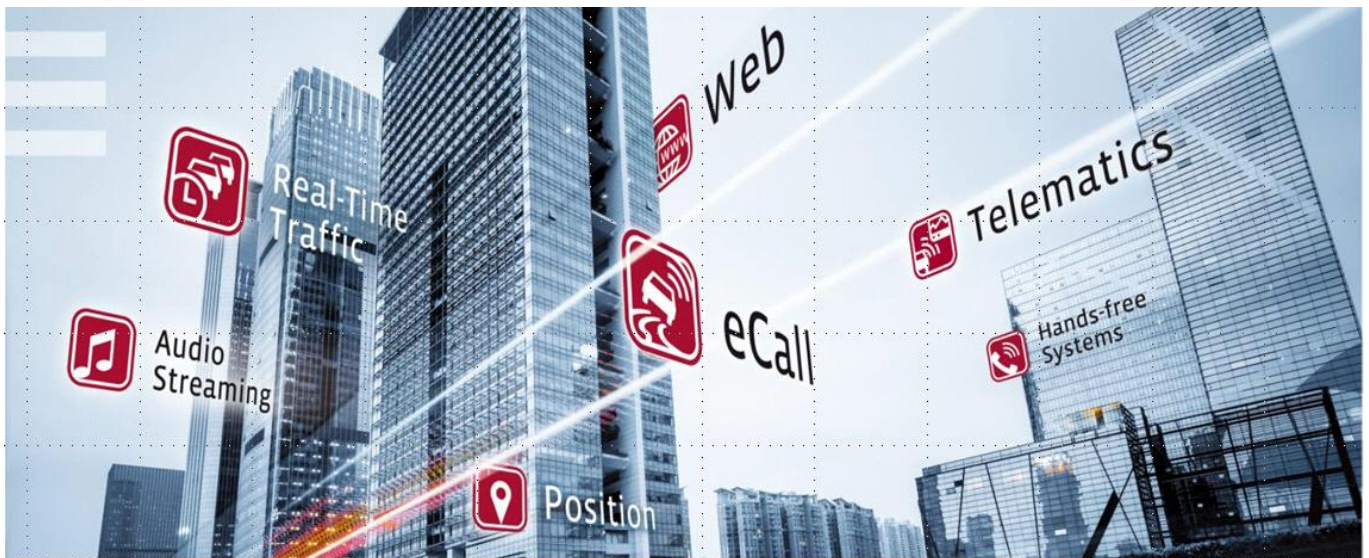


# User manual

## LTE-NAD V1140-10x-1



Peiker product IDs:            2189-140-133-00 (V1140-103-1)  
   2189-140-170-00 (V1140-100-1)  
   2189-140-174-00 (V1140-104-1)  
   2189-140-176-00 (V1140-106-1)  
   2189-140-181-00 (V1140-101-1)

Revision:                         1.6  
Date:                                May 2016

Status:                              Release

## History:

<b>Date</b>	<b>Revision</b>	<b>Name</b>	<b>Comment</b>
30.11.2015	1.0	Phse	Initial document based on V1140-xxx documents
12.01.2016	1.1	Phse	Added some missing Product IDs on the cover page Corrected the FCC ID and IC ID of V1140-103-1 in section 8.3
20.01.2016	1.2	Phse	Removed LTE B8 support for V1140-100-1
22.03.2016	1.3	Phse	Updated sections 2.3 and 8.3
30.03.2016	1.4	Phse	Updated sections 2.1 to 2.3 with V1140-101-2 Deleted "eCall inband modem" from section 2.2 Updated the List of Acronyms and moved it to the end
04.04.2016	1.5	Phse	Deleted V1140-103-1 and V1140-104-1 from section 7.3 IC Labeling
17.05.2016	1.6	Phse	Added section 2.2 Reworked section 7.3 OEM Responsibilities / Antenna

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# 1 Introduction

## **1.1 Scope**

This document gives an overview about electrical, mechanical and functional detail of the peiker LTE-NAD V1140-10x-1 modules.

## **1.2 Audience**

Information to integrate the module in other applications.

## **1.3 Contact information, Support**

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Max-Planck Street 32  
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Germany

<http://www.peiker.de>  
info@peiker.de

## 2 Overview

### 2.1 Product Variants

LTE-NAD module is available in multiple variants:

<b>Peiker product #</b>	<b>Module configuration</b>
2189-140-170-00 (V1140-100-1)	LTE EU configuration
2189-140-181-00 (V1140-101-1 / V1140-101-2)	LTE North America configuration
2189-140-133-00 (V1140-103-1)	2G/3G EU/RoW configuration
2189-140-154-00 (V1140-104-1)	LTE Asia Pacific configuration
2189-140-176-00 (V1140-106-1)	2G/3G China configuration

#### **V1140-100-1**

GSM Bands	900MHz and 1800MHz
WCDMA Bands	FDD1 and FDD8
LTE Bands	eFDD3, eFDD7 and eFDD20

#### **V1140-101-1 / V1140-101-2**

GSM Bands	850MHz and 1900MHz
WCDMA Bands	FDD2 and FDD5
LTE Bands	eFDD2, eFDD4, eFDD5 and eFDD17

#### **V1140-103-1**

GSM Bands	850MHz, 900MHz, 1800MHz and 1900MHz
WCDMA Bands	FDD1, FDD2, FDD5, FDD6 and FDD8
LTE Bands	No LTE support

#### **V1140-104-1**

GSM Bands	850MHz, 900MHz, 1800MHz and 1900MHz
WCDMA Bands	FDD1, FDD5, FDD6 and FDD8
LTE Bands	eFDD1, eFDD3, eFDD5, eFDD7 and eFDD19

#### **V1140-106-1**

GSM Bands	900MHz and 1800MHz
WCDMA Bands	FDD1
LTE Bands	No LTE support

## 2.2 Module to Hosts Mapping

The below table shows the mapping between the module variants and the host/ATM devices:

Module	Host devices embedding this module variant
V1140-100-1	ATM-01 R2-ECE-4G, ATM-01 R2-ECE-4GW and ATM-01 R2-RUS-4G ATM-01 T2-ECE-4G, ATM-01 T2-ECE-4GW and ATM-01 T2-RUS-4G
V1140-101-1	ATM-01 R2-US-4G and ATM-01 R2-US-4GW ATM-01 T2-US-4G and ATM-01 T2-US-4GW
V1140-101-2	TCB4G-01 T2-US-4G
V1140-103-1	ATM-01 R2-ECE-3G, ATM-01 R2-BR-3G, ATM-01 R2-RoW-3G and ATM-01 R2-RUS-3G ATM-01 T2-ECE-3G, ATM-01 T2-BR-3G, ATM-01 T2-RoW-3G and ATM-01 T2-RUS-3G
V1140-104-1	ATM-01 R2-RoW-4G ATM-01 T2-RoW-4G
V1140-106-1	ATM-01 R2-CHN-3G and ATM-01 R2-CHN-3GW ATM-01 T2-CHN-3G and ATM-01 T2-CHN-3GW

## 2.3 Features

### Features

- Same footprint and pin-out (all modules)
- Voice and data calls (all modules)
- GSM, GPRS and EDGE (all modules)
- WCDMA R99, R5 HSDPA, R6 HSUPA and R7 HSPA+ (all modules)
- WCDMA R8 DC-HSPA+ (all modules except V1140-101-1 & V1140-101-2)
- LTE-FDD Rel.9, Cat3 (all LTE capable modules)
- DTM/eDTM (all modules)
- Standalone GPS/GALILEO/GLONASS, A-GPS CP (MS-Assisted and MS-Based)
- IMS/VoLTE (V1140-101-1 only)

### Data rates

- GSM: DL/UL – 14.4kbps / 14.4kbps
- GPRS: Multislot class 12, DL/UL – 85.6kbps / 42.8kbps
- EDGE: Multislot class 12, DL/UL – 236.8kbps / 118.4kbps
- WCDMA: DL/UL up to 384kbps
- HSPA+:
  - Category 24 in DL using 64 QAM and Dual-Cell; Up to 42 Mbps – Not supported by V1140-101-1 / V1140-101-2
  - Category 14 in DL using 64 QAM; Up to 21 Mbps
  - Category 6 in UL using 16 QAM; Up to 5.76 Mbps
- LTE-FDD Category 3: Up to 100 Mbps in DL, up to 50 Mbps in UL

### Power Classes

- LTE: All supported bands, Power Class 3
- WCDMA: All supported bands, Power Class 3
- EDGE: 850/900/1800/1900, Power Class E2
- GSM/GPRS: 850/900, Power Class 4
- GSM/GPRS: 1800/1900, Power Class 1

### Dimension and Weight

- Dimensions: 31mm x 46mm x 4mm
- Weight < 10 grams

## 2.4 Approvals

	<b>GCF</b>	<b>R&amp;TTE</b>	<b>PTCRB</b>	<b>FCC/IC</b>	<b>AT&amp;T</b>
V1140-100-1	Planned	Planned			
V1140-101-1			Planned	Planned	Planned
V1140-101-2			Planned	Planned	Planned
V1140-103-1	Planned	Planned		Planned	
V1140-104-1		Planned		Planned	
V1140-106-1		Planned			

## 3 Overview

### 3.1 HW Features

- Qualcomm SoC (system on chip)  
MDM9215 Baseband / PMIC8018 Power management / WTR1605L
- Cortex A5 Core up to 550 MHz
- 3 DSPs for modem and low power audio sub systems
- RPM Resource and power manager
- 2Gb NAND Flash x16,
- 2Gb Low Power Mobile DDR SDRAM x32
- 19.2MHz clock reference
- Dedicated heat sink in center area underneath the PCB
- GPS/GLONASS operation, GPS antenna biasing and diagnostics

### 3.2 Connectors

#### 3.2.1 Module Signal and RF Connectors

The LTE-NAD has 172 signal pins (2xAA and 2xBB) connector pads with 1.0mm pitch. The signal pads are located close to the board edges.

There are three antenna pads, each collocated by RF GND connectors

- Main transmit and receive antenna – pin LGA\_PRX\_ANT
- Diversity antenna for WCDMA respective MIMO antenna for LTE – pin LGA\_DRX\_ANT\_IN
- GNSS antenna for both GPS and GLONASS – pin LGA\_GPS\_DRX\_ANT

#### 3.2.2 Ground and Heat Dissipation Connectors

To support the usage of module under complicated thermal conditions, there are a number of large grounded pads in the center of PCB. These pads are dedicated ground pads to transfer heat dissipation to a carrier board.

This should be especially considered by customer designs. A reference design showing landing patterns and PCB stack-up is available on request.



## 3.3 Main Interfaces

### 3.3.1 USB

The NAD has one USB2.0 OTG high speed (480MBit) compliant interface including the PHY. The IF consists of 5 signals:

- USB\_D\_P: USB Data Plus signal
- USB\_D\_M: USB Data Minus signal
- USB\_ID: Master/Slave Configuration<sup>1</sup>
- USB\_VBUS: USB Voltage Supply
- VREG\_USB3\_3V075 USB Voltage Output

A dynamic reconfiguration between USB-Host or USB-Device is not foreseen, the NAD can be configured to USB-Host or USB-Device by the insertion of a resistor on the USB\_ID line.

### 3.3.2 SIM Interface

The NADs SIM interface is compatible to 1.8V and 3V SIM Cards, the necessary voltage and level shifting is handle by LTE-NAD automatically. The IF consists of the following signals:

VREG\_USIM  
USIM\_CLK  
USIM\_DATA  
USIM\_RESET

The data speed on the SIM IF is up to 4 Mbps, so HW designers should take care of the length and routing of the SIM IF to prevent potential EMC problems.

### 3.3.3 Power on

The signal PON\_N is used switch on the NAD-Module. PON\_N is pulled against VMAIN on the LTE-NAD internally.

Due to this fact it is recommended to pull this input against GND using an open collector or open drain output only.

### 3.3.4 Reset

EXT\_RESIN\_N is used to reset the LTE-NAD-Module, see table of LTE-NAD signal pins. There are further reset signals available, please check.

---

<sup>1</sup> The LTE-NAD is configured in the slave mode. For other configuration of the USB – Interface please contact peiker acustic GmbH & Co.KG.

RES\_IN is pulled against VMAIN power on the LTE-NAD internally. Therefore, it is recommended to pull this input against GND using an open collector or open drain output only.

### 3.3.5 GPIOs

There are 51 GPIOs on the LTE-NAD module available. Most of them are part of the 5 GSBI bundles provided in next chapter. They are used for different interfaces (see Table 1 and the following chapters). For allocation of GPIOs/GSBIs to different configurations please contact peiker acustics GmbH & Co.KG

GPIOs and GSBIs share the same output pins and may not be available when used as GSBI configuration.

The following GPIOs are not belonging to a GSBI bundle:

GPIO 47, 72, 82, 25, 28, 26, 27, 84, 80, 21, 23, 22, 24, 20, 1, 78, 79, 85, 86, 69, 0, 77, 65, 61, 68, 51, 54, 73, 48, 49, 53.

The following GPIOs are belonging to a GSBI bundle:

GPIO 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 29, 30.

### 3.3.6 GSBIs

Each GSBI (General Serial Bus Interface) consists of a bundle of 4 GPIOs. 5 GSBI bundles are available. The reference voltage of the GSBIs is 1.8V.

Available signals on GSBI bundles at the board to board connector:

- GSBI1: GSBI1\_0, GSBI1\_1, GSBI1\_2, GSBI1\_3 (GPIO\_29, 30, 2, 3)
- GSBI2: GSBI2\_0, GSBI2\_1, GSBI2\_2, GSBI2\_3 (GPIO\_4, 5, 6, 7)
- GSBI3: GSBI3\_0, GSBI3\_1, GSBI3\_2, GSBI3\_3 (GPIO\_8, 9, 10, 11)
- GSBI4: GSBI4\_0, GSBI4\_1, GSBI4\_2, GSBI4\_3 (GPIO\_12, 13, 14, 15)
- GSBI5: GSBI5\_0, GSBI5\_1, GSBI5\_2, GSBI5\_3 (GPIO\_16, 17, 18, 19)

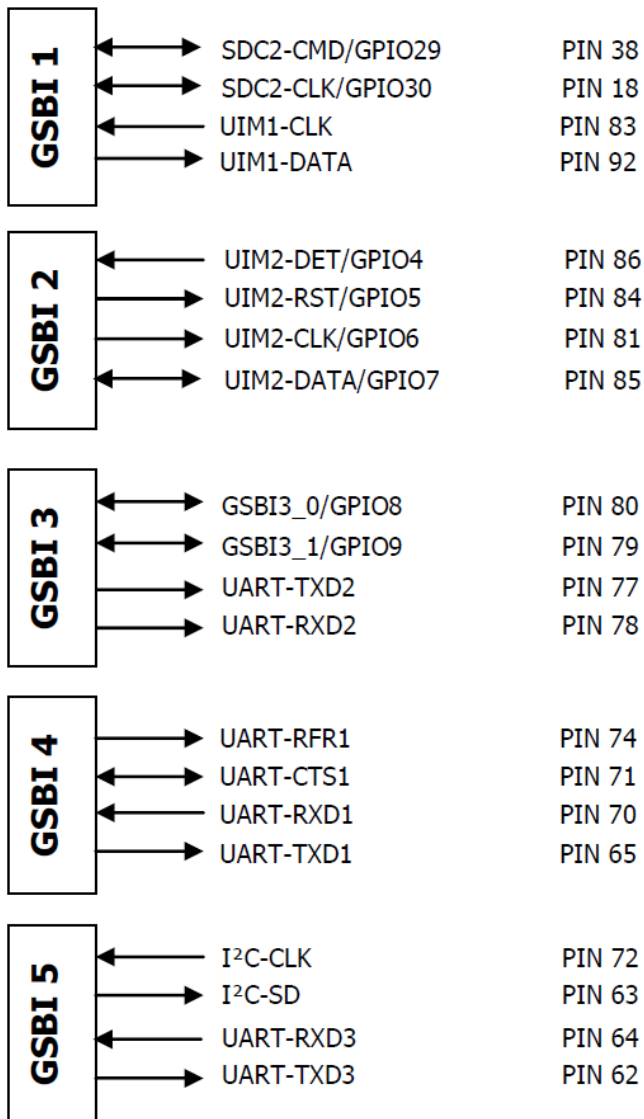


Figure 1 V1140-xxx General Serial Bus Interface GSBI interface configuration

### 3.3.7 Module Pin-out

Table 1 Module Pin-out

PIN	Signal	Direction related to LTE-NAD	Comment
1	GND	Input Power	Main ground connection, Corner pad
2 – 22	GND	Input Power	Main ground connection
23	GPIO47	Input	WDOG_DISABLE
24	JTAG_TDI	Input	JTAG Interface
25	JTAG_TDO	Output	JTAG Interface
26	GPIO_72	IN/OUT	
27	JTAGTMS	Input	JTAG Interface
28	JTAG_TRST_N	Input	JTAG Interface

<b>PIN</b>	<b>Signal</b>	<b>Direction related to LTE-NAD</b>	<b>Comment</b>
29	JTAG_RTCK	Output	JTAG Interface
30	GND	Input Power	Main ground connection
31	JTAG_TCK	Input	JTAG Interface
32	JTAG_RESOUT_N	Input	JTAG Interface
33	GPIO82	Output	NAD – Runnig, Control signal
34	JTAG_PS_HOLD	Input	JTAG Interface
35	EXT_RESIN_N	Input	Input Reset for LTE-NAD module
36	GND	Input Power	Main ground connection
37	RESOUT_N	Output	Output Reset
38	GPIO29_SDC2_CMD	IN/OUT	SD Card CMD
39	GPIO25_SDC2_D0	IN/OUT	SD Card Data 0
40	GPIO28_SDC2_D3	IN/OUT	SD Card Data 3
41	GPIO30_SDC2_CLK	Output	SD Card Clock
42	GND	Input Power	Main ground connection
43	GPIO26_SDC2_D1	IN/OUT	SD Card Data 1
44	GPIO27_SDC2_D2	IN/OUT	SD Card Data 2
45	PM_GPIO4	IN/OUT	
46	GPIO84	Output	Reset of the Codec
47	GND	Input Power	Main ground connection
48	SDC1_CMD	IN/OUT	SD Card CMD
49	SDC1_DATA0	IN/OUT	SD Card Data 0
50	SDC1_DATA3	IN/OUT	SD Card Data 3
51	SDC1_CLK	Output	SD Card Clock
52	GPIO80_SDC1_DET_N	IN/OUT	
53	GND	Input Power	Main ground connection, Corner pad
54	SDC1_DATA2	IN/OUT	SD Card Data 2
55	SDC1_DATA1	IN/OUT	SD Card Data 1
56	GPIO21_I2S_WS	Output	I <sup>2</sup> S - Word Select
57	GPIO23_I2S_DOUT	Output	I <sup>2</sup> S – Data Output
58	GPIO22_I2S_DIN	Input	I <sup>2</sup> S - Data Input
59	GPIO24_I2S_MCLK	Output	I <sup>2</sup> S - Master Clock
60	GND	Input Power	Main ground connection
61	GPIO20_I2S_CLK	Output	I <sup>2</sup> S - Clock
62	GPIO19_GSBI5_3	Output	2 – Pin – UART TXD 3
63	GPIO17_GSBI5_1	IN/OUT	PC – Serial Data
64	GPIO18_GSBI5_2	Input	2 – Pin – UART RXD 3
65	GPIO15_GSBI4_3	Output	4 – Pin – UART TXD 1
66	GND	Input Power	Main ground connection
67	USB_D_P	IN/OUT	High – Speed USB Device for communication
68	USB_D_M	IN/OUT	High – Speed USB Device for communication
69	GND	Input Power	Main ground connection

<b>PIN</b>	<b>Signal</b>	<b>Direction related to LTE-NAD</b>	<b>Comment</b>
70	GPIO14_GSBI4_2	Input	4 – Pin – UART RXD 1
71	GPIO13_GSBI4_1	Input	4 – Pin – UART Clear To Send 1
72	GPIO16_GSBI5_0	Output	I <sup>2</sup> C - Clock
73	USB_ID	Input	
74	GPIO12_GSBI4_0	Output	4 – Pin – UART Ready For Receive 1
75	GND	Input Power	Main ground connection
76	USB_VBUS	Input	High – Speed USB Device for communication
77	GPIO11_GSBI3_3	Output	2 – Pin – UART TXD 2
78	GPIO10_GSBI3_2	Input	2 – Pin – UART RXD 2
79	GPIO9_GSBI3_1	IN/OUT	
80	GPIO8_GSBI3_0	IN/OUT	
81	GPIO6_UIM2_CLK	IN/OUT	
82	GND	Input Power	Main ground connection
83	GPIO2_UIM1_CLK	Output	SIM Card - Clock
84	GPIO5_UIM2_RST	IN/OUT	
85	GPIO7_UIM2_DATA	IN/OUT	
86	GPIO4_UIM2_DET	IN/OUT	
87	GND	Input Power	Main ground connection, Corner pad
88	HSIC_DATA	IN/OUT	Connection to Ethernet Controller
89	GND	Input Power	Main ground connection
90	HSIC_STROBE	IN/OUT	Connection to Ethernet Controller
91	GND	Input Power	Main ground connection
92	GPIO3_UIM1_DATA	Output	SIM Card – Data 1
93	GPIO1_UIM1_RST	Output	SIM Card – Reset 1
94	GPIO78	IN/OUT	
95	GPIO79_HSIC_RDY	Output	Reset of Ethernet Controller
96	GPIO85	Output	Time synchronization
97	GPIO86_GPS_EXT_LNA_EN	IN/OUT	
98	GND	Input Power	Main ground connection
99	VREG_USB3_3V075	Output Power	Output Power to USB
100	GND	Input Power	Main ground connection
101	VREG_MSME_1V8	Output Power	Output Power
102	GND	Input Power	Main ground connection
103	VREG_UIM2	Output Power	Output Power to SIM Card 2
104	VREG_SDC1_2V95	Output Power	Output Power to SD Card 1
105	GND	Input Power	Main ground connection
106	VREG_UIM1	Output Power	Output Power to SIM Card 1
107	GND	Input Power	Main ground connection
108	GND	Input Power	Main ground connection
109	VMAIN	Input Power	Main power
110	VMAIN	Input Power	Main power

<b>PIN</b>	<b>Signal</b>	<b>Direction related to LTE-NAD</b>	<b>Comment</b>
111	VMAIN	Input Power	Main power
112	VMAIN	Input Power	Main power
113	GND	Input Power	Main ground connection
114	GND	Input Power	Main ground connection
115	PON	Input	Power On
116	HW-REV-RESISTOR	Output	
117	PM_GPIO3	IN/OUT	
118	GND	Input Power	Main ground connection
119	PM_MPP5	Input	PM – ADC – channel
120	PM_MPP1	Input	PM – ADC – channel
121	GND	Input Power	Main ground connection
122	GPIO69	Output	Switch between main and back up antenna
123	GPIO0_UIM1_DET	Input	SIM Card – Detection 1
124	GPIO77	Output	Reset signal of SDC2
125	GPIO65	Output	NAD – Wake up
126	GPIO61	Input	NAD – Update
127	PON_N	Input	Power On
128	GND	Input Power	Main ground connection
129	GPIO68	Output	PS-3V8-Hold
130	GPIO51	Input	BOOT_CONFIG3
131	GPIO54	Input	BOOT_CONFIG0
132	GND	Input Power	Main ground connection
133	PM_MPP2	Input	PM – ADC - channel
134	PM_GPIO2	IN/OUT	
135	PM_GPIO1	IN/OUT	
136	PM_GPIO6	IN/OUT	
137	GND	Input Power	Main ground connection
138	GPIO73	IN/OUT	
139	GND	Input Power	Main ground connection, Corner pad
140	GPIO48	Input	BOOT_CONFIG6
141	GPIO49	Input	BOOT_CONFIG5
142	GPIO53	Input	BOOT_CONFIG1
143 – 152	GND	Input Power	Main ground connection
153	LGA_PRX_ANT		Connection to the antenna switch
154 – 160	GND	Input Power	Main ground connection
161	LGA_GPS_DRX_ANT		Connection to the antenna connector
162 – 164	GND	Input Power	Main ground connection
165	LGA_DRX_ANT_IN	Input	Connection to the antenna switch
166	LGA_DRX_ANT_OUT		
167 –	GND	Input Power	Main ground connection

PIN	Signal	Direction related to LTE-NAD	Comment
172			

Note: Pins should be grounded when not used in design.

### 3.4 Supply Voltage

The external supply voltage is applied to LTE-NAD by 8 Pins on modules signal connectors.

PINs 109, 110, 111, 112 for VMAIN

PINs 107, 108, 113, 114 for the corresponding GND

Please note that there are further main ground connections that should be connected to ensure proper NAD function.

$T_A = -40^{\circ}\text{C} \dots +85^{\circ}\text{C}$

Absolute minimum/maximum supply voltages	3.6V ~ 4.0V
Nominal supply voltage	3.8V
Recommended supply voltage	3.8V
Voltage drop @ GSM power burst (33dBm)	<100mV

During Hi RF Power GSM bursts the power amplifier can draw peak currents > 2Amps at VMAIN. The voltage drop during the GSM burst shall not exceed 100mV.

### 3.5 Power Consumption

$T_A = +25^{\circ}\text{C}$ ,  $V_{PH\_PWR} = 3.8\text{V}$

		<b>Output Power</b>	<b>Output Power</b>
		<b>max. (typ. 23dBm)</b>	<b>0 dBm</b>
Voice call WCDMA BC1		~530mA	~145mA
Voice call WCDMA BC2		~570mA	~145mA
Voice call WCDMA BC5		~630mA	~140mA
Voice call WCDMA BC8		~580mA	~140mA
		<b>PCL 5 (typ. 32.5 dBm)</b>	<b>PCL 19 (typ. 5dBm)</b>
Voice call GSM850		~260mA	~65mA
Voice call GSM900		~270mA	~65mA
		<b>PCL 0 (typ.30.5dBm)</b>	<b>PCL 15 (typ.0dBm)</b>
Voice call GSM1800		~165mA	~65mA
Voice call GSM1900		~165mA	~65mA

		<b>Output Power</b>	<b>Output Power</b>
Standby current GSM	DRX = 5	Tbd mA	
Standby current WCDMA	DRX = 7	Tbd mA	
Standby current LTE	DRX = 7		
LTE data call B3			
LTE data call B7			
LTE data call B20			

## **3.8 Environmental Specification**

### **3.8.1 Temperature Range**

Range		
Operating temp. range	-20°C ... +65°C	3GPP spec. conform
Operating temp. range	-40°C ... +85°C <sup>Note 1</sup>	Operational Performance might slightly deviate from 3GPP spec.
Storage temp. range	-40°C ... +85°C	

Note 1: Due to temperature specification of the chipset, the temperature of the power manager and the temperature of the modem chip shall not exceed +85°C.



## 4 Evaluation Kit

For the NAD V1140-10x-1, there is an evaluation board available.

Features:

- On board 12V DC power supply (alternatively 3,8V DC direct connected, unbuffered).
- USB port type B
- SIM card tray
- 20 pin JTAG header for debugging
- 2 UART ports connected to DB9
- CODEC supported by I2S and I2C interfaces

### Using the evaluation board with an external power supply

By default the module can be supplied by a switching regulator at 12V DC input voltage or by the module VCC at 3.8V.

3.8V supply should be able to deliver 3.5A max. Sense contacts are for supplies which support the corresponding feature.

### Using the evaluation board with on board 3.8V regulator

For use at 3.8V simply disconnect the 12V supply and plug on 3.8V.

**Note: Make sure that the external power supply is not generating spikes or hazards higher than 4.0V. LTE-NAD Module gets damaged when spikes or hazards above 4.0V are applied**

### RF Connector

- For RF measurements use main antenna connector

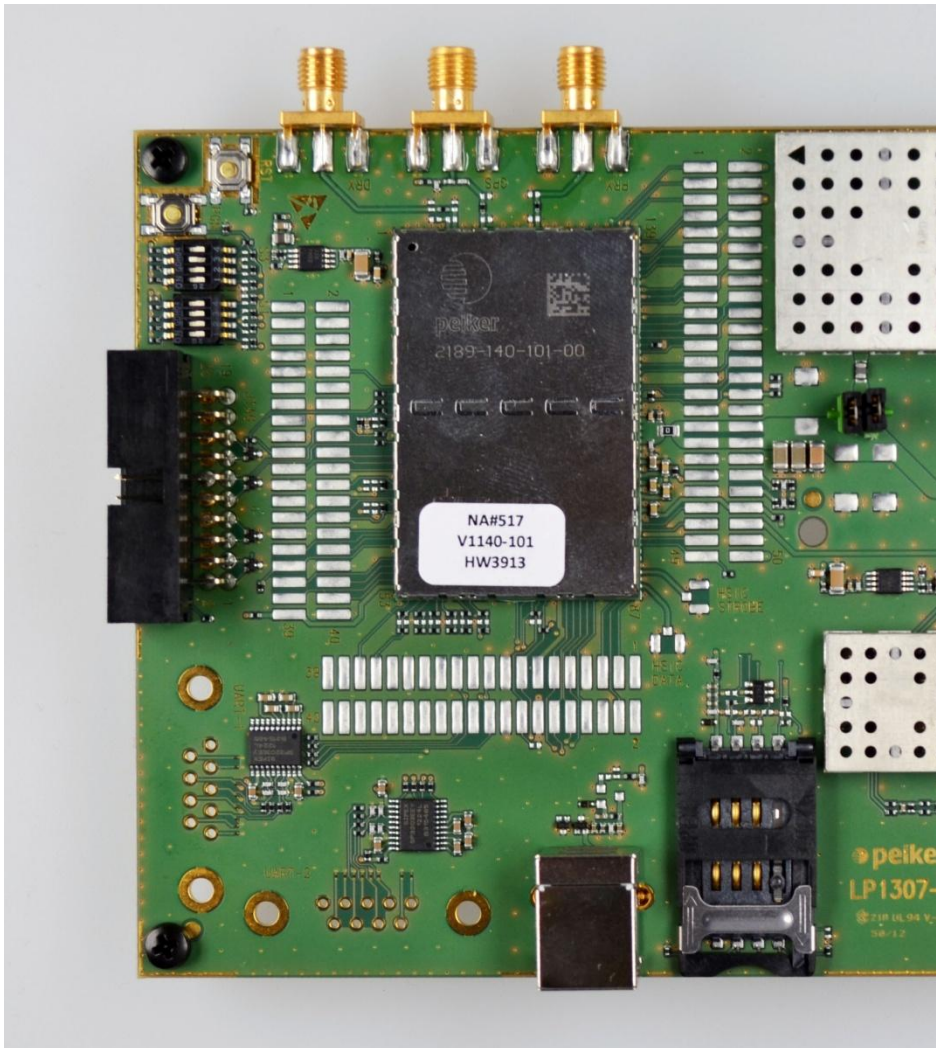


Figure 2 Evaluation Kit for V1140-10x-1.

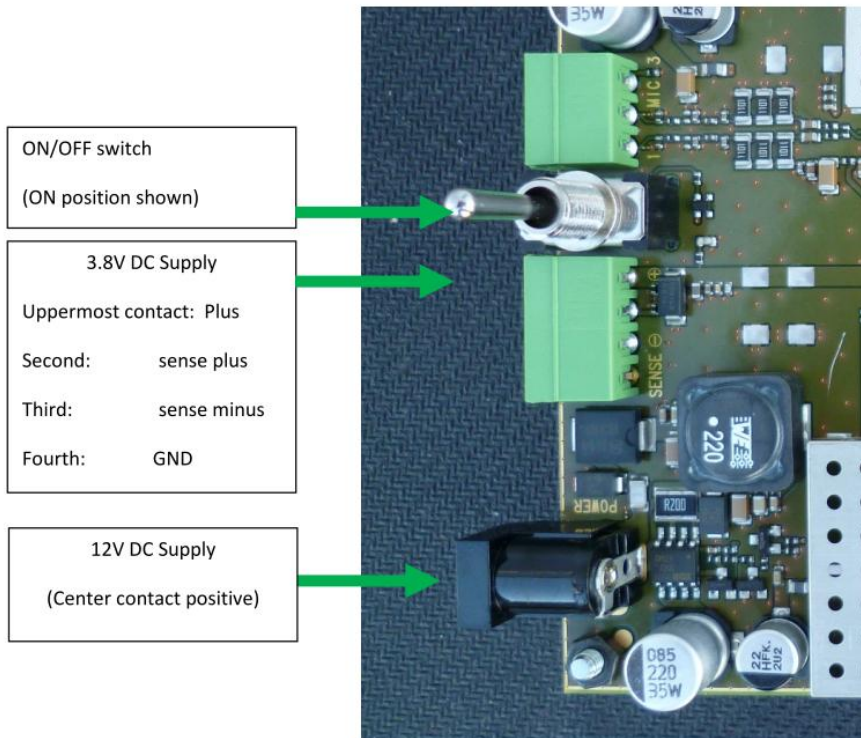


Figure 3 Power supply for Evaluation Kit for V1140-xxx.

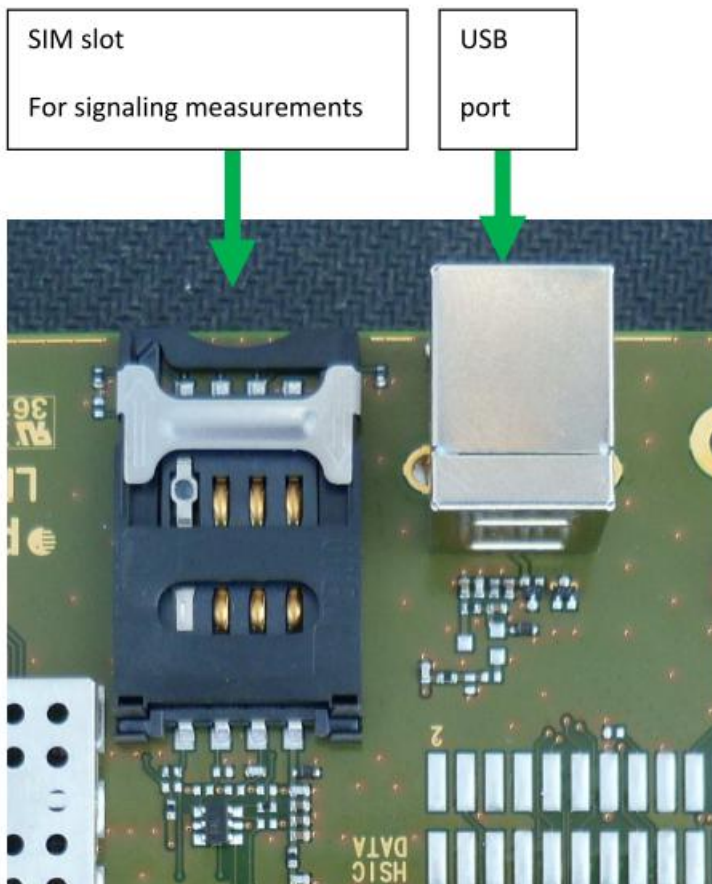


Figure 4 SIM card and USB interfaces for Evaluation Kit for V1140-xxx.

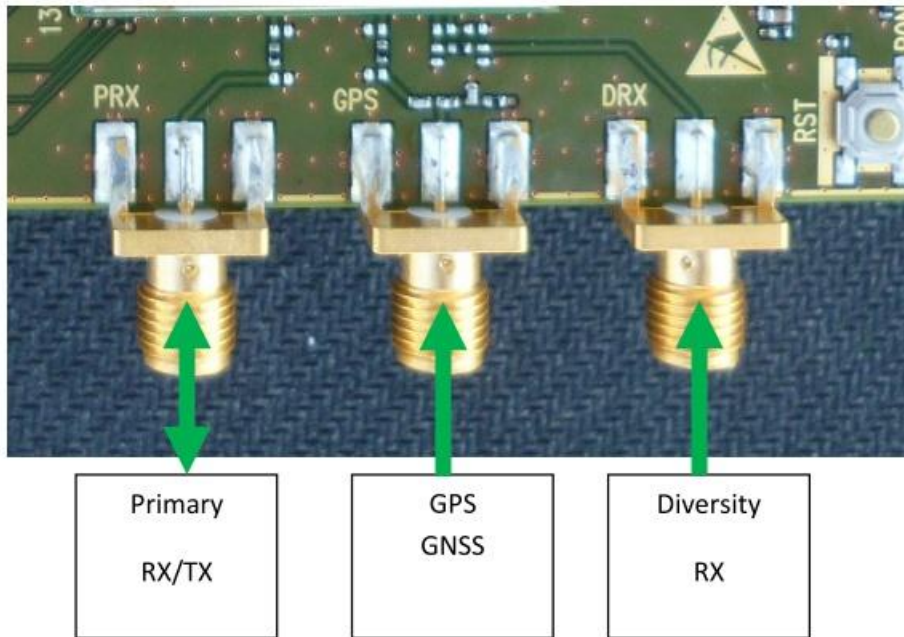


Figure 5 RF interfaces for Evaluation Kit for V1140-xxx.

## 5 AT Command interface

The modules supports standard AT command as listed below. Commands are compliant to 3GPP TS 27.007 and TS 27.005

Command	Description	Comment
AT+CMGF	Message Format	
AT+CSCA	Service Centre Address	
AT+CMGS	Send Message	
AT+CGMI	Manufacturer Identification	
AT+CGMM	Request model identification	
AT+CGMR	Request revision identification	
AT+CGSN	Request product serial number	
AT+CIMI	Request international mobile subscriber identification	
AT+CMOD	Call mode	Only one Parameter is supported by the device.
AT+CHUP	Hang up call	
ATD	Initiate a CS or PS call or supplementary service	
ATA	Answer incoming CS call command	
ATH	Hangup CS call command	
AT+CBST	Select bearer service type	
AT+CEER	Extended error report	
AT+CVHU	Voice hangup control	
AT+CREG	Network registration	
AT+COPS	PLMN selection	
AT+CLCK	Facility lock	
AT+CPWD	Change password	



Command	Description	Comment
AT+CLIP	Calling line identification presentation	
AT+CLIR	Calling line identification restriction	
AT+CCWA	Call waiting	
AT+CHLD	Call related supplementary services	
AT+CUSD	Unstructured supplementary service data	
AT+CLCC	List current calls	
AT+CPOL	Preferred PLMN list	
AT+CPAS	Phone active status	
AT+CFUN	Set phone functionality	
AT+CPIN	Enter PIN	
AT+CSQ	Signal quality	
AT+CMER	Mobile termination event reporting	
AT+CSIM	Generic SIM access	
AT+CRSM	Restricted SIM access	
AT+CMEE	Report mobile termination error	
AT+CGDCONT	Define PDP context	
AT+CGEQREQ	Request 3G quality of service profile	
AT+CGATT	PS attach or detach	
AT+CGACT	PDP context activate or deactivate	
AT+CGPADDR	Show PDP address	
AT+CGSMS	Select service for MO SMS messages	
ATE	Character Echo ON/OFF	
AT+CSMS	Check Message Service support	
AT+CSMP	Set Text Mode Parameters	
AT+CSDH	Show Text Mode Parameters	
AT+CSCB	Select Cell Broadcast Message Types	
AT+CSAS	Save Settings	Only one Parameter is supported by the device.
AT+CRES	Restore Settings	Only one Parameter is supported by the device.
AT+CMGL	List messages	
AT+CNMA	New message acknowledgement	
AT+CMGC	Send Command	
AT+CMMS	More Messages to Send	
AT+ATV	DCE response format	
AT+ATX	Result code selection and call progress monitoring control	
AT+CNMI	New Message Indications to TE	
AT+CPMS	Preferred Message Storage	
AT+CMGW	Write Message to Memory	
AT+CMSS	Send Message from Storage	
AT+CMGD	Delete Messages	
AT+CNUM	Get MSISDN	
AT+CPBS	Select phonebook memory storage	
AT+CPBR	Read phonebook entries	
AT+CPBW	Writephonebook entry	

## **6 Safety Recommendations according to EN60950-1**

This device must be supplied by a limited power source according to EN 60950-1.  
The clearance and creepage distances required by the end product must be withheld when the module is installed.  
The cooling of the end product shall not negatively be influenced by the installation of the module.

## 7 Regulatory Certifications

### 7.1 USA (FCC)

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.

#### 7.1.1 FCC Warnings and Notices

**WARNING:** The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by peiker acoustic GmbH & Co. KG could void the user's authority to operate the equipment.

**NOTICE:** 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 or more 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.

### 7.2 Canada (IC)

This Class b digital apparatus complies with Canadian ICES-003.  
Cet appareil numérique de la classe b est conforme à la norme NMB-003 du Canada.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

## 7.3 OEM Responsibilities

### Antenna

- The systems antenna(s) must be installed such that 20 cm is maintained between the antenna(s) and the body of the user or nearby persons.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The preceding statement must be included as a Caution statement in OEM product manuals in order to alert users of FCC RF Exposure compliance.
- Antenna Gain:

Standalone Module Configurations: Maximum Authorized Antenna Gain (No path loss, no antenna gain)					
Module	TX Freq Range 704 to 716 MHz	TX Freq Range 824 to 849 MHz	TX Freq Range 1710 to 1755 MHz	TX Freq Range 1850 to 1910 MHz	TX Freq Range 2500 to 2570 MHz
V1140-101-1 V1140-101-2	1,27 dBd (3,42 dBi)	1,27 dBd (3,42 dBi)	5 dBi	2,01 dBi	Not supported
V1140-103-1	Not supported	0,77 dBd (2,92 dBi)	Not supported	2,01 dBi	Not supported
V1140-104-1	Not supported	0,77 dBd (2,92 dBi)	Not supported	2,01 dBi	8,01 dBi

ATM Roof Devices: Internal Antenna Gain				
TX Freq Range 704 to 716 MHz	TX Freq Range 824 to 849 MHz	TX Freq Range 1710 to 1755 MHz	TX Freq Range 1850 to 1910 MHz	TX Freq Range 2500 to 2570 MHz
-1,05 dBd (1,1 dBi)	-0,85 dBd (1,3 dBi)	1,8 dBi	2,0 dBi	4,3 dBi

ATM Roof Antennas: Maximum Antenna Gain per TX Frequency Range					
Antenna Model / Related Modules	TX Freq Range 704 to 716 MHz	TX Freq Range 824 to 849 MHz	TX Freq Range 1710 to 1755 MHz	TX Freq Range 1850 to 1910 MHz	TX Freq Range 2500 to 2570 MHz
Laird 34105 (US 4G) / V1140-101-1	-0,34 dBd (1,81 dBi)	0,64 dBd (2,79 dBi)	2,4 dBi	1,9 dBi	Not supported
Laird 64150 (ECE-3G) / V1140-103-1	Not supported	1,85 dBd (4 dBi)	Not supported	3,4 dBi	Not supported
Laird 64159 (ECE-4G) / V1140-104-1	Not supported	1,55 dBd (3,7 dBi)	2,8 dBi	3,4 dBi	4,2 dBi



ATM Trunk Antenna: Maximum Antenna Gain per TX Frequency Range					
Antenna Model / Related Modules	<i>TX Freq Range</i> 704 to 716 MHz	<i>TX Freq Range</i> 824 to 849 MHz	<i>TX Freq Range</i> 1710 to 1755 MHz	<i>TX Freq Range</i> 1850 to 1910 MHz	<i>TX Freq Range</i> 2500 to 2570 MHz
Hirschmann 920 325-102 / All Modules	-1,15 dBd	-1,15 dBd	1 dBi	1 dBi	1 dBi

Host Device Configurations: Maximum Authorized Antenna Gain (including path loss)					
Host Device (Embedded Module)	<i>TX Freq Range</i> 704 to 716 MHz (eFDD17)	<i>TX Freq Range</i> 824 to 849 MHz (GSM 850, FDD5, eFDD5)	<i>TX Freq Range</i> 1710 to 1755 MHz (eFDD4)	<i>TX Freq Range</i> 1850 to 1910 MHz (GSM 1900, FDD2, eFDD2)	<i>TX Freq Range</i> 2500 to 2570 MHz (eFDD7)
ATM-01 R2-RoW-3G (V1140-103-1)	Not supported	<b>3,32 dBd (5,47 dBi)</b>	Not supported	<b>6,76 dBi</b>	Not supported
ATM-01 T2-RoW-3G (V1140-103-1)	Not supported	<b>2,37 dBd (4,52 dBi)</b>	Not supported	<b>4,82 dBi</b>	Not supported
ATM-01 R2-RoW-4G (V1140-104-1)	Not supported	<b>3,32 dBd (5,47 dBi)</b>	Not supported	<b>6,76 dBi</b>	<b>12,96 dBi</b>
ATM-01 T2-RoW-4G (V1140-104-1)	Not supported	<b>2,37 dBd (4,52 dBi)</b>	Not supported	<b>4,82 dBi</b>	<b>11,02 dBi</b>

Note:

Path loss for R2: 2,4dB (704 – 716MHz), 2,8dB (824 – 849MHz), 4,9dB (1710 – 1755MHz), 5dB (1850 – 1910MHz), 5,2dB (2500 – 2570MHz)  
 Path loss for T2: 1,9dB (704 – 716MHz), 1,85dB (824 – 849MHz), 3,03dB (1710 – 1755MHz), 3,06dB (1850 – 1910MHz), 3,26dB (2500 – 2570MHz)

Path loss tolerance for T2 and R2: 0,25dB

## Power Regulation

- The host equipment must provide power regulation circuitry to ensure that the module is supplied with stable 3.8VDC.

## FCC Labeling

FCC labeling of V1140-101-1:

V1140-101-1 is labeled with its own FCC ID Number. If the FCC ID is not visible when V1140-101-1 is installed inside another device, then the host device must contain the FCC ID number with the statement such as the following: "Contains Transmitter Module FCC ID: QWY-V1140-101-1" or "Contains FCC ID: QWY-V1140-101-1"

#### FCC labeling of V1140-103-1:

V1140-103-1 is labeled with its own FCC ID Number. If the FCC ID is not visible when V1140-103-1 is installed inside another device, then the host device must contain the FCC ID number with the statement such as the following: "Contains Transmitter Module FCC ID: QWY-V1140-103" or "Contains FCC ID: QWY-V1140-103"

#### FCC labeling of V1140-104-1:

V1140-104-1 is labeled with its own FCC ID Number. If the FCC ID is not visible when V1140-101-1 is installed inside another device, then the host device must contain the FCC ID number with the statement such as the following: "Contains Transmitter Module FCC ID: QWY-V1140-104-1" or "Contains FCC ID: QWY-V1140-104-1"

### **IC Labeling**

#### IC labeling of V1140-101-1:

V1140-101-1 is labeled with its own IC ID Number. If the IC ID is not visible when V1140-101-1 is installed inside another device, then the host device must contain the IC ID number with the statement such as the following: "Contains Transmitter Module IC 6588A-V11401011" or "Contains IC 6588A-V11401011".

## 8 List of Acronyms

3GPP	3 rd Generation Partnership Project
ADC	Analog Digital Converter
ADN	Abbreviated Dialing Number
A-GPS CP	Assisted GPS Control Plane
AMR	Adaptive Multi Rate
AT	Attention Command
AWS	Advanced Wireless Services
BER	Bit Error Rate
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CSD	Circuit Switch Data
DARP	Downlink Advanced Receiver Performance
EDGE	Enhanced Data rates for GSM Evolution
DTMF	Dual Tone Multi Frequency
FCC	Federal Communications Commission
FDN	Fixed Dialing Number
FTP	File Transfer Protocol
GCF	Global Certification Forum
GSM	Global System for Mobile communication
GPIO	General Purpose Input Output
GPRS	General Packet Radio Service
GPS	Global Positioning System
HSPA	High Speed Uplink Packet Access
HW	Hardware
IC	Industry Canada
LED	Led Emitting Diode
LTE	Long-Term Evolution
MO	Mobile Originated
MT	Mobile Terminated
OEM	Original Equipment Manufacturer
PCB	Printed Circuit Board
PCM	Pulse Code Modulation
PDU	Protocol Data Unit
PIN	Personal Identification Number
PTCRB	PCS Type Certification Review Board
RF	Radio Frequency
RoHs	Restriction of Hazardous Substances
UART	Universal Asynchronous Receiver and Transmitter
USB	Universal Serial Bus
USIM	Universal Subscriber Identity Module
UMTS	Universal Mobile Telecommunications System
WCDMA	Wideband Code Division Multiple Access