

# High-Power Outdoor C-, X-, and Ku-Band Power Amplifier



## INTRODUCTION

Comtech EF Data's (CEFD) series of High-Power Outdoor (HPOD) C-, X-, and Ku-Band Solid-State Power Amplifiers (SSPA) provide a cost effective, more reliable replacement for TWT amplifiers in satellite communications terminals.

The HPOD delivers its rated power, guaranteed, at the 1 dB compression point, to the transmit waveguide flange.

## FIELD REPLACEABLE POWER SUPPLY

Recognizing that the MTBF limiting factor for almost all electronic equipment is the power supply, the HPOD provides for easy field replacement. Simply disconnect the AC mains, release the captive fasteners, and remove the supply from the SSPA module.

## THE SOLID-STATE ADVANTAGE

Each HPOD SSPA is constructed with highly reliable GaAs FETs. With third order intermodulation products from 4 to 6 dB better than TWT ratings, the CEFD unit replaces TWTs with saturated power levels of up to twice the HPOD's rated output. The HPOD SSPA also provides an MTBF that is 4 to 5 times greater than the typical TWT MTBF.

## FUNCTIONAL DESCRIPTION

An HPOD consists of an SSPA module with the Monitor/Control Processor (MCP), a field replaceable power supply, and a field replaceable fan assembly. The amplifier features a Comtech EF Data low loss combining technique and MCP-based temperature versus gain compensation.

## REDUNDANT SYSTEMS

Comtech EF Data's HPOD amplifiers were designed from the start to provide cost effective 1:1 or 1:2 systems. Redundant system control is built into the unit, eliminating an external controller with its associated cabling. This provides a cost benefit to our customer both at initial purchase and at installation.

## HIGHER POWER THROUGH PHASE COMBINING

Comtech EF Data's phase-combined systems allow the outputs of two amplifiers to be summed together. A "normal" 1:1 system using 300W amplifiers provides 300W of output power (the offline unit's capabilities are unusable). The same amplifiers in a 1+1 phase-combined system will provide 600W of output power in normal operation, and a "soft failure" state of 300W. If no degradation on failure can be accommodated, a third amplifier can be added to form a 1:2 phase-combined system.

## OPTIONAL "SMART BUC" FUNCTIONALTY

CEFD's unique approach to L band/RF frequency conversions eliminates DC and 10 MHz from the input coax. This greatly simplifies redundant and multi-carrier operation. It offers full 13.75 to 14.5 GHz Ku coverage and supports industry standard FSK modem/BUC communications. The optional BUC can lock to an external or internal reference oscillator.

## FEATURE PACKED

Comtech EF Data's HPOD SSPAs come equipped with useful features that other manufacturers offer as options. Included in each unit's base price are temperature compensation, sample ports, power monitor, field-replaceable power factor corrected supply, and full remote monitor and control capabilities.

# High-Power Outdoor C-, X-, and Ku-Band Power Amplifier

## SPECIFICATIONS

### Output

Frequency	<u>C-Band</u>	<u>X-Band</u>	<u>Ku-Band</u>
	5.850 to 6.425 GHz	7.9 to 8.4 GHz	14.0 to 14.5 GHz
	5.850 to 6.725 GHz (Optional)		13.75 to 14.5 GHz (Optional)
Available Power: Outputs P1dB (P <sub>sat</sub> ), Watts (See Note)	<u>C-Band</u> 200(250) 250(300) 350(400)	<u>X-Band</u> 175(200) 200(250) 282(350)	<u>KU-Band</u> 80(100) 100(125)
Phase Combined Systems P1dB (P <sub>sat</sub> ), Watts (See Note)	400(500) 500(600) 700(800)	350(400) 400(500) 550(700)	160(200) 200(250)
Mute	-60 dBc		
Impedance	50Ω		
VSWR	1.25:1 Maximum		
Connector	<u>C-Band</u> CPR-137G Waveguide	<u>X-Band</u> CPR-112G Waveguide	<u>Ku-Band</u> WR75G Waveguide

### Gain

Linear	<u>C- and X-Band</u>	<u>Ku-Band</u>
	70 dB min, 75 dB typical	65 dB min, 70 dB typical
Adjust	20 dB in 0.25 dB steps	
Full Band	± 1.0 dB	
Per 40 MHz	± 0.25 dB	
-40 to +55°C	± 1.0 dB	

### Third Order Intermodulation

Products	-30 dBc typical, -25 dBc max @ 3 dB total back-off from rated P1dB (two tones, Δf = 1 MHz)
----------	--

### AM to PM Conversion

2° typical, 3.5° maximum at rated output

### Group Delay (per 40 MHz)

Linear	± 0.03 ns/MHz
Parabolic	± 0.003 ns/MHz <sup>2</sup>
Ripple	± 1.0 ns peak to peak

### Spurious

Second Harmonic	<u>C- and X-Band</u> -60 dB dBc max @ 1 dB below rated output
-----------------	--

Note: P1dB over all temp/frequencies, P<sub>sat</sub> typ., Derate power by 1dB over 6.425 to 6.725 and 13.75 to 14.5 GHz



HPOD shown with field replaceable power supply removed.

Impedance	50Ω
Noise Figure	8 dB typical, 10 dB maximum @ maximum gain (15 dB for HPOD Ku-Band)
VSWR	1.25:1 Maximum
Connector	Type N

### Sample Ports

Output Sample	Type N, 50Ω, -40 dBc nominal
Input Sample	Type N, 50Ω, -20 dBc nominal

### Remote Control

Com Port	RS-485 or RS-232
----------	------------------

### Alarms

Summary Fault	Form C
---------------	--------

### Environmental

Operating Temp.	-40° to +55°C (-40° to 131°F)
Non-Operating Temp.	-50° to +75°C (-58° to 167°F)
Operating Humidity	0 to 100% condensing
Altitude	10,000 ft above sea level (derated 2°C/1000 ft AMSL)

### Power Requirements

	<u>C- and X-Band</u>	<u>Ku-Band</u>
	180 to 264 VAC,	180 to 264 VAC,
	47 to 63 Hz	47 to 63 Hz

### Physical

Dimensions	26.77L x 17.88W x 11.49H inches (67.99L x 45.41W x 29.18H cm)
Weight	75 lbs (34 kg) nominal

### Available Options

Optional BUC

