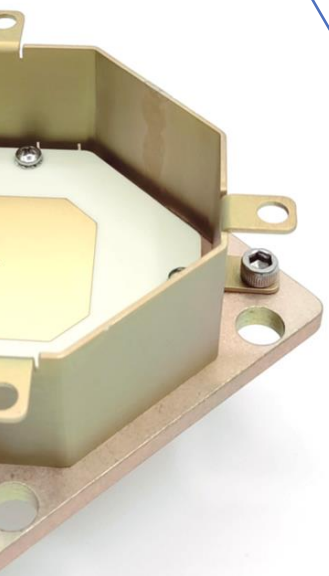
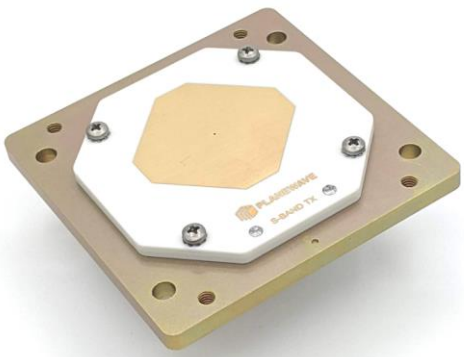
PLANEWAVE

Space-Rated Product Catalog





PLANEWAVE

PlaneWave is an emerging provider of antenna/RF product development and manufacturing services. PlaneWave specializes in designing and manufacturing cutting-edge wireless communication, navigation and sensing front-end hardware and subsystems for clients in a wide range of industries. The application of its products include but are not limited to fast moving platforms such as aviation and space vehicles, as well as transportation and agriculture sectors.

1 DIVERSE AND EFFICIENT TEAM COVERING A WIDE VARIETY OF TECHNICAL SUBJECTS

2 EXPERIENCE IN HIGH-VOLUME MANUFACTURING

PlaneWave's team of engineers and technicians have vast experience in product development, prototyping, testing, and mass production. The company uses latest technologies and equipment to ensure that its products are of the highest quality, are cost-effective and meet the industry standards. Clients can rely on PlaneWave's expertise and efficiency in providing full-cycle product development services, from concept to mass production.

3 KNOWLEDGE OF REGULATORY AND APPROVAL PROCESSES

4 EXPERIENCE IN DESIGN AND MANUFACTURING FOR HARSH ENVIRONMENTS

PlaneWave aims to bring canonical engineering to a wide array of applications. Our team is comprised of seasoned players in the RF and digital fields with a bend towards efficient prototyping and iteration as well as a strong emphasis on designing with manufacturability and robustness. Whether the need be of the Navigation, Communications, IoT, or specialized RF hardware, front-end or Antenna design variety, PlaneWave is ready to meet your needs.

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Contents

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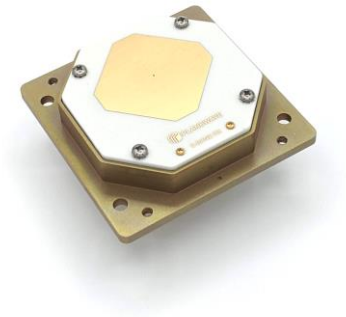


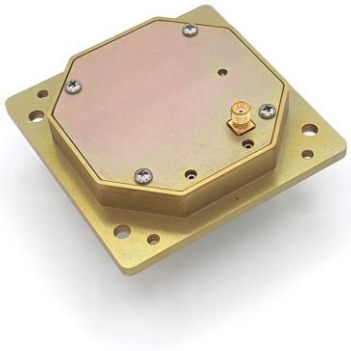
PW2020-000 Active S-Band RHCP RX Omni Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	2025		2110	MHz
Polarization		RHCP		
Axial Ratio		2	3	dB
VSWR			2:1	
Passive Gain	4	4.5	5	dBic
Pattern Coverage		Omni		
LNA Gain (Notes 1 and 2)	26	28	32	dB
Noise Figure (Note 2)		2.2	3.5	dB
Rejection @ 2200 MHz	60			dBc
Voltage	4.5	5	12	V
Current		50	60	mA
Mass			140	g
Operating Temperature	-70		100	°C
Radiation Hardness (TID)	500			krad
Destructive Single Event Effects (Note 3)	37			MeV-cm²/mg
Vibration	14.1			G_{RMS}

Note 1: LNA gain is customizable upon request

Note 2: Measured over the full operating temperature range

Note 3: No destructive SEE was observed when tested with heavy ions up to the above LET



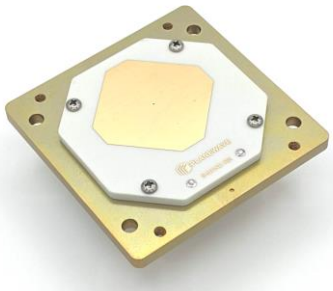
PW2020-200 S-Band LNA

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	2025		2110	MHz
VSWR			2:1	
Gain (Notes 1 and 2)	26	28	32	dB
Noise Figure (Note 2)		2.2	3.5	dB
Rejection @ 2200 MHz	60			dBc
Voltage	4.5	5	12	V
Current		50	60	mA
Mass			110	g
Operating Temperature	-70		100	°C
Radiation Hardness (TID)	500			krad
Destructive Single Event Effects (Note 1)	37			MeV-cm²/mg
Vibration	14.1			G_{RMS}

Note 1: LNA gain is customizable upon request

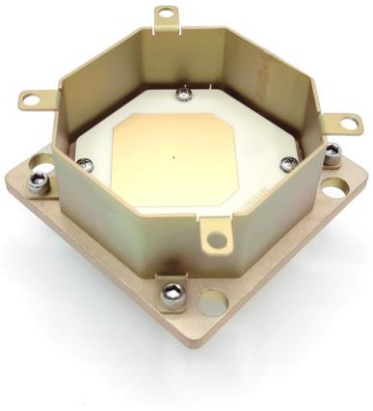
Note 2: Measured over the full operating temperature range

Note 3: No destructive SEE was observed when tested with heavy ions up to the above LET



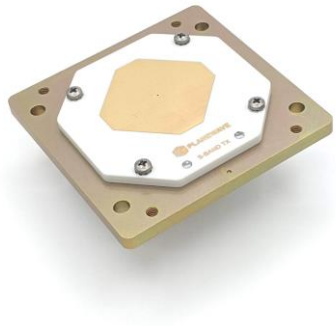
PW2020-110 S-Band Dual-CP RX Omni Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	2025		2110	MHz
Polarization		RHCP/LHCP		
Axial Ratio		2	3	dB
VSWR			2:1	
Gain	4	4.5	5	dBic
Pattern Coverage		Omni		
Mass			100	g
Operating Temperature	-70		100	°C
Vibration	14.1			G_{RMS}



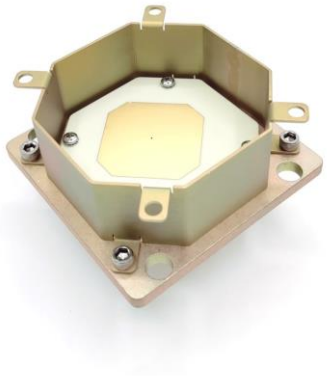
PW2020-310 S-Band Dual-CP RX Omni Test Hat

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	2025		2110	MHz
Polarization		RHCP/LHCP		
VSWR			2.5:1	
Coupling	2.5	3.5	4.5	dB
Mass			130	g
Operating Temperature	-70		100	°C



PW2222-110 S-Band Dual-CP TX Omni Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	2200		2290	MHz
Polarization		RHCP/LHCP		
Axial Ratio		2	3	dB
VSWR			2:1	
Gain	4	4.5	5	dBic
Pattern Coverage		Omni		
Power Handling	20			W
Mass			100	g
Operating Temperature	-70		100	°C
Vibration	14.1			G_{RMS}

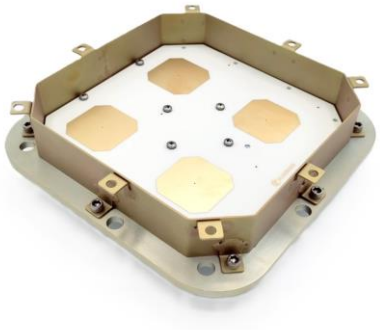


PW2222-310 S-Band Dual-CP TX Omni Test Hat

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	2200		2290	MHz
Polarization		RHCP/LHCP		
VSWR			2.5:1	
Coupling	2.5	3.5	4.5	dB
Mass			130	g
Operating Temperature	-70		100	°C

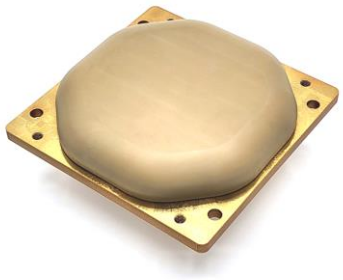
PW2222-101 S-Band RHCP TX 2x2 Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	2200		2290	MHz
Polarization		RHCP		
Axial Ratio		2	3	dB
VSWR			2:1	
Gain	10	11	12	dBic
Pattern Coverage		Directional		
Power Handling	20			W
Mass			350	g
Operating Temperature	-70		100	°C
Vibration	14.1			G_{RMS}



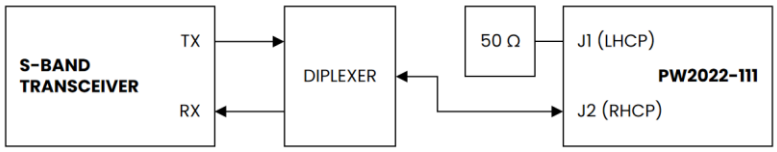
PW2222-301 S-Band RHCP TX 2x2 Test Hat

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	2200		2290	MHz
Polarization		RHCP		
VSWR			2:1	
Coupling	2.0	3.0	4.0	dB
Operating Temperature	-70		100	°C

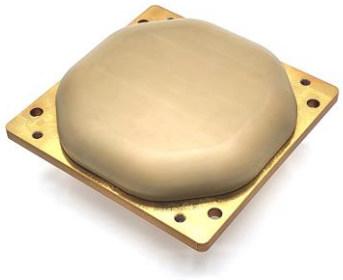


PW2022-111 S-Band Dual-CP Wideband Omni Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	2025		2290	MHz
Polarization		RHCP/LHCP		
Axial Ratio		2	3	dB
VSWR			2:1	
Gain	4	4.5	5	dBic
Pattern Coverage		Omni		
Power Handling	20			W
Mass			150	g
Operating Temperature	-70		100	°C
Vibration	14.1			G_{RMS}
LEO Mission Life	5			years

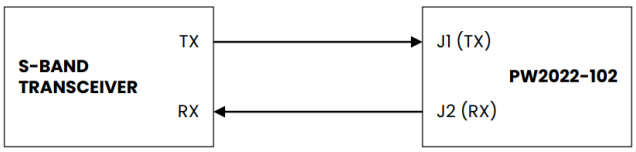


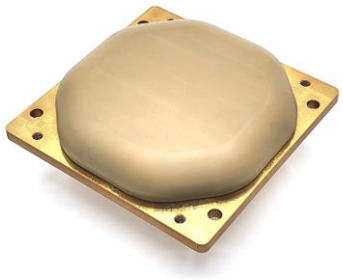
RHCP Link



PW2022-102 S-Band RHCP Dual-Port (TX+RX) Omni Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency				
TX	2200		2290	MHz
RX	2025		2110	MHz
Polarization		RHCP		
Axial Ratio				
TX		2	4	dB
RX		2	4	dB
VSWR			2:1	
Port to Port Isolation	20			dB
Gain				
TX	3.5	4	4.5	dBic
RX	4	4.5	5	dBic
Pattern Coverage		Omni		
Power Handling	20			W
Mass			150	g
Operating Temperature	-70		100	°C
Vibration	14.1			G_{RMS}
LEO Mission Life	5			years





PW2022-002 Active S-Band RHCP Dual-Port (TX+RX) Omni Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency				
TX	2200		2290	MHz
RX	2025		2110	MHz
Polarization		RHCP		
Axial Ratio				
TX		2	4.5	dB
RX		2	3	dB
VSWR			1.8:1	
TX to RX Isolation	25			dB
Passive Gain				
TX	1.5	2.5	3	dBic
RX	4.5	4.5	5.2	dBic
LNA Gain (Notes 1 and 2)	13	15	17	dB
Noise Figure (Note 2)		2.2	3.5	dB
Voltage	4.5	5	12	V
Current		30	40	mA
Pattern Coverage		Omni		
TX Power Handling	20			W
Mass			140	g
LEO Mission Life	5			years
Operating Temperature	-70		100	°C
Radiation Hardness (TID)	1			Mrad
Destructive Single Event Effects (Note 3)	37			MeV-cm^2/mg
Vibration	14.1			G_{RMS}

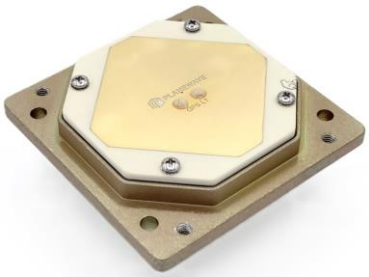
Note 1: LNA gain is customizable upon request

Note 2: Measured over the full operating temperature range

Note 3: No destructive SEE was observed when tested with heavy ions up to the above LET

PW2022-302 S-Band RHCP Dual-Port (TX+RX) Omni Test Hat

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency				
TX	2200		2290	MHz
RX	2025		2110	MHz
Polarization		RHCP		
VSWR			2.5:1	
Coupling				
TX	-7	-5	-4	dB
RX	-5	-3	-2	dB
Mass			230	g
Operating Temperature	-70		100	°C



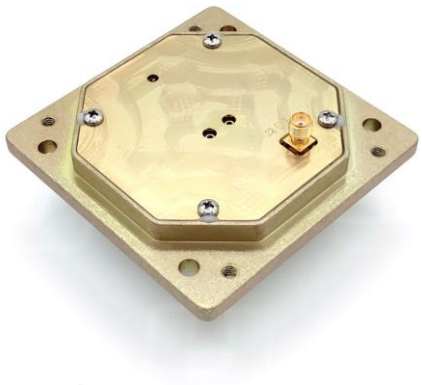
PW1515-001 Active GPS L1 Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	1563		1588	MHz
Polarization		RHCP		
Axial Ratio		2	3	dB
VSWR			2:1	
Passive Gain	4.5	5	5.5	dBic
Pattern Coverage		Omni		
LNA Gain (Notes 1 and 2)	12	15	18	dB
Noise Figure (Note 2)		2.5	3.5	dB
Rejection @ 1650 MHz	50			dBc
Voltage	4.5	5	12	V
Current		25	30	mA
Mass			130	g
Operating Temperature	-70		100	°C
Radiation Hardness (TID)	500			krad
Destructive Single Event Effects (Note 3)	37			MeV-cm^2/mg
Vibration	14.1			G_{RMS}

Note 1: LNA gain is customizable upon request

Note 2: Measured over the full operating temperature range

Note 3: No destructive SEE was observed when tested with heavy ions up to the above LET



PW1515-201 GPS L1 LNA

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	1563		1588	MHz
VSWR			2:1	
Gain (Notes 1 and 2)	12	15	18	dB
Noise Figure (Note 2)		2.2	3.5	dB
Rejection @ 2200 MHz	60			dBc
Voltage	4.5	5	12	V
Current		25	30	mA
Mass			110	g
Operating Temperature	-70		100	°C
Radiation Hardness (TID)	500			krad
Destructive Single Event Effects (Note 1)	37			MeV-cm^2/mg
Vibration	14.1			G_{RMS}

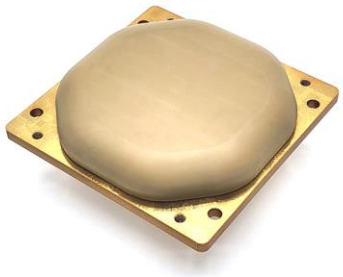
Note 1: LNA gain is customizable upon request

Note 2: Measured over the full operating temperature range

Note 3: No destructive SEE was observed when tested with heavy ions up to the above LET

PW1515-301 GPS L1 Test Hat

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	1563		1588	MHz
Polarization		RHCP		
VSWR			2.5:1	
Coupling	3.5	4.5	6	dB
Mass			150	g
Operating Temperature	-70		100	°C



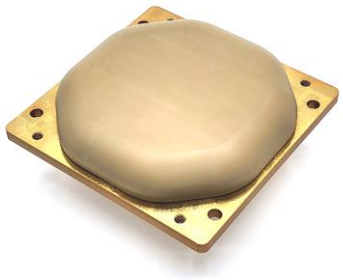
PW1515-004 Active GNSS L1/E1 Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	1559		1592	MHz
Polarization		RHCP		
Axial Ratio		2	3	dB
VSWR			2:1	
Passive Gain	4.5	5	5.5	dBic
Pattern Coverage		Omni		
LNA Gain (Notes 1 and 2)	12	15	18	dB
Noise Figure (Note 2)		2.5	3.5	dB
Rejection @ 1650 MHz	50			dBc
Voltage	4.5	5	12	V
Current		25	30	mA
Mass			130	g
Operating Temperature	-70		100	°C
Radiation Hardness (TID)	10			Mrad
Destructive Single Event Effects (Note 3)	37			MeV-cm^2/mg
Vibration	14.1			G_{RMS}
LEO Mission Life	5			years

Note 1: LNA gain is customizable upon request

Note 2: Measured over the full operating temperature range

Note 3: No destructive SEE was observed when tested with heavy ions up to the above LET



PW1115-002 Active GNSS L1/E1/L2/L5/E5 Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency				
L5/E5/L2	1164		1240	MHz
L1/E1	1559		1591	MHz
Polarization		RHCP		
Axial Ratio		2	3	dB
VSWR			2:1	
Passive Gain	2.5	3.5	4	dBic
Pattern Coverage		Omni		
LNA Gain (Notes 1 and 2)	12	15	18	dB
Noise Figure (Note 2)		2.5	3.5	dB
Rejection @ 1650 MHz	50			dBc
Voltage	4.5	5	12	V
Current		75	100	mA
Mass			140	g
LEO Mission Life	5			years
Operating Temperature	-70		100	°C
Radiation Hardness (TID)	1			Mrad
Destructive Single Event Effects (Note 3)	37			MeV-cm^2/mg
Vibration	14.1			G_{RMS}

Note 1: LNA gain is customizable upon request

Note 2: Measured over the full operating temperature range

Note 3: No destructive SEE was observed when tested with heavy ions up to the above LET

PW1115-302 GNSS L1/E1/L2/L5/E5 Test Hat

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency				
L5/E5/L2	1164		1240	MHz
L1/E1	1559		1591	MHz
Polarization		RHCP		
VSWR			2.5:1	
Coupling				
L5/E5/L2	-5	-3	-2	dB
L1/E1	-8	-7	-5	dB
Mass			250	g
Operating Temperature	-70		100	°C

PW8282-101 X-Band RHCP TX 2x2 Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	8025		8400	MHz
Polarization		RHCP		
Axial Ratio		2	3	dB
VSWR			2:1	
Gain	9	10	11	dBic
Pattern Coverage		Directional		
Power Handling	20			W
Mass			70	g
Operating Temperature	-70		100	°C
Vibration	14.1			G_{RMS}

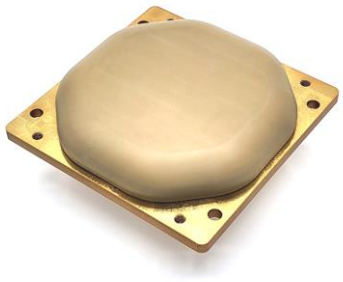
PW8282-301 X-Band RHCP TX 2x2 Test Hat

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	8025		8400	MHz
Polarization		RHCP		
VSWR			2:1	
Coupling	4	5	7	dB
Mass			130	g
Operating Temperature	-70		100	°C

Coming Soon

PW8282-104 X-Band RHCP TX 4x4 Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	8025		8500	MHz
Polarization		RHCP		
Axial Ratio		2	3	dB
VSWR			2:1	
Gain	15	16	17	dBic
Pattern Coverage		Directional		
Power Handling	20			W
Operating Temperature	-70		100	°C
Vibration	14.1			G_{RMS}

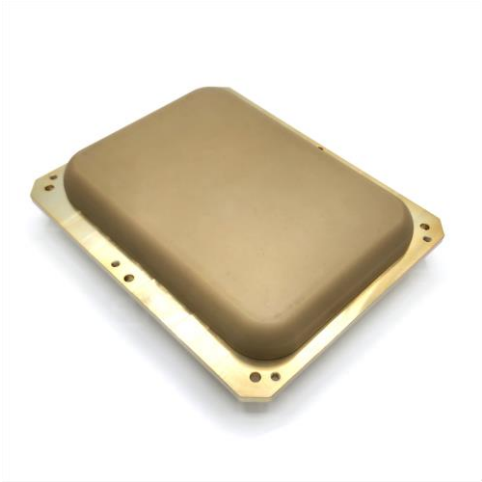


PW1516-100 L-Band RHCP Wideband Omni Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	1513		1675	MHz
Polarization		RHCP		
Axial Ratio		2	3	dB
VSWR			2:1	
Gain	4	4.5	5	dBic
Pattern Coverage		Omni		
Power Handling	20			W
Mass			200	g
Operating Temperature	-70		100	°C
Vibration	14.1			G_{RMS}
LEO Mission Life	5			years

PW1516-300 L-Band RHCP Wideband Omni Test Hat

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	1513		1675	MHz
Polarization		RHCP		
VSWR			2.5:1	
Coupling	2.5	3.5	4.5	dB
Mass			150	g
Operating Temperature	-70		100	°C



PW0404-100 UHF Linearly Polarized Antenna

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	395		405	MHz
Polarization		Linear		
VSWR		2:1	3.6:1	
Gain	-1	0.5	1	dBi
Pattern Coverage		Omni		
Power Handling	20			W
Mass			630	g
Operating Temperature	-70		100	°C
Vibration	14.1			G_{RMS}
LEO Mission Life	5			years

PW0404-300 UHF Linearly Polarized Test Hat

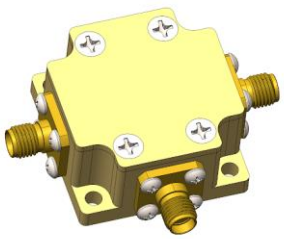
Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency (RX)	395		405	MHz
Polarization		Linear		
VSWR		2:1	3.6:1	
Coupling	-10	-4	-3	dB
Mass			720	g
Operating Temperature	-70		100	°C

PW4018-100 Dual-Ridged Horn Antenna, 18-40 GHz

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	18		40	GHz
Polarization		Linear		
VSWR			2:1	
Gain	8		12	dBi
Power Handling (CW)			10	W
Operating Temperature	-40		85	°C
Mass			25	g
Operating Temperature	-40		85	°C
Vibration	14.1			G_{RMS}

PW4010-101 Quad-Ridged Horn Antenna, 10-40 GHz

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	10		40	GHz
Polarization		Dual-Linear		
VSWR			2:1	
Gain	3		11	dBi
Power Handling (CW)			10	W
Operating Temperature	-40		85	°C
Mass			45	g
Operating Temperature	-40		85	°C
Vibration	14.1			G_{RMS}



PW1040-400 L+S-Band Bias Tee

Parameter / Condition	Min	Typ	Max	Unit
Operating Frequency	1000		4000	MHz
VSWR			2:1	
Insertion Loss	0.2	0.3	0.4	dB
DC to RF Isolation	30			dB
Voltage			50	V
Current			500	mA
Mass			80	g
Operating Temperature	-70		100	°C
Vibration	14.1			G_{RMS}
LEO Mission Life	5			years