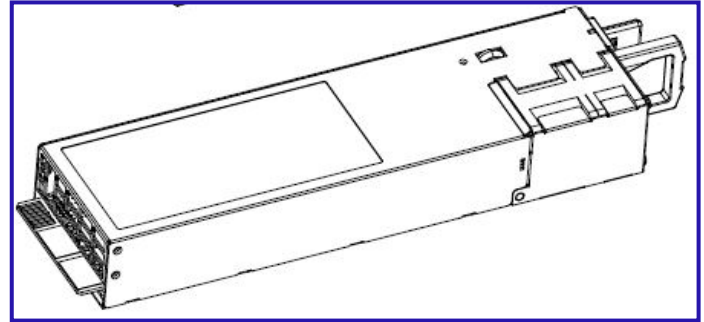




Model: BPA-CRL180012AxS

PRELIMINARY

BPA-CRL180012AxS Family is isolated AC-DC converter with standard M-CRPS that can deliver up to 150Adc/12V main output and 12V/3.5A standby output with internal cooling fan on high line input. It has high efficiency of typical 96% (VIN = 230Vac and half load). These modules can operate over universal AC input and high voltage DC input, even up to 300Vac for AC input, and provide a precisely regulated output voltage. BPA-CRL180012AxS Family has excellent electrical and thermal performance with creative circuit design and optimized component placement. With different status signal, I2C/PMbus control, and hot plug/parallel, BPA-CRL180012AxS Family has very flexibility for various application. The series module integrated input UVP/OVP, OCP, OTP, SCP feature for high reliability design. The module can be compliance with UL/EN/IEC62368 safety requirement.



Special Features

- ✓ Wide input voltage range: Universal AC input up to 300Vac/47-63Hz without damage
- ✓ Support DC input from 180Vdc-320Vdc
- ✓ Fully tightly regulated output voltage
- ✓ Hot plug and forced current sharing
- ✓ High efficiency profile from half load to full load
- ✓ Deliver up to 150A/12V main output and 3.5A/12V standby output with internal cooling fan
- ✓ High output current peak
- ✓ Active PFC (typical:0.98@115Vin, 0.95@230Vin)
- ✓ Industry standard (Pls see the mechanical drawing for detail)
265mm(L) x 73.5mm(W) x 40mm(H)
10.43inch(L) x 2.90inch(W) x 1.58inch(H)
- ✓ Directive 2002/95/EC (RoHS) Compatible
- ✓ I2C Communication (PMbus compliance)
- ✓ Full protection for Input UVP, Output OVP, OCP, SCP, OTP
- ✓ 3000Vac/1Min for Pri to Sec and 1500Vac/1Min for Pri to Earth isolation voltage, 500Vdc /1Min for Sec to Earth isolation voltage
- ✓ Wide operating temperature range (-10°C to 70°C) with derating from 50°C. And -40°C can power up
- ✓ Design to meet safety standard of IEC/EN/UL6236

Applications

- ✓ Datacom, Server, AI.....
- ✓ Distributed power architectures
- ✓ Instrument and Test Equipment
- ✓ Industry/automation
- ✓ LANs/WANs
- ✓ Enterprise Networks

Dimensions: 265mm(L) x 73.5mm(W) x 40mm(H)
10.43inch(L) x 2.90inch(W) x 1.58inch(H)

(Note: safety certificate is not ready now)



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Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only, functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability

Parameter	Device	Symbol	Min	Max	Unit
Input Voltage					
Continuous (AC)	All	V_{IN}		264	Vac
Operation Transient(AC)				300	Vac
Non-operating continuous(AC)				315	Vac
Continuous (DC)				320	Vdc
Non-operating continuous(DC)				445	Vdc
Status Signal Pin	All		-0.3	30	Vdc
Operating Ambient Temperature (Derating from 50°C to 70°C by 2.5%/°C)	All	T_A	-10	70	°C
Storage Temperature	All	T_{stg}	-55	105	°C
Input/Output Isolation voltage	All			3000	Vac
Input/Earth-Chassis Isolation voltage	All			1500	Vac

Electrical Specifications

Unless otherwise indicated, specifications apply overall operating input voltage, resistive load, and room temperature conditions.

Parameter	Device	Symbol	Min	Typ	Max	Unit
Operating Input Voltage(AC)		V_{IN}	90	—	264	Vac
Operating Frequency(AC)	All		47	—	63	Hz
Operating Input Voltage(DC)		V_{IN}	180	—	320	Vdc
Max Input Current ($V_{IN}=180V_{ac}$, $P_O=1800W$)	All	$I_{IN,max}$			12.0	A
Input No Load Power ($V_{IN}=115/230V_{ac}$, $I_O=0$, Module enabled)			—	15	—	W
Input Standby Power ($V_{IN}=115/230V_{ac}$, Module disabled)			—	4	—	W
Inrush Current with Cold Start	All	230Vin	—	50	—	A
Power Factor (Nominal Input and Full Load)	All	λ	0.95	0.98	—	
Leakage Current (264Vac)	All		—		3.5	mA
Input Protection		Fuse in Line Input				

Electrical Specifications (continued)

Output Spec (Spec is required at +25°C if not specification).

Parameters	Condition and Description		Min	Mon	Max	Unit
Output Voltage	Half load condition, Nominal Input	12Vout	12.06	12.22	12.34	V
		12Vstb	11.65	12.00	12.35	V
	No trim requirement					
Output Load (High Line)	180-264Vac input: 1600W	12Vout	0		150	A
		12Vstb	0		3.5	A
Output Load (Low Line)	90-108Vac input:1000W	12Vout	0		83.3	A
		12Vstb	0		3.5	A
	108-132Vac input:1200W	12Vout	0		100	A
		12Vstb	0		3.5	A

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Electrical Specifications (continued)

Peak Load 1	60 second Peak power $\geq 115\%$ continuous power	90-108 VAC	12Vout			95.8	A
		108-122 VAC	12Vout			115	A
		180-264 VAC	12Vout			172.5	A
Peak Load 2	10millisecond peak $\geq 190\%$ continuous power	90-108 VAC	12Vout			158.3	A
		108-122 VAC	12Vout			190	A
		180-264 VAC	12Vout			285	A
Load Regulation	From zero to Full (Nominal Input)	12Vout			$\pm 2\% \cdot V_{out}$	V	
		12Vstb			$\pm 3\% \cdot V_{out}$	V	
Line Regulation	All Range (50% load)				$\pm 1\% \cdot V_{out}$	V	
Thermal regulation					$\pm 0.03\% \cdot V_{out}/^{\circ}\text{C}$	V	
Min Load	No requirement					A	
Ripple and Noise	115/230 in Full load (20k-20M bandwidth/10uf Tan-capacitor)	12Vout			$\pm 1\% V_{out}$	V	
		12Vstb			$\pm 2\% V_{out}$	V	
External Capacitive load	full load	12Vout			50000	μF	
		12Vstb			1000	μF	
Dynamic 1 (1A/us)	25% to 75% to 25% load				$\pm 5\% V_{out}$	V	
Dynamic 2 (1A/S)	5%-50% and 50%-100% load				$\pm 5\% V_{out}$	V	
Recovery Time	Back to 1% Vout				500	μS	
Turn On Overshoot					3%	V	
Delay time	Nominal Input to 90% output				3	s	
Rise time	10% output to 90% output, Monotonic. No external capacitor			30	100	mS	
Output Indicator	LED signal Indicator and PMbus						
Efficiency	230Vac input/Half load			96		%	
Current Sharing	Forced current sharing@ $\geq 50\%$ load				5%	%	
Holdup Time	Nominal Input and Full Load and droop to 90% of output voltage			10		mS	

Note: Ripple and noise for these signal is less than 120mV at 20Mhz bandwidth, less than 250mV at 250Mhz bandwidth

Protection Spec

Parameters	Condition and Description	Min	Mon	Max	Unit
Input UVP	Auto-Recovery			85	Vac
Output OCP	Auto-Recovery	$110\% \cdot I_o$		$130\% \cdot I_o$	A
Output OVP	Latch Mode		$120\% \cdot V_o$	$130\% \cdot V_o$	V
OTP(Ambient)	Auto-Recovery		75		$^{\circ}\text{C}$
Short protection	All condition	No damage/smoke/fire			

Environment Spec

Parameters	Condition and Description	Min	Mon	Max	Unit
Working Temperature	For full load/input(<5000m)	-20	+25	+70	°C
	Derating from 50°C	derating from 50°C to 70°C by 2.5%/°C			
Hot Spot Temperature	Pls see the application for the hot spot location			115	°C
Airflow Direction	BPA-CRL180012A1S: Fan in PSU, Airflow from input to output, adjustable fan speed				
	BPA-CRL180012A2S: Fan in PSU, Airflow from output to input, adjustable fan speed				
Altitude				5000	m
Humidity		+5%		95%	

Isolation Specifications

Isolation Voltage from Primary to Secondary	3000Vac@1Min
Isolation Voltage from Primary to Earth	1500Vac@1Min
Isolation Voltage from Secondary to Earth	500Vdc@1Min

EMC Spec

EMC Item	Requirement	Criterion	reference
Conducted Emissions	Class A + system box		EN55022 QP/AV Method
Radiated Emissions	Class A + system box		EN55022/FCC Controlled by system
Conducted Immunity	Level 2		EN55024, EN61000-4-3
SURGE	DM: ±2KV CM: ±4KV	B	EN61000-4-5, EN 55024 ETSI EN 300 386 V1.3.2
EFT	±2KV (Level 2)	B	EN61000-4-4, EN 55024 ETSI EN 300 386 V1.3.2
ESD	Touch: ±6KV Air: ±8KV	B	EN61000-4-2, EN 55024 ETSI EN 300 386 V1.3.2
	Touch: ±8KV Air: ±15KV for Case	R	EN61000-4-2, EN 55024 ETSI EN 300 386 V1.3.2
Harmonic	Class A	NC	EN 61000-3-2 ETSI EN 300 386 V1.3.2
Flicker		NC	EN 61000-3-3 ETSI EN 300 386 V1.3.2
RS	80M~2GHz 10V/m, 80% AM (level 3)	A	EN 61000-4-3, EN 55024 ETSI EN 300 386 V1.3.2
CS	150KHz~80MHz 10V, 80% AM	A	EN 61000-4-6, EN 55024 ETSI EN 300 386 V1.3.2
Lightning AC power fault			GR-1089 Issue 4
DIP	See the following		EN 61000-4-11, EN 55024 ETSI EN 300 386 V1.3.2

DIP Requirement

Voltage Drop	Duration Time	Criteria
0%Ut	10ms	B
70%Ut	500ms	C
40%Ut	200ms	C
0%Ut	5000ms	C

LED indicator

The power supply uses a bi-color LED: Amber and Green to identify different operating states of the power supply. Table 2 defines the characteristics of the LED indicator.

LED Characteristics

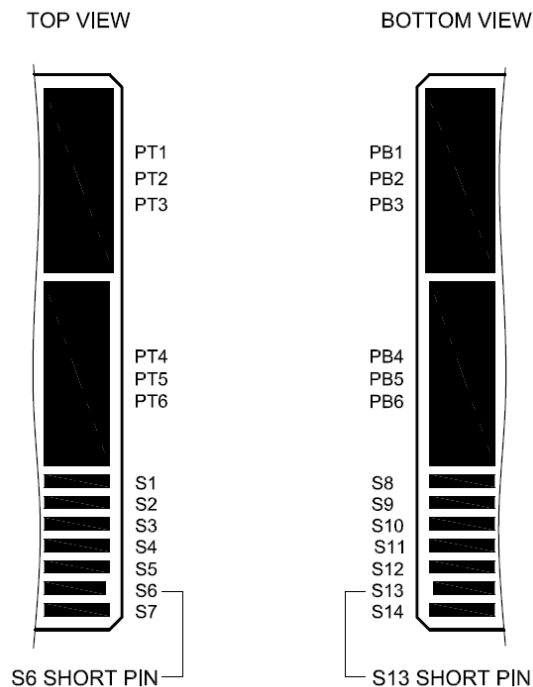
Power Supply Condition	LED State
12V output mode normal	Green
No AC power to all power supplies	OFF
PSU standby state AC present	1Hz Blink Green
Power supply FW updating mode	2Hz Blink Green
Power supply is cold standby state or always standby state	0.33Hz Blink GREEN 1s OFF, 2s GREEN
AC cord unplugged or AC power lost; with a second power supply in parallel still with AC input power	Amber
+12V output critical events causing a shutdown; Failure, OCP, Short Circuit, OVP, Fan Failure, OTP, Input OVP	Amber
Power supply warning events where the power supply continues to operate; high temp, high power, high current, slow FAN	1Hz Blink Amber

Input/Output connector and Pin assignment

Input Socket

IEC320-C14

Output Pin Assignment (Output: PCB gold finger)



Output Pin Assignment

Name	Con. pin	Con. pin	Name
GND	PT1	PB1	GND
GND			GND
GND			GND
GND	PT2	PB2	GND
GND			GND
GND			GND
GND	PT3	PB3	GND
GND			GND
GND			GND
+12V	PT4	PB4	+12V
+12V			+12V
+12V			+12V
+12V	PT5	PB5	+12V
+12V			+12V
+12V			+12V
+12V	PT6	PB6	+12V
+12V			+12V
+12V			+12V
PMBus SDA	S1	S8	A0 (SMBus address)
PMBus SCL	S2	S9	A1 (SMBus address)
PS_ON#	S3	S10	+12VSB
SMBAlert#	S4	S11	Cold Redundancy Bus
Return Sense / PS_KILL ²	S5	S12	12V load share bus
+12V Remote Sense	S6	S13	I _{mon} ¹
PWOK	S7	S14	VINOK

Note:

1. The user can select to have an I_{mon} signal or presence by configuring the option, presence is default.
2. Return Sense / PS_KILL pin is dual purpose.

Pin Assignment and explanation

Items	Description	Explanation	Notes
Voltage Sense	Remote Sense(+) Remote Sense(-)	These two signal can compensate voltage drop of V _{out} . The maximum can compensate 0.25V for each pin	
Current Sharing Signal	ISHARE	Connect together to guarantee output current within required tolerance at N+1 operation	

Pin Assignment and explanation (continued)

Items	Description	Explanation	Notes
Remote On/Off	Remote ON/OFF	To turn on or off the power supply by this signal Inside of power supply, this pin is connected to ground by 10K resistor, so floating for this pin is 0V. When logic low (<0.8V) for this pin, the PSU is on. When logic high (>2.5V), the power supply is off	
Input status indicator	AC OK	OC output, this pin is connected to 3.3V by pull up resistor 4.7K Logic High for normal operation Logic Low (<0.4V, sink current <0.4mA) for abnormal operation	
Output status indicator	Power Good	OC output, this pin is connected to 3.3V by pull up resistor 4.7K Logic High for normal operation Logic Low (<0.4V, sink current <0.4mA) for abnormal operation	
PSU failure	Fault	Power fault include input abnormal, output abnormal, OTP, Fan failure, etc) OC output, this pin is connected to 3.3V by pull up resistor 4.7K Logic High for no fault Logic Low (<0.4V, sink current <0.4mA) for fault	
PSU present to system box	PS PRESENT	Inside of PSU, the signal is connected to ground by 100ohm resistor	
Control signal for hot plug	PSKILL	Suggest to connect the signal to ground in system side. When PSKILL is connected to ground, the power can have output. When PSKILL is pulled out, the power will shut down within 2mS	
	Signal Return		
I2C address	A0,A1,A2		
I2C data	SDA		
I2C clock	SCL		
	SMBALERT	I2C interrupt signal, connect to 3.3V by pull up resistor 4.7k in PSU	
5V standby output	5VSB 5VSB Return		

PMBus and EEPROM

The PSU has 8Kbyte EEPROM and can communicate with Host system by I2C on PMBus1.1 standard

Address for MCU and EEPROM

Device	Address	Address Allocation (From high bit to low bit)							
MCU	0xBx	1	0	1	1	A2	A1	A0	R/W
EEPROM	0xAx	1	0	1	0	A2	A1	A0	R/W

A0 is the D1 of output connector, which can connect to logic high or low by system application

A1 is Pin A1

Definition for EEPROM

Byte address (decimal)	Byte address (hex)	item	format	value
0000	0000h	Block signal		01
0001	0001h	Block signal		00
0002	0002h	Block signal		00
0003	0003h	Block signal		00
0004	0004h	Block signal		01
0005	0005h	Block signal		0B
0006	0006h			00
0007	0007h			F3
0008	0008h			01
0009	0009h			0A
0010	000Ah			19
0011	000Bh			C8
0012-0019	000Ch-0013h	MFG	Char*8	
0020	0014h			CA
0021-0044	0015h-002Ch	Product number	Char*24	GPR650B-12A1H(ASCII)
0045	002Dh			D2
0046-0063	002Eh-003Fh	SN	Char*18	
0064-2047	0040h-07FFh		Char*1984	Reserved

PMBus command

CMD Code	Name	Type	Bytes	Conditions
03h	CLEAR_FAULTS	Send Byte	0	
19h	CAPABILITY	Read Byte	1	Value 00h
1Ah	QUERY	Block Write- Block Read Process Call	See PMBUS SPEC	
79h	STATUS_WORD	Read Word	2	
7Ah	STATUS_VOUT	Read Byte	1	

PMBus command (continued)

CMD Code	Name	Type	Bytes	Conditions
7Bh	STATUS_IOUT	Read Byte	1	
7Ch	STATUS_INPUT	Read Byte	1	
7Dh	STATUS_TEMPERATURE	Read Byte	1	
81h	STATUS_FANS_1_2	Read Byte	1	
8Bh	READ_VOUT	Read Word	2	
8Ch	READ_IOUT	Read Word	2	
8Dh	READ_TEMPERATURE_1	Read Word	2	
90h	READ_FAN_SPEED_1	Read Word	2	Rpm value
91h	READ_FAN_SPEED_2	Read Word	2	Rpm value
94h	READ_DUTY_CYCLE	Read Word	2	
96h	READ_POUT	Read Word	2	
97h	READ_PIN*	Read Word	2	
98h	PMBUS_REVISION	Read Byte	1	Value 11h
99h	MFR_ID	Read Block	Variable	See MFR Data table
9Ah	MFR_MODEL	Read Block	Variable	See MFR Data table
9Bh	MFR_REVISION	Read Block	Variable	See MFR Data table
A0h	MFR_VIN_MIN	Read Word	2	See MFR Data table
A1h	MFR_VIN_MAX	Read Word	2	See MFR Data table
A2h	MFR_IIN_MAX	Read Word	2	See MFR Data table
A3h	MFR_PIN_MAX	Read Word	2	See MFR Data table
A4h	MFR_VOUT_MIN	Read Word	2	See MFR Data table
A5h	MFR_VOUT_MAX	Read Word	2	See MFR Data table
A6h	MFR_IOUT_MAX	Read Word	2	See MFR Data table
A7h	MFR_POUT_MAX	Read Word	2	See MFR Data table
A8h	MFR_TAMBIENT_MAX	Read Word	2	See MFR Data table
A9h	MFR_TAMBIENT_MIN	Read Word	2	See MFR Data table
AAh	MFR EFFICIENCY_LL	Read Word	2	See MFR Data table
ABh	MFR EFFICIENCY_HL	Read Word	2	See MFR Data table
ACH	MFR_FW_REVISION	Read Block	Variable	See MFR Data table
ADh	MFR_FW_ID	Read Block	Variable	See MFR Data table

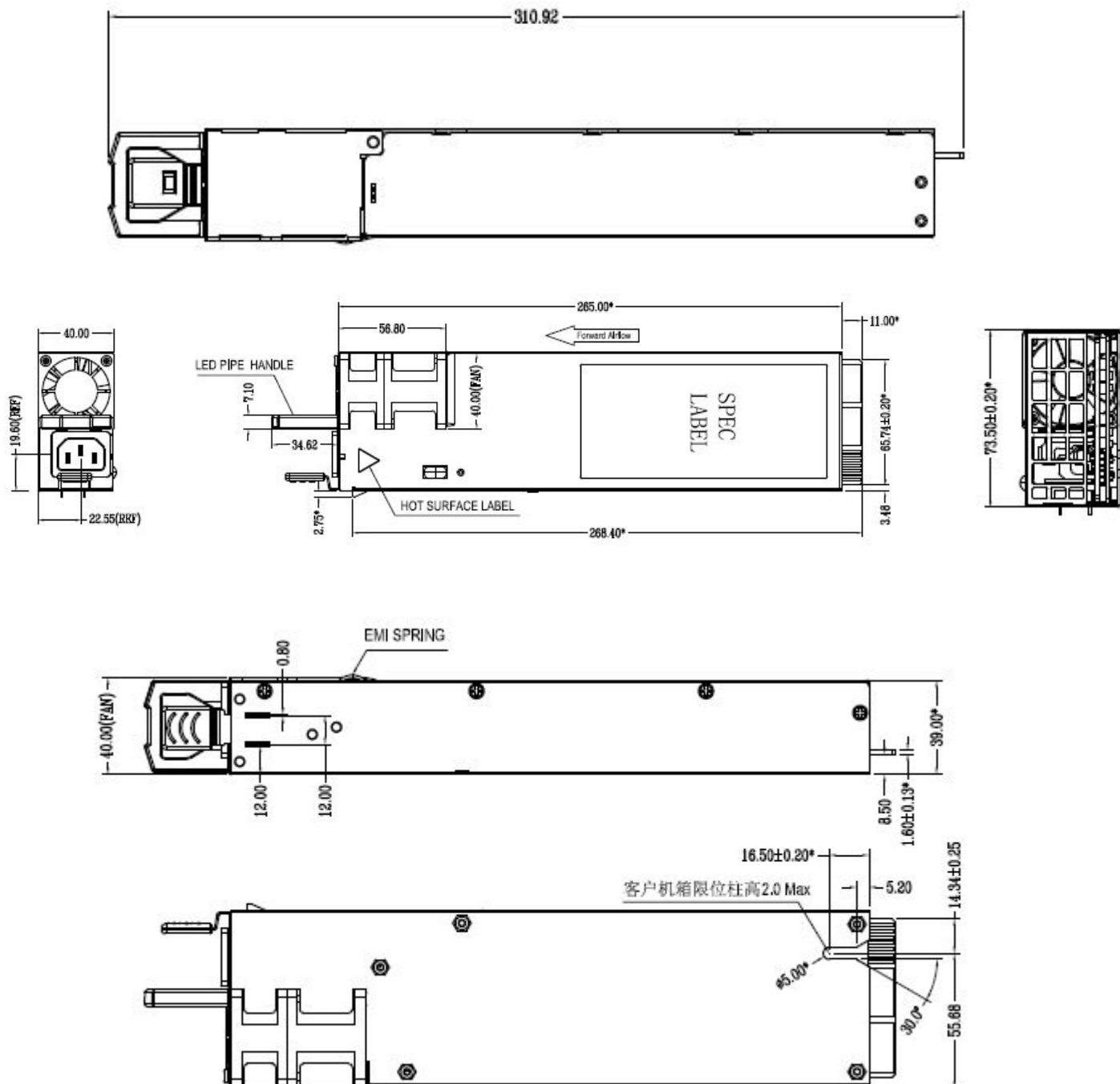
MFR Data table

CMD Code	Name	PSR650B-12A1
99h	MFR_ID	GRE
9Ah	MFR_MODEL	PSR650B-12A1
9Bh	MFR_REVISION	V100
A0h	MFR_VIN_MIN	85V
A1h	MFR_VIN_MAX	264V
A2h	MFR_IIN_MAX	10A
A3h	MFR_PIN_MAX	750W
A4h	MFR_VOUT_MIN	11.63V
A5h	MFR_VOUT_MAX	12.36V
A6h	MFR_IOUT_MAX	53A
A7h	MFR_POUT_MAX	650W
A8h	MFR_TAMBIENT_MAX	80
A9h	MFR_TAMBIENT_MIN	0
AAh	MFR_EFFICIENCY_LL	0.90
ABh	MFR_EFFICIENCY_HL	0.92
ACH	MFR_FW_REVISION	V100
ADh	MFR_FW_ID	PSR650B-12A1

Order Information

Input Voltage	Main Output	Aux Power	Product Name	Note
90-264Vac	12V/13 2A	12V/3.5A	BPA-CRL180012A1S	Main Model: airflow from input to output
90-264Vac	12V/13 2A	12V/3.5A	BPA-CRL180012A2S	Main Model: airflow from output to input

Mechanical Drawing



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