

## Communications & Power Industries LLC QuadMod SSPAs using GaN-based amplifiers are completely modular RF amplifier systems that offer output power up to 540 watts in Ku-Band

Based on patented technology used in our field-proven ModuMAX amplifiers, QuadMod SSPAs utilize truly hot-swappable RF modules, power supplies, and electronic assemblies to maximize performance and minimize downtime in SATCOM systems.

QuadMod SSPAs offer state-of-the-art operator interfaces that provide real-time performance indicators and control. These interfaces include a color touch screen display with easily navigable menus, and remote monitoring capability through a secure embedded web interface.



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

**Plug and play hot-swappable design maximizes performance and minimizes downtime**

**Mean Time to Repair (MTTR) of less than 3 minutes for field-serviceable components**

**Automated prime power saving and link recovery software**

**Easy-to-use touch screen for local control**

### FEATURES:

- Higher power, reliable Gallium Nitride (GaN) SSPA technology
- Real-time remote factory support
- Multiple redundancy configurations available
- 3-Year all-inclusive warranty
- Embedded web interface, with remote monitoring
- Remote software upgrade, and factory remote assistance capabilities

### POWER AND FREQUENCIES:

- **Ku-Band**  
550 watts

### Easy to Operate and Maintain

- Front panel color touch screen offers quick and easy access for onsite operational control
- Full remote control of all features via the standard network and RS-232/-422/-485 interfaces
- Fast and easy servicing via four hot-swappable RF modules accessible from the front panel
- No downtime during module replacement

### Parallel Architecture

- RF and power supply modules readily accessible from the front of the chassis for easy maintenance
- Solid State RF power amplifiers and power supply modules configured in parallel to share load making the QuadMod SSPAs extremely reliable and fault tolerant
- Passive RF combining architecture provides robust design with no single point of failure allowing the system to stay online during a module replacement
- RF modules are combined in an efficient, waveguide power combining network, enabling multi power level, self redundant configurations
- Front accessible modules eliminate cumbersome back-of-chassis cabling problems
- Hot-swappable major system components (power supply modules, fans, logic board, parallel I/O board, front panel touch screen) enable continuous uptime

### Auto Recovery

- Failure of an RF module causes a drop of only 2.4 dB in output power until the auto recovery software selects and enables an in-chassis spare module, or increases the gain of the remaining online RF modules
- Unlike conventional, switched redundant systems, there is no interruption of the uplink
- Defective modules can be hot-swapped while the SSPA continues to operate

### RF Plug-In Modules

- 4 identical and fully interchangeable RF plug-in modules
- GaN technology provides improved reliability and higher linear output power compared to GaAs technology
- Module status is indicated via the touch screen front panel as well as an LED on each module
- Software continuously monitors temperature, voltage and current performance and auto-corrects for changes associated with long-term component operation, enhancing long term performance while logging parameter changes
- Electrical interfaces for power and RF provided by blindmate connectors located at the back of the RF plug-in modules
- Elimination of cables makes swapping modules easy and fast

### Modular Power Supply

- Powered by up to 4 identical 48-volt dc power supply modules that share the SSPA power load in a redundant "N+1" configuration
- Sufficient built-in margin ensures that the loss of a single module will not affect operations and any module can be hot-swapped without interruption via front panel
- Automatic logging of operational parameters of the power supply modules such as temperature, current and voltage

### Phase-Combined Systems

- A pair of QuadMod systems can be phase combined to achieve higher power for additional multi-carrier operation

## Cooling System

- Integral forced-air cooling system with fault tolerant redundancy minimizes RF plug-in module temperature rise, maintaining RF power capability and increasing operational lifetime
- Built-in margin tolerates the loss of one cooling fan
- Monitoring of fan performance and status via the control panel display and via the M&C interfaces
- Easily remove and replace fans in the air cooling system without taking the system offline
- In the event of a fan failure, the system will continue to operate until a replacement is installed

## User Interface—Leading Edge Software

The QuadMod GaN SSPA is equipped with a color touch-screen for local control along with a leading-edge TCP/IP embedded Web interface. The software can be configured for remote monitoring and firmware upgrades, while allowing virtual factory access to monitor the amplifier system's key performance parameters such as temperature, current, and voltage measurements to individual component levels. The software provides a secure environment for systems management through the use of Simple Network Management Protocol version 3 (SNMPv3). SNMPv3 provides confidentiality through the use of packet encryption; message integrity to ensure that a packet has not been altered while in transit; and authentication that assures the received message originated from a valid source.

The screenshot shows the web interface for the CPI QuadMod GaN SSPA. The top navigation bar includes 'Status', 'Configuration', 'Setup', 'Security', 'Help', 'Logout', and 'ModuMAX'. The main content area displays a table with columns for RFM # (1-8) and rows for Status, Fwd Power, Temperature (C), Current (A), and Input Voltage (V). All values are consistent across all RFM units. Below the table is a 'STATUS CODES' legend.

RFM #	1	2	3	4	5	6	7	8
Status	0	0	0	0	0	0	0	0
Fwd Power	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Temperature (C)	-2	-2	-2	-2	-2	-2	-2	-2
Current (A)	65.280	65.280	65.280	65.280	65.280	65.280	65.280	65.280
Input Voltage (V)	65.280	65.280	65.280	65.280	65.280	65.280	65.280	65.280

**STATUS CODES**

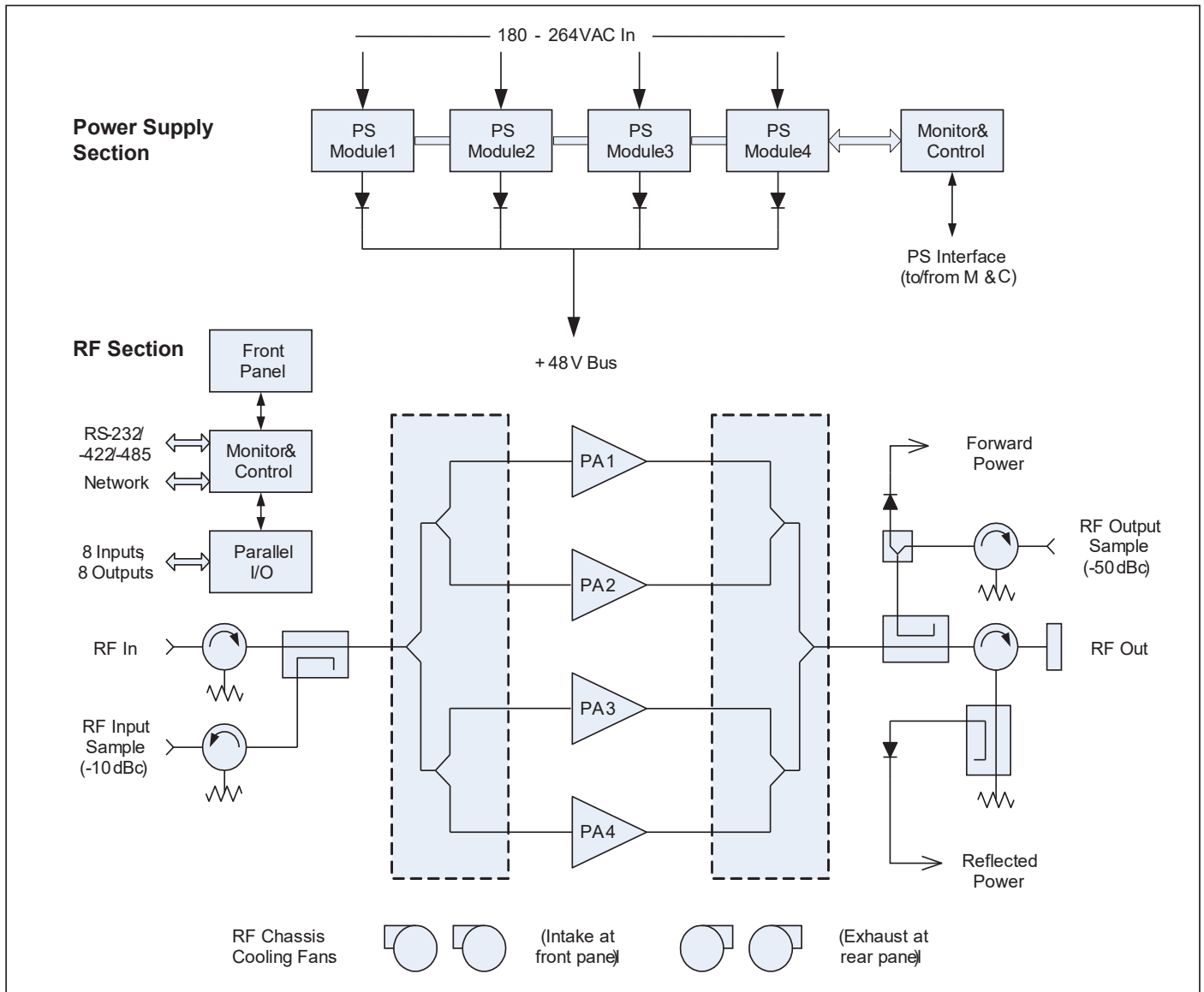
0 - Operating	9 - OK RF Inhibit
1 - Missing	10 - OK No Reason Given
2 - Disabled	11 - Faulted
3 - OK Thermal Shutdown	12 - OK Overcurrent Shutdown
4 - OK Over Voltage Shutdown	13 - OK Switch Inhibit
5 - OK Aided	14 - Disabled, SMFC

## Sparing

Sparing costs are minimized by utilizing a prudent spares kit capable of covering numerous systems. Spare RF modules offer an affordable alternative, since replacement is restricted to the module level. Spare modules can go from shelf to on-line in minutes.

## Global EMC and Safety Compatibility

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



## Stand-Alone SSPA Specifications

Parameter	Notes	Specification
Frequency Range	Ku-band, Extended	13.75 to 14.50 GHz
Gain, at Maximum Setting		65 dB min.
Gain vs. Temperature	0 to 50° C	±0.75 max., ±0.5 typical
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 Power Output		+57.3 dBm typ. (540 W)
Linear Output Power		+54.3 dBm min. (270 W)
Two Tone Intermodulation		-25 dBc max., -30 dBc typical at rated linear power
Residual Noise, Ku-Band	13.75 – 14.50 GHz	-70 dBW/4 kHz max.
Group Delay	Linear Parabolic Ripple	0.03 ns/MHz 0.003 ns/MHz <sup>2</sup> 1.0 ns peak to peak
AM/PM Conversion		1.0°/dB typical at rated linear power
Second Harmonic		-50 dBc max. at rated linear power
Spurious		-70 dBc max. at rated linear 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	Voltage Frequency Power factor	180 to 264 VAC 63 Hz max., 47 Hz min. .98 typical
Power Requirement		5.5 kVA typical
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	System (12 RU panel height)	19.0" W x 20.97"H x 29.37" D; 483 mm W x 533 mm H x 746 mm D
Weight	System	270 lbs (122 kg)

## Electrical Connections

RF Input	N-Type (f) 50 ohms	J1
RF Output	WR75	J2
RF Monitor Ports (Input, Output)	N-Type (f) 50 ohms	J13, J14
Serial I/O	D 9 Female	J4
Parallel I/O	D 37 Male	J5
Network	RJ-45, Jack	J6
System	D 15 Male	J7
USB	USB Type A (f)	J12
PS Control	Micro-D, 9 Pos (m)	P1
AC Input	Terminal Blocks, 4 Pos	TB1 – TB4
Ground	#10-32 Threads (m)	

NOTES:

1. DIMENSIONS SHOWN IN INCHES [mm].
2. REFER TO DSPC-30592 FOR ADDITIONAL PRODUCT SPECIFICATIONS.
3. ESTIMATED MAX. WEIGHT: 270 LBS. [122 KG] INCLUDING RF UNIT (4 MODULES) & PS UNIT (4 MODULES MAX).
4. ESTIMATED MAX. AIR FLOW & MAX. POWER DISSIPATION (P<sub>tot</sub>):  
 RF UNIT (4 MODULES): 640 CFM [18.1 m<sup>3</sup>/min], 11,750 BTUHR [3.5 KW]  
 PS UNIT (4 MODULES): 80 CFM [2.26 m<sup>3</sup>/min], 3,410 BTUHR [1.0 KW]

