36o Watts - 48V Output AC/DC Converter IP68, Box Type Package

FEATURES

- Wide input voltage range, 85~265VAC
- 360W Output
- Full Load Efficiency up to 93.5% @220VAC;
- Metal Case Box Type Package
- Package Dimension: 165.0x115.0x25.4mm (6.50”x4.53”x1.00”)
- Operating Temperature Range - 40℃ to +75°C
- Input Brown-Out, Output OCL, OTP, OVP, SHORT protection
- Digital PMBus interface(Optional)
- Minimized Inrush current
- 3000Vac Isolation
- IP68 Protection rating
- RoHs Compliant
- UL60950 and UL508
- CE Mark
- EMC compatible: CISPR11 ClassB
- ISO 9001, ISO 14001 certified manufacturing facility

The 360W 48Volts, a wide input voltage range of 85~265VAC, and single isolated output converter, is the latest product offering from a world leader in power systems technology and manufacturing . Such metal box type ACDC converter can provide 360W, 48V regulated DC output voltage with full load efficiency up to 93.5% @220Vac; The 360W 48 Volts offers Brown-out, output OCL, OTP, OVP and Short protections, and allows a wide operating temperature range of –40°C to +75°C. With creative design technology and optimization of component placement, this converter possess outstanding electrical and thermal performance, as well as high reliability under extrmely harsh operating conditions. The 360W 48Volts meet IP68 protection..

Input Characteristics

Item	Condition	Min.	Typ.	Max.	Unit
Continuous Input Voltage range		85	110/220	265	VAC
Input voltage frequency range		47	50/60	63	Hz
Maximum Input Current	Vin=85VAC, 100% Load			5	A
Input PF value	Vin=220VAC, 100% Load	0.95			
No-Load Input power	Vin=110VAC, 0% Load		1.8	2	W
	Vin=220VAC, 0% Load		1.8	2	W
Internal Input Fuse	Ø5mm*20mm	250V/6.3A Fast-acting fuse			A
Max Inrush current	Vin=220VAC			15	A

Output Characteristics

Item	Conditions	Min.	Typ.	Max.	Unit
Output voltage setpoint	Vin=220VAC, Io=0A	48	48.6	49.2	Vdc
	Vin=220VAC, Io=7.5A	47.4	48	48.46	Vdc
Out put current range		0		7.5	A
Output Current Limit		8.5	9	9.5	A
Turn-on rise time			50	60	ms
Start up time	Vin=110/220VAC		800	1000	mS
Hold up time	Vin=110/220VAC, Io= 60% Load	20			mS
Output OVP point		52	54	56	V
Output Voltage Current Transient	Positive voltage step, 75% to 25% load dynamic, 0.1A/us slew rate		800	1000	mV
	Negative voltage step, 25% to 75% load dynamic, 0.1A/us slew rate		800	1000	mV

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Output Voltage Ripple and Noise	Vin=110Vac, Io=7.5A, peak to peak, 20MHz bandwidth		500	800	mV
	RMS		100	150	mV
	Vin=220Vac, Io=7.5A, peak to peak, 20MHz bandwidth		500	800	mV
	RMS		100	150	mV
Maximum Output Capacitance				470	µF
Output overshoot				3	%
Efficiency @ 60% Load	Vin=110VAC	90.3	91.3		%
Efficiency @ 60% Load	Vin=220VAC	91.8	92.8		%
Efficiency @ 100% Load	Vin=110VAC	90.5	91.5		%
Efficiency @ 100% Load	Vin=220VAC	92.5	93.5		%

General Characteristics

Item	Conditions	Min.	Typ.	Max.	Unit
I/O Isolation Voltage	Input to output		3000		VAC
	Input to case		1500		VAC
	Output to case		500		VAC
I/O Isolation Resistance	500Vdc	10			MΩ
Isolation Capacitance, Input to Output			2000		pF
Switching Frequency			300		KHz
MTBF	Ta=25ºC, 80%load		TBD		Mhours
Weight			TBD		g

Environmental Specifications

Parameter	Conditions	Min.		Max.	Unit
Storage Temperature Range		-55		+125	℃
Operating Temperature Range	Ambient Temperature	-40		+75	℃
Over Temperature Protection	Case Temperature		100		℃
Humidity (non condensing)				95	% rel. H
Water Protection Level		IP68			
Vibration	IEC 60068-2-6	10G/15~200HZ/3 PLANES			
Shock	IEC 60068-2-27	50G 3 PLANES			
Radio and Conduct Emission	CISPR11	CLASS B			
ESD	EN61000-4-2	Direct: ±4KV; Air:±8KV			
Radio-frequency electromagnetic field	EN61000-4-3	10V/m 80-1000MHz, 3V/m 1.4 to 2GHZ, 10V/m 2G to 2.7GHZ 80%AM;			
EFT	EN61000-4-4	5/50nS, +/-2kV 5kHZ			
SURGE	EN61000-4-5	1.2/50uS, L/N to PE +/-2kV, L to N +/-1kV			
Power-frequency magnetic field	EN61000-4-8	50/60HZ 30A/m			

Notes

1 Specifications typical at Ta=+25℃, nominal input voltage and rated full load output current unless otherwise noted.
2 Specifications are subject to change without notice.

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ELECTRICAL CURVES

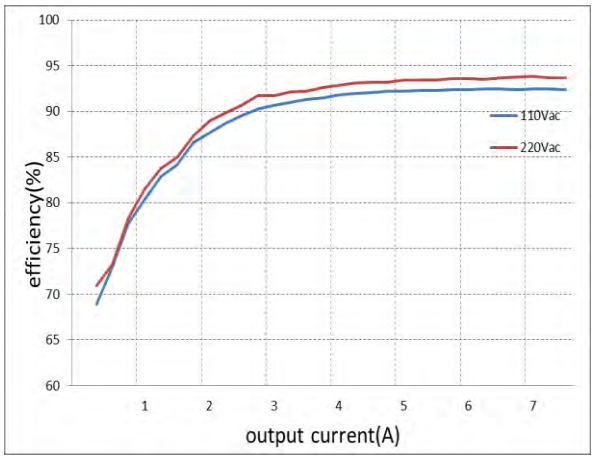

Figure 1: *Efficiency vs. Output current @ Vin=110,220VAC*

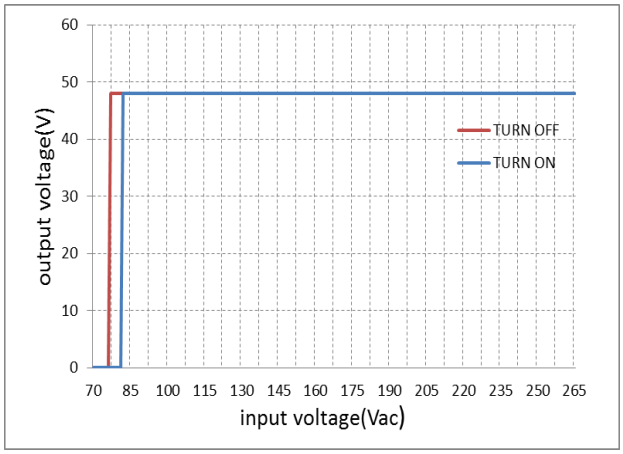

Figure 2: *Vout vs. Vin @ Full load*

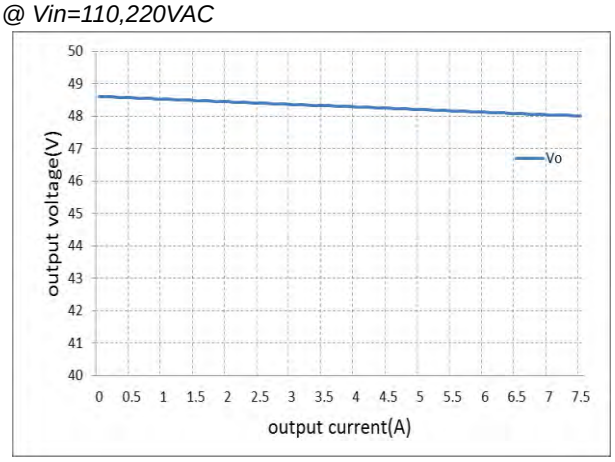

Figure 3: *Output voltage vs. Output current @Vin=110/220Vac. Droop function.*

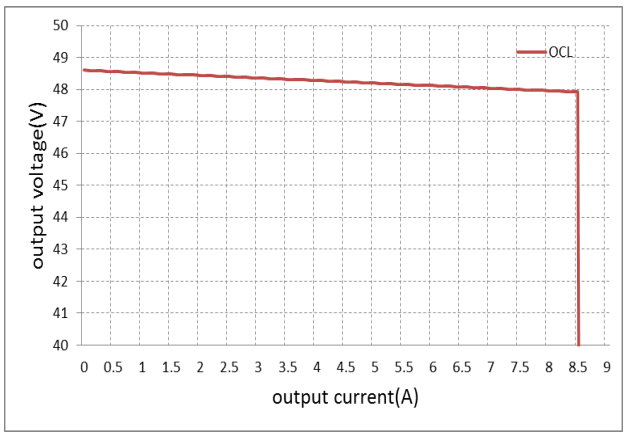

Figure 4: *Output voltage vs. Output current OCL Performance @110/220Vac*

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ELECTRICAL CURVES (continous)

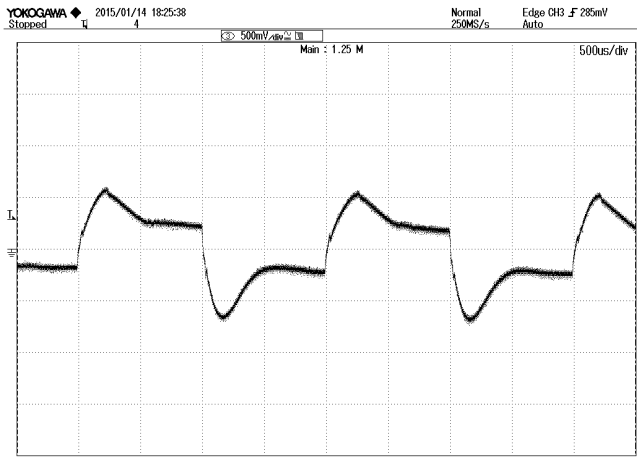

Figure 5: *Dynamic response to load step 6.25A~9.375A with 0.1A/uS slew rate at 110/220Vac*
CH1:VOUT, 500mV/div, 500uS/div

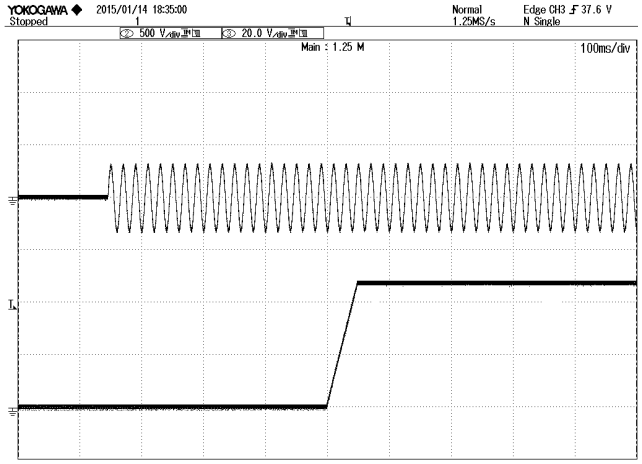

Figure 6: *Vout start up with Enable on at 220Vac,7.5A Iout,*
TOP:Vin, 500V/div, 100mS/div
BOTTOM: VOUT, 20V/div, 100mS/div

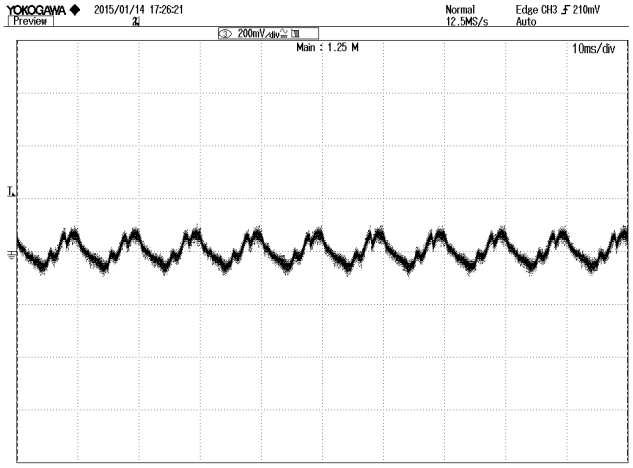

Figure 7: *Output ripple & noise at 110/220Vac, 7.5A Iout*
CH1:VOUT, 50mV/div, 5uS/div

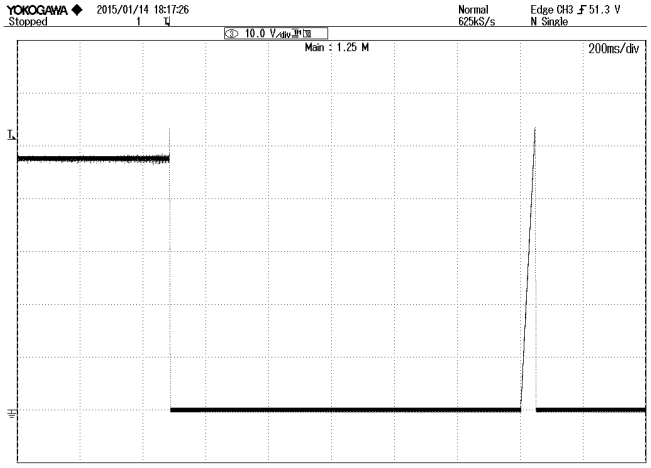

Figure 8: *Output over voltage protection at 110/220Vac,7.5A Iout CH1:VOUT, 10V/div, 200mS/div*

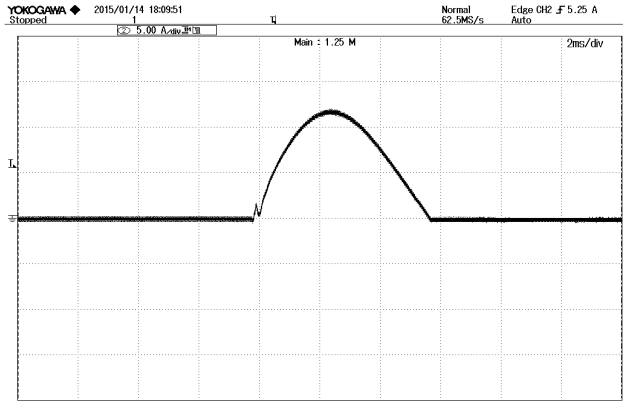

Figure 9: *Inrush current @ Vin=220Vac*
CH1:Iin, 5A/div, 2mS/div; Max current 12A

FEATURES DESCRIPTIONS

Output Over-Current Limit and Short Protection

The modules include internal output over-current limit (OCL) and short circuit protection (SCP) circuits, the OCL set point is lower than that of the SCP; The response of SCP circuit is much fast than that of the OCL circuit. The slowly increase of the output current will let module enter OCL protection when the current exceeds the OCL set point, while the fast increase of the output current will let module enter SCP when the current exceeds the SCP set point.

When the modules enter OCL protection, the output voltage will decrease while the output current is kept constant, the output voltage will soft start to set point when the overload condition is removed.

The module will enter hiccup mode when it triggers the SCP set point. The module will try to restart after shutdown. If the overload condition still exists, the module will shut down again. This restart trial will continue until the overload condition is removed.

Output Over-Voltage Protection

The power module includes an internal output over-voltage protection(OVP) circuit, which monitors the voltage on the output terminals. If this voltage exceeds the OVP set point, the module will shut down, and then restart after a fixed delay time (hiccup mode), please refer to figure6 for detail.

Over-Temperature Protection

The over-temperature protection consists of circuitry that provides protection from thermal damage. If the temperature exceeds the preset temperature threshold the module will shut down,and all components will not exceed their absolute maximum temperature ratings.The module will restart after the temperature is within specification.

DESIGN CONSIDERATIONS

EMC

The converter has the internal EMI filters and meet the EMC standards CISPR11 CLASS B.The test result is showed as below
Conditions: Vin=110/220VAC, Io=7.5A, 3m measure distance

Conduct emission test result

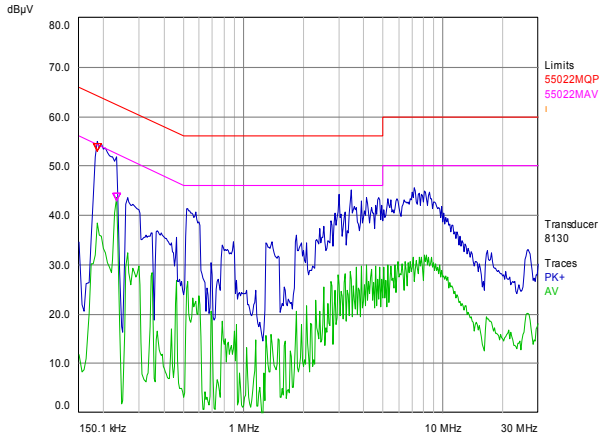

Figure 10: *110Vac(CE)*

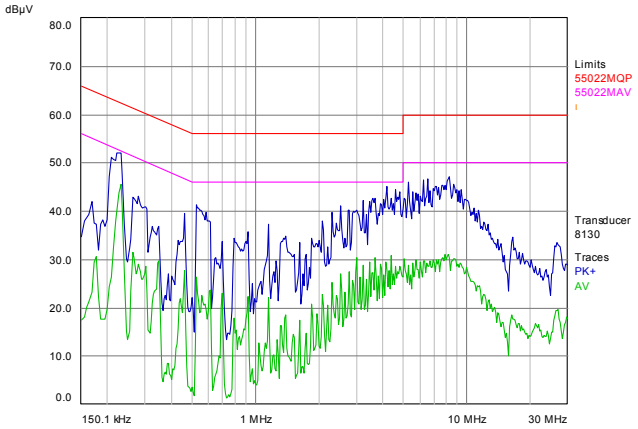

Figure 11: *220Vac(CE)*

Radio emission test result

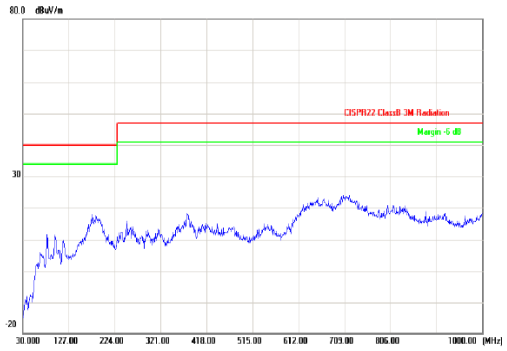

Figure 12: 220Vac(Horizontal)

Figure 13: 220Vac(Vertical)

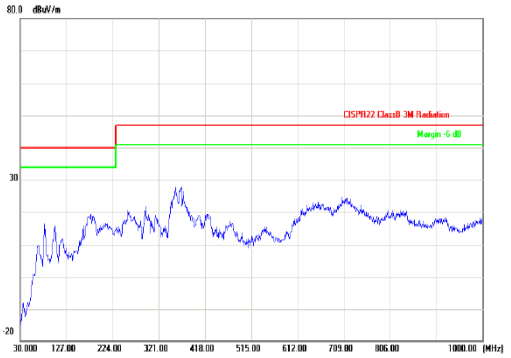

Figure 14: 110Vac(Horizontal)

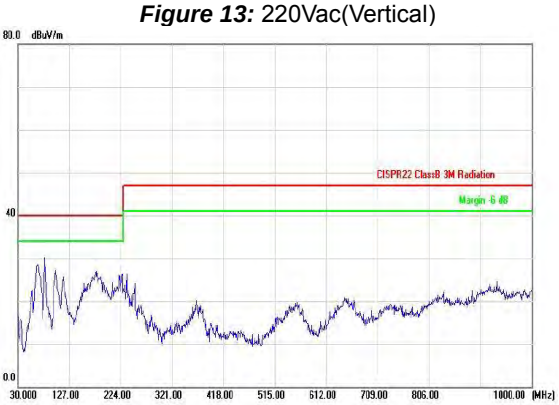

Figure 15: 110Vac(Vertical)

THERMAL CONSIDERATION

The thermal curve (Figure17) is based on a 250x300x5 AL table, shown as below figure.

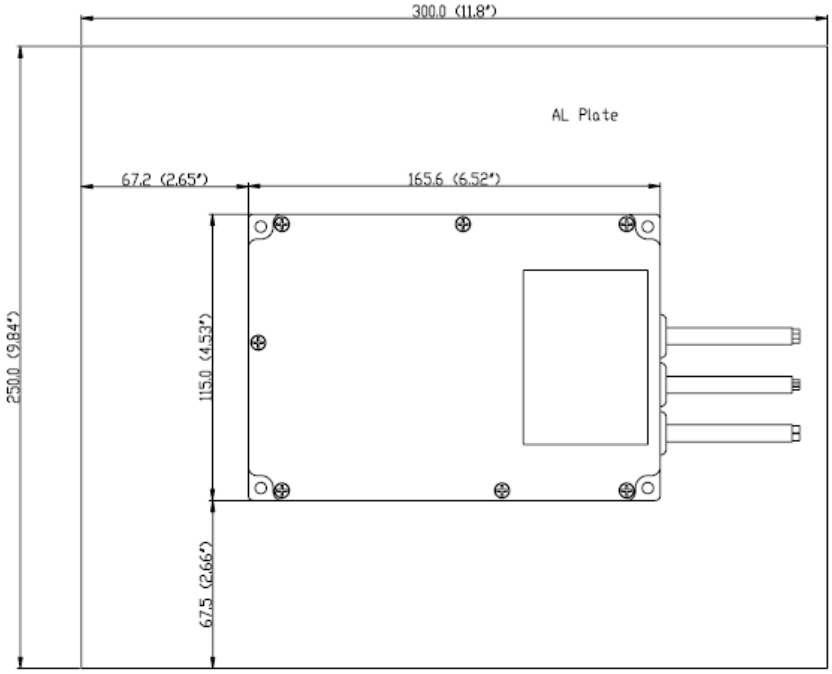

Figure 16: *Thermal consideration*

THERMAL CURVE

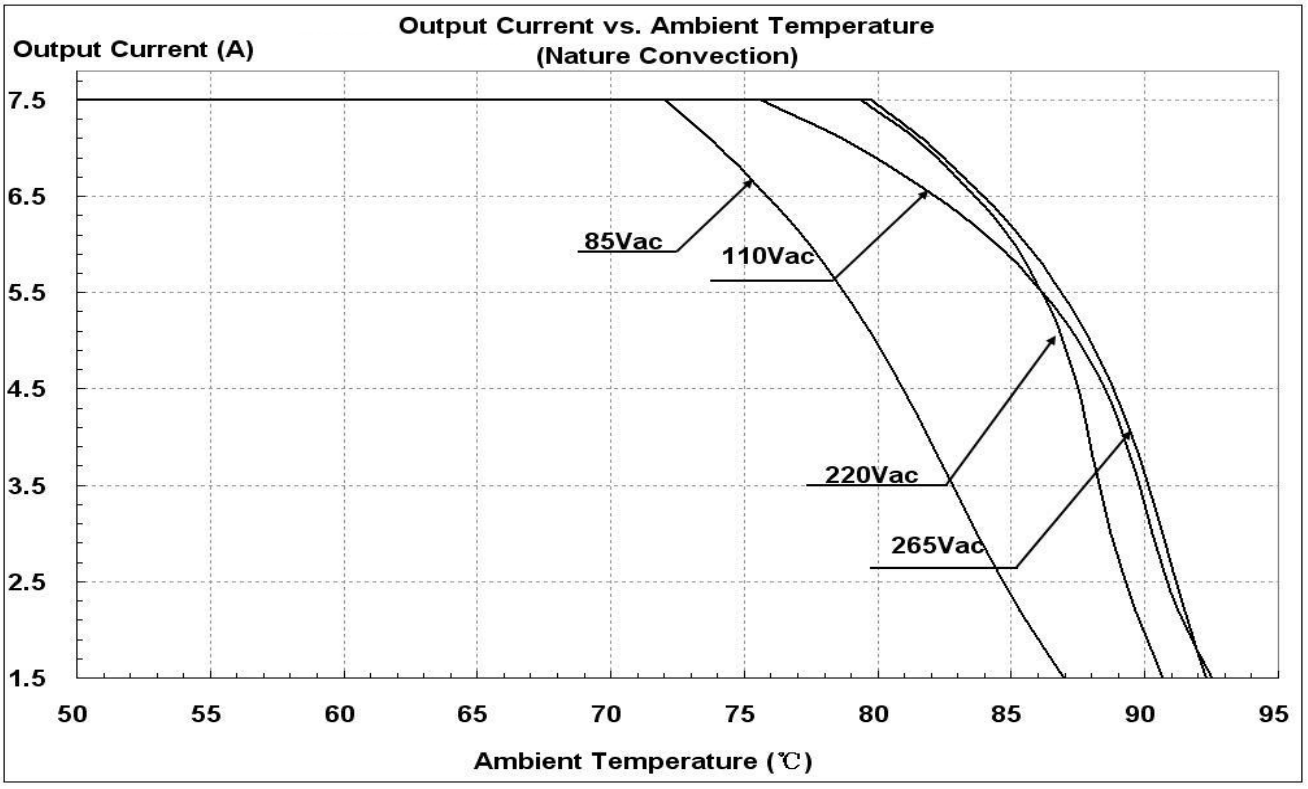

Figure 17: *Output Current vs. ambient temperature*

THERMAL CONSIDERATION

The following figure shows the location to monitor the temperature of base plate. Before customer decides to use this DCDC converter, a thermal evaluation need to be done to make sure the temperature of base plate is lower than that read from below thermal curves (Figure19 base on different input voltage).

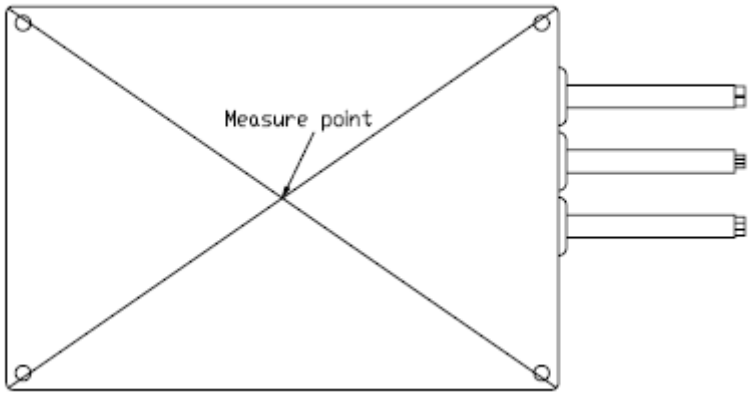

Figure 18: *Thermal test setsup*

THERMAL CURVE

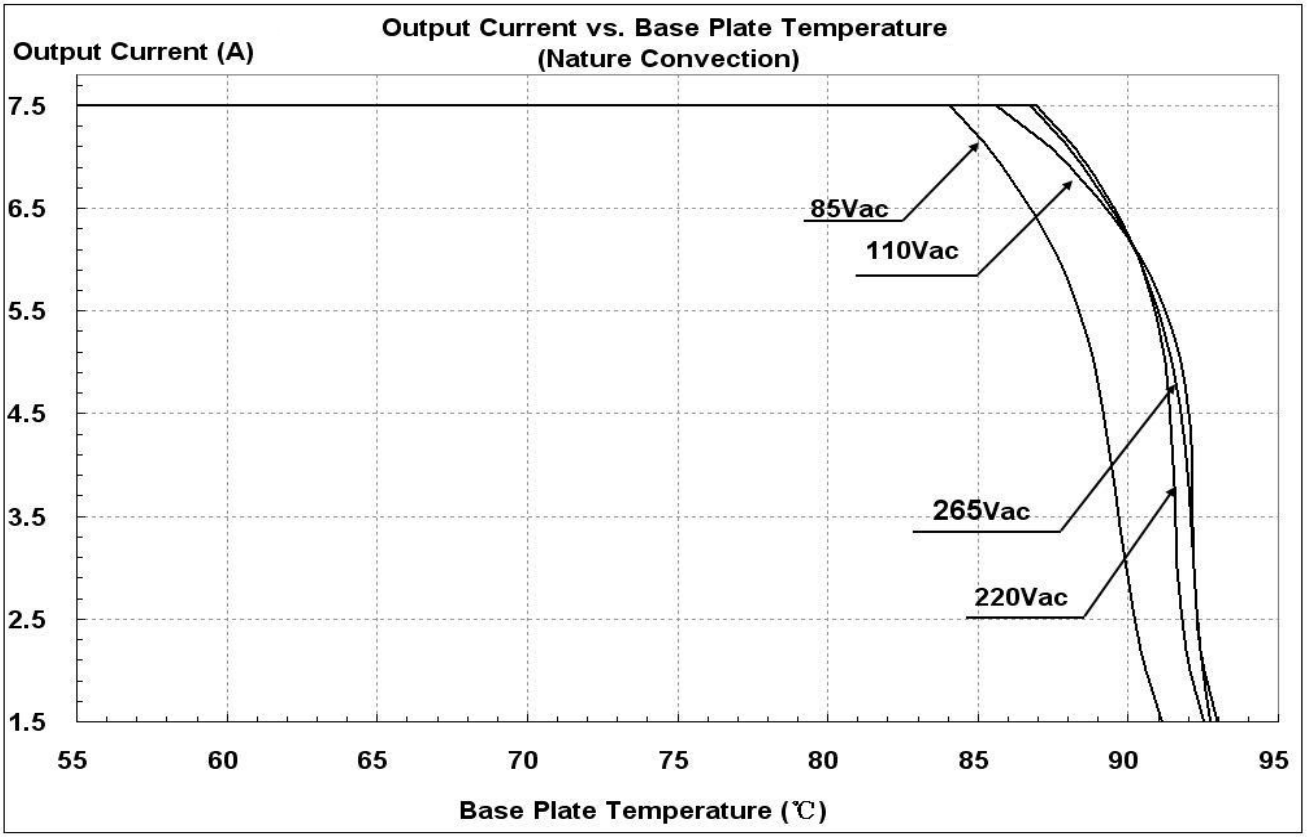

Figure19: *Output Power vs. base plate temperature*

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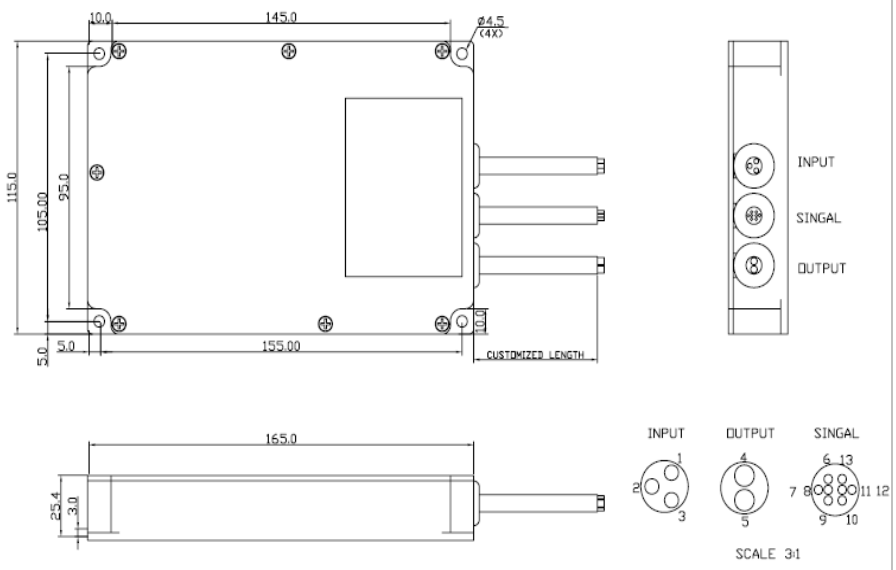
Mechanical Drawing

Mechanical Dimensions



Pin Connections

Pin	Function	Wire Color
1	INPUT -	GREEN
2	INPUT +	RED
3	PE	BLACK
4	OUTPUT -	RED
5	OUTPUT +	BLACK
6	CLK	WHITE
7	DATA	GREEN
8	ALERT	YELLOW
9	CTRL	PINK
10	GND	BLUE
11	NC	RED
12	NC	BLACK
13	NC	GRAY

All dimensions in mm (inches)
Tolerance:
X.X±0.5 (X.XX±0.02)
X.XX±0.25 (X.XXX±0.010)
Connector : Optional

Physical Outline

Case Size	:	165.0x115.0x25.4 mm (6.50”x4.53”x1.00”)
Case Material	:	ADC12