PA25-VHF-H-34

High Power RF Amplifiers and Accessories

25W VHF Band III TV Linear Pallet Amplifier

The **PA25-VHF-H-34** is a versatile output or driver pallet amplifier. Offering a minimum of 34dB gain, this two stage amplifier can be used as a driver or output stage depending on the application. With no circuit changes required, the PA25-VHF-H-34 can be configured as a Class A driver or Class AB output stage offering excellent flexibility. All gold-metallized MOSFETS are used in construction.

- No RF assembly or circuit tuning!
- 25 Watts of Linear Output Power Minimum!
- 34dB typical gain at Channel 13!
- Combined Video and Aural at full rated power!
- Modular Construction for ease of Integration!

Specifications:

Vsup=+28V_{dc}, I_{dq}=2.77A, 170-230MHz

Parameter	Min	Typ	Max	Units
Fundamental Pout, PEP 2-tone, 215-216MHz, IMD3 -30dBc		50		Watts
Linear Power Out, Pk Sync	25	40		Watts
Power Input	8	10	13	+dBm
Power Gain		34		dB
IMD, Full Field Red, NTSC-NA For input signal 10dB better than desired output	-54	-58		dBc
Drain Current		3		A
Input VSWR		1.1:1	1.4:1	
Insertion Phase Variation (unit to unit)		±5		°
Power Gain Variation (unit to unit)		±1		dB
F2 Second Harmonic		-15		dBc
F3 Third Harmonic		-25		dBc
Baseplate Operating Temp	0		+60	°C
Physical Dimensions	2.0" x 5.0" x 1.0" / 5cm x 13cm x 3cm			

All values listed are without pre-correction.

Absolute Maximum Ratings:

Parameter	Value	Units
Maximum Operating Voltage	+32.0	V DC
Stable Operating Voltage	+26.0 to +32.0	V DC
Maximum Bias Current, Q1 Factory set to 0.020A.	0.25	A
Maximum Bias Current, Q4 Factory set to 2.75A.	3.0	A
Maximum Total Drain Current	5	A
Load Mismatch Survival At all phase angles with the base plate held at 40C and Id current limited to 5A, 2 seconds maximum	3:1	
Storage Temperature	-40 to +105	°C
Maximum Operating Baseplate Temperature	+60	°C

Features Include:

- Temperature Compensated Bias
- Temperature Controller- Analog Temp Output
- High Temp alarm with automatic PA disable
- High Temp alarm output
- Amplifier Disable
- Current Sense, Each Transistor
- Connectorized Power and I/O

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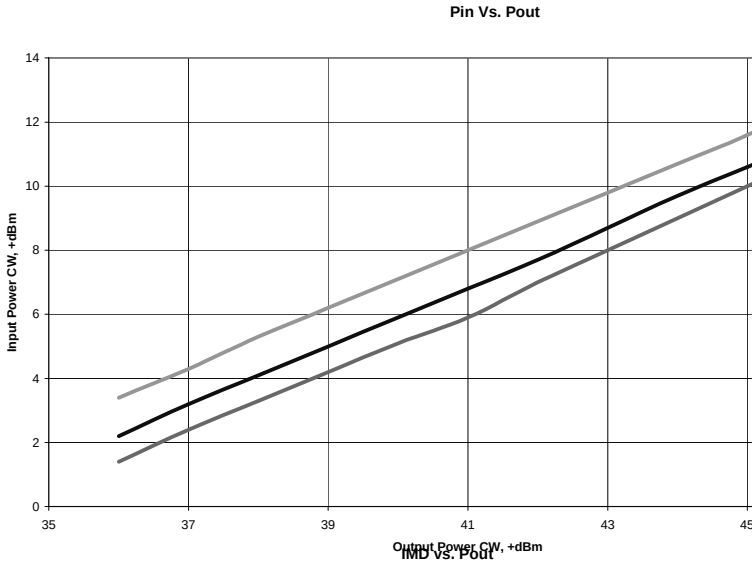

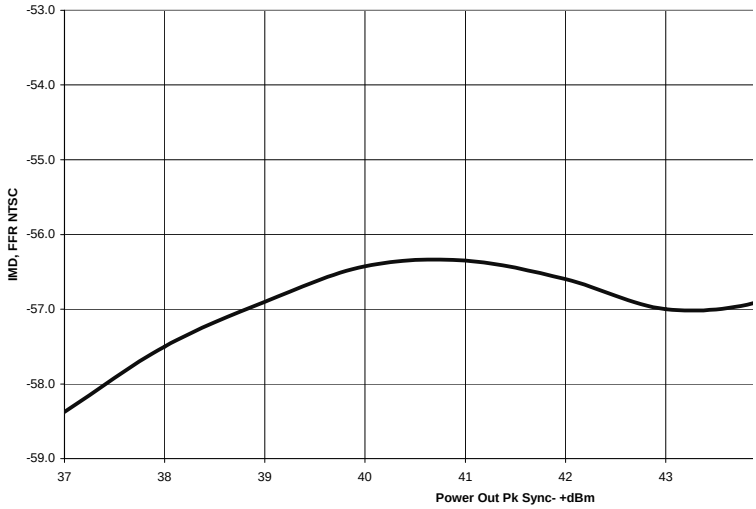

This amplifier has been designed for two purposes - as an output stage and as an ultra-linear driver.

Driver - the amplifier is shipped from the factory biased best case for driver use from 2 - 20W, depending on needed output power (please see curves above). Frequency specific improvements may be made by adjusting the bias on Q1 (refer to page 4). Do not exceed rated bias current for Q1.

Output Stage - for improved harmonic performance and efficiency, reset bias for Q1 to 0.250A, and reset bias to Q4 to 0.500A. Minor adjustments may need to be performed on Q1 / Q4 for optimum IMD performance. Do not exceed rated bias current for Q1.

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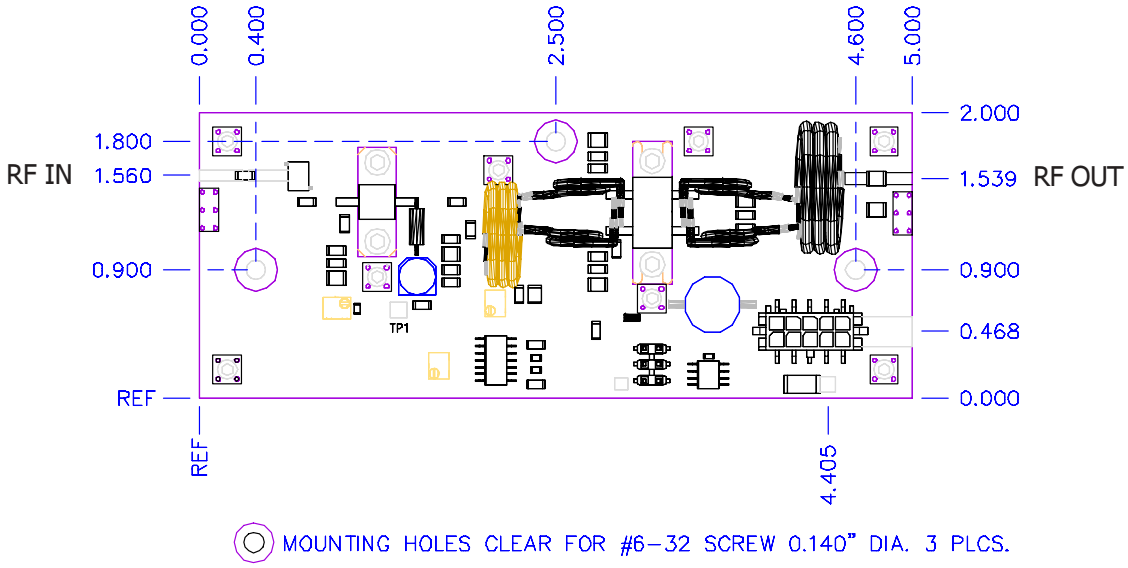

Tips for Mechanical Mounting:

1 All holes are clear for #6 Screw. Stainless Steel mounting hardware is recommended, grade 18-8 or better. A lock washer of same material should also be used.
2 Ensure mounting surface is flat to better than 0.003" / "
3 Use a thin layer of thermal compound on the backside of the PA - no more than 0.001" - 0.002" thickness!
4 Torque all screws to 10-12 in-lbs

Considerations for Mechanical Mounting:

- Considerations for proper thermal design include
- Total power dissipated = Total DC Power Consumed x (1-Efficiency)
- Ambient Airflow
- Thermal Resistance of Heat Sink

For this PA, typical DC efficiency is 30%. At 25W Pk power output, 15W Average, +28.0V DC operation, 84 total watts are consumed, which leaves 70W dissipated power. If we assume an input air temperature of +25°C, and a maximum desired baseplate temperature of 55°C, this leaves a temperature differential between baseplate and ambient air of 30°C. The desired thermal resistance for heatsink mounting surface to air is therefore 30°C/74W = 0.4°C/W.
Since the baseplate is aluminum, it is important to find a heat sink that it sized at least as big as the outline of the PA which can give this thermal resistance. For example, a 100mm x 54mm heat sink with serrated fins, 70mm in length, (20 fins across 127mm dimension) with an air velocity of 4 m / s exceeds this value.

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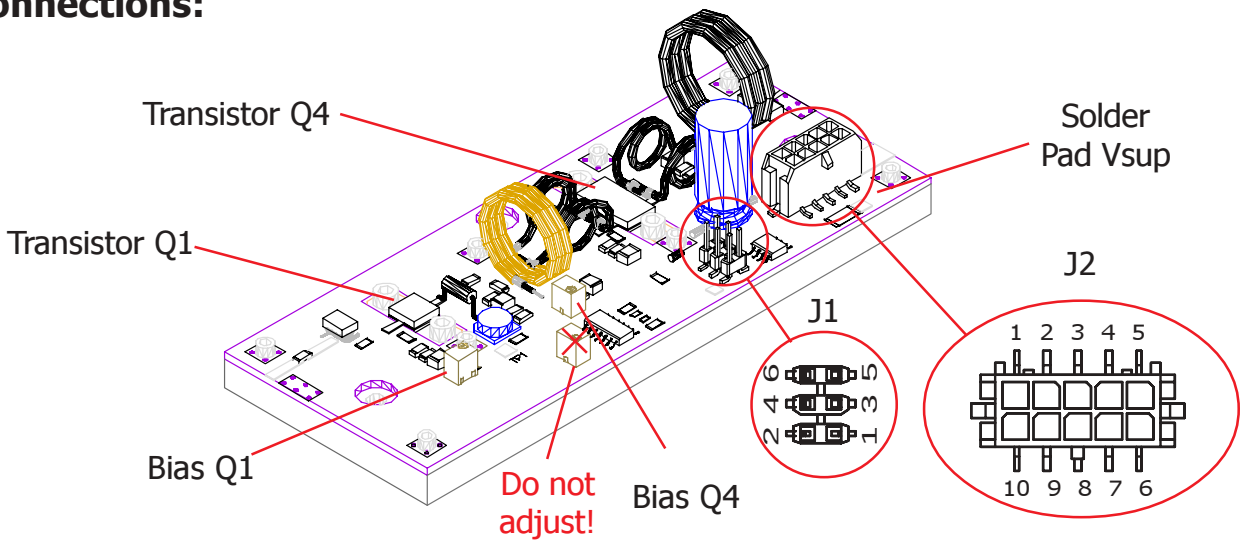
Electrical Connections:



I/O Standard 0.100" pitch DIP /IDC header: SAMTEC type IDSD, HCSD 3M type 89106-0101 AMP 102393-1, 102398-1 BERG 71602-306 -or- Solder directly to Pin in I/O connector	**J1-1**	ALARM_OUT	TTL Hi when baseplate exceeds 70C
	J1-2	ALARM_IN	Jumper to J1-1 for automatic shutdown at 70C, automatically re-enables at 60C
	J1-3	GROUND	
	J1-4	BIAS_SUP	Not used for this amplifier. Vsup internally connected here.
	J1-5	TEMP	Baseplate Temperature
	J1-6	DISABLE	TTL Hi to Disable amplifier
Power 3.0mm Micro Connector: MOLEX 43025-1000 MOLEX Pin 43030-0001, 43030-0007 AMP 1-794617-0 AMP Pin 794610, 794606 -or- Solder directly to pad adjacent to connector	**J2-1,10**	CURRENT	Current Sense, Transistor Q1, Q4
	J2-2,3,8,9	GROUND	System Ground
	J2-4,5,6,7	Vsup	+28 to +32 VDC

Connections:
Connect amplifier to +Vsup and Ground using either 3.0mm modular 10-position plug (J2) or soldering directly to pad adjacent to connector. If using Single connection, 14 gauge wire is recommended, 12 gauge ground wire. 20 gauge wire is recommended for use in modular connector, and all power connections must be used! In all cases, use of teflon insulated wire is highly recommended.
I/O connector (J1) connections are optional.
Connect coaxial cable to input and output RF connections (semi rigid or flexible) using best RF practices. Ensure output cable is of sufficient power handling rating. Pads are provided for ground on co-axial connections.

Amplifier Startup
+Vsup should be applied to amplifier with no drive applied. The system must allow drain voltage to reach +26V minimum before applying drive or damage will result to the amplifier and void warranty. This typically takes between 2 - 10 seconds and should be verified by the system integrator. This can be accomplished in several ways:
1) Apply power to amp at J2. After proper voltage has been reached, amplifier is ready for use.
2) Apply power to amp at J2. Place a TTL Hi (+5V) to J1-6 DISABLE. After proper voltage has been reached, remove TTL Hi from J1-6 DISABLE. Amplifier is ready for use.

Bias Current:
Bias current is controlled via temperature compensated bias system that uses a hermetically sealed glass thermistor as reference. If excessive air is directed above the amplifier such that the thermistor is cooled below the temperature of the baseplate, this circuitry may not perform properly. Bias has been pre-set at the factory to 0.020A Q1 and 2.750A Q4 at +28.0V DC. This bias point has been selected to offer the optimum balance between IMD performance, efficiency, and gain. If the bias point is changed, take great care not to exceed the bias listed on page 1 - Absolute Maximum Ratings. Please refer to applications note on Page 2.

Fault Condition - Bad VSWR
Current sense J2-1, J2-10 (pins are internally connected) should be monitored for excessive current. The voltage difference between J2-1,J2-10 (transistors Q1,Q4) to J2-4,5,6,7 is scaled 1A per 0.010 V. If transistors experience currents in excess of normal operation, a fault condition exists, and the amplifier should be disabled through J1-6 DISABLE.

Temperature Sense and Temperature Fault
An on board temperature controller reports temperature on pin J1-5 TEMP. This is scaled to +395mV + (Temperature °C X +6.20mV/°C) and has an output impedance of 1.5kohm typical. An output alarm, J1-1 ALARM OUT, is TTL Low when the temperature exceeds approximately 70°C, and the alarm is cleared when the baseplate temperature drops below approximately 60°C. For automatic operation, jumper J1-1 ALARM OUT to J1-2 ALARM IN and the amplifier will automatically disable by removing bias when the temperature exceeds 70°C, and automatically re-enable when the temperature drops below 60°C.

Amplifier Shutdown
To prevent damage to amplifier and surrounding systems, bias and drive should be removed prior to powering down PA. This can be accomplished by applying TTL Hi (+5V) to J1-6 DISABLE. Power can safely be removed from PA.

Miscellaneous:
Placing noisy analog or digital systems, such as additional control circuitry, directly over the top of transistors or RF path can cause improper operation. Care should be taken to locate these components where they will not cause interference.