

# C-Band Gen IV Klystron High Power Amplifier for Satellite Communications

## The Gen IV High Power Amplifier

*C-Band Gen IV— provides up to 3.35 kW of power in a dual drawer package*

### Unmatched Efficiency

Uses less power and produces less heat than any other K-HPA. Features Power Saver and Power Tracker, optimizing K-HPA efficiency to meet your operating condition.

### New Features and Options

Scopescreen provides a graphical log display. The Ethernet Option provides higher speed connections, can update and coordinate all clock settings, and enables a snapshot feature where user can create a file containing all settings, alarms and faults at a single point in time. Additional Uplink Power Control option can drastically reduce capital costs.

### Unmatched Size

Greater efficiency and exceptional thermal margins have enabled CPI to design the smallest KPA on the market --- without the threat of overheating or a shorter klystron life.

### Greater Reliability

Low temperatures are the key to longer lifetimes for klystrons and electronic parts. The CPI power supply design and high efficiency, multi-stage depressed collector klystron make these lower temperatures possible.

### Useful Displays

Large, high quality, color, graphical display has a wide viewing angle and sharp appearance. All important functions are clearly displayed, and an event log is included.

### Integrated Protection Switching

Redundant switch controller eliminates the cost of external controllers. System status is shown on the display and switch controls are implemented locally on the front panel touch-pad, or remotely via the digital serial interface.

## C-Band



### Easy Maintenance, Easy Handling

All areas of the amplifier are easily accessible and there are no large harnesses to get in the way. Separate RF and Power Supply drawers slide out from a standard rack.

### Acoustically Quiet

The quietest K-HPA in the industry.

### Worldwide Support

Backed by over three decades of satellite communications experience, and CPI's worldwide 24-hour customer support network that includes eleven regional factory service centers.

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C-Band

Gen IV Klystron High Power Amplifier

## SPECIFICATIONS, C-Band Gen IV

### Electrical

Frequency Ranges	5.85 - 6.425 GHz; others available as options
Klystron Power Output	3.35 kW min. (65.2 dBm)
Amplifier Output <sup>1</sup> at flange with harmonic filter	2.88 kW min. (64.6 dBm)
Bandwidth	45 MHz; 80 MHz available as an option.
Power Adjustability	0 to -20 dB of output with $\pm 0.1$ dB typical resolution
Gain at Rated Power	77 dB min.
Gain Stability vs. Time	$\pm 0.25$ dB/24 hr. max. at constant drive and temperature
Gain Stability vs. Temp.	1 dB max. from 20° to 40°C; $\pm 2.5$ dB max from 0° to 50°C (at constant drive)
Gain Slope (at rated power)	0.04 dB/MHz max. over $F_o \pm 13$ MHz ( $F_o \pm 18$ MHz with 80 MHz option)
Gain Variation (at rated power)	0.4 dB pk-pk $\pm F_o$ 13 MHz ( $F_o \pm 18$ MHz with 80 MHz option)
Input VSWR	1.25:1 max.
Output VSWR	1.30:1 max.
Load VSWR	2.0:1 max. for full spec. compliance; any value for operation without damage
Residual AM <sup>2</sup>	-50 dBc maximum, 20 to 400 Hz -60 dBc maximum, 400 Hz to 2 kHz -80 dBc maximum, 2 kHz to 500 kHz
AM/PM Conversion (at rated power)	4°/dB maximum
Harmonic Output with filter: without filter:	-80 dBc -35 dBc
Noise and Spurious (at rated gain)	-135 dBW/4 kHz, 3.7 to 4.2 GHz -70 dBW/4 kHz, in passband -110 dBW/MHz, 4.2 to 40 GHz (excluding passband)
Phase Noise <sup>2</sup>	Exceeds requirements of IESS-308/309 by -10 dB at -10 dB backoff.
Intermodulation	-29 dBc with two equal carriers at total output 7 dB below rated single-carrier output
Group Delay	In any 36 MHz band (72 MHz for 80 MHz klystron): 0.25 ns/MHz linear max. 0.05 ns/MHz <sup>2</sup> parabolic max. 2.0 ns pk-pk ripple max.
Primary Power <sup>3</sup>	All ratings are $\pm 10\%$ , 47-63 Hz 3-phase with neutral and ground: 200 VAC (without neutral) 208 VAC 380 to 415 VAC 480 VAC

<sup>1</sup> Harmonic filter can be removed as an option. Add 0.25 dB to amplifier output for units ordered without harmonic filter.

<sup>2</sup> Prime power AC line unbalance not to exceed 3%. Excess imbalance may cause an increase in residual RF noise (AM, FM and PM). Phase noise increase is typically 2.5 dB / % imbalance.

### Electrical (continued)

Power Consumption <sup>4</sup>	9.5 kW max. Typical values for the following RF output backoffs with respect to rated (power saver off): 8.9 kW @ 0 dB (rated) 6.6 kW @ -4 dB 5.6 kW @ -7 dB 5.2 kW @ -10 dB 4.8 kW @ -13 dB
Power Factor	0.95 min.
Inrush Current, peak	180% of normal line current peak max. (first half cycle only)

### Mechanical

RF Input Connection	Type N female
RF Output Connection	CPR137F flange
RF Power Monitors	Type N female
Dimension (W x H x D without fans and handles)	
RF Drawer	19 x 17.5 x 28 in. (483 x 445 x 711 mm)
PS Drawer	19 x 8.75 x 24 in. (483 x 223 x 610 mm)
Weight	
RF Drawer	160 lbs w/klystron (72.6 kg)
PS Drawer	100 lbs (45.4 kg)
Cooling	Forced air with integral blower and fans; separate klystron collector cooling path
Air Flow Rate, Klystron	175 cfm min., at sea level
External Ducts Backpressure	0.5 inch water gauge total, maximum
Klystron Heat Loss <sup>5</sup>	5300 W max.
Heat Loss in Room (cabinet less Klystron)	2000 W max.
Acoustic Noise	63 dBA nominal, measured 3 ft. from front of equipment

### Environmental

Ambient Temperature	-10° to +50° operating; -40° to +80° non-operating
Relative Humidity	95%, non-condensing
Altitude operating:	10,000 ft. (3000 m) with standard adiabatic temp derating of 2°C/1000 ft. or 6.5°C/km
non-operating:	40,000 ft. (12,000 m)
Shock and Vibration	As normally encountered in satellite earth stations and shipping

<sup>3</sup> AC current harmonic content: less than 20%, primarily fifth and seventh harmonics. Harmonics must be considered when choosing UPS sources.

<sup>4</sup> Lower power consumption can be achieved if power saver (included as standard) is employed when operating below rated output power.

<sup>5</sup> For 3.35kW klystron.

### OPTIONS:

- *Motorized Channel Selector: (<1 second)*
- *Remote Control Panel*
- *80 MHz Bandwidth*
- *Linearizer*
- *L-Band Block Upconverter (BUC) (Contact factory for typical performance specifications with integrated BUC)*
- *Ethernet Interface*
- *Uplink Power Control*



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not up in the air

Please check CPI's web site to ensure most current data sheet.

For more detailed information, please refer to the corresponding CPI Technical Description.

Note: Specifications may change without notice as a result of additional data or product refinement.

Please contact CPI before using this information for system design.



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