TELEDYNE
PARADISE DATACOM
Everywhereyoulook™

Redundant Systems
Indoor Packaged GaAs SSPAs
3RU, 5RU, 6RU

C-Band 1:1 Redundant System in the 5RU chassis, with 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.

Redundant systems may be configured without an optional 1RU system controller. However, the controller front panel mimic display shows the current switch positions and the online amplifiers. Dedicated fault indicators provide easy indication of system status.

All system controller monitor and control is available locally at the front panel touchscreen display, as well as remotely by the RS-232, RS-485 or Ethernet interface ports.

FEATURES

- Extremely High Power Density:
  1.1 kW C-Band
  200 W X-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
- Hot/Cold Standby operating modes for reduced power consumption

OPTIONS

- Controller-less 1:2 System
- Reflected Power Alarm
- Arc Detection Kit
- L-Band Input Operation
- External Exhaust Air Ducting Kit
- Custom Configurations

Single 3RU Chassis
Output Power Levels

C Band: 100W - 300W
X Band: 200W

Single 5RU Chassis
Output Power Levels

C Band: 400W - 500W

Single 6RU Chassis
Output Power Levels

C Band: 800W - 1.1 kW

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.

For example, a single thread 200W C-Band 3RU SSPA has a typical saturated output power of 53.0 dB (200W). Placing two of the above amplifiers in a 1:1 redundant system configuration would reduce the typical system saturated output by 0.2 dB to 52.8 dB (191W).

Placing three of the above amplifiers in a 1:2 redundant system configuration would reduce the typical system saturated output by 0.4 dB to 52.6 dB (182W).

Actual system losses will vary based on the system options.

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}).

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Common System Specifications

PARAMETER	NOTES	LIMITS	UNITS
Gain Gain Flatness Gain Slope Gain Variation vs. Temperature Gain Stability Gain Adjustment	minimum full band (except Extended C-Band) Extended C-Band units per 40 MHz 0°C to +50°C at constant temperature 0.1 dB resolution	70 ± 1.0 ± 1.5 ± 0.3 ± 1.0 ± 0.25 20	dB dB dB dB/40 MHz dB dB/24 hours dB
Intermodulation Distortion	@ P_{1dB} - 3 dB	-25	dBc
AM/PM Conversion	@ rated P_{1dB} @ P_{1dB} - 3 dB	3.5 0.5	°/dB °/dB
Spurious Harmonics	@ rated P_{1dB} @ rated P_{1dB} - 3 dB	-65 -50	dBc dBc
Input / Output VSWR		1.50:1	
Group Delay (per 40 MHz segment)	Linear Parabolic Ripple	0.01 0.003 1.0	ns/MHz ns/MHz^2 ns p-p
Noise Output	TX Band RX Band (C-band) RX Band (X-band)	-70 -155 -100	dBW/4 KHz 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
Residual 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

Mechanical

Size 3 RU SSPA Chassis 5 RU SSPA Chassis 6 RU SSPA Chassis 1RU Power Supply Chassis	width x height x depth	 19.0 x 5.22 x 25.25 (483 x 133 x 641) 19.0 x 8.75 x 30.25 (483 x 222 x 768) 19.0 x 10.47 x 30.25 (483 x 266 x 768) 19.0 x 1.75 x 16.10 (483 x 44 x 409)	 inches (mm) inches (mm) inches (mm) inches (mm)
Weight, typical 3RU SSPA Chassis 5RU SSPA Chassis 6RU SSPA Chassis 1RU Power Supply Chassis		 85 (38.5) 150 (68) 180 (82) 29 (13)	 lbs. (kg) lbs. (kg) lbs. (kg) lbs. (kg)
Finish		powder coat	Gray

Environmental

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

Supplying Power to Indoor Packaged SSPAs

The Indoor Packaged SSPAs use a separate 1RU power supply chassis in an N+1 redundant configuration, which means it has one additional power supply module than is necessary to operate the SSPA, with that module in hot standby. Power supply modules are hot swappable at the front panel.

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. Adding a zBUC® converter to an SSPA typically increases the gain by 2-4 dB. In addition:

- 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

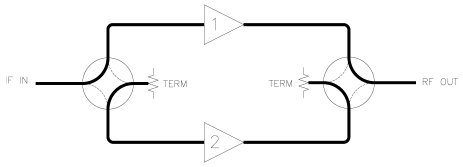
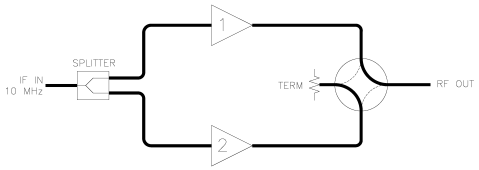
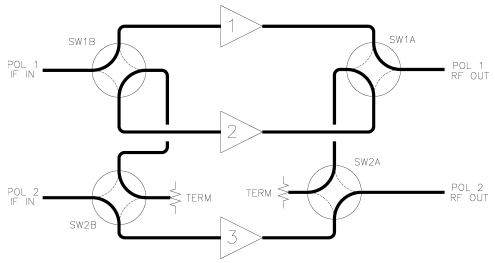
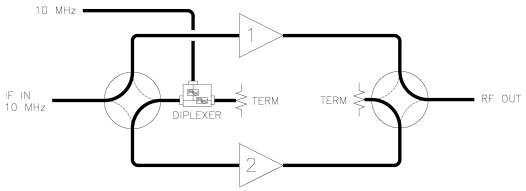
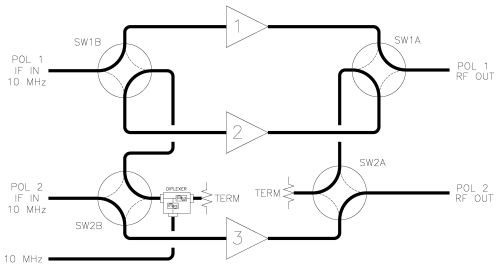
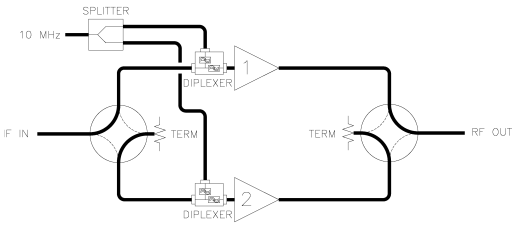
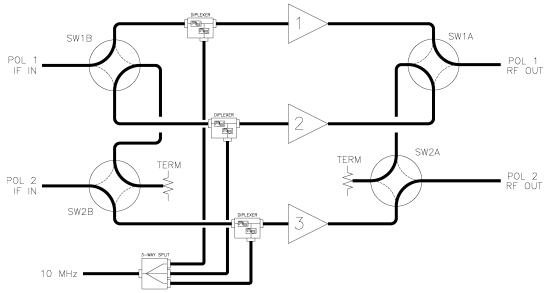
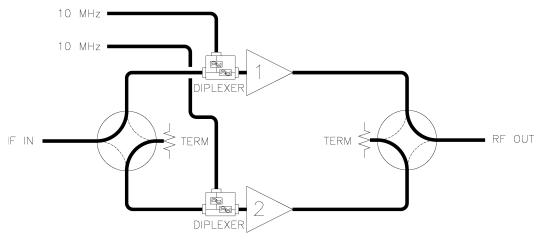
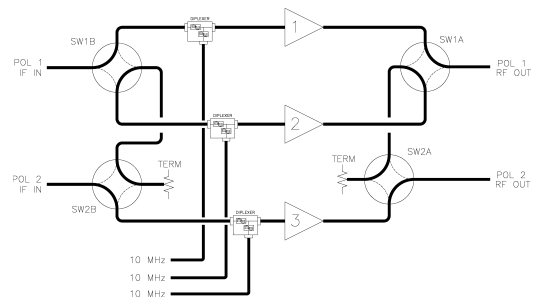
Band	Model Number	IF Input	LO Frequency	RF Output
C	Sub-Band "A"	950 - 1525 MHz	4.900 GHz	5.850 - 6.425 GHz
C	Sub-Band "B"	950 - 1825 MHz	4.900 GHz	5.850 - 6.725 GHz
C	Sub-Band "C"	950 - 1870 MHz	4.800 GHz	5.750 - 6.670 GHz
X	Sub-Band "A"	950 - 1450 MHz	6.950 GHz	7.900 - 8.400 GHz

Electrical Specifications for RM SSPA Systems with ZBUC converter

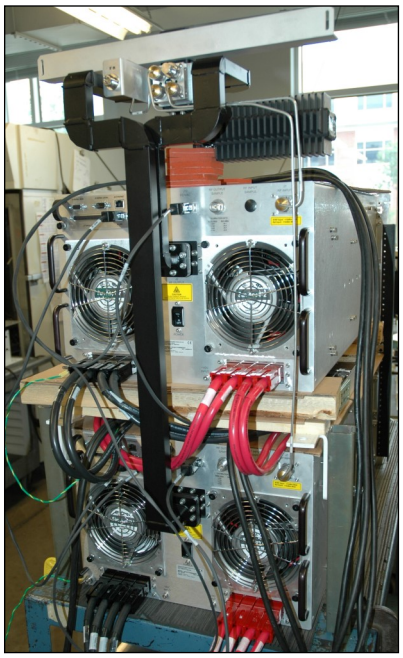
PARAMETER	NOTES	LIMITS			UNITS
Gain	Nominal setting	75			dB
Gain Flatness	full band	± 2.0			dB
Gain Slope	per 40 MHz	± 0.5			dB/40 MHz
Gain Adjusted Range		20			dB
	Typical C-Band Adj. Range	60 - 80			dB
Gain Stability	-40 to +60 °C	± 1.5			dB
Phase Noise	Offset frequency from carrier	Absolute max.	C-band (typ.)	X-band (typ.)	
	10 Hz	-30	-60	-58	dBc/Hz
	100 Hz	-60	-74	-70	dBc/Hz
	1 KHz	-70	-84	-80	dBc/Hz
	10 KHz	-80	-100	-94	dBc/Hz
	100 KHz	-90	-105	-97	dBc/Hz
	1 MHz	-90	-125	-122	dBc/Hz
Spurious	In-Band Signal Related (C-Band)		-50		dBc
	(Extended C-Band)		-40		dBc
	Close to Carrier Spurious (≤ 20 MHz)		-50		dBc
	Local Oscillator		-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)		$\pm 1 \cdot 10^{-8}$		
	Aging per day (after 30 days)		$\pm 1 \cdot 10^{-9}$		
	Aging per year (after 30 days)		$\pm 6 \cdot 10^{-8}$		
	Reference Stability over Temperature (-40 to +40 °C, ambient)		$\pm 1 \cdot 10^{-8}$		

Reference Options in Redundant Systems with L-Band Input

See below for BUC configurations in which the 10 MHz reference can be distributed to units in redundant systems. Converters with internal reference oscillators automatically switch to an externally applied reference.

1:1 Redundant Systems	Ref. Option	1:2 Redundant Systems
Internal Reference Standard for BUC option 'M' with input switching  **Internal/External Reference** Standard for BUC option 'M' with input splitting  	**Option 1**	**Internal Reference** Standard for BUC option 'M' 
External 10 MHz Diplexed to Standby Unit  	**Option 2**	**External 10 MHz Diplexed to Standby Unit** 
Single External 10 MHz Diplexed to Each Unit  	**Option 3**	**Single External 10 MHz Diplexed to Each Unit** 
Separate External 10 MHz Diplexed to Each Unit  	**Option 4**	**Separate External 10 MHz Diplexed to Each Unit** 

Indoor Redundant System Physical Configurations

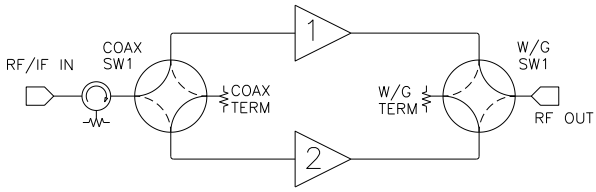


◄ 1:1 Redundant System, Top Facing W/G, Without Cabinet

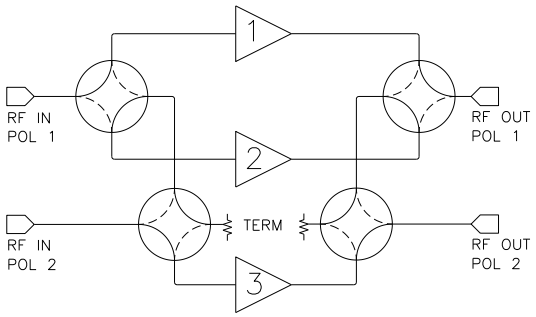
1:2 Redundant ► 3RU System With Cabinet

Redundant System Controllers

Redundant System Controller with Touchscreen (1:1 Mode Shown)

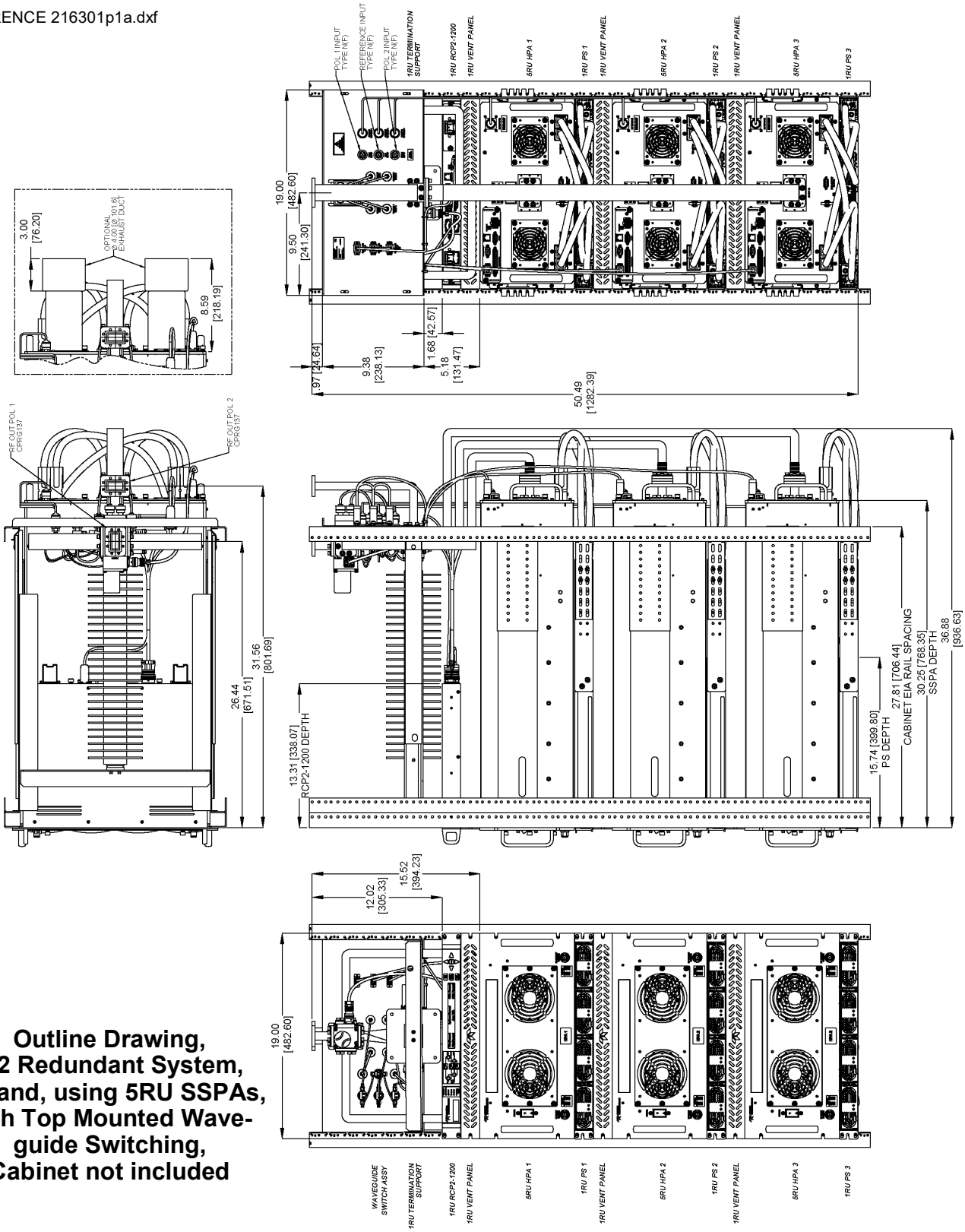


Block Diagram, 1:1 Redundant System



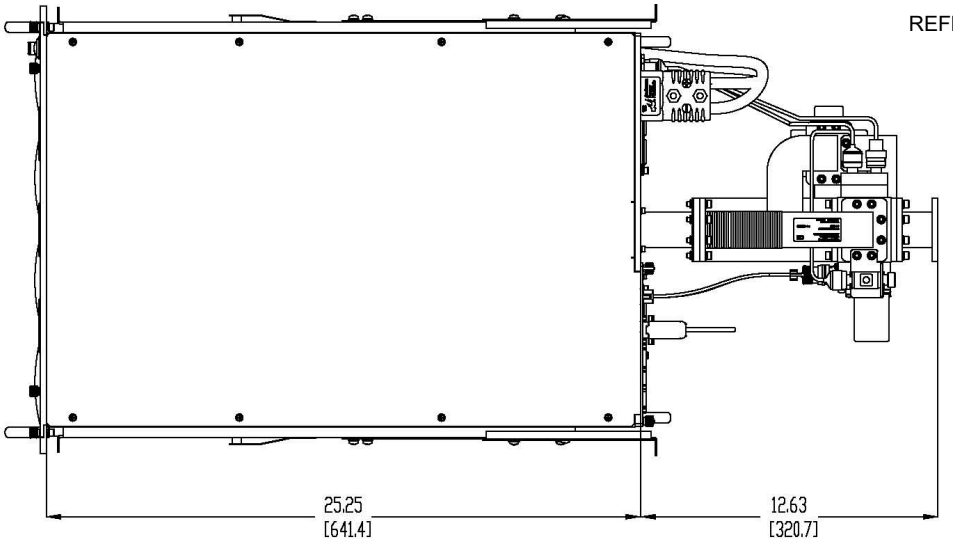
Block Diagram, 1:2 Redundant System

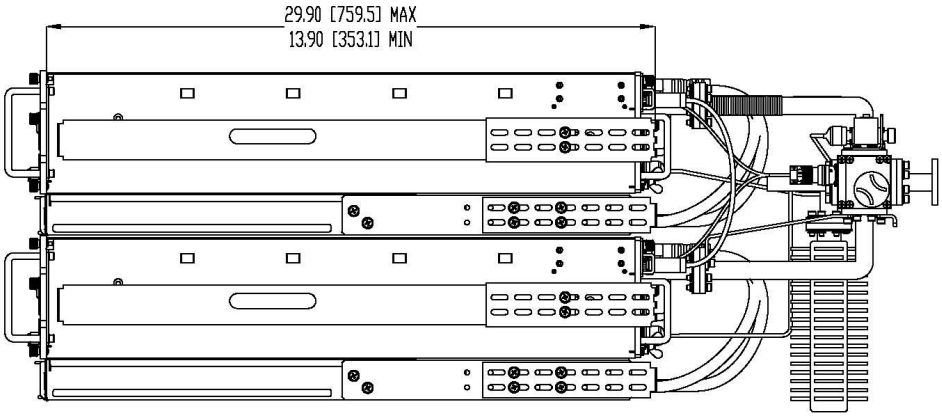
REFERENCE 216301p1a.dxf

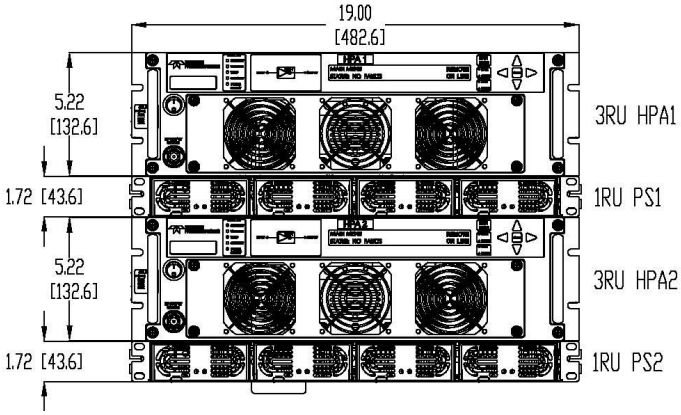


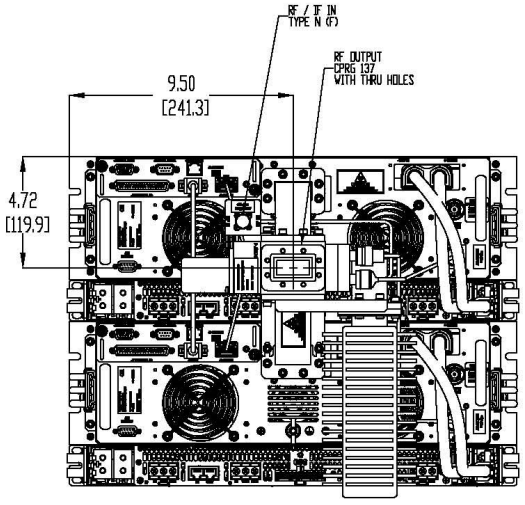
**Outline Drawing,
1:2 Redundant System,
C-Band, using 5RU SSPAs,
with Top Mounted Wave-
guide Switching,
Cabinet not included**

REFERENCE 216135









Outline Drawing, 1:1 Redundant System, C-Band, using 2nd Gen 3RU SSPAs, with Rear Mounted Waveguide Switching, Cabinet not included

Redundant Systems
Indoor Packaged GaAs SSPAs
3RU, 5RU, 6RU

Part Number Configuration, 2nd Generation 3 RU GaAs SSPA

HPA	C	3	3	0	0	A	S	M	B	S	X	P	2

2nd Generation

Band	
C-Band	C
X-Band	X

Rack Height	
3RU	3

Power Level (Watts)	
C-Band	100, 140, 200, 250, 300
X-Band	200

Frequency Sub Band	
C-Band	
A[1]	5.850 to 6.425 GHz
B[1]	5.850 to 6.725 GHz
C[1]	5.750 to 6.670 GHz
X-Band	
A[1]	7.90 to 8.40 GHz

[1] Available with optional BUC

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

For standalone SSPA specifications, refer to document 214576.

COMMENTS:

Configuration Modifier 3	
P	1RU N+1 Power Supply
L[1]	1RU N+1 Power Supply & Rear Exhaust Adapters

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

Configuration Modifier 2	
X	Standard
P	Front Panel Power Switch
R[1]	Receive Band Reject Filter
V	Reflected Power Monitor
A[1]	P + R (see above)
B	P + V (see above)
C[1]	V + R (see above)
D[1]	P + R + V (see above)

[1] X-Band only

Configuration Modifier 1	
X	Standard
K	110 VAC Input
S	Input Sample Port
C	K + S (see above)

System Configuration	
A	1:1 System, Input Switching, Internal control
B	1:1 System, Input Splitter, Internal control
C	1:2 System, Input Switching, RCP2-1200[1]
D	1:2 System, Input Switching, Internal control
F	1:1 System, Input Splitter, RCP2-1100[1]
H	1:1 System, Input Switching, RCP2-1100[1]

[1] Standard location for RCP is directly above HPA1

Block Up Converter	
M	Autosensing BUC
X	No BUC

See page 5 for BUC reference configuration options.
Option 1 is standard for all 1:1 and 1:2 systems using BUC option 'M'.

Redundant Systems
Indoor Packaged GaAs SSPAs
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Part Number Configuration, 5 RU GaAs SSPA

HPA	C	5	5	0	0	A	S	M	B	S	X	P

Band

C-Band	C

Rack Height

5RU	5

Power Level (Watts)

C-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[1]	5.750 to 6.670 GHz

[1] Available with optional BUC

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

Block Up Converter

M	Autosensing BUC
X	No BUC

See page 5 for BUC reference configuration options. **Option 1** is standard for all 1:1 and 1:2 systems using BUC option 'M'.

System Configuration

A	1:1 System, Input Switching, Internal control
B	1:1 System, Input Splitter, Internal control
C	1:2 System, Input Switching, RCP2-1200[1]
D	1:2 System, Input Switching, Internal control
F	1:1 System, Input Splitter, RCP2-1100[1]
H	1:1 System, Input Switching, RCP2-1100[1]

[1] Standard location for RCP is directly above HPA1

Configuration Modifier 1

X	Standard
S	Input Sample Port

Configuration Modifier 2

X	Standard
V	Reflected Power Monitor

Configuration Modifier 3

P	1RU N+1 Power Supply
L[1]	1RU N+1 Power Supply & Rear Exhaust Adapters

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

For standalone SSPA specifications, refer to document 214165.

COMMENTS:

Redundant Systems
Indoor Packaged GaAs SSPAs
3RU, 5RU, 6RU

Part Number Configuration, 6 RU GaAs SSPA

HPA	C	6	8	0	0	A	S	M	B	S	X	P

Band	
C-Band	C

Rack Height	
6RU	6

Power Level (Watts)	
C-Band	800, 900, 1100 (11K)

Frequency Sub Band	
C-Band	
A[1]	5.850 to 6.425 GHz
B[1]	5.850 to 6.725 GHz
C[1]	5.750 to 6.670 GHz

[1] Available with optional BUC

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 3	
P	1RU N+1 Power Supply
L[1]	1RU N+1 Power Supply & Rear Exhaust Adapters

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

Configuration Modifier 2	
X	Standard
V	Reflected Power Monitor

Configuration Modifier 1	
X	Standard
S	Input Sample Port

System Configuration	
A	1:1 System, Input Switching, Internal control
B	1:1 System, Input Splitter, Internal control
C	1:2 System, Input Switching, RCP2-1200[1]
D	1:2 System, Input Switching, Internal control
F	1:1 System, Input Splitter, RCP2-1100[1]
H	1:1 System, Input Switching, RCP2-1100[1]

[1] Standard location for RCP is directly above HPA1

Block Up Converter	
M	Autosensing BUC
X	No BUC

See page 5 for BUC reference configuration options.
Option 1 is standard for all 1:1 and 1:2 systems using BUC option 'M'.

For standalone SSPA specifications, refer to document 217002.

COMMENTS:

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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.

Specifications are subject to change without notice.