

Final

Product Specification

- Model Name: Intellian i6PE
- Model. No : B4-629Q

Product Management/ Intellian Technologies, Inc.

Any modification of this spec is not allowed without Intellian's permission.

Note: This specification is subject to change without notice.

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1. Introduction

1.1. General description

Intellian i6PE is the satellite antenna system which includes a 60cm (23.6”) dish diameter, a 2-axis satellite tracking antenna system, designed and manufactured so as to automatically identify, track and capture the DVB (Digital Video Broadcasting) and the DVB-S2 format satellite signals. The i6PE is primarily designed for vessels travelling on North Sea routes. With expanded elevation angle from -15° ~ $+90^{\circ}$, the i6PE enables you to receive reliable satellite signals at Polar Regions. The i6PE's embedded GPS and Auto Skew Angle Control System enable the antenna system to maintain optimal signal strength.

1.2. Purpose

Intellian i6PE is a digital satellite antenna system designed specifically for all types of vessels (Anchored or transit) to automatically identify, track and capture satellite signals from the Digital Video Broadcasting (DVB: the international standard for digital TV transmissions) and the DVB-S2 compatible Satellites. Specifically, Intellian i6PE supports Wide Range Search (WRS) algorithm, which minimizes the search time at initial state. Intellian i6PE also offers Dynamic Beam Tilting (DBT) technology, which dynamically shapes the antenna beam to utilize stabilization. Once a satellite is acquired, the antenna DBT continuously measures the heading, pitch, and roll of a vessel by obtaining satellite signal level around the antenna point, and transmits commands to the antenna motors to keep the antenna pointed at a satellite at all times. This active stabilization is enhanced by a conical scan tracking function to detect and lock onto the strongest signal; resulting in the clearest reception possible.

1.3. System components

The Intellian i6PE satellite TV antenna system consists of two major groups; an Antenna group and Controller group. Each group is comprised of the items listed below. All equipment comprising the Antenna Unit is incorporated inside the radome assembly and is integrated into a single operational entity.

- **Antenna Unit includes,**
 - a. Mechanical unit
 - b. Control unit
 - c. RF unit
 - d. Radome Assembly
- **Controller Group includes,**
 - a. Antenna Control Unit

1.4. General scope of this spec sheet

This spec sheet describes Intellian satellite TV antenna system, i6PE antenna unit, antenna control unit, its key specification and features. In order to completely put together a satellite TV antenna system, it is required that user configure the Satellite Receiver (Decoder/STB) and TV system according to manufacturer's operating instructions

2. Configuration

2.1. Components of the system configuration

The following text provides a basic functional overview of the system components and component interconnection as referred to in the System Block Diagram in next section.

The system is comprised of two major sections. The Antenna Unit is comprised solely of the antenna radome assembly which is mounted on a ship's upper deck or mast location chosen for the best satellite reception to minimize blockages by mast structure or funnel and interference with other ship's navigation and communication systems such as marine radars, radio and magnet compass etc. The Antenna Control Unit (ACU) and all other ancillary equipment can be mounted in various locations on a ship.

2.1.1. Antenna unit

The antenna & radome assembly (Antenna Unit) consists of mechanical unit, control unit, RF unit, and Radome. The mechanical unit manipulates the antenna to receive the optimal satellite signal regardless of the movement of the vessel, and the control unit controls mechanical operation of the antenna. RF unit transmits the optimum satellite signal to the IRD, and the radome provides an environmental enclosure for the antenna pedestal assembly inside it. This keeps wind, water condensation and salt-water spray off the antenna pedestal assembly. This prevents damage and corrosion that would shorten the expected life span of the equipment.

2.1.2. Antenna Control Unit (ACU)

The Antenna Control Unit (ACU) provides the power to the antenna and controls the various settings of the antenna. Additionally, VFD (Vacuum Fluorescent Display) allows for you to operate the ACU in the dark. The built-in Wi-Fi function enables connectivity with the Aptus Mobile that allows for simple control and monitoring, including One-Touch Satellite library and firmware updates.

The ACU's main function is,

- a. Provide power for the Antenna Unit
- b. Monitor the antenna status
- c. Change the target satellite
- d. Set up the user environment
- e. Set the current GPS information

- f. Set satellite information
- g. Move antenna manually
- h. Perform self-diagnosis of the antenna
- i. Set up the interface with a PC
- j. IRD Interface.

It is recommended that the ACU to be mounted near one of the television locations where you can see the television screen while you are controlling the antenna.

2.1.3. System power requirement

Intellian i6PE has been designed to work on a boat's power supply rated from 9V~30 V DC (Standard 12V or 24V DC). If your IRD(s) and television(s) require a 110/240V AC power, a suitable DC to AC converter will be needed to operate the unit(s) from your boat's DC power supply.

2.1.4. Satellite receivers (not supplied by Intellian)

This antenna can be used with standard satellite receivers, and Integrated Receiver-Decoders (IRD). Both can receive "free" programming, but IRD is required when the desired programming is encrypted. When authorized, it will decode the encrypted signals for use. Authorizing the receiver-decoder is a process of registering your receiver(s) and paying subscription fees to the service provider. The service provider then arranges for a signal to be sent through a satellite to your receiver-decoder, which will "enable" it to decode the programs you subscribed.

2.1.5. Television/ monitor (not supplied by Intellian)

An appropriate television monitor is used to view the satellite television programming and to view the on screen displays from the receiver.

2.2. Basic configuration of the overall system

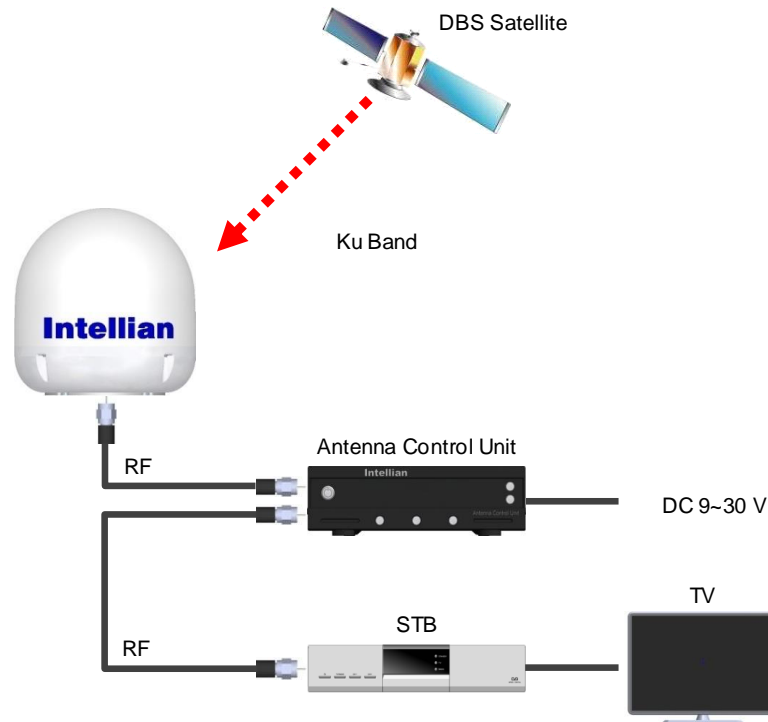


Figure1. i6PE Basic configuration of Overall System

3. Key features

- Extended Elevation Angle Range**
 Extended elevation range (-15°~ 90°) and special pedestal design for the extremely low or high latitude regions such as the Scandinavian Peninsula and the Equatorial regions.
- Fully Automated System**
 Automatic Satellite Search and Identification Function
 2-axis Step Motor for Manipulating the Pedestal
- Enhanced Antenna**
 High efficiency 60cm (23.6") parabolic antenna
 LHCP/ RHCP or Horizontal/Vertical Polarization
- Easy Installation**
 One Cable from the ACU to the Antenna
- Superior Dynamic Tracking**
 Dynamic Beam Tilting (DBT) by rotating sub-reflector.

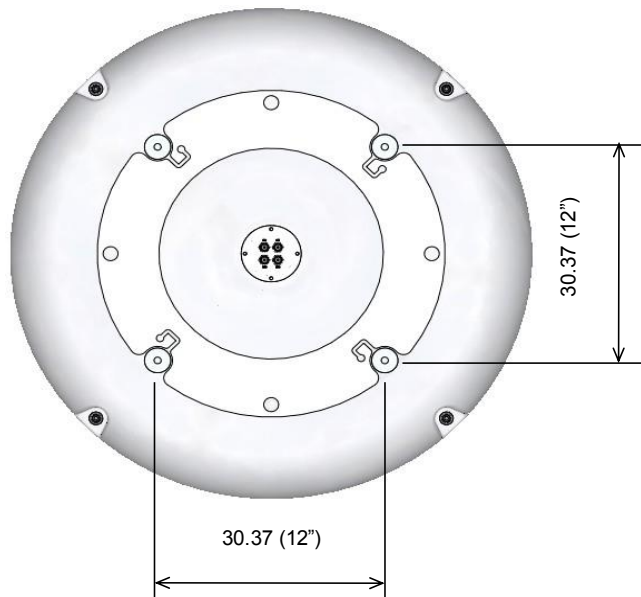
- **Fastest Search Algorithm**
Wide Range Search (WRS) Algorithm
Statistical Search Algorithm
- **DVB-S2 Signal Identification**
Support both DVB and DVB-S2 signal decode
- **Built-in GPS and NMEA 0183 Interface Port**
The i6PE includes a built-in GPS inside of the antenna unit for faster signal acquisition.
The ship's GPS can also be connected through the NMEA 0183 port in the rear panel of the ACU.
- **New type Antenna Control Unit**
Intuitive controls and digital information display on the ACU.
Easy satellite information change and update.
Easy antenna status check and automatic diagnosis.
- **Wireless Support**
Built-in Wi-Fi enables one touch diagnostic and updates from user's PC or iOS device.
- **Various Interfaces**
DC Out port for direct connection to Intellian DISH NET MIM or Shaw Decoder Module
1 Ethernet port enables LAN connection
1 Serial port supports easy PC connection
- **Outstanding reliability**
Intellian i6PE provides highly reliable system through the implementation of a modularized design and use of strictly proven components.
- **Automatic Polarization (Skew-angle) Control**
Automatic Skew Control System (-90 °~+90°) for Linear Horizontal/ Vertical Polarization.

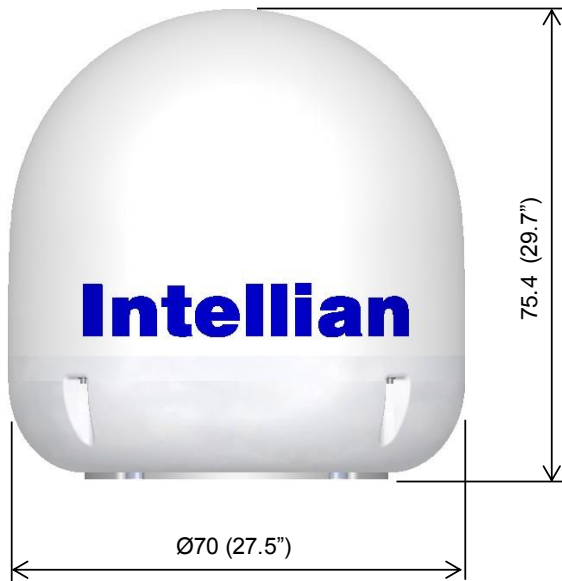
4. Technical specification

4.1. Mechanical specification

Item		Requirement specification
Size	Radome Height	75.4 cm (29.7")
	Radome Diameter	70 cm (27.5")
Weight		20 kg (44 lbs.)
Reflector Diameter		60cm (23.6")
Material	Radome	A.S.A (Acrylate-Styrene-Acrylonitrile)
	Reflector	Aluminum Alloy

Unit : cm (inch)





Front View

Bottom View

Figure 2. Dimension of i6PE Radome

4.2. Antenna specification

Item	Requirement specification
Antenna Type	ADE (Axially Displaced Ellipse)
Size	60cm (23.6")
Polarization	RHCP / LHCP, Vertical / Horizontal
Frequency	Ku-Band 10.7 ~ 12.75 GHz
Antenna Gain	36 dBi @ 11.7GHz
Minimum EIRP	46 dBW

4.3. Stabilized pedestal assembly

Item	Requirement specification	
Type	Two-axis: Azimuth, Elevation	
Stabilization	2 Dimensional Velocity Mode Servo	
Actuator	Size 17 DC Step Motors	
Tracking Method	Conical Scanning by the rotation of Sub-Reflector	
Tracking Rates	Roll/Pitch	45 °/sec
	Azimuth/Turn	45 °/sec

Range of Motion	Azimuth	680°
	Elevation	-15° to +90°
	Skew	-90° to +90°

4.4. ACU (Antenna Control Unit)

Item	Requirement specification
Size	17.8 cm (7") x 21.7 cm (8.5") x 5.4 cm (2.1")
Weight	1.2kg (2.6 lbs)
Display	2 Line 20 Character VFD Module
User Control Key	5 Integrated Key Buttons
Serial Interface	19200bps 8, N, 1 (RS232)
Power Requirements	DC 9 ~ 30V (Typ. 30W, Max 50W)
Ethernet port	1EA
DC Out port	1EA
GPS Interface	Built-In (NMEA 0183 GPS)

4.4.1. Antenna Control Unit

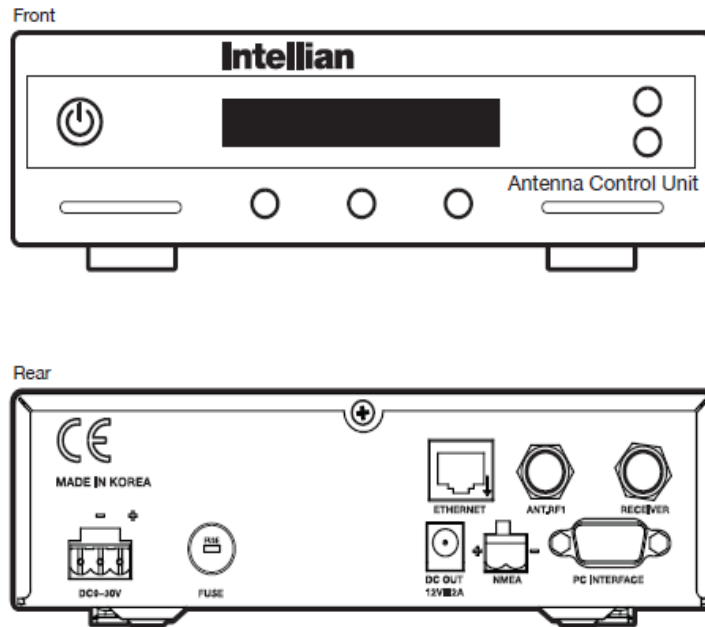


Figure 3. ACU Drawing

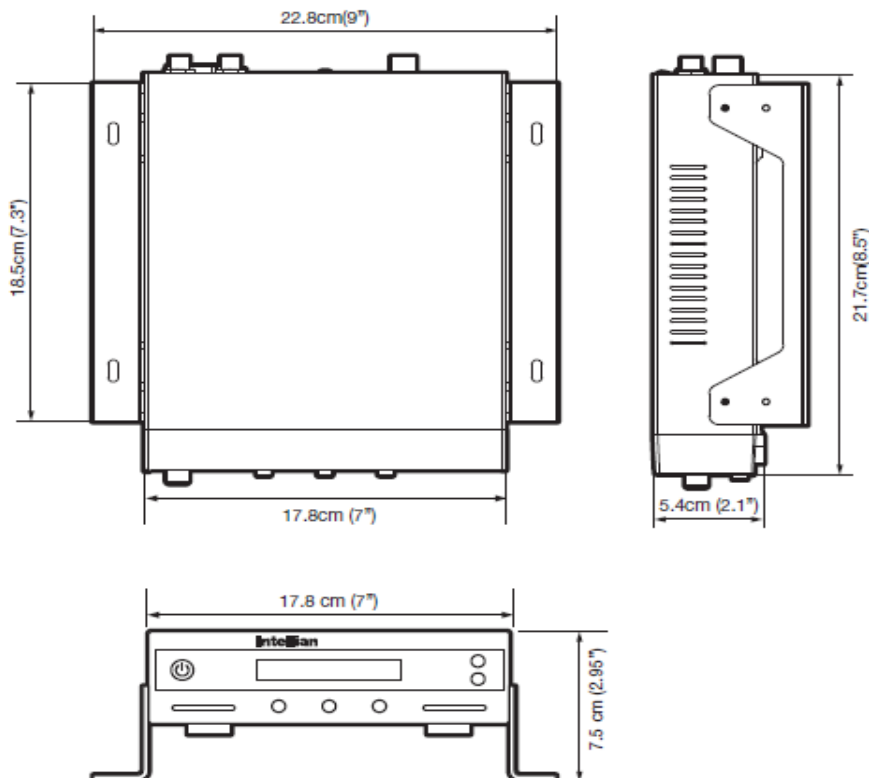


Figure 4. ACU Dimensions

4.5. RF cable specification

Item		Requirement specification
Part No.		9116 Coax
Manufacturer		BELDEN CDT
Compatible Cable		RG-6 Cable
Conductor	AWG	18
	Conductor Diameter	0.040 inch
	Conductor Material	BCCS – Bare Copper Covered Steel
Insulation	Insulation Material	Gas-injected FPE – Foam Polyethylene
	Insulation Diameter	0.180 inch
Outer Shield	Outer Shield Type	Tape / Braid
	Outer Shield Material	Tape – Bonded Aluminum Foil Braid -- Aluminum
Outer Jacket Material		PVC – Polyvinyl Chloride
Overall Nominal Diameter		0.270 inch
Temperature		Operation : -40°C to +80°C Storage : -30°C to +80°C
Applicable Standards	UL Specification	CATV
	EU CE Mark	Yes
	EU RoHS Compliant	Yes
	UL Flame Test	UL1685 UL Loading
Electrical Characteristics	Conductor DC Resistance	28 Ohms / 1000 ft (1.38 Ohms / 15m)
	Outer Shield DC Resistance	9 Ohms / 1000 ft (0.45 Ohms / 15m)

4.5.1. 15m RF cable

Item		Requirement specification
Functions	Power	Supplying Power to Antenna from ACU
	RF	Sending RF Signal from Antenna to ACU
	Communication	Communication between ACU and Antenna

Maximum Extendable Length	50m
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5. Package

Item	Size	Quantity	
Antenna	-	1EA	
Installation Kit Pack	ACU	1EA	
	ACU Bracket	2EA	
	RG6 (Antenna – ACU RF Cable)	15m	
	RG6 (ACU – Receiver RF Cable)	3m	
	Power Cable	10m	
	PC Serial Cable	1.8m	
	NMEA Connector	AK950-2	
	Power Connector	AK950-3	
	Hex Bolt	M8x50L	
	Tapping Screw	ø4x16L	5EA
		ø3x8L	5EA
	Flat Washer	M8	
	Spring Washer	M8	
	Install CD	-	
	Manual	-	
	Installation Template	304x420	
Quick Installation Guide	A3		

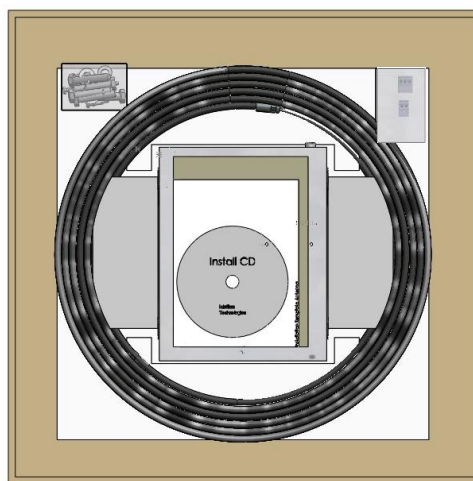


Figure 5. Installation kit box

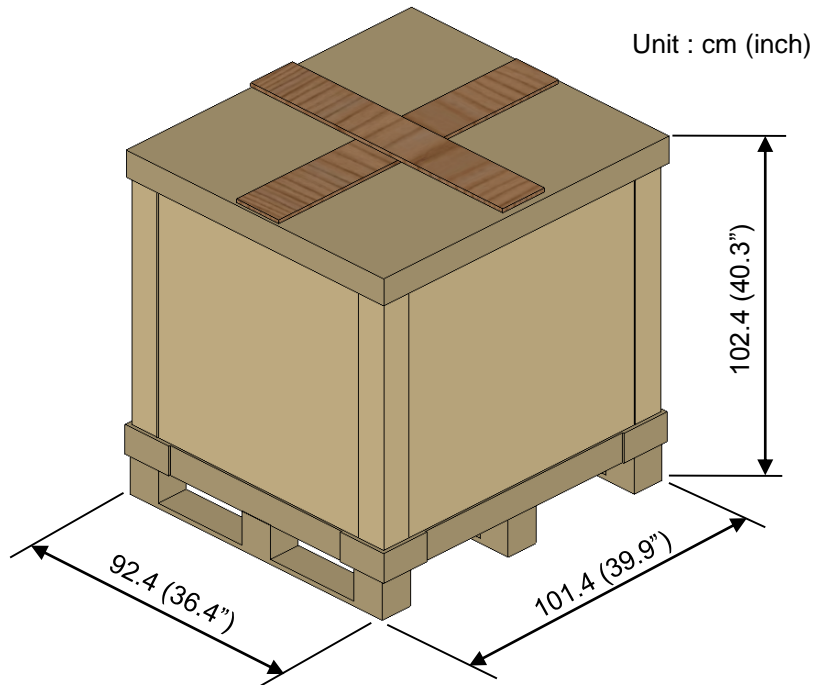


Figure 6. Package box

6. Reliability – Environmental test specification

Intellian i6PE products are qualified under reliability test standards as below. These Intellian standards are much stricter than usual marine equipment condition. Also, all tests are performed with one unit through a continued sequence. Therefore, Intellian products will have excellent reliability and durability.

Item	Requirement specification
Operating Temperature and Humidity	-25°C ~ 55°C(-13°F ~ +131°F), 95%R.H
Storage Temperature	-40°C ~ 80°C(-40°F ~ +80°F), 95%R.H
Thermal Shock	-20°C ~ 70°C
Shock	27G, 11 msec
Vibration	1G over 6~350 Hz, 60 sweeps (X,Y,Z axis)
Water ingress	IPX6

7. Certification

- EN60945 : 2002

Item	Specification
9.2	Conducted Emissions
9.3	Radiated Emissions from enclosure port
10.3	Immunity to Conducted Radio frequency disturbance
10.4	Immunity to Radiated Radio frequencies
10.5	Immunity to Fast Transients on ac power, signal and control lines
10.6	Immunity to Surges on ac power lines
10.7	Immunity to Power supply short-term variation
10.8	Immunity to Power failure
10.9	Immunity to Electrostatic Discharge

8. Appendix

8.1. Specification of LNB

This Section provides specification of LNB.

8.1.1. B00005_A (LNB USA)

Item	Requirement specification
Reception Frequency	12.2 ~ 12.7 GHz
Output Frequency	950 ~ 1450 MHz
Noise Figure	1.1 dB (max.)
Conversion Gain	50 ~ 62 dB
Gain Flatness	1 dB (max.) at 24 MHz intervals
Gain Variation	5 dB (max.) across 500 MHz
L.O. Frequency	11.250 GHz
L.O. Frequency Stability	±4 MHz (max.) over temperature and life
L.O. Phase Noise	-50 dBc/Hz @ 1 KHz
	-75 dBc/Hz @ 10 KHz
	-95 dBc/Hz @ 100 KHz
Cross Pol. Isolation	25 dB (min.)
Output Impedance	75 Ω (F type female)
Image Rejection	40 dB (min.)
DC Voltage Supply	15 V (typ.) (working range : 9.5 ~ 18 V)
Operating Temperature Range	-40°C ~ +60°C
Output VSWR	2 : 1 (max.)
P 1dB	0 dBm (min.)
DC Current Consumption	180 mA (max.)
Polarity Switching voltage	10.5 ~ 14 V at RHCP
	15.0 ~ 21 V at LHCP

8.1.2. B00002F (LNB Universal)

Item	Requirement specification
Reception Frequency	Low Band 10.70 ~ 11.70 GHz
	High Band 11.70 ~ 12.75 GHz
Output Frequency	Low Band 950 ~ 1950 MHz
	High Band 1100 ~ 2150 MHz
Noise Figure	Low Band 0.6 dB (typ.)
	High Band 0.6 dB (typ.)
Conversion Gain	53 dB (min.) 63 dB(max.)
Gain Flatness	±0.5 dB / 26 MHz
Cross Pol. Isolation	25 dB (typ.)
L.O. Frequency	Low Band 9.75 GHz
	High Band 10.60 GHz
L.O. Frequency Stability	±1.0 MHz (max.) @ +25°C
	±2.0 MHz (max.) @ -40°C ~ +60°C
L.O. Phase Noise	-50 dBc/Hz @ 1 KHz
	-75 dBc/Hz @ 10 KHz
	-95 dBc/Hz @ 100 KHz
Image Rejection	40 dB (min.)
Output VSWR	2.0 : 1 (max.)
Output Impedance	75 Ω (F type female)
DC Current Consumption	160 mA (max.)
Low/High Band Switching	Low Band 0 kHz
	High Band 22 kHz ±4 kHz
Polarity Switching Voltage	10.5 ~ 14.0 V @ VP
	16.0 ~ 19.0 V @ HP
Operating Temperature	-40°C ~ +60°C

8.1.3. B00047F (LNB Universal Quad)

Item	Requirement specification
Reception Frequency	Low Band 10.70 ~ 11.70 GHz
	High Band 11.70 ~ 12.75 GHz
Output Frequency	Low Band 950 ~ 1950 MHz
	High Band 1100 ~ 2150 MHz
Noise Figure	Low Band 1.2 dB (typ.)
	High Band 1.2 dB (typ.)
Conversion Gain	55 dB (min.) 67 dB(max.)
Gain Flatness	1 dB / 26 MHz (max.)
Cross Pol. Isolation	20 dB (min.)
L.O. Frequency	Low Band 9.75 GHz
	High Band 10.60 GHz
L.O. Frequency Stability	±1.0 MHz (max.) @ +25°C
	±2.5 MHz (max.) @ -40°C ~ +60°C
L.O. Phase Noise	-55 dBc/Hz @ 1 KHz
	-75 dBc/Hz @ 10 KHz
	-95 dBc/Hz @ 100 KHz
	-105 dBc/Hz @ 1 MHz
	-115 dBc/Hz @ 10 MHz
Image Rejection	40 dB (min.)
Output VSWR	2.5 : 1 (max.)
DC Current Consumption	200 mA (max.)
Polarity Switching Voltage	11.5 ~ 14.0 V @ VP
	16.0 ~ 21.0 V @ HP
Operating Temperature	-40°C ~ +60°C

8.1.4. B00003_A (LNB Asia)

Item	Requirement specification
Reception Frequency	12.25 ~ 12.75 GHz
Output Frequency	950 ~ 1450 MHz
Noise Figure	0.9 dB (typ.)
Conversion Gain	50 dB (min.) 60 dB(max.)
Gain Flatness	±0.5 dB / 26 MHz
Cross Pol. Isolation	25 dB (typ.)
L.O. Frequency	11.3 GHz
L.O. Frequency Stability	±1.0 MHz (max.) @ +25°C
	±2.0 MHz (max.) @ -40°C ~ +60°C
L.O. Phase Noise	-50 dBc/Hz @ 1 KHz
	-75 dBc/Hz @ 10 KHz
	-95 dBc/Hz @ 100KHz
Image Rejection	40 dB (min.)
Output VSWR	2.0 : 1 (max.)
DC Current Consumption	230 mA (typ.)
Polarity Switching voltage	10.5 ~ 14.0 V @ VP
	15.0 ~ 19.0 V @ HP
Operating Temperature Range	-40 ~ +60°C

8.1.5. B00049 (LNB Latin America)

Item	Requirement specification
Reception Frequency	11.45 ~ 12.2 GHz
Output Frequency	950 ~ 1700 MHz
Noise Figure	0.7 dB (typ.)
Conversion Gain	50 dB (min.) 62 dB(max.)
Gain Flatness	±0.5 dB, over any 24 MHz band
Cross Pol. Isolation	25 dB (typ.)
L.O. Frequency	10.5 GHz
L.O. Frequency Stability	±4.0 MHz (max.) @ -40°C ~ +60°C
L.O. Phase Noise	-50 dBc/Hz @ 1 KHz
	-75 dBc/Hz @ 10 KHz
	-95 dBc/Hz @ 100KHz
Image Rejection	40 dB (min.)
Output VSWR	2.0 : 1 (max.)
DC Current Consumption	180 mA (typ.)
Polarity Switching voltage	10.5 ~ 14.0 V @ VP
	15.5 ~ 21.0 V @ HP
Operating Temperature Range	-35 ~ +52°C

8.1.6. B00027 (LNB Japan BS)

Item	Requirement specification
Reception Frequency	11.71 ~ 12.01 GHz
Output Frequency	1032 ~ 1332 MHz
Noise Figure	0.6 dB (min.) 0.9 dB (max.) @ +25°C
Conversion Gain	55 dB (typ.)
Gain Flatness	6 dBp-p (max.)
Gain Ripple	±0.75 dB (max.) @ per channel
L.O. Frequency	10.678 GHz
L.O. Frequency Stability	±2.0 MHz (over temp.)
L.O. Phase Noise	-80 dBc/Hz @ 10 KHz
	-95 dBc/Hz @ 100KHz
	-110 dBc/Hz @ 1MHz
Leakage	-60 dBm (max.) @ input port
1dB Gain Compression Point	0 dBm (min.)
Image Rejection	40 dB (min.)
Output Impedance	75 Ω (F type female)
Input VSWR	2.5 : 1 (typ.)
Output VSWR	2.0 : 1 (typ..)
DC Current Consumption	150 mA (max.)
Power Supply	+12 ~ 24V DC
Relative Humidity	0% ~ 95% RH
Input Waveguide Flange	WR-75
Operating Temperature Range	-30 ~ +60°C
Storage Temperature Range	-40 ~ +80°C
Weight	190g

8.1.7. B0004 (LNB Korea)

Item	Requirement specification
Reception Frequency	11.7 ~ 12.75 GHz
Output Frequency	950 ~ 2000 MHz
Noise Figure	0.6 dB (min.) 0.9 dB (max.) @ +25°C
Conversion Gain	55 dB (typ.)
Gain Flatness	6 dBp-p (max.)
Gain Ripple	±0.75 dB (max.) @ per channel
L.O. Frequency	10.750 GHz
L.O. Frequency Stability	±2.0 MHz (over temp.)
L.O. Phase Noise	-80 dBc/Hz @ 10 KHz
	-95 dBc/Hz @ 100KHz
	-110 dBc/Hz @ 1MHz
Leakage	-60 dBm (max.) @ input port
1dB Gain Compression Point	0 dBm (min.)
Image Rejection	40 dB (min.)
Output Impedance	75 Ω (F type female)
Input VSWR	2.5 : 1 (typ.)
Output VSWR	2.0 : 1 (typ..)
DC Current Consumption	150 mA (max.)
Power Supply	+12 ~ 24V DC
Relative Humidity	0% ~ 95% RH
Input Waveguide Flange	WR-75
Operating Temperature Range	-30 ~ +60°C
Storage Temperature Range	-40 ~ +80°C
Weight	190g