

Series: Ceramic Chip Antenna

#### **TECHNICAL DATA SHEET**

Description: 1.575 GHz GNSS Ceramic

Chip Antenna

PART NUMBER: W3011

### **Features:**

- Frequency 1559-1606.6MHz
- Gain 1 / 1.8 / 1.4dBi
- Size 3.2 x 1.6 x 1.1 mm
- PCB Keep out 4 x 4.25 mm
- Polarization Linear
- · Radiation pattern Omni

# **Applications:**

- L1 GNSS Receivers
- Beidou, GPS, Galileo Glonass
- IoT, M2M
- Asset tracking
- · Portable satellite receivers

#### All dimensions are in mm / inches

Issue: 2019

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### **ELECTRICAL SPECIFICATIONS**

Antenna Type Chip antenna

Frequency 1559-1563MHz

1574.4-1576.4MHz 1598.6-1606.6MHz

Nominal Impedance 50  $\Omega$ 

Return Loss (Max) -6 / -10 / -7 dB

Radiation Pattern Omni

Gain(Min) 1 / 1.8 / 1.4dBi

Efficiency(Min) 50 / 68 / 60 %

Polarization Vertical Power Withstanding 2W

### **MECHANICAL SPECIFICATIONS**

Compact size 3.2 x 1.6 x 1.1mm

Weight 0.033g
Fixing system SMT

MSL(MOISTURE SENSITIVITY LEVEL) 1

### **ENVIRONMENTAL SPECIFICATIONS**

Operating Temperature  $-40 \sim +85^{\circ}$  C Storage Temperature  $-40 \sim +85^{\circ}$  C

RoHS Compliant Yes



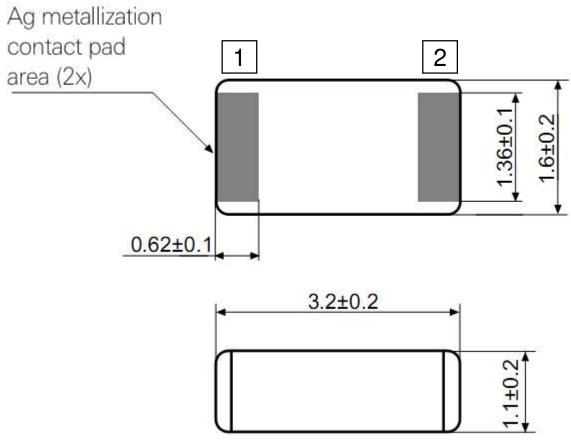
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# **MECHANICAL DRAWING**



# Antenna features

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 of terminals 1 or 2 can be feed / GND





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# **W3011 GPS Antenna PWB Layout**

Ground cleared under antenna, clearance area 4.00 x 4.25 mm Matching and tuning component value and placement depend on application and surrounding mechanics / materials.

Feed line should be designed to match 50  $\Omega$  characteristic impedance, depending on PWB material and thickness.

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





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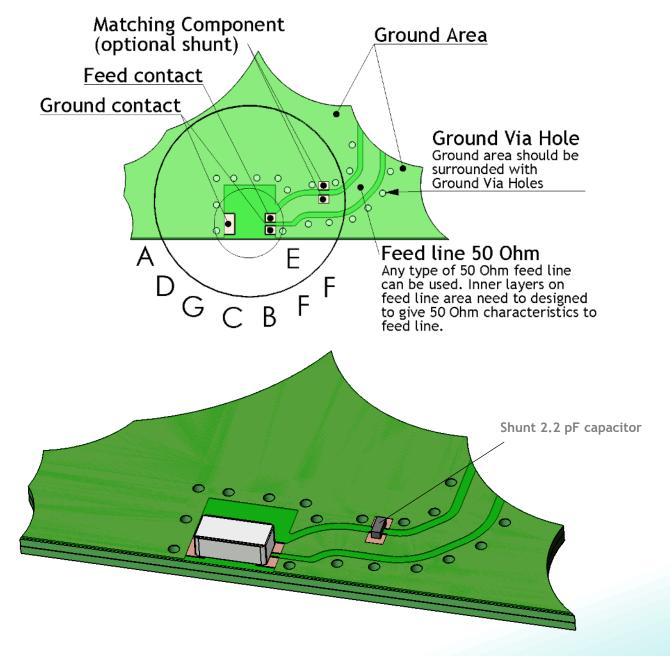
Chip Antenna

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# PWB layout for W3011 GPS Antenna

Note: All dimensions are in metric system.









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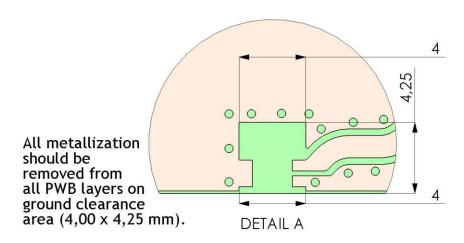
Chip Antenna

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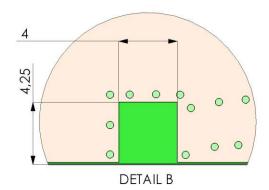
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### Ground clearance area for W3011 GPS Antenna

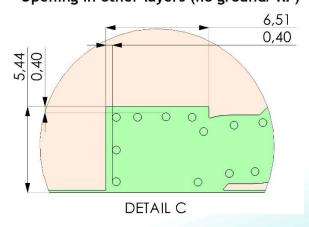
#### Ground clearance area (4,00 x 4,25 mm)



#### Opening in bottom/inner ground layers



#### Opening in other layers (no ground/ RF)







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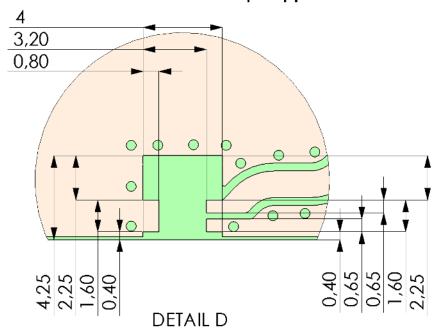
Chip Antenna

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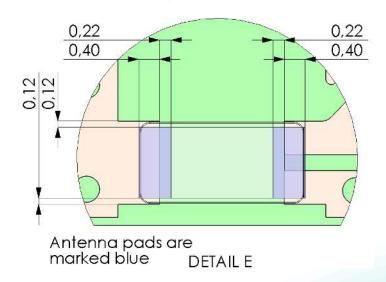
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# PWB pad dimensions and antenna position for W3011 GPS Antenna

# Pad dimensions in top copper



#### Antenna position on PWB layout





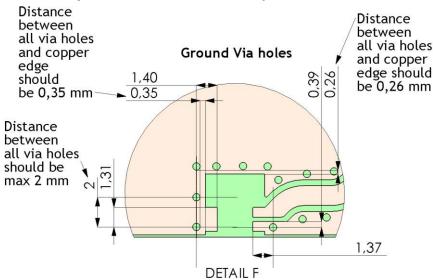
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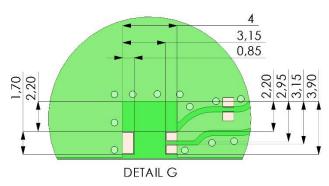
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# Typical Ground via hole placement in PWB layout for W3011 GPS Antenna

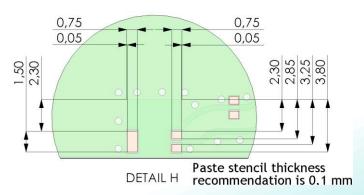


# Solder resist opening and paste stencil recommendations for W3011 GPS Antenna

#### Solder resist opening



#### Paste stencil recommendation



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ROHS



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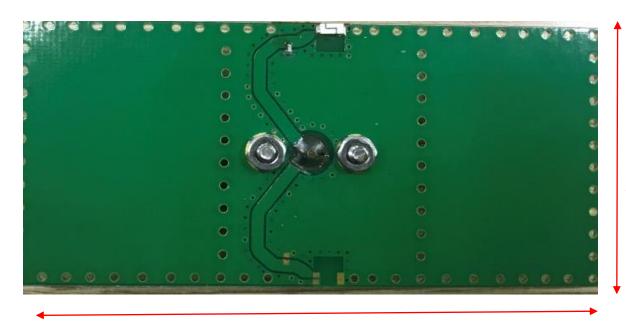
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### **TEST SETUP**

All RF parameters tested on 80x37mm sized test board. Antenna position on side center of PCB long edge.



37mm

80mm





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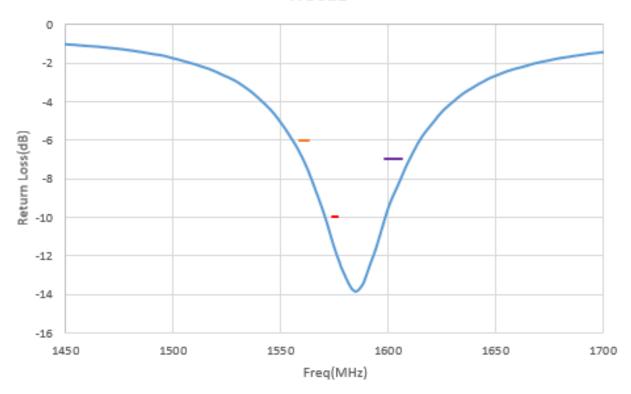
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# **CHARTS**

# Return Loss vs Frequency

#### W3011





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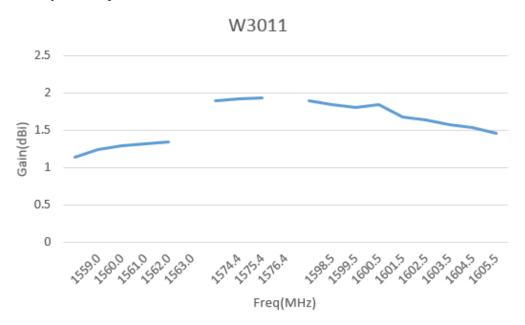
Chip Antenna

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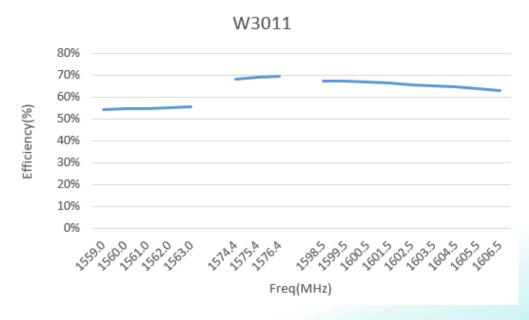
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### **CHARTS**

# Gain vs Frequency



# Radiation Efficiency vs Frequency





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#### **CHARTS** XY Plane **ZX Plane** 1559MHz Avg(dBi) = -3.45 Peak(dBi) = 0.83 Avg(dBi) = -3.53 Peak(dBi) = 1.14 Avg -3(deg) = 108.5 Avg -3(deg) = 83.5 1561MHz 1561MHz Avg (dBi) = -3.38 Peak (dBi) = 0.91 Avg -3 (deg) = 108.5 Avg (dBi) = -3.43 Peak (dBi) = 1.29 Avg -3 (deg) = 77.5 Power (dBm) Power (dBm) 1563MHz 1563MHz Avg (dBi) = -3.28 Peak (dBi) = 1.02 Avg (dBi) = -3.37 Peak (dBi) = 1.34 270 270 Avg -3 (deg) = 108.5 Avg -3 (deg) = 77.5 Beidou B1 Theta Angle (90°) -1559MHz --1561MHz --- 1563MHz -1559MHz ---1561MHz ---1563MHz XY Plane **ZX** Plane 1574.4MHz 1574.4MHz Avg(dBi) = -2.52 Avg(dBi) = -2.59Peak(dRi) = 1.89 Peak(dBi) = 1.66 Avg -3(deg) = 103.5 Avg -3(deg) = 112.5 1575.4M Avg (dBi) = -2.55 Peak (dBi) = 1.62 Avg -3 (deg) = 116.5 1575.4MHz Avg (dBi) = -2.49 Peak (dBi) = 1.91 300 300 Avg -3 (deg) = 103.5 Power (dBm) Power (dBm) 1576.4MHz 1576.4MHz Avg (dBi) = -2.48 Avg (dBi) = -2.52 270 270 Peak (dBi) = 1.92 Peak (dBi) = 1.58 Avg -3 (deg) = 103.5 Avg -3 (deg) = 131.5 GPS L1 210 150 150 Phi Angle (°) Phi Angle (°) 180 1574 4MHz \_\_1575.4MHz \_\_ XY Plane **ZX Plane** 1598.5MHz 1598.5MHz Avg(dBi) = -2.62Avg(dBi) = -2.75Peak(dBi) = 1.72 Avg -3(deg) = 106.5 Peak(dBi) = 0.08 Avg -3(deg) = 170.5 1602 5MHz 300 Avg(dBi) = -2.64Avg (dBi) = -2.73 Peak (dBi) = 1.55 Avg -3 (deg) = 111.5 Peak (dBi) = 0.25 Avg -3 (deg) = 167.5 Power (dBm) 1606.5MHz 1606.5MHz Avg (dBi) = -2.90 Peak (dBi) = 1.29 Avg (dBi) = -2.88 Peak (dBi) = 0.47 Avg -3 (deg) = 111.5 Avg -3 (deg) = 157.5 Glonass L1 Theta Angle (90°) Phi Angle (0°)

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-1598.5MHz -

-1602.5MHz --1606.5MHz



-1602.5MHz -

-1598.5MHz -

-1606.5MHz



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# **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

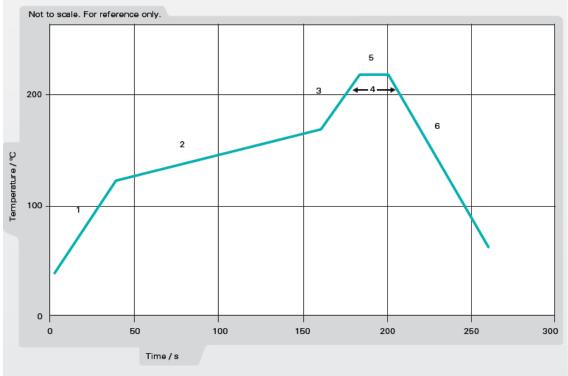


Figure 1. Minimum temperature profile recommendation for reflow soldering process



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# **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

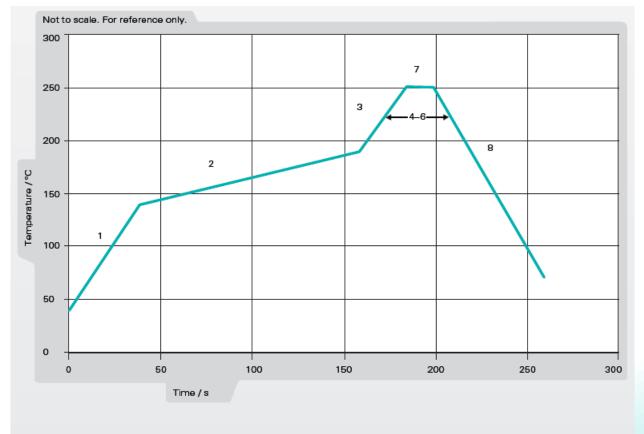


Figure 2. Maximum temperature profile recommendation for reflow soldering process



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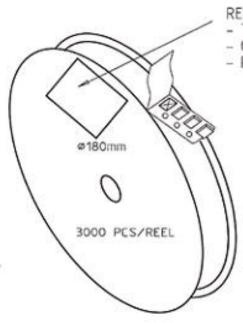
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## **PACKAGING**

# Taping package 3000PCS/Reel 30000PCS/Carton box



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: 50 empty cavities before component section
- Trailer section: 25 empty cavities after component section.

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

BOX H85-00128 (182x182x132) 1 pcs

- LABEL

1 pcs/BOX

REEL H85-00127

10 pcs

(D180,W12)

- REEL LABEL

1 pcs/REEL



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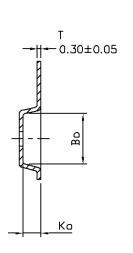
Chip Antenna

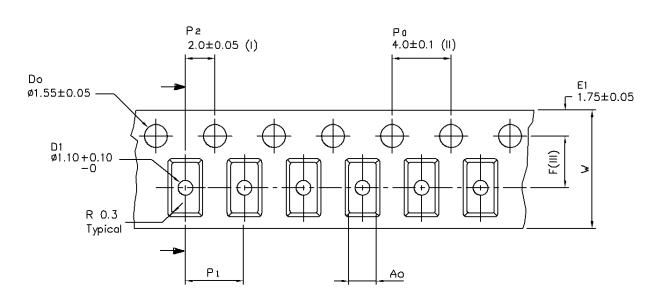
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### **PACKAGING**

# Tape size





Ao	1.85	+/-	0.1
Во	3.43	+/-	0.1
Ko	1.22	+/-	0.1
F	3.50	+/-	0.05
P <sub>1</sub>	4.00	+/-	0.1
W	8.00	+/-	0.1

