

Revision 2.c Release Date July 11 2007

Revision Notes

## Technical Specifications Summary

Frequency Range:	88 - 108 MHz	Gain:	16 dB
P1dB:	60Watts CW	Efficiency:	70%
Class:	C	Temperature Range:	0 to +60°C
Supply Voltage:	12.5 V	Max VSWR:	3:1

## Amplifier General Description

The **P50-FM-16** is an LDMOS based integrated amplifier building block which requires only power, input and output connections. This highly cost effective amplifier has been designed for FM radio transmitter integrators and gives a great deal of flexibility. Utilizing new plastic based LDMOS transistor technology, high performance at a reasonable cost is achieved. This amplifier is suitable for use as a driver or output stage for LPFM applications.

- **No RF assembly or Circuit Tuning!**
- **60 Watts Typical Output Power!**
- **16dB Typical Gain 88 - 108MHz!**
- **Amp Disable!**

## Amplifier Picture

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Parameter	Min	Typ	Max	Units	Notes
Frequency	88		108	MHz	
P1dB	60			W, CW	
Power Input		1.5	2.5	W, CW	
Gain	15	16		dB	
Vsupply	12	12.5	15	V, DC	
Drain Current		5.7		A, DC	
Input VSWR		1.3:1	1.5:1		
Insertion Phase Variation		±5		°	Unit to unit
Gain Variation		±1		dB	Unit to unit
F2 Second Harmonic		-55		dBc	
F3 Third Harmonic		-55		dBc	
Baseplate Operating Temperature	0		60	°C	

Physical Dimensions 2" x 4" x .08" / 5cm x 10cm x 2cm

All specifications valid for 50 Ω output load,  $V_{sup} = +12.5VDC$ ,  $I_{dq} = 0.1A$

## Absolute Maximum Ratings

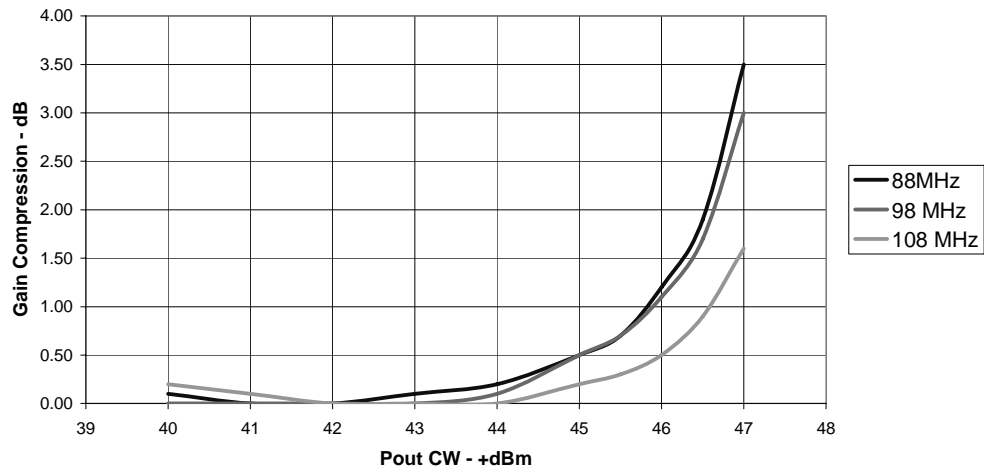
Parameter	Value	Units	Notes
Maximum Operating Voltage	15.6	VDC	
Stable Operating Voltage	12-15	VDC	
Maximum Bias Current, Q100	0.5	A, DC	Factory set to 0.1A
Maximum Drain Current	8	A, DC	
Load Mismatch Survival	5:1		
Storage Temperature	-40 to +105	°C	
Maximum Operating Baseplate Temp	+65	°C	

## Features, Auxillary Functions

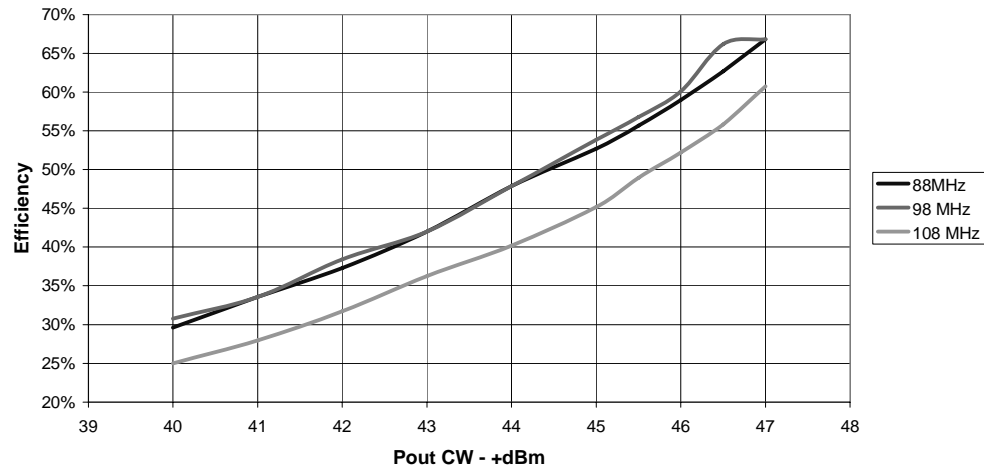
- ◆ Amplifier Disable
- ◆ Current Sense, Each Transistor
- ◆ Connectorized Power



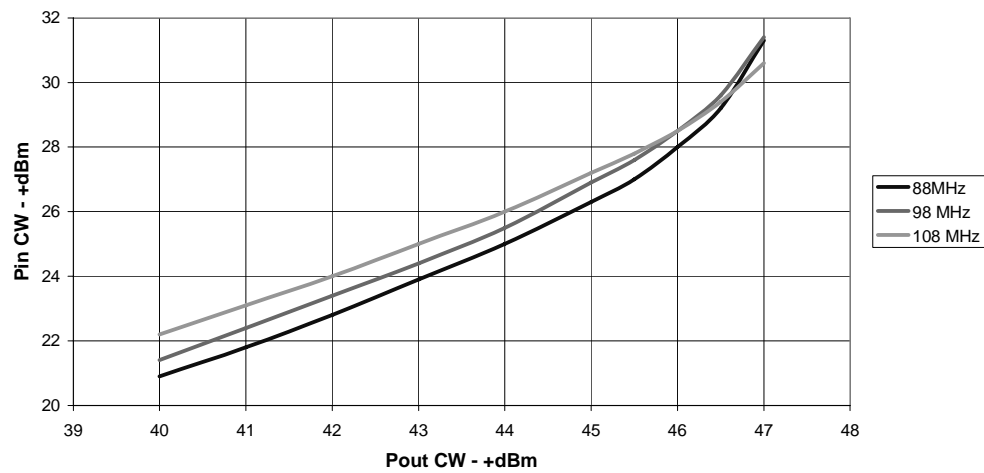
### Gain Compression

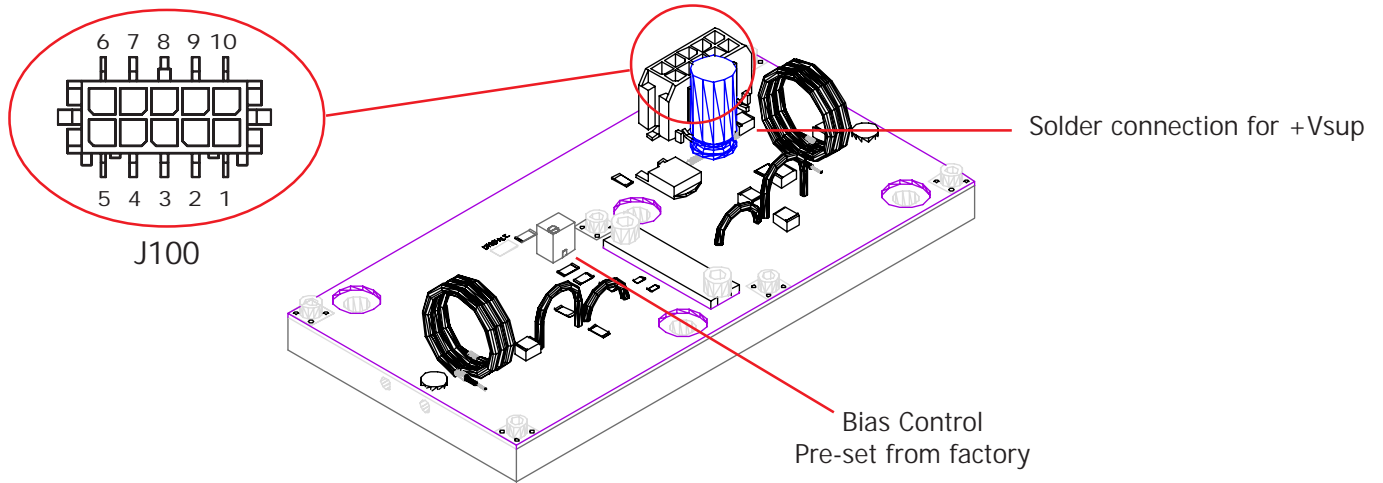


### Efficiency



### Pin vs. Pout





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	<b>J100-1,2,8,9,10</b>	GROUND	System Ground
	<b>J100-3,4,5,6,7</b>	Vsup	+11.5 TO +13.6 V DC

**Connections:**

Connect amplifier to +Vsup and Ground using either 3.0mm modular 10-position plug (J100) or soldering directly to pad adjacent to capacitor. If using Single connection, 14 gauge wire is recommended. 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.

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 +10V minimum before applying drive or damage can result to the amplifier and void warranty. This typically takes between 2 - 10 seconds and should be verified by the system integrator. **Bias Current:**

Bias current is controlled via potentiometer and is factory set to 0.5A. Should the need arise to adjust bias current, do not exceed 2.0A. Bias has been pre-set at the factory to 0.50A at +12.5V DC.

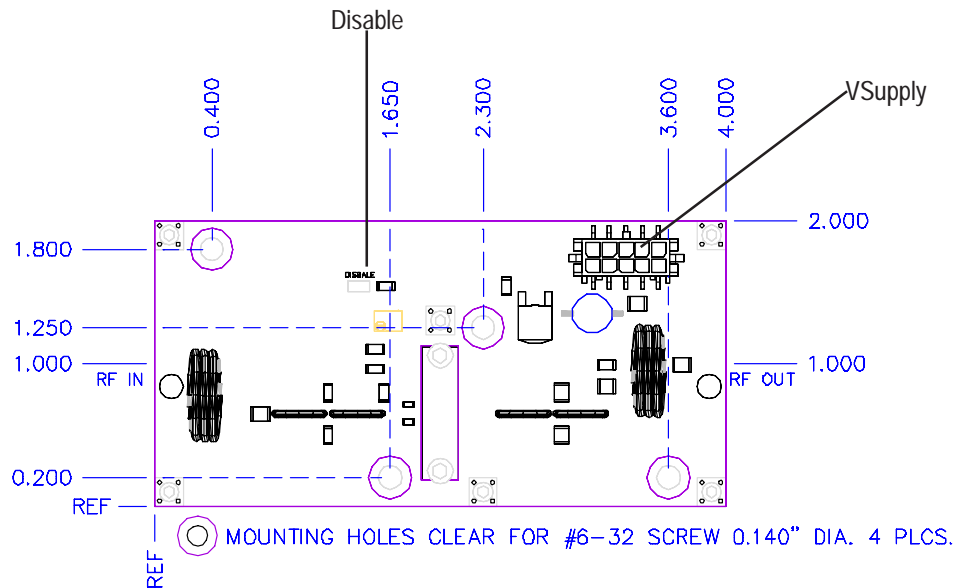
**Amplifier Shutdown**

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 Ground to DISABLE. Power can safely be removed from PA. Note that the pad should be left to float in order to enable the 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.





#### 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 the 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 66%. At 50W average power output, +12.5V DC operation, 75 total watts are consumed, which leaves 25W dissipated power. If we assume an input air temperature of +25°C, and a maximum desired baseplate temperature of 60°C, this leaves a temperature differential between baseplate and ambient air of 35°C. The desired maximum thermal resistance for heatsink mounting surface to air is therefore  $35^{\circ}\text{C}/25\text{W} = 1.4^{\circ}\text{C}/\text{W}$ .

This is extremely easy to achieve by using any reasonable size heatsink which is at least the size of the pallet with 1" fins. Airflow is required only to keep the baseplate below 60°C.



**Ordering Information:**

Order Code	Description	DRFT Reference
P50-FM-16	P50-FM-16	1717
PAB50-FM-16	Amplifier in Enclosure	TBD

**Options**

-A11	SMA Female Connectors In / Out	0201
-A12	Heat Sink Option	0202
-A13	Heat Sink Option with DC Fan, pre wired	0203
-A14	Ruggedized for vibration	0204
-A15	Wire harness, 1' length, 10 wires for pallet amplifier only (NON-FM)	0205
-A16	Wire harness, customer specified length for pallet amplifier only	0206
-T2	Extended Burn In	0271
-T3	Extended Data Collection	0272

**Standard Pallet Options:**

**SMA Female Connectors**, Input and Output. Stainless Body, Gold Center pin, 4-hole SMA bolted to pallet amplifier edge through bottom two holes located at amplifiers RF IN and RF OUT locations. All stainless steel hardware.

**Enclosure**- all aluminum machined enclosure available for most pallet amplifiers. Alodined aluminum, alloy 6061-T6. SMA Female input and output RF connectors. Supply voltage and ground through solder / feedthrough connections. Module must be bolted to appropriate heatsink.

**Heat Sink** - aluminum extruded heat sink, black anodized. Pallet amplifier or module will be bolted to heatsink. Customer will be required to provide adequate airflow.

**Heat sink with fan** - aluminum extruded heat sink as above, with included fan bolted to push air through the heat sink. Depending on heat requirements, a second fan may also be provided on the output of the unit.

**Ruggedized** - all screws have threadlocking compound applied, and all flying components are staked and attached to base. Designed to withstand MIL-STD-810E 514.4 Category 8.

**Power Connector** - a 10 pin molex connector is used on all standard pallet amplifiers to supply +Vsup and Ground connections, as well as hi-side current shunts for current monitoring. Delta RF offers the mating connector with 1' wires - Red (Vsup), Black (Ground), Yellow (Current monitor). All wires are 18 gauge teflon insulated wires. Customer may optionally specify wire length and wire color.

**Testing Options:**

**Standard** - includes power test and brief burn - in under laboratory conditions. Printed test report gives graph of Gain and Input Return Loss at rated P1dB and Voltage Conditions. Report shows pass/fail criteria. All amplifiers include this test.

**Extended burn in** - 8-hour burn in at P1dB with standard test run at completion. Unit is monitored during test and any discrepancy reported. Standard test data is included.

**Extended data collection** - Standard data is run and included. Detailed data is taken point by point giving the customer 25 - 70 frequency points, depending on the amplifier model. For each frequency point, data is generated to include gain, input power, input return loss, current, second harmonic, third harmonic, efficiency, audio distortion.

Other tests available - Vibration, Temp cycling, Shock. Please inquire.

The specifications contained herein are subject to change without notice. Delta RF Technology, Inc. assumes no liability for the use of this information.

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