

APPLICABILITY TABLE

PRODUCT
LN930
LN930-AP
HN930

Preliminary



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Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.5 Document Organization

This document contains the following chapters (sample):

[“Chapter 1: “Introduction”](#) provides a scope for this document, target audience, contact and support information, and text conventions.

[“Chapter 2: “Chapter two”](#) gives an overview of the features of the product.

[“Chapter 3: “Chapter three”](#) describes in details the characteristics of the product.

“Chapter 6: “Conformity Assessment Issues” provides some fundamental hints about the conformity assessment that the final application might need.

“Chapter 7: “Safety Recommendation” provides some safety recommendations that must be follow by the customer in the design of the application that makes use of the AA99-XXX.

1.6 Text Conventions



Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.



Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.



Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.7 Related Documents

- TBA



Preliminary



Table 1 M.2 Module - General Feature

Feature	Description	Additional Information	M.2 module			
			HN930	LN930-AP	LN930	
Mechanical	M.2 Card Type 3042 Slot B	30 mm x 42 mm Pin count: 75 (67 usable, 8 slot)	x	x	x	
Operating Voltage	3.3 V Typical	-	x	x	x	
Operating Temperature	-10°C to +55°C – Normal +55°C to +70°C – Extended	Extreme - This is the surrounding air temperature of the module inside the platform when the card is fully operating at worst case condition	x	x	x	
Application Interface (75 pin card)	USB 2.0 High-speed	Interprocessor Communications	x	x	x	
	USIM w/ Card Detect	SIM_CLK, SIM_RESET, SIM_IO, SIM_PWR, SIM_DETECT	x	x	x	
	M.2 Control	Full_Card_Power_On_Off		x	x	x
		Reset#		x	x	x
		W_DISABLE#		x	x	x
		LED #1		x	x	x
		DPR (Body SAR)		x	x	x
		Wake on WWAN		x	x	x
	GNSS Disable		x	x	x	
	Global Positioning (GPS/ GLONASS)	I2C_SCL, I2C_SDA, I2_IRQ, CLKOUT, TX_BLANKING		x	x	x
Antenna Tuning	(4) GPO (RF Transceiver)		-	x	x	
RF Coexistence	(3) GPIO		-	x	x	
RF Antenna	Main & Diversity/ GNSS	Separate coax connectors	x	x	x	
Debug	JTAG	-	x	x	x	
	ETM11	-	-	x	x	
	MIPI PTI	-	-	x	X	



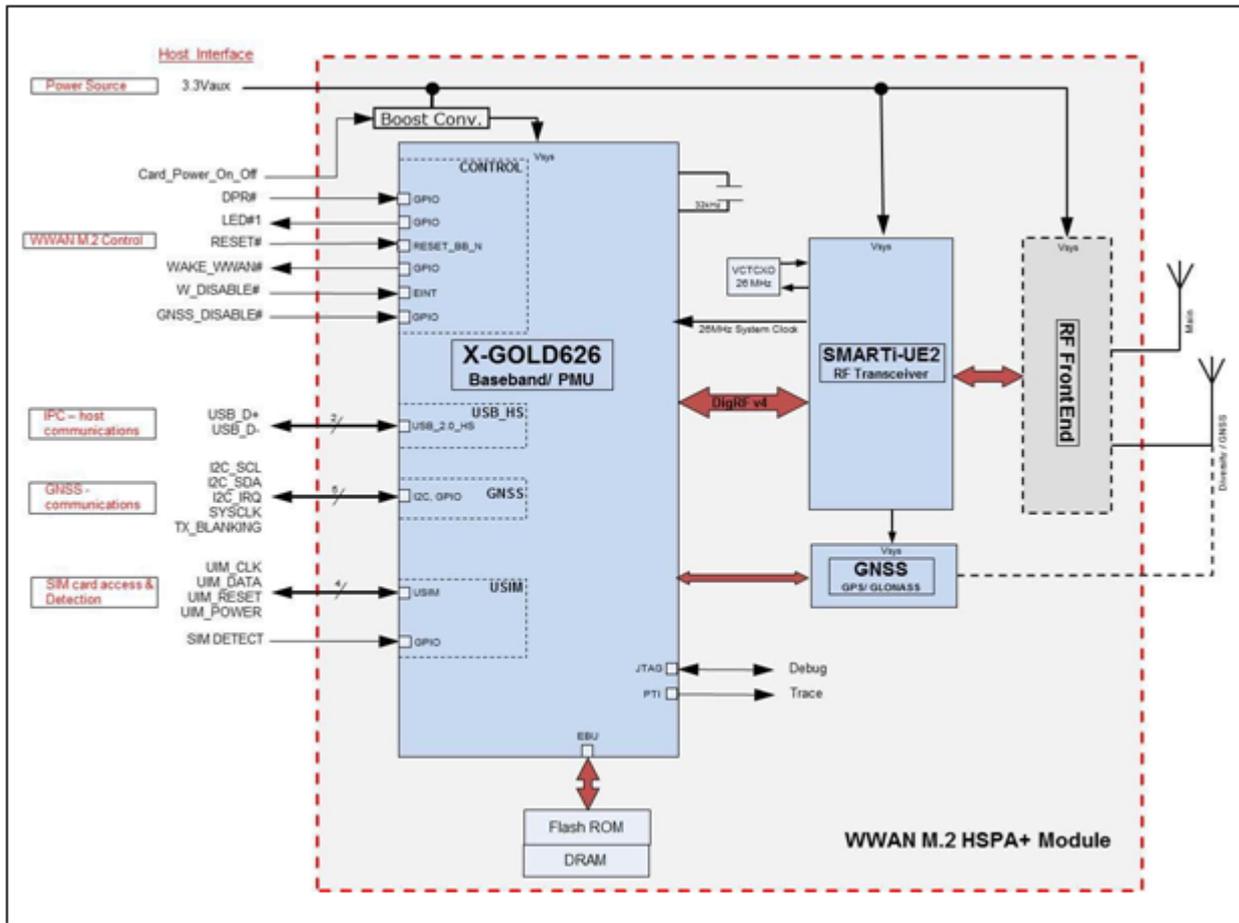


Figure 1 M.2 HSPA+ Block Diagram

Preliminary



2.2.2 M.2 LN930-AP Module

The M.2 APAC LTE module is another Intel design based on the XMM™7160 modem platform. The module has a targeted area of operation in the Asia Pacific rim and offers 3G and LTE datacard functionality, 2G Functionality is not supported.

The M.2 APC LTE module includes support at the 75 pin application interface for M.2 Control, USB 2.0 HS, GNSS, USIM and Antenna Tuning.

A block diagram of the M.2 APAC LTE module is shown in Figure 2.

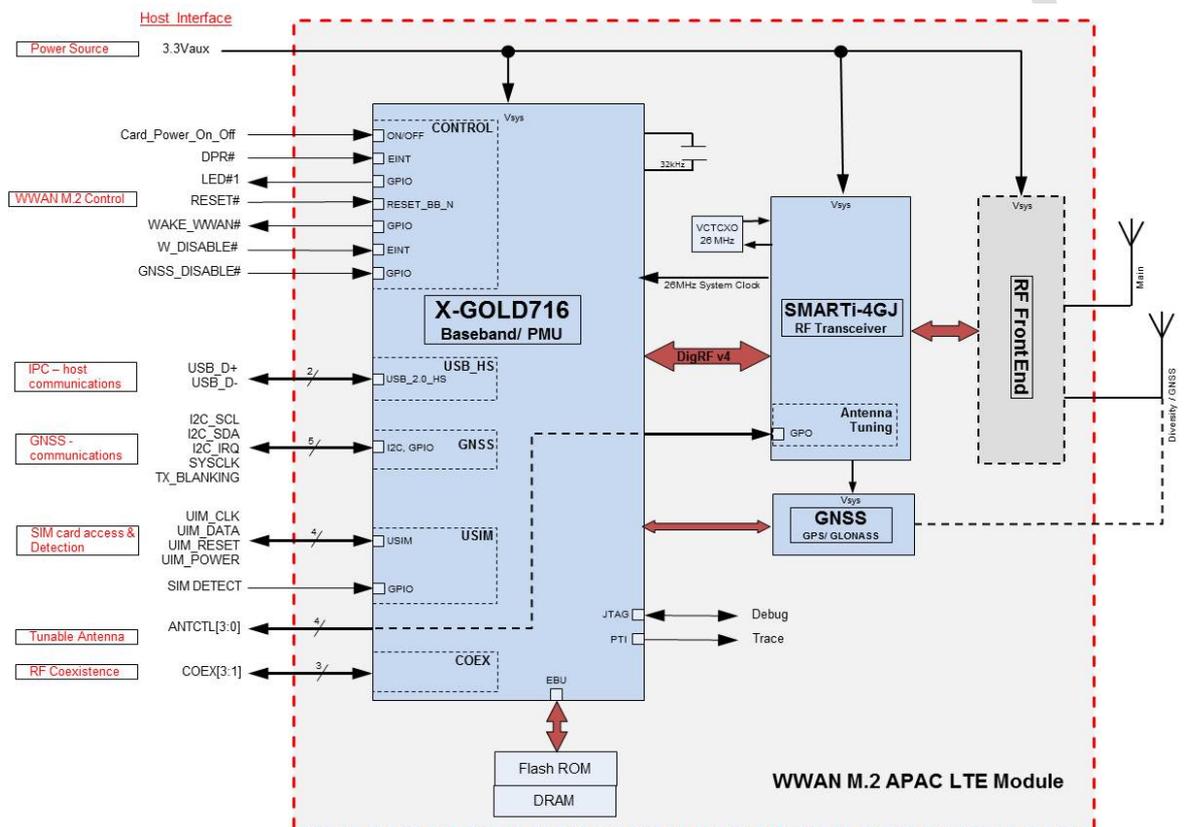


Figure 2 M.2 APAC LTE Module Block Diagram

2.2.3 M.2 LN930 Module

The M.2 LTE module is based on Intel’s XMM™7160 modem platform. The M.2 LTE module is a triple-mode (2G, 3G, and 4G) 3GPP release 9 modem providing datacard functionality.

The M.2 LTE module includes support at the 75 pin application interface for M.2 Control, USB 2.0 HS, GNSS, USIM and Antenna Tuning.

A block diagram of the M.2 LTE module is shown in Figure 3.

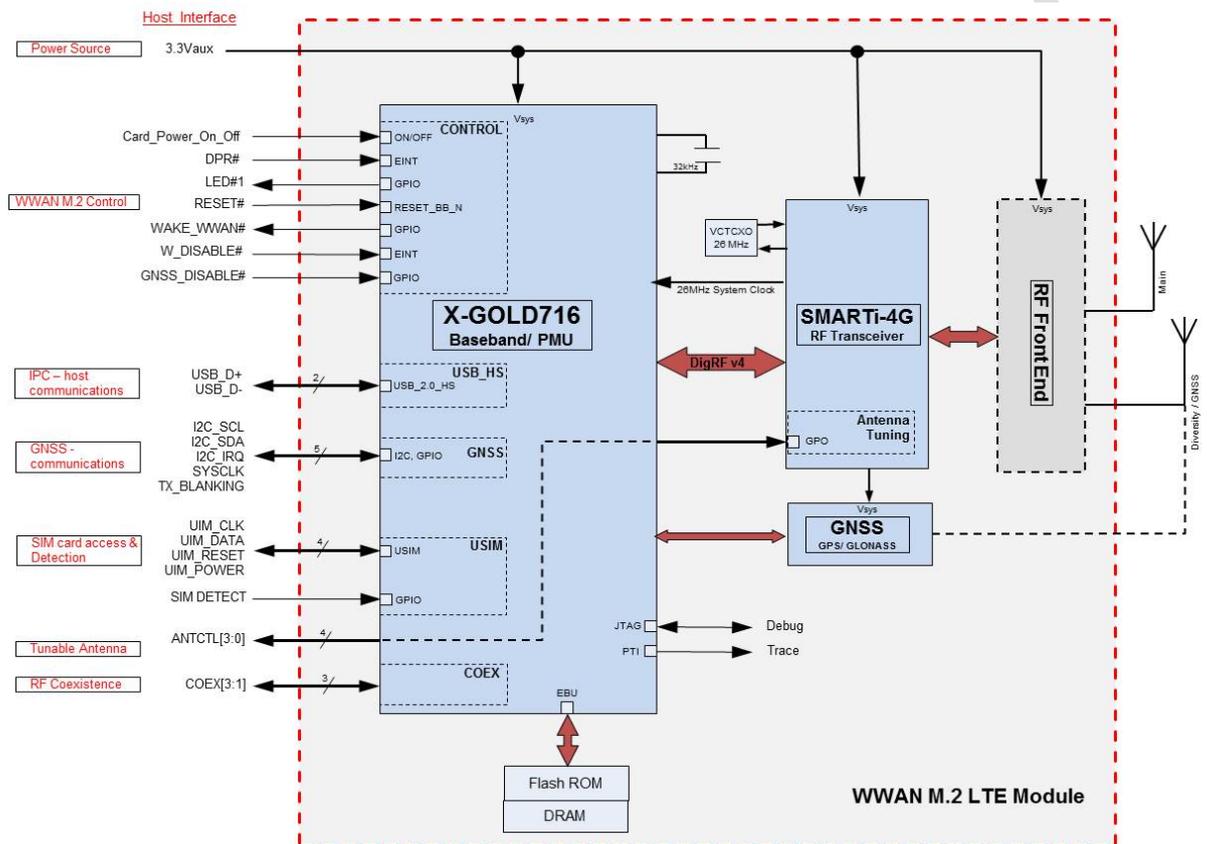


Figure 3 M.2 LTE Module Block Diagram

A more detailed interconnect diagram of the RF Engine utilized on the M.2 LTE Module is shown in Figure 4.

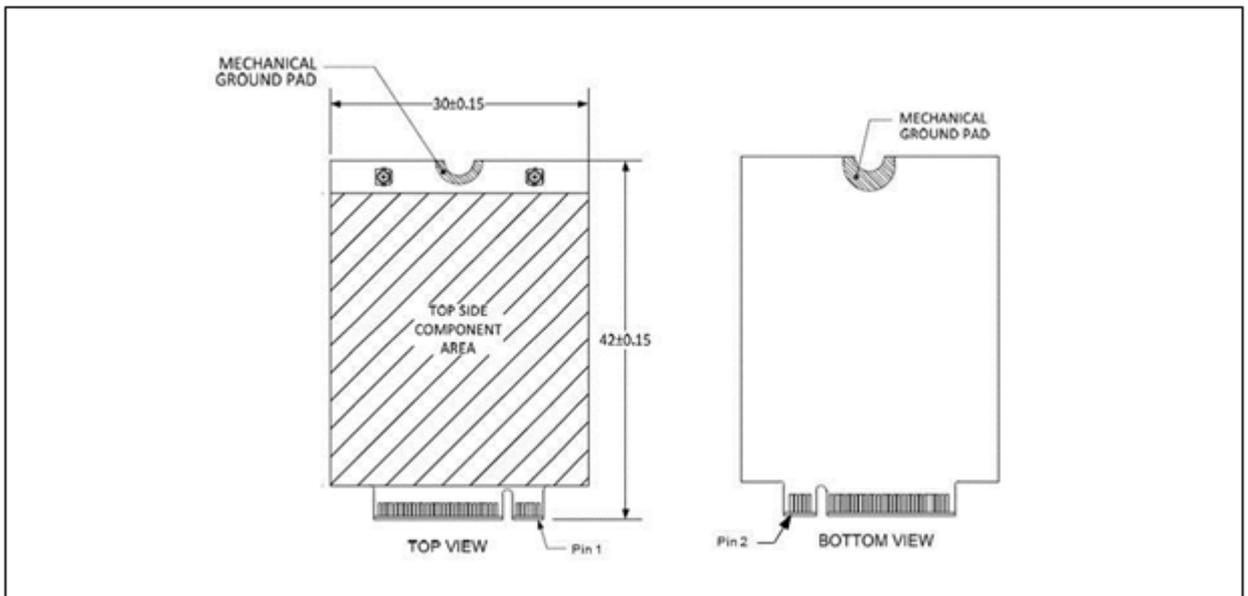


Figure 5 PCI Express M.2 Module Interface

A complete description of all interface signals available at the host interface is listed in Table 4. Some features, such as GNSS and Antenna Tuning, are not available on every M.2 module. On those modules, the signals at the application interface are not connected on the M.2 module.

Table 4 M.2 Host Interface Signals

Pin	Signal Name	I/O	Description	Supply
1	CONFIG_3	O	Presence Indication: WWAN M.2 Connects to GND internally	-
2	3.3V	P	M.2 Supply Pin 3.3 V	3.3 V
3	GND	P	Ground	-
4	3.3V	P	M.2 LTE Supply Pin 3.3 V	3.3 V
5	GND	P	Ground	-
6	Card_Power_On_Off	I	Control signal to power On/Off M.2.	1.8 V
7	USB D+	IO	USB 2.0 HS DPLUS Signal	1.8 V/2.9 V
Pin	Signal Name	I/O	Description	Supply
8	W_DISABLE#	I	Active low signal to Disable Radio Operation	3.3 V

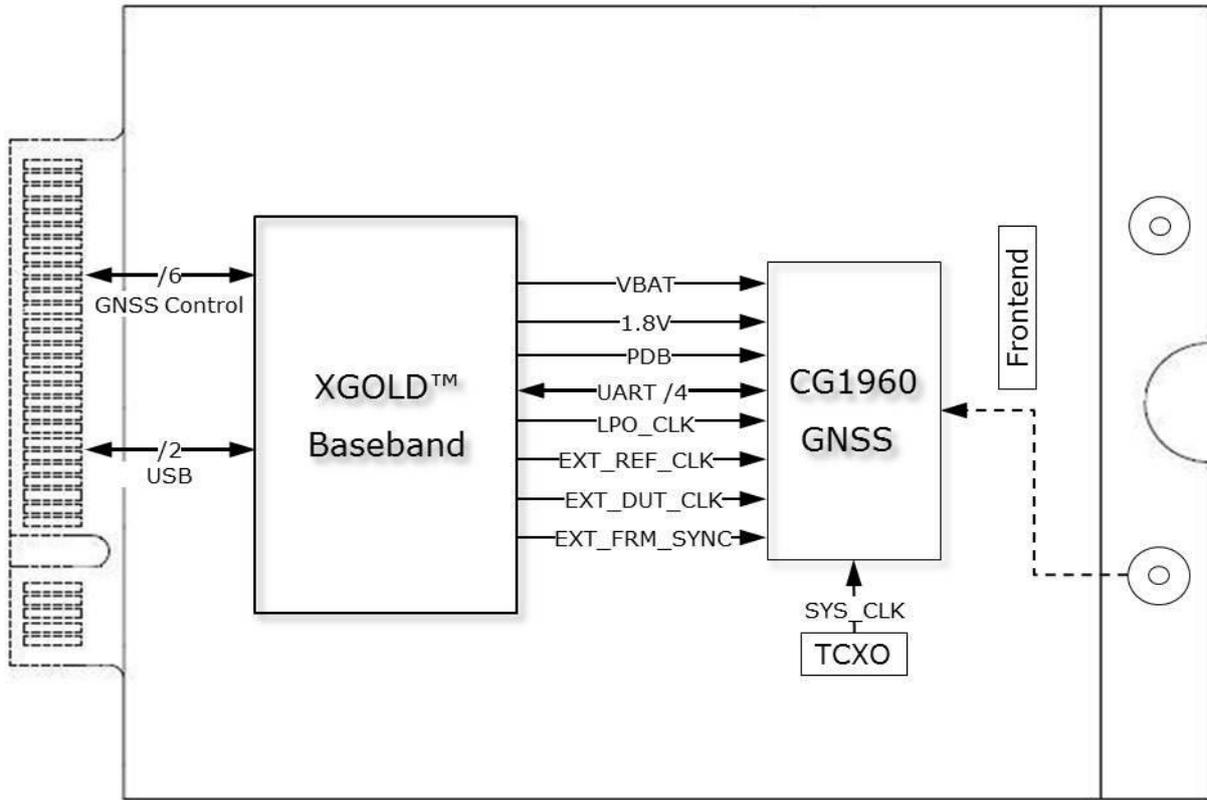


Figure 6 GNSS Connections and Interface

A description of the signals between the X-GOLD™ baseband and the CG1960 interface are defined in Table 7.

PREMIUM



Table 7 X-GOLD™ Baseband to GNSS Interface Signals

Signal	Description
VBAT	Battery Supply
1.8V	1.8 V Supply provided from X-GOLD™ Baseband
UART	The data and control I/F between the X-GOLD™ baseband and the GNSS device is over a 4 wire UART interface which include CTS/RTS handshaking.
PDB	X-GOLD™ baseband uses this signal to control Power-on/reset of the GNSS device
LPO_CLK	X-GOLD™ baseband provides a permanently active 32 kHz clock to the GNSS device
EXT_REF_CLK	X-GOLD™ baseband provides a 26 MHz clock to the GNSS device for frequency aiding.
EXT_DUT_CLK	X-GOLD™ baseband provides this signal to notify the GNSS device of that GSM Tx activity (PA Blanking)
EXT_FRM_SYNC	X-GOLD™ baseband provides a strobe signal to the GNSS device to allow fine time assistance based on 3GPP cell timing.

The GNSS signals available to the host at the WWAN module interface to support GNSS operation are shown in Table 8.

Table 8 GNSS Module Interface Signals

Signal Name	Description	Pin	Direction (WWAN)	Voltage Level
I2C_SCL	I2C Clock	40	I, O	1.8 V
I2C_SDA	I2C Data	42	I, O	1.8 V
I2C_IRQ	I2C IRQ - Interrupt signal	44	I	1.8 V
SYSCLK	Synchronization Clock	46	I	1.8 V
TX_BLANKING	TX Blanking – Active High when M.2 is transmitting.	48	O	1.8 V
GNSS_DISABLE#	GNSS Disable <ul style="list-style-type: none"> High: GNSS function is determine by AT command. Low: GNSS function is disabled. 	26	I	1.8 V

3.4 System Control Interface

The system control interface is used to control the power-up and reset of the WWAN module. There are additional control signals to disable the radio, drive an LED as a status indicator, an output to wake the host processor, and an input for body SAR.



3.4.1 Power On & Reset

The host processor has two signals that can be used to power on and reset the modem. Powering off the modem is accomplished through an AT command.

Table 9 Power-on & Reset Signals

Signal Name	Description	Pin	Direction (WWAN)	Voltage Level
Card_Power_ON_OFF	<p>Modem power on: For Tablet based designs only; this signal is used for power on-off control of X-GOLD™ Baseband IC.WWAN M.2 module</p> <ul style="list-style-type: none"> Logic Low: M.2 Off Logic High: WWAN M.2 Power On <p>This pin has an internal pull-down resistor.</p> <p>Ultrabook designs: Ultrabook host should deliver a 1.8V signal to turn on the module. If 1.8V is not feasible, recommend using a 47k series resistor connected to 3.3V.</p>	6	I	1.8 V
RESET#	<p>Reset the WWAN system. For Tablet based designs, this signal is used to reset the module.</p> <ul style="list-style-type: none"> Asynchronous, active low signal. When active, the WWAN M.2 module will be placed in a power-on reset condition. <p>Ultrabook designs, this signal is not used.</p>	67	I	1.8 V

3.4.2 Host Radio Disable Operation

An additional control signal is used to disable the radio on the module.

Signal W_DISABLE# is provided to allow users to disable, via a system-provided switch, the add-in card's radio operation in order to meet public safety regulations or when otherwise desired. Implementation of this signal is required for systems and all add-in cards that implement radio frequency capabilities.

The W_DISABLE1 signal is an active low signal that when driven low by the system shall disable radio operation. The assertion and de-assertion of the W_DISABLE# signal is asynchronous to any system clock. All transients resulting from mechanical switches need to be de-bounced by the host system and no further signal conditioning will be required. When the W_DISABLE# signal is asserted, all radios attached to the add-in card shall be disabled. When the W_DISABLE# is not asserted or in a high impedance state, the radio may transmit if not disabled by other means such as software.

The operation of the W_DISABLE# Signal is:



Enable, ON (3.3V): The radio transmitter is to be made capable of transmitting. Disable,

OFF (low): The radio transmitter(s) is to be made incapable of transmitting.

Standard TTL signaling levels shall be used making it compatible with 1.8 V and 3.3 V signaling.

W_DISABLE# pin has a pull-up resistor on the M.2 module.

Table 10 Radio Disable Signal

Signal Name	Detailed Description	Pin	Direction (WWAN)	Voltage Level
W_DISABLE#	<p>Disable Radio. This active low signal allows the host to disable the M.2 radio operation in order to meet public safety regulations or when otherwise desired.</p> <ul style="list-style-type: none"> • Logic Low: M.2 Off • Logic High: function is determined by Software (AT Command). <p>If this pin is left un-connected, functionality is controlled by software. Care should be taken not to activate this pin unless there is a critical failure and all other methods of regaining control and/or communication with the M.2 module have failed.</p>	8	I	Compatible with 1.8 V/3.3 V

Standard TTL signaling levels shall be used.

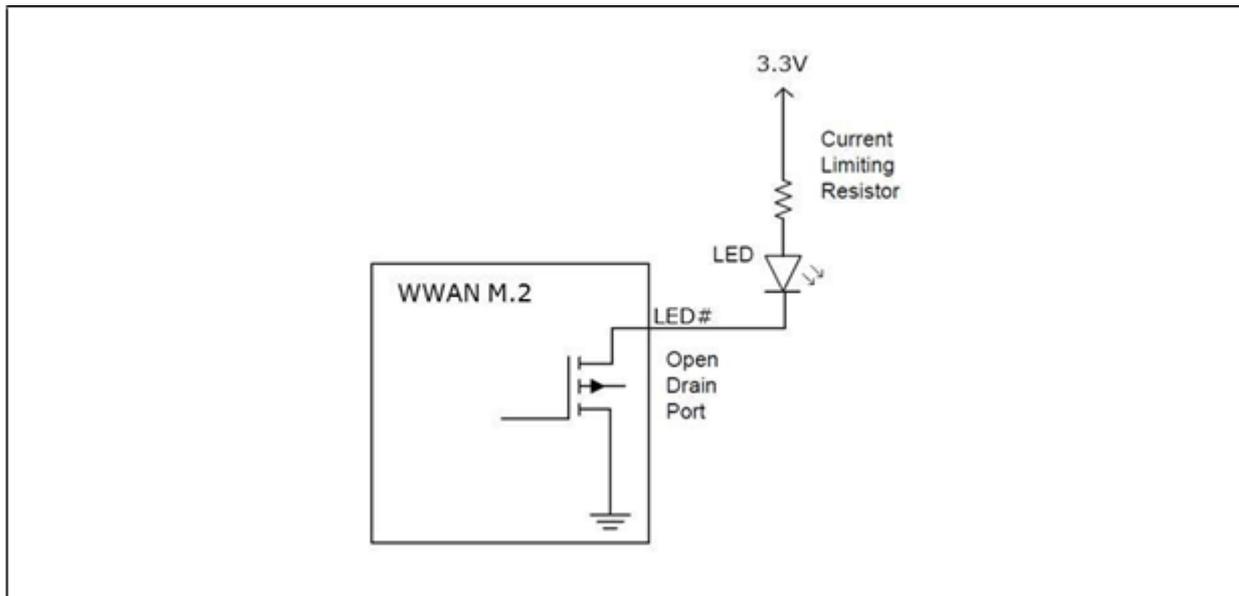


Figure 7 Typical LED Connection

The indication protocol for the LED is shown in Table 13.

Table 13 LED State Indicator

State	Definition	Characteristics	WWAN
OFF	The LED is emitting no	-	Not
ON	The LED is emitting light in a stable non-flashing	-	Powered registered but not transmitting or
Slow Blink	The LED is flashing at a steady but slow	250 ±25% ms ON period. 0.2 ±25% Hz blink rate	Activity proportional to transmitting/ receiving
Intermediate Blink	The LED is flashing intermittently proportional to the activity on the interface	50% duty cycle, 3 Hz minimum blink rate, 20 Hz maximum blink rate	-

3.4.4 Wake on WWAN Signal

An output signal is available to wake the host system, WWAN_N. This is an active low, open-drain output.

This output requires a pull-up resistor on the host system.



3.5 Tunable Antenna Control Interface

In notebook platforms, since the WWAN antennas are usually located on the top of the lid, there is a long RF mini-coax cable that can be up to 60 cm long between the antenna and WWAN module, it is preferred to use switches/tunable components directly on the antenna for antenna band switching/tuning to improve efficiency. On select WWAN M.2 modules, four (4) GPOs are available on the host interface that can be connected to an external antenna switch, to load the antenna with different impedances, configuring the different frequency responses for the main antenna. A sample block diagram depicting the antenna control signal connections to the antenna switch is shown in Figure 8 Intel's current antenna control solution offers an open loop control solution. The WWAN M.2 modem expects the AP to provide the antenna profile detection and through a pre-defined API, notify the WWAN M.2 modem with the correct antenna profile. The WWAN M.2 modem then applies the proper antenna profile data accordingly.

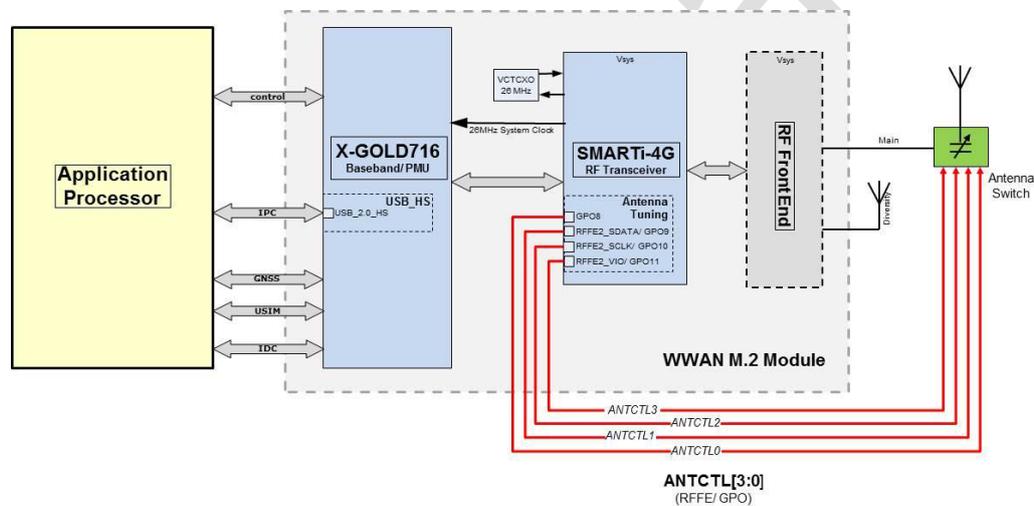


Figure 8 Antenna Control – Connections Detail

The electrical specification for the antenna control GPIOs are shown in Table 16.

Table 16 Tunable Antenna Control Signals

Signal Name	Description	Smarti™ 4G Signal	Pin	Direction (WWAN)	Voltage Level
ANTCTL0	Antenna Control 0	GPO8	59	O	1.7 – 2.6 V
ANTCTL1	Antenna Control 1	RFFE2_SDATA/ GPO9	61	O	1.7 – 2.6 V
ANTCTL2	Antenna Control 2	RFFE2_SCLK/ GPO10	63	O	1.7 – 2.6 V
ANTCTL3	Antenna Control 3	RFFE2_VIO/ GPO11	65	O	1.7 – 2.6 V



3.6 In-Device Coexistence Interface

As more and more radios are added to PC Ultrabook™ and tablet platforms, the sources RF interference increases significantly as multiple radios will have overlapping transmissions and receptions. This problem will increase further as overlapping bands continue to be rolled out; WIFI, BT, WWAN will all use overlapping band from 2300 MHz to 2600 MHz.

In-Device Coexistence is a feature which improves the user experience and maximizes throughput and Quality of Service of connectivity systems (WLAN, BT and GNSS) when these radios are simultaneously running with the WWAN M.2 LTE modem.

A diagram of the In-Device Coexistence architecture is shown in Figure 6.

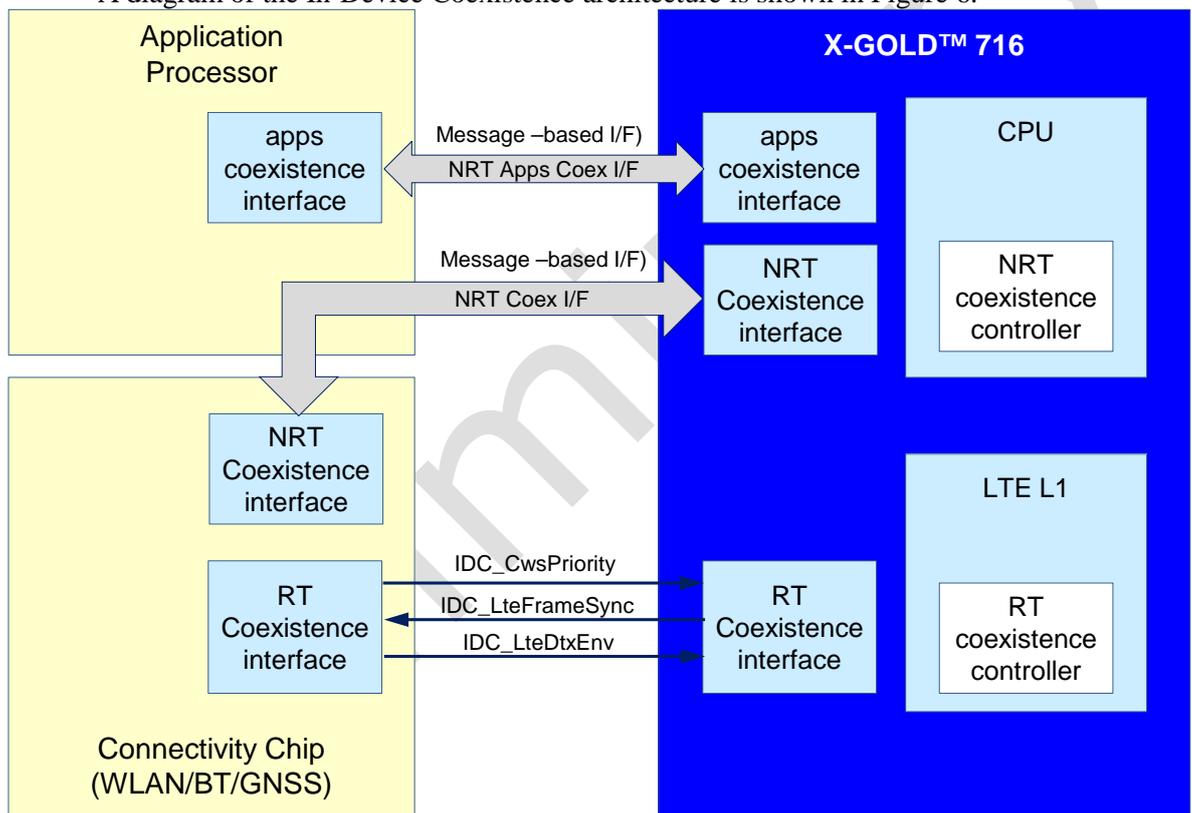


Figure 9 In-Device Coexistence Architecture

Seamless Co-running

In-Device-Coexistence primarily aims at avoiding interference between radio systems to allow seamless co-running where LTE and WLAN/BT/GNSS ensuring their maximum throughput and performance. To do so, a Non Real Time (NRT) coexistence controller is implemented on the ARM™ CPU. The NRT coexistence controller centralizes LTE, WLAN, BT and GNSS information and performs interference avoidance mechanisms, selecting interference-safe frequency configurations whenever possible. The NRT coexistence controller is also in charge of enabling some Real Time (RT) coexistence mechanisms when



NRT mechanisms are not sufficient to guarantee seamless co-running of LTE and connectivity systems (WLAN, BT, and GNSS).

Inter-system Synchronization

For the cases where co-running of LTE and connectivity systems cannot be achieved, a Real Time (RT) coexistence controller is implemented in the LTE Layer-1 subsystem. The RT coexistence controller is in control of the RT coexistence interface, which is exposed to the connectivity chip. The RT coexistence controller exploits real time information received from the LTE Layer-1 subsystem and from the connectivity chip to coordinate LTE and connectivity “in the air” activities. The coordination function protects LTE traffic while optimizing the throughput and availability of WLAN/BT/GNSS. When operating in this mode, the connectivity systems have reduced capability since they access the medium when LTE is inactive, or when their respective operations do not impact each other significantly.

The Non Real-Time mechanism implements a messaging based interface, formatted as AT commands that are passed to the AP host over the IPC interface (USB). A simple piece of SW residing on the AP host will tunnel the Non Real-Time messages between the BT/WLAN device and M.2 module, translate AT commands to/from the BT/WLAN driver commands, and maintain the states of the BT/ WLAN and M.2 LTE modem. The host software will also be responsible for initializing the Real-Time mechanism.

The Real-Time mechanism consists of 3 GPIO signals which allow the synchronization of multiple TX and RX events. The signals to support real Time coexistence are listed in Table 17.

If the coexistence signals are not used by the host system, they should not be connected.

Table 17 Coexistence – Hardware Synchronization Signals

Signal Name	Description	Pin	Direction (WWAN)	Voltage Level
COEX0	IDC_LteDtxEnv - Synchronous signal indicating LTE UL gap. Envelop signal with edges occurring 1ms before in-the-air gap (raising and falling edges) RT arbiter indicates to connectivity cores when there is no LTE Tx (Envelope)	60	I/O	1.8 V
COEX1	IDC_CwsPriority - 0 : Low priority / 1 : high priority CWS Indicates if the coming activity is high priority	62	I/O	1.8 V





Figure 10 RF Antenna – Coaxial Connector Location

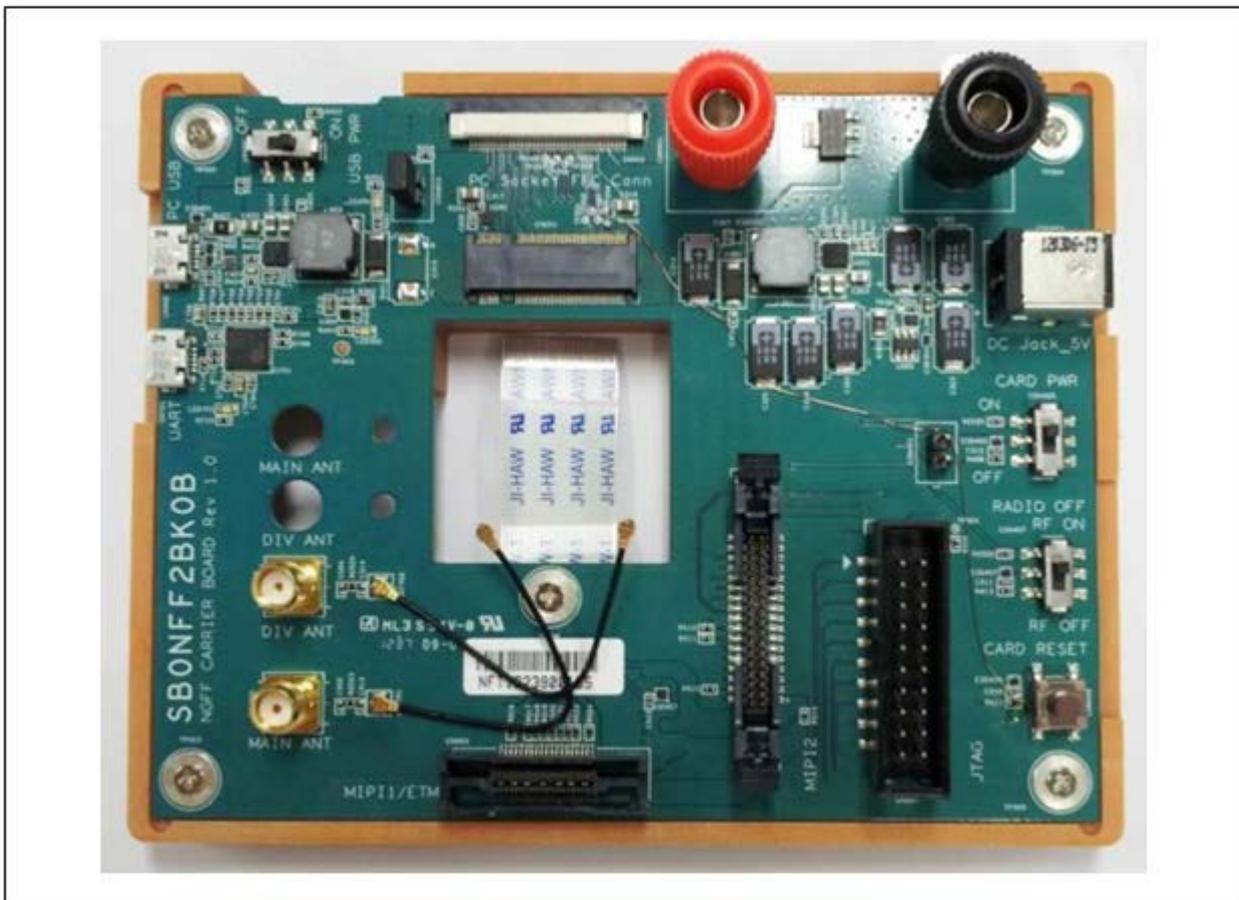


Figure 11 M.2 Carrier Board

4.1.1 FlashTool

Intel Mobile Communications provides a utility program called FlashTool for downloading a binary image into the Flash memory of the M.2 module. The USB-HS port or USIF on the platform is used for connection to a PC via a USB cable for flashing.

FlashTool is a Win32/64 application built on top of the dynamic link library, Download.DLL.

4.1.2 PhoneTool

PhoneTool is a development tool built on top of the so-called “production test dll, DWDIO.dll”. PhoneTool can be used to fine tune the parameters of:

- Audio configuration and settings (if enabled on M.2 module)
- NV (Non-Volatile) memory



6 Modem Configuration on Linux Based PC

The following section describes the system architecture of Inter-Processor Communication on a M.2 module when connected to a Linux based Host OS (Android, Chrome, and Ubuntu). The description is only concerned with the HS-USB port which is the only available functional interprocessor communications (IPC) interface at run-time and takes into account only the AT control plane and IP packets data connection. Audio packet exchange is outside the scope of the current version of M.2.

6.1 Overview

Figure 13 illustrates the architecture of the IPC and its components.

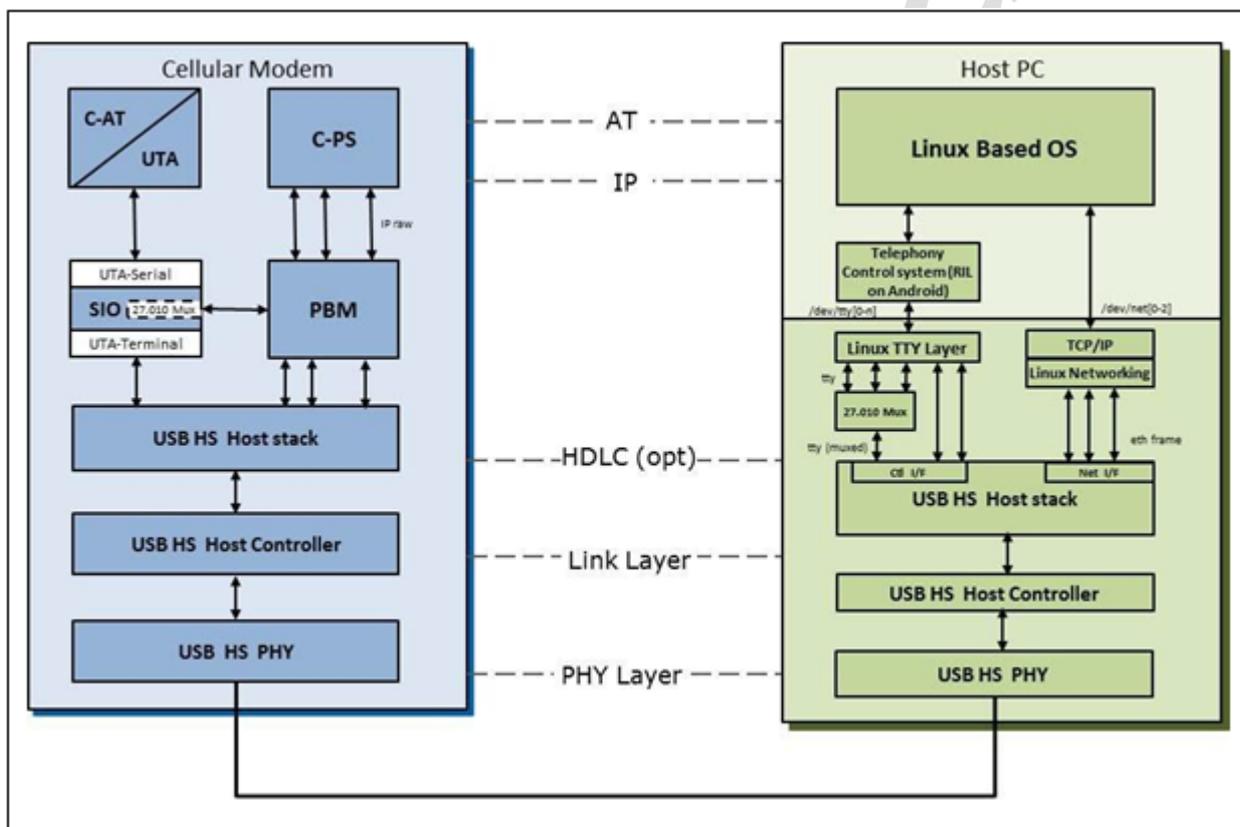


Figure 13 Linux Software Architecture

The user data is transferred from/to the cellular protocol stack (C-PS) to the IPC via a centralized memory manager. The centralized memory manager is called packet buffer manager (PBM). The user data is routed along the data plane as IP packets using several



8 Power Delivery Requirements

8.1 Electrical Parameters – 3.3 V Power Supply

The M.2 modules utilize a single regulated power rail of 3.3 V provided by the host platform. There is no other VDDIO like pin and the M.2 module is responsible for generating its own I/O voltage source using the 3.3 V power rail. This 3.3 V voltage rail source on the platform should always be on and available during the system's stand-by/suspend state to support the wake event processing on the communications card.

There are 5 power pins on the host interface, pins 2, 4, 70, 72, 74.

The requirements of the regulated 3.3 V power supply provided by the host platform are listed below.

Table 24 M.2 Module Power Delivery Requirements - Ultrabook

Requirement	Detailed Description
Supply voltage	3.3 V at the Card connector will be within 5% tolerance (3.15 V to 4.4 V) on the motherboard.
Peak Current	The host board shall provide 2.5 A peak current.
Average Current	Average max current of 1.1 A will be supported.
Max in-rush current	Max module in-rush current of 5.1 A will be supported.
Power pin connections	The power pins specified in WWAN card #'s, 2, 4, 70, 72, 74 will be connected to 3.3 V supply and WWAN configuration pins 1, 69, and 75 will be connected to ground.

For Tablet platforms, the 3.3 V regulated power rail can be replaced with a direct VBAT connection. Key parameters for VBAT in a direct connection configuration are shown in Table 25.

Table 25 VBAT Power Delivery Requirements – Direct Connections (Tablet)

Power Source	Vmin	Vmax	Cell Type
VBAT	3.135 V*	4.4 V	Once cell Li-Ion battery

(*) RF performance cannot be guaranteed below 3.135 V.



The M.2 Data Card includes a digital thermal sensor in order to monitor the temperature of the WWAN Card. The firmware will support the extraction of temperature information from the module and the configuration of auxiliary trip points.

The configuration of the thermal trip points and receipt of thermal data is available through a WWAN power control API in order for the host to implement a power and thermal management framework for the system.

9.4 Seamless Roaming / Wifi Offload

The WWAN M.2 module provides support for EAP methods; EAP-SIM, EAP-AKA, and EAP-AKA'. These methods, which are used on WiFi authentication, require access to WWAN SIM credentials to connect to WiFi Networks and offload from WWAN.

All necessary AT commands needed for the EAP-SIM functionality are supported. In addition, all necessary commands need for the PIN entry, change, and lock/unlock are supported.

Through the API, the host can manage Wi-Fi Hotspot connectivity with Operator provisioned Hotspot SSIDs and/or End-User provided SSIDs and seamlessly offload a data session from a 3G/4G connection to Wi-Fi hotspot connection after successful authentication of the device and authorization of the end-user subscription using the SIM on the platform.

9.5 Conducted Transmit Power

Transmit power as measure at the WWAN antenna connector, in W-CDMA power class 3.

Conducted transmit power as measured at the WWANM.2 RF main antenna connector.

Table 30 Conducted Transmit Power

Parameter	Condition	Requirement
Conducted Transmit Power	W-CDMA class 3	23.5 dBm +/-1.1 db

9.6 Conducted Receiver Sensitivity

TBA

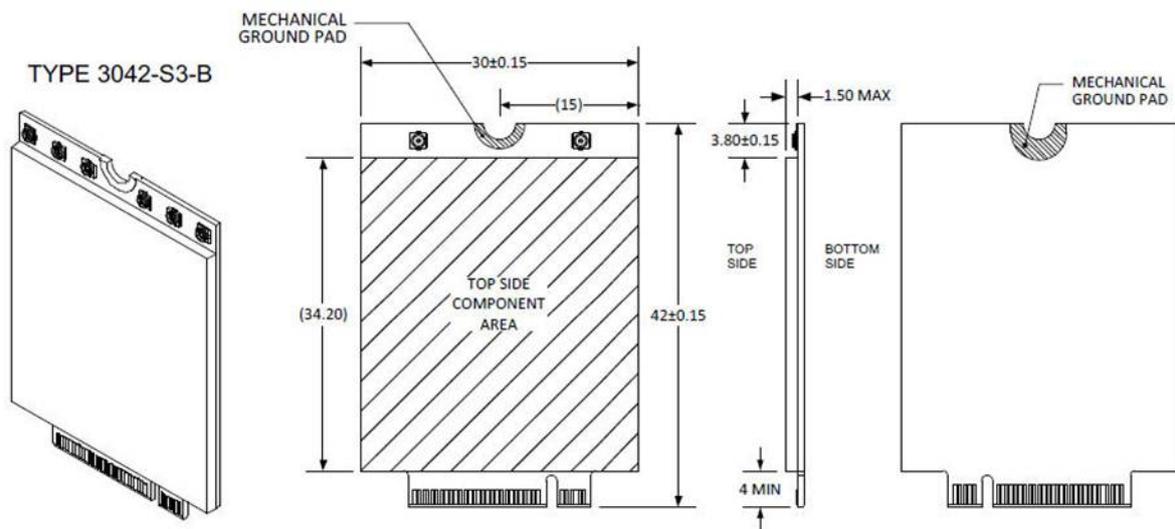


10 WWAN Card Type 3042-S3-B

10.1 Mechanical Dimensions

The mechanical dimensions of WWAN Card Type 3042 are shown in Figure 14.

The WWAN card is 30 mm x 42 mm. The height is 1.5 mm from the top of the PCB to the top of the outside shield. There are a total of 75 pins; however 8 pins are lost to support the slot+. All components are mounted on the Top side.



WWAN Card Type 3042-S3-B Mechanical Dimensions

Figure 14 WWAN Card 3042 Mechanical Dimensions

10.2 Land Pattern

Figure 16 illustrates a typical land pattern for a top-mount connector with the key removed.

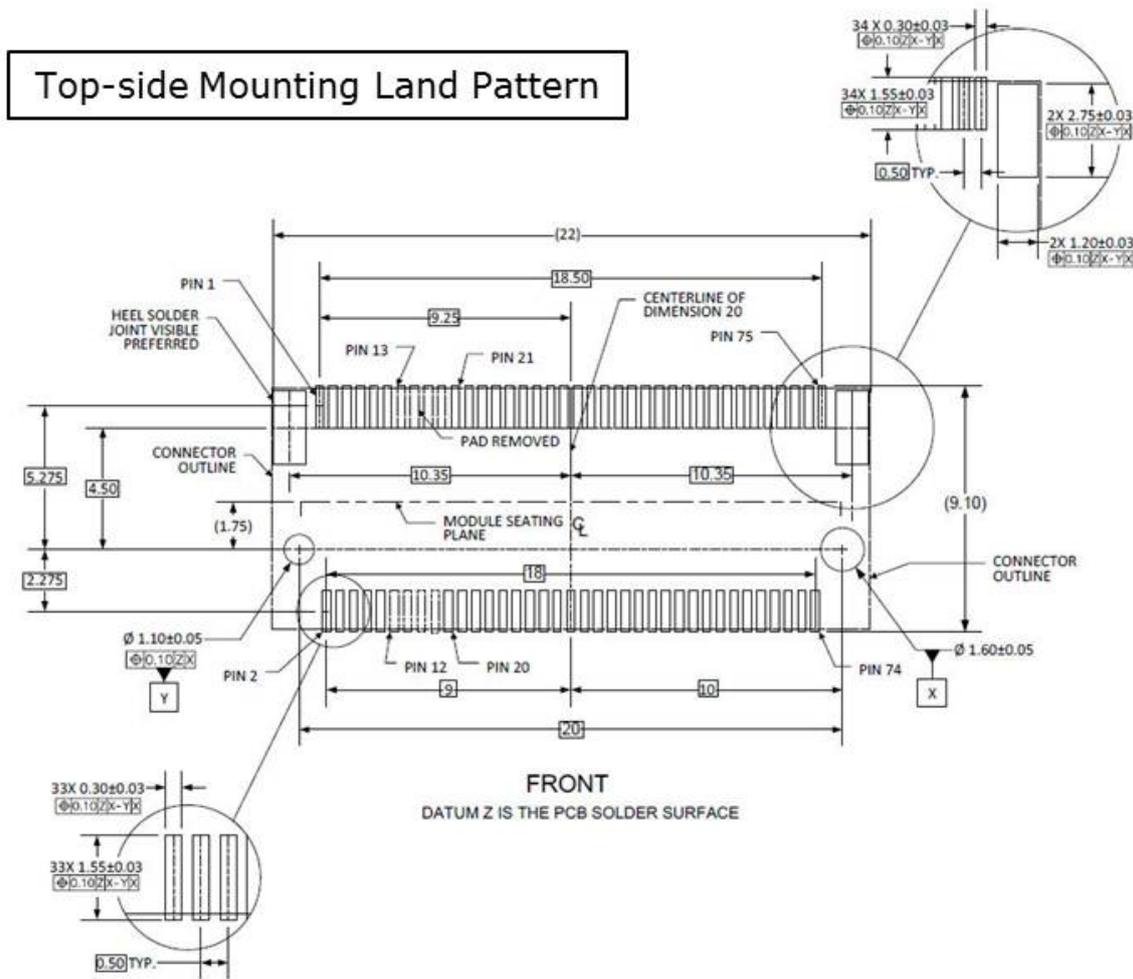


Figure 16 WWAN Card Type 3042 Top-Side Mounting Land Pattern

Norwegian	Telit Communications S.p.A. erklærer herved at utstyret 2G/3G module er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 1999/5/EF.
Polish	Niniejszym Telit Communications S.p.A. oświadcza, że 2G/3G module jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC
Portuguese	Telit Communications S.p.A. declara que este 2G/3G module está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
Slovak	Telit Communications S.p.A. týmto vyhlasuje, že 2G/3G module spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
Slovenian	Telit Communications S.p.A. izjavlja, da je ta 2G/3G modul v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
Spanish	Por medio de la presente Telit Communications S.p.A. declara que el 2G/3G module cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
Swedish	Härmed intygar Telit Communications S.p.A. att denna 2G/3G module står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

In order to satisfy the essential requirements of 1999/5/EC Directive, the xN930 is compliant with the following standards:

RF spectrum use (R&TTE art. 3.2)	EN 300 440-2 V1.4.1 EN 301 511 V9.0.2 EN 301 908-1 V6.2.1 EN 301 908-2 V5.2.1 EN 301 908-13 V5.2.1 EN 300 440-1 V1.6.1
EMC (R&TTE art. 3.1b)	EN 301 489-1 V1.9.2 EN 301 489-3 V1.4.1 EN 301 489-7 V1.3.1 EN 301 489-24 V1.5.1
Health & Safety (R&TTE art. 3.1a)	EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 EN 62311: 2008



The conformity assessment procedure referred to in Article 10 and detailed in Annex IV of Directive 1999/5/EC has been followed with the involvement of the following Notified Body:

Thus, the following marking is included in the product:

CE 0682

The full declaration of conformity can be found on the following address:
<http://www.telit.com/>

There is no restriction for the commercialization in all the countries of the European Union.

Final product integrating this module must be assessed against essential requirements of the 1999/5/EC (R&TTE) Directive. It should be noted that assessment does not necessarily lead to testing. Telit Communications S.p.A. recommends carrying out the following assessments:

RF spectrum use (R&TTE art. 3.2)	It will depend on the antenna used on the final product.
EMC (R&TTE art. 3.1b)	Testing
Health & Safety (R&TTE art. 3.1a)	Testing

Alternately, assessment of the final product against EMC (Art. 3.1b) and Electrical safety (Art. 3.1a) essential requirements can be done against the essential requirements of the EMC and the LVD Directives:

- Low Voltage Directive 2006/95/EC and product safety
- Directive EMC 2004/108/EC for conformity for EMC

12.2 CE RF Exposure Compliance

This device meets the EU requirements (1999/519/EC) and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) on the limitation of exposure of the general public to electromagnetic fields by way of health protection.

To comply with the RF exposure requirements, this module must be installed in a host platform that is intended to be operated in a minimum of 20 cm separation distance to the user.



13.4 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 20 cm between the radiator & your body.

13.5 End Product Labeling

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: “Contains FCC ID: RI7LN930”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

This device is intended only for OEM integrators under the following conditions:

- (1) The antenna must be installed such that 20 cm is maintained between the antenna and users,
- (2) The transmitter module may not be co-located with any other transmitter or antenna.
- (3) To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile exposure condition must not exceed:

- 5.0 dBi in Cellular band
- 3.0 dBi in PCS band
- 5.5 dBi in AWS band
- 5.0 dBi in 700 MHz band
- 5.0 dBi in 2500MHz band

In the event that these conditions cannot 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 cannot 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.

14 Document History

Revision	Date	Changes
0	2013-05-20	First issue
1	2013-07-09	<ul style="list-style-type: none"> Update setting for Pin 21 on the host interface. This signal is not connected. Updated pin names of pins 1, 21, 69, and 75 in Table 4 and Table 19 to simply reflect HW Configuration use. Updated Table 24 to indicate configuration pins 1, 69, and 75 are tied to GND. Rename section 3.6 Coexistence Interface to In-Device Coexistence Interface. Additional information on the Inter-device coexistence support was added. Updated section 4.1.3 System Trace Tool Section. Updated Figure 5 – RF Engine for WW SKU. Add further information USB LPM to USB section Added information on Seamless Roaming & Wifi Off-load – SIM_EAP, SIM-AKA under Other Requirements Added information on Antenna Design Guidelines under Other Requirements.
2	2013-07-29	RF bands updated
3	2013-08-26	Updating on RF bands Updated section 3.5 and 3.4.5 Updated temp range
4	2013-09-09	HN930-DC product was removed from portfolio
5	2013-09-15	<p>Main & Diversity antenna positions have been swapped.</p> <ul style="list-style-type: none"> Updated documentation accordingly, Figure 6 and Figure 10. Updated WWAN M.2 Mechanical drawings, Figure 14 through Figure 17. Updated Card_power_ON_OFF description for UltraBook in Table 9. Updated comments in Table 15 regarding the DPR#/SAR signal. Updated SIM DTECTED signal to indicate an external pull-up. Updated Platform Block Diagrams to show DPR# signal is connected to an EINT pin (not GPIO) on XGOLD. Identified Audio Signals on host interface in Table 4. Previously these were simply defined as Reserved. Updated VBAT requirements in Table 24 and Table 25.



