# APPROVAL SHEET

MULTILAYER CERAMIC ANTENNA

**RFANT Series -RoHS Compliance** 

2.4 GHz ISM Band Working Frequency

P/N:RFANT321611BT-03 Series

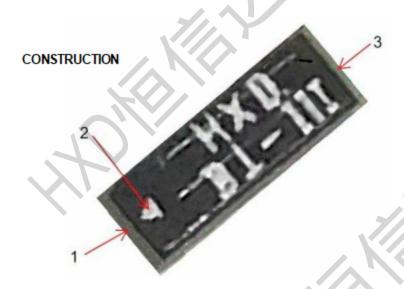
\*Contents in this sheet are subject to change without prior notice.

## FRATURES

- 1. Surface Mounted Devices with a small dimension of 5.0 X2.0X1.1 mm3meet future miniaturization trend.
- 2.LTCC process
- 3. High stability in Temperature / Humidity Change

## APPLICATIONS

- 1.2.4GHz ISM band RF applications
- 2.Bluetooth, Wireless, HomeRF



- 1.Feeding
- 2.Identification Mark
- 3. Soldering terminal

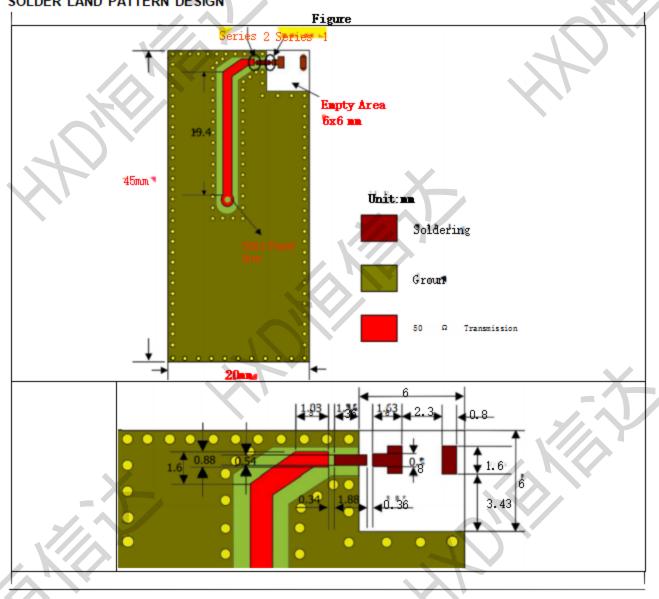
#### DITERSTORS

Figure	Symbol	Dimension (mm)
a  	L	3.2±0.30
A - HX II.	₩	1.6±0.10
L T	T	1.1±0.10
	a	0.25±0.15

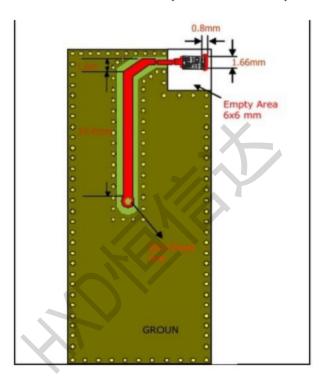
# ELECTRICAL CHARACTERISTICS

RFANT321612	DAIT	Specification			
♥orking Frequen	cy Range	2450 ± 50 MHz			
Fc (GHz)		2.5			
Gain (dB	i)	2 (Typical)			
Series 1				4.7nH	
Matching component valve	Series 2				

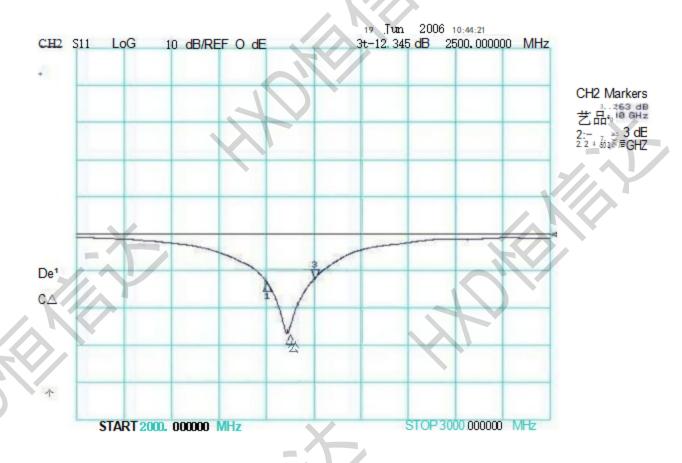
\*This frequency must be adjusted to 2.45GHz with matching circuit.
SOLDER LAND PATTERN DESIGN



# Antenna on Test Board (Thickness 1.2mm)



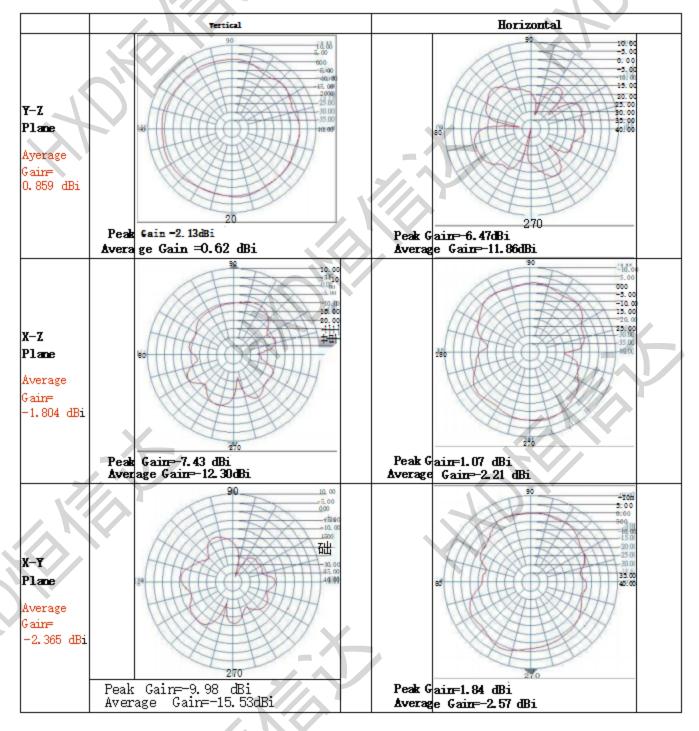
Antenna S11 on Test Board



#### RADIATION PATTERN

Radiation Pattern and Gain were dependent on measurement board design. The specification of HXD\_RFANT502011BT-02 antenna was measured based on the PCB size and installation position as shown in the below figure Test Board





# RELIABILITY TEST

######################################			
JIS C 0050-4.6  JISB022-8102D  *Immersion time:2±0.5 sec  *Solder/Sn3Ag0.50x for lead-free  *Solder:SN6AA  *Solder:SN6AA  *Solder:SN6AA  *Solder:SN6AA  *Solder:SN6AA  *Solder:SN6AA  *Solder:SN6AA  *Solder:SN6AA  *Preheating temperature:200±50C, 1 minute  *Solder:Sn6AA  *Solder:Sn6AA  *Preheating temperature:210*150C, 1 minute  *Solder temperature:270±5° C  *Immersion time:10±1 sec  *Solder:Sn6AA,0.50x for lead-free  *Measurement to be made after keeping at room temperature for 24±½ hrs  *Times:6 surfaces for each units:2 times for each side  *Adhesive Strength of Termination JIS C 0051-7.4.3  *Pressurizing force: SN(= 0600) 100(00603)  *Test time:10±1 sec  *Solder:SN6AA  *No mechanical damage.  *Samples shall satisfy electrical specification after test  *Solder:SN6AA  *No mechanical damage.  *Samples shall satisfy electrical specification after test  *Times:6 surfaces for each units:2 times for each side  *Pressurizing force: SN(= 0603):10N(00603)  *Test time:10±1 sec  *Solder:SN6AA  *No remarkable damage or removal of the termination.  *Solder:SN6AA  *No mechanical damage.  *Samples shall satisfy electrical specification after test  *Solder:SN6AA  **No mechanical damage.  *Samples shall satisfy electrical specification after test  **Times:6 surfaces for each units:2 times for each units:2 times for each side  **Pressurizing force: SN(= 0603):10N(00603)  **Test time:10±1 sec  **Solder:SN6AA  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **Solder:SN6AA  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **Solder:SN6AA  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **Solder:SN6AA  **Solder:SN6AA  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **Solder:SN6AA  **Solder:SN6AA  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **Solder:SN6AA  **No mechanical damage.  **Solder:SN6AA  **No mechanical damage.  **Samples shall satisfy	Test item	Test condition / Test method	Specification
#Immersion time:2±0.5 sec  #Solder:Sn3Ag0.5Cu for lead-free  #Solder:Sn63A  Resistance to dissolution of metallization EC 60060-2-58  #Preheating temperature:200±50  I minute  #Solder:Sn63A  Resistance to soldering heat  #Preheating temperature:210*150°C, I minute  #Solder:Sn3Ag0.5Cu for lead-free  #Resurement to be made after keeping at room temperature for 24±2 hrs  #Immersion time:0±1 sec  #Solder:Sn3Ag0.5Cu for lead-free  #Resurement to be made after keeping at room temperature for 24±2 hrs  #Immersion time:0±1 sec  #Solder:Sn3Ag0.5Cu for lead-free  #Resurement to be made after keeping at room temperature for 24±2 hrs  #Immersion time:0±1 sec  #Solder:Sn3Ag0.5Cu for lead-free  #Resurement to be made after keeping at room temperature for 24±2 hrs  ### ### ### ### ### ### ### ### ### #		*Solder bath temperature:235±5℃	At least 95%of a surface of each terminal
Resistance to dissolution of metallization   Steckhing immersion time:30±0.5 sec   electrode shall not exceed 25%.	•	*Immersion time:2±0.5 sec	electrode must be covered by fresh solder.
(Resistance to dissolution of metallization)  EC 60063-2-58  *Splear bash temperature:200±0 to see the selectrode shall not exceed 25%.  *Splear selectrode shall not exceed 25%.  *Supplear selectrode shall not exceed 25%.  *Samples shall satisfy electrical specification of the edges of each units: 2 times for e		*Solder: Sn3Ag0. 5Cu for lead-free	
### Solder: SN63A  Resistance to soldering heat ### Solder: SN63A  Resistance to soldering heat ### Solder: SN63A  **Solder: SN63A  **Solder: SN63A  **Preheating temperature: 120*150°C, I minute  **Solder temperature: 270±5°C  **Immersion time: 10±1 sec  **Solder: SN3Ag0. 5Cu for lead-free  #### Measurement to be made after keeping at room temperature for 24±2 hrs  #### BIS C 0044  **Times: 6 aurfaces for each units: 2 times for each side  #### Adhesive Strength of Termination JIS C 0051-7. 4.3  #### Bending temperature: 120*150°C,  **Times: 6 aurfaces for each units: 2 times for each side  #### Pressurizing force: SN(= 0603): 10N(>0603): 10N(>0603)  **Test time: 10±1 sec  **Bending test  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1 mm/s and then pressure shall be maintained for 5±1  Sec.  ###################################		*Solder bath temperature:260±5°C	Loss of metallization on the edges of each
Resistance to soldering heat  JIS C 0050-5.4  1 minute  *Solder temperature:270±5° C  *Immersion time:10±1 sec  *Solder:Sn3Ag0.5Cu for lead-free  Measurement to be made affer keeping at room temperature for 24±2 hrs  Prop Test  JIS C 0044  **Height:75 cm  *Times:6 aurfaces for each units:2 times for each side  Adhesive Strength of Termination JIS C 0051-7.4.1  Bending test  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1 mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at  *Preheating temperature:120°150°C,  No mechanical damage.  Samples shall satisfy electrical specification after test  *Samples shall satisfy electrical specification after test  *No mechanical damage.  Samples shall satisfy electrical specification after test  *Samples shall satisfy electrical specification after test  **Samples shall satisfy electrical specification after test  **Samples shall satisfy electrical specification after test  **Samples shall satisfy electrical specification after test  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **No mechanical damage.  **Samples shall satisfy electrical specification after test  **No mechanical damage.  **Samples shall satisfy electrical specification after tes		*Leaching immersion time:30±0.5 sec	electrode shall not exceed 25%.
#Preheating temperature:120°150°C,  1 minute  *Solder temperature:270±5°C  *Immersion time:10±1 sec  *Solder:Solder:Solder for lead-free  Weasurement to be made after keeping at room temperature for 24±2 hrs   *Times:6 surface:Rigid surface of concrete or steel.  *Times:6 surface:Rigid surface of concrete or steel.  *Times:6 surfaces for each units:2 times for each side  Adhesive Strength of Termination JIS C 0051-7.4.1  *Pressurizing force: 5N(\(\frac{\pi}{2}\) 0603):10N(>0603)  *Test time:10±1 sec  Bending test JIS C 0051-7.4.1  The middle part of substrate shall be pressurized by means of the pressuring rod at a rate of about 1 mm/s per second until the deflection becomes 1 mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at  No mechanical damage.  No mechanical damage.  Samples shall satisfy electrical specification after test  No remarkable damage or removal of the termination.  No mechanical damage.  Samples shall satisfy electrical specification after test  No mechanical damage.  Samples shall satisfy electrical specification after test  No mechanical damage.  Samples shall satisfy electrical specification after test  No mechanical damage.  Samples shall satisfy electrical specification after test  No mechanical damage.  Samples shall satisfy electrical specification after test  No mechanical damage.  Samples shall satisfy electrical specification after test  No mechanical damage.  Samples shall satisfy electrical specification after test  No mechanical damage.  Samples shall satisfy electrical specification after test  No mechanical damage.  Samples shall satisfy electrical specification after test  No mechanical damage.  Samples shall satisfy electrical specification after test  No mechanical damage.	EC 60068-2-58	*Solder: SN63A	
JIS C 0050-5.4  1 minute  *Solder temperature:270±5° C  *Immersion time:10±1 sec  *Solder:Sn3Ag0.5Cu for lead-free  Measurement to be made after keeping at room temperature for 24±2 hrs   *Test Surface:Rigid surface of concrete or steel.  *Times:6 surfaces for each units:2 times for each side  Adhesive Strength of Termination JIS C 0051-7.4.1  *Pressurizing force: 5N(= 0603):10N(>0603) *Test time:10±1 sec  Bending test JIS C 0051-7.4.1  The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at	Resistance to soldering heat	*Preheating temperature:120~150°C	No machanical damage
*Solder temperature:270±5° C  *Immersion time:10±1 sec  *Solder:Sn3Ag0.5Cu for lead-free  Measurement to be made after keeping at room temperature for 24±2 hrs  *Height:75 cm  *Test Surface:Rigid surface of concrete or steel  *Times:6 surfaces for each units:2 times for each side  *Pressurizing force: 5N(= 0603):10N(>0603)  JIS C 0051-7.4.1  *The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at  *fer test  Loss of metallization on the edges of each electrode shall not exceed 25%.  No mechanical damage.  Samples shall satisfy electrical specification after test  No remarkable damage or removal of the termination.  *Test time:10±1 sec  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at	JIS C 0050-5.4		No mechanical damage. Samples shall satisfy electrical specification
*Immersion time:10±1 sec  *Solder:Sn3Ag0.5Cu for lead-free  Measurement to be made after keeping at room temperature for 24±2 hrs   *Height:75 cm  *Test Surface:Rigid surface of concrete or steel.  *Times:6 surfaces for each units:2 times for each side  Adhesive Strength of Termination JIS C 0051-7.4.1  Bending test JIS C 0051-7.4.1  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at  *In mo mechanical damage.  Samples shall satisfy electrical specification after test  No mechanical damage.  No mechanical damage or removal of the termination.  *Samples shall satisfy electrical specification after test  No mechanical damage.  Samples shall satisfy electrical specification after test			after test
*Solder:Sn3Ag0.5Cu for lead-free Measurement to be made after keeping at room temperature for 24±2 hrs  *Height:75 cm  *Test Surface:Rigid surface of concrete or steel.  *Times:6 surfaces for each units:2 times for each side  Adhesive Strength of Termination JIS C 0051-7.4.3  *Pressurizing force: 5N(= 0603):10N(>0603)  *Test time:10±1 sec  Bending test JIS C 0051-7.4.11  The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec. Measurement to be made after keeping at		*Immersion time:10±1 sec	Loss of metallization on the edges of each
Drop Test JIS C 0044  *Height:75 cm  *Test Surface:Rigid surface of concrete or steel.  *Times:6 surfaces for each units;2 times for each side  Adhesive Strength of Termination JIS C 0051-7.4.3  *Test time:10±1 sec  Bending test JIS C 0051-7.4.1  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at		*Solder:Sn3Ag0.5Cu for lead-free	electrode shall not exceed 25%.
#Height:75 cm  #Test Surface:Rigid surface of concrete or steel.  #Times:6 surfaces for each units;2 times for each side  Adhesive Strength of Termination  JIS C 0051-7.4.3  #Test time:10±1 sec  Bending test  JIS C 0051-7.4.1  The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at		Measurement to be made after keeping at	
*Test Surface: Rigid surface of concrete or steel.  *Times: 6 surfaces for each units: 2 times for each side  Adhesive Strength of Termination JIS C 0051-7.4.3  *Test time: 10±1 sec  Bending test JIS C 0051-7.4.1  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at		room temperature for 24±2 hrs	
*Test Surface: Rigid surface of concrete or steel.  *Times:6 surfaces for each units; 2 times for each side  Adhesive Strength of Termination JIS C 0051-7.4.3  Bending test JIS C 0051-7.4.1  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at	_	*Height:75 cm	No mechanical damage.
*Times:6 surfaces for each units;2 times for each side  Adhesive Strength of Termination JIS C 0051-7.4.3  *Test time:10±1 sec  Bending test JIS C 0051-7.4.1  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec. Measurement to be made after keeping at	JIS C 0044	*Test Surface: Rigid surface of concrete or	Samples shall satisfy electrical specification
Adhesive Strength  of Termination  JIS C 0051-7.4.1  Bending test  JIS C 0051-7.4.1  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at		steel.	after test
*Pressurizing force: $5N(\equiv)$ of Termination  JIS C 0051-7. 4.3  *Test time: $10\pm1$ sec  Bending test  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for $5\pm1$ Sec.  Measurement to be made after keeping at		*Times:6 surfaces for each units;2 times	<b>ノ</b> ヘリ
of Termination JIS C 0051-7.4.1  Bending test JIS C 0051-7.4.1  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at	Adhasiya Strongth		
#Test time:10±1 sec  Bending test  JIS C 0051-7.4.1  The middle part of substrate shall be pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at			No remarkable damage or removal of the
*Test time:10±1 sec  Bending test  The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at		0603);10N(>0603)	termination.
JIS C 0051-7.4.1  pressurized by means of the pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at		*Test time:10±1 sec	
rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at	Bending test	The middle part of substrate shall be	No mechanical damage.
until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1  Sec.  Measurement to be made after keeping at	JIS C 0051-7.4.1	pressurized by means of the pressurizing	Samples shall satisfy electrical specification
then pressure shall be maintained for $5\pm1$ Sec. Measurement to be made after keeping at		rod at a rate of about 1 mm/s per second	after test
Sec. Measurement to be made after keeping at		until the deflection becomes 1mm/s and	
Measurement to be made after keeping at		then pressure shall be maintained for $5\pm1$	
		Sec.	
room temperature for 24±2 hours			
		room temperature for 24±2 hours	

Temperature cycle	1.30±3 minutes at -40° C±3°C	No mechanical damage
JI8 C 0025	2.10~15 minutes at room temperature,	Samples shall satisfy electrical specification
	3.30±3 minutes at +85° C±3°C,	after test.
	4.10~15 minutes at room temperature	
	Total 100 continuous cycles	
	Measurement to be made after keeping at	
	room temperature for 24±2 hrs	
Vibration	*Frequency:10Hz~55Hz~10Hz(1min)	No mechanical damage.
JIS C 0040	*Total amplitude:1.5mm	Samples shall satisfy electrical specification
	*Test times:6hrs.(Two hrs each in three	after test.
	mutually perpendicular directions)	
High temperature	*Temperature:85° C±2°C	No mechanical damage.
JIS C 0021	*Test duration:1000+24/-0 hours	Samples shall satisfy electrical specification
	Measurement to be made after keeping at	after test
///	room temperature for 24±2 hrs	
Humidity	*Humidity:90%to 95%R.H.	No mechanical damage.
(steady conditions)	*Temperature: 40±2°C	Samples shall satisfy electrical specification
JIS C 0022	*Time:1000+24/-0 hrs	after test.
	Measurement to be made after	
	keeping at room temperature for 24±2	
	hrs	
	3 500hrs measuring the first data then	X
	1000hrs data	
Low temperature	*Temperature:-40° C±2°C	No mechanical damage.
JIS C 0020	*Test duration:1000+24/-0 hours	Samples shall satisfy electrical specification
	Measurement to be made after keeping at	after test
-17	room temperature for 24±2 hrs	

# **SOLDERING CONDITION**

Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 2

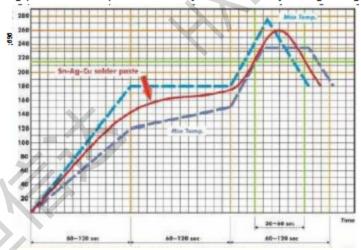


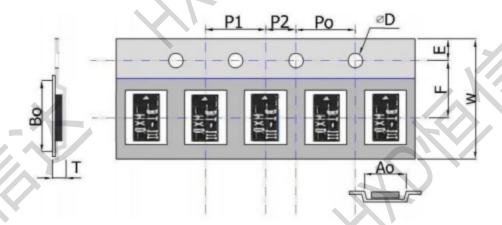
Fig 2.Infrared soldering profile

# ORDERIND CODE

RF	ANT	502011Dimensio	0	Α.	1	T
Talsin	Product code	n code	Unit of	Application	Specification	Packing
RF device	ANT: Antenna	Per 2 digits of	dimension	A:2.4GHZ ISM	Design Code	T:7"Reeled
		Length, Width,	0:0.1 -	Band		
		Thickness:	1:1.0 ==			
		e. g. :				
		502011-				
		Length 50				
		Width 20.				
		Thickness 11				

Hinimm Ordering Quantity: 2000 pcs per reel.

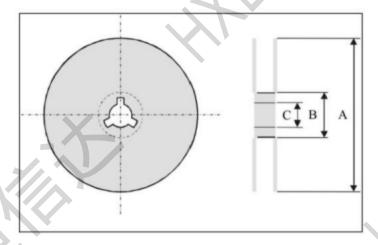
#### **PACKAGING**



Plastic Tape specifications (unit :mm)

Index	Ao	Во	PD	T	W
Dimension (mm)	1.9±0.10	3.55±0.10	1.55±0.05	1.50±0.10	8.0 +0.10
					<b>−</b> 0.30
Index	E	F	Po	P1	P2
Dimension (mm)	1.75±0.10	3.5±0.05	4.00±0.10	4.0±0.10	2.00±0.10

#### Reel dimensions



Index	A	В	С
Dimension(mm	Ф 178	ф60. 0	ф 13. 5

Typing Quantity: 5000 pieces per 1 SET

#### CAUTION OF HANDLING

#### Limitation of Applications

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects, which might directly cause damage to the third party's life, body or property.

- (1) Aircraft equipment
- (2) Aerospace equipment
- (3) Undersea equipment
- (4) Medical equipment
- (5) Disaster prevention / crime prevention equipment
- (6) Traffic signal equipment
- (7)Transportation equipment (vehicles, trains, ships, etc.)
- (8) Applications of similar complexity and/or reliability requirements to the applications listed in the above.

#### Storage condition

- (1)Products should be used in 6 months from the day of WALSIN outgoing inspection, which can be confirmed.
- Storage environment condition.

Products should be storage in the warehouse on the following conditions.

Temperature :-10 to +40°C

Humidity :30 to 70% relative humidity

Don't keep products in corrosive gases such as sulfur. Chlorine gas or acid or it may cause oxidization of electrode, resulting in poor solderability.

Products should be storage on the palette for the prevention of the influence from humidity, dust and son on.

Products should be storage in the warehouse without heat shock vibration, direct sunlight and soon.

Products should be storage under the airtight packaged condition.

