GNSS Inside Hangars

GNSS Repeater Kit GIH4

- **Installation and User Guide**

- **Suports systems:GPS/GLONASS/Beidou/Galileo/IRNSS/QZSS/SBAS/NAVIC;**
- **Frequency Range of Antanna: 1556~1623MHz/1164~1288MHz**
- **Frequency Range of Amplifier: 1150MHz~1650MHz**
- **Operating Temperature: -55°~85°;**
- **Four output antennas ports.**
- **Each antenna covers a diameter of 50 meters.**

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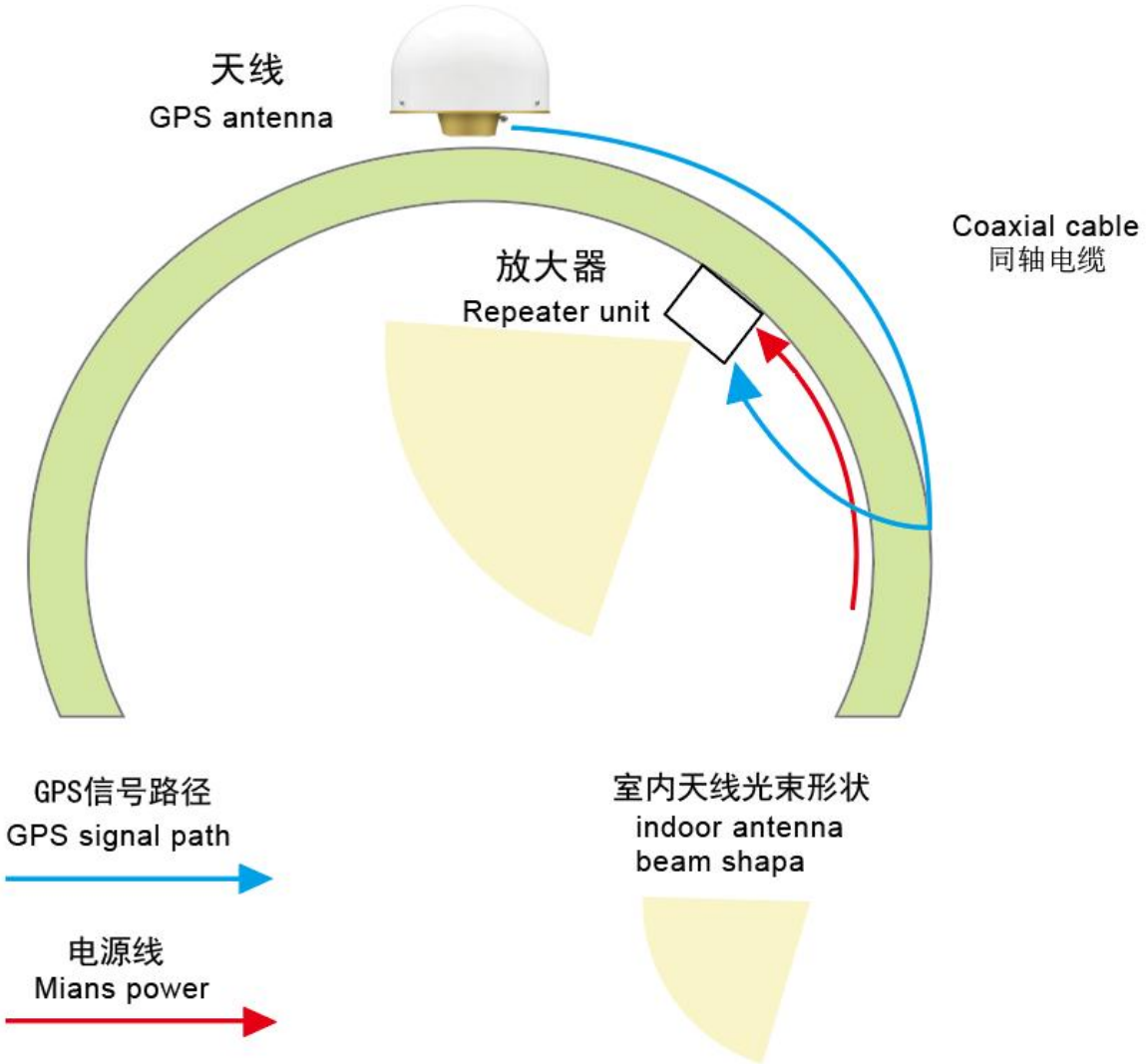
Descriptions

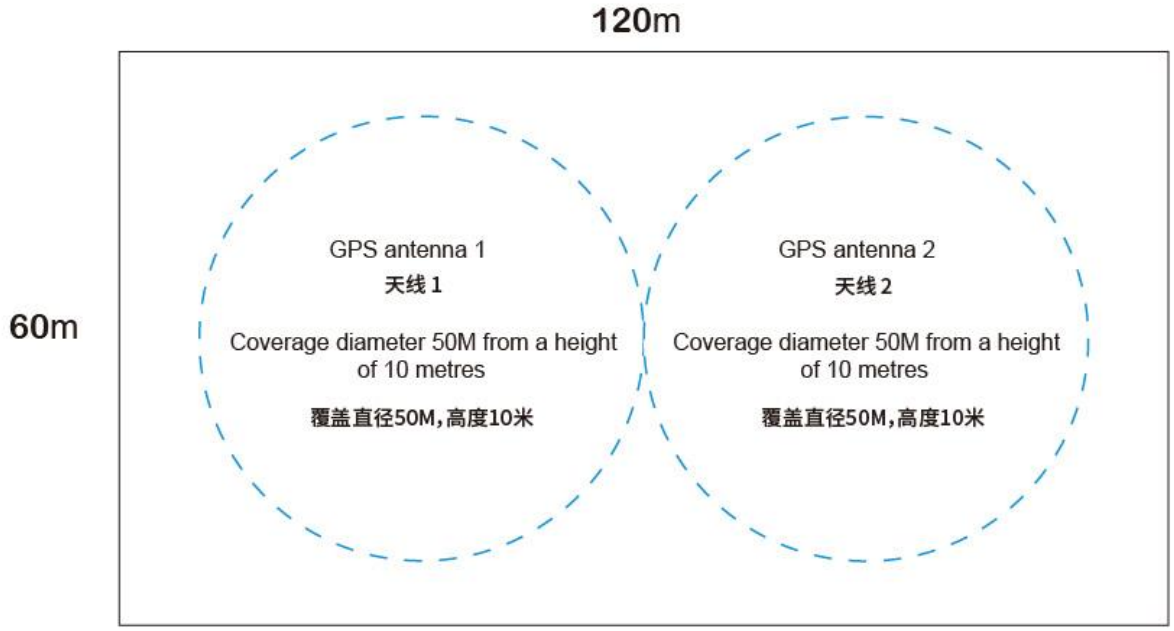
The GIH4 serial GPS/GNSS Repeater kit is a far forward gps signal amplifier unit. It is a GPS booster for hangard.
The structure of an aircraft hangar can block the ingress of GNSS signals, making it impossible to test on-board navigation equipment without pushing the aircraft outside where it has a view of the sky. GIH4 is GNSS Inside Hangar repeater.
GIH4 repeater system overcomes this physical barrier by transferring the outdoor signals to the interior of the hangar, which means all maintenance work can be carried out indoors. The GIH4 supports four antennas, each antenna can cover a radius of 25 meters, so a GIH4 system can do GNSS coverage for four areas at the same time.
The GIH4 solution supports Global Navigation Satellite Systems (GNSS) including Beidou,GPS,Glonass & Galileo.
High efficiency directional indoor re-transmitting antenna suitable for:
√ Aircraft hangars
√ Border surveillance
√ Military bunkers

Equipment List with Standard Configuration

- Program-controlled adjustable amplifier: GA30-PV4, 1 Set;
- GNSS 3D choke antenna: 3D185, 1 Set;
- Cable assembly: RG8, 30~200M, 1 pcs;
- Cable assembly: XHY240, 20~30M, 4pcs;
- Line amplifier: GA40, 4 pcs;
- Transmitting antennas: GRA10, 4 pcs;
- Lightning arrester: 1pcs;

System Connection





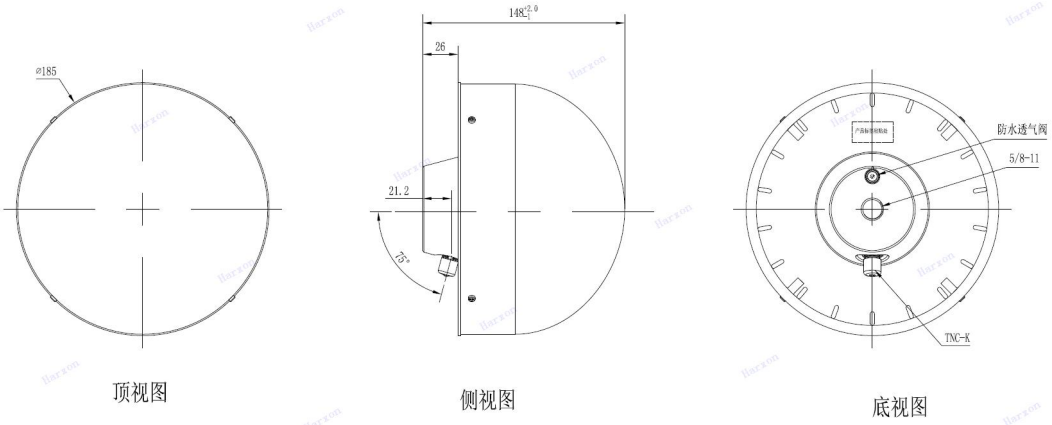
Each blue circle shows the coverage area from a re-radiating antenna mounted on a roof be am bout 10M high.As long as aircraft receiving antennas have ine-of-sight with the re-radiating antenna they will all receive a GNSS signal.

每个蓝色圆圈表示安装在室内屋顶上的发射天线的覆盖区域，高度大概是10米。只要飞机的接收天线与再辐射天线有视线可以看到，飞机就可接收到GNSS信号。

Product Introduction

Roof Antenna 3D185

3D185 is a four-system full-range small choke antenna covering BDS, GPS, GLONASS, GALILEO, to meet the needs of high-precision and multi-system compatibility of current measurement equipment. It can be widely used in geodetic mapping, marine surveying, channel surveying, dredging survey, seismic monitoring, bridge deformation monitoring, landslide monitoring, terminal container operations and other high-precision occasions; The antenna is a nationally produced antenna.



(Dimensional tolerance± 0.2mm)

1) Full-band signal compatible

It covers the full-band signals of the four major GNSS systems to meet the current needs of multi-system compatibility and interoperability.

2) Highly stable phase center

The antenna adopts a unique choke structure design and has excellent anti-multipath interference ability. The antenna part adopts a unique four-feed point design scheme to achieve the high coincidence of the phase center and the geometric center, and minimize the influence of the antenna on the measurement error. With submillimeter stability in the phase center, it is ideal for applications such as foundation reference stations, bridge and tall building deformation monitoring, geological monitoring, etc

3) Tracking in complex environments

The antenna unit has the characteristics of high gain and wide pattern beam, which ensures that the antenna still has a strong signal reception effect at a low elevation angle, and ensures that the satellite can be quickly locked in complex environments such as occlusion and stably output GNSS navigation signals.

Key features

- **Support GNSS four-system full-band signals**
- **Horizontal direction to achieve 360° all-round coverage, working elevation angle of 10°**
- **With frequency gating capability, the passband 1556~1623MHz/1164~1288MHz in-band jitter ≤**

1dB, out-of-band rejection ≥20dB, and up to 40dB within 1300~1550MHz between dual bands.

- Stable phase center ensures submillimeter positioning accuracy
- Strong anti-interference ability, can withstand harsh working environment
- Support up to -55~85℃ standard working temperature, core chips and electronic devices
- support -55~+125℃ working temperature

Performance parameters:

Antenna characteristics	
Frequency range	GPS L1/L2/L5 BDS B1/B2/B3 GLONASS L1/L2/L3 GALILEO E1/E5a/E5b/E6 QZSS L1/L2/L5/L6 IRNSS L5 SBAS L1/L5 L-Band
Impedance	50 Ω
Polarization mode	Right-handed circular polarization
Antenna-axis ratio	≤3dB
Horizontal plane coverage angle	360°
Output standing waves	≤2.0
Highest gain	6.5dBi
Phase center error	±1mm
Structural properties	
Antenna size	Φ185*148mm
weight	≤1.8Kg
Joint type	TNC
Installation method	5/8"×11 Threaded mounting holes
Working environment	
Operating temperature	-55℃~ +85℃
Storage temperature	-55℃~ +85℃
humidity	95% Non-condensing
Low noise amplifier specification	
gain	50±2dB
Noise figure	≤2dB
Output standing waves	≤2.0
In-band flatness	±2dB

Operating voltage	+3.3 ~ +12VDC
Operating current	≤60mA
Differential transmission delay	≤5ns

Programmable gain-adjustable GNSS amplifier GA30-PV4

Product Function Description:

- Adjustable gain range: 0-30d, step: 1dB.
- Working frequency range: 1164MHz-1616MHz,
- IN terminal input voltage: 5V;
- Connector mode: TNC-K; N; SMA;
- Program control mode: 485 protocol interface
- 100% localization of the whole machine products;
- Power supply mode:
  1.220V AC to 12V DC power adapter power supply (standard);
  2. Dual 18-76V DC input (optional);
- Input port feed: 5V DC.

Product description

A programmable adjustable amplifier is a device that integrates an active GNSS amplifier with one input and four port outputs. The signal received by the active GPS receiving antenna is evenly distributed to 4 outputs and supplied to other receiving devices. In such an application, its IN terminal can be configured to pass 5V DC to power the active GPS antenna connected to the port to work, and the other output ports will have a 200ohm DC load to simulate the DC loss of any receiving antenna connected to these ports, and the device can control the required gain and attenuation value through

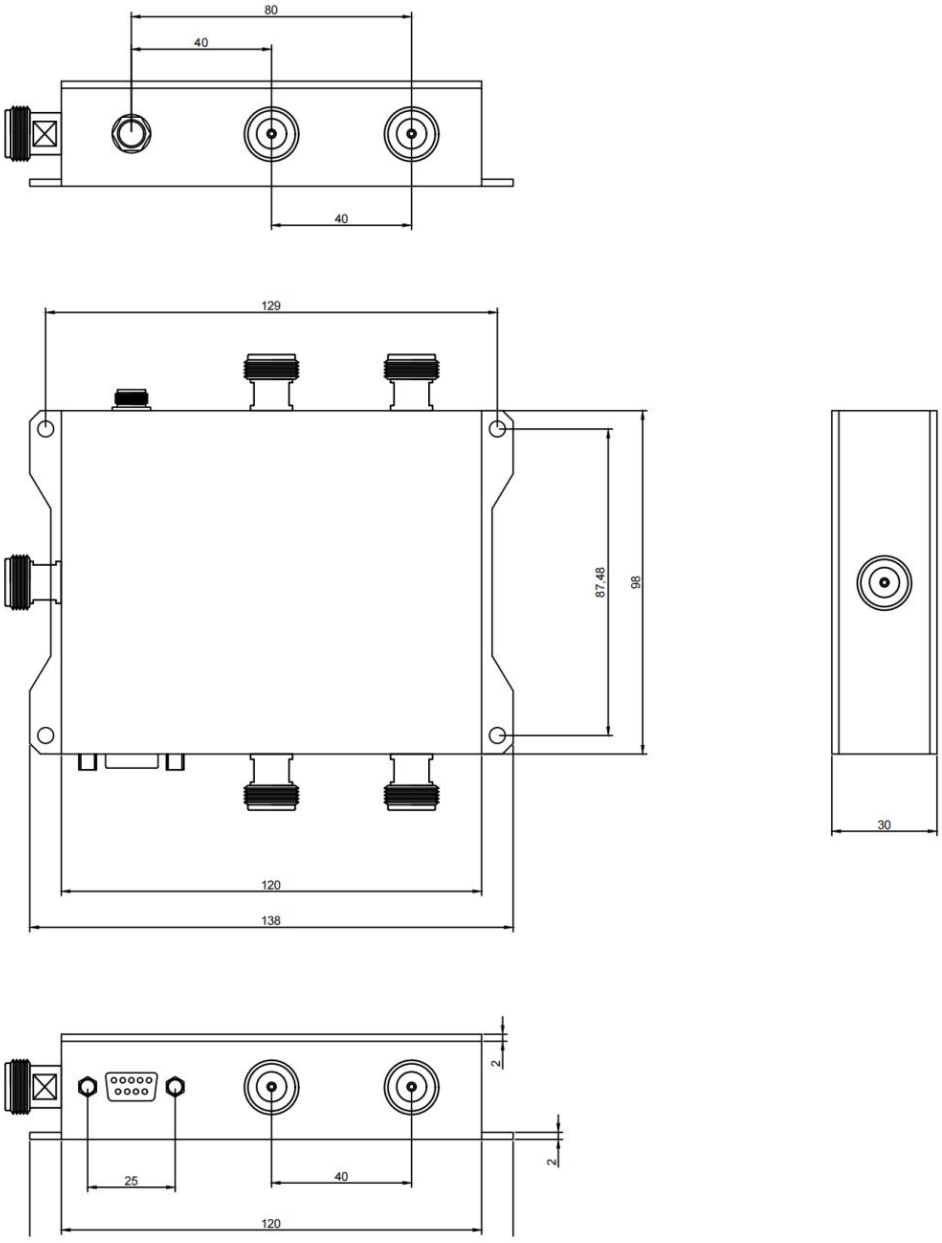
the 485 protocol; The maximum adjustable gain is 30dB.

Electrical parameters:

parameter	condition	Min	Std	Max	Unit
Operating temperature		-40°		85°	℃
Frequency range	Antenna – Either port	1150		1650	MHz
Input & output impedance	Input, All Output ports		50		Ω
Adjustable gain range	Step 1dB		30		dB
Enter VSWR			1.5	2.0	-
Output VSWR			1.5	2.0	-
Noise figure			2	3	dB
Gain flatness				2	dB
Isolation	Unused port - 50Ω	20			dB
DC input	220VAC to 12VDC power adapter		12		VDC
Device current			20		mA
Maximum RF input	Maximum RF input			0	dBm
Input and output port types		N Female、TNC Female、SMA Female			
Enter the number of ports		1			
Number of output ports		4			

The program-controlled adjustable amplifier is compatible with single, dual and quad output interfaces, and the whole machine has multiple outputs, meeting the waterproof and explosion-proof level, supporting the maximum -40°~85°C standard working temperature, and the core chip and electronic devices supporting -55°~+125°C working temperature.

Product Size:



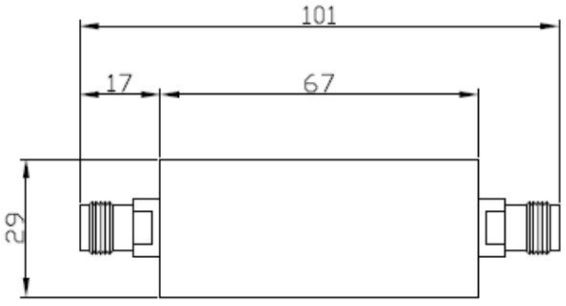
Surface treatment process of structural parts: nickel plating

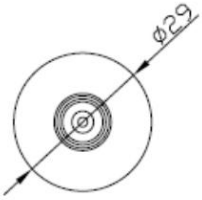
GPS amplifier GA40

Electrical parameters	
Operating	1150~1650MHz
Gain	40dB
Noise figure	< 2.0dB
Output	< 2.0
Input standing	< 2.0
voltage	DC 3~9 V
current	< 30 mA
Operating	-40to85℃
Connector type	N-Female
Waterproof	IP68
impedance	50Ω

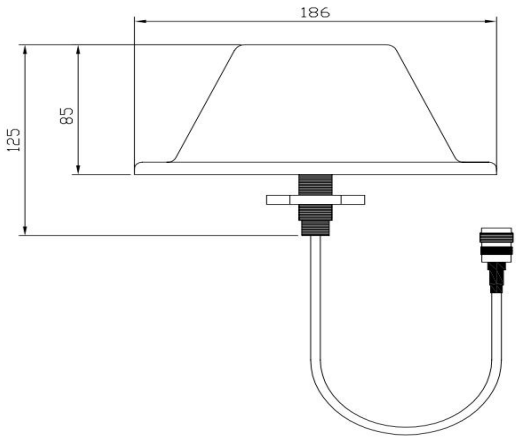
The GA40 line amplifier is a single-stage, low-noise, waterproof amplifier. Coverage frequencies include GPS, Galileo, GLONASS and Beidou2 (including GPS L1 amplifiers). Its gain is 40dB the noise figure is less than 2.5dB, the power consumption is less than 20mA, the equipment and the receiving antenna are installed vertically, and the power is drawn from the voltage output of the receiving antenna. Our GA40 is more practical than other similar products on the market.

Structural dimensions





Antenna GRA10



The antenna that acts on indoor signal transmission, this antenna is a passive antenna, 100% produced nationwide. The indicators are as follows:

Technical parameters:

Frequency [MHz]	**1100-1700MHz,**
Input impedance	**50Ω**
Gain	**3dBi**
Polarization mode	**Vertical polarization**
Cross-polarization ratio	**≥30dBi**
Horizontal coverage angle	**360°**
VSWR	**≤1.45**
Intermodulation	**＜-110dBm**
Input impedance	**50Ω**
Maximum power	**50W**
Working elevation angle	**10°**
Connector	**N-Female/SMA Female**

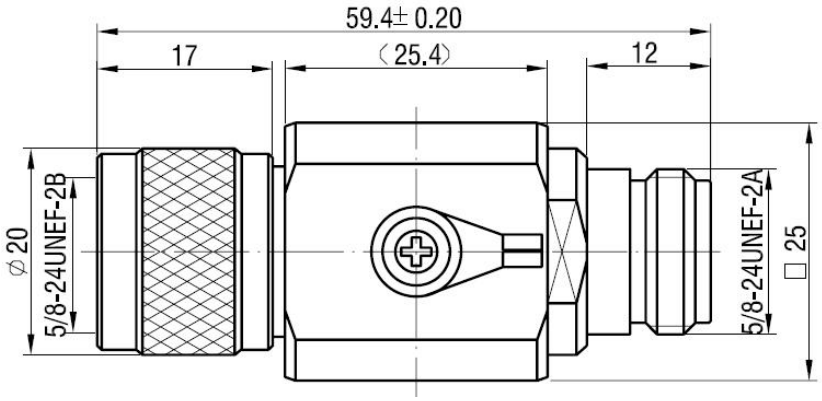
The antenna is designed with UV-resistant PC material, which is waterproof, impact-resistant, high-temperature resistant, mold-resistant and corrosion-resistant. Support up to -55~85 ° C standard working temperature, built-in antenna -55~+125°C working temperature.

Lighting Arrester

Lighting arresters are mainly used for antenna lighting protection.

Electrical parameters	
Characteristic impedance	50Ω
Frequency range	DC~2.5GHz
Rated voltage	230V±20%
Contact resistance	Inner conductor:≤1mΩ; Outer conductor≤1mΩ
Insulation resistance	≥5000 MΩ
The medium is pressure-resistant	2500V
Characteristic impedance	50Ω
Materials and surface treatment	
Inner conductor	The material is bronze QSn6.5-0.1 GB3124-82
Coating	Electroplated three alloys
enclosure	The material is brass HPb59-1 GB4425-84
insulator	polytetrafluoroethylene
Rubber gasket	silastic
Gas discharge tubes	230V±20% (diode) 6xϕ8
Mechanical properties	
Inner conductor separation force	>0.57N
Mechanical life	≥ 500 times (12 beats per minute)
Connection nut torque	Recommend 0.68~1.13N. M

Structural dimensions



Notes

Weld one end of the lightning protection wire to the grounding ear of the arrester, and fully weld the other end to the closest building to ensure grounding. The grounding resistance should be guaranteed to be less than 10 ohms.

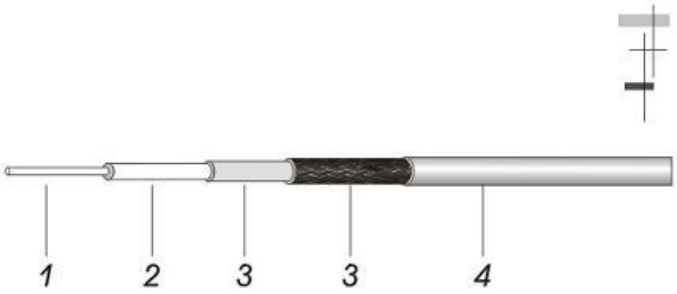
RF Cables

RG8

RG8,30M is usually used for connecting Receiver antenna S440 and lighting-protector. You can calculate the length according to your actual environment, also 60m or 90 be selected.
The connectors are N Male-N Male.

RG Series MIL-C-17 Cable

RG8



Construction Specification

	Material	Diameter(mm)
1. Inner Conductor	Bare Copper	2.74
2. Dielectric	Physical Foam Polyethylene	7.24
3. Outer Conductor	Bonded Aluminum Foil +Tinned Copper Braid	8.13
4. Jacket	PE	10.29

Electrical Characteristics

Capacitance(pF/m)	78.4
Impedance(ohm)	50
Velocity(%)	85
Shielding Effectiveness(≥dB)	90
Max. Oper. Voltage(VMS)	4000
Operating Temp. (℃)	-40 to 80

Attenuation

Frequency(MHz)	Attenuation(≈dB/100m)
30	2.2
50	2.9
150	5.0
220	6.1
450	8.9
900	12.8
1500	16.8
1800	18.6
2000	19.6
2500	22.2
5800	35.5

XHY240

The cable assembly XHY240 is the cable that connects the amplifier RGA30-XXX to the antenna GRA10.

低损耗电缆

XHY240

结构参数

项目	材料	直径(mm)
1. 内导体	裸铜线	1.42
2. 绝缘体	发泡聚乙烯	3.81
3. 外导体	自粘铝箔+ 镀锡铜线编织	4.52
4. 护套	PE 聚乙烯 （或其他材料）	6.10

电性能参数

电容(pF/m)	79.4
阻抗(ohm)	50
速率(%)	84
护套耐压(VRMS)	5000
峰值功率 (kW)	5.6
屏蔽衰减(>dB)	90
截止频率(GHz)	31

衰减和平均功率

频率（MHz）	衰减 （≥dB/100m)	平均功率 (kW)
30	4.4	1.49
50	5.7	1.15
150	9.9	0.66
220	12.0	0.54
450	17.3	0.38
900	24.8	0.26
1500	32.4	0.20
1800	35.6	0.18
2000	37.7	0.17
2500	42.4	0.15
5800	66.8	0.10

Frequency Reference Table

Gllobal/Compass Navigation Satellite Systems(GNSS/CNSS)	5						2					6/3				6				1								
Frequency (MHz)	1164	1176	1188	1192	1207	1215	1219	1227	1239	1245	1252	1259	1266	1268	1278	1290	1535	1540	1545	1550	1558	1558	1561	1563	1575	1587	1592	1602	1609	1616	2491
GPS(USA) L1,L2,L2C,L5	L5+/-12						L2/L2C+/-12												L6+/-5					L1+/-12						
Glonass(Russia) G1,G2										G2+/-7																		G1+/-7		
Galileo(Europian) L1,E1,E2,E5(E5a,E5b),E6	E5+/-15 E5a+/-12 E5b+/-12												E6+/-12						L6+/-5			E2		L1+/-17			E1			
Compass (Beidou 2,China)				B2+/-10								B3+/-10										B1+/-2								
Beidou 1 (China,Tx(LHCP)/Rx(RHCP)																														L	S
IRNSS (India)			L5+/-15																					L1+/-12						S+/-15
OmniStar																O+/-14---->														