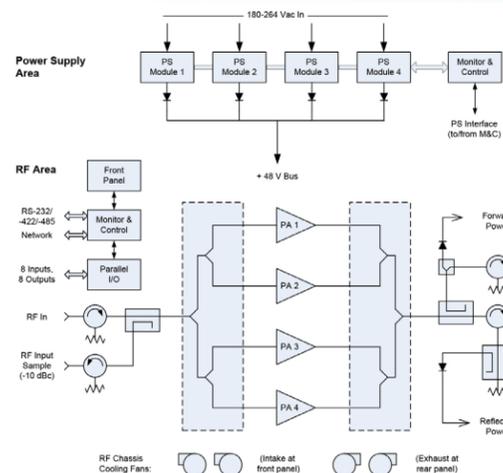


# QuadMod GaN SSPAs

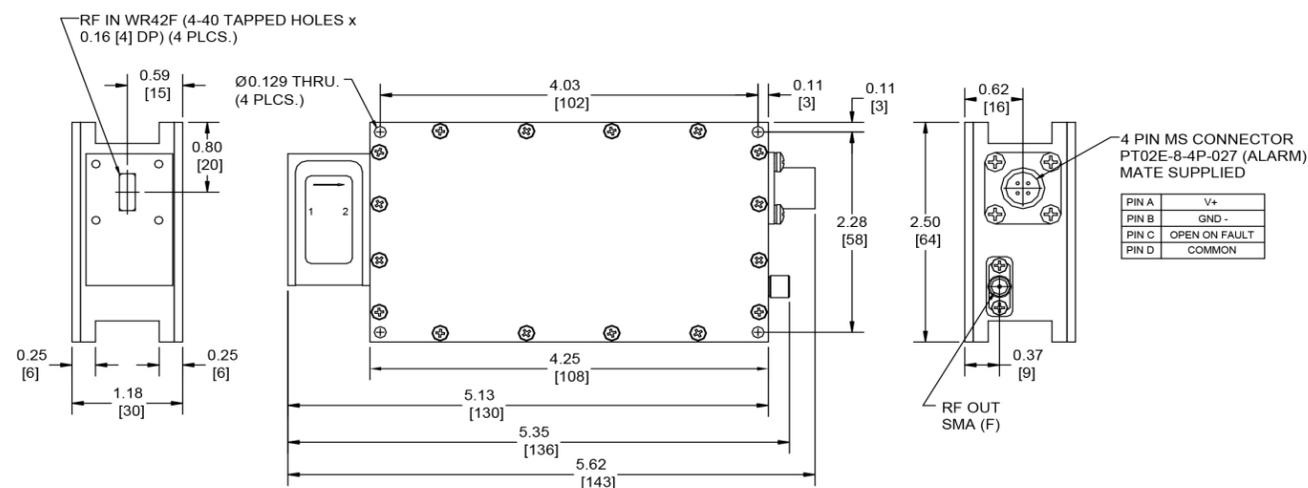
## Ku Band Single-Thread SSPA

### Block Diagram



### Outline Drawing

NOTES:  
1. DIMENSIONS ARE SHOWN IN INCHES AND [mm].



### Electrical Connections

RF Input	N-Type (f)	50 ohms
RF Output	WR75	
RF Monitor Ports (Input, Output)	N-Type (f)	50 ohms
Network	RJ-45	J6
Parallel I/O	D 37 Male	J5
System	D 15 Male	J7
Serial I/O	D 9 Female	J12



True hot-swappable with modular architecture

Color touch screen for local control

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

Automated prime power saving and link recovery software

Higher power, reliable Gallium Nitride SSPA technology

### Overview

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. GaN designs have increased efficiency, Mean-Time-Between-Failure, and RF power capability over GaAs FET technology.

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 an embedded, secure web page with the ability to issue email alerts in the event of a problem.

### Parallel Architecture

Solid-state RF power amplifier modules and power supply modules are configured in parallel to collectively share load. The passive combining architecture provides a robust design free from a single point of failure. This makes the QuadMod SSPAs extremely reliable and fault-tolerant.

### Features

- Embedded web page and automated email alerts
- Virtual factory real-time support
- Multiple redundancy configurations available
- 3-Year all-inclusive warranty
- Embedded web browser, with remote monitoring, remote software upgrade, and factory monitoring and assistance capabilities

## Easy to Operate and Maintain

QuadMod SSPAs are designed to be easy to operate and maintain. The front panel color touch screen offers quick and easy access for on-site operational control when needed. All features are fully remote controllable through the standard network and RS-232/-422/-485 interfaces. .

## 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 and via the color touch screen display. The software constantly monitors temperature, voltage and current performance and auto-corrects for changes associated with long-term component operation enhancing long term performance while logging changes in parameters.

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.

## Cooling System

QuadMod also incorporates redundancy into its integral forced-air cooling system. Sufficient 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.

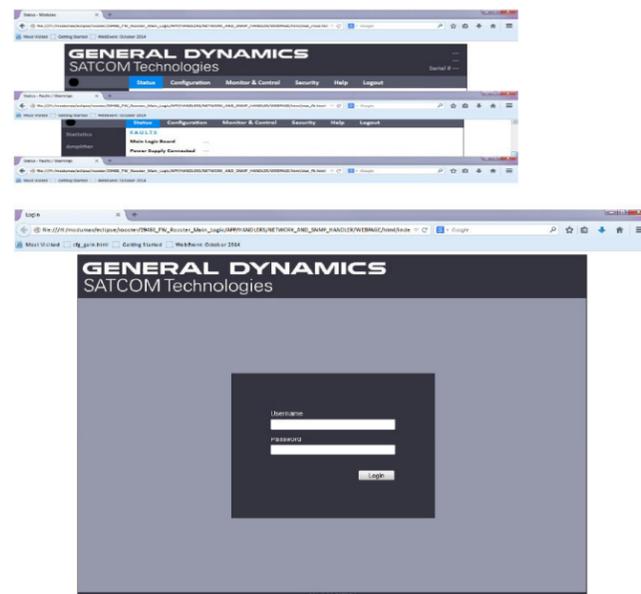
Any of the fans in the air-cooling system can be easily removed and replaced, without taking the SSPA off-line. Even the power supply is N+1 redundant, consisting of four hot-swappable plug-in modules, any three of which are fully capable of powering the entire amplifier.

## Power

System power is supplied by four identical power supply modules in an "N+1" configuration. If a module fails, the remaining three 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.

## 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 Page software package. The software can be configured for remote monitoring and firmware upgrades, while allowing virtual factory access to monitor the amplifiers modules key performance parameters such as temperature, current, and voltage measurements to individual component level. The software is on a SNMP v3 secure protocol base capable of issuing email alerts.



## Auto-Recovery

In the unlikely event of a RF module failure, auto-recovery software increases the gain level of the remaining on-line RF modules to compensate for the approximate drop of 2.5 dB output power. Unlike traditional switched redundant systems, the uplink power is not interrupted. Defective modules can be hot-swapped while the SSPA continues to operate.

## Sparing

Sparing costs are minimized by utilizing a prudent spares kit capable of covering numerous systems. Spare RF modules are affordable, since they contain only a fraction of the RF power transistors in the SSPA.

## Global EMC and Safety Compatibility

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

## Stand-Alone SSPA Specifications

Parameter	Notes	Min	Nom./Typ. <sup>†</sup>	Max.	Units
Frequency Range	Ku-Band, Extended	13.75		14.50	GHz
Gain, at Maximum Setting		65			dB
Gain vs. Temperature	0 to 50 °C		±0.5	±0.75	dB
Gain Adjust Range	Digital, 0.1 dB steps	20			dB
Gain Flatness	Full band Per 40 MHz			±1.0 ±0.3	dB dB
Saturated Power Output			+57.3 (540)		dBm (W)
Power Output, Linear (P <sub>LIN</sub> )		+54.3 (270)			dBm (W)
Two-Tone Intermodulation	At P <sub>LIN</sub>		-30	-25	dBc
Residual Noise, Ku-Band	13.75–14.50 GHz			-70	dBW/4 kHz
Group Delay	Linear Parabolic Ripple			0.03 0.003 1.0	ns/MHz ns/MHz <sup>2</sup> ns p-p
AM/PM Conversion	At P <sub>LIN</sub>		1.0		%dB
Second Harmonic	At P <sub>LIN</sub>			-50	dBc
Spurious	At P <sub>LIN</sub>			-70	dBc
VSWR	Input, Output		1.2	1.3	:1
Sample Ports	Input/Output		-10/-50		dBc
Power Requirements (single or 3-phase)	Voltage Frequency Power factor	180 47	0.98	264 63	Vac Hz
Power Requirement	Single or 3-phase prime power		5.5		KVA
Cooling System			Forced Air		
Operating Temperature	Ambient/inlet air	0		+50	°C
Storage Temperature	Non-operating	-45		+85	°C
Relative Humidity	Non-condensing			95	%
Altitude Derating	10,000 ft (3000 m) max		Derate 2 °C per 1000 ft (300 m)		
Size	System (12 U panel ht.)		19.00 W x 20.97 H x 29.50 D 483 W x 533 H x 749 D		inches mm
Weight	System		250 (113)		lb (kg)

<sup>†</sup>When there is only one value on a line, the Nom./Typ. column is a nominal value; otherwise it is a typical value. Typical values are intended to illustrate typical performance, but are not guaranteed.