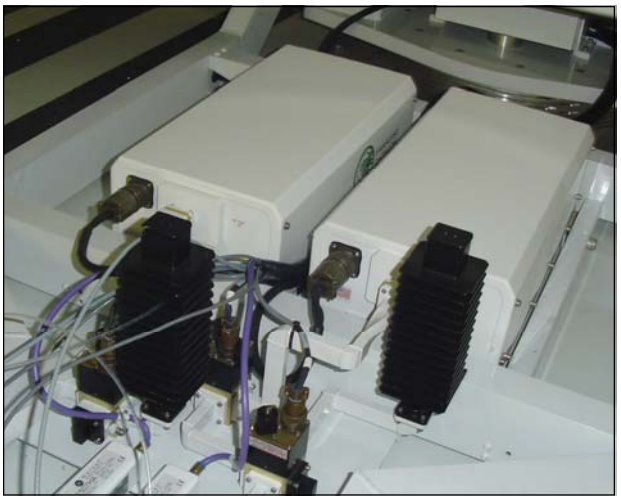
Redundant Systems
Outdoor SSPA Packages



SNG-mount 1:1 Redundant Compact Outdoor System
with side-mount AC input

600W C-Band High Power Outdoor
1:1 Redundant System

DESCRIPTION

Paradise Datacom's Outdoor series of redundant amplifier systems provide the highest degree of earth station redundancy and reliability. Based on Paradise Datacom's family of rugged and robust SSPAs, these systems provide the highest MTBFs possible.

These systems can be configured in either 1:1 or 1:2 redundant configurations using any of the Paradise Datacom family of Outdoor SSPAs. The RCP2-1100/1200 Redundant Controller provides an extremely user-friendly interface for complete monitor and control of the high power amplifiers in either 1:1 or 1:2 configurations.

The RCP front panel mimic display shows the on-line amplifiers and the current switch positions. Dedicated fault lights provide easy indication of system status. All RCP2-1X00 monitor and control is available locally, at the front panel LCD display, as well as remotely by the RS232 or RS485 interface ports.

FEATURES

- System Output Power to:
  600W S-Band;
  600W C-Band;
  500W X-Band;
  250W Ku-Band
- Universal Input, Power Factor Corrected Power Supply
- Output Power Monitoring
- Separate 1RU Redundant Controller or Controller-less configurations

OPTIONS

- System Output Power Monitor
- Reflected Power Alarm
- L-Band Input operation
- Cold Standby Amplifier Operation
- Custom Configurations

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Redundant Systems
Outdoor SSPA Packages

High Power Outdoor Output Power Levels

S-Band: 400W - 600W
C-Band: 400W - 600W
X-Band: 350W - 500W
Ku-Band: 200W - 250W

Compact Outdoor Output Power Levels

S-Band: 50W - 300W
C-Band: 30W - 300W
X-Band: 25W - 250W
Ku-Band: 10W - 125W

Typical C-Band System Output Power

Single Thread Amplifier Model	1:1 Redundant Output Power	
	P_{sat} dBm (W)	P_{1dB} dBm (W)
HPAC2100AC	49.8 (96)	49.3 (85)
HPAC2140AC	51.3 (135)	50.8 (120)
HPAC2200AC	52.8 (191)	52.1 (162)
HPAC2250AC	53.8 (240)	52.8 (191)
HPAC2300AC	54.5 (282)	53.8 (240)
HPAC2400AW	55.8 (380)	54.8 (302)
HPAC2500AW	56.8 (479)	55.8 (380)
HPAC2600AW	57.6 (575)	56.8 (479)

Typical Ku-Band System Output Power

Single Thread Amplifier Model	1:1 Redundant Output Power	
	P_{sat} dBm (W)	P_{1dB} dBm (W)
HPAK2040AC	45.8 (38)	44.8 (30)
HPAK2050AC	46.8 (48)	45.8 (38)
HPAK2070AC	48.3 (68)	47.3 (54)
HPAK2100AC	49.8 (96)	48.8 (76)
HPAK2125AC	50.8 (123)	49.8 (96)
HPAK2200AW	52.8 (191)	51.8 (151)
HPAK2250AW	53.8 (240)	52.8 (191)

General Specifications

PARAMETER	NOTES	LIMITS	UNITS
Gain Gain Flatness Gain Slope Gain Variation vs. Temperature Gain Adjustment	minimum full band (all except Extended C-Band) Extended C-Band units per 40 MHz -40 to +60°C 0.1 dB resolution adjustable by either serial or analog voltage input: 0.5 to 2.5 VDC	67 ±1.0 ±1.5 ±0.3 ±1.0 20	dB dB dB dB/40 MHz dB dB
Intermodulation Distortion	3dB back off relative to P_{1dB}	-25	dBc
AM/PM Conversion	(@ rated P_{1dB}) (@P_{1dB}-3dB)	3.5 1.0	°/dB °/dB
Spurious Harmonics	(@ rated P_{1dB}) (@ rated $P_{1dB-3dB}$) (C-,X-,Ku-bands) (@ rated $P_{1dB-3dB}$) (S-band)	-60 -50 -30	dBc dBc dBc
Input/Output VSWR	 (Extended C-Band with 1.3:1 VSWR option)	1.50:1 1.30:1	
Noise Figure	at maximum gain (C-,X-,Ku-bands) at maximum gain (S-band)	10 8	dB dB
Group Delay (per 40 MHz segment)	Linear Parabolic Ripple	0.01 0.003 1.0	ns/MHz ns/MHz^2 ns p-p
Transmit Band Noise Output Power Density	TX Band RX Band (C- or Ku-bands) RX Band (X-Band) RX Band (S-Band)	-75 -150 -100 See options	dBW/4 KHz dBW/4 KHz dBW/4 KHz
Receive Band Noise Output Power Density	S-Band, with optional filter S-Band, without optional filter	-155 -95	dBW/4 KHz dBW/4 KHz
Residual AM Noise	0 - 10 KHz 10 KHz - 500 KHz 500 KHz - 1 MHz	-45 -20 (1.25 + log F) -80	dBc dBc dBc
Phase Noise	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

Environmental

Operating Temperature	Ambient	-40 to +60	°C
Relative Humidity	condensing	100	%
Cooling System	Integrated	Forced air	

Mechanical

Size, High Power Outdoor Size, Compact Outdoor	width X length X height width X length X height	21.0 X 27.95 X 13.5 533 X 710 X 343 10.0 X 19.5 X 6.50 254 X 495 X 165	inches mm inches mm
Weight, High Power Outdoor Weight, Compact Outdoor	 Base unit (<200W S/C-bands; <100W Ku) Base unit (≥200W S/C-bands; ≥100W Ku) Base unit (<200W X-Band) Base unit (≥200W X-Band) With Internal zBUC	125 (57) 36 (16.4) ± 3% 44 (20.0) ± 3% 46.7 (21.1) ± 3% 54.9 (25.0) ± 3% +1.7 (0.8)	lbs.(kg) lbs.(kg) lbs.(kg) lbs.(kg) lbs.(kg) lbs.(kg)
Finish		Paint	White; powder coat

Specifications are subject to change.

L-Band Operation

Paradise Datacom offers C-, X-, and Ku-Band amplifiers with an integrated L-Band Block Up Converter. The L-Band units utilize Paradise Datacom's proprietary ZBUC™ technology. The addition of a ZBUC™ to an Oudoor SSPA typically increases the gain by 2-4 dB. The advantages of ZBUC™ technology include:

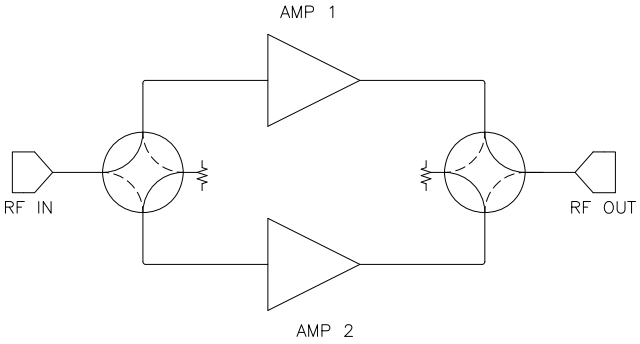
- ZBUC™ can detect and switch to an extenally supplied reference.
- Optional internal high stability (10MHz) reference.
- ZBUC™ can lock to an externally supplied reference of 5, 10, 20, 25, or 50 MHz without modification.
- ZBUC™ can accept a wide range of external reference power (-10dBm to +5 dBm)
- ZBUC™ can accept FSK monitor and control signal via the IFL for complete amplifer remote control.

Available Frequency Plans

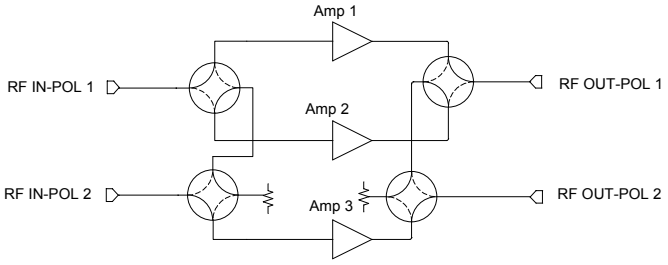
Band	Frequency Band	IF Input	LO Frequency	RF Output	Gain Change
C	Standard C-Band	950 - 1525 MHz	4.900 GHz	5.850 - 6.425 GHz	0-4 dB
C	Extended C-Band	950 - 1825 MHz	4.900 GHz	5.850 - 6.725 GHz	0-4 dB
C	Palapa Band	950 - 1250 MHz	5.475 GHz	6.425 - 6.725 GHz	0-4 dB
C	Insat Band	950 - 1250 MHz	5.775 GHz	6.725 - 7.025 GHz	0-4 dB
C	Extended C-Band 2	950 - 1675 MHz	4.800 GHz	5.750 - 6.475 GHz	0-4 dB
X	Standard X-Band	950 - 1450 MHz	6.950 GHz	7.900 - 8.400 GHz	0-2 dB
Ku	Standard Ku-Band	950 - 1450 MHz	13.050 GHz	14.00 - 14.50 GHz	0-2 dB
Ku	Extended Ku-Band	950 - 1700 MHz	12.800 GHz	13.75 - 14.50 GHz	0-2 dB

Electrical Specifications for Outdoor SSPA with ZBUC™

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	Absolute max.	C-band (typ.)	X-band (typ.)	Ku-band (typ.)	
	10 Hz	-30	-60	-60	-50	dBc/Hz
	100 Hz	-60	-80	-75	-65	dBc/Hz
	1 KHz	-70	-80	-75	-72	dBc/Hz
	10 KHz	-80	-85	-100	-90	dBc/Hz
	100 KHz	-90	-120	-110	-110	dBc/Hz
	1 MHz	-90	-125	-122	-120	dBc/Hz
Spurious	In-Band Signal Related (C-/Ku-Band)			-50		dBc
	(Extended C-Band)			-40		dBc
	Close to Carrier Spurious (≤ 20 MHz)			-50		dBc
	Local Oscillator			-30		dBm
	Non-Signal Related			-40		dBm
Noise Figure	At 75 dB gain setting			20		dB
Input VSWR	L-Band			1.5 : 1		
Internal Reference Option	Reference accuracy @ 25 °C			$\pm 1 \cdot 10^{-8}$		
	Reference Stability over Temperature (-40 to +40 °C)			$\pm 1 \cdot 10^{-9}$		

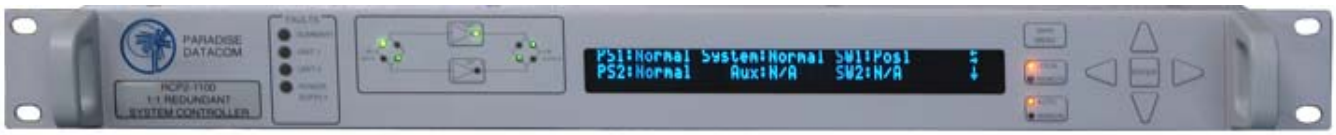


1:1 Redundant HPA System

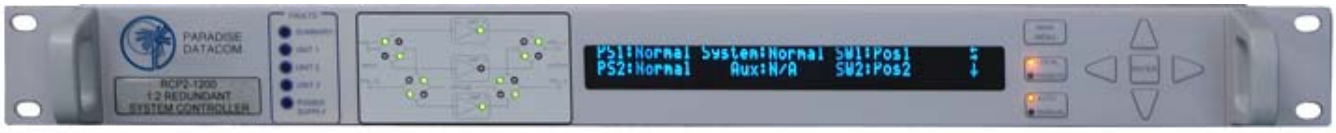


1:2 Redundant HPA System

Paradise Datacom's Outdoor Packaged Redundant Systems are designed with built-in redundancy for 1:1 systems, so all system-level monitor and control is internal and no separate controller is required, although an optional RCP2-1100 1:1 Redundant Controller is available. Either Ethernet or RS485 communications are selectable for user monitor and control. All 1:2 redundant systems require a separate RCP2-1200 Redundant Controller.



RCP2-1100 1:1 Redundant Controller

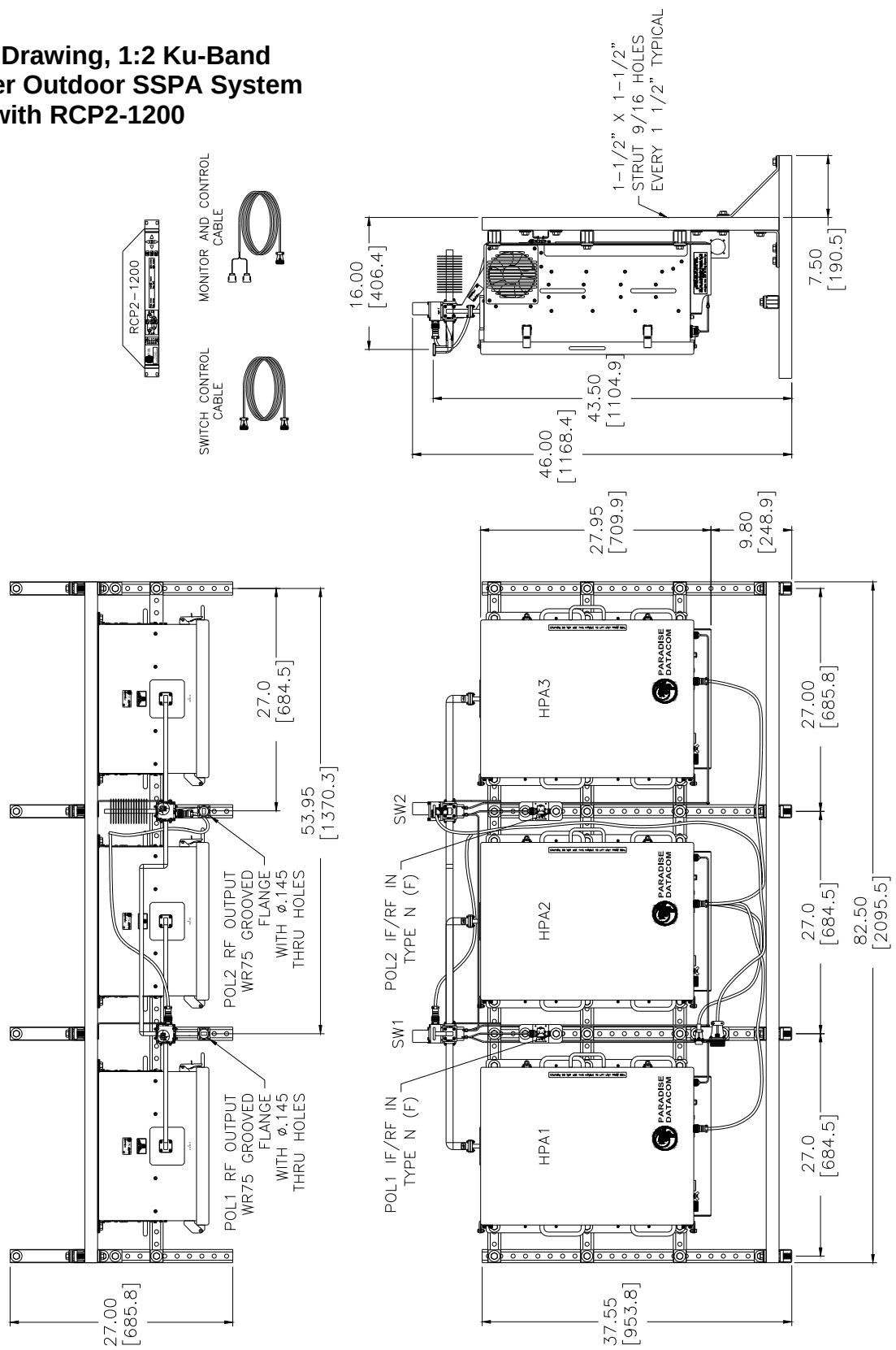


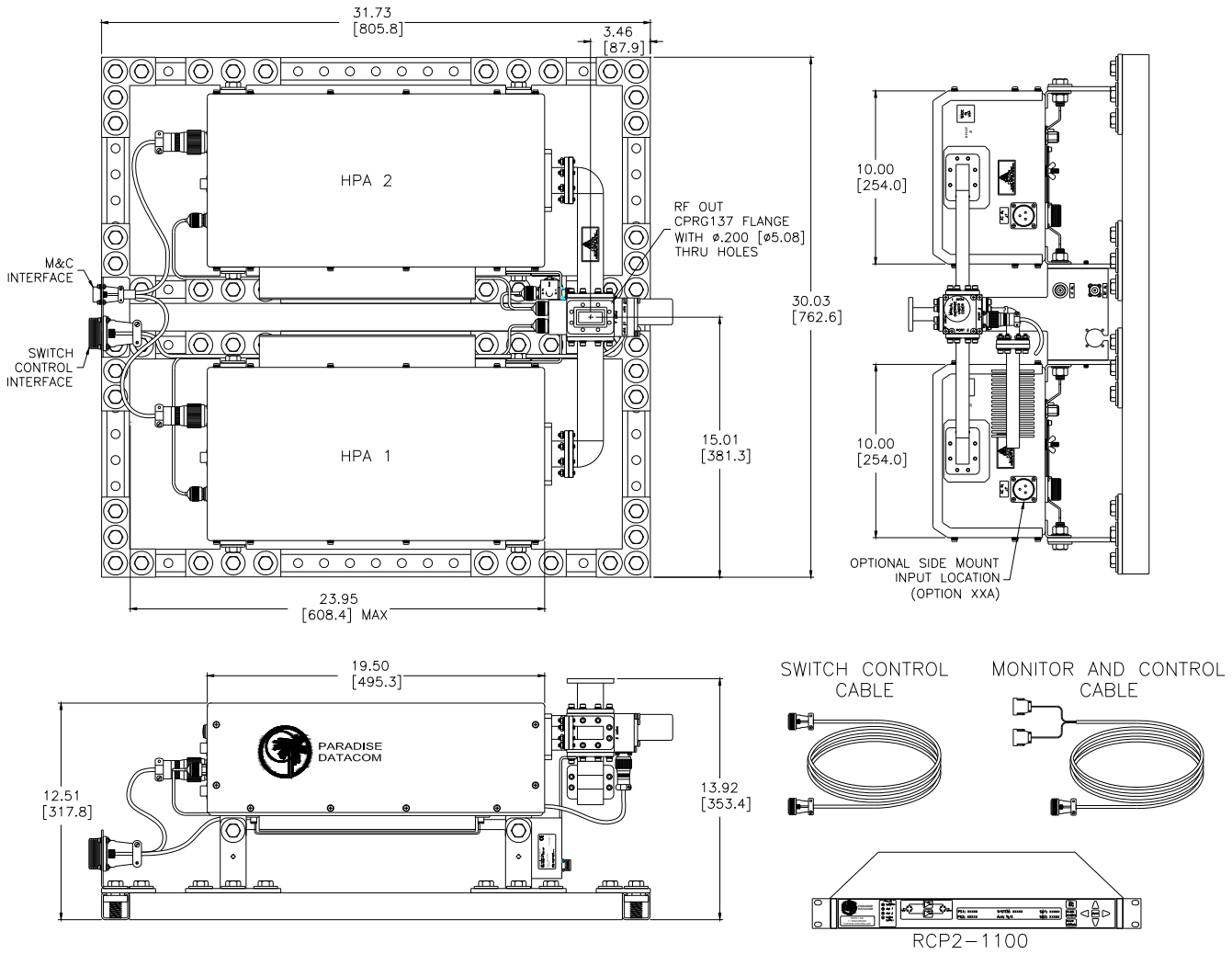
RCP2-1200 1:2 Redundant Controller

The RCP2-1X00 is the heart of the Redundant System. It provides an extremely user friendly interface for complete monitor and control of the high power amplifiers. The front panel mimic display shows the on-line amplifiers and the current switch positions. Dedicated fault lights are provided for easy indication of system status.

All RCP2-1X00 monitor and control is available locally, at the front panel LCD display, as well as remotely by the RS232 or RS485 interface ports. Audible alarms and a full compliment of parallel I/O signal are available at the rear panel of the RCP2-1X00.

Outline Drawing, 1:2 Ku-Band High Power Outdoor SSPA System with RCP2-1200





Outline Drawing, 1:1 C-Band Compact Outdoor SSPA System with RCP2-1100

Part Number Configuration, High Power Outdoor System

HPA [ ] 2 [ ][ ][ ][ ] W [ ][ ][ ][ ][ ]

Band
S - S-Band
C - C-Band
X - X-Band
K - Ku-Band

Power Level (in Watts)
S-Band
400, 500, 600
C-Band
400, 500, 600
X-Band
350, 500
Ku-Band
200, 250

Frequency Sub Band
S-Band
A - 2.020 - 2.120 GHz
B - 2.200 - 2.300 GHz
C-Band
A[1] - 5.85 - 6.425 GHz
B[1] - 5.85 - 6.725 GHz
C - 5.75 - 6.670 GHz
E[1,2] - 6.425 - 6.725 GHz (Palapa)
F[1,2] - 6.725 - 7.025 GHz (Insat)
G[1] - 5.750 - 6.475 GHz
H[1] - 5.715 - 5.790 GHz
J[1] - 5.740 - 6.650 GHz
V[1,3] - 5.85 - 6.725 GHz
X-Band
A[1] - 7.90 to 8.40 GHz
B - 7.50 to 8.50 GHz
D - 7.70 to 8.40 GHz
E - 7.75 to 8.50 GHz
Ku-Band
A[1] - 14.00 - 14.50 GHz
B[1] - 13.75 - 14.50 GHz

[1] Available with optional ZBUC.
[2] Available in 400W and 500W power levels.
[3] With 1.3:1 VSWR.

Configuration Modifier
XXX = Standard
SXX = Input Sample
XVX = Reflected Power Monitor
XXR* = Receive Band Reject Filter

* S-Band only. 500W & 600W units require an external filter.

System Configuration
A[1] = 1:1 w/ Input Switching, Internal control
B = 1:1 w/ Input Splitter, Internal control
C[1] = 1:2 w/ Input Switching & RCP2-1200[2]
D = 1:2 w/ Input Switching, Internal control
F = 1:1 w/ Input Splitter & RCP2-1100[2]
H[1] = 1:1 w/ Input Switching & RCP2-1100[2]
S = System (Custom)

[1] Not available with BUC option P.
[2] Standard Cable Length of 100 ft. (30m) with RCP unit.

Block Up Converter
B = BUC (Custom)
M = Internal Reference ZBUC
P = External Reference ZBUC
X = None

Package
W = Weather proof (NEMA)

Example - A 400W S-Band 1:1 Redundant High Power Outdoor SSPA System with input splitter is part number: **HPAS2400AWXBXXX**.

Part Number Configuration, Compact Outdoor Systems

HPA [ ] 2 [ ][ ][ ][ ] C [ ][ ][ ][ ][ ]

Band
S - S-Band
C - C-Band
X - X-Band
K - Ku-Band

Power Level (in Watts)
S-Band
050, 100, 200 or 300
C-Band
030, 040, 050, 075, 100, 140, 200, 250 or 300
X-Band
025, 030, 060, 075, 100, 140, 200, or 250
Ku-Band
010, 020, 025, 035, 040, 050, 070, 100, or 125

Frequency Sub Band
S-Band
A - 2.020 - 2.120 GHz
B - 2.200 - 2.300 GHz
C-Band
A[1] - 5.85 - 6.425 GHz
B[1] - 5.85 - 6.725 GHz
C - 5.75 - 6.670 GHz
E[1,2] - 6.425 - 6.725 GHz (Palapa)
F[1,2] - 6.725 - 7.025 GHz (Insat)
G[1] - 5.750 - 6.475 GHz
H[1] - 5.715 - 5.790 GHz
J[1] - 5.740 - 6.650 GHz
V[1,3] - 5.85 - 6.725 GHz
X-Band
A[1] - 7.90 to 8.40 GHz
B - 7.50 to 8.50 GHz
D - 7.70 to 8.40 GHz
E - 7.75 to 8.50 GHz
Ku-Band
A[1] - 14.00 - 14.50 GHz
B[1] - 13.75 - 14.50 GHz

[1] Available with optional ZBUC.
[1] Available in 400W and 500W power levels.
[3] With 1.3:1 VSWR.

Configuration Modifier
XXX = Standard
KXX[1] = 110 VAC Option
XMX = MS-Connector Covers
XRX[2] = Receive Band Reject Filter
XSX[2] = MS-Connector Covers & Receive Band Reject Filter
XTX[3] = Transmit Band Filter
XUX[3] = MS-Connector Covers & Transmit Band Filter
XXA = Side-mount AC Input, Location 'A'
XXD = 48 VDC Input
XXF = Side-mount 48V Input, Location 'A'

[1] Available in C- and X-Band models ≥140W and Ku-band models ≥100W.
[2] S-Band only.
[3] X-Band only.

System Configuration
A[1] = 1:1 w/ Input Switching, Internal control
B = 1:1 w/ Input Splitter, Internal control
C[1] = 1:2 w/ Input Switching & RCP2-1200[2]
D[1] = 1:2 w/ Input Switching, Internal control
F = 1:1 w/ Input Splitter & RCP2-1100[2]
H[1] = 1:1 w/ Input Switching & RCP2-1100[2]
S = System (Custom)

[1] Not available with BUC option P.
[2] Standard Cable Length of 100 ft. (30m) with RCP unit.

Block Up Converter
B = BUC (Custom)
M = Internal Reference ZBUC
P = External Reference ZBUC
X = None

Package
C = Standard Compact Outdoor

Refer to specification sheet 205489 for Fiber options.

Example - A 1:1 standard frequency 70W Ku-Band Compact Outdoor SSPA system with input splitter and internal control with an external reference BUC is part number: **HPAK2070ACBPXXX**.