MPCI-L100

LTE Mini PCIe module

Data Sheet

Abstract

Technical data sheet describing the MPCI-L100 LTE cellular module. The module is a complete and cost efficient 4G solution covering two LTE bands and offering up to 100 Mb/s download and up to 50 Mb/s upload data rates. It comes in the industry standard PCI Express Mini Card form factor, which enables easy integration into an application board and is ideal for manufacturing of small series.

51.0 x 30.0 x 3.7 mm

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Document Information

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Document status information	
Objective Specification	Document contains target values. Revised and supplementary data will be published later.
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This document applies to the following products:

Product name	Type number	Firmware version	PCN / IN
MPCI-L100	MPCI-L100-00S-00	G0.V.01.00.03	UBX-14043301
MPCI-L100	MPCI-L100-02S-00	G0.V.01.00.05R	UBX-16005625

Contents

1 Functional description

1.1 Overview

The MPCI-L100 is a complete and cost efficient LTE single mode cellular module in the industry standard PCI Express Mini Card form factor, which enables an easy integration into an application board and is ideal for the manufacturing of small series.

The MPCI-L100 module supports LTE bands 4 and 13.

With LTE Category 3 data rates of 100 Mb/s (downlink) and 50 Mb/s (uplink), the module is ideal for applications requiring the high data-rates and high-speed internet access.

Typical applications are industrial computing, ruggedized terminals, video communications, wireless routers, alarm panels and surveillance, digital signage and payment systems.

1.2 Product features

Model	Region	Access Technology				GNSS	Interfaces					Audio		Features								Grade		
		3GPP Release Baseline	LTE FDD Category	LTE Bands	MIMO	GNSS receiver	UART	USB 2.0	RMII / RGMII	SDIO (Master/Slave)	GPIO	Analog audio	Digital audio	Antenna Supervisor	Jamming Detection	Embedded TCP/UDP	Embedded HTTP, FTP, SSL	AssistNow software	CellLocate®	FOTA	FW update via USB	Standard	Professional	Automotive
MPCI-L100	N. America (Verizon)	9	3	4, 13	2x2			1													•		(green)	

Table 1: MPCI-L100 main features summary

1.3 Block diagram

As described in Figure 1,, each MPCI-L100 module integrates one TOBY-L100 module, which represents the core of the device, providing the related LTE modem and processing functionalities. Additional signal conditioning circuitry is implemented for PCI Express Mini Card compliance, and two U.FL connectors are available for easy antennas integration.
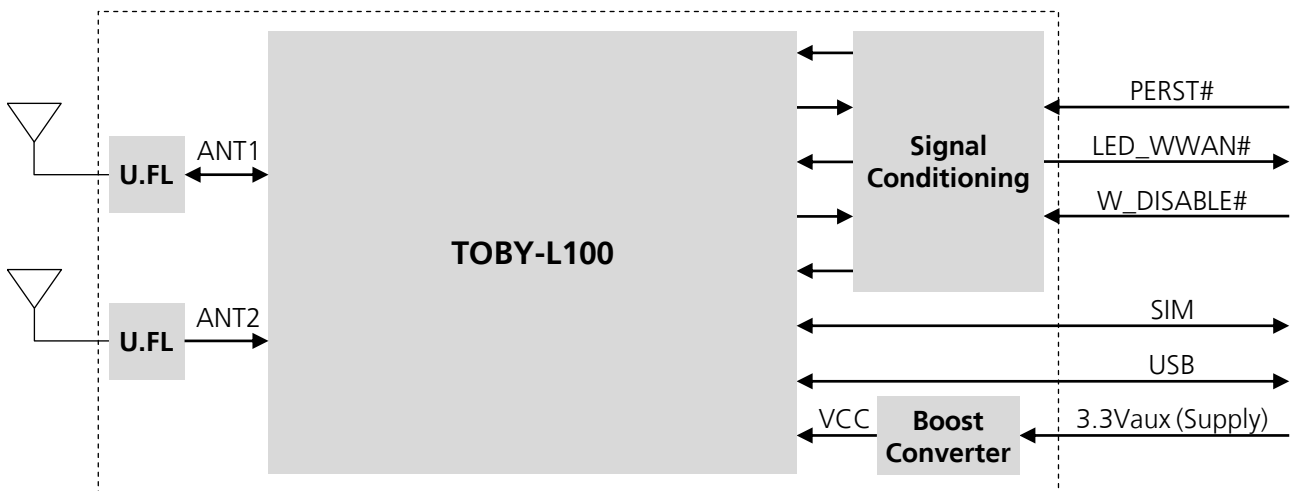
Figure 1: MPCI-L100 block diagram

1.4   Product description

MPCI-L100 modules provide 4G LTE-only data communication support over two LTE-FDD bands:

- MPCI-L100 is designed for operation on the LTE Verizon network in North America (LTE bands 4, 13), and meets the requirements of Verizon network certification for LTE only devices.

4G LTE Characteristics
3GPP Release 9 - Long Term Evolution (LTE) Evolved Universal Terrestrial Radio Access (E-UTRA) Frequency Division Duplex (FDD) Multi-Input Multi-Output (MIMO) 2 x 2 antenna support

Band support:
    • MPCI-L1:
        o   Band 4: 1710 - 1755 MHz (Tx), 2110 - 2155 MHz (Rx)
        o   Band 13:   777 - 787 MHz (Tx),   746 -   756 MHz (Rx)

Channel bandwidth:
    • MPCI-L1
        o   Band 4: 5 MHz, 10 MHz, 15 MHz, 20 MHz
        o   Band 13: 10 MHz

Power class: • Power class 3 (+23 dBm)
Data rate: • LTE category 3: up to 50 Mb/s Up-Link, 100 Mb/s Down-Link
Short Message Service (SMS):   • SMS via embedded IMS (IP Multimedia Subsystem)

Table 2: MPCI-L100 LTE characteristics summary

1.5   AT command support

The MPCI-L100 module supports AT commands according to 3GPP standards TS 27.007 [1], 27.005 [2] and the u-blox AT command extension.

☞   For the complete list of all supported AT commands and their syntax, refer to u-blox TOBY-L1 / MPCI-L1 AT Commands Manual [3].

RIL (Radio Interface Layer) software for Android is available for MPCI-L100 modules free of charge.

1.6   Supported features

Table 3 lists the main features supported by MPCI-L100 modules. For more details refer to the TOBY-L1 / MPCI-L1 System Integration Manual [4] and u-blox TOBY-L1 / MPCI-L1 AT Commands Manual [3].

Feature	Description
Airplane Mode	W_DISABLE# active-low input signal disables the radio operations as specified by the PCI Express Mini Card Electromechanical Specification [7].
Network Indication	LED_WWAN# signal provides the Wireless Wide Area Network status indication as specified by the PCI Express Mini Card Electromechanical Specification [7].
LTE DL MIMO 2x2	Improved cellular link quality and reliability on all operating bands.
Power saving	The power saving configuration is by default disabled, but it can be configured using the +UPSV AT command. When power saving is enabled, the module automatically enters the low power idle-mode whenever possible, reducing current consumption (see the u-blox TOBY-L1 / MPCI-L1 AT Commands Manual [3]). In power saving mode, the USB interface in the suspend state

Table 3: MPCI-L100 main supported features

2 Interfaces

2.1 Module supply input

MPCI-L100 modules must be supplied through the **3.3Vaux** pins by a DC power supply. The voltage must be stable, because during this operation the current drawn from **3.3Vaux** can vary significantly, based on the power consumption profile of the LTE system (described in TOBY-L1 / MPCI-L1 System Integration Manual [4]).

2.2 Antenna RF interfaces

The modules have two RF interfaces over two standard U.FL connectors with a characteristic impedance of 50 Ω. The primary RF interface (**ANT1**) supports both Tx and Rx, providing the main antenna interface, while the secondary RF interface (**ANT2**) supports Rx only for the LTE MIMO 2x2 diversity configurations.

2.3 System functions

2.3.1 Module power-on

MPCI-L100 can be switched on by:

- Rising edge on the **3.3Vaux** pin to a valid voltage for module supply, i.e. applying module supply.

2.3.2 Module power-off

MPCI-L100 can be switched off by:

- Removal of the **3.3Vaux** supply: this causes an abrupt under-voltage shutdown of MPCI-L100 modules.

In this case the current parameter settings are not saved in the module's non-volatile memory and a proper network detach is not performed: these actions have to be previously done by means of proper AT command (refer to the u-blox TOBY-L1 / MPCI-L1 AT Commands Manual [3]).

2.3.3 Module reset

MPCI-L100 can be reset (rebooted) by:

- Issuing either the AT+CFUN or AT+CPWROFF command (see the u-blox TOBY-L1 / MPCI-L1 AT Commands Manual [3]).

    The behavior of the AT+CPWROFF command differs from that of TOBY-L100 modules, which remain powered off. In response to the AT+CPWROFF command MPCI-L100 modules will boot back up, rather than remain powered off, due to the MPCI-L100 module's internal configuration.

    In both cases an "internal" or "software" reset of the module is executed: the current parameter settings are saved in the module's non-volatile memory and a proper network detach is performed.

- Forcing to the low level the **PERST#** pin, which is normally set high by an internal pull-up, for a valid time period (refer to section 4.2.7). This causes an abrupt "external" or "hardware" reset of the MPCI-L100 module. In this case the current parameter settings are not saved in the module's non-volatile memory and a proper network detach is not performed. The **PERST#** line should be driven by open drain, open collector, or contact switch.

2.4   (U)SIM interface

A (U)SIM card interface is provided on the **UIM_PWR**, **UIM_DATA**, **UIM_CLK**, **UIM_RESET** pins of the system connector as well as on a micro-SIM (3FF) card holder solderable on the back side of the board. The high-speed SIM/ME interface is implemented as well as the automatic detection of the required SIM supporting voltage.

Both 1.8 V and 3 V SIM types are supported (1.8 V and 3 V ME). Activation and deactivation with automatic voltage switch from 1.8 V to 3 V is implemented, according to ISO-IEC 7816-3 specifications. The SIM driver supports the PPS (Protocol and Parameter Selection) procedure for baud-rate selection, according to the values proposed by the SIM card/chip.

2.5   USB interface

MPCI-L100 includes a high-speed USB 2.0 compliant serial interface on the **USB_D+** and **USB_D-** lines, with maximum data rate of 480 Mb/s, available for AT commands, data communication, and FW upgrade through the u-blox software tool.

The module itself acts as a USB device and can be connected to any USB host that has the necessary drivers installed. For driver details, please refer to TOBY-L1 / MPCI-L1 System Integration Manual [4].

MPCI-L1 modules open two USB CDCs (Communications Device Class):

- Network Adapters : **Remote NDIS based Internet Sharing Device** (Ethernet connection)
- Port : **Gadget Serial** (AT commands)

2.6   W_DISABLE#

MPCI-L100 includes the **W_DISABLE#** active-low input signal to disable the radio operations as specified by the PCI Express Mini Card Electromechanical Specification [7].

2.7   LED_WWAN#

MPCI-L100 includes the **LED_WWAN#** active-low open drain output to provide Wireless Wide Area Network status indication as specified by the PCI Express Mini Card Electromechanical Specification [7].

3 Pin Definition

3.1 Pin assignment

No	PCI Express Mini Card E.M. Spec. Rev. 2.0	MPCI-L1	Voltage domain	I/O	Description	Remarks
1	WAKE#	NC		N/A		Internally not connected
2	3.3Vaux	3.3Vaux	3.3Vaux	I	MPCI supply input	Connect to external 3.3 V supply. See 4.2.2 for detailed electrical specs.
3	COEX1	NC		N/A		Internally not connected.
4	GND	GND	GND	N/A	Ground	Connect to ground
5	COEX2	NC		N/A		Internally not connected
6	1.5V	NC		N/A		Internally not connected
7	CLKREQ#	NC		N/A		Internally not connected
8	UIM_PWR	UIM_PWR	SIM	O	SIM supply output	1.8 V or 3.0 V output according to the SIM card/chip voltage type. See 4.2.6 for detailed electrical specs.
9	GND	GND	GND	N/A	Ground	Connect to ground
10	UIM_DATA	UIM_DATA	SIM	I/O	SIM data input/output	Internal 4.7 kΩ pull-up to UIM_PWR. See 4.2.6 for detailed electrical specs.
11	REFCLK-	NC		N/A		Internally not connected
12	UIM_CLK	UIM_CLK	SIM	O	SIM clock output	5 MHz output for SIM card/chip. See 4.2.6 for detailed electrical specs.
13	REFCLK+	NC		N/A		Internally not connected
14	UIM_RESET	UIM_RESET	SIM	O	SIM reset output	Reset output for SIM card/chip. See 4.2.6 for detailed electrical specs.
15	GND	GND	GND	N/A	Ground	Connect to ground
16	UIM_SPU	NC		N/A		Internally not connected
17	UIM_IC_DM	NC		N/A		Internally not connected
18	GND	GND	GND	N/A	Ground	Connect to ground
19	UIM_IC_DP	NC		N/A		Internally not connected
20	W_DISABLE1#	W_DISABLE#		I	Wireless disable input	Internal 22 kΩ pull-up to 3.3Vaux See 4.2.8 for detailed electrical specs.
21	GND	GND	GND	N/A	Ground	Connect to ground
22	PERST#	PERST#		I	MPCI reset input	Internal 10 kΩ pull-up to 2.5 V. See 4.2.7 for detailed electrical specs.
23	PERn0	NC		N/A		Internally not connected
24	3.3Vaux	3.3Vaux	3.3Vaux	I	MPCI supply input	Connect to external 3.3 V supply. See 4.2.2 for detailed electrical specs.
25	PERp0	NC		N/A		Internally not connected
26	GND	GND	GND	N/A	Ground	Connect to ground
27	GND	GND	GND	N/A		Connect to ground
28	1.5V	NC		N/A		Internally not connected
29	GND	GND	GND	N/A	Ground	Connect to ground
30	SMB_CLK	NC		N/A		Internally not connected

No	PCI Express Mini Card E.M. Spec. Rev. 2.0	MPCI-L1	Voltage domain	I/O	Description	Remarks
31	PETn0	NC		N/A		Internally not connected
32	SMB_DATA	NC		N/A		Internally not connected
33	PETp0	NC		N/A		Internally not connected
34	GND	GND	GND	N/A	Ground	Connect to ground
35	GND	GND	GND	N/A	Ground	Connect to ground
36	USB_D-	USB_D-	USB	I/O	USB Data Line D-	90 Ω nominal differential impedance. Pull-up, pull-down and series resistors as required by USB 2.0 specifications [5] are part of the USB pin driver and need not be provided externally. See 4.2.5 for detailed electrical specs.
37	GND	GND	GND	N/A	Ground	Connect to ground
38	USB_D+	USB_D+	USB	I/O	USB Data Line D+	90 Ω nominal differential impedance. Pull-up, pull-down and series resistors as required by USB 2.0 specifications [5] are part of the USB pin driver and need not be provided externally. See 4.2.5 for detailed electrical specs.
39	3.3Vaux	3.3Vaux	3.3Vaux	I	MPCI supply input	Connect to external 3.3 V supply. See 4.2.2 for detailed electrical specs.
40	GND	GND	GND	N/A	Ground	Connect to ground
41	3.3Vaux	3.3Vaux	3.3Vaux	I	MPCI supply input	Connect to external 3.3 V supply. See 4.2.2 for detailed electrical specs.
42	LED_WWAN#	LED_WWAN#		O	LED indicator output	Open drain active low output. See 4.2.9 for detailed electrical specs.
43	GND	GND	GND	N/A	Ground	Connect to ground
44	LED_WLAN#	NC		N/A		Internally not connected
45	Reserved	NC		N/A		Internally not connected
46	LED_WPAN#	NC		N/A		Internally not connected.
47	Reserved	NC		N/A		Internally not connected
48	1.5V	NC		N/A		Internally not connected
49	Reserved	NC		N/A		Internally not connected
50	GND	GND	GND	N/A	Ground	Connect to ground
51	W_DISABLE2#	NC		N/A		Internally not connected
52	3.3Vaux	3.3Vaux	3.3Vaux	I	MPCI supply input	Connect to external 3.3 V supply. See 4.2.2 for detailed electrical specs.

Table 4: MPCI-L100 system connector pin assignment

4 Electrical specifications

⚠ **Stressing the device above one or more of the ratings listed in the Absolute Maximum Rating section may cause permanent damage. These are stress ratings only. Operating the module at these or at any conditions other than those specified in the Operating Conditions sections (chapter 4.2) of the specification should be avoided. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.**

☞ Operating condition ranges define those limits within which the functionality of the device is guaranteed.

☞ Where application information is given, it is advisory only and does not form part of the specification.

4.1 Absolute maximum rating

☞ Limiting values given below are in accordance with the Absolute Maximum Rating System (IEC 134).

Symbol	Description	Condition	Min.	Max.	Unit
3.3Vaux	Module supply voltage	Input DC voltage at 3.3Vaux pins	−0.3	5.0	V
USB	USB D+/D- pins	Input DC voltage at USB interface pins		3.6	V
GPI	Generic input	Input DC voltage at Generic input pins	−0.3	3.6	V
GPO	Generic output	Input DC voltage at Generic output pins	−0.3	3.6	V
SIM	SIM interface	Input DC voltage at SIM interface pins	−0.3	3.6	V
ERS	External reset signal	Input DC voltage at PERST# pin	−0.3	5.0	V
ANT	Antenna power	Input RF power at ANT1 / ANT2 connectors		-8	dBm
Rho_ANT	Antenna ruggedness	Output RF load mismatch ruggedness at ANT1 / ANT2		10:1	VSWR
Tstg	Storage Temperature		−40	85	°C

Table 5: Absolute maximum ratings

⚠ **The product is not protected against overvoltage or reversed voltages. If necessary, voltage spikes exceeding the power supply voltage specification, given in table above, must be limited to values within the specified boundaries by using appropriate protection devices.**

4.1.1 Maximum ESD

Parameter	Min	Typical	Max	Unit	Remarks
ESD sensitivity for all pins except ANT1 / ANT2			1000	V	Human Body Model according to JESD22-A114
ESD sensitivity for ANT1 / ANT2			1000	V	Human Body Model according to JESD22-A114
ESD immunity for ANT1 / ANT2			4000	V	Contact Discharge according to IEC 61000-4-2
			8000	V	Air Discharge according to IEC 61000-4-2

Table 6: Maximum ESD ratings

⚠ **u-blox cellular modules are Electrostatic Sensitive Devices and require special precautions when handling. See Section 7.2 for ESD handling instructions.**

4.2 Operating conditions

☞ Unless otherwise indicated, all operating condition specifications are at an ambient temperature of 25°C.

⚠ **Operation beyond the operating conditions is not recommended and extended exposure beyond them may affect device reliability.**

4.2.1 Operating temperature range

Parameter	Min.	Typical	Max.	Unit	Remarks
Normal operating temperature	-10	+25	+55	°C	Normal operating temperature range (fully functional and meet 3GPP specifications)
Extended operating temperature	-40		+85	°C	Extended operating temperature range (Occasional deviations from 3GPP specifications may occur, though the module is functional)

Table 7: Environmental conditions

4.2.2 Supply/Power pins

Symbol	Parameter	Min.	Typical	Max.	Unit
3.3Vaux	Module supply operating input voltage	3.00	3.30	3.60	V

Table 8: Input characteristics of Supply/Power pins

4.2.3 Current consumption

Mode	Condition	Min.	Typical	Max.	Unit
Power saving enabled (Cyclic Idle/Active-Mode)	Module registered with the network, with a paging period of 2.56 s. USB interface in the suspend state.		3.9		mA
Connected mode	Band 4, Maximum Tx power (23 dBm typical)		930		mA
	Band 13, Maximum Tx power (23 dBm typical)		850		mA

Table 9: Module 3.3Vaux supply current consumption[1]

4.2.4 LTE RF characteristics

MPCI-L100 LTE RF characteristics are specified in the TOBY-L1 Data Sheet [8].

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[1] Averaged values for module current consumption through the **3.3Vaux** pins in the described conditions, at 25 °C, with **3.3Vaux** = 3.3 V. It is assumed that no significant load is connected to any pin.

4.2.5   USB pins

USB data lines (**USB_D+** / **USB_D-**) are compliant to the USB 2.0 high-speed specification. The values in Table 10 are for information only. Refer to the USB 2.0 specifications [5] for detailed electrical characteristics.

Parameter	Min.	Typical	Max.	Unit	Remarks
High-speed squelch detection threshold (input differential signal amplitude)	100		150	mV	
High speed disconnect detection threshold (input differential signal amplitude)	525		625	mV	
High-speed data signaling input common mode voltage range	–50		500	mV	
High-speed idle output level	–10		10	mV	
High-speed data signaling output high level	360		440	mV	
High-speed data signaling output low level	–10		10	mV	
Chirp J level (output differential voltage)	700		1100	mV	
Chirp K level (output differential voltage)	–900		–500	mV	

Table 10: USB pins characteristics

4.2.6   (U)SIM pins

The (U)SIM pins are a dedicated interface to the external (U)SIM card/chip. The electrical characteristics fulfill regulatory specification requirements. The values in Table 11 are for information only.

Parameter	Min.	Typical	Max.	Unit	Remarks
UIM_PWR supply output	1.75	1.80	1.85	V	1.8 V SIM type (Need to verify these values)
	2.92	3.00	3.08	V	3.0 V SIM type
Input characteristic: Low-level	-0.10		0.45	V	VSIM = 1.8 V
	-0.10		0.75	V	VSIM = 3.0 V
Input characteristic: High-level	1.53		2.10	V	VSIM = 1.8 V
	2.55		3.30	V	VSIM = 3.0 V
Output characteristics: High-level		0.00	0.40	V	VSIM = 1.8 V, Max value at I_{OL} = +8 mA
		0.00	0.80	V	VSIM = 3.0 V, Max value at I_{OL} = +8 mA
Output characteristics: High-level	1.53	1.80		V	VSIM = 1.8 V, Min value at I_{OH} = -8 mA
	2.55	3.00		V	VSIM = 3.0 V, Min value at I_{OH} = -8 mA
Input / Output leakage current			10	μA	
Internal pull-up resistor on UIM_DATA		4.7		kΩ	Internal pull-up to UIM_PWR supply
Clock frequency on UIM_CLK		5		MHz	

Table 11: (U)SIM pins characteristics

4.2.7 PERST# pin

Pin Name	Parameter	Min.	Typical	Max.	Unit	Remarks
PERST#	Low-level input	0.00		0.40	V	
	High-level input	1.10		2.60	V	
	L-level input current		-250		µA	
	Pull-up resistance		10		kΩ	Internal pull-up to 2.5 V
	PERST# low time	1			s	Low pulse time to reset the module

Table 12: PERST# pin characteristics

4.2.8 W_DISABLE# pin

Pin Name	Parameter	Min.	Typical	Max.	Unit	Remarks
W_DISABLE#	Low-level input	0.00		0.80	V	
	High-level input	2.00		3.60	V	
	Pull-up resistance		22		kΩ	Internal pull-up to 3.3Vaux

Table 13: W_DISABLE# pin characteristics

4.2.9 LED_WWAN# pin

Pin Name	Parameter	Min.	Typical	Max.	Unit	Remarks
LED_WWAN#	Low-level output		0.00	0.40	V	Open-drain output Max value at I_{OL} = +9.0 mA

Table 14: LED_WWAN# pin characteristics

5 Mechanical specifications

MPCI-L100 modules are fully compliant to the 52-pin PCI Express Full-Mini Card Type F2 form factor, with top-side and bottom-side keep-out areas, with 50.95 mm nominal length, 30 mm nominal width and all the other dimensions as defined by the PCI Express Mini Card Electromechanical Specification [7] except for the card thickness (which nominal value is 3.7 mm), as described in Figure 2.
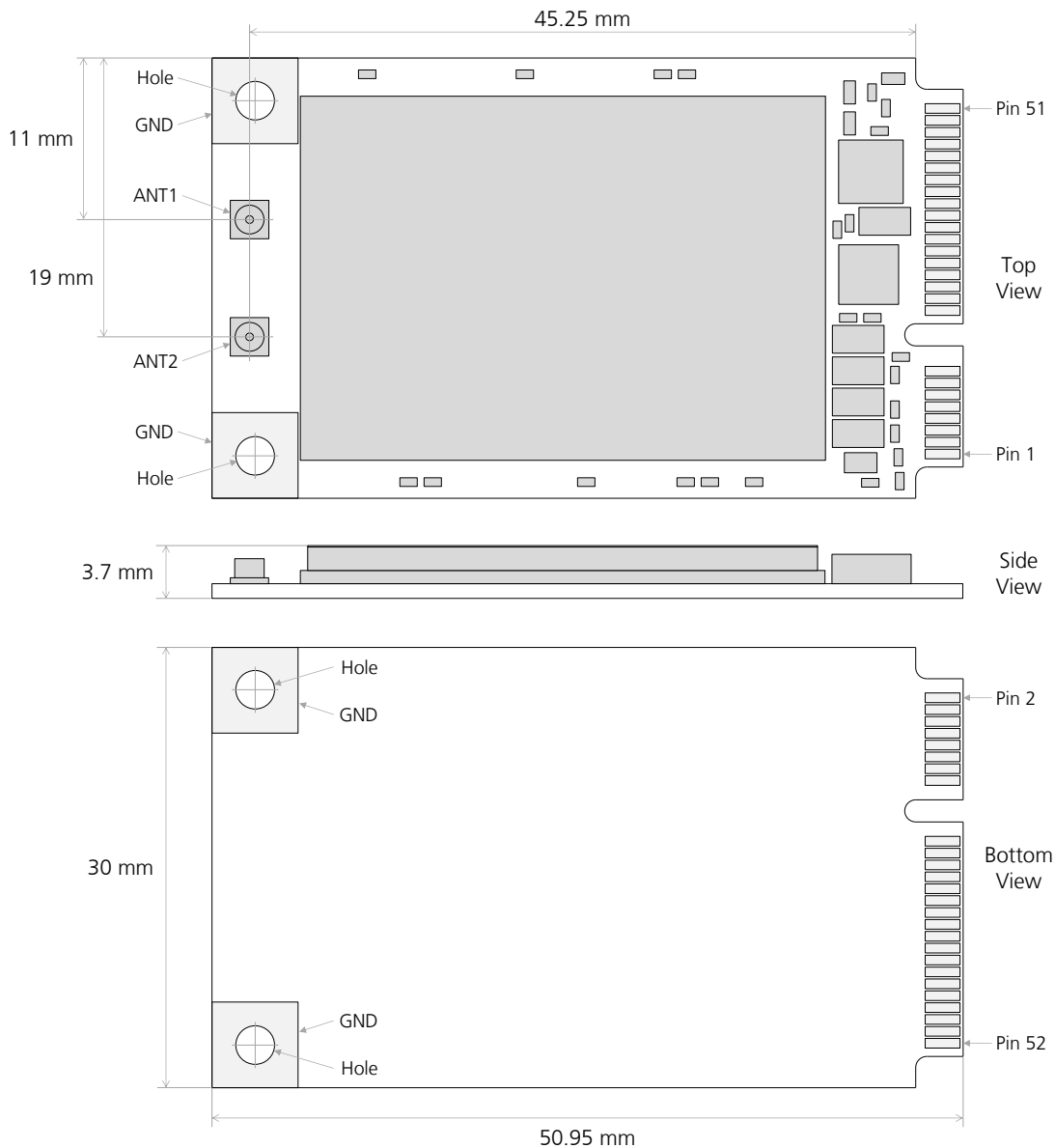

Figure 2: MPCI-L100 mechanical dimensions (Top view, Side view, Bottom view)

☞ For further details regarding mechanical specifications refer to PCI Express Mini Card Electromechanical Specification [7].

6 Qualification and approvals

6.1 Reliability tests

Tests for product family qualifications according to ISO 16750 "Road vehicles - Environmental conditions and testing for electrical and electronic equipment", and appropriate standards.

6.2 Approvals

Products marked with this lead-free symbol on the product label comply with the "Directive 2002/95/EC of the European Parliament and the Council on the Restriction of Use of certain Hazardous Substances in Electrical and Electronic Equipment" (RoHS).

MPCI-L100 modules are RoHS compliant.

No natural rubbers, hygroscopic materials, or materials containing asbestos are employed.

For the complete list of approvals and for specific details on all country and network operator certifications refer to our website, www.u-blox.com.

7 Product handling

7.1 Packaging

MPCI-L100 modules are delivered as hermetically sealed trays of 32 pieces, 5 trays in 1 package (160 units in total), to enable efficient production, production lot set-up and tear-down. For more information about packaging, see the u-blox Package Information Guide [6].

7.2 ESD precautions

⚠ **MPCI-L100 modules contain highly sensitive electronic circuitry and are Electrostatic Sensitive Devices (ESD). Handling MPCI-L100 modules without proper ESD protection may destroy or damage them permanently.**

MPCI-L100 modules are Electrostatic Sensitive Devices (ESD) and require special ESD precautions typically applied to ESD sensitive components.

Table 6 reports the maximum ESD ratings of the MPCI-L100 modules.

Proper ESD handling and packaging procedures must be applied throughout the processing, handling and operation of any application that incorporates MPCI-L100 module.

ESD precautions should be implemented on the application board where the module is mounted, as described in the TOBY-L1 / MPCI-L1 System Integration Manual [4].

⚠ **Failure to observe these recommendations can result in severe damage to the device!**

8 Labeling and ordering information

8.1 Product labeling

The labels of MPCI-L100 modules include important product information as described in this section.

Figure 3 illustrates the label of MPCI-L100 modules, which is placed on the bottom side of the modules, including: the u-blox logo, Pb-free marking, product type number, production lot, certification numbers and production country.
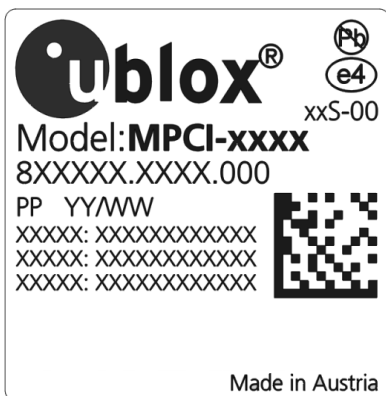

Figure 3: MPCI-L100 modules label

8.2 Explanation of codes

Three different product code formats are used. The **Product Name** is used in documentation such as this data sheet and identifies all u-blox products, independent of packaging and quality grade. The **Ordering Code** includes options and quality, while the **Type Number** includes the hardware and firmware versions. Table 15 details these 3 different formats:

Format	Structure
Product Name	MPCI-TGVV
Ordering Code	MPCI-TGVV-TTQ
Type Number	MPCI-TGVV-TTQ-XX

Table 15: Product Code Formats

Table 16 explains the parts of the product code.

Code	Meaning	Example
PPP(P)	Form factor (3 or 4 digit, typically 4 for cellular product)	MPCI
TG	Platform (Technology and Generation) • Technology: G:GSM; U: HSUPA; L:LTE, C:CDMA 1xRTT; D:EV-DO • Generation: 1…9	L1
VV	Variant function set based on the same platform [00…99]	00
TT	Major product version [00…99]	00
Q	Quality grade/production site • S = standard • A = automotive	S
XX	Minor product version (not relevant for certification)	Default value is 00

Table 16: Part identification code

8.3   Ordering information

Ordering No.	Product
MPCI-L100-00S	LTE bands 4 / 13, PCI Express Mini Card module, 51 x 30 x 3.7 mm, 160 pcs/package

Table 17: Product ordering codes

Appendix

A Glossary

Name	Definition
3FF	Third Form Factor (micro-SIM card)
CSFB	Circuit Switched Fall-Back
DL	Down-link (Reception)
ERS	External Reset Input Signal
ESD	Electrostatic Discharge
FOTA	Firmware update Over The Air
FW	Firmware
GND	Ground
GNSS	Global Navigation Satellite System
GPIO	General Purpose Input Output
GPI	General Purpose Input
GPO	General Purpose Output
GSM	Global System for Mobile Communication
H	High
HSIC	High Speed Inter Chip
I	Input (means that this is an input port of the module)
IMEI	International Mobile Equipment Identity
L	Low
LGA	Land Grid Array
LTE	Long Term Evolution
MIMO	Multi-Input Multi-Output
N/A	Not Applicable
O	Output (means that this is an output port of the module)
OD	Open Drain
PCN / IN	Product Change Notification / Information Note
PD	Pull-Down
PPS	Protocol and Parameter Selection
PU	Pull-Up
QPSK	Quadrature Phase-Shift Keying
RMII	Reduced Media Independent Interface
SIM	Subscriber Identity Module
T	Tristate
TBD	To Be Defined
UART	Universal Asynchronous Receiver-Transmitter serial interface
UL	Up-link (Transmission)
USB	Universal Serial Bus
VoLTE	Voice Over LTE

Table 18: Explanation of abbreviations and terms used

Related documents

[1]   3GPP TS 27.007 - AT command set for User Equipment (UE)

[2]   3GPP TS 27.005 - Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)

[3]   u-blox TOBY-L1 / MPCI-L1 Commands Manual, Document No. UBX-13002211

[4]   u-blox TOBY-L1 / MPCI-L1 System Integration Manual, Document No UBX-13001482

[5]   Universal Serial Bus Revision 2.0 specification, http://www.usb.org/developers/docs/

[6]   u-blox Package Information Guide, Document No. UBX-14001652

[7]   PCI Express Mini Card Electromechanical Specification, Revision 2.0, April 21, 2012

[8]   u-blox TOBY-L1 Data Sheet, Document No. UBX-13000868

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Revision history

Revision	Date	Name	Status / Comments
R01	05-Mar-2014	clee / sses	Initial release
R02	03-Jun-2014	clee / sses	Updated module mechanical specifications: corrected thickness and added GND areas description Updated pin 3, 5, 44, 46 characteristics: internally not connected Updated PERST# input characteristics Updated LED_WWAN# current capability characteristics
R03	15-Oct-2014	pafe	Updated document status to Advanced Information Added W_DISABLE# among list of supported features Removed FOTA from Product Feature table Added current consumption values Updated mechanical dimensions figure Updated packaging information
R04	10-Nov-2014	pafe	Updated document status to Early Production Information Added latest approved FW version
R05	18-Jan-2016	pafe	Updated document status to Advance Information Added applicable type number MPCI-L100-02S
R06	01-Mar-2016	Pafe	Update document status to Early Production Information Added IN document

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