Service Manual

Model : KP320

Internal Use Only

Service Manual

KP320

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AMENDMENT RECORD

AMENDMENT RECORD SHEET

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SECTION 1

Introduction

1. Introduction

The variation of “KP320” is shown below.
This Service Manual is indicated for 7610.

Variation Note.

	Product Code	Trade Name
7610	XXXXXXXX	KP320

This is the Electronic Service Manual for KP320 Triple Band GSM Digital Cellular Telephone from LG. It contains specific information on repair and test procedures.
For details of user functions, general operation and installation, please refer to the User Guide.

The Service Manual is set out in the following sections.

1. Precautions for Repair Work : provides general guidelines for undertaking safe and efficient repair work.

2. Unit Specification: provides the technical specifications for KG195 Triple Band GSM Digital Cellular Telephone.

3. Introduction of Service Level :
   a) Service Level 1:describes definition of Service Level 1, equipment and tools required for this level.

   b) Service Level 2 :describes definition, equipment and tools required for Service Level 2.

4. Circuit Description: provides functional details of the circuits, block diagrams and component purpose descriptions.

5. Servicing : defines the jigs, fixtures and test configurations required for servicing the product; and describes the processes of assembly and disassembly.

6. Troubleshooting : provides an aid to fault finding the product. Includes, using the signal levels and plots at various parts of the circuit.

7. Device Information : provides functional information and pin-outs of most of the semiconductor devices within the HHP.

8. Glossary : terms used in this GSM and this manual.

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SECTION 2

Precautions for Repair Work

PRECAUTION

Important

Please read the following cautions, notes and warnings before progressing through this manual or undertaking any repair action.
Remember: SAFETY FIRST!

CAUTION:

AC Power Cord:

Care must be taken not to damage the AC power cord as fire or electric shock may result.

Battery Pack:

Only use the specified batteries and chargers with this equipment.
Do not short the battery terminals together.
Keep the battery pack away from fire and sources of ignition.
Remember to recharge the battery pack after each use.

Before Powering up the Equipment:

- Only switch on the telephone's power once the test or installation set-up is complete.
- Switching on at the wrong time may result in electric shock or damage to system components.
- Always ensure that the power is switched off before making connections / disconnection's.
- It is important to check that the correct DC voltage is applied to the equipment to prevent electrical damage.

Component Polarity:

Always check the polarity of connections and components before soldering. Particular attention must be paid to IC.s, diodes, transistors, capacitors and any other semiconductor device that is polarity dependent.

Electrostatic Damage (ESD):

Semiconductor devices are easily damaged by electrostatic discharge. Many of the procedures detailed in this manual involve disassembly of the equipment and therefore handling of the printed circuit boards.
To protect these devices from ESD a wrist strap connected to ground must be worn. In addition to this the work surface must be covered with an anti-electrostatic mat, which should also be grounded.
If printed circuit boards are to be stored without being re-assembled into their equipment, then they must be kept in an anti-electrostatic bag.

Grounding:

Each piece of test equipment should be electrically grounded. A third (grounding) pin is provided as a safety feature. Ensure that the electrical outlet also contains this feature.

Cosmetic Protection during Repair Work:

Always ensure that the working surface is kept clean and free from abrasive materials.
The LCD is very susceptible to scratches and damage. It should be covered with clear adhesive vinyl while the equipment is disassembled.

Storage of Faulty Components:

Any components that are replaced due to failure should be kept safely in an anti-electrostatic container. NEC's Quality or Research & Development Departments may require them to make quality and reliability investigations.

No Fault Found Equipment:

In some cases the reported symptom may not be apparent. You may subject the equipment to a controlled amount of stress, vibration and temperature variation to see if the fault occurs.
Care should be taken not to apply excessive stress or vibration or extreme temperature variations as further faults may develop.

Soldering and Disordering :

The solder used is only Pb-free.
Fast, accurate and high quality soldering is required to minimize the risk of heat damage to the electronic components.
It is necessary to adjust the temperature of soldering tip to 330 degrees or less.
The soldering tip should not be in contact with components or PCB tracks for longer than 4 seconds (average). This time depends on temperature conditions of parts.
Heat the pad on the PCB and the lead, quickly apply solder, remove heat and cool.
After soldering is complete, ensure that all solder joints are of good quality - no dry joints, solder bridges, cracks or excess solder.
The majority of chip components are machine mounted using solder paste.
Removal of the solder is not sufficient for chip component removal. Each solder point must be heated simultaneously and quickly (to prevent component and PCB damage). When the solder has melted, remove the component with tweezers.

Short Circuits:

Care must be taken to avoid short circuits. Soldering, solder dust, screws, metal clippings, metal wrist watches etc. can cause short circuits on PCBs which may result in component damage.

Test Equipment Calibration:

Your test equipment should be calibrated before use. Frequent calibration is essential to ensure high quality and reliable repairs.

Cleaning:

Before cleaning ensure that the telephone is switched off and disconnected from the power source. Cleaning should be done using a soft dry cloth. If the equipment is heavily soiled a soft cloth soaked in a mild synthetic detergent diluted in water may be used.
Never use benzene or any other chemicals to clean the equipment.

RF Shielding:

It is advisable to carry out detailed measurements and repair (in particular RX) in a shielded area to minimize RF interference.

AC Adapter and Battery Charger:

The AC adapter and battery chargers are for indoor use only. Ensure that the devices are not exposed to rain or moisture

Electrical Safety:

Electrical equipment is hazardous if misused. Any repairs must be carried out with care and only by authorized personnel.
Ensure all power sources are switched off and power cords removed before undertaking any repairs.

Hazardous Waste:

The battery pack, if incorrectly disposed of, is an environmental hazard. It must be disposed of in accordance with the regulations of the country concerned.
Never dispose of the battery pack in fire or water.

Confidentiality:

The circuitry within this equipment contains several components that are regarded as company confidential. Only use NEC specified parts as replacements.

RF Injury:

To avoid RF injury, direct exposure to radio frequency energy should be avoided. In particular, exposed parts of your body (especially the eyes and face) should not come into contact with the antenna while the equipment is transmitting.

Storage Conditions:

It is recommended that the following storage conditions should be avoided to prevent damage to the equipment: -

Dusty.
Humid.
Near to magnetic equipment
In direct sunlight

Ventilation:

Repair areas should be well ventilated and fume extraction systems should be installed where necessary. Potential hazardous substances are solder fumes, flux, alcohol etc.

PCB Handling:

It is recommend that cotton gloves are worn during repair work. This is to protect your hands from chemical contamination and to protect the PCBs from fingerprints and humidity

.

SIM Card:

- Do not bend.
- Clean by using a soft dry cloth.

AUDIO Parts:

- Be careful for alien substance/oils and fats, etc. not to adhere to the terminal contact part of MIC, the receiver, the speaker.
- Be careful to handle AUDIO parts with electrostatics measures at the worker/in the working place.
- Be careful not to spend a stress on the MIC side part to the utmost.
- Be careful not to pressurize the coil joint (protection Bond part) of the receiver and speaker because they are easy of broken.
- Be careful for alien substance to approach to sound hole part of the speaker.
- Be careful sufficiently so as not to blow air with the process into the receiver, speaker/MIC sound hole. It causes sounds being small by the diaphragm transformation or vibration.

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SECTION 3

Unit Specifications

3. UNIT SPECIFICATION

PRODUCT FEATURES AND SPECIFICATION

Solution	MT6229	Media Tek
Type	Bar type	
Antenna Type	Internal (tri-Band with Bluetooth)	
Main Display	2.0" QVGA (240x320)	
GPRS	Class 10	
MMS	Yes, 1.1	
Camera	3M	
Battery	900mAh Li-ion inner pack	
Audio player	Yes (support MP3, WMA and AAC playback)	
FM Receiver	Yes, US/Europe band (87.5~108MHz)	
MPEG4/H.263	Yes (support 3GP)	
H.264	No (no support)	
AAC+	Yes	
FM as alarm	Yes	
Scheduled FM recording	Yes	
MP4 for incoming call/ power on off animation and screen saver	Yes	
Loud Speaker	Yes	
Audio player--real resuming	Yes, for MP3 and WMA	
Video recording	Yes	
Memory Size	1Gb NAND + 256Mb SDRAM	
Internal NAND	1Gb	User memory 100MB (TBC)
Memory Card	Micro SD	Up to 4GB
Bluetooth	Yes, version 1.2	
USB	Yes, slave 1.1	
IrMC	No	
WAP	Yes, 2.0	
Java	Yes	
PoC	No	
EMAIL	No	
Status LED	Yes	
DRM	No	
Dictionary	No	
MPEG4 caller ID	Yes	
Finger handwriting	No	

Touch Panel	No	
Caption	No	
OTA	Yes	
語言學習機(AB repeat)	No	
Music Equalizer	Yes	
Image Editing	No	
In flight mode	Yes	

General Requirement

Category	Requirement Description	Parameter	Support
Frequency	Shall support multiple radio bands/power		
	- 850 MHz/class 4 (2W)		N
	- 900 MHz/class 4 (2W)		Y
	- 1800 MHz/class 1 (1W)		Y
	- 1900 MHz/class 1 (1W)		Y
Antenna	Shall support [Internal/External] antenna	Internal	Y
GPRS	Shall support GPRS bearer		
	- release [R#]	R99 (Except EDGE)	Y
	- multi-slot class [class #]	10	Y
	- Service class [Class #]	Class B	Y
	- Coding scheme [CSn]	CS1, CS2, CS3, CS4	Y
Data Service	Shall support following data transaction mode and services.		
	- Fax		N
	- Data		N
	- WAP [rel #]	2.0	Y
	- SMS		Y
	- EMS [rel #]	Code 5.0	Y
	- MMS [rel #]	1.1	Y
Java	Support JAVA MIDP [ver #]	2.0	Y
	Support JAVA CLDC [ver #]	1.1	Y
Voice codec Audio decoder	Shall support multiple voice codec		Y
	- FR		Y
	- EFR		Y
	- HR		Y
	- AMR NB (air link (Channel Coding))		Y
	- AMR WB (Sound Recording)		Y
	Shall support multiple audio decoders		
	- MP3		Y
	- WMA		Y
	- AAC		Y
	- AAC+		Y

Category	Requirement Description	Parameter	Support
Physical	The physical dimension is [Length x Width x Thickness mm]	107.3x46.6x13.9 (mm)	Y
	The overall volume is [# cc]	69.5 cc	Y
	The weight is [# g]	81.5 g	Y
Display	Shall support main display with following characteristics:		Y
	- Size	2.0”	Y
	- Type	TFT, Transmissive	Y
	- Color depth	262K	Y
	- Pixel resolution [width x height]	240x320	Y
	- Active area [W x H mm]	30.6mm(W) x 40.8mm (H)	Y
Camera	Shall support high resolution camera with following characteristics:		Y
	- Active pixel array up to resolution [X x Y pixels]	2048 x 1536	Y
	- Sensor type [CMOS or CCD]	CMOS	Y
FM radio	Shall support FM radio bands		
	- US/Europe band	87.5~108MHz	Y
	- Japan band	76~90MHz	N
Battery	Shall support Li-Ion battery with minimum capacity of [mAh].	900mAh	Y
Connectivity	Shall support following device to connect external devices.		
	- USB [ver, host or slave or OTG]	1.1 slave	Y
	- Bluetooth [ver, power class]	1.2, class 2	Y
	- Bluetooth profiles	GAP SDAP DUN SPP HSP HFP OPP FTP A2DP, AVRCP	Y
Storage	Shall support mass data storage for different multimedia content.		Y
	- Build-in NAND [MB]. Used as mobile disk. (Notes: Designed footprint shall be possible to support multiple memory capacity)		Y
	- Micro SD		Y
Indication	Shall support LED for status indication.		N
	Shall support LED for charger (TA or USB) plug-in status indication.	By display	N

Category	Requirement Description	Parameter	Support
Vibrator	Shall support in built vibration alert		Y
SIM Card	Shall support SIM card both 1.8V and 3V.		Y
Keypad	Shall support - 12 alphanumeric/number keys (0-9,#,*) - 4 function keys (on hook, off hook, left softkey, right softkey) - 5 way navigation keys (up, down, ok, left, right) - 3 side keys (side up, side down and camera key)		Y
	Shall support illumination color [color] for keypad backlight.	2 LED (Blue) with light guide film	Y
	Shall design in a nub on or around key number 5.		Y
Camera	Shall support AWB (Automatic White Balance)		Y
	Shall support automatic flicker reduction		N
	Shall support gamma correction		Y
TV-OUT	Shall support TV-OUT function		Y

Performance Requirement

Category	Requirement Description	Parameter	Support
Standby Time	Shall support minimum test hours as [hrs] based on battery capacity of [mAh] (Reference measurement conditions refer to TW-09)	↑ 240 hrs & ↓ 3.4mA @ 900mAh (P.P.: 5) Standby time = Capacity/ Standby current	Y
Talk Time	Shall support minimum test minutes as [min] based on battery capacity of [mAh] (Reference measurement conditions refer to TW-09)	↑3 hrs@900mAh (PCL: 5) Talk time = 95% Capacity / Talk current)	Y
MP3 play time	Shall support MP3 play at least for [# hrs] assume stereo headset is attached	15 hrs @900mAh	Y
Video play time	Shall support Video play at least for [# hrs] assume stereo headset is attached	4hrs	Y
Bluetooth Standby Time	Shall support minimum test hours as [hrs] based on battery capacity of [mAh]	150hrs@ Paging period: 5	Y
FM Radio Current consumption	Shall support minimum current [mA]	↓40mA @Paging period: 2	Y
RTC	The real time clock shall be able to sustain for at least [#hrs] after removing the battery.	10hrs (25 degree C)	Y
RF	The RF performance shall comply with 3GPP TS45.005. The internal/special RF performance requirement are defined as below.		Y
	Shall exceed the sensitivity performance [dBm] in GSM band under conditions of static channel, extreme conditions without fading.	-105dBm	Y
	Shall exceed the sensitivity performance [dBm] in DCS band under conditions of static channel, extreme conditions without fading.	-105dBm	Y
Antenna	Shall exceed the sensitivity performance [dBm] in PCS band under conditions of static channel, extreme conditions without fading.	-105dBm	Y
	Antenna performance test shall be done according to [#] standard	CTIA	Y
	The GSM TRP (Total Radiated Power), when transmitting at the maximum power, shall be no less than [dBm] (low, middle, high channel)	Free space: ↑28dBm Body: ↑21dBm	Y
	The DCS TRP (Total Radiated Power), when transmitting at the maximum power, shall be no less than [dBm] (low, middle, high channel)	Free space: ↑25dBm Body: ↑19dBm	Y

Category	Requirement Description	Parameter	Support
	The PCS TRP (Total Radiated Power), when transmitting at the maximum power, shall be no less than [dBm] (low, middle, high channel)	Free space: ↑25dBm (24dBm: in case of minor band) Body: ↑19dBm (18dBm: in case of minor band)	Y
	The flatness of TRP of the same band shall be within	2dB.(low, middle, high channel)	Y
	The TIS of GSM band shall be better [dBm]	Free Space: ↓-103dBm Body: ↓-97dBm	Y
	The TIS of DCS band shall be better [dBm]	Free Space: ↓ -103dBm Body: ↓-97dBm	Y
	The TIS of PCS shall be better [dBm]	Free Space: ↓-103dBm (-102dBm: in case of minor band) Body: ↓-97dBm (-96dBm: in case of minor band)	Y
	The flatness of TIS of the same band shall be within	2dB.(low, middle, high channel)	Y
	The SAR value shall NOT exceed [W/kg] with 10g averaging	1.3	Y
Camera	Camera module shall support following top-level specification.		Y
	- Sensitivity	490mV/Lux·sec	Y
	- Dynamic Range	60.0dB	Y
	- FOV	60.8o (diagonal)	Y
	- Focus	10cm -∞ Auto Focus	Y
	Shall support preview up to [resolution @fps] on main display. Note: The actual visual quality might be up to the response time of LCD.	240X320@ 30fps	Y
Video	The time spacing between two consecutive burst capture shall be less than [# sec]	2 sec @ 320x240 image size stored to Micro SD card	Y
	Shall support recording with the maximum frame rate (fps) in specific video resolution, [resolution @ # fps]	CIF @ 15fps	Y
Display	Shall support playback with the maximum frame rate (fps) in specific video resolution	CIF @ 30fps	Y
	Main display shall sustain the following specification.		Y
	- Typical central Luminance [# cd/m2]	200 cd/m2 @handset level	Y
	- No conspicuous cross talk observed on test pattern.		Y

<table>
<tr><td>Category</td><td>Requirement Description</td><td>Parameter</td><td>Support</td></tr>
<tr><td></td><td>- The chromaticity of main display should be better than
<table>
<tr><td></td><td>x</td><td>y</td></tr>
<tr><td>R</td><td>0.633</td><td>0.350</td></tr>
<tr><td>G</td><td>0.326</td><td>0.599</td></tr>
<tr><td>B</td><td>0.147</td><td>0.069</td></tr>
<tr><td>W</td><td>0.306</td><td>0.319</td></tr>
</table>
Tolerance:+-0.05</td><td>Component spec</td><td>Y</td></tr>
<tr><td></td><td>- The contrast ratio of main display should be better than [#] at normal temperature</td><td>300 @ Handset level</td><td>Y</td></tr>
<tr><td>Acoustic</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Uplink audio shall be Compliant with 3GPP TS43.050 V4.00 (Referring to TS26.131 & 132)</td><td></td><td>Y</td></tr>
<tr><td></td><td>Downlink audio shall be Compliant with 3GPP TS43.050 V4.00 (Referring to 26.131 & 132)</td><td></td><td>Y</td></tr>
<tr><td></td><td>The TDD noise in downlink direction shall be better than [# dB] (Max power)</td><td>-62dBm</td><td>Y</td></tr>
<tr><td></td><td>The TDD noise in uplink direction shall be better than [# dB] (Max power)</td><td>-62dBm</td><td>Y</td></tr>
<tr><td>Ringer Volume</td><td>At least 58 dBspl under below conditions:
1. Ringer set as ringer.
2. Test distance set as 1 m</td><td>Under 58dB : 0 %
≥ 58 dB : 100% ↑
≥ 63dB : 60% ↑</td><td>Y</td></tr>
<tr><td>Charge Current</td><td>Fast Charge (TA):
Fast Charge (USB):
Pre-Charge:
Total Charging Time:</td><td>650 ±65 mA
450 ±45 mA
50 ±15 mA
≤ 3 hours</td><td>Y</td></tr>
<tr><td rowspan="8">Antenna Display</td><td>Antenna Bar indicator</td><td>Rx power</td><td rowspan="8">Y</td></tr>
<tr><td>7</td><td>-91dBm ~</td></tr>
<tr><td>5</td><td>-95dBm ~ -91dBm</td></tr>
<tr><td>4</td><td>-99dBm ~ -95dBm</td></tr>
<tr><td>2</td><td>-103dBm ~ -99dBm</td></tr>
<tr><td>1</td><td>-105dBm ~ -103dBm</td></tr>
<tr><td>0</td><td>~ -105dBm</td></tr>
<tr><td>Off</td><td>No Service</td></tr>
<tr><td rowspan="10">Battery Indicator</td><td colspan="2">Battery Indicator</td><td>Voltage</td><td rowspan="10">Y</td></tr>
<tr><td colspan="2">Full Charge</td><td>4.20 ± 0.05V</td></tr>
<tr><td rowspan="4">Discharge</td><td>3 ➔ 2</td><td>3.72 ± 0.05V</td></tr>
<tr><td>2 ➔ 1</td><td>3.62 ± 0.05 V</td></tr>
<tr><td>1 ➔ 0 (Blinking)</td><td>3.54 ± 0.05 V</td></tr>
<tr><td>0 ➔ 0ff</td><td>3.35 ± 0.05 V</td></tr>
<tr><td rowspan="4">Charge</td><td>0 (1st Bar Blinking)</td><td>Under 3.62 ± 0.05 V</td></tr>
<tr><td>0 ➔ 1 (2nd Bar Blinking)</td><td>3.62 ± 0.05 V</td></tr>
<tr><td>1 ➔ 2 (3rd Bar Blinking)</td><td>3.72 ± 0.05 V</td></tr>
<tr><td>2 ➔ 3 (4th Bar Blinking)</td><td>4.20 ± 0.05 V</td></tr>
<tr><td>Low voltage Warning</td><td colspan="2">Warning tone duration</td><td>Warning tone once per two minutes</td><td>Y</td></tr>
</table>

Category	Requirement Description	Parameter	Support
	Voltage	3.54V± 0.05V during call 3.50V± 0.05V during stand by	
Forced shut down voltage		3.35V ± 0.03V	Y
USB	The average USB connection throughput between ME and USB should be better than [# kB/s]	RD: 600kB/s WR: 200kB/s	Y

Software Function

4-1 System Specification

Item	Target Specification
Form Factor	Bar Type
Size	107.3x46.6x13.9 (mm)
Weight	81.5 g
Battery	3.7V, 900mAh Li-Ion
Talk Time	3 hrs @900mAh @GSM900 PCL 5
Standby Time	240 hrs @900mAh @ Paging period 5
Antenna	Embedded type
LCD	262Kcolor, 240x320 TFT
FM Radio	Yes, FM band only
Camera	3M Pixel Auto Focus
Back Light	White LED
Keypad Backlight Color	Blue LED
Vibrator	Yes
Loud Speaker	Yes
Microphone	Yes
Earphone Jack	Yes (MMI)
SIM Socket	Yes, 1.8/3.0V
Volume Key	Side key
Basic Accessory	Travel Adaptor
	Standard Battery (900mAh, Li-Ion)
	Stereo Headset with button
	USB Data Cable
	TV Out cable (Option)

4-2 General Features

Function	Target Specification
Basic Display	RSSI (7 Levels <<Off, 0~2, 4~5, 7>>)
	Battery Indicator (4 Levels, 0~3 for charging; 5 Levels, 0~4 for discharging)
	Icons Indicator
	Others reference to "Phone Personalization Setting"
Speech Codec	FR/EFR/HR/AMR
Keypad	Number of Keys: 24 Key (include 12 alphanumeric/number keys (0-9,#,*), 4 function keys, 5 way navigation keys, 3 side keys)
	Soft Function Keys: 2
	International Access (+)(long 0)
User Profile (Audio Settings)	User Selectable and Customizable Profiles (7 profiles: General, Meeting, Outdoor, Vibrate only, Headset, Silent, Bluetooth)
	Auto-detect and activated profiles (1 profile: Headset)
	Key Tone
	Key Tone Volume (7 Level - 0 ~ 6, 0 for Mute)

	Key tone setting (4 sets: Silent, Click, Keyboard Tone, Melody Tone, English/Russia Human voice)
	Ring Tone
	Ring Tone Volume (7 Level - 0 ~ 6, 0 for Mute)
	Built-in Ring Tone Pattern: 20
	Customizable Ring Tone Link: 5
	Intelligent Call Alert
	Digits To Sound Synthesizing
	Alert Type
	5 Types - Ring, Vibration Only, Vibration and Ring, Ring after vibration, Light Only, Beep Once
	Power On Tone
	Built-in Ring Tone Pattern: 5 (include Silent)
	Power Off Tone
	Built-in Ring Tone Pattern: 5 (include Silent)
	Message Tone
	Built-in Ring Tone Pattern: 8 (include Silent)
	Warning Tone
	Built-in Ring Tone Pattern: 1 (Only On/Off operation)
	Error Tone
	Built-in Ring Tone Pattern: 1 (Only On/Off operation)
	Camp On Tone
	Built-in Ring Tone Pattern: 1 (Only On/Off operation)
	Connect Tone
	Built-in Ring Tone Pattern: 1 (Only On/Off operation)
	Answer Mode
	Any Key Answer
	Auto (Only available for headset mode while headset plugged in)
Personal Information Management	Calendar - Month view only
	To do list - 6 fields (Date, Start time, End time, Note, Alarm, Repeat)
Tools and Utilities	Alarm
	5 sets of Alarm
	4 major fields for each set - On/Off, Time, Repeat type, Audio options
	World Clock
	Cities list: China(52),IND(54),CIS(68) cities
	Daylight saving time support: activated by user selection
	Home city set
	Calculator
	Addition, Subtraction, Multiplication, Division
	Unit Converter
	Weight, Length
	Currency Converter
	Health
	BMI, Menstrual
Phone Personalization	Greeting Text

Setting	Home Shortcut
	Call Information Display
	Flight Mode
	Time and Date Setting
	Wallpaper
	Screen Saver
	Power On Animation
	Power Off Animation
	LCD Backlight
	PLMN/Service Indicator (Display of PLMN Name/Service Provider Name from SIM)
	Date Time Display
	Own Number Display
	Restore Factory Default Setting
	Main Menu Style Setting
	Themes Setting
Security	Phone Lock, SIM Lock, Auto Keypad Lock, Fixed Dial, Barred Dial
Input Method	Engine
	T9
	Support Language
	Depends on customer and market requirement. Total supported languages will be limited to memory condition.
	Predictive word input
Game	2 embedded games: Cricket and Sudoku 2 embedded Java Games: Mini Game World, Chequered Flag
	Settings: BGM, Sound Effect, Vibration
File Management	Hidden root directories except five folders as fellows: Audio, Images, Other, Received, Video
	Limit the actions on root directories. No create/rename/delete options on root directories.
	Total Memory: 90MB

4-3 GSM / GPRS Features

Function	Target Specification
GPRS	GPRS Multi slot Class 10
Data Service	BS 24 - 26 (2400-9600 bit/s), asynchronous, non-transparent, UDI. CSD rate up to 9.6K bit/s
Call History	Last Dialed Number: 40
	Last Received Number: 40
	Last Missed Number: 40
	Scratch Pad Memory (Save an input number in call): 1
Call Cost	Last Call Time
	Total Dialed Call Time
	Total Received Call Time
	Last Call Cost
	Total Cost
	Reset Cost
	Max Cost
	Price Per Unit
GPRS Counter	Last Sent (unit in Byte)
	Last Received (unit in Byte)
	All Sent (unit in Byte)
	All Received (unit in Byte)
Call Management	Call Swap
	Call Retrieve
	Automatic Redial
	Speed Dialing
	Last Number Redial
Call Related Supplementary Services	Call Hold
	Call Waiting
	Calling Line Identity Presentation
	Calling Line Identity Restriction
	Connected Identification Restriction
	Call Divert All voice Calls
	Call Divert if unreachable
	Call Divert if no answer
	Call Divert if busy
	Call Divert all data calls
	Cancel all divert
	Call Barring All Outgoing Calls
	Call Barring All Outgoing International Calls Call Barring All outgoing International except home
	Call Barring All incoming Calls
	Call Barring All incoming Calls when roaming
	Multi-party Call (up to 7 calls, 5 in conference, 1 on held, 1 waiting)

	Line switching (Line1, Line2) Call reminder (Off, Single, Periodic) Closed User Group
Phone Book	Quick Search (Notice: Quick search function only works in Phonebook, SMS and MMS. In other application, this phone supports regular search.)
	Alphabetical Store and Recall
	Access Phone Book in call
	Copy & Move
	Fixed Dial Number
	Service Dial Number
	Speed Dial Number
	SOS Number
	Entry: 1000 names (12 fields – Name, Mobile, Home, Company name, Email address, Office number, Fax number, Birthday, Associate Picture, Associate Video, Associate Sound, Caller group)
	Caller Group-5 caller group- Friends, Family, VIP, Business, Others (5 fields – Name, Ring, Picture, LED pattern, Video, Member list)
	Own Numbers: User can change the own numbers of handset. (Sets of own numbers depends on SIM)
	vCard: (Edit, Send and Receive. 7 fields – Name, Mobile, Home, Company Name, Email Address, Office Number, Fax Number)
	Note: This phone doesn't support phone number search.
Message	SMS
	Standard SMS
	SMS Reply Path
	SMS Delivery Report Valid period (1 hour/12 hours/1 day/1 week/Maximum) Message Type (Text, Fax, Page, Email) Message Indication Type refer to GSM 03.40
	Basic text-only SMS as described in 3GPP TS 23.040 R5
	Notice: This phone doesn't support video ring tone via SMS
	SMS Character Sets Support
	GSM7
	UCS-2
	EMS
	EMS Standard as described in 3GPP TS 23.040 R5 excluding WVG
	EMS Text Format
	Text Style: Normal, Bold, Italic, Underlined, Strikethrough
	Text Alignment: Left, Right, Center
	Text Size: Normal, Large, Small
	EMS Image Support
	1-bit small image 16x16 pixels black and white
	1-bit large image 32x32 pixels black and white
	1-bit variable image in single SMS packet
	Extended black and white 1-bit image up to 255x255 pixels
	Extended 6-bit image up to 255x255

	Pre-defined animation
	User-defined small animation 8x8 pixel 4-frame black and white
	User-defined large animation 16x16 pixel 4-frame black and white
	Pre-defined sound
	User-defined i-Melody up to 128 bytes
	LZSS compression algorithm
	Re-use extended object
	Object Distribution
	User Prompt Indicator
	Hyperlink format element
	Extended Object Distribution
	Notice: This mobile doesn't support Nokia smart message format (including WBMP), only support *.ems format" → subject to Nokia smart message license
	EMS Character Sets Support
	GSM7
	UCS-2
	EMS Miscellaneous
	SMS Concatenation (8 Segments for MT/MO)
	SMS Compression
	MMS
	MMS Standard as described in 3GPP TS 23.140 V4.8.0
	Extract media from Message
	Insert Media into message
	OTA provisioning partially support (Network Profile setting
	Auto download mode
	Manual download mode
	Operator can pre-configure the delivery mode
	MMS notification with icon or Pop-up message display)
	MMS Message Format
	MMS SMIL (A subset of SMIL descried in the MMS Conformance Document 1.2)
	MMS Character Sets Support
	US-ASCII
	Unicode
	ISO-8859-1
	UTF-16
	UTF-8
	MMS Images Support
	WBMP Wireless bitmap
	GIF87
	GIF89a
	JPEG
	MMS Sound Formats Support
	WAV
	AMR

	MIDI
	MP3
	i-Melody
	MMS Miscellaneous
	Multipart binary MIME
	Storage
	Separated Inbox folder for SMS and MMS
	Separated Outbox folder for SMS and MMS
	Total 300 SMS in the storage of phone plus SIM including Inbox and Outbox (Phone could supports 260sets SMS including Inbox and Outbox. The maximum SMS s8tored in SIM are 40sets. It means the actual SMS quantities in Inbox and Outbox are among 260 to 300.)
	Total 100 MMS in the phone storage including Inbox, draft and Outbox Notice: Total MMS count need depends on user memory space.
	Common Operation
	Write Message
	Read Message
	Edit Message (For MMS, Edit only conformance messages, unknown media not supported, unknown SMIL not supported)
	Reply Message
	Send Message
	Delete Message
	Forward Message
	Use Sender's Number
	Message Templates
	Extract media from Message (MMS/EMS)
	Store Media (MMS/EMS)
	Delete Media (MMS/EMS)
Cell Broadcast	Read Cell Broadcast
	Cell Broadcast Mode: Receive On/Off
	Cell Broadcast Message Language
	Channel Setting
Network	Automatic Network Selection
	Manual Network Selection
	Network Service Status
	Preferred Network (User definition)
	GPRS connection mode selection: Always, When Needed
SIM	Common Operation
	SIM Application Toolkit (Release 98 Class 2 certified)
	Security
	PIN
	Personalization (Service provider lock, Network lock)
	DTMF Signaling
DTMF	DTMF Enable & Disable

4-4 Multimedia Features

Function	Target Specification
Camera	Image size: 240X320, 320X240, 640X480, 1280X960, 1600X1200, 2048X1536
	Continuous Shot: 9 shot, 5 shot, 3 shot, OFF
	Zoom: 1x ~ 4x
	Image Quality: High, Normal, Low
	White Balance: Auto, Daylight, Tungsten, Fluorescent, Cloud, Incandescence
	Shot: Three Shot Sounds
	EV: -4 ~+4
	Scene Mode: Auto, Night
	Banding: 60Hz/50Hz
	Effect settings: (Total 14 types) Normal, Grayscale, Sepia, Sepia Green, Sepia Blue, Color Invert, Gray Invert, Blackboard, Whiteboard, Copper Carving, Blue Carving, Embossment, Contrast, Sketch
	No. of the Stick Frames: 3 Frame 1, Frame 2, None Stick Frame Only can be used while image size is 240WX320H
	Storage Selection: Phone, Memory card (Only available when external memory card supported)
	Delay timer: Off/ 5/ 10/ 15 Sec
	Light: Off/Auto/Always on/When taking
Image Viewer	Thumbnail supported
	Browse Style: List, Matrix
	View
	Forward: To Wallpaper, Phonebook, Screen Saver, Power On Display, Power Off Display, MMS, Bluetooth
	Rename
	Delete
	Delete All
	Sort: By Name, Type, Time, Size, None
	Storage Selection: Get list from Phone, Memory card (Only available when external memory card supported)
	Image Format Support
	JPEG Baseline
	GIF87a
	GIF89a
	WBMP
	BMP
Music Player	Play

	Pause
	Resume
	Stop
	Next
	Previous
	Storage Selection: Get list from Phone, Memory card (Only available when external memory card supported)
	Auto-Generate Playlist
	Skin: 2 skins
	Spectrum display style: 2 styles
	Repeat Mode: Off, One Song, All Songs
	Shuffle Play
	Background Play
	Equalizer Setting: 8 sets Normal, Bass, Dance, Classical, Treble, Party, Pop, Rock
	Volume Control: 7 levels (0 ~ 6, 0 for Mute)
	Playlist Edit: Add, Remosztve, Remove All
	Sound Format Support
	MP3
	AMR
	MIDI
	WAV
	AAC
Video Player	Play
	Pause
	Stop
	Speed Control: X1, X2, X4, X8, X1/2
	Forward: To Phonebook, Screen Saver, Power On Animation, Power Off Animation, MMS, Bluetooth
	Rename
	Delete
	Delete All
	Sort: By Name, Type, Time, Size, None
	Storage Selection: Get list from Phone, Memory card
	Volume Control: 7 levels (0 ~ 6, 0 for Mute)
Video Recorder	White Balance: Auto, Daylight, Tungsten, Fluorescent, Cloud, Incandescence
	EV: -4 ~+4
	Night Mode: On/Off
	Banding: 60Hz/50Hz
	Video Quality: Fine, High, Normal, Low
	File Size Limit: No Limit, 95KB, 195KB, 295KB,
	Record Time Limit: No Limit, 15 sec, 30 sec, 60 sec
	Record Audio: On/Off

	Encode Format: MPEG4, H.263
	Effect settings: (Total 14 types) Normal, Grayscale, Sepia, Sepia Green, Sepia Blue, Color Invert, Gray Invert, Blackboard, Whiteboard, Copper Carving, Blue Carving, Embossment, Contrast, Sketch
	Storage Selection: Phone, Memory card (Only available when external memory card supported)
	Record
	Pause
	Resume Recording
	Stop
Sound Recorder	Storage Selection: Phone, Memory card (Only available when external memory card supported)
	Encode Format: WAV, AMR,AWB
	Audio Quality: Low, High
	Record
	Pause
	Resume Recording
	Stop
Melody Compose	Edit
	Play
	Save
	Instrument Selection: 10 types Piano, Guitar, Violin, Saxophone, Steel Drums, Flute, Harmonica, Trumpet, Music Box, Xylophone
	Play Speed: Fast, Normal, Slow
	[Notice] Melody composer only support one instrument in one imelody file, so the last chosen instrument will be used to play this imelody file
FM Radio	Frequencies: 87.5 ~ 108.0 Skin: 2 skins
	User definable Preset Channel List
	Channel Auto Search
	Background Play
	Record
	Record Format: AMR, WAV, AWB
	Record Storage: Phone, Memory Card (Only available when external memory card supported)
	Preset Channel List generated by auto search
JAVA	MIDP 2.0
	CLDC 1.1
	Memory Limit – Heap size 1.5MB Support JSR 139,118,120,135,185, 75

4-5 Connectivity Features

Function	Target Specification
WAP	WAP 2.0 Spec.
	WAP Push OTA/Message
	WAP Provisioning Service
	CSD/GPRS data connection
	Bookmark
	Wireless Telephony Application (WTA) support: Only Public WTA support, supported functions listing below - * Make a telephone call * Send a string of DTMF tones over an established voice connection * Add an entry to the telephone book of the device
	Support OTA push and push message
	OTA Provisioning & OTA download
	Supports WML, WCSS, XHTML mp
Bluetooth	Version 1.2
	Profile: GAP; SDAP; DUN; SPP; OPP; HSP; HFP; FTP; A2DP; AVRCP
USB	Mass Storage Device
	Virtual COM
	TV-OUT

4-6 GSM/GPRS Features

Function	Target Specification	Status
		Code base 07A (KP320)
Browser	WAP	WAP2
	wap version 2.0 / WML version : 1. 3	WAP2
	WAP 2.0+MMS+Push /	Yes
	-WML version : 1.3 xhtml version : 1.0	WML 1.3 / XHTML 1.1
	Character sets supported in WAP browser (UTF-8 (Default), UTF-16, USASCII, Latin1, UCS2, ISO-8859-1, UTF-8, UTF-16, ISO-10646-UCS-2, USASCII)	utf-8, iso-8859-1, us-ascii, iso-10646-ucs-2
	Contents Decoder	Base64, Quote-Printable
	WBMP Wireless bitmap, GIF87, GIF89a, PNG, JPEG, JPG, BMP, AMR, MIDI, MID, IMELODY, MP3, 3GP, AAC	JPG,JPEG,GIF,WBMP,BMP,PNG MP3,MIDI,MID,AMR,MMF,WAV,MPEG,MPG,AAC 3GP,MPEG4,MP4,3GPP

4-7 WAP

Function	Description	Value	Comments
		Code base 07A	
General	Type of Browser (Browser Name)	Obigo	
	Version of the Browser	Q03C	
	The usable size of the device's screen in units of pixels (px*px)	240X320	
	Size of the device's screen in units of characters. (Number of characters per row)x(Number of rows). In calculating this attribute use the largest character in the device's default font.	Variable font width.	
	Size of the device's screen in units of characters. (Number of characters per row)x(Number of rows). In calculating this attribute use the smallest character in the device's default font.	Variable font width.	
	Browser version interrogation capability via keypad	No	
	Factory configuration option available	No	
Bearer	Bearer Selection available to end user via multiple profiles or via bearer options in each profile (circuit or Packet if both available):	Yes	multiple profile selection with bearer in CSD or GPRS
	Bearer Dependent Display Indication supported (ie End user must be able to differentiate between WAP over a circuit connection from WAP over a Packet connection due to likely charging implications)	Yes	For CSD, there’ s a dialing up progress screen. End-user could sense currently using CSD.
	GPRS	Yes	
	CSD	Yes	
	Automatic bearer selection	No	
Language	Version of WML supported by the browser	1.3	
	WML script support	Yes	
	Version of XHTML supported by the browser	1.1	
	Version of HTML supported by the browser	1.1	
	Maximum WML Deck Size supported (WML Binaire)	30KB	But it depends on assigned total memory pool. And by content diversity, the value is dynamic.
TAG/ Browing	Is the attribute hspace for images ignored by the device?	No	
	Is it possible to select/download images with the device?	Yes	

Function	Description	Value	Comments
		Code base 07A	
	Tables supported? Yes/No	Yes	
	Is it possible to mask table's border? Yes/No	No	
	Is there automatically a break line after a link? Yes/No	No	
	Labels for links supported in the Soft key? Yes/No	No	
	Possibility to use Select List for links? Yes/No	No	
	Card title supported? Yes/No	Yes	
	Is the Back function existing by default for the handset? Yes/No	Yes	
	Tag <noop/> supported? Yes/No	Yes	
	Multiple choice and single choice for checkbox supported?	Yes	
	Input fields supported?	Yes	
	Styles of characters supported? (<u><i>...)	Yes	
	Image and text on the same line supported?	Yes	
	Image and link on the same line supported?	Yes	
	Link inside a text paragraph supported?	Yes	
	Horizontal alignement supported? Yes/No	Yes	
	WAP CSS supported (WAP2.0)? Yes/No	Yes	
WTA	WTAI supported?	Yes	
	WTAI make call function supported?	Yes	
	WTA Save in phonebook	Yes	
	WTA Send DTMF	No	Currently there’ s no this scenario on handset.
	WTAI location function supported?	No	
Security	WTLS supported?	Yes	
	TLS supported?	Yes	
	WAP forum certification	Yes	
	Clear Display Indication that WTLS Security is successful for a given session	Yes	
	Clear Indication that user has accessed/exited a secure site	No	
	1. WTLS Class 2 with >= 128 bit encryption	Yes	
	2. WTLS Class 3 with >= 128 bit encryption	Yes	
	Supported Algorythms	SHA-1, MD5	
	Support of WIM	No	
	Certificates store supported?	Yes	
	1. Verisign	Yes	
	2. Baltimore	No	
	3. Certicom	No	
	4. Diversinet	No	
	5. Entrust	Yes	

Function	Description	Value	Comments
		Code base 07A	
	6. Globalsign	No	
Profile/ Bookmark	Multiple WAP Profile Capability	Yes	
	WAP Profiles Editable by - End User	Yes	
	WAP Profiles Editable by - OTAC (via SMS)	Yes	
	Maximum Number of WAP Settings	10	
	Maximum number of bookmarks in the handset	20	Customizable
	Maximum number of characters for an URL managed by the handset for GET and POST method	1024	
OTA/ Push	Support OTA Provisionning for the WAP Client? If yes, Which type of OTA?	Yes, OMA OTA & Nokia&Ericsson OTA	
	1. View settings	Yes	after set up.
	2. Accept preconfiguration settings	Yes	
	3. Reject preconfiguration settings	Yes	
	WAP Push Alerts	Yes	
	Push bearer SMS	Yes	
	Push bearer WAP	Yes	
	Push SI (Service Indication)	Yes	
	Push SL (Service Loading)	Yes	
	Push CO (Cache Operation)	Yes	
	Push SIA (Session Initiation Application)	Yes	
	Maximum number WAP Push that can be stored/ Memory dimension reserved to WAP Push	15	
	is it possible to read Wap push later on ?	Yes	
	SyncML parameters OTA provisioning (Y/N)?	Yes	
	E-mail parameters OTA provisioning	Yes	
	IM client parameters OTA provisioning	Yes	
	MMS parameters OTA provisioning (OMA, proprietary, none)? * if OMA : SIM card provisioning support (Y/N)? * If YES : could you describe the way to manage the parameters in the SIM and the parameters in the phone?	OMA, SIM card Provisioning support (N)	
	WAP parameters OTA provisioning support (OMA, proprietary, none)? * if OMA : SIM card provisioning support (Y/N)? * If YES : could you describe the way to manage the parameters in the SIM and the parameters in the phone?	OMA, SIM card Provisioning support (N)	
Stack	SAR supported? Yes/No	Yes	
	Is WTP Concatenation supported by the mobile? Yes/No	Yes	

Function	Description	Value	Comments
		Code base 07A	
	Can the Connect and the Get be sent in the same PDU? Yes/No	No	
	Is the mobile able to send multiple GET in the same PDU in case of complex pages (at least 2 images)?	No	
	Is the mobile able to send multiple GET in rafale without waiting for to acknowledge the reply in case of complex pages (at least 2 images)?	No	
	WP-HTTP	Yes	
	WP-TCP	Yes	
	WP-TLS	Yes	
	Dual Stack 1.x/2.0	Yes	
Cache/ Cookie	Cache size (bytes)	50KB	Customizable
	Default behaviour in case no caching control has been defined for a WML or XHTML page?	Reload Always	
	Default behaviour in case no caching control has been defined for an image?	Reload	
	Where is the cache stored (RAM, flash memory, ...)?	Flash memory (system drive)	
	Cache control using HTTP headers supported?	Yes	
	Attributes for Cache control supported in HTTP headers (expires, max-age, no-cache, ...)	Expire, max-age, Etag, Last-Mofified-Since, no-cache.	
	Cache control using HTTP-EQUIV meta tags in the WML or XHTML content supported?	Yes	
	Attributes for Cache control supported for HTTP-EQUIV meta tags (expires, max-age, no-cache, ...)	Expire, max-age, Etag, Last-Mofified-Since, no-cache.	
	Cache Operation Support as defined by WAP Forum in WAP1.2.1 spec or WAP2.0 spec	Yes	
	Are cookies supported by the handset? Yes/No	Y	
	Lifetime	Y	
	Empty cache function (Y/N)	Y	
Download	Maximum SDU Size as Server (bytes)	104856700	WSP
	Maximum SDU Size as Client (bytes)	104856700	WSP
	Maximum number of images per page	Common memory pool	
	Maximum size for an image (bytes)	Common memory pool	
	Prefered image format	Gif, JPG, WBMP	
	Type of Multipart supported in MIME Type format	All object formats that could be used on handset	

Function	Description	Value	Comments
		Code base 07A	
	Audio Files	All object formats that could be used on handset	
	JAR download over WSP/HTTP	Yes	
	Support of TCP network connection	Yes	

* Battery life is Network dependent; variations may occur.
The KG195 HHP works closely with the network and the standby and talk times achieved depend upon this. In particular the location of the HHP within the network, the type of SIM, reception of area messages, the use of AMR, Full Rate speech, Half Rate speech or Enhanced Full Rate speech and other factors will affect both standby and talk times.

Transmitting Frequency Range:	EGSM : 880 - 915MHz DCS1800 : 1710 - 1785MHz PCS1900 : 1850 - 1910MHz
Receiving Frequency Range:	EGSM : 925 - 960MHz DCS1800 : 1805 - 1880MHz PCS1900 : 1930 - 1990MHz
TX - RX Duplex Spacing:	EGSM : 45MHz DCS1800 : 95MHz PCS1900 : 80MHz
Channel Spacing:	EGSM : 200KHz DCS1800 : 200KHz PCS1900 : 200KHz
Number of Channels (ARFCN):	GSM : 124 (Numbered 1 to 124) std. EGSM : 50 (Numbered 975 to 1023 & 0) DCS1800 : 374 (Numbered 512 to 885) PCS1900 : 299 (Numbered 512 to 810)
Power Class:	EGSM : Class 4 MTS (33 +/- 2dBm) DCS1800 : Class 1 MTS (30 +/- 2dBm) PCS1900 : Class 1 MTS (30 +/- 2dBm)
Tx Peak Current:	2500mA
GPRS Class:	Class 10; Operation class B
GPRS Coding Scheme:	CS1/CS2/CS3/CS4
Data Rates (Packet):	EGSM/DCS1800/PCS1900 : Uplink : Up to 21.4Kbps (1 slot) Downlink : Up to 85.6Kbps (4 slots)
Data Rates (Circuit Switch):	EGSM/DCS1800/PCS1900 : Up to 9600Kbps

TRANSMITTER (EGSM)

RF Power Output

Power Levels	15 decrements in 2dB steps
Power Control Level 5	33dBm +/-2dB
Power Control Level 6	31dBm +/-3dB
Power Control Level 7	29dBm +/-3dB
Power Control Level 8	27dBm +/-3dB
Power Control Level 9	25dBm +/-3dB
Power Control Level 10	23dBm +/-3dB
Power Control Level 11	21dBm +/-3dB
Power Control Level 12	19dBm +/-3dB
Power Control Level 13	17dBm +/-3dB
Power Control Level 14	15dBm +/-3dB
Power Control Level 15	13dBm +/-3dB
Power Control Level 16	11dBm +/-5dB
Power Control Level 17	9dBm +/-5dB
Power Control Level 18	7dBm +/-5dB
Power Control Level 19	5dBm +/-5dB

TX Frequency Output

Low Channel (Ch 975)	880.2 MHz
Mid Channel (Ch 62)	902.4 MHz
High Channel (Ch 124)	914.8 MHz
TX Frequency Calculation (F_{tx})MHz (0 - 124) (975 - 1023)	 890 + (ARFCN x 0.2)MHz 890 + 0.2x(ARFCN - 1024)MHz

Phase and Frequency Error

Peak Phase Error	< 20 degrees
RMS Phase Error	< 5 degrees
Frequency Stability	< +/- 90Hz

TRANSMITTER (DCS1800)

RF Power Output

Power Levels	16 decrements in 2dB steps
Power Control Level 0	30dBm +/-2dB
Power Control Level 1	28dBm +/-3dB
Power Control Level 2	26dBm +/-3dB
Power Control Level 3	24dBm +/-3dB
Power Control Level 4	22dBm +/-3dB
Power Control Level 5	20dBm +/-3dB
Power Control Level 6	18dBm +/-3dB
Power Control Level 7	16dBm +/-3dB
Power Control Level 8	14dBm +/-3dB
Power Control Level 9	12dBm +/-4dB
Power Control Level 10	10dBm +/-4dB
Power Control Level 11	8dBm +/-4dB
Power Control Level 12	6dBm +/-4dB
Power Control Level 13	4dBm +/-4dB
Power Control Level 14	2dBm +/-5dB
Power Control Level 15	0dBm +/-5dB

TX Frequency Output

Low Channel (Ch 512)	1710.2 MHz
Mid Channel (Ch 699)	1747.6 MHz
High Channel (Ch 885)	1784.8 MHz
TX Frequency Calculation (F_{tx})MHz	1710.2 + 0.2 x (ARFCN - 512) = F_{tx} MHz

Phase and Frequency Error

Peak Phase Error	< 20 degrees
RMS Phase Error	< 5 degrees
Frequency Stability	< +/- 180Hz

TRANSMITTER (PCS1900)

RF Power Output

Power Levels	16 decrements in 2dB steps
Power Control Level 0	30dBm +/-2dB
Power Control Level 1	28dBm +/-3dB
Power Control Level 2	26dBm +/-3dB
Power Control Level 3	24dBm +/-3dB
Power Control Level 4	22dBm +/-3dB
Power Control Level 5	20dBm +/-3dB
Power Control Level 6	18dBm +/-3dB
Power Control Level 7	16dBm +/-3dB
Power Control Level 8	14dBm +/-3dB
Power Control Level 9	12dBm +/-4dB
Power Control Level 10	10dBm +/-4dB
Power Control Level 11	8dBm +/-4dB
Power Control Level 12	6dBm +/-4dB
Power Control Level 13	4dBm +/-4dB
Power Control Level 14	2dBm +/-5dB
Power Control Level 15	0dBm +/-5dB

TX Frequency Output

Low Channel (Ch 512)	1850.2MHz
Mid Channel (Ch 657)	1879.2MHz
High Channel (Ch 810)	1909.8MHz
TX Frequency Calculation (F_{tx})MHz	1850.2 + 0.2 x (ARFCN - 512) = F_{tx} MHz

Phase and Frequency Error

Peak Phase Error	< 20 degrees
RMS Phase Error	< 5 degrees
Frequency Stability	< +/- 185Hz

RECEIVER (EGSM)

RX Frequency Input

Low Channel (Ch 975)	925.2 MHz
Mid Channel (Ch 62)	947.4 MHz
High Channel (Ch 124)	959.8 MHz
RX Frequency Calculation (F_{rx})MHz (0 - 124) (975 - 1023)	 F_{tx} + 45 Mhz = F_{rx} MHz F_{tx} + 45 Mhz = F_{rx} MHz

BER (Bit Error Ratio)	Type II BER <2.4% at -102dBm Type II BER <0.1% at -15dBm

RECEIVER (DCS1800)

RX Frequency Input

Low Channel (Ch 512)	1805.2 MHz
Mid Channel (Ch 699)	1842.6 MHz
High Channel (Ch 885)	1879.8 MHz
RX Frequency Calculation (F_{rx})	F_{tx} + 95 Mhz = F_{rx} MHz

BER (Bit Error Ratio)	Type II BER <2.4% at -102dBm Type II BER <0.1% at -23dBm

RECEIVER (PCS1900)

RX Frequency Input

Low Channel (Ch 512)	1930.2MHz
Mid Channel (Ch 657)	1959.2MHz
High Channel (Ch 810)	1989.8 MHz
RX Frequency Calculation (F_{rx})	F_{tx} + 80 Mhz = F_{rx} MHz

BER (Bit Error Ratio)	Type II BER <2.4% at -102dBm Type II BER <0.1% at -23dBm

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Section 4

Introduction of Service Level

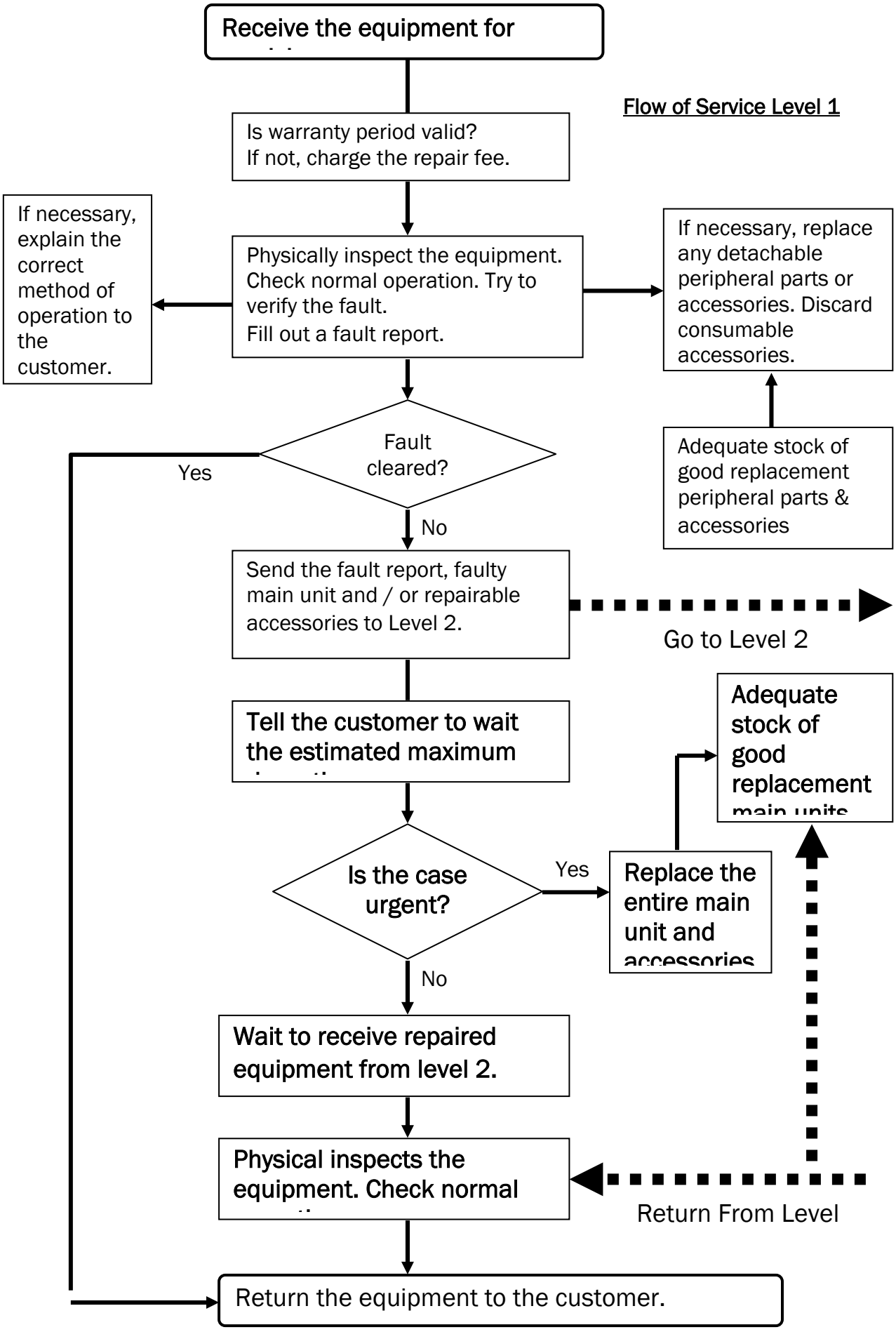
4-1. SERVICE LEVEL 1
4-2. SERVICE LEVEL 2

4-1. SERVICE LEVEL 1

INTRODUCTION OF SERVICE LEVEL 1

The dealers at service level 1 will have to do the following:

1. Attend to the subscriber's complaint. Receive the equipment for servicing from the customer and checking that the warranty period is valid or not.
2. Check the external appearance of the main equipment, peripheral units, and accessories.
3. Check the normal operation and performance of the main equipment, peripheral unit, and accessories.
4. If necessary, replace detachable parts, peripheral units, and accessories that cannot be repaired. Keep a stock of good replacement phone and accessories.
5. If necessary, explain the correct method of operation to the customer.
6. Verify any faulty reported by the end-user at 2. and 3. Above.
7. Specify the symptom and fill out the fault report.
8. Send the fault report and faulty equipment to service level 2. Ask the subscriber to wait for the equipment to be repaired.
9. In certain cases, replace the entire main equipment.
10. Receive back the repaired equipment and carry out a final check.
11. Return the repaired and correctly functioning equipment to the end-user.


Receive the equipment for
Flow of Service Level 1
Is warranty period valid?
If not, charge the repair fee.
If necessary, explain the correct method of operation to the customer.
Physically inspect the equipment. Check normal operation. Try to verify the fault.
Fill out a fault report.
If necessary, replace any detachable peripheral parts or accessories. Discard consumable accessories.
Adequate stock of good replacement peripheral parts & accessories
Fault cleared?
Yes
No
Send the fault report, faulty main unit and / or repairable accessories to Level 2.
Go to Level 2
Tell the customer to wait the estimated maximum
Adequate stock of good replacement main units
Is the case urgent?
Yes
Replace the entire main unit and accessories
No
Wait to receive repaired equipment from level 2.
Physical inspects the equipment. Check normal
Return From Level
Return the equipment to the customer.

TEST EQUIPMENT AND TOOLS FOR SERVICE LEVEL 1

No GSM tester and soldering are required for Service Level 1. The following equipment and tools are recommended for this level.

1. Fully charged battery :
   Use as a power source or a temporary replacement of original battery for faulty equipment.

2. Workable SIM card :
   Used for testing the performance and functions of faulty equipment.

3. Rubber :
   Used for cleaning electronic contacts, such as battery terminals, etc.

4. AC Adapter :
   Used for testing the charging function of faulty equipment and / or battery.

5. Simple Hands free Kit :
   Used for testing the Hands free relevant functions of faulty equipment.

6. USB Cable :
   Used for testing the connection between HHP and PC.

4-2. SERVICE LEVEL 2

INTRODUCTION TO SERVICE LEVEL 2

The tasks at Service Level 2 will have to :

1. Receive the fault report and faulty equipment from Service Level 1.

2. Verify the faults reported at Level 1 and check the doubtful modular sub-units or part.

3. Identify the faulty modular sub-unit or part.

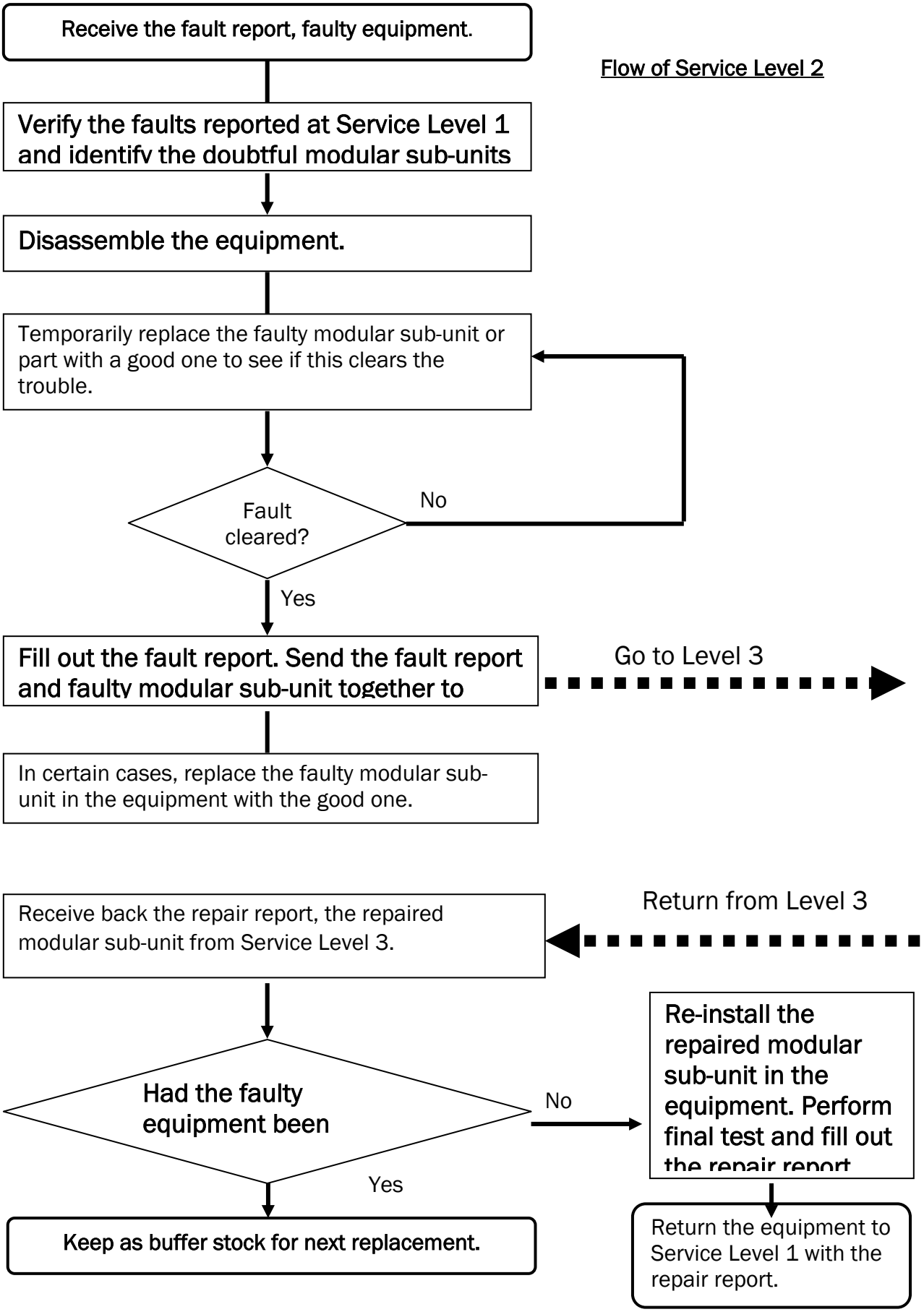
4. Disassemble the equipment. Temporarily replace the faulty modular sub-unit or part with a good one to see if this clears the trouble. Specify the faulty modular sub-unit or part in the faulty report.

5. Send the fault report and faulty modular sub-unit together to Service Level 3. In certain cases, replace the faulty modular sub-unit in the equipment with the good one for quick repair.

6. Receive back the repair report, the repaired modular sub-unit from Service Level 3 and re-install it in the equipment. Or keep this repaired modular sub-unit for next replacement, if the faulty modular sub-unit had been replaced with a good one in step 5.

7. Perform the final test with a workable SIM card. Fill out the repair report.

8. Return the equipment to Service Level 1 with the repair report.


Receive the fault report, faulty equipment.
Flow of Service Level 2
Verify the faults reported at Service Level 1 and identifv the doubtful modular sub-units
Disassemble the equipment.
Temporarily replace the faulty modular sub-unit or part with a good one to see if this clears the trouble.
Fault cleared?
No
Yes
Fill out the fault report. Send the fault report and faultv modular sub-unit together to
Go to Level 3
In certain cases, replace the faulty modular sub-unit in the equipment with the good one.
Receive back the repair report, the repaired modular sub-unit from Service Level 3.
Return from Level 3
Had the faulty equipment been
No
Yes
Re-install the repaired modular sub-unit in the equipment. Perform final test and fill out the repair report
Keep as buffer stock for next replacement.
Return the equipment to Service Level 1 with the repair report.

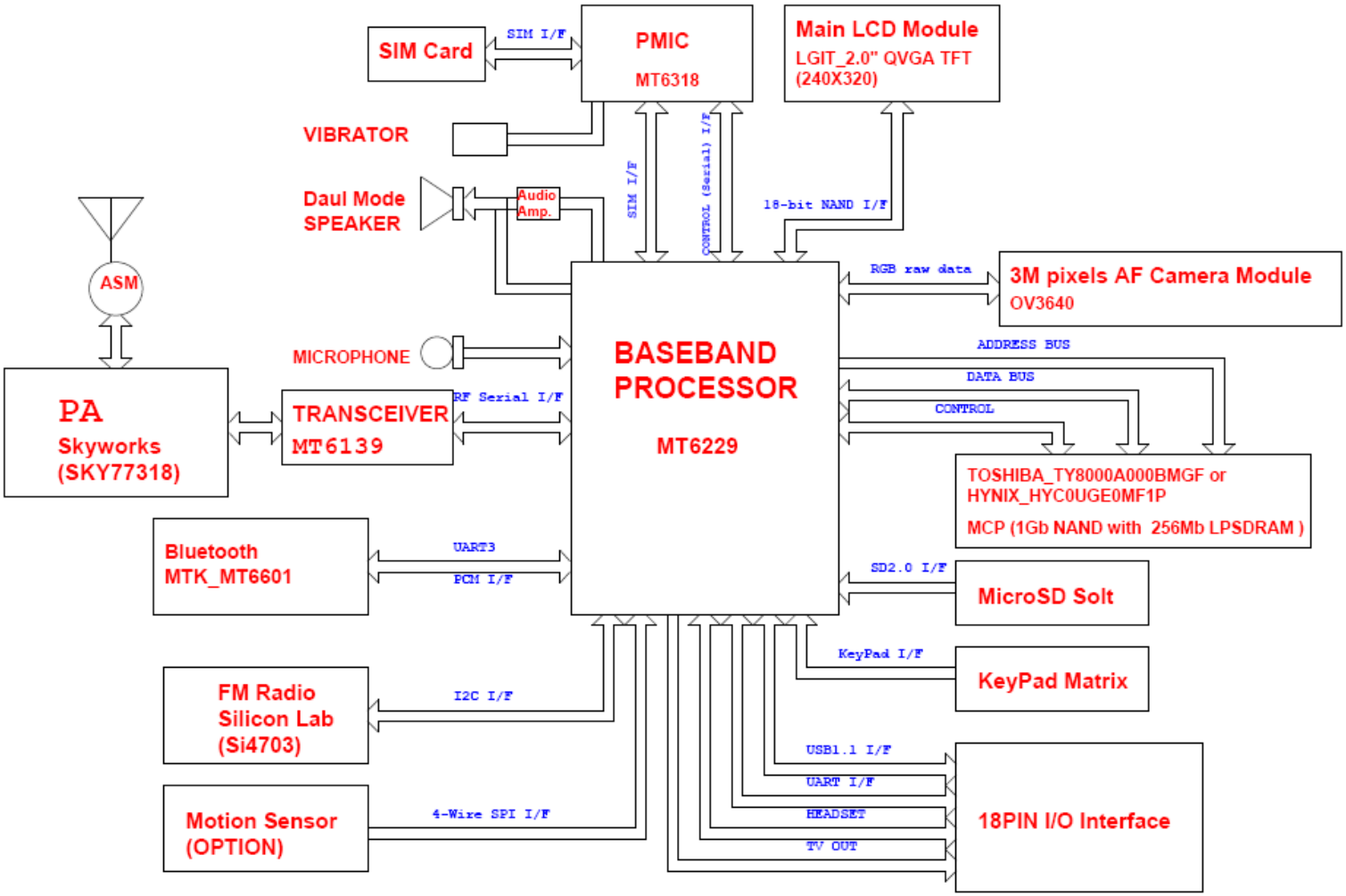
<<	Previous Section	
	Next Section	>>
	Main Menu	

Section 5

Circuit Description

5-1. LOGIC BLOCK DIAGRAM
5-2. LOGIC

5-1. LOGIC BLOCK DIAGRAM



5-2. LOGIC

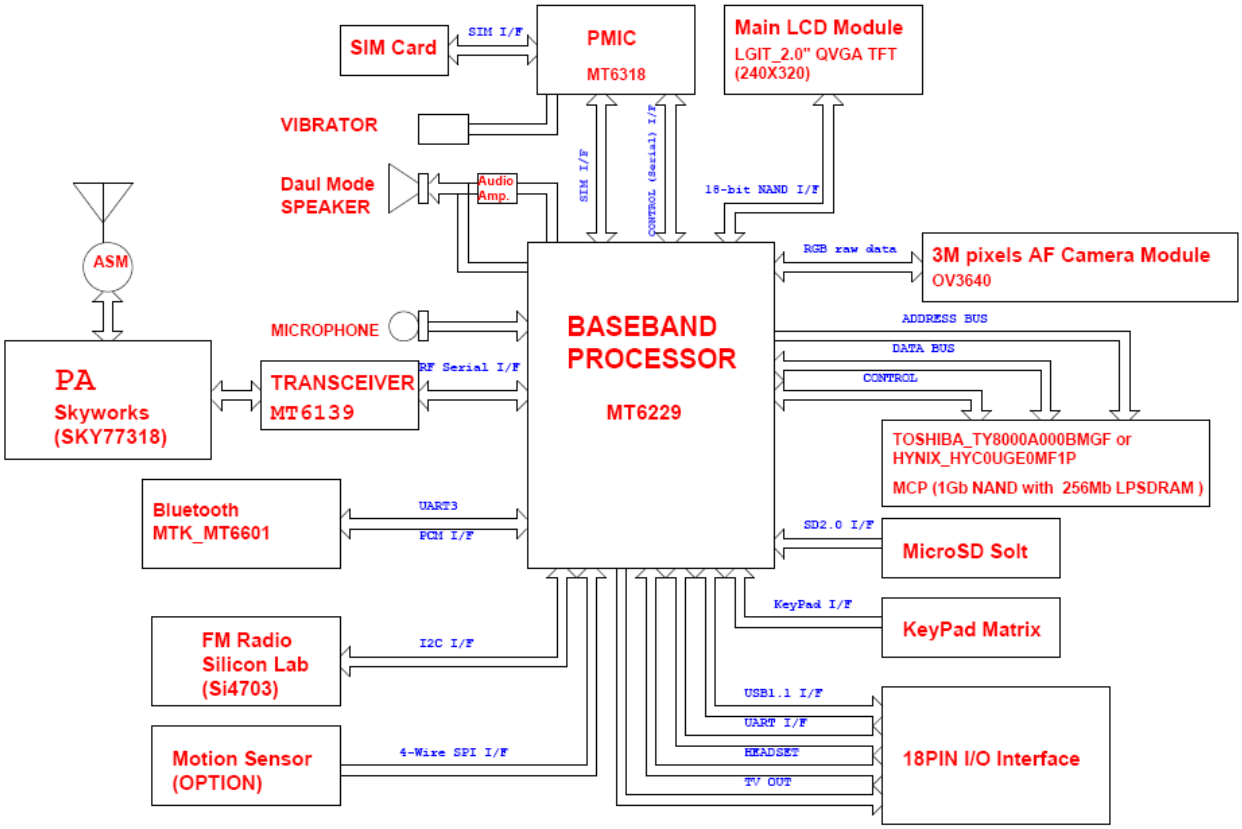
LOGIC AND BASE BAND PORTION

5-2-1. INTRODUCTION

The logic part of 7332 phone is based on Leonardo that is MTK Systems platform.
The circuit comprises the following main functional blocks:

- Memory Subsystem
- Baseband CPU(MTK6229)
- MT6305: PMIC handles all baseband power
- FM Radio IC(SI4703)
- Main LCM (LGIT_2.0"QVGA TFT 240*320)
- Camera (3M pixels CMOS sensor)
- Bluetooth(MTK_MT6601)
- TOSHIBA MCP(1Gb NAND + 256Mb SDRAM)
- User I/O (KEY,MINI SD CARD,USB Client, SIM card)

5-2-2. SYSTEM BLOCK DIAGRAM



5-2-3. MEMORY SUBSYSTEM

KP320 handset memory;
Memory: (1Gb NAND + 256Mb SDRAM)

5-2-3.1. Memory

Low Power SDRAM and Nand E^{2}PROM Mixed Multi-Chip Package

DESCRIPTION

The TY8000A000CMGF is a mixed multi-chip package containing a 268,435,456-bit Low Power Synchronous DRAM and a 1,107,296,256-bit Nand E^{2}PROM. The TY8000A000CMGF is available in a 149-pin BGA package making it suitable for a variety of applications

MCP Features

1. Power supply voltage
   Low power SDRAM : 1.7 to 1.9 V
   Nand E^{2}PROM : 2.7 to 3.3 V
2. Operating temperature of 30° to 85°C
3. Package:
   P-FBGA149-1013-0.80AZ (Weight: 0.33 g)

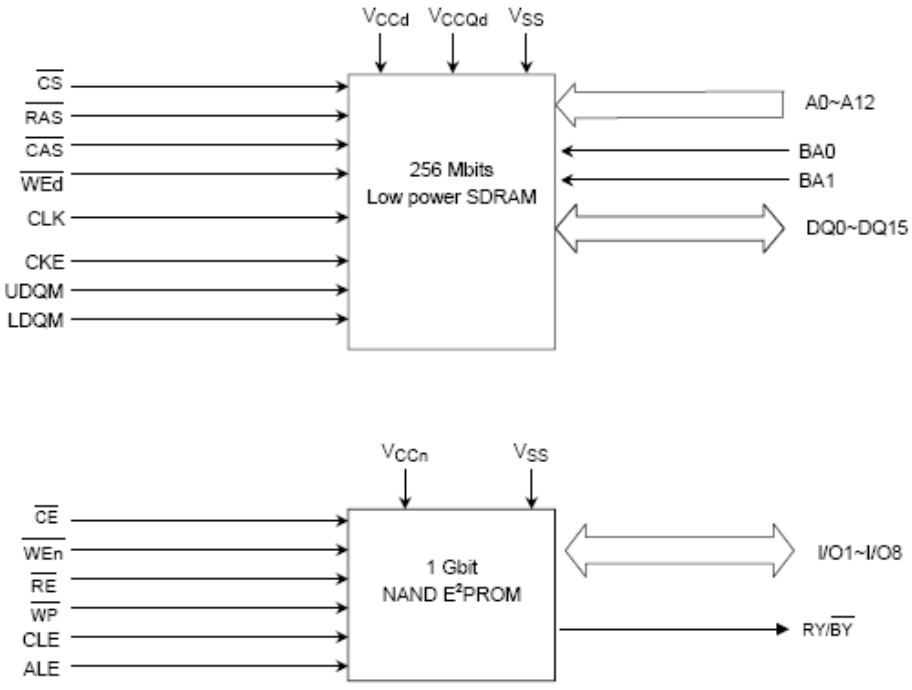
Low Power SDRAM Features

1. Organization : 4M 16 bits 4 banks
2. Power dissipation
   Operating : 50 m A maximum
   Burst operating: 80mA maximum
   Refresh :50 m A maximum
   Self refresh : 550 uA maximum
3. Programmable driver strength
4. Clock frequency: 133MHz (max.)
5. 2KB page size
6. Row address: A0 to A12
7. Column address : A0 to A8
8. 4 internal banks for concurrent operation
9. Interface : LVCMOS
10. Burst lengths (BL) : 1, 2, 4, 8, full page
11. Burst type (BT) :
    Sequential (1, 2, 4, 8, full page)
    Interleave (1, 2, 4, 8)
    CAS Latency (CL) : 2, 3
12. Precharge : auto precharge operation for each burst access
13. Driver strength: normal/weak
14. Refresh : auto-refresh, self-refresh
15. Refresh cycles : 8192 refresh cycles/64ms
    Average refresh period : 7.8 s
16. Operating junction temperature range
17. Single pulsed $\overline{RAS}$
18. Burst read/write operation and burst read/single write operation capability
19. Byte control by DQM
20. Programmable Partial Array Self Refresh
21. Auto Temperature Compensated Self Refresh by built-in temperature sensor
22. Deep power down mode
23. Burst termination by burst stop command and Precharge command

Nand E²PROM Features

- Organization
  Memory cell array : 2112 64K 8 bits
  Register : 2112 8 bits
  Page size : 2112 bytes
  Block size : (128K 4K) bytes
  Power dissipation
  Read operating : 30 mA maximum Program operating : 30 mA
  maximum Erase operating : 30 mA maximum Standby : 50 A
  maximum
  Access time :
  Cell array register : 30 s
  Serial read cycle : ns @CL=100pF
  Modes :
  Read , Reset , Auto page program
  Auto block erase , Status read
  Mode control
  Serial input / output , Command control

BLOCK DIAGRAM



5-2-2. MTK6229 BASE BAND CHIP

General Description

Figure 2 details the block diagram of MT6229 and MT6230. Based on a dual-processor architecture, MT6229 / MT6230 integrate both an ARM7EJ-S core and 2 digital signal processor cores. ARM7EJ-S is the main processor that is responsible for running high-level 2G to 2.75G protocol software as well as multi-media applications. Digital signal processors handle the MODEM algorithms as well as advanced audio functions. Except for some mixed-signal circuitries, the other building blocks in MT6229 and MT6230 are connected to either the microcontroller or one of the digital signal processor.

Specifically, both MT6229 and MT6230 consist of the following subsystems:

- Microcontroller Unit (MCU) Subsystem - includes an ARM7EJ-S RISC processor and its accompanying memory management and interrupt handling logics.
- Digital Signal Processor (DSP) Subsystem - includes 2 DSP cores and their accompanying memory, memory controller, and interrupt controller.
- MCU/DSP Interface - where the MCU and the DSPs exchange hardware and software information.
- Microcontroller Peripherals - includes all user interface modules and RF control interface modules.
- Microcontroller Coprocessors - runs computing-intensive processes in place of Microcontroller.
- DSP Peripherals - hardware accelerators for GSM/GPRS/EGDE channel codec.
- Multi-media Subsystem - integrates several advanced accelerators to support multi-media applications.
- Voice Front End - the data path for converting analog speech from and to digital speech.
- Audio Front End - the data path for converting stereo audio from stereo audio source
- Video Front End - the data path for converting video signal to NTSL/PAL format.
- Baseband Front End - the data path for converting digital signal from and to analog signal of RF modules.
- Timing Generator - generates the control signals related to the TDMA frame timing.
- Power, Reset and Clock subsystem - manages the power, reset, and clock distribution inside MT6229 and MT6230.

Details of the individual subsystems and blocks are described in following Chapters. By default, except CMOS sensor interface, all features are identical for MT6229 and MT6230, and those descriptions related to MT6229 can also be applied to MT6230.

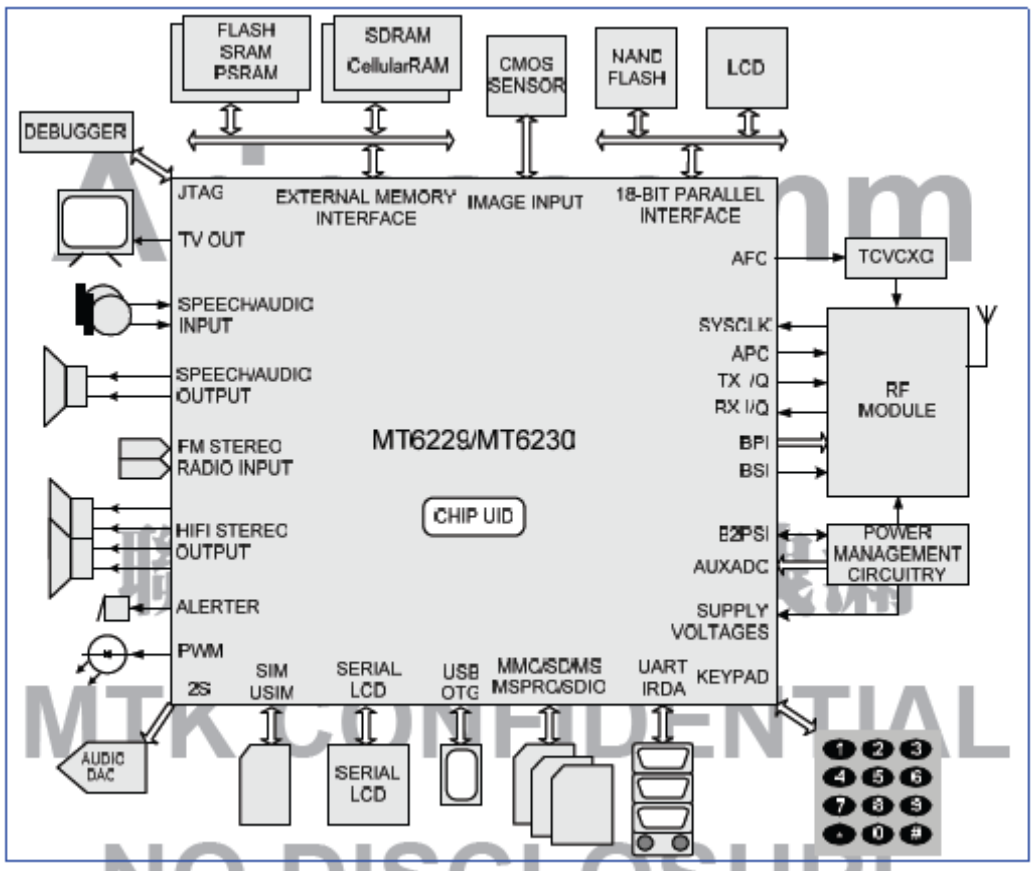


Figure 1 Typical application of MT6229 / MT6230.

5-2-3.PMU IC MT 6305

1 Handles all GSM/GPRS Baseband Power Management
2 Input range: 2.8 V ~ 5.0 V
3 Charger input of up to 15 V
4 11 LDOs optimized for specific GSM/GPRS subsystems
5 2-step RTC LDO
6 600 mW Class AB audio amplifier
7 Booster for series backlight LED driver
8 Charge pump for parallel backlight LED driver
9 SPI interface
10 Pre-charge indication
11 Li-ion battery charge function
12 SIM card interface
13 RGB LED driver
14 V_{core} for power-saver mode
15 Over-current and thermal overload protection
16 Programmable under voltage lockout protection
17 Power-on reset and start-up timer
18 96-pin TFBGA package

1.2 Applications

GSM/GPRS mobile handsets, basic phones and high-end phones.

1.3 General Description

The MT6318 is a power management system chip optimized for GSM/GPRS handsets, especially those based on the MediaTek MT621x/MT622x system solution. MT6318 contains 11 LDOs, one to power each of the critical GSM/GPRS sub-blocks. Sophisticated controls are available for power-up during battery charging, for the keypad interface, and for the RTC alarm. The MT6318 is optimized for maximum battery life.

The 2-step RTC LDO design allows the RTC circuit to stay alive without a battery for several hours.

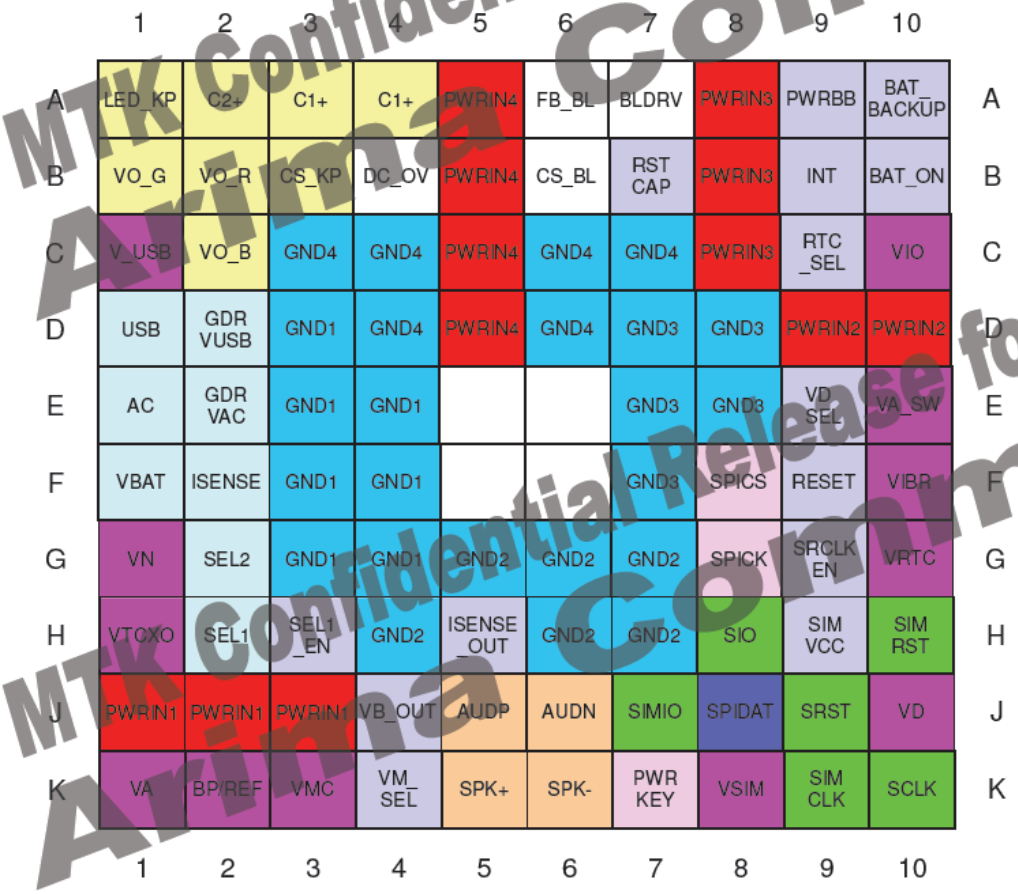
The MT6318 battery charger can be used with a lithium-ion (Li+) battery.

The SIM interface provides the level shift between SIM card and microprocessor.

The MT6318 is available in a 96-pin TFBGA package. The operating temperature range is -25°C to +85°C.

1.5 Pin Assignments and Descriptions

Figure 1: MT6318 TFBGA 96(7x7 mm²) Pin Assignments



5-2-5.1. Voice Band Interface

The audio front-end essentially consists of voice and audio data paths. **Figure 38**. Shows the block diagram of the audio front-end . All voice band data paths comply with the GSM 03.50 specification. Mono hands-free audio or external FM radio playback paths are also provided.

The audio stereo path facilitates CD-quality playback ,external FM radio , and voice playback through a handset.

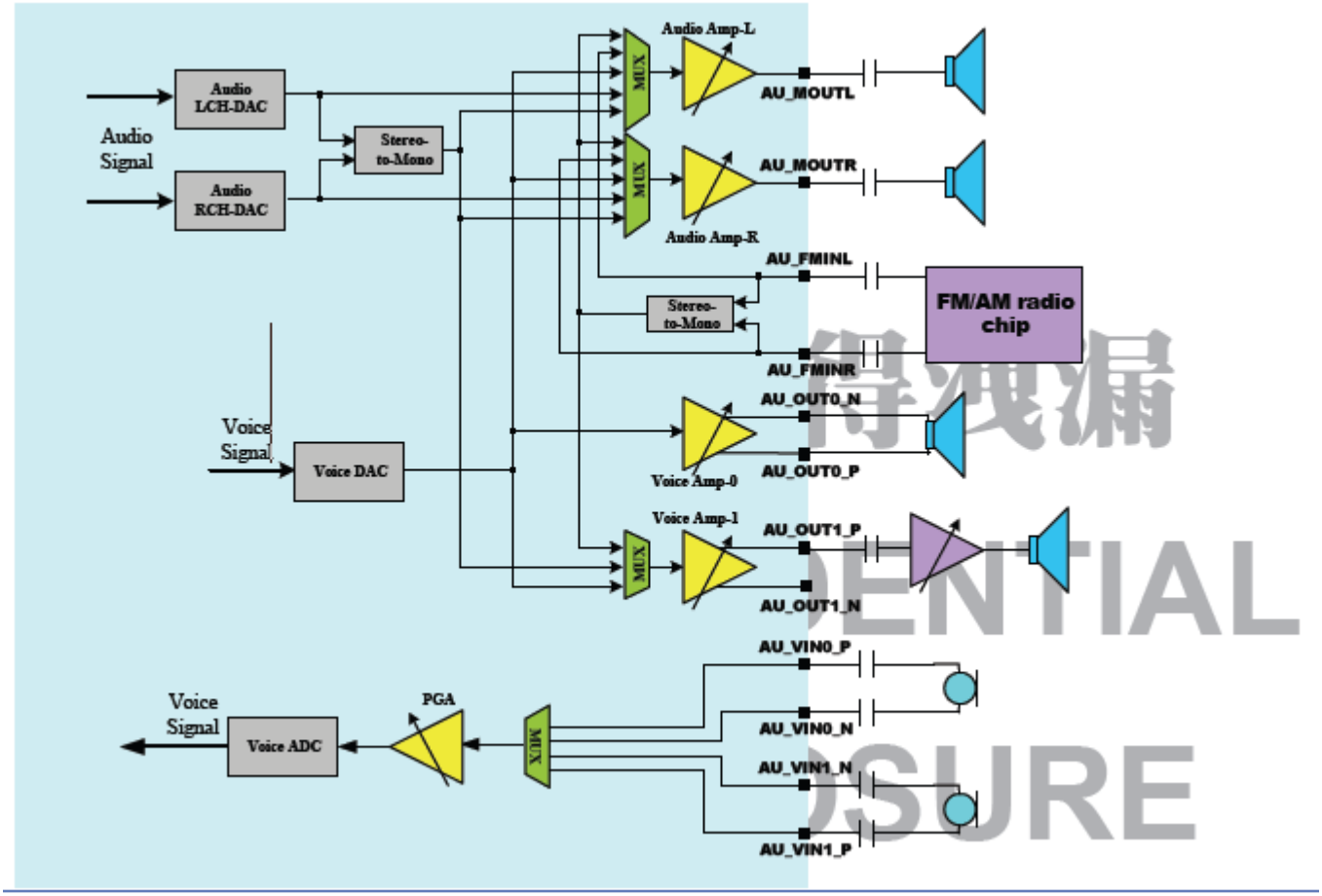


Figure 38 Block diagram of audio front-end

Figure 39 shows the digital circuits block diagram of the audio front-end. The APB register block is an APB peripheral that stores setting from the MCU. The DSP audio port block interfaces with the DSP for control and data communications. The digital filter block performs filter operations for voice band and audio band signal processing The Digital Audio Interface (DAI) block communicates with the System Simulator for FTA or external Bluetooth modules.

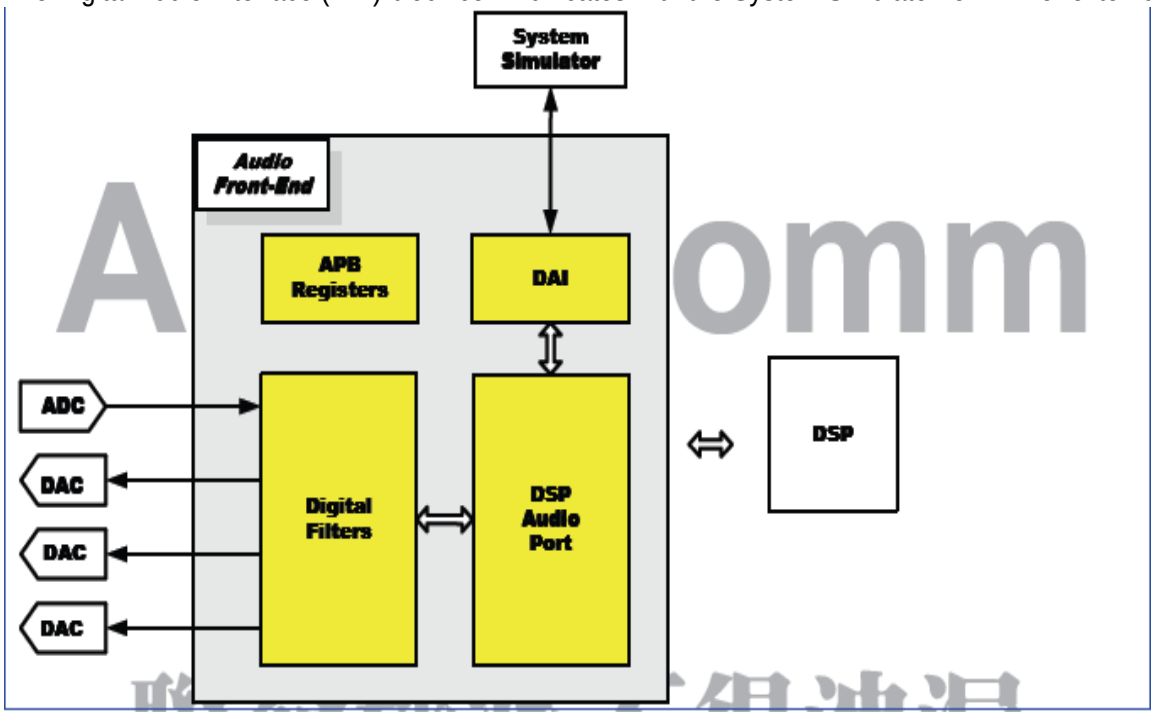


Figure 39 Block diagram of digital circuits of the audio front-end

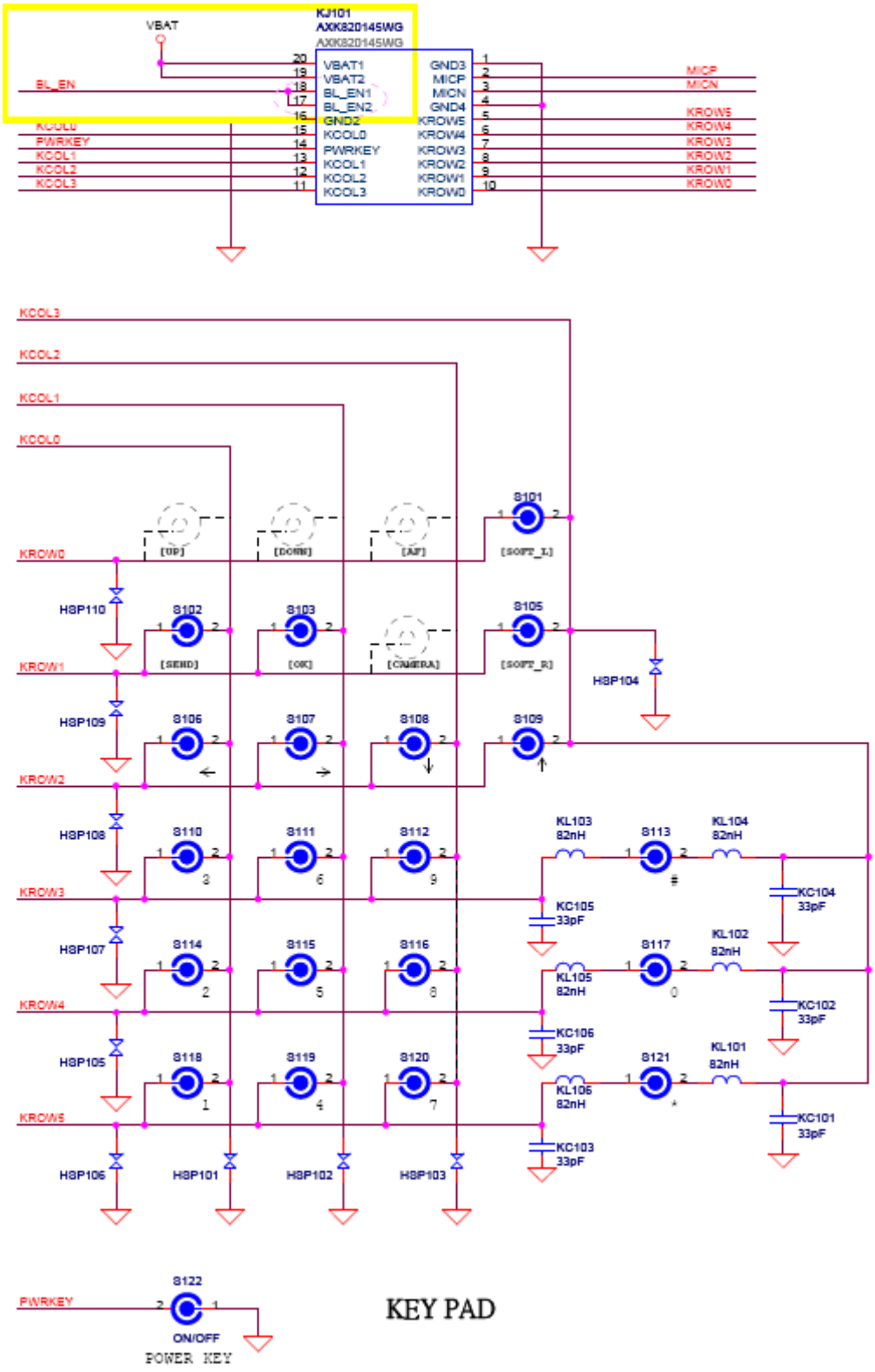
5-2-5.2 Monitor ADC

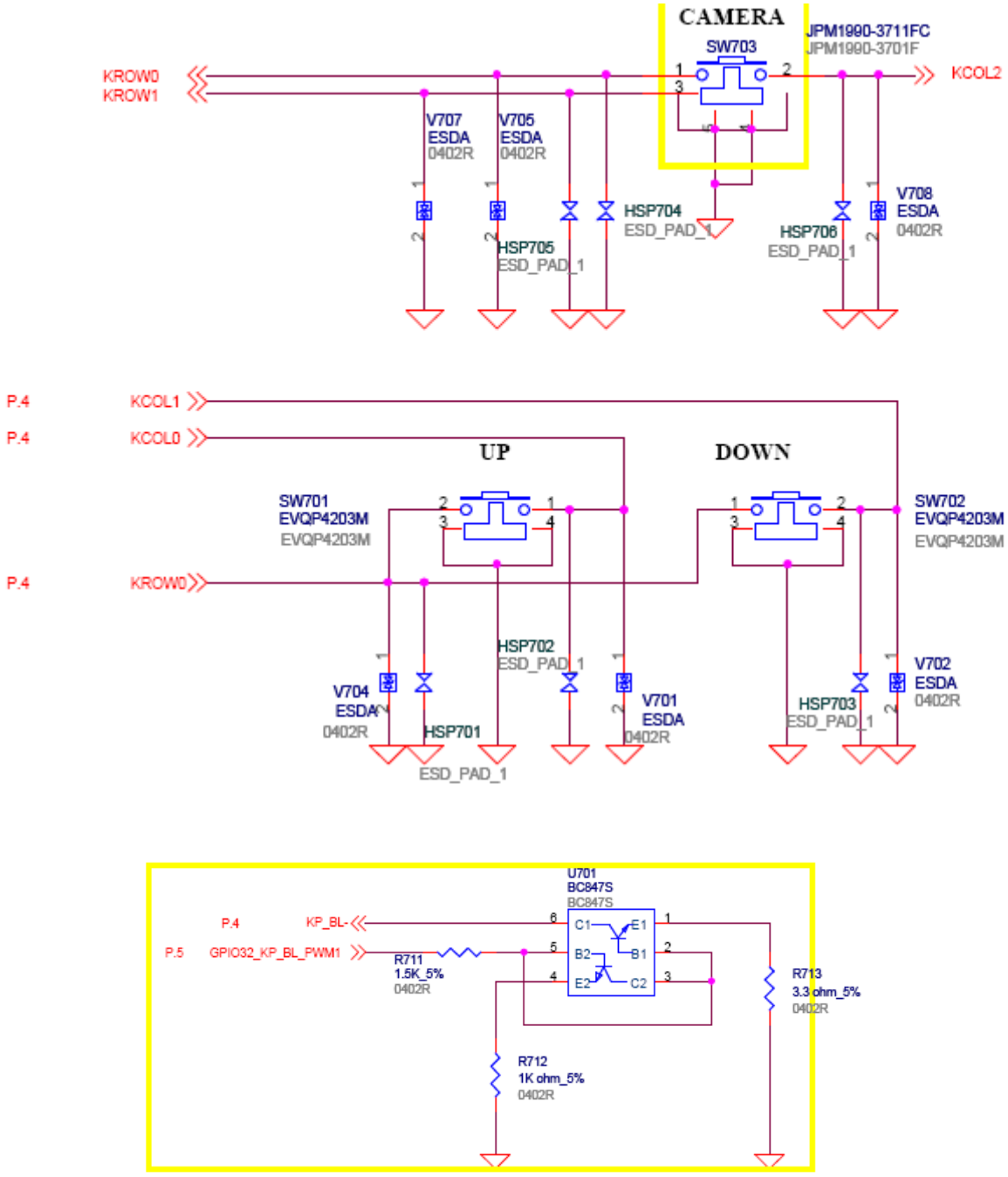
The following is 7610 ADC in use.

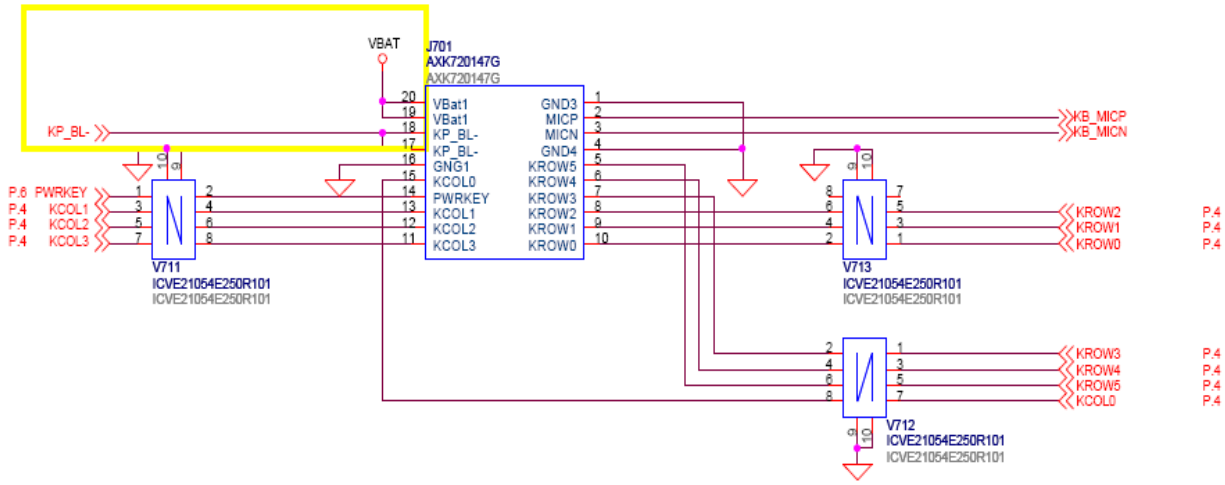
External ADC name	Purpose in 7610
ADC0_1-	Detect Battery Voltage and Current
ADC0_1+	Detect Battery Voltage and Current
ADC2_TBAT	Detect Battery tempter
ADC3_VCHG	Detect Charging voltage
ADC5_T/R_TBAT	
ADC5_ACCESSORY	Detect hand free
ADC6_USB	Detect USB device

5-2-6. KEY SWITCHES

Circuit Diagram

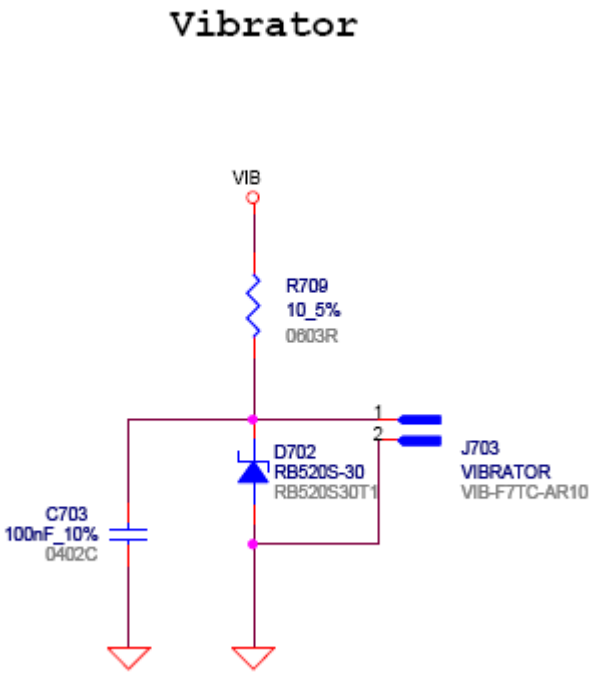



CAMERA
SW703
JPM1990-3711FC
JPM1990-3701F
KROW0
KROW1
KCOL2
V707
ESDA
0402R
V705
ESDA
0402R
HSP705
ESD_PAD_1
HSP704
ESD_PAD_1
HSP706
ESD_PAD_1
V708
ESDA
0402R
P.4
KCOL1
P.4
KCOL0
UP
DOWN
SW701
EVQP4203M
EVQP4203M
SW702
EVQP4203M
EVQP4203M
P.4
KROW0
HSP702
ESD_PAD_1
V704
ESDA
0402R
HSP701
ESD_PAD_1
V701
ESDA
0402R
HSP703
ESD_PAD_1
V702
ESDA
0402R
U701
BC847S
BC847S
P.4
KP_BL-
P.5
GPIO32_KP_BL_PWM1
R711
1.5K_5%
0402R
C1
E1
B2
B1
E2
C2
R713
3.3 ohm_5%
0402R
R712
1K ohm_5%
0402R



5-2-7. VIBRATOR

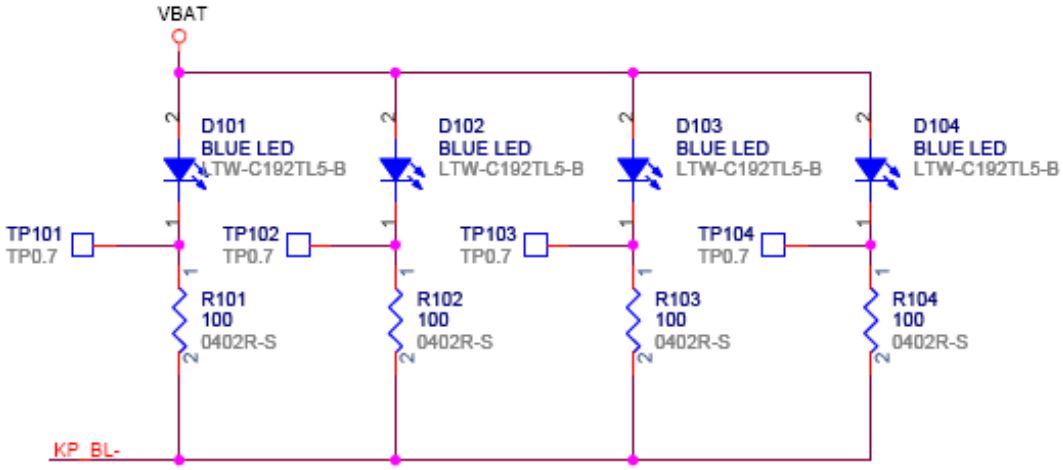
Circuit Diagram



5-2-8. KEY BACKLIGHT LED

There are eight LEDs used for key backlighting. The LED driver of 6305 controls these LEDs.

Circuit Diagram



LED

5-2-9 BATTERY CHARGING

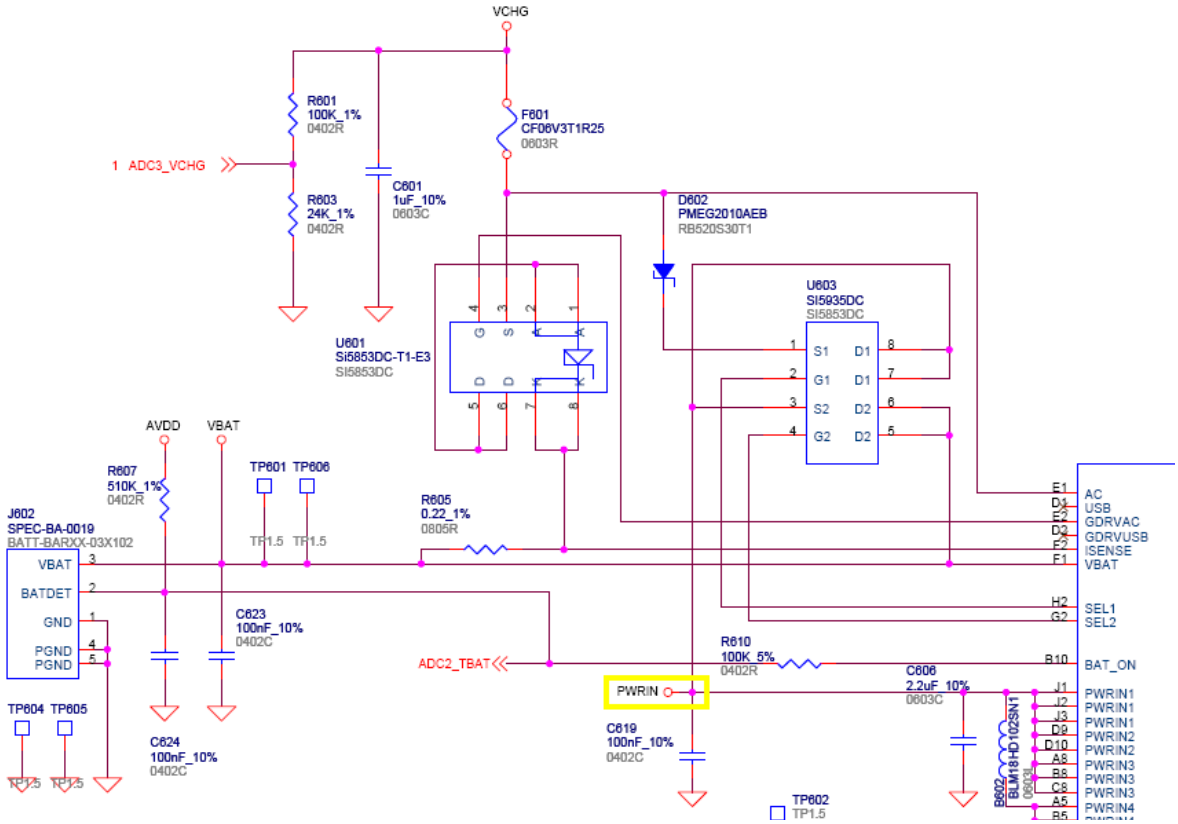
Battery management, which controls charge and discharge of the battery is the most important function for safety. 7338 SW performs charging algorithm. To regulator the power PMOS for set the charging current.

KP320 CHARGING CIRCUIT AND ALGORITHM

charging Circuit and Algorithm

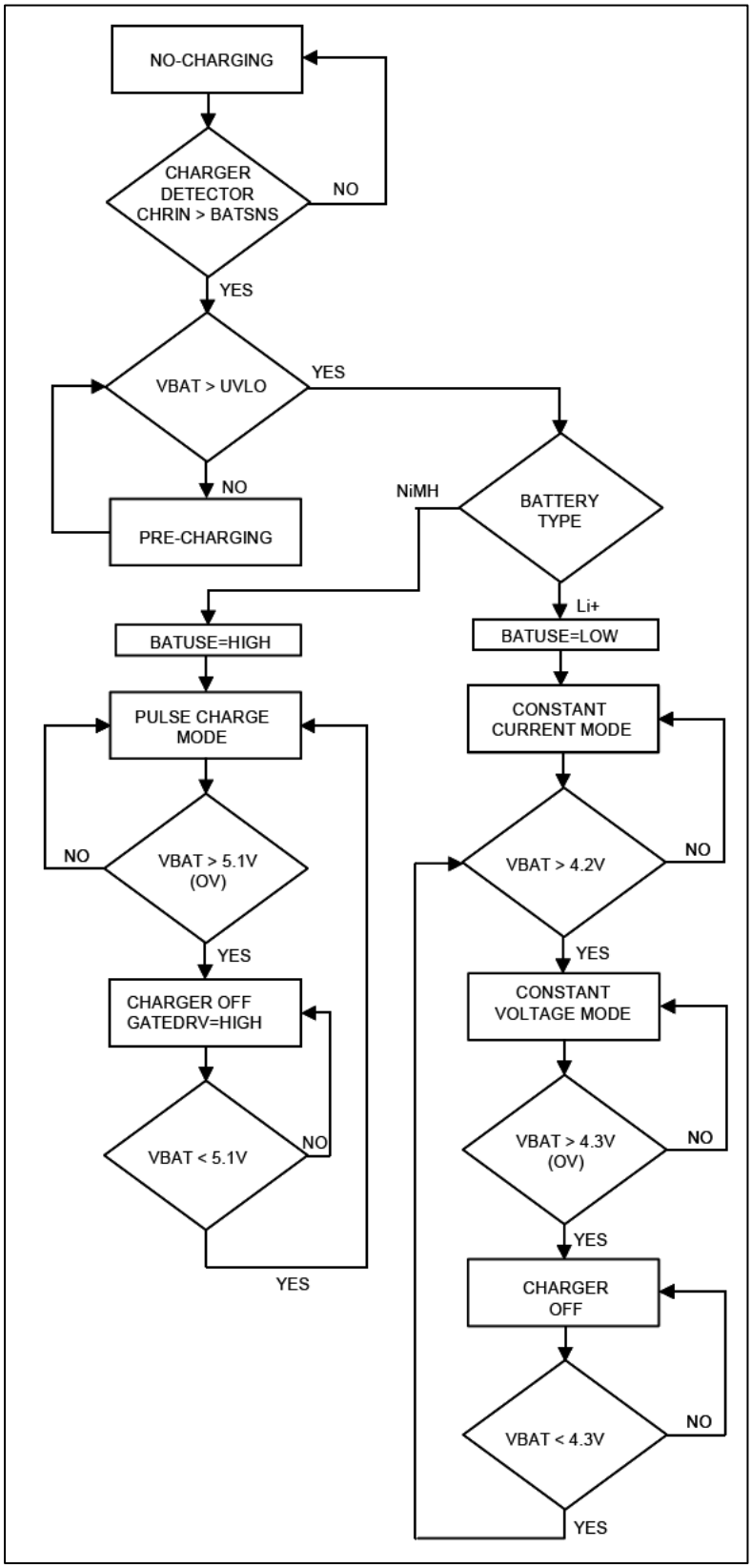
7610 Charging circuit:

The schematic below shows the external charging components used in the Arima 7610 project. All ports are directly connected to the corresponding pins of PMU IC (6318). VCHG is the V charger supply rail coming directly from the wall-plug constant voltage charger via the system connector, and VBAT is the Battery Voltage rail, connected directly to the battery pack terminal connector. The system uses a solid ground plane, and both the Battery Pack terminal and the wall-plug charger return paths are connected directly to ground.



Charger Sub-system

The MT6305 battery charger can be used with Li-ion and NiMH batteries. BATUSE pin can set MT6305 to fit the battery type. When BATUSE is set low, Li-ion battery is used. When BATUSE is set high, then NiMH battery is used. MT6305 charges the battery in three phases: pre-charging, constant current mode charging, and constant voltage mode charging. Figure 2 shows the flow chart of charger behavior. The circuitry of MT6305 combines with a PMOS transistor, diode and current-sense resistor externally to form a simple and low cost linear charger shown in Figure 3. MT6305 is available pulsed top-off charging algorithm by the CHRCNTL pin control from baseband chipset.



Charge Detection

The MT6305 charger block has a detection circuit that determinates if an adapter has been applied to the CHRIN pin. If the adapter voltage exceeds the battery voltage by 3.75%, the CHRDET output will go high. If the adapter is then removed and the voltage at the CHRIN pin drops to only 2.5% above the VBAT pin, CHRDET goes low.

Pre-Charging mode

When the battery voltage is below the UVLO threshold, the charge current is in the pre-charging mode. There are two steps in this mode. While the battery voltage is deeply discharged below 2V, a 10mA trickle current of MT6305 charges the battery internally. When the battery voltage exceeds 2V, the pre-charge current is enabled, which allows 10mV (typically) across the external current sense resistor. This pre-charge current can be calculated:

Constant Current Charging Mode

Once the battery voltage has exceeded the UVLO threshold the charger will switch to the constant current charging mode. The MT6305 allows 160mV (typically) across the external current sense resistor. This constant current can be calculated.

$$I_{PRE\_CHARGING} = \frac{V_{SENSE}}{R1} = \frac{10mV}{R1}$$

If the voltage of Li-ion battery is below 4.2V (5.1V for NiMH battery), the battery will be in the constant current charging mode.

$$I_{CONSTANT} = \frac{V_{SENSE}}{R1} = \frac{160mV}{R1}$$

Constant Voltage Charging Mode

This mode is only applied to Li-ion battery charging. If the battery has reached the final charge voltage, a constant voltage is applied to the battery and keeps it at 4.2V. The charge termination is determined by the baseband chip internally, which will pull the CHRCNTL low to stop the charger. Once the battery voltage exceeds 4.3V of Li-ion battery (5.1V of NiMH battery), a hardware over voltage protection (OV) should be activated and turn off the charger block of MT6305.

Pulsed Charging Algorithm

MT6305 is available to pulsed top-off charging algorithm by the CHRCNTL pin. The control signal is from baseband chipset to limit the charging duty cycle. This charging algorithm combines the efficiency of switch-mode chargers with the simplicity and low cost of linear chargers.

Battery Voltage Monitor

As the Table 2 shown, the relations of battery voltage and charger control signals are listed. When Vbat < 3.2V, an UVLO signal is active low. When Vbat >= 4.3, an OV signal is active and terminates charging. The disconnection of battery could be detected by BATDET pin. BATDET is pulled high internally when battery disconnected and terminates charging immediately.

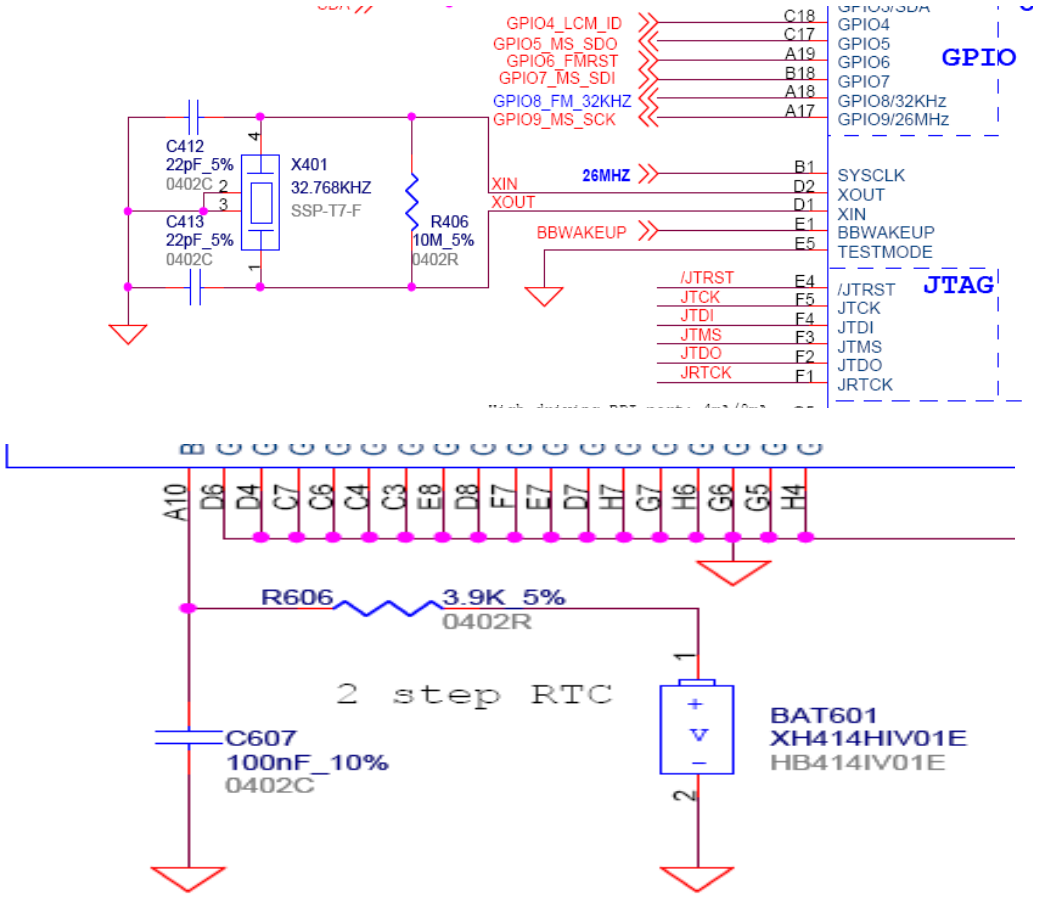
Vbat	CHRON	CHRCNTL	CHRDET	-UVLO	BATUSE	Charger Condition
Any Vbat	L	X	L	X	X	No-Charging
Vbat > 3.2V	X	L	X	X	X	No-Charging
Vbat < UVLO	H	X	L	L	X	Pre-Charging
3.2V<Vbat<4.2V	H	H	H	H	L	CC mode
Vbat = 4.2V	H	H	H	H	L	CV mode
3.2V<Vbat	H	H	H	H	H	CC mode

Notes: OV terminates charging at 4.3V for Li-ion battery or 5.1V for NiMH battery.

5-2-10. REAL-TIME CLOCK (RTC)

RTC is the feature to count “second”.

MTK6229’s clock generation on 32.768kHz is made by OSC(X401 in 7610), connecting to OSC32K_IN/ OSC32K_OUT and supply the clock to 6318.



The real-time clock (RTC) is driven by a 32.768 kHz clock from a crystal oscillator. The input clock is divided by 32.768 to generate a clock with a 1 second period. In addition, it can generate interrupts at a programmed time. The following are basic function of RTC:

-Time information (seconds/minutes/hours) coded in BCD

-Calendar information (Day/Month/Year/Day of the week) directly in BCD code up to year 2099.

-Alarm function with interrupts generation bases on a periodical (second/minute/hour/day) or a precise time event in the century (second accuracy).

-30s time range correction

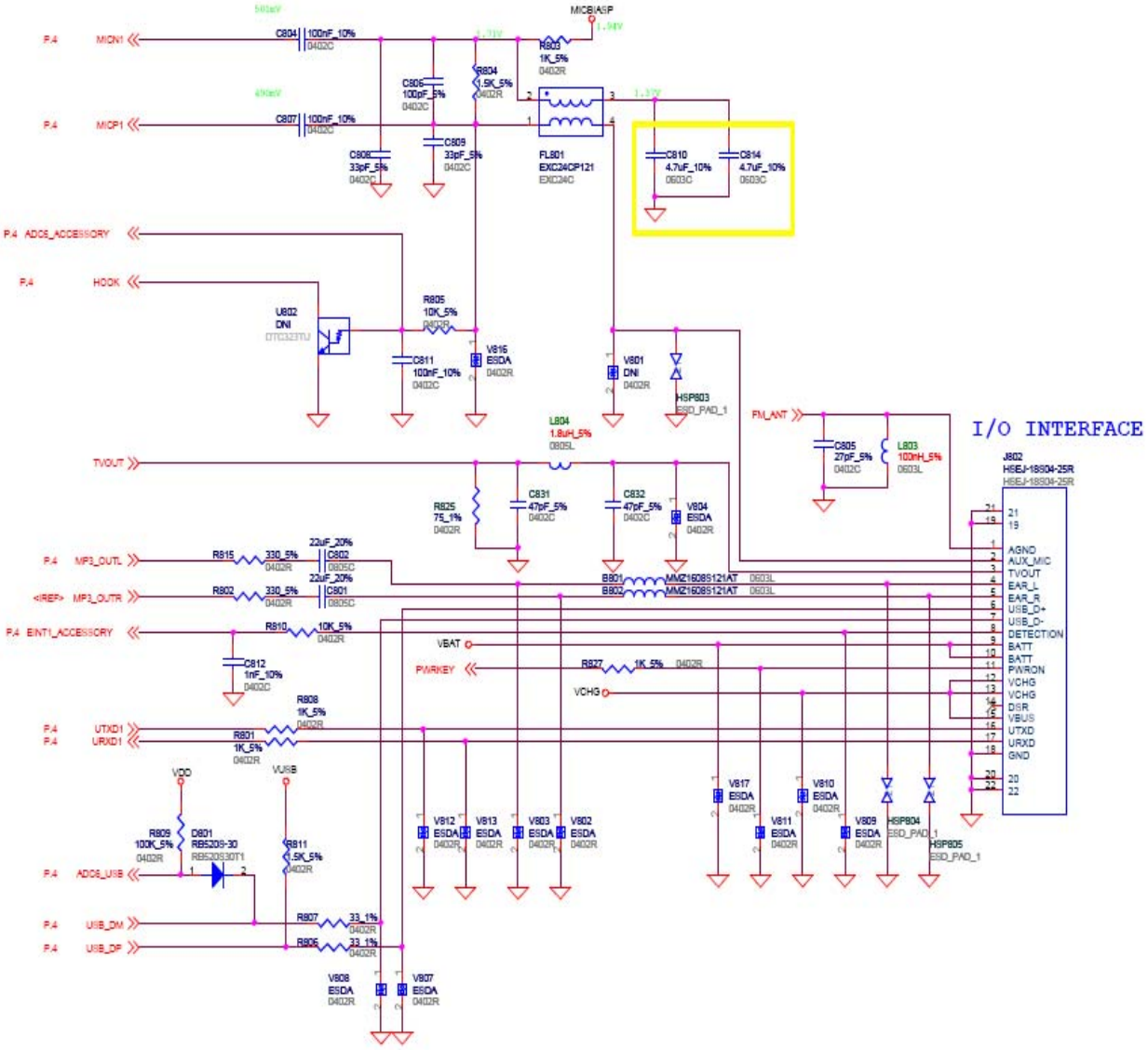
-32khz oscillator frequency gauging.

The RTC module of 7610 is supplied by 3V Backup Battery made by Sanyo.

The target of running time of the backup battery (fully charged) is longer than two hours after the main battery is removed.

5-2-11. EXTERNAL INTERFACE

The pin arrangement of system I/O is shown below.



5-2-12. SIM INTERFACE

The SIM interface module within MTK6229 allows access to the subscriber identity module smart card. With the appropriate software and level conversion by MT6318, the interface is compliant with GSM 11.11 and GSM 11.12.

The electrical interface consists of five signals:

SIMVCC
This output connects to contact C306 (VCC) of the SIM connector. It is used to supply power to the SIM card and is supplied directly from MT6318.
It is controlled by MTK6318 , and enable the power and 3V operation respectively. Note that while SIMPWR is low, the software sets SIMRST, SIMCLK and SIMDATA signals low.

SIMRST
This output connects to contact V502 (RST) of the SIM connector. It is set directly by the CPU writing to the SIM control register.

SIMCLK
This output connects to contact V501 (CLK) of the SIM connector. The clock may be set high or low, or a choice of 13/4 MHz or 13/12 MHz clock frequencies may be selected, by writing to the SIM control register. In order to save power, the clock should be stopped when not required, if the SIM allows it.

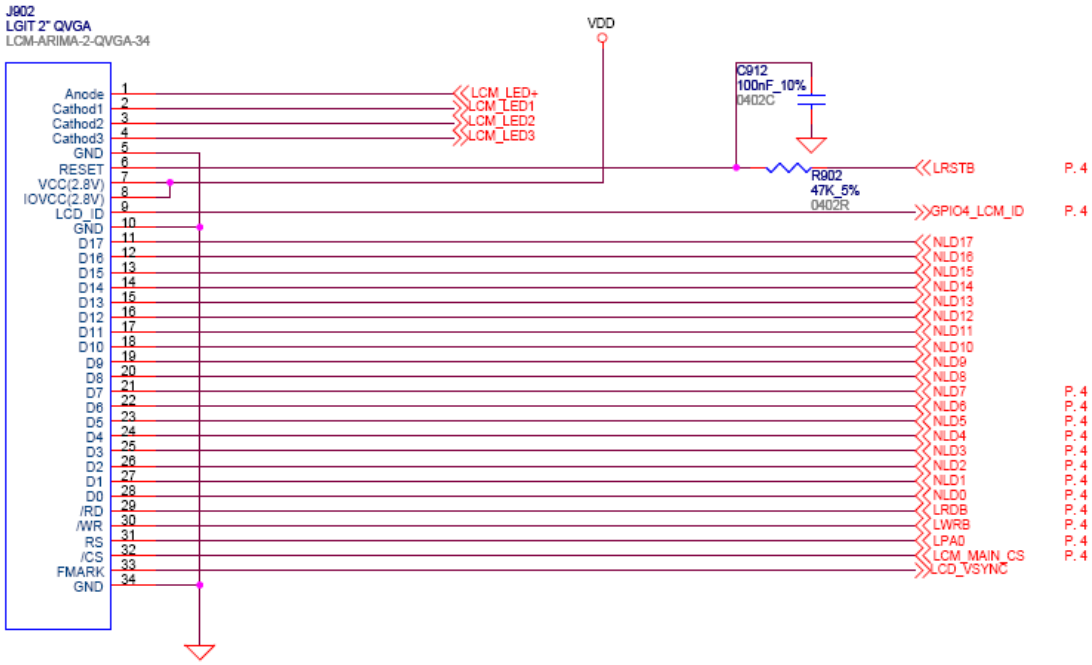
SIMDATA
This is a bi-directional, open drain signal, connected to contact V504 (I/O) of the SIM connector. Control of the data signal is done in the SIM interface section of MTK6229, although the output can be disabled by writing to the SIM control register. Being open-drain with an external pull-up, the output floats high when not being driven low by either Trident-HP or the SIM card.

All the above control signals maintain their state when MTK6229 is powered down. This allows the SIM to remain powered during soft-OFF. SIMPWR should be switched OFF when handset 'hard-OFF' mode is selected.

5-2-13. SIGNAL CONTROL PATH FOR BACKLIGHT LED, CAMERA FLASH LED AND INDICATOR LED

5-2-13.1 Backlight LED Control

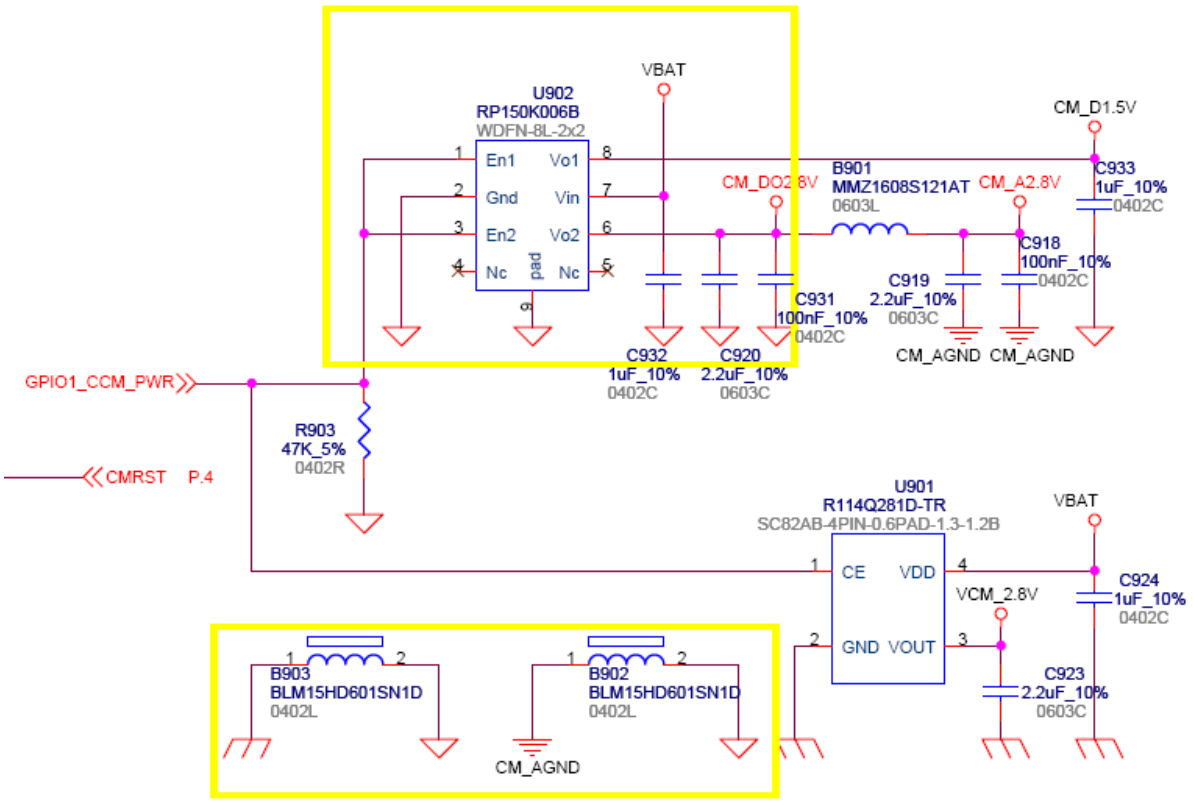
The LCD backlight is controlled by the PWL signal from the PMU 6318.

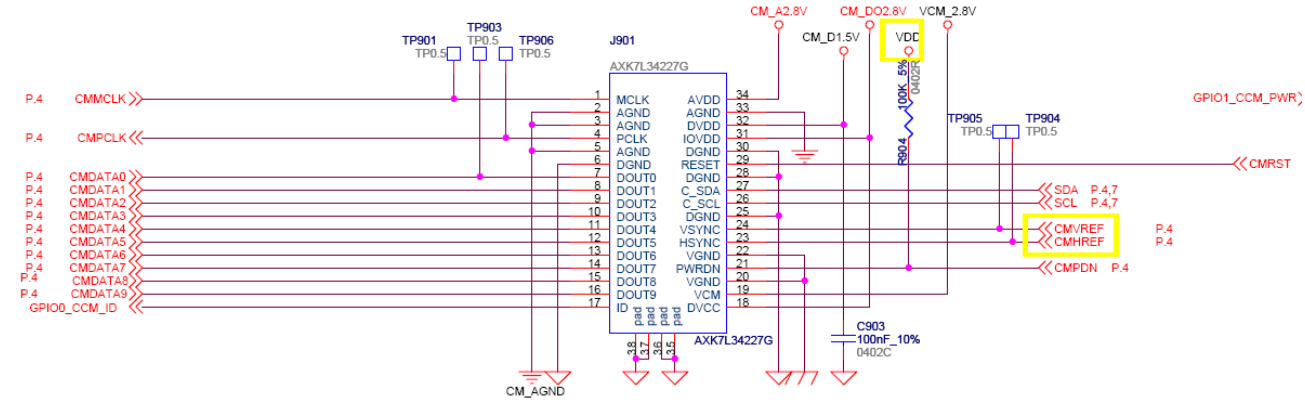


5-2-13.2 Camera Control

Overview of voltage supply for Camera

RP150K006B provides power supply for Camera shown below.





5-2-14. DISPLAY SYSTEM

5-2-14.1 TFT LCD Module

1. General Description

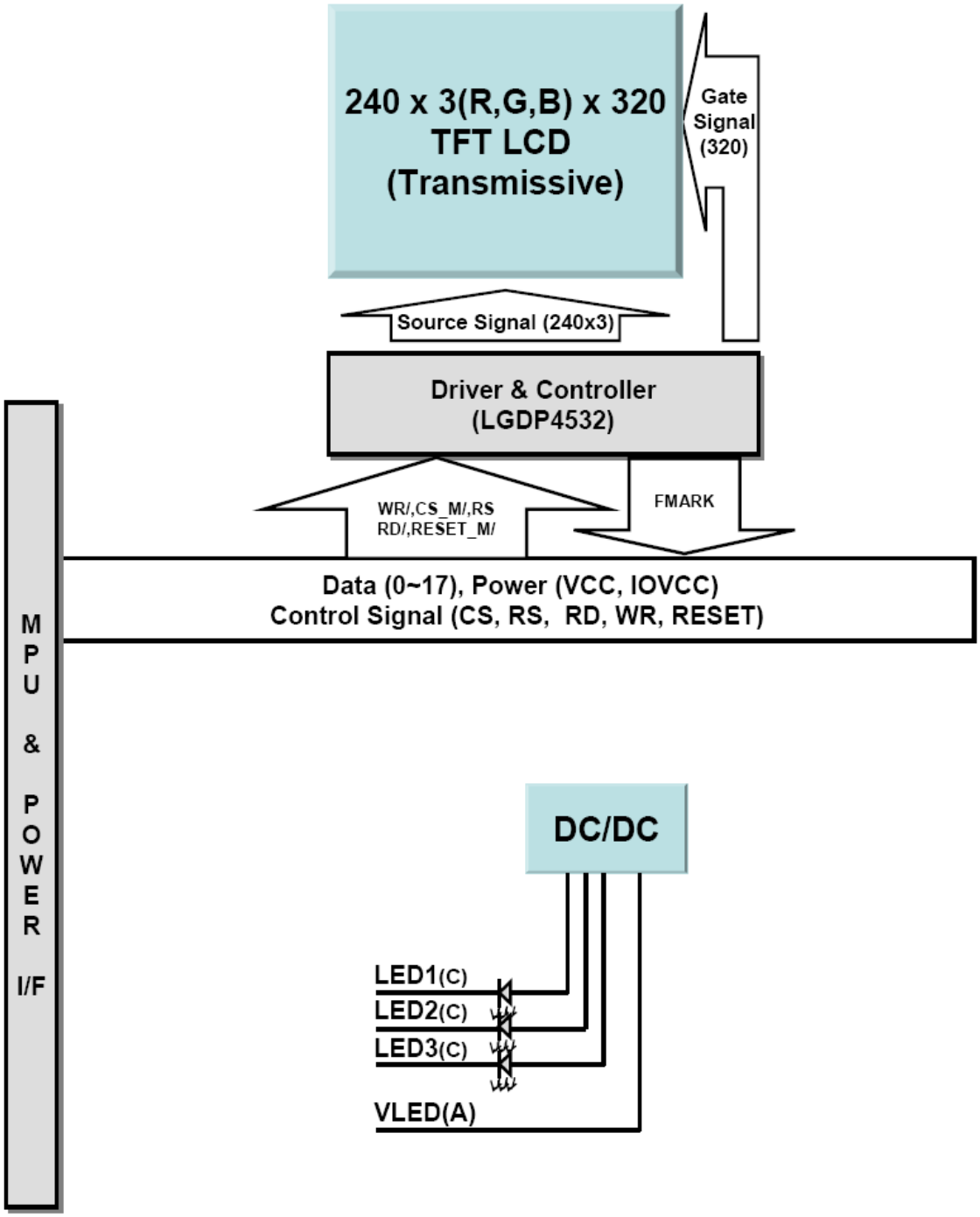
The **IM200DBN5A** model is a Color TFT LCD supplied by LG Innotek.
This main Module has a 2.0 inch diagonally measured active display area with 240(RGB)X320 resolution.
Each pixel is divided into Red, Green and Blue sub-pixels and dots which are arranged in vertical stripes.

Main LCD color is determined with 262,144 colors signal for each pixel.
The **IM200DBN5A** has been designed to apply the interface method that enables low power, high speed, and high contrast.
The **IM200DBN5A** is intended to support applications where thin thickness, wide viewing angle and low power are critical factors and graphic displays are important.

2. General Features

Item	Main Display	Remark
Display Mode	Normally Black, Transmissive LCD	
Driving Method	A-Si TFT Active Matrix	
Input Signals	18Bit, CPU I/F Parallel	
Outside Dimensions	37.2mm(H) x 52.1mm(W) x 1.9mm(D) (Typ.)	
Active Area	30.6mm(H) x 40.8mm(V)	
Number of Pixels	240(×RGB)×320 Pixels	Note 1)
Pixel Pitch	0.1275mm(H) X 0.1275mm(W)	Note 1)
Pixel Arrangement	RGB Vertical stripes	Note 1)
Drive IC	LGDP4532 (LG)	
Weight	T.B.D	

5-2-14.2 LCD interface



5-2-15. CAMERA

5-2-15.1 Camera Module

The F130B/COV is a low voltage SXGA camera chip which includes CMOS image sensor (CIS) and Image Signal Processor (ISP). It is fabricated by OV 0.13µm CMOS image sensor process developed for imaging application to realize high-efficiency photo sensor. The sensor consists of 1280 x 1024 effective pixels which meet with 1/5 inch optical format. The F130B/COV provides full-frame , sub-sampled ,scaled or Windowed through the Serial Camera Control Bus(SCCB) interface.

The F130B/COV all required image processing functions ,including exposure control ,gamma ,white balance ,Color saturation ,hue control ,white pixel canceling ,noise canceling ,and more ,are also programmable through the SCCB interface .In addition F130B/COV use proprietary sensor technology to improve image quality by reducing or eliminating common lighting/electrical source of image contamination ,such as fixed pattern noise ,smearing ,etc., to produce a clean ,fully stable color image.

The F130B/COV needs a single master clock, is suitable for low power camera module with 2.8V/1.8V/1.2V power supply.

5-2-15.2 Specifications

- Lens Size: 1/5 inch
- Pixel Size: 2.0 um x 2.0um
- Effective Resolution: 1280 (H) x 1024 (V)
- Scan Mode: Progressive
- Shutter Type: Electronic Rolling Shutter
- Output format8-Bit :YUV/YCbCr4:2:2;RGB565/ 555/444;Raw RGB Data
- Max. frame rate: 15fps @ SXGA;30fps@VGA
- Color Interpolation and Color Correction
- Image Scaling: SXGA ,VGA ,CIF,and any size Scaling down from CIF to 40*30
- Auto Exposure Control (AEC)
- Auto White Balance (AWB)
- Auto Gain Control (AGC)
- Auto Band Filter (ABF)
- Auto Black Level Calibration (ABLC)
- Image quality controls including color saturation ,gamma ,sharpness(edge enhancement),lens correction ,white pixel canceling ,noise canceling ,and 50/60Hz luminance detection.
- ADC Resolution: 8-Bit
- Stand-By Mode for Power Saving
- I^2C Bus Control Interface
- Operating Temperature: -20°C to +60°C
- Supply Voltage: 2.8V for Analog , 2.8V/1.8V for I/O Digital,1.2V for Digital core
- Supports scaling

5-2-16. AUDIO SUBSYSTEM

5-2-16.1 Outline

The audio system is composed of MTK6229, PMU IC (MT6318). The attached device is MIC, Receiver, Speaker.

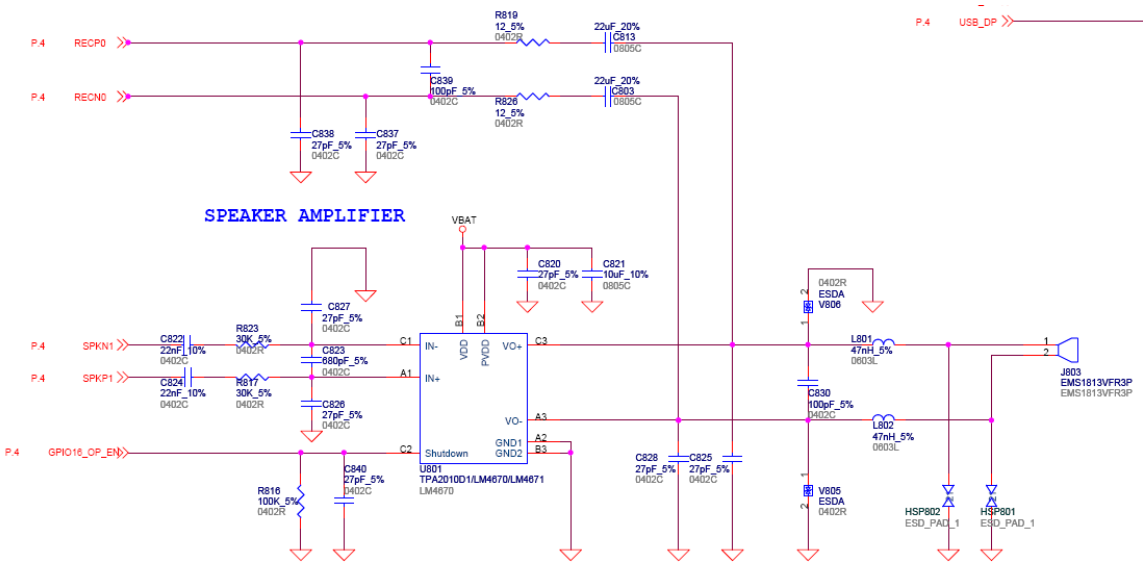
5-2-16.2. Audio Control

Speaker and Receiver interface

SPEAKER interface:

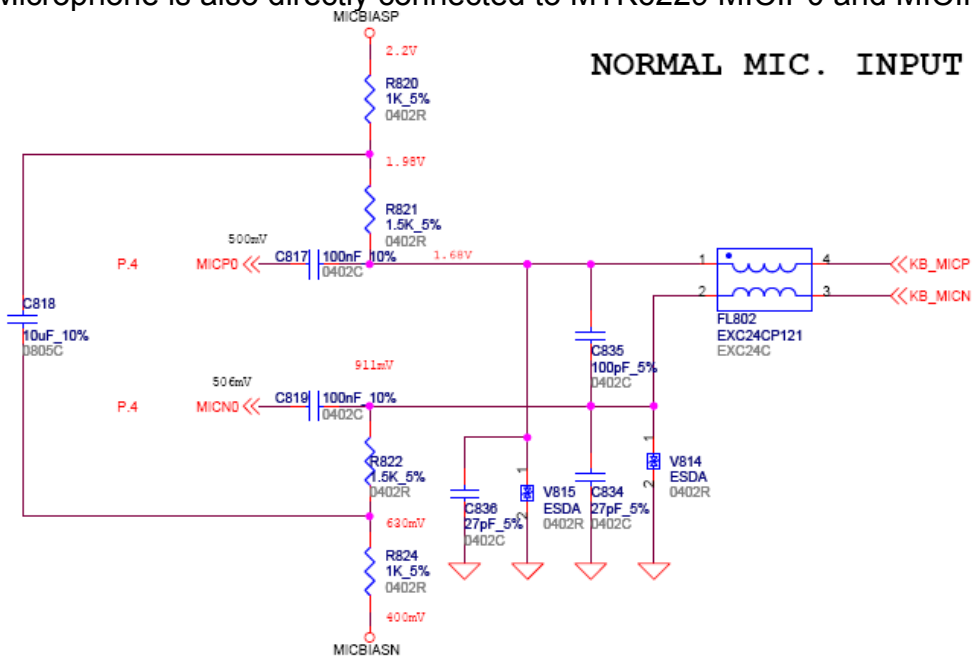
Use U801 to amplify voice and voice signal from SPKN1 and SPKP1

Receiver interface:

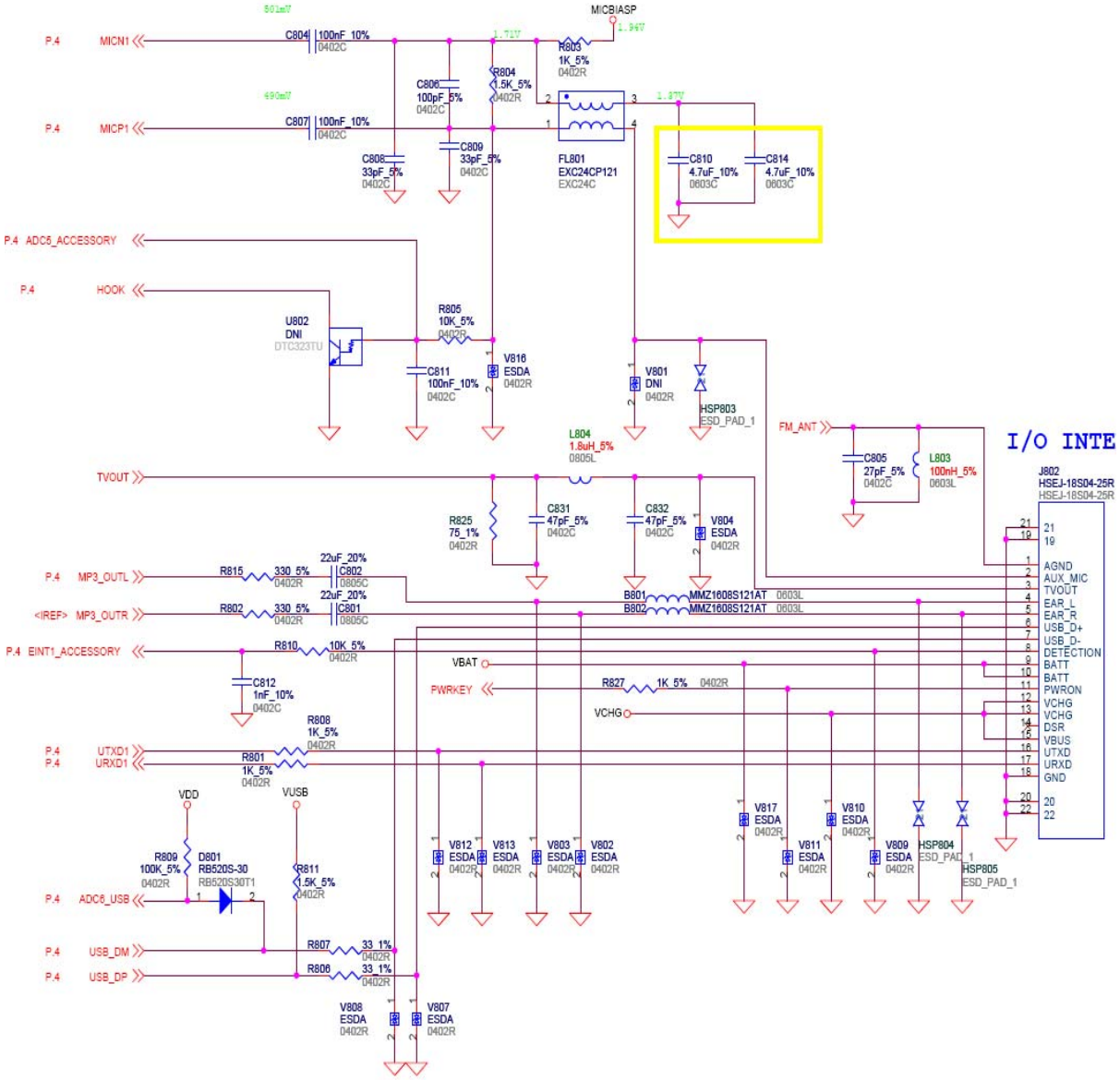


Receiver and Microphone

The Microphone is also directly connected to MTK6229 MICIP0 and MICIN0.



Hands Free Interface



5-2-17 FM interface

MT6229 integrates a mixed-signal Baseband front-end in order to provide a well-organized radio interface with flexibility for efficient customization. It contains gain and offset calibration mechanisms, and filters with programmable coefficients for comprehensive compatibility control on RF modules. This approach also allows the usage of a high resolution D/A Converter for controlling VCXO or crystal, thus reducing the need for expensive TCVCXO. MT6229 achieves great MODEM performance by utilizing 14-bit high resolution A/D Converter in the RF downlink path. Furthermore, to reduce the need for extra external current-driving component, the driving strength of some BPI outputs is designed to be configurable.

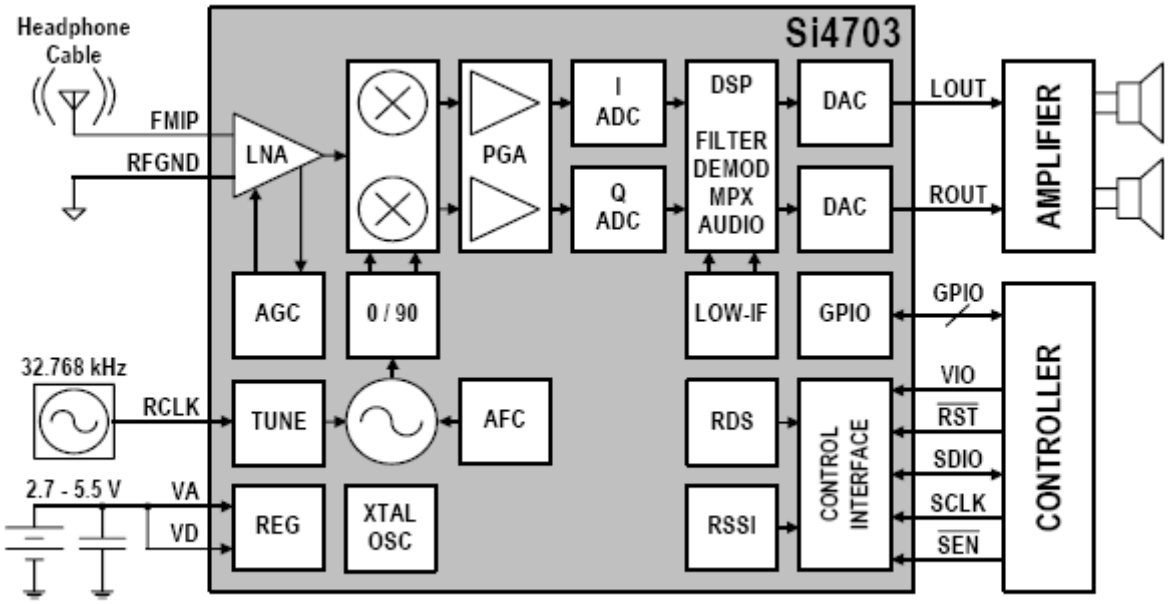
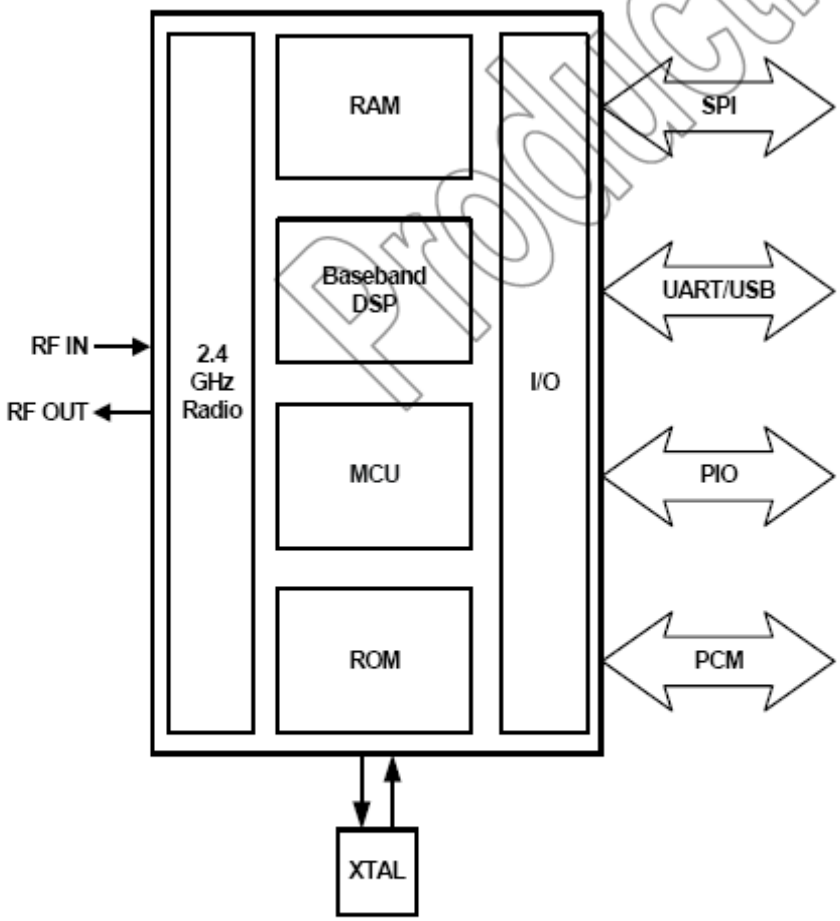


Figure 7. Si4703 FM Receiver Block Diagram

5-2-18 Bluetooth interface

BuleCore3-ROM CSP is signal chip radio and baseband chip for Bluetooth wireless technology 2.4G Hz system .it is implemented in 0.18um CMOS technology.
The 4Mbit ROM is metal programmable ,which enables an eight week turn-around from approval of firm are to production samples.



BlueCore3-ROM CSP System Architecture

5-2-19 RF Sub-systems

1.1 Features

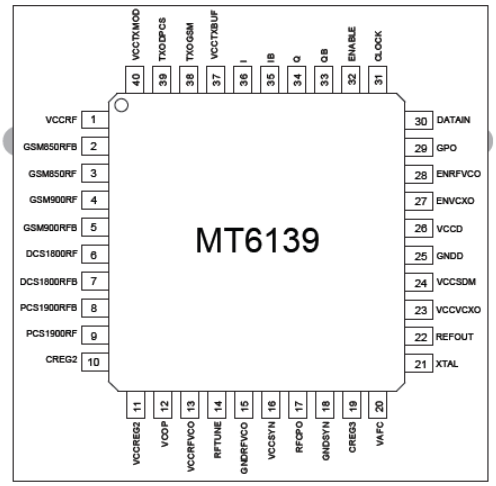
- **Receiver**
  - Direct-conversion architecture with automatic DC-Offset Correction (DCOC) loops
  - Quad-band differential-input LNAs
  - Fully-integrated 135 kHz channel filter
  - 93 dB gain with 60 dB gain control range
  - No IIP2 calibration needed
- **Transmitter**
  - High-precision I/Q modulator
  - Direct-conversion architecture
- **Frequency Synthesizer**
  - Fractional-N architecture with a built-in automatic frequency calibration loop
  - Fully-integrated wide-range VCO
  - Semi-integrated loop filter
- **Voltage-Controlled Crystal Oscillator (VCXO)**
  - One-pin 26 MHz crystal oscillator
  - On-chip programmable capacitor array
  - On-chip varactor
- **Regulators**
  - Built-in low-noise, Low-DropOut (LDO) regulators for Sigma-Delta Modulator (SDM), VCO, and VCXO.
- **3-wire serial interface**
- **0.35μm BiCMOS process**
- **6x6 mm^2 40-pin Quad Flat No-lead (QFN) package**
- **Lead-free/RoHS-compliant**

1.2 Applications

GSM900 / DCS1800 dual-band handsets
GSM850 / PCS1900 dual-band handsets
GSM900 / DCS1800 / PCS1900 tri-band handsets
GSM850 / DCS1800 / PCS1900 tri-band handsets

1.3 General Descriptions

MT6139 is a highly-integrated RF transceiver IC for the Global Systems for Mobile Communication (GSM850/GSM900), Digital Cellular Communication Systems (DCS1800), and Personal Communication Services (PCS1900) cellular systems. It includes four LNAs, two RF quadrature mixers, a channel filter, a programmable-gain amplifier for the receiver, a high-precision I/Q modulator for the transmitter, a 26 MHz VCXO reference, a fractional-N frequency synthesizer with a fully-integrated LC-tank VCO and three built-in LDO regulators for VCO, VCXO and SDM. It is housed in a 40-pin QFN package with a downset paddle for additional grounding. Figure 1 shows the MT6139 functional block diagram.



MT6139 Pin Assignment (Top View)

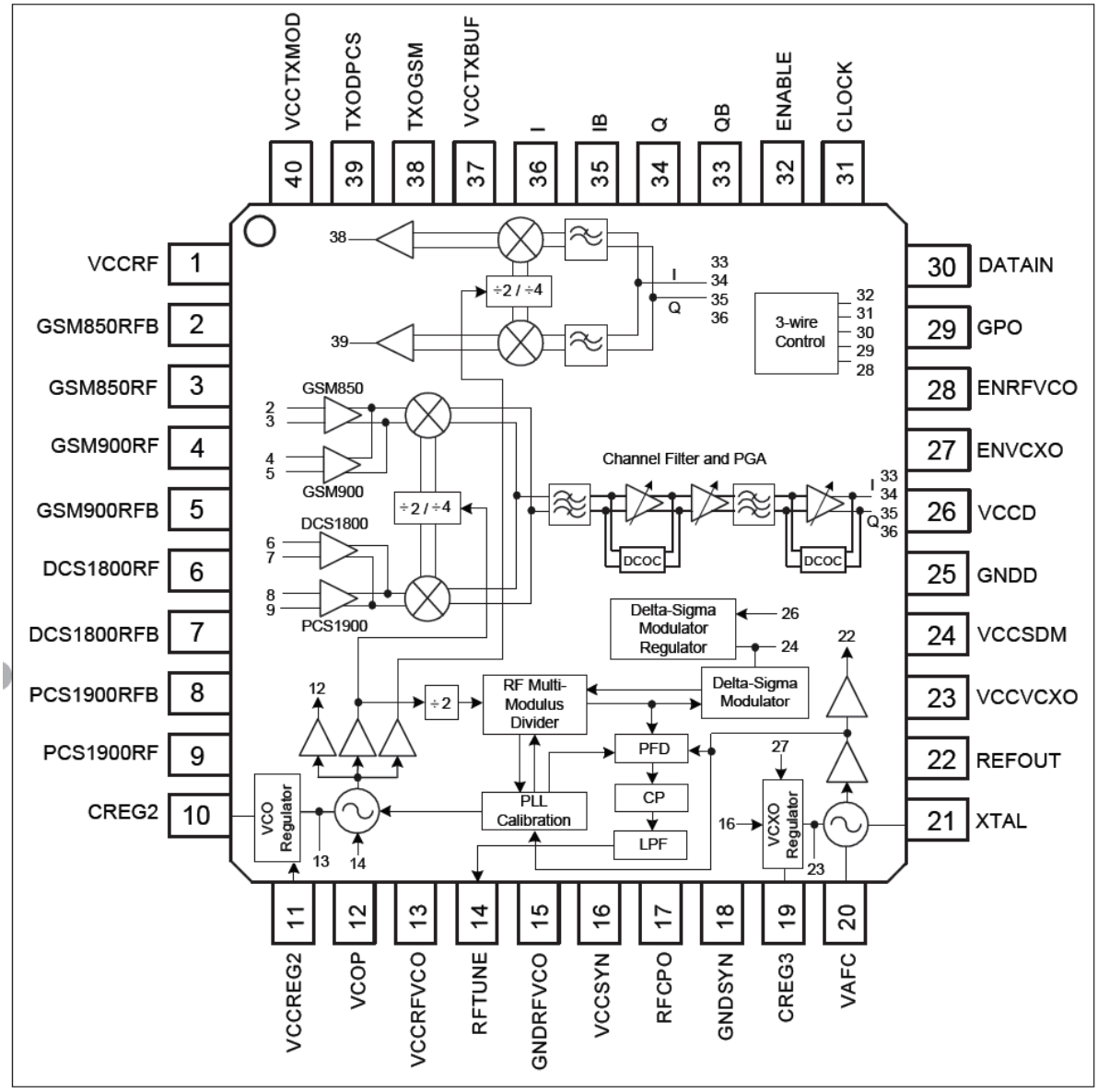


Figure 1 MT6139 Functional Block Diagram

5-2-19.1 Receiver

2.1 Receiver

The receiver section of MT6139 includes Quad-band Low-Noise Amplifiers (LNAs), RF quadrature mixers, channel filters, Programmable-Gain Amplifiers (PGAs), and on-chip automatic DC-offset correction loops. The fully-integrated channel filters reject interference and blocking signals without any external components. The MT6139 includes four differential LNAs for GSM850 (869-894 MHz), GSM900 (925-960 MHz), DCS1800 (1805-1880 MHz) and PCS1900 (1930–1990 MHz) applications. The differential inputs are matched to external SAW filters using LC networks and the H/L gain step is 36 dB. Following the LNAs are two quadrature RF mixers that down-convert the RF signal to IF I/Q signals. The LO signals for mixers are generated by VCO divided-by-2 (for DCS1800/PCS1900) and divided-by-4 (GSM850/GSM900). No external components are needed at the output of the RF mixers.

The IF I/Q signals are then filtered and amplified through a low-pass filter and a PGA. The overall channel reponse composes of an anti-blocking low-pass filter with f_{3dB} = 1.5 MHz at mixer differential load and a 5th-order Butterworth low-pass filter with f_{3dB} = 135 kHz.The multi-stage PGA is implemented between filtering stages to control the gain of the receiver. With a 2 dB gain step, a 60 dB dynamic range of the PGA ensures a proper signal level for baseband setting requirement.

Two DC-Offset Correction (DCOC) loops ensure that the residual static DC-offset voltage held digitally is less than 200mV at maximum gain case. DC-offset correction is performed every time the receiver gain is programmed even in the multislot mode.

By careful control of the chip isolation and mismatch condition, 2nd-order intercept point (IP2) performance (which is correlated to Amplitude-Modulation (AM) suppression performance) is guaranteed by design and no calibration procedure is needed.

2.2 Transmitter

MT6139 transmitter adopts the direct-conversion architecture with higher integration level and simpler frequency plan. It consists of BaseBand (BB) I/Q filters, I/Q modulators, frequency dividers, output buffers and a bias-core circuit. BB I/Q differential signals from the BB chip are fed into the one-pole RC low-pass filter first for better out-of-the-band noise performance. The 3-dB frequency corner is allocated at 700 kHz. Two double balanced mixers (modulators), one for I+/I- and another for Q+/Q- signals, are responsible for translating the filtered BB I/Q signals to the transmitting frequencies. LO signals are provided by the divided-by-2 (for DCS1800/PCS1900) and divided-by-4 (for GSM850/GSM900) dividers. Such kind of the frequency plan will minimize VCO pulling effect and also achieve the better in-band phase noise. The output buffers amplify the modulator output signals to an adequate level to fulfill P_{in} requirement of Power Amplifiers (PA). A Proportional-To-Absolute-Temperature (PTAT) bias-core circuit is used to minimize output power variations under temperature extremes. At last, the on-chip balun is used to convert the differential signals to single-ended output signal.

2.3 RF Frequency Synthesizer

2.3.1 Synthesizer System Description

The MT6139 includes a Phase-Locked Loop (PLL)-based fractional-N frequency synthesizer with a fully-integrated LC-tank VCO. It provides the Local Oscillator (LO) signals for both receiver and transmitter. In order to reduce the inherent spurs caused by the fractional-N synthesizer, a 3rd-order sigma-delta modulator with a dithering function is

used to generate the division number N for the prescaler. The prescaler is composed of a high-frequency divided-by-2 circuit and a multi-modulus frequency divider with the programmable division number ranging from 32 to 127. A conventional digital-type Phase-Frequency Detector (PFD) with a charge pump is used for phase comparison. By changing the output current of the charge pump, the phase detector gain can be programmed from $50/2\pi$ μA/rad to $400/2\pi$ μA/rad.

To reduce the acquisition time or to enable fast settling time for multi-slot data services such as GPRS, a digital frequency calibration loop along with a fast-acquisition system are implemented in the RF synthesizer. During the synthesizer programming, the VCO is pre-set to the vicinity of the desired frequency by the digital frequency calibration loop. After the frequency calibration is finished, a fast-acquisition option is utilized for a period of time to facilitate fast locking. Once the acquisition is done, the PLL reverts back to the normal operation mode.

2.3.2 Synthesizer Frequency Programming

The frequency range of the RF synthesizer is as following.

Rx mode	GSM850	3476 MHz ~ 3576 MHz
	GSM900	3700 MHz ~ 3840 MHz
	DCS1800	3610 MHz ~ 3760 MHz
	PCS1900	3860 MHz ~ 3980 MHz
Tx mode	GSM850	3296 MHz ~ 3396 MHz
	GSM900	3520 MHz ~ 3660 MHz
	DCS1800	3420 MHz ~ 3570 MHz
	PCS1900	3700 MHz ~ 3820 MHz

And the division number N can be decided by the following procedure.

1. Calculate LO frequency f_{VCO} from Rx channel frequency f_{CH}
   $f_{VCO} = 4 * f_{CH}$ for GSM850 and GSM900
   $f_{VCO} = 2 * f_{CH}$ for DCS1800 and PCS1900
2. Calculate the division number N, N_{int} and N_{frac}
   $N = (f_{VCO}/2) / 26\ MHz = N_{int} + N_{frac}/130$ N_{int} and N_{frac} are integers
   $0 \le N_{frac} < 130$
3. Use the binary equivalents of N_{int} and N_{frac} to program registers CW1-N_INTEGER[1] and CW1-N_FRACTION[1].

2.3.3 Digital Frequency Calibration Loop

The MT6139 adopts a digital calibration technique to shorten the synthesizer locking time. Once the frequency synthesizer is programmed through a 3-wire serial interface, a calibration loop is activated. The main function of the calibration loop is to preset the VCO to the vicinity of the desired frequncy quickly and correctly, thus aiding the PLL to settle faster. On the other hand, since a large portion of initial frequency error is dealt with by the integrated calibration loop, the overall locking time can be drastically confined within a small range, irrespective of the desired frequency.

2.3.4 Fast-Acquisition Option

After the digital calibration loop presets the VCO, the RF synthesizer reverts to the PLL operation and a fast-acquisition option is activated. For faster settling, the charge pump current is set to a higher current than normal setting for a period of time. In MT6139, 20 μs or 60 μs is allowed.

2.4 Voltage-Controlled Crystal Oscillator (VCXO)

The VCXO consists of an amplifier, an output buffer, a programmable capacitor array and on-chip varactors. It is an one-pin, parallel-resonance design where a grounded 26 MHz crystal can be used. The output buffer provides a typical 600 mV_{pp} voltage swing at 26 MHz to the BB processor. The programmable capacitor array is used to compensate initial crystal tolerance and aging while the on-chip varactors are used for Automatic Frequency Control (AFC) function.

2.5 Regulator

In MT6139, there are three built-in LDO regulators to provide low-noise, stable, temperature and process independent supply voltages to critical blocks, including VCO, VCXO and sigma-delta modulator. The regulated voltages for these three critical blocks are 1.2 V, 2.5 V and 2 V, respectively. In this way, the pushing figures of VCO and VCXO can be enhanced and the fractional-N spurs caused by SDM can be minimized as well.

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SECTION 6

Servicing

6-1. Structure
6-2. Accessories
6-3. Exploded Diagram
6-4. Assembly
6-5. Disassembly
6-6. Soldering

6-1. STRUCTURE

1. KP320

Front View

Back View

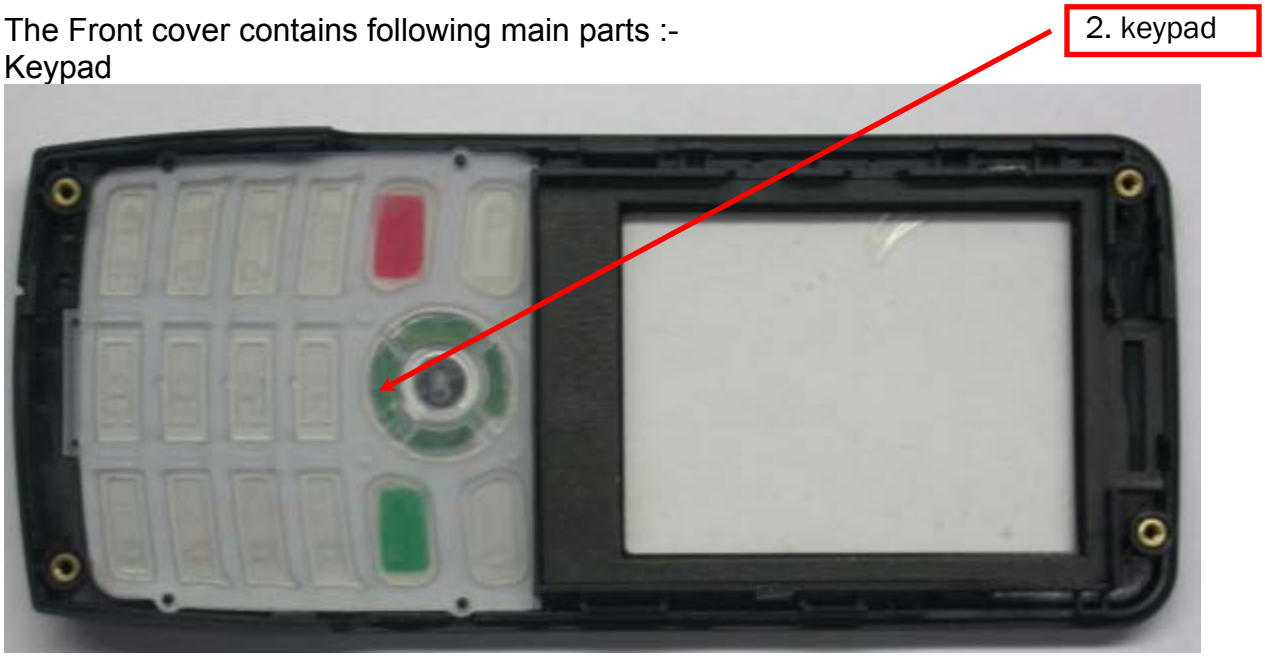
MAIN BOARD ASSEMBLY

The lower board consists of the following circuits:-

1. Tri band GPRS GSM Transceiver and logic Unit
2. SIM connection socket
3. System I/O connector with charge capability
4. battery terminals
5. Hands free jack
6. Embedded tri band antenna connection terminal
7. Vibrator connection terminal
8. Microphone connection terminal
9. Camera connection terminal
10. Receiver connection terminal
11. Speaker connection terminal
12. SD Card connection terminal
13. LED, camera control and LCD driver circuit
14. Flash LED connector terminal

FRONT COVER

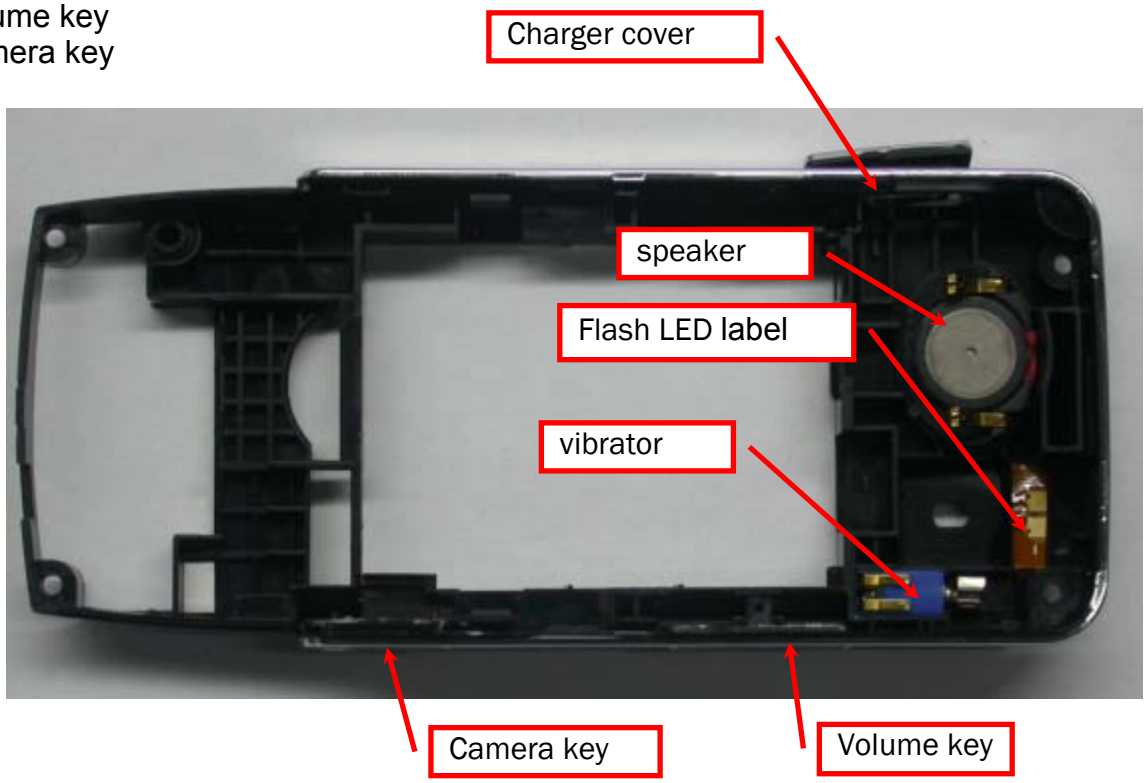
The Front cover contains following main parts :-
Keypad



REAR COVER

The Rear cover contains following main parts :-

1. Speaker
2. Vibrator
3. Flash LED label
4. Charger cover
5. SD card cover
6. Volume key
7. Camera key



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6-2. ACCESSORIES

BATTERY

AC ADAPTER

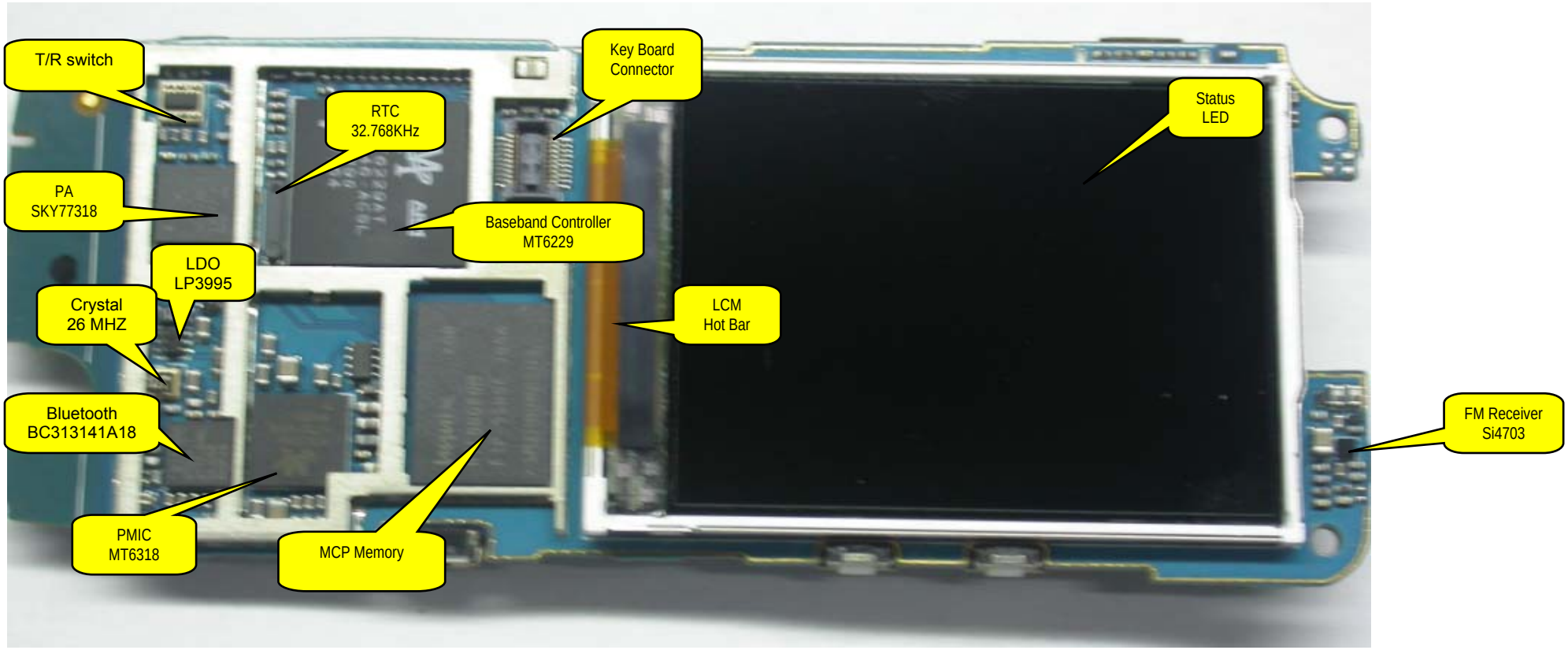
HANDSFREE & USB CABLE

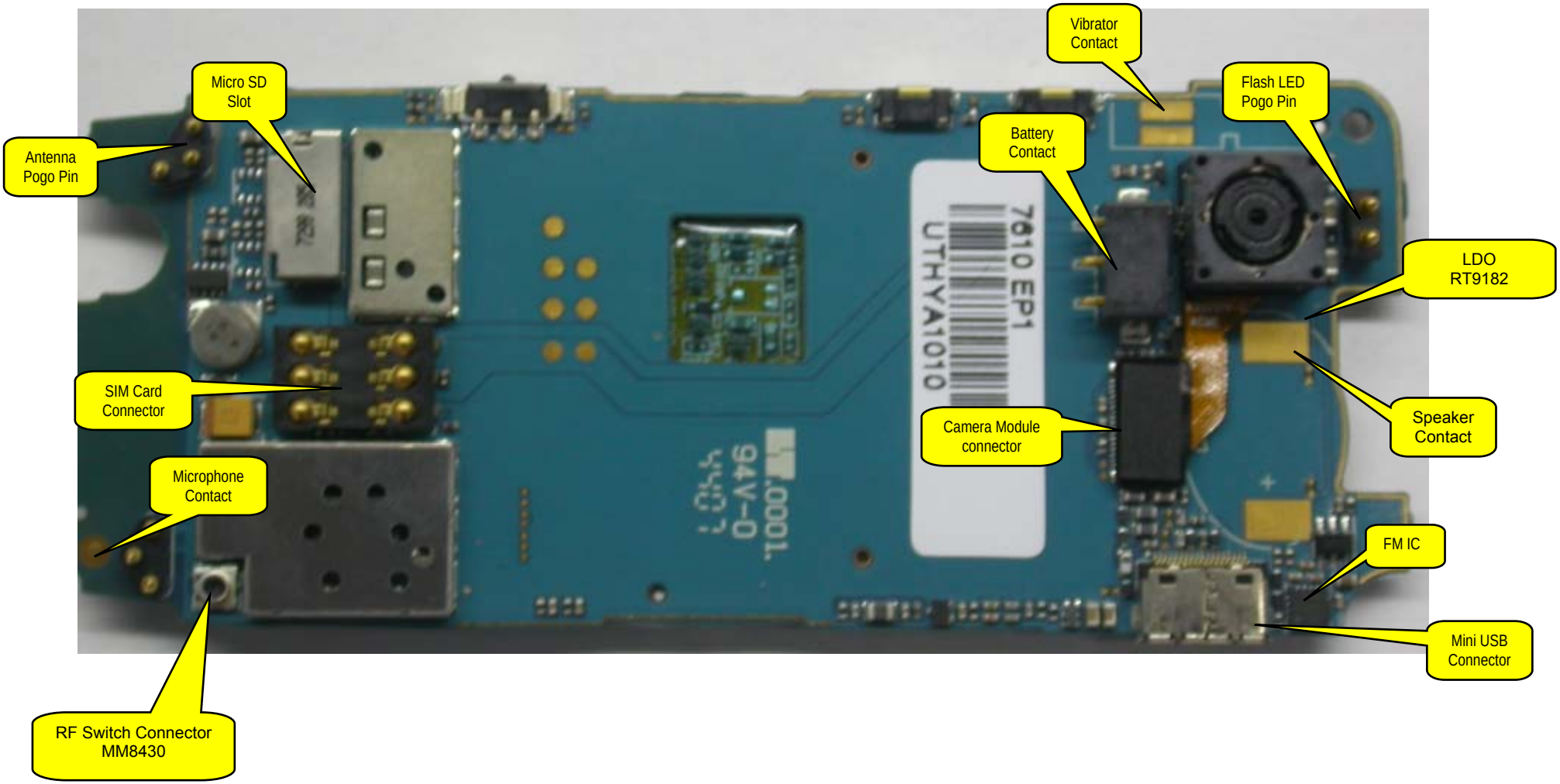
Cable

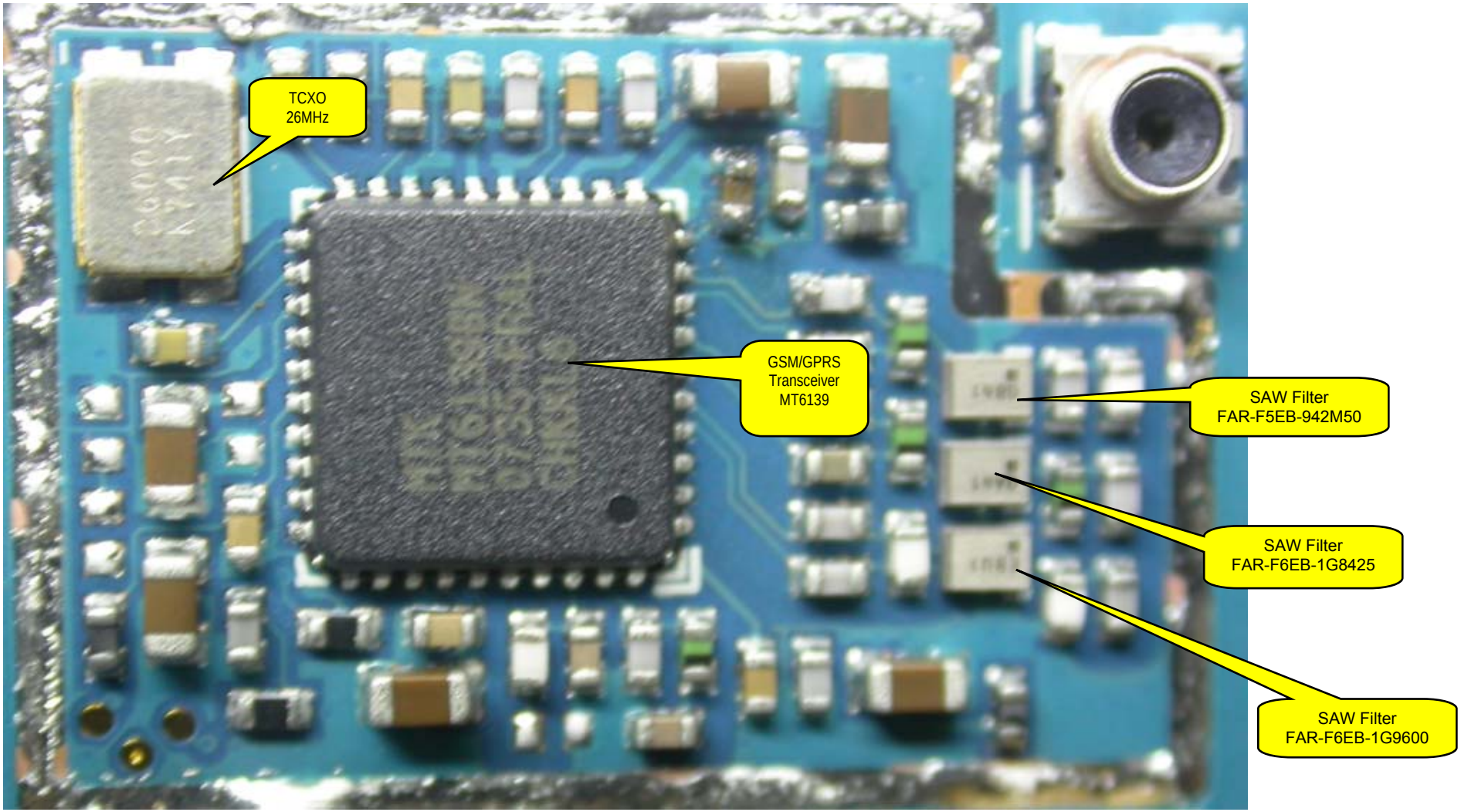
6-6. SOLDERING

SOLDERING PARTS LOCATION

SOLDERING REPAIRED PARTS AT SERVICE LEVEL 2 ARE SHOWN AS BELOW.




Vibrator Contact
Micro SD Slot
Flash LED Pogo Pin
Antenna Pogo Pin
Battery Contact
LDO RT9182
SIM Card Connector
Speaker Contact
Camera Module connector
Microphone Contact
FM IC
Mini USB Connector
RF Switch Connector MM8430


TCXO
26MHz
GSM/GPRS
Transceiver
MT6139
SAW Filter
FAR-F5EB-942M50
SAW Filter
FAR-F6EB-1G8425
SAW Filter
FAR-F6EB-1G9600

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Section 7

Repairing

7-1. Testing

7-2. Troubleshooting

7-3. Circuit Diagrams

7-1. TESTING

OVERVIEW

1. Product overview and frequency assignment

Radio Frequency Band	TX E-GSM	880MHz to 915MHz (deltaF=200KHz)
	RX E-GSM	925MHz to 960MHz (deltaF=200KHz)
	TX DCS1800	1710MHz to 1785MHz
	RX DCS1800	1805MHz to 1880MHz
	TX PCS1900	1850MHz to 1910MHz
	RX PCS1900	1930MHz to 1990MHz
ARFCN	E-GSM	Ful(n) = 890 + 0.2 x n at (0 <= n <= 124)
		Ful(n) = 880 + 0.2 x (n-1024) at (975 <= n <= 1023)
		Fdl(n) = Ful(n) + 45
	DCS1800	Ful(n) = 1710.2 + 0.2 x (n-512) at (512 <= n <= 885)
		Fdl(n) = Ful(n) + 95
	PCS1900	Ful(n) = 1850.2 + 0.2 x (n-512) at (512 <= n <= 810)
		Fdl(n) = Ful(n) + 80
RF Local Synthesizer	E-GSM	1279~1314 MHz
	DCS1800	1327~1402 MHz
	PCS1900	1423~1483 MHz
TX IF Frequency	E-GSM	798 MHz (Typ) (880-895 MHz, 900-915 MHz)
		790 MHz (Typ) (895-900 MHz)
	DCS1800	766 MHz (Typ)
	PCS1900	854 MHz (Typ)
Access form		8 channel multiple TDMA
Multiple		8 channel / carrier (E-GSM/DCS1800/PCS1900)
Modulation		270.8333Kbit/s GMSK
Peak output power	E-GSM	2W(33dBm) Class4 MTS
	DCS1800	1W(30dBm) Class1 MTS
	PCS1900	1W(30dBm) Class1 MTS
Nominal supply voltage		+3.8V
TX peak current		2500mA max.
GPRS Class		Class10 (max 1UL/4DL) Operation class B
GPRS Coding scheme		CS1/CS2/CS3/CS4

2. Channel selection conditions

Verify that there is no interference from other radio devices or neighboring measurement systems in the frequencies to be used for the test. If there is interference, select the test channels within the range of the following channels. Especially in case of bit error tests, make sure that there is no influence from outside before the test. If necessary, use a shielded box or take other channel measures.

	E-GSM	DCS1800	PCS1900
Lch	975ch to 980ch	513ch to 523ch	512ch to 522ch
Mch	60ch to 65ch	690ch to 710ch	657ch to 667ch
Hch	120ch to 124ch	874ch to 884ch	800ch to 810ch

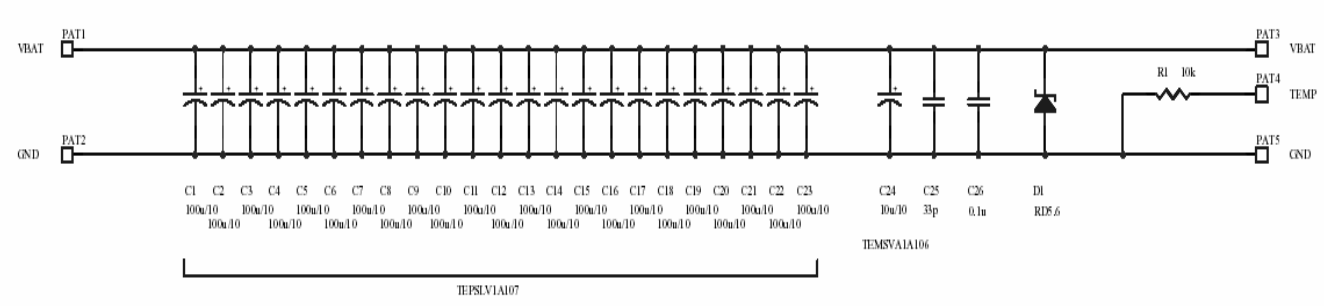
3. Product Specification

Based on GSM 11.10-1 / 3G TS 51.110

4. Measurement adapter

Dummy battery

Dummy battery should be used shown as follows:



Test SIM card

In confidence test, general Phase2 (or Phase2+) test SIM should be used.

RF connector and RF cable

RF connector and RF cable should be used for RF test

PC-Link cable

PC-link cable (Serial Link Cable) should be used.

FUNCTION TEST

1. Test purpose

a) To verify Appearance by visual check
b) To verify recognition of SIM card
c) To verify Function Test in the table shown as below
d) To verify power down phone

2. Test System

1. Power Supply Unit (PSU)+Dummy Battery or Battery
2. Test SIM Card (Spec: GSM Phase 2+ Test SIM Standard 1(3.1))
3. Sample Hands free Kit (SHF, Stereo)

3. Test Procedure

3.1 Appearance Test

Verify appearance by visual check

3.2 SIM Test

Verify recognition of SIM card
If “Insert SIM” indicated on Display, it is NG.

3.3 Enter Service Mode

3.1.1 No SIM Card installed

a. Power on Phone
b. Press **878** to enter service mode.

3.1.2 SIM Card installed

a. Power on Phone
b. Press ***#878#** to enter service mode.

3.1.3 Software Version Check

Select item 1 “Service Info” in Service mode to check software version.

3.4 MMI Tests

1. Auto test
2. BT Mode
3. Echo Loop
4. Version
5. Resource BIN
6. Keypad
7. Vibrator
8. Loud SPK
9. Ring Tone
10. LED
11. LCD
12. Receiver
13. ADC
14. Charger
15. Headset
16. RTC
17. MTBF
18. UART
19. Memory Card
20. Nand Flash
21. Camera
22. Total call time
23. FM Radio

CONFIDENCE TEST

1. Test purpose

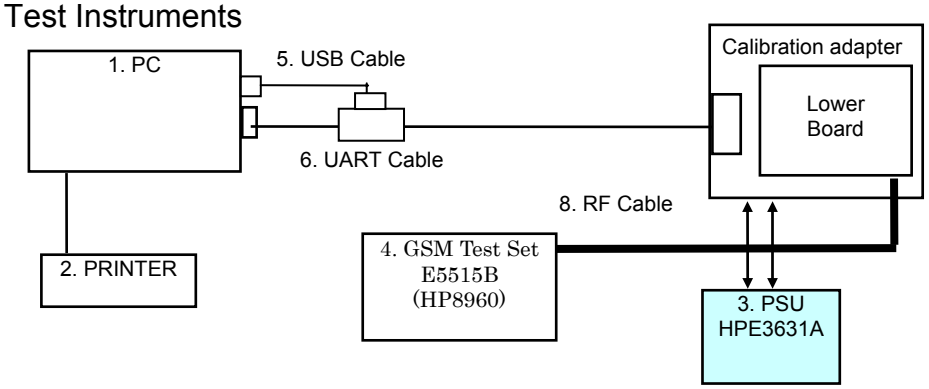
This test is for check RF characteristics.

2. Test system

1. PC
2. Printer
3. PSU
4. GSM Test Set
5. USB Cable
6. UART Cable
7. Calibration Adapter
8. RF Cable

Measurement setup is shown as follows:

Test Instruments

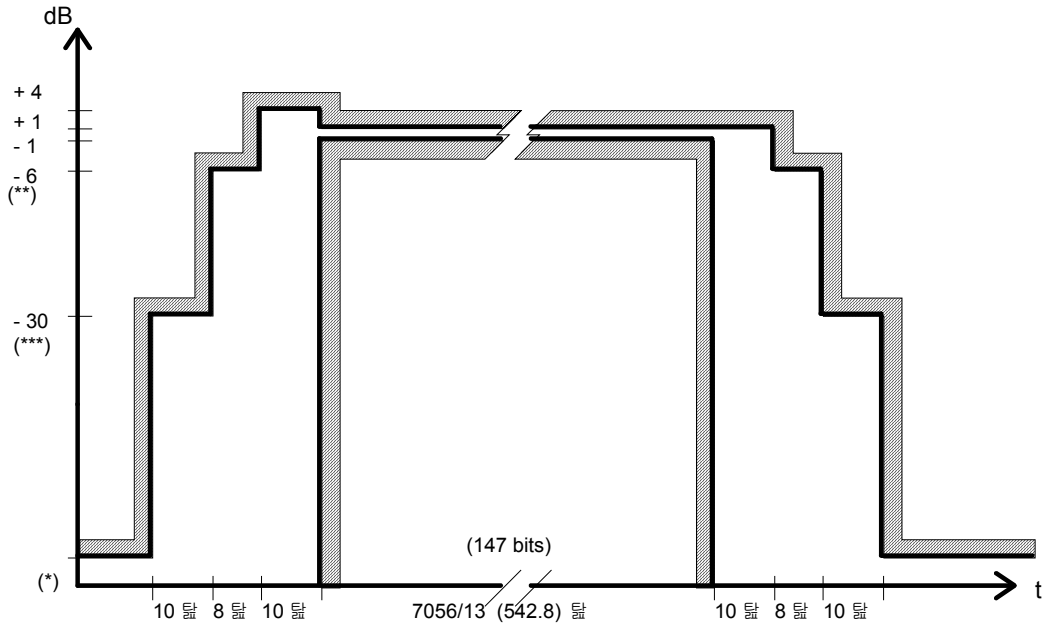


3. Test Specification

Measurement item and specification is defined as follows:

Test Item	Specification		
	E-GSM	DCS1800	PCS1900
TX Maximum Power	33dBm +/-2dB	30dBm +/-2dB	
TX Power	31dBm +/- 3dB @ PL6 29dBm +/- 3dB @ PL7 27dBm +/- 3dB @ PL8 25dBm +/- 3dB @ PL9 23dBm +/- 3dB @ PL10 21dBm +/- 3dB @ PL11 19dBm +/- 3dB @ PL12 17dBm +/- 3dB @ PL13 15dBm +/- 3dB @ PL14 13dBm +/- 3dB @ PL15 11dBm +/- 5dB @ PL16 9dBm +/- 5dB @ PL17 7dBm +/- 5dB @ PL18 5dBm +/- 5dB @ PL19	28dBm +/- 3dB @ PL1 26dBm +/- 3dB @ PL2 24dBm +/- 3dB @ PL3 22dBm +/- 3dB @ PL4 20dBm +/- 3dB @ PL5 18dBm +/- 3dB @ PL6 16dBm +/- 3dB @ PL7 14dBm +/- 3dB @ PL8 12dBm +/- 4dB @ PL9 10dBm +/- 4dB @ PL10 8dBm +/- 4dB @ PL11 6dBm +/- 4dB @ PL12 4dBm +/- 4dB @ PL13 2dBm +/- 5dB @ PL14 0dBm +/- 5dB @ PL15	
RMS Phase error	<5deg		
PEAK Phase error	<20deg		
Frequency Error	< 90Hz	< 180Hz	< 185Hz
Power Vs Time	pass/fail indication. Detail specification is shown as table 4.1		
RX Class2 RBER	<2.4% @ -103.5dBm (avg 10000bit)		
RX Level	7 +/-4 @ -103.5dBm		
RX Quality	<3 @ -103.5dBm		

Power Vs Time mask specification



Time mask for normal duration bursts(NB,FB,dB and SB) at GMSK modulation

(*)	For GSM 900 MS	:	-59 dBc or -54 dBm, whichever is the greater, except for the time slot preceding the active slot, for which the allowed level is -59 dBc or -36 dBm whichever is the greater
	For DCS1800 and PCS1900 MS	:	-48 dBc or -48 dBm, whichever is the higher.
(**)	For GSM 900 MS	:	-4 dBc for power control level 16; -2 dBc for power level 17; -1 dBc for power level controls levels 18 and 19.
	For DCS1800 and PCS1900 MS	:	-4dBc for power control level 11, -2dBc for power level 12, -1dBc for power control levels 13,14 and 15
(***)	For GSM 900 MS	:	-30 dBc or -17 dBm, whichever is the higher.
	For DCS1800 and PCS1900 MS	:	-30dBc or -20dBm, whichever is the higher.

4. Test Procedure

Test items should be sequential in the table shown as below. Due to limitation of GSM test set, the test should be started under E-GSM mode and hand over to DCS1800. In PCS1900 mode, the test should be started under PCS1900 mode.

Default setting of GSM test set and PSU is shown as follows:

(Internal Loss)	(Please measure cable loss on first set-up and calibrate it.)
CALL STATUS	IDLE
CELL STATUS	ACTIVE CELL
OPERATING MODE	E-GSM
Expected input level	TX Level 5 : 33dBm
Control Base station Broadcast	Broadcast ON
Control Base station Channel	20
Control Base station Amplitude	-85dBm
Mobile Phone Channel	62 (could be changed ARFCN Mch)
Mobile Phone TX Level	5
Mobile Phone Timeslot	4
PSU output voltage	+3.8V +/- 0.05V
PSU maximum current limit	2500mA

CALL STATUS	IDLE
CELL STATUS	ACTIVE CELL
OPERATING MODE	PCS1900
Expected input level	TX Level 0 : 30dBm
Control Base station Broadcast	Broadcast ON
Control Base station Channel	512
Control Base station Amplitude	-85dBm
Mobile Phone Channel	661 (could be changed ARFCN Mch)
Mobile Phone TX Level	0
Mobile Phone Timeslot	4
PSU output voltage	+3.8V +/- 0.05V
PSU maximum current limit	2800mA

Test item	MODE	Procedure
Start up	E-GSM	1. Set SIM card and dummy battery to HHP 2. Power on HHP 3. Wait to indicate “GSM Test Net 001”
Call setup	E-GSM	1. Input the PTE command “StartCall” 2. Input the PTE command “Receivecall”. 3. Wait to indicate “Active” to establish call
TX Power	E-GSM DCS1800	1. ARFCN is assign to Mch (and Lch/Hch) 2. Set PL to 5(E-GSM) or 0(DCS1800) 3. Wait to establish hand over 4. Measure output power
RMS Phase error	E-GSM DCS1800	1. ARFCN is assigned to Mch (or Lch/Hch) 2. Set PL to 5(E-GSM) or 0(DCS1800) 3. Wait to establish hand over 4. Change mode of GSM tester to “Phase/FREQ” 5. Set analyze burst number to 50 6. Read “RMS maximum” window
PEAK Phase error	E-GSM DCS1800	1. ARFCN is assigned to Mch (or Lch/Hch) 2. Set PL to 5(E-GSM) or 0(DCS1800) 3. Wait to establish hand over 4. Change mode of GSM tester to “Phase/FREQ” 5. Set analyze burst number to 50 6. Read “PEAK maximum” window
Frequency Error	E-GSM DCS1800	1. ARFCN is assigned to Mch (or Lch/Hch) 2. Set PL to 5(E-GSM) or 0(DCS1800) 3. Wait to establish hand over 4. Change mode of GSM tester to “Phase/FREQ” 5. Set analyze burst number to 50 6. Read “Frequency error maximum” window
Power Vs Time	E-GSM DCS1800	1. ARFCN is assigned to Mch 2. Set PL to 5(E-GSM) or 0(DCS1800) 3. Wait to establish hand over 4. Change mode of GSM tester to “Power Ramp” 5. To check pass/fail indication under three mode “TOP 2dB” “Rise edge” and “Fall edge”
RX Class2 RBER	E-GSM DCS1800	1. ARFCN is assigned to Mch*1 2. Set PL to 5(E-GSM) or 0(DCS1800) 3. Wait to establish hand over 4. Change mode of GSM tester to “Bit error” 5. To define sampling value to 10000 6. To define measure “Res Type 2” 7. To adjust base station output level to -103.5dBm 8. Wait to indicate BE Ratio and read it.
RX Level	E-GSM DCS1800	1. Same setting and procedure as RX RBER 2. Wait to indicate “Mobile reported Rxlev” and read it.
RX Quality	E-GSM DCS1800	1. Same setting and procedure as RX RBER 2. Wait to indicate “Mobile reported RX Qual” and read it.
Hand over	E-GSM to DCS1800	1. Change mode of GSM tester to “DUAL BAND” 2. To define DCS1800 parameter. ARFCN to Mch, Base station output level to –85dBm, Mobile power level to PL0. 3. Push “Execute” and check establish hand over.
		(Test is repeated under DCS1800 band)
Close down	DCS1800	1. Push “END Call” of GSM tester 2. Wait to indicate “Call End” and change to idle screen. 3. Push “Power” to check shut down.

***1 Refer to 1.Overview Channel selection condition**

Test item	MODE	Procedure
Band Change	E-GSM / DCS1800 -> PCS1900	1. Change mode of GSM tester to “PCS1900”. 2. Set HHP to PCS1900 mode using PTE Command Use PTE command 00140 => SetBandSelect,1
Call setup	PCS1900	1. Input the PTE command “Start Call” 2. input the PTE command “Receive call” 3. Wait to indicate “Active” to establish call
TX Power	PCS1900	1. ARFCN is assign to Mch (or Lch/Hch) 2. Set PL to 0(PCS1900) 3. Wait to establish hand over 4. Measure output power
RMS Phase error	PCS1900	1. ARFCN is assigned to Mch (or Lch/Hch) 2. Set PL to 0(PCS1900) 3. Wait to establish hand over 4. Change mode of GSM tester to “Phase/FREQ” 5. Set analyze burst number to 50 6. Read “RMS maximum” window
PEAK Phase error	PCS1900	1. ARFCN is assigned to Mch (or Lch/Hch) 2. Set PL to 0(PCS1900) 3. Wait to establish hand over 4. Change mode of GSM tester to “Phase/FREQ” 5. Set analyze burst number to 50 6. Read “PEAK maximum” window
Frequency Error	PCS1900	1. ARFCN is assigned to Mch (or Lch/Hch) 2. Set PL to 0(PCS1900) 3. Wait to establish hand over 4. Change mode of GSM tester to “Phase/FREQ” 5. Set analyze burst number to 50 6. Read “Frequency error maximum” window
Power Vs Time	PCS1900	1. ARFCN is assigned to Mch 2. Set PL to 0(PCS1900) 3. Wait to establish hand over 4. Change mode of GSM tester to “Power Ramp” 5. To check pass/fail indication under three mode “TOP 2dB” “Rise edge” and “Fall edge”
RX Class2 RBER	PCS1900	1. ARFCN is assigned to Mch*1 2. Set PL to 0(PCS1900) 3. Wait to establish hand over 4. Change mode of GSM tester to “Bit error” 5. To define sampling value to 10000 6. To define measure “Res Type 2” 7. To adjust base station output level to -103.5dBm 8. Wait to indicate BE Ratio and read it.
RX Level	PCS1900	1. Same setting and procedure as RX RBER 2. Wait to indicate “Mobile reported Rx lev” and read it.
RX Quality	PCS1900	1. Same setting and procedure as RX RBER 2. Wait to indicate “Mobile reported RX Qual” and read it.
Close down	PCS1900	1. Push “END Call” of GSM tester 2. Wait to indicate “Call End” and change to idle screen. 3. Push “Power” to check shut down.

***1 Refer to 1.Overview Channel selection condition**

3. Test Specification

Measurement item and specification is shown as below :

Test item	MODE	Specification
TX Maximum Power	E-GSM	+24dBm ~ +43dBm

Test item	MODE	Specification
Current Value		Max 100mA
USB I/F Check		Detection of HHP COM port

4. Test Procedure

Test items should be sequential in the table shown as below :

Test item	MODE	Procedure
Start up	E-GSM	1. Set dummy battery to HHP 2. Link cable is connected （auto power ON） 3. Put Into test mode
TX Power	E-GSM	1. ARFCN is assign to Mch 2. Set PL to 5(E-GSM) 3. Measure output power
Current Check		1. Input following PTE command. Use PTE Command, <Magic Number> Cont Tx off Backlight off Key Backlight off Select Backlight off 2. Check current value
USB I/F Check		1. Check detection of HHP COM port *1

5. Back Up Battery Check

Back Up Battery Check must performed after FT process

Back Up Battery Check process is shown as follows :

1.RTC time is automatically set up at FT process（2004/01/01 00:00）

2.Check the RTC time next process

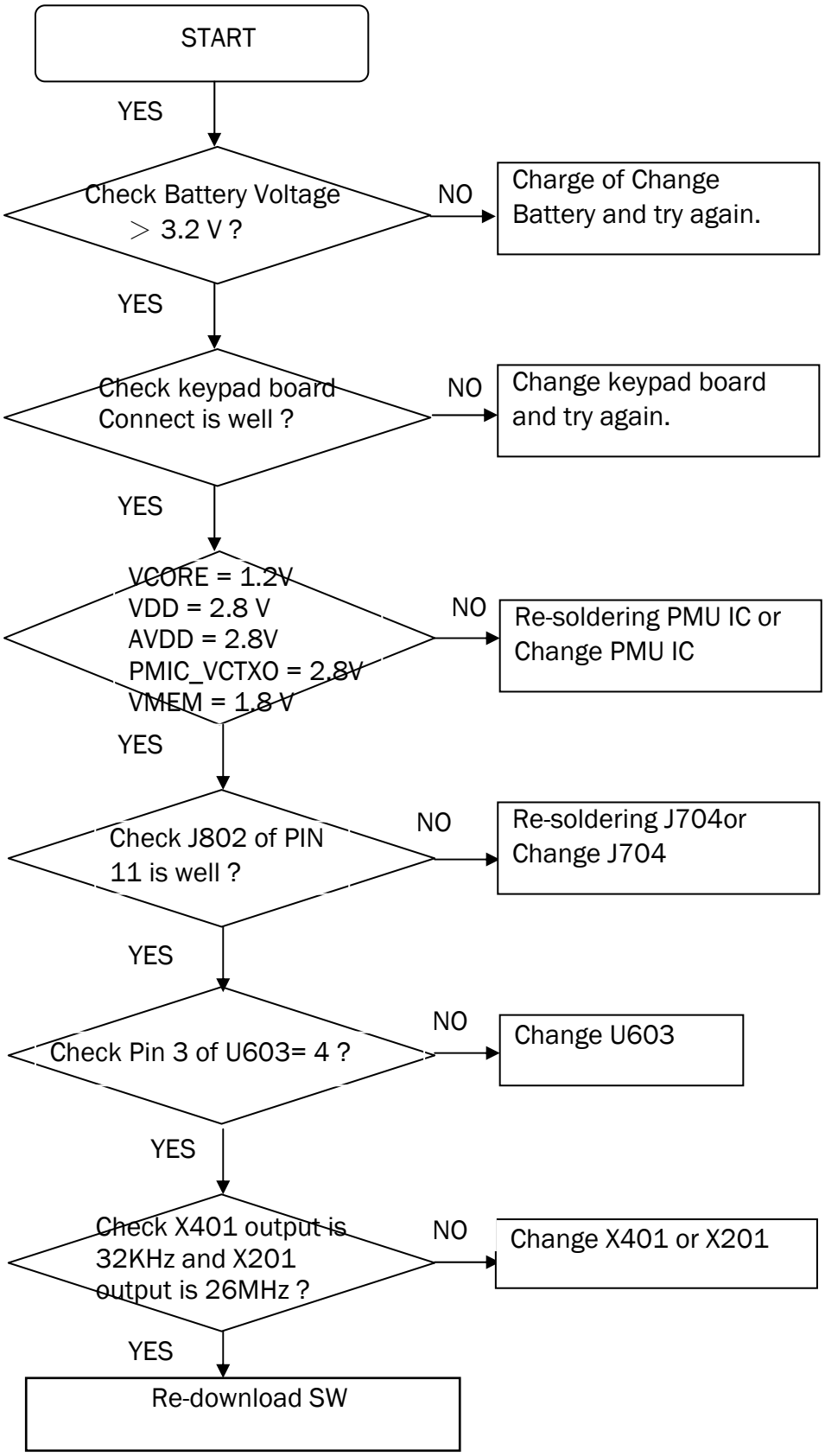
ITEM	DETAIL	PTE command	Specification
Check RTC time	Check the RTC clock register value	HexPeek,700CC008,3,1	Min05a39a80(HEX) Max05a4ec00(HEX) (24hour)

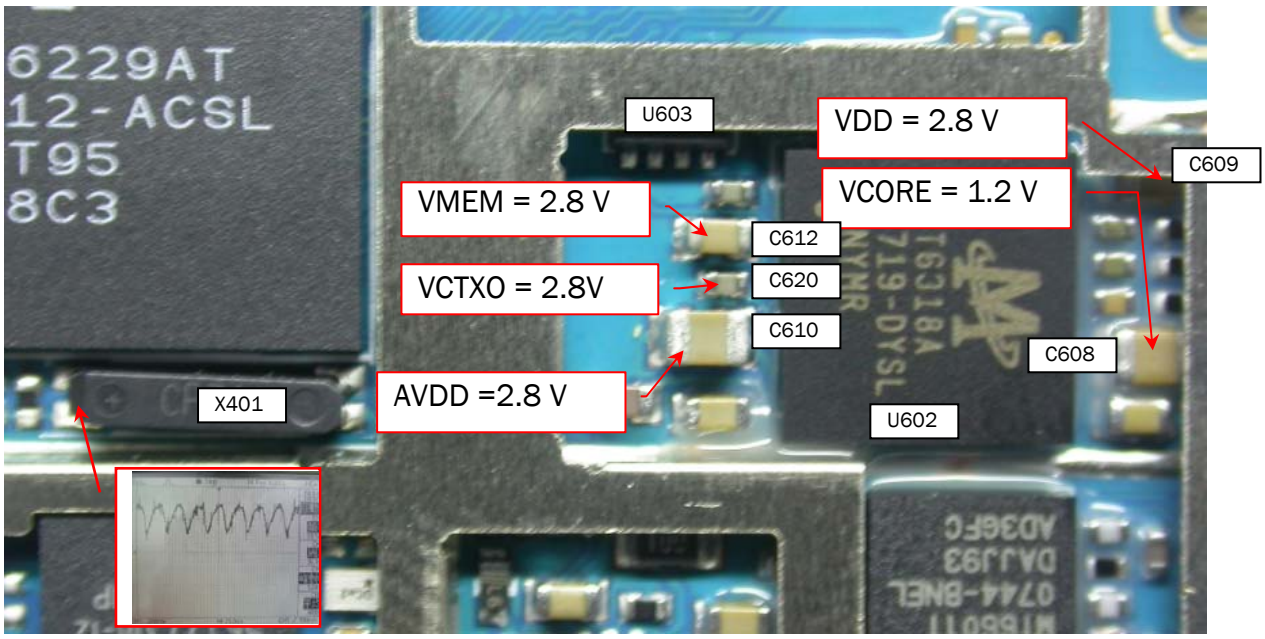
Note: Stingray's Back Up Battery will become empty in 2.5 days.
Back Up Battery test must be performed within two days after soldering VIB FPC.

7-2. TROUBLE SHOOTING

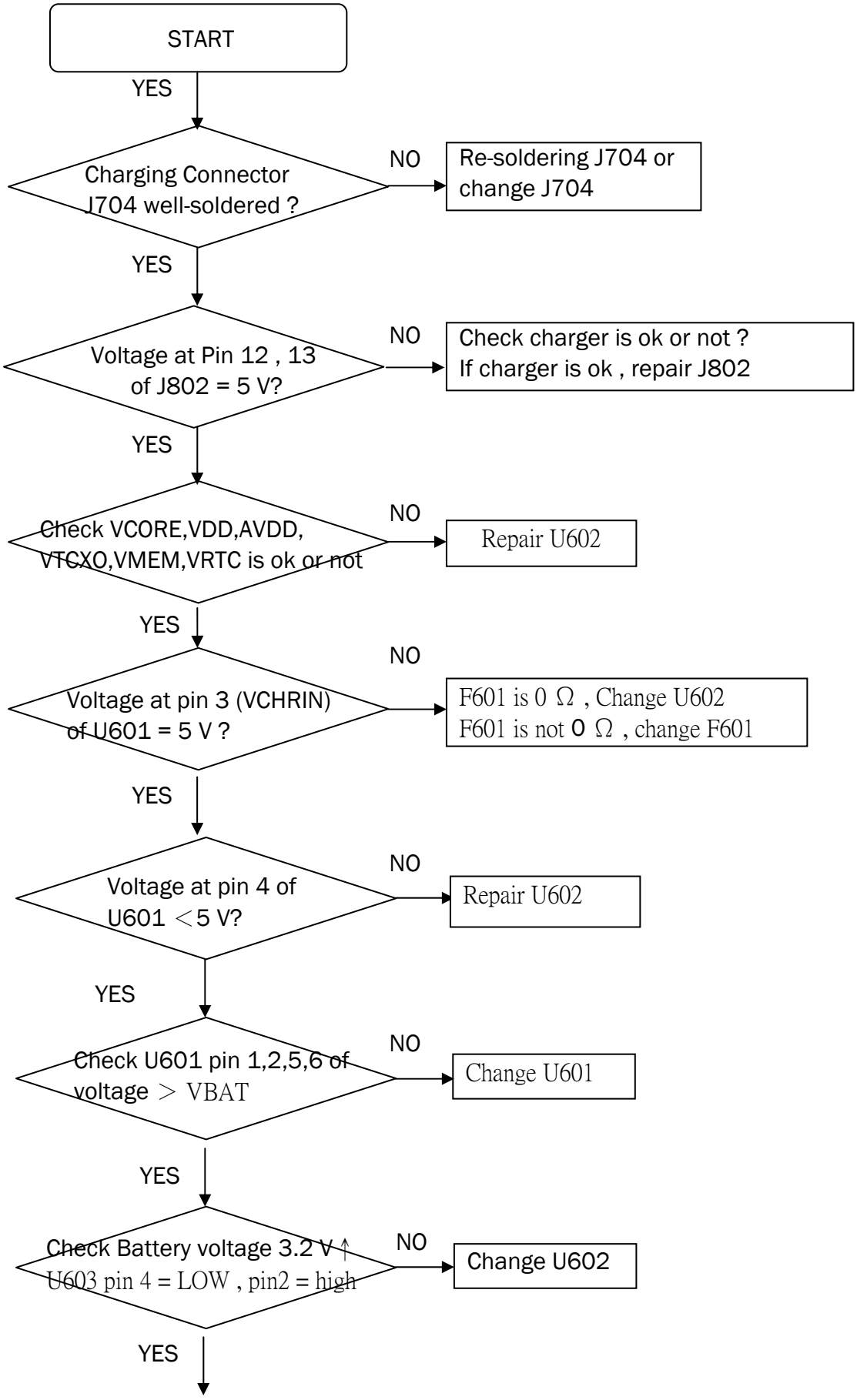
MAIN BOARD SECTION

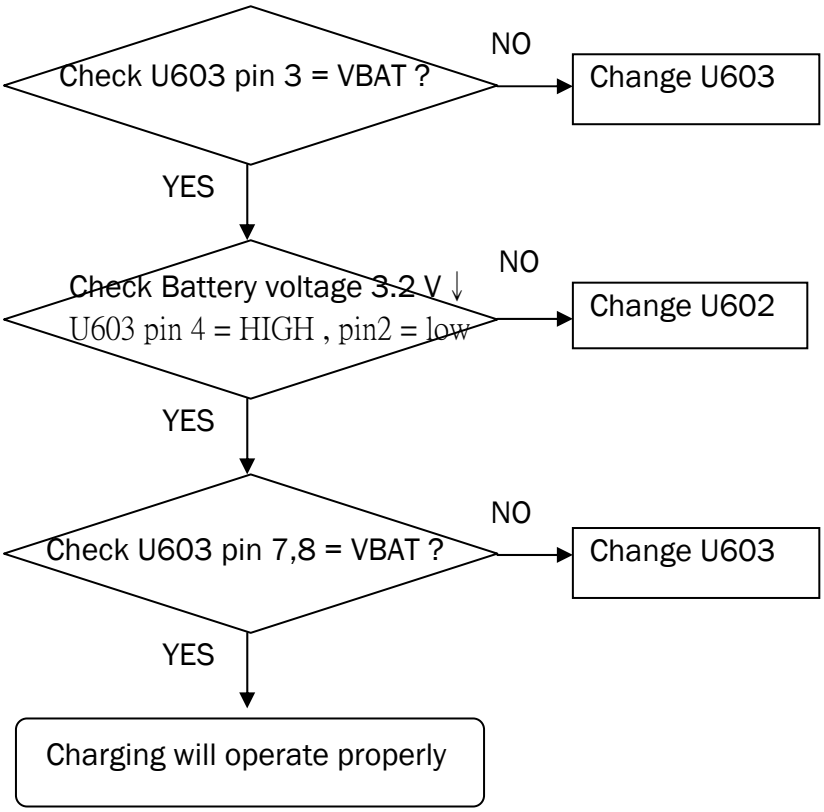
1. Can not power on

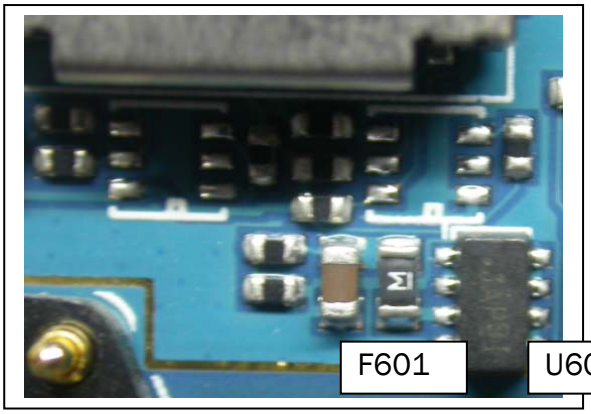


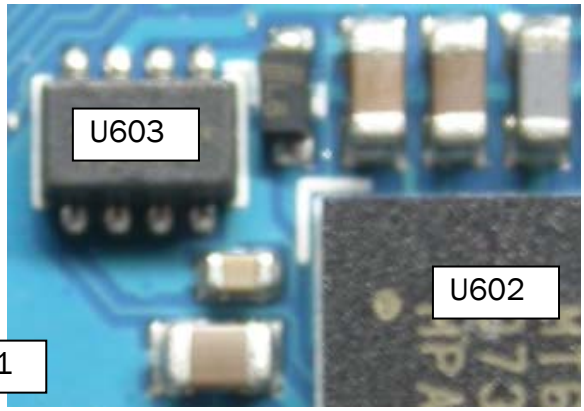

6229AT
12-ACSL
T95
8C3
U603
VDD = 2.8 V
C609
VMEM = 2.8 V
VCORE = 1.2 V
C612
VCTXO = 2.8V
C620
C610
C608
AVDD =2.8 V
X401
U602

2. Can not charge battery

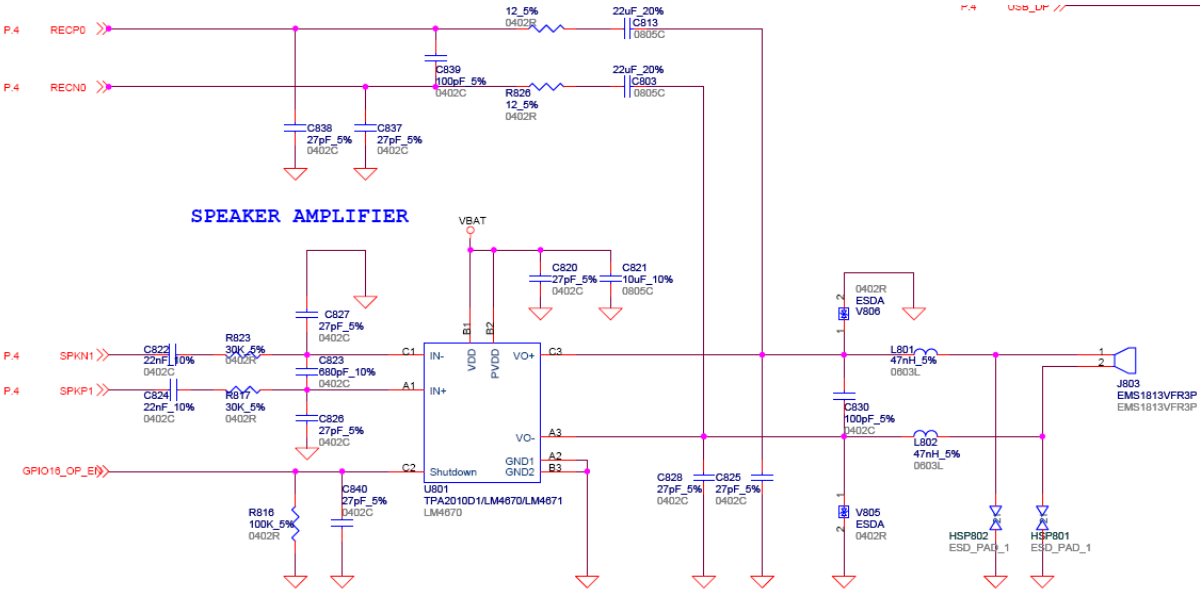



Check U603 pin 3 = VBAT ?
NO
Change U603
YES
Check Battery voltage 3.2 V ↓
U603 pin 4 = HIGH , pin2 = low
NO
Change U602
YES
Check U603 pin 7,8 = VBAT ?
NO
Change U603
YES
Charging will operate properly

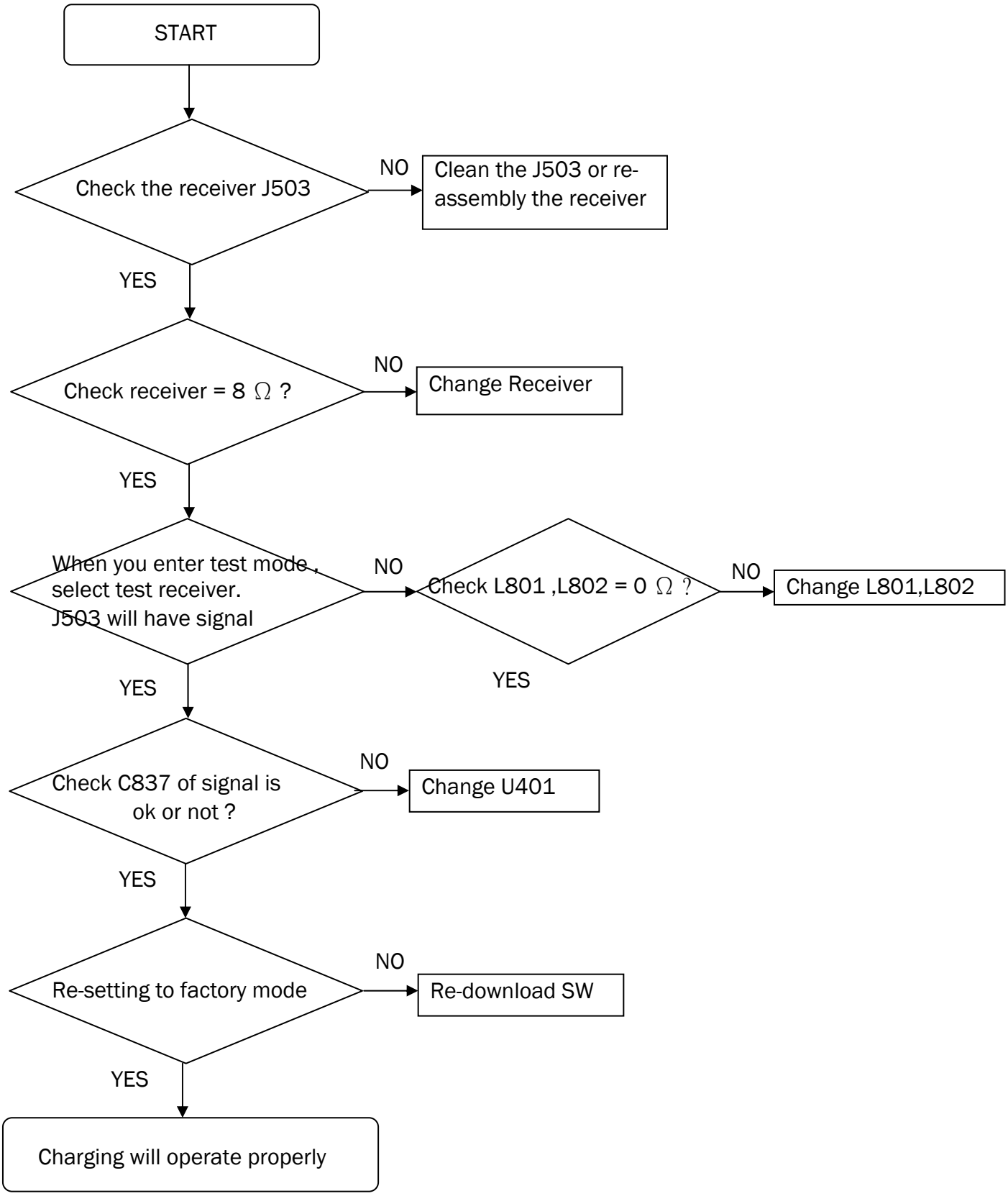

F601
U601


U603
U602

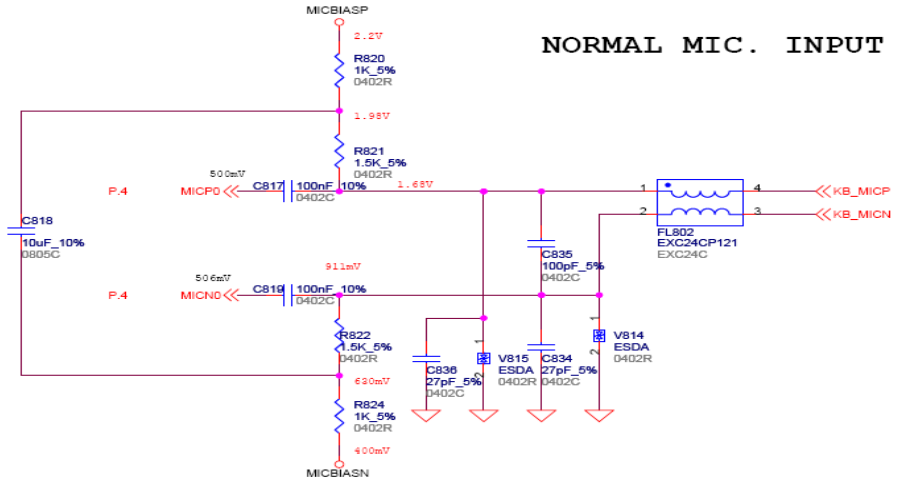
3. Receiver

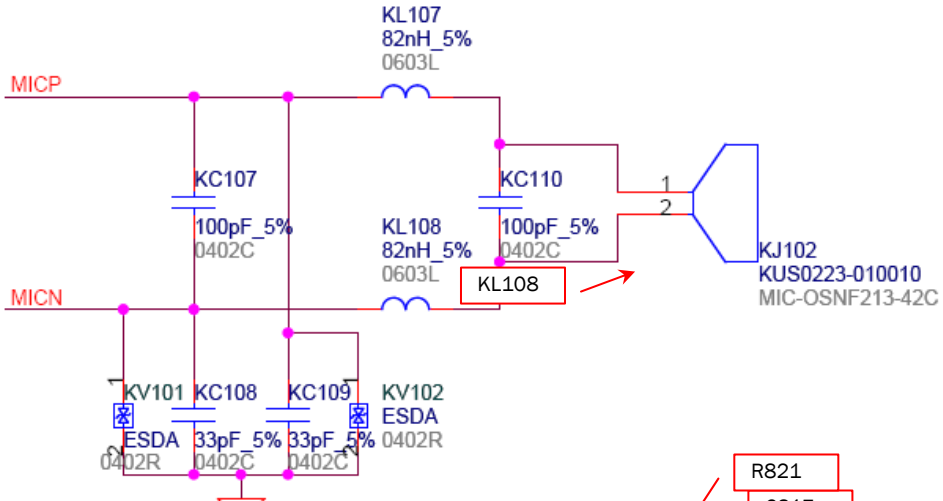


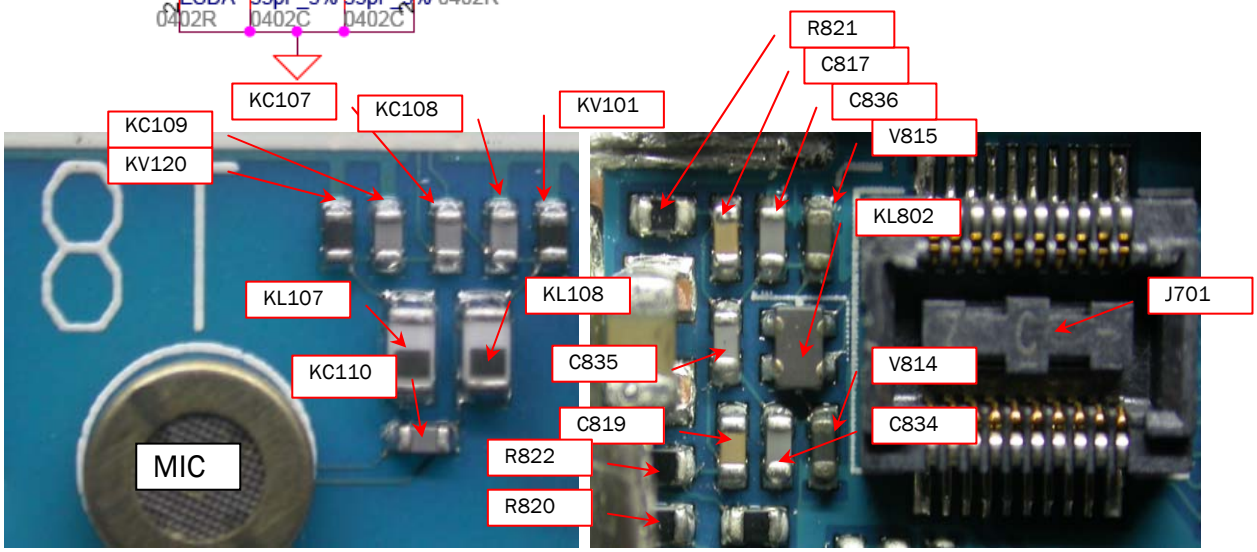
Circuit Diagram

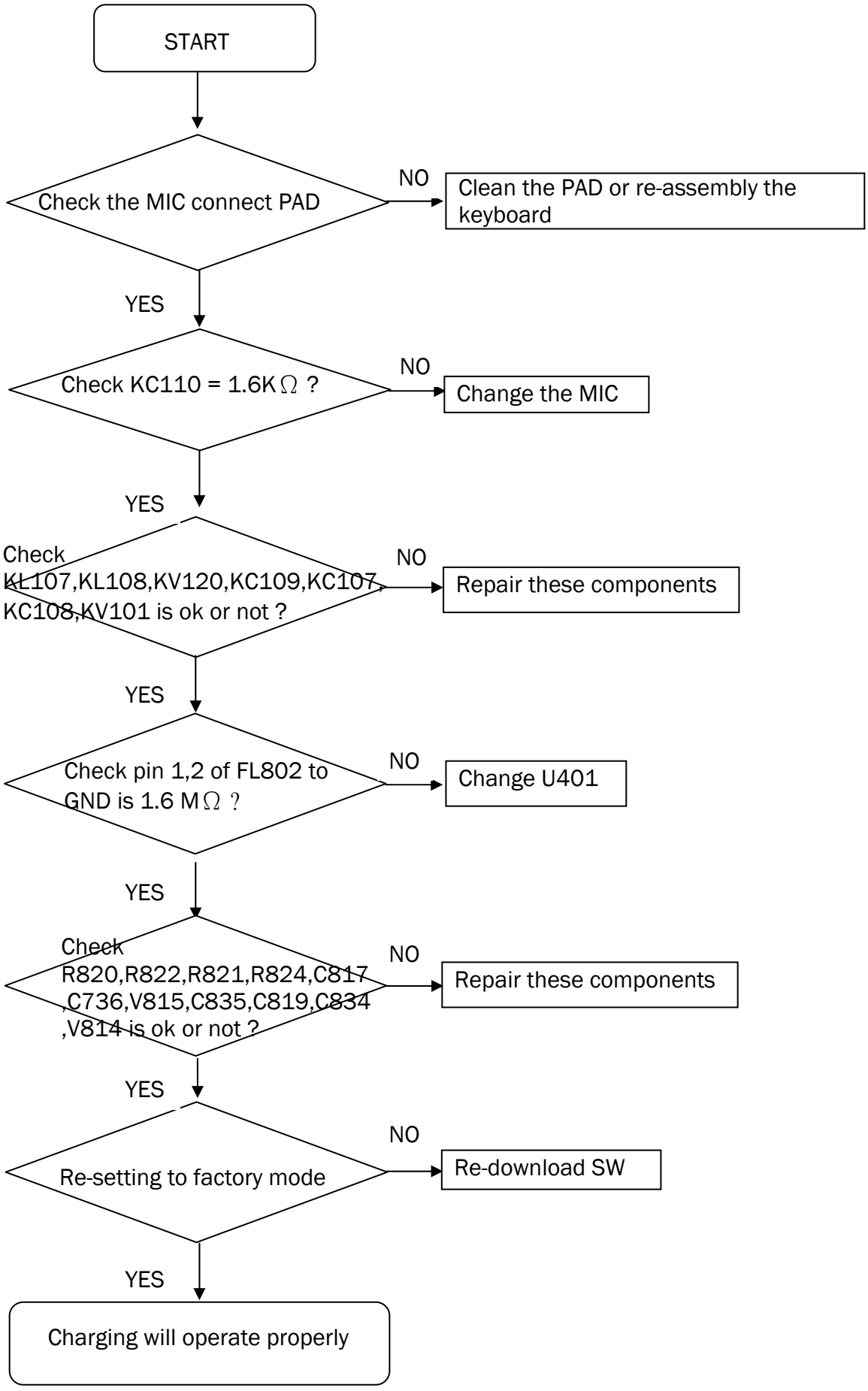

START
Check the receiver J503
NO
Clean the J503 or re-assembly the receiver
YES
Check receiver = 8 Ω ?
NO
Change Receiver
YES
When you enter test mode , select test receiver. J503 will have signal
NO
Check L801 ,L802 = 0 Ω ?
NO
Change L801,L802
YES
YES
Check C837 of signal is ok or not ?
NO
Change U401
YES
Re-setting to factory mode
NO
Re-download SW
YES
Charging will operate properly

4. MIC phone

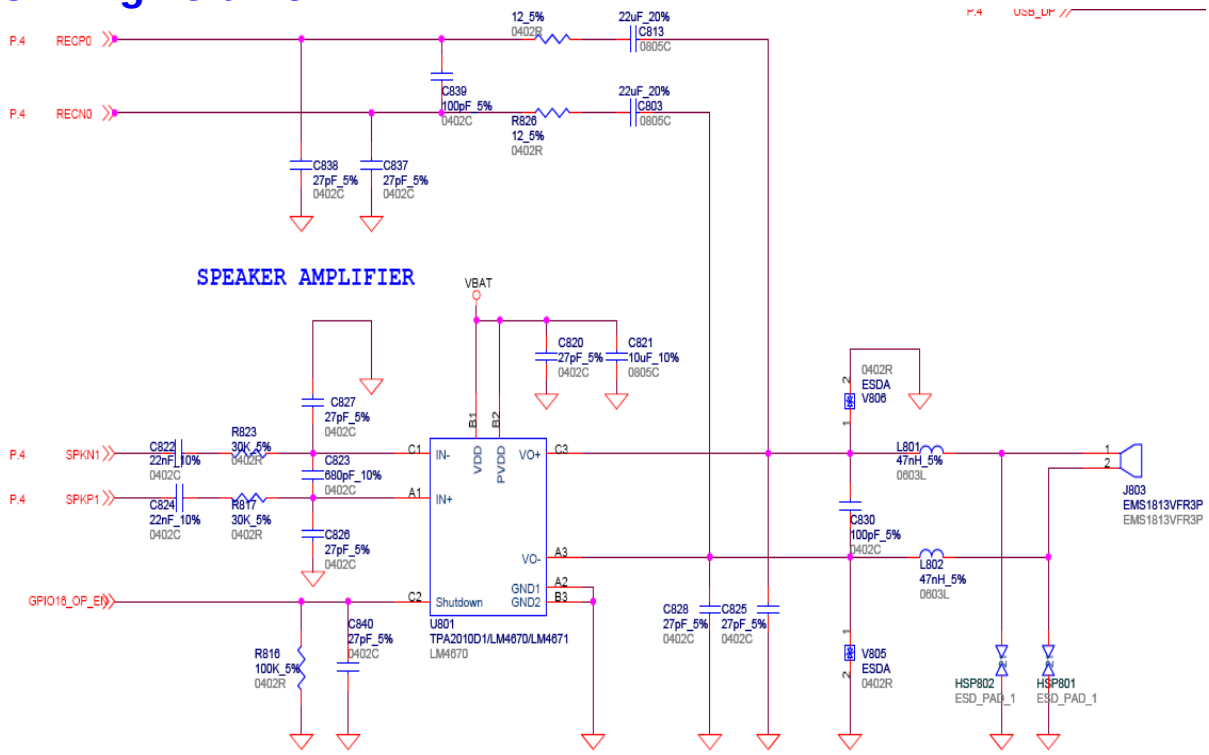

NORMAL MIC. INPUT
MICBIASP
R820
1K_5%
0402R
R821
1.5K_5%
0402R
C817
100nF_10%
0402C
MICP0
P.4
C818
10uF_10%
0805C
C819
100nF_10%
0402C
MICN0
P.4
C835
100pF_5%
0402C
FL802
EXC24CP121
EXC24C
KB_MICP
KB_MICN
R822
1.5K_5%
0402R
C836
27pF_5%
0402C
V815
ESDA
0402R
C834
27pF_5%
0402C
V814
ESDA
0402R
R824
1K_5%
0402R
MICBIASN


KL107
82nH_5%
0603L
MICP
KC107
100pF_5%
0402C
KC110
100pF_5%
0402C
KL108
82nH_5%
0603L
KL108
KJ102
KUS0223-010010
MIC-OSNF213-42C
MICN
KV101
ESDA
0402R
KC108
33pF_5%
0402C
KC109
33pF_5%
0402C
KV102
ESDA
0402R

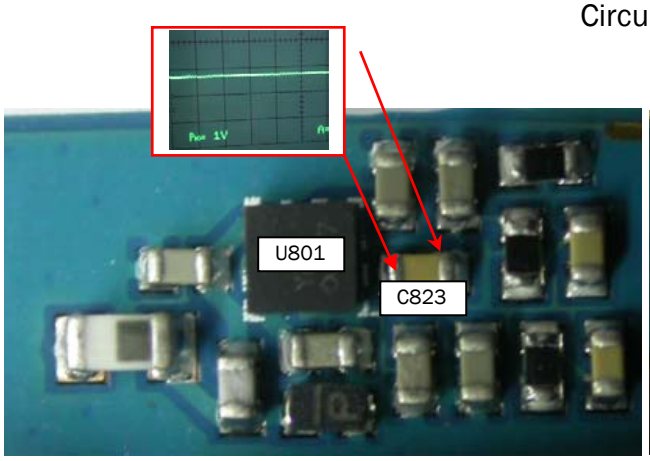

KC107
KC108
KV101
KC109
KV120
KL107
KL108
KC110
MIC
R821
C817
C836
V815
KL802
J701
C835
V814
C819
C834
R822
R820

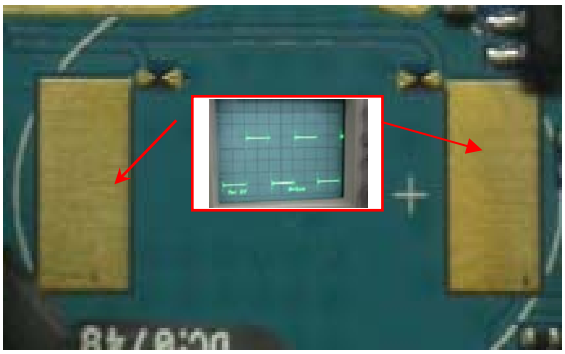

START
Check the MIC connect PAD
NO
Clean the PAD or re-assembly the keyboard
YES
Check KC110 = 1.6KΩ ?
NO
Change the MIC
YES
Check KL107,KL108,KV120,KC109,KC107, KC108,KV101 is ok or not ?
NO
Repair these components
YES
Check pin 1,2 of FL802 to GND is 1.6 MΩ ?
NO
Change U401
YES
Check R820,R822,R821,R824,C817 ,C736,V815,C835,C819,C834 ,V814 is ok or not ?
NO
Repair these components
YES
Re-setting to factory mode
NO
Re-download SW
YES
Charging will operate properly

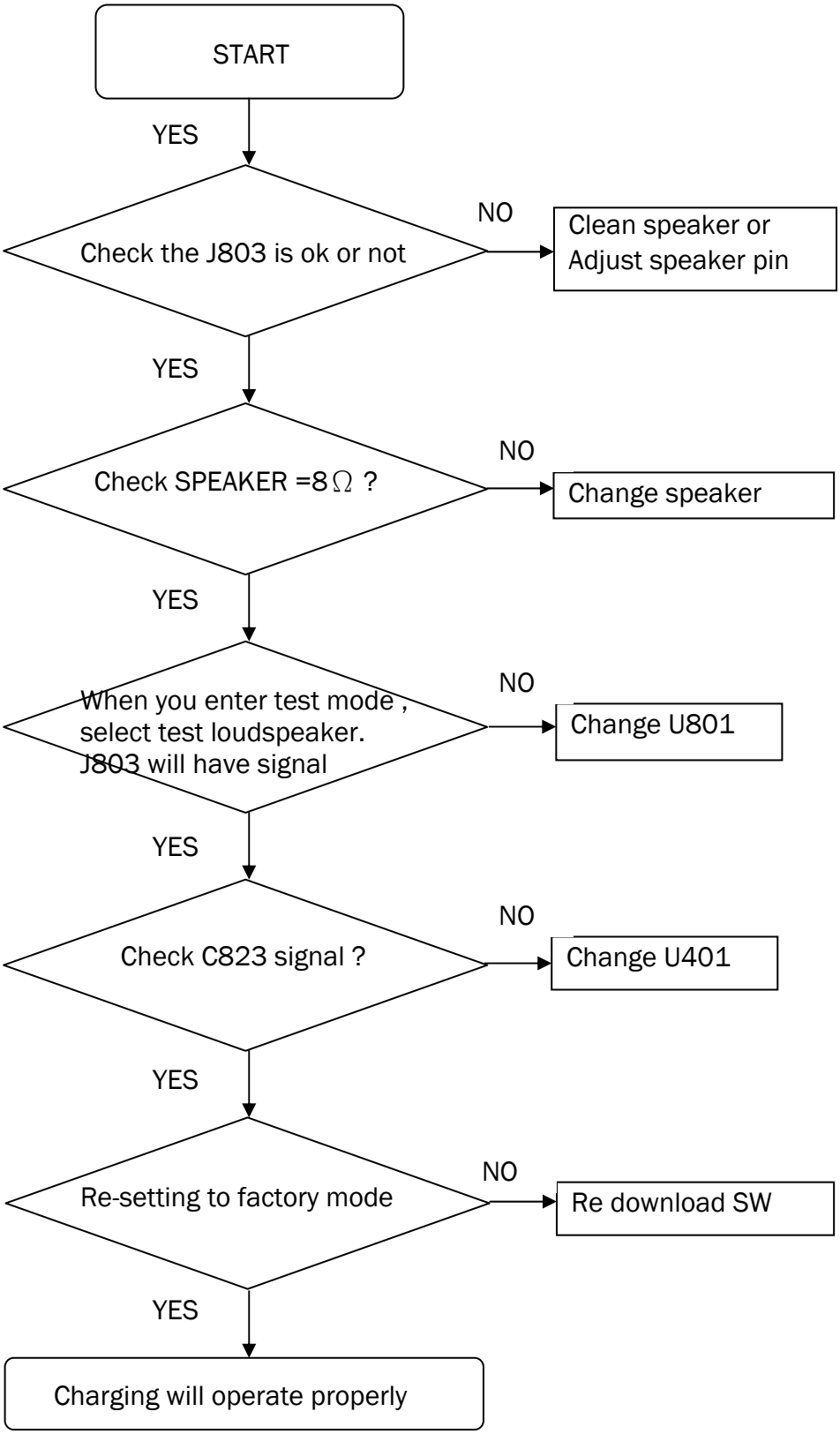
5. Ring volume



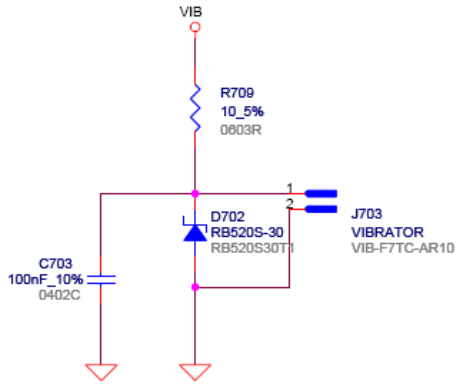
Circuit Diagram



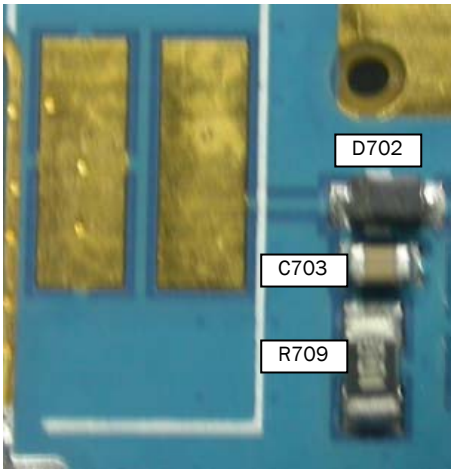


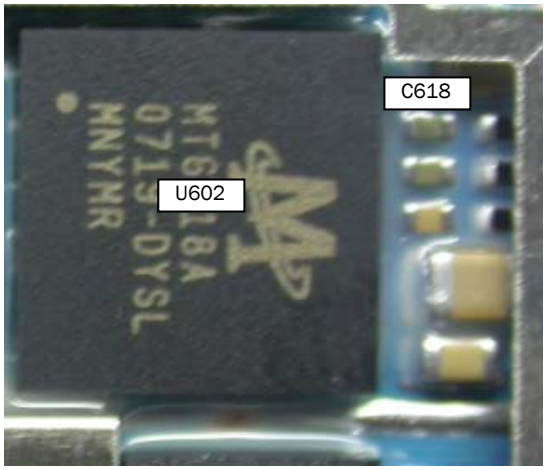

START
YES
Check the J803 is ok or not
NO
Clean speaker or
Adjust speaker pin
YES
Check SPEAKER =8Ω ?
NO
Change speaker
YES
When you enter test mode ,
select test loudspeaker.
J803 will have signal
NO
Change U801
YES
Check C823 signal ?
NO
Change U401
YES
Re-setting to factory mode
NO
Re download SW
YES
Charging will operate properly

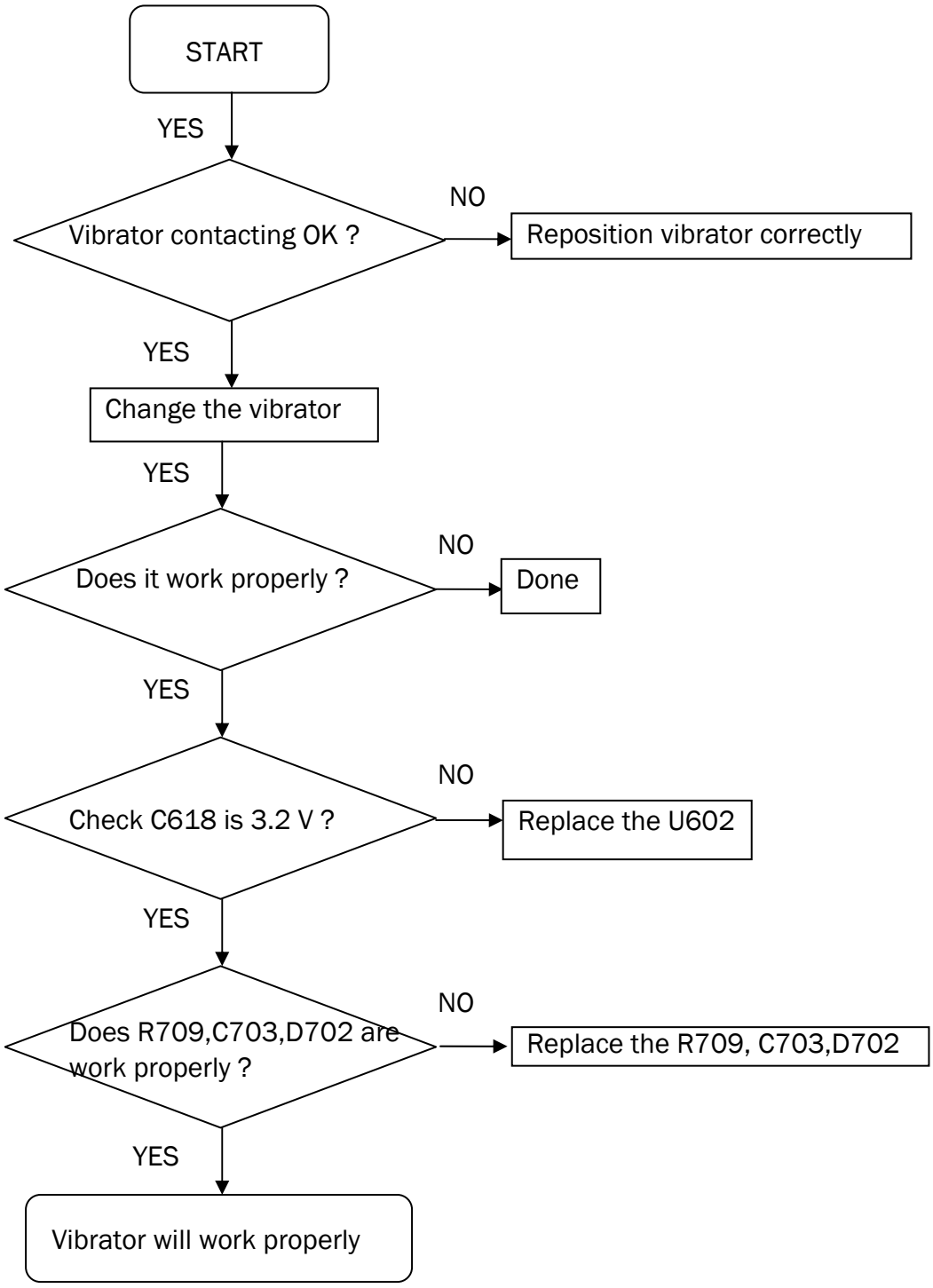
6. Vibration



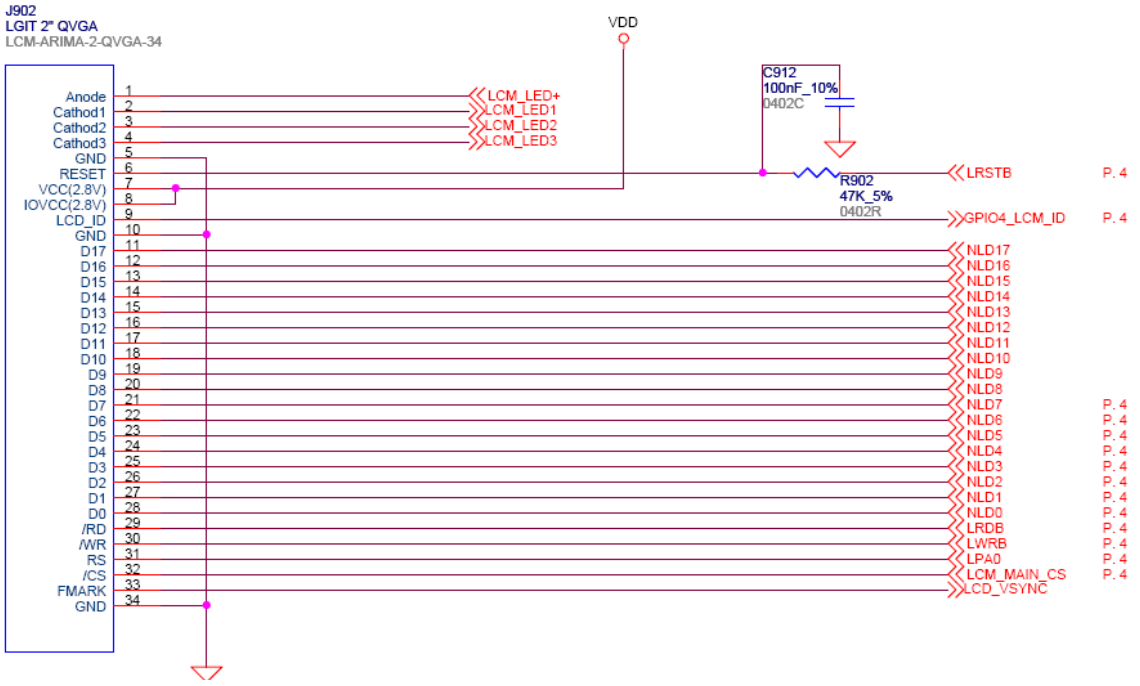
Circuit Diagram





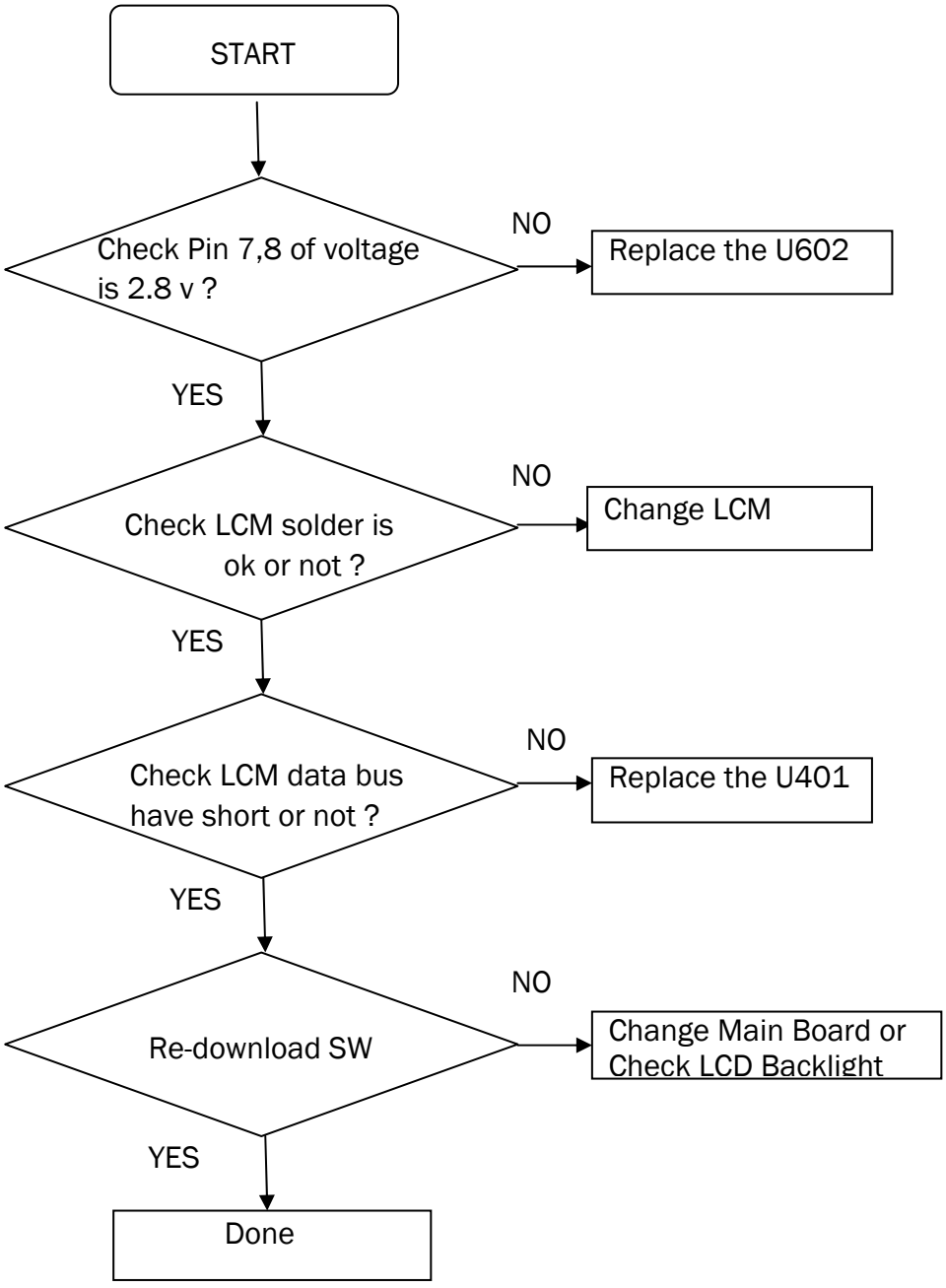

START
YES
Vibrator contacting OK ?
NO
Reposition vibrator correctly
YES
Change the vibrator
YES
Does it work properly ?
NO
Done
YES
Check C618 is 3.2 V ?
NO
Replace the U602
YES
Does R709,C703,D702 are work properly ?
NO
Replace the R709, C703,D702
YES
Vibrator will work properly

7 LCD

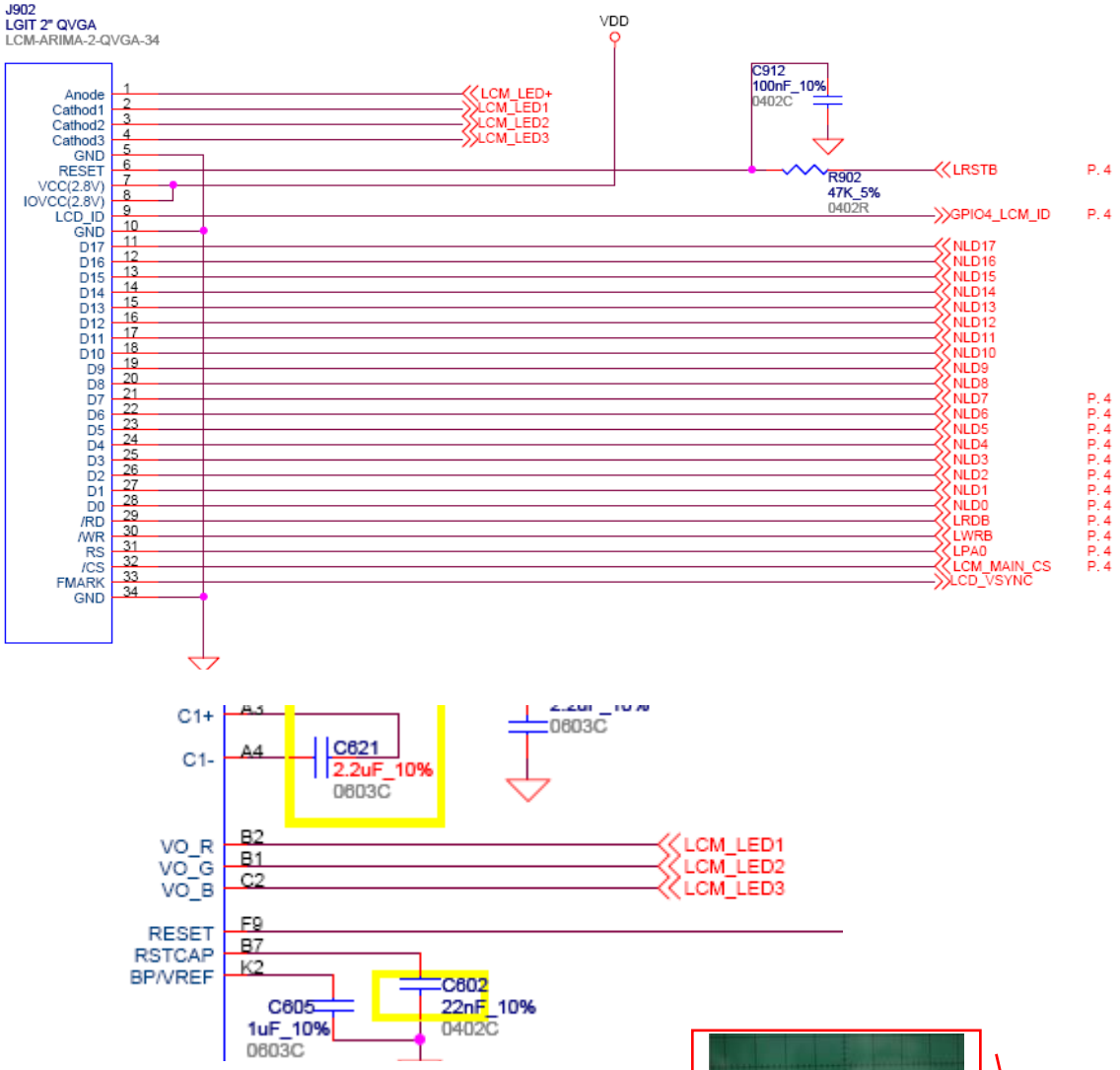


Circuit Diagram

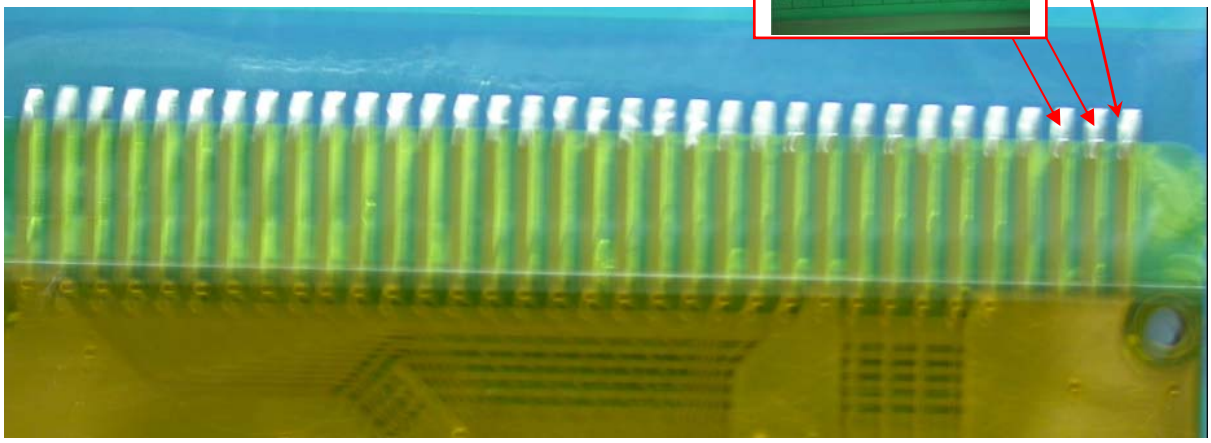
LCD PART


START
Check Pin 7,8 of voltage is 2.8 v ?
NO
Replace the U602
YES
Check LCM solder is ok or not ?
NO
Change LCM
YES
Check LCM data bus have short or not ?
NO
Replace the U401
YES
Re-download SW
NO
Change Main Board or Check LCD Backlight
YES
Done

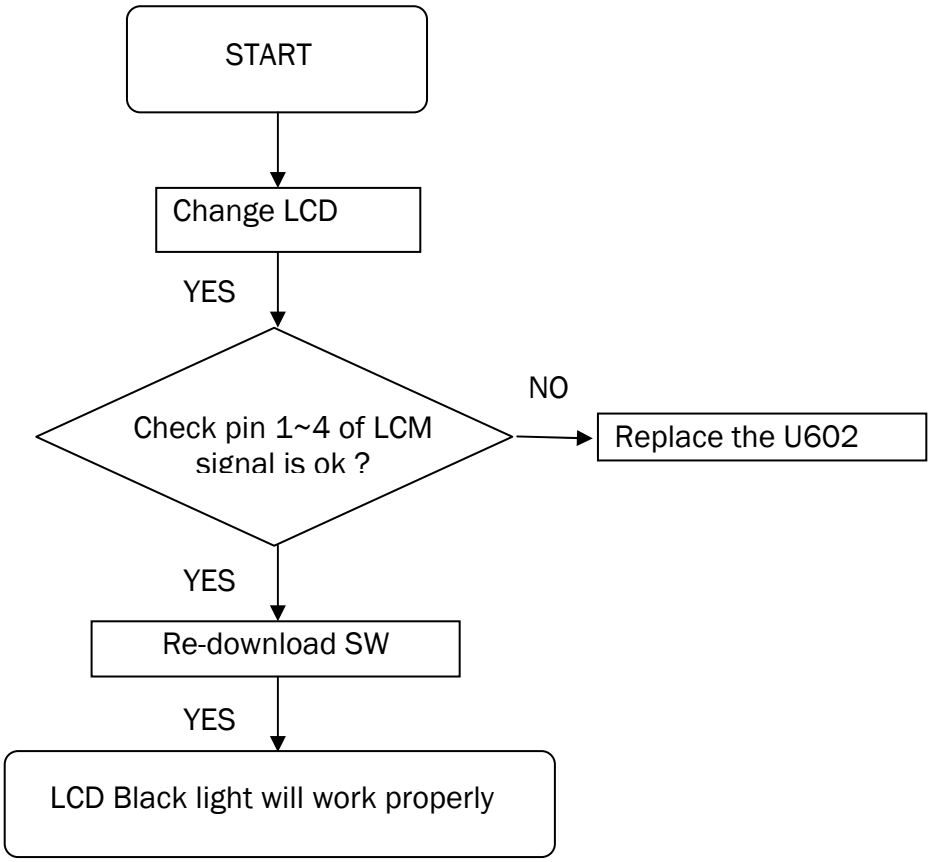
8 LCD Black light



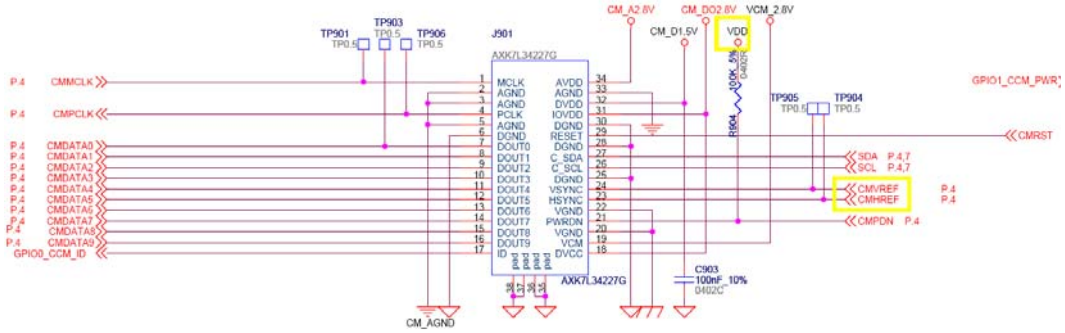
Circuit Diagram

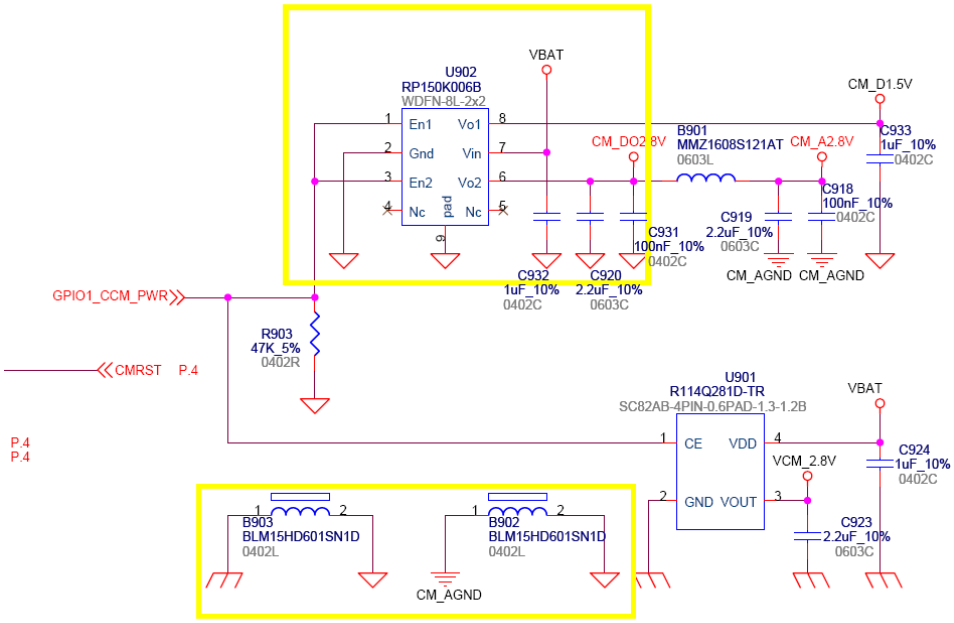


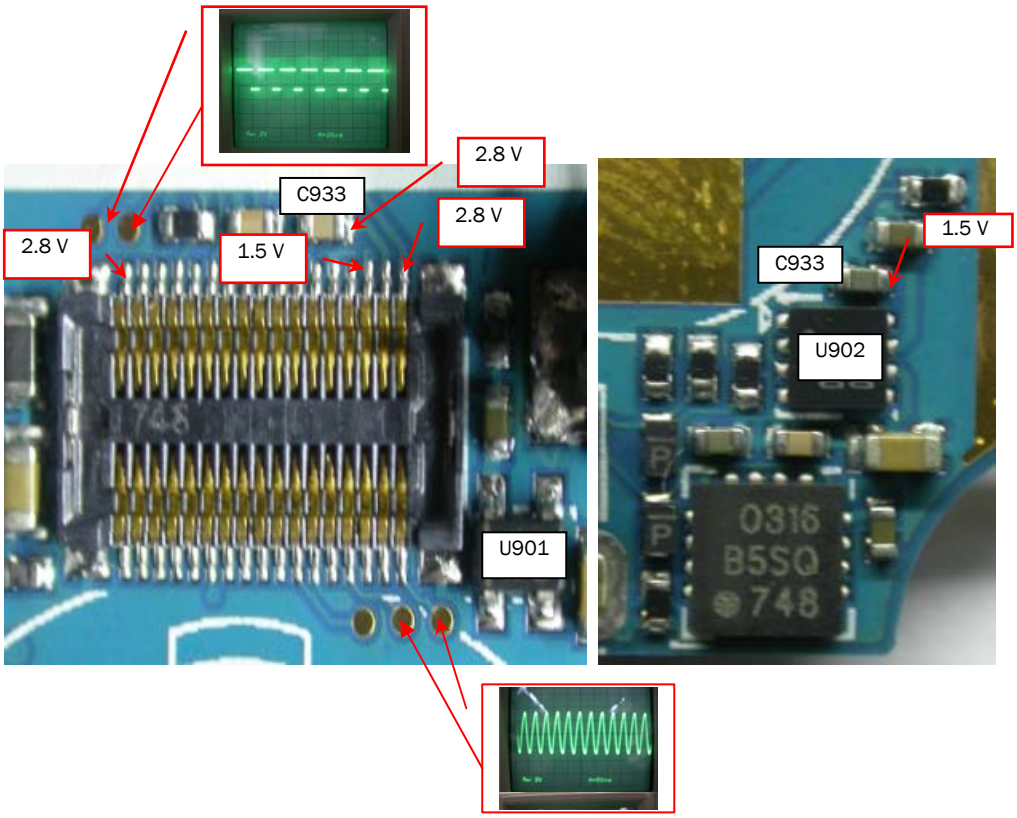
LCD Black light PART

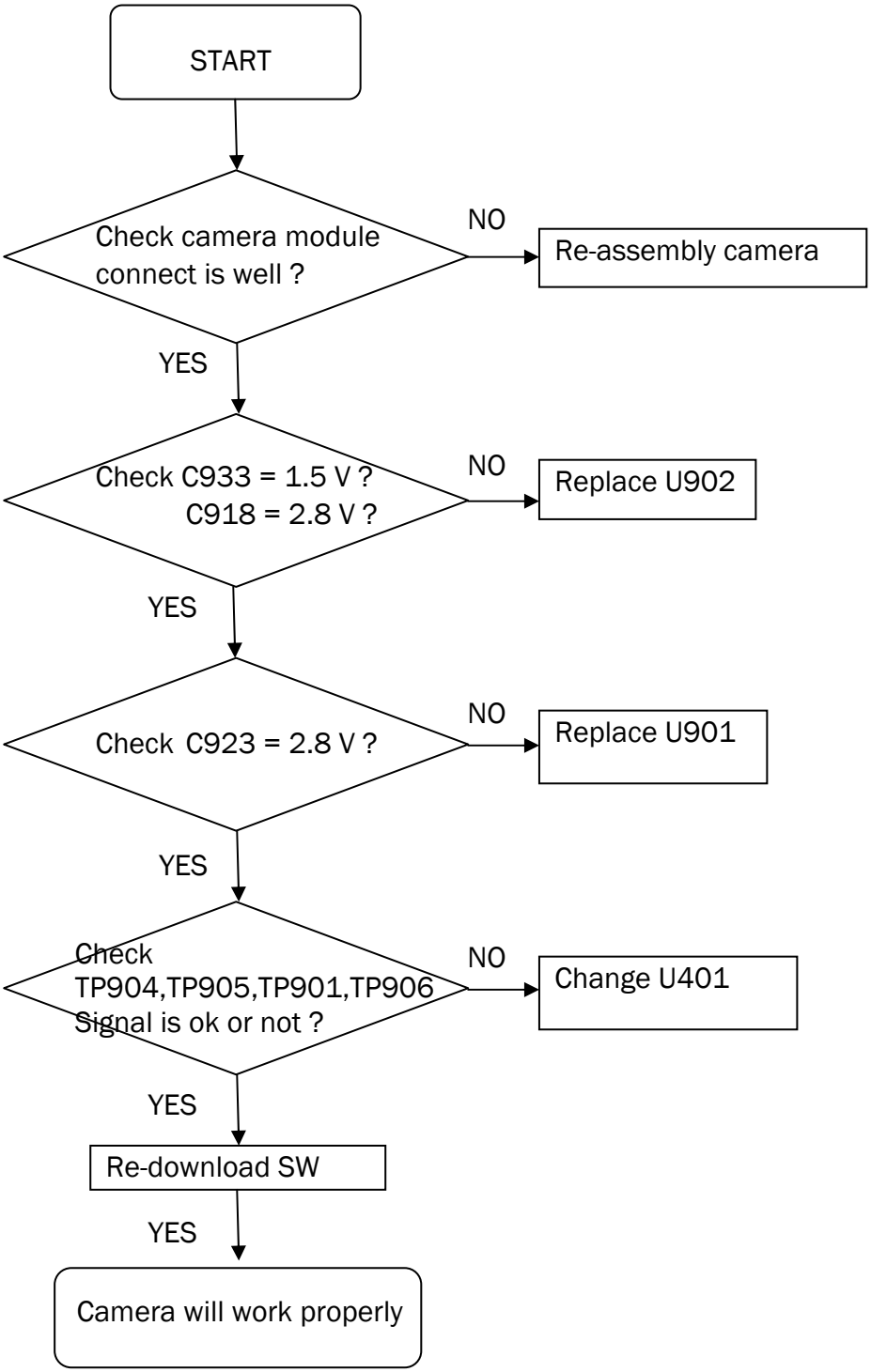

START
Change LCD
YES
Check pin 1~4 of LCM signal is ok ?
NO
Replace the U602
YES
Re-download SW
YES
LCD Black light will work properly

9. Camera

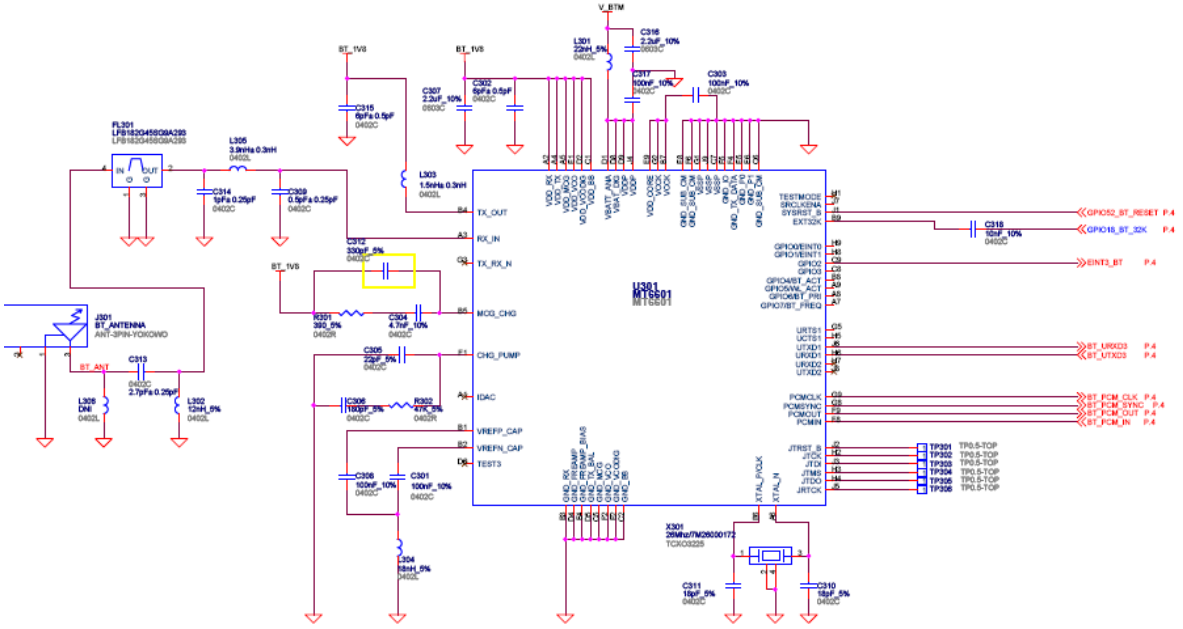

J901
AXK7L34227G
CM_AGND
CMMCLK
CMPCLK
CMDATA0
CMDATA1
CMDATA2
CMDATA3
CMDATA4
CMDATA5
CMDATA6
CMDATA7
CMDATA8
CMDATA9
GPIO0_CCM_ID
CM_A2.8V
CM_DO2.8V
VCM_2.8V
CM_D1.5V
VDD
R904
100K_5%
TP901
TP903
TP906
TP905
TP904
GPIO1_CCM_PWR
CMRST
SDA
SCL
CMVREF
CMHREF
CMPDN
C903
100nF_10%

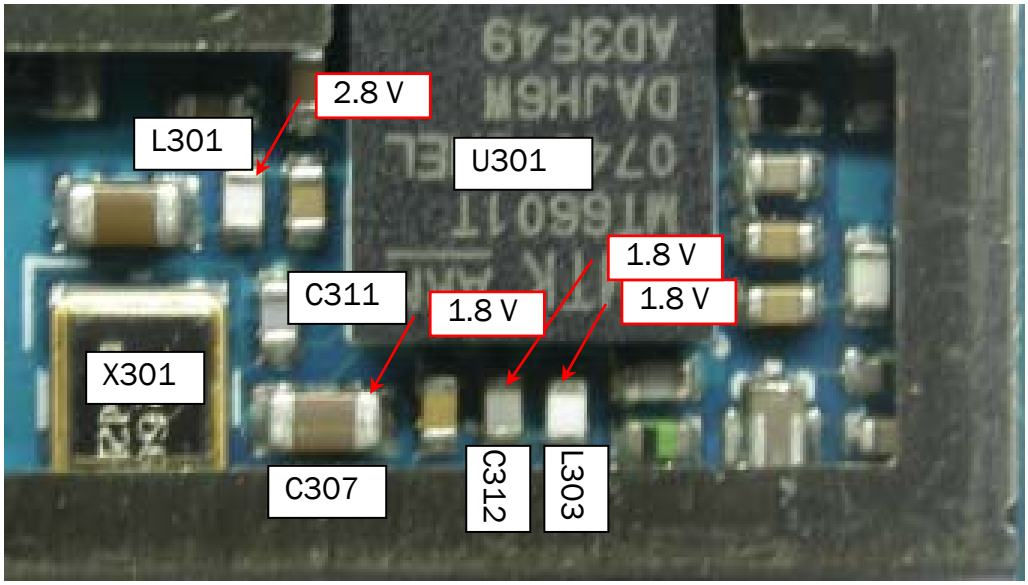

U902
RP150K006B
WDFN-8L-2x2
VBAT
CM_D1.5V
CM_DO2.8V
CM_A2.8V
B901
MMZ1608S121AT
0603L
C933
1uF_10%
0402C
C918
100nF_10%
C919
2.2uF_10%
C931
100nF_10%
C932
1uF_10%
C920
2.2uF_10%
CM_AGND
GPIO1_CCM_PWR
R903
47K_5%
0402R
CMRST
U901
R114Q281D-TR
SC82AB-4PIN-0.6PAD-1.3-1.2B
VCM_2.8V
C924
1uF_10%
C923
2.2uF_10%
B903
BLM15HD601SN1D
0402L
B902
BLM15HD601SN1D
0402L

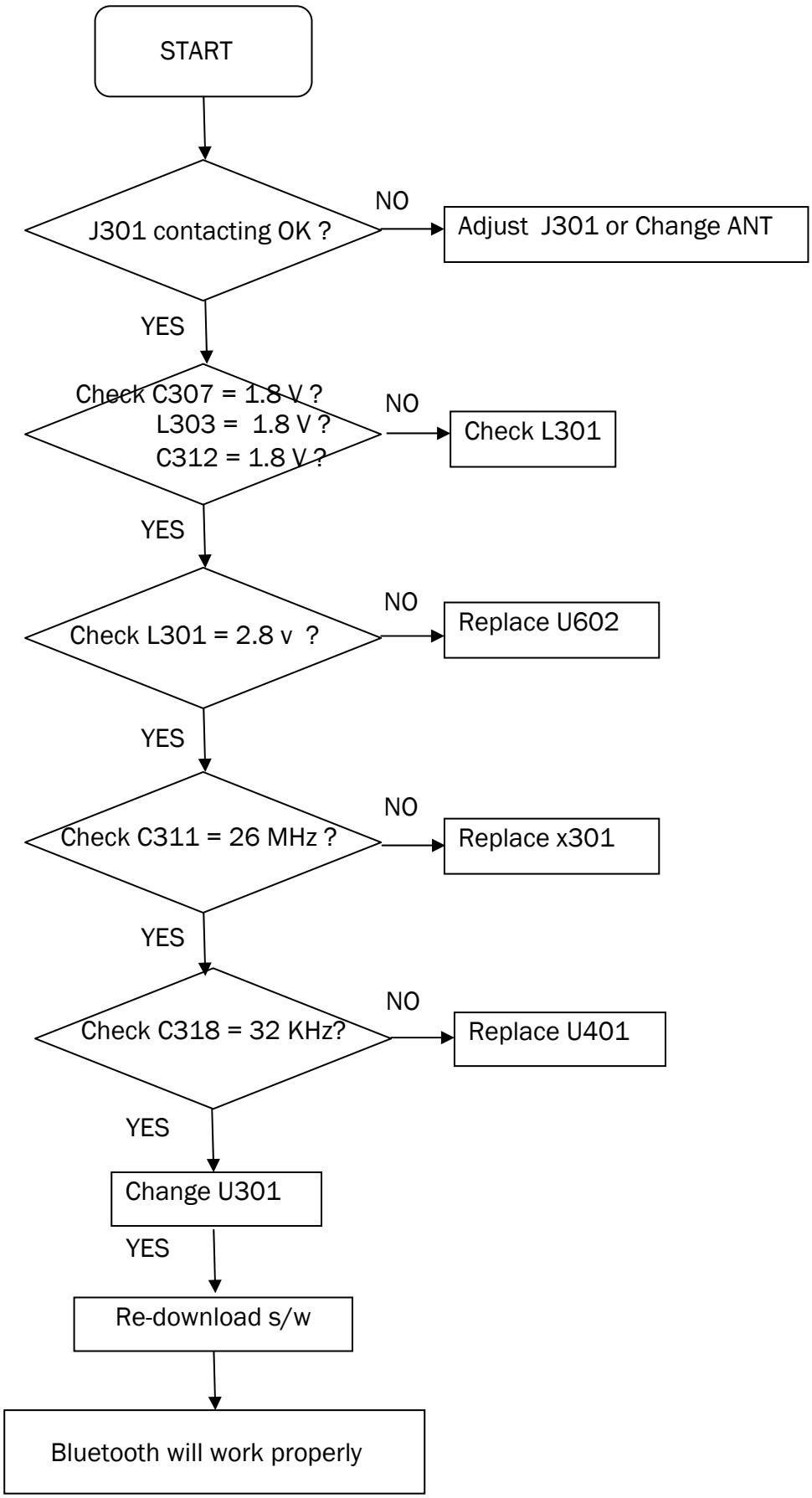

2.8 V
C933
2.8 V
2.8 V
1.5 V
U901
1.5 V
C933
U902


START
Check camera module connect is well ?
NO
Re-assembly camera
YES
Check C933 = 1.5 V ?
C918 = 2.8 V ?
NO
Replace U902
YES
Check C923 = 2.8 V ?
NO
Replace U901
YES
Check TP904,TP905,TP901,TP906 Signal is ok or not ?
NO
Change U401
YES
Re-download SW
YES
Camera will work properly

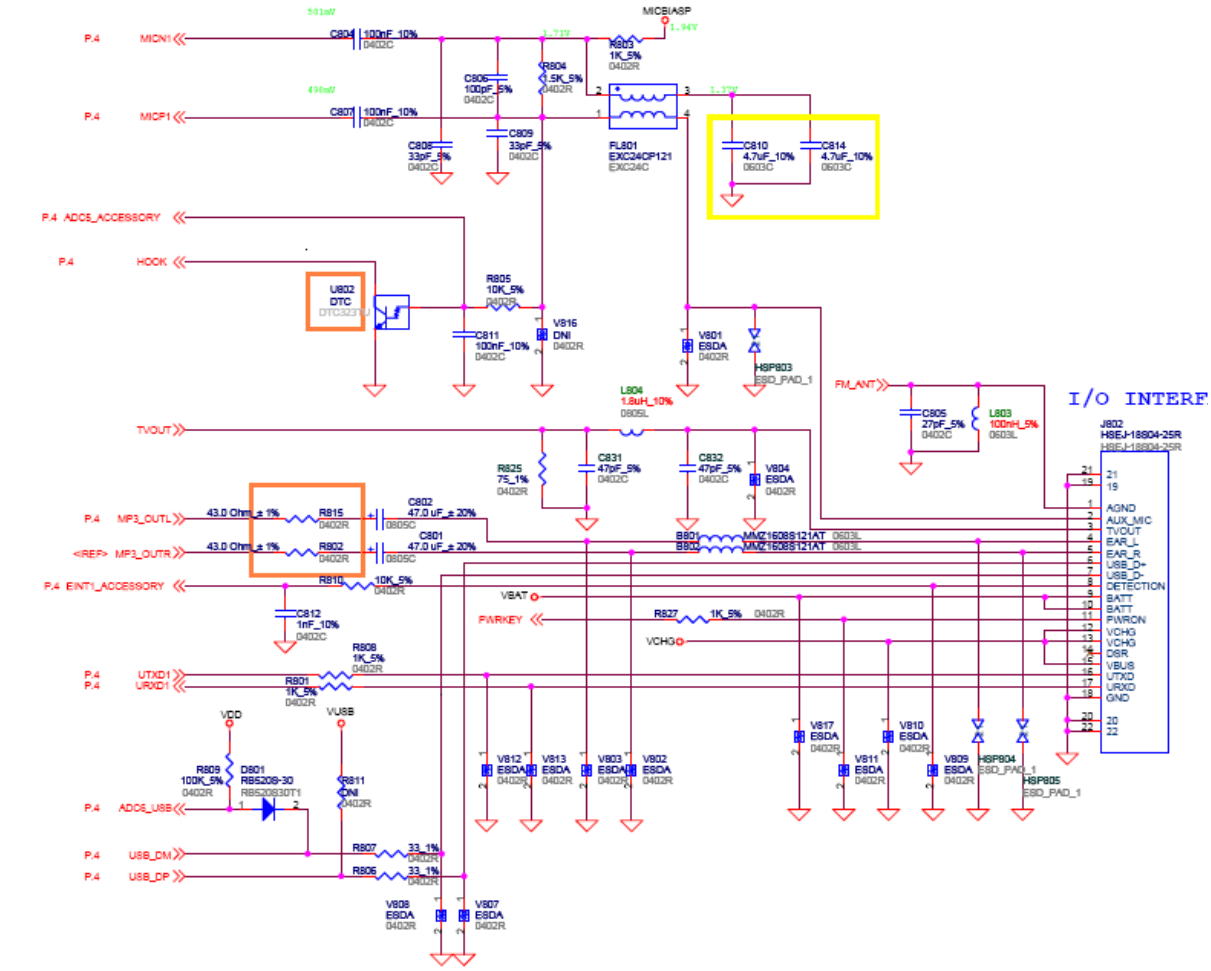
10. Bluetooth

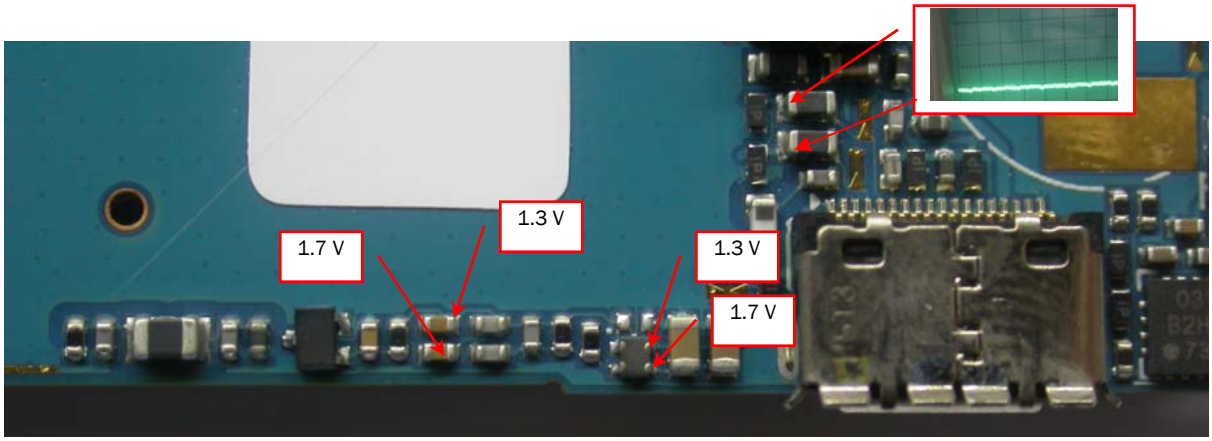




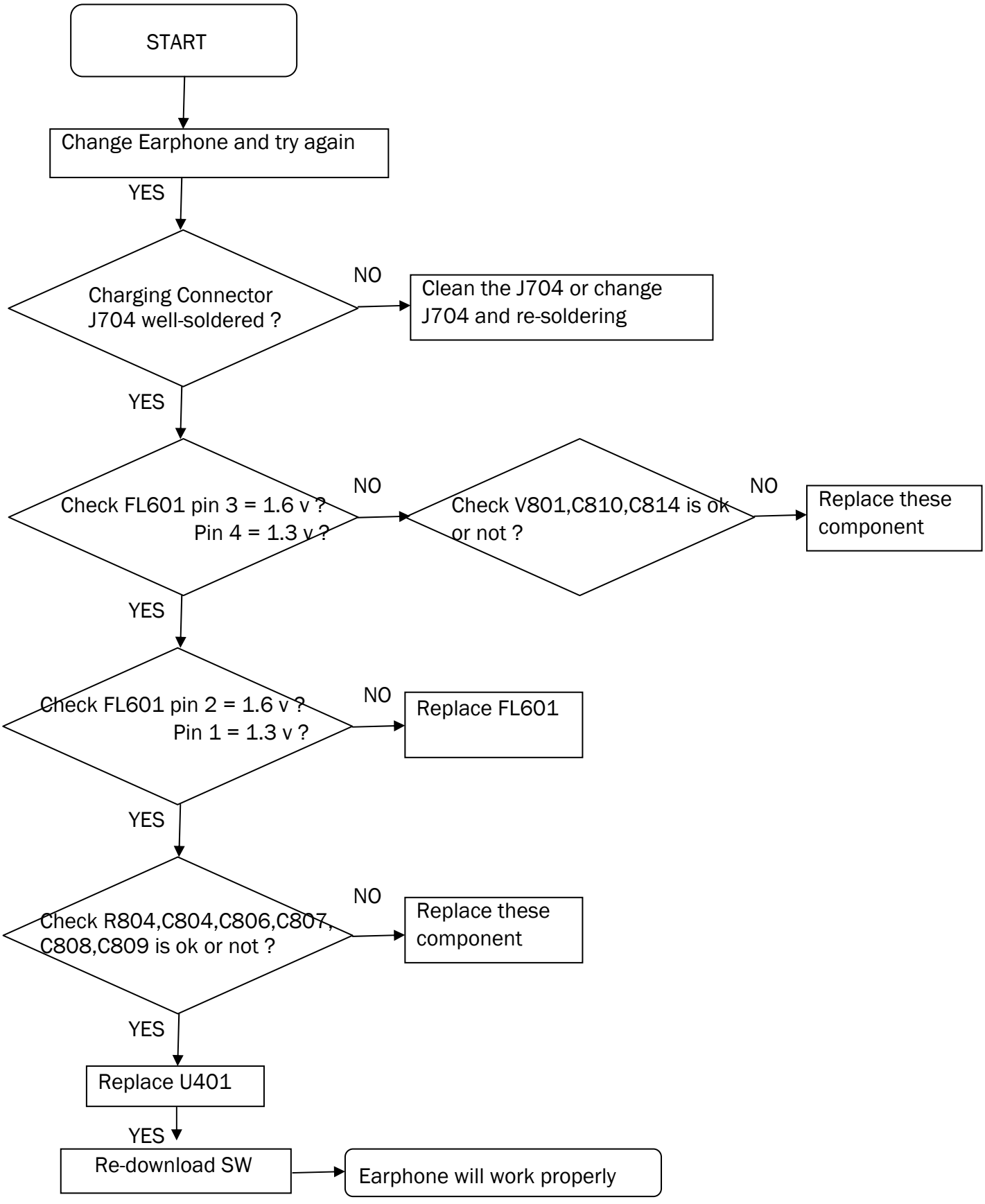

START
J301 contacting OK ?
NO
Adjust J301 or Change ANT
YES
Check C307 = 1.8 V ?
L303 = 1.8 V ?
C312 = 1.8 V ?
NO
Check L301
YES
Check L301 = 2.8 v ?
NO
Replace U602
YES
Check C311 = 26 MHz ?
NO
Replace x301
YES
Check C318 = 32 KHz?
NO
Replace U401
YES
Change U301
YES
Re-download s/w
Bluetooth will work properly

11. Earphone

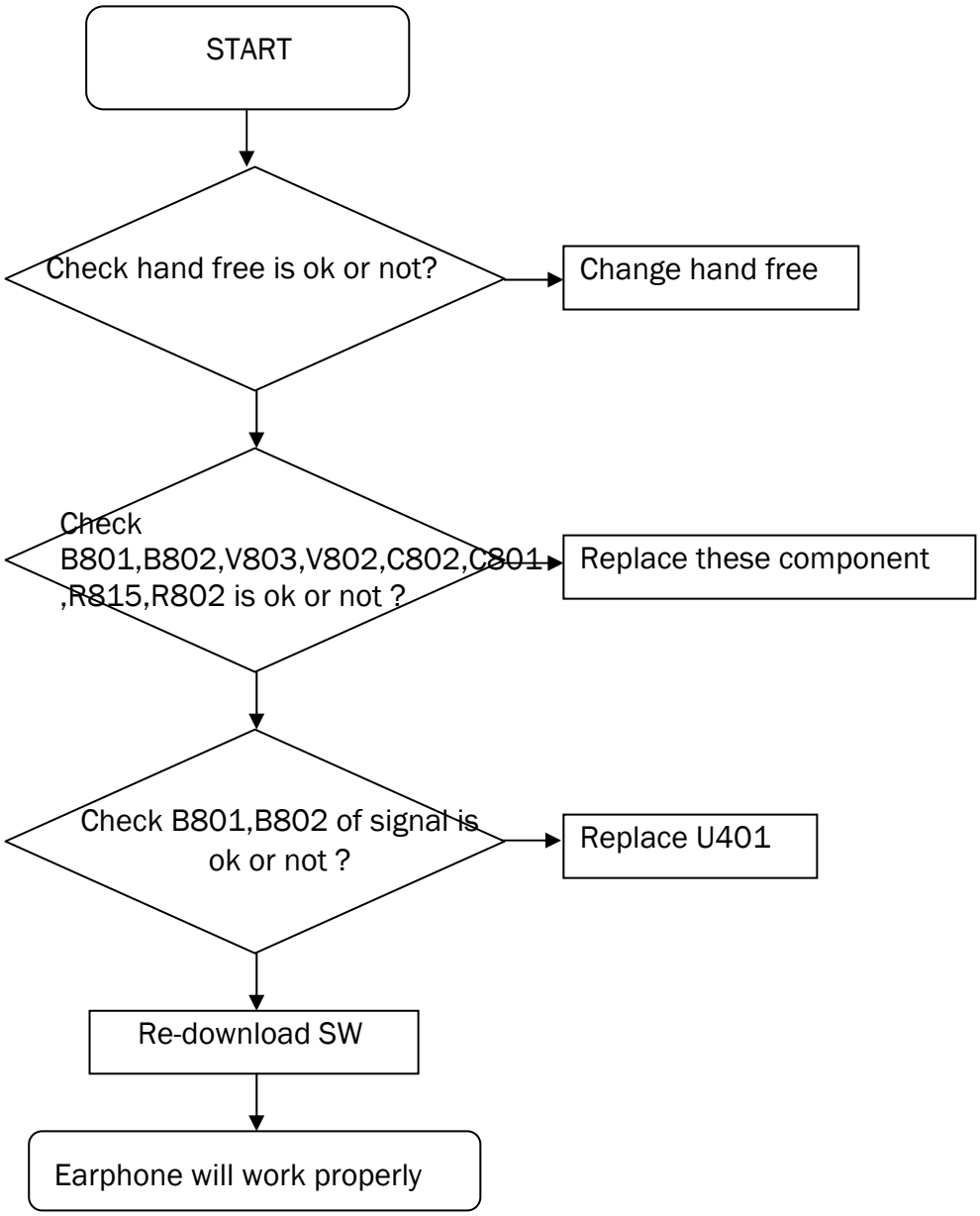

MICBIASP
MICN1
MICP1
P.4 ADCS_ACCESSORY
HOOK
TVOUT
FM_ANT
I/O INTERF
MP3_OUTL
MP3_OUTR
EINT1_ACCESSORY
VBAT
PWRKEY
VCHG
UTXD1
URXD1
VDD
VUSB
ADCS_USB
USB_DM
USB_DP
AGND
AUX_MIC
EAR_L
EAR_R
USB_D+
USB_D-
DETECTION
BATT
PWRON
DSR
VBUS
UTXD
URXD
GND


1.7 V
1.3 V
1.3 V
1.7 V

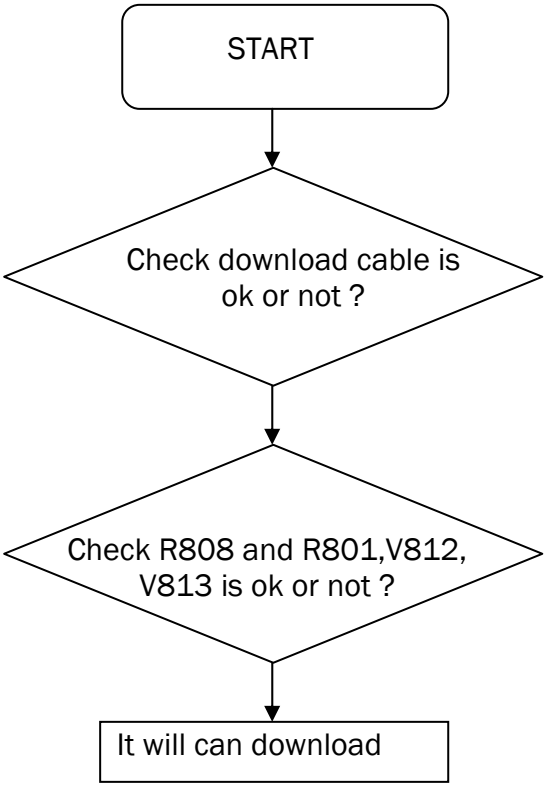
Hand free (ear-MIC)



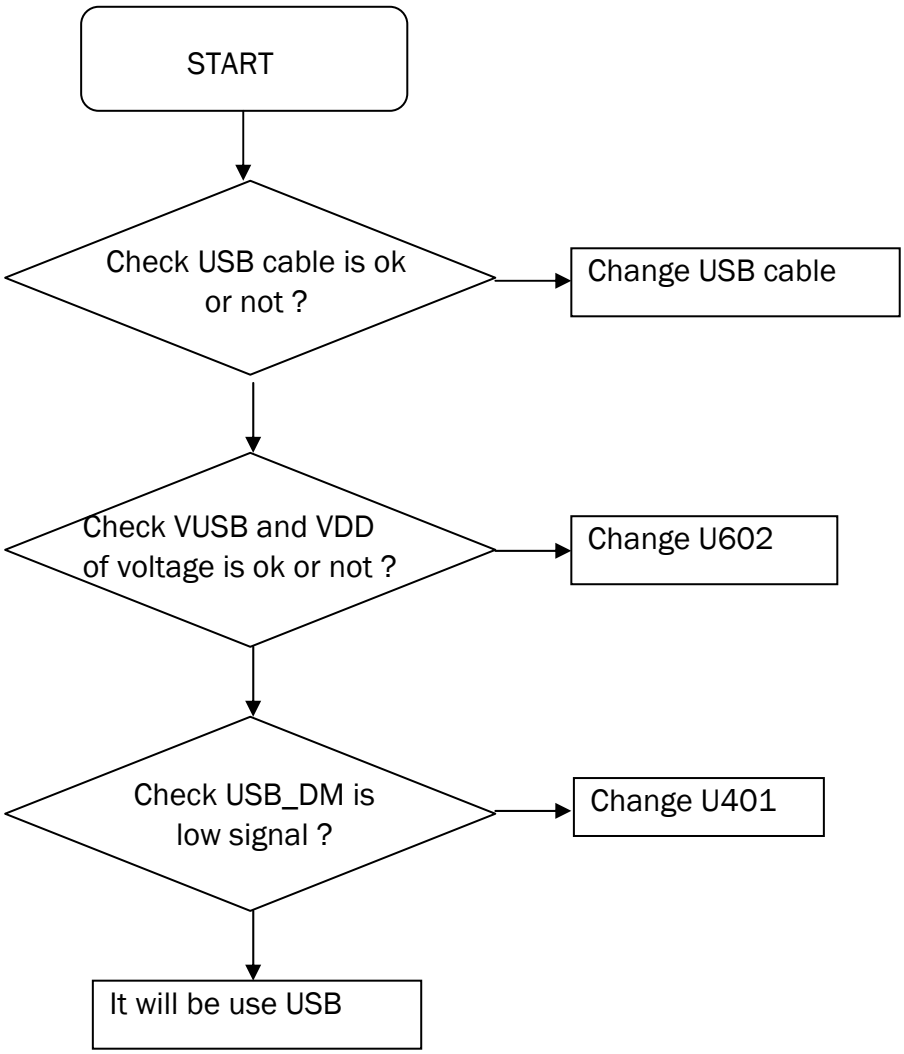
Hand free (Play MP3)



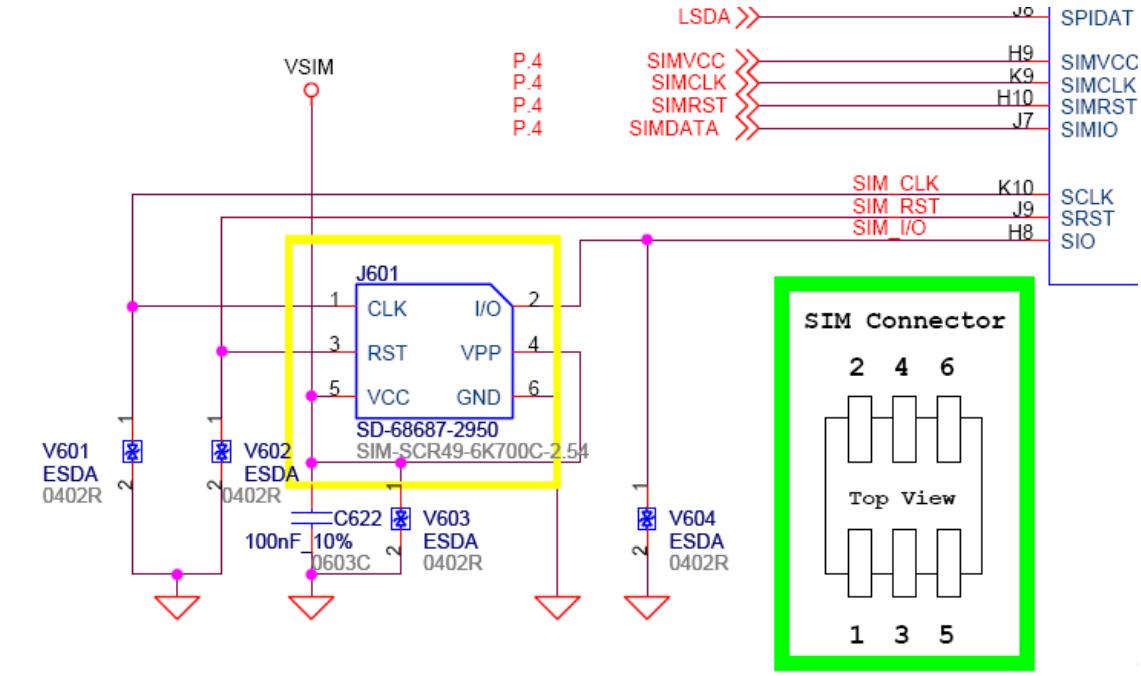
Download cable

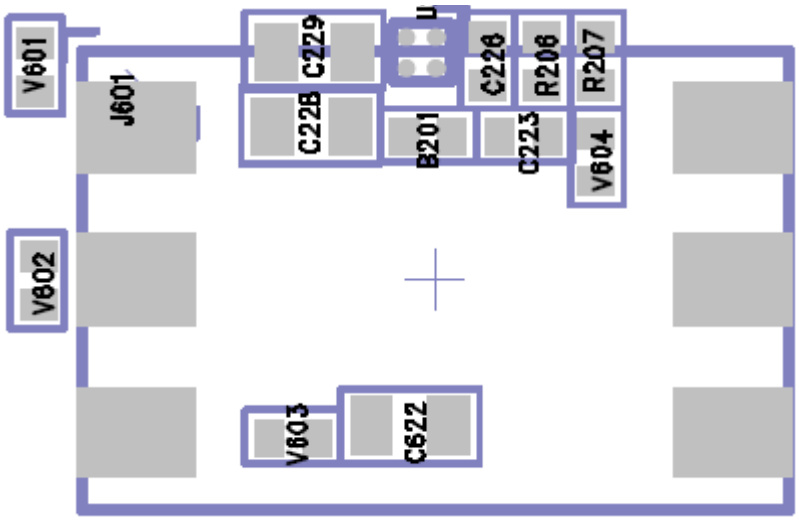


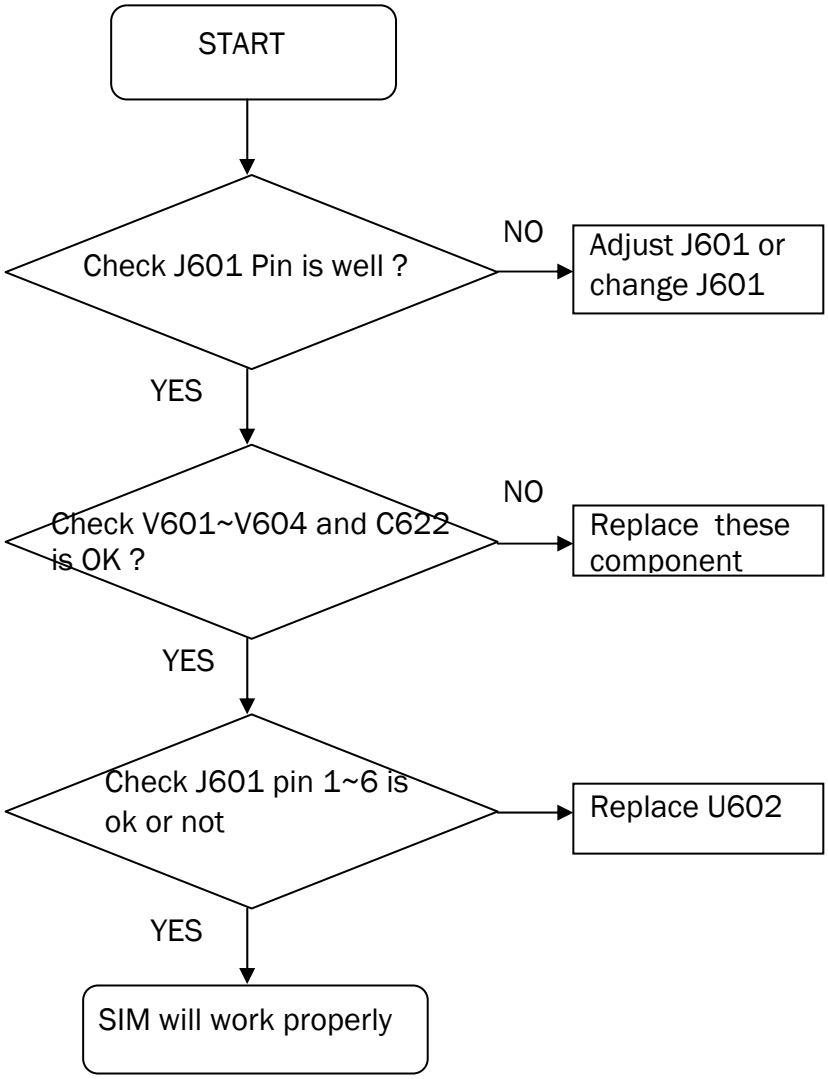
USB cable


START
Check USB cable is ok or not ?
Change USB cable
Check VUSB and VDD of voltage is ok or not ?
Change U602
Check USB_DM is low signal ?
Change U401
It will be use USB

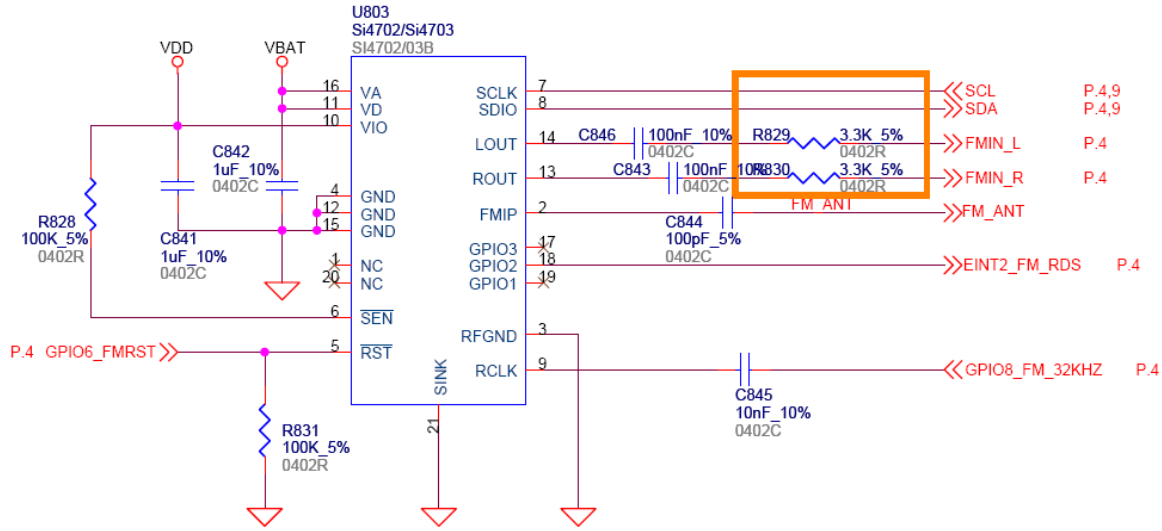
12. SIM card

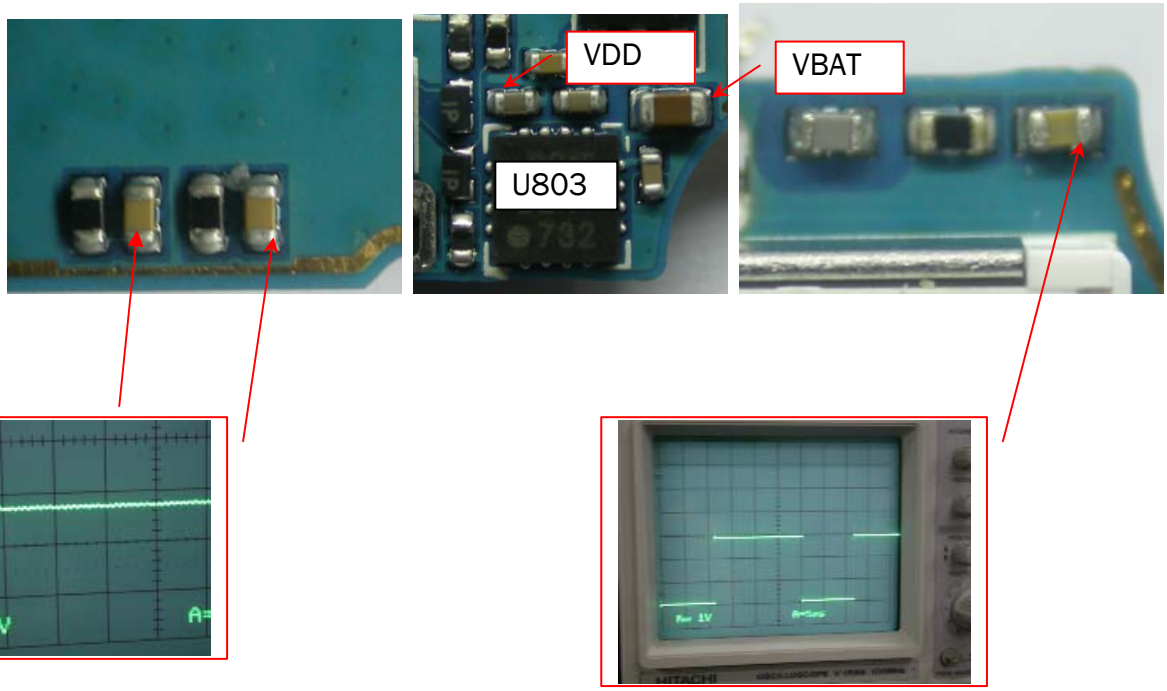

LSDA
SPIDAT
VSIM
P.4
P.4
P.4
P.4
SIMVCC
SIMCLK
SIMRST
SIMDATA
H9
K9
H10
J7
SIMVCC
SIMCLK
SIMRST
SIMIO
SIM_CLK
SIM_RST
SIM_I/O
K10
J9
H8
SCLK
SRST
SIO
J601
CLK
I/O
RST
VPP
VCC
GND
SD-68687-2950
SIM-SCR49-6K700C-2.54
V601
ESDA
0402R
V602
ESDA
0402R
C622
100nF
10%
0603C
V603
ESDA
0402R
V604
ESDA
0402R
SIM Connector
2 4 6
Top View
1 3 5

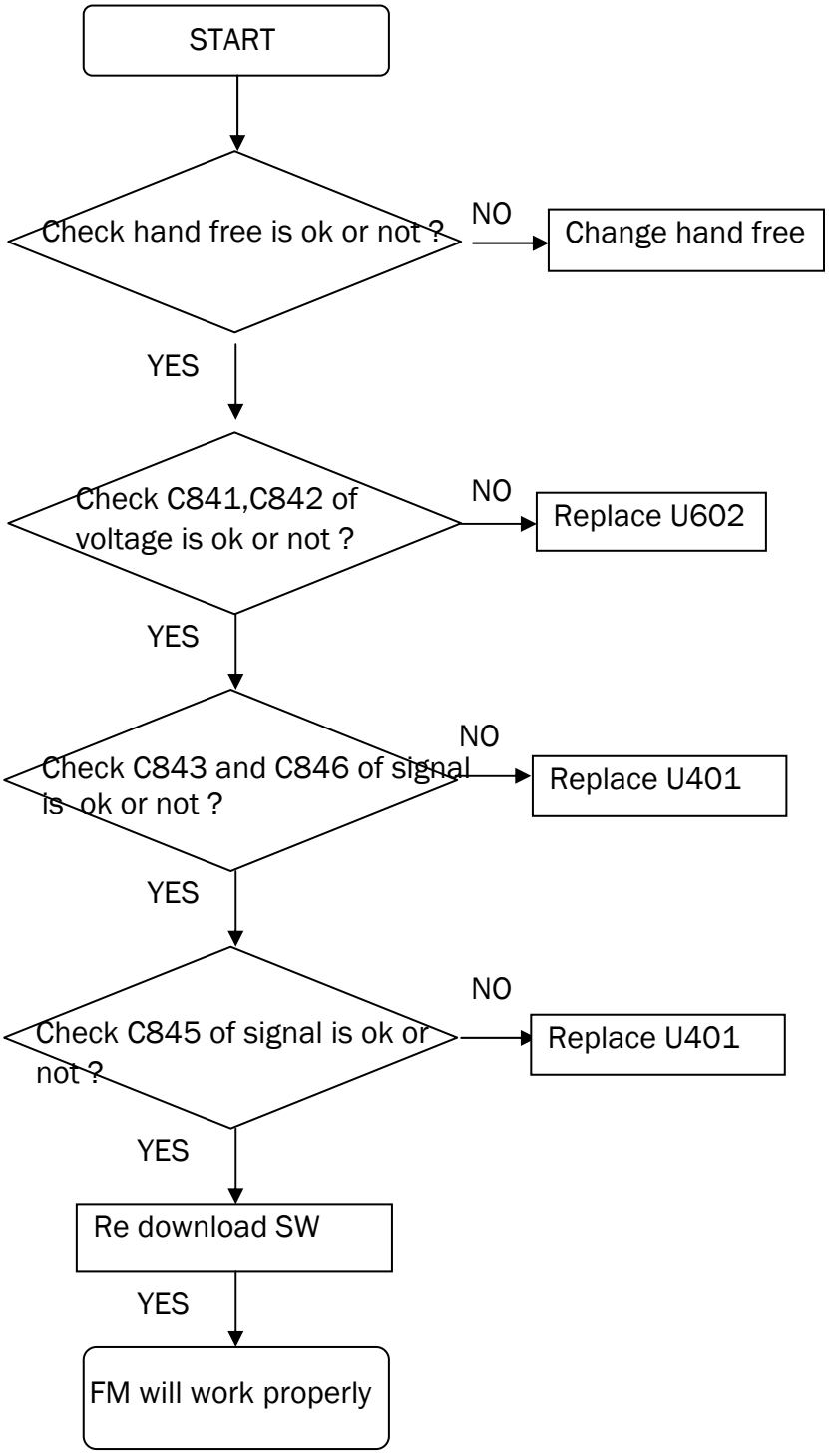

V601
J601
C229
C228
B201
C226
R206
R207
C223
V604
V602
V603
C622


START
Check J601 Pin is well ?
NO
Adjust J601 or change J601
YES
Check V601~V604 and C622 is OK ?
NO
Replace these component
YES
Check J601 pin 1~6 is ok or not
Replace U602
YES
SIM will work properly

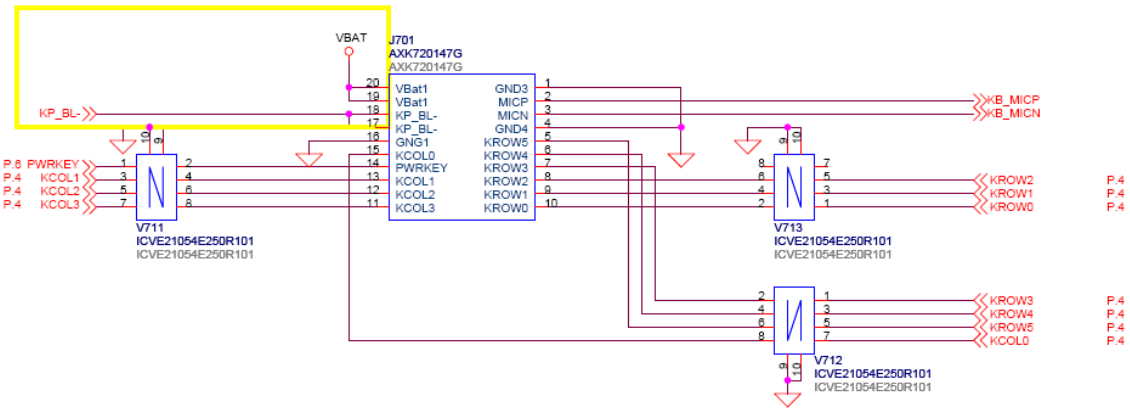
13. FM (radio)

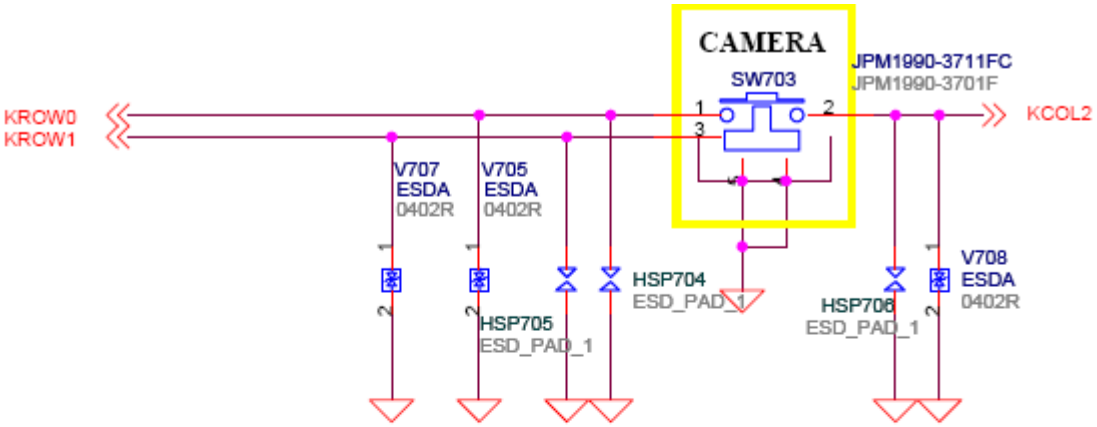

U803
Si4702/Si4703
SI4702/03B
VDD
VBAT
VA
VD
VIO
GND
GND
GND
NC
NC
SEN
RST
SCLK
SDIO
LOUT
ROUT
FMIP
GPIO3
GPIO2
GPIO1
RFGND
RCLK
SINK
C842
1uF_10%
0402C
C841
1uF_10%
0402C
R828
100K_5%
0402R
R831
100K_5%
0402R
C846
100nF_10%
0402C
C843
100nF_10%
0402C
R829
3.3K_5%
0402R
R830
3.3K_5%
0402R
C844
100pF_5%
0402C
C845
10nF_10%
0402C
FM_ANT
P.4 GPIO6_FMRST
SCL
SDA
FMIN_L
FMIN_R
FM_ANT
EINT2_FM_RDS
GPIO8_FM_32KHZ
P.4,9
P.4,9
P.4
P.4
P.4
P.4

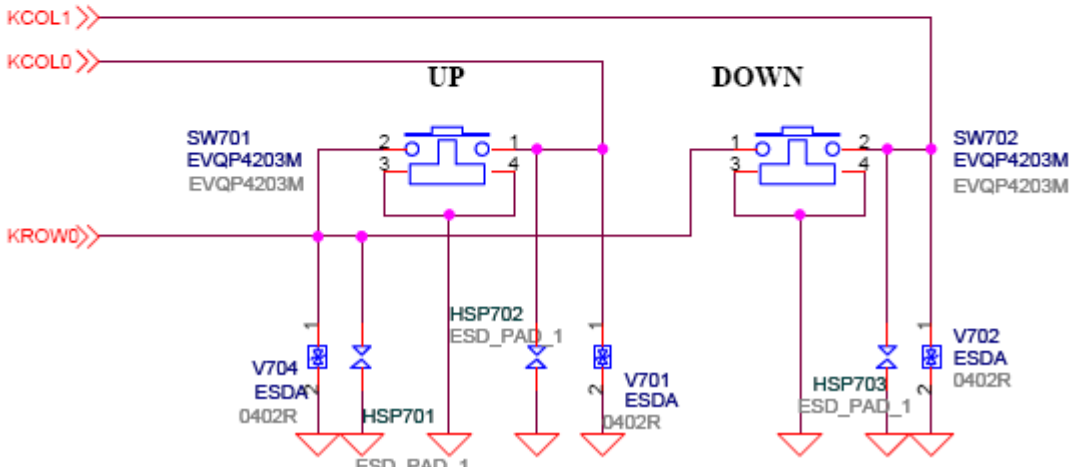

VDD
VBAT
U803

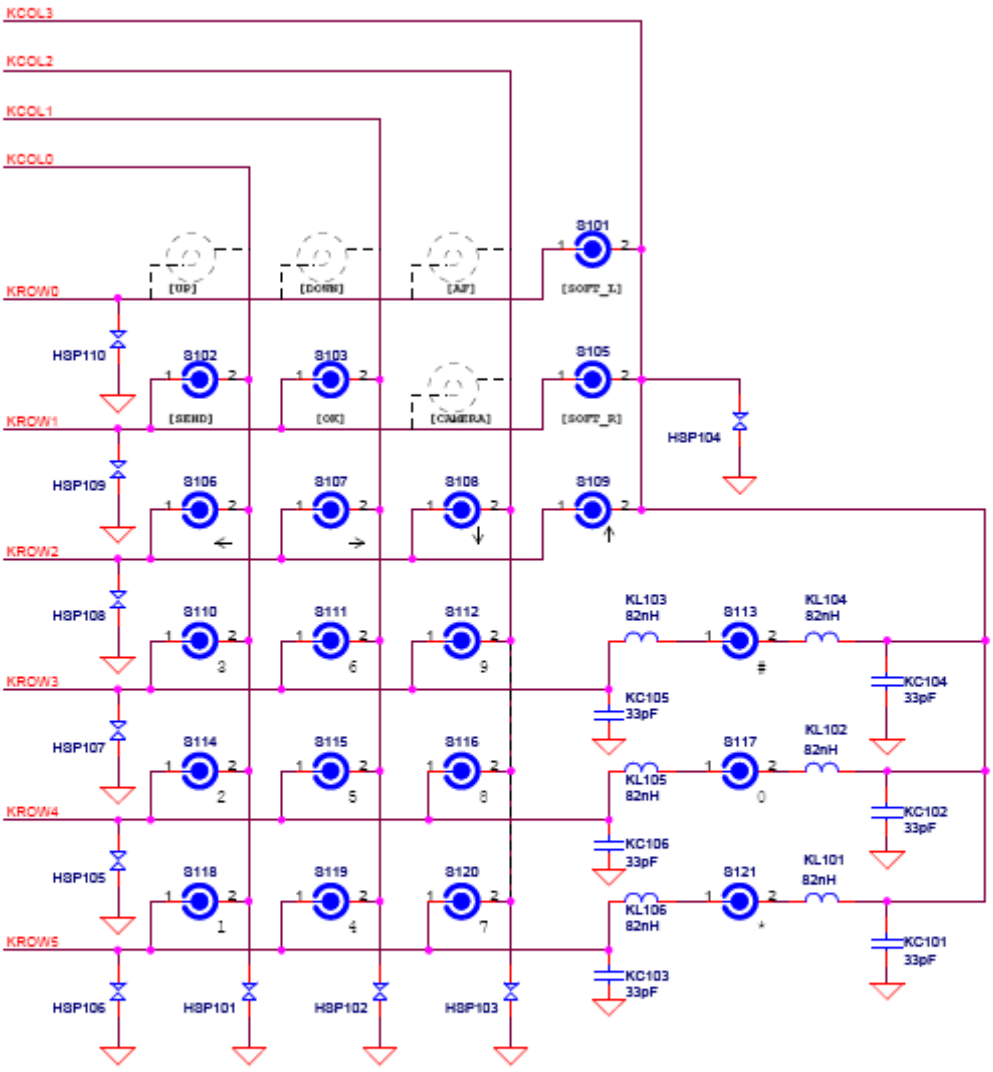

START
Check hand free is ok or not ?
NO
Change hand free
YES
Check C841,C842 of voltage is ok or not ?
NO
Replace U602
YES
Check C843 and C846 of signal is ok or not ?
NO
Replace U401
YES
Check C845 of signal is ok or not ?
NO
Replace U401
YES
Re download SW
YES
FM will work properly

14. Keypad

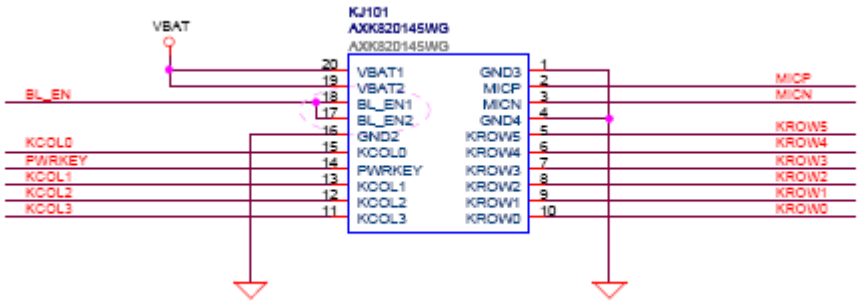

VBAT
J701
AXK720147G
KP_BL-
P.6 PWRKEY
P.4 KCOL1
P.4 KCOL2
P.4 KCOL3
V711
ICVE21054E250R101
V713
ICVE21054E250R101
V712
ICVE21054E250R101
KB_MICP
KB_MICN
KROW2
KROW1
KROW0
KROW3
KROW4
KROW5
KCOL0

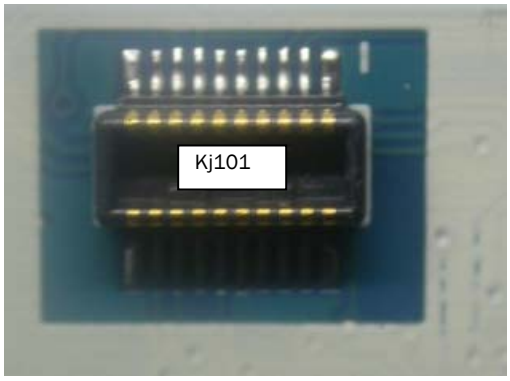

CAMERA
SW703
JPM1990-3711FC
JPM1990-3701F
KROW0
KROW1
KCOL2
V707
ESDA
0402R
V705
ESDA
0402R
HSP704
ESD_PAD_1
HSP705
ESD_PAD_1
HSP706
ESD_PAD_1
V708
ESDA
0402R

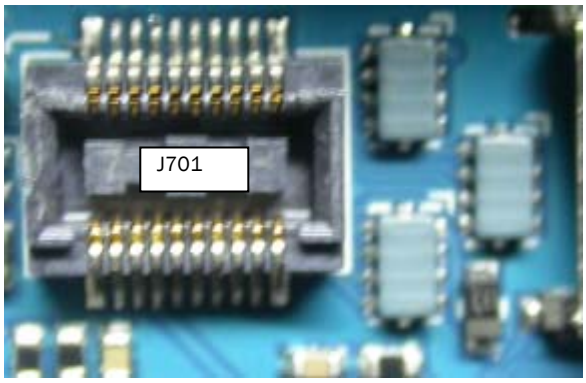

KCOL1
KCOL0
UP
DOWN
SW701
EVQP4203M
SW702
EVQP4203M
KROW0
HSP702
ESD_PAD_1
V704
ESDA
0402R
HSP701
V701
ESDA
0402R
HSP703
ESD_PAD_1
V702
ESDA
0402R

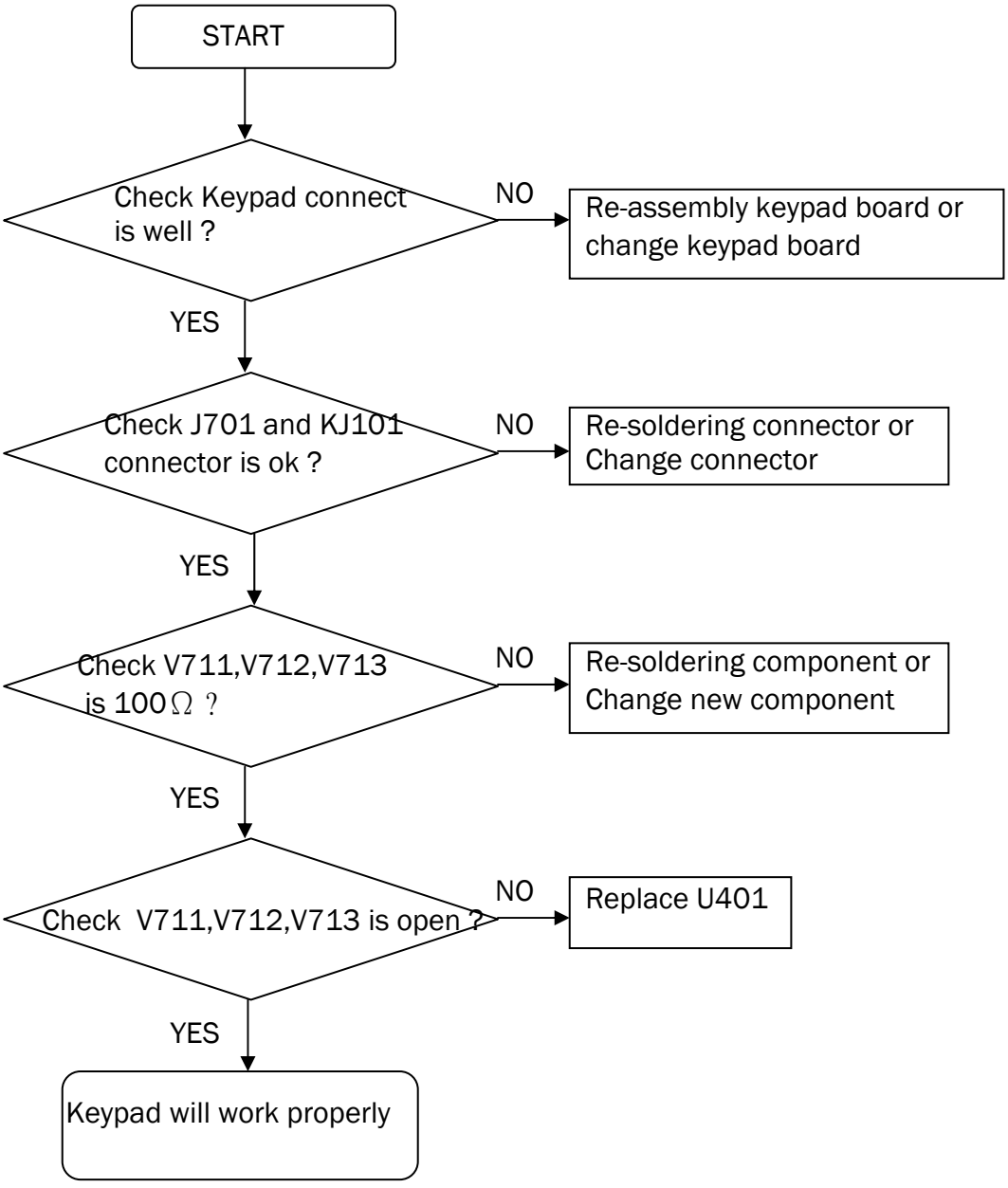

KCOL3
KCOL2
KCOL1
KCOL0
KROW0
KROW1
KROW2
KROW3
KROW4
KROW5
S101
[UP]
[DOWN]
[AF]
[SOFT_L]
S102
[SEND]
S103
[OK]
[CAMERA]
S105
[SOFT_R]
S106
S107
S108
S109
S110
S111
S112
S113
S114
S115
S116
S117
S118
S119
S120
S121
S122
PWRKEY
ON/OFF
POWER KEY
HSP110
HSP109
HSP108
HSP107
HSP105
HSP106
HSP101
HSP102
HSP103
HSP104
KL103
82nH
KL104
82nH
KL105
82nH
KL102
82nH
KL106
82nH
KL101
82nH
KC105
33pF
KC104
33pF
KC106
33pF
KC102
33pF
KC103
33pF
KC101
33pF

KEY PAD

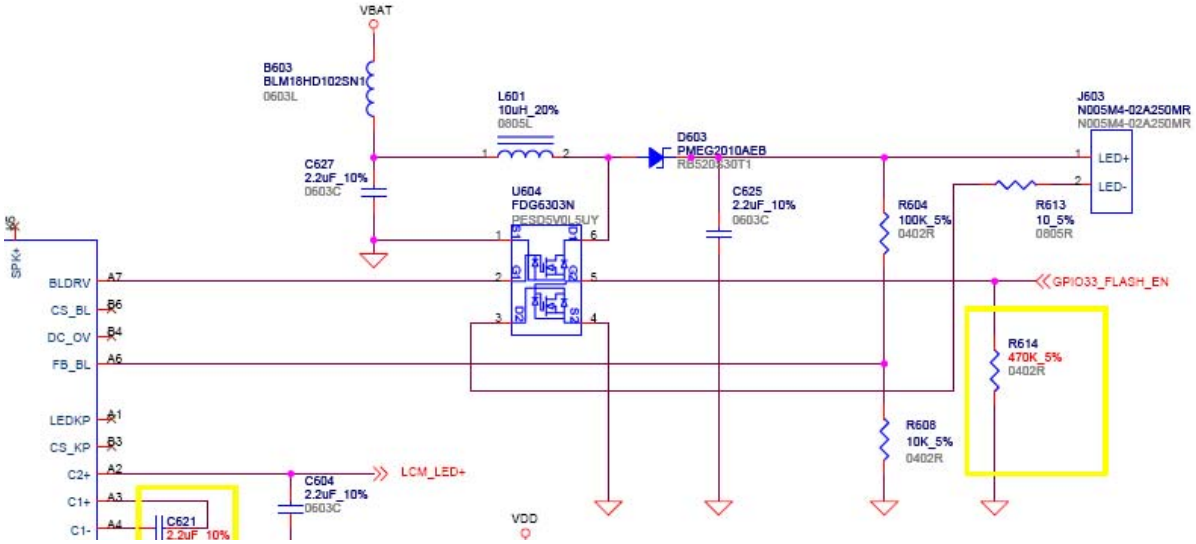

VBAT
KJ101
AXK820145WG
BL_EN
KCOL0
PWRKEY
KCOL1
KCOL2
KCOL3
VBAT1
VBAT2
BL_EN1
BL_EN2
GND2
KCOL0
PWRKEY
KCOL1
KCOL2
KCOL3
GND3
MICP
MICN
GND4
KROW5
KROW4
KROW3
KROW2
KROW1
KROW0
MICP
MICN
KROW5
KROW4
KROW3
KROW2
KROW1
KROW0

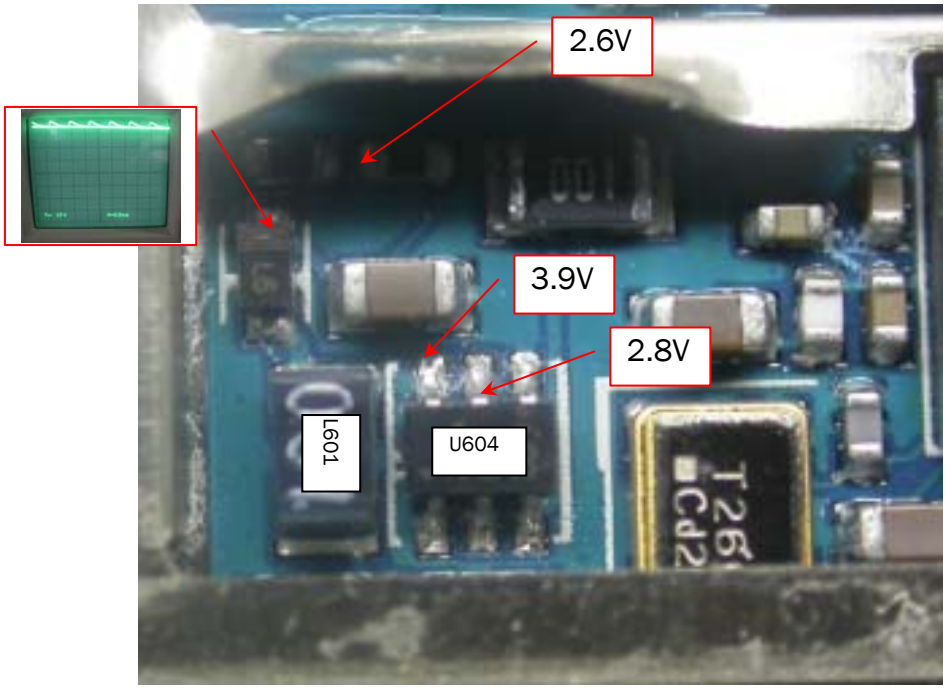

Kj101

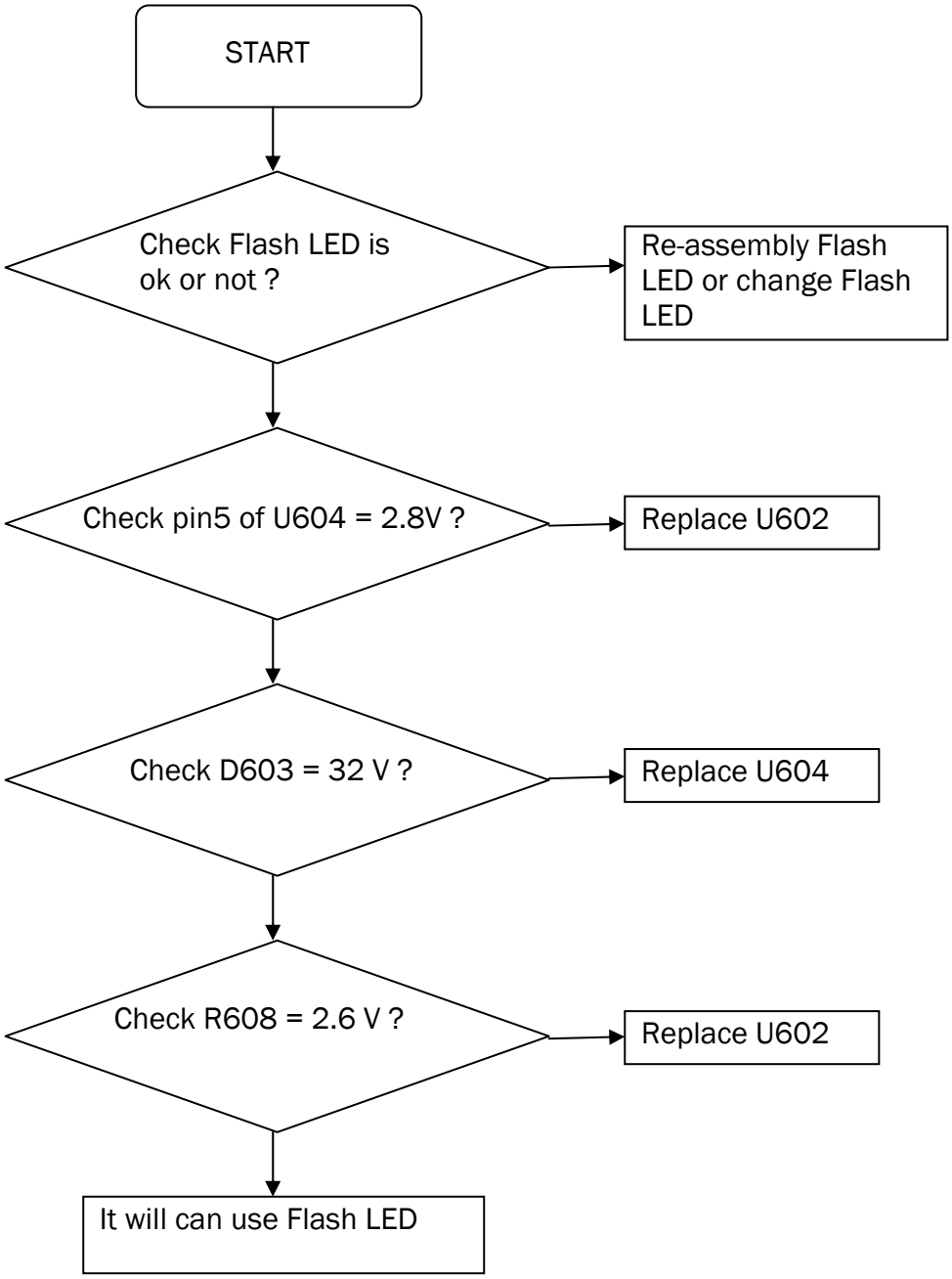

J701


START
Check Keypad connect is well ?
NO
Re-assembly keypad board or change keypad board
YES
Check J701 and KJ101 connector is ok ?
NO
Re-soldering connector or Change connector
YES
Check V711,V712,V713 is 100Ω ?
NO
Re-soldering component or Change new component
YES
Check V711,V712,V713 is open ?
NO
Replace U401
YES
Keypad will work properly

15. Flash LED


VBAT
B603
BLM18HD102SN1
0603L
L601
10uH_20%
0805L
D603
PMEG2010AEB
RB520S30T1
J603
N005M4-02A250MR
LED+
LED-
C627
2.2uF_10%
0603C
U604
FDG6303N
C625
2.2uF_10%
0603C
R604
100K_5%
0402R
R613
10_5%
0805R
GPIO33_FLASH_EN
R614
470K_5%
0402R
R608
10K_5%
0402R
BLDRV
CS_BL
DC_OV
FB_BL
LEDKP
CS_KP
C2+
C1+
C1-
C604
2.2uF_10%
0603C
LCM_LED+
C621
2.2uF_10%
VDD


2.6V
3.9V
2.8V
L601
U604


START
Check Flash LED is ok or not ?
Re-assembly Flash LED or change Flash LED
Check pin5 of U604 = 2.8V ?
Replace U602
Check D603 = 32 V ?
Replace U604
Check R608 = 2.6 V ?
Replace U602
It will can use Flash LED

16. RF Trouble shooting

14.1 TX signal (GSM 900)

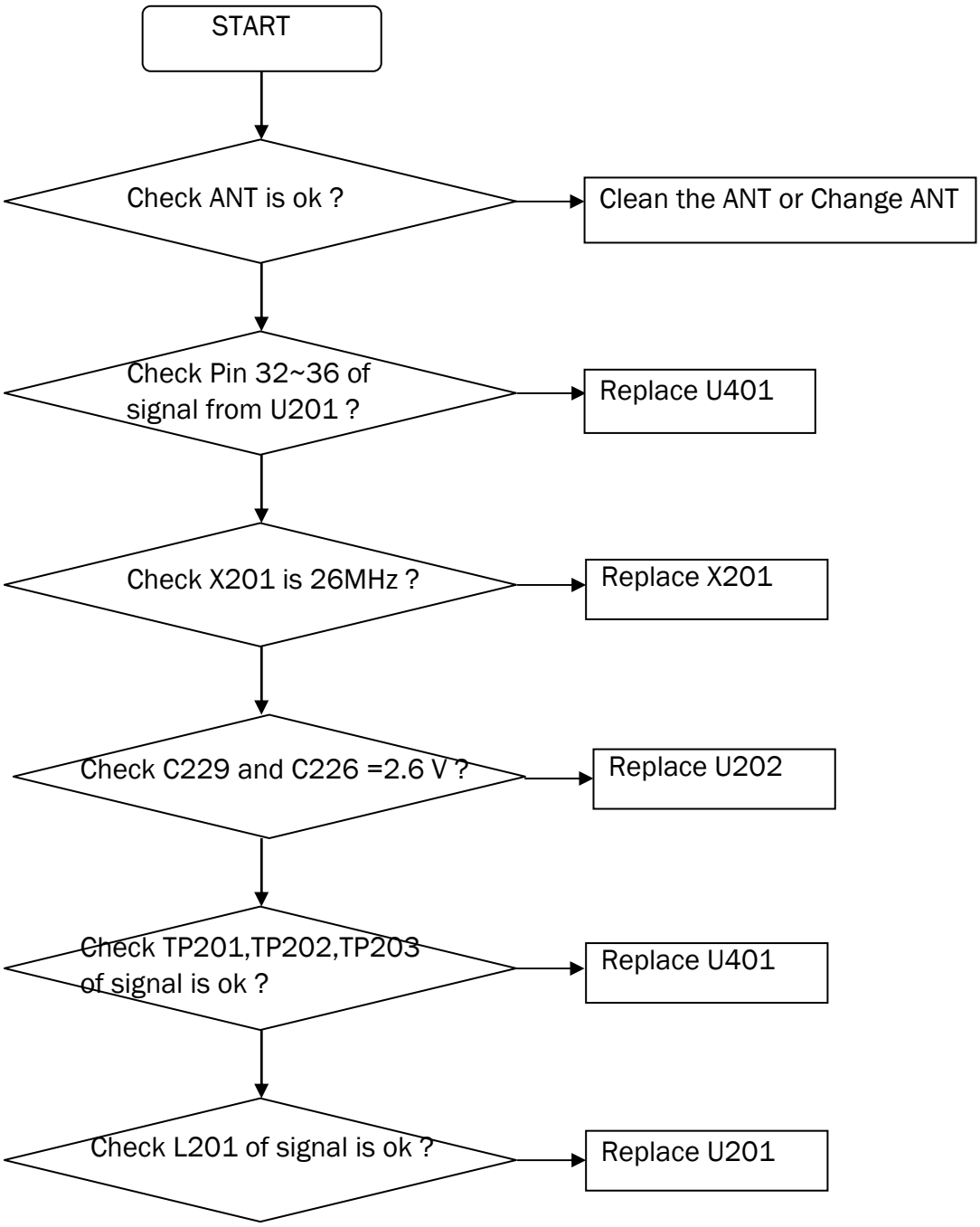
(1)Use meta tool connect PCBA

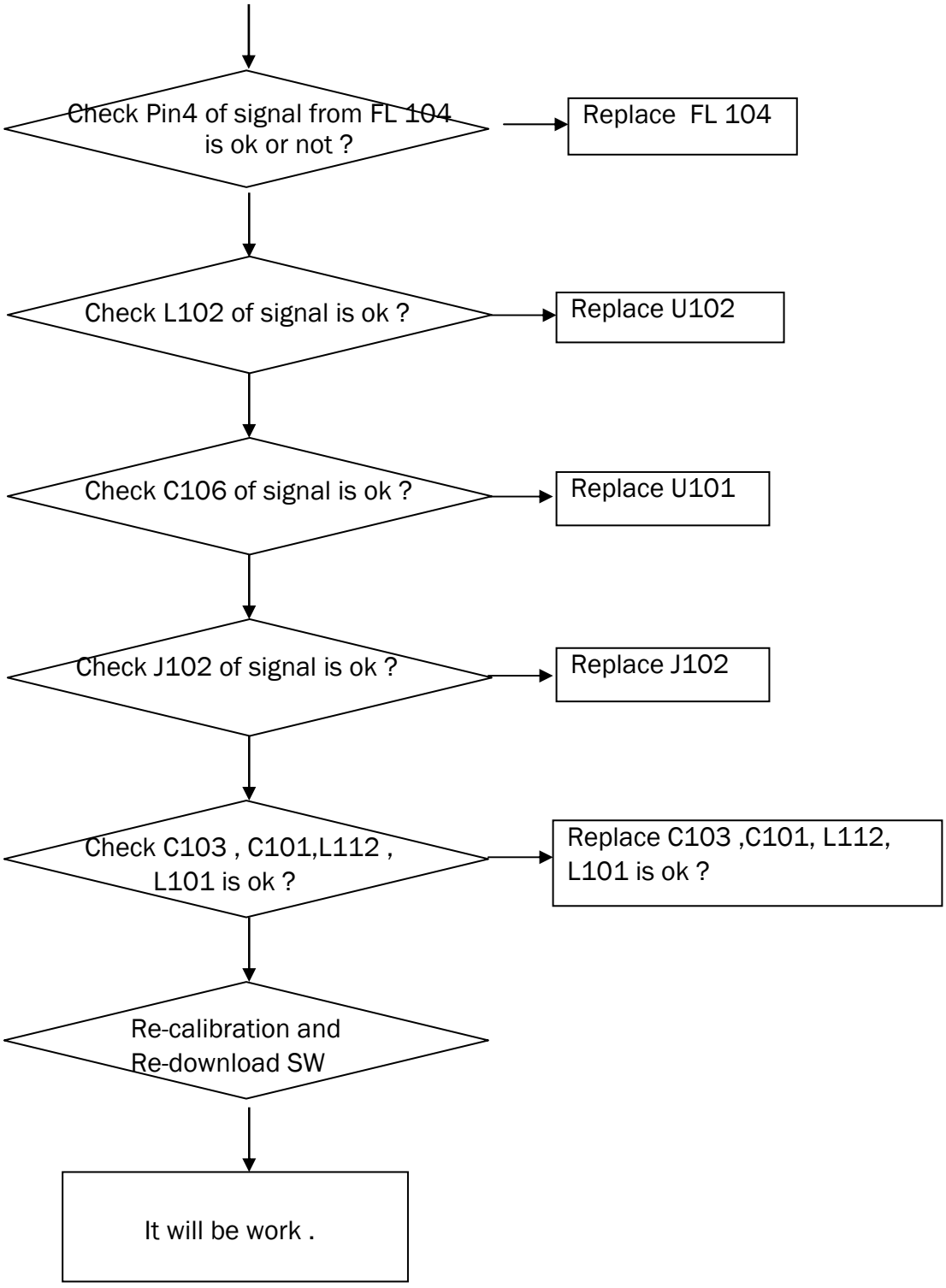
(2)Choose TX level and profile

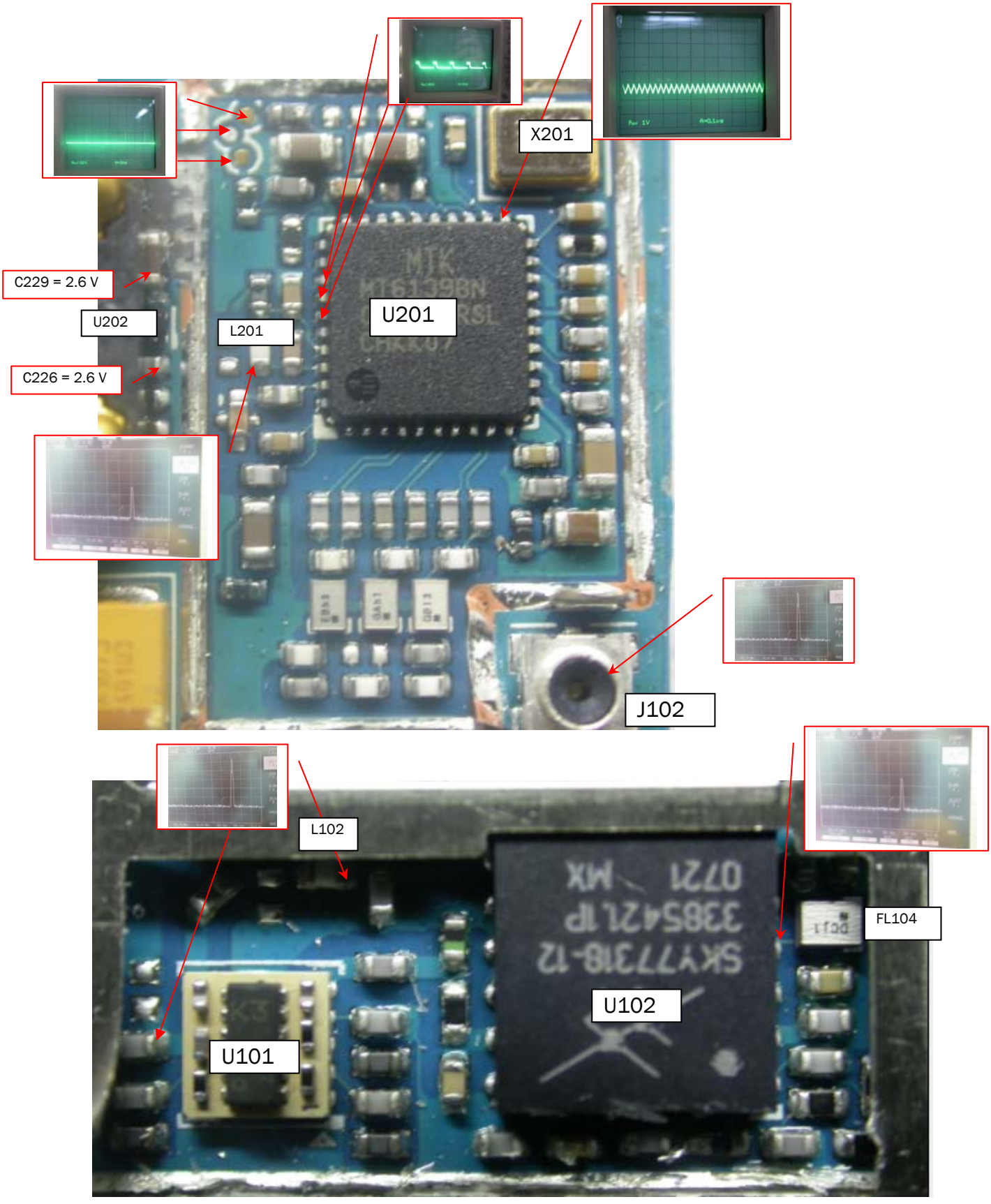
(3)Band :GSM 900 ARFCN : 62 TSC : 5 PCL : 5 AFC:4100

(4)Spectrum key in FREQ: 902.4 MHz

SPAN: 20 MHz




Check Pin4 of signal from FL 104 is ok or not ?
Replace FL 104
Check L102 of signal is ok ?
Replace U102
Check C106 of signal is ok ?
Replace U101
Check J102 of signal is ok ?
Replace J102
Check C103 , C101,L112 , L101 is ok ?
Replace C103 ,C101, L112, L101 is ok ?
Re-calibration and Re-download SW
It will be work .


X201
C229 = 2.6 V
U202
L201
U201
C226 = 2.6 V
J102
L102
FL104
U102
U101

14.2 TX signal (GSM 1800)

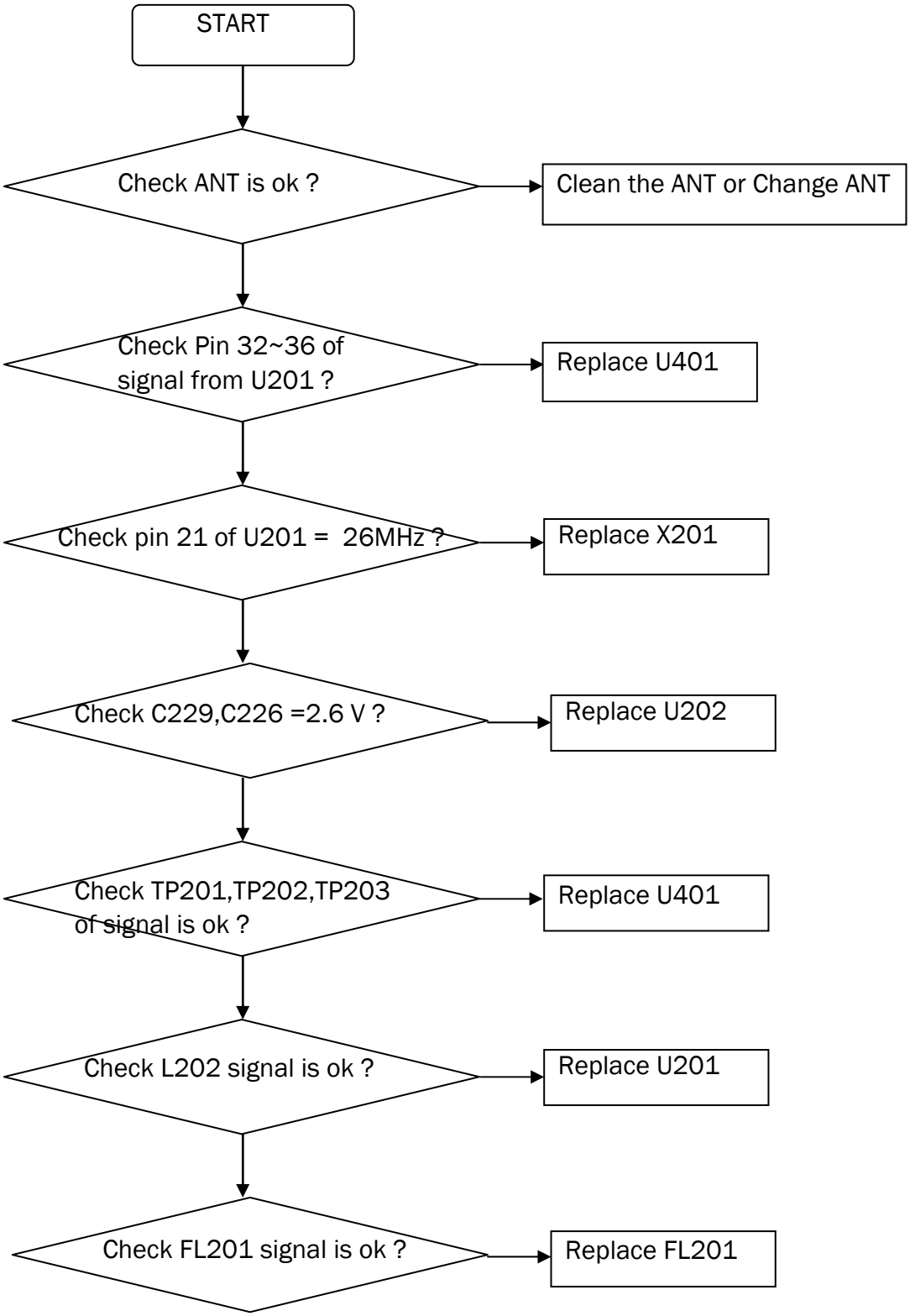
(1)Use meta tool connect PCBA

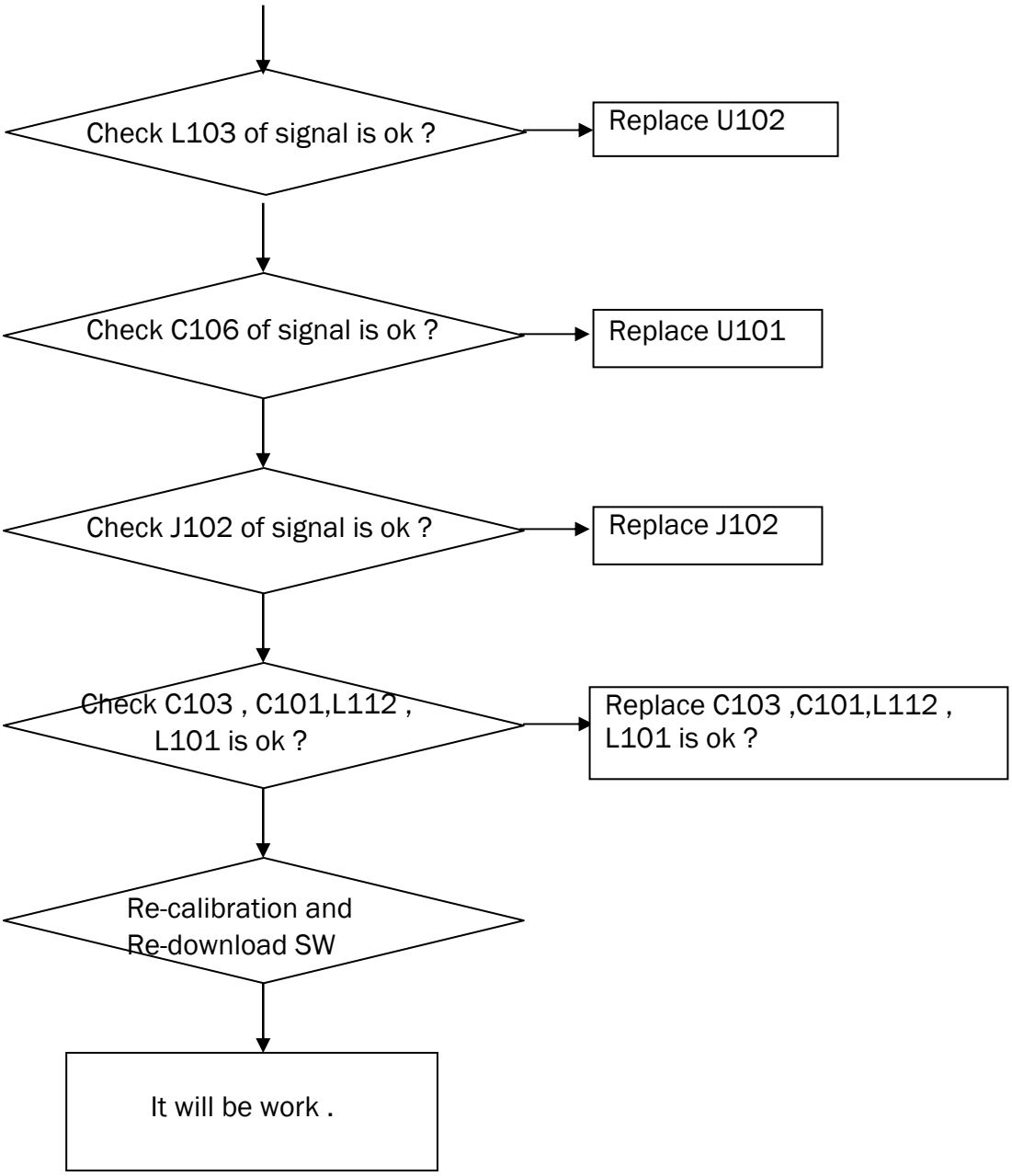
(2)Choose TX level and profile

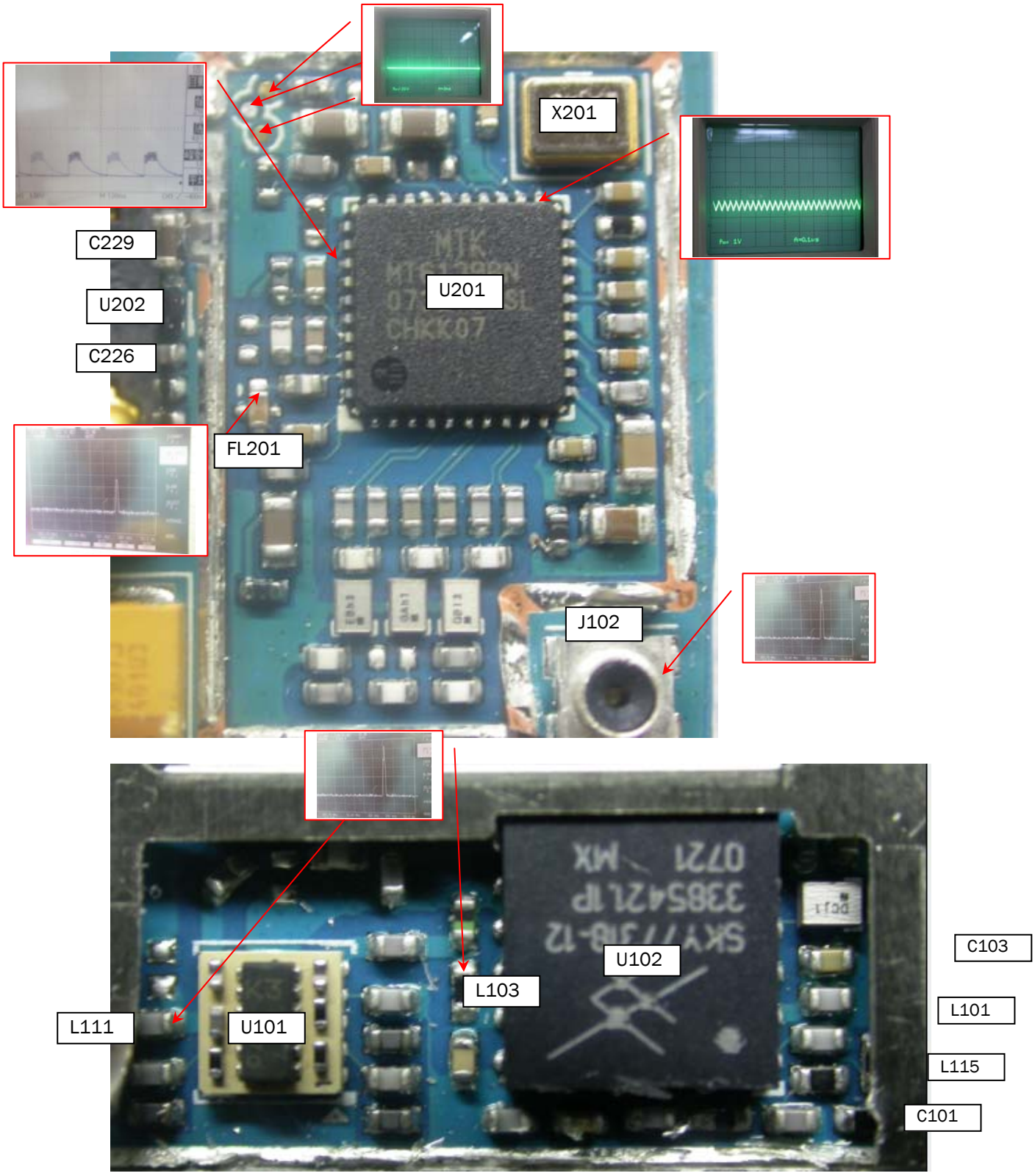
(3)Band :GSM 1800 ARFCN : 700 TSC : 5 PCL : 5 AFC:4100

(4)Spectrum key in FREQ: 1.7478GHz

SPAN: 20 MHz




Check L103 of signal is ok ?
Replace U102
Check C106 of signal is ok ?
Replace U101
Check J102 of signal is ok ?
Replace J102
Check C103 , C101,L112 , L101 is ok ?
Replace C103 ,C101,L112 , L101 is ok ?
Re-calibration and Re-download SW
It will be work .


X201
C229
U202
C226
U201
FL201
J102
L111
U101
L103
U102
C103
L101
L115
C101

Section 8

Device Information

8. DEVICE INFORMATION

DSC (DIGITAL STATIC CAMERA) MODULE

Pin List

Pinout Description

P/N	Signal Name	Type	Description
1	MCLK	Input	System clock input
2	AGND	Ground	Ground for analog circuit
3	AGND	Ground	Ground for analog circuit
4	PCLK	Output	Pixel clock output
5	AGND	Ground	Ground for analog circuit
6	DGND	Ground	Ground for digital core
7	D0	Output	Video port output bit[0]
8	D1	Output	Video port output bit[1]
9	D2	Output	Video port output bit[2]
10	D3	Output	Video port output bit[3]
11	D4	Output	Video port output bit[4]
12	D5	Output	Video port output bit[5]
13	D6	Output	Video port output bit[6]
14	D7	Output	Video port output bit[7]
15	D8	Output	Video port output bit[8]
16	D9	Output	Video port output bit[9]
17	CCM_ID	Input	CCM Identification
18	DVCC	Power	VCM Driver IC Power 2.8V
19	VCM+	Power	Actuator Power 2.8V
20	VCM DGND	Ground	VCM & VCM Driver IC DGND
21	PD	Input	VCM Driver IC Power Down, active High
22	VCM AGND	Ground	VCM & VCM Driver IC AGND
23	HSYNC	Output	Horizontal reference output
24	VSYNC	Output	Vertical sync output
25	DGND	Ground	Ground for digital core
26	SCL	Input	SCCB serial interface clock input
27	SDA	I/O	SCCB serial interface data I/O
28	DGND	Ground	Ground for digital core
29	RSTN	Input	Reset mode , active low
30	DGND	Ground	Ground for digital core
31	DOVDD	Power	Power (2.8V) for digital video port
32	DVDD	Power	Sensor digital power(core) 1.5V
33	AGND	Ground	Ground for analog circuit
34	AVDD	Power	Power for analog circuit 2.8V

FRONT END MODULE (TX/RX SWITCH)

1. Pin List

Pin No.	Symbol	Description
1	CE1	Chip Enable Pin 1 ("H" Active)
2	GND	Ground Pin
3	CE2	Chip Enable Pin 2 ("H" Active)
4	NC	No Connection
5	NC	No Connection
6	V_{OUT2}	Output Pin 2
7	V_{DD}	Input Pin
8	V_{OUT1}	Output Pin 1

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FLASH MEMORY

1

	1	2	3	4	5	6	7	8	9	10	11	12
A	NC	NC	NC							NC	NC	NC
B	NC	NC	NC							NC	NC	NC
C	NC	NC	NC	V_{CCd}	V_{SS}	NC	CLK	V_{CCd}	V_{SS}	I/O8	NC	NC
D	NC	NC	NC	A0	$\overline{CS}$	$\overline{WEd}$	CKE	A7	A8	I/O7	NC	
E		NC	RY/$\overline{BY}$	A1	BA0	$\overline{CAS}$	A12	A6	NC	I/O6	NC	
F		NC	$\overline{RE}$	A2	BA1	$\overline{RAS}$	A11	A5	NC	I/O5	NC	
G		V_{SS}	$\overline{CE}$	A3	A10	NC	A9	A4	NC	NC	NC	
H		V_{CCn}	NC	NC	NC	NC	NC	NC	NC	V_{SS}	NC	
J		NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	
K		NC	CLE	NC	NC	LDQM	UDQM	NC	NC	NC	NC	
L		NC	ALE	DQ0	DQ3	NC	NC	DQ10	DQ13	I/O4	NC	
M		NC	$\overline{WEn}$	DQ1	DQ4	DQ6	DQ8	DQ11	DQ14	I/O3	NC	
N		NC	$\overline{WP}$	DQ2	DQ5	DQ7	DQ9	DQ12	DQ15	I/O2	NC	
P	NC	NC	NC	V_{CCQd}	V_{SS}	V_{CCd}	V_{SS}	V_{CCQd}	V_{SS}	I/O1	NC	NC
R	NC	NC	NC							NC	NC	NC
T	NC	NC	NC							NC	NC	NC

2. Pin List

PIN NAMES

A0 to A12	Address inputs for Low Power SDRAM
BA0,BA1	Bank Select for Low Power SDRAM
DQ0 to DQ15	Data inputs / outputs for Low Power SDRAM
CLK	Clock inputs for Low Power SDRAM
CKE	Clock enable for Low Power SDRAM
$\overline{CS}$	Chip select for Low Power SDRAM
$\overline{RAS}$	Row address strobe for Low Power SDRAM
$\overline{CAS}$	Column address strobe for Low Power SDRAM
$\overline{WEd}$	Write enable for Low Power SDRAM
UDQM	Upper data mask enable for Low Power SDRAM
LDQM	Lower data mask enable for Low Power SDRAM
I/O1 to I/O8	I/O port Nand E^2PROM
$\overline{CE}$	Chip enable for Nand E^2PROM
$\overline{RE}$	Read enable for Nand E^2PROM
$\overline{WEn}$	Write enable for Nand E^2PROM
CLE	Command latch enable for Nand E^2PROM
ALE	Address latch enable for Nand E^2PROM
$\overline{WP}$	Write protect for Nand E^2PROM
RY/$\overline{BY}$	Ready/Busy for Nand E^2PROM
V_{CCd}	Main power supply for Low Power SDRAM
V_{CCQd}	DQ power supply for Low Power SDRAM
V_{CCn}	Power supply for Nand E^2PROM
V_{SS}	Ground
NC	Not connected

PIN NAME CONVERSION TABLE

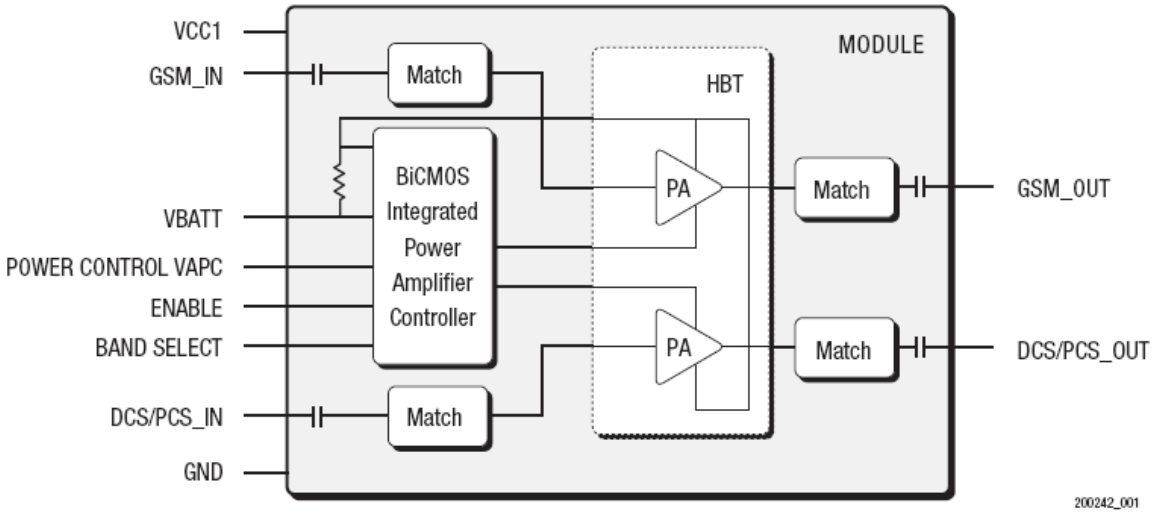
MCP Pin		256M	1G
Location	Name	LPSD	Nand
A1-3	NC	–	–
A4-9	–	–	–
A10-12	NC	–	–
B1-3	NC	–	–
B4-9	–	–	–
B10-12	NC	–	–
C1	NC	–	–
C2	NC	–	–
C3	NC	–	–
C4	V_{CCd}	V_{DD}	–
C5	V_{SS}	V_{SS}, V_{SSQ}	V_{SS}
C6	NC	–	–
C7	CLK	CK	–
C8	V_{CCd}	V_{DD}	–
C9	V_{SS}	V_{SS}	V_{SS}
C10	I/O8	–	I/O8
C11	NC	–	–
C12	NC	–	–
D1	NC	–	–
D2	NC	–	–
D3	NC	–	–
D4	A0	A0	–
D5	$\overline{CS}$	$\overline{CS}$	–
D6	$\overline{WEd}$	$\overline{WE}$	–
D7	CKE	CKE	–
D8	A7	A7	–
D9	A8	A8	–
D10	I/O7	–	I/O7
D11	NC	–	–
D12	–	–	–
E1	–	–	–
E2	NC	–	–
E3	RY/$\overline{BY}$	–	RY/$\overline{BY}$
E4	A1	A1	–
E5	BA0	BA0	–
E6	$\overline{CAS}$	$\overline{CAS}$	–
E7	A12	A12	–
E8	A6	A6	–
E9	NC	–	–
E10	I/O6	–	I/O6
E11	NC	–	–
E12	–	–	–
F1	–	–	–
F2	NC	–	–
F3	$\overline{RE}$	–	$\overline{RE}$
F4	A2	A2	
F5	BA1	BA1	–
F6	$\overline{RAS}$	$\overline{RAS}$	–
F7	A11	A11	–
F8	A5	A5	–
F9	NC	–	–
F10	I/O5	–	I/O5
F11	NC	–	–
F12	–	–	–

MCP Pin		256M	1G
Location	Name	LPSD	Nand
G1	–	–	–
G2	V_{SS}	V_{SS}, V_{SSQ}	V_{SS}
G3	$\overline{CE}$	–	$\overline{CE}$
G4	A3	A3	–
G5	A10	A10	–
G6	NC	–	–
G7	A9	A9	–
G8	A4	A4	–
G9	NC	–	–
G10	NC	–	–
G11	NC	–	–
G12	NC	–	–
H1	–	–	–
H2	V_{CCn}	–	V_{CC}
H3	NC	–	–
H4	NC	–	–
H5	NC	–	–
H6	NC	–	–
H7	NC	–	–
H8	NC	–	–
H9	NC	–	–
H10	V_{SS}	V_{SS}, V_{SSQ}	V_{SS}
H11	NC	–	–
H12	–	–	–
J1	–	–	–
J2	NC	–	–
J3	NC	–	–
J4	NC	–	–
J5	NC	–	–
J6	NC	–	–
J7	NC	–	–
J8	NC	–	–
J9	NC	–	–
J10	NC	–	–
J11	NC	–	–
J12	–	–	–
K1	–	–	–
K2	NC	–	–
K3	CLE	–	CLE
K4	NC	–	–
K5	NC	–	–
K6	LDQM	LDQM	–
K7	UDQM	UDQM	–
K8	NC	–	–
K9	NC	–	–
K10	NC	–	–
K11	NC	–	–
K12	–	–	–

MCP Pin		256M	1G
Location	Name	LPSD	Nand
L1	–	–	–
L2	NC	–	–
L3	ALE	–	ALE
L4	DQ0	DQ0	–
L5	DQ3	DQ3	–
L6	NC	–	–
L7	NC	–	–
L8	DQ10	DQ10	–
L9	DQ13	DQ13	–
L10	I/O4	–	I/O4
L11	NC	–	–
L12	–	–	–
M1	–	–	–
M2	NC	–	–
M3	$\overline{WEn}$	–	$\overline{WE}$
M4	DQ1	DQ1	–
M5	DQ4	DQ4	–
M6	DQ6	DQ6	–
M7	DQ8	DQ8	–
M8	DQ11	DQ11	–
M9	DQ14	DQ14	–
M10	I/O3	–	I/O3
M11	NC	–	–
M12	–	–	–
N1	–	–	–
N2	NC	–	–
N3	$\overline{WP}$	–	$\overline{WP}$
N4	DQ2	DQ2	–
N5	DQ5	DQ5	–
N6	DQ7	DQ7	–
N7	DQ9	DQ9	–
N8	DQ12	DQ12	–
N9	DQ15	DQ15	–
N10	I/O2	–	I/O2
N11	NC	–	–
N12	–	–	–
P1	NC	–	–
P2	NC	–	–
P3	NC	–	–
P4	V_{CCQd}	V_{DDQ}	–
P5	V_{SS}	V_{SS}, V_{SSQ}	V_{SS}
P6	V_{CCd}	V_{DD}	–
P7	V_{SS}	V_{SS}, V_{SSQ}	V_{SS}
P8	V_{CCQd}	V_{DDQ}	–
P9	V_{SS}	V_{SS}, V_{SSQ}	V_{SS}
P10	I/O1	–	I/O1
P11	NC	–	–
P12	NC	–	–
R1-3	NC	–	–
R4-9	–	–	–
R10-12	NC	–	–
T1-3	NC	–	–
T4-9	–	–	–
T10-12	NC	–	–

POWER AMP MODULE (PA)

1. Function Block



2. Pin List

Pin	Name	Description
1	BS	Band Select
2	VCC1A	VCC (to GSM 1st stage, DCS/PCS 1st stages, BiCMOS PAC)
3	DCS/PCS_IN	RF input 1710–1910 MHz (DCS1800, PCS1900)
4	GSM_IN	RF input 880–915 MHz (GSM)
5	GND	RF and DC Ground
6	VCC1B	VCC (to GSM 2nd stage, DCS/PCS 2nd stages)
7	GND	RF and DC Ground
8	GND	RF and DC Ground
9	GND	RF and DC Ground
10	GND	RF and DC Ground
11	GSM_OUT	RF Output 880–915 MHz (GSM)
12	GND	RF and DC Ground
13	GND	RF and DC Ground
14	GND	RF and DC Ground
15	DCS/PCS_OUT	RF Output 1710–1910 MHz (DCS1800, PCS1900)
16	GND	RF and DC Ground
17	VBATT	Battery input to high side of internal sense resistor
18	ENABLE	BiCMOS Enable
19	RSVD(GND)	RF and DC Ground
20	VAPC	Power Control Bias Voltage
GND PAD	GND	Ground Pad, device underside

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CPU

1. Function Block

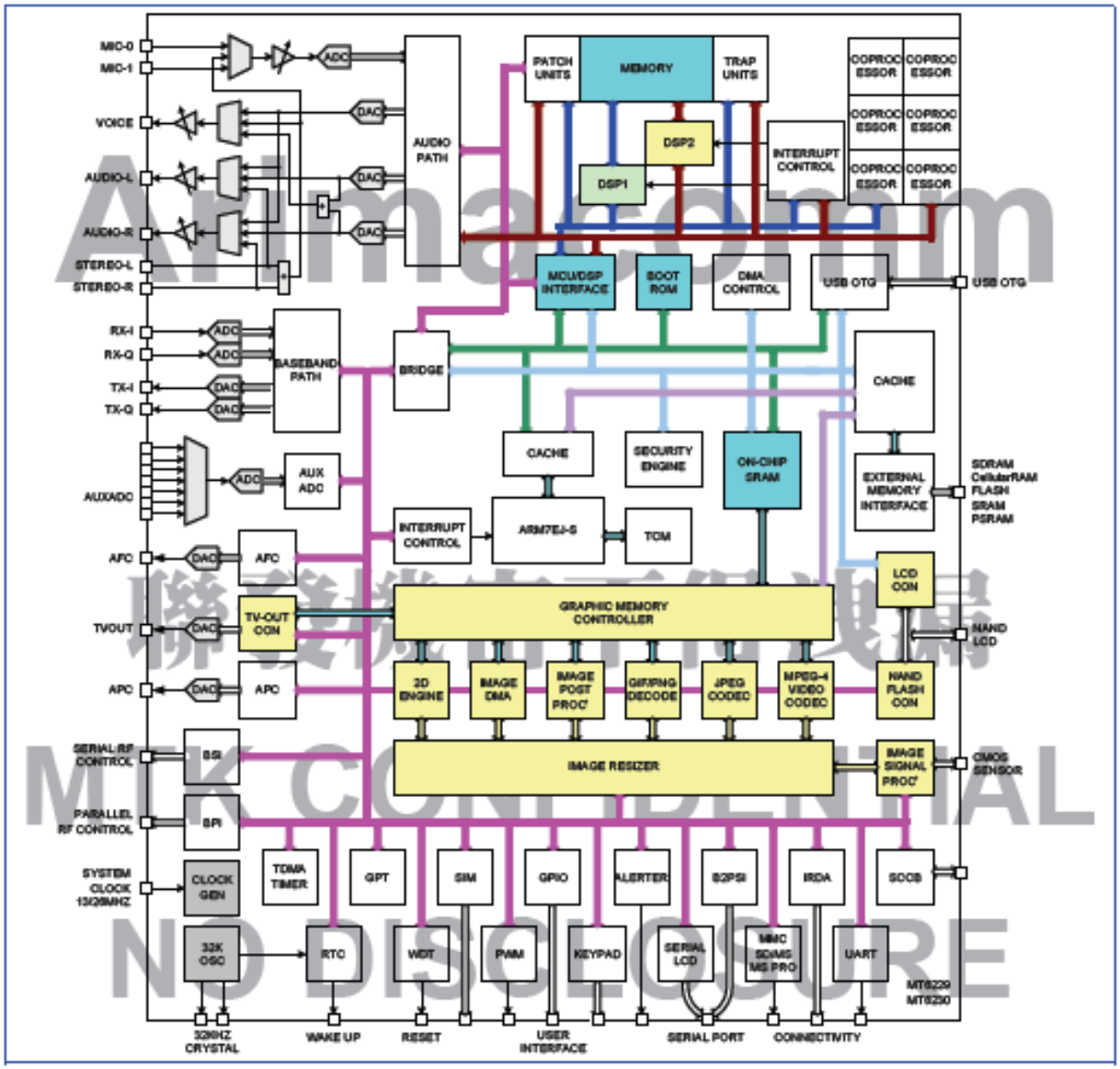


Figure 2 MT6229 / MT6230 block diagram.

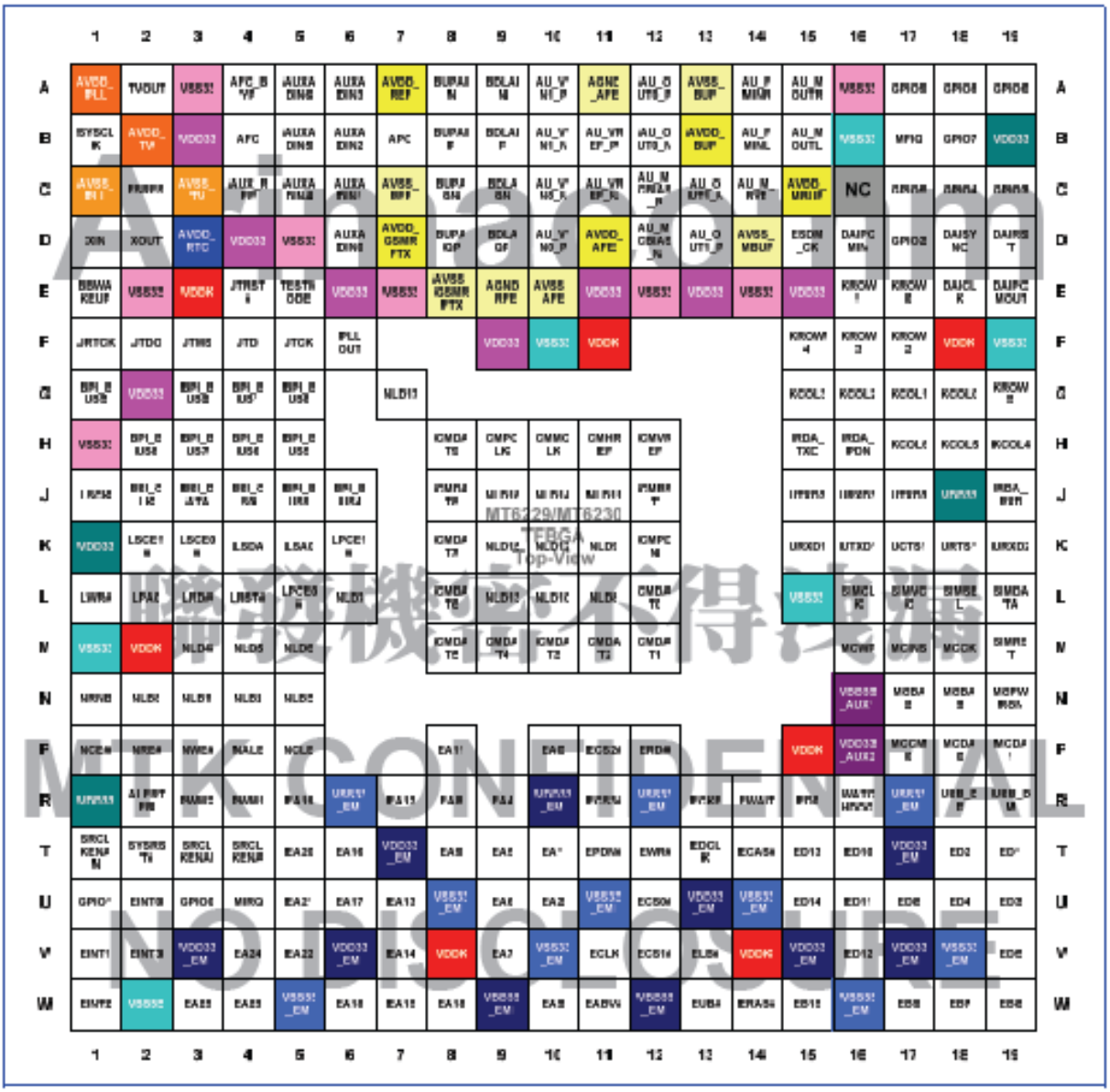


Figure 3 Top View of MT6229 (MT6230) TFBGA 13mm*13mm, 314-ball, 0.65 mm pitch Package

Ball 13X13	Name	Dir	Description	Mode0	Mode1	Mode2	Mode3	PU/PD	Reset
			JTAG Port						
E4	**JTRST#**	I	JTAG test port reset input					PD	Input
F5	**JTCK**	I	JTAG test port clock input					PU	Input
F4	**JTDI**	I	JTAG test port data input					PU	Input
F3	**JTMS**	I	JTAG test port mode switch					PU	Input
F2	**JTDO**	O	JTAG test port data output						0
F1	**JRTCK**	O	JTAG test port returned clock output						0
			RF Parallel Control Unit						
G5	**BPI_BUS0**	O	RF hard-wire control bus 0						0
G4	**BPI_BUS1**	O	RF hard-wire control bus 1						0
G3	**BPI_BUS2**	O	RF hard-wire control bus 2						0
G1	**BPI_BUS3**	O	RF hard-wire control bus 3						0
J6	**BPI_BUS4**	O	RF hard-wire control bus 4						0
H5	**BPI_BUS5**	O	RF hard-wire control bus 5						0
H4	BPI_BUS6	IO	RF hard-wire control bus 6	**GPIO16**	BPI_BUS6			PD	Input
H3	BPI_BUS7	IO	RF hard-wire control bus 7	**GPIO17**	BPI_BUS7	13MHz	26MHz	PD	Input
H2	BPI_BUS8	IO	RF hard-wire control bus 4	**GPIO18**	BPI_BUS8	6.5MHz	32KHz	PD	Input
J5	BPI_BUS9	IO	RF hard-wire control bus 5	**GPIO19**	BPI_BUS9	BSI_CS1	BFEPRBO	PD	Input
			RF Serial Control Unit						
J4	**BSI_CS0**	O	RF 3-wire interface chip select 0						0
J3	**BSI_DATA**	IO	RF 3-wire interface data output						0
J2	**BSI_CLK**	O	RF 3-wire interface clock output						0
			PWM Interface						
R4	PWM1	IO	Pulse width modulated signal 1	**GPIO32**	PWM1	TBTXFS	D2_TID2	PD	Input
R3	PWM2	IO	Pulse width modulated signal 2	**GPIO33**	PWM2	TBRXEN	D2_TID3	PD	Input
R2	ALERTER	IO	Pulse width modulated signal for buzzer	**GPIO34**	ALERTER	TBRXFS	D2_TID4	PD	Input
			Serial LCD/PM IC Interface						
J1	LSCK	IO	Serial display interface data output	**GPIO20**	LSCK	TDMA_CK	TBTXEN	PU	Input
K5	LSA0	IO	Serial display interface address output	**GPIO21**	LSA0	TDMA_D1	TDTIRQ	PU	Input
K4	LSDA	IO	Serial display interface clock output	**GPIO22**	LSDA	TDMA_D0	TCTIRQ2	PU	Input
K3	LSCE0#	IO	Serial display interface chip select 0 output	**GPIO23**	LSCE0#	TDMA_FS	TCTIRQ1	PU	Input
K2	LSCE1#	IO	Serial display interface chip select 1 output	**GPIO24**	LSCE1#	LPCE2#	TEVTVAL	PU	Input
			Parallel LCD/NAND-Flash Interface						
K6	LPCE1#	IO	Parallel display interface chip select 1 output	**GPIO25**	LPCE1#	NCE1#	D2_TID0	PU	Input
L5	**LPCE0#**	O	Parallel display interface chip select 0 output						1
L4	**LRST#**	O	Parallel display interface Reset Signal						1
L3	**LRD#**	O	Parallel display interface Read Strobe						1
L2	**LPA0**	O	Parallel display interface address output						1
L1	**LWR#**	O	Parallel display interface Write Strobe						1
G7	NLD17	IO	Parallel LCD/NAND-Flash Data 17	**GPIO11**	NLD17	MCDA4	D2_TID1	PD	Input
J9	NLD16	IO	Parallel LCD/NAND-Flash Data 16	**GPIO10**	NLD16	MCDA5	D2ID	PD	Input
K9	**NLD15**	IO	Parallel LCD/NAND-Flash Data 15	**NLD15**	GPIO61		D2IMS	PD	Input
J10	**NLD14**	IO	Parallel LCD/NAND-Flash Data 14	**NLD14**	GPIO60		D2ICK	PD	Input
L9	**NDL13**	IO	Parallel LCD/NAND-Flash Data 13	**NLD13**	GPIO59		SWDBGPKT	PD	Input
K10	**NLD12**	IO	Parallel LCD/NAND-Flash Data 12	**NLD12**	GPIO58		SWDBGWR	PD	Input
J11	**NLD11**	IO	Parallel LCD/NAND-Flash Data 11	**NLD11**	GPIO57		SWDBGRD	PD	Input
L10	**NLD10**	IO	Parallel LCD/NAND-Flash Data 10	**NLD10**	GPIO56		SWDBGROE	PD	Input
K11	**NLD9**	IO	Parallel LCD/NAND-Flash Data 9	**NLD9**	GPIO55		SWDBGA0	PD	Input

L11	**NLD8**	IO	Parallel LCD/NAND-Flash Data 8	**NLD8**	GPIO54		SWDBGA1	PD	Input
L6	**NLD7**	IO	Parallel LCD/NAND-Flash Data 7					PD	Input
M5	**NLD6**	IO	Parallel LCD/NAND-Flash Data 6					PD	Input
M4	**NLD5**	IO	Parallel LCD/NAND-Flash Data 5					PD	Input
M3	**NLD4**	IO	Parallel LCD/NAND-Flash Data 4					PD	Input
N5	**NLD3**	IO	Parallel LCD/NAND-Flash Data 3					PD	Input
N4	**NLD2**	IO	Parallel LCD/NAND-Flash Data 2					PD	Input
N3	**NLD1**	IO	Parallel LCD/NAND-Flash Data 1					PD	Input
N2	**NLD0**	IO	Parallel LCD/NAND-Flash Data 0					PD	Input
N1	**NRNB**	IO	NAND-Flash Read/Busy Flag	**NRNB**	GPIO26	USBSESSVLD	SWDBGD2	PU	
P5	**NCLE**	IO	NAND-Flash Command Latch Signal	**NCLE**	GPIO27	USBVBUSVLD	SWDBGD1	PD	
P4	**NALE**	IO	NAND-Flash Address Latch Signal	**NALE**	GPIO28	USBSESSEND	SWDBGD0	PD	
P3	**NWE#**	IO	NAND-Flash Write Strobe	**NWE#**	GPIO29			PU	
P2	**NRE#**	IO	NAND-Flash Read Strobe	**NRE#**	GPIO30	USBVBUSDSC	SWDBGCK	PU	
P1	**NCE#**	IO	NAND-Flash Chip select output	**NCE#**	GPIO31			PU	
			SIM Card Interface						
M19	**SIMRST**	O	SIM card reset output						0
L16	**SIMCLK**	O	SIM card clock output						0
L17	**SIMVCC**	O	SIM card supply power control						0
L18	SIMSEL	O	SIM card supply power select	**GPIO48**	SIMSEL			PD	Input
L19	**SIMDATA**	IO	SIM card data input/output						0
			Dedicated GPIO Interface						
U3	**GPIO0**	IO	General purpose input/output 0	**GPIO0**	CMFLASH		D2_TID5	PD	Input
U1	**GPIO1**	IO	General purpose input/output 1	**GPIO1**	BSI_RFIN			PD	Input
D17	**GPIO2**	IO	General purpose input/output 2	**GPIO2**	SCL			PU	Input
C19	**GPIO3**	IO	General purpose input/output 3	**GPIO3**	SDA			PU	Input
C18	**GPIO4**	IO	General purpose input/output 4	**GPIO4**	EDICK	URXD2 (EINT6)	SWDBGD7		
C17	**GPIO5**	IO	General purpose input/output 5	**GPIO5**	EDIWS	UTXD2	SWDBGD6		
A19	**GPIO6**	IO	General purpose input/output 6	**GPIO6**	EDIDAT		SWDBGD5		
B18	**GPIO7**	IO	General purpose input/output 7	**GPIO7**		USBVBUSON	SWDBGD4		
A18	**GPIO8**	IO	General purpose input/output 19	**GPIO8 (EINT7)**	32KHz	USBVBUSCHG	SWDBGF		
A17	**GPIO9**	IO	General purpose input/output 21	**GPIO9**	26MHz	13MHz	SWDBGE		
			Miscellaneous						
T2	**SYSRST#**	I	System reset input active low						Input
R16	**WATCHDOG#**	O	Watchdog reset output						1
T1	**SRCLKENAN**	O	External TCXO enable output active low	GPO1	**SRCLKENAN**				0
T4	**SRCLKENA**	O	External TCXO enable output active high	GPO0	**SRCLKENA**				1
T3	SRCLKENAI	IO	External TCXO enable input	**GPIO35 (EINT5)**	SRCLKENAI			PD	Input
E5	**TESTMODE**	I	TESTMODE enable input					PD	Input
D15	**ESDM_CK**	O	Internal Monitor Clock						
			Keypad Interface						
H17	**KCOL6**	I	Keypad column 6					PU	Input
H18	**KCOL5**	I	Keypad column 5					PU	Input
H19	**KCOL4**	I	Keypad column 4					PU	Input
G15	**KCOL3**	I	Keypad column 3					PU	Input
G16	**KCOL2**	I	Keypad column 2					PU	Input
G17	**KCOL1**	I	Keypad column 1					PU	Input
G18	**KCOL0**	I	Keypad column 0					PU	Input
G19	**KROW5**	O	Keypad row 5	**KROW5**	GPIO44	ARM CK	TV CK		0
F15	**KROW4**	O	Keypad row 4	**KROW4**	GPIO45	AHB CK	DSP CK		0
F16	**KROW3**	O	Keypad row 3	**KROW3**	GPIO46	FTV CK	SLOW CK		0
F17	**KROW2**	O	Keypad row 2	**KROW2**	GPIO47	FMCU CK	FUSB CK		0
E16	**KROW1**	O	Keypad row 1						0
E17	**KROW0**	O	Keypad row 0						0

			External Interrupt Interface						
U2	**EINT0**	I	External interrupt 0					PU	Input
V1	**EINT1**	I	External interrupt 1					PU	Input
W1	**EINT2**	I	External interrupt 2					PU	Input
V2	**EINT3**	I	External interrupt 3					PU	Input
U4	MIRQ	I	Interrupt to MCU	**GPIO36**	MIRQ	6.5MHz	32KHz	PU	Input
B17	MFIQ	I	Interrupt to MCU	**GPIO63**	MFIQ	USBID (EINT8)	SWDBGD3	PU	Input
			External Memory Interface						
R15	**ED0**	IO	External memory data bus 0						Input
T19	**ED1**	IO	External memory data bus 1						Input
T18	**ED2**	IO	External memory data bus 2						Input
U19	**ED3**	IO	External memory data bus 3						Input
U18	**ED4**	IO	External memory data bus 4						Input
V19	**ED5**	IO	External memory data bus 5						Input
W19	**ED6**	IO	External memory data bus 6						Input
W18	**ED7**	IO	External memory data bus 7						Input
U17	**ED8**	IO	External memory data bus 8						Input
W17	**ED9**	IO	External memory data bus 9						Input
T16	**ED10**	IO	External memory data bus 10						Input
U16	**ED11**	IO	External memory data bus 11						Input
V16	**ED12**	IO	External memory data bus 12						Input
T15	**ED13**	IO	External memory data bus 13						Input
U15	**ED14**	IO	External memory data bus 14						Input
W15	**ED15**	IO	External memory data bus 15						Input
P12	**ERD#**	O	External memory read strobe						1
T12	**EWR#**	O	External memory write strobe						1
U12	**ECS0#**	O	External memory chip select 0						1
V12	**ECS1#**	O	External memory chip select 1						1
P11	**ECS2#**	O	External memory chip select 2						1
R11	**ECS3#**	O	External memory chip select 3						1
R14	**EWAIT**	O	Flash, PSRAM and CellularRAM data ready					PU	Input
T14	**ECAS#**	O	MobileRAM column address						1
W14	**ERAS#**	O	MobileRAM row address						1
R13	**ECKE**	O	MobileRAM clock enable						1
T13	**EDCLK**	O	MobileRAM clock						
V13	**ELB#**	O	External memory lower byte strobe						1
W13	**EUB#**	O	External memory upper byte strobe						1
T11	**EPDN#**	O	PSRAM power down control	GPO2	**EPDN#**	26Mhz	13MHz		0
W11	**EADV#**	O	Flash, PSRAM and CellularRAM address valid						1
V11	**ECLK**	O	Flash, PSRAM and CellularRAM clock						0
P10	**EA0**	O	External memory address bus 0						0
T10	**EA1**	O	External memory address bus 1						0
U10	**EA2**	O	External memory address bus 2						0
W10	**EA3**	O	External memory address bus 3						0
R9	**EA4**	O	External memory address bus 4						0
T9	**EA5**	O	External memory address bus 5						0
U9	**EA6**	O	External memory address bus 6						0
V9	**EA7**	O	External memory address bus 7						0
R8	**EA8**	O	External memory address bus 8						0
T8	**EA9**	O	External memory address bus 9						0
W8	**EA10**	O	External memory address bus 10						0
P8	**EA11**	O	External memory address bus 11						0
R7	**EA12**	O	External memory address bus 12						0
U7	**EA13**	O	External memory address bus 13						0
V7	**EA14**	O	External memory address bus 14						0
W7	**EA15**	O	External memory address bus 15						0
T6	**EA16**	O	External memory address bus 16						0

U6	**EA17**	O	External memory address bus 17						0
W6	**EA18**	O	External memory address bus 18						0
R5	**EA19**	O	External memory address bus 19						0
T5	**EA20**	O	External memory address bus 20						0
U5	**EA21**	O	External memory address bus 21						0
V5	**EA22**	O	External memory address bus 22						0
W4	**EA23**	O	External memory address bus 23						0
V4	**EA24**	O	External memory address bus 24						0
W3	**EA25**	O	External memory address bus 25						0
			USB Interface						
R18	**USB_DP**	IO	USB D+ Input/Output						
R19	**USB_DM**	IO	USB D- Input/Output						
			Memory Card Interface						
P17	**MCCM0**	IO	SD Command/MS Bus State Output					PU/PD	
P18	**MCDA0**	IO	SD Serial Data IO 0/MS Serial Data IO					PU/PD	
P19	**MCDA1**	IO	SD Serial Data IO 1					PU/PD	
N17	**MCDA2**	IO	SD Serial Data IO 2					PU/PD	
N18	**MCDA3**	IO	SD Serial Data IO 3					PU/PD	
M18	**MCCK**	O	SD Serial Clock/MS Serial Clock Output						
N19	**MCPWRON**	O	SD Power On Control Output						
M16	**MCWP**	I	SD Write Protect Input					PU	
M17	**MCINS**	I	SD Card Detect Input					PU/PD	Input
			UART/IrDA Interface						
K15	**URXD1**	I	UART 1 receive data					PU	Input
K16	**UTXD1**	O	UART 1 transmit data						1
K17	**UCTS1**	I	UART 1 clear to send					PU	Input
K18	**URTS1**	O	UART 1 request to send						1
K19	URXD2	IO	UART 2 receive data	**GPIO37**	URXD2 (EINT6)	UCTS3		PU	Input
J15	UTXD2	IO	UART 2 transmit data	**GPIO38**	UTXD2	URTS3		PU	Input
J16	URXD3	IO	UART 3 receive data	**GPIO39**	URXD3		D1ID	PU	Input
J17	UTXD3	IO	UART 3 transmit data	**GPIO40**	UTXD3		D2_TID6	PU	Input
J19	IRDA_RXD	IO	IrDA receive data	**GPIO41**	IRDA_RXD	UCTS2	SWDBGD15	PU	Input
H15	IRDA_TXD	IO	IrDA transmit data	**GPIO42**	IRDA_TXD	URTS2	SWDBG14	PU	Input
H16	IRDA_PDN	IO	IrDA Power Down Control	**GPIO43**	IRDA_PDN		SWDBG13	PU	Input
			Digital Audio Interface						
E18	DAICLK	IO	DAI clock output	**GPIO49**	DAICLK		SWDBGD12	PU	Input
E19	DAIPCMOUT	IO	DAI pcm data out	**GPIO50**	DAIPCMOUT		SWDBGD11	PD	Input
D16	DAIPCMIN	IO	DAI pcm data input	**GPIO51**	DAIPCMIN		SWDBGD10	PU	Input
D19	DAIRST	IO	DAI reset signal input	**GPIO52**	DAIRST		SWDBG9	PU	Input
D18	DAISYNC	IO	DAI frame synchronization signal output	**GPIO53**	DAISYNC		SWDBG8	PU	Input
			CMOS Sensor Interface						
J12	CMRST	IO	CMOS sensor reset signal output	**GPIO12**	CMRST		D1_TID0	PD	Input
K12	CMPDN	IO	CMOS sensor power down control	**GPIO13**	CMPDN		D1_TID1	PD	Input
H12	**CMVREF**	I	Sensor vertical reference signal input					PD	Input
H11	**CMHREF**	I	Sensor horizontal reference signal input					PD	Input
H9	**CMPCLK**	I	CMOS sensor pixel clock input					PD	Input
H10	**CMMCLK**	O	CMOS sensor master clock output						0
H8	**CMDAT9**	I	CMOS sensor data input 9	**CMDAT9**	GPIO74			PD	Input
J8	**CMDAT8**	I	CMOS sensor data input 8	**CMDAT8**	GPIO73			PD	Input
K8	**CMDAT7**	I	CMOS sensor data input 7	**CMDAT7**	GPIO72			PD	Input
L8	**CMDAT6**	I	CMOS sensor data input 6	**CMDAT6**	GPIO71			PD	Input
M8	**CMDAT5**	I	CMOS sensor data input 5	**CMDAT5**	GPIO70			PD	Input

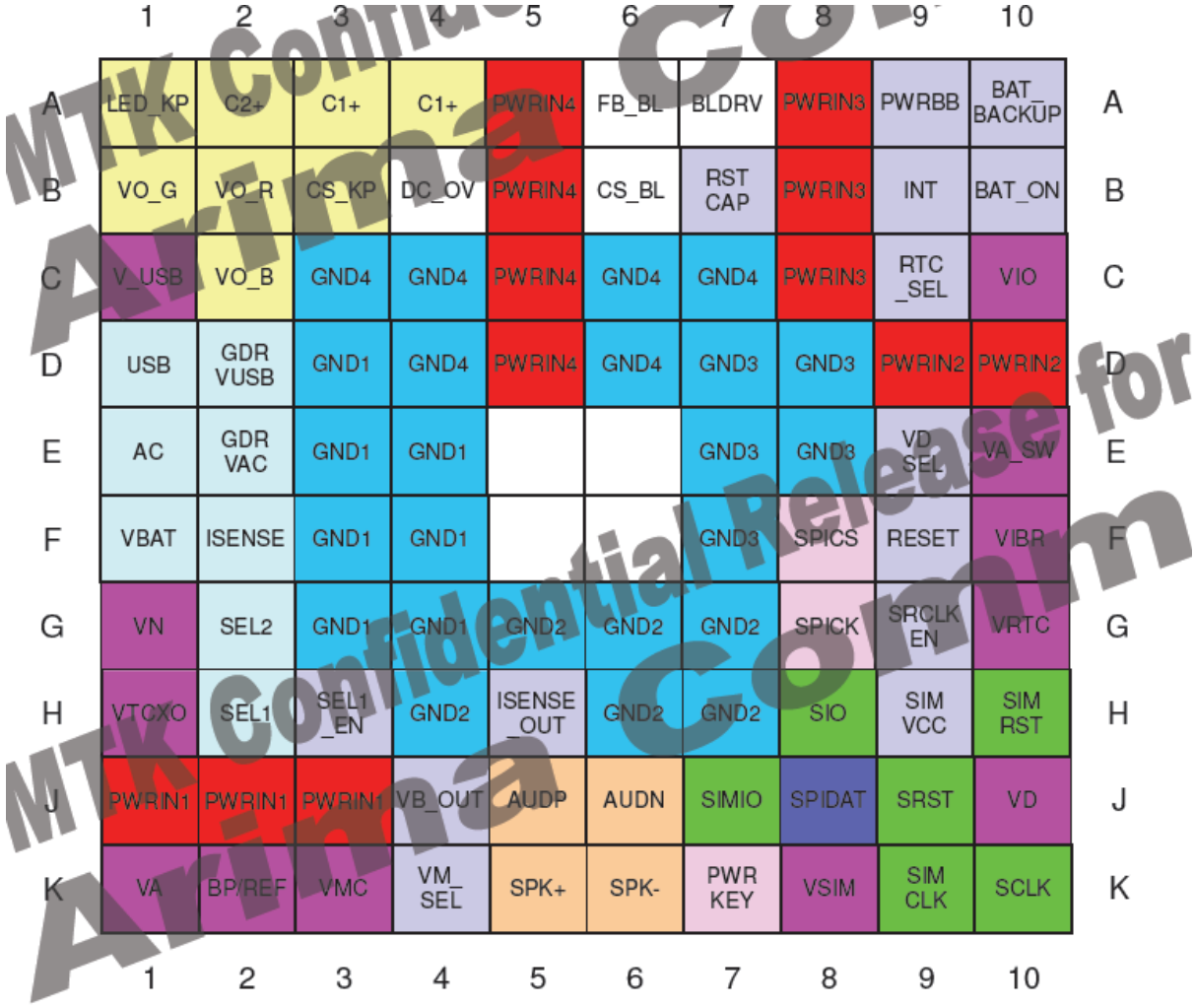
M9	CMDAT4	I	CMOS sensor data input 4	CMDAT4	GPIO69			PD	Input
M10	CMDAT3	I	CMOS sensor data input 3	CMDAT3	GPIO68			PD	Input
M11	CMDAT2	I	CMOS sensor data input 2	CMDAT2	GPIO62			PD	Input
M12	CMDAT1	IO	CMOS sensor data input 1	GPIO14	CMDAT1		D1IMS	PD	Input
L12	CMDAT0	IO	CMOS sensor data input 0	GPIO15	CMDAT0		D1ICK	PD	Input
			Analog Interface						
B15	AU_MOUL		Audio analog output left channel						
A15	AU_MOUR		Audio analog output right channel						
C14	AU_M_BYP		Audio DAC bypass pin						
B14	AU_FMINL		FM radio analog input left channel						
A14	AU_FMINR		FM radio analog input right channel						
D13	AU_OUT1_P		Earphone 1 amplifier output (+)						
C13	AU_OUT1_N		Earphone 1 amplifier output (-)						
B12	AU_OUT0_N		Earphone 0 amplifier output (-)						
A12	AU_OUT0_P		Earphone 0 amplifier output (+)						
C12	AU_MICBIAS_P		Microphone bias supply (+)						
D12	AU_MICBIAS_N		Microphone bias supply (-)						
C11	AU_VREF_N		Audio reference voltage (-)						
B11	AU_VREF_P		Audio reference voltage (+)						
D10	AU_VIN0_P		Microphone 0 amplifier input (+)						
C10	AU_VIN0_N		Microphone 0 amplifier input (-)						
B10	AU_VIN1_N		Microphone 1 amplifier input (-)						
A10	AU_VIN1_P		Microphone 1 amplifier input (+)						
D9	BDLAQP		Quadrature input (Q+) baseband codec downlink						
C9	BDLAQN		Quadrature input (Q-) baseband codec downlink						
A9	BDLAIN		In-phase input (I+) baseband codec downlink						
B9	BDLAIP		In-phase input (I-) baseband codec downlink						
B8	BUPAIP		In-phase output (I+) baseband codec uplink						
A8	BUPAIN		In-phase output (I-) baseband codec uplink						
C8	BUPAQN		Quadrature output (Q+) baseband codec uplink						
D8	BUPAQP		Quadrature output (Q-) baseband codec uplink						
B7	APC		Automatic power control DAC output						
D6	AUXADIN0		Auxiliary ADC input 0						
C6	AUXADIN1		Auxiliary ADC input 1						
B6	AUXADIN2		Auxiliary ADC input 2						
A6	AUXADIN3		Auxiliary ADC input 3						
C5	AUXADIN4		Auxiliary ADC input 4						
B5	AUXADIN5		Auxiliary ADC input 5						
A5	AUXADIN6		Auxiliary ADC input 6						
C4	AUX_REF		Auxiliary ADC reference voltage input						
B4	AFC		Automatic frequency control DAC output						
A4	AFC_BYP		Automatic frequency control DAC bypass capacitance						
			VCXO Interface						
B1	SYSCLK		13MHz or 26MHz system clock input						
F6	PLLOUT		PLL reference voltage output						
			RTC Interface						
D1	XIN		32.768 KHz crystal input						
D2	XOUT		32.768 KHz crystal output						
E1	BBWAKEUP	O	Baseband power on/off control						1
			TV Interface						
A2	TVOUT		TV DAC Output						
C2	FSRES								
			Supply Voltages						
E3	VDDK		Supply voltage of internal logic						
M2	VDDK		Supply voltage of internal logic						
V8	VDDK		Supply voltage of internal logic						
V14	VDDK		Supply voltage of internal logic						

F18	VDDK		Supply voltage of internal logic						
F11	VDDK		Supply voltage of internal logic						
P15	VDDK		Supply voltage of internal logic						
V3	VDD33_EMI		Supply voltage of memory interface driver						
V6	VDD33_EMI		Supply voltage of memory interface driver						
T7	VDD33_EMI		Supply voltage of memory interface driver						
W9	VDD33_EMI		Supply voltage of memory interface driver						
R10	VDD33_EMI		Supply voltage of memory interface driver						
W12	VDD33_EMI		Supply voltage of memory interface driver						
U13	VDD33_EMI		Supply voltage of memory interface driver						
V15	VDD33_EMI		Supply voltage of memory interface driver						
T17	VDD33_EMI		Supply voltage of memory interface driver						
V17	VDD33_EMI		Supply voltage of memory interface driver						
W5	VSS33_EMI		Ground of memory interface driver						
R6	VSS33_EMI		Ground of memory interface driver						
U8	VSS33_EMI		Ground of memory interface driver						
V10	VSS33_EMI		Ground of memory interface driver						
U11	VSS33_EMI		Ground of memory interface driver						
R12	VSS33_EMI		Ground of memory interface driver						
U14	VSS33_EMI		Ground of memory interface driver						
W16	VSS33_EMI		Ground of memory interface driver						
R17	VSS33_EMI		Ground of memory interface driver						
V18	VSS33_EMI		Ground of memory interface driver						
P16	VDD33_AUX2		Supply voltage of drivers for USB						
N16	VDD33_AUX1		Supply Voltage of MS/MMC/SD						
G2	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
K1	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
R1	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
J18	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
B19	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
E15	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
E13	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
E11	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
F9	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
E6	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
D4	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
B3	VDD33		Supply voltage of drivers except memory interface, USB and MS/MMC/SD						
W2	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
E2	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
H1	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
M1	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
L15	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
F19	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						

B16	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
A16	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
E14	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
E12	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
F10	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
E7	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
D5	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
A3	VSS33		Ground of drivers except memory interface, USB and MS/MMC/SD						
A1	AVDD_PLL		Supply voltage for PLL						
C1	AVSS_PLL		Ground for PLL supply						
B2	AVDD_TV		Supply voltage for TV out						
C3	AVSS_TV		Ground for TV out						
D3	AVDD_RTC		Supply voltage for Real Time Clock						
			Analog Supplies						
C15	AVDD_MBUF		Supply Voltage for Audio band section						
D14	AVSS_MBUF		GND for Audio band section						
B13	AVDD_BUF		Supply voltage for voice band transmit section						
A13	AVSS_BUF		GND for voice band transmit section						
D11	AVDD_AFE		Supply voltage for voice band receive section						
A11	AGND_AFE		GND reference voltage for voice band section						
E10	AVSS_AFE		GND for voice band receive section						
E9	AGND_RFE		GND reference voltage for baseband section, APC, AFC and AUXADC						
E8	AVSS_GSMRFTX		GND for baseband transmit section						
D7	AVDD_GSMRFTX		Supply voltage for baseband transmit section						
C7	AVSS_RFE		GND for baseband receive section, APC, AFC and AUXADC						
A7	AVDD_RFE		Supply voltage for baseband receive section, APC, AFC and AUXADC						

2. Pin List

MT6305(PMUIC)



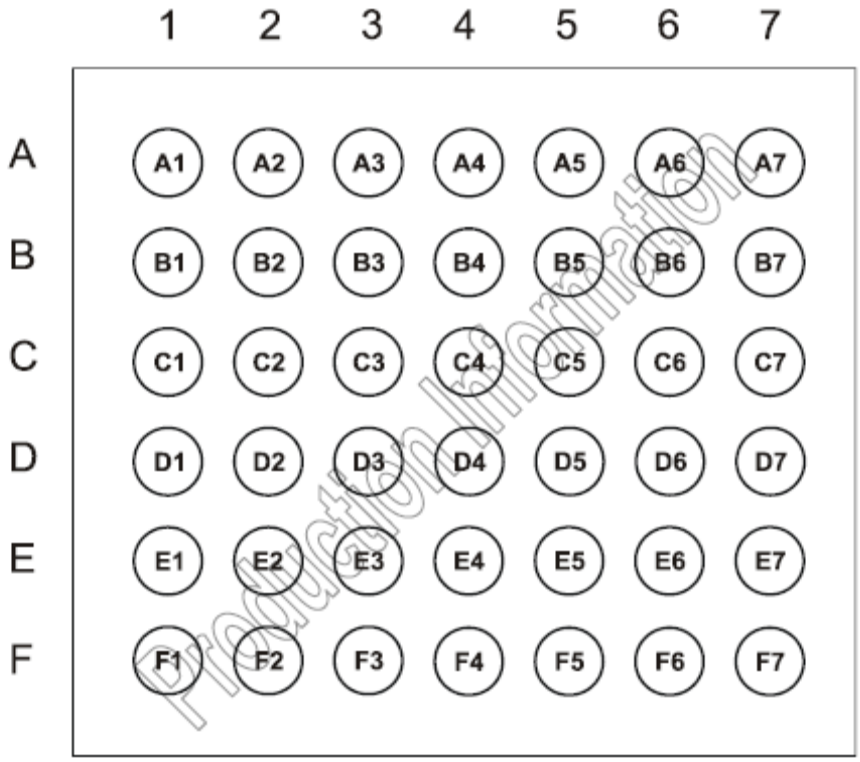
	1	2	3	4	5	6	7	8	9	10	
A	LED_KP	C2+	C1+	C1+	PWRIN4	FB_BL	BLDRV	PWRIN3	PWRBB	BAT_BACKUP	A
B	VO_G	VO_R	CS_KP	DC_OV	PWRIN4	CS_BL	RST CAP	PWRIN3	INT	BAT_ON	B
C	V_USB	VO_B	GND4	GND4	PWRIN4	GND4	GND4	PWRIN3	RTC _SEL	VIO	C
D	USB	GDR VUSB	GND1	GND4	PWRIN4	GND4	GND3	GND3	PWRIN2	PWRIN2	D
E	AC	GDR VAC	GND1	GND1			GND3	GND3	VD SEL	VA_SW	E
F	VBAT	ISENSE	GND1	GND1			GND3	SPICS	RESET	VIBR	F
G	VN	SEL2	GND1	GND1	GND2	GND2	GND2	SPICK	SRCLK EN	VRTC	G
H	VTCXO	SEL1	SEL1 _EN	GND2	ISENSE _OUT	GND2	GND2	SIO	SIM VCC	SIM RST	H
J	PWRIN1	PWRIN1	PWRIN1	VB_OUT	AUDP	AUDN	SIMIO	SPIDAT	SRST	VD	J
K	VA	BP/REF	VMC	VM_ SEL	SPK+	SPK-	PWR KEY	VSIM	SIM CLK	SCLK	K
	1	2	3	4	5	6	7	8	9	10	

PIN sheet

Pin	Symbol	Input (I), Output (O), or Analog (A)	Description
Control			
K7	PWRKEY	I	Power on button input. Active low.
A9	PWRBB	I	Power on/off from microprocessor. Active high.
G9	SRCLKEN	I	VTCXO and VA enable. High = enable. Low = disable.
H9	SIMVCC	I	VSIM enable. High = enable. Low = disable.
B10	BAT_ON	I	Indication that Li-ion battery is inserted. High = no battery. Low = battery inserted.
B4	DC_OV	I	DC/DC protection input. OV threshold voltage is 1V.
K4	VM_SEL	I	External memory supply selection. 1 = 2.8V, 0 = 1.8V.
H3	SEL1_EN	I	Enable the "pre-charge indication" function. 1 = enable, 0 = disable. (Note1)
C9	RTC_SEL	I	VRTC output voltage selection. 1 = 1.5V, 0 = 1.2V (Note1)
E9	VD_SEL	I	VD output voltage selection. 1 = 1.8V/1.5V, 0 = 1.2V/0.9V (depending on the register PWR_SAVE setting).
Charger Control			
E1	AC	IA	AC-DC adaptor input
D1	USB	IA	USB power input
C1	V_USB	OA	3.3V USB power output
B9	INT	O	Interrupt PIN. Active low. This pin informs the BB if an AC or USB voltage is detected, or if OVP (AC > 9V) is detected. Is reset to normal high after BB has communicated with the PMIC through SPI.
D2	GDRVUSB	OA	Control output to the gate of the external p-channel FET for the USB charger.
E2	GDRVAC	OA	Control output to the gate of the external p-channel FET for the AC charger.
F2	ISENSE	OA	Charger current sensing input
H2	SEL1	OA	Control output to the gate of the external PMOS for the AC charger input as power source.
G2	SEL2	OA	Control output to the gate of the external PMOS for the VBAT input as power source.
SIM Interface			
J7	SIMIO	I/O	Non level-shifted SIM data (3V)
H10	SIMRST	I	Non level-shifted SIM reset input (3V)
K9	SIMCLK	I	Non level-shifted SIM clock input (3V)
H8	SIO	I/O	Level-shifted SIM data (1.8/3V)
J9	SRST	O	Level-shifted SIM reset output (1.8/3V)
K10	SCLK	O	Level-shifted SIM clock output (1.8/3V)
Reset			
B7	RSTCAP	IA	Reset delay time capacitance
F9	RESET	O	System reset. Low active.

Power-Related			
F1	VBAT	IA	Battery input voltage
J1, J2, J3, D9, D10, A8, B8, C8, A5, B5, C5, D5	PWRIN	IA	Power input
J4	VB_OUT	OA	Battery output voltage. Switchable.
H5	ISENSE_OUT	OA	ISENSE output voltage. Switchable.
K2	BP/VREF	OA	Bandgap reference and bypass capacitance
D3, E3, E4, F3, F4, G3, G4, G5, G6, G7, H4, H6, H7, D7, D8, E7, E8, F7, C3, C4, C6, C7, D4, D6	GND		Ground
J10	VD	OA	Digital core supply
C10	VIO	OA	Digital IO supply
K1	VA	OA	Analog supply
E10	VA_SW	OA	Auxiliary analog supply. Switchable.
H1	VTCXO	OA	TCXO supply
G1	VM	OA	Memory supply
K8	VSIM	OA	SIM supply
G10	VRTC	OA	RTC supply
K3	VMC	OA	Memory card supply
Miscellaneous			
F10	VIBR	IA	Vibrator driver
A3	C1+	A	Charge pump capacitor. Positive terminal.
A4	C1-	A	Charge pump capacitor. Negative terminal.
A2	C2+	A	DC/DC output back-up capacitor. Positive terminal.
A10	BAT_BACKUP	OA	Backup battery pin for 2-step RTC
Speaker Amplifier			
J5	AUDP	IA	Audio positive input
J6	AUDN	IA	Audio negative input
K5	SPK+	OA	Speaker positive output
K6	SPK-	OA	Speaker negative output
LED Driver			
B2	VO_R	IA	R LED current driver
B1	VO_G	IA	G LED current driver
C2	VO_B	IA	B LED current driver
A1	LED_KP	OA	KP LED driver
B3	CS_KP	IA	KP LED current sensor
A7	BLDRV	OA	Control output to the gate of the external FET for the backlight DC-DC converter.
B6	CS_BL	IA	Voltage sensor input for external BL FET current
A6	FB_BL	IA	Voltage sensor input from white LED ballast resistor
SPI Interface			
F8	SPICS	I	Serial port select input
G8	SPICK	I	Serial port clock input
J8	SPIDAT	IO	Serial port I/O

Bluetooth



Pin Sheet

Radio	Ball	Pad Type	Description
TX_A	D1	Analogue	Transmitter output/Switched Receiver input
TX_B	E1	Analogue	Complement of TX_A

Synthesiser and Oscillator	Ball	Pad Type	Description
XTAL_IN	A1	Analogue	For crystal or external clock input
XTAL_OUT	A3	Analogue	Drive for crystal

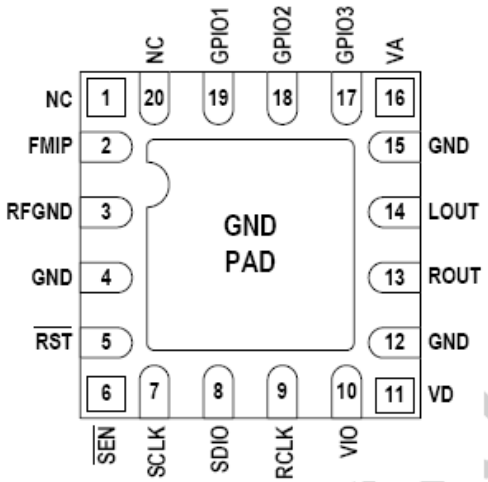
PCM Interface	Ball	Pad Type	Description
PCM_OUT	D5	CMOS output, tri-state with weak internal pull-down	Synchronous data output
PCM_IN	B7	CMOS input, with weak internal pull-down	Synchronous data input
PCM_SYNC	C5	Bi-directional with weak internal pull-down	Synchronous data sync
PCM_CLK	B6	Bi-directional with weak internal pull-down	Synchronous data clock

UART	Ball	Pad Type	Description
UART_TX	D4	CMOS output, tri-state with weak internal pull-up	UART data output active high
UART_RX	B5	CMOS input with weak internal pull-down	UART data input active high
UART_RTS	A7	CMOS output, tri-state with weak internal pull-up	UART request to send active low
UART_CTS	C4	CMOS input with weak internal pull-down	UART clear to send active low

Test and Debug	Ball	Pad Type	Description
RESETB	E6	CMOS input with weak internal pull-up	Reset if low. Input debounced so must be low for >5ms to cause a reset
SPI_CSB	F6	CMOS input with weak internal pull-up	Chip select for Synchronous Serial Interface active low
SPI_CLK	F5	CMOS input with weak internal pull-down	Serial Peripheral Interface clock
SPI_MOSI	F4	CMOS input with weak internal pull-down	Serial Peripheral Interface data input
SPI_MISO	F7	CMOS output, tri-state with weak internal pull-down	Serial Peripheral Interface data output
TEST_EN	F3	CMOS input with strong internal pull-down	For test purposes only (leave unconnected)

PIO Port	Ball	Pad Type	Description
PIO[0]	D3	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
PIO[1]	C3	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
PIO[2]	E3	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
PIO[3]	F2	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
PIO[4]	E5	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
PIO[5]	E4	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
PIO[6]	D7	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
PIO[7]	D6	Bi-directional with programmable strength internal pull-up/down	Programmable input/output line
AIO[0]	C2	Bi-directional	Programmable input/output line
AIO[2]	A5	Bi-directional	Programmable input/output line

FM (radio)



Top View

Pin Number(s)	Name	Description
1, 20	NC	No Connect. Leave floating.
2	FMIP	FM RF inputs.
3	RFGND	RF ground. Connect to ground plane on PCB.
4, 12, 15, PAD	GND	Ground. Connect to ground plane on PCB.
5	$\overline{RST}$	Device reset (active low) input.
6	$\overline{SEN}$	Serial enable input (active low).
7	SCLK	Serial clock input.
8	SDIO	Serial data input/output.
9	RCLK	External reference oscillator input.
10	V_{IO}	I/O supply voltage.
11	V_D	Digital supply voltage. May be connected directly to battery.
13	ROUT	Right audio output.
14	LOUT	Left audio output.
16	V_A	Analog supply voltage. May be connected directly to battery.
17, 18, 19	GPIO3, GPIO2, GPIO1	General purpose input/output.

TRANSCEIVER

1. Function Block

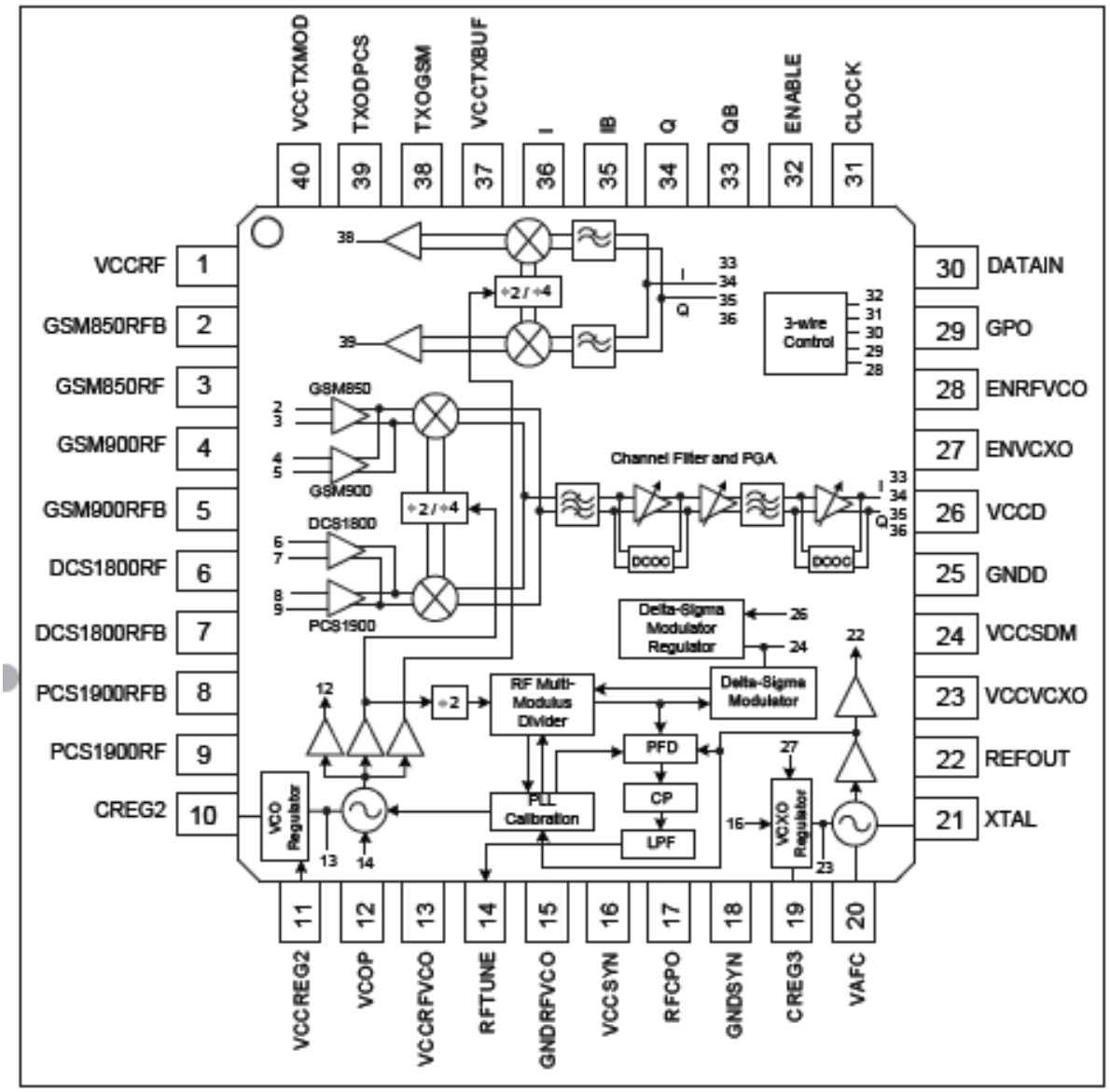


Figure 1 MT6139 Functional Block Diagram

2. Pin List

1.5 Pin Assignment and Description

Pin No.	Pin Name	Description
1	VCCRF	RX RF block supply voltage / TX DIV block supply voltage
2	GSM850RFB	Receiver GSM850 RF differential negative input
3	GSM850RF	Receiver GSM850 RF differential positive input
4	GSM900RF	Receiver GSM900 RF differential positive input
5	GSM900RFB	Receiver GSM900 RF differential negative input
6	DCS1800RF	Receiver DCS1800 RF differential positive input
7	DCS1800RFB	Receiver DCS1800 RF differential negative input
8	PCS1900RFB	Receiver PCS1900 RF differential negative input
9	PCS1900RF	Receiver PCS1900 RF differential positive input
10	CREG2	Regulator 2 (VCO) external noise bypass
11	VCCREG2	Regulator 2 (VCO), RX DIV block, VCO buffer supply voltage
12	VCOP	VCO test differential positive output
13	VCCVCO	VCO supply voltage
14	RFTUNE	VCO tune input
15	GNDVCO	VCO ground
16	VCCSYN	RF synthesizer, PFD, charge pump, VCXO regulator supply voltage
17	RFCPO	RF synthesizer charge pump output
18	GNDSYN	RF synthesizer, PFD and charge pump ground
19	CREG3	Regulator 3 (VCXO) external noise bypass
20	VAFC	VCXO tuning
21	XTAL	26 MHz crystal reference input
22	REFOUT	26 MHz reference output
23	VCCVCXO	VCXO supply voltage and Regulator 3 (VCXO) output
24	VCCSDM	RF synthesizer Sigma-Delta modulator supply voltage and Regulator 1 (SDM) output
25	GNDD	3-wire digital circuit and RF synthesizer Sigma-Delta modulator ground
26	VCCD	Supply voltage for 3-wire digital circuit and supply voltage for Regulator 1 (SDM)
27	ENVCXO	Regulator 3 enable input for VCXO
28	ENRFVCO	Regulator 2 enable input for VCO
29	GPO	General-purpose output. Auxiliary test output
30	DATAIN	3-wire serial bus data input
31	CLOCK	3-wire serial bus clock input
32	ENABLE	3-wire serial bus enable input
33	QB	Q path negative baseband input / output
34	Q	Q path positive baseband input / output
35	IB	I path negative baseband input / output
36	I	I path positive baseband input / output
37	VCCTXBUF	TX buffer block supply voltage
38	TXOGSM	TX buffer output for GSM850 / GSM900
39	TXODPCS	TX buffer output for DCS1800 / PCS1900
40	VCCTXMOD	TX modulator supply voltage

Table 1 MT6129 Pin Assignment and Description

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9. ATE TOOL

Environment Requirement

OS

- MS Windows 2000 or XP

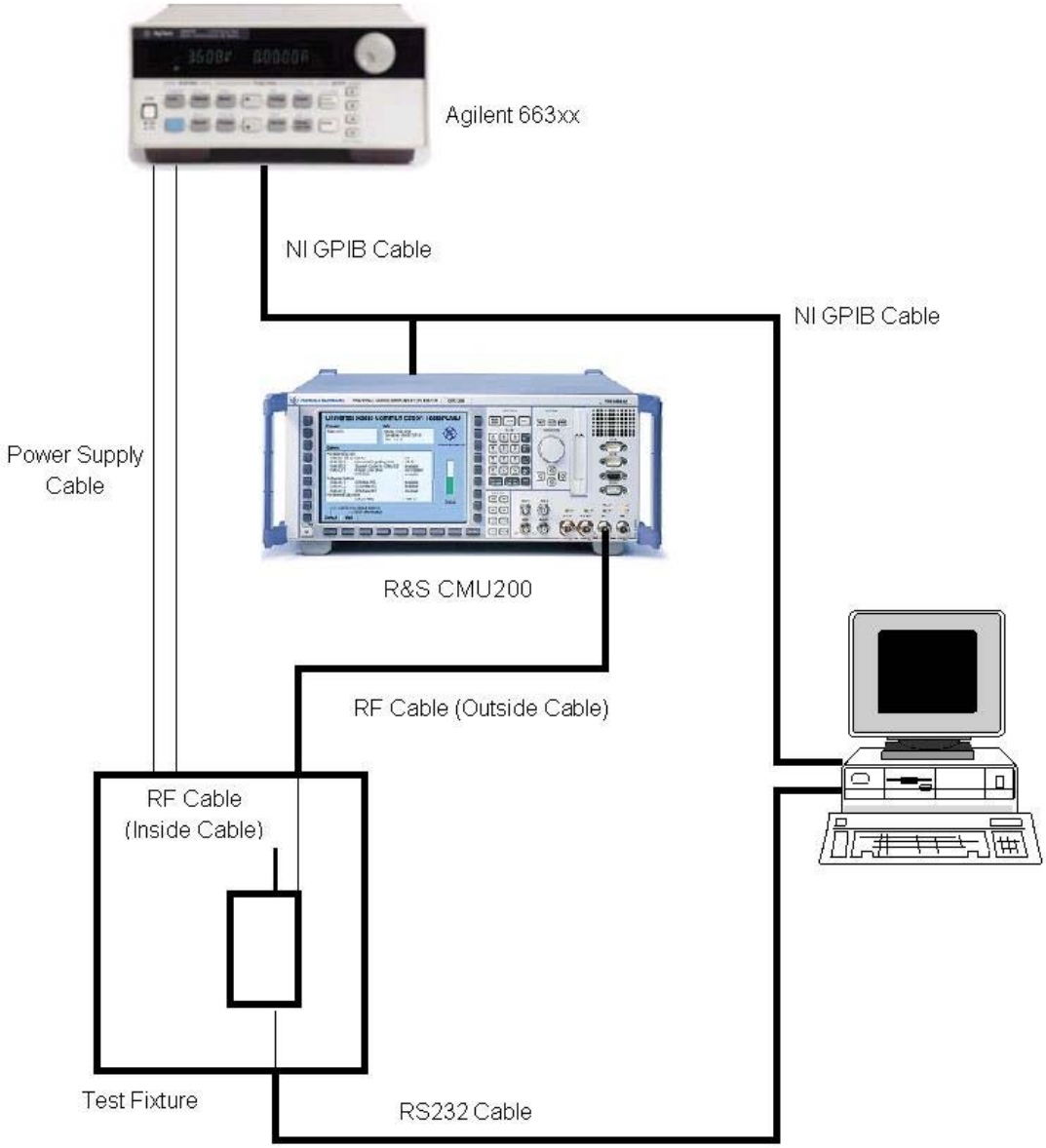
Hardware:

- Generic Pentium III or above PC (256M RAM or above)
- GPIB Card
  - National Instruments GPIB device and driver
  - Agilent GPIB card and driver
  - KEITHLEY GPIB card and driver
- Radio Communication Tester
  - Rohde & Schwarz CMU 200
  - Agilent 8960 (1960A ,1968A firmware)
  - Anritsu MT8820
  - Rohde & Schwarz CMD55
  - Willtek WT4400
  - Agilent N4010A (for Bluetooth test)
  - Rohde & Schwarz CBT (for Bluetooth test)
  - Anritsu MT88852 (for Bluetooth test)
- DC Power Supply
  - Agilent 661x or Agilent 663x2 series power supply
  - R&S NGSM Power Supply
  - KEITHLEY 2303, 2304, 2306
  - Agilent 3631A power supply
  - Willtek WT4400 power supply option

Others

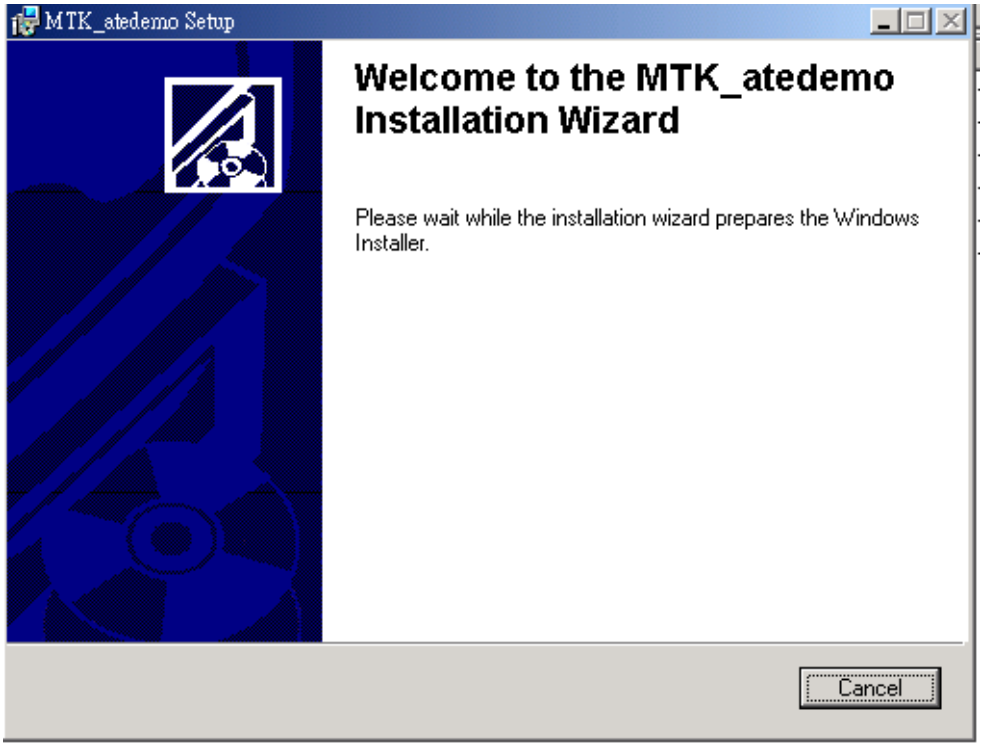
USB download cable
Dummy battery
RF cable

The following diagrams depict the system setups when using the R&S CMU200 or Agilent test platform.

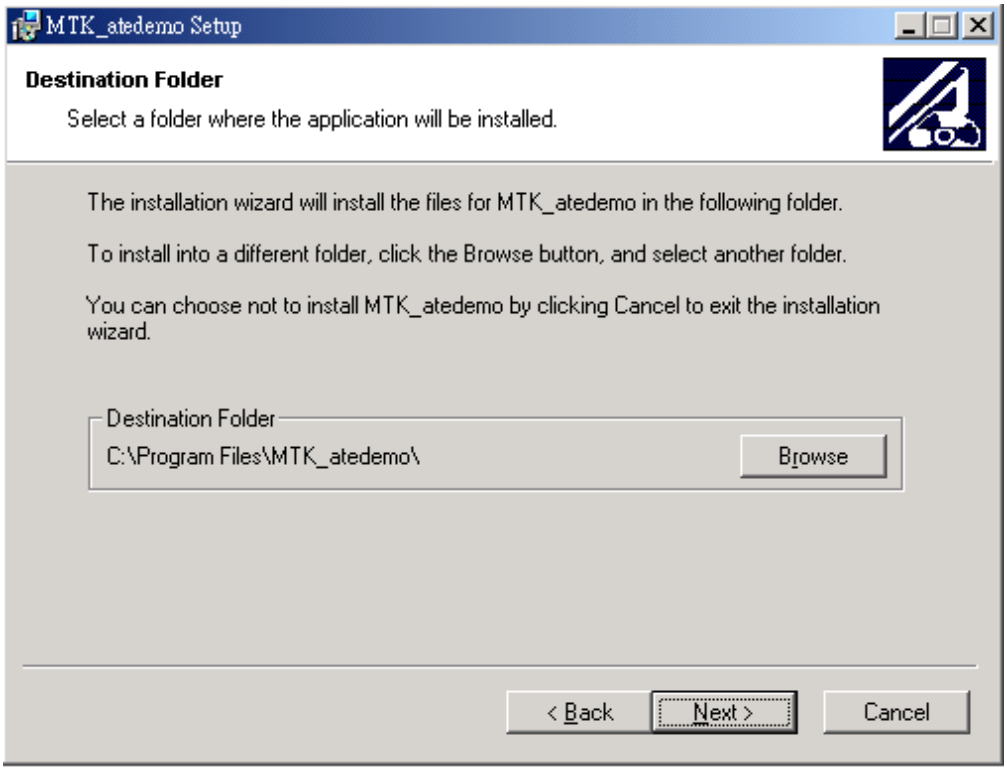


Connect 8960, power supply ,computer ,phone

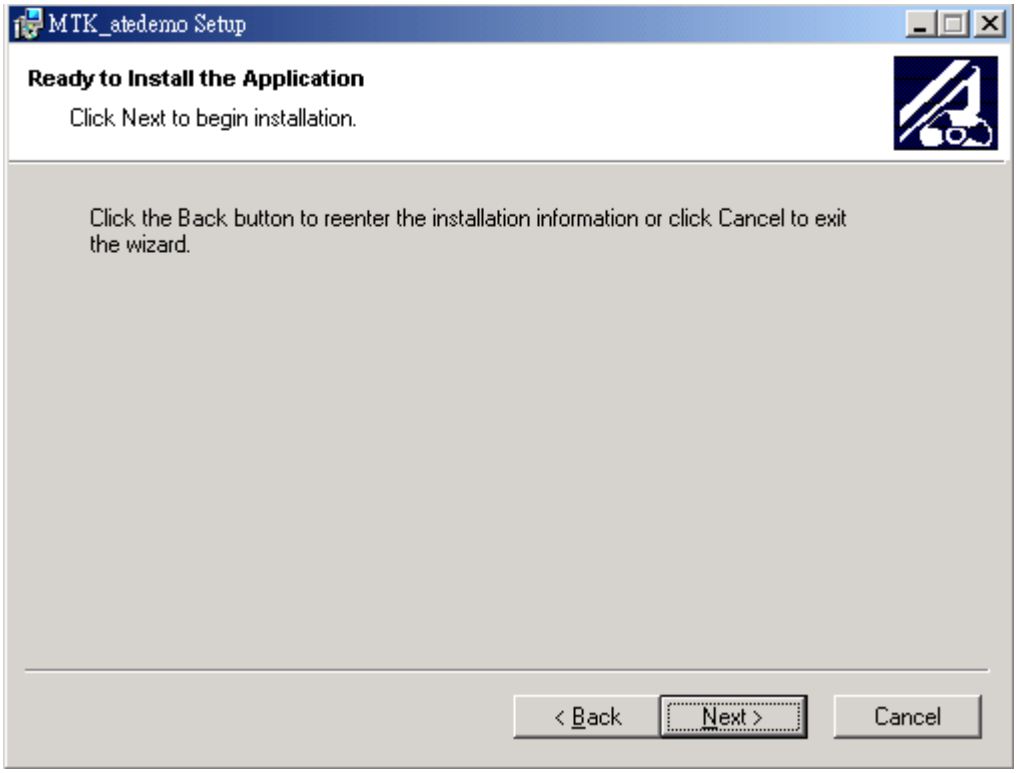
To install the MTK ATE tool, execute the setup.exe file. The Installation Wizard guides the user through the installation process step by step.



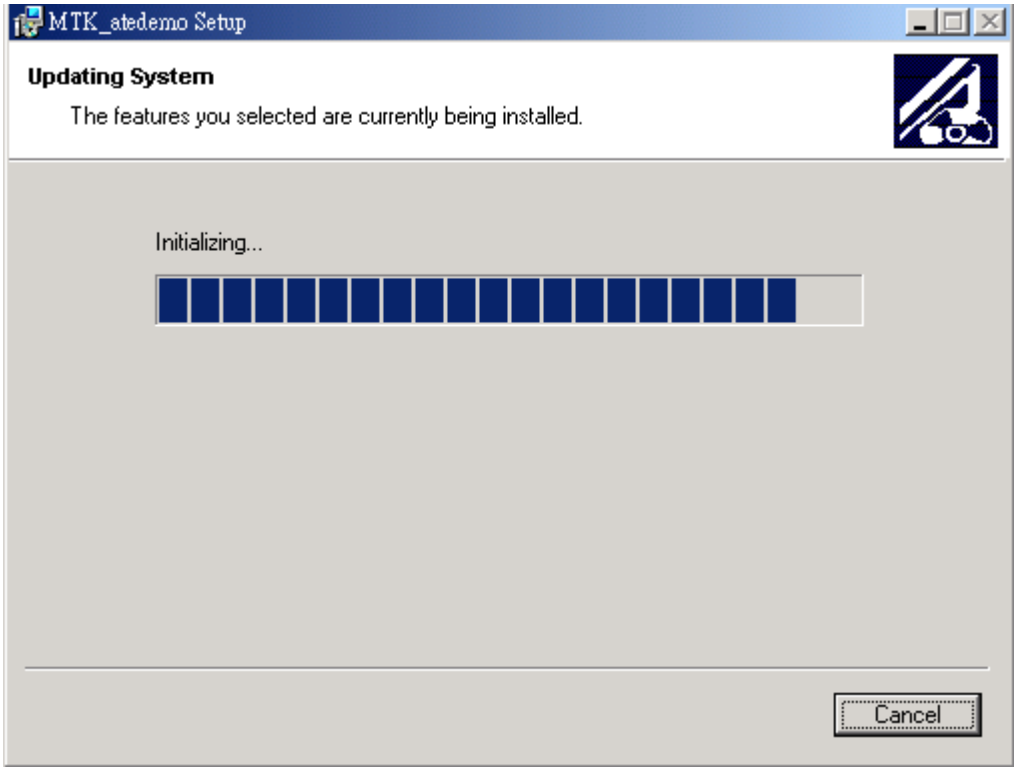
Press Next



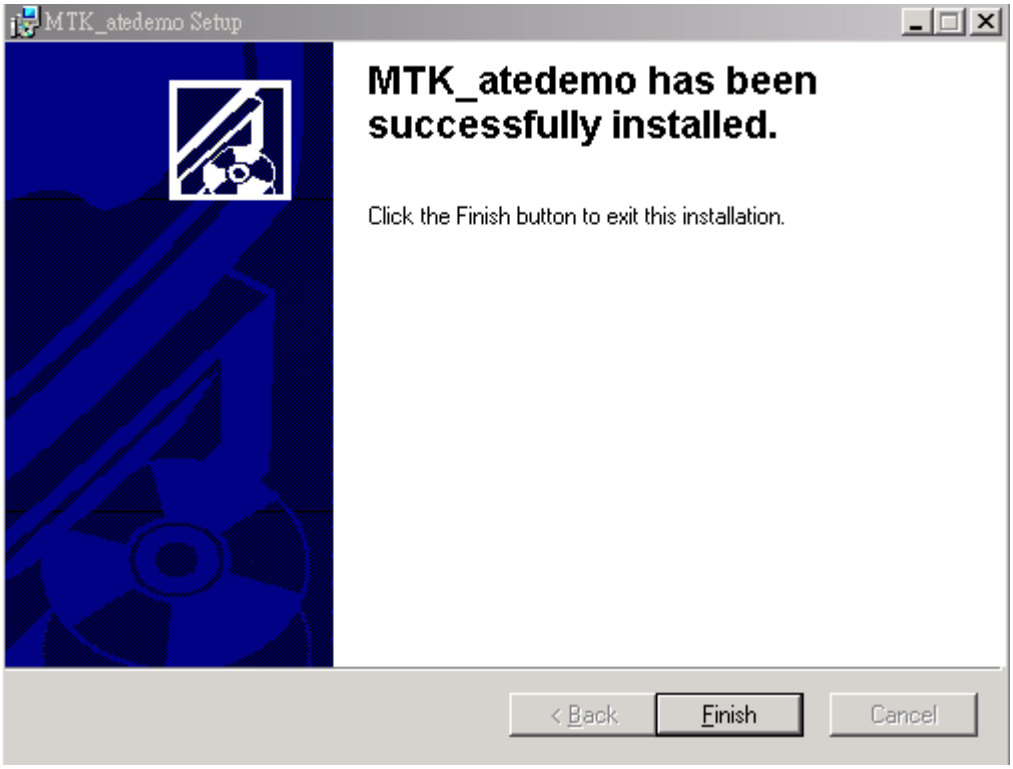
Press Next



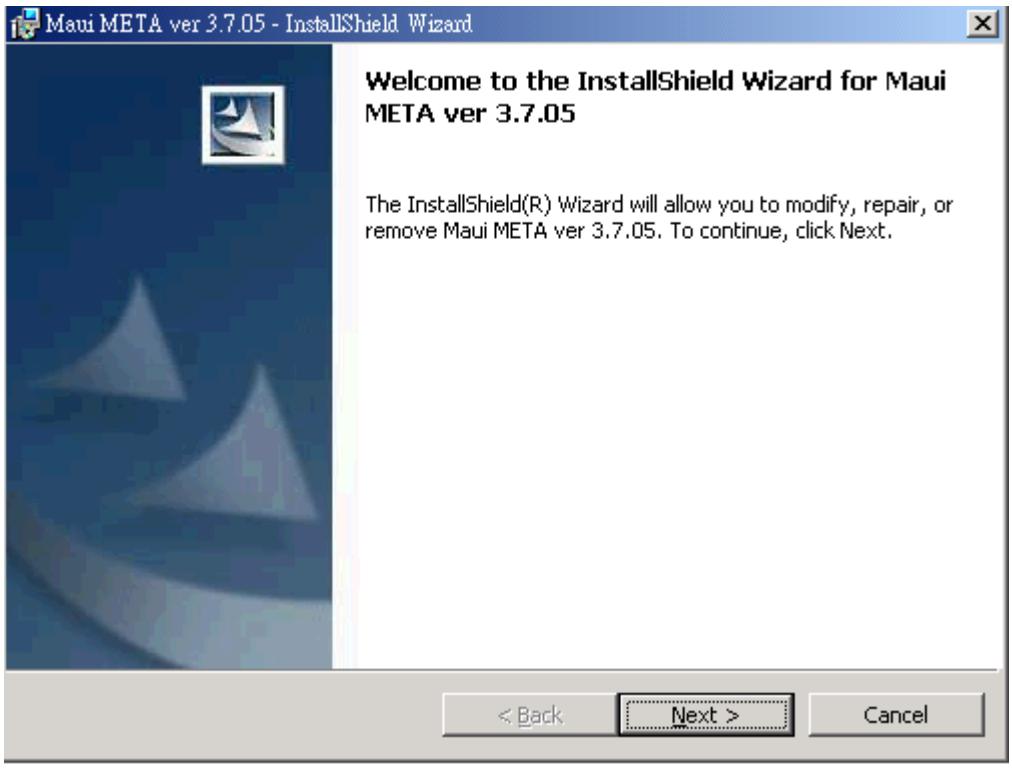
START INSTALL



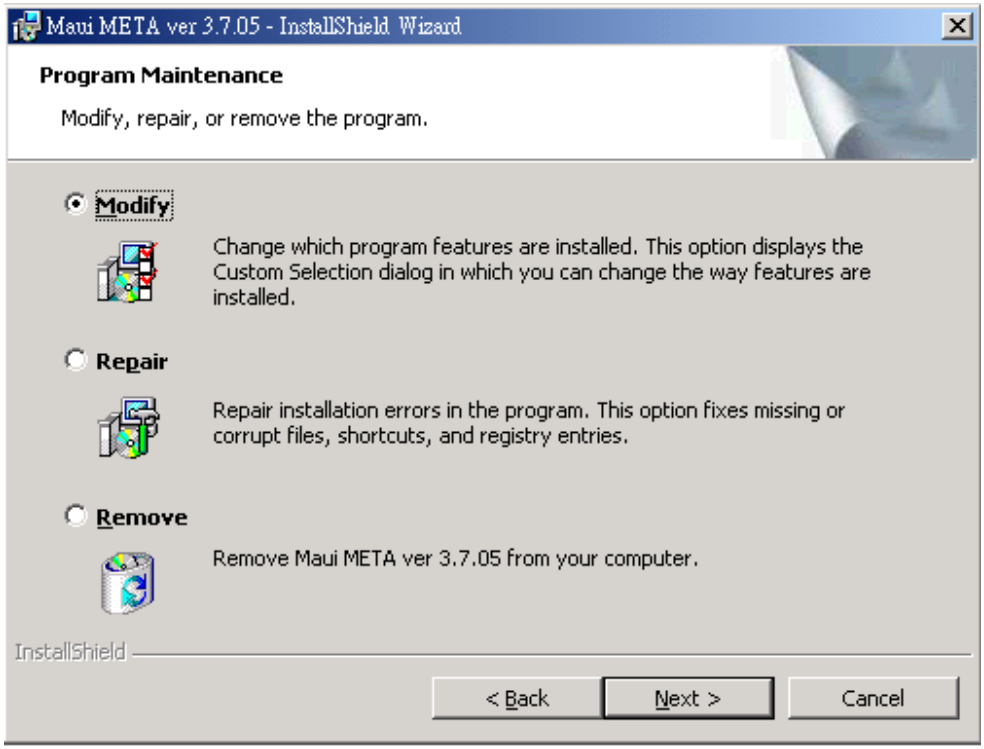
PRESS FINISH AND INSTALL FINISH



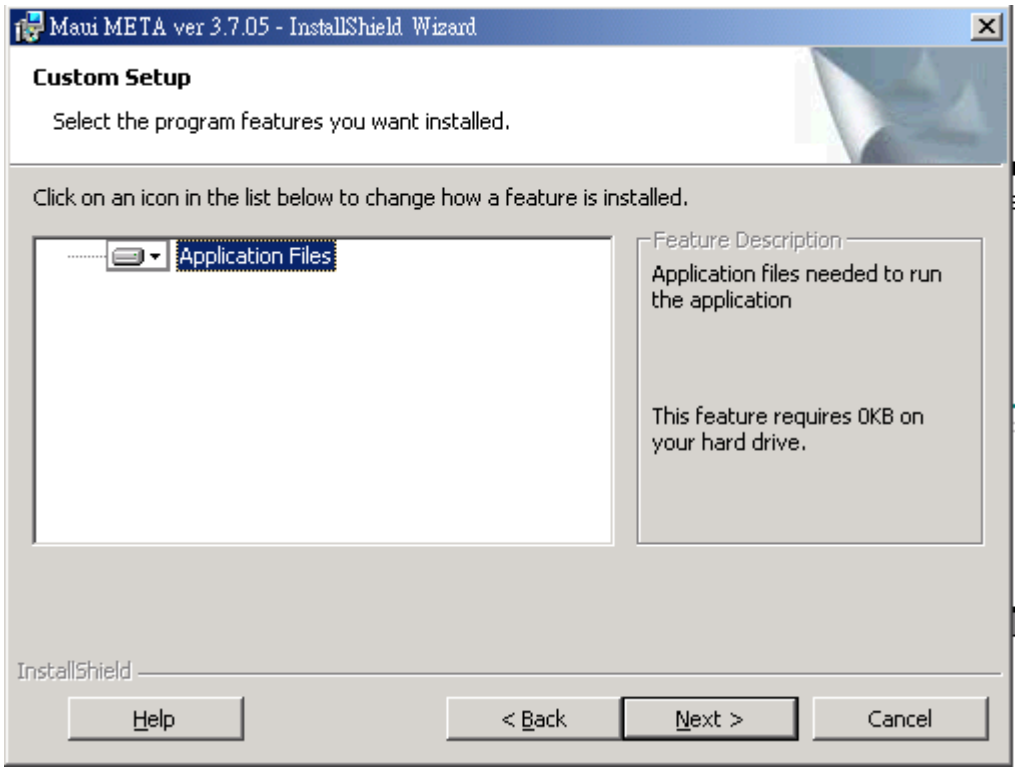
Install META and press Next



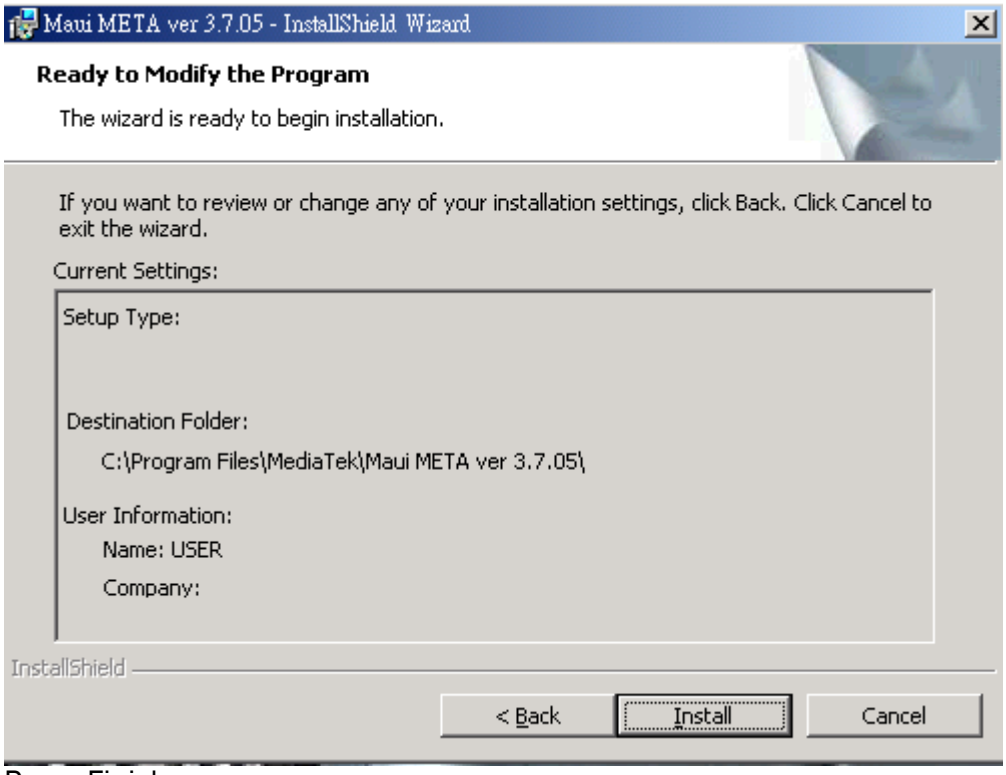
Choose Modify and press NEXT



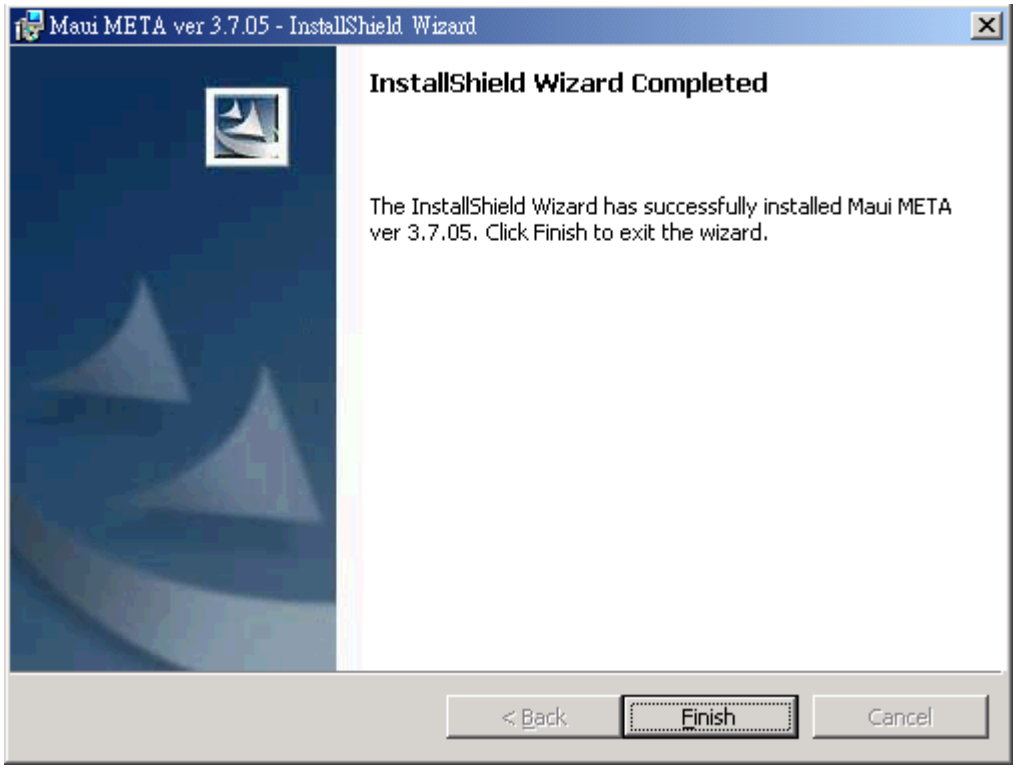
Press NEXT



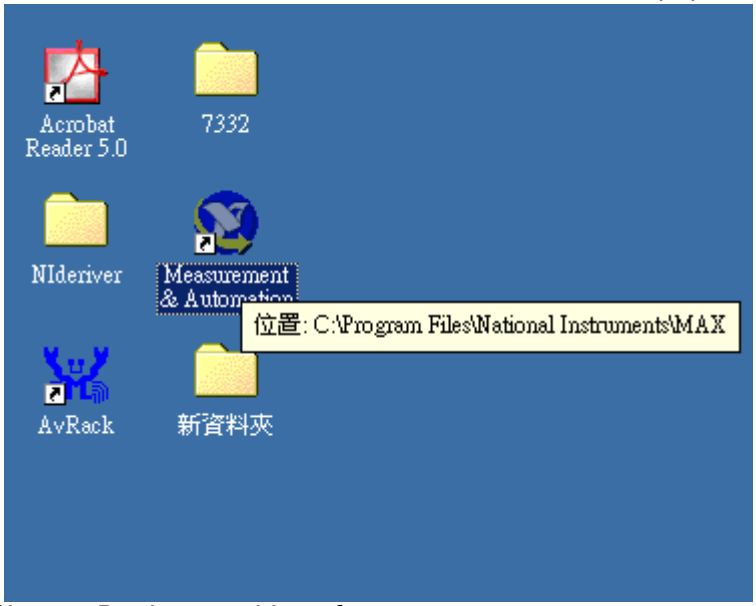
Press Install



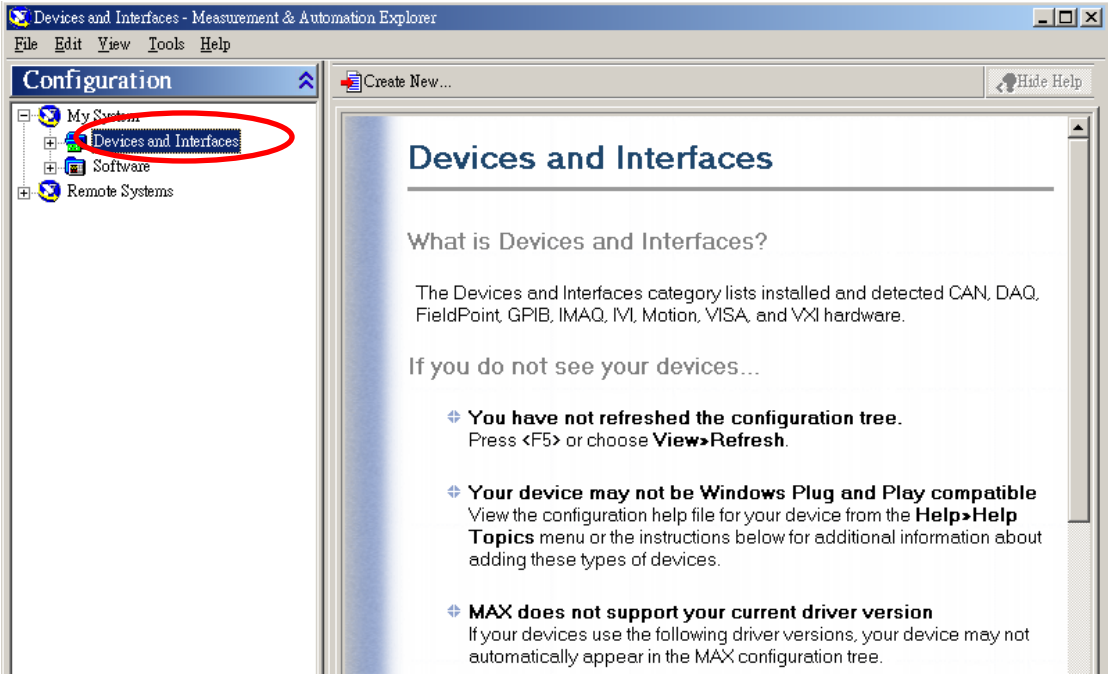
Press Finish



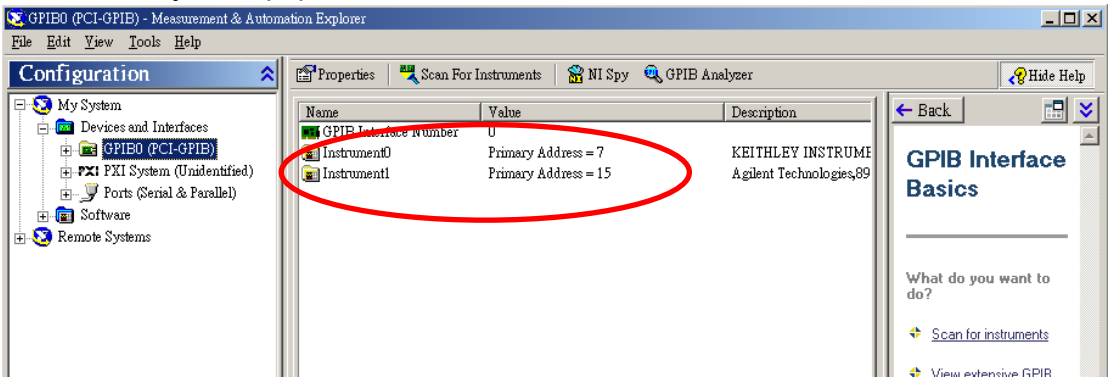
Execute Measurement & Automation to check equipment address



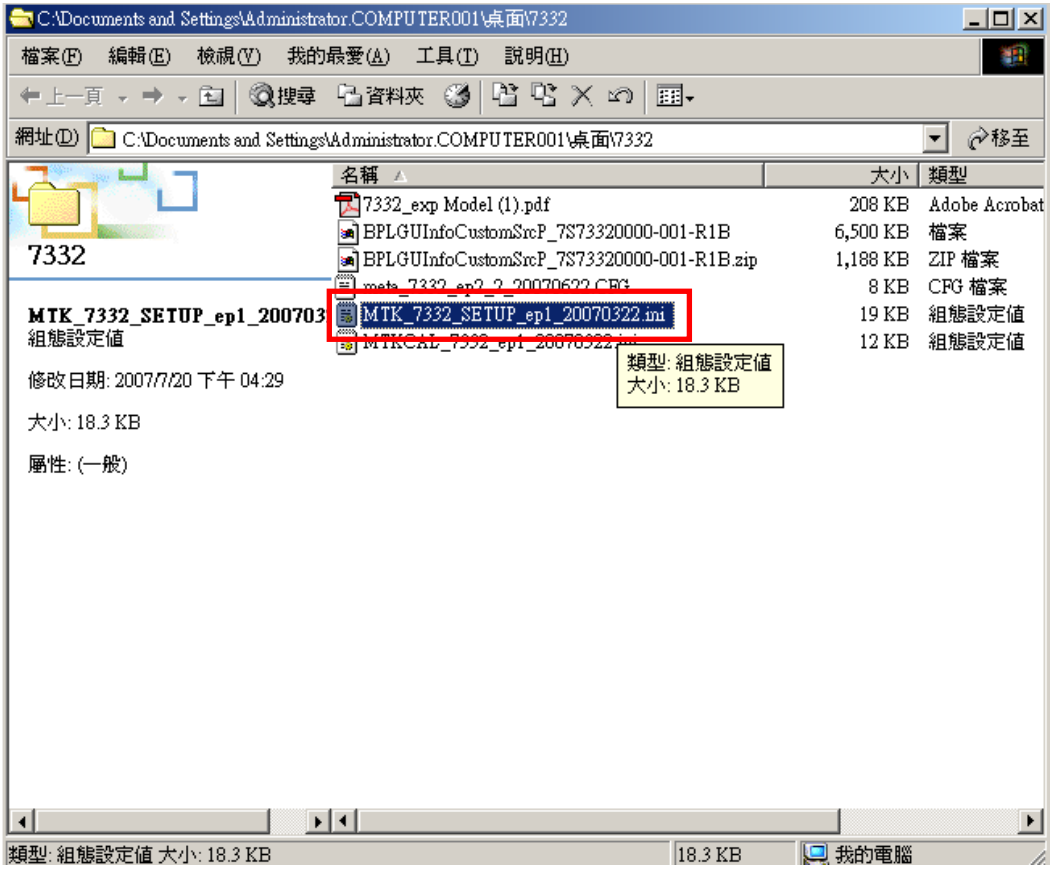
Choose Devices and Interfaces



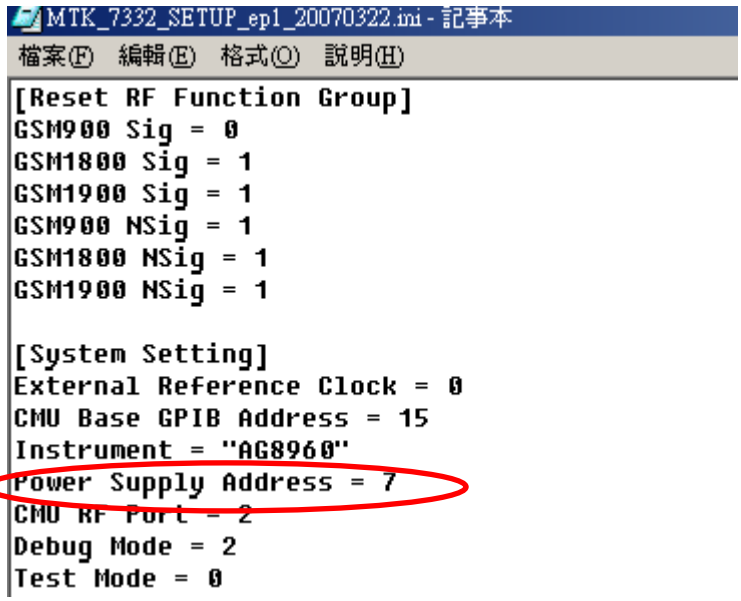
You can see your equipment address



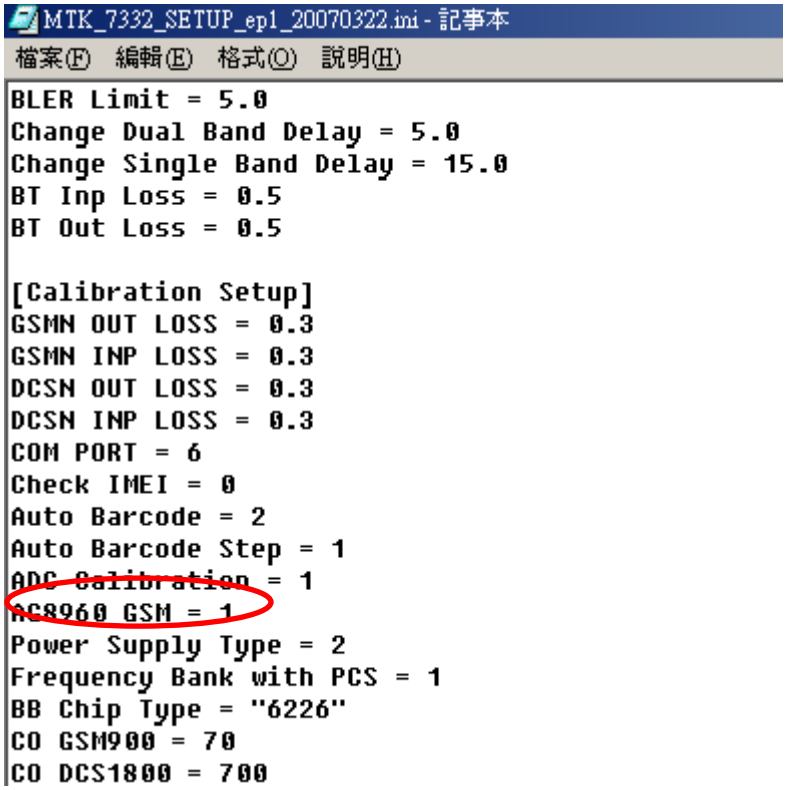
Choose MTK_7332_SETUP_ep1_20070322.ini and open the file to setup from data files



Setup your CMU Base GPIB address and power supply address

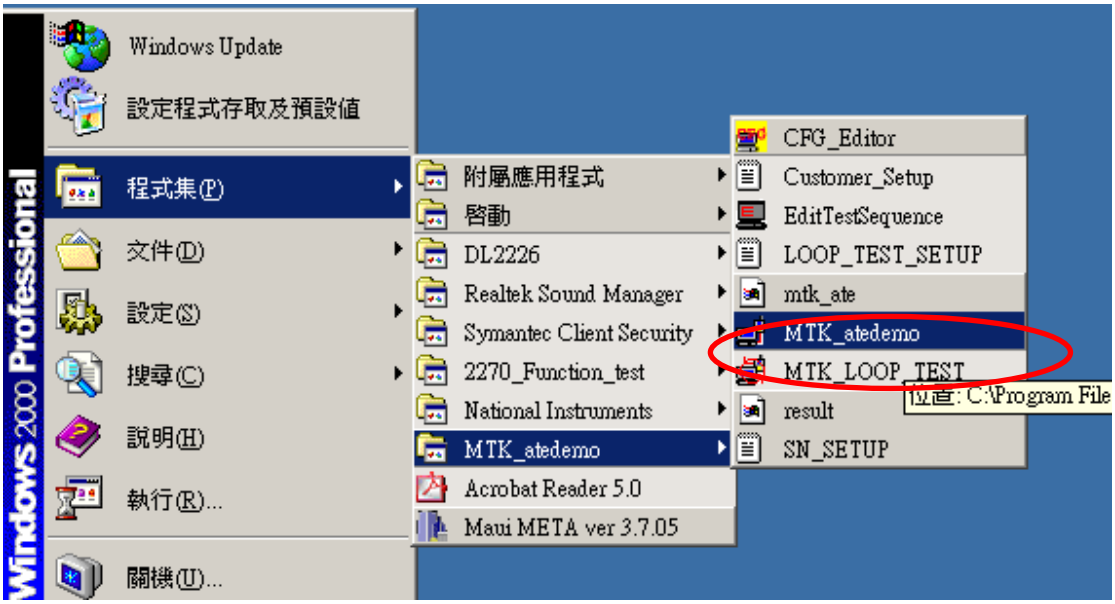


Please setting AG8960 GSM = 1 and save the file

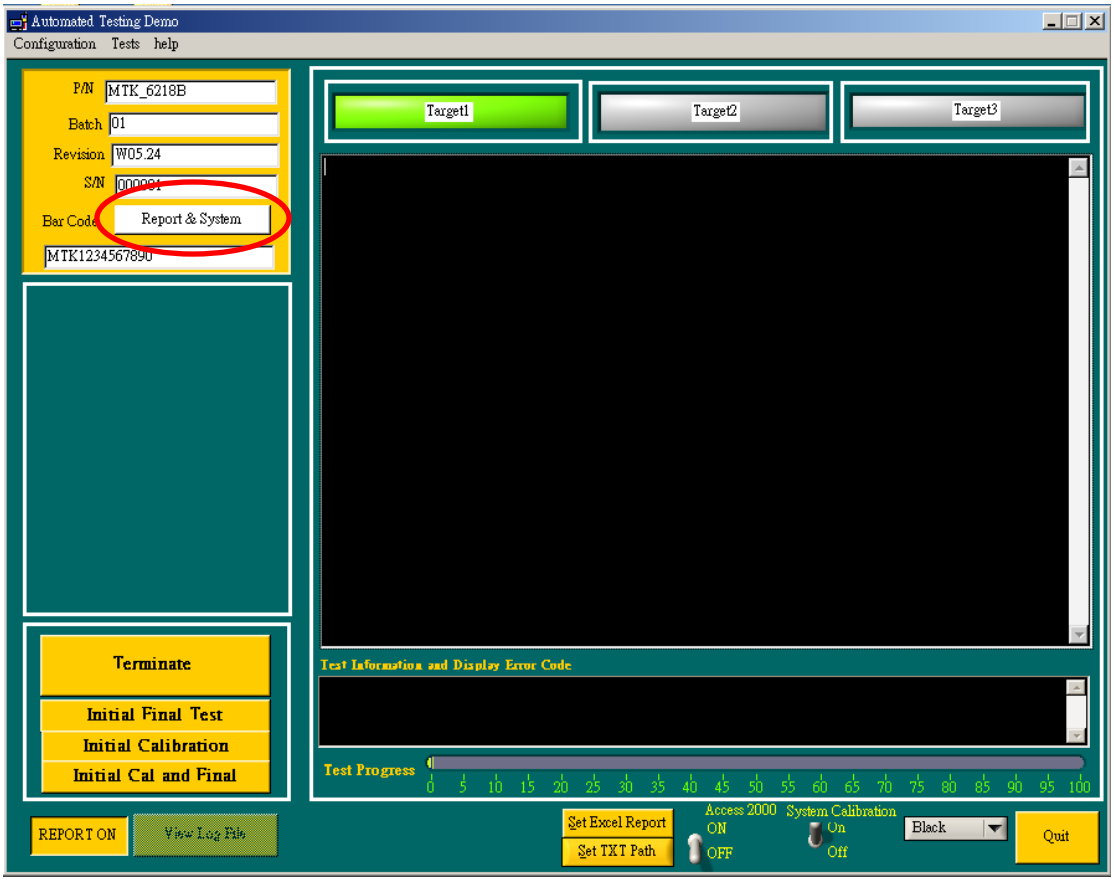


ATE Tool system setting

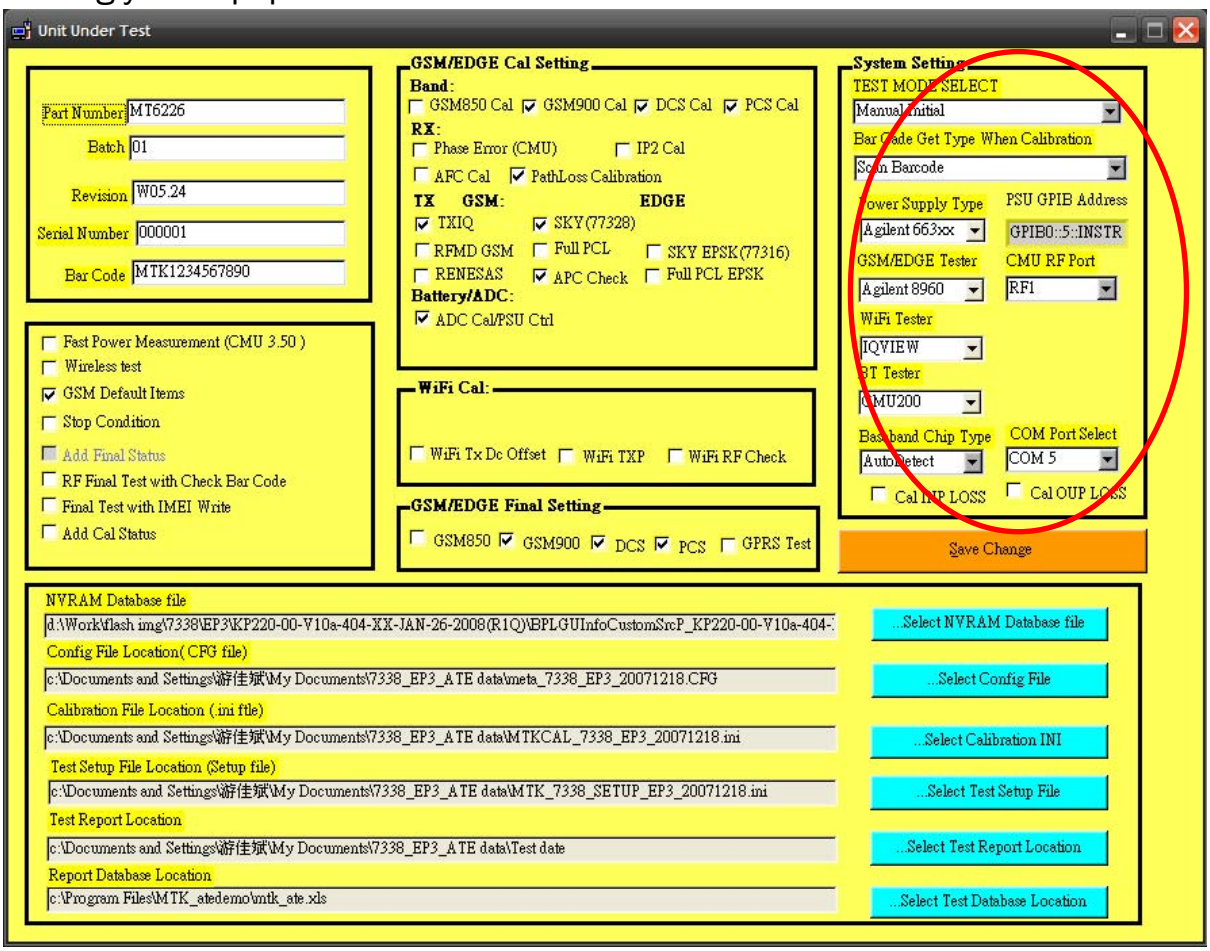
Execute MTK _ ate demo



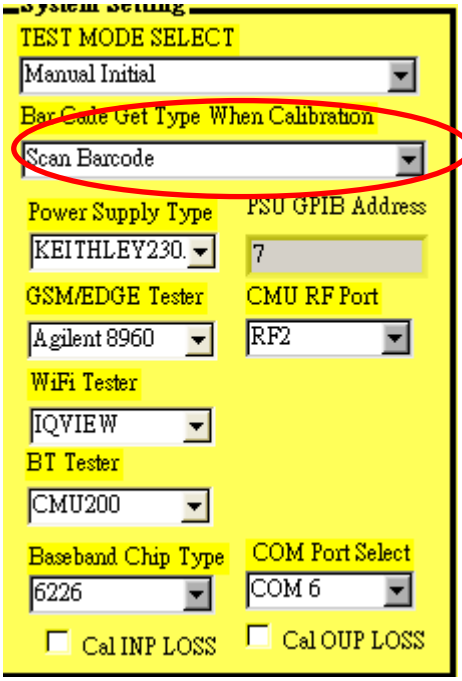
Press Report & System button



Setting your equipment

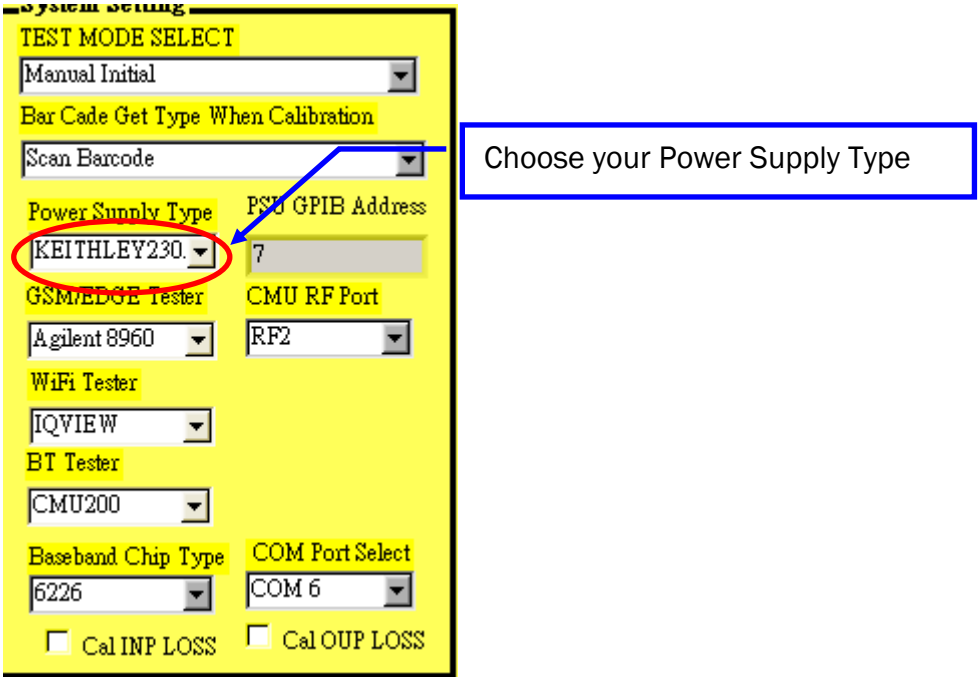


Setting Bar Cade Get Type When Calibration

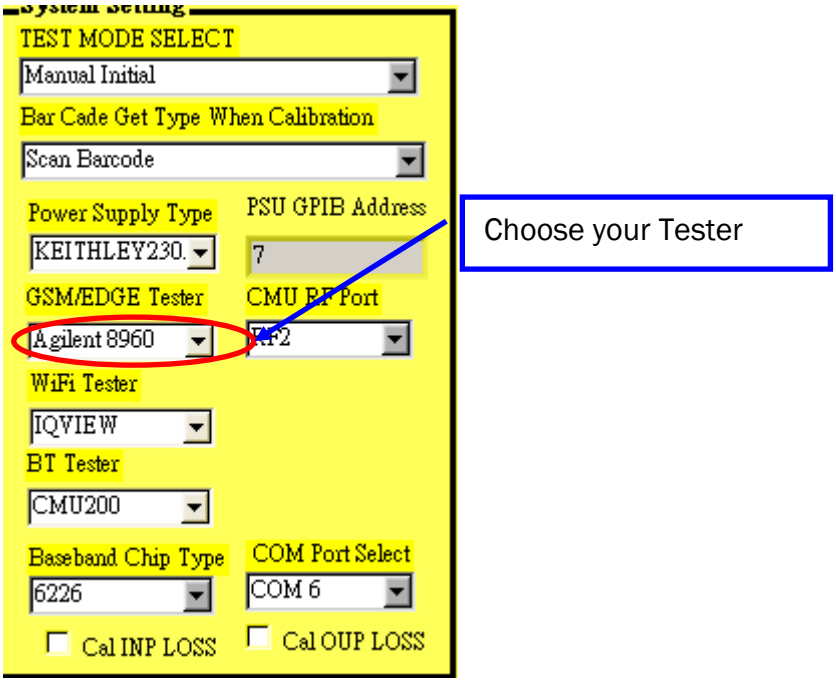


Choose “Scan Barcode”

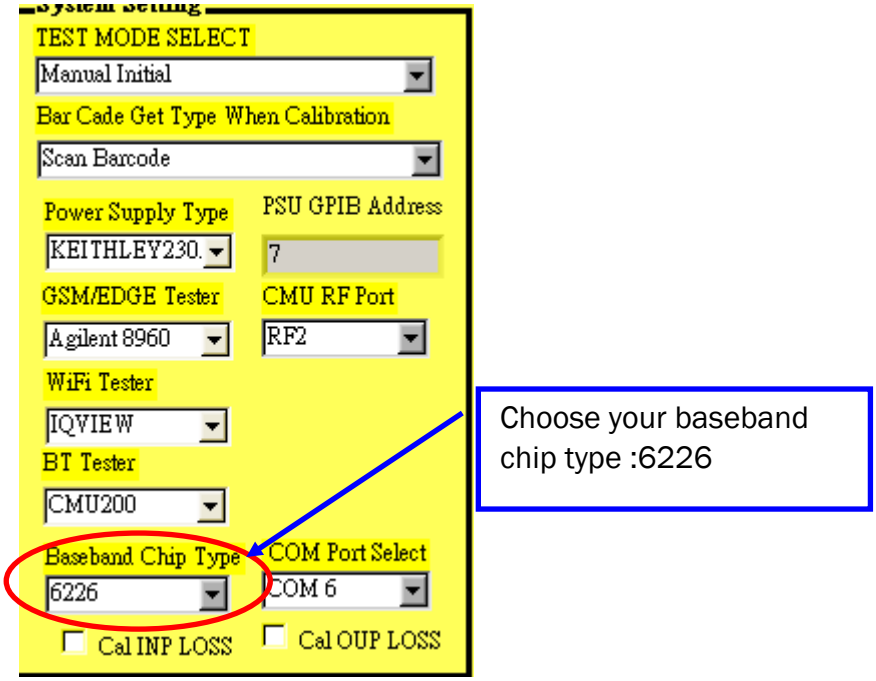
Setting your power supply type



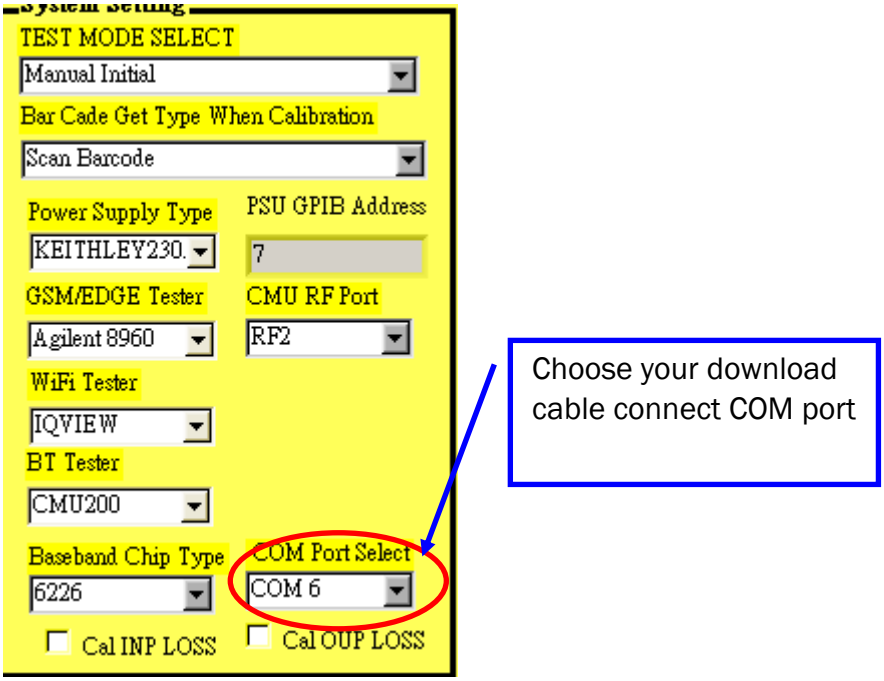
Setting your GSM/EDGE Tester



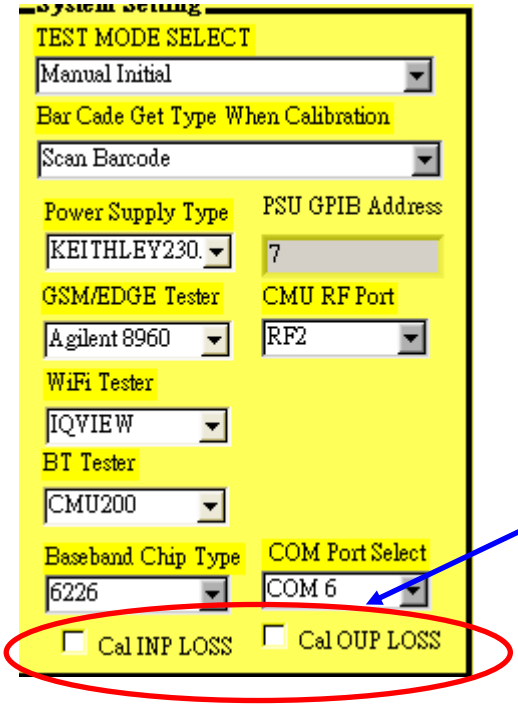
Choose Baseband Chip Type



Choose your download com port

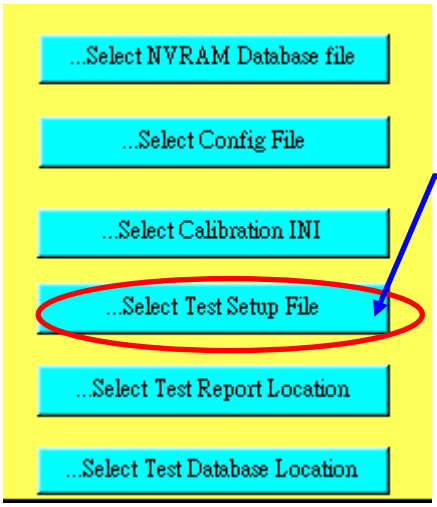


Cancel Loss



Cancel Cal INP LOSS and Cal OUP LOSS

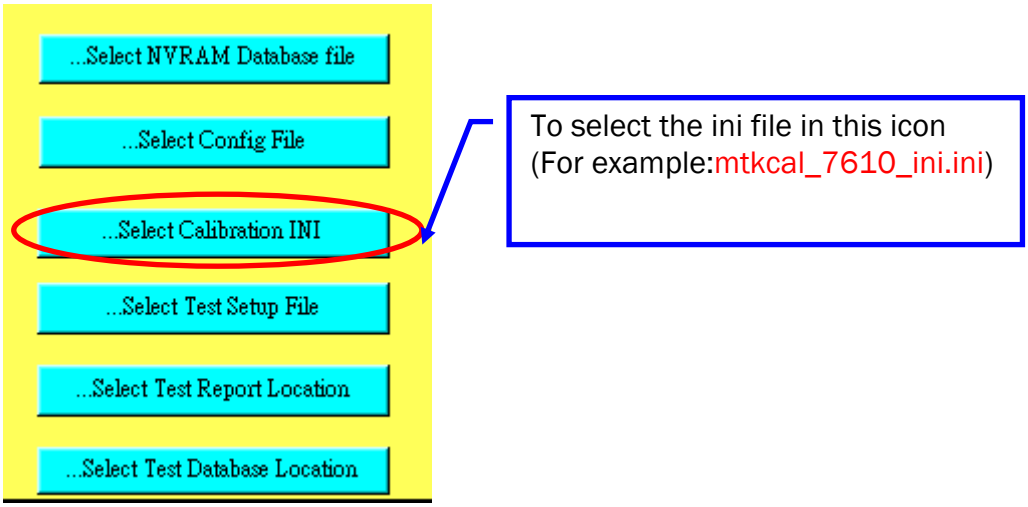
Choose “select test setup file”



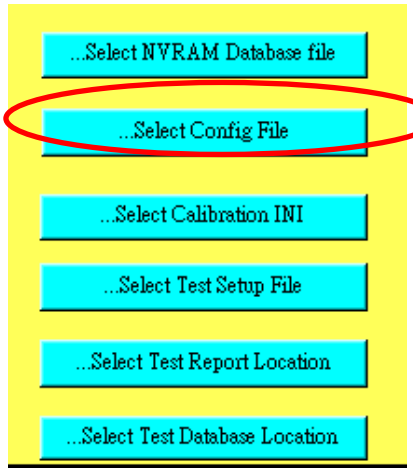
To select the setup file in this icon
(For example:MTK_7610_SETUP.ini)

Execute MTK _ ate demo again

Choose Calibration INI

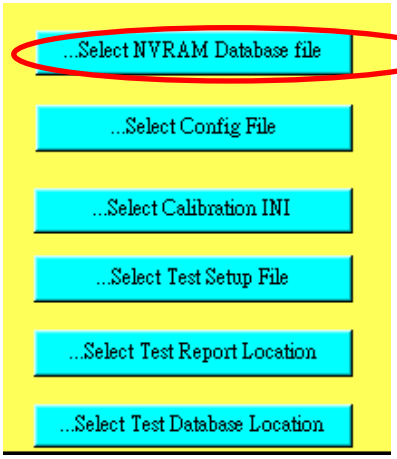


Choose Con fig File



To select the CFG file in this icon
(For example:metal_7610.cfg)

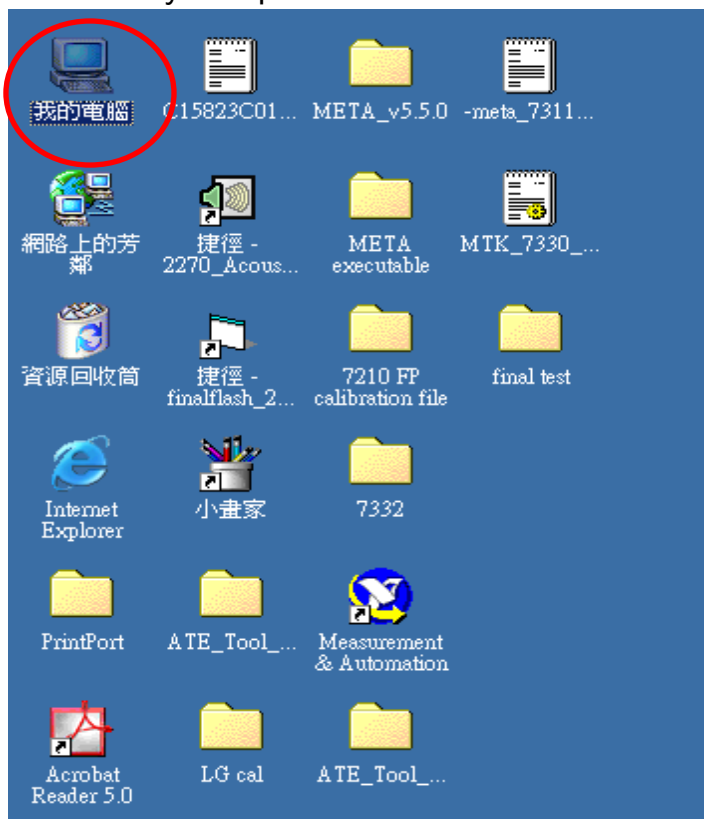
Choose NVRAM Database file



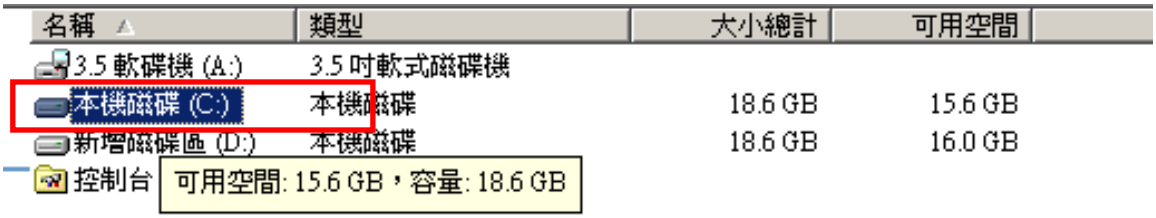
To select the sw database in this icon.

How to setup your test report location

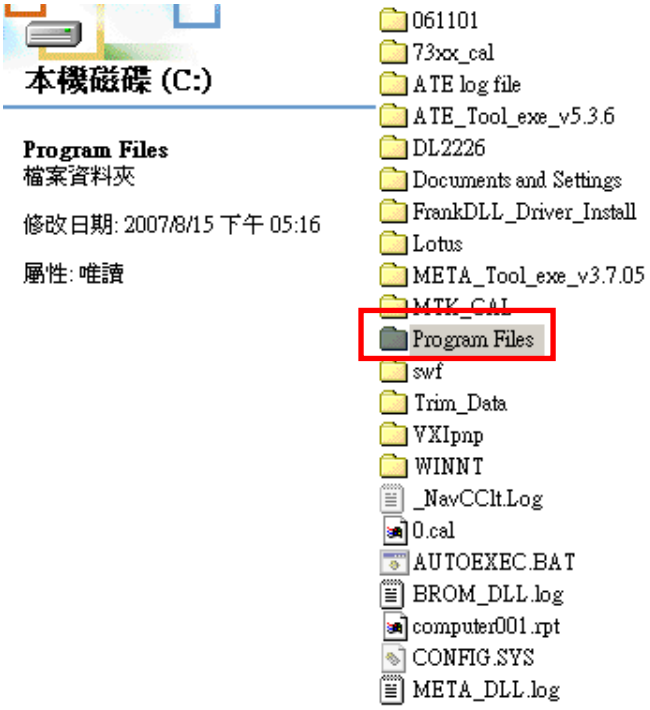
Choose my computer



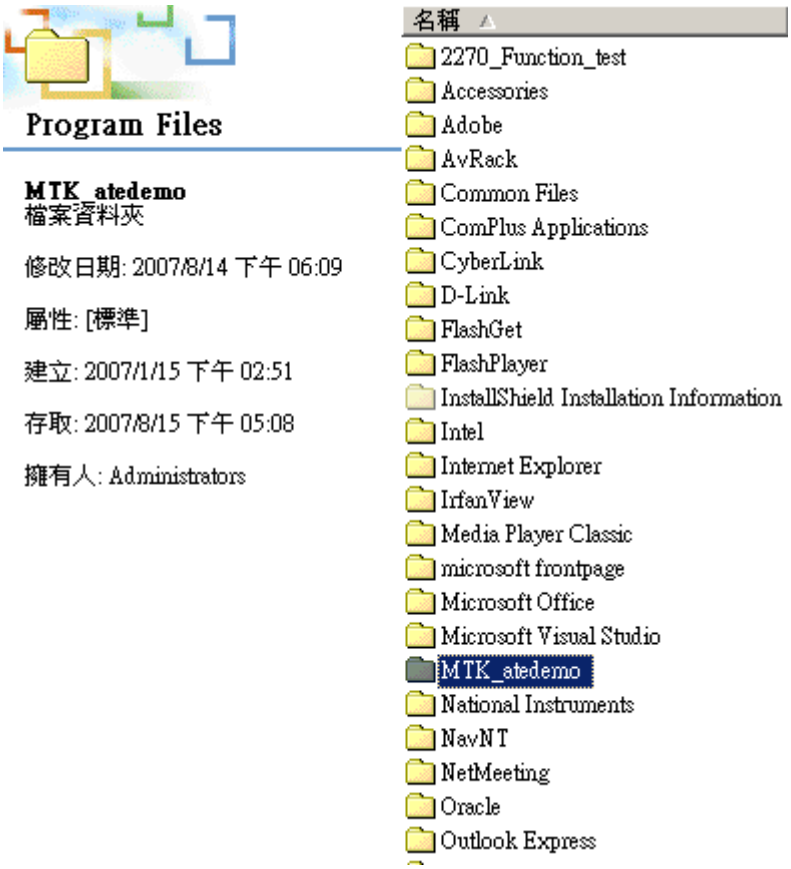
Choose “C” disk



Choose “program files”



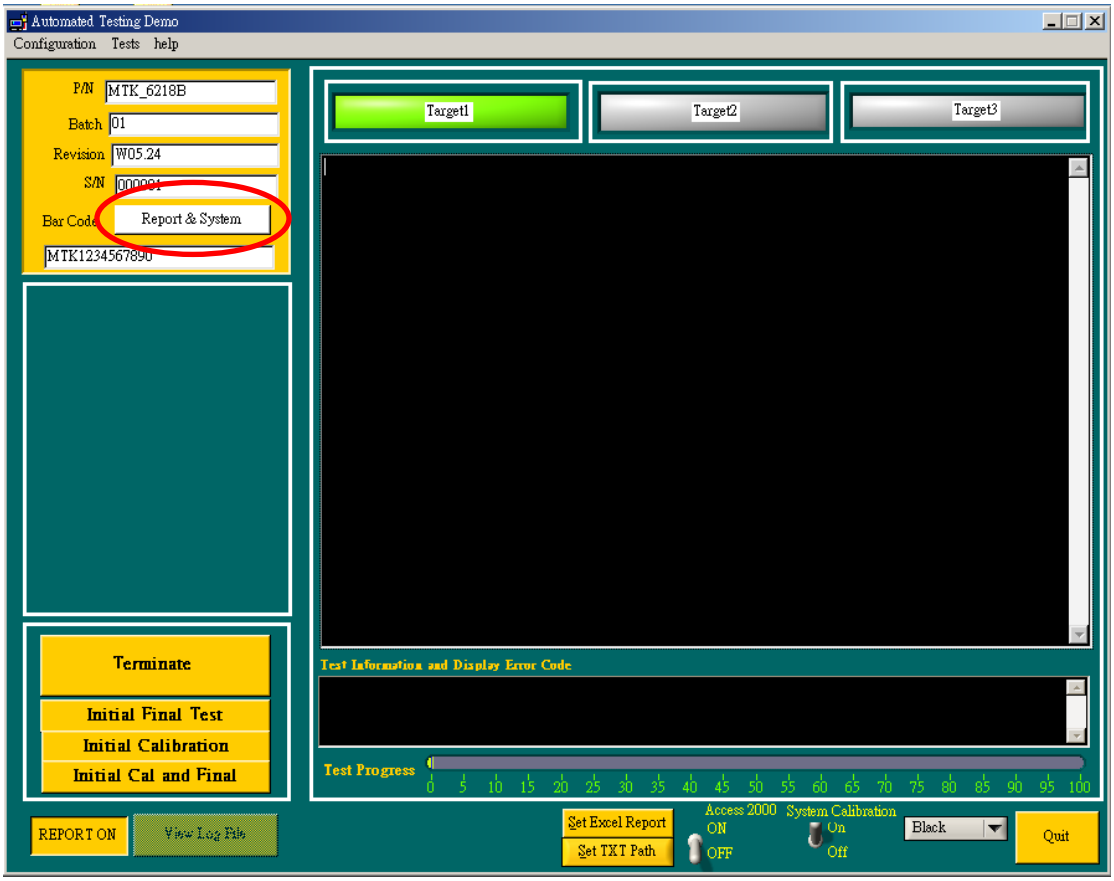
Choose “MTK _ ate demo ”files



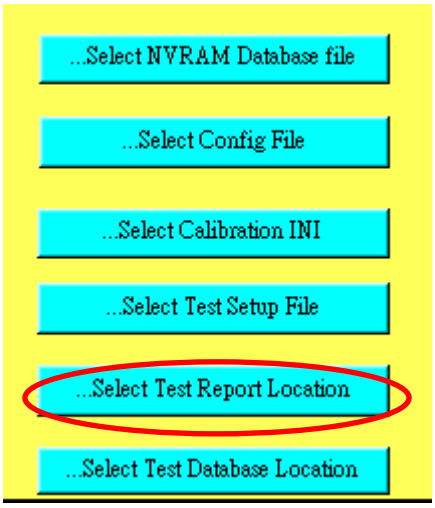
Setup new file and leave the window

Execute MTK _ ate demo

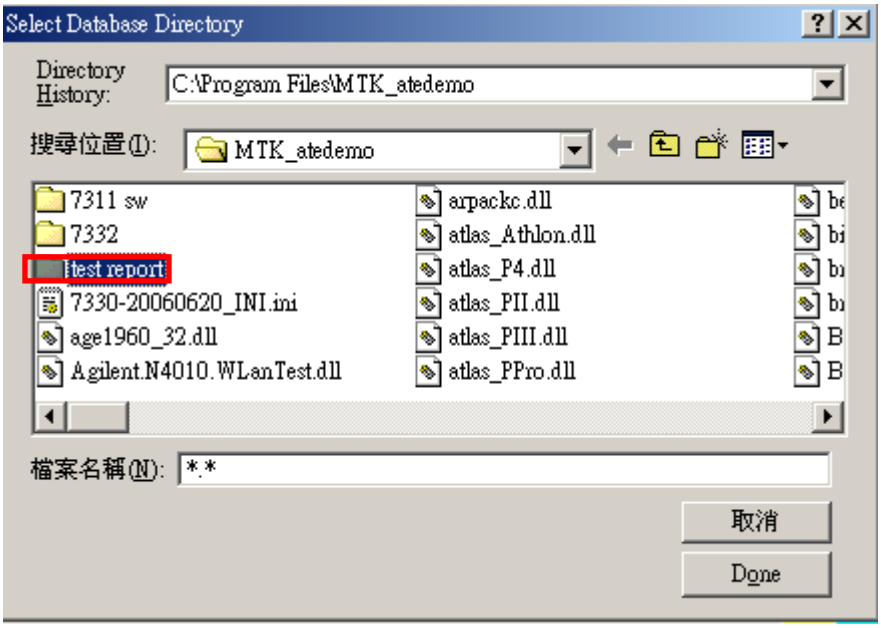
Press Report & System button



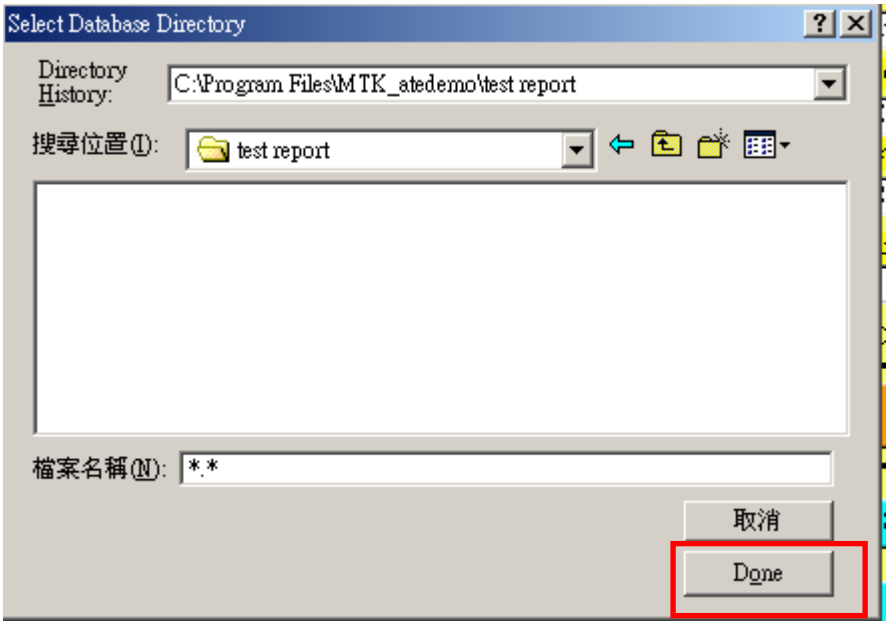
Press “select test report location”



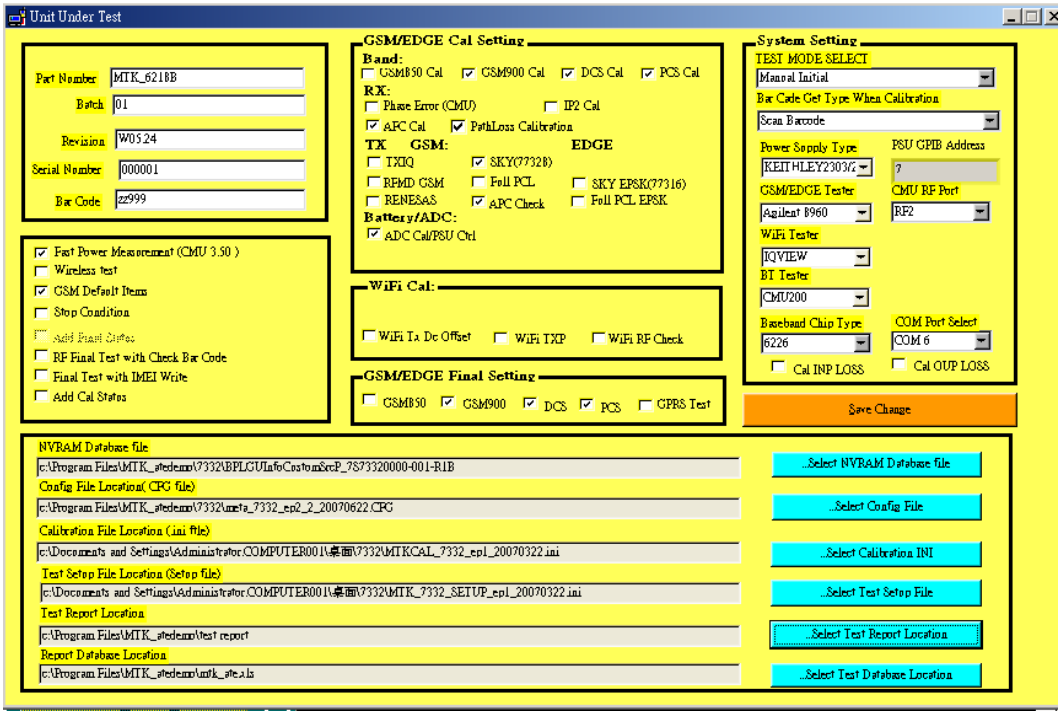
Choose your setup report



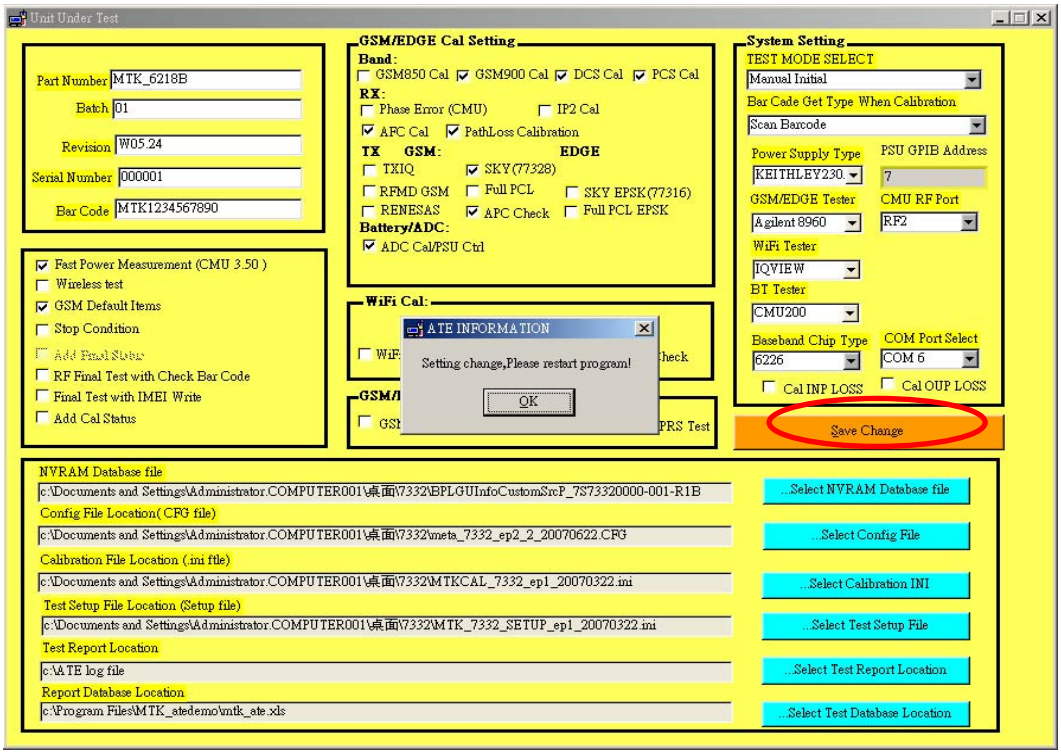
Press “Done”



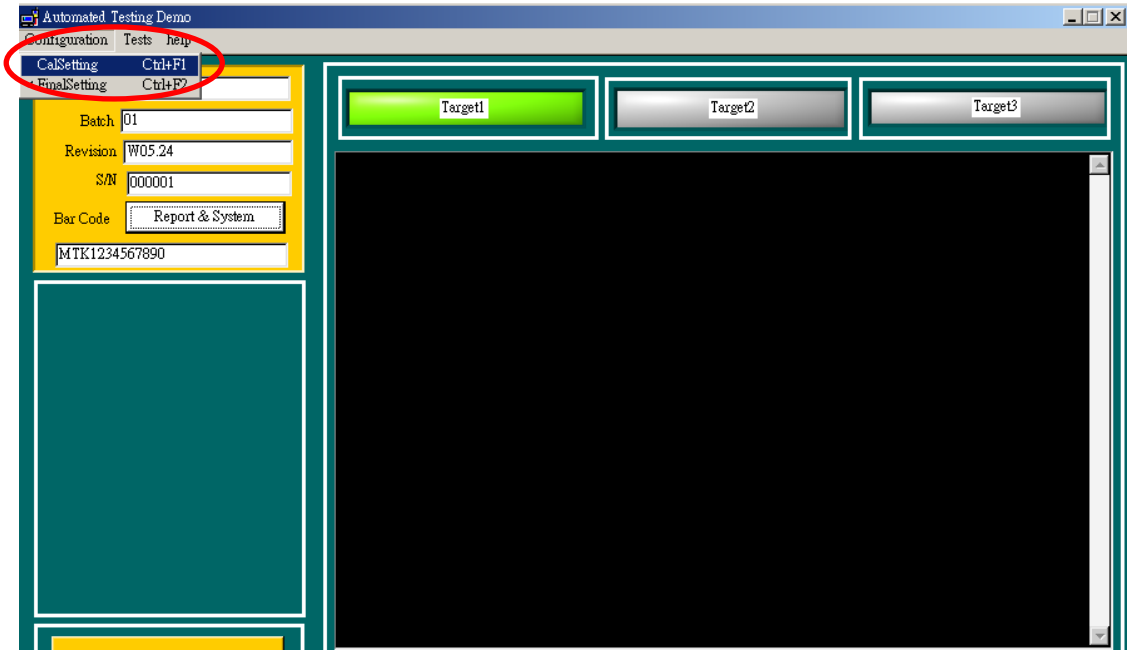
Setup finish



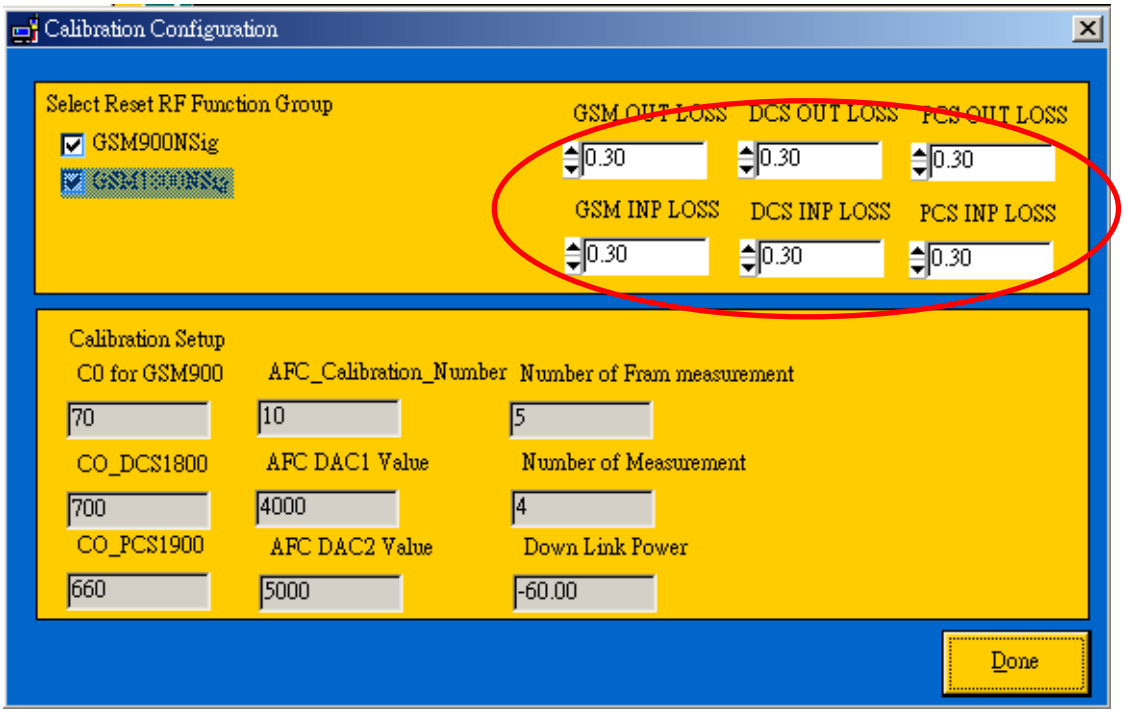
When you finish the setup then you press save change icon.



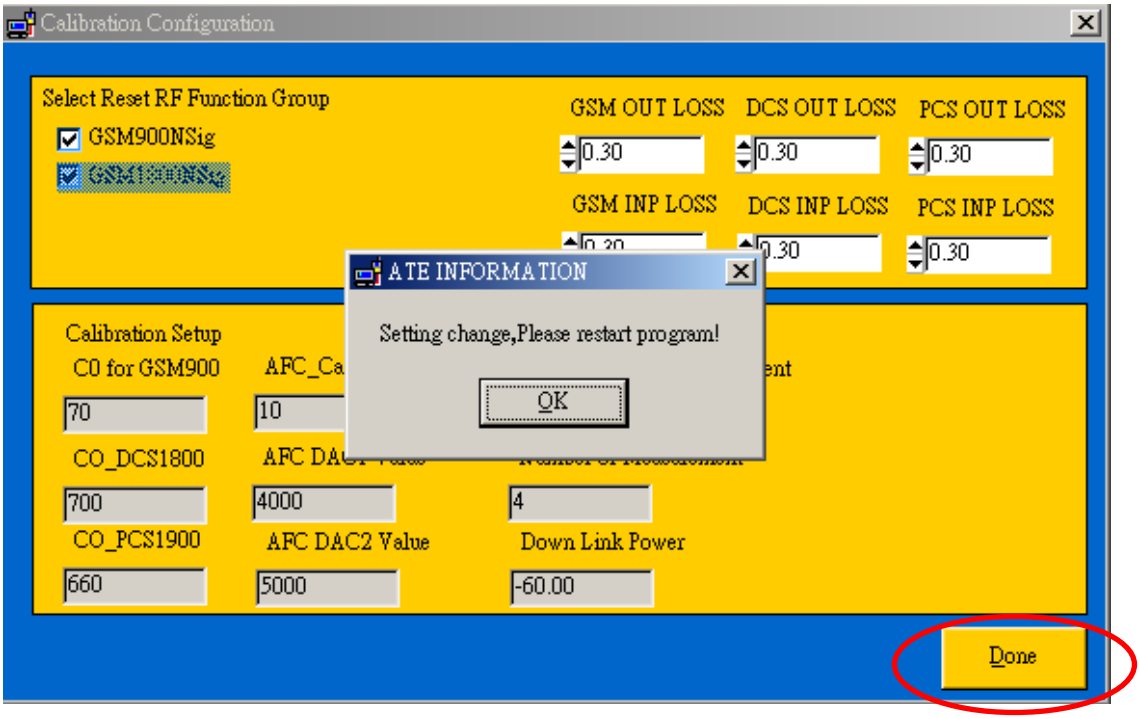
Press Configuration choose Cal Setting



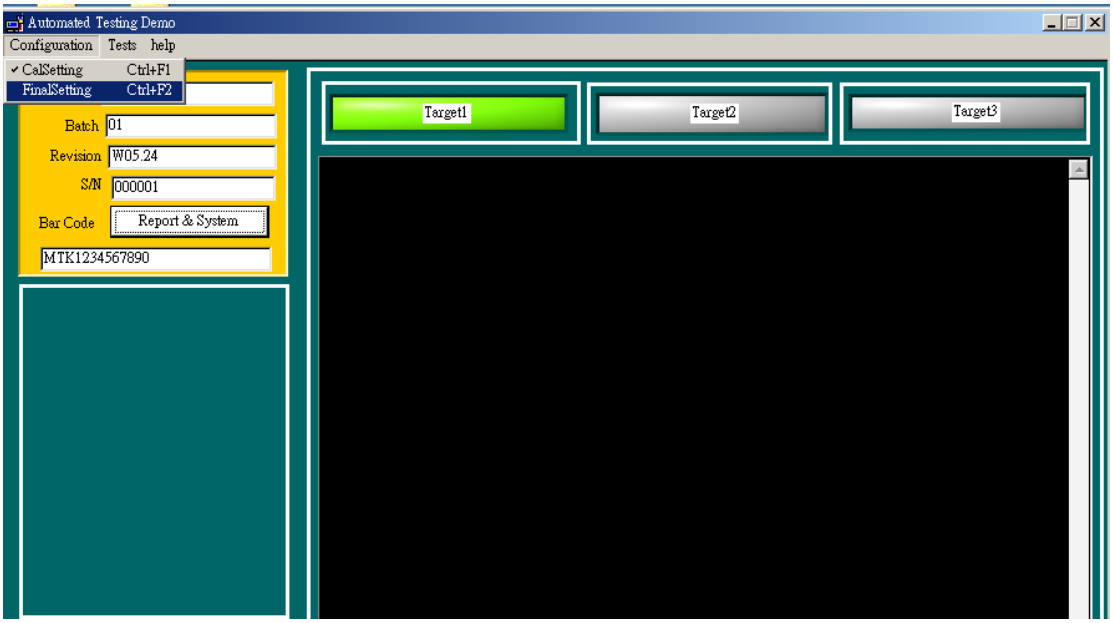
Setting your cable loss



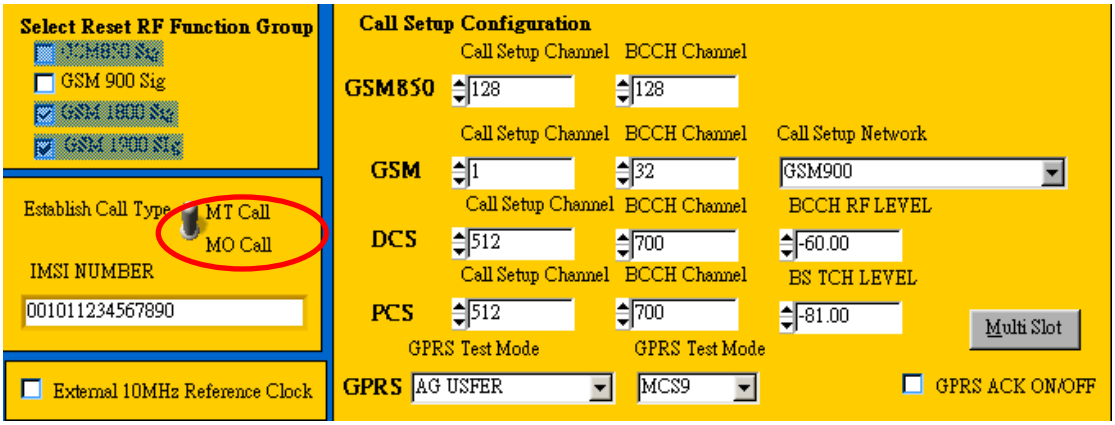
Press Done to save



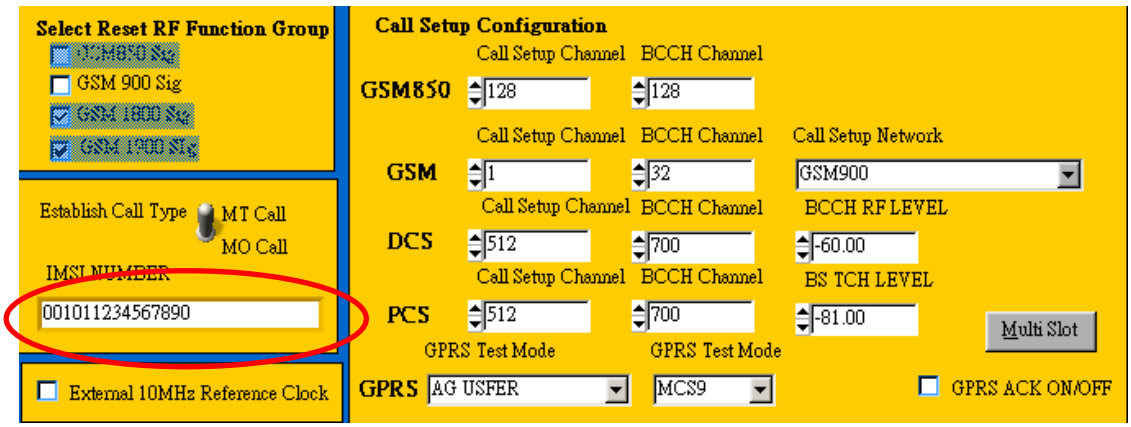
Press Configuration choose Final setting



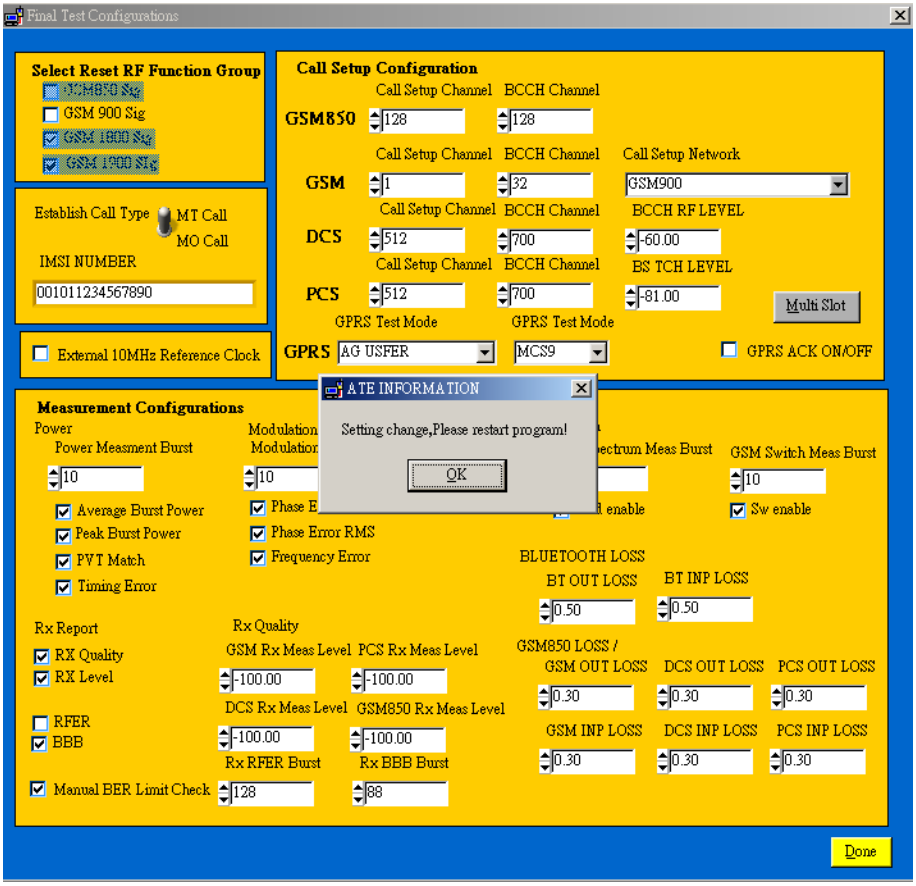
Choose “MT Call” from Establish Call Type



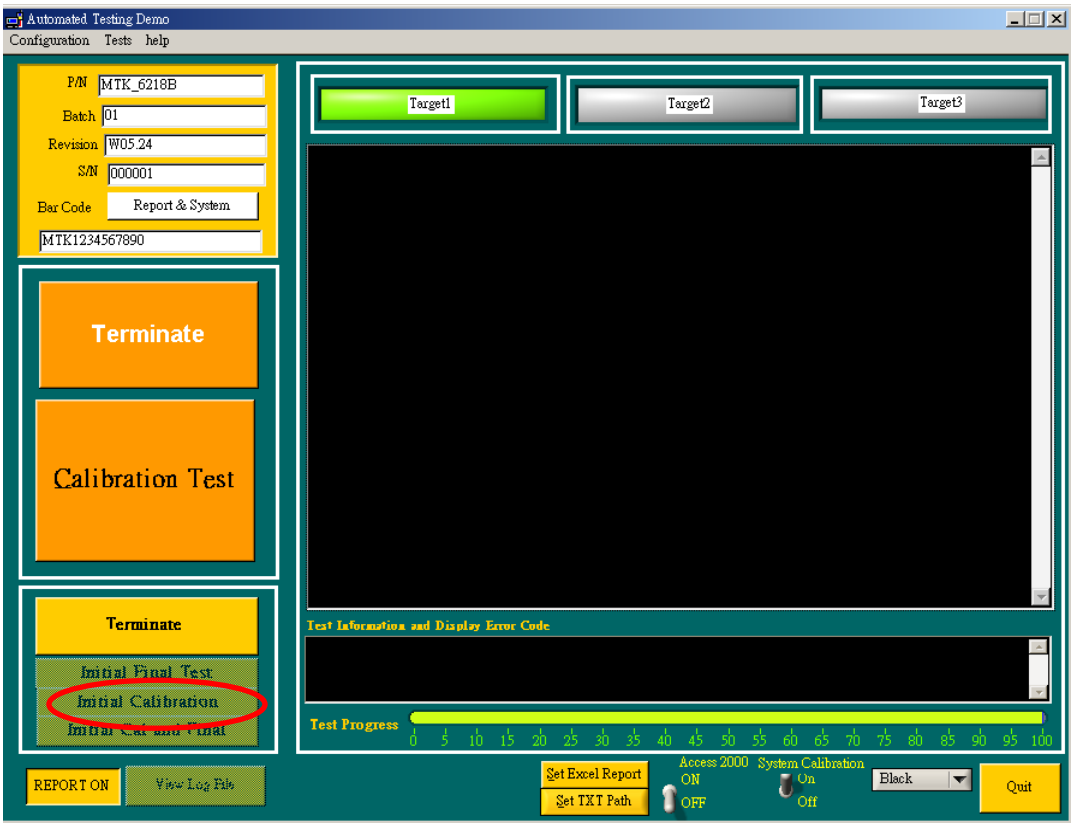
Key in your test SIM card number form IMSI NUMBER



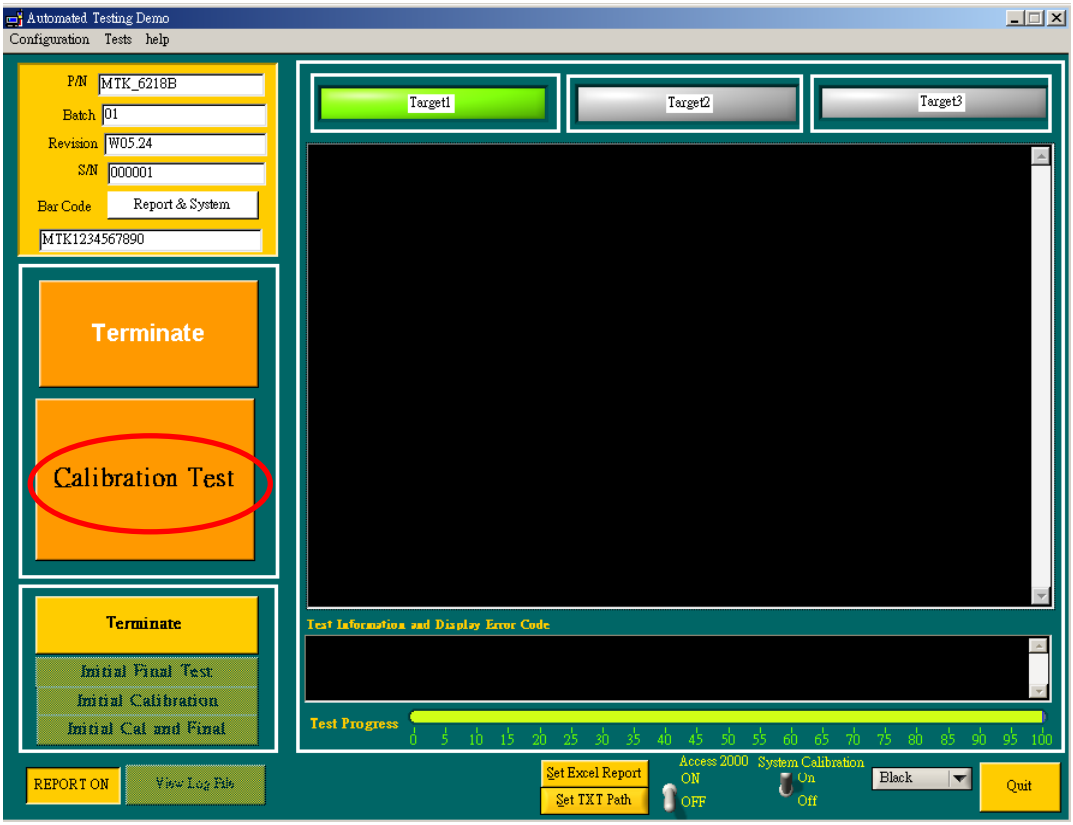
Press Done and save your setting



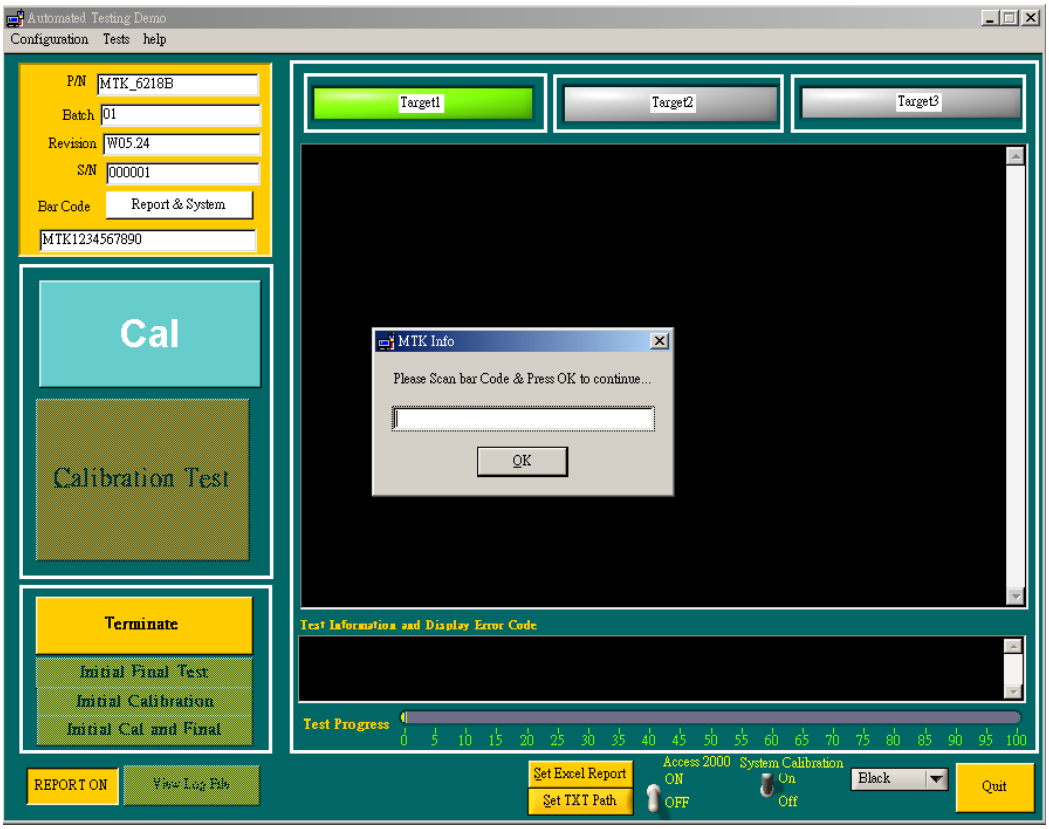
If you want calibration , you can press “initial calibration”



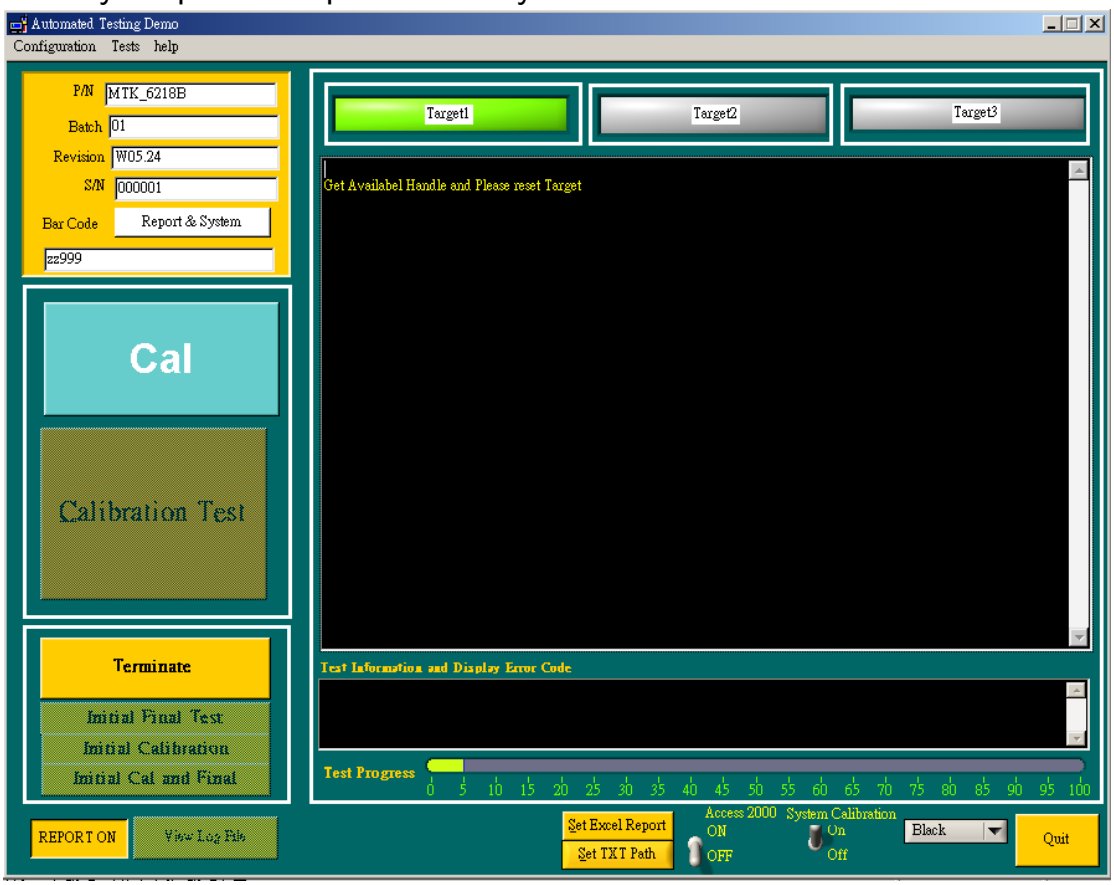
Press Calibration Test



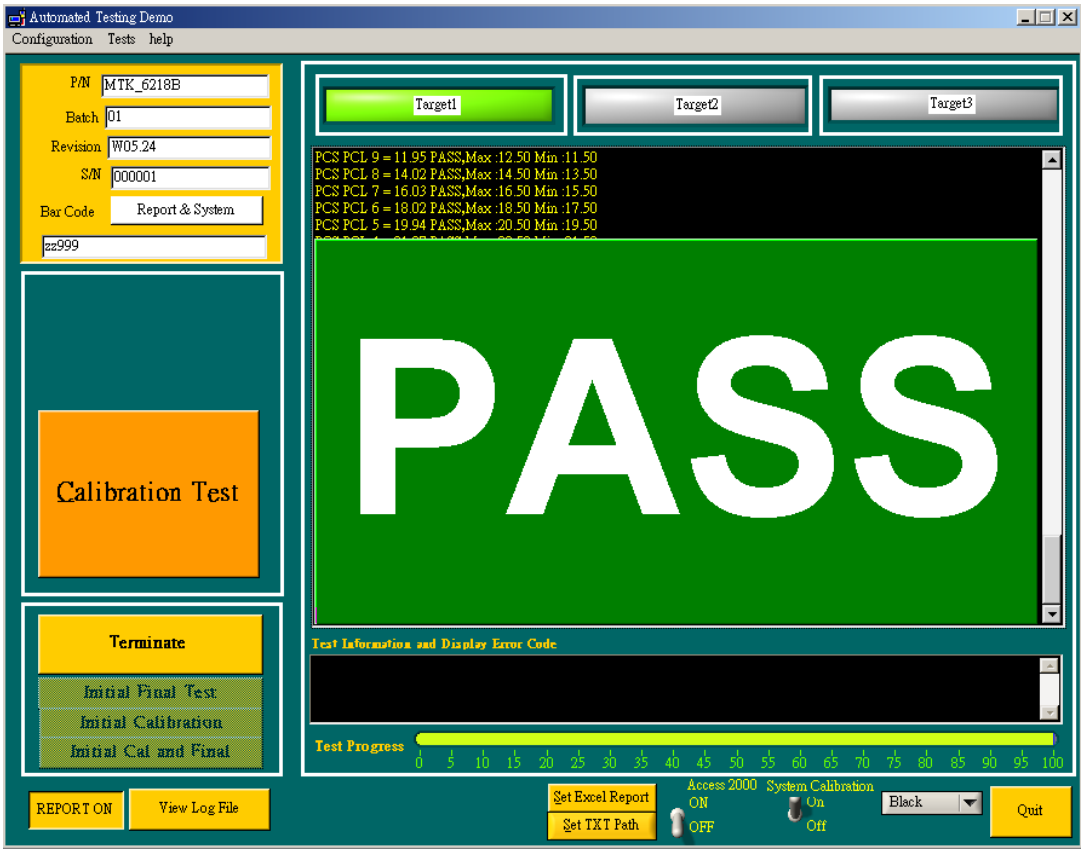
Key-in your phone bar Code



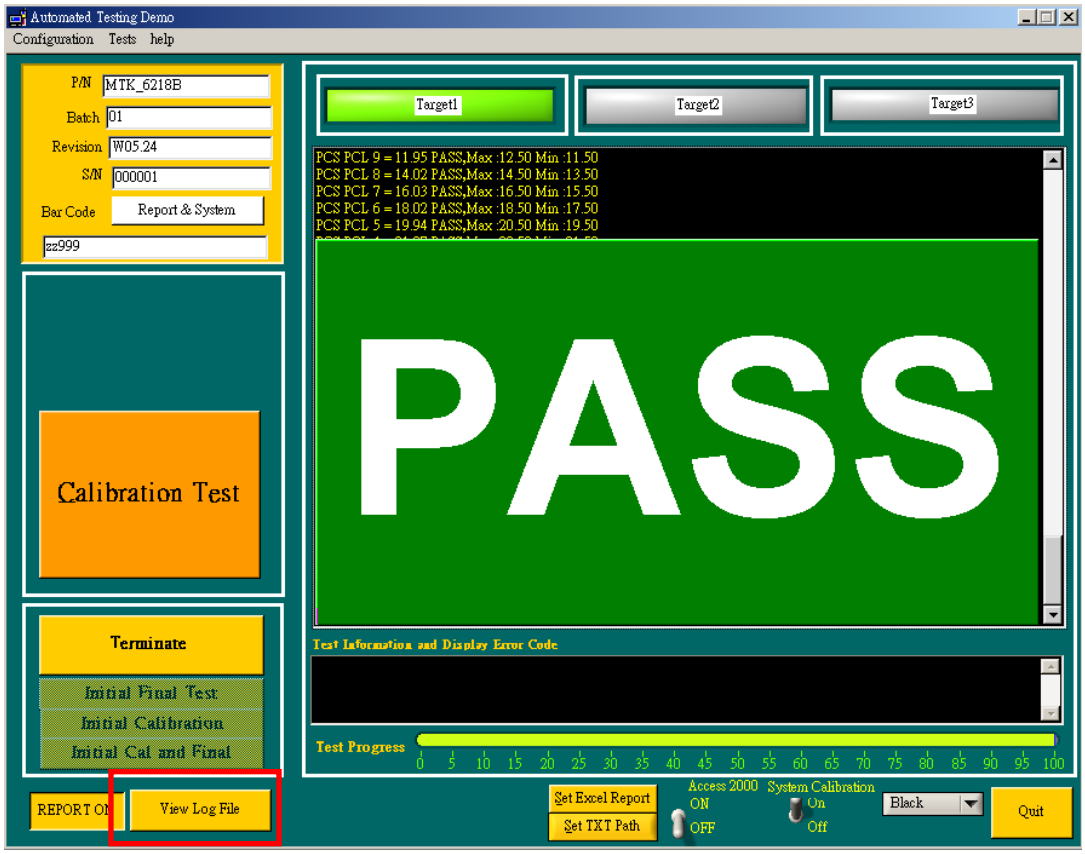
Press your phone of power on key and Start calibration



Calibration is ok and will show “PASS”



If you want see test report , you can press “View log file”

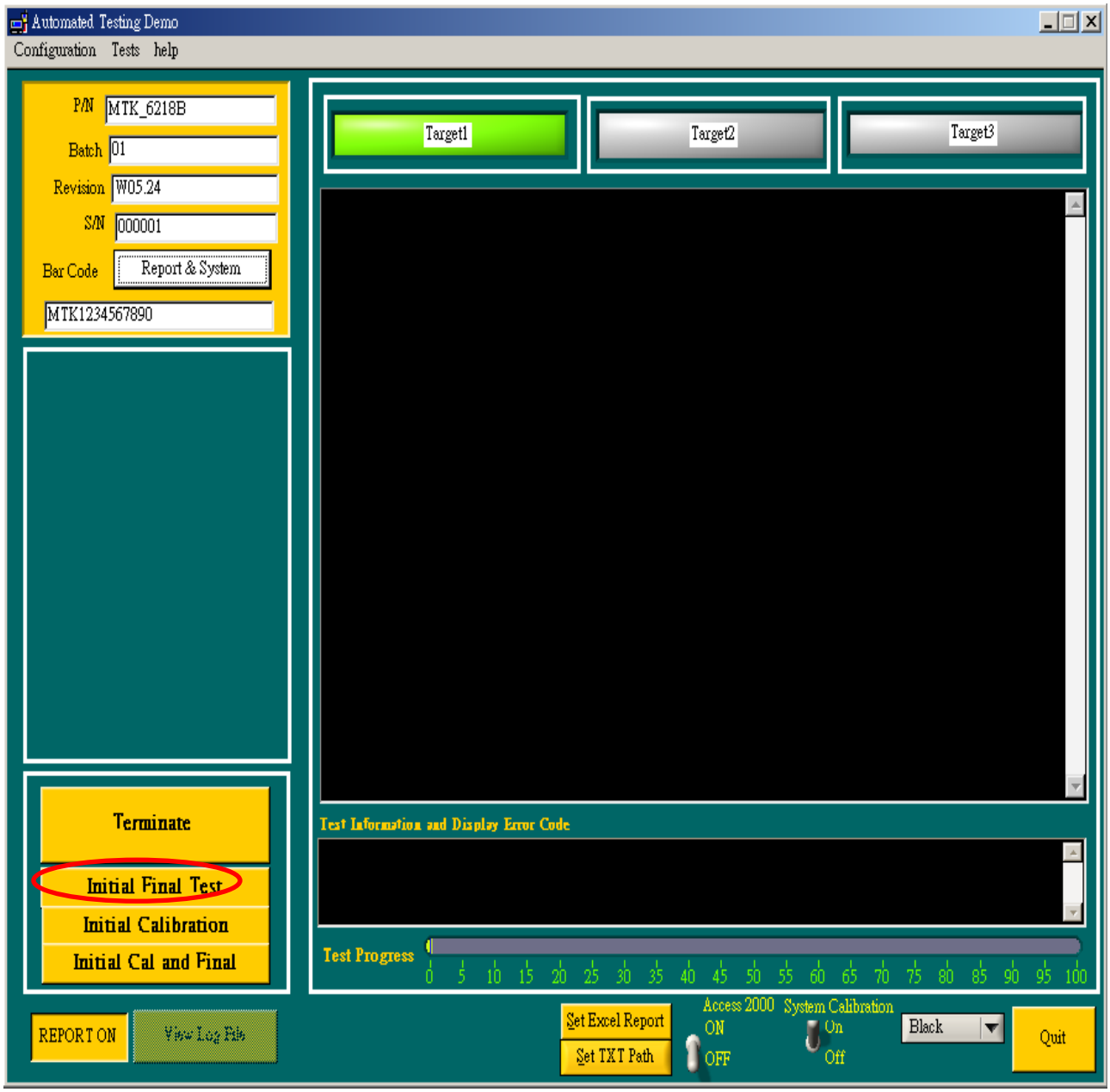


You can see the test report

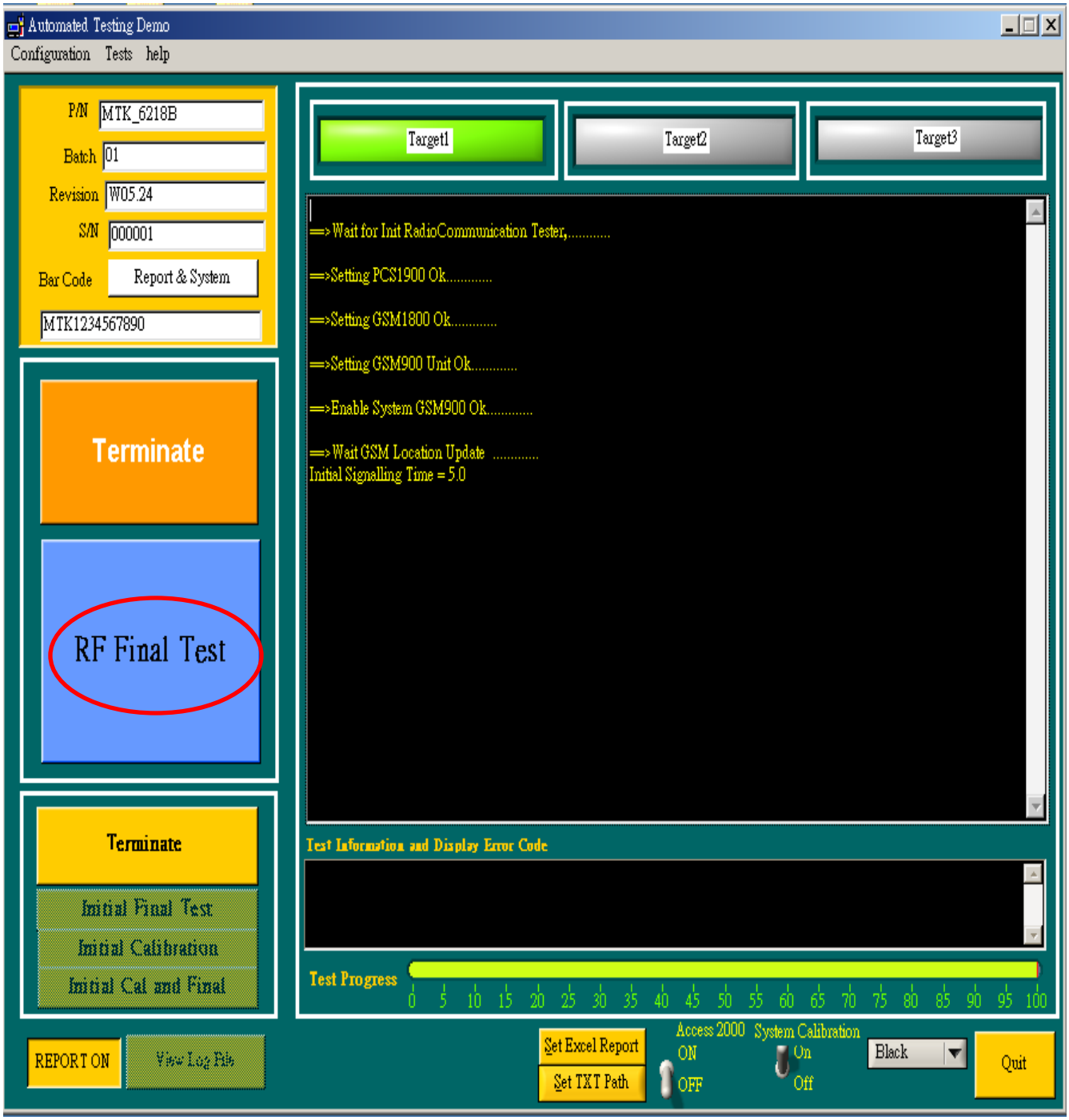
```
------------
 ATE Tool Version:5.0.3
 Part Number:  MTK_6218B
 Serial Number:  000001
 Revision:  W05.24
 Batch:  01
 Bar Code:  qqq
Error Code:  000
------------


        ==>Wait GSM Location Update  ..............
         Enter into META Mode OK
        AFC Calibration OK
Slope=2.824,min:1.000,max:10.000
Use Default Value=3836
        AFC Calibration time=1.64(sec)
PL GSM TCH 15 = 1.25  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 30 = 1.00  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 45 = 0.88  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 60 = 1.25  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 75 = 1.38  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 80 = 1.50  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 100 = 1.25  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 124 = 1.25  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 975 = 1.50  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 1000 = 1.38  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 1023 = 1.00  Pass MAX:3.00   MIN:-3.00
PL DCS TCH 550 = 0.50  Pass MAX:3.00   MIN:-3.00
PL DCS TCH 590 = 1.00  Pass MAX:3.00   MIN:-3.00
```

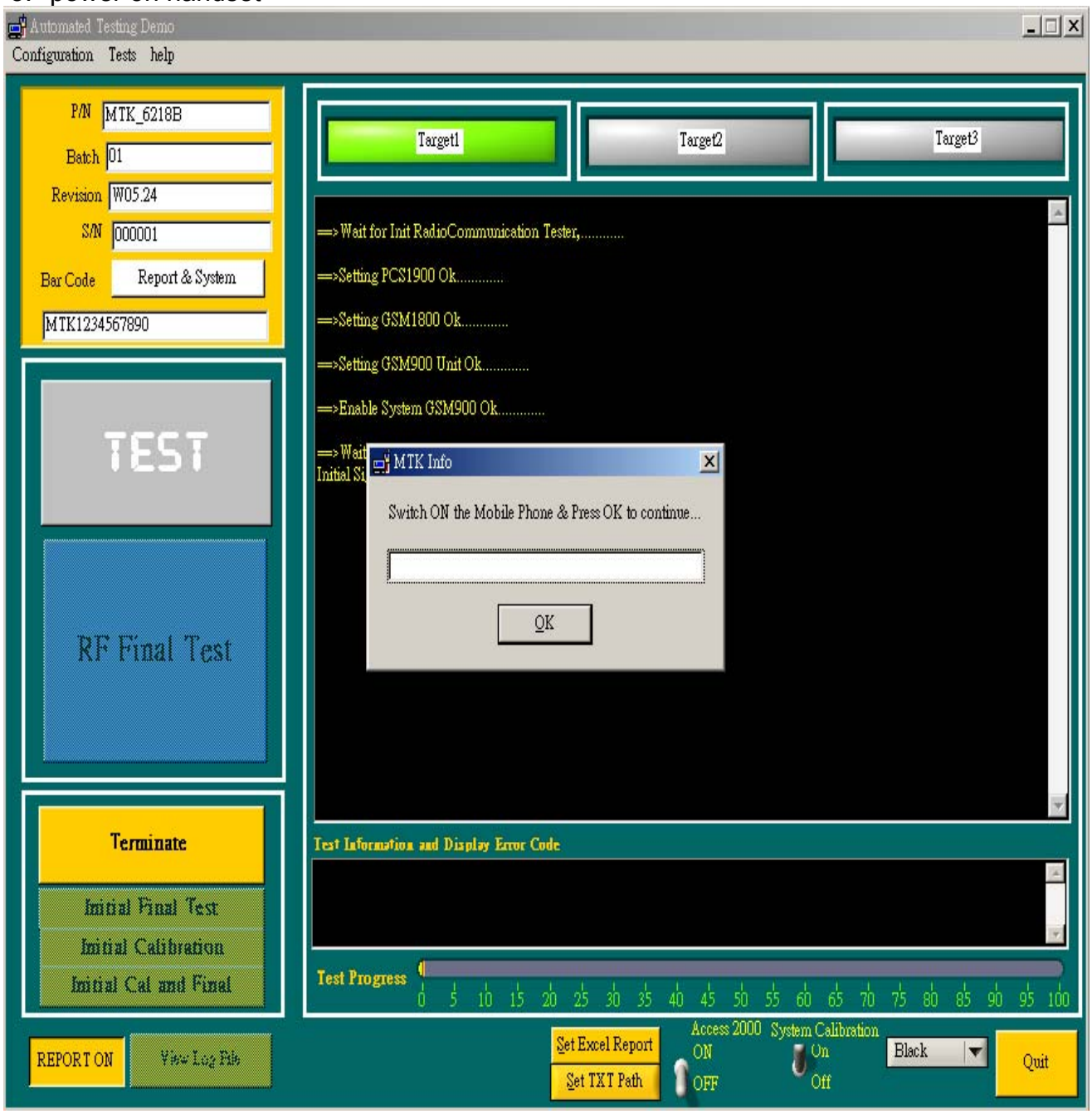
If you want final test , you can press “initial final test “



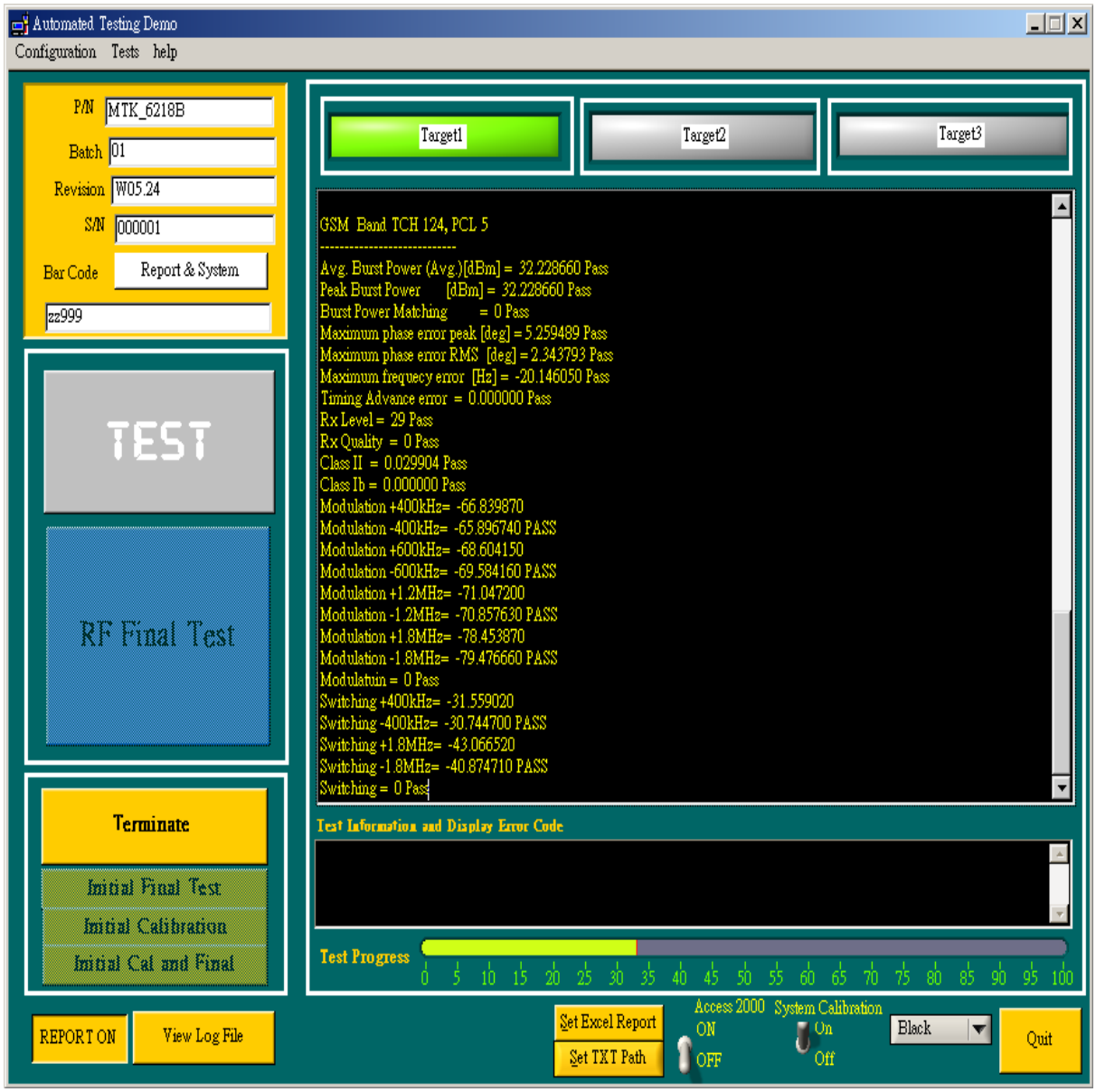
Press “RF Final test”



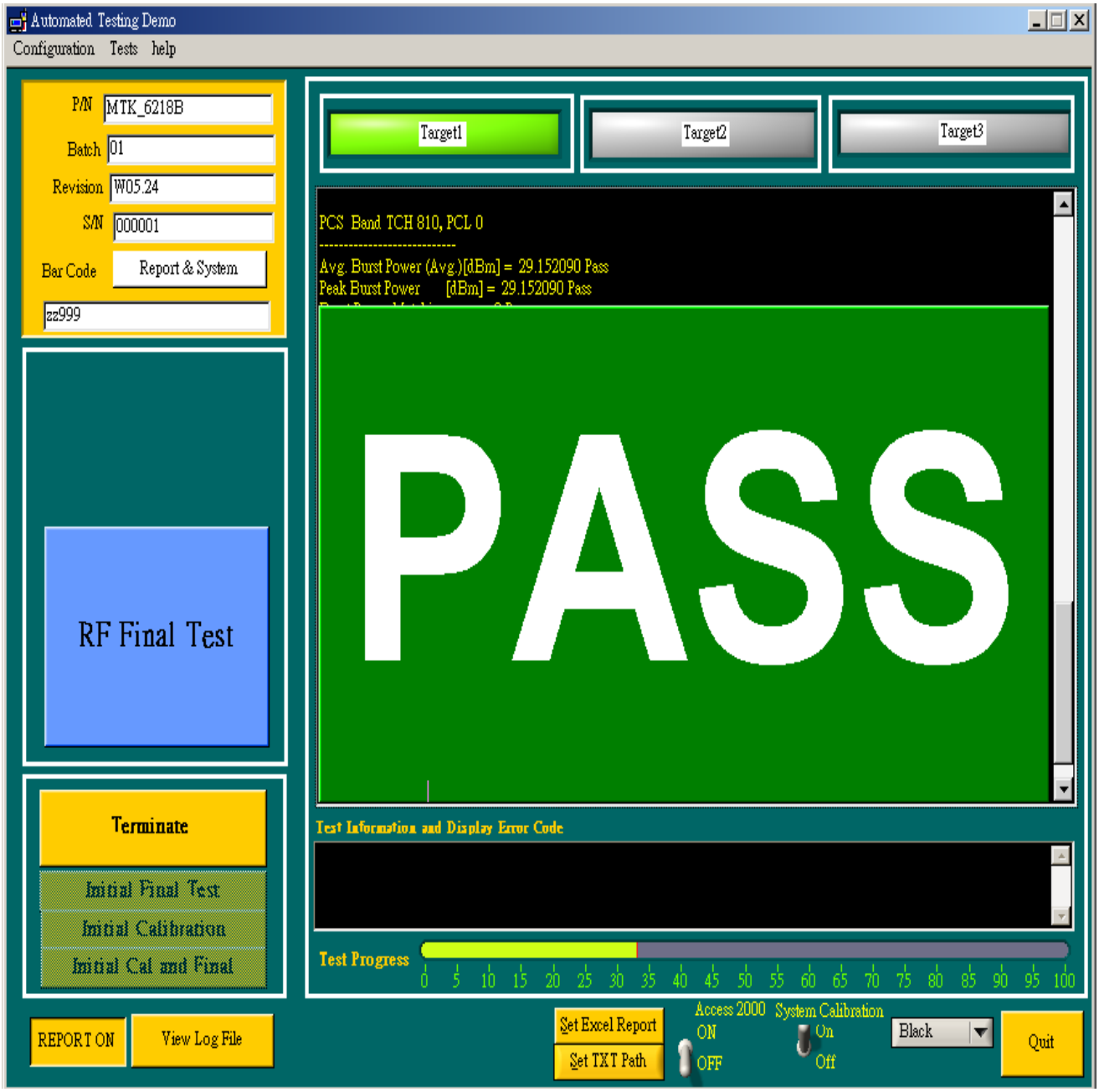
1. Handset to insert SIM card
2. Key-in bar code or IMEI number
3. power on handset



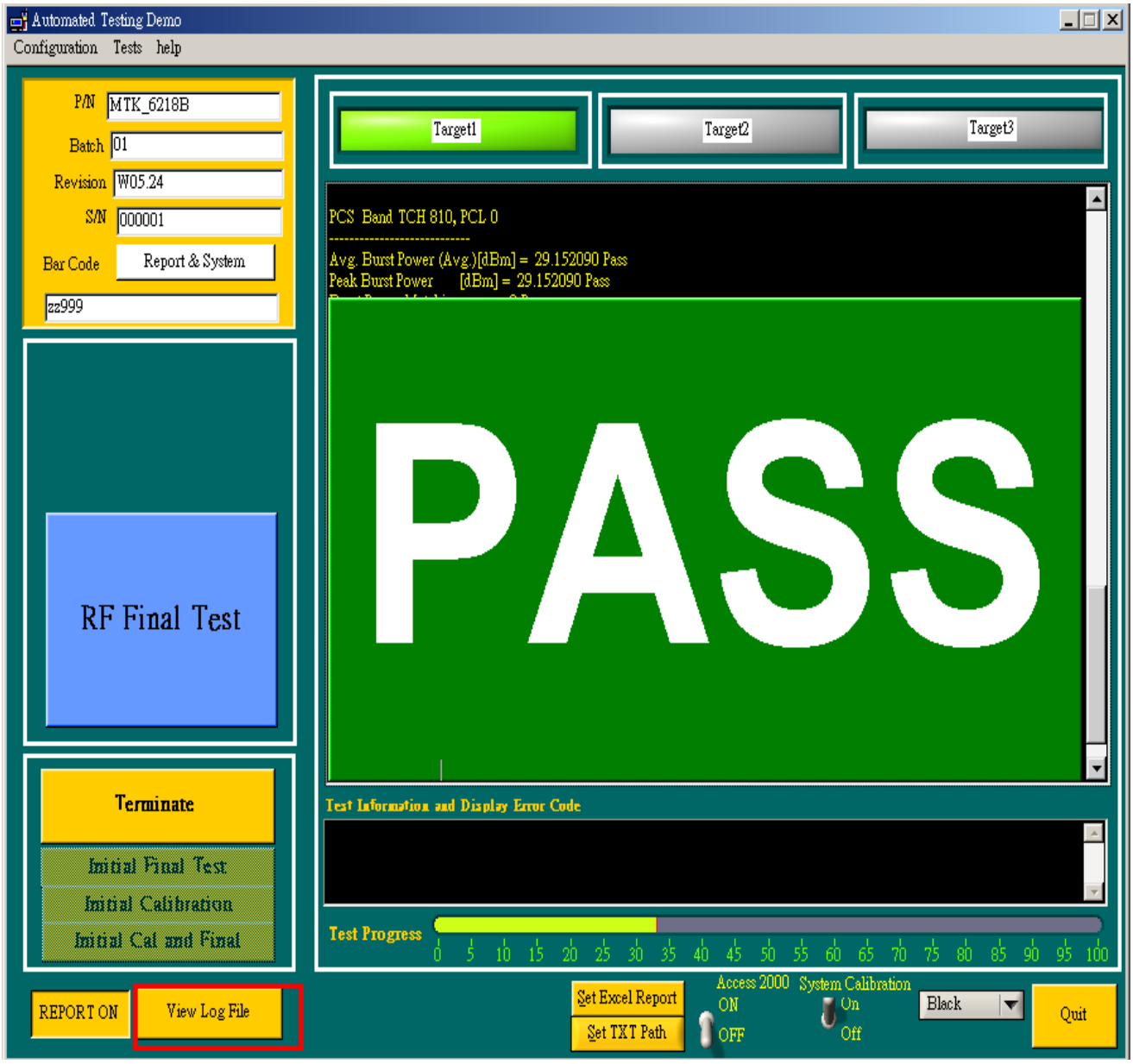
ATE start final test



If ATE test finish , ATE will show pass



If you want see the test report , you can press “View Log File”

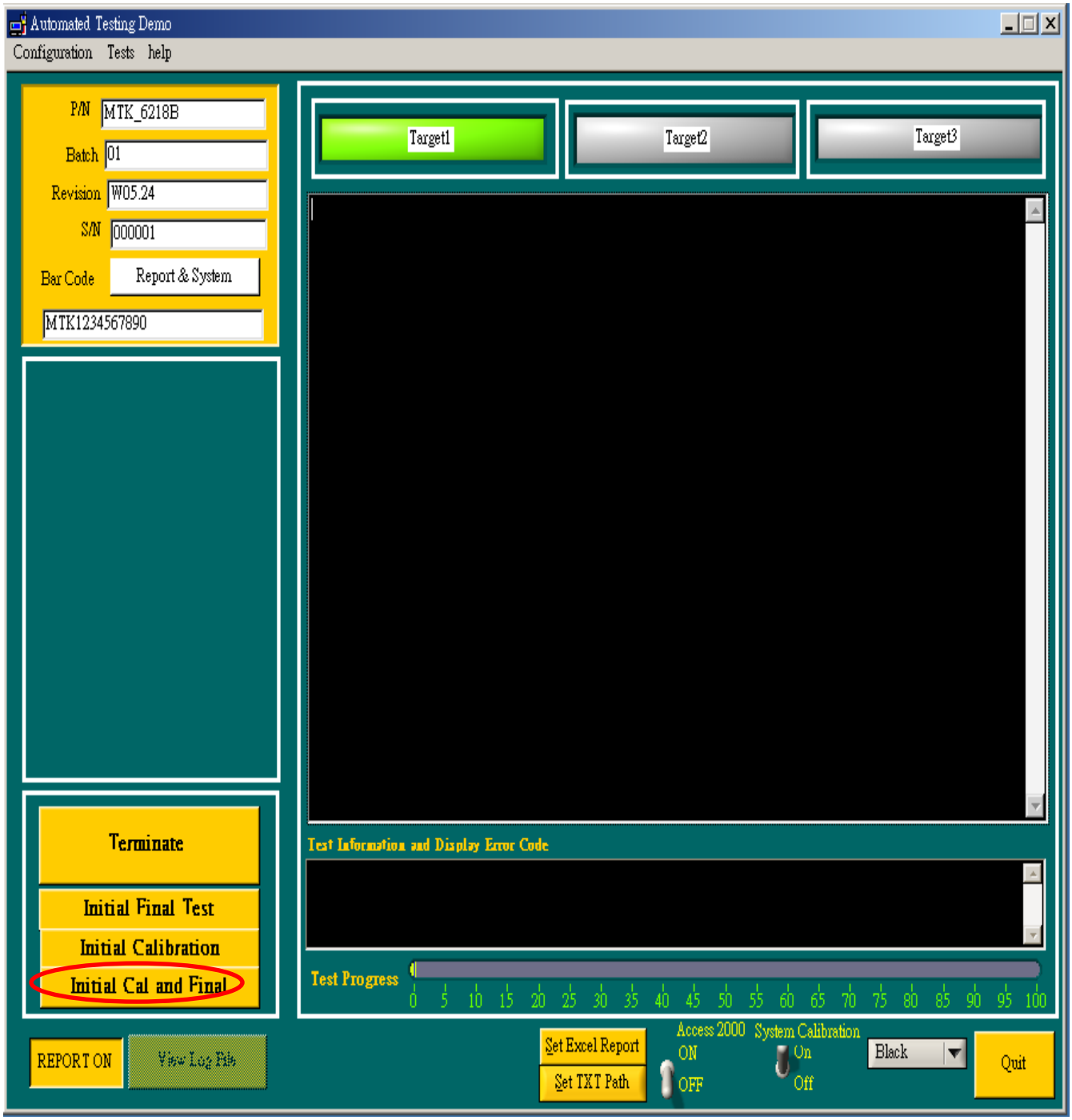


You can see the test report

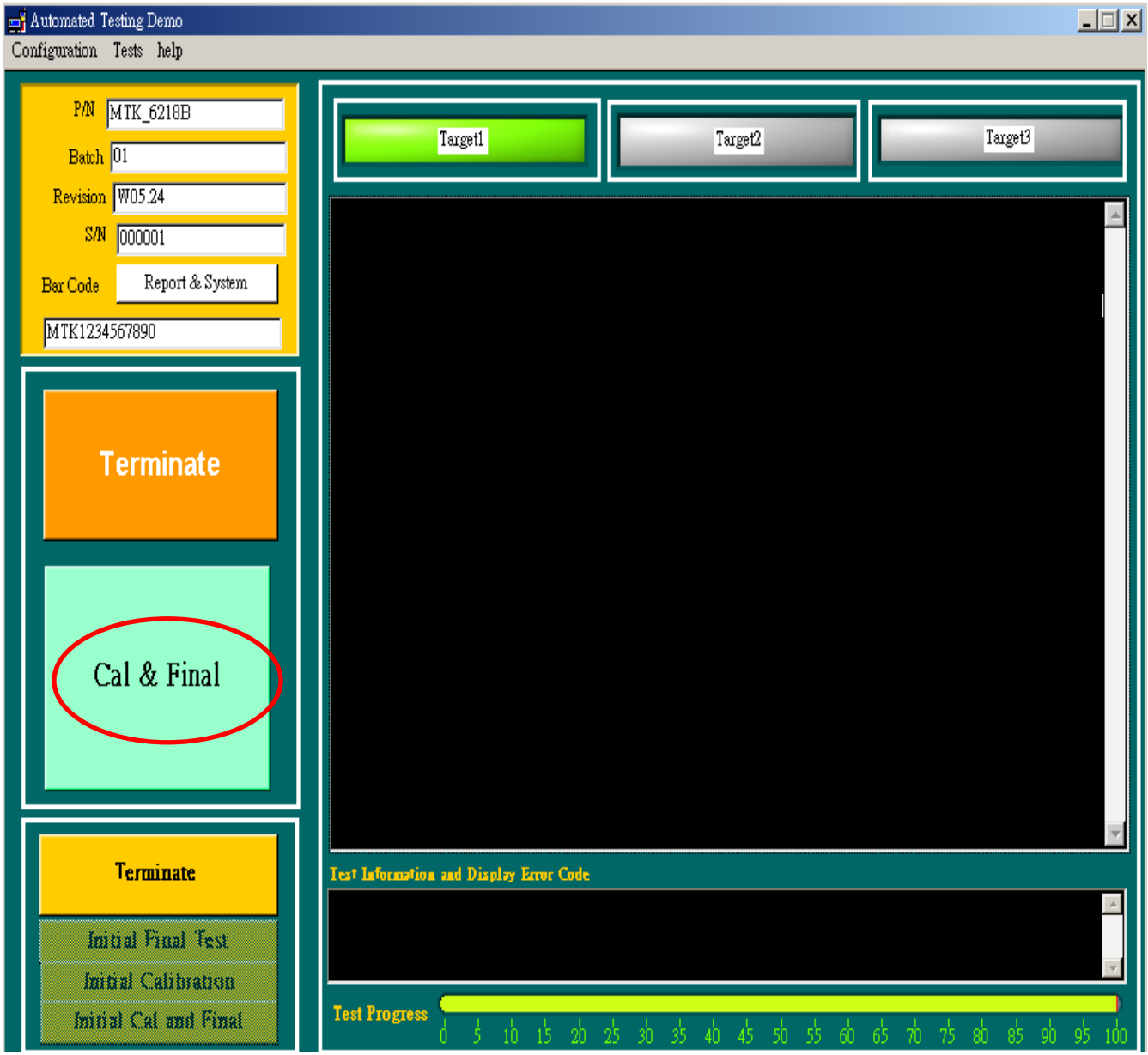
```
------------
 ATE Tool Version:5.0.3
 Part Number:  MTK_6218B
 Serial Number:  000001
 Revision:  W05.24
 Batch:  01
 Bar Code:  qqq
Error Code:  000
------------


        ==>Wait GSM Location Update  ..............
         Enter into META Mode OK
        AFC Calibration OK
Slope=2.824,min:1.000,max:10.000
Use Default Value=3836
        AFC Calibration time=1.64(sec)
PL GSM TCH 15 = 1.25  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 30 = 1.00  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 45 = 0.88  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 60 = 1.25  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 75 = 1.38  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 80 = 1.50  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 100 = 1.25  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 124 = 1.25  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 975 = 1.50  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 1000 = 1.38  Pass MAX:3.00   MIN:-3.00
PL GSM TCH 1023 = 1.00  Pass MAX:3.00   MIN:-3.00
PL DCS TCH 550 = 0.50  Pass MAX:3.00   MIN:-3.00
PL DCS TCH 590 = 1.00  Pass MAX:3.00   MIN:-3.00
```

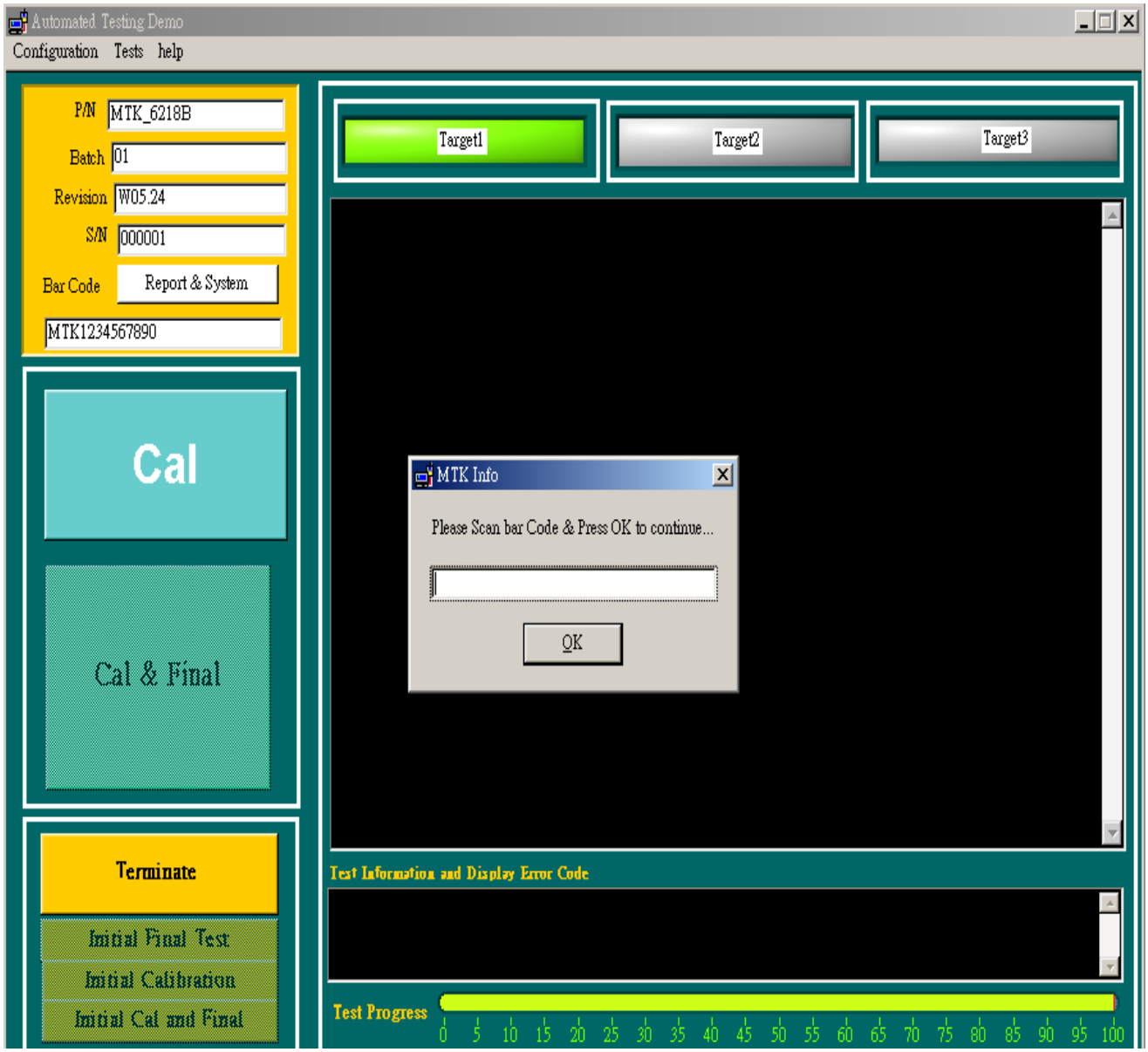
If you want initial cal and final test , you can press “initial cal and final test”



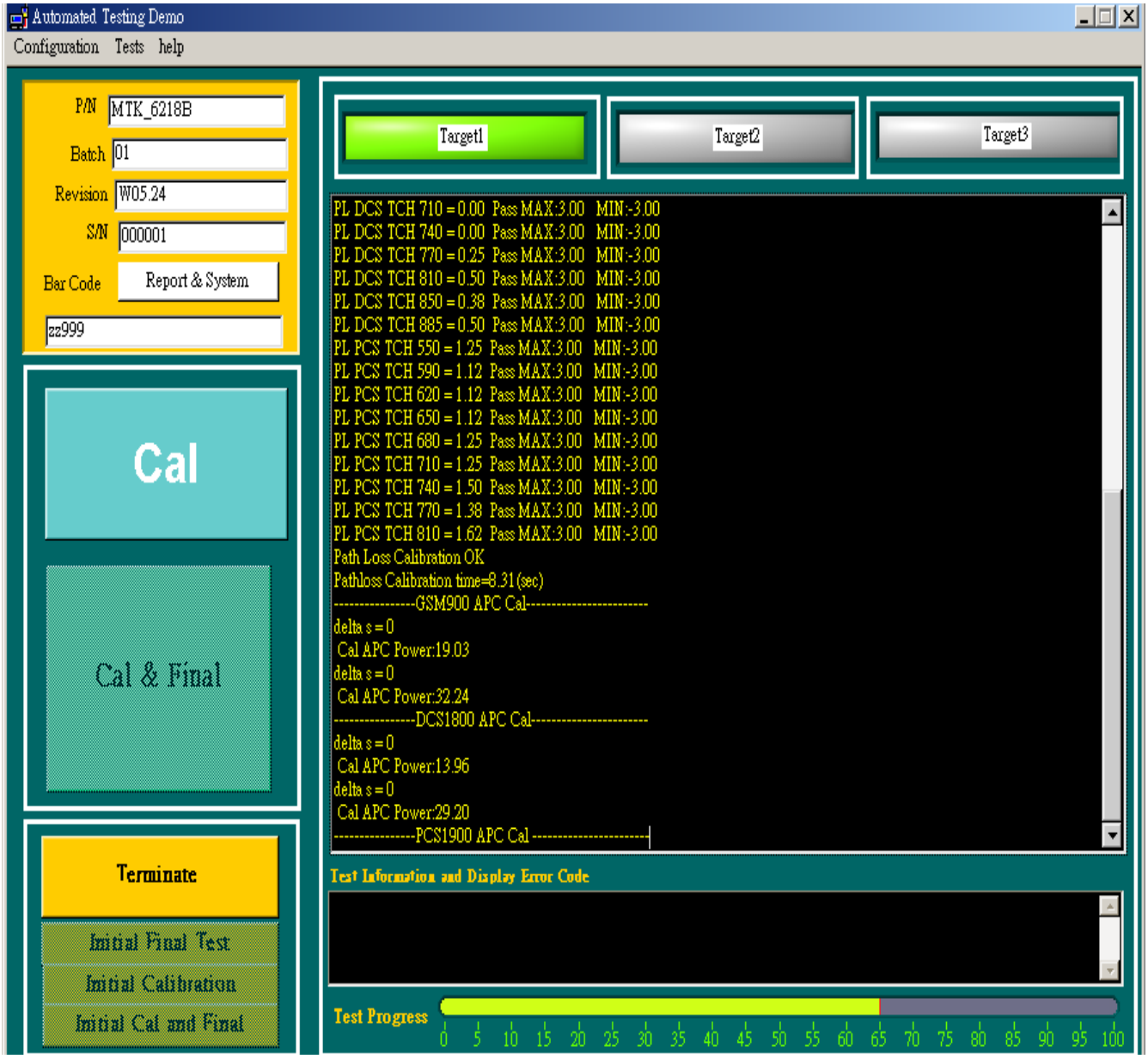
Press “Cal & Final”



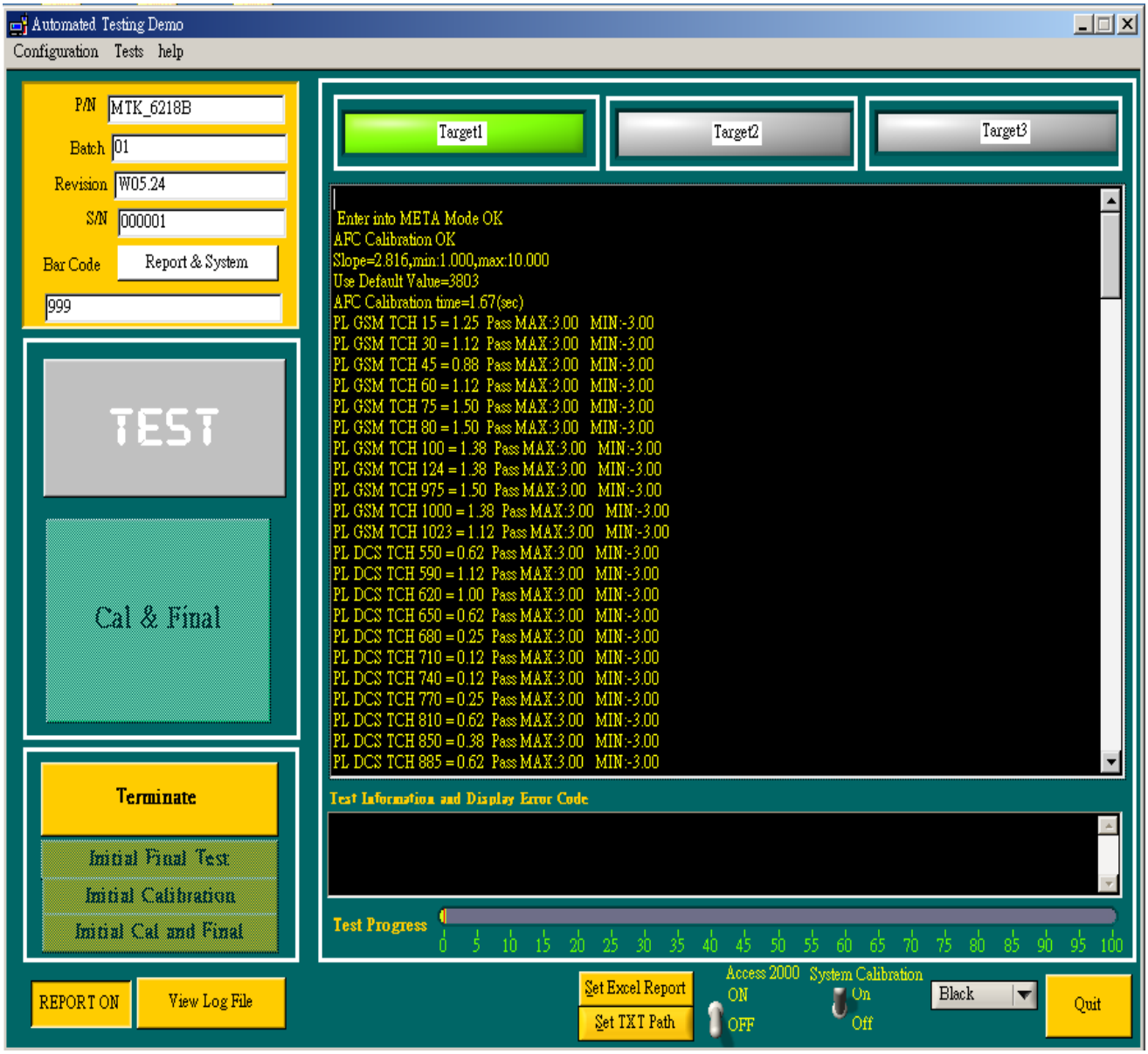
1.Handset to insert SIM card
2.Key-in bar code or IMEI number
3.Power on handset



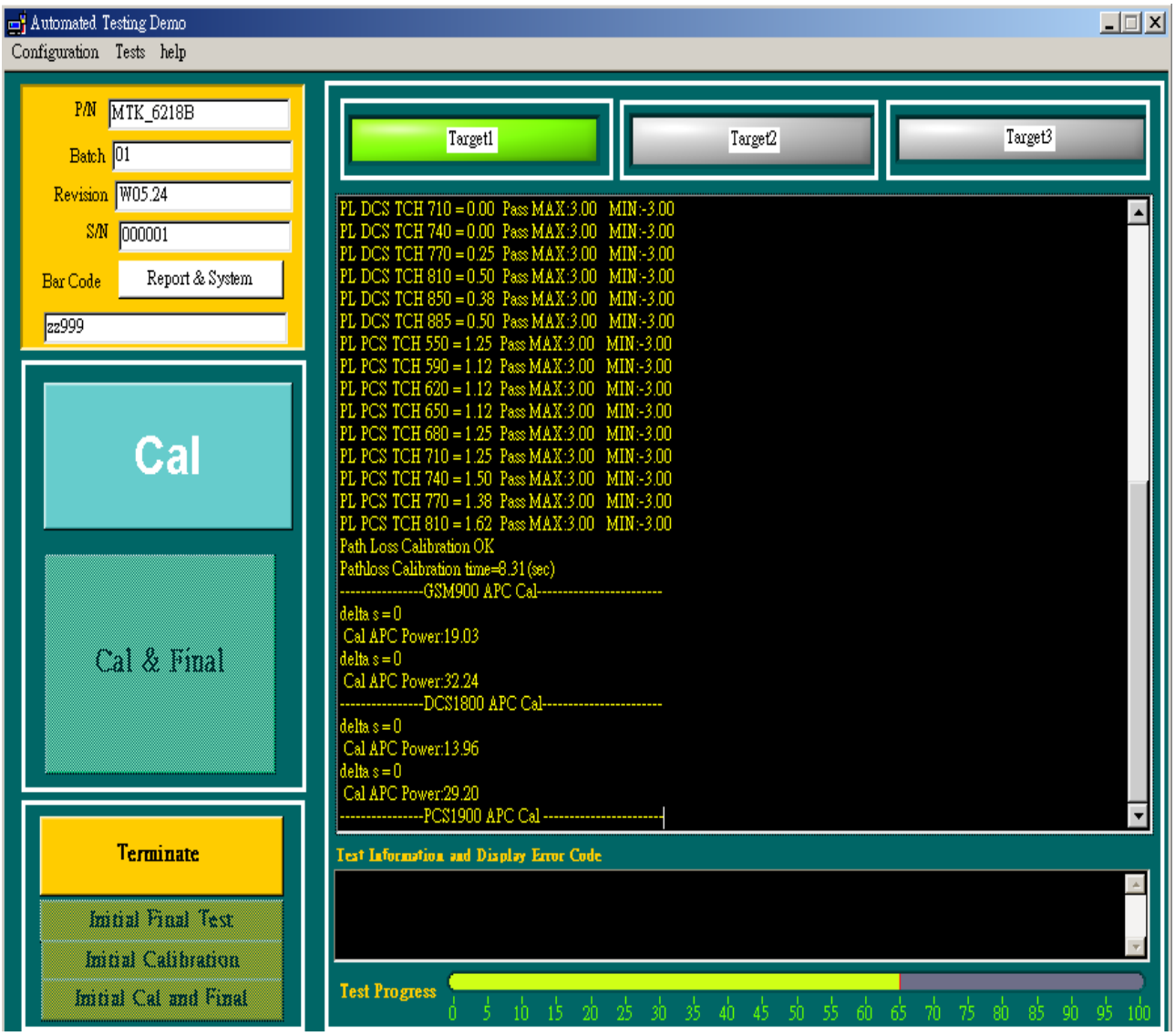
Start calibration



Calibration finish and power on handset again

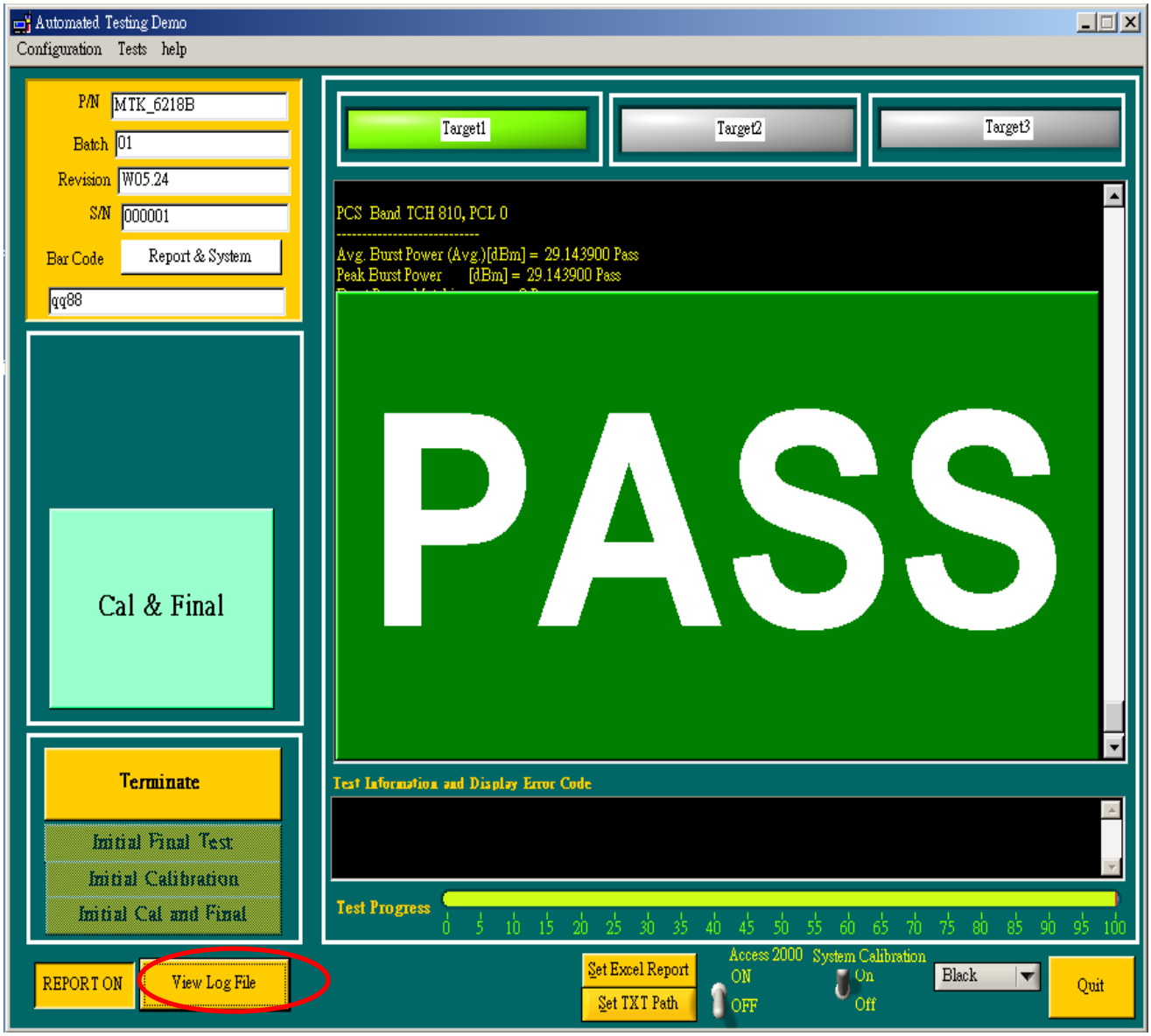


Start final test

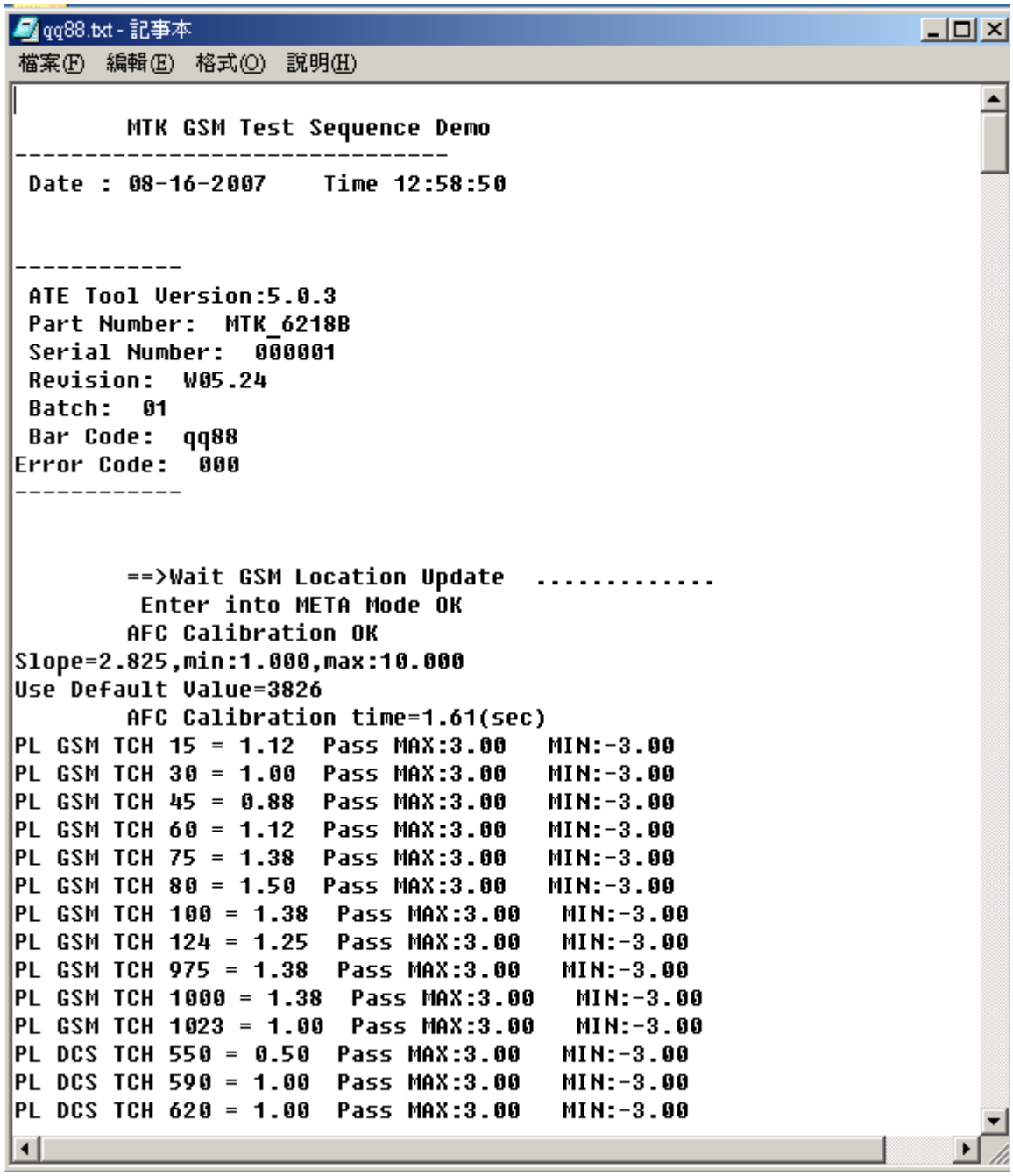


Finish “Cal & Final test”

If you want see the report , you can press “View Log File”



Ate show the test report



LEO Download Tool

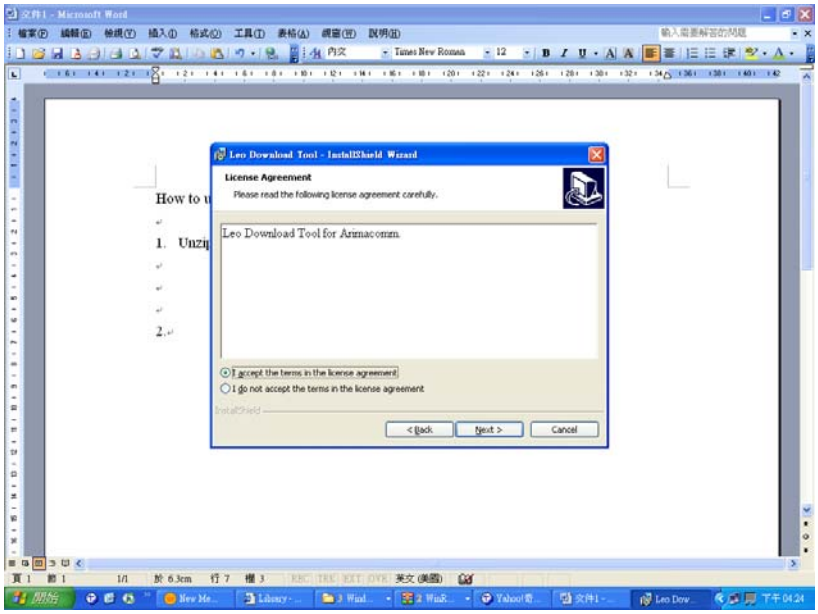
10 Software Download Procedure

Tools

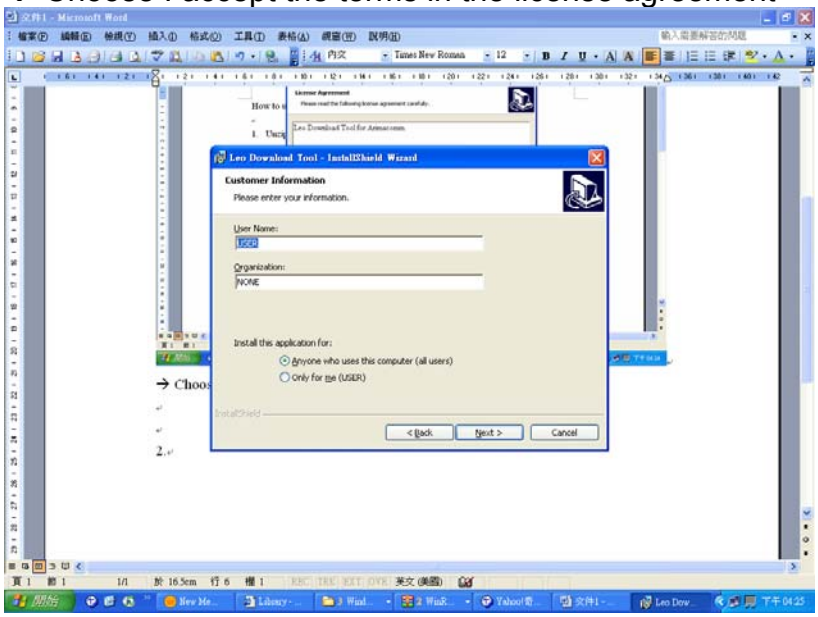
1. Download cable
2. PC
3. Battery (3.8 V Li-ion Battery)

How to user Leo download tool

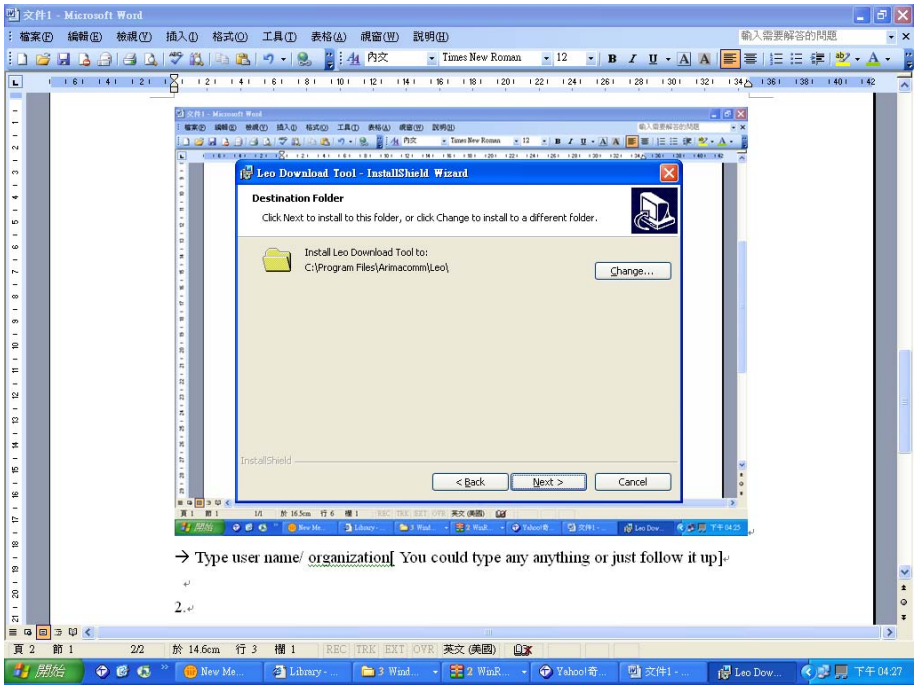
Install Leo Download tool



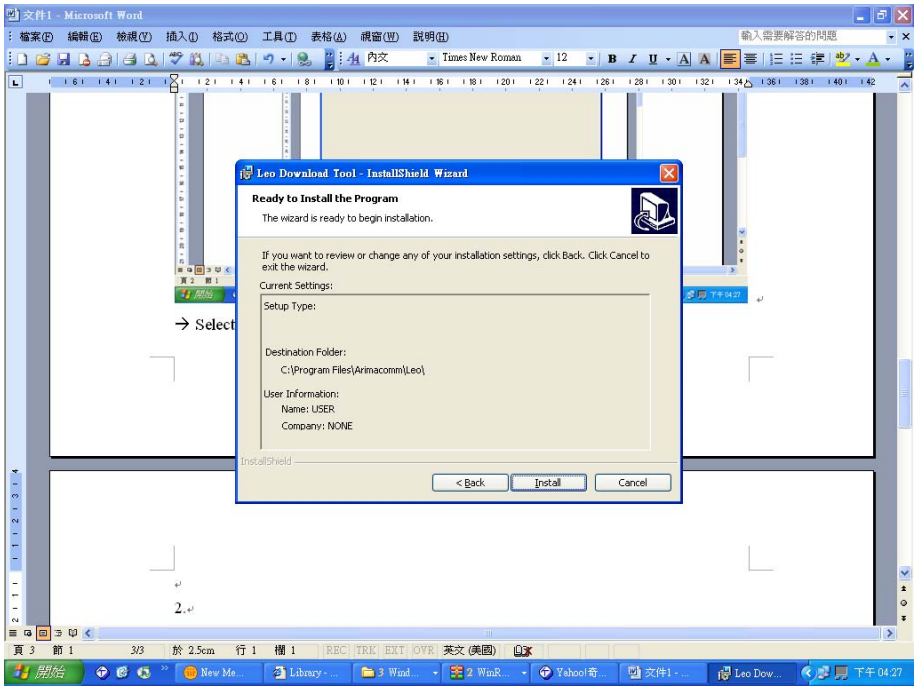
→ Choose I accept the terms in the license agreement



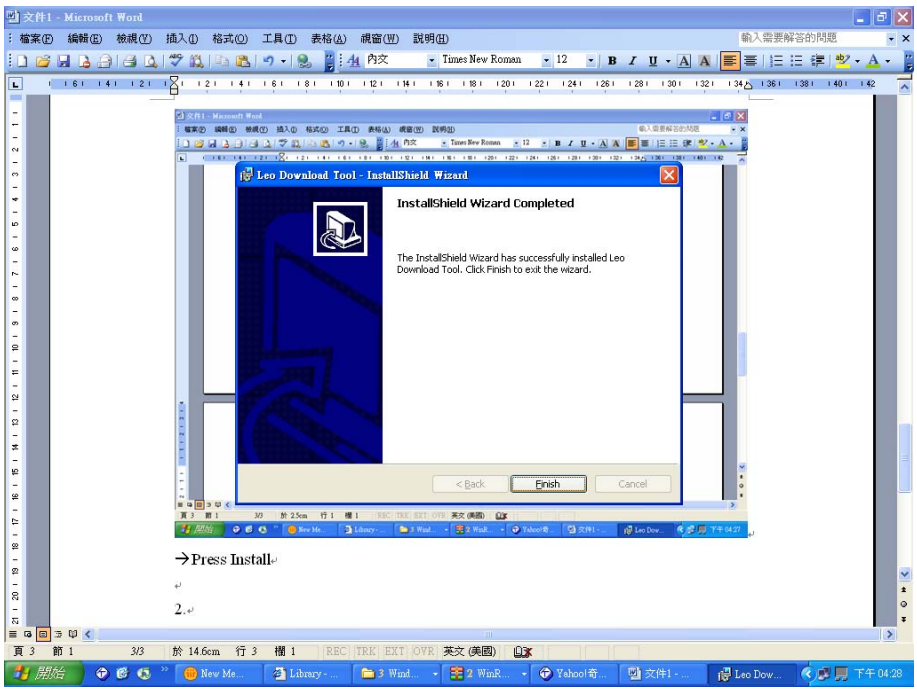
→ Type user name / organization. [You could type any anything or just follow it up]



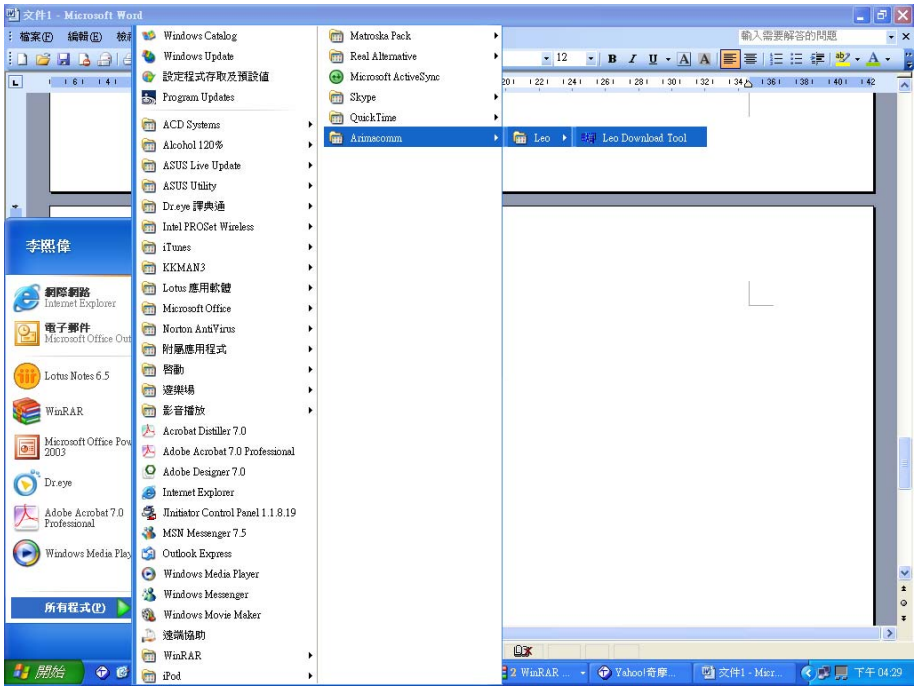
→ Select default folder



→Press Install



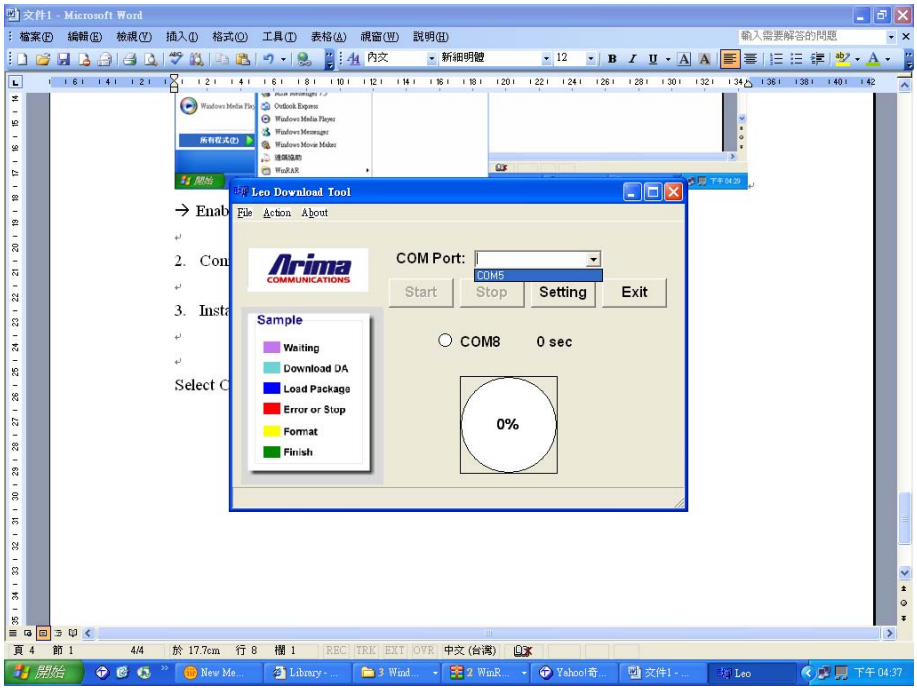
→ Press Finish



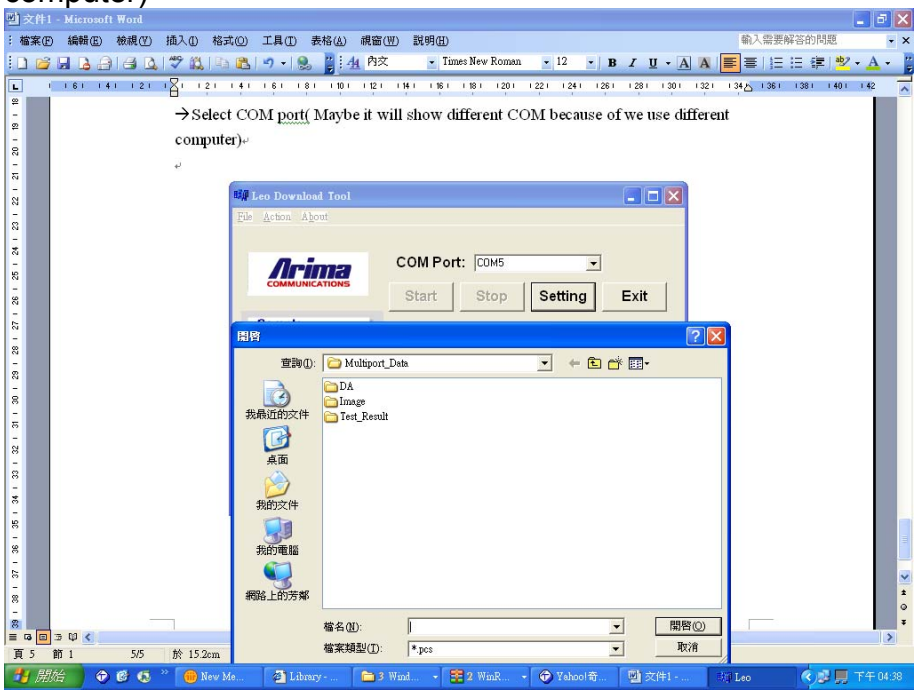
→ Enable Leo Download tool

Connect Download cable with computer and mobile

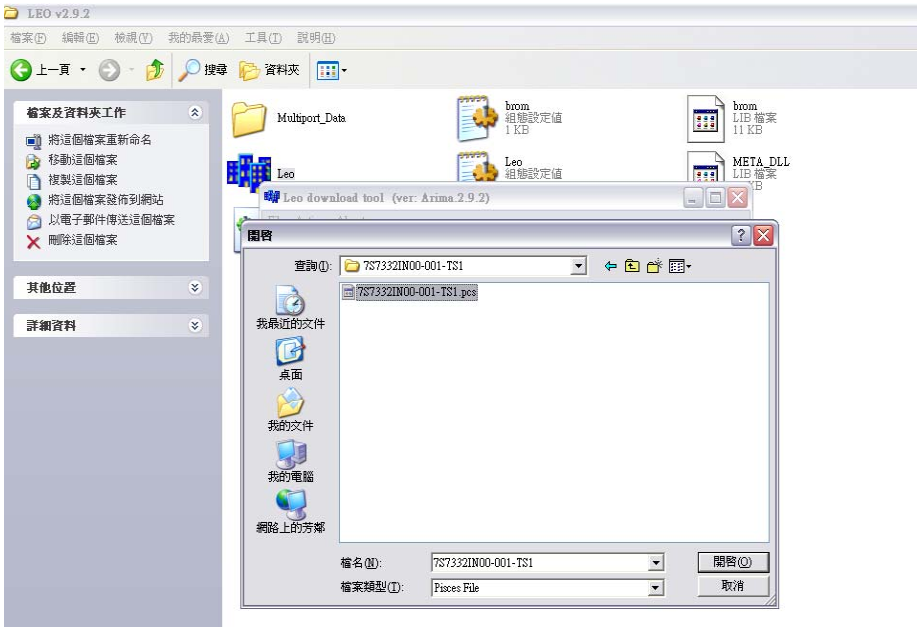
Install SW



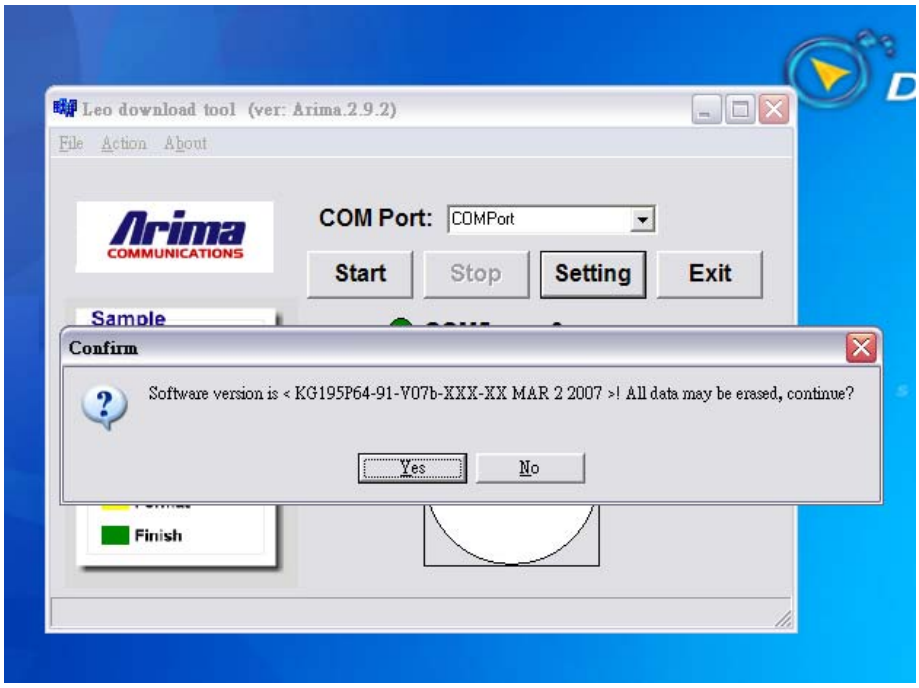
→Select COM port (Maybe it will show different COM because of we use different computer)



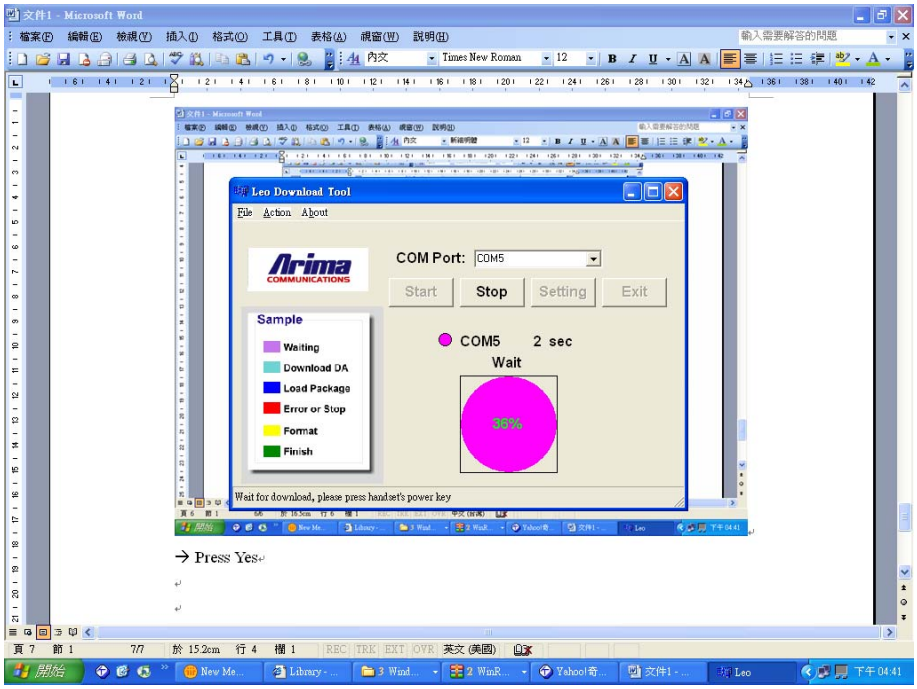
→ Press Setting and then you will see Multiport Data folder. Change it to the folder which you store the SW.



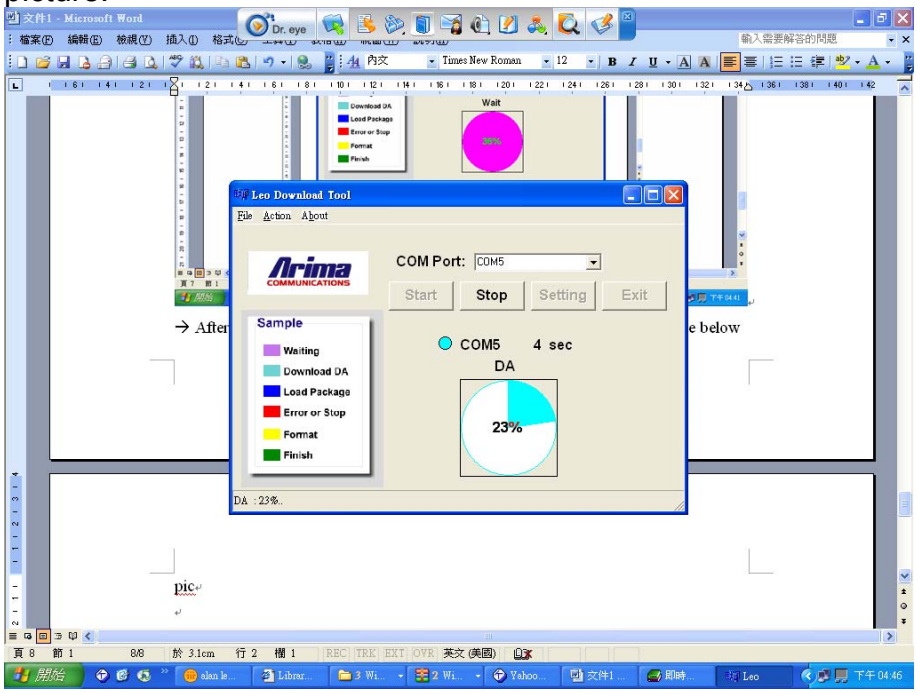
→ Select the. PCS file and press open. After few seconds, you will see below screen.



→ Press Yes



→ After you see the pink cycle, long press power on key and then you will see below picture.

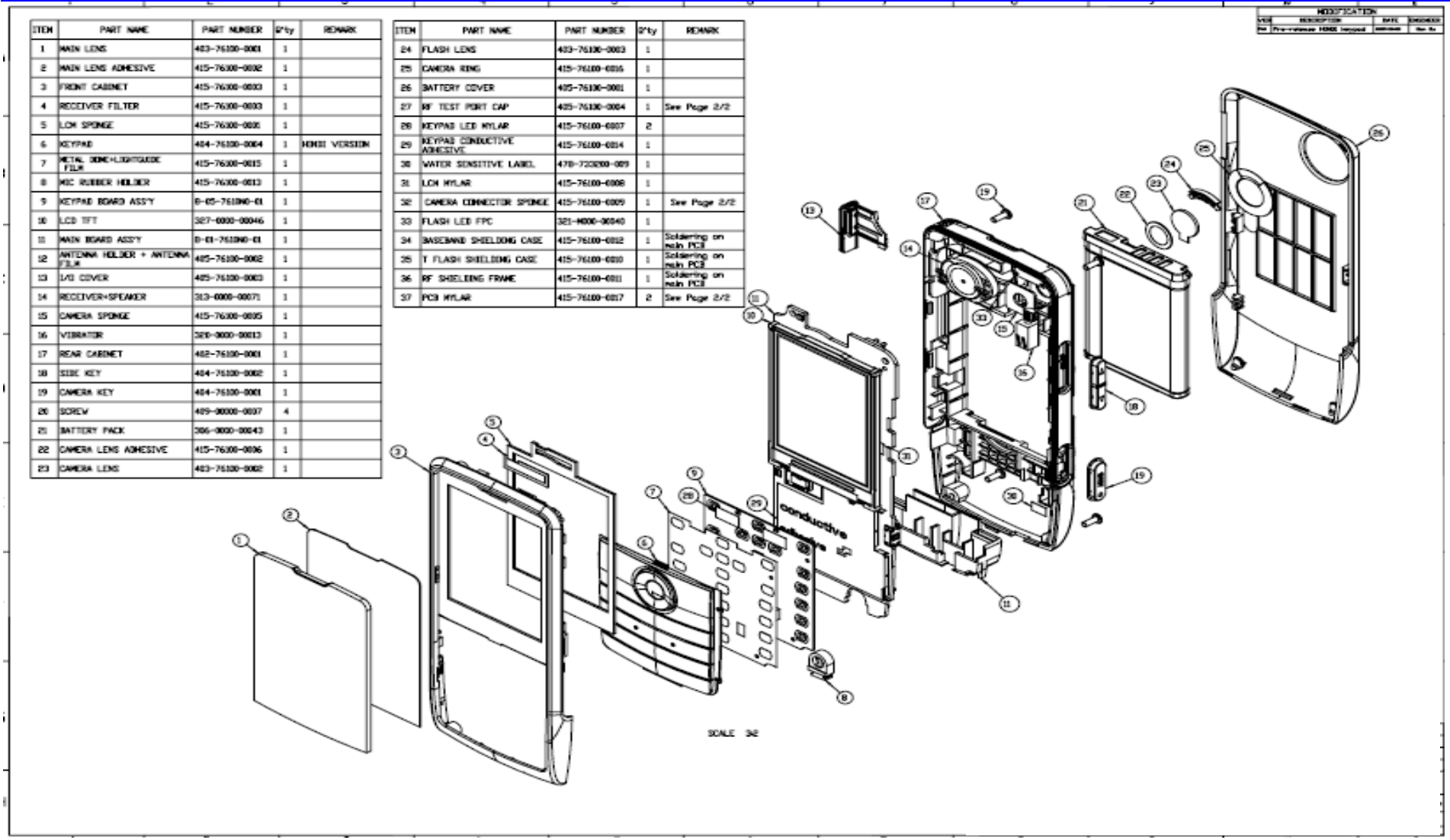


→ After reach to 100%, SW downloads finish.

6-3. EXPLODED DIAGRAM

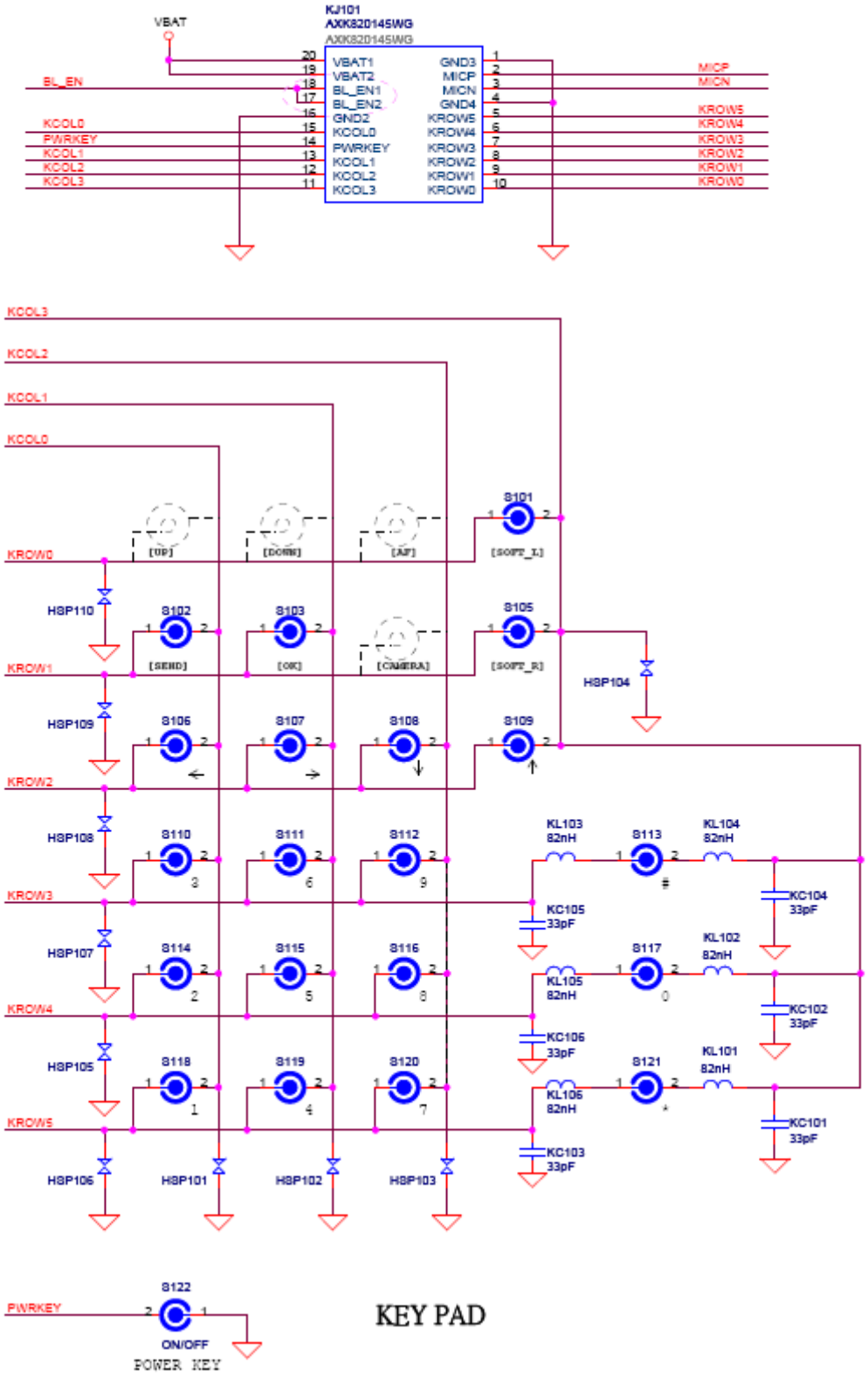
ITEM	PART NAME	PART NUMBER	Q'ty	REMARK
1	MAIN LENS	403-76100-0001	1	
2	MAIN LENS ADHESIVE	415-76100-0002	1	
3	FRONT CABINET	401-76100-0003	1	
4	RECEIVER FILTER	415-76100-0003	1	
5	LCM SPONGE	415-76100-0001	1	
6	KEYPAD	404-76100-0004	1	HDIII VERSION
7	METAL DOME+LIGHTGUIDE FILM	415-76100-0015	1	
8	MIC RUBBER HOLDER	415-76100-0013	1	
9	KEYPAD BOARD ASS'Y	R-05-76100-01	1	
10	LCD TFT	327-0000-00046	1	
11	MAIN BOARD ASS'Y	R-01-76100-01	1	
12	ANTENNA HOLDER + ANTENNA FILM	405-76100-0002	1	
13	I/O COVER	405-76100-0003	1	
14	RECEIVER+SPEAKER	313-0000-00071	1	
15	CAMERA SPONGE	415-76100-0005	1	
16	VIBRATOR	329-0000-00013	1	
17	REAR CABINET	402-76100-0001	1	
18	SIDE KEY	404-76100-0002	1	
19	CAMERA KEY	404-76100-0001	1	
20	SCREW	409-00000-0007	4	
21	BATTERY PACK	306-0000-00043	1	
22	CAMERA LENS ADHESIVE	415-76100-0006	1	
23	CAMERA LENS	403-76100-0002	1	

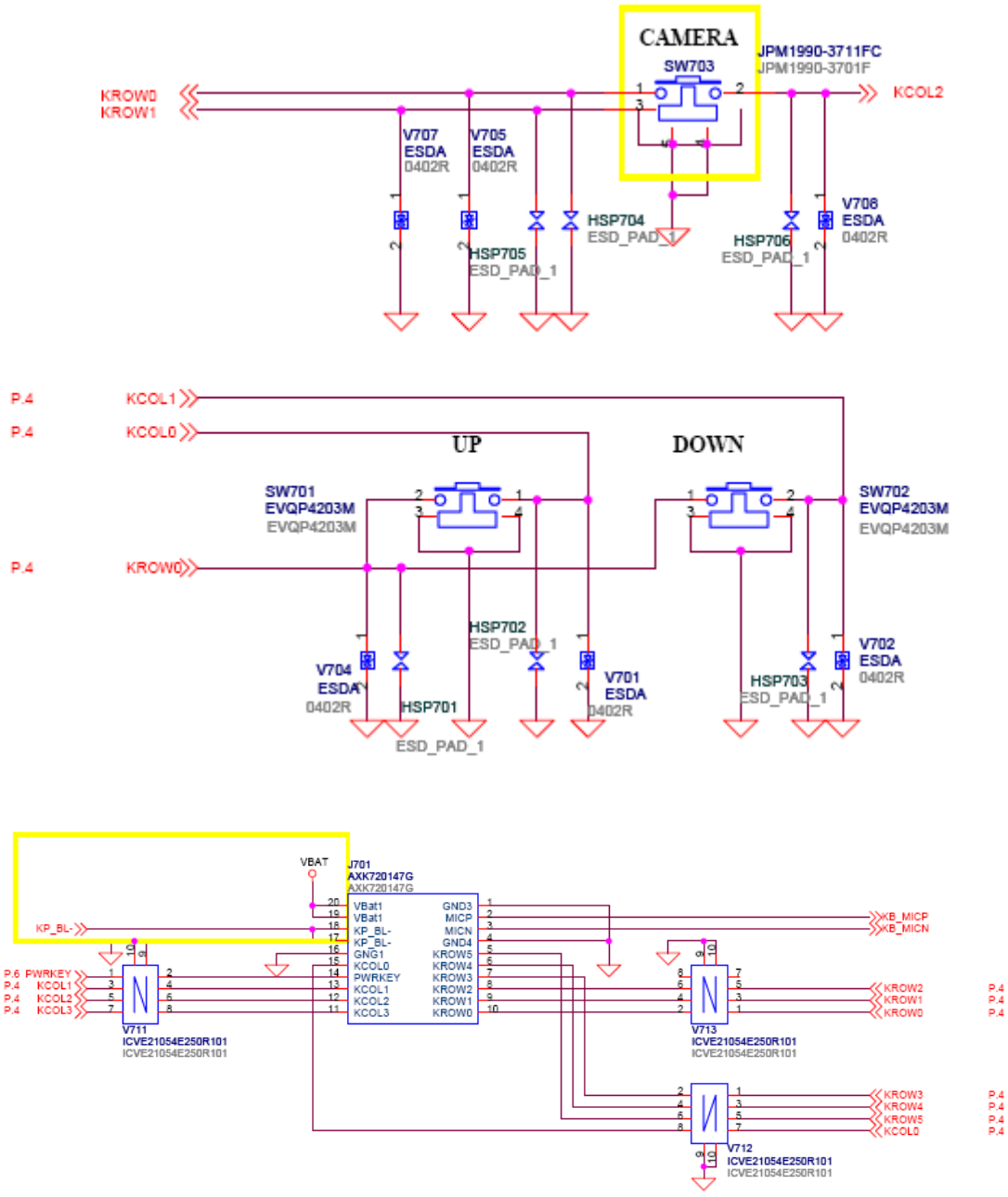
ITEM	PART NAME	PART NUMBER	Q'ty	REMARK
24	FLASH LENS	403-76100-0003	1	
25	CAMERA RING	415-76100-0016	1	
26	BATTERY COVER	405-76100-0001	1	
27	RF TEST PORT CAP	425-76100-0004	1	See Page 2/2
28	KEYPAD LED MYLAR	415-76100-0007	2	
29	KEYPAD CONDUCTIVE ADHESIVE	415-76100-0014	1	
30	WATER SENSITIVE LABEL	478-720200-009	1	
31	LCM MYLAR	415-76100-0008	1	
32	CAMERA CONNECTOR SPONGE	415-76100-0009	1	See Page 2/2
33	FLASH LED FPC	321-M000-00040	1	
34	BASEBAND SHIELDING CASE	415-76100-0012	1	Soldering on main PCB
35	T FLASH SHIELDING CASE	415-76100-0010	1	Soldering on main PCB
36	RF SHIELDING FRAME	415-76100-0011	1	Soldering on main PCB
37	PCB MYLAR	415-76100-0017	2	See Page 2/2



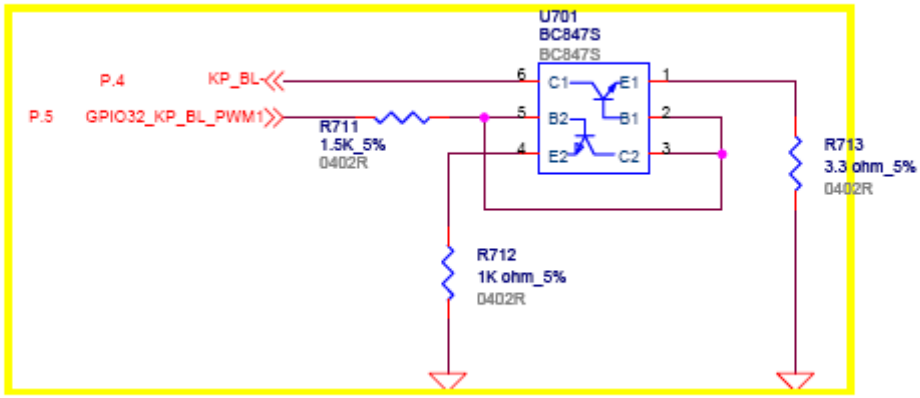
7.3 Circuit Diagrams

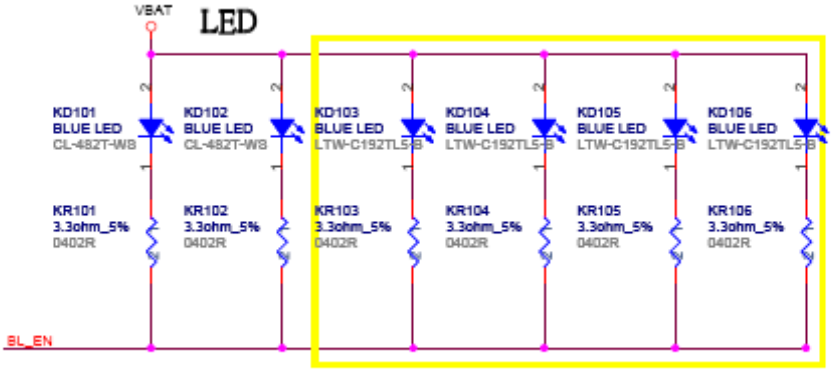
Keypad board



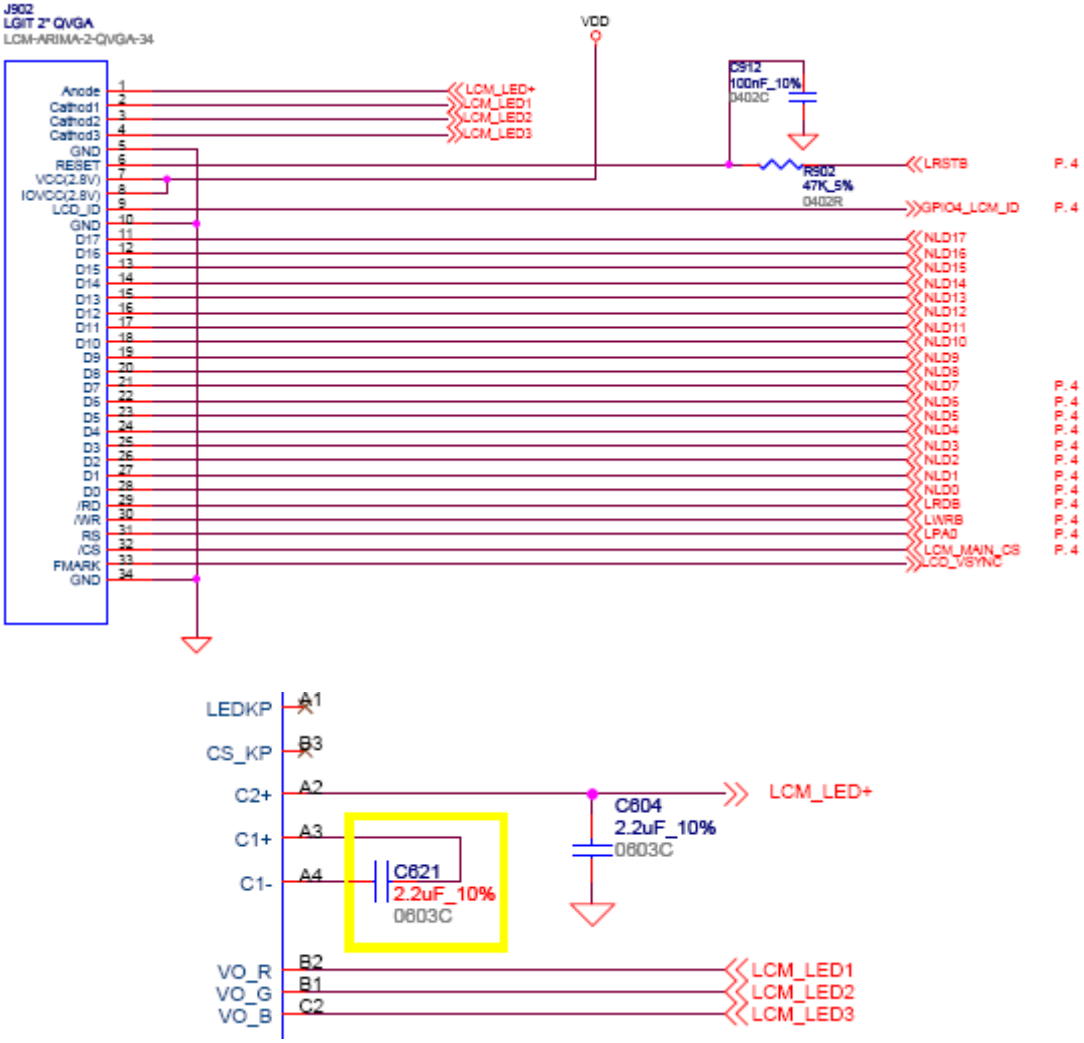

CAMERA
SW703
JPM1990-3711FC
JPM1990-3701F
KROW0
KROW1
KCOL2
V707
ESDA
0402R
V705
ESDA
0402R
HSP704
ESD_PAD_1
HSP705
ESD_PAD_1
HSP706
ESD_PAD_1
V706
ESDA
0402R
P.4
KCOL1
P.4
KCOL0
UP
DOWN
SW701
EVQP4203M
EVQP4203M
SW702
EVQP4203M
EVQP4203M
P.4
KROW0
HSP702
ESD_PAD_1
V704
ESDA
0402R
HSP701
ESD_PAD_1
V701
ESDA
0402R
HSP703
ESD_PAD_1
V702
ESDA
0402R
VBAT
J701
AXK720147G
AXK720147G
KP_BL-
VBat1
VBat1
KP_BL-
KP_BL-
GND1
KCOL0
PWRKEY
KCOL1
KCOL2
KCOL3
GND3
MICP
MICN
GND4
KROW5
KROW4
KROW3
KROW2
KROW1
KROW0
KB_MICP
KB_MICN
P.6 PWRKEY
P.4 KCOL1
P.4 KCOL2
P.4 KCOL3
V711
ICVE21054E250R101
ICVE21054E250R101
V713
ICVE21054E250R101
ICVE21054E250R101
KROW2
KROW1
KROW0
P.4
P.4
P.4
KROW3
KROW4
KROW5
KCOL0
P.4
P.4
P.4
P.4
V712
ICVE21054E250R101
ICVE21054E250R101

Key Backlight Illumination

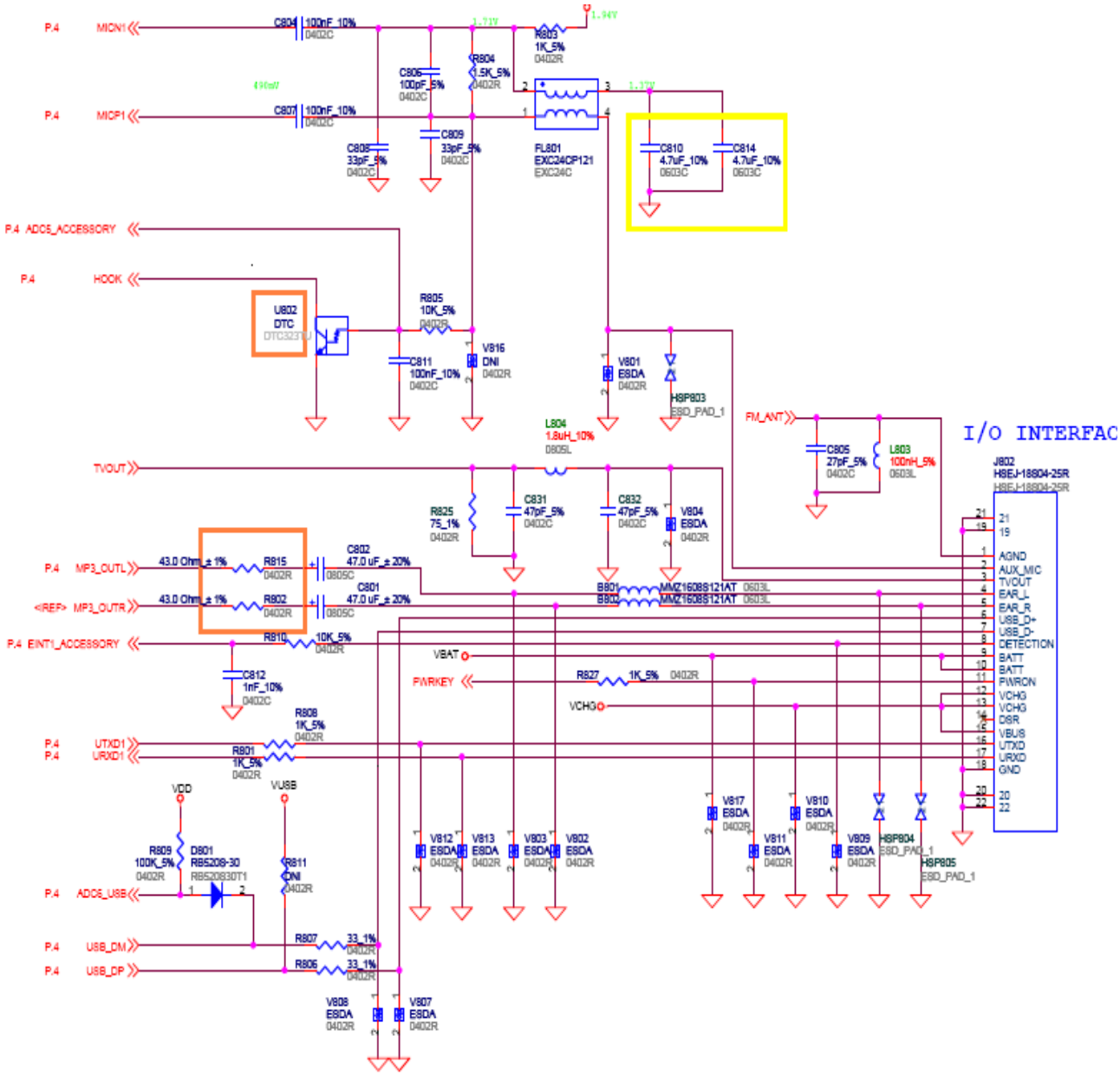




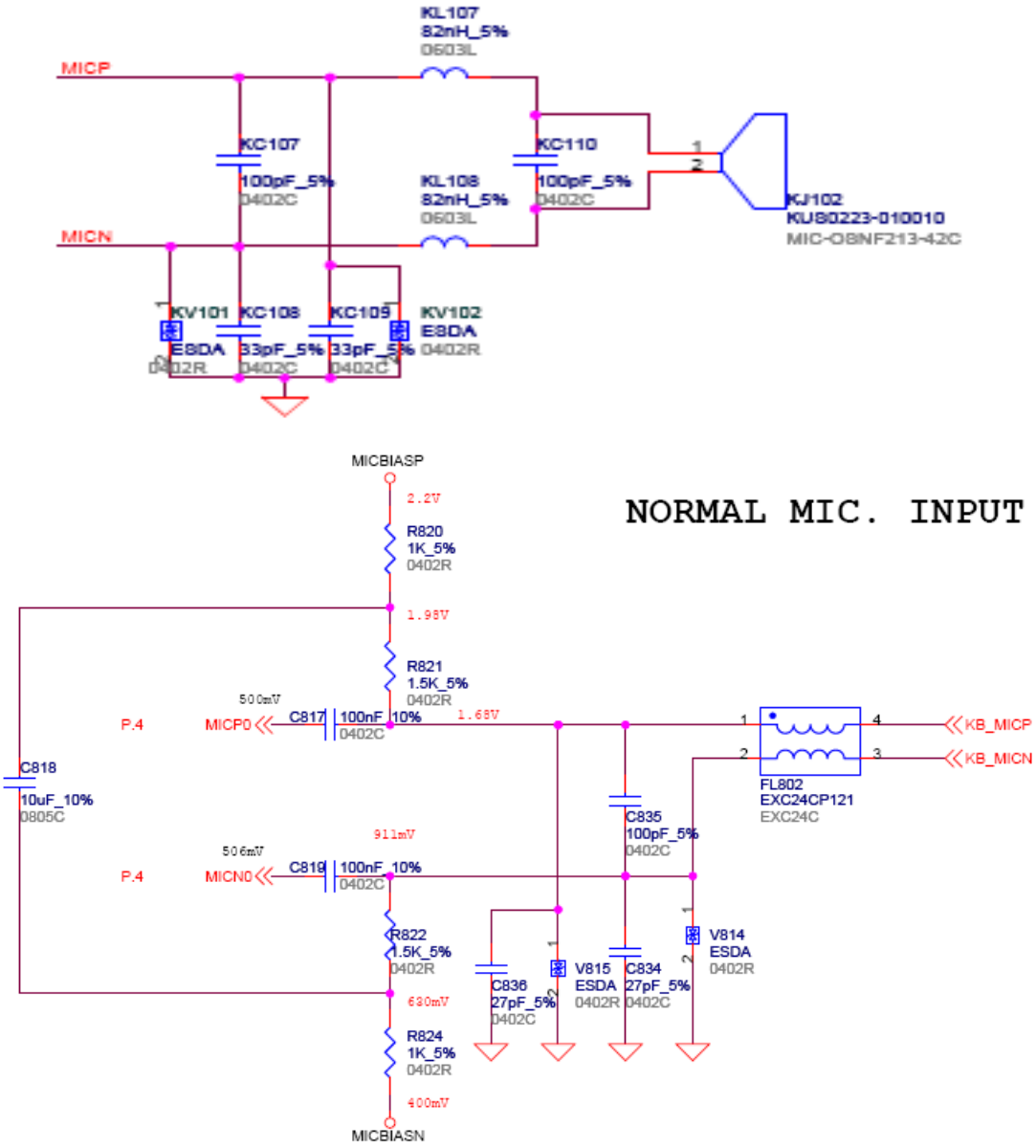
LCM and LCM Backlight Circuit



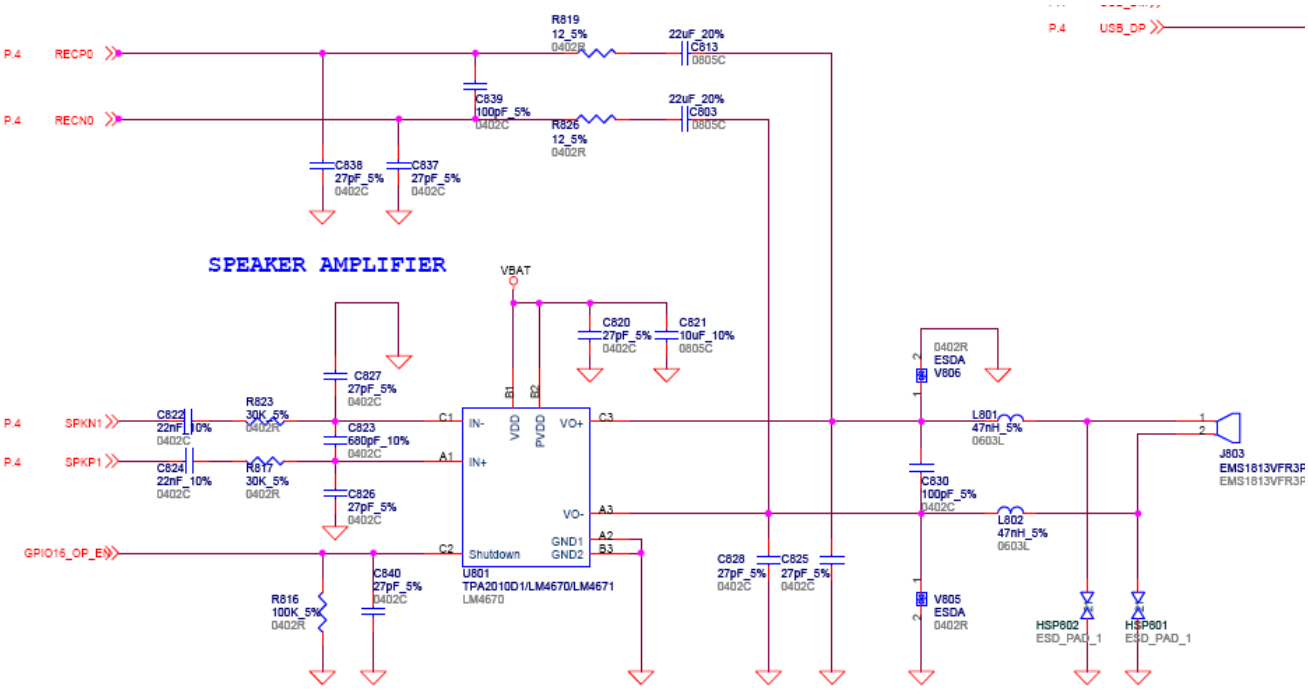
Earphone Jack



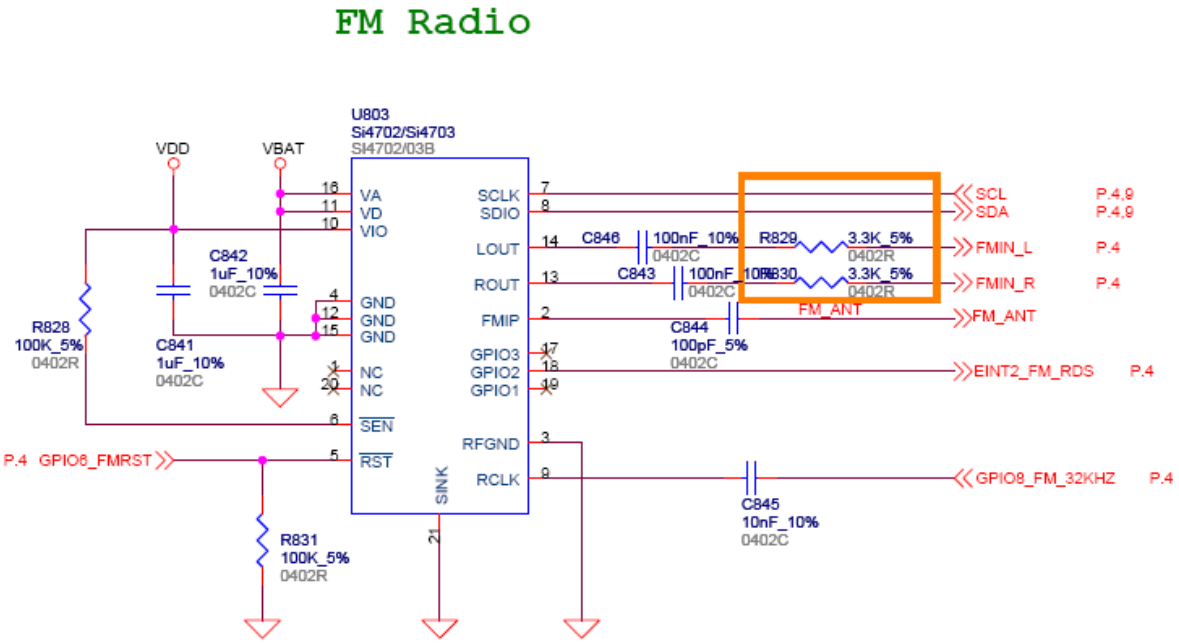
Microphone


KL107
82nH_5%
0603L
MICP
KC107
100pF_5%
0402C
KC110
100pF_5%
0402C
KL108
82nH_5%
0603L
KJ102
KU80223-010010
MIC-OBNF213-42C
MICN
KV101
ESDA
KC108
33pF_5%
KC109
33pF_5%
KV102
ESDA
MICBIASP
2.2V
R820
1K_5%
0402R
1.98V
R821
1.5K_5%
0402R
500mV
P.4
MICP0
C817
100nF_10%
0402C
1.68V
C818
10uF_10%
0805C
KB_MICP
KB_MICN
FL802
EXC24CP121
EXC24C
C835
100pF_5%
0402C
911mV
506mV
P.4
MICN0
C819
100nF_10%
0402C
R822
1.5K_5%
0402R
C836
27pF_5%
0402C
V815
ESDA
C834
27pF_5%
V814
ESDA
630mV
R824
1K_5%
0402R
400mV
MICBIASN
NORMAL MIC. INPUT

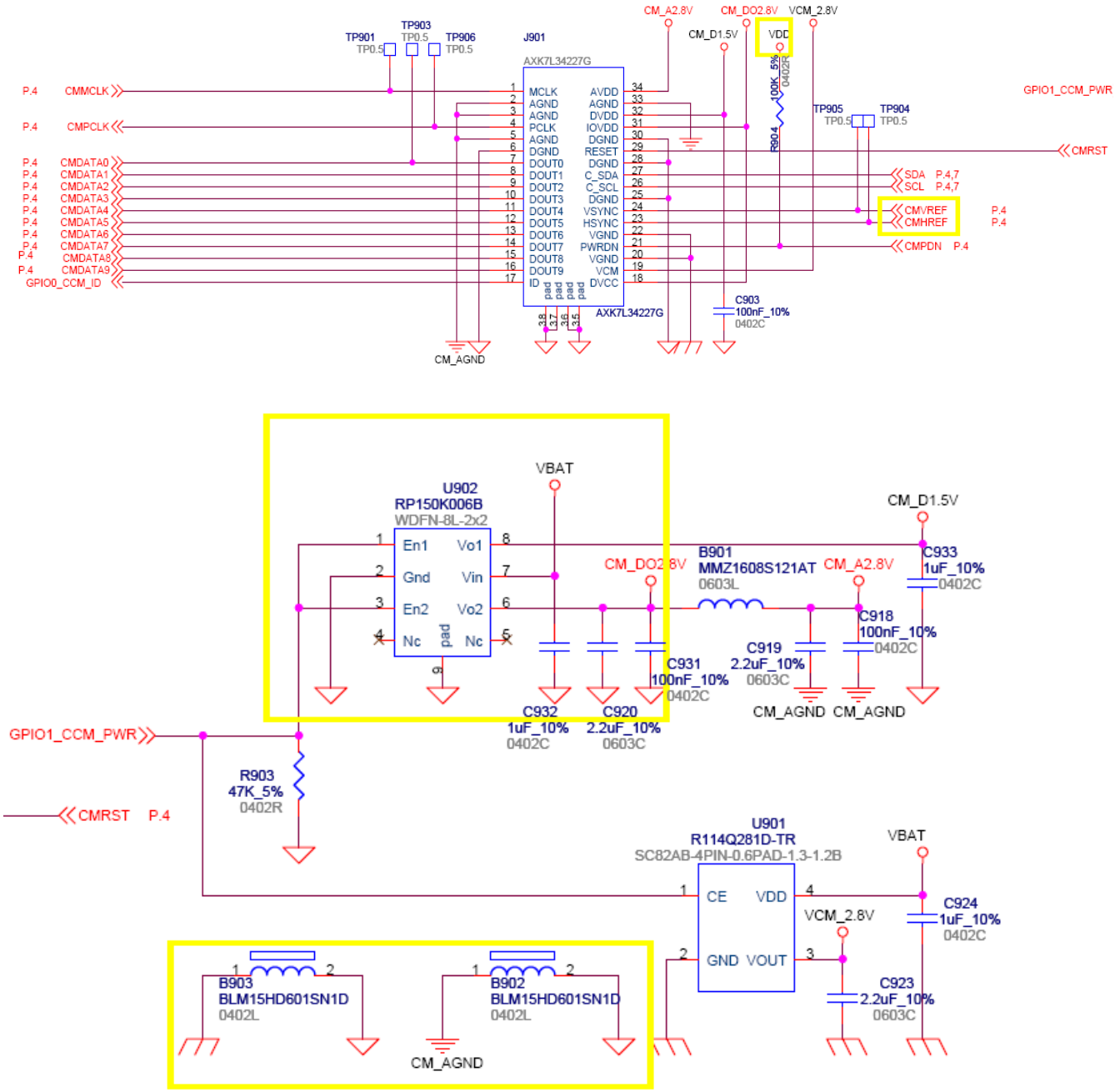
Speaker and Receiver



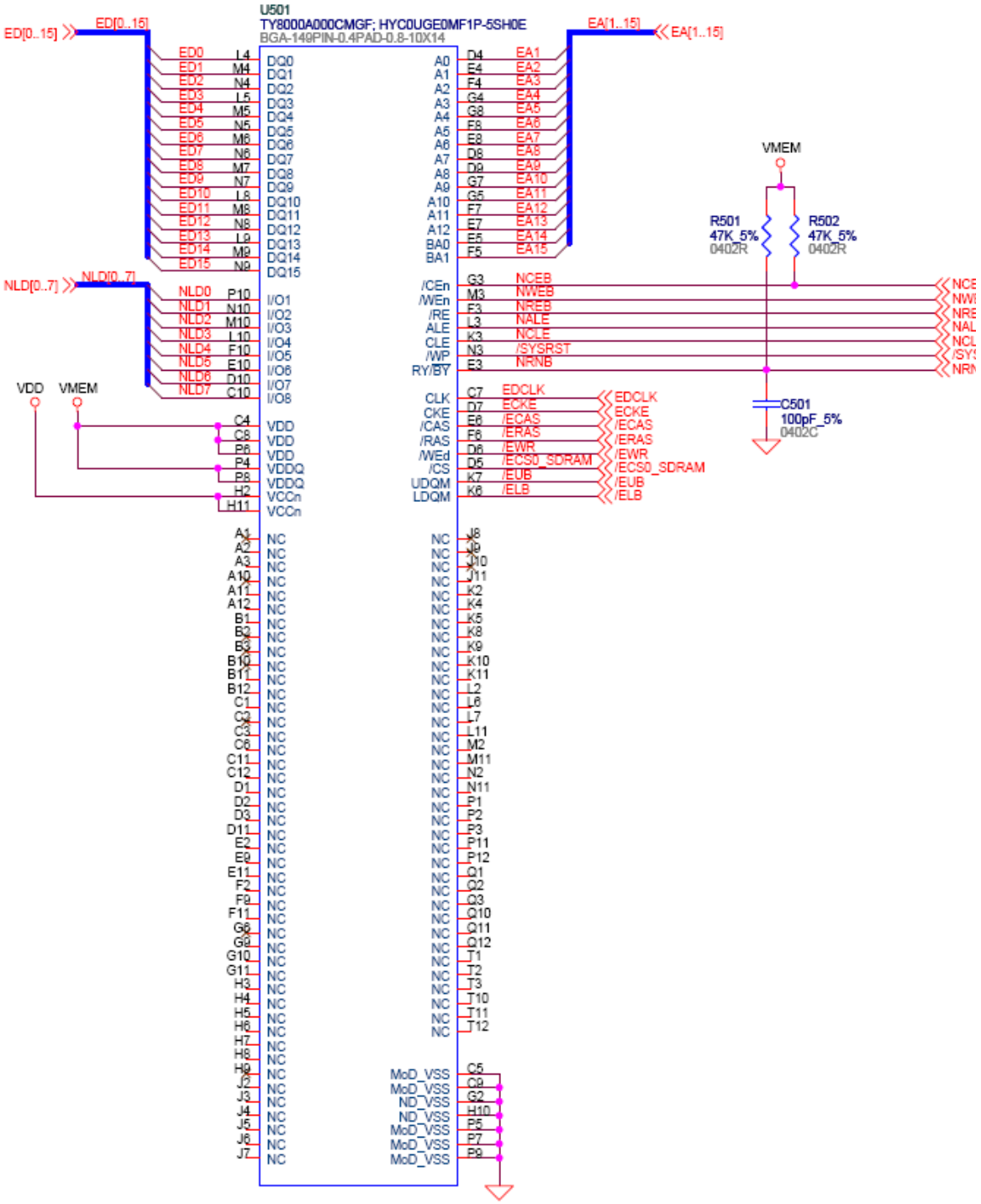
FM Receiver



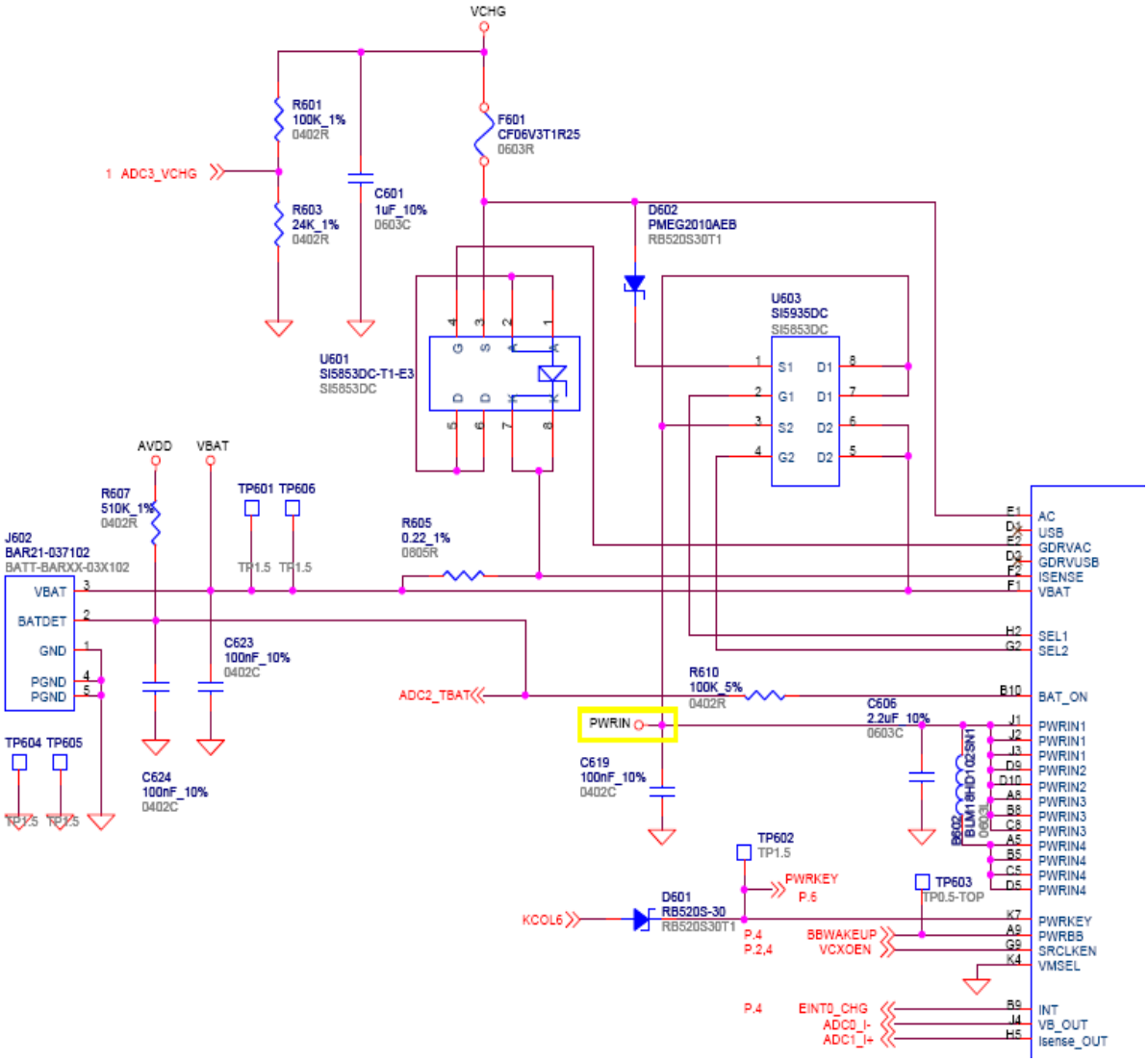
Camera Module



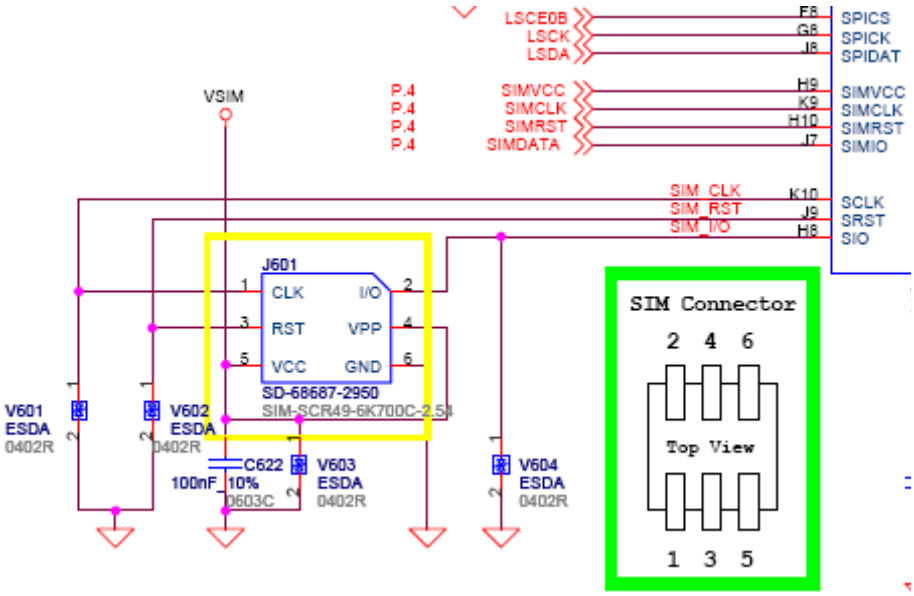
Memory


U501
TY8000A000CMGF; HYC0UGE0MF1P-5SH0E
BGA-149PIN-0.4PAD-0.8-10X14
ED[0..15]
EA[1..15]
NLD[0..7]
VMEM
VDD
R501
47K_5%
0402R
R502
47K_5%
0402R
C501
100pF_5%
0402C
NCEB
NWEB
NREB
NALE
NCLE
/SYSRST
NRNB
EDCLK
ECKE
/ECAS
/ERAS
/EWR
/ECS0_SDRAM
/EUB
/ELB

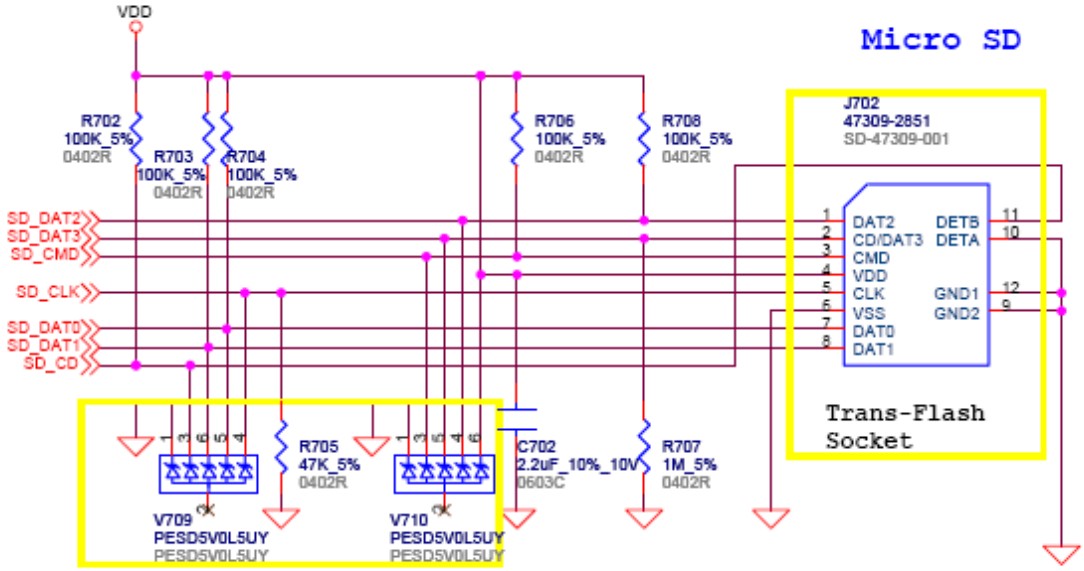
Charger


VCHG
R601
100K_1%
0402R
F601
CF06V3T1R25
0603R
1 ADC3_VCHG
R603
24K_1%
0402R
C601
1uF_10%
0603C
D602
PMEG2010AEB
RB520S30T1
U601
SI5853DC-T1-E3
SI5853DC
U603
SI5935DC
SI5853DC
S1
D1
G1
D1
S2
D2
G2
D2
AVDD
VBAT
R607
510K_1%
0402R
TP601
TP606
TP1.5
TP1.5
R605
0.22_1%
0805R
J602
BAR21-037102
BATT-BARXX-03X102
VBAT
BATDET
GND
PGND
PGND
C623
100nF_10%
0402C
C624
100nF_10%
0402C
TP604
TP605
TP1.5
TP1.5
ADC2_TBAT
R610
100K_5%
0402R
PWRIN
C606
2.2uF_10%
0603C
C619
100nF_10%
0402C
TP602
TP1.5
PWRKEY
P.5
TP603
TP0.5-TOP
KCOL6
D601
RB520S-30
RB520S30T1
P.4
P.2,4
BBWAKEUP
VCXOEN
P.4
EINT0_CHG
ADC0_I-
ADC1_I+
AC
USB
GDRVAC
GDRVUSB
ISENSE
VBAT
SEL1
SEL2
BAT_ON
PWRIN1
PWRIN1
PWRIN1
PWRIN2
PWRIN2
PWRIN3
PWRIN3
PWRIN3
PWRIN4
PWRIN4
PWRIN4
PWRIN4
PWRKEY
PWRBB
SRCLKEN
VMSEL
INT
VB_OUT
Isense_OUT

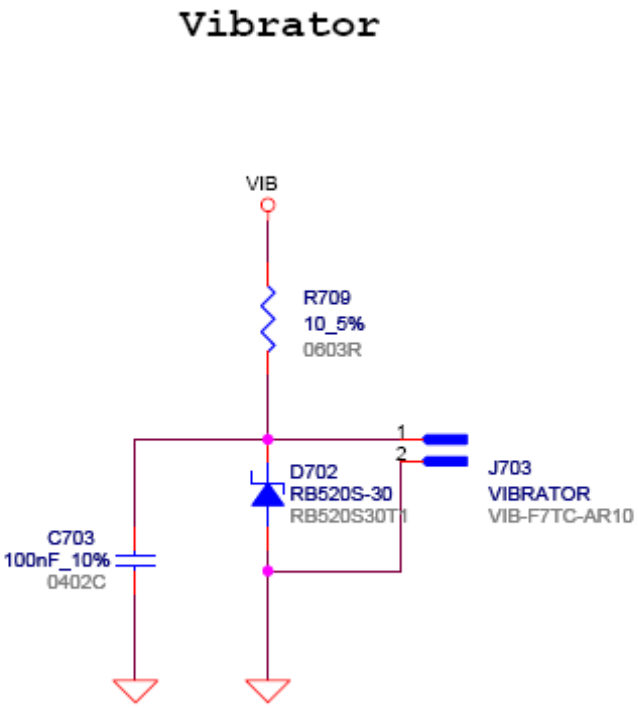
SIM card



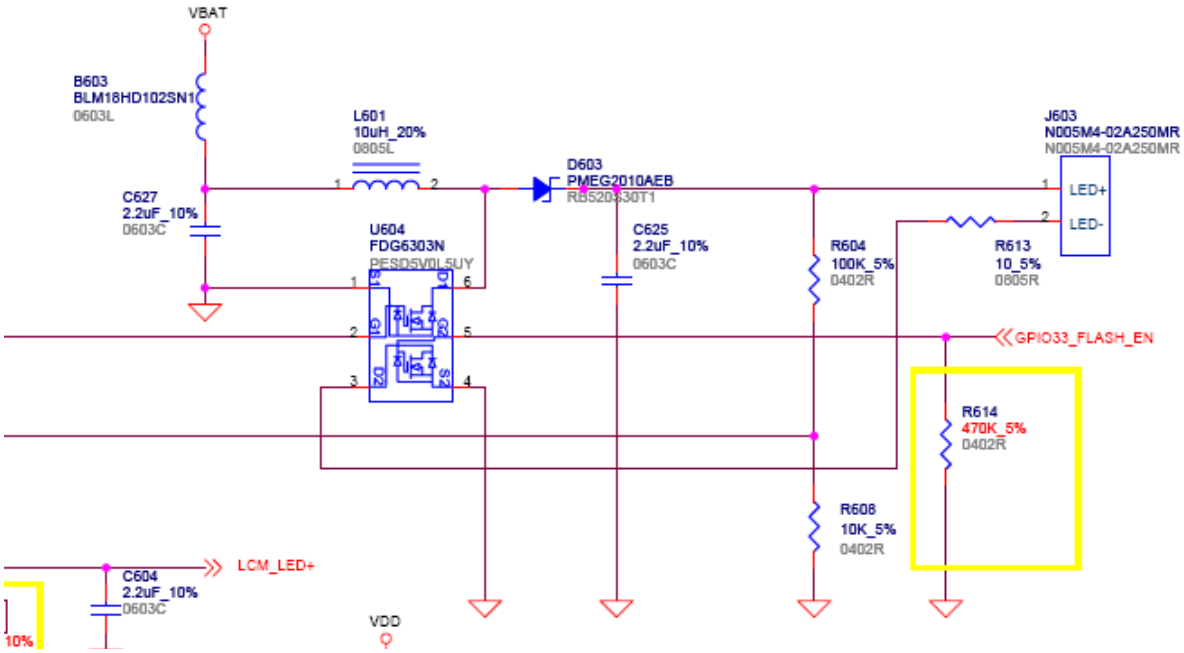
SD card



Vibrator

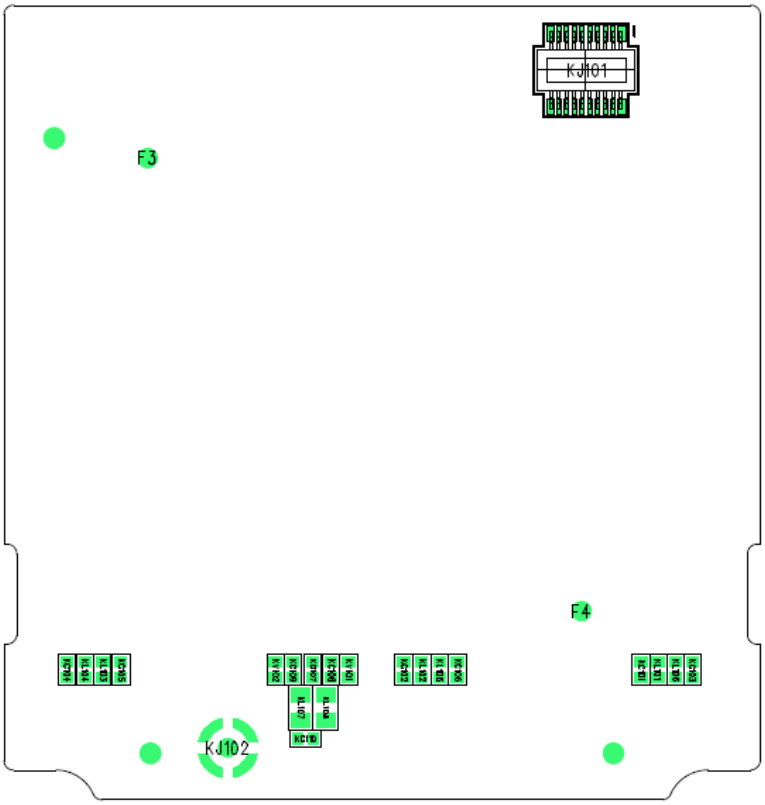


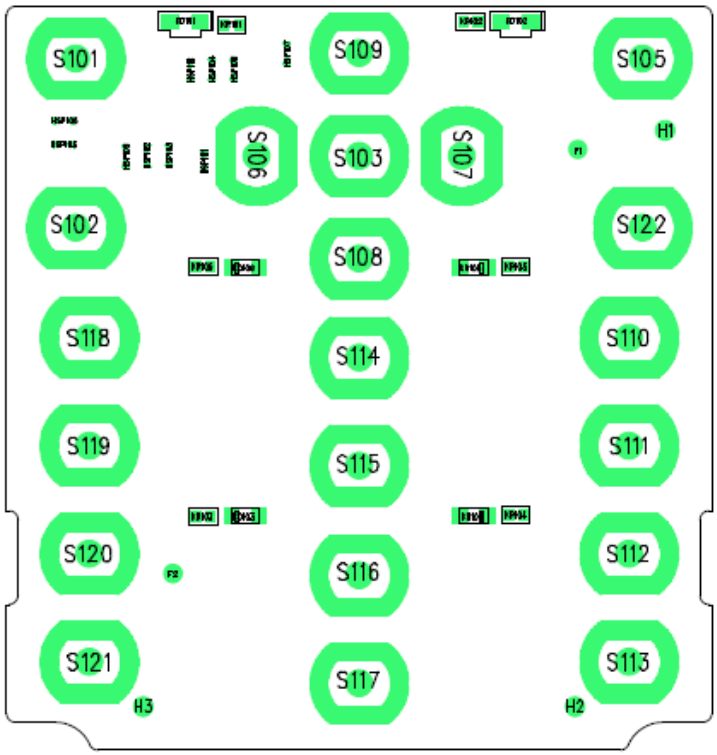
Flash LED



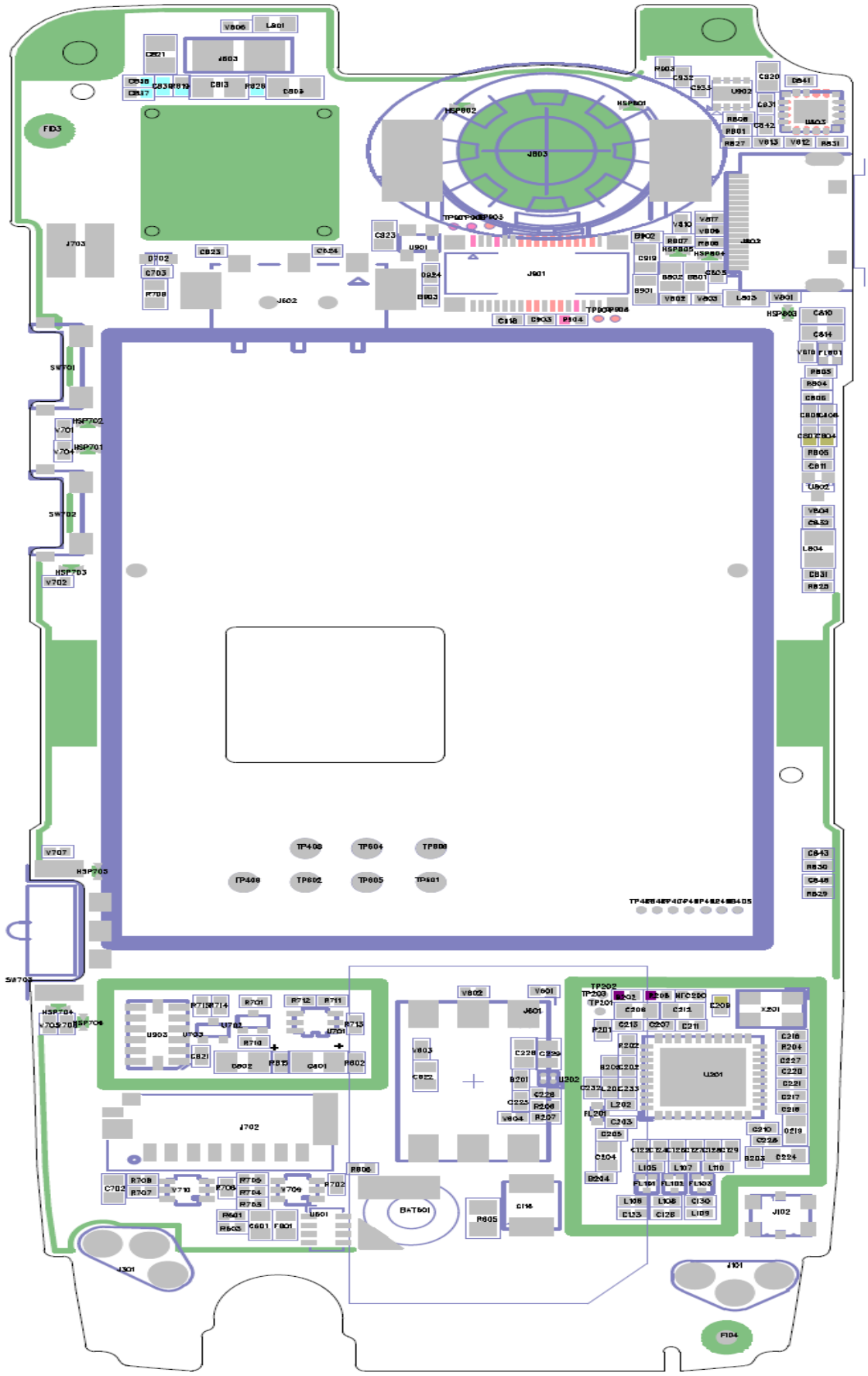
Component place information

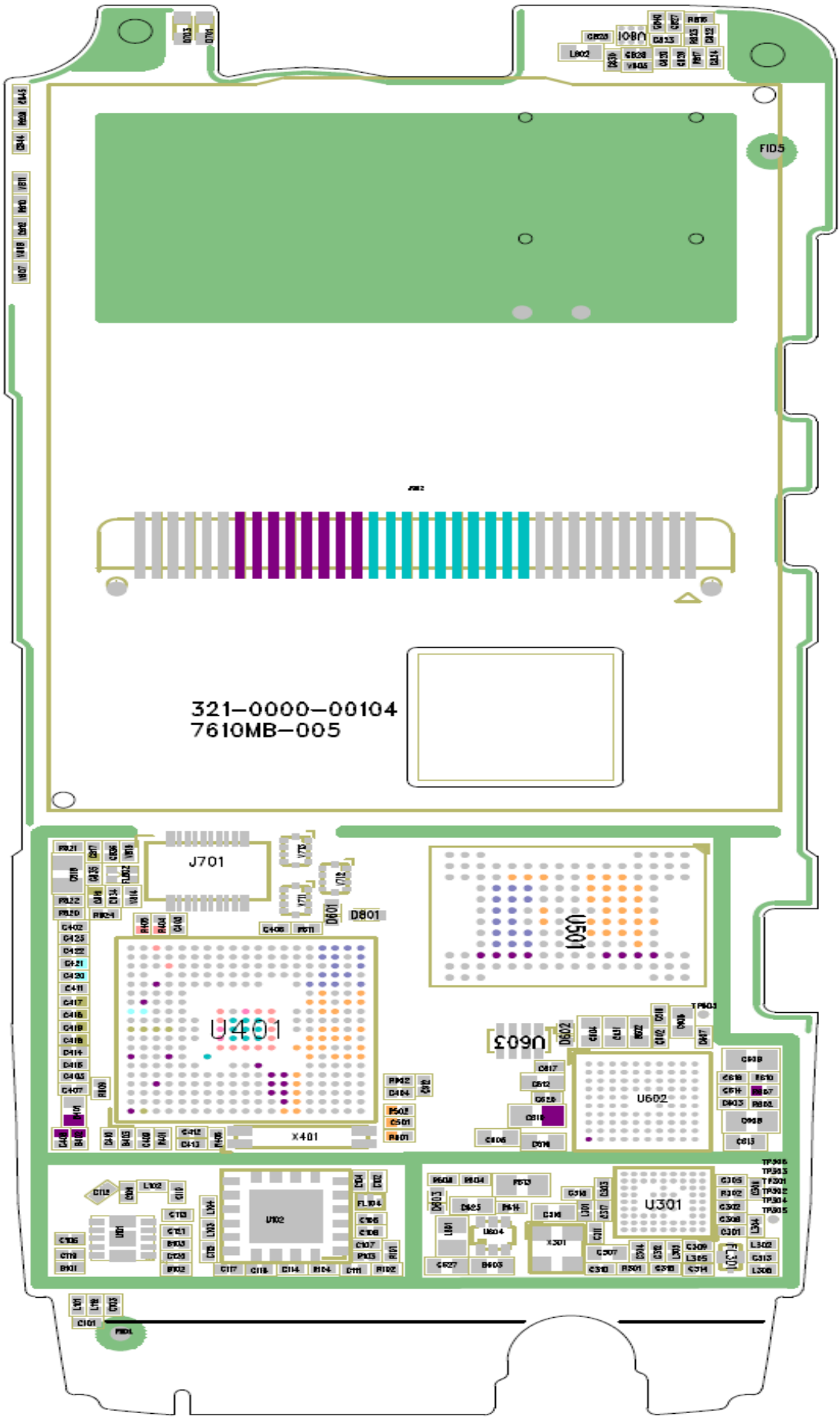
Key pad board





Main board




FID5
321–0000–00104
7610MB–005
J701
D801
U401
U501
U603
U602
X401
U301

Part Number

ITEM	PART NAME	PART NUMBER	Q'ty	REMARK
1	MAIN LENS	403-76100-0001	1	
2	MAIN LENS ADHESIVE	415-76100-0002	1	
3	FRONT CABINET	415-76100-0003	1	
4	RECEIVER FILTER	415-76100-0003	1	
5	LCM SPONGE	415-76100-0001	1	
6	KEYPAD	404-76100-0004	1	HINDI VERSION
7	METAL DOME+LIGHTGUIDE FILM	415-76100-0015	1	
8	MIC RUBBER HOLDER	415-76100-0013	1	
9	KEYPAD BOARD ASS'Y	8-05-7610N0-01	1	
10	LCD TFT	327-0000-00046	1	
11	MAIN BOARD ASS'Y	8-01-7610N0-01	1	
12	ANTENNA HOLDER + ANTENNA FILM	405-76100-0002	1	
13	I/O COVER	405-76100-0003	1	
14	RECEIVER+SPEAKER	313-0000-00071	1	
15	CAMERA SPONGE	415-76100-0005	1	
16	VIBRATOR	320-0000-00013	1	
17	REAR CABINET	402-76100-0001	1	
18	SIDE KEY	404-76100-0002	1	
19	CAMERA KEY	404-76100-0001	1	
20	SCREW	409-00000-0007	4	
21	BATTERY PACK	306-0000-00043	1	
22	CAMERA LENS ADHESIVE	415-76100-0006	1	
23	CAMERA LENS	403-76100-0002	1	

ITEM	PART NAME	PART NUMBER	Q'ty	REMARK
24	FLASH LENS	403-76100-0003	1	
25	CAMERA RING	415-76100-0016	1	
26	BATTERY COVER	405-76100-0001	1	
27	RF TEST PORT CAP	405-76100-0004	1	See Page 2/2
28	KEYPAD LED MYLAR	415-76100-0007	2	
29	KEYPAD CONDUCTIVE ADHESIVE	415-76100-0014	1	
30	WATER SENSITIVE LABEL	478-733200-009	1	
31	LCM MYLAR	415-76100-0008	1	
32	CAMERA CONNECTOR SPONGE	415-76100-0009	1	See Page 2/2
33	FLASH LED FPC	321-M000-00040	1	
34	BASEBAND SHIELDING CASE	415-76100-0012	1	Soldering on main PCB
35	T FLASH SHIELDING CASE	415-76100-0010	1	Soldering on main PCB
36	RF SHIELDING FRAME	415-76100-0011	1	Soldering on main PCB
37	PCB MYLAR	415-76100-0017	2	See Page 2/2