

# MODEL NIGHTHAWK

## *Fast Switching Series*

### 225-450 MHz

### 20 WATTS CW/PEP

**NIGHTHAWK** is the first booster in **AR Modular RF's** new line of fast switching amplifiers. Featuring an innovative, digital domain architecture, **AR Modular RF** fast switching amplifiers are designed to support the modern, fast T/R switching digital communications protocols employed by the leading tactical radios. With turnkey, fully automatic operation, **NIGHTHAWK** performance is unmatched.

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#### **Key Features:**

- Fast T/R Switching – *under 2  $\mu$ s*
- Fully Automatic, Auto-Sensing, T/R Switching Booster Amplifier with Automatic Harmonic Suppression
- High Duty Cycle – 90% at 25°C, Indefinitely
- Mobile Form Factor
- IP67 Rated
- NVG Compatible Interface
- Battery & Vehicle Operation
- Radio & Waveform Agnostic
  - AM, FM, Narrowband, Wideband
- Turnkey Operation
- Fixed Gain, Linear Amplification
- Protections:
  - Input Overdrive
  - Antenna mismatch
  - Over Temperature

#### **Future Features:**

- *Tethered Operation*
- *Customizable Default Settings*
- *Configurable Gain – Gain Control (GC)*
- *Configurable Maximum Level Control (MLC)*
- *Configurable Fixed Output Power - Automatic Level Control (ALC)*
- *Fan Kit Support*



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The following specifications apply to the **AR Modular RF** booster model **NIGHTHAWK** – a standard amplifier providing **20 Watts** output power from **225 to 450 MHz** with pass-through support outside of this band.



## PERFORMANCE SPECIFICATIONS – NIGHTHAWK

### RF

SPECIFICATION		Unit	Minimum	Typical	Maximum	Notes	
Amplifier Class		-	A/B			Modulation: AM, FM, Narrowband & Wideband	
Frequency Response		MHz	30	225	-	Full Duplex – <i>no TX/RX gain</i>	
			225	-	450	Active TX/RX	
			-	450	2600	Bypass – <i>no TX/RX gain, minimum loss</i>	
Maximum Limits	Radio Port	W	-	-	5	Damage may occur above this level	
	Antenna Port		-	-	5	Damage may occur above this level – <i>during RX mode</i>	
	Overdrive Threshold	dB	Rated Input plus 3 dB (typical)			Amplifier switches to bypass upon Overdrive	
T/R Switching	TX Keying Threshold	dBm	15 ± 3			Independent of rated input power	
	f <sub>1</sub> ↔ f <sub>1</sub>	T/R	μs	-	-	2.0	Non-frequency hopping; 225 through 450 MHz; To 90% Signal Power
		R/T	μs	-	-	2.0	
	f <sub>1</sub> ↔ f <sub>2</sub>	T/R	μs	-	-	10.0	Frequency hopping; 225 through 450 MHz; To 90% Signal Power
		R/T	μs	-	-	10.0	
	Active ↔ Bypass	ms	-	-	5	Automatic switching between Active TX/RX and Bypass modes for frequencies above 225 MHz; Automatic switching below 225 MHz is not guaranteed ( <i>see Manual for details</i> )	
Bypass	-	Instantaneous			Full Duplex – <i>no TX/RX gain, minimum loss</i>		
Transmit	Rated Output Power	W	20	-	32	Rated output power achieved at rated input power	
		dBm	43	-	45		
	Input Power for Rated Power	W	0.1	-	2.0	Rated Input Power (and subsequent gain) is factory configurable to achieve 20 Watts output power – See <b>Ordering Information</b> for details	
		dBm	20	-	33		
Gain	dB	10	-	25			
Receive	Loss	dB	-	1.5	2	Active RX Path – <i>passive, no LNA, 225 to 450 MHz</i>	
	Noise Figure	dB	-	3	10		
Insertion Loss Passive Bypass (TX & RX)		dB	-	-	1.5	30 to 225 MHz	
			-	-	1.0	225 to 450 MHz	
			-	-	1.5	450 to 1000 MHz	
			-	-	4.0	1000 to 2000 MHz	
			-	-	5.0	2000 to 2600 MHz	
Radio / Antenna Port Impedance	Ohm	-	50	-			
VSWR Tolerance	-	-	-	Infinite	Protections against mismatch; Power delivered to load may be reduced or unit may switch to bypass		
Spurious Outputs	dBc	-	-	-55	@ Rated output, < 100 kHz from carrier, 10 Hz RBW		
		-	-	-70	@ Rated output, > 100 kHz from carrier, 10 Hz RBW		
Harmonic Performance	dBc	-	-	-60			
<i>RF performance metrics guaranteed at rated input power and 25°C</i>							

### THERMAL

SPECIFICATION	Units	Details	Notes
Duty Cycle	%	90	At ambient temperature of 25°C or below, indefinitely
		<i>See Application Note TBD</i>	Duty cycle dependent on ambient environmental conditions, modulation (FM vs AM) and signal period

## PRODUCT DETAILS – NIGHTHAWK

### DC POWER

SPECIFICATION	Units	Typical @ 24 VDC	Mode
Power Consumption	W	85	Transmit – <i>at rated input power</i>
		16	Receive
		12	Bypass
		4	Standby ( <i>see Manual for details</i> )

### MECHANICAL & ENVIRONMENTAL

SPECIFICATION	Units	Details	Notes
Size	Inches	5.0" W; 3.0" H; 6.00" L	Not including connectors
		5.0" W; 3.0" H; 6.85" L	Including connectors
Weight	lbs	4.5	
Ambient Operating Temperature	°C	-30°C to +60°C	See Application Note TBD for derating information
Relative Humidity	%	95	Maximum, non-condensing
Cooling	-	Passive	Natural Convection / Radiation
Immersion (water)	-	IP67	Waterproof to 1 M to 30 minutes minimum

### INTERFACE & CONTROL

The **NIGHTHAWK** has interface and control elements on both the front and rear panels. The amplifier can be used standalone (only RF and DC power connections) but will support tethered operation in systems desiring, or requiring, advanced control and monitoring following the release of more advanced product features.

Interface	Panel	Details	Notes
Radio Connection	Rear	TNC-F	RF ports; Alternate connector options possible
Antenna Connection	Rear	TNC-F	
DC Power Connection	Rear	High-density, Multipin Circulator Connector	Compatible with Nett Warrior connectors
Remote Monitor & Control	Front	High-density, Multipin Circulator Connector	USB, Custom high-speed digital (LVDS, open collector) and analog & digital interfaces available
Local Monitor & Control	Front	OLED Display, Buttons	Local interface to support monitoring and control of amplifier functions via OLED display and push buttons. Standard interface ( <i>see Manual for details</i> ): <ul style="list-style-type: none"> <li>• Power State (ON/OFF, if DC applied)</li> <li>• Current Operation Mode: <ul style="list-style-type: none"> <li>○ Active TX/RX – <i>normal operation</i></li> <li>○ Bypass / Fault</li> </ul> </li> </ul>

### PERFORMANCE STANDARDS

**AR Modular RF** booster amplifiers can be designed to meet many military standards including, but not limited to:

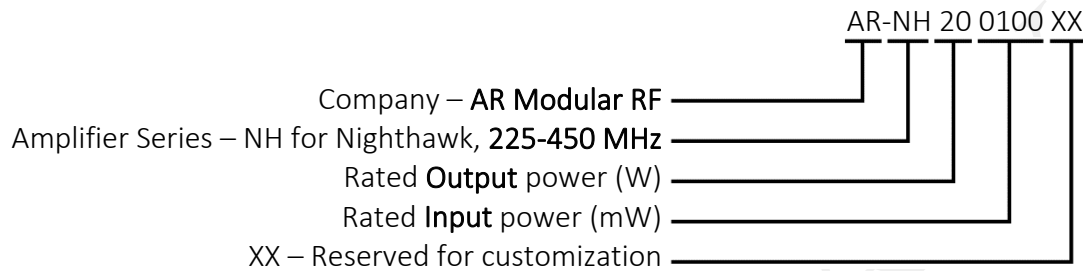
- MIL-STD-810x
- MIL-STD-461x
- MIL-STD-1399x
- MIL-STD-1275x

*Please speak with your AR Modular RF Sales Representative compliance to these or any other standards is required.*

**ORDERING INFORMATION – NIGHTHAWK**

MODEL NUMBER	BASIC SPECIFICATIONS
AR-NH200100XX	Standard model, 20 W rated output, 100 mW rated input
AR-NH200250XX	Standard model, 20 W rated output, 250 mW rated input
AR-NH200500XX	Standard model, 20 W rated output, 500 mW rated input
AR-NH201000XX	Standard model, 20 W rated output, 1 W rated input
AR-NH202000XX	Standard model, 20 W rated output, 2 W rated input

**Model Numbering Codes:**



PRELIMINARY