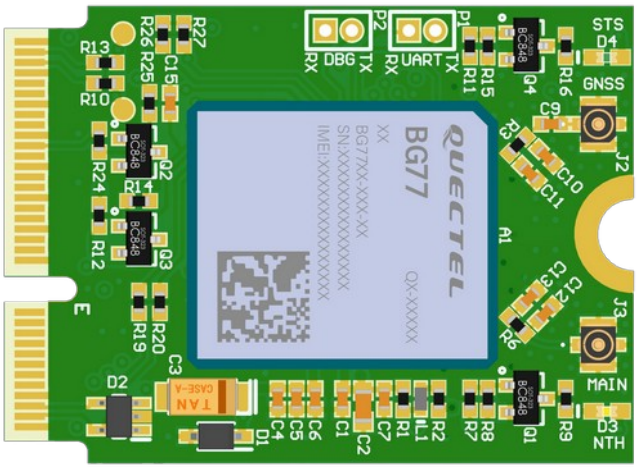
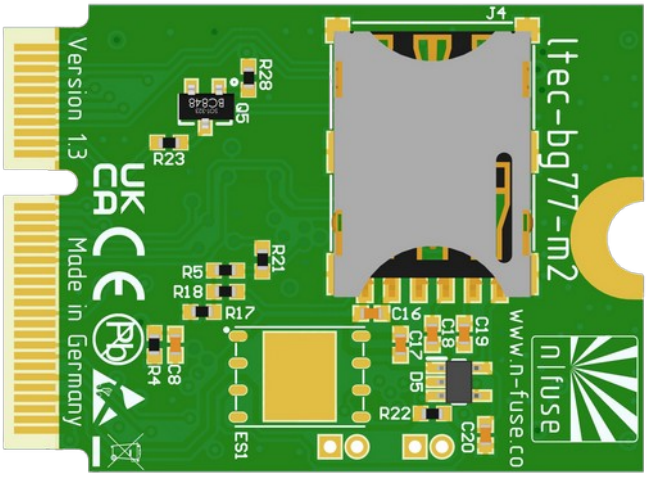
LTEC-BG77-M2 card M.2 2230 E-Key

LTEC-BG77-M2





LTE Cat M1 and LTE Cat NB2 (NB-IoT) card based on Quectel BG77 multi-band LTE module Design in M.2 2230 E-Key Form Factor

The LTEC card is an LTE Cat M1, NB2 card with integrated GNSS adopting the standard M.2 2230 E-Key. For a IoT, M2M applications such as wireless PoS, tracking, smart metering, etc.

Key Features

- Ultra-low power consumption
- Integrated RAM and flash in baseband chipset
- Support for external SIM card
- On-board nano-SIM card holder and eSIM footprint
- Comprehensive set of hardware-based security features
- Super slim profile and compact size
- Robust mounting and interfaces
- Broad usage spectrum through standard M.2 2230 E-Key
- USB and UART interface
- Support USB and DFOTA (Delta Firmware Upgrade Over-the-Air) firmware upgrade
- Output power level up to 21 dBm

Application Areas

- Internet of Things (IoT) and Industrial Internet of Things (IIoT) applications
- Machine to Machine (M2M)
- Smart city
- Agricultural monitoring

- Home-, building-, industrial monitoring and control
- Remote control
- Wireless alarm and security systems
- Tracking applications

Specifications

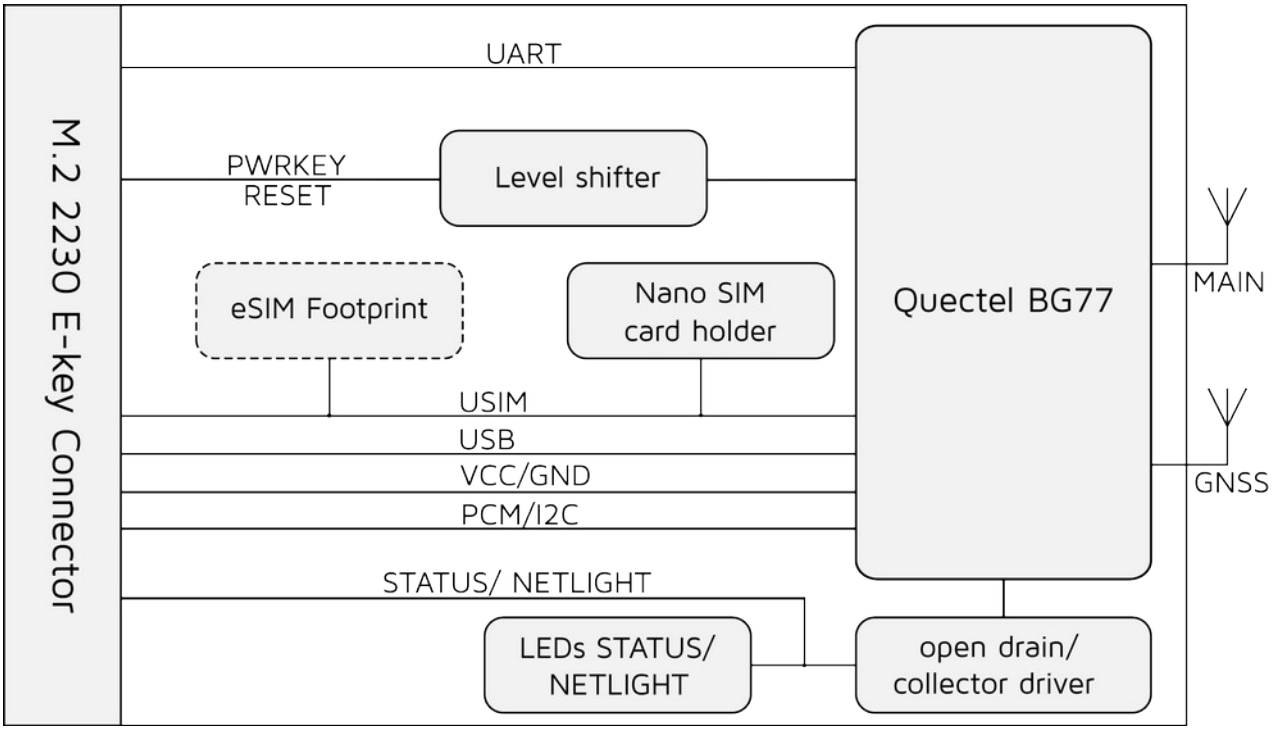
Category	Feature	Description
Main Module	Quectel BG77	Embedded IoT (LTE Cat M1, LTE Cat NB2) wireless communication module with GNSS
Connectors	Connector Type	M.2 2230 E-Key
	External Antenna	MHF4 connectors with 50 Ω impedance for GNSS and LTE communication
Host Interface	UART (main, debug, GNSS) and USB (virtual com port)	Used for data transmission and AT command communication. Support RTS and CTS hardware flow control. Used for software debugging and log output. Used for GNSS data and NMEA sentences output. 115200 bps baud rate by default.
	PCM and I2C	The two interfaces which can be applied on audio codec design.
	Logical Level	3.3 V and 1.8 V, see pin reference
Power	Input Voltage	2.6-4.8 V, typical 3.3 V
	Consumption	Power Saving Mode: 3.2 µA Sleep Mode: 1.61 mA @ DRX = 1.28 s 0.61 mA @ e-I-DRX = 81.92 s Idle Mode: 19.6 mA @ DRX = 1.28 s 19 mA @ e-I-DRX = 81.92 s Active Mode: 228 mA @ 21 dBm, GNSS off
RF	LTE Features	Support 3GPP Rel. 14 Support LTE Cat M1 and LTE Cat NB2 Support 1.4 MHz RF bandwidth for LTE Cat M1 Support 200 KHz RF bandwidth for LTE Cat NB2 Cat M1: Max. 588 kbps (DL)/ 1119 kbps (UL) Cat NB2: Max. 127 kbps (DL)/ 158.5 kbps (UL)
	GNSS *	Gen9 VT of Qualcomm (GPS, GLONASS, BeiDou, Galileo and QZSS)
	Max. TX Power	Class 5 (21 dBm +1.7/-3 dB) for LTE-FDD bands (21 dBm is max)
Functions	Internet Protocol Features	Support PPP/TCP/UDP/SSL/TLS/FTP(S)/HTTP(S)/ NITZ/PING/MQTT/LwM2M/CoAP protocols Support PAP (Password Authentication Protocol) and CHAP (Challenge Handshake Authentication Protocol) protocols which are usually used for PPP connections
	SMS	Text and PDU mode

Category	Feature	Description
		Point to point MO and MT SMS cell broadcast SMS storage: ME by default
	AT Commands	3GPP TS 27.007 and 3GPP TS 27.005 AT commands Quectel enhanced AT commands
Status Indication	LEDs	Green: Operation status indication Yellow: Network activity status indication
Firmware Upgrade	For BG77	USB interface DFOTA **
Operating Conditions	Temperature (operating)	Operation temperature range: -35 °C to +75 °C Extended temperature range: -40 °C to +85 °C Storage temperature range: -40 °C to +90 °C
	Humidity	10% ~ 90% RH Non-condensing
Physical Properties	Dimensions WxHxD	22 x 30.15 x 3.2 mm
	Weight	5 g
Regulatory	Certifications (BG77 module)	GCF (Global) CE (Europe) PTCRB (North America) FCC (America) IC (Canada) JATE/TELEC (Japan) RCM (Australia/ New Zealand)
	Materials	RoHS, REACH
Warranty		12 months for B2B customers 24 months for B2C customers

* Optional.

** Function, which allows you to upgrade the firmware of the module over the air. It can upgrade the firmware to a new version, and upgrade back to the old version as well.

Block Diagram



Interfaces

M.2 2230 E-Key Connector

The card is compliant with the M.2 2230 E-Key specification and can thus be used in any compatible system. Some reserved pins are used and others re-purposed as shown in the following table.

Pin #	Symbol	Type	Description
1	GND	power	
2	VCC	power	3.3 V
3	USB_D+	input/ output	USB differential data (+)
4	VCC	power	
5	USB_D-	input/ output	USB differential data (-)
6	STATUS	output	Operation status indication (active low)
7	GND	power	
8	PCM_CLK	output	PCB clock
9	NC	-	
10	PCM_SYNC	output	PCM data frame sync
11	NC	-	
12	PCM_OUT	output	PCM data output
13	NC	-	
14	PCM_IN	output	PCM data input

Pin #	Symbol	Type	Description
15	NC	-	
16	NETLIGHT	output	Network activity status indication (active low)
17	NC	-	
18	GND	power	
19	NC	-	
20	DTR	input	Main UART data terminal ready (3.3 V)
21	NC	-	
22	TXD	output	Main UART transmit (1.8 V)
23	NC	-	
32	RXD	input	Main UART receive (1.8 V)
33	GND	power	
34	RTS	input	Main UART request to send (1.8 V)
35	NC	-	
36	CTS	output	Main UART clear to send (1.8 V)
37	NC	-	
38	USIM_DATA	input/output	SIM card data
39	GND	power	
40	USIM_CLK	output	SIM card clock
41	NC	-	
42	USIM_RST	output	SIM card reset
43	NC	-	
44	NC	-	
45	GND	power	
46	NC	-	
47	NC	-	
48	NC	-	
49	NC	-	
50	NC	-	
51	GND	power	
52	RESET/ PERST0	input	Reset the module (active low)
53	NC	-	
54	NC	-	
55	PWRKEY/ PEW AKE	input	Turn on the module by pulling the pin to ground for 500 – 1000 ms (active low)
56	NC	-	
57	GND	power	
58	I2C_SDA	input/output	I2C data (1.8 V)
59	NC	-	

Pin #	Symbol	Type	Description
60	I2C_SCL	input	I2C clock (1.8 V)
61	NC	-	
62	NC	-	
63	GND	power	
64	USIM_GND	power	Specified ground for SIM card
65	NC	-	
66	NC	-	
67	NC	-	
68	USIM_VCC	power	SIM card power supply
69	GND	power	
70	NC	-	
71	RI	output	Main UART ring indication (1.8 V)***
72	VCC	power	
73	DCD	ouput	Main UART data carrier detect (1.8 V)***
74	VCC	power	
75	GND	power	

*** Deactivated, to enable functionality 0 R resistors R10 and R13 (0402) must be installed.

NC = Not Connected
VCC = Power Supply
Vmax = 4.8 V
Vmin = 2.6 V
Vnorm = 3.3 V
GND = Ground

NOTE: For every VCC transition/ re-insertion from 0 V, the minimum power supply voltage should be higher than 2.7 V. After the card starts up normally, the minimum safety voltage is 2.6 V. In order to ensure full-function mode, the minimum power supply voltage should be higher than 2.8 V.

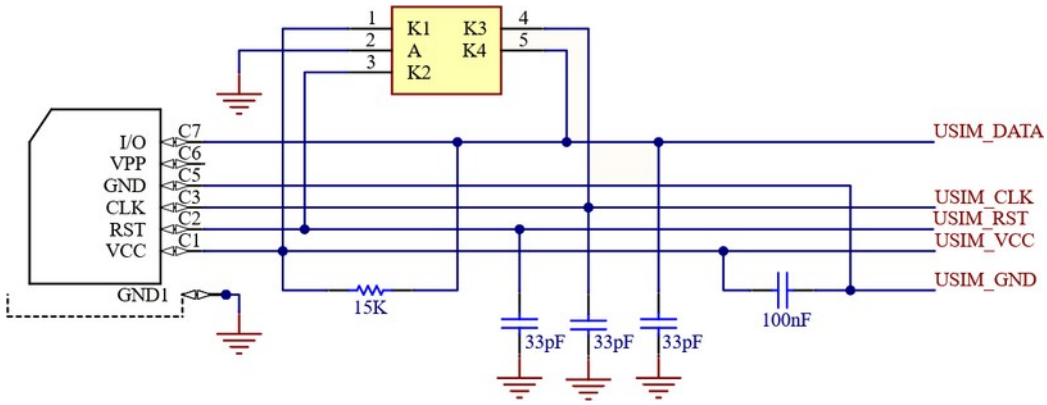
Debugging Headers

P1 header – GNSS UART (RX and TX)
P2 header – Debug UART (RX and TX)

State of NETLIGHT

Logic Level Changes	Network Status
Flicker slowly (200 ms High/1800 ms Low)	Network searching
Flicker slowly (1800 ms High/200 ms Low)	Idle
Flicker quickly (125 ms High/125 ms Low)	Data transfer is ongoing

SIM Interface for external SIM Card



Reference Circuit of SIM Interface

Recomendations for USIM

1. Keep the placement of SIM card connector as close to the module as possible.
2. Keep SIM card signals away from RF and VBAT traces.
3. To avoid cross-talk between USIM_DATA and USIM_CLK, keep them away from each other and shield them with surrounded ground. USIM_RST should also be ground shielded.
4. In order to offer good ESD protection, it is recommended to add a TVS diode array with parasitic capacitance not exceeding 15 pF.

MAIN and GNSS Ports

The MAIN and GNSS ports is a MHF4 type connector for the connection to the antenna. Usually a 'pigtail' cable with a MHF4 to SMA or N-Type connector is used for this.

Note: that the device must not be used without a proper 50 Ohm load on the MAIN and GNSS ports.

Product Family Portfolio

Part Number	Description	Availability
ltec-bg77-m2	LTEC-BG77-M2 card based on Quectel BG77, M.2 2230 E-Key form factor	available

Ordering Information

All n-fuse products can be ordered directly through the n-fuse website.
You can also contact a sales representative via devices-sales@n-fuse.co for volume ordering.

Version 20.11.2024