

Revision 1.a Release Date July 24, 2007

Revision Notes Update module mechanical housing. This document applies to 4229 and 3866

## Technical Specifications Summary

|                  |                |                    |           |
|------------------|----------------|--------------------|-----------|
| Frequency Range: | 400 - 1000 MHz | Gain:              | 41dB      |
| P1dB:            | 10 Watts CW    | Efficiency:        | 10%       |
| Class:           | A              | Temperature Range: | 0 to 70°C |
| Supply Voltage:  | 28.0V          | Max VSWR:          | 10:1      |

## Amplifier General Description

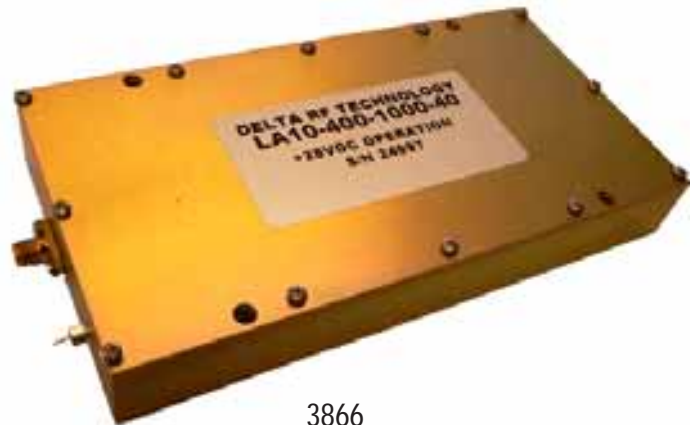
The **PA10-400-1000-40** is a three stage ultra linear class A integrated communications amplifier designed for a variety of end uses. Providing a minimum of 10 W P1dB, the PA10-400-1000-40 is the perfect pre-amplifier for any broadband UHF communications transmitter. Featuring quadrature input and output combining, the amplifier is isolated from most external circuit problems.

- No RF assembly or circuit tuning!
- 15 Watts typ of Linear Output Power!
- 40dB typical gain at 1 GHz!
- Combined **Video and Aural** at full rated power!
- Modular Construction for ease of Integration!
- Proper heatsinking is required for operation

## Amplifier Picture



4229



3866



**Delta RF Technology, Inc.**

High Power RF Amplifiers and Accessories

350 South Rock Boulevard • Reno • NV • 89502 • USA

Phone +1.775 DELTA RF [775 335 8273]

Fax +1.775 DELTA FX [775 335 8239]

website: <http://www.drft.com>

email: [sales@drft.com](mailto:sales@drft.com)

| Parameter                       | Min | Typ   | Max   | Units | Notes                                |
|---------------------------------|-----|-------|-------|-------|--------------------------------------|
| Frequency                       | 400 |       |       | MHz   |                                      |
| P1dB                            | 40  | 42    |       | W, CW |                                      |
| Linear Power Out                |     | 12    |       | W     |                                      |
| IMD3                            |     | -30   |       | dBc   | For 2 tones, 10KHz spacing, 10 W PEP |
| Power Input                     |     | 0     |       | W, CW | for 10W output                       |
| Gain                            | 39  | 40    |       | dB    |                                      |
| Vsupply                         | 26  |       | 30    | V, DC |                                      |
| Drain Current                   |     | 2.75  |       | A, DC |                                      |
| Input VSWR                      |     | 1.2:1 | 1.5:1 |       |                                      |
| Output VSWR                     |     |       | 1.5:1 |       |                                      |
| Insertion Phase Variation       |     | ±5    |       | °     | Unit to unit                         |
| Gain Variation                  |     | ±2    |       | dB    | Unit to unit                         |
| F2 Second Harmonic              |     | -30   |       | dBc   |                                      |
| F3 Third Harmonic               |     | -20   |       | dBc   |                                      |
| Baseplate Operating Temperature | 0   |       | 70    | °C    |                                      |

Physical Dimensions 2.5" x 6.0" x .07 / 7cm x 15cm x 2cm

All specifications valid for 50 Ω output load,  $V_{sup} = +28VDC$ ,  $I_{dq} = 2.75A$

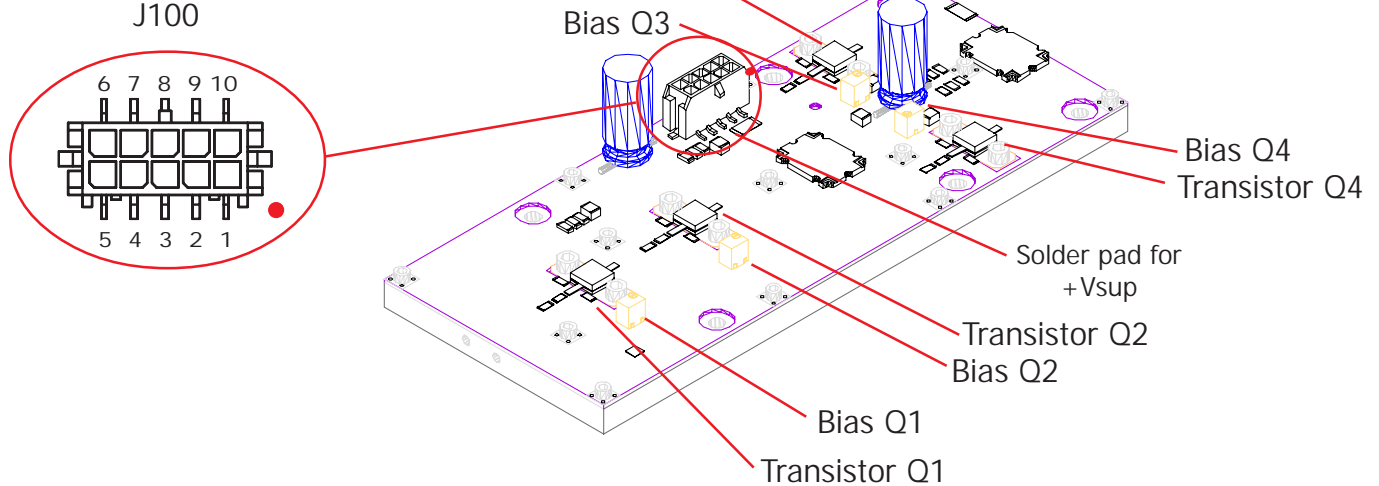
## Absolute Maximum Ratings

| Parameter                        | Value          | Units | Notes |
|----------------------------------|----------------|-------|-------|
| Maximum Operating Voltage        | +32            | VDC   |       |
| Stable Operating Voltage         | +26.0 to +32.0 | VDC   |       |
| Maximum Bias Current, Q100       | .25            | A     |       |
| Maximum Bias Current, Q101       | .5             | A     |       |
| Maximum Bias Current, Q102,103   | 2.00           | A     |       |
| Maximum Drain Current            | 3.50           | A     |       |
| Load Mismatch Survival           | 10:1           |       |       |
| Storage Temperature              | -40 to +105    | °C    |       |
| Maximum Operating Baseplate Temp | +70            | °C    |       |

## Features, Auxillary Functions

- ◆ Amplifier Disable
- ◆ Current Sense
- ◆ Connectorized Power



**Electrical Connections:****Connections:**

Connect amplifier to +Vsup and Ground using either 3.0mm modular 10-position plug (J100) or soldering directly to pad adjacent to connector. If using Single connection, 14 gauge wire to each side 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 +26V minimum before 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 voltage regulator and divider. Bias has been pre-set at the factory to 0.250A first stage, 0.500A for second stage, and 1.0 amps each for two output stages at +28.0V DC. This bias point has been selected to offer optimum IMD performance and linearity. If the bias point is changed, take great care to set the same bias point on each output transistor, and not to exceed the bias listed on page 1.

**Fault Condition - Bad VSWR**

Current sense J100-1,10 should be monitored for excessive or no current. The voltage difference between J100-1,10 to J100-4,5,6,7 is scaled 1A per 0.010 V. If either transistor experiences currents in excess of normal operation, a fault condition exists, and the amplifier should be disabled through DISABLE. If current on either transistor drops to below 1.25A indicated, a fault condition exists, and the amplifier should be disabled through DISABLE.

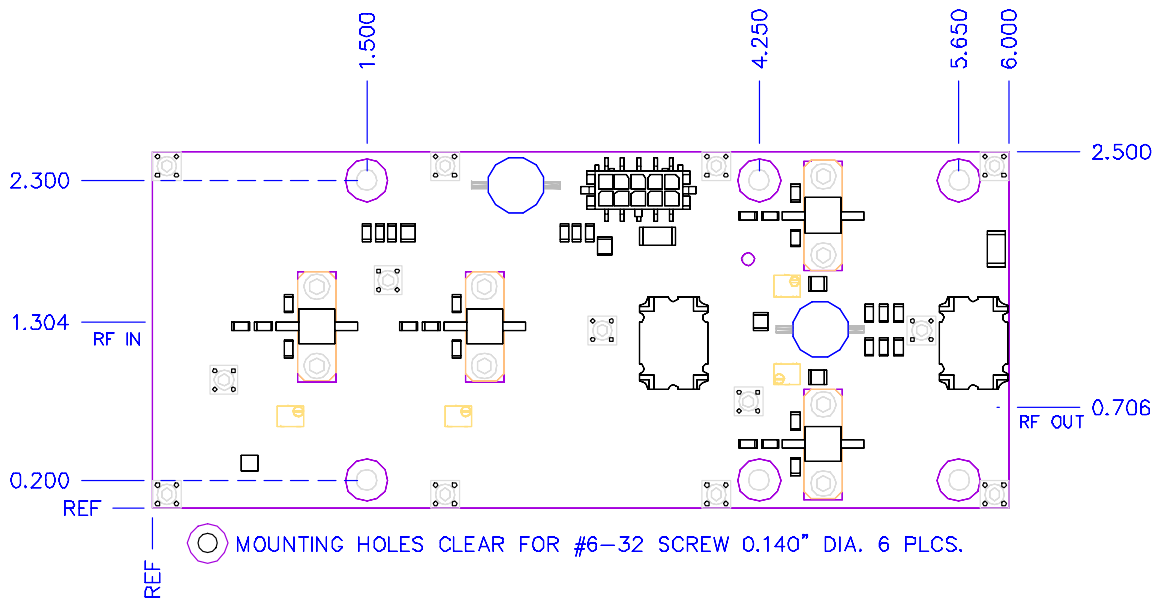
**Amplifier Shutdown**

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

**Miscellaneous:**

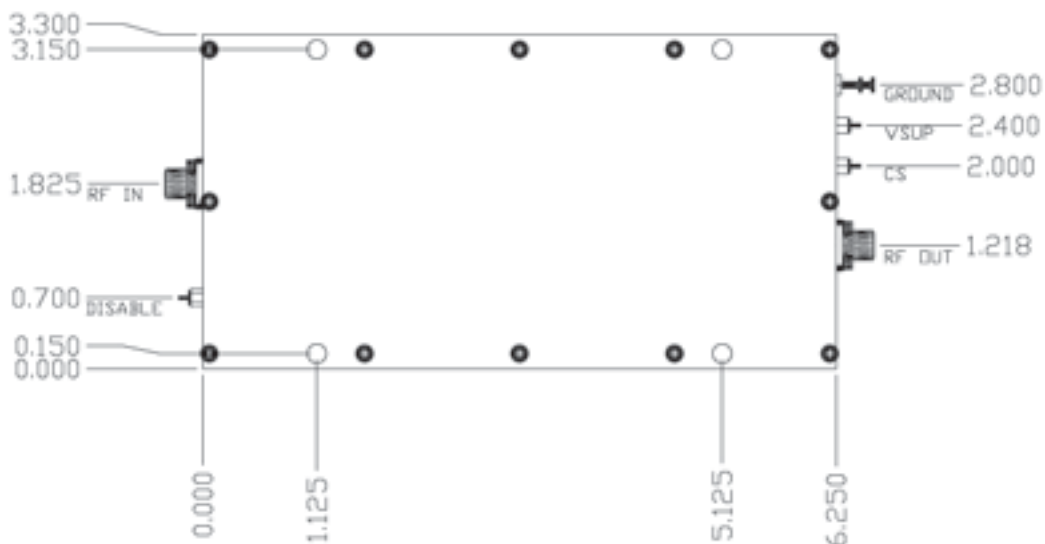
Placing noisy analog or digital systems, such as additional control circuitry, directly over the top of transistors or RF path can cause improper operation. Care should be taken to locate these components where they will not cause interference.





### 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



**Ordering Information:**

| Order Code        | Description                                       | DRFT Reference |
|-------------------|---|----------------|
| PA10-400-1000-40  | Pallet Amplifier 10 Watt 400-1000MHz 40 dB gain   | 4229           |
| PAB10-400-1000-40 | Enclosed Amplifier 10 Watt 400-1000MHz 40 dB gain | 3868           |

**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.

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