

Troubleshooting Manual

K630 - V640 - K660



ABOUT

General information

The purpose of this document is to provide enhanced technical information for Sony Ericsson repair technicians in order to assist during service, repair and troubleshooting operations on Sony Ericsson mobile phones. It should be used as a complement to other repair instructions and tools as notified by the local Sony Ericsson representative.

To search for components throughout the entire document use the “search” function in Adobe Acrobat Reader 7.0 (or later version) and enter the component name or other word. Use zoom to enlarge.

For easier navigation of the document you can use the bookmarks that appear in the Bookmarks tab on the left side of the Adobe Acrobat Reader window. Each bookmark jumps to a page in the document.

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Revision History

Rev.	Date	Changes / Comments
1	06/20/2008	Initial revision.

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K630, V640 and K660 Equipment List

K630 and V640



Note: Additional information about the equipment used for TRS can be found in the Repair Tools Catalogue on CSPN or on the following location: CSPN – Repair Instructions – Electrical – K630, V640 – Equipment List.

K660



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TRS Fixture Kit

K630 and V640

Location: CSPN-Repair Instructions-Electrical- K630, V640 -Equipment List

K660

Location: CSPN-Repair Instructions-Electrical- K660 -Equipment List

Dummy Battery

K630 and V640

Location: CSPN-Repair Instructions-Electrical- K630, V640 -Equipment List

Part number: NTZ 112 533

K660

Location: CSPN-Repair Instructions-Electrical- K660 -Equipment List

Part number: NTZ 112 533

Instruments

Power Supply Channel 1 VBATT

Agilent 6632B or similar

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Instrument Settings:

Voltage: 3.8 Volt

Limiter: 2A

Note: During the calibration the accurate voltage from the VBATT must be within ± 0.015 V. If this is not fulfilled it will result in a faulty calibration. (For more information about recommended power supply units, see the Repair Tool Catalogue on CSPN under the Mechanical level. The Power Supply Channel 1 VBATT must allow reverse current.

Note: Maximal cable length between the Power Supply Channel 1 VBATT and the dummy battery must be maximum 1m. The cable must have a capacity for at least 16A.

Note: It is very important to follow instrument settings instructions when performing the Battery Calibration Test.

Power Supply Channel 2 DCIO/SEPI

Agilent 6632B or similar

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Instrument Settings:

Voltage: 5.0 Volt

Limiter: 2A

Note: It is very important to follow instrument setting instructions when performing the Current Calibration Test.

Oscilloscope

Tektronix TDS 2012 or similar

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Digital Multimeter (DMM)

Fluke 83 or similar

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
The 0, 64 mm Test Probes is recommended by Sony Ericsson when DMM is in use see picture 1.

Picture 1



Spectrum Analyzer

HP 8595E or similar
Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

RF probe

HP 85024A or similar
Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Mobile Phone Tester

Yokogawa VC230 or similar
Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

FM Signal Generator

Agilent E4433B or similar
Location: -

RF Adaptor

Adaptor 33 N-BNC-50-1
Adaptor to Signal Generator RF Output
See Picture 2
Location: -

Picture 2



PC Package & PC Software

PC Package (Computer)

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Urquell Fault Trace SW with project file

K630 and V640

Location: CSPN-Repair Instructions-Electrical-K630, V640-Trouble Shooting Application
Project File: K630, K660, V640 Project_R1A

K660

Location: CSPN-Repair Instructions-Electrical-K660 -Trouble Shooting Application
Project File: K630, K660, V640 Project_R1A

Drivers

SEPI BOX Drivers
Location: EMMA III-Drivers-SEPI

SE Communication Interface SEPI BOX

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
Part number: LTN 214 1484
See Picture 3.

Picture 3



Cables

USB Computer Cable

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
See Picture 4.

Picture 4



DSU-60/USB Cable

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
Part number: KRY 101 1413

RF Test Cable Flexible

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
Part number: RPM 119 885
See Picture 5.

Picture 5



SEPI Interface Cable – A1

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
Part number: KRY 101 1119/1
See Picture 6.

Picture 6



Power Cable RED to Power Supply Channel 1 VBATT

Maximum Length: 1m
Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Power Cable BLACK to Power Supply Channel 1 VBATT

Maximum Length: 1m
Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Customized Power Supply Channel 2 DCIO/SEPI Cable

To perform Current Calibration the phone must be supplied directly through the system connector. Customize the cable according to following instructions:

STEP 1:

Take the CST-75 battery charger and cut off the charger according to Picture 7.

Picture 7



Note: Cable length must be exact 1.3m.

STEP 2:

Connect the CST-75 charger Red or White wire to the Plus Output and the Black wire to the Minus (GND) Output at Power Supply Channel 2 DCIO/SEPI according to Picture 8.

Picture 8



STEP 3:

Cut off isolation material from inside of the charger plug according to Picture 9.

Picture 9



STEP 4:

Connect DCIO and SEPI Interface Cable – A1 cables according to Picture 10.

Picture 10



Wrong setup.

Picture 11



Power Supply Channel 2 DCIO/SEPI Cable Connection Setups

Correct DCIO/SEPI Cable setup when TRS Fixture is used.

Picture 12



Note: Example of DCIO/SEPI and K750 TRS Fixture Setup.

Correct DCIO/SEPI Cable setup when the Dummy Battery is used.

Picture 13



Picture 14



Customized FM Radio Cable

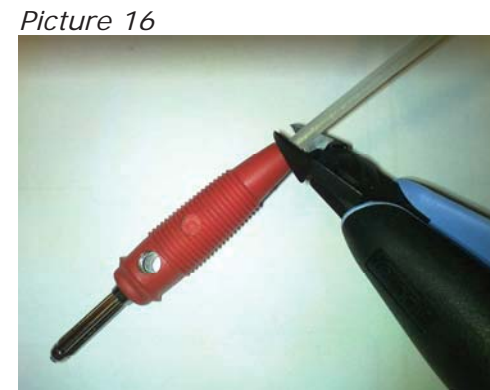
STEP 1:
Use Cable according to Picture 15



Product Name: Test lead BNC-4mm 1,5m
Product Description: Test lead with 4 mm lab plugs at one end and a BNC plug at the other.
Manufacturer: PMK Germany

Location: <http://www.elfa.se/en/> or other supplier.
Part number: 46-310-40 (**Note:** This is ELFA part number)

STEP 2:
Cut the Red lab plug according to Picture 16

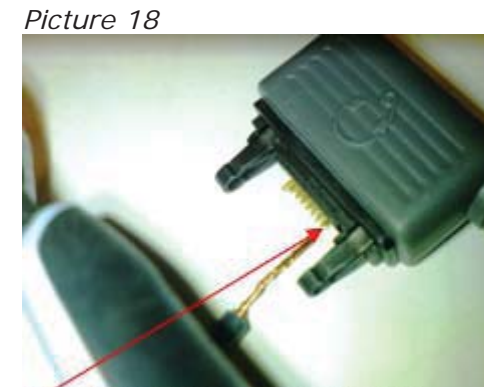


STEP 3:
Use any Portable Handsfree (PHF) Cable and cut according to Picture 17



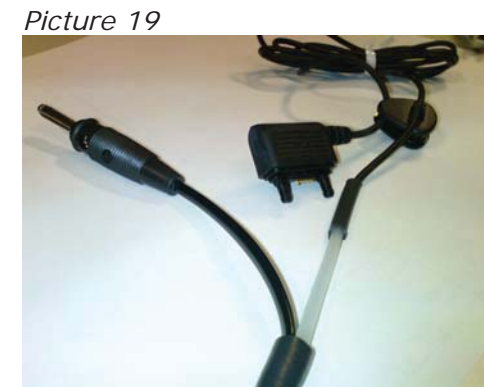
Note: Minimum Cable length 40 cm.

STEP 4:
Use only wire connected to Pin2 and cut all other wires according to Picture 18.
Use a digital multimeter instrument (DMM) and perform diode measurement to select the wire connected to Pin2 at hands free system connector plug.



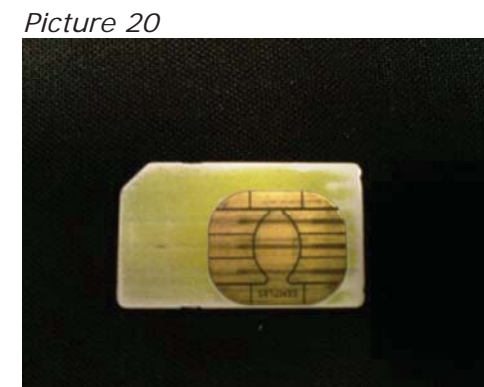
Pin2 (**Note:** Pin1 is not mounted)

STEP 5:
Connect by soldering cable from Picture 16 and cable from Picture 18 according to Picture 19.



Test Cards

Local SIM
Any functional Local SIM Card, see Picture 20



Test SIM GSM/UMTS

One Test SIM GSM/UMTS is needed to perform Current Consumption Test, see Picture 21.
Location: To buy a Test SIM GSM/UMTS, please contact your supplier of test equipment.

Picture 21



Sony Memory Stick M2

Any functional Memory Stick Micro M2 Card, see Picture 22

Picture 22



Rohde & Schwarz RF Shield Package (Box)

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue

Picture 23



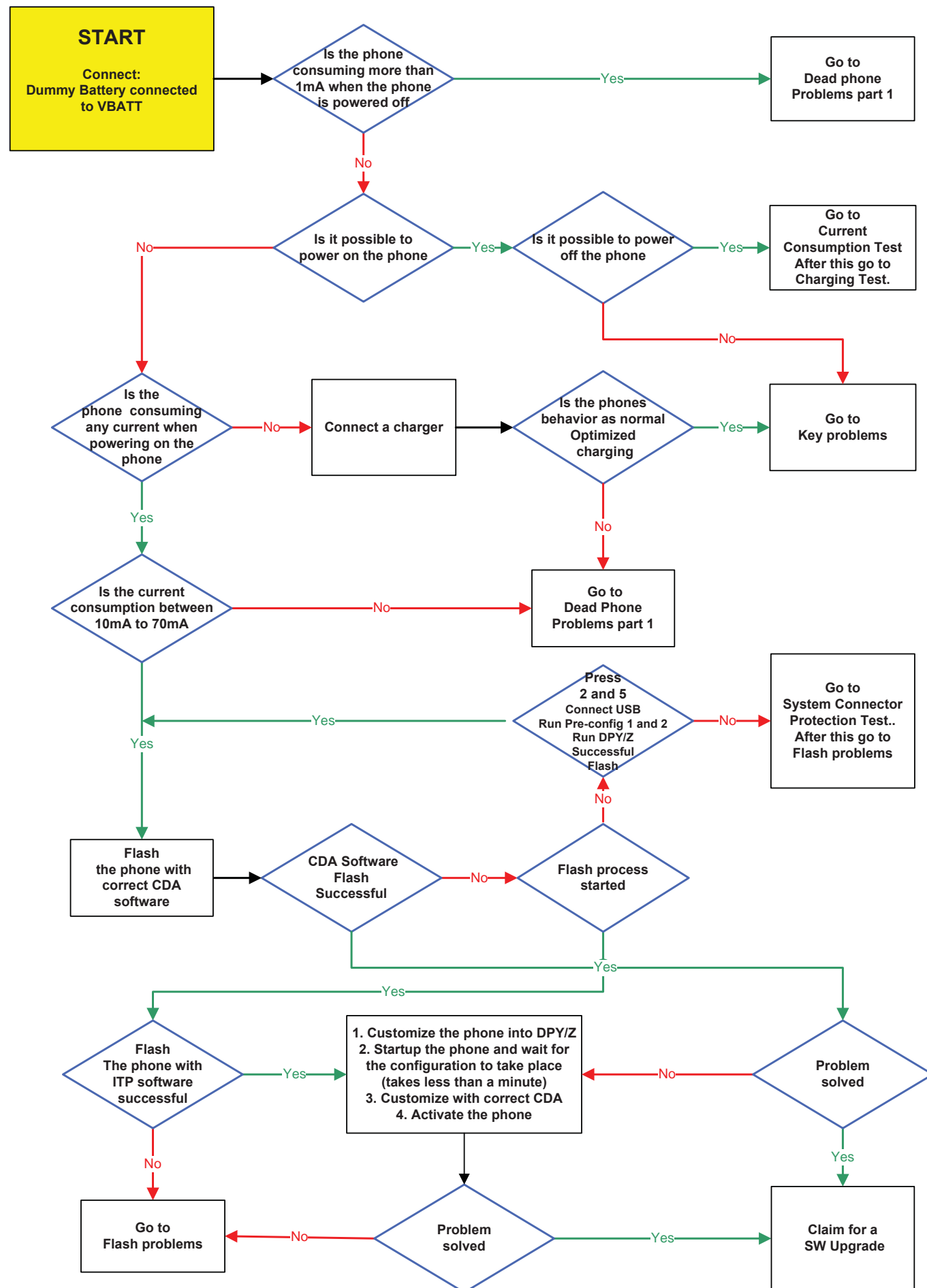
SMK RF Probe

Location: CSPN-Repair Instructions-Level: Mechanical-Tool Catalogue
Part number: SXA 109 6356

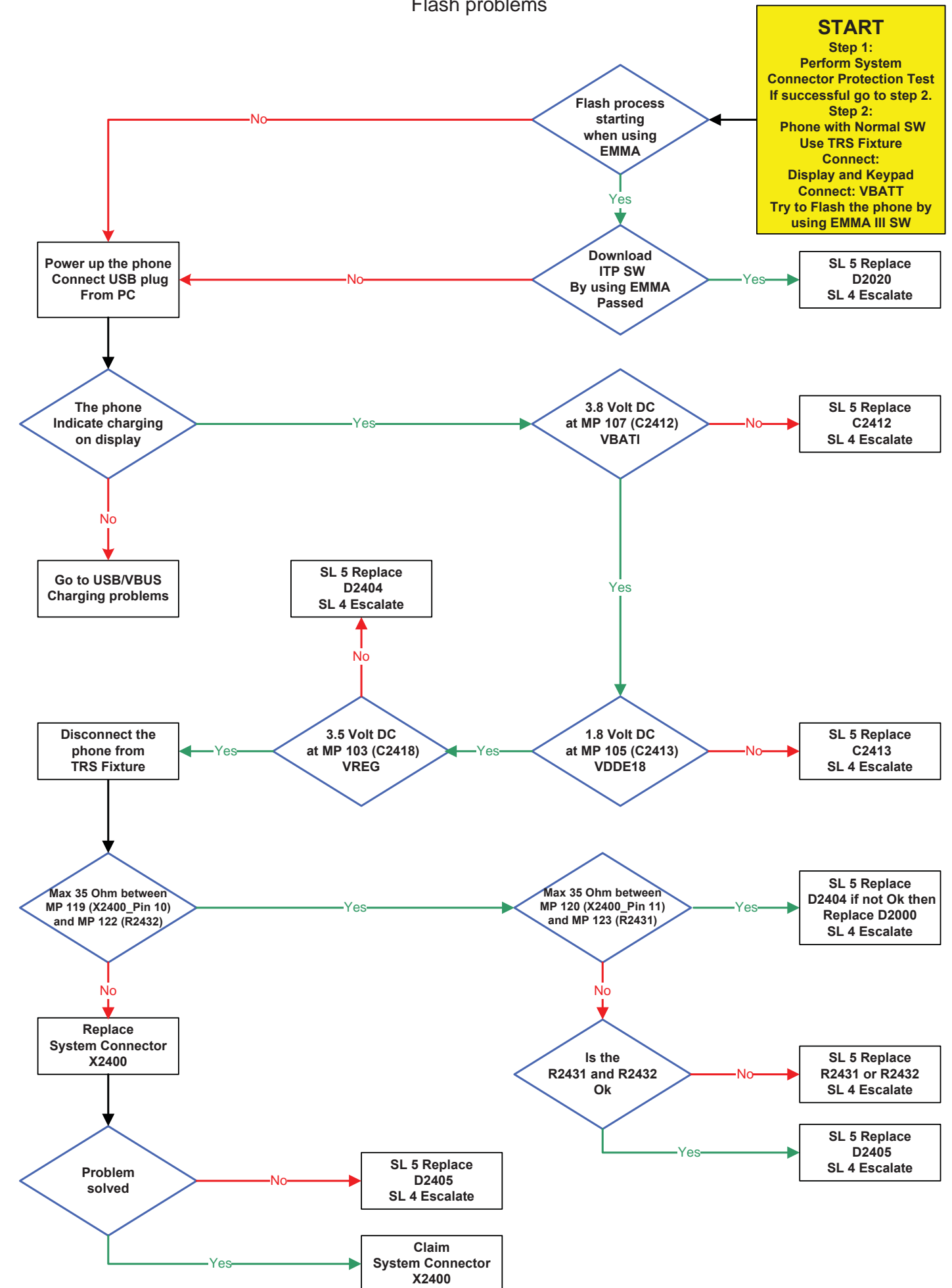
Picture 24

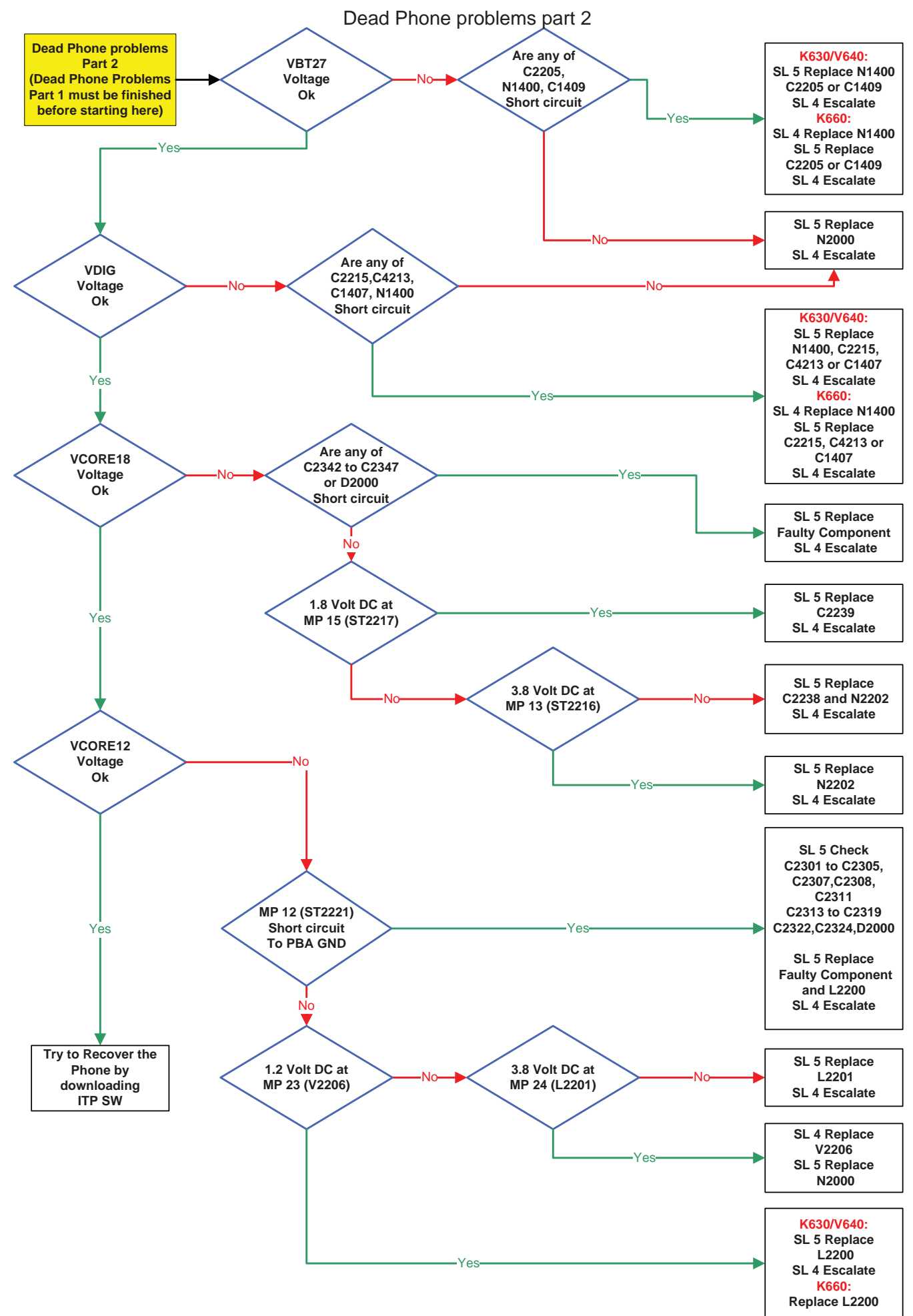
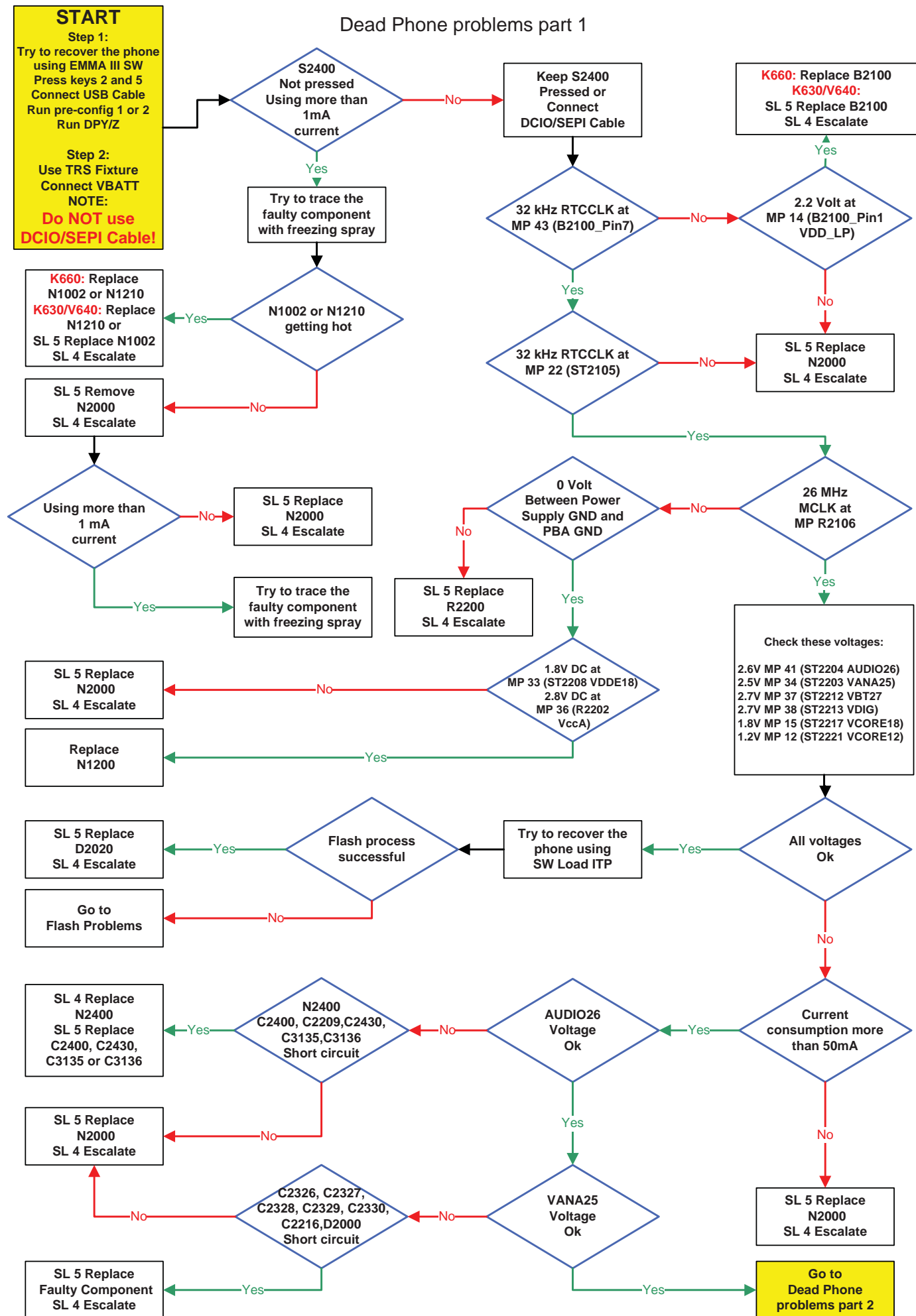


On/Off problems

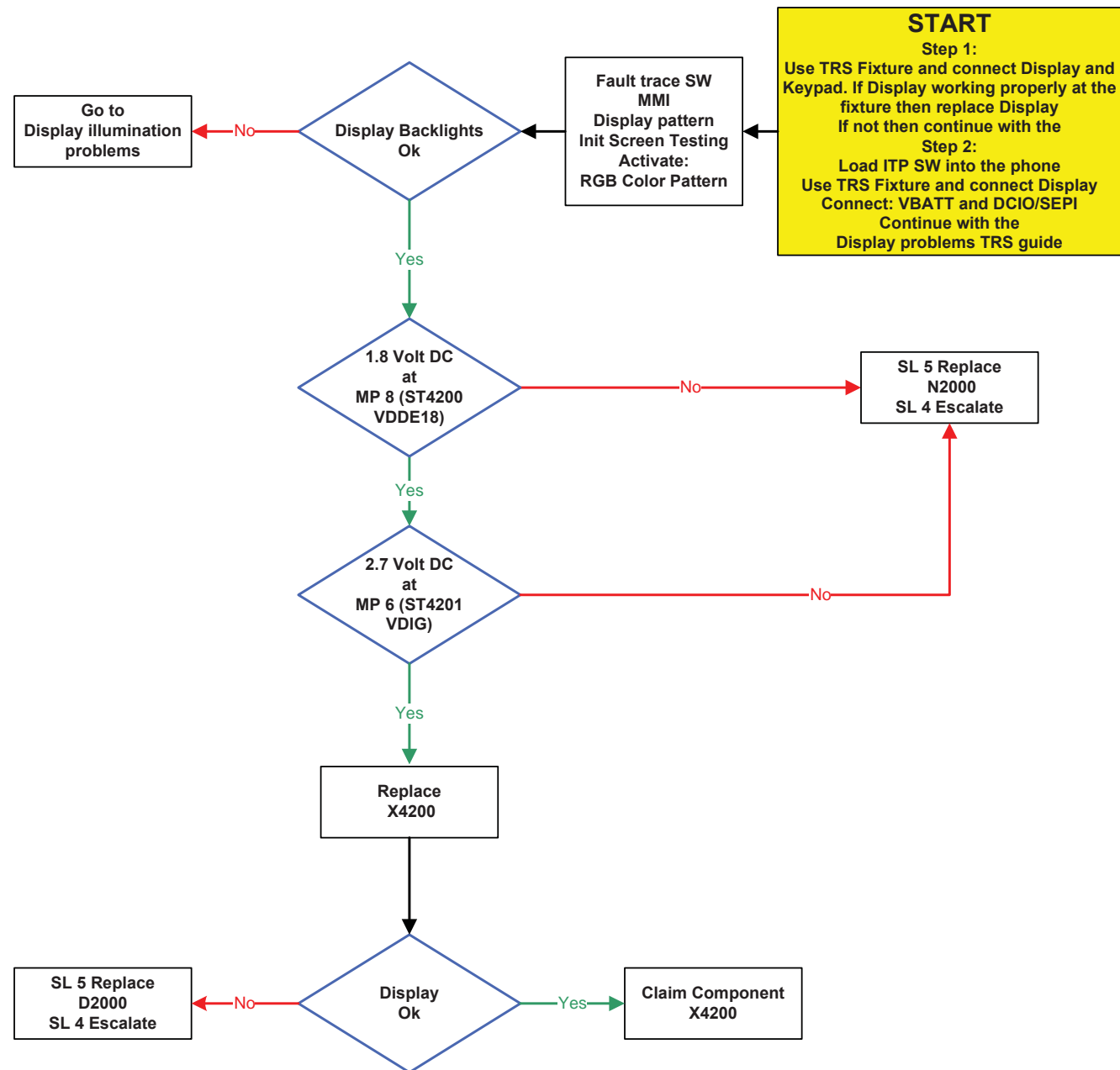


Flash problems

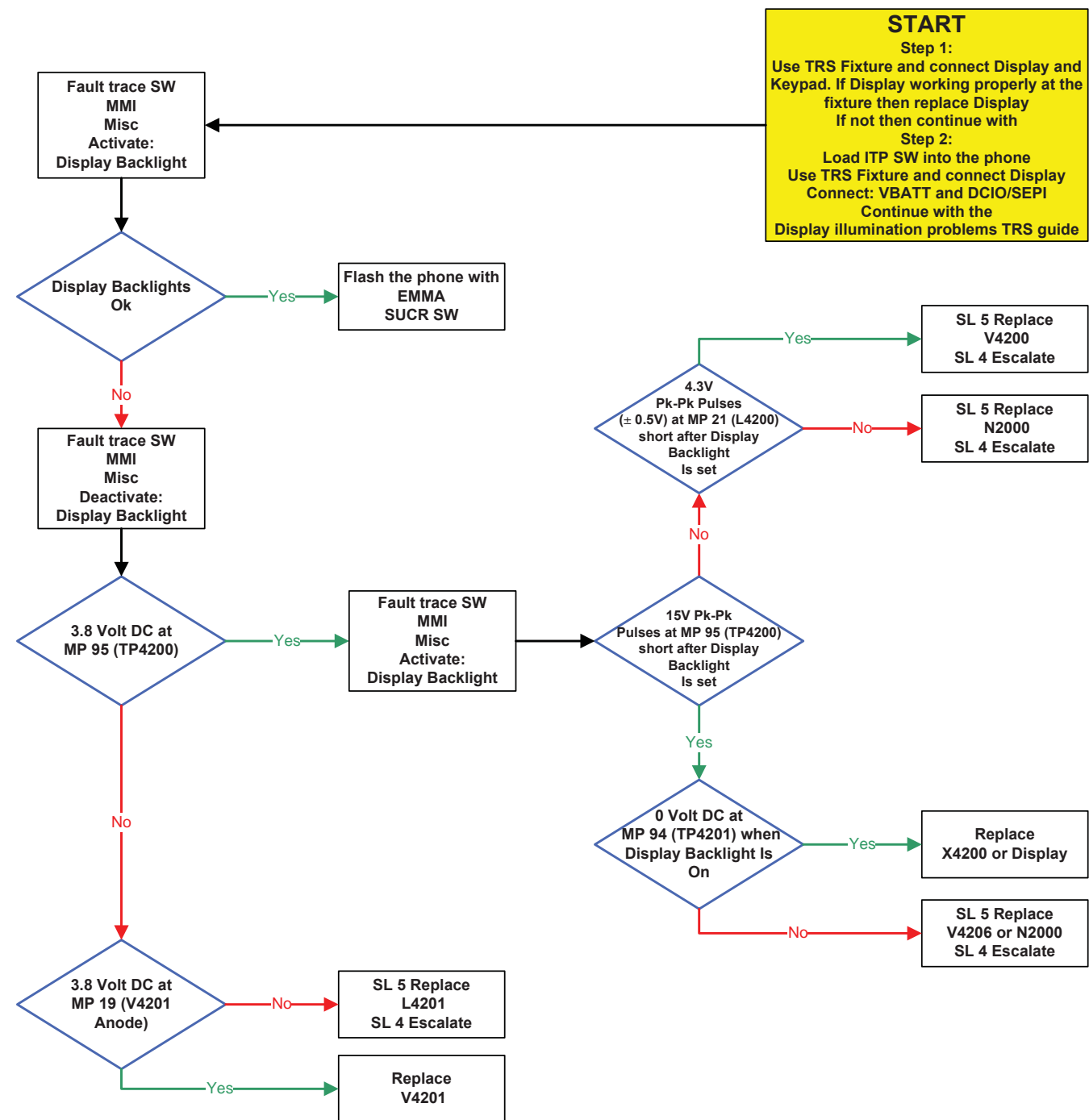




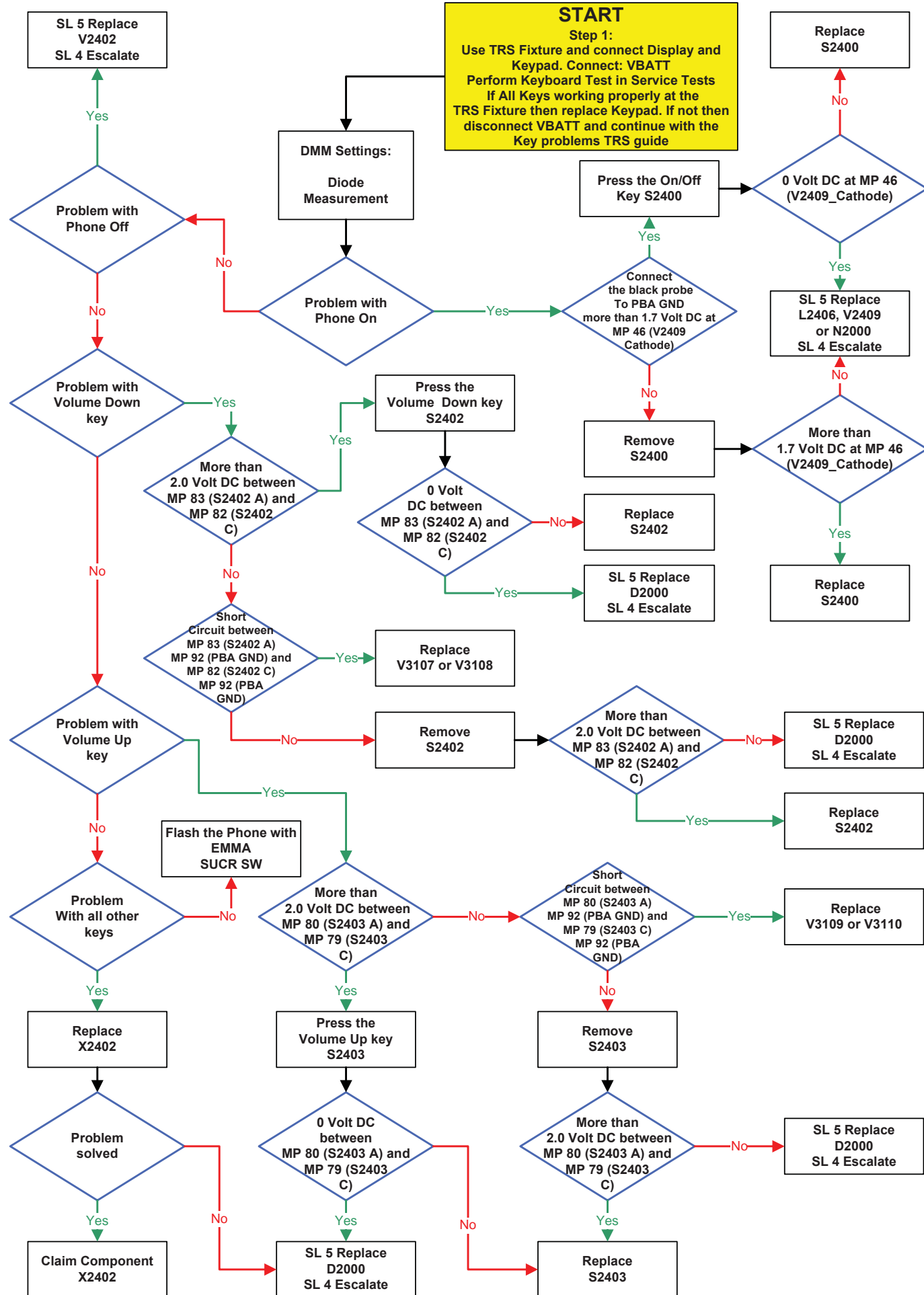
Display problems



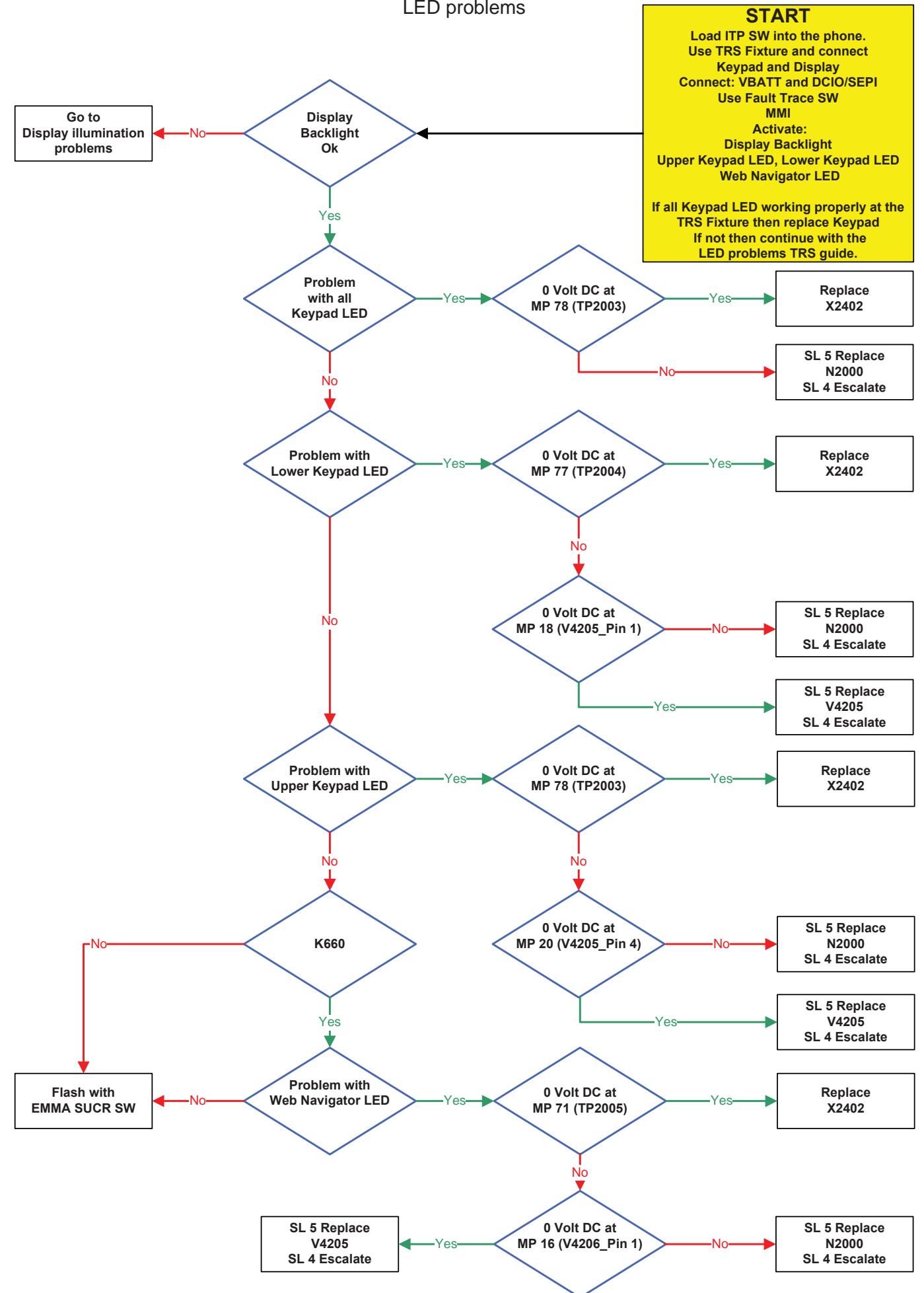
Display Illumination problems



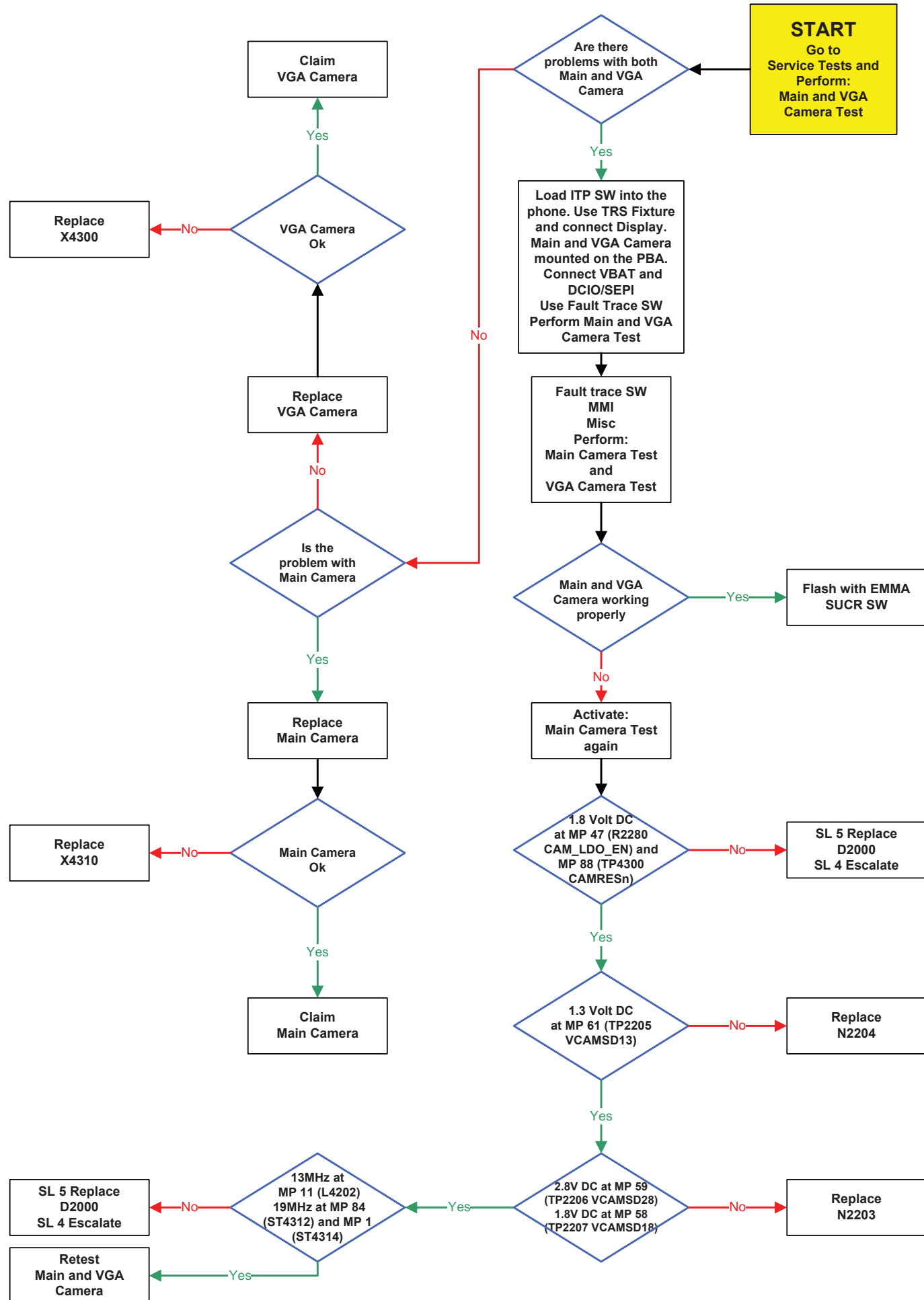
Key problems



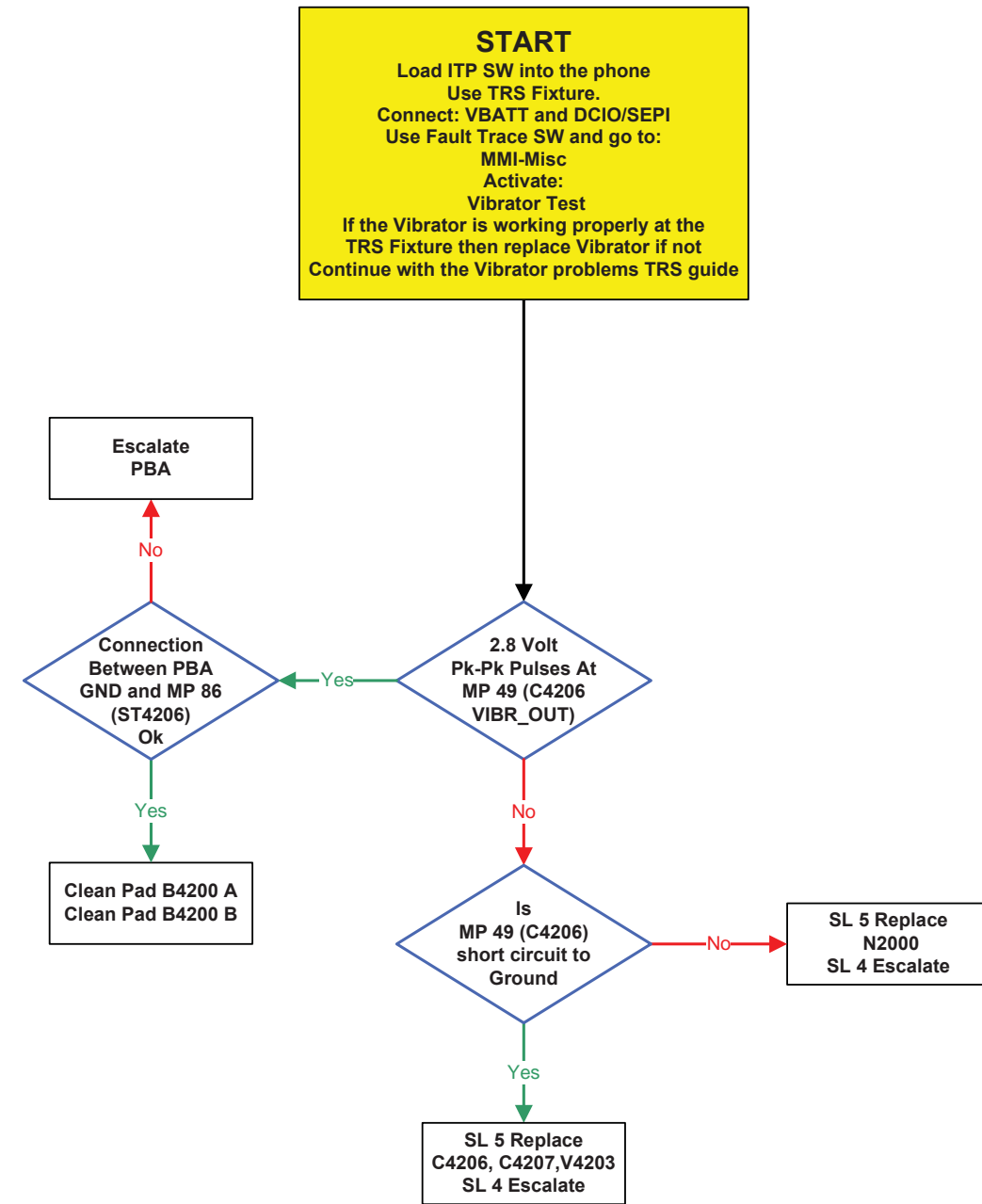
LED problems



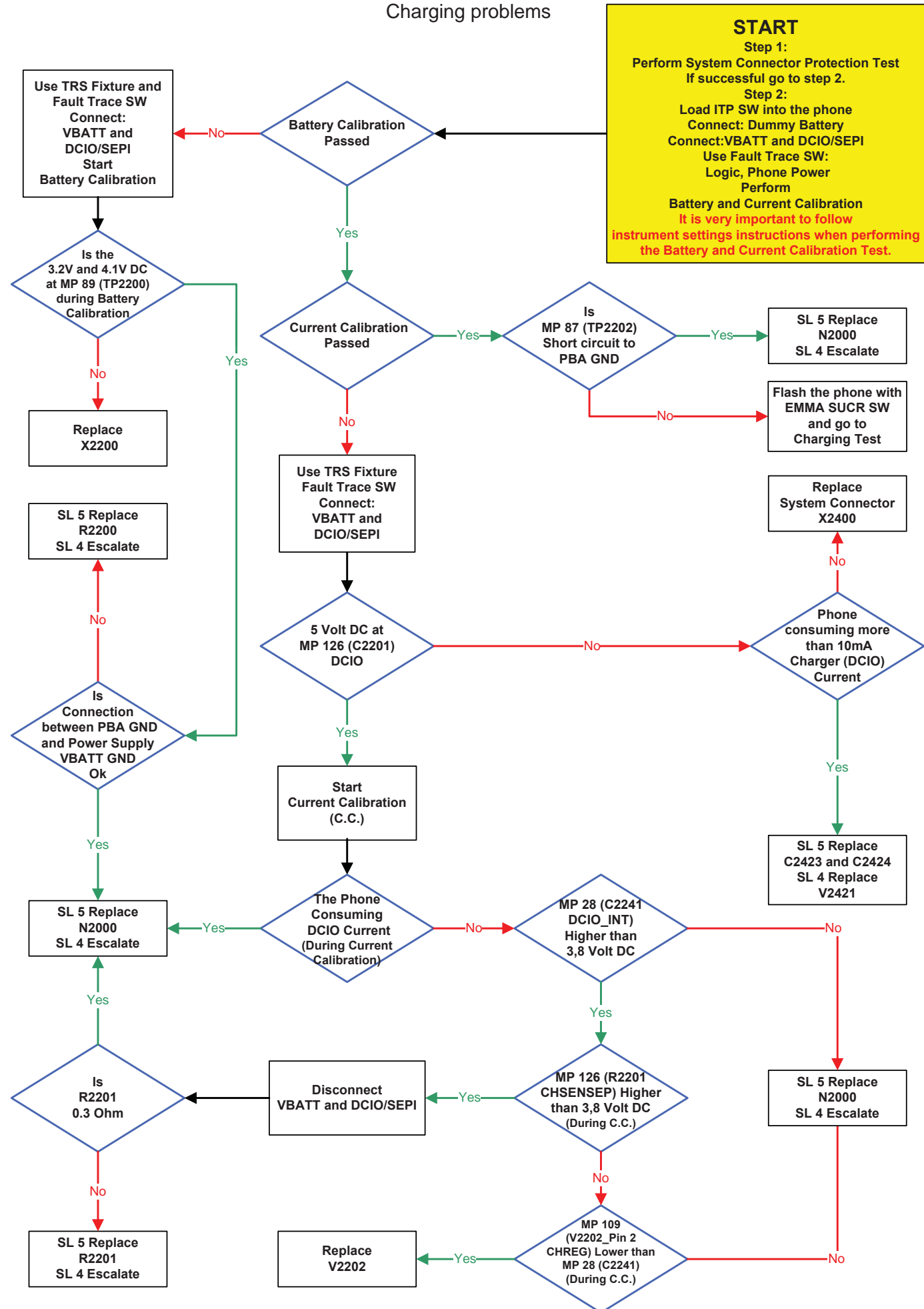
Main and VGA Camera problems



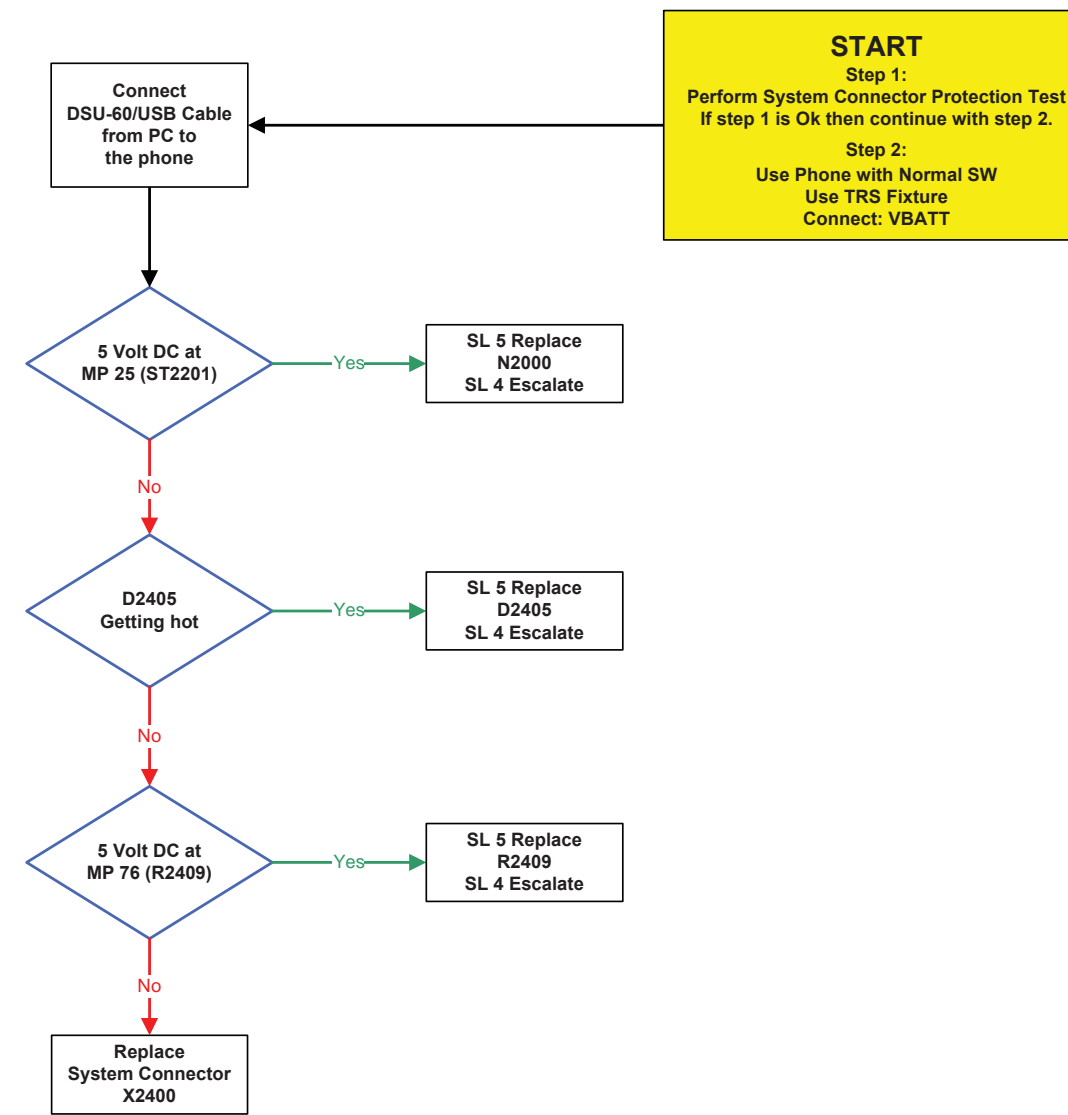
Vibrator problems



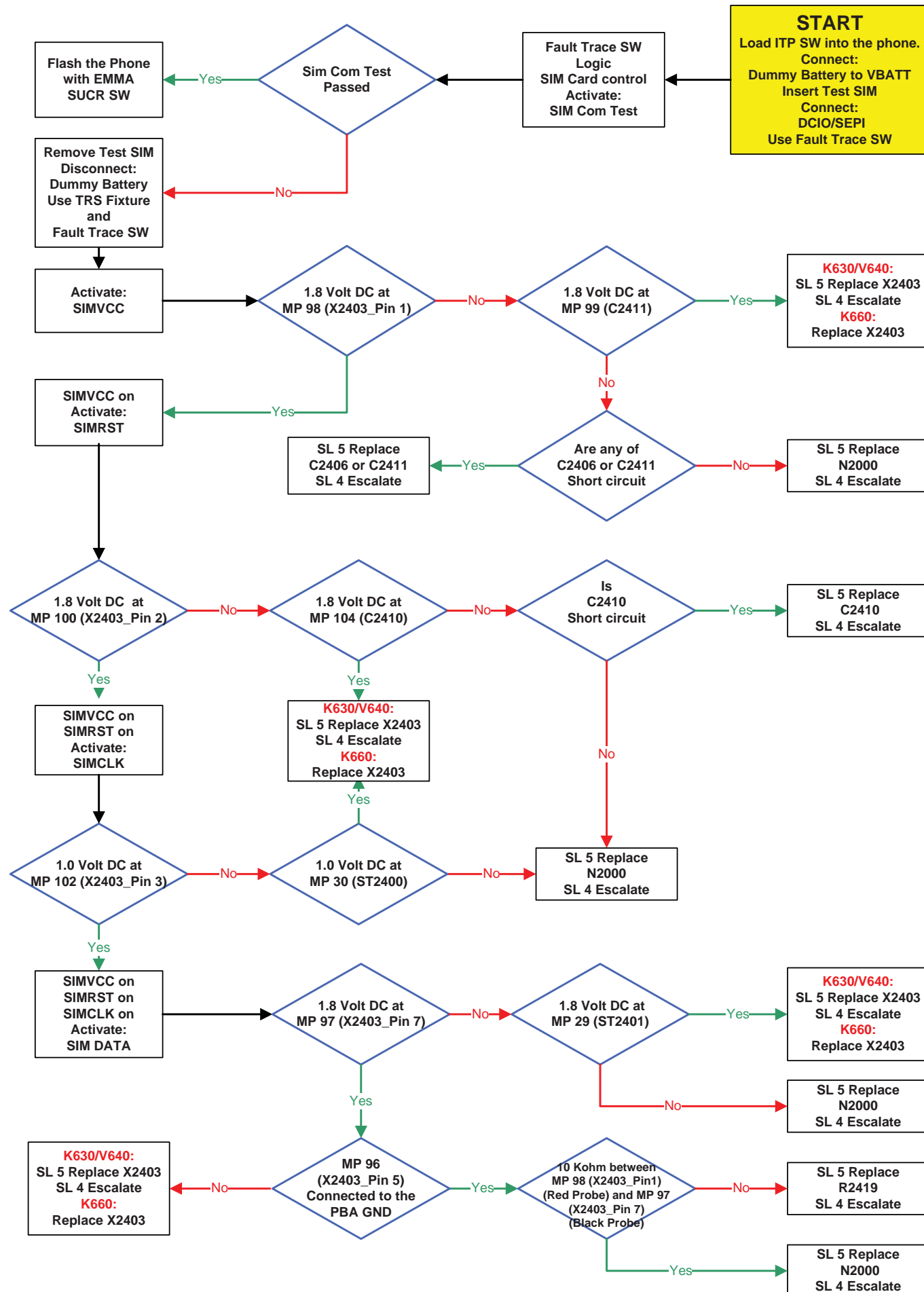
Charging problems



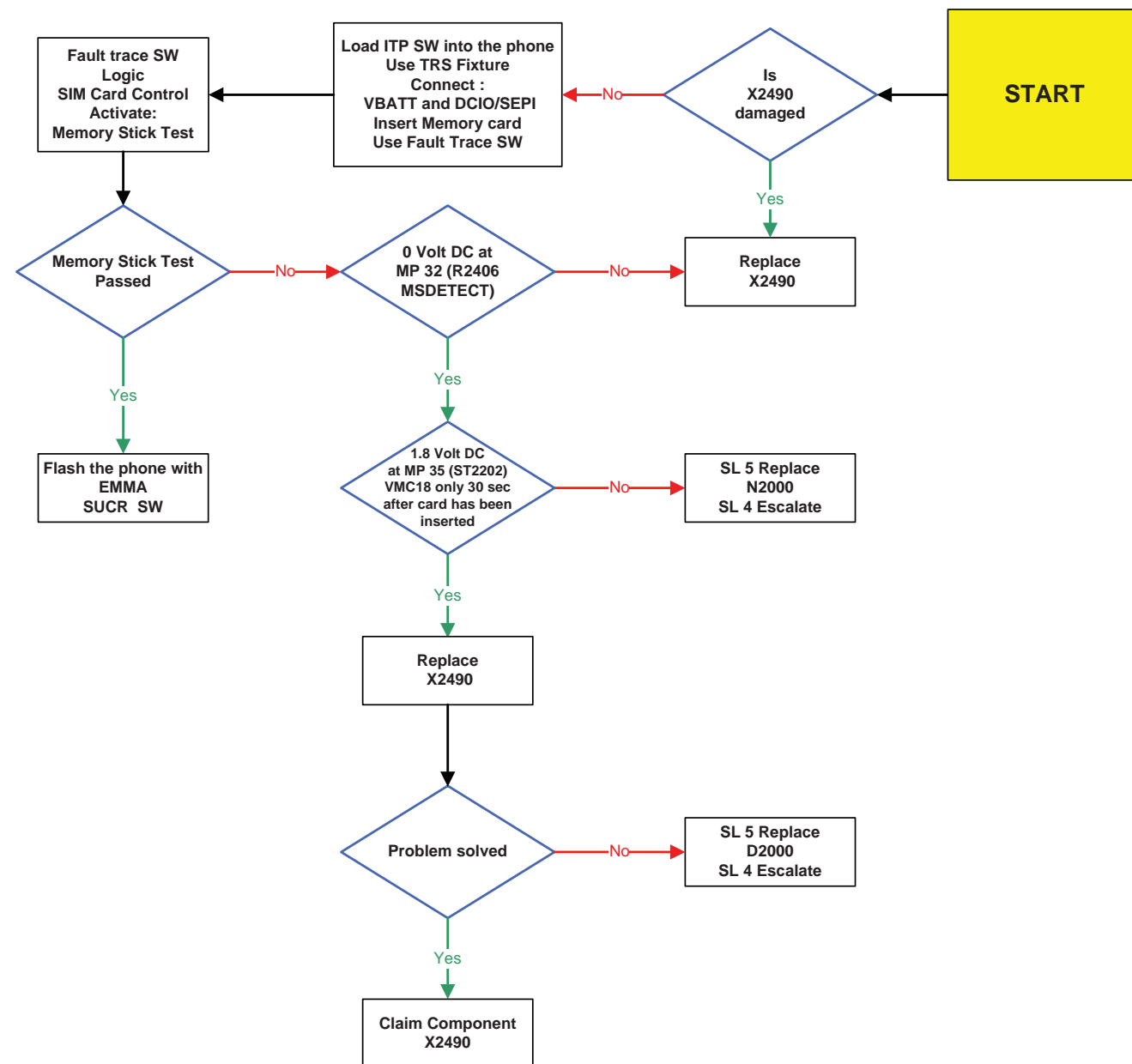
USB/VBUS Charging problems



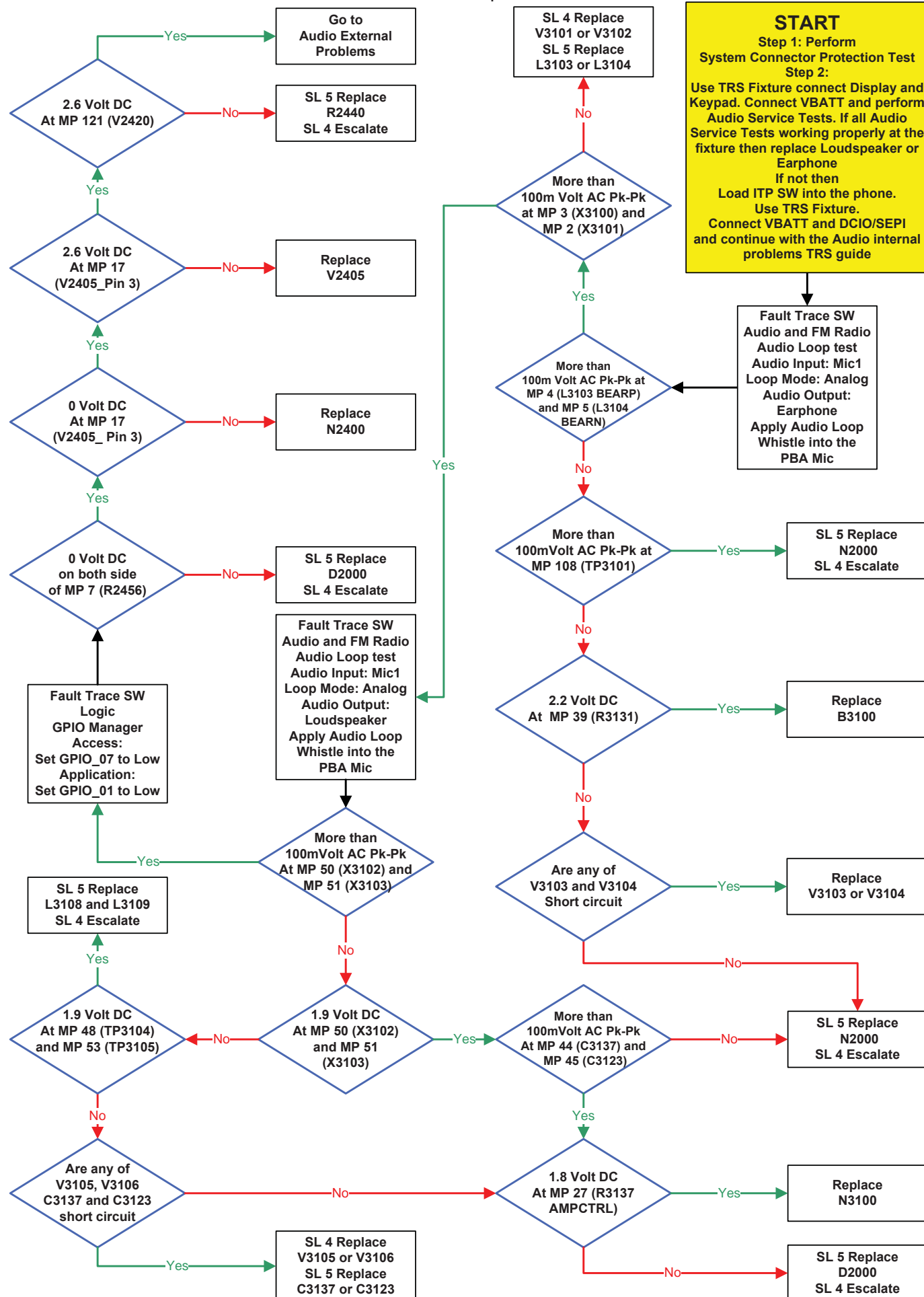
SIM problems



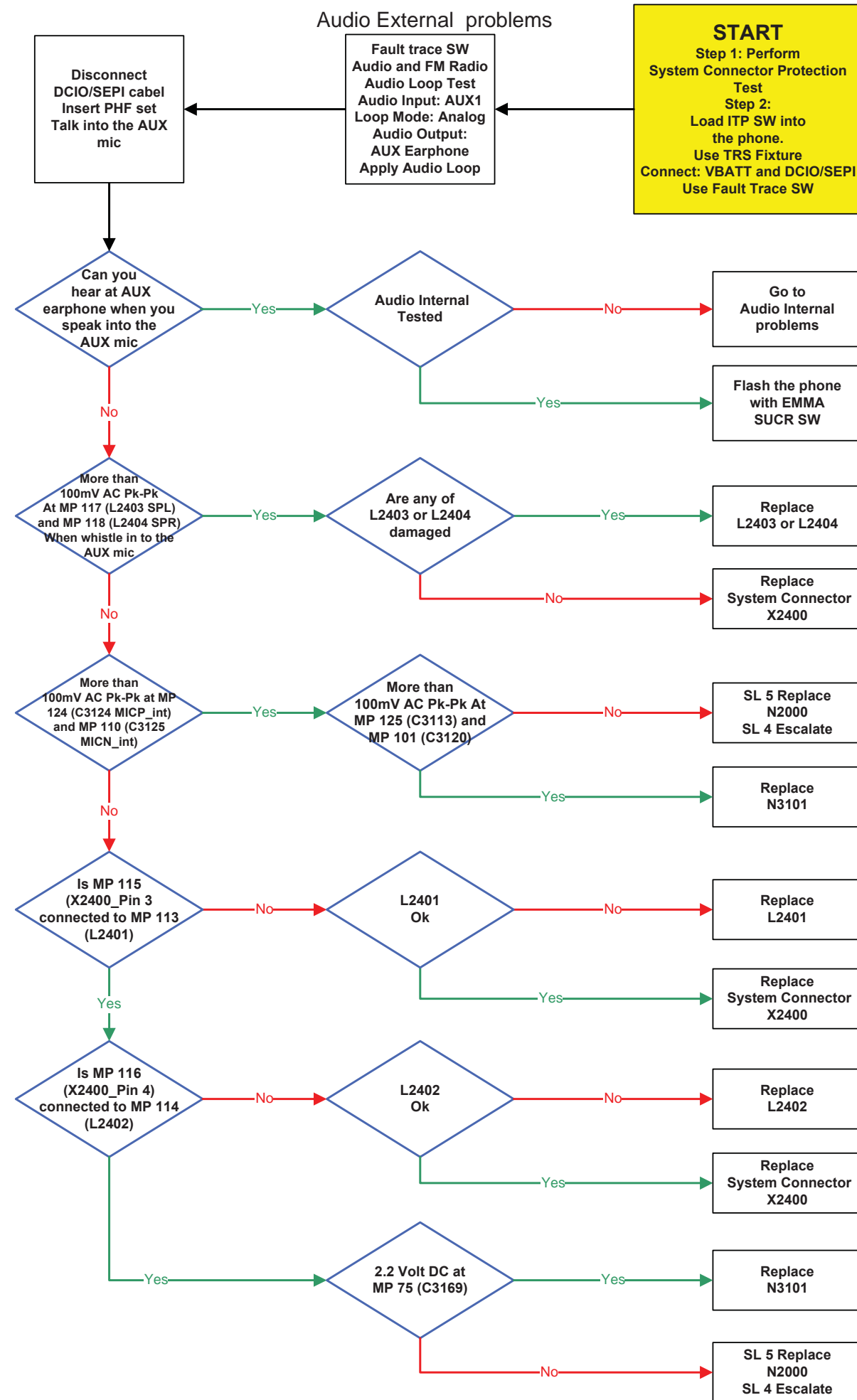
Memory Stick problems

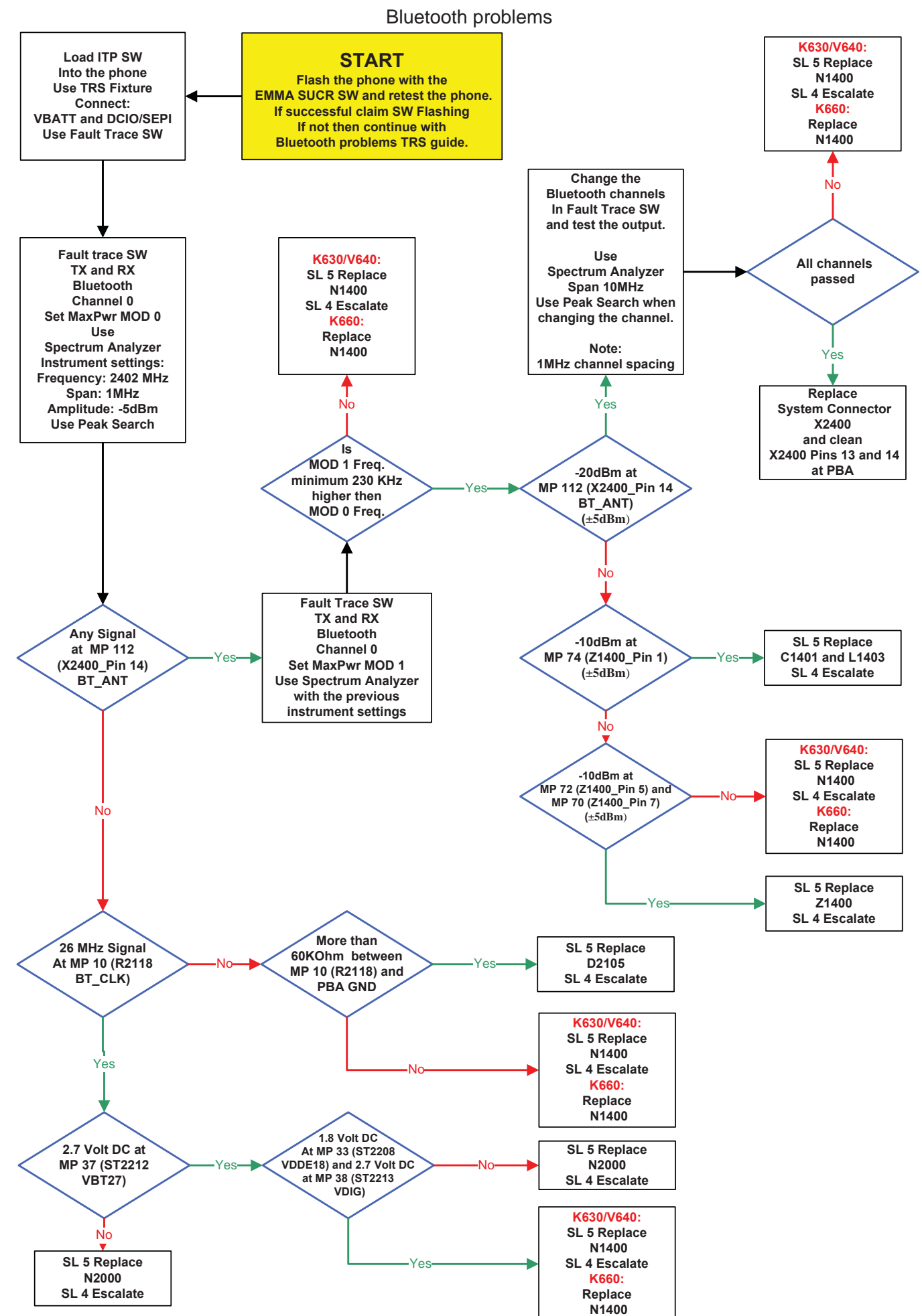
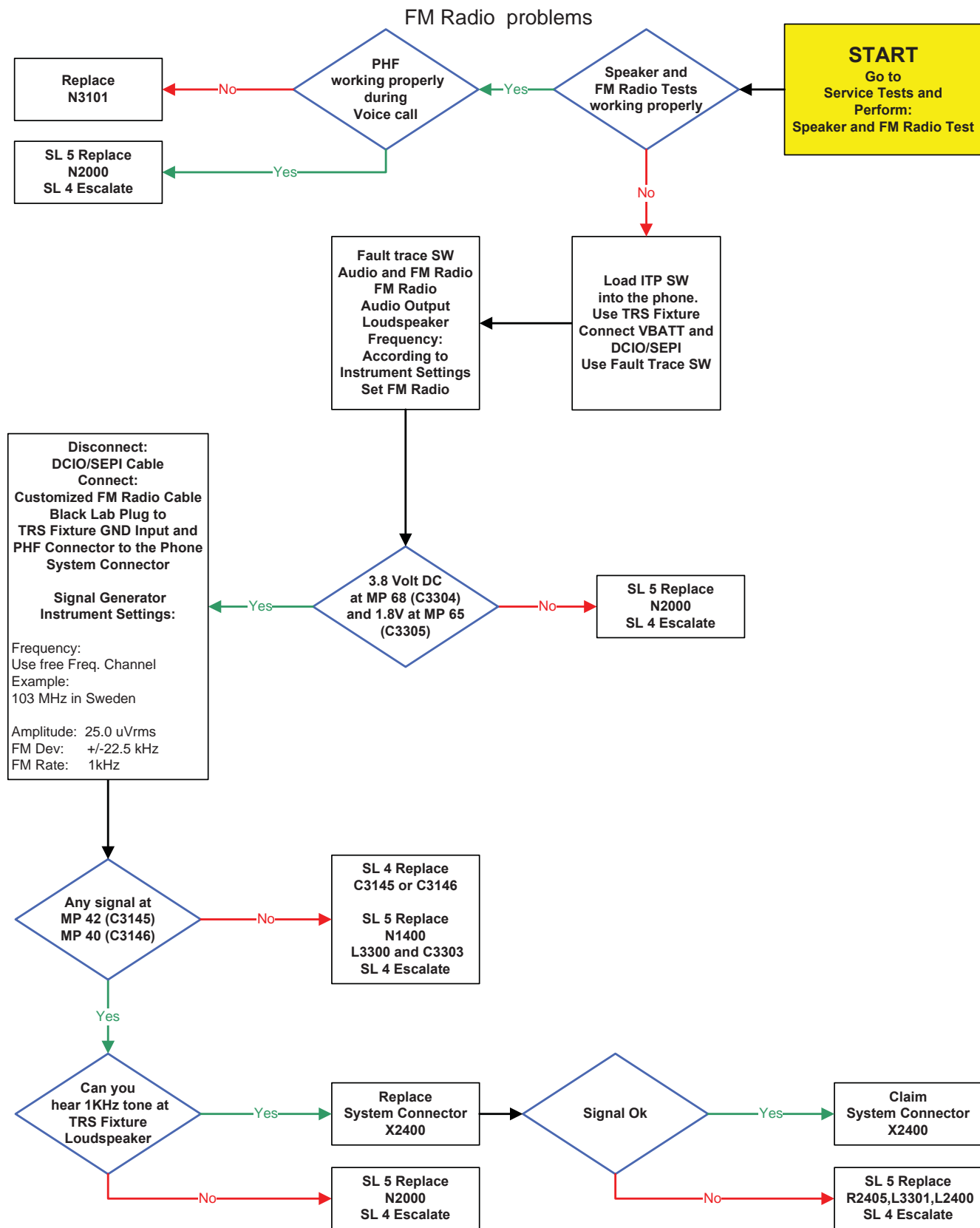


Audio Internal problems



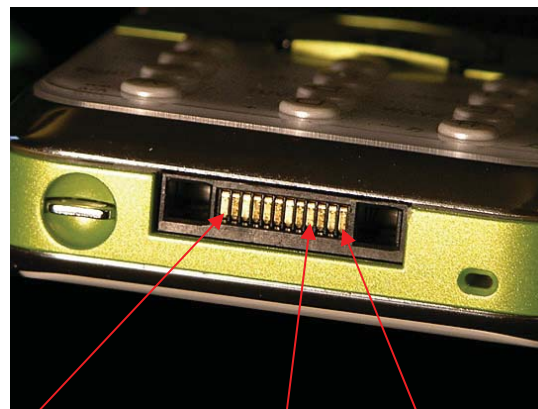
Audio External problems





System Connector Protection Test

Perform Diode and Ohm measurements with a Multimeter
Connect the black probe at ground (Pin 9 on the system connector, X2400)



Pin 1 Pin 9GND Pin 12

Pin at X2400	Diode Measurements / Volt	Ohm Measurements / Ohm	SL 4 Action	SL 5 Action
1	OL	27K	No Action	D2405 if lower than 27KΩ R2433 if higher than 27KΩ
2	0.0	1.4	No Action	L2400 and L3301 If higher than 1.4Ω
3	2.0	12K	N3101 if lower than 12KΩ L2401 if higher than 12KΩ	L2407 If higher than 12KΩ
4	1.0	1K	N3101 if lower than 1KΩ L2402 if higher than 1KΩ	L2408 if higher than 1KΩ
5	0.0	82	N3101 if lower than 82Ω L2403 if higher than 82Ω	L2410 if higher than 82Ω
6	0.0	82	N3101 if lower than 82Ω L2404 if higher than 82Ω	L2409 if higher than 82Ω
7	OL	OL	Not connected	Not connected
8	1.4	1.5K	V2420 if lower than 1.5KΩ	L2405, R2440, R2436 if higher than 1.5KΩ
9	0	0	No Action	No Action
10	OL	430K	No Action	D2405 if lower than 430KΩ R2432 if higher than 430KΩ
11	OL	470K	No Action	D2405 if lower than 470KΩ R2431 if higher than 470KΩ
12	OL	80K	V2421 if lower than 80KΩ	

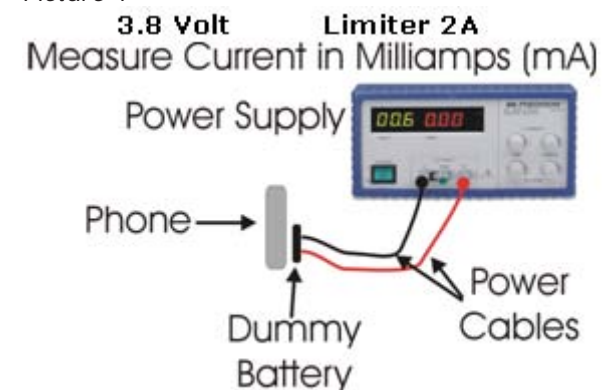
Current Consumption Test

Step 1:

Insert Local SIM Card and use the phone with the Normal SW (SSW) and dummy battery connected to Power Supply Channel 1 VBATT according to Picture 1.
Instrument settings: Voltage: 3.8 Volt, Limiter 3A.

Measure the current when the Phone is off. Check the current consumption at Power Supply Channel 1 VBATT.

Picture 1



Current consumption in off mode should be less than 1mA.
If more than 1mA go to **Dead Phone problems part 1 TRS guide**.

Step 2:

Start the phone:

Measure the deep sleep current max 6mA typical between **0-3mA**.
Make sure that the operator is running with deep sleep. (This operation can be switched off by operator if the network is busy).

If the phone is using more than 6mA, then go to EMMA III and perform Software Update Contents Refresh (SUCR).

Step 3 with Mobile Phone Tester Instrument

Insert Test SIM Card and use the phone with the Normal SW (SSW) and dummy battery connected to Power Supply Channel 1 VBATT according to Picture 1.
Instrument settings: Voltage: 3.8 Volt, Limiter 3A.

Use the Mobile Phone Tester Instrument in signalling mode directly connected to the phone with the RF Connector or use Shield Box if not possible. **Phone Display** must be **on** during these tests to get correct current measurements.

Perform Radio TX measurements at GSM and WCDMA Band and compare the result with limits according to the text below.

- Transmitter current **850 MHz** at Ch: 128 power level 5. Typical **400mA**
- Transmitter current **900 MHz** at Ch: 1 power level 5. Typical **385mA**
- Transmitter current **1800 MHz** at Ch: 512 power level 0. Typical **365mA**
- Transmitter current **1900 MHz** at Ch: 512 power level 0. Typical **365mA**
- Transmitter current **WCDMA BAND I** Low RX Ch: 10562 at 23dBm output power Max **850mA**

If the current consumption is not correct, the fault could be fixed by running SERP calibration if not then go to **GSM and WCDMA Network problems TRS guides**.

If the current consumptions are equal to test limits then go to **Charging Test**.

Step 4 with Fault Trace SW application:

- Flash the phone with ITP SW
- Use the TRS Fixture
- Connect the:
 - Power Supply Channel 1 VBATT:
Instrument settings: Voltage: 3.8 Volt, Limiter 3A
 - Power Supply Channel 2 DCIO/SEPI
Instrument settings: Voltage: 5 Volt, Limiter 2A
- Connect DCIO/SEPI Cable to the phone

Perform the following tests:
- Max TX Power GSM 850 MHz

Fault Trace SW settings:

TX and RX GSM
 GSM Mode Settings:
 TX Switched
 GSM Radio Settings:
 Select Band: GSM 850
 Channel: 128
 Power Level: 5

- Max TX Power GSM 900 MHz

Fault Trace SW settings:

TX and RX GSM
 GSM Mode Settings:
 TX Switched
 GSM Radio Settings:
 Select Band: GSM 900
 Channel: 1
 Power Level: 5

- Max TX Power GSM 1800 MHz

Fault Trace SW settings:

TX and RX GSM
 GSM Mode Settings:
 TX Switched
 GSM Radio Settings:
 Select Band: GSM 900
 Channel: 512
 Power Level: 0

- Max TX Power GSM 1900 MHz

Fault Trace SW settings:

TX and RX GSM
 GSM Mode Settings:
 TX Switched
 GSM Radio Settings:
 Select Band: GSM 900
 Channel: 512
 Power Level: 0

- Max TX Power WCDMA BAND I

Fault Trace SW settings:

TX and RX WCDMA
 Radio Settings:
 Select Band: BAND I
 Fast Select Channels: Ch LOW
 Modes: Max Pwr 23dBm

Compare the current consumption during Max TX Power Tests with the current consumption limits below.

Transmitter current **GSM 850 MHz** at Ch: 128 power level 5. Typical **175mA**
 Transmitter current **GSM 900 MHz** at Ch: 1 power level 5. Typical **185mA**
 Transmitter current **GSM 1800 MHz** at Ch: 512 power level 0. Typical **170mA**
 Transmitter current **GSM 1900 MHz** at Ch: 512 power level 0. Typical **145mA**
 Transmitter current in **WCDMA BAND I** RX Ch Low: 10562 Max power level 23 dBm and Rx on **575mA**

Tolerance: ±10%

If the current consumption is not correct, the fault could be fixed by running SERP calibration. If it does not work then go to **GSM and WCDMA Network problems TRS guides**.

If the current consumptions are equal to the sheet go to **Charging Test**.

Battery and Current Calibration Test

Use the Phone with the ITP SW

Instrument settings for the Battery Calibration Test

Power Supply Channel 1 VBATT:

X Volt according to the Fault Trace SW Test Instructions:
Fault Trace SW-Logic-Phone Power-Battery Calibration and follow test instructions.
Limiter: 2A.

Power Supply Channel 2 DCIO/SEPI:

5.0 Volt
Limiter: 2A

If the test is performed at the Core Level then use dummy battery according to the Equipment List. If the TRS Fixture is used no dummy battery is needed.

Note: Maximal cable length between Power Supply Channel 1 VBATT and the dummy battery or the TRS Fixture must be 1m. The cable must have a capacity for at least 16A.

Limits Table for the Battery Calibration Test

Voltage Level on VBATT	Min	Max	UNIT
3.2 Volt	263	351	mV
3.2 Volt	107	15F	HEX
4.1 Volt	789	877	mV
4.1 Volt	315	36D	HEX

Instrument settings for the Current Calibration Test

If the test is performed at the Core Level then use dummy battery according to the Equipment List. If the TRS Fixture is used no dummy battery is needed.

Note: The Power Supply Channel 1 VBATT must allow reverse current.

Note: Maximal cable length between Power Supply Channel 1 VBATT and the dummy battery or the TRS Fixture must be 1m. The cable must have a capacity for at least 16A.

Note: Length of the Power Supply Channel 2 DCIO/SEPI customized cable must be exactly 1,3m.

Power Supply Channel 1 VBATT:

3.8 Volt
Limiter 2A

Power Supply Channel 2 DCIO/SEPI:

5.0 Volt
Limiter: 2A

Limits Table for the Current Calibration Test

Measured Current	Name	Min	Max	Unit
100mA	DCIO Current	50	150	mA
800mA	DCIO Current	725	875	mA

Backup Capacitor Test

To perform this test use:

- Phone with the ITP SW
- Power Supply Channel 1 VBATT: Instrument settings: Voltage: 3.8V, Limiter: 2A
- Power Supply Channel 2 DCIO/SEPI: Instrument settings Voltage: 5V, Limiter: 2A

This test should be performed in 3 steps:

Step1:

Measure the voltage at the Backup capacitor by using **Fault Trace SW- Logic - ADC Values – Read ADC Value** (Reading 1).

Step2:

This step should be done **30 seconds** after Step 1. Measure the voltage at the Backup capacitor by using **Fault Trace SW - Logic – ADC Values - ADC Channels – Read ADC Value** (Reading 2).

Step3:

Compare the difference between Reading 1 and Reading 2 with the reference table below. If the Reading 1 value is between 50 and 680 go to Interval 1, if between 681 and 800 go to Interval 2, if between 801 and 880 go to Interval 3 and compare with the Reading 2 – Reading 1 Min and Max Limits.

Reference Table:

	Min	Max	Unit
Absolute readout Reading 1	50	880	Dec

Reading 1 (Dec)	Reading 2 – Reading 1 (Dec)	
	Min	Max
Interval 1 (50 – 680)	20	210
Interval 2 (681 – 800)	5	30
Interval 3 (801 – 880)	0	10

Note: The upper table contains the absolute limits for the readouts. The lower table contains the allowed delta between the first and the second readout, separated in time with 30 seconds. If reading is out of the test limits then replace **C2217** Backup capacitor.

If problem is not solved then SL 5 Replace N2000 SL 4 Escalate.

Charging Test

To perform this test use:

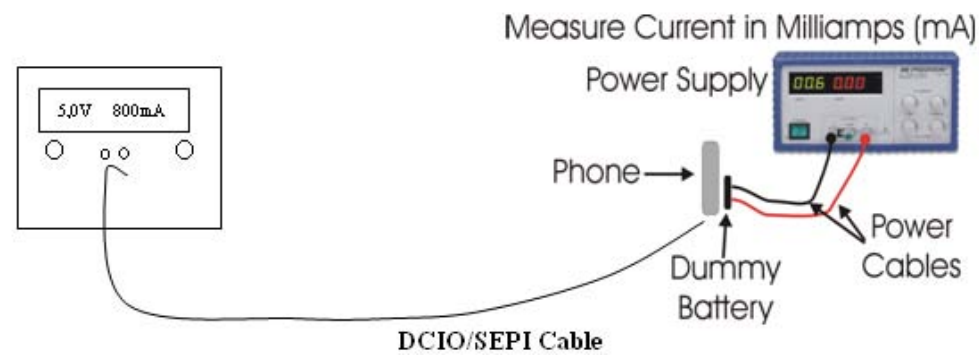
- Phone with the Normal SW (SSW)
- Dummy Battery connected to Power Supply Channel 1 VBATT
- Power Supply Channel 1 VBATT instrument settings:
Voltage: 3.0 to 4.2 Volts, according to VBATT row in the Reference Table.
Limiter: 2A
- Power Supply Channel 2 DCIO/SEPI instrument settings:
Voltage: 5V
Limiter: 2A

Test instructions:

- Disconnect the DCIO/SEPI Cable between each measurement and wait for phone to shut down when changing VBATT voltage.
- Take a note of Current measurements at Power Supply Channel 2 DCIO/SEPI and Display charging indicator status, X seconds after DCIO/SEPI cable has been inserted according to Test Time row in the reference table below.
- Compare test results with the reference table below, tolerance +/-20%.

Reference Table

VBATT x Volt	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2
Test Time x sec.	15s	15s	25s	25s	25s	25s	25s	25s	25s	25s	25s	25s	40s
DCIO/SEPI Current mA	220	220	200-400	200	200	200	200	770	770	770	700	430	0
Display indicate charging	Nothing	Nothing	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Fully Charged



Power Supply Channel 1 VBATT must allow reverse current.

If the charging current is **Not** equal to the reference table go to **Charging problems** TRS Guide.

If the charging current is equal to reference table then insert the normal battery and test the charging current to define if the phone battery is working properly.

Measure the voltage at the battery to define the current level.
If the battery is receiving the right current, then the phone and the battery are working properly.

ASIC Revision Test

The purpose with this test is to check following items:

- that the ASICs Revision State is correct
- Check if communication to and from the ASIC-s is Ok

The following ASICs are tested:

- D2000 (Anja)
- N2000 (Vera)
- N1400 (Bluetooth and FM Radio ASIC)

To perform this test use:

- Phone with the ITP SW
- TRS Fixture
- Power Supply Channel 1 VBATT (Voltage: 3.8V, Limiter: 2A)
- Power supply Channel 2 DCIO/SEPI (Voltage: 5V, Limiter: 2A)
- Fault Trace SW choose General – Asic Revisions – Read All

Reference return value can be found in the table below.

ASIC	Description	Part Number	Return Value (hex)
D2000	CPU (Anja)	1200-0186	0x2C8
N2000	Power Management (Vera)	1000-8142	0xC5
N1400	Bluetooth: Firmware Revision Chip ID	1200-6182	0x5,0x1 0x0,0x0,0x0,0x0 Will always return 0 on STLC because Chip ID is not supported.
N1400	FM Radio	1200-6182	0x800

Voltages to N2000

MP	MP 92 (PBA GND)	MP 63 (X2200 Pin 3)	MP 89 (TP2200)	MP 87 (TP2202)	MP 26 (C2242)	Power sup 3.80 V
	GND	VBAT	VBATI	BDATA	VDD_REF	
Phone Off	0.00V	3.8V	3.8V	0.00V	3.8V	
Phone On	0.00V	3.8V	3.8V	0.00V	3.8V	

Voltages from N2000

MP	MP 41 (ST2204)	MP 34 (ST2203)	MP 33 (ST2208)	MP 37 (ST2212)	MP 38 (ST2213)	
	VAUDIO26	VANA25	VDDE18	VBT27	VDIG	
	0.00V	0.00V	0.00V	0.00V	0.00V	Power sup 0.00 Volt
Phone Off	0.00V	0.00V	0.00V	0.00V	0.00V	Power sup 3.80 Volt
Phone On	2.6V	2.5V	1.8V	2.7V	2.7V	Power sup 3.80 Volt

Voltages from N2000

MP	MP 12 (ST2221)	MP 36 (R2202)	MP 31 (C2218)	MP 52 (ST2210)	
	VCORE12	VccA	VDD_LP	VBACKUP	
	0.00V	0.00V	2.2V	2.2V	Power sup 0.00 Volt
Phone Off	0.00V	0.00V	2.2V	2.2V	Power sup 3.80 Volt
Phone On	1.2V	2.8V	2.2V	2.2V	Power sup 3.80 Volt
			C2217	Completely charged	

Clocks to N2000

MP	MP 43 (B2100_Pin7)	
	RTCCLK	
Phone Off	32.768kHz	Power sup 0.00 Volt
Phone On	32.768kHz	Power sup 3.80 Volt

Clocks from N2000

MP	MP 22 (ST2105)	
	RTCCLK	
Phone Off	0Hz	Power sup 3.80 Volt
Phone On	32.768kHz	Power sup 3.80 Volt

VCORE18 from N2202

MP	MP 15 (ST2217)	
	VCORE18	
Phone Off	0.00V	Power sup 0.00 Volt
Phone On	1.8V	Power sup 3.80 Volt

Charging

Charging off 1: DCIO/SEPI not connected.	Charging 100mA: Fault Trace SW: Start Current Calibration----> Set VBATT to 3.8	Use Charging 800mA: Fault Trace SW: Start Current Calibration-->Set VBATT to 3.8V-->Perform Step1
Charging off 2: DCIO/SEPI connected.	Note: The Current Calibration Test must be repeted if current consumption going under 50mA at Power Supply Channel 2 when you performing this measurements.	Note: The Current Calibration Test must be repeted if current consumption going under 725mA at Power Supply Channel 2 when you performing this measurements.

MP	MP 126 (C2201)	MP 28 (C2241)	MP 109 (V2202 Pin2)	MP 106 (R2201)	Power sup 3.8 Volt
	DCIO	DCIO_INT	CHREG	CHSENSEP	
Charging off 1	0.00V	3.6V	3.2V	3.8V	Charger voltage 0.0 Volt
Charging off 2	5.0V	4.7V	4.7V	3.8V	Charger voltage 5.0 Volt
Charging 100mA	5.0V	4.8V	3.8V	3.8V	Charger voltage 5.0 Volt
Charging 800mA	4.5V	4.3V	2.3V	4.2V	Charger voltage 5.0 Volt

WCDMA N1210

Use Fault Trace SW to activate and deactivate WCDMA Radio

MP	MP 56 (L2207)	MP 54 (R2221)	MP 55 (R2299)	MP 36 (R2202)	MP 33 (ST2208)	Power sup 3.80 Volt
	VCC_WPA	WPAVCC	DCDC_EN	VccA	VDDE18	
WCDMA Radio Off	0.00V	0.00V	0.00V	2.8V	1.8V	
WCDMA Radio On	3.2V	1.3V	1.8V	2.8V	1.8V	

Bluetooth N1400

Use Fault Trace SW to activate and deactivate Bluetooth

MP	MP 69 (ST1401)	MP 66 (C1408)	MP 73 (C1409)	MP 64 (C1412)	MP 10 (R2118)	MP 22 (ST2105)	Power sup 3.80 Volt
	VDIG	VDDE18	VBT27	VDDE18	BT_CLK	RTCCLK	
Bluetooth Off	2.7V	1.8V	2.7V	1.8V	26MHz	32.768kHz	
Bluetooth On	2.7V	1.8V	2.7V	1.8V	26MHz	32.768kHz	

FM Radio N1400

Use Fault Trace SW to activate and deactivate FM Radio

MP	MP 68 (C3304)	MP 65 (C3305)	MP 67 (R3301)	Power sup 3.80 Volt
	VBATI	VDDE18	RTCCLK	
FM Radio Off	3.8V	1.8V	32.768kHz	
FM Radio On	3.8V	1.8V	32.768kHz	

Memory Card

Memory Card inserted

MP	MP 35 (ST2202)	Power sup 3.80 Volt
	VMC28	
Phone Off	0.00V	
Phone On	2.8V	

Main Camera

Use Fault Trace SW to activate and deactivate Main Camera. Main Camera must be connected to the PBA

MP	MP 47 (R2280)	MP 61 (TP2205)	MP 59 (TP2206)	MP 58 (TP2207)	MP 11 (L4202)	MP 84 (ST4312)	Power sup 3.80 Volt
	CAM_LDO_EN	VCAMSD13	VCAMSD28	VCAMSD18	CAMSYSCLK	PCLK	
Main Camera Off	0.00V	0.00V	0.00V	0.00V	0Hz	0Hz	
Main Camera On	1.8V	1.3V	2.8V	1.8V	13MHz	19MHz	

VGA Camera

Use Fault Trace SW to activate and deactivate VGA Camera. VGA Camera must be connected to the PBA

MP	MP 47 (R2280)	MP 59 (TP2206)	MP 58 (TP2207)	MP 11 (L4202)	MP 1 (ST4314)	Power sup 3.80 Volt
	CAM_LDO_EN	VCAMSD28	VCAMSD18	CAMSYSCLK	PCLK	
VGA Camera Off	0.00V	0.00V	0.00V	0Hz	0Hz	
VGA Camera On	1.8V	2.8V	1.8V	13MHz	19MHz	

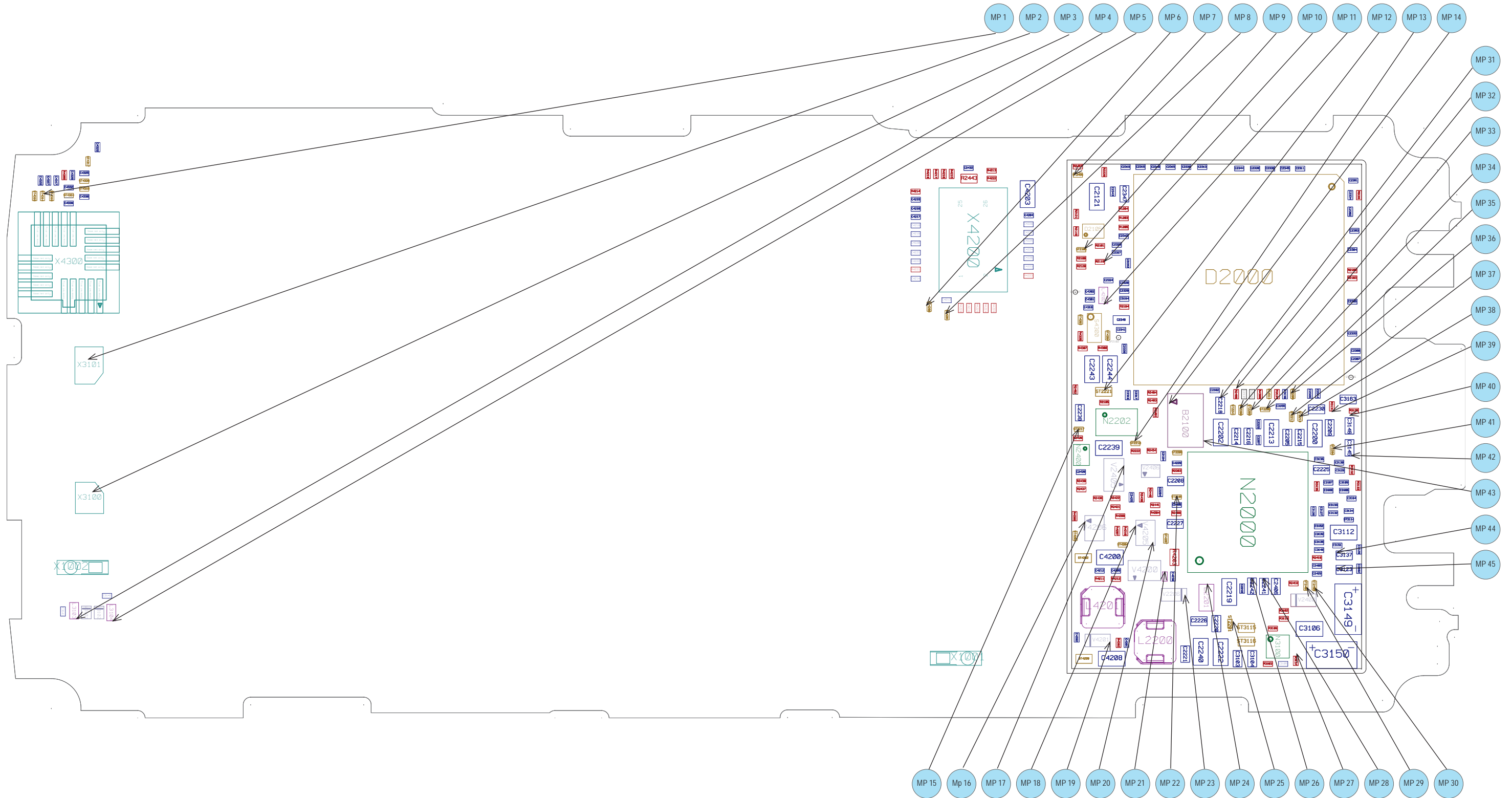
MCLK 26MHz from N1200

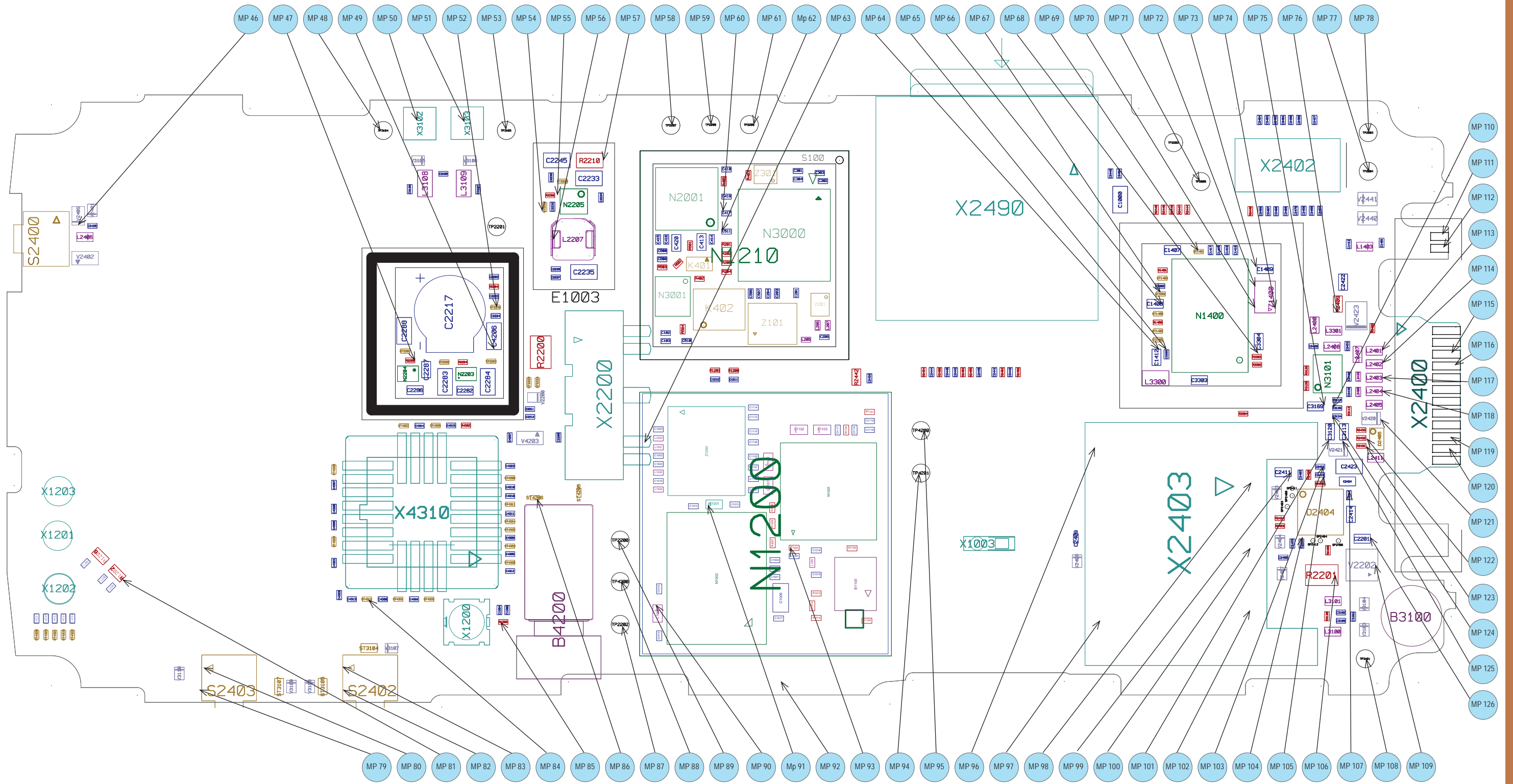
MP	MP 9 (R2106)	
	MCLK	
Phone Off	0Hz	Power sup 3.80 Volt
Phone On	26MHz	Power sup 3.80 Volt

VBUS

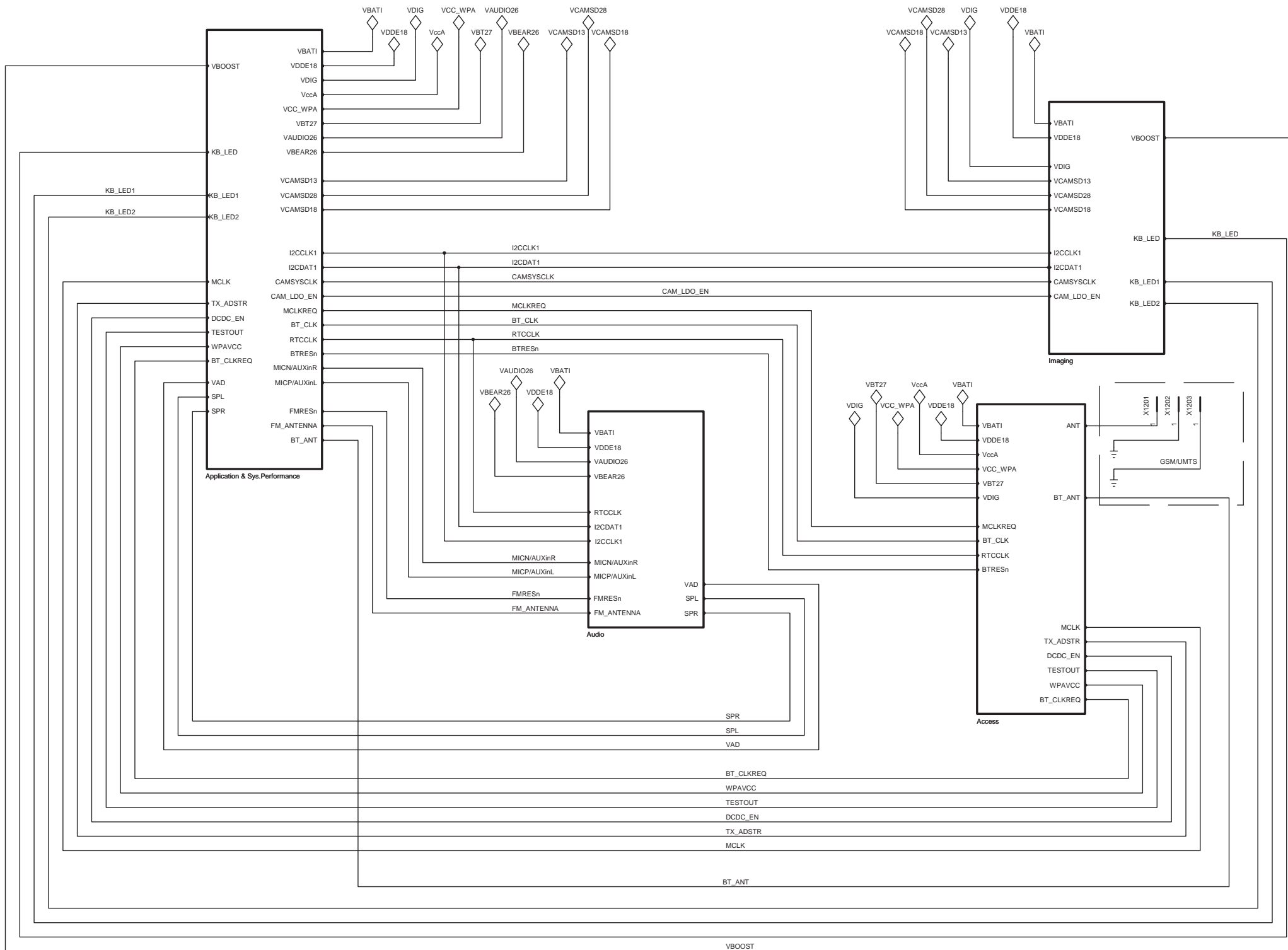
USB cable connected to PC

MP	MP 25 (ST2201)	Power sup 3.80 Volt
	VBUS	
USB Cable disconnected from the phone	0.00V	
USB Cable connected to the phone	5.0V	

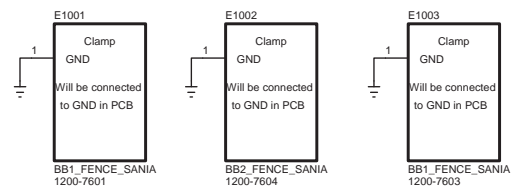
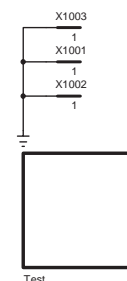




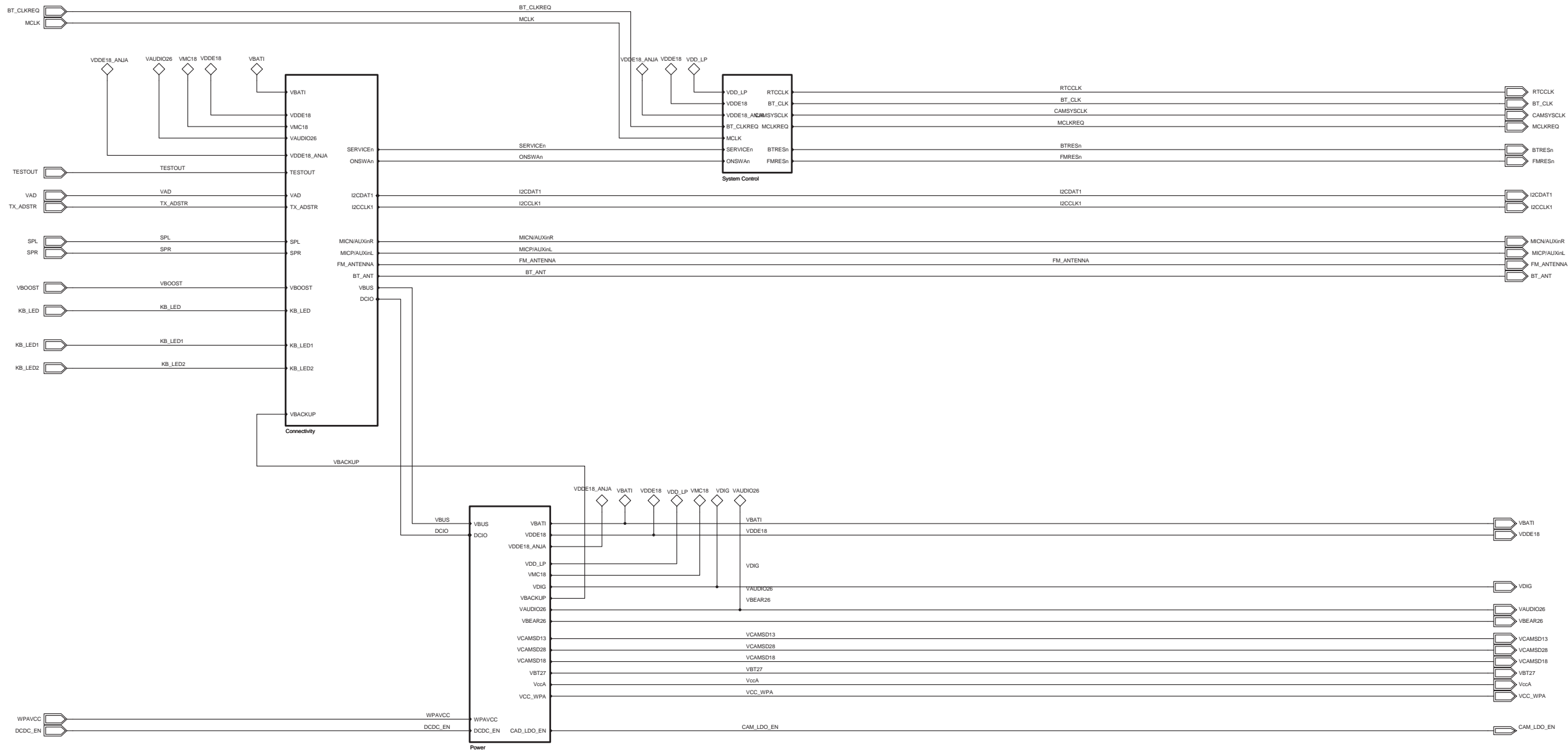
MEASUREMENT POINTS



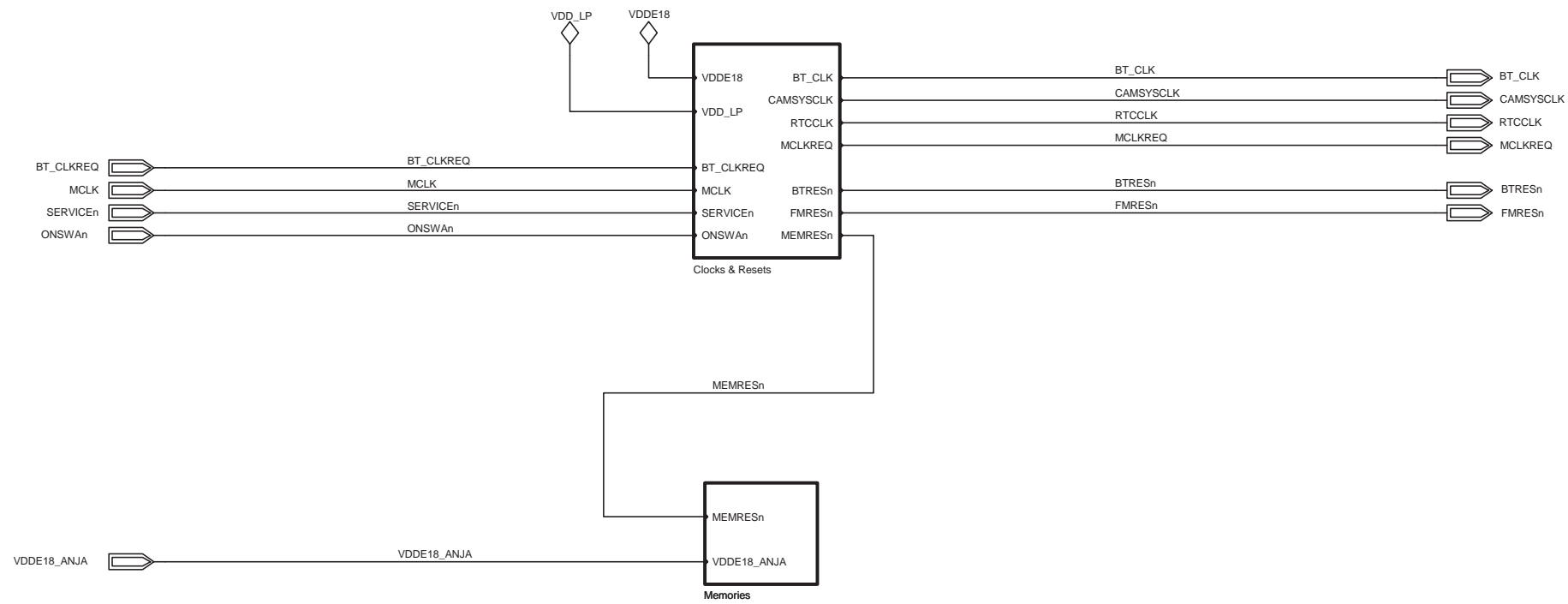
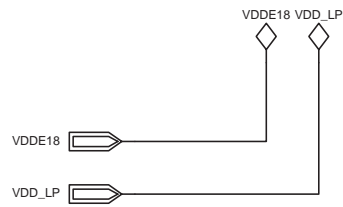
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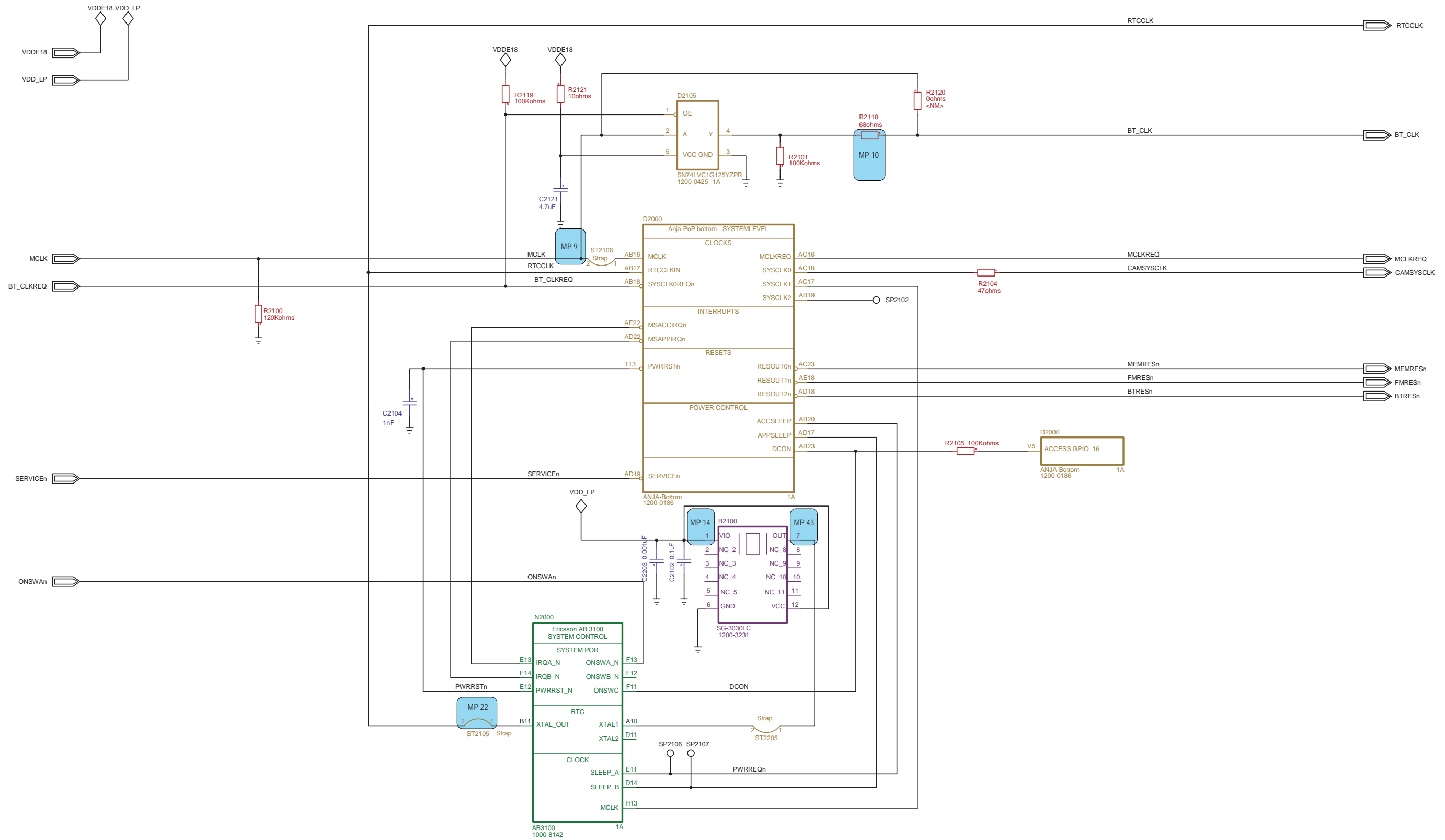
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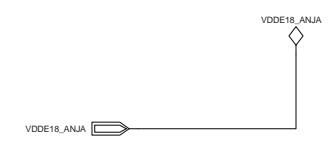
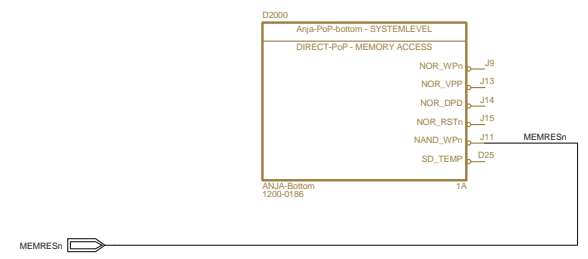
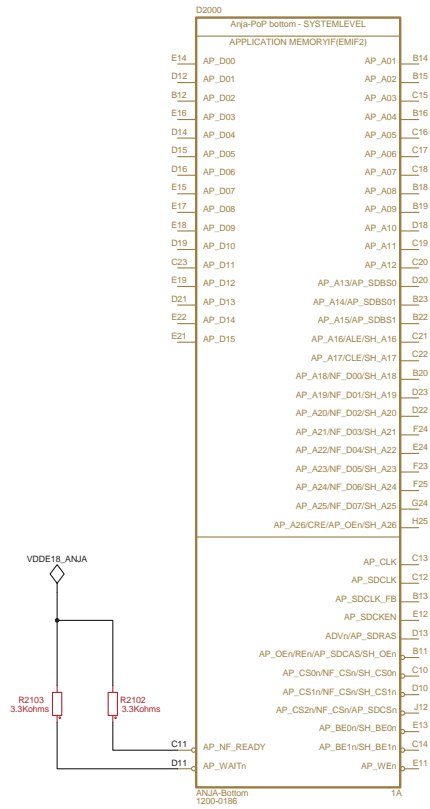
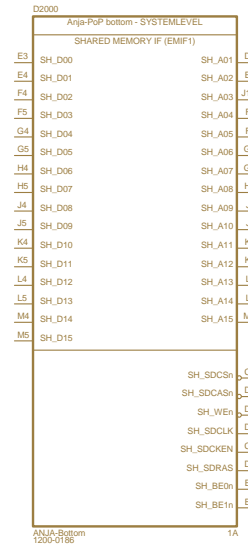


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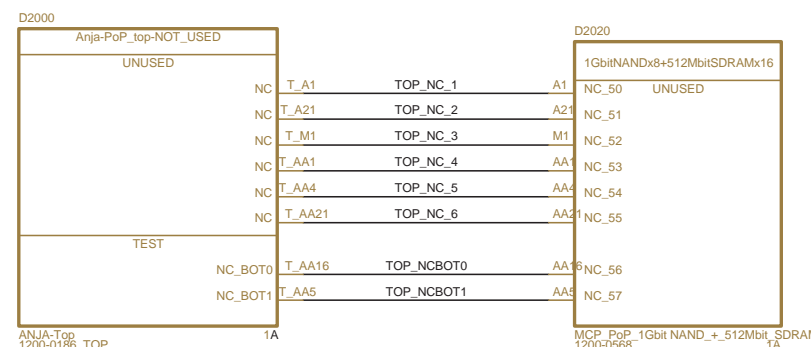
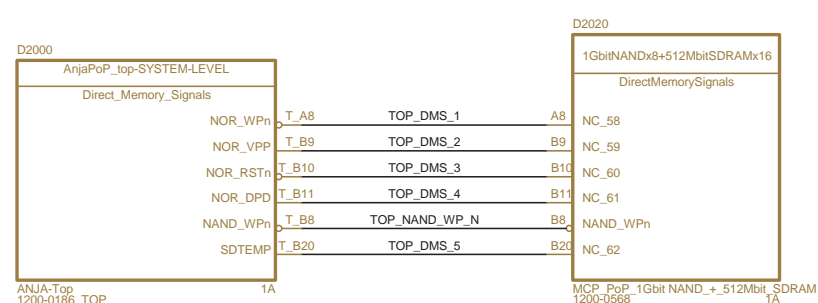
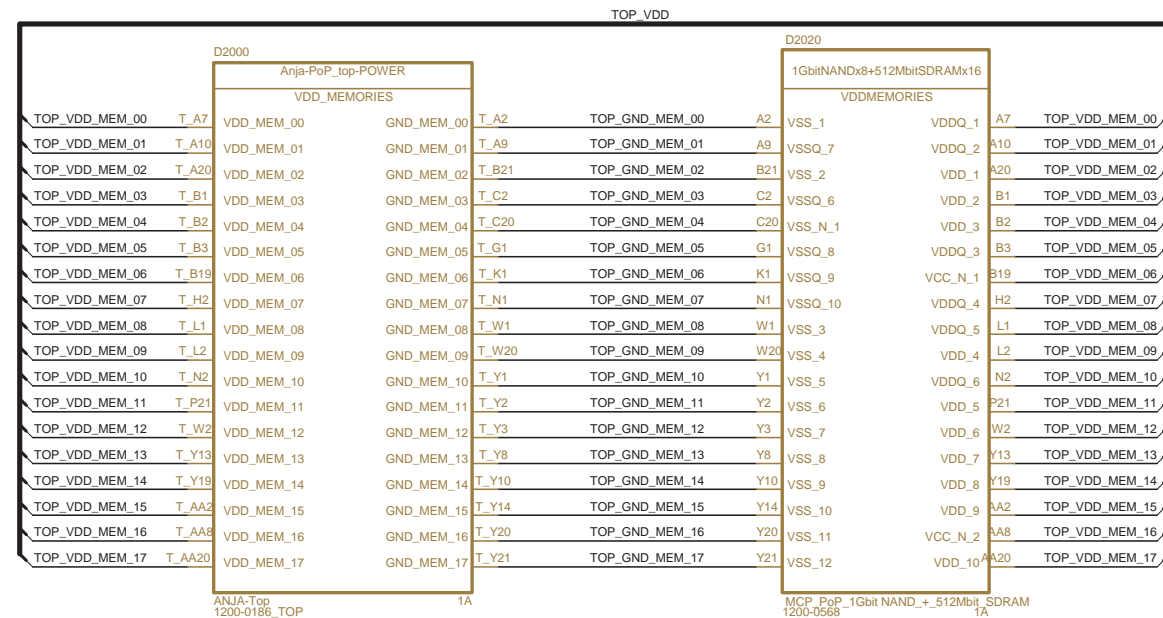
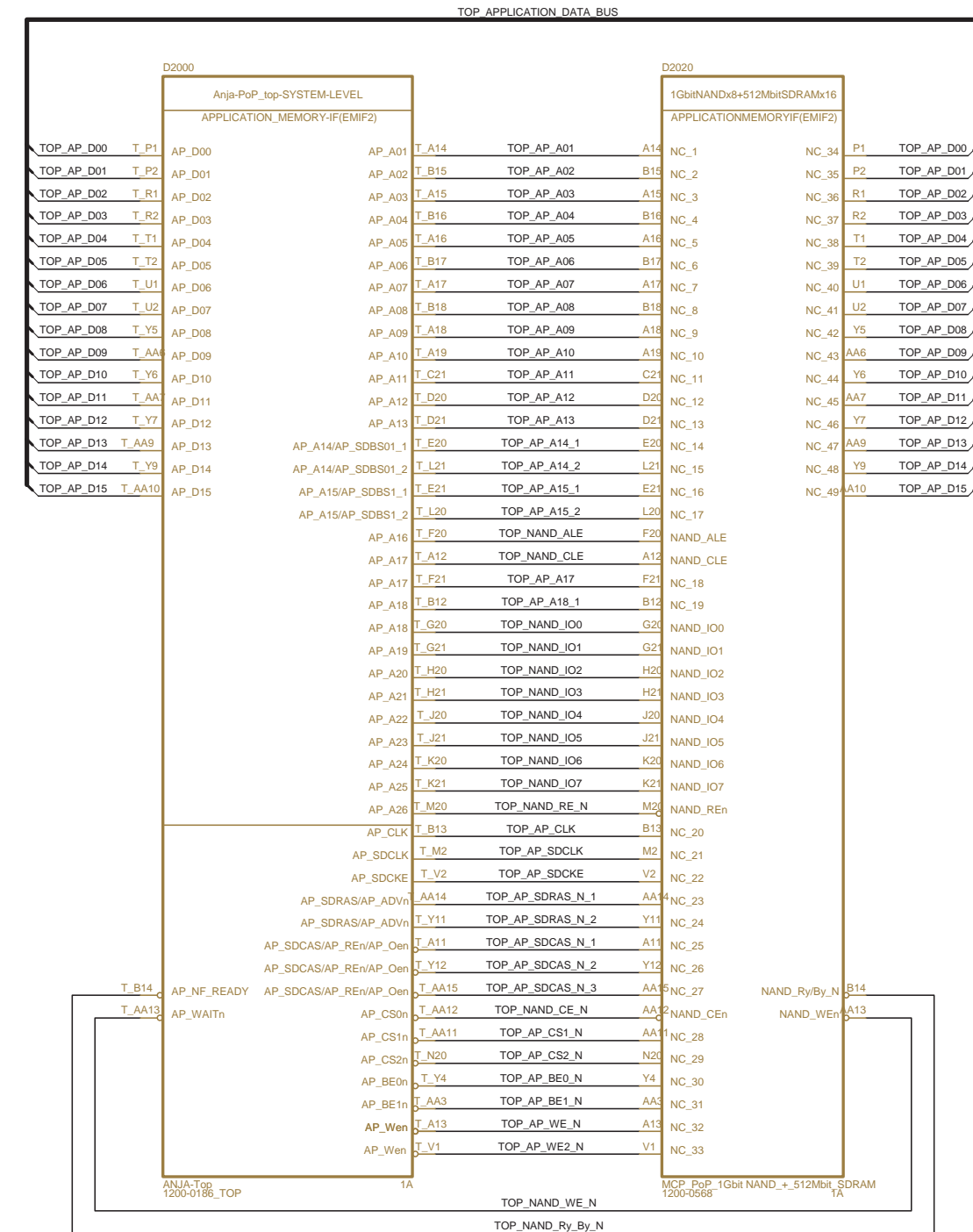
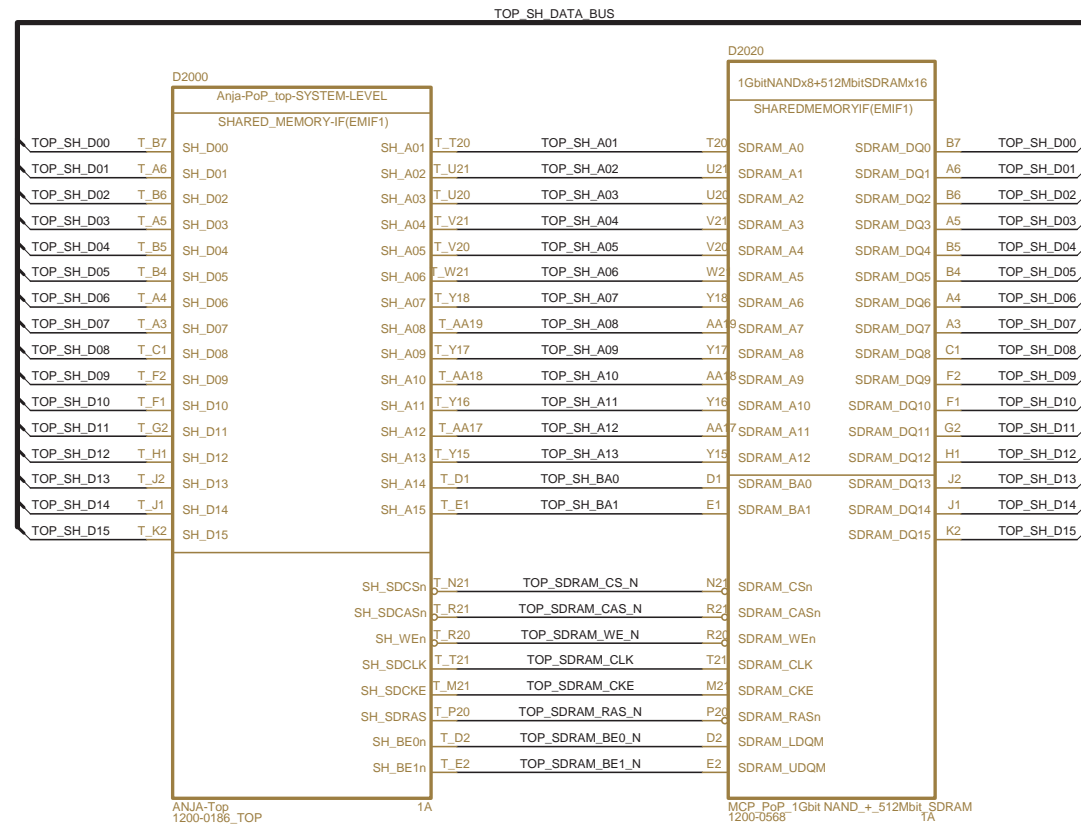


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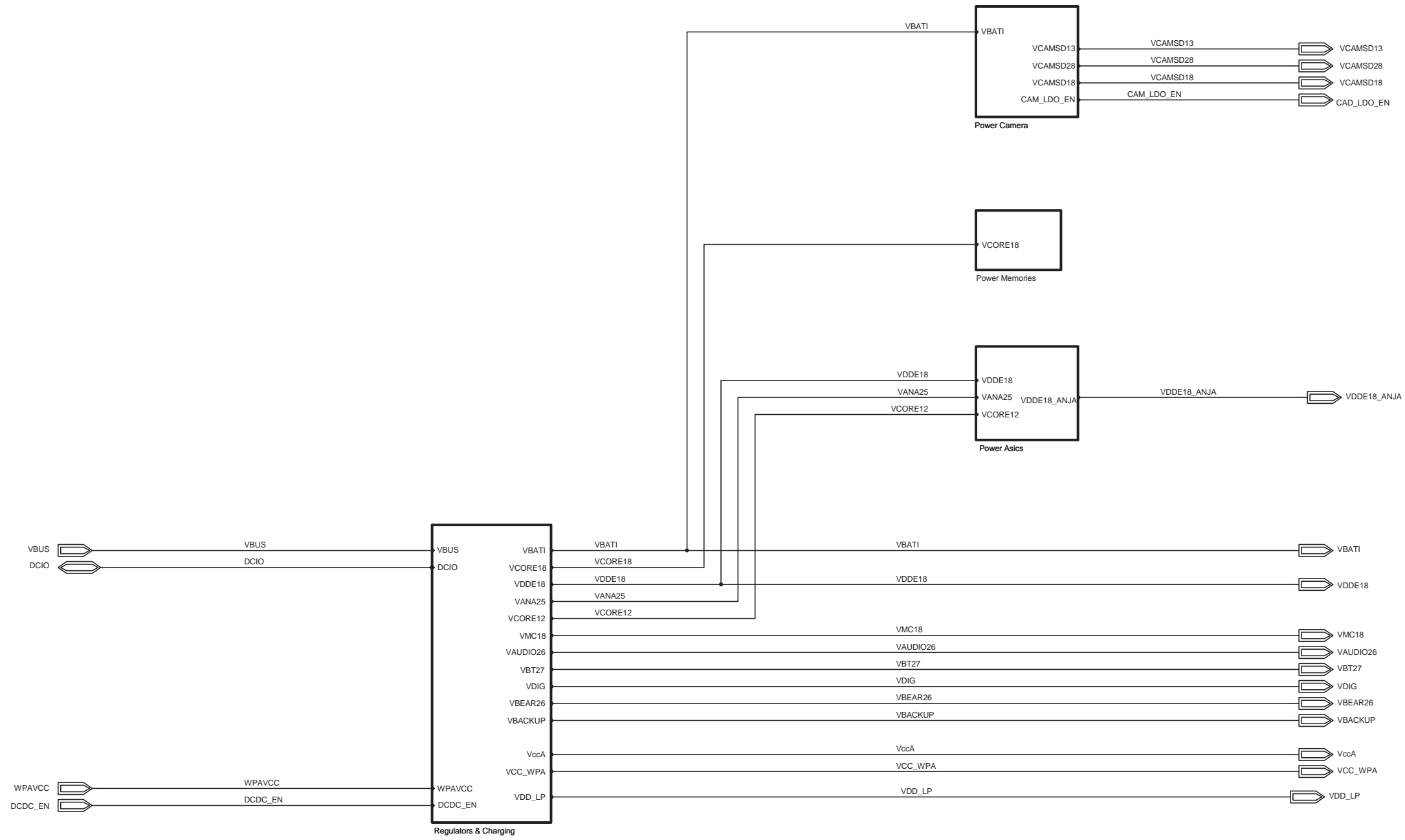
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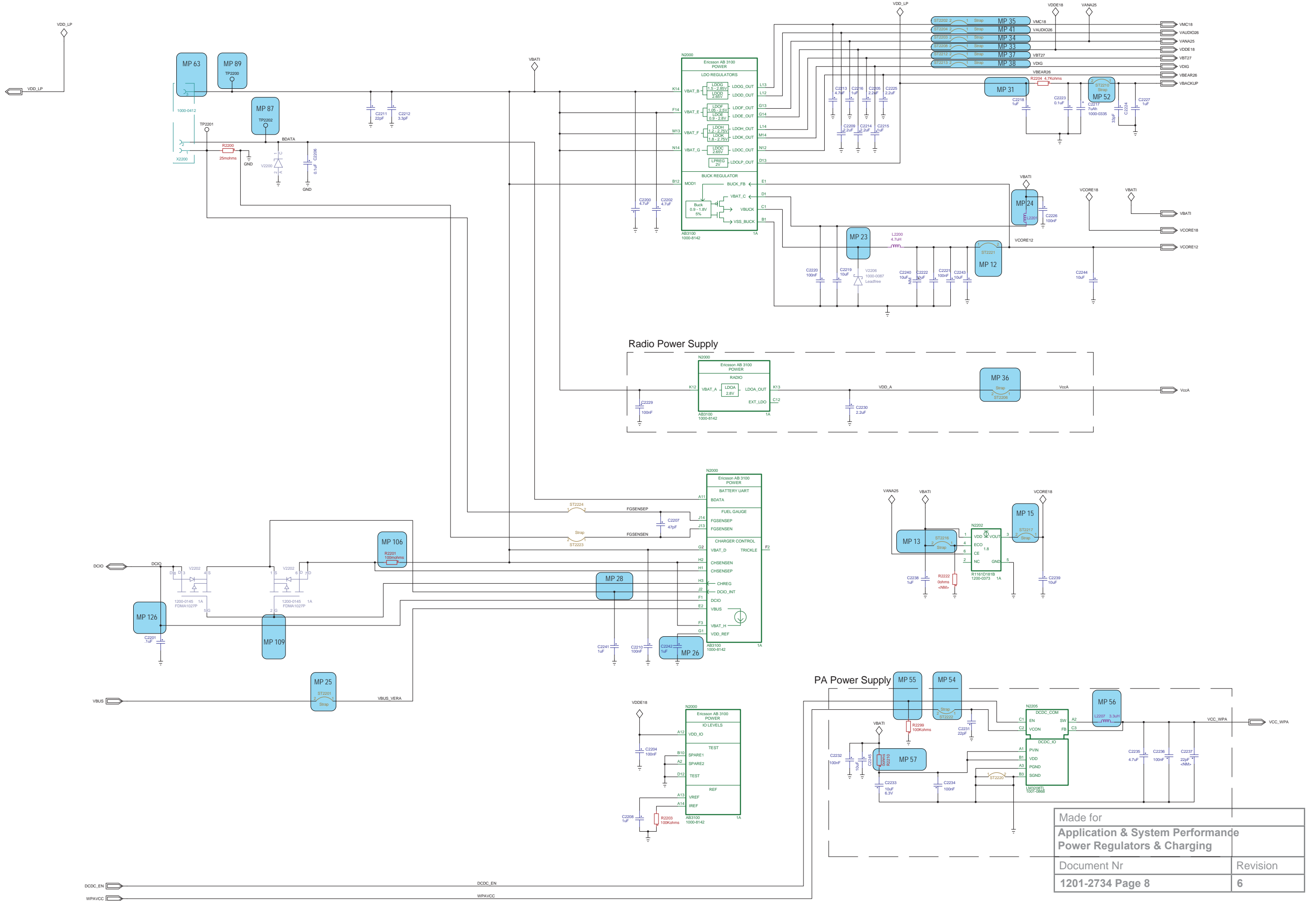
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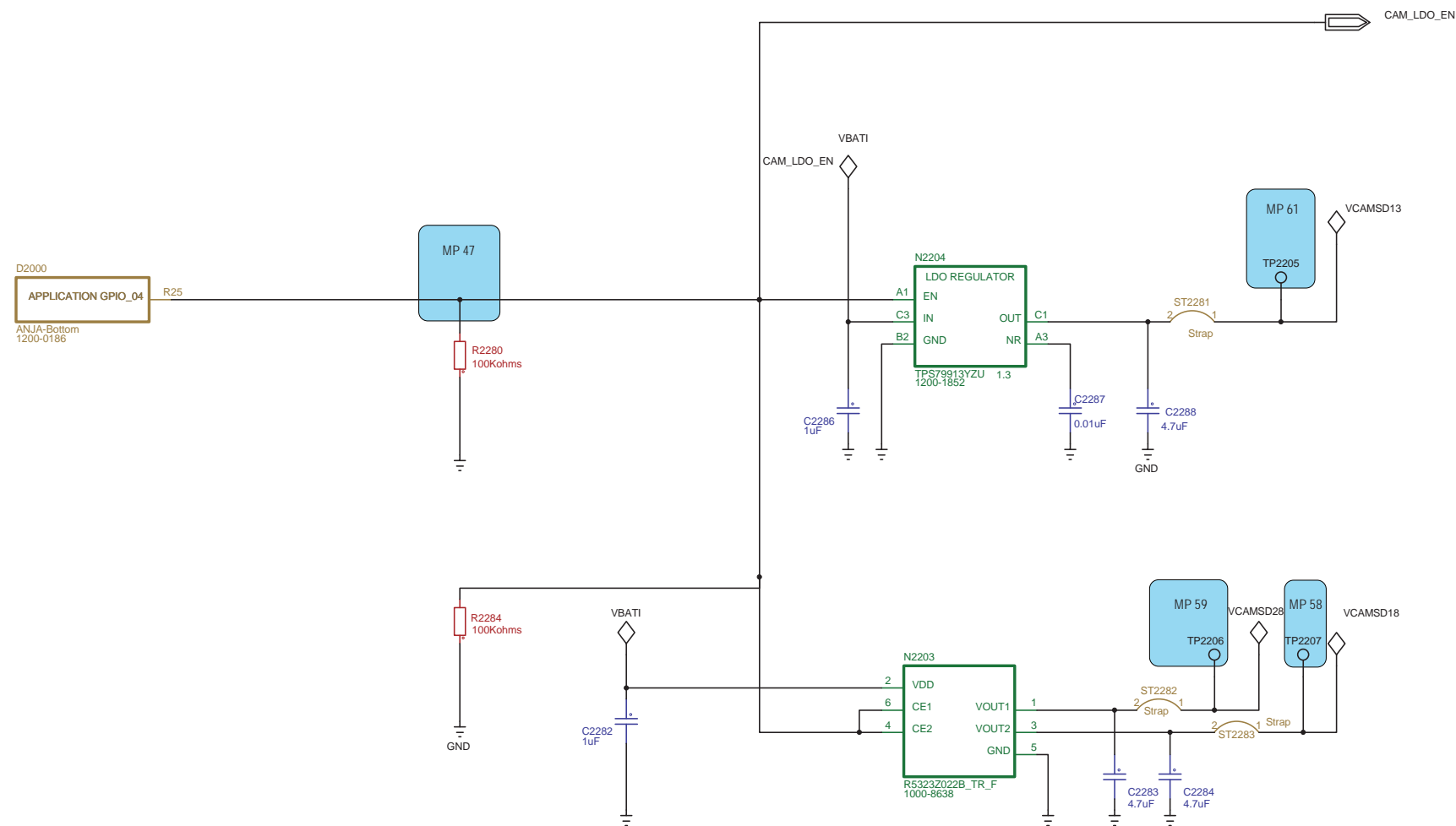
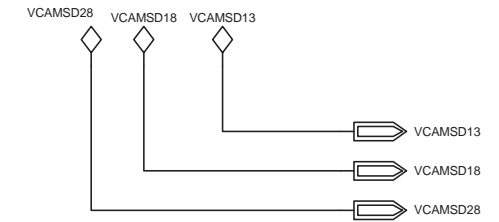
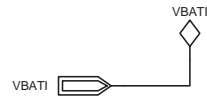
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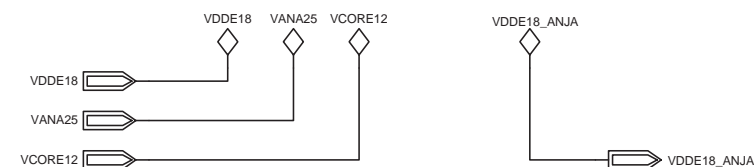
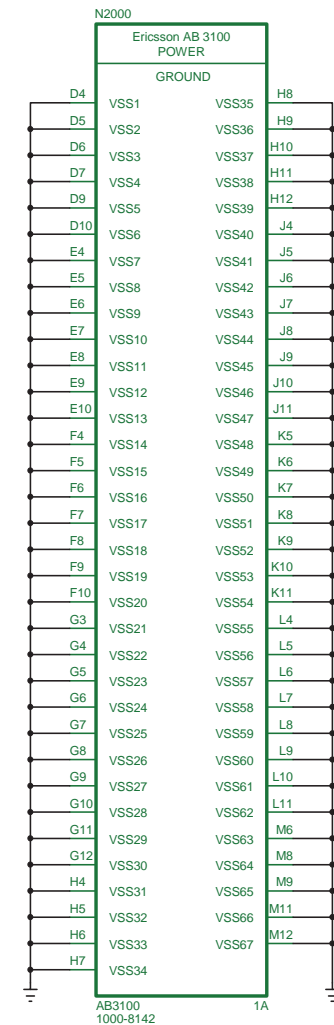
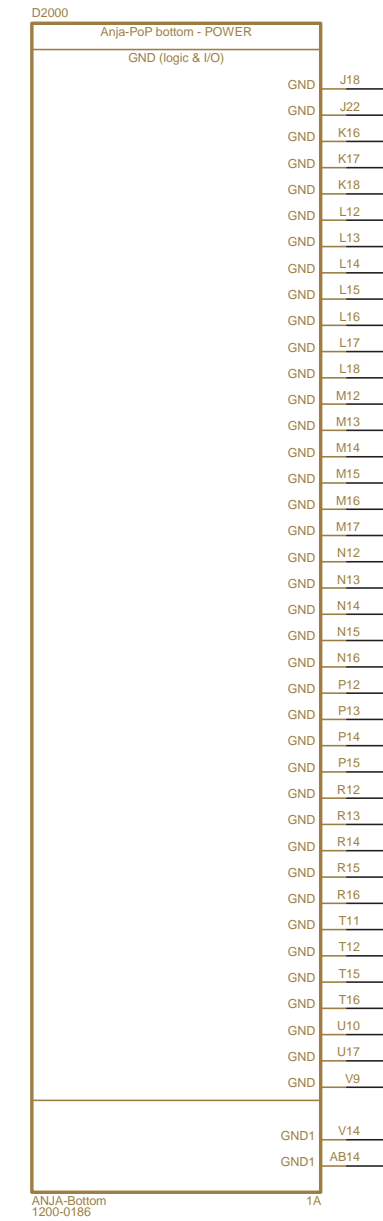
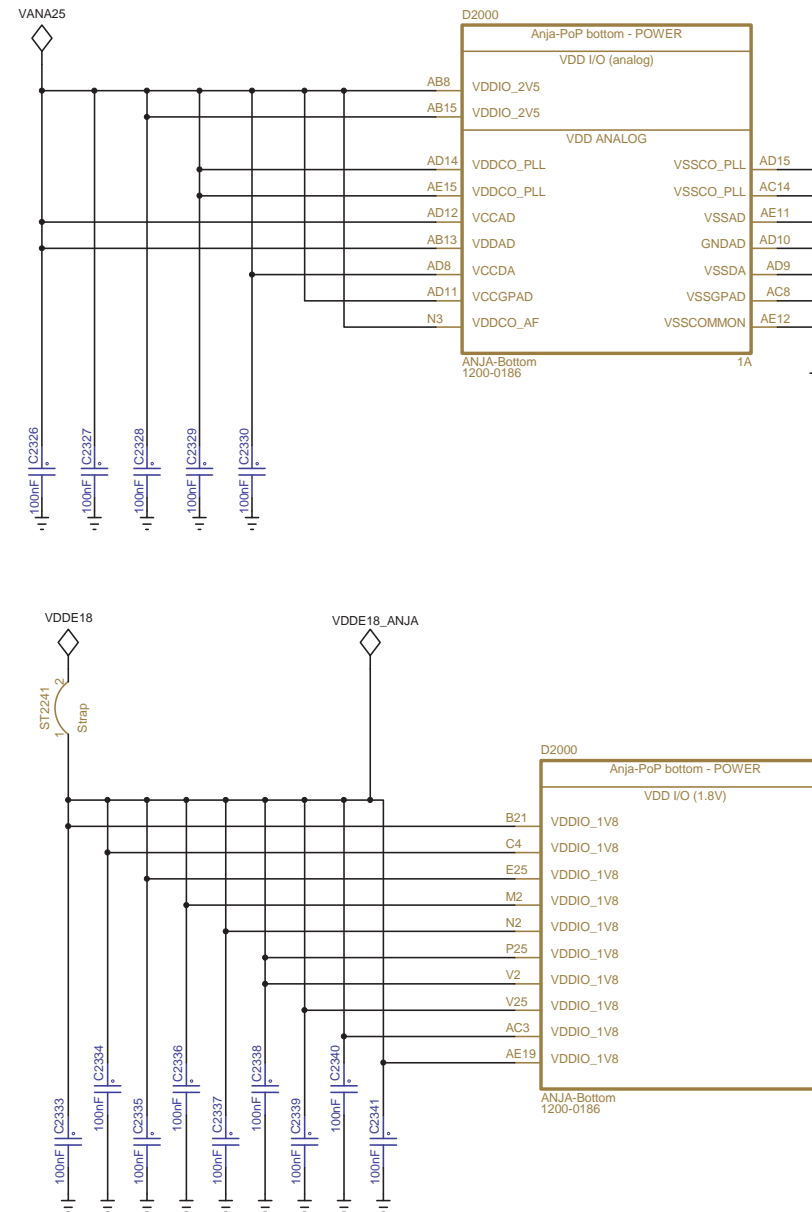
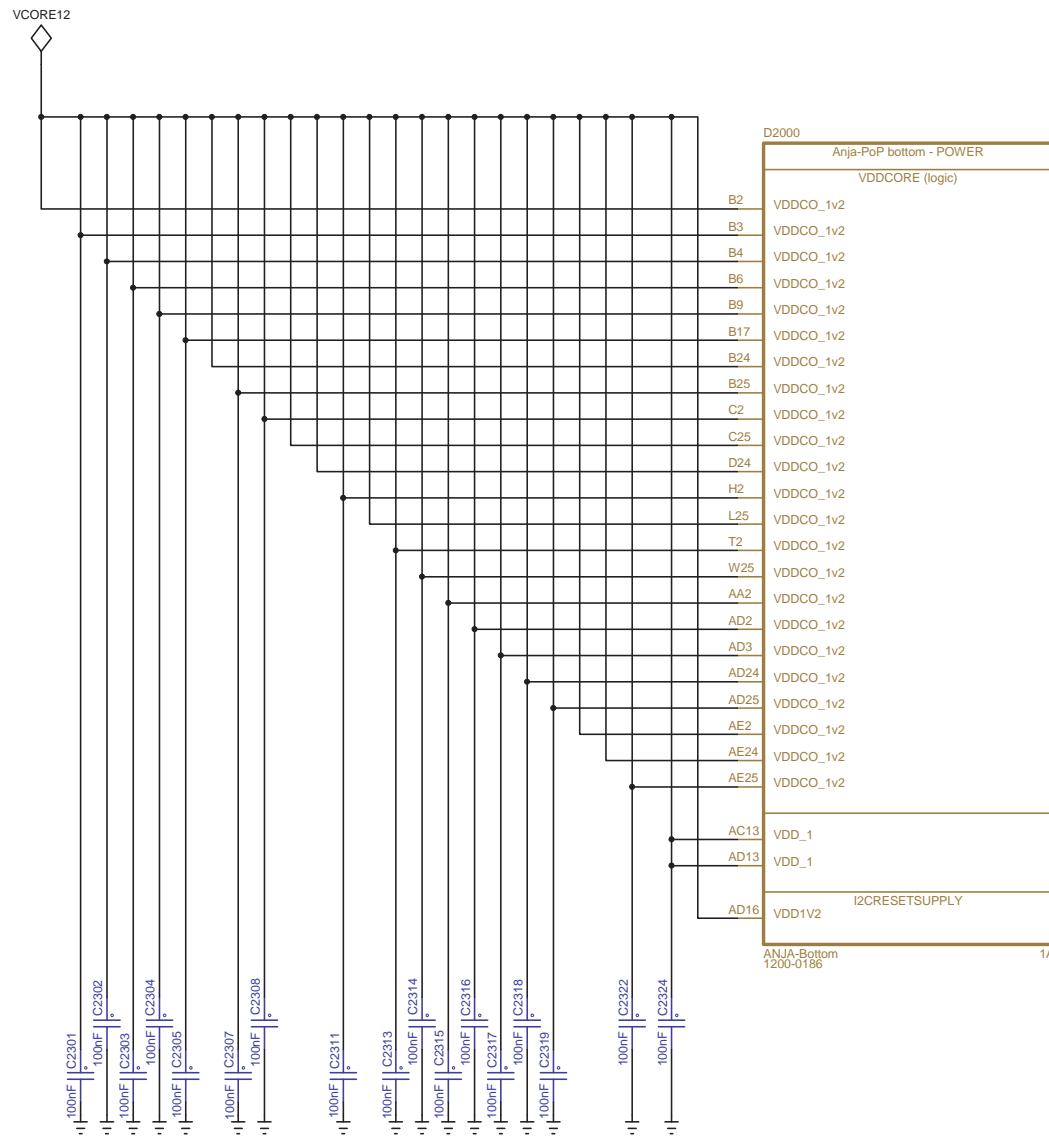


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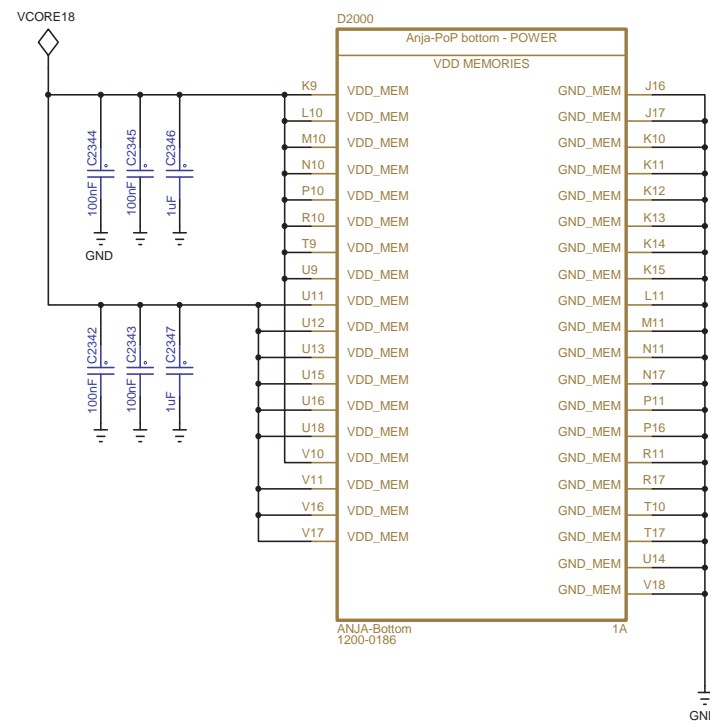
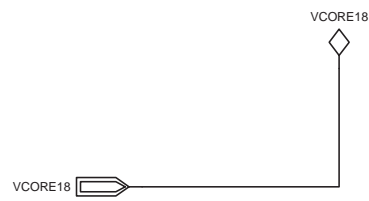


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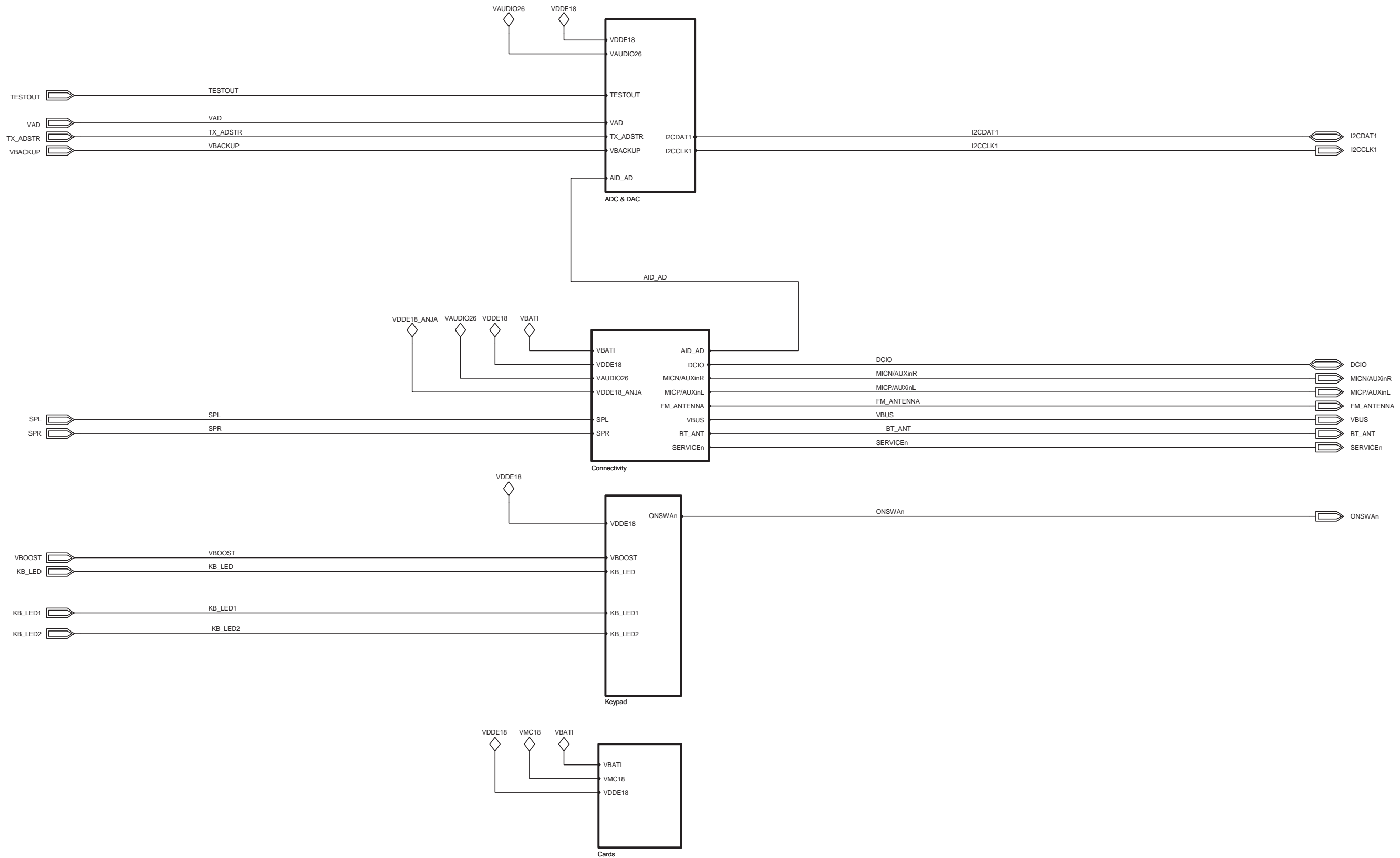
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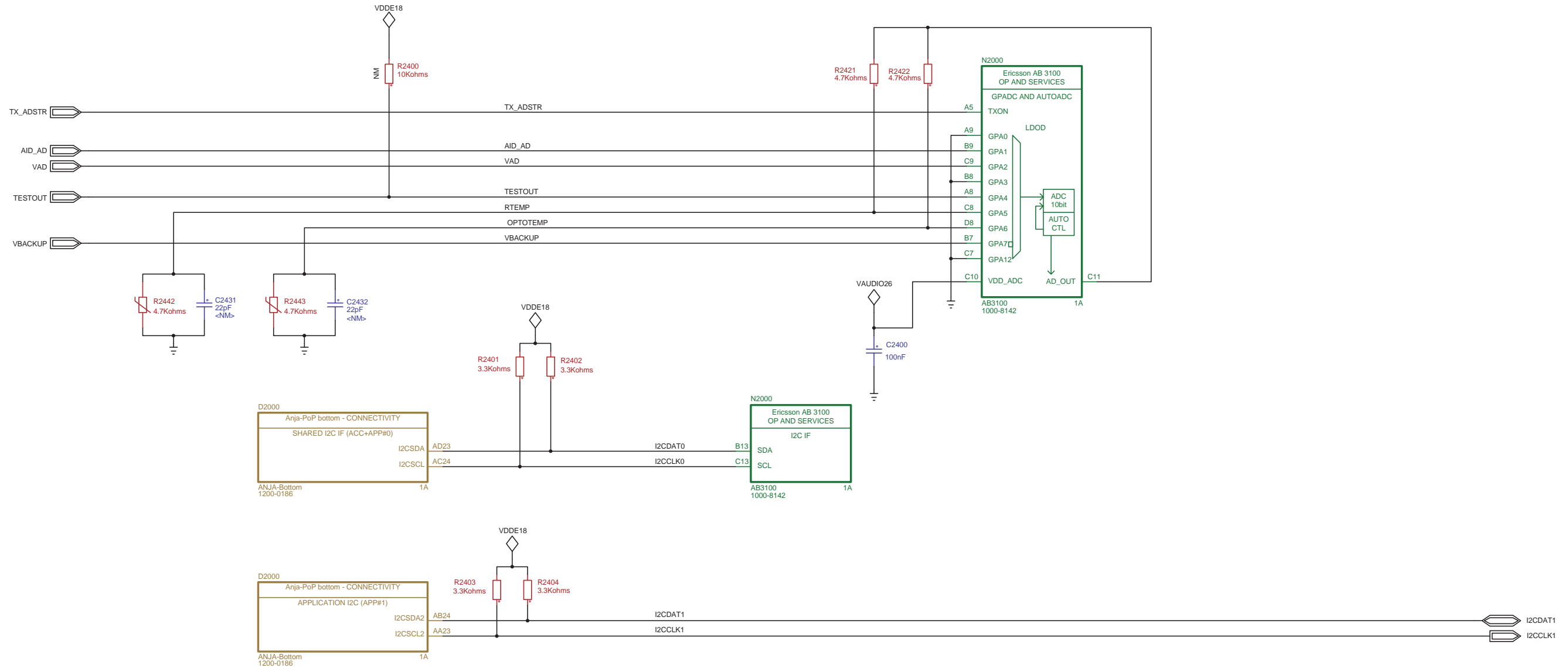
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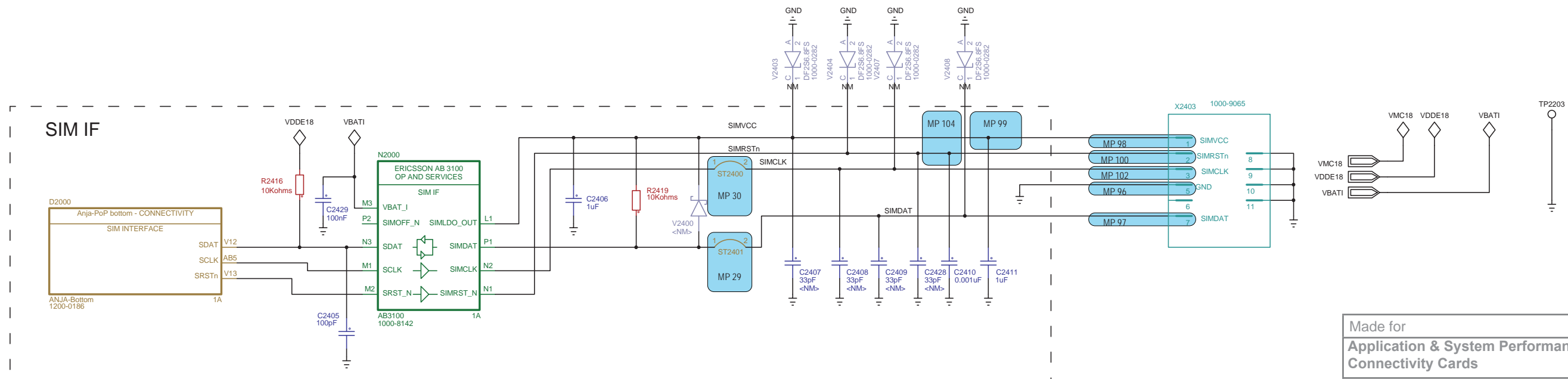
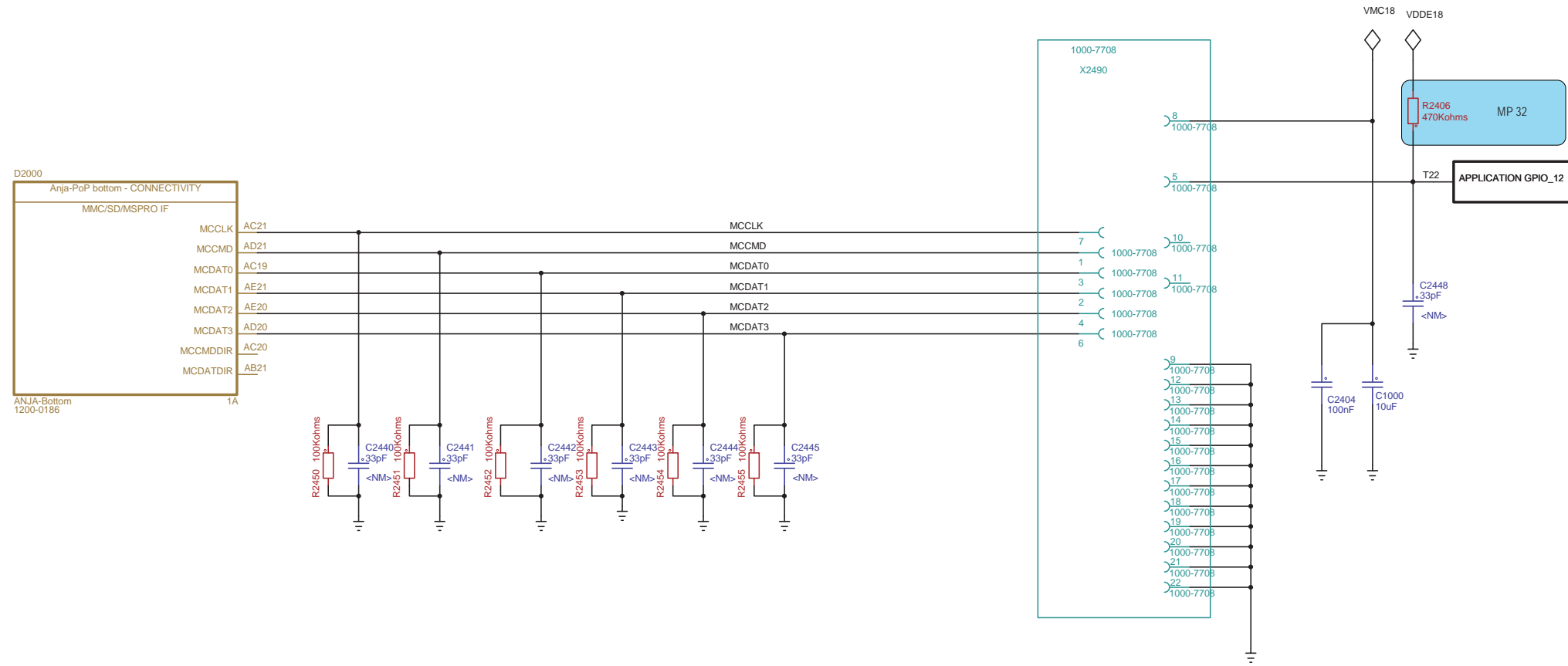
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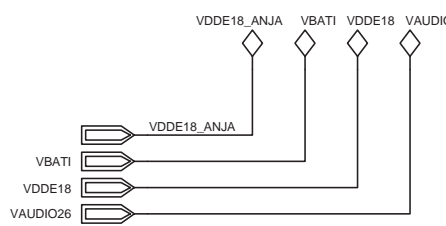
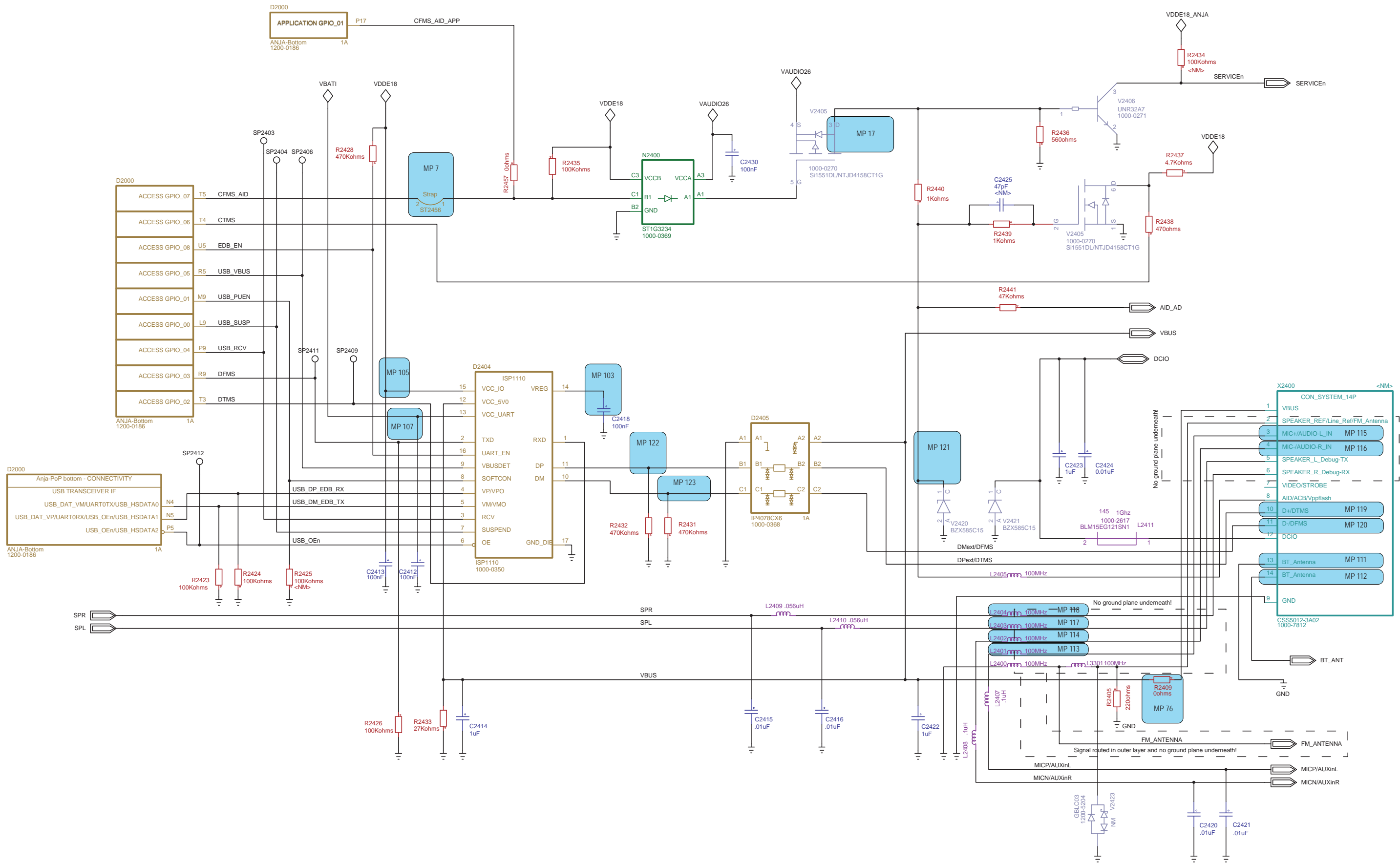
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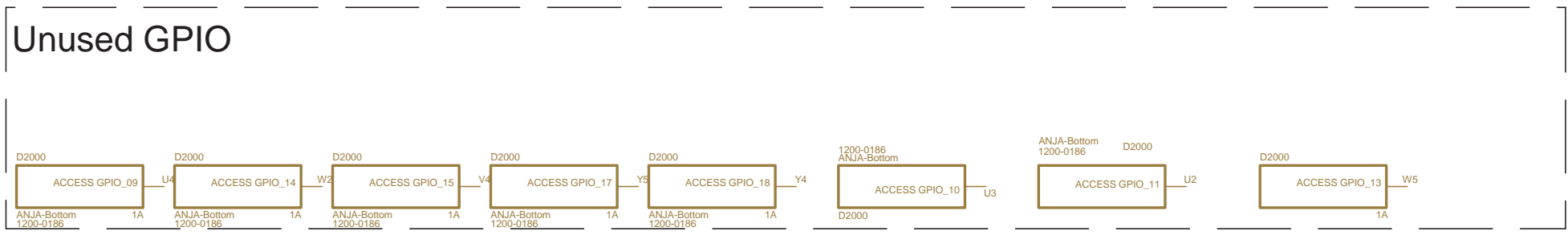
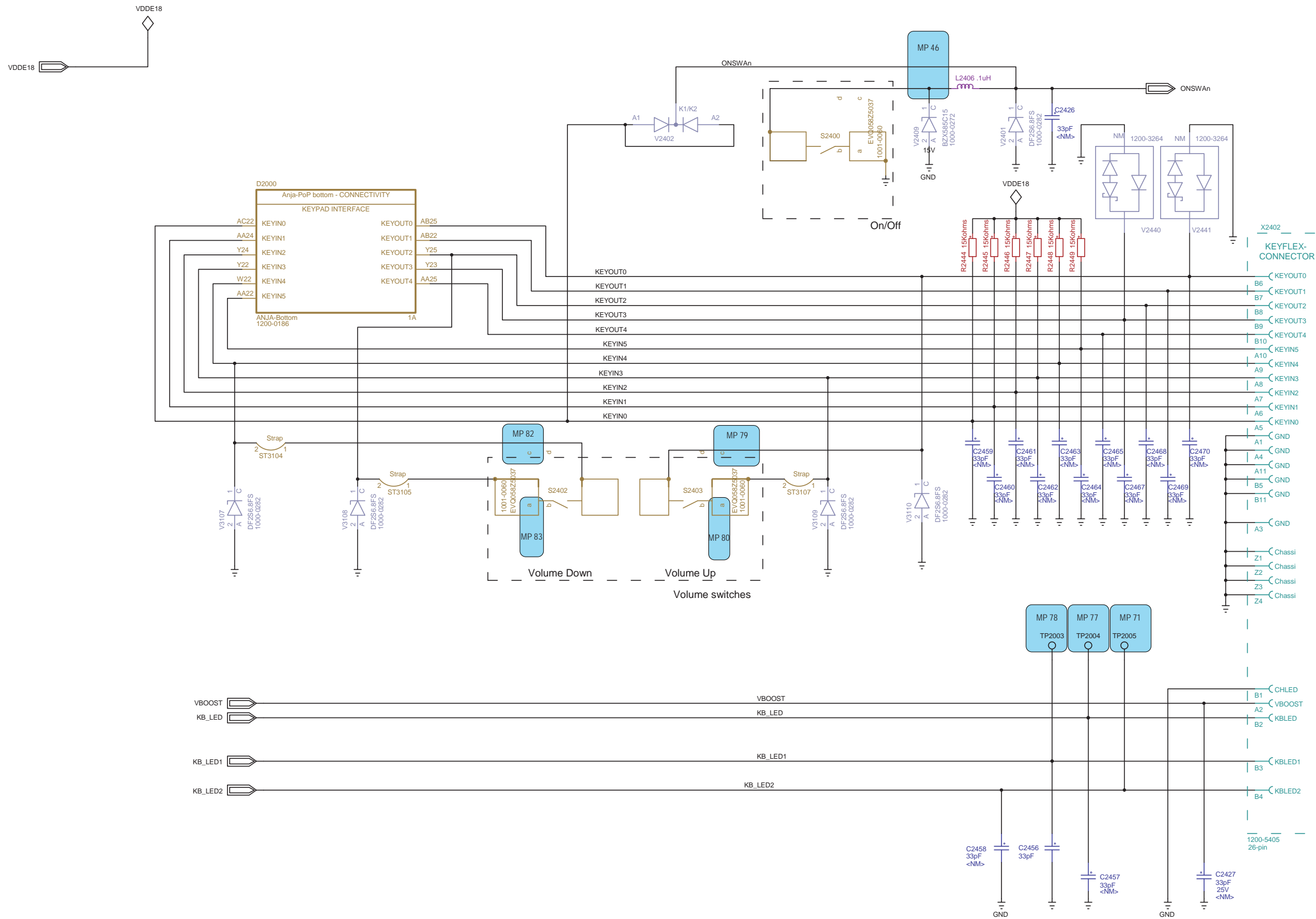
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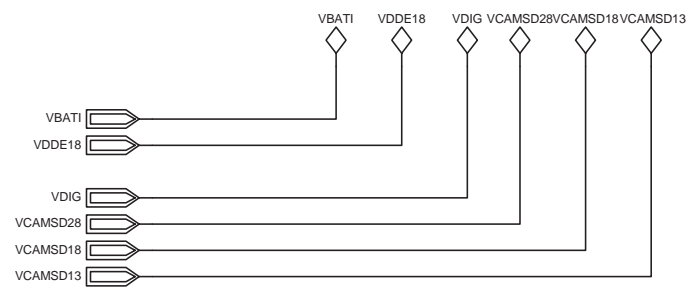
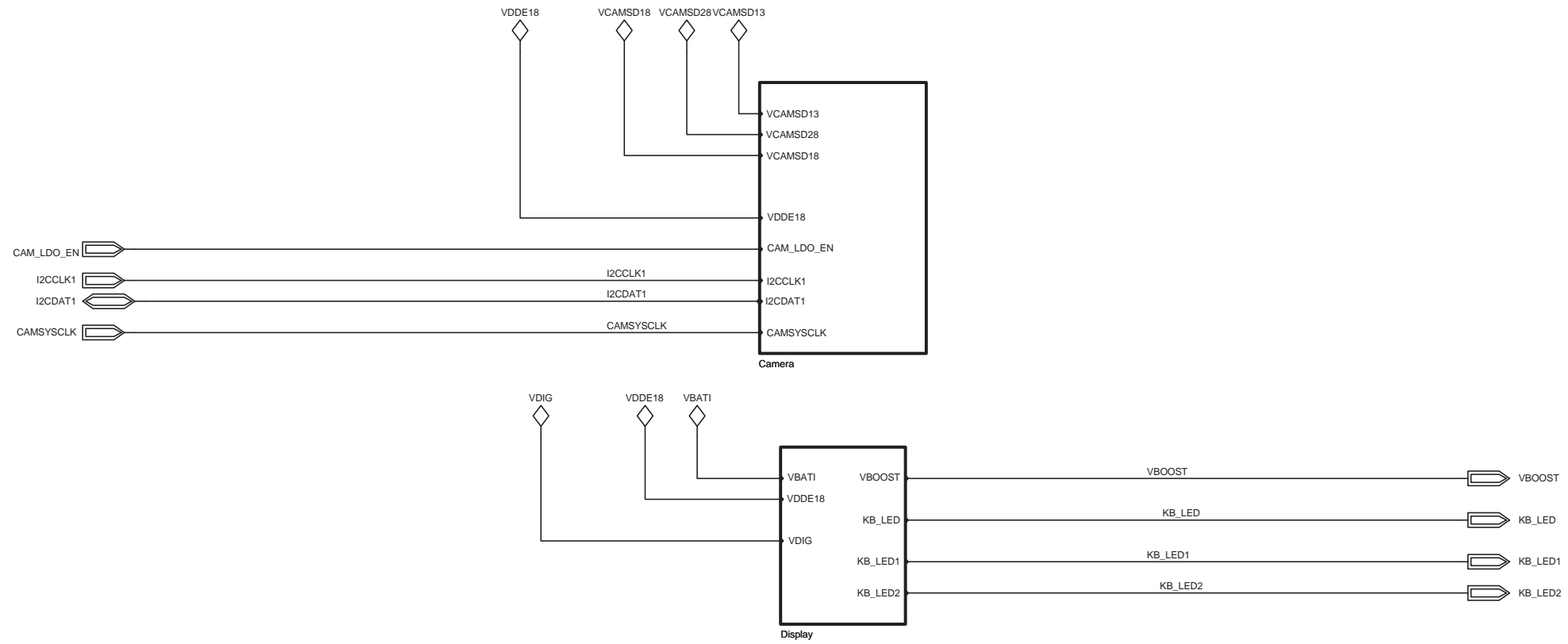
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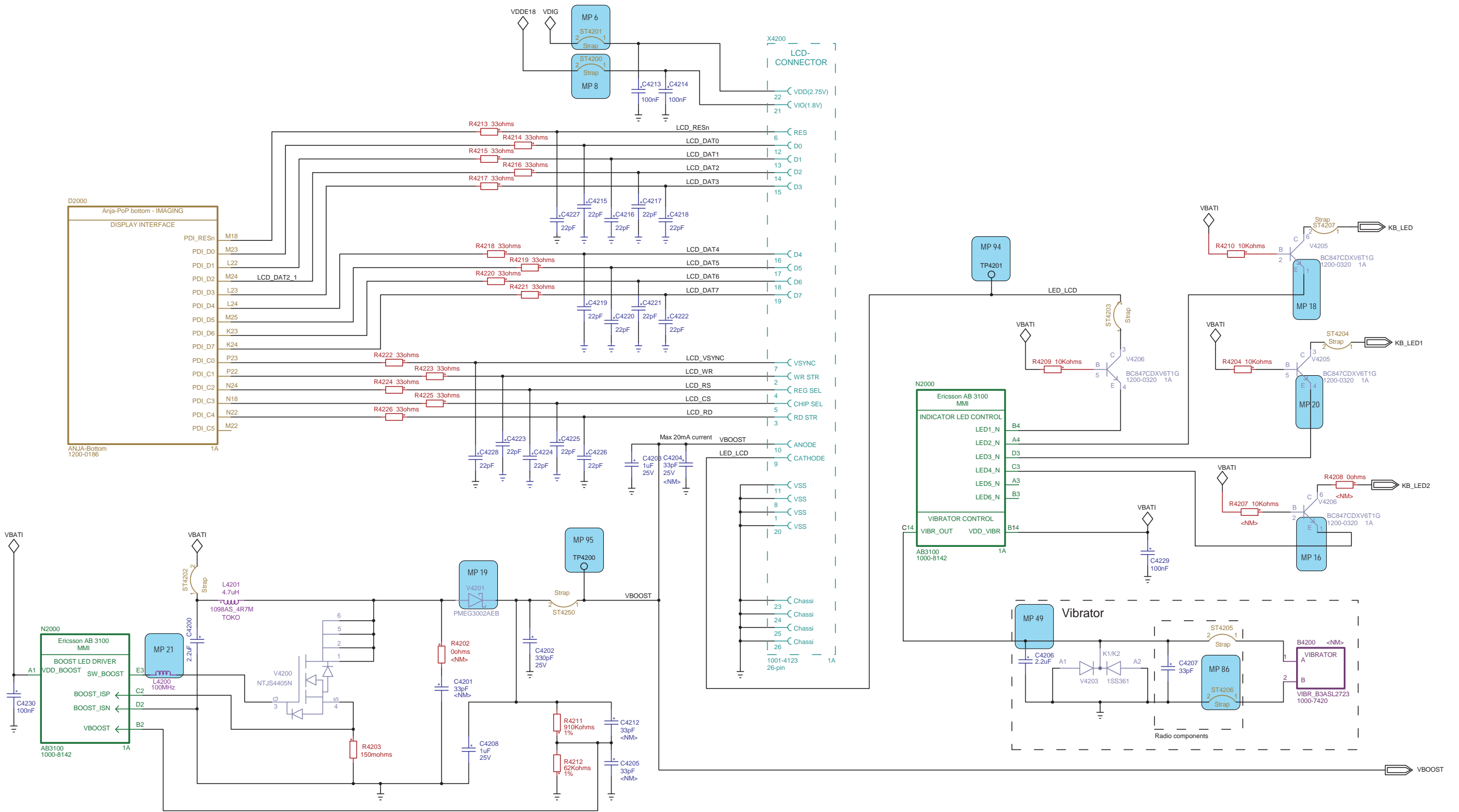
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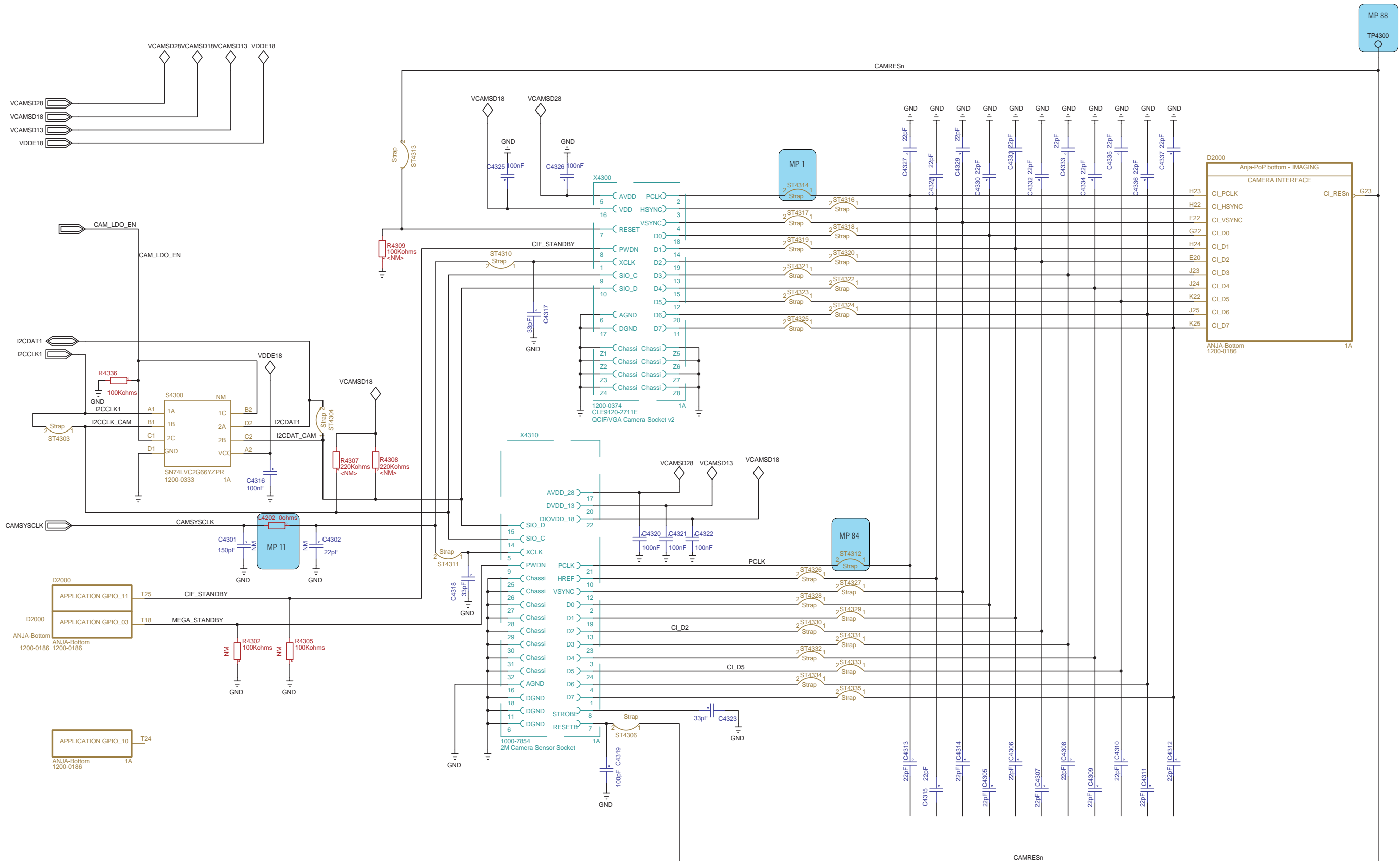


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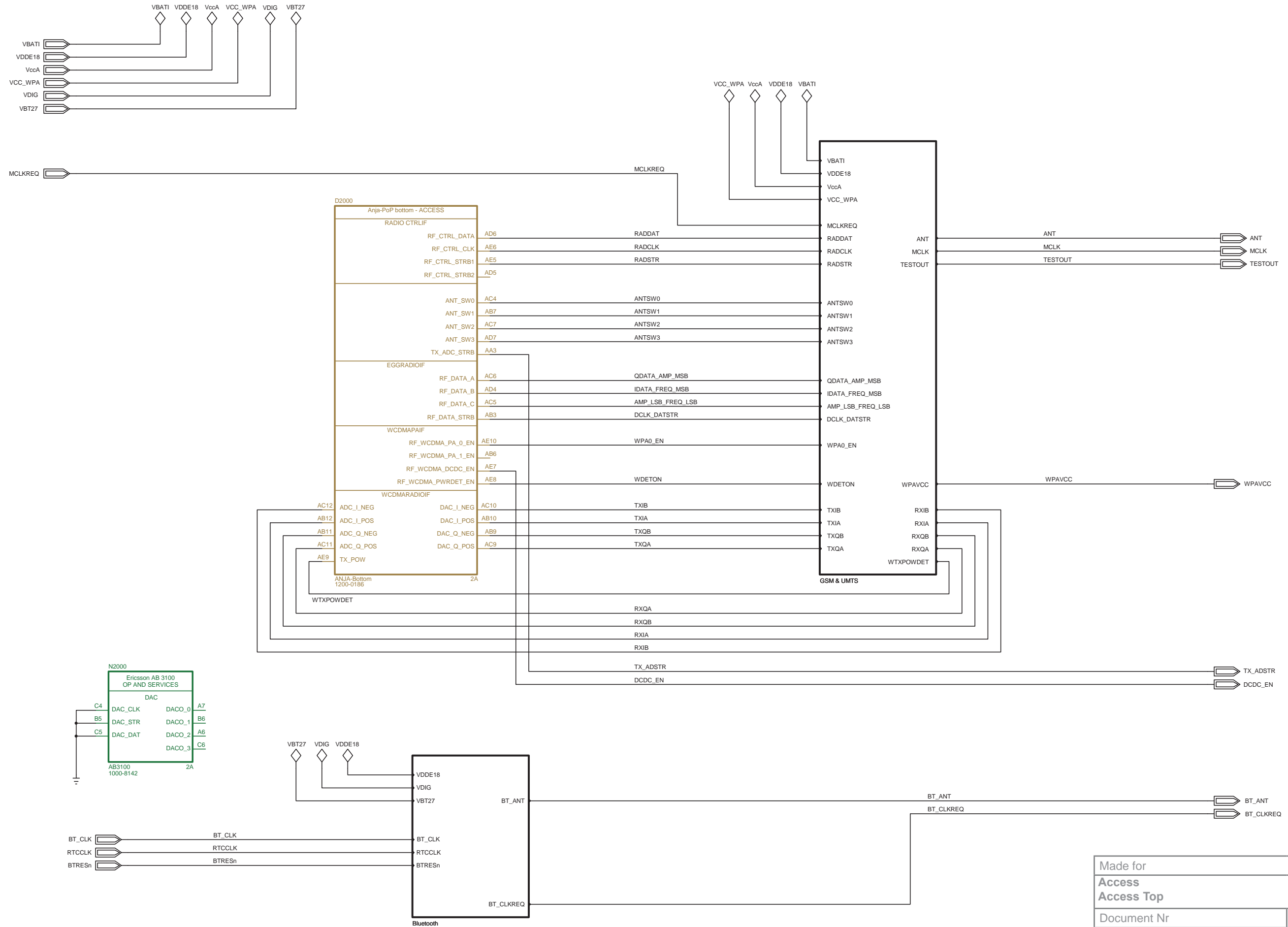
MEASUREMENT POINTS

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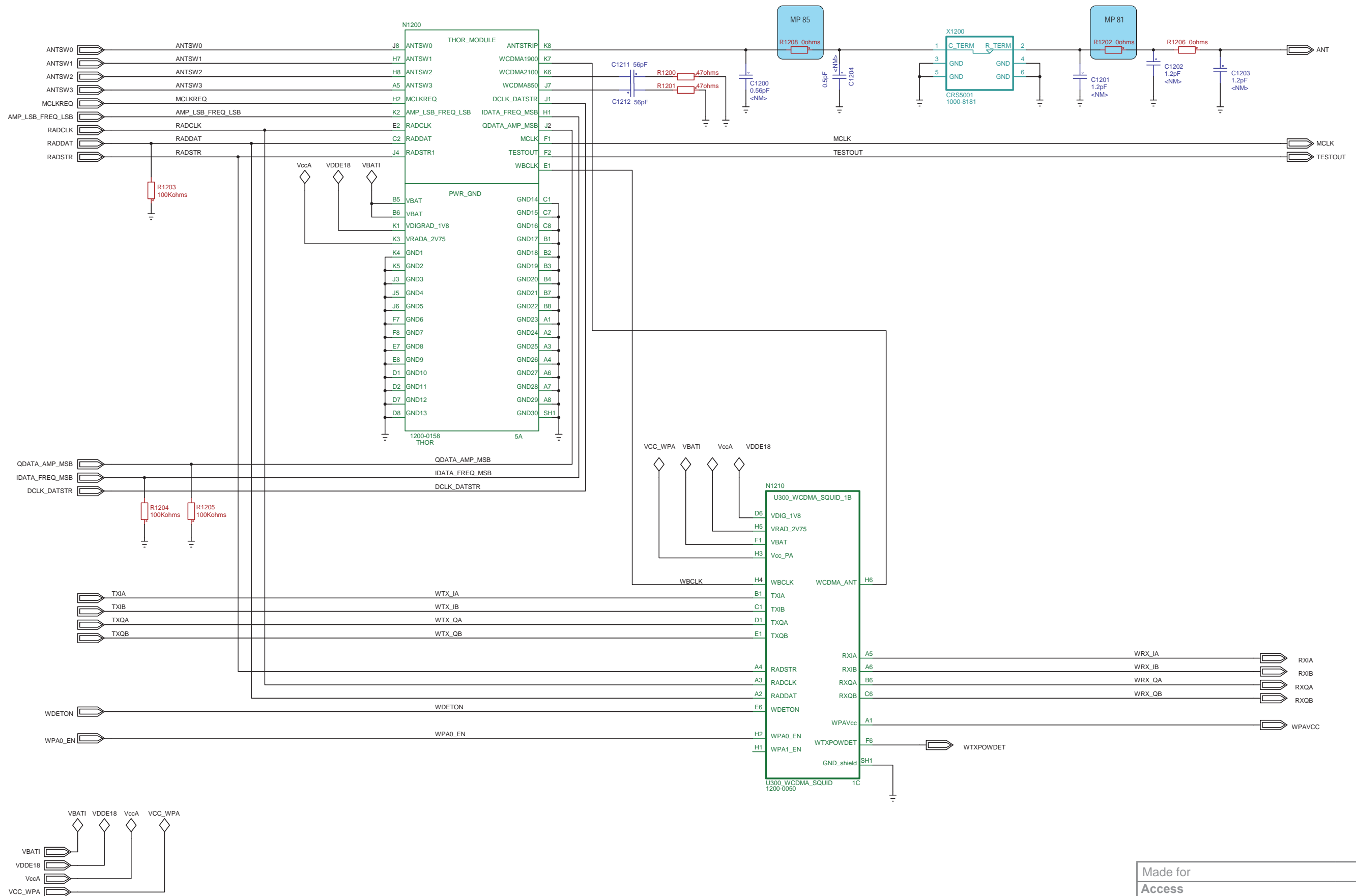


MEASUREMENT POINTS

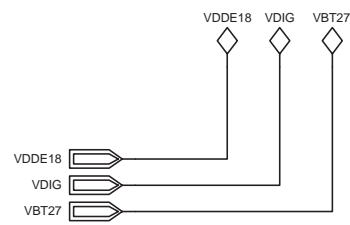
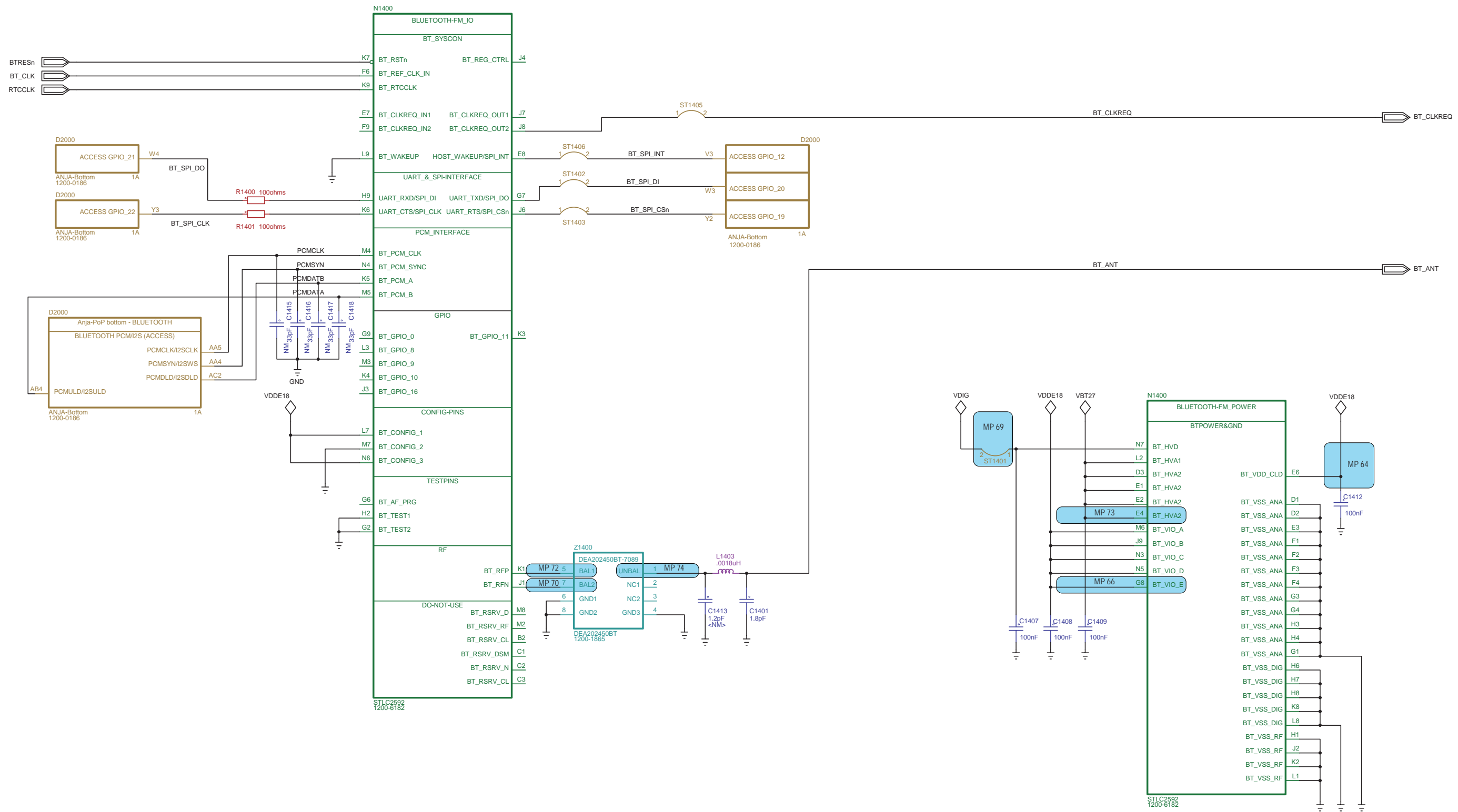
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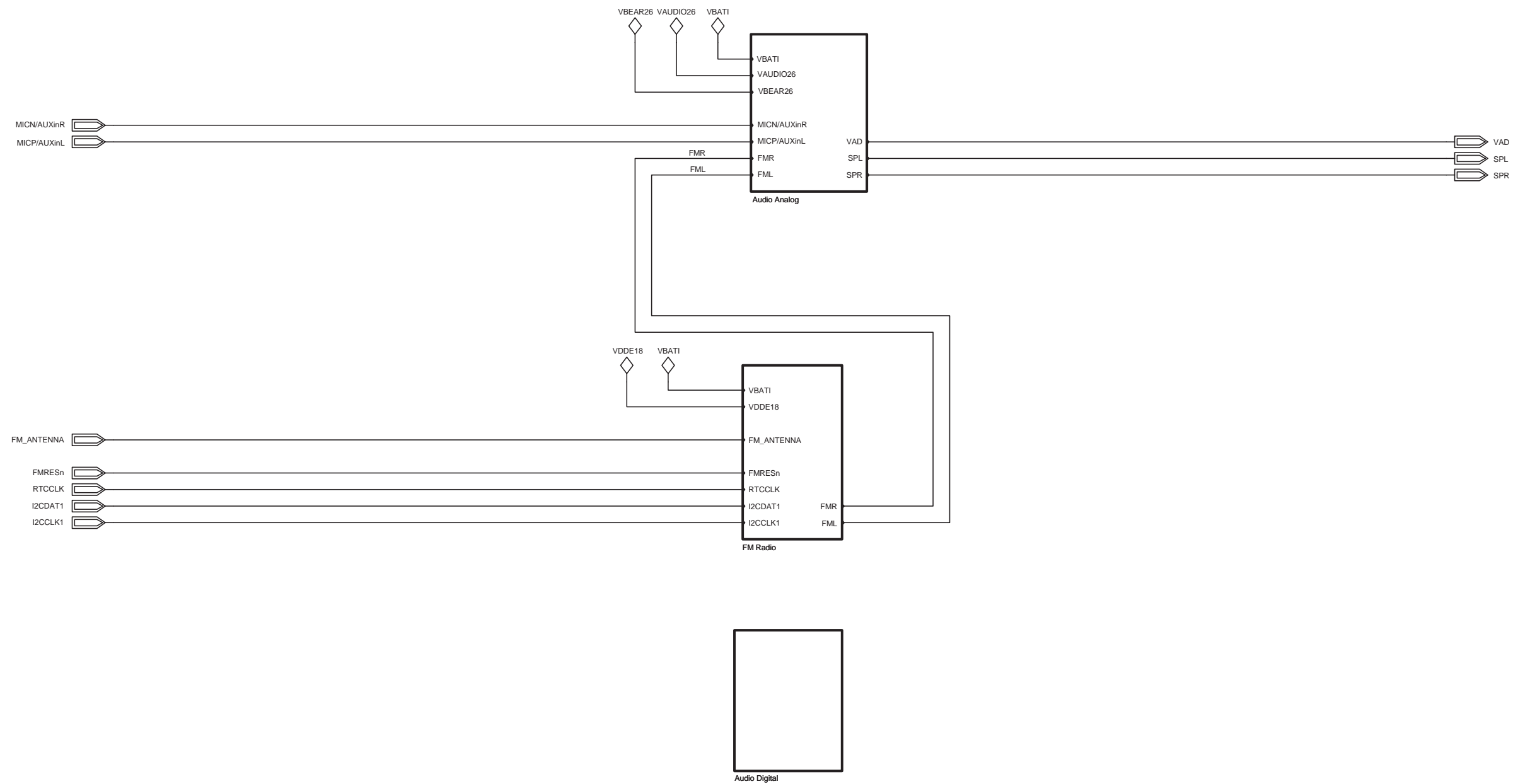
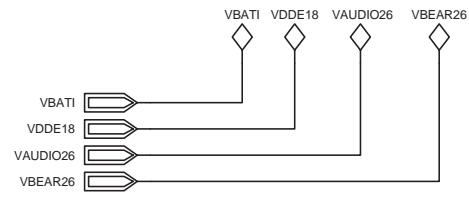


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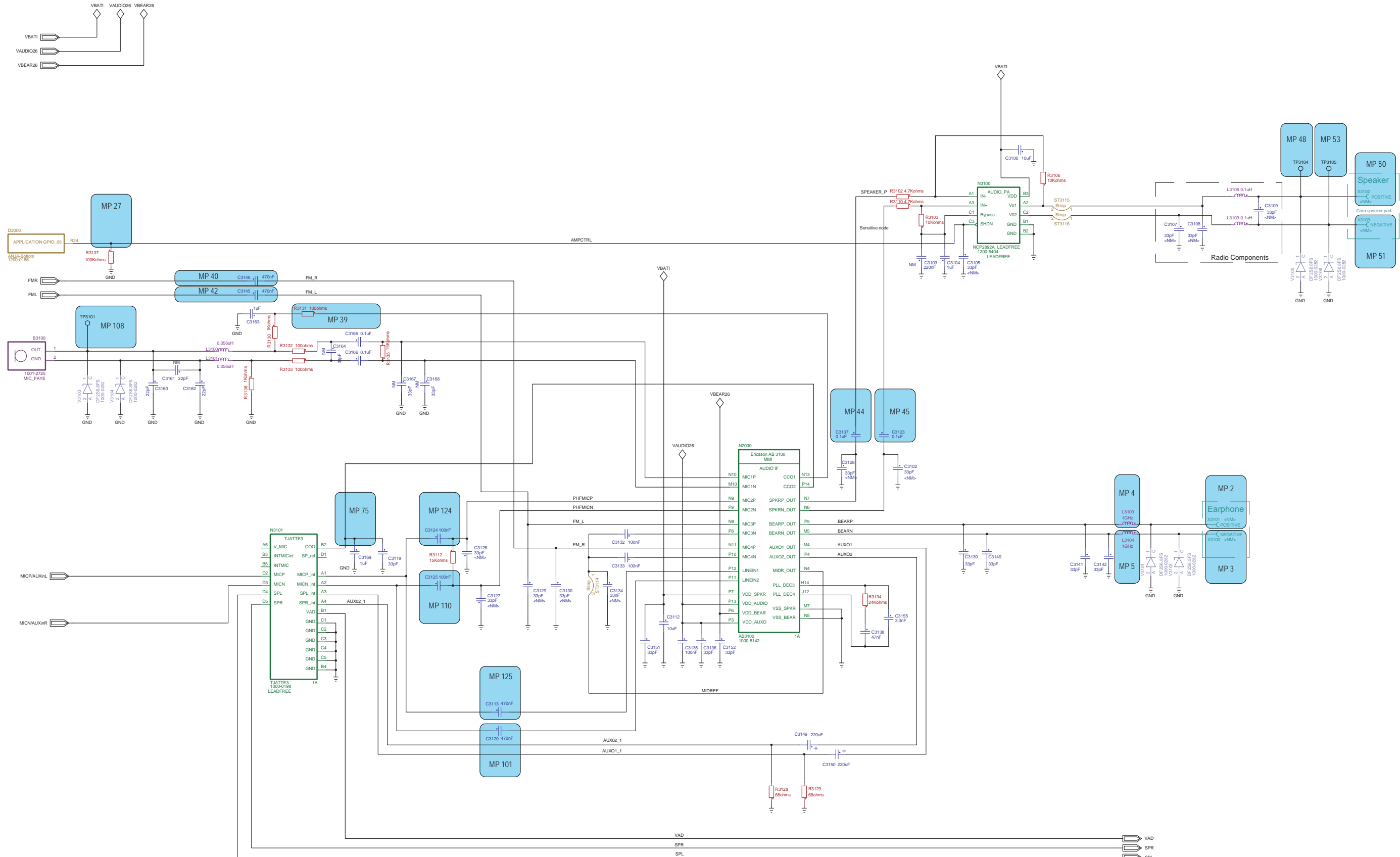
MEASUREMENT POINTS

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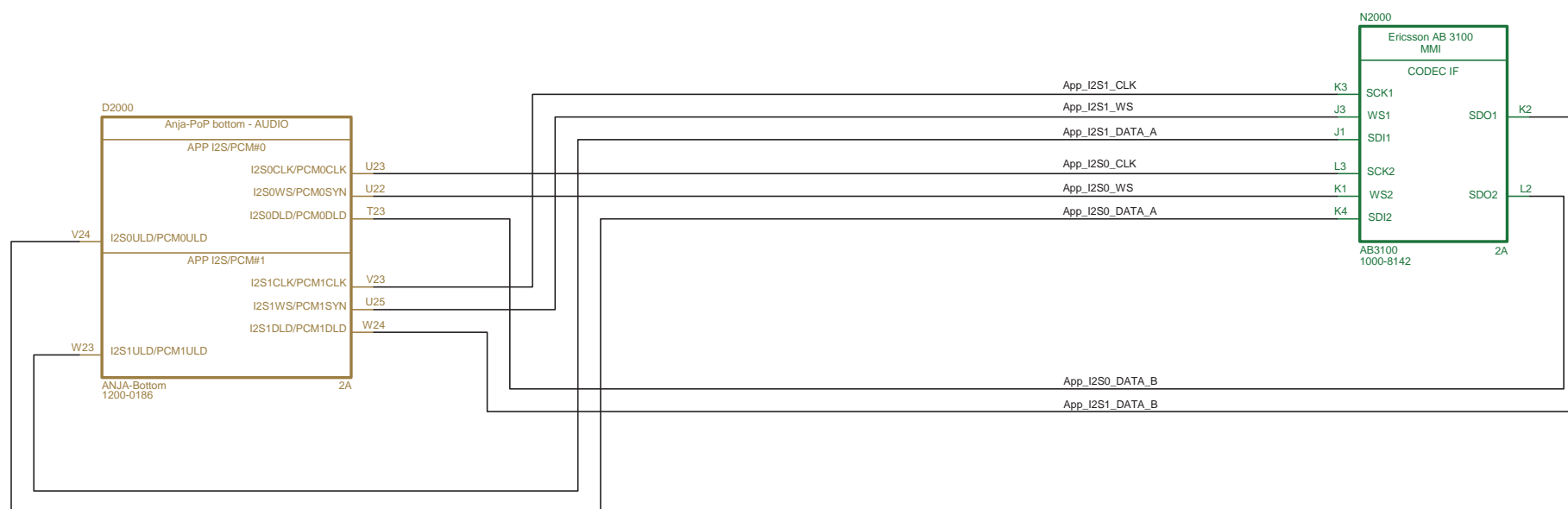
MEASUREMENT POINTS

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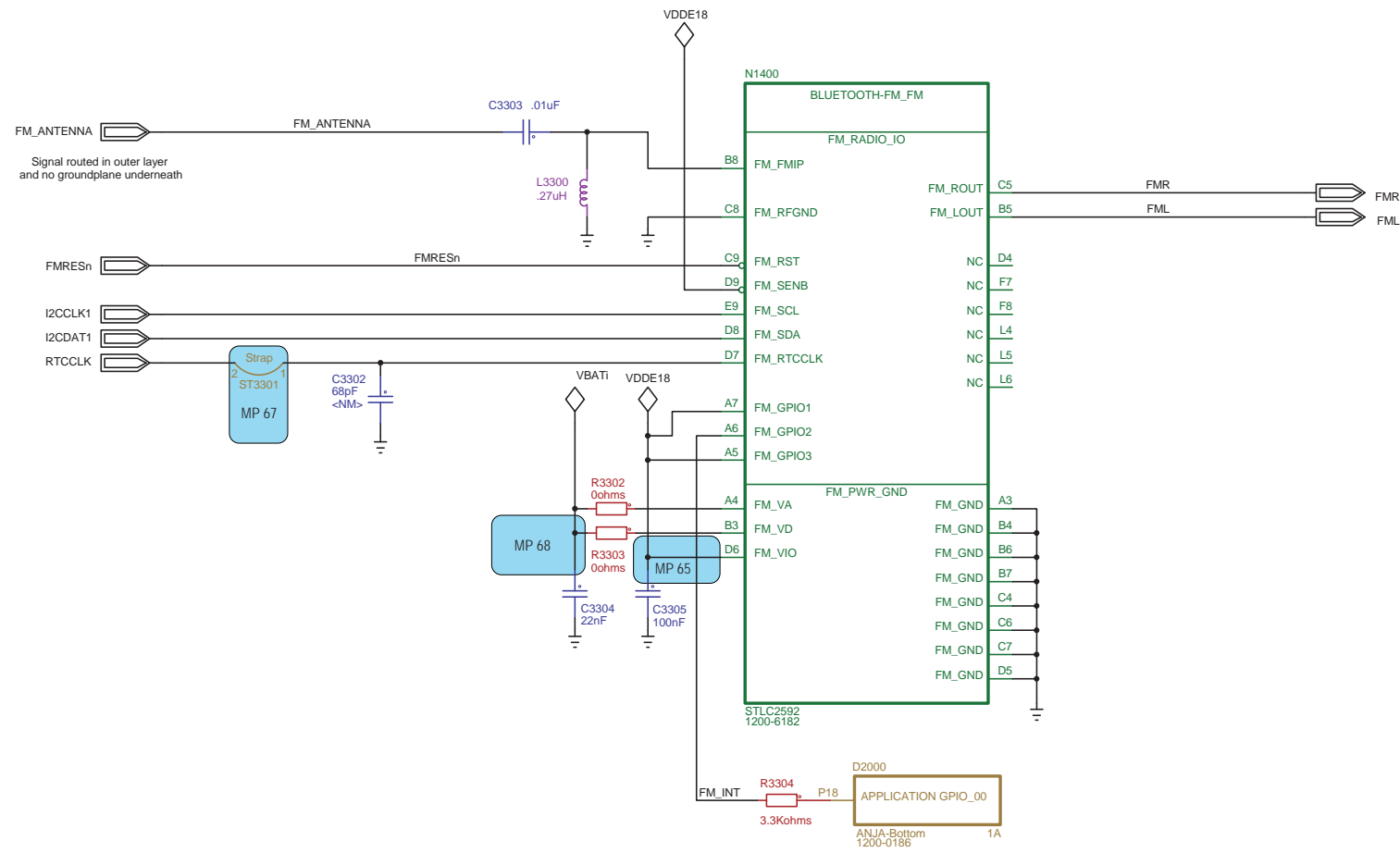
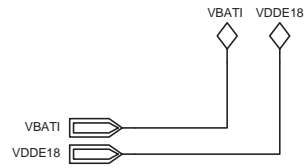


MEASUREMENT POINTS

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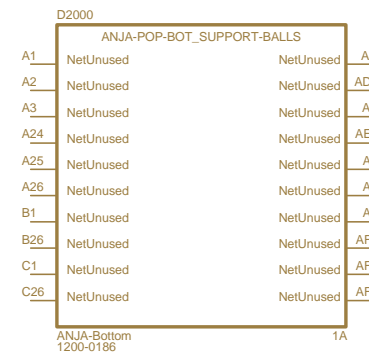
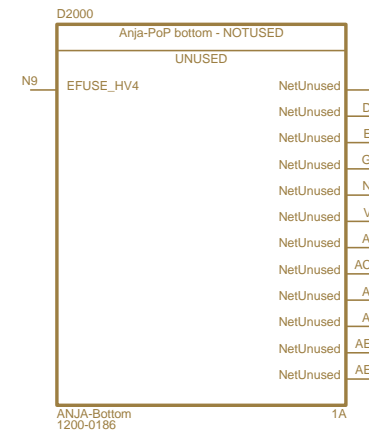
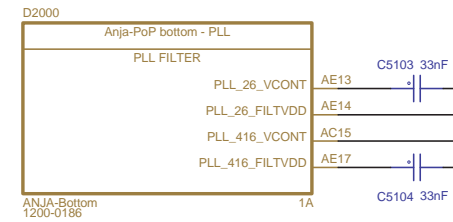
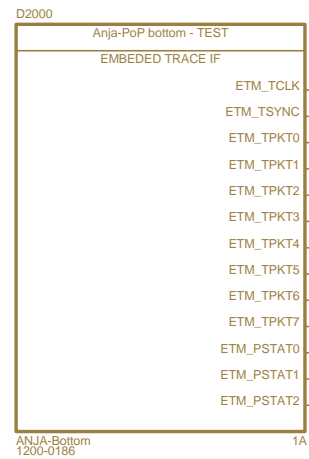
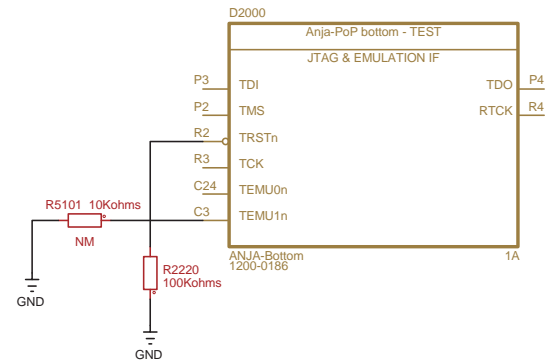


Made for	
Audio	
Audio Digital	
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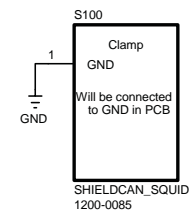
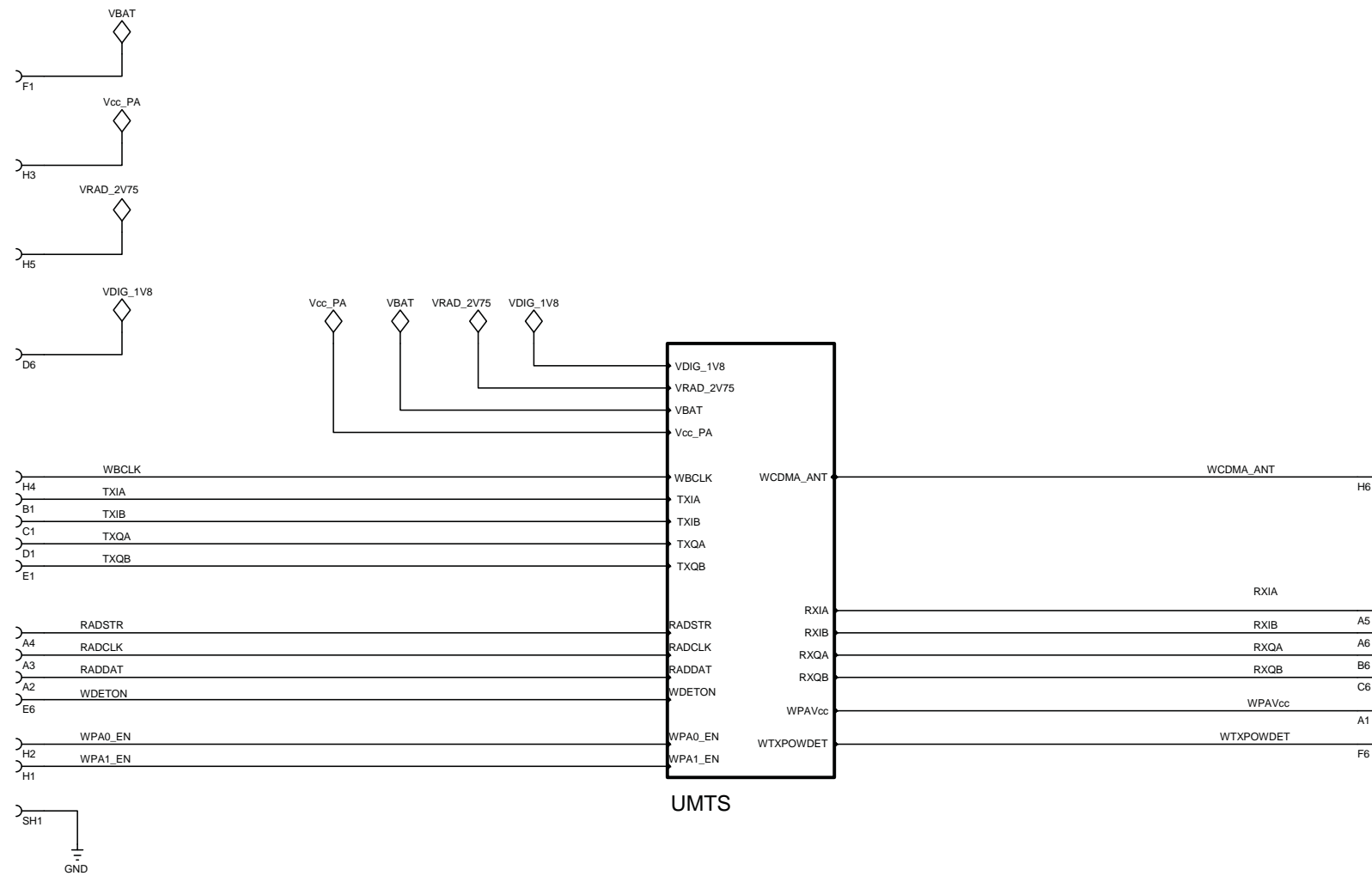


MEASUREMENT POINTS

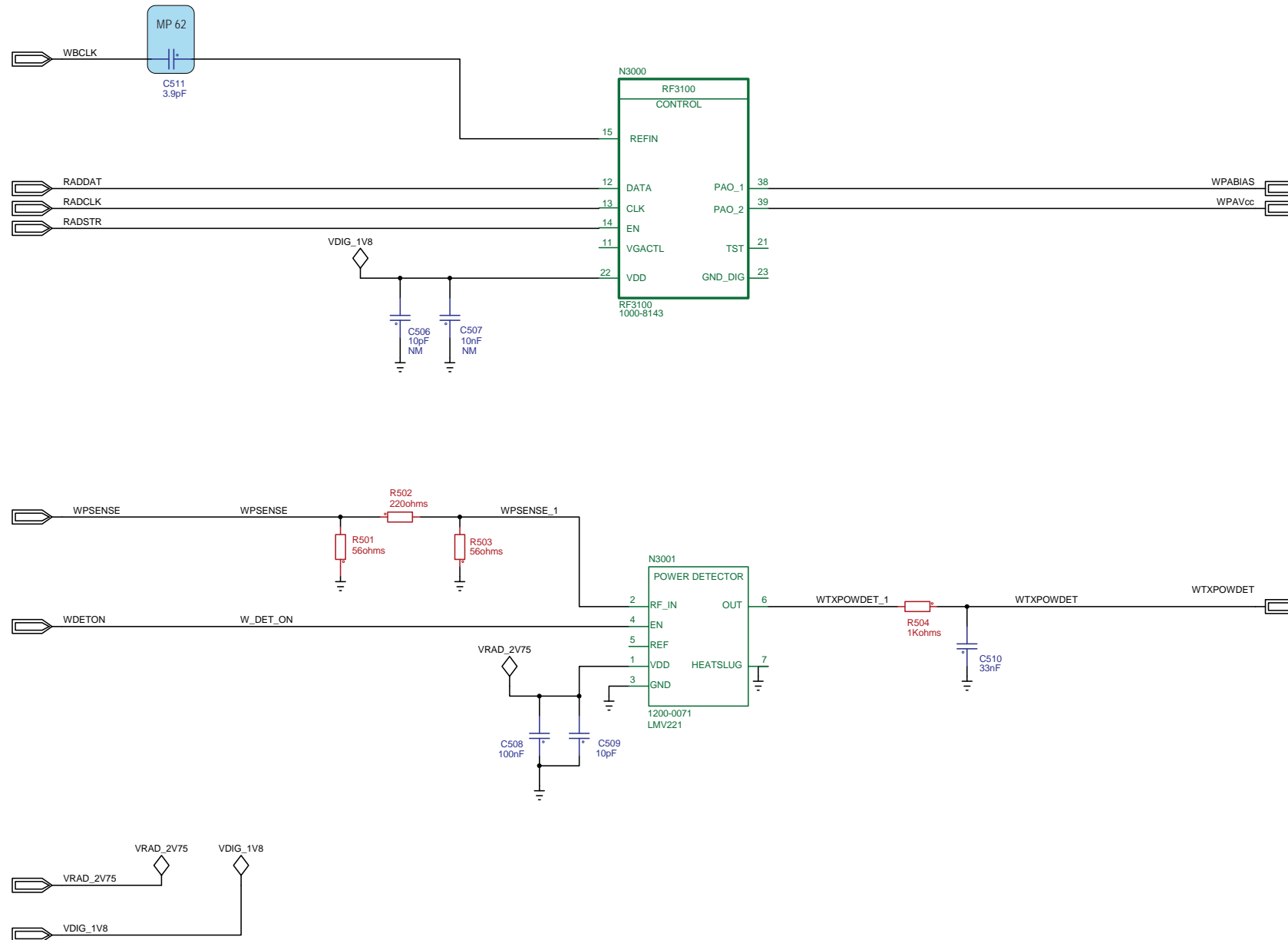
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FM Radio	
Document Nr	Revision
1201-2734 Page 26	6



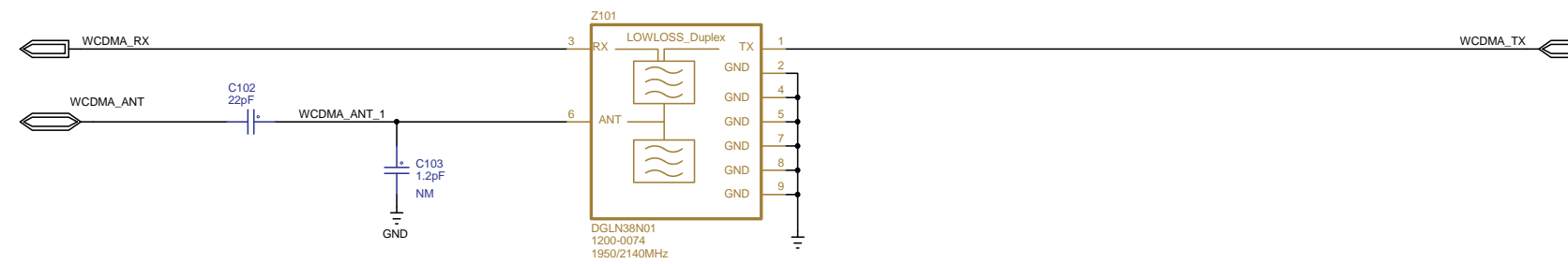
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Document Nr	Revision
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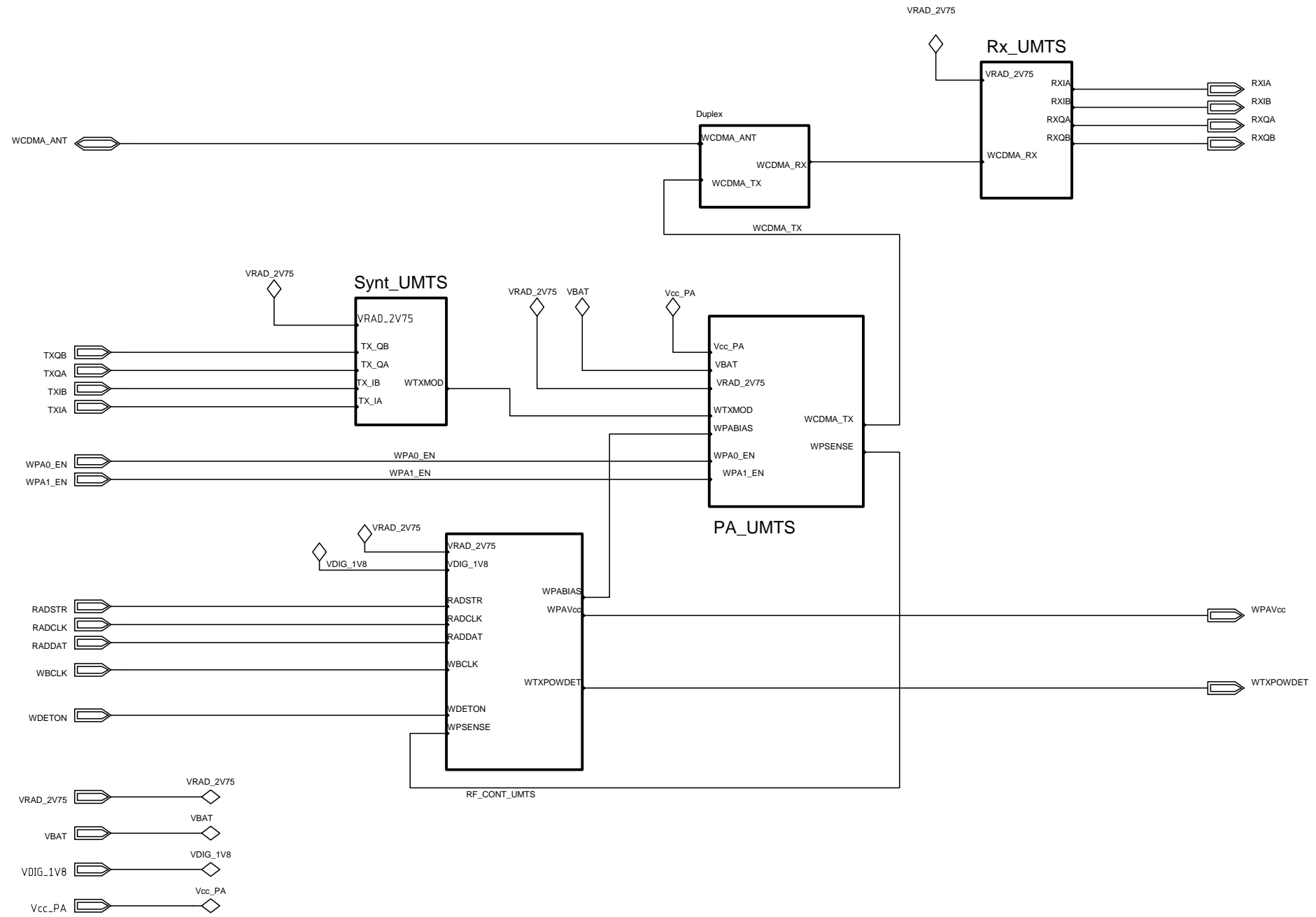
Made for Squid RF Module Radio Top	
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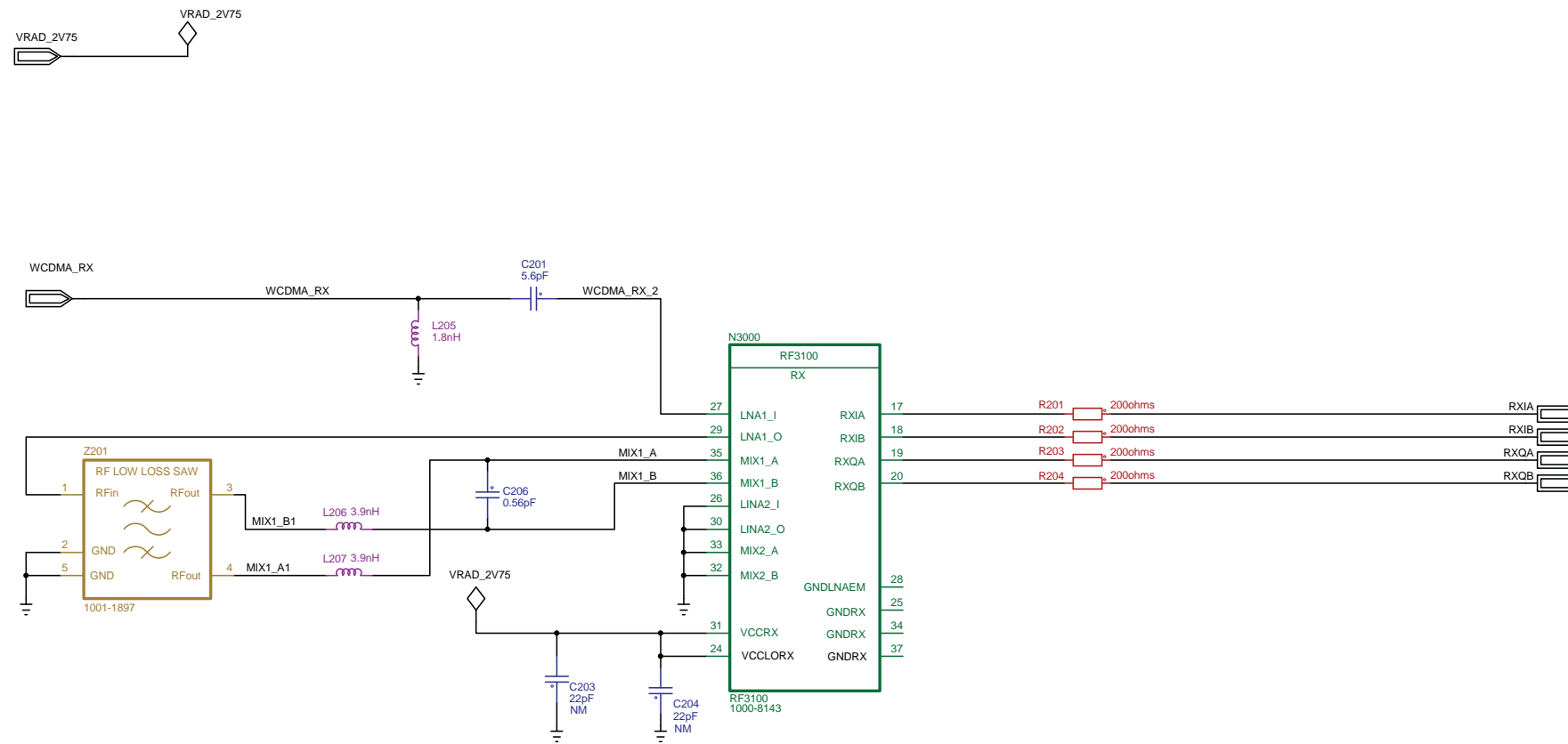
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Squid RF Module Radio Cont UMTS	
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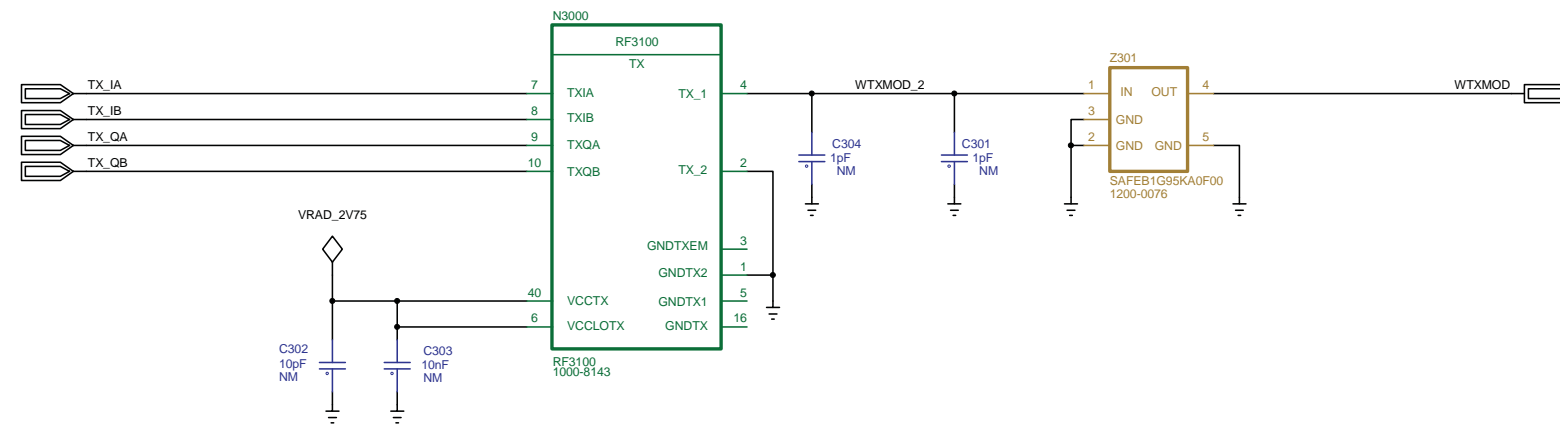
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Document Nr	Revision
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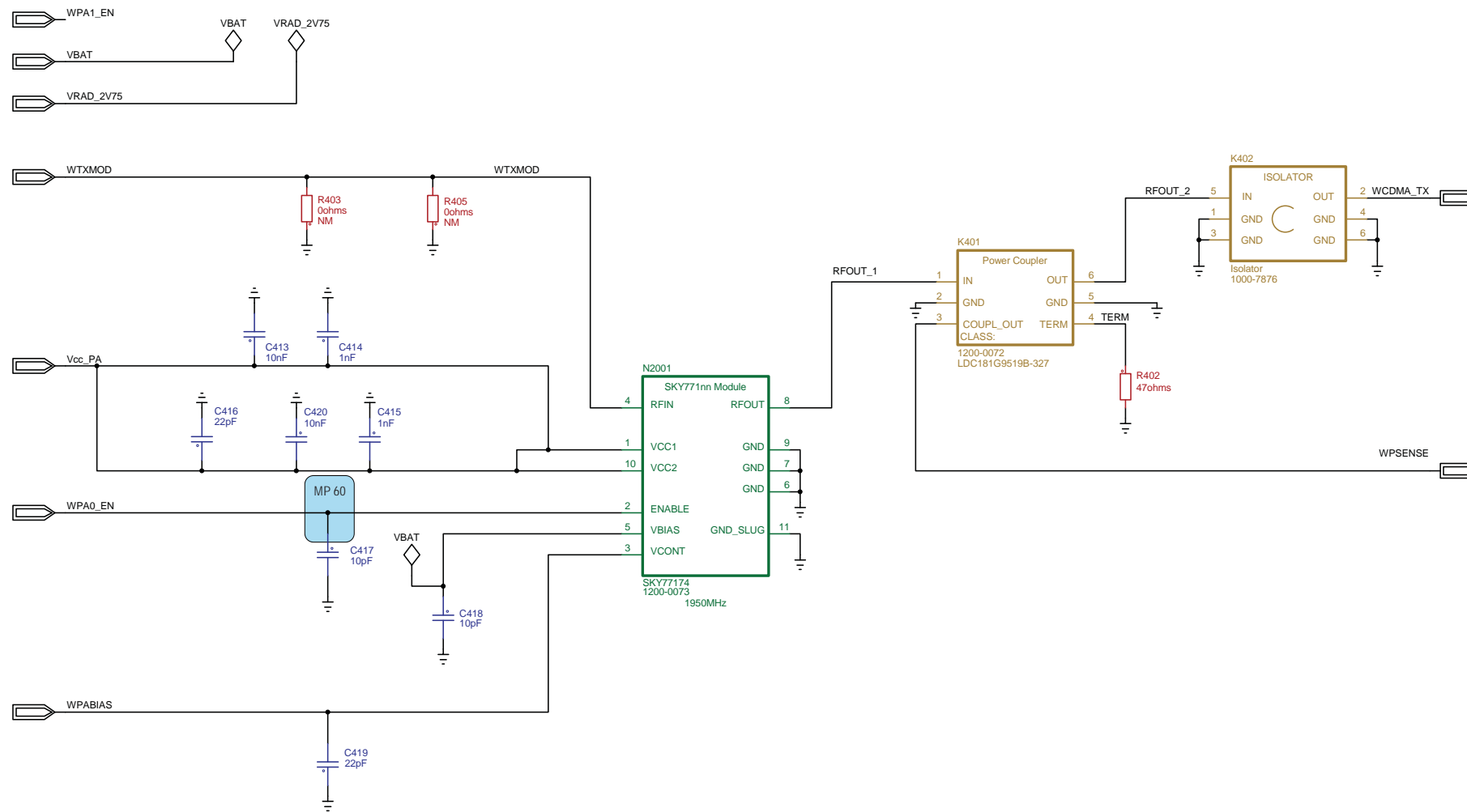
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Radio Top UMTS	
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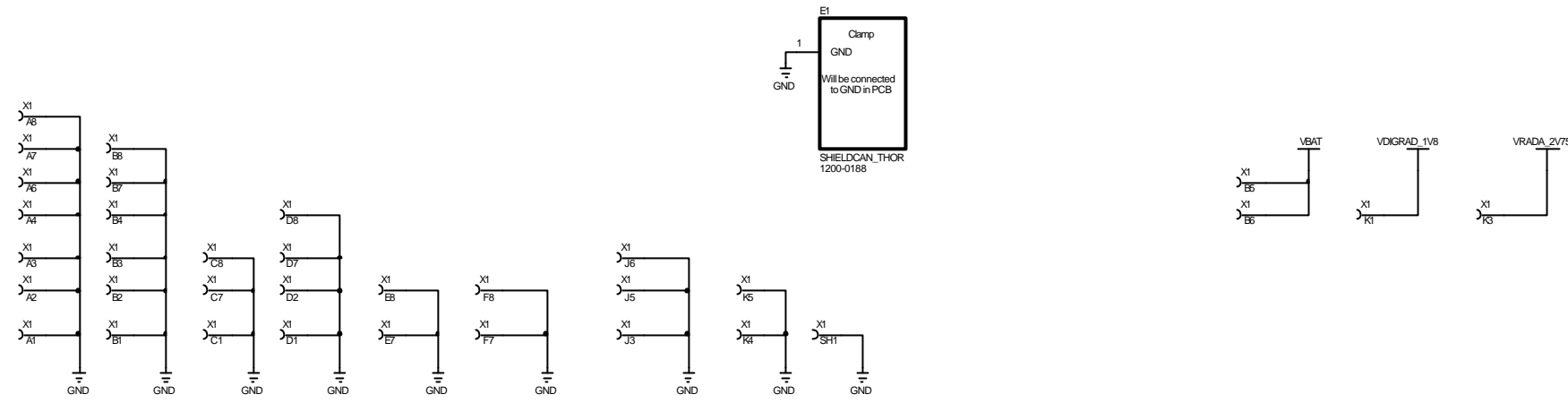
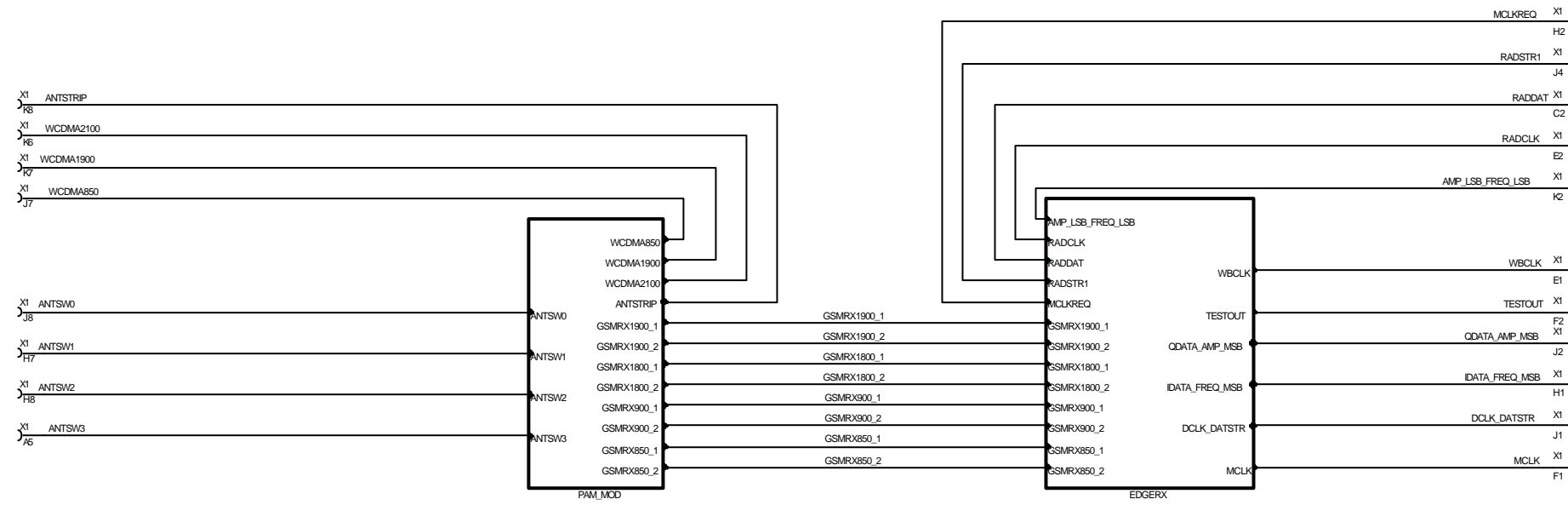
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Squid RF Module Radio Synthesizer UMTS	
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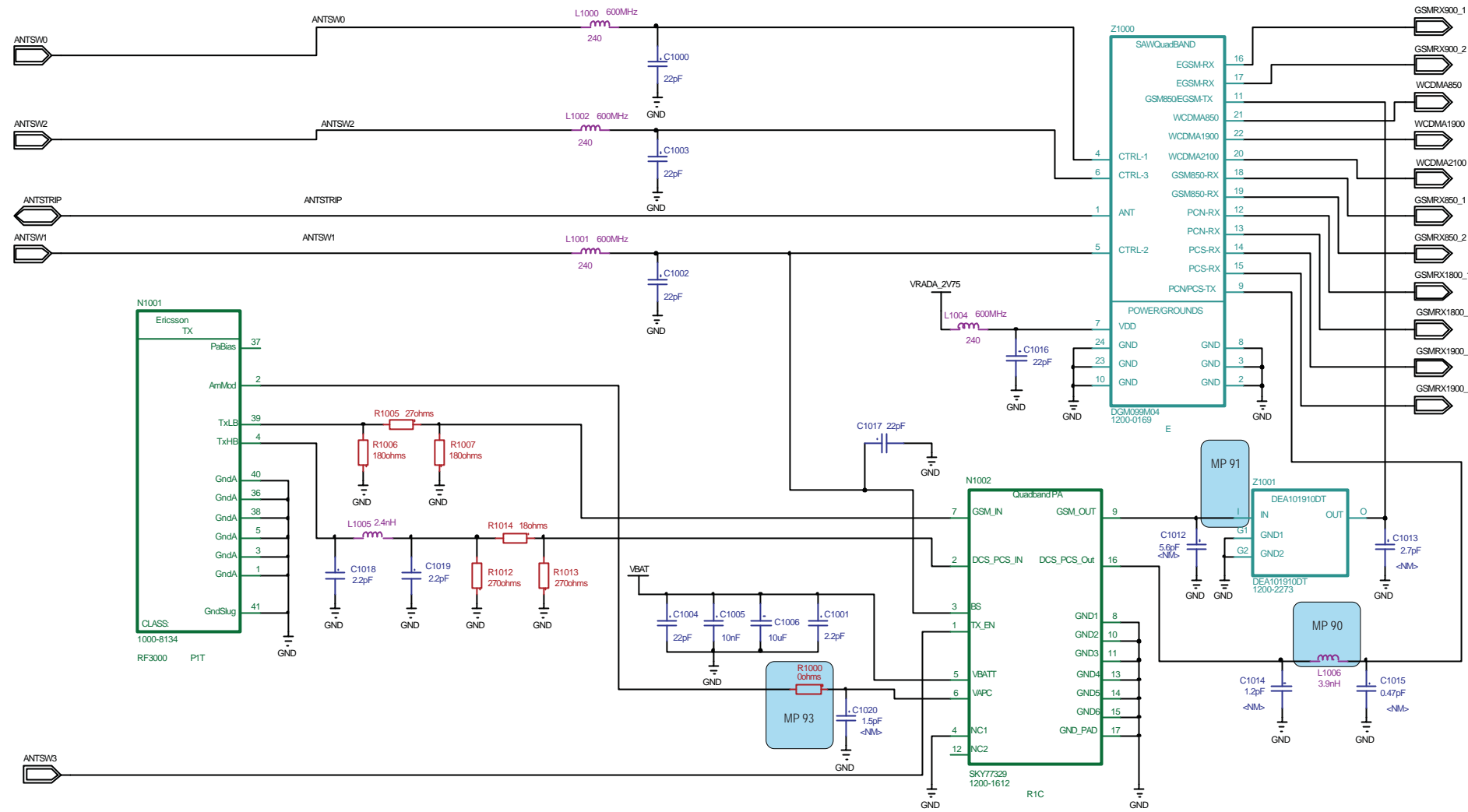


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Document Nr	Revision
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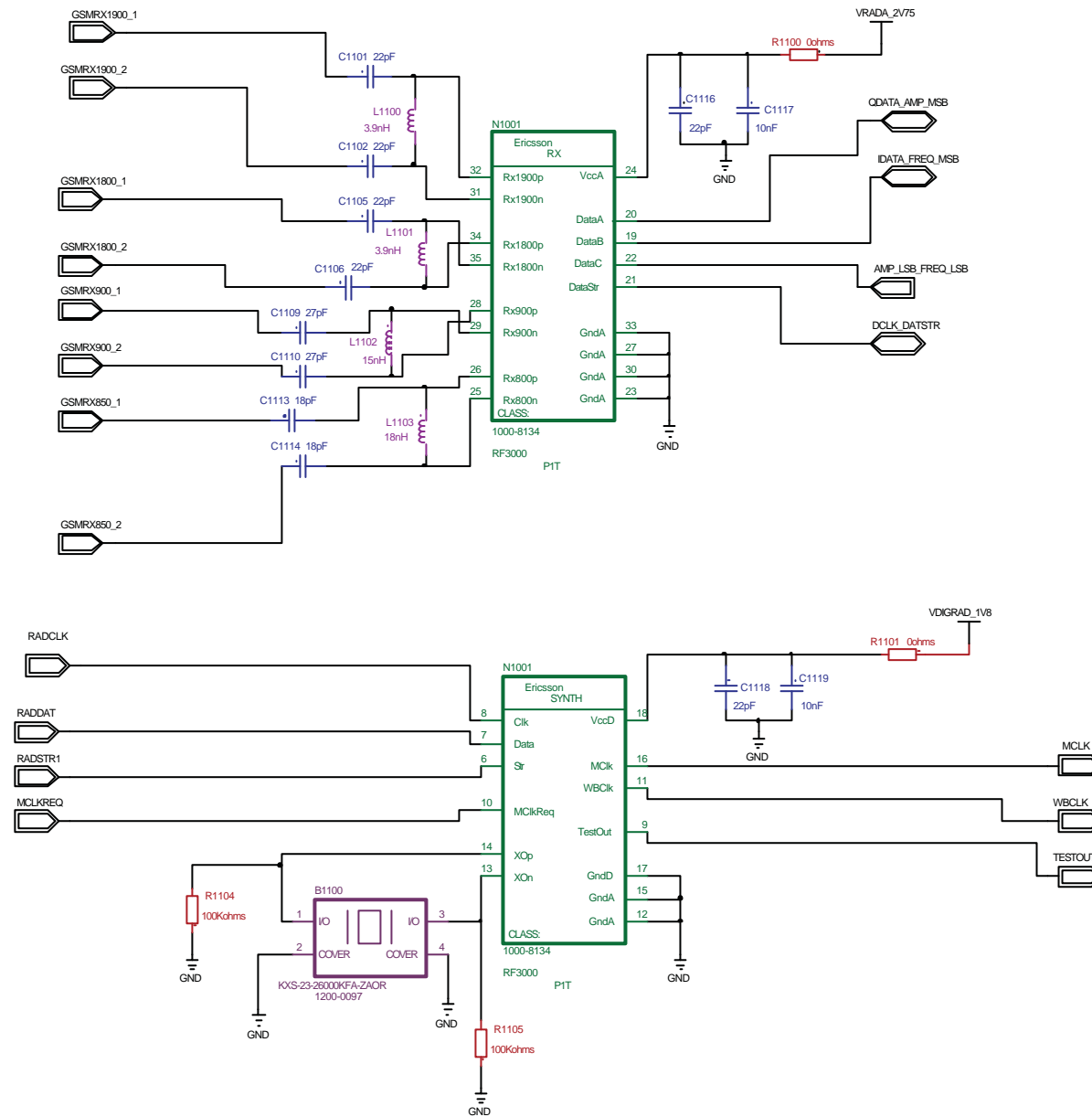
MEASUREMENT POINTS

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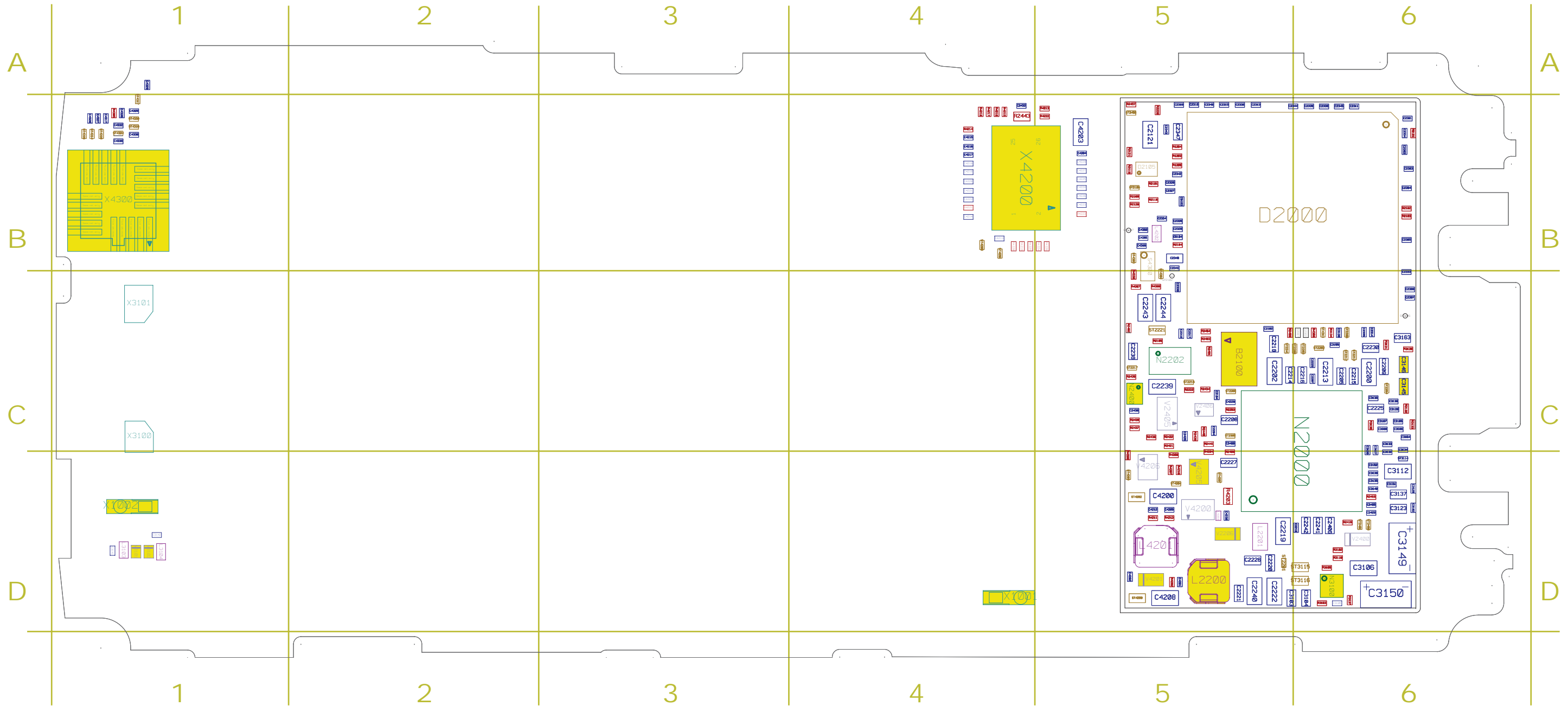


MEASUREMENT POINTS

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Document Nr	Revision
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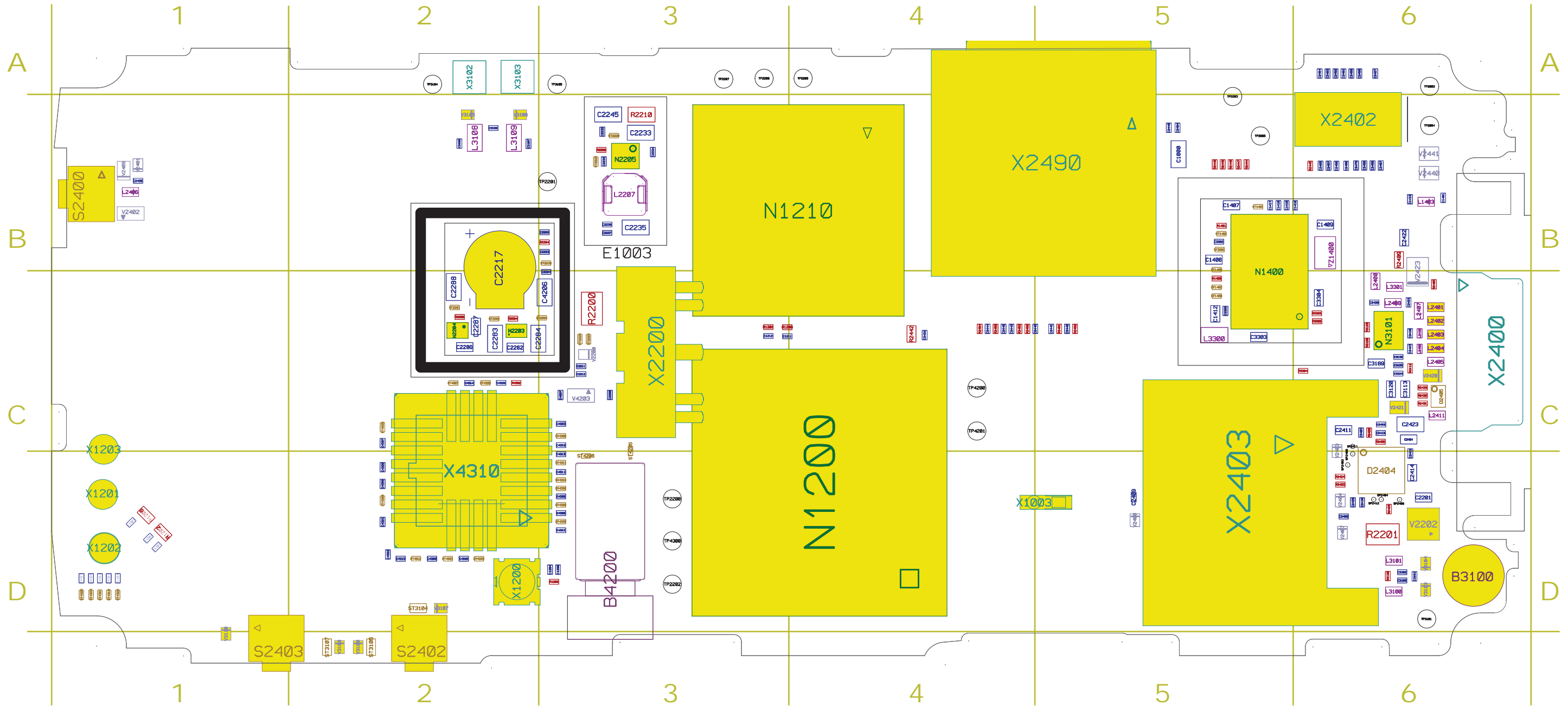


Made for	
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C2102	1000-0048	C5	C2222	1000-0061	D5	C2311	1000-0048	B6	C2337	1000-0048	C6	C3123	1000-0336	D6	C3165	1000-0048	C6	C4226	1000-0049	B5	D2105	1200-0425	B5	R2104	1000-0232	B5	R2438	1000-0240	C5	R4207	1000-0175	D5	R4226	1000-4035	B5
C2104	1000-0050	C5	C2225	1000-6901	C6	C2313	1000-0048	B5	C2338	1000-0048	B5	C3132	1000-0048	D6	C3166	1000-0048	C6	C4227	1000-0049	B5	L2200	1200-0119	D6	R2105	1000-0231	C5	R2439	1000-0172	C5	R4208	1000-0181	D5	R4336	1000-0231	C5
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R - Replaceable
See Appendix for
more information.



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R - Replaceable
See Appendix for
more information.

K630, V640, K660 Overview

K630, V640



Camera

2 megapixel camera, 2.5x digital zoom, Picture blogging, Video recording

Music

Bluetooth™ stereo (A2DP), Media player, Music tones, PlayNow™, TrackID™

Internet

RSS feeds, Access NetFront™, Web browser

Communication

Polyphonic ringtones, Speakerphone, Vibrating alert, Video calling

Messaging

Email, Picture messaging (MMS), Predictive text input, Sound recorder, Text messaging (SMS)

Design

Navigation key, Picture wallpaper, Wallpaper animation

Entertainment

3D games, Java, FM radio, Video streaming, Video viewing

Organiser

Alarm clock, Calculator, Calendar, Flight mode, Notes, Phone book, Stopwatch, Tasks, Timer

Connectivity

Bluetooth™ technology, Modem, Synchronization, USB mass storage, USB support

Screen: 262,144 color TFT

Resolution: 176 x 220 pixels

Size: 2 inches

Phone memory: Up to 32 MB

Memory card support: Memory Stick
Micro™ (M2™)

Talk time GSM: Up to 9 hrs

Standby time GSM: Up to 300 hrs

Talk time UMTS: Up to 5 hrs

Standby time UMTS: Up to 300 hrs

Networks:

UMTS/HSDPA 2100

GSM/GPRS 900/1800/1900 EDGE

K660



Camera

2 megapixel camera, 4x digital zoom, Picture blogging, Video recording

Music

Bluetooth™ stereo (A2DP), Media player, Mega Bass™, Music tones, PlayNow™, TrackID™

Internet

RSS feeds, Access NetFront™, Web browser

Communication

Polyphonic ringtones, Speakerphone, Vibrating alert, Video calling

Messaging

Email, Picture messaging (MMS), Predictive text input, Sound recorder, Text messaging (SMS)

Design

Navigation key, Picture wallpaper, Wallpaper animation

Entertainment

3D games, Java, FM radio, Video streaming, Video viewing

Organizer

Alarm clock, Calculator, Calendar, Flight mode, Notes, Phone book, Stopwatch, Tasks, Timer

Connectivity

Bluetooth™ technology, Modem, Synchronization, USB mass storage, USB support

Size: 104 x 47 x 15 mm

Weight: 95 grams

Colors:

Lime on White

Wine on Black

Screen: 262,144 color TFT

Resolution: 240 x 320 pixels

Size: 2 inches

Phone memory: Up to 32 MB

Memory Stick Micro™ (M2™) support

Talk time GSM: Up to 9 hrs

Standby time GSM: Up to 330 hrs

Talk time UMTS: Up to 4 hrs 30 min

Standby time UMTS: Up to 330 hrs

Networks:

UMTS/HSDPA 2100

GSM/GPRS/EDGE 850/900/1800/1900

Hardware Overview

The K630, V640 and K660 are using the U360 platform provided by Ericsson Mobile Platform (EMP)

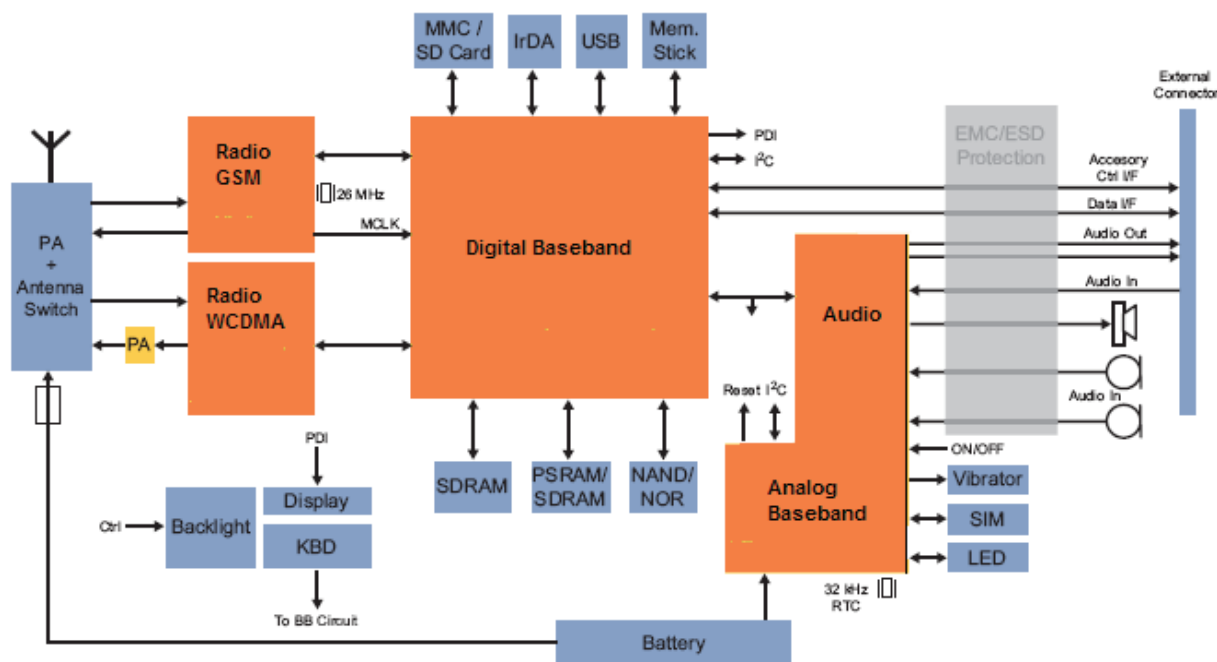
Baseband Part

Analog Baseband Controller
Power Management
N2000 (Vera)

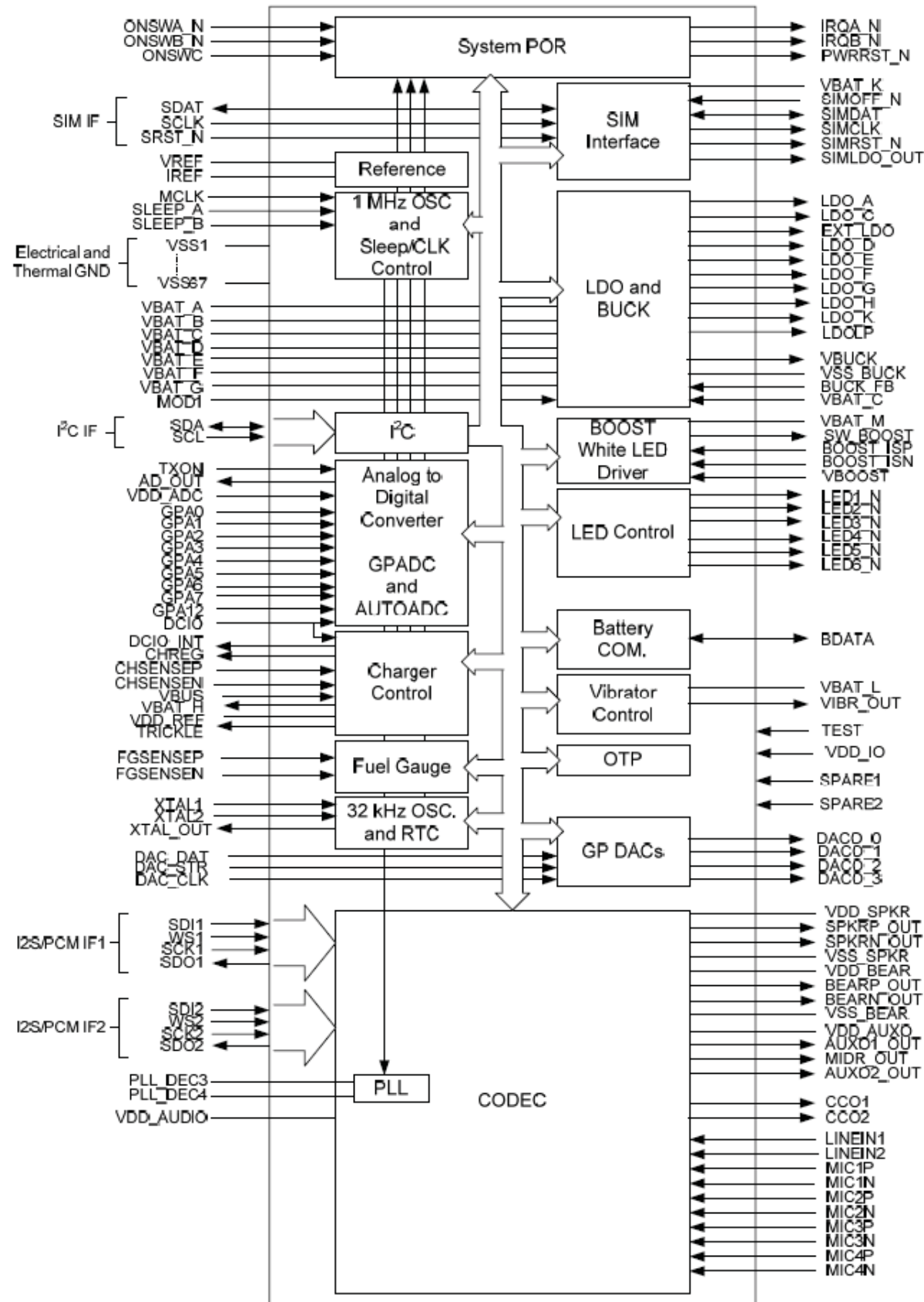
This component is not replaceable on SL 4 because Baseband calibration is required. The analog baseband controller is a mixed digital and analog device that supports the following circuitry:

- Power management circuitry
- Voltage regulation circuitry
- Eight Low Dropout (LDO) regulators and low power regulator
- 600 mA integrated Buck regulator
- Boost step-up DC/DC converter for White Light Emitting Diode (WLED) driving
- Battery charging and communication circuitry
- Battery fuel gauging circuitry
- Analog-to-Digital Converter (ADC)
- SIM interface
- Six programmable LED drivers
- Accurate band gap reference
- Vibrator driver
- Real Time Clock (RTC)
- Eight-byte One-Time Programmable (OTP) memory
- Pulse Code Modulation (PCM) voice coder/decoder
- PCM audio coder/decoder
- Microphone interface
- Stereo line input
- Earphone driver
- Earpiece driver
- 8-Ω speaker driver / Stereo line output

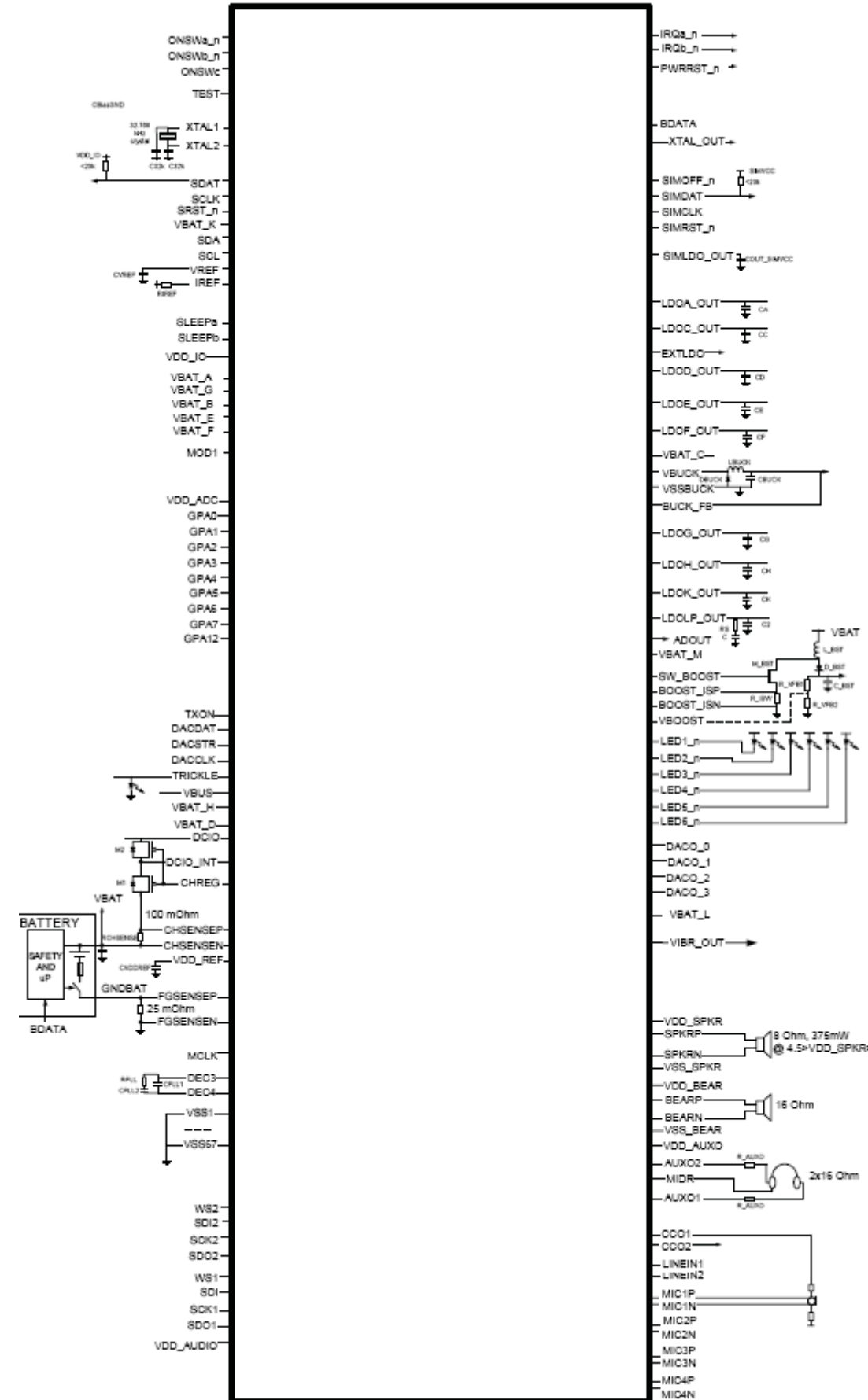
The analog baseband controller is controlled by an I2C™ interface. It also comprises the main power management circuits, equipped with a number of converters and regulators for generating the required supply voltages.



Functional Blocks of the Analog Baseband Controller.



Connection Diagram



Charger Control

A programmable charger is used for battery charging. Limits can be set for the output voltage at CHSENSE- and the output current from DCIO through the sense resistor to CHSENSE-.

The programmable charger is enabled or disabled by the assertion/negation of the external signal DCIO. Parts of the programmable charger are activated and deactivated depending on the level of VBAT. The rest of the programmable charger is activated and deactivated through I2C.

The programmable charger supports the following functions:

- Constant current charging
- Constant voltage charging
- Trickle charging
- PWM controlled charging
- Over-voltage and over current detection
- Watchdog termination
- DCIO assertion/removal detection
- Voltage and current measure functions
- Low resistive path (reverse mode)

The programmable charger is able to control the voltage and limit the current to a load seen at CHSENSE-. The programmable charger can also be run in PWM mode to turn the charging on and off in accordance with the particular period and duty cycle. When the charging is on, it is set to the current and voltage selected by I2C.

A low resistive path from VBAT to DCIO can be formed when DCIO is not detected. When this setting is done in the appropriate registers, a lowering of CHREG to 0 V turns on the external pass device. The pass device is automatically turned off when an external source is detected on DCIO, or when the watchdog termination block times out. The watchdog termination block must be active when the external switch is enabled, both in normal charging mode and in the low resistive path mode. The watchdog is set through the serial interface, and if it has not been set again before timeout, the watchdog turns off the external switch. The watchdog is disregarded during trickle charging.

When no battery is present, the system can be booted and supplied from DCIO by applying the correct voltage on DCIO.

USB Charger

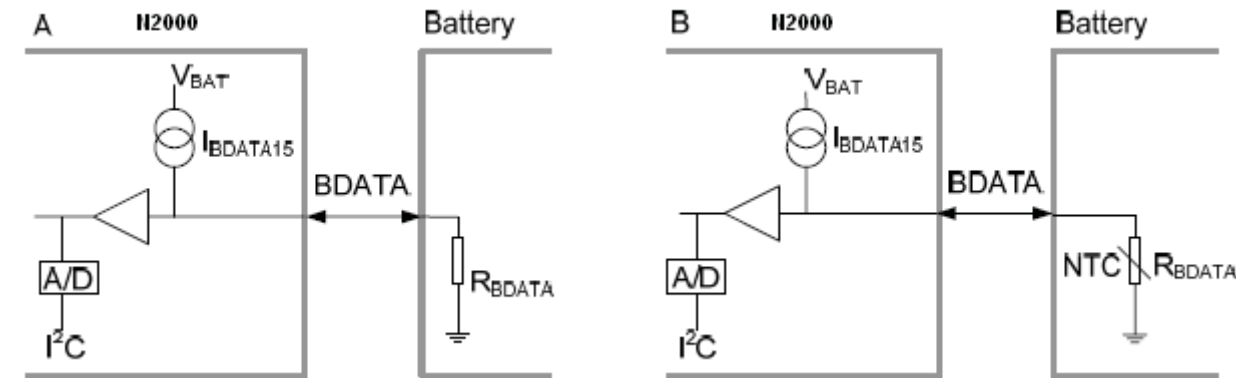
The analog baseband controller contains a standalone USB charger. The USB charger has a separate input and incorporates full functionality during low VBAT.

The programmable charger supports the following functions:

- Trickle charging
- Constant current charging
- Watchdog termination
- Trickle LED indication
- VBUS assertion/removal detection

Resistance Identification and Temperature Measurement

The resistance identification mode utilizes the constant current source to feed the battery data output while monitoring the voltage at the battery data node with general purpose ADC. The conversion is started through I2C.

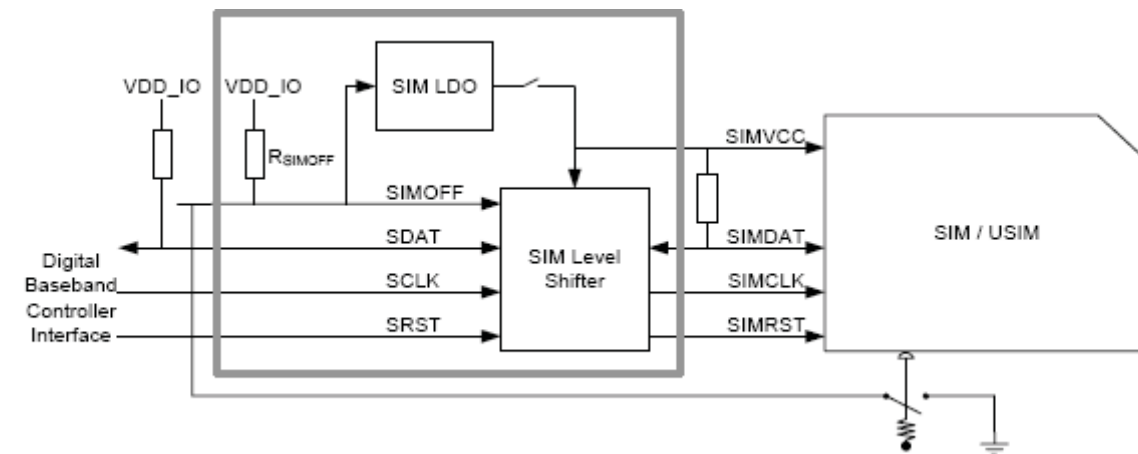


Resistance Identification (A) and Temperature Measurement (B)

SIM Interface

The SIM interface supplies level shifting between the digital baseband controller and the SIM/USIM card. Moreover, hard-wired SIM deactivation functionality manages removal of a SIM card that has not been powered down.

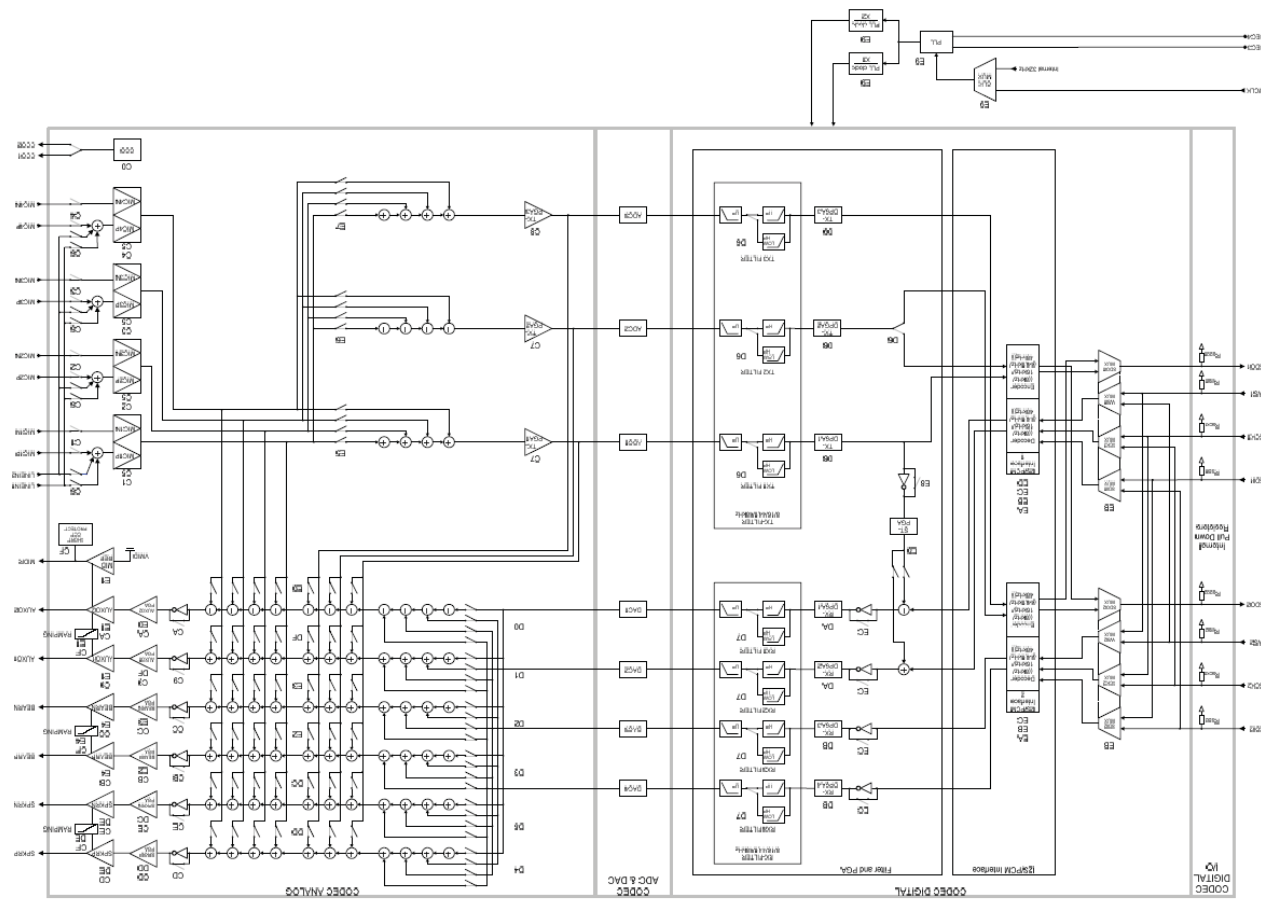
Block Diagram of the SIM Interface.



CODEC Overview

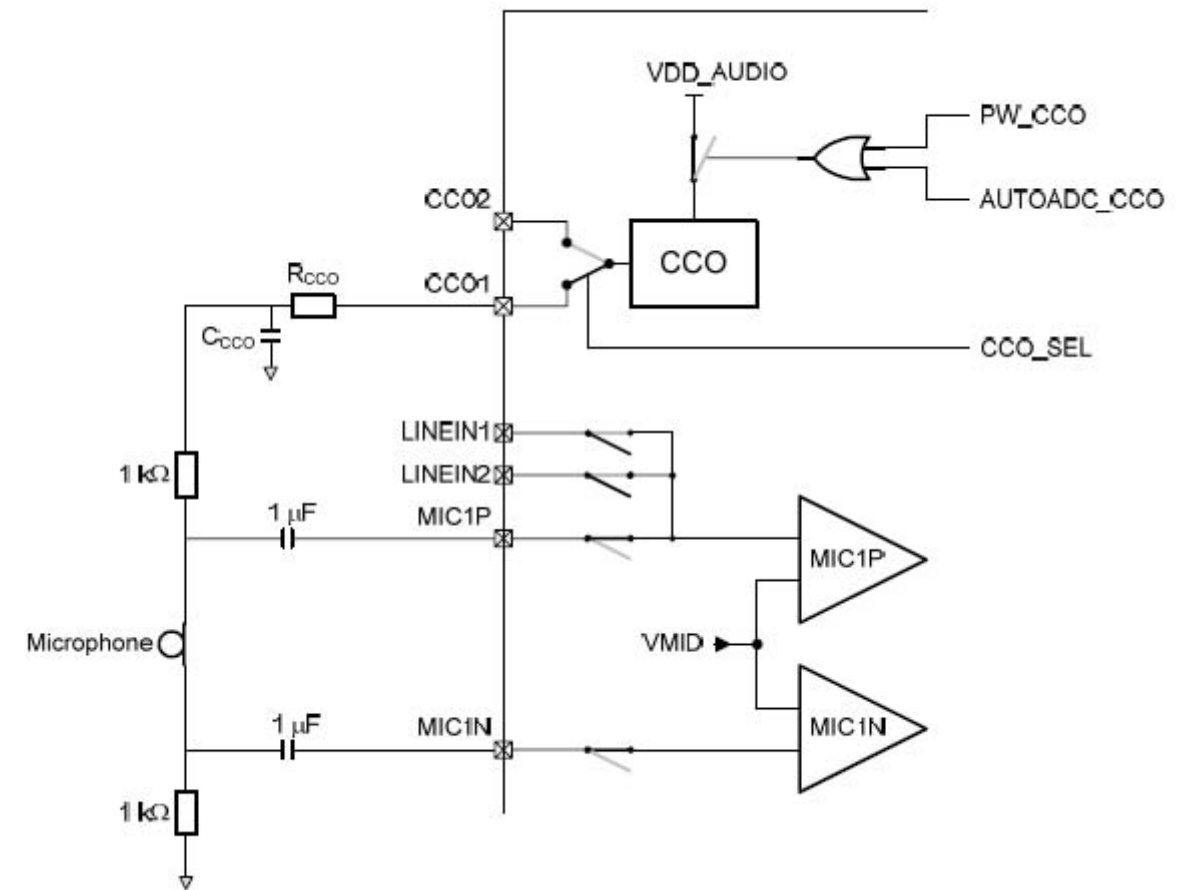
The CODEC is encoding analog audio signals and analog voice signals into digital signals using ADCs. This is done in the coder section of the CODEC, also named the TX path (transfer section). The CODEC is also decoding digital audio signals and digital voice signals into analog signals using DACs. This is done in the decoder section of the CODEC, also named the RX path (receiver section).

CODEC Block Schematic



CODEC CCO Voltage Source

There is an internal voltage source CCO that provides the necessary drive current for electret microphones. The voltage source is I²C programmable to 2.2 V or 2.4 V. The source can be disabled during standby. A typical use case with a microphone connected to MIC1 and the CCO is shown in picture below.



Earphone Amplifier

The earphone amplifiers (BEARP and BEARN) are mainly intended to be differentially configured and drive a low impedance dynamic transducer (earpiece) but they can also be single ended configured. The BEARP and BEARN amplifiers can be powered down by the I²C. The amplifiers can exhibit high impedance to 1.4 V or low impedance to ground when powered-down. Fifty-one gains are available for BEARP and BEARN: from +15 dB down to -60 dB in 1.5 dB steps. When the BEARP and BEARN outputs are operating in differential mode, an I²C selectable bit must invert one of the inputs.

Digital Baseband Controller (CPU) D2000 (Anja)

This component is not replaceable on SL 4 because Baseband calibration is required. The Digital Baseband Controller is divided in two subsystems:

- Application
- Access

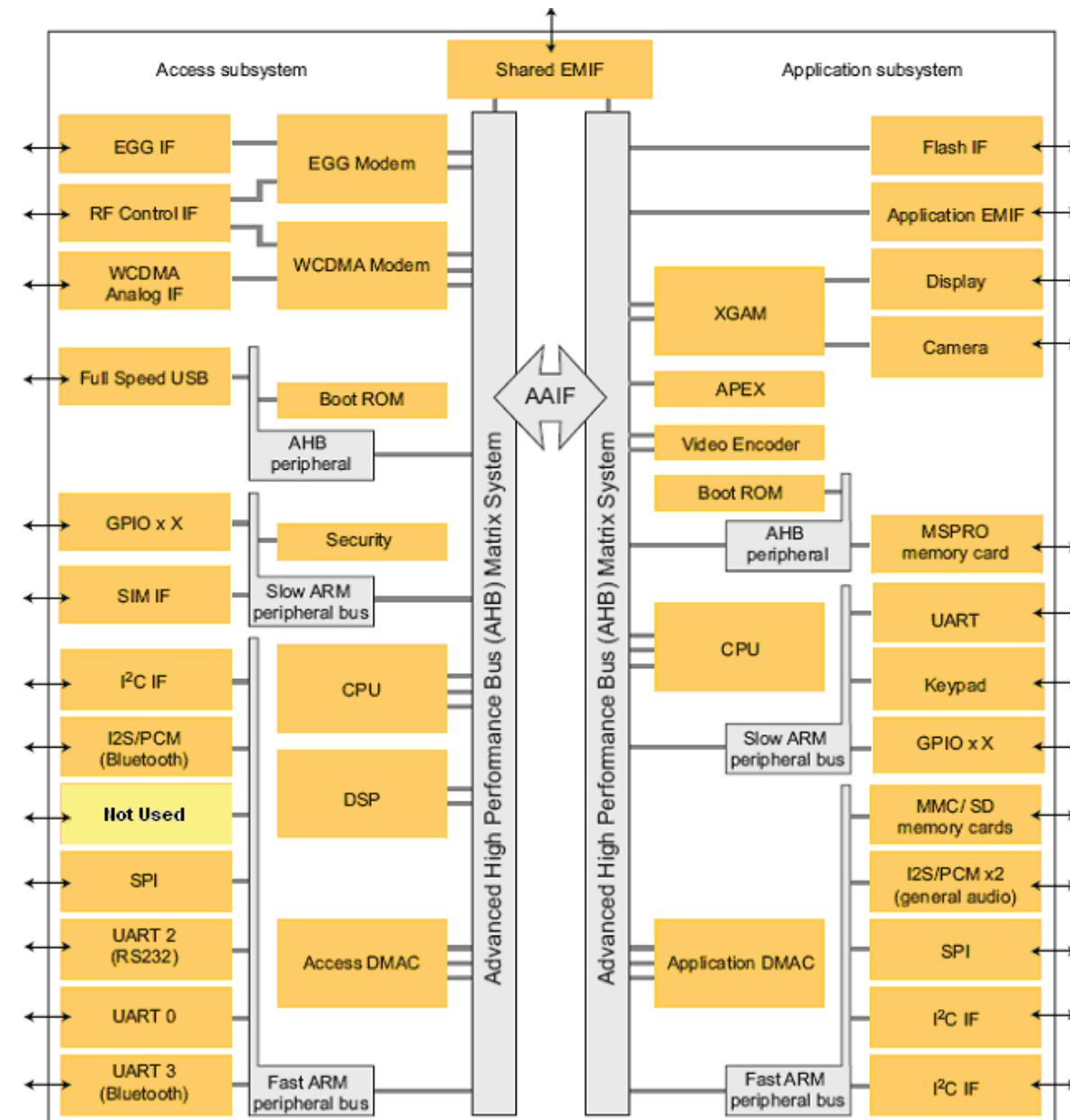
Access Subsystem

All modem functionality in the digital baseband controller resides in the Access subsystem. This includes EDGE/GPRS/GSM interface, WCDMA interface, USB, and other peripheral modules. The control CPU is an ARM926 and a DSP is used for signal processing and layer one control code. The main communication between the blocks in the Access subsystem is done through the Advanced High-performance bus (AHB) matrix, which is a set of control buses connecting the different parts together. A block called Syscon is responsible for distributing clocks and resets to all parts of the Access subsystem. This block is under SW control. The Access subsystem is connected to the Shared EMIF, an interface for communication with an external SDRAM. The interface has 39 signals (including one chip select) and supports memory sizes up to 512 Mbit. The Shared EMIF is shared between the Access subsystem and the Application subsystem.

Application Subsystem

The Application subsystem contains functionality related to functions such as MMI, graphics, audio and memory media. The control CPU is an ARM926 with three external memory interfaces, one shared with the Access subsystem and two dedicated for the Application subsystem. The Application subsystem contains several blocks. The main communication between the blocks is done through the Advanced High performance bus (AHB) matrix, which is a set of control buses connecting the different parts. A block called Syscon is responsible for distributing clocks and resets to all parts of the Application subsystem. This block is under SW control. The Application subsystem is connected to the Shared EMIF that is used for code execution or data storage. In addition, a dedicated EMIF and a Flash IF are also available. The Application EMIF is a general interface for communication with, for example external SDRAM, PSRAM, NOR flash, NAND flash and companion chips. The Application EMIF has a total of 56 signals (including a maximum of 7 chip selects if GPIO is used) and can be set in several different modes to support different types of memory combinations.

Functional blocks of the Digital Baseband Controller



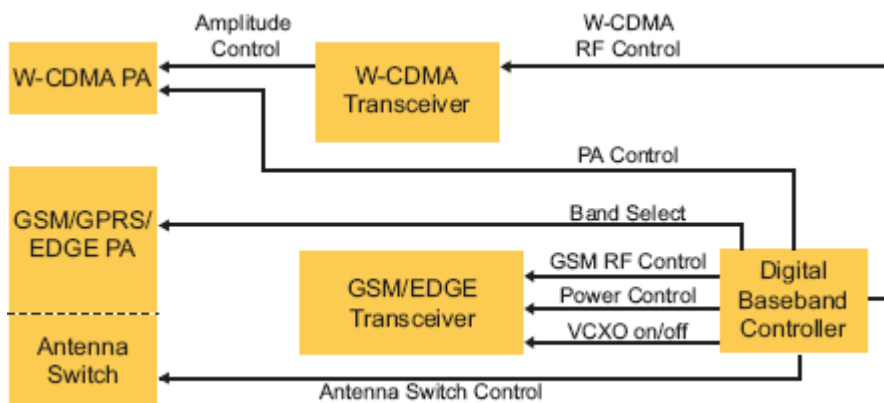
Keypad

The keypad interface block supports up to 30 keys with 65 columns and 6 rows and operates in both scan and idle mode. The keypad scan is performed by software. Any transition in the state of the column inputs is written directly to the register. The keypad interface differentiates between single key presses, simultaneous presses of any keys with a function key, and any key releases. The period between successive scans is programmable over the range 5 ms to 80 ms, in 5 ms steps. During scan mode, the keypad generates an interrupt whenever a valid keypad state change occurs (including a release of any pressed keys). The scan function is disabled during system power-up. The keypad is able to detect at least four simultaneous key presses. Not all combinations are supported.

RF System Control

The access subsystem of the digital baseband controller controls the overall radio system. In both EDGE/GSM/GPRS and WCDMA air interface mode, the digital baseband controller controls the radio system through a 3-wire serial bus. The digital baseband controller also manages PA band control and the antenna switch mechanism in the front end module. The 26 MHz VCXO clock residing in the GSM/EDGE transceiver is turned on only when required. The digital baseband controller initiates turning on of the clock. The EDGE/GSM/GPRS RF system requires control, which is temperature dependent. The temperature within the RF system is estimated by a voltage measurement performed by the analog baseband controller N2000 (Vera).

The control flow for the RF system.

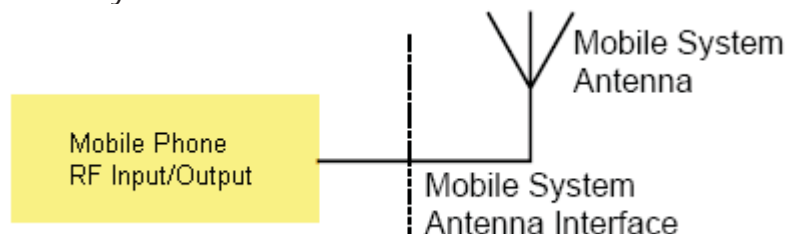


Radio Part

Antenna

The mobile system antenna interface connects the Wideband Code Division Multiple Access (WCDMA) and Global System for Mobile Communication (GSM) input/output to the antenna of the Mobile Phone. It is a bi-directional RF interface containing signals in the range 800 MHz to 2.2 GHz. The mobile system antenna interface is the interface between the Mobile Phone Radio Frequency (RF) input/output and the mobile system antenna. The interface handles the GSM 850, EGSM 900, GSM 1800, GSM 1900 and WCDMA Band I, RF inputs/outputs.

Mobile System Antenna Interface:



Radio Modules

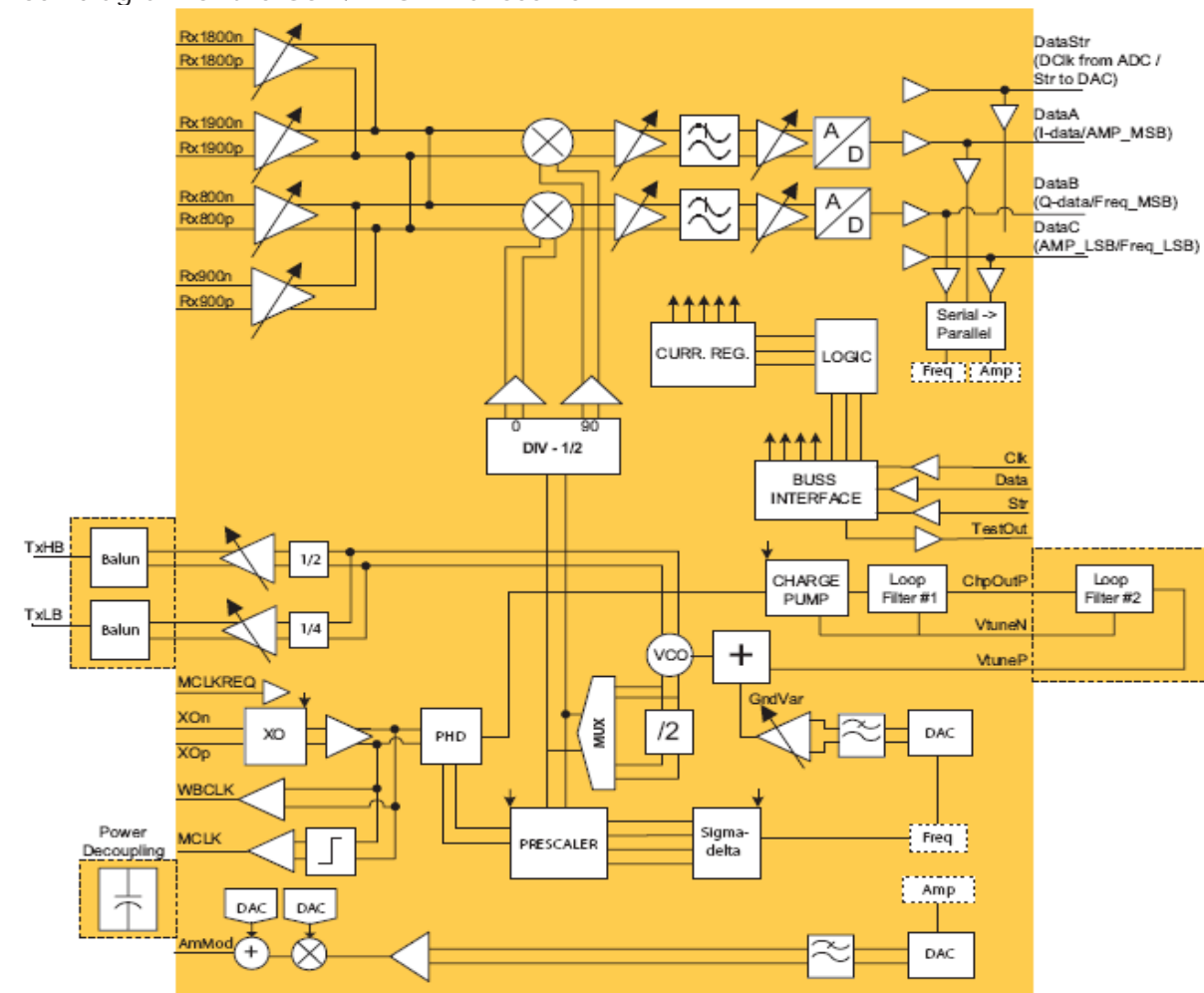
GSM/GPRS/EDGE Radio Module N1200 (Thor)

The GSM/GPRS/EDGE transceiver use a digital interface that is shared between receive and transmit data. The receive interface is based on I and Q data and the transmitter interface is based on envelope and frequency data. The quad band GSM/GPRS/EDGE transceiver has the following general features:

The GSM/EDGE transceiver has the following features:

- Individual low-noise amplifiers for the 850, 900, 1800 and 1900 MHz frequency bands with a common quadrature mixer
- Fully integrated VCO with dividers to generate both receive and transmit frequencies
- I and Q baseband receive channel amplifiers with on-chip antialiasing filtering
- I and Q receiver sigma-delta A to D converters
- Digital interface for the receive I and Q channel
- Multi modulus prescaler for direct VCO modulation in transmit mode
- Integrated phase detector with programmable charge pump
- Transmit output buffer with controllable output power level
- Transmit baluns integrated
- Digital interface for the transmit frequency and amplitude modulation
- 3-wire serial bus interface for control, configuration, and test
- Deep power down function
- Programmable power level to power amplifier (PA)

Block diagram of the GSM/EDGE Transceiver



The module is shielded using fence and lid technology. The main components contained are transceiver ASIC, PA module, Front End Module and X-tal.

Frequency Generation

The 26 MHz reference signal is used as the reference for the on-chip synthesizer. To cover the required frequency range, the integrated Voltage Controlled Oscillator (VCO) operates at twice the frequency for band 1800/1900, and at four times the desired frequency for band 850/900.

Transmitter

The transmitter block consists of the following sub-blocks:

A separate block is used to convert the digital bit streams from the baseband into parallel words to be used in the DACs and the Sigma Delta modulator. This block also includes programmable delays for optimizing delays between the different modulation paths.

The combined DAC and LP-filter is used to convert the digital words of the digital block into analog signals. The second FM-path is used to add the high frequency part of the FM to the VCO. It also includes an auto-tuning block that compensates VCO gain variations.

The AM-block converts the differential voltage from the DAC to a single-ended output that drives the PA. The output is scaled according to the desired output power, and an offset can be added for PA linearization. The TX-buffer is used to drive the PA with the correct power level. A divide by 2 or 4 block is used to generate the correct output frequency from the 4 GHz VCO.

TX Frequency, Channel and Power Level Range:

GSM 850:

Frequency Range: 824,2 MHz – 848,8 MHz

Channel Range: 128 – 251

Power Level: Min: 19 – Max 5

GSM 900:

Frequency Range: 890,2 MHz – 914,8 MHz

Channel Range: 1 - 124

Power Level: Min: 19 – Max 5

EGSM 900:

Frequency Range: 880,2 MHz – 889,8 MHz

Channel Range: 975 - 1023

Power Level: Min: 19 – Max 5

DCS 1800:

Frequency Range: 1710,2 MHz – 1784,8 MHz

Channel Range: 512 – 885

Power Level: Min: 15 – Max 0

PCS 1900:

Frequency Range: 1850,2 MHz – 1909,8 MHz

Channel Range: 512 - 810

Power Level: Min: 15 – Max 0

Receiver

The receiver is a homodyne receiver with direct conversion of the received radio channel to baseband I and Q channels. The analog signals are converted to digital bitstreams in a sigma delta A/D converter. The receiver block consists of a front-end with separate LNAs for each band and a common quadrature mixer. The front-end block is followed by a baseband block with active antialiasing filters that also suppress blocking signals and interferers. After the baseband block is a fully integrated Analog to Digital Converter of sigma delta structure

with high dynamic range. The digital output signals are sent over a serial interface to the digital base-band circuit for further processing and detection.

RX Frequency and Channel Range

GSM 850:

Frequency Range: 869,2 MHz – 893,8 MHz

Channel Range: 128 – 251

GSM 900:

Frequency Range: 935,2 MHz – 959,8 MHz

Channel Range: 1 - 124

EGSM 900:

Frequency Range: 925,2 MHz – 934,8 MHz

Channel Range: 975 – 1023

DCS 1800:

Frequency Range: 1805,2 MHz – 1879,8 MHz

Channel Range: 512 – 885

PCS 1900:

Frequency Range: 1930,2 MHz – 1989,8 MHz

Channel Range: 512 - 810

WCDMA Radio Module N1210 (Squid)

RF 3100 is an integrated transceiver intended for the Universal Mobile Telecommunication System (UMTS). The circuit is specially designed for the Frequency Division Duplex (FDD) mode of the Wideband Code Division Multiple Access (WCDMA) that operates in Band I (TX 1920-1980 MHz, RX 2110-2170 MHz). The baluns, loop filters and most of the passive components are included in the package.

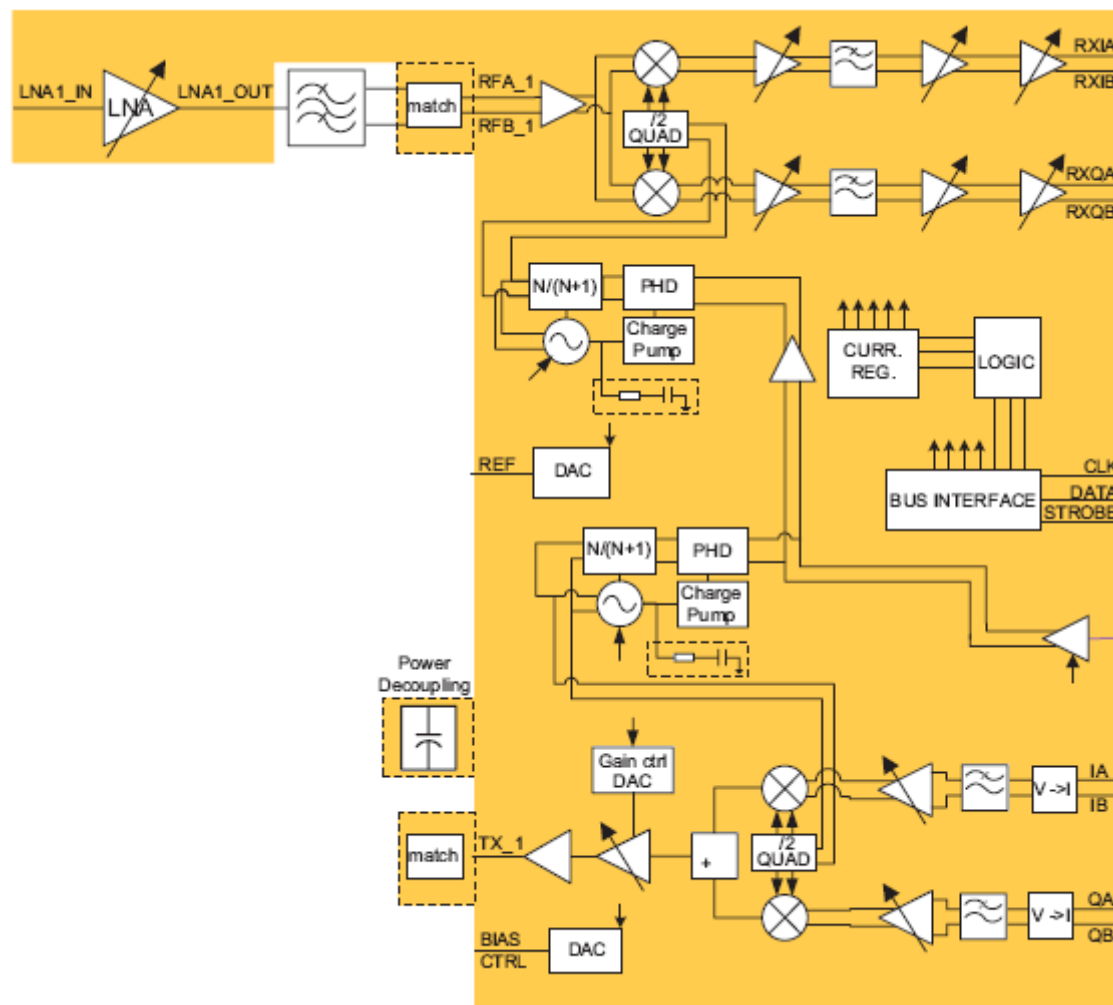
The WCDMA transceiver has the following features:

- System in Package solution
- Single band application (UMTS band I)
- High Speed Downlink Packet Access (HSDPA) capability
- Variable duplex in band I
- Fully integrated TX baluns, loop filters and decoupling capacitors
- Low noise, wide dynamic range for zero IF RX and TX
- RX 87 dB gain control range in increments of 1 dB
- TX 80 dB gain analog control range; 1 dB minimum resolution
- RX 99 dB voltage gain
- Maximum TX output power at least +5dBm average
- Integrated RX channel filters (band I)
- RX & TX fully integrated fractional-N synthesizer with AFC control capability
- RX & TX fully integrated RF VCO with integrated supply voltage regulator
- Supply voltage from 2.6 V to 3.0 V
- 3-wire serial interface bus
- HVQFN40 package
- Lead-free

Frequency Generation

The transmitter and receiver frequency synthesizers and the VCOs are fully integrated in the WCDMA radio circuit. The signal from the crystal oscillator is used as a reference for the synthesizers. The two synthesizers are controlled through the serial bus from the access subsystem of the digital baseband controller.

WCDMA Transceiver Block Diagram



Transmitter

The TX IQ modulator has differential voltage I and Q inputs. It converts input signals to RF output frequency and is designed to achieve LO and image suppression. The transmit output stage provides at least +5 dBm at maximum power control at the single-ended 50 Ω output. Gain is set through the 3-wire bus. Two 10-bit DACs are used to control the DC/DC converter and the PA gain. These DACs are controlled through the 3-wire bus.

Receiver

The front-end receiver converts the aerial RF signal from WCDMA band I down to a Zero Intermediate Frequency (ZIF). The first stage consists of one single-ended low noise amplifier (LNA) with a 16 dB gain step. This LNA is followed through an external filter by an IQ down-mixer which consists of a mixer in parallel driven by quadrature out-of-phase LO signals. The In phase (I) and Quadrature phase (Q) ZIF signal are then low pass filtered to provide protection from high frequency offset interferer fed into the channel filter. The front-end zero IF I and Q outputs are applied to the integrated low-pass channel filter with a provision for 4 x 8 dB gain steps in front of the filter. The filter is a self-calibrated 6 pole, 2 zero filter with a cut-off frequency around 2.15 MHz and a second order group delay compensation (2 poles, 2 zeroes). Once filtered, the zero IF I and Q signals are further amplified with provision of 31 x 1 dB steps and DC offset compensation. The zero IF output buffer provides close rail-to-rail output signals.

Bluetooth and FM Radio

The STLC2592 circuit N1400 combines Bluetooth and FM tuner functionality into one.

Bluetooth

The Bluetooth implementation is compliant with Bluetooth specification 2.1 + EDR. The Bluetooth™ transceiver has frequency channels with 1 MHz separation from 2402 to 2480 MHz. The same band is used for both transmission and reception. This gives 79 frequency channels.

Receiver

The first stage of the receiver is an external antenna filter, which suppresses unwanted frequencies. The receiver is of a "near-zero" IF receiver architecture. The local oscillator is generated by a frequency synthesizer, which allows the receiver to be set at frequencies in intervals of 1 MHz. The synthesizer is controlled from the logic part. The received signal is sampled in the logic for later signal processing.

Transmitter

The synthesizer generates the TX frequency which modulated by the BT baseband block. It is then amplified. The BT system is a class 1 device with maximum of +4 dBm output power (minimum setting is about -50 dBm).

FM Radio

FM Receiver

The receiver uses a digital low-IF architecture. The receive (RX) section integrates a low noise amplifier (LNA) supporting the worldwide FM broadcast band (76 to 108 MHz). An automatic gain control (AGC) circuit controls the gain of the LNA to optimize sensitivity and rejection of strong interferers. An image-reject mixer down converts the RF signal to low-IF. The quadrature mixer output is amplified, filtered and digitized with high resolution analog-to-digital converters (ADCs). This advanced architecture allows the use of digital signal processing (DSP) to perform channel selection, FM demodulation and stereo audio processing.

Tuning

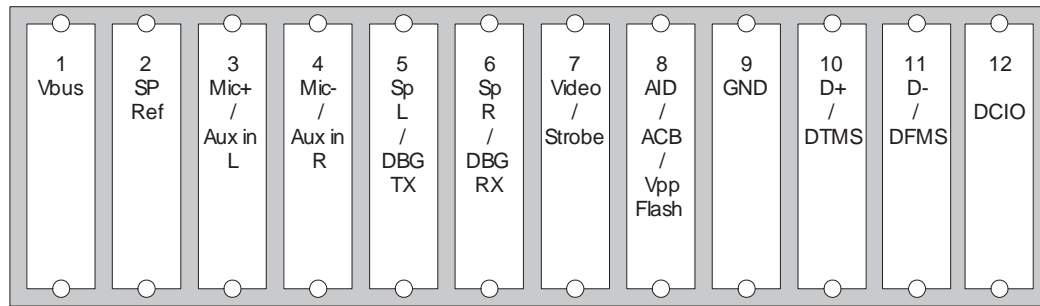
The receiver uses frequency synthesizer technology including a completely integrated VCO. The frequency synthesizer generates the quadrature local oscillator signal used to downconvert the RF input to a low intermediate frequency. The VCO frequency is locked to the reference clock and adjusted with an automatic frequency control (AFC) servo loop during reception. The tuning frequency is defined as:

$$\text{Freq (MHz)} = \text{Spacing (kHz)} \times \text{Channel} + \text{Bottom of Band (MHz)}$$

External Connectors

External units are connected to the transceiver by means of a 12-pin connector on the bottom of the phone. The pin numbering is starting from the right when looking at the system connector with the front up.

System connector pin out:



Clocks

Clock Distribution

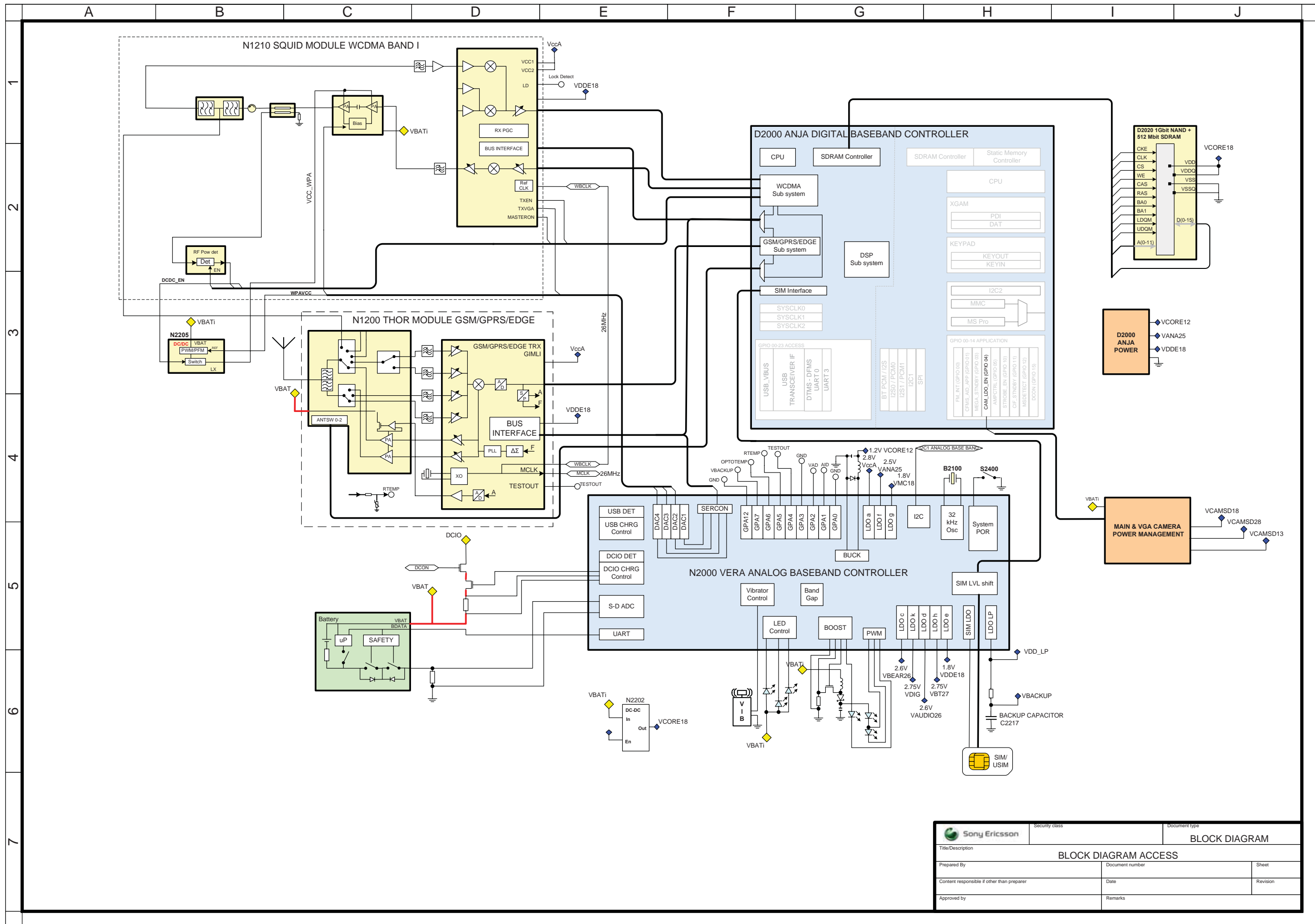
The clocking for the access and application subsystems is separated. This means that they can wake up or go to sleep mode independently. The access subsystem is clocked by the 26 MHz Voltage Controlled Crystal Oscillator (VCXO) located in the GSM/EDGE module N1200 (Thor). When the access subsystem has a job to do, the Master Clock (MCLK) signal is requested from the RF part. Most other clocks needed within the access subsystem are generated from the MCLK. Some minor parts like sleep timer and cable detect use the 32 kHz real-time clock. The 32 kHz real-time clock clocks the application subsystem, and all other internal clocks needed within the application subsystem are generated from this clock. However, when audio is transferred between the application and the access subsystems, the MCLK is used.

Master Clock (26 MHz)

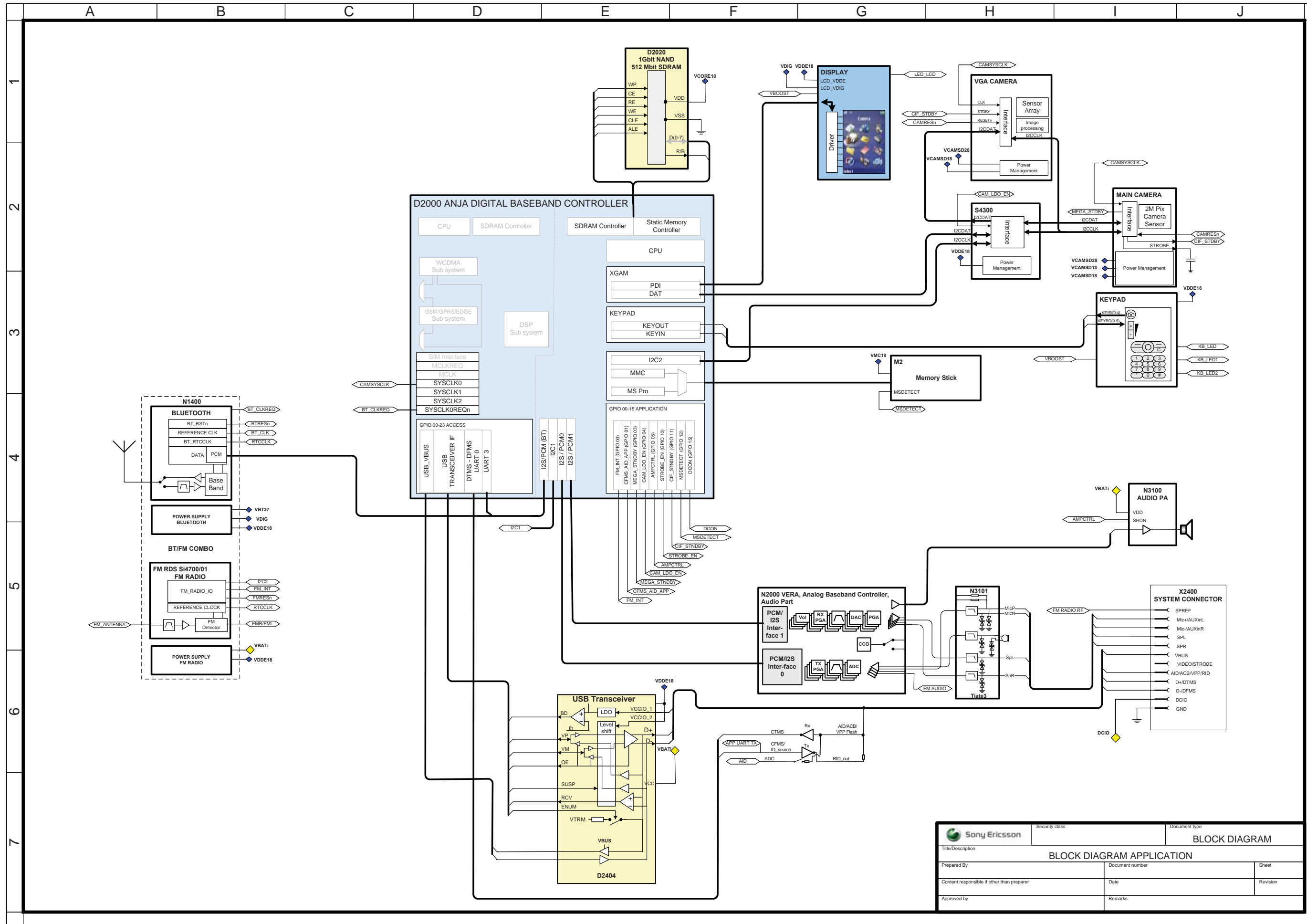
The 26.00 MHz VCXO-based MCLK is distributed as a square wave signal from the GSM/EDGE circuit. In order to have full control over the load on the MCLK, only the access side of the digital baseband controller is allowed to request the MCLK. However, by indirect means also the application side CPU can issue the request. A VCXO-based square wave is also distributed to the WCDMA circuit, but is turned on only upon a command from the digital baseband controller.

Real-time Clock (32. 768 KHz)

A 32.768 kHz crystal oscillator provides a low frequency clock whenever the phone has power. This clock is used to keep the Real-Time Clock (RTC) block functioning, so that the phone can keep track of the time and date. The low frequency clock is generated in the analog baseband controller N2000 (Vera) and distributed to the digital baseband controller D2000 (Anja), and if necessary to external devices like Bluetooth, FM radio and A-GPS.



Sony Ericsson		Security class	Document type
BLOCK DIAGRAM ACCESS		BLOCK DIAGRAM	
Prepared By	Document number	Sheet	
Content responsible if other than preparer	Date	Revision	
Approved by	Remarks		



Sony Ericsson		Security class	Document type
BLOCK DIAGRAM			
Title/Description BLOCK DIAGRAM APPLICATION			
Prepared By	Document number	Sheet	
Content responsible if other than preparer	Date	Revision	
Approved by	Remarks		

Electrical Part list

The list contains only components that are possible to replace on the main board. Pos. number refer to the components position number on the board.

Some components are noted as MSL X. These components are moisture-sensitive and are rated at various levels (MSL):

- Level 1:** Unlimited floor life; does not require dry pack or re-baking.
- Level 2:** 1 year floor life; $\leq 30\text{ C}$; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 2A:** 4 week floor life; $\leq 30\text{ C}$; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 3:** 168 hours floor life; $\leq 30\text{ C}$; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 4:** 72 hours floor life; $\leq 30\text{ C}$; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 5:** 48 hours floor life; $\leq 30\text{ C}$; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 5A:** 24 hours floor life; $\leq 30\text{ C}$; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.
- Level 6:** 6 hours floor life; $\leq 30\text{ C}$; 60%rh; shipped in dry pack; must be re-baked after being opened if floor life is exceeded.

NOTE! RF Calibration by using SERP can only be done by authorized repair centers.

Fence modification according to Working Instruction Electrical.

F=Front side, B=Back side.

Side	Pos.	Description	Part Number	Comments	Page
F	B2100	Osc XO 32.768 kHz LC	1200-3231	K660 ONLY Require calibration (SERP)	78
B	B3100	Microphone	RLC509429/5		78
B	C2217	0.07F 3.3V Capacitor	RJE3551335/7		
F	C3145, C3146	Capacitor Ceramic 470,0 nF +/-10% 6,3 V	RJC5163026/47	MSL1	
F	L2200	Ind WW 4.7 uH +/-20% 3.6X2.8X1.2	1200-0119	K660 ONLY MSL1	78
B	L2401, L2402, L2403, L2404,	Filter 0.0 Hz 0402	REG70618/20	MSL1	79
B	N1002	PA Module. 22 TERMINAL LGA	RYT101988/1	MSL3 Calibration Required (SERP)	79
B	N1200	RF-Module Thor Pre-bumped	1203-6579	Calibration required (SERP) MSL R5A Special Soldering Process Required - Authorized Repair Centers Only	79
B	N1210	RF-Module Squid Pre -bumped	1204-1674	Calibration required (SERP) MSL R5A Special Soldering Process Required - Authorized Repair Centers Only	80

F=Front side, B=Back side.

Side	Pos.	Description	Part Number	Comments	Page
B	N1400	Module Bluetooth + FM STLC2592	1200-6182	K660 ONLY MSL3 Special Soldering Process Required - Authorized Repair Centers Only	80
B	N2203	2ch-LDO, Vout1=2.8V, Vout2=1.8V, WL-CSP6	RYT113997/4		81
B	N2204	LDO1.2 V, 200mA, low noice, CS 5	RYT1137816/3		81
B	N2205	IC Vreg	1200-0107		81
F	N2400	1-Bit Level Translator	RYT109914/1		
F	N3100	IC Amp	RYT1017841/1		82
B	N3101	EMI filter and ESD	ROP1013074/1	MSL1	82
B	S100	Shield Can Fence with lid	1200-0085	K660 ONLY	
B	S2400, S2402, S2403	Input Switch side push	RMD10116/9		82
B	V2202	TRANS V;DUAL_PMOFET;BYX10 1603_A;REQ318	RYN122910/1		83
F	V2206	Diode V schotty	RKZ123905/2		83
F	V2405	MOSFET Complementary N P 20 V (D S)	RYN901918/2		83
B	V2420, V2421	Zener Diode voltage regulator 15V 5%	RKZ223905/2	MSL1	83
F&B	V3101,V3102, V3103,V3104, V3105,V3106, V3107,V3108, V3109,V3110	Zener diode	RKZ223911/1		83
F	V4201	Schotty Diode	RKZ323907/1		83
F&B	X1001, X1002, X1003	Antenna Pin Connector	SND90158		84
B	X1200	Conn Antenna	RPT79947		84
B	X1201, X1202, X1203	POGO Pin (For Antenna)	SND10625		84
B	X2200	Battery Connector	SND10620		85
B	X2402	Con X Keyboard connector	RNV799036		85
B	X2403	SIM card reader	SXA1096432		86
B	X2490	MS-Micro Pico holder	RNK87147/2		86
F	X4200	B to B connector, female, 22 pin	RNV799046		86
F	X4300	Conn Socket	1200-0374		87
B	X4310	Conn (Camera Socket)	RNV799011		86

B2100 Osc. XO 32.768 kHz LC 1200-3231

Crystal oscillator

CRYSTAL OSCILLATOR
32.768 kHz

SG-3030LC
SG-3040LC

+Built-in 32.768 kHz crystal unit allows adjustment-free efficient operation.
+Use of C-MOS IC enables reduction of current consumption.
+VIO controls swing amplitude (SG-3030 / SG-3040).

RoHS Compliant

SG-3030LC
SG-3040LC

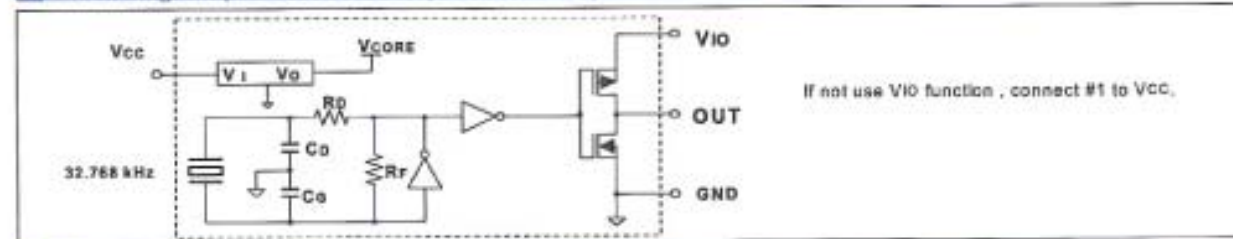
Actual size
LC Type.

Specifications (characteristics)

Item	Symbol	Specifications			Remarks
		SG-3030LC(JF/JC)	SG-3040LC(JC)	SG-3032JC	
Output frequency range	f_o	32.768 kHz			
Supply voltage	Vcc	1.5 V to 5.5 V	0.9 V to 3.6 V	1.8 V to 3.6 V	
Interface power supply voltage	Vio	1.5 V to 5.5 V	0.9 V to 3.6 V	—	
Temperature range	T _{stg}	-55 °C to +125 °C			Store as bare product after unpacking
Storage temperature	T _{use}	-40 °C to +85 °C			
Operating temperature range	T _{use}	-20 °C to +70 °C			
Frequency tolerance	F _{tol(osc)}	±23 × 10 ⁻⁶			+25 °C, Vcc=3.3 V (SG-3040: Vcc=1.2 V)
Frequency temperature coefficient	Fo-Tc	+10 × 10 ⁻⁶ / -120 × 10 ⁻⁶			-20 °C to +70 °C (+25 °C is reference)
Frequency / voltage coefficient	Fo-Vcc	±2 × 10 ⁻⁶ / V Max.	±5 × 10 ⁻⁶ / V Max.	±2 × 10 ⁻⁶ / V Max.	+25 °C
Current consumption	Icc	2 µA Max.	3.1 µA Max.	5 µA Max.	3.3 V, No load condition
Symmetry	SYM	45 % to 55 %			1/2 Vcc(Vio)level (SG-3040: Vio=1.2 V to 3.6 V)
High output voltage	Voh	Vio-0.4 V Min.			I _{oh} =0.4 mA (SG-3040: Vio=1.2 V to 3.6 V)
Low output voltage	Vol	0.4 V Max.			I _{ol} =0.4 mA (SG-3040: Vio=1.2 V to 3.6 V)
Output load condition (CMOS)	L, CMOS	15 pF Max.			CMOS load
Output rise and fall time	t _r / t _f	200 ns Max.	100 ns Max.		CMOS load: 20 % Vcc(Vio) to 80 % Vcc(Vio)level (SG-3040: Vio=1.2 V to 3.6 V)
Oscillation start up time	t _{osc}	1 s Max.	3 s Max.		Time at minimum Supply voltage to be 0 s +25 °C (SG-3030: Vcc=2.0 V to 5.5 V) +25 °C, Vcc=3.3 V, First year
Frequency aging	F _{aging}	±5 × 10 ⁻⁶ / year Max.			

Unless otherwise stated, characteristics (specifications) shown in the above table are based on the rated operating temperature and voltage condition.

Block diagram (SG-3030LC/JC, JF, SG3040JC/LC)



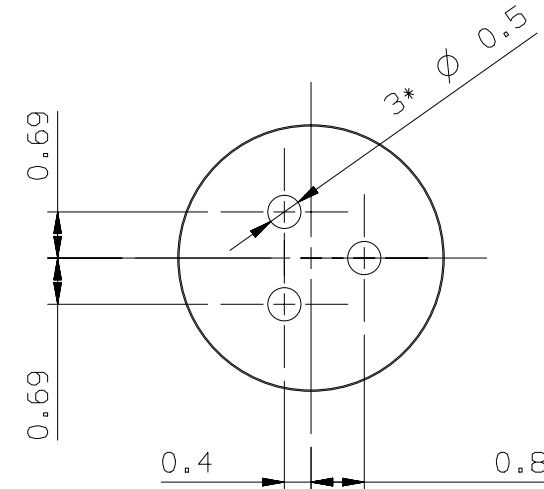
External dimension (Unit:mm)



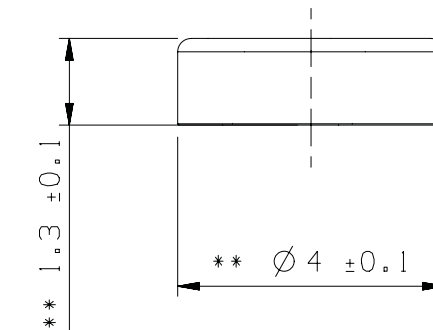
Footprint (Recommended) (Unit:mm)



B3100 Microphone RLC509429/5

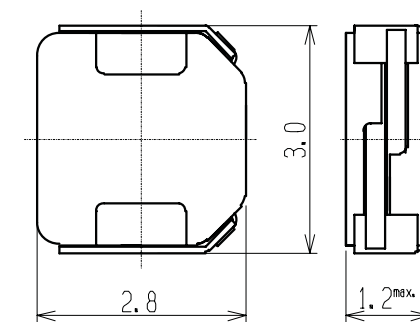


Note:
The dimension with ** is PSA and SPVR dimensions.

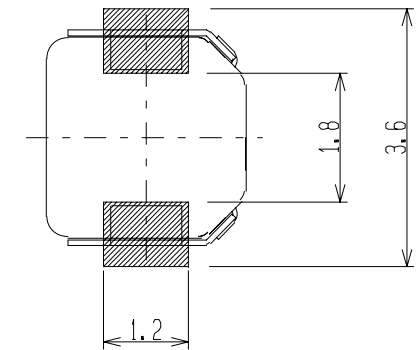


L2200 Ind WW 4.7 uH +-20% 1200-0119

【Dimensions】



【Recommended Pad Layout】

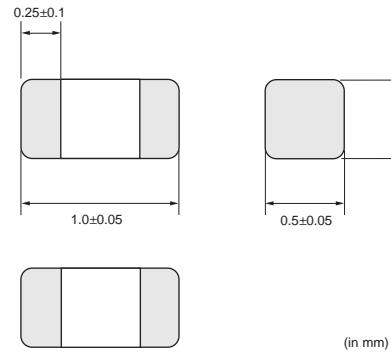


Tolerance : ±0.2 UNIT : mm

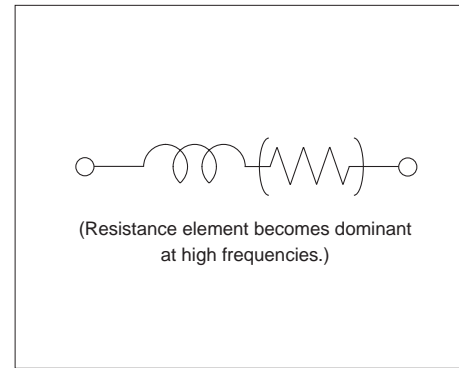
UNIT : mm

L2401-04 Filter 0.0 Hz 0402 REG70618/20

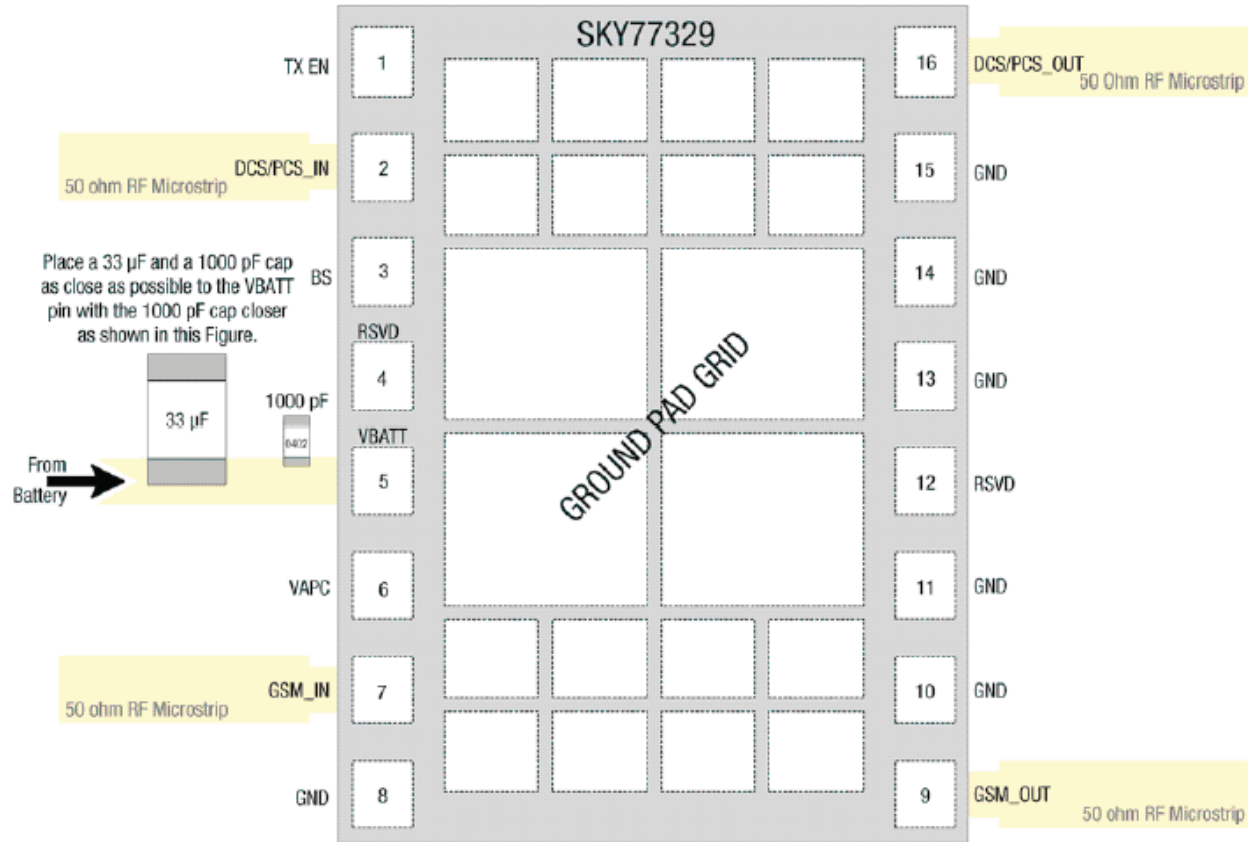
■ Dimension



■ Equivalent Circuit

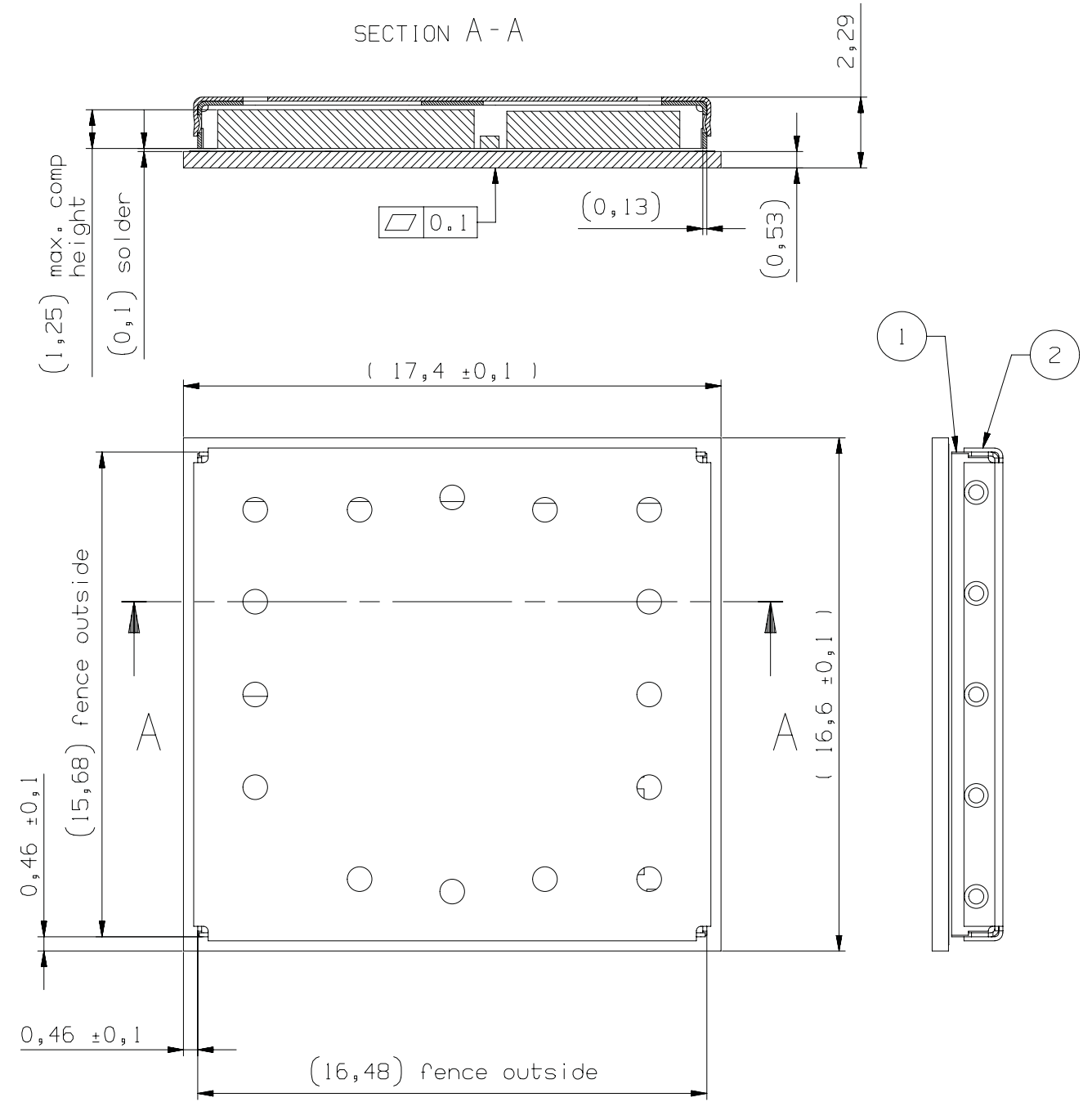


N1002 PA Module 22 Terminal LGA RYT101988/1



10020_002

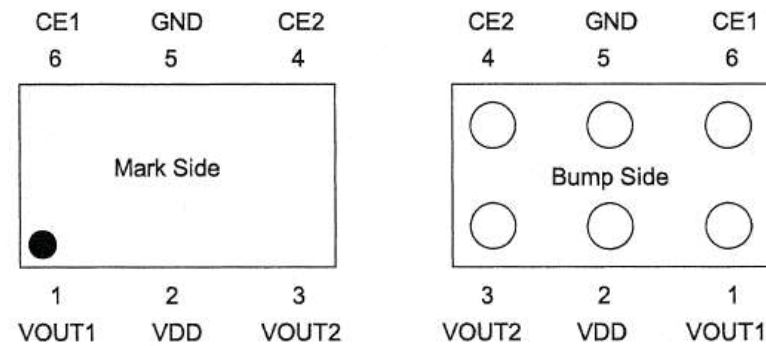
N1200 RF Module Thor 1203-6579



N2203 2CH-LDO Vout1 = 2.8V Vout2 = 1.8V RYT113997/4

[3] Pin Description

Pin No.	Symbol	Pin description
1	VOUT1	Output Pin of Voltage Regulator 1 (VR1)
2	VDD	Power Supply Pin
3	VOUT2	Output Pin of Voltage Regulator 2 (VR2)
4	CE2	Chip Enable Pin for Voltage Regulator 2(VR2)
5	GND	Ground Pin
6	CE1	Chip Enable Pin for Voltage Regulator 1(VR1)

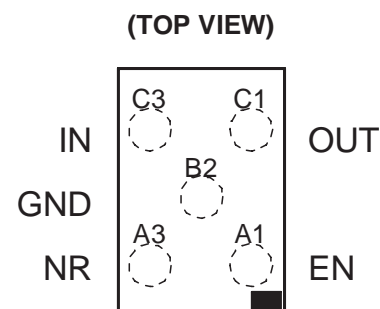


[4] Absolute Maximum Ratings

T_{opt}=25°C, V_{ss}=0V

Item	Symbol	Rating	Unit
Supply Voltage	V _{IN}	6.5	V
Input Voltage			
CE pin Voltage	V _{CE}	-0.3 to V _{IN} +0.3	V
Output Voltage	V _{OUT}	-0.3 to V _{IN} +0.3	V
Output Current (V _{OUT1})	I _{OUT1}	200	mA
Output Current (V _{OUT2})	I _{OUT2}	200	mA
Power Dissipation	P _D	Refer to p.9 [8]	mW
Operating Temperature	T _{opr}	-40 to 85	°C
Storage Temperature	T _{stg}	-55 to 125	°C

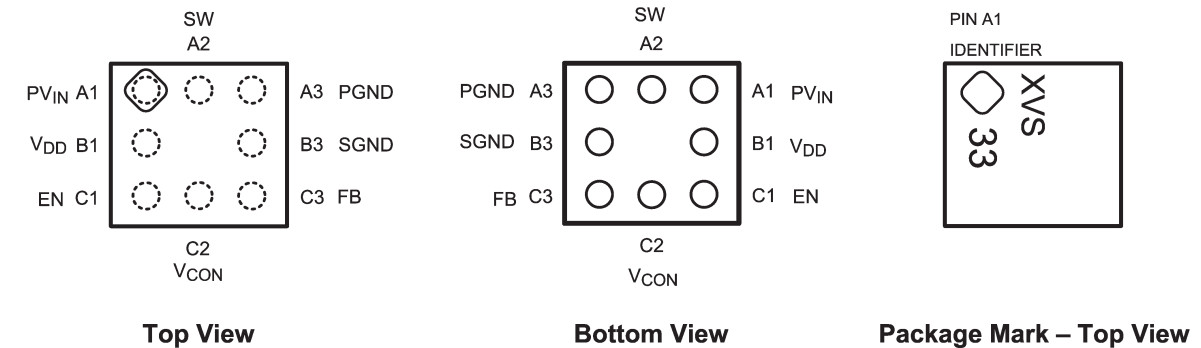
N2204 LDO 1.2V, 200mA Low Noise CS 5 RYT1137816/3



TPS799xx			DESCRIPTION
NAME	YZU		
IN	C3		Input supply.
GND	B2		Ground
EN	A1		Driving the enable pin (EN) high turns on the regulator. Driving this pin low puts the regulator into shutdown mode. EN can be connected to IN if not used.
NR	A3		Fixed voltage versions only; connecting an external capacitor to this pin bypasses noise generated by the internal bandgap. This allows output noise to be reduced to very low levels.
FB	A3		Adjustable version only; this is the input to the control loop error amplifier, and is used to set the output voltage of the device.
OUT	C1		Output of the regulator. A small capacitor (total typical capacitance ≥ 2.0µF ceramic) is needed from this pin to ground to assure stability.

N2205 IC Vreg 1200-0107

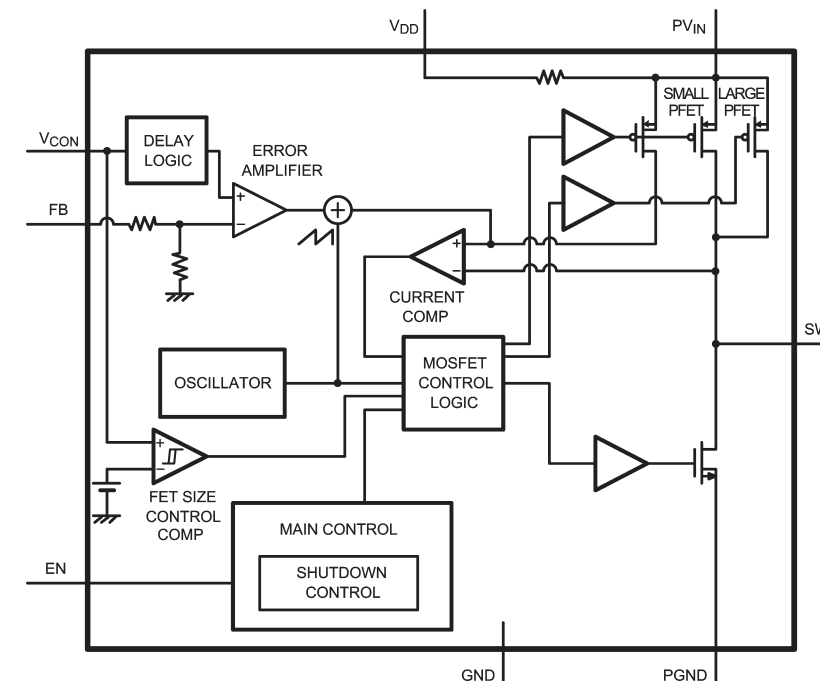
Connection Diagrams



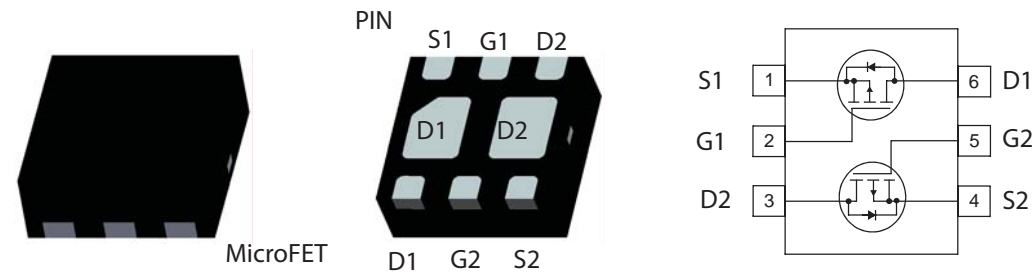
Pin Descriptions

Pin #	Name	Description
A1	PV _{IN}	Power Supply Voltage Input to the internal PFET switch.
B1	V _{DD}	Analog Supply Input.
C1	EN	Enable Input. Set this digital input high for normal operation. For shutdown, set this pin low.
C2	V _{CON}	Voltage Control Analog input. V _{CON} controls V _{OUT} in PWM mode.
C3	FB	Feedback Analog Input. Connect to the output at the output filter capacitor.
B3	SGND	Analog and Control Ground
A3	PGND	Power Ground
A2	SW	Switch node connection to the internal PFET switch and NFET synchronous rectifier. Connect to an inductor with a saturation current rating that exceeds the maximum Switch Peak Current Limit specification of the LM3208.

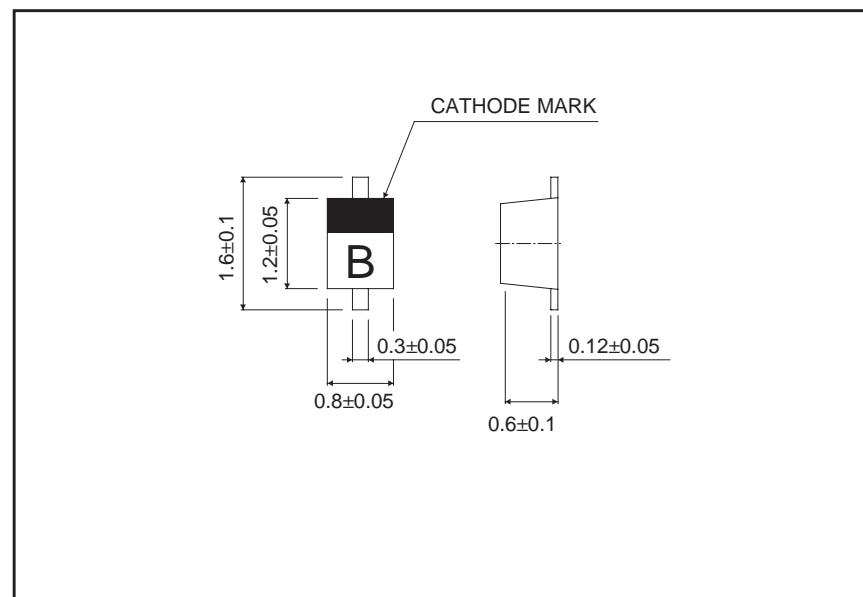
Block Diagram



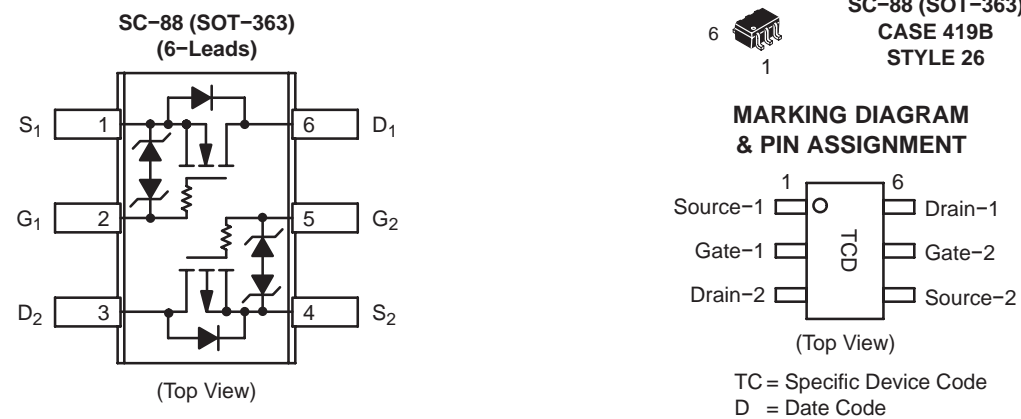
V2202 Trans V; Dual PMOSFET RYN 122910/1



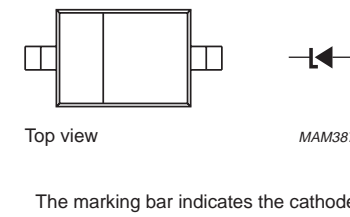
V2206 Diode V Schottky RKZ123905/2



V2405 MOSFET Complementary N P 20V (D S) RYN901918/2



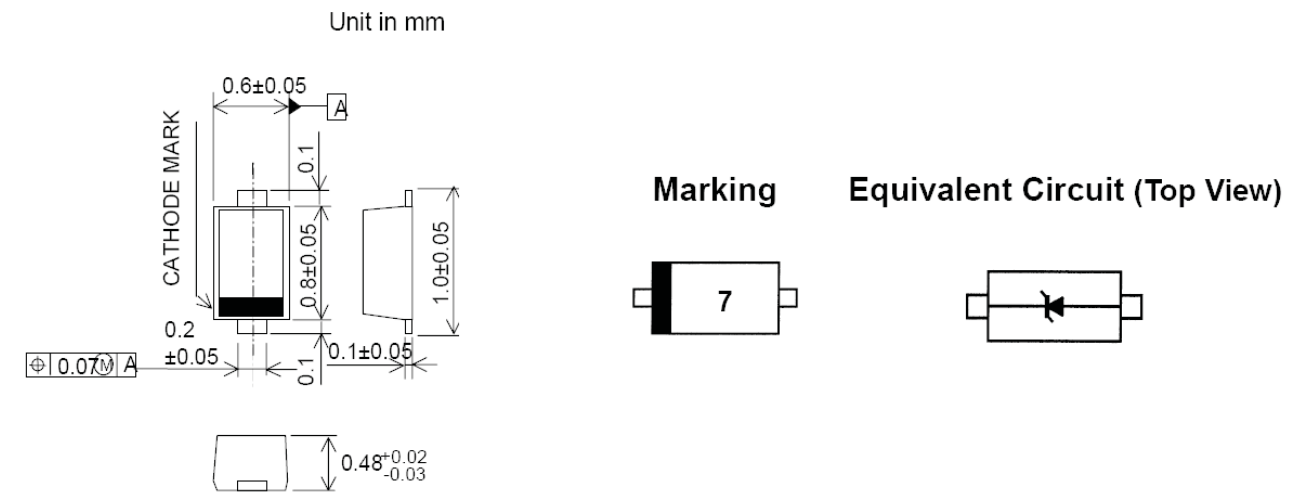
V2420-21 Zener Diode Voltage Regulator 15V 15% RKZ223905/2



PINNING

PIN	DESCRIPTION
1	cathode
2	anode

V3101-10 Zener Diode RKZ223911/1

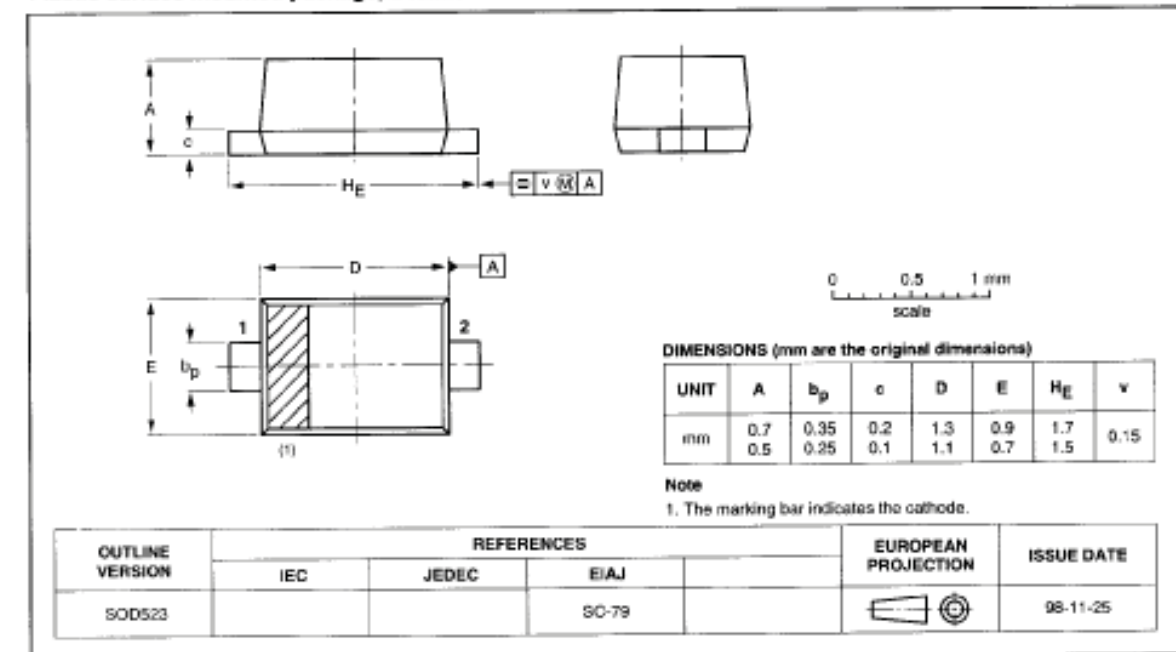


V4201 Schottky Diode RKZ323907/1

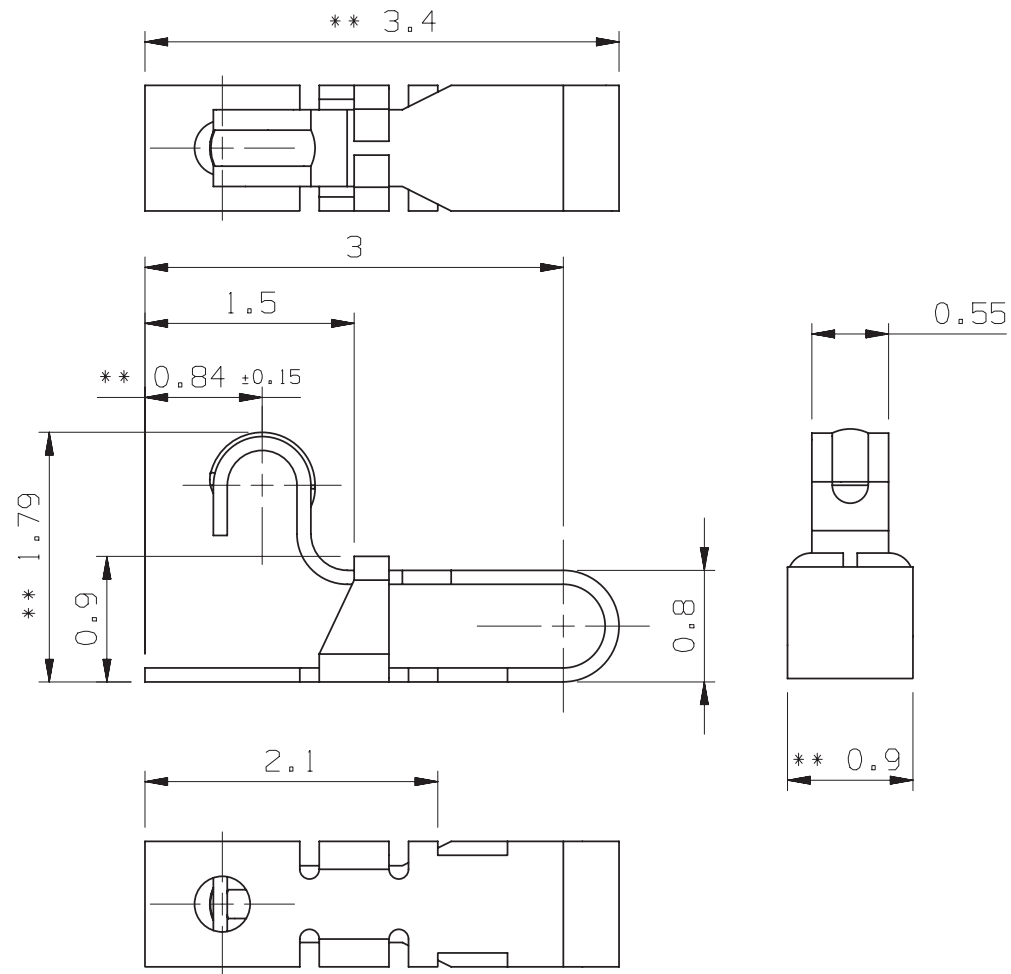
PACKAGE OUTLINE

Plastic surface mounted package; 2 leads

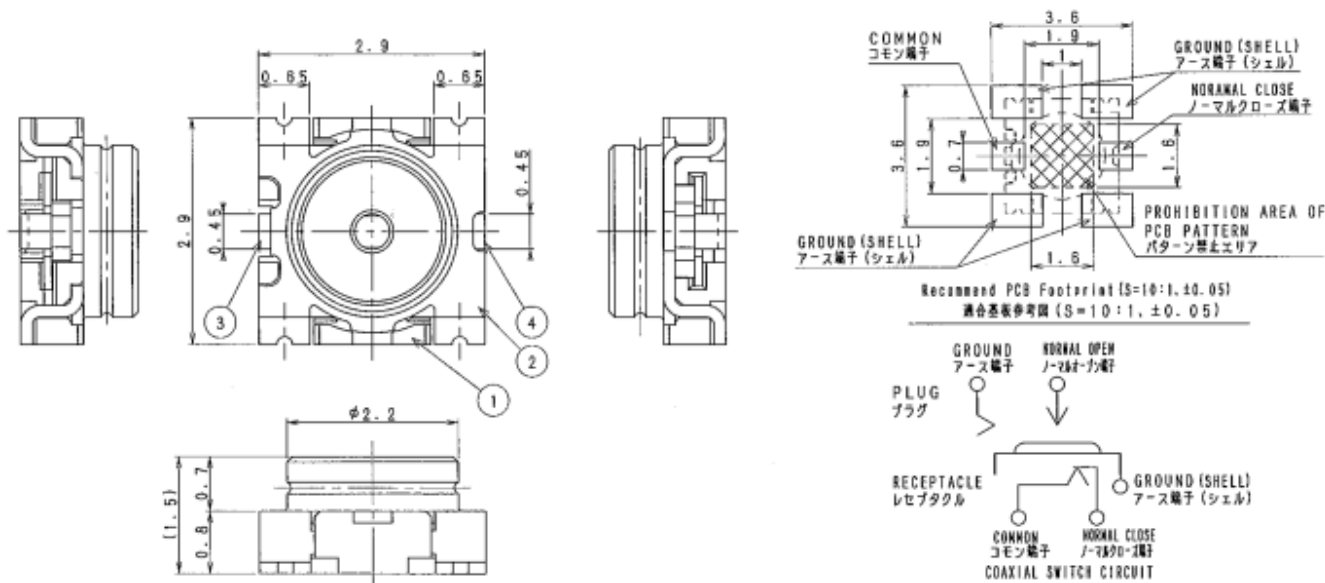
SOD523



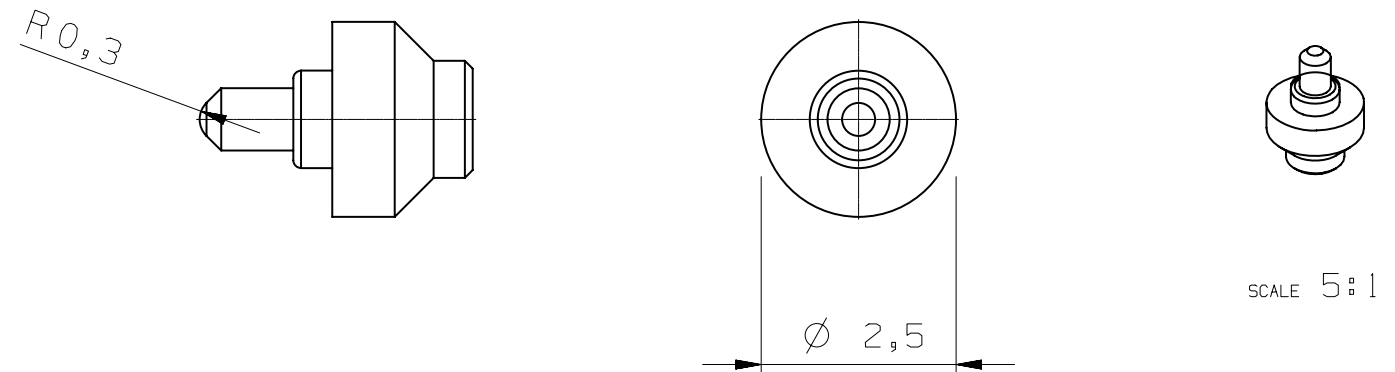
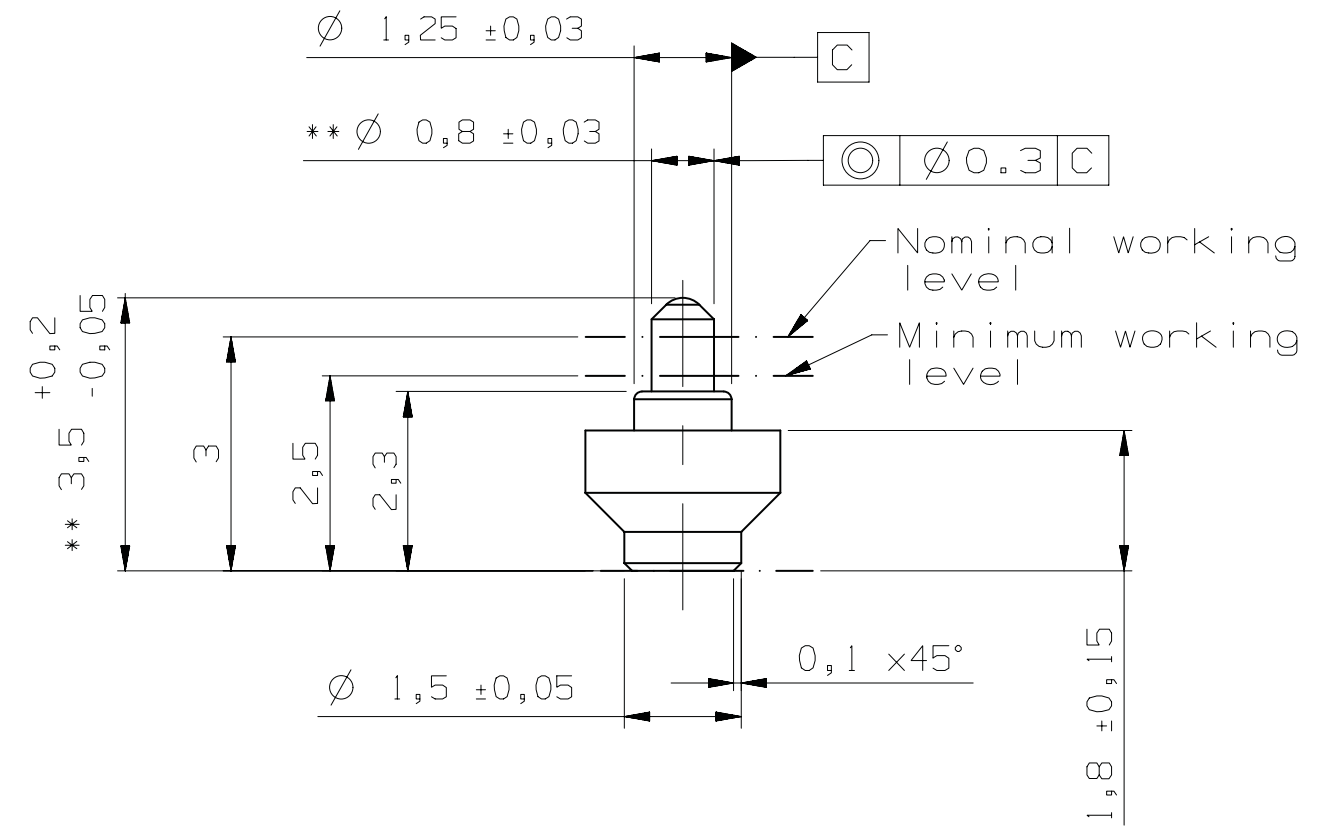
X1001-03 Antenna Pin Connector SND90158



X1200 Conn Antenna RPT79947

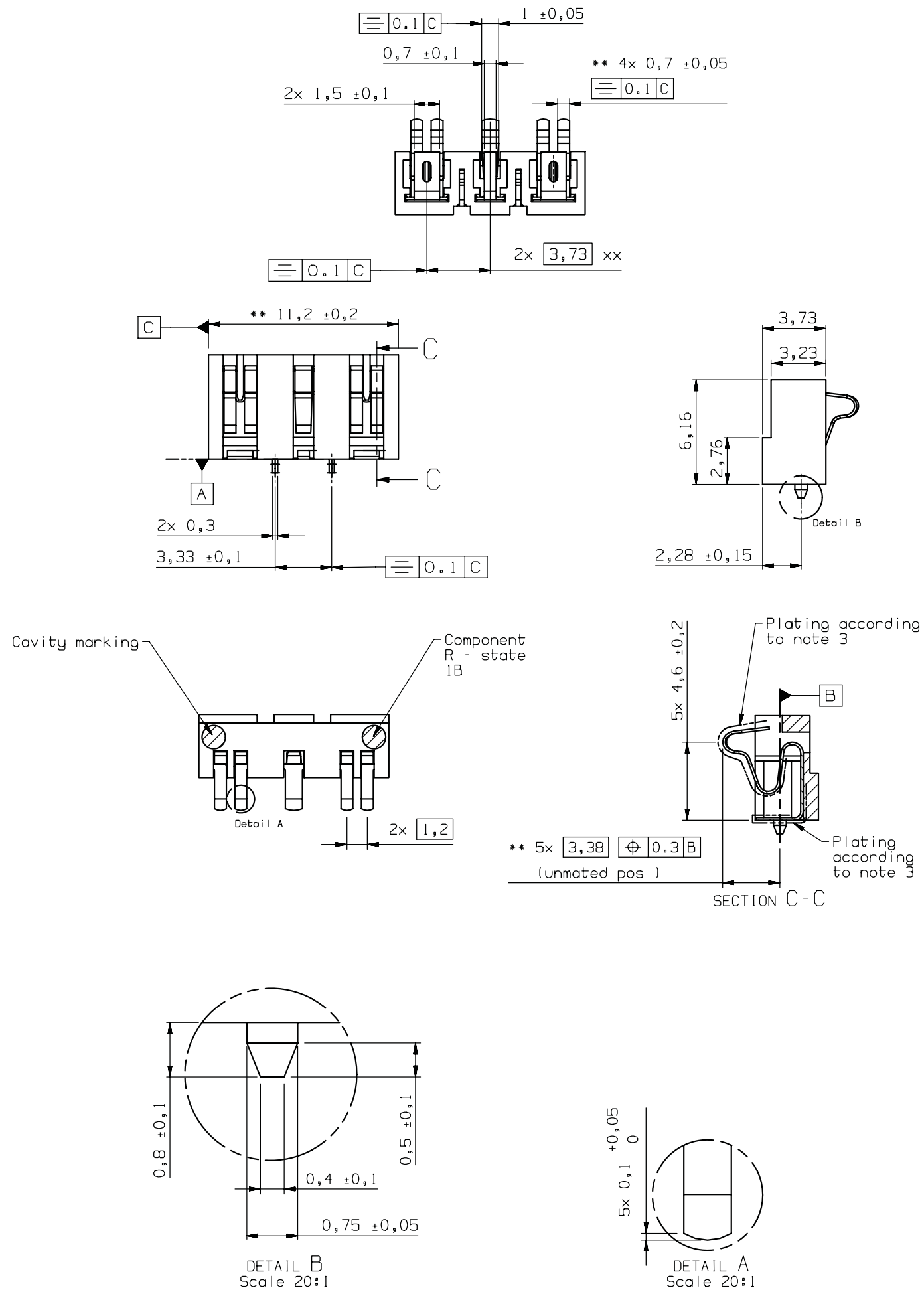


X1201-03 POGO Pin (For Antenna) SND10625

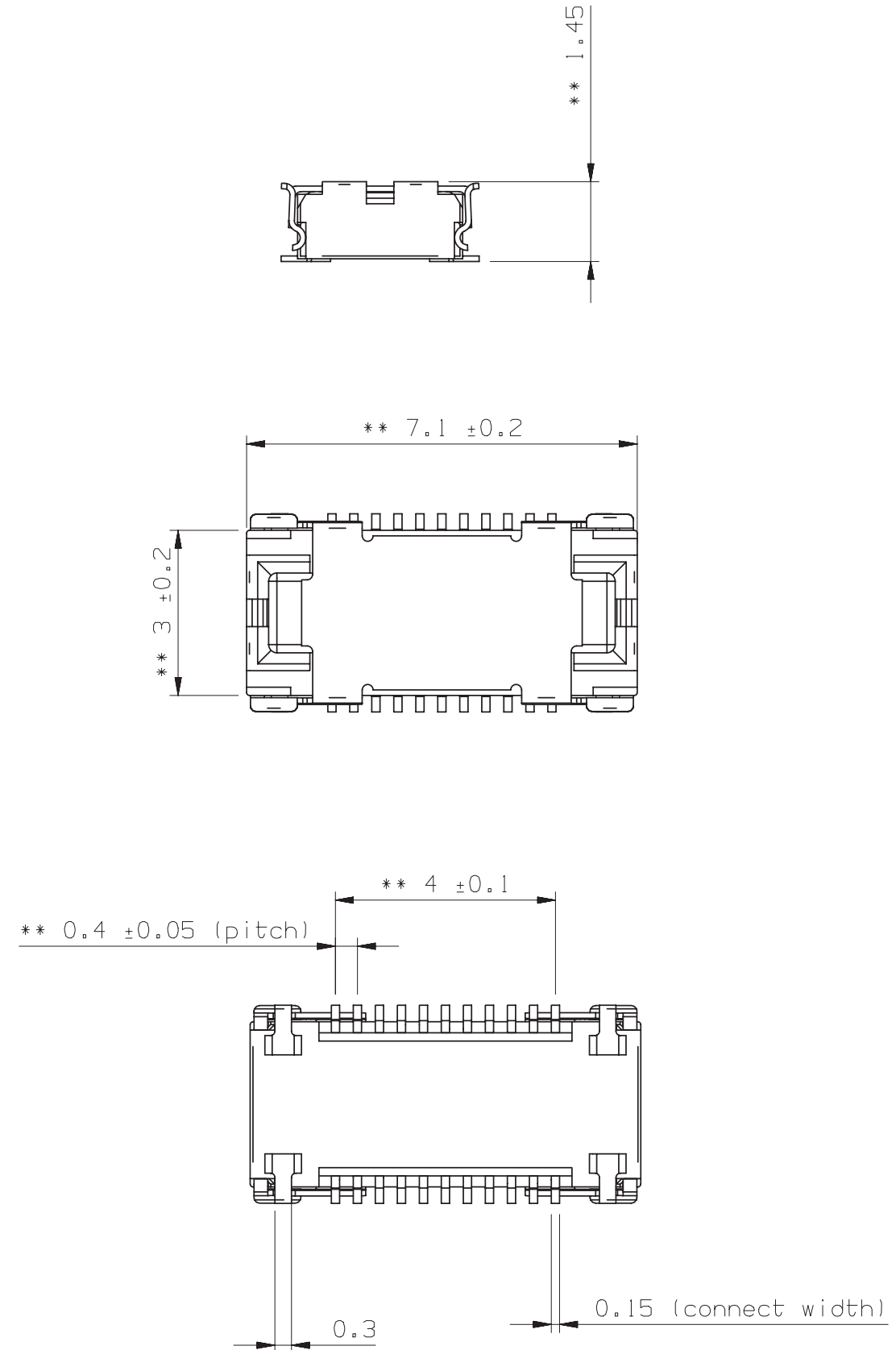


SCALE 5:1

X2200 Battery Connector SND10620

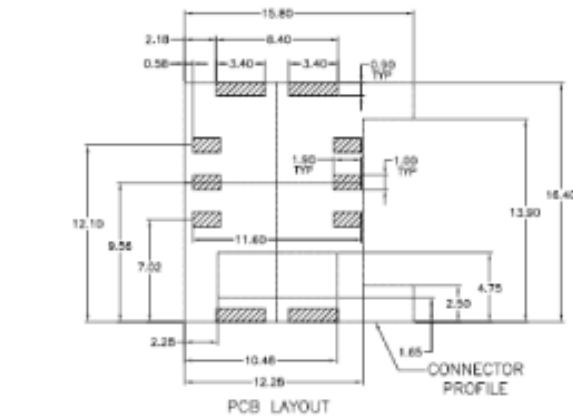
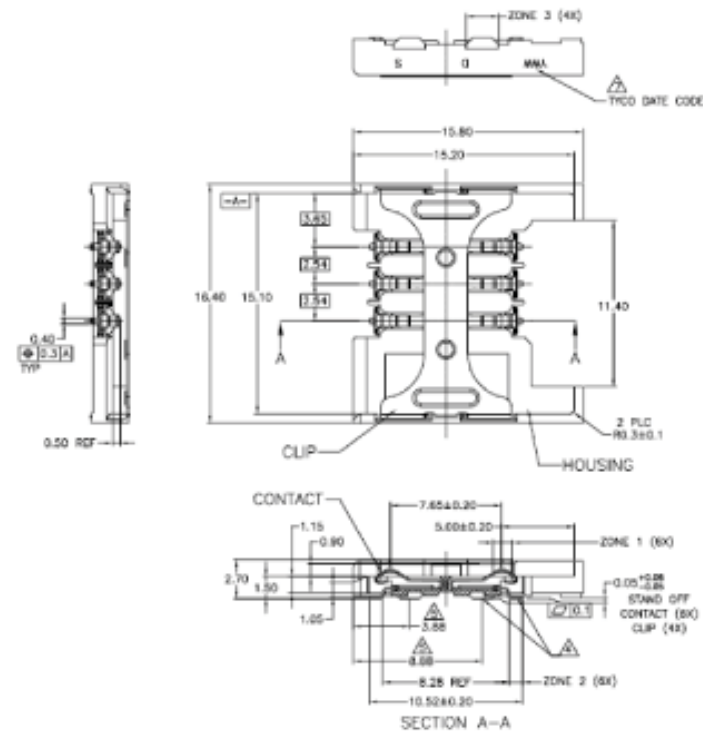


X2402 Con X Keyboard Connector RNV799036



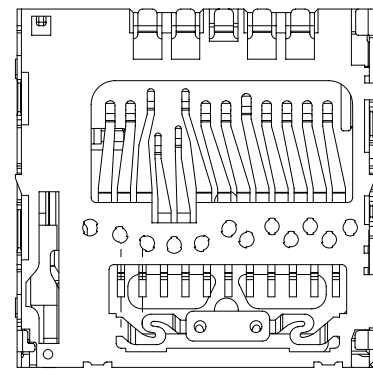
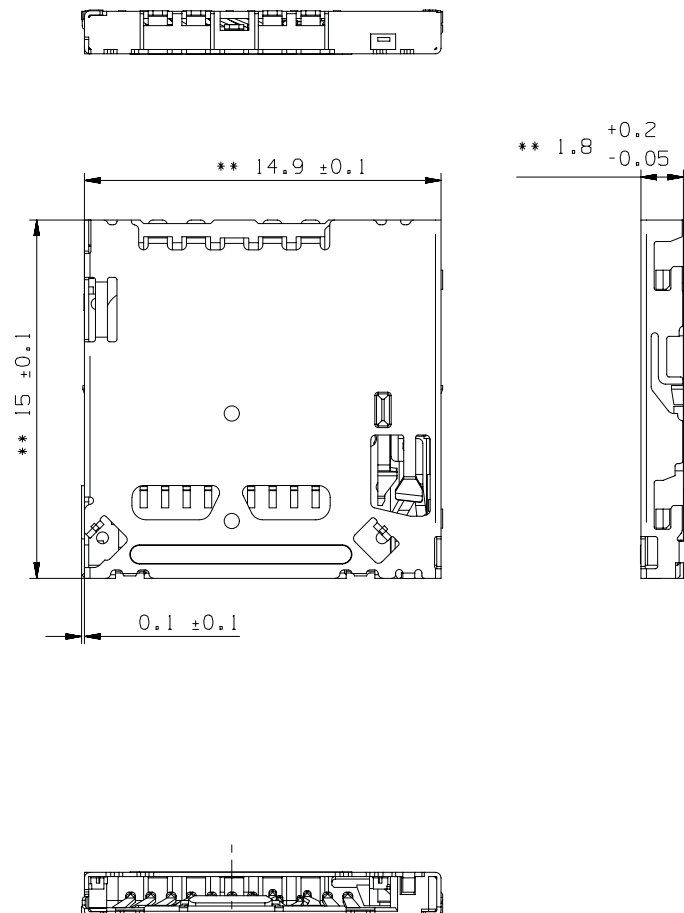
NOTE:
The dimension with '***' is for PSA and SPVR.

X2403 SIM Card Reader SXA1096432

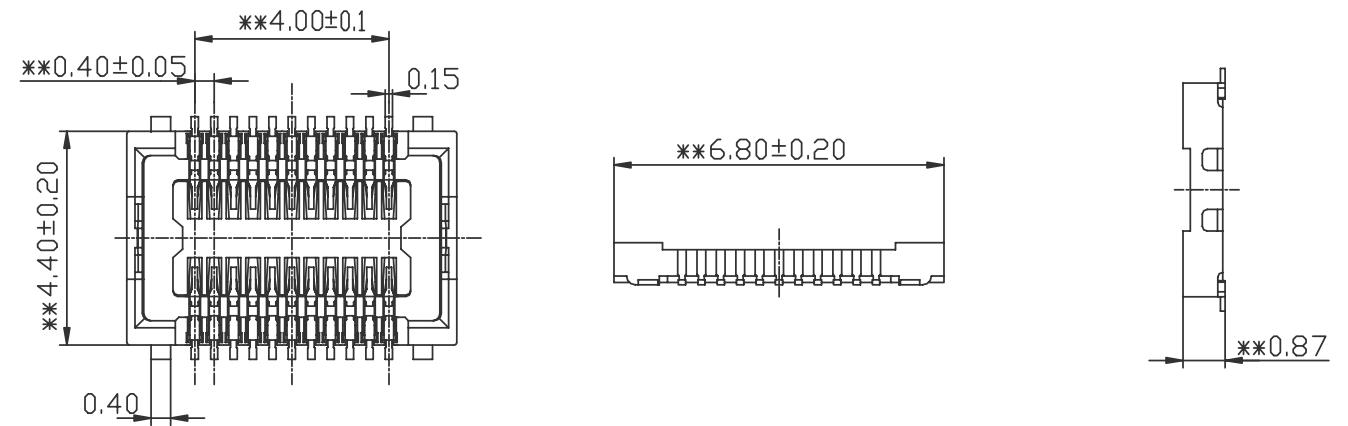


- △ HOUSING MATERIAL: THERMO PLASTIC RESIN.
- △ CONTACT MATERIAL: COPPER ALLOY.
- FINISH: 1.3µm MIN. NICKEL UNDERPLATING, CONTACT SIDE 0.2µm MIN. GOLD PLATING OVER 1.0µm MIN. Pd-Ni ON ZONE 1, TIN PLATING 3.0µm MIN. ON ZONE 2.
- △ CLIP MATERIAL: COPPER ALLOY.
- FINISH: 1.3µm MIN. NICKEL UNDERPLATING ALL OVER, 1.0µm MIN. TIN PLATING ON ZONE 3.
- △ COPLANARITY MEASURED ON 6 CONTACTS AND 4 CLIP FEES IN ONE PASS.
- △ DIMENSION MEASURED FROM PLASTIC TO CENTER OF CLIP FEES.
- △ PACKAGING SPECIFICATION: 107-00193.
- △ TYCO DATE CODE LOCATED AT OPPOSITE OF GATING SIDE
YYEAR; W=NEED; D=DAY; S=SHIFT

X2490 MS-Micro Pico Holder RNK87147/2

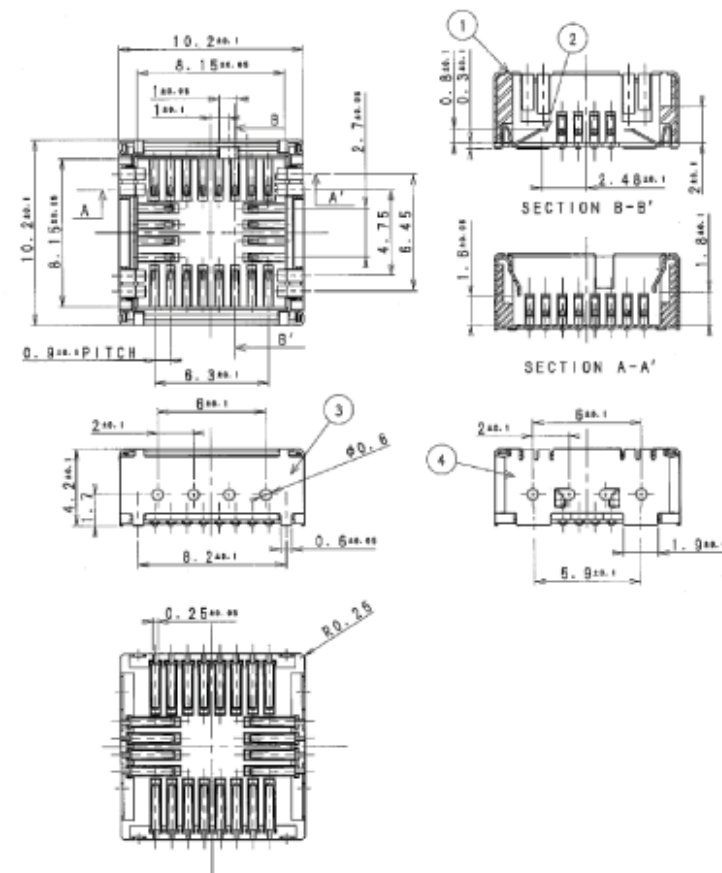


X4200 B to B Connector, Female 22 pin RNV799046

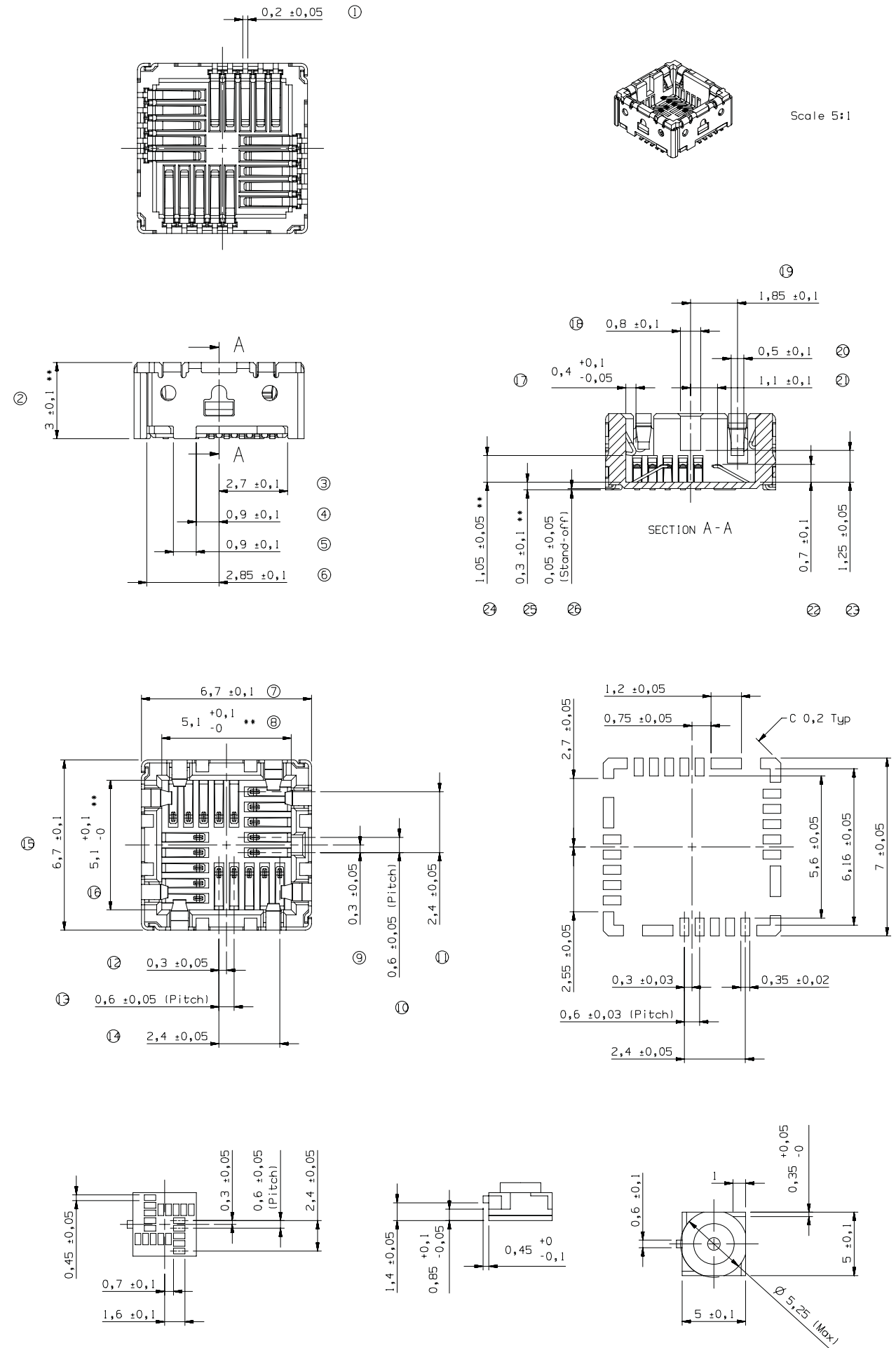


NOTE:
The dimension with "**" is for SPA and SPVR.

X4310 Conn (Camera Socket) RNV799011



X4300 Conn Socket 1200-0374



Applicable Camera Module (Scale 5:1)

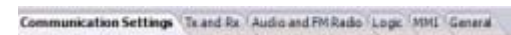
Troubleshooting Software Documentation

Introduction

Using this software you can control most parts and functions of all Sony Ericsson mobile phones. It is a GUI (Graphical User Interface) for the commands implemented in the ITP (Integrated Test Program). The software communicates with the phone through standard serial communication over a USB/RS232 interface (SEPI).

Note: The Troubleshooting Software application is to be used with the Troubleshooting Manual and the Troubleshooting fixture kit.

The functions in the Troubleshooting Software application are divided into three main sections: **Communication Settings**, **Radio Control** and **Base Band Controls**. These main sections are presented under six different tabs.



All settings and functions are collected under these six main tabs.

Communication Settings

All settings for the communication between the Troubleshooting Software application and the phone are presented under the Communication Settings Tab.

Radio Controls

Note: Some parts of Radio Control functions may not be implemented since they are not supported by the ITP SW.

Note: There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.

All Radio Control Functions implemented in the Troubleshooting Software are presented under the **Tx and Rx** tab. The main radio functions of the mobile phone presented in this tab are:

- GSM radio part
- WCDMA radio part
- Bluetooth radio part

In the GSM and the WCDMA radio control part the following radio functions can be controlled: Transmitter (TX) and Receiver (RX)

In the Bluetooth radio control part only the Transmitter (TX) function is supported.

Base Band Controls

Note: Some parts of Base Band Control functions may not be implemented since they are not supported by the ITP SW.

Note: There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available for all products.

The functions for Base Band Control are presented under the following four different tabs:

Audio and FM Radio

Used for setting Audio Loop mode and test the functionality of the FM Radio.

Logic

Used to:

- Read out of the ADC channels
- Control or Test of SIM and Memory Stick Card
- Perform of Battery and Current Calibration
- Check Radio and Display temperature
- Etc.

GPIO Manager

Used to control GPIO ports at the Access and Application CPU.

Note: It is very important to follow the GPIO activation sequence according to the Troubleshooting Guide instructions when the GPIO manager is used to avoid Hardware or SW function interruption.

MMI

Used for:

- Main and VGA Camera Tests
- Camera Door Test
- Keyboard Scan Test
- Vibrator Test
- LED and Backlight Tests
- Xenon Flash Test
- Display Test
- Etc.

General

Used to:

- Read out Software and Product Data Information flashed into the phone
- Perform ASIC Revision test
- Perform available Self tests

Equipment Setup

Note: During calibration the accurate voltage from VBATT must be within ± 0.015 V. If this is not fulfilled it will cause a faulty calibration. For more information about recommended power supply units, see the Repair Tool Catalogue in CSPN under the Mechanical level. The Power Supply Channel 1 VBATT must allow reverse current.

Note: Before starting calibration test, the phone must be flashed with ITP Software.

Instructions for Customization of Power Supply Channel 2 DCIO/SEPI Cable

To perform Current Calibration the phone must be powered directly through the system connector. Customize the cable according to following instructions: Take the CST-75 battery charger and cut off the charger according to picture 1. **Length of the cable must be exact 1.3m.** Connect the CST-75 charger **Red** or **White** cable to the **Positive (+) Output** at Power Supply and the **Black** cable to the **Negative (GND) Output** at the Power Supply according to picture 2. Cut off isolation material from inside of the charger plug according to picture 3.

Picture 1



Picture 2



Picture 3



Power Supply Channel 2 DCIO/SEPI Cable Connection Setup

Note: The Power Supply Channel 1 (VBATT) must allow reverse current.

Note: The maximal cable length between the Power Supply Channel 1 VBATT and the dummy battery must not exceed 1m. The cable must have a capacity for at least 16A.

Picture 4



Correct DCIO and SEPI A1 Cable setup when the Troubleshooting Fixture is used.

Picture 5



Correct DCIO and SEPI A1 Cable setup when a Dummy Battery is used.

Picture 6



This setup between DCIO and SEPI A1 Cable is WRONG!

Note: Voltage and Current settings for the Power Supply Channel 1 VBATT and 2 DCIO/SEPI can be found in the Equipment List included in the Product Specific Troubleshooting Manual.

Note: Instructions about the Troubleshooting fixture connections with the External RF connector, Display, SIM Card, Memory Stick Card, Keyboard etc. can be found in Troubleshooting Fixture Connection Instruction included in the Product Specific Troubleshooting Manual.

System Requirements

Note: Before start using the Troubleshooting Software, the phone must be flashed with ITP SW.

The system requirements for running the application are:

- At least a Pentium III 500 MHz, with 128 MB of RAM
- Win2000 or Win XP
- One free USB connector
- USB Computer Cable
- At least 1024x768 display resolution. (1152x864 is recommended.)
- SEPI Drivers must be installed
- SEPI BOX
- SEPI A1 Cable
- Phone Specific Dummy Battery
- Phone Specific TRS Fixture
- CST-75 Charger cable
- One Dual or Two Single Channel Power Supplies

TX and RX - Tab

Communication Functions

Note: Some parts of the Communications functions may not be implemented since they are not supported by ITP Software.

Note: There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.

GSM

GSM Mode Settings

Used for selecting of the GSM radio mode. The following Radio Modes are available:

- TX and RX Switched
- TX and RX Static

Note: In the TX Switched mode all parameters are available (Band, Channel and Power Level). In the TX Static mode the control of Power Level is hidden and the transmitter works with a predefined DAC value. This is done to protect the power amplifier against overheating.

GSM Radio Settings

Used for Channel and Power Level control of the selected GSM Band. The TX and RX frequency value for selected band and channel will be presented in the TX and RX frequency box.

1. Select the desired GSM band. Available options are **GSM 850** (Ch 128...251), **GSM 900** (Ch 1...124), **EGSM 900** (Ch 975...1023), **DCS 1800** (Ch 512...885) and **PCS 1900** (Ch 512...810).
2. Use default value or select desired channel.
3. Use default value or select desired power level.

Note: Any GSM band not used by the Mobile Phone will be unavailable in the GSM Radio Settings.

GSM RSSI measurements

This measurement is only possible to perform when RX Switched mode is selected. Use the Mobile Phone Tester instrument for feeding a signal to the mobile phone's receiver. For Instrument and Phone's settings go to Troubleshooting Manual – GSM Network problems.

1. Select RX Switched Mode.
2. Select desired GSM band and Channel.
3. Go to GSM RSSI Measurements and Start RSSI Test.

Note: The RSSI Test can be performed differently from product to product due to the limited ITP Software support.

WCDMA

Note: Unused WCDMA Bands will not be available in the WCDMA Radio Settings.

Note: For some products the TX and RX WCDMA Channels range can be reduced due to the limited product functionality or Test Instrument limitation. This is done to avoid wrong and incorrect measurement results.

Radio Settings

Used for TX and RX Channels control of the selected WCDMA Band. The TX and RX Channels frequency for selected band will be presented in the TX and RX frequency box.

1. Select the desired WCDMA band. Available options are **Band I** (TX Ch 9612...9888, RX Ch 10562...10838), **BAND II** (TX Ch 9262...9538, RX Ch 9662...9938), **BAND IV** (TX Ch 1312...1513, RX Ch 1537...1738), **BAND V** (TX Ch 4132...4233, RX Ch 4357...4458) and **BAND VIII** (TX Ch 2712...2863, RX Ch 2937...3088)
2. Use default value or select desired TX or RX channel.

Fast select channels

Set High Channel: The High Channel for selected WCDMA Band will be set by the Troubleshooting SW.

Set Mid Channel: The Mid Channel for selected WCDMA Band will be set by the Troubleshooting SW.

Set Low Channel: The Low Channel for selected WCDMA Band will be set by the Troubleshooting SW.

Modes

Max Pwr 23dBm set the Phone to transmit with maximum power at the selected Band and TX Channel. The limit is 23dBm.

Min Pwr Max -50dBm set the Phone to transmit with minimum power at the selected Band and TX Channel. The limit is -50dBm.

Read RSSI set the Phone in RX mode at the selected Band and RX Channel.

Out Pwr level x dBm set the Phone in TX mode at the desired power level value at the selected Band and TX Channel (Power level range to choose is: from -50dBm to 23dBm).

INP/OUT Pwr check set the Phone to transmit with maximum power and switch the receiver On at the selected Band and TX/RX Channel

Reset output set the Phone in WCDMA Off mode.

Rx on

Read measurement read the RSSI and report the result at Phone reported power. This function can only be used when the Receiver is On.

Note: *The RSSI Measurement can be performed differently from product to product due to the limited ITP Software support.*

VCO and VCXO Functions

Note: *These calibrations are only possible to perform when RX static mode is selected.*

Note: *These calibrations may not be possible to implement for all products due to limitations in ITP Software.*

VCO Calibration (TX)

Uses the default values in the TP to adjust the varactor diode to a pre-determined operating point, so that the loop voltage of the TXVCO (measured with an ADC) is within the valid range and the optimal value is chosen. The optimal value is defined as: The CVCO value that gives loop voltages within the limits for both high and low channel and that has the lowest maximum loop voltage.

The optimum value is stored in GDFS.

VCXO Control

Used to fine tune the VCXO to **MCLK** frequency by calibrating the DAC that sets the VCXO control voltage. It is also used to verify the VCXO tuning range. When transmission is in Switched TX mode you are allowed to calibrate the VCXO oscillator controlling the DAC value on the AFC pin.

1. Switch the GSM tester to GSM900, Ch1.
2. Read the stored VCXO value from the GDFS by clicking the "**Read from GD**" button.
3. Start transmitting by clicking the "**TX Switched**" mode button.
4. To apply the VCXO DAC value you set, click the "**Set VCXO**" button.
5. Check your GSM tester.
6. Set the frequency error as close to 0 Hz as possible by using the up/down arrows and then click the "**Set VCXO**" button again.
7. The button "**Mean Value**" sets the value to 1024.
8. When the procedure is finished, click on "**Save VCXO**" button to store the calibrated value in GDFS.

VCO Calibration (RX)

Uses the default values in the TP to adjust the varactor diode to a pre-determined operating point, so that the loop voltage of the RXVCO (measured with an ADC) is within the valid range, and the optimal value is chosen. The optimal value is defined as: The CVCO value that gives loop voltages within the limits for both high and low channel and that has the lowest maximum loop voltage.

The optimum value is stored in GDFS.

Audio and FM Radio - Tab

Audio & Radio Functions

Note: *Some parts of Audio and FM Radio may not be possible to implement for all products due to limitations in ITP Software.*

Note: *There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.*

Audio Loop Test

1. Select desired Audio Loop Test
2. Click "**Apply Audio Loop**" to start the test.
3. To switch off the loop, select **OFF** from **Audio Output** and click "**Apply Audio Loop**".

Audio input:

- **Mic1** is the internal microphone.
- **Aux1** is the input from the system connector.

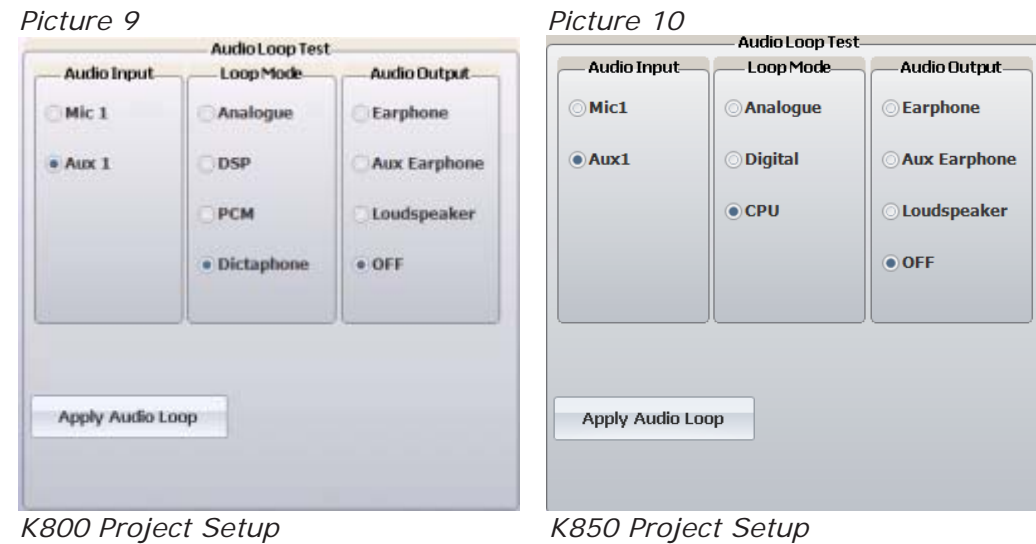
Loop mode:

- **Analogue**, where the loop is set before and after the AD/DA conversions.
- **Digital/DSP** loop, where the DSP signal processing also affects to the audio signal.
- **CPU/PCM** loop, where the loop is set between the PCM audio signals.
- **Dictaphone** loop.

Audio output:

- **Earphone** is the internal Earpiece speaker of the unit.
- **AUX earphone** connected to the system connector.
- **Loudspeaker** is the internal loudspeaker of the unit.
- **OFF** is used to switch off the currently used Audio Loop.

Examples of different Audio Loop Test setups in Fault Trace SW.



Note: Audio output and input pins can be used by disconnecting the blue SEPI connector from the phone after the audio loop has been applied. Now the Portable Handsfree can be connected to the System Connector. After function test operation, disconnect the PHF or external audio device from the System Connector and connect the SEPI cable to proceed with other Audio Loop Tests.

FM Radio

- To activate the FM radio, click at the **Set FM Radio** button.
- To turn off the FM radio, click at the **Turn OFF FM Radio** button.

Audio output

Used for selecting Audio Output from the FM Radio. Most common Audio Outputs for all projects are AUX Stereo (Portable Handsfree, PHF) or Loudspeaker.

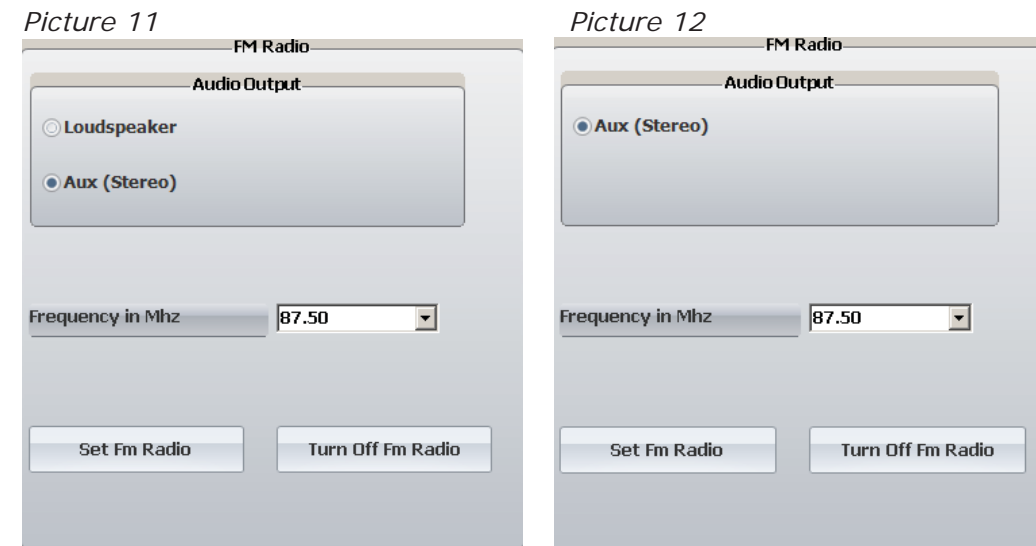
Frequency in MHz

Frequency range box for the FM Radio. The frequency value can be selected in two different ways:

- The first one is with up/down spin buttons
- The second one is to type it directly into the Frequency field.

When typing directly into the Frequency field, the Frequency Span should be 100 KHz when changing from one frequency to another. The Frequency Range used in the Troubleshooting Software is from 87.50 MHz to 108.00 MHz.

Examples of different FM Radio Test setups in the Troubleshooting Software



K850 Project FM Radio Setup

K800 Project FM Radio Setup

Logic – Tab

Logic Functions

Note: Some of the Logic functions may not be possible to implement for all products due to limitations in the ITP Software.

Note: There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.

Battery Calibration

Note: To perform this test only Power Supply channel 1 is needed. Make sure that the correct voltage values are set for each test step, otherwise the test will fail.

The Battery Calibration test is similar to the Battery Calibration test performed in the factory environment.

1. Click **1. Battery Calibration.**
2. Click **SET VBATT to 3.2 Volt.**
3. Adjust Power Supply channel 1 (the dummy battery) to 3.2 V.
4. Click **VBAT1.**
5. Click **SET VBATT to 4.1 Volt.**
6. Adjust Power Supply channel 1 to 4.1 V and click **VBAT2.**
7. Adjust Power Supply channel 1 to 3.8 V and click **SET VBATT to 3.8 Volt.**
8. The test result (**Passed** or **Failed**) will now be displayed.

When the measured values are within the limits the calibration will be passed otherwise the test will be failed. The compensation factor will be calculated and stored in the GDFS.

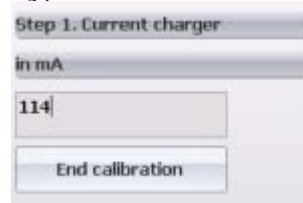
More information about the test limits can be found in the product specific Troubleshooting Manual and in the **Read Limits Table** in the **Battery and Current Calibration Test** document.

Current Calibration

The Current Calibration test is similar to the Current Test for the charging algorithm in the factory environment.

Note: For a correct and accurate result, perform the **Battery Calibration Test** before current calibration. To perform this test you will need both channel 1 and 2 from the Power Supply.

1. Click **2. Current Calibration.**
2. Adjust channel 1 (the dummy battery) to 3.8 V.
3. Click button **SET VBATT to 3.8 Volt.**
4. Note the measured current for channel 2 (the customized charger with SEPI).
5. Type in the measured current (in mA) in the text box.



In this example the current is measured to 114 mA.

6. Press **Enter.**
7. The phone will switch to charging with 800mA. Note the measured current value result at Power Supply Channel 2 DCIO/SEPI.
8. Type the new value in the text box.
9. Press **Enter.**
10. The test result (**Passed** or **Failed**) will now be displayed.

When the measured values are within the limits the calibration will be passed otherwise the test will be failed. The compensation factor will be calculated and stored in the GDFS.

More information about the test limits can be found in the product specific Troubleshooting Manual and in the **Read Limits Table** in the **Battery and Current Calibration Test** document.

ADC Values

1. Select the desired ADC Channel.
2. Click **Read ADC value.**

- The measured value will be presented in both hex and decimal info boxes.
- N/A means that the General Purpose port is not used by this phone or this port is not supported by ITP.
- If a port is missing in the Troubleshooting SW that port is not supported by the ITP SW.

SIM Card Control

This section controls the SIM interface in the phone.

SIM VCC: Voltage for the SIM Card will be activated.

SIM RESET, SIM DATA and **SIM CLOCK:** Activate the Reset, Data and Clock signals for the SIM Card.

SIM Com Test: Checks the communication with the SIM Card.

The test result (**Passed** or **Failed**) will be displayed in the info box.

Note: A SIM card must be inserted and a card reader connected to run this test.

Memory stick test checks the communication with the Memory stick card.

The test result (**Passed** or **Failed**) will be displayed in the info box.

Note: A Memory stick card must be inserted and a Memory card reader connected to run this test.

End Calibration

Ends the calibration and no data will be stored.

Go Idle for 2 sec

The unit will be set to IDLE mode for 2 seconds.

Reboot Phone

IPT command **KILL** will be send and the phone will restart.

Radio Temperature

The value of the Radio Temperature will be displayed in the info box.

Display Temperature

The value of the Display Temperature will be displayed in the info box.

GPIO Manager Functions

Set GPIO port at Access and/or Application CPU to High or Low and Read Out status of the port.

MMI – Tab

Functions

Note: Some parts of MMI functions may not be possible to implement for all products due to limitations in the ITP Software.

Note: There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.

Display Pattern

Activate different test patterns on the display.

LED and Backlight

Activate/Deactivate LEDs and Backlights on the phone.

Misc

Activate/Deactivate tests such as:

- Main Camera Test
- VGA Camera Test

- Camera Door Test
- Vibrator Test
- Keyboard Scan Test
- Etc.

Note: *When one test has been deactivated the phone will be restarted.*

General – Tab

Functions

Note: *Some parts of General functions may not be possible to implement for all products due to limitations in ITP Software.*

Note: *There are some differences in the user interface depending on the phone project file loaded. Some functions may not be available on all products.*

Software Information

This function is used to display the following information stored into the phone:

- ITP version
- IMEI number
- OTP number
- CID number
- PAF status
- Lock Status
- Etc.

Note: *The OTP number must match the IMEI number otherwise the IMEI has been changed.*

Note: *Some of these functions may not be available for all products due to security reasons.*

Product Data

This function displays production data stored in the phone, such as:

- First Identification (Serial Nr.)
- PBA Nr.
- PBA Rev.
- DPY Nr. (Sales Unit)
- Etc.

ASIC Revisions

This function displays the types and revisions of the different ASICs. To find out more information about which components are included in this test go to the **ASIC Revision Test** document **included in** the product specific **Troubleshooting Manual**.

Self Test

This function runs available self tests on the Phone.

Fault Trace SW Error Messages

1.

...timeout when reading

Check the following items:

- Connection between Power Supply Channel 2 (DCIO) and SEPI A1 cable (Se picture 4, 5 and 6).
- If the SEPI BOX works properly (The Green LED at the SEPI BOX must be on).
- If the USB cable between SEPI BOX and PC is connected properly.
- If the phone has been flashed with the correct ITP version.
- If VBATT and DCIO Power Supply instruments are on.

2.

...timeout when writing

...timeout when reading

Check if the correct COM Port is selected in Troubleshooting Software - Communication Settings Tab

3.

...Port has not been successfully opened timeout

- Check if COM Port is connected
- Check if the correct Phone Project File is loaded
- Restart the Troubleshooting Software application and try again

4.

Command failed due to:

.... Error_InvalidParameter, ERR

or

CERR: Error_CommandDoesNotExist, ERR

- Check if the correct Phone Project File is loaded
- Check if the phone has been flashed with the correct ITP version.

Troubleshooting Fixture Setup Instructions

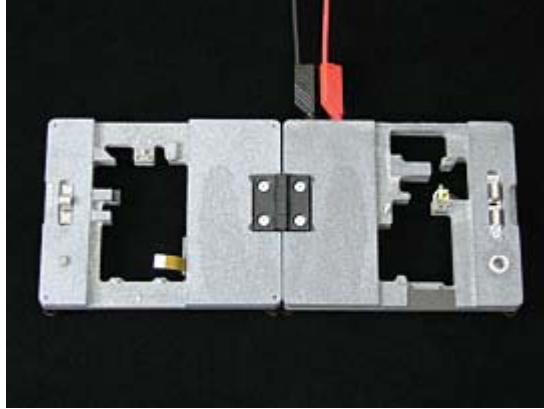
Front side overview of the TRS Fixture, see picture 1.

Picture 1



Connect Power Supply Channel 1 VBATT (Black and Red plugs) according to picture 4.

Picture 4



Back side overview of the TRS Fixture, see picture 2.

Picture 2



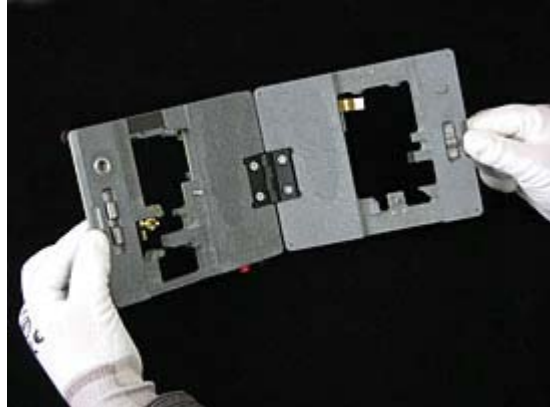
Insert SIM Card if needed according to picture 5.

Picture 5



Open the TRS Fixture according to picture 3.

Picture 3



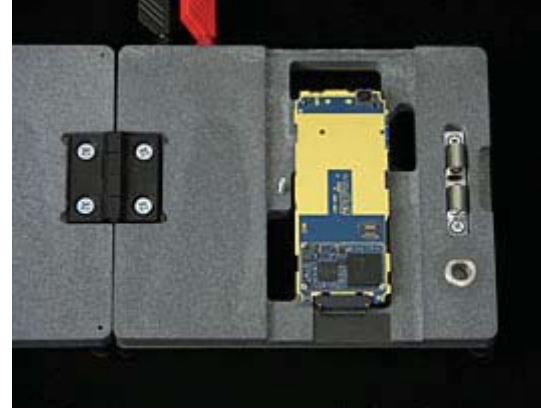
Insert Memory Card if needed according to picture 6.

Picture 6



Place the PBA by using Guide Pin mounted inside the TRS Fixture according to picture 7.

Picture 7



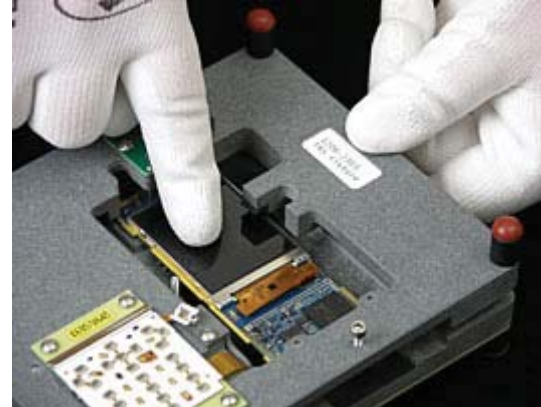
Connect Display if needed according to picture 8.

Picture 8



Close the TRS Fixture according to picture 9.

Picture 9



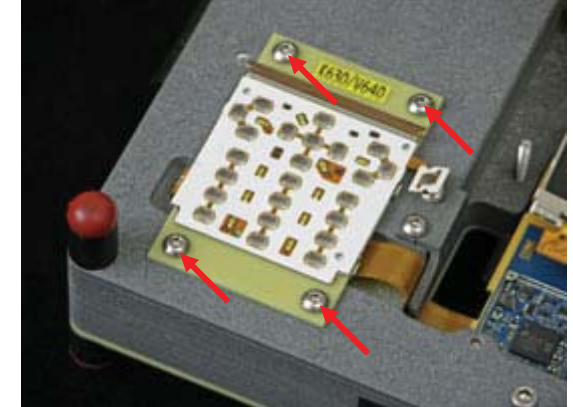
Connect the Keypad Flex Cable to the board-to-board connector mounted on the PBA when Keypad is in use according to picture 10.

Picture 10



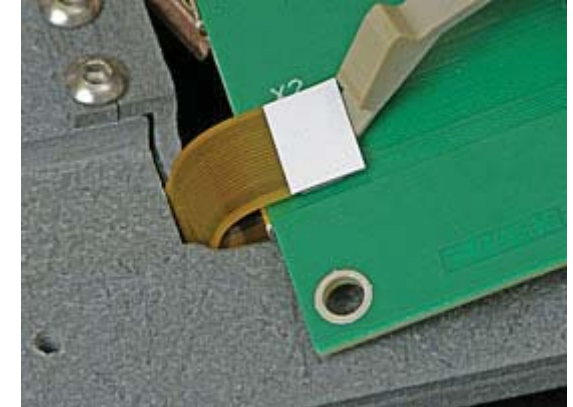
To switch Keypad between K630/V640 and K660, unscrew 4 screws marked with "RED" arrows, from the TRS Fixture see picture 11.

Picture 11



Disconnect the Keypad Flex Cable on the backside according to picture 12.

Picture 12



Connect Power Supply Channel 2 DCIO/SEPI Cable according to picture 13.

Picture 13



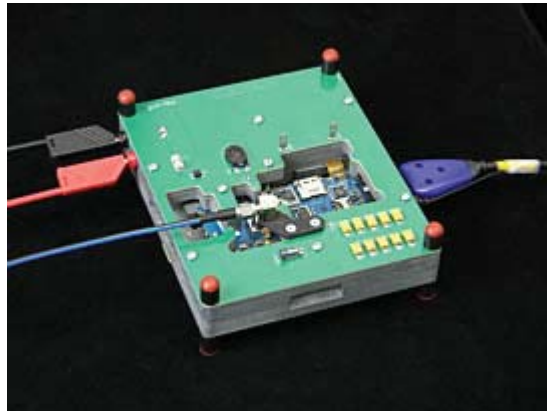
Secure the DCIO/SEPI Cable by using the screw according to the picture 14.

Picture 14



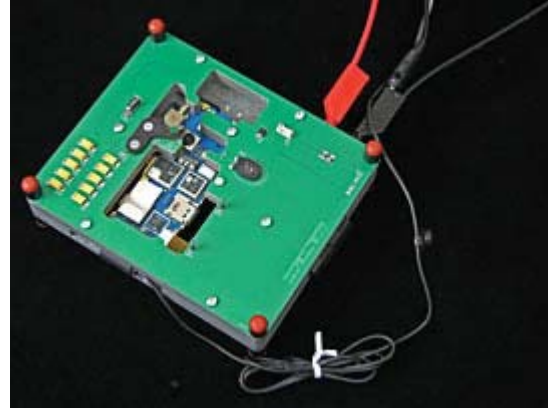
Connect RF Test Cable Flexible if needed according to picture 15.

Picture 15



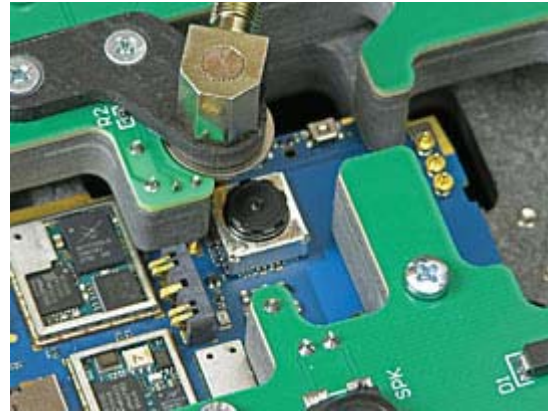
Connect FM Radio Cable if needed according to picture 16.

Picture 16



Connect Main Camera directly on the PBA if needed according to picture 17.

Picture 17



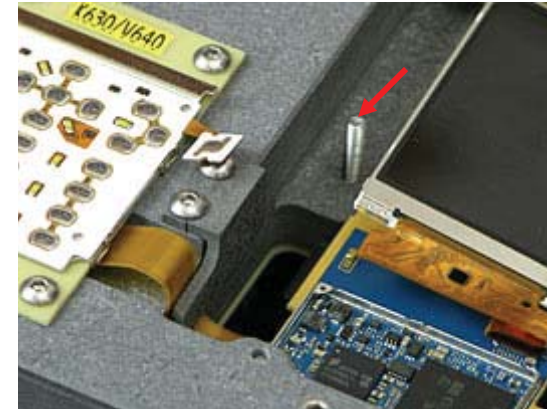
Connect VGA Camera directly on the PBA if needed according to picture 18.

Picture 18



The Pin mounted inside the TRS Fixture marked with a RED arrow can be used as MP TRS Fixture GND or grounding for the oscilloscope probe, see picture 19.

Picture 19



The GND pins on the backside of the TRS Fixture can be used as MP TRS Fixture GND or as grounding for the oscilloscope probe, see picture 20.

Picture 20

