

GENERAL DYNAMICS
Broadband

OEM PCI Express Mini Module Integration Guide

V01.04

Contents

1 General..... 3

 1.1 Approvals and Dates 3

 1.2 Change Record 3

 1.3 Acronyms 4

 1.4 External References..... 4

2 Introduction..... 5

 2.1 Scope of Document..... 5

 2.2 Overview of Module..... 5

3 Module Connections 6

 3.1 PCI Express Mini Interface (J1) 6

 3.1.1 Universal Serial Bus 6

 3.1.2 SIM Interface 6

 3.1.3 RF Connections..... 6

 3.2 DC Power 6

4 Mechanical 7

 4.1 Thermal Management 7

5 Regulatory Information 8

 5.1 Compliance with FCC Rules and Regulations 8

 5.2 Exposure to Radio Frequency Signals 9

6 Annex 1: PCI Express Mini Edge Connector Pinout 10

Figures

Figure 1: RF Connections 6

Figure 2: PEM Module..... 7

1 General

1.1 Approvals and Dates

	Approval Date
W. J. Jones	

1.2 Change Record

Date	Version	Author	Reason For Change Issue
21/06/2012	01.00	PFW	New Document.
14/08/2012	01.01	PFW	Updated with LTE.
21/08/2012	01.02	PFW	Updated with LTE Band 4, Band 14 removed.
03/09/2012	01.03	PFW	Technical Corrections
21/03/2014	01.04	PFW	Added Band 14

1.3 Acronyms

Term	Definition
MPE	Maximum Permissible Exposure
OEM	Original Equipment Manufacturer
PCIe	PCI Express
PCI SIG	PCI Special Interest Group
PEM	PCI Express Mini
SIM	Subscriber Identity Module
LTE	Long Term Evolution
USB	Universal Serial Bus

1.4 External References

Ref ()	Number	Title
1	FCC Part 15	Radio Frequency Devices
2	FCC Part 27	Miscellaneous Wireless Communications Service
3	FCC Part 90	Private Land Mobile Radio Services
4	PCI SIG	PCI Express Base Specification Revision 2.0
5	PCI SIG	Card Electromechanical Specification Revision 2.0
6	-	PEM + Adapter Thermal Specification Revision 1.0

Note: Where a reference is undated, the latest version applies unless a specific revision is defined.

2 Introduction

This document describes the method of integrating the General Dynamics Broadband PCI Express Mini module into an OEM product.

2.1 Scope of Document

This document applies to the General Dynamics Broadband PCI Express Mini module only.

2.2 Overview of Module

The General Dynamics Broadband PCI Express Mini module provides a complete LTE wireless modem solution and only requires to be inserted in a PCI Express Mini compliant interface and connection of external antennas. The module is designed to minimise the time and resource required to integrate.

3 Module Connections

3.1 PCI Express Mini Interface (J1)

The General Dynamics Broadband PCI Express Mini module is provided with a 52 pin edge connector for connection to the external application. This connection supports the following interface types and these are described below. The pinout is shown in Annex 1.

3.1.1 Universal Serial Bus

The PCI Express edge connector provides a USB 2.0 interface, this interface supports low speed (1.5Mbps), full speed (12Mbps) and High speed (480Mbps) operation.

3.1.2 SIM Interface

The PCI Express edge connector provides a 4 line SIM interface to allow use with Subscriber Identity Modules if required, this interface supports both 1.8V and 3.0V SIM's. The SIM interface does not provide ESD protection and this should be provided by the host device.

3.1.3 RF Connections

The General Dynamics Broadband PCI Express Mini module provides two RF connections for external antennas. The main port must be connected, the diversity port may or may not be connected depending upon application. The connector type is the Hirose U.FL series.

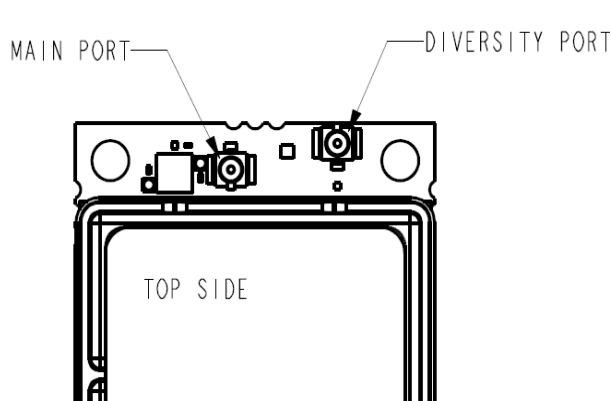


Figure 1: RF Connections

3.2 DC Power

The module requires a DC supply of between 3.0V to 3.6VDC with the nominal voltage being 3.3VDC, maximum input current is 950mA at 3.3VDC. DC power is applied to the module via the PCI Express Mini edge connector.

4 Mechanical

The General Dynamics Broadband PCI Express Mini module is designed to be installed in a PCI Express compliant slot capable of holding an F1 full size mini card.

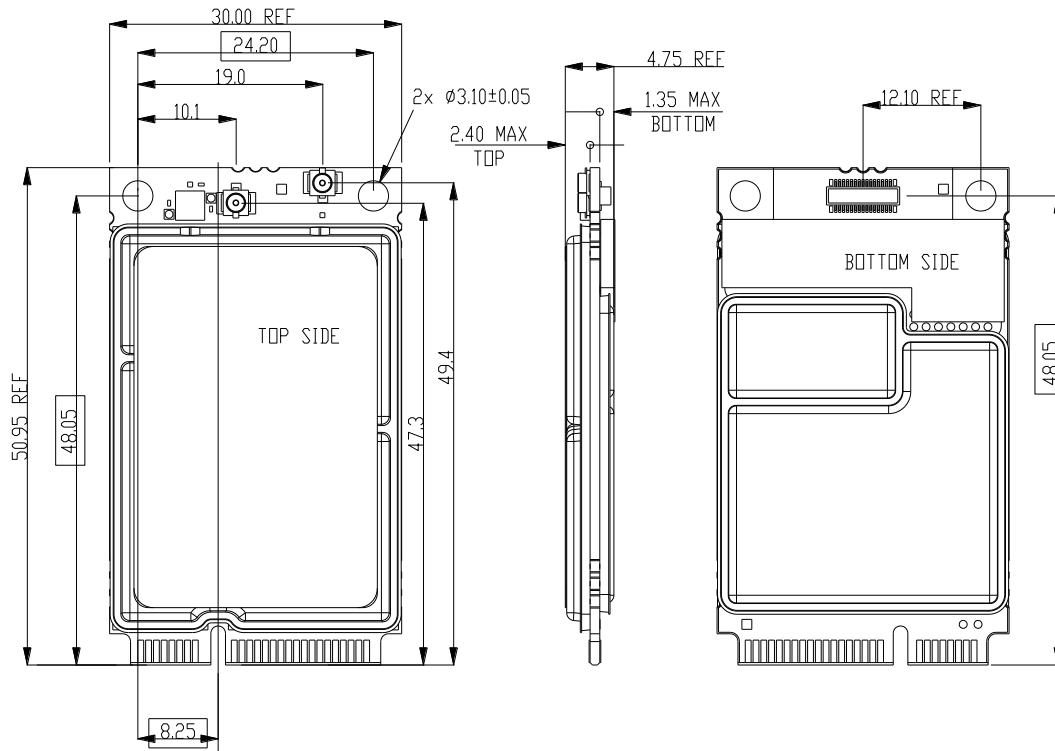


Figure 2: PEM Module

4.1 Thermal Management

The PCI Express Mini module integration shall be in accordance with the PCISIG thermal requirements.

5 Regulatory Information

5.1 Compliance with FCC Rules and Regulations

The General Dynamics Broadband PCI Express Mini module is certified against FCC Part 27 for operation in the 699-716MHz (Band 12) and 1710-1755MHz (Band4) frequency allocations and FCC Part 90 for operation in the 788-798MHz (Band 14) frequency allocation.

The module certified under FCC ID: PKTPEMAMW (Bands 4 and 12) and is only certified for use with external antennas, the maximum antenna gains to comply with EIRP/ERP and RF Exposure limits for each band are shown below.

- Band 4 – 5dBi
- Band 12 – 8.6dBi (6.45dBd)

Please refer to the FCC Grant of Certification for this device.

The module certified under FCC ID: PKTPEMAMW1 (Bands 4, 12 and 14) and is only certified for use with external antennas, the maximum antenna gains to comply with EIRP/ERP and RF Exposure limits for each band are shown below.

- Band 4 – 5dBi
- Band 12 – 8.6dBi (6.45dBd)
- Band 14 – 8.9dBi (6.85dBd)

Please refer to the FCC Grant of Certification for this device.

If the FCC ID label on the PCI Express Mini Module is not visible from outside of the host device, then an additional label is required on the outside of the host device stating.

‘Contains FCC ID: PKTPEMAMW’ or ‘Contains FCC ID: PKTPEMAMW1’

IMPORTANT: Manufacturers of devices containing the General Dynamics Broadband PCI Express Mini module are advised to.

1. Clarify any regulatory questions, particularly if the host device contains other radio transceivers.
2. Have their final product tested and approved for FCC compliance.
3. Include instructions with the final product regarding meeting RF Exposure requirements of the FCC rules.

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.

Caution: Changes or modifications not covered in this document must be approved in writing by General Dynamics Broadband. Changes or modifications made without written approval may void the user’s authority to operate this equipment.

5.2 Exposure to Radio Frequency Signals

To comply with the FCC RF exposure rules, the UE PCI Express Mini module has been evaluated against the Maximum Permissible Exposure (MPE) limits defined in Section 1.1310 of the FCC rules for the uncontrolled environment. During normal operation, all persons should maintain a distance of at least 20cm from the antenna to ensure compliance with the MPE limits.

If after module integration, the user will be less than 20cm from the antennas additional RF exposure assessment will be required.

6 Annex 1: PCI Express Mini Edge Connector Pinout

Pin	Name	Pin	Name
51	Reserved	52	+3.3Vaux
49	Reserved	50	GND
47	Reserved	48	+1.5V
45	Reserved	46	LED_WPAN#
43	GND	44	LED_WLAN#
41	+3.3Vaux	42	LED_WWAN#
39	+3.3Vaux	40	GND
37	GND	38	USB_D+
35	GND	36	USB_D-
33	PETp0	34	GND
31	PETn0	32	SMB_DATA
29	GND	30	SMB_CLK
27	GND	28	+1.5V
25	PERp0	26	GND
23	PERn0	24	+3.3Vaux
21	GND	22	PERST#
19	Reserved	20	W_DISABLE#
17	Reserved	18	GND
Mechanical Key			
15	GND	16	UIM_VPP
13	REFCLK+	14	UIM_RESET
11	REFCLK-	12	UIM_CLK
9	GND	10	UIM_DATA
7	CLKREQ#	8	UIM_PWR
5	COEX2	6	+1.5V
3	COEX1	4	GND
1	WAKE#	2	+3.3Vaux

Key	
	Used on PEM
	Unused