

## HPA Series

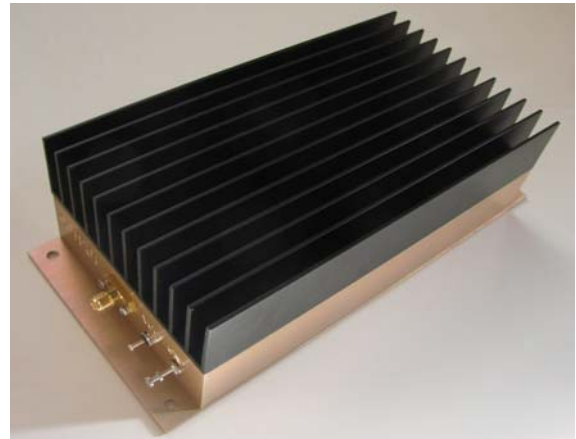
## 130-180MHz 20-28W RF Power Amplifier

### Features

- Frequency Range: 135-175MHz (min)
- Gain: 38.5dB (typ.)
- P<sub>3dB</sub>: > +43.0dBm
- P<sub>sat</sub>: > +44.5dBm
- DCpower: 12V (nominal), 9-15V OK
- SMA-Female connectorized
- Typ. for Mobile Radio, HAM Radio, etc

cooling is capable of **28Watt RFpower out** (@P<sub>sat</sub>), under *special (non-standard) warranty*.

### Photo



### Description

HPA-155 is a 20Watt output (min. @P<sub>3dB</sub>) RF Power Amplifier; within frequencies of 135 to 175MHz; operating from a single 12VDC power supply. Also usable within 130-180MHz, 9-15VDC (not recommended). With proper (active)

### Electrical Specifications @ +25°C, Z<sub>in</sub>=Z<sub>out</sub>=50Ohm, V<sub>supply</sub> = +12VDC

**IMPORTANT: MUST USE ACTIVE COOLING IF CASE TEMP. EXCEEDS 65°C or to ACHIEVE MAX. RFpower Output over 16W upto 28W (over +42dBm upto +44.5dBm).**

Parameter	Unit	Minimum	Typical	Maximum
Frequency Range	MHz	135 [130]		175 [180]
Small Signal Gain	dB	37.6	38.5	40.4
Output Power - 3dB gain compr. (P <sub>3dB</sub> )	dBm	42.5	+43	
Output Power - saturated (P <sub>sat</sub> )	dBm	+44.0	+44.5	
Reverse Isolation (S12) @155MHz	dB		-54.0	-51
VSWR - Input (S11)	ratio:1	1.1 @140MHz	1.5 @155MHz	2.3 @175MHz
VSWR - Output (S22)	(unitless)	2.0 @148MHz	2.2	2.6 @135MHz
VSWR - Load Tolerance (non-destructive)	ratio:1			18:1
Efficiency @155MHz & P <sub>out</sub> in dBm	%	<26 @P <sub>out</sub> <+40	34 @P <sub>out</sub> +42	45 @P <sub>out</sub> +44
DCpower Supply - voltage (unipolar, positive)	V	9 not recommended	<b>12</b>	15 not recommended
DCpower Supply - current: quiesc. (no RF)	A	1.8	2.0	
@P <sub>out</sub> = +40dBm	A		3.2	3.9



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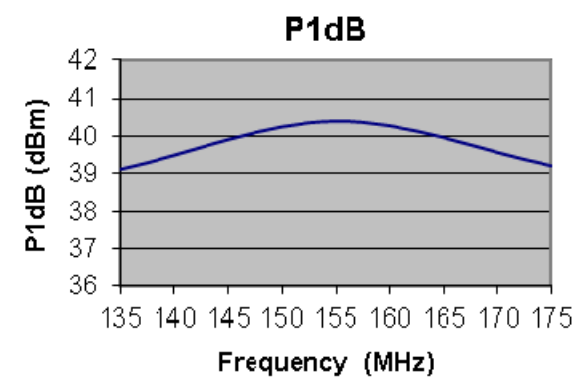
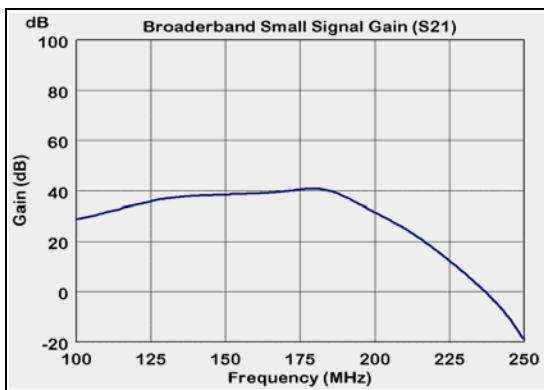
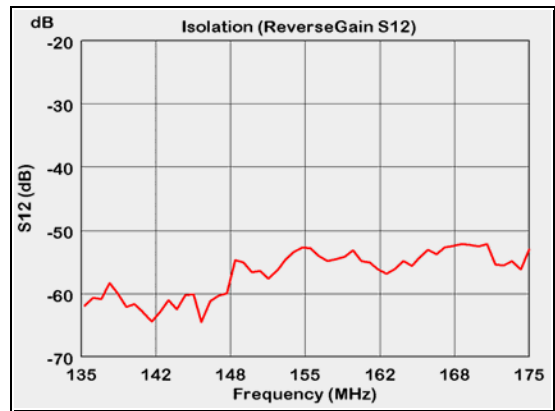
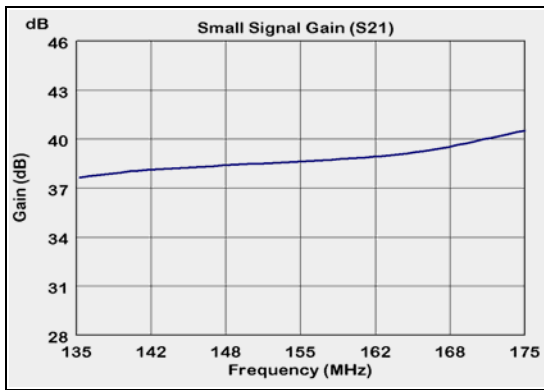
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Size (incl. all hardware & heatsink [standard])	Inch	7.00 (L) x 3.25 (W) x 2.00 (H)
Weight (incl. all hardware & heatsink [standard])	Oz	24

### Typical Performance @ +25°C

(download)

(Power & S-parameters also available for



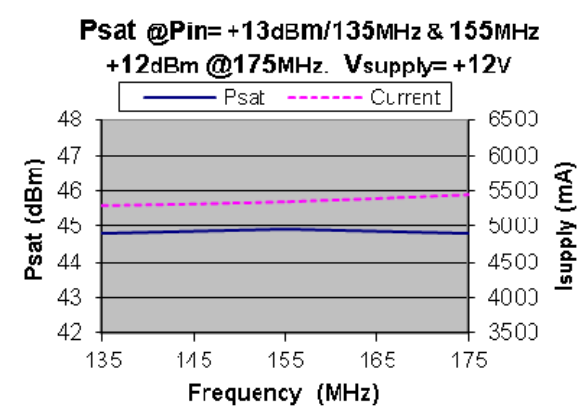
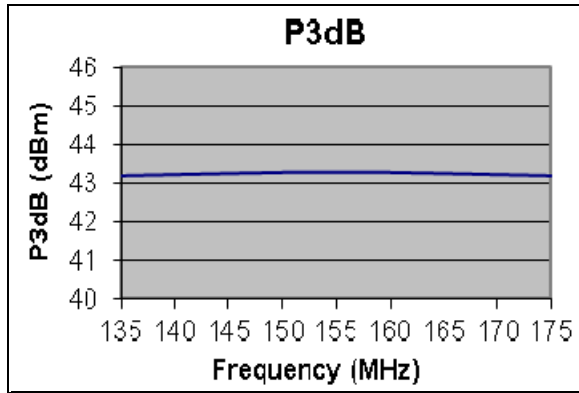


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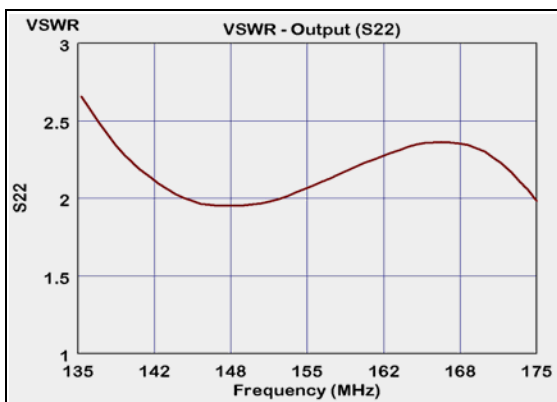
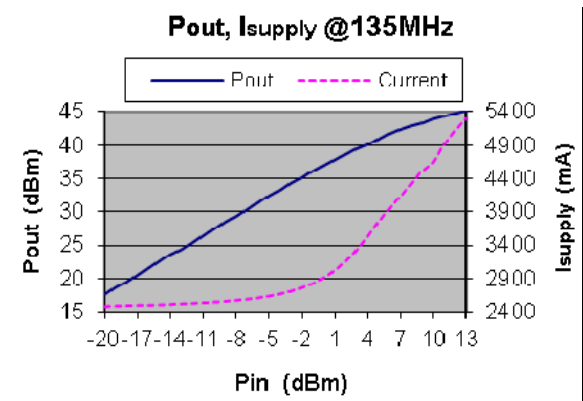
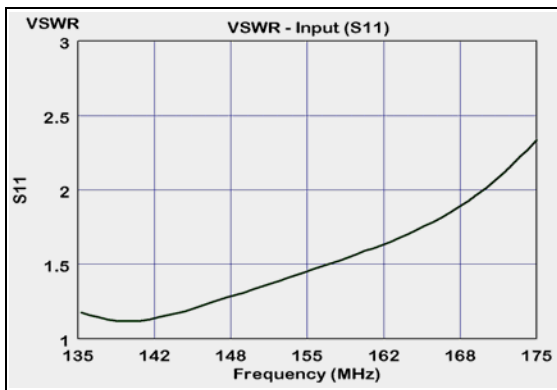
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### Typical Performance @ +25°C (download)

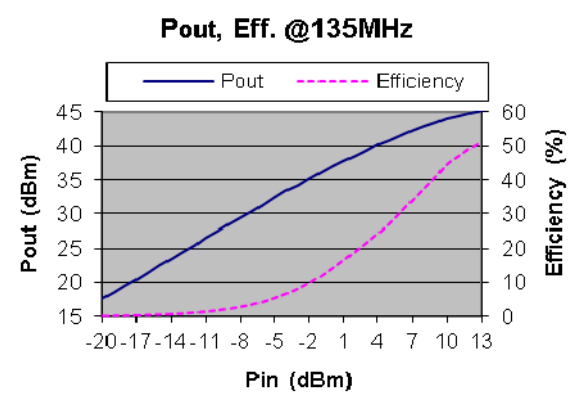
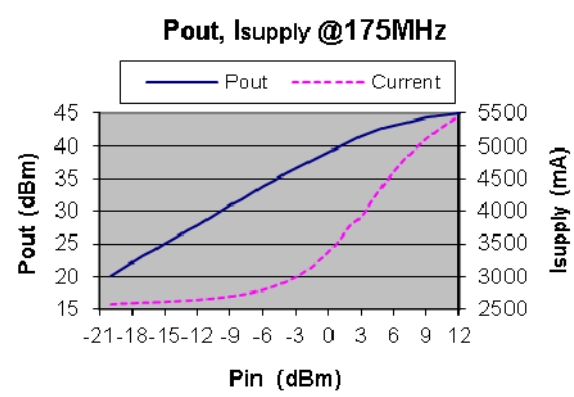
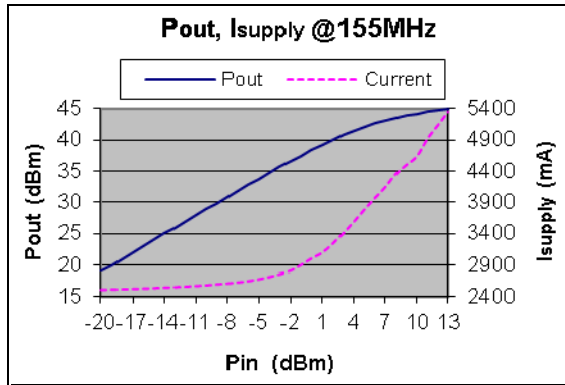
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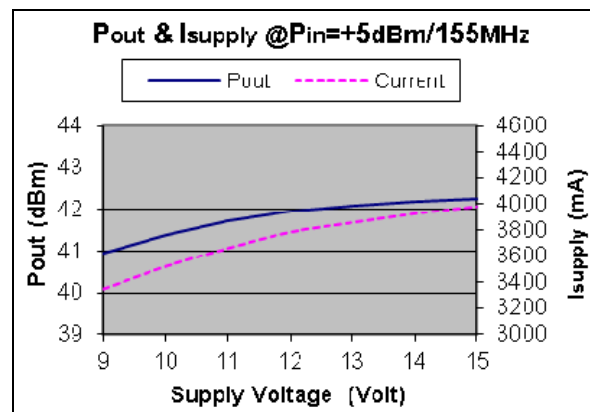
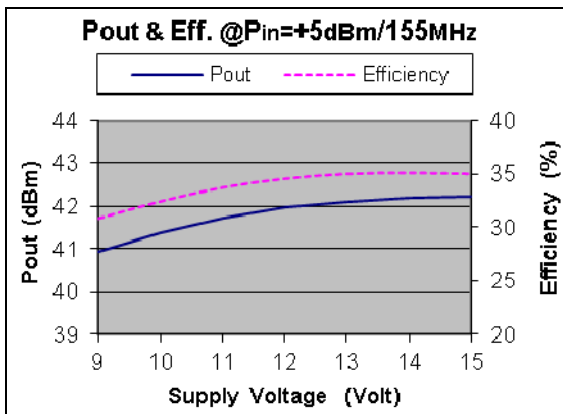
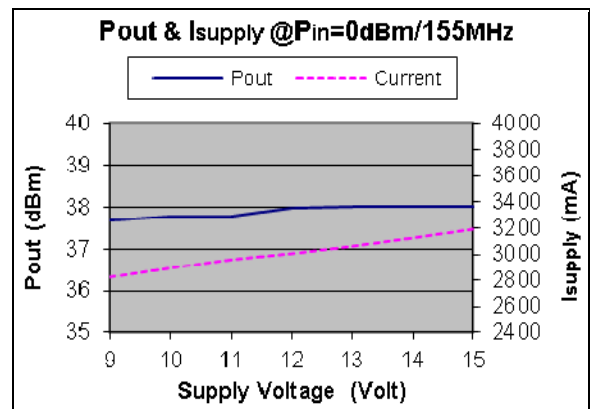
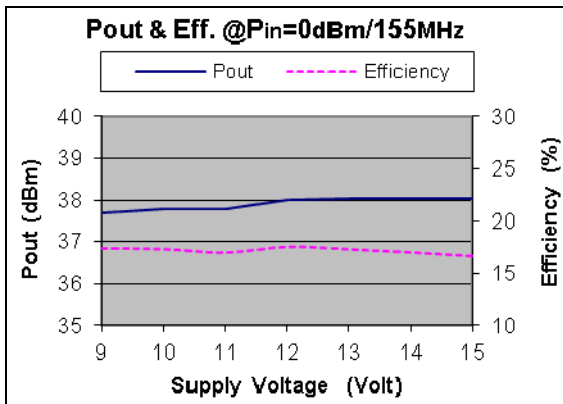
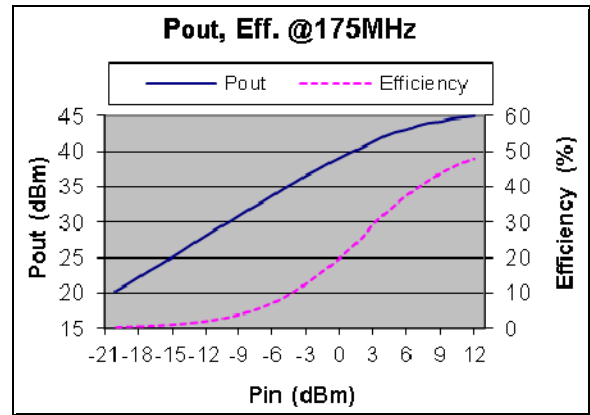
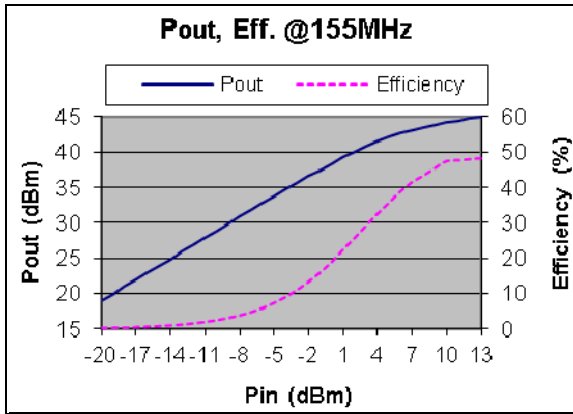




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### Typical Performance @ +25°C



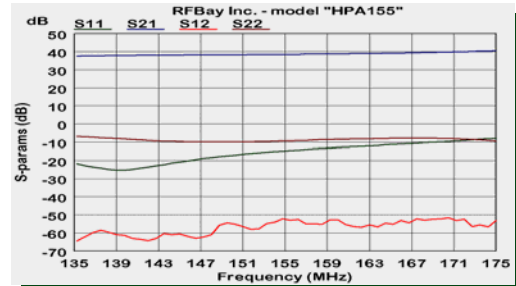


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### Absolute Maximum Ratings

Parameter	Absolute Maximum
RF Input Power	+15dBm
Supply Voltage	+16V
Operating Temperature	-30 °C to +65 °C
Storage Temperature	-55 °C to +100 °C



The above parameters are independently guaranteed and are @Tcase <23°C, unless otherwise specified

### APPLICATION NOTES (reliability):

#### • Thermal:

Specifications shown above as graphs, are at room temperature (23-25°C i.e. in a controlled environment), per international standard. If Amplifier's temperature is let rise significantly (e.g. towards max. 65-70°C) in customer's use, DCpower (supply) current may rise and stabilize at approx. 200-450mA higher values vs. shown in graphs, especially if at the same time RF PowerOut is driven beyond approx. 12Watt (contributing to selfheating, besides ambient temperature) - which is normal. Such increase in DCsupply current due to higher than standard ambient temperature, is less pronounced at low RF PowerOut; at below 1Watt it may add less than 90mA vs. current @25°C. Amplifier is designed to operate normal at **ANY** temperature or RF PowerOut within specs, this notice is only a recommendation to expect higher DCcurrent if user allows heat build-up far above standard 25°C.

Stock Heatsink is removable & upgradeable by the user, additionally Mountplate (opposite of heatsink) is strongly recommended to mount on a surface conducting heat away (e.g. mass of metal); some customers use active cooling such as fans (for extreme environment, even liquid cooling is an option), however be careful to not generate ElectroStatic Fields harmful for RF/Microwave devices. Use of inadequate Heatsink or HeatSpreader instead of stock, or inappropriate thermal-interface-material (TIM, i.e. grease, paste, semi-solids) voids warranty; *RF Bay Inc.* reserves the right to determine if a unit submitted for warranty service had been thermally abused. The key to reliability, is not only to minimize temperature rise, but also avoid repetitive thermal gradient (shock) due to cold-hot-cold cycling; these Amplifiers are meant for Commercial (rather than Mission-Critical) Mobile communications; in particular in Base & Fixed station applications with long-term continuous transmission and a higher On-Off frequency, please consider derating, redundancy system, maintenance schedule, or otherwise assure reliability.

#### • Oscillation & Load VSWR:

This amplifier's rugged design can withstand Load VSWR mismatch upto 18:1 (no degradation/destruction), guaranteed stable (no parasitic self-oscillation) for Pout<30Watt & Load VSWR under 3:1. If oscillation is observed, check if Load & Source impedances  $Z_L = Z_S = 50 \text{ Ohm}$ ; adding DCpower decoupling ceramic + electrolytic capacitors (in parallel, closest possible to amplifier & minimal parasitic inductance to Ground) may help but not necessary, because already present internally.

#### • ESD:

Sensitive to ESD voltages to approx. 1KiloVolt - as typical for RF/Microwave amplifiers, appropriate ESD precaution is required.



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### • Mounting & DCpower connection:

Avoid excessive or torque (twisting) force onto DC terminals

### Outline (compact version)

Also available as a standalone higher-resolution 3Dmodel (MCADsolid) & 2Ddrawing - see "Notes" on compact drawing (below):

