

Revision 0.e Release Date December 13, 2007

This document applies to 4454 and 5029

Revision Notes: 0.b Full production release, Apr 07. 0.c Revised Specs May 07. Revised Integration Instructions Jun 07 0.d and drawings

Technical Specifications Summary

Frequency Range:	470 - 680 MHz	Gain:	17dB
P1dB:	650 Watts	Efficiency:	36%
Class:	AB	Temperature Range:	-10 to 55°C
Supply Voltage:	32.0V	Max VSWR:	3:1

Amplifier General Description

This ultra high performance pallet offers industry leading power density for broadcast television in the UHF frequency range. Using the latest generation LDMOS high power transistors, a minimum of 500W linear power is achieved for analog broadcast television, and an incredible 120W for ATSC broadcast standard. With a typical 17dB gain and excellent repeatability, integration is simplified by reducing the number of stages required.

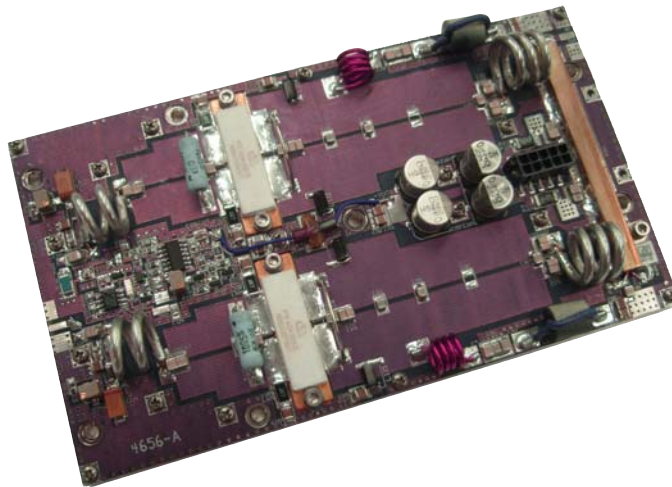
On board circuitry includes a temperature compensated bias system and automatic high temperature shutdown. Safety features include temperature compensated bias, which prevents damage to the amplifier as the baseplate temperature increases. A high temperature safety circuit will disable the amplifier at an approximate baseplate temperature of 70°C. The alarm output is an open collector output that may be chained between all output amplifiers to provide simultaneous shutdown and monitoring. The pallet amplifier is constructed using all military grade components and a copper baseplate which allows high temperature operation from this very power dense amplifier.

For higher frequency operation, please refer to P500-UHF-17-B which offers operation from 650 - 860MHz. The PA25-UHF-40 makes an excellent driver for one or two pallets of either band.

Estimates for Digital power assume limited precorrection using ATSC standard. Advanced predistortion systems and / or DVB formats can have a significant impact on digital power performance.

Please carefully read integration instructions and warnings on page 4 of this document.

Amplifier Picture



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High Power RF Amplifiers and Accessories

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Parameter	Min	Typ	Max	Units	Notes
Frequency	470		680	MHz	Operation possible to 700MHz
P1dB	650			W	Amplifier is rated for 350W CW Maximum
Power	500			W, PEP	For 2 tones, 1MHz spacing, -40dBc
IMD3		-42		dBc	For 2 tones, 1MHz spacing, 500W PEP
Power Input		10		W	For 500W Output
Gain	16	17		dB	At 500W PEP / Pk Sync
Vsupply		32		V, DC	
Drain Current		26		A, DC	For SLB, 500W Pk Sync
Input Return Loss			-14	dB	
Insertion Phase Variation		±5		°	Unit to unit
Gain Variation			±1	dB	
F2 Second Harmonic		-45	-25	dBc	
F3 Third Harmonic		-45	-35	dBc	
Baseplate Operating Temperature	-10		55	°C	
Video Parameters					
Maximum Analog Power			550	W, Pk Sync	
IMD Performance		-56	-54	dBc	500W Pk Sync, FFR NTSC
Differential Gain Error (Abs)		3	5	%	500W Pk Sync
Differential Phase Error (Abs)		2	5	°	500W Pk Sync
Sync Compression		8	14	%	500W Pk Sync
Digital Power		120		W, Avg	
M.E.R.	33			%	120W, w p/c
Shoulders		-35		dBc	120W, w p/c ATSC

Physical Dimensions 3.8" x 6.7" x 1.0" / 97mm x 170mm x 25mm

Weight 1.8 Pounds / 1.1 kG

All specifications valid for load impedance 50 Ω , $V_{sup} = +32VDC$, $I_{dq} = 4.8A$

Absolute Maximum Ratings

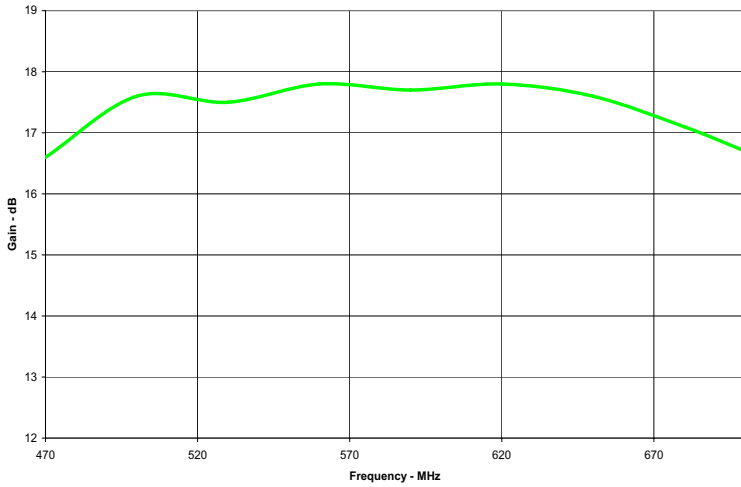
Parameter	Value	Units	Notes
Maximum Output Power	350	W, Avg	Peak power may exceed this level
Maximum Operating Voltage	34	V, DC	
Stable Operating Voltage	28 - 34	V, DC	Specifications degrade below 32V
Maximum Bias Current, Q100,101	3.6	A, DC	Do not adjust. Each transistor.
Maximum Drain Current	32	A, DC	Derate Linearly to 30A above 45°C, total pallet
Load Mismatch Survival	5 : 1		Derate Max Pout to 330W Average linearly above 45°C
Storage Temperature	-40 to 105	°C	
Maximum Operating Baseplate Temp	55	°C	

Features, Auxillary Functions

- ◆ Temperature Compensated Bias
- ◆ Temperature Controller - Analog Temperature Output
- ◆ High Temperature Alarm with Automatic PA Disable
- ◆ High Temperature Alarm Output
- ◆ Amplifier Enable
- ◆ Current Sense, Each Transistor
- ◆ Connectorized Power

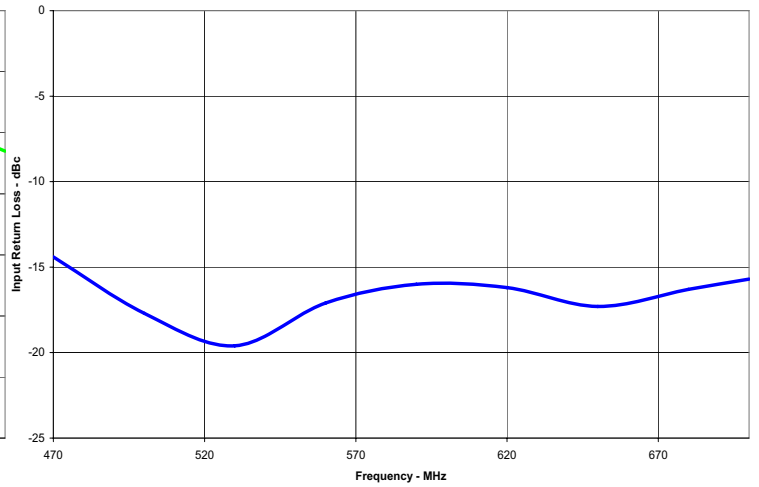


Gain, 500W

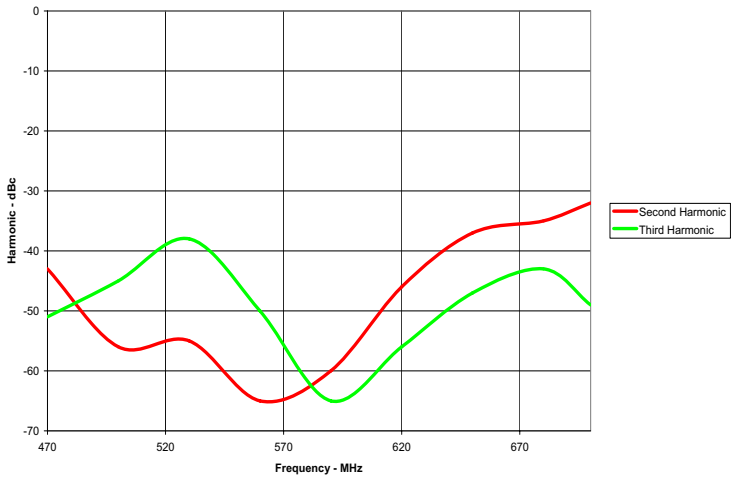


Graph 1. Gain
Harmonic Performance

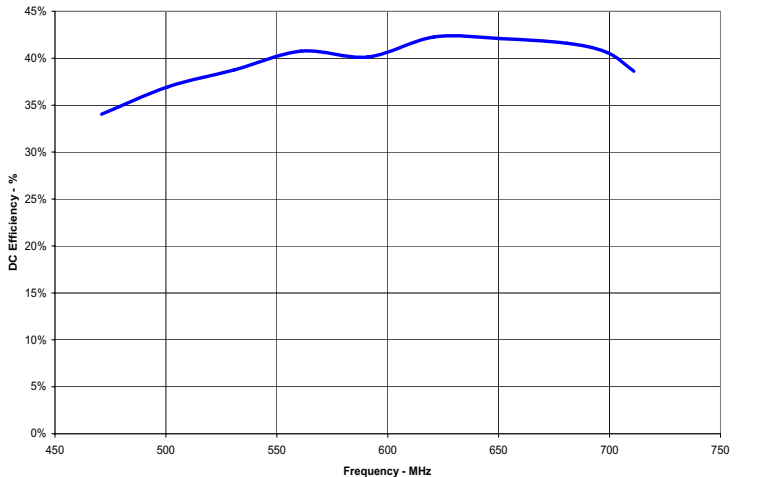
Input Return Loss



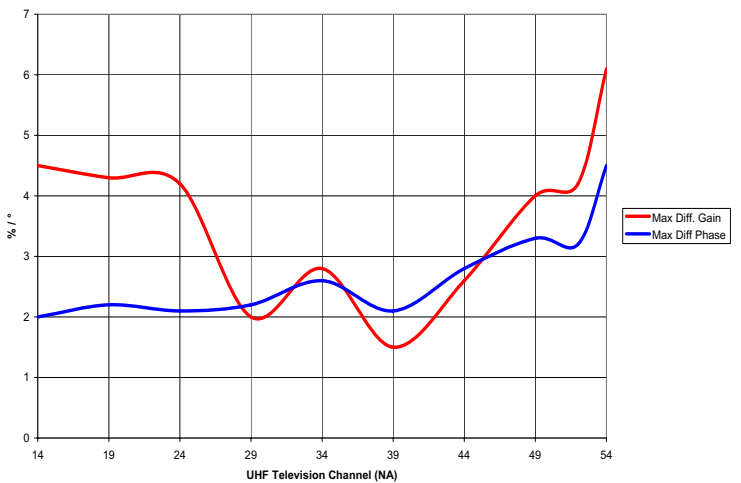
Graph 2. Input Return Loss
Efficiency, 500W Pk Sync SLB



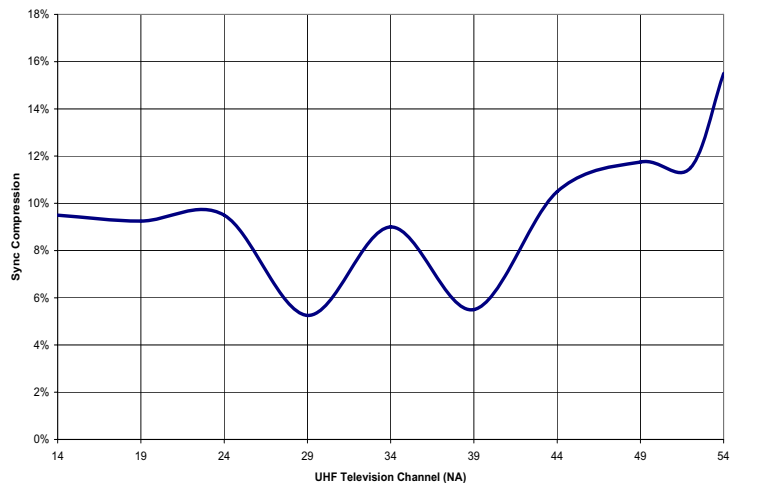
Graph 3. Harmonics
Video Performance



Graph 4. Efficiency
Sync Compression - 500W Pk Sync



Graph 5. Differential Gain and Phase



Graph 6. Sync compression



This pallet amplifier is designed for operation of up to 330W average power or 350W absolute maximum with reduced baseplate temperature at elevated ambient air temperatures. The high power density of the amplifier will not safely allow prolonged operation above this average power level - the built in security features will disable the amplifier before damage occurs in most cases. The transistors used in this design are capable of high peak power so long as the average power does not exceed ratings. This allows digital television signals with high peak power to be used so long as the average power remains below absolute maximum ratings.

The P500-UHF-17-A amplifier requires an *excellent* heatsink for reliable operation. This heatsink must be capable of dissipating the maximum heat generated. In the case of 500W Pk Sync operation, this is approximately 620W of heat. Use of correct heatsink compound and correct amount is critically important to long term operation and high reliability. Amplifiers require 0.20" minimum spacing in the short dimension between amplifiers. Use all attachment points using stainless hardware and applying appropriate torque. Direct some airflow over the top of the amplifier - minimal airflow is recommended, strong airflow is not required.

Use 12 gauge or larger teflon insulated wire for positive and ground, or use the Delta RF supplied wiring harness and use solder connections at all attachment points. Multiple voltage supply wires are acceptable. Please refer to the next page for contact locations. Customer may choose ground to use (only one is required) but if solder pads are used for Vsup, both pads must be connected.

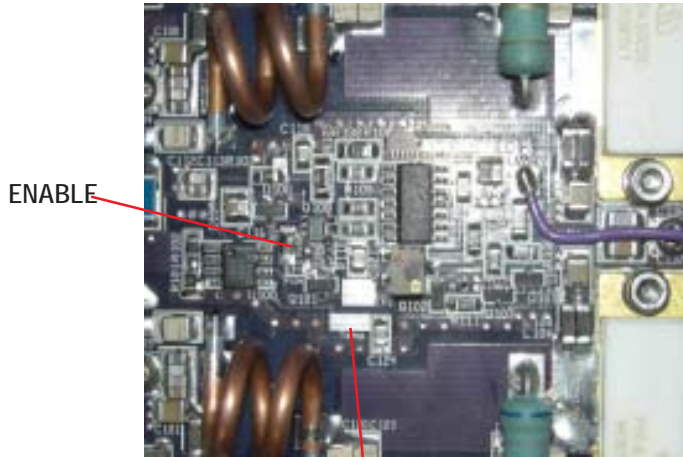
Apply supply voltage with the amplifier disabled or the exciter power reduced or both. Due to its high gain, the amplifier is sensitive to overdrive and can be damaged if overdriven. By starting the amplifier disabled, the exciter power will settle before amplifier is enabled and reduce chance of overdrive. Monitor on board temperature alarm. In the event of cyclic shutdown, cooling must be improved.

NOTE: The amplifier requires +5V (TTL COMPATIBLE) signal at 'ENABLE' pad to enable amplifier. Without this voltage - i.e. if amplifier has nothing attached to this point - the amplifier *will not operate*. Also, the amplifier will not operate until the Vsup has reached 25.0 V DC. Below this voltage, the bias circuitry is automatically disabled to prevent damage to the amplifier.

IMPORTANT: This amplifier is sensitive to overdrive and may be damaged by careless application of input power. Please consider that a 1.5dB spike in input power when operating at 500W Pk sync translates to a 200+ watt spike in output power. This additional power is too much heat for the transistors and will result in the destruction of one or both of the output devices. Older, lower power models, are not as sensitive to this overdrive as the magnitude of the power increase is much lower. **The customer should make use of the ENABLE line feature** of this amplifier to delay enabling the amplifier until the exciter, modulator, or other RF source has stable output power. **It is the customer's responsibility to ensure output power does not exceed ratings.** Warranty will be voided in cases of overdrive. Delta RF will be pleased to provide schematics for a simple power up delay function.

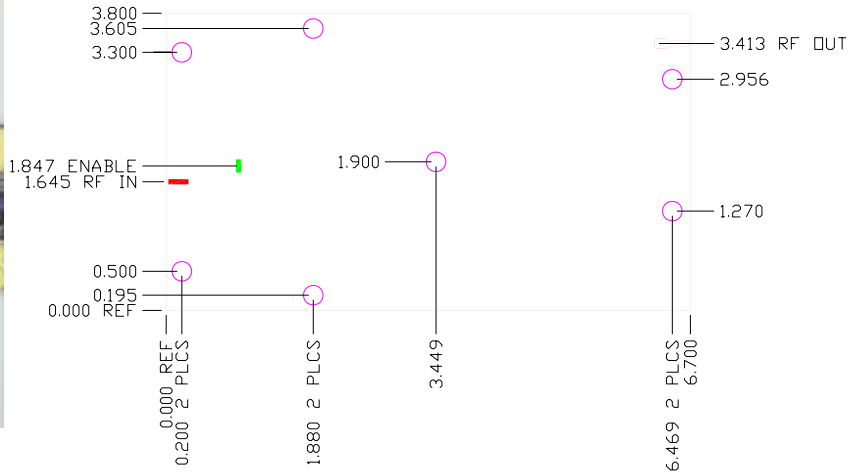
Please consult the factory with any integration questions.





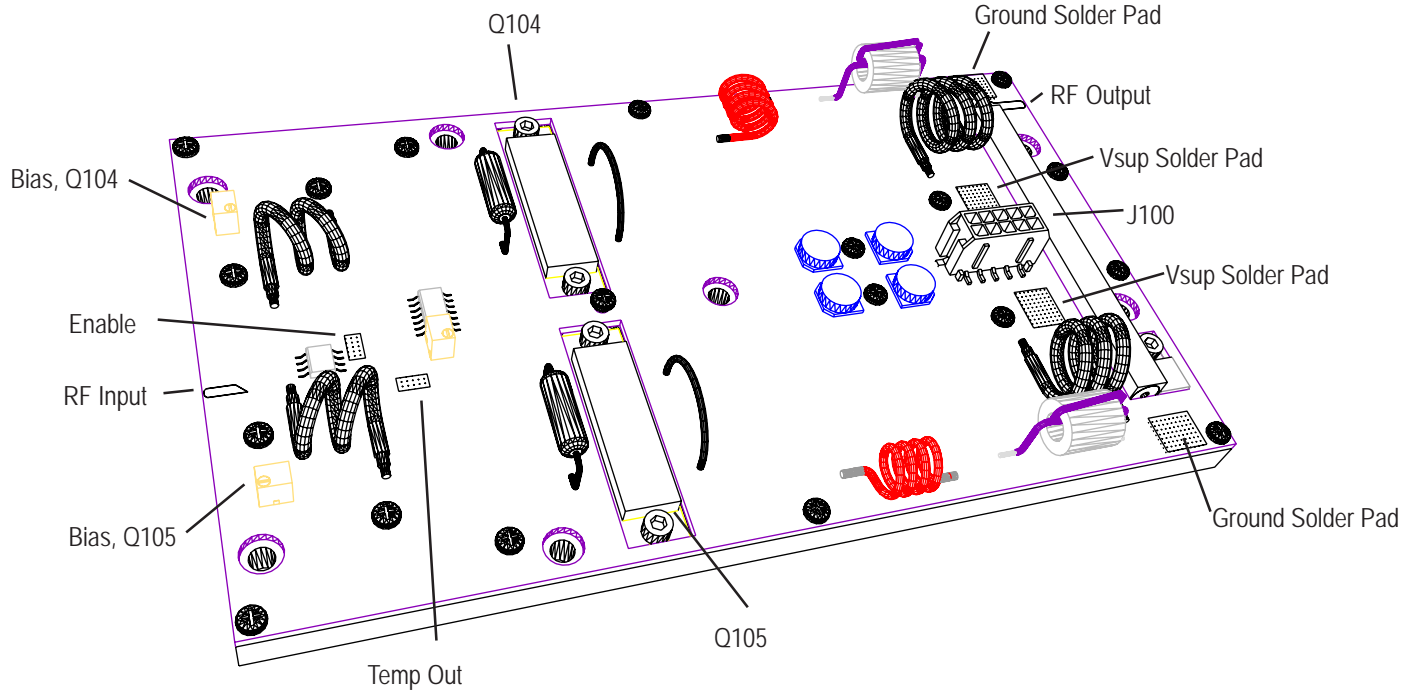
ENABLE

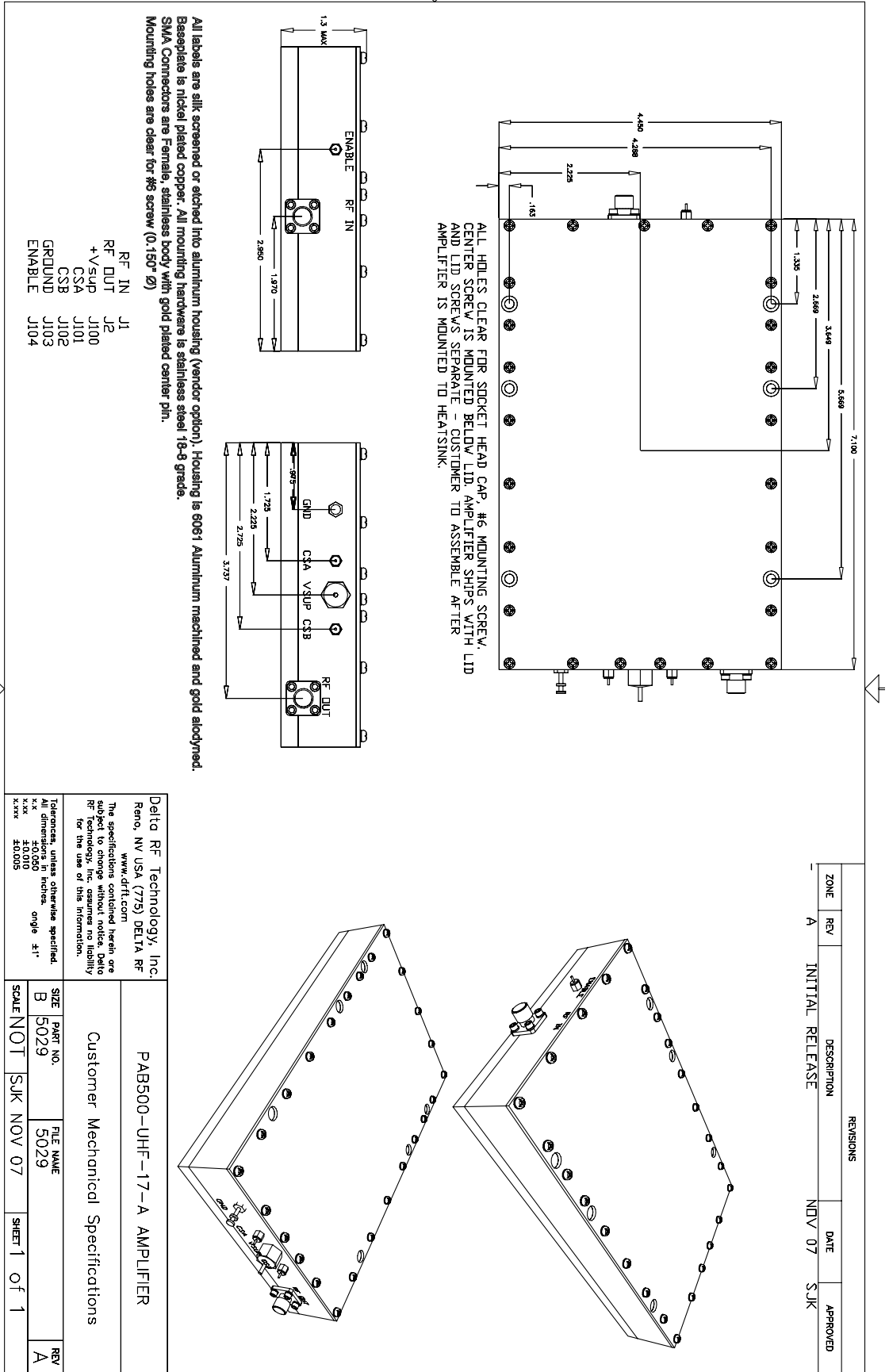
ANALOG TEMPERATURE



All holes clear for #6 Mounting Screw.

Power	J100-1	CURRENT	Current Sense, Q104
3.0MM Micro Connector: MOLEX 43025-1000	J100-10	CURRENT	Current Sense, Q105
MOLEX Pin 43030-0001, 43030-0007	J100-2,3,8,9	GROUND	System Ground
AMP 1-794617-0	J100-4,5,6,7	Vsup	+26 to +30 V Supply Voltage
AMP Pin 794610, 794606			
-or-			
Solder directly to pad adjacent to connector			

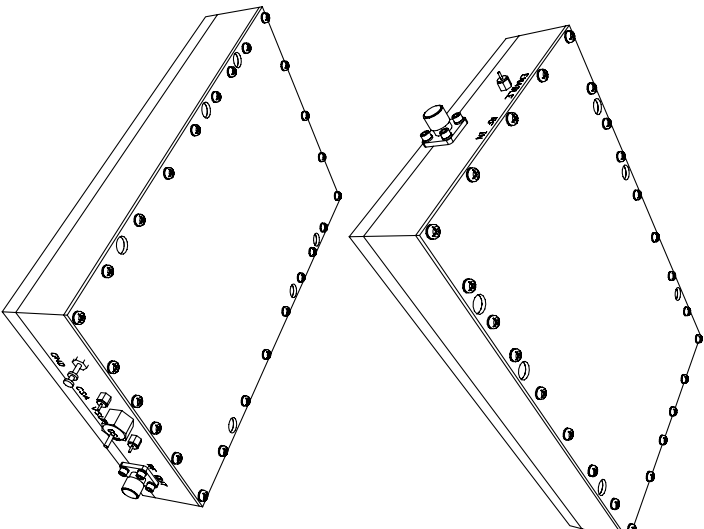




All labels are silk screened or etched into aluminum housing (vendor option). Housing is 6061 Aluminum machined and gold alodined. Baseplate is nickel plated copper. All mounting hardware is stainless steel 18-8 grade. SMA Connectors are Female, stainless body with gold plated center pin. Mounting holes are clear for #6 screw (0.150" Ø)

- RF IN J1
- RF OUT J2
- +Vsup J100
- CSA J101
- CSB J102
- GROUND J103
- ENABLE J104

Delta RF Technology, Inc. Reno, NV USA (775) DELTA-RF www.drft.com		PAB500-UHF-17-A AMPLIFIER	
The specifications contained herein are subject to change without notice. Delta RF Technology, Inc. assumes no liability for the use of this information.			
Tolerances, unless otherwise specified. All dimensions in inches. angle ±1° xxx ±0.010 xxxxx ±0.005		SIZE B PART NO. 5029 SCALE NOT	FILE NAME 5029 DATE NOV 07 SHEET 1 OF 1
Customer Mechanical Specifications		REV A	DESCRIPTION INITIAL RELEASE DATE NOV 07 APPROVED SJK



Ordering Information:

Order Code	Description	DRFT Reference
P500-UHF-17-A	500W UHF Television Broadband Pallet Amplifier	4454
PAB500-UHF-17-A	500W UHF Television Broadband Amplifier Module	5029

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 average power and Voltage Conditions. Report shows pass/fail criteria. All amplifiers include this test.

Extended burn in - 8-hour burn in at average rated power 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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