GPS RADIONOVA® Co-planar Antenna

Part No. A10137

Product Specification

1 Features

- GPS antenna designed for embedded applications.
- Balanced antenna technology.
- High efficiency.
- Good resistance to de-tuning.
- Designed for easy integration onto PCB.
- Low height, small footprint, light weight.

2 Description

- Antenna for reception of GPS signals (1575MHz).
- SMD antenna.
- Uses matching circuit and cut-out area for optimising efficiency.

The antenna has balanced antenna characteristics. The minimum populated ground plane size is 20 x 30 mm (LxW)

The antenna has RHCP characteristics suitable for reception of GPS signals. The antenna patterns are given in section 7-2 “Radiation Patterns”.

It should be noted that the radiation patterns change with the size of the ground plane as described for the two reference boards indicated in section 7-2 “Radiation Patterns”.

3 Application

- Antenna for mobile phones and handheld devices with embedded GPS systems
- Application specific tracking modules
- Mapping software accessories: USB dongle, SDIO cards, PCMCIA card.



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4 Model name

4-1 GPS RADIONOVA® Co-Planar

Ordering Part Number: **A10137**

4-2 Reference Board

There are two Reference Boards available for evaluating this product:

Ordering Part Number	**A10137-R**
Size	40 x 100mm
Connector	SMA
Input Impedance:	50Ω



Ordering Part Number	**A10137-D**
Size	20 x 60mm
Connector	MMCX
Input Impedance:	50Ω



5 Mechanical

Size	9 x 20.1 x 1.6 mm
Weight	<1 g
Operating Temperature	-40 to +85°C
PCB Mounting	SMD
Resistance to Soldering Heat	260°C for 10 seconds

6 Electrical

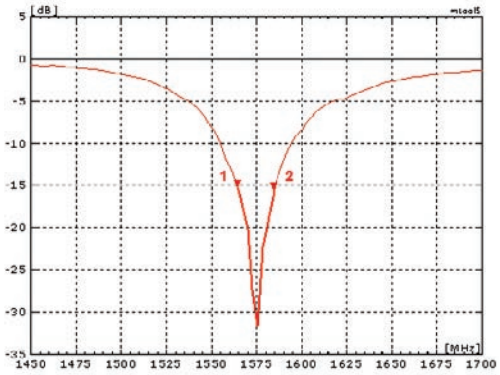
Reference Board A10137-R	
Centre Frequency	1575.42 MHz
Bandwidth	>20MHz at –10dB return loss
Peak Gain (RHCP)	-0.2 dBi
Average Gain (RHCP)	-4.4 dBi
Nominal Impedance	50Ω
VSWR	Better than 1.5:1 ±1 MHz
Average Radiation Efficiency	≈60%

Reference Board A10137-D	
Center Frequency	1575.42 MHz
Bandwidth	>30MHz at –10dB return loss
Peak Gain (RHCP)	-1.5 dBi
Average Gain (RHCP)	-3.3 dBi
Nominal Impedance	50Ω
VSWR	Better than 1.5:1 ±1 MHz
Average Radiation Efficiency	≈70%

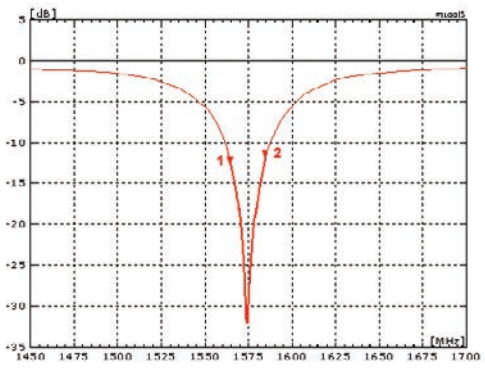
7 Performance

7-1 Return Loss

Performance data:



Reference Board A10137-D



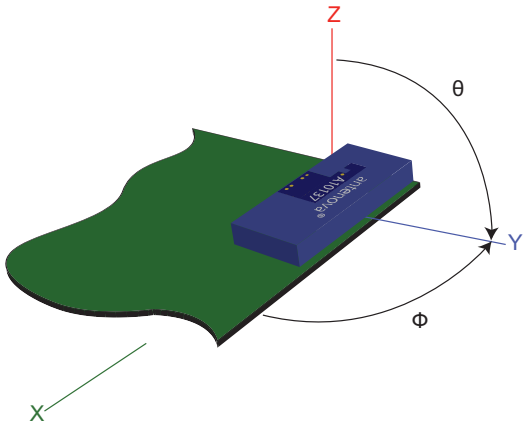
Reference Board A10137-R

Marker 1 = 1565 MHz

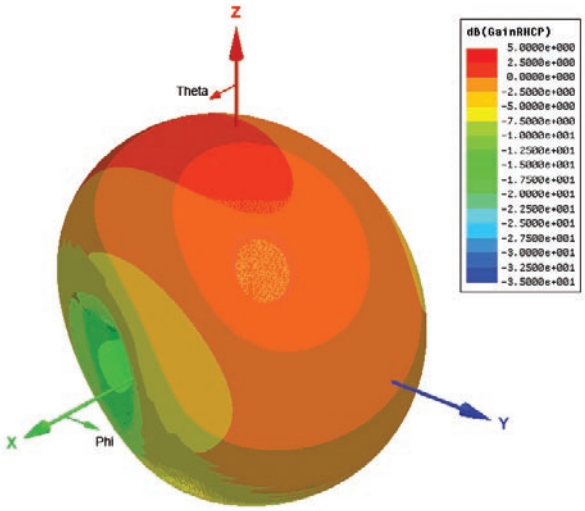
Marker 2 = 1585 MHz

7-2 Radiation Patterns

7-2-1 3D Pattern (RHCP) Polarisation A10137-R

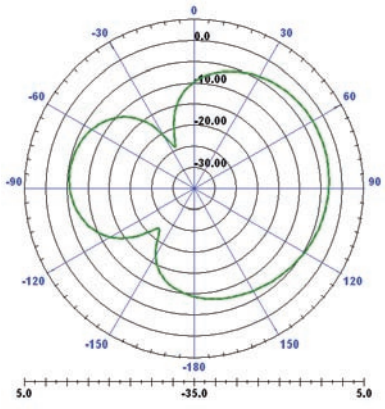


RHCP 3-D Gain (dBi)

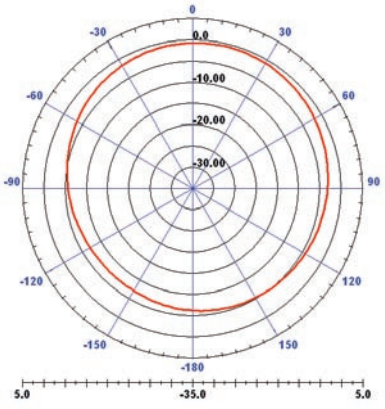


RHCP Gain (dBi)

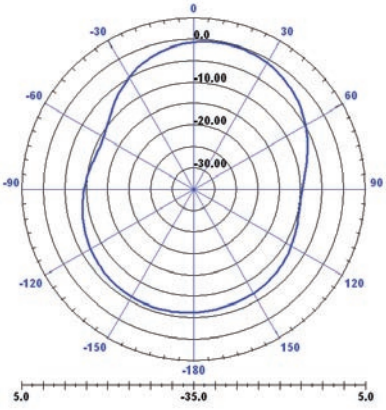
XY-Plane (θ = 90)



ZY-Plane (ϕ = 90)

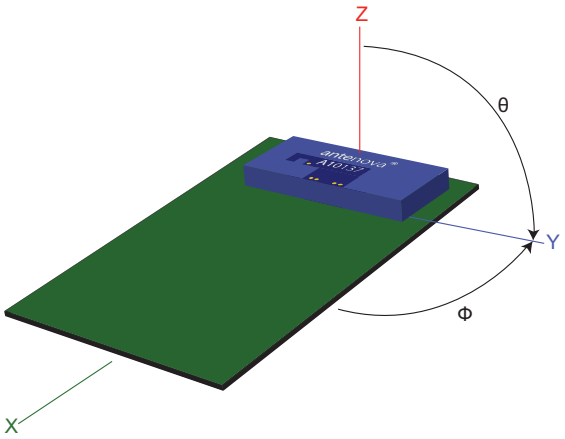


ZX-Plane (ϕ = 0)

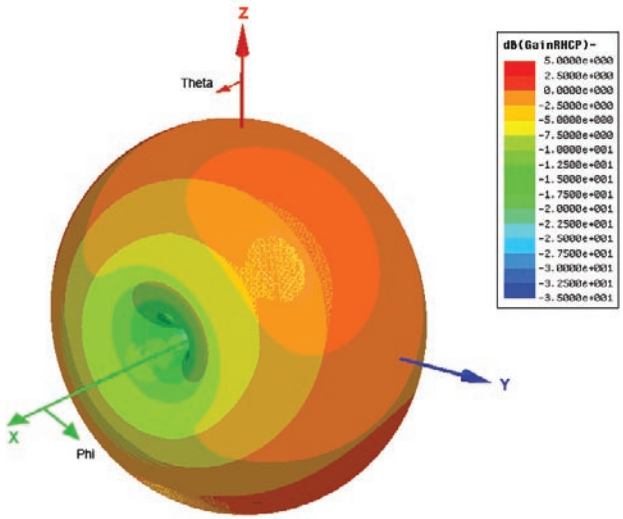


The results shown in this section have been obtained by simulations made using Ansoft HFSS and correlated and verified by the near polarisation measurements made in Antenova's anechoic chamber.

7-2-2 3D Pattern (RHCP) Polarisation A10137-D

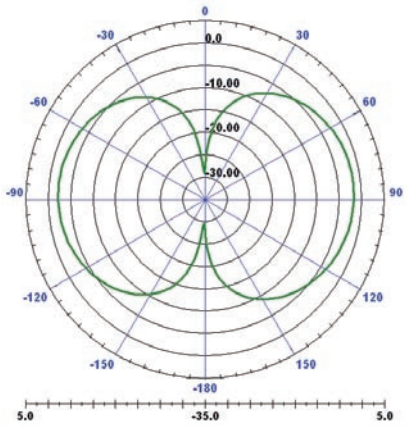


RHCP 3-D Gain (dBi)

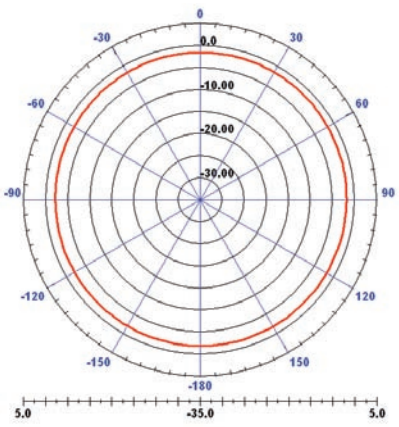


RHCP Gain (dBi)

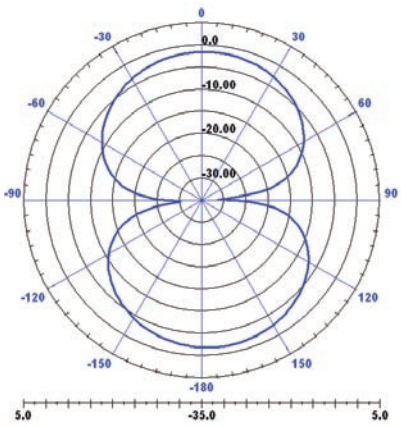
XY-Plane (θ = 90)



ZY-Plane (ϕ = 90)



ZX-Plane (ϕ = 0)



The results shown in this section have been obtained by simulations made using Ansoft HFSS and correlated and verified by the near polarisation measurements made in Antenova's anechoic chamber.

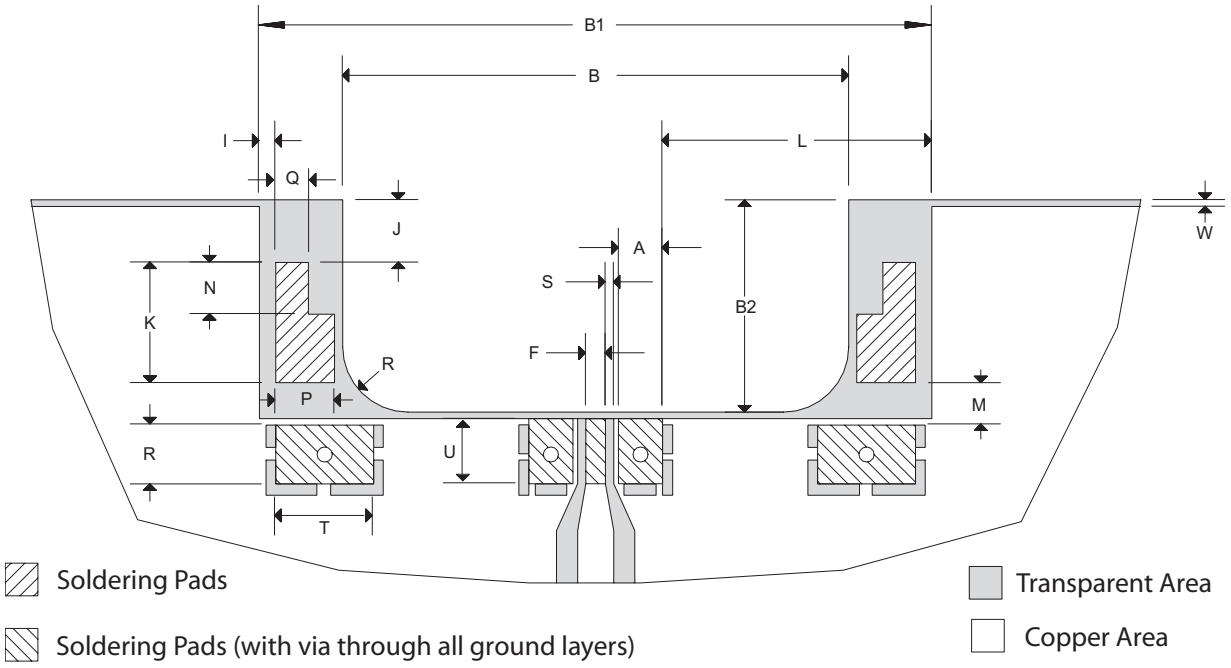
8 Physical Dimensions



W	H	D
Width	Height	Depth
20.1	9	1.6

Dimensions in millimeters. Tolerance ±0.25mm unless stated.

9 Footprint



R	F(Feed)	S	A	B	B1	B2	I	J	K	L	M	N	P	Q	R	T	U	W
2	0.6 ±0.05	0.25 ±0.05	1.35	15.5	20.6	6.5	0.5	1.72	3.68	8.25	1.3	1.58	1.8	1	1.8	3	2	0.2

Dimensions in millimeters. Tolerance ±0.1mm unless stated.

Dimension **B1** stated is a minimum; depending on the application it can be extended to optimise Antenna performance. For more details please contact Antenova Technical Support.

The antenna is mounted on the PCB using soldering pads. The antenna is connected via one feed, four ground pads and two isolated pads. A cut-out is required in the PCB as detailed.

10 General Application Guidelines

1. **Placement of the antenna.**
   The antenna shall be placed on an area with the PCB cut out (see drawing on page 7), preferably at the edge of the PCB.
2. **Placement of GPS radio module.**
   To avoid losses in the strip line, the module shall be placed as close to the antenna as possible.
3. **Matching Circuit**
   The antenna requires a matching circuit, a PI network is recommended. This should be placed as close to the antenna feed as possible.
   Component values are depending on antenna placement, PCB dimensions and location of other components.
   Vias should connect all ground layers. Vias should be used to fence in the feed track from the radio to the antenna. Vias should also be placed close to the ground pads of matching components. Vias size and spacing depends on the application but generally 0.3 to 0.5mm diameter, spacing 3 to 10mm.
4. **Strip line.**
   The strip line must be dimensioned according to your specific PCB. No crossing strip lines are allowed between the strip line and its ground plane.
5. **Via connections.**
   To avoid spurious effects, via connections must be made to analogue ground.
6. **Clearance.**
   Minimum clearance to other components is 2-5 mm.
7. **Casing material.**
   No metal casing or plastics using metal flakes shall be used, avoid also metallic based paint or laquer.

Note ! Incorrect implementation of the antenna will affect the performance.
Contact Antenova for implementation services and technical support.

11 Lead Free Soldering

The antenna has been tested and approved for lead free soldering. (See 12.4). Follow the guidelines and reflow temperature vs time data for the solder paste supplied by the solder manufacturer.

12 Test Standards Conformance

(Information provided in this section is based on similarity and analysis with Antenova's existing products. Results from testing (in progress) will be released in future revisions of this product specification.)

12-1 Temperature

Antenna shall suffer no physical damage or performance degradation under the following operating conditions.

Item	Standard	Requirement	Procedure
Operating Temperature	EN/IEC 60068-2-2 Test: Bd Dry Heat	-30degC to +90degC	
Temperature Cycling	EN/IEC 60068-2-14 Test: Na Change of Temperature	-40degC to +90degC	500 cycles/10 min

12-2 Storage Life

Antenna shall suffer no physical damage or performance degradation under the following storage conditions.

Item	Standard	Requirement	Procedure
Humidity	EN/IEC 60068-2-14 Test: Ca Damp Heat	+60 degC / 90% RH	500 hours
Low Temperature	EN/IEC 60068-2-14 Test: Ad Cold	-55 degC	500 hours
High Temperature	EN/IEC 60068-2-14 Test: Bb Dry Heat	+125 degC	500 hours

12-3 Mechanical

Antenna shall suffer no physical damage or performance degradation under the following conditions.

Item	Standard	Requirement	Procedure
Bending	EN/IEC 60068-2-21 Test: Ue Bending	Bend rate of 1mm/sec for 1 mm total displacement.	Bend Reference Board PCB with antenna mounted with one end of PCB fixed.
Shear	EN/IEC 60068-2-21 Test: Ue Shear	Force of 5 N.	Applied to long side of antenna.
Drop Test		Antenna mounted on dummy weight of 150gms from vertical height of 170 cm.	One drop on each side of antenna(Total 6)

12-4 Other

Item	Standard	Requirement	Procedure
Solderability	EN/IEC 80068-2-58 Test: Td	Estimation of the % of tin plating on each soldering pad.	Visual inspection.

13 Hazardous Material Regulation Conformance

Restriction of Hazardous Substances (RoHS)

The GPS RADIONOVA® Co-planar Antenna, A10137, is in full compliance with the relevant EU directives with respect to the content of:

- lead
- mercury
- cadmium
- hexavalent chromium
- polybrominated biphenyls (PBB)
- polybrominated diphenyl ethers (PBDE)

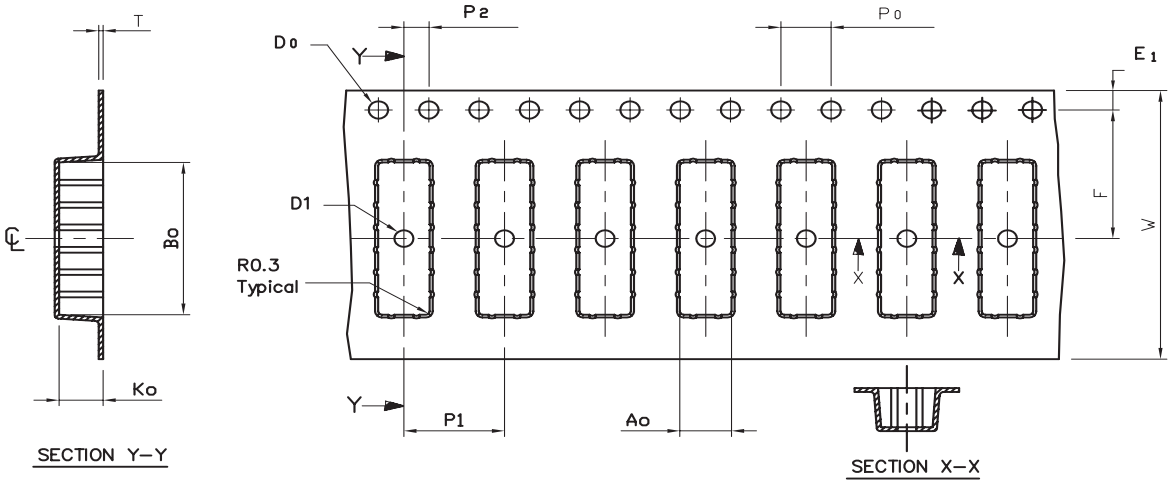
Antenova's Declaration of Compliance for the GPS RADIONOVA® Co-planar Antenna, A10137 is available upon request from Antenova Technical Support.

14 Packaging

14-1 Shelf Storage Recommendation

Temperature	-10 to +40 degree C
Humidity	Less than 75% RH
Shelf Life	12 Months
Storage place	Away from corrosive gas and direct sunlight

14-2 Tape Characteristics



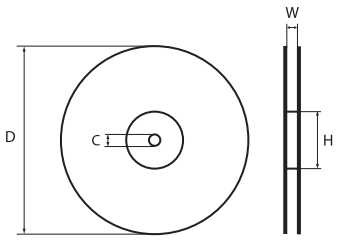
W	F	E_1	P_0	P_1	P_2	A_0	B_0	K_0	T	D_0	D_1
32±0.2	14.2±0.1	1.75±0.1	4.0±0.1	16.0±0.1	2.0±0.1	9.3±0.1	20.4±0.1	1.8±0.1	0.3±0.05	1.5±0.1	1.0 Min

Dimensions in millimetres

Quantity	Leading space	Trailing space
1000 Pcs / reel	50 blank antenna holders	50 blank antenna holders

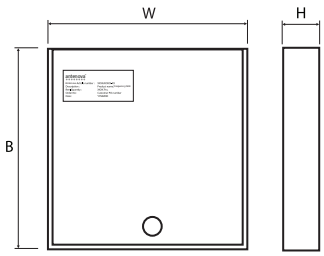
14-3 Reel Dimension

Material:	Antistatic Polystyrene
Width [mm]	W: 33.5
Reel dia [mm]	D: 330(13”)
Hub dia [mm]	H: 80(3”)
Shaft dia [mm]	C: 13



14-4 Box Dimension

Material:	Cardboard
Width [mm]	W: 345
Breadth [mm]	B: 345
Thickness [mm]	H: 45



14-5 Bag Properties

Antistatic Aluminium Moisture Barrier Bag

Thickness [mil] T: 3.2

14-6 Reel Label Information

antenova

Antenova Article number :	XXXXAXXXX-XX
Description :	Product name, Frequency GHz
Reel Quantity :	XXXX Pcs.
Order No:	Customer PO number
Date:	YYMMDD

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Certificate No: 4598/04

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