TELEDYNE
PARADISE DATACOM
A Teledyne Technologies Company

Redundant Systems

Indoor Packaged SSPAs
3RU, 4RU, 6RU & 7RU

400W C-Band, 1:1 Redundant System in the 4RU chassis, with optional N+1 redundant power supplies

1.1 kW C-Band, 1:1 Redundant System in the 6RU Chassis

200W Ku-Band 1:1 Redundant System in the 3RU Chassis, with optional N+1 redundant power supplies

DESCRIPTION

Teledyne Paradise Datacom's Indoor Rack Mount (-RM) series of redundant amplifier systems provide the highest degree of earth station redundancy and reliability.

These systems can be configured in either 1:1 or 1:2 redundant configurations using any of the Teledyne Paradise Datacom family of Indoor Rack Mount SSPAs.

The RCP2-1100/1200 System Controller front panel mimic display shows the current switch positions and the on-line amplifiers. Dedicated fault lights provide easy indication of system status.

All RCP2-1100/1200 monitor and control is available locally, at the front panel LCD display, as well as remotely by the RS-232 or RS-485 interface ports.

FEATURES

- System Output Power to:
  - 1.1 kW C-Band
  - 1.0 kW X-Band
  - 600 kW S-Band
  - 500 W Ku Band
- Universal Input, Power Factor Corrected Power Supply
- Output Power Monitoring
- Separate 1 RU Redundant Controller for 1:2 systems
- Controller-less solutions for 1:1 systems

OPTIONS

- Controller-less 1:2 System
- Reflected Power Alarm
- L-Band Input operation
- Cold Standby Amplifier Operation
- External Exhaust Air Ducting Kit
- Custom Configurations

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Redundant Systems

Indoor Packaged SSPAs
3RU, 4RU, 6RU & 7RU

3RU SSPA Chassis
Output Power Levels

S-Band: 50W - 300W
C-Band: 25W - 300W
X-Band: 60W - 200W
Ku-Band: 10W - 150W

3 RU Chassis includes integrated AC-DC power supply

4RU SSPA Chassis
Output Power Levels

S-Band: 50W - 500W
C-Band: 50W - 600W
X-Band: 60W - 500W
Ku-Band: 25W - 250W

4 RU Chassis includes integrated AC-DC power supply

6RU & 7RU SSPA Chassis
Output Power Levels

C-Band: 750W - 1.1 kW
X-Band: 700W - 1.0 kW
Ku-Band: 400W - 500W

6RU & 7RU Chassis use separate, 3RU power supply chassis.

Power Supply is a redundant, N+1, chassis.

Only 2 of 3 power supply modules required to operate the SSPA with 1 hot standby.

Power Supply modules are front panel hot swappable.

Common System Specifications

PARAMETER	NOTES	LIMITS	UNITS
Gain	minimum	70	dB
Gain Flatness	full band (except Extended C-Band)	±1.0	dB
	Extended C-Band units	±1.5	dB
Gain Slope	per 40 MHz (C-,X-,Ku-bands)	±0.3	dB/40 MHz
	per 10 MHz (S-band)	±0.2	dB/10 MHz
Gain Variation vs. Temperature	0°C to +50°C	±1.0	dB
Gain Adjustment	0.1 dB resolution	20	dB
Intermodulation Distortion	3dB back off relative to P_{1dB}	-25	dBc
AM/PM Conversion	(@ rated P_{1dB})	3.5	°/dB
	(@P_{1dB}-3dB)	0.5	°/dB
Spurious	(@ rated P_{1dB})	-60	dBc
Harmonics	(@ rated P_{1dB}-3dB)(C-,X-,Ku-bands)	-50	dBc
	(@ rated P_{1dB}-3dB) (S-band)	-40	dBc
Input / Output VSWR	All units except Extended C-Band	1.30:1	
	Extended C-Band units	1.50:1	
Noise Figure	at maximum gain	12	dB
Group Delay	Linear	0.01	ns/MHz
(per 40 MHz segment)	Parabolic	0.003	ns/MHz^2
	Ripple	1.0	ns p-p
Noise Output	TX Band (S-,C-,X- or Ku-bands)	-70	dBW/4 KHz
	RX Band (C- or Ku-bands)	-155	dBW/4 KHz
	RX Band (X-band)	-100	dBW/4 KHz
	RX Band (S-band)	(see below)	
Residual AM Noise	0 - 10 KHz	-45	dBc
	10 KHz - 500 KHz	-20 (1.25 + log F)	dBc
	500 KHz - 1 MHz	-80	dBc
Residual Phase Noise	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

Mechanical

Size	width x height x depth		
3 RU SSPA Chassis		19.0 x 5.22 x 24.13 (483 x 133 x 613)	inches (mm)
4 RU SSPA Chassis		19.0 x 7.0 x 28.0 (483 x 178 x 711)	inches (mm)
6 RU SSPA Chassis		19.0 x 10.47 x 30.0 (483 x 266 x 762)	inches (mm)
7 RU SSPA Chassis		19.0 x 12.22 x 30.0 (483 x 310 x 762)	inches (mm)
3RU Power Supply Chassis		19.0 x 5.25 x 15.44 (483 x 134 x 433)	inches (mm)
Weight			
3RU SSPA Chassis		66 (30)	lbs. (kg)
4RU SSPA Chassis	≤ 250W Chassis	75 (34)	lbs. (kg)
4RU SSPA Chassis	> 250W Chassis	100 (45)	lbs. (kg)
6RU SSPA Chassis		180 (82)	lbs. (kg)
7RU SSPA Chassis		180 (82)	lbs. (kg)
3RU Power Supply Chassis		50 (23)	lbs. (kg)
Finish		powder coat	Gray

Environmental

Operating Temperature	Ambient	0 to +50	°C
Relative Humidity	Condensing	95	%
Cooling System	Integrated	Forced air	

S-Band Receive Band Noise and Filter Option

Receive Band Reject Filter	Insertion Loss	-0.3	dB
Filter integrated into SSPA chassis through 400W output; ≥500W SSPAs require external filter	Rx Reject @ 2.200 - 2.300 GHz	-60	dBc
	Rx Reject @ 2.025 - 2.120 GHz	-60	dBc
Receive Band Noise Power Density	Without optional filter	-95	dBw/4 KHz
	With optional filter	-155	dBw/4 KHz

L-Band Operation

Teledyne Paradise Datacom offers integrated L-Band Block Up Converters in C-, X-, and Ku-Band amplifiers in 3RU, 4RU and 6RU configurations. The L-Band units utilize Paradise Datacom's proprietary ZBUC™ technology. The addition of a ZBUC converter to a Rack Mountable SSPA system typically increases the gain by 2-4 dB. The advantages of ZBUC™ technology include:

- ZBUC converter can detect and switch to an extenally supplied reference.
- Optional internal high stability (10MHz) reference.
- ZBUC converter can lock to an externally supplied reference of 5, 10, 20, 25, or 50 MHz without modification.
- 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 amplifer remote control.

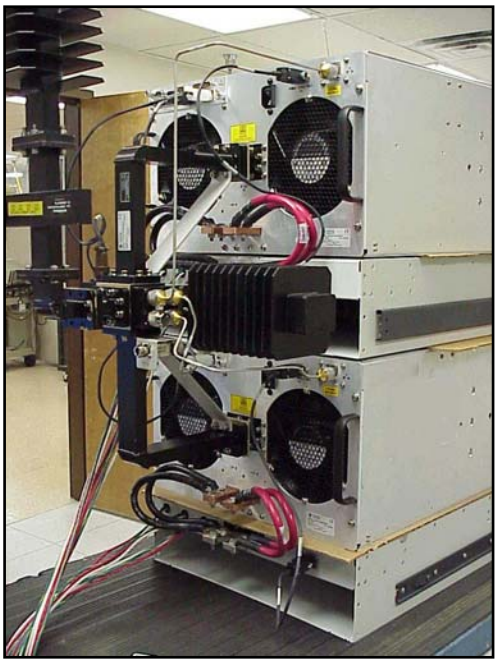
Available Frequency Plans

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 RM SSPA System with ZBUC™ converter

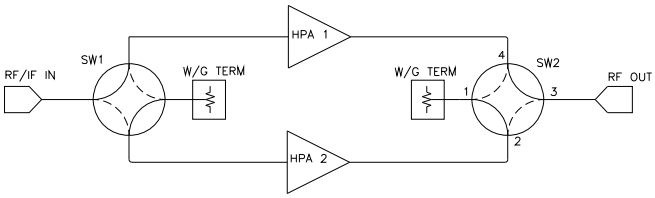
PARAMETER	NOTES	LIMITS				UNITS
Gain	Nominal setting	75				dB
Gain Flatness	full band (C-,X-,Ku-bands)	±2.0				dB
Gain Slope	per 40 MHz (C-,X-,Ku-bands)	±0.5				dB/40 MHz
Gain Adjusted Range		20				dB
	Typical C-Band Adj. Range	60 - 80				dB
	Typical Ku-Band Adj. Range	57 - 77				dB
Gain Stability	-40 to +60 °C	±1.5				dB
Phase Noise	Offset frequency from carrier	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
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)			$\pm 1 \cdot 10^{-9}$		

Indoor Redundant System Physical Configurations

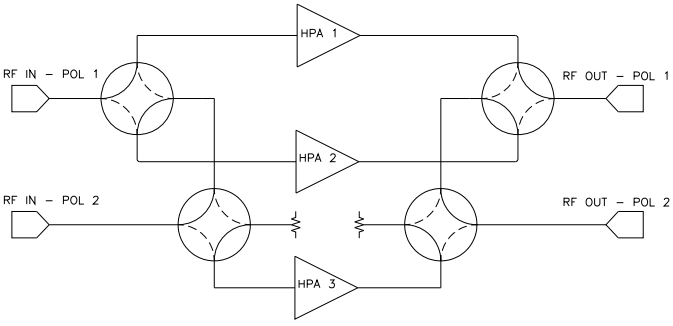


Redundant Control Panels

RCP2-1100 1:1 Redundant Controller

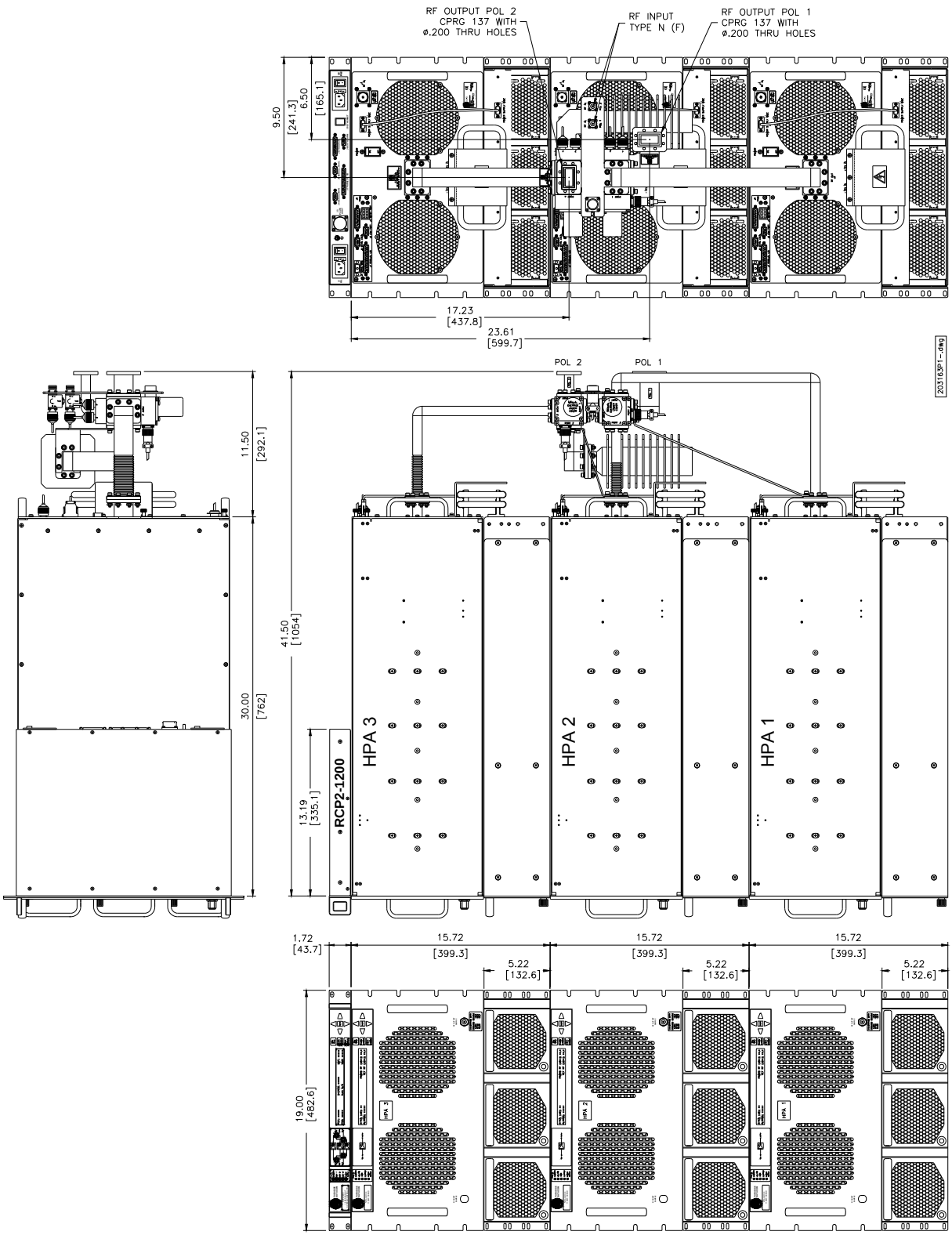


Block Diagram, 1:1 Redundant System

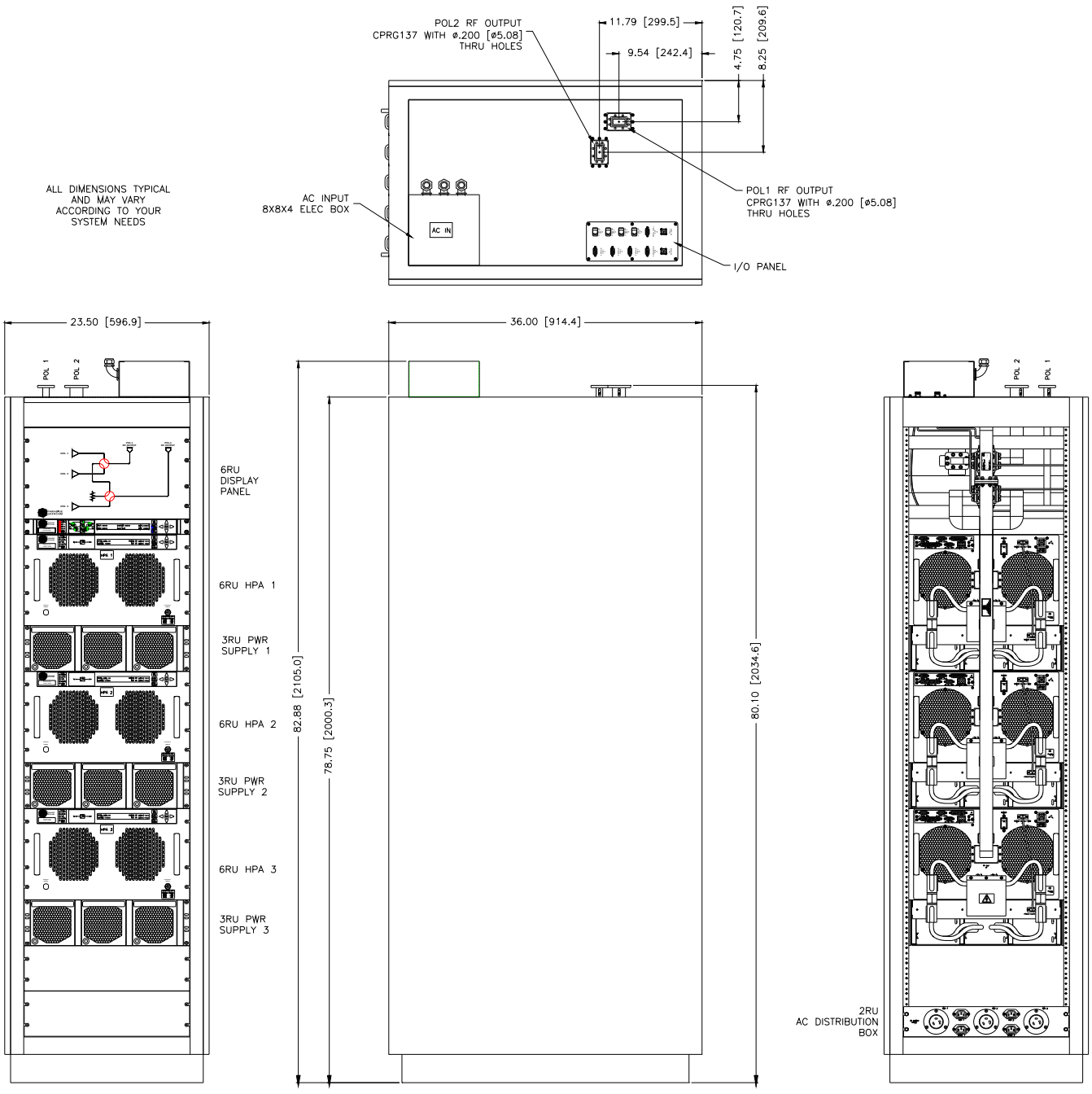


Block Diagram, 1:2 Redundant System

RCP2-1200 1:2 Redundant Controller

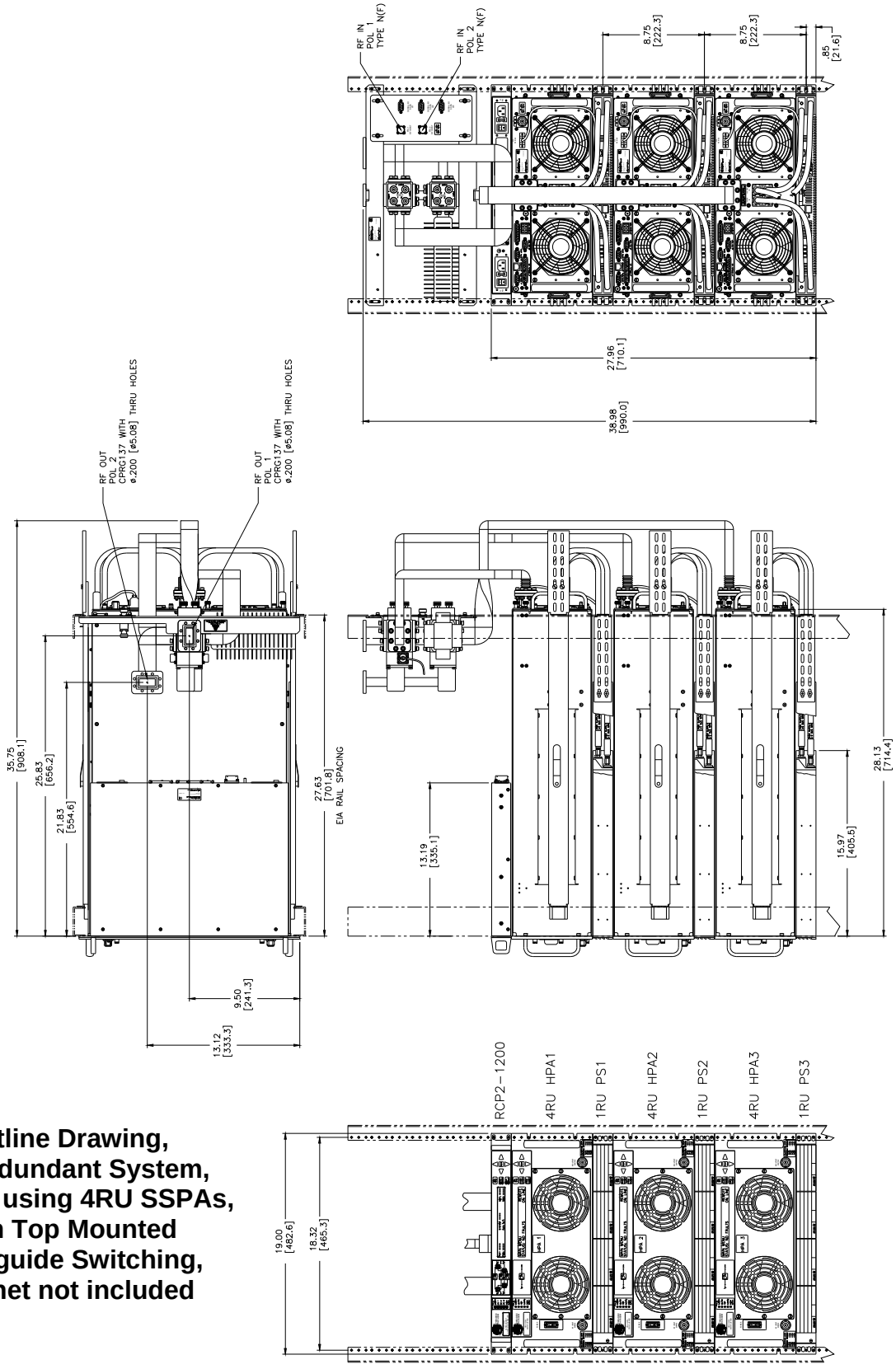


Outline Drawing, 1:2 Redundant System, C-Band, using 6RU SSPAs and 3RU Power Supplies, with RCP2-1200 and Rear Mounted Waveguide Switching, Cabinet not included

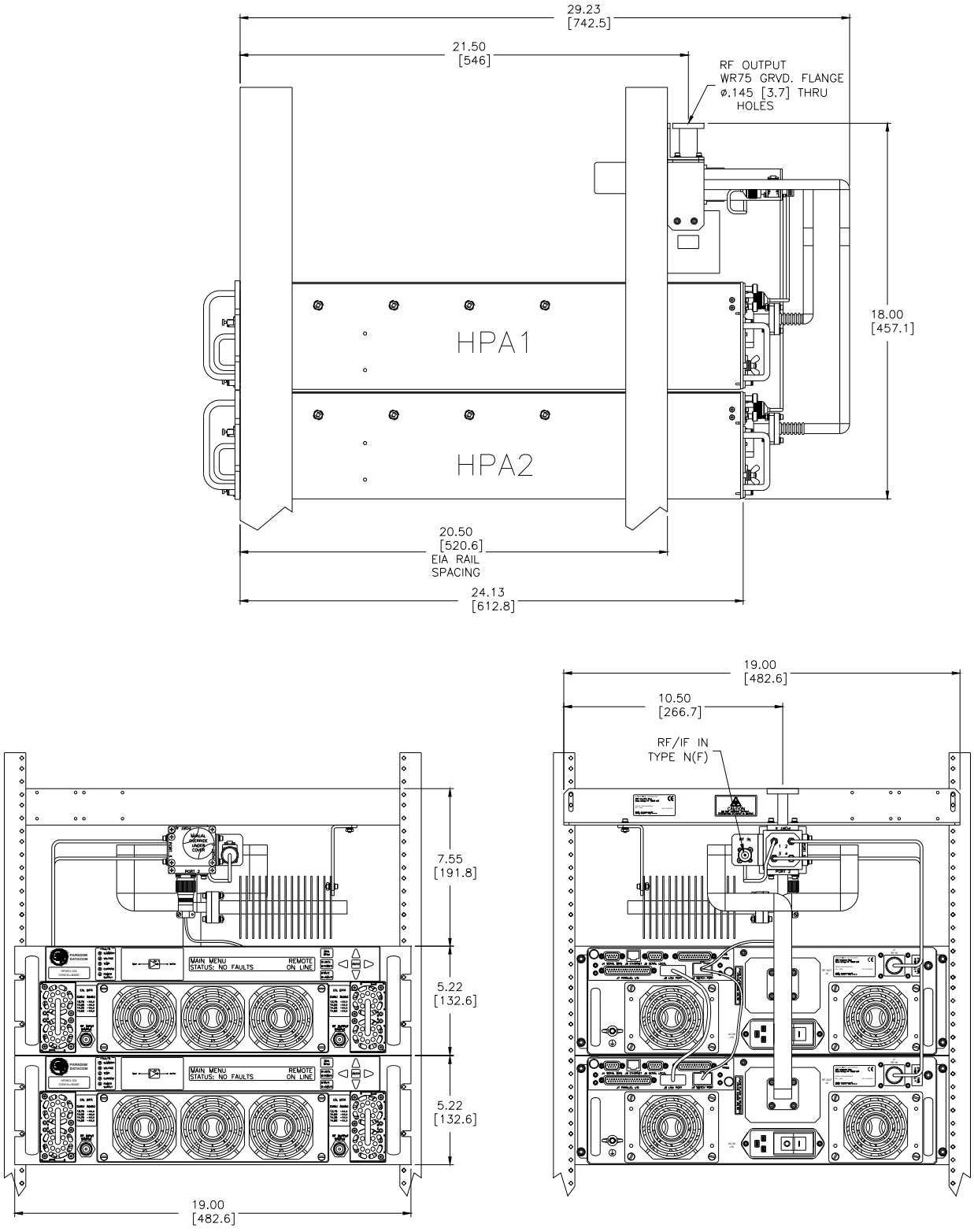


Outline Drawing, 1:2 Redundant System, C-Band, using 6RU SSPAs and 3RU Power Supplies, with RCP2-1200 and Top Mounted Waveguide Switching with Cabinet

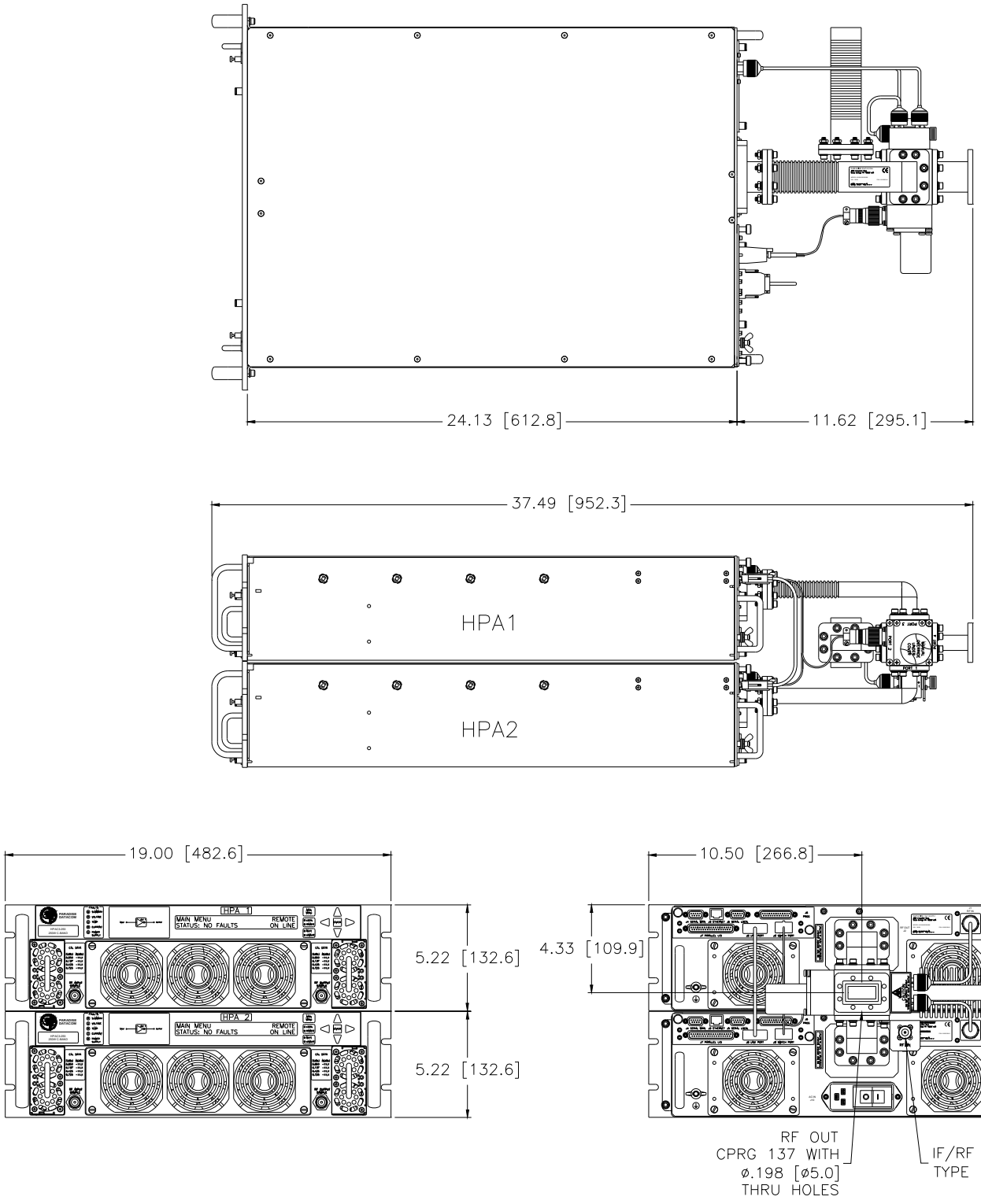
Indoor Packaged SSPAs
3RU, 4RU, 6RU & 7RU



**Outline Drawing,
1:2 Redundant System,
C-Band, using 4RU SSPAs,
with Top Mounted
Waveguide Switching,
Cabinet not included**



Outline Drawing, 1:1 Redundant System, Ku-Band, using 3RU SSPAs, with Top Mounted Waveguide Switching, Cabinet not included



Outline Drawing, 1:1 Redundant System, C-Band, using 3RU SSPAs, with Rear Mounted Waveguide Switching, Cabinet not included

Part Number Configuration, 3 RU Chassis

HPA [ ] 3 [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

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
025, 030, 040, 050, 075, 100, 140, 200, 250, or 300

X-Band
060, 075, 100, 140 or 200

Ku-Band
010, 020, 025, 035, 040, 050, 070, 100, 125 or 150

Frequency Sub Band

S-Band
A - 2.02 to 2.12 GHz
B - 2.20 to 2.30 GHz

C-Band
A[1] – 5.850 to 6.425 GHz
B[1] – 5.850 to 6.725 GHz
C – 5.750 to 6.670 GHz
E[1] – 6.425 to 6.725 GHz (Palapa)
F[1] – 6.725 to 7.025 GHz (Insat)
G[1] – 5.750 to 6.475 GHz
V[1,2] – 5.850 to 6.725 GHz

X-Band
A[1] - 7.90 to 8.40 GHz
B - 7.50 to 8.50 GHz
C - 9.50 to 10.50 GHz
D - 7.70 to 8.40 GHz

Ku-Band
A[1] – 14.00 to 14.50 GHz
B[1] – 13.75 to 14.50 GHz

[1] Available with optional BUC.
[2] With 1.3:1 VSWR.

Configuration Modifier
XXX = Standard
RXX[1] = 90° Output W/G Flange
SXX = Input Sample
TXX[1] = 90° Output W/G Flange with Input Sample Port
XVX = Reflected Power Monitor
XPX[2] = Front Panel Power Switch
XRX[2] = Reflected Power Monitor & Front Panel Power Switch
XXE[3] = Rear Panel Exhaust Adapters
XXP = External 1RU N+1 Power Supply
XXR[4] = Receive Band Reject Filter
XXK[3,4] = Rear Panel Exhaust Adapters & Receive Band Reject Filter
XXL[3] = External 1RU N+1 Power Supply & Rear Panel Exhaust Adapters
XXM[4] = External 1RU N+1 Power Supply & Receive Band Reject Filter

[1] Not available in S-Band units.
[2] Not available with External 1RU N+1 Power Supply.
[3] Not available with Package options 'Y' or 'Z'.
[4] S-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 = Custom

[1] Input switching with external reference BUC requires a reference distribution box.
[2] Standard location for RCP is directly above HPA1

Block Up Converter
B = BUC (Custom)
M = Internal Reference ZBUC
P = External Reference ZBUC
X = N/A

Package
S = Rack Mount, Top Mounted Waveguide Switching, with Cabinet
T = Rack Mount, Top Mounted Waveguide Switching, without Cabinet
Y = Rack Mount, Rear Mounted Waveguide Switching, with Cabinet
Z = Rack Mount, Rear Mounted Waveguide Switching, without Cabinet

Specifications listed in this document are subject to change without notice.

Part Number Configuration, 4 RU Chassis

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

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

Power Level (in Watts)

S-Band
050, 100, 200, 400, 500

C-Band
025, 030, 040, 050, 075, 100, 140, 200, 250, 300, 400, 500, 600

X-Band
060, 075, 100, 140, 200, 250, 350, 500

Ku-Band
010, 020, 025, 035, 040, 050, 070, 100, 125, 200, 250

Frequency Sub Band

S-Band
A - 2.02 to 2.12 GHz
B - 2.20 to 2.30 GHz

C-Band
A[1] – 5.850 to 6.425 GHz
B[1] – 5.850 to 6.725 GHz
C – 5.750 to 6.670 GHz
E[1] – 6.425 to 6.725 GHz (Palapa)
F[1] – 6.725 to 7.025 GHz (Insat)
G[1] – 5.750 to 6.475 GHz
V[1,2] – 5.850 to 6.725 GHz

X-Band
A[1] - 7.90 to 8.40 GHz
B - 7.50 to 8.50 GHz
C - 9.50 to 10.50 GHz
D - 7.70 to 8.40 GHz

Ku-Band
A[1] – 14.00 to 14.50 GHz
B[1] – 13.75 to 14.50 GHz

[1] Available with optional BUC.
[2] With 1.3:1 VSWR.

Package
S = Rack Mount, Top Mounted Waveguide Switching, with Cabinet
T = Rack Mount, Top Mounted Waveguide Switching, without Cabinet
Y = Rack Mount, Rear Mounted Waveguide Switching, with Cabinet
Z = Rack Mount, Rear Mounted Waveguide Switching, without Cabinet

Configuration Modifier
XXX = Standard
SXX = Input Sample
CXX[1] = Input Sample & 110/220 VAC Operation
KXX[1] = 110/220 VAC Operation
XVX = Reflected Power Monitor
XXD = 48V Input
XXE[2] = Rear Panel Exhaust Adapters
XXR[3] = Receive Band Reject Filter
XXJ[2] = 48V Input & Rear Panel Exhaust Adapters
XXH[3] = 48V Input & Receive Band Reject Filter
XXK[2,3] = Rear Panel Exhaust Adapters & Receive Band Reject Filter
XXL[2] = External 1RU N+1 Power Supply & Rear Panel Exhaust Adapters
XXM[3] = External 1RU N+1 Power Supply & Receive Band Reject Filter
XXP = External 1RU N+1 Power Supply

[1] 100-125W Ku- & 200-300W C-band only; Consult factory regarding other bands and power levels.
[2] Not available with Package options Y and Z.
[3] S-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 = Custom

[1] Input switching with external reference BUC requires a reference distribution box.
[2] Standard location for RCP is directly above HPA1

Block Up Converter
B = BUC (Custom)
M = Internal Reference ZBUC
P = External Reference ZBUC
X = N/A

Specifications listed in this document are subject to change without notice.

Part Number Configuration, 6 RU Chassis

HPA [ ] 6 [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

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

Power Level (in Watts)
C-Band
750, 1100 (11K)
X-Band
700, 1000 (10K)
Ku-Band
400, 500

Frequency Sub Band
C-Band
A[1] – 5.850 to 6.425 GHz
B[1] – 5.850 to 6.725 GHz
C – 5.750 to 6.670 GHz
E[1] – 6.425 to 6.725 GHz (Palapa)
F[1] – 6.725 to 7.025 GHz (Insat)
G[1] – 5.750 to 6.475 GHz
V[1,2] – 5.850 to 6.725 GHz
X-Band
A[1] - 7.90 to 8.40 GHz
B - 7.50 to 8.50 GHz
C - 9.50 to 10.50 GHz
D - 7.70 to 8.40 GHz
Ku-Band
A[1] – 14.00 to 14.50 GHz
B[1] – 13.75 to 14.50 GHz

[1] Available with optional BUC.
[2] With 1.3:1 VSWR.

Configuration Modifier
XXX = Standard
DXX[1] = Non-redundant 1RU Power Supply
EXX[1] = Non-redundant 1RU Power Supply & Input Sample Port
FXX = (2) 1RU Power Supplies, Non-redundant[2]
GXX = (2) 1RU Power Supplies, Non-redundant[2] & Input Sample
HXX = (2) 1RU Power Supplies, Redundant
JXX = (2) 1RU Power Supplies, Redundant & Input Sample Port
SXX = Input Sample Port
XVX = Reflected Power Monitor
XXE[3] = Rear Panel Exhaust Adapters

[1] Only available with 750W C-Band; 400W Ku-Band.
[2] Redundant with 750W C-Band; 400W Ku-Band.
[3] Not available with Package options Y or Z.

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

[1] Input switching with external reference BUC requires a reference distribution box.
[2] Standard location for RCP is directly above HPA1

Block Up Converter
B = BUC (Custom)
M = Internal Reference ZBUC
P = External Reference ZBUC
X = N/A

Package
S = Rack Mount, Top Mounted Waveguide Switching, with Cabinet
T = Rack Mount, Top Mounted Waveguide Switching, without Cabinet
Y = Rack Mount, Rear Mounted Waveguide Switching, with Cabinet
Z = Rack Mount, Rear Mounted Waveguide Switching, without Cabinet

Specifications listed in this document are subject to change without notice.

Part Number Configuration, 7 RU Chassis

HPA [ ] 7 [ ][ ][ ][ ][ ] X [ ][ ][ ][ ]

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

Power Level (in Watts)
C-Band
750, 1100 (11K)
X-Band
700, 1000 (10K)
Ku-Band
400, 500

Frequency Sub Band
C-Band
A[1] – 5.850 to 6.425 GHz
B[1] – 5.850 to 6.725 GHz
C – 5.750 to 6.670 GHz
E[1] – 6.425 to 6.725 GHz (Palapa)
F[1] – 6.725 to 7.025 GHz (Insat)
G[1] – 5.750 to 6.475 GHz
V[1,2] – 5.850 to 6.725 GHz
X-Band
A[1] - 7.90 to 8.40 GHz
B - 7.50 to 8.50 GHz
C - 9.50 to 10.50 GHz
D - 7.70 to 8.40 GHz
Ku-Band
A[1] – 14.00 to 14.50 GHz
B[1] – 13.75 to 14.50 GHz

[1] Available with optional BUC.
[2] With 1.3:1 VSWR.

Configuration Modifier
XXX = Standard
SXX = Input Sample Port
XVX = Reflected Power Monitor
XXE[1] = Rear Panel Exhaust Adapters

[1] Not available with Package options Y or Z.

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

[1] Input switching with external reference BUC requires a reference distribution box.
[2] Standard location for RCP is directly above HPA1

Block Up Converter
X = N/A

Package
S = Rack Mount, Top Mounted Waveguide Switching, with Cabinet
T = Rack Mount, Top Mounted Waveguide Switching, without Cabinet
Y = Rack Mount, Rear Mounted Waveguide Switching, with Cabinet
Z = Rack Mount, Rear Mounted Waveguide Switching, without Cabinet

Specifications listed in this document are subject to change without notice.