



Directional Antenna and Equipment Information Sheet

Directional Antenna

The Ground Station Directional antennas used in Sceye flight operations include the following:

1. Two (2) Eravant Dish antennas (SAY-7138634212-12-S1) E-Band (71 GHz to 86 GHz) Cassegrain Antennas; 9"; 42 dBi Gain. See Attached Equipment Specifications.

Parameter	Minimum	Typical	Maximum
Frequency	71 GHz		86 GHz
Gain		42 dBi	
3 dB Beamwidth		1.2°	
Sidelobes		-17 dB	
Return Loss		15 dB	
Orientation in Horizontal Plane		N/A	
Orientation in Vertical Plane		N/A	

2. Two (2) Eravant lens antennas (SAG-7138634002-12-S1) E-Band (71 GHz to 86 GHz) Gaussian Optics Antennas; 6"; 40 dBi Gain. See Attached Equipment Specifications.

Parameter	Minimum	Typical	Maximum
Frequency	71 GHz		86 GHz
Gain		40 dBi	
3 dB Beamwidth		1.8°	
Sidelobes		-20 dB	
Polarization		Linear	
Return Loss		15 dB	
Orientation in Horizontal Plane		N/A	
Orientation in Vertical Plane		N/A	

Additional Equipment used on the Ground in Sceye flight operations include the following:

1. Two (2) Filtronic Transceiver Morpheus X2 TA447 (ground-to-air). See Attached Equipment Specifications.
2. Two (2) Filtronic Transceiver Morpheus X2 TA446 (air-to-ground) as spares on the ground to be used for redundancy purposes in case of failure of transmission to/from the airship. See Attached Equipment Specifications.
3. Four (4) Escape Communications (ESM-5008) Modem Modules. See Attached Equipment Specifications.

The High-Altitude Platform Systems (“HAPS”) Directional antennas used in Sceye flight operations include the following:

1. One (1) Eravant Dish antenna (SAY-7138634212-12-S1) E-Band (71 GHz to 86 GHz) Cassegrain Antennas; 9"; 42 dBi Gain. See Attached Equipment Specifications.

Parameter	Minimum	Typical	Maximum
Frequency	71 GHz		86 GHz
Gain		42 dBi	
3 dB Beamwidth		1.2°	
Sidelobes		-17 dB	
Polarization		Linear	
Return Loss		15 dB	
Orientation in Horizontal Plane		N/A	
Orientation in Vertical Plane		N/A	

Additional Equipment used on the HAPS in Sceye flight operations include the following:

1. One (1) Filtronic Transceiver Morpheus X2 TA446 (air-to-ground on HAPS). See Attached Equipment Specifications.
2. One (1) Escape Communications (ESM-5008) Modem Module. See Attached Equipment Specifications. See Attached Equipment Specifications.

SAY-7138634212-12-S1

E-Band Cassegrain Antenna, 71 to 86 GHz, 9", 42 dBi Gain

SAY-7138634212-12-S1 is a E-band Cassegrain antenna that offers a nominal gain of 42 dBi and a typical half power beamwidth of 1.2 degrees from 71 to 86 GHz. The aluminum reflector offers a lightweight and rugged mechanical structure and is treated with a chem film conversion coating for corrosion resistance. A corrugated scalar feed horn is used to provide optimal feed efficiency, low side lobes, high cross-pol rejection, and uniform illumination. The antenna port is a WR-12 waveguide with UG-387/U anti-cocking flange and can support linear polarized waveforms. Other port configurations, such as a Ø0.110" circular waveguide port, are available under different model numbers.



Electrical Specifications:

Parameter	Minimum	Typical	Maximum
Frequency	71 GHz		86 GHz
Gain		42 dBi	
3 dB Beamwidth		1.2°	
Sidelobes		-17 dB	
Return Loss		15 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Mechanical Specifications:

Item	Specification
Antenna Port	WR-12 Waveguide with UG 387/U Anti-Cocking Flange
Reflector Diameter	9"
Reflector Material	Aluminum
Finish	Chem Film
Weight	2.1 lbs.
Outline	AY-RE42-09-A

ECCN

EAR99

FEATURES

- Linear Polarization
- Low Side Lobe Levels
- High Cross-Polarization

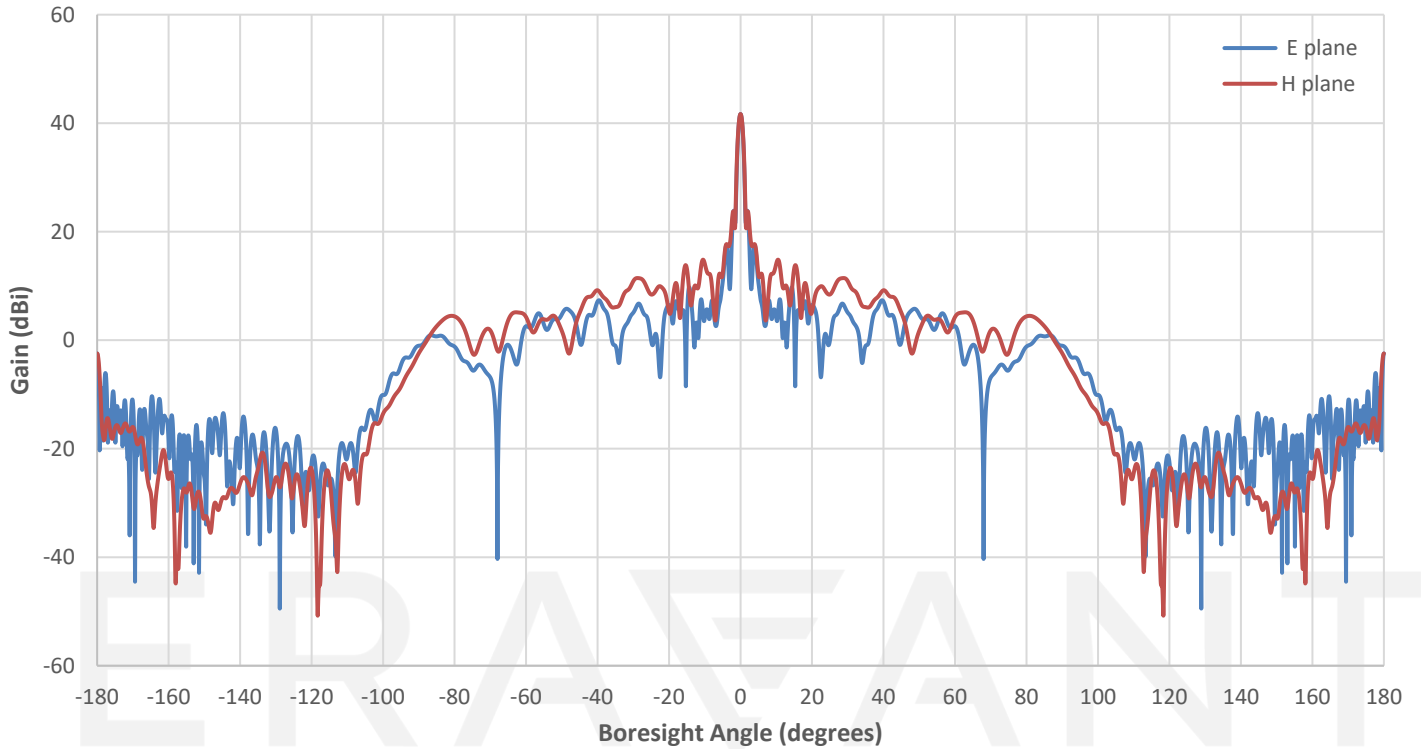
APPLICATIONS

- Radar Communication System
- EW Systems

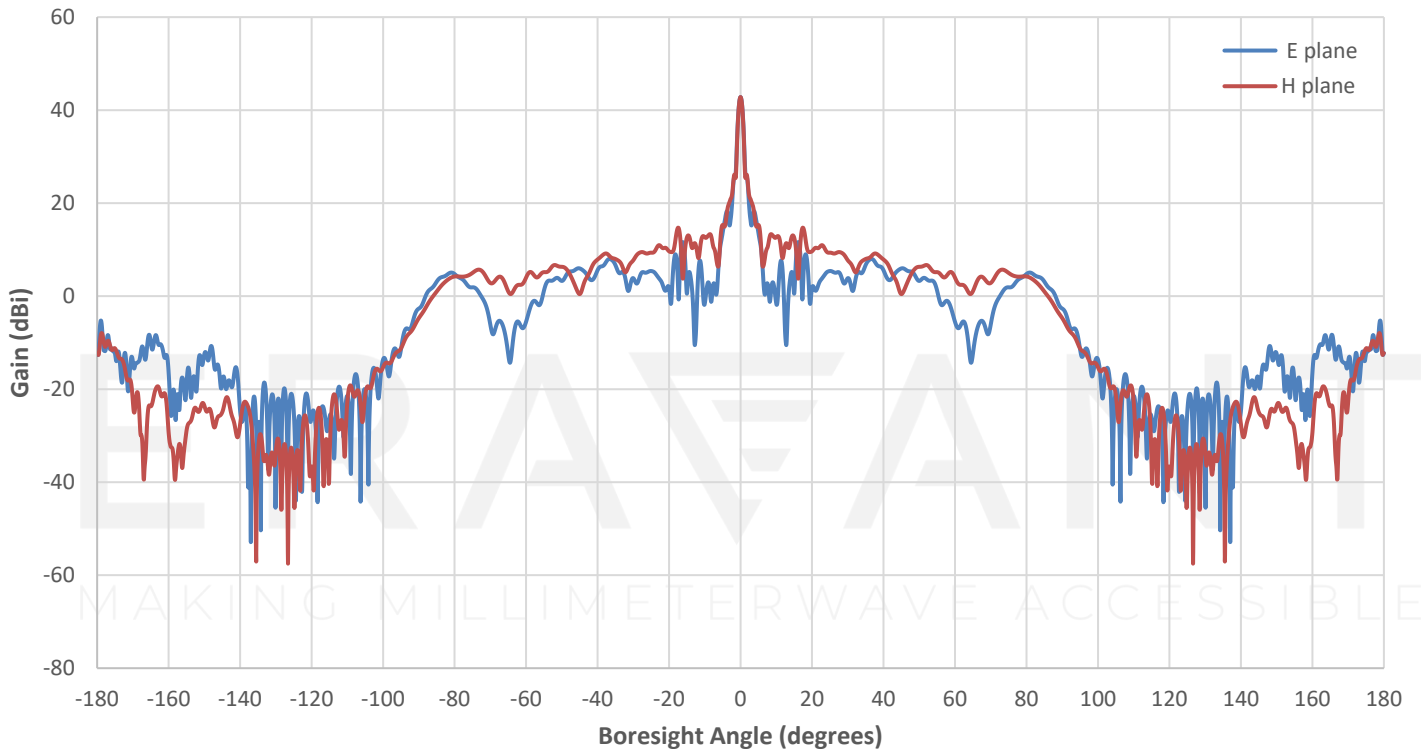
SUPPLEMENTAL DETAILS

SAY-7138634212-12-S1

Simulated Pattern at 71 GHz

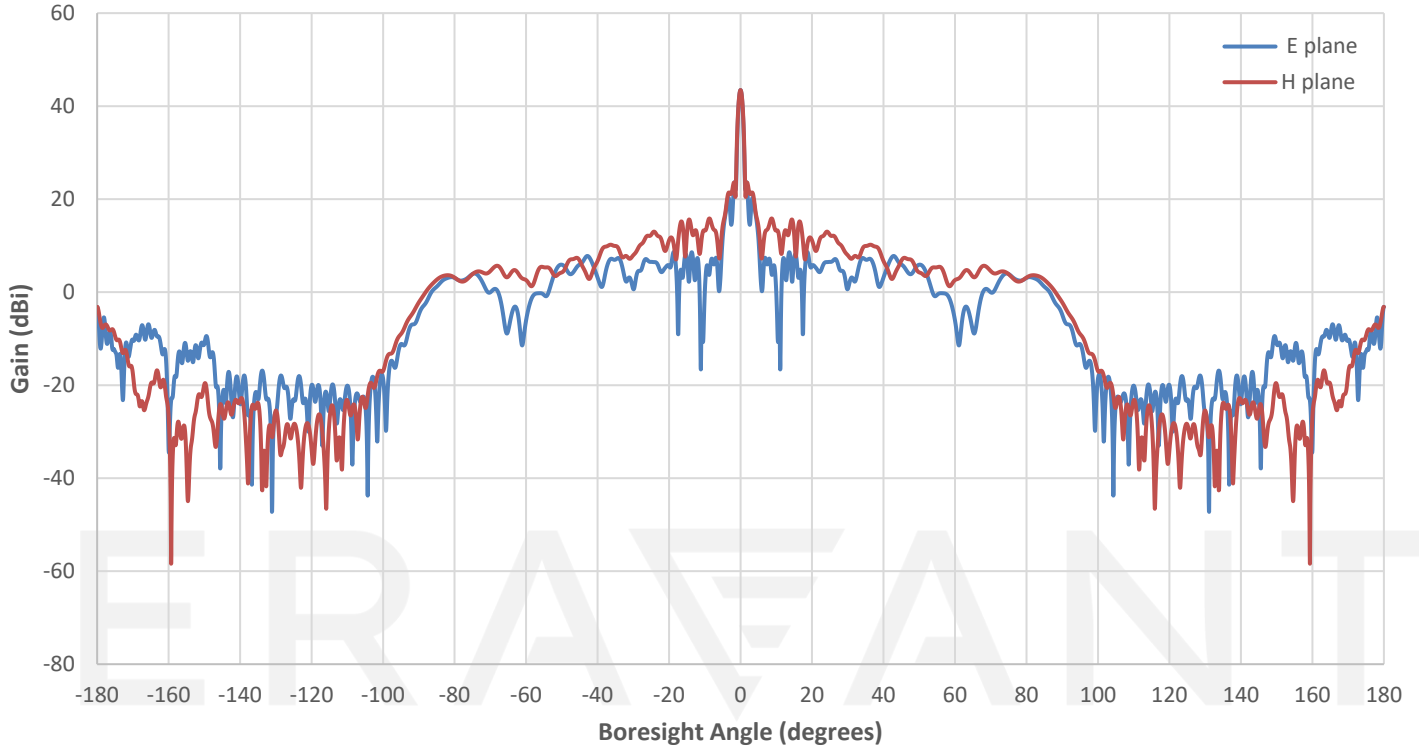


Simulated Pattern at 80 GHz

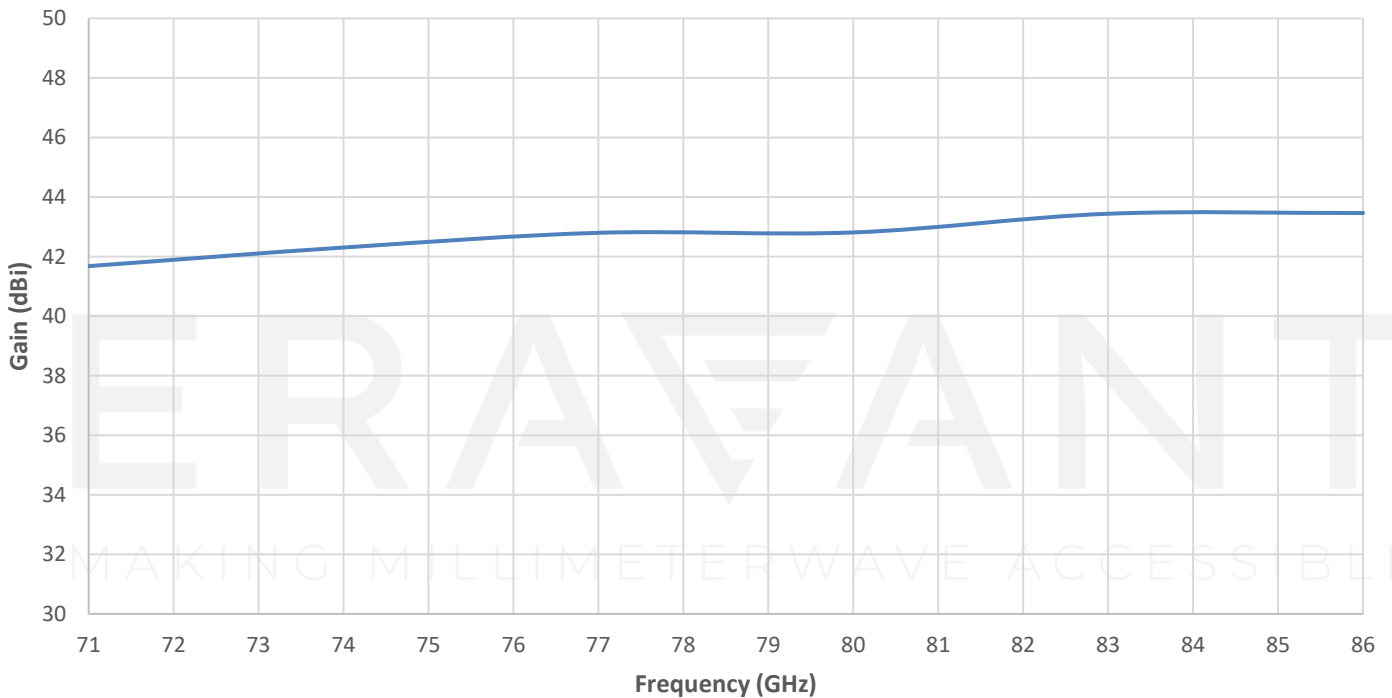


SAY-7138634212-12-S1

Simulated Pattern at 86 GHz

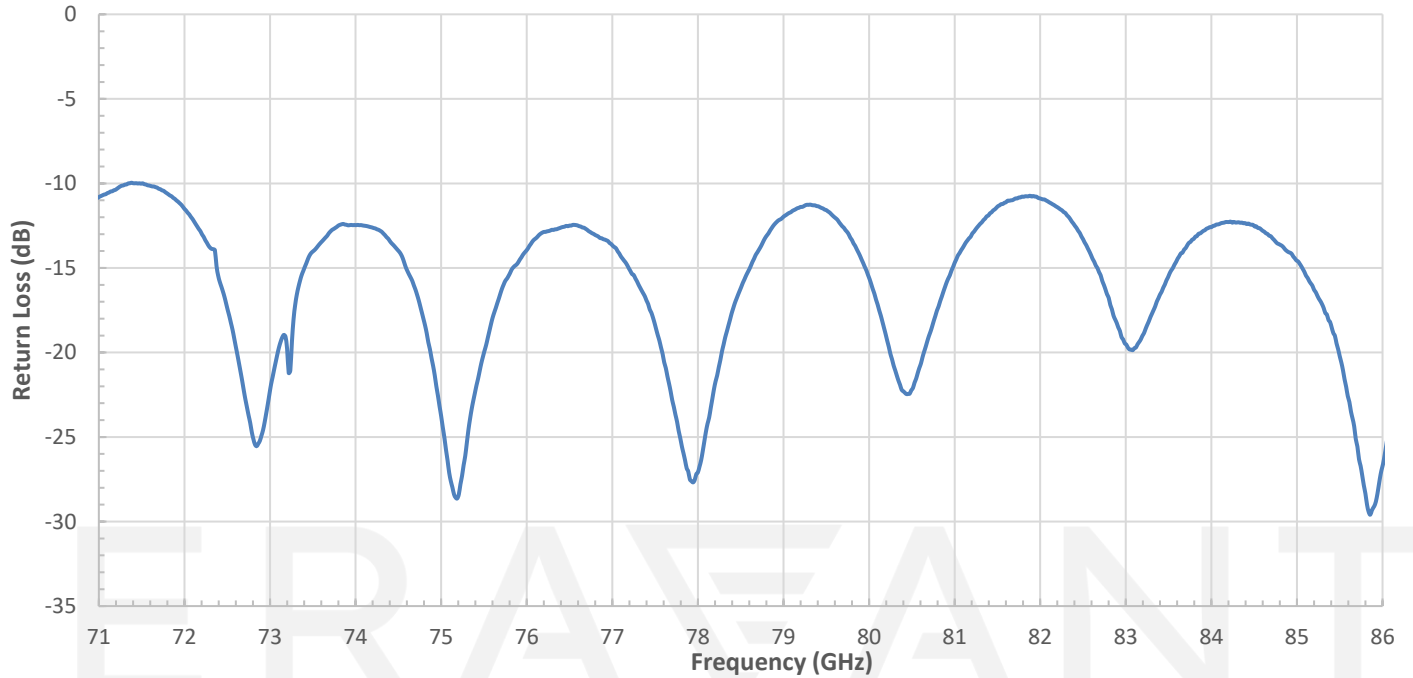


Simulated Gain vs Frequency

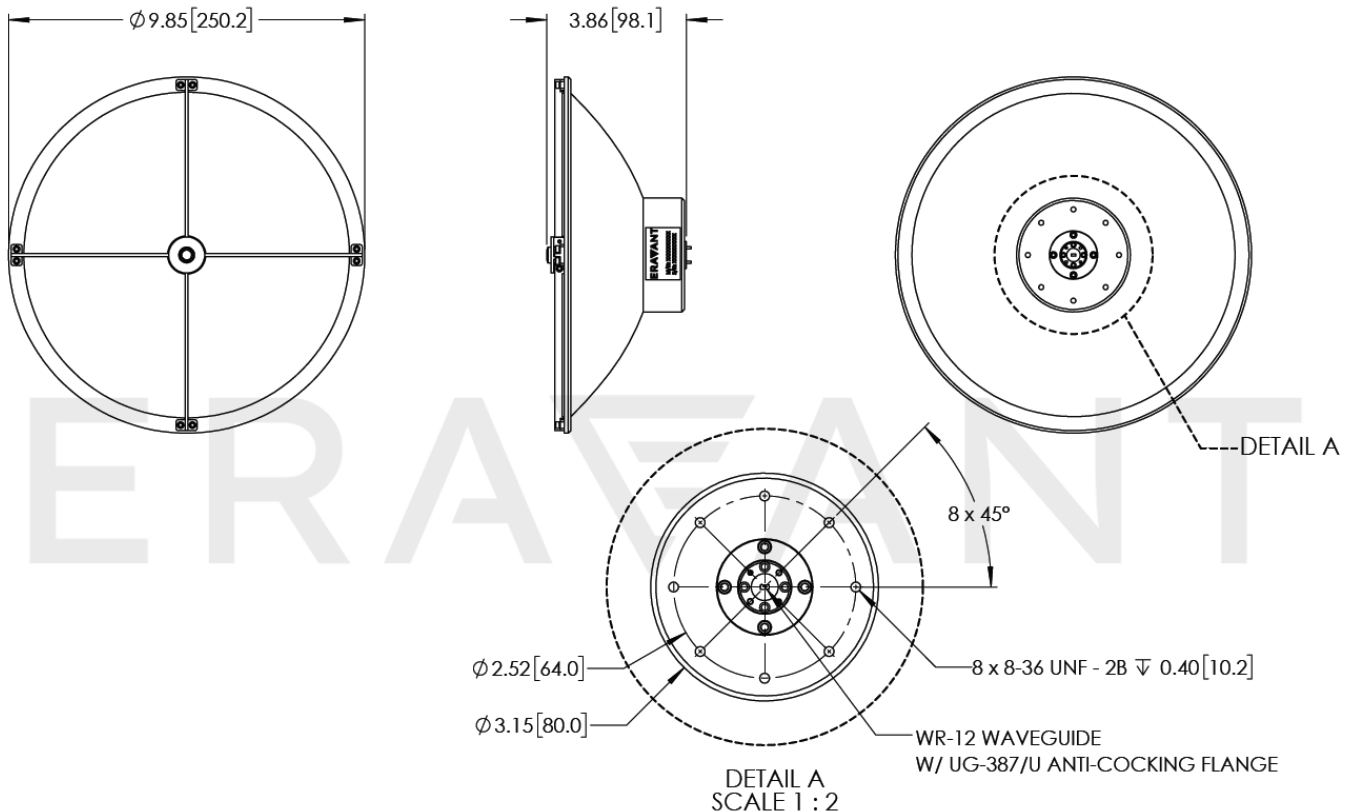


SAY-7138634212-12-S1

Measured Return Loss vs Frequency



Mechanical Outline: (Unless otherwise specified, all dimensions are in inches [millimeters])



NOTE:

- Test data provided is collected from a sample lot. Actual data may vary slightly from unit to unit. All testing is performed under +25 °C room temperature.
- For the simulated test data provided, actual measured data may slightly vary.
- Eravant reserves the right to change the information presented without notice.

CAUTION:

- Any foreign objects in the antenna will cause performance degradation and possible device damage.

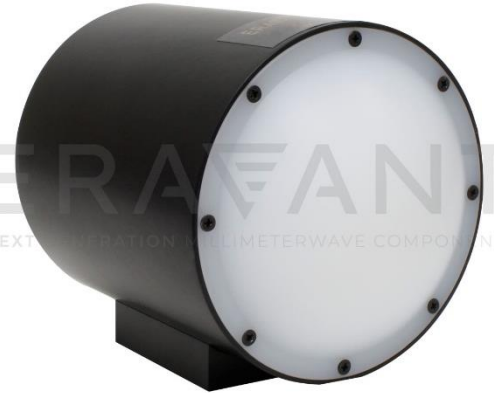
ERAVANT
MAKING MILLIMETERWAVE ACCESSIBLE

ERAVANT
MAKING MILLIMETERWAVE ACCESSIBLE

SAG-7138634002-12-S1

E-Band Gaussian Optics Antenna, 71 to 86 GHz, 40 dBi Gain, 6"

SAG-7138634002-12-S1 is a 6" E-Band Gaussian antenna that operates from 71 to 86 GHz. The Gaussian antenna delivers a 40 dBi nominal gain and 1.8-degree typical half-power beamwidth at center frequency. The antenna supports linear polarized waveforms and employs a corrugated feed horn to offer excellent aperture efficiency, high cross-polarization rejections, and low sidelobe levels. This model is equipped with a standard WR-12 waveguide with UG-387/U flange as its input port. By removing the mode transition, model **SWT-12110-SB**, the input port becomes a \varnothing 0.110" circular waveguide, which can support both linear and circular polarized waveforms.



Electrical Specifications:

Parameter	Minimum	Typical	Maximum
Frequency	71 GHz		86 GHz
Gain		40 dBi	
3 dB Beamwidth		1.8°	
Sidelobes		-20 dB	
Polarization		Linear	
Return Loss		15 dB	
Specification Temperature		+25 °C	
Operating Temperature	-40 °C		+85 °C

Mechanical Specifications:

Item	Specification
Antenna Port	WR-12 Waveguide with UG-387/U Flange
Material	Aluminum
Finish	Black Anodized
Lens Diameter	6.0"
Outline	AG-RE40

ECCN

EAR99

FEATURES

- Center Fed
- Low Sidelobes
- Low Cross Polarization

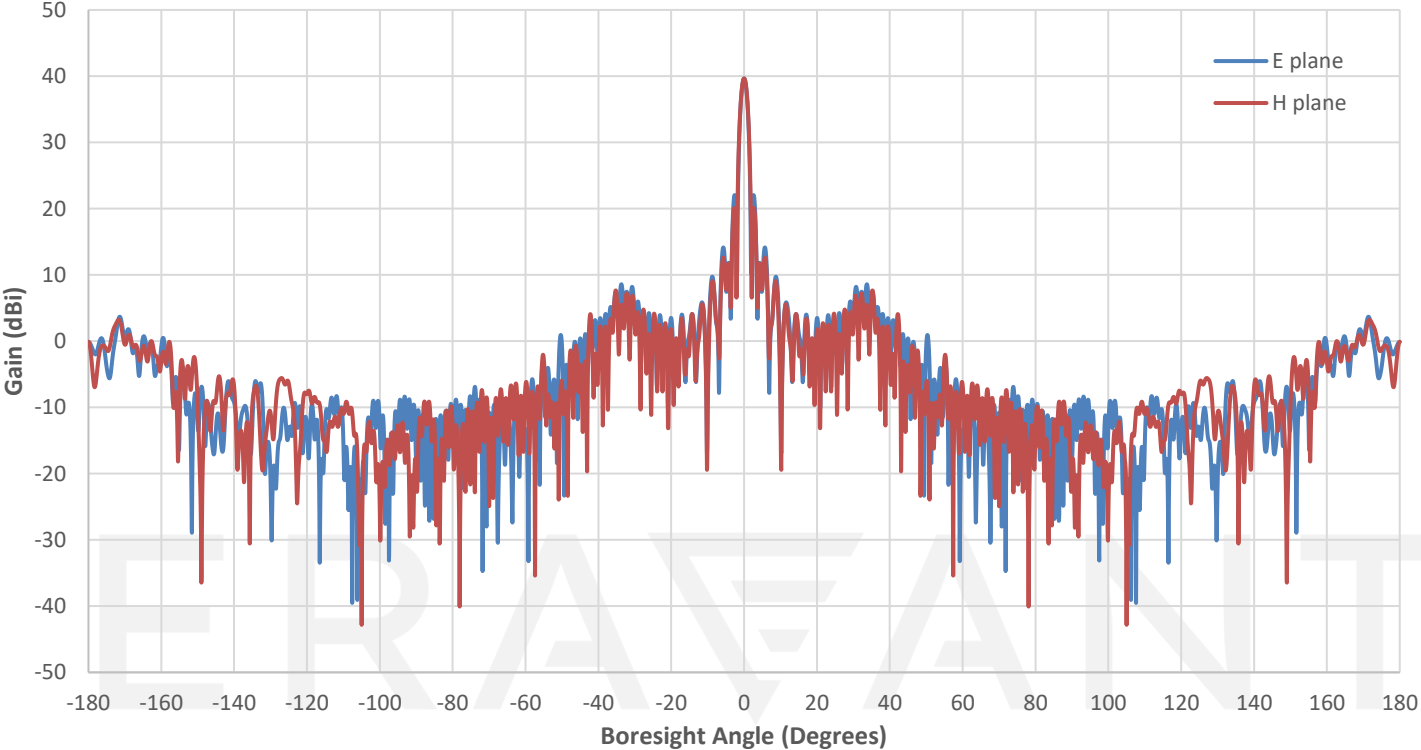
APPLICATIONS

- Radar Systems
- Communication Systems
- Plasma Systems

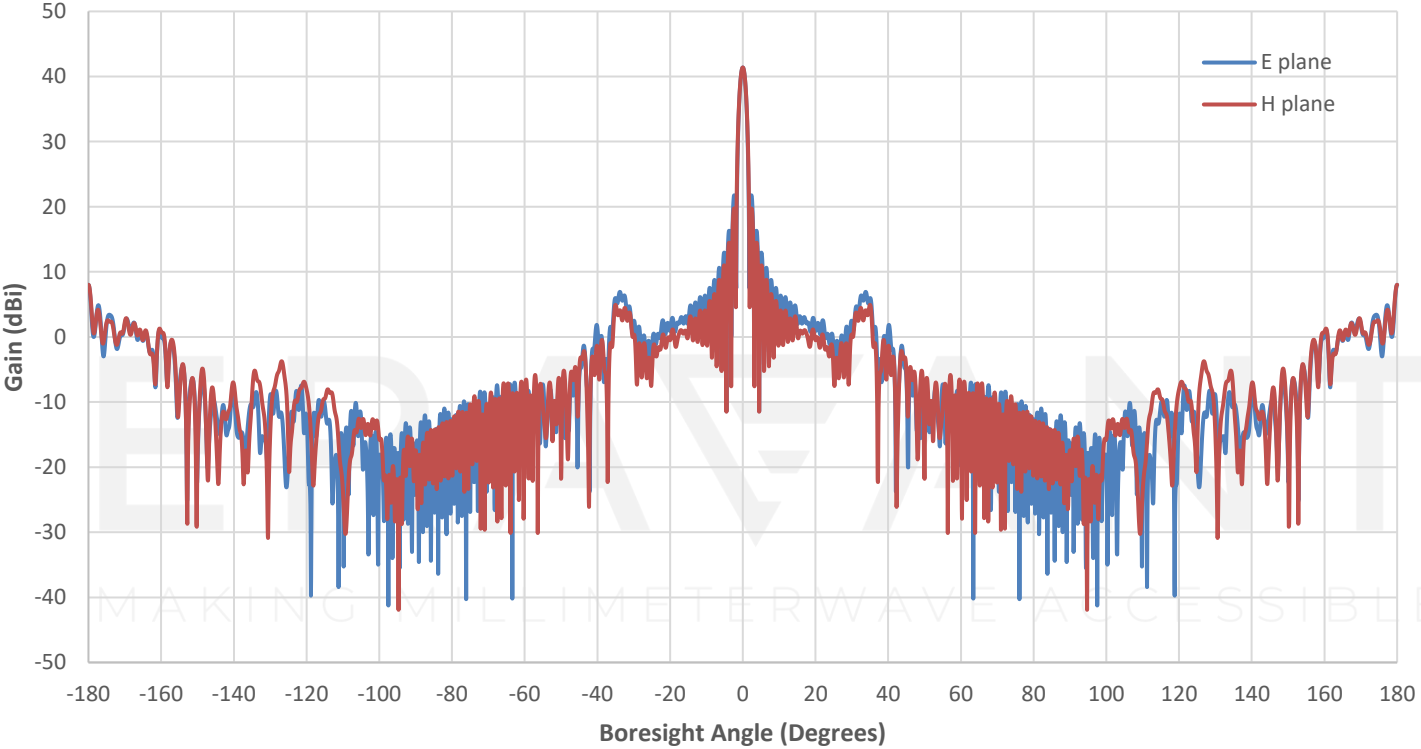
SUPPLEMENTAL DETAILS



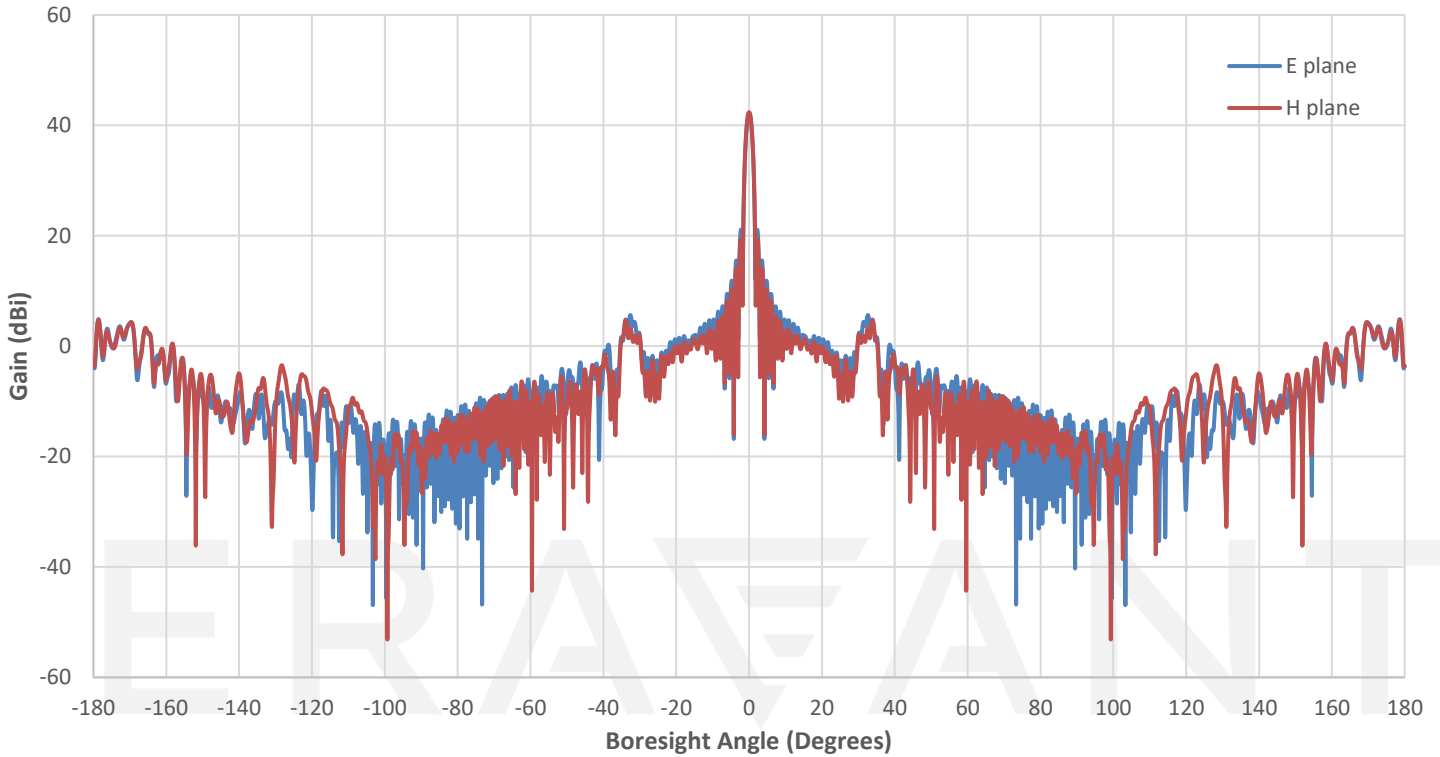
Simulated Pattern at 71 GHz



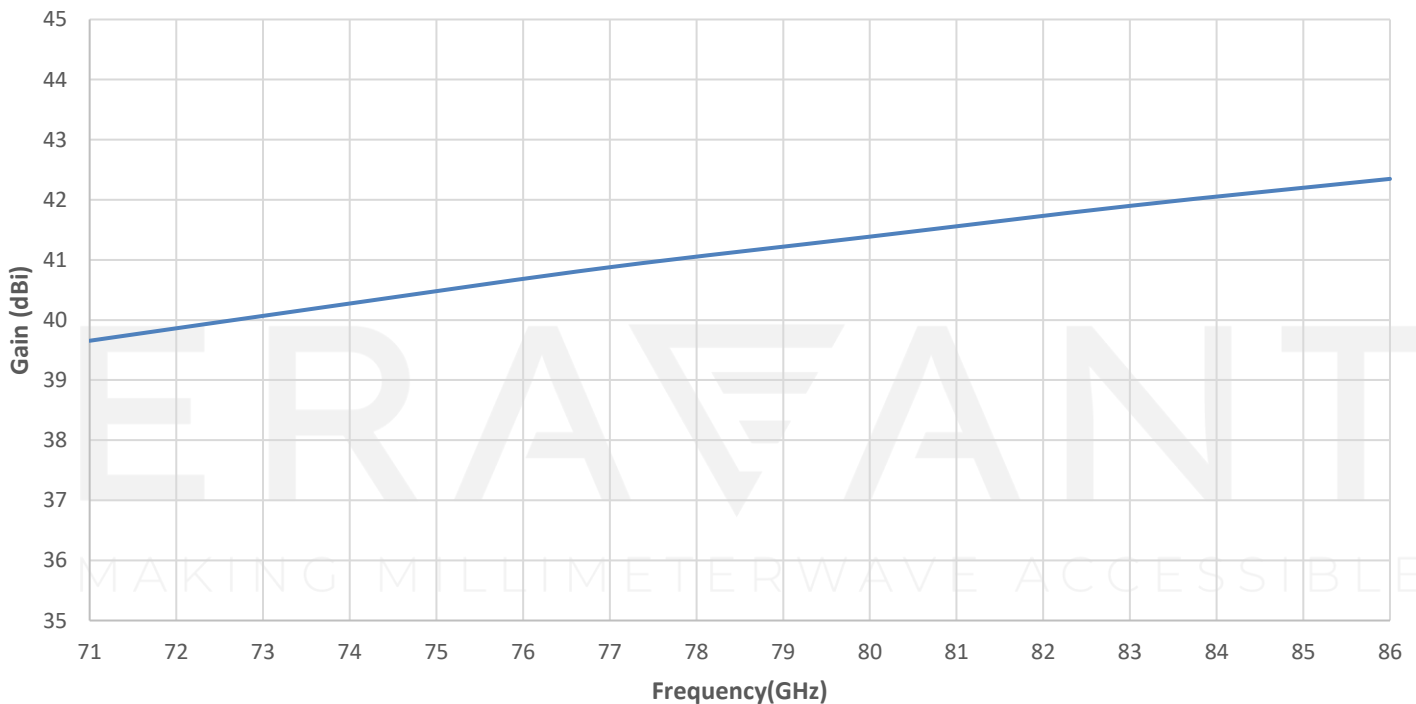
Simulated Pattern at 80 GHz



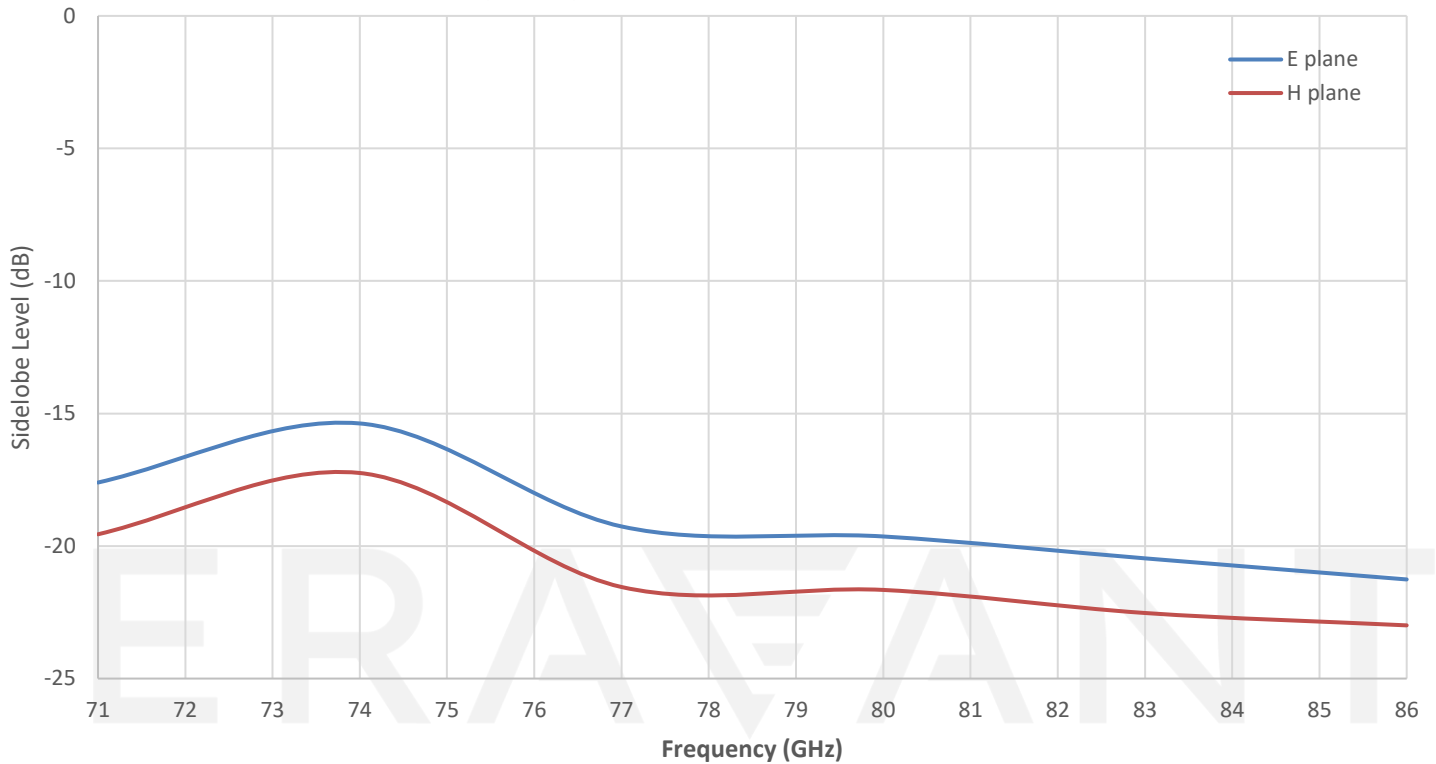
Simulated Pattern at 86 GHz



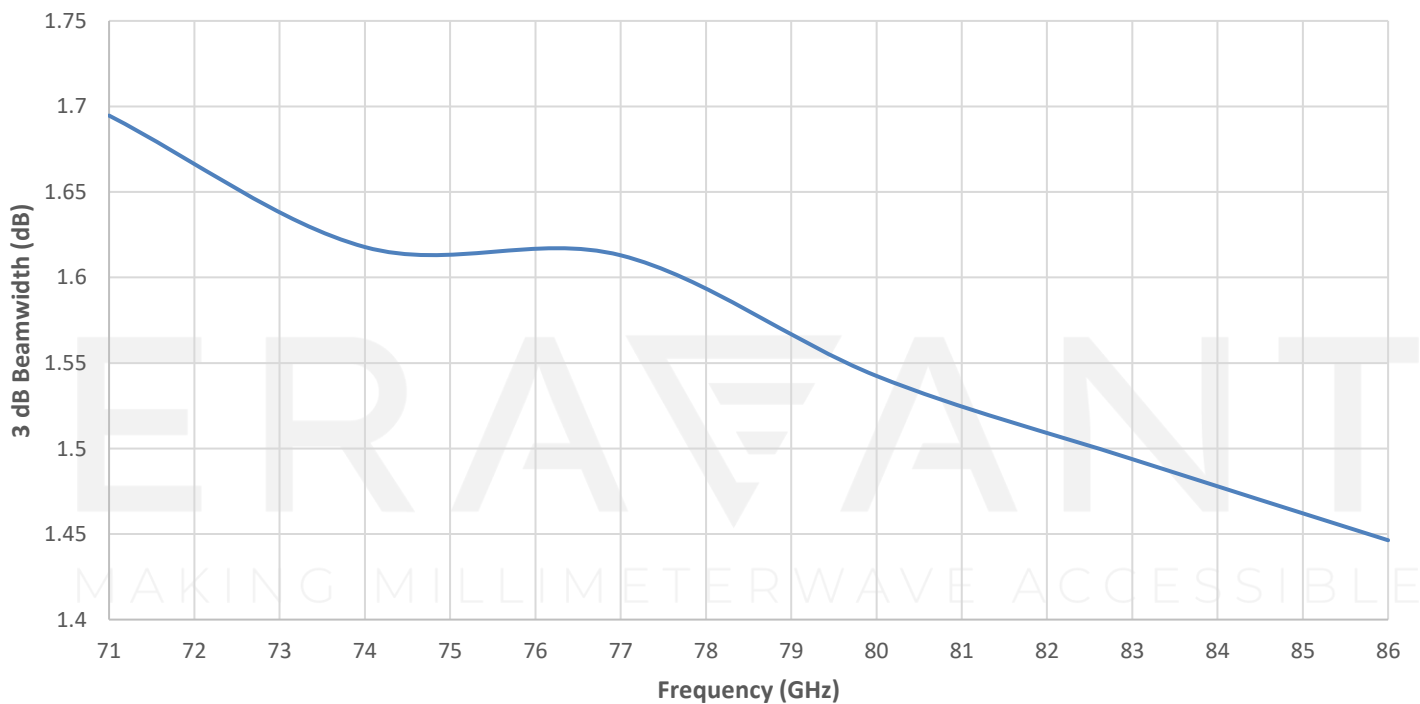
Simulated Gain vs Frequency



Simulated Sidelobe level vs Frequency

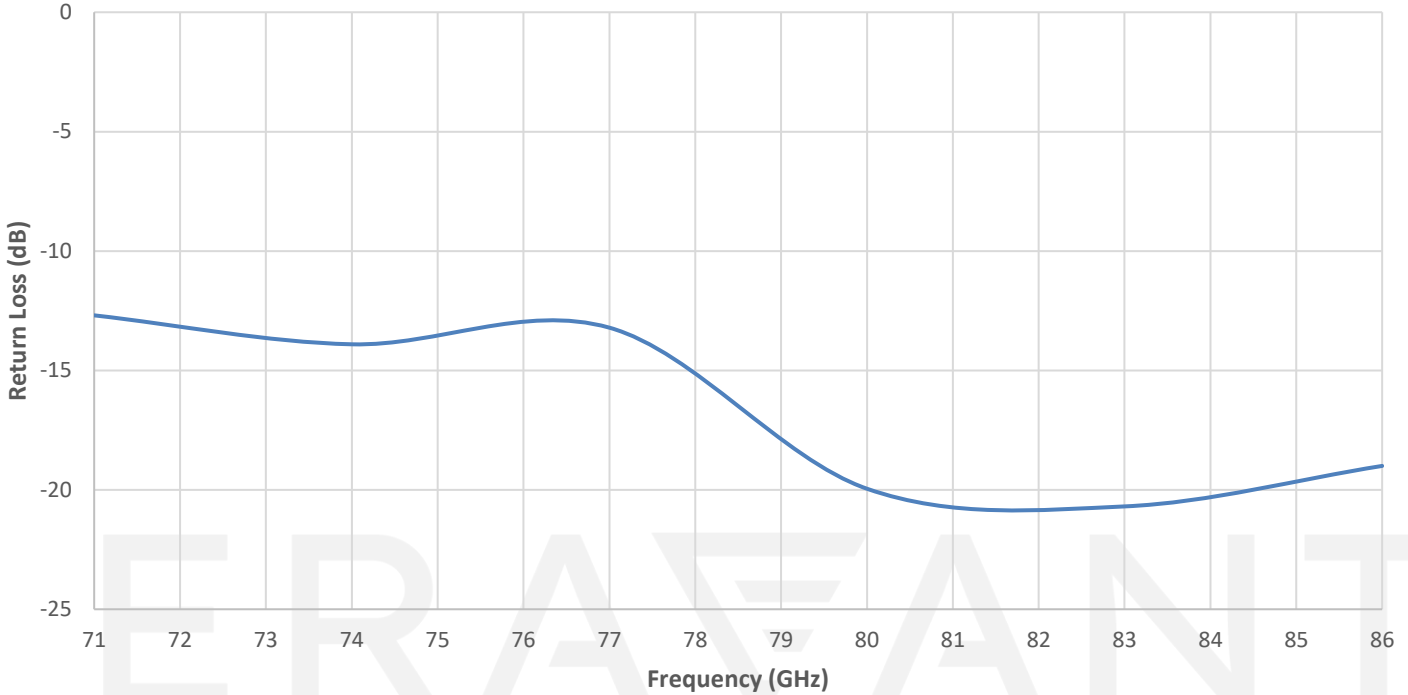


Simulated 3 dB Beamwidth vs Frequency

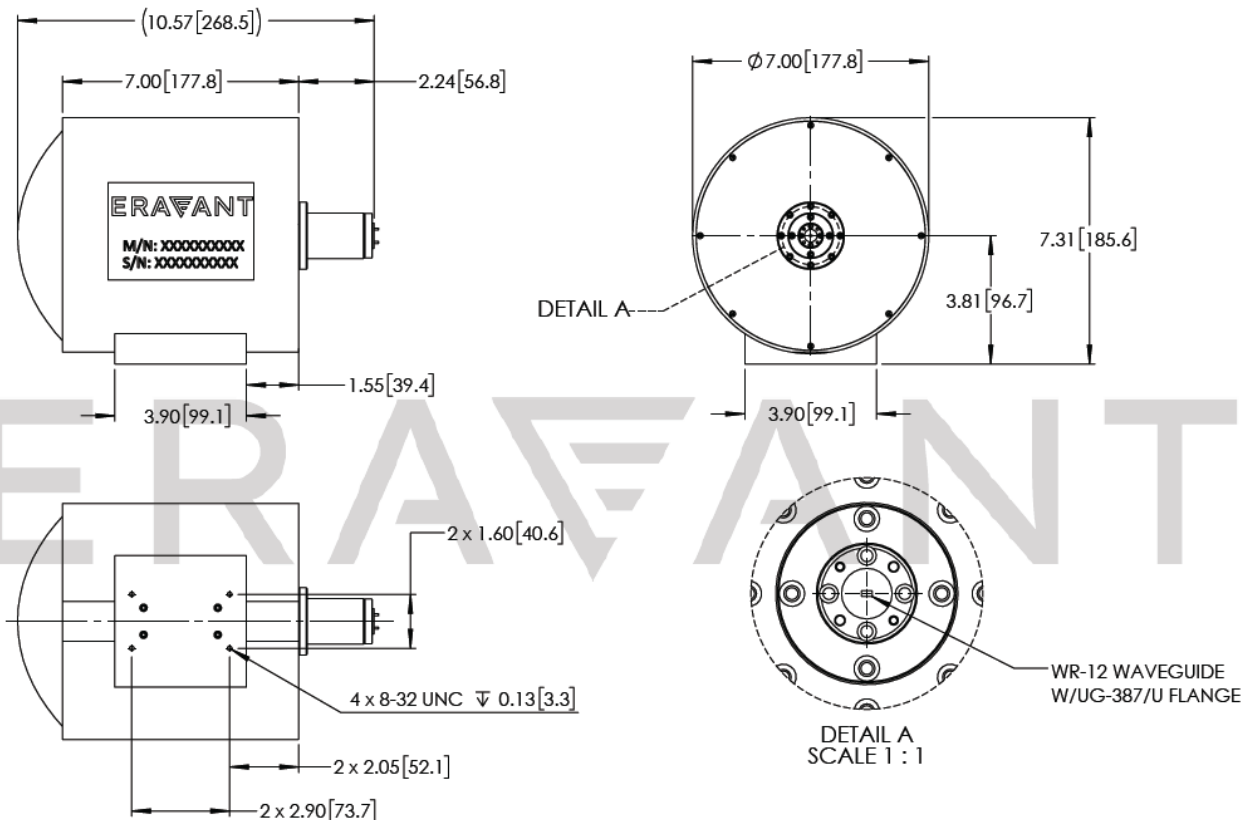


SAG-7138634002-12-S1

Simulated Return Loss vs Frequency



Mechanical Outline: (Unless otherwise specified, all dimensions are in inches [millimeters])



Note:

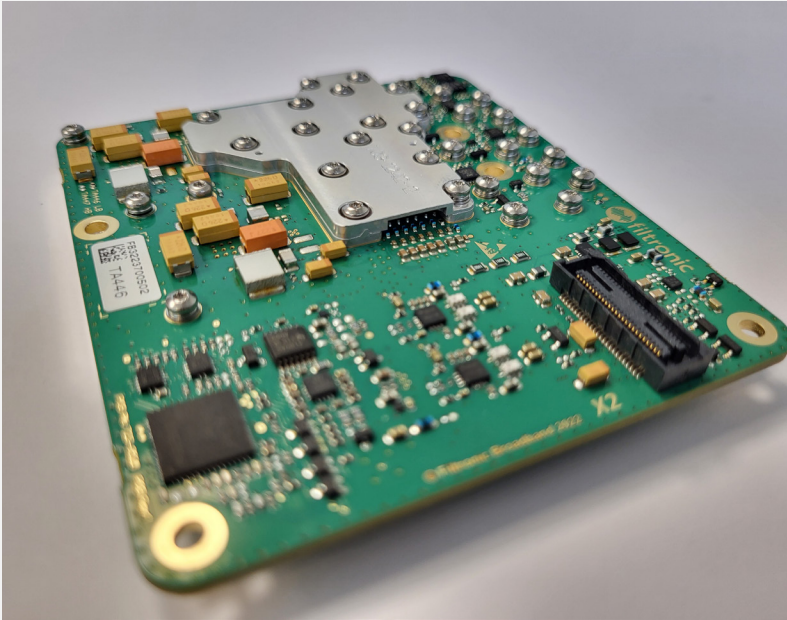
- All antenna pattern and gain data presented is simulated. Actual data may vary, slightly.
- Eravant reserves the right to change the information presented without notice.

Caution:

- Foreign objects in the waveguide will affect device performance and may damage the antenna.

ERAVANT
MAKING MILLIMETERWAVE ACCESSIBLE

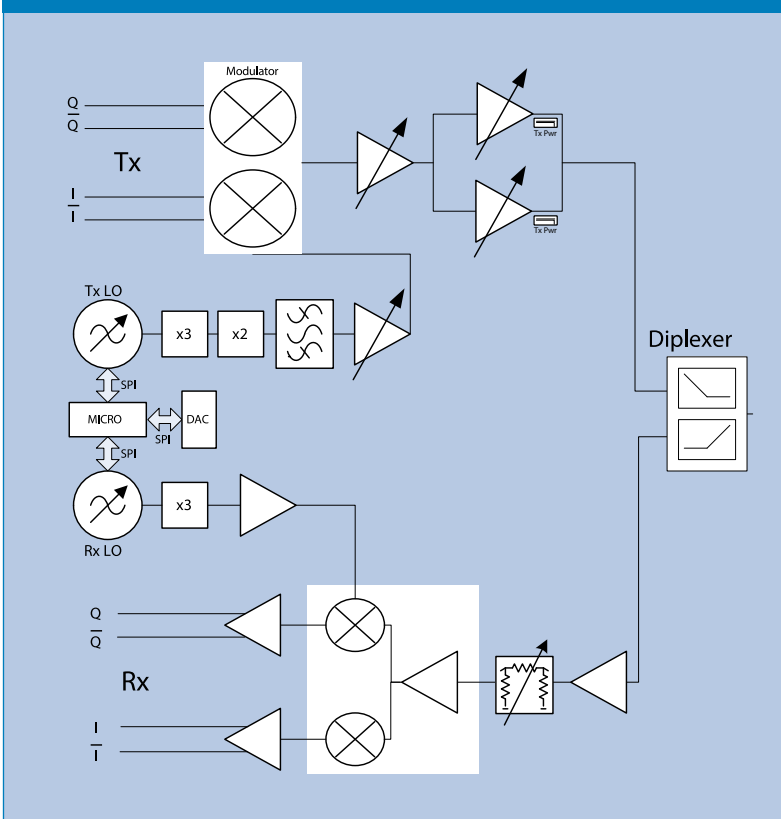
ERAVANT
MAKING MILLIMETERWAVE ACCESSIBLE



Features

- Fully integrated 71-76 to 81-86 GHz TRx modules
- Supports linear Tx output power in excess of 24dBm
- Supports >2GHz channel bandwidth
- Low phase noise -112dBc/Hz at 1MHz
- Supports up to 512QAM modulation
- Integrated Diplexer
- Single T/R port for antenna interface
- Single connector for modem interface
- 100% calibrated & tested
- Compact low mass form factor

Morpheus X2 transceiver block diagram



Description

Morpheus X2 E-Band transceiver modules provide a turn-key solution for carrier grade mobile XHaul applications. Each module contains all the transmit and receive functions necessary for the RF section of an E-Band link and provides a simple connection to a high data rate full duplex modem. The integrated diplexer connects directly to an antenna of choice via a standard WR12 interface. Internal, low phase noise VCOs are settable via an SPI interface in 31.25MHz steps to support ECC/ITU channel arrangements.

- Proven system performance
 - 10 Gbps demonstrated with spectral efficient 256QAM modulation.
- Field proven technology
 - tens of thousands of Filtronic millimetre wave transceivers deployed worldwide.

Morpheus X2 modules are designed for easy incorporation into ODUs for rapid time to market with minimal customer engineering resource.

TA446 Outline Specification

Over Baseplate operating temperature -33 to +75C
 All RF parameters referenced to antenna port
 (inclusive of diplexer loss)

Function	Parameter	Min	Typ	Max	Units
Transmitter	Tx Frequency	71		76	GHz
	Tx Power control range	0		27	dBm
	Output IP3 @ 24dBm		37		dBm
	P _{SAT}		30		dBm
	Tx ALC accuracy	-2		2	dB
	Tx LO Cancellation		-30		dBc
	Tx Sideband suppression		-40	-20	dBc
	Tx Baseband input power	-12.5		-2	dBm
	I/Q Gain imbalance	-3		+3	dB
	I/Q Phase imbalance	-7		+7	degrees
	I/Q impedance - differential		100		Ohms
Receiver	Rx Frequency	81		86	GHz
	Rx Noise Figure (High gain mode)		8	10	dB
	Rx Gain in High gain mode	22	25	28	dB
	Rx Gain in Low gain mode	14.5	17.5	20.5	dB
	Rx Gain accuracy reported over SPI	-1.5		+1.5	dB
	RF input power			-23	dBm
	Input IP3 in Low gain mode	-10	-7		dBm
	I/Q Gain imbalance	-3		+3	dB
	I/Q Phase imbalance	-10		+10	degrees
Both	Phase Noise @ 100KHz			-89	dBc/Hz
	Phase Noise @ 1MHz			-112	dBc/Hz
	LO frequency step	31.25			MHz

Power Supplies

Voltage (V)	Max Current (mA)	Tolerance (±)	Abs' max voltage (V)
5.1	4100	2%	5.5
3.3	160	2%	3.6
2.8	310	2%	3.0
18	25	2%	20
-5	50	2%	-5.5

TA447 Outline Specification

Over Baseplate operating temperature -33 to +75C
 All RF parameters referenced to antenna port
 (inclusive of diplexer loss)

Function	Parameter	Min	Typ	Max	Units
Transmitter	Tx Frequency	81		86	GHz
	Tx Power control range	0		27	dBm
	Output IP3 @ 24dBm		36		dBm
	P _{SAT}		29		dBm
	Tx ALC accuracy	-2		2	dB
	Tx LO Cancellation		-30		dBc
	Tx Sideband suppression		-40	-20	dBc
	Tx Baseband input power	-12.5		-2	dBm
	I/Q Gain imbalance	-3		+3	dB
	I/Q Phase imbalance	-7		+7	degrees
	I/Q impedance - differential		100		Ohms
Receiver	Rx Frequency	71		76	GHz
	Rx Noise Figure (High gain mode)		7	10	dB
	Rx Gain in High gain mode	22	25	28	dB
	Rx Gain in Low gain mode	14.5	17.5	20.5	dB
	Rx Gain accuracy reported over SPI	-1.5		+1.5	dB
	RF input power			-23	dBm
	Input IP3 in Low gain mode	-10	-7		dBm
	I/Q Gain imbalance	-3		+3	dB
	I/Q Phase imbalance	-10		+10	degrees
Both	Phase Noise @ 100KHz			-89	dBc/Hz
	Phase Noise @ 1MHz			-112	dBc/Hz
	LO frequency step	31.25			MHz

Power Supplies

Voltage (V)	Max Current (mA)	Tolerance (±)	Abs' max voltage (V)
5.1	4100	2%	5.5
3.3	160	2%	3.6
2.8	310	2%	3.0
18	25	2%	20
-5	50	2%	-5.5

Connector pin out

The interface between the Filtronic E-band Module and the customer modem is a single 50-way connector.

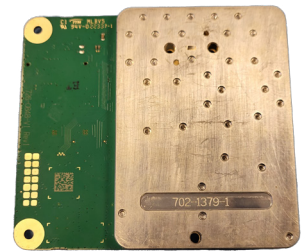
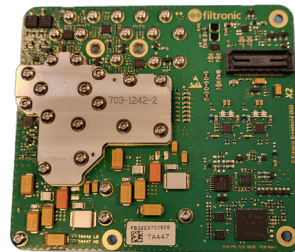
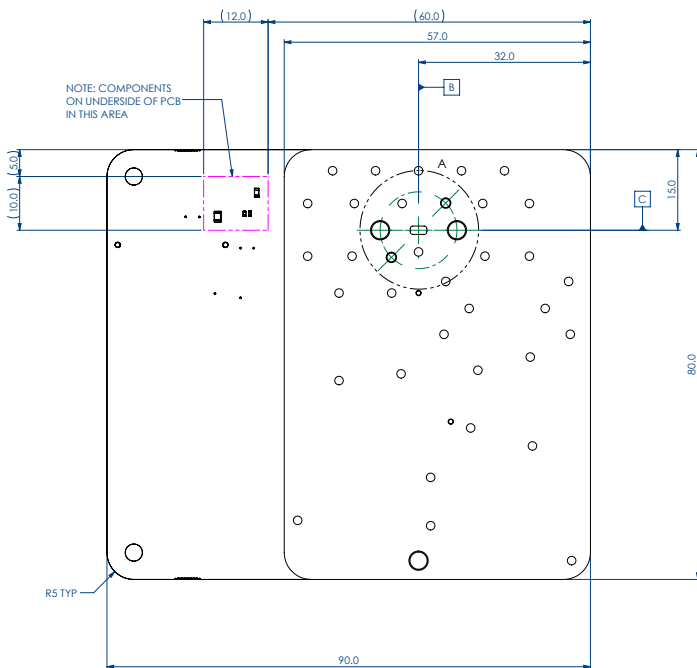
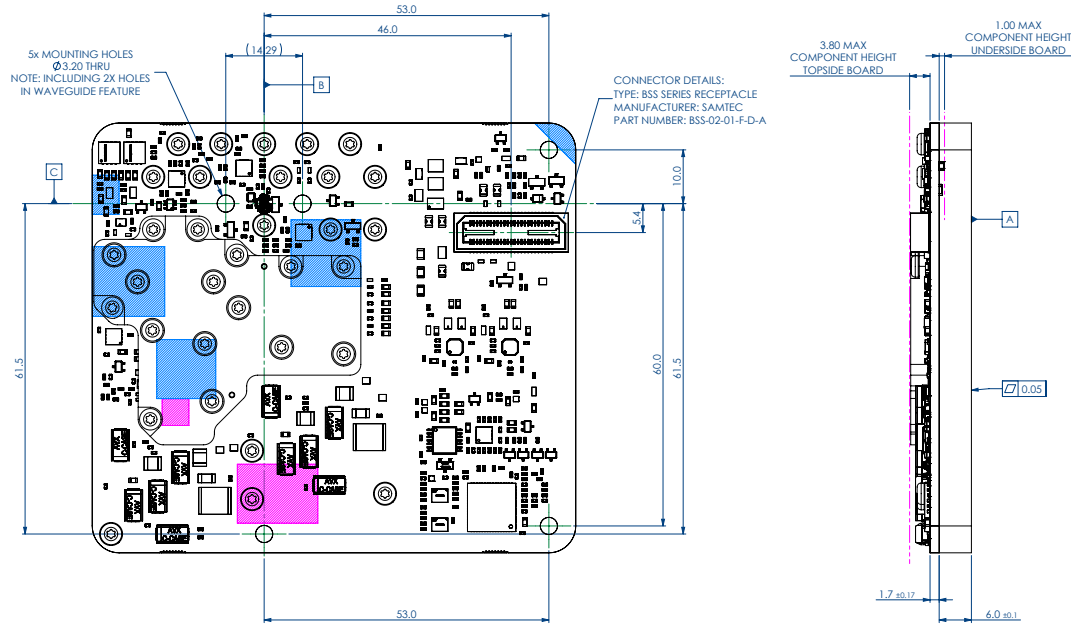
This connector is used for all communication between the module and modem; DC power, baseband data and control signals.

Pin number	Description	Description	Pin number
1	5.1V	5.1V	2
3	5.1V	5.1V	4
5	GND	GND	6
7	GND	GND	8
9	-5V	3.3V	10
11	GND	3.3V	12
13	18V	GND	14
15	GND	GND	16
17	GND	2.8V	18
19	GND	2.8V	20
21	GND	GND	22
23	GND	GND	24
25	GND	Txl	26
27	Rxlbar	GND	28
29	GND	Txlbar	30
31	Rxl	GND	32
33	GND	TxQ	34
35	RxQ	GND	36
37	GND	TxQbar	38
39	RxQbar	GND	40
41	GND	GND	42
43	GND	RST-SBWD	44
45	Spare	SPL_CS_RFM	46
47	Connected	SPL_MOSI	48
49	SPL_CLK	SPL_MISO	50

Environmental

Parameter	
Operating Temperature	-33 to 75 °C
Storage Temperature	-45 to +80 °C
Mechanical shock and vibration	ETS 300 019-2-4 Class 4M3
MTBF	>106 Hours (per Bellcore TR-332 with ambient temperature of +40oC)
ROHS & REACH	COC for ROHS & REACH Compliance available

Mechanical Outline



Other hardware configurations also available.

Custom adapters can be provided for all popular antennas.

OMT and Polariser options for XPIC applications may also be provided.

Contact Us

Filtronic, NETPark Plexus 1, Thomas Wright Way, Sedgfield, County Durham. TS21 3FD. UK

Tel: +44 1740 625 163 Email: sales@filtronic.com

All specifications are subject to change without notice. Visit www.filtronic.com for the most current datasheets. © 2021 Filtronic plc. All rights reserved.

VALUE PROPOSITION

- All-digital software defined modem
- 2.6 Gbps full-duplex user data rate
- Compatible with ETSI 500 MHz channel spacing
- Fast product time-to-market when paired with 3rd party plug-and-play RF module and housing

APPLICATIONS

- E-band and V-band wireless point-to-point communications
- 5G, LTE, WiMAX and HSDPA+ wireless backhaul
- Large-cell and small-cell backhaul
- Private networks and campus connectivity
- Fiber extensions and replacements
- High-definition video surveillance and monitoring
- Triple-play (voice, data and video) transmission
- Government and campus building interconnection
- Critical infrastructure protection
- Public safety applications



ALL-DIGITAL 2.6 GBPS MODEM FOR MMW RADIOS

Escape Communications' ESM-5008 is a high-capacity, all-digital modem module specifically designed for the 60, 70, and 80 GHz mm-wave E-band and V-band markets.

The ESM-5008 provides up to 2.6 Gbps full-duplex user data links using 256QAM modulation in a 500 MHz channel. The ESM-5008 includes a powerful microprocessor, power-over-Ethernet, 1GigE and 10GigE network interfaces, analog I/Q baseband interfaces, as well as control and status interfaces to/from RF electronics.

Assembling a complete point-to-point mm-wave radio is as simple as pairing the ESM-5008 modem module with a mm-wave transceiver and a weather-tight enclosure.

See our complete mmW radio kit offering to get started today!

FEATURES

High user data throughput to 2.6 Gbps full duplex

1 and 10 Gigabit Ethernet network interfaces (copper and optical)

Meets ETSI 500 MHz channel spacing

Configurable QPSK thru 256QAM modulation with Adaptive Coding and Modulation (ACM)

HTTP web GUI, telnet and SNMP for network management and control

Integrated Layer-2 switch supporting

- In-band terminal management for 1 and 10 Gigabit Ethernet modes
- Jumbo frame support
- IEEE 1588v2 (TC) and Sync-E

4PPoE Power over Ethernet (path to 802.3bt compliance)

RSSI LEDs for alignment

-45 to +60 deg C

7 inch x 7 inch board designed for outdoor environment use

Available with 3rd party RF and chassis design for a fully functional kit

RELATED PRODUCTS

ESM-20008



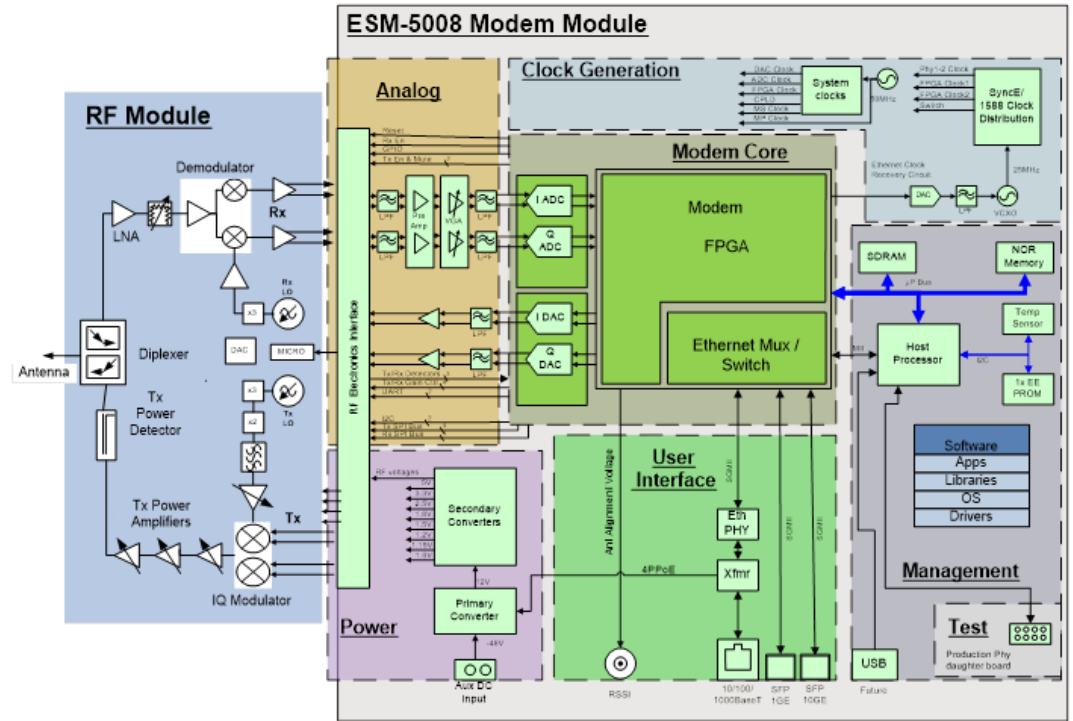
10 Gbps, 2 GHz bandwidth modem, QPSK to 256QAM with Adaptive Coding and Modulation, IEEE1588v2, SyncE, management via web GUI, SNMP or telnet/SSH.

ESM5008-KIT



Reference design kit for the ESM5008 modem module, including mechanical design files and management software integrating Filtronic, Ltd. Orpheus and Morpheus E-band modules.

ALL-DIGITAL 2.6 GBPS MODEM MODULE



QUALITY



ISO 9001:2015 certified quality management system

Escape Communications is committed to providing high quality products and services to our customers through:

- Consistently exceeding our customer's expectations for product quality in performance, functionality, design, and value
- Timely delivery of products and services to meet our customer's requirements
- Continuous improvement of our processes and systems
- Ensuring our personnel are properly trained so they are better able to serve our customers