4812 SCA10000-1.5-30-A0

Part Number — Amplifier Name

Revision 0.c Release Date Dec 29 2007
Revision Notes Updated AC Power Supply Configuration, Mechanical, Clarified Specifications

Technical Specifications Summary

Frequency Range:	1.5 - 30 MHz	Gain:	Variable (Radio Drive)
P1dB:	10000 Watts CW	Efficiency:	25% (system)
Class:	AB	Temperature Range:	-20 to 55°C
Supply Voltage:	400V AC / 3 Phase	Max VSWR:	5:1

Amplifier General Description

This 10kW broadband HF solid state amplifier offers modular simplicity and excellent performance. Based on our P300-2-30-18 MOSFET Pallet amplifier, in production for over 10 years, and our PAB control system, this amplifier offers ruggedness and reliability.

Integrated into this amplifier are high efficiency switching power supplies in an n+2 configuration. Twenty-four hot swappable power supplies have 8% headroom, and two additional online spare ensures uninterrupted high power operation. Up to two individual power supplies can fail before the system's maximum power is affected (CW mode). Our PAB series controller will keep the system operational in the event of power supply or amplifier failure at highest possible power levels.

The system design features 19kW of silicon to achieve 10kW output power - the end result is an extremely robust amplifier capable of driving poor loads safely. In-phase isolated combiners at the amplifier and system level allow operation even if individual pallet amplifiers are damaged. Our driver chain uses full class A linear amplifiers, and output stages offer Class AB linear amplifiers for an ideal balance between efficiency and linearity. This system is suitable for use in AM and FM communications modes, and a customer radio / exciter can be integrated into the system.

The PAB controller monitors all individual amplifiers, combiners, input power, output power, reflected power, temperatures and reports status on front panel and to the primary controller. The Primary Controller monitors all of the amplifier blocks as well as the power supplies, and reports status on all components on an easy to use 7" touch panel interface.

Amplifier Picture

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RF Specifications

Parameter	Min	Typ	Max	Units	Notes
Frequency	1.5		30	MHz	
P1dB	10000			W, CW	
Psat		12500		W,CW	Software limited to 11000W
Load VSWR			2:1		For full rated power delivered
Load VSWR			3:1		Power gracefully reduced from approx 2:1
Maximum VSWR			5:1		Amplifier is disabled above this VSWR
IMD3			-30	dBc	For 2 tones, 1kHz spacing, 10kW PEP
Power Input		25		dBm	Radio dependent, up to 100W CW
Gain		45		dB	Set to match radio capabilities
Gain Variation		±1.5		dB	ALC off
Vsupply		48		V, DC	For internal RF Modules, Fans
Drain Current			770	A, DC	10000W O/P 1:1 VSWR
Power Consumption			30	kVA	AM, SSB
Efficiency		45		%	Module - DC, 10000W O/P
Input VSWR			1.5:1		
Insertion Phase Variation		±5		°	Unit to unit
Spurious			-60	dBc	* Contribution from amplifier
Harmonic Distortion			-60	dBc	After LPF

All specifications valid for 50 Ω load

Environmental, Mechanical, Interface

Parameter	Min	Typ	Max	Units	Notes
Form Factor	19” IEC Rackmount Cabinet 40U Height 2 Cabinets - 73” H 44” Wide, 32” Depth				
Weight		1920		lbs	
Operating Temperature	-20		55	°C	
Storage Temperature	-30		85	°C	
Altitude	0		10000	Ft ASL	Derate Max Operating Temperature to 40°C linearly from 8000 Ft to Max
Relative Humidity	5		95	%	Non condensing
Shock	Designed to meet MIL-883-C Method 516.2 Proc 2				
Vibration	Normal Truck Transport				
Control Connector	RJ-45 10B-t Ethernet				Control, Communications, Status
Mains AC Connector	Hard wire				
RF Input Connector	N-Female				If no radio installed
RF Output Connector	7/8 EIA-Flange				Top mounted

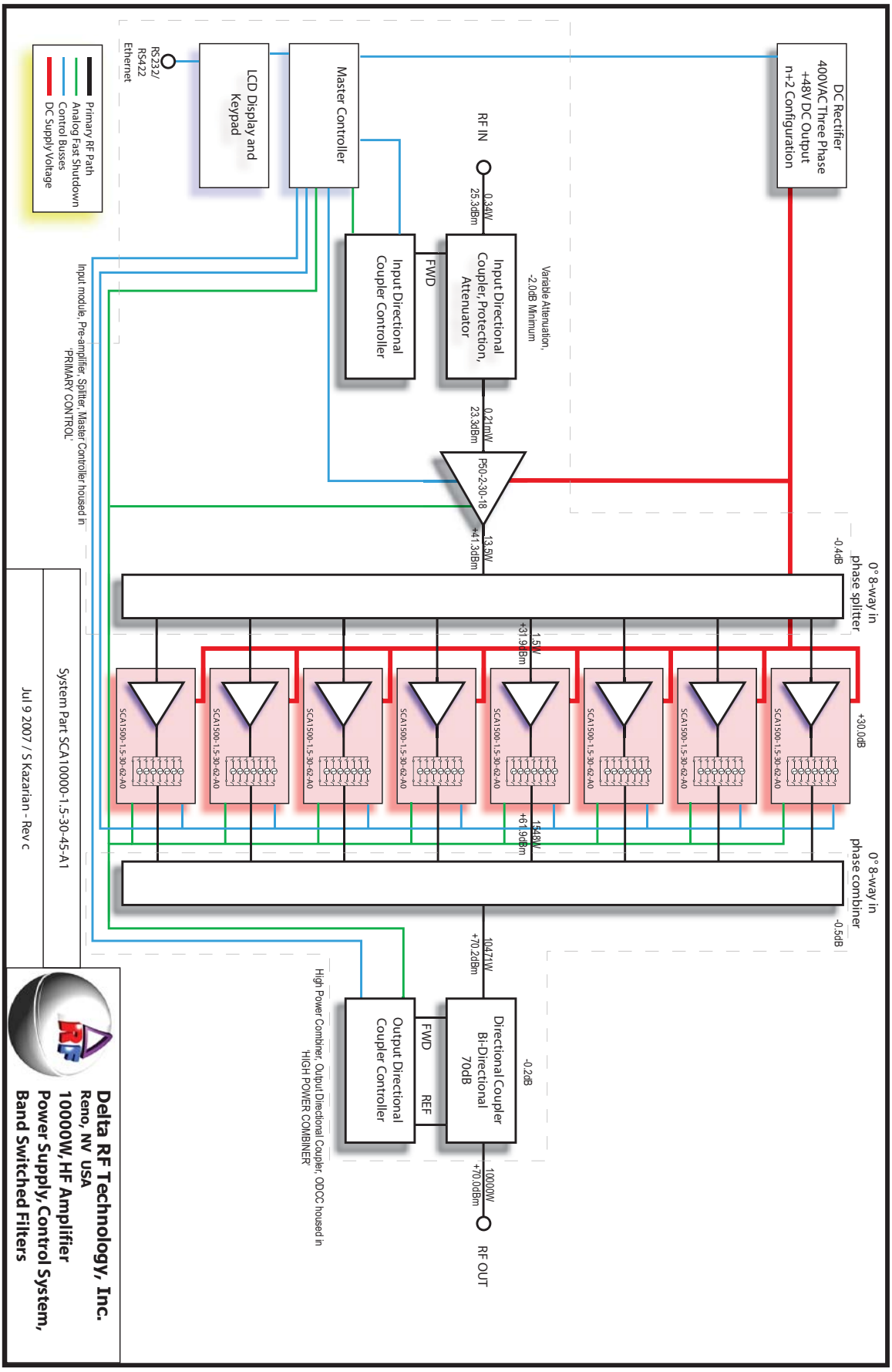
Absolute Maximum Ratings

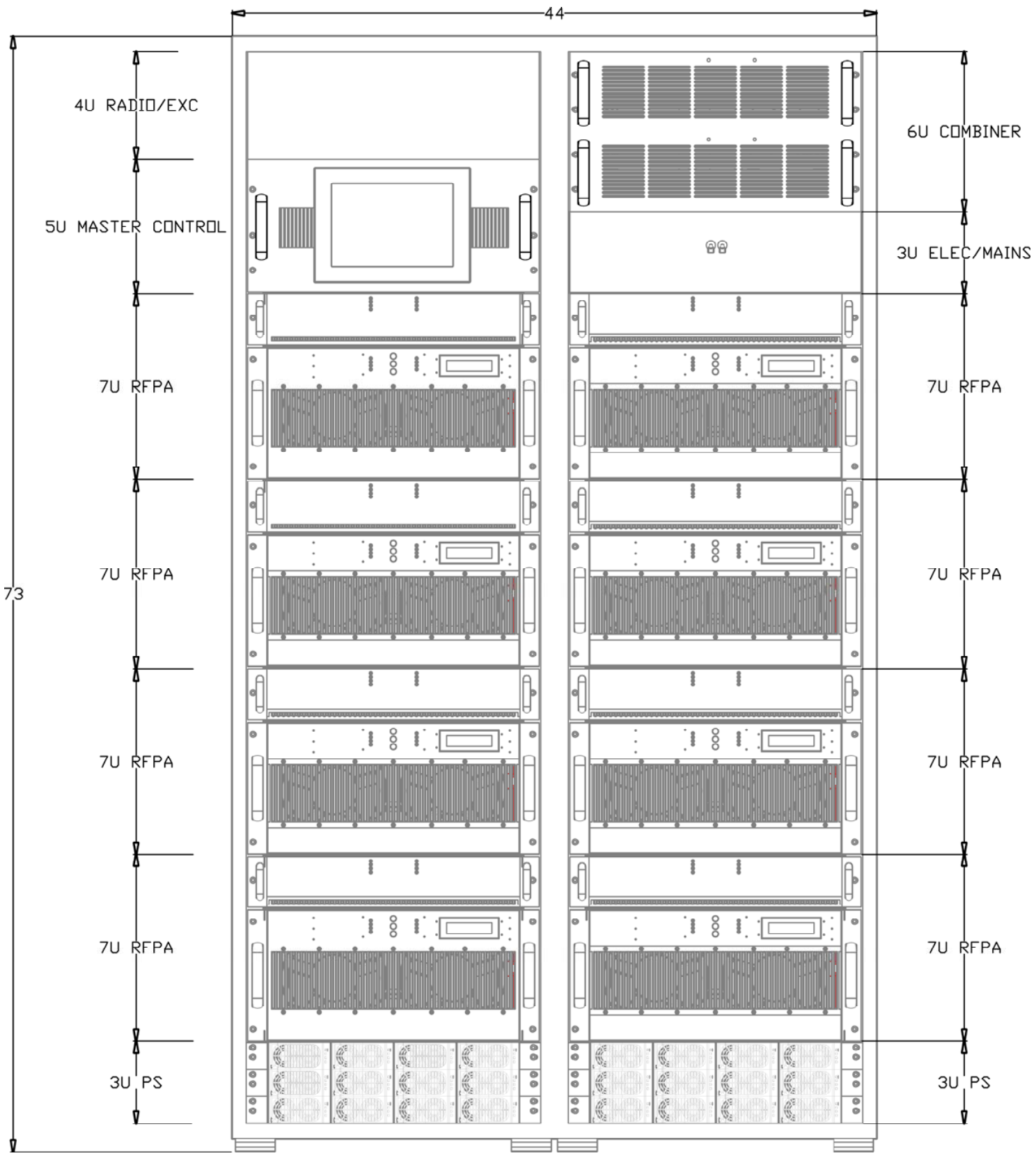
Parameter	Value	Units	Notes
Operating Voltages	340 - 420	V AC	Three Phase, 47 - 63 Hz
Maximum Power Consumption	44000	VA	
Maximum Current	70	A AC	Per leg
Maximum Input Power	30	dBm	For normal operation at max power
Maximum Input Power	40	dBm	No amplifier damage
Load mismatch survival	∞ : 1		

ALC & Detector Information

Parameter	Min	Typ	Max	Units	Notes
Detector Type		Logarithmic Amplifier, RMS			
ALC Modes		Constant Gain (ALC Disabled) Constant Power			
Input Attenuator Range		0 - 10dB, continuous			Can be programmed for discrete power levels
Forward Power Accuracy		±250	±500	Watts	10000W, 50Ω
Reflected Power Accuracy		±125	±250	Watts	1000W, 50Ω
Input Power Accuracy		±2.0		dB	
Forward Power Trip - Hardware	11000		11500	Watts	50Ω
Reflected Power Trip - Hardware	2000		2500	Watts	Referenced to 50Ω
Forward Power Trip - Software		10500		Watts	50Ω
Reflected Power Trip - Software		1500		Watts	Referenced to 50Ω
Voltage - Driver, PA, PS		2	5	%	
Current - Driver, PA, PS		2	5	%	

- Standard Communications 10-Base T Ethernet, Telnet interface. Windows based program optional.
- Optional RS-422, RS-232 Serial and / or Parallel interface
- Output Connector 7/8-EIA Flange
- Input Connector N-Female if no radio installed
- Interface Connector, RJ-45
- BITE Functions include Current, Voltage, Temperature, VSWR, Input Power, Output Power, Power Supply
- 14 Pin Serial / Parallel interface Bus - For integration with exciter / radio
- All interconnect RF and IO cables included
- Airflow from front of PA / PSU units and exhausts through the top of the rack
- AC Inputs are direct wire connections


DC Rectifier
400VAC Three Phase
+48V DC Output
n+2 Configuration
Master Controller
LCD Display and Keypad
RS232/
RS422
Ethernet
Primary RF Path
Analog Fast Shutdown
Control Busses
DC Supply Voltage
RF IN
0.34W
25.3dBm
Input Directional Coupler, Protection, Attenuator
Variable Attenuation,
-2.0dB Minimum
Input Directional Coupler Controller
FWD
0.21mW
23.3dBm
P50-2-30-18
13.5W
+41.3dBm
-0.4dB
0° 8-way in
phase splitter
1.5W
+31.9dBm
SCA1500-1.5-30-62-A0
+30.0dB
144W
+61.9dBm
0° 8-way in
phase combiner
-0.5dB
104.71W
+70.2dBm
Directional Coupler
Bi-Directional
70dB
-0.2dB
FWD
REF
Output Directional Coupler Controller
10000W
+70.0dBm
RF OUT
Input module, Pre-amplifier, Splitter, Master Controller housed in
'PRIMARY CONTROL'
High Power Combiner, Output Directional Coupler, ODCC housed in
'HIGH POWER COMBINER'
System Part SCA10000-1.5-30-45-A1
Jul 9 2007 / S Kazarian - Rev c
Delta RF Technology, Inc.
Reno, NV USA
10000W, HF Amplifier
Power Supply, Control System,
Band Switched Filters


44
73
4U RADIO/EXC
5U MASTER CONTROL
7U RFPA
7U RFPA
7U RFPA
7U RFPA
3U PS
6U COMBINER
3U ELEC/MAINS
7U RFPA
7U RFPA
7U RFPA
7U RFPA
3U PS

Front Panel Displays:

* Forward Power (watts)
* Reflected Power (watts)
* Input Power (watts)
* Up-time (d h m)
* Event Log
* PA voltages, Driver Voltage, PA Currents, Driver Current, PA Temperatures, Driver Temperature
* Chassis Temperature
* Module Serial Numbers

Error Trapping:
* Output Power too high (power reduced 3dB, second trip disabled)
* Reflected Power too high (2:1, power reduced 3dB, second trip disabled)
* Input Power too high (disabled)
* PS Failure (Over voltage, PS Failure, PS Fan Failure)
* Fan Failure (reduce output power 3dB, if temp continues to rise, power off)
* Overtemperature (reduce output power 3dB, if temp continues to rise, power off)
* Too many password attempts (can only be re-enabled through front panel)

Other front panel functions:
* Enter password for operation
* Disable / Enable remote control
* Amplifier On / Off
* Calibrate Directional Couplers
* Change Password - Remote and Front Panel
* Set system time and date

Remote Control Functions: (9600/8/N/1)
* ON - Enables Amplifier
* OFF - Disables Amplifier, and resets error condition
* STATUS - Displays complete amplifier and module status, including power levels, voltages, currents, temperatures
* LOG - lists last log entry
* LOG xx - lists xx log entries - up to 1000

Please note - this is an abbreviated list, please refer to complete PAB series SCD which covers all possible functions.

Ordering Information:

Order Code	Description	DRFT Reference
SCA10000-1.5-30-A0	Self Contained HF Amplifier, 10kW, 1.5 - 30 MHz	4812
Options		
-A14	Ruggedized for vibration and harsh environment	0204
-T2	Extended Burn In	0271
-T3	Extended Data Collection	0272

Standard Options:

Ruggedized - 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.

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 critera. 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.