Product Technical Description

BLE (Bluetooth Low Energy) USB dongle

Model Name: SSD005

Revision History

First revision By Axel Hammar 2017-04-05

Second revision By Axel Hammar 2017-04-11

Third revision By Axel Hammar 2017-05-10
Change to 4Mbit Flash, replace RTTE with RED.

Fourth revision by Axel Hammar 2017-12-25
updated with final mechanical size and antenna Gain

Fifth revision by Axel Hammar 2018-01-03
update model name to SSD005 only

Sixth revision by Axel Hammar 2018-01-09
Add antenna Efficiency

Scope

The document is a technical description of SMART SENSOR DEVICES Bluetooth Low Energy USB dongle white label product SSD005.

The document defines the product technical features and specifications.

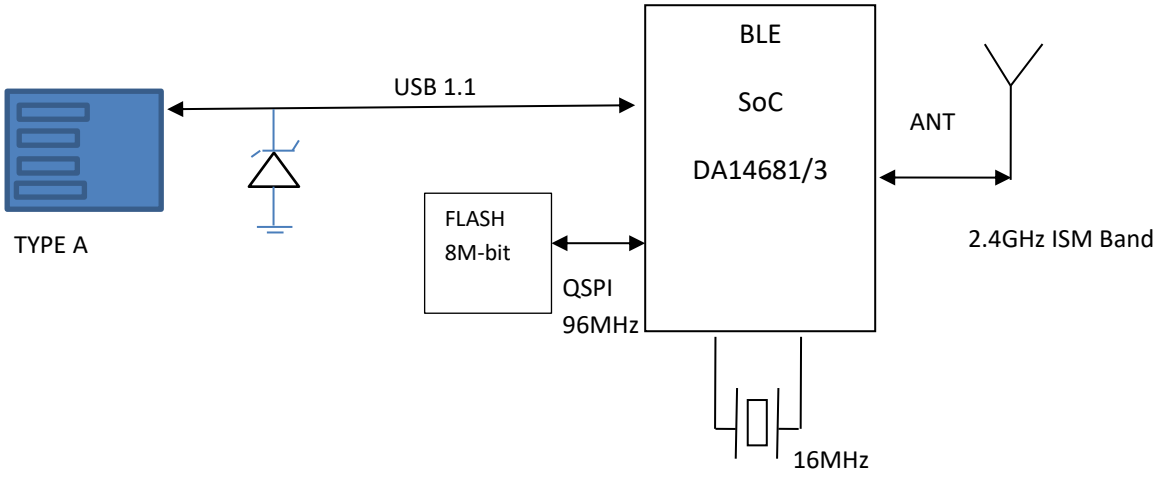
Content

1 Performance Data

Parameter	Value
Bluetooth QDID	QDID 89628 Host QDID 87407 Controller
Model Name	SSD005
Operational Frequency Band [MHz]	2400-2483.5
Number Of Channels	40 Channels
Channel Spacing [MHz]	2
Modulation	GFSK
Nominal Input[V]	5
Max Input [V]	5.25
Min Input [V]	4.75
Operational Max Temperature [^{o}C]	50
Operational Min Temperature [^{o}C]	-20
Storage Max temperature [^{o}C]	65
Storage Min temperature [^{o}C]	-30
Nominal Conducted RF Output Power [dBm]	0
Antenna Efficiency / Antenna Gain [dB]	-8dB
Peak Current Consumption Active[mA]	<10
USB Suspend Mode [mA]	< 2.5
Power Supply	USB VBUS
Nominal RF Range [m]	10
Weight [g]	5

2 Block Diagram

Figure below show the different functional blocks to be found on the board.



3 Functional description

3.1. USB interface

The unit supports USB 1.1 Full Speed device serial interface used for communication at 12Mb/s and power supply (VBUS).
Data communication on bi-directional differential pair (D+, D-) .
Power supply is done via two dedicated lines (VBUS and GND).

The USB transceiver has integrated resistors as specified in USB spec 2.0 ECN “pull-up/pull-down resistors”.

3.2 Radio standard

The device complies with the Bluetooth 4.2 specification and uses Advertiser and connection modes.
The unit uses a Radio SoC DA14681, with integrated BLE software stack in ROM and a MCU Cortex M0 running up to 96MHz with internal PLL.

3.3 Device Address

The “Device Address” `BD_ADDR` is the unique 48-bit address of a Bluetooth device MAC address used for network connection.

3.4 External Clock

The spec for BT low energy is 50ppm. To compensate for aging and offset an external crystal is used and operates with minimum accuracy of +/- 15ppm.

The radio transceiver needs an external crystal fundamental frequency of 16MHz.

3.5 Memory

The USB dongle is equipped with 4Mbit or 8M-bit Quad SPI external memory running up to 96MHz. The DA14681 chip has internal instruction cache controller and can execute from external Flash memory.

3.6 Antenna

Antenna is to be implemented in PCB trace and tuned for 2.4GHz Band.

The antenna system efficiency measurements are carried out in a *scattered field chamber.* The antenna system efficiency, ε_T, is the ratio of the power delivered at the 50Ω antenna interface, P_t, relative to the power radiated from the antenna, $P_{radiated}$. $\varepsilon_T = P_{radiated} P_t$

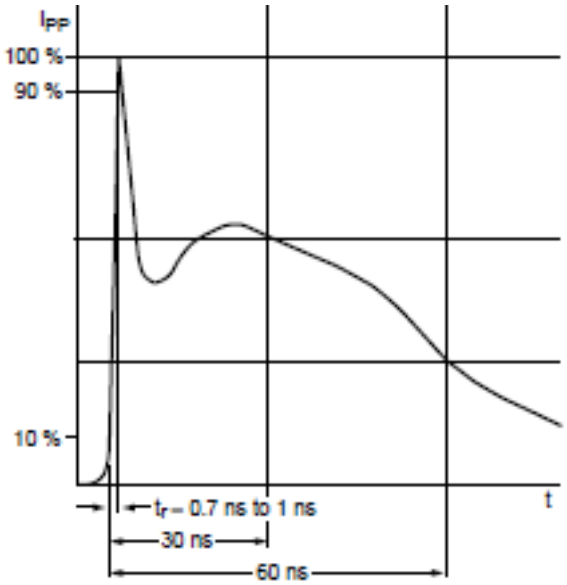
The antenna system efficiency can be expressed in dB or %, where 100% corresponds to 0dB.

Antenna system efficiency Freq [Mhz]	Antenna efficiency [dB]
2405	-8.2
2440	-8.1
2480	-8.6

3.7 ESD Protection

The units is equipped with ESD protection on the USB interface.

VBUS and data +/- lines is protected up to 8KV (contact) according to IEC 61000-4-2, level 4 (ESD)

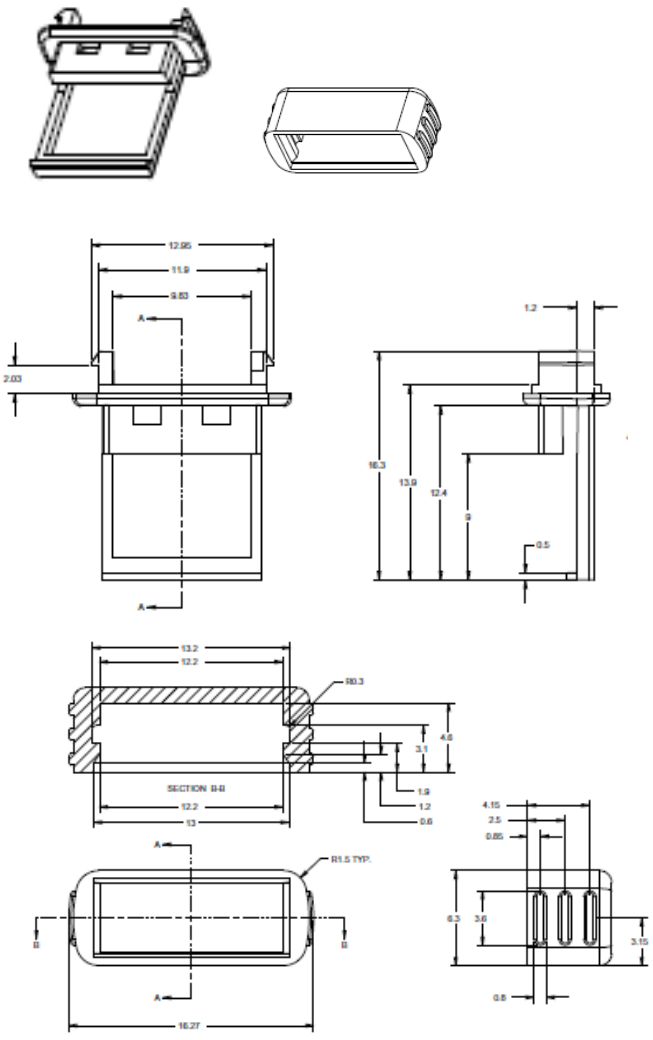


4 Printed Circuit Board

The PCB is a four-layer printed circuit board on FR4 material, gold plated. With plugged micro-vias.

5 Enclosure

Plastic material assembled in two parts in PBT + 20% glass fiber.



6 Regulatory requirements

Complies with Radio Equipment Directive (RED) 2014/53/EU and US FCC ID.

Complies with Restriction of Hazardous Substances (RoHS) Directive (Directive 2011/65/EU) ("ROHS2").

No	Description
1	CE/ RED (EMC ,RF, ROHS 2)
	- ETSI EN 300 328 V2.1.1
	- ETSI EN 301 489-1
	- ETSI EN 301 489-17
	- EN 62479
	- EN 62368-1:2014/AC:2015 (Safety)
	- Radio Equipment Directive (RED) 2014/53/EU
2	FCC ID
	FCC Part 15.247

7 Marking information

The device is laser marked with regulatory information on the metal connector part.