

Built for Satellite Communications Uplinks

QuadMod SSPAs are completely modular RF amplifier systems that offer output powers of up to 800 watts in C Band, 700 watts in X-Band, or 400 watts in Ku-Band. Based on patented technology used in our field proven ModuMAX amplifiers, QuadMod SSPAs utilize hot-swappable RF modules, power supplies and electronic assemblies to maximize performance and minimize downtime.



CPI QuadMod SSPA series: high power, fully redundant, patented technology

Parallel Architecture

Solid-state power amplifiers (SSPAs) consist of multiple transistors in parallel, and naturally contain a degree of built-in redundancy. Utilizing multiple+ RF modules, power supply modules and cooling fans, QuadMod SSPAs are extremely reliable and fault-tolerant.

RF Plug-In Modules

QuadMod SSPAs consist of four identical and fully inter-changeable RF plug-in modules. Module status is indicated by an LED on each module as well as the control panel display.

Complete failure of a module causes a drop of only 2.5 dB in output power, without the momentary loss of signal caused by redundant switchover systems. Defective modules can be hot-swapped while the SSPA continues to operate. Spare RF modules are affordable, since they contain only a fraction of the RF power transistors in the SSPA.

FEATURES:

- Modular architecture
- Three year all-inclusive warranty
- Worldwide service
- Proven reliability

POWER AND FREQUENCIES:

- | | |
|-----------------|------------------|
| • C-Band | • Ku-Band |
| 1500 watts | 750 watts |
| 800 watts | 400 watts |
| 500 watts | 250 watts |
| 400 atts | |
| • X-Band | |
| 1250 watts | |
| 700 watts | |
| 400 watts | |

Easy to Operate and Maintain

QuadMod SSPAs are designed to be easy to operate and maintain. Commonly used controls are brought out to the front panel for quick and easy access. All features are fully remote controllable through the standard RS-232/-422/-485 and network interfaces.

Servicing is fast and easy with four hot-swappable RF modules that are accessible from the front panel. Modules can be removed and replaced while the SSPA continues to operate.

Any of the four fans in the air-cooling system can be easily removed and replaced, without taking the SSPA off-line. Even the power supply is N+1 redundant, consisting of three hot-swappable plug-in modules, any two of which are fully capable of powering the entire amplifier.

Global EMC and Safety Compatibility

QuadMod SSPA systems are certified to applicable EU EMI/EMC and safety standards.

Phase-Combined Systems

QuadMod is easy to expand. Phase-combine two SSPAs for double the power output in only 35" (20 RU) of rack space. An added bonus—with 8 RF modules, one failed module causes only a 1.2 dB drop in output power.

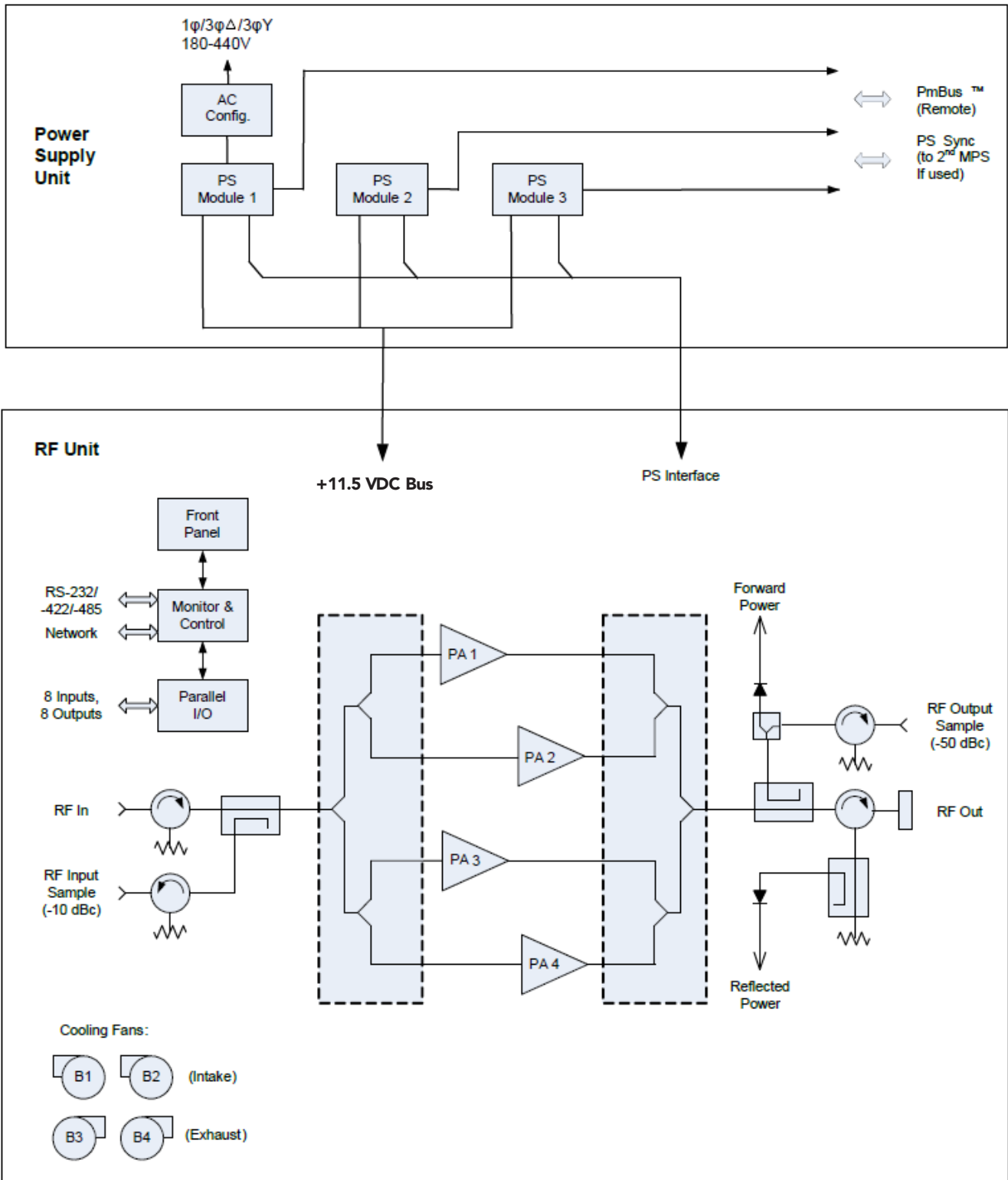
Cooling System

QuadMod also incorporates redundancy into its integral forced-air cooling system. Enough margin is built into the design to tolerate the loss of one cooling fan. Fans are monitored for rotational speed, and failure of a fan is indicated on the control panel display. In the event of a fan failure, the SSPA can continue to operate until a replacement is installed. The air cooling system utilizes separate front panel air intake and rear panel exhausts. Exhaust air can be ducted outdoors or into the room.

Power

System power is supplied by three identical modules in an "N+1" configuration. If a module fails, the remaining two can supply 100% of the required load current and the defective module can be hot-swapped without interruption. QuadMod operates from either single- or three phase AC, allowing considerable flexibility in installations and worldwide operation.

Ref Des	Function	Connector Type	Mating Connector	Comment
RF Unit				
J1	RF Input	Type N Female	Type N Male	
J2	RF Output	CPR137G/CPR112G/ WR75G Waveguide	CPR137/CPR112/WR75 Flange	C-/X-/Ku-Band
J3	DC In	Bus Bars	Ring Terminals	Supplied
J4	Serial I/O	9-pos D, Female	9-pos D, Male	Supplied
J5	Parallel I/O	37-pos D, Male	37-pos D, Female	Supplied
J7	System Interface	15-pos D, Male	15-pos D, Female	Used with optional maintenance switch
J9	PS Interface	9-pos D, Male	9-pos D, Female	Supplied
J10	RF Input Sample	Type N Female	Type N Male	On front panel
J11	RF Output Sample	Type N Female	Type N Male	On front panel
A15	Network Interface	RJ-45 Receptacle	RJ-45 Plug	Ethernet 10 Base T
Power Supply Unit				
+12 V, RTN	DC Output	Bus Bars	Cable Lugs	Supplied
L1, L2, L3, N	AC Input	Terminal Block	Wires	
J4	Remote	9-pos D, Female	9-pos D, Male	Supplied
J5	PS Status	9-pos D, Male	9-pos D, Female	Supplied
J6	Sync	RJ-45	RJ-45	Supplied, if used
J7	PS Sense	9-pos D, Female	9-pos D, Male	Supplied



Parameter	Notes	Specification
Frequency Range (1)	C-band, Standard (MPCD-) C-band, Extended (MPCM-) X-band, Std (MPXB-) Ku-band, Std (MPKM-) Ku-band, Ext (MPKO-)	5.850 to 6.425 GHz 5.850 to 6.725 GHz 7.900 to 8.400 GHz 14.00 to 14.50 GHz 13.75 to 14.50 GHz
Gain, at Maximum Setting	C-band, X-band and Ku-band	70 dB min. to 75 dB max. 65 dB min. to 72 dB max.
Gain Adjustment Range	Digital	20 dB min. in 0.1 dB steps
Gain Flatness		±1.0 dB over the full band; ±0.3 dB over any 40 MHz
Saturated / P1dB Output Power	800 W C-band 500 W C-band (D-band) 400 W C-band 700 W X-band 400 W X-band 400 W Ku-band 250 W Ku-band	+59.0 dBm typ. (800 W) / +58.0 dBm min. (630 W) +57.0 dBm typ. (500 W) / +56.0 dBm min. (400 W) +56.0 dBm typ. (400 W) / +55.0 dBm min. (316 W) +58.5 dBm typ. (700 W) / +57.5 dBm min. (560 W) +56.0 dBm typ. (400 W) / +55.0 dBm min. (316 W) +56.0 dBm typ. (400 W) / +55.0 dBm min. (316 W) +54.0 dBm typ. (250 W) / +53.0 dBm min. (200 W)
Two Tone Intermodulation		-25 dBc max.. at 3 dB backoff from P1dB (-30 dBc typical)
Residual Noise, C-Band	5.850 - 6.425 GHz 3.4 - 4.2 GHz	-70 dBW/4 kHz max. -160 dBW/4 kHz max.
Residual Noise, Ku-Band	13.75 – 14.50 GHz	-70 dBW/4 kHz max.
Group Delay	Linear Parabolic Ripple	0.3 ns/MHz 0.003 ns/MHz ² 1.0 ns peak to peak
AM/PM Conversion		3.5°/dB max. at P1dB output power (2.5°/dB typical)
Second Harmonic		-60 dBc max. at P1dB output power
Spurious		-70 dBc max. at P1dB output power
VSWR		1.3:1 max, input and output, 1.2:1 typical
Sample Ports	Input Output	-10 dBc typical -50 dBc typical
Power Requirements	Single or 3-phase	180 to 264 VAC, 47 to 63 Hz
Power Consumption	800 W C-band 500 W C-band (D-band) 400 W C-band 700 W X-band 400 W X-band 400 W Ku-band 250 W Ku-band	3.5 kW typ; 4.6 kW max. (2) 2.8 kW typ; 3.7 kW max. (2) 2.4 kW typ; 3.2 kW max. (2) 3.5 kW typ; 4.6 kW max. (2) 3.2 kW typ; 4.2 kW max. (2) 3.5 kW typ; 4.6 kW max. (2) 2.7 kW typ; 3.5 kW max. (2)
Cooling System		Forced Air
Operating Temperature	Ambient/Inlet air	0°C to +50°C
Storage Temperature	Non-operating	-45°C to +85°C
Relative Humidity		95% non-condensing
Altitude Derating	10,000 ft (3000 m) max.	Derate 2°C per 1000 ft (300 m)
Dimensions	RF Unit (7 RU panel height) Power Supply (3 RU Panel ht.)	19.0" W x 12.25" H x 29.38" D; 483 mm W x 311 mm H x 746 mm D 19.0" W x 5.24" H x 23.5" D; 483 mm W x 133 mm H x 595 mm D
Weight	RF Unit Power Supply	182 lbs (82 kg) 53 lbs (24 kg)

(1) Consult factory for non-standard frequency bands.

(2) Cold start at 0°C and saturated output.

C-Band

MPC 6 Q

5.850-6.425 GHz = D	400 W = 400
	500 W = 500
	800 W = 800
5.850-6.725 GHz = M	400 W = 400
	800 W = 800

X-Band

MPX 8 Q

7.90-8.40 GHz = B	400 W = 400
	700 W = 700

Ku-Band

MPK 14 Q

14.00-14.50 GHz = M	250 W = 250
	400 W = 400
13.75-14.50 GHz = O	250 W = 250
	400 W = 400

Each SSPA system includes an RF Unit, a Power Supply Unit, interconnecting cables, mating connectors, rack slides, and mounting hardware. All features described in this specification are included as standard equipment.

Option Kits (Order separately):

- **45 RU Rack Cabinet (standard).** See also Rack Cabinet Integration Kits, below.
- **Rack Cabinet Integration Kits:** Includes cabling and waveguide needed to complete installation of one or two SSPAs into a standard 45 RU rack cabinet.
 - Qty. 1 SSPA: Integrate (1) SSPA into a standard rack cabinet, with top-panel system interfaces for primary AC power, RF input, RF output, network, serial I/O, parallel I/O.
 - Qty 2 SSPAs: Integrate (2) single-thread SSPAs into a standard rack cabinet.
- **Spares Kit A:** Includes (1) RF Unit plug-in Module, (1) Power Supply Unit plug-in Module, and (1) RF Unit Fan Assembly.
- **Spares Kit B:** Includes Spares Kit A plus (1) RF Unit Logic PCB, (1) Power Supply Capacitor PCB, (1) RF Unit Parallel I/O PCB, (1) RF Unit NIC PCB, (1) RF Unit Front Panel assembly, and (2) RF Module Flexible Cable assemblies.

- **Maintenance Switch Kit:** Antenna/Dummy Load switch and high power RF termination for one SSPA.
- **Air Exhaust Duct Kit:** Duct transition for one RF Unit chassis rear panel outlet to 8" diameter (203 mm) circular duct.
- **Phase Combining Kit:** Variable phase combiner assembly and interconnection to (2) identical SSPAs to provide nominally twice the RF power output. (Both SSPAs must be installed in one rack cabinet; cabinet is not included in the Phase Combining Kit.)

Combined system maximum saturated power:

- C-band 1500 W (2x 800 W);
 - X-band 1250 W (2x 700 W);
 - Ku-band 750 W (2x 400 W).
 - 1-for-1 (1:1) Redundancy Kit: Switching assembly, interconnect cabling and waveguide to configure (2) identical SSPAs in a 1:1 redundant system.*
 - 1-for-2 (1:2) Redundancy Kit: Switching assembly, interconnect cabling and waveguide to configure (3) identical SSPAs in a 1:2 redundant system.*
- *Order redundancy controller separately.

Outline Drawing, Typical C - Band SSPA (X and Ku-Band are similar)

