Application note

Ceramic Dual Band Monopole Antenna

EGSM900 and PCN1800

10 mm x 3.2 mm x 2 mm Ceramic Chip Antenna

Ground Cleared Under Antenna:
Version 1: 25 mm x 10 mm
Version 2: 40 mm x 10 mm

Pulse Part Number: W3070

Status

<table>
<thead>
<tr>
<th>Author</th>
<th>Version</th>
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<td>MiJu</td>
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Ceramic Chip Antenna

Ground Cleared Under Antenna

Features

- Low profile
- Compact size W x L x H (10 x 3.2 x 2 mm)
- Low weight (240 mg)
- Lead free materials
- Fully SMD compatible
- Lead free soldering compatible
- Tape and reel packing
- RoHS Compliant Product

Applications

- EGSM900 and PCN1800 radios

Electrical specifications @ +25 °C

Note: Electrical characteristics depend on test board (GP) size and antenna positioning on GP and Ground Clearance area size.

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<tbody>
<tr>
<td>880 - 960</td>
<td>+1.5 (peak)</td>
<td>70 / -1.55 (peak)</td>
<td>-4.7 ; -3.8 (band edges)</td>
<td>50</td>
<td>-40 to +85</td>
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<td>-0.4 (band edges)</td>
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<tr>
<td>1710 – 1880</td>
<td>+1 (peak)</td>
<td>50 / -3 (peak)</td>
<td>-4 ; -4.6 (band edges)</td>
<td>50</td>
<td>-40 to +85</td>
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<tr>
<td></td>
<td>-1 ; +0.5 (band edges)</td>
<td>30 ; 40 / -5.2 ; -4 (band edges)</td>
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W3070 Ceramic Dual Band Monopole Antenna (Version 1: Ground Cleared Under Antenna 25 mm x 10mm)

Typical performance (test board size 95 mm x 40 mm, PWB ground clearance area 25 mm x 10 mm)
18nH and 10nH series-inductors used for frequency tuning and 6.8nH shunt-inductor used for impedance matching.

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<tbody>
<tr>
<td>880 - 960</td>
<td>+1.2 (peak)</td>
<td>65 / -1.9 (peak)</td>
<td>-5.1 ; -5.3 (band edges)</td>
<td>50</td>
<td>-40 to +85</td>
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<td>-0.4 (band edges)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1710 – 1880</td>
<td>+2.5 (peak)</td>
<td>60 / -2.2 (peak)</td>
<td>-5.8 ; -5.7 (band edges)</td>
<td>50</td>
<td>-40 to +85</td>
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<tr>
<td></td>
<td>+1.5 ; +2 (band edges)</td>
<td>50 ; 55 / -3 ; -2.6 (band edges)</td>
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W3070 Ceramic Dual Band Monopole Antenna (Version 2: Ground Cleared Under Antenna 40 mm x 10mm)

Typical performance (test board size 95 mm x 40 mm, PWB ground clearance area 40 mm x 10 mm)
18nH and 10nH series-inductors used for frequency tuning.
Ceramic Chip Antenna

Terminal Configuration and Antenna Dimensions

<table>
<thead>
<tr>
<th>No.</th>
<th>Terminal Name</th>
<th>Terminal Dimensions</th>
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<tbody>
<tr>
<td>1</td>
<td>Feed</td>
<td>1.5 x 2.75 mm</td>
</tr>
<tr>
<td>2</td>
<td>Support pad</td>
<td>1.5 x 2.75 mm</td>
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</table>

Antenna is symmetrical and orientation on footprint can be rotated 180 degrees without change in performance
Ceramic Chip Antenna

Test Setup for Electrical Measurements

Recommended test board- layout for electrical characteristic measurement. Test board outline size 95 x 40mm.

Ground cleared under antenna, clearance area **25 mm x 10 mm**

**Matching component locations.**
Values depend on application and surrounding mechanics / materials.

**W3070 Ceramic chip antenna location.**

**Stub for PCN1800 band frequency tuning.**
Length depends on application and surrounding mechanics / materials.

**Via- holes on ground clearance-area edges.**

**Antenna feeding point.**
Transmission line should be designed to match 50Ω characteristic impedance, depending on PWB material and thickness.

**VIA- holes to the bottom-layer of the PWB.**

Ground cleared under antenna, clearance area **40 mm x 10 mm**
Recommended test board layout for electrical characteristic measurement. Test board outline size 95 x 40mm.

3D- view of Test Setup
Ground cleared under antenna, clearance area **25 mm x 10 mm**

3D- view of Test Setup
Ground cleared under antenna, clearance area **40 mm x 10 mm**
Ceramic Chip Antenna

Ground cleared under antenna. Clearance areas 25 mm x 10 mm and 40mm x 10mm.

Typical Electrical Characteristics (T=25 °C)

Measured on the 95 x 40mm test board with matching circuit.

Typical Return Loss S11

Typical free Space Total Efficiencies [%]
Typical free Space Total Efficiencies [dB] and Maximum Gain [dBi]

Free Space Total efficiencies [dB] : Max gain [dBi]

<table>
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<tr>
<th>f [MHz]</th>
<th>eff [dB]</th>
<th>Max gain [dBi]</th>
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<tbody>
<tr>
<td>850</td>
<td>-8</td>
<td></td>
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<tr>
<td>870</td>
<td>-7</td>
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<td>885</td>
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<td>945</td>
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<tr>
<td>980</td>
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W3070_40mm x 10mm GC- Area_eff [dB]
W3070_40mm x 10mm GC- Area_Max Gain [dBi]
W3070_25mm x 10mm GC- Area_eff [dB]
W3070_25mm x 10mm GC- Area_Max Gain [dBi]
Ceramic Chip Antenna
Ground cleared under antenna. Clearance area 25 mm x 10mm.

Typical Free Space Radiation Patterns for EGSM900 Band

YZ-PLANE 900MHz

XZ-PLANE 900MHz

XY-PLANE 900MHz
Typical Free Space Radiation Patterns for PCN1800 Band

YZ-PLANE 1800MHz

XZ-PLANE 1800MHz

XY-PLANE 1800MHz
Ceramic Chip Antenna

Ground cleared under antenna. Clearance area **40 mm x 10mm**.

Typical Free Space Radiation Patterns for EGSM900 Band

![YZ-PLANE 900MHz](image)

![XZ-PLANE 900MHz](image)

![XY-PLANE 900MHz](image)
Typical Free Space Radiation Patterns for PCN1800 Band

YZ-PLANE 1800MHz

XZ-PLANE 1800MHz

XY-PLANE 1800MHz
Ceramic Chip Antenna

Packing

General
Tape and reel packing is used. Carrier tape, reel and box dimensions are presented in following pictures.

Carrier tape
**Block orientation**

Antenna soldering pads facing down to the bottom of the carrier tape.
Packing form

CARRIER TAPE H85-00168
width=24.00 depth=2.20
COVER TAPE H85-00159
width=21.20

LENGTH OF TAPE:
- Leader section: min 350 nm before component section
- Trailer section: min 40 nm after component section.

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

BOX H85-00128 (162x182x125) 1 pcs
- LABEL 1 pcs/BOX

REEL H85-00160 (D180, W28) 4 pcs
- REEL LABEL 1 pcs/REEL

MATERIAL

HANDLINGS

PRODUCT H90-0Y113-F01P01

DENOMINATION PACKING FORM

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Ceramic Chip Antenna

Mechanical Outline
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