



Migration Guide from AirPrime MC879x to AirPrime MC8704/MC8705

AirPrime MC8704/MC8705



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Contact Information

Sales Desk:	Phone:	1-604-232-1488
	Hours:	8:00 AM to 5:00 PM Pacific Time
	E-mail:	sales@sierrawireless.com
Post:	Sierra Wireless 13811 Wireless Way Richmond, BC Canada V6V 3A4	
Technical Support:	support@sierrawireless.com	
RMA Support:	repairs@sierrawireless.com	
Fax:	1-604-231-1109	
Web:	www.sierrawireless.com	

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1. Introduction

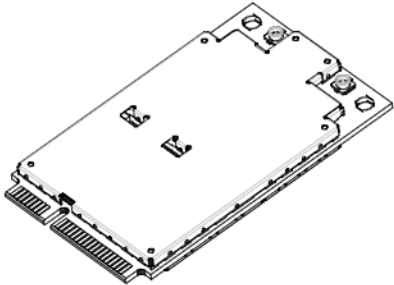
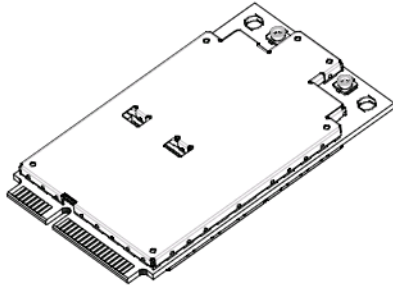
This document aims to provide guidance with migrating applications from using the AirPrime MC879x mini card (with variants MC8790, MC8790V, MV8792V, MC8795V) to using the AirPrime MC8704/MC8705 mini card. It sums up the differences between the AirPrime MC879x and AirPrime MC8704/MC8705 mini cards; and provides recommendations to maximize the compatibility between the two mini card families when used for the same application.

2. General Description

2.1. General Information

The table below defines the MC879x and MC8704/MC8705 mini cards.

Table 1. Comparison Table Between the MC879x and MC8704/MC8705

MC879x	MC8704/MC8705
	
Quad band GSM EDGE Quad band UMTS* HSDPA and HSUPA Standalone GPS, gpsOneXTRA, A-GPS	Quad band GSM EDGE Penta band UMTS HSDPA, HSUPA and HSPA+ Standalone GPS, gpsOneXTRA, A-GPS
HSDPA 7.2Mbps HSUPA 5.76Mbps	HSPA+ 21.1Mbps HSUPA 5.76Mbps
Regular use: -25°C to +60°C Reduced RF performance: +60°C to +75°C	Regular use: -25°C to +60°C Reduced RF performance: +60°C to +75°C
1 x UART interface ⁽¹⁾ 1 x USB 2.0 High speed 1 x PCM ⁽¹⁾ 1 x Analog Audio ⁽¹⁾ 4 x GPIO ⁽¹⁾ 1 x Flash LED Output 1 x ADC ⁽¹⁾ 1 x USIM	I ² S interface ⁽²⁾ 1 x USB 2.0 High speed 5 x GPIO ⁽²⁾ 1 x Flash LED Output 1 x USIM
51mm x 30mm x 4.5mm (typical)	50.85mm x 29.85mm x 4.38mm (typical)

* The MC8792V is tri band UMTS, and the MC8795V is penta band UMTS.

(1) Not available on the MC8790.

(2) Not available on the MC8705.



3. Hardware Compatibility

3.1. RF Band

The MC879x and MC8704/MC8705 mini cards are currently available in footprint compatible EDGE, HSPA. The following table shows the RF capabilities of each mini card variant.

Table 2. RF Band Supported by the MC879x and MC8704/MC8705

Mini Card Variant	RF Band	Bandwidth
MC8790	Quad band GSM EDGE 850 / 900 / 1800 / 1900 MHz Quad band UMTS 800 / 850 / 1900 / 2100 MHz Diversity (800 / 850 / 1900 / 2100 MHz) GPS, Data only	EDGE Class 12, HSDPA 7.2Mbps, HSUPA 5.76Mbps
MC8790V	Quad band GSM EDGE 850 / 900 / 1800 / 1900 MHz Quad band UMTS 800 / 850 / 1900 / 2100 MHz Diversity (800 / 850 / 1900 / 2100 MHz) GPS, Voice or Data	EDGE Class 12, HSDPA 7.2Mbps, HSUPA 5.76Mbps
MC8792V	Quad band GSM EDGE 850 / 900 / 1800 / 1900 MHz Tri band UMTS 900 / 1900 / 2100 MHz Diversity (900 / 1900 / 2100 MHz) GPS, Voice or Data	EDGE Class 12, HSDPA 7.2Mbps, HSUPA 5.76Mbps
MC8795V	Quad band GSM EDGE 850 / 900 / 1800 / 1900 MHz Penta band UMTS 800 / 850 / 900 / 1900 / 2100 MHz Diversity (800 / 850 / 900 / 1900 / 2100 MHz) GPS, Voice or Data	EDGE Class 12, HSDPA 7.2Mbps, HSUPA 5.76Mbps
MC8704	Quad band GSM EDGE 850 / 900 / 1800 / 1900 MHz Penta band UMTS 800 / 850 / 900 / 1900 / 2100 MHz Diversity (800 / 850 / 900 / 1900 / 2100 MHz) GPS, Voice or Data	EDGE Class 12, HSPA+ 21.1Mbps, HSUPA 5.76Mbps
MC8705	Quad band GSM EDGE 850 / 900 / 1800 / 1900 MHz Penta band UMTS 800 / 850 / 900 / 1900 / 2100 MHz Diversity (800 / 850 / 900 / 1900 / 2100 MHz) GPS, Data only	EDGE Class 12, HSPA+ 21.1Mbps, HSUPA 5.76Mbps

3.2. RF Connectors

The MC879x and MC8704/MC8705 mini cards have identical RF connectors – a main RF connector and another connector shared for Diversity and GPS.

Refer to the following diagram for the RF connectors available on the MC879x and MC8704/MC8705 mini cards.

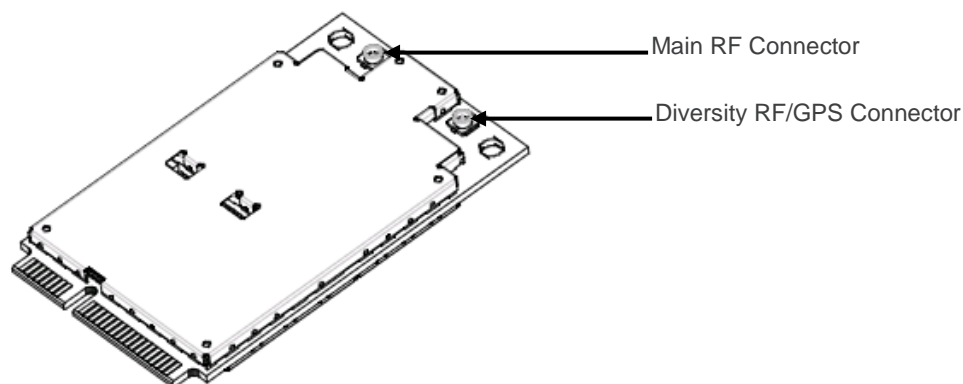


Figure 1. AirPrime MC879x, MC8704, MC8705 Mini Card RF Connectors

3.3. Temperature Range

There is no difference between the operating temperature range of the MC879x and MC8704/MC8705 mini cards.

Table 3. Operating Temperature Range of the MC879x and MC8704/MC8705

Product Reference	Operating Temperature Range
MC8790/MC8790V/MC8792V/MC8795V/MC8704/MC8705	Regular use: -25°C to +60°C Reduced RF performance: +60°C to +75°C

3.4. Power Supply

The MC879x and MC8704/MC8705 mini cards have slightly varying operating voltages. The minimum voltage for the MC879x is 3.0V, while the minimum voltage for the MC8704/MC8705 is 3.2V. Refer to the following table for more information.

Table 4. Operating Voltages of the MC879x and MC8704/MC8705

V _{in}	MC879x	MC8704/MC8705
V _{in} Max.	3.6 volt	3.6 volt
V _{in} Nominal	3.3 volt	3.3 volt
V _{in} Min.	3.0 volt	3.2 volt

3.5. Application Design Limitation

3.5.1. Analog Audio Interface

Analog audio is only available on the MC8790V, MC8792V, and MC8795V. The MC8790 and MC8704/MC8705 do not support analog audio.

Table 5. Analog Audio Interface Pin Out of the MC879x and MC8704/MC8705

Pin #	MC8790, MC8704, MC8705			MC8790V, MC8792V, MC8795V		
	Signal Name	Function	DC Bias	Signal Name	Function	DC Bias
1	NC	--	--	MIC_P	Microphone positive with internal bias	2.1V
3	NC	--	--	MIC_N	Microphone negative	--
5	NC	--	--	SPK_P	Speaker positive output	--
7	NC	--	--	SPK_N	Speaker negative output	--

3.5.2. Digital Audio Interface

The MC8790V, MC8792V, MC8795V and MC8704 with PCM mini cards have compatible pin outs for digital audio interface; while the MC8704 supports I²S digital audio interface.

The MC8790 and MC8705 do not support digital audio function.

The following table describes the PCM signals of the MC8790V/MC8792V/MC8795V and the I²S pins of the MC8704.

Table 6. Digital Audio Interface Pin Out of the MC879x and MC8704/MC8705

Pin #	MC8790, MC8705			MC8790V, MC8792V, MC8795V			MC8704		
	Signal Name	Function	Value	Signal Name	Function	Value	Signal Name	Function	Value
45	NC	--	--	PMC_CLK	Bit Clock	2V6 output	I2S_SCLK	I ² S Clock	1V8 output
47	NC	--	--	PCM_DIN	Data input	2V6 input	I2S_DOUT	I ² S Data Out	1V8 output
49	NC	--	--	PCM_DOUT	Data output	2V6 output	I2S_DIN	I ² S Data In	1V8 input
51	NC	--	--	PCM_SYNC	Frame Sync	2V6 output	I2S_WS	I ² S Word Select	1V8 output

The MC8790V/MC8792V/MC8795V's digital audio interface works in master mode. To make the application compatible with other mini cards, the external device which connects to the modules' digital audio interface must be compatible with the modules' operating clock rates.

The following table shows the operating mode details between the MC8790V/MC8792V/MC8795V and MC8704.

Table 7. Digital Audio Interface Features of the MC8790V/MC8792V/MC8795V and MC8704

Parameter	MC8790V/MC8792V/MC8795V	MC8704
Operating Mode	Master	Master
Bit rate	2.048MHz	32x sample rate
Sample rate	8kHz	8kHz/16KHz/48KHz

3.5.3. UART1 Interface

The MC8790V/MC8792V/MC8795V mini cards support full UART; while the MC8790, MC8704 and MC8705 do not support UART function.

3.5.4. USB Interface

Both the MC879x and MC8704/MC8705 mini cards support USB 2.0 High Speed.

Table 8. Common USB Interface on the MC879x and MC8704/MC8705

Pin #	MC879x			MC8704/MC8705		
	Signal Name	Function	Value	Signal Name	Function	Value
36	USB_D-	USB Data -ve	--	USB_D-	USB Data -ve	--
38	USB_D+	USB Data +ve	--	USB_D+	USB Data +ve	--

3.5.5. GPIO(s)

The number of GPIO varies depending on the mini card. The MC8790 and MC8705 mini card do not support GPIO, the MC8790V and MC8792V provides six GPIOs, the MC8795V provides four GPIOs, and the MC8704 provides five GPIOs.

The following table enumerates the available GPIOs on the MC879x and MC8704/MC8705.

Table 9. GPIOs Available on the MC879x and MC8704/MC8705

Pin #	MC8790, MC8705	MC8790V	MC8792V	MC8795V	MC8704
6	-	GPIO_1	GPIO_1	GPIO_1	-
16	-	GPIO_2	GPIO_2	GPIO_2	GPIO_1
28	-	GPIO_3	GPIO_3	GPIO_3	GPIO_2
30	-	-	-	GPIO_4	
44	-	GPIO_4	GPIO_4	-	GPIO_3
46	-	GPIO_5	GPIO_5	-	GPIO_4
48	-	GPIO_6	GPIO_6	-	GPIO_5

3.5.6. Digital Control Signal

3.5.6.1. ON/OFF

The W_DISABLE# signal (pin 20) of the MC879x and MC8704/MC8705 is used to power ON or power OFF the mini card.

3.5.6.2. Flash LED

The Flash LED output of the MC879x and the MC8704/MC8705 are the same. It provides an open drain output which allows the LED to be directly connected to the mini card.

3.6. Mechanical Differences

The module thickness between the MC879x and MC8704/MC8705 mini cards vary. The following table enumerates the thickness of both MC879x and MC8704/MC8705 mini cards.

Table 10. Thickness of the MC879x and MC8704/MC8705

	MC879x	MC8704/MC8705
Thickness	4.5mm (typical)	4.3mm (typical)

For detailed mechanical drawings, refer to the specific Product Technical Specification of each mini card variant as listed in section 5.1 List of References.



4. MC879x and MC8704/MC8705 Mini Card Pin Out

Table 11. MC879x and MC8704/MC8705 Mini Card Pin Assignments

Pin #	MC8790			MC8790V/MC8792V			MC8795V			MC8704			MC8705		
	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O
1	NC	Not connected	--	MIC_P	Microphone positive	I	MIC_P	Microphone positive	I	NC	Not connected	--	NC	Not connected	--
2	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I
3	NC	Not connected	--	MIC_N	Microphone negative	I	MIC_N	Microphone negative	I	NC	Not connected	--	NC	Not connected	--
4	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
5	NC	Not connected	--	SPK_P	Speaker positive	O	SPK_P	Speaker positive	O	NC	Not connected	--	NC	Not connected	--
6	NC	Not connected	--	GPIO_1	General purpose I/O	I/O	GPIO_1	General purpose I/O	I/O	Indicate enumeration	USB enumeration completion indicator	O	NC	Not connected	--
7	NC	Not connected	--	SPK_N	Speaker negative	O	SPK_N	Speaker negative	O	NC	Not connected	--	NC	Not connected	--
8	USIM_P WR	USIM VCC supply	O	USIM_P WR	USIM VCC supply	O	USIM_P WR	USIM VCC supply	O	USIM_P WR	USIM VCC supply	O	USIM_P WR	USIM VCC supply	O
9	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
10	USIM_DATA	USIM I/O pin	I/O	USIM_DATA	USIM I/O pin	I/O	USIM_DATA	USIM I/O pin	I/O	USIM_DATA	USIM I/O pin	O	USIM_DATA	USIM I/O pin	O
11	NC	Not connected	--	VCC_M SM26_DIG	2.6V voltage reference	O	VCC_M SM26_DIG	2.6V voltage reference	O	VCC_M SM18_DIG	1.8V voltage reference	O	NC	Not connected	--
12	USIM_CLK	USIM clock	O	USIM_CLK	USIM clock	O	USIM_CLK	USIM clock	O	USIM_CLK	USIM clock	O	USIM_CLK	USIM clock	O

Pin #	MC8790			MC8790V/MC8792V			MC8795V			MC8704			MC8705		
	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O
13	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--
14	USIM_RESET	USIM reset	O	USIM_RESET	USIM reset	O	USIM_RESET	USIM reset	O	USIM_RESET	USIM reset	O	USIM_RESET	USIM reset	O
15	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
16	NC	Not connected	--	GPIO_2	General purpose I/O	I/O	GPIO_2	General purpose I/O	I/O	GPIO_1	Not connected	--	NC	Not connected	--
17	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--
18	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
19	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--
20	W_DISABLE#	Wireless disable	I	W_DISABLE#	Wireless disable	I	W_DISABLE#	Wireless disable	I	W_DISABLE_N	Wireless Disable	I	W_DISABLE_N	Wireless Disable	I
21	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
22	NC	Not connected	--	AUXV1	Auxiliary voltage 1	I	AUXV1	Auxiliary Voltage 1	I	AUXV1	Auxiliary Voltage 1	--	NC	Not connected	--
23	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--
24	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I
25	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--
26	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
27	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
28	NC	Not connected	--	GPIO_3	General purpose I/O	I/O	GPIO_3	General purpose I/O	I/O	GPIO_2	General	I/O	NC	Not connected	--
29	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--

Pin #	MC8790			MC8790V/MC8792V			MC8795V			MC8704			MC8705		
	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O
30	NC	Not connected	--	Reserved	Reserved	--	GPIO_4	General purpose I/O	--	I2C_CLK	I ² C Serial bus clock	O	NC	Not connected	--
31	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--	NC	Not connected	--
32	NC	Not connected	--	UART RI	Ring indicator	O	UART RI	Ring indicator	O	I2C_DATA	I ² C Serial bus data	O	NC	Not connected	--
33	NC	Not connected	--	MDL_RESET_N	Reset	I	MDL_RESET_N	Reset	I	MDL_RESET_N	Reset	I	NC	Not connected	--
34	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
35	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
36	USB_D-	USB data negative	I/O	USB_D-	USB data negative	I/O	USB_D-	USB data negative	I/O	USB_D-	USB data negative	I/O	USB_D-	USB data negative	I/O
37	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
38	USB_D+	USB data positive	I/O	USB_D+	USB data positive	I/O	USB_D+	USB data positive	I/O	USB_D+	USB data positive	I/O	USB_D+	USB data positive	I/O
39	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I
40	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
41	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	--	VCC	3.3V supply	--
42	LED_WAN#	LED driver	O	LED_WAN#	LED driver	O	LED_WAN#	LED driver	O	LED_WAN#	LED driver	O	LED_WAN#	LED driver	O
43	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
44	NC	Not connected	--	DCD/GPIO_4	UART data carrier detect	O	UART DCD	UART data carrier detect	O	GPIO_3	General purpose I/O	I/O	NC	Not connected	--
45	NC	Not connected	--	CTS/PCM_CLK	UART clear to send/PCM Clock	O	CTS/PCM_CLK	UART clear to send/PCM clock	O	I2S_SCLK	I ² S Clock	O	NC	Not connected	--

Pin #	MC8790			MC8790V/MC8792V			MC8795V			MC8704			MC8705		
	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O	Signal Name	Function	I/O
46	NC	Not connected	--	DSR/GPIO_5	UART data set ready	O	DSR	UART data set ready	O	GPIO_4	General purpose I/O	I/O	NC	Not connected	--
47	NC	Not connected	--	RTS/PCM_DIN	UART ready to send/PCM data in	I	RTS/PCM_DIN	UART ready to send/PCM data in	I	I2S_DO UT	I ² S Data out	O	NC	Not connected	--
48	NC	Not connected	--	DTR/GPIO_6	UART data terminal ready	I	DTR	UART data terminal ready	I	GPIO_5	General purpose I/O	I/O	NC	Not connected	--
49	NC	Not connected	--	RD/PCM_DO UT	UART receive data/PCM data out	O	RD/PCM_DO UT	UART receive data/PCM data out	O	I2S_DIN	I ² S Data in	O	NC	Not connected	--
50	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--	GND	Ground	--
51	NC	Not connected	--	TD/PCM_SYNC	UART transmit data/PCM sync out	I/O	TD/PCM_SYNC	UART transmit data/PCM sync out	I/O	I2S_WS	I ² S Word select	I	NC	Not connected	--
52	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I	VCC	3.3V supply	I



5. Reference Documents

5.1. List of References

- [1] AirPrime MC8790 PCI Express Mini Card Product Specification
Reference: 2111279
- [2] AirPrime MC8790V with Audio PCI Express Mini Card Product Specification
Reference: 2111280
- [3] AirPrime MC8792V with Audio PCI Express Mini Card Product Specification
Reference: 2131033
- [4] AirPrime MC8795V with Audio PCI Express Mini Card Product Specification
Reference: 2131276
- [5] AirPrime MC8704 with Audio PCI Express Mini Card Product Specification
Reference: 4111998
- [6] AirPrime MC8705 PCI Express Mini Card Product Specification
Reference: 4111996
- [7] AirCard/AirPrime UMTS Devices Supported AT Command
Reference: 2130617

5.2. Glossary

Term	Definition
GND	Ground
NC	Not Connected When a pin is marked as not connected, it means that no connection should be made from the pin to the application board.
Reserved	When a pin is marked as Reserved, it means that no connection should be made from the module pin to the application board; and that there might be a connection to the pin from within the module.



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