



兆 福 科 技

兆福科技股份有限公司

SPECIFICATION

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PRODUCT NAME : WSDT-752B_SC

	APPROVED	CHECKED	PREPARED	DCC ISSUE
NAME				

GIGAFU

WSDT-752B_SC

**ARM Cortex M3 + Bluetooth Low Energy
with Antenna Module**

Product Specification Sheet

Revision History

Date	Revision Content	Revised By	Version
2015/03/31	- Original release	R & D	1.0
2015/07/08	- Modify voltages ratings - Add power consumption - Replace outline dimension	Ander	1.1
2015/07/08	- Modify RF Specification	May	1.2
2015/07/13	- Add Antenna keep out area size	Ander	1.3
2015/09/09	- Update Operating Temperature - Update Power Consumption	Ander	1.4
2015/10/21	- Modify 7.1 schematic	Peter	1.5
2015/11/04	- Renamed	Peter	1.6
2015/12/30	- Modify temperature of operation and storage	Peter	1.7
2018/05/14	- Modify General Specification	Geoffrey	1.8
2018/07/12	- Add FCC/IC Statement	Geoffrey	1.9
2018/07/16	- Add Label Drawing	Geoffrey	2.0

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1. Introduction

GIGAFU Technology would like to announce a low-cost and low-power consumption module which has of the BLE functionalities. The highly integrated WSDT-752B_SC with RF front end BLE module makes the possibilities of Bluetooth Low Energy HID and other applications.

1.1 DESCRIPTION

The WSDT-752B_SC is very low active and low power mode current consumption as well as fast mode transitions provide excellent battery lifetime and allows operation on small coin cell batteries and in energy harvesting applications.

Integrated a powerful 32-bit Cortex M3 running at 48 MHz has more than 30% more processing power per MHz than Cortex M0 based systems and significantly more than 8 and 16-bit processors.

The Bluetooth Low Energy Controller is embedded into ROM and are partly running on a separate ARM Cortex M0 dedicated for radio purpose. This improves overall system performance and power consumption as well as frees up FLASH memory for the application.

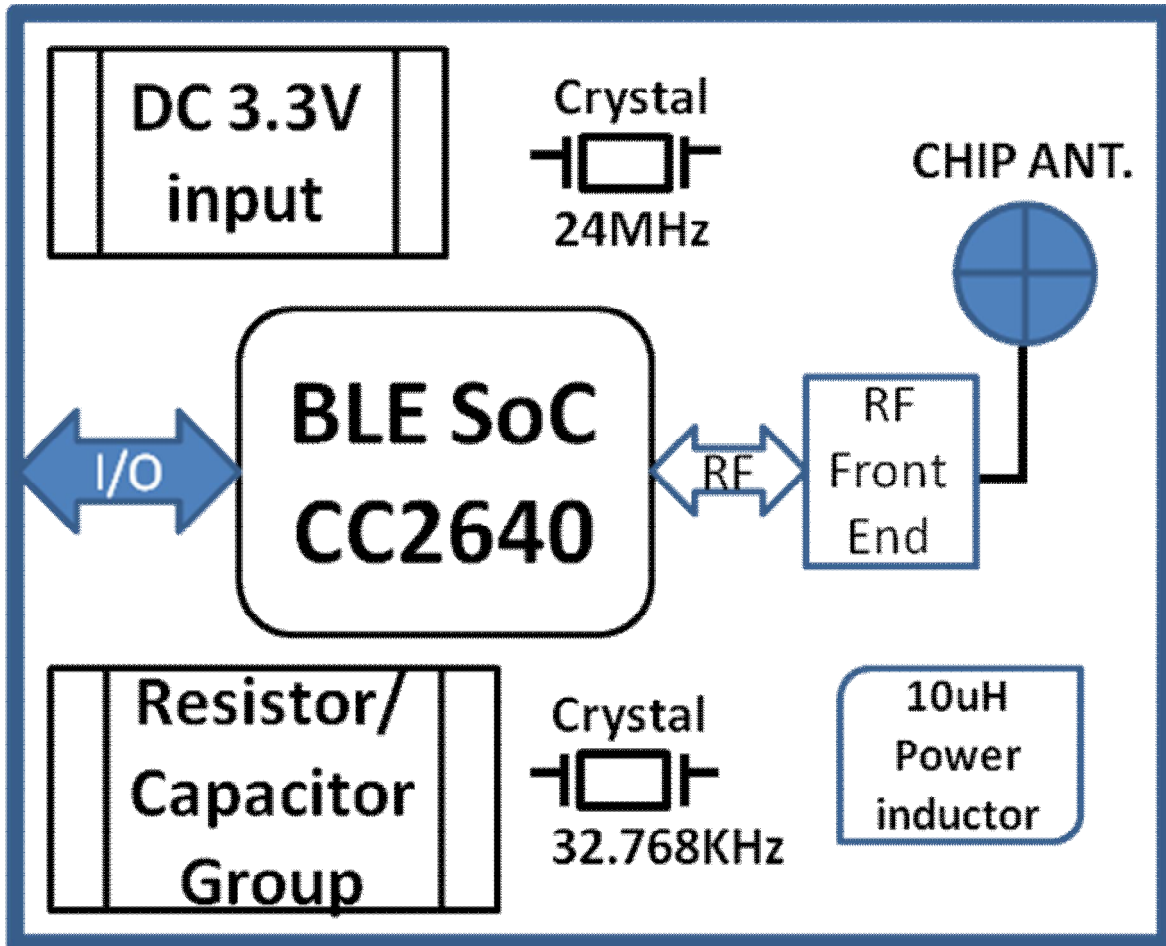
1.2 APPLICATIONS

- Consumer electronics
- Mobile phone accessories
- Sports & Fitness equipment
- HID applications
- Home Automation and Lighting Control
- Alarm and Security
- Electronic Shelf Labeling
- Proximity Tags
- Medical and Healthcare
- Remote Controls
- Wireless Sensor Networks

2. FEATURES

- ❖ Lead Free design which is compliant with RoHS requirements.
- ❖ Integrated Ceramic Chip Antenna
- ❖ Integrated Power Inductor 10uH for DC/DC converter
- ❖ - 2.4 GHz RF transceiver compatible with Bluetooth 4.2 low energy and proprietary communication protocols
- ❖ - Programmable GFSK modulation mode.
- ❖ - Supports data rates between 50 kbps and 5 Mbps
- ❖ - Programmable output power up to +5 dBm
- ❖ - Suitable for systems targeting compliance with worldwide radio frequency regulations
- ❖ - All Digital Peripheral Pins can be Routed to any GPIO
- ❖ - 4 General-purpose Timer Modules (8x 16-bit or 4x 32 bit-timer, PWM each)
- ❖ - 12-bit ADC, 200-kamples/s, 8 channel analog MUX
- ❖ - Continuous Time Comparator
- ❖ - Ultra-low-power analog comparator
- ❖ - Programmable Current Source
- ❖ - UART
- ❖ - SPI
- ❖ - I2C
- ❖ - I2S
- ❖ - 10 GPIO
- ❖ - True Random Number Generator (TRNG)
- ❖ - Real-time clock
- ❖ - AES-128 security module
- ❖ - Support for 8 capacitive sensing channels
- ❖ - Integrated Temperature Sensor
- ❖ - Very few external components
- ❖ - Low-speed clock can be derived from high-speed crystal

System Block Diagram



3. General Specification

3.1 General Specification

Model Name	WSDT-752B_SC
Product Description	BLE module
Dimension	10.0 mm x 10.0 mm x 1.5 mm (W*L*T)
Operating temperature	-10°C to +65°C
Storage temperature	-20°C to +85°C
Humidity	Operating Humidity 10% to 80% Non-Condensing Storage Humidity 5% to 95% (Non-Condensing)
Weight	0.023 g +/- 10g

3.2 Voltages

3.2.1 Absolute Maximum Ratings

Symbol	Description	Min.	Max.	Unit
VDDS	Module Voltage	-0.2	4.0	V
VDDS2	Module Voltage	-0.2	4.0	V
VDDS_DCDC	Module Voltage	-0.2	4.0	V

3.2.2 Recommended Operating Ratings

Test conditions: At room temperature 25°C				
Symbol	Min.	Typ.	Max.	Unit
VDD	2.16	3.3	3.465	V

3.3 Power Consumption

3.3.1 BLE Power Consumption

Test conditions: TX mode @VDD=3.3V; Temp=25°C
 Current@VDD

Test at 25°C/3.3V (Default FW@ROM)		
Power Mode	Description	Current (Peak)
Initialize	DUT link to Smart RF Studio	2.7mA
Tx Continuous	Transmit Packet Continuously@1.82dBm	8.1mA
Rx Continuous	Receive Packet Continuously	7.2mA
Tx Packet	Transmit Packet to Golden Sample	3.5mA
RX Packet	Receive Packet From Golden Sample	7.5mA
Broadcast	After Press Reset Button ,enter advertising state for 10 sec then enter Standby Mode(Specific FW)	238uA
		10uA 1.4uA (Typical)

Deep Sleep mode (timer on)

3.3V	Typ.	Max.	Unit
Broadcast	--	238	uA
Srandby Mode	1.4	10	uA

4. Main CPU Overview

The WSDT-752B_SC contains an ARM® Cortex™ M3 (CM3) 32-bit CPU, which runs the application and protocol stack in the product, and the protocol stack in the wireless network processor (WNP) products.

4.1 CM3 Features

32-bit ARM Cortex-M3 architecture optimized for small-footprint embedded applications

**Outstanding processing performance combined with fast interrupt handling
Thumb®-2 mixed 16- and 32-bit instruction set delivers the high performance expected of a 32-bit ARM core in a compact memory size usually associated with 8- and 16-bit devices, typically in the range of a few kilobytes of memory for microcontroller-class applications:**

–Atomic bit manipulation (bit-banding), delivering maximum memory use and streamlined peripheral control

**–Unaligned data access, enabling data to be efficiently packed into memory
Fast code execution permits slower processor clock or increases sleep mode time**

**Harvard architecture characterized by separate buses for instruction and data
Efficient process core, system and memories**

Hardware division and fast digital-signal-processing oriented multiply accumulate

Saturating arithmetic for signal processing

Deterministic, high-performance interrupt handling for time-critical applications

Enhanced system debug with extensive breakpoint and trace capabilities

Serial wire trace reduce the number of pins required for debugging and tracing

Migration from the ARM7™ processor family for better performance and power efficiency

Optimized for single-cycle flash memory use

Ultra-low power consumption with integrated sleep modes

48 MHz operation – the operating frequency can be dynamically altered to minimize power requirements.

1.25 DMIPS / MHz

5. RF Specification

5.1 BLE Specification

1 Mbps GFSK (Bluetooth low energy)

Conditions : VDD=3.3V ; Temp:25°C. Using Anisu CombiTest with MT8852B

TX

<u>Output Power</u>					
TX PARAMETER	limit	MIN	TYP	MAX	UNIT
Output power @2402MHz	>-20 <+10		0.92	2.4	dBm
Peak to Average Power @2402MHz	<3dB		0.14		dB
Output power @2440MHz	>-20 <+10		0.74		dBm
Peak to Average Power @2440MHz	<3dB		0.13		dB
Output power @2480MHz	>-20 <+10		0.39		dBm
Peak to Average Power @2480MHz	<3dB		0.14		dB
<u>Carrier Frequency Offset and Drift</u>					
TX PARAMETER	limit	MIN	TYP	MAX	UNIT
Frequency Offset @2402MHz	$\leq \pm 150$ kHz	-0.9	5.7	10.6	KHz
Drift Rate / 50 μ s @2402MHz	≤ 20 kHz / 50 μ s		10.65		KHz
Max Drift @2402MHz	≤ 50 kHz		-10		KHz
Frequency Offset @2440MHz	$\leq \pm 150$ kHz	2.5	6.5	9.9	KHz
Drift Rate / 50 μ s @2440MHz	≤ 20 kHz / 50 μ s		-7.37		KHz
Max Drift @2440MHz	≤ 50 kHz		-7		KHz
Frequency Offset @2480MHz	$\leq \pm 150$ kHz	-0.2	5.1	7.1	KHz

Drift Rate / 50 μ s @2480MHz	≤ 20 kHz / 50 μ s		-8.85		KHz
Max Drift @2480MHz	≤ 50 kHz		-11		KHz
<u>Modulation Characteristics</u>					
TX PARAMETER	limit	MIN	TYP	MAX	UNIT
F1avg @2402MHz	225 kHz < F1avg < 275 kHz		252	263	KHz
F2max @2402MHz	≥ 185 kHz		201		KHz
'F2max' Pass Rate @2402MHz	> 99.9 %		100		%
F1/F2 ratio @2402MHz	≥ 0.80		20		
F1avg @2440MHz	225 kHz < F1avg < 275 kHz		261.2	271.4	KHz
F2max @2440MHz	≥ 185 kHz		214.4		KHz
'F2max' Pass Rate @2440MHz	> 99.9 %		100		%
F1/F2 ratio @2440MHz	≥ 0.80		20		
F1avg @2480MHz	225 kHz < F1avg < 275 kHz		262	273.7	KHz
F2max @2480MHz	≥ 185 kHz		210		KHz
'F2max' Pass Rate @2480MHz	> 99.9 %		100		%
F1/F2 ratio @2480MHz	≥ 0.80		20		

RX

<i>Receiver sensitivity(Power Level: -90.0 dBm, Dirty Tx Status: On)</i>					
RX PARAMETER	limit	MIN	TYP	MAX	UNIT
Frame Error Rate@2402MHz	<= 30.800 %		12.6		%
Frame Error Rate@2440MHz	<= 30.800 %		21.07		%
Frame Error Rater @2480MHz	<= 30.800 %		14.74		%
<i>PER Report Integrity(Power Level: -30.0 dBm, Packet Number Mode: Random)</i>					
RX PARAMETER	limit	MIN	TYP	MAX	UNIT
Frame Error Rate@2402MHz	50.0 % <= PER <= 65.4 %		50.4		%
Frame Error Rate@2440MHz	50.0 % <= PER <= 65.4 %		50.4		%
Frame Error Rate@2480MHz	50.0 % <= PER <= 65.4 %		50.3		%
<i>Maximum Input Signal Level(Power Level: -10.0 dBm)</i>					
RX PARAMETER	limit	MIN	TYP	MAX	UNIT
Fame Error Rate @2402MHz	<= 30.800 %		0.8		%
Frame Error Rate@2440MHz	<= 30.800 %		0.8		%
Frame Error Rate@2480MHz	<= 30.800 %		0.733		%

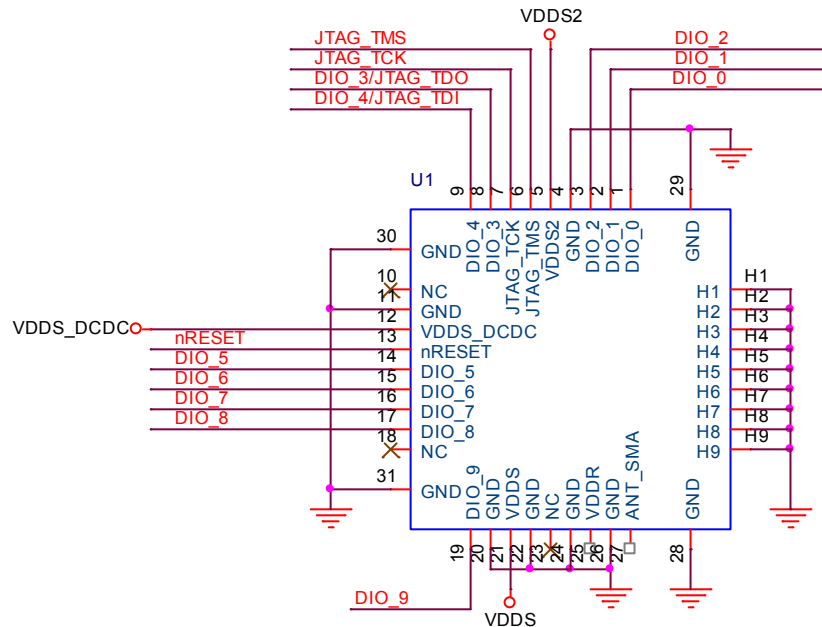
6. Ceramic Chip Antenna Specification

6.1 Description Value

DESCRIPTION	VALUE
Working Frequency	2.45 GHz
Bandwidth	170 MHz (Typ.)
VSWR	2.0 (Max.)
Polarization	Linear
Azimuth Beamwidth	Omni-directional
Peak Gain	5.88 dBi (Typ.)
Impedance	50 Ω
Maximum Power	1 W
Termination	Ni / Sn (Environmentally-Friendly Leadless)

7. Pinout Information

7.1 Schematic Diagram



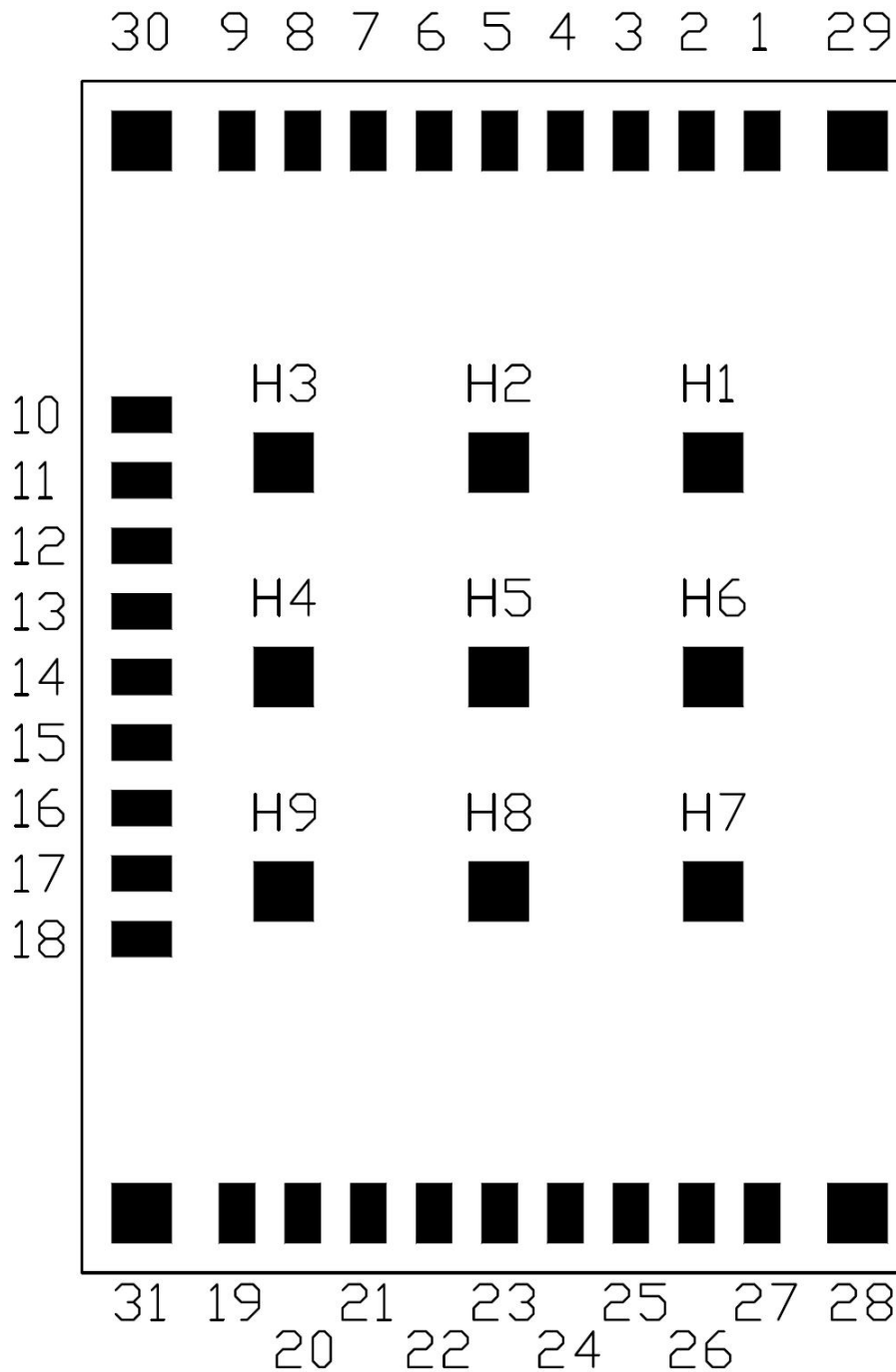
7.2 Pin Descriptions

PIN NAME	PIN	PIN TYPE	DESCRIPTION
DIO_0	1	Digital I/O	GPIO, ULP Sensor Interface, LED driving capability , 2mA / 4mA / 8mA
DIO_1	2	Digital I/O	GPIO, ULP Sensor Interface, LED driving capability , 2mA / 4mA / 8mA , UART_TX
DIO_2	3	Digital I/O	GPIO, ULP Sensor Interface, LED driving capability , 2mA / 4mA / 8mA , UART_RX
GND	4	Power	Ground
VDDSD2	5	Power	3.3V DIO supply
JTAG_TMSC	6	Digital I/O	JTAG TMSC
JTAG_TCKC	7	Digital I/O	JTAG TCKC
DIO_3	8	Digital I/O	JTAG_TDO , High drive capability , 2mA / 4mA / 8mA
DIO_4	9	Digital I/O	JTAG_TDI , High drive capability , 2mA / 4mA / 8mA
NC	10		No Connector

GND	11	Power	Ground
VDDS_DCDC	12	Power	3.3V DC/DC supply.
RESET_N	13	Digital input	Reset, active-low. No internal pull-up
DIO_5	14	Digital/Analog I/O	GPIO, ULP Sensor Interface, Analog
DIO_6	15	Digital/Analog I/O	GPIO, ULP Sensor Interface, Analog
DIO_7	16	Digital/Analog I/O	GPIO, ULP Sensor Interface, Analog / I2C_SCL
DIO_8	17	Digital/Analog I/O	GPIO, ULP Sensor Interface, Analog / I2C_SDA
NC	18		No Connector
DIO_9	19	Digital/Analog I/O	GPIO, ULP Sensor Interface, Analog
GND	20	Power	Ground
VDDS	21	Power	3.3V main chip supply
GND	22	Power	Ground
NC	23		No Connector
GND	24	Power	Ground
NC	25		No Connector
GND	26	Power	Ground
NC	27		No Connector
GND	28	Power	Ground
GND	29	Power	Ground
GND	30	Power	Ground
GND	31	Power	Ground
GND	H1~H9	Power	Ground

7.3 Pin Number Define

TOP VIEW



8. Software Overview

8.1 Software tool installation

Follow TI document “CC2640 BLE Software Developer's Guide” to setup compiler tool, BSP and related tools.

8.2 WSDT-752B_SC board GPIO configuration file path

...\Projects\ble\common\cc26xx\boards\WSDT-752B_SC

Source files:

...\CC2640EM_4XS\board.h

...\CC2640EM_4XS\board.c

8.3 PIN define in header file Board.h

```
// UART Board
#define Board_UART_TX          IOID_1
#define Board_UART_RX          IOID_2
#define Board_UART_CTS         PIN_UNASSIGNED
#define Board_UART_RTS         PIN_UNASSIGNED

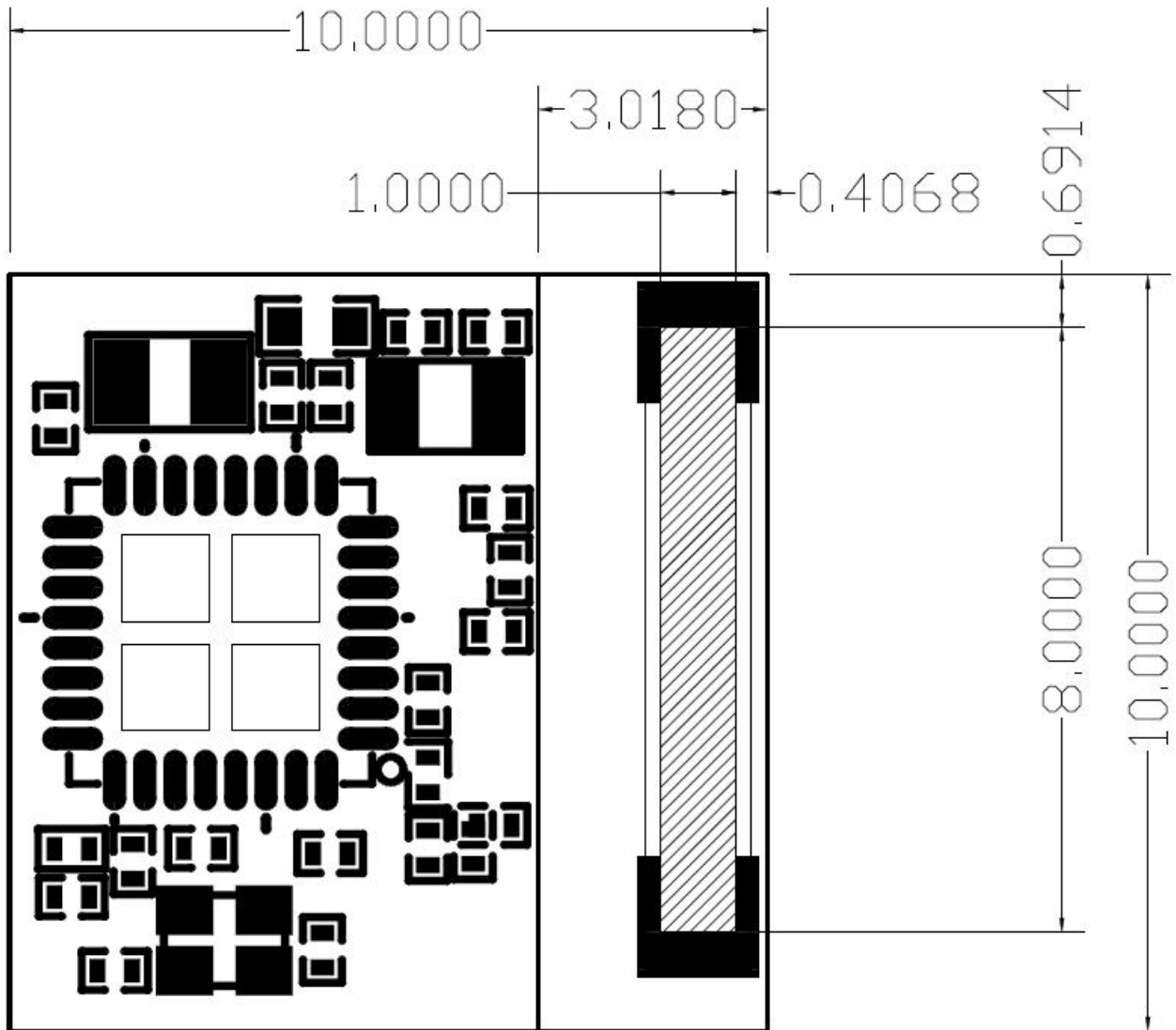
// I2C Board
#define Board_I2C_SCL           IOID_7
#define Board_I2C_SDA           IOID_8

//Customer Define
#define Board_DIO_0             IOID_0
#define Board_DIO_5             IOID_5
#define Board_DIO_6             IOID_6
#define Board_DIO_9             IOID_9
```

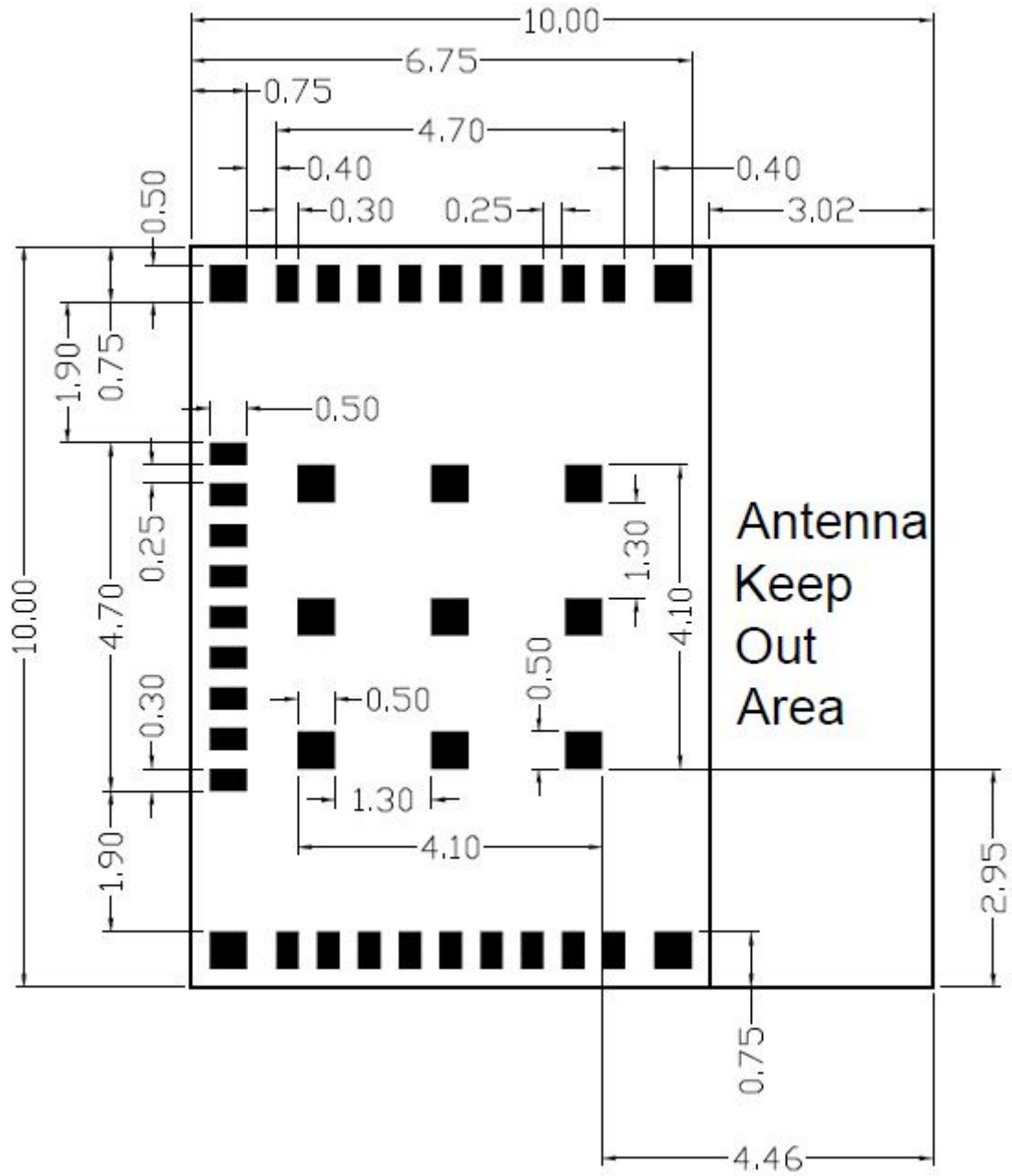
9. Module Dimensions

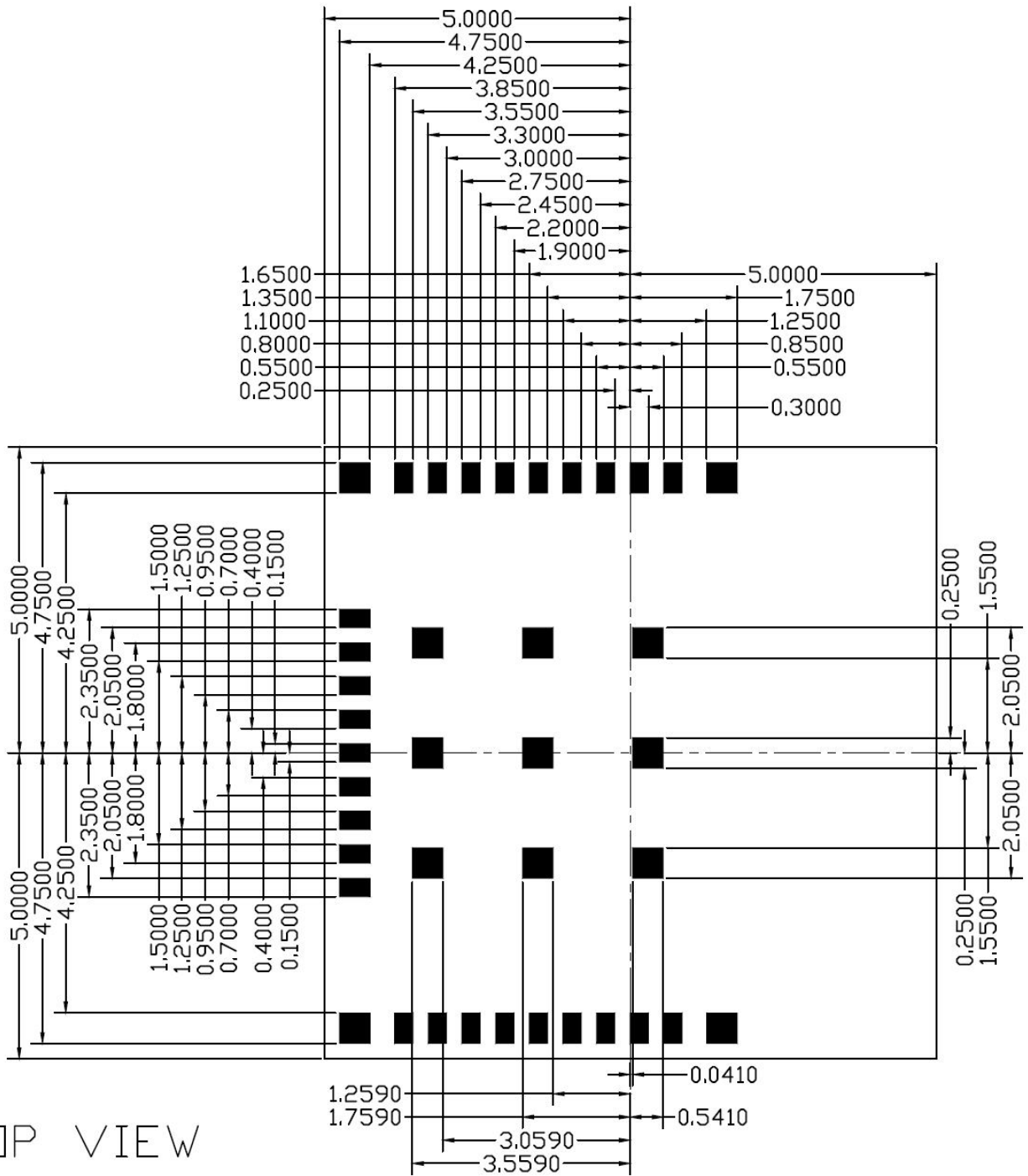
9.1 Outline Dimension (Unit: mm)

TOP VIEW

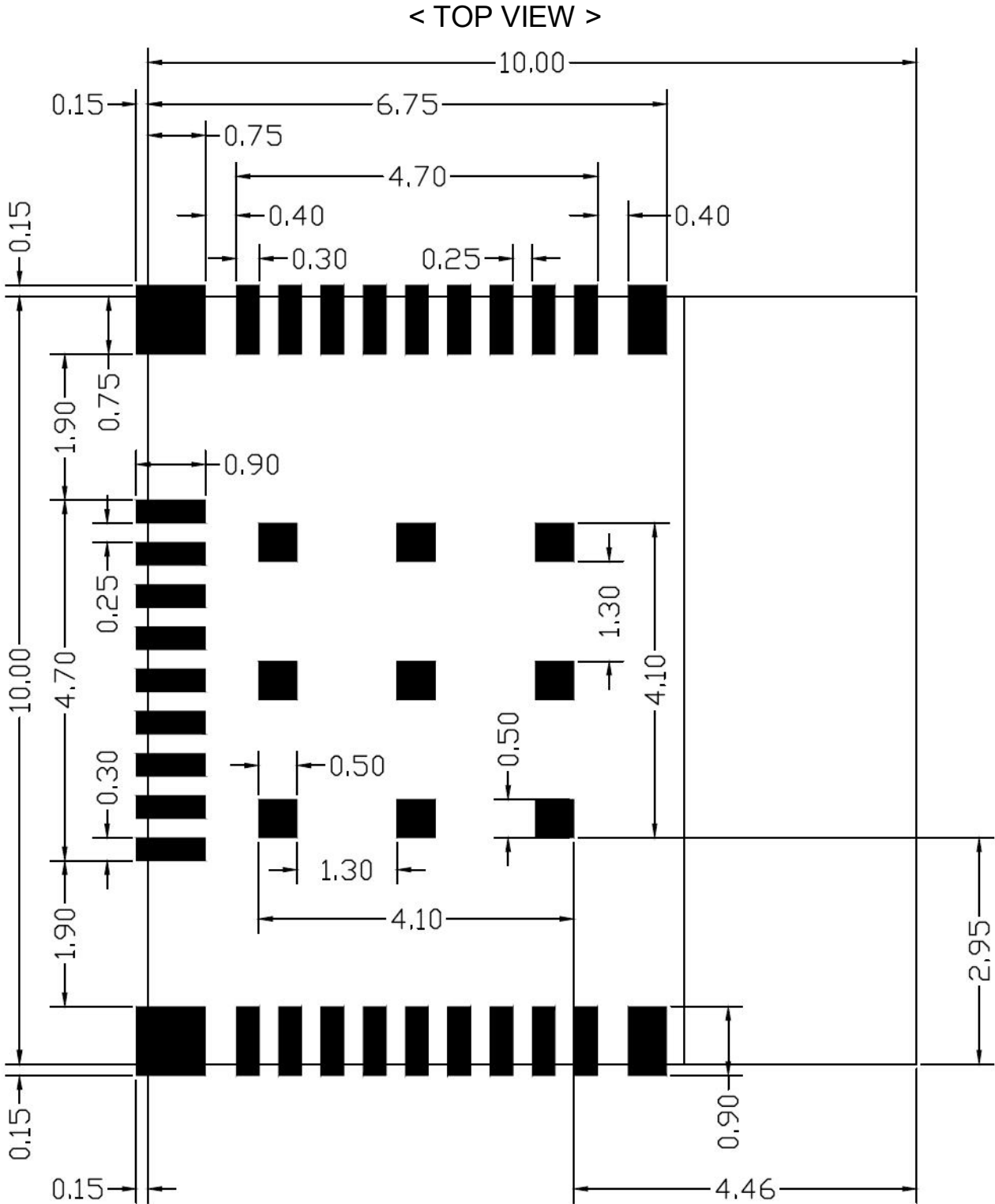


Note1 : 3.018mm * 10mm, This is antenna keep out area in the your application.



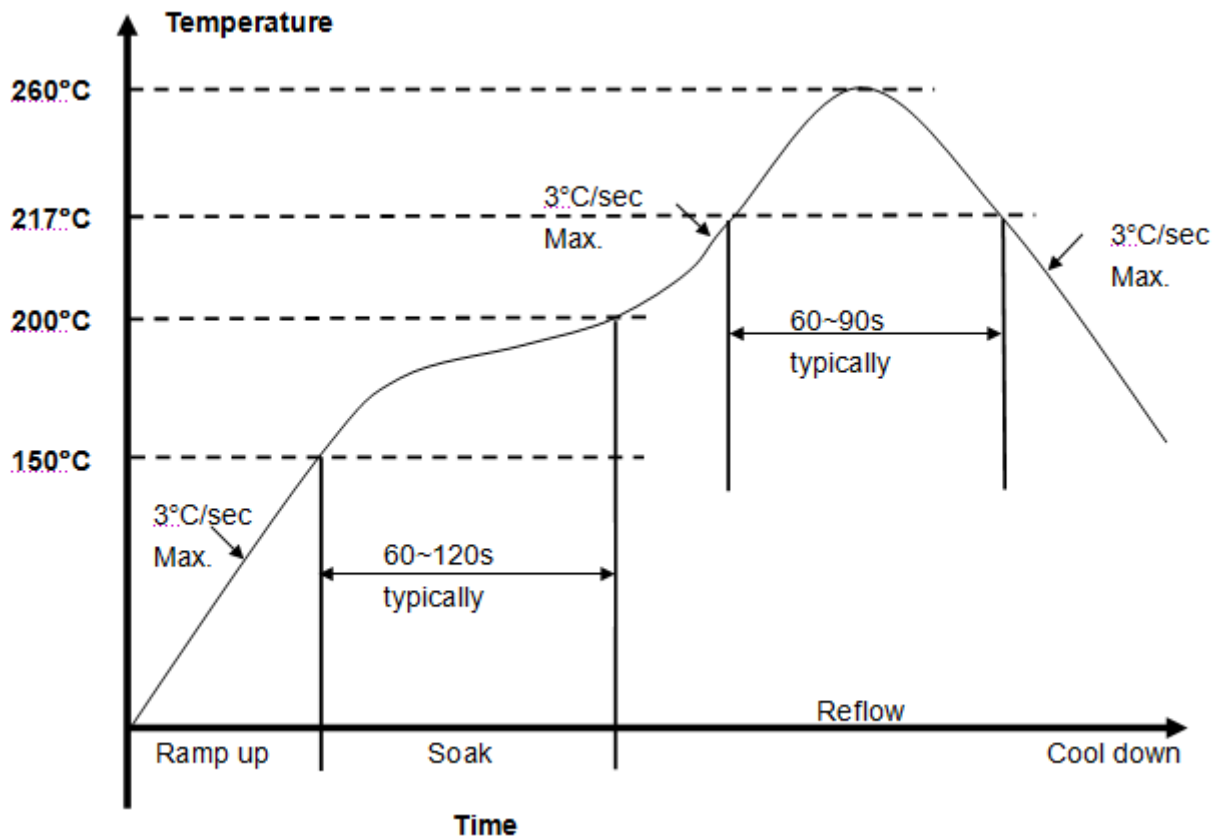


9.2 Recommended Footprint (Unit: mm)

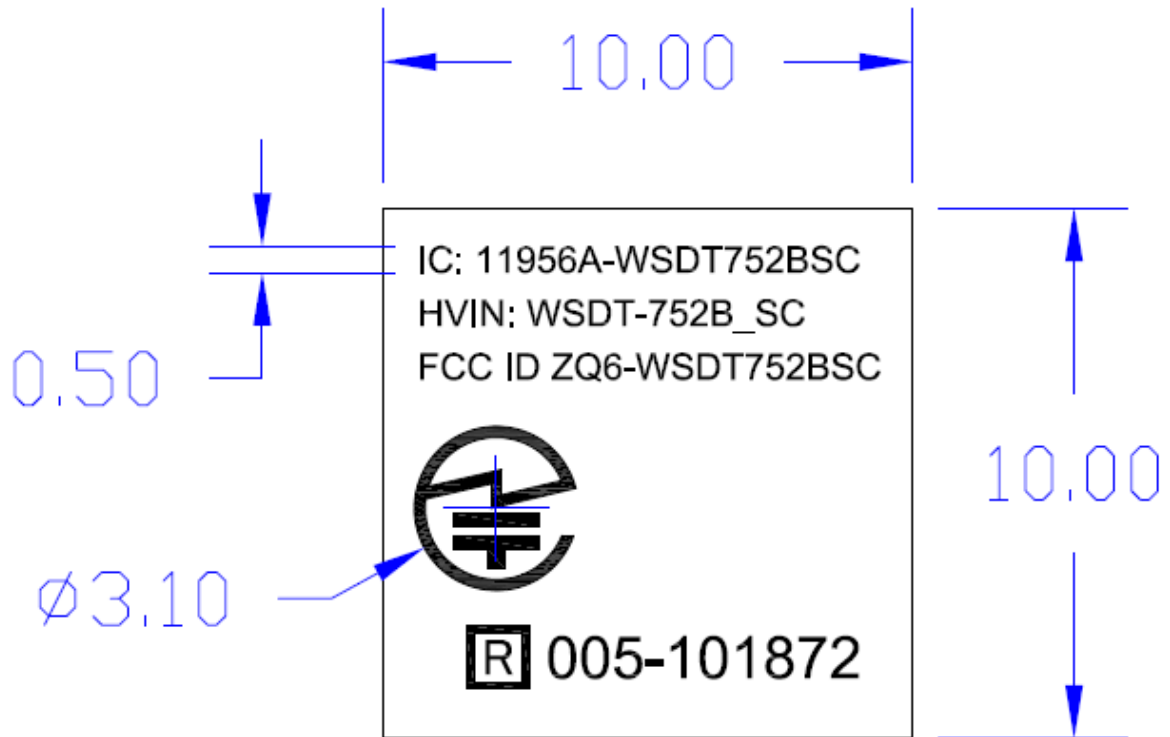


10. Recommended Reflow Profile

1. Referred to IPC/JEDEC standard
2. Peak Temperature : <math><260^{\circ}\text{C}</math>
3. Cycle of Reflow : 2 times max.
4. Nitrogen reflow is recommended, less than 2000ppm of oxygen concentration.
5. If the shelf time is exceeded, be sure baking step to remove the moisture from the component.



11. Label Drawing



(Unit: mm)

12. Packing Information

12.1 Packing Dimension

TBD

13.Statement

13.1 FCC Statement:

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 interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

13.2 ISED Statement:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisee aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement.

In accordance with FCC Part 15C and RSP-100, this module is listed as a Modular Transmitter device.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

The antenna of this transmitter must not be co-located or operating in conjunction with any other antenna or transmitters within a host device, except in accordance with FCC multitransmitter product approval procedures.

13.3 FCC Label Instructions

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as the following: “**Contains Transmitter Module FCC ID: ZQ6-WSDT752BSC**” or “**Contains FCC ID: ZQ6-WSDT752BSC**.” Any similar wording that expresses the same meaning may be used.

Additionally, there must be the following sentence on the device, unless it is too small to carry it:

“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 interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.”

If the final product is to be sold in Canada, then this exterior label should use wording such as the following: “Contains Transmitter Module IC: **11956A-WSDT752BSC**”