

BEC B41-15

OEM / Integrators Installation Manual

**Our aim is to provide customers with timely and comprehensive service.
For any assistance, please contact our company headquarters:**

Billion Electric Co., Ltd.

8F, No. 192, Sec. 2, Zhongxign Rd., Xindian Dist., New Taipei City 23146, Taiwan

Tel.: +886-2-29145665

Email: service@billion.com

Or our local office. For more information, please visit:

<http://www.billion.com/page/contact/index.aspx>

1. General description

BEC B41-25 is an advanced multi-band CAT12 LTE PCIe mini card product for embedded LTE module market. It supports standard PCIe USB interface and can be easily integrated into laptop, set-top box and real time industry devices to provide instant advanced 4G broadband communication capability.

2. Quote Criterion

Meet 3GPP LTE-A Release12, USB3.0 Standard, Mini PCI Express

3. Power Characteristic

3.1 Input Voltage Range

Rated operating voltage 3.8Vdc to 5.5Vdc input DC voltage (Mini PCI-E).

3.2 Rated Power

Average 2.7 W@5V, Peak 4W@5V.

4. Environmental Requirement

4.1 Operating Temperature

-30 to 55°C

4.2 Storage Temperature

-40 to 85°C

5. Mechanical Requirement

5.1 Dimension

The nominal external dimensions of the LTE module are 51mm * 42mm * 6mm

5.2 Weight

Weight are approx. 20g.

5.3 Vibration Test Requirement

Non-operating, with packing) Reference to IEC publ. 68-2-6

Test conditions		Acceptance Criteria
Frequency	10~55Hz	Nominal functional test should be satisfied after the test
Sweep	2hours, For each axis (X, Y, Z)	
Acceleration	0.6G 1.5G (5~50Hz, peak-peak)	
Displacement	0.35 mm(5~50Hz)	

6. Physical Interface

6.1 Antenna Connectors

BEC B41-15 is mounted with four antenna connectors for external antenna connection: a main antenna connector, an aux antenna connector, and 2 Rx-diversity function is enabled by default. The impedance of the antenna connectors is 50Ω.

The connector type is IPEX-1.

6.2 Hardware Connector

52-Pin Mini PCI-E card interface

6.3 Network Connector

USB3.0 & USB2.0

7. Radio Spec

7.1 Duplex mode

TDD

7.2 Frequency

LTE BAND 41

7.3 Bandwidth

5MHz 10MHz, 15MHz, 20MHz

7.4 Conducted RF Output Power

Frequency Band	Max.	Min.
B41	17±2dBm	<-40dBm

7.5 Conducted RF Receiving Sensitivity

Frequency Bands	MIMO	SISO	3GPP
B41 (BW=10MHz)	-102	-105	-96

7.6 DL MIMO and CA

Support 8*4 MIMO (1CC), 4*4 MIMO (2CC), 2*2 MIMO (3CC & 4CC)

8. Pin Assignment

N o	Standard PCIE signal	Signal Description	Pin Definitions	Signal Direction	Support Signal Level	Note
1	WAKE#	AP2CP_WAKE	AP2CP_WAKE(G PD2_0)	Input	1.8V	
2	3.3Vaux	VBATT	VCC_PCIE	Input	3.8~5.5V	
3	COEX1	CP2AP_WAKE	CP2AP_WAKE(G PD2_1)	Output	1.8V	
4	GND	GND	GND	GND	GND	
5	COEX2	GPIO	GPD2_2	In/Out	1.8V	
6	1.5V	GPIO	GPD2_9	In/Out	1.8V	
7	CLKREQ#	GPIO	GPD2_3	In/Out	1.8V	
8	UIM_PWR	VSIM_1V8_3V0	SIM_PWR	Output	1.8/3.0V	
9	GND	GND	GND	GND	GND	
10	UIM_DATA	SIM_DATA	SIM_DATA	In/Out	SIM_DATA	
11	REFCLK-	UART_RXD	UART_RXD	Input	1.8V	
12	UIM_CLK	SIM_CLK	SIM_CLK	Input	SIM_CLK	
13	REFCLK+	UART_TXD	UART_TXD	Output	1.8V	
14	UIM_RESET	SIM_RST	SIM_RST	Input	SIM_RST	
15	GND	GND	GND	GND	GND	
16	UIM_VPP	GPIO	GPD2_10	In/Out	1.8V	
17	Reserved (UIM_C8)	NC	NC	NC	NC	
18	GND	GND	GND	GND	GND	
19	Reserved (UIM_C4)	NC	NC	NC	NC	
20	W_DISABLE#	GPIO	W_DISABLE(GPD 2_11)	Input	1.8V	
21	GND	GND	GND	GND	GND	
22	PERST#	MB2PCIE_RST_ N	PE_RST	Input	3.8~5.5V	Power on Reset
23	PERn0	USB3.0	USB3.0_TX-	Output	USB3.0_TX-	
24	3.3Vaux	VBATT	VCC_PCIE	Input	3.8~5.5V	
25	PERp0	USB3.0	USB3.0_TX+	Output	USB3.0_TX+	
26	GND	GND	GND	GND	GND	
27	GND	GND	GND	GND	GND	
28	1.5V	NC	NC	NC	NC	
29	GND	GND	GND	GND	GND	
30	SMB_CLK	NC	NC	NC	NC	
31	PETn0	USB3.0	USB3.0_RX-	Input	USB3.0_RX-	
32	SMB_DATA	NC	NC	NC	NC	
33	PETp0	USB3.0	USB3.0_RX+	Input	USB3.0_RX+	
34	GND	GND	GND	GND	GND	
35	GND	GND	GND	GND	GND	
36	USB_D-	USB_D-	USB_D-	I/O	USB_D-	
37	GND	GND	GND	GND	GND	
38	USB_D+	USB_D+	USB_D+	I/O	USB_D+	
39	3.3Vaux	VBATT	VCC_PCIE	Input	3.8~5.5V	
40	GND	GND	GND	GND	GND	

41	3.3Vaux	VBATT	VCC_PCIE	Input	3.8~5.5V	
42	LED_WWAN#	NC	NC	NC	NC	
43	GND	GND	GND	GND	GND	
44	LED_WLAN#	NC	NC	NC	NC	
45	Reserved	NC	NC	NC	NC	
46	LED_WPAN#	NC	NC	NC	NC	
47	Reserved	NC	NC	NC	NC	
48	1.5V	NC	NC	NC	NC	
49	Reserved	GPIO	Config Reset (GPD2_4)	Input	1.8V	Soft Reset
50	GND	GND	GND	GND	GND	
51	Reserved	GPIO	GPD2_5	In/Out	1.8V	
52	3.3Vaux	VBATT	VCC_PCIE	Input	3.8~5.5V	

9. Photograph of the Product



10. Rating Label Drawing



FCC ID: QI3BEC-B41-15

Professional installation instruction

1. Installation personal

This product is designed for specific application and needs to be installed by a Qualified personal who has RF and related rule knowledge. The general user shall not attempt to install or change the setting.

2. Installation location

The product shall be installed at a location where the radiating antenna can be kept 20cm from nearby person in normal operation condition to meet regulatory RF exposure requirement.

3. External antenna

Use only the antennas which have been approved by the applicant. The non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which may lead to the violation of FCC limit and is prohibited.

4. Installation procedure

Please refer to user's manual for the detail.

5. Warning

Please carefully select the installation position and make sure that the final output power does not exceed the limit set force in relevant rules. The violation of the rule could lead to serious federal penalty.

Federal Communication Commission Interference Statement

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.

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 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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This module is intended for OEM integrators only. Per FCC KDB 996369 D03 OEM Manual V01 guidance, the following conditions must be strictly followed when using this certified module:

KDB 996369 D03 OEM Manual V01 rule sections:

2.2 List of applicable FCC rules

This module has been tested for compliance to FCC Part 27.

2.3 Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.

2.4 Limited module procedures

Not applicable.

2.5 Trace antenna designs

N/A

2.6 RF exposure considerations

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

2.7 Antennas

The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module. The antenna must be installed such that 20 cm can be maintained between the antenna and users.

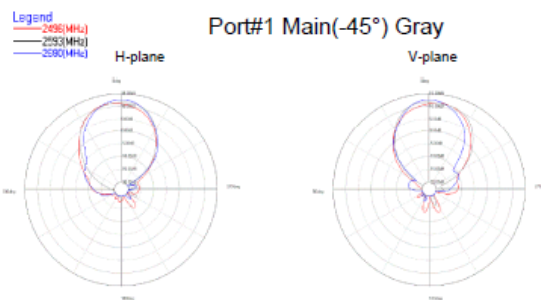
Antenna Type	Dipole	PCB
Antenna connector	SMA	ipex(MHF)

Antenna 1. (PCB antenna)

Port1.

Port#1(-45°) Gray:

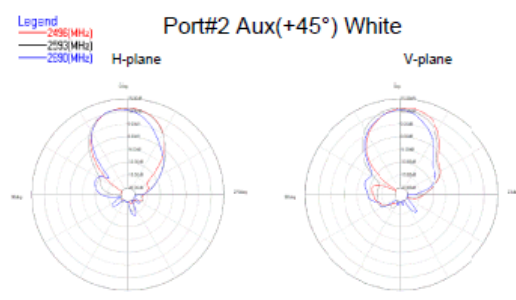
Frequency (MHz)	Peak Gain (dBi)		HPBW (degree)	
	H-plane	V-plane	H-plane	V-plane
2500	11.3	11.1	46	45
2600	11.5	11.5	48	51
2700	12.5	12.5	36	33



Port2.

Port#2(+45°) White:

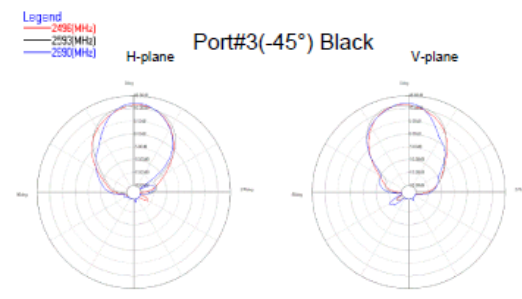
Frequency (MHz)	Peak Gain (dBi)		HPBW (degree)	
	H-plane	V-plane	H-plane	V-plane
2500	11.1	11.3	45	42
2600	11.0	11.1	48	47
2700	10.8	10.4	44	40



Port 3.

Port#3(-45°) Black:

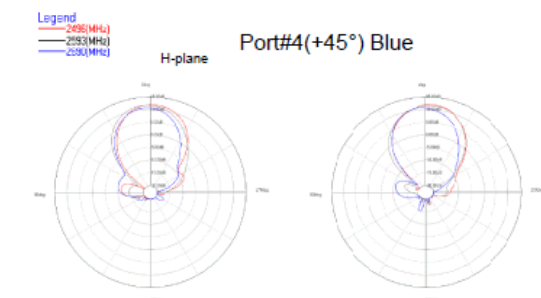
Frequency (MHz)	Peak Gain (dBi)		HPBW (degree)	
	H-plane	V-plane	H-plane	V-plane
2500	11.2	11.3	44	43
2600	10.9	11.2	53	52
2700	11.9	11.9	37	36



Port 4.

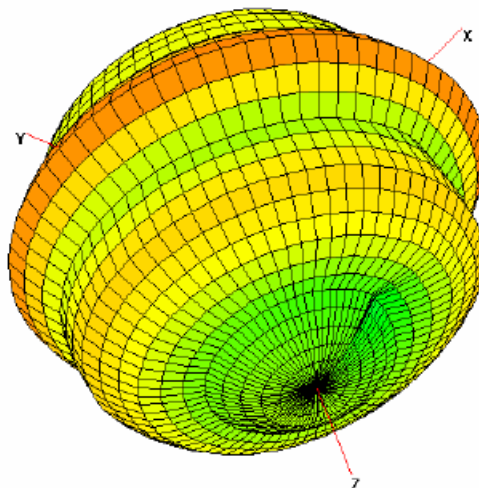
Port#4(+45°) Blue:

Frequency (MHz)	Peak Gain (dBi)		HPBW (degree)	
	H-plane	V-plane	H-plane	V-plane
2500	11.8	11.8	41	40
2600	11.6	11.5	43	44
2700	10.6	10.7	42	40



Antenna 2. (Dipole antenna)

Total	Point Values	Ant. Port Input Pwr. (dBm)	Tot. Rad. Pwr. (dBm)	Peak EIRP (dBm)	Directivity (dBi)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
	Frequency (MHz)							
	2500	0	-0.364575	6.70015	7.06472	-0.364575	91.948	6.70015
	2520	0	-0.217678	6.89132	7.109	-0.217678	95.1113	6.89132
	2540	0	-0.114379	6.97968	7.09406	-0.114379	97.4007	6.97968
	2560	0	-0.0305543	7.05889	7.08944	-0.0305543	99.2989	7.05889
	2580	0	0.0757443	7.14095	7.0652	0.0757443	101.759	7.14095
	2600	0	-0.139428	6.91158	7.05101	-0.139428	96.8405	6.91158
	2620	0	-0.136858	6.91607	7.05293	-0.136858	96.8979	6.91607
	2640	0	-0.0852772	6.951	7.03628	-0.0852772	98.0556	6.951
	2660	0	-0.249648	6.79668	7.04633	-0.249648	94.4137	6.79668
	2680	0	-0.386712	6.65605	7.04276	-0.386712	91.4806	6.65605
	2700	0	-0.448956	6.55324	7.00219	-0.448956	90.1788	6.55324



2.8 Label and compliance information

The final end product must be labeled in a visible area with the following:
“Contains FCC ID: QI3BEC-B41-15”. The grantee's FCC ID can be used only
when all FCC compliance requirements are met.

2.9 Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any
co-located or simultaneous transmission with other transmitter(s) or portable use
will require a separate class II permissive change re-evaluation or new
certification.

2.10 Additional testing, Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not
cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement

applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

As long as all conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.