

P R B X

POWERBOX Defense Line 1200
DBA Series
1200W
AC/DC Conduction Cooled
Manual

Table of Contents

1. Introduction	P1
2. Features	P1
3. Block diagram	P2
4. Options description	P3
5. Input	P3
6. Output	P4
7. Auxiliary functions	P5
8. Electromagnetic	P6
9. Mechanical	P8
10. Connector pin allocation	P11
11. Safety and installation	P12
12. Options and configuration	P13

1. Introduction

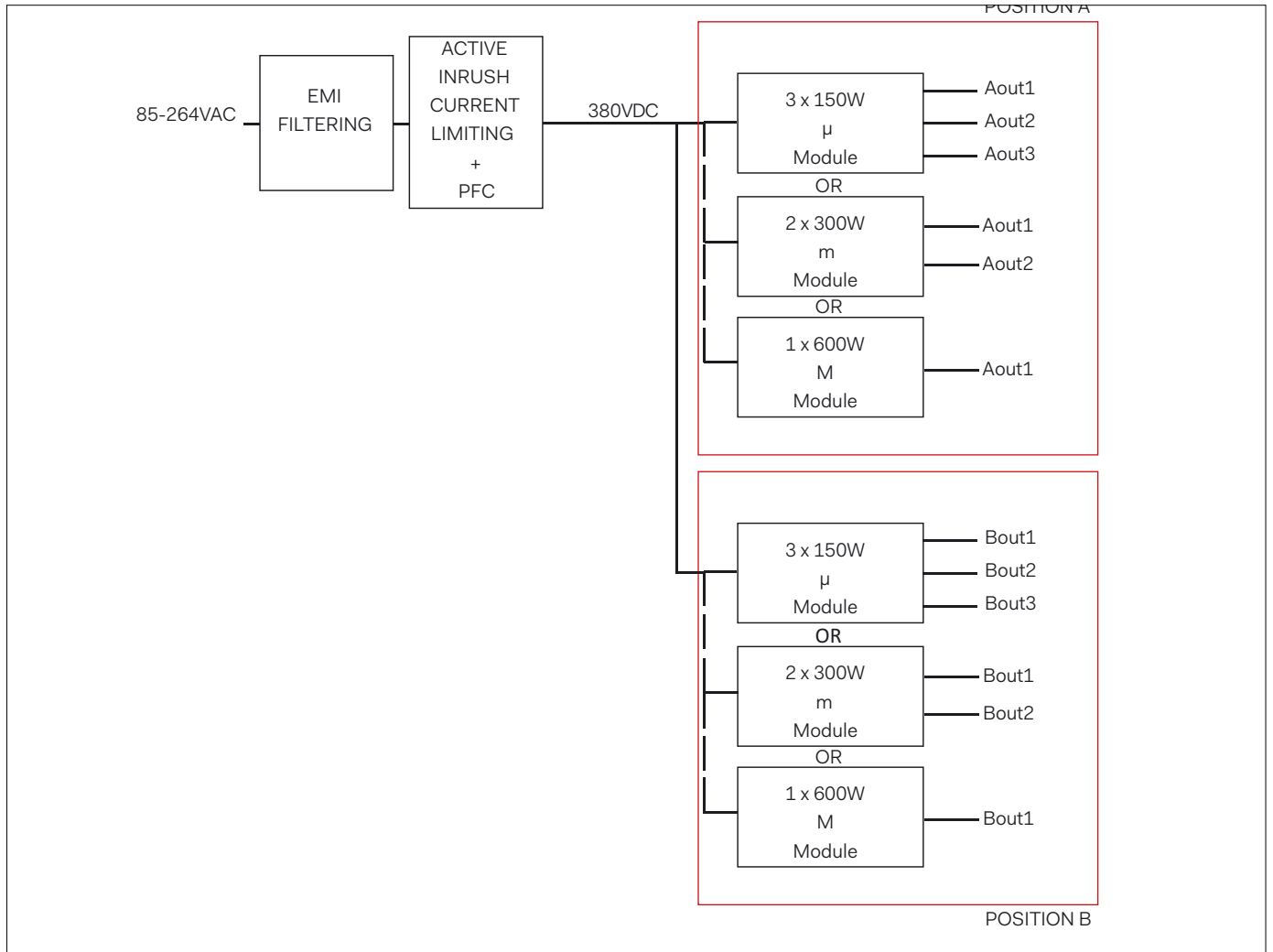
The DBA series, very compact and low profile AC/DC power supply up to 1200W in chassis format, incorporates input filtering, input and output protections, very robust mechanical mounting and connection, conformal coating and MIL-STD options required in most of the severe environment for industrial, defense applications. The psu provides high reliability, high efficiency, input-to-output isolation, soft start and active very low inrush circuit, overtemperature protection, input over/undervoltage lockout. The psu is configurable with 1 to 6 outputs in many output voltages from 2V to 54VDC, other outputs are even possible as semi-standard versions. They are continuously short-circuit proof. The 100°C baseplate allows operation in high temperature environment.



2. Features

85-264VAC or 120-350VDC input voltage ranges
1-6 isolated outputs up to 1200W
255 x 127 x 40mm very low profile
Power Factor Correction EN61000-3-2
Active very low inrush limitation
Surge and transient protection
Many output configurations available
Conduction cooled 100°C baseplate. No derating
Safety IEC/EN 60950-1, RoHS lead-free-solder compliant

3. Block Diagram



4. Options Description

MIL-STD ruggedized (-M)

Meet MIL-STD 461E CE102, MIL-STD 1399-300A, MIL-STD810F shock & vibrations. No laboratory certification.

-40°C operation (-T)

The thermal grade of the DC/DC converters used and other components are changed to comply with low ambient temperature.

Conformal coating (-V)

During manufacturing process, when V option is specified, components and pcb are covered with an acrylic coating to address high level of ambient humidity application.

Heatsink (-H, -H1)

-H: a 15 mm heatsink is mounted on the baseplate with longitudinal fins.
 -H1: a 15 mm heatsink is mounted on the baseplate with transversal fins.

Thermal impedance of -H and -H1 heat sinks are 1,1°C/W in free air convection and 0,35°C/W in 2 m/s air flow.

5. Input

Operating input voltage
 85-264VAC. 120-350VDC.

Frequency
 44Hz min, 50Hz typ, 440Hz max.

Power factor
 0.96 typ, 230VAC, 50Hz, Pnom.

Input current
 16A at Vin min.

No-load input power
 15W at Vin typ.

Peak inrush current
 4A Vin max.

Start-up time
 3s typ.

Input fuse

A fuse mounted inside the psu protects against damages in case of a failure. The fuse is not user-accessible without opening the unit. In DC mode, reverse polarity at the input is protected and will not cause the fuse to blow.

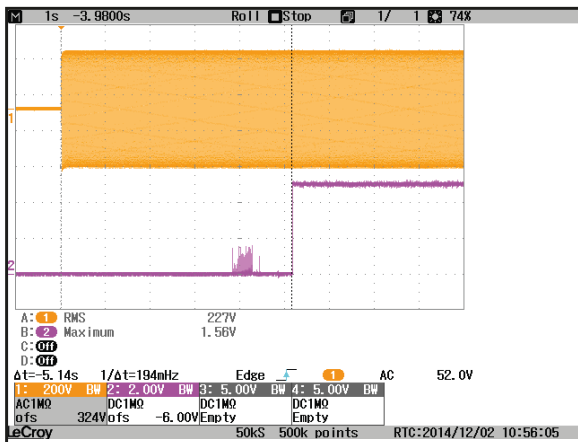
Fuse type

Littlefuse, 15A, 0218015.MXP.

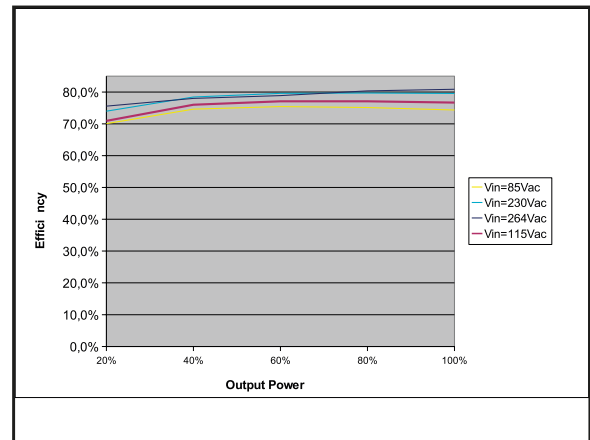
Transient protection

A VDR (Voltage Dependent Resistor) and a common mode input filter form an effective protection against input transients in severe environments.

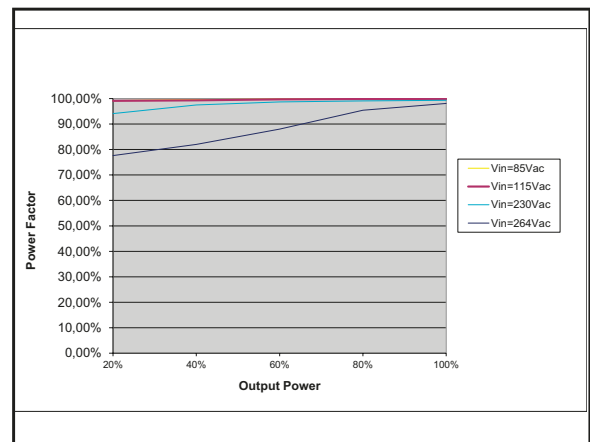
Establishment time curve at 23VAC - DBA-5300-48150-550-3V375



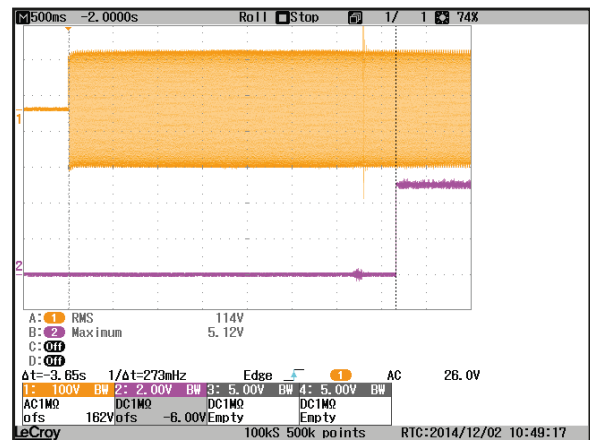
Efficiency curve - DBA-5300-48150-550-3V375



Power factor curve - DBA-5300-48150-550-3V375



Establishment time curve at 115VAC - DBA-5300-48150-550-3V375



Parallel operation

Parallel operation is possible in the same unit or between different units for m-boards, M-boards and 2M-boards with active current sharing through the PR signal. The outputs put in parallel MUST be exactly the same, all OUT+ connected together and all OUT- connected together when PR are linked (risk of damage otherwise).

Redundant operation

When systems require a very high level of reliability and should work normally in the event of a failure, N+1 redundancy is implemented where N is the number of converter to support power requirement. If one converter fails, the remaining ones still delivers the power to the loads. Redundant operation requires external oring diodes.

Hold-up time

The psu provides internal hold-up time.

Output current limitation

All outputs are continuously protected against short-circuit by a constant current limitation (no foldback) with automatic recovery. See page 3 for the value.

Thermal considerations

When a converter is mounted in conduction cooled, the temperature measured on the baseplate should not exceed 100°C. When heatsink option is used in convection cooling and is operating at its nominal output power at the max. ambient temperature, the temperature measured on the heatsink should not exceed 100°C.

Thermal protection

A temperature protection (OTP) is integrated in each output module, disabling output when baseplate temperature exceeds 105°C (±5°C). The converter automatically restarts, when the temperature drops below 70°C. Nevertheless, exceeding the max operating temperature may cause failures of the converter.

Overvoltage protection

An OVP is incorporated on each output. All outputs are cut if an OVP is detected. This protection is latch style (Recovery after AC reset or inhibit)

6. Output

Electrical Output Data		3V3			5V			12V			15V			24V			28V			48V			Unit	
Characteristics	Conditions	min	typ	max	min	typ	max	min	typ	max	min	typ	max	min	typ	max	min	typ	max	min	typ	max	Unit	
Output voltage		3V3			5			12			15			24			28			48			V	
Trim range	Factory set	3			3.6	4.5	5.5	10.8	13.2	13.5	16.5	21.6	26.2	25.2	30.8	43.2	51.8				V			
Overvoltage protection		4.5			6.5			14.9			18.5			29.1			34			58			V	
Output noise	20Mhz	75			75			1200			100			100			100			150			mVpp	
Efficiency		75			83			85			84			83			84						%	
Load regulation	Vin nom	1			1			0.5			0.5			0.4			0.4			0.4			%	
2M board		Each board include 2 identical M modules in parallel for high power configuration																						
Output current		0	160	0	160	0	100	0	80	0	50	0	43	0	25				A					
Max power		528			800			1200			1200			1200			1200			W				
Output power limit		184	208	184	208	115	135	92	112	58	78	48	58	28	34				A					
M board		Each board includes 1 M module below																						
Output current		0	80	0	80	0	50	0	40	0	25	0	21.5	0	12.5				A					
Max power		264			400			600			600			600			600			W				
Output current limit		92	104	92	108	57.5	67.5	46	56	29	39	24	29	14	17				A					
m board		Each board includes up to 2 m modules below																						
Output current		0	45	0	40	0	25	0	20	0	12.5	0	10.7	0	6.25				A					
Max power		150			200			300			300			300			300			W				
Output current limit		54	64	46	52	29	35	23	26	14.5	17	12.5	14.5	7.2	8.2				A					
µ board		Each board includes up to 3 µ modules below																						
Output current		0	22.7	0	20	0	12.5	0	10	0	6.25	0	5.3	0	3.1				A					
Max power		75			100			150			150			150			150			W				
Output current limit		25	31	23	26	14.5	17	11	14	7.2	8.2	6.2	7	3.6	4.4				A					

See "options and configurations" section for all the power possibilities.

7. Auxiliary Functions

Remot on/off

An isolated INHIB signal disables corresponding output voltage when connected to RTN. - outputs inhibited : INH level LOW.

Overvoltage adjustment

Output can be adjusted 90-110%Vnom. with the potentiometer at the output side or by an external voltage 0,6 to 1,25V max. referred to RTN.

Remote sense

This feature enables compensation of voltage drop across the connector contacts and the load lines. Remote Sense, max 0,5V per line compensation (If local sense, connect locally S+ to OUT+ and S- to OUT- of the corresponding output). Senses are not included on μ -board.

Output type	Total drop	Positive line drop
V1, V2	<0.5V	<0.25V

Power good & LED

Collector isolated optocoupled signal referred to RTN, closed when all outputs voltages are OK. Led is also available for each output.

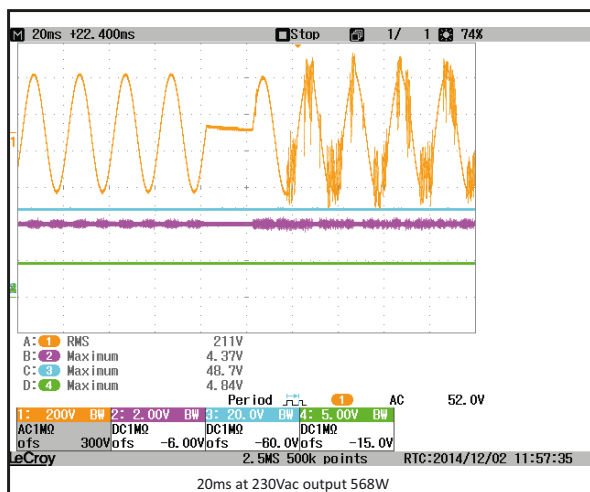
Auxiliary bias voltage

Auxiliary supply limited to 200mA. Referred to RTN.

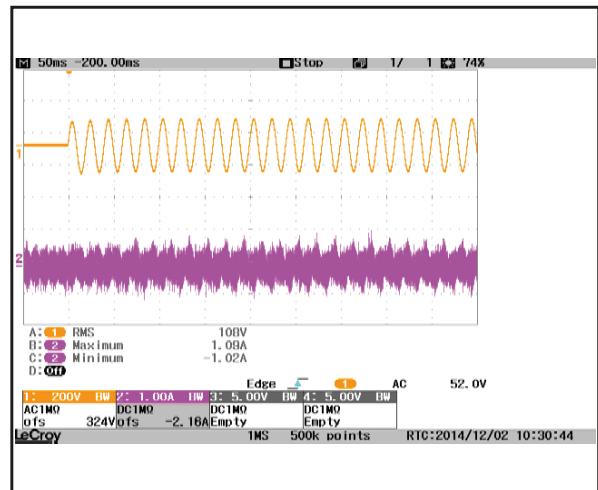
Paralleling signal

Parallel only identical outputs (voltage and power). Outputs in parallel will current share when their corresponding PR are connected together. When outputs are coming from different boards, RTN have to be connected together.

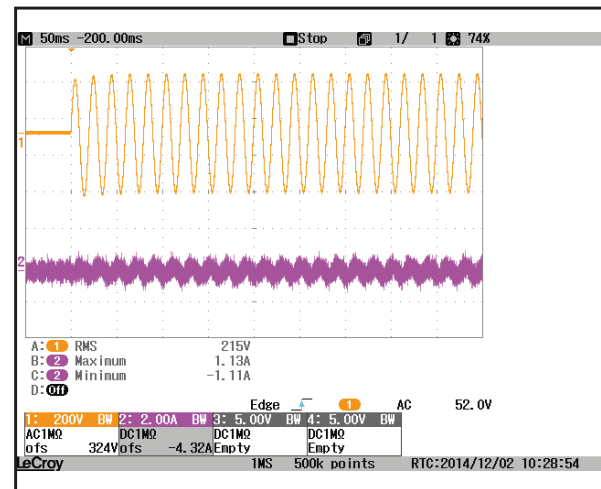
Input power break - DBA-5300-48150-550-3V375



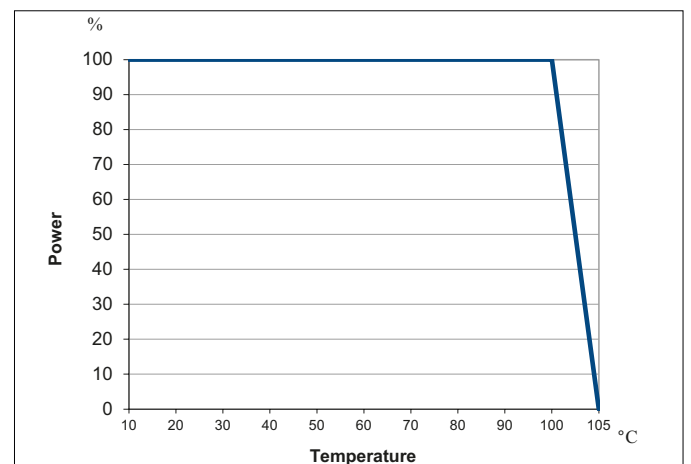
Inrush current at 115VAC - DBA-5300-48150-550-3V375



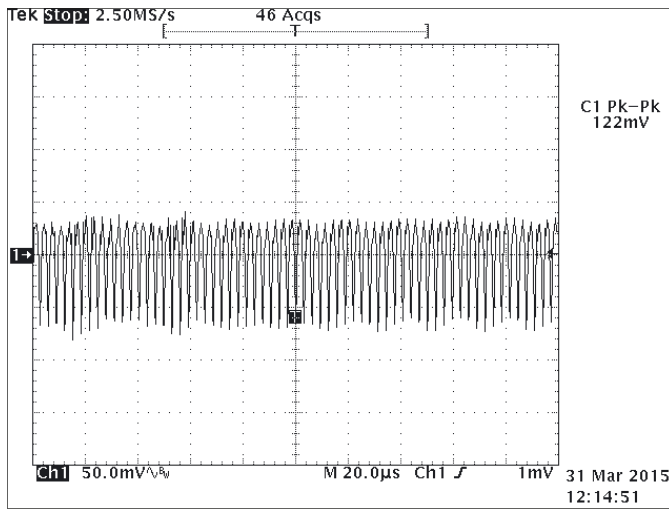
Inrush current at 230VAC - DBA-5300-48150-550-3V375



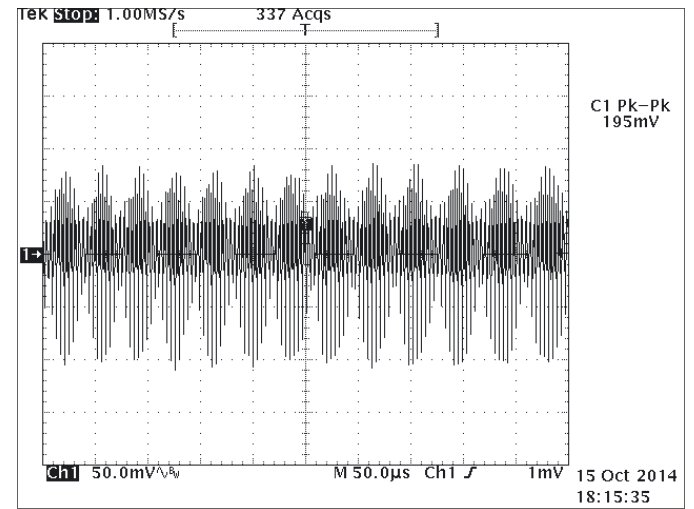
Derating



Waveforms Output noise - DBA-5300-48150-550-3V375



Waveforms Output noise - DBA-48600-48600-M

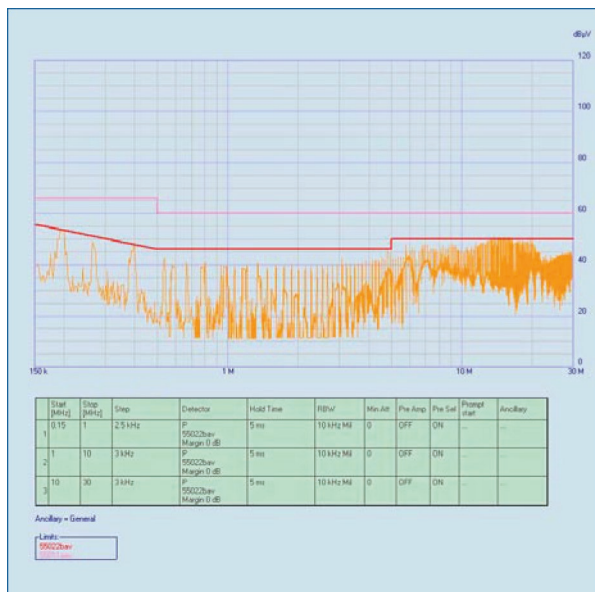


8. Electromagnetic

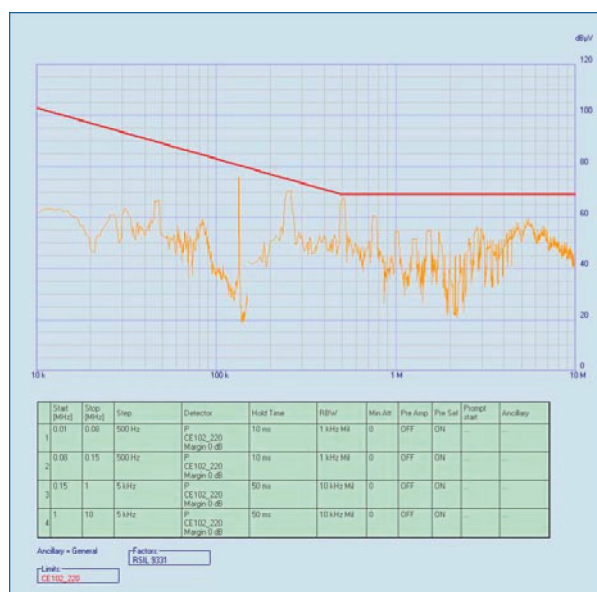
Immunity		Standard	Level	Value	Waveform	Source impeded.	Test procedure	Mode	Criteria	
Surges	Built to meet	EN61000-4-5	DM	3	1kV	1,2/50µs	12 ohms	OP	B	
			CM			2IV	1,2/50µs	12 ohms	OP	A
Electrostatic discharge	Built to meet	EN61000-4-2		4	8000V	1/50µs	330 ohms	10 pos, 10 neg	OP	B
Fast transients/burst	Built to meet	EN61000-4-4		4	4000V	5/50µs	50 ohms		OP	B

Emissions

According to EN55022A/B for DBA-48600-48600 at 115VAC IN/800W

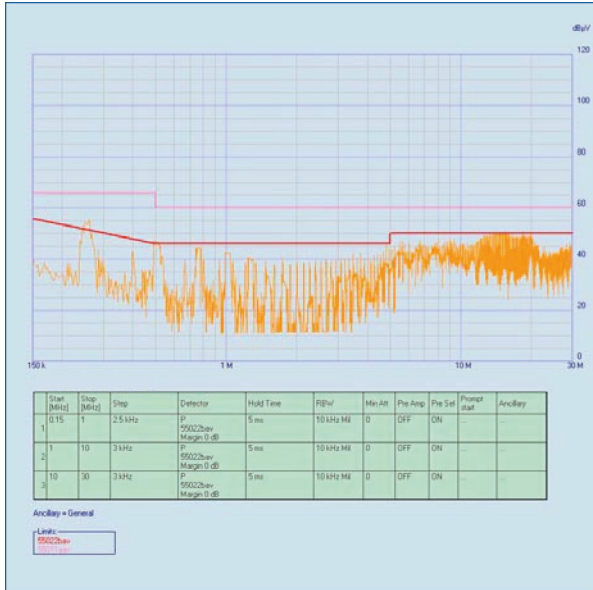


According to MIL-STD461E CE102 DBA-48600-48600-M at 230VAC IN/800W



POWERBOX Defense Line 1200
 DBA Series
 1200W
 AC/DC Conduction Cooled
 Manual

According to EN55022A/B for DBA-48600-48600
 at 230VAC IN/1200W



Immunity to Environmental Conditions

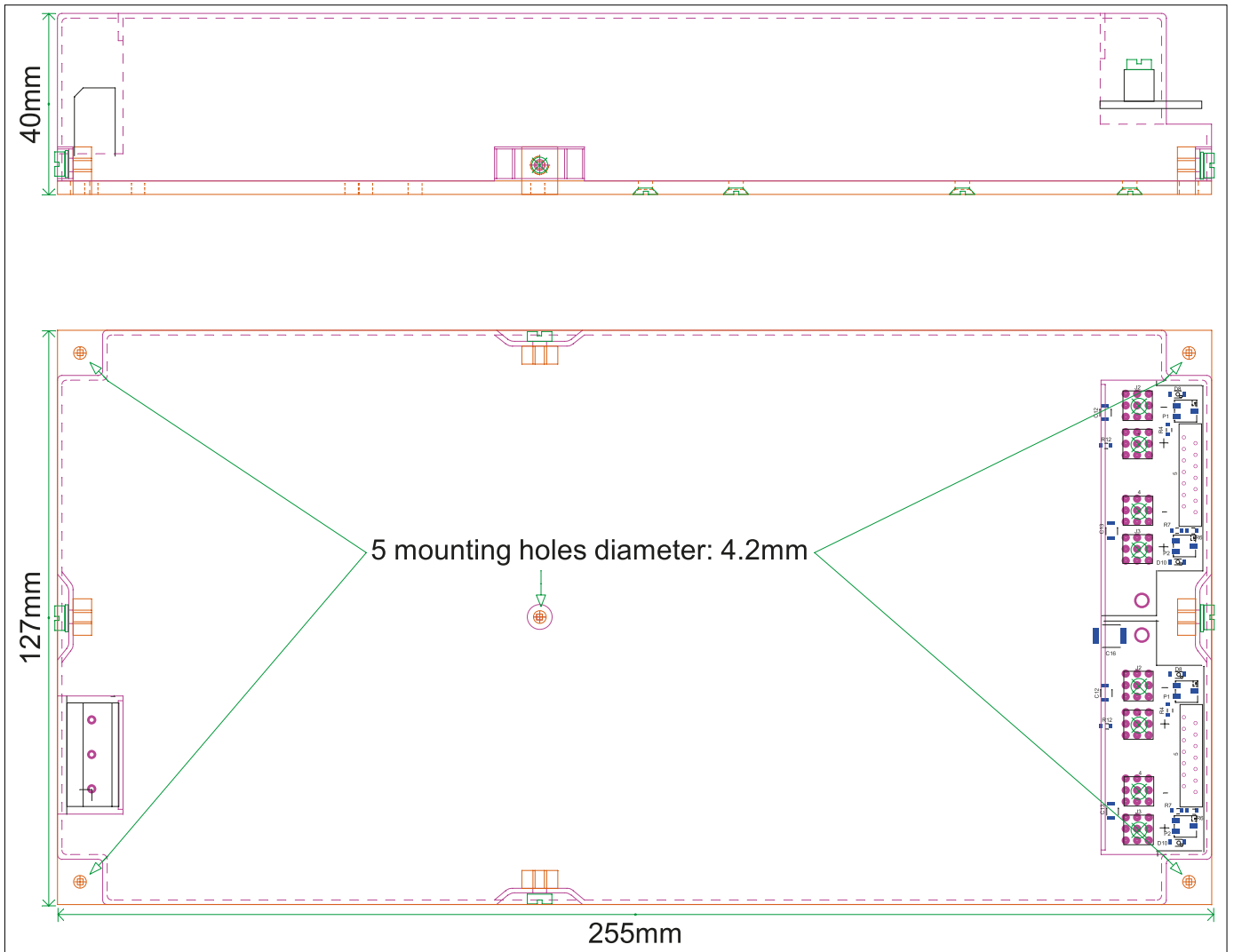
Test Method	Standard	Test Conditions	Status
Damp heat	MIL STD 810F Proc. 507-2	Humidity 93%, 40°C, 56 days	Option (-V), built to meet
Shock	MIL STD 810F Proc. 516.3	20g/18ms half size, 5g/30ms	Option (-M), built to meet
Vibrations	MIL STD 810F Proc. 514-5	4-80Hz (2,8m/s ²)/2Hz, non operating 160-500Hz, (0,175m/s ²) ² /Hz, non operating	Option (-M), built to meet

9. Mechanical

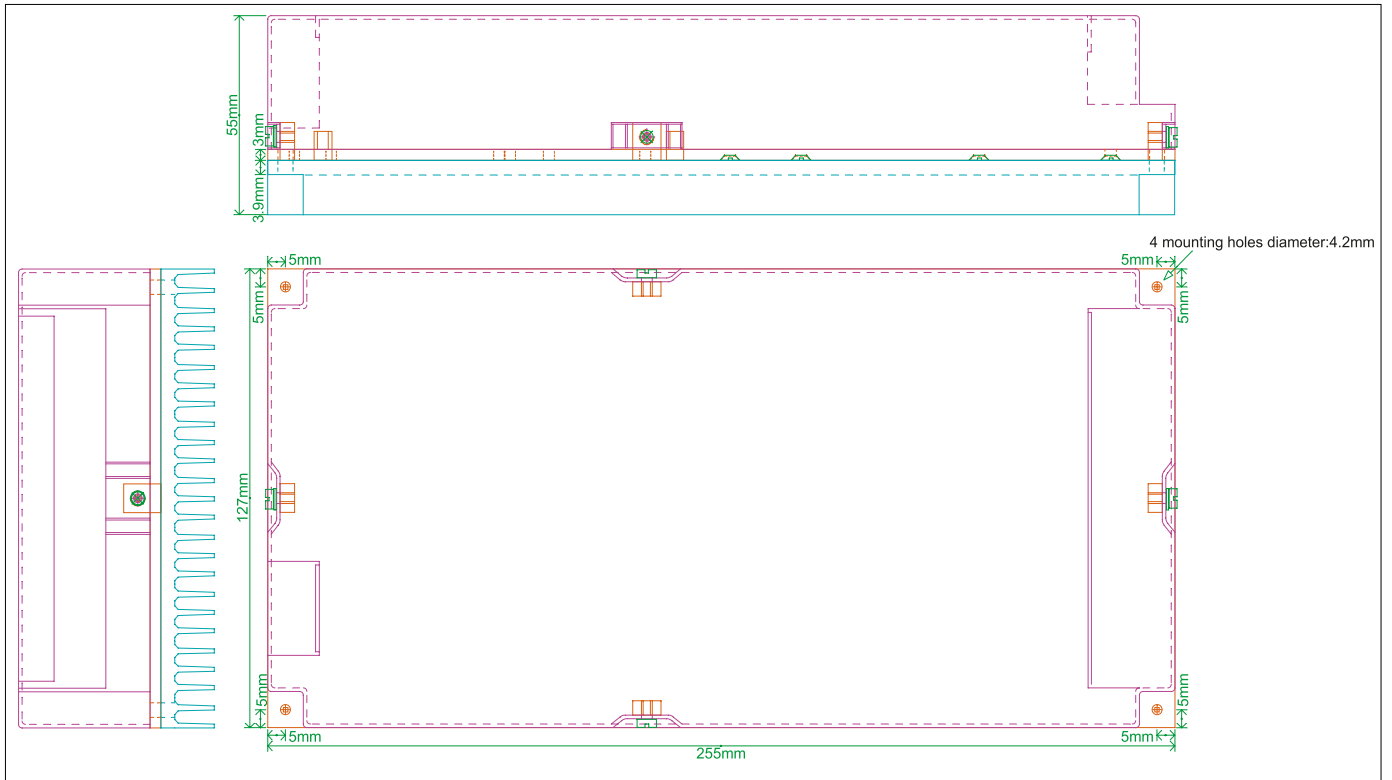
Size: 255 x 127 x 40 mm.

Aluminum Natural.

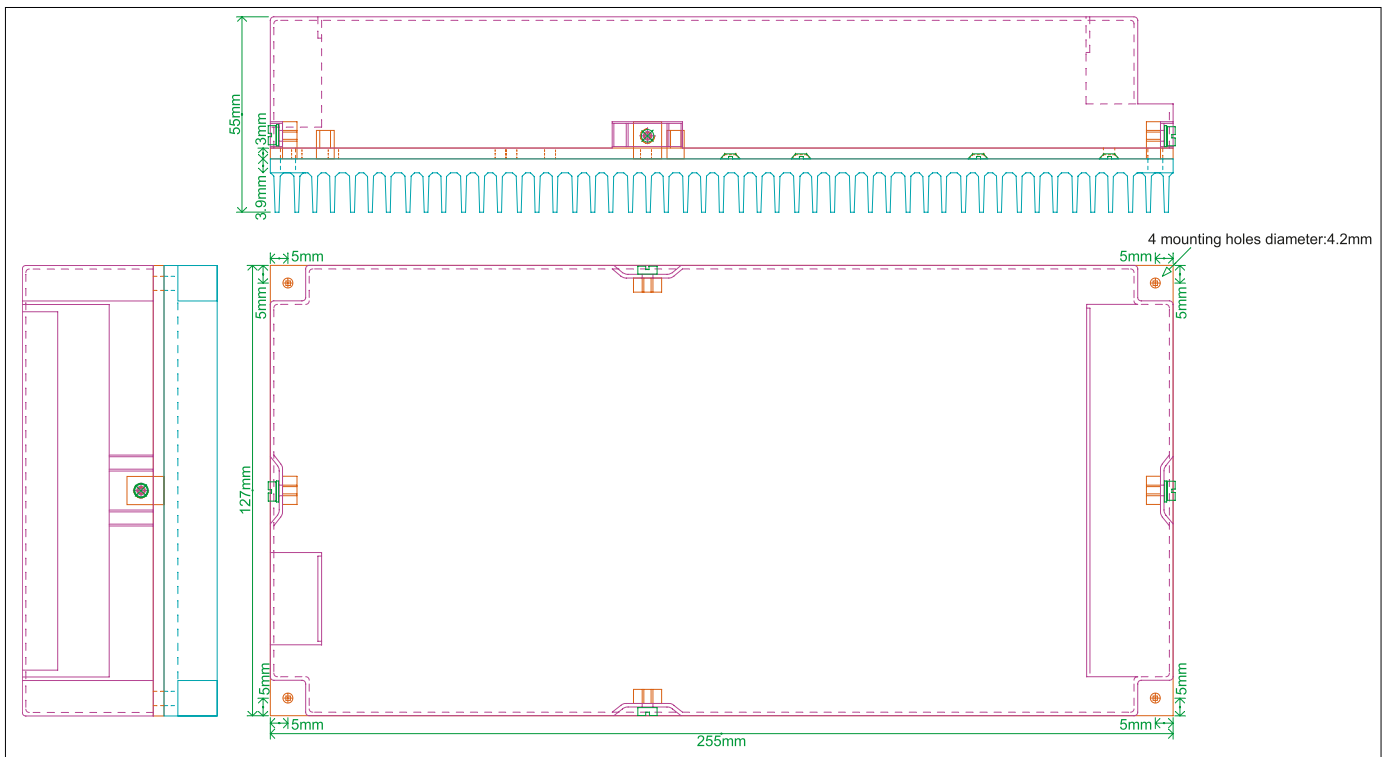
Weight: 1500g without heatsink.



H option

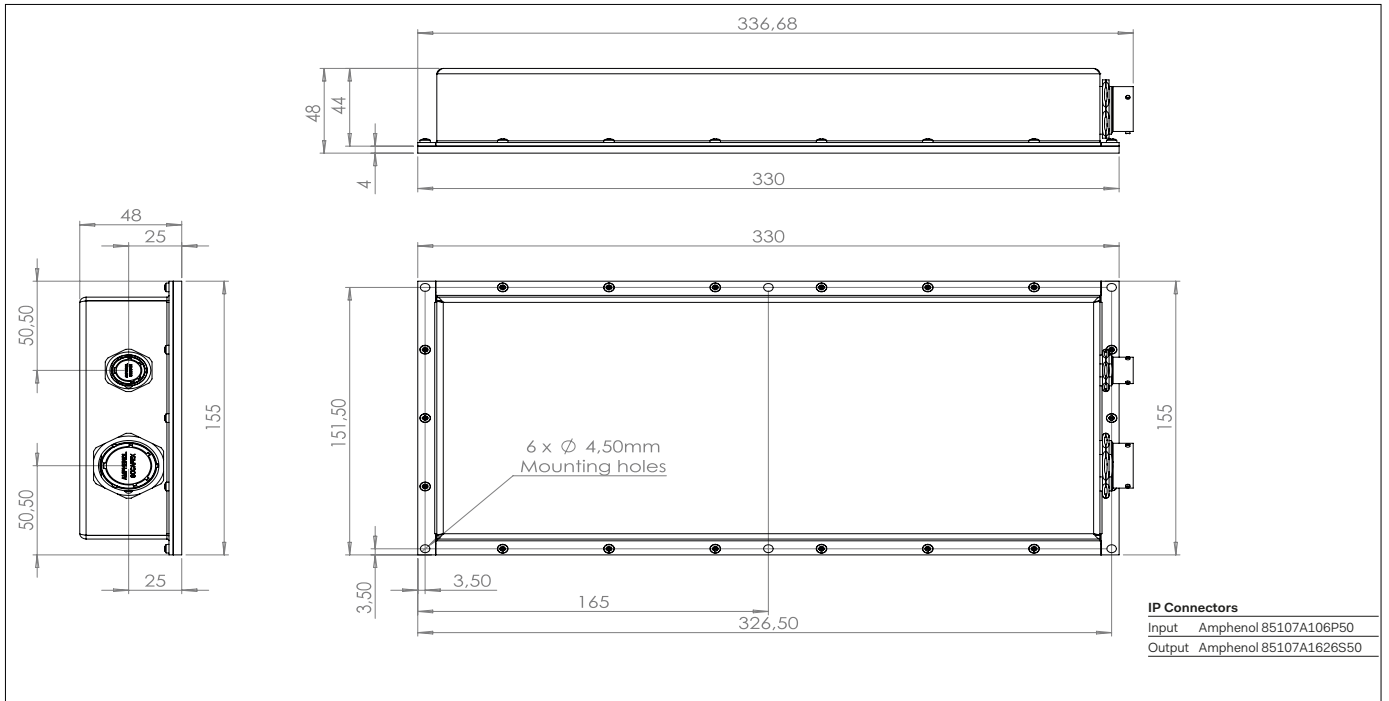


H1 option




POWERBOX Defense Line 1200
DBA Series
1200W
AC/DC Conduction Cooled
Manual

IP option

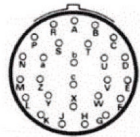


10. Connector Pin Allocation (-IP Version)

Input			
Connection	Type	Pin	Description
J1 Input		A	NC
		B	AC / L
		C	AC / L
		D	Earth
		E	AC / N
		F	AC / N

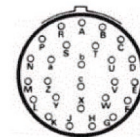
AMPHENOL Male 451 07A 106P50

Output Dual Maxi Board (1 output 90A max)		
J2 Output	Pin	Description
	A	Output +
	B	Output +
	C	Output +
	D	Output +
	E	Output +
	F	Output +
	G	Output +
	H	Output +
	J	Output +
	K	Output +
	L	Output +
	M	Output +
	N	Output -
	P	Output -
	R	Output -
	S	Output -
	T	Output -
	U	Output -
	V	Output -
	W	Output -
	X	Output -
	Y	Output -
	Z	Output -
	a	Output -
	b	INHIB
	c	RTN



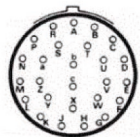
SOURIAU Female
85107A1626S50A7

Output 2* Maxi Board (2 outputs 45A max)		
J2 Output	Pin	Description
	A	Output1 A +
	B	Output1 A +
	C	Output1 A +
	D	Output1 A +
	E	Output1 A +
	F	Output1 A +
	G	Output2 B +
	H	Output2 B +
	J	Output2 B +
	K	Output2 B +
	L	Output2 B +
	M	Output2 B +
	N	Output1 A -
	P	Output1 A -
	R	Output1 A -
	S	Output1 A -
	T	Output1 A -
	U	Output1 A -
	V	Output2 B -
	W	Output2 B -
	X	Output2 B -
	Y	Output2 B -
	Z	Output2 B -
	a	Output2 B -
	b	INHIB
	c	RTN



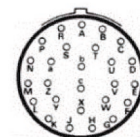
SOURIAU Female
85107A1626S50A7

Output 2* Mini Board (4 outputs 22.5A max)		
J2 Output	Pin	Description
	A	Output1 A +
	B	Output1 A +
	C	Output1 A +
	D	Output2 A +
	E	Output2 A +
	F	Output2 A +
	G	Output1 B +
	H	Output1 B +
	J	Output1 B +
	K	Output2 B +
	L	Output2 B +
	M	Output2 B +
	N	Output1 A -
	P	Output1 A -
	R	Output1 A -
	S	Output2 A -
	T	Output2 A -
	U	Output2 A -
	V	Output1 B -
	W	Output1 B -
	X	Output1 B -
	Y	Output2 B -
	Z	Output2 B -
	a	Output2 B -
	b	INHIB
	c	RTN



SOURIAU Female
85107A1626S50A7

Output 2* Micro Board (6 outputs 15A max)		
J2 Output	Pin	Description
	A	Output1 A +
	B	Output1 A +
	C	Output2 A +
	D	Output2 A +
	E	Output3 A +
	F	Output3 A +
	G	Output1 B +
	H	Output1 B +
	J	Output2 B +
	K	Output2 B +
	L	Output3 B +
	M	Output3 B +
	N	Output1 A -
	P	Output1 A -
	R	Output2 A -
	S	Output2 A -
	T	Output3 A -
	U	Output3 A -
	V	Output1 B -
	W	Output1 B -
	X	Output2 B -
	Y	Output2 B -
	Z	Output3 B -
	a	Output3 B -
	b	INHIB
	c	RTN

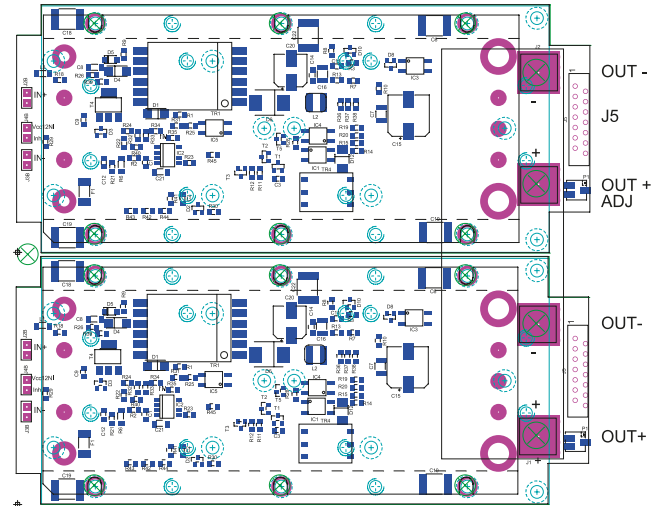


SOURIAU Female
85107A1626S50A7

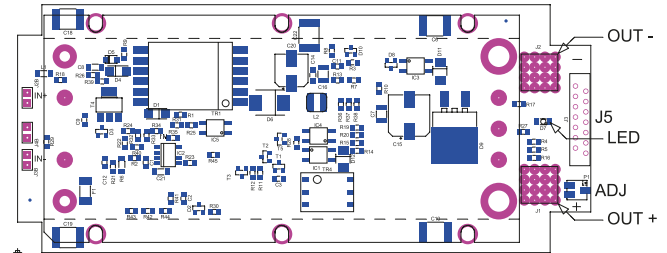
10. Connector Pin Allocation

Description	Pin	Connector	
Input screw type connector GMKDS 3/3-7.62			
1	J1-1	Earth	
2	J1-2	Neutral AC/N	
3	J1-3	Line AC/L	
Output 2M-board power connectors			
OUT+	J1	Würth Pres Fit M4 Ref : 7461095	
OUT-	J2	Würth Pres Fit M4 Ref : 7461095	
Output M-board power connectors			
OUT+	J1	Würth Pres Fit M4 Ref : 7461095	
OUT-	J2	Würth Pres Fit M4 Ref : 7461095	
Output m-board power connectors			
OUT1+	J1	Würth Pres Fit M3 Ref : 7461093	
OUT1-	J2	Würth Pres Fit M3 Ref : 7461093	
OUT2+	J3	Würth Pres Fit M3 Ref : 7461093	
OUT2-	J4	Würth Pres Fit M3 Ref : 7461093	
Output μ-board power connector 6 Pins Male			
OUT1+	J1-1	WURTH TBL3117691311700006	
OUT1-	J1-2		
OUT2+	J1-3		
OUT2-	J1-4		
OUT3+	J1-5		
OUT3-	J1-6		
Signals Würth 690368191472 Female Male 2*7 pins			
μ-board	m-board	M-board	2M-board
J5-1 : ACFAIL	J5-1 : ACFAIL	J5-1 : ACFAIL	J5-1 : ACFAIL
J5-2 : PGOOD	J5-2 : PGOOD	J5-2 : PGOOD	J5-2 : PGOOD
J5-3 : RTN	J5-3 : RTN	J5-3 : RTN	J5-3 : RTN
J5-4 : INHIB	J5-4 : INHIB	J5-4 : NC	J5-4 : NC
J5-5 : +5VAUX	J5-5 : +5VAUX	J5-5 : +5VAUX	J5-5 : +5VAUX
J5-6 : NC	J5-6 : S1+	J5-6 : NC	J5-6 : NC
J5-7 : NC	J5-7 : S1-	J5-7 : NC	J5-7 : NC
J5-8 : ADJ1	J5-8 : ADJ1	J5-8 : NC	J5-8 : NC
J5-9 : NC	J5-9 : PR1	J5-9 : PR1	J5-9 : PR1
J5-10 : NC	J5-10 : NC	J5-10 : NC	J5-10 : NC
J5-11 : ADJ2	J5-11 : PR2	J5-11 : INHIB	J5-11 : INHIB
J5-12 : NC	J5-12 : S2+	J5-12 : S1+	J5-12 : S1+
J5-13 : NC	J5-13 : S2-	J5-13 : S1-	J5-13 : S1-
J5-14 : ADJ3	J5-14 : ADJ2	J5-14 : ADJ1	J5-14 : ADJ1

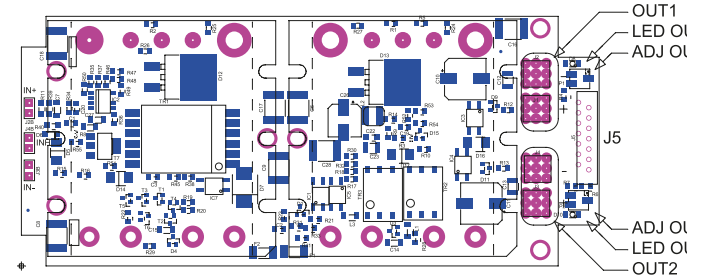
J5



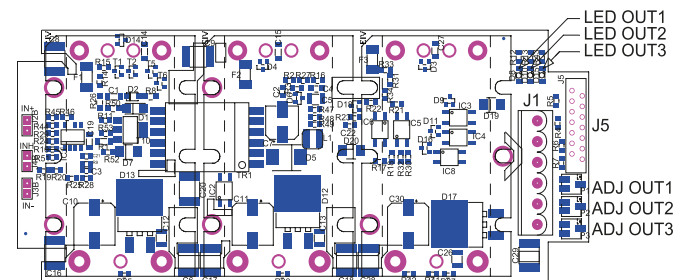
DBA 2M board



DBA M board



DBA m board



DBA μ-board

11. Safety and Installation

These converters are components, intended exclusively for integration into other equipment by an industrial assembly process or by a professionally competent person. Installation must strictly follow the safety regulations in respect of the enclosure, mounting, creepage and clearance distances, markings of the end-use application. Connection to the system shall be made via the male connector Würth.

The AC/L is internally fused. This fuse is designed to protect the converter against overcurrent caused by a failure, but may not be able to satisfy all requirements. External fuses in the wiring circuit to one or both input pins may be necessary to ensure compliance with local requirements.

Do not open the PSU, or the warranty will be invalidated. Make sure that there is sufficient thermal baseplate dissipation (max. temperature: 100°C). This should be verified by measuring the case of temperature at the specified measuring point, when the converter is operated in the end-use application.

Electric Strength

Characteristic		Input to Earth	Input to Output	Output to Earth	Output to Output	Unit
Electric strength	Design strength	1500	3000	500		Vrms
	Factory test for production	2000	2000	500		Vdc
Insulation resistance				> 100	>100	Mohms

Temperature Conditions		Standard			T option			Unit
		Min	Typ	Max	Min	Typ	Max	
Ambiant	Operating (see derating)	-20		+71	-40		+71	°C
Heatsink		-20		+100	-40		+100	°C
Storage	Not operating	-40		+125	-40		+125	°C

In operation, there is no power derating as long as the baseplate temperature is in the below indicated range.

Reliability

MIL-HFBK-217F, notice 2	Model	Heatsink Temp	GB	GF
MTBF (Hours)	DBA 3 outputs	40°C	285000	165000
		70°C	139000	82300
		100°C	86600	51000

MTBF calculation for a specific part number has to be ordered.

Standards and Approvals

The converters are built to meet the safety standards IEC 60950-1, EN 60950-1. 'Built to meet' mentioned in the different paragraphs of the datasheet means that Powerbox has designed the product to meet the standard but not certified it in a laboratory. 'Qualified' means that the test has been made in a certified laboratory.

Cleaning Agents and Process

The converters are not hermetically sealed. In order to avoid possible damage, any penetration of liquids shall be avoided.

Isolation

The electric strength test is performed in the factory in accordance with IEC/EN 60950.

12. Options and Configuration

Input Stage DBA	Position A			
Vin	1	2	3	For μ -board
	1	2		For m-board
	1			For M-board
	1			For 2M-board
<hr/>				
	Position B			
	1	2	3	For μ -board
	1	2		For m-board
	1			For M-board
	1			For 2M-board

DBA - AOUT1	AOUT2	AOUT3	- BOUT1	BOUT2	BOUT3	*)
μ	μ	μ	μ	μ	μ	
μ	μ	μ	m	m		
μ	μ	μ	M			
m	m		m	m		
m	m		M			
M			M			
			2M			

***)Options**

H : Heatsink longitudinal fins

H1 : Heatsink transversal fins

IP : IP65 enclosure

M : Ruggedized

T : -40°C

V : Conformal coating

POWERBOX Defense Line 1200
 DBA Series
 1200W
 AC/DC Conduction Cooled
 Manual

μ-μ-μ : μ-board Aout1,Aout2,Aout3 or Bout1,Bout2,Bout3: Up to 3 outputs with μ-modules from 2V to 48VDC 150W (see table page 2).
 Note: High current, low voltage outputs have to be placed on Aout3 or Bout3 in priority.

μ		μ		μ	
v	w	v	w	v	w
N	N	N	N	N	N
2	50	2	50	2	50
3V3	50, 75	3V3	50, 75	3V3	50, 75
5	50, 100	5	50, 100	5	50, 100
8	100	8	100	8	100
12	75, 150	12	75, 150	12	75, 150
15	75, 150	15	75, 150	15	75, 150
24	75, 150	24	75, 150	24	75, 150
28	75, 150	128	75, 150	28	75, 150
36	75, 150	36	75, 150	36	75, 150
48	75, 150	48	75, 150	48	75, 150

m-m : m-board Aout1,Aout2 or Bout1,Bout2: Up to 2 outputs with m-modules from 2V to 48VDC 300W (see table page 2). Note: High current, low voltage outputs have to be placed on Aout1 or Bout1 in priority.

m		m	
v	w	v	w
N	N	N	N
2	100	2	100
3V3	100, 150	3V3	100-150
5	150, 200	5	150, 200
8	200	8	200
12	200, 300	12	200, 300
15	200, 300	15	200, 300
24	200, 300	24	200, 300
28	200, 300	28	200, 300
36	200, 300	36	200, 300
48	200, 300	48	200, 300

Empty slots are filled with "NN"

Example :

DBA-48150-48150-48150-48150-48150-48150-M (2 μ-boards with 6 outputs of 48V 150W with MIL-STD option).
 DBA-3V375-5100-12150-24300-28300 (1 μ-board with 3 different outputs and 1 m-board with 2 different outputs).

M : M-board Aout1 &/or Bout1: 1 output with M-module from 2V to 54VDC 600W (see table page 2).

M	
v	w
N	N
2	160
3V3	200, 264
5	300, 400
8	300, 400
12	400, 600
15	400, 600
24	400, 600
28	400, 600
32	600
36	400, 500, 600
48	400, 600
54	600

2M : 2M-board Aout1 & Bout1: 1 output with M-module from 2V to 54VDC 1200W (see table page 2).

2M	
v	w
N	N
2	320
3V3	400, 528
5	600, 800
8	600, 800
12	800, 1200
15	800, 1200
24	800, 1200
28	800, 1200
32	1200
36	800, 1000, 1200
48	800, 1200
54	1200