



GNSS & WiFi Ceramic Chip Antenna
Model: AA089
TELA Series
Product Number: H2U94W1H1G0300

REFERENCE SPECIFICATION

Table of Contents

1	Introduction	3
2	Electrical Characteristics.....	4
2.1	Table with electrical properties for Individual signal mode:	4
2.2	Table with electrical properties for Combined signal mode:.....	5
2.3	Return Loss (S_{11}) of GPS band for Individual signal mode	6
2.4	VSWR (S_{11}) of GPS band for Individual signal mode.....	6
2.5	Return Loss (S_{11}) of WiFi (B.T.) band for Individual signal mode	7
2.6	VSWR (S_{11}) of WiFi (B.T.) band for Individual signal mode	7
2.7	Isolation between GPS Band & WiFi (B.T.) Band.....	8
2.8	Return Loss (S_{11}) of GPS band for Combined signal mode.....	9
2.9	VSWR (S_{11}) of GPS band for Combined signal mode.....	9
2.10	Efficiency Table for Individual signal mode.....	10
2.11	Efficiency Table for Combined signal mode.....	10
2.12	Efficiency vs. Frequency for Individual signal mode	11
2.13	Efficiency vs. Frequency for Combined signal mode	12
2.14	Radiation Pattern for Individual signal mode (with 80x40mm ² Evaluation Board).....	13
2.15	Radiation Pattern for Combined signal mode (with 80x40mm ² Evaluation Board).....	15
3	Layout	17
3.1	Antenna Dimensions	17
3.2	Evaluation Board for Individual Signal Input.....	18
3.3	Evaluation Board for Combined Signal Input	18
3.4	Solder Land Pattern.....	19
4	Frequency tuning.....	20
5	Packing.....	21
5.1	Packing Process	24
6	Notes.....	25
6.1	Typical Soldering Profile for Lead-free Process.....	25
6.2	Operating and storage conditions:.....	26
6.3	Installation guide:.....	26
6.4	Reminders for users of Unictron's AA089 ceramic chip antennas	26

1 Introduction

Unictron's AA089 ceramic chip antenna is designed for GPS & Wi-Fi (B.T.) 2.4GHz band applications, covering frequencies 1575.42 MHz & 2400~2484MHz. Fabricated with proprietary design and processes, AA089 shows excellent performance and is fully compatible with SMT processes which can decrease the assembly cost and improve device's quality and consistency.

Features

- * Stable and reliable in performances
- * Good isolation between GPS bands and WiFi (Bluetooth) bands
- * Low profile, compact size
- * RoHS compliance
- * SMT processes compatible
- * Compatible with individual signal input or combined signal input

Applications

- * For GPS applications
- * For Wi-Fi/ Bluetooth/ BLE/ ZigBee/ 2.4GHz applications
- * For wireless devices when both GPS and Wi-Fi(Bluetooth) functions are needed, e.g., Smart phone, Tablet PC, Tracker, Real time video recorder. Smart watch, etc.

2 Electrical Characteristics

2.1 Table with electrical properties for Individual signal mode:

Electrical Specifications (Evaluation Board Dimensions: 80 x 40 mm²)

Electrical Table (GPS Band)			
Characteristics		Specifications	Unit
Outline Dimensions		3.2 x 1.6 x 0.5	mm
Ground Plane Dimensions		80 x 40	mm
Working Frequency		1575.42	MHz
Isolation (S ₂₁)		≤ -20 (typical)	dB
VSWR (@center frequency)*		2 Max	
Characteristic Impedance		50	Ω
Polarization		Linear Polarization	
Peak Gain	(@1575.42 MHz)	1.3 (typical)	dBi
Efficiency		61 (typical)	%

*Center frequency means the frequency with the lowest value in return loss of the chip antenna on the evaluation board.

Electrical Table (WiFi & B.T. Band)			
Characteristics		Specifications	Unit
Working Frequency		2400 – 2500	MHz
Isolation		≤ -16 (typical)	dB
VSWR (@center frequency)*		2 Max	
Characteristic Impedance		50	Ω
Polarization		Linear Polarization	
Peak Gain	(@2442 MHz)	1.8 (typical)	dBi
Efficiency		68 (typical)	%

*Center frequency means the frequency with the lowest value in return loss of the chip antenna on the evaluation board.

2.2 Table with electrical properties for Combined signal mode:

Electrical Specifications (Evaluation Board Dimensions: 80 x 40 mm²)

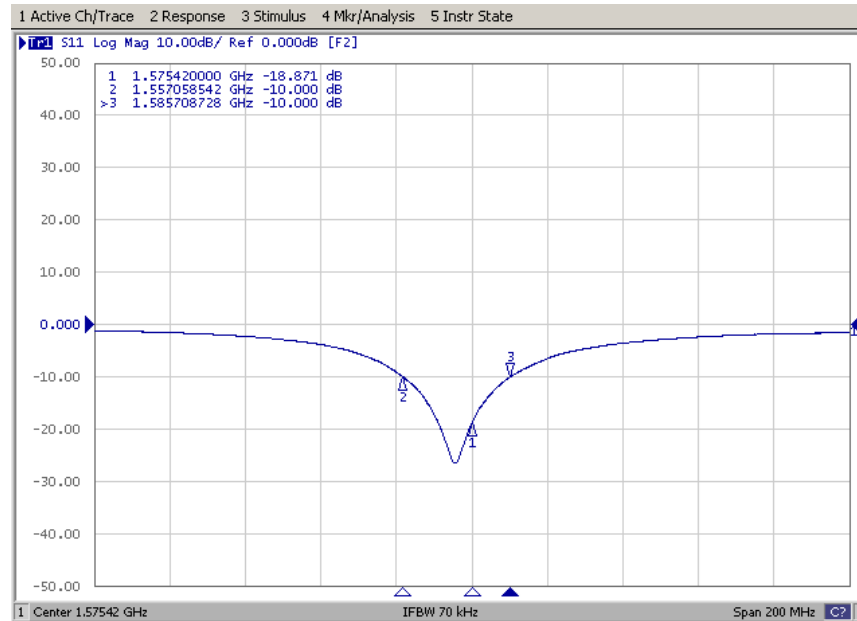
Electrical Table (GPS Band)			
Characteristics		Specifications	Unit
Outline Dimensions		3.2x1.6x0.5	mm
Ground Plane Dimensions		80x40	mm
Working Frequency		1575.42	MHz
VSWR (@ center frequency)*		2 Max (typical)	
Characteristic Impedance		50	Ω
Polarization		Linear Polarization	
Peak Gain	(@1575.42 MHz)	2.0 (typical)	dBi
Efficiency		65 (typical)	%

*Center frequency means the resonance frequency of chip antenna on the evaluation board.

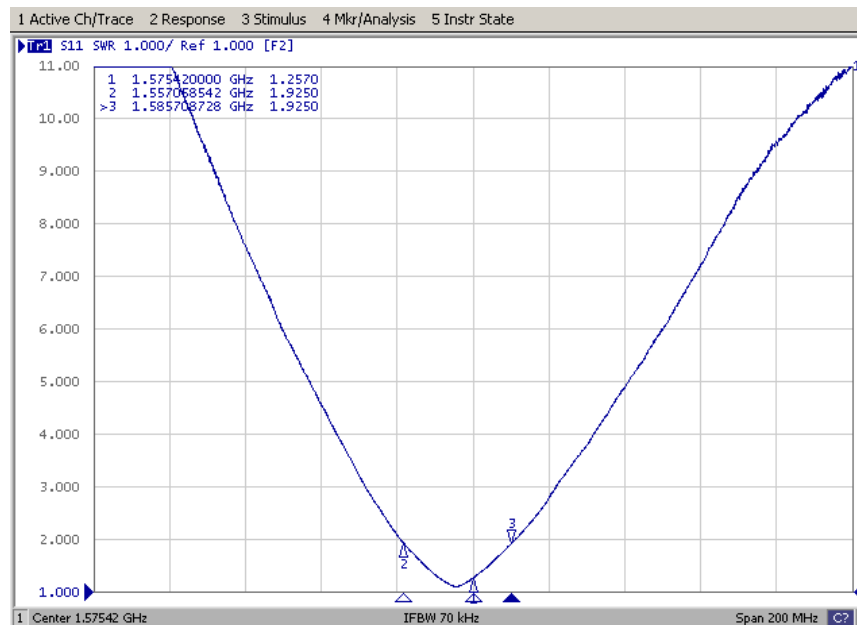
Electrical Table (WiFi & B.T. Band)			
Characteristics		Specifications	Unit
Working Frequency		2400 – 2500	MHz
VSWR (@ center frequency)*		2 Max (typical)	
Characteristic Impedance		50	Ω
Polarization		Linear Polarization	
Peak Gain	(@2442 MHz)	-0.4 (typical)	dBi
Efficiency		54 (typical)	%

*Center frequency means the resonance frequency of chip antenna on the evaluation board.

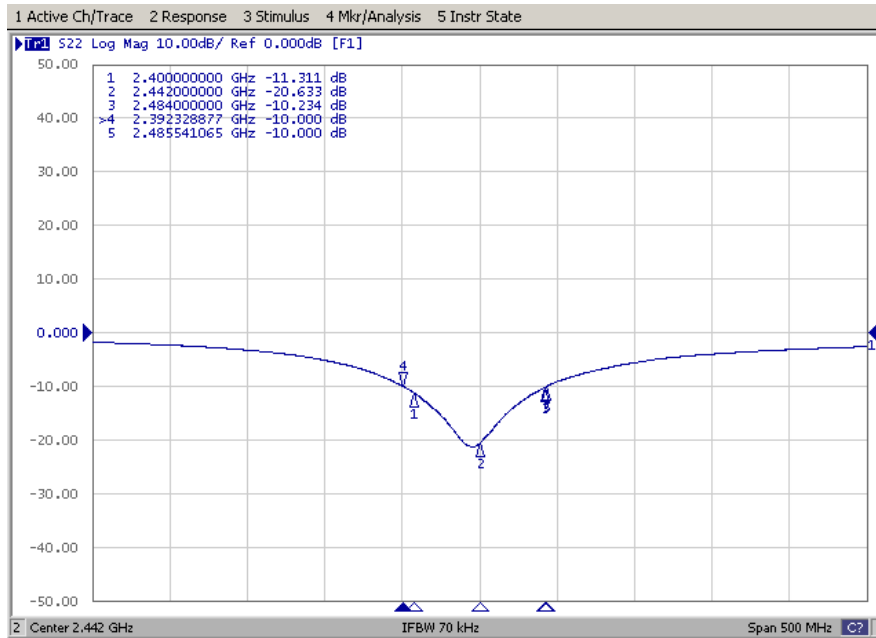
2.3 Return Loss (S_{11}) of GPS band for Individual signal mode



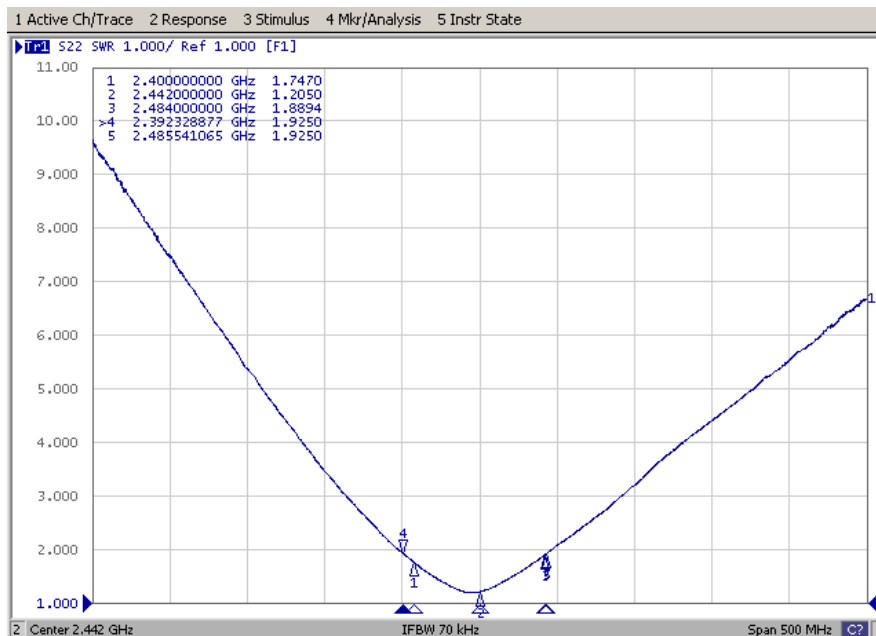
2.4 VSWR (S_{11}) of GPS band for Individual signal mode



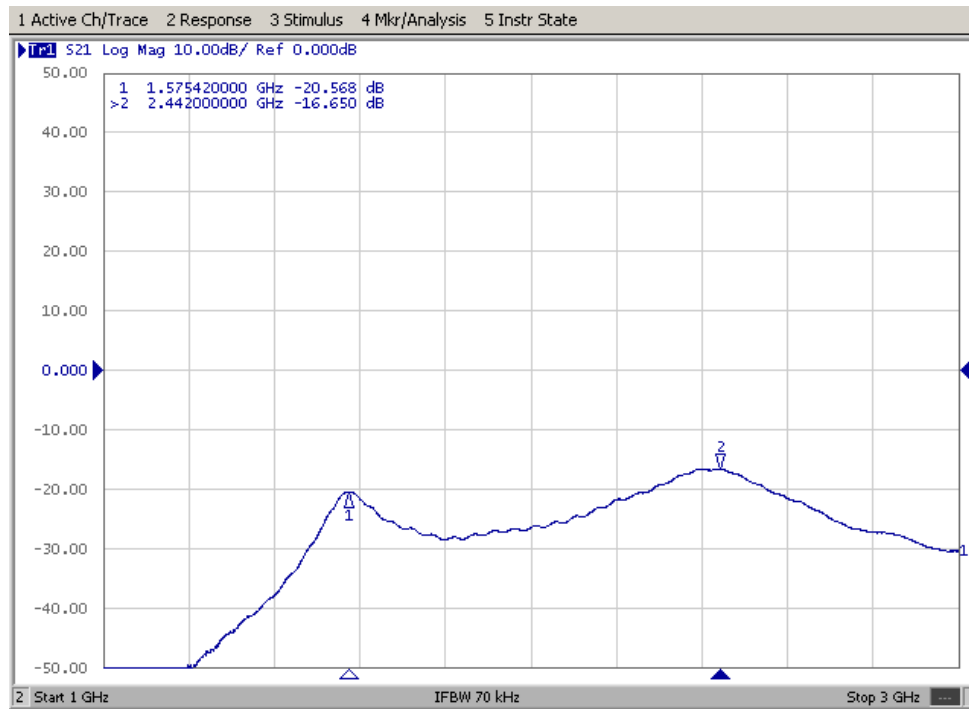
2.5 Return Loss (S_{11}) of WiFi (B.T.) band for Individual signal mode



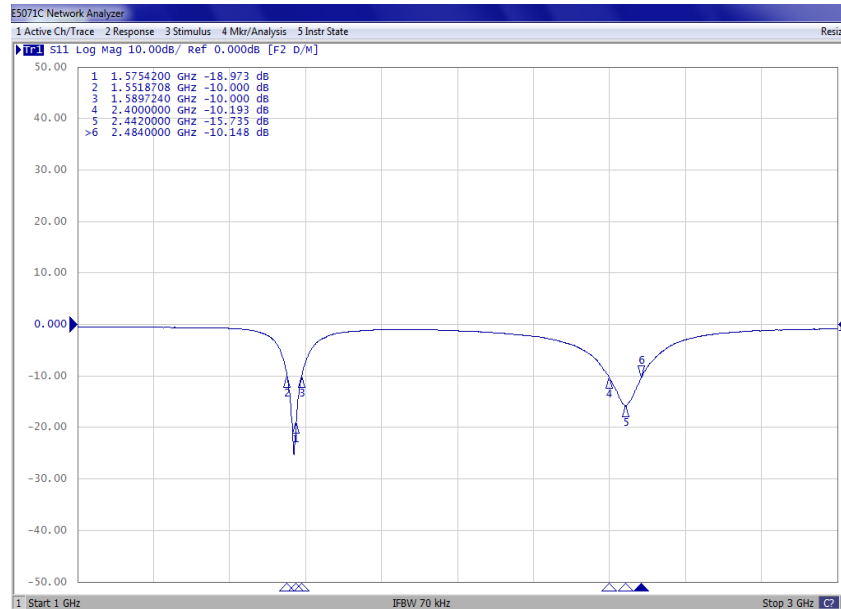
2.6 VSWR (S_{11}) of WiFi (B.T.) band for Individual signal mode



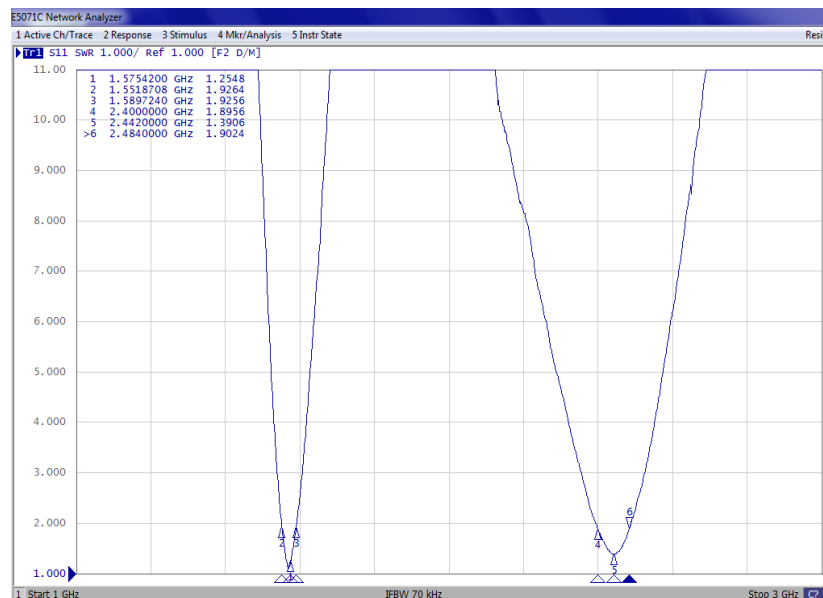
2.7 Isolation between GPS Band & WiFi (B.T.) Band



2.8 Return Loss (S_{11}) of GPS band for Combined signal mode



2.9 VSWR (S_{11}) of GPS band for Combined signal mode



2.10 Efficiency Table for Individual signal mode

GPS:

Frequency(MHz)	1570	1571	1572	1573	1574	1575	1576	1577	1578	1579	1580
Efficiency(dB)	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.2	-2.2	-2.2
Efficiency(%)	61.0	61.4	61.7	61.6	61.4	61.4	61.3	61.0	60.7	60.6	60.0
Gain(dBi)	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.1	1.1

WiFi (B.T.)

Frequency(MHz)	2400	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	2500
Efficiency(dB)	-2.2	-2.1	-2.0	-1.9	-1.8	-1.7	-1.7	-1.6	-1.7	-1.6	-1.6	-1.6	-1.6	-1.8	-2.2	-2.5
Efficiency(%)	59.6	61.1	63.8	64.7	66.1	67.7	68.1	68.7	68.1	68.9	69.0	69.2	68.5	66.4	59.7	56.6
Gain(dBi)	1.7	1.6	1.7	1.7	1.7	1.7	1.8	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.6	1.5

2.11 Efficiency Table for Combined signal mode

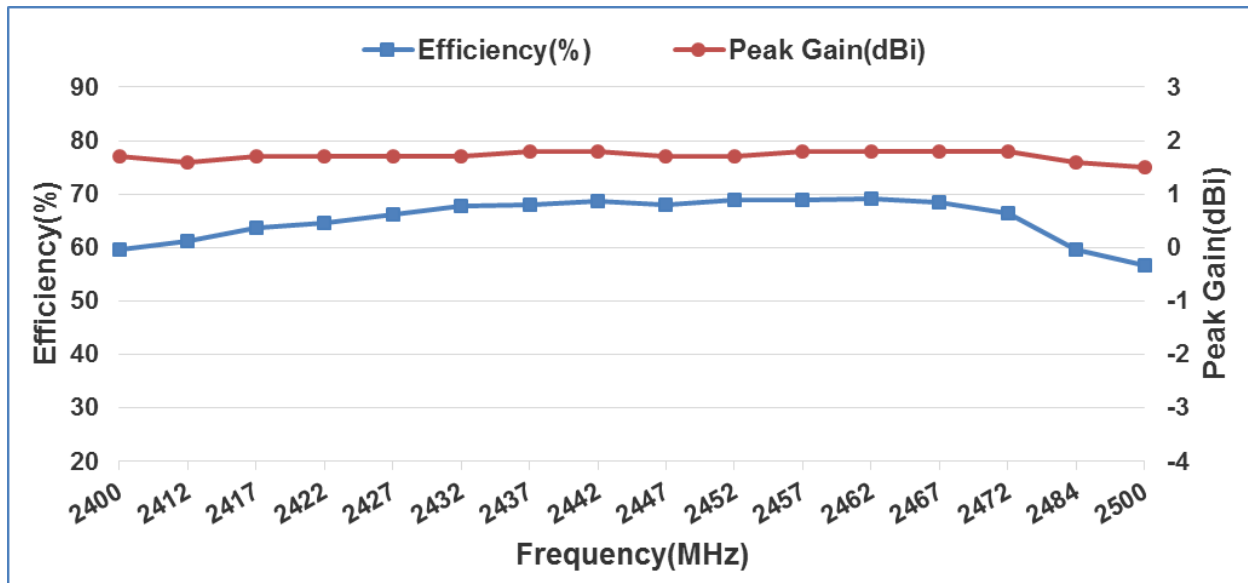
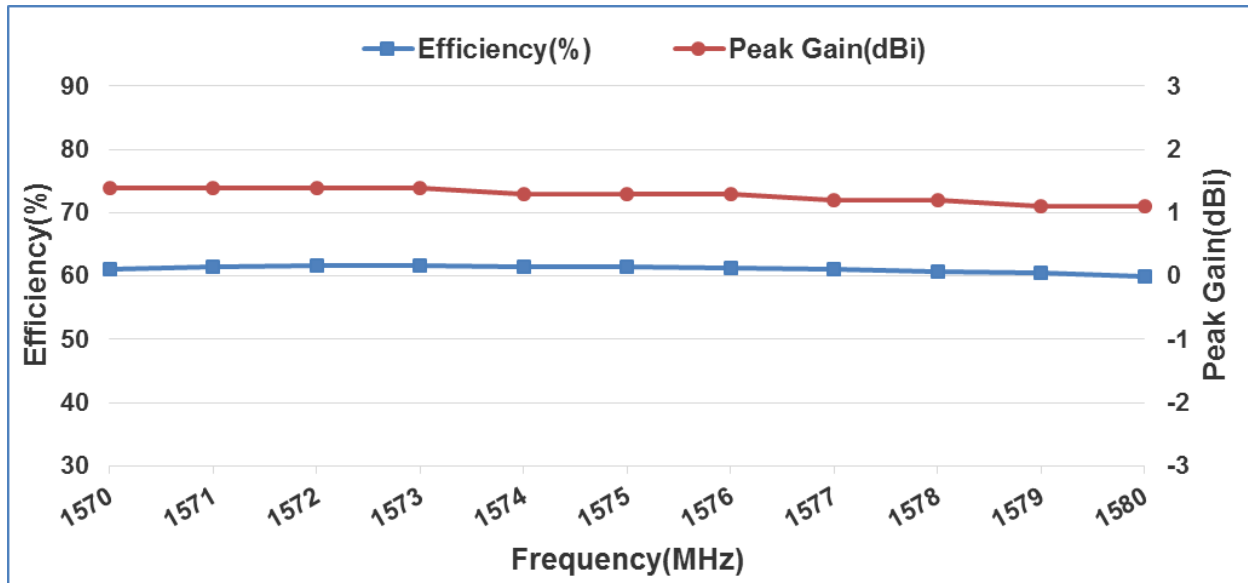
GPS:

Frequency(MHz)	1570	1571	1572	1573	1574	1575	1576	1577	1578	1579	1580
Efficiency(dB)	-2.0	-1.9	-1.9	-1.9	-1.9	-1.8	-1.8	-1.8	-1.8	-1.7	-1.8
Efficiency(%)	63.7	64.4	65.0	65.0	65.2	65.5	65.9	66.4	66.7	67.0	66.8
Gain(dBi)	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.1

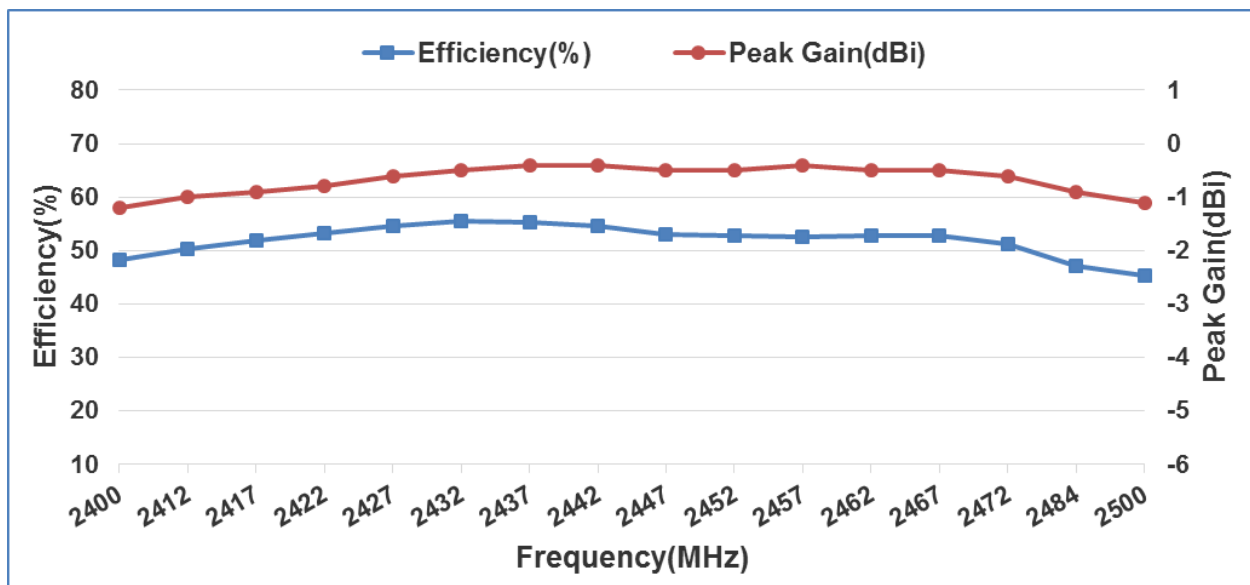
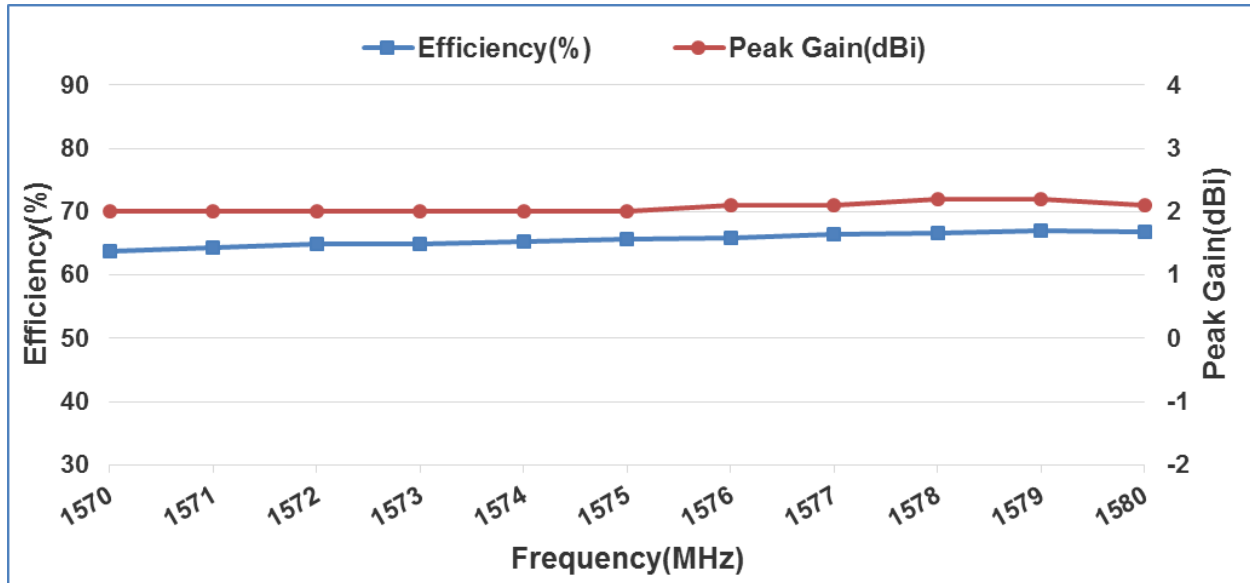
WiFi (B.T.)

Frequency(MHz)	2400	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462	2467	2472	2484	2500
Efficiency(dB)	-3.2	-3.0	-2.9	-2.7	-2.6	-2.6	-2.6	-2.6	-2.8	-2.8	-2.8	-2.8	-2.8	-2.9	-3.3	-3.4
Efficiency(%)	48.2	50.2	51.8	53.3	54.5	55.5	55.2	54.7	53.0	52.8	52.6	52.8	52.8	51.1	47.1	45.2
Gain(dBi)	-1.2	-1.0	-0.9	-0.8	-0.6	-0.5	-0.4	-0.4	-0.5	-0.5	-0.4	-0.5	-0.5	-0.6	-0.9	-1.1

2.12 Efficiency vs. Frequency for Individual signal mode

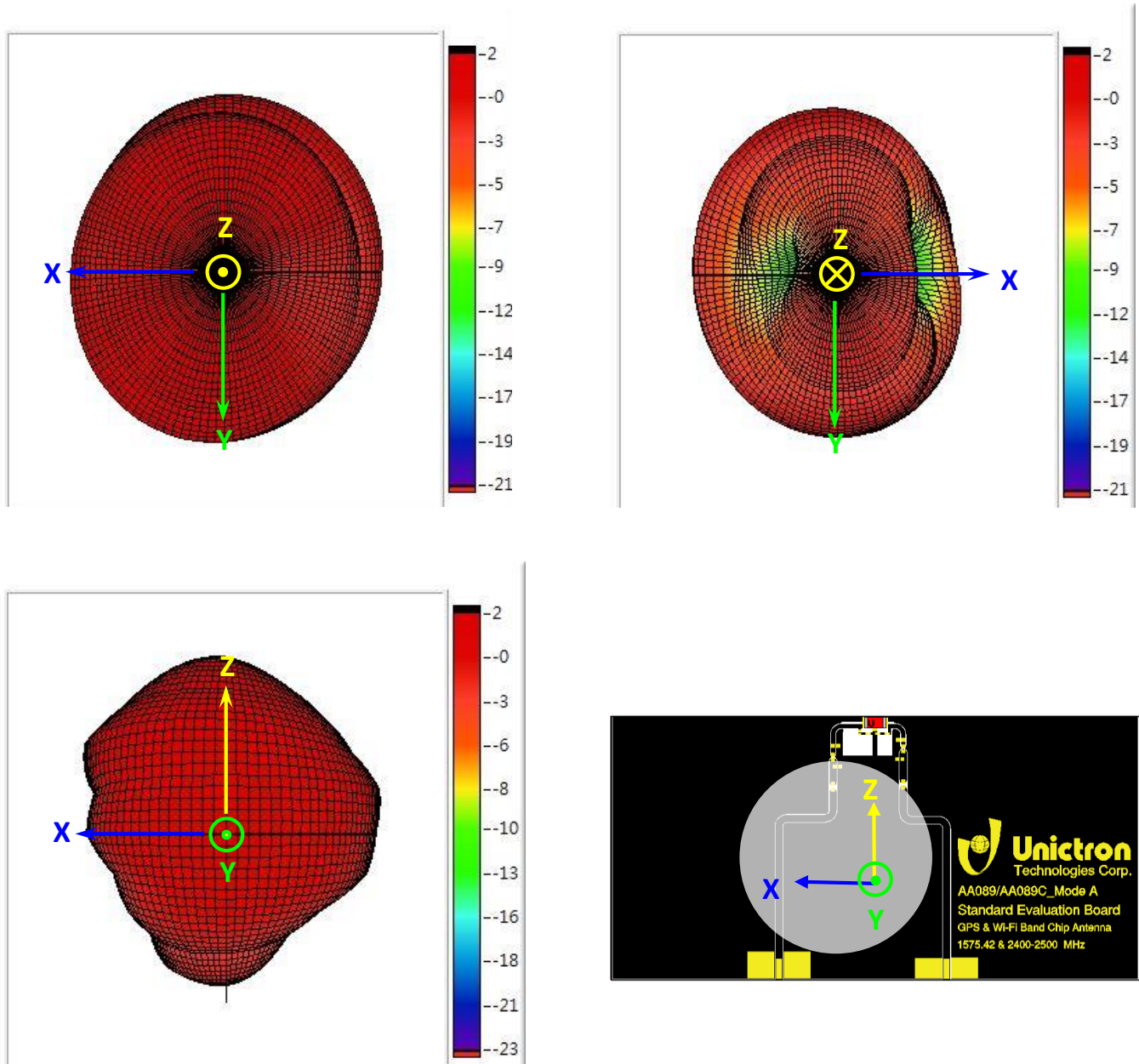


2.13 Efficiency vs. Frequency for Combined signal mode

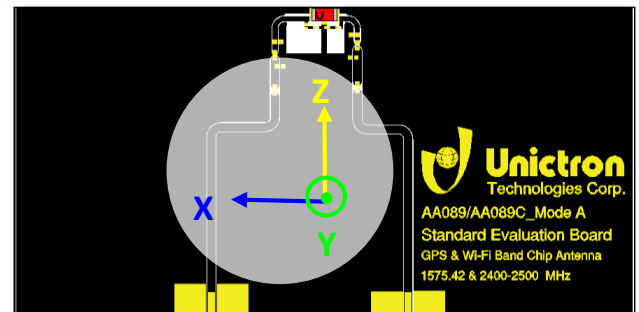
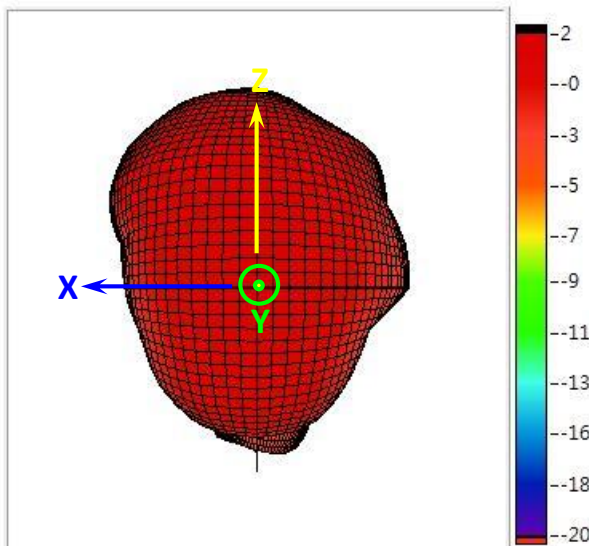
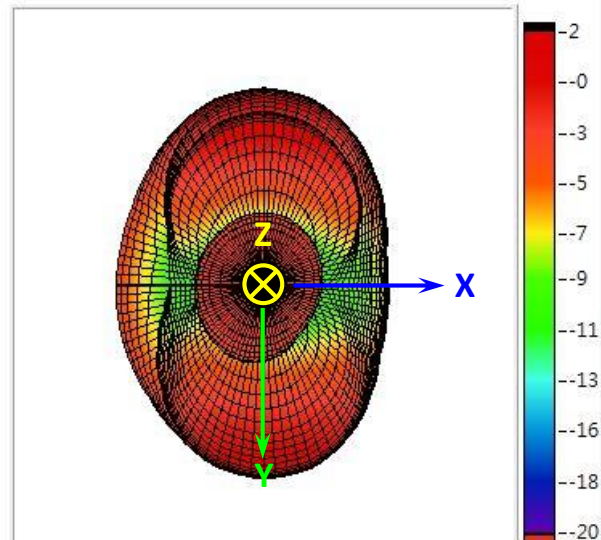
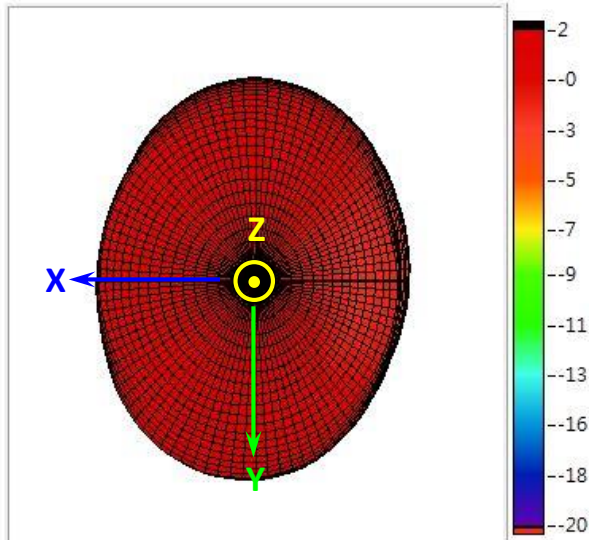


2.14 Radiation Pattern for Individual signal mode (with 80x40mm² Evaluation Board)

3D Gain Pattern @ 1575 MHz (unit: dBi)

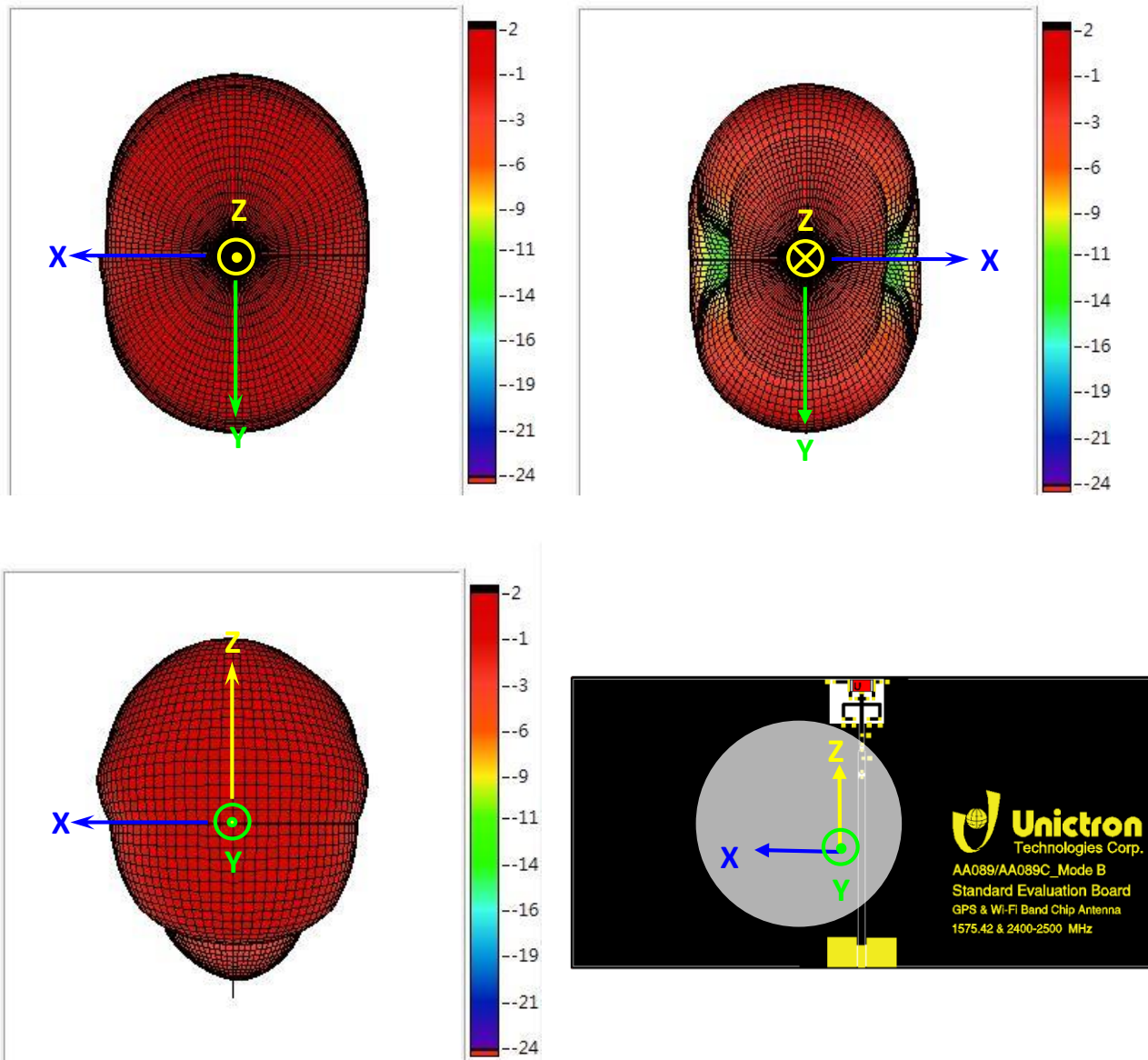


3D Gain Pattern @ 2442 MHz (unit: dBi)

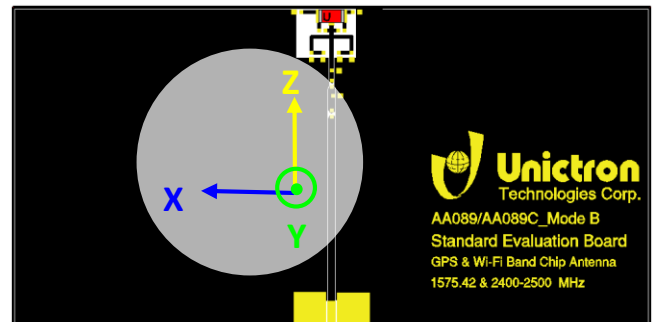
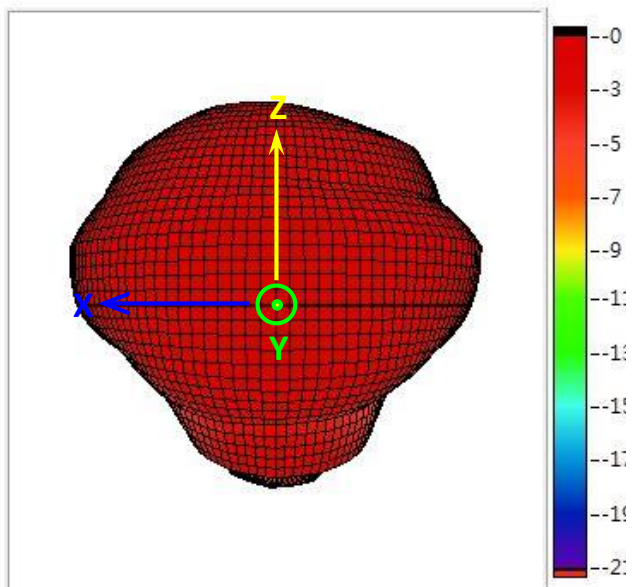
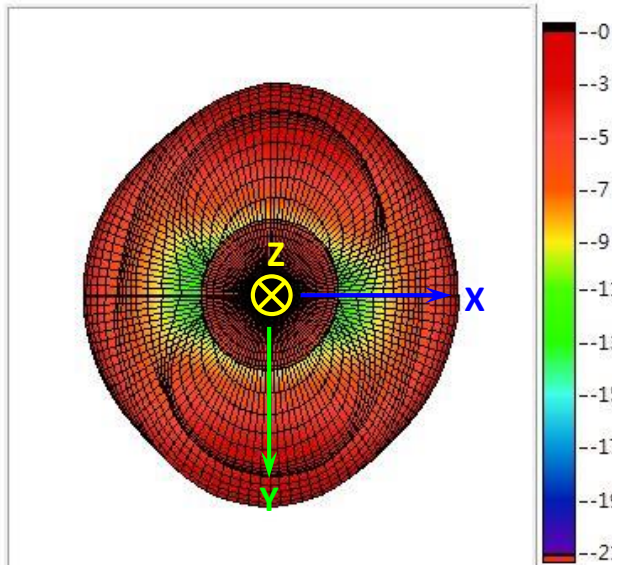
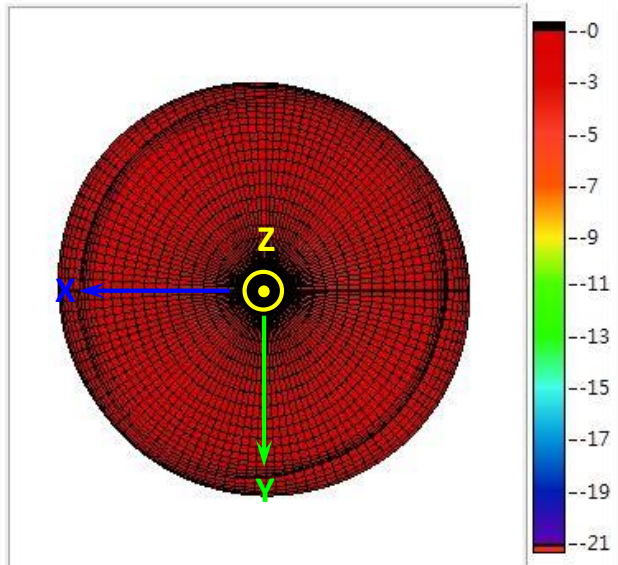


2.15 Radiation Pattern for Combined signal mode (with 80x40mm² Evaluation Board)

3D Gain Pattern @ 1575.42 MHz (unit: dBi)

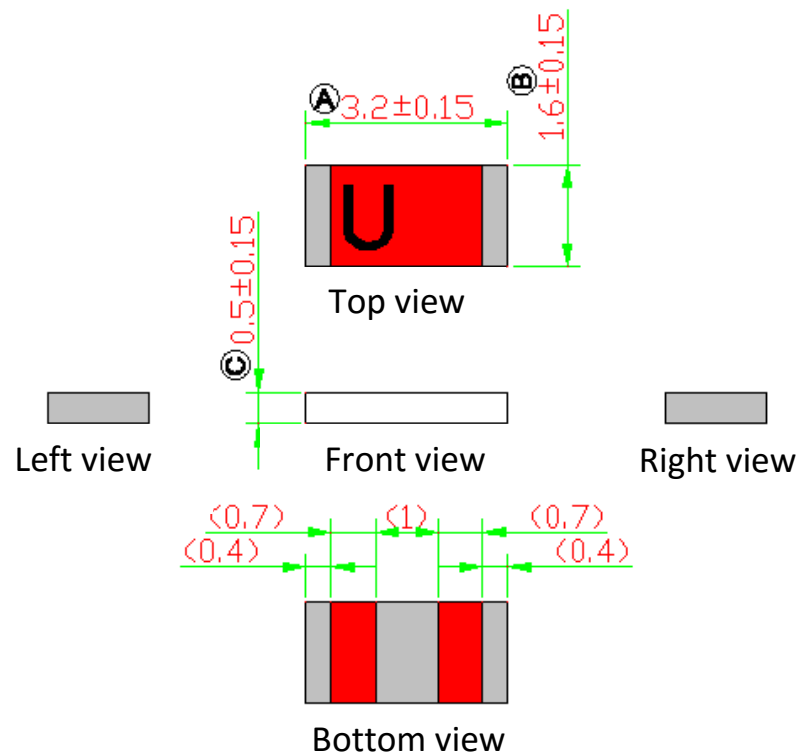


3D Gain Pattern @ 2442 MHz (unit: dBi)

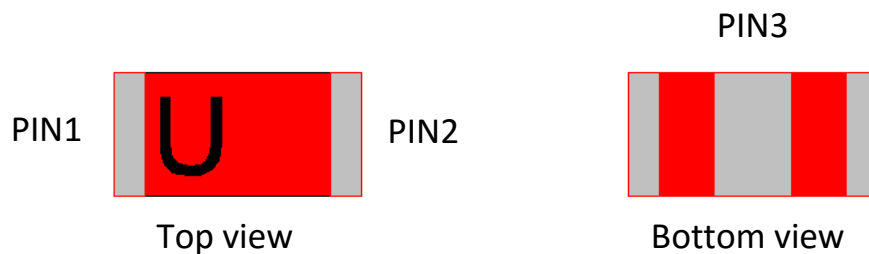


3 Layout

3.1 Antenna Dimensions

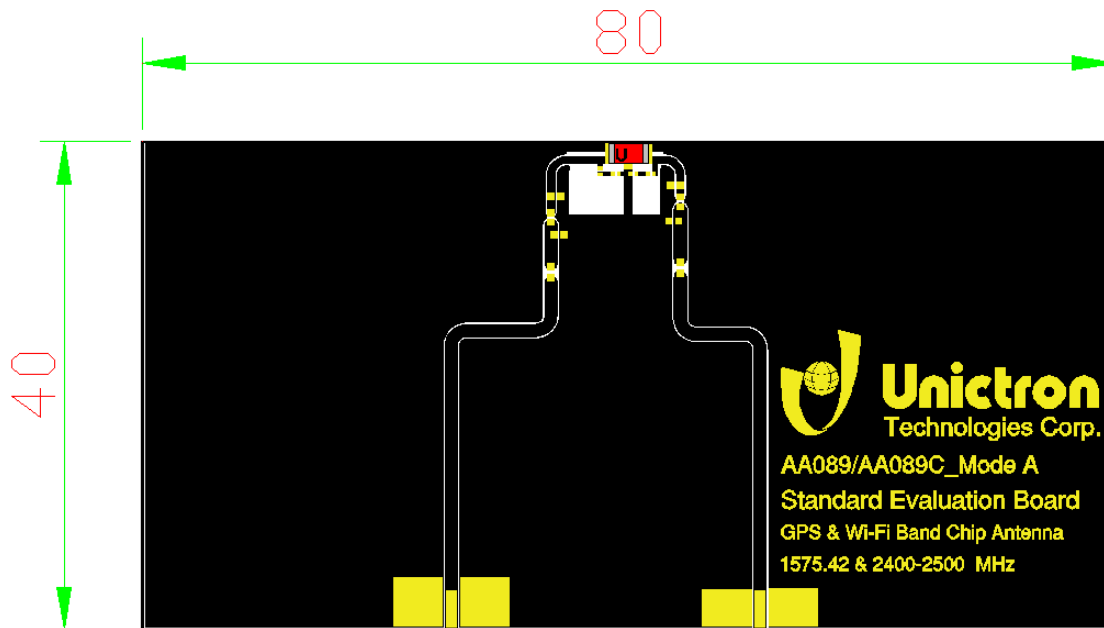


PIN Definitions



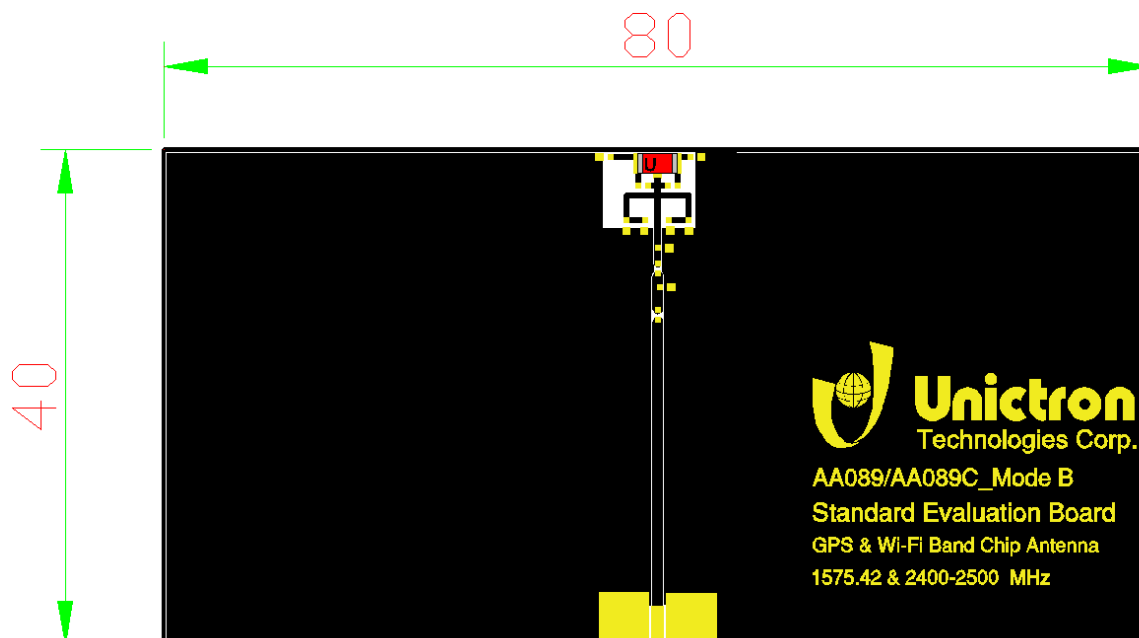
PIN	1	2	3
Soldering PAD (Individual signal)	GPS Signal	Wi-Fi & B.T. Signal	Tuning / Ground
Soldering PAD (Combined signal)	Tuning / Ground	Tuning / Ground	GPS & Wi-Fi(B.T.) Signal

3.2 Evaluation Board for Individual Signal Input



Unit: mm

3.3 Evaluation Board for Combined Signal Input



Unit: mm

3.4 Solder Land Pattern

Request detailed solder land pattern layout from Unictron at e-sales@unictron.com Please let us know whether you are implementing the individual signal input (one for GPS and one for WiFi/BT) or combined signal input (one signal input for both GPS and WiFi/BT).

4 Frequency tuning

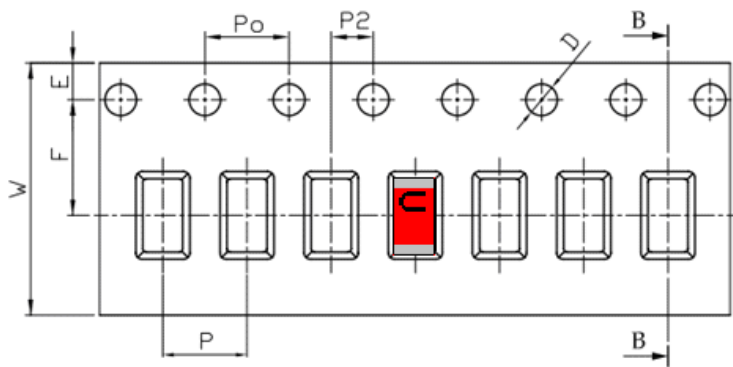
The center frequency of GPS and WiFi (B.T.) band can be adjusted by antenna's frequency tuning elements. The value of frequency tuning elements depends on the device environment (e.g. size of the PCB, antenna placement on the PCB). Unictron will help you with tuning service based on your PCB layout. For the best results we recommend to do tuning on the real device, please send us your demo device for evaluation.

The standard values of matching and tuning components used on the Unictron's evaluation boards are available upon request. Please let us know (e-sales@unictron.com) whether you are implementing individual signal input (one for GPS and one for WiFi/BT) or combined signal input (one signal input for both GPS and WiFi/BT).

5 Packing

1. Quantity/Reel: 5000 pcs/Reel
2. Plastic tape:

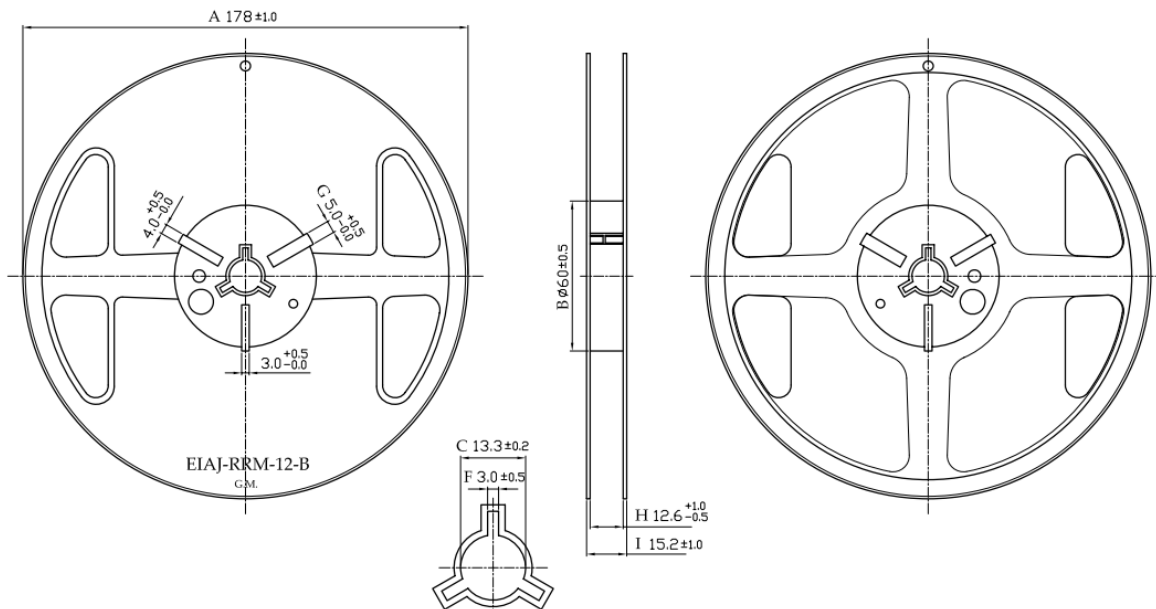
a) Tape drawing:



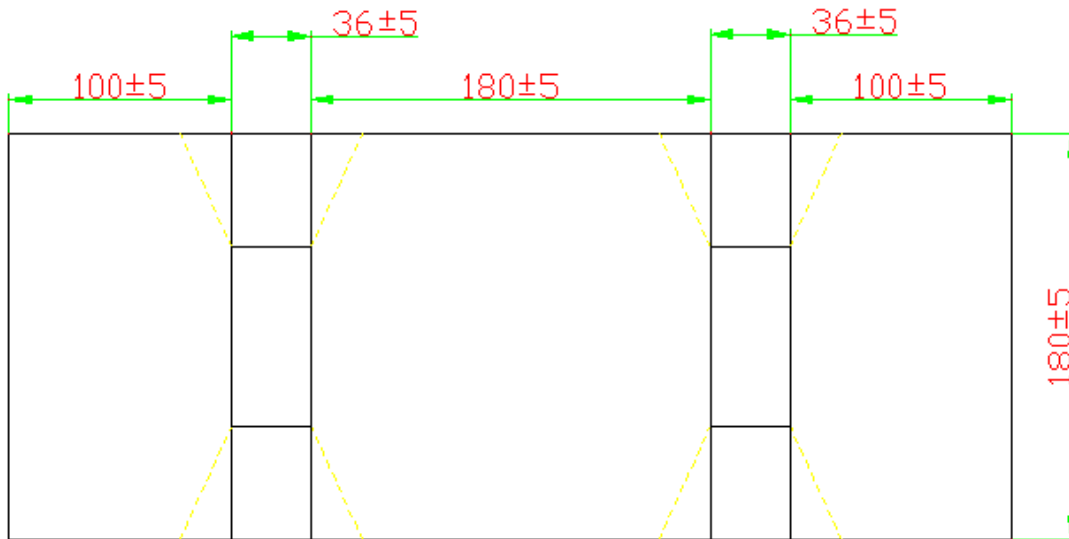
b) Tape dimensions (unit: mm)

Feature	Specifications	Tolerances
W	12.00	± 0.30
P	4.00	± 0.10
E	1.75	± 0.10
F	5.50	± 0.10
P2	2.00	± 0.10
D	1.50	$+0.10$ -0.00
P0	4.00	± 0.10
10P0	40.00	± 0.20

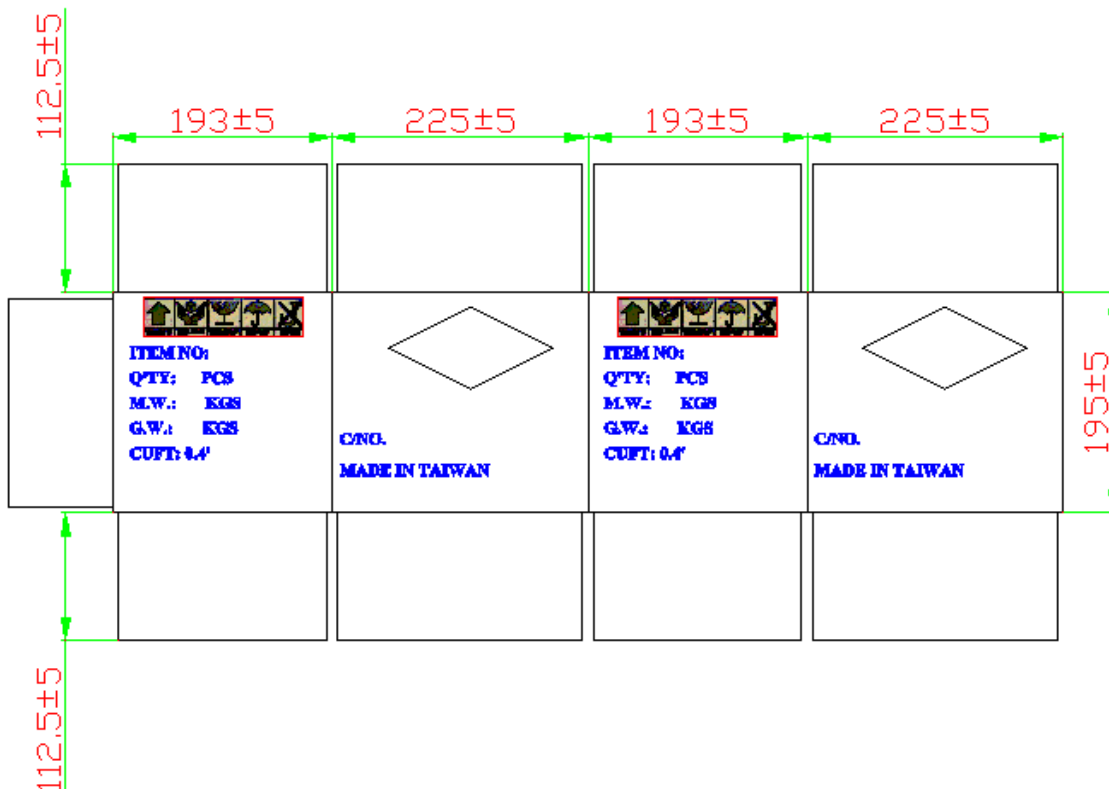
c) Reel Drawing



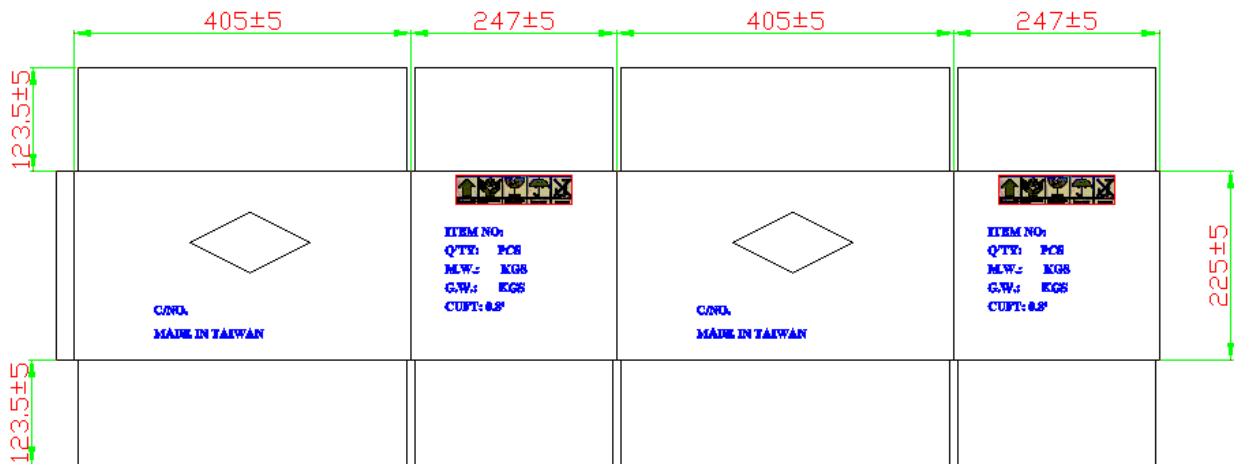
d) Drawing of small size carton in developed view



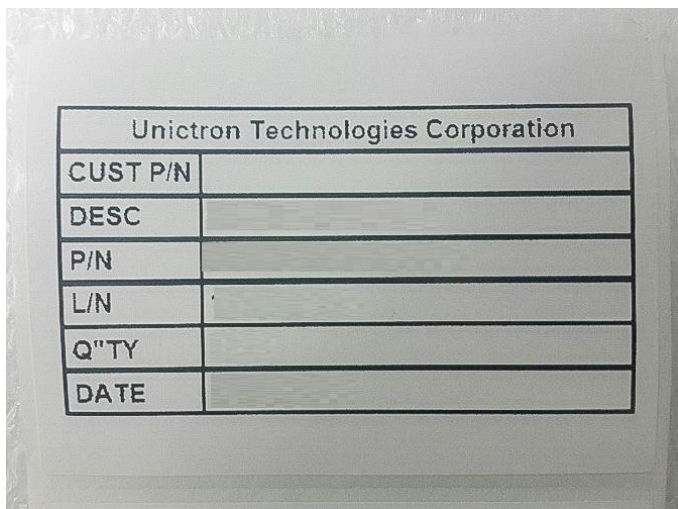
e) Drawing of middle size carton in developed view



f) Drawing of large size carton in developed view



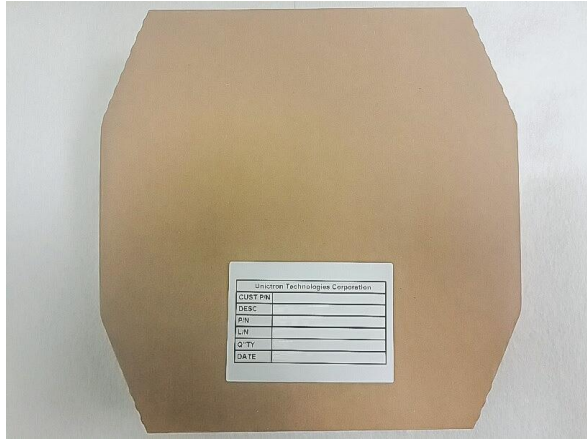
g) Picture of the label



h) Reel with the label



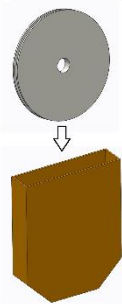
i) Small size carton with the label



j) Middle size carton with the label



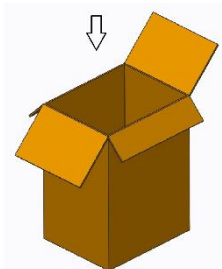
5.1 Packing Process



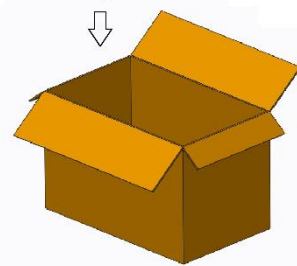
1 reel includes max 5000 pieces chip antennas



1 small size carton includes max 2 reels



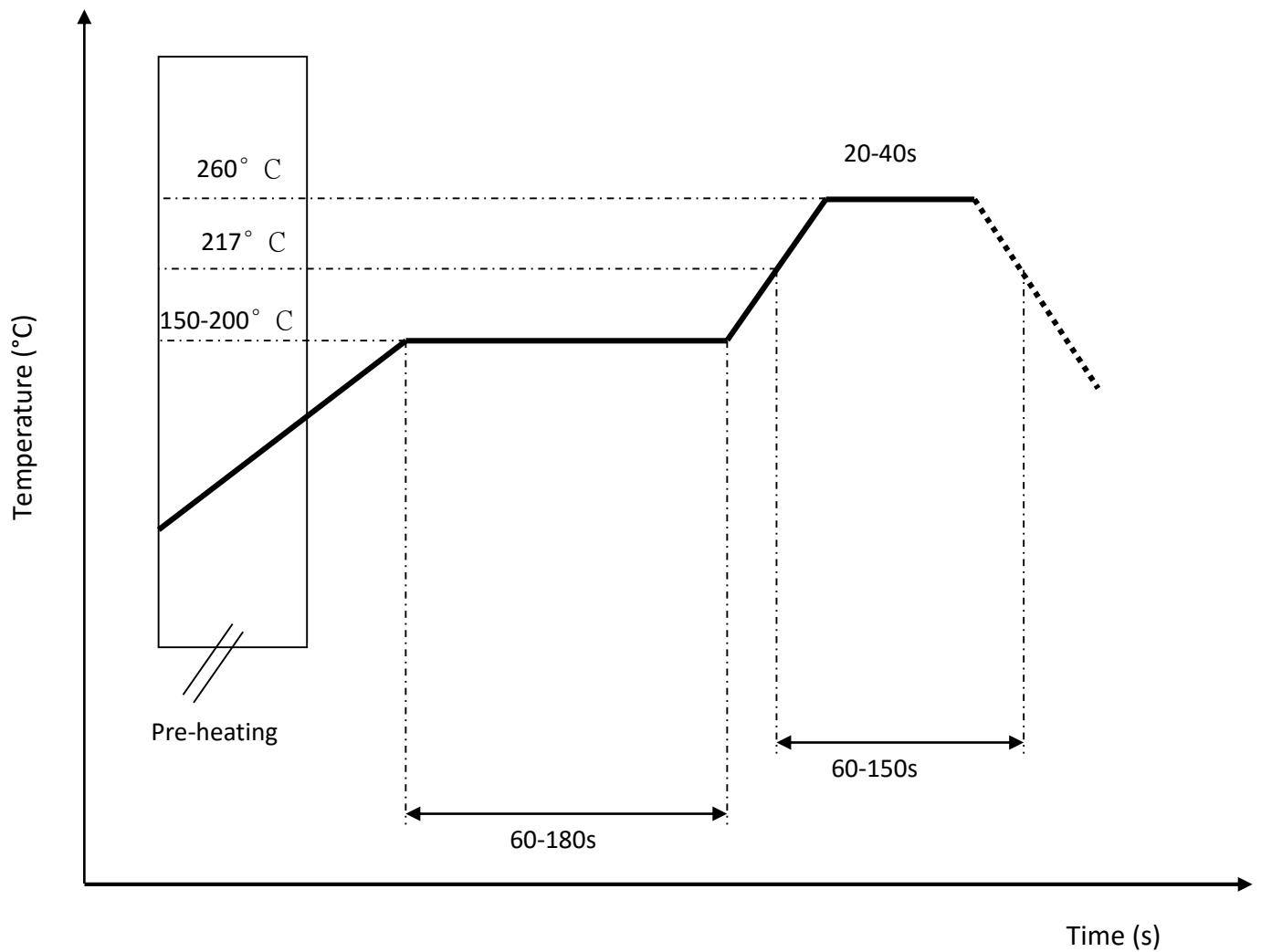
1 middle size carton includes max 5pcs of small carons



1 large size carton includes max 2 pcs of middle size cartons

6 Notes

6.1 Typical Soldering Profile for Lead-free Process



6.2 Operating and storage conditions:

Operating:

Maximum Input Power: 2W

Operating Temperature: -40 C to 85 C

Storage:

Storage Temperature -5C to 40 C

Relative Humidity: 20% to 70%

Shelf Life: 1 year

6.3 Installation guide:

Request Unictron's application notes "General guidelines for the installation of Unictron's chip antennas" for further information at e-sales@unictron.com.

6.4 Reminders for users of Unictron's AA089 ceramic chip antennas

- 6.4.1. This chip antenna is made of ceramic materials which are relatively more rigid and brittle compared to printed circuit board materials. Bending of circuit board at the locations where chip antenna is mounted may cause the cracking of solder joints or antenna itself.
- 6.4.2. Punching/cutting of the break-off tab of PCB panel may cause severe bending of the circuit board which may result in cracking of solder joints or chip antenna itself. Therefore break-off tab shall be located away from the installation site of chip antenna.
- 6.4.3. Be cautious when ultrasonic welding process needs to be used near the locations where chip antennas are installed. Strong ultrasonic vibration may cause the cracking of chip antenna solder joints.

Presented data were measured on reference PCB (ground) as shown in this specification. When the antenna placement or size of the PCB is changed, antenna performance and values of matching components may differ from data shown here.

Information presented in this Reference Specification is believed to be correct as of the date of publishing. Unictron Technologies Corporation reserves the rights to change the Reference Specification without notice due to technical improvements, etc. Please consult with Unictron's engineering team about the latest information before using this product. Per request, we may provide advice and assistance in implementing this antenna to a customer's device by simulation or real measurement of the interested device in our testing facilities.

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