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承 認 書
(Specification Sheet)

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Revision History

Date	Version	Description
12/10/2012	Rev 0.0	First draft.
12/11/2012	Rev 0.1	Update antenna spec picture and modify typo from m to mm
12/18/2012	Rev 0.2	Update 1. BOM; 2. Ant specification; 3. PCB circuit drawing; 4. Label drawing; 5 Manufacturing test plan
12/24/2012	Rev 0.3	1.Chang some "870" characters into "875" for CX875-3PB 2.Remove Antenna spec. part 3.Add reliability report
17/01/2013	Rev 0.4	1. Update Part 3 WLAN test report 2. Update Part6 PCB Circuit Drawing 3. Update Part 8 Packing Method

This documentation describes the marketing requirements specification of the Lite-on made CX875-3PB Wireless module. It is a confidential document of LITEON.

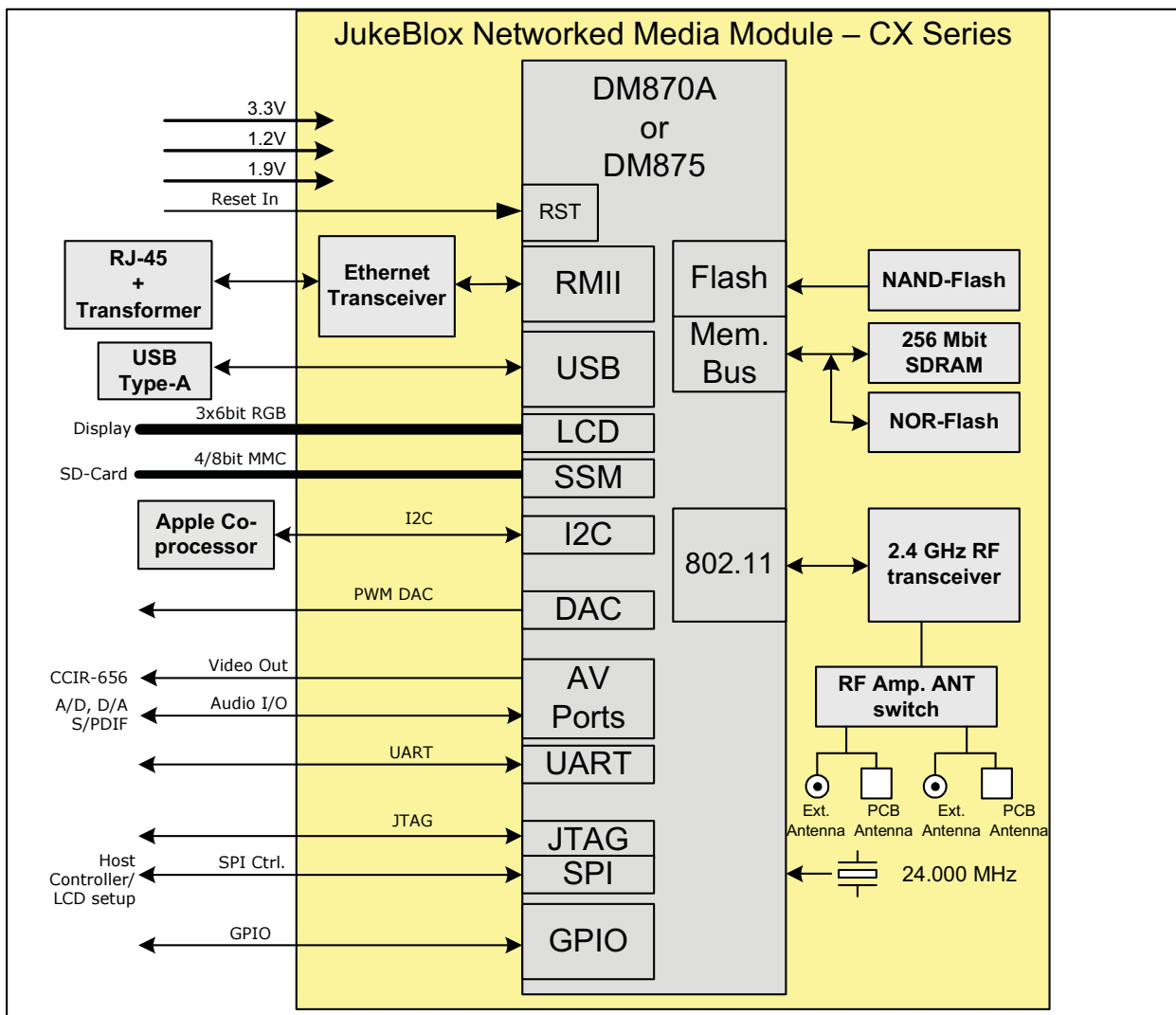
Part1. Module Spec Sheet

1 Introduction

The CX-series module is a single-board networked media player module, based on SMSC's DM870A and DM875 media processors, and enables fast product developments with Ethernet, USB and optional WiFi connectivity. The module connects to standard legacy components in various audio, video/LCD and control formats.

This products ideal for enabling network and USB audio playback for iPod docks, audio systems, AV Receivers, active speaker systems,internet radios, network playback adaptors

2 Block Diagram

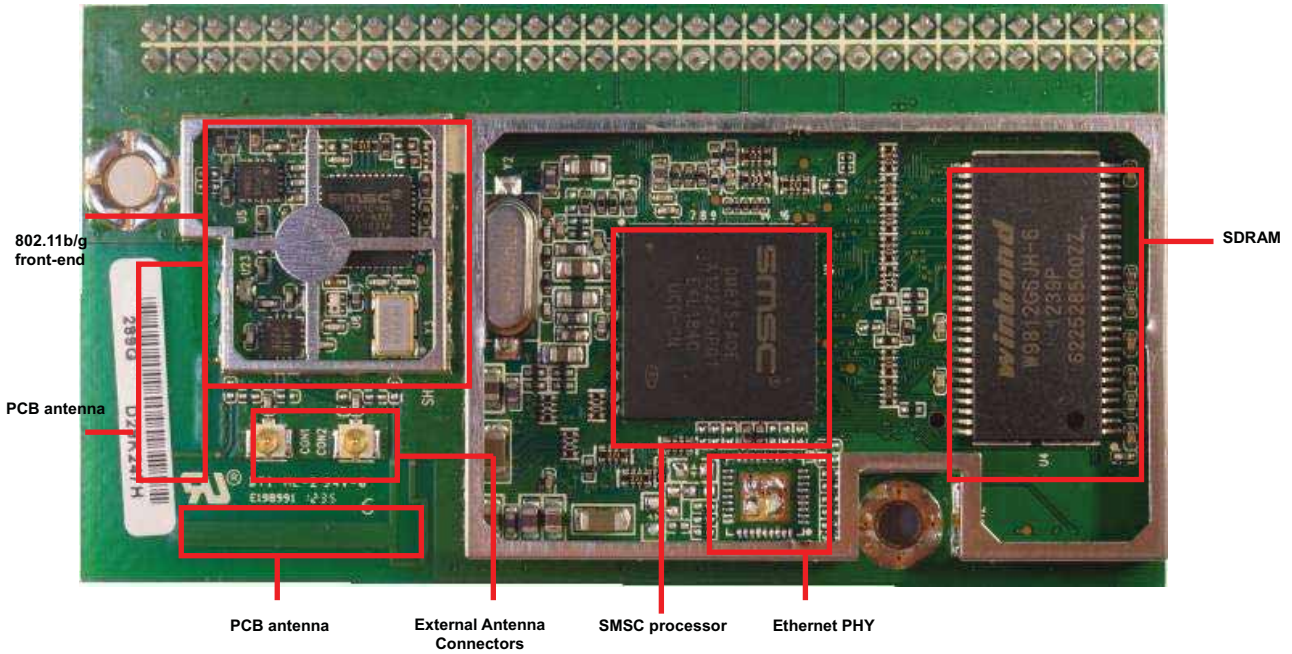


Note: Choice of antenna is a build option, see Ordering Guide.

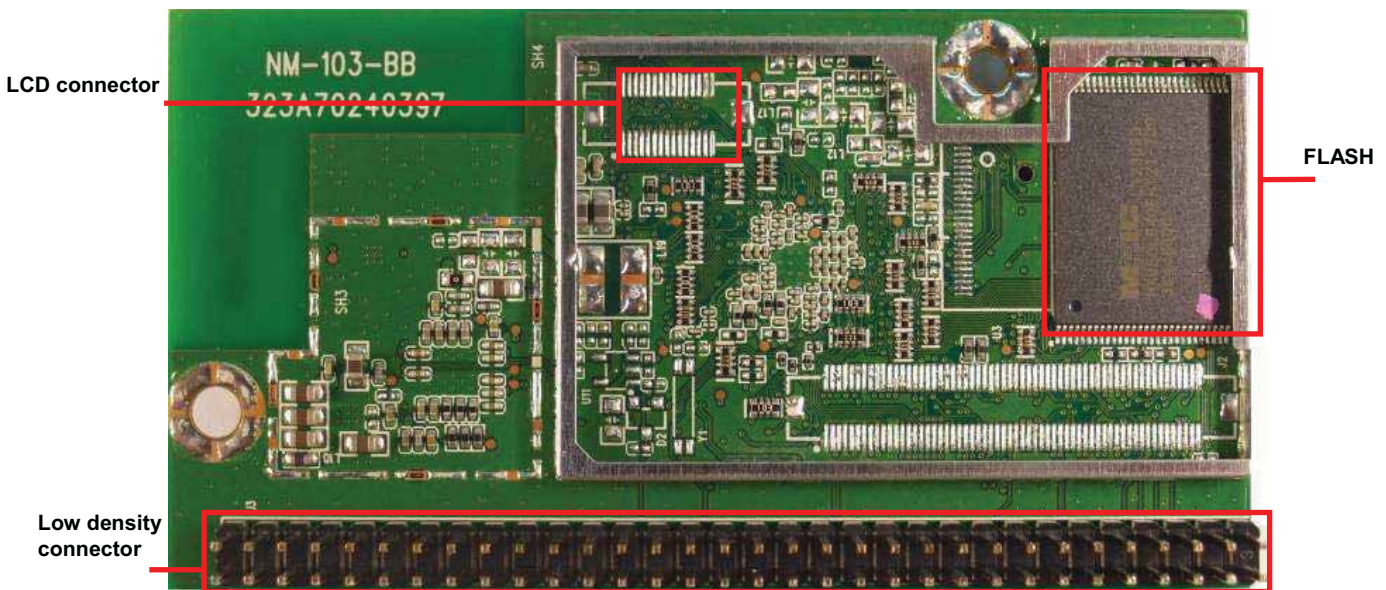
3 Board Pictures

Please note that all production modules include the RF and top shield. The below top view has the shields temporarily removed to show the components. Also, please note that the 64-pin connector mounted on the module is the male gender.

3.1 Top View of CX Module



3.2 Bottom View of CX Module



3.3 Production Module with Top and RF shields in place – Top View



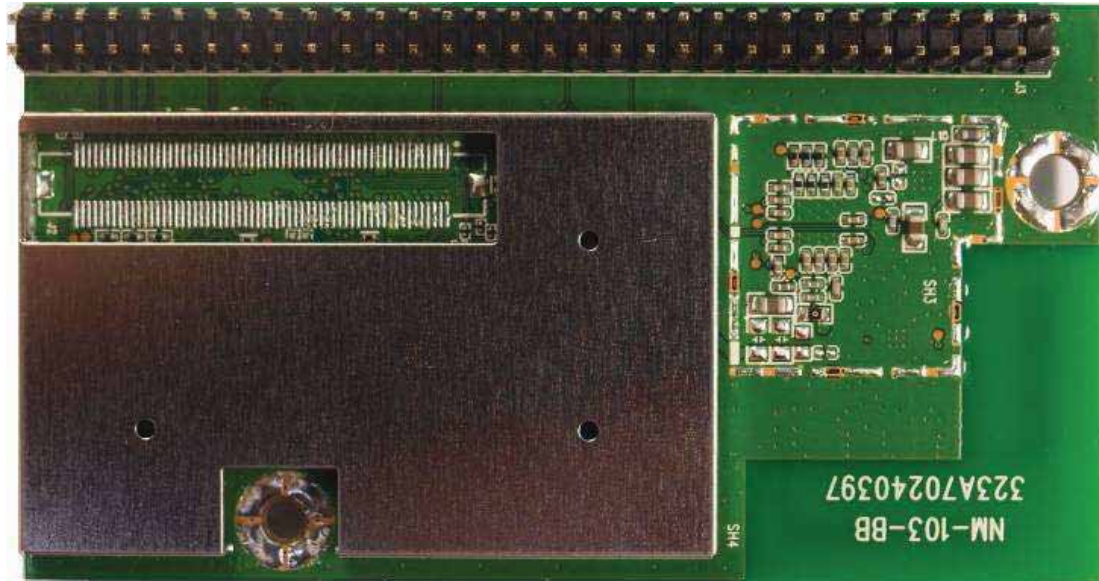
3.4 Production Module with 64-pin Connector Option – Side View



3.5 Example Production Module Showing Soldered RF Shield



3.6 Production Module with Bottom Shield (Part Numbers with a “B” after the configuration letter)



4 Ordering Guide

Part Number	Status	SMSC ICs	Internal PCB Diversity Antennas	Ext. Diversity Antennas (UFL Conn.)*		Ethernet	USB Host	Low density 64-pin Conn.	Hi density 120-pin Conn.	Hi density LCD Conn.	32MB SDRAM	16MB SDRAM	8MB SDRAM	1Gb NAND	8MB NOR	Top Module Shield	Bottom Module Shield
				One Ant.	Two Ant.												
CX870-3A	CO	DM870A+T6201	X		(X)*	X	X		X	X	X			X		X	
CX870-3B	O	DM870A+T6201		X		X	X	X			X			X		X	
CX870-3D	CO	DM870A+T6201			X	X	X		X			X		X		X	
CX870-3DS	CO	DM870A+T6201			X	X	X		X			X		X		X	
CX870-3F	O	DM870A+T6201	X			X	X	X				X			X	X	
CX870-3G	O	DM870A+T6201	X				X	X				X			X	X	
CX870-3H	O	DM870A+T6201			X	X	X	X				X			X	X	
CX870-3I	O	DM870A+T6201			X		X	X				X			X	X	
CX870-3J	O	DM870A+T6201			X		X		X			X			X	X	
CX870-3K	CO	DM870A+T6201	X	X			X	X				X			X	X	
CX870-3BB	SA	DM870A+T6201		X		X	X	X			X			X		X	X
CX870-3HB	SA	DM870A+T6201			X	X	X	X				X			X	X	X
CX870-3IB	SA	DM870A+T6201			X		X	X				X			X	X	X
CX870-3JB	SA	DM870A+T6201			X		X		X			X			X	X	X
CX870-3KB	CA	DM870A+T6201	X	X			X	X				X			X	X	X
CX780-3LB	CA	DM870A+T6201	X	X		X	X		X			X		X		X	X
CX870-3MB	CA	DM870A+T6201	X	X		X	X		X		X			X		X	X
CX875-3PB	SA	DM875+T6201			X		X	X				X			X	X	X

Note: Please note that the Apple Authentication Coprocessor will not be provided on the CX module. The Apple Authentication Coprocessor should be provided on the product motherboard, connected to the SDA, SCL signals from the CX module.

Note: Shaded rows indicate Custom or Obsolete configuration - NOT TO BE USED FOR NEW/STANDARD MP DESIGNS.

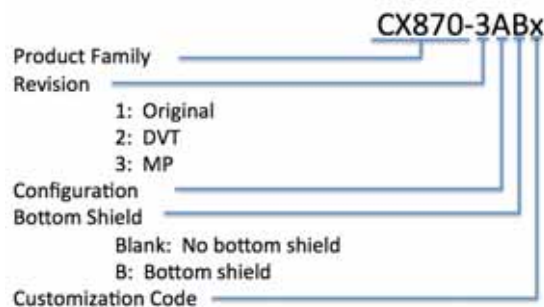
Status code: C - Custom | S - Standard | O - Obsolete | A - Available

* Connector on board, but requires board modification to enable the connector.

+ The position of the X in the One Ant. column indicates that there is one external antenna connector provided. The position of the X in the Two Ant. column indicates that there are two external antenna connectors provided. Do not use a module which has two external antenna connectors with only one external antenna connected. Leaving one antenna socket open will degrade WiFi performance. SMSC recommends always using modules with two external antennas for best performance.

% The CX870-3DS is the same as CX870-3D, except that the RF shield is soldered in place.

4.1 Part Number Syntax



5 Electrical Specifications

Parameter	State	Model	Voltage	Symbol	min.	typ.	max.	Units
Power Supply Input Voltage				VIN	3.0	3.3	3.6	V
					1.08	1.2	1.32	V
					1.8	1.9	2.0	V
Logic Input high voltage				V _{IH}	1.7		5.5	V
Logic Input low voltage				V _{IL}	-0.3		0.7	V
Logic Input threshold voltage				V _{IT}	1.29	1.39	1.5	V
Schmitt-trigger input low to high threshold voltage				V _{IT+}	1.58	1.65	1.71	V
Schmitt-trigger input high to low threshold voltage				V _{IT-}	0.95	1.01	1.06	V
Logic Output high voltage				V _{OH}	2.4			V
Logic Output low voltage				V _{OL}			0.4	V
Logic Low-level output current (V _{OL} =0.4V)				I _{oL}	-9.6	-15.6	-19.3	mA
Logic High-level output current (V _{OH} =2.4V)				I _{oH}	11.1	22.5	35.3	mA
Current Consumption	Reset State	CX875	3.3	I3.3		60	78	mA
			1.2	I1.2		32	42	mA
			1.9	I1.9		18	23	mA
	Operating in idle state		3.3	I3.3		185	241	mA
			1.2	I1.2		337	438	mA
			1.9	I1.9		257	334	mA
	Playback over WiFi high mips & rate condition		3.3	I3.3		240	312	mA
			1.2	I1.2		347	451	mA
			1.9	I1.9		258	335	mA

Note: The maximum current values are 30% larger than the typical values. The maximum values are intended to be used for power supply sizing calculations.

5.1 Absolute Maximum Ratings

Parameter	Component	Min	Max	Units
3.3V Supply Voltage	Main	-0.5	4.6	V
1.2V Supply Voltage		-0.5	1.8	V
1.9V Supply Voltage		-0.5	2.2	V
Logic Input Voltage		-0.5	6	V
Logic Output Voltage		-0.5	4.6	V

5.2 Operating Conditions

Parameter	Min	Max	Units
Operating Temperature	0	+70	°C
Operating Humidity	10	90 (non condensing)	%RH
Storage Temperature	-10	+75	°C
Storage Humidity	10	95 (non condensing)	%RH
Storage Temperature Cycle Test 24 hrs	-10	+75	°C

5.3 WiFi Specification (CX875 only)

Feature	Description
WLAN Standards	IEEE 802.11b IEEE 802.11g
Frequency Band	2.412 – 2.472 GHz (2.4GHz ISM Band, 13 Channels) Channel 1 - Channel 13 North America FCC, Japan Telec, Europe ETSI
Modulation	802.11b mode (DS-SS: IEEE 802.11b) 802.11g mode (OFDM: IEEE 802.11g)
Transmission Speed	802.11b mode 11Mbps, 5.5Mbps, 2Mbps, 1Mbps 802.11g mode 54Mbps, 48Mbps, 36Mbps, 24Mbps, 18Mbps, 12Mbps, 9Mbps, 6Mbps
Tx Power	Using nominal production settings as follows: Channel RF11 Rate: 11B = '3' (11Mbps), 11G = '8' (54Mbps) MIB: 11B=9, 11G=1 (Reference for Tx Power Tuning) Room temperature The above TX Power specifications will apply to modules shipped from Liteon after 9 April 2012.
Power-on Ramp	< 2us
RF Carrier Suppression	< 15dBc
TX EVM	802.11b mode: <-22dB 802.11g mode: <-25dB
Rx Sensitivity (incl. CE2 Mother board)	802.11b mode: <=-82dBm @ 1Mbps, <=-81dBm @ 2Mbps, <=-81dBm @ 5.5Mbps, <=-78dBm @ 11Mbps 802.11g mode: <=-82dBm @ 9Mbps, <=-81dBm @ 18Mbps, <=-75dBm @ 36Mbps, <=-70dBm @ 54Mbps
Throughput Rate (measured for each module)	See factory test specification

Note: About Tx Power, different (higher/lower) RF output power settings may be used for specific regions, antennas and/or enclosures, in which case re-certification may be required.

6 Regulatory Compliance and Quality

Description	Country	Compliance	Module Versions Passed
Electromagnetic Compatibility (Prescan)	USA Europe	FCC CFR47 Part15B EN 55022 EN 55024 EN 61000-3-2 EN 61000-3-3 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-5 EN 61000-4-6 EN 61000-4-8 EN 61000-4-11	
Radio Regulations (CX870/CX875 only)	USA Japan Canada Europe New Zealand/Australia China Korea	FCC Part 15C Telec IC RSS-210 CE AZ/NZS:4268 SRRC KCC	B, D, F, H, I, J B B, D, F, H, I, J B

SMSC does not certify all module variants for all countries. Please see above table for those module versions for which certain certifications have already been done.

Please contact your SMSC sales office for the latest information about which modules are certified for which countries, and arranging for additional certification for your chosen module if needed. Any additional certifications will need to be paid for by the customer.

Product manufacturers are responsible for the end product certification.

SMSC can help manufacturers to prepare for the WiFi Alliance tests by providing an example test plan and the required commands to enable special test modes. Please contact your SMSC sales office about WiFi Alliance logo certification assistance.

The CX module has received Limited Module Approval (LMA) from FCC. This is because the CX module does not have a built-in +1.9V regulator circuit. SMSC recommends that customers follow the +1.9V supply voltage requirements given in this data sheet, and follow the +1.9V power supply design given in "CX Module Power Supply_V1.1.pdf" document or later version. If the power supply recommendations are followed, then customers will not need to go through formal certification of the product for WiFi related RF behavior for FCC. It is the product manufacturers responsibility to make sure that the power supply recommendations are followed, and that the RF behavior meets the certification requirements when the module is installed in the final product.

Please check the SMSC/BridgeCo Customer Portal at <https://portal.bridgeco.net/> for documents about WiFi certification and recommended interfacing and power supply schematics.

6.0.1 Antenna Considerations

Here are the antennas used for certification:

Cfg Code	Ant. Type	Ant. Gain (dBi)	Ant. Model Name
CX870-3F	Printed on PCB	3.56	Liteon N/A
CX870-3J	Dipole	2	MAG. LAYERS EDA-8709-2G4C1-A66
CX870-3K	PIFA	2.1	MAG. LAYERS MSA-3612-2G4C1-A1
CX870-3IB	Dipole	2	MAG. LAYERS EDA-8709-2G4C1-A66
CX870-3B-D60	PIFA	2 2 1.7 1.7 1.7	MSA-0354-2G4C1-A3, black 200mm (max) MSA-0345-2G4C1-A3, gray 200mm (max) MSA-5103-2G4C1-A1, black 200mm MSA-5403-2G4C1-A1, gray 200mm MSA-5103-2G4C1-A3, black 300mm

		1.7 1.7 1.7	MSA-5403-2G4C1-A3, gray 300mm MSA-5103-2G4C1-A2, black 400mm MSA-5403-2G4C1-A2, gray 400mm
CX870-3BB	Dipole	3.2	WINiZEN W1E-WO-08
CX870-3HB	Dipole	2	MAG. LAYERS EDA-8709-2G4C1-A66
CX875-3PB	PIFA	2.76 2.69	3010000394ID 3010000395ID

Notes about antenna changes:

- 1) Equivalent antennas from other manufacturers may be substituted, and then marketed without a Class II permissive change
- 2) Equivalent antennas must be of the same type (e.g. dipole, PIFA, etc.), must be of equal or less gain than the antennas listed and previously authorized under the same FCC ID, and must have similar in band and out of band characteristics (consult specification sheet for cutoff frequencies).
- 3) In case of new antenna types, or higher gain antennas, a Class II permissive change is required and compliance with FCC section 15.203 must be met.

6.0.2 CX Power Settings Used For Modular Approval

3B/3V/3J/3H/3IB/3B-D/3B-D60/BB/HB				3K			
FCC				FCC			
11b	2412(1)	2437(8)	2462(11)	11b	2412(1)	2437(8)	2462(11)
	Power setting	Power setting	Power setting		Power setting	Power setting	Power setting
	8	8	9		10	10	10
11g	2412(1)	2437(8)	2462(11)	11g	2412(1)	2437(8)	2462(11)
	Power setting	Power setting	Power setting		Power setting	Power setting	Power setting
	1	0	2		2	2	2
3B/3V/3J/3H/3IB/3B-D/3B-D60/BB/HB				3K			
CE/JP				CE/JP			
11b	2412(1)	2437(8)	2472(13)	11b	2412(1)	2437(8)	2472(13)
	Power setting	Power setting	Power setting		Power setting	Power setting	Power setting
	10	10	10		10	10	10
11g	2412(1)	2437(8)	2472(13)	11g	2412(1)	2437(8)	2472(13)
	Power setting	Power setting	Power setting		Power setting	Power setting	Power setting
	2	2	2		1	1	1
3F				3F			
FCC				CE/JP			
11b	2412(1)	2437(8)	2462(11)	11b	2412(1)	2437(8)	2472(13)
	Power setting	Power setting	Power setting		Power setting	Power setting	Power setting
	8	8	8		10	10	10
11g	2412(1)	2437(8)	2462(11)	11g	2412(1)	2437(8)	2472(13)
	Power setting	Power setting	Power setting		Power setting	Power setting	Power setting
	0	0	1		2	2	2

Measurement conditions: 11b mode at 1Mbps, 11g mode at 8Mbps

6.1 RoHS

Uses only RoHS compliant components

6.2 Environmental Test

Withstands 4 hours at 70°C, 90% RH

6.3 ESD and Transient Test (Applies to LAN and USB external connections only)

ESD: +/- 2kV operation, +/- 4kV no destruction (part of CE test)
Fast electrical transients: +/- 500V operation, +/- 1000V no destruction (part of CE test)

6.4 Magnetic Field Test

Passes EN55022 and EN55024 (part of CE test)

6.5 MTBF

>10000 hours

6.6 Mechanical Specifications

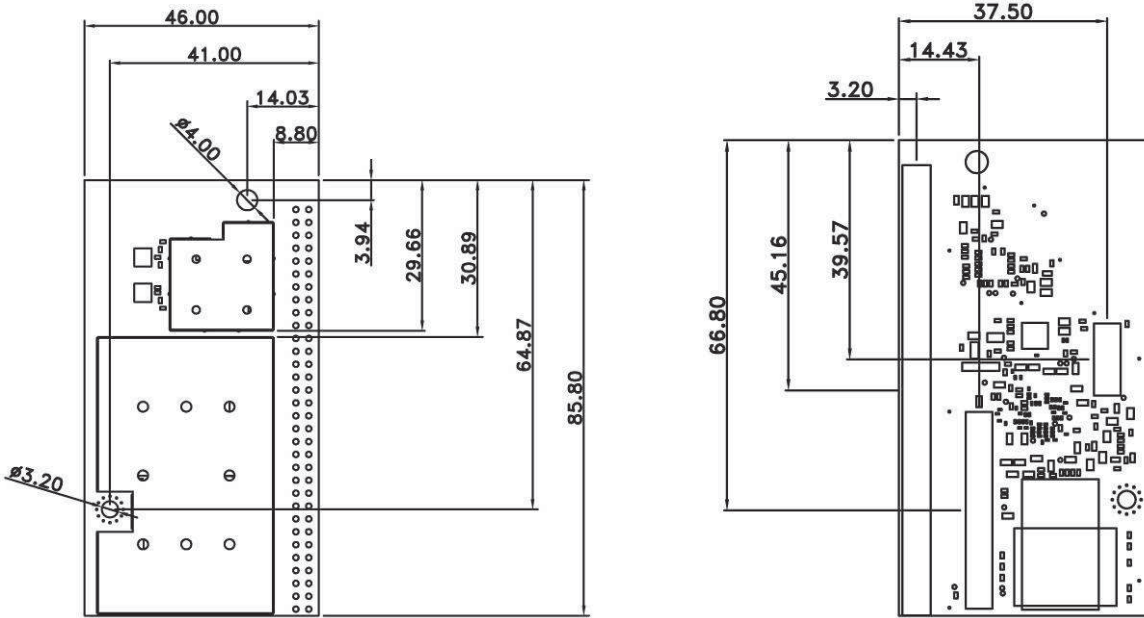
Passes drop test according to I.E.C. 68-2-32, height 100 cm, 1 corner, 6 faces.
Passes vibration test with sine, vertical, 60 minutes, 600 to 18000 cpm, 1G

6.7 Module Quality

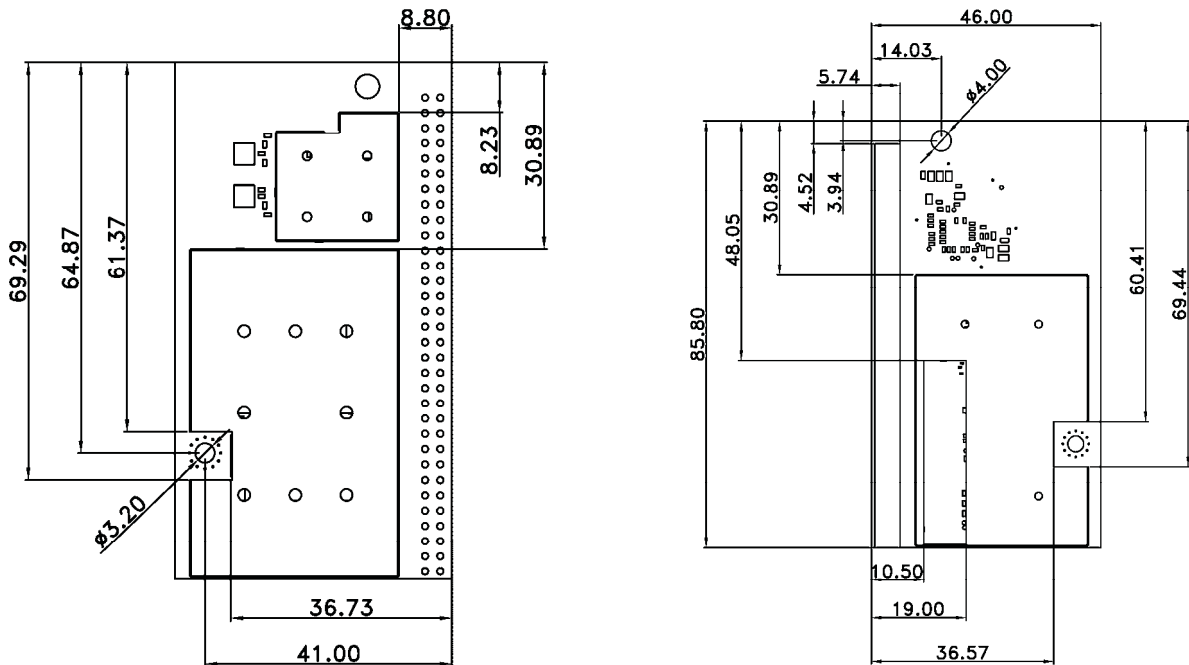
Defect Rate: < 1%
AQL CR=0, MA=0.4, MI=0.4

7 Board Dimensions and Weight

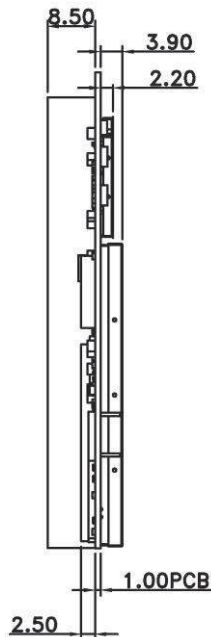
7.1 Top & Bottom View of CX875 Module without Bottom Shield



7.1.1 Top & Bottom View of CX Module with Bottom Shield



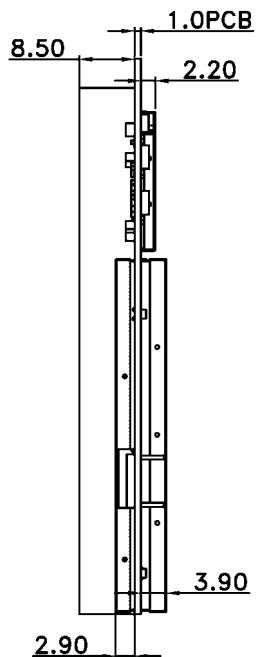
7.2 Side View of CX875 module without Bottom Shield



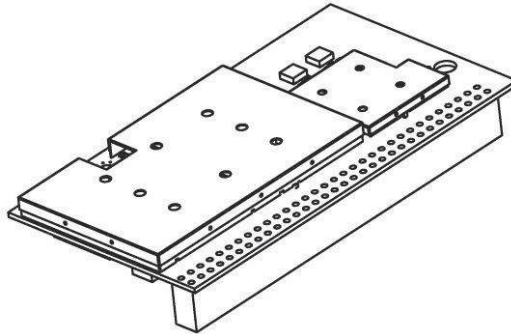
Note:

1. All dimensions are measured in **millimetres (mm)**.
2. PCB's thickness: 1.00 +/- 0.10mm
3. Tolerance: +/-0.10mm
4. Outline Tolerance: +/-0.10mm
5. NPTH Hole: +/-0.05mm
6. PTH Hole: +/-0.075mm
7. Connector positions, board dimensions, mounting hole positions and sizes are the same for all module variants.
8. Connector position tolerance: +/- 0.38mm
9. The 64-pin connector mounted on the module along one edge is the male gender.
10. Not all module variants have all connectors. Please see the Ordering Guide table for details of connector options.

7.2.1 Side View of CX Module with Bottom Shield



7.3 3D View of CX875 Module without Bottom Shield



Note: A 3D file of the CX module in .stp format is available from the SMSC Customer Portal.

7.4 Module Weight

CX875: 20g

Note: Module weight applies to all versions of the module.

8 Connectors and Connections

8.1 WLAN UFL Antenna Connector (optional)

The module includes two PCB strip antennas operated in diversity mode. Alternatively, one or two coaxial antenna connectors are provided for connecting external (to the module) antennas. The choice between using the strip antenna or using the coaxial sockets is a build option, determined by the position of surface mount capacitors on the module PCB. If the PCB antennas are chosen, then diversity mode is always used. If external (to the module) antenna sockets are used, then two external antennas should be used to provide 2X diversity operation.

If external antenna is used, please choose the proper part number indicating two external antenna sockets. Do not use a module which has two external antenna sockets with only one external antenna connected; this will result in reduced WiFi performance.

Please see ordering guide for build option details.

The surface-mount antenna socket used in the CX module is:

UFL type Ultra Small Surface Mount Coaxial Connector

8.2 Module Connectors

The CX860/870/875 module uses 3 board-to-board connectors as interfaces to the product main board. The part numbers for the connectors needed on the product main board, which mate with the connectors on the CX module, are shown in the table below.

Connector Number	Connector Purpose	Connector Type	Number of Pins	Pin Configuration	Mating Connector Part Numbers
J1	LCD	B2B Connector	30	2 x 15 x 0.5mm	14-5046-030-145-829+ (Kyocera)
J2	Media		120	2 x 60 x 0.5mm	14-5046-120-145-829+ (Kyocera)
J3	Low Density		64	2 x 32 x 2.54mm	CSHA201-3202A001A1AB

The pinout and signal names are shown on the next page. The following table provides an overview for the most important control and interface signals.

8.2.1 Pin Descriptions

Signal(s)	Type	Description
-----------	------	-------------

POWER

VIN(+3.3V)	P	Power supply input ; +3.3V.
VIN (+1.2V)	P	Power supply input ; +1.2V.
VIN (+1.9V)	P	Power Supply input; +1.9V for powering RF section. Make sure this is a clean supply.
3V3RTC	P	The RTC function is no longer supported. This pin should be left open.
GND	P	Ground (GND) connection for power supply 0V, signal returns and shielding.

SPI

SPI_DOUT	O	SPI data from DM875 to host controller.
SPI_DIN	I	SPI data from host controller to DM875
SPI_CLK	I	SPI clock from host controller to DM875. Maximum recommended frequency is 2MHz, typical frequency is 1MHz. See Note 2 below.
SPI_NCS0	I	SPI chip select from host controller to DM875.
PDOUT1	O	This signal is used as SPI_REQ, SPI request signal, from DM875 to host controller for eDMP applications. Logic 1 indicates that there is an SPI message waiting to be read, the host controller should start the SPI clock and read any changed registers. Logic 0 indicates that all changed register messages have been read and the message buffer is empty. Also GPIO-06.
SPI_NCS1	I	Not used. Leave open.

UART

RXD1	I	UART1 input to the DM875, used for shell access. SMSC recommends providing a connection to an external RS-232 transceiver and DB9 connector to connect to a PC COM port. Such a connection can be used for product development debugging, and for module programming control on the product manufacturing line and for module control during certification procedures.
TXD1	O	UART1 output from the DM875, used for shell access. SMSC recommends providing a connection to an external RS-232 transceiver and DB9 connector to connect to a PC COM port. Such a connection can be used for product development debugging, and for module programming control on the product manufacturing line and for module control during certification procedures.
RXD0	I	UART0 input. Optionally used for controlling an iPod via UART.
TXD0	O	UART0 output. Optionally used for controlling an iPod via UART.

AUDIO

AV2DATA0	O	I2S or left justified audio data output. Typically connected to external D/A converter input or to external DSP for further audio processing. Used for main left and right channel audio output data. See Note 3.
AV2CTRL0	O	LRCK, audio data word clock at the audio sample rate (Fs). Maximum currently supported frequency is 192kHz.
AV2CTRL1	O	MCLK, audio master clock at 256Fs. This can be used to clock an external D/A converter or DSP.
AV2CLK	O	SCLK, audio data bit clock at 64Fs. Allows for up to 32 audio data bits per sample word.
AV4DATA1	O	SPDIF format output. Can support samples rates up to 192kHz, so the maximum instantaneous frequency on this pin is 24.576MHz.
AV4DATA0	I	SPDIF input. Not used at present. Leave open.
AV2DATA1	O	I2S or left justified audio data output. Not used at present. Leave open.
AOUTLP/AOUTLN, AOUTRP/AOUTRN	O	Differential stereo output from PWM-DAC, right and left channels. These signals require analog low pass filtering. SMSC is not recommending using the PWM-DAC outputs because of the potential for high out-of-band noise and uncharacterized audio quality. SMSC recommends using an external D/A converter connected to AV2DATA0.
AV2DATA2	I	I2S or left justified audio data input. Can be driven from an optional external A/D converter used to interface to iPod analog output or other analog audio sources. If not used, leave open.
AV2DATA3	I	I2S or left justified audio data input. Not used at present. Leave open.

CONTROL

NCS3	I	This signal is configured as GPIO-17 and is currently not used. DM875-internal pull-up. Leave this pin open.
PDOOUT0	I	Factory Reset. GPIO-04. Return the CnE to factory settings. High-active input, DM875-internal pull-down. Pull to GND with a 10kohm resistor, unless return to factory settings from a hardware control is needed. Normally, return to factory settings is controlled from the host controller via SPI register. This pin is only monitored during the boot up process.
VCO0	I	Infrared sensor input. GPIO-05. This is a Schmitt-Trigger input and can handle inputs with slow slopes. Used for aDMP firmware builds for infrared remote control sensor output connection to DM875. For applications with a host controller, pull this pin to +3.3V via a 10kohm resistor.
AV3CLK	O	ETH_NRESET Low-active reset for the on-board ethernet PHY. This output is driven by the DM875. GPIO-12. Leave this pin open.
AV3CTRL0, AV3CTRL1	I/O	I2C_SCL, I2C_SDA bus created by GPIO-13 and GPIO-14. No internal pull-ups; Use 4.7kohm pull up resistor on each pin to +3.3V. Maximum frequency is 400kHz.
NRESET_MOD	I	Low-active input to reset the module. This signal must be driven by an external reset generator, or by a GPIO output from a host controller. See the application section of this data sheet for the timing requirements for NRESET_MOD. Includes internal 10K pull-up resistor to +3.3V.
NPD_RF	I	Active low input to shut down the power for the 802.11 RF section. Internal 10kohm pull-up resistor to +3.3V. Leave open if powering down the RF section is not required.

ETHERNET

ETH_RXN, ETH_RXP, ETH_TXN, ETH_TXP	M	Ethernet signals between the PHY on the module and the external magnetics (transformer). See Note 4. Maximum bit rate is 100Mbps.
ETH_LED_SPEED, ETH_LED_ACT	O	3.3V push-pull outputs (max. $\pm 12\text{mA}$) to drive the ethernet LEDs. 100Mbps speed mode and activity are indicated by the outputs being low. Connect to LEDs through 220ohm resistors.

USB

USB_DN, USB_DP	M	USB data signals, normally connected to type A connector, USB switch or iPod dock connector. Maximum bit rate is USB High Speed at 480Mbps.
USB_VBUS	M	Analog input for monitoring USB type A connector power. Connect to the +5V power which is driving the USB type A connector power pins. If this pin drops below 4.6V, then the DM875 will drive the USBVBUSDRV signal low to control an external power MOSFET to disconnect +5V power from the USB type A connector. See Note 5.
USBVBUSDRV	O	Logic output to control an external MOSFET that is in series with USB type A connector power. See USB_VBUS above and Note 5.

JTAG

TMS, TCK, TDI, TDO	I/O	JTAG port for DM875. Leave open.
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SSM

SSMD4, SSMD5, SSMD6, SSMD7	I/O	Can be used to drive external shift registers to make extended GPIO signals (see Note 6), or as individual GPIO signals, or to make an SD card interface. SD card firmware is not supported at present in JB2. Can be mapped to GPIO #s 08,09,10,11. Leave open if not used.
SSMD0, SSMD1, SSMD2, SSMD3, SSMCLK, SSMCP, SSMCMD, SSMWP	I/O	Used to make an SD card interface. SD card firmware is not supported at present in JB2. Leave open.

VIDEO

AV0CLK, AV0CTRL0, AV0CTRL1, AV0CTRL2, AV0DATA0, AV0DATA1, AV0DATA2, AV0DATA3, AV1DATA0, AV1DATA1, AV1DATA2, AV1DATA3	O	ITU-R BT.656 digital video output signals. Optionally used to make a TVout menu display, or to display decoded album art. Can be connected to video D/A converter (see Note 7), or connected to a video DSP.
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GPIO (not already mentioned elsewhere in this table)

A22	O	GPIO18 Reserved for NOR flash address A22. Leave open.
A23	O	GPIO-16 Reserved for NOR flash address A23. Leave open.
NWAIT	I/O	GPIO-15 Not currently assigned. Leave open.
NCS2	I	GPIO-19 Assigned to iPod dock connector iPod NDETECT. See Note 8.
VCO1	I/O	GPIO-07 Not currently assigned. Leave open.
MIICRS	I/O	GPIO-00 Not currently assigned. Leave open.
MIICOL	I/O	GPIO-01 Not currently assigned. Leave open.
MIITXER	I/O	GPIO-02 Not currently assigned. Leave open.
MIITXCLK	I/O	GPIO-03 iPod dock connector Accessory Power signal. See Note 8.

MII

MIITXD0, MIITXD1, MIIRXD0, MIIRXD1	I/O	Can be used, with GPIO signals above, to drive an external ethernet PHY. This is not supported by JB2 firmware. Leave open.
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LCD

LCDD0, LCDD1, LCDD2, LCDD3, LCDD4, LCDD5, LCDD6, LCDD7, LCDD8, LCDD9, LCDD10, LCDD11, LCDD12, LCDD13, LCDD14, LCDD15, LCD16, LCD17, LCDCLK, LCDCTRL0, LCDCTRL1, LCDCTRL2, LCDCTRL3	O	Uses optional J1 LCD connector. Connect to local LCD display. See Note 9. Leave open if not used.
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Notes:

1. Signal type codes:
 - I – 3.3V level Digital Logic Input into the DM875
 - O – 3.3V level Digital Logic Output from the DM875
 - IO – 3.3V level Digital Logic Input and Output (bi-directional) signal
 - M – Miscellaneous, see text for description
 - P – Power Supply
2. For SPI timing diagram for eDMP applications, please see:
BridgeCo_JB2x - DeviceControlProtocol_Registers_v_2_1.pdf, or later version.
For detailed setup and hold timing details, see DM870A IC data sheet:
DM870A DS rev. 1.3_12-15-11.pdf, or later version.
3. For audio port timing diagrams, and for detailed setup and hold timing, please see DM870A IC data sheet:
DM870A DS rev. 1.3_12-15-11.pdf, or later version.
4. For example ethernet external schematic, see:
CX Module Ethernet (RJ45 + Ext.Magnetics)_V1.2.pdf, or later version.
This schematic is typically compressed into a zip file, for example:
CX Module_Interface Schematics_one_page_V1.2_Jun_11.rar
5. For example USB schematics, see:
CX Module USB_V1.2.pdf, or later version.
This schematic is typically compressed into a zip file, for example:
CX Module_Interface Schematics_one_page_V1.2_Jun_11.rar
6. For example use of extended GPIO shift registers, see CE2 schematic:
A EVMCE2-4_schematic.pdf, or later version.
7. For example connection to a video D/A converter, see CE2 schematic:
A EVMCE2-4_schematic.pdf, or later version.
8. iPod dock connector pin and GPIO assignments are under discussion. Please contact SMSC for recommendations for iPod dock connections to CX module.
9. For example connection to an LCD display, see CE2 schematic:
A EVMCE2-4_schematic.pdf, or later version.
10. All the above signals are brought out to J2 pins. Not all the above signals are brought out to J3, the 64-pin low density connector. The J3 pin assignments table shows which signals are brought out to the J3 pins.
11. SMSC has a set of example motherboard schematics that shows example external circuitry that is typically connected to the module. Please check the SMSC/BridgeCo customer portal at <https://portal.bridgenco.net/> for a copy of these example schematics. These schematics are typically compressed into a zip file, for example:
CX Module_Interface Schematics_one_page_V1.2_Jun_11.rar
12. Please check the SMSC/BridgeCo Customer Portal *Download* area for the latest version of the SMSC documents. Go to <https://portal.bridgenco.net/>. If you do not have an account, please contact SMSC.

8.2.2 Connector PIN Assignments

J2 – Media Connector

Function	GPIO	IC PIN	Signal	PIN Number	Signal	IC PIN	GPIO	Function	
			GND	1	2				
			VIN (+3.3V)	3	4				
			VIN (+3.3V)	5	6				
			GND	7	8				
			VIN (+1.2V)	9	10				
			VIN (+1.2V)	11	12				
			GND	13	14				
			VIN (+1.9V)	15	16				
			GND	17	18				
			3V3RTC	19	20				
			GND	21	22				
			GND	23	24				
SPI		D15	SPI_DOUT	25	26			JTAG	
		D14	SPI_DIN	27	28				
		B16	SPI_CLK	29	30				
		C13	TXD0	31	32			SPI	
		B14	RXD0	33	34				
Debug UART		A14	RXD1	35	36			Module reset input	
		B13	TXD1	37	38				
			GND	39	40				
SPI_E_NCS SPI_E_SDI	GPIO-11	D12	SSMD7	41	42			GPIO-10 GPIO-08 GPIO-17 GPIO-19	
		B12	SSMD5	43	44				
	D11	SSMD3	45	46					
	A11	SSMD0	47	48					
	C10	SSMCLK	49	50					
	D10	SSMCP	51	52					
			GND	53	54				
				55	56				
USB		A1	USB_DN	55	56			USB	
		B1	USB_DP	57	58				
		E3	USBVBSDRV	59	60				
			GND	61	62				
		K4	AOUTLP	63	64			GPIO-06 GPIO-07 GPIO-04 GPIO-05 GPIO-12	
		L2	AOUTLN	65	66				
			GND	67	68				
		H17	A23	69	70				
I2C SDA I2C SCL	GPIO-16 GPIO-18 GPIO-14 GPIO-13	H16	A22	71	72				
		T3	AV3CTRL1	73	74				
		U2	AV3CTRL0	75	76				
Video Output		M3	AV0CTRL2	77	78				Video Output
		M2	AV0CTRL1	79	80				
		L1	AVOCLK	81	82				
		M4	AV0DATA3	83	84				
		N1	AV0DATA2	85	86				
		N2	AV0DATA1	87	88				
		N3	AV0DATA0	89	90				
			GND	91	92				
LRCK A/D data 1 A/D data 0 D/A data 1 D/A data 0		T1	AV2CTRL0	93	94			MCLK SCLK SPDIF output SPDIF input	
		P4	AV2DATA3	95	96				
		R3	AV2DATA2	97	98				
		T2	AV2DATA1	99	100				
		U1	AV2DATA0	101	102				
			GND	103	104			Ethernet	
Ethernet			ETH_RXN	105	106				
			ETH_RXP	107	108				
				109	110				
				111	112				
				113	114				
			GND	115	116				
	GPIO-15	K18	NWAIT	117	118				
				119	120				
			ETH_TXN	111	112			GPIO-00 GPIO-01 GPIO-02 GPIO-03 iPod Access Power	
			ETH_TXP	113	114				
			GND	115	116				
			MIICRS	117	118				
			MIICOL	119	120				
			MIITXER	121	122				
			MIITXCLK	123	124				
			MIITXD0	125	126				
			MIITXD1	127	128				
			MIIRXD0	129	130				
			MIIRXD1	131	132				
			GND	133	134				

Note: The IC PIN column indicates the pin number on the DM860A or DM870A or DM875 integrated circuit. This allows for easy cross-reference to the DM860A or DM870A or DM875 data sheet information.

J1 – LCD Connector

Function	GPIO	IC PIN	Signal	PIN Number		Signal	IC PIN	GPIO	Function		
			GND	1	2	GND					
LCD Interface		V8	LCDD0	3	4	LCDD1	U8	LCD Interface			
		T8	LCDD2	5	6	LCDD3	R8				
		V7	LCDD4	7	8	LCDD5	U7				
		T7	LCDD6	9	10	LCDD7	R7				
		V6	LCDD8	11	12	LCDD9	U6				
		T6	LCDD10	13	14	LCDD11	R6				
		V5	LCDD12	15	16	LCDD13	U5				
		T5	LCDD14	17	18	LCDD15	V4				
		U4	LCDD16	19	20	LCDD17	V3				
			GND	21	22	GND					
	LCD Interface		T10	LCDCCLK	23	24	LCDCCTRL0		R9	LCD Interface	
			T9	LCDCCTRL1	25	26	LCDCCTRL2		U9		
		V9	LCDCCTRL3	27	28	GND					
			GND	29	30	GND					

Note: The IC PIN column indicates the pin number on the DM860A or DM870A or DM875 integrated circuit. This allows for easy cross-reference to the DM860A or DM870A or DM875 data sheet information.

J3 – Low Density Connector

Function	GPIO	IC PIN	Signal	PIN Number		Signal	IC PIN	GPIO	Function
			GND	1	2	GND			
			VIN (+3.3)	3	4	RXD0	B14		
			VIN (+3.3)	5	6	TXD0	C13		
			GND	7	8	GND			
			VIN (+1.9)	9	10	VIN (+1.2)			
			VIN (+1.9)	11	12	VIN (+1.2)			
			GND	13	14	GND			
Free iPod NDETECT	GPIO-15 GPIO-19	K18	NWAIT	15	16	RXD1	A14	Debug UART	
		J17	NCS2	17	18	TXD1	B13		
		D13	NRESET	19	20	GND			
			3V3RTC	21	22	AV2CTRL1	R2	MCLK LRCK SCLK A/D data 0 D/A data 0 SPDIF output SPDIF input	
			GND	23	24	AV2CTRL0	T1		
			SPI_DIN	25	26	AV2CLK	R1		
			SPI_DOUT	27	28	AV2DATA2	R3		
			SPI_CLK	29	30	AV2DATA0	U1		
			SPI_NCS0	31	32	AV4DATA1	T2		
			H18	NCS3	33	34	AV4DATA0	V2	
		GND	35	36	GND				
		SSMD7	37	38	USB_DN	A1	USB		
E-GPIO_NCS/TBA	GPIO-11	T3	AV3CTRL1	39	40	USB_DP		B1	
I2C SDA	GPIO-14	U2	AV3CTRL0	41	42	USBVBUSDRV		E3	
I2C SCL	GPIO-13		GND	43	44	USB_VBUS	D2		
SPI_REQ	GPIO-06	J1	PDOUT1	45	46	GND			
Factory Reset	GPIO-04	K1	PDOUT0	47	48	SSMD5	B12	GPIO-09	E-GPIO_SDI/TBA
IR input	GPIO-05	K2	VCO0	49	50	SSMD4	A12	GPIO-08	E-GPIO_SDO/TBA
			GND	51	52	GND			
Ethernet			ETH_LED_SPEED	53	54	ETH_LED_ACT			Ethernet
iPod Access Power	GPIO-03	R12	MIITXCLK	55	56	SSMD6	C12	GPIO-10	E-GPIO_CLK/TBA
Ethernet			ETH_RXN	57	58	ETH_RXP			Ethernet
			ETH_TXN	59	60	ETH_TXP			Ethernet
Free	GPIO-00	R14	MIICRS	61	62	MIICOL	T13	GPIO-01	Free
			GND	63	64	GND			

Note: The IC PIN column indicates the pin number on the DM860A or DM870A or DM875 integrated circuit. This allows for easy cross-reference to the DM860A or DM870A or DM875 data sheet information.

8.2.3 GPIO Assignments

GPIO Assignments for J3 64-pin Low Density Connector

GPIO	PIN Name	PIN Number	Function
00	MIICRS	61	Free
01	MIICOL	62	Free
03	MIITXCLK	55	iPOD Access Power
04	PDOUT0	47	Factory Reset
05	VCO0	49	IR Input
06	PDOUT1	45	Host NIREQ
08	SSMD4	50	E_GPIO_SDO/TBA
09	SSMD5	48	E_GPIO_SDI/TBA
10	SSMD6	56	E_GPIO_CLK/TBA
11	SSMD7	37	E_GPIO_NCS/TBA
13	AV3CTRL0	41	I2C_SCL
14	AV3CTRL1	39	I2C_SDA
15	NWAIT	15	Free
17	NCS3	33	Free
19	NCS2	17	IPOD NDETECT

Note: Not all 20 GPIO signals are brought out to J3 64-pin low density connector. For the CX870-3K, GPIOs 00, 01 and 03 are not brought out to J3 64-pin low density connector. J3 pin numbers 61, 62 and 55 are not connected to any signal in the CX870-3K module.

9 Application Guidelines

9.1 Power Supply sequencing and Reset Timing

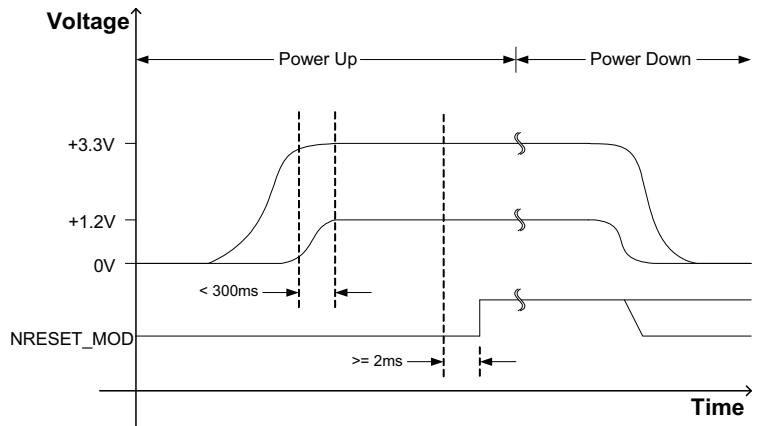
There are strict power sequencing and reset timing requirements.

- Power up the I/O voltage (3.3V) first and hold NRESET_MOD low.
- The core voltage (1.2V) must never be higher than (I/O voltage +0.5 V).
- The core voltage (1.2V) must be within the specified core voltage limits less than 300ms after the I/O voltage (3.3V) reaches the specified I/O voltage limits.
- Throughout the power down process, the 3.3V supply must maintain a higher voltage than the 1.2V supply, until both have reached ground potential.
- To assure a proper IC reset, the power supplies must be present for a minimum time of 2ms before NRESET_MOD is de-asserted.

Please see the power and reset timing figure in Section 9.1.1 below.

About 1.9V, the arrival of 1.9V supply should lag behind the arrival of the 3.3V. The delay between the 1.9V and the 3.3V is not critical. Typical delay is approximately 10ms, for example using 10kohm resistor and 0.1uF capacitor on the enable pin of a 1.9V dc-to-dc converter.

9.1.1 Power up, Reset and Power Down Timing



9.2 RF Considerations

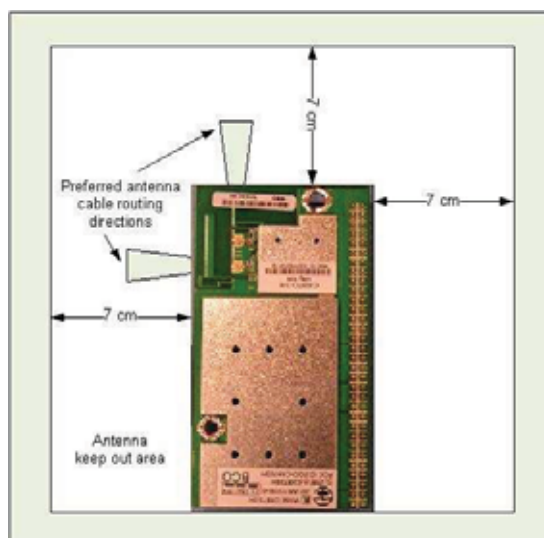
Note that overall system, RF and WiFi performance is significantly affected by the product design, environment and the application. It is the responsibility of the product designer to ensure proper system level shielding (if required) and to verify performance and fitness for the given product features and applications.

The WiFi performance will be affected by the RF environment surrounding the CX module. Please ensure that the CX module is positioned in a “quiet” RF environment, as far away as possible from high frequency clock signals and any other sources of RF energy. Also, make sure the antenna is not shielded by any metal objects, for example loudspeakers or other metal parts. Please make sure that the power supplies, in particular the +1.9V supply, are quiet and free from noise.

SMSC recommends that systems implementing AirPlay should use a module configuration that includes on-module shielding, as well as paying particular attention to system configuration and shielding. In particular, SMSC is recommending the use of the Bottom Shield versions of the modules, which allows greater freedom in antenna positioning.

Also, please see the SMSC Application Note: *SMSCAppNote - CX870_Antenna_Placement_V1_4.pdf* regarding antenna positioning guidelines.

Please see below picture for the recommended keep out area and cable routing for the antennas.



10 Revision Control

Revision	Date / Author	Details of Change	Reason for Change
V2.8 (093012)	Sept 30, 2012 / SHs	Updated Section 4 Ordering Guide with 2 new rows for CX870-3LB & CX870-3MB and moved the row for CX870-3KB to be with them.	New SKUs available.
V2.8 (092412)	Sept 24, 2012 / SHs	<p>Updated cover page with new Microchip logo; removed SMSC logo from header; removed SMSC logo & address from legal text (page 2); added info about Microchip to legal text; updated © to 2012.</p> <p>Updated filename to 'CX_Module_DS_Rev2-8_MM-DD-YY.pdf'.</p> <p>Removed CX860 from Section 7.4 Module Weight.</p> <p>Updated left side of footer to 'SMSC CX Module'.</p> <p>Updated title of Section 7.1.1 to 'Top & Bottom View of CX Module with Bottom Shield'.</p> <p>Updated title of Section 7.2.1 to 'Side View of CX Module with Bottom Shield except CX870-3JB'.</p> <p>In Sections 3.1, 3.2, 3.2.1 & 3.2.2, updated occurrences of 'CX870' to 'CX Module'.</p> <p>Updated Section 4 Ordering Guide to remove rows for CX870-3DB and CX870-3DBS, and add a row for CX870-3KB.</p> <p>Removed 'I2C' box, arrow & label in Section 2 Block Diagram.</p>	<p>Microchip purchased SMSC.</p> <p>Data covers all CX modules.</p> <p>No CX860 module available.</p> <p>Data sheet is for all CX modules.</p> <p>Drawings are for all CX modules.</p> <p>Drawings are for all CX modules.</p> <p>Pictures are for all CX modules.</p> <p>Updated to show actual status.</p> <p>Correction.</p>
V2.8 (090912)	Sept 9, 2012 / SHs	<p>Updated Section 2 Block Diagram to show obscured black lines leading out from LCD & SSM blocks.</p> <p>In Section 2 Block Diagram changed "DM860A or DM870A" to "DM870A or DM875"</p> <p>In Section 1 Introduction, changed "DM860A and DM870A" to "DM870A and DM875"</p> <p>In Section 4 Ordering Guide, added a 'Status' column and status code key.</p> <p>In Section 4 Ordering Guide, added row for CX875-3PB.</p> <p>In Section 4 Ordering Guide, changed "SMSC IC's" heading to "SMSC ICs".</p> <p>In Section 6.0.1 Antenna Considerations, replaced text list with a new table.</p> <p>Added a new section 6.0.2 CX Power Settings Used For Modular Approval.</p> <p>In Section 6 Regulatory Compliance and Quality, updated the Compliance entry for New Zealand / Australia for Radio Regulations from "CE" to "AZ/NZS:4268"</p> <p>In Section 9.2 RF Considerations, changed the application note file path from "App Note Antenna Placement recommendation CX870 modules rev1.1.pdf" to "SMSCAppNote - CX870_Antenna_Placement_V1_4.pdf"</p> <p>In Section 9.2 RF Considerations, added note & picture regarding recommended keep out area and cable routing for antennas.</p> <p>In Notes of Section 8.2.1 Pin Descriptions, added text regarding schematics being compressed into zip files to Notes 4, 5 & 11.</p>	<p>Correction.</p> <p>CX module uses DM870A and DM875.</p> <p>CX module uses DM870A and DM875.</p> <p>To show current availability status of each module version.</p> <p>To give details of newly available module version.</p> <p>Correction.</p> <p>Updated information and in a clearer format.</p> <p>To provide more details about CX module power settings.</p> <p>Updated information.</p> <p>Provide most up to date Application Note file.</p> <p>Provide information about keep out areas and cable routing.</p> <p>Provide further information about schematic files.</p>
V2.7	June 13,	In Section 4 Ordering Guide, made rows for	All new designs should use modules with a

Revision	Date / Author	Details of Change	Reason for Change
(061312)	2012 / SHs	CX870-3B, 3H, 3I, 3J shaded.	bottom shield, so modules without a bottom shield are now marked as "NOT TO BE USED FOR NEW/STANDARD MP DESIGNS" by shading the rows in the Ordering Guide table for those modules with no bottom shield.
V2.6 (050812)	May 8, 2012 / SHs	Removed entries in '8MByte NOR' column for modules 3A, 3B, 3D, 3DS in Section 4 Ordering Guide	Correction.
V2.5 (042212)	April 22, 2012 / SHs	Updated title of Section 7.2.1 Side View of CX870 Module with Bottom Shield to include "...except CX870-3JB" Added Section 7.2.2 Side View of CX870 Module with Bottom Shield part number CX870-3JB only	Reflect addition of separate section (7.2.2) for the CX870-3JB module. CX870-3JB has thinner bottom shield than other modules.
V2.4 (032312)	March 23, 2012 / SHs	Added IC PIN entry for MIICRS in J3 Low Density Connector table in Section 8.2.2 Connector PIN Assignments. Changed "MMIICRS" to "MIICRS" in Section 8.2.3 GPIO Assignments. Changed "MMIICRS" to "MIICRS" in J3 Low Density Connector table in Section 8.2.2 Connector PIN Assignments. Changed "MMIICRS" to "MIICRS" in GPIO table in Section 8.2.1 Pin Descriptions. Added important note text to Tx Power row in Section 5.3 WiFi Specification. Removed the 'm' from "+/-1dBm" in the Tx Power row in Section 5.3 WiFi Specification.	CX module uses DM870A. Correction. Correction. Correction. To indicate which modules the Tx Power specifications relate to. Correction.
V2.4 (031712)	March 17, 2012 / SHs	In Section 5.3 WiFi Specifications, updated Transmission Speed entry In Section 4 Ordering Guide, changed all occurrences of DM870 to DM870A & DM860 to DM860A In Section 2 Block Diagram, changed all occurrences of DM870 to DM870A & DM860 to DM860A In Section 1 Introduction, changed all occurrences of DM870 to DM870A & DM860 to DM860A In Section 8.2.1 Pin Descriptions, changed all occurrences of DM870 to DM870A In the Notes for Section 8.2.1 Pin Descriptions, changed <i>dat_DM870_16_datasheet.pdf</i> to <i>DM870A DS rev. 1.3_12-15-11.pdf</i> Changed all occurrences of DM870 to DM870A throughout the datasheet. Updated J1, J2 & J3 tables in Section 8.2.2 Connector PIN Assignments, changing DM870 to DM870A. Changed "WiFi (on-module PCB diversity)" column heading to "Internal PCB Diversity Antennas" in Section 4 Ordering Guide Added 'FCC' to North America in Frequency Band entry in Section 5.3 WiFi Specification Updated TX EVM entry in Section 5.3 WiFi Specifications Updated Rx Sensitivity entry in Section 5.3 WiFi Specifications Updated Tx Power entry in Section 5.3 WiFi Specifications	Add missing 2Mbps speed. CX module uses DM870A. CX module uses DM870A. CX module uses DM870A. CX module uses DM870A. CX module uses DM870A. CX module uses DM870A. CX module uses DM870A. CX module uses DM870A. Improve clarity of meaning. Specify North American WiFi regulatory certification body. Update values to better reflect actual performance. Update values to better reflect actual performance. Show test conditions.

Revision	Date / Author	Details of Change	Reason for Change
V2.4 (031212)	March 12, 2012 / SHs	Added Section 3.6 Production Module with Bottom shield (Part Numbers with a "B" after the configuration letter)	Show module versions with bottom shield.
		Added Section 3.6.1 Including J3 Low Density 64-pin connector - Bottom View	Show bottom shield.
		Added Section 3.6.2 Including J2 High Density 120-pin connector - Bottom View	Show bottom shield.
V2.4 (031012)	March 10, 2012 / SHs	Updated Section 4 Ordering Guide & Section 4.1 Part Number Syntax drawing with bottom shield versions	Bottom shield versions added to table and Syntax drawing.
		Added another note to Section 8.2.3 GPIO Assignments	Document missing GPIOs for CX870-3K.
		Updated TX Power row in Section 5.3 WiFi Specification (CX870 only)	Show improved tolerances for TX power.
		Added Section 7.1.1 Top & Bottom View of CX870 Module with Bottom Shield	Show drawings of module with Bottom Shield.
		Added Section 7.2.1 Side View of CX870 Module with Bottom Shield	Show drawings of module with Bottom Shield.
		Added a note to Section 7.3 3D View of CX870 Module	To indicate availability of digital copy of 3D view of module.
Added additional text to Section 9.2 RF Considerations	Providing further recommendations regarding the use of bottom shield versions and to indicate the availability of a pdf about antenna positioning guidelines.		
V2.3 (112011)	November 20, 2011 / SHs	Added CX870-3DS option to Section 4 Ordering Guide	To indicate soldered shield version.
V2.2 (110811)	November 8, 2011 / SHs	Added CX870-3K option to Section 4 Ordering Guide.	Added -3K option.
V2.1 (100711)	October 7, 2011 / SHs	Updated title of Section 6.1 from "1 RoHS" to "RoHS".	Correcting typo.
		In Section 10 Revision Control table, updated an entry for V2.0 b in the Reason for Change column from "RTV" to "RTC"	Correcting typo.
		Removed "Preliminary Datasheet" from the footer.	CX module is in production, so the datasheet is no longer preliminary.
Removed the word "Preliminary" from the title page.	CX module is in production, so the datasheet is no longer preliminary.		
V2.0 (100211)	October 2, 2011 / SHs	Updated Section 5.3 WiFi Specification "TX Power" entry for 802.11g	Correspond to actual production test limits.
		Updated Section 6.0.1 Antenna Considerations with updated module numbering scheme	Revert to original module numbering scheme.
		Updated Section 6.7 Module Quality with new Defect Rate	Data is now available.
		Updated Section 4.1 Part Number Syntax with removal of Antenna Configuration number and Note	Revert to original part numbering scheme.
		Updated Section 10 Revision Control with new Reason for Change column	Corporate standard.
V2.0 (092611)	Sept. 26, 2011 / SHs	Change from BridgeCo logos and disclaimer text to SMSC logos and disclaimer text	Corporate standard.
		Updated location of red boxes in Section 3.2.1 CX870 Bottom View with 64-pin Low density connector	Improve alignment of red box to photo.
		Updated location of red boxes in Section 3.2.2 CX870 Bottom View with 120-pin Media connector	Improve alignment of red box to photo.
		Moved Section 5.3 WiFi Specification on to one page	Improve readability.
		Updated Customer Portal information in Section 6 Regulatory Compliance and Quality	Easier to access URL directly.
		Reverted Antenna Considerations back to Section 6.0.1; subsequently all subsections in	Decided to keep original part numbering scheme to avoid unnecessary paper work and

Revision	Date / Author	Details of Change	Reason for Change
		Section 6 reverted back to original numbering	the need to redo certifications.
		Updated Notes 11 & 12 in Section 8.2.1 Pin Descriptions with updated Customer Portal information	Easier to access URL directly.
		Updated Table of Contents	Keep TOC aligned with actual content.
V2.0 c	Sept. 14, 2011 / SHs	Updated font styling of Table of Contents	Easier to read.
		Update Section 2 Block Diagram : moved RJ45+Transformer & USB Type A boxes inside the drawing boundary	Improve accuracy of drawing.
		Updated Section 5.3 WiFi Specification (CX870 only) TX Power Description entry	Align data with test limits.
		Updated Section 5.3 WiFi Specification (CX870 only) Rx Sensitivity Description entry	Align data with test limits.
		Updated Section 5.3 WiFi Specification (CX870 only) : add a Note underneath the table	Clarification of the possible effect of changing the TX Power setting.
		Updated Section 4 Ordering Guide : changed CX870-3D row Two Ant entry from (X)* to X	Change to match final CX870-3D configuration.
		Updated Section 4 Ordering Guide : removed the two blank rows	Improve readability.
V2.0 b	Sept. 10, 2011 / SHs	Updated the Description for pin NCS3 in Section 8.2.1 Pin Descriptions	Update to align with actual use.
		Updated Section 4 Ordering Guide : added gray background to CX870-3F & CX870-3G	Internal antenna versions are not available until performance issues are resolved.
		Updated Section 4 Ordering Guide : removed the 2 from A, H, I & J version Part Numbers	Decided to keep original part numbering scheme to avoid unnecessary paper work and the need to redo certifications.
		Updated Section 4 Ordering Guide : split Ext. Diversity Antennas column into two, added two sub-columns "One Ant." & "Two Ant.", moved Xs to correspond with correct sub-column	Show the number of external antenna connections.
		Updated Section 4 Ordering Guide : CX870-3D : removed X from WiFi column	CX870-3D is not configured for internal antenna.
		Updated Section 4 Ordering Guide : updated + Note text	Explained about one or two external antenna options.
		Updated Section 4 Ordering Guide : moved the + from Part Numbers column to Ext. Diversity Antennas column	Proper link for "+" Note.
		Updated Section 4 Ordering Guide : removed # Note completely	Content now covered by "+" Note
		Updated Section 4.1 Part Number Syntax : Updated graphic	Explain antenna configuration field
		Updated Section 4.1 Part Number Syntax : Updated Note text	Explain about one or two antenna configuration.
		Updated text in Section 8.1 WLAN UFL Antenna Connector	Remove references to part numbering scheme which includes the number of antennas, and repeat advice to use two external antennas.
		Removed RTC elements from Section 2 Block Diagram	Support for RTC is removed.
		Updated the Description for pin 3V3RTC in Section 8.2.1 Pin Descriptions	Support for RTC is removed.
V2.0 a	August 22, 2011 / SHs	Added Section 3.5 Example Production Module Showing Soldered RF Shield	Photo shows that RF shield is soldered, needed for Japan Telec certification.
V2.0	August 12, 2011 / SHs	Updated Note Section 4.1 Part number syntax	Highlighted that CX870-3D does not follow the new part numbering scheme. This Note was subsequently deleted, so this is not relevant any more.
		Updated all Section 3 Board Pictures to new versions + inserted new Sections 3.2.1 & 3.2.2 which show two different bottom views	Improve accuracy of data sheet photos.
V1.9 c	August 2, 2011 / SHs	<ul style="list-style-type: none"> Updated Key Features on Title page: removed (optional) from "WiFi-certified 802.11b/g" entry 	

Revision	Date / Author	Details of Change	Reason for Change
		<ul style="list-style-type: none"> Updated Antenna Configuration entry in Section 4.1 Part number syntax 	
V1.9 b	July 28, 2011 / SHs	<ul style="list-style-type: none"> Updated Section 4.1 Part number syntax <ul style="list-style-type: none"> Updated graphic Added a Note Changed intro text in Section 3 Board Pictures Updated Section 4 Ordering Guide <ul style="list-style-type: none"> Changed CX870-3B1 to CX870-3B Updated the text for + note Added a note to CX870-3B Ext. Diversity Antenna column Added a new # note Added Section 6.0.1 Antenna Considerations 	
V1.9 a	July 25, 2011 / SHs	<ul style="list-style-type: none"> Inserted new photo for Section 3.1 Top View of CX870 Inserted new photo for Section 3.2 Bottom View of CX870 Added new Section 3.3 Production Module with Top & RF shields Added new Section 3.4 Production Module with 64-pin Connector Option Updated Section 4 Ordering Guide <ul style="list-style-type: none"> Added gray background to CX870-3D Changed CX870-3A to CX870-3A2 Changed CX870-3B to CX870-3B1 Changed CX870-3H to CX870-3H2 Changed CX870-3I to CX870-3I2 Changed CX870-3J to CX870-3J2 Added a Note to the Part Number title Updated Section 8.1 WLAN UFL Antenna Connector with new text Updated Section 5.3 WiFi Specification TX EVM entry to -9dB@6MHz Updated Section 6 Regulatory Compliance & Quality with Module Versions Passed for Radio Regulations entries Replaced the Note in Section 6 to be main body text and updated the text. Added new Section 4.1 Part number syntax Updated module weight to 20g 	
V1.8 a	July 10, 2011 / SHs	<ul style="list-style-type: none"> Update section 8.1 WLAN UFL Antenna Connector Deleted section 8.1.1 Coaxial antenna connector dimensions 	
V1.8	July 5, 2011 / SHs	<ul style="list-style-type: none"> Updated the acceptable surface-mount receptacle parts in Section 8.1 WLAN UFL Antenna Connector 	

Revision	Date / Author	Details of Change	Reason for Change
		<ul style="list-style-type: none"> Added Appendix 1: Certification Notices 	
V1.7 c	May 13, 2011 / SHs	<ul style="list-style-type: none"> Updated "Module Quality" Defect Rate field entry Updated "Board Dimensions & Weight" drawings Updated the "Electrical Specifications" table Added another Note to the "Pin Descriptions" section 	
V1.7 b	May 11, 2011 / SHs	<ul style="list-style-type: none"> Updated Note 8 in "Pin Descriptions" table Re-imported "Board Dimensions & Weight" drawings Updated "Board Pictures" images Updated board photo on Cover page Updated the Feature list on Cover page Updated J1, J2 & J3 "Connector PIN Assignments" tables: removed Power column & re-organised columns Changed "Application Notes" title to "Application Guidelines" Updated Copyright date to "2011" Updated Table of Contents font styling 	
V1.7 a	May 6, 2011 / SHs	<ul style="list-style-type: none"> Re-imported Block Diagram as a wmf file Updated "Power up, Reset & Power down Timing" figure Updated "Pin Descriptions" table Re-organised text in "Power Supply sequencing & Reset Timing" Re-imported J2 & J3 Connector PIN Assignment tables 	
V1.7	May 4, 2011 / SHs	<ul style="list-style-type: none"> Added note to Module Weight section Updated the Ordering Guide – Part Numbers & added new J version Added new text to the Board Pictures section Updated all Mechanical Drawings and added & removed Notes Updated the J3 Low Density Connector table Updated the GPIO Assignment table Added new Power Supply & Timing figure Updated the text in the "Power Supply sequencing and Reset Timing" section Updated the Key Connections table Updated "Key Connections" section title to "Pin Descriptions" Updated "Detailed Connector PIN Descriptions" section title to "Connector PIN Assignments" Updated J2 Media Connector table 	
V1.6 d	March 3, 2011 / SHs	<ul style="list-style-type: none"> Updated J3 Low Density Connector table Update GPIO Assignments section and table 	
V1.6 c	February 24, 2011 / SHs	<ul style="list-style-type: none"> Updated all mechanical drawings in "Board Dimensions and Weights" section Deleted warning note in "Board Dimensions and Weights" section 	

Revision	Date / Author	Details of Change	Reason for Change
V1.6 b	February 23, 2011 / SHs	<ul style="list-style-type: none"> Updated "J3-Low density connector" pin description table Updated "GPIO Assignments" table 	
V1.6	February 11, 2011 / SHs	<ul style="list-style-type: none"> Entirely updated the "Ordering Guide" Added a Note to the "Ordering Guide" Updated the subsection titles for the "Board Pictures" section Updated the Block Diagram – changed 'WiFi Antenna' to 'Ext. Antenna' 	
V1.5 b	January 27, 2011 / SHs	<ul style="list-style-type: none"> Added Note to "Board Dimensions and Weight" section 	
V1.5 a	January 24, 2011 / SHs	<ul style="list-style-type: none"> Updated the "Ordering Guide" – removed Mfg column and consolidated into one table Updated the Header to reflect Preliminary nature of datasheet 	
V1.5	January 22, 2011 / SHs	<ul style="list-style-type: none"> Updated the datasheet to be a Preliminary Datasheet Added new feature to Summary on Front Page Updated "J3 - Low Density Connector" table Updated "GPIO Assignments" table Added note to "Board Dimensions & Weight – Side Views of CX870 module" section Updated text in "Application Notes – Power Supply Sequencing & Reset Timing" section Updated "Block Diagram" Updated text in "Connectors & Connections – WLAN UFL Antenna Connector" section 	
V1.4 b	January 11, 2011 / SHs	<ul style="list-style-type: none"> Updated the Application Notes, RF Considerations section 	
V1.4	January 3, 2011 / SHs	<ul style="list-style-type: none"> Updated the module photo on the Title page Updated the Application Notes, RF Considerations section 	
V1.3	December 23, 2010 / SHs	<ul style="list-style-type: none"> Updated Ordering Guide Added Notes to Ordering Guide Updated Block Diagram Updated "J3 – Low Density Connector" table Updated "Electrical Specifications" table Added Power Consumption data to "Electrical Specifications" table Updated the Board Dimensions and Weight images Updated the "GPIO Assignments" table Added another Application Note Added titles to Application Notes 	
V1.2	December 19, 2010 / SHs	<ul style="list-style-type: none"> Inserted CX860 and CX870 Module Weights Updated module image on Front Page 	
V1.1	December 13, 2010 / SHs	<ul style="list-style-type: none"> Added the Ordering Guide. Updated the Block Diagram. Updated the "Electrical Specifications" 	

Revision	Date / Author	Details of Change	Reason for Change
		table <ul style="list-style-type: none"> • Updated the "Absolute Maximum Ratings" table • Updated the Notes for "Regulatory Compliance and Quality" section • Updated "Key Connections" table • Updated "J2 – Media Connector" table • Updated "J3 – Low Density Connector" table • Updated "GPIO Assignments" table • Added Board Pictures • Replaced Mechanical Drawings in "Board Dimensions and Weight" section 	
V1.0	October 18, 2010 / SHs	<ul style="list-style-type: none"> • Initial Version 	

Part2. Reliability Test



IEC17025 Certified

DONG GUAN G-COM COMPUTER CO., LTD
TEST CENTER

TEST REPORT

DONG GUAN G-COM COMPUTER CO., LTD TEST CENTER
1st, Row Yin Shan Rd., Yin Hu Industrial Area, Qing xi, Town, DongGuan City
Tel: 86-769-87312821 Fax: 86-769-87313021
Website: <http://www.Liteon.com>
Email: GCOM.Lab@liteon.com
Postcode: 523648

TEST REPORT

Report NO.: Pr-R1210018

Production	DONG GUAN G-COM COMPUTER CO.,LTD		
Applicant	PM Department		
Address	1st, Row Yin Shan Rd., Yin Hu Industrial Area, Qing xi, Town, DongGuan City		
Contact Tel.	86-769-87312821-507		
Application No.	A1210032	Sample Name	Airplay module
Receive date	Oct 26 th 2012	Trademark	SMSC
Finish date	Dec 19 th 2012	Model	CX875-3PB
Environment	25°C 53%RH	Sample Q'ty	18Pcs
The reference standard	See report text		
Test Result	See Test Process result		

Tester: JianDong Zhuang

Auditor: Jason He

Approver: TC WU

The special cachet:

Date : 2012/12/19

Test Process:

No.	Test Item	Sample No.	Result	Period	Page
1	Vibration Test (un-Packaged)	16# - 17#	Pass	10/31	Page4-5
2	Drop Test (un-packaged)	16# - 17#	Pass	10/31	Page6-7
3	Temperature Profile Test(Operational)	3#,4#,5#	Pass	12/18-12/19	Page8-10

Equipment and Instrument:

No.	Equipment Name	Model	Next calibration date
1	Vibration Tester	KD-9363	Dec 24 th 2012
2	Drop Tester	KD-128	Sep 1 th 2013
3	Temperature and Humidity chamber	MHU-408A	Jun 1 th 2013

Note:

MP Sample

TEST REPORT

Detection details

Test 1: Vibration Test (un-Packaged)

1.1 Equipment and instrument

No.	Equipment	Model	Next calibration date
1	Vibration Tester	KD-9363	Dec 24 th 2012

1.2 Simple Q'ty

2pcs; Number: 16# - 17#

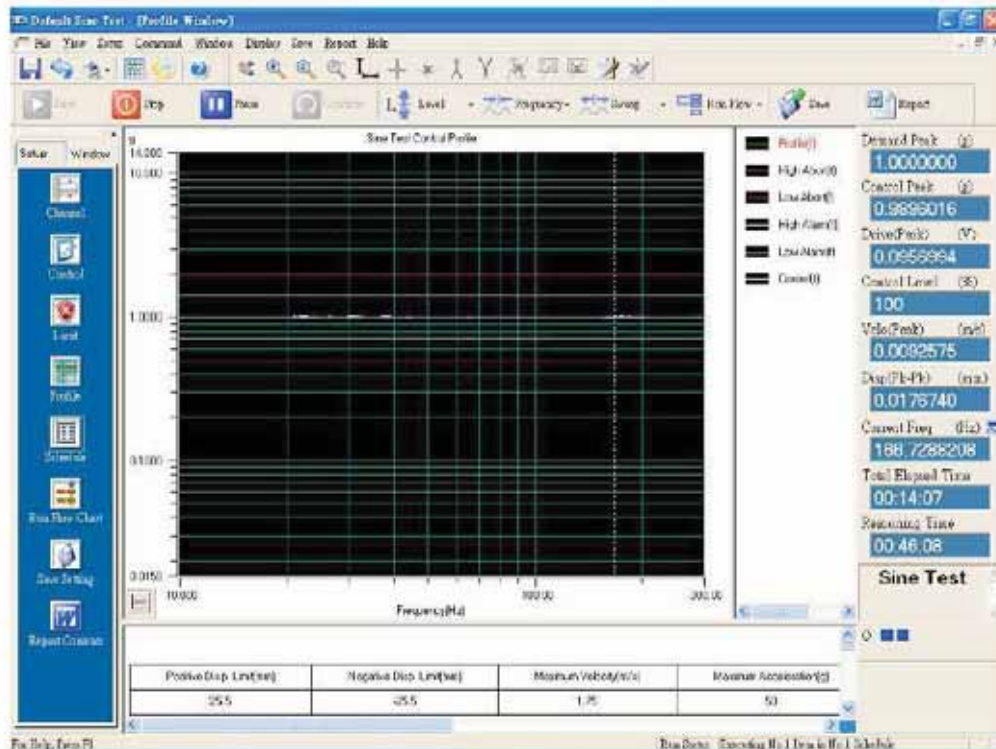
1.3 The reference standard

Test Plan of Customer

1.4 Test condition

1. Total duration: 1 cycle, 1hrs.
2. Test Samples: 2 Units
3. Perform functional test and visual inspection before and after test event.

Vibration Wave	Frequency Range	Minutes	Axis
Sine Wave	10 ~ 300-10Hz, 1Grms	60 min.	Z Axis



Graph

1.5 Test Criteria:

Pass / Fail, DUT should perform function normally after test events.

No any serious material deformation or crack after test events

1.6 Test result: Pass.

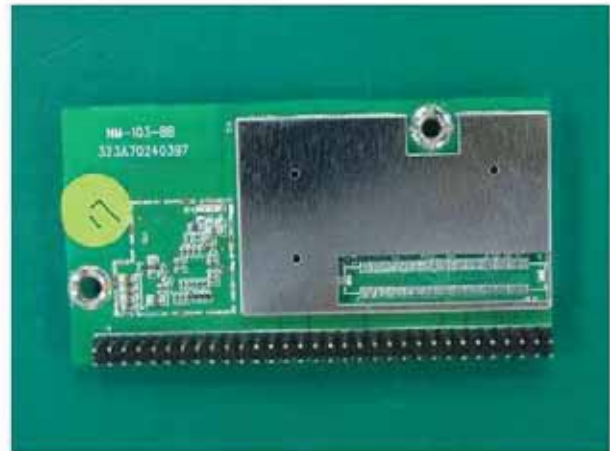
Samples passed perform functional test and visual inspection before and after the test.

1.7 Test picture:

Set up



Before test photos:



After test photos:



Test 2: Drop Test (un-Packaged)

2.1 Equipment and instrument

No.	Equipment	Model	Next calibration date
1	Drop Tester	KD-128	Sep 1 th 2013

2.2 Samples

2pcs; Number: 16# - 17#

2.3 The reference standard

Test Plan of Customer

2.4 Test condition

1. Total duration: 1hrs.
2. Test Samples: 2 Units
3. Drop height: 100cm, Weight : 0.024Kg.
4. Drop Sequences: 1 corner and 6 faces
5. Method: Free fall
6. Perform functional test and visual inspection before and after test event.

2.5 Test Criteria:

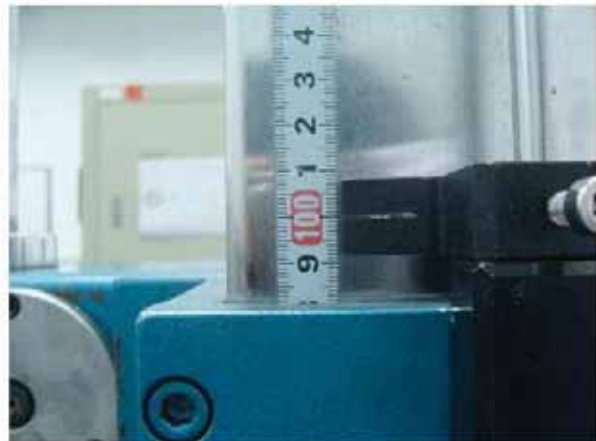
Pass / Fail, DUT should perform function normally after test events.
No any serious material deformation or crack after test events

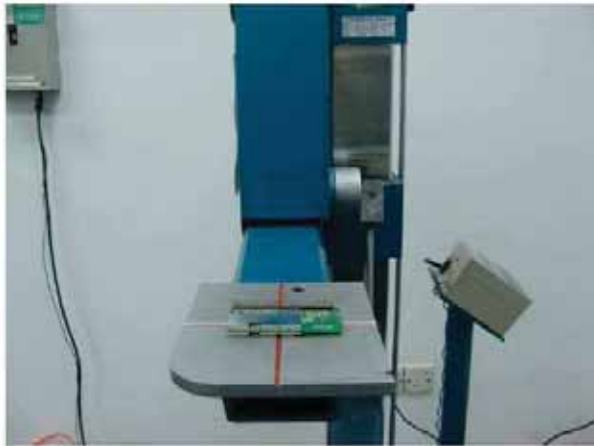
2.6 Test result: Pass.

Samples passed perform functional test and visual inspection before and after the test.

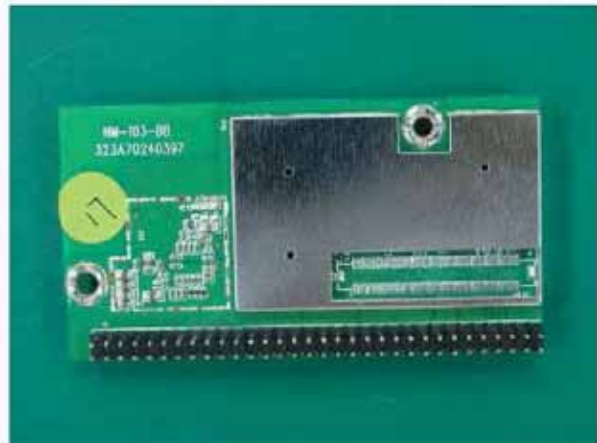
2.7 Test picture:

Set up





Before test photos:



After test photos:



Test 3: Temperature Profile Test(Operational)

3.1 Equipment and instrument

No.	Equipment	Model	Next calibration date
1	Temperature and Humidity chamber	KIHD-415TBS	Jun 1 th 2013

3.2 Simple Q'ty

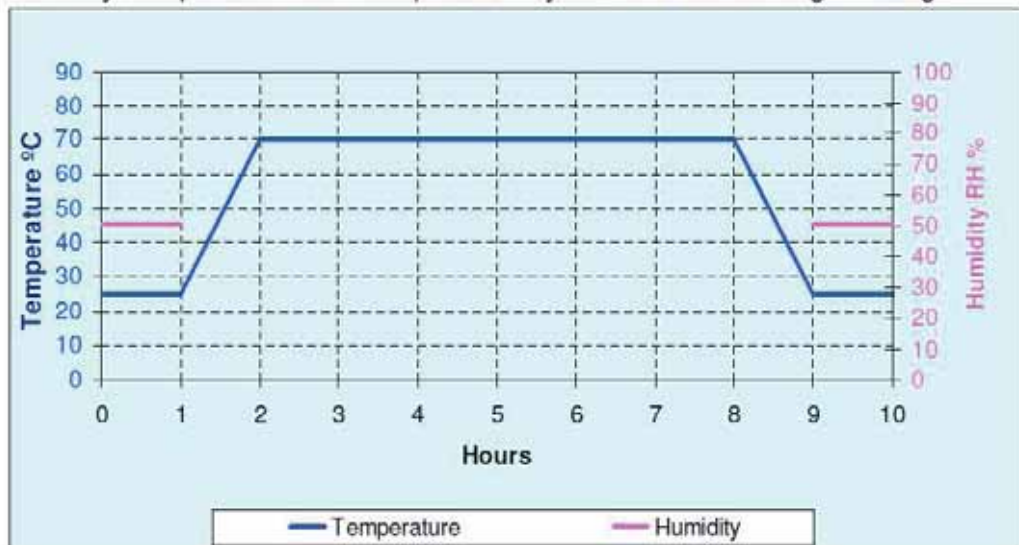
3pcs; Number: 4#,5#,6#.

3.3 The reference standard

Test Plan of Customer

3.4 Test condition

1. 25°C 50% up to 70°C 1Hrs.
2. 70°C 6Hrs
3. Sample Size: 3pcs\test (with shielding)
4. Perform Larvel Test during the whole test.
5. Measure key components Case temperature by the each stable stage ending.



Graph

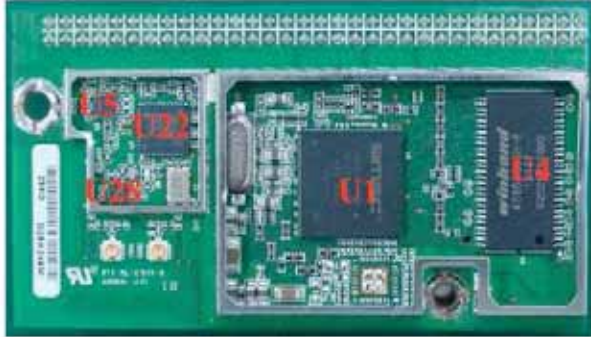
3.5 Test Criteria:

- Pass / Fail, DUT should perform function normally after test events.
- No any serious material deformation or crack after test events

3.6 Test result: Pass

- Samples passed perform functional test and visual inspection before and after the test.
- Temperatures of key components as below:

Temperature profile for NM-103-BB (CX875-3PB) measured at 70°C ambient.



NM-103BB Sample #4

NO.	Components	Location	Measure at 70 °C
1	NETWIRKED MEDIA PROCESSOR DM870A	U1	88.4
2	FLASH MEMORY IC NM-103-BB CX870-3B	U3	75.5
3	SDRAM IC 16M*16bit H57V2562GTR-60C	U4	79
4	IC RF PA SST12LP15A-QVCE 2.4GHz	U5	77.7
5	BAND PASS FILTER 2.4-2.5GHz BF1608	U22	82.1
6	SWITCH IC QFN12L HWS410 12PIN	U28	79.7
7	Shielding Case (above U1)	Shielding 1	75.7
8	Shielding Case (above U22)	Shielding 2	77.4

NM-103BB Sample #5

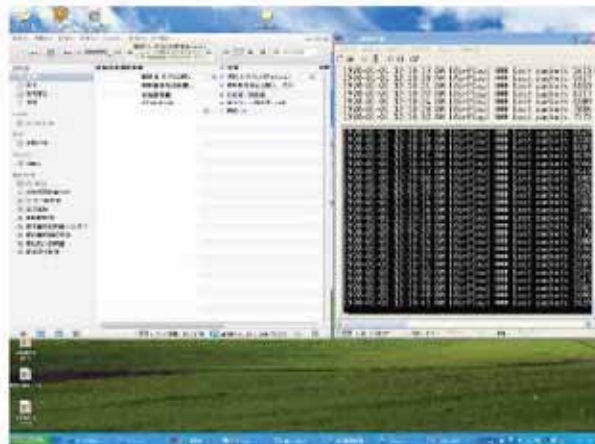
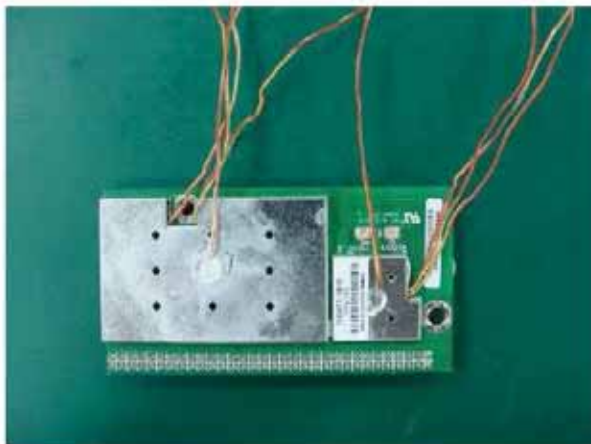
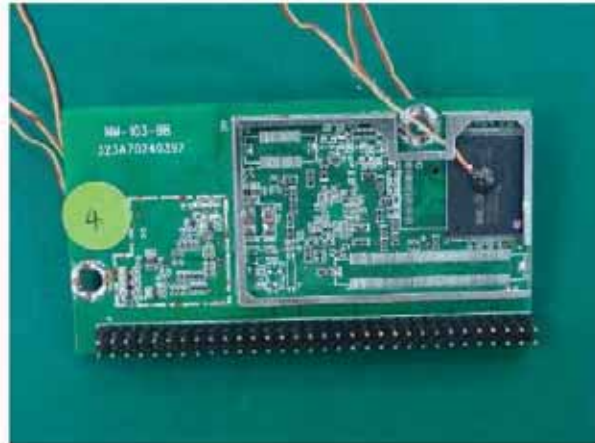
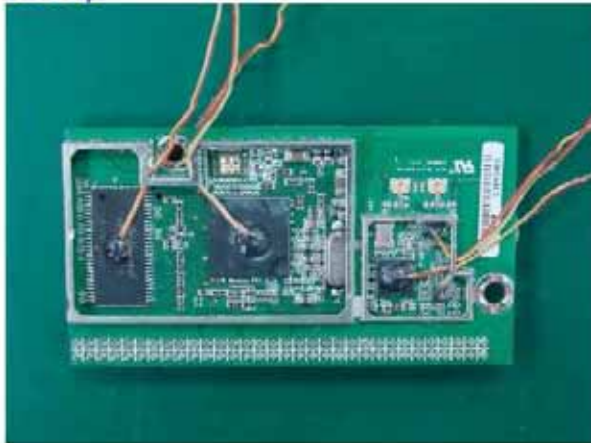
NO.	Components	Location	Measure at 70 °C
1	NETWIRKED MEDIA PROCESSOR DM870A	U1	88.5
2	FLASH MEMORY IC NM-103-BB CX870-3B	U3	76.4
3	SDRAM IC 16M*16bit H57V2562GTR-60C	U4	77
4	IC RF PA SST12LP15A-QVCE 2.4GHz	U5	77.9
5	BAND PASS FILTER 2.4-2.5GHz BF1608	U22	81
6	SWITCH IC QFN12L HWS410 12PIN	U28	78.8
7	Shielding Case (above U1)	Shielding 1	74.9
8	Shielding Case (above U22)	Shielding 2	77.2

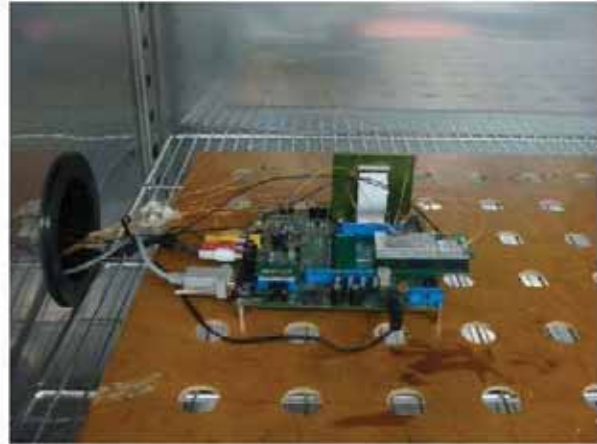
NM-103BB Sample #6

NO.	Components	Location	Measure at 70 °C
1	NETWIRKED MEDIA PROCESSOR DM870A	U1	89
2	FLASH MEMORY IC NM-103-BB CX870-3B	U3	76
3	SDRAM IC 16M*16bit H57V2562GTR-60C	U4	78.5
4	IC RF PA SST12LP15A-QVCE 2.4GHz	U5	78.9
5	BAND PASS FILTER 2.4~2.5GHz BF1608	U22	82.3
6	SWITCH IC QFN12L HWS410 12PIN	U28	79.6
7	Shielding Case (above U1)	Shielding 1	75.6
8	Shielding Case (above U22)	Shielding 2	78

3.7 Test picture:

Set up





Attention

- i. The test report is invalid without the official stamp of the testing center.
- ii. Any photocopies or part photocopies of the test report are forbidden without the written permission from the testing center.
- iii. The test report is invalid without the signatures of Author and Reviewer.
- iv. The test report is invalid if altered.
- v. If there is objection about the test report, please raise within 15 days in receive the report beginning, or it will not be attended to.
- vi. The report just be responsible for submitted sample.
- vii. In the test results, "N/A" means "not applicable", "P" means "conformity", "F" means "inconformity", "R" means "for reference only".

*****END*****

Part3. WLAN Test Report**NM-104 BB (CX875)****WLAN Test Plan and Report**

Department:	PD-2/NABU
Prepared by:	Frank Gung
Checked by:	Ralf Liu
Approved by:	
Revised Date:	2012-12-28

Note:

1. This document does leave the possibility of improvement, or change.
2. All right are reserved: No one is permitted to reproduce, duplicate or explain contents of this document, in any from, the whole or part of this document without Liteon's permission.

Revision History

Version No.	Revised Date	Revised by	Description	Note
V0.1	2012-12-28	Frank Gung	Check CX875-3PB module RF performance	

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1. WLAN Test

1.1. Purpose

This report is made to check the NM-104BB CX875 module RF performance. In order to avoid the fail test on RF center frequency error and improve the yield rate of CX875 module, we proposed a solution to fine tune the 50MHz crystal of RF IC by changing the load capacitors.

This solution was already sending to SMSC review and we also show the performance results in this report.

1.2. WLAN Function Performance Test Plan

Test performed on module : CX875-3PB module

(CX875-3PB* means with capacitors changed for crystal accuracy improvement)

Date of test : 2012-12-27

➤ Test Item

Sub Test ID		Description
Transmit Test	1.3.1	Transmit power levels
	1.3.2	Transmit spectrum mask
	1.3.3	Transmit center frequency tolerance
	1.3.4	Chip clock frequency tolerance
	1.3.5	Transmit power-on and power-down ramp
	1.3.6	RF carrier suppression
	1.3.7	Transmit modulation accuracy
	1.3.8	Symbol clock frequency tolerance
	1.3.9	Transmitter center frequency leakage
	1.3.10	Transmitter spectral flatness
	1.3.11	Transmitter constellation error
Receiver Test	1.3.12	Receiver minimum input level sensitivity

➤ Duration of Test

1 day

➤ Test Conditions

Item	Description
System Sample Quantity	CX875-3PB
Temperature	At room temperature
F/W Version	Latest CX875 Factory Default code
Test pad	Measurements are taken at the discrete component pins

➤ **Test Equipment & Procedure**

Item	Description
PC	DELL M4500 Notebook
One-box WLAN tester	Litepoint IQview

Transmit & Receive Test



1.3. WLAN Function Performance Test Result

1.3.1 Transmit power levels

Verify the transmitter output power of the Device Under Test (DUT) is below conformance limit. DUT generates continuous frames to power meter with Test software utility and measure the output power.

1.3.1.1 Criteria

Refer to the Below Table.

1.3.1.2 Test Report

802.11b Transmit Power Test

	Data Rate	Output Power (AVG) dBm		Remark
		Ch1 (2.412GHz)	CH11 (2.462GHz)	
CX875-3PB	11 Mbps	15.88	15.42	Power setting:9
CX875-3PB*	11 Mbps	15.74	15.30	With Cap changed

802.11g Transmit Power Test

	Data Rate	Output Power (AVG) dBm		Remark
		Ch1 (2.412GHz)	CH11 (2.462GHz)	
CX875-3PB	54 Mbps	15.27	14.63	Power setting:1
CX875-3PB*	54 Mbps	15.44	14.56	With Cap changed

1.3.2 Transmit Spectrum Mask

To verify the transmitter spectrum of the Device Under Test (DUT) is below conformance limit. DUT generates continuous frames to spectrum analyzer with test software utility and check if the spectrum mask conforms to the IEEE 802.11 Standard.

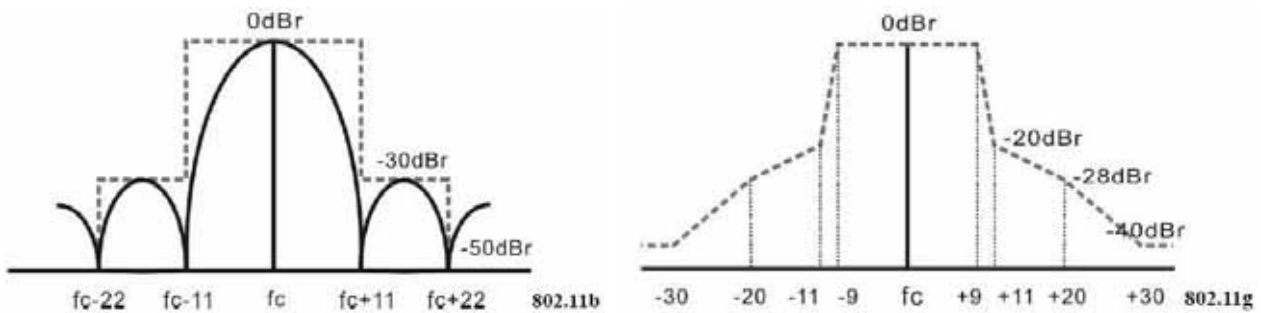
1.3.2.1 Criteria

802.11b

The transmitted spectral products shall be less than -30dBr for $fc-22\text{MHz} < f < fc-11\text{MHz}$; and $fc+11\text{MHz} < f < fc+22\text{MHz}$; and shall be less than -50dBr for $f < fc-22\text{MHz}$; and $f > fc+22\text{MHz}$
 fc : channel center frequency.

802.11g

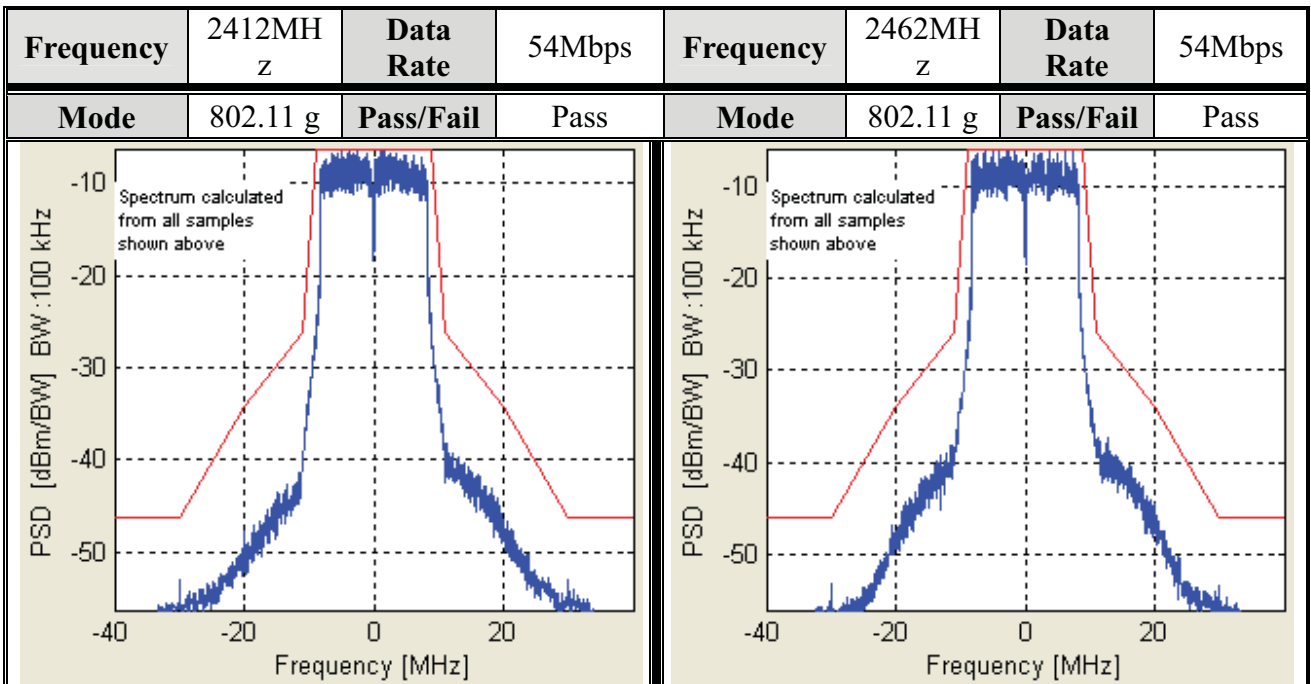
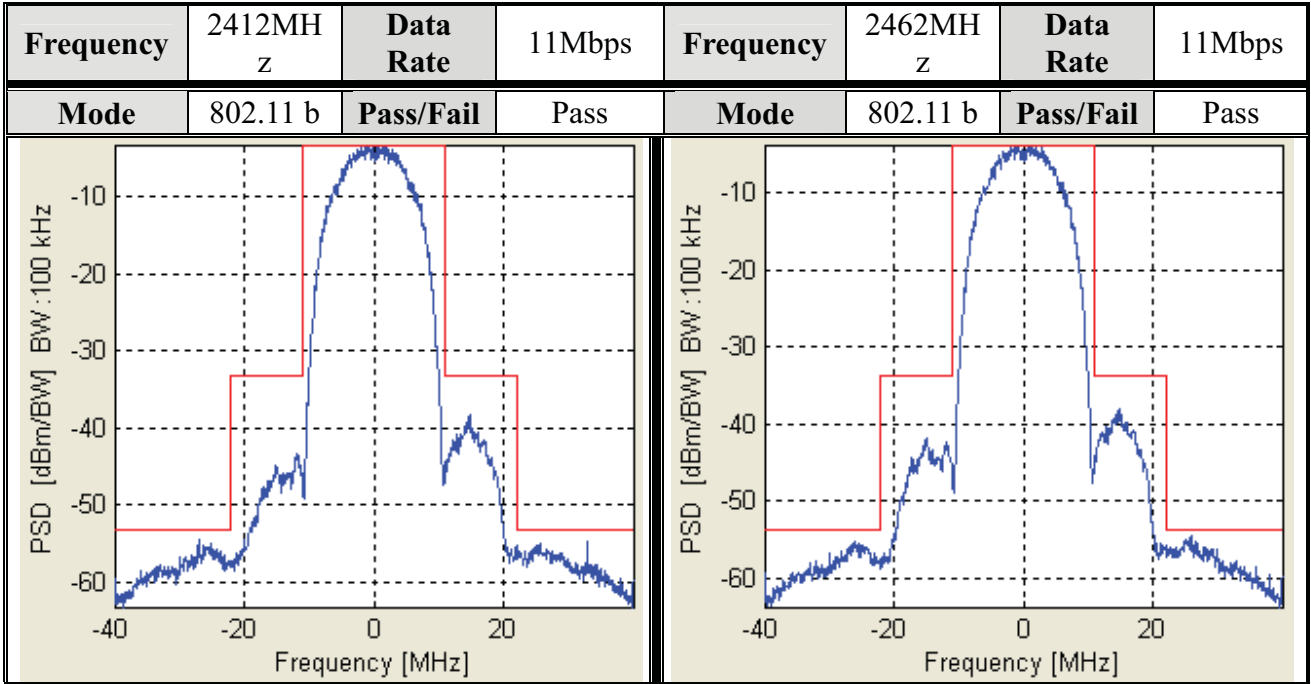
The transmitted spectrum shall have a 0 dBr (dB relative to the maximum spectral density of the signal) bandwidth not exceeding 18 MHz, -20 dBr at 11 MHz frequency offset, -28 dBr at 20 MHz frequency offset and -40 dBr at 30 MHz frequency offset and above.



1.3.2.2 Test Report

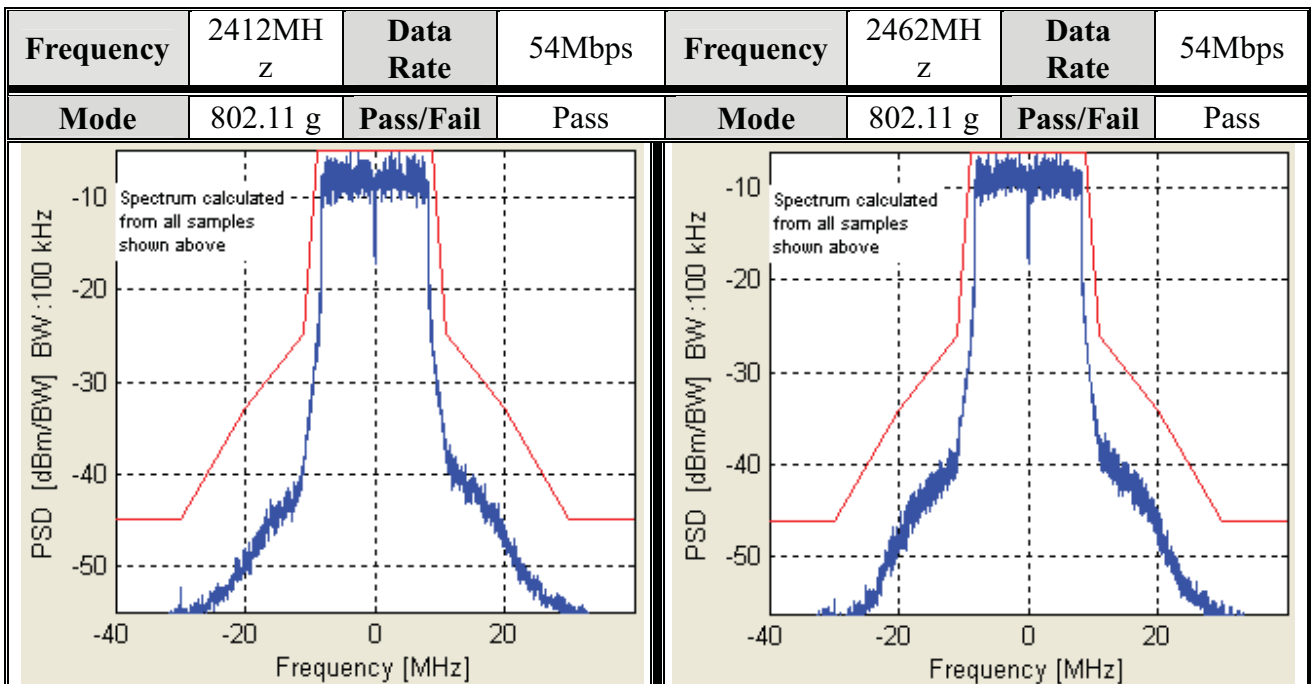
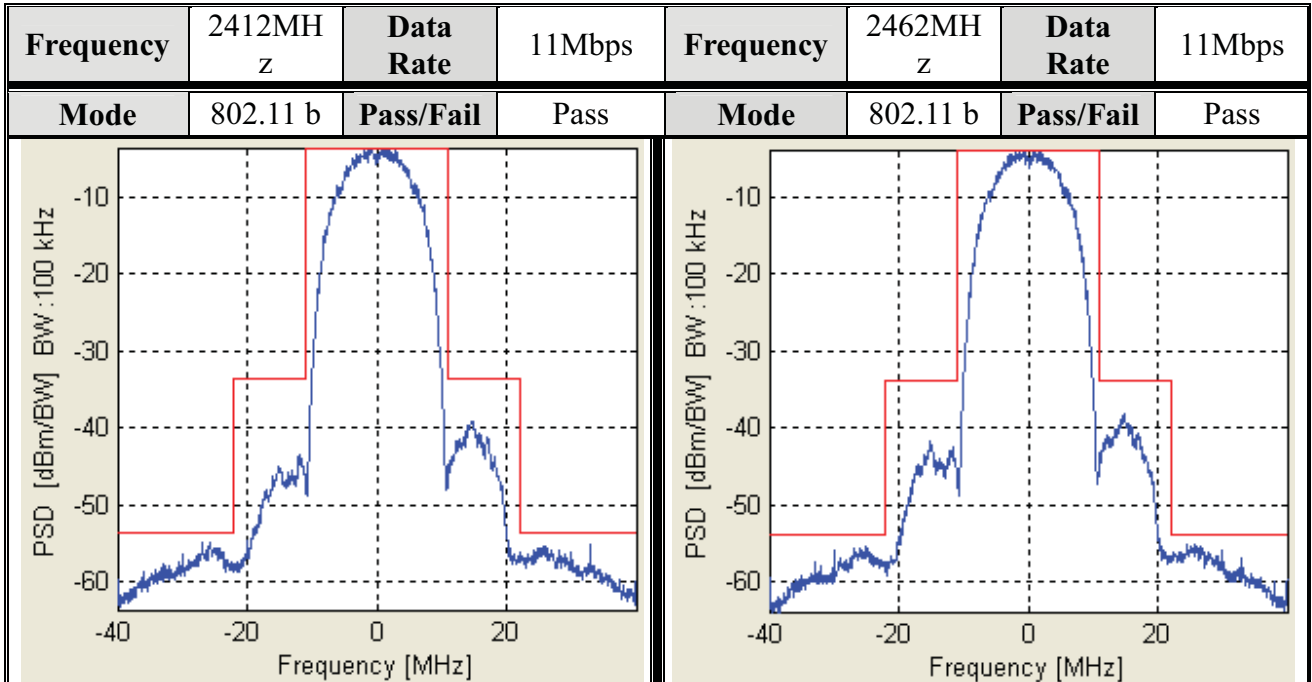
(Original CX875-3PB)

Standard	Frequency	Data Rate	Pass/Fail	Note
2412 MHz	802.11 b	11Mbps	Pass	
	802.11 g	54Mbps	Pass	
2462 MHz	802.11 b	11Mbps	Pass	
	802.11 g	54Mbps	Pass	



(CX875-3PB with Cap Changed)

Standard	Frequency	Data Rate	Pass/Fail	Note
2412 MHz	802.11 b	11Mbps	Pass	
	802.11 g	54Mbps	Pass	
2462 MHz	802.11 b	11Mbps	Pass	
	802.11 g	54Mbps	Pass	



1.3.3 Transmit center frequency tolerance

To verify that the frequency offset is within the limits. DUT generates continuous frames to spectrum analyzer with SMSC transmit test commands.

1.3.3.1 Criteria

The max allowed frequency offset is less than 25ppm

1.3.3.2 Test Report

(Original CX875-3PB)

Frequency offset (ppm) @11b				Design Spec. (ppm)	Pass/Fail
CX875-3PB	11 Mbps	CH1	CH11	< 25ppm	Pass
		-14.28	-14.26		
Frequency offset (ppm) @11g				Design Spec. (ppm)	Pass/Fail
CX875-3PB	54 Mbps	CH1	CH11	< 25ppm	Pass
		-14.13	-14.22		

(CX875-3PB with Cap Changed)

Frequency offset (ppm) @11b				Design Spec. (ppm)	Pass/Fail
CX875-3PB*	11 Mbps	CH1	CH11	< 25ppm	Pass
		-7.68	-7.63		
Frequency offset (ppm) @11g				Design Spec. (ppm)	Pass/Fail
CX875-3PB*	54 Mbps	CH1	CH11	< 25ppm	Pass
		-7.53	-7.47		

1.3.4 Chip clock frequency tolerance

To verify that the frequency offset is within the limits. DUT generates continuous frames to spectrum analyzer with SMSC transmit test commands.

1.3.4.1 Criteria

The max allowed frequency offset is less than 25ppm

1.3.4.2 Test Report

(Original CX875-3PB)

Frequency offset (ppm) @11b				Design Spec. (ppm)	Pass/Fail
CX875-3PB	11 Mbps	CH1	CH11	<25ppm	Pass
		-13.37	-13.03		

(CX875-3PB with Cap Changed)

Frequency offset (ppm) @11b				Design Spec. (ppm)	Pass/Fail
CX875-3PB*	11 Mbps	CH1	CH11	<25ppm	Pass
		-7.27	-7.16		

1.3.5 Power-on ramp

To verify that the Power-on ramp time is within the limits. DUT generates continuous frames to spectrum analyzer with SMSC transmit test commands.

1.3.5.1 Criteria

The transmit power-on ramp for 10% to 90% of maximum power shall be no greater than 2us.

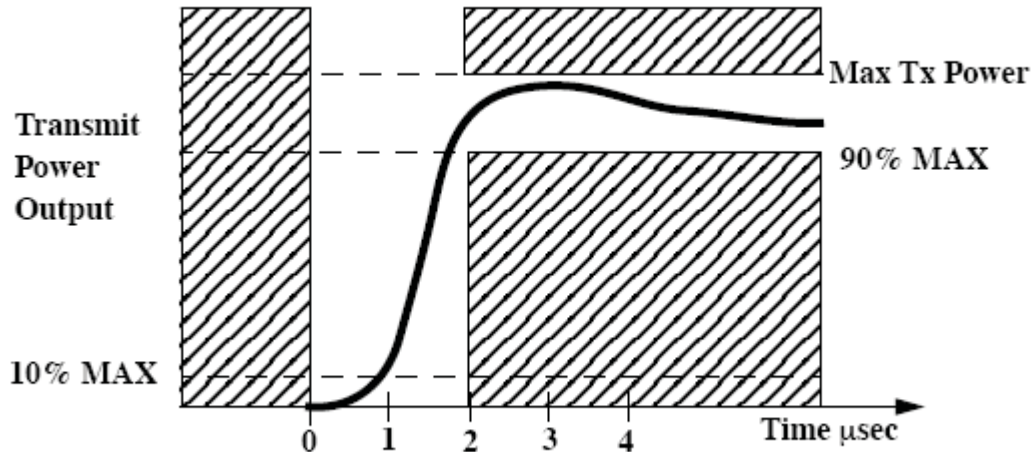


Figure 146—Transmit power-on ramp

1.3.5.2 Test Report

(Original CX875-3PB)

Power-on ramp time (us) @11b 11Mbps				Design Spec. (us)	Pass/Fail
CX875-3PB	11 Mbps	CH1	CH11	< 2	Pass
		0.6	0.3		

(CX875-3PB with Cap Changed)

Power-on ramp time (us) @11b 11Mbps				Design Spec. (us)	Pass/Fail
CX875-3PB*	11 Mbps	CH1	CH11	< 2	Pass
		0.3	0.3		

1.3.6 RF carrier suppression

Testing of the RF carrier suppression for 802.11b according to the IEEE specification requires a special test signal to be provided by the DUT. DUT generates continuous frames to spectrum analyzer with SMSC transmit test commands.

1.3.6.1 Criteria

The RF carrier suppression, measured at the channel center frequency, shall be at least 15 dB below the peak SIN(x)/x power spectrum.

1.3.6.2 Test Report

(Original CX875-3PB)

LO Leakage (dBc) @11b 1Mbps				Design Spec. (dBc)	Pass/Fail
CX875-3PB	11 Mbps	CH1	CH11	<-15	Pass
		-31.84	-34.61		

(CX875-3PB with Cap Changed)

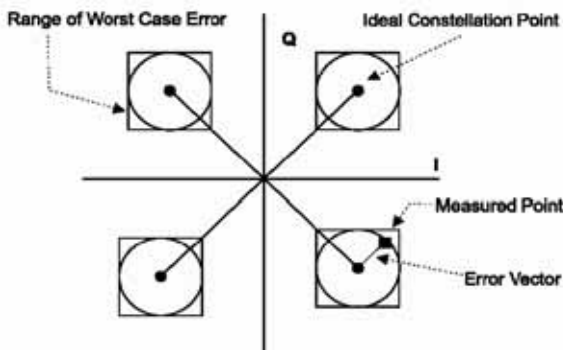
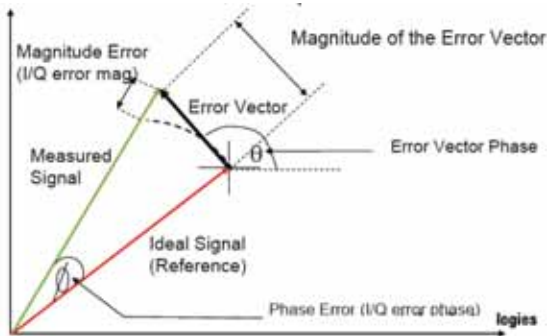
LO Leakage (dBc) @11b 1Mbps				Design Spec. (dBc)	Pass/Fail
CX875-3PB*	11 Mbps	CH1	CH11	<-15	Pass
		-30.94	-34.48		

1.3.7 Transmit modulation accuracy

The transmit modulation accuracy is measured using error vector magnitude (EVM). EVM is the magnitude of the phase difference as a function of time between an ideal reference signal and the measured transmitted signal. DUT generate frame with with SMSC transmit test commands and send the RF signal to vector signal analyzer. Measure the EVM from vector signal analyzer.

1.3.7.1 Criteria

The EVM specification is 35% peak for 1000 symbols.



Error vector magnitude (EVM) and related Quantities

1.3.7.2 Test Report

(Original CX875-3PB)

EVM (%) @11b 1Mbps				Design Spec. (%)	Pass/Fail
CX875-3PB	11 Mbps	CH1	CH11	< 35%	Pass
		6.54	6.38		
EVM (%) @11g 54Mbps					Pass/Fail
CX875-3PB	54 Mbps	CH1	CH11	< 5.62%	Pass
		3.41	4.25		

(CX875-3PB with Cap Changed)

EVM (%) @11b 1Mbps				Design Spec. (%)	Pass/Fail
CX875-3PB*	11 Mbps	CH1	CH11	< 35%	Pass
		6.60	6.45		
EVM (%) @11g 54Mbps					Pass/Fail
CX875-3PB*	54 Mbps	CH1	CH11	< 5.62%	Pass
		3.47	4.09		

1.3.8 Symbol clock frequency tolerance

To verify that the frequency offset is within the limits. DUT generates continuous frames to spectrum analyzer with SMSC transmit test commands.

1.3.8.1 Criteria

The max allowed frequency offset is less than 25ppm

1.3.8.2 Test Report

(Original CX875-3PB)

Frequency offset (ppm) @11g				Design Spec. (ppm)	Pass/Fail
CX875-3PB	54 Mbps	CH1	CH11	< 25ppm	Pass
		-13.71	-12.88		

(CX875-3PB with Cap Changed)

Frequency offset (ppm) @11g				Design Spec. (ppm)	Pass/Fail
CX875-3PB*	54 Mbps	CH1	CH11	< 25ppm	Pass
		-7.07	-7.40		

1.3.9 Transmitter center frequency leakage

Testing of the Transmitter center frequency leakage for 802.11g according to the IEEE specification requires a special test signal to be provided by the DUT. DUT generates continuous frames to spectrum analyzer with SMSC transmit test commands.

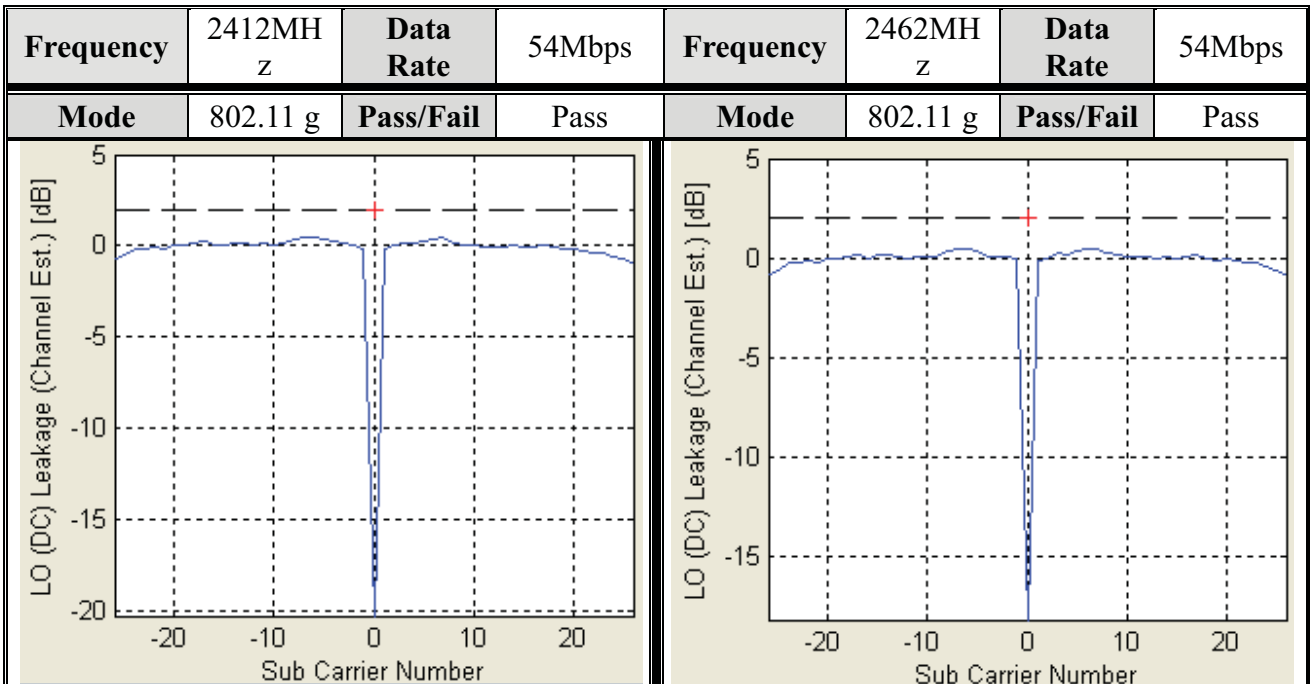
1.3.9.1 Criteria

Certain transmitter implementations may cause leakage of the center frequency component. Such leakage (which manifests itself in a receiver as energy in the center frequency component) shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of the rest of the subcarriers. The data for this test shall be derived from the channel estimation phase.

1.3.9.2 Test Report

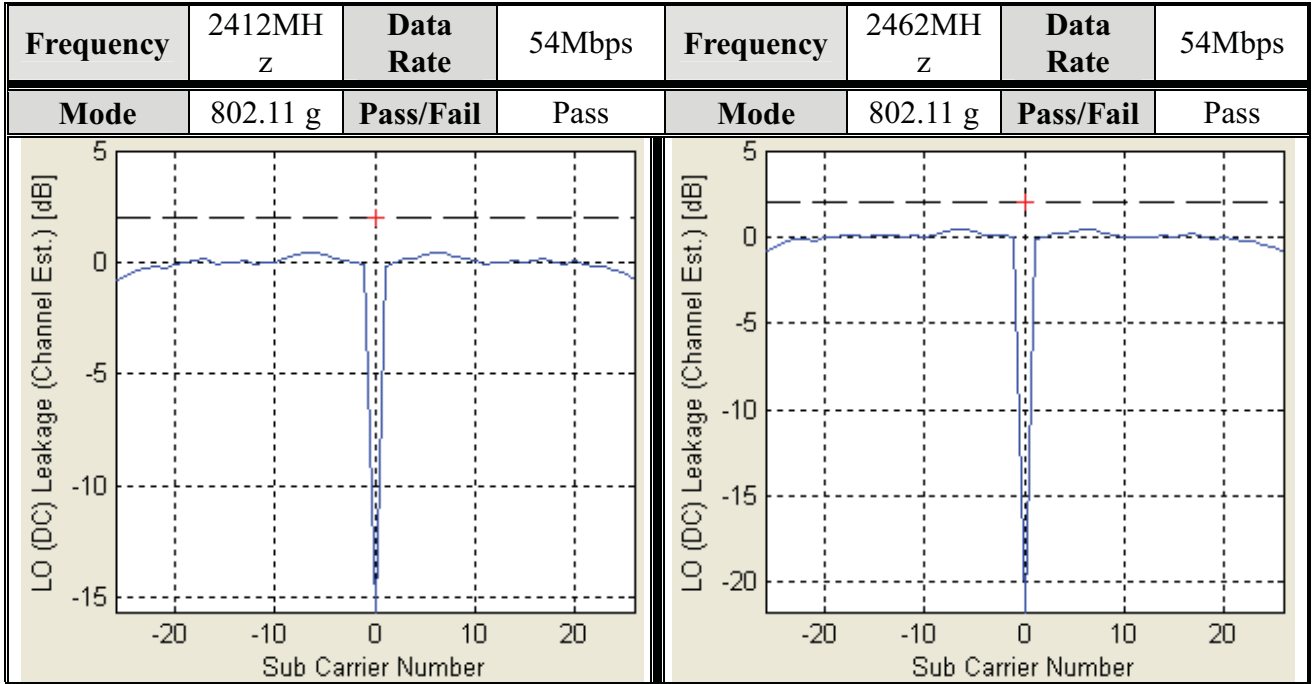
(Original CX875-3PB)

LO Leakage				Design Spec (dB)	Note
CX875-3PB	54 Mbps	CH1	CH11	2	
		Pass	Pass		



(CX875-3PB with Cap Changed)

LO Leakage				Design Spec (dB)	Note
CX875-3PB*	54 Mbps	CH1	CH1	2	
		Pass	Pass		



1.3.10 Transmitter spectral flatness

To verify if the Transmit Spectrum Flatness can conform to the IEEE 802.11g Standard. DUT generates continuous frames to spectrum analyzer with SMSC transmit test commands.

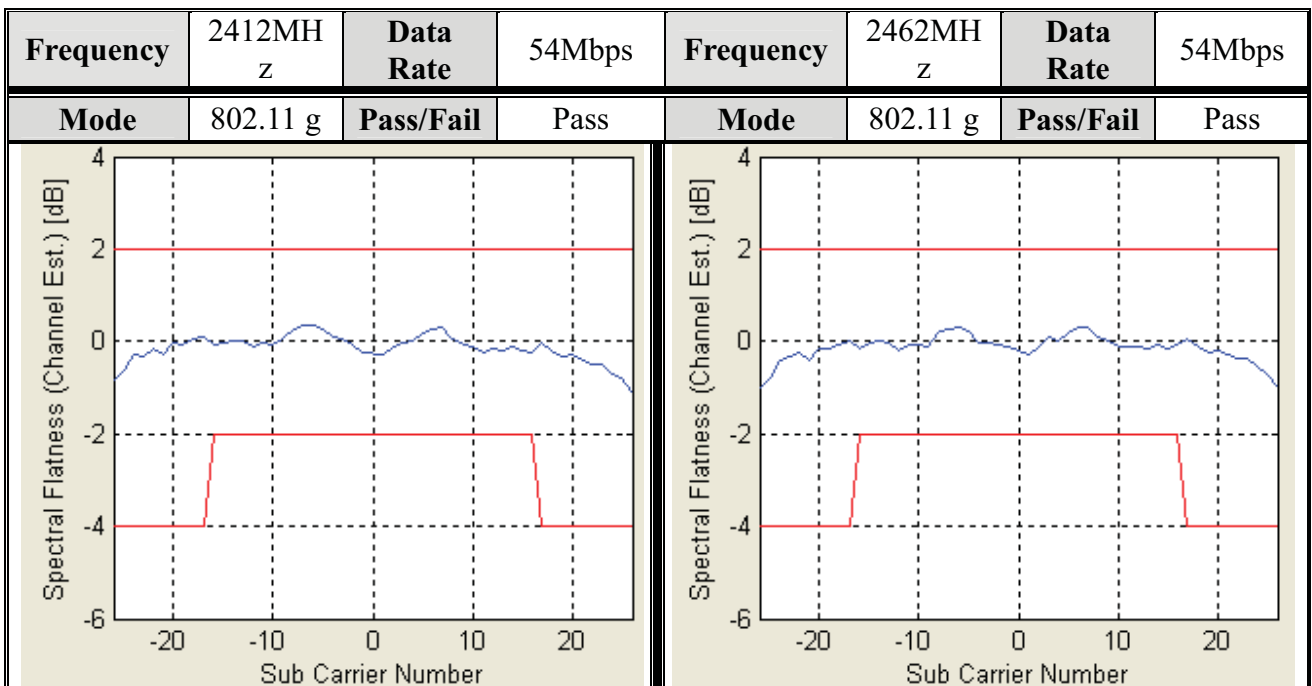
1.3.10.1 Criteria

The average energy of the constellations in each of the spectral lines -16~-1 and +1~+16 will deviate no more than ± 2 dB from their average energy. The average energy of the constellations in each of the spectral lines -26~-17 and +17~+26 will deviate no more than $+2/-4$ dB from the average energy of spectral lines -16~-1 and +1~+16. The data for this test shall be derived from the channel estimation step.

1.3.10.2 Test Report

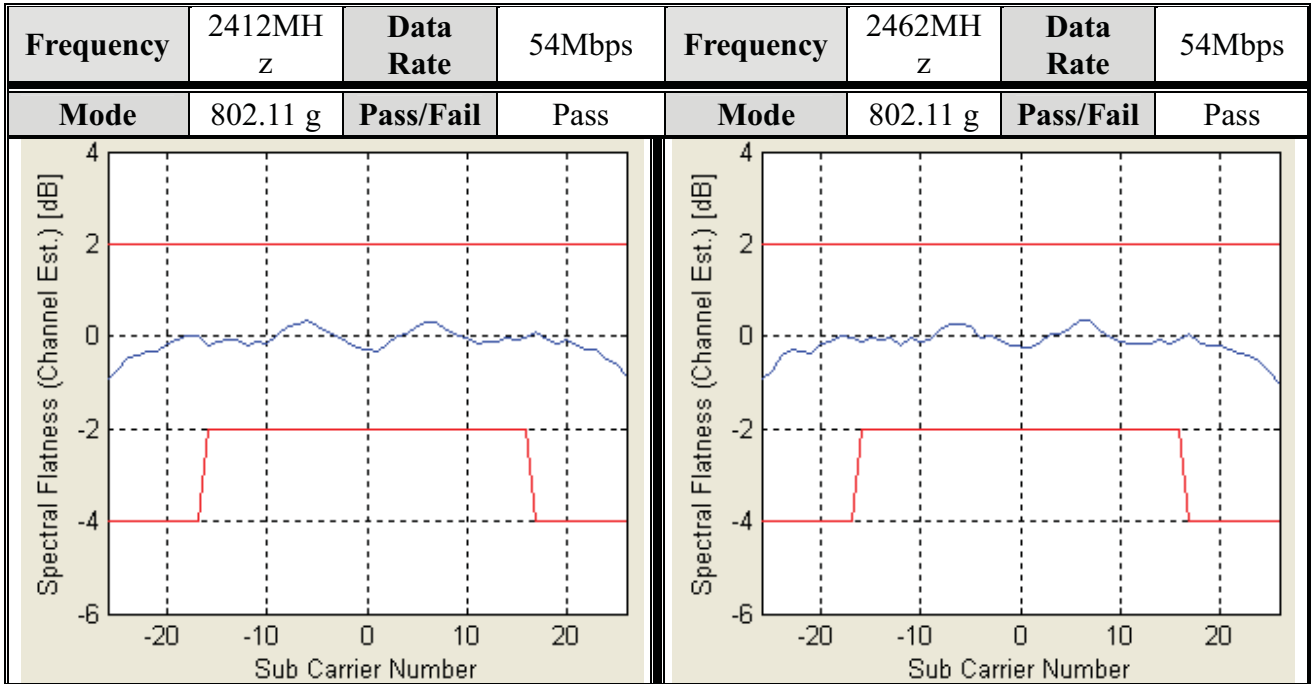
(Original CX875-3PB)

Transmit Spectrum Flatness				Design Spec (dB)	Note
CX875-3PB	54 Mbps	CH1	CH11	-16~-1 and +1~+16 $< \pm 2$ dB; -26~-17 and +17~+26 $< +2/-4$ dB	
		Pass	Pass		



(CX875-3PB with Cap Changed)

Transmit Spectrum Flatness				Design Spec (dB)	Note
CX875-3PB*	54 Mbps	CH1	CH11	-16~-1 and +1~+16 < ± 2 dB; -26~-17 and +17~+26 < +2/-4 dB	
		Pass	Pass		



1.3.11 Transmitter constellation error

The transmit constellation error is measured using error vector magnitude (EVM). EVM is the magnitude of the phase difference as a function of time between an ideal reference signal and the measured transmitted signal. DUT generate frame with SMSC transmit test commands and send the RF signal to vector signal analyzer. Measure the EVM from vector signal analyzer.

1.3.11.1 Criteria

The relative constellation RMS error, averaged over subcarriers, OFDM frames, and packets, shall not exceed a data-rate dependent value according to Table.

Data rate (Mbits/s)	Relative constellation error (dB)
6	-5
9	-8
12	-10
18	-13
24	-16
36	-19
48	-22
54	-25

1.3.11.2 Test Report

(Original CX875-3PB)

EVM (dB) @11g 54Mbps				Design Spec.	Pass/Fail
CX875-3PB	54 Mbps	CH1	CH11	< -25dB	Pass
		-29.35	-27.42		

(CX875-3PB with Cap Changed)

EVM (dB) @11g 54Mbps				Design Spec.	Pass/Fail
CX875-3PB*	54 Mbps	CH1	CH11	< -25dB	Pass
		-29.20	-27.76		

1.3.12 Receiver minimum input level sensitivity

To verify if the receiver minimum input level sensitivity conforms to the IEEE 802.11 Standard.

1.3.12.1 Criteria

Refer to the Below Table.

1.3.12.2 Test report

Test Condition:

Using IQnrxn send 10000 packets and measure the minimal power level that keeps packet loss under 10%.

The power value does not include the cable loss about 1dB

● **Test Result**

802.11b Sensitivity Test

Test Module	Data Rate	dBm (measured)		Design Spec. dBm	Pass/Fail	Remark
		Ch1 (2.412GHz)	CH11 (2.462GHz)			
CX875-3PB	11 Mbps	-78	-78.5	<=-78	Pass	
CX875-3PB*	11 Mbps	-78	-78.5	<=-78	Pass	With Cap changed

802.11g Sensitivity Test

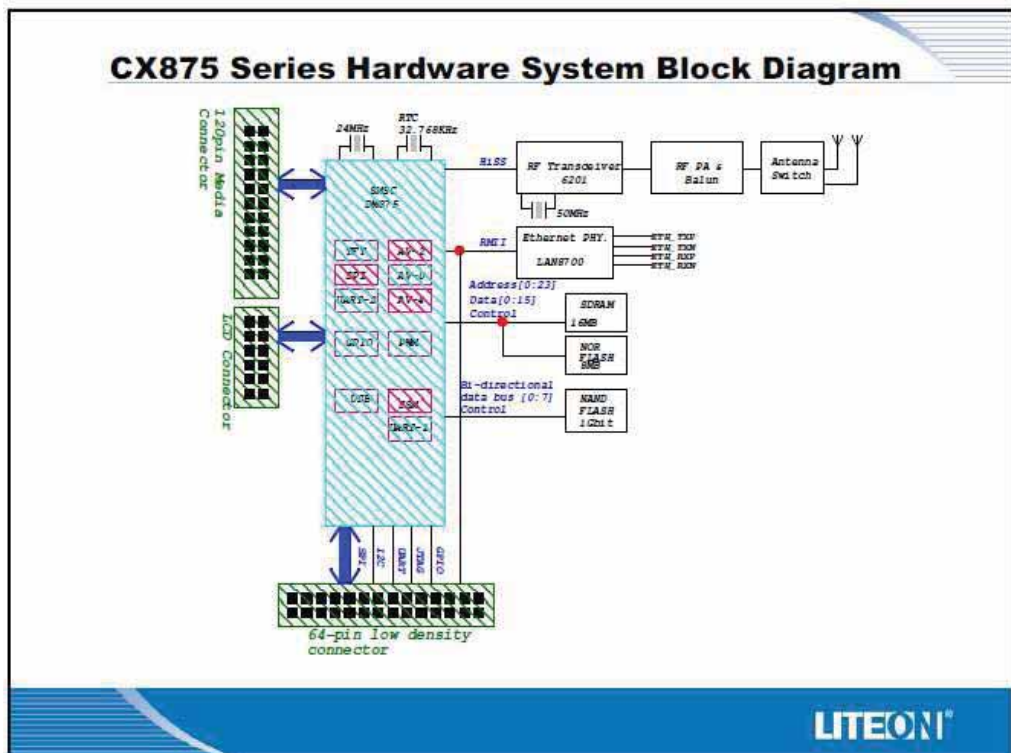
Test Module	Data Rate	dBm (measured)		Design Spec. dBm	Pass/Fail	Remark
		Ch1 (2.412GHz)	CH11 (2.462GHz)			
CX875-3PB	54 Mbps	-70	-70	<=-70	Pass	
CX875-3PB*	54 Mbps	-70	-70	<=-70	Pass	With Cap changed

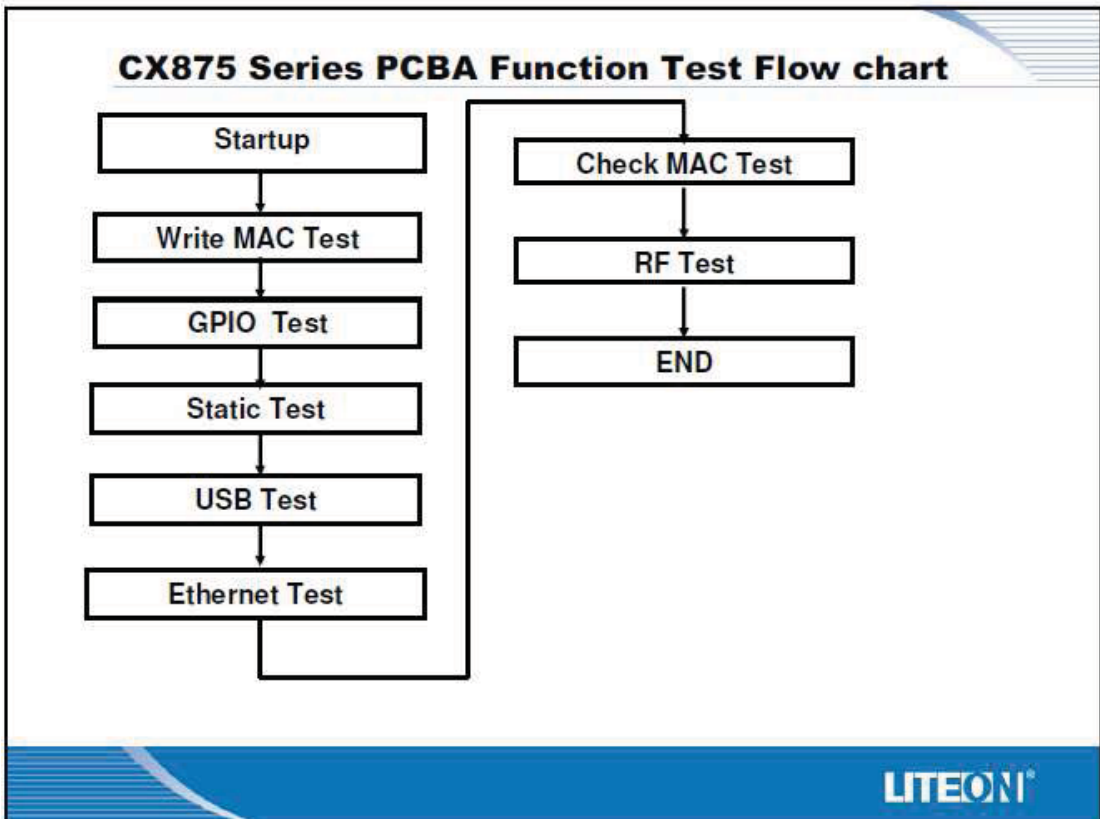
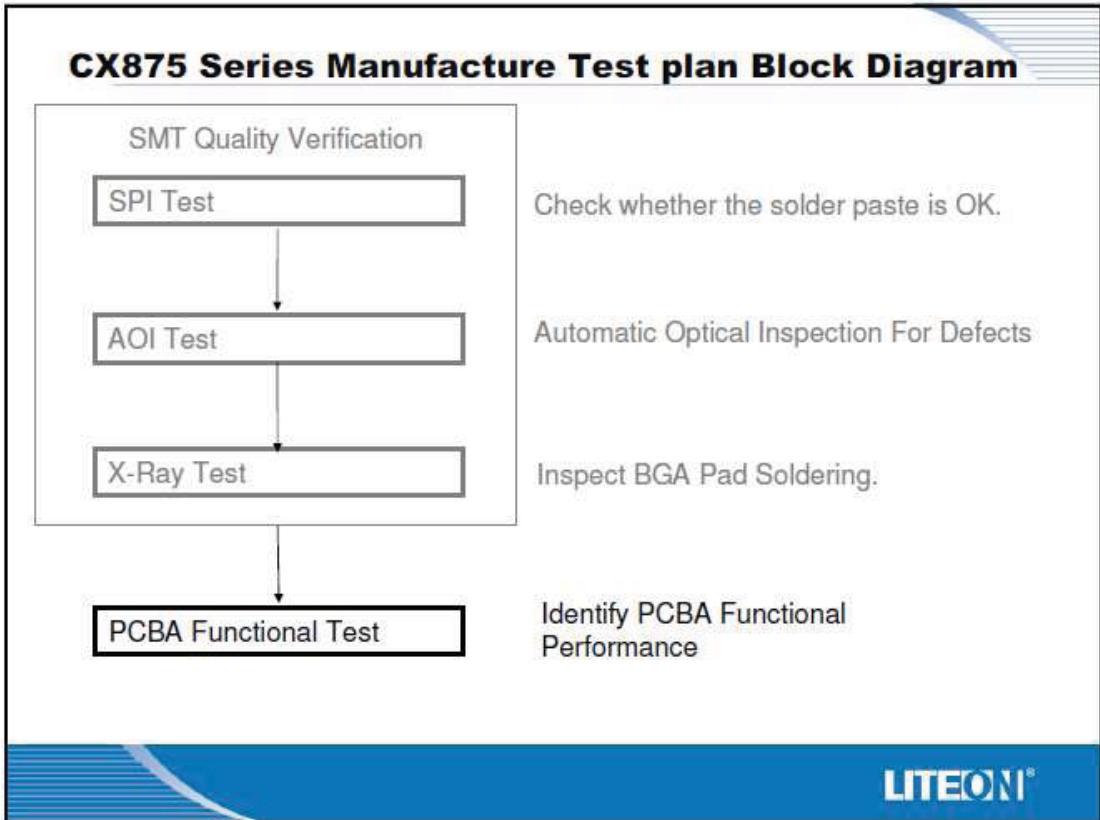
Part4. WiFi Certification

To be Discussed

- 1. FCC**
- 2. IC**
- 3. CE**
- 4. Japan Telecfication**

Part5. Manufacturing Test Plan





CX875 Series Test Equipment list

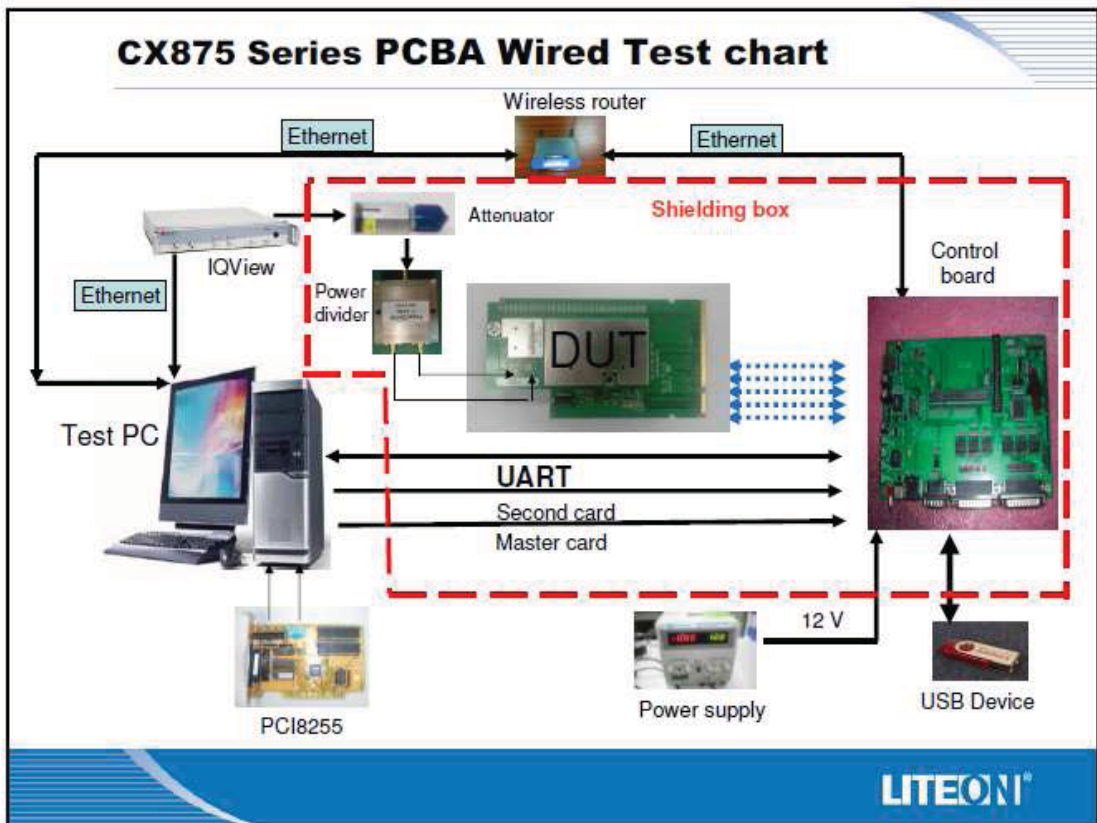
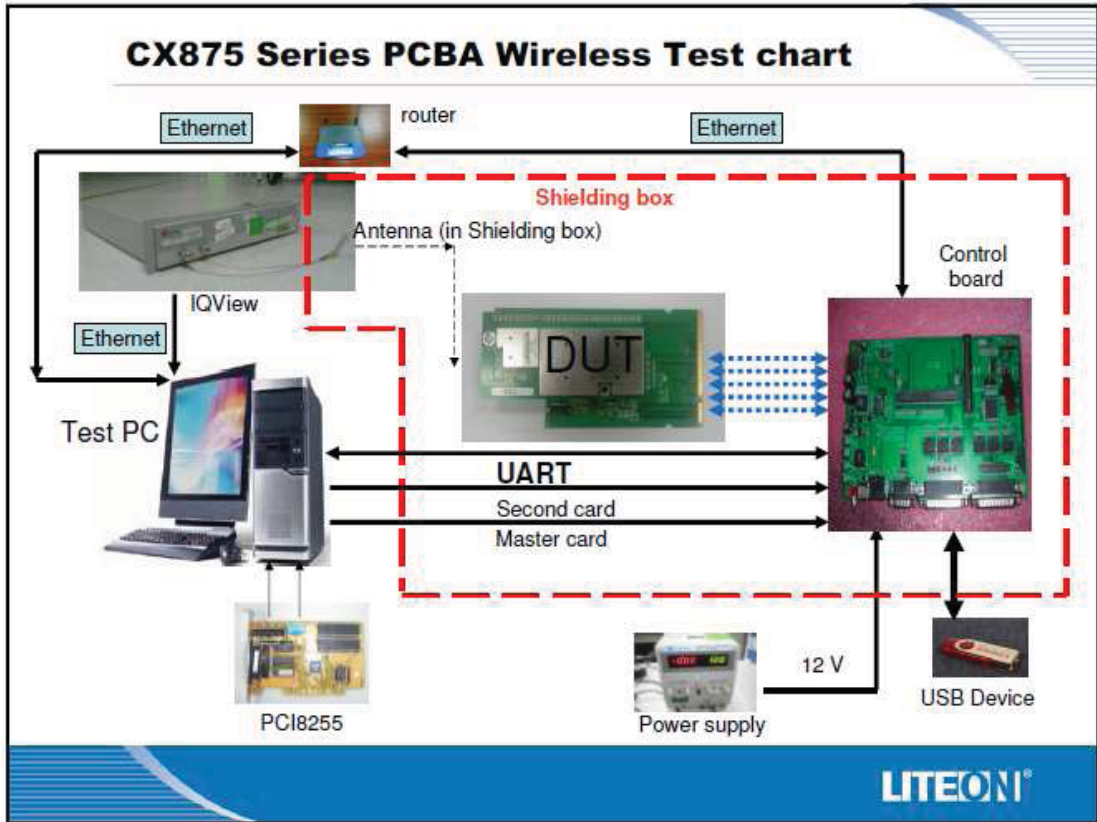
Test Equipment:

NO.	Equipment	Amount
1	Test PC/NB 	1
2	USB Device 	1
3	Power Supply 	1
4	PCI8255 Card 	1
5	Print port control board 	1
6	Wireless Router 	1
7	IQ View 	1

CX875 Series Test Equipment list

Test Equipment:

NO.	Equipment	Amount
8	Antenna 	1
9	Multimeter 	1
10	GPIB 	1
11	Power divider 	1
12	Circuit Test Board 	1



CX875 Series PCBA Function Test Item

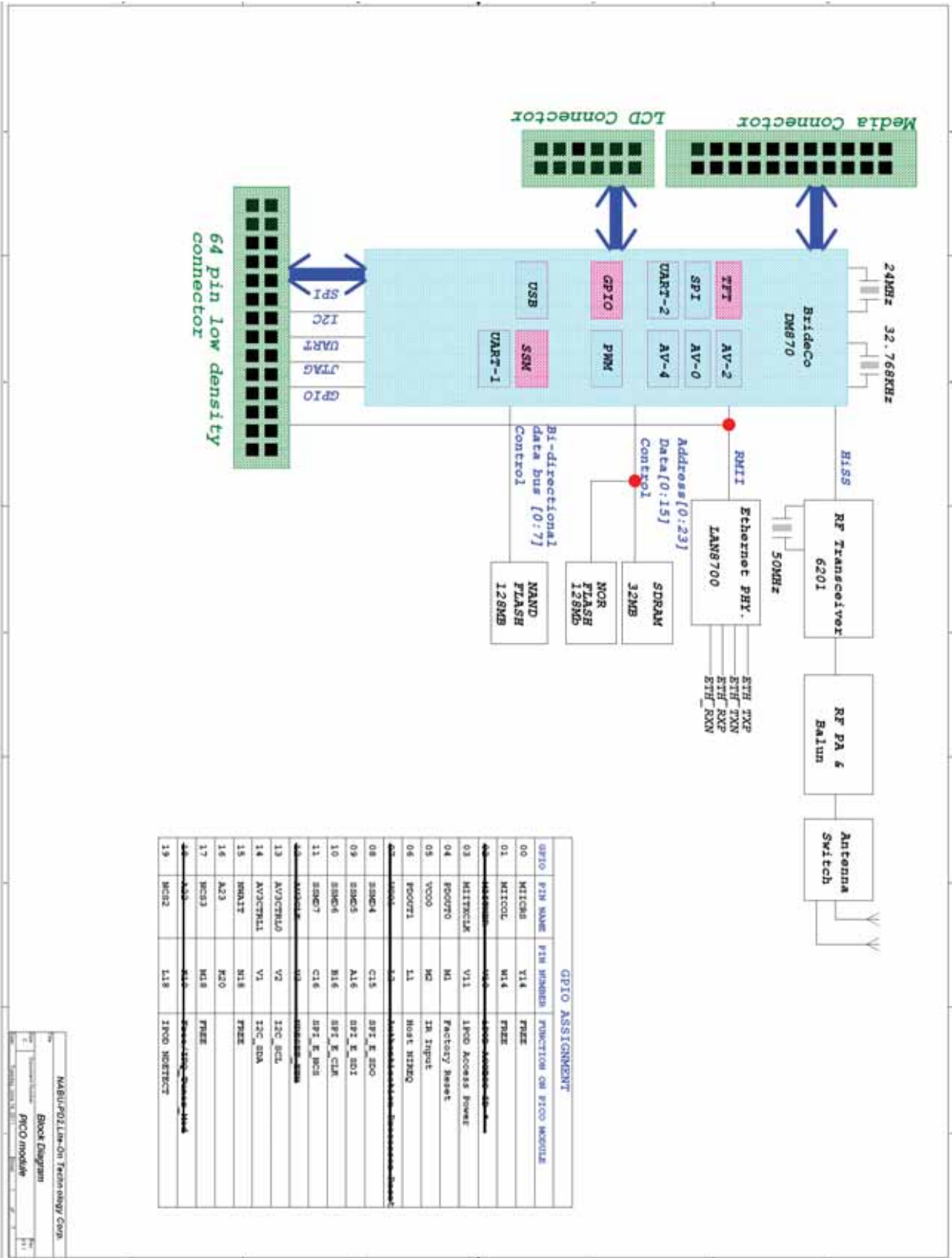
Startup	Send Ctrl + A(0x01) within 2 seconds, when come into BL1, input "4" and the system will come into BL2, the DUT sends: "Bootloader 2 Menu" over UART
Write MAC Test	Writing MAC Address to FLASH
GPIO Test	Run JB MICRO gpio loop test from loop 1 to loop5, if all the loop test meet requirement, the UART will show "JB MICRO BIST OK", otherwise show "BIST ERROR, press ctrl C to skip".
Static Test	The test fixture provides configurable connections between individual SO-DIMM test socket pins. The test firmware will configure several GPIO modes and verify proper connectivity by toggling the GPIOs and verifying the corresponding signals.
USB Test	The test firmware will detect whether the usb is connected or not automatically. If connected, the UART will show "USB Test Passed".

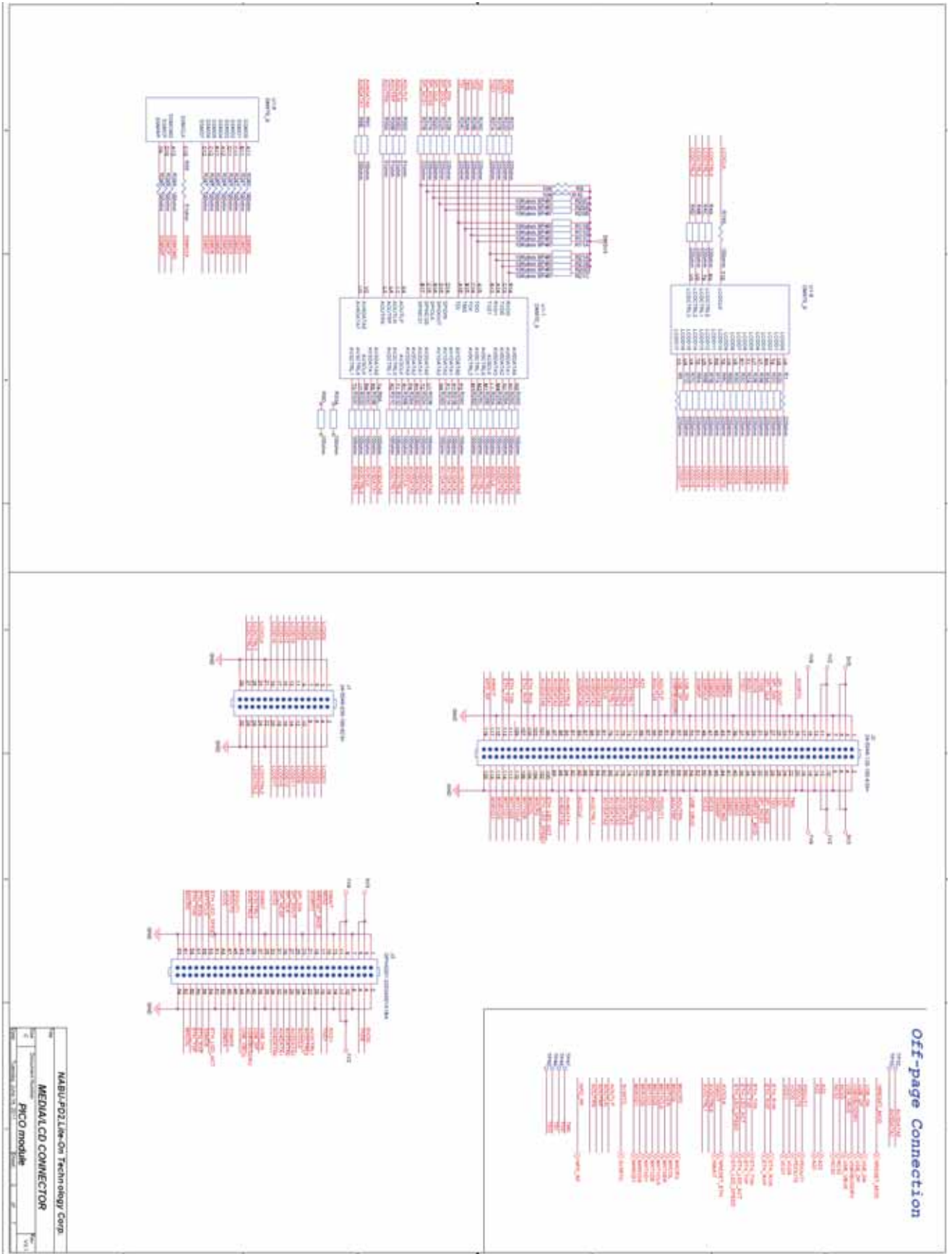
CX875 Series PCBA Function Test Item

Ethernet Test	The test fixture provides an RJ-45 connects to an router, it will pass if the DUT get an IP address
Check MAC Test	Check whether the Mac address in the FLASH is conformed to the Mac address on the label
RF Rx Test	<p>Command1: "sys wlan ctrl scan"</p> <p>Command2: "sys wlan test startRx <channel>"</p> <p>Command3: "sys wlan mlb get 20 16 0" → read RX packet count</p> <p>Command4: "sys wlan mlb set 32 20 16 0 0" → clear the packet count</p> <p>Command5: "sys wlan test stopRx" → exit Rx mode</p> <p>Measure the Sensitivity PER (using channel 11, running Legacy_11b_11M.mod or Legacy_11g_54M.mod document b/g mode), and then check the results whether meet the spec (PER (b/g Mode)).</p>
RF Tx Test	<p>Command1: "sys wlan ctrl Tuning_Status"</p> <p>Command2: "sys wlan test Reset_Tx_Power_Tuning_G/B"</p> <p>Command3: "sys wlan test startTx <channel><datarate><duration><antenna><power><duty cycle>"</p> <p>Command4: "sys wlan ctrl Tx_Power_Up/Down_G/B <step_size>"</p> <p>Command5: "sys wlan ctrl Confirm_Register_Setting_G/B"</p> <p>1. Measure the transmit power (using channel 11, datarate 3/8(11/54 Mbps), durations 10s, b/g mode), and then check the results whether meet the spec.</p> <p>2. Measure the EVM, Frequency Offset (ferr) (using channel 11, datarate 3/8(11/54 Mbps), durations 10s b/g mode), and then check the results whether meet the spec.</p>

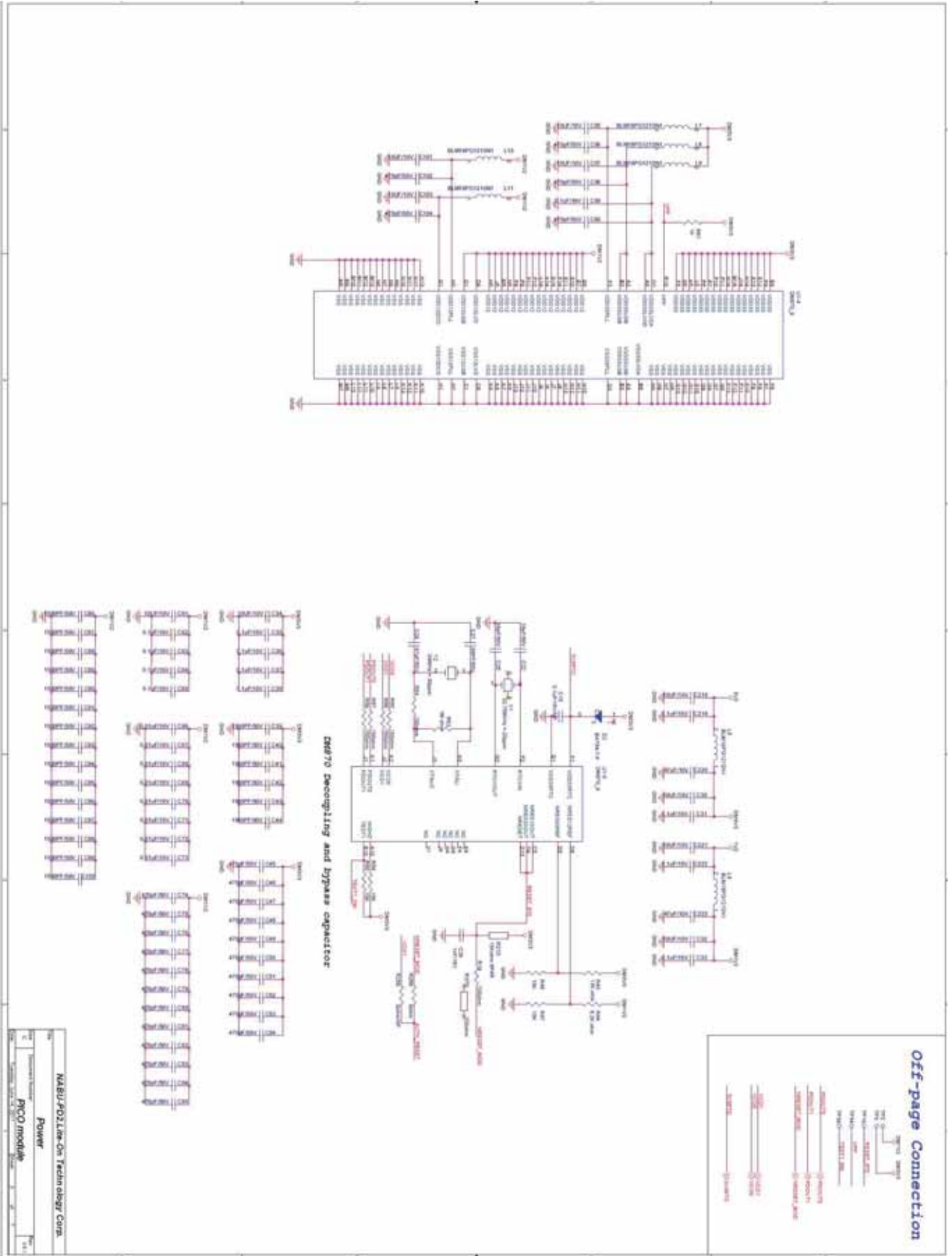


Part6. PCB Circuit Drawing

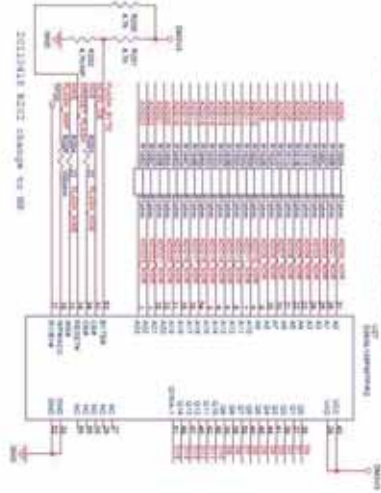




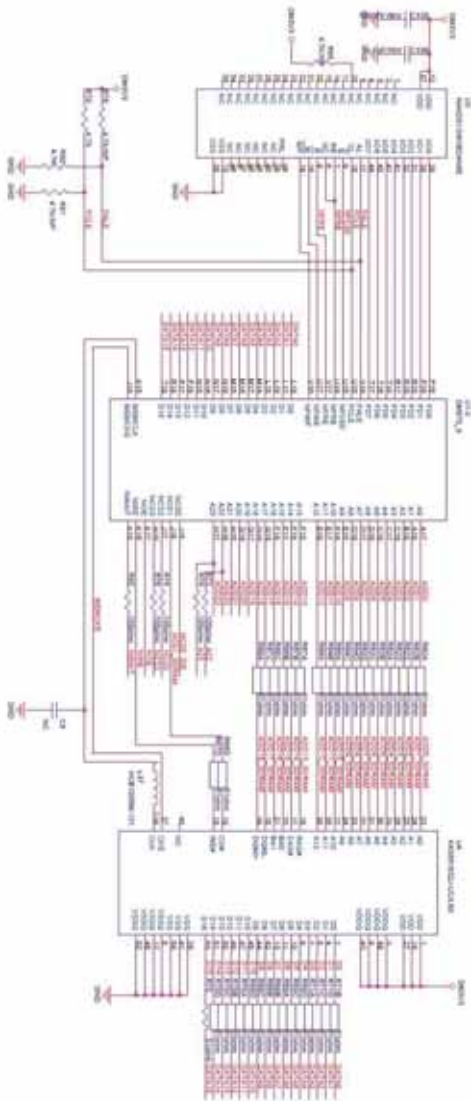
NABU-PDZLinc-On Technology Corp
 MEDIAL CD CONNECTOR
 PICO module



3/11 change to MCF5921SE
10/05 change to 6190L128P0712C

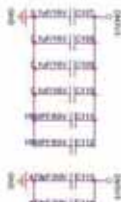
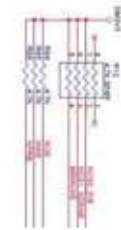


Nand Flash Memory I/O

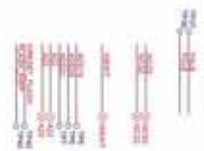


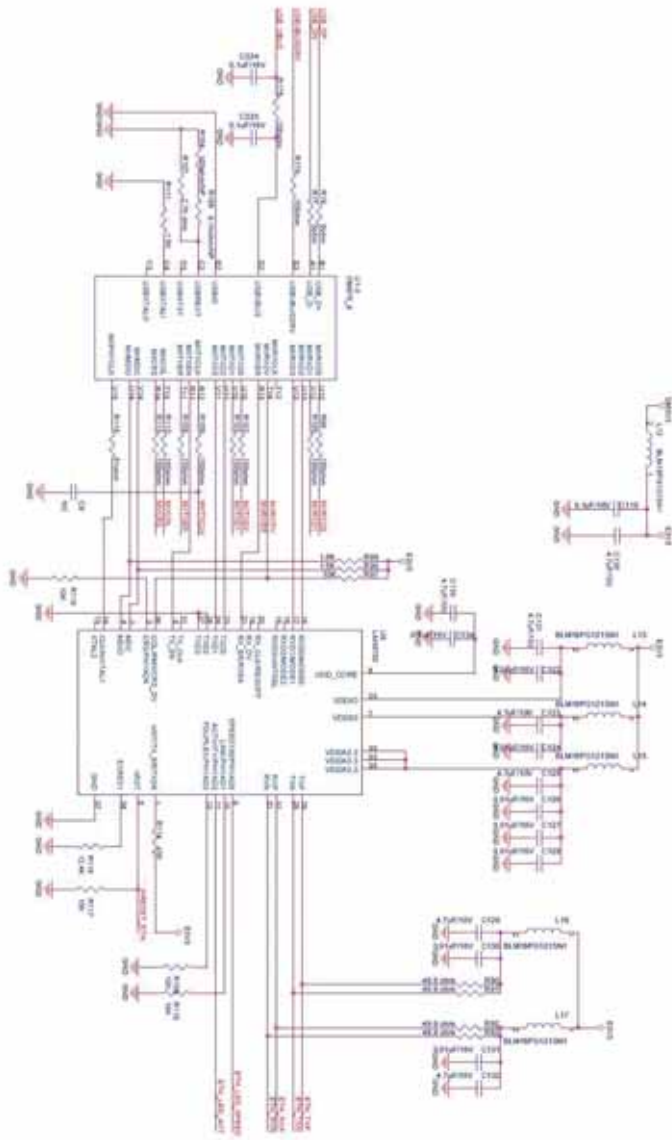
SDRAM, 256Mbit

Boot Options			
Source	Page Size	PCUd	PAIS
NAND Flash	512bytes	0	1
SPZ (Serial)	200bytes	1	0
NOR Flash		0	0

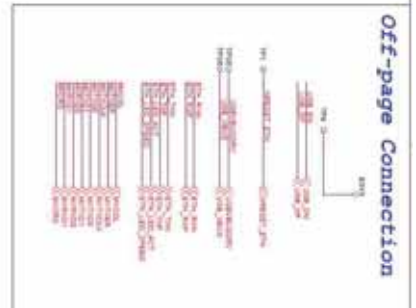


Off-page Connection

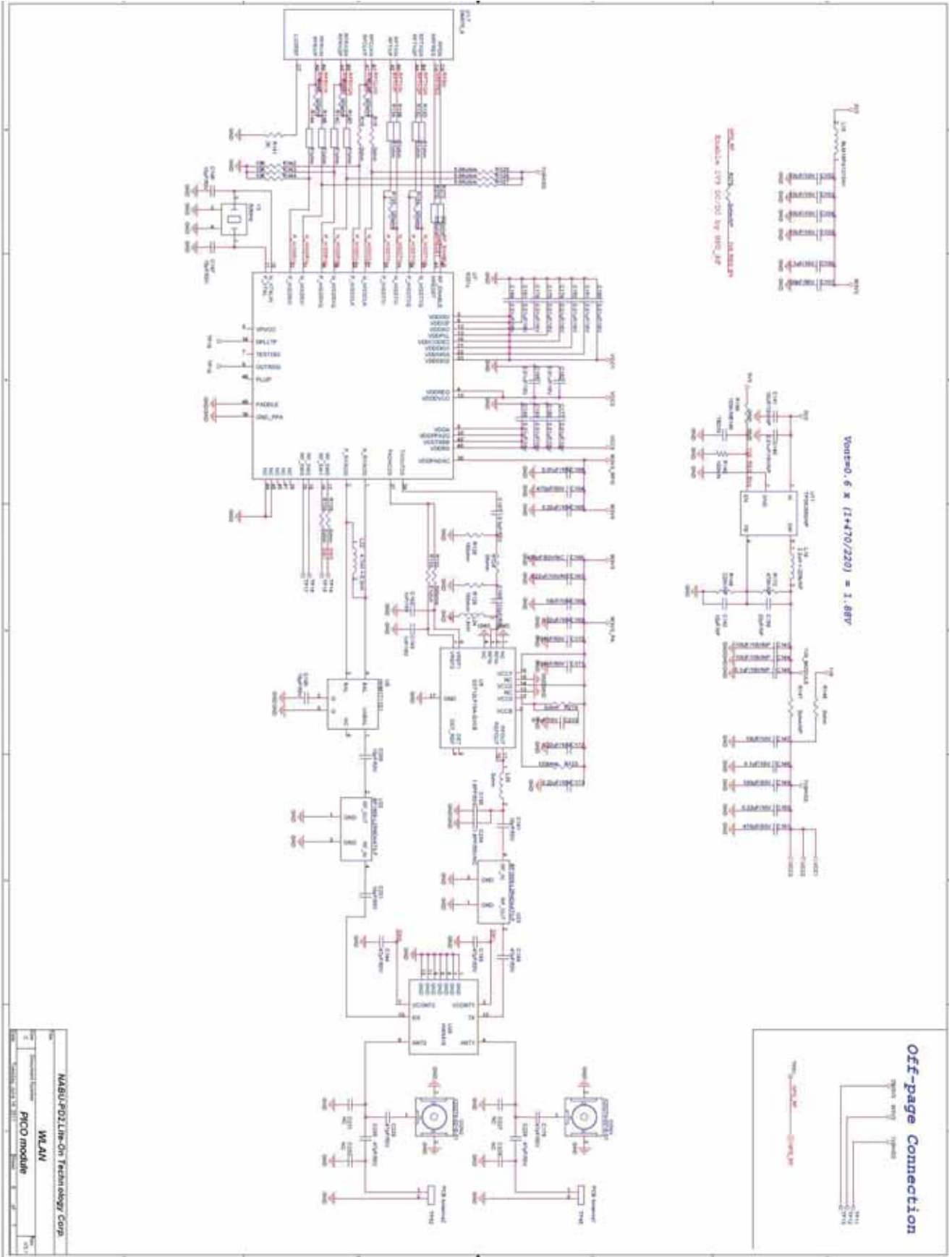




Ethernet



Part No.	MABU-P02Lite-On Technology Corp.
Product Name	Ethernet/USB
Product Model	PCIO module
Version	1.0



DATE	VER	Change description
20100606	V01	2175 Initial version
20100606	V02	Modify after R02 insert's error and add 010 assignment
20100606	V03	add and add change from 104 to 105
20100606	V04	Pin 1 Change from E208 to 2108
20100606	V05	Pin 1 Change from E208 to 2108
20100606	V06	Pin 1 Change from E208 to 2108
20100606	V07	Pin 1 Change from E208 to 2108
20100606	V08	Pin 1 Change from E208 to 2108
20100606	V09	Pin 1 Change from E208 to 2108
20100606	V10	Pin 1 Change from E208 to 2108
20100606	V11	Pin 1 Change from E208 to 2108
20100606	V12	Pin 1 Change from E208 to 2108
20100606	V13	Pin 1 Change from E208 to 2108
20100606	V14	Pin 1 Change from E208 to 2108
20100606	V15	Pin 1 Change from E208 to 2108
20100606	V16	Pin 1 Change from E208 to 2108
20100606	V17	Pin 1 Change from E208 to 2108
20100606	V18	Pin 1 Change from E208 to 2108
20100606	V19	Pin 1 Change from E208 to 2108
20100606	V20	Pin 1 Change from E208 to 2108
20100606	V21	Pin 1 Change from E208 to 2108
20100606	V22	Pin 1 Change from E208 to 2108
20100606	V23	Pin 1 Change from E208 to 2108
20100606	V24	Pin 1 Change from E208 to 2108
20100606	V25	Pin 1 Change from E208 to 2108
20100606	V26	Pin 1 Change from E208 to 2108
20100606	V27	Pin 1 Change from E208 to 2108
20100606	V28	Pin 1 Change from E208 to 2108
20100606	V29	Pin 1 Change from E208 to 2108
20100606	V30	Pin 1 Change from E208 to 2108
20100606	V31	Pin 1 Change from E208 to 2108

Part8. Packing Method

1.Label

1.1 Certificate Label

20 mm

20 mm

1:1

CE 高度不低于5mm

20 mm

20 mm

3:1

LG Electronics
JukeBlox Networked Media Module
Model : CX875-3PB
KCC-CRM-LGE-DMCX875-3PB
CE

(客户):LG
(空白LABEL): 509000017927
(材质):60#白色特多龍
(颜色):BLACK
(上光方式):NO
(尺寸):20*20mm
(公差):±0.3mm

不得含有
W1-QES-002
要求禁用之符号,有害物用

A4	UNIT	SCALE	SHEET	MODEL No.	(CX875-3PB)					
	MM	NON	1(1)	PART NAME	FCC LABEL					
LIMITS UNLESS OTHERWISE NOTED				APPROVED	CHECKED	DESIGNED	PART No.	Mm125	REV	A1
X, +-	X°+-					Anny 2013.1.2	光寶科技股份有限公司 LITE-ON TECHNOLOGY CORP.			
.X +-	.X°+-									
.XX +-	.XX°+-									
.XXX +-	.XXX°+-									

1.2 Carton Label

12345678


ABCD

80.00 mm


Part Number :CX875-3PB

Mfg 100

Carton Number:C20110310XXXX



Quantity:100



Made in China

Part Number: CX875-3PB为固定,


固定码 (Pre fix)

條碼為Code 39 (Bar code :39Code)
 條碼顯示內容為 (Scanner read) :C20110310XXXX
 文字顯示內容為 (Read) :C20110310XXXX
 C=Carton
 2~5碼=年份 2~5digit=year
 6~7碼=月份 6~7digit=month
 8~9碼=日期 8~9digit=day
 後四碼=流水號 10~13digit=sequence number
 (0001~9999十进制) (0001~0002...9999)


條碼為:39Code (Bar code :39Code)
 條碼顯示內容:100(依裝箱數量) (scanner read) : 100
 文字顯示內容:100(依裝箱數量) (reading:100)


1:1

90.00mm



(客戶): SMSC
 (上光方式):NO
 (空白Label):50900005922D
 (材質):熱敏紙 HTP-150
 (顏色):Black
 (尺寸):90*80mm
 (公差):±0.3mm



A4	UNIT	SCALE	SHEET	MODEL No.	NM-103BB (CX875-3PB Mfg100)	
	MM	NON	1(1)	PART NAME	Carton label with RoHS logo	
	APPROVED	CHECKED	DESIGNED	PART No.	REV	A4
LIMITS UNLESS OTHERWISE NOTED						
X. --	X.*--					
.X +-	.X*+-					
.XX +-	.XX*+-					
.XXX +-	.XXX*+-					

Amey
 核准日期
 2013.1.8

LITEON
 LITE-ON TECHNOLOGY CORP.

12345678

1.3 MAC ID Label

1:1

3:1

CX875-3PB 为固定
Mfg XXX
(Mfg:固定碼; XXX見成品BOM敘述(description).)

MAC ID 編碼原則:
1.條碼為 39 Code
2.條碼顯示內容為: XXXXXXXXXXXX業務提供*(Liteon MAC ID).

請使用IT3800掃描
(Scan By IT3800)

(空白料號):50900005442D
(上光方式):NO
(材質):50#白色特多龙
(顏色):BLACK
(尺寸):20*8mm
(公差):±0.3mm

不得含有
WI-QES-002
要求禁用之有毒,有害物質

A4	UNIT	SCALE	SHEET	MODEL No.	NM-103-BB(CX875-3PB)	
	MM	NON	1(1)	PART NAME	MAC ID LABEL	
APPROVED			CHECKED	DESIGNED	PART No.	REV A4
Anny 審核 2013.1.8			 LITEON 光寶科技股份有限公司 LITE-ON TECHNOLOGY CORP.			

LIMITS UNLESS OTHERWISE NOTED

X. +-	X.* +-
.X +-	.X.* +-
.XX +-	.XX.* +-
.XXX +-	.XXX.* +-

2. Packing Instruction

100PCS/CARTON

6	5030000584N7	Carton	1/100
5	5060000655N7	Partition-25	21/100
4	5060000654N7	Partition-6	6/100
3	50110007087	Pop bag	1
2	***	NM-103-BB PCBA	1
1	5060000653N7	Carton sheet	2/100
ITEM	P/N	DESCRIPTION	QTY

MODEL No.		NM-103-BB	
PART NAME		DUMMY PACKING	
PART No.		REV A2	

APPROVED		CHECKED		DESIGNED	
BraoZhong		BraoZhong		Add: 10/2011	

REQ	A	B	C	D	ANGLE
0-5	±0.02	±0.05	±0.10		0°-30° ±0.5°
5-10	±0.05	±0.10	±0.15		30°-45° ±0.5°
10-50	±0.10	±0.15	±0.20		45°-90° ±0.5°
50-100	±0.15	±0.20	±0.25		
100*	±0.15	±0.20	±0.25		

CARTON OUTSIDE DIM 526(L)*476(W)*100(H)mm

NOTE:
 1: 100PCS/CARTON
 2: 4 CARTONS/LAYER
 3: TOTAL 6 LAYERS
 4: 2400PCS/PALLET

10	50400000E7	PALLET(標準規格)1219*1117*100mm(全高)	2/2400
9	51000000E7	PLY-WOOD PALLET 1219*1117*100mm(45°/44°) (部分板)	1/2400
8	50400001E3	PALLET(標準規格)1000*500*100mm(全高)	2/2400
7	50400000E7	標準規格500*500*100mm(全高)	4/2400
ITEM	P/N	DESCRIPTION	QTY

MODEL No.		NM-103-BB	
PART NAME		DUMMY PACKING	
PART No.		REV A2	

APPROVED		CHECKED		DESIGNED	
BraoZhong		BraoZhong		Add: 10/2011	

REQ	A	B	C	D	ANGLE
0-5	±0.02	±0.05	±0.10		0°-30° ±0.5°
5-10	±0.05	±0.10	±0.15		30°-45° ±0.5°
10-50	±0.10	±0.15	±0.20		45°-90° ±0.5°
50-100	±0.15	±0.20	±0.25		
100*	±0.15	±0.20	±0.25		