

ignion<sup>™</sup>

Your innovation.  
Accelerated.

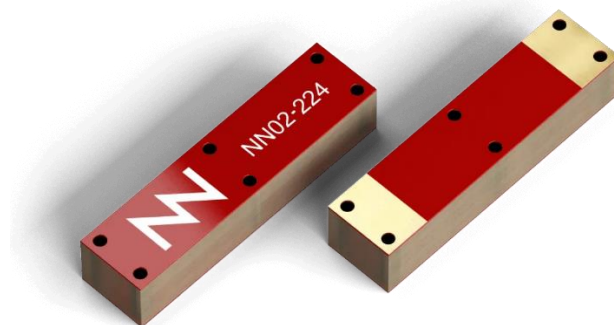
# **RUN mXTEND<sup>™</sup>** **(NN02-224)**

DATASHEET

## RUN mXTEND<sup>™</sup>: Highly versatile and powerful.

The small, versatile RUN mXTEND<sup>™</sup> (NN02-224) is the perfect solution for devices where **volume and cost are constrained but maximum performance is desired**.

Thanks to its dimensions and tuneability, the antenna easily adapts to almost every wireless device and to any radio technology within the 824-8000 MHz frequency range.



RUN mXTEND<sup>™</sup> component (NN02-224)

### Most used industries.

- **Asset Tracking.**
- **Smart Metering.**
- **Fleet Management.**
- **IoT Sensors and Modules.**
- **5G and Wi-Fi Routers (MIMO).**

### RUN mXTEND<sup>™</sup> benefits.

- **Top performance:** Top multiband IoT performance.
- **Ultra-compact form factor:** 12.0 mm x 3.0 mm x 2.4 mm.
- **Global reach:** Multiband performance compatible with global standards.
- **Fast time to market** – build a digital prototype using Antenna Intelligence Cloud<sup>™</sup>.
- **Simple manufacturing:** Off-the-Shelf standard component mounted with pick-and-place.

### Operation bands summary.

LTE/LTE-M/NB-IoT, GSM, UMTS, 4G, 5G, GNSS, Bluetooth, Wi-Fi 7, and many more within the frequency range of 698 MHz to 8000 MHz.

## 1. AVAILABLE SOLUTIONS SUMMARY

Configuration	Frequency range	Frequency Regions
<u>CELLULAR IoT</u>	824 – 960 MHz & 1710 – 2690 MHz	2
<u>ISM</u>	863 – 928 MHz	1
<u>ISM + BLUETOOTH</u>	863 – 928 MHz & 2400 – 2500 MHz	2
<u>GNSS</u>	1561 MHz, 1575 MHz & 1598 – 1606 MHz	3
<u>BLUETOOTH</u>	2400 – 2500 MHz	1
<u>Wi-Fi DUAL BAND</u>	2400 – 2500 MHz & 4900 – 5875 MHz	2

## 2. DETAILED AVAILABLE SOLUTIONS

The following table presents the technical specifications of the RUN mXTEND<sup>™</sup> antenna booster, including its radiation pattern, polarization, weight, temperature range, impedance, and dimensions. These features make the RUN mXTEND<sup>™</sup> antenna booster a highly versatile and durable component that can be easily integrated into a wide range of wireless applications.

Technical Features	RUN mXTEND <sup>™</sup> (NN02-224)
<b>Radiation Pattern</b>	Omnidirectional
<b>Polarization</b>	Linear
<b>Weight (approx.)</b>	0.19 g
<b>Temperature</b>	-40 to + 125 °C
<b>Impedance</b>	50 Ω

Technical features for the RUN mXTEND<sup>™</sup>.

## 2.1. LTE SOLUTION

Technical features	824 – 960 MHz	1710 – 2690 MHz
Average Efficiency	> 65 %	> 70 %
Peak Gain	1.8 dBi	1.9 dBi
VSWR	< 3:1	

Technical features. Measures from the evaluation board (131 mm x 60 mm x 1 mm).

## 2.2 ISM SOLUTION

Technical features	863 – 870 MHz	902 – 928 MHz	863 – 928 MHz
Average Efficiency	> 85 %	> 85 %	> 85 %
Peak Gain	2.1 dBi	2.1 dBi	2.2 dBi
VSWR	< 2:1	< 2:1	< 2:1

Technical features. Measures from the evaluation board with UFL cables (131 mm x 60 mm x 1 mm).

## 2.3 GNSS SOLUTION

Technical features	1561 MHz	1575 MHz	1598 – 1606 MHz
Average Efficiency	> 75 %	> 75 %	> 80 %
Peak Gain	2.9 dBi	3.0 dBi	3.3 dBi
VSWR	< 1.5:1		

Technical features. Measures from the evaluation board with UFL cables (126.5 mm x 60 mm x 1 mm).

## 2.4 BLUETOOTH SOLUTION

Technical features	2400 – 2500MHz
Average Efficiency	> 75%
Peak Gain	4.2 dBi
VSWR	< 1.5:1

Technical features. Measures from the evaluation board with UFL cables (126.5 mm x 60 mm x 1 mm).

## 2.5 Wi-Fi-DUAL BAND SOLUTION

Technical features	2400 – 2500 MHz	4900 – 5875 MHz
Average Efficiency	> 70 %	> 70 %
Peak Gain	2.9 dBi	3.1 dBi
VSWR	< 2.5:1	

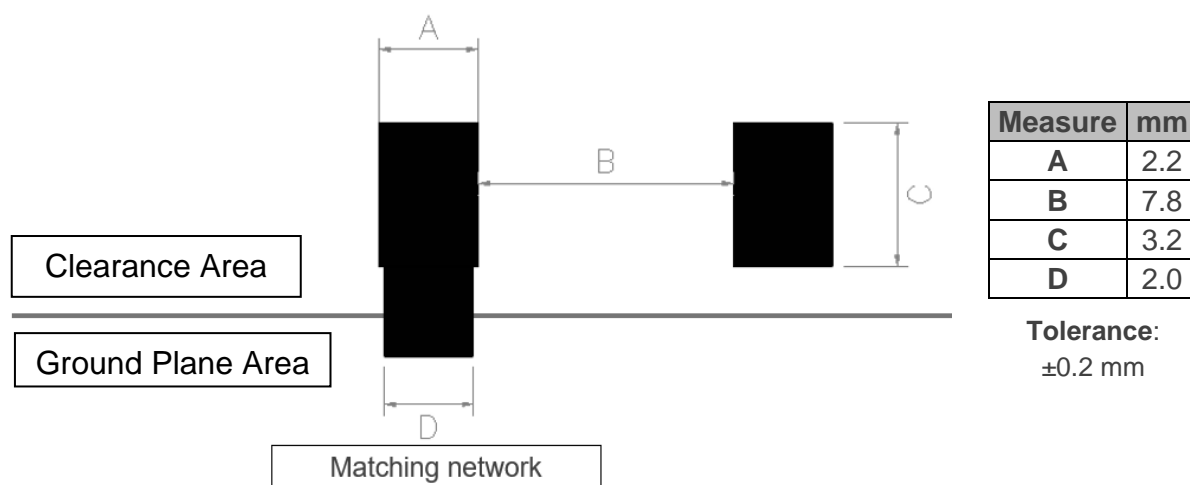
Technical features. Measures from the evaluation board with a coplanar grounded transmission line (126.5 mm x 60 mm x 1 mm).

## 2.6 ISM + BLUETOOTH SOLUTION

Technical features	863 – 870 MHz	902 – 928 MHz	863 – 928 MHz
Average Efficiency	> 75 %	> 75 %	> 75 %
Peak Gain	1.4 dBi	1.6 dBi	1.6 dBi
VSWR	< 2:1	< 2:1	< 2:1
Technical features	2400 – 2500MHz		
Average Efficiency	> 80 %		
Peak Gain	2.9 dBi		
VSWR	< 2:1		

Technical features. Measures from the evaluation board with UFL cables (131 mm x 60 mm x 1 mm).

## 2.7 ANTENNA FOOTPRINT



Footprint dimensions for the single booster.

If you are designing a device with a different size or operating frequency than shown above, you can assess the performance of this solution using our free-of-charge [Antenna Intelligence Cloud<sup>™</sup>](#) tool. This tool provides a complete design report, including expected performance and tailored design guide, within 24 hours. For additional information about Ignion's range of R&D services, please visit: <https://ignion.io/resources-support/technical-center/engineering-support/>. If you require further assistance, please contact [support@ignion.io](mailto:support@ignion.io).

Purchase this or other evaluation boards through our main distributors by visiting the following link: <https://ignion.io/distributors/>.



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Contact:  
[support@ignion.io](mailto:support@ignion.io)  
+34 935 660 710

#### **Barcelona**

Av. Alcalde Barnils, 64-68 Modul C, 3a pl.  
Sant Cugat del Vallés  
08174 Barcelona  
Spain

#### **Shenzhen**

Topway Information Building, Binhai Avenue,  
Nanshan District, N° 3369 – Room 2303  
Shenzhen, 518000  
China  
+86 13826538470

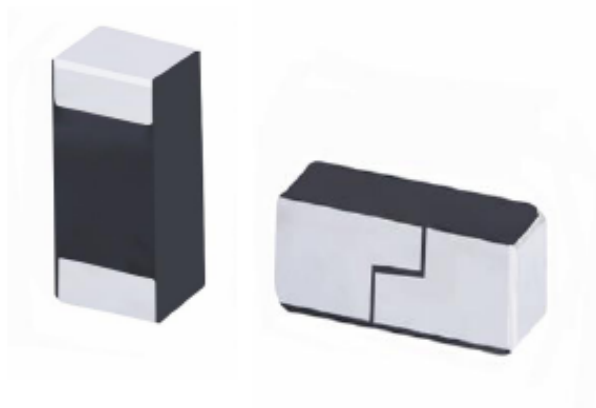
#### **Tampa**

8875 Hidden River Parkway  
Suite 300  
Tampa, FL 33637  
USA

Description: **2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area**

Series: **Chip Antenna**

**PART NUMBER: W3008**



#### Features:

- 2400-2483.5MHz
- Size: 3.2 x 1.6 x 1.1mm
- Efficiency: 66 %
- Gain: 1.1 dBi
- Polarization: Linear
- Power Handling: 5W
- RoHS Compliant
- Moisture Sensitivity Level MSL1

#### Applications:

- Bluetooth, BLE, Zigbee, WiFi
- 2.4GHz ISM band radios

All dimensions are in mm / inches

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Description: **2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area**

Series: **Chip Antenna**

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### ELECTRICAL SPECIFICATIONS

Frequency	2400-2483.5MHz
Nominal Impedance	50 $\Omega$
Return Loss	-4dB
Radiation Pattern	Omni
Gain	1.1dBi
Efficiency	66%
Polarization	linear
Power Withstanding	5W

### MECHANICAL SPECIFICATIONS

Weight	0.03 g
Overall Length	3.2 [0.126] MM [INCHES]
Over all width	1.6 [0.063] MM [INCHES]
Over all thickness	1.1 [0.043] MM [INCHES]
MSL (Moisture Sensitivity Level)	1

### ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-40~+85° C
Storage Temperature	-40~+85° C
RoHS Compliant	Yes

(\*) All RF parameters measured on 80\*37mm PCB with 4\*4.25mm clearance in free space. No matching component used.

Issue: 1946

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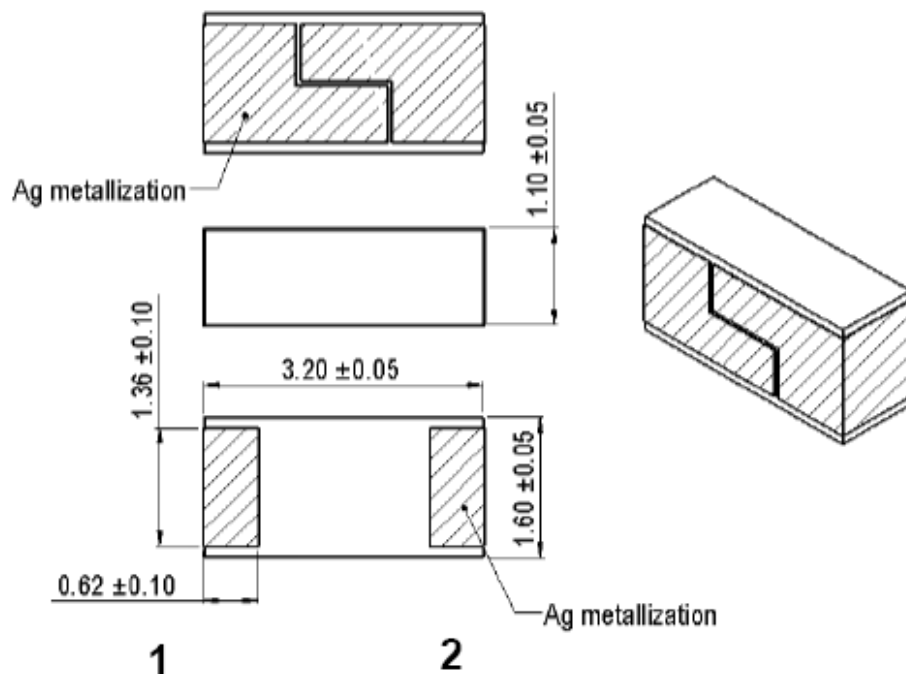
 **RoHS**

Series: Chip Antenna

Description: 2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area

PART NUMBER: W3008

## MECHANICAL DRAWING AND TERMINAL CONFIGURATION



No.	Terminal Name	Terminal Dimensions
1	Feed /GND	0.62 x 1.36 mm
2	Feed /GND	0.62 x 1.36 mm
Antenna is symmetrical, either one of pads 1 or 2 can be used as feed terminal		

Note: This type of antenna is called loaded PIFA. One pad (on the bottom of the ceramic chip antenna) that feedline and GND are connected is a basic PIFA antenna structure. And, another pad on the other side that only GND is connected is for capacitive loading. Loaded capacitive value is optimized by the gap distance between two pads on the top surface. In PIFA, there is short mechanism usually in proximity to feed. This RF shorting affects impedance and current distribution mechanism of antenna. The actual antenna top face can seem to be mirrored, however it can be used same as the non-mirrored version. Please follow the design recommendation specified in this data sheet for either case.

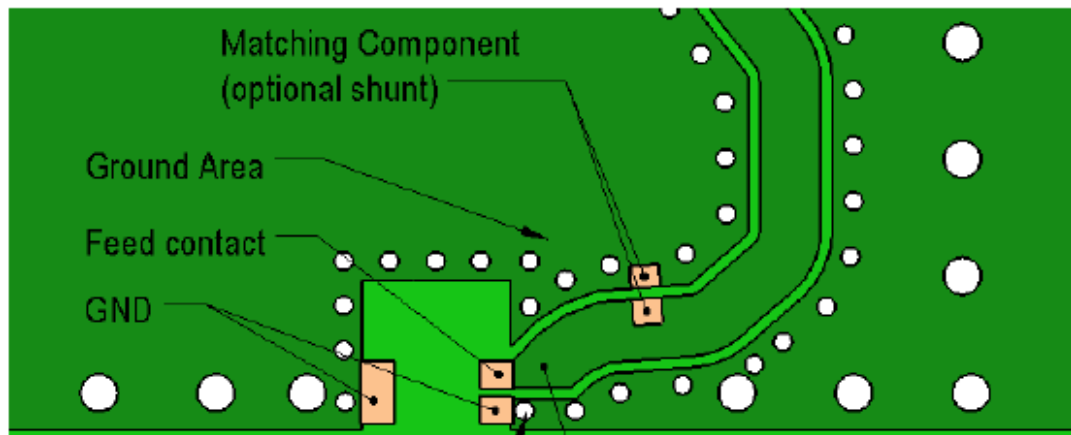
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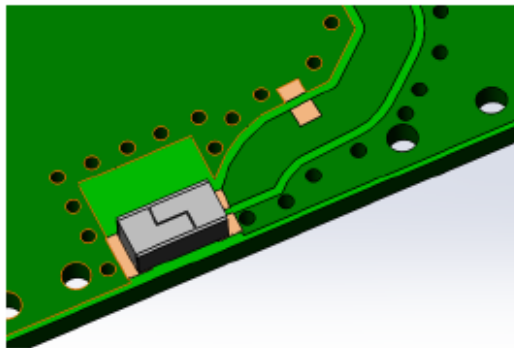
## MECHANICAL DRAWING AND TERMINAL CONFIGURATION

*Ground cleared under antenna, clearance area 4 mm x 4.25mm*



Ground Via Hole  
Ground area should be surround with ground via holes

Feed line 50 Ohm  
Any type of 50 Ohm feed line can be used. inner layers on feed line area need to designed to give 50 Ohm characteristics to feed line.



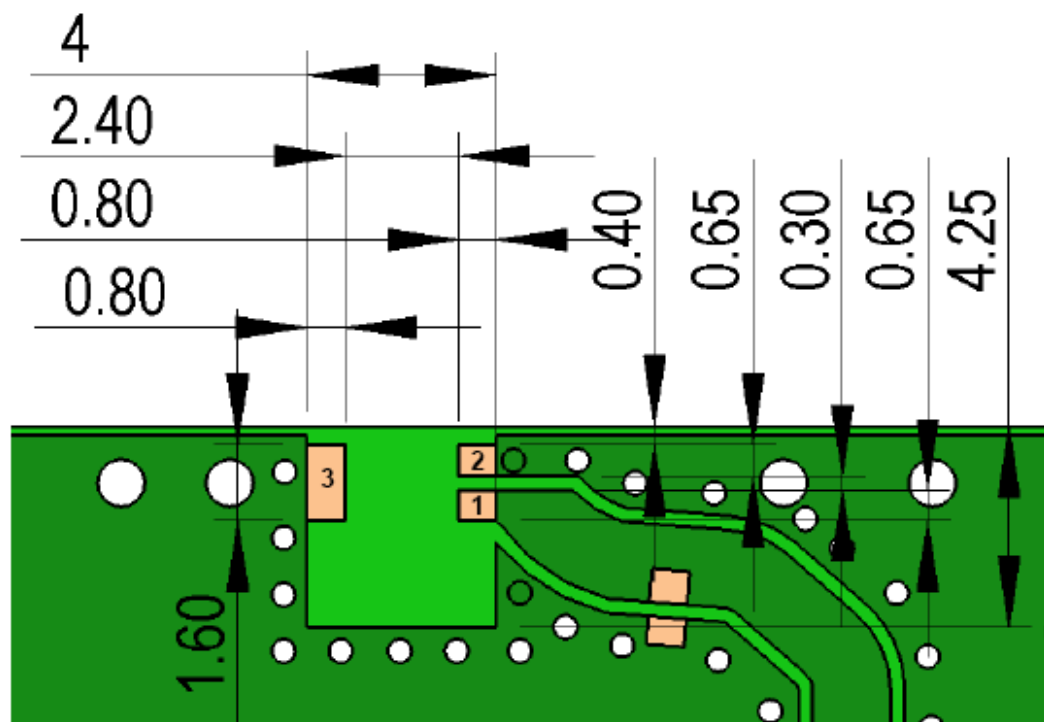
Series: Chip Antenna

Description: 2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area

PART NUMBER: W3008

### MECHANICAL DRAWING AND TERMINAL CONFIGURATION

*Recommended Antenna Pad Dimensions on PCB Layout (top surface)  
Ground cleared under antenna, clearance area 4 mm x 4.25 mm*



PCB contact pads		
No.	Terminal Name	Terminal Dimensions
1	Feed	0,80 x 0,65 mm
2	GND	0,80 x 0,65 mm
3	GND	0,80 x 1,60 mm

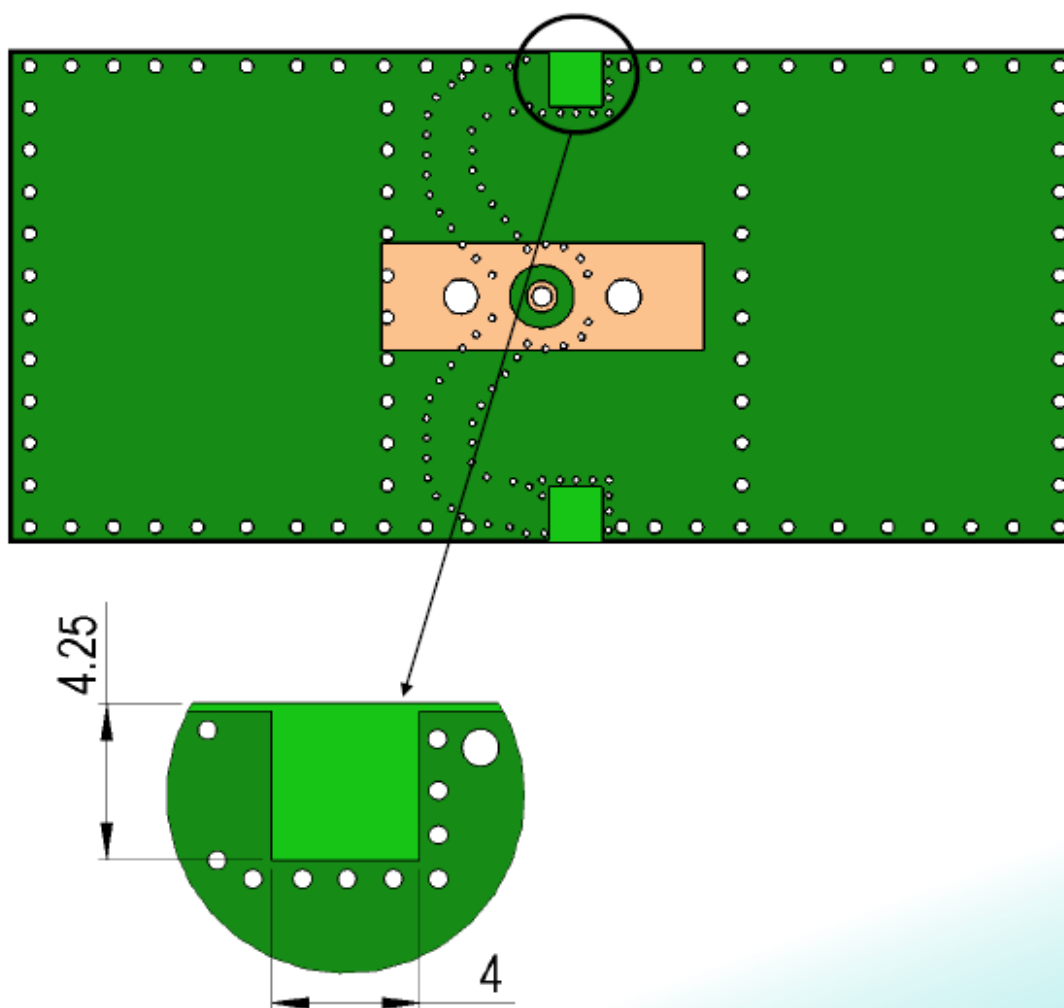
Description: 2.4-2.4835GHz Ceramic SMT  
antenna, 4x4.25mm keep out area

Series: Chip Antenna

PART NUMBER: W3008

MECHANICAL DRAWING AND TERMINAL CONFIGURATION

*Recommended Antenna Pad Dimensions on PCB Layout (bottom surface)  
Ground cleared under antenna, clearance area 4 mm x 4.25 mm*



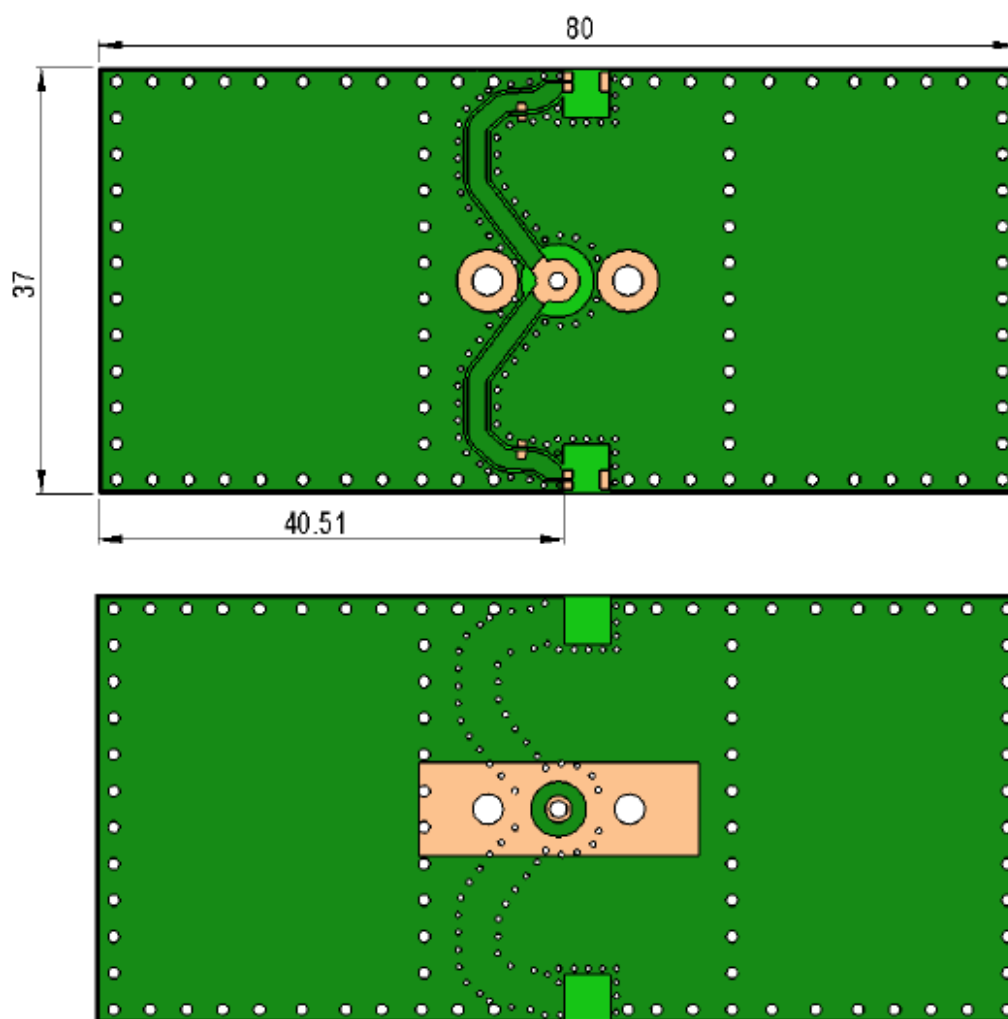
Description: 2.4-2.4835GHz Ceramic SMT  
antenna, 4x4.25mm keep out area

Series: Chip Antenna

PART NUMBER: W3008

### MECHANICAL DRAWING AND TERMINAL CONFIGURATION

*Recommended test board layout for electrical characteristic  
measurement, test board outline size 80 x 37mm*



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✓  
RoHS

7

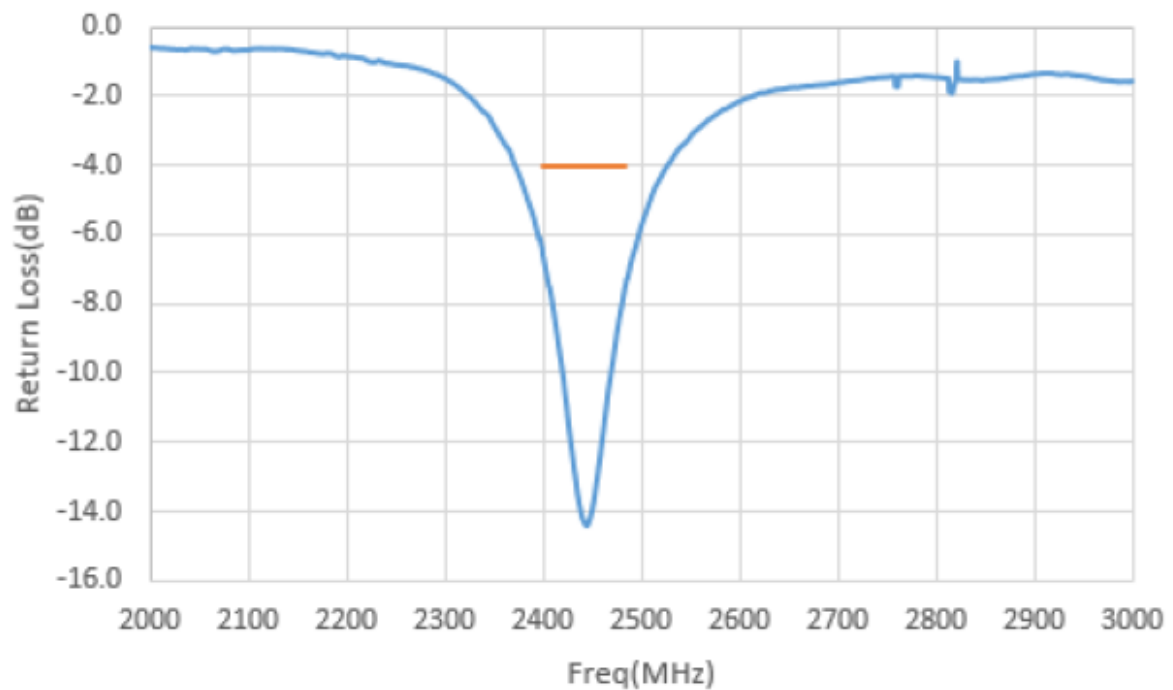
Description: 2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area

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PART NUMBER: W3008

## CHARTS

### Return loss



(\*) All RF parameters measured on 80\*37mm PCB with 4\*4.25mm clearance in free space. No matching component used.

Issue: 1946

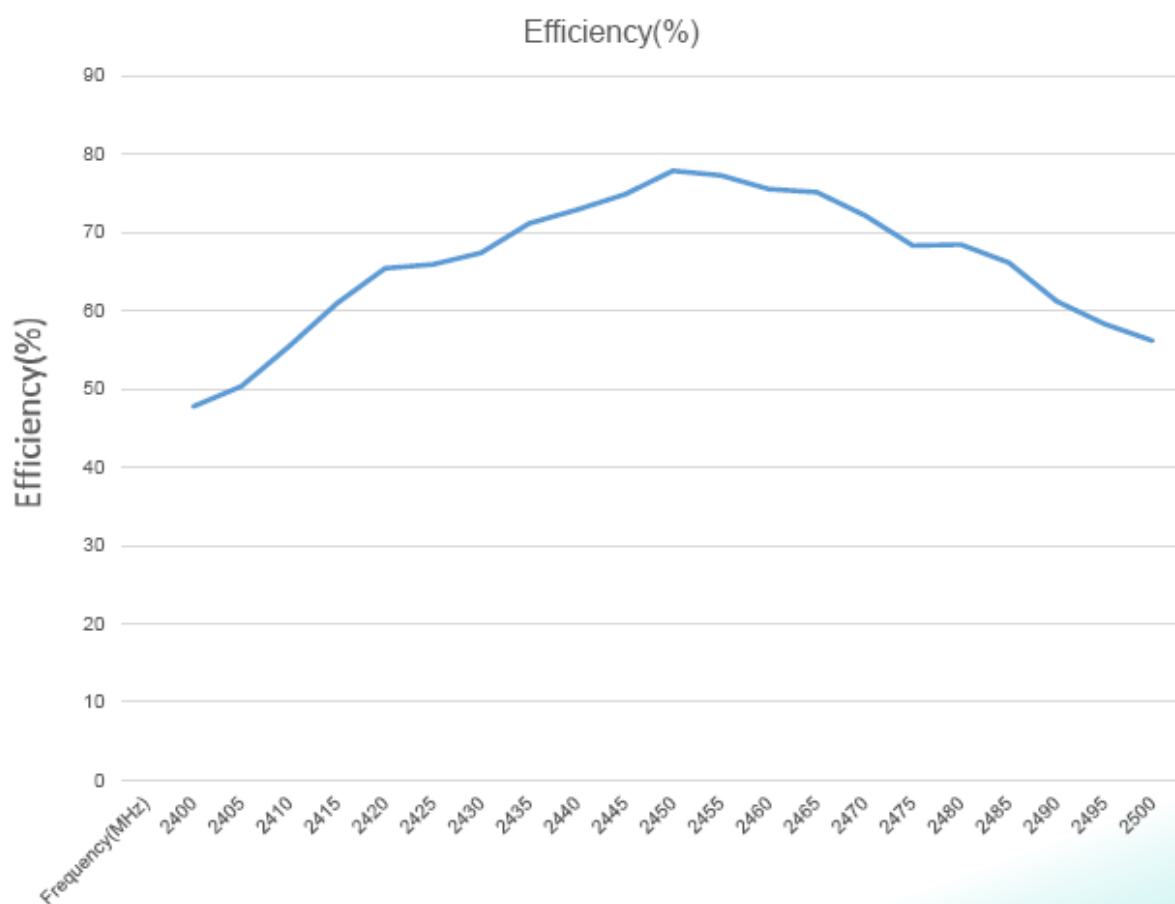
In the effort to improve our products, we reserve the right to make changes judged to be necessary.

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Description: 2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area

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## CHARTS



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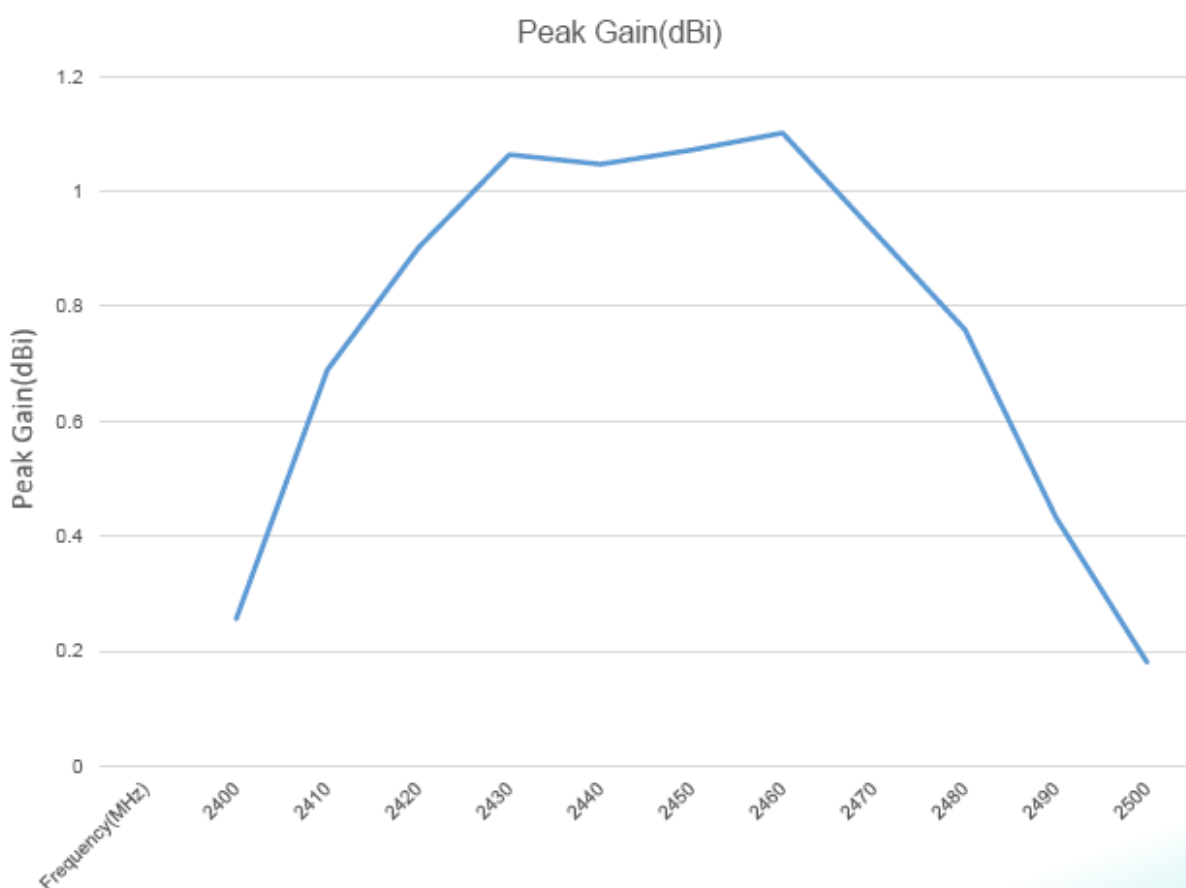
✓  
RoHS

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## CHARTS



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✓  
RoHS

10

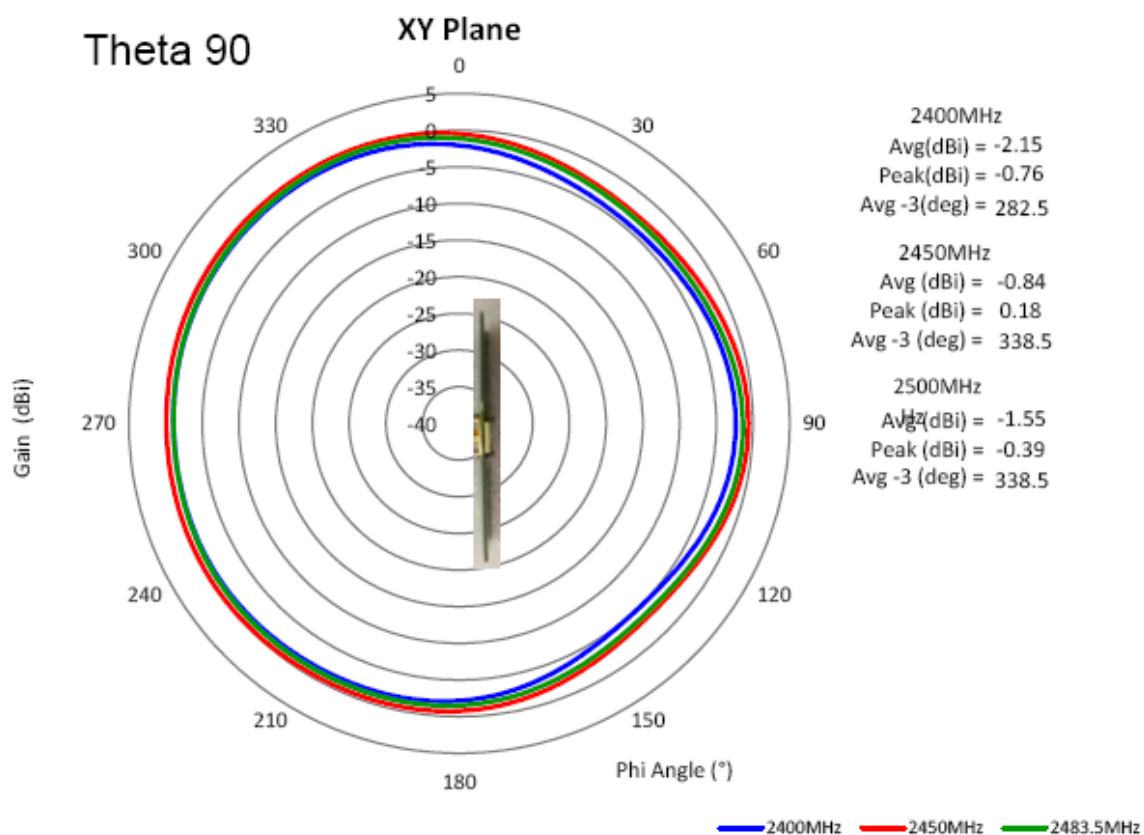
Series: Chip Antenna

Description: 2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area

PART NUMBER: W3008

## CHARTS

### Free Space Radiation Pattern



(\*) All RF parameters measured on 80\*37mm PCB with 4\*4.25mm clearance in free space. No matching component used.

Issue: 1946

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RoHS

11

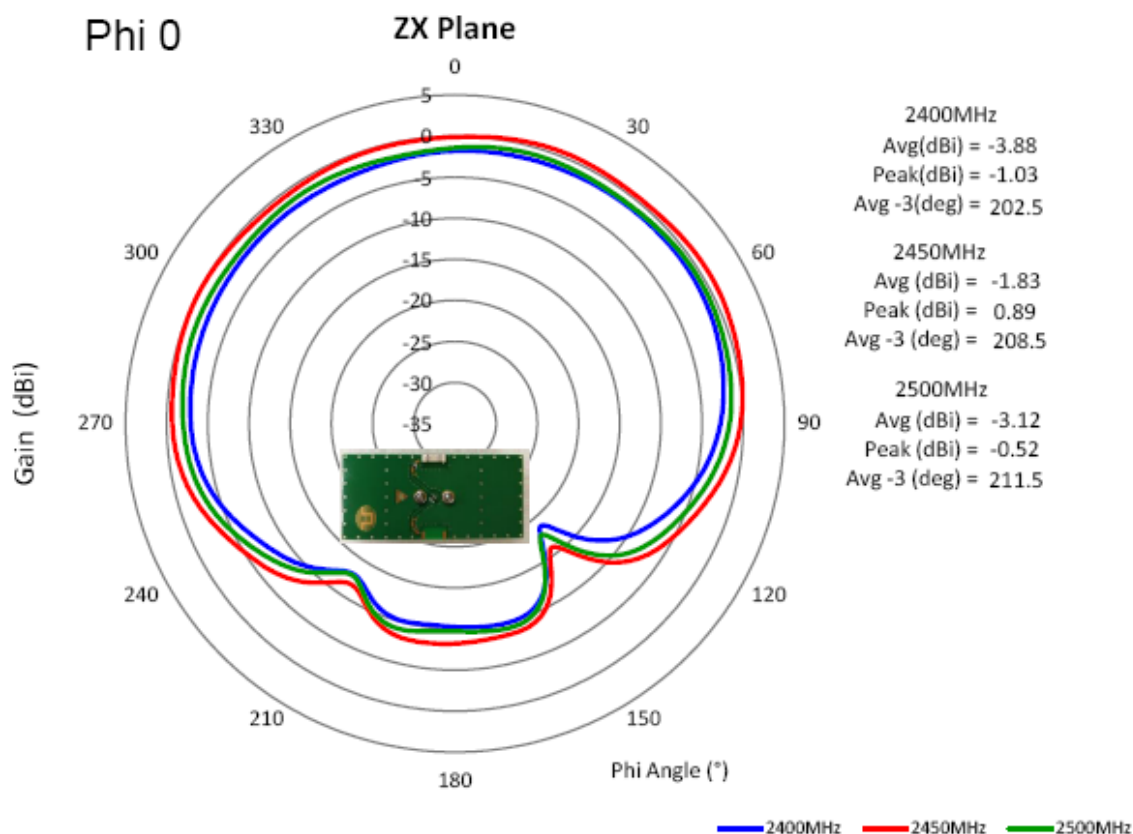
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## CHARTS

### Free Space Radiation Pattern



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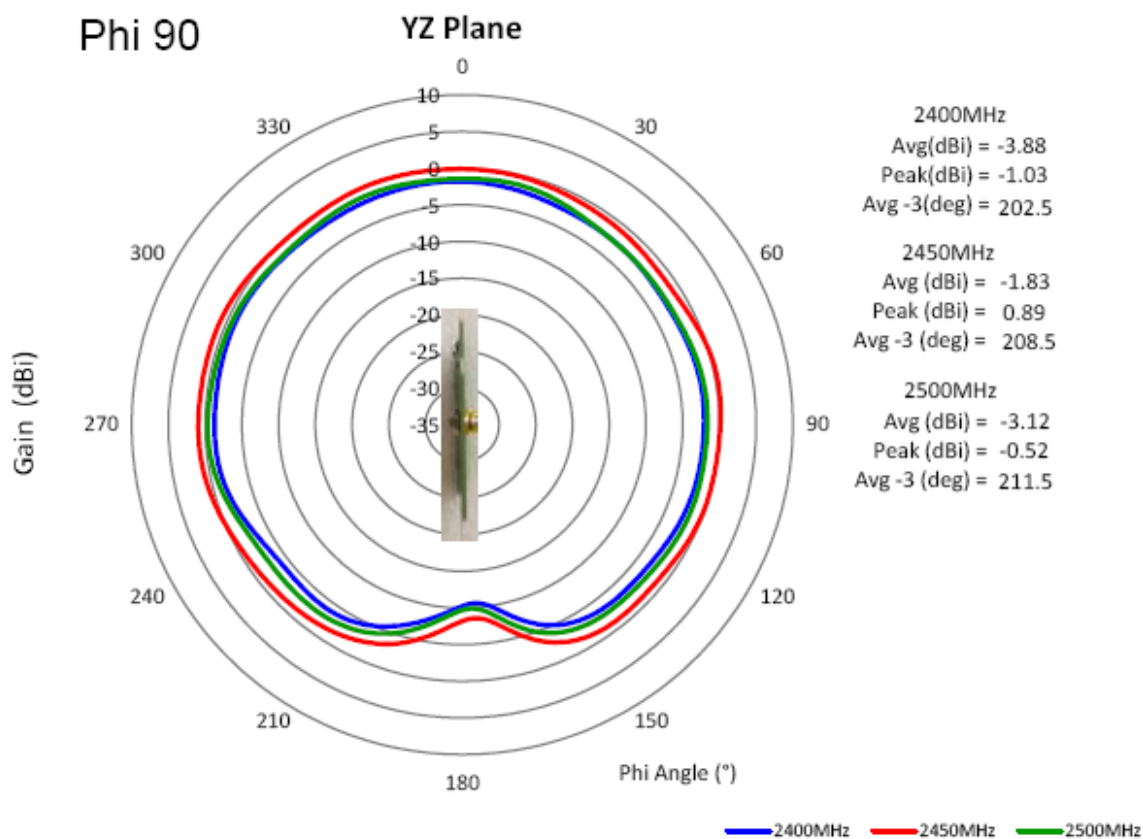
Description: 2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area

Series: Chip Antenna

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## CHARTS

### Free Space Radiation Pattern



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Description: 2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area

Series: Chip Antenna

PART NUMBER: W3008

### Recommendation for reflow soldering process

Printing stencil thickness 0,15 - 0,25 mm is recommended for the solder paste. The maximum soldering temperature should not exceed 260°C. The temperature profile recommendations for reflow soldering process is presented in the Figures 1 and 2. The reflow profile

presented in figure 1 describes minimum reflow temperatures. The reflow profile presented in figure 2 describes maximum reflow temperatures, located at the center of the coverage area.

	Method of heat transfer	Controlled hot air convection
1	Average temperature gradient in preheating	2.5 °C/s
2	Soak time	2-3 minutes
3	Max temperature gradient in reflow	3 °C/s
4	Time above 217 °C	Max 30 sec
5	Peak temperature in reflow	230 °C for 10 seconds
6	Temperature gradient in cooling	Max -5 °C/s

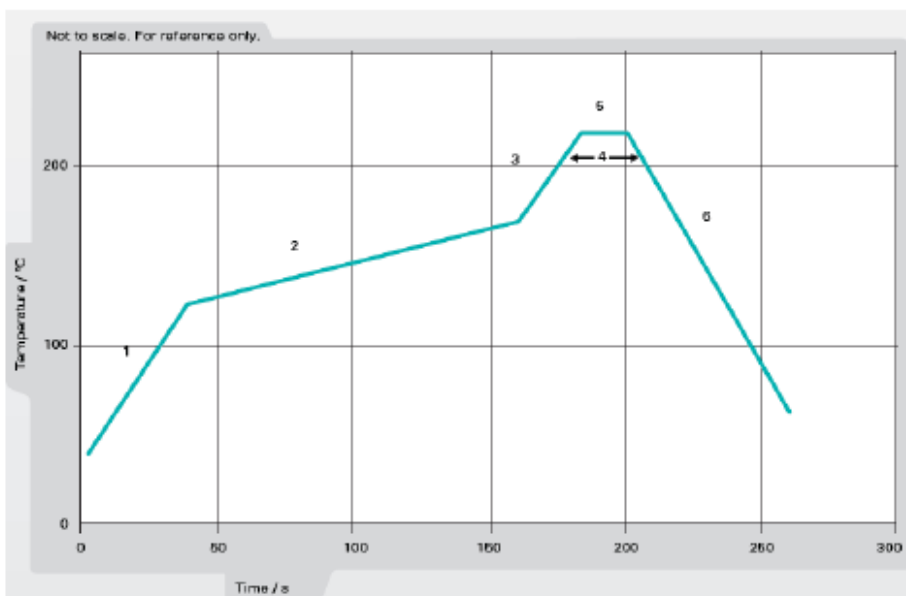


Figure 1. Minimum temperature profile recommendation for reflow soldering process

Description: 2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area

Series: Chip Antenna

PART NUMBER: W3008

### Recommendation for reflow soldering process

	Method of heat transfer	Controlled hot air convection
1	Average temperature gradient in preheating	2.5 °C/s
2	Soak time	2-3 minutes
3	Max temperature gradient in reflow	3 °C/s
4	Time above 217 °C	Max 60 sec
5	Time above 230 °C	Max 50 sec
6	Time above 250 °C	Max 10 sec
7	Peak temperature in reflow	260 °C for 5 seconds
8	Temperature gradient in cooling	Max -5 °C/s

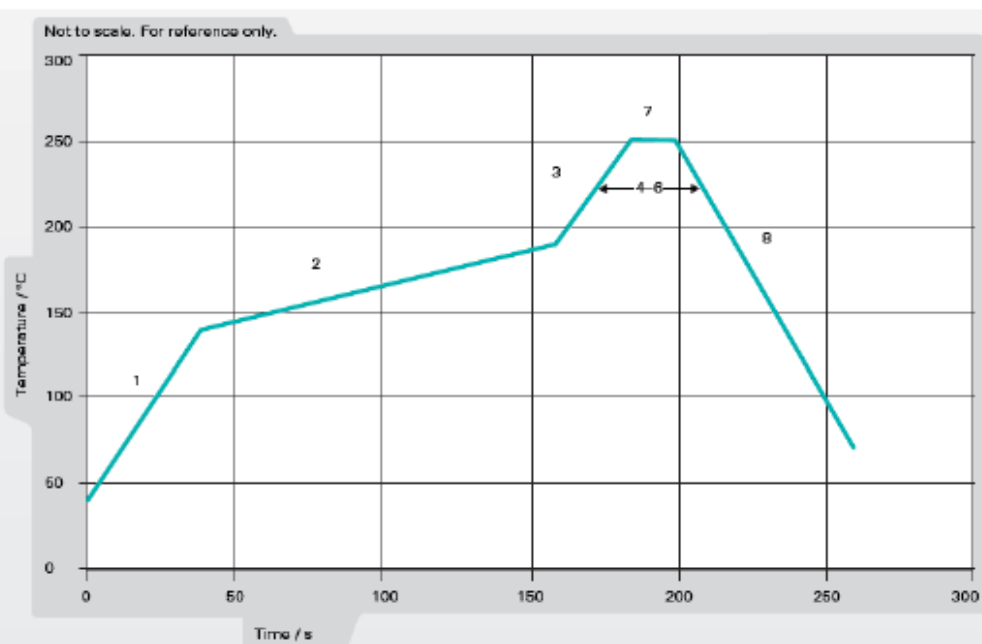


Figure 2. Maximum temperature profile recommendation for reflow soldering process

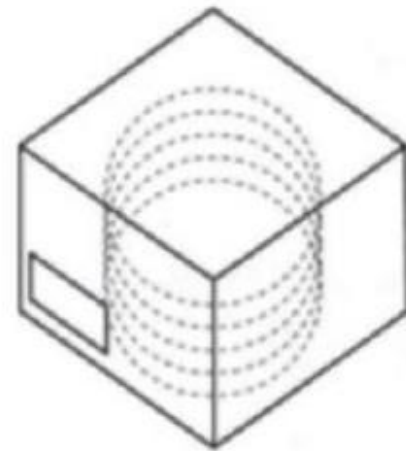
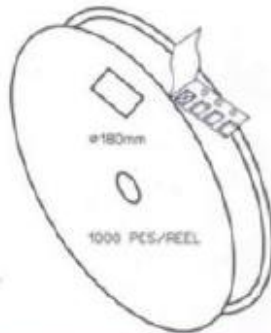
**Series: Chip Antenna**

**Description: 2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area**

**PART NUMBER: W3008**

**PACKAGING-1**

3000pcs antennas per 7" reel  
5pcs 7" reel per inner package box  
2pcs inner box per out box  
Total 30000pcs antenna per out box  
Out box size: 390mmx215mmx165mm



**LEVEL**

**NOT MOISTURE SENSITIVE**

**1**

These Devices do not require special storage conditions provided:

1. They are maintained at conditions equal to or less than 30°C and 85% RH.
2. They are solder reflowed at a peak body temperature which does not exceed 260°C.

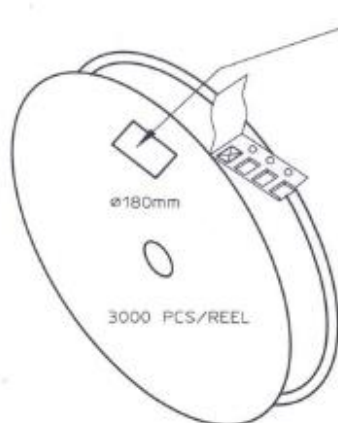
Note: Level I and body temperature defined by IPC/JEDEC J-STD-020

Series: Chip Antenna

Description: 2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area

PART NUMBER: W3008

## PACKAGING-2



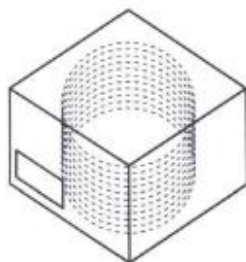
REEL LABEL INFORMATION:  
- TRACEABILITY  
- QUANTITY  
- PRODUCT CODE

CARRIER TAPE H85-00125  
width=8,00 depth=1,22  
COVER TAPE H85-00126  
width=5,60

LENGTH OF TAPE:

- Leader section: min 350 mm before component section
- Trailer section: min 40 mm after component section.

Empty part cavities at leader and trailer section of the tape must be sealed with top cover tape.



BOX H85-00128 1 pcs  
(182x182x132)  
- LABEL 1 pcs/BOX  
REEL H85-00127 10 pcs  
(D180, W12)  
- REEL LABEL 1 pcs/REEL

MATERIAL

HANDLINGS



RATIO

DRWN	090507 PeHa	H
DGNER		G
CHKD		F
APPRD		E
APPRD BY		D
		C
		B
		A
VERSION	MOD/DATE/NAME	

PRODUCT H90-OY805

DENOMINATION PACKING FORM

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RoHS