



500W C-Band 5RU SSPA Chassis

Teledyne Paradise Datacom's Indoor, Rack Mount (R) series SSPAs represent the latest in High Power Microwave Amplifier Technology. The 5RU SSPA chassis achieves the highest power density in the industry along with enhanced maintainability.

Local control is available with a front panel color touchscreen display, with a menu structure full of useful functions. Five fault condition indicators reflect some of the SSPA major faults states. The amplifier icon on the mimic panel turns green when the amplifier is in Online mode (1:1 Mode). Local/Remote and Mute/Unmute indicators show the current control mode and mute state of the amplifier.

Serial and parallel (contact closure) control is also available from the rear panel. Our free Universal M&C software allows monitor and control of the SSPA from a remote computer.

A state of the art thermal platform provides efficient cooling for the amplifier module and power supplies. This ensures the highest possible MTBFs for microwave power amplifiers.

Prime power to the amplifier is provided by a separate, external power supply in an N+1 redundant configuration. A failure of one power supply module will not take the amplifier off the air.

FEATURES

- Extremely High Power Density:
to 500 W C-Band
- Removable Fan Tray and Monitor & Control Card Assembly
- Remote Communication via RS232/485 or Ethernet
- RF Output Sample Port
- 20 dB Gain Adjustment
- 1RU N+1 Power Supply
- Color Touchscreen Display
- True RF Output Power Measurement
- Built-in Maintenance Switch Controller
- Hot/Cold Standby operating modes for reduced power consumption

OPTIONS

- Remote Control Panel
- L-Band Input operation
- Reflected Power Monitor
- Input Sample Port
- Exhaust Duct Adapters
- Redundant Systems
- Phase Combined Systems

Specifications, C-Band SSPAs

PARAMETER	NOTES	LIMITS	UNITS
Frequency Range	Frequency selection "A" Frequency selection "B" ¹ Frequency selection "C" ²	5.850 to 6.425 5.850 to 6.725 5.750 to 6.670	GHz GHz GHz
Output Power Typical, P _{sat} Guaranteed minimum, P _{1dB}	HPAC5400ARXXXXP HPAC5500ARXXXXP	P_{sat} / P_{1dB} 56.0 (400) / 55.0 (316) 57.0 (500) / 56.0 (400)	dBm (W) dBm (W)
Power Requirements Line Frequency Line Power (Voltage) (typical @ 220 VAC)	power factor HPAC5400ARXXXXP HPAC5500ARXXXXP	.98 47 to 63 2400 (180 to 265) ³ 2800 (180 to 265) ³	Hz W (VAC) W (VAC)

Note 1: De-rate output power by 1.0 dB linearly from 6.425 to 6.725 GHz.

Note 2: De-rate output power by 1.0 dB linearly from 5.850 to 5.750 GHz and by 1.0 dB linearly from 6.425 to 6.670 GHz.

Note 3: For 90 to 180 VAC operation, consult factory.

Continuous operation at saturated power can negatively impact the life of the amplifier and will not be covered by warranty. Normal operating output should be limited to P_{1dB} (1dB backed off from the full rated power, P_{sat}).

Common Electrical Specifications

PARAMETER	NOTES	LIMITS	UNITS
Gain	range	55-75	dB
Gain Flatness	full band	± 1.0	dB
	full band (Extended C-Band)	± 1.5	dB
Gain Slope	per 40 MHz	± 0.3	dB/40 MHz
Gain Variation vs. Temperature	0 °C to +50 °C	± 1.0	dB
Gain Stability	at constant temperature	± 0.25	dB / 24 hours
Gain Adjustment	0.1 dB resolution	20	dB
Intermodulation Distortion (Two-tone, 5 MHz spacing)	@ P _{1dB} - 3 dB	-25	dBc
AM/PM Conversion	@ rated P _{1dB}	≤ 1.0	°/dB
Spurious	@ rated P _{1dB}	-65	dBc
Harmonics (SSPA only)	@ rated P _{1dB}	-50	dBc
Input/Output VSWR	Extended C-Band	1.30:1 1.50:1	
Group Delay (per 40 MHz segment)	Linear	0.01	ns/MHz
	Parabolic	0.003	ns/MHz ²
	Ripple	1.0	ns p-p
Transmit Band Noise Output Power Density	TX Band	-75	dBW/4 KHz
Residual AM Noise, typical	Offset frequency from carrier		
	1 Hz	-110	dBc/Hz
	10 Hz	-120	dBc/Hz
	100 Hz	-130	dBc/Hz
	1 KHz	-135	dBc/Hz
	10 KHz	-140	dBc/Hz
	100 KHz	-140	dBc/Hz
	1 MHz	-140	dBc/Hz
Residual Phase Noise, typical (SSPA only)	Offset frequency from carrier		
	10 Hz	-90	dBc/Hz
	100 Hz	-100	dBc/Hz
	1 KHz	-110	dBc/Hz
	10 KHz	-120	dBc/Hz
	100 KHz	-125	dBc/Hz
	1 MHz	-130	dBc/Hz
True RF Power Detector	Range Accuracy	P _{sat} to (P _{sat} - 20) ± 0.5	dB dBm

Specifications are subject to change without notice.

1RU N+1 Redundant Power Supply

The combination of a separate, fully redundant power supply is an excellent means of obtaining the ultimate in system reliability. The power supply is an N+1 redundant configuration, meaning that there is one more power supply module available than required to operate the SSPA. A failure of one power supply module will not take the amplifier off the air.



L-Band Operation

Teledyne Paradise Datacom amplifiers are available with an integrated L-Band Block Up Converter. L-Band units utilize Teledyne Paradise Datacom's proprietary zBUC technology. The addition of a zBUC® converter to the SSPA typically increases the gain by 2-4 dB. The advantages of zBUC technology include:

- Autosensing zBUC includes an internal reference but will switch to an external reference if applied;
- Internal high stability (10 MHz) reference; will lock to externally supplied (10 or 50 MHz) reference;
- zBUC converter can accept a wide range of external reference power (-10 to +5 dBm);
- zBUC converter can accept FSK monitor and control signal via the IFL for complete amplifier remote control.

Available Frequency Plans

Band	Frequency Plan*	IF Input	LO Frequency	RF Output
C	Sub-Band "A"	950 - 1525 MHz	4.900 GHz	5.850 - 6.425 GHz
C	Sub-Band "B"	950 - 1825 MHz	4.900 GHz	5.850 - 6.725 GHz
C	Sub-Band "C"	950 - 1870 MHz	4.800 GHz	5.750 - 6.670 GHz

Electrical Specifications for 5RU RM SSPA with ZBUC converter

PARAMETER	NOTES	LIMITS		UNITS
Gain	Nominal setting	75		dB
Gain Flatness	full band	± 2.0		dB
Gain Slope	per 40 MHz	± 0.5		dB/40 MHz
Gain Adjusted Range		20		dB
Gain Stability	Typical C-Band Adj. Range -40 to +60 °C	60 - 80		dB
		± 1.5		dB
Phase Noise	Offset frequency from carrier	<u>Absolute max.</u>	<u>C-band (typ.)</u>	
	10 Hz	-30	-60	dBc/Hz
	100 Hz	-60	-74	dBc/Hz
	1 KHz	-70	-84	dBc/Hz
	10 KHz	-80	-100	dBc/Hz
	100 KHz	-90	-105	dBc/Hz
	1 MHz	-90	-125	dBc/Hz
Spurious	In-Band Signal Related (Extended C-Band)	-50		dBc
	Close to Carrier Spurious (≤ 20 MHz)	-40		dBc
	Local Oscillator	-50		dBc
		-30		dBm
Transmit Band Noise Output Power Density	Tx Band at Maximum gain	-65		dBW/4kHz
Input VSWR	L-Band	1.5 : 1		
Internal Reference Option	Reference Accuracy (initial)	± 1 • 10 ⁻⁸		
	Aging per day (after 30 days)	± 1 • 10 ⁻⁹		
	Aging per year (after 30 days)	± 6 • 10 ⁻⁸		
	Reference Stability over Temperature (-40 to +40 °C, ambient)	± 1 • 10 ⁻⁸		

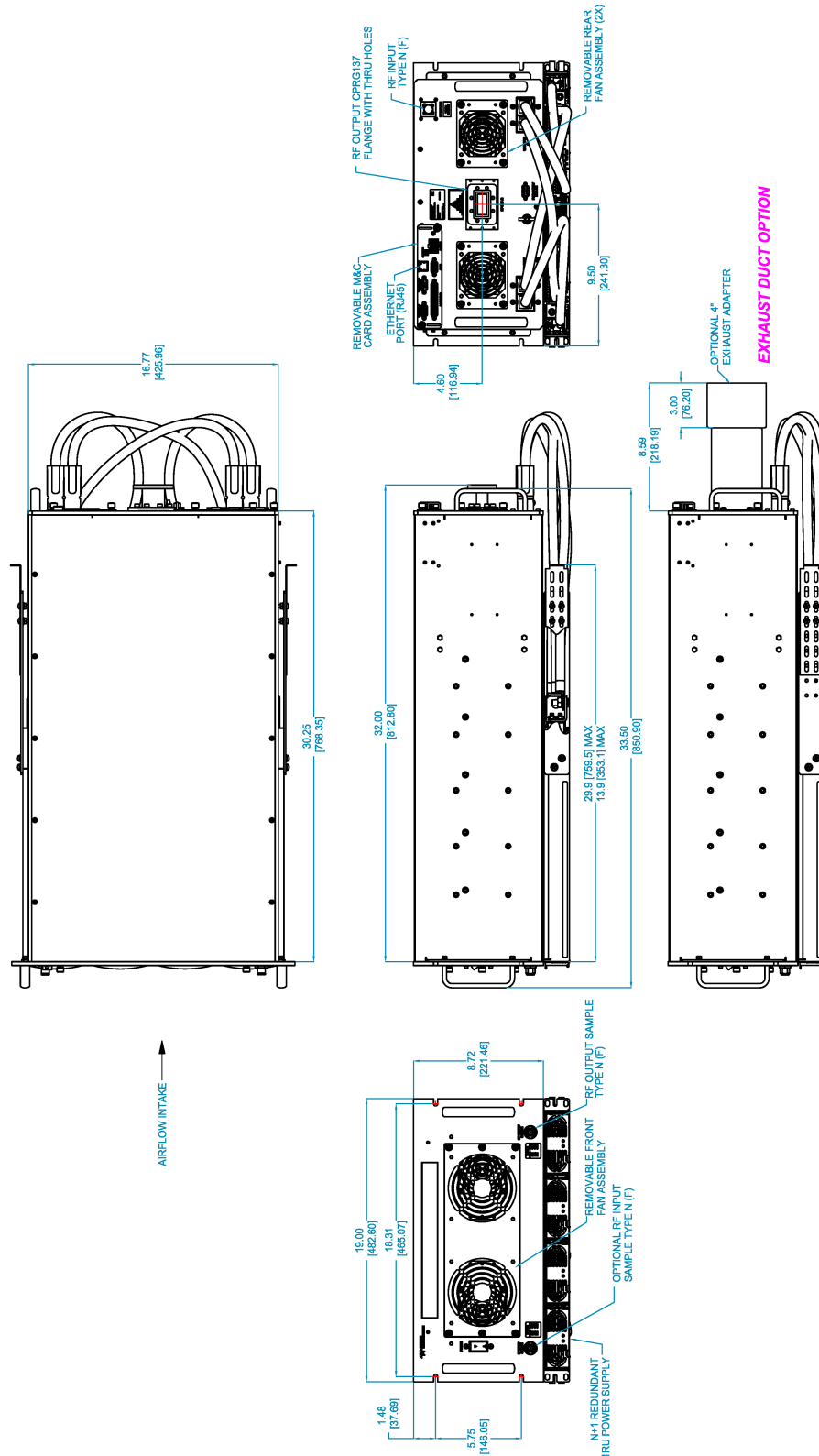
Mechanical Specifications

PARAMETER	NOTES	LIMITS	UNITS
Size (SSPA)	width X height X depth	19.0 x 8.75 x 30.25 483 x 222 x 768	inches mm
Size (Power Supply)	width X height X depth	19.0 x 1.75 x 15.97 483 x 45 x 406	inches mm
Weight (SSPA)	With integrated zBUC converter	150 (68) +1.7 (+0.8)	lbs. (kg) lbs. (kg)
Weight (Power Supply)	with four (4) power supply modules	29 (13.2)	lbs. (kg)
Finish		Paint	Gray; powder coat
Connectors	RF Input RF Output (C-Band) RF Output Sample	Type N WR137 Waveguide Type N	Female CPR137G Flange (PDR-70) Female

Environmental Specifications

PARAMETER	NOTES	LIMITS	UNITS
Operating Temperature	Ambient	0 to +50	°C
Relative Humidity	Non-condensing	95	%
Cooling System	Forced Convection Air Cooling	Front Panel - Intake Rear Panel - Exhaust	
Audible Noise	Measured 1m from unit, at P _{sat}	61	dBA
Altitude	No temperature de-rating up to 10,000 ft, (3000 m) De-rate maximum temperature by 2 °C per 1,000 ft (300 m) beyond 10,000 ft.		

Outline Drawing, Typical C-Band SSPA Chassis



Redundant and Phase Combined Systems

Teledyne Paradise Datacom's 5RU Rack Mount SSPAs can be configured in a variety of redundant and phase combined configurations.

- 1:1 Redundant System with Internal Redundancy Control
- 1:1 Redundant System with RCP2-1100 Redundant System Controller
- 1:1 Fixed Phase Combined System with FPRC-1100 Phase Combined System Controller
- 1:2 Redundant System with Internal Redundancy Control
- 1:2 Redundant System with RCP2-1200 Redundant System Controller
- 1:2 Fixed Phase Combined System with FPRC-1200 Phase Combined System Controller

System Output Power Capacity

Due to residual losses inherent in redundant system configurations (waveguide bends; switch and coupler losses), reduce the typical output power specification of a single amplifier by approximately 0.2 dB for 1:1 and by 0.4 dB for 1:2 systems.

In phase combined systems, these same losses result in slightly less than the ideal addition of 3 dB to the output power of a single HPA unit. For 1:1 phase combined systems, the typical additive output power is approximately 2.70 dB above the output power of a single HPA. For 1:2 phase combined systems, the typical additive output power is approximately 2.50 dB above the output power of a single HPA.

Actual system losses will vary based on the system options.

System Controllers

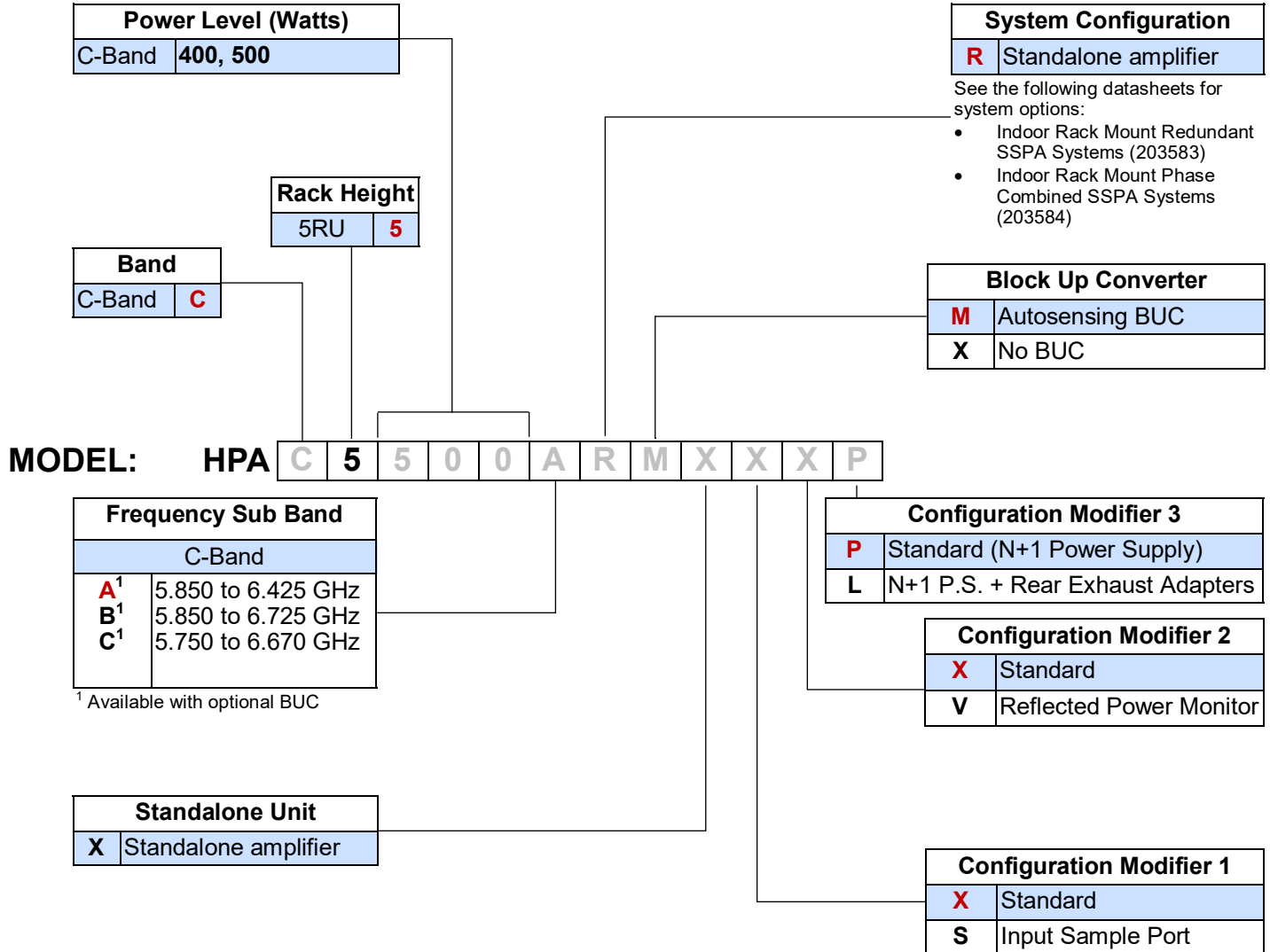
The 1RU system controller provides an extremely user friendly interface for complete monitor and control of the amplifier system.



Redundant System Controller Configured for 1:1 Redundant Mode

The front panel touchscreen display shows the on-line amplifiers and the switch positions. Fault indicators are provided for easy identification of system status. All system monitor and control is available locally at the front panel, as well as remotely by the RS232, RS485, or Ethernet interface ports. Audible alarms and a full complement of parallel I/O signal are available at the rear panel of the controller.

Part Number Configuration Matrix



Example - A standalone 500W GaAs C-Band 5RU Rack Mount SSPA with standard N+1 external power supply and an optional internal reference block up converter is part number: **HPAC5500ARMXXXP**.

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Data Security: Teledyne Paradise Datacom amplifiers and controllers do not inherently provide encryption to transmitted data, and have limited security measures to protect it. If the unit will be accessible over the Internet, exercise appropriate data security protocols. Teledyne Paradise Datacom strongly recommends placing the equipment behind a protective Firewall or setting up a VPN link with dual authentication for remote access.

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