RF Solid State Amplifiers: The Most Innovative, Most Reliable, Highest Power RF Solid State Amplifiers Ever Created

www.arworld.us

# All The Power You Need...With Legendary Performance & Reliability

"A" Series: Up to 400 MHz/25 to 50,000 watts CW depending upon frequency range "W" Series: Up to 1,000 MHz/1 to 10,000 watts CW

Our "A" and "W" Series amplifiers have the power to deliver all the field strength you need. With unsurpassed mismatch capabilities and excellent flatness, they provide all the power promised over the entire operating band.

We subject our amplifiers to the harshest conditions just to make sure they give you reliable service and performance over the long haul. We test them under various output VSWR loads to stress them to the limit. The only problem we ran into was that there were no available loads to handle the enormous power, up to 80,000 watts, that our amplifiers deliver. Whereas this would stop most manufacturers, it presented another challenge to our talented designers, and we designed our own as shown in Figures 1 & 2. All our RF solid-state amplifiers have modulation capability that will faithfully reproduce AM, FM or Pulse Modulation appearing on the input signal for use in the most demanding EMC applications.

These technologically advanced amplifiers perform beyond the norm, beyond expectations, and way beyond the abilities of other test amplifiers.

These self-contained, broadband, completely solid-state amplifiers are designed for applications requiring the ultimate in output power over a wide instantaneous bandwidth with high gain. Extensive control and status reporting capabilities are available both locally and remotely. Most models feature air-cooled designs while some higher power units feature liquid cooled designs. The touch-screen panels are intuitive, convenient, and easy to use.



Figure 1 Mismatch Load Standards for 0.5 – 4.5 GHz



Figure 2 – Mismatch Standards for DC – 700 MHz

AR RF/Microwave makes the toughest EMC Compliance Class A amplifiers with the highest power densities and widest bandwidths. However, it is reliability that drives this 50-year-old brand; and customer service you can depend on.

> Randall Bloom CEO, W5 Engineering Portland Oregon

# AR Ultra High Power Amplifier Capabilities

AR's history of providing broadband, high power amplifiers has remained constant through the years. Applying the latest technology has enabled us to break new ground in very high power, solid state amplifier design.

#### Facility

We made an investment in 2016 to create a Large Amplifier Integration and Test Area. Not only did this open up floor space to support the building of multiple systems but it brought added HVAC capabilities for the amplifiers and primary AC power to properly conduct factory testing. Engineers now have the freedom to create designs to accommodate multiple configurations and optimize performance. The area also supports customer factory acceptance testing as required.

#### Air vs. Liquid Cooling

Liquid cooling of the amplifier's solid-state transistors has a number of advantages. First, it allows for precise temperature control of the devices. The number one factor determining the reliability of solid state devices is temperature. By carefully controlling the temperature, engineers can optimize the performance of the amplifier without sacrificing reliability.

Second, it reduces the size of the amplifier. Air-cooled amplifiers use large metal heat sinks over which air is forced to carry away heat. In a liquid-cooled amplifier, the transistors are mounted on cooling plates through which water flows. The plates are much smaller than heat sinks and because you don't have to accommodate air flow they can be built closer together.

Third, it reduces the heat load on the amplifier room and its resulting HVAC requirements. Since most of the heat generated is carried away by the cooling liquid, room HVAC requirements are reduced.

Fourth, it allows for fewer fans. This makes the amplifier audibly quieter. By reducing the noise, operators can work in a safer, more pleasant environment without fatigue.

Fifth, it gives customers the option of using existing cooling infrastructure to save costs. Liquid cooling options include an external chiller or the use of chilled water supplied by the customer's facility. By utilizing existing infrastructure, operating costs can be reduced.

Visit http://bit.ly/CoolAR for more information on AR's Liquid Cooling capabilities.

### Informative Touch Panel

AR's high power amplifiers incorporate our latest Touch Panel amplifier control system<sup>\*</sup>. This new system makes it easier to monitor and control important amplifier functions. On the right are some example screen shots unique to one of AR's newest ultra high power amplifiers. See page 45 for more details on AR's intuitive touch panel capabilities.





### "A" and "W" Series Amplifiers Provide A Wide Range Of Features & Benefits

- Highest Output Power In Its Class Enough Margin To Obtain The Necessary Field Strength You Require
- Unsurpassed Service, Support & Warranty Reduce Downtime To Save Money And Provide Your Customers
  With Testing Continuity
- Durability & Longevity Provides Lower Life Cycle Costs
- Best Efficiency In Its Class Reduces Operating Costs and Helps The Environment
- Great Mismatch Capability Gives You The Power You Need For Driving Poor Loads, Allowing You To Select Lower Power Amplifiers And Saving You Money
- Multiple Control Interfaces That Some Of Our Competitors Lack More Value For Your Money
- Unsurpassed Harmonic Rejection Provides More Accurate Measurements
- Lower Acoustical Noise Enhances The Work Environment
- Compact, Lightweight, Modular Designs Ability To Fit In Small Areas/Chambers And Easily Transportable
- Intuitive Operation Saves You Time And Money

#### 10000W1000A 10000 Watts CW, 80 MHz - 1000 MHz



### Liquid Cooling For Large High-Power RF Amplifiers

Temperature is a major factor in determining the reliability of solid state devices used in high-power RF amplifiers. Reducing the temperature that the semiconductor devices see can greatly improve both reliability and performance.

Liquid cooling not only allows for lower overall temperatures, but also offers a number of other important advantages:

• Liquid cooling reduces the size of the amplifier

Air-cooled amplifiers use large metal heat sinks over which air is forced to carry away heat. In a liquid-cooled amplifier, the transistors are mounted on cooling plates through which water flows. The plates are much smaller than heat sinks and because you don't have to accommodate airflow, they can be built closer together.

- Liquid Cooling Reduces The Heat Load On The Amplifier Room Since most of the heat generated is carried away by the cooling liquid, HVAC requirements are reduced, which results in more comfortable surroundings and reduced utility bills.
- Liquid Cooling Allows For Fewer Fans This makes the amplifier significantly quieter. By reducing the noise, operators can work in a safer, more pleasant environment without fatigue.
- Liquid Cooling Provides The Option Of Using Your Existing Cooling Infrastructure

Liquid cooling options include an external chiller or the use of chilled water supplied by the customer's facility. By utilizing one's existing infrastructure, operating costs can be greatly reduced.

Like everything we do at AR, liquid cooling has been carefully considered, tested and researched before being chosen as the preferred method for controlling temperatures in large high-power amplifiers. We utilize proprietary techniques to implement the most reliable and robust mechanical designs possible.

# CoolAR Chillers

AR, the world leader in supplying high power, broadband amplifiers, can now supply chillers for any of its standard liquid-to-liquid cooled amplifiers such as the models 12500A225A-L and 20000A225A-L. This capability ensures amplifier performance in any operating condition, reduces the risk of inappropriately sized equipment, and eases the procurement process by working with only one vendor. Each chiller is sized for the amplifier model, taking into consideration the user's operating requirements and environment. We can also supply chillers for custom amplifiers designed to user specifications and provide a true turnkey solution.

The chillers are provisioned to handle the unique requirements of test amplifiers and to interface with the amplifier controller for monitoring of faults. Consultation for proper sizing and installation and training are included. Service is provided through a wellestablished, worldwide network of support distributors with over 40 years of experience. 000

# **RF** Solid State Amplifiers 10 Hz to 1 MHz

# 4 kHz to 400 MHz 10 kHz to 3 MHz

#### 350AH1A

#### 100A400AM20

#### 800A3B



#### 350 watts CW, 10 Hz - 1 MHz

Operation	Class AB Linear
<b>Power Output</b> (1.79 Ohm load)	
CW, min.	350 watts, 10 Hz - 300 kHz
	350 - 55 watts, 300 kHz - 1 MHz
Voltage Output, min.	25 Vrms, 10 Hz - 300 kHz
	25 - 10 Vrms, 300 kHz - 1 MHz
Current Output, min.	14 Arms, 10 Hz - 300 kHz
	14 - 5.5 Arms, 300 kHz - 1 MHz
Flatness	±1.0 dB, 10 Hz - 300 kHz
	±4.0 dB, 300 kHz - 1 MHz
Frequency Response	10 Hz - 1 MHz instantaneously
Input Signal	0 - 2 Vrms
Gain (Power)	47 dB min., 10 Hz - 300 kHz
	39 dB min., 300 kHz - 1 MHz
Power Gain Control Range	48 dB min.
Input Impedance	600 ohms typ.
Output Impedance	$< 1\Omega$ typ.
Mismatch Tolerance	100% of rated power without fail
Modulation Capability	
Will faithfully reproduce AM,	FM, or pulse modulation
appearing on the input signal	
Primary Power	90 - 260 VAC
47 - 63	Hz, single phase, 1200 watts max.
Connectors	
RF Input	Type BNC female on front panel
RF Output	5-way binding posts on front panel
Remote Control	
IEEE-488	24 pin female
RS-232	9 pin subminiature D female
USB Eth ann at	I ype B female
	NJ-40
Safety Interlock	15 pin subminiature D
Cooling	Forced air (self contained fans)
Weight	25 kg (55 lb)
Size (WxHxD)	705 140
50.5 x 19.9 x 37.6 cm / 19.8 x	x (.85 x 14.8 in





#### 100 watts CW, 4 kHz-400 MHz

#### Rated Output Power Into 50Q:

4 kHz-100 kHz: 10 v	watts min. rising to 100 watts min. at 100 kHz
100 kHz-400 MHz:	125 watts, typ.; 100 watts min.
Input For Rated Outp	ut 1.0 milliwatt max.
Power Output @ 3dB	Compression Into $50\Omega$ :
4 kHz-100 kHz: 10 v	vatts min. rising to 100 watts min. at 100 kHz
100 kHz-400 MHz:	125 watts typ.; 100 watts min.
Power Output @ 1dB	Compression Into 50Ω:
4 kHz-100 kHz: 10 v	vatts min. rising to 75 watts at 100 kHz
100 kHz-400 MHz: 8	35 watts typ.; 75 watts min.
Flatness ±1.0	) dB typ. / ±1.5 dB max, 100 kHz-400 MHz
Frequency Response	4 kHz-400 MHz instantaneously
Gain (at max. setting)	
50 dB min., 100 kHz	-400 MHz; <50 dB below 100 kHz
Gain Adjustment (con	tinuous range) 20 dB min.
Input Impedance	50 ohms, VSWR 2.0:1 max.
Output Impedance	50 ohms, nominal
Mismatch Tolerance*	··1 · ( 111 1 W7·11 · · · 1 ·
100% of rated power	without foldback. Will operate without
and load impedance	i with any magnitude and phase of source
Harmonic Distortion	
Minus 20 dBc max.	at 75 watts.
Minus 30 dBc typica	l at 50 watts (.01 - 400MHz)
Spurious	Minus 73 dBc typ.
Third Order Intercept	Point 55 dBm typ.
Noise Figure	8 dB typ.
Primary Power	
100 - 240 VAC, 50 /	60 Hz, 500 watts
Connectors	
RF Input	I ype N female
RF Output	I ype in female
IEEE 488	24 pip fomala
RS-737	9 pin Subminiature D female
Fiber ontic	ST Conn Tx and Rx RS-232
USB 2.0	Type B
Ethernet	RI-45
Safety Interlock	15 Pin Subminiature D
Cooling	Forced air (self contained fans)
Weight	With cabinet: 18.5 kg (41 lb)
	Without cabinet: 10.4 kg (23 lb)
Size (WxHxD)	
With cabinet	$50.5 \times 155 \times 551 \text{ cm} / 198 \times 61 \times 717 \text{ in}$

Without cabinet 48.3 x 13.2 x 55.1 cm / 19.8 x 5.2 x 21.7 in Export classification



EAR99



#### 800 watts CW, 10 kHz-3 MHz

Rated Output Power	800 watts
Input For Rated Output	1.0 milliwatt max.
Power Output @ 3dB compress	sion
Nominal 800 watts	Min. 800 watts, 10 kHz - 2 MHz Min. 700 watts, 2 - 3 MHz
Power Output @ 1dB compress Nominal 500 watts / Min. 40	<b>sion</b> 0 watts
Flatness	± 1.0 dB max.
Frequency Response	10 kHz - 3 MHz instantaneously
Gain (at max. setting)	60 dB min.
Gain Adjustment (continuous ra	ange) 23 dB min.
Input Impedance	50 ohms, nominal
Output Impedance (switch select 12.5, 25, 50, 100, 150, 200, 4 (10 kHz - 3 MHz) on front p	rt; manual) 00 ohms nominal anel
Mismatch Tolerance* Will operate without damage and phase of source and load without foldback up to 6.0:1 to 400 watts reflected power.	or oscillation with any magnitude impedance. 100% of rated power mismatch above which may limit
Harmonic Distortion Minus 20 dBc max. at 400 w	atts power output
Connectors RF Input RF Output Remote Control IEEE-488/RS-232, USB a an external impedance tr	Type N female on front panel Type N female on front panel bility to remote control and power ansformer.
<b>RF Power Display</b> 0 - 1000 watts full scale. Dire separate display of forward ar	ectional power monitor allows nd reflected power.
Cooling	Forced air (self contained fans)
Primary Power 190 - 240 VAC 50 - 60 Hz, 2500 watts max.	
Weight (max.)	36.4 kg (80 lb)
Size (WxHxD) 50.3 x 34 x 55.1 cm / 19.8 x	13.4 x 21.7 in
For external impedance transfor sheet for IT2000 Series impedan	mer options, see specification ce transformers.



# 10 kHz to 100 MHz 10 kHz to 225 MHz

#### 150A100D



#### 150 watts CW, 10 kHz-100 MHz 180 watts typ., 150 watts min. Rated Output Power Input For Rated Output 1.0 milliwatt max. Power Output @ 3dB compression Typical: 165 watts / Min. 140 watts

Power Output @ 1dB compress	ion
Typical: 135 watts / Min. 110	watts
Flatness	$\pm 1.0$ dB typ., $\pm 1.5$ dB max.
Frequency Response	0 kHz - 100 MHz instantaneously
Gain (at max. setting)	51.8 dB min.
Gain Adjustment (continuous ra	inge) 20 dB min.
Input Impedance	50 ohms, VSWR 2.0:1 max.
Output Impedance	50 ohms nominal.
Mismatch Tolerance* 100% of rated power without damage or oscillation with an and load impedance.	foldback. Will operate without y magnitude and phase of source
Noise Figure	9 dB typ.
Harmonic Distortion Minus 20 dBc max. at 100 wa Minus 30 dBc typ. at 70 watt	atts S
Third Order Intercept Point	55 dBm typ.
Spurious	Minus 73 dBc typ.
Primary Power 100 - 240 VAC 50/60Hz 500 watts	
RE Input	Type N female
RF Output	Type N female
Remote Interfaces IEEE-488 RS-232 Fiber optic USB 2.0	24-pin female 9-pin subminiature D (female) ST Conn Tx and Rx RS-232 Type B
Safety Interlock	15-pin subminiature D
Cooling	Forced air (self contained fans)
Weight	18.5 kg (41 lb)
Size (WxHxD)	1015 mg (11 10)
50.3 x 15.5 x 55.1 cm / 19.8 x	x 6.1 x 21.7 in



1200A225

Rated Output Power	
Typ.: 1300 watts, min. 1200 watts,	.01 - 100MHz
Typ.: 1200 watts, min. 1100 watts,	, 100 - 225MHz
Input For Rated Output	1.0 milliwatt max.
Power Output @ 3dB compression	
Typ.: 1300 watts, min. 1200 watts	.01 - 100MHz
Typ.: 1200 watts, min. 1100 watts.	100 - 225MHz
Power Output @ 1dB compression	
Typ.: 1250 watts, min. 1100 watts,	.01 - 100MHz
Typ.: 1050 watts, min. 800 watts,	100 - 225MHz
Flatness	$\pm 2.0$ dB typ., $\pm 2.5$ dB max.
Frequency Response 10kH	Hz - 225 MHz instantaneously
Gain (at max, setting)	61.8 dB min.
Gain Adjustment (continuous range)	20 dB
Input Impedance	50 ohms VSWR 1 5.1 max
Output Impedance	50 ohms nominal
Mismatch Tolerance	50 onins noniniai
100% of rated power without fold	back up to 6 0.1 mismatch
above which may limit to 600W n	eflected power.
Harmonic Distortion	
Minus 30 dBc typical minus 20 d	Bc maximum at 750 watts
Third Order Intercent Point	78 dBm typ
Primary Power	to ubin typ.
200 - 240 VAC single-phase	
50/60Hz	
4.6 kWatts	
Connectors	
RF Input	N female
RF Output:	7/16 DIN female
Remote Control	1710 211 (1011110
IEEE-488	24-pin female
RS-232 9	p-pin subminiature D (female)
Fiber optic	ST Conn Tx and Rx RS-232
USB 2.0	Type B
Ethernet	ŔI-45
Safety Interlock	15-pin subminiature D
Cooling	
Forced air (self contained fans wit	h internal self-contained
liquid cooling)	
iiquid cooling)	
Weight	139 kg (305 lb)
Weight Size (WxHxD)	139 kg (305 lb)

# 

2500A225A

#### 1,200 watts CW, 10 kHz-225 MHz 2,500 watts CW, 10 kHz-225 MHz

Rated Output Power	
Typ.: 2800 watts, min. 2500	watts, .01 - 100MHz
Typ.: 2300 watts, min. 2000	watts, 100 - 225MHz
Input For Rated Output	1.0 milliwatt max.
Power Output @ 3dB compres	ssion
Typ.: 2800 watts, min. 2500	watts, .01 - 100MHz
Typ.: 2300 watts, min. 2000	watts, 100 - 225MHz
Power Output @ 1dB compres	ssion
Typ.: 2400 watts, min. 2000	watts, .01 - 100MHz
Typ.: 1900 watts, min. 1500	watts, 100 - 225MHz
Flatness	$\pm 2.0$ dB typ., $\pm 2.5$ dB max.
Frequency Response	10kHz - 225 MHz instantaneously
Gain (at max. setting)	64 dB min.
Gain Adjustment (continuous	range) 20 dB
Input Impedance	50 ohms, VSWR 1.5:1 max.
Output Impedance	50 ohms nominal
Mismatch Tolerance	
100% of rated power withou	it foldback up to 6.0:1 mismatch.
above which may limit to 12	250W reflected power.
Harmonic Distortion	I
Minus 30 dBc typ., minus 2	0 dBc max. at 1750 watts
Third Order Intercept Point	74 dBm typ.
Spurious	Minus 70 dBc typ.
Primary Power (user must spec	vify):
200 - 240 VAC or 380 - 41	5 VAC 3-phase
50/60Hz	· · · · · · · · · · · · · · · · · · ·
9.5 kWatts	
Connectors	
RF Input:	N female
RF Output:	7/16 DIN female
Remote Control	
IEEE-488	24-pin female
RS-232	9-pin subminiature D (female)
Fiber optic	ST Conn Tx and Rx RS-232
USB 2.0	Type B
Ethernet	RJ-45
Safety Interlock	15-pin subminiature D
Cooling	.1. 1.16 . 1
Forced air (self contained fa	ans with internal self-contained
iiquid cooling)	1501 (250 11)
Weight	159 kg (350 lb)
NO 1187 11 133	

 $56.1 \times 115 \times 88.9 \text{ cm} / 22.1 \times 45.25 \times 35 \text{ in}$ 







### **RF** Solid State Amplifiers 10 kHz to 225 MHz

#### 5000A225A



#### 5,000 watts CW, 10 kHz-225 MHz

Rated Output Power Typ.: 5500 watts, min. 5000 watts, .01 - 100MHz Typ.: 4500 watts, min. 3500 watts, 100 - 225MHz Input For Rated Output 1.0 milliwatt max. Power Output @ 3dB compression Typ.: 5500 watts, min. 5000 watts, .01 - 100MHz Typ.: 4500 watts, min. 3500 watts, 100 - 225MHz Power Output @ 1dB compression Typ.: 5000 watts, min. 4000 watts, .01 - 100MHz Typ.: 4000 watts, min. 3000 watts, 100 - 225MHz  $\pm 2.0$  dB typ.,  $\pm 2.5$  dB max. Flatness Frequency Response 10kHz - 225 MHz instantaneously 67 dB min. Gain (at max. setting) Gain Adjustment (continuous range) 20 dB 50 ohms, VSWR 2.0:1 max. Input Impedance Output Impedance 50 ohms nominal Mismatch Tolerance 100% of rated power without foldback up to 6.0:1 mismatch, above which may limit to 2500W reflected power. Harmonic Distortion Minus 30 dBc typ., minus 20 dBc max. at 3000 watts 74 dBm typ. Third Order Intercept Point Minus 70 dBc typ. Spurious Primary Power (user must specify): 200 - 240 VAC or 380 - 415 VAC 3-phase 50/60Hz 20 kWatts Connectors **RF** Input: N female EIA 1-5/8 male, rear RF Output: Remote Control **IEEE-488** 24-pin female 9-pin subminiature D (female) RS-232 ST Conn Tx and Rx RS-232 Fiber optic USB 2.0 Type B Ethernet ŔJ-45 Safety Interlock 15-pin subminiature D Cooling Forced air (self contained fans with internal self-contained liquid cooling) 250 kg (550 lb) Weight Size (WxHxD) 56.1 x 173 x 88.9 cm / 22.1 x 68.15 x 35 in



#### 10000A225A-A



#### 10,000 watts CW, 10 kHz-225 MHz Rated Output Power

Nominal	11,000 watts
Minimum	10,000 watts, .01 - 100 MHz,
	6000 watts, 100 - 225 MHz
Input For Rated Output	1.0 milliwatt max.
Power Output for 1dB compre	ession
Nominal	8000 watts
Minimum	7000 watts, .01 - 100 MHz,
	4000 watts, 100 - 225 MHz
Flatness	±3.0 dB max.
	$\pm 1.0$ dB with internal leveling
Frequency Response	10 kHz - 225 MHz instantaneously
Gain (at max. setting)	70 dB min.
Gain Adjustment (continuous	range) 20 dB min.
Input Impedance	50 ohms. VSWR 2.0:1 max.
Output Impedance	50 ohms, nominal
Mismatch Tolerance	
100% rated power without	foldback up to 6.0:1 mismatch
above which may limit to 5	000 watts reflected power, from
10 kHz to 100 MHz. Limite	ed to 3000 watts reflected power
from 100 MHz to 225 MHz	L
Harmonic Distortion	Minus 20 dBc max, at 6000 watts
Third Order Intercept Point	77 dBm tvn.
RF Power Display	$0 \sim 15000$ watts full scale
RF Rise/Fall Time	150 paposeconds max
Primary Power (user must spe	cifu):
190 - 240 VAC Delta (4 w	ire)
380 - 480 VAC, Delta (4 w	ire)
47 - 63 Hz 3-phase	nc)
40.000 watts max. at .95 Pl	E tvp.
Connectors	
RF Input	Type N female on rear panel
RF Output	Type EIA 1-5/8 male on rear panel
Forward Sample	Type N female on front panel
	(coupling factor 80dB typ.)
Reverse Sample	Type N female on front panel
Ĩ	(coupling factor 80dB typ.)
Pulse Modulation Input	Type BNC female on rear panel
Safety Interlock	15 pin female Type D on rear panel
Remote Control	* ** *
IEEE-488	24-pin female on rear panel
RS-232	
	9-pin female Type D on rear panel
RS-232 (fiber optic):	9-pin female Type D on rear panel Type ST, rear panel
RS-232 (fiber optic): USB 2.0:	9-pin female Type D on rear panel Type ST, rear panel Type B female, rear panel

#### Cooling

Forced air (self contained fans with internal liquid cooling) Weight 500 kg (1100 lb Size (WxHxD)

112.1 x 82.4 x 165.3 cm / 44.12 x 32.43 x 65.1 in



#### 12500A225A-L



#### 12,500 watts CW, 10 kHz-225 MHz

Rated Output Power	
Nominal	12,500 watts
Minimum	10,000 watts, .01 - 100 MHz,
	6000 watts, 100 - 225 MHz
Input For Rated Output	1.0 milliwatt max.
Power Output for 1dB compre	ession
Nominal	11,000 watts
Minimum	10,000 watts, .01 - 100 MHz,
	5000 watts, 100 - 225 MHz
Flatness	±3.0 dB max.
	$\pm 1.0$ dB with internal leveling
Frequency Response	10 kHz - 225 MHz instantaneously
Gain (at max, setting)	71 dB min.
Gain Adjustment (continuous	range) 20 dB min.
Input Impedance	50 ohms, VSWR 2.0:1 max.
Output Impedance	50 obms nominal
Mismatch Tolerance	se onnis, nonintar
100% rated power without t	foldback up to 6 0:1 mismatch
above which may limit to 50	000 watts reflected power from
10 kHz to 100 MHz. Limite	d to 3000 watts reflected power
from 100 MHz to 225 MHz	a to seee water reneeted power
Harmonic Distortion	Minus 20 dBc max_at 8000 watts
Third Order Intercent Point	77 dBm tvp
RF Power Display	0 - 15 000 watts full scale
RE Rico/Fall Time	150 paposaconds max
Drimory Down (waar pourt apor	if i
100 240 VAC Dolto (4 mi	ro)
380 - 480 VAC Delta (4 wi	ire)
47 - 63 Hz 3-phase	iic)
45 000 watts max at 95 Pl	F typ
Connectors	i typ.
RE Input	Type N female on rear panel
RF Output	Type FIA 1.5/8 male on rear panel
Forward Sample	Type N female on front panel
r orward bample	(coupling factor 80dB typical)
Reverse Sample	Type N female on front panel
	(coupling factor 80dB typical)
Pulse Modulation Input	Type BNC female, rear panel
Safety Interlock	15 pin female Type D on rear panel
Remote Control	
IEEE-488	24 pin female on rear panel
RS-232	9-pin female Type D on rear panel
USB 2.0	Type B female, rear
Ethernet	RJ-45
Cooling	<b>,</b>
Liquid cooled via external c	hilled water supply
Weight (max.)	500 kg (1100 lb)
Size (WxHxD)	
112.1 x 82.4 x 165.3 cm / 4	4.12 x 32.43 x 65.1 in
Export classification	EAR99
14000	12500A225A-L
	PSat
12000	
10000	P1dB
ω	
Ë <sup>8000</sup>	
S 6000	



4000

2000

# 10 kHz to 250 MHz

#### 16000A225A-A

16,000 watts CW, 10 kHz-225 MHz

.



20,000 watts CW, 10 kHz-225 MHz

20000A225A-L

Rated Output Power	15.000	Rated Output Power
Nominal	16 000 watts 01 100 MHz	Nominal
Minimum	12.000 watts, 100 - 225 MHz	MIIIIIIIIII
Input For Rated Output	1.0 milliwatt max.	Input For Rated Output
Power Output for 1dB compression		Power Output for 1dB con
Nominal	15,000 watts	Nominal
Minimum	14,000 watts, .01 - 100 MHz,	Minimum
Flatness	$\pm 3.0 \text{ dB max}.$	
	±1.0 dB with internal leveling	Flatness
Frequency Response 10 kl	Hz - 225 MHz instantaneously	Enormon av Doonon oo
Gain (at max. setting)	(2.05 dB min.	Gain (at max setting)
Gain Adjustment (continuous range)	20 dB min.	Gain Adjustment (continu
Output Impedance	50 ohms, v 5 w K 2.0:1 max.	Input Impedance
Mismatch Tolorance*	50 onins, nominai	Output Impedance
100% rated power without foldba	ck up to 6.0:1 mismatch	Mismatch Tolerance*
above which may limit to 8000 wa	atts reflected power from	100% rated power with
10kHz - 100MHz. Limited to 700	0 watts reflected power from	above which may limit t
100MHz - 225MHz.	*	10kHz - 100MHz. Limit
Modulation Capability		Modulation Canability
Will faithfully reproduce AM, FM	or Pulse modulation	Will faithfully reproduce
appearing on the input signal.	aa 15 (a aaa	appearing on the input
Harmonic Distortion Minu	s 20 dBc max. at 10,000 watts	Harmonic Distortion
Third Order Intercept Point	77 dBm typ.	Third Order Intercept Poin
RF Power Display	0 - 20,000 watts full scale	RF Power Display
RF Kise/Fall Time	150 nanoseconds max.	RF Rise/Fall Time
190, 240 VAC Delta (4 wire)		Primary Power (user must
380 - 480 VAC, Delta (4 wire)		380 - 480 VAC, Delta (
47 - 63 Hz, 3-phase		47 - 63 Hz, 3-phase
75,000 watts max. at .95 P.F. typ.		85,000 watts max. at .95
Connectors		Connectors
RF Input	Type N female on rear panel	RF Input
RF Output Type	EIA 3-1/8 male on rear panel	Economic N f
Forward Sample N female, fro	nt (coupling factor 84dB typ.)	Reverse Sample N f
Reverse Sample N female, fro	nt (coupling factor 84dB typ.)	Pulse Modulation Input
Safety Interlock 15 pir	female Type D on rear panel	Safety Interlock
Remote Control	remare rype D on rear parter	Remote Control
IEEE-488:	24 pin female, rear	IEEE-488:
RS-232:	9 pin female D, rear	RS-232:
RS-232 (fiber optic):	Type ST, rear	KS-252 (nder optic):
USB 2.0:	Type B female, rear	Ethernet
Ethernet:	RJ-45	Cooling
Cooling	1 • . 11• • 1 1• .	Liquid cooled via extern
Forced air (self contained fans wit	in internal liquid cooling) $007 \ln (2200 \text{ lb})$	Weight
Size (WvHvD)	777 Kg (2200 lb)	Size (WxHxD)
$226.7 \times 99.1 \times 177.8 \text{ cm} / 89.75 \text{ v}$	39 x 70 in	226.7 x 99.1 x 177.8 cm
Export classification	EAR99	Export classification









25A250B

#### 25 watts CW. 10 kHz-250 MHz.

Rated Output Power	35 watts typ., 25 watts min.
Input For Rated Output	1.0 milliwatt max.
Power Output @ 3dB co Typ. 35 watts / Min. 25	mpression 5 watts
Power Output @ 1dB con Typ. 30 watts / Min. 20	mpression ) watts
Flatness	$\pm 1.0 \text{ dB typ.} / \pm 1.5 \text{ dB max.}$
Frequency Response	10 kHz - 250 MHz instantaneously
Gain (at max. setting)	44 dB min.
Gain Adjustment (contin	uous range) 20 dB min.
Input Impedance	50 ohms, VSWR 2.0:1 max.
Output Impedance	50 ohms, nominal
Mismatch Tolerance*	,
100% of rated power w damage or oscillation w and load impedance.	vithout foldback. Will operate without with any magnitude and phase of source
Modulation Capability Will faithfully reproduce	ce AM, FM, or pulse modulation
Harmonic Distortion	signal.
Minus 20 dBc max. at	20 watts
Minus 35 dBc typ. at 1	5 watts
Spurious	Minus 73 dBc typ.
Third Order Intercept Po	int 55 dBm typ.
Noise Figure	8 dB typ.
Primary Power 100 - 240 VAC 50 / 60 Hz, 200 watts	
Connectors	
RF Input	Type N female
RF Output	I ype N female
Remote Interfaces	24 min (
IEEE-400 RS.232	9 pin Subministure D female
Fiber optic	ST Conn Tx and Rx RS-232
USB 2.0	Type B
Ethernet	ŔJ-45
Safety Interlock	15 Pin Subminiature D
Cooling	Forced air (self contained fans)
Weight	
With cabinet	16.7 kg (37 lb)
Without cabinet	8.6 kg (19 lb)
Size (WxHxD)	2 15 5 55 1 (10.0) (1.21.7)
With cabinet 50	$1.3 \times 13.3 \times 55.1 \text{ cm} / 19.8 \times 6.1 \times 21.7 \text{ in}$
Fyport classification	ΓΔΡΟΟ
Export classification	LAIG
	25A250B



### **RF** Solid State Amplifiers 10 kHz to 250 MHz

#### 50A250



#### 50 watts CW. 10 kHz-250 MHz.

Rated Output Power		70 watts typ., 50 watts 1	min.
Input For Rated Output	ıt	1.0 milliwatt n	nax.
Power Output @ 3dB Typ. 70 watts / Min.	compression . 50 watts		
Power Output @ 1dB Typ. 55 watts / Min	compression . 40 watts		
Flatness		±1.0 dB typ. / ±1.5 dB n	nax.
Frequency Response	10 kH	Iz - 250 MHz instantaneo	ously
Gain (at max. setting)		47 dB 1	nin.
Gain Adjustment (con	tinuous range)	20 dB 1	nin.
Input Impedance		50 ohms, VSWR 2.0:1 n	nax.
Output Impedance		50 ohms, nom	inal
Mismatch Tolerance*			
100% of rated powe damage or oscillatio and load impedance	er without foldb n with any mag e.	back. Will operate withou gnitude and phase of sour	t ce
Harmonic Distortion Minus 20 dBc max. Minus 30 dBc typ. a	at 40 watts, at 30 watts		
Spurious		Minus 73 dBc	typ.
Third Order Intercept	Point	55 dBm	typ.
Noise Figure		8 dB	typ.
Primary Power			
100 - 240 VAC 50 / 60 Hz, 250 wat	ts		
Connectors		TuN	1
RF Output		Type N Ier Type N fer	nale
Remote Interfaces		i ype i viei	naic
IEEE-488		24 pin fer	nale
RS-232		9 pin Subminiature D fer	nale
Fiber optic		ST Conn Tx and Rx RS-	232
USB 2.0		Typ	pe B
Ethernet		R	J-45
Safety Interlock	_	15 Pin Subminiatur	e D
Cooling	Fc	orced air (self contained f	ans)
Weight		16.7.1 (25	7 11 \
With cabinet		10.7 kg (57 8.6 kg (10	(1b) (1b)
Size (WyHyD)		0.0 Kg (15	, 10)
With cabinet	50.3 x 15.5 x 4	55.1 cm / 19.8 x 6.1 x 21.	7 in
Without cabinet	48.3 x 13.2 x	55.1 cm / 19.8 x 5.2 x 21.	7 in
Export classification		EA	R99





125A250

#### 125 watts CW, 10 kHz-250 MHz

Rated Output Power	150 watts typ., 125 watts min.
Input For Rated Output	1.0 milliwatt max.
Power Output @ 3dB compre Typical: 145 watts / Min. 12	ssion 5 watts
Power Output @ 1dB compre Typical: 110 watts / Min. 90	ssion watts
Flatness	$\pm 1.0$ dB typ., $\pm 1.5$ dB max.
Frequency Response	10 kHz - 250 MHz instantaneously
Gain (at max. setting)	50 dB min.
Gain Adjustment (continuous	range) 20 dB min.
Input Impedance	50 ohms, VSWR 2.0:1 max.
Output Impedance	50 ohms nominal.
Mismatch Tolerance* 100% of rated power withou damage or oscillation with a and load impedance.	it foldback. Will operate without iny magnitude and phase of source
Noise Figure	8 dB typ.
Harmonic Distortion Minus 20 dBc max. at 90 w Minus 30 dBc typ. at 70 wa	atts tts
Third Order Intercept Point	55 dBm typ.
Spurious	Minus 73 dBc typ.
Primary Power 100 - 240 VAC 50/60Hz 500 watts	
Connectors	Tune N famale
RF Output	Type N female
Remote Interfaces	24-pin female
RS-232	9-pin subminiature D (female)
Fiber optic	ŜT Conn Tx and Rx RS-232
USB 2.0	Type B
Etnernet Safety Interlock	KJ-45 15-pin subminiature D
Cooling	Forced air (self contained fans)
Weight	18.5 kg (41 lb)
Size (WxHxD)	1000 mg (11 10)
50.3 x 15.5 x 55.1 cm / 19.8	8 x 6.1 x 21.7 in
Export classification	EAR99

500A250D



#### 500 watts CW, 10 kHz-250 MHz

Rated Output Power 600 watts typ., 500 watts min., .01 - 250 MHz Power Output @ 3dB compression 600 watts typ., 500 watts min., .01 - 200 MHz 550 watts typ., 475 watts min., 200 MHz - 250 MHz Power Output @ 1dB compression 525 watts typ., 400 watts min., .01 - 200 MHz 425 watts typ., 375 watts min., 200 MHz - 250 MHz  $\pm 1.5$  dB typ.,  $\pm 2.0$  dB max. Flatness Frequency Response 10 kHz - 250 MHz instantaneously Gain (at max. setting) 57 dB min. 20 dB min. Gain Adjustment (continuous range) Input Impedance 50 ohms, VSWR 2.0:1 max. Output Impedance 50 ohms nominal. Mismatch Tolerance\* 100% of rated power without foldback. Will operate without damage or oscillation with any magnitude and phase of source and load impedance. Noise Figure 7 dB typ. Harmonic Distortion Minus 20 dBc max. at 400 watts; <-20dBc typ. at 500 watts Third Order Intercept Point 68 dBm typ. Spurious Minus 73 dBc typ. Primary Power 200 - 240 VAC 50 / 60Hz, 2400 watts Connectors **RF** Input Type N female Type N female Type N female (optional) RF Output RF Sample Ports **Remote Interfaces** IEEE-488 24-pin female RS-232 9-pin subminiature D (female) Fiber optic USB 2.0 ST Conn Tx and Rx RS-232 Type B ŔJ-45 Ethernet Safety Interlock 15-pin subminiature D Cooling Forced air (self contained fans) Weight With Cabinet 78 kg (171 lb) Without Cabinet 58 kg (128 lb) Size (WxHxD) With Cabinet 50.3 x 38.1 x 75.5 cm (19.8 x 15.0 x 29.7 in) Without Cabinet 48.3 x 35.6 x 75.5 cm (19 x 14.0 x 29.7 in) Export classification EAR99





# 10 kHz to 400 MHz

#### 100A400A



#### 100 watts CW, 10 kHz-400 MHz

Rated Output Power		130 watts typ., 100 watts min.
Input For Rated Outp	out	1.0 milliwatt max.
Power Output @ 3dE Typ. 125 watts / M	compression in. 100 watts	
Power Output @ 1dE Typ. 85 watts / Mir	compression n. 75 watts	
Flatness		±1.0 dB typ. / ±1.5 dB max.
Frequency Response	10 k	Hz - 400 MHz instantaneously
Gain (at max. setting)		50 dB min.
Gain Adjustment (con	ntinuous range	e) 20 dB min.
Input Impedance		50 ohms, VSWR 2.0:1 max.
Output Impedance		50 ohms, nominal
Mismatch Tolerance* 100% of rated pow damage or oscillati and load impedance	er without folo on with any m	lback. Will operate without agnitude and phase of source
Harmonic Distortion Minus 20 dBc max Minus 30 dBc typio	. at 75 watts, cal at 50 watts	
Spurious		Minus 73 dBc typ.
Third Order Intercept	t Point	55 dBm typ.
Noise Figure		8 dB typ.
Primary Power 100 - 240 VAC 50 / 60 Hz, 500 wa	tts	
Connectors		<b>T N</b> ( 1
RF Input		Type N female
Pomoto Interfecco		i ype in tentale
IEEE-488 RS-232 Fiber optic USB 2.0 Ethernet		24 pin female 9 pin Subminiature D female ST Conn Tx and Rx RS-232 Type B RJ-45
Safety Interlock		15 Pin Subminiature D
Cooling	]	Forced air (self contained fans)
Weight With cabinet Without cabinet		18.5 kg (41 lb) 10.4 kg (23 lb)
Size (WxHxD)		5( )
With cabinet Without cabinet	50.3 x 15.5 x 48.3 x 13.2 x	x 55.1 cm / 19.8 x 6.1 x 21.7 in x 55.1 cm / 19.8 x 5.2 x 21.7 in

Export classification

tput Power	150 watts typ., 100 watts min.
Rated Output	1.0 milliwatt max.
tput @ 3dB compression 25 watts / Min. 100 watts	
tput @ 1dB compression 5 watts / Min. 75 watts	
	$\pm 1.0$ dB typ. / $\pm 1.5$ dB max.
Response 10 k	Hz - 400 MHz instantaneously
nax. setting)	50 dB min.
ustment (continuous range	) 20 dB min.
edance	50 ohms, VSWR 2.0:1 max.
npedance	50 ohms, nominal
Tolerance*	
of rated power without fold e or oscillation with any m ad impedance.	lback. Will operate without agnitude and phase of source
Distortion	
/II dBc mov of (5 wotte	

EAR99



175A400

#### 175 watts CW, 10 kHz-400 MHz Rated Output Power 225 watts typ., 175 watts min. Input For Rated Output 1.0 milliwatt max. Power Output @ 3dB compression Typ. 210 watts / Min. 165 watts Power Output @ 1dB compression Typ. 165 watts / Min. 125 watts Flatness $\pm 0.9$ dB typ. / $\pm 1.5$ dB max. 10 kHz - 400 MHz instantaneously Frequency Response 52.5 dB min. Gain (at max. setting) Gain Adjustment (continuous range) 20 dB min. 50 ohms, VSWR 2.0:1 max. Input Impedance Output Impedance 50 ohms, nominal Mismatch Tolerance\* 100% of rated power without foldback. Will operate without damage or oscillation with any magnitude and phase of source and load impedance. Harmonic Distortion Minus 20 dBc max. at 150 watts Minus 73 dBc typ. Spurious Third Order Intercept Point 60 dBm typ. 8.5 dB typ. Noise Figure Primary Power 100 - 240 VAC 50 / 60 Hz, 770 watts Connectors RF Input Type N female RF Output Type N female Remote Interfaces IEEE-488 24 pin female RS-232 9 pin Subminiature D female Fiber optic ST Conn Tx and Rx RS-232 USB 2.0 Type B ŔJ-45 Ethernet Safety Interlock 15 Pin Subminiature D Cooling Forced air (self contained fans) Weight With cabinet 33 kg (73 lb) Without cabinet 22 kg (48 lb) Size (WxHxD) 50.3 x 20.5 x 74.9 cm / 19.8 x 8.1 x 29.5 in With cabinet Without cabinet 48.3 x 17.7 x 74.9 cm / 19 x 7 x 29.5 in Export Classification EAR99

250A400



#### 250 watts CW, 10 kHz-400 MHz

Rated Output Power		325 watts typ., 250 watts min.
Input For Rated Outp	ut	1.0 milliwatt max.
Power Output @ 3dB	compression	
Typ. 325 watts / Mi	n. 250 watts	
Power Output @ 1dB	compression	
Typ. 250 watts / Mi	n. 200 watts	15 ID ( / 20 ID
Flatness	10.1	$\pm 1.5$ dB typ. / $\pm 2.0$ dB max.
Frequency Response	10 k	Hz - 400 MHz instantaneously
Gain (at max. setting)		54 dB min.
Gain Adjustment (con	itinuous range	e) 20 dB min.
Input Impedance		50 ohms, VSWR 2.0:1 max.
Output Impedance		50 ohms, nominal
Mismatch Tolerance*		
100% of rated powe	er without fol	back. Will operate without
damage or oscillatio	on with any m	agnitude and phase of source
	e.	
Minus 20 dBc max	at 200 watte	
Spurious	at 200 watts	Minus 73 dBc tro
Spurious Third Ordon Intercent	Doint	65 dBm tur
Maica Eiguna	TOIII	0.5 dB true
Dutan and Daman		0.5 dB typ.
100, 240 VAC		
50 / 60 Hz, 1350 w	atts	
Connectors		
RF Input		Type N female
RF Output		Type N female
Remote Interfaces		
IEEE-488		24 pin female
RS-232		9 pin Subminiature D female
Fiber optic		ST Conn Tx and Rx RS-232
USB 2.0		lype E
Ethernet		KJ-43
Safety Interlock		15 Pin Subminiature D
Cooling		Forced air (self contained fans)
Weight		45 1 (00 11)
With cabinet		45 kg (98 lb)
		55 kg (75 lb)
Size (WXHXD) With cabinet	503 x 205	74.9 cm / 19.8 x 8.1 x 20.5 in
Without cabinet	48 3 v 1'	7 x 74 9 cm / 19 x 7 x 7 x 7 9 5 in
Export Classification	101J A 1	FAR00
Export Classification		LINO







# RF Solid State Amplifiers 10 kHz to 400 MHz

# 50 to 1000 MHz

#### 350A400



#### 350 watts CW, 10 kHz-400 MHz

Rated Output Power	425 watts typ., 350 watts min.
Input For Rated Outp	at 1.0 milliwatt max.
Power Output @ 3dB Typ. 400 watts / Mi	compression n. 325 watts
Power Output @ 1dB Typ. 325 watts / Mi	compression n. 225 watts
Flatness	$\pm 1.5$ dB typ. / $\pm 2.0$ dB max.
Frequency Response	10 kHz - 400 MHz instantaneously
Gain (at max. setting)	55.5 dB min.
Gain Adjustment (con	tinuous range) 20 dB min.
Input Impedance	50 ohms, VSWR 2.0:1 max.
Output Impedance	50 ohms, nominal
Mismatch Tolerance*	
100% of rated powe damage or oscillation and load impedance	er without foldback. Will operate without on with any magnitude and phase of source e.
Harmonic Distortion Minus 20 dBc max.	at 300 watts
Spurious	Minus 73 dBc typ.
Third Order Intercept	Point 65 dBm typ.
Noise Figure	8.5 dB typ.
Primary Power 100 - 240 VAC 50 / 60 Hz, 1750 wa	itts
Connectors	
RF Input	Type N female
RF Output	Type N female
Remote Interfaces	24
IEEE-400 RS.232	9 pin Subministure D female
Fiber optic	ST Conn Tx and Rx RS-232
USB 2.0	Type B
Ethernet	ŔJ-45
Safety Interlock	15 Pin Subminiature D
Cooling	Forced air (self contained fans)
Weight	
With cabinet	48 kg (104 lb)
Without cabinet	35 kg (78 lb)
Size (WXHXD) With cabinet	$50.3 \times 20.5 \times 74.9 \text{ cm} / 10.8 \times 8.1 \times 20.5 \text{ in}$
Without cabinet	48.3 x 17.7 x 74.9 cm / 19 x 7 x 29.5 in
Export Classification	EAR99





#### 600 watts CW, 10 kHz-400 MHz

Rated Output Power	
700 watts typ., 600 watts min.;	.01 - 250MHz
600 watts typ., 500 watts min., 2	250MHz - 400MHz
Power Output @ 3dB compression	n 01 250) (U
600 watts typ., 600 watts min.;	UI - ZOUMHZ
Outwalls typ., 500 walls min., .	ZOUNINZ - 4001VINZ
575 watts trip 500 watts min :	n 01 250MHz
500 watts typ. 400 watts min.	250MHz - 400MHz
Flatness	+15 dB tvp / +20 dB max
Frequency Response 10	kHz . 400 MHz instantaneously
Coin (at max sotting)	57.8 dB min
Cain Adjustment (continuous ren	20  dB min
Sam Adjustment (Continuous rang	50 share VSWD 2 0.1 men
	50 0nms, VSWK 2.0:1 max.
Jutput Impedance	50 ohms, nominal
Mismatch Tolerance*	1 11 1 XV7-11 1
100% of rated power without fo	Idback. Will operate without
and load impedance	haghitude and phase of source
Harmonia Distortion	
Minus 20 dBc max_at 500 watt	s
Spurious	Minus 73 dBc typ
Third Order Intercent Point	67 dBm typ.
Naisa Figura	7.5 dB tro
Drimory Dowon	7.5 dB typ.
200 - 240 VAC	
$50 / 60 H_z$ , 2950 watts	
Connectors	
RF Input	Type N female
RF Output	Type 7/16 DIN
RF Sample Ports:	Type N female (optional)
Remote Interfaces	
IEEE-488	24 pin female
RS-232	9 pin Subminiature D female
Fiber optic	ST Conn Tx and Rx RS-232
USB 2.0	Type B
Ethernet	RJ-45
Safety Interlock	15 Pin Subminiature D
Cooling	Forced air (self contained fans)
Weight	
With cabinet	87 kg (191 lb)
Without cabinet	68 kg (148 lb)
Size (WxHxD)	
With cabinet 50.5 x 38.1 x (	$5.5 \text{ cm} / 19.8 \times 15.0 \times 29.7 \text{ in in}$
without cabinet 46.5 X 55.0	א נאר א גער א א גער א ג
export Classification	EAR99

Export Classification



# WAA

50W1000D

#### 50 watts CW, 50-1000 MHz

Rated Output Power	70 watts typ., 50 watts min.
Input For Rated Output	t 1.0 milliwatt max.
Power Output @ 3dB Typ. 70 watts / Min.	compression 60 watts
Power Output @ 1dB Typ. 60 watts / Min.	compression 45 watts
Flatness	$\pm 1.0$ dB typ. / $\pm 1.5$ dB max.
Frequency Response	50 MHz - 1000 MHz instantaneously
Gain (at max. setting)	48 dB min.
Gain Adjustment (con	inuous range) 20 dB min.
Input Impedance	50 ohms, VSWR 2.0:1 max.
Output Impedance	50 ohms, nominal
Mismatch Tolerance*	, ,
100% of rated powe	without foldback. Will operate without
damage or oscillatio	with any magnitude and phase of source
and load impedance	
Modulation Capability Will faithfully repro	uce AM, FM, or pulse modulation
Uamania Distortion	ut signal.
Minus 20 dBc may	at 50 watts
Minus 30 dBc typ. a	50 watts
Spurious	Minus 73 dBc typ.
Third Order Intercept	Point 55 dBm typ.
Noise Figure	8 dB typ
Primary Power	o ab tip.
100 - 240 VAC	
50 / 60 Hz, 250 wat	5
Connectors	
RF Input	Type N female
RF Output	Type N female
Remote Interfaces IEEE-488	24 pin female
RS-232	9 pin Subminiature D female
Fiber optic	ST Conn Tx and Rx RS-232
USB 2.0	Iype B
Ethernet	KJ-45
Safety Interlock	15 Pin Subminiature D
Cooling	Forced air (self contained fans)
With achieved	$17.7 \ln (20.1L)$
With cabinet	9.5  kg (39.10)
Size (WyHyD)	7.5 Kg (21 10)
With cabinet	50.3 x 15.5 x 55.1 cm / 19.8 x 6.1 x 21 7 in
Without cabinet	48.3 x 13.2 x 55.1 cm / 19.8 x 5.2 x 21.7 in
Export classification	EAR99
50W1000D	
100	
95	



600A400

# 80 to 1000 MHz

#### 150W1000B



#### 150 watts CW, 80-1000 MHz

Rated Output Power	160 watts typical, 130 watts min.
Input For Rated Output	1.0 milliwatt max.
Power Output @ 3dB cc	mpression
Nominal 150 watts / N	Ain. 125 watts
Power Output @ 1dB cc Nominal 125 watts / N	mpression /in. 100 watts
Flatness	±1.5 dB typ. / ±2.0 dB max.
Frequency Response	80 - 1000 MHz instantaneously
Gain (at max. setting)	52 dB min.
Gain Adjustment (contir	uous range) 20 dB min.
Input Impedance	50 ohms, VSWR 1.5:1 max.
Output Impedance	50 ohms, nominal
Mismatch Tolerance*	
100% of rated power	without foldback. Will operate without
damage or oscillation and load impedance.	with any magnitude and phase of source See Application Note #27.
Modulation Capability	
Will faithfully reprodu	ce AM, FM, or Pulse modulation
appearing on input sig	mal.
Noise Figure	8 dB max.; 6 dB typ.
Harmonic Distortion	
Minus 20 dBc maximu 100 watts	um at 100 watts; minus 30 dBc typical at
Third Order Intercept Po	pint 58 dBm typ.
Spurious	Minus 73 dBc typ.
Primary Power	
100-240 VAC,	
50/60Hz, 650 watts	
Connectors	
RF Input	Type N female on front panel
RF Output	Type N female on front panel
Remote Interfaces IEEE-488	24 pin female
RS-232	9 pin Subminiature D (female)
Fiber Optic	ST Conn Tx and Rx RS-232
USB 2.0	Type B
Ethernet	RJ-45
Safety Interlock	15 pin Subminiature D
Cooling	Forced air (self contained fans)
Weight	,
With cabinet	36.7 kg (81 lbs)
Without cabinet	25.4 kg (56 lbs)
Size (WxHxD)	
With cabinet 50	J.3 x 20.5 x 74.9 cm / 19.8 x 8.1 x 29.5 in
without cabinet	40.3 X 1/./ X /4.9 cm / 19 X /.0 X 29.5 in
EXPORT L Jassification	FARUG





250W1000C

#### 250 watts CW, 80-1000 MHz

Rated Output Power	250 watts 1.0 milliwatt may
Power Output @ 3dB compression Typical: 300 watts, Minimum: 2 250 watts 500-1000MHz	n 75 watts up to 500 MHz;
Power Output @ 1dB compression Typical: 250 watts, Minimum: 2 200 watts 500-1000MHz	<b>n</b> 25 watts up to 500 MHz;
Flatness ±2.0 dB max. / 1.5 dB typ.	
Frequency Response	80 - 1000 MHz instantaneously
Gain (at max. setting)	59 dB min.
Gain Adjustment (continuous rang	ge) 20 dB min.
Input Impedance	50 ohms, VSWR 1.5:1 max.
Output Impedance	50 ohms, nominal
Mismatch Tolerance 100% of rated power with-out damage or oscillation with any	foldback. Will operate without magnitude and phase of source
and load impedance. See App	lication Note #27.
Modulation Capability Will faithfully reproduce AM, F appearing on input signal.	M, or Pulse modulation
Noise Figure	8 dB max.: 6 dB typ.
Harmonic Distortion Minus 20 dBc maximum at 200 200 watts	watts; minus 30 dBc typical at
Third Order Intercept Point	62 dBm typ.
Spurious	Minus 73 dBc typ.
Primary Power 100-240 VAC 50/60Hz, 1000 watts	71
Connectors	
RF Input RF Output	Type N female on front panel Type N female on front panel
Remote Interfaces IEEE-488	24 pin female
RS-232	9 pin Subminiature D (female)
Fiber Optic USB 2.0	ST Conn Tx and Rx RS-232 Type B
Ethernet	RI-45
Safety Interlock	15 pin Subminiature D
Cooling	Forced air (self contained fans)
Weight	42.6 kg (94 lbs)
Size (WxHxD)	
50.3 x 20.5 x 74.9 cm / 19.8 x 8	8.1 x 29.5 in
Export Classification	EAR99



#### 500W1000C



#### 500 watts CW, 80-1000 MHz

Rated Output Power 60	00 watts typical, 500 watts Minimum
Input For Rated Output	1.0 mW max.
Power Output @ 3dB compre Typical: 575 watts, Minimu 475 watts 700-1000MHz	ession m: 525 watts up to 700 MHz;
Power Output @ 1dB compre Typical: 500 watts, Minimu 425 watts 700-1000MHz	ession m:450 watts up to 700 MHz;
Flatness ±1.0 dB max. / 1.5 dB typ.	
Frequency Response	80 - 1000 MHz instantaneously
Gain (at max. setting)	57 dB min.
Gain Adjustment (continuous	range) 25 dB min.
Input Impedance	50 ohms, VSWR 1.5:1 max.
Output Impedance	50 ohms, nominal
Mismatch Tolerance	
100% of rated power with damage or oscillation with and load impedance. See	out foldback. Will operate without any magnitude and phase of source Application Note #27.
Modulation Capability Will faithfully reproduce A appearing on input signal.	M, FM, or Pulse modulation
Noise Figure	8 dB max.: 6 dB typ.
Harmonic Distortion	• •= ••••, • •= •/F
Minus 20 dBc maximum at 425 watts	425 watts; minus 30 dBc typical at
Third Order Intercept Point	63 dBm typ.
Spurious	Minus 73 dBc typ.
Primary Power 100-240 VAC 50/60Hz, 1800 watts	
Connectors RF Input RF Output	Type N female Type N female
Remote Interfaces	
IEEE-488	24 pin female
RS-232	9 pin Subminiature D (female)
Fiber Optic	ST Conn Tx and Rx RS-232
USB 2.0	Type B
Ethernet	RJ-45
Safety Interlock	15 pin Subminiature D
Cooling	Forced air (self contained fans) With $C_1$ is a $(0, 41 + (152, 11))$
weight	With Cabinet 50.8 kg (153 lbs)
Size (WxHxD) With cabinet: 50.3 x 38.1 x	74.0 cm / 19.8 x 15 x 20.5 in

With cabinet: 50.3 x 38.1 x /4.9 cm / 19.8 x 15 x 29.5 in Without Cabinet: 48.3 x 35.6 x 74.9 cm / 19 x 14.0 x 29.5 in Export Classification EAR99



# **RF** Solid State Amplifiers 80 to 1000 MHz

#### 750W1000B



#### 750 watts CW, 80-1000 MHz

Rated Output Power 850 watts typ., 750 watts min. Input For Rated Output 1.0 milliwatt max. Power Output @ 3dB compression Typical: 900 watts, Minimum: 775 watts up to 700 MHz; 725 watts 700-1000MHz Power Output @ 1dB compression Typical: 750 watts, Minimum: 700 watts up to 700 MHz; 650 watts 700-1000MHz Flatness ±1.5 dB max. / 1.0 dB typ. 80 - 1000 MHz instantaneously Frequency Response Gain (at max. setting) 58.8 dB min. Gain Adjustment (continuous range) 25 dB min. Input Impedance 50 ohms, VSWR 1.5:1 max. **Output Impedance** 50 ohms, nominal Mismatch Tolerance 100% of rated power with-out foldback. Will operate without damage or oscillation with any magnitude and phase of source and load impedance. See Application Note #27. Modulation Capability Will faithfully reproduce AM, FM, or Pulse modulation appearing on input signal. Noise Figure 8 dB max.; 6 dB typ. Harmonic Distortion Minus 20 dBc maximum at 700 watts; minus 20 dBc typical at 750 watts Third Order Intercept Point 64 dBm typ. Minus 73 dBc typ. Spurious Primary Power 200-240 VAC 50/60Hz, 3300 watts Connectors Type N female on front panel **RF** Input RF Output Type 7-16 DIN female on rear panel Remote Interfaces **IEEE-488** 24 pin female RS-232 9 pin Subminiature D (female) Fiber Optic ST Conn Tx and Rx RS-232 USB 2.0 Type B Ethernet RJ-45 Safety Interlock 15 pin Subminiature D Cooling Forced air (self contained fans) 113.4 kg (250 lbs) Weight Size (WxHxD) 56.1 x 97.8 x 82.5 cm / 22.1 x 38.5 x 32.5 in EAR99 Export Classification



#### 1000W1000G



#### 1,000 watts CW, 80-1000 MHz

Rated Output Power	1200 watts typ., 1000 watts min. 1.0 milliwatt max
Power Output @ 3dB compre Typical: 1200 watts / 1100 950 watts from 700 to 1000	ession watts min. up to 700 MHz; ) MHz
Power Output @ 1dB compre Typical: 1000 watts / 975 w 900 watts from 700 to 1000	e <b>ssion</b> atts min. up to 700 MHz, ) MHz
Flatness	$\pm 1.5$ dB max; $\pm 1.0$ dB typ.
Frequency Response	80 - 1000 MHz instantaneously
Gain (at max. setting)	60 dB min.
Gain Adjustment (continuous	range) 25 dB min.
Input Impedance 50	ohms, VSWR 1.5:1 max; 1.5:1 typ.
Output Impedance	50 ohms, nominal
Mismatch Tolerance* 100% of rated power witho damage or oscillation with and load impedance.	ut foldback. Will operate without any magnitude and phase of source
Harmonic Distortion	
Minus 20 dBc max. at 900	watts, -20 dBc typ. @ 1000 watts
Third Order Intercept Point	66 dBm typ.
Spurious	Minus 73 dBc typ.
Noise Figure	8 dB max., 6 dB typ.
Primary Power 200 - 240 VAC, 50 / 60 Hz, 4000 watts	
Connectors	
RF Input RF Output	Type N female Type 7-16 DIN female on rear panel
Kemote Interfaces IEEE-488 RS-232 Fiber Optic USB 2.0 Ethernet Safety Interlock Cooling Weight (approximate) Size (WxHxD) 56.1 x 97.8 x 82.5 cm / 22. Export Classification	24 pin female 9 pin Subminiature D (female) ST Conn Tx and Rx RS-232 Type B RJ-45 15 pin Subminiature D Forced air (self contained fans 124.8 kg (275 lb) 1 x 38.5 x 32.5 in EAR99



#### $\pm 2.0$ dB max. / $\pm 1.5$ dB typ. 80 - 1000 MHz instantaneously Frequency Response Gain (at max. setting) 61.8 dB min. Gain Adjustment (continuous range) 50 ohms, VSWR 1.5:1 max.; 1.3:1 typ. Output Impedance 50 ohms, nominal Mismatch Tolerance\* 100% of rated power without foldback. Will operate without damage or oscillation with any magnitude and phase of source and load impedance.

#### Harmonic Distortion

Input Impedance

Rated Output Power

Flatness

Input For Rated Output

Power Output @ 3dB compression

Power Output @ 1dB compression

1400 watts from 700 to 1000 MHz

1250 watts min. from 700 to 1000 MHz

Harmonic Distortion	Minus 20 dBc max. at 1350 watts, -20 dBc typ. at 1500 watts
Third Order Intercept Point	68 dBm typ.
Noise Figure	8 dB max., 6 dB typ.
Primary Power (user must spec 200 - 240 VAC 50 / 60 Hz, 3 phase, 7000 w	cify) vatts
Connectors RF Input RF Output Forward Sample Reverse Sample Remote Interfaces: IEEE-488 RS-232 Fiber Optic USB 2.0 Ethernet Safety Interlock 15 pi Cooling	Type N female on rear panel Type 1 5/8 female on rear panel Type N female, front (-63 dBc) Type N female, front (-63 dBc) 24-pin female 9-pin Subminiature D, female ST Conn Tx and Rx RS-232 Type B RJ-45 in female subminiature D, rear panel
Forced air (self contained fa	ans), enters front and bottom

182 kg (400 lb) Weight (approximate) Size (WxHxD)

56.1 x 175.3 x 97.6 cm / 22.1 x 69 x 38.4 in



#### 1500W1000A



1,500 watts CW, 80-1000 MHz

Nominal 1600 watts / 1500 watts min. up to 700 MHz;

Nominal 1450 watts / 1400 watts min. up to 700 MHz;

1500 watts min.

25 dB min.

1.0 milliwatt max.

#### 2000W1000D



#### 2,000 watts CW, 80-1000 MHz

Rated Output Power	2000 watts min.
Input For Rated Output	1.0 milliwatt max.
Power Output @ 3dB co Nominal 2100 watts / 1650 watts from 500 t	<b>mpression</b> 2000 watts min. up to 500 MHz; o 1000 MHz
Power Output @ 1dB cc Nominal 1850 watts / 1400 watts min. from	mpression 1750 watts min. up to 500 MHz; 500 to 1000 MHz
Flatness	$\pm 2.0$ dB max. / $\pm 1.5$ dB typ.
Frequency Response	80 - 1000 MHz instantaneously
Gain (at max. setting)	63 dB min.
Gain Adjustment (contin	uous range) 25 dB min.
Input Impedance	50 ohms, VSWR 1.5:1 max.; 1.3:1 typ.
Output Impedance	50 ohms, nominal
Mismatch Tolerance* 100% of rated power damage or oscillation and load impedance.	without foldback. Will operate without with any magnitude and phase of source
Harmonic Distortion	Minus 20 dBc max. at 1600 watts, -20 dBc typ. at 2000 watts
Third Order Intercept P	pint 70 dBm typ.
Primary Power (user mu 200 - 240 VAC, Delta 380 - 415 VAC, Wye 50 / 60 Hz, 3 phase, 9	st specify) 1-connected (4-wire) connected (5-wire) 000 watts
Connectors	
RF Input RF Output Forward Sample Reverse Sample	Type N female on rear panel Type 1 5/8 female on rear panel N female, front (-63 dBc) N female, front (-63 dBc)
Remote interfaces: IEEE-488 RS-232 Fiber Optic USB 2.0	24-pin female 9-pin Subminiature D, female ST Conn Tx and Rx RS-232 Type B
Ethernet Sefety Interleal	KJ-45
	15 pin famala subminiatura D rear papal
Cooling	15 pin female subminiature D, rear panel
Cooling Weight (approximate)	15 pin female subminiature D, rear panel Forced air (self contained fans) 218 kg (480 lb)
Cooling Weight (approximate)	15 pin female subminiature D, rear panel Forced air (self contained fans) 218 kg (480 lb)



#### 3000W1000B



#### 3,000 watts CW, 80-1000 MHz

Rated Output Power	2800 watts min.	
Input For Rated Output	1.0 milliwatt max.	
Power Output @ 3dB compression	on	
Nominal 3000 watts / 2600 wa 2400 watts from 500 to 1000 N	utts min. up to 500 MHz; MHz	
Power Output @ 1dB compression	on	
Nominal 2500 watts / 2250 watts min. up to 500 MHz; 1850 watts from 500 to 1000 MHz		
Flatness	$\pm 2.0$ dB max. / $\pm 1.5$ dB typ.	
Frequency Response	80 - 1000 MHz instantaneously	
Gain (at max. setting)	64.8 dB min.	
Gain Adjustment (continuous rar	nge) 25 dB min.	
Input Impedance 50 oh	ms, VSWR 1.5:1 max.; 1.3:1 typ.	
Output Impedance	50 ohms, nominal	
Mismatch Tolerance*	,	
100% of rated power without foldback up to 6.0:1 mismatch above, which may limit to 1500 watts reflected power. Will operate without damage or oscillation with any magnitude and phase of source and load impedance.		
Harmonic Distortion	Minus 20 dBc max. at 2400 watts,	
	-20 dBc typ. at 3000 watts	
Third Order Intercept Point	72 dBm typ.	
Noise Figure	8 dB max., 6 dB typ.	
Primary Power (user must specify	)	
200 - 240 VAC		
50/60 Hz 3 phase 14kVA	u (J-wile)	
Connectors		
RF Input	Type N female on rear panel	
RF Output	Type 1 5/8 female on rear panel	
Forward Sample	Type N female, front (-70 dBc)	
Reverse Sample	Type N female, front (-70 dBc)	
Remote Interfaces:		
IEEE-488	24-pin female	
KS-232	9-pin Subminiature D, female	
Fiber Optic	51 Conn 1x and Kx K5-232	
Ethernet	RL45	
Safety Interlock 15 pin f	emale subminiature D. rear papel	
Cooling		
Forced air (self contained fans), enters front and bottom		
Weight (approximate)	364 kg (800 lb)	

Weight (approximate) Size (WxHxD) (2 joined cabinets) 111.8 x 177.8 x 82.3 cm / 44 x 70 x 32.4 in





#### 4,000 watts CW, 80-1000 MHz

Rated Output Power	3700 watts min.	
Input For Rated Output	1.0 milliwatt max.	
Power Output @ 3dB compression		
Nominal 4000 watts / 3600 watts min. up to 500 MHz;		
3400 watts from 500 to 100	0 MHz	
Power Output @ 1dB compre	ssion	
Nominal 3500 watts / 3000 watts min. up to 500 MHz; 2500 watts from 500 to 1000 MHz		
Flatness	$\pm 2.0$ dB max. / $\pm 1.5$ dB typ.	
Frequency Response	80 - 1000 MHz instantaneously	
Gain (at max, setting)	66 dB min.	
Gain Adjustment (continuous	range) 25 dB min.	
Input Impedance 50	ohms VSWR 1 5.1 max · 1 3.1 typ	
Output Impedance	50 ohms nominal	
Mismatch Tolerance*	50 onnis, nonintar	
100% of rated power without foldback up to 6.0.1 mismatch		
above, which may limit to 2	000 watts reflected power.	
Will operate without damage	ge or oscillation with any	
magnitude and phase of sou	irce and load impedance.	
Harmonic Distortion	Minus 20 dBc max. at 3400 watts,	
	-20 dBc typ. at 4000 watts	
Third Order Intercept Point	73 dBm typ.	
Noise Figure	8 dB max., 6 dB typ.	
Primary Power (user must spec	cify)	
200 - 240 VAC		
360 - 435 VAC Wye connected (5-wire)		
50 / 60 Hz, 3 phase, 17.5kV	A	
Connectors		
RF Input	I ype N female on rear panel	
KF Output Forward Sample	Type 1 5/8 female on rear panel	
Reverse Sample	Type N female, front (-70 dBc)	
Remote Interfaces:	Type IV ternate, from (10 ube)	
IEEE-488	24-pin female	
RS-232	9-pin Subminiature D, female	
Fiber Optic	ST Conn Tx and Rx RS-232	
USB 2.0	Туре В	
Ethernet	RJ-45	
Satety Interlock 15 pi	n temale subminiature D, rear panel	
Cooling		
roiced air (seil contained fa	$422.1 \times (050.11)$	
weight (approximate)	432 kg (950 lb)	

Size (WxHxD) (2 joined cabinets) 111.8 x 177.8 x 82.3 cm / 44 x 70 x 38.4 in



# RF Solid State Amplifiers 80 to 1000 MHz

#### 6000W1000



#### 6,000 watts CW, 80-1000 MHz

Rated Output Power	6000 watts min.
Input For Rated Output	1.0 milliwatt max.
Power Output @ 3dB cc Nominal 6000 watts / 5100 watts from 700 f	mpression 5500 watts min. up to 700 MHz; to 1000 MHz
Power Output @ 1dB cc Nominal 5500 watts / 4500 watts from 700 f	<b>mpression</b> 5000 watts min. up to 700 MHz; to 1000 MHz
Flatness	$\pm 2.0$ dB max. / $\pm 1.5$ dB typ.
Frequency Response	80 - 1000 MHz instantaneously
Gain (at max. setting)	67.8 dB min.
Gain Adjustment (contin	nuous range) 25 dB min.
Input Impedance	50 ohms, VSWR 1.5:1 max.; 1.3:1 typ.
Output Impedance	50 ohms, nominal
Mismatch Tolerance* 100% of rated power above, which may lim Will operate without magnitude and phase	without foldback up to 6.0:1 mismatch it to 3000 watts reflected power. damage or oscillation with any of source and load impedance.
Harmonic Distortion	Minus 20 dBc max. at 5500 watts,
	-20 dBc typ. at 6000 watts
Third Order Intercept P	oint 75 dBm typ.
Noise Figure	8 dB max., 6 dB typ.
Primary Power (user mu: 200 - 240 VAC Delta 360 - 435 VAC Wye o 50 / 60 Hz, 3 phase, 2	st specify) connected (4-wire) connected (5-wire) 4kVA
Connectors	
RF Input RF Output Forward Sample Reverse Sample Bemote Interfaces:	Type N female on rear panel Type 1 5/8 female on rear panel Type N female, front (-70 dBc) Type N female, front (-70 dBc)
Fiber Optic USB 2.0 Ethernet	24-pin female 9-pin Subminiature D, female ST Conn Tx and Rx RS-232 Type B RJ-45
Safety Interlock	15 pin female subminiature D, rear panel
Cooling	16)
Forced air (self contai	$702 \ln \alpha (1550 \text{ l})$
weight (approximate)	(U3 kg (1550 lb)
51ze (WXHXD) (5 joined 170 x 183 x 90 cm / 6	cabinets) $7 \times 72 \times 30$ in
Export classification	EAR99





REMOTE

10000W1000A

#### 10,000 watts CW, 80-1000 MHz

Rated Output Power	Nominal, 12500 watts	
1	12000 watts min. up to 700 MHz	
	10500 watts min., 700 to 1000 MHz	
Input For Rated Output	1.0 milliwatt max.	
Power Output @ 3dB compr	ression	
Nominal 12500 watts / 12 10000 watts from 700 to 1	000 watts min. up to 700 MHz; 000 MHz	
Power Output @ 1dB compr	ression	
Nominal 11000 watts / 10 9500 watts from 700 to 10	500 watts min. up to 700 MHz; 000 MHz	
Flatness	$\pm 2.0$ dB max. / $\pm 1.5$ dB typ.	
Frequency Response	80 - 1000 MHz instantaneously	
Gain (at max. setting)	70 dB min.	
Gain Adjustment (continuou	s range) 25 dB min.	
Input Impedance 50	0 ohms, VSWR 1.5:1 max.; 1.3:1 typ.	
Output Impedance	50 ohms, nominal	
Mismatch Tolerance*		
100% of rated power with	6000 mother and a stard a survey	
Will operate without dame	occor oscillation with any magnitude	
and phase of source and lo	ad impedance.	
Modulation Capability	I	
Faithfully reproduces AM, on input signal.	FM, or Pulse modulation appearing	
Harmonic Distortion	Minus 20 dBc max. at 10000 watts,	
	-25 dBc typ. at 10000 watts	
Third Order Intercept Point	78 dBm typ.	
Noise Figure	8 dB max., 6 dB typ.	
200 - 240 VAC Delta con	ge) nected (4-wire)	
360 - 435 VAC Wye conn	lected (5-wire)	
50 / 60 Hz, three phase, 48	8000W	
Connectors		
RF Input RF Output	Type N female on rear panel	
Forward Sample	N female front (-70 dBc)	
Reverse Sample	N female, front (-70 dBc)	
Remote Interfaces:	( ••••••)	
IEEE-488	24-pin female	
KS-232 Filese Operie	9-pin Subminiature D, female	
LISB 2 0	51 Conn 1x and Kx K5-252 Type B	
Ethernet	RI-45	
Safety Interlock 15	pin female subminiature D, rear panel	
Cooling		
Forced air (self contained fans), enters front and bottom		
Weight (approximate)	1407 kg (3100 lbs)	
Size (WxHxD)	<b>7</b> 2 22 1	
340 x 183 x 99 cm / 134 x	: 72 x 39 in	

