VAISALA

USER'S GUIDE

Vaisala GPS Antenna GA41

M211633EN-B

PUBLISHED BY

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CHAPTER 1

GENERAL INFORMATION

This chapter provides general notes for the manual and the product.

About This Manual

This manual provides the information needed to use Vaisala GPS Antenna GA41.

Contents of This Manual

This manual consists of the following chapters:

- Chapter 1, General Information, provides general notes for the manual and the product.
- Chapter 2, Product Overview, provides a general description of GA41.
- Chapter 3, Installation, provides information on GA41 installation.
- Chapter 4, Maintenance, explains preventive maintenance for GA41.
- Chapter 5, Specifications, presents the technical specifications for the antenna.
- Chapter 6, Spare Parts List, presents the spare parts lists for GA41.

Version Information

Table 1 Manual Revisions

Manual Code	Description
M211633EN-B	March 2015. Updated information on cable lengths.
M211633EN-A	First version. October 2013.

Documentation Conventions

Throughout the manual, important safety considerations are highlighted as follows:

WARNING	Warning alerts you to a serious hazard. If you do not read and follow instructions very carefully at this point, there is a risk of injury or even death.

CAUTION	Caution warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.

NOTE	Note highlights important information on using the product.

ESD Protection

Electrostatic Discharge (ESD) can cause immediate or latent damage to electronic circuits. Vaisala products are adequately protected against ESD for their intended use. It is possible to damage the product, however, by delivering electrostatic discharges when touching, removing, or inserting any objects inside the equipment housing.

To make sure you are not delivering high static voltages yourself:

- Handle ESD sensitive components on a properly grounded and protected ESD workbench.
- When an ESD workbench is not available, ground yourself to the equipment chassis with a wrist strap and a resistive connection cord.
- If you are unable to take either of the above precautions, touch a conductive part of the equipment chassis with your other hand before touching ESD sensitive components.
- Always hold component boards by the edges and avoid touching the component contacts.

Recycling

Recycle all applicable material.

Dispose of batteries and the unit according to statutory regulations. Do not dispose of with regular household refuse.

Warranty

Visit our Internet pages for standard warranty terms and conditions: www.vaisala.com/warranty.

Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or Conditions of Sale for details of the warranty for each product.

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CHAPTER 2
PRODUCT OVERVIEW

This chapter provides a general description of GA41.

General

GA41 is used for receiving GPS C/A code signals at L1 frequency. These signals are Right Hand Circular Polarization (RHCP) centered at 1575.42 MHz. GA41 is suitable for stations equipped with GPS wind finding system.

The GA41 active antenna element provides Low Noise Amplifier, high out-of-band rejection performance, and a highly stable phase center, improving the accuracy of the calculated height and atmospheric pressure profiles.

GA41 differs from GA31, another GPS antenna version, in that it is a GPS antenna with enhanced multipath rejection. Multipath occurs when a GPS signal arrives at the GPS antenna from more than one propagation route, that is, from multiple propagation paths. Compared with GA31, GA41 provides more accurate information in demanding signal conditions when height is calculated from GPS. For example, if there are high buildings or metal surfaces close to the antenna causing reflected signals, GA41 provides improved accuracy for the calculated geopotential and pressure estimates. See Figure 2 on page 9 for an example of a possible GA41 site.

GA41 can be used in conjunction with Vaisala sounding instruments equipped with MRG GPS receiver unit.

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Figure 1 Vaisala GPS Antenna GA41

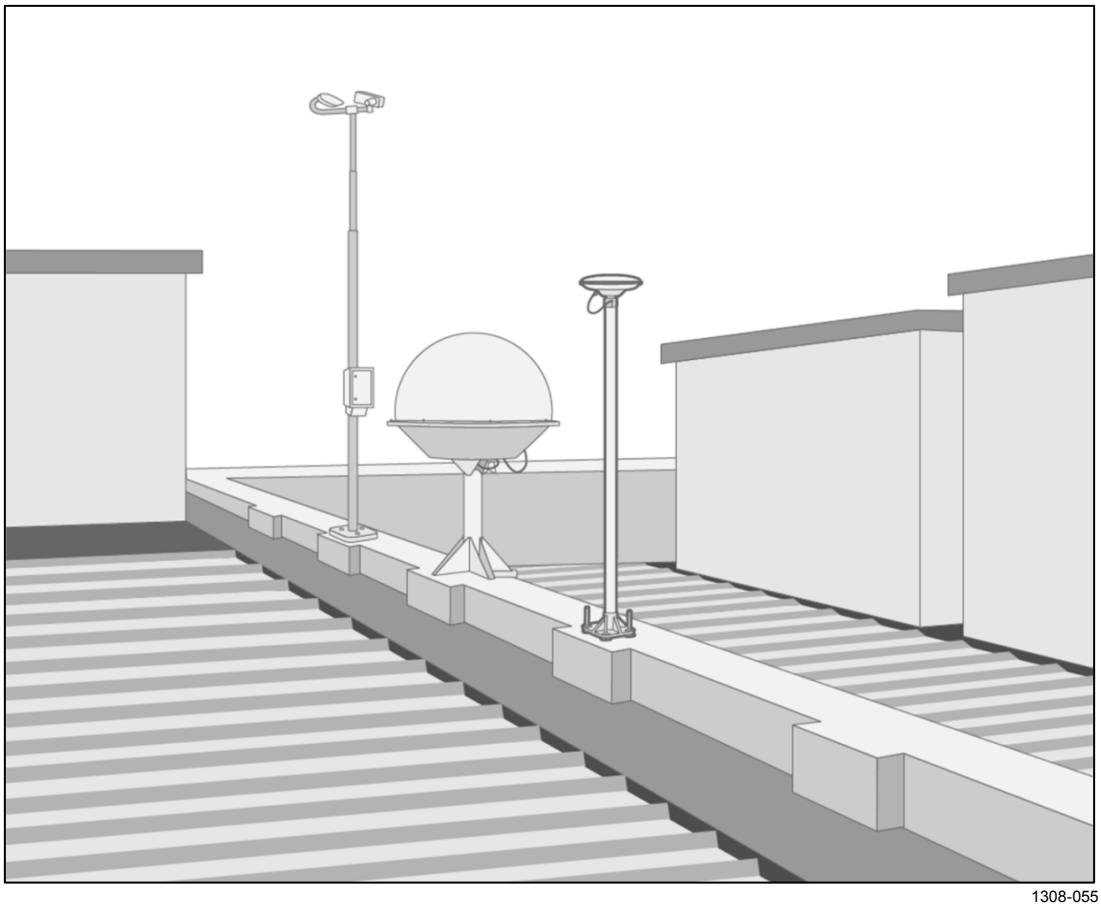

Figure 2 Example of GA41 Site

Construction

The active GPS Antenna module consists of an L1 frequency antenna element integrated with an internal interference rejection filter and Low Noise Amplifier (LNA). The element is enclosed within a radome with an attached mounting base. A single N connector carries both the GPS signal to the navigation unit and the 5-voltage power to the LNA. The antenna element and preamplifier are housed in a waterproof round-shaped plastic radome that is mounted on top of the 1.5-meter pole.

The aluminum insert in the base of the antenna accepts a 5/8” x 11 pole mount. The N connector is located outside the threaded insert, allowing the antenna cable to be routed through the pole mount, which protects the cable connection from the environment for added reliability.

The antenna is equipped with a mounting flange at the lower end of the pole.

See Figure 10 on page 17 for an illustration of GA41 base mounting and Figure 11 on page 18 for an illustration of GA41 tube mounting.

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CHAPTER 3

INSTALLATION

This chapter provides information on GA41 installation.

Selecting Installation Site

Proper siting of the antenna is important for good performance. As a general rule, the antenna should be installed so that it is not screened by large obstacles, such as buildings, thick forest, or high metal masts.

For best reception, choose an antenna location that has a clear view of the sky down to the horizon in all directions. This will ensure that all satellites in view can be tracked without obstruction. In some cases it may be required to mount the antenna on an elevated structure to guarantee unobstructed reception.

A single obstacle has little effect on reception if it is not exceptionally dense or very near the antenna (less than 20 meters). Sparse forest causes some attenuation but is usually no hindrance.

Antenna masts and other similar metal structures with a small diameter do not normally disturb reception to a serious extent if they are located more than 20 meters away. Metal roofs and other corresponding large surfaces can reflect signals in some instances, causing multipath reception. A large metal structure or a building screens the antenna, and reception through it is then impossible.

Installing and Mounting GA41

This section explains how to install GA41 and, if you currently have GA31 antenna, how to upgrade GA31 to GA41. For upgrade instructions, see section Upgrading GA31 on page 15.

Installing GA41

When you install GA41, you must attach the antenna unit to the antenna pole, connect the cable, and mount the antenna. See the following steps and section Mounting the Antenna on page 16.

1. GA41 antenna unit is delivered to you with the cable attached. Attach the mount thread (number 1 in Figure 3 below) to the metal adapter on the bottom of the antenna (number 2), and rotate the antenna unit clockwise until it is properly secured.

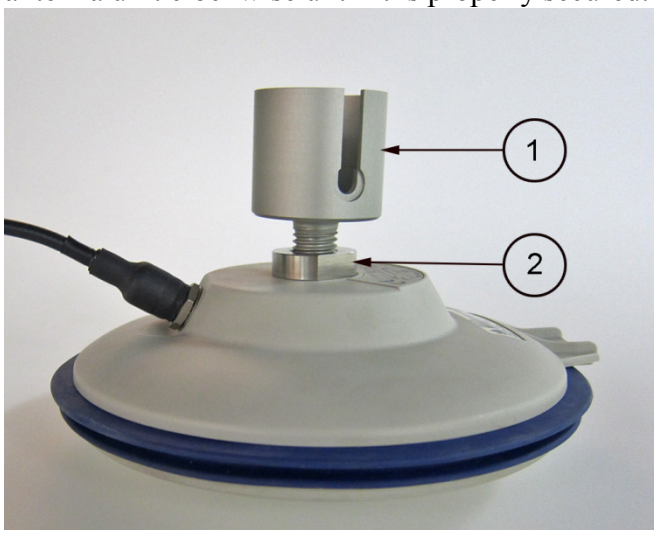

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Figure 3 GA41 Mount Thread (1) and Metal Adapter (2)

2. The main cable inside the antenna pole is installed at Vaisala. Connect the GA41 antenna unit's coaxial cable to the main cable.

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Figure 4 Connecting Antenna Unit Cable and Main Cable

3. Make sure the antenna unit's cable runs through the cable groove in the antenna's mount thread.

Figure 5 Antenna Unit Cable Running through the Groove

4. Place the antenna's mount thread on top of the pole so that the screws on top of the pole are placed in the thread's grooves. Tighten the screws.

Figure 6 Placing the Antenna Unit on Top of the Pole

5. Tie the antenna unit cable to the pole with the steel cable tie included in the delivery. It is important that the cable tie is attached as shown in Figure 7 below. In this position, the cable tie holds the cable loop down so that rain flows downwards. Do not tie the cable so that the cable loop is upwards or above the antenna.

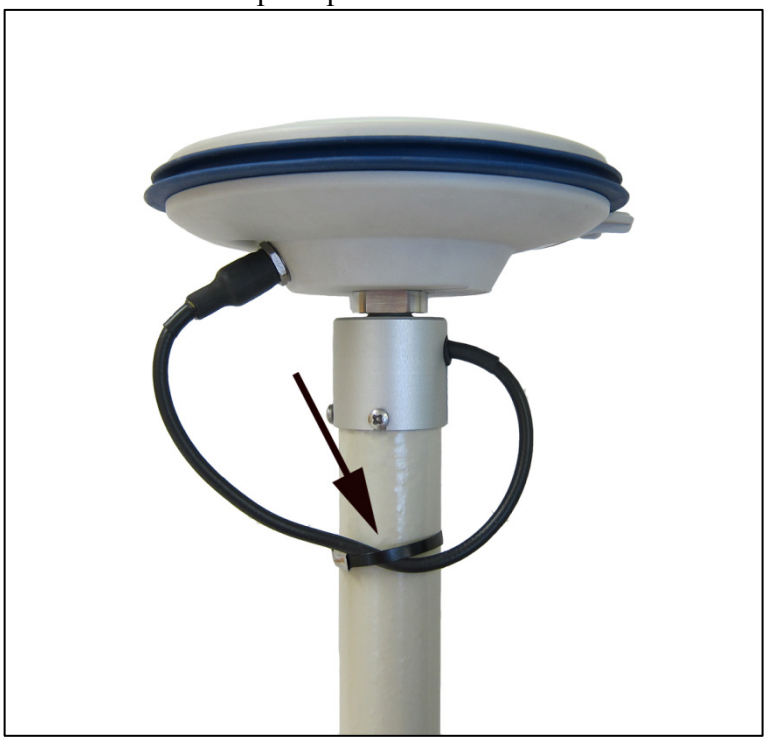

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Figure 7 GA41 Antenna Cable Tied to the Pole

Upgrading GA31 to GA41

GA31 and GA41 use the same antenna pole and mounting equipment. To upgrade GA31 to GA41, you only have to replace the GA31 bullet antenna with the GA41 antenna unit and connect the cable.

1. Remove the bullet antenna from GA31.

Figure 8 Removing GA31 Bullet Antenna

2. Using a crosshead screwdriver, loosen the two M4 screws and remove the GA31 bushing from the top of the antenna pole. Make sure that the antenna cable inside the pole is visible.

Figure 9 Removing the Bushing

To proceed with the installation, follow the steps for installing the GA41 antenna unit in section Installing GA41 on page 11.

Mounting the Antenna

NOTE	For maintenance purposes, leave an empty area of 600 mm around the antenna.

The antenna can be mounted with the mounting flange on a foundation that is solid enough. Alternatively, the flange can be removed and the pole can be attached with the clamps included in the delivery, for instance, to a vertical rail. See Figure 10 on page 17 for an illustration of GA41 base mounting, and Figure 11 on page 18 for an illustration of GA41 tube mounting.

Base Mounting

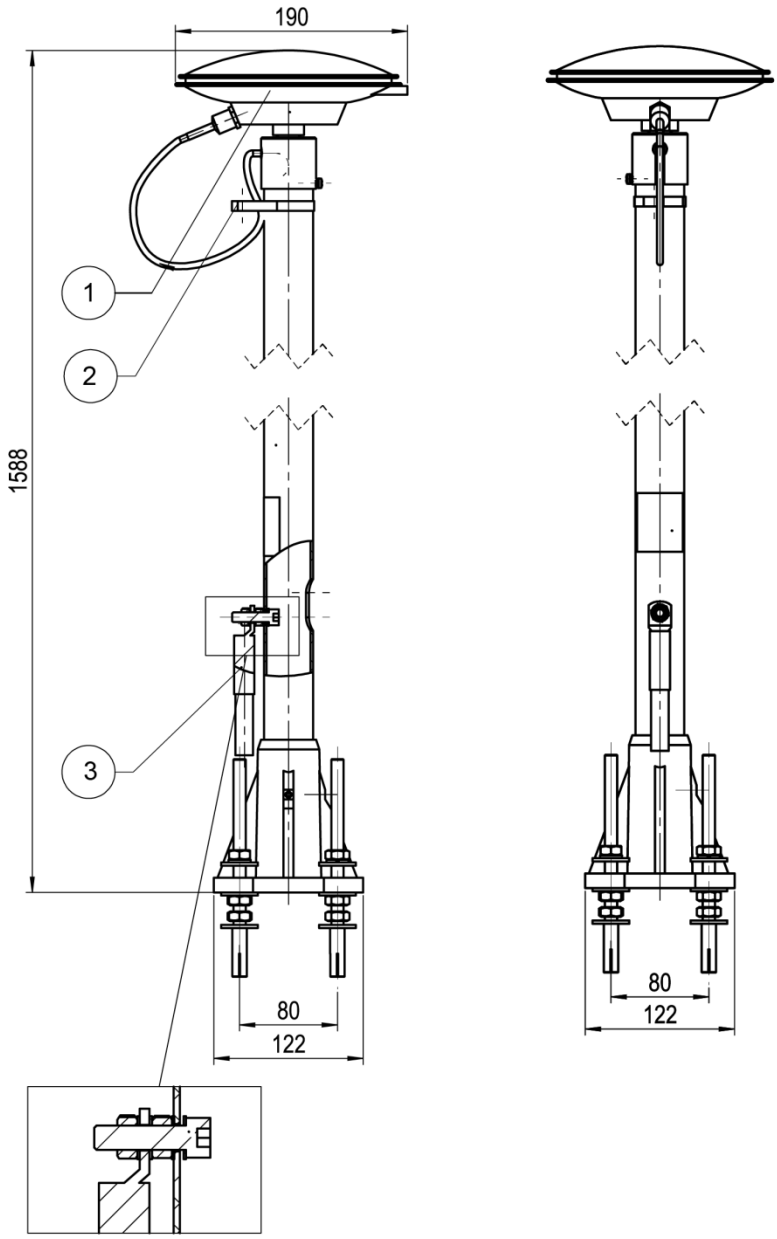

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Figure 10 GPS Antenna GA41 Base Mounting

The following numbers refer to Figure 10:

1 = GPS antenna unit
2 = Cable tie
3 = Grounding cable

Tube Mounting

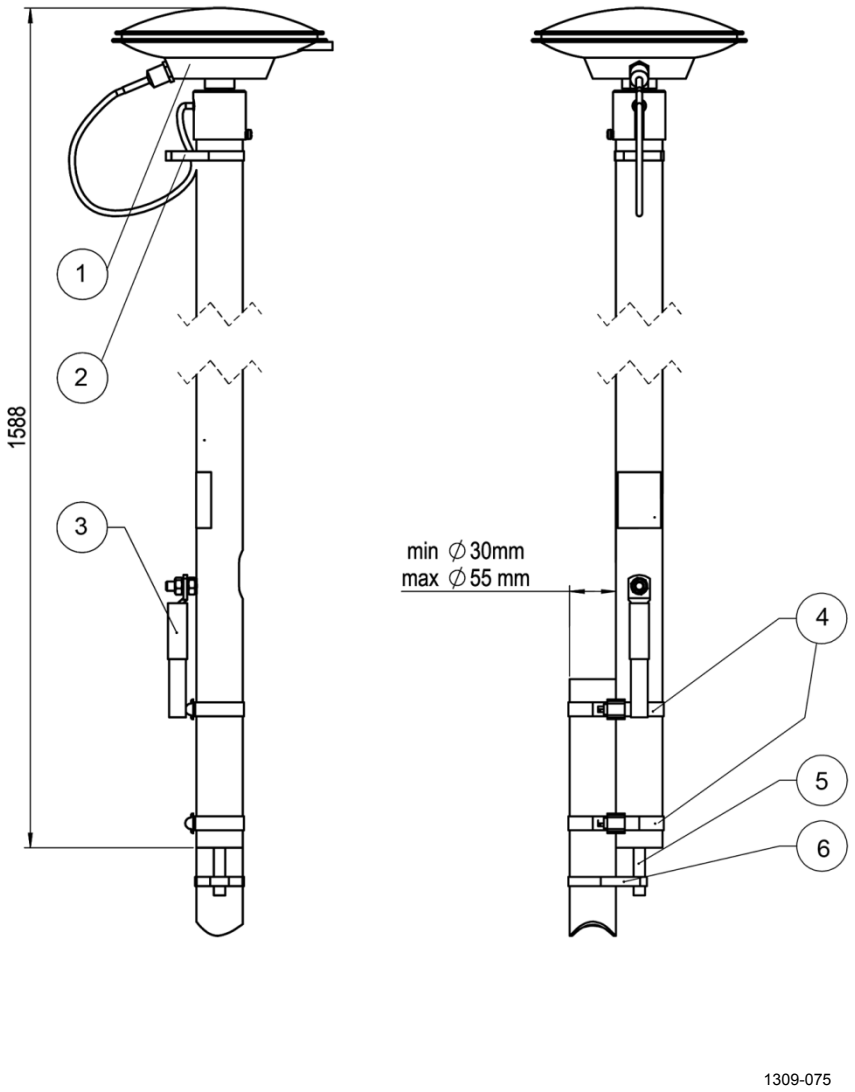

Figure 11 GA41 Antenna Tube Mounting

The following numbers refer to Figure 11:

1 = GPS antenna unit
2 = Cable tie
3 = Grounding cable
4 = Clamps for tube mounting
5 = Coaxial cable
6 = Cable tie

Length of the Antenna Cable

The standard length of the antenna cable is 33 meters and the attenuation of the standard cable type (RG-213/U) is 31 dB/100 m at 1500 MHz.

Other cable types and lengths are possible, but, for full system performance, the attenuation of the antenna cable must be less than 21 dB.

Table 2 Cable Lengths

Vaisala Code	Length
DRW216768SP	33 m
DRW216768S	Customer-specific length, max. 60 m

Grounding

Because antennas can act as lightning rods, a separate lightning protection grounding must be taken into consideration according to local lightning protection regulations. To protect structures, equipment and personnel, a low-resistance path to the ground (ground electrode) must be provided for the current of the lightning strike.

A good grounding also protects the personnel against hazardous touch voltages under fault conditions; therefore, the grounding system must get proper attention.

Attach the grounding cable as follows:

1. Attach the grounding cable (= down conductor) separately from the other cables, and secure it firmly at intervals of one meter or less.
2. Make sure the bending radius is not under 200 mm (eight inches). All bends must be smooth and never over 90 degrees.
3. Route the grounding cable to the ground as directly as possible. Do not let the excess cable form loops.

CAUTION Never let the excess cable form loops.

Grounding Cable

The grounding cable is weather, UV and ozone-resistant, and also suitable for direct burial.

Table 3 Grounding Cables

Vaisala Part Number	Cable Length	Other Information
CBL210160-4M	4 meters	35 mm^2 stranded copper with jacket and M8 tube cable lugs on both cable ends
CBL210160-SPEC	Can be ordered separately at custom length	

CHAPTER 4

MAINTENANCE

This chapter explains preventive maintenance for GA41.

Preventive Maintenance

Sensitive parts of the antenna are protected by the plastic cover and are thus not prone to mechanical damage. The antenna is also designed to withstand the elements, including rain, snow, and dust. Nevertheless, from time to time it is advisable to inspect the antenna for possible corrosion damage and ensure that the connectors are in good condition. Keep the top surface of the antenna (antenna radome) clean, and brush off any ice and snow.

If the antenna operates poorly as a whole, first check that the DC supply input (+5V) is found at the end of the antenna cable. If the supply voltage is in order, the fault is possibly in the antenna preamplifier. Replace the GPS antenna unit.

When disassembling the antenna, loosen the M4 screws first. Then remove the antenna unit with the mounting thread and disconnect the cable.

Technical Support

For technical questions, contact the Vaisala technical support by e-mail at helpdesk@vaisala.com. Provide at least the following supporting information:

- Name and model of the product in question
- Serial number of the product
- Name and location of the installation site
- Name and contact information of a technically competent person who can provide further information on the problem.

For Vaisala Service Center contact information, see www.vaisala.com/servicecenters.

CHAPTER 5
SPECIFICATIONS

This chapter presents the technical specifications for the antenna.

Table 4 GA41 Specifications

Feature	Specification
Primary power	+ 5 V DC (± 10%)
Power consumption	35 mA (typical)
Output impedance	50 Ω
Frequency	L1 (1575 MHz)
Polarization	Right-hand circular
VSWR	≤ 2.0 : 1
Gain	29 dB (nominal)
Noise figure	2.0 dB (nominal)
3 dB pass-band width	L1: ± 23.0 MHz
Cable attenuation	< 21 dB at 1.5 GHz
Azimuth coverage	360° (omni-directional)
Elevation coverage	0° to 90° elevation (hemispherical)
Height	1.6 m
Weight (without cables)	2.9 kg
Mounting	Pedestal flange or pole clamps
Standard cable length	33 m. 60 m also available.
Environmental conditions:	
Operating temperature	-40°C to +85°C
Storage temperature	-55°C to +85°C

Figure 12 represents the typical right-hand circular polarized (RHCP) and left-hand circular polarized (LHCP) normalized radiation patterns for the GA41 L1 frequency.

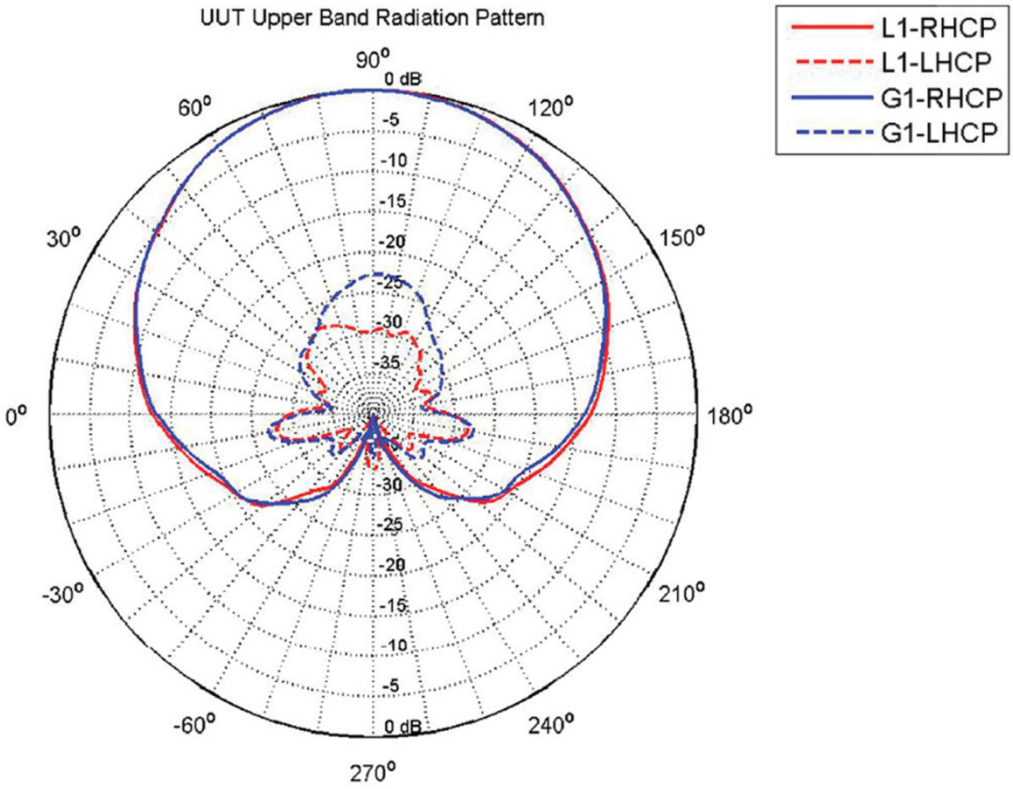

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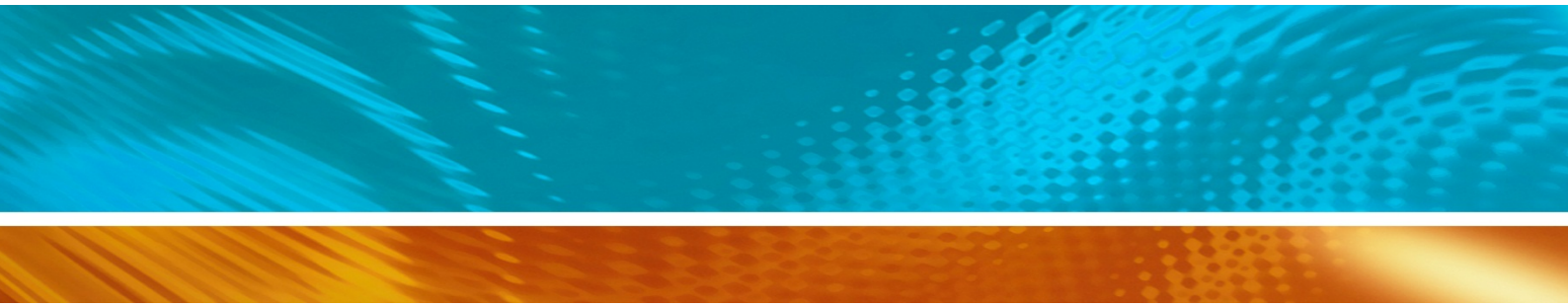
Figure 12 GA41 Radiation Pattern

CHAPTER 6
SPARE PARTS LIST

This chapter presents the spare parts lists for GA41.

Table 5 GA41 Spare Parts

Part Number	Item	Quantity
DRW216768SP	Antenna cable, 33 m	1
DRW216768S	Antenna cable, max. 60 m	1
237941SP	GPS antenna Novatel GPS-701-gg	1
238499SP	Mounting hardware kit	1
234092SP	Fixing screw set	1
CBL210287	Coaxial Cable N(f)-TNC(m), RG223, 0.5m	1
60172	Worm bar M10x150, A4	4
0952	Anchor, M10x150 /Fe/Zn	4
3069	Nut, hex M10 DIN934 A4	12
16267	Washer, Fender A10,5 DIN9021 A4	12
4342	Washer, spring, B 10 A4	2
CBL210160-4MSP	Grounding cable, 4 m	1
CBL210160-SPEC	Grounding Cable. Can be ordered separately at custom length.	1
234092	Fixing screw set for the grounding cable	1



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