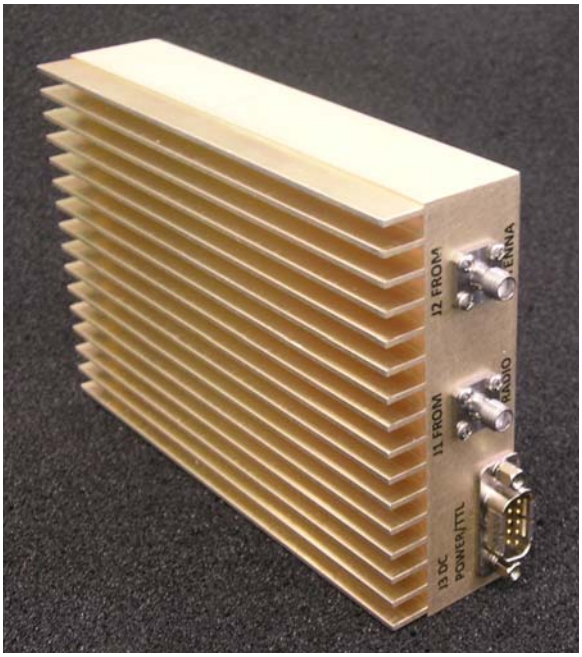
Operating Manual

PS009900

The PS009900 amplifier is a single channel auxiliary amplifier for use with constant envelope modulation formats such as FM, GMSK, BPSK and FSK. It is intended for use with the MDS9710 Radio to augment the signal level to emulate an MCS2000 Radio for railside communications.



Antenna Installation Warning

*1. All antenna installation and servicing is to be performed by **qualified technical personnel only**. When servicing the antenna, or working at distances closer than those listed below, **ensure the amplifier has been disabled**. Output is measured at the antenna terminal of the amplifier. The antenna(s) used for this amplifier must be fixed-mounted on outdoor permanent structures to provide the minimum separation distances described in this filing for satisfying RF exposure compliance requirements. When applicable, RF exposure compliance may need to be addressed at the time of licensing, as required by the responsible FCC Bureau(s), including antenna co-location requirements of 1.1307(b)(3).*

2. Typically, the antenna connected to the amplifier is a directional (high gain) antenna, fixed-mounted on the side or top of a building, or on a tower. Depending upon the application and the gain of the antenna, the total composite power could exceed 450 watts EIRP. The antenna location should be such that it can only be accessed by qualified technical personnel and that under normal operating conditions no other person can touch the antenna or approach within 8 meters of the antenna.

RF Exposure

Separation distances required for FCC RF Exposure compliance

Antenna Gain vs. Recommended Safety Distance

	Antenna Gain (dBi)		
	0–5 dBi	**5–10 dBi**	**10-12 dBi**
Minimum RF Safety Distance	**3.5**	**6.3**	**7.9**

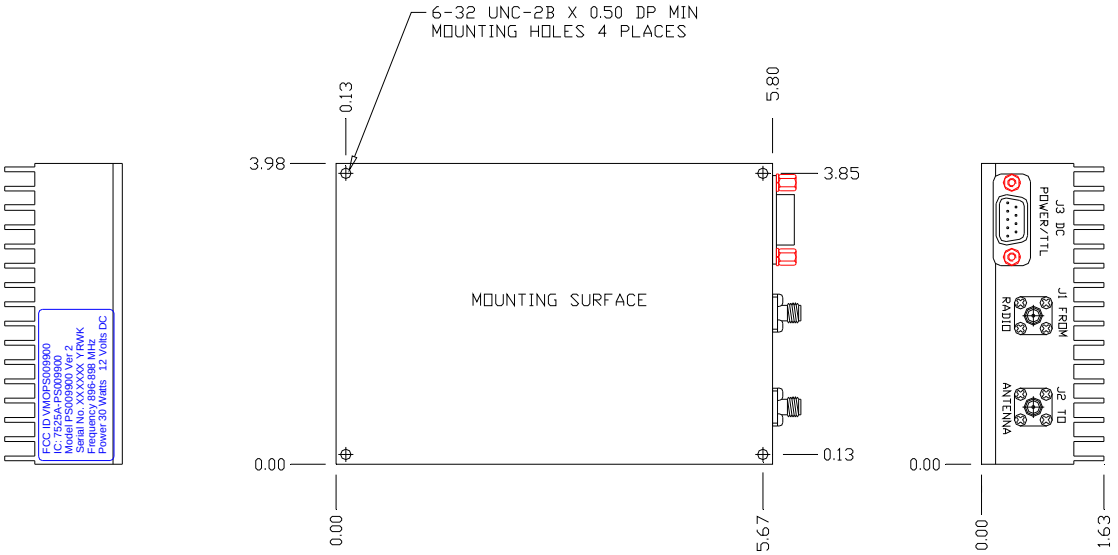
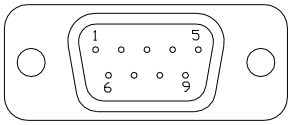


Figure 2 - Outline Drawing



PIN 1 - PTT TTL
2 - RESERVED FOR FUTURE USE
3 - RESERVED FOR FUTURE USE
4 - DC POWER +12V
5 - DC POWER +12V
6 - TTL RETURN
7 - GND
8 - DC RETURN
9 - DC RETURN

Figure 1 - Control Connector Pinout

Overview

The PS009900 is designed to be inserted between a single channel 5 watt radio and an antenna to provide performance enhancement. It amplifies a 5 watt signal from the radio output to a 30 watt signal available to the antenna in the 896-898 MHz frequency band. It contains a passive receive path for pass through of signals in the 935-938 MHz frequency band. The unit operates from a nominal +12 VDC supply, requiring 7.5 amps at 30 watts of output. Transmit is enabled with a logic controlled Push-to-Talk (PTT) signal. The unit is passively cooled and is suitable for intermittent transmit operation to 20% duty cycle.

RF signal connection is through SMA (F) connectors. Supply voltage and PTT signal are applied through a 9 pin D-Subminiature E Shell connector. The unit's physical dimensions are 5.8"x4.0"x1.6". The amplifier may be attached to a user supplied assembly using the integral 6-32 threaded mounting locations and suitable hardware (not supplied).

WARNING

This amplifier is not configured for "hot switching". PTT must not be engaged with the radio transmit signal connected and transmit power from the radio or signal source applied. Enabling the PTT logic with RF transmit signal applied my permanently damage the amplifier.

WARNING

Avoid operating the amplifier without properly terminating the antenna port with an antenna or a suitable dummy load.

Interconnection

The PS009900 is intended for use as part of system to augment the transmit performance of lower power radios. Specific implementation requires system knowledge regarding the appropriate power levels to be used in the implementation. Consult manuals for the radio and antenna to be used prior to installation.

The PS009900 should be connected to the system as shown in Figure 3 - Interconnection Block Diagram. High quality 50 ohm coaxial cables should be used for interconnection between the radio, the amplifier and the antenna. The DC supply, return, PTT control and return should be connected from the bias supply and controller, respectively, using signal wire gauge appropriate to the amperage and wire length. Verify the wire connections and pin configuration. The PTT control/Bias D connector shell should be secured to the amplifier using appropriate hardware.

WARNING

Connection of the +12 volt Bias supply to the PTT pin of J3 will permanently damage the unit.

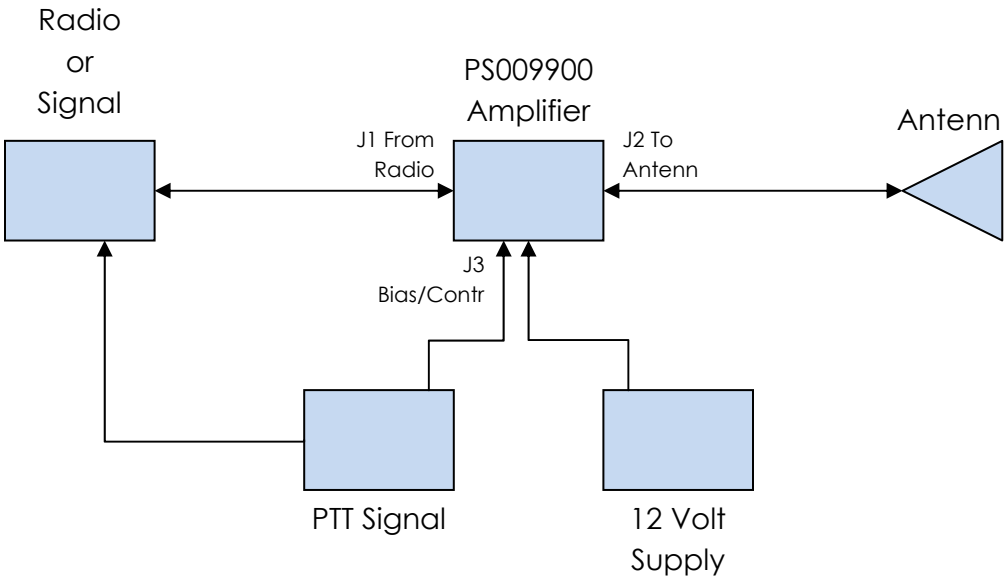


Figure 3 - Interconnection Block Diagram

Setup and Operation

Set the radio output to 5 Watts, but **do not** enable the radio transmit function. Verify the radio transmit frequency is set to within the specified amplifier frequency. Enable the PTT function on the amplifier by applying a TTL low (0 Volts) to J3, Pin 1. With PTT in transmit mode (TTL low) but no RF input from the Radio, the amplifier should draw approximately 650 mA from the DC supply at +12 Volts.

Enable the radio to transmit. Verify the transmit output power from the amplifier antenna port is 30 watts. If needed, adjust the radio transmit power level to achieve thirty watts. The amplifier should draw 7.5 A from the DC supply in this mode. Disable the radio transmit function. Disable the PTT function by applying TTL High (5 volts) to J3 Pin 1.

NOTICE

The amplifier will default to PTT disabled if PTT signal logic is not connected. No transmit capability will be available. The unit will not be damaged if RF transmit power is applied to the radio input with PTT disabled, as long as the PTT signal is not applied with Radio transmit power present.

WARNING

Avoid operating the amplifier continuously in transmit mode (PTT TTL Low) for longer than five minutes at rated power (30 watts). If lengthy operation of the amplifier is

required for test or evaluation purposes, the amplifier must be cooled by supplying air flow with a fan across the heat sink fins of the amplifier. For additional information

Electrical Parameters	Units	Min.	Typ.	Max.
@12 V, 25°C Baseplate, Forward Path				
Frequency (Forward)	MHz	888		902
Transmit Power (5 Watts Drive)	Watts		30	
Forward Gain	dB		8	
Forward Gain Variation	±dB		0.25	0.5
Forward Gain Variation, Over Operating Temp.	±dB		<1	
Input VSWR (50 Ohms)			1.5:1	2:1
Voltage	Volts	10.5	12	16
Current @ 30 Watts Output	A		7	7.5
PTT Delay	µS			10

regarding operating this amplifier in continuous mode, contact the factory.

With PTT disabled (TTL high), the amplifier is in passive receive mode and will pass signals from the antenna to the radio with minimal loss. Verify the radio is capable of receiving signals in receive mode.

Specifications

PTT Logic (Forward Path Select)	V		0	0.8
PTT Logic (Reverse Path Select)	V	2.8	5	5.5
RF Rise/Fall Time	µS			1
RF Input Level	Watts	0.10		20
Duty Factor	%			20
Transmit Duration	Min.			5
Harmonics	dBc			60
Spurious	dBc			60
Maximum Load VSWR				∞

@12 V, 25°C Baseplate, Reverse Path				
Frequency (Reverse)	MHz	935		938
Reverse Insertion Loss	dB		1.5	2.0
Reverse Amplitude Variation	±dB		0.1	0.25
Reverse Amplitude Variation, Over Operating Temp.	±dB		<0.25	
Input VSWR (50 Ohms)			1.5:1	2:1
Voltage	Volts	10.5	12	16
Current (Reverse Path Mode)	mA		40	250
Physical Parameters	**Units**			
Size	In.	3.98 x 5.8 x 1.63		
RF Connectors		SMA (F)		
DC Connectors		9 Pin Subminiature D Pin		
Environmental Parameters		**Min.**	**Typ.**	**Max.**
Operating Temperature, Ambient	°C	-30		+60

Repair or Service

If this amplifier requires repair or service and was supplied as part of a system, contact the system supplier for information regarding service and/or repair. If this amplifier was supplied by CAP Wireless, contact CAP Wireless to request a Product Return (PR) number and authorization to return the unit. There are no user serviceable parts within this unit. Opening the unit and/or servicing the unit may void any warranty and invalidate FCC certification.

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