Datasheet

Pacwave™ Bluetooth® Smart (BLE) Module

FEATURES

- Built in CSR µEnergy® CSR1010 Bluetooth® Smart (v4.1) chipset
- +7.5dBm Maximum RF Transmit Output Power
- -92.5dBm RF Receive Sensitivity
- RSSI Monitoring
- Built-in Switch-mode Power Supply
- 512Kbit (65,536 x 8) EEPROM
- Real-Time Clock (RTC) and Calendar
- UART Communication
- Wake-up Interrupt
- GPIO
- Operating voltage: 3.3V
- ~16mA Active Transmit/Receive
- ~1mA Idle Mode
- <5uA Sleep Mode
- Size: 24mm x 28.5mm
- U.FL Connector
- Bluetooth® Smart Specification v4.2 Ready
- FCC and Bluetooth® SIG Pending
- RoHS Compliant

DESCRIPTION

The PacWave™ Bluetooth® Smart module fully supports single-mode Bluetooth Low Energy operation. The module receives its power from a host that provides 3.3V and ground to the 6-pin receptacle, and also communicates with the host via the UART on the same 6-pin receptacle. The two additional pins provide a wake-up interrupt input and a general purpose input/output (GPIO). The module can be programmed using the open sockets. The RTC can be used for timekeeping and scheduling of activities.

BLOCK DIAGRAM

VCC GND TX RX Wake GPIO

6-pin Receptable
(2mm pitch)

6

SPI Programming
Socket

5

16 MHz
Crystal

32.768 kHz
Crystal

CSR1010
Bluetooth Smart IC

I²C

EEPROM
512Kbit

I²C

RTC

RF

U.FL

Band
Pass
Filter

DIPOLE Antenna
BLE:(2.402GHZ~2.480GHZ)TX/RX

PacWave™ Bluetooth Smart Module
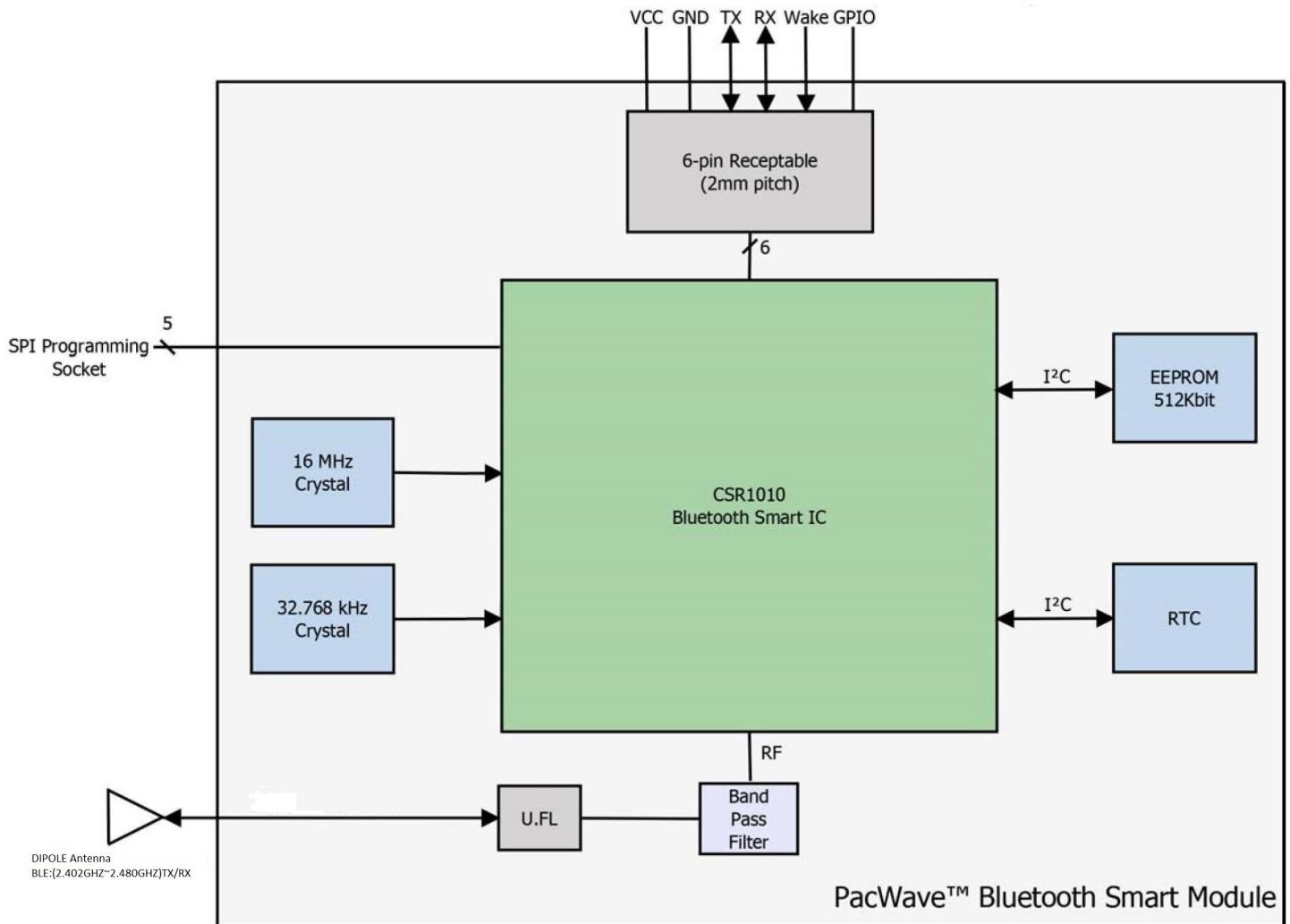
PIN DESCRIPTIONS

J1 (6-pin Receptacle)			
Pin	Name	I/O Type	Description
1	VDD	Input	Power supply to module
2	GND	GND	Power supply Ground
3	RX	Input	UART Interface Receive
4	TX	Output	UART Interface Transmit
5	GPIO	I/O	General Purpose Input/output
6	WAKE	Input	Module wake-up interrupt signal

J2 (Programming/Debug socket)			
Pin	Name	I/O Type	Description
1	SCLK	I/O	Programming/Debug SPI clock
2	CS	Input	Programming/Debug SPI chip select
3	MOSI	Input	Programming/Debug SPI MOSI
4	MISO	Output	Programming/Debug SPI MISO
5	SPI_EN	Input	Programming/Debug SPI Enable

J3 (Off-module Antenna Connector)			
Pin	Name	I/O Type	Description
1	Ext. Ant.	I/O	U.FL (male) Off-module antenna connector

ELECTRICAL SPECIFICATIONS

Absolute Maximum Ratings			
Rating	**Min**	**Max**	**Unit**
Input supply voltage	1.8	4.4	V
I/O supply voltage	-0.4	4.4	V
Other terminal voltages	VSS - 0.4	VCC + 0.4	V
Storage Temperature	-40	85	°C

Recommended Operating Conditions			
Rating	**Min**	**Max**	**Unit**
Input supply voltage	1.8	3.6	V
I/O supply voltage	1.2	3.6	V
Operating temperature range	-30	85	°C

Digital Terminals			
Voltage Levels	**Min**	**Max**	**Unit**
Voltage input logic level low	-0.4	0.3 x VCC	V
Voltage input logic level high	0.7 x VCC	VCC + 0.4	V
Input rise/fall time	-	25	ns
Voltage output logic level low	-	0.4	V
Voltage output logic level high	0.75 x VCC	-	V
Output rise/fall time	-	5	ns

ESD Protection		
Condition	**Class**	**Max Rating**
Human body model contact discharge	2	2000V (all pins)
Charged device model contact discharge	III	500V (all pins)

ELECTRICAL SPECIFICATIONS (cont.)

Current Consumption ($T_{ambient}$ = 25°C)		
Mode	**Description**	**Total Typical Current at 3V**
Dormant	All functions are shutdown. Toggle WAKE pin to wake them up.	<900nA
Hibernate	Everything off except for the sleep clock and VCC pads.	<1.9µA
Deep Sleep	VCC pads, sleep clock, RAM, digital circuits, SMPS are on. 2.2ms wake-up time.	<5µA
Idle	MCU idling	~1mA
RX/TX Active	RF active	~16mA @ 3V peak current

General Characteristics	
Model Name	WCM-01
Product Description	Bluetooth Smart (BLE) wireless module
Dimensions[a]	24mm x 28.5mm x 3.75mm (W*L*T)
Weight	3g ± 0.1g

[a]Thickness = 4.67mm when including the height of the 6-pin receptacle.

MECHANICAL DATA (cont.)

2.00mm   4.00mm

2.00mm
(pitch)

6.05mm

3.56mm
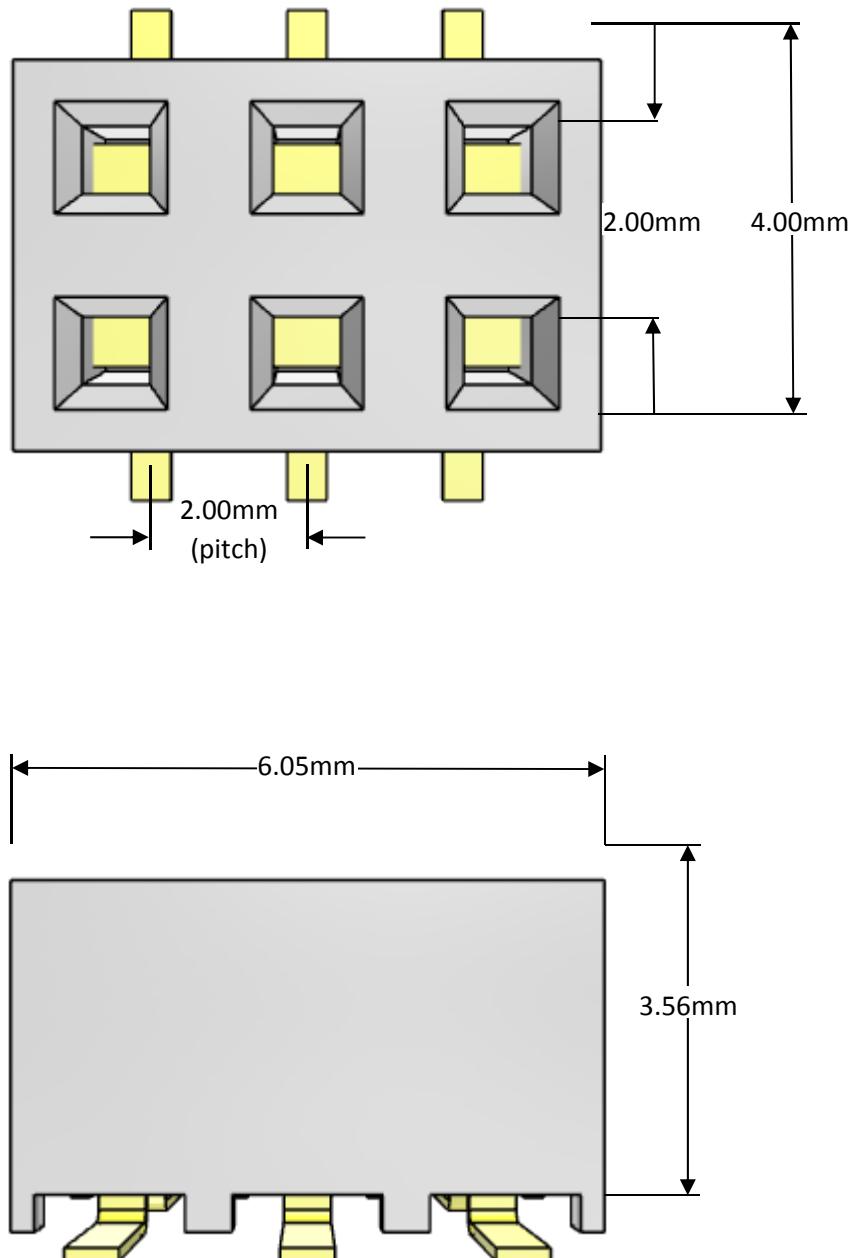
NOTE: For best performance, the module should be connected near or on the outside edge of the host PCB with nothing underneath the antenna portion.

APPLICATION INFORMATION

HOST INTERFACE

The module incorporates one Universal Asynchronous Receiver/Transmitter (UART) interface dedicated to the host for communication to and from the module. Also available to the host is one General Purpose Input/Output (GPIO) and a WAKE interrupt input used to wake up the module from a low power sleep mode. The host supplies 1.8V-3.6VDC and ground to power the module.
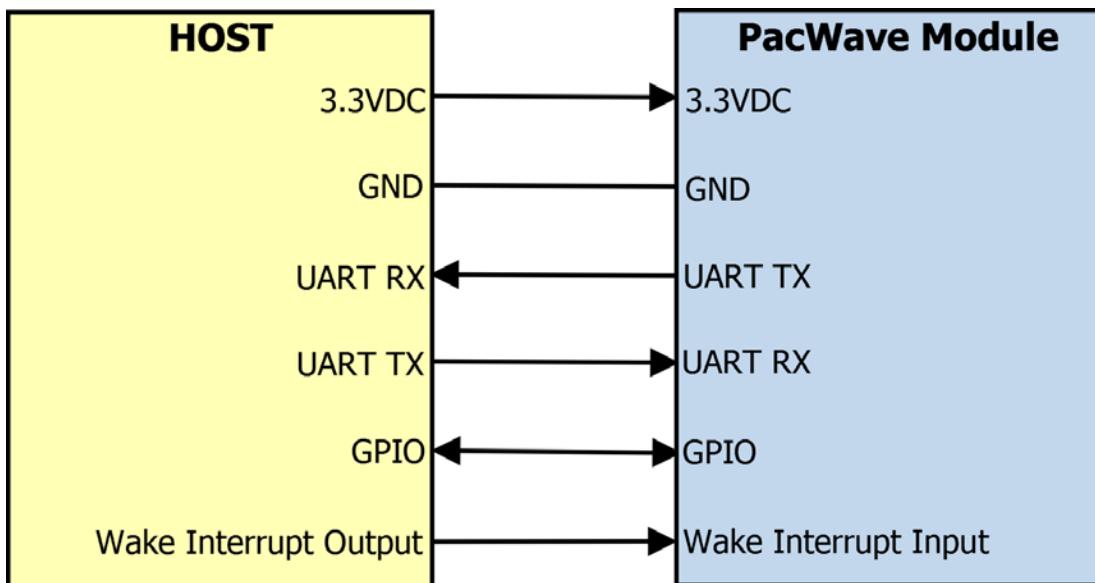
EXTERNAL ANTENNA

The module is certified for use only with the following FCC approved antenna.

FCC Approved Antenna Specifications	
Manufacturer	Shenzhen Taida Century Technology Co., Ltd
Part Number	1012
Type	Whip Straight (Wire)
Wire Length	150mm
Material of Radiator	Cu
Connector	IPEX (U.FL, female)
S.W.R	<= 2.0 @ 2400-2500MHz
Gain (Typical)	2.0 dBi @ 2450MHz // Peak Gain
Impedance	50 Ohm
Polarization	Linear
Operating Temperature	-30°C to +85°C
Storage Temperature	-30°C to +85°C

NOTE: Use of other antenna types or the same type with a higher gain is not allowed without additional testing and FCC approval.

FEDERAL COMMUNICATIONS COMMISSION (FCC) STATEMENTS

The PacWave™ Module complies with Part 15 of the United States of America FCC rules and regulations. The Original Equipment Manufacturer (OEM) must comply with the FCC certification requirements.

15.21 Any changes or modifications made to the module without the manufacturer's approval could void the user's authority to operate the module.

15.105(b) 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.

PLEASE NOTE THE MODULE OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

1. This device may not cause harmful interferences.
2. This device must accept any interference received, including interference that may cause undesired operation.

RADIATION EXPOSURE STATEMENT

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter, and the end product must have a separation distance of at least 20mm from all   persons. With the documented max output power the module meets the FCC SAR Exemption to comply with any applicable RF exposure requirements in its final configuration.

ORIGINAL EQUIPMENT MANUFACTURER (OEM) NOTES

- The OEM must certify the final end product to comply with unintentional radiators (FCC Sections 15.107 and 15.109) before declaring compliance of the final product to Part 15 of the FCC rules and regulations. Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change.

- The OEM must comply with the FCC labeling requirements. If the module's label is not visible when installed, then an additional permanent label must be applied on the outside of the finished product which states: "Contains transmitter module FCC ID: ZZOWCM-01". Additionally, the following statement should be included on the label and in the final product's user manual: "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 interferences, and (2) this device must accept any interference received, including interference that may cause undesired operation."

- The module is limited to installation in mobile or fixed applications. Separate approval is required for all other operating configurations, including portable configuration with respect to Part 2.1093 and different antenna configurations.

- A module or modules can only be used without additional authorizations if they have been tested and granted under the same intended end-use operational conditions, including simultaneous transmission operations. When they have not been tested and granted in this manner, additional testing and/or FCC application filing may be required. The most straightforward approach to address additional testing conditions is to have the grantee responsible for the certification of at least one of the modules submit a permissive change application. When having a module grantee file a permissive change is not practical or feasible, the following guidance provides some additional options for host manufacturers. Integrations using modules where additional testing and/or FCC application filing(s) may be required are: (A) a module used in devices requiring additional RF exposure compliance information (e.g., MPE evaluation or SAR testing); (B) limited and/or split modules not meeting all of the module requirements; and (C) simultaneous transmissions for independent collocated transmitters not previously granted together.

This Module is full modular approval, it is limited to OEM installation ONLY.
Integration into devices that are directly or indirectly connected to AC lines must add with Class II Permissive Change.
(OEM) Integrator has to assure compliance of the entire end product incluld the integrated Module.
Additional measurements (15B) and/or equipment authorizations (e.g Verification) may need to be addressed depending on co-location or simultaneous transmission issues if applicable.
(OEM) Integrator is reminded to assure that these installation instructions will not be made available to the end user of the final host device.