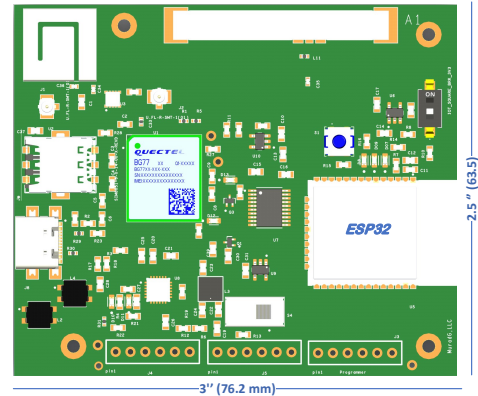




PicoloTSOM

BG77 LTE-ESP32 System-on-Module



PicoloTSOM is all you need to develop a cellular connectivity, GNSS, Wifi, and Bluetooth application. It is based on the ultra-compact LTE cat M1/cat NB2 BG77 module and the generic WiFi+BLE ESP32-WROOM-32D 32-bit Microcontroller. This 2.5"x3" board comes with all needed antennas on-board including GNSS low-noise amplifier front-end with integrated pre and post SAW filters and a GNSS ceramic antenna, LTE PIFA, WiFi, and BLE antennas. External active and passive GNSS antennas can be used via the u.FL connector. Also, an external LTE antenna can be used via a u.FL connector. The BG77 is an ultra-compact LPWA module supporting LTE Cat M1, LTE Cat NB1/NB2 and integrated GNSS. It is fully compliant with 3GPP Rel-14 specification and provides maximum data rates of 588 kbps downlink and 1119 kbps uplink. It features ultra-low power consumption by leveraging the integrated RAM/flash as well as the ARM Cortex A7 processor supporting ThreadX, achieving up to 70% reduction in PSM leakage and 85% reduction in eDRX current consumption compared to its predecessor. The ESP32 is a low power and a peripheral rich Xtensa dual-core 32-bit LX6 microcontroller with WiFi and dual-mode Bluetooth. PicoloTSOM also comes with an on-board Accelerometer and a vibrator.

Key

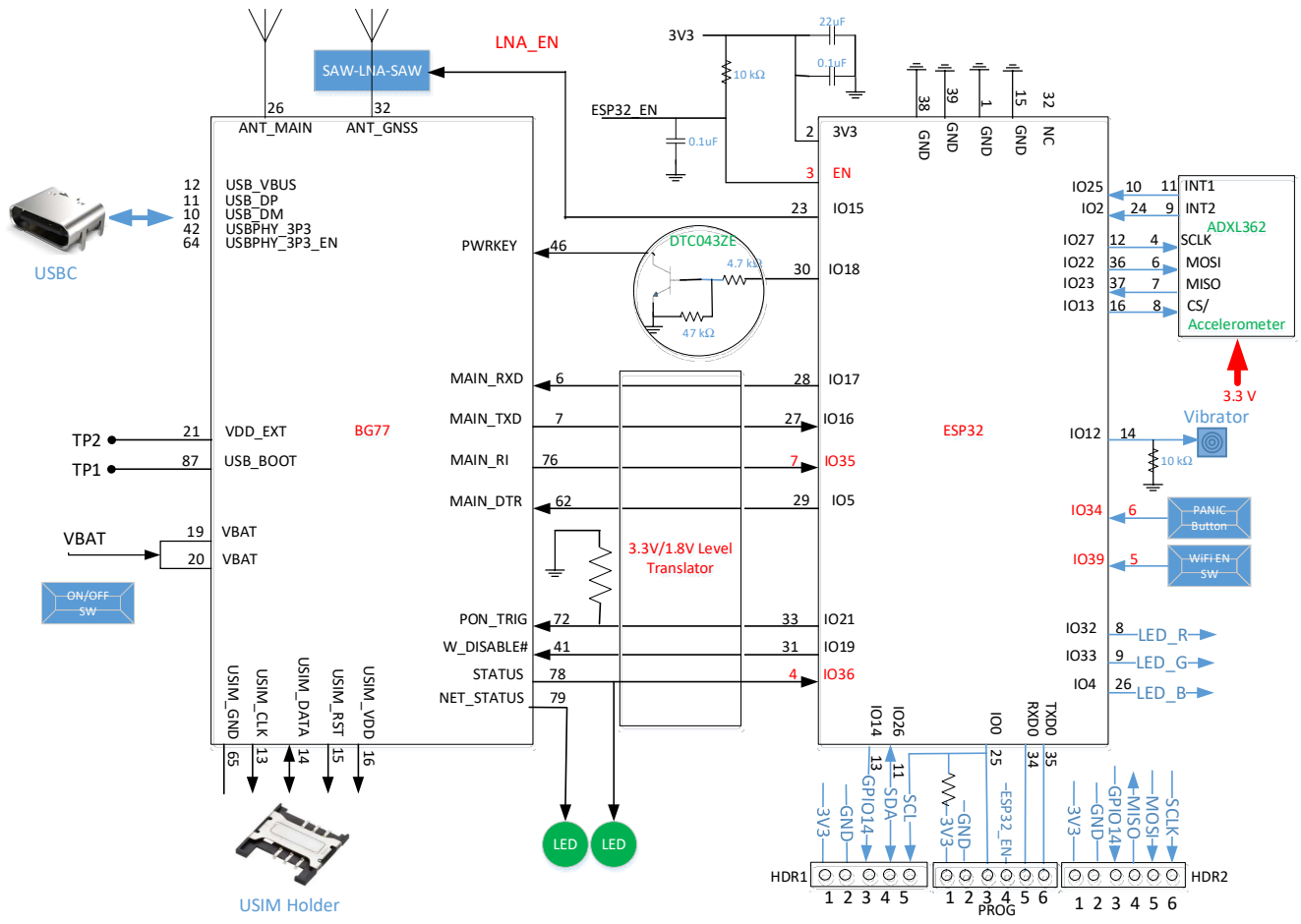
Benefits

- ✓ SWAP (Size, Weight, and Power) IoT solution
- ✓ 2 LTE antenna options
- ✓ 3 GNSS antenna options
- ✓ On-Board WiFi and BLE antennas
- ✓ On-Board Accelerometer and vibrator
- ✓ DC-jack, USB-C, and Li-Ion battery powered
- ✓ Module and Network status LEDs
- ✓ 3 headers supporting I2C, SPI, ADC, GPIO, etc.

Applications

- ✓ Asset Management
- ✓ Logistics
- ✓ Tracking
- ✓ Geo-Fence
- ✓ Wearables
- ✓ Smart Energy
- ✓ Medical Devices
- ✓ PPP/Hotspot

Block Diagram



HDR1 Pin Description

Pin Number	Direction	Name	Description
1	Power Output	3V3	Power Supply
2	-	GND	Ground
3	Input/Output	GPIO14	General Purpose I/O
4	Input/Output	SDA	I ² C-SDA (or GPIO)
5	Input/Output	SCL	I ² C-SCL (or GPIO)
6	-	GND	Ground

HDR2 Pin

Description

Pin Number	Direction	Name	Description
1	Power Output	3V3	Power Supply
2	-	GND	Ground
3	Input/Output	GPIO14	General Purpose I/O (or SPI SS)
4	Input/Output	MISO	SPI-MISO (or GPIO)
5	Input/Output	MOSI	SPI-MOSI (or GPIO)
6	Input/Output	SCLK	SPI-SCLK (or GPIO)

PROGRAMMER Pin

Description

Pin Number	Direction	Name	Description
1	Power Output	3V3	Power Supply
2	-	GND	Ground
3	Input	GPIO0	BOOT MODE
4	Input	ESP32_EN	ESP32 enable signal
5	Input	RXD0	U0RXD
6	Output	TXD0	U0TXD

LED

Description

LED Number	Name	Description
D12	NET 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 Always high: Voice calling
D13	STATUS	High: BG77 is ON Low: BG77 is OFF

Power

Interface: The board can be powered by providing a 3.3 V at the J? pin or through a USB-C.

Power Supply	Jumper Position	Description
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3.3 V	JMR1 installed JMR2 uninstalled	Connect a 3.3 V and Ground to HDR pins 11 and 12 respectively.
USB-C	JMR1 uninstalled JMR2 installed	

Jumper

Settings

JMB1	JMB2	Function
Installed	Uninstalled	USB-C is the input power
Uninstalled	Installed	3.3 V is an input powered
Installed	Installed	3.3 V is an output Power
Uninstalled	Uninstalled	System off

GNSS

Antenna

LTE

Antenna

TP1

Description: TP1 is connected to the BG77 USB_BOOT input pin. This pin is used Force the module into emergency download mode.

Resources

1- BG77 AT Commands Manual

https://www.quectel.com/download/quectel_bg95bg77bg600l_series_at_commands_manual_v2-0

2- BG77 GNSS Application Note

https://www.quectel.com/download/quectel_bg95bg77bg600l_series_gnss_application_note_v1-2

3- ESP-IDF Programming Guide

<https://docs.espressif.com/projects/esp-idf/en/latest/esp32/get-started/index.html#step-8-build-the-project>