ema:USB

USER GUIDE

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OptConnect
MANAGED WIRELESS SOLUTIONS

Welcome to ema:USB

The OptConnect ema:USB is designed to simplify OptConnect ema™ module integration into a host system by means of a single USB (Type C) port. With a standard USB 3.X port, the host system both powers and communicates with the ema:USB device, and obtains a managed cellular connection via the OptConnect ema™. The compact form factor of the ema:USB simplifies mechanical integration into the host enclosure and/or installation.

This user guide outlines best practices for hardware and software integrations. Designers should follow these guidelines for a robust cellular experience.

Contact Information

For more information about OptConnect ema™, please contact OptConnect Sales at 1.877.678.3343 ext. 2 during normal business hours. For technical support, contact the OptConnect Customer Care Center at 1.877.678-3343 ext. 3 between 6:00 am and 7:00 pm Monday - Saturday.

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Orderable Part Numbers

Orderable Device	Operating Temperature	LTE Bands	Network	Region
EMA-L4-1-US-B-C-000	-20 to +85°C	FDD B2, B4, B5, B12, B13	AT&T, Verizon	United States

Table 1

Additional Resources

OptConnect ema™ and accessories are supported by a full range of documentation, including User Guides and Application Notes as well as related code samples. The latest versions of these resources can be found at https://optconnect.com/products/emausb/.

For preliminary information, please refer to the following resources:

- OptConnect ema™ Getting Started
- OptConnect ema™ emaLink AT Command Manual
- OptConnect ema™ Windows Networking Guide - Application Note: 002
- OptConnect emaConnect User Guide*

Contact an OptConnect representative to inquire for availability

Overview

Features

- **LED indicators**
  - Power x1
  - Cellular Signal Quality x 4
  - Exposes both the ema modem UART and the emaLink UART
  - OptConnect ema™ status x 1

- **Access to all OptConnect ema™ communication interfaces**
  - Onboard 2x1 UART to USB bridge
    - Exposes both the ema modem UART and the emaLink UART

- **Onboard USB 2.0 hub**
  - Exposes both UARTs as virtual COM ports
  - Exposes native USB interface

- **Mounting Options**
  - Magnetic
  - DIN rail

Contents

The ema:USB device ships ready to use. Packing contents include:

ema:USB device

USB type C to type C cable

USB type A to type C cable

OptConnect Gemini dual-lead LTE antenna

DIN rail mounting clip and hardware (optional)

Hardware

The ema:USB hardware and components

Technical Specifications

Hardware	
Dimensions	57.56 x 33.55 x 22.60 mm
Power	
Input Voltage	(USB VBUS Standard) 4.75VDC to 5.25VDC , nominal 5.0VDC
Continuous Avg. Current	100mA @ 5V
Peak Current (Pulse)	1A @ 5V
Interfaces	
Type	UART(2) to USB Bridge(Virtual COM Port), USB 2.0 Hub
USB Driver Support	USB 2.0, Linux, Windows, Android*
LED Indicators	Power (Green), Cell Signal Quality x4 (Green), Cell Activity (Amber), ema Status (Green)
Approvals	
Compliance	FCC, IC, RoHS
Temperature Range	
Commercial/Industrial	-20° C to + 85° C
Support and Warranty	1 year standard warranty

Table 2

Contact an OptConnect representative to check availability of this feature

At a Glance

Power

The OptConnect ema:USB must be powered by its connected host system. The host must provide a USB 3.x or USB type C power-compliant port to meet the necessary power demands of the ema:USB. Additionally, two (2) USB 2.x compliant USB ports can be used with a USB Y cable, combining power outputs of both USB ports to power the ema:USB device. More information on power requirements can be found in the Technical Specifications section.

Communications

The ema:USB exposes all OptConnect ema™ communication interfaces including the modem UART interface, emaLink UART Interface, and the native USB interface. The two UART interfaces convert to USB onboard and are accessible through the onboard USB 2.0 Hub. Furthermore, the two UART interfaces will enumerate with the host system as Virtual Comm Ports over USB, facilitating serial communications. The ema’s native USB interface will enumerate with the host system as a Network Adaptor (CDC/ACM/MBIM) instance.

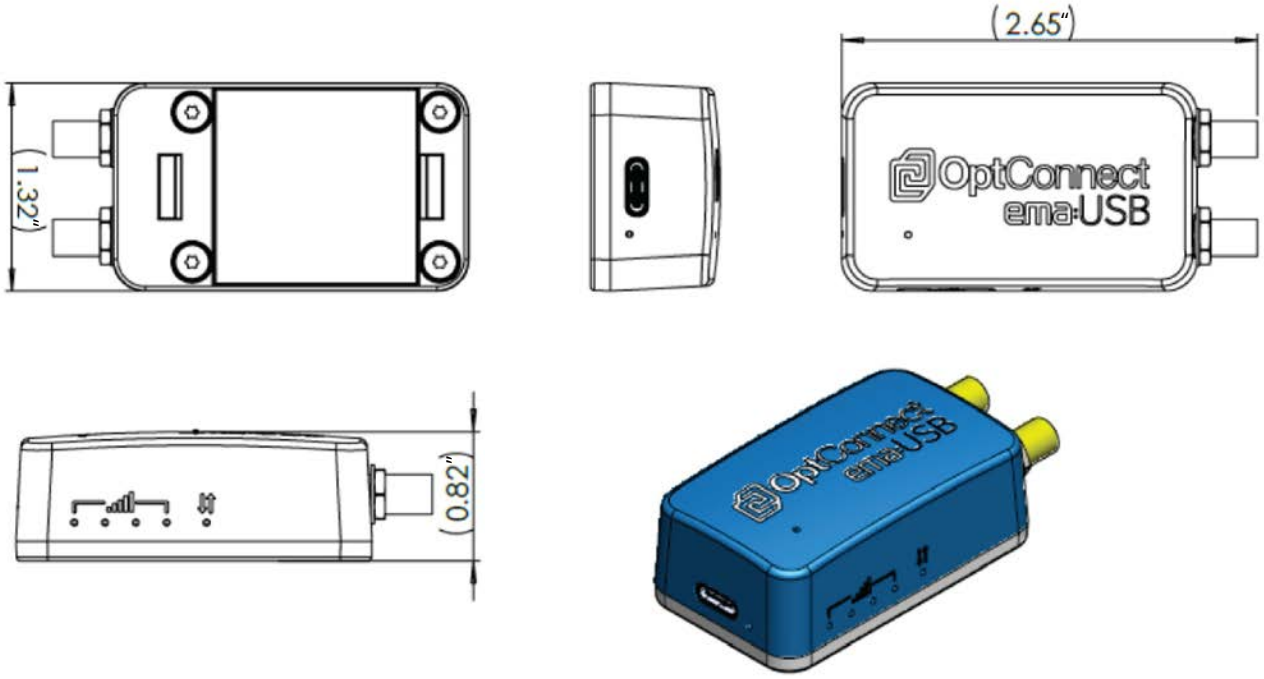
LED Indicators

The ema:USB features seven (7) LEDs dedicated for user feedback. Table 3 outlines the behavior of each LED.

LED	Description
Power LED (green)	ON when USB power has been applied at the USB type C input connector
ema Modem Status (green)	Power + Searching = Blinking Power + Connected = ON
Cellular Signal Quality x4 (Green)	Excellent = All 4 LEDs ON Good = 3 LEDs ON OK = 2 LEDs ON Poor = 1 LED ON Searching = Scrolling LEDs Signal Unknown = Poor LED Blinking
Cellular Activity (Amber)	Blinking indicates cellular data traffic upload/download

Table 3

Mechanical Dimensions



Software

This section provides guidance on software-related components of the ema:USB, and how best to integrate with the host system.

Communications

The host system can use all three ema communication interfaces to communicate with the ema:USB. These three interfaces are available to the host system over a single USB 2.0, so the host system must support USB 2.0 host functionality. Table 4 summarizes these interfaces and how they will enumerate with the host.

Interface	Description
Native USB	Enumerates with the host as a “Network Adaptor” in the form of CDC/ACM/MBIM.
ema Modem UART	Enumerates with the host as a “Virtual COM Port” in the form of Standard COM Port. USB drivers required.
ema Link	Enumerates with the host as a “Virtual COM Port” in the form of Enhanced COM Port. USB drivers required.

Table 4

Host system requires implementation with emaLink interface and one of the other two interfaces

Native USB

The ema:USB's native USB interface is typically used by, but not limited to, high-level operating systems. The appropriate USB drivers must be used and are available from OptConnect.

Supported drivers are as follows:

- Windows
- Linux
- Android*

ema Modem UART

The ema Modem UART interface for the ema:USB is typically used by, but not limited to, embedded systems. Relative to the ema:USB, this interface is bridged from a UART to USB, in the form of a virtual COM port. USB drivers are required and can be downloaded at https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers.

Reference Figure 3 for a sample snapshot of the ema Modem UART over USB enumeration as virtual COM port standard COM port) description in a Windows 10 environment.

Figure 3

emaLink

The ema:USB's emaLink interface should be used and monitored by all host system implementations. Relative to the ema:USB, this interface is bridged from a UART to USB in the form of a virtual COM port. USB drivers are required and can be downloaded at https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers.

Reference Figure 4 for a sample snapshot of the emaLink over USB enumeration as virtual COM port (enhanced COM port) description in a Windows 10 environment.

Figure 4

emaConnect

The OptConnect emaConnect™ is a modem-management software application designed to quickly interface with the OptConnect ema™modem embedded inside the ema:USB. This app allows the ema:USB to appear as a Network Adaptor/Interface to the host operating system. The app ensures that the ema modem remains online and connected to the internet for user applications. Contact an OptConnect representative to learn more.

Contact an OptConnect representative to check availability of this feature

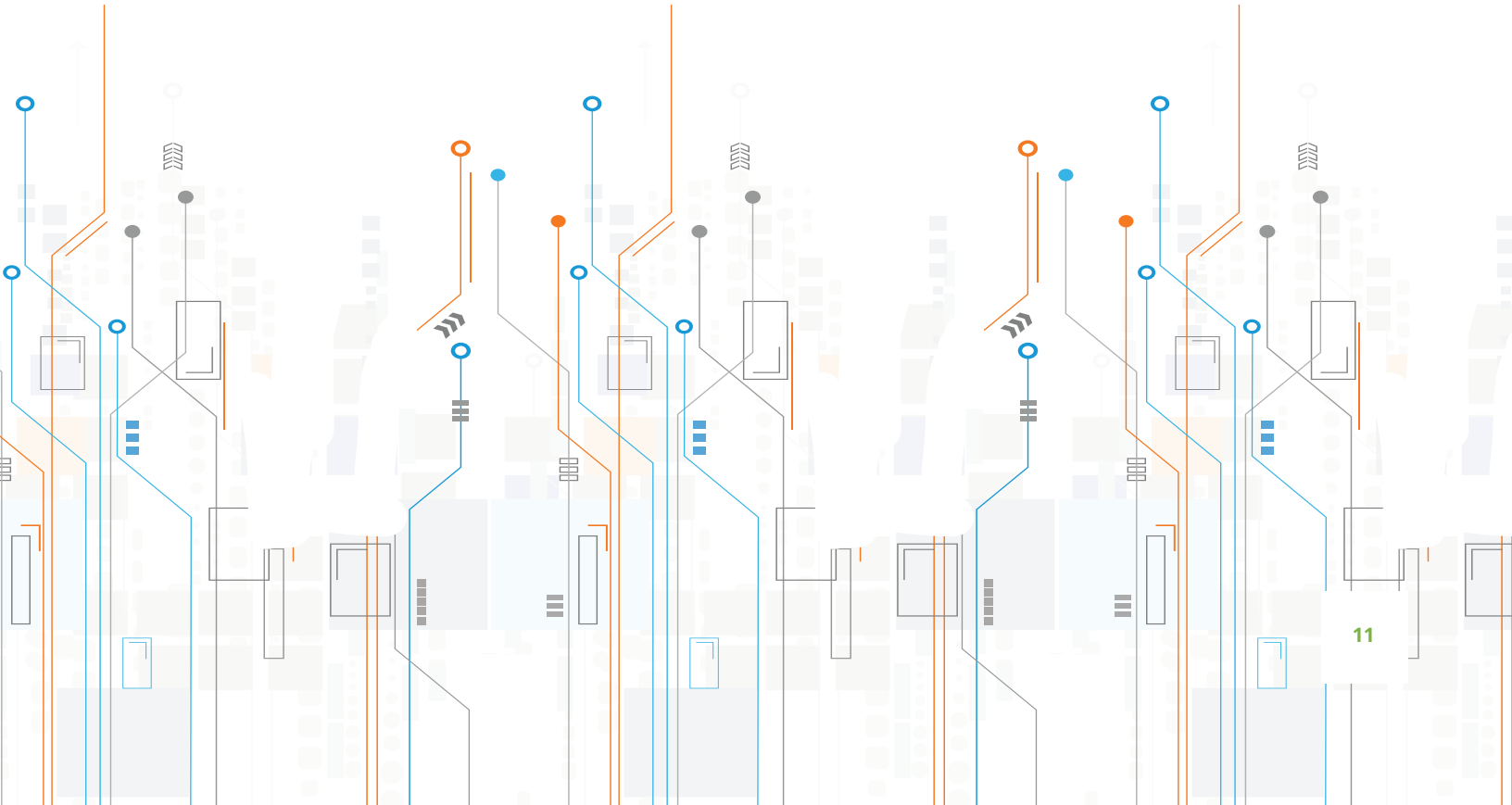
Unavailable AT Commands

The OptConnect ema:USB device is designed to work with the currently implemented AT command set defined by the Telit LE910-V2 Series AT Commands Reference Guide. The AT command interface allows the host to interact with the OptConnect ema™ cellular modem. However, certain AT commands are incompatible with the ema:USB design. These commands are unavailable to the host interface on the ema modem UART or Standard COM Port interface.

To help ensure functionality and compatibility with the ema modem, view the list below.

Unavailable AT Command	Description
AT+CLAC	Execution command causes the ME to return the AT commands that are available for the user
AT+ICF= <format>,<parity>	Set command defines the asynchronous character framing to be used when autobauding is disabled
AT+IPR=<rate>	Set command specifies the DTE speed at which the device accepts commands during command mode operations; it may be used to fix the DTE-DCE interface speed

Table 5

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