

## GENERAL DESCRIPTION

The NWPA8892-65 is a high-reliable X-band Transmitter unit in a 19" rack mountable housing (height 5U) based on GaN Solid-State Power Amplifier (SSPA) modules. It provides a minimum of 3 kW peak output power within the desired frequency band. By customizing the design, the entire X-Band Radar Frequency Band ranging from 8.5 GHz to 10.55 GHz can be covered. Typically, the amplifier is operated in full saturation.



The unit accommodates a 3-phase power supply of 100 to 400 VAC input voltage. An internal power distribution system generates the required single-phase VAC lines required to power the four (4) hot-swappable 800W Field Replaceable Units (FRU). Each FRU is 4U compatible and has the capability of precise digital phase factory calibration. It also allows easy phase re-calibration in the field. Forced air fan cooling is incorporated in the unit. Sophisticated Control Logic enables remote sensing of Bias Conditions and RF power levels, as well as functional control (e.g. RF ON/OFF switching) via an Ethernet interface. Optionally, the unit can host a Control Graphical User Interface (GUI) via a standard web browser. Built-in-Test (BIT) capabilities allow easy troubleshooting of the hardware in the field. The Transmitter has an incorporated gate pulse shaper, which limits the maximum gate width and duty cycle to protect the RF hardware, as well as over-temperature and over-current detection and protective shutdown.

The unit has the option to be combined with another 3kW SSPA for a total transmit power of 6kW through an external combiner, which is sold separately.

## FEATURES

- High efficiency SSPA
- Full internal voltages, power and temperature monitoring
- High phase and pulse-to-pulse stability for good signal processing performance.
- Remote diagnostics and control through Ethernet interface
- Hot-swap FRU capability

## APPLICATIONS

- Weather Radar
- Coastal Surveillance Radar
- Ground Station Radar
- Naval applications
- Air Traffic Control (ATC)

## ELECTRICAL PARAMETERS

Parameter	Unit	Min	Typ.	Max	Remarks
Operating Frequency Range	GHz	8.8		9.2	1)
Peak Output Power	dBm		65.0		

### NANOWAVE Technologies Inc.

425 Homer Avenue  
Etobicoke, ON M8W 4W3  
Canada  
Phone: +1 416 252-5602  
Fax: +1 416 252-7077  
Email: sales@nanowavetech.com

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	W		3000		
Output Power Variation over Frequency	dB		± 1.0		@ test conditions described in 2)
Pulse Droop	dB			0.7	@ test conditions described in 2)
Small Signal Gain	dB		+59.0		
Gain Variation over Frequency	dB			± 1.0	Within 400 MHz bands
Reduced Power Transmission	dB	16.0			Difference between rated power at Pin = 0dBm and Pin = -30dBm
Input and Output VSWR			1.3 :1		3)
Input and Output Return Loss	dB			-15	
Pulse Width Capability	µs	2.5		350	Measured at 50 % points
Duty Cycle	%			20.0	Maximum
Rise and Fall Time	ns			200.0	
Overshoot	dB			0.7	Measured at 9GHz for test conditions in 2)
Inter-pulse noise level	dBm/Hz			-170 @ 1µS	Measured at 9GHz for test conditions in 2)
Noise Power Density	dBc			-70	
Harmonics Level 2 <sup>nd</sup>	dBc			-30.0	
In-Band Spurious Level	dBc			-60.0	NTIA conformal 4)
Pulse-to-Pulse Amplitude Stability	dBc			-42.0	Measured at 9GHz
Pulse-to-Pulse Phase Stability	dBc			-36.0	Measured at 9GHz
AC Power Consumption	kW			4.15	@ 20% duty cycle, 0dBm
Power Supply Voltage	V		400		3-phase / 60Hz

**Notes:**

- 1) Operation frequency band is custom designable
- 2) Test conditions: V<sub>AC</sub> = 400V (3-phase), Pulse Width = 100µs, Duty Cycle = 20%, Pin = 0dBm
- 3) The output can handle arbitrary load VSWR without degradation of the unit.
- 4) NTIA, Section 5.5 Criteria B, NON-FM Pulse Radars

## MECHANICAL AND ENVIRONMENTAL PARAMETERS

Parameter	Unit	Min	Typ.	Max	Remarks
Size (length, width, height)	Inches/ mm	26.09 x 19.00 x 8.73 / 682.69 x 482.60 x 221.75			5U 19" rack chassis compatible
Weight	Kg		67		
Operating Temperature Range	°C	+5		+45	
Cooling		Forced air through fans			
MTBF	Hours	110,300			87% of full Power (Graceful degradation: 1x 400W SSPA can fail out of 8) @Duty Cycle = 20%, 25°C
Operating Humidity	%			95	Noncondensing @ +45°C ambient temperature
Output RF Connectors	-	WR90			
RF Connector Input/Sample output		N-type Female			
Ethernet	-	RJ45			Interface for Network Management of Unit
RS-422 and Tx_Transmit control	-	DB-25 / micro-D9			Debug Port, unit management
Material					All plating and painting are RoHS compliant
Certification		UL/CE Certified			
Marking					Manufacturer name, model, serial number, date code

**Notes:** Specifications subject to change without notice.

**NANOWAVE Technologies Inc.**

425 Horner Avenue  
Etobicoke, ON M8W 4W3  
Canada  
Phone: +1 416 252-5602  
Fax: +1 416 252-7077  
Email: sales@nanowavetech.com

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## **COMMUNICATION AND CONTROL INTERFACE**

The default Control Interface is based on a SCPI command protocol. Optionally, the SSPA can be monitored and controlled via a web Graphical User Interface (GUI). The communication is established once the unit is connected to an Ethernet TCP/IP port to a LAN. In addition, there is a LVTTTL Debug Interface for easy communication and on-site transmit control. The embedded control system runs a proprietary RTOS, while having a built-in memory for event recording and logs, and factory setup features. Optionally, higher-level communication protocols (e.g. MODBUS, CAN-Bus) can be implemented.

The unit is built by four Field Replaceable Unit (FRU) that can be independently configured, monitored, and controlled. Moreover, each FRU has a front panel status monitor display and it is hot-swappable.

Monitored parameters are:

- Temperatures
- Voltages and Currents
- Over-Current and Over-Temperature Failures
- RF Power OK
- General System Status

The following functions can be remote controlled:

- RF Power ON / OFF
- Transmitter Reset
- Threshold Settings
- Setup for possible graceful degradation
- SSPA Standby / Operate (optional)
- (further options on request)

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## OUTLINE DRAWING

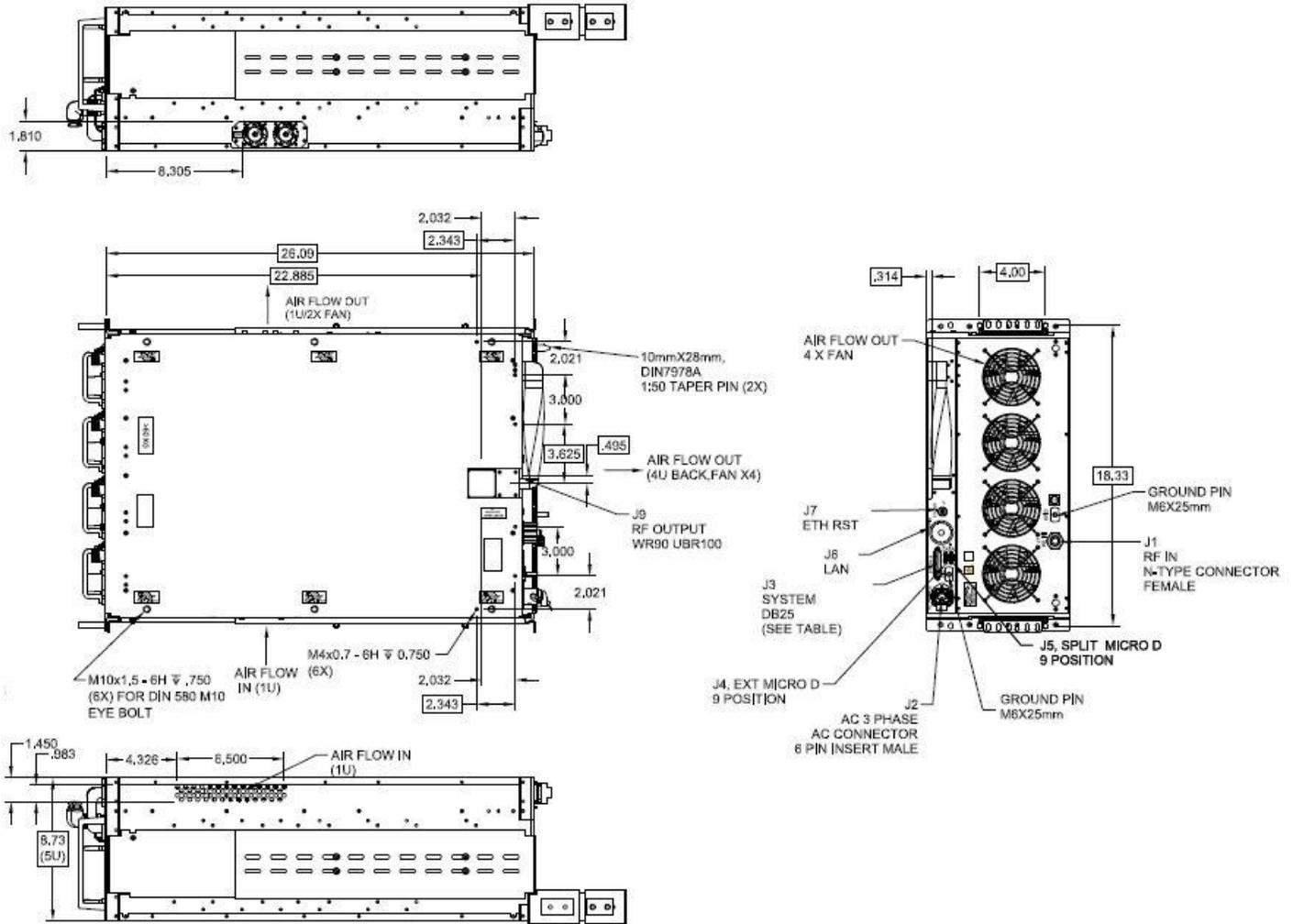


Fig 1: Outline Drawing of 3KW X-Band Transmitter Unit

### Notes:

The outline of this SSPA unit is fully customizable. Arbitrary shapes are possible to accommodate form-fit functionality.

## ADDITIONAL FEATURES

- Marking: The unit is marked with manufacturer part no., date code, and Serial Number.
- All plating and painting is RoHS compliant

For further information please contact NANOWAVE Technologies Inc. at [sales@nanowavetech.com](mailto:sales@nanowavetech.com), or call at (+1) 416-252-5602