Migration Guide
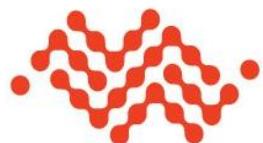
AirPrime Q2698

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Document History

Version	Date	Updates
1.0	February 07, 2012	Creation
1.1	February 24, 2012	Updated Figure 1 Block Level Functional Compatibility; added a note after the figure.
2.0	May 07, 2012	Added Q2698 support for Band VI 800 MHz in Table 1 and Table 2.
		Updated Q2698 Class A temperature range in Table 3.
		Updated Q2698 minimum voltage in Table 4.
3.0	April 08, 2013	Updated: • Table 1 Comparison Table Between the Q26 Series Embedded Modules • Table 8 GPIOs Available on the Q26 Series Embedded Modules • Table 21 Q26 Series Pin Description
4.0	April 17, 2013	Updated section 4.3 RF Interface
4.1	June 19, 2013	Updated temperature range for Q2698 in Table 1 Comparison Table Between the Q26 Series Embedded Modules
		Added a reference for section 4.3 RF Interface in section 3.4.2.1 Antenna Interface

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1. Introduction

This document aims to provide a guideline for designing applications based on the AirPrime Q26 series of embedded modules (Q26 Extreme, Q2686, Q2687, and Q2698). Recommendations are provided to maximize the compatibility of applications when migrating from one Q26 embedded module to another.

2. General Description

The table below lists the features and interfaces available on the Q26 Extreme, Q2686, Q2687 and Q2698 embedded modules.

Table 1.   Comparison Table Between the Q26 Series Embedded Modules

Q26 Extreme	Q2686	Q2687	Q2698
Tri-Band UMTS/HxDPA (WCDMA/FDD) 2100/1900/850 MHz (band I, II, V): • Downlink data rates up to HSDPA Category 8 (7.2 Mbps) • Uplink data rates up to HSUPA Category 5 (2 Mbps)	N/A	N/A	Penta-Band UMTS/HSPA (WCDMA/FDD) 2100/1900/850/800/900 MHz (band I, II, V, VI, VIII): • Downlink data rates up to HSDPA Category 10 (14.4 Mbps) • Uplink data rates up to HSUPA Category 6 (5.76 Mbps)
Quad-band GSM GPRS EDGE 850/900/1800/1900 MHz: • GPRS class 12 • EDGE (E-GPRS) multi-slot class 12	Quad-Band GSM GPRS 850/900/1800/1900 MHz: • GPRS multi-slot class 10	Quad-Band GSM GPRS EDGE 850/900/1800/1900 MHz: • GPRS multi-slot class 10 • EDGE (E-GPRS) multi-slot class 10	Quad-band GSM GPRS EDGE 850/900/1800/1900 MHz: • GPRS class 12 • EDGE (E-GPRS) multi-slot class 12
100-pin General Purpose Connector	100-pin General Purpose Connector	100-pin General Purpose Connector	100-pin General Purpose Connector

Q26 Extreme	Q2686	Q2687	Q2698
2 Serial Interfaces: • 2 SPI Buses • 1 I^{2}C Buses 1 Parallel Interface 1 Keyboard Interface 2 UART Interfaces (8-wire UART1 and 4-wire UART2) 45 GPIOs 1 USIM/SIM Interface 2 sets of Analog Audio Interface: • 2 Microphone inputs • 2 Speaker outputs 1 Digital Audio Interface (PCM) 1 USB 2.0 Interface 2 RF Connections: • 1 UFL Connector • 1 RF Solder Pad 1 BUZZER output 3 External Interrupts 2 ADCs 1 DAC 1 Flash LED	2 Serial Interfaces: • 2 SPI Buses • 1 I^{2}C Buses 1 Keyboard Interface 2 UART Interfaces (8-wire UART1 and 4-wire UART2) 44 GPIOs 1 SIM Interface 2 sets of Analog Audio Interface: • 2 Microphone inputs • 2 Speaker outputs 1 Digital Audio Interface (PCM) 1 USB 2.0 Interface 3 RF Connections: • 1 UFL Connector • 1 RF Solder Pad • 1 Precidip Connector 1 BUZZER output 5 External Interrupts 2 ADCs 1 DAC 1 Flash LED	2 Serial Interfaces: • 2 SPI Buses • 1 I^{2}C Buses 1 Parallel Interface 1 Keyboard Interface 2 UART Interfaces (8-wire UART1 and 4-wire UART2) 44 GPIOs 1 SIM Interface 2 sets of Analog Audio Interface: • 2 Microphone inputs • 2 Speaker outputs 1 Digital Audio Interface (PCM) 1 USB 2.0 Interface 3 RF Connections: • 1 UFL Connector • 1 RF Solder Pad • 1 Precidip Connector 1 BUZZER output 5 External Interrupts 2 ADCs 1 DAC 1 Flash LED	2 Serial Interfaces: • 2 SPI Buses* • 1 I^{2}C Buses 2 UART Interfaces (8-wire UART1 and 4-wire UART2*) 43 GPIOs 1 USIM/SIM Interface 1 set of Analog Audio Interface: • 1 Microphone inputs • 1 Speaker outputs 1 Digital Audio Interface (PCM) 1 USB 2.0 Interface 3 RF Connections: • 1 UFL Connector • 1 RF Solder Pad • 1 Precidip Connector 1 BUZZER output 3 External Interrupts 3 ADCs 1 Flash LED 1 TX Burst Indicator
Class A: -20 °C to +55°C Class B: -30 °C to +75°C	Class A: -30°C to +70°C Class B: -40°C to +85°C	Class A: -30°C to +70°C Class B: -40°C to +85°C	Class A: -30°C to +70°C Class B: -40°C to + 85°C
32.2x40x6.3 mm (excluding shielding pins)	32.2x40x4 mm (excluding shielding pins)	32.2x40x4 mm (excluding shielding pins)	32.2x40x6.2 mm (excluding shielding pins)

*　　　The SPI2 and UART2 interface of the Q2698 cannot be used simultaneously. Refer to document [4] AirPrime Q2698 Product Technical Specification and Customer Design Guidelines for more information about switching between SPI2 and UART2.

3. Functional Compatibility

The following diagram shows the features and interfaces that are available in the Q26 Series, and indicates the compatibility status of a feature across the different Q26 Series embedded modules.
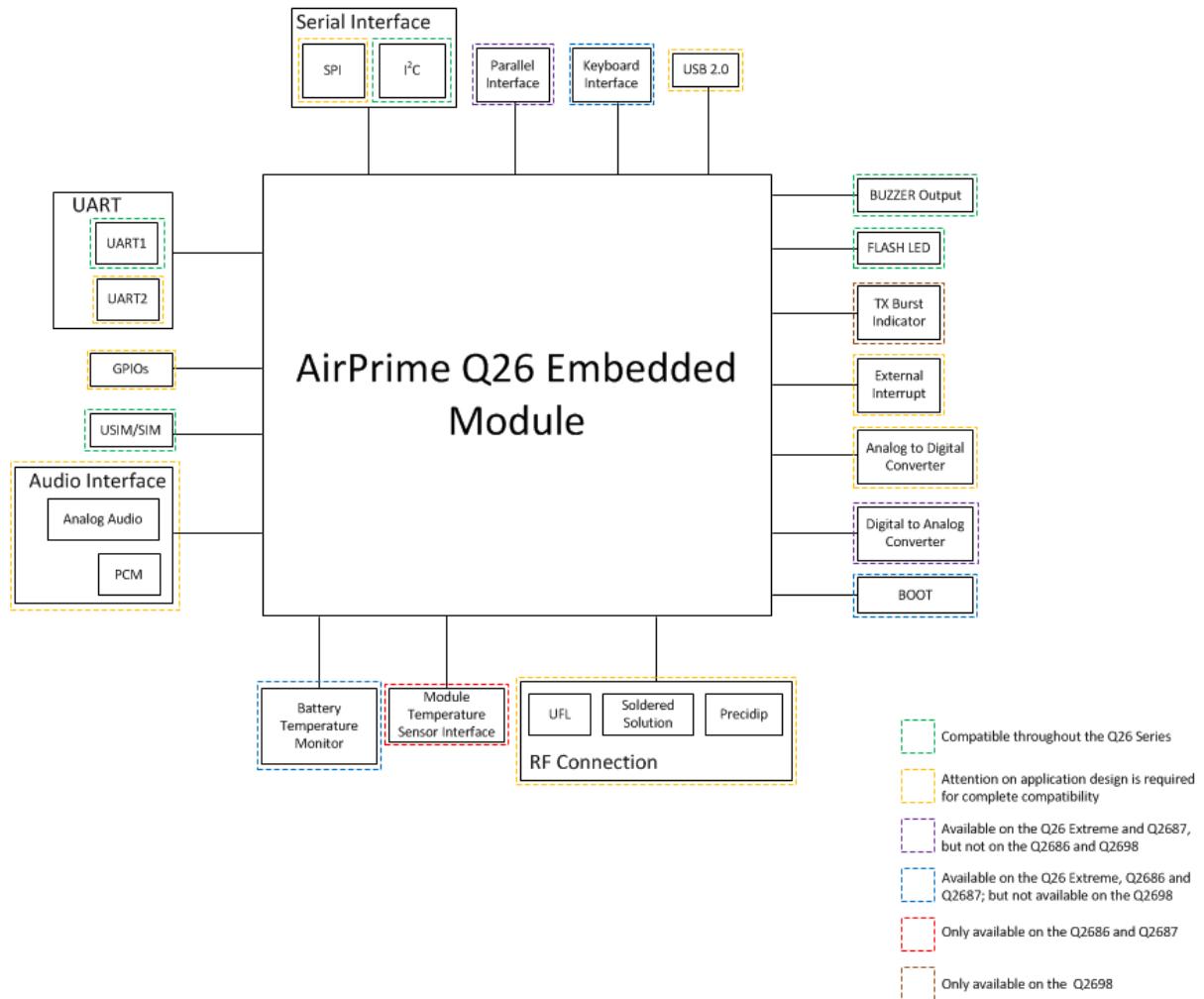
Figure 1.   Block Level Functional Compatibility

Caution: *Although the AirPrime Q2698 also supports both analog and digital audio interfaces, it should be noted that the audio interface characteristics of the AirPrime Q2698 is different from those of the other AirPrime Q26 Series embedded modules. Refer to document [4] AirPrime Q2698 Product Technical Specification and Customer Design Guidelines for more information.*

3.1. RF Band Compatibility

The following table shows the RF capabilities of the Q26 Extreme, Q2686, Q2687, and Q2698 embedded modules.

Table 2.   RF Bands Supported by the Q26 Series Embedded Modules

Q26 Extreme	Q2686	Q2687	Q2698
UMTS/HxDPA (WCDMA/FDD) 850/1900/2100 MHz (band I, II, V) EGSM / GPRS CL 12 / EDGE CL 12 850/900/1800/1900 MHz	EGSM / GPRS CL 10 850/900/1800/1900 MHz	EGSM / GPRS / EGPRS CL 10 850/900/1800/1900 MHz	UMTS/HxDPA (WCDMA/FDD) 800/850/900/1900/2100 MHz (band I, II, V, VI, VIII) EGSM / GPRS CL 12 / EDGE CL 12 850/900/1800/1900 MHz

3.2. Operating Temperature Compatibility

The following table lists the operating temperature range of the Q26 Extreme, Q2686, Q2687, and Q2698 embedded modules.

Table 3.   Operating Temperature Range of the Q26 Series Embedded Modules

Q26 Extreme	Q2686	Q2687	Q2698
Class A: -20 °C to +55°C Class B: -30 °C to +75°C	Class A: -30°C to +70°C Class B: -40°C to +85°C	Class A: -30°C to +70°C Class B: -40°C to +85°C	Class A: -30°C to +70°C Class B: -40°C to + 85°C

3.3. Power Supply Compatibility

Refer to the following table for the power supply voltage range of the Q26 Extreme, Q2686, Q2687, and Q2698 embedded modules.

Table 4.   Operating Voltages of the Q26 Series Embedded Modules

Voltage	Q26 Extreme	Q2686	Q2687	Q2698
V_{in} Minimum	3.4V	3.2V	3.2V	3.4V
V_{in} Nominal	3.8V	3.6V	3.6V	3.8V
V_{in} Maximum	4.2V	4.8V	4.8V	4.2V

3.4.　　Application Design Limitation

The following sub-sections describe application design limitations that must be taken into account when migrating from the Q26 Extreme, Q2686, or Q2687 to the Q2698 embedded module.

3.4.1.　　Features Compatible throughout the Q26 Series

The following table lists features that are compatible throughout the Q26 Series embedded modules that do not have any design restrictions.

Table 5.　　Features Compatible Throughout the Q26 Series Embedded Modules

Pin Number	Q26 Extreme Signal Name	Q2686 Signal Name	Q2687 Signal Name	Q2698 Signal Name
I^2C				
44	SCL1	SCL1	SCL1	SCL1*
46	SDA1	SDA1	SDA1	SDA1*
UART1				
69	~CT125-RI1	~CT125-RI1	~CT125-RI1	~CT125-RI1
70	~CT109-DCD1	~CT109-DCD1	~CT109-DCD1	~CT109-DCD1
71	CT103-TXD1	CT103-TXD1	CT103-TXD1	CT103-TXD1
72	~CT105-RTS1	~CT105-RTS1	~CT105-RTS1	~CT105-RTS1
73	CT104-RXD1	CT104-RXD1	CT104-RXD1	CT104-RXD1
74	~CT107-DSR1	~CT107-DSR1	~CT107-DSR1	~CT107-DSR1
75	~CT106-CTS1	~CT106-CTS1	~CT106-CTS1	~CT106-CTS1
76	~CT108-2-DTR1	~CT108-2-DTR1	~CT108-2-DTR1	~CT108-2-DTR1
USIM/SIM				
9	SIM-VCC	SIM-VCC	SIM-VCC	SIM-VCC
11	SIM-IO	SIM-IO	SIM-IO	SIM-IO
12	SIMPRES	SIMPRES	SIMPRES	SIMPRES
13	~SIM-RST	~SIM-RST	~SIM-RST	~SIM-RST
14	SIM-CLK	SIM-CLK	SIM-CLK	SIM-CLK
Buzzer Output				
15	BUZZER0	BUZZER0	BUZZER0	BUZZER0
Flash LED				
17	LED0	LED0	LED0	LED0

*　　　　The I^2C pins cannot be connected to GND when not used. Refer to document [4] AirPrime Q2698 Product Technical Specification and Customer Design Guidelines for more information.

3.4.2.   Features Compatible throughout the Q26 Series with Application Design Restrictions

The following sub-sections describe the interfaces that are compatible in the Q26 Series embedded modules but with some application design restrictions.

3.4.2.1.   Antenna Interface
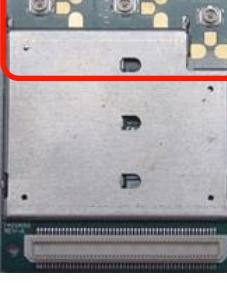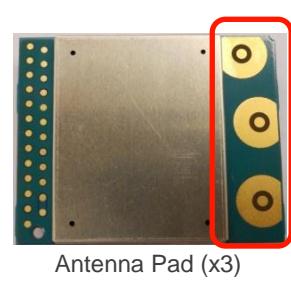
The Q26 Extreme embedded module supports two antenna types (main and diversity) and two antenna connections; the Q2686 and Q2687 support one antenna, but three different connections; and the Q2686 supports three antennas (main, diversity, GPS) and three antenna connections.

Refer to the following tables for more information about the supported antennas and their available connections on the Q26 Series embedded modules.

Table 6.   Antenna Connections Available on the Q26 Series Embedded Modules

Antenna	Q26 Extreme Connector	Q2686 Connector	Q2687 Connector	Q2698 Connector
Main	UFL, Soldered Solution	UFL, Soldered Solution, Precidip	UFL, Soldered Solution, Precidip	UFL, Soldered Solution, Precidip
Diversity	Soldered Solution	N/A	N/A	UFL, Soldered Solution, Precidip
GPS	N/A	N/A	N/A	UFL, Soldered Solution, Precidip

Table 7.   Antenna Connection Locations on the Q26 Series Embedded Modules

Q26 Extreme	Q2686	Q2687	Q2698
UFL Connector	UFL and Precidip Connectors	UFL and Precidip Connectors	UFL and Precidip Connectors (x3)
Antenna Pad	Antenna Pad	Antenna Pad	Antenna Pad (x3)

For more information about the antenna interfaces of the Q26 Series, refer to section 4.3 RF Interface, or the corresponding product technical specification of the embedded module as listed in section 7.1 Reference Documents.

3.4.2.2.   GPIOs

The Q26 Extreme provides up to 45 GPIOs, while the Q2686 and Q2687 provide up to 44 GPIOs, and the Q2698 provides 43 GPIOs.

Refer to the following table for the pin description of the GPIOs available in the Q26 Series embedded modules.

Table 8.   GPIOs Available on the Q26 Series Embedded Modules

Pin Number	Q26 Extreme Signal Name	Q2686 Signal Name	Q2687 Signal Name	Q2698 Signal Name
12	GPIO18	GPIO18	GPIO18	GPIO18
22	GPIO31	GPIO31	GPIO31	GPIO31
23	GPIO28	GPIO28	GPIO28	GPIO28
24	GPIO30	GPIO30	GPIO30	GPIO30
25	GPIO29	GPIO29	GPIO29	GPIO29
26	GPIO32	GPIO32	GPIO32	GPIO32
27	GPIO33	GPIO33	GPIO33	GPIO33
28	GPIO35	GPIO35	GPIO35	GPIO35
29	GPIO34	GPIO34	GPIO34	GPIO34
30	GPIO15	GPIO15	GPIO15	GPIO15
31	GPIO14	GPIO14	GPIO14	GPIO14
32	GPIO16	GPIO16	GPIO16	GPIO16
33	GPIO17	GPIO17	GPIO17	GPIO17
43	GPIO0	GPIO0	GPIO0	GPIO0
44	GPIO26	GPIO26	GPIO26	SCL1
45	GPIO19	GPIO19	GPIO19	GPIO19
46	GPIO27	GPIO27	GPIO27	SDA1
47	GPIO21	GPIO21	GPIO21	GPIO21
48	GPIO20	GPIO20	GPIO20	GPIO20
49	GPIO25	GPIO25	GPIO25	GPIO25
50	GPIO3	GPIO3	GPIO3	GPIO3
51	GPIO1	GPIO1	GPIO1	GPIO1
53	GPIO2	GPIO2	GPIO2	GPIO2
55	GPIO23	GPIO23	GPIO23	GPIO23
57	GPIO22	GPIO22	GPIO22	GPIO22
58	GPIO24	GPIO24	GPIO24	GPIO24
59	GPIO4	GPIO4	GPIO4	GPIO4
60	GPIO5	GPIO5	GPIO5	GPIO5
61	GPIO6	GPIO6	GPIO6	GPIO6
62	GPIO7	GPIO7	GPIO7	GPIO7
63	GPIO8	GPIO8	GPIO8	GPIO8
64	GPIO13	GPIO13	GPIO13	GPIO13
65	GPIO12	GPIO12	GPIO12	GPIO12
66	GPIO11	GPIO11	GPIO11	GPIO11
67	GPIO10	GPIO10	GPIO10	GPIO10
68	GPIO9	GPIO9	GPIO9	GPIO9

Pin Number	Q26 Extreme Signal Name	Q2686 Signal Name	Q2687 Signal Name	Q2698 Signal Name
69	GPIO42	GPIO42	GPIO42	GPIO42
70	GPIO43	GPIO43	GPIO43	GPIO43
71	GPIO36	GPIO36	GPIO36	GPIO36
72	GPIO38	GPIO38	GPIO38	GPIO38
73	GPIO37	GPIO37	GPIO37	GPIO37
74	GPIO40	GPIO40	GPIO40	GPIO40
75	GPIO39	GPIO39	GPIO39	GPIO39
76	GPIO41	GPIO41	GPIO41	GPIO41
83	GPIO44	Reserved	/CS3	GPIO44

Only common GPIO pins can be used in the application board when the application board has to be compatible with all Q26 Series embedded modules.

For more information about the GPIO pins, refer to the corresponding product technical specification of the embedded module as listed in section 7.1 Reference Documents.

3.4.2.3.   UART2 and SPI2

The UART2 and SPI2 interface in the Q2698 embedded module cannot be used simultaneously. Attention should be paid in designing the application board to ensure complete compatibility with these interfaces when migrating from the Q26 Extreme, Q2686, or Q2687 to the Q2698.

Refer to the following table for the pin description of both UART2 and SPI2 in the Q26 Series embedded modules.

Table 9.   UART2 Signals Available on the Q26 Series Embedded Modules

Pin Number	Q26 Extreme	Q2686	Q2687	Q2698
30	CT104-RXD2/GPIO15	CT104-RXD2/ GPIO15/INT4	CT104-RXD2/ GPIO15/INT4	CT104-RXD2/GPIO15
31	CT103-TXD2/GPIO14	CT103-TXD2/GPIO14	CT103-TXD2/GPIO14	CT103-TXD2/GPIO14
32	~CT106-CTS2/ GPIO16	~CT106-CTS2/ GPIO16	~CT106-CTS2/ GPIO16	~CT106-CTS2/ GPIO16
33	~CT105-RTS2/ GPIO17	~CT105-RTS2/ GPIO17	~CT105-RTS2/ GPIO17	~CT105-RTS2/ GPIO17

Table 10.   SPI2 Signals Available on the Q26 Series Embedded Modules

Pin Number	Q26 Extreme	Q2686	Q2687	Q2698
26	SPI2-CLK/GPIO32	SPI2-CLK/GPIO32	SPI2-CLK/GPIO32	SPI2-CLK/GPIO32
27	SPI2-IO/GPIO33	SPI2-IO/GPIO33	SPI2-IO/GPIO33	SPI2-IO/GPIO33
28	SPI2-LOAD/GPIO35	SPI2-LOAD/GPIO35	SPI2-LOAD/GPIO35	GPIO35
29	SPI2-I/GPIO34	SPI2-I/GPIO34	SPI2-I/GPIO34	SPI2-I/GPIO34
47	GPIO21	GPIO21	GPIO21	SPI2_CS/GPIO21

For more information, refer to the corresponding product technical specification of the embedded module as listed in section 7.1 Reference Documents.

3.4.2.4.   USB Interface

The Q26 Extreme, Q2686, and Q2687 support USB 2.0 full speed; while the Q2698 support USB 2.0 high speed.

Refer to the following table for the pin description of the USB interface available in the Q26 Series embedded modules.

Table 11.   USB Signals Available on the Q26 Series Embedded Modules

Pin Number	Q26 Extreme Signal Name	Q2686 Signal Name	Q2687 Signal Name	Q2698 Signal Name
52	VPAD-USB	VPAD-USB	VPAD-USB	VPAD-USB
54	USB-DP	USB-DP	USB-DP	USB-DP
56	USB-DM	USB-DM	USB-DM	USB-DM

3.4.2.5.   Audio Interface

The following sub-sections describe the differences between the analog and digital audio interface of the Q26 Extreme and Q2698 embedded modules.

3.4.2.5.1.   Analog Audio Interface

The Q26 Extreme, Q2686, and Q2687 embedded modules offers two microphone inputs and two speaker outputs; while the Q2698 embedded module only offers one microphone input and one speaker output.

Refer to the following table for the pin description of the analog audio interface in the Q26 Series embedded modules.

Table 12.   Analog Audio Signals Available on the Q26 Series Embedded Modules

Pin Number	Q26 Extreme Signal Name	Q2686 Signal Name	Q2687 Signal Name	Q2698 Signal Name
34	MIC2N	MIC2N	MIC2N	NC
35	SPK1P	SPK1P	SPK1P	SPK1P
36	MIC2P	MIC2P	MIC2P	NC
37	SPK1N	SPK1N	SPK1N	SPK1N
38	MIC1N	MIC1N	MIC1N	MIC1N
39	SPK2P	SPK2P	SPK2P	NC
40	MIC1P	MIC1P	MIC1P	MIC1P
41	SPK2N	SPK2N	SPK2N	NC

Note that SPK1 in the Q26 Extreme, Q2686, Q2687, and Q2698 embedded modules can only be connected in single-ended mode; while SPK2 on the Q26 Extreme, Q2686, and Q2687 can be connected in either single-ended or differential mode.

For more information, refer to the product technical specification of the corresponding module as listed in section 7.1 Reference Documents.

3.4.2.5.2.   Digital Audio Interface (PCM)

The Q26 Extreme, Q2686, Q2687, and Q2698 offer a digital audio interface (PCM).

Refer to the following table for the pin description of the digital audio interface (PCM) in the Q26 Series embedded modules.

Table 13.   Digital Audio Signals Available on the Q26 Series Embedded Modules

Pin Number	Q26 Extreme Signal Name	Q2686 Signal Name	Q2687 Signal Name	Q2698 Signal Name
77	PCM-SYNC	PCM-SYNC	PCM-SYNC	PCM-SYNC
78	PCM-IN	PCM-IN	PCM-IN	PCM-IN
79	PCM-CLK	PCM-CLK	PCM-CLK	PCM-CLK
80	PCM-OUT	PCM-OUT	PCM-OUT	PCM-OUT

The digital audio interface of the Q26 Series embedded module works in master mode. To make the application compatible with the Q26 Extreme, Q2686, Q2687, and Q2698 embedded modules, the external device which connects to the embedded module's digital audio interface must be compatible with the embedded module's operating clock rates. The following table shows the operating mode details between the Q26 Series embedded modules.

Table 14.   Digital Audio Interface Features of the Q26 Series Embedded Modules

Parameter	Q26 Extreme	Q2686	Q2687	Q2698
Operating Mode	Master mode with 6 slots by frame, user only on slot 4	Master mode with 6 slots by frame, user only on slot 0	Master mode with 6 slots by frame, user only on slot 0	Master mode with 16 slots for Linear Law, 32 slots for Compression Law
Bit Rate	Single clock mode at 768kHz	Single clock mode at 768kHz	Single clock mode at 768kHz	Single clock mode at 2MHz
Sample Rate	8kHz (Linear Law)	8kHz (Linear Law)	8kHz (Linear Law)	8kHz (Linear Law & A/µ Law)
Frame Format	16 bits data word MSB first	16 bits data word MSB first	16 bits data word MSB first	16 bits data word MSB first
Frame Sync Type	Long frame sync only	Long frame sync only	Long frame sync only	Short frame; optional long frame sync (clock mode at 128kHz)

For more information, refer to the product technical specification of the corresponding module as listed in section 7.1 Reference Documents.

3.4.2.6.   External Interrupt

The Q26 Extreme and Q2698 provide 3 external interrupts, while the Q2686 and Q2687 provide 5 external interrupts.

Refer to the following table for the pin description of the external interrupts available in the Q26 Series embedded modules.

Table 15.   External Interrupts Available on the Q26 Series Embedded Modules

Pin Number	Q26 Extreme Signal Name	Q2686 Signal Name	Q2687 Signal Name	Q2698 Signal Name
30	CT104-RXD2/GPIO15	INT4	INT4	CT104-RXD2/GPIO15
49	INT1	INT1	INT1	INT1
50	INT0	INT0	INT0	INT0
51	INT2	GPIO1	GPIO1	INT2
73	CT104-RXD1/GPIO37	INT2	INT2	CT104-RXD1/GPIO37
76	~CT108-2-DTR1/ GPIO41	INT3	INT3	~CT108-2-DTR1/ GPIO41

For more information, refer to the product technical specification of the corresponding module as listed in section 7.1 Reference Documents.

3.4.2.7.   Analog to Digital Converter (ADC)

The Q26 Extreme, Q2686 and Q2687 embedded modules offer two ADCs, while the Q2698 offers 3 ADCs.

Refer to the following table for the pin description of the ADCs in the Q26 Series embedded modules.

Table 16.   ADCs Available on the Q26 Series Embedded Modules

Pin Number	Q26 Extreme Signal Name	Q2686 Signal Name	Q2687 Signal Name	Q2698 Signal Name
20	ADC1	ADC1/BAT-TEMP	ADC1/BAT-TEMP	ADC1
21	ADC2	ADC2	ADC2	ADC2
42	A1	Reserved	A1	ADC3

For more information, refer to the product technical specification of the corresponding module as listed in section 7.1 Reference Documents.

3.4.3.   Features Only Supported on the Q26 Extreme and Q2687

The Q26 Extreme and Q2687 support some features and functionalities not available on the Q2686 and Q2698. The following table enumerates these interfaces/features.

Table 17.   Features Only Supported on the Q26 Extreme and Q2687

Pin Number	Signal Name	Function
Parallel Interface		
42	A1	External address/byte enable
51	/CS2	User Chip Select 2
53	A24	Address line for external device/command selection
81	/OE-R/W	Output enable signal/read not write signal
83	/CS3	User Chip Select 3
84	/WE-E	Write enable signal/enable signal

Pin Number	Signal Name	Function
85	D0	Data Bus
86	D15	Data Bus
87	D1	Data Bus
88	D14	Data Bus
89	D2	Data Bus
90	D13	Data Bus
91	D3	Data Bus
92	D12	Data Bus
93	D4	Data Bus
94	D11	Data Bus
95	D5	Data Bus
96	D10	Data Bus
97	D6	Data Bus
98	D9	Data Bus
99	D7	Data Bus
100	D8	Data Bus
Digital to Analog Converter		
82	DAC0	D/A Converter

For more information, refer to documents [1] AirPrime Q26 Extreme Product Technical Specification and Customer Design Guidelines and [3] AirPrime Q2687 Product Technical Specification and Customer Design Guidelines.

3.4.4.   Features Only Supported on the Q26 Extreme, Q2686, and Q2687

The Q26 Extreme, Q2686, and Q2687 support some features and functionalities that are not available on the Q2698. The following table enumerates these interfaces/features.

Table 18.   Features Only Supported on the Q26 Extreme, Q2686, and Q2687

Pin Number	Signal Name	Function
Keyboard Interface		
59	COL0	Column Scan
60	COL1	Column Scan
61	COL2	Column Scan
62	COL3	Column Scan
63	COL4	Column Scan
64	ROW4	Row Scan
65	ROW3	Row Scan
66	ROW2	Row Scan
67	ROW1	Row Scan
68	ROW0	Row Scan

Pin Number	Signal Name	Function
Battery Temperature Monitor		
6	CHG-IN	Current source input
8	CHG-IN	Current source input
20	BAT-TEMP	A/D Converter
Boot		
16	BOOT	Download mode selection

For more information, refer to documents [1] AirPrime Q26 Extreme Product Technical Specification and Customer Design Guidelines, [2] AirPrime Q2686 Product Technical Specification and Customer Design Guidelines and [3] AirPrime Q2687 Product Technical Specification and Customer Design Guidelines.

3.4.5.   Features Only Supported on the Q2686 and Q2687

The Q2686 and Q2687 support a temperature sensor interface that is not available in the Q26 Extreme and Q2698. This temperature sensor interface is used to detect the temperature of the embedded module. Refer to documents [2] AirPrime Q2686 Product Technical Specification and Customer Design Guidelines and [3] AirPrime Q2687 Product Technical Specification and Customer Design Guidelines for more information about the temperature sensor interface.

3.4.6.   Features Only Supported on the Q2698

The Q2698 supports a TX Burst Indicator which is not available on the Q2 Extreme, Q2686 or Q2687. This signal is available via GPIO13 (pin 64). For more information about this feature, refer to document [4] AirPrime Q2698 Product Technical Specification and Customer Design Guidelines

4. Mechanical Compatibility

4.1. Physical Dimensions

Although the Q26 Series embedded modules share the same form factor, there are some differences in their dimensions.

Table 19.   Physical Dimensions

Dimension	Q26 Extreme	Q2686	Q2687	Q2698
Length	40mm	40mm	40mm	40mm
Width	32.2mm	32.2mm	32.2mm	32.2mm
Height (excluding shielding pins)	6.3mm	4mm	4mm	6.2mm
Weight	11.8g	8g	8g	11.8g

4.2. Shielding Can

The bottom side shielding frame provides 4 legs for connecting the embedded module to an application board, the Q26 Series development kit, or for a GND connection between two boards. The position of these 4 legs is the same for the Q26 Series embedded modules.

4.3. RF Interface

A UFL connector is available on the bottom side of the Q26 Extreme, Q2686, Q2687, and Q2698 embedded module; while an antenna pad is available on the top side of the Q26 Extreme, Q2686, Q2687, and Q2698 embedded module.

The Precidip connector, located on the bottom side of the embedded module, is only available on the Q2686, Q2687, and Q2698.

Note: The X-Y coordinates of the RF interfaces on the Q2698 embedded module is different from the X-Y coordinates of the RF interfaces on the Q26 Extreme, Q2686 and Q2687 modules. Refer to the following figures for more information.
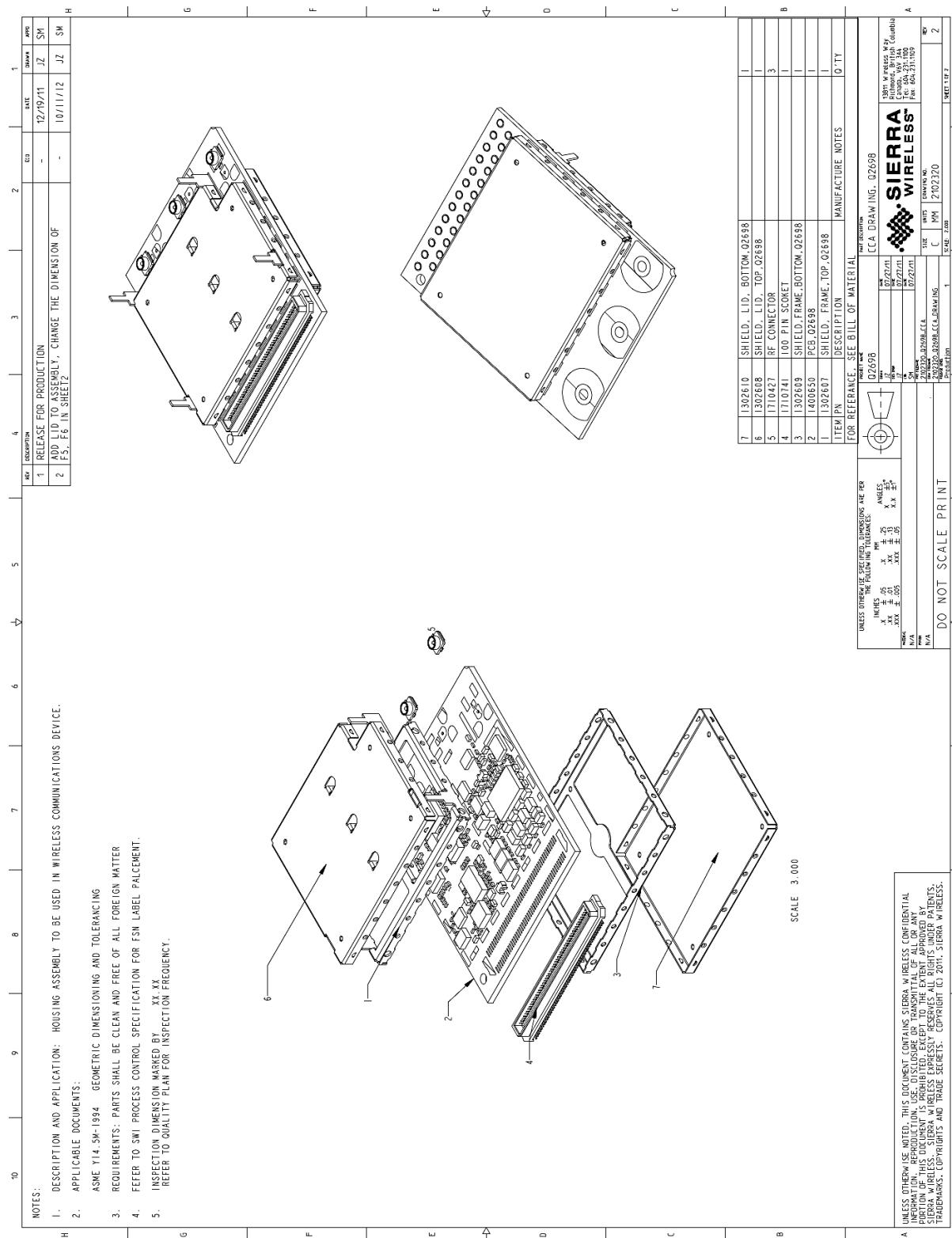
Figure 2.   AirPrime Q2698 Circuit Card Assembly (figure 1 of 2)
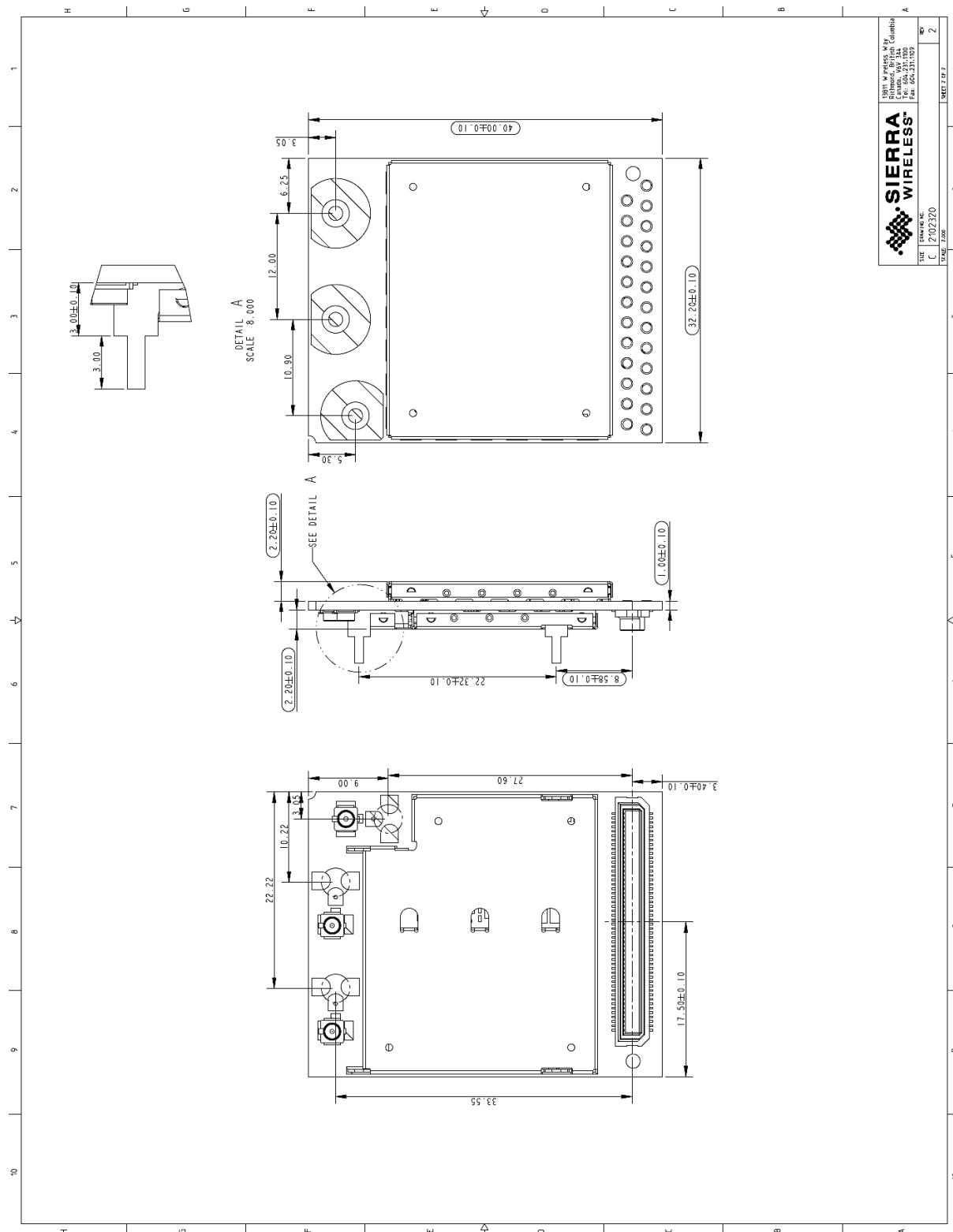
Figure 3.   AirPrime Q2698 Circuit Card Assembly (figure 2 of 2)

For other information about differences of the RF interface among the Q26 Series embedded modules, refer to section 3.4.2.1 Antenna Interface.

5. Performance Difference

The following table shows the power consumption of each Q26 Series embedded module. For more information about the different operating modes and how consumption values were measured, please refer to the product technical specification of the specific Q26 Series embedded module as listed in section 7.1 Reference Documents.

Table 20.   Performance Differences Between the Q26 Series Embedded Module

Operating Mode	I_{NOM} Average				Unit
	Q26 Extreme	Q2686	Q2687	Q2698	
Alarm Mode	18.80	11.3	11.10	29.5	µA
Sleep Mode	1.85	0.39	0.44	2.2	mA
Active Mode	38.24	45.5	22.12	45	mA

6. Q26 Series Pin Description

The following table lists the pin outs of the Q26 Extreme, Q2686, Q2687, and Q2698 embedded modules.

Table 21. Q26 Series Pin Description

Pin #	Q26 Extreme		Q2686		Q2687		Q2698	
	Signal Name	Description	Signal Name	Description	Signal Name	Description	Signal Name	Description
1	VBATT	Power Supply	ADC0/VBATT	Power Supply	ADC0/VBATT	Power Supply	VBATT	Power Supply
2	VBATT	Power Supply	ADC0/VBATT	Power Supply	ADC0/VBATT	Power Supply	VBATT	Power Supply
3	VBATT	Power Supply	ADC0/VBATT	Power Supply	ADC0/VBATT	Power Supply	VBATT	Power Supply
4	VBATT	Power Supply	ADC0/VBATT	Power Supply	ADC0/VBATT	Power Supply	VBATT	Power Supply
5	VCC_1V8	1.8V Supply Output	VCC_1V8	1.8V Supply Output	VCC_1V8	1.8V Supply Output	VCC_1V8	1.8V Supply Output
6	CHG-IN	Charger input	CHG-IN	Charger input	CHG-IN	Charger input	NC	Not Connected
7	BAT-RTC	RTC Battery connection	BAT-RTC	RTC Battery connection	BAT-RTC	RTC Battery connection	BAT-RTC	RTC Battery connection
8	CHG-IN	Charger input	CHG-IN	Charger input	CHG-IN	Charger input	NC	Not Connected
9	SIM-VCC	SIM Power Supply	SIM-VCC	SIM Power Supply	SIM-VCC	SIM Power Supply	SIM-VCC	USIM Power Supply
10	VCC_2V8	2.8V Supply Output	VCC_2V8	2.8V Supply Output	VCC_2V8	2.8V Supply Output	VCC_2V8	2.8V Supply Output
11	SIM-IO	SIM Data	SIM-IO	SIM Data	SIM-IO	SIM Data	SIM-IO	USIM Data
12	SIMPRES/ GPIO18	SIM Detection	SIMPRES/GPIO18	SIM Detection	SIMPRES/GPIO18	SIM Detection	SIMPRES/GPIO18	USIM Detection
13	~SIM-RST	SIM Reset Output	~SIM-RST	SIM Reset Output	~SIM-RST	SIM reset Output	~SIM-RST	USIM Reset
14	SIM-CLK	SIM Clock	SIM-CLK	SIM Clock	SIM-CLK	SIM Clock	SIM-CLK	USIM Clock
15	BUZZER0	Buzzer Output	BUZZER0	Buzzer Output	BUZZER0	Buzzer Output	BUZZER0	Buzzer Output
16	BOOT	Not Used	BOOT	Not Used	BOOT	Not Used	NC	Not Connected
17	LED0	LED0 Output	LED0	LED0 Output	LED0	LED0 Output	LED0	LED0 Output

Pin #	Q26 Extreme		Q2686		Q2687		Q2698	
	Signal Name	Description	Signal Name	Description	Signal Name	Description	Signal Name	Description
18	~RESET	RESET Input	~RESET	RESET Input	~RESET	RESET Input	~RESET	RESET Input
19	ON/~OFF	ON / ~OFF Control	ON/~OFF	ON / ~OFF Control	ON/~OFF	ON / ~OFF Control	ON/~OFF	ON / ~OFF Control
20	BAT-TEMP	Analog temperature	ADC1/BAT-TEMP	Analog temperature	ADC1/BAT-TEMP	Analog temperature	ADC1	Analog temperature
21	ADC2	Analog to Digital Input	ADC2	Analog to Digital Input	ADC2	Analog to Digital Input	ADC2	Analog to Digital Input
22	GPIO31/ SPI1-LOAD		GPIO31/SPI1-Load		GPIO31/ SPI1-Load		GPIO31	General Purpose Input / Output
23	SPI1-CLK/ GPIO28	SPI1 Clock	SPI1-CLK/GPIO28	SPI1 Clock	SPI1-CLK/GPIO28	SPI1 Clock	SPI1-CLK/GPIO28	SPI1 Clock
24	SPI1-I/ GPIO30	SPI1 Data Input	SPI1-I/GPIO30	SPI1 Data Input	SPI1-I/GPIO30	SPI1 Data Input	SPI1-I/GPIO30	SPI1 Data Input
25	SPI1-IO/GPIO29	SPI1 Data Input / Output	SPI1-IO/GPIO29	SPI1 Data Input / Output	SPI1-IO/GPIO29	SPI1 Data Input / Output	SPI1-IO/GPIO29	SPI1 Data Input / Output
26	SPI2-CLK/ GPIO32	SPI2 Clock	SPI2-CLK/GPIO32	SPI2 Clock	SPI2-CLK/GPIO32	SPI2 Clock	SPI2-CLK/GPIO32	SPI2 Clock
27	SPI2-IO/ GPIO33	SPI2 Data Input / Output	SPI2-IO/GPIO33	SPI2 Data Input / Output	SPI2-IO	SPI2 Data Input / Output	SPI2-IO/GPIO33	SPI2 Data Input / Output
28	GPIO35/ SPI2-LOAD		GPIO35/SPI2-Load		GPIO35/SPI2-Load		GPIO35/SPI2-Load	General Purpose Input / Output
29	SPI2-I/ GPIO34	SPI2 Data Input	SPI2-I/GPIO34	SPI2 Data Input	SPI2-I/GPIO34	SPI2 Data Input	SPI2-I/GPIO34	SPI2 Data Input
30	CT104-RXD2/ GPIO15	Auxiliary RS232 Receive	CT104-RXD2/ GPIO15/INT4	Auxiliary RS232 Receive	CT104-RXD2/ GPIO15/INT4	Auxiliary RS232 Receive	GPIO15/ CT104-RXD2	General Purpose Input / Output
31	CT103-TXD2/ GPIO14	Auxiliary RS232 Transmit	CT103-TXD2/ GPIO14	Auxiliary RS232 Transmit	CT103-TXD2/ GPIO14	Auxiliary RS232 Transmit	GPIO14/ CT103-TXD2	General Purpose Input / Output
32	~CT106-CTS2/ GPIO16	Auxiliary RS232 Clear To Send	~CT106-CTS2/ GPIO16	Auxiliary RS232 Clear To Send	~CT106-CTS2/ GPIO16	Auxiliary RS232 Clear To Send	GPIO16/~CT106-CTS2	General Purpose Input / Output
33	~CT105-RTS2/ GPIO17	Auxiliary RS232 Request To Send	~CT105-RTS2/ GPIO17	Auxiliary RS232 Request To Send	~CT105-RTS2/ GPIO17	Auxiliary RS232 Request To Send	GPIO17/~CT105-RTS2	General Purpose Input / Output

Pin #	Q26 Extreme		Q2686		Q2687		Q2698	
	Signal Name	**Description**	**Signal Name**	**Description**	**Signal Name**	**Description**	**Signal Name**	**Description**
34	MIC2N	Micro 2 Input Negative	MIC2N	Micro 2 Input Negative	MIC2N	Micro 2 Input Negative	NC	Not Connected
35	SPK1P	Speaker 1 Output Positive	SPK1P	Speaker 1 Output Positive	SPK1P	Speaker 1 Output Positive	SPK1P	Speaker 1 Output Positive
36	MIC2P	Micro 2 Input Positive	MIC2P	Micro 2 Input Positive	MIC2P	Micro 2 Input Positive	NC	Not Connected
37	SPK1N	Speaker 1 Output Negative	SPK1N	Speaker 1 Output Negative	SPK1N	Speaker 1 Output Negative	SPK1N	Speaker 1 Output Negative
38	MIC1N	Micro 1 Input Negative	MIC1N	Micro 1 Input Negative	MIC1N	Micro 1 Input Negative	MIC1N	Micro 1 Input Negative
39	SPK2P	Speaker 2 Output Positive	SPK2P	Speaker 2 Output Positive	SPK2P	Speaker 2 Output Positive	NC	Not Connected
40	MIC1P	Micro 1 Input Positive	MIC1P	Micro 1 Input Positive	MIC1P	Micro 1 Input Positive	MIC1P	Micro 1 Input Positive
41	SPK2N	Speaker 2 Output Negative	SPK2N	Speaker 2 Output Negative	SPK2N	Speaker 2 Output Negative	NC	Not Connected
42	A1	Address Bus 1	Reserved		A1	Address bus 1	ADC3	Analog to Digital Input
43	GPIO0/32kHz		GPIO0/32kHz		GPIO0/32kHz		GPIO0	General Purpose Input / Output
44	SCL1/ GPIO26	I²C Clock	SCL1/GPIO26	I²C Clock	SCL1/GPIO26	I²C Clock	SCL1	I²C Clock
45	GPIO19		GPIO19		GPIO19		SPI1_CS/ GPIO19	SPI_1 Chip Select
46	SDA1/ GPIO27	I²C Data	SDA1/GPIO27	I²C Data	SDA1/GPIO27	I²C Data	SDA1	I²C Data
47	GPIO21		GPIO21		GPIO21		SPI2_CS/GPIO21	SPI_2 Chip Select
48	GPIO20		GPIO20		GPIO20		GPIO20	General Purpose Input / Output
49	INT1/ GPIO25	Interruption 1 Input	INT1/GPIO25	Interruption 1 Input	INT1	Interruption 1 Input	INT1/GPIO25	External Interrupt

Pin #	Q26 Extreme		Q2686		Q2687		Q2698	
	Signal Name	Description	Signal Name	Description	Signal Name	Description	Signal Name	Description
50	INT0/ GPIO3	Interruption 0 Input	INT0/GPIO3	Interruption 0 Input	INT0	Interruption 0 Input	INT0/GPIO3	External Interrupt
51	GPIO1		GPIO1		GPIO1		INT2/GPIO1	External Interrupt
52	VPAD-USB	USB Power supply input	VPAD-USB	USB Power supply input	VPAD-USB	USB Power supply input	VPAD-USB	USB Power supply input
53	GPIO2/ A24		GPIO2		GPIO2		GPIO2	General Purpose Input / Output
54	USB-DP	USB Data	USB-DP	USB Data	USB-DP	USB Data	USB-DP	USB Data
55	GPIO23		GPIO23		GPIO23		GPIO23	General Purpose Input / Output
56	USB-DM	USB Data	USB-DM	USB Data	USB-DM	USB Data	USB-DM	USB Data
57	GPIO22		GPIO22		GPIO22		GPIO22	General Purpose Input / Output
58	GPIO24		GPIO24		GPIO24		GPIO24	General Purpose Input / Output
59	COL0/ GPIO4	Keypad column 0	COL0/GPIO4	Keypad column 0	COL0/GPIO4	Keypad column 0	GPIO4	General Purpose Input / Output
60	COL1/ GPIO5	Keypad column 1	COL1/GPIO5	Keypad column 1	COL1/GPIO5	Keypad column 1	GPIO5	General Purpose Input / Output
61	COL2/ GPIO6	Keypad column 2	COL2/GPIO6	Keypad column 2	COL2/GPIO6	Keypad column 2	GPIO6	General Purpose Input / Output
62	COL3/ GPIO7	Keypad column 3	COL3/GPIO7	Keypad column 3	COL3/GPIO7	Keypad column 3	GPIO7	General Purpose Input / Output
63	COL4/ GPIO8	Keypad column 4	COL4/GPIO8	Keypad column 4	COL4/GPIO8	Keypad column 4	GPIO8	General Purpose Input / Output
64	ROW4/ GPIO13	Keypad Row 4	ROW4/GPIO13	Keypad Row 4	ROW4/GPIO13	Keypad Row 4	GPIO13/TX Burst	General Purpose Input / Output; TX Burst Signal Output
65	ROW3/ GPIO12	Keypad Row 3	ROW3/GPIO12	Keypad Row 3	ROW3/GPIO12	Keypad Row 3	GPIO12	General Purpose Input / Output

Pin #	Q26 Extreme		Q2686		Q2687		Q2698	
	Signal Name	Description	Signal Name	Description	Signal Name	Description	Signal Name	Description
66	ROW2/ GPIO11	Keypad Row 2	ROW2/GPIO11	Keypad Row 2	ROW2/GPIO11	Keypad Row 2	GPIO11	General Purpose Input / Output
67	ROW1/ GPIO10	Keypad Row 1	ROW1/GPIO10	Keypad Row 1	ROW1/GPIO10	Keypad Row 1	GPIO10	General Purpose Input / Output
68	ROW0/ GPIO9	Keypad Row 0	ROW0/GPIO9	Keypad Row 0	ROW0/GPIO9	Keypad Row 0	GPIO9	General Purpose Input / Output
69	~CT125-RI/ GPIO42	Main RS232 Ring Indicator	~CT125-RI/ GPIO42	Main RS232 Ring Indicator	~CT125-RI/ GPIO42	Main RS232 Ring Indicator	~CT125-RI/ GPIO42	Main RS232 Ring
70	~CT109-DCD1/ GPIO43	Main RS232 Data Carrier Detect	~CT109-DCD1/ GPIO43	Main RS232 Data Carrier Detect	~CT109-DCD1/ GPIO43	Main RS232 Data Carrier Detect	~CT109-DCD1/ GPIO43	Main RS232 Data
71	CT103-TXD1/ GPIO36	Main RS232 Transmit	CT103-TXD1/ GPIO36	Main RS232 Transmit	CT103-TXD1/ GPIO36	Main RS232 Transmit	CT103-TXD1/ GPIO36	Main RS232 Transmit
72	~CT105-RTS1/ GPIO38	Main RS232 Request To Send	~CT105-RTS1/ GPIO38	Main RS232 Request To Send	~CT105-RTS1/ GPIO38	Main RS232 Request To Send	~CT105-RTS1/ GPIO38	Main RS232 Request To Send
73	CT104-RXD1/ GPIO37	Main RS232 Receive	CT104-RXD1/ GPIO37/INT2	Main RS232 Receive	CT104-RXD1/ GPIO37/INT2	Main RS232 Receive	CT104-RXD1/ GPIO37	Main RS232 Receive
74	~CT107-DSR1/ GPIO40	Main RS232 Data Set Ready	~CT107-DSR1/ GPIO40	Main RS232 Data Set Ready	~CT107-DSR1/ GPIO40	Main RS232 Data Set Ready	~CT107-DSR1/ GPIO40	Main RS232 Data Set Ready
75	~CT106-CTS1/ GPIO39	Main RS232 Clear To Send	~CT106-CTS1/ GPIO39	Main RS232 Clear To Send	~CT106-CTS1/ GPIO39	Main RS232 Clear To Send	~CT106-CTS1/ GPIO39	Main RS232 Clear To Send
76	~CT108-2-DTR1/ GPIO41	Main RS232 Data Terminal Ready	~CT108-2-DTR1/ GPIO41/INT3	Main RS232 Data Terminal Ready	~CT108-2-DTR1/ GPIO41/INT3	Main RS232 Data Terminal Ready	~CT108-2-DTR1/ GPIO41	Main RS232 Data Terminal Ready
77	PCM-SYNC	PCM Frame Synchro	PCM-SYNC	PCM Frame Synchro	PCM-SYNC	PCM Frame Synchro	PCM-SYNC	PCM Frame Synchro
78	PCM-IN	PCM Data Input	PCM-IN	PCM Data Input	PCM-IN	PCM Data Input	PCM-IN	PCM Data Input
79	PCM-CLK	PCM Clock	PCM-CLK	PCM Clock	PCM-CLK	PCM Clock	PCM-CLK	PCM Clock
80	PCM-OUT	PCM Data Output	PCM-OUT	PCM Data Output	PCM-OUT	PCM Data Output	PCM-OUT	PCM Data Output
81	~OE-R/W	Read enable	Reserved		/OE-R/W	Output Enable/ Read not write	NC	Not Connected

Pin #	Q26 Extreme		Q2686		Q2687		Q2698	
	Signal Name	Description	Signal Name	Description	Signal Name	Description	Signal Name	Description
82	DAC0		Reserved		DAC0	Digital to Analog Output	GND	Ground
83	GPIO44/ ~CS3	Chip select 3	Reserved		/CS3	Chip Select 3	GPIO44	General Purpose Input / Output
84	~WE-E	Write enable	Reserved		/WE-E	Write Enable	NC	Not Connected
85	D0	DATA bus	Reserved		D0	Data for Peripheral	NC	Not Connected
86	D15	DATA bus	Reserved		D15	Data for Peripheral	NC	Not Connected
87	D1	DATA bus	Reserved		D1	Data for Peripheral	NC	Not Connected
88	D14	DATA bus	Reserved		D14	Data for Peripheral	NC	Not Connected
89	D2	DATA bus	Reserved		D2	Data for Peripheral	NC	Not Connected
90	D13	DATA bus	Reserved		D13	Data for Peripheral	NC	Not Connected
91	D3	DATA bus	Reserved		D3	Data for Peripheral	NC	Not Connected
92	D12	DATA bus	Reserved		D12	Data for Peripheral	NC	Not Connected
93	D4	DATA bus	Reserved		D4	Data for Peripheral	NC	Not Connected
94	D11	DATA bus	Reserved		D11	Data for Peripheral	NC	Not Connected
95	D5	DATA bus	Reserved		D5	Data for Peripheral	NC	Not Connected
96	D10	DATA bus	Reserved		D10	Data for Peripheral	NC	Not Connected
97	D6	DATA bus	Reserved		D6	Data for Peripheral	GND	Ground

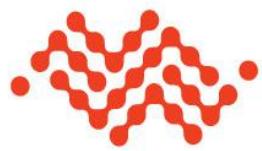| Pin #	Q26 Extreme		Q2686		Q2687		Q2698	
	Signal Name	**Description**	**Signal Name**	**Description**	**Signal Name**	**Description**	**Signal Name**	**Description**
98	D9	DATA bus	Reserved		D9	Data for Peripheral	GND	Ground
99	D7	DATA bus	Reserved		D7	Data for Peripheral	GND	Ground
100	D8	DATA bus	Reserved		D8	Data for Peripheral	GND	Ground

7. References

7.1. Reference Documents

[1] AirPrime Q26 Extreme Product Technical Specification and Customer Design Guidelines
Document Number: WM_DEV_Q26EX_PTS_002

[2] AirPrime Q2686 Product Technical Specification and Customer Design Guidelines
Document Number: 4111963

[3] AirPrime Q2687 Product Technical Specification and Customer Design Guidelines
Document Number: 4111964

[4] AirPrime Q2698 Product Technical Specification and Customer Design Guidelines
Document Number: 4111754

7.2. Glossary

Term	Definition
EDGE	Enhanced Data rates for GSM Evolution
EGSM	Extended GSM
GND	Ground
GPIO	General Purpose Input Output
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
HSDPA	High Speed Downlink Packet Access
HSUPA	High Speed Uplink Packet Access
I/O	Input/Output
MAX	Maximum
MIN	Minimum
NC	Not Connected When a pin is marked as not connected, this means that no connection should be made from the pin to the application board.
NOM	Nominal
RF	Radio Frequency
SIM	Subscriber Identification Module
UMTS	Universal Mobile Telecommunication System
USIM	Universal Subscriber Identity Module
WCDMA	Wideband Code Division Multiple Access

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