



**100W Ka-Band  
 Compact Outdoor SSPA**

## FEATURES

- Compact size and weight
- CE Compliance Tested
- Integrated forced-air cooling system
- 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
- Ethernet Interface
- RS-485

## 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.

Available as a broadband SSPA or SSPB covering 1 GHz wide frequency sub-bands.

## OPTIONS

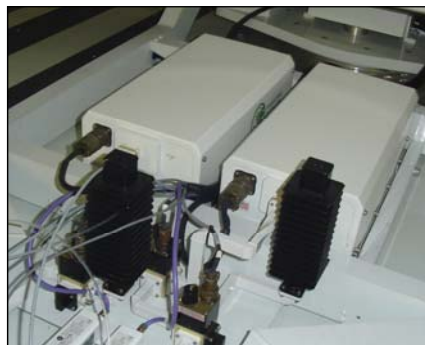
- Custom Frequency Sub-Bands
- Antenna Mounting Kit
- Remote Control Panel
- L-Band Input
- FSK monitor & control via IFL
- Phase Combined Systems
- Optional side-mount AC input for SNG installations

## SPECIFICATIONS

- Compact Outdoor housing  
 10.0 X 19.5 X 6.5 in  
 254 X 496 X 165 mm
- 50 lbs. / 22.7 kg (80/100W)  
 53 lbs. / 24.1 kg (180W)
- White powder coat finish
- Operating temperature:  
 -40 to +60 °C



Antenna-mount 1:1 system w/ mounting frame



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

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## Specifications, Ka-Band SSPAs

PARAMETER	NOTES	LIMITS	UNITS
Frequency Range	Frequency selection "A" Frequency selection "B"	30.00 to 31.00 29.00 to 30.00	GHz GHz
Output Power Typical, P <sub>sat</sub> Guaranteed minimum, P <sub>Linear</sub> <sup>1</sup>	HPAA2080ACXXXXXG HPAA2100ACXXXXXG HPAA2180ACXXXXXG	P <sub>sat</sub> / P <sub>Linear</sub> 49.0 (80) / 46.0 (40) 50.0 (100) / 47.0 (50) 52.5 (180) / 49.5 (90)	dBm (W) dBm (W) dBm (W)
Power Requirements Line Frequency Line Power (Voltage) (typical @ 220 VAC)	power factor  HPAA2080ACXXXXXG HPAA2100ACXXXXXG HPAA2180ACXXXXXG	.91 47 to 63  P <sub>sat</sub> / P <sub>Linear</sub> 825 / 575 (90 to 265) 1100 / 700 (90 to 265) 2000 / 1270 (90 to 265)	Hz  W (VAC) W (VAC) W (VAC)

**Note 1:** P<sub>Linear</sub> = maximum output power at which third order intermodulation products < -25 dBc (for two tones separated by 5 MHz) or spectral regrowth on a single QPSK at 1.5 x symbol rate or OQPSK at 1.0 x symbol rate is < -30 dBc.

## Common Electrical Specifications

PARAMETER	NOTES	LIMITS	UNITS
Gain Gain Flatness Gain Slope Gain Variation vs. Temperature Gain Stability Gain Adjustment	range full band per 40 MHz -40 °C to +60 °C at constant temperature 0.1 dB resolution	55-75 ± 1.0 ± 0.3 ± 1.5 ± 0.25 20	dB dB dB/40 MHz dB dB/24 hours dB
Intermodulation Distortion (Two-tone, 5 MHz spacing)	At P <sub>Linear</sub> (P <sub>sat</sub> - 3 dB)	-25	dBc
AM/PM Conversion	@ rated P <sub>Linear</sub>	≤ 1.0	°/dB
Spurious Harmonics (SSPA only)	@ rated P <sub>Linear</sub> @ rated P <sub>Linear</sub>	-65 -50	dBc dBc
Input/Output VSWR		1.30:1 (17.7)	(dB)
Noise Figure	at maximum gain	10	dB
Group Delay (per 40 MHz segment)	Linear Parabolic Ripple	0.01 0.003 1.0	ns/MHz ns/MHz <sup>2</sup> 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 10 Hz 100 Hz 1 KHz 10 KHz 100 KHz 1 MHz	-110 -120 -130 -135 -140 -140 -140	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz
Residual Phase Noise, typical (SSPA only)	Offset frequency from carrier 10 Hz 100 Hz 1 KHz 10 KHz 100 KHz 1 MHz	-90 -100 -110 -120 -125 -130	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz
True RF Power Detector	Range Accuracy	P <sub>sat</sub> to (P <sub>sat</sub> - 20) ± 0.75	dB dBm

## Optional L-Band Operation

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

- zBUC converters can detect and switch to an externally supplied reference.
- Optional internal high stability (50 MHz) reference.
- zBUC converters can lock to an externally supplied reference of 10 MHz or 50 MHz without modification.
- zBUC converters can accept a wide range of external reference power (-10 dBm to +5 dBm)
- zBUC converters can accept FSK monitor and control signal via the IFL for complete amplifier remote control.

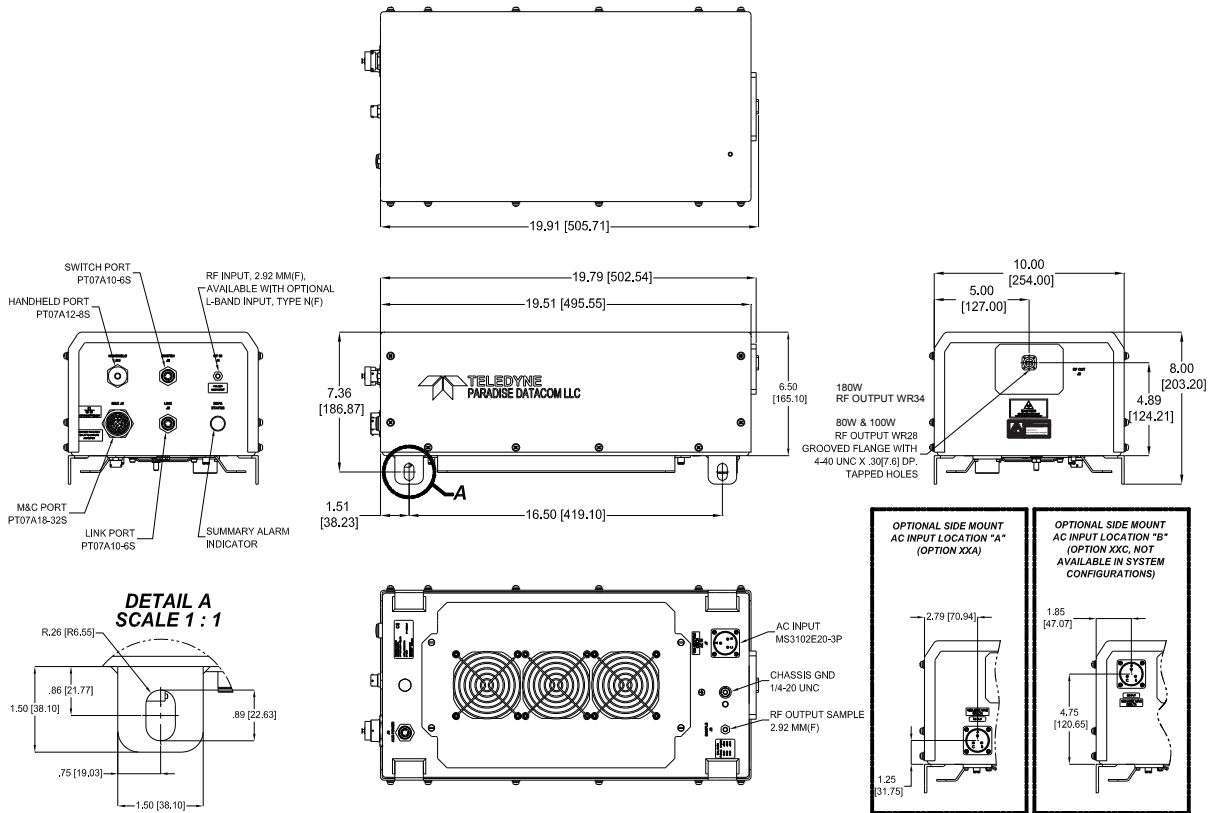
## Available Frequency Plans

Band	Frequency Band	IF Input	LO Frequency	RF Output
Ka	Standard Ka-Band	1.0 - 2.0 GHz	29.0 GHz	30.00 - 31.00 GHz
Ka	Extended Ka-Band	1.0 - 2.0 GHz	28.0 GHz	29.00 - 30.00 GHz

## Electrical Specifications for Compact Outdoor with zBUC converter

PARAMETER	NOTES	LIMITS		UNITS
Gain	range	55-75		dB
Gain Flatness	full band	± 2.0		dB
Gain Slope	per 40 MHz	± 0.75		dB/40 MHz
Gain Stability	-40 to +60 °C	± 2.5		dB
Phase Noise	Offset frequency from carrier	<u>Absolute max.</u>	<u>Ka-band (typ.)</u>	
	10 Hz	-30	-50	dBc/Hz
	100 Hz	-60	-65	dBc/Hz
	1 KHz	-70	-76	dBc/Hz
	10 KHz	-80	-85	dBc/Hz
	100 KHz	-90	-105	dBc/Hz
	1 MHz	-90	-120	dBc/Hz
Spurious	In-Band Signal Related	-50		dBc
	Close to Carrier Spurious (≤ 20 MHz)	-50		dBc
	Local Oscillator	-30		dBm
Noise Figure	At 75 dB gain setting	20		dB
Input VSWR (Return Loss)	L-Band	1.5 : 1 (13.9)		(dB)
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>		

## Outline Drawing, Ka-Band Compact Outdoor SSPA

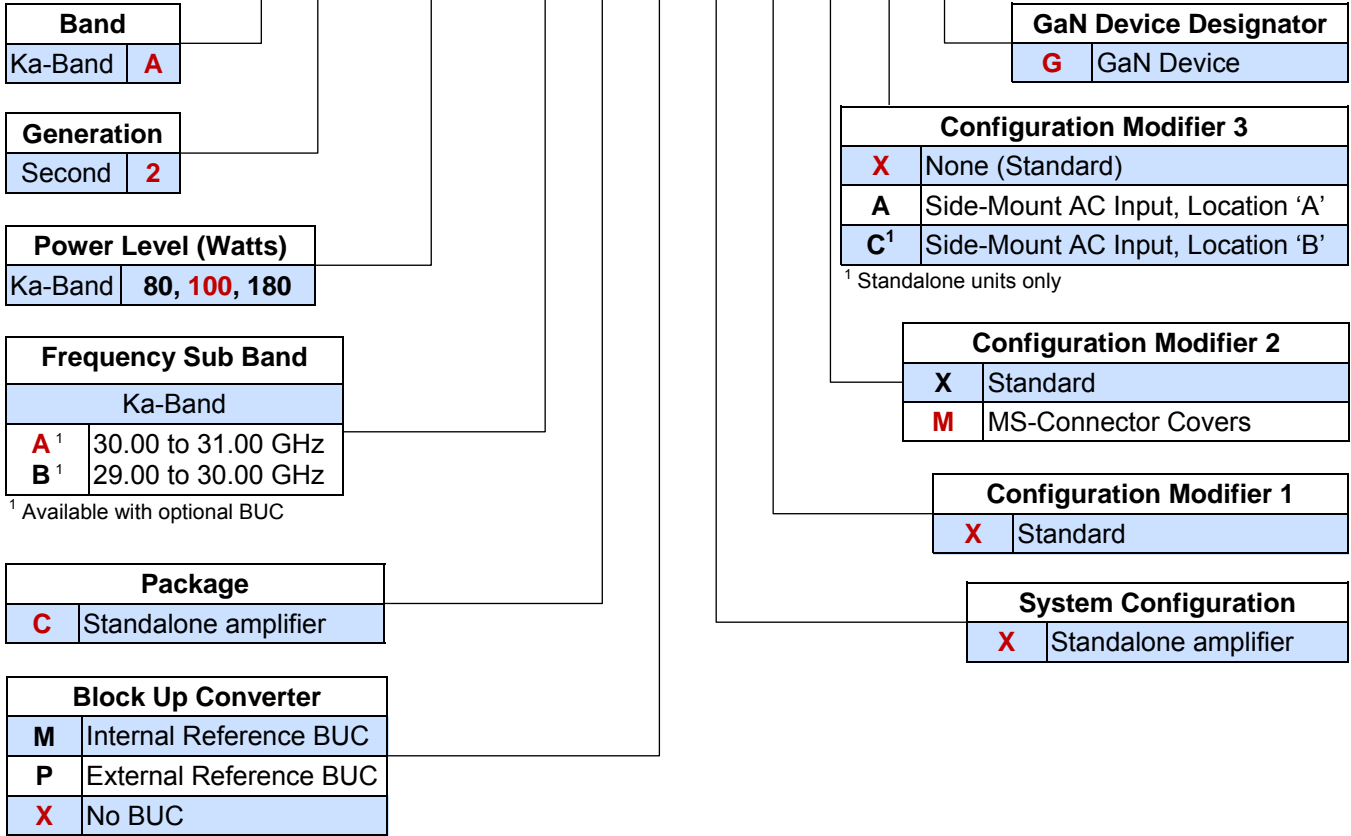


## Mechanical & Environmental Specifications

PARAMETER	NOTES	LIMITS	UNITS
Size	width X length X height	10.0 X 19.50 X 6.50 254.0 X 495.3 X 165.1	inches mm
Weight	80W & 100W 180W With Internal zBUC	50 (22.7) ± 3% 53 (24.1) ± 3% +1.7 (0.8)	lbs. (kg) lbs. (kg) lbs. (kg)
Finish		Paint	White; powder coat
Connectors	RF Input L-Band Input RF Output (80W & 100W) RF Output (180W) RF Output Sample Line Power Monitor and Control Link Port Redundancy Switch Auxiliary +15VDC LNB Power (500 mA)	2.92 mm Type N WR28 Waveguide WR34 Waveguide 2.92 mm 3-pin MS-type 32-pin MS-type 6-pin MS type 6-pin MS-type 6-pin MS-type	Female Female Grooved Flange Grooved Flange Female Plug Socket Socket Socket Socket
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 <sub>sat</sub>	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		

**Part Number Configuration Matrix**

**HPA** **A** **2** **1** **0** **0** **A** **C** **X** **X** **X** **M** **X** **G**



**Example:** A standalone 100W Ka-Band (30.0 to 31.0 GHz) Compact Outdoor SSPA with optional MS-Connector covers is part number: **HPAA2100ACXXMXG**.

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