

Ku-Band Solid-State Power Amplifiers

These high power solid-state amplifiers offer output powers of 40, 50, 80 or 100 watts, across the standard 14.0-14.5 GHz ("M") or extended 13.75-14.5 GHz ("O") satellite uplink bands. Built for reliable, trouble-free service, the amplifiers incorporate microprocessor-based monitor and control systems.

Features

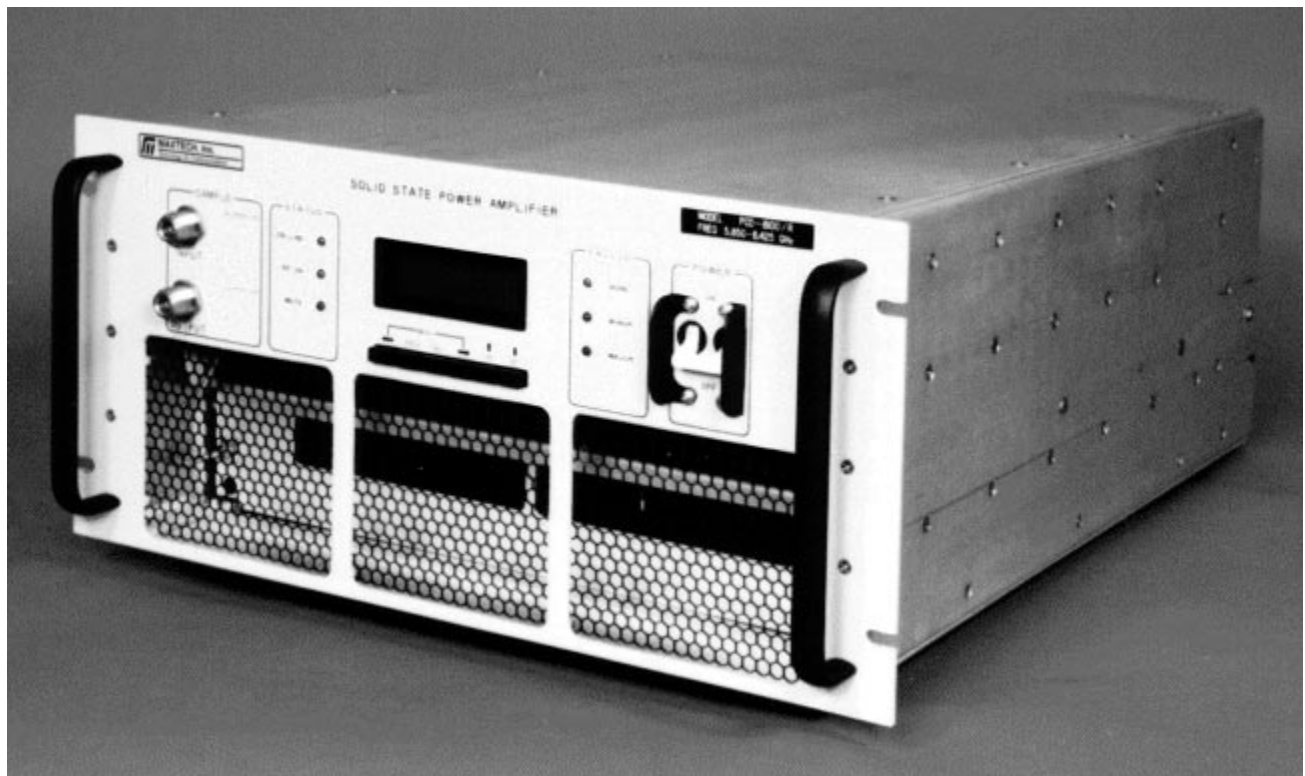
- 40/50/80/100 W saturated output power
- 53 dB minimum gain
- Gain adjustment (remote controllable)
- Direct-reading RF power meter
- Microprocessor-based monitor and control
- Serial interface (RS232/422/485) standard
- Dual power supplies with soft-fail (80 and 100 W units only)
- Output isolator for high VSWR protection

Options

- Front panel RF In/Out sample ports
- Parallel I/O with Form 'C' outputs and optoisolated inputs
- Built-in 1:1 redundancy control — no external controller required
- 48 Vdc prime power



- **100 Watts**
- **Extended-band coverage**



Functional Description

These rugged, reliable, solid-state power amplifiers deliver the power output of a TWTA yet achieve lower intermodulation distortion and longer lifetime than tube type amplifiers.

MAXTECH has incorporated a number of features into its in-house all GaAs FET SSPA modules, including low loss power combining techniques, active bias regulation for stable Q-point vs. time and temperature, microprocessor-based current fault monitoring of each RF power module, and low dropout dc regulation to minimize wasted power.

The amplifiers incorporate complete thermal management, optimized by thermal analysis CAD software to deliver lower device junction temperatures. The forced-air cooling system draws cool air in through front panel vents and exhausts air out the rear panel vents.

All models use high efficiency switching power supplies. In the 80 and 100 W units, dual supplies operate independent halves of the amplifier in a soft-fail configuration; if one supply fails, the SSPA will continue to operate at 6 dB down from full power. The dc power, regulation, and bias circuitry are all optimized to minimize generation of waste heat.

Remote Control

The standard unit contains one summary fault output and serial I/O to allow control and monitoring of the SSPA from a remote location. The 9-pin serial interface can be connected to RS-232 unbalanced, RS-422 balanced, or RS-485 multidrop interfaces. Baud rates are selectable from 300, 1200, 2400, 4800, 9600, 14400, or 19200 baud. Unit addresses can be set between 0 and 255. Features controlled and monitored remotely include:

FAULTS

- List faults
- Reset faults

OPERATE

- Operate/Mute
- Gain
- Antenna/Dummy Load (1:1 systems with System Option 2)

1:1 (with Option 4)

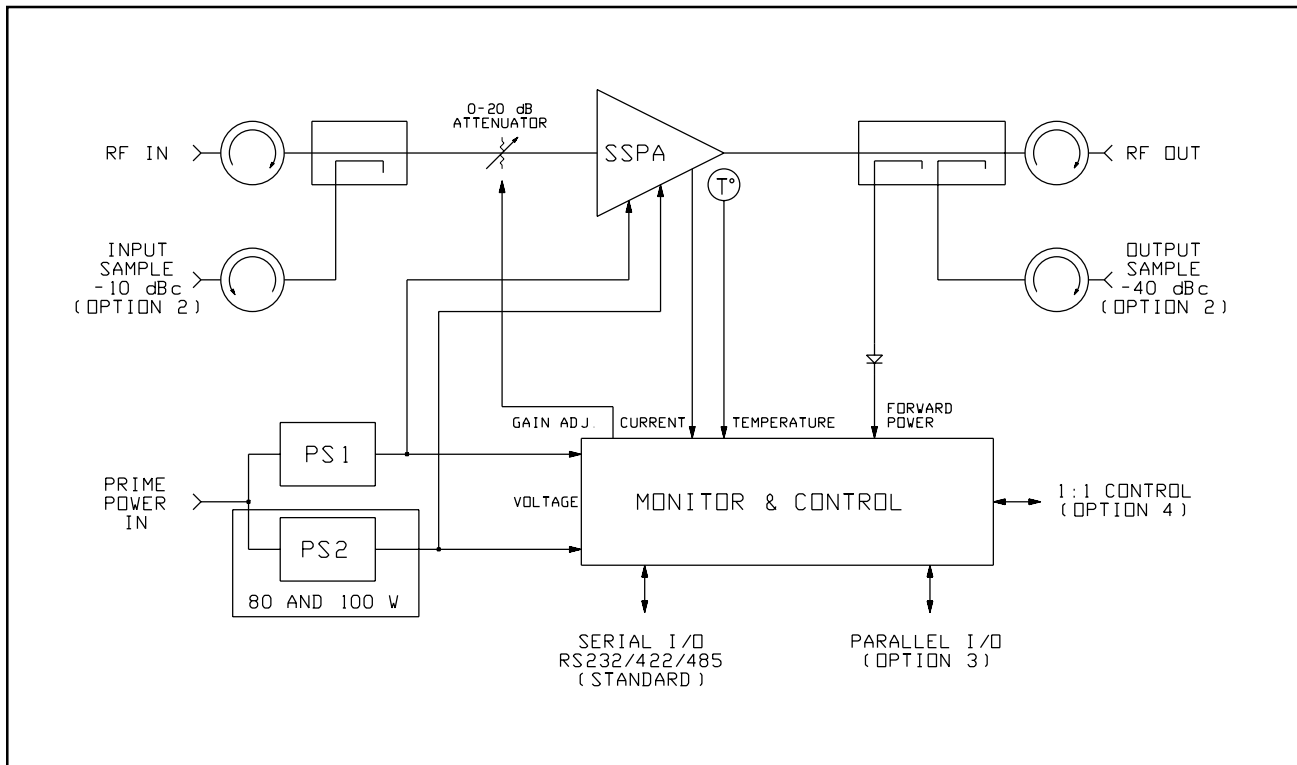
- Auto/Manual Mode
- On-Line/Standby
- Status

SERVICE

- Metering
 - Power Output
 - Temperature
 - Current
 - Voltage
- μ P Test

SETUP

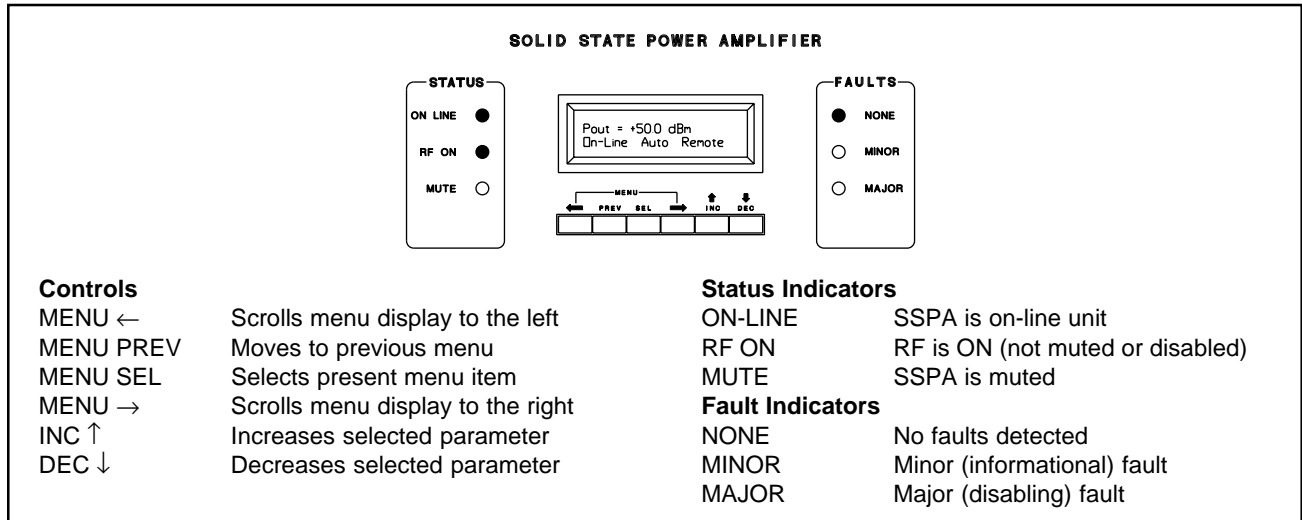
- Faults
- Power Cal
- Serial I/O
- Power-up State
- Password



Operator Interface

Microprocessor-based monitor and control simplifies amplifier operation and allows incorporation of powerful user-friendly features, such as direct-reading RF power metering with display in dBm, dBW, or watts. Operation is menu-driven, with simple, logical

menus arranged in order of most frequent use. Four menu softkeys are used to scroll through menus and make selections, while two keys are used to increment or decrement parameters. Information is presented on an alphanumeric 2-line by 20-character backlit liquid-crystal display.



Fault Monitoring and Metering

The internal microprocessor continually monitors operation of the SSPA and reports any faults on the front panel display. Monitored parameters include microprocessor status, overtemperature shutdown, heatsink temperature, device currents, power supply voltages, RF output level, 1:1 status (with Option 4), maintenance switch position (with System Option 2), and reflected power (with System Option 3). Nominal

values and tolerances are all adjustable from the front panel via the setup menu. Password protection can be activated to prevent inadvertent or unauthorized access. Faults are reported as either major (disabling) or minor (informational). Major faults will cause automatic switchover in a 1:1 redundant system, but minor faults will not.

The following parameters can be displayed via the operate and service menus:

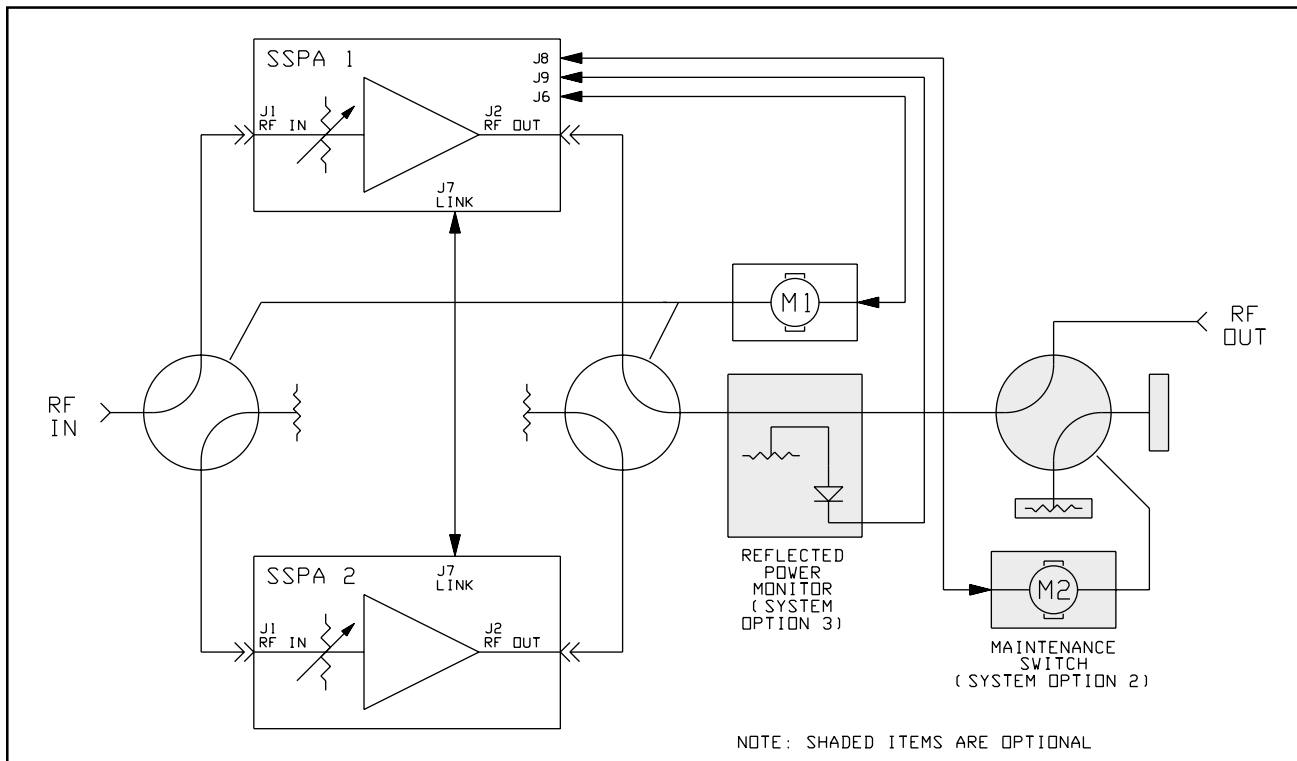
Parameter	Features/Notes	Measurement Range	Resolution
Gain Adjust		0 to -20 dB	0.1 dB
Power Output	Can be offset ±6 dB in 0.1 dB steps for calibration/loss compensation.	40 W units: +16.0 to +48.0 dBm 50 W units: +17.0 to +49.0 dBm 80 W units: +19.0 to +51.0 dBm 100 W units: +20.0 to +52.0 dBm	0.1 dB (top 20 dB)
Temperature	Heatsink	-40.0 to +85.0 °C	0.5 °C
Current	Input stages Output modules Total current	0 to 10.00 A 0 to 20.0 A 0 to 99.99 A	40 mA 80 mA 40/80 mA
Voltage	Each supply	0 to 12.50 V	50 mV
Reflected Power	Available on 1:1 systems only (with System Option 3).	40 W units: +16.0 to +48.0 dBm 50 W units: +17.0 to +48.0 dBm 80 W units: +19.0 to +51.0 dBm 100 W units: +20.0 to +52.0 dBm	0.1 dB (top 20 dB)

1:1 Option

This option adds 1:1 redundancy switchover logic to the SSPA. With this option, no external redundancy controller is required. The complete 1:1 redundant SSPA system consists of two SSPAs, an external switching assembly, and a cable to link the SSPAs. If a fault occurs in one of the units, it is switched off-line. Full remote control of the system is available via the serial I/O interface (or parallel I/O with Option 3).

A maintenance switch at the system output is offered as an option. This allows operation of the system into the antenna or into a dummy load. This switch is controlled and its position is monitored via the serial I/O interface.

A reflected power monitor is also available as an option. Reflected power is measured at the system's output and can be monitored via the serial I/O interface.



Parallel I/O Option

This option adds eight Form 'C' status outputs, and eight contact-closure-to-ground control inputs, and an analog voltage output that is proportional to forward power. Each input or output is menu selectable.

Form 'C' Status Outputs

- Major/Minor Faults
 - Mute/Unmute/RF Inhibit
 - Faults: Summary, Power Out, Reflected Power, Voltage, Current and Temperature
 - Remote, Local, Maintenance Mode
- with 1:1 Option*
- Auto/Manual
 - On-Line/Standby
 - Antenna/Dummy Load Position

Control Inputs

- Major/Minor Faults
 - Mute/Unmute/RF Inhibit
 - Fault Reset
- with 1:1 Option*
- Auto/Manual Select
 - Standby/On-Line
 - Antenna/Dummy Load

Analog Output

- Proportional to forward power, 0 to 5 Vdc nominal, 0.1 V/dB (5 V = +50 dBm)
- Balanced, 2-wire. Can be run over long distances.
- Drives loads to 600 ohms min.

SPECIFICATIONS

PKM-, PKO-1440/R, -1450/R, -1480/R, and -14100/R

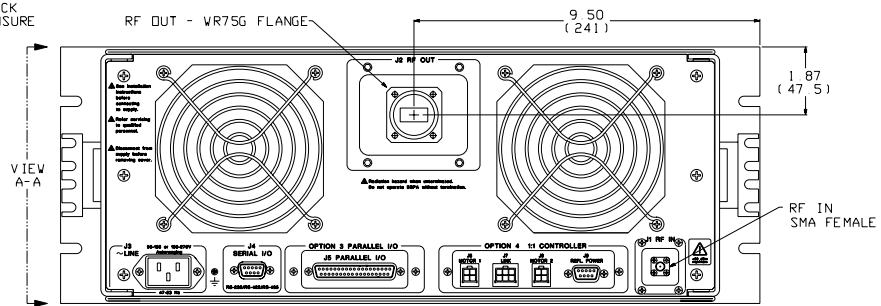
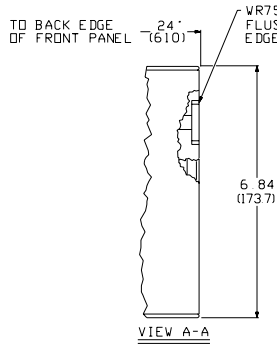
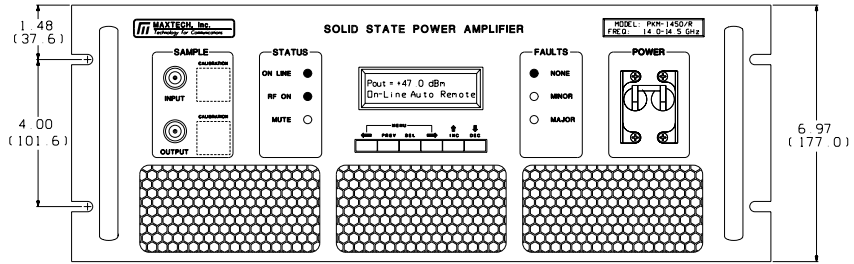
Parameter	Notes	Min	Nom/Typ†	Max	Units
Frequency Range	Band M 40/50/80/100 W	14.0		14.5	GHz
	Band O 50/100 W Only	13.75		14.5	GHz
Gain	At maximum gain setting	53	56		dB
Gain Adjust Range		20			dB
Gain Flatness	Full band Per 40 MHz			±1.0	dB
				±0.3	dB
Saturated Power Output	40 W		+46		dBm
	50 W		+47(See Note 1)		dBm
	80 W		+49		dBm
	100 W		+50(See Note 1)		dBm
Power Output, at 1 dB compression	40 W	+45			dBm
	50 W	+46 (See Note 1)			dBm
	80 W	+48			dBm
	100 W	+49 (See Note 1)			dBm
Two-tone Intermodulation	At 3 dB total backoff from 1 dB compression point		-30	-25	dBc
Group Delay per 40 MHz Band Segment	Linear			0.03	ns/MHz
	Parabolic			0.003	ns/MHz ²
	Ripple			1.0	ns p-p
AM/PM Conversion	At 3 dB backoff		1.0	2.0	°/dB
VSWR	Input		1.20	1.25	:1
	Output		1.20	1.30	:1
Front Panel Sample Ports (Optional)	Input		-10		dBc
	Output		-40		dBc
Connectors	Input		SMA Female		
	Output		WR75G Waveguide		
	Sample Ports (Optional)		Type N Female		
	Serial I/O		9-pin D, Female		
	Parallel I/O (Optional)		37-pin D, Male		
	Power		IEC 320		
Power Requirements	Voltage (autoranging), 40 W and 50 W		90-135 or 180-270		Vac
	Voltage, 80 W and 100 W	180		270	Vac
	Frequency	47		63	Hz
	Power, 40 W		500	550	W
	Power, 50 W		530	570	W
	Power, 80 W and 100 W		950	1050	W
Cooling System		Forced air. Intake on front panel.			
Operating Temperature Range	Ambient air temperature	0		+50	°C
Dimensions and Weight	40 W, 50 W	19 W x 7 H x 24 D			inches
		483 W x 178 H x 610 D			mm
	65 (29.5)			lb (kg)	
	80 W, 100 W	19 W x 8.75 H x 24 D			inches
483 W x 222 H x 610 D			mm		
		83 (38)			lb (kg)

† When there is only one value on a line, this column is a nominal value. Otherwise it is a typical value. Typical values are intended to illustrate typical performance, but are not guaranteed.

Note 1: Between 14.0-14.5 GHz. 1dB lower between 13.75-14.0 GHz for Band "O" amplifiers.

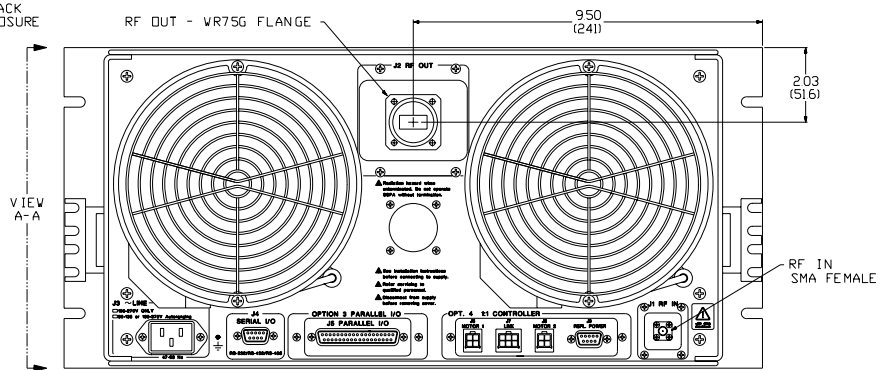
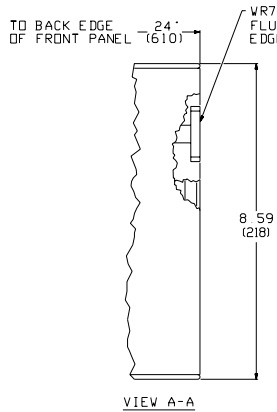
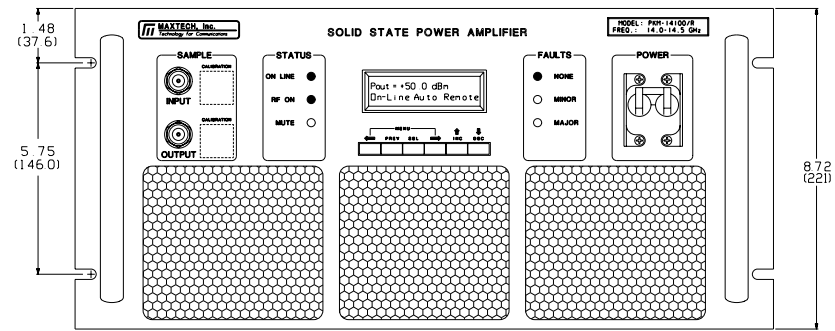
Outline Drawing, SSPA

PKM-1440/R,
PKM-1450/R,
PKO-1450/R



Outline 6485

PKM-1480/R,
PKM-14100/R,
PKO-14100/R



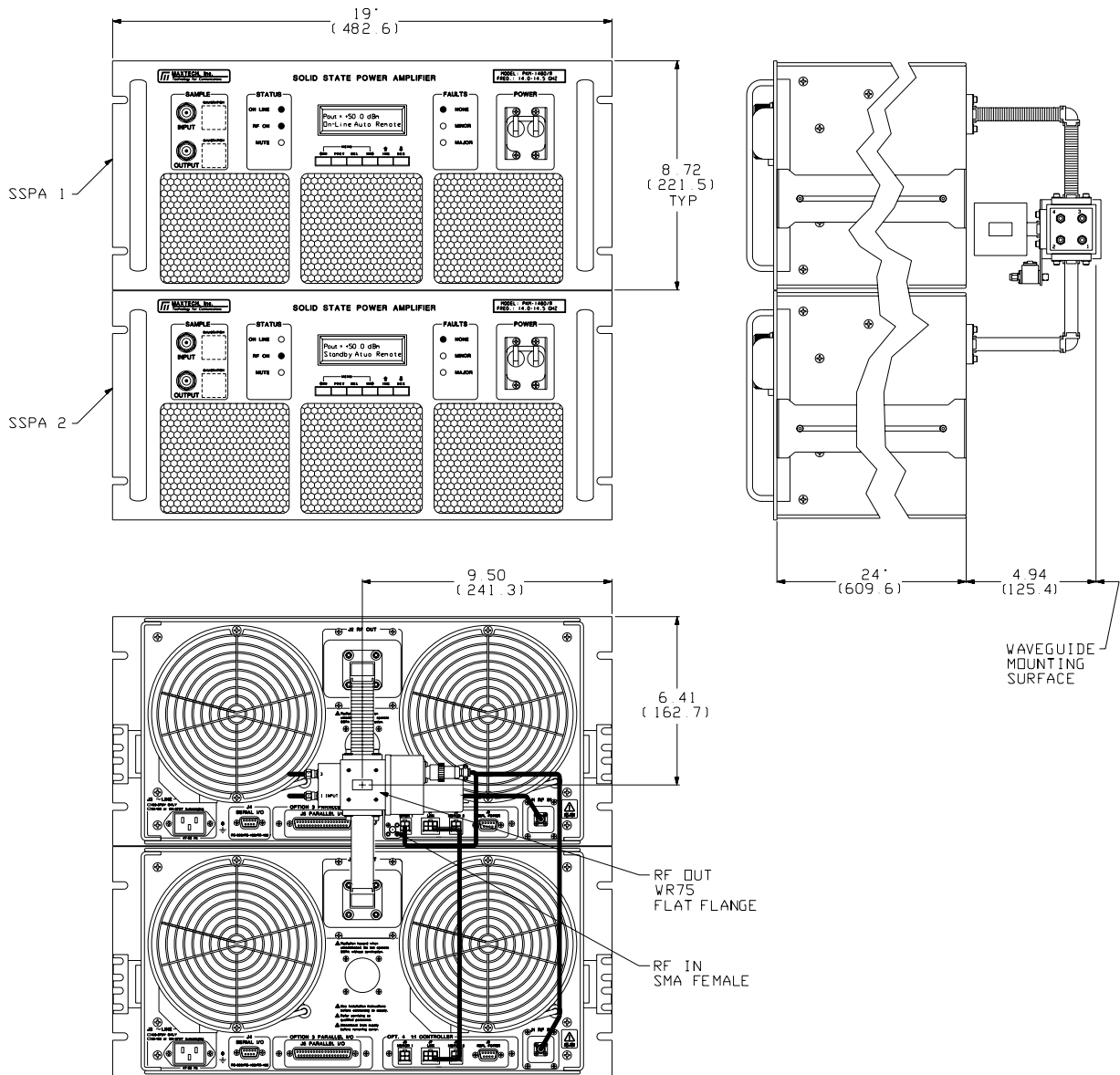
Outline 6486

Outline Drawing, 1:1 System

(PRK-11100/R shown)

NOTES:

- 1) REMOVE WAVEGUIDE, SWITCH, AND RELATED CABLES BEFORE SLIDING AMPLIFIER OUT
- 2) AIR INTAKE ON FRONT PANELS AND AIR EXHAUST ON REAR PANELS MUST NOT BE OBSTRUCTED
- 3) CABLES SHOWN ARE FURNISHED WITH SYSTEM
- 4) DIMENSIONS ARE SHOWN IN INCHES (mm)
- 5) SHOWN WITH OPTIONAL INPUT AND OUTPUT SAMPLE PORTS



Outline 6488

Connector Interface

Ref. Des.	Function	Connector Type	Mating Connector	Comment
J1	RF Input	SMA Female	SMA Male	
J2	RF Output	WR75G Waveguide	WR75 Flange	
J3	AC In	IEC 320	IEC Cordset	Supplied
"	DC In	4-pin MS, Male	4-pin MS, Female	Option 6
J4	Serial I/O	9-pin D, Female	9-pin D, Male	Standard
J5	Parallel I/O	37-pin D, Male	37-pin D, Female	Option 3
J6	1:1 Switch	4-pin Molex	4-pin Molex	Option 4
J7	1:1 Link	6-pin Molex	6-pin Molex	Option 4

Part Number/Ordering Information

SSPAs:		PK <input type="text"/> -14 <input type="text"/> /R	
		M = 14.00-14.50 GHz	40 = 40 watts
		O = 13.75-14.50 GHz (50/100 W only)	50 = 50 watts 80 = 80 watts 100 = 100 watts
Options			
1	Rack Slides		
2	Sample Ports	Front panel mounted -10 dBc input sample and -40 dBc output sample ports, Type N Female	
2A	Output Sample Port	-40 dBc Output sample port only, Type N Female	
3	Parallel I/O	Form 'C' status outputs (100 Vdc/0.5 A contacts) and contact closure to ground (5 V/5 mA) control inputs. (Serial I/O is standard.)	
4	1:1	Redundant capability (required for units in 1:1 systems)	
6	48 Vdc Prime Power	42 to 56 Vdc, positive or negative ground	
Example:	PKM-14100/R with Options 1, 2 and 4	=	100 watt SSPA with rack slides (Option 1), sample ports (Option 2), and 1:1 redundant capability (Option 4).
Redundant Systems: (Consists of 1:1 switching assembly, two SSPAs, and interconnecting cables.)		PRK-11 <input type="text"/> /R	
			040 = 40 watts 050 = 50 watts 080 = 80 watts 100 = 100 watts
System Options			
2	Maintenance Switch	Allows selection of antenna or dummy load at system output	
3	Reflected Power Monitor	Measures reflected power at system output	
Example:	PRK-11100/R with Option 2	=	1:1 redundant system (includes switching assembly, two 100 watt SSPAs, and cables) and maintenance switch (Option 2).
Related Accessories:			
<ul style="list-style-type: none"> • RCP-1000 SSPA Remote Control Panel 1U-high rack-mounted panel duplicates all menus and functions available at SSPA front panel. Can be located up to 1.3 km (4000 ft) away and interconnects with inexpensive cable. • MAXCON™ Monitor and Control Software. Microsoft® Windows® application. 			

MAXTECH, Inc.



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Specifications are subject to change at Maxtech's discretion.