JukeBlox Networked Media Module
CX Series

Datasheet

- Complete audio networking system on a small module
- Integrated Ethernet + USB 2.0
- WiFi-certified 802.11b/g
- Built-in strip antenna
- Optional 2X Diversity Antenna
- Glueless audio, video and control ports
- FCC certified
- Ideal for enabling network and USB audio playback for iPod docks, audio systems, AV Receivers, active speaker systems, internet radios, network playback adaptors

SMSC CONFIDENTIAL

JukeBlox Networked Media Modules – CX Series

Datasheet

Table of Contents

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.

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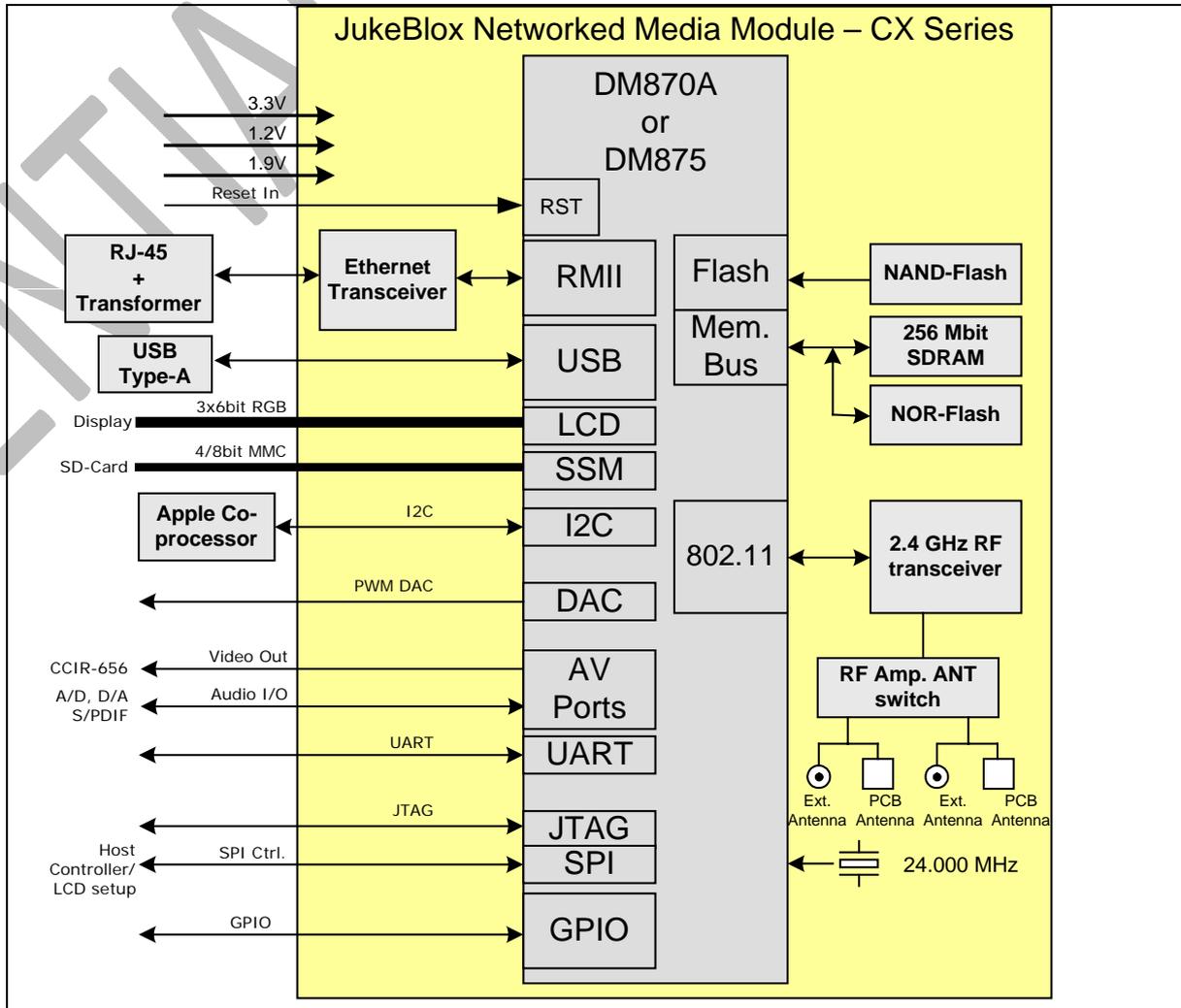
Note: Choice of antenna is a build option, see Ordering Guide.

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

802.11b/g front-end

PCB antenna

PCB antenna

External Antenna Connectors

SMSC processor

Ethernet PHY

SDRAM
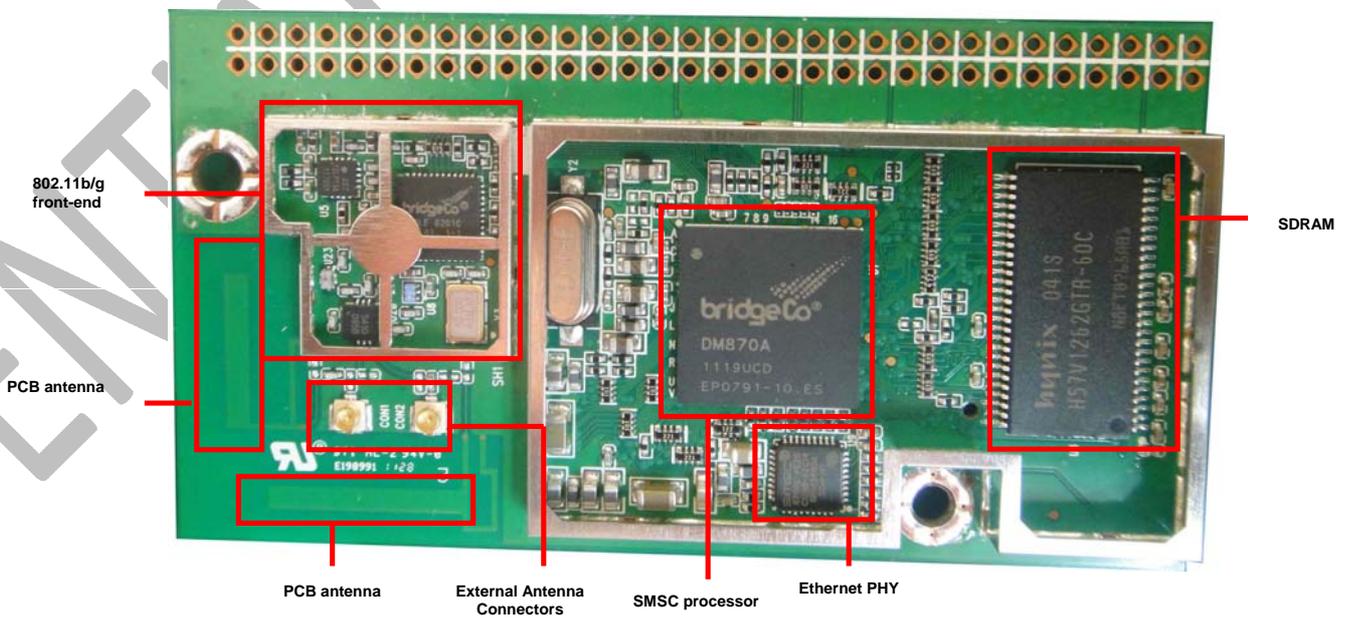
3.2   Bottom View of CX Module

3.2.1   CX Module Bottom View w/64-pin Low Density Connector
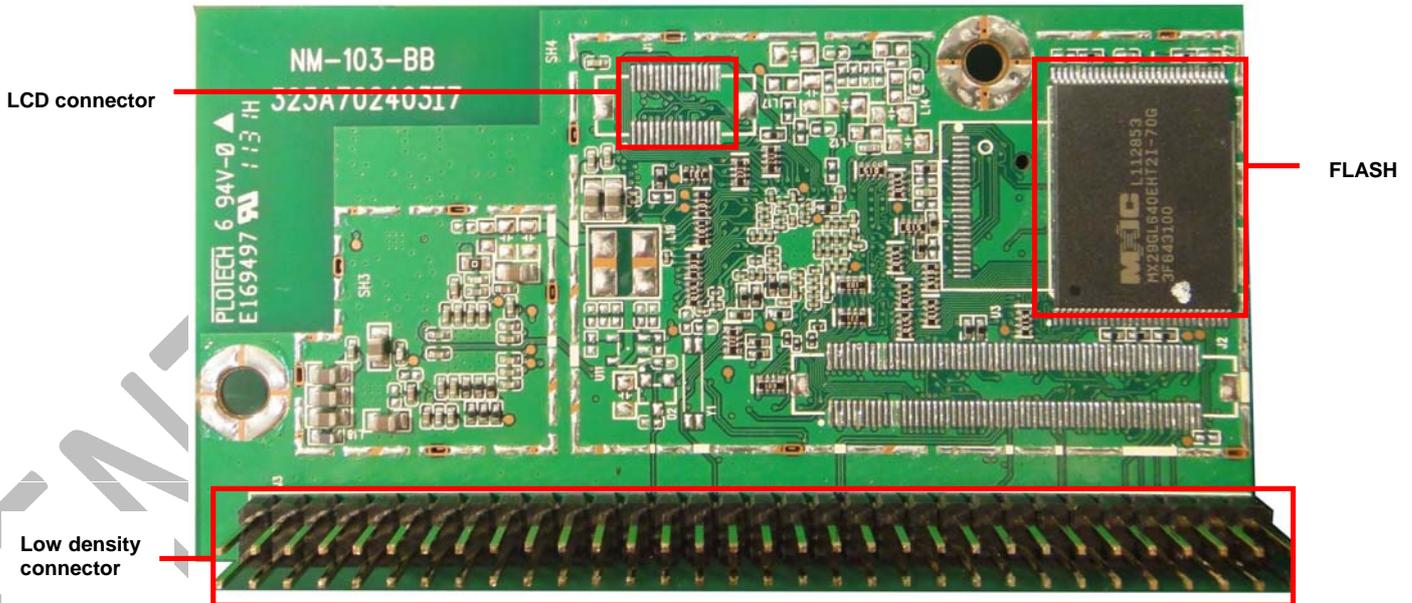
3.2.2   CX Module Bottom View w/120-pin Media Connector
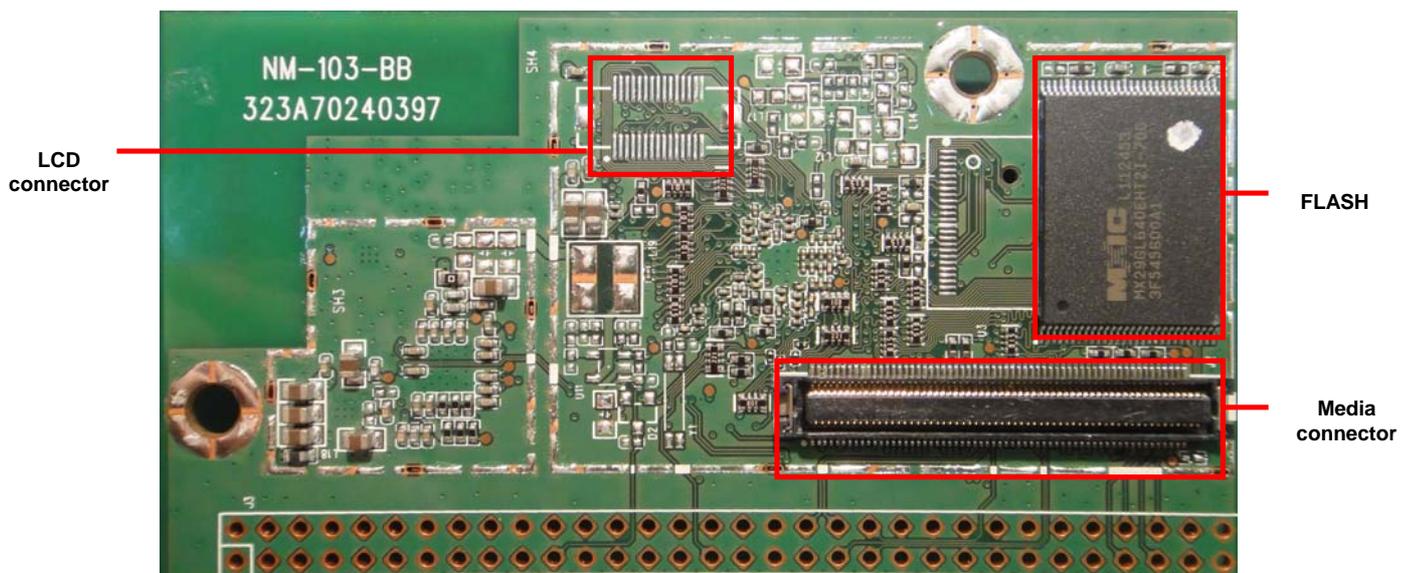
3.3   Production Module with Top and RF shields in place – Top View
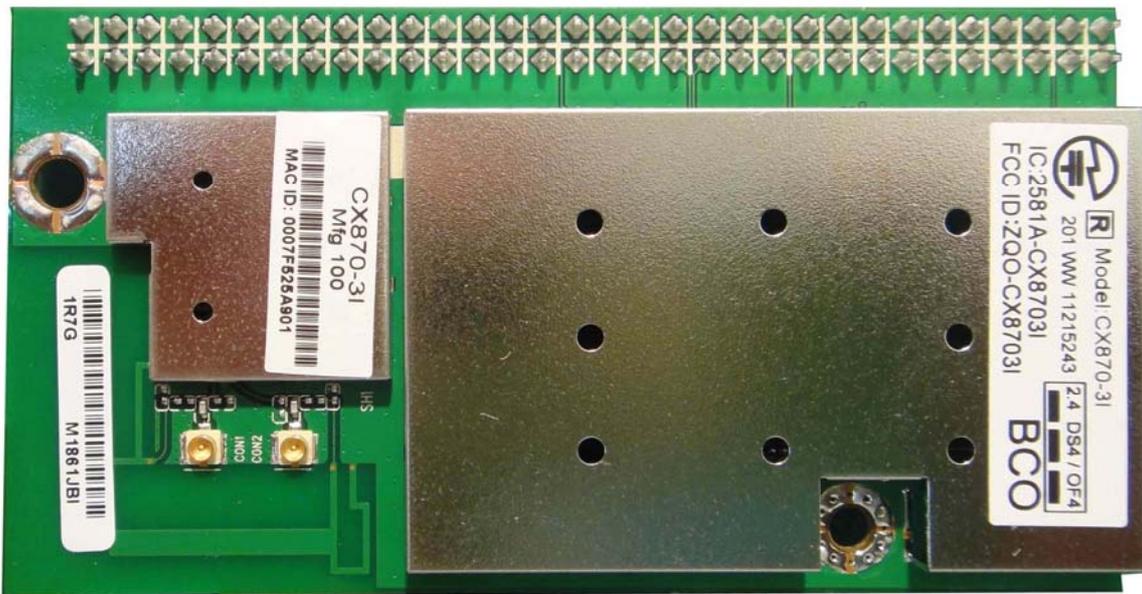
3.4   Production Module with 64-pin Connector Option – Side View

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)

3.6.1   Including J3 Low Density 64-pin connector – Bottom View

3.6.2   Including J2 High Density 120-pin connector – Bottom View
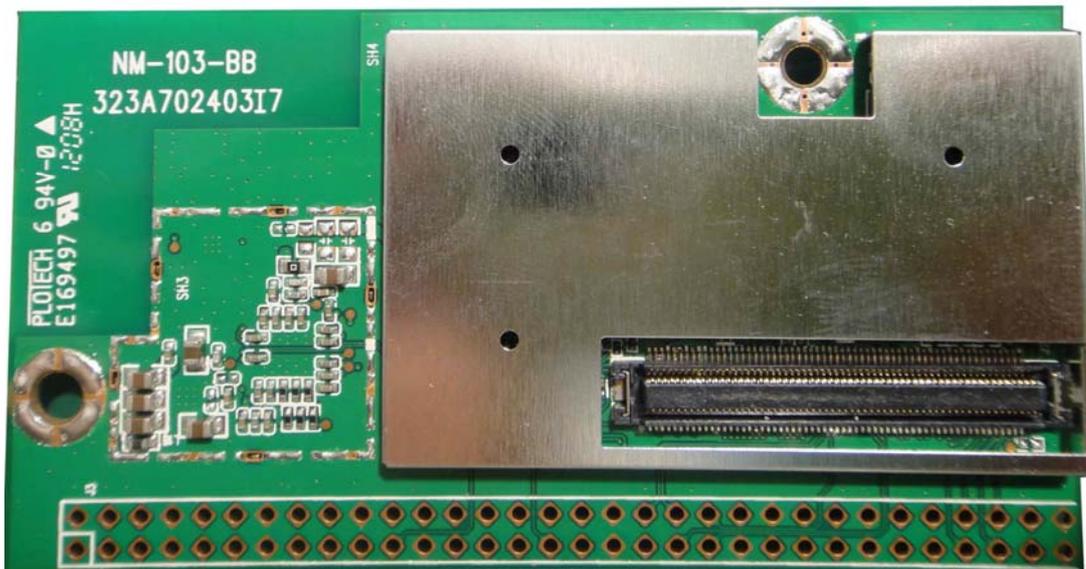
4 Ordering Guide

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
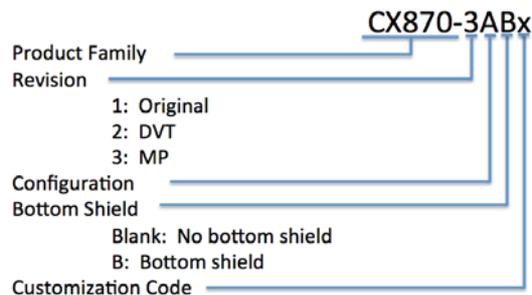
5 Electrical Specifications

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		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	CX870	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		-0.5	4.6	V
1.2V Supply Voltage		-0.5	1.8	V
1.9V Supply Voltage	Main	-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 (CX870 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	802.11b mode: 16.5dBm, +/-1dB
	802.11g mode: 15.0dBm, +/-1dB
	
	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 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 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 MSA-5403-2G4C1-A3, gray 300mm MSA-5103-2G4C1-A2, black 400mm MSA-5403-2G4C1-A2, gray 400mm
CX870-3BB	Dipole	3.2 5.03	WINiZEN W1E-WO-08 DAM-L0-B-N0-000-04-02(INPAO)
CX870-3HB	Dipole	2	MAG. LAYERS EDA-8709-2G4C1-A66
CX870-3HB	PIFA	3 2.8	3010000243ID (DA-E670) 3010000218ID (DA-E750)
CX870-3LB	Linear polarization	0.84 2.4	1-888-241-00

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/3I/3J/3H/3IB/3B-D/3B-D60/BB/HB					3K		
FCC					**FCC**		
11b	2412(1)	2437 (6)	2462 (11)	**11b**	2412(1)	2437 (6)	2462 (11)
	Power setting	Power setting	Power setting		Power setting	Power setting	Power setting
	8	8	9		10	10	10
11g	2412(1)	2437 (6)	2462 (11)	**11g**	2412(1)	2437 (6)	2462 (11)
	Power setting	Power setting	Power setting		Power setting	Power setting	Power setting
	1	0	2		2	2	2

3B/3I/3J/3H/3IB/3B-D/3B-D60/BB/HB					3K		
CE/JP					**CE/JP**		
11b	2412(1)	2437 (6)	2472 (13)	**11b**	2412(1)	2437 (6)	2472 (13)
	Power setting	Power setting	Power setting		Power setting	Power setting	Power setting
	10	10	10		10	10	10
11g	2412(1)	2437 (6)	2472 (13)	**11g**	2412(1)	2437 (6)	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 (6)	2462 (11)	**11b**	2412(1)	2437 (6)	2472 (13)
	Power setting	Power setting	Power setting		Power setting	Power setting	Power setting
	8	8	8		10	10	10
11g	2412(1)	2437 (6)	2462 (11)	**11g**	2412(1)	2437 (6)	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 6Mbps

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 CX870 Module without Bottom Shield
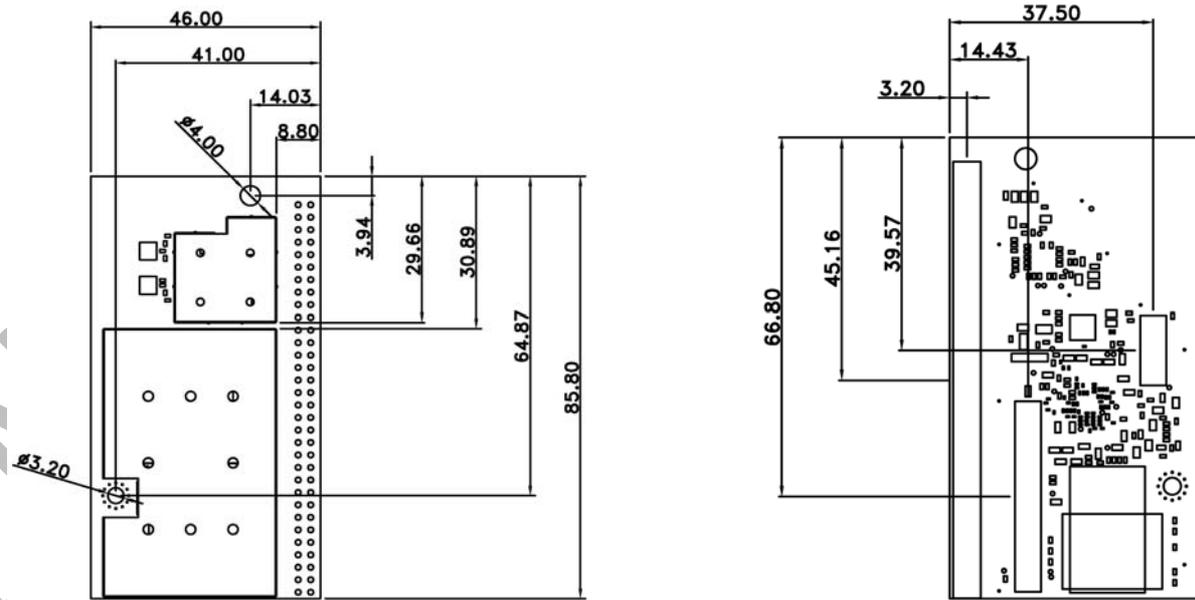
7.1.1   Top & Bottom View of CX Module with Bottom Shield
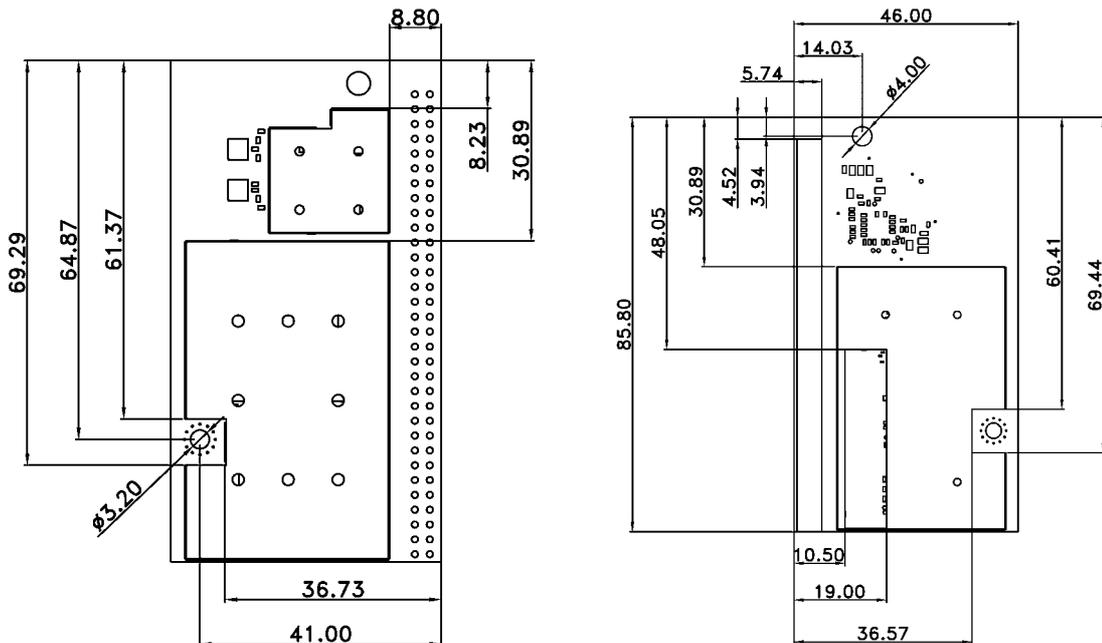
7.2   Side View of CX870 module without Bottom Shield
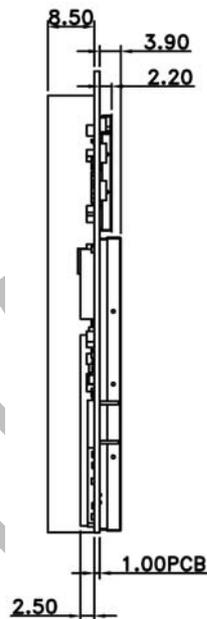
Note:

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 except CX870-3JB
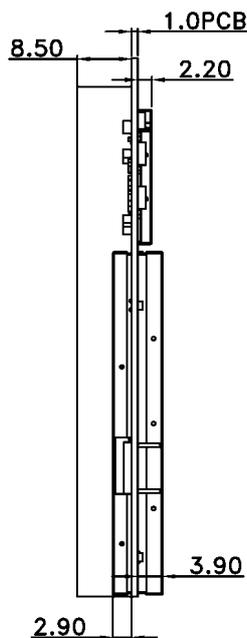
7.2.2 Side View of CX870 Module with Bottom Shield part number CX870-3JB only
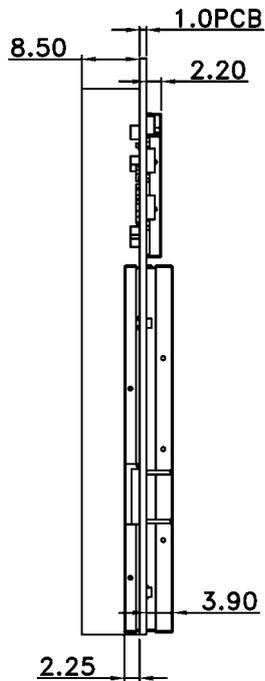
7.3 3D View of CX870 Module without Bottom Shield
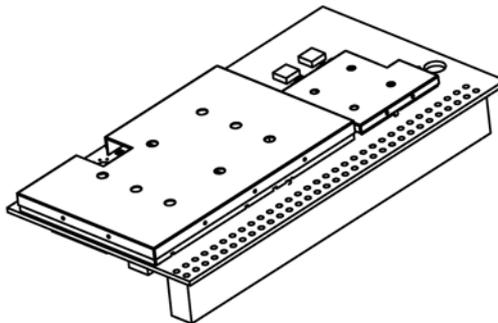
Note: A 3D file of the CX module in .stp format is available from the SMSC Customer Portal.

7.4   Module Weight

CX870: 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:

UF.L type Ultra Small Surface Mount Coaxial Connector

8.2   Module Connectors

The CX860/870 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		30	2 x 15 x 0.5mm	14-5046-030-145-829+ (Kyocera)
J2	Media	B2B Connector	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 DM870A to host controller.
SPI_DIN	I	SPI data from host controller to DM870A.
SPI_CLK	I	SPI clock from host controller to DM870A. Maximum recommended frequency is 2MHz, typical frequency is 1MHz. See Note 2 below.
SPI_NCS0	I	SPI chip select from host controller to DM870A.
PDOUT1	O	This signal is used as SPI_REQ, SPI request signal, from DM870A 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 DM870A, 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 DM870A, 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. DM870A-internal pull-up. Leave this pin open.
PDOUT0	I	Factory Reset. GPIO-04. Return the CnE to factory settings. High-active input, DM870A-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 DM870A. 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 DM870A. 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. ±12mA) 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 DM870A 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 DM870A. Leave open.

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.

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.

LCD

LCDD0, LCDD1, LCDD2, LCDD3, LCDD4, LCDD5, LCDD6, LCDD7, LCDD8, LCDD9, LCDD10, LCDD11, LCDD12, LCDD13, LCDD14, LCDD15, LCD16, LCDD17, LCDCLK, LCDCTRL0, LCDCTRL1, LCDCTRL2, LCDCTRL3	O	Uses optional J1 LCD connector. Connect to local LCD display. See Note 9. Leave open if not used.

Notes:

1. Signal type codes:
   I – 3.3V level Digital Logic Input into the DM870A
   O – 3.3V level Digital Logic Output from the DM870A
   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 CX870 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.bridgeco.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.bridgeco.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	GND			
			VIN (+3.3V)	3	4	VIN (+3.3V)			
			VIN (+3.3V)	5	6	VIN (+3.3V)			
			GND	7	8	GND			
			VIN (+1.2V)	9	10	VIN (+1.2V)			
			VIN (+1.2V)	11	12	VIN (+1.2V)			
			GND	13	14	GND			
			VIN (+1.9V)	15	16	VIN (+1.9V)			
			GND	17	18	GND			
			3V3RTC	19	20	GND			
			GND	21	22	TMS	B15		**JTAG**
			GND	23	24	TCK	C14		
SPI		D15	SPI_DOUT	25	26	TDI	A16		
		D14	SPI_DIN	27	28	TDO	A15		
		B16	SPI_CLK	29	30	SPI_NCS0	C15		**SPI**
		C13	TXD0	31	32	SPI_NCS1	B17		
		B14	RXD0	33	34	NRESET_MOD			Module reset input
Debug UART		A14	RXD1	35	36	SSMD6	C12	GPIO-10	SPI_E_CLK
		B13	TXD1	37	38	SSMD4	A12	GPIO-08	SPI_E_SDO
			GND	39	40	SSMD2	C11		
SPI_E_NCS	GPIO-11	D12	SSMD7	41	42	SSMD1	B11		
SPI_E_SDI	GPIO-09	B12	SSMD5	43	44	SSMCMD	A13		
		D11	SSMD3	45	46	SSMWP	D9		
		A11	SSMD0	47	48	**NCS3**	H18	**GPIO-17**	**BIST activate**
		C10	SSMCLK	49	50	NCS2	J17	GPIO-19	iPod NDETECT
		D10	SSMCP	51	52	GND			
			GND	53	54	USB_VBUS	D2		**USB**
USB		A1	USB_DN	55	56	GND			
		B1	USB_DP	57	58	AOUTRN	L3		
		E3	USBVBUSDRV	59	60	AOUTRP	L4		
			GND	61	62	GND			
		K4	AOUTLP	63	64	PDOUT1	J1	GPIO-06	SPI_REQ
		L2	AOUTLN	65	66	VCO1	J2	GPIO-07	
			GND	67	68	**PDOUT0**	K1	**GPIO-04**	**Factory reset**
	GPIO-16	H17	A23	69	70	**VCO0**	K2	**GPIO-05**	**IR input**
	GPIO-18	H16	A22	71	72	**AV3CLK**	R4	**GPIO-12**	**ETH NRESET**
I2C SDA	GPIO-14	T3	AV3CTRL1	73	74	AV0CTRL0	M1		**Video Output**
I2C SCL	GPIO-13	U2	AV3CTRL0	75	76	AV1DATA3	N4		
		M3	AV0CTRL2	77	78	AV1DATA2	P1		
		M2	AV0CTRL1	79	80	AV1DATA1	P2		
		L1	AV0CLK	81	82	AV1DATA0	P3		
Video Output		M4	AV0DATA3	83	84	GND			
		N1	AV0DATA2	85	86	AV2CTRL1	T1		MCLK
		N2	AV0DATA1	87	88	GND			
		N3	AV0DATA0	89	90	AV2CLK	R1		SCLK
			GND	91	92	GND			
LRCK		T1	AV2CTRL0	93	94	AV4DATA1	U3		SPDIF output
A/D data 1		P4	AV2DATA3	95	96	AV4DATA0	V2		SPDIF input
A/D data 0		R3	AV2DATA2	97	98	GND			
D/A data 1		T2	AV2DATA1	99	100	ETH_LED_ACT			**Ethernet**
D/A data 0		U1	AV2DATA0	101	102	ETH_LED_SPEED			
			GND	103	104	MIICRS	R14	GPIO-00	
			ETH_RXN	105	106	MIICOL	T13	GPIO-01	
			ETH_RXP	107	108	MIITXER	T11	GPIO-02	
Ethernet				109	110	MIITXCLK	R12	GPIO-03	iPod Access Power
			ETH_TXN	111	112	MIITXD0	U10		
			ETH_TXP	113	114	MIITXD1	V10		
			GND	115	116	MIIRXD0	U12		
	GPIO-15	K18	NWAIT	117	118	MIIRXD1	V12		
			NPD_RF	119	120	GND			

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

J1 – LCD Connector

Function	GPIO	IC PIN	Signal	PIN Number		Signal	IC PIN	GPIO	Function
			GND	1	2	GND			
		V8	LCDD0	3	4	LCDD1	U8		
		T8	LCDD2	5	6	LCDD3	R8		
		V7	LCDD4	7	8	LCDD5	U7		
		T7	LCDD6	9	10	LCDD7	R7		
LCD Interface		V6	LCDD8	11	12	LCDD9	U6		LCD Interface
		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			
		T10	LCDCLK	23	24	LCDCTRL0	R9		LCD Interface
LCD Interface		T9	LCDCTRL1	25	26	LCDCTRL2	U9		
		V9	LCDCTRL3	27	28	GND			
			GND	29	30	GND			

Note: The IC PIN column indicates the pin number on the DM860A or DM870A integrated circuit. This allows for easy cross-reference to the DM860A or DM870A 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	GPIO-15	K18	NWAIT	15	16	RXD1	A14		Debug UART
iPod NDETECT	GPIO-19	J17	NCS2	17	18	TXD1	B13		
		D13	NRESET	19	20	GND			
			3V3RTC	21	22	AV2CTRL1	R2		MCLK
			GND	23	24	AV2CTRL0	T1		LRCK
		D14	SPI_DIN	25	26	AV2CLK	R1		SCLK
SPI		D15	SPI_DOUT	27	28	AV2DATA2	R3		A/D data 0
		B16	SPI_CLK	29	30	AV2DATA0	U1		D/A data 0
		C15	SPI_NCS0	31	32	AV4DATA1	T2		SPDIF output
Free	GPIO-17	H18	NCS3	33	34	AV4DATA0	V2		SPDIF input
			GND	35	36	GND			
E-GPIO_NCS/TBA	GPIO-11	D12	SSMD7	37	38	USB_DN	A1		USB
I2C SDA	GPIO-14	T3	AV3CTRL1	39	40	USB_DP	B1		
I2C SCL	GPIO-13	U2	AV3CTRL0	41	42	USBVBUSDRV	E3		
			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			
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 integrated circuit. This allows for easy cross-reference to the DM860A or DM870A 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
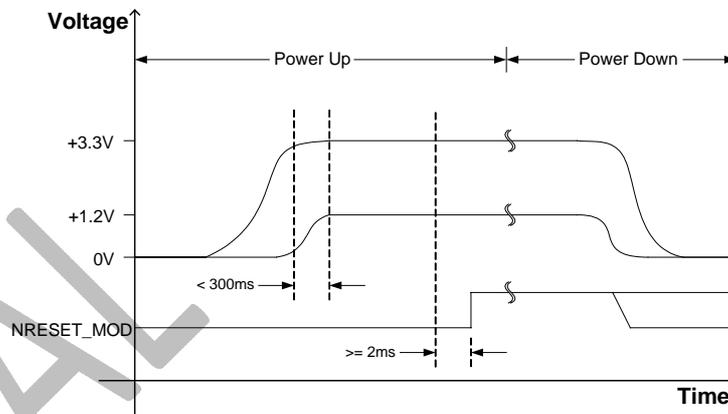
9.2   RF Considerations

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.
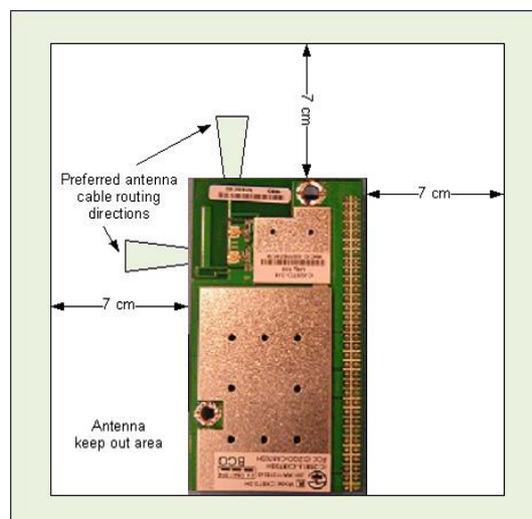
10 Revision Control

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	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.	Microchip purchased SMSC.
		Updated filename to 'CX_Module_DS_Rev2-8_MM-DD-YY.pdf'.	Data covers all CX modules.
		Removed CX860 from Section 7.4 Module Weight.	No CX860 module available.
		Updated left side of footer to 'SMSC CX Module'.	Data sheet is for all CX modules.
		Updated title of Section 7.1.1 to 'Top & Bottom View of CX Module with Bottom Shield'.	Drawings are for all CX modules.
		Updated title of Section 7.2.1 to 'Side View of CX Module with Bottom Shield except CX870-3JB'.	Drawings are for all CX modules.
		In Sections 3.1, 3.2, 3.2.1 & 3.2.2, updated occurrences of 'CX870' to 'CX Module'.	Pictures are for all CX modules.
		Updated Section 4 Ordering Guide to remove rows for CX870-3DB and CX870-3DBS, and add a row for CX870-3KB.	Updated to show actual status.
		Removed 'I2C' box, arrow & label in Section 2 Block Diagram.	Correction.
V2.8 (090912)	Sept 9, 2012 / SHs	Updated Section 2 Block Diagram to show obscured black lines leading out from LCD & SSM blocks.	Correction.
		In Section 2 Block Diagram changed "DM860A or DM870A" to "DM870A or DM875"	CX module uses DM870A and DM875.
		In Section 1 Introduction, changed "DM860A and DM870A" to "DM870A and DM875"	CX module uses DM870A and DM875.
		In Section 4 Ordering Guide, added a 'Status' column and status code key.	To show current availability status of each module version.
		In Section 4 Ordering Guide, added row for CX875-3PB.	To give details of newly available module version.
		In Section 4 Ordering Guide, changed "SMSC IC's" heading to "SMSC ICs".	Correction.
		In Section 6.0.1 Antenna Considerations, replaced text list with a new table.	Updated information and in a clearer format.
		Added a new section 6.0.2 CX Power Settings Used For Modular Approval.	To provide more details about CX module power settings.
		In Section 6 Regulatory Compliance and Quality, updated the Compliance entry for New Zealand / Australia for Radio Regulations from "CE" to "AZ/NZS:4268"	Updated information.
		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"	Provide most up to date Application Note file.

Revision	Date / Author	Details of Change	Reason for Change
		In Section 9.2 RF Considerations, added note & picture regarding recommended keep out area and cable routing for antennas.	Provide information about keep out areas and cable routing.
		In Notes of Section 8.2.1 Pin Descriptions, added text regarding schematics being compressed into zip files to Notes 4, 5 & 11.	Provide further information about schematic files.
V2.7 (061312)	June 13, 2012 / SHs	In Section 4 Ordering Guide, made rows for CX870-3B, 3H, 3I, 3J shaded.	All new designs should use modules with a 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"	Reflect addition of separate section (7.2.2) for the CX870-3JB module.
		Added Section 7.2.2 Side View of CX870 Module with Bottom Shield part number CX870-3JB only	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.	CX module uses DM870A.
		Changed "MMIICRS" to "MIICRS" in Section 8.2.3 GPIO Assignments.	Correction.
		Changed "MMIICRS" to "MIICRS" in J3 Low Density Connector table in Section 8.2.2 Connector PIN Assignments.	Correction.
		Changed "MMIICRS" to "MIICRS" in GPIO table in Section 8.2.1 Pin Descriptions.	Correction.
		Added important note text to Tx Power row in Section 5.3 WiFi Specification.	To indicate which modules the Tx Power specifications relate to.
		Removed the 'm' from "+/-1dBm" in the Tx Power row in Section 5.3 WiFi Specification.	Correction.
V2.4 (031712)	March 17, 2012 / SHs	In Section 5.3 WiFi Specifications, updated Transmission Speed entry	Add missing 2Mbps speed.
		In Section 4 Ordering Guide, changed all occurrences of DM870 to DM870A & DM860 to DM860A	CX module uses DM870A.
		In Section 2 Block Diagram, changed all occurrences of DM870 to DM870A & DM860 to DM860A	CX module uses DM870A.
		In Section 1 Introduction, changed all occurrences of DM870 to DM870A & DM860 to DM860A	CX module uses DM870A.
		In Section 8.2.1 Pin Descriptions, changed all occurrences of DM870 to DM870A	CX module uses DM870A.
		In the Notes for Section 8.2.1 Pin Descriptions, changed *dat_DM870_16_datasheet.pdf* to *DM870A DS rev. 1.3_12-15-11.pdf*	CX module uses DM870A.
		Changed all occurrences of DM870 to DM870A throughout the datasheet.	CX module uses DM870A.
		Updated J1, J2 & J3 tables in Section 8.2.2 Connector PIN Assignments, changing DM870 to DM870A.	CX module uses DM870A.

Revision	Date / Author	Details of Change	Reason for Change
		Changed "WiFi (on-module PCB diversity)" column heading to "Internal PCB Diversity Antennas" in Section 4 Ordering Guide	Improve clarity of meaning.
		Added 'FCC' to North America in Frequency Band entry in Section 5.3 WiFi Specification	Specify North American WiFi regulatory certification body.
		Updated TX EVM entry in Section 5.3 WiFi Specifications	Update values to better reflect actual performance.
		Updated Rx Sensitivity entry in Section 5.3 WiFi Specifications	Update values to better reflect actual performance.
		Updated Tx Power entry in Section 5.3 WiFi Specifications	Show test conditions.
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.

Revision	Date / Author	Details of Change	Reason for Change
		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 Section 6 reverted back to original numbering	Decided to keep original part numbering scheme to avoid unnecessary paper work and 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.

Revision	Date / Author	Details of Change	Reason for Change
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	• Updated Key Features on Title page: removed (optional) from "WiFi-certified 802.11b/g" entry • Updated Antenna Configuration entry in Section 4.1 Part number syntax	
V1.9 b	July 28, 2011 / SHs	• Updated Section 4.1 Part number syntax o Updated graphic o Added a Note • Changed intro text in Section 3 Board Pictures • Updated Section 4 Ordering Guide o Changed CX870-3B1 to CX870-3B o Updated the text for + note o Added a note to CX870-3B Ext. Diversity Antenna column o Added a new # note	

Revision	Date / Author	Details of Change	Reason for Change
		• Added Section 6.0.1 Antenna Considerations	

V1.9 a	July 25, 2011 / SHs	• 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
		   o Added gray background to CX870-3D
		   o Changed CX870-3A to CX870-3A2
		   o Changed CX870-3B to CX870-3B1
		   o Changed CX870-3H to CX870-3H2
		   o Changed CX870-3I to CX870-3I2
		   o Changed CX870-3J to CX870-3J2
		   o 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	• Update section 8.1 WLAN UFL Antenna Connector • Deleted section 8.1.1 Coaxial antenna connector dimensions	
V1.8	July 5, 2011 / SHs	• Updated the acceptable surface-mount receptacle parts in Section 8.1 WLAN UFL Antenna Connector • Added Appendix 1: Certification Notices	
V1.7 c	May 13, 2011 / SHs	• 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	• Updated Note 8 in "Pin Descriptions" table • Re-imported "Board Dimensions & Weight" drawings • Updated "Board Pictures" images • Updated board photo on Cover page	

Revision	Date / Author	Details of Change	Reason for Change
		• 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	• 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	• 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	• Updated J3 Low Density Connector table • Update GPIO Assignments section and table	
V1.6 c	February 24, 2011 / SHs	• Updated all mechanical drawings in "Board Dimensions and Weights" section • Deleted warning note in "Board Dimensions and Weights" section	
V1.6 b	February 23, 2011 / SHs	• Updated "J3-Low density connector" pin description table • Updated "GPIO Assignments" table	
V1.6	February 11, 2011 / SHs	• 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	• Added Note to "Board Dimensions and Weight" section	
V1.5 a	January 24, 2011 / SHs	• Updated the "Ordering Guide" – removed Mfg column and consolidated into one table	

Revision	Date / Author	Details of Change	Reason for Change
		• Updated the Header to reflect Preliminary nature of datasheet	
V1.5	January 22, 2011 / SHs	• 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	• Updated the Application Notes, RF Considerations section	
V1.4	January 3, 2011 / SHs	• Updated the module photo on the Title page • Updated the Application Notes, RF Considerations section	
V1.3	December 23, 2010 / SHs	• 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	• Inserted CX860 and CX870 Module Weights • Updated module image on Front Page	
V1.1	December 13, 2010 / SHs	• Added the Ordering Guide. • Updated the Block Diagram. • Updated the "Electrical Specifications" table • 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	

Revision	Date / Author	Details of Change	Reason for Change
V1.0	October 18, 2010 / SHs	• Initial Version	

11 Appendix 1: Certification Notices

Federal Communications Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

CAUTION:

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

Labeling requirements

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

RF exposure warning

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

Information for the OEMs and Integrators

The following statement must be included with all versions of this document supplied to an OEM or integrator, but should not be distributed to the end user.

> This device is intended for OEM integrators only. Please see the full Grant of Equipment document for other restrictions. This device must be operated and used with a locally approved access point.

Information To Be Supplied to the End User by the OEM or Integrator

The following regulatory and safety notices must be published in documentation supplied to the end user of the product or system incorporating an adapter in compliance with local regulations.

Host system must be labeled with "Contains FCC ID:ZQO-CX870-3"X"", FCC ID displayed on the label. The label text should be updated according to the table shown in Ordering Guide section of this document. The proper letter shown in Ordering Guide Part Number column should be substituted for "X". For example, for the CX870-3B module, the label text should be "Contains FCC ID:ZQO-CX870-3B".

Canada, Industry Canada (IC) Notices

This Class B digital apparatus complies with Canadian ICES-003 and RSS-210.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Radio Frequency (RF) Exposure Information

The radiated output power of the Wireless Device is below the Industry Canada (IC) radio frequency exposure limits. The Wireless Device should be used in such a manner such that the potential for human contact during normal operation is minimized.

This device has also been evaluated and shown compliant with the IC RF Exposure limits under mobile exposure conditions. (antennas are greater than 20cm from a person's body).

This device has been certified for use in Canada. Status of the listing in the Industry Canada's REL (Radio Equipment List) can be found at the following web address:

http://www.ic.gc.ca/app/sitt/reltel/srch/nwRdSrch.do?lang=eng

Additional Canadian information on RF exposure also can be found at the following web address:

http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08792.html

Canada, avis d'Industry Canada (IC)

Cet appareil numérique de classe B est conforme aux normes canadiennes ICES-003 et RSS-210.

Son fonctionnement est soumis aux deux conditions suivantes : (1) cet appareil ne doit pas causer d'interférence et (2) cet appareil doit accepter toute interférence, notamment les interférences qui peuvent affecter son fonctionnement.

Informations concernant l'exposition aux fréquences radio (RF)

La puissance de sortie émise par l'appareil de sans fil Dell est inférieure à la limite d'exposition aux fréquences radio d'Industry Canada (IC). Utilisez l'appareil de sans fil Dell de façon à minimiser les contacts humains lors du fonctionnement normal.

Ce périphérique a également été évalué et démontré conforme aux limites d'exposition aux RF d'IC dans des conditions d'exposition à des appareils mobiles (les antennes se situent à moins de 20 cm du corps d'une personne).

Ce périphérique est homologué pour l'utilisation au Canada. Pour consulter l'entrée correspondant à l'appareil dans la liste d'équipement radio (REL - Radio Equipment List) d'Industry Canada rendez-vous sur:

http://www.ic.gc.ca/app/sitt/reltel/srch/nwRdSrch.do?lang=eng

Pour des informations supplémentaires concernant l'exposition aux RF au Canada rendez-vous sur:

http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08792.html

This radio transmitter FCCID: ZQO-CX8703B has been approved by FCC to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.