

APPROVAL SHEET

FREE ANTENNA

RGFRA Series / Pb free

Halogens Free Product

2.4 GHz ISM Band Working Frequency

P/N: RGFRA9937380A3T

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

FEATURES

1. Surface Mounted Devices with a small dimension of $9.9 \times 3.7 \times 3.8 \text{ mm}^3$.
2. Able to be placed above/on ground plane. No external keep-out zone (empty space) required, which relatively save more space on PC board.
3. Allow placing other components besides antenna or on the backside of PCB right underneath antenna.
4. No sensitive to environmental includes hand effects. Ideal for Handheld devices application.

APPLICATIONS

1. Bluetooth, ISM 2.4GHz in samrt phone, PDA and other handheld devices.
2. 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. To fulfill the friendly usage for antenna, this antenna has been designed to no empty space required and no sensitive to environmental through Walsin's superior product design via 3D EM Simulation Skill.

CONSTRUCTION

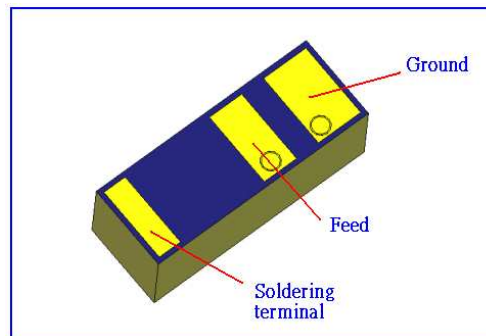
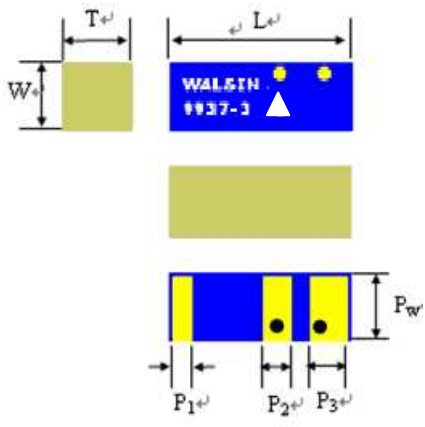


Fig 1. Outline of Free Antenna – RGFRA9937380A3T

DIMENSIONS

Figure	Dimension(mm)		Port definition
 <p>Note: The part number of 9937-3 is RGFRA9937380A3T</p>	L	9.9 ± 0.15	-
	W	3.7 ± 0.15	-
	T	3.8 ± 0.20	-
	P_w	3.48 ± 0.10	Pad width
	P_1	1.4 ± 0.10	Soldering terminal
	P_2	1.9 ± 0.10	Feed terminal
	P_3	2.4 ± 0.15	Ground terminal

ELECTRICAL CHARACTERISTICS

RGFRA9937380A3T		Specification
Central Frequency(GHz)	Marking	9937-3 *1
	Frequency(GHz)	2.55GHz *3
Gain		2 dBi (Typical)
VSWR		2 max.
Polarization		Linear
Azimuth Bandwidth		Omni-directional
Impedance		50Ω
Rated Power (max.)		1 W
Operation Temperature		-40°C ~ +85°C

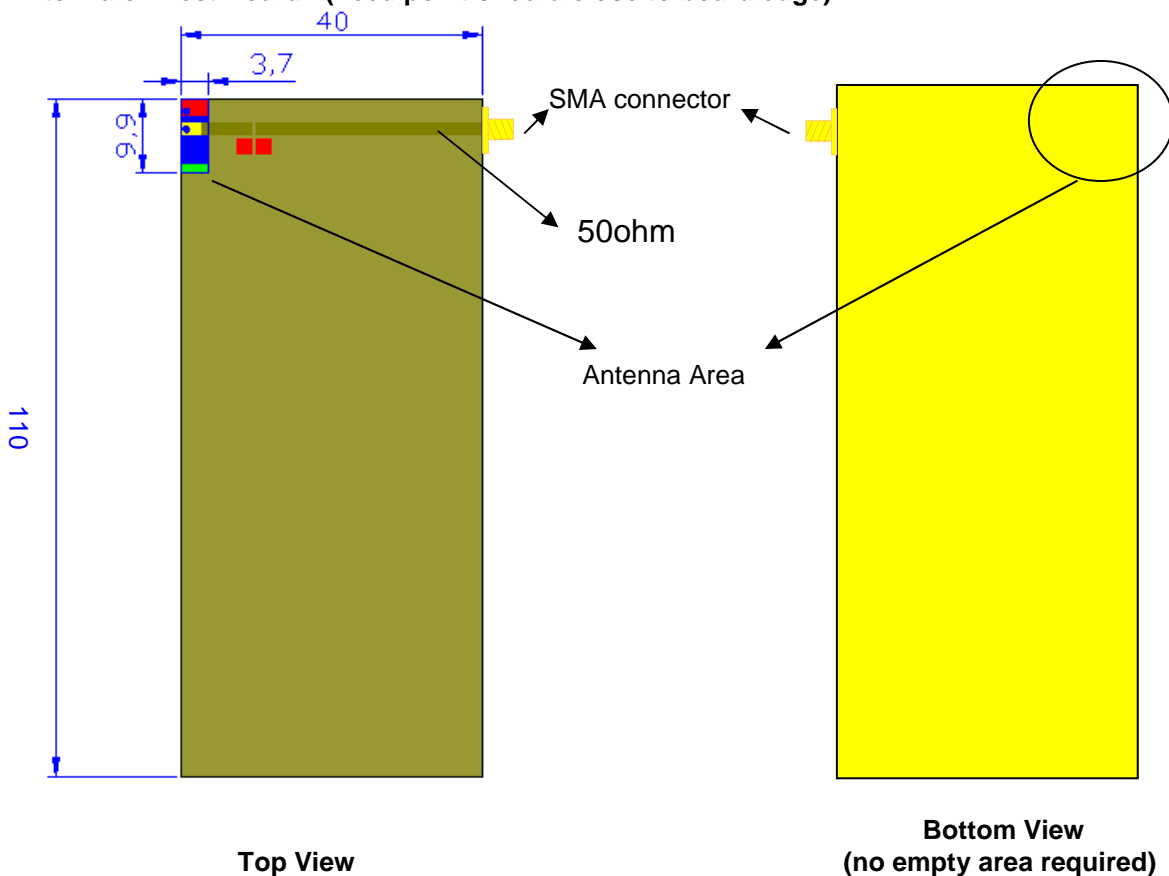
Remark: 1.



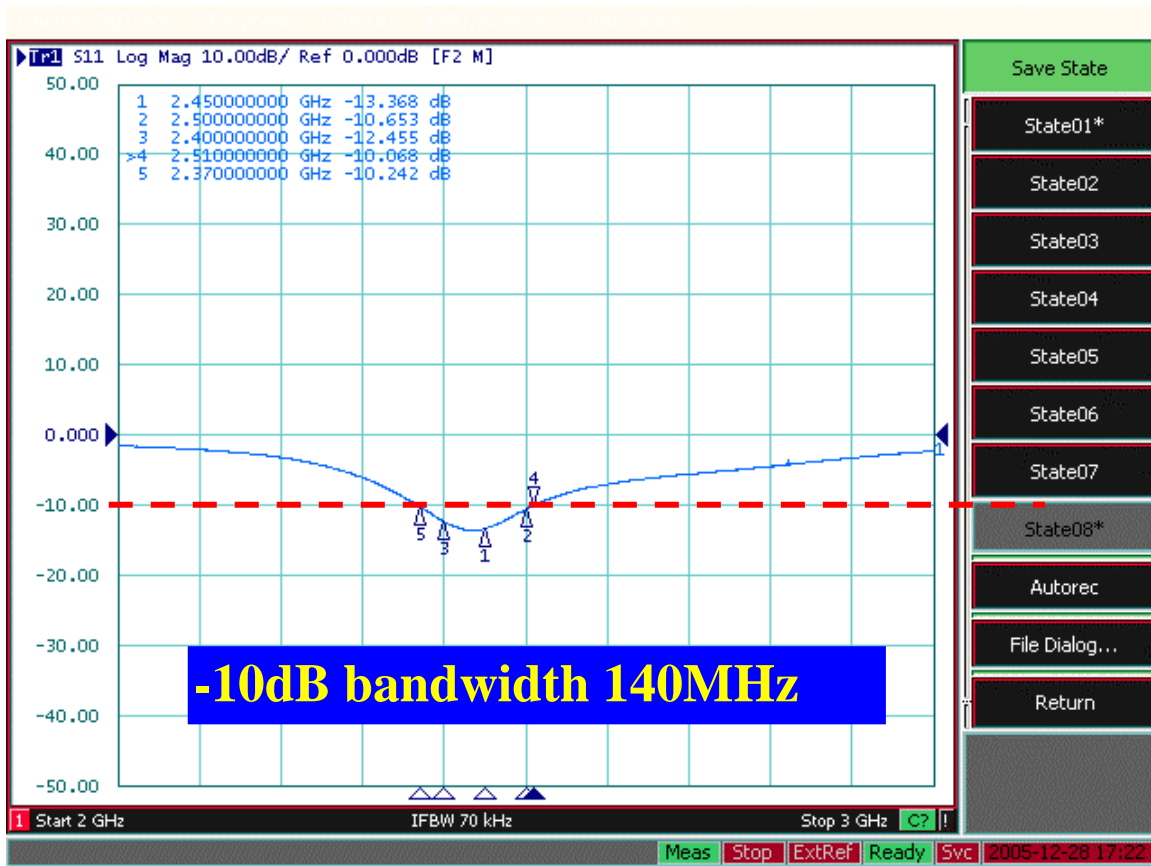
RGFRA9937380A3T

- The specification is defined based on the test board dimension as in below
- Should be fine tuned to 2450±50MHz during application.

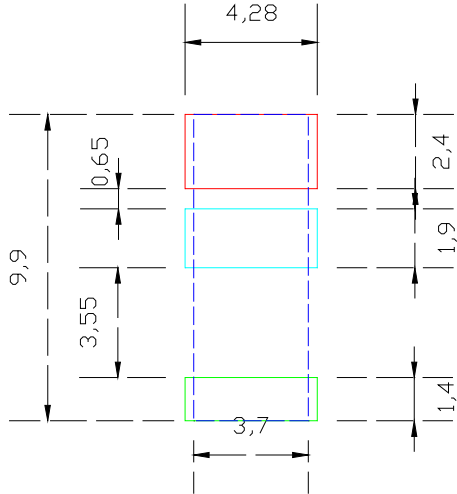


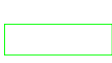

Antenna on Test Board : (Feed point should close to board edge)



Antenna S11 on Test Board

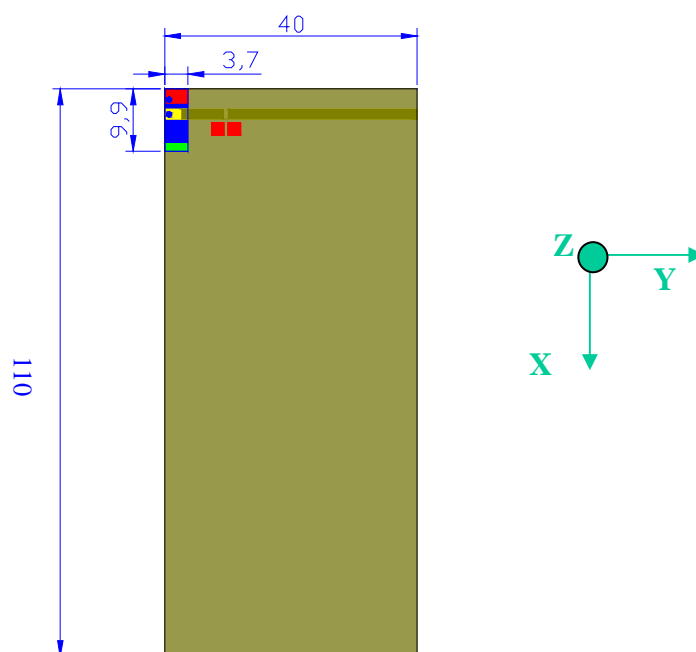


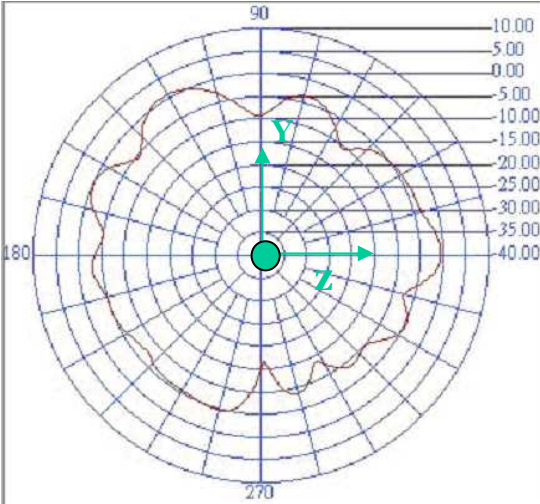
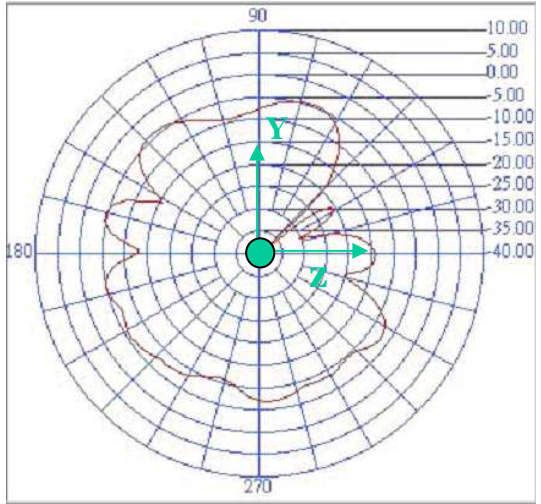
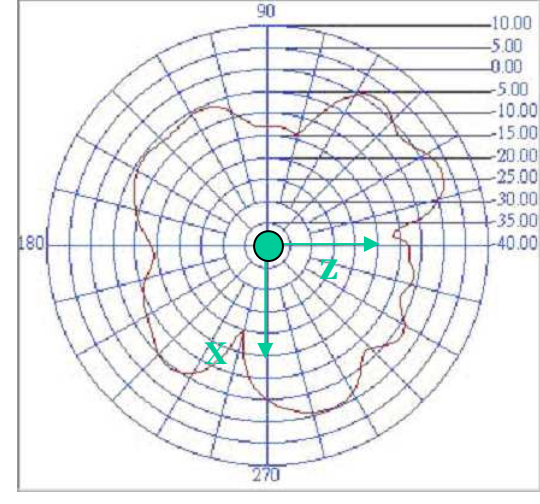
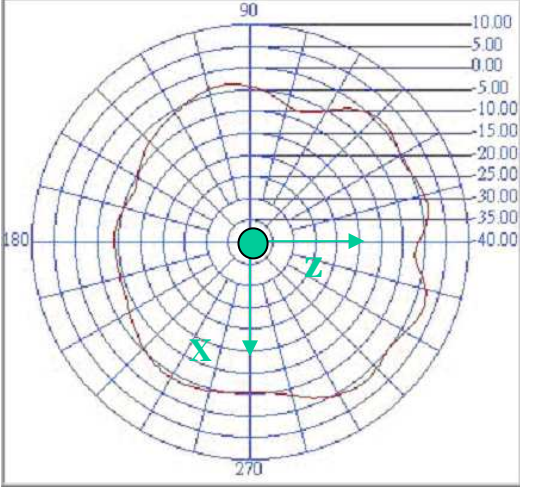
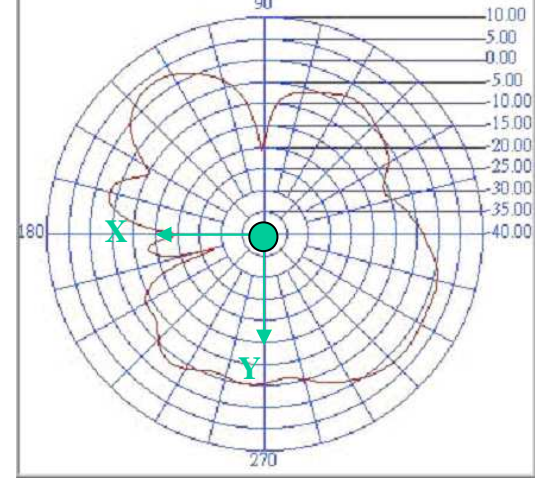
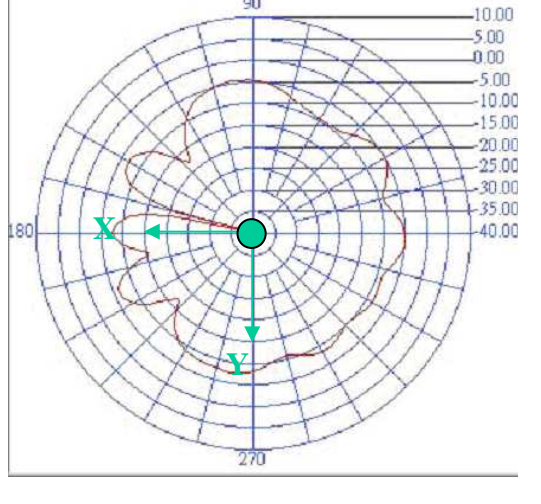
SOLDER LAND PATTERN DESIGN

Figure	Symbol	Dimension
 <p>The diagram shows a vertical rectangular solder land pattern with the following dimensions and components:</p> <ul style="list-style-type: none"> Total height: 9.9 mm Distance from top edge to the top of the ground pad: 3.55 mm Distance from top edge to the top of the feed pad: 0.65 mm Distance from top edge to the top of the soldering pad: 3.7 mm Width of the ground pad: 4.28 mm Width of the feed pad: 3.7 mm Width of the soldering pad: 3.7 mm Distance from the right edge of the ground pad to the right edge of the feed pad: 1.9 mm Distance from the right edge of the feed pad to the right edge of the soldering pad: 1.4 mm Distance from the right edge of the soldering pad to the right edge of the antenna outline: 1.4 mm Distance from the right edge of the antenna outline to the right edge of the ground pad: 2.4 mm 	<ul style="list-style-type: none">  Ground, connect to ground  Feed, connected to 50ohm transmission line  Soldering pads  Antenna outline 	<p>Unit: mm</p>

RADIATION PATTERN

Radiation Pattern and Gain were dependent on measurement board design. The specification of RGFRA9937380A3T 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= -3.185 dBi	 <p>Peak Gain = 0.95dBi Average Gain = -4.26 dBi</p>	 <p>Peak Gain= -4.05dBi Average Gain=-8.03 dBi</p>
X - Z Plane Average Gain= -0.99 dBi	 <p>Peak Gain= 3.05 dBi Average Gain= -4.10dBi</p>	 <p>Peak Gain= 2.49 dBi Average Gain= -2.47 dBi</p>
X - Y Plane Average Gain= -1.543 dBi	 <p>Peak Gain= 3.19 dBi Average Gain= -2.65 dBi</p>	 <p>Peak Gain= -4.48 dBi Average Gain= -8.02 dBi</p>

RELIABILITY TEST

Test item	Test condition / Test method	Specification
Solderability JIS C 0050-4.6 JESD22-B102D	*Solder bath temperature : $235 \pm 5^{\circ}\text{C}$ *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 : $260 \pm 5^{\circ}\text{C}$ *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 : $120\sim 150^{\circ}\text{C}$, 1 minute. *Solder temperature : $270\pm 5^{\circ}\text{C}$ *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 : $5\text{N}(\leq 0603)$; $10\text{N}(>0603)$ *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	<ol style="list-style-type: none"> 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.

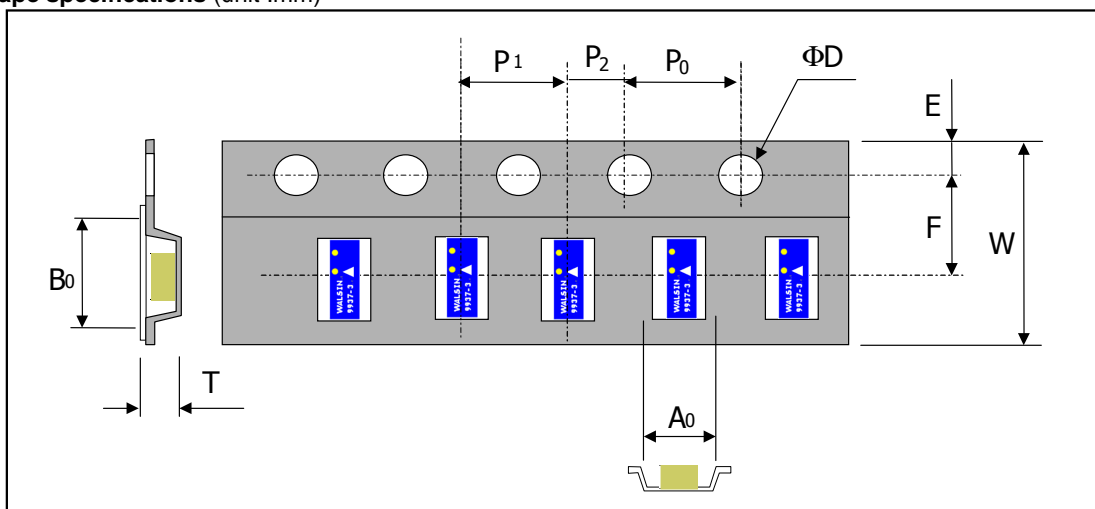
ORDERING CODE

RG Walsin RG: RF /Pb free device	FRA Product code FRA : Antenna	993738 Dimension code Per 2 digits of Length, Width, Thickness : e.g. : 993738 = Length 99, Width 37, Thickness 38	0 Unit of dimension 0 : 0.1 mm 1 : 1.0 mm	A Application A : 2.4GHZ ISM Band	3 Specification Design Code	T Packing T : Reeled
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Minimum Ordering Quantity: 1000 pcs per reel.

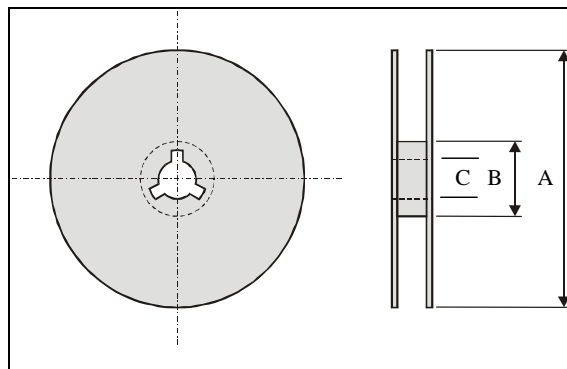
PACKAGING

Plastic Tape specifications (unit :mm)



Index	A ₀	B ₀	ΦD	T	W
Dimension (mm)	3.95 ± 0.10	10.2 ± 0.10	1.55 ± 0.05	4.05 ± 0.10	16.0 ± 0.3
Index	E	F	P ₀	P ₁	P ₂
Dimension (mm)	1.75 ± 0.10	7.50 ± 0.05	4.00 ± 0.10	12.0 ± 0.10	2.00 ± 0.05

Reel dimensions



Index	A	B	C
Dimension (mm)	Φ330±1	Φ99 ±1	Φ17.4 ± 0.5

Typing Quantity: 1000 pieces per 13" 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 WAL SIN 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.