2032 PAB700-FM-A0

Part Number | Amplifier Name

Revision 0.c Release Date July 2010
Revision Notes Updated specs, added mechanical and FAULT diagram

Technical Specifications Summary

Frequency Range:	86 - 108 MHz	Gain:	14.5dB
P1dB:	700 Watts CW	Efficiency:	65%
Class:	C	Temperature Range:	-20 to 70°C
Supply Voltage:	+50 VDC	Max VSWR:	3 :1

Amplifier General Description

This modular 700W amplifier is specifically designed for use as IPA's in larger transmitter systems produced by Harris, Silicon Valley Power Amplifiers, and others. It is also designed to be used in combined systems for low power transmitters (less than 10kW). This amplifier has been modified from the 'Standard' model - the input connector is a right angle BNC female connector in place of the straight 'standard' one. This amplifier uses the reliable MRF-151G push pull MOSFET.

Features include over power protection, over voltage protection, reverse power protection, over temperature protection and will self reset when the fault is cleared. Airflow is required for proper operation.

For Continental, SCA, B series SVPA modules, please refer to part number 2045, PAB700-FM-A1 data sheet.

This item was originally sold as Silicon Valley Power Amplifiers 0101-700Cxx.
Silicon Valley Power Amplifiers is owned by Delta RF Technology, Inc.

Amplifier Picture

Input Side

Output Side

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2032 PAB700-FM-A0

RF Specifications

Parameter	Min	Typ	Max	Units	Notes
Frequency	86		108	MHz	
P1dB	700			W, CW	Amplifier is self limited to 705W min
Psat			755	W, CW	
Power Input	19		30	W, CW	
Gain	13.5		15.5	dB	
Vsupply	45		52	V, DC	Module supply
Drain Current		21.5	25	A, DC	
Efficiency	65			%	
Gain Flatness		±0.7		dB	
Input VSWR			1.5:1		
Insertion Phase Variation		±10		°	Unit to unit
F2 Second Harmonic		-25		dBc	
F3 Third Harmonic		-15		dBc	
Airflow Operating Temperature	-20		+70	°C	

All specifications valid for 50 Ω load, V_{sup} = +50VDC, I_{dq} = 0.0A

Environmental, Mechanical, Interface

Parameter	Min	Typ	Max	Units	Notes
Form Factor	Module with Heatsink 11.0" x 7.5" x 5.3" 27.5cm x 19.1cm x 13.5cm				
Weight		18		lbs	Including shipping container
Operating Temperature	-20		70	°C	
Storage Temperature	-20		80	°C	
Altitude	0		10000	Ft ASL	Derate Max Operating Temperature to 40°C linearly from 8000 Ft to Max
Airflow		125		cfm	S.P. at SL
Relative Humidity	5		95	%	Non condensing
Shock	Normal Truck Transport				
Vibration	Normal Truck Transport				
MTBF		5 - 7		Years	Typical, normal operation
I/O Connector	6 Position Terminal Block				
Mains DC Connector	Same as above				
RF Input Connector	BNC-Female, Right Angle				
RF Output Connector	N-Female				

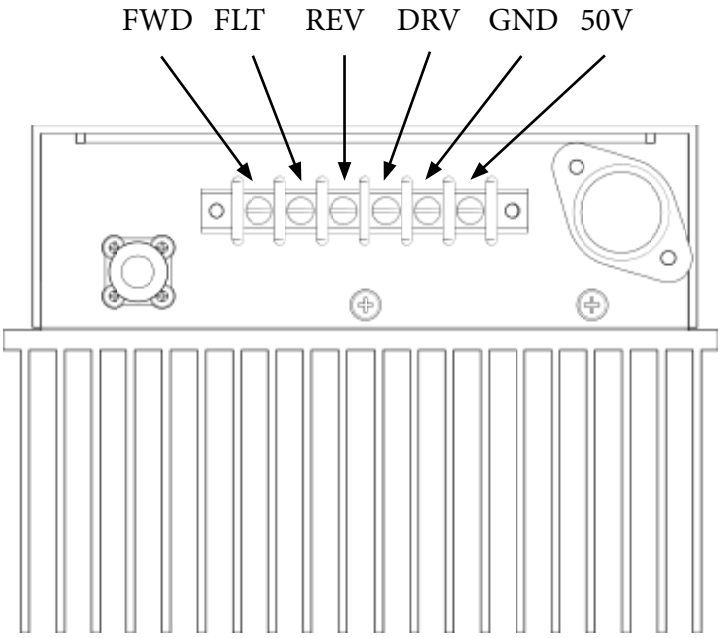
Absolute Maximum Ratings

Parameter	Value	Units	Notes
Operating Voltages	46 - 52	V DC	
Maximum Voltage	54.5 - 55.5	V DC	OVP Range
Maximum Current	25	V DC	Fused for 30A
Maximum Input Power	30	W	
Maximum Temperature	70 - 75	°C	OT Range
Maximum Reflected Power	75 - 150	W	OR Range
Load mismatch survival	3 : 1		Protection Operating

ALC & Detector Information

Parameter	Min	Typ	Max	Units	Notes
Detector Type		Dual Directional Coupler Diode Detector FWD and REV			
Temperature Protection		Bimetal Thermostat Self Resetting, 80°C Trip			
Detector					
Forward Power Accuracy		±25	±50	Watts	Output 700W, 50Ω, 98 MHz
Reflected Power Accuracy		±25	±50	Watts	Reflected 150W, 50Ω, 98 MHz
Input Power Accuracy		±5		Watts	Input 20W, 50Ω, 98 MHz
Forward Power Trip - Hardware	705		770	Watts	50Ω, 98 MHz
Reflected Power Trip - Hardware	75		150	Watts	50Ω, 98 MHz
Forward Detector “FWD”		1.5		V, DC	Output 700W, 50Ω, 98 MHz
Reflected Detector “REF”		0.7		V, DC	Threshold for 2:1, Ref to 50Ω
Input Detector “DRV”		0.9		V, DC	Input 20W, 50Ω, 98 MHz
FAULT		0		Ω	To ground, when in fault condition
FAULT			50	mA	Sink capability, when in fault condition
FAULT		1000		Ω	To +Vsup, when not faulted (“open”)
FUSE Type		KLK-030A			Or equivalent

Terminal Block / Interface description (output side)



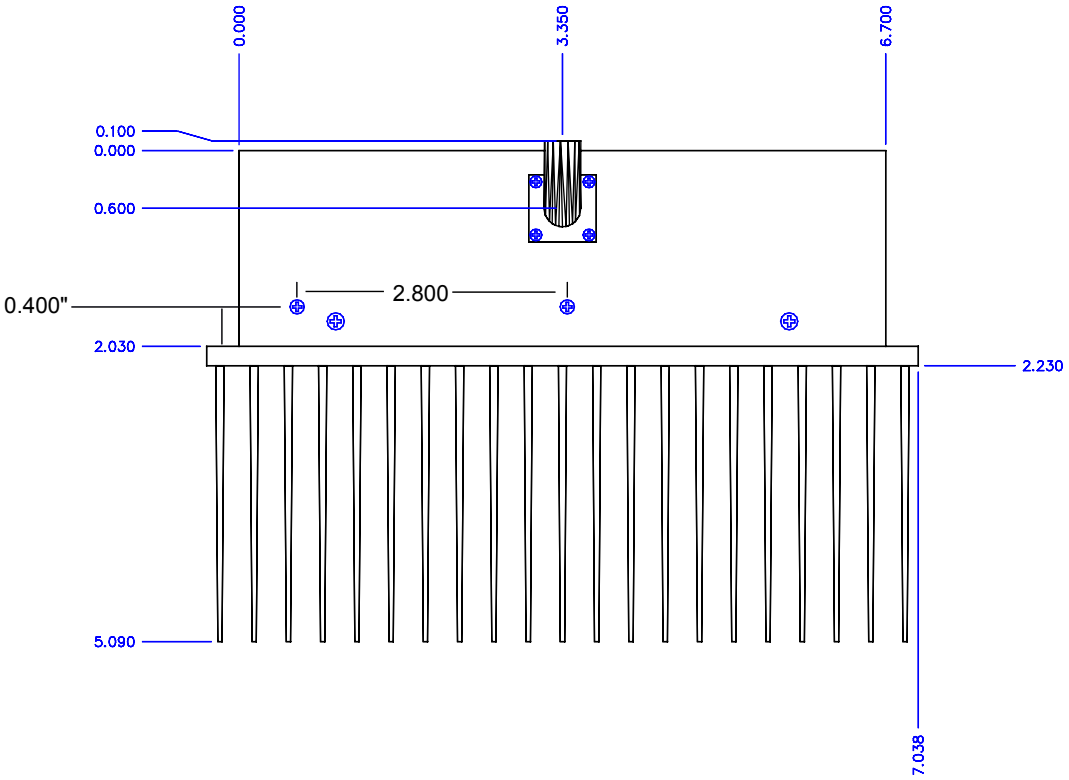
Fault conditions for active FAULT:
Any or all of the conditions will cause the FAULT output to be active:

1. Temperature - internal temperature sensor will disable amplifier at 80°C baseplate temperature.
2. High Output Power - Output power in excess of rated power
3. High Reflected Power - Reflected power in excess of rated reflected power tolerance
4. High Power Supply Voltage - Voltage in excess of rated Supply Voltage will cause fault.

When FAULT is active, a negative bias is applied to the gates of the transistors effectively shutting the amplifier off. Because of the time constant in the shutdown circuit, which is of a non-latching type, the amplifier will re-enable once the FAULT condition is cleared. With the exception of the temperature fault, the remaining fault conditions will appear as a square wave3 on the FAULT output and may appear as an AM modulated output on the now reduced power module. Temperature faults will manifest as a cyclic output - 1 - 20 minutes on, 1 - 20 minutes off, repeating.

Note: Whenever Vsup is present, RF energy may be present at the RF output terminal. Remove Vsup before attempting any work involving RF output.

Terminal	Min	Typical	Max	Description
FWD Forward Power	0V	1.5V	2.5V	DC Output scaled to Output Power. Set nominally to 1.5V at 98MHz at 700W CW. Will vary depending on frequency and power. Approx 1.27V at 500W. 100k ohm output impedance.
FLT Fault				Open collector output when FAULT not active. 0 ohms to ground when active FAULT. Can sink up to 50mA. 1k ohms to +Vsup when not active. 100k ohm output impedance.
REV Reflected Power	0V	0.02V	5.0V	DC Output scaled to reflected power. Set nominally to 0.5V - 98MHz - 100W reflected power. Will vary depending on frequency and VSWR.
DRV Input Power	0V	0.9V	2.5V	DC Output scaled to drive power. Set nominally to 0.9V - 98MHz - 20W input. Will vary depending on frequency and power. 100k ohm output impedance.
GND				Chassis Ground.
50V	46V	50V	52V	Supply voltage input. Fused for 30A.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3.350
6.700
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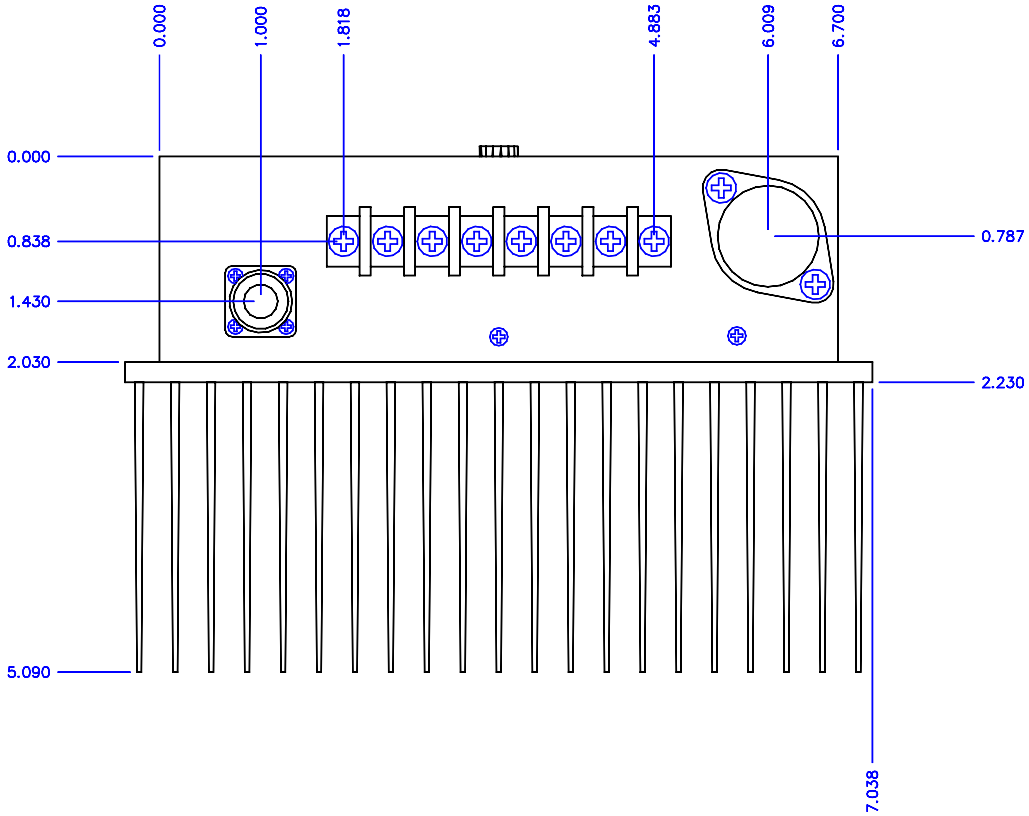
0.000
0.600
0.400"
2.800
2.030
2.230
5.090
7.038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1.000
1.818
4.883
6.009
6.700
0.000
0.838
1.430
2.030
0.787
2.230
5.090
7.038

Recommended Installation Instructions:

1. After receipt of unit, please inspect amplifier carefully. Bent heat sink fins, cracked fuseholders or bent connectors are not covered under warranty, and if units are operated with any of these conditions, warranty is void. Please contact the common carrier for insurance claim.
2. Do not tamper with security seals - if seals are removed for any reason, warranty is void.
3. Verify that power supply voltage from power supply is within limits - it should be stable and between 46V and 52V. Excessive noise on the supply line can appear on RF Output of module - please correct or repair any power supply problems before installing module. Voltages above 55V will shutdown module, excessive high voltages will irreparably damage the module. Low voltages below 46V can cause unstable operation and may damage the module. Please allow the transmitter and power supply to warm fully before checking voltages. Power supply problems are the leading cause of module failure. Certain Harris installations allow power supply voltage down to 42V. For good amplifier stability, ensure the input VSWR of the next amplifier stage is better than 2.0 : 1.
4. Check the output cable inside the transmitter - check for good 50 ohm match or VSWR if possible. While the amplifier has VSWR protection, excessive amounts of reflected power will reduce the lifespan of the module. Repair any problems prior to installing the module.
5. Check drive level to ensure it is within limits -and 30W or less. Excessive input, even momentary, will damage the input of the module and void the warranty. It is strongly recommended that exciter or input power level be reduced and increased only after the system has come up to temperature.
6. Check airflow for any obstructions. Module requires forced air at less than 45C at 80 CFM (recommended). While the unit will operate at higher temperatures, and has a built- in temperature shut down, excessive operating temperatures will reduce amplifier lifespan. Correct any problems prior to operating amplifier.

Install amplifier and apply power. Check output power, reflected power, input power for proper operation. Allow unit to operate for minimum 15 minutes before increasing power.

Recommended Post-installation Module Tests:

After installation, allow the unit to operate minimum 15 minutes. These simple tests can be performed with a voltmeter and access to the terminal strip. All voltages listed are nominal and are factory set at 98Mhz. Actual values will vary from ideal depending on power level, frequency, temperature, and load VSWR.

1. Using a DVM with good input impedance (minimum 500kΩ), place common lead on the ground terminal, marked ‘GND’ and probe voltages using the positive DVM lead. Be careful when testing module not to short positive lead against the chassis of the module or the ground lead.
2. Start by probing the ‘FWD PWR’ terminal - this is a DC voltage scaled to output power. For 700W output, this lead will be approximately 1.5V, for 500W approximately 1.2V.
3. Probe the ‘REF PWR’ terminal - this is a DC voltage scaled to reflected output power. At 700W into a good 50 ohm load (1.2:1 or better) the voltage on this terminal will be less than 0.2V.
4. Probe the ‘DRV PWR’ terminal - this is a DC voltage scaled to drive power. At 25W input, it will be approximately 0.9V. Please note that because of the gain specification tolerance, this voltage will vary in normal operation between 0,7V and 1.1 V.
5. The FAULT terminal is an open collector output. Change the DVM to ohms mode and probe the FAULT terminal to ground. A high restistance, in excess of 1kohms is no fault. Low resistance, less than 100 ohms, is a fault condition.
6. Check the temperature of the baseplate using a temperature probe, if possible. Measure at the heat sink below the 6 position terminal block. Temperatures in excess of 70°C mean there is a cooling issue.

The protection systems are not designed to protect the module for prolonged periods of time. To prevent damage to the module, repair transmitter or system to remove the fault as soon as possible. In extreme cases, such as elevated temperature, overdrive, or excessive VSWR, resultant damage to the module will not be covered under warranty.

If it becomes necessary to operate the module directly on the air, a low pass filter sufficient to remove harmonic energies must be used.

Troubleshooting Guide

Please perform tests indicated prior to contacting factory for assistance or RMA.

Condition	Action	Remedy
No Output Power	Check +Vsup (50V) - Verify supply voltage of approx 50V is present when measured from "50V" to "GND"	Fix Power Supply if no voltage present.
	Check Fuse - remove and verify using ohm meter.	If blown, replace with same type KLK 030 A or equivalent.
	Check output cable - verify cable is connected and is 50 ohm impedance.	Repair or replace output connection.
	Check drive power - measure at cable end on module. Ensure within limits.	Correct source if not correct.
Amplifier will not make full power	Check reflected power to module. Use external watt meter or measure voltage at 'REV' terminal.	Correct source of high reflected power.
	Check Supply Voltage - measure at '50V' termina. Check for low voltage, or signs of power supply going into current limit.	Correct Power Supply.
	Verify baseplate temperature is under 75°C	Correct Cooling Problem.
	Check drive level is sufficient to drive module to full power - consistent with specifications. Verify exciter power using watt meter or by measuring voltage at 'DRV' terminal.	Correct exciter or pre-amplifier problem.
Amplifier cycles on and off in ~~ 5 minute intervals.	Check baseplate for excessive temperature and check for any blockage or failure of cooling system.	Correct cooling system problem.
	Monitor supply voltage for cycling response.	Correct Power Supply.
Excessive Noise of output of RF Amplifier	Verify output of RF amplifier - if low (in 175W range) verify exciter power and supply voltage and correct, otherwise...	Module requires repair
	Check VSWR of antenna / combiner system (external to amplifier)	Repair or replace
	Check for power supply noise	Repair or replace power supply
For all problems, take the following data	While under power and warmed up, if possible, use a DVM in volts DC mode to measure	FWD, DRV, REV, 50V, all relative to GND
	While under power and warmed up, if possible, use a DVM in ohms mode to measure	FLT (to ground)
	While under power and warmed up, if possible, use an external watt meter to measure	Forward and reflected RF power on the output

Ordering Information:

Order Code	Description	DRFT Reference
PAB700-FM-A0	Pallet Amplifier Name	2032
Options		
-T2	Extended Burn In	0271
-T3	Extended Data Collection	0272

Standard Module Options:
N Female Connectors, Output. Stainless Body, Gold Center pin, 4-hole bolted to module output side. All stainless steel hardware.
BNC Female Connectors, input. Stainless or nickel body.
Enclosure- all aluminum sheet metal enclosure, aluminum extruded heatsink, passivated - alodyned aluminum. Copper baseplate.
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.
Power Connector - a 6 pin terminal block is used for Vsup, Ground, Fault, detected power outputs.
Shipping Container - a UPS® approved cardboard box and high density polystyrene foam bumpers, suitable for air or ground delivery.

Testing Options:
Standard - includes power test and brief burn - in under laboratory conditions. Printed test report includes input power, return loss, gain, supply current at 7 discreet frequencies. Tests for OVP, FWD power, REF power, Stability included. Gain flatness and efficiency also tested.
Extended burn in - 24-hour burn in at 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.

Limited Warranty Statement:
Delta RF Technology, Inc. (Seller) warrants its Silicon Valley Power Amplifier products free from defects in material and workmanship and to meet performance specifications provided that:
A) Sellers Liability under this warranty is limited to repairing or replacing, at its option, any product delivered hereunder not conforming to this warranty.
B) This warranty is limited to a period of one year,
C) Minor deviations from specifications which do not affect performance are excluded from this Warranty, and
D) Seller shall be liable under this warranty only if:
1) It is promptly notified in writing by the Buyer upon discovery of the failure of any product to conform to this warranty,
2) The product is return to the Seller, transportation charges prepaid by the Buyer,
3) The product is received by the Seller not later than ten days after the last day of the warranty period,
4) Product is returned in original packaging, or substitute packaging provided by seller, and
5) Seller examination of the product discloses to Sellers reasonable satisfaction that such defects or failures as may exist have not been caused by misuse, neglect, improper installation, repair, alteration, accident, Acts of God, or shipping.
E) The Buyer will prepay freight to and from Seller on products serviced hereunder at Sellers plant, but Seller may, at its option, elect to perform any repairs at the Buyers place of business.
F) The foregoing constitutes Seller's entire warranty expressed, implied, and/or statutory, except as to title, and states the full extent of Seller's liability to the Buyer or to any other party for any breach of such warranty and for damages, whether direct, special, incidental or consequential: and, other than as expressly provided in this document no warranties, express or implied, including any warranty of merchantability or of fitness for a particular purpose, are made. No employee, representative or agent of the Seller has any authority, expressed or implied, to alter or supplement the terms of this warranty.

Repair Policy:
For amplifiers and / or modules which are out of warranty, a flat rate shall apply to all repairs. Details about pricing may be obtained by contacting Delta RF Technology, Inc. All 700W gold modules manufactured by Silicon Valley Power Amplifier and Delta RF Technology inc, unaltered, are eligible for repair. Typical repair times are 1 - 2 weeks, and priority is given to any customer who is off the air or running at extremely low power. An RMA number is required and may be obtained by contact Delta RF Technology, or completing forms on the website: http://www.drft.com. Repaired modules are covered by a separate 90 day limited warranty. Module serial numbers less than 3000, or modules with mechanical damage are subject to additional fees.