1.0 Description & Key Electrical Specifications

The AMCA72-2R470G-S1F-T4 is a Ceramic Chip Antenna designed for 2470MHz, ISM Band, WiFi and Bluetooth applications. These parts utilize multi-layer ceramic technology in their design.

1.1 Maximum Ratings

Table (1.0) – Maximum Ratings

Item	Value
Operating Temperature Range	-40ºC to + 85ºC
Storage Temperature Range	-10℃ ~ +40 and RH ℃ 70% (Max.)

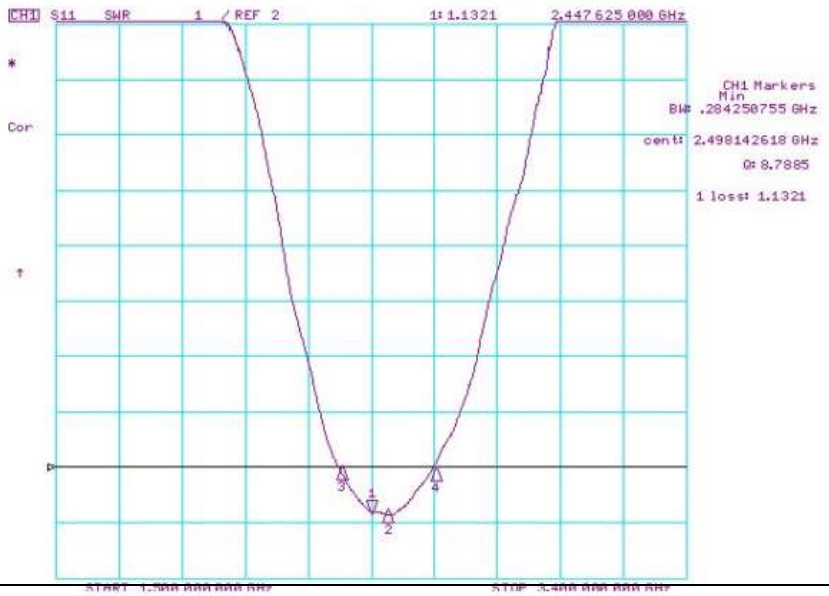
1.2 Electrical Characteristics

Table (1.1) – Electrical Characteristics AMCA72-2R470G-S1F-T4

Item	Spec
Frequency	2470MHz
Bandwidth	≥200MHz
Peak Gain	2.7 dBi typ.
Average Gain	1.0 dBi typ
VSWR	<2:1
Impedance	50 Ohm
Power Capability	3W max

1.3 Electrical Performance

Figure (1) – Electrical plot showing measured bandwidth



2.0 Abracon PN AMCA72-2R470G-S1F-T4 is RoHS / RoHS II Compliant & Pb free.

3.0 Moisture Sensitivity Level (MSL) – MSL = 1

4.0 Part Identification – AMCA72-2R470G-S1F-T4

Figure (2) - Identification and Order Code

AMCA72-2R470G-S1F-T4

Packaging
Blank: Bulk or Cut Tape
T4 : T/R 4000pcs per reel

4.1 Part Coding

AMCA 72 -2R470G -S1 F -T4

① ② ③ ④ ⑤ ⑥

Table (4.1) – Part Number Coding Scheme

① Type		② External Dimensions (L×W) (mm)		③ Center Frequency	
AMCA	Multilayer Chip Antenna	72	7.0×2.0	2R470G	2470.0MHz
④ Series Code		**⑤ Hazardous Substance**		**⑥ Packing**	
S1		F	Free	Blank T4	Bulk or Cut Tape T/R: 4000pcs

5.0 Application Test Circuit & PCB layouts – Default Layouts

Figure (3) – Evaluation Board PCB Layout

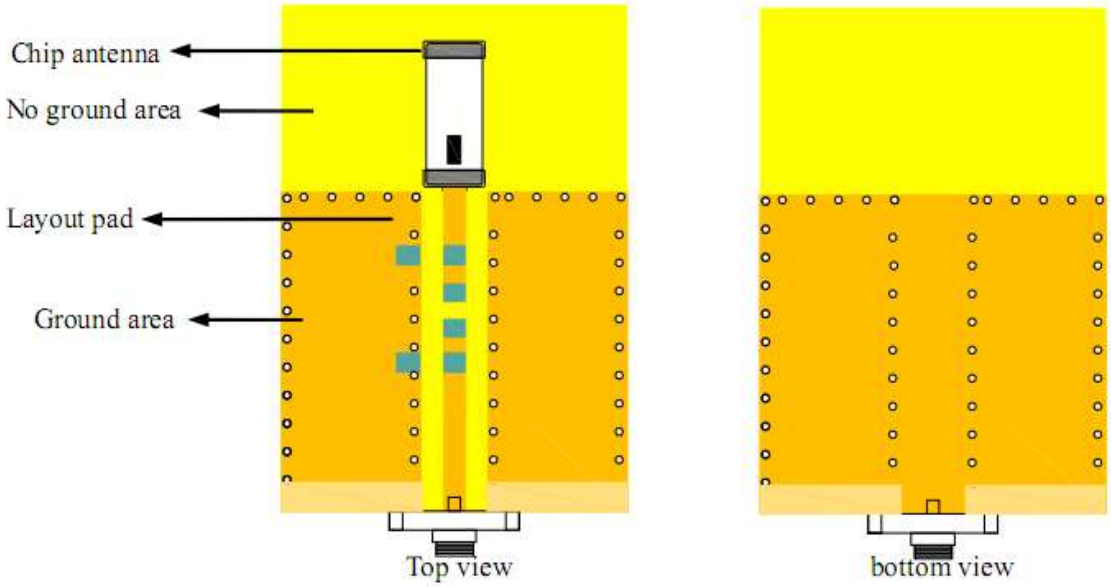
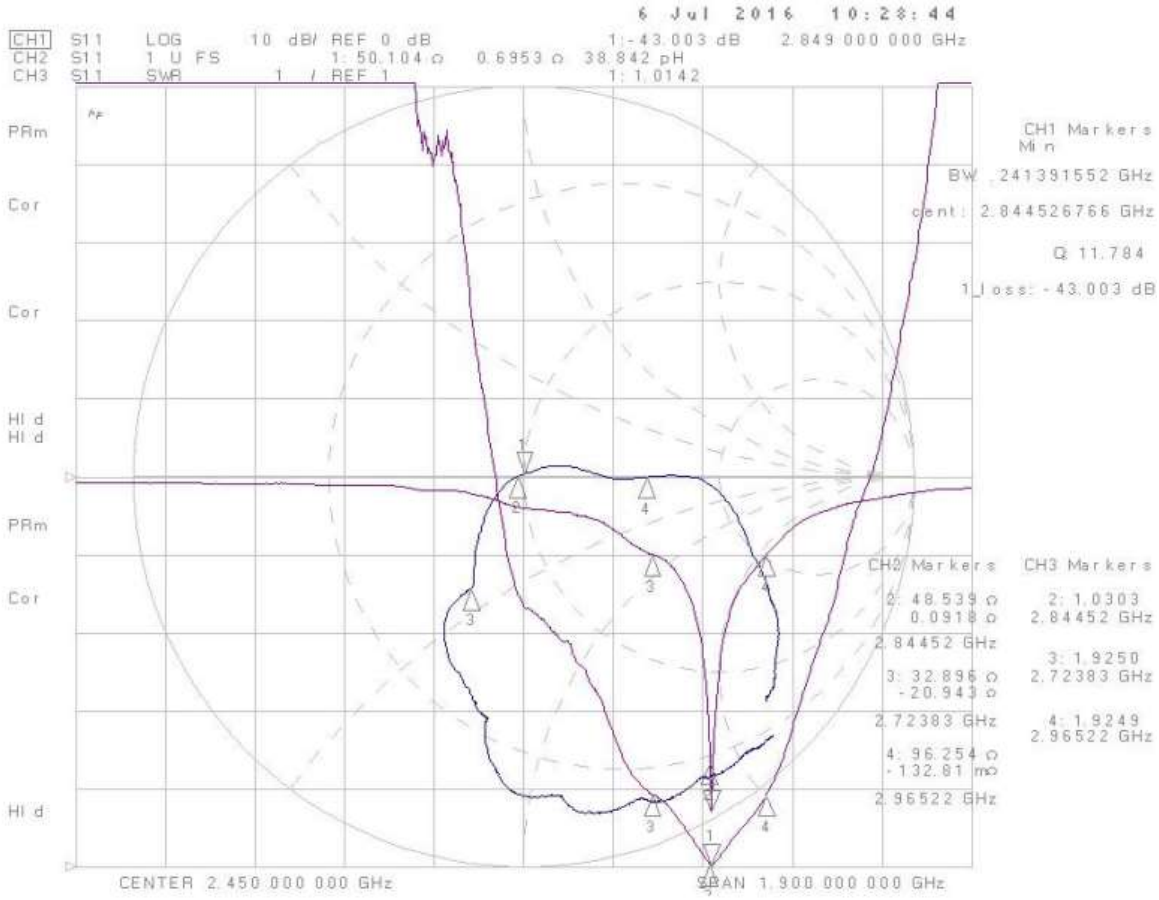


Figure (3) shows the PCB layout highlighting the Ground and No Ground areas and trace feed line to the chip antenna.

6.0 Antenna Performance with and without PCB Matching Circuitry

6.1 Smith Chart showing S11 (Without Matching Circuit)

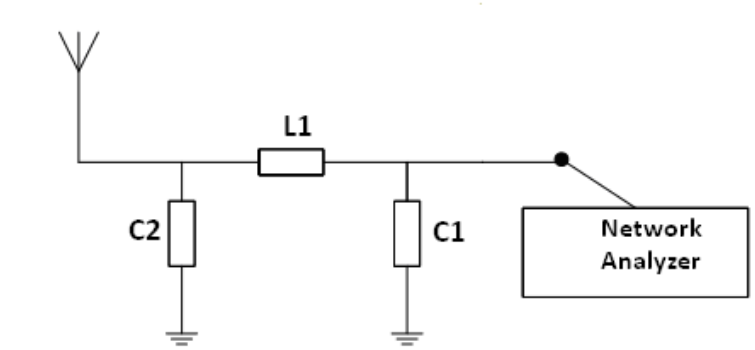
Figure (4) – S11 without Matching Circuit



6.2 Antenna Matching Circuit on EVB

Chip antenna should be matched with the environment of final products. Normally this process can be done with capacitor or inductor

Figure (5) – Matching Circuit Network



Passive Test with Network Analyzer

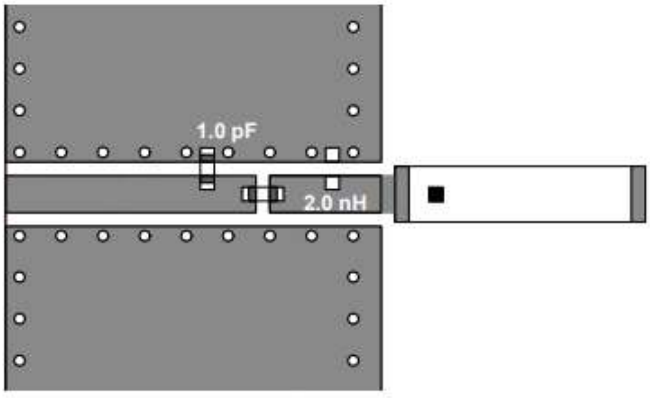
Table (6.2) – Matching Component Values from EVB

Component	Description	Value
Antenna	AMCA72-2R470G-S1F-T4	----
Capacitor	C1	1pF
	C2	Do Not Place
Inductor	L1	2.0 nH

Note: Recommendation is to pre-place the π-type circuit layout circuit which will offer full flexibility to match the antenna to 50 Ohm in the final product layout with one of the match configurations below. Depending on matching, NC will apply to certain components.

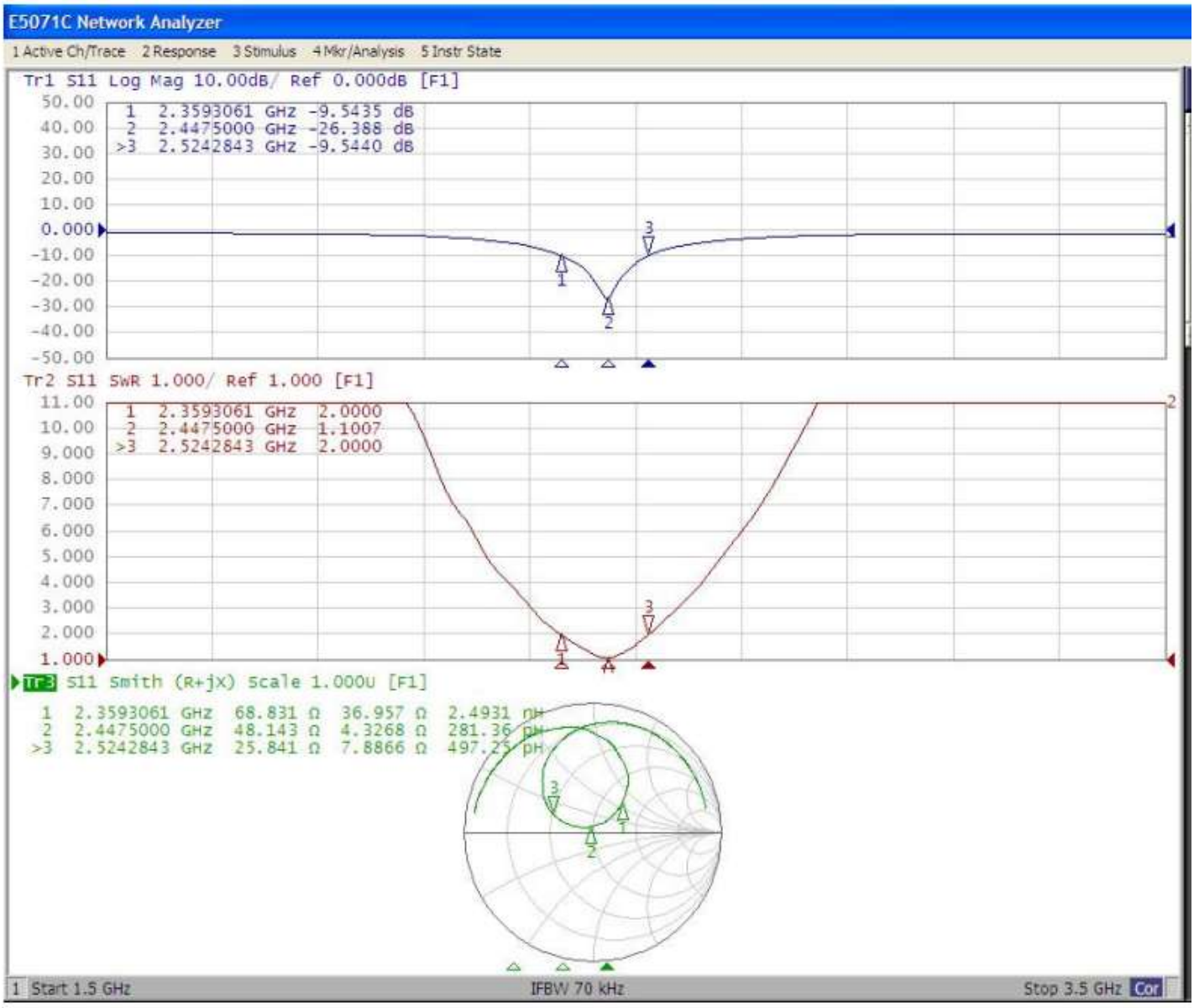
6.3 Antenna Evaluation Board

Figure (6) – Evaluation Board (25 x 25 mm)



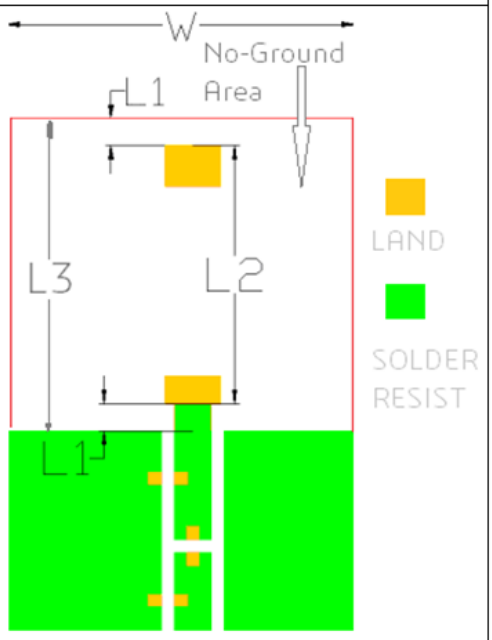
6.4 Electrical Performance with Matching Circuit

Figure (7) – S11 Plots & Smith Chart with matching



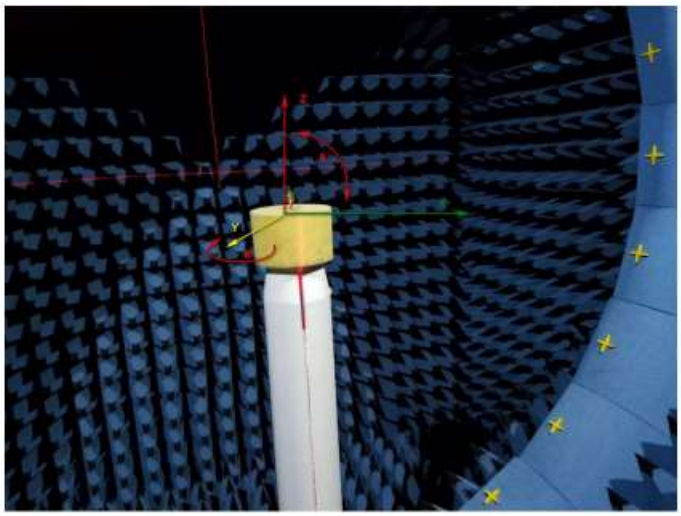
6.5 No-Ground and Layout

Figure (8) – No Ground and Layout Dimensions for AMCA72 Series

PN	Antennna Size	No Ground Area Size (mm min)				Drawing
		L1	L2	L3	W	
AMCA72	7.0 x 2.0 x 1.0	1.5	7.4	10.4	6.8	

6.6 Antenna Orientation Reference

Figure (9) – Antenna Orientation Plane Reference



6.7 2D Radiation Patterns

Figure (10) – 2D Radiation Pattern in X-Y Plane

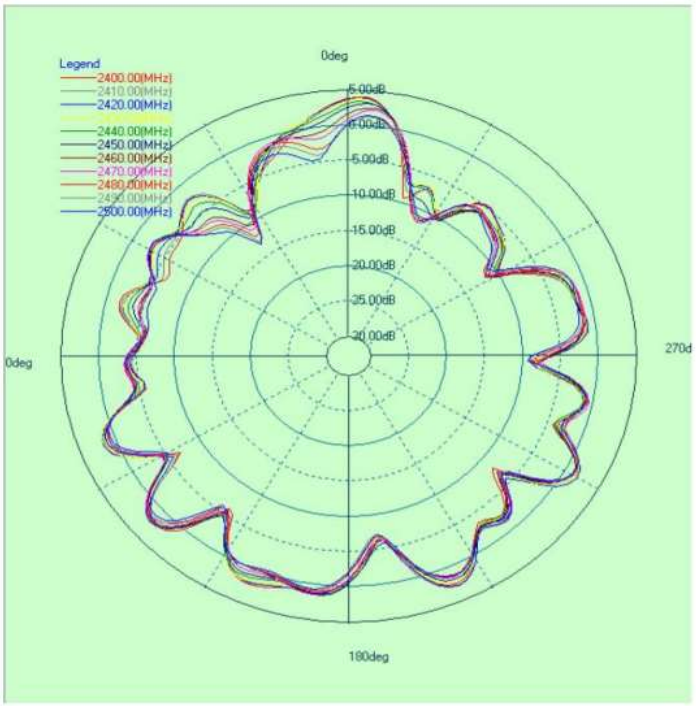


Figure (11) – 2D Radiation Pattern in X-Z Plane

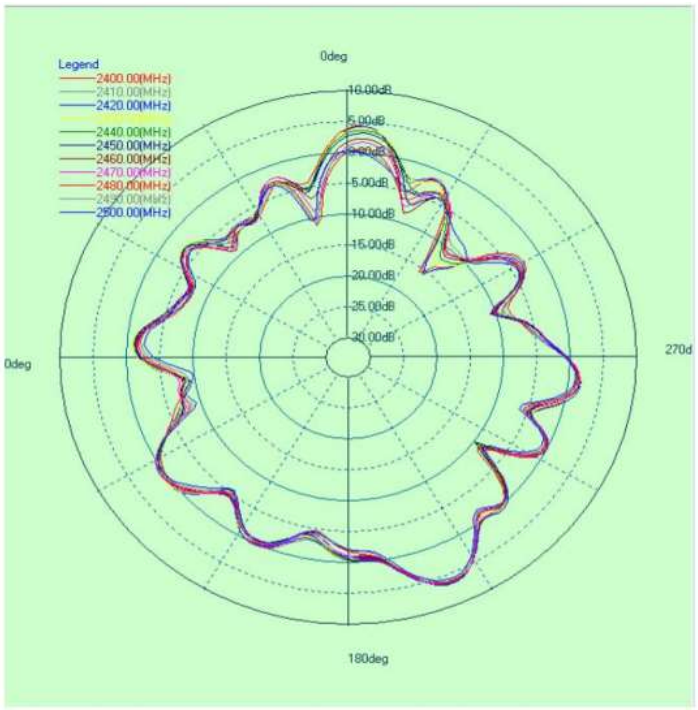
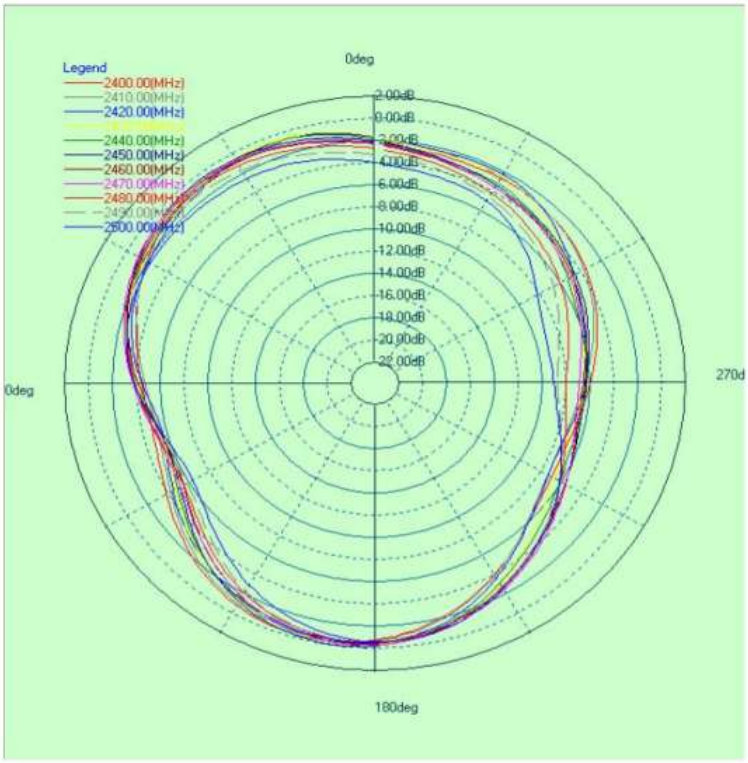


Figure (12) – 2D Radiation Pattern in Y-Z Plane



6.8 3D Radiation Patterns

Figure (13) – 3D Radiation Pattern at 2400MHz

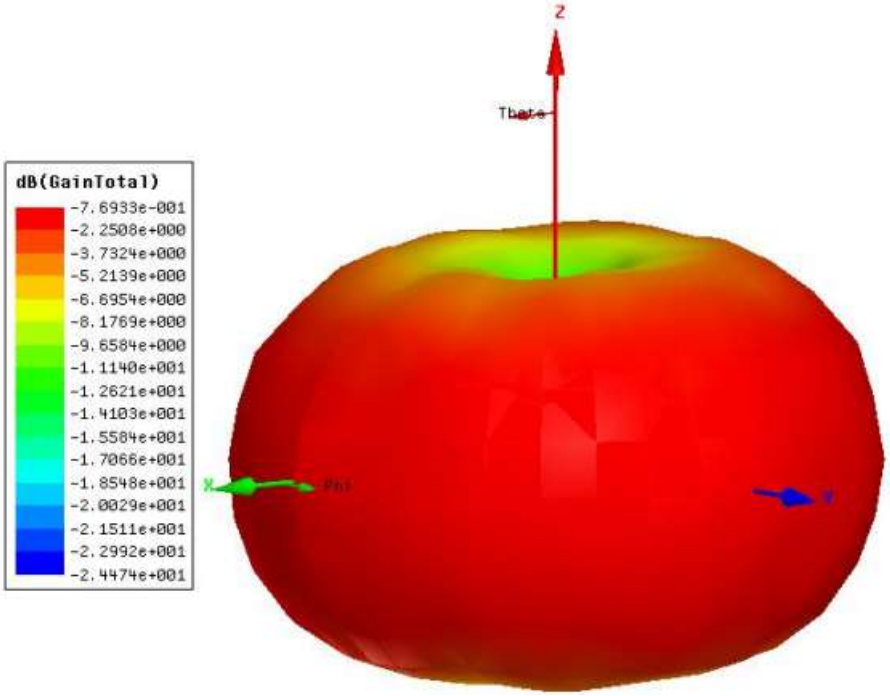


Figure (14) – 3D Radiation Pattern at 2450MHz

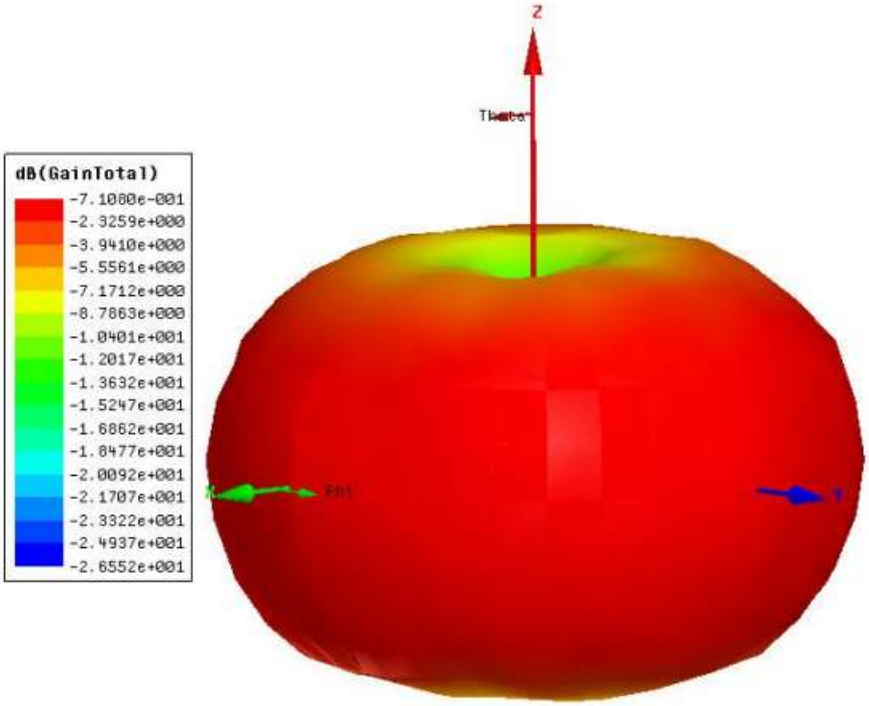
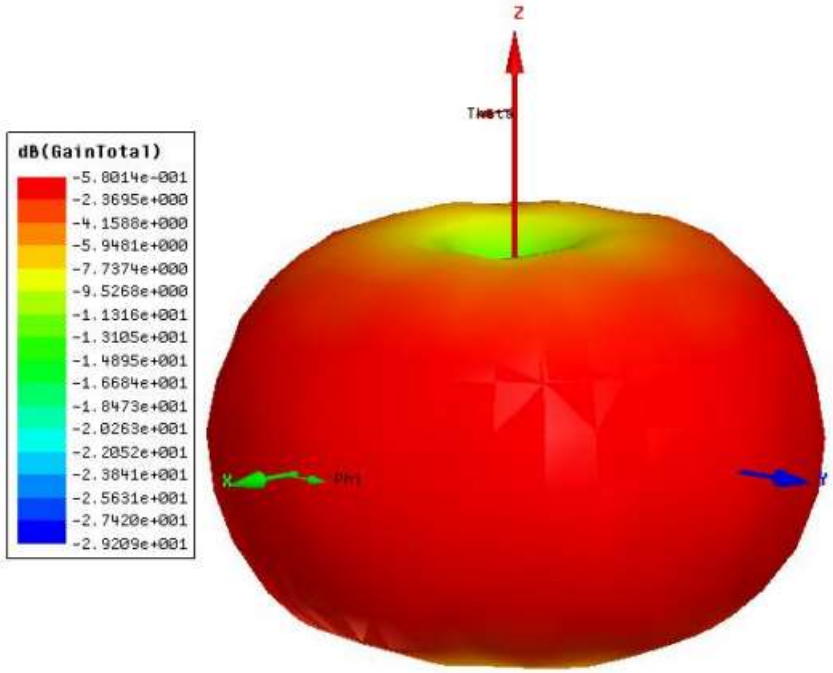
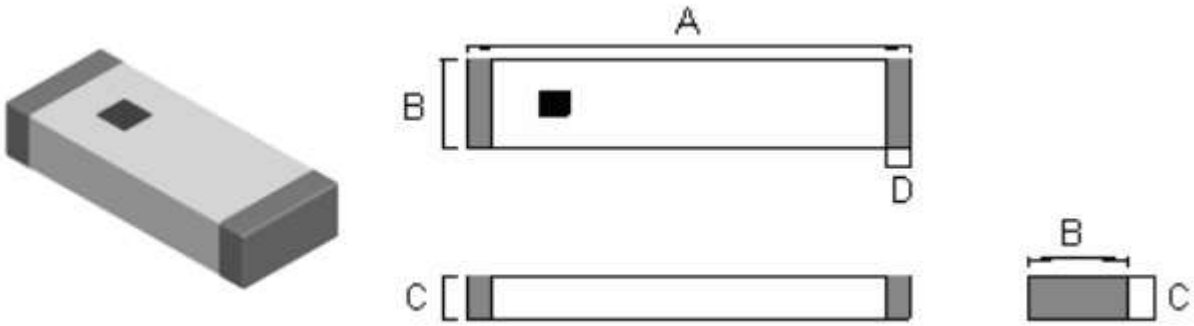


Figure (15) – 3D Radiation Pattern at 2500MHz



7.0 Outside Dimensions and PCB Land Drawing

Figure (16) – Outside Dimensions & PCB Land Drawing for AMCA72-2R470G-S1F-T4



(Dimensions in mm)

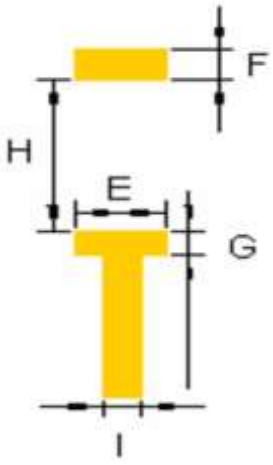


Table (7.0) – Outside and PCB Land Dimensions: mm

Series	A	B	C	D	E	F	G	H	I
AMCA72	7.0±0.2	2.0±0.2	1.0±0.2	0.5±0.2	2.0	1.5	1.0	6.0	1.4

7.1 Terminal Configuration

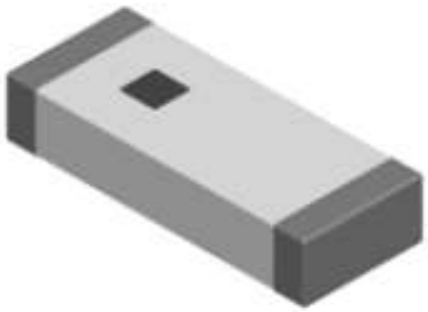
Figure (17) – Terminal identifications

Table (7.1) - Terminal Configuration

No	Terminal Name	No	Terminal Name
Pad 1	**Feed Point**	**Pad 2**	**NC**

8.0 Markings: Black mark, per Section (7.1), other details to be found on reel and packaging.

Figure (18) – AMCA72-2R470G-S1F-T4 Marking

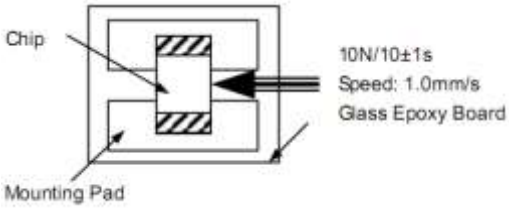


Top Side

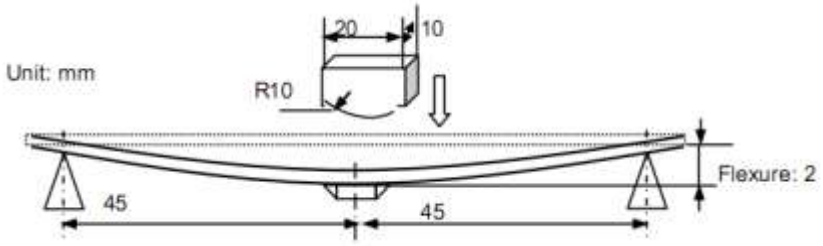
8.1 Marking Method: Black Ink.

9.0 Reliability Tests Conditions

9.1 Terminal Strength

Item	Requirement	Test Method and Remarks
Terminal Strength.	No visible mechanical damage.	① Solder the antenna to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. Then apply a force in the direction of the arrow. ② 10N force for 3216 series. ③ Keep time: 10±1sec. 

9.2 Resistance to Flexure

Item	Requirement	Test Method and Remarks
Resistance to Flexure.	No visible mechanical damage.	① Solder the chip to the test jig (glass epoxy board) using a eutectic solder. Then apply a force in the direction shown as the following figure. Solder the chip antenna to the test jig (glass epoxy board) using eutectic solder. Then apply a force in the direction of the arrow. ② Flexure: 2mm. ③ Pressurizing Speed: 0.5mm/sec. ④ Keep time: ≥30 sec. 

9.3 Drop Test

Item	Requirement	Test Method and Remarks
Drop Test.	No visible mechanical damage.	① AMCA Series: Drop the chip antenna 5 times onto a wood floor from a height of 50 cm.

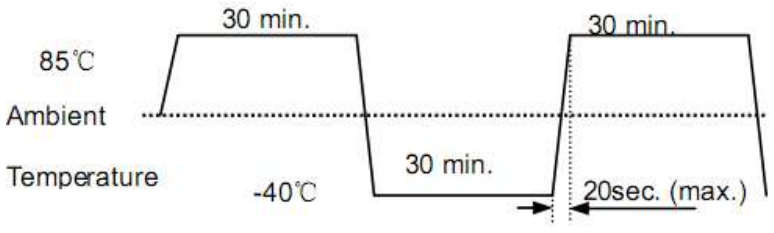
9.4 Solderability

Item	Requirement	Test Method and Remarks
Solderability.	① No visible mechanical damage. ② Wetting shall be exceeded 75% coverage.	① Solder Temperature: 240±2℃. ② Duration: 3sec. ③ Solder: Sn/3.0Ag/0.5Cu. ④ Flux: 25% Resin and 75% ethanol in weight.

9.5 Resistance to Soldering Heat

Item	Requirement	Test Method and Remarks
Resistance to Soldering Heat.	No visible mechanical damage.	① Solder Temperature: 260±5℃. ② Duration: 5 sec. ③ Solder: Sn/3.0Ag/0.5Cu. ④ Flux: 25% Resin and 75% ethanol in weight. ⑤ The chip antenna shall be stabilized at normal condition for 1~2 hours before measuring.

9.6 Thermal Shock

Item	Requirement	Test Method and Remarks
Thermal Shock.	① No visible mechanical damage. ② Satisfy electrical Characteristic.	① Temperature and time: -40 for 30±3 min→85 for ℃℃ 30±3min. ② Transforming interval: Max. 20 sec. ③ Tested cycle: 10 cycles. ④ The chip antenna shall be stabilized at normal condition for 1~2 hours before measuring. 

9.7 Damp Heat (Steady States)

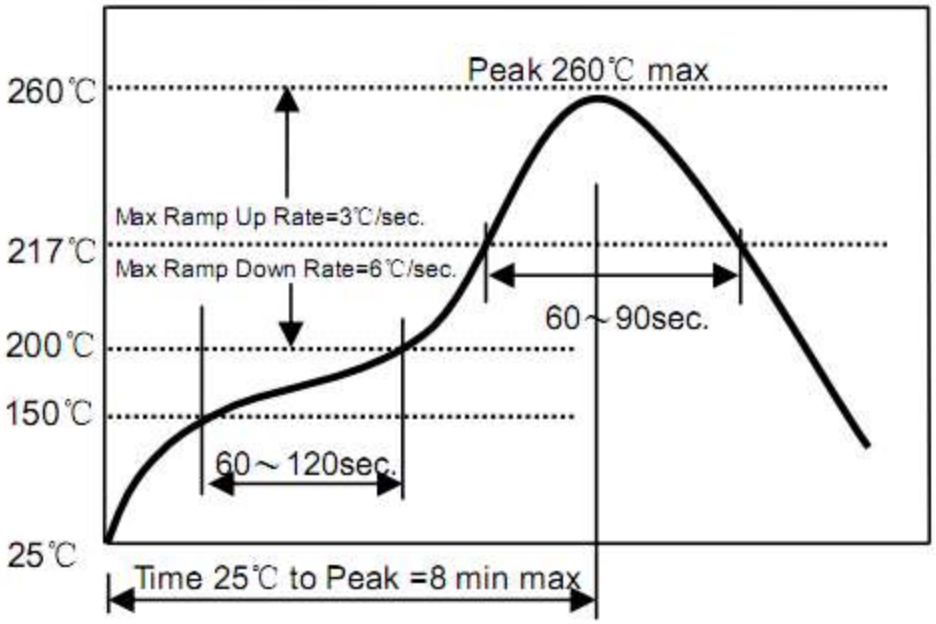
Item	Requirement	Test Method and Remarks
Damp Heat.	① No visible mechanical damage. ② Satisfy electrical Characteristic.	① Temperature: 60±2℃. ② Humidity: 90% to 95% RH. ③ Duration: 96+24 hours. ④ The chip antenna shall be stabilized at normal condition for 1~2 hours before measuring.

9.8 Resistance to High Temperature

Item	Requirement	Test Method and Remarks
Resistance to High Temperature	① No visible mechanical damage. ② Satisfy electrical Characteristic.	① Temperature: 85±2℃. ② Duration: 96+24 hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.

10.0 Reflow Profile:

Figure (19) – Reflow Profile



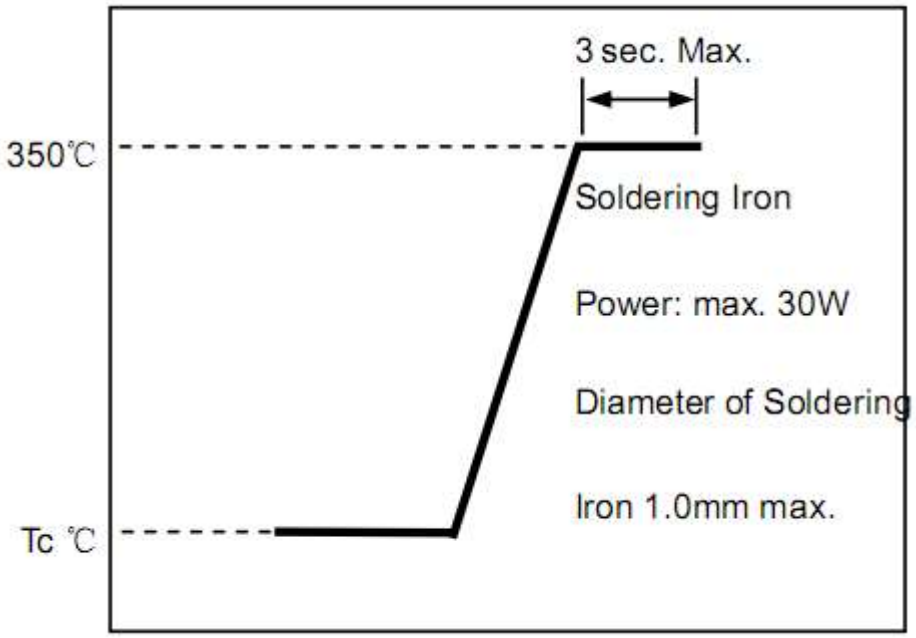
- Preheat condition: 150 ~200 / 60~120 ℃ sec.
- Allowed time above 217℃: 60~90sec.
- Max temp: 260℃.
- Max time at max temp: 10sec.
- Solder paste: Sn/3.0Ag/0.5Cu.
- Allowed Reflow time: 2x max.

[Note: The reflow profile in the above table is only for qualification and is not meant to specify board assembly profiles. Actual board assembly profiles must be based on the customer's specific board design, solder paste and process, and should not exceed the parameters as the Reflow profile shows.]

10.1 Manual Soldering

Pre-heating Temperature: 120℃, 60 ~ 300 sec.

Figure (20) – Manual Solder Profile



- Iron soldering power: Max.30W.
- Pre-heating: 150 / 60 sec ℃.
- Soldering Tip temperature: 350 Max ℃.
- Soldering time: 3 sec Max.
- Solder paste: Sn/3.0Ag/0.5Cu.
- Max 1 times for iron soldering.
- Soldering Temperature: 340℃±5℃, 5sec max per each terminal.

[Note: Take care not to apply the tip of the soldering iron to the terminal electrodes.]

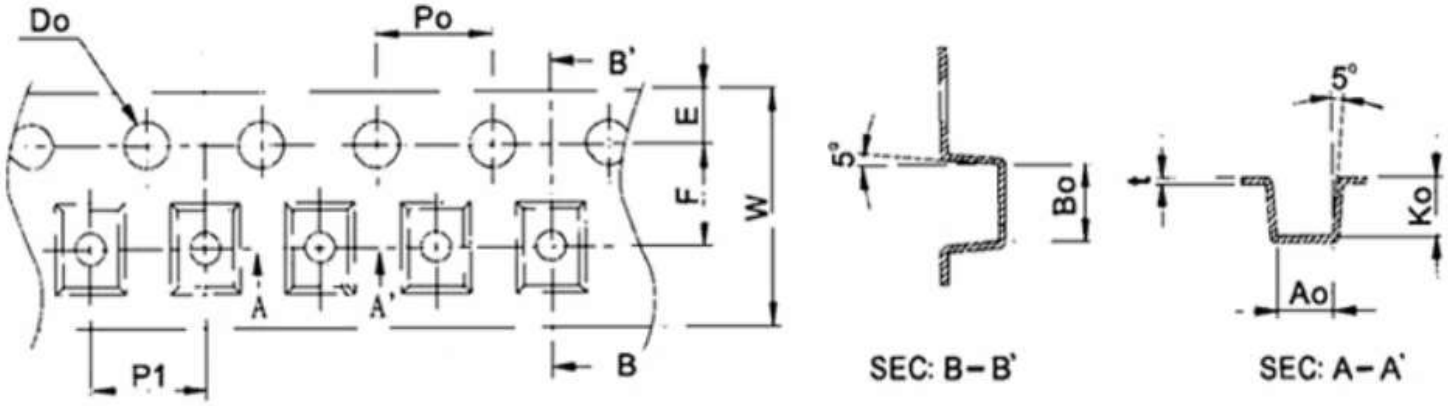
11.0 Packaging: Packaging: T4=4000 Units per reel

11.1 Package Handling and Storage Precautions

- The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to high humidity. Package must be stored at 40 ℃or less and 70% RH or less.
- The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to dust of harmful gas (e.g. HCl, sulfurous gas of H2S).
- Packaging material may be deformed if package are stored where they are exposed to heat of direct sunlight.
- Solderability specified in Para 9.4 shall be guaranteed for 6 months from the date of delivery on condition that they are stored at the environment specified in Para 1.1. For those parts, which passed more than 6 months shall be checked solder-ability before use.

12.0 Tape Dimensions :

Figure (21) – Tape Dimensions (AMCA72)



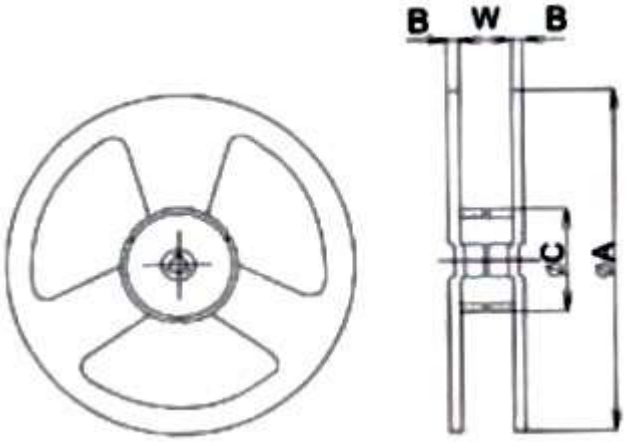
(Dimensions: mm)

Table (12.0) – Tape Dimensions: mm

W	16.0±0.10	**D0**	1.50 +0.10 / -0.0
P1	8.0±0.10	**P0**	4.0±0.10
E	1.75±0.10	**K0**	1.40±0.10
F	7.50±0.15	**A0**	2.30±0.10
B0	7.50±0.10	**t**	0.3±0.05

12.1 Reel Dimensions:

Figure (22) – Reel Dimensions

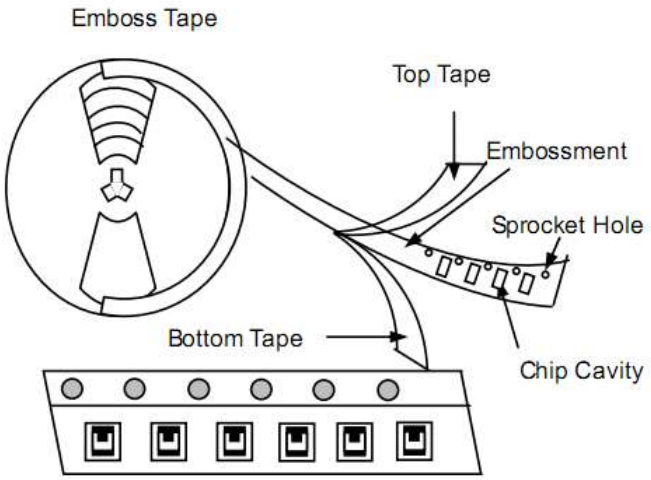


(Dimensions in mm)

Table (12.1) – Reel Dimensions: mm

Type	Spec	Dimensions			
		A	W	C	B
AMCA72	13”*16mm	330±1	16.5±0.2	100±0.5	2.3±0.2

Figure (23) - Mounting Direction of Tape on Reel



Note: The sprocket holes are to the right as the tape is pulled toward the user.