

July 16, 2015

TS-GARR-0001
WO: GARR0004
PO: PO00005921

SM-100

Antenna Info:

Manufacturer: Molex

Model: 0479501001

Gain: 3.5 dB

Form factor: 9.0 x 35.0 x 150 mm u.FL PCB connector mount, adhesive mount to inside of case.

Complies with FCC 15.203 as a unique connector attached antenna completely inside the case.

Weldon Sanders

Garrett Metal Detectors

Attachments: Antenna Data Sheets, photos

PLEASE CHECK WWW.MOLEX.COM FOR LATEST PART INFORMATION

Part Number:

0479501001

Status:

Active

Overview:

Standard Antennas

Description:

2.4GHz / 5GHz Wifi Stand Alone Antenna, 9.00mm, Cable Length 150.00mm

Documents:

[3D Model](#)

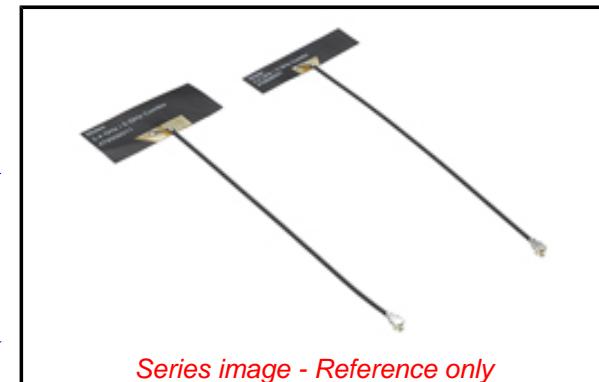
[Drawing \(PDF\)](#)

[Product Specification PS-47950-001 \(PDF\)](#)

[Packaging Specification PK-47950-001 \(PDF\)](#)

[RoHS Certificate of Compliance \(PDF\)](#)

[Product Literature \(PDF\)](#)



Series image - Reference only

General

Product Family

Antennas

Series

47950

Component Type

Stand Alone Antenna with Cable

Mates With

73412-0110 Microcoaxial RF, 50 Ohm

Overview

Standard Antennas

Product Literature Order No

987650-5892

Product Name

2.4 GHz SMD Stand Alone

Type

Wi-Fi Antenna

UPC

884982680883

Physical

Cable Length

150.00mm

Depth

0.10mm

Length

34.90mm

Mounting Style

Adhesive

Net Weight

0.800/g

Packaging Type

Tray

Polarization

Linear

Radiation Pattern

Omnidirectional

Weight

0.477g

Width

9.00mm

Electrical

Band#1 F_End (MHz)

2,483.5

Band#1 F_Start (MHz)

2,400

Band#2 F_End (MHz)

5,900

Band#2 F_Start (MHz)

4,800

Electrical Connectivity

Cable

Impedance

50#

Number of Bands

2

Peak Gain (dBi)

3.5

Return Loss - S11 (dB)

< -10, < -9

Total Efficency (dB)

> -1.5

Material Info

Reference - Drawing Numbers

Packaging Specification

PK-47950-001

Product Specification

PS-47950-001

Sales Drawing

SD-47950-001

EU ELV

Not Relevant

EU RoHS

REACH SVHC

Not Reviewed

Halogen-Free

Status

Not Reviewed

Need more information on product environmental compliance?

China RoHS

Email productcompliance@molex.com
Please visit the [Contact Us](#) section for any non-product compliance questions.

ELV

Not Relevant

Search Parts in this Series

47950 Series

Molex's class-leading 2.4/5GHz standalone antennas combine ground-plane-independent design with high-radiation efficiency to give customers better connectivity and reduced development time for wireless devices

Key to any wireless applications that impact the most critical design variables such as power efficiency, antenna coverage and radio-link quality is the antenna's Total Radiation Efficiency. Molex's 2.4 and 5GHz dual-band, standalone antennas offer customers maximum radiation efficiencies over a wide range of wireless applications, with the convenience of easy-to-use and easy integration features.

Molex's series 47950 antennas include the small footprint 34.5 by 9.00mm version that delivers 75% minimum total efficiency in the 2.4GHz band, with a minimum of 60% in the 5GHz band. The hallmark of this product is its small footprint, since it fits into many wireless devices easily. The larger 35.9 by 15.90mm version antenna is for applications that require the highest level of RF performance. It gives an efficiency of at least 80% in the 2.4GHz band with a 70% minimum in the 5GHz band. These products can be used in wireless applications including †Wi-Fi access points, consumer electronics, telemedicine devices and more.

Another important feature of Molex's 2.4/5GHz standalone antenna is its dipole-style design which makes it independent from the PCB dimensions used in the wireless application. Molex's 2.4/5GHz standalone antennas are ground-independent and can be applied in any device without the constraints and concerns of PCB grounding or PCB ground-induced radiation.

Molex's 2.4 and 5GHz standalone antennas are very easy to use. Simply peel off the poly-flexible adhesive tape on the underside of antenna and stick the latter on any desired location within the device casing. Then mount the *UFL-type coaxial connector (located at the end of the micro-coaxial cable) to the device radio and the antenna is ready to use.

For more information visit our website at:
www.molex.com/link/standard_antennas.html

**2.4/5 GHz Standalone
Antennas,
RoHS-compliant,
Halogen-free**

**47950 2.4/5 GHz
Standalone
Antennas,
34.90 by 9.00mm
(1.37 by 0.34") and
35.90 by 15.90mm
(1.41 by 0.61")
variants**



Typical 2.4 / 5 GHz Standalone
Antennas with 100.0mm (3.94")
micro-coaxial cable

FEATURES AND BENEFITS

- Ground-plane-independent design significantly reduces costs and engineering resources needed to tune and optimize ground-plane-dependent antennas
- High-radiation efficiency 34.9 by 9.00 mm (1.37 by 0.34") version antenna offers Total Efficiency values of 75% minimum in the 2.4GHz band and 60% minimum in the 5GHz band
- Higher radiation efficiency 35.9 by 15.90 mm (1.41 by 0.61") version antenna offers Total Efficiency values of 80% minimum in the 2.4 GHz band and 70% minimum in the 5GHz band
- Poly-flexible, double-sided adhesive tape on antenna enables easy peel-and-stick mounting anywhere within the device casing
- Robust coaxial cable to flexi-antenna with Pull Force of over 18.0N ensures maximum reliability of antenna
- Choice of several miniature coaxial cable length options provides for maximum flexibility for antenna placement in the wireless device

SPECIFICATIONS

Reference Information

Packaging: Tray
Mates With: highlighted item to Micro-coaxial SMT Jack (Part Number: 73412-0110)
Use With:
 Use With: Any Wi-Fi radio device
Designed In: mm
RoHS: Yes
Halogen Free: Yes
Glow Wire Compliant: No

Electrical Specifications

(2.4 GHz) include:
 f_start (MHz): 2400
 f_end (MHz): 2483.5
 Return Loss S11 (dB): Refer table
 Total Eff. (dB): Refer table
 Peak Gain (dBi): Refer table
 Polarization: Linear
 Input Impedance (Ohms): 50
(5 GHz) include:
 f_start (MHz): 4900
 f_end (MHz): 5900
 Return Loss S11 (dB): Refer table
 Total Eff. (dB): Refer table

Peak Gain (dBi): Refer table

Polarization: Linear

Input Impedance (Ohms): 50

Mechanical

Pull Force: > 18.0N (4.05 lb force)

Physical

Thickness: 0.10mm (0.004")

Operating Temperature: -30 to +75°C

*Use with: Surface-mount, micro-coaxial Jack (Molex Part Number: 73412-0110).

Refer to datasheet literature (Order No. 987650-3242) for more details.

† Wi-Fi is a registered trademark of the Wi-Fi Alliance

RF PERFORMANCE

**2.4/5 GHz Standalone
Antennas,
RoHS-compliant,
Halogen-free**

Return Loss

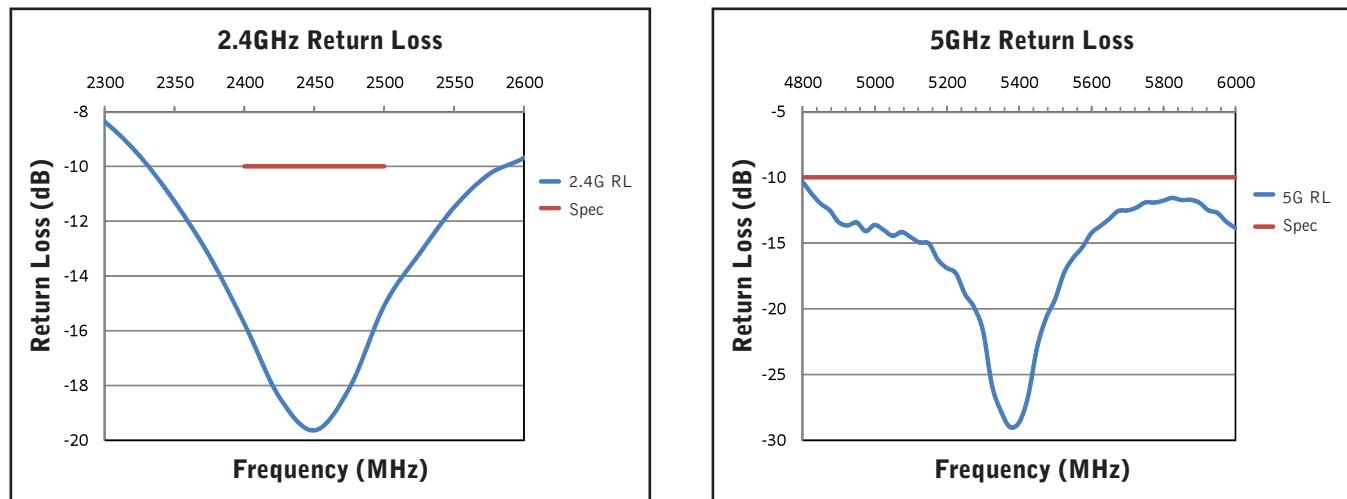


Figure 1: Antenna Return Loss (S11) for 2.4 and 5 GHz measured on a 1mm-thick plate of PC/ABS material

Efficiency

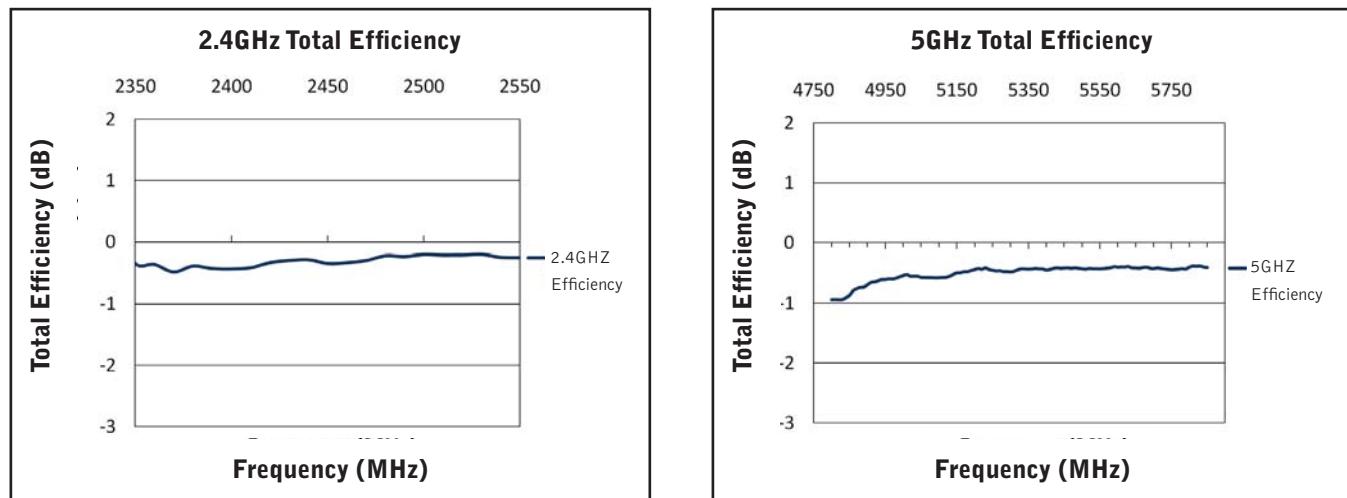


Figure 2: Antenna Total Efficiency (including Mismatch Loss) for 2.4 and 5 GHz measured on a 1mm-thick plate of PC/ABS material

**2.4/5 GHz Standalone
Antennas,
RoHS-compliant,
Halogen-free**

Radiation Plots 2.4 GHz

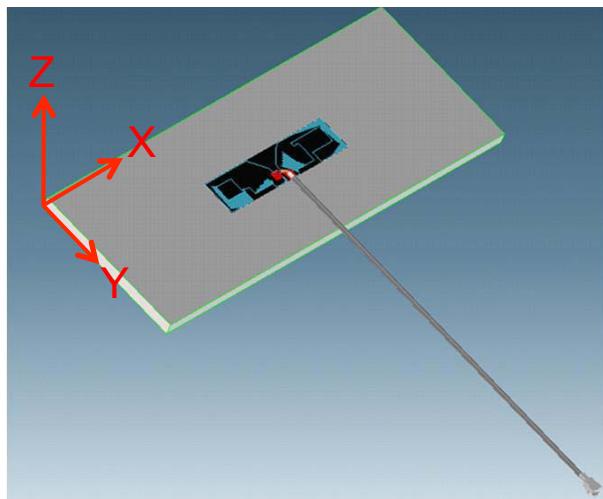


Figure 3a: Antenna on a 1mm-thick
PC/ABS material plate

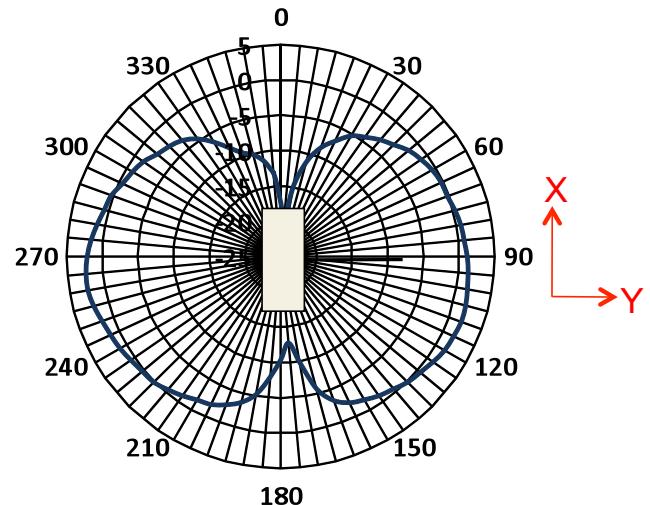


Figure 3b: Radiation diagram of X-Y plane
showing combined polarizations at 2.45 GHz

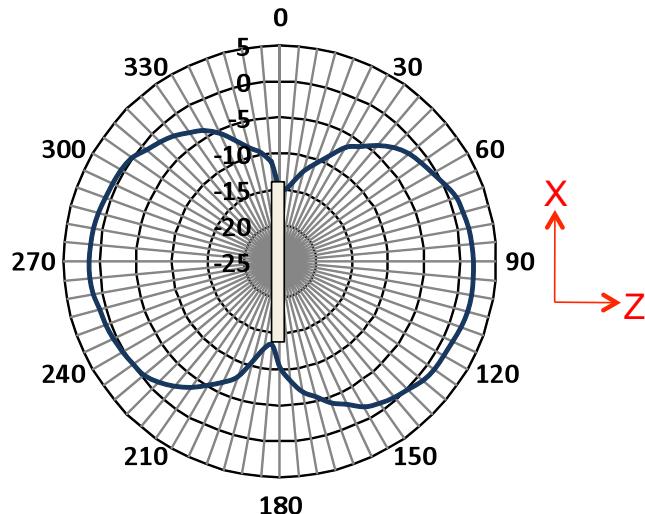


Figure 3c: Radiation diagram of X-Z plane
showing combined polarizations at 2.45 GHz

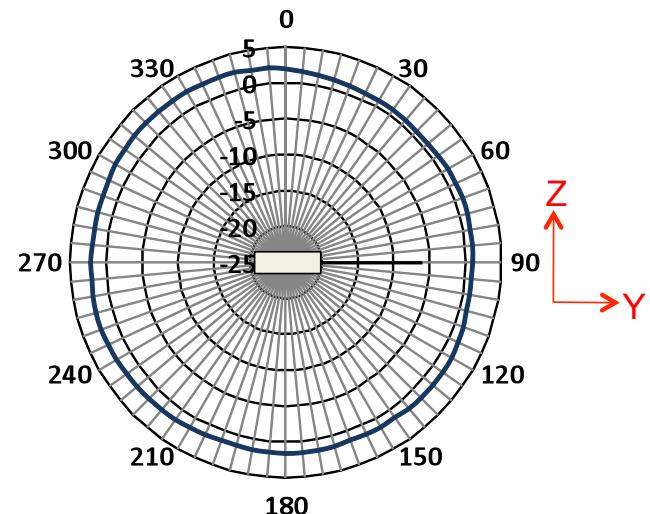


Figure 3d: Radiation diagram of Z-Y plane
showing combined polarizations at 2.45 GHz

**2.4/5 GHz Standalone
Antennas,
RoHS-compliant,
Halogen-free**

Radiation Plots 5 GHz

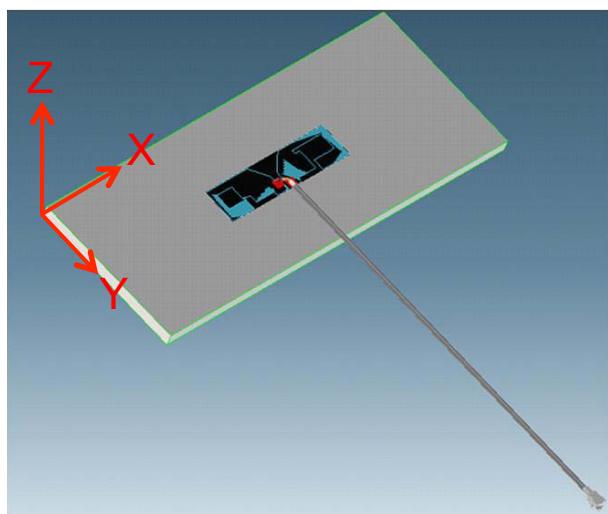


Figure 3e: Antenna on a 1mm-thick
PC/ABS material plate

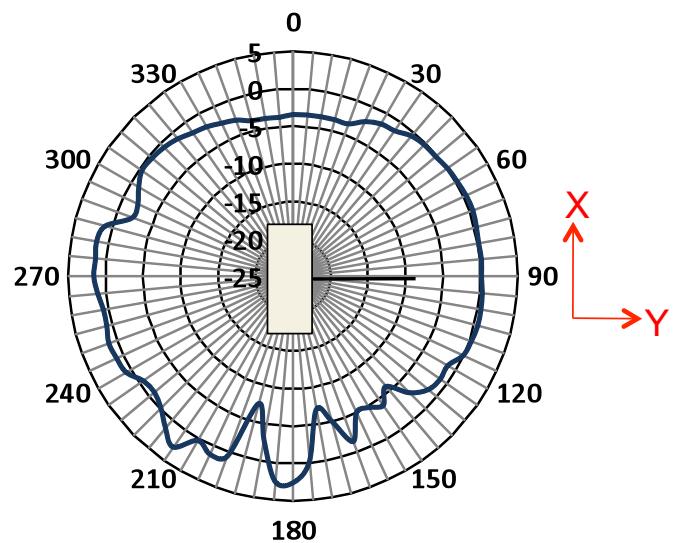


Figure 3f: Radiation diagram of X-Y plane
showing combined polarizations at 5.45 GHz

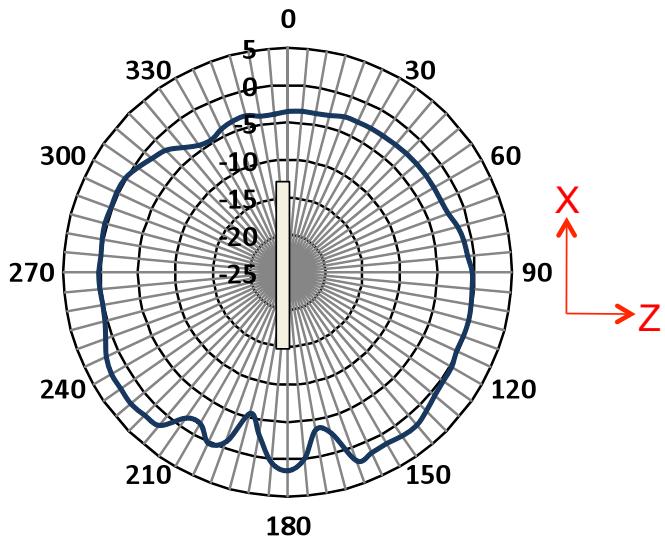


Figure 3g: Radiation diagram of X-Z plane
showing combined polarizations at 5.45 GHz

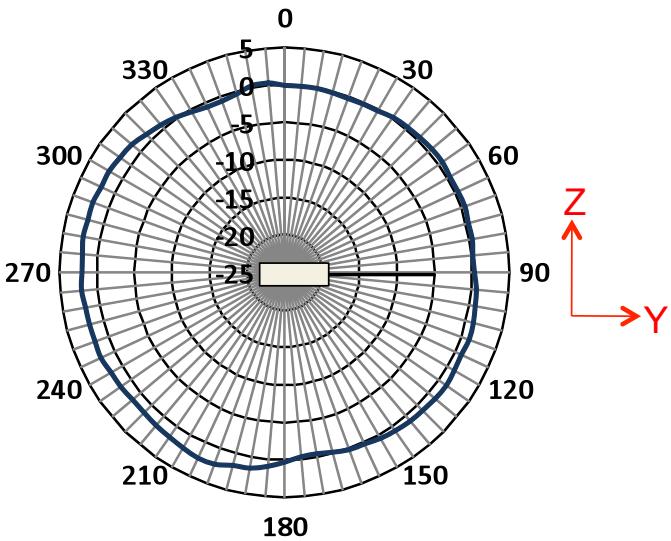


Figure 3h: Radiation diagram of Z-Y plane
showing combined polarizations at 5.45 GHz

APPLICATIONS

- Telecommunication Applications
 - Wireless Wi-Fi access points
 - Wireless Wi-Fi routers
 - Wi-Fi devices
 - Wireless LAN (WLAN)
 - IEEE 802.11b/g/n devices
- Industrial Applications
 - Machine-to-machine (M2M) communications
 - Smart meters
 - 2.4 GHz [‡]ZigBee IEEE 802.15.4 devices
 - 2.4 GHz and 5 GHz Industrial, Scientific and Medical (ISM) band systems and wireless devices
- Consumer Electronics (CE) Applications
 - Cameras
 - Mobile gaming devices
 - Personal navigation devices
 - Wireless internet TV and audio devices
- Automotive Applications
 - ^{*}Bluetooth devices
 - Infotainment systems
 - Mobile hotspots
- Medical Applications
 - Telemedicine- and telehealth devices



Wireless Wi-Fi access points



Wireless Wi-Fi router



Mobile gaming devices

2.4/5 GHz Standalone Antennas, RoHS-compliant, Halogen-free

ORDERING INFORMATION

Order No.	Flexi-Antenna Dimensions	Miniature Coaxial Cable Lengths (mm/inches)	Frequency Range (GHz)	Return Loss S11 (db)	Peak Gain (dBi)	Total Efficiency (%)	
47950-0001	34.90 by 9.00mm (1.37" by 0.34")	100.0mm (3.94")	2.4 - 2.5	< -10	3.0	> 75	
			4.8 - 5.85		4.6	> 70	
47950-1001		150.0mm (5.91")	2.4 - 2.5		3.0	> 75	
			4.8 - 5.85		2.7	> 60	
			5.0 - 5.85	< -6	3.7	> 70	
			2.4 - 2.5		2.9	> 75	
47950-2001	34.90 by 9.00mm (1.37" by 0.34")	200.0mm (7.87")	4.8 - 5.85		5.9	> 70	
			2.4 - 2.5		2.6	> 80	
			4.8 - 5.85		4.4	> 75	
			2.4 - 2.5		3.0	> 80	
47950-0011	35.90 by 15.90mm (1.41" by 0.61")	100.0mm (3.94")	4.8 - 5.85	< -10	4.8	> 70	
			2.4 - 2.5		3.4	> 80	
		150.0mm (5.91")	4.8 - 5.85		5.5	> 75	
			2.4 - 2.5				
47950-1011		200.0mm (7.87")	4.8 - 5.85				
			2.4 - 2.5				
			4.8 - 5.85				
			2.4 - 2.5				

[‡]Bluetooth is a registered trademark of Bluetooth SIG

[§]ZIGBEE is a registered trademark of trademark of ZigBee Alliance

molex

www.molex.com/link/standard_antennas.html



PRODUCT SPECIFICATION

TITLE

2.4/ 5GHz Stand Alone Antenna (34.9mm*9mm)

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REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
C	<u>EC No:</u> ABU2012-0075 <u>DATE:</u> 2012-06-19	2.4/5GHZ Stand Alone Antenna(34.9mm*9mm)	1 of 6
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
PS-47950-001	<u>Serena Zhang</u> 2011-05-23	<u>Amos Cheah</u> 2011-05-23	<u>Welson Tan</u> 2011-05-23



PRODUCT SPECIFICATION

2.4/5GHZ Stand Antenna

1.0 SCOPE

This Product Specification covers the mechanical, electrical and environmental performances requirements and test methods for 2.4/5GHz stand alone antenna.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER (S)

Product name: 2.4/5 GHZ Stand Alone Antenna 47950-****

2.2 Design and Construction

Antenna shall be of the design, construction and physical dimensions specified on the applicable sales drawing.

2.3 Materials

- a) Flex: Refer to respective Molex sales or engineering drawings
- b) Plating: Refer to respective Molex sales or engineering drawings
- c) Cable Line: Refer to respective Molex sales or engineering drawings
- d) Connector: Refer to respective Molex sales or engineering drawings

3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

See drawings and other sections of this specification for the relevant reference documents. In cases where the specification differs from the drawings, the drawings take precedence.

4.0 RATINGS

4.1 RF POWER

2 WATTS

4.2 TEMPERATURE

Operating: - 30°C to + 75°C
Storage : - 30°C to + 75°C

4.3 HUMIDITY

Storage : +15~70% RH
Test : +80~95% RH

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PRODUCT SPECIFICATION

5.0 PERFORMANCE

5.1 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 100mm (47950-0001)

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT	
5.1.1	Frequency Range	2.3GHz~5.85GHz	2.4GHz~2.5GHz	4.8GHz~6.0GHz
5.1.2	Return Loss	Antenna loads on PC/ABS housing with 100mm; 1.13mm diameter micro coax cable. Measured by VNA5071C	< -10 dB	
5.1.3	Peak Gain	Measure antenna on recommended PC/ABS housing through OTA chamber	3.0 dBi	4.6 dBi
5.1.4	Total Efficiency	Measure antenna on recommended PC/ABS housing through OTA chamber	>75%	>70%
5.1.5	Polarization	Measure antenna through the OTA chamber	Liner	
5.1.6	Input Impedance	Measure antenna on recommended PCB through VNA E5071C	50Ohms	

5.2 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 150mm (47950-1001)

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT		
5.2.1	Frequency Range	2.3GHz~5.85GHz	2.4GHz~2.5GHz	4.8GHz~5.0GHz	5.0GHz~5.85GHz
5.2.2	Return Loss	Antenna loads on PC/ABS housing with 100mm; 1.13mm diameter micro coax cable. Measured by VNA5071C	< -10 dB	< -6 dB	< -10 dB
5.2.3	Peak Gain	Measure antenna on recommended PC/ABS housing through OTA chamber	3.0 dBi	2.7 dBi	3.7 dBi
5.2.4	Total Efficiency	Measure antenna on recommended PC/ABS housing through OTA chamber	>75%	>60%	>70%
5.2.5	Polarization	Measure antenna through the OTA chamber	Liner		
5.2.6	Input Impedance	Measure antenna on recommended PCB through VNA E5071C	50Ohms		

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C	EC No: ABU2012-0075 DATE: 2012-06-19	2.4/5GHZ Stand Alone Antenna(34.9mm*9mm)	3 of 6
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PRODUCT SPECIFICATION

5.3 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 200mm (47950-2001)

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT	
5.3.1	Frequency Range	2.3GHz~5.85GHz	2.4GHz~2.5GHz	4.8GHz~6.0GHz
5.3.2	Return Loss	Antenna loads on PC/ABS housing with 100mm; 1.13mm diameter micro coax cable. Measured by VNA5071C	< -10 dB	
5.3.3	Peak Gain	Measure antenna on recommended PC/ABS housing through OTA chamber	2.9 dBi	5.0 dBi
5.3.4	Total Efficiency	Measure antenna on recommended PC/ABS housing through OTA chamber	>75%	>70%
5.3.5	Polarization	Measure antenna through the OTA chamber	Liner	
5.3.6	Input Impedance	Measure antenna on recommended PCB through VNA E5071C	50Ohms	

5.4 MECHANICAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
1	Pull test	Test machine :Max intelligent load tester Stick the flex antenna in a PC block, pull cable in horizontal direction	Pull force >4.5N

5.5 RELIABILITY REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.5.1	Cross section	Cross section on pad soldering area. Check under microscope	No soldering problem

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PRODUCT SPECIFICATION

5.6 ENVIRONMENTAL REQUIREMENTS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
5.6.1	Humidity Test	1. Test condition: The device under test is kept for 12 hours in an environment with a temperature of 55 degrees and a relative humidity of 95%. Thereafter for 12 hours in an environment with a temperature of 25 degrees and a relative humidity of 95%. The cycle is repeated until a total of 6 cycles have been completed. Hereafter the conditions are stabilized at room temperature.	1) Parts should meet RF spec before and after test. 2) No cosmetic problem
5.6.2	Temperature cycling test	1. Test condition: The product temperature is decreased from room temperature to -40 degrees during 2 hours and kept there for 2 hours. Then temperature is increased to 85 degree during 2 hours and kept for 2 hours. The temperature is then again decreased to -40 degrees during a 2-hours period. The cycle is repeated until a total of 6 cycles have been completed. Hereafter the conditions are stabilized at room temperature.	1) Parts should meet RF spec before and after test. 2) No cosmetic problem
5.6.3	Salt mist test	1. Test condition: The device under test is exposed to a spray of a 5% (by volume) solution of NaCl in water for 2 hours. Thereafter the device under test is left for 1 week in room temperature at a relative humidity of 95%. The cycle is repeated until a total of 2 cycles have been completed. Hereafter the conditions are stabilized at room temperature.	1) Parts should meet RF spec before and after test. 2) No visible corrosion. Discoloration accept.

The meaning of text "**No Cosmetic Problem**" in the table above is:

- a. no soldering problem
- b. no adhesion problem of glue
- c. no peel off of plating

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PRODUCT SPECIFICATION

6.0 TEST GROUPINGS

Test Item	Description	Group1	Group2	Group3	Group4
5.5.1	Cross section	X			
5.6.1	Humidity Test		X		
5.6.2	Temperature cycling test			X	
5.6.3	Salt mist test				X
	Sample Quantity	5	5	5	5

7.0 PACKAGING

Refer to the Molex related packaging drawings.

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