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

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Table of Contents

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1   Introduction

The CX-series module is a single-board networked media player module, based on SMSC's DM860 and DM870 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
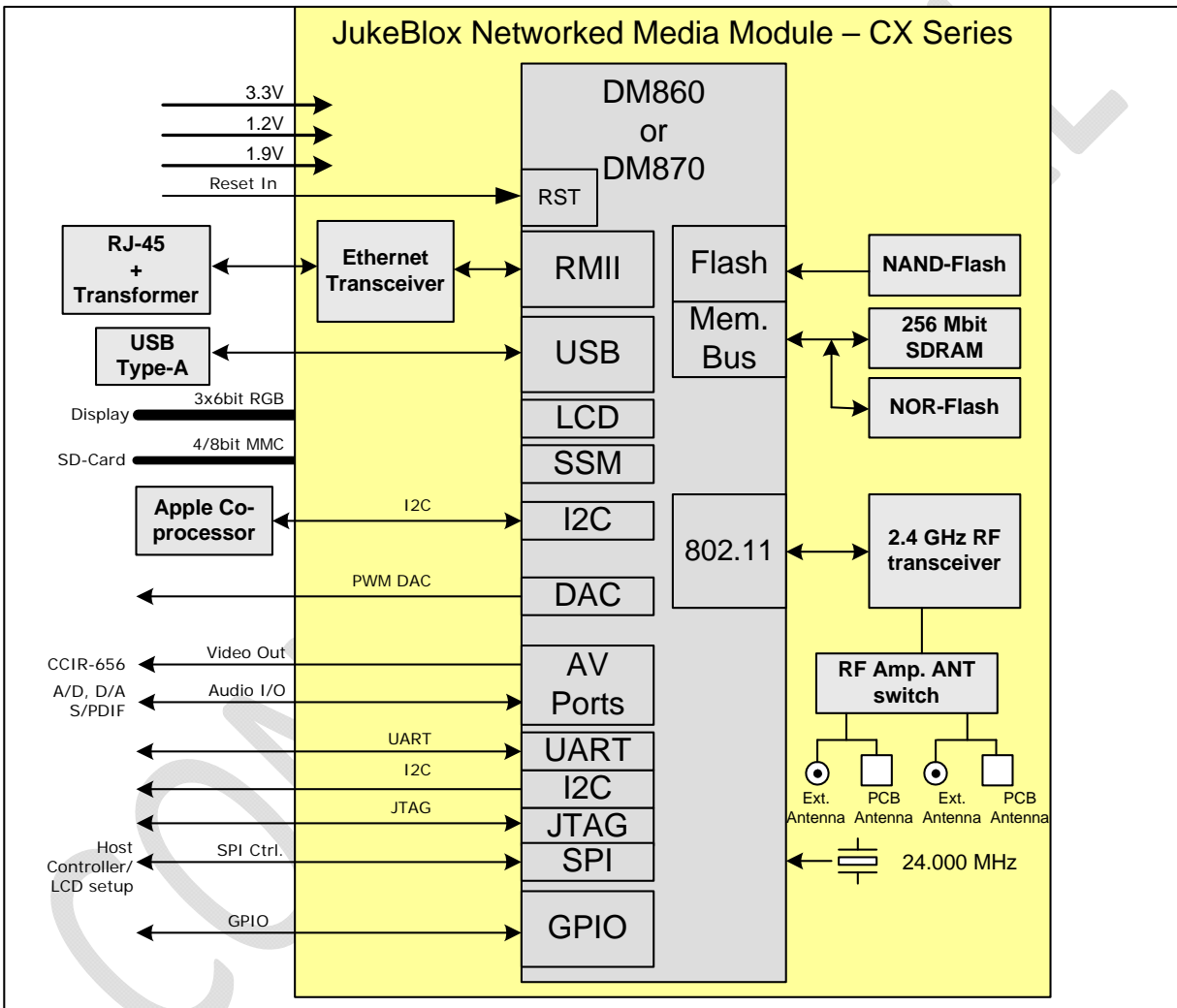
Note: Choice of antenna is a build option, see Ordering Guide.

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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 CX870

802.11b/g front-end

SDRAM

PCB antenna

PCB antenna

External Antenna Connectors

SMSC processor

Ethernet PHY

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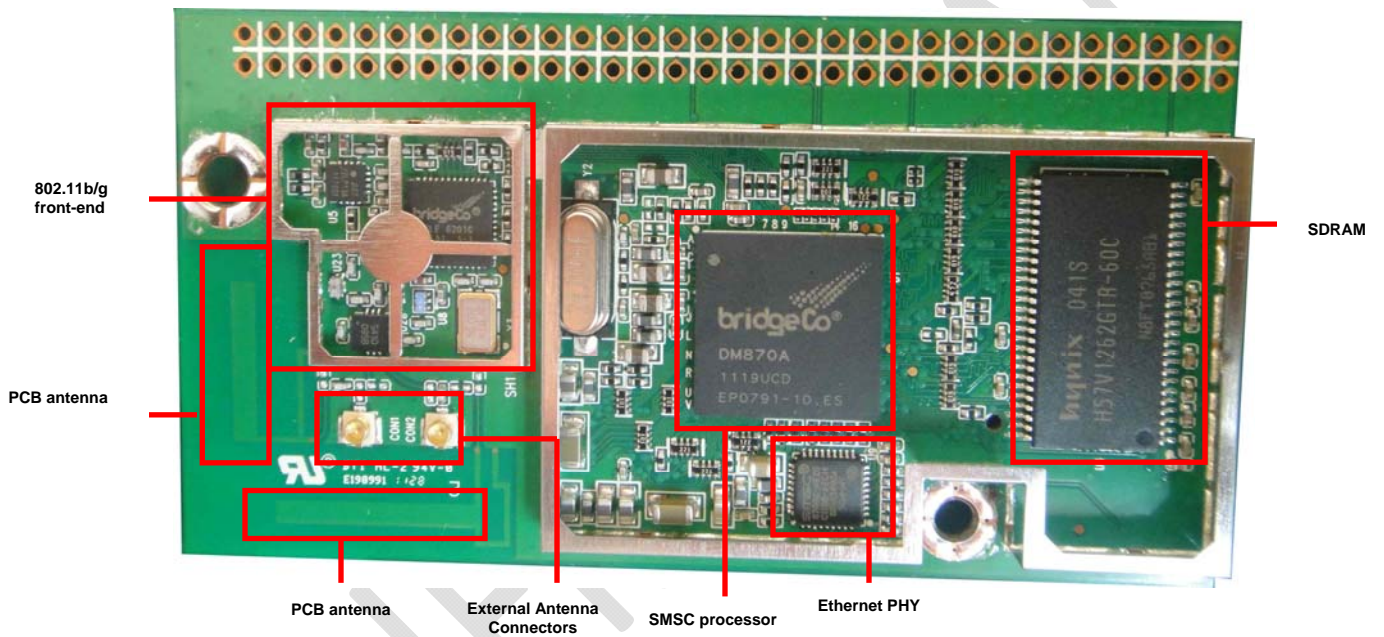
3.2   Bottom View of CX870

3.2.1   CX870 Bottom View with 64-pin Low Density Connector

3.2.2   CX870 Bottom View with 120-pin Media Connector
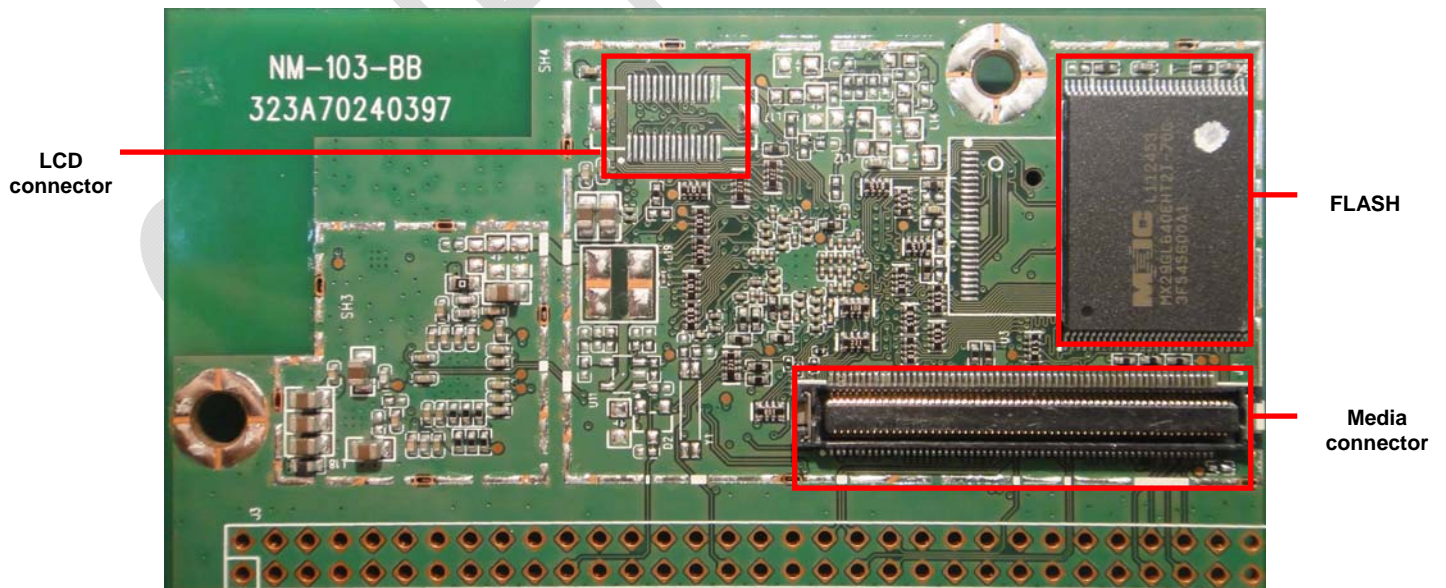
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3.3   Production Module with Top and RF shields in place – Top View

3.4   Production Module with 64-pin Connector Option – Side View
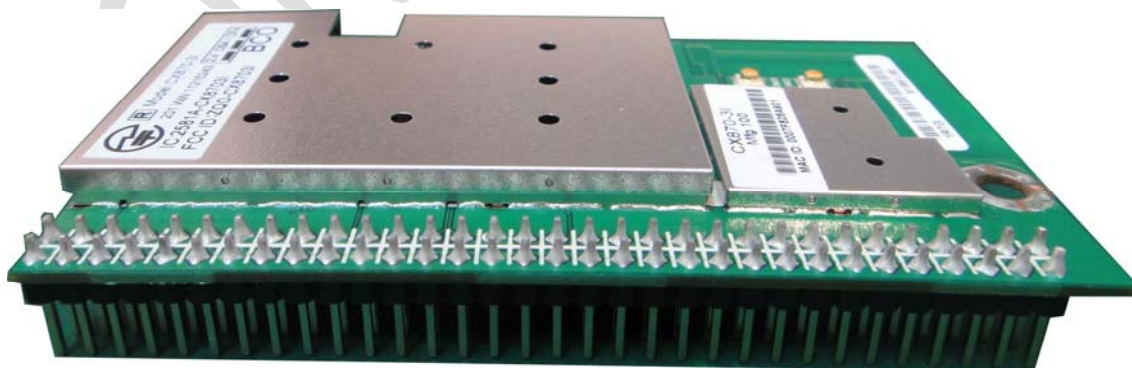
3.5   Example Production Module Showing Soldered RF Shield

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4   Ordering Guide

Part Number	SMSC IC's	WiFi (on-module PCB diversity)	Ext. Diversity Antennas (UFL Conn.)*		Ethernet	USB Host	Low density 64-pin Conn.	Media 120-pin Conn.	LCD Conn.	32MByte SDRAM	16MByte SDRAM	1Gbit NAND FLASH	8MByte NOR FLASH	Top Module Shield
			One Ant.	Two Ant.										
CX870-3A	DM870+T6201	X		(X)*	X	X		X	X	X		X		X
CX870-3B	DM870+T6201		X		X	X	X			X		X		X
CX870-3D	DM870+T6201			X	X	X		X			X	X		X
CX870-3F	DM870+T6201	X			X	X	X				X		X	X
CX870-3G	DM870+T6201	X				X	X				X		X	X
CX870-3H	DM870+T6201		X		X	X	X				X		X	X
CX870-3I	DM870+T6201		X			X	X				X		X	X
CX870-3J	DM870+T6201		X			X		X			X		X	X
CX870-3K	DM870+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.

* 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.

4.1   Part Number Syntax

CX870-3A

Product Family

Revision
   1: DVT1
   2: DVT2
   3: MP

Configuration

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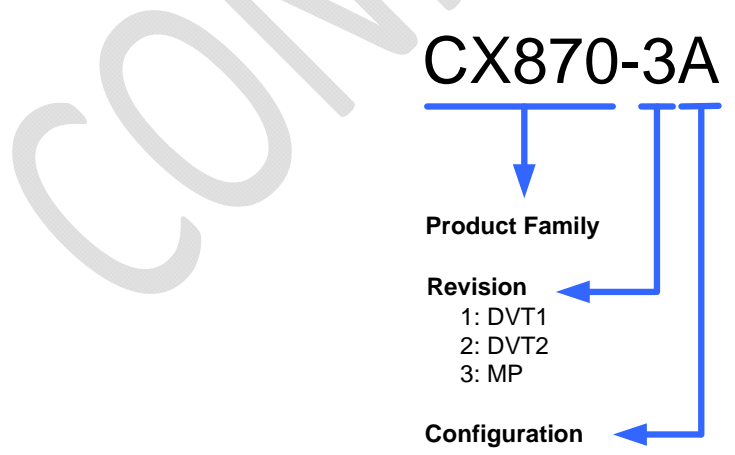
5 Electrical Specifications

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.

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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, 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, 1Mbps
	802.11g mode
	          54Mbps, 48Mbps, 36Mbps, 24Mbps, 18Mbps, 12Mbps, 9Mbps, 6Mbps

Tx Power	802.11b mode: 17.5dBm, +2dB/-3dBm, using nominal MIB settings
	802.11g mode: 16.0dBm +/-2.5dBm, using nominal MIB settings
Power-on Ramp	< 2us
RF Carrier Suppression	< 15dBc
TX EVM	< -9dB @ 6MHz < -25dB @ 54Mbps
Rx Sensitivity (incl. CE2 Mother board)	802.11b mode: <=-86dBm @ 1Mbps, <=-83dBm @ 5.5Mbps, <=-81dBm @ 11Mbps (<10%PER) 802.11g mode: <=-86dBm @ 6Mbps, <=-75dBm @ 36Mbps, <=-69dBm @ 54Mbps (<10% PER)
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.

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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 CE 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.

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6.0.1 Antenna Considerations

Here are the antennas used for certification:

CX870-3B

Dipole, WINiZEN, WIE-WO-08, 3.2 dBi for 2.4GHz

CX870-3D

FCC&IC: Inverted-F, Tyco Electronics, 2174241, 2.19 dBi for 2.4 GHz

CE: Wanshih 01S0940-00, dipole, 1.59dBi@2.4GHz, 2.65dBi@2.45GHz, 1.76dBi@2.5GHz

CX870-3F

Printed on PCB, Lite-On, N/A, 3.91 dBi for 2.4 GHz

CX870-3H

Dipole, MAG.LAYERS, EDA-8709-2G4C1-A66, 2 dBi for 2.4GHz

CX870-3I

Dipole, MAG.LAYERS, EDA-8709-2G4C1-A66, 2 dBi for 2.4GHz

CX870-3J

Dipole, MAG.LAYERS, EDA-8709-2G4C1-A66, 2 dBi for 2.4GHz

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.

6.1 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

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7 Board Dimensions and Weight

7.1 Top & Bottom View of CX870 Module
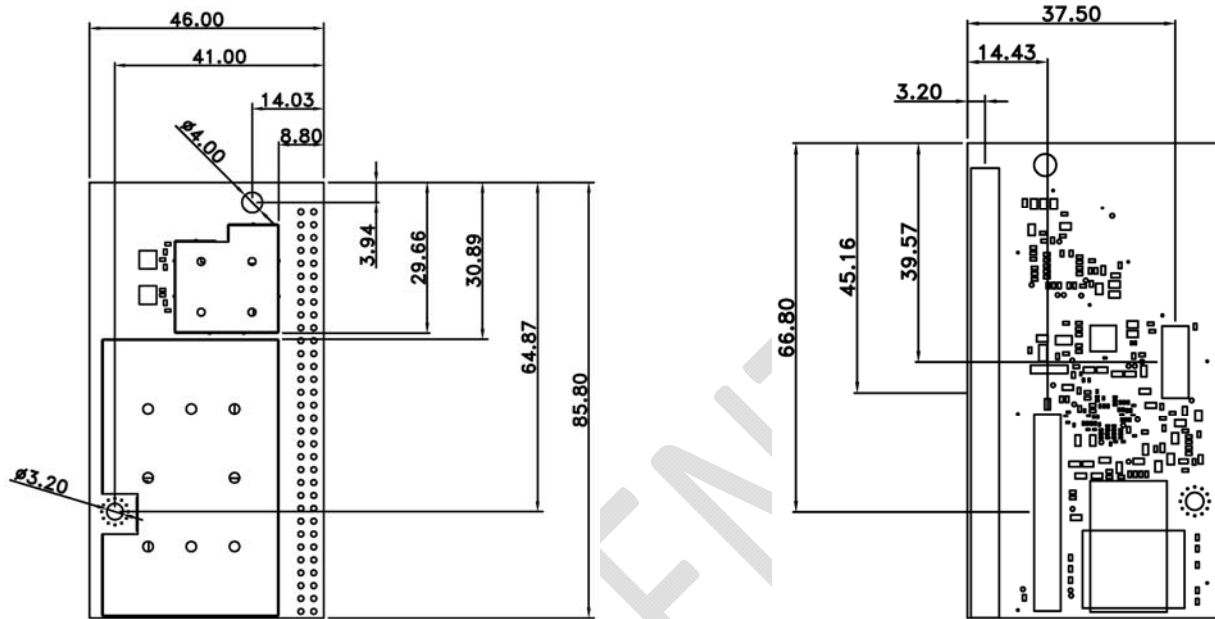
7.2 Side View of CX870 module
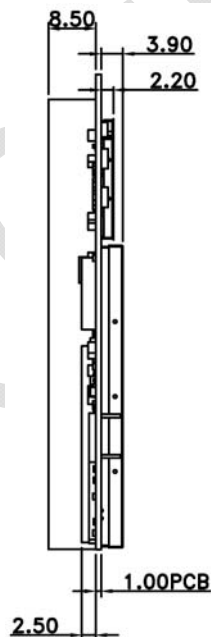
Note:
1. All dimensions are measured in **millimetres** (mm).
2. PCB's thickness: 1.00 +/- 0.10mm
3. Tolerance: +/-0.10mm
4. Outline Tolerance: +/-0.10mm
5. NPTH Hole: +/-0.05mm
6. PTH Hole: +/-0.075mm
7. Connector positions, board dimensions, mounting hole positions and sizes are the same for all module 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.

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7.3   3D View of CX870 Module
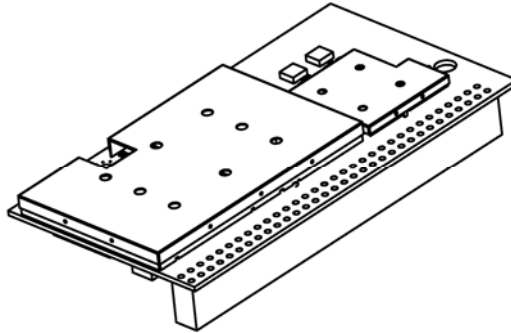
7.4   Module Weight

CX860: 20g
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	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

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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

Signal(s)	Type	Description
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

Signal(s)	Type	Description
SPI_DOUT	O	SPI data from DM870 to host controller.
SPI_DIN	I	SPI data from host controller to DM870.
SPI_CLK	I	SPI clock from host controller to DM870. Maximum recommended frequency is 2MHz, typical frequency is 1MHz. See Note 2 below.
SPI_NCS0	I	SPI chip select from host controller to DM870.
PDOUT1	O	This signal is used as SPI_REQ, SPI request signal, from DM870 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

Signal(s)	Type	Description
RXD1	I	UART1 input to the DM870, 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 DM870, 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.

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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. DM870-internal pull-up. Leave this pin open.
PDOUT0	I	Factory Reset. GPIO-04. Return the CnE to factory settings. High-active input, DM870-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 DM870. 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 DM870. 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.

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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 DM870 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 DM870. 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.
MMIICRS	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.

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Notes:

1. Signal type codes:

   I – 3.3V level Digital Logic Input into the DM870

   O – 3.3V level Digital Logic Output from the DM870

   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 DM870 IC data sheet:

   dat_DM870_16_datasheet.pdf, or later version.

3. For audio port timing diagrams, and for detailed setup and hold timing, please see DM870 IC data sheet:

   dat_DM870_16_datasheet.pdf, or later version.

4. For example ethernet external schematic, see:

   CX Module Ethernet (RJ45 + Ext.Magnetics)_V1.2.pdf, or later version.

5. For example USB schematics, see:

   CX Module USB_V1.2.pdf, or later version.

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.

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.

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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			
		F4	3V3RTC	19	20	GND			
			GND	21	22	TMS	B20		JTAG
			GND	23	24	TCK	A20		
SPI		E17	SPI_DOUT	25	26	TDI	B19		
		F17	SPI_DIN	27	28	TDO	A19		
		D17	SPI_CLK	29	30	SPI_NCS0	D16		SPI
		C17	TXD0	31	32	SPI_NCS1	D15		
		A18	RXD0	33	34	NRESET_MOD			Module reset input
Debug UART		B17	RXD1	35	36	SSMD6	B16	GPIO-10	SPI_E_CLK
		A17	TXD1	37	38	SSMD4	C15	GPIO-08	SPI_E_SDO
			GND	39	40	SSMD2	A15		
SPI_E_NCS	GPIO-11	C16	SSMD7	41	42	SSMD1	C14		
SPI_E_SDI	GPIO-09	A16	SSMD5	43	44	SSMCMD	A14		
		B15	SSMD3	45	46	SSMWP	C11		
		B14	SSMD0	47	48	NCS3	M18	GPIO-17	BIST activate
		C13	SSMCLK	49	50	NCS2	L18	GPIO-19	iPod NDETECT
		C12	SSMCP	51	52	GND			
			GND	53	54	USB_VBUS			USB
USB		A1	USB_DN	55	56	GND			
		B1	USB_DP	57	58	AOUTRN	K2		
			USBVBUSDRV	59	60	AOUTRP	J2		
			GND	61	62	GND			
		H3	AOUTLP	63	64	PDOUT1	L1	GPIO-06	SPI_REQ
		J3	AOUTLN	65	66	VCO1	L2	GPIO-07	
			GND	67	68	PDOUT0	M1	GPIO-04	Factory reset
	GPIO-16	K20	A23	69	70	VCO0	M2	GPIO-05	IR input
	GPIO-18	K19	A22	71	72	AV3CLK	U3	GPIO-12	ETH NRESET
I2C SDA	GPIO-14	V1	AV3CTRL1	73	74	AV0CTRL0	M3		
I2C SCL	GPIO-13	V2	AV3CTRL0	75	76	AV1DATA3	P3		
		K3	AV0CTRL2	77	78	AV1DATA2	R1		Video Output
		L3	AV0CTRL1	79	80	AV1DATA1	R2		
		N1	AV0CLK	81	82	AV1DATA0	R3		
Video Output		N2	AV0DATA3	83	84	GND			
		N3	AV0DATA2	85	86	AV2CTRL1	T1		MCLK
		P1	AV0DATA1	87	88	GND			
		P2	AV0DATA0	89	90	AV2CLK	R4		SCLK
			GND	91	92	GND			
LRCK		T2	AV2CTRL0	93	94	AV4DATA1	W2		SPDIF output
A/D data 1		T3	AV2DATA3	95	96	AV4DATA0	Y1		SPDIF input
A/D data 0		T4	AV2DATA2	97	98	GND			
D/A data 1		U1	AV2DATA1	99	100	ETH_LED_ACT			Ethernet
D/A data 0		U2	AV2DATA0	101	102	ETH_LED_SPEED			
			GND	103	104	MIICRS	Y14	GPIO-00	
			ETH_RXN	105	106	MIICOL	W14	GPIO-01	
			ETH_RXP	107	108	MIITXER	V10	GPIO-02	
Ethernet				109	110	MIITXCLK	V11	GPIO-03	iPod Access Power
			ETH_TXN	111	112	MIITXD0	W10		
			ETH_TXP	113	114	MIITXD1	Y10		
			GND	115	116	MIIRXD0	W12		
	GPIO-15	N18	NWAIT	117	118	MIIRXD1	Y12		
			NPD_RF	119	120	GND			

Note: The IC PIN column indicates the pin number on the DM860 or DM870 integrated circuit. This allows for easy cross-reference to the DM860 or DM870 data sheet information.

J1 – LCD Connector

Function	GPIO	IC PIN	Signal	PIN Number		Signal	IC PIN	GPIO	Function
			GND	1	2	GND			
		Y7	LCDD0	3	4	LCDD1	W7		
		V7	LCDD2	5	6	LCDD3	Y6		
		W6	LCDD4	7	8	LCDD5	V6		
		U6	LCDD6	9	10	LCDD7	Y5		
LCD Interface		W5	LCDD8	11	12	LCDD9	V5		LCD Interface
		U5	LCDD10	13	14	LCDD11	Y4		
		W4	LCDD12	15	16	LCDD13	V4		
		U4	LCDD14	17	18	LCDD15	Y3		
		W3	LCDD16	19	20	LCDD17	Y2		
			GND	21	22	GND			
		Y9	LCDCLK	23	24	LCDCTRL0	W9		
LCD Interface		Y8	LCDCTRL1	25	26	LCDCTRL2	W8		LCD Interface
		V8	LCDCTRL3	27	28	GND			
			GND	29	30	GND			

Note: The IC PIN column indicates the pin number on the DM860 or DM870 integrated circuit. This allows for easy cross-reference to the DM860 or DM870 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			
			VIN (+3.3)	5	6	TXD0			
			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	N18	NWAIT	15	16	RXD1	B17		Debug UART
iPod NDETECT	GPIO-19	L18	NCS2	17	18	TXD1	A17		Debug UART
			NRESET	19	20	GND			
		F4	3V3RTC	21	22	AV2CTRL1	T1		MCLK
			GND	23	24	AV2CTRL0	T2		LRCK
SPI		F17	SPI_DIN	25	26	AV2CLK	R4		SCLK
SPI		E17	SPI_DOUT	27	28	AV2DATA2	T4		A/D data 0
SPI		D17	SPI_CLK	29	30	AV2DATA0	U2		D/A data 0
SPI		D16	SPI_NCS0	31	32	AV4DATA1	W2		SPDIF output
Free	GPIO-17	D15	NCS3	33	34	AV4DATA0	Y1		SPDIF input
			GND	35	36	GND			
E-GPIO_NCS/TBA	GPIO-11	C16	SSMD7	37	38	USB_DN	A1		
I2C SDA	GPIO-14	V1	AV3CTRL1	39	40	USB_DP	B1		USB
I2C SCL	GPIO-13	V2	AV3CTRL0	41	42	USBVBUSDRV			USB
			GND	43	44	USB_VBUS			
SPI_REQ	GPIO-06	L1	PDOUT1	45	46	GND			
Factory Reset	GPIO-04	M1	PDOUT0	47	48	SSMD5	K20	GPIO-09	E-GPIO_SDI/TBA
IR input	GPIO-05	M2	VCO0	49	50	SSMD4	C15	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	V11	MIITXCLK	55	56	SSMD6	B16	GPIO-10	E-GPIO_CLK/TBA
Ethernet			ETH_RXN	57	58	ETH_RXP			Ethernet
Ethernet			ETH_TXN	59	60	ETH_TXP			Ethernet
Free	GPIO-00		MMIICRS	61	62	MIICOL		GPIO-01	Free
			GND	63	64	GND			

Note: The IC PIN column indicates the pin number on the DM860 or DM870 integrated circuit. This allows for easy cross-reference to the DM860 or DM870 data sheet information.

8.2.3   GPIO Assignments

GPIO Assignments for J3 64-pin Low Density Connector

GPIO	PIN Name	PIN Number	Function
00	MMIICRS	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.

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.

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9.1.1 Power up, Reset and Power Down Timing
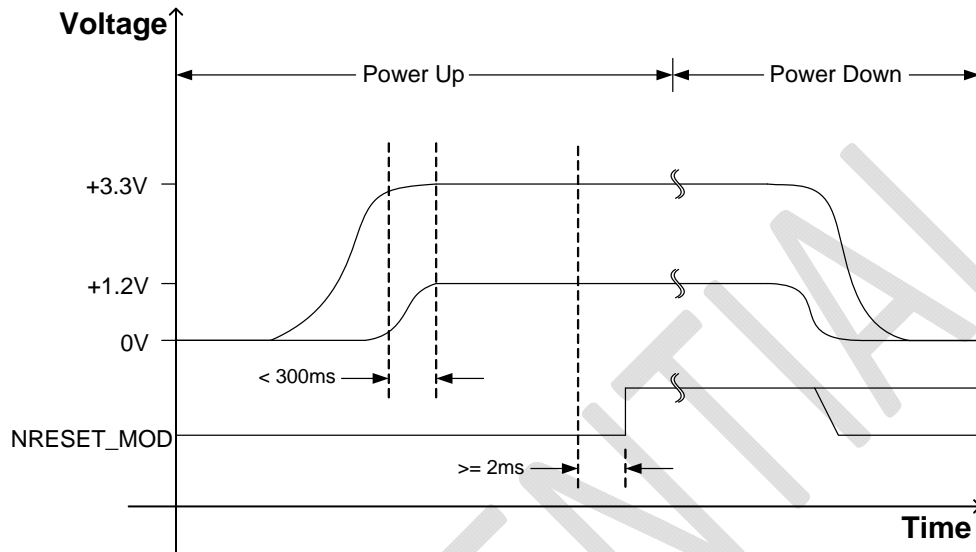
9.2 RF Considerations

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.

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10 Revision Control

Revision	Date / Author	Details of Change	Reason for Change
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 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.

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Revision	Date / Author	Details of Change	Reason for Change
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	• Updated Key Features on Title page: removed (optional) from "WiFi-certified	

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Revision	Date / Author	Details of Change	Reason for Change
		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 • 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	

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Revision	Date / Author	Details of Change	Reason for Change
		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 • 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	

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Revision	Date / Author	Details of Change	Reason for Change
		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 • 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	

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

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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".

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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

SMSC CONFIDENTIAL

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-CX8703x ", FCC ID displayed on label.

The   "x "is for different versions of CX870-3 serial modules, the label text should be updated according to the table shown in Chapter

4.The proper letter shown in Chapter 4 should be substituted for X. For example, The FCC ID:ZQO -CX8703B is for model 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

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 IC: 2581A-CX8703x ", IC ID displayed on label.

The "x"is for different versions of CX870-3 serial modules, the label text should be updated according to the table shown in Chapter 4.The proper letter shown in Chapter 4 should be substituted for x. For example, The IC: 2581A-CX8703B is for model CX870-3B.

This radio transmitter IC: 2581A-CX8703K has been approved by Industry Canada 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.

Antenna List

No	Manufacturer	Part No.	Antenna Type	Peak Gain
1	MAG. LAYERS	MSA-3612-2G4C1-A1	PIFA	2.1 dBi for 2.4GHz