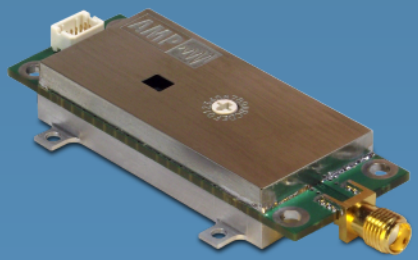
# Operation Manual

## P Series Products

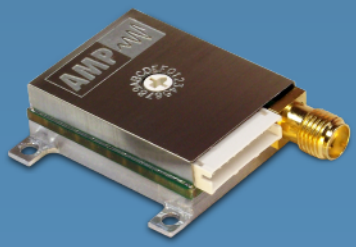
*Video / Audio / Data*

*Transmitters & Receivers*

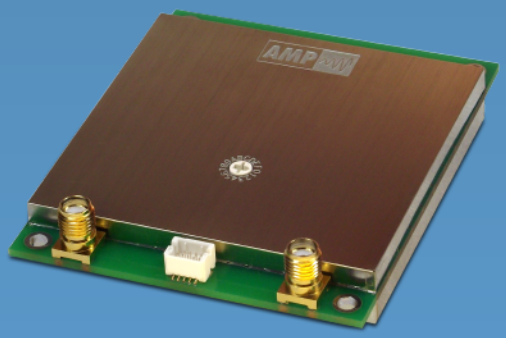
PST1 Transmitter



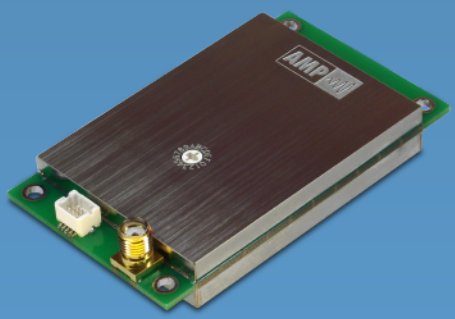
PMT1 Transmitter



PDR1 Diversity Receiver



PSR1 Receiver




*Advanced Microwave Products*
*PO Box 1437*
*2465 Old Highway 40 West, Suite 200*
*Verdi, NV 89439*

*www.advmw.com*
*engineering@advmw.com*
*(775) 345-9933*

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# 1. INTRODUCTION

Thank you for choosing this AMP Wireless Video Product. Every effort has been made to design and manufacture a quality product that will meet your surveillance needs for many years. Please visit our website (www.advmw.com) for information on other products and for datasheets, quick start guides, model number builders, operation manuals, and other related materials.

If you have any questions regarding this product or if you require technical assistance, please feel free to contact us at (775) 345-9933.

## 1.1. Purpose and Function

P series PCB Video/Audio/Data Transmitters and Receivers are developed and manufactured by Advanced Microwave Products (AMP).

P series products are designed for color or monochrome video, audio, and data transmission. P series transmitters/receivers are best operated with AMP's P or V series receivers/transmitters but are compatible with most other analog FM video receivers/transmitters on the market.

## 1.2. Capabilities

AMP Transmitters and Receivers are designed for harsh environments and feature robust packaging and connectors. Compact package sizes provide versatility in unit placement and system applications.

AMP Transmitters and Receivers require no tuning or adjustments. All units operate directly with any standard video camera or display. Power can be derived from batteries, simple power supplies, or vehicle power.

Whip or "rubber duck" antennas are adequate for most applications.

## 1.3. Environmental Requirements

AMP Transmitters and Receivers are designed for indoor or outdoor use. Precautions should be taken when exposing the products to the elements. Do not expose to 100% humidity.

Transmitters and Receivers should be located in areas where the ambient temperature does not exceed the maximum operating temperature indicated in the specifications. Placement in confined locations with minimal airflow, in direct sunlight in areas of temperature extremes, or in proximity to other devices that generate heat, such as power supplies, heating systems, etc., should be avoided. Temperatures exceeding +75°C may cause permanent damage to the equipment.

When not used for extended periods of time, external connections, including power cable, video cable, and antenna, should be removed and the units covered, boxed, or crated and stored in a clean, dry place.

# 2. PMT1 TRANSMITTER

## 2.1. PMT1 Specifications

### RF Characteristics

| | | | |
|---|---|---|---|
| Frequency Range (Specify): | UHF: | 340.0-399.9 MHz | 100 kHz Channels |
| (Other Ranges Available) | Lower L-Band: | 1435-1535 MHz | 1 MHz Channels |
| | Upper L-Band: | 1700–1850 MHz | 1 MHz Channels |
| | Lower S-Band: | 2200-2399 MHz | 1 MHz Channels |
| | Upper S-Band: | 2400-2499 MHz | 1 MHz Channels |
| | Full S-Band: | 2200-2499 MHz | 1 MHz Channels |
| | Lower C-Band: | 4400-4900 MHz | 1 MHz Channels |
| | Upper C-Band | 4900-4999 MHz | 1 MHz Channels |
| | Full C-Band: | 4400-4999 MHz | 1 MHz Channels |
| | ISM 5.8 GHz Band: | 5725-5875 MHz | 1 MHz Channels |
| Frequency Selection (Specify): | Full Band Channelized - Remote Control Only or Remote/Programmable Switch | | |
| Frequency Stability: | ±5 ppm Over -20°C to +60°C | | |
| Output Power (Specify): | 20 mW or 250 mW Nominal | | |
| Output Impedance: | 50 Ω Nominal, VSWR 2:1 Maximum | | |
| Spurious Output: | -13 dBm Maximum | | |

### Video Characteristics

| | |
|---|---|
| Modulation Type: | Analog FM, Positive Sense |
| Video Standard (Specify): | NTSC (10Hz to 4.2MHz, 525 Line P/E) or PAL (10Hz to 5.0MHz, 625 Line P/E), +/- 1.5dB |
| Modulation Sensitivity: | ±4 MHz / 1 Vpk-pk @ Crossover Frequency |
| Input Impedance: | 75 Ω Nominal, Unbalanced, Shunted by 30 pF Maximum |
| Distortion: | 2% Maximum |
| Incidental FM: | 10 kHz RMS Maximum |

### Audio/Data Subcarrier Characteristics

| | |
|---|---|
| Subcarriers (Specify): | None or One, Audio or Data |
| Subcarrier Frequency (Specify): | 5.8, 6.0, 6.2, 6.5, 6.8, 7.2, 7.5, 8.3, or 8.59 MHz, or Custom |
| Frequency Stability: | ±0.5% Over -20°C to +60°C |
| Subcarrier Insertion Level: | -26 dBc Nominal (Audio) or -22 dBc Nominal (Data) |
| Subcarrier On/Off Control: | Remote and Programmable Switch Control |
| Modulation Type: | Analog FM, Positive Sense |
| Frequency Response: | 100 Hz to 10 kHz ±1.5 dB (Audio) or DC to 50 kbps (Data) |
| Pre-Emphasis: | 75 µsec NTSC or 50 µsec PAL (Audio) or None (Data) |
| Modulation Sensitivity: | 150 kHz pk-pk @ 1 kHz rate (Audio) or 150 kHz pk-pk (Data) |
| Input Level: | -55 dBV Mic or -10 dBV Line (Selectable, Audio) or RS232/TTL (Selectable, Data) |
| Input Impedance: | >4 kΩ Unbalanced (Audio) or 10 kΩ to Gnd (Data) |
| Mic DC Supply: | 2.0 Vdc Thru 4.7 kΩ Pull-Up |

### Configuration Interface Characteristics

| | |
|---|---|
| Interface Type: | Two-Way UART |
| Signalling Type (Specify): | RS232 or 3.3V TTL |
| Interface Parameters: | 9600/8/1/None/None (Baud/Data Bits/Stop Bits/Parity/Handshake) |

### Power Requirements

| | |
|---|---|
| Input Voltage: | +9 to +14 Vdc, Reverse Polarity Protected |
| Current Draw: | 100mA at 20mW, 200mA at 250mW Typical at 12 Vdc |

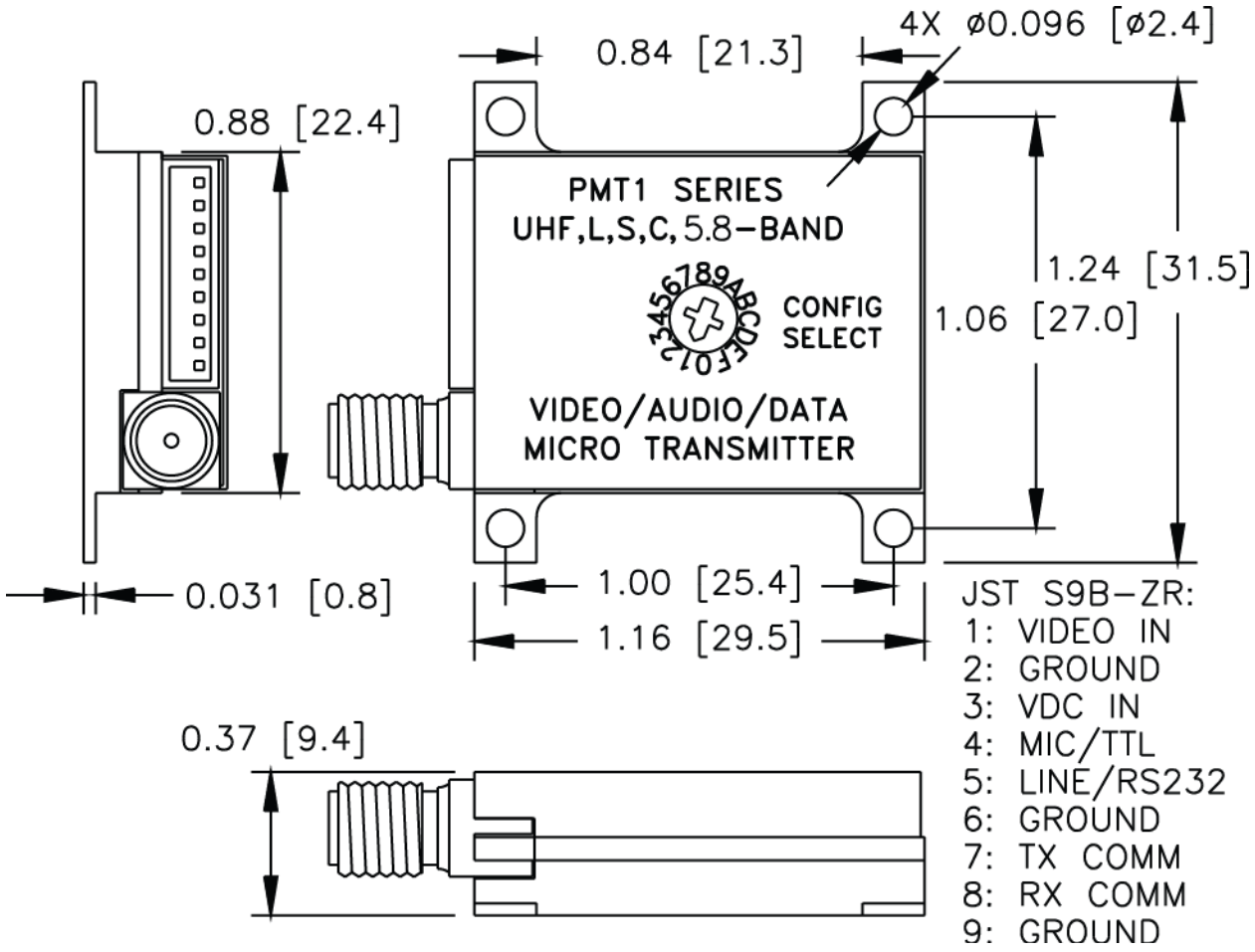
### Mechanical

| | | |
|---|---|---|
| Dimensions: | 1.16" x 1.24" x 0.37" | |
| Weight: | < 1oz. | |
| Interconnects*: | RF Output: | SMA Female |
| | DC Supply, Video Input, Comms, Audio/Data In: | JST S9B-ZR Male, Mate Supplied |

### Environmental

| | |
|---|---|
| Temperature (Operating): | -20°C to +60°C |
| Temperature Indication: | Query via Comms |
| Acceleration: | 100 g, 3 Axes |
| Altitude: | Unlimited |
| Humidity: | Up to 95% @ Any Temperature Forming Frost or Condensation |

2.2. PMT1 Mechanical Drawing and Connector Pin-Outs




2.3. PMT1 List of Items Furnished

- (1) PMT1 Transmitter (configured as ordered)
- (1) WHSPMT1-S09S0 – Power, Video, Audio, Data, Comm Connector

2.4. PMT1 List of Items Required

- Antenna, Type SMA Plug (Male) Connector
- Camera
- Video connector adapter to flying leads
- Microphone(s) (as applicable)

# 3. PST1 TRANSMITTER

## 3.1. PST1 Specifications

### RF Characteristics

| | | | |
|---|---|---|---|
| Frequency Range (Specify): | UHF: | 340.0-399.9 MHz | 100 kHz Channels |
| (Other Ranges Available) | Lower L-Band: | 1435-1535 MHz | 1 MHz Channels |
| | Upper L-Band: | 1700–1850 MHz | 1 MHz Channels |
| | Lower S-Band: | 2200-2399 MHz | 1 MHz Channels |
| | Upper S-Band: | 2400-2499 MHz | 1 MHz Channels |
| | Full S-Band: | 2200-2499 MHz | 1 MHz Channels |
| | Lower C-Band: | 4400-4900 MHz | 1 MHz Channels |
| | Upper C-Band | 4900-4999 MHz | 1 MHz Channels |
| | Full C-Band: | 4400-4999 MHz | 1 MHz Channels |
| | ISM 5.8 GHz Band: | 5725-5875 MHz | 1 MHz Channels |
| Frequency Selection (Specify): | Full Band Channelized - Remote Control Only or Remote/Programmable Switch | | |
| Frequency Stability: | ±5 ppm Over -20°C to +60°C | | |
| Output Power (Specify): | 250 mW, 500 mW, 1 Watt, or 2 Watts (2W not available for C-Band and ISM 5.8 GHz), Nominal (Selectable) | | |
| Output Power, PA Disabled: | < 0 dBm | | |
| Power Modes (Specify): | One (Fixed), Two (Specify), Three (Specify), or Four (Specify) | | |
| Power Leveling: | Within ±0.5 dB Over 6 Equal Width Sub-Bands, Typical | | |
| Output Impedance: | 50 Ω Nominal, VSWR 2:1 Maximum | | |
| Output Protection: | Internal Isolator (Most Bands) - Open/Short Indefinitely | | |
| Spurious Output: | -13 dBm Maximum | | |

### Video Characteristics

| | |
|---|---|
| Modulation Type: | Analog FM, Positive Sense |
| Video Standard (Specify): | NTSC (10Hz to 4.2MHz, 525 Line P/E) or PAL (10Hz to 5.0MHz, 625 Line P/E), +/- 1.5dB |
| Modulation Sensitivity: | ±4 MHz / 1 Vpk-pk @ Crossover Frequency |
| Input Impedance: | 75 Ω Nominal, Unbalanced, Shunted by 30 pF Maximum |
| Distortion: | 2% Maximum |
| Incidental FM: | 10 kHz RMS Maximum |

### Audio/Data Subcarrier Characteristics

| | |
|---|---|
| Subcarriers (Specify): | None or One, Audio or Data |
| Subcarrier Frequency (Specify): | 5.8, 6.0, 6.2, 6.5, 6.8, 7.2, 7.5, 8.3, or 8.59 MHz, or Custom |
| Frequency Stability: | ±0.5% Over -20°C to +60°C |
| Subcarrier Insertion Level: | -26 dBc Nominal (Audio) or -22 dBc Nominal (Data) |
| Subcarrier On/Off Control: | Remote and Programmable Switch Control |
| Modulation Type: | Analog FM, Positive Sense |
| Frequency Response: | 100 Hz to 10 kHz ±1.5 dB (Audio) or DC to 50 kbps (Data) |
| Pre-Emphasis: | 75 µsec NTSC or 50 µsec PAL (Audio) or None (Data) |
| Modulation Sensitivity: | 150 kHz pk-pk @ 1 kHz rate (Audio) or 150 kHz pk-pk (Data) |
| Input Level: | -55 dBV Mic or -10 dBV Line (Selectable, Audio) or RS232/TTL (Selectable, Data) |
| Input Impedance: | >4 kΩ Unbalanced (Audio) or 10 kΩ to Gnd (Data) |
| Mic DC Supply: | 2.0 Vdc Thru 4.7 kΩ Pull-Up |

### Configuration Interface Characteristics

| | |
|---|---|
| Interface Type: | Two-Way UART |
| Signalling Type (Specify): | RS232 or 3.3V TTL |
| Interface Parameters: | 9600/8/1/None/None (Baud/Data Bits/Stop Bits/Parity/Handshake) |

### Power Requirements

| | |
|---|---|
| Input Voltage: | +11 to +16 Vdc, Reverse Polarity Protected |
| Current Draw (Typical at 12V): | 200mA for 250mW, 300mA for 500mW, 400mA for 1W, or 650mA for 2W |
| Current Draw, PA Disabled: | 70 mA, Typical |
| Transmitter Enable Control: | Open = On, Ground (or <1.5 Vdc) = Off |

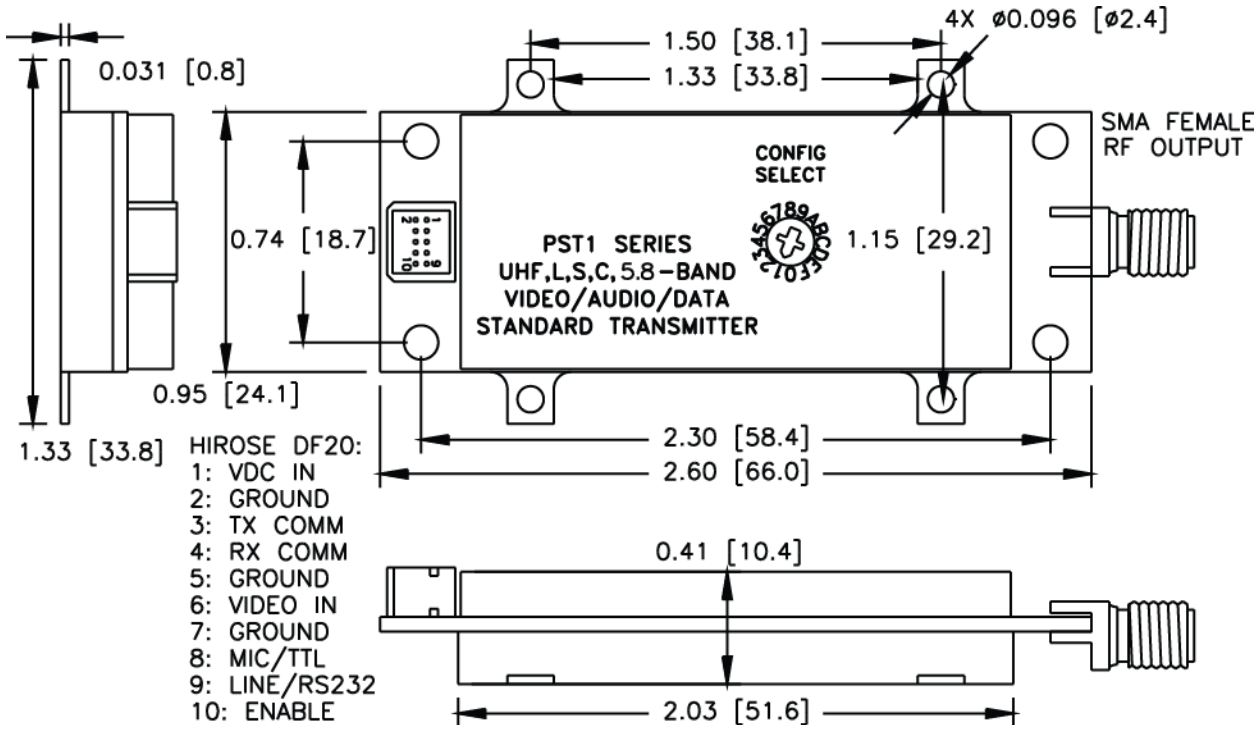
### Mechanical

| | | |
|---|---|---|
| Dimensions: | 0.95" x 2.6" x 0.41" | |
| Weight: | <1 oz. | |
| Interconnects*: | RF Output: | SMA Female |
| | DC Supply, Video Input, Enable, Comms, Audio/Data In: | Hirose DF20F-10DP-1V Male, Mate Supplied |

### Environmental

| | |
|---|---|
| Temperature (Operating): | -20°C to +60°C |
| Over-Temperature Protection: | Reduces Output Power at +75°C, Returns to Full Power at +70°C, Limits Configurable Via Remote Control, Protection Bypassable |
| Acceleration: | 100 g, 3 Axes |
| Altitude: | Unlimited |
| Humidity: | Up to 95% @ Any Temperature Forming Frost or Condensation |

3.2. PST1 Mechanical Drawing and Connector Pin-Outs




3.3. PST1 List of Items Furnished

- (1) PST1 Transmitter (configured as ordered)
- (1) WHSPXX1-S10S0 – Power, Video, Audio, Data, Comm Connector

3.4. PST1 List of Items Required

- Antenna, Type SMA Plug (Male) Connector
- Camera
- Video connector adapter to flying leads
- Microphone(s) (as applicable)
- Heatsink (for 500mW, 1W, 2W versions)

# 4. PSR1 RECEIVER

## 4.1. PSR1 Specifications

### RF Characteristics

| | | | |
|---|---|---|---|
| Frequency Range (Specify): | UHF: | 340.0-399.9 MHz | 100 kHz Channels |
| (Other Ranges Available) | Lower L-Band: | 1435-1535 MHz | 1 MHz Channels |
| | Upper L-Band: | 1700–1850 MHz | 1 MHz Channels |
| | Lower S-Band: | 2200-2399 MHz | 1 MHz Channels |
| | Upper S-Band: | 2400-2499 MHz | 1 MHz Channels |
| | Full S-Band: | 2200-2499 MHz | 1 MHz Channels |
| | Lower C-Band: | 4400-4900 MHz | 1 MHz Channels |
| | Upper C-Band | 4900-4999 MHz | 1 MHz Channels |
| | Full C-Band: | 4400-4999 MHz | 1 MHz Channels |
| | ISM 5.8 GHz Band: | 5725-5875 MHz | 1 MHz Channels |
| Frequency Selection (Specify): | Full Band Channelized - Remote Control Only or Remote/Programmable Switch | | |
| Maximum RF Input: | +10 dBm Without Damage | | |
| Input Impedance: | 50 Ω Nominal, VSWR 2:1 Maximum | | |
| Noise Figure: | < 3 dB | | |
| Image Rejection: | > 60 dB | | |
| Signal Strength Output: | Remote Query | | |

### LO/IF Characteristics

| | |
|---|---|
| LO Stability: | ±5 ppm Over -20°C to +60°C |
| IF Frequency: | UHF: 153.6 MHz, L/S: 374 MHz, C/5.8: 480 MHz |
| IF Bandwidth: | 17 MHz Nominal |
| Harmonic and Spurious Level: | -25 dB Maximum |

### Video Characteristics

| | |
|---|---|
| Modulation Type: | Analog FM, Positive Sense |
| Video Standard (Specify): | NTSC (10Hz to 4.2MHz, 525 Line D/E) or PAL (10Hz to 5.0MHz, 625 Line D/E), +/- 1.5dB |
| Output Level: | 1 Vpk-pk/±4 MHz @ Crossover Frequency into 75 Ω Load |
| Output Impedance: | 75 Ω Nominal, Unbalanced |

### Audio/Data Subcarrier Characteristics

| | |
|---|---|
| Subcarriers (Specify): | None or One, Audio or Data |
| Subcarrier Frequency (Specify): | 5.8, 6.0, 6.2, 6.5, 6.8, 7.2, 7.5, 8.3, or 8.59 MHz, or Custom |
| Frequency Stability: | ±0.5% Over -20°C to +60°C |
| Subcarrier On/Off Control: | Remote and Programmable Switch Control |
| Modulation Type: | Analog FM, Positive Sense |
| Frequency Response: | 100 Hz to 10 kHz ±1.5 dB (Audio) or DC to 50 kbps (Data) |
| De-Emphasis: | 75 µsec NTSC or 50 µsec PAL (Audio) or None (Data) |
| Output Level: | -10 dBV and +4 dBu Line / 150 kHz pk-pk @ 1 kHz Rate into 10 kΩ Load (Audio) or RS232 and TTL / 150 kHz pk-pk Deviation (Data) |
| Output Impedance: | 100 Ω Nominal, Unbalanced (Audio) or 300 Ω (Data) |

### Configuration Interface Characteristics

| | |
|---|---|
| Interface Type: | Two-Way UART |
| Signalling Type (Specify): | RS232 or 3.3V TTL |
| Interface Parameters: | 9600/8/1/None/None (Baud/Data Bits/Stop Bits/Parity/Handshake) |

### Power Requirements

| | |
|---|---|
| Input Voltage: | +9 to +16 Vdc, Reverse Polarity Protected |
| Current Draw (Typical at 12V): | 200 mA |

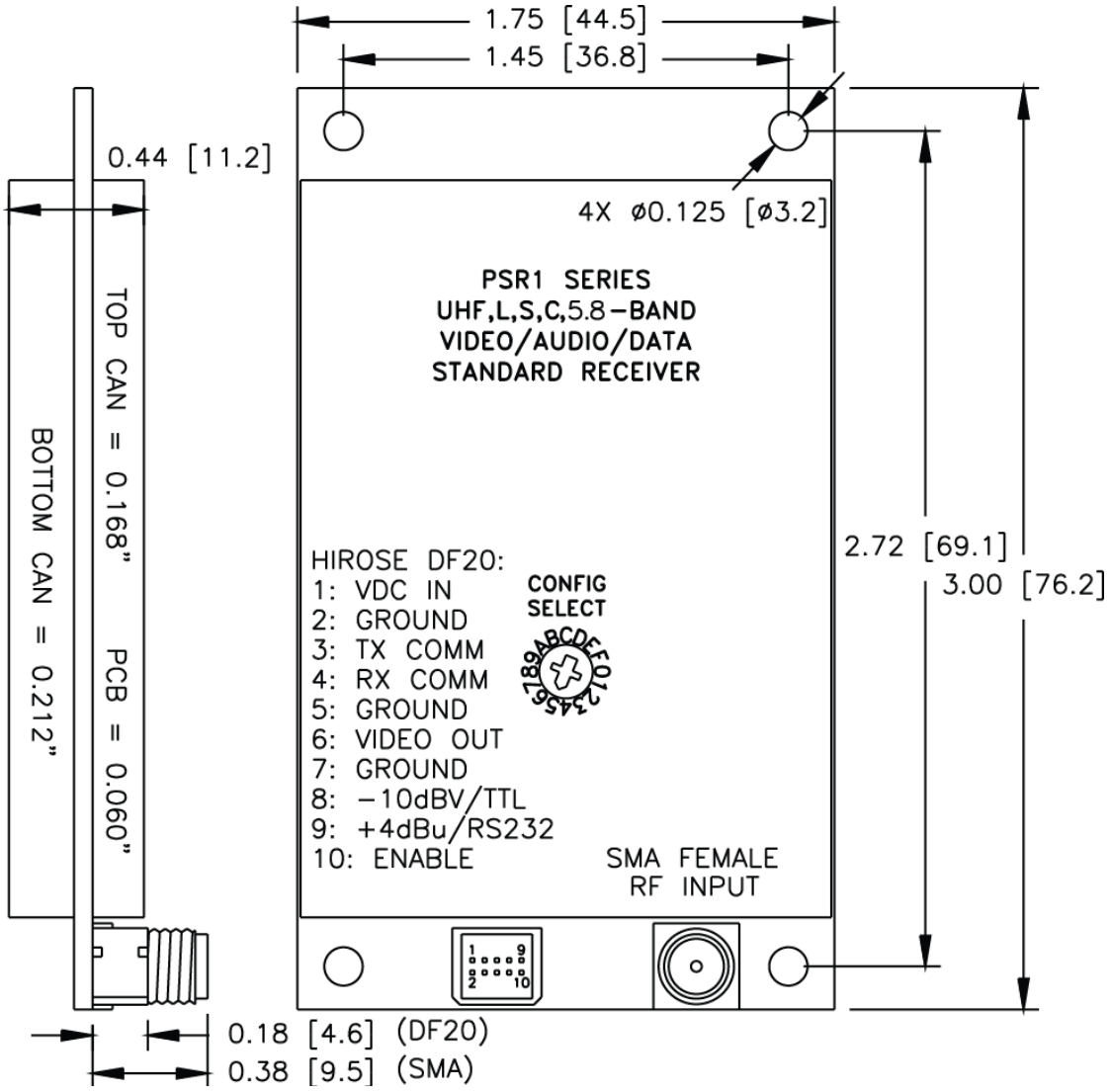
### Mechanical

| | | |
|---|---|---|
| Dimensions: | 1.75" W x 3.00" L x 0.44" H | |
| Weight: | <1.5 oz. | |
| Connectors: | RF Input: | SMA Female |
| | DC Supply, Video Output, Audio/Data Out, Comms: | Hirose DF20F-10DP-1V Male, Mate Supplied |

### Environmental

| | |
|---|---|
| Temperature (Operating): | -20°C to +60°C |
| Acceleration: | 100 g, 3 Axes |
| Altitude: | Unlimited |
| Humidity: | Up to 95% @ Any Temperature Forming Frost or Condensation |

4.2. PSR1 Mechanical Drawing and Connector Pin-Outs




4.3. PSR1 List of Items Furnished

- (1) PSR1 Receiver (configured as ordered)
- (1) WHSPXX1-S10S0 – Power, Video, Audio, Data, Comm Connector

4.4. PSR1 List of Items Required

- Antenna, Type SMA Plug (Male) Connector
- Monitor
- Video connector to flying leads
- Speaker or Headphones

# 5. PDR1 DIVERSITY RECEIVER

## 5.1. PDR1 Specifications

### RF Characteristics

| | | | |
|---|---|---|---|
| Frequency Range (Specify): | UHF: | 340.0-399.9 MHz | 100 kHz Channels |
| (Other Ranges Available) | Lower L-Band: | 1435-1535 MHz | 1 MHz Channels |
| | Upper L-Band: | 1700–1850 MHz | 1 MHz Channels |
| | Lower S-Band: | 2200-2399 MHz | 1 MHz Channels |
| | Upper S-Band: | 2400-2499 MHz | 1 MHz Channels |
| | Full S-Band: | 2200-2499 MHz | 1 MHz Channels |
| | Lower C-Band: | 4400-4900 MHz | 1 MHz Channels |
| | Upper C-Band | 4900-4999 MHz | 1 MHz Channels |
| | Full C-Band: | 4400-4999 MHz | 1 MHz Channels |
| | ISM 5.8 GHz Band: | 5725-5875 MHz | 1 MHz Channels |
| Frequency Selection (Specify): | Full Band Channelized - Remote Control Only or Remote/Programmable Switch | | |
| Maximum RF Input: | +10 dBm Without Damage | | |
| Input Impedance: | 50 Ω Nominal, VSWR 2:1 Maximum | | |
| Noise Figure: | < 3 dB | | |
| Image Rejection: | > 60 dB | | |
| Signal Strength Output: | Remote Query | | |
| Voting Characteristics | RSSI Based, >150 kHz Voting Rate | | |

### LO/IF Characteristics

| | |
|---|---|
| LO Stability: | ±5 ppm Over -20°C to +60°C |
| IF Frequency: | UHF: 153.6 MHz, L/S: 374 MHz, C/5.8: 480 MHz |
| IF Bandwidth: | 17 MHz Nominal |
| Harmonic and Spurious Level: | -25 dB Maximum |

### Video Characteristics

| | |
|---|---|
| Modulation Type: | Analog FM, Positive Sense |
| Video Standard (Specify): | NTSC (10Hz to 4.2MHz, 525 Line D/E) or PAL (10Hz to 5.0MHz, 625 Line D/E), +/- 1.5dB |
| Output Level: | 1 Vpk-pk/±4 MHz @ Crossover Frequency into 75 Ω Load |
| Output Impedance: | 75 Ω Nominal, Unbalanced |

### Audio/Data Subcarrier Characteristics

| | |
|---|---|
| Subcarriers (Specify): | None or One, Audio or Data |
| Subcarrier Frequency (Specify): | 5.8, 6.0, 6.2, 6.5, 6.8, 7.2, 7.5, 8.3, or 8.59 MHz, or Custom |
| Frequency Stability: | ±0.5% Over -20°C to +60°C |
| Subcarrier On/Off Control: | Remote and Programmable Switch Control |
| Modulation Type: | Analog FM, Positive Sense |
| Frequency Response: | 100 Hz to 10 kHz ±1.5 dB (Audio) or DC to 50 kbps (Data) |
| De-Emphasis: | 75 µsec NTSC or 50 µsec PAL (Audio) or None (Data) |
| Output Level: | -10 dBV and +4 dBu Line / 150 kHz pk-pk @ 1 kHz Rate into 10 kΩ Load (Audio) or RS232 and TTL / 150 kHz pk-pk Deviation (Data) |
| Output Impedance: | 100 Ω Nominal, Unbalanced (Audio) or 300 Ω (Data) |

### Configuration Interface Characteristics

| | |
|---|---|
| Interface Type: | Two-Way UART |
| Signalling Type (Specify): | RS232 or 3.3V TTL |
| Interface Parameters: | 9600/8/1/None/None (Baud/Data Bits/Stop Bits/Parity/Handshake) |

### Power Requirements

| | |
|---|---|
| Input Voltage: | +9 to +16 Vdc, Reverse Polarity Protected |
| Current Draw (Typical at 12V): | 230 mA |

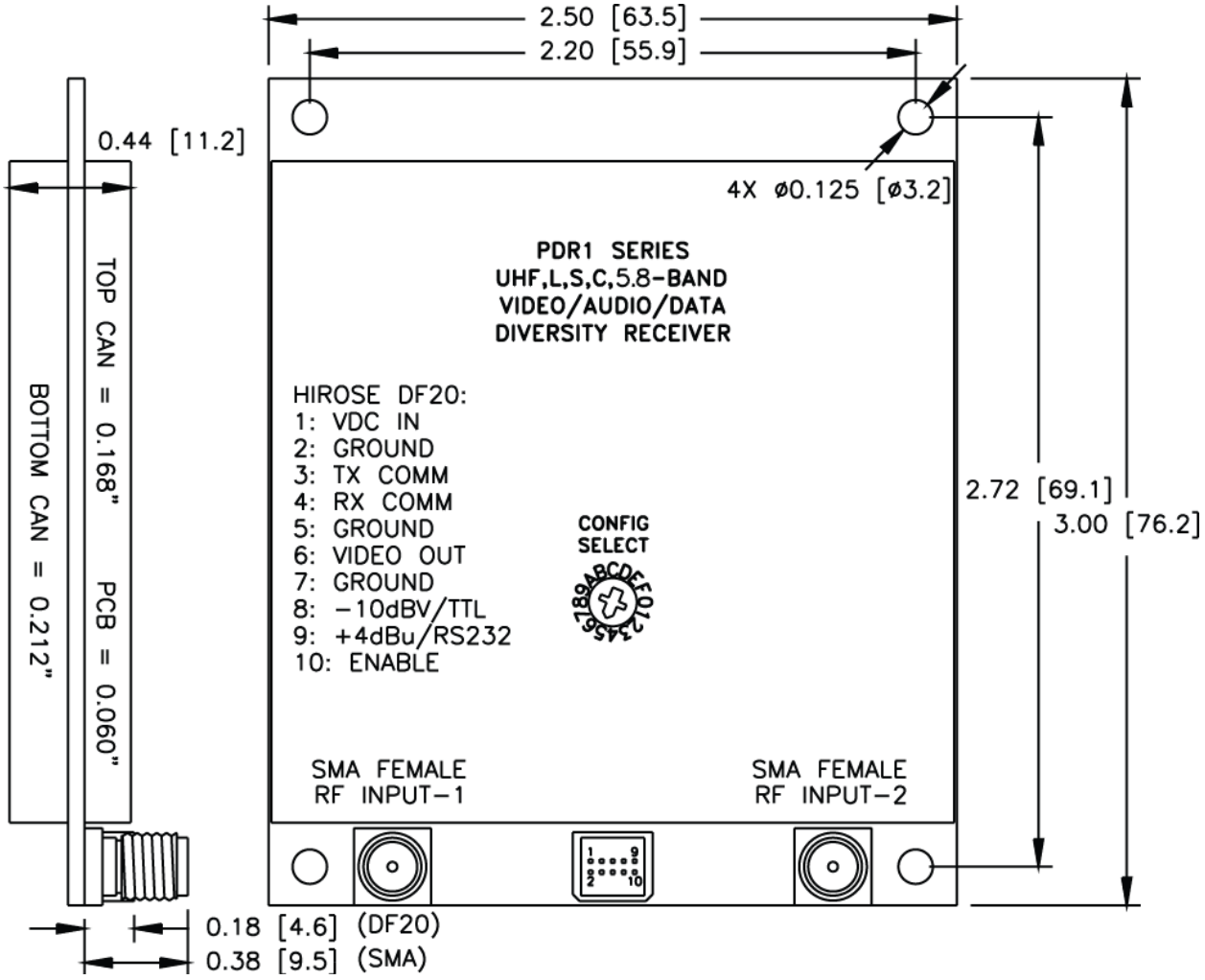
### Mechanical

| | | |
|---|---|---|
| Dimensions: | 2.50" W x 3.00" L x 0.44" H | |
| Weight: | <2 oz. | |
| Connectors: | RF Inputs: | SMA Female |
| | DC Supply, Video Output, Audio/Data Out, Comms: | Hirose DF20F-10DP-1V Male, Mate Supplied |

### Environmental

| | |
|---|---|
| Temperature (Operating): | -20°C to +60°C |
| Acceleration: | 100 g, 3 Axes |
| Altitude: | Unlimited |
| Humidity: | Up to 95% @ Any Temperature Forming Frost or Condensation |

5.2. PDR1 Mechanical Drawing and Connector Pin-Outs




5.3. PDR1 List of Items Furnished

- (1) PDR1 Receiver (configured as ordered)
- (1) WHSPXX1-S10S0 – Power, Video, Audio, Data, Comm Connector

5.4. PDR1 List of Items Required

- Two (2) Antennas, Type SMA Plug (Male) Connector
- Monitor
- Video connector to flying leads
- Speaker or Headphones

## 6. SAFETY PRECAUTIONS

Transmitters and Receivers should be handled with caution like any electrical or electronic device. Do not handle the units or associated cabling with wet hands or materials.

Connections should be made only to previously-tested, active power sources (outlets or batteries) of the correct voltage, and each connector should be inserted only into its designated port. All connections should be checked to ensure they are firmly in place.

WARNING! RF RADIATION HAZARD

In order to keep the RF Exposure within the FCC 1.1310 limit, a safe personal distance from the antenna must be maintained according to the below tables. The first table is for transmitters operating 1500 MHz or higher where the Maximum Permissible Exposure (MPE) is 10 Watts/meter2. The second table is for transmitters operating in the 340-400 MHz range where the MPE is 2.27 Watts/meter2. See following page for details on calculation of safe personal distances.

| Operating Frequency 1500 MHz and Higher (MPE = 10 W/m$^2$) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Transmitter Power 0.25 Watts | | Transmitter Power 0.5 Watts | | Transmitter Power 1 Watt | | Transmitter Power 2 Watts | | Transmitter Power 5 Watts | |
| Antenna Gain (dBi) | EIRP (Watts) | Minimum Distance (Meters) | EIRP (Watts) | Minimum Distance (Meters) | EIRP (Watts) | Minimum Distance (Meters) | EIRP (Watts) | Minimum Distance (Meters) | EIRP (Watts) | Minimum Distance (Meters) |
| 0 | 0.25 | >0.20 | 0.5 | >0.20 | 1 | >0.20 | 2 | >0.20 | 5 | >0.20 |
| 2 | 0.4 | >0.20 | 0.79 | >0.20 | 1.58 | >0.20 | 3.17 | >0.20 | 7.9 | 0.25 |
| 5 | 0.79 | >0.20 | 1.58 | >0.20 | 3.16 | >0.20 | 6.32 | 0.22 | 15.8 | 0.35 |
| 10 | 2.5 | >0.20 | 5 | >0.20 | 10 | 0.28 | 20 | 0.4 | 50 | 0.63 |
| 15 | 7.91 | 0.25 | 15.8 | 0.35 | 31.6 | 0.5 | 63.2 | 0.71 | 158.1 | 1.12 |
| 20 | 25 | 0.45 | 50 | 0.63 | 100 | 0.89 | 200 | 1.26 | 500 | 1.99 |
| 25 | 79.1 | 0.79 | 158.1 | 1.12 | 316.2 | 1.59 | 632.5 | 2.24 | 1581.1 | 3.55 |
| 30 | 250 | 1.41 | 500 | 1.99 | 1000 | 2.82 | 2000 | 3.99 | 5000 | 6.31 |

| Operating Frequency 340 - 400 MHz (MPE = 2.27 W/m2) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Transmitter Power 0.25 Watts | | Transmitter Power 0.5 Watts | | Transmitter Power 1 Watt | | Transmitter Power 2 Watts | | Transmitter Power 5 Watts | | Transmitter Power 10 Watts | |
| Antenna Gain (dBi) | EIRP (Watts) | Minimum Distance (Meters) | EIRP (Watts) | Minimum Distance (Meters) | EIRP (Watts) | Minimum Distance (Meters) | EIRP (Watts) | Minimum Distance (Meters) | EIRP (Watts) | Minimum Distance (Meters) | EIRP (Watts) | Minimum Distance (Meters) |
| 0 | 0.25 | >0.20 | 0.5 | >0.20 | 1 | >0.20 | 2 | 0.26 | 5 | 0.42 | 10 | 0.59 |
| 2 | 0.4 | >0.20 | 0.79 | >0.20 | 1.58 | 0.24 | 3.17 | 0.33 | 7.9 | 0.53 | 15.8 | 0.75 |
| 5 | 0.79 | >0.20 | 1.58 | 0.24 | 3.16 | 0.33 | 6.32 | 0.47 | 15.8 | 0.74 | 31.6 | 1.05 |
| 10 | 2.5 | 0.3 | 5 | 0.42 | 10 | 0.59 | 20 | 0.84 | 50 | 1.32 | 100 | 1.87 |
| 15 | 7.91 | 0.53 | 15.8 | 0.74 | 31.6 | 1.05 | 63.2 | 1.49 | 158.1 | 2.35 | 316.2 | 3.33 |
| 20 | 25 | 0.94 | 50 | 1.32 | 100 | 1.87 | 200 | 2.65 | 500 | 4.19 | 1000 | 5.92 |
| 25 | 79.1 | 1.66 | 158.1 | 2.35 | 316.2 | 3.33 | 632.5 | 4.71 | 1581.1 | 7.45 | 3162.3 | 10.53 |
| 30 | 250 | 2.96 | 500 | 4.19 | 1000 | 5.92 | 2000 | 8.37 | 5000 | 13.24 | 10000 | 18.72 |

MAINTAIN A SAFE PERSONAL DISTANCE FROM THE ANTENNA WHILE TRANSMITTER IS OPERATIONAL.

FAILURE TO MAINTAIN A SAFE PERSONAL DISTANCE FROM THE ANTENNA MAY RESULT IN PERSONAL INJURY.

# 7. PREPARATION FOR USE

## 7.1. Unpacking

Carefully remove the product from the shipping container and make sure all listed furnished items are included as noted in the respective section. Inspect all items for damage. If any item is omitted from the shipment or appears damaged, contact AMP with detailed description of problem.

## 7.2. Transmitter Pre-Test

Although each unit is thoroughly tested at the factory for both functional and environmental performance, a minimal amount of pre-testing should be done by the operator before placing the transmitter into service. The transmitter, an appropriate AMP receiver, transmit and receive antennas, a video camera, a video monitor, proper cabling, and DC power supplies are the only components required to perform a functional test of the transmitter. If testing audio or data, an audio source (microphone or line level) or data source and a speaker or headphones (audio) or data monitor will also be required.

The transmit and receive antennas should be situated at a distance of greater than 25 feet apart to prevent serious damage to or destruction of the receiver's front end. Set up the receiver and make all necessary adjustments in accordance with that unit's Quick Start Guide. Connect the receiver video output to the video monitor and, if testing audio or data, connect the receiver audio or data output to the speaker or headphones (audio) or data monitor as appropriate.

Verify DC power supplies are between +11 and +16 Vdc. With the WHSPXX1-S10S0 (PST1) or WHSPMT1-S09S0 (PMT1) interface cable DISCONNECTED from the transmitter, connect DC power supply to the VDC IN and Ground pins (per Section 2.2 (PMT1), Section 3.2 (PST1)). Do not connect the WHSPXX1-S10S0 (PST1) or WHSPMT1-S09S0 (PMT1) interface cable to transmitter until all other connections are complete.

Connect the transmit antenna to transmitter RF output connector (SMA). Connect the video source, communications input/output, and audio or data source (if applicable) to the WHSPXX1-S10S0 (PST1) or WHSPMT1-S09S0 (PMT1) interface cable per Section 2.2 (PMT1) or Section 3.2 (PST1).

Configure the rotary switch with the required preset channel. Connect the WHSPXX1-S10S0 (PST1) or WHSPMT1-S09S0 (PMT1) interface cable to the transmitter. Video should be observed on the monitor and (if applicable) audio heard through the speaker / headphones or data observed at the data monitor once the transmitter locks on frequency (requires several seconds). If no video or audio/data (if applicable) is present, refer to Section 9.2 for troubleshooting instructions.

## 7.3. Receiver Pre-Test

Although each unit is thoroughly tested at the factory for both functional and environmental performance, a minimal amount of pre-testing should be done by the operator before placing the receiver into service. The receiver, an appropriate AMP transmitter, transmit and receive antennas, a video camera, a video monitor, and DC power supplies are the only components required to perform a functional test of the receiver. If testing audio or data, an audio source (microphone or line level) or data source and a speaker or headphones (audio) or data monitor will also be required.

The transmit and receive antennas should be situated at a distance of greater than 25 feet apart to prevent serious damage to or destruction of the receiver's front end. Set up the transmitter and make all necessary adjustments in accordance with that unit's Quick Start Guide. Connect the video camera to the transmitter video input and, if testing audio or data, connect the audio or data source to the transmitter audio or data input(s).

Verify DC power supplies are between +9 and +16 Vdc. With the WHSPXX1-S10S0 interface cable DISCONNECTED from the receiver, connect DC power supply to the VDC IN and Ground pins with the correct polarity (per Section 4.2 (PSR1) or Section 5.2 (PDR1)). Do not connect WHSPXX1-S10S0 interface cable to receiver until all other connections are complete.

Connect the receive antenna(s) to receiver RF input connector(s) (SMA). Connect the video monitor, communication input/output, and speaker or headphones (audio) or data monitor to the WHSPXX1-S10S0 interface cable per Section 4.2 (PSR1) or Section 5.2 (PDR1).

Configure the rotary switch to the appropriate preset channel. Connect the WHSPXX1-S10S0 interface cable to receiver. Video should be observed on the monitor and (if applicable) audio heard through the speaker / headphones or data observed at the data monitor. If no video or audio/data (if applicable) is present, refer to Section 9.2 for troubleshooting instructions.

## 8. INSTALLATION AND OPERATING INSTRUCTIONS

### 8.1. Use and Function of Connectors

AMP P series products are simple to install, requiring only connection to the antenna, camera, audio, and DC power supply using the appropriate cables for the transmitters and requiring only connection to the antenna(s), monitor, speaker or headphones, and DC power supply using the appropriate cables for the receivers. The use and function of the connectors are in the respective product sections.

### 8.2. Frequency Selection

Frequency selectability is standard on all P Series products providing RF frequency control though either a rotary switch accessible through the chassis lid and/or remote programming.

To program the desired RF frequency using rotary switches, position the rotary switches as shown in the Frequency Selection Chart in Section 11. To program the desired RF frequency using remote interface, refer to the communication Interface Control Document (ICD) for the P series products.

### 8.3. Audio/Data Inputs (transmitters only)

When an audio subcarrier is specified, two audio inputs are provided on the transmitter. Microphone level input (nominally -55 dBV) is applied to pin 4 of the WHSPMT1-S09S0 interface cable for the PMT1 or pin 8 of the WHSPXX1-S10S0 interface cable for the PST1. Line level input (nominally -10 dBV) is applied to pin 5 of the WHSPMT1-S09S0 interface cable for the PMT1 or pin 9 of the WHSPXX1-S10S0 interface cable for the PST1. The transmitter may be programmed to transmit either, but not both, audio source through configuration using the communications port and is set to transmit microphone level from the factory.

When a data subcarrier is specified, two data inputs are provided on the transmitter. 3.3V TTL level input is applied to pin 4 of the WHSPMT1-S09S0 interface cable for the PMT1 or pin 8 of the WHSPXX1-S10S0 interface cable for the PST1. RS232 level input is applied to pin 5 of the WHSPMT1-S09S0 interface cable for the PMT1 or pin 9 of the WHSPXX1-S10S0 interface cable for the PST1. The transmitter may be programmed to transmit either, but not both, data source through configuration using the communications port and is set to transmit RS232 level from the factory.

### 8.4. Audio/Data Outputs (receivers only)

When an audio subcarrier is specified, the audio output signal is available on both pins 8 (-10 dBV level) and 9 (+4 dBu level) of the WHSPXX1-S10S0 interface cable. All audio outputs are 100 Ohms output impedance, unbalanced, at the specified line levels.

When a data subcarrier is specified, the data output signal is available on both pins 8 (RS232 level) and 9 (3.3V TTL level) of the WHSPXX1-S10S0 interface cable. All audio outputs are 300 Ohms output impedance at the specified standard levels.

### 8.5. Use of Heat Sink (transmitters only)

PST1 transmitters operating at or above 500 mW require the use of a heat sink or must be securely fastened to an adequate heat sinking object or surface. Advanced Microwave Products recommends the SNK3513-S06B0 heat sink for use with the PST1 transmitter.

PST1 transmitters should be fastened to the heat sink by the four mounting “feet” using the provided #2-56 pan head or socket head screws with lock washers. Use of thermal grease, such as Wakefield Engineering 120 Series Thermal Compound, to improve thermal conduction between transmitter base plate and heat sinking surface will reduce unit temperature and increase product reliability.

### 8.6. Initial Adjustments and Settings

There are no initial adjustments or settings necessary to use AMP products other than proper configuration of the rotary switch as outlined in Section 0. To assure optimum performance, the user should be familiar with the camera, monitor, microphone, and speaker/headphones used with this video system.

### 8.7. Shut Down

If the transmitter or receiver is to be shut down only briefly, simply remove DC voltage from the WHSPXX1-S10S0 (PST1, PSR1, PDR1) or WHSPMT1-S09S0 (PMT1) interface cable or disconnect the cable from the unit. If the unit is to be shut down for an extended period, all external cabling including the antenna should be removed and the unit should be stored in a container and placed in a clean, dry environment.

## 9. MAINTENANCE INSTRUCTIONS

### 9.1. Cleaning

AMP Transmitters and Receivers should be periodically wiped off with a clean, damp cloth. For more thorough cleaning, dampen a clean cloth with glass cleaner and wipe off unit. Ensure units are completely disconnected from their power sources before cleaning.

### 9.2. Troubleshooting

To avoid poor performance, ensure all mating connectors are tightly fastened, clean, and have no pins bent or damaged.

Verify configuration of the rotary switch (*If the presets are the original factory set presets, the rotary BCD switches should be configured the same). If poor or no operation is observed, ensure the external DC voltage supply is between +11 and +16 Vdc (transmitters) or +9 and +16 Vdc (receivers) with correct polarity. All AMP transmitters and receivers have over-voltage and reverse polarity protection circuits. If the input voltage is over +16 Vdc, remove the WHSPXX1-S10S0 (PST1, PSR1, PDR1) or WHSPMT1-S09S0 (PMT1) interface cable from the unit, reduce the DC voltage to between +11 and +16 Vdc (transmitters) or +9 and +16 Vdc (receivers), and reconnect the cable. If the input voltage is negative polarity, remove the WHSPXX1-S10S0 (PST1, PSR1, PDR1) or WHSPMT1-S09S0 (PMT1) interface cable from the unit, reverse the connections between the DC voltage supply and reconnect the cable.

If all connections are adequate, switches are correctly configured, and DC voltage is correctly applied, check the video camera, video monitor, video cables, and antennas for damage. A monitor may be connected directly to the camera to verify proper camera and monitor operation.

For audio or data applications, if receiving video but no audio or data, check connections between audio (microphone or line level) or data source and the interface cable at the transmitter and between the interface cable and speaker / headphones (audio) or data monitor at the receiver. Also check audio or data sources, interface cables, and speaker / headphones or data monitor for damage.

If these efforts fail, do not attempt to repair the unit. Please contact AMP with a detailed description of the problem. Depending on the nature of the problem, AMP may provide further troubleshooting assistance or advise the entire system be returned for repair and retest.

Caution: Removal of the cover constitutes breaking the seal and VOIDS PRODUCT WARRANTY.

### 9.3. Preparation for Reshipment

If the transmitter, receiver, and/or any other purchased item(s) are to be shipped to another location or returned for repair or realignment, use the original packaging or a sturdy box with sufficient protective material to avoid damage from movement or exposure during transit. Remove all external connections (cables, antenna, etc.) prior to shipping.

### 9.4. Returning an Item

Please contact AMP customer service at (775) 345-9933 for a Return Authorization Number before returning an item. The AMP ship-to address is listed below. When returning an item, always include a contact name and phone number and a detailed description of the problem with your shipment.

**Advanced Microwave Products**
Advanced Microwave Products
PO Box 1437
2465 Old Highway 40 West, Suite 200
Verdi, NV 89439

## 10. WARRANTY STATEMENT

Advanced Microwave Products (AMP) warrants these products to be free from defects in material and workmanship for a period of one year from date of original shipment. AMP shall, at its option, either repair or replace products which prove to be defective.

No products may be returned to AMP without the permission of AMP. BUYER, after obtaining a return authorization from AMP, shall return the equipment to AMP accompanied by a report stating as completely as possible the reason for return, the defects, and the conditions under which they occurred. BUYER shall pay all shipping charges, duties, and fees for the return of products to AMP. All warranty services will be carried out at AMP's facility. AMP will pay for the return of products to the BUYER.

All articles are to be properly and carefully inspected by BUYER upon receipt. Shipping container damage may indicate equipment damage. All shipping damage must be promptly reported to the carrier. AMP is not liable for shipping damage.

Limitation of Warranty: The above warranty does not apply to defects of, or resulting from the following:

1) End items included as part of a system, but not designed by, AMP are subject only to warranty as may be obtained from the original manufacturers. Such items include, but are not limited to, batteries, cameras, monitors, cabling, etc.,
2) Operation outside of the environmental specifications of the product,
3) Unauthorized modifications, misuse, or mishandling,
4) Improper or inadequate maintenance by BUYER,
5) Improper or inadequate heat sinking by BUYER,
6) Improper installation or improper testing,
7) Malfunction of connected hardware.

THIS WARRANTY IS EXCLUSIVE AND NO OTHER WARRANTY, WHETHER WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED. AMP SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The remedies set forth above are the purchaser's sole and exclusive remedies. In no circumstances shall AMP assume liability for loss, damage, or consequential expense (including loss of profits) whether based on contract, tort, or any other legal theory, arising directly or indirectly from the use of its equipment separately or in combination with other equipment.

## 11. FREQUENCY PROGRAMMING CHART

AMP P series transmitters and receivers have two modes for configuring the unit: Preset Mode and Remote Mode.

In Preset Mode, transmitters and receivers have 15 pre-set configurations available for local selection via the rotary switch located on the lid. Units ship from the factory with the 15 pre-sets configured with all options “ON” and set to their max settings with the frequencies set per the table below. Presets may be changed utilizing RealTerm or other devices connected to the communications port while the unit is set to Remote Mode. Presets are reprogrammable using Remote Mode, selected when the rotary switch is set to zero.

Remote Mode allows reprogramming of Presets or control of the unit in real time via the communications port per Section 2.2 (PMT1), Section 3.2 (PST1), Section 4.2 (PSR1), or Section 5.2 (PDR1). To set the transmitter or receiver to Remote Mode, the rotary switch must be in the “0” position. See the P series ICD for details on programming your product.

“Remote Only” P series products do not have a rotary switch installed, are always in Remote Mode, and are only configurable through the communications port.

*Frequency Band*

| *“Config Select” Preset* | U1 | L1 | L2 | S1 | S2 | S3 | C1 | C2 | C3 | 58 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 340 MHz | 1435 MHz | 1700 MHz | 2200 MHz | 2400 MHz | 2200 MHz | 4400 MHz | 4900 MHz | 4400 MHz | 5725 MHz |
| 2 | 344 MHz | 1442 MHz | 1711 MHz | 2214 MHz | 2407 MHz | 2221 MHz | 4436 MHz | 4907 MHz | 4443 MHz | 5736 MHz |
| 3 | 349 MHz | 1449 MHz | 1721 MHz | 2228 MHz | 2414 MHz | 2243 MHz | 4471 MHz | 4914 MHz | 4486 MHz | 5746 MHz |
| 4 | 353 MHz | 1456 MHz | 1732 MHz | 2243 MHz | 2421 MHz | 2264 MHz | 4507 MHz | 4921 MHz | 4528 MHz | 5757 MHz |
| 5 | 357 MHz | 1464 MHz | 1743 MHz | 2257 MHz | 2428 MHz | 2285 MHz | 4543 MHz | 4928 MHz | 4571 MHz | 5768 MHz |
| 6 | 361 MHz | 1471 MHz | 1754 MHz | 2271 MHz | 2435 MHz | 2307 MHz | 4579 MHz | 4935 MHz | 4614 MHz | 5779 MHz |
| 7 | 366 MHz | 1478 MHz | 1764 MHz | 2285 MHz | 2442 MHz | 2328 MHz | 4614 MHz | 4942 MHz | 4657 MHz | 5789 MHz |
| 8 | 370 MHz | 1485 MHz | 1775 MHz | 2300 MHz | 2450 MHz | 2350 MHz | 4650 MHz | 4950 MHz | 4700 MHz | 5800 MHz |
| 9 | 374 MHz | 1492 MHz | 1786 MHz | 2314 MHz | 2457 MHz | 2371 MHz | 4686 MHz | 4957 MHz | 4742 MHz | 5811 MHz |
| A | 379 MHz | 1499 MHz | 1796 MHz | 2328 MHz | 2464 MHz | 2392 MHz | 4721 MHz | 4964 MHz | 4785 MHz | 5821 MHz |
| B | 383 MHz | 1506 MHz | 1807 MHz | 2342 MHz | 2471 MHz | 2414 MHz | 4757 MHz | 4971 MHz | 4828 MHz | 5832 MHz |
| C | 387 MHz | 1514 MHz | 1818 MHz | 2356 MHz | 2478 MHz | 2435 MHz | 4793 MHz | 4978 MHz | 4871 MHz | 5843 MHz |
| D | 391 MHz | 1521 MHz | 1829 MHz | 2371 MHz | 2485 MHz | 2456 MHz | 4829 MHz | 4985 MHz | 4913 MHz | 5854 MHz |
| E | 396 MHz | 1528 MHz | 1839 MHz | 2385 MHz | 2492 MHz | 2478 MHz | 4864 MHz | 4992 MHz | 4956 MHz | 5864 MHz |
| F | 399.9 MHz | 1535 MHz | 1850 MHz | 2399 MHz | 2499 MHz | 2499 MHz | 4900 MHz | 4999 MHz | 4999 MHz | 5875 MHz |

Remote Configuration Mode allows you to program your products Preset Configuration Mode or control the product real time via the communication. See the Mechanical Drawing and Connector Pin-Outs of the applicable product.

To set the Transmitter or Receiver to Remote Configuration Mode the BCD switch must be in the “0” position. See the ICD for details on programming your product.