BREAKOUT BOARD DESCRIPTION

CME-WIDI-Core/CoreX is a smart (BLE) breakout board that implements MIDI over Bluetooth Low Energy functionality.

The breakout board can be used in any existing MIDI equipment that features MIDI I/O. The breakout board is low cost, ultra low in power consumption and works natively with Apple iOS, MacOS, Windows and Android, when used as a MIDI peripheral or central according to the MMA "MIDI over BLE" specification.

CME-WIDI-Core has an embedded antenna and does not require any external antenna. CME-WIDI-CoreX has an external antenna connector (IPEX) on board for connecting to external antenna (note: external antenna is not included in the CME-WIDI-CoreX package and should be purchased in separate.). Please refer to the section RECOMMENDED EXTERNAL ANTENNA for further information.

The breakout board is able to play a central or peripheral role to connect to any BLE MIDI third parties peripherals, such as Roland AX Edge, Korg MicroKey Air, Roli Seaboard, CME Xkey Air, Jamstik+ Guitar, and all other existing BLE MIDI peripherals.

CME-WIDI-Core/CoreX is a small size breakout board that implements all MIDI over BLE characteristics, services and IOs. Besides this, it has the ability to negotiate the smallest possible BLE connection interval to reduce MIDI latency depending on the connected BLE equipment.

Also, it works natively with all Apple devices (BLE functionality and iOS8+ installed), as well as with Mac OS computers (BLE functionality and Yosemite installed), Windows computers and Android devices.

The breakout board can be seen as a black box with MIDI In/Out on one side, and wireless BLE on the other side. Therewith it is able to send and receive pure MIDI data, and take care of encoding/decoding BLE packets.

The MIDI UART can be configured at a standard MIDI baud rate 31.25 kb/sec or in high speed mode at 400 kb/sec when connected to an external MCU.

The breakout board features an onboard Low Drop Out regulator, able to accept input voltages from 2.0 to 16V

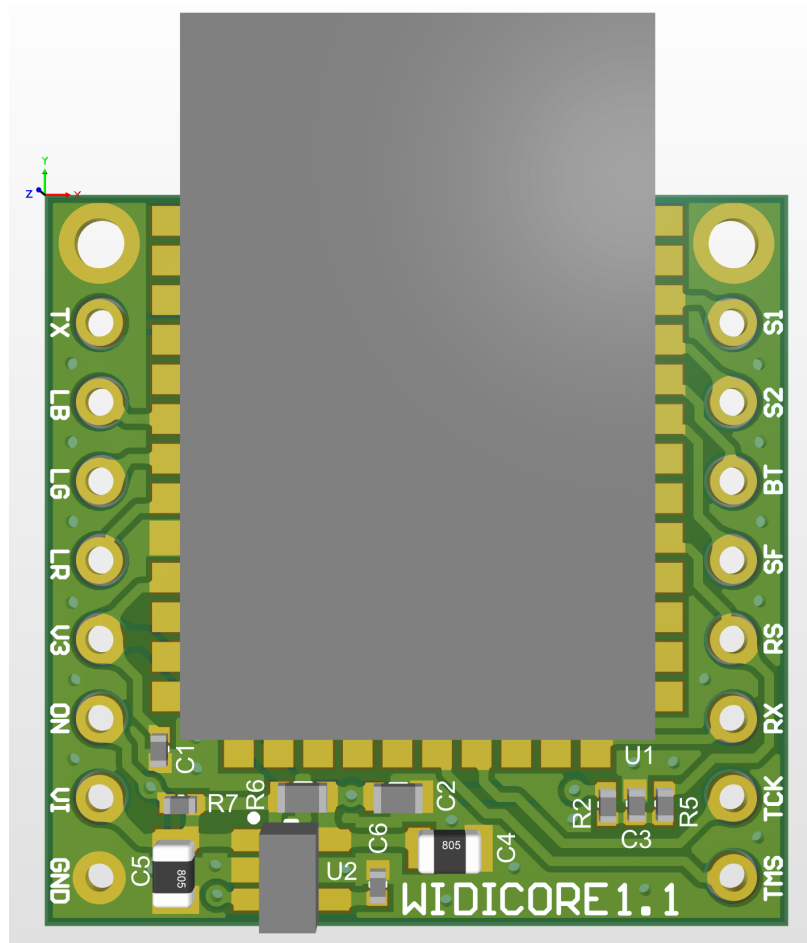*The information in this document is subject to change without notice*

BREAKOUT BOARD OVERVIEW

All pins are placed on a 2.54mm grid.
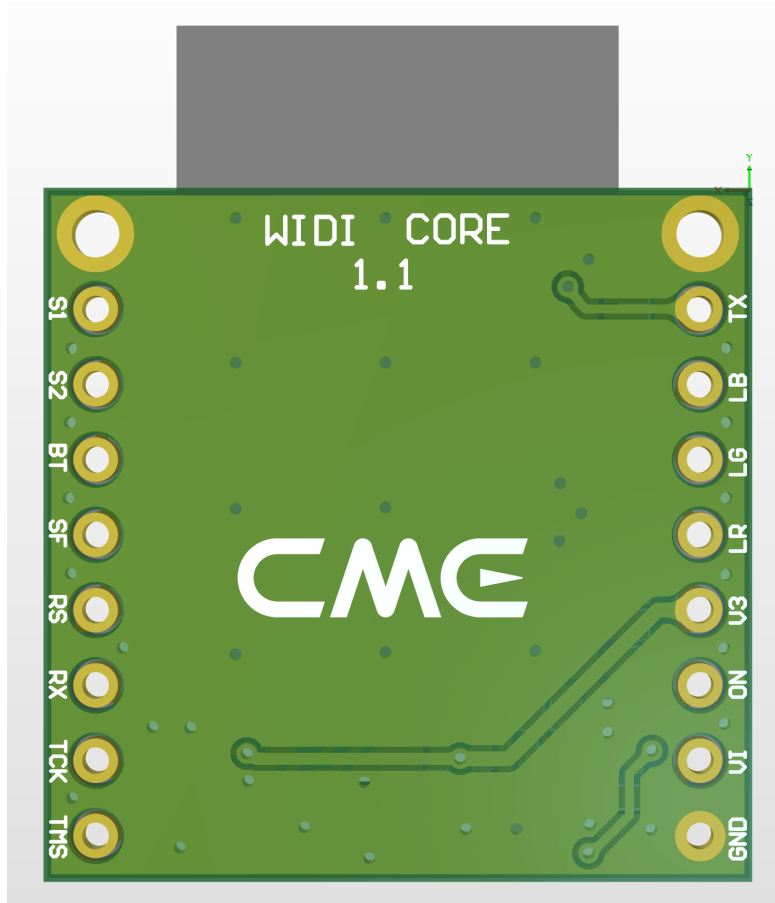Two M2 pins connected to ground can be used as fixing holes.
All components are located on the top side for seamless integration.

Top view

Bottom view

PINS DESCRIPTION

PIN	TYPE (1)	DESCRIPTION
TX	O	3.3V MIDI Output, connect to external MCU serial port input
LB	O	3.3V Blue LED output, this pin can drive up to 8mA, active low. Connect to a LED cathode through a 470-820R resistor. LED anode connected to power supply. This Blue LED indicates Bluetooth states, roles etc. *This pin can be left unconnected if not used*
LG	O	3.3V Green LED output, this pin can drive up to 8mA, active low. Connect to a LED cathode through a 470-820R resistor. LED anode connected to power supply. This Green LED is On (in addition to the Blue LED) when the WIDI acts as a Bluetooth Central. This LED is also used in the bootloader mode *This pin can be left unconnected if not used*
LR	O	3.3V Red LED output, this pin can drive up to 8mA, active low. Connect to a LED cathode through a 470-820R resistor. LED anode connected to power supply. This Red LED indicates is only used in the bootloader mode *This pin can be left unconnected if not used*
ON	I	ON input, no pull up, no pull down. This pin allows to turn off the breakout board when tied to ground, and turn on the breakout board when tied to Vin. If this feature is not used, this pin can be connected to VI pin. If used, connect to external MCU output, through a pull down resistor to GND.
V3	PO	3.3V regulated output. This pin is the output of the on board 3.3V regulator. It can be used to power an external circuitry requiring 3.3V regulated output. Max current available through this output is about 100mA. *This pin can be left unconnected if not used*
VI	PI	Power input, connect a power supply (2.0V to 16V), able to deliver at least 30mA.
GND	P	Ground power input.
TMS	IO	Programming data pin. This IO allows to externally program the breakout board, it should be connected to an external programmer during production. This pin can also be connected to an external MCU if the MCU is able to program the breakout board. *This pin can be left unconnected if not used*

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TCK	I	Programming clock pin. This input allows to externally program the breakout board, it should be connected to an external programmer during production. This pin can also be connected to an external MCU if the MCU is able to program the breakout board. *This pin can be left unconnected if not used*
RX	I	3.3V MIDI Input, connect to external MCU serial port output
RS	I (PU)	Reset input, internal pull up. The breakout board can be reset with this input. It is also used to program the breakout board. It should be connected to an external programmer during production. This pin can also be connected to an external MCU if the MCU is able to program the breakout board. *This pin can be left unconnected if not used*
SF	I (PU)	Slow / fast input, internal pull up. This input allows control the MIDI baud rate used on TX/RX pins. When tied to ground, a high speed baud rate is used (400 kb/sec), when connected to 3.3V or left unconnected (internal pull up), the baud rate is MIDI 31.25 Kb/sec. This input pin is sampled during boot, it cannot be changed dynamically. To change serial port speed setting, the SF pin should be asserted then a reset cycle should be done (RS pin 1->0->1). *This pin can be left unconnected if not used*
BT	I (PU)	Button input, internal pull up. This pin is used to connect a push button. When pressed, the button creates a short to Ground. Button behaviour controls different functions of the breakout board, described separately. *This pin can be left unconnected if not used*
S2	O	Status 2 : this output pin provides information about the bluetooth role used by the breakout board. (0 = peripheral, 1 = central). *This pin can be left unconnected if not used*
S1	O	Status 1 : this output pin provides information about the bluetooth connection status (0 = Not connected, 1 = Connected). *This pin can be left unconnected if not used*

Note 1: Input, O: Output, IO: Input/Output, PI: Power input, PO: Power output

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FEATURES

- Built in CC2642R single-chip Bluetooth Smart (BLE 4 / 5) System-On-Chip (SOC).
- TX power: -21dBm to 5dBm
- RX sensitivity: up to -105dBm (LE coded PHY)
- Breakout board size: 23.82mm (W) x 29.03mm (L) x 4.3 mm (H) (With Shielding)
- Operating Voltage: 2.0V to 16V
- RX current: 6.9mA
- TX current @ 0dBm: 7.4mA
- TX current @ 5dBm: 9.7mA
- Auto-negotiation of the lowest possible connection interval
- Auto-negotiation of the faster PHY 1Mb / 2Mb depending on RSSI
- Auto-negotiation of the largest supported MTU
- Over The Air firmware update
- Support BLE central and peripheral roles
- Support automatic connection with other BLE devices
- Full MIDI implementation available on request
- Support MIDI SYSEXs up to 5K bytes @ lowest BLE connection interval
- Support Unlimited MIDI SYSEX size @ higher BLE connection interval
- Support all MIDI events (SYSEX, Real-time, controllers, …)
- Support MIDI Running status

ELECTRICAL SPECIFICATION

Max input voltage on VI pin : 16VDC
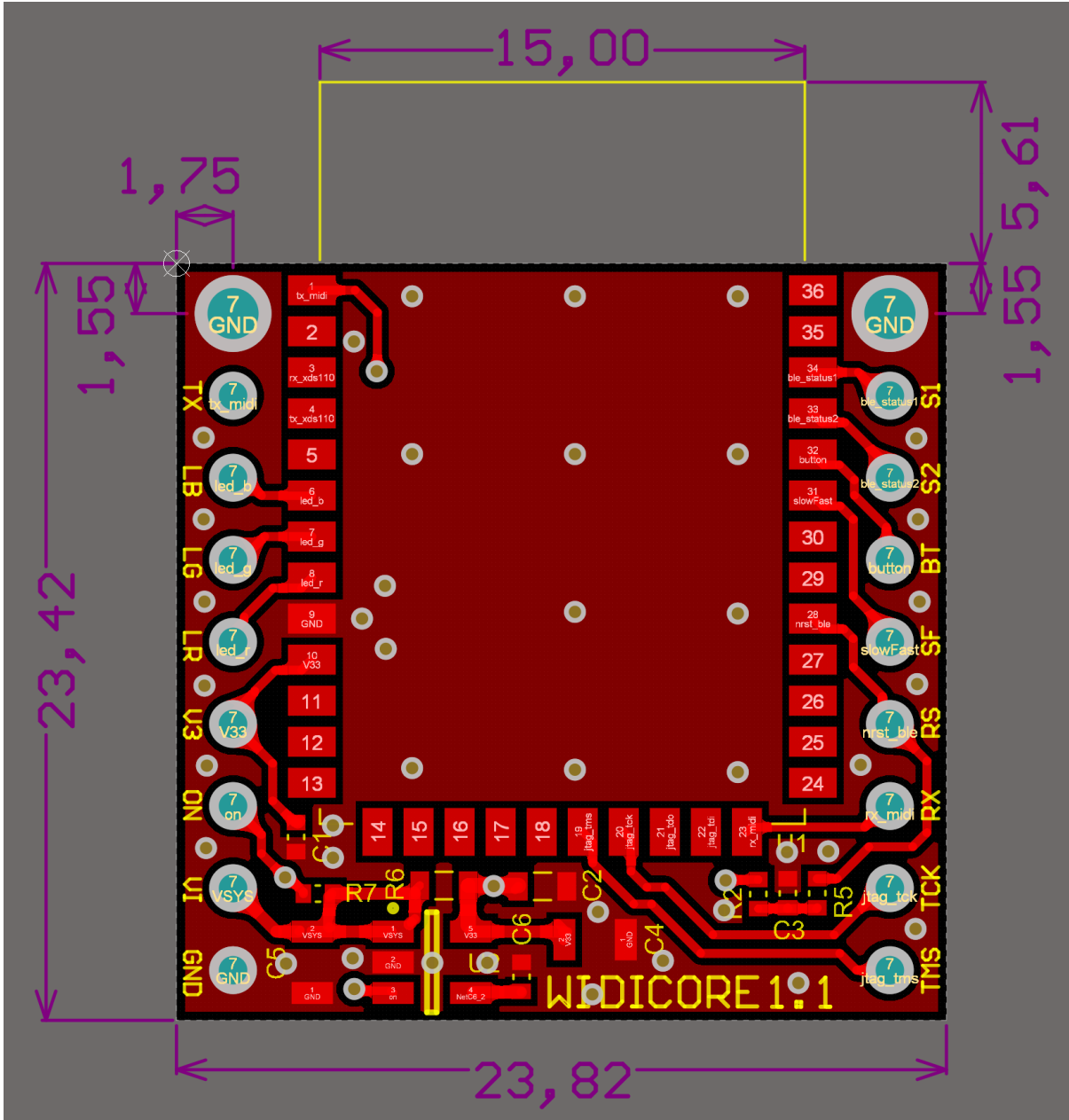Max input voltage on other pins : 4.1VDC
Quiescent input current (ON = GND) : TBD
Average input current (ON = Unconnected) : TBD
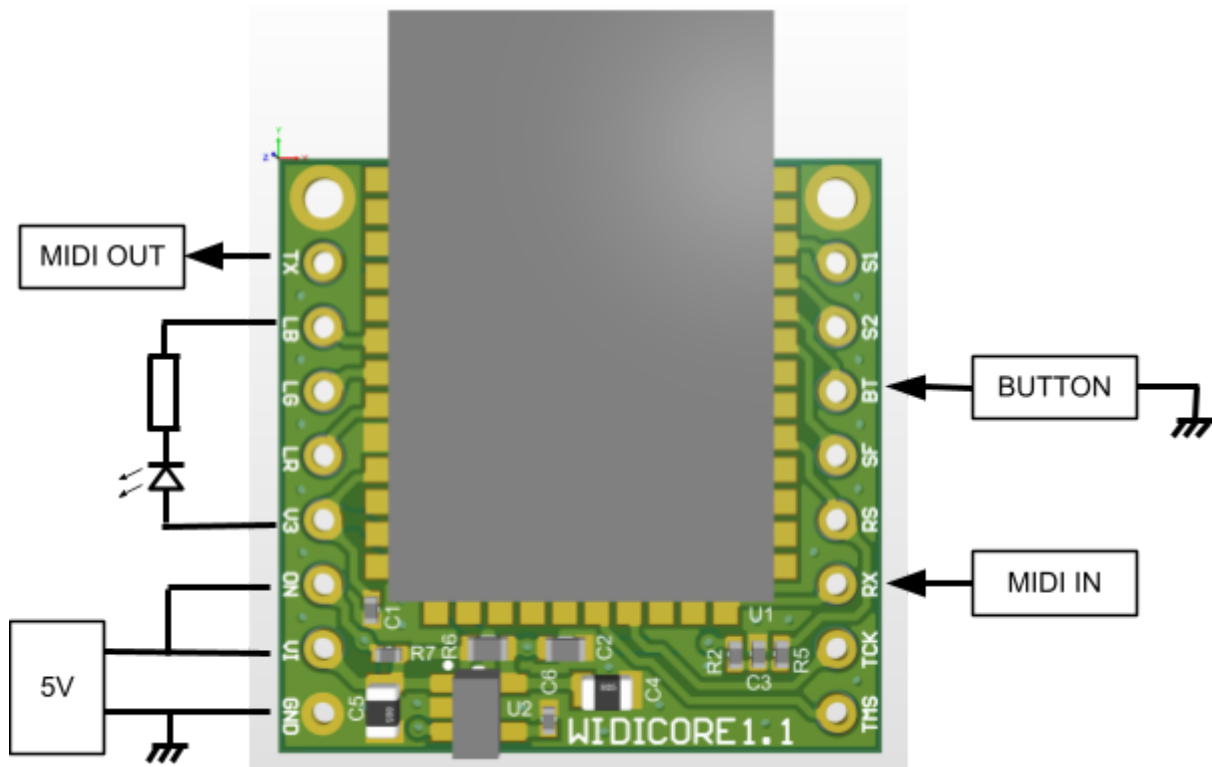LEDs outputs (LR, LG, LB) maximum current : 8mA

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DIMENSIONS

TYPICAL APPLICATION

LEDs BEHAVIOUR

Red (LR)	Green (LG)	Blue (LB)	Description
Blink	Blink	Off	Booting to bootloader mode
Off	Blink	Off	Upgrading firmware
Off	Off	Blink	Bluetooth is advertising or scanning
Off	On	On	Bluetooth is connected, WIDICore is central
Off	Off	On	Bluetooth is connected, WIDICore is peripheral

BUTTON BEHAVIOUR

Press & hold during boot	Press & hold during normal operation	Description
< 7sec		Reset settings to factory defaults and erase all existing bonds
> 7sec		Reboot the WIDICore in bootloader mode
	> 3sec	Force WIDI to BLE peripheral mode and disconnect any existing connection.

RECOMMENDED EXTERNAL ANTENNA (for CME-WIDI-CoreX only)

Rod Antenna	Flex Antenna
- Frequency range: 2400~2500MHz - Peak gain: 2.8dBi - Radiation type: Omni-directional - Polarization: Linear, vertical - Nominal impedance: 50 ohm - Require SMA to IPEX connection cable	- Frequency range: 2400~2500MHz - Peak gain: 3.7dBi - Radiation type: Omni-directional - Polarization: Linear, vertical - Nominal impedance: 50 ohm
Data sheet can be downloaded at https://www.dropbox.com/s/e2tnto7pzbf9sdk/Rod_Antenna.pdf?dl=0	Data sheet can be downloaded at https://www.dropbox.com/s/w3ro4wa7ndevmv7/Flex_Antenna.pdf?dl=0

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Note:
DOCUMENT HISTORY

V1.1

- Updated WIDI Core photos with latest HW version
- Updated LEDs output active states from high to low (LB, LG, LR)
- Updated product dimensions

V1.2

- Added external antenna information
- Updated drawing in page 8

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