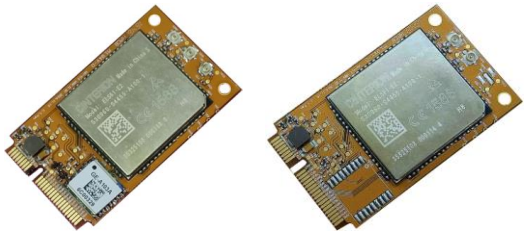
WW-4161, LTE WWAN Mini PCIe Card w/ RS232/GNSS Options

RoHS Compliant



Overview

WW-4161 4G PCI Express Mini Card supports the latest 4G LTE with seamless fallback to 2G networks.

It is designed based on Thales/Gemalto/Cinterion LTE Cat1 and 2G GSM/GPRS wireless WAN technologies. Not only exhibits excellent hardware/radio frequency performance, it also supports rich software for fast product development. Following the PCI Express Mini Card standard, it could be easily applied in devices with PC architecture.

It is an ideal solution for the vast number of M2M and industrial IoT applications that are not dependent on speed but that requires the longevity of LTE networks, while still providing 2G connectivity to ensure complete population and geographic coverage as LTE rolls out.

In addition to WWAN, features of (a) ultra-sensitive GNSS (GPS & GLONASS), (b) SIM card holder, and (c) modem control via UART TTL/RS232 are available for increasing your product value in just one card.

Applications

- Smart grid / IoT
- POS / Automatic Meter Reading
- School Bus / Transit / Taxi / Police
- Tracking & Tracing / Fleets Management
- Industrial PC / Netbook PC / Tablet PC / SBC
- Mobile Internet Terminal / Fixed Wireless Terminal
- Kiosk /Digital Signage / Intelligent Vending Machine
- Financial / Security / Payment / Inventory / Healthcare
- Remote Monitoring / Telematics / mHealth

Features

- Both 4G LTE and 2G GSM/GPRS/EDGE support.
- PCI Express Mini Card standard V1.2 compliant
  - Communication via USB
  - Network status indication
  - Airplane mode support
  - Remote host wakeup support
- Powered by Thales/**Gemalto LTE Cat 1** module
  - ELS61-E2 (4G LTE bands 1, 3, 8, 20, 28; 2G bands 3,8) for Europe/APAC
  - Approvals: R&TTE (CE), GCF
- USB 2.0 High Speed (480Mbit/s) device interface, Full Speed (12Mbit/s) compliant
- Onboard SIM card holder (for Micro-SIM)
- Customer IMEI/SIM-Lock as variant
- RLS Monitoring (Jamming detection)
- Rich driver/RIL support for various platforms
- Rich internet communication protocol support
- Internet Services TCP/UDP server/client, DNS, Ping, HTTP, SMTP, FTP client
- The latest TLS/SSL engine provides secure and reliable TCP/IP connectivity.
- **eSIM** support, BIP (Bearer Independent Protocol)
- SIM Access Profile (SAP)
- Abnormal temperature protection of module board (out of -40~90℃)
- Option of UART TTL or RS232 modem control
- Option of high performance GNSS (GPS&GLONASS)
  - GNSS antenna short circuit protection

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- Industrial grade operating temperature

Technical Specifications

Wireless WAN

Frequency bands	4G LTE Bands 1,3,8,20,28; 2G Bands 3,8 2100/1800/900/800/700MHz (4G) 1800/900MHz (2G)
Output power	**Class 3, LTE, FDD (Release 8)** ● (+23dBm +1/-2dB) for LTE 2100, LTE FDD B1 ● (+23dBm +1/-2dB) for LTE 1800, LTE FDD B3 ● (+23dBm +1/-2dB) for LTE 900, LTE FDD B8 ● (+23dBm +1/-2dB) for LTE 800, LTE FDD B20 ● (+23dBm +1/-2dB) for LTE 700, LTE FDD B28 **2G GSM/GPRS/EDGE (Release 99)** ● Class 4 (+32.5dBm +/-2dB) for EGSM900 ● Class 1 (+30dBm +/-2dB) for GSM1800 ● Class E2 (+26.5dBm +/-3dB) for GSM900 8-PSK ● Class E2 (+26dBm +3/-4dB) for GSM1800 8-PSK
LTE Features 3GPP Release 9	DL max. 10.2 Mbps, UL max. 5.2 Mbps UE CAT 1 supported
GSM/GPRS/ EGPRS features	Data transfer GPRS: ● Multi-slot Class 12 ● Full PBCCH support ● Mobile Station Class B ● Coding Scheme 1 – 4 EGPRS: ● Multi-slot Class 12 ● EDGE E2 power class for 8 PSK ● Downlink coding schemes – CS 1-4, MCS 1-9 ● Uplink coding schemes – CS 1-4, MCS 1-9
	● SRB loopback and test mode B ● 8-bit, 11-bit RACH ● PBCCH support ● 1 phase/2 phase access procedures ● Link adaptation and IR ● NACC, extended UL TBF ● Mobile Station Class B
SMS	Point-to-point MT and MO Cell broadcast Text and PDU mode Storage: SIM card plus SMS locations in mobile equipment
AT commands	Hayes 3GPP TS 27.007, TS 27.005, Gemalto M2M AT commands for RIL compatibility
SIM UICC	SIM Application Toolkit: SAT letter classes b, c, e with BIP Support of 3 V and 1.8 V SIM/USIM cards
USB	USB 2.0 High Speed (480Mbit/s) device interface. Full Speed (12Mbit/s) compliant

GNSS (GPS & GLONASS)+ option

Receiver Type	SiRFstarV - 52 channels, L1 frequency, C/A code GPS & QZSS:1575.42 MHz GLONASS: 1598.0625~1605.375 MHz
Horizontal Position Accuracy	< 2.5m (Autonomous) (50% 24 hr static, -130 dBm)
Velocity Accuracy	<0.01 m/s (speed, autonomous) <0.01° (heading) (50%@30m/s)
Time To First Fix Hot start Warm start Cold start	Autonomous (50% -130dBm) <1sec <30sec <35sec
Sensitivity	Acquisition: -146 dBm (GPS)

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(Autonomous)	Tracking: -165 dBm (GPS), -163 dBm(GLONASS) Navigation: -160 dBm (GPS), -159 dBm(GLONASS) (-142dBm 28dB-Hz with 4dB noise figure)
Max. Update Rate	5 Hz
Max. Altitude	<18,000 m
Max. Velocity	<1,852 km/hr.
Protocol Support	NMEA V4.00, 115200 bps (default) GGA, GSA, GSV, RMC, VTG OSP (One Socket Protocol)
SBAS Support	WAAS, EGNOS, MSAS,GAGAN
Dynamics	<4g
Power Consumption	29 mA/average tracking

+ Note. According to IC Spec

Windows Platform support

USB driver for Vista, 7, 8, 10
RIL, USB driver for Embedded Handheld (Pocket PC and Smartphone) : CE 5.x, 6.0, 7.0, 8.0 (2013)

Linux/Mac/Android Platform support

Compatible with standard USB kernel drivers Android RIL driver support up to 8.0

Electrical Data

Power Supply (VCC)	3.3 ± 0.3 V
Power Consumption[&] Airplane mode Normal function mode[+]	Without GPS 80mA 330mA

[&] The indicative data is from testing for information purpose only as measurements of an example application. Actual value depends on antenna efficiency, application environment, network etc.

[+] Web browsing on a Win7 IPC.

Environmental Data

Operating temperature (board temperature of ELS61-E2)	-40 ~ 90 ℃[*+&]: -30 ~ 85 ℃[&] (normal) -40 ~ -30 ℃[*&] (extended) 85 ~ 90 ℃[*&] (extended)
Operating temperature/ GNSS	-40 ~ 85 ℃

[*] Extended operation allows normal mode speech calls or data transmission for limited time until automatic thermal shutdown takes effect. Within the extended temperature range (outside the normal operating temperature range) the specified electrical characteristics may be in- or decreased.

[&] Because of temperature measurement uncertainty, a tolerance of ±3°C on the thresholds may occur.

[+] Airflow: min. 1 m/s

Mechanical Data

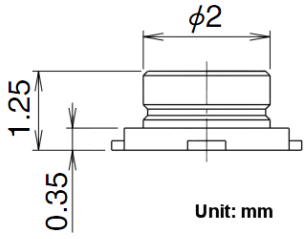
30 x 50.9 x 4.65 **(mm)**



Weight

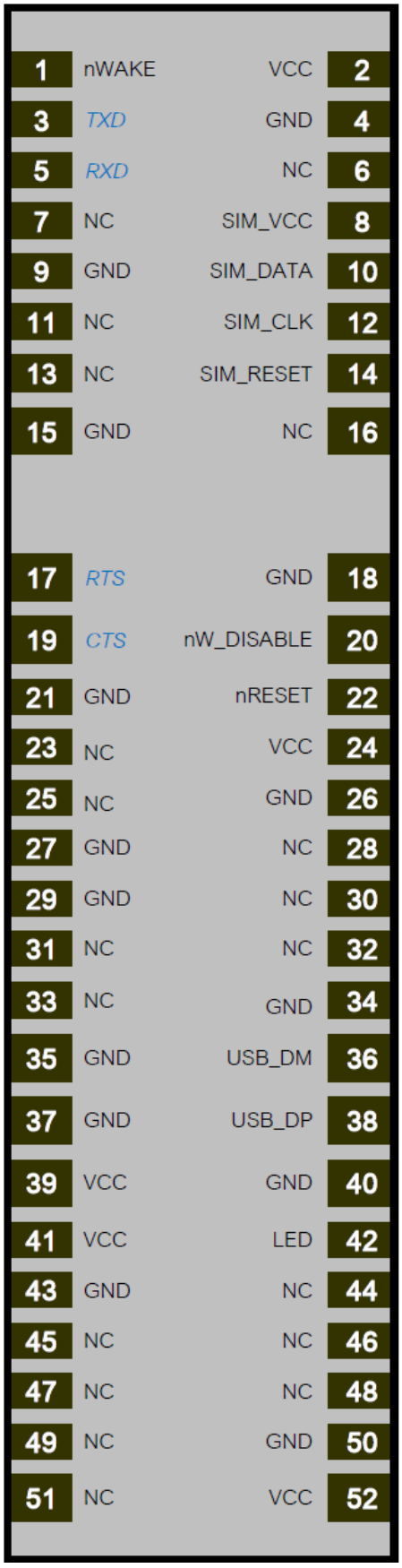
WW-4161V	8.7 g
WW-4164V	9.0 g

RF Connector: I-PEX Receptacle



Note. Corresponding plug cable: diameter of 1.13mm

52-Pin Gold-Finger Definition



Name	PINs	Function	I/O
VCC	2,24,39,41 ,52	3.3V power supply, Min 3.0V, Max 3.6V	Input
GND	4,9,15,18, 21,26,27,2 9,34,35,37 ,40,43,50	Ground	Input
USB_DM	36	USB data signal minus	I/O
USB_DP	38	USB data signal plus	I/O
LED	42	Open Drain active Low WWAN status indicator;	Output
SIM_VCC	8[!]	Power for SIM card	Output
SIM_DATA	10[!]	SIM data signal	I/O
SIM_CLK	12[!]	SIM clock signal	Output
SIM_RESET	14[!]	SIM reset signal	Output
nWAKE[v]	1	Open drain, active low wakeup signal	Output
nW_DISABLE	20	Active low radio control signal, internal pull-up	Input
nRESET[v]	22	Min 10ms active low reset signal,	Input
TXD[#&]	3	UART/RS232 data into card	Input
RXD[#&]	5	UART/RS232 data out of card	Output
RTS[#&]	17	UART/RS232 request to send	Input
CTS[#&]	19	UART/RS232 clear to send	Output
NC	Remaining pins	No connection	-

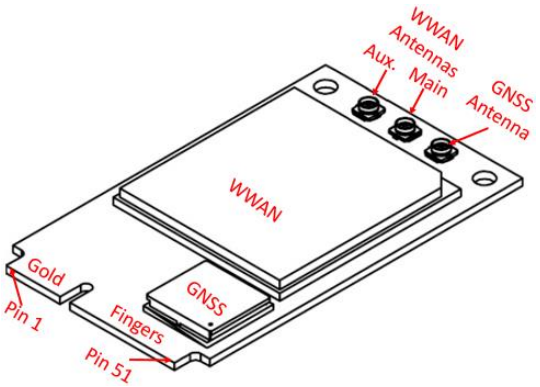
[!] Leave these pins open if they are not used

[&] Optional, default is NC

[#] Reserved pins used, proprietary

[v] No connect (NC) for specified model

Outlook



Order Information

WW-4161X (w/o GPS), WW-4164X (w/ GPS)

where X = Q, S, V , W as shown below

Feature \ Model	Q	S	V	W
USB	Y	Y	Y	Y
TTL/RS232	TTL	RS232	-	-
Pin 1 (nWAKE)	Y	Y	Y	NC
Pin 22 (nRST)	NC	NC	NC	NC

*This document is subject to change without notice.

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