566-1, Ko-Shi Road , Yang-Mei, Tao-Yuan, 32668, Taiwan

# APPROVAL SHEET

# MULTILAYER CERAMIC ANTENNA

# **RFANT Pb free Series – RoHS Compliance**

**Halogens Free Product** 

2.4 GHz ISM Band Working Frequency

P/N: RFANT5220110A0T

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



#### **FEATURES**

- 1. Surface Mounted Devices with a small dimension of 5.2 x 2.0 x 1.1 mm<sup>3</sup> meet future miniaturization trend.
- 2. Embedded and LTCC (Low Temperature Co-fired Ceramic) technology is able to future integrate with system design as well as beautifying the housing of final product.
- 3. High Stability in Temperature / Humidity Change

#### **APPLICATIONS**

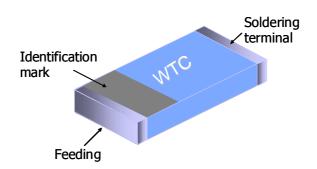
- 1. Bluetooth
- 2. Wireless LAN
- 3. HormRF
- 4. ISM band 2.4GHz wireless applications

#### **DESCRIPTION**

Walsin Technology Corporation develops a new ceramic embedded antenna specified for 2.4 GHz ISM Band application, as shown in below "CONSTRUCTION". Both of Wireless LAN IEEE 802.11b and Bluetooth TM typically located on this unlicensed frequency band which range covers from 2.4GHz to 2.4835GHz. To fulfil the friendly usage for antenna, this antenna has been designed to a typical 150MHz bandwidth through Walsin's advanced LTCC (Low Temperature Co-fired Ceramic) technology and superior product design via 3D EM Simulation Skill.

This antenna has a rectangular ceramic body with a tiny dimension of 5.2x 2.0 x 1.1 mm<sup>3</sup> meet the future SMT automation and miniaturization requirements on modern portable devices.

#### **CONSTRUCTION**

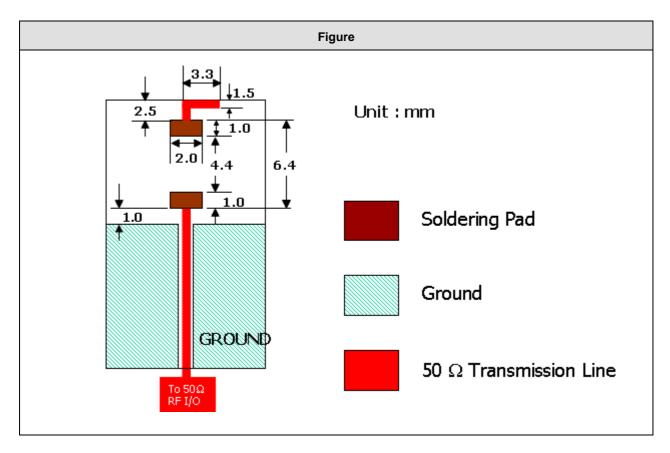


#### **DIMENSIONS**

Figure	Symbol	Dimension
L=2.0±0.2mm T=1.15±0.1mm	L	5.20 ± 0.20 mm
0.25mm 0.25mm	W	2.00 ± 0.20 mm
W=5.2±0.2mm A=0.4±0.25mm A=0.4±0.25mm	Т	1.15 ± 0.10 mm
	A	0.40 ± 0.25 mm



## **SOLDER LAND PATTERN DESIGN**



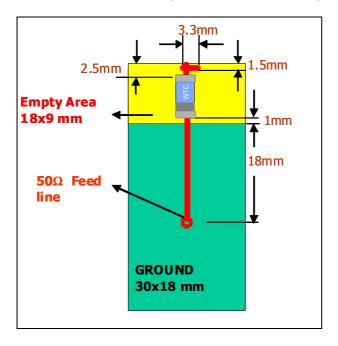
## **ELECTRICAL CHARACTERISTICS**

RFANT5220110A0T	Specification	
Working Frequency Range	2.4 GHz ~ 2.5GHz	
Gain	2.66dBi (Typical)	
VSWR	2 max.	
Polarization	Linear	
Azimuth Bandwidth	Omni-directional	
Impedance	$50\Omega$	
Rated Power (max.)	3 Watts	
Maximum Input Power	5 Watts for 5 minutes	
Operation Temperature	-40°C ~ +85°C	

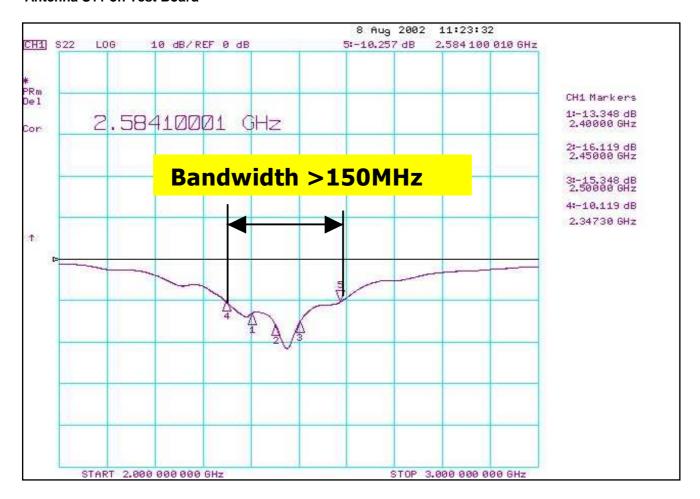
Remark: The specification is defined based on the test board dimension as in below



# Antenna on Test Board (FR4 Thickness 0.8mm)



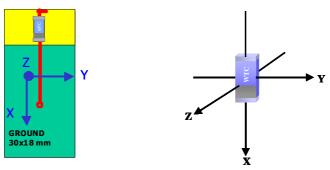
#### **Antenna S11 on Test Board**

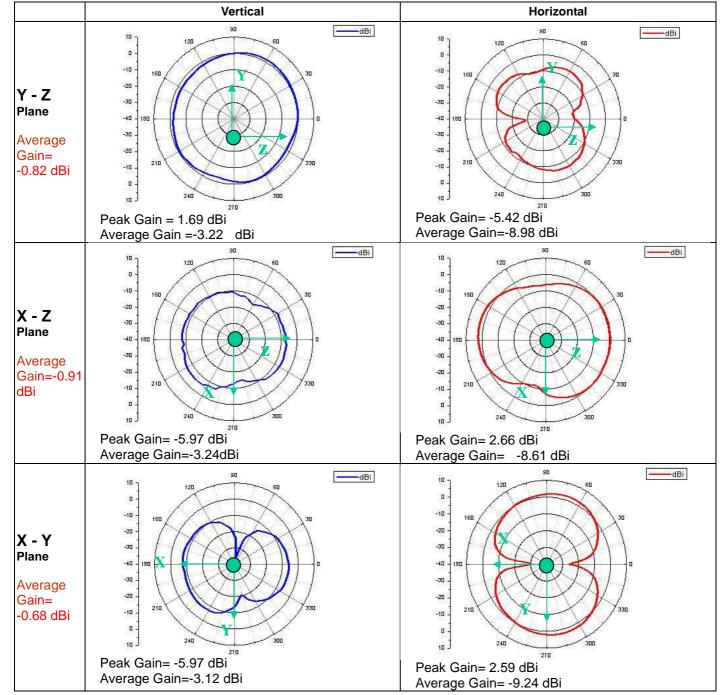




#### **RADIATION PATTERN**

Radiation Pattern and Gain were dependent on measurement board design. The specification of RFANT5220110A0T antenna was measured based on the PCB size and installation position as shown in the below figure Test Board







# **RELIABILITY TEST**

Test item	Test condition / Test method	Specification
Solderability JIS C 0050-4.6 JESD22-B102D	*Solder bath temperature : $235 \pm 5^{\circ}$ C  *Immersion time : $2 \pm 0.5$ sec  *Solder : Sn3Ag0.5Cu for lead-free	At least 95% of a surface of each terminal electrode must be covered by fresh solder.
Leaching (Resistance to dissolution of metallization) IEC 60068-2-58	*Solder bath temperature : $260 \pm 5^{\circ}\text{C}$ *Leaching immersion time : $30 \pm 0.5 \text{ sec}$ *Solder : SN63A	Loss of metallization on the edges of each electrode shall not exceed 25%.
Resistance to soldering heat JIS C 0050-5.4	*Preheating temperature : 120~150°C,  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	No mechanical damage.  Samples shall satisfy electrical specification after test.  Loss of metallization on the edges of each electrode shall not exceed 25%.
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.	after test.
Adhesive Strength of Termination JIS C 0051- 7.4.3	*Pressurizing force : 5N(≤0603) ; 10N(>0603)  *Test time : 10±1 sec	No remarkable damage or removal of the termination.
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 room temperature for 24±2 hours	No mechanical damage.  Samples shall satisfy electrical specification after test.

Temperature cycle	1 2012 minutes at 40°C12°C	No machanical damage	
JIS C 0025	1. 30±3 minutes at -40°C±3°C,	No mechanical damage.	
	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			
JIS C 0021	*Temperature: 85°C±2°C	No mechanical damage.	
010 0 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		
Low temperature	1000hrs data		
JIS C 0020	*Temperature : -40°C±2°C	No mechanical damage.	
3.5 5 5525	*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		

# **SOLDERING CONDITION**

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

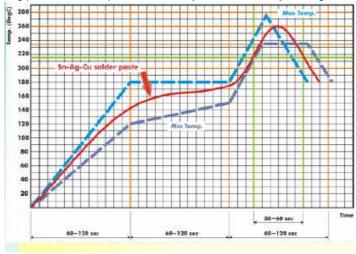


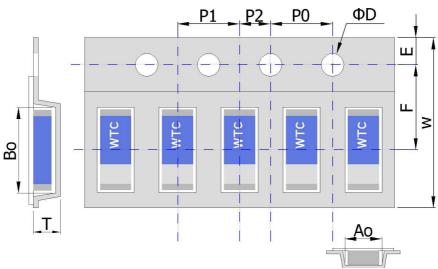
Fig 2. Infrared soldering profile

# **ORDERING CODE**

RF	ANT	522011	0	Α	0	Т
Walsin	Product code	Dimension 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 mm	Band		
		Thickness :	1 : 1.0 mm			
		e.g. :				
		522011 =				
		Length 52,				
		Width 20,				
		Thickness 11				

Minimum Ordering Quantity: 2000 pcs per reel.

# **PACKAGING**

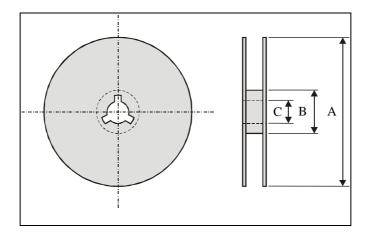


## Plastic Tape specifications (unit :mm)

Index	Ao	Во	ΦD	T	W
Dimension (mm)	$2.40 \pm 0.10$	$5.50 \pm 0.10$	$1.55 \pm 0.05$	$1.20 \pm 0.10$	$12.0 \pm 0.10$
Index	Е	F	Po	P1	P2
Dimension (mm)	$1.75 \pm 0.10$	$5.50 \pm 0.10$	$4.00 \pm 0.10$	$4.00 \pm 0.10$	$2.00 \pm 0.10$



#### Reel dimensions



Index	А	В	С
Dimension (mm)	Φ178	Φ60.0	Ф13.5

Typing Quantity: 2000 pieces per 7" reel

#### **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.
- (2) 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 so on.
- Products should be storage under the airtight packaged condition.