APPROVAL SHEET

FREE ANTENNA

RGFRA Series / Pb free

2.4 GHz ISM Band Working Frequency

P/N: RGFRA1304011A1T

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

FEATURES

- Surface Mounted Devices with a small dimension of 12.8 x 3.9 x 1.1 mm^3 .
- Embedded technology is able to future integrate with system design as well as beautifying the housing of final product.

APPLICATIONS

- Bluetooth, ISM 2.4GHz in samrt phone, PDA and other handheld devices.
- ISM band 2.4GHz applications

DESCRIPTION

Walsin Technology Corporation develops a new antenna specified for 2.4 GHz ISM Band application, as shown in below "CONSTRUCTION". It's application typically located on this unlicensed frequency band which range covers from 2.4GHz to 2.4835GHz.

CONSTRUCTION

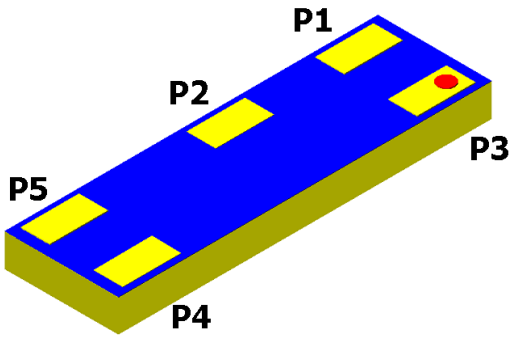
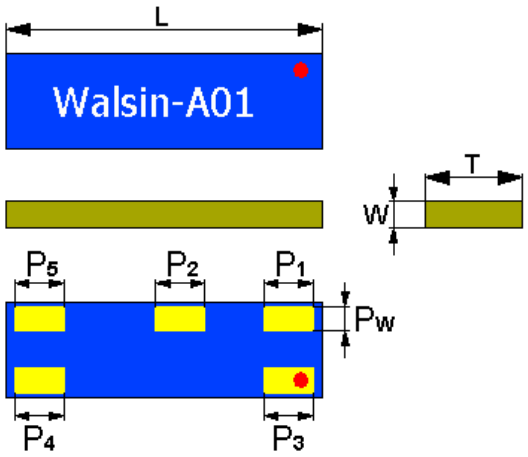


Fig 1. Outline of Free Antenna – RGFRA1304011A1T

PIN	Definition
P1	Feed
P2	Ground
P3	Soldering
P4	Soldering
P5	Soldering

DIMENSIONS

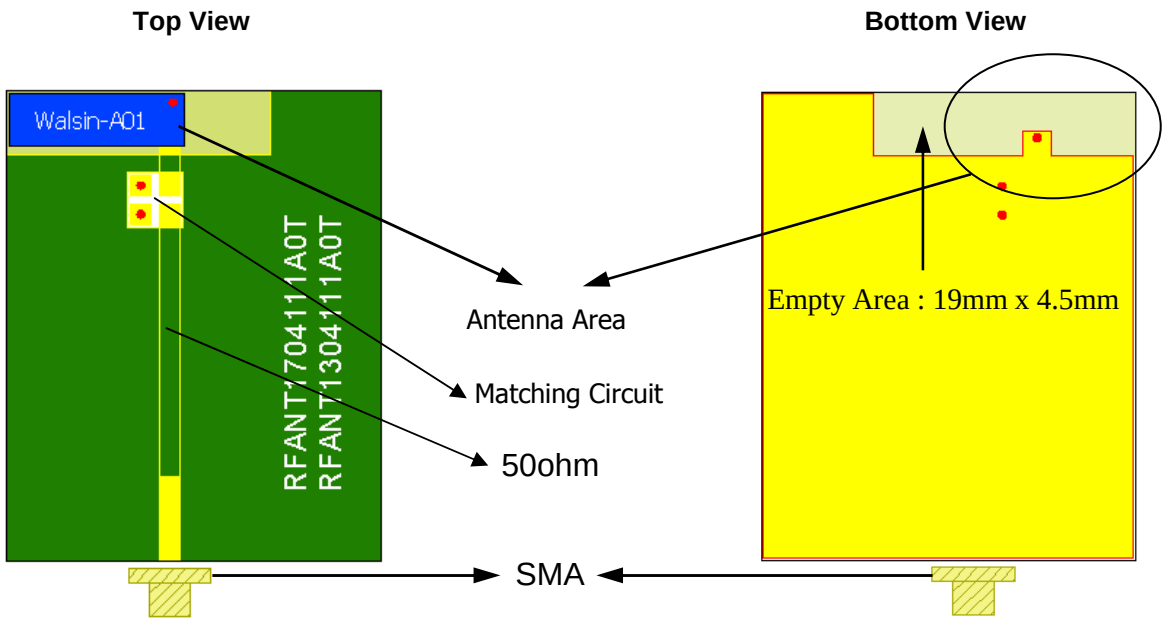
Figure		Dimension	Port definition
	L	12.8 ± 0.15 mm	-
	W	3.9 ± 0.15 mm	-
	T	1.1 ± 0.20 mm	-
	P_W	1.0 ± 0.10 mm	Pad width
	P_1	2.0 ± 0.10 mm	Feed terminal
	P_2	2.0 ± 0.10 mm	Ground terminal
	P_3	2.0 ± 0.10 mm	Soldering terminal
	P_4	2.0 ± 0.10 mm	Soldering terminal
	P_5	2.0 ± 0.10 mm	Soldering terminal

ELECTRICAL CHARACTERISTICS

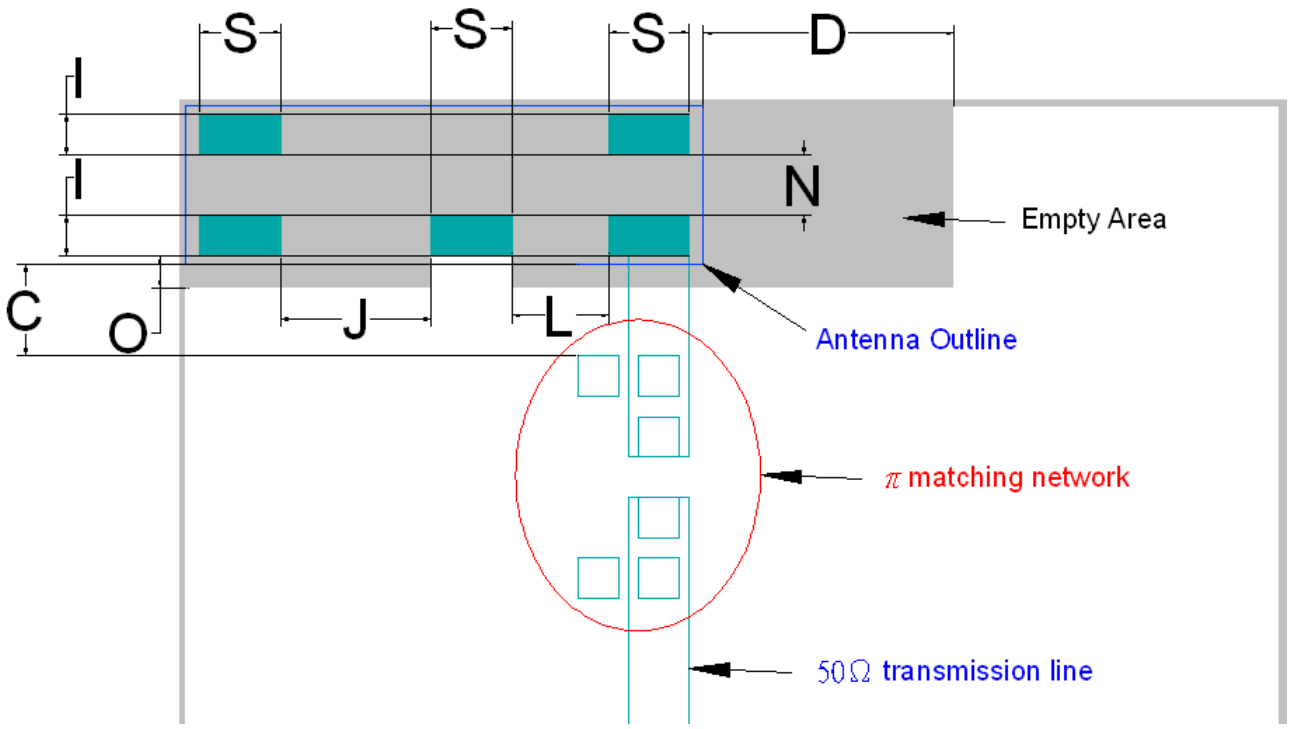
RGFRA1304011A1T	Specification
Working Frequency Range	2.4 GHz ～ 2.5GHz
Gain	2 dBi (Typical)
VSWR	2.1 max.
Polarization	Linear
Azimuth Bandwidth	Omni-directional
Impedance	50Ω
Rated Power (max.)	1 W
Operation Temperature	-40˚C ~ +85˚C

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

Antenna on Test Board



Antenna Foot Print

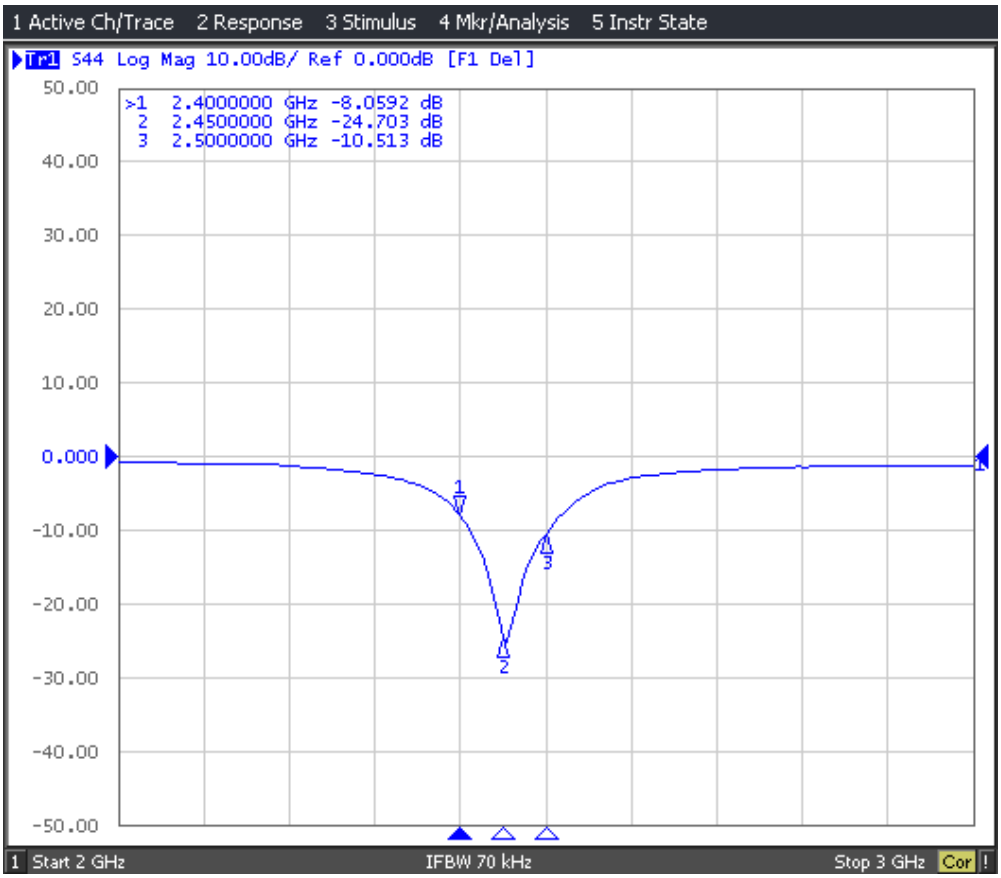


S	D	I	N	O	J	L
2.0±0.1	6.0±0.1	1.0±0.1	1.5±0.1	0.6±0.1	3.7±0.1	2.4±0.1

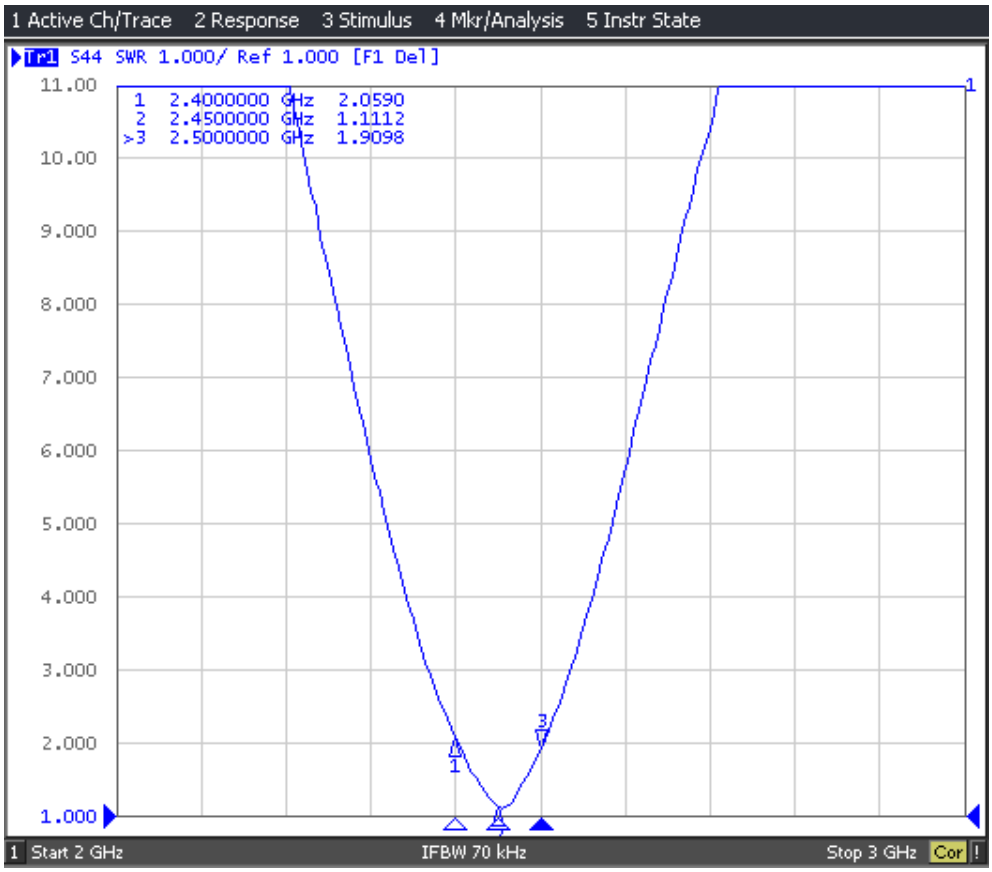
Application Note

- The antenna performance is dependent on the size of the groundplane and the empty area.
- The component values of matching network are depending on antenna placement,PCB dimensions and location of other components.
- The antenna shall be placed on a empty area without underlying groundplane at the edge of the PCB.
- WALSIN strongly recommends placing the antenna near the edge of the board. And the antenna can work very well with a clearance of D = 6 mm as shown in the drawing above, which minimum clearance of D > 2 mm are also acceptable.
- No components allowed within the clearence area with a minimum distance to other components, C=3-5mm.
- No metal casing or plastics using metal flakes should be used, avoid also metallic based paint. Keep a minimum clearance of 1mm between the antenna and the casing.

Antenna S11 on Test Board



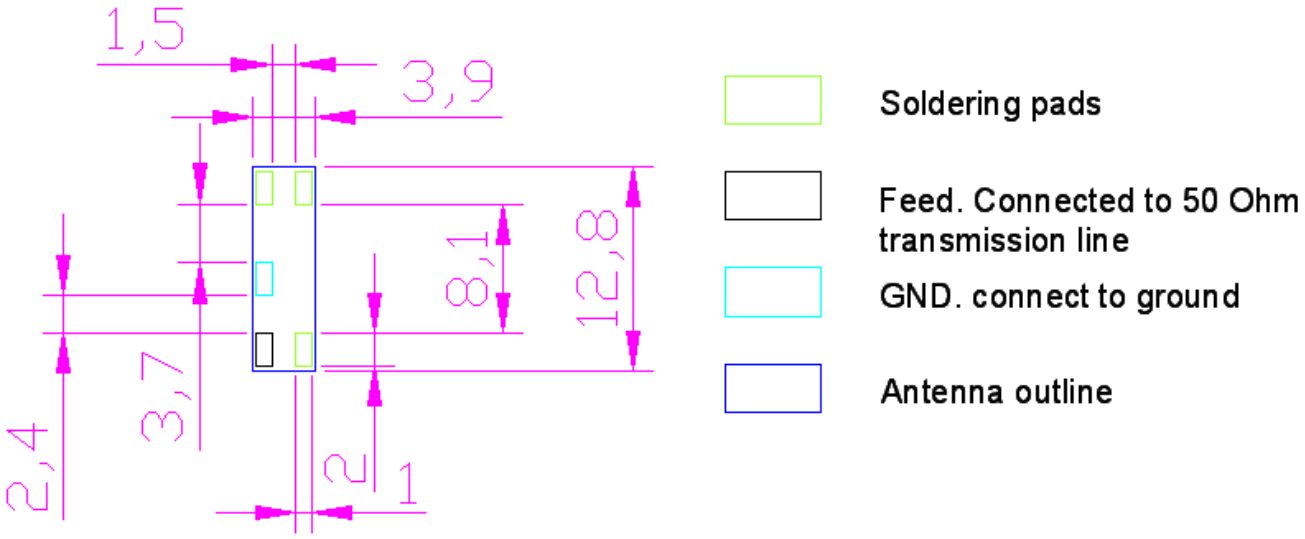
VSWR



SOLDER LAND PATTERN DESIGN

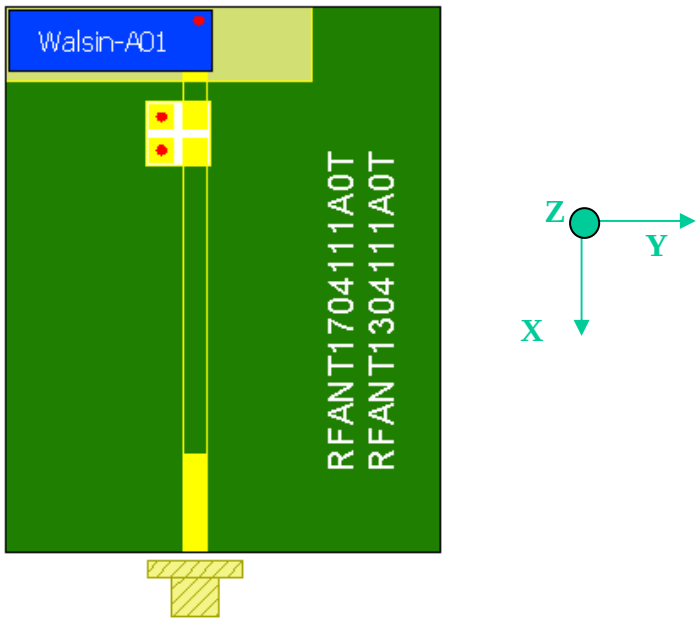
Figure	Symbol	Dimension

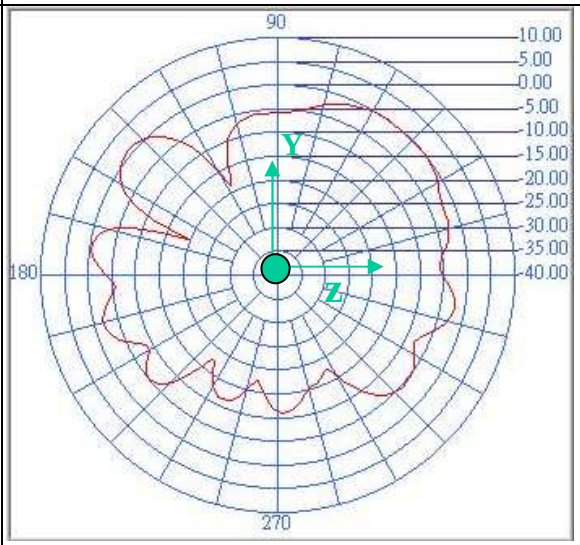
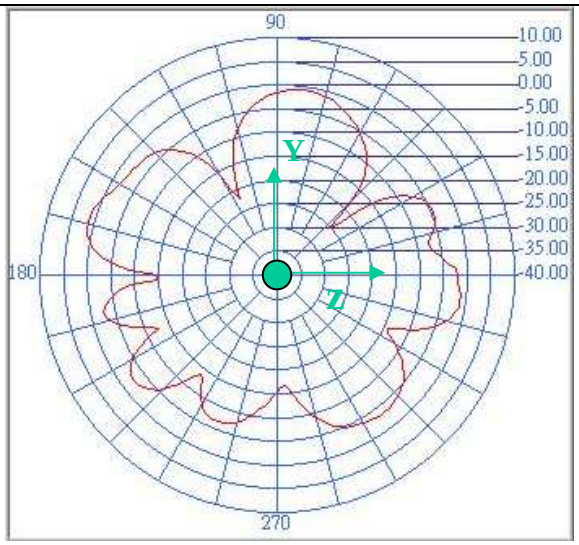
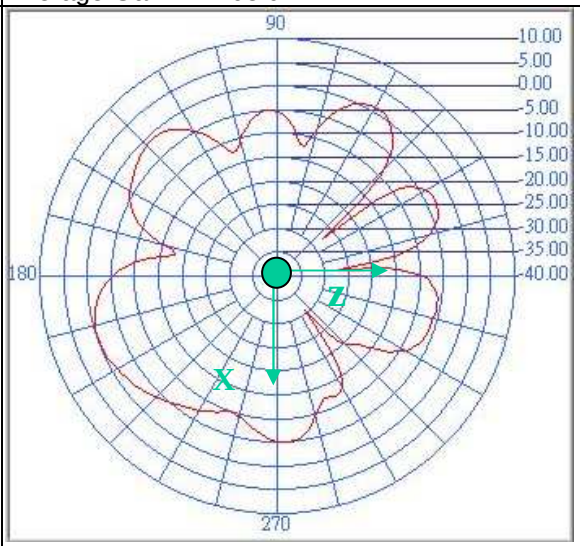
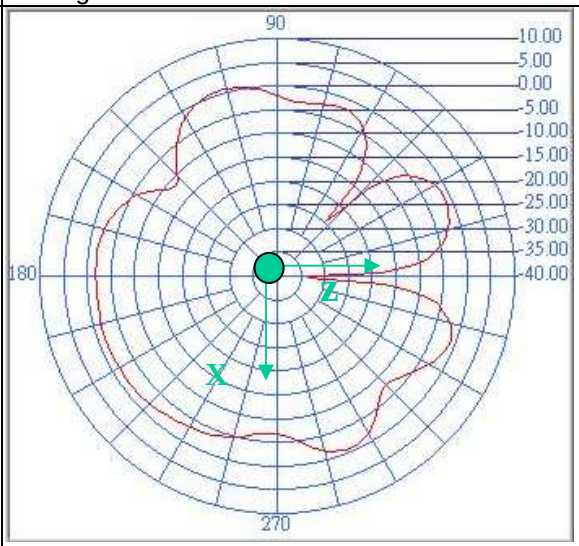
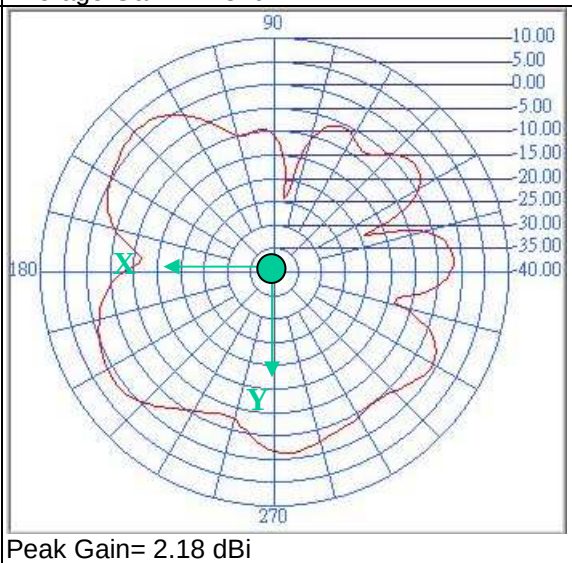
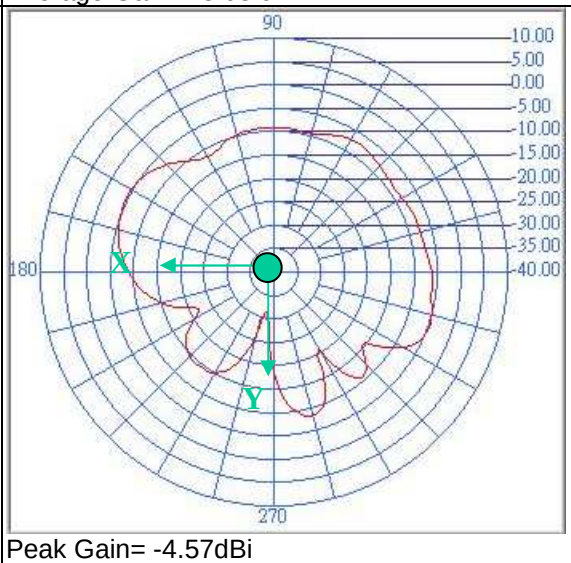
Unit: mm



RADIATION PATTERN

Radiation Pattern and Gain were dependent on measurement board design. The specification of RGFRA1304011A1T antenna was measured based on the test board size and the antenna installation position as shown in the below:



	Horizontal	Vertical
Y - Z Plane Average Gain= -1.287 dBi	 Peak Gain = 1.03dBi Average Gain = -4.05 dBi	 Peak Gain= 1.48dBi Average Gain=-4.56 dBi
X - Z Plane Average Gain= -0.843 dBi	 Peak Gain= -1.07 dBi Average Gain= -4.87dBi	 Peak Gain= 0.85 dBi Average Gain= -3.03 dBi
X - Y Plane Average Gain= -1.905 dBi	 Peak Gain= 2.18 dBi Average Gain= -2.87 dBi	 Peak Gain= -4.57dBi Average Gain= -8.91 dBi

RELIABILITY TEST

Test item	Test condition / Test method	Specification
Solderability JIS C 0050-4.6 JESD22-B102D	*Solder bath temperature：235 ± 5°C *Immersion time：2 ± 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 ± 5°C *Leaching immersion time：30 ± 0.5 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℃, 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.	No mechanical damage. Samples shall satisfy electrical specification 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.

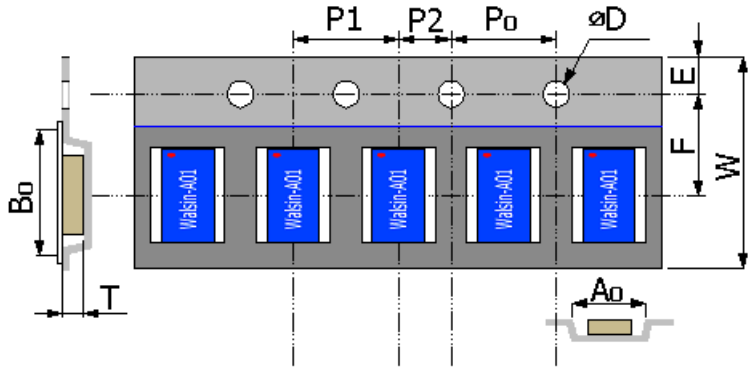
Temperature cycle JIS C 0025	1. 30±3 minutes at -40°C±3°C, 2. 10~15 minutes at room temperature, 3. 30±3 minutes at +85°C±3°C, 4. 10~15 minutes at room temperature, Total 100 continuous cycles Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Samples shall satisfy electrical specification after test.
Vibration JIS C 0040	*Frequency：10Hz~55Hz~10Hz(1min) *Total amplitude：1.5mm *Test times：6hrs.(Two hrs each in three mutually perpendicular directions)	No mechanical damage. Samples shall satisfy electrical specification after test.
High temperature JIS C 0021	*Temperature：85°C±2°C *Test duration：1000+24/-0 hours Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Samples shall satisfy electrical specification after test.
Humidity (steady conditions) JIS C 0022	*Humidity：90% to 95% R.H. *Temperature：40±2°C *Time：1000+24/-0 hrs. Measurement to be made after keeping at room temperature for 24±2 hrs ※ 500hrs measuring the first data then 1000hrs data	No mechanical damage. Samples shall satisfy electrical specification after test.
Low temperature JIS C 0020	*Temperature：-40°C±2°C *Test duration：1000+24/-0 hours Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Samples shall satisfy electrical specification after test.

ORDERING CODE

RG	FRA	130401	1	A	1	T
Walsin RG: RF /Pb free device	**Product code** FRA : Antenna	**Dimension code** Per 2 digits of Length, Width, Thickness : e.g. : 130401= Length 12.8, Width 3.9, Thickness 1.1	**Unit of dimension** 0 : 0.1 mm 1 : 1.0 mm	**Application** A : 2.4GHZ ISM Band	**Specification** Design Code	**Packing** T : Reeled

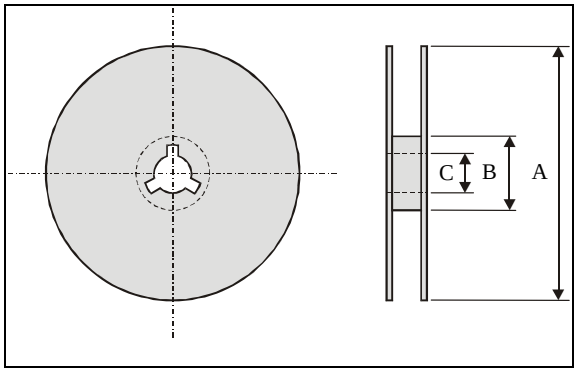
PACKAGING

Plastic Tape specifications (unit :mm)



Index	Ao	Bo	ΦD	T	W
Dimension (mm)	4.3 ± 0.1	13.2 ± 0.1	1.5 + 0.1 -0.0	1.5 ± 0.1	24 ± 0.3
Index	E	F	Po	P1	P2
Dimension (mm)	1.75 ± 0.1	11.5 ± 0.1	4.0 ± 0.1	8 ± 0.1	2.0 ± 0.1

Reel dimensions



Index	A	B	C
Dimension (mm)	Φ330 ± 5.0	Φ100 ±2.0	Φ13.0 ± 0.5

Typing Quantity: 1000 pieces per 13”-32mm 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.