



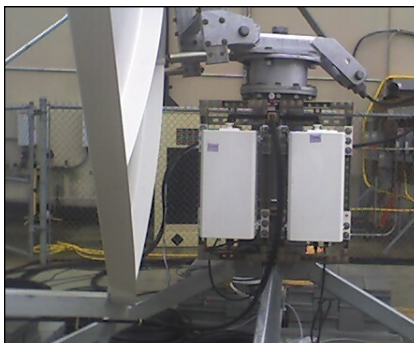
**125W Ku-Band  
Compact Outdoor SSPA**

## Description

The Teledyne Paradise Datacom Compact Outdoor Solid State Power Amplifier (SSPA) is built for extreme environmental conditions and high reliability operation. Along with the robust construction exists the highest power density in the industry. This allows solid state technology to be used in applications that have long been reserved for TWTAs.

At less than 40 lbs. (18 kg), and only slightly larger than a shoe box, this family of SSPAs is available in output power levels in the following range:

**C-Band: 75W - 300W**  
**X-Band: 200W**  
**Ku-Band: 100W - 125W**



Antenna-mount 1:1 system w/ mounting frame



SNG-mount 1:1 system w/ side-mount AC input

## FEATURES

- Compact size and weight
- CE & MIL-STD-461 Compliant
- Integrated forced-air cooling system
- Adjustable RF Gain, 55 dB to 75 dB
- Extreme Environmental Testing
- RF Output Sample Port
- Maintenance Free Operation
- Universal, Power Factor Corrected Power Supply
- Built-in 1:1 Redundancy Control
- Built-in Maintenance Switch Controller
- Hot/Cold Standby operating modes for reduced power consumption

## OPTIONS

- Extended band operation
- Antenna Mounting Kit
- DC Operation (48VDC)
- Remote Control Panel
- L-Band Input
- Phase Combined Systems
- Reflected Power Monitor
- Low line voltage operation
- Fiber Optic Input
- Optional side-mount AC input for SNG installations

## SPECIFICATIONS

- Compact Outdoor housing  
10.0 X 19.5 X 6.50 in  
254 X 495 X 165 mm
- White powder coat finish
- Operating temperature:  
-40 to +60 °C



### Specifications, C-Band SSPAs

PARAMETER	NOTES	LIMITS	UNITS
Frequency Range	(See options for extended bands) Insat Band	5.850 to 6.425 6.725 to 7.025	GHz GHz
Output Power @: Saturation/ $P_{1dB}$ (Typical/Guaranteed minimum)	HPAC2075ACXXXXX HPAC2100ACXXXXX HPAC2140ACXXXXX HPAC2200ACXXXXX HPAC2250ACXXXXX HPAC2300ACXXXXX	$P_{sat} / P_{1dB}$ 48.8 (76) / 48.5 (70) 50.0 (100) / 49.5 (89) 51.5 (141) / 51.0 (126) 53.0 (200) / 52.3 (170) 54.0 (250) / 53.0 (200) 54.7 (300) / 54.0 (251)	dBm (W) dBm (W) dBm (W) dBm (W) dBm (W) dBm (W)
Power Requirements Line Frequency Line Power (Voltage) (typical @ 220 VAC)	power factor corrected  HPAC2075ACXXXXX HPAC2100ACXXXXX HPAC2140ACXXXXX HPAC2200ACXXXXX HPAC2250ACXXXXX HPAC2300ACXXXXX	47 to 63 500 (90-265) 750 (90-265) 875 (180-265) <sup>1</sup> 1300 (180-265) <sup>1</sup> 1500 (180-265) <sup>1</sup> 1675 (180-265) <sup>1</sup>	Hz W (VAC) W (VAC) W (VAC) W (VAC) W (VAC) W (VAC)
Receive Band Noise Power Density	without filter	- 155	dBW / 4 KHz
Frequency Sub-Band Power De-rating 5.85 to 6.725 GHz 5.75 to 6.67 GHz	De-rate output power by 1.0 dB linearly from 6.425 to 6.725 GHz De-rate output power by 1.0 dB linearly from 6.425 to 6.67 GHz and by 0.5 dB from 5.85 to 5.75 GHz		

**Note 1:** Available with low line voltage option, 90 to 265 VAC.

### Specifications, X-Band SSPAs

PARAMETER	NOTES	LIMITS	UNITS
Frequency Range	(see options for extended band)	7.900 to 8.400	GHz
Output Power @: Saturation/ $P_{1dB}$ (Typical/Guaranteed minimum)	HPAX2200ACXXXXX	$P_{sat} / P_{1dB}$ 53.0 (200) / 51.8 (170)	dBm (W)
Power Requirements Line Frequency Line Power (Voltage) (typical @ 220 VAC)	power factor corrected  HPAX2200ACXXXXX	47 to 63 1425 (180-265) <sup>1</sup>	Hz W (VAC)
Receive Band Noise Power Density	without optional filter with optional filter	- 85 - 155	dBW / 4 KHz dBW / 4 KHz
Frequency Sub-Band Power De-rating 7.70 to 8.40 GHz	De-rate output power by 1.0 dB linearly from 7.90 to 7.70 GHz		

**Note 1:** Available with low line voltage option, 90 to 265 VAC.

### Specifications, Ku-Band SSPAs

PARAMETER	NOTES	LIMITS	UNITS
Frequency Range	(see options for extended band)	14.00 to 14.50	GHz
Output Power @: Saturation/ $P_{1dB}$ (Typical/Guaranteed minimum)	HPAK2100ACXXXXX HPAK2125ACXXXXX	$P_{sat} / P_{1dB}$ 50.0 (100) / 49.0 (80) 51.0 (125) / 50.0 (100)	dBm (W) dBm (W)
Power Requirements Line Frequency Line Power (Voltage) (typical @ 220 VAC)	power factor Line frequency HPAK2100ACXXXXX HPAK2125ACXXXXX	.98 47 to 63 1200 (180-265) <sup>1</sup> 1250 (180-265) <sup>1</sup>	Hz W (VAC) W (VAC)
Receive Band Noise Power Density <sup>2</sup>		- 155	dBW / 4 KHz
Frequency Sub-Band Power De-rating 13.75 to 14.50 GHz	De-rate output power by 1.0 dB linearly from 14.00 to 13.75 GHz		

**Note 1:** Available with low line voltage option, 90 to 265 VAC.

**Note 2:** All Ku-Band SSPAs are fitted with a receive band reject bulkhead filter, standard.



### Common Electrical Specifications

PARAMETER	NOTES	LIMITS	UNITS
Gain	range	55 - 75	dB
Gain Flatness	full band	$\pm 1.0$	dB
	full band (Extended C-Band)	$\pm 1.5$	dB
Gain Slope	per 40 MHz	$\pm 0.3$	dB/40 MHz
Gain Variation vs. Temperature	-30 °C to +50 °C	$\pm 1.5$	dB
Gain Stability	at constant temperature	$\pm 0.25$	dB/24 hours
Gain Adjustment	0.1 dB resolution	20	dB
Intermodulation Distortion	Two-Tone 3 dB back off from $P_{1dB}$	-25	dBc
AM/PM Conversion	@ rated $P_{1dB}$	3.5	°/dB
	@ $P_{1dB} - 1$ dB	1.5	°/dB
	@ $P_{1dB} - 2$ dB	1.0	°/dB
Spurious Harmonics (SSPA only)	(@ rated $P_{1dB}$ )	-65	dBc
	(@ rated $P_{1dB} - 3$ dB)	-50	dBc
Input/Output VSWR	Extended C-Band	1.30:1	
	Output VSWR: Ku-Band with bulkhead filter	1.50:1	
		1.40:1	
Noise Figure	at maximum gain	10	dB
Group Delay (per 40 MHz segment)	Linear	0.01	ns/MHz
	Parabolic	0.003	ns/MHz <sup>2</sup>
	Ripple	1.0	ns p-p
Transmit Band Noise	TX Band	-75	dBW/4 KHz
Output Power Density	RX Band	-150	dBW/4 KHz
Residual AM Noise	0 - 10 KHz	-45	dBc
	10 KHz - 500 KHz	-20 (1.25 + log F)	dBc
	500 KHz - 1 MHz	-80	dBc
Phase Noise (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
RF Power Detector	$P_{sat}$ to ( $P_{sat} - 20$ dBm)	$20 \pm 1.0$	dBm

### Environmental Specifications

PARAMETER	NOTES	LIMITS	UNITS
Operating Temperature	Ambient	-40 to +60	°C
Relative Humidity	Condensing	100	%
Cooling System	Integrated, Forced air	103	CFM
Ingress Protection Rating	With connectors properly sealed	IP54	
Audible Noise	Measured 1m from unit, at $P_{sat}$	74	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.		
Shock	50 g p-p, 11 msec pulses		
Vibration	3g rms 30 min. 5-2000 Hz		



## 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:

- zBUC converter can detect and switch to an externally supplied reference.
- Optional internal high stability (10MHz) reference.
- zBUC converter can lock to an externally supplied reference of 10 or 50 MHz.
- 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
C	Sub-Band "E"	950 - 1250 MHz	5.475 GHz	6.425 - 6.725 GHz
C	Sub-Band "F"	950 - 1250 MHz	5.775 GHz	6.725 - 7.025 GHz
C	Sub-Band "G"	950 - 1675 MHz	4.800 GHz	5.750 - 6.475 GHz
X	Sub-Band "A"	950 - 1450 MHz	6.950 GHz	7.900 - 8.400 GHz
Ku	Sub-Band "A"	950 - 1450 MHz	13.050 GHz	14.00 - 14.50 GHz
Ku	Sub-Band "B"	950 - 1700 MHz	12.800 GHz	13.75 - 14.50 GHz

## Electrical Specifications for Compact Outdoor SSPA with ZBUC converter

PARAMETER	NOTES	LIMITS				UNITS
Gain	Nominal setting	75				dB
Gain Flatness	full band (C-,X-,Ku-bands)	± 2.0				dB
Gain Slope	per 40 MHz (C-,X-,Ku-bands)	± 0.5				dB/40 MHz
Gain Adjusted Range		20				dB
	Typical C-Band Adj. Range	60 - 80				dB
	Typical Ku-Band Adj. Range	57 - 77				dB
Gain Stability	-40 to +60 °C	± 1.5				dB
Phase Noise	Offset frequency from carrier	<u>Absolute max.</u>	<u>C-band (typ.)</u>	<u>X-band (typ.)</u>	<u>Ku-band (typ.)</u>	
	10 Hz	-30	-60	-58	-56	dBc/Hz
	100 Hz	-60	-74	-70	-67	dBc/Hz
	1 KHz	-70	-84	-80	-78	dBc/Hz
	10 KHz	-80	-100	-94	-91	dBc/Hz
	100 KHz	-90	-105	-97	-94	dBc/Hz
	1 MHz	-90	-125	-122	-120	dBc/Hz
Spurious	In-Band Signal Related (C-/Ku-Band)					dBc
	(Extended C-Band)					dBc
	Close to Carrier Spurious (≤ 20 MHz)					dBc
	Local Oscillator					dBm
Noise Figure	At Maximum gain	20				dB
Transmit Band Noise	Tx Band at Maximum gain	-65				dBW/4kHz
Output Power Density						
Input VSWR	L-Band	1.5 : 1				
Internal Reference Option	Reference Accuracy (initial)	± 1 • 10 <sup>-8</sup>				
	Aging per day (after 30 days)	± 1 • 10 <sup>-9</sup>				
	Aging per year (after 30 days)	± 6 • 10 <sup>-8</sup>				
	Reference Stability over Temperature (-40 to +40 °C, ambient)	± 1 • 10 <sup>-8</sup>				

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## Optional Accessories

### Remote Control Panel (RCP2-1000-CO)



The RCP2-1000-CO is a Remote Control Panel for the Compact Outdoor SSPA. It requires 1RU of cabinet space and provides a similar local interface as exists on Teledyne Paradise Datacom Indoor Rack Mount amplifiers. Reference specification sheet **209728**.

The controller communicates with the outdoor amplifier via a RS485 link. The controller then provides a wide range of interface capability including Ethernet communications. The following communication links are available at the Remote Control Panel:

- RS232 or Addressable RS485 Serial Data
- Discrete (Parallel) Interface - Form C contact outputs & Opto Isolated Inputs
- Ethernet Interface - A full compliment of Ethernet Communications including UDP, SNMP, and an internal web browser
- Local (Manual) interface via front panel LCD display

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### Universal Handheld Controller (RCH-1000)

The Universal Handheld Controller (RCH-1000) is a versatile device used to interface with a variety of Teledyne Paradise Datacom amplifiers, including Compact Outdoor SSPA, Mini Compact Outdoor SSPA, or H-Series High Power Outdoor SSPA. Reference specification sheet **211667**.

The device is housed in a ruggedized enclosure that is environmentally sealed to IP65 levels. This allows the Universal Handheld Controller (RCH-1000) to be used in most outdoor environments. The rugged construction of the device enclosure provides protection from impact and vibration.



This device allows the operator to adjust the attenuation of the connected unit, and control the mute/unmute selection, as well as monitor the status, conditions and settings of the connected unit via a serial RS-485 connection. Fault conditions and other events are tracked in the controller's internal log.

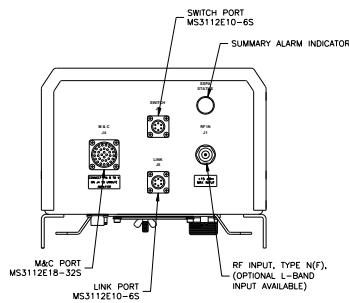


### Mechanical Specifications

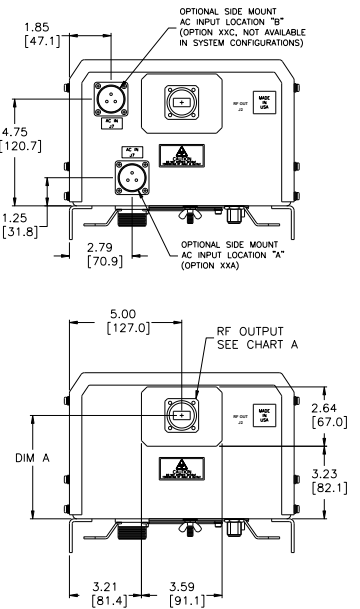
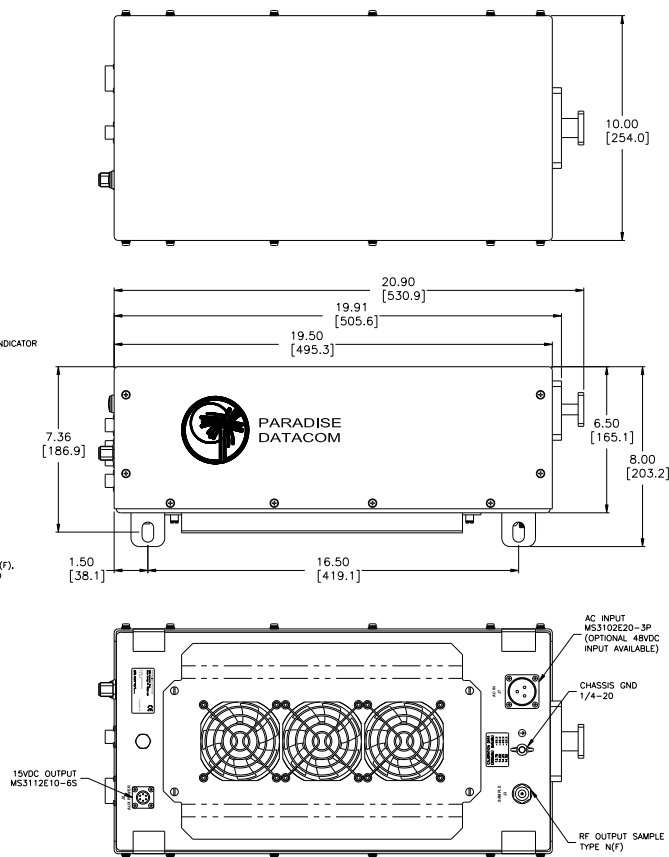
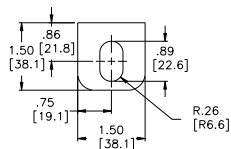
PARAMETER	NOTES	LIMITS	UNITS/DETAILS
Size	Width X Length X Height	10.0 X 19.5 X 6.50 254 X 495 X 165	inches mm
Weight	Base unit (< 200W C-Band; < 100W Ku-Band) Base unit (≥ 200W C-Band; ≥ 100W Ku-Band) Base unit (≥ 200W X-Band) With Internal zBUC With 110 VAC Option With optional Tx Filter or Rx Reject Filter	36 (16.4) ± 3% 44 (20.0) ± 3% 54.9 (25.0) ± 3% +1.7 (0.8) + 1.2 (0.6) + 1.0 (0.5) ea.	lbs. (kg) lbs. (kg) lbs. (kg) lbs. (kg) lbs. (kg) lbs. (kg)
Finish		Paint	White; powder coat
Connectors	RF Input RF Output - Ku-Band RF Output - C-Band RF Output - X-Band RF Output Sample Line Power Monitor and Control Link Port Redundancy Switch Auxiliary +15VDC LNB Power (500 mA)	Type N WR75 Waveguide WR137 Waveguide WR112 Waveguide Type N 3-pin MS-type 32-pin MS-type 6-pin MS type 6-pin MS-type 6-pin MS-type	Female Grooved flange (PBR-120) CPR137G flange (PDR-70) CPR112G flange (PDR-84) Female Plug Socket Socket Socket Socket

### Outline Drawing, Compact Outdoor SSPA (typical)

SUMMARY ALARM INDICATOR  
OMITTED ON X-BAND UNITS



#### MOUNTING TAB DETAIL



BAND	W/G OUTLINE	W/G DESCRIPTION	DIM A
KU		WR75 GROOVED FLANGE WITH ø.145 [ø3.68] THRU HOLES	4.60 [116.8]
C		CPR137 FLANGE WITH ø.198 [ø5.0] THRU HOLES	4.78 [121.4]
X		CPR112 FLANGE WITH ø.170 [ø4.3] THRU HOLES	4.78 [121.4]



## Part Number Configuration Matrix

HPA **C 2 2 0 0 A C M X X X X**

Band	
C-Band	<b>C</b>
X-Band	<b>X</b>
Ku-Band	<b>K</b>

Generation	
Second	<b>2</b>

Power Level (Watts)	
C-Band	<b>075, 100, 140, 200, 250, or 300</b>
X-Band	<b>200</b>
Ku-Band	<b>100 or 125</b>

Frequency Sub Band	
C-Band	
<b>A<sup>1</sup></b>	5.850 to 6.425 GHz
<b>B<sup>1</sup></b>	5.850 to 6.725 GHz
<b>C<sup>1</sup></b>	5.750 to 6.670 GHz
<b>E<sup>1</sup></b>	6.425 to 6.725 GHz (Palapa)
<b>F<sup>1</sup></b>	6.725 to 7.025 GHz (Insat)
<b>G<sup>1</sup></b>	5.750 to 6.475 GHz
<b>H</b>	5.715 to 5.790 GHz
<b>J</b>	5.740 to 6.650 GHz
X-Band	
<b>A<sup>1</sup></b>	7.90 to 8.40 GHz
Ku-Band	
<b>A<sup>1</sup></b>	14.00 to 14.50 GHz
<b>B<sup>1</sup></b>	13.75 to 14.50 GHz

<sup>1</sup> Available with optional BUC

Package	
<b>C</b>	Standalone amplifier

**Example** - A standalone 200W GaAs C-Band Compact Outdoor SSPA with an optional internal reference block up converter is part number: **HPAC2200ACMXXXX**.

### Configuration Modifier 3

<b>X</b>	None (Standard)
<b>A</b>	Side-Mount AC Input, Location 'A'
<b>C<sup>1</sup></b>	Side-Mount AC Input, Location 'B'
<b>D</b>	48 VDC Input
<b>F</b>	Side-mount 48V Input, Location 'A'
<b>G<sup>1</sup></b>	Side-mount 48V Input, Location 'B'

<sup>1</sup> Standalone units only

### Configuration Modifier 2

<b>X</b>	Standard
<b>M</b>	MS-Connector Covers
<b>R<sup>1</sup></b>	Receive Band Reject Filter
<b>S<sup>1</sup></b>	M + R (see above)

<sup>1</sup> X-Band only

### Configuration Modifier 1

<b>X</b>	Standard
<b>K<sup>1</sup></b>	110 VAC Input Power

<sup>1</sup> Available on C- and X-Band units ≥ 140W and Ku-Band units ≥ 100W

### System Configuration

<b>X</b>	Standalone amplifier
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Refer to the following specification sheets:

- 203581 for Redundant Systems
- 203582 for Phase Combined Systems

### Block Up Converter

<b>M</b>	Internal Reference BUC
<b>P</b>	External Reference BUC
<b>X</b>	No BUC

COMMENTS:



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Specifications are subject to change without notice.