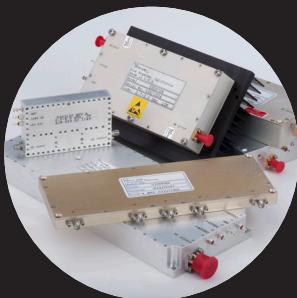




HIGH POWER RF SYSTEMS



ABOUT OPHIR RF

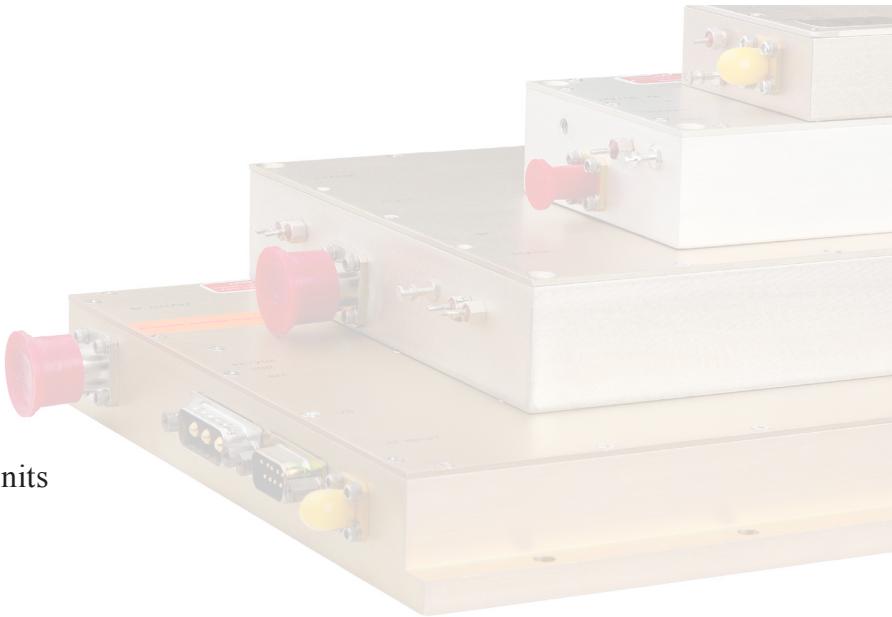
Ophir RF boasts one of the most comprehensive arrays of high-power, solid state, radio frequency (RF) amplifiers in the industry. Established in 1992 by a group of engineers with diverse talents and backgrounds. Ophir's initial charter was to design the most challenging of broadband linear amplifiers. The knowledge and design experience gained through the years has allowed Ophir RF to supply broadband and band-specific RF and microwave amplifiers to domestic and international markets. Today, design, development, manufacturing, testing and customer support are carried out in our 40,000 sq. ft. headquarters located in Los Angeles, California, USA. Our core products includes RF amplifiers from 10 kHz to 40 GHz with power levels varying from 1 W to 24 kW. This allows the company to react swiftly to new requirements and offer a variety of solutions.

Markets

- EMC testing
- Laboratory test and measurement
- Electronic warfare (EW)
- Radar
- Communications
- Scientific and medical applications

What We Offer

- Best power density available in the market
- High efficiency and reliability
- Utilizing state-of-the-art technology
- Competitive prices
- Fast delivery for both standard and custom units
- 5 year warranty on standard products
- ISO9001/2015 certified



Quality and Support

The outstanding quality of Ophir RF amplifiers translates into superior performance and reliability in the toughest environments. The commitment to quality is proven by a 5 year warranty* and a staff of engineers ready to support customers from the factory or customer's location when needed. Final test data is included with every unit. Special data requirements can be supported when necessary.

*Excluding TWT amplifiers and modules

Technologies

Ophir's designs are based on the latest device technologies. We were one of the first RF power amplifier companies to employ GaN (Gallium Nitride) technology in high power RF amplifier designs. Ophir RF has a vast database of GaN applications in power systems.



Ophir RF is ISO 9001/2015
registered with TÜVRheinland.



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EMC/TEST & MEASUREMENT



Image courtesy of ETS-Lindgren

APPLICATIONS:

- RFI/EMI/EMC testing
- Test and measurement
- Antenna sources
- TWT replacement
- Semiconductor testing

Electromagnetic compatibility (EMC) RF/Microwave Amplifiers are used to generate an electrical field for the purposes of testing an Equipment Under Test (EUT's) ability to withstand Electromagnetic Interference.

To assure the reproducibility of the immunity test, the various standards will prescribe the homogeneity of the field generated. The immunity test system including the anechoic chamber must guarantee a homogeneous field within a specified distance from the transmitting antenna. Since 1992 Ophir RF has been designing and manufacturing high powered RF amplifiers for use in the EMC and Automated Test System markets.

All Ophir RF units go through extensive testing, qualification and burn-in prior to shipment. Ophir RF backs all standard products with an industry leading five year warranty.

SYSTEM FEATURES:

- Wide frequency band
- High P1dB
- Low distortion and noise figure
- Small and lightweight
- Standard 19" rack mount
- Built-in power supply
- Built-in air cooling

System	Frequency (MHz)	PSAT (W)	P1dB (W)	Gain (Min) (dB)	Gain Flatness (dB)	Height (RU)
5117	0.01-100	10000	7000	72	± 4.0	26
5087	0.01-200	250	175	55	± 2.5	5
5088	0.01-200	600	250	59	± 2.5	5
5089	0.01-200	1000	500	61	± 3.5	15
5115	0.01-200	2500	2000	64	± 3.0	26
5116	0.01-225	5000	3400	67	± 4.0	26
5084	0.01-230	25	15	44	± 1.5	3
5085	0.01-250	100	60	50	± 2.5	5
7034	0.01-400	400	250	56	± 2.0	8
5042	0.1-400	120	100	51	± 2.5	3
5046	0.15-200	20	12	44	± 2.0	3
5064	1-1000	50	30	48	± 2.0	3
5062	1-1000	100	70	50	± 2.5	5
5124	20-1000	20	10	44	± 1.5	3
5125	20-1000	70	40	49	± 2.5	3
5126	20-1000	120	70	52	± 2.0	5
5127	20-1000	200	120	57	± 3.0	5
5067	20-1000	500	250	58	± 2.0	15
4121	30-200	1000	750	61	± 2.5	8
4120	30-200	4000	3000	65	± 2.5	26

AMPLIFIER SYSTEMS TO 1000 MHZ



ELECTRICAL CHARACTERISTICS:

Input/Output Impedance:	50 Ohms
DC Input (modules):	+13V or +28 V nominal
RF input overdrive:	+10 dB over 1 dB compression
RF input signal format:	CW/AM/FM/PM/Pulse*
Noise figure:	10 dB max
Harmonics:	-20dBc typical at P-1dB
Spurious signals:	< -60 dBc
VSWR:	2:1
AC Input (systems):	100 – 240 VAC, single phase, 50/60Hz. 180- 264 VAC for systems 500W and up
Input/Output connectors:	N-type for systems and SMA for modules
Cooling (systems):	Internal air-cooled (can be customized for water cooling)

* Consult factory with pulse characteristics

FRONT PANEL CONTROLLER (SYSTEM E OPTION)

ENVIRONMENTAL CHARACTERISTICS:

Communication: IEEE-488 GPIB, RS-232, Ethernet
Standby
Gain setting with 25dB dynamic range
Forward and reflected power readings
VSWR fault and VSWR alarm
Temp fault (set to activate fault at +85°C base plate)
Automatic leveling control

Operating temperature:	0 °C to +50 °C
Storage temperature:	-40 °C to +85 °C
Humidity:	95% non-condensing
Altitude:	Up to 10,000 feet
Shock and vibration:	Normal truck transport

CIRCUIT PROTECTION:

Thermal overload
Over current
Over voltage
Output VSWR protection (included with system "E" option)

EMC/TEST & MEASUREMENT



Image courtesy of ETS-Lindgren

There are a variety of field strength requirements depending on the type of testing being done (61000-4-3, DO-160, MIL-STD 461 and others) and the distance the EUT is from the antenna.

A high power amplifier purchase is more than a simple purchase order, it is a relationship with a company that will last for decades during the life of the amplifier.

Ophir RF has been building high power RF/Microwave Amplifiers for over 25 years, and this relationship is taken seriously. Whether it is our award winning customer service, or our dedicated engineering design staff, your amplifier will be supported for many years to come.

APPLICATIONS:

- RFI/EMI/EMC testing
- Test and measurement
- Antenna sources
- TWT replacement
- Semiconductor testing

SYSTEM FEATURES:

- Wide frequency band
- High P1dB
- Low distortion and noise figure
- Small and lightweight
- Standard 19" rack mount
- Built-in power supply
- Built-in air cooling

System	Frequency (MHz)	PSAT (W)	P1dB (W)	Gain (Min) (dB)	Gain Flatness (dB)	Height (RU)
5225	80-1000	200	120	54	±2.0	3
5226	80-1000	300	200	56	±2.5	5
5227	80-1000	750	500	58	±3.0	5
5228	80-1000	1000	700	68	±4.0	14
5229	80-1000	2000	1750	71	±4.0	35
5230	80-1000	4400	3400	67	±5.0	35
5232	140-1000	5000	-	67	±4.0	41
5016A	800-2000	25	20	44	±1.5	3
5022A	800-2000	50	35	48	±1.5	3
5038A	800-2000	120	80	52	±2.0	5
5063A	800-2000	200	150	54	±2.0	5
5135A	800-2000	300	150	56	±2.0	3
5136A	800-2000	500	300	58	±3.5	5
5257	1000-2500	500	250	57	±3.0	5
5258	1000-2500	1000	900	60	±3.0	8
5259	1000-2500	2000	1250	64	±3.0	16

AMPLIFIER SYSTEMS TO 2500 MHZ



ELECTRICAL CHARACTERISTICS:

Input/Output Impedance:	50 Ohms
DC Input (modules):	+13V or +28 V nominal
RF input overdrive:	+10 dB over 1 dB compression
RF input signal format:	CW/AM/FM/PM/Pulse*
Noise figure:	10 dB max
Harmonics:	-20dBc typical at P-1dB
Spurious signals:	< -60 dBc
VSWR:	2:1
AC Input (systems):	100 – 240 VAC, single phase, 50/60Hz. 180- 264 VAC for systems 500W and up
Input/Output connectors:	N-type for systems and SMA for modules
Cooling (systems):	Internal air-cooled (can be customized for water cooling)

* Consult factory with pulse characteristics

FRONT PANEL CONTROLLER (SYSTEM E OPTION)

ENVIRONMENTAL CHARACTERISTICS:

Communication: IEEE-488 GPIB, RS-232, Ethernet
Standby
Gain setting with 25dB dynamic range
Forward and reflected power readings
VSWR fault and VSWR alarm
Temp fault (set to activate fault at +85°C base plate)
Automatic leveling control

Operating temperature:	0 °C to +50 °C
Storage temperature:	-40 °C to +85 °C
Humidity:	95% non-condensing
Altitude:	Up to 10,000 feet
Shock and vibration:	Normal truck transport

CIRCUIT PROTECTION:

Thermal overload
Over current
Over voltage
Output VSWR protection (included with system "E" option)

EMC/TEST & MEASUREMENT



Electromagnetic Compatibility (EMC) is the branch of electrical sciences which studies the unintentional generation, propagation and reception of electromagnetic energy with reference to the unwanted effects (Electromagnetic interference, or EMI) that such energy may induce. The goal of EMC is the correct operation, in the same electromagnetic environment, of different equipment which uses electromagnetic phenomena and the avoidance of any interference effects.

Our original charter was making high power RF Amplifiers designed for rugged military use. Our military designs have been certified to MIL-STD 810 and MIL-STD 461 and designed to handle whatever can be thrown at them. These same designs, now geared for the EMC industry, guarantees reliable and repeatable performance.

APPLICATIONS:

- RFI/EMI/EMC testing
- Test and measurement
- Antenna sources
- TWT replacement
- Semiconductor testing

SYSTEM FEATURES:

- Wide frequency band
- High P1dB
- Low distortion and noise figure
- Small and lightweight
- Standard 19" rack mount
- Built-in power supply
- Built-in air cooling

System	Frequency (MHz)	PSAT (W)	P1dB (W)	Gain (Min) (dB)	Gain Flatness (dB)	Height (RU)
5275	1000-3000	250	150	55	± 3.0	5
5278	1000-3200	1000	700	61	± 4.0	16
5161	700-4200	15	12	43	± 2.0	3
5263	700-4200	60	40	49	± 3.0	3
5265	700-4200	200	120	55	± 2.0	3
5266	700-4200	500	300	60	± 4.0	16
5267	700-4200	800	600	61	± 4.0	16
5268	700-4200	1000	800	61	± 4.0	23
5293	700-6000	50	30	47	± 3.0	3
5294	700-6000	100	60	51	± 4.0	5
5295	700-6000	200	120	54	± 4.0	5
5296	700-6000	300	200	55	± 4.0	11
5297	1000-6000	400	350	57	± 4.5	16
5182	2000-4000	30	24	46	± 1.5	3
5283	2000-4000	60	40	49	± 3.0	3
5285	2000-4000	200	150	54	± 3.0	5
5192	2000-6000	30	25	45	± 1.5	3
5193	2000-6000	50	40	50	± 3.0	3
5194	2000-6000	100	80	53	± 3.0	5
5195	2000-6000	200	150	55	± 4.5	8
4128	4000-8000	100	60	52	± 2.5	5
4129	4000-8000	200	120	55	± 2.5	5
4131	6000-12000	50	20	48	± 2.5	3
4136	6000-18000	50	15	48	± 2.5	3

AMPLIFIER SYSTEMS TO 18 GHZ



ELECTRICAL CHARACTERISTICS:

Input/Output Impedance:	50 Ohms
DC Input (modules):	+13V or +28 V nominal
RF input overdrive:	+10 dB over 1 dB compression
RF input signal format:	CW/AM/FM/PM/Pulse*
Noise figure:	10 dB max
Harmonics:	-20dBc typical at P-1dB
Spurious signals:	< -60 dBc
VSWR:	2:1
AC Input (systems):	100 – 240 VAC, single phase, 50/60Hz. 180- 264 VAC for systems 500W and up
Input/Output connectors:	N-type for systems and SMA for modules
Cooling (systems):	Internal air-cooled (can be customized for water cooling)

* Consult factory with pulse characteristics

FRONT PANEL CONTROLLER (SYSTEM E OPTION)

ENVIRONMENTAL CHARACTERISTICS:

Communication: IEEE-488 GPIB, RS-232, Ethernet
 Standby
 Gain setting with 25dB dynamic range
 Forward and reflected power readings
 VSWR fault and VSWR alarm
 Temp fault (set to activate fault at +85°C base plate)
 Automatic leveling control

Operating temperature:	0 °C to +50 °C
Storage temperature:	-40 °C to +85 °C
Humidity:	95% non-condensing
Altitude:	Up to 10,000 feet
Shock and vibration:	Normal truck transport

CIRCUIT PROTECTION:

Thermal overload
 Over current
 Over voltage
 Output VSWR protection (included with system "E" option)

EMC/TEST & MEASUREMENT



The Ophir RF TWT Amplifiers have been designed to operate at various output levels from 2.5 - 40.0 GHz. Internal power supplies are solid state DC-DC converter designs with fast loop response times so that output level variations are minimal.

Both cathode and collector power supplies and the heater supply are duty cycle regulated designs.

The cathode and collector power supplies have very low ripple, with attendant low phase noise in the TWT Amplifier. Output spurious signals are less than -50 dBc. Plug-in PC cards are accessible through the front panel. The PC card cover contains a legend for PC card location test points and controls.

The modular design provides convenient accessibility to all elements in the TWT amplifier. High voltage modules are encapsulated, plug-in assemblies.

There is no exposed high voltage.

Most modules are interchangeable between all TWT units regardless of frequency.

APPLICATIONS:

- High level electrical field testing
- EMC RF Immunity Testing
- General Laboratory Test and Measurement

SYSTEM FEATURES:

- Wide frequency band
- Standard 19" rack mount
- Solid state power supplies
- Built-in air cooling
- High frequency levels up to 40 GHz

System	Frequency (MHz)	Power (W)	Amplitude Variation	Gain (Min) (dB)	Gain Flatness (dB)	Height (RU)
6537	2500-7500	250	$\leq \pm 1^\circ$	54	± 4.0	7
6533	4000-18000	20	$\leq \pm 1^\circ$	43	± 4.0	2
6536	4000-8000	250	$\leq \pm 1^\circ$	54	± 4.0	7
6535	7500-18000	250	$\leq \pm 1^\circ$	54	± 4.0	7
6531	18000-26500	40	$\leq \pm 1^\circ$	46	± 4.0	5
6539	18000-26500	150	$\leq \pm 1^\circ$	52	± 4.0	7
6532	26500-40000	40	$\leq \pm 1^\circ$	46	± 4.0	5
6540	26500-40000	150	$\leq \pm 1^\circ$	52	± 4.0	5

TWT AMPLIFIERS



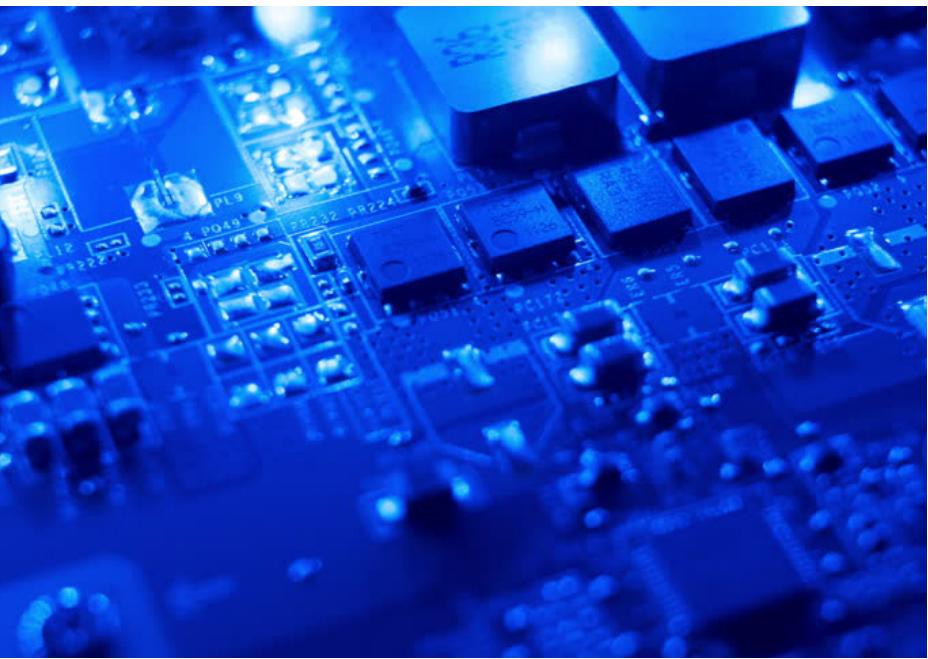
ELECTRICAL CHARACTERISTICS:

Duty Cycle:	CW
Phase Noise:	Less than +/- 1°
Amplitude Variation:	0.1 dB Maximum
RF Connectors:	N-type or Waveguide
Primary Power:	3Ø Phase, 208VAC +/- 10% 50/60 Hz

OPHIR RF TWT AMPLIFIER SALIENT FEATURES

- Low Spurious Outputs
- Phase and Amplitude Stability
- Complete TWT Protection
 - Helix Overcurrent
 - Cathode Over/Undervoltage
 - Collector Overvoltage
 - Filament Low Voltage
 - Over temperature
 - Input Energy Limit
 - Reverse Power Monitor
- Solid State Except for the TWT
- Front Panel Voltage Adjustments
- Front Panel Fault Isolation
- Modular Construction
- DC TWT Filaments
- Four Line Display
 - Operating Mode
 - Cathode Voltage
 - Collector Voltage(s)
 - Helix Current
 - Filament and Operating Time
- Front Panel Controls
 - Power On / Off
 - Operate
 - Standby
 - Fault Reset
 - Local / Remote

SPECIAL APPLICATIONS



Special Applications refers to any number of specialized RF/Microwave Testing applications. These may include, but are not limited to:

- Pin Diode Testing
- PIM Testing
- Heating Biological Material
- Filter Testing
- Resonant Cavity Testing
- Material Sciences
- Semi-Conductor Testing
- Antenna Testing
- Satellite Tracking
- And Many Others!

Model	Frequency (MHz)	PSAT (W)	P1dB (W)	Gain (dB)	Height (RU)
4109	2-30	2500	1500	66	8
4134	2-30	12000	10000	72	35
4135	2-30	20000	15000	75	35
4122	1000-3000	250	200	55	3
4119	1000-3000	1000	800	65	8
4115	1200-1400	1000	-	61	3
4123	1200-1600	1500	1000	60	8
4107	2400-2600	400	200	56	5
4130	2400-3900	600	400	14	15
4116	2700-3100	500	-	58	3
4108	2700-3200	300	150	56	5
4132	3100-3400	4000	-	67	5
4133	3100-3400	8000	-	69	8
4117	8000-8400	120	100	51	3
5387	0.01-400	10	6	41	1/4 rack
5390	20-1000	25	10	46	1/4 rack
5391	600-6000	10	6	45	1/4 rack
5392	6000-12000	25	-	43	1/4 rack
5395	6000-18000	12	-	43	1/4 rack



SALIENT CHARACTERISTICS:

Rugged construction
Super High Rel
VSWR Tolerant
5 Year Warranty



ELECTRONIC WARFARE



Image courtesy of China Lake NAWC

The purpose of Electronic Warfare (EW) is to deny the opponent the advantage of and ensure friendly forces unimpeded access to the EM spectrum. EW can be applied from air, sea, land, and space by manned and unmanned platforms, and can target communications, radar or other services. EW includes three major subdivisions: Electronic Attack (EA), Electronic Protection (EP), and Electronic Warfare Support (ES). Ophir RF has specialized in designing and manufacturing EW amplifiers since 2003. Ophir RF has a wide array of EW jamming modules, and has participated in numerous EW programs over the last several years including CREW, Symphony, and most recently Corporal and Intrepid Tiger II.

Each EW system has numerous design intricacies and has different design approaches. Listed on this page are several generic options for high power amplifiers for an EW system. All designs go through extensive qualification tests for environmental, mechanical, electromagnetic, and overall performance and reliability parameters.

Module	Frequency (MHz)	PSAT (W)	Gain (Min) (dB)	Gain Flatness (dB)
5304006-040	500-3000	10	41	±1.5
5304007-002	1800-6000	20	40	±2.0
5304039	2000-6000	30	47	±3.0
5304006	500-2500	50	46	±1.5
5304043-020	2000-6000	50	50	±3.0
5304028	700-2800	80	50	±2.5
5304042	3100-3600	100	51	±2.5
5304023	800-3000	100	51	±2.5
5304025	800-3000	200	55	±2.5
5304024	80-1000	200	53	±3.0
5304044	2700-3000	200	55	±1.0
5304045	100-500	300	250	±1.5
5304046	3000-6000	160	53	±4.0
5304047	20-100	50	47	±1.0
5304048	100-600	50	47	±1.0
5304049	600-6000	10	50	±2.5
5304050	6000-18000	10	40	±4.0
5304052	2000-8000	6	37	±2.5



SALIENT CHARACTERISTICS:

Operating Humidity

95% Non-condensing

Operating Altitude

Up to 50,000 ft Above Sea Level

(Per MIL-STD-810F Method 500.4)

Shock and Vibration

MIL-STD-810F (Method 516.5)

Input Overdrive

+10 dBm over P1dB

Load VSWR

∞ @ all load phase & amplitude for one minute duration

Thermal Overload

3:1 @ all load phase & amplitude continuous

95°C shutdown



RADAR



High power amplifiers are one of the most critical components in radar transmitters. Since 2003 Ophir RF has conducted extensive research and development for high power solid state amplifier subsystems targeted specifically for the radar market. As a result, cutting edge technologies developed by Ophir RF led to unparalleled amplifier performance and reliability. The latest solid state device technologies, such as GaN and LDMOS, are utilized to provide the highest power density and efficiency. In addition, Ophir RF has developed expertise in customized high performance power supplies, flexible software interface controls, and mechanical and thermal design capabilities for harsh environments. This combination enables Ophir RF to provide complete subsystem solutions for radar amplifiers and Transmit/Receive (T/R) modules.

Ophir RF has delivered power amplifier systems up to 20kW for radar transmitters. The amplifiers cover frequency bands from UHF to X-Band. The amplifiers used in land fixed, land mobile and shipborne environments pass stringent environmental and EMC testing. The reliability is proven by long term testing. Each unit also undergoes extensive burn-in prior to final test and inspection.

APPLICATIONS:

- Avionics
- TACAN
- IFF
- Air traffic control
- Surveillance
- TWT replacement
- Weather sensing
- Weapons locating
- Fire control
- SAR
- Over the horizon





ELECTRICAL CHARACTERISTICS:

Input/Output Impedance:	50 Ohms
AC Input:	Custom power supply with capacitor bank
RF input signal format:	Pulse
Pulse width	1 µs -10 ms
Duty cycle	up to 30%
Phase stability	-70dBc
Droop	< 0.5 dB
Spurious signals:	< -60 dBc
VSWR:	2:1
Output protection	Built-in isolator
Cooling (systems):	Air-cooled or water-cooled

OPTIONAL CUSTOM CONTROLLER:

Communication: IEEE-488 GPIB, RS-232, Ethernet or custom;
 Gain setting with 25dB dynamic range or custom;
 Forward and reflected power readings
 VSWR fault and VSWR alarm
 Temp fault
 Status report

ENVIRONMENTAL CHARACTERISTICS:

Operating temperature:	-40°C to +55°C
Storage temperature:	-40°C to +85°C
Humidity:	MIL-STD-810F
Altitude:	MIL-STD-810F (Method 500.4)
Shock and vibration:	MIL-STD-810F (Method 516.5)

dBm to WATTS TABLE

dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts
0.0	0.0010	8.6	0.0072	17.2	0.0525	25.8	0.3802	34.4	2.75	43.0	19.95
0.2	0.0010	8.8	0.0076	17.4	0.0550	26.0	0.3981	34.6	2.88	43.2	20.89
0.4	0.0011	9.0	0.0079	17.6	0.0575	26.2	0.4169	34.8	3.02	43.4	21.88
0.6	0.0011	9.2	0.0083	17.8	0.0603	26.4	0.4365	35.0	3.16	43.6	22.91
0.8	0.0012	9.4	0.0087	18.0	0.0631	26.6	0.4571	35.2	3.31	43.8	23.99
1.0	0.0013	9.6	0.0091	18.2	0.0661	26.8	0.4786	35.4	3.47	44.0	25.12
1.2	0.0013	9.8	0.0095	18.4	0.0692	27.0	0.5012	35.6	3.63	44.2	26.30
1.4	0.0014	10.0	0.0100	18.6	0.0724	27.2	0.5248	35.8	3.80	44.4	27.54
1.6	0.0014	10.2	0.0105	18.8	0.0759	27.4	0.5495	36.0	3.98	44.6	28.84
1.8	0.0015	10.4	0.0110	19.0	0.0794	27.6	0.5754	36.2	4.17	44.8	30.20
2.0	0.0016	10.6	0.0115	19.2	0.0832	27.8	0.6026	36.4	4.37	45.0	31.62
2.2	0.0017	10.8	0.0120	19.4	0.0871	28.0	0.6310	36.6	4.57	45.2	33.11
2.4	0.0017	11.0	0.0126	19.6	0.0912	28.2	0.6607	36.8	4.79	45.4	34.67
2.6	0.0018	11.2	0.0132	19.8	0.0955	28.4	0.6918	37.0	5.01	45.6	36.31
2.8	0.0019	11.4	0.0138	20.0	0.1000	28.6	0.7244	37.2	5.25	45.8	38.02
3.0	0.0020	11.6	0.0145	20.2	0.1047	28.8	0.7586	37.4	5.50	46.0	39.81
3.2	0.0021	11.8	0.0151	20.4	0.1096	29.0	0.7943	37.6	5.75	46.2	41.69
3.4	0.0022	12.0	0.0158	20.6	0.1148	29.2	0.8318	37.8	6.03	46.4	43.65
3.6	0.0023	12.2	0.0166	20.8	0.1202	29.4	0.8710	38.0	6.31	46.6	45.71
3.8	0.0024	12.4	0.0174	21.0	0.1259	29.6	0.9120	38.2	6.61	46.8	47.86
4.0	0.0025	12.6	0.0182	21.2	0.1318	29.8	0.9550	38.4	6.92	47.0	50.12
4.2	0.0026	12.8	0.0191	21.4	0.1380	30.0	1.0000	38.6	7.24	47.2	52.48
4.4	0.0028	13.0	0.0200	21.6	0.1445	30.2	1.05	38.8	7.59	47.4	54.95
4.6	0.0029	13.2	0.0209	21.8	0.1514	30.4	1.10	39.0	7.94	47.6	57.54
4.8	0.0030	13.4	0.0219	22.0	0.1585	30.6	1.15	39.2	8.32	47.8	60.26
5.0	0.0032	13.6	0.0229	22.2	0.1660	30.8	1.20	39.4	8.71	48.0	63.10
5.2	0.0033	13.8	0.0240	22.4	0.1738	31.0	1.26	39.6	9.12	48.2	66.07
5.4	0.0035	14.0	0.0251	22.6	0.1820	31.2	1.32	39.8	9.55	48.4	69.18
5.6	0.0036	14.2	0.0263	22.8	0.1905	31.4	1.38	40.0	10.00	48.6	72.44
5.8	0.0038	14.4	0.0275	23.0	0.1995	31.6	1.45	40.2	10.47	48.8	75.86
6.0	0.0040	14.6	0.0288	23.2	0.2089	31.8	1.51	40.4	10.96	49.0	79.43
6.2	0.0042	14.8	0.0302	23.4	0.2188	32.0	1.58	40.6	11.48	49.2	83.18
6.4	0.0044	15.0	0.0316	23.6	0.2291	32.2	1.66	40.8	12.02	49.4	87.10
6.6	0.0046	15.2	0.0331	23.8	0.2399	32.4	1.74	41.0	12.59	49.6	91.20
6.8	0.0048	15.4	0.0347	24.0	0.2512	32.6	1.82	41.2	13.18	49.8	95.50
7.0	0.0050	15.6	0.0363	24.2	0.2630	32.8	1.91	41.4	13.80	50.0	100.00
7.2	0.0052	15.8	0.0380	24.4	0.2754	33.0	2.00	41.6	14.45	50.2	104.71
7.4	0.0055	16.0	0.0398	24.6	0.2884	33.2	2.09	41.8	15.14	50.4	109.65
7.6	0.0058	16.2	0.0417	24.8	0.3020	33.4	2.19	42.0	15.85	50.6	114.82
7.8	0.0060	16.4	0.0437	25.0	0.3162	33.6	2.29	42.2	16.60	50.8	120.23
8.0	0.0063	16.6	0.0457	25.2	0.3311	33.8	2.40	42.4	17.38	51.0	125.89
8.2	0.0066	16.8	0.0479	25.4	0.3467	34.0	2.51	42.6	18.20	51.2	131.83
8.4	0.0069	17.0	0.0501	25.6	0.3631	34.2	2.63	42.8	19.05	51.4	138.04

dBm to WATTS TABLE

dBm	Watts
51.6	144.54
51.8	151.36
52.0	158.49
52.2	165.96
52.4	173.78
52.6	181.97
52.8	190.55
53.0	199.53
53.2	208.93
53.4	218.78
53.6	229.09
53.8	239.88
54.0	251.19
54.2	263.03
54.4	275.42
54.6	288.40
54.8	302.00
55.0	316.23
55.2	331.13
55.4	346.74
55.6	363.08
55.8	380.19
56.0	398.11
56.2	416.87
56.4	436.52
56.6	457.09
56.8	478.63
57.0	501.19
57.2	524.81
57.4	549.54
57.6	575.44
57.8	602.56
58.0	630.96
58.2	660.69
58.4	691.83
58.6	724.44
58.8	758.58
59.0	794.33
59.2	831.76
59.4	870.96
59.6	912.01
59.8	954.99
60.0	1000.00

dBm	Watts
60.2	1047.13
60.4	1096.5
60.6	1148.2
60.8	1202.3
61.0	1258.9
61.2	1318.3
61.4	1380.4
61.6	1445.4
61.8	1513.6
62.0	1584.9
62.2	1659.6
62.4	1737.8
62.6	1819.7
62.8	1905.5
63.0	1995.3
63.2	2089.3
63.4	2187.8
63.6	2290.9
63.8	2398.8
64.0	2511.9
64.2	2630.3
64.4	2754.2
64.6	2884.0
64.8	3020.0
65.0	3162.3
65.2	3311.3
65.4	3467.4
65.6	3630.8
65.8	3801.9
66.0	3981.1
66.2	4168.7
66.4	4365.2
66.6	4570.9
66.8	4786.3
67.0	5011.9
67.2	5248.1
67.4	5495.4
67.6	5754.4
67.8	6025.6
68.0	6309.6
68.2	6606.9
68.4	6918.3
68.6	7244.4

dBm	Watts
68.8	7585.8
69.0	7943.3
69.2	8317.6
69.4	8709.6
69.6	9120.1
70.0	10000.0
70.2	10471.3
70.4	10964.8
70.6	11481.5
70.8	12022.6
71.0	12589.3
71.2	13182.6
71.4	13803.8
71.6	14454.4
71.8	15135.6
72.0	15848.9
72.2	16595.9
72.4	17378.0
72.6	18197.0
72.8	19054.6
73.0	19952.6
73.2	20893.0
73.4	21877.6
73.6	22908.7
73.8	23988.3
74.0	25118.9
74.2	26302.7
74.4	27542.3
74.6	28840.3
74.8	30199.5
75.0	31622.8
75.2	33113.1
75.4	34673.7
75.6	36307.8
75.8	38018.9
76.0	39810.7
76.2	41686.9
76.4	43651.6
76.6	45708.8
76.8	47863.0
77.0	50118.7
77.2	52480.7

dBm	Watts
77.4	54954.1
77.6	57544.0
77.8	60256.0
78.0	63095.7
78.2	66069.3
78.4	69183.1
78.6	72443.6
78.8	75857.8
79.0	79432.8
79.2	83176.4
79.4	87096.4
79.6	91201.1
79.8	95499.3
80.0	100000.0
80.2	104712.9
80.4	109647.8
80.6	114815.4
80.8	120226.4
81.0	125892.5
81.2	131825.7
81.4	138038.4
81.6	144544.0
81.8	151356.1
82.0	158489.3
82.2	165958.7
82.4	173780.1
82.6	181970.1
82.8	190546.1
83.0	199526.2
83.2	208929.6
83.4	218776.2
83.6	229086.8
83.8	239883.3

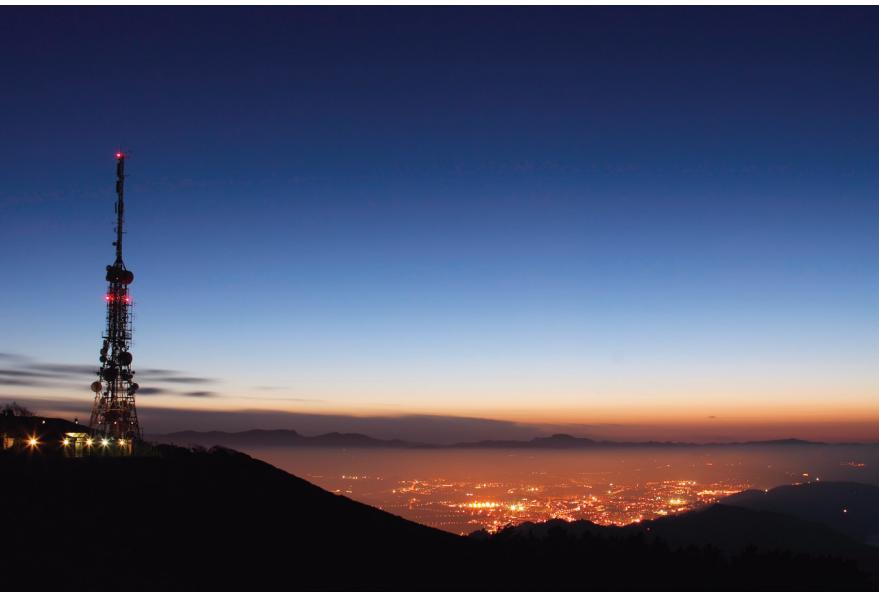
dBm	Watts
84.0	251188.6
84.2	263026.8
84.4	275422.9
84.6	288403.2
84.8	301995.2
85.0	316227.8
85.2	331131.1
85.4	346736.9
85.6	363078.1
86.0	398107.2
86.2	416869.4
86.4	436515.8
86.6	457088.2
86.8	478630.1
87.0	501187.2
87.2	524807.5
87.4	549540.9
87.6	575439.9
87.8	602559.6
88.0	630957.3
88.2	660693.4
88.4	691831.0
88.6	724436.0
88.8	758577.6
89.0	794328.2
89.2	831763.8
89.4	870963.6
89.6	912010.8
89.8	954992.6
90.0	1000000.0
90.2	1047128.5
90.4	1096478.2
90.6	1148153.6



www.ophirrf.com

TEL: 310-306-5556

COMMUNICATIONS



Ophir RF offers both broadband and band-specific amplifiers for various communication standards in commercial and military markets. Telecommunication amplifiers cover specific frequency bands up to 6 GHz, including 700 to 1000 MHz, 1.7 to 2.2 GHz, and 2.3 to 2.7 GHz. Military communication amplifiers cover frequency bands from 2 MHz to 2 GHz and beyond.

The amplifiers utilize the latest LDMOS, GaAs, and GaN power transistors. The linearity and efficiency are optimized for specific applications. The reliability is proven by long-term testing. Each unit also undergoes extensive burn-in prior to final test and inspection.

APPLICATIONS:

- SATCOM
- WIMAX
- GSM
- PCS
- LTE
- WCDMA
- SINCGARS
- JTRS
- Public safety
- 5G
- 802.11

SYSTEM FEATURES:

- Wide frequency band
- High IP3
- Low distortion and noise figure
- Small and lightweight
- Standard 19" rack mount
- Built-in power supply
- Built-in air cooling

Module	Frequency (MHz)	PSAT (W)	P1dB (W)	Gain (Min) (dB)	Gain Flatness (dB)	Height (RU)
4088	1-80	1000	600	61	±2.0	5
4035	2-30	100	60	50	±1.0	3
4041	2-30	300	200	56	±2.0	3
4042	2-30	500	300	57	±2.0	5
4043	2-30	1000	600	50	±2.0	5
4044	2-30	2000	1200	63	±2.0	15
4091	30-90	500	250	58	±1.5	5
4007	400-450	1000	600	62	±1.5	5
4072	700-800	100	60	51	±0.5	3
4015	800-1000	60	50	48	±1.0	3
4009	800-1000	200	100	54	±1.0	3
4010	800-1000	300	150	56	±1.0	5
4046-001	1100-1300	400	320	57	±1.5	5
4046-005	1200-1400	400	320	57	±1.5	5
4060	1850-2170	120	100	50	±1.0	5
4061	1850-2170	200	160	53	±1.0	5



ELECTRICAL CHARACTERISTICS:

Input/Output Impedance:	50 Ohms
AC Input (systems):	100 – 240 VAC, single phase, 50/60Hz. 180- 264 VAC for systems 500W and up
DC Input (modules):	+13V or +28 V nominal
RF input overdrive:	+10 dB over 1 dB compression
RF input signal format:	CW/AM/FM/PM/Pulse*
Noise figure:	10 dB max
Harmonics:	-20dBc typical at P-1dB
Spurious signals:	< -60 dBc
VSWR:	2:1
Input/Output connectors:	N-type for systems and SMA for modules
Cooling (systems):	Internal air-cooled (can be customized for water cooling)

* Consult factory with pulse characteristics

FRONT PANEL CONTROLLER (SYSTEM E OPTION)

Communication: IEEE-488 GPIB, RS-232, Ethernet
Standby
Gain setting with 25dB dynamic range
Forward and reflected power readings
VSWR fault and VSWR alarm
Temp fault (set to activate fault at +85°C base plate)
Automatic leveling control

ENVIRONMENTAL CHARACTERISTICS:

Operating temperature:	0 °C to +50 °C
Storage temperature:	-40 °C to +85 °C
Humidity:	95% non-condensing
Altitude:	Up to 10,000 feet
Shock and vibration:	Normal truck transport

CIRCUIT PROTECTION:

Thermal overload
Over current
Over voltage
Output VSWR protection (included with system "E" option)

MODULES

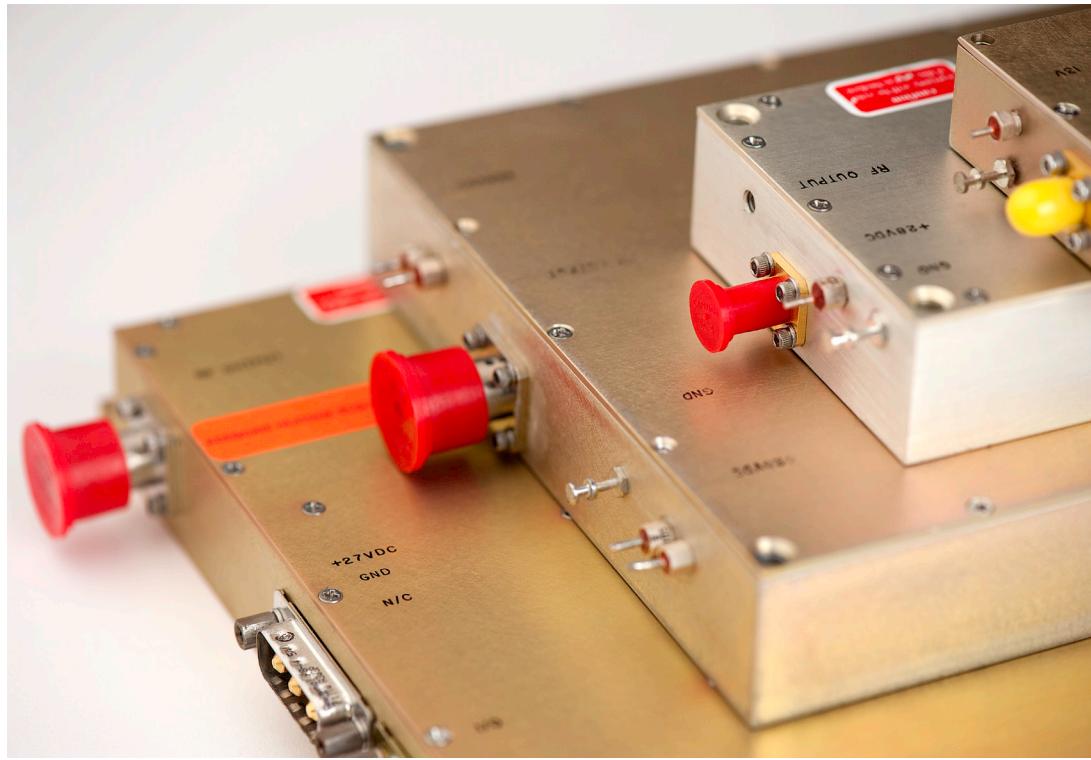


The building block of any high power RF/Microwave system is the amplifier module.

Ophir RF modules are extremely robust, operate over a wide temperature range, and exhibit best in class power densities.

Most RF amplifier modules are available as a standalone unit, or can be incorporated onto a factory selected heatsink.

Module	Frequency (MHz)	PSAT (W)	P1dB (W)	Gain (Min) (dB)	Gain Flatness (dB)	Nominal Voltage (V)
5303030	0.15-230	8	4	39	± 1.0	+28
5303055	0.15-230	25	15	43	± 1.5	+28
5303032	0.5-500	8	4	40	± 1.0	+28
5303060	1-1000	4	2	36	± 1.5	+28
5303039A-001	1-1000	50	30	50	± 2.0	+28
5300920	2-30	300	200	18	± 1.5	+36
5303006A	20-500	50	30	48	± 1.5	+28
5303148-100	20-500	100	60	48	± 1.0	+32
5300835	20-1000	4	2	40	± 2.0	+28
5303038	20-1000	25	10	46	± 1.5	+28
5303039D	20-1000	70	30	22	± 2.0	+28
5303107	20-1000	150	100	53	± 2.5	+50
5303133-001	80-1000	100	60	50	± 2.5	+28
5303058	500-1000	50	30	48	± 1.5	+28
5303084	500-3000	50	25	48	± 2.0	+36
5303129	700-4200	8	7	38	± 2.0	+13
5300690	700-4200	1.5	1.2	31	± 2.0	+13
5302022	800-1000	12	10	45	± 1.0	+28
5302063	800-1000	40	25	44	± 1.0	+28
5303012A	800-2000	12	10	41	± 1.5	+13
5303081	1000-2500	10	8	40	± 1.5	+28
5300828-003	1000-3000	75	60	49	± 2.5	+28
5302027	1800-2000	12	10	45	± 1.0	+13
5302030	1800-2000	40	35	45	± 1.0	+13
5302034	1800-2000	60	50	50	± 1.0	+13
5302029	1800-2000	80	60	51	± 1.0	+13
5302031	1800-2000	150	120	53	± 1.0	+13
5303023	2000-4000	4	3	36	± 1.0	+13
5800842-001	2000-6000	5	1.2	40	± 2.5	+28
5302015	2400-2500	10	8	41	± 1.0	+13
5302019	2400-2500	50	40	48	± 1.0	+13



APPLICATIONS:

- Test and Measurement
- Integral part of any High Power RF System
- Jamming
- Electronic Warfare
- Semi-Conductor Testing

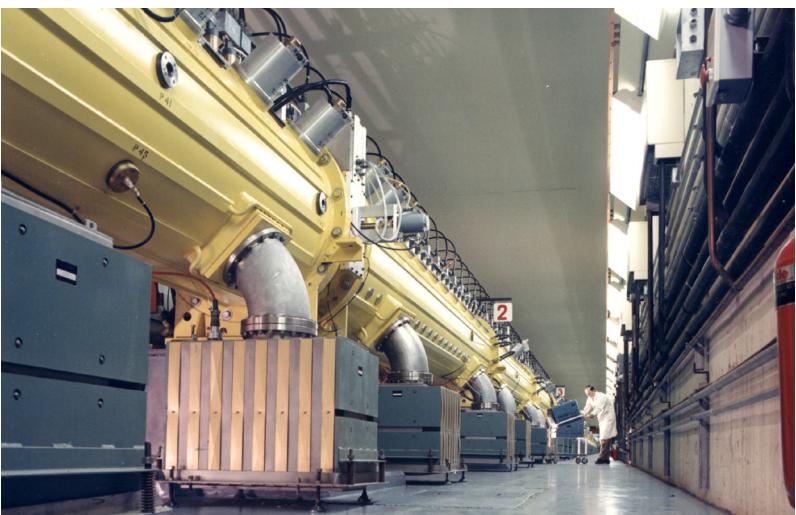
AVAILABLE FEATURES:

- Blanking/Gating
- Directional Coupler
- Heat Sink
- Fan(s)
- Power Supply
- Isolator/Circulator
- Various control features
 - Gain Control
 - Power monitoring
 - Temperature Monitoring
 - Current Monitoring
 - Many Others...Just Ask!

ELECTRICAL CHARACTERISTICS:

Input/Output Impedance:	50 Ohms
DC Input (modules):	Various
RF input overdrive:	+10 dB over 1 dB compression
RF input signal format:	CW/AM/FM/PM/Pulse*
Harmonics:	-20dBc typical at P-1dB
Spurious signals:	< -60 dBc
VSWR:	2:1
Input/Output connectors:	SMA standard. Higher power may use N-type.
Cooling (systems):	Adequate cooling needed to operate modules (Consult factory)

SCIENTIFIC/ACCELERATOR



A linear accelerator (LINAC) is a type of particle accelerator that accelerates charged ions to very high speeds by exposing them to a series of alternating electrical potentials (+/-) along a linear beamline.

RF Amplifiers in this application create electrical fields which accelerates the particles down the beamline.

Applications for LINACs include creation of X-Rays and electrons for medical applications and driving larger Accelerators for particle physics applications such as researching “Dark Matter.”

APPLICATIONS:

- Nuclear Magnetic Resonance
- Magnetic Resonance Imaging
- Electron Paramagnetic Resonance

SYSTEM FEATURES:

- Wide frequency band
- Fast RF rise/fall time
- Fast blanking/gating time
- High isolation
- Low distortion and noise figure
- Small and lightweight
- Standard 19" rack mount
- Built-in power supply
- Built-in air cooling

System	Frequency (MHz)	PSAT (W)	Pulse CW	Gain (Min) (dB)	Height (RU)
4204	162	2000	CW/Pulse	63	5
4205	162	4000	CW/Pulse	66	8
4206	162	10000	Pulse	70	16
4214	324	2000	CW/Pulse	63	5
4215	324	4000	CW/Pulse	66	8
4216	324	10000	Pulse	70	16
4219	324	100000	Pulse	80	64
4222	650	500	CW/Pulse	57	5
4226	650	10000	Pulse	70	16
4229	650	100000	Pulse	80	64
4233	1300	1000	CW/Pulse	60	5
4234	1300	2000	CW/Pulse	63	8
4235	1300	4000	Pulse	66	8
4242	2600	500	CW/Pulse	57	5
4243	2600	1000	CW/Pulse	60	8
4245	2600	4000	Pulse	66	8
4252	3900	500	CW/Pulse	57	16
4253	3900	1000	CW/Pulse	60	32
4254	3900	2000	Pulse	63	32



ELECTRICAL CHARACTERISTICS:

Input/Output Impedance:	50 Ohms
DC Input (modules):	+13V or +28 V nominal
RF input overdrive:	+10 dB over 1 dB compression
RF input signal format:	CW/AM/FM/PM/Pulse*
Noise figure:	10 dB max
Harmonics:	-20dBc typical at P-1dB
Spurious signals:	< -60 dBc
VSWR:	2:1
AC Input (systems):	100 – 240 VAC, single phase, 50/60Hz. 180- 264 VAC for systems 500W and up
Input/Output connectors:	N-type for systems and SMA for modules, gating connector varies by application
Cooling (systems):	Internal air-cooled (can be customized for water cooling)

* Consult factory with pulse characteristics

CIRCUIT PROTECTION:

Thermal overload
Over current
Over voltage

ENVIRONMENTAL CHARACTERISTICS:

Operating temperature:	0 °C to +50 °C
Storage temperature:	-40 °C to +85 °C
Humidity:	95% non-condensing
Altitude:	Up to 10,000 feet
Shock and vibration:	Normal truck transport

CUSTOM SOLUTIONS



Utilizing an extensive product line Ophir RF provides custom solutions for all applications. Ophir RF has the engineering capabilities to design a unique amplifier based on a customer's specific requirements incorporating the latest technology.

Ophir RF's front panel controller is a powerful tool. The controller's software can be modified to add more features. It can provide various monitoring capabilities, power reduction features, temperature compensation, fast pulse detection, antenna and channel selection, numerous analog and digital I/O's for multiple selections.

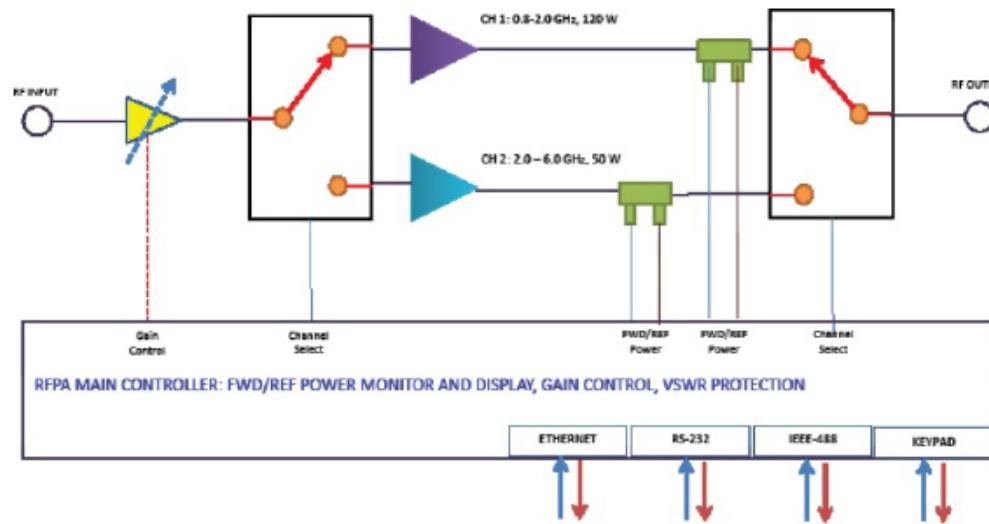
For more information on a custom solution please contact Ophir RF at info@ophirrf.com.

CUSTOM CAPABILITIES:

- Switched filter banks
- NEMA rated outdoor enclosures
- Various primary power options:
 - 480 VAC
 - 3φ Power
 - 400 Hz
 - DC Input
 - battery revert options
- Private labeling
- RF sample ports:
 - detected RF ports
 - forward or reflected ports
 - input power sample ports

CUSTOM FEATURES:

- Water cooling
- RS 485 communications
- RS 422 communications
- Transmit/receive switches
- Limiter/LNA
- Multi-channel RF amplifiers



INDEX

System	Frequency (MHz)	PSAT (W)	Page Number	System	Frequency (MHz)	PSAT (W)	Page Number
4204	162	2000	21	6010	20-1000	125	17
4205	162	4000	21	5124	20-1000	20	1
4206	162	10000	21	4091	30-90	500	17
4214	324	2000	21	4120	30-200	4000	1
4215	324	4000	21	4121	30-200	1000	1
4216	324	10000	21	5225	80-1000	200	3
4219	324	100000	21	5226	80-1000	300	3
4222	650	500	21	5227	80-1000	750	3
4226	650	10000	21	5228	80-1000	1000	3
4229	650	100000	21	5229	80-1000	2000	3
4233	1300	1000	21	5230	80-1000	4400	3
4234	1300	2000	21	6011	100-1000	250	17
4235	1300	4000	21	5232	140-1000	5000	3
4242	2600	500	21	6001	200-500	200	17
4243	2600	1000	21	6003	200-500	300	17
4245	2600	4000	21	6002	250-500	100	17
4252	3900	500	21	6004	300-500	600	17
4253	3900	1000	21	4007	400-450	1000	17
4254	3900	2000	21	5391	600-6000	10	9
5117	0.01-100	10000	1	6007	650-850	290	17
5087	0.01-200	250	1	6012	650-850	500	17
5088	0.01-200	600	1	5161	700-4200	15	5
5089	0.01-200	1000	1	5263	700-4200	60	5
5115	0.01-200	2500	1	5265	700-4200	200	5
5116	0.01-225	5000	1	5266	700-4200	500	5
5084	0.01-230	25	1	5267	700-4200	800	5
5085	0.01-250	100	1	5268	700-4200	1000	5
5387	0.01-400	10	9	5293	700-6000	50	5
7034	0.01-400	400	1	5294	700-6000	100	5
5042	0.1-400	120	1	5295	700-6000	200	5
5046	0.15-200	20	1	5296	700-6000	300	5
4088	1-80	1000	17	4072	700-800	100	17
5062	1-1000	100	1	6005	700-900	200	17
5064	1-1000	50	1	4009	800-1000	200	17
4109	2-30	2500	9	4010	800-1000	300	17
4134	2-30	12000	9	4015	800-1000	60	17
4135	2-30	20000	9	5016A	800-2000	25	3
4035	2-30	100	17	5022A	800-2000	50	3
4041	2-30	300	17	5038A	800-2000	120	3
4042	2-30	500	17	5063A	800-2000	200	3
4043	2-30	1000	17	5135A	800-2000	300	3
4044	2-30	2000	17	5136A	800-2000	500	3
5125	20-1000	70	1	5257	1000-2500	500	3
5126	20-1000	120	1	5258	1000-2500	1000	3
5127	20-1000	200	1	5259	1000-2500	2000	3
5390	20-1000	25	9	5275	1000-3000	250	5

INDEX

System	Frequency (MHz)	PSAT (W)	Page Number
4122	1000-3000	250	9
4119	1000-3000	1000	9
5278	1000-3200	1000	5
5297	1000-6000	400	5
6006	1020-1050	150	17
4046-001	1100-1300	400	17
4115	1200-1400	1000	9
4046-005	1200-1400	400	17
4123	1200-1600	1500	9
4060	1850-2170	120	17
4061	1850-2170	200	17
5182	2000-4000	30	5
5283	2000-4000	60	5
5285	2000-4000	200	5
5192	2000-6000	30	5
5193	2000-6000	50	5
5194	2000-6000	100	5
5195	2000-6000	200	5
4107	2400-2600	400	9
4130	2400-3900	600	9
6537	2500-7500	250	7
4116	2700-3100	500	9
4108	2700-3200	300	9
4132	3100-3400	4000	9
4133	3100-3400	8000	9
6533	4000-18000	20	7
4128	4000-8000	100	5
4129	4000-8000	200	5
6536	4000-8000	250	7
4131	6000-12000	50	5
5392	6000-12000	25	9
4136	6000-18000	50	5
5395	6000-18000	12	9
6535	7500-18000	250	7
4117	8000-8400	120	9
6531	18000-26500	40	7
6539	18000-26500	150	7
6532	26500-40000	40	7
6540	26500-40000	150	7

Module	Frequency (MHz)	PSAT (W)	Page Number
5303039A-001	1-1000	50	19
5300920	2-30	300	19
5304047	20-100	50	11
5303006A	20-500	50	19
5303148-100	20-500	100	19
5300835	20-1000	4	19
5303038	20-1000	25	19
5303107	20-1000	150	19
5303039D	20-1000	70	19
5304024	80-1000	200	11
5303133-001	80-1000	100	19
5304045	100-500	300	11
5304048	100-600	50	11
5303058	500-1000	50	19
5304006	500-2500	50	11
5304006-040	500-3000	10	11
5303084	500-3000	50	19
5304049	600-6000	10	11
5304028	700-2800	80	11
5300690	700-4200	1.5	19
5303129	700-4200	8	19
5302022	800-1000	12	19
5302063	800-1000	40	19
5303012A	800-2000	12	19
5304023	800-3000	100	11
5304025	800-3000	200	11
5303081	1000-2500	10	19
5300828-003	1000-3000	75	19
5302027	1800-2000	12	19
5302029	1800-2000	80	19
5302030	1800-2000	40	19
5302031	1800-2000	150	19
5302034	1800-2000	60	19
5304007-002	1800-6000	20	13
5303023	2000-4000	4	19
5304039	2000-6000	30	11
5304043-020	2000-6000	50	11
5800842-001	2000-6000	5	19
5304052	2000-8000	6	11
5302015	2400-2500	10	19
5302019	2400-2500	50	19
5304044	2700-3000	200	11
5304046	3000-6000	160	11
5304042	3100-3600	100	11
5304050	6000-18000	10	11

Module	Frequency (MHz)	PSAT (W)	Page Number
5303030	0.15-230	8	19
5303055	0.15-230	25	19
5303032	0.5-500	8	19
5303060	1-1000	4	19

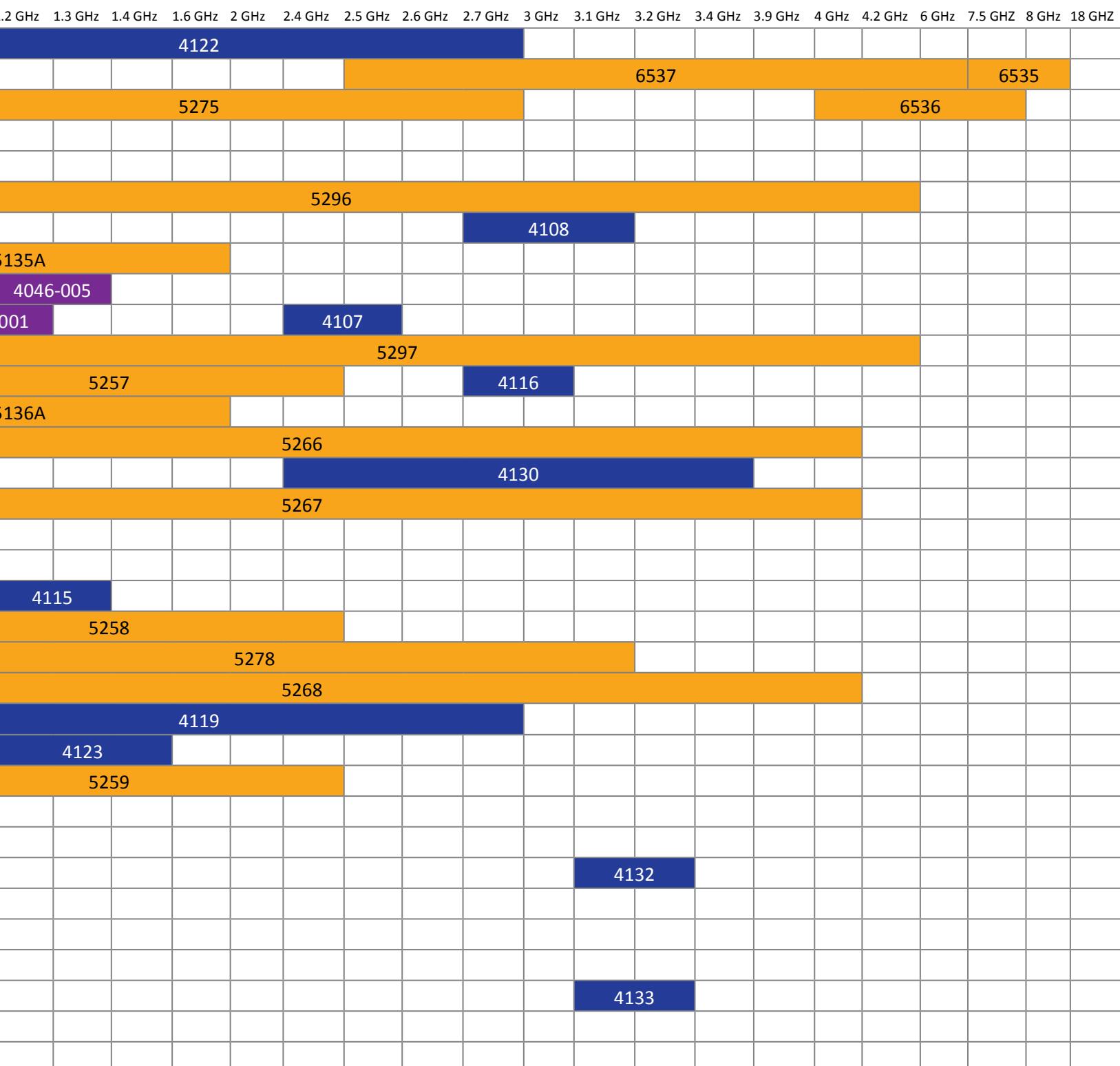
AMPLIFIER SELECTION GUIDE

	10 KHz	1 MHz	2 MHz	20 MHz	30 MHz	80 MHz	200 MHz	250 MHz	400 MHz	600 MHz	700 MHz	800 MHz	1 GHz
10 W					5387								
12 W													
15 W													
20 W		5046							5124				
25 W			5084										5016
28 W									5390				
30 W													
40 W													
50 W						5064							5022
60 W													
70 W							5125						4015
100 W		4035										4072	
			5085										
							5062						
120 W			5042					5126					5038
125 W													
130 W													
150 W													
200 W						5127				5225			5063
													4009

	1.85 GHz	2 GHz	2.17 GHz	3 GHz	4 GHz	4.2 GHz	6 GHz	8 GHz	8.4 GHz	12 GHz	18 GHz	26.5 GHz	40 GHz	
	5391													10 W
										5395				12 W
	5161													15 W
								6533						20 W
	5A									5392				25 W
														28 W
				5192										30 W
				5182										40 W
								4131						
	2A			5193				4136						50 W
				5293										
				5263										60 W
				5283										70 W
				5294										100 W
					5194									
		4060						4117						
														120 W
														125 W
														130 W
														150 W
				5195										
	3A			5285										
				5265										
				5295										
		4061												

AMPLIFIER SELECTION GUIDE

	10 KHz	1 MHz	2 MHz	20 MHz	30 MHz	80 MHz	90 MHz	100 MHz	140 MHz	200 MHz	225 MHz	300 MHz	400 MHz	450 MHz	700 MHz	800 MHz	1 GHz	1.1 GHz	1.2 GHz
250 W																			
290 W																			
300 W																			
400 W																			
500 W																			
600 W																			
750 W																			
800 W																			
1 KW																			
1.5 KW																			
2 KW																			
2.5 KW																			
4 KW																			
4.4 KW																			
5 KW																			
8 KW																			
12 KW																			
20 KW																			



NOTES



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