



Teledyne Paradise Datacom's newly packaged High Power Outdoor (H) series of Solid State Power Amplifiers represent the latest in High Power Microwave Amplifier Technology. The SSPA package achieves the highest power density in the industry, along with enhanced maintainability.

A state-of-the-art thermal platform provides efficient cooling for the amplifier module and power supplies. This ensures the highest possible MTBFs for microwave power amplifiers.

Teledyne Paradise Datacom amplifiers are optimized for the best wide band intermod performance and linearity possible.

All Teledyne Paradise Datacom SSPAs have a full complement of local and remote control capability. The remote control capabilities include: RS485/RS232 serial control, Ethernet including SNMP, UDP, and internal web browsing. Discrete hardware control, Form C contact alarms and opto isolated inputs are also included.

FEATURES

- Extremely High Power Density:
 - to 500 W X-Band
 - to 600 W C-Band
 - to 250 W Ku-Band
- RF Output Sample Port
- Remote Communication via RS232/485 or Ethernet
- -20 dB Gain Adjustment
- Built-in 1:1 Redundancy Control with 'Cold' Standby capability
- Built-in Maintenance Switch Controller

OPTIONS

- Hand Held Controller
- RF Input Sample Port
- L-Band Input operation
- Reflected Power Monitor
- Phase Combined Systems
- Antenna Mounting Kit

SPECIFICATIONS

- Dimensions & Weight:
 - 16.5 x 27.5 x 9.335 in.
 - 419 x 699 x 238 mm
 - 95.0 lbs. / 43.2 kg

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C-Band Output Power Levels

| PARAMETER | NOTES | LIMITS | UNITS |
|---|--|--|-------------------------------------|
| Frequency Range | (see options for extended band) | 5.850 to 6.425 | GHz |
| Output Power P _{sat} , typical P _{1dB} , guaranteed minimum | HPAC2400AHXXXXX HPAC2500AHXXXXX HPAC2600AHXXXXX | P _{sat} / P _{1dB} 56.0 (400) / 55.0 (316) 57.0 (500) / 56.0 (400) 57.8 (600) / 57.0 (500) | dBm (W) dBm (W) dBm (W) |
| Power Requirements Line Frequency Line Power (Voltage) (typical @ 220 VAC) | Power Factor corrected Autoranging HPAC2400AHXXXXX HPAC2500AHXXXXX HPAC2600AHXXXXX | > 0.9 47 - 63 2400 (90-265) 2800 (90-265) 3700 (180-265) | Hz W (VAC) W (VAC) W (VAC) |

X-Band Output Power Levels

| PARAMETER | NOTES | LIMITS | UNITS |
|---|---|---|--------------------------|
| Frequency Range | (see options for extended band) | 7.90 to 8.40 | GHz |
| Output Power P _{sat} , typical P _{1dB} , guaranteed minimum | HPAX2350AHXXXXX HPAX2500AHXXXXX | P _{sat} / P _{1dB} 55.5 (354) / 54.5 (282) 57.0 (500) / 55.7 (370) | dBm (W) dBm (W) |
| Power Requirements Line Frequency Line Power (Voltage) (typical @ 220 VAC) | Power Factor corrected Autoranging HPAX2350AHXXXXX HPAX2500AHXXXXX | > 0.94 47 - 63 2700 (90-265) 4000 (180-265) | Hz W (VAC) W (VAC) |

Ku-Band Output Power Levels

| PARAMETER | NOTES | LIMITS | UNITS |
|---|---|---|--------------------------|
| Frequency Range | (see options for extended band) | 14.00 to 14.50 | GHz |
| Output Power P _{sat} , typical P _{1dB} , guaranteed minimum | HPAK2200AHXXXXX HPAK2250AHXXXXX | P _{sat} / P _{1dB} 53.0 (200) / 52.0 (158) 54.0 (250) / 53.0 (200) | dBm (W) dBm (W) |
| Power Requirements Line Frequency Line Power (Voltage) (typical @ 220 VAC) | Power Factor corrected Autoranging HPAK2200AHXXXXX HPAK2250AHXXXXX | > 0.94 47 - 63 2500 (90-265) 2800 (90-265) | Hz W (VAC) W (VAC) |

Options

| | | |
|---|--|---|
| Extended C-Band 5.850 to 6.725 GHz (Sub-band "B") 5.750 to 6.670 GHz (Sub-band "C") 6.425 to 7.025 GHz (Sub-band "E" or "F") | De-rate power by 1.0 dB linearly from 6.425 to 6.725 GHz De-rate power by 1.0 dB linearly from 5.850 to 5.750 GHz and from 6.425 to 6.670 GHz. Available in power levels up to 500W | Model: HPAC2XXXBHXXXXX HPAC2XXXCHXXXXX HPAC2XXXE/FHXXXXX |
| Extended X-Band 7.70 to 8.40 GHz (Sub-band "D") | De-rate power by 1.0 dB linearly from 7.90 to 7.70 GHz | Model: HPAX2XXXDHXXXXX |
| Extended Ku-Band 13.75 to 14.5 GHz (Sub-band "B") | De-rate power by 1.0 dB linearly from 14.0 to 13.75 GHz | Model: HPAK2XXXBHXXXXX |

Common Specifications; HPA_2000XH Series

Electrical Specifications

| PARAMETER | NOTES | LIMITS | UNITS |
|--------------------------------|---|--------------------|---------------------|
| Gain | range | 55-75 | dB |
| Gain Flatness | full band | ± 1.0 | dB |
| | Extended C-Band units | ± 1.5 | dB |
| Gain Slope | per 40 MHz | ± 0.3 | dB/40 MHz |
| Gain Variation vs. Temperature | -40°C to +60°C | ± 1.5 | dB |
| Gain Stability | at constant temperature | ± 0.25 | dB/24 hours |
| 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} - 3 dB) | 1.0 | °/dB |
| Spurious | (@ rated P _{1dB}) | -65 | dBc |
| Harmonics | (@ rated P _{1dB} - 3 dB) | -50 | dBc |
| Input/Output VSWR | Standard Band units | 1.30:1 | |
| | Extended Band units | 1.50:1 | |
| Noise Figure | at maximum gain | 10 | 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 | -75 | dBW/4 KHz |
| | RX Band (C- or Ku-Band) | -150 | dBW/4 KHz |
| | RX Band (X-Band) | -100 | 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 | 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 Specifications

| | | | |
|--------|------------------------|--|--------------|
| Size | width X height X depth | 21.0 X 27.95 X 13.5 533 X 710 X 343 | inches mm |
| Weight | typical | 95 ± 5 (43.2 ± 2) | lbs. (kg) |
| Finish | | powder coat | white |

Environmental Specifications

| | | | |
|---------------------------|---|------------|----|
| Operating Temperature | Ambient | -40 to +60 | °C |
| Relative Humidity | Condensing | 100 | % |
| Cooling System | Integrated | Forced air | |
| Ingress Protection Rating | With connectors properly sealed | IP54 | |
| Altitude | No temperature de-rating up to 10,000 ft. (3,000 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 | | |

Specifications are subject to change without notice.

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.

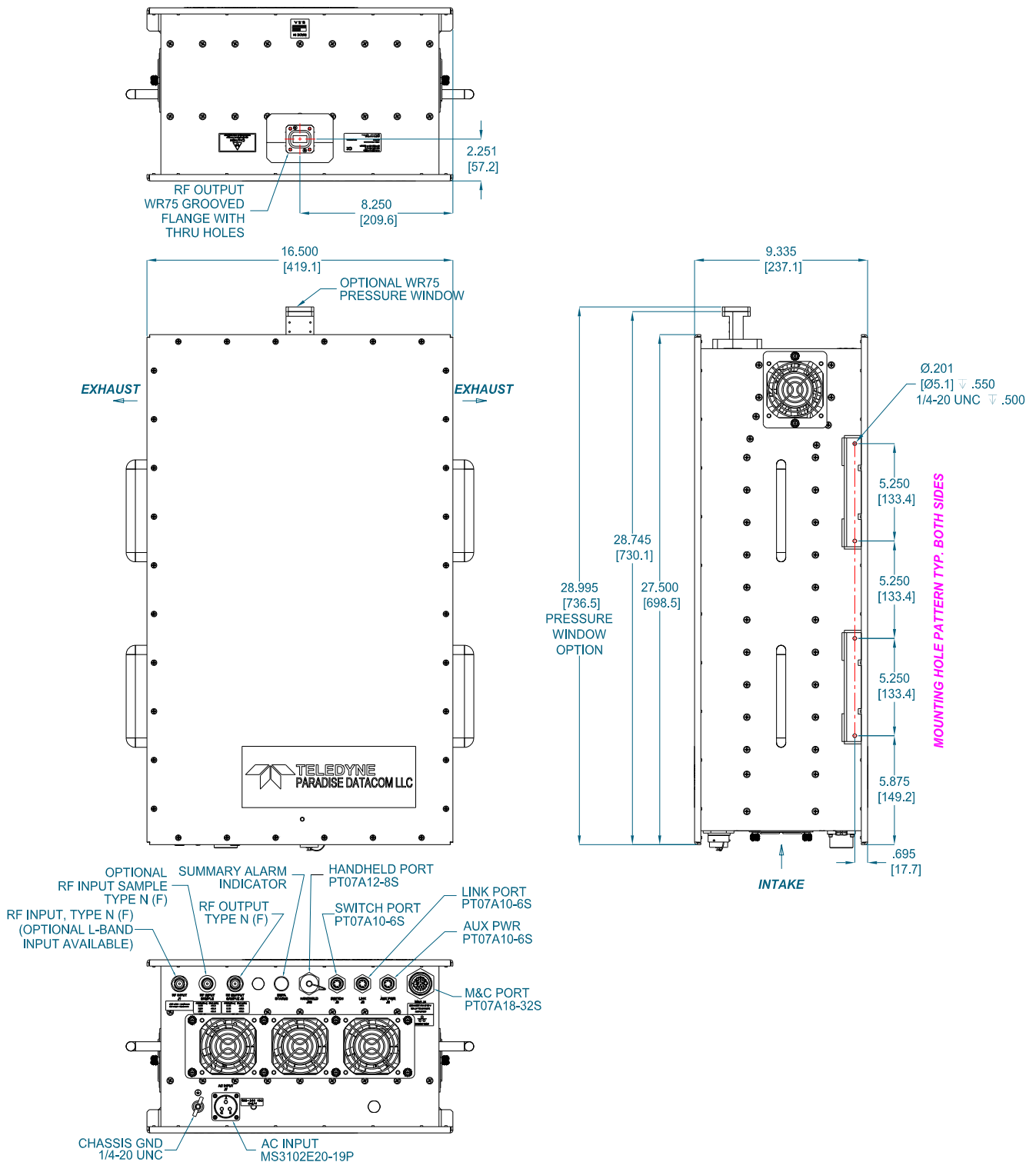
Available Frequency Plans

| Band | Frequency 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 |
| C | Low C-Band | 840 - 1000 MHz | 4.250 GHz | 5.090 - 5.250 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 High Power 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 |
| Gain Stability | Typical C-Band Adj. Range | 60 - 80 | | | | dB |
| | Typical Ku-Band Adj. Range | 57 - 77 | | | | dB |
| Phase Noise | Offset frequency from carrier | ± 1.5 | | | | dB |
| | 10 Hz | <u>Absolute max.</u> | <u>C-band (typ.)</u> | <u>X-band (typ.)</u> | <u>Ku-band (typ.)</u> | dBc/Hz |
| | 100 Hz | -30 | -60 | -60 | -50 | dBc/Hz |
| | 1 KHz | -60 | -80 | -75 | -65 | dBc/Hz |
| | 10 KHz | -70 | -80 | -75 | -72 | dBc/Hz |
| | 100 KHz | -80 | -85 | -100 | -90 | dBc/Hz |
| | 1 MHz | -90 | -120 | -110 | -110 | 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 75 dB gain setting | 20 | | | | dB |
| Input VSWR | L-Band | 1.5 : 1 | | | | |
| Internal Reference Option | Reference Accuracy (initial) | ± 1 • 10 ⁻⁸ | | | | |
| | Aging per day (after 30 days) | ± 1 • 10 ⁻⁹ | | | | |
| | Aging per year (after 30 days) | ± 6 • 10 ⁻⁸ | | | | |
| | Reference Stability over Temperature (-40 to +40 °C, ambient) | ± 1 • 10 ⁻⁸ | | | | |

Outline Drawing, Ku-Band High Power Outdoor SSPA (typical)



Optional Accessories

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.

Remote Control Panel (RCP2-1000)



The RCP2-1000 is a Remote Control Panel for the High Power Outdoor SSPA. It requires only 1RU of cabinet space and provides an identical local interface as exists on Teledyne Paradise Datacom Indoor Rack Mount amplifiers.

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

Part Number Configuration Matrix

HPA **C 2 4 0 0 A H M X S X X**

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

| Generation | |
|------------|----------|
| Second | 2 |

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

| 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 |
| F ¹ | 6.725 to 7.025 GHz |
| G | 5.750 to 6.475 GHz |
| H | 5.715 to 5.790 GHz |
| J | 5.740 to 6.650 GHz |
| X-Band | |
| A ¹ | 7.90 to 8.40 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 |
| F ¹ | 12.75 to 13.25 GHz |

¹ Available with optional BUC

| Configuration Modifier 3 | |
|--------------------------|-----------------|
| X | None (Standard) |

| Configuration Modifier 2 | |
|--------------------------|----------------------------|
| X | Standard |
| R ¹ | Receive Band Reject Filter |
| V | Reflected Power Monitor |
| W ² | Waveguide Pressure Window |
| Y ¹ | R + V (see above) |
| Z ² | V + W (see above) |

¹ X-Band units only

² Ku-Band standalone units only

| Configuration Modifier 1 | |
|--------------------------|-------------------|
| X | Standard |
| S | Input Sample Port |

| System Configuration | |
|----------------------|----------------------|
| X | Standalone amplifier |

| Block Up Converter | |
|--------------------|------------------------|
| M | Internal Reference BUC |
| P | External Reference BUC |
| X | No BUC |

| Package | |
|----------|----------------------|
| H | Standalone amplifier |

Example - A standalone 400W GaAs C-Band High Power Outdoor SSPA an optional input sample port and optional internal reference block up converter is part number: **HPAC2400AHMXSXX**.

An optional mounting kit is available.

Use and Disclosure of Data

The information contained herein is classified as EAR99 under the U.S. Export Administration Regulations. Export, re-export or diversion contrary to U.S. law is prohibited.

Specifications are subject to change without notice.