HC997EXF

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TALLYSMAN®
A CALIAN® COMPANY

HC997EXF Extended-Filter Embedded Triple-Band GNSS Low-Profile Helical Antenna + L

Frequency Coverage: GPS/QZSS-L1/L2/L5, GLONASS-G1/G2/G3, Galileo-E1/E5a/E5b, BeiDou-B1/B2/B2a, NavIC-L5 + L-Band correction services

The HC997EXF eXtended-filter embedded low-profile helical antenna is designed for precision positioning, covering the GPS/QZSS-L1/L2/L5, GLONASS-G1/G2/G3, Galileo-E1/E5a/E5b, BeiDou-B1/B2/B2a, and NavIC-L5 frequency bands, including the satellite-based augmentation system (SBAS) available in the region of operation [WAAS (North America), EGNOS (Europe), MSAS (Japan), or GAGAN (India)], as well as L-band correction services.

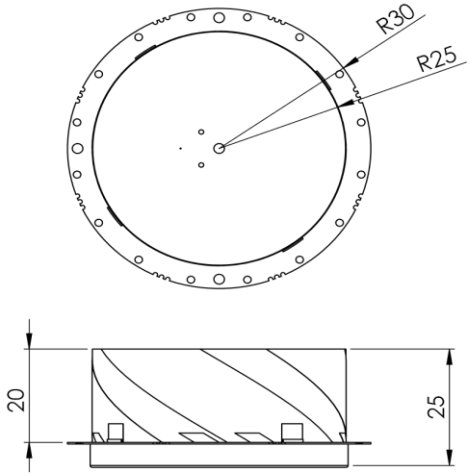
The patent-pending HC997EXF utilizes Tallysman's latest wideband helical element design. The antenna element provides 67 MHz of signal bandwidth supporting the entire upper GNSS band and L-Band corrections (1539 - 1606 MHz) and 91 MHz of the lower band signal bandwidth (1164 - 1255 MHz). The other key component of the antenna is the axial ratio, which is a measure of how well the antenna captures the broadcast Right Hand Circular Polarized (RHCP) signal and mitigates the reflected LHCP signals. The Tallysman HC997EXF has a high peak gain of 2.5 dBi and 0.5 dB axial ratio at zenith, enabling excellent multipath mitigation and a very precise phase centre.

Weighing only 11 g, the light and compact HC997EXF features a precision-tuned helix element that provides excellent axial ratios and operates without the requirement of a ground plane, making it ideal for a wide variety of applications, including unmanned aerial vehicles (UAVs).

The HC997EXF features an industry-leading low current, low-noise amplifier (LNA) that includes an integrated low-loss pre-filter to prevent harmonic interference from high-amplitude signals, such as 700 MHz band LTE and other near-band cellular signals. As the radio frequency spectrum has become more congested, the signals or harmonic frequencies of new LTE bands [e.g. 800MHz x 2 = 1600MHz (GLONASS-G1)] can affect GNSS antennas and receivers. In North America, planned Ligado signals at 1525 - 1536 MHz can especialy impact GNSS antennas that support space-based L-band correction services (1539 - 1559 MHz). New LTE signals in Europe [Band 32 (1452 - 1496 MHz)] and Japan [Bands 11 and 21 (1476 – 1511 MHz)] have also been observed to interfere with GNSS signals. In addition, Inmarsat satellite communication (uplink: 1626.5 - 1660.5 MHz) can also affect GNSS signals. The new Tallysman XF antennas have been designed to mitigate out-of-band signals and prevent GNSS antenna saturation. Tallysman's custom XF filtering mitigates all existing signals and new Ligado and LTE signals, enabling the antennas and attached GNSS receivers to perform optimally.

The HC997EXF must be installed carefully, as ground planes below the antenna can affect its tuning. To facilitate a successful installation and optimum antenna performance, Tallysman also provides an Embedded Helical Antenna Installation Guide. For mounting instructions, visit: https://www.tallysman.com/downloads/Helical_Mounting_Instruction.pdf

Mechanical Drawing



Applications

- Autonomous unmanned aerial vehicles (UAVs)
- Precision GNSS positioning
- Precision land survey positioning
- Mission-critical GNSS timing
- Marine and avionics systems

Features

- Very low noise preamp (2.5 dB typ.)
- Axial ratio (≤ 0.5 dB at zenith)
- High LNA gain (28 dB typ. | 35 dB typ.)
- Low current (25 mA typ. | 31 mA typ.)
- ESD circuit protection (15 kV)
- Invariant performance from 2.2 to 16 VDC
- REACH and RoHS compliant

Benefits

- Extremely light (11 g)
- Excellent RH circular polarized signal reception
- Great multipath rejection
- Increased system accuracy
- Excellent signal-to-noise ratio
- Industrial temperature range

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Antenna

Technology Triple-frequency, RHCP quadrifilar helix

		Gain	Axial Ratio
		dBic typ. at Zenith	dB at Zenith
GNSS			
GPS / QZSS	L1	2.5	≤ 0.5
	L2	2.1	≤ 0.5
	L5	1.6	≤ 0.5
GLONASS	G1	2.3	≤ 0.5
	G2	2.0	≤ 0.5
	G3	2.4	≤ 0.5
Galileo	E1	2.5	≤ 0.5
	E5a	1.6	≤ 0.5
	E5b	2.4	≤ 0.5
	E6	-	-
BeiDou	B1	2.5	≤ 0.5
	B2	2.4	≤ 0.5
	B2a	1.6	≤ 0.5
	B3	-	-
IRNSS / NavIC	L5	1.6	≤ 0.5
QZSS	L6	-	-
L-band correction services		2.7	≤ 0.5
Satellite Communications			
Iridium		-	-
Globalstar		-	-
Phase Centre			
Phase Centre Variation (PCV)		TBD	
Phase Centre Offset (PCO)		TBD	

Mechanicals

Mechanical Size	60.0 mm (dia.) x 26.0 mm (h.)
Weight	11 g (without cable)
Available Connectors	RG174 cable - See Ordering Guide for connectors
Radome / Enclosure	-
Mount	Helical mounting ring P/N #

Environmental

Operating Temperature	-45 °C to +85 °C
Storage Temperature	-55 °C to +95 °C
Random Vibration	-
Shock and Drop	-
Salt Fog	-
IP Rating (housing)	n/a
Compliance	IPC-A-610, FCC, RED / CE Mark, RoHS, REACH

Warranty:

Parts and Labour	1-year standard warranty

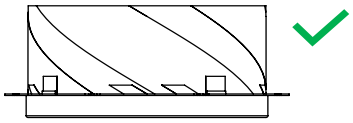
Low Noise Amplifier (LNA) - Measured at 3.0 VDC and 25°C

Frequency Bandwith		Out-of-Band Rejection
Lower Band	1164 - 1255 MHz	≥ 85 dB @ ≤ 0950 MHz ≥ 70 dB @ ≤ 1125 MHz ≥ 43 dB @ ≥ 1270 MHz ≥ 80 dB @ ≥ 1320 MHz
L-band corrections services	1539 - 1559 MHz	≥ 65 dB @ ≤ 1500 MHz ≥ 45 dB @ ≤ 1525 MHz ≥ 05 dB @ ≤ 1536 MHz ≥ 30 dB @ ≥ 1626 MHz ≥ 65 dB @ ≥ 1650 MHz
Upper Band	1559 - 1606 MHz	

Architecture	Pre-filter → LNA
Gain	28 dB typ. | 35 dB typ.
Noise Figure	2.5 dB typ.
VSWR	< 1.5:1 typ. | 1.8:1 max.
Supply Voltage Range	2.2 to 16 VDC
Supply Current	25 mA typ. (28 dB) | 31 mA typ. (35 dB)
ESD Circuit Protection	15 kV air discharge
P 1dB Output	13.3 dBm @ L1 | 13.1 dBm @ L2/L5
Group Delay Variation	20 ns @ L1 | 18 ns @ L2 | 36 ns @ L5

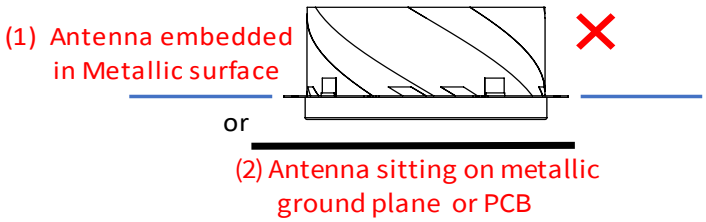
Installation Instructions

PROPER INSTALLATION



No metallic ground plane or PCB

IMPROPER INSTALLATION



Ordering Information

Part Number **33-HC997EXF-GG-xx-yyyy**

where GG = gain (28 or 35 dB); xx = connector type;
yyyy = cable length in mm

Please refer to our **Ordering Guide** to review available radomes and connectors at:
https://www.tallysman.com/resource/tallysman-ordering-guide/