

TECHNICAL DATA SHEET

PA350R-212A-R



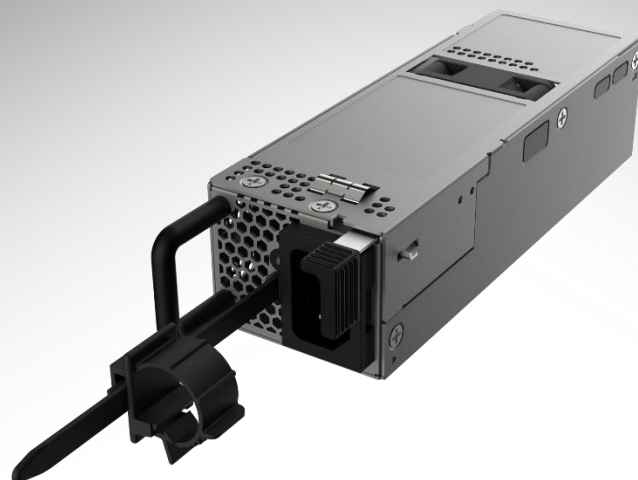
DESCRIPTION

This rack-mount power supply accepts AC line input voltage from 100Vac to 240Vac or DC voltage from 180Vdc to 300Vdc, provides 350 watts of 12Vdc main and 5Vdc standby power. This high power density power supply features a fully digital design, supports the PMBus communication protocol, and is equipped with short circuit, overcurrent, over-voltage, and over-temperature protection.



FEATURES

- ✓ 12Vdc Main Output
- ✓ Maximum 6 PSUs
- ✓ Supports PMBus Version 1.2
- ✓ AC & DC Input
- ✓ 5,000 Meters Operating Altitude
- ✓ Over-Voltage, Over-Current, Short Circuit, Over-Temperature & Under Voltage Protection





TECHNICAL DATA

Input

Voltage	100Vac-240Vac, 180Vdc-300Vdc
Current	4.5A maximum
Frequency	47Hz - 63 Hz
Inrush Current	<30A_peak @ 115Vac/25C cold start; <60A_peak @ 230Vac/25C cold start
Leakage current	<3.5mA @ 240V/50Hz

Output

12V	0A-29.2A
5Vsb	0A-3A
5Vsb Voltage Adjustable	Default Output Voltage is 5V, Step Up Range is 5V to 12V (Optional); Step Down Range is 5V to 1V
Ripple and Noise	<120mVp-p @ +12V full load; <50mVp-p @ 5Vsb full load
Output Regulation	±5% for +12V & 5Vsb
Load Regulation	±1% for +12V ; ±5% for 5Vsb
Maximum Output Power	350W
Hold Up Time	10mS @ +12V full load; 180ms @ 5Vsb (default)
Redundant	Maximum 6 PSUs
Current Share Accuracy	4%* +12V full load current
Capacitive Load	6000uF maximum
Dynamic Regulation	±5% @ 50% maximum step load change (10Hz-10kHz, 50% duty, slew rate 5A), with 3300uF capacitor

Efficiency / PF / iTHD

Efficiency	>88% @ 230Vac/20%load; >92% @ 230Vac/50%load; >88% @ 230Vac/100%load
Power Factor	>0.9 @ 230Vac/50%load
iTHD	<20% @ 230Vac/20%load; <10% @ 230Vac/50%load; <5% @ 230Vac/100%load

Protection

Over Current Protection	+12V rail: 120%±5% load (latch mode) ; 5Vsb rail: 120%~140% load (auto recovery mode)
Over Voltage Protection	+12V rail: 13.3V-15.6V (latch mode) ; 5Vsb rail: 6.0V-7.2V (auto recovery mode)
Under Voltage Protection	+12V rail: 10.0V-11.0V (latch mode)
Over Temperature Protection	Auto recovery mode
Short Circuit Protection	+12V rail: (latch mode); 5Vsb rail: (auto recovery mode)

Control Signals

AC_OK	Output Signal : AC_OK HIGH to indicate Input AC/DC OK; High>2V, Low<1V
PW_OK	Output Signal: PW_OK HIGH to indicate the output rail OK; High>2V, Low<1V
PS_ON	Input Signal: PSON L2H to turn off +12V; PSON H2L to turn on +12V and clear fault; High>2V, Low<1V
PS_KILL	Input Signal: PS_KILL H2L to turn on 5Vsb; PS_KILL L2H to turn off 5Vsb and +12V, High>2V, Low<1V
SMB_ALERT	Output Signal: SMB_ALERT LOW to indicate warning event; High>2V, Low<1V
SDA	PMBus Data
SCL	PMBus Clock
+12VRS+	Input Signal: +12V rail remote sense positive, maximum 200mV
+12VRS-	Input Signal: +12V rail remote sense negative, maximum 200mV
A0 (Address)	Address Pin 0; High>2V, Low<1V
A1 (Address)	Address Pin 1; High>2V, Low<1V
A2 (Address)	Address Pin 2; High>2V, Low<1V (optional)
I_Share	Active Current Share Bus I_Share Voltage = 1.4V±70mV @ +12V 20% load I_Share Voltage = 3.5V±70mV @ +12V 50% load I_Share Voltage = 7V±2% @ +12V 100% load



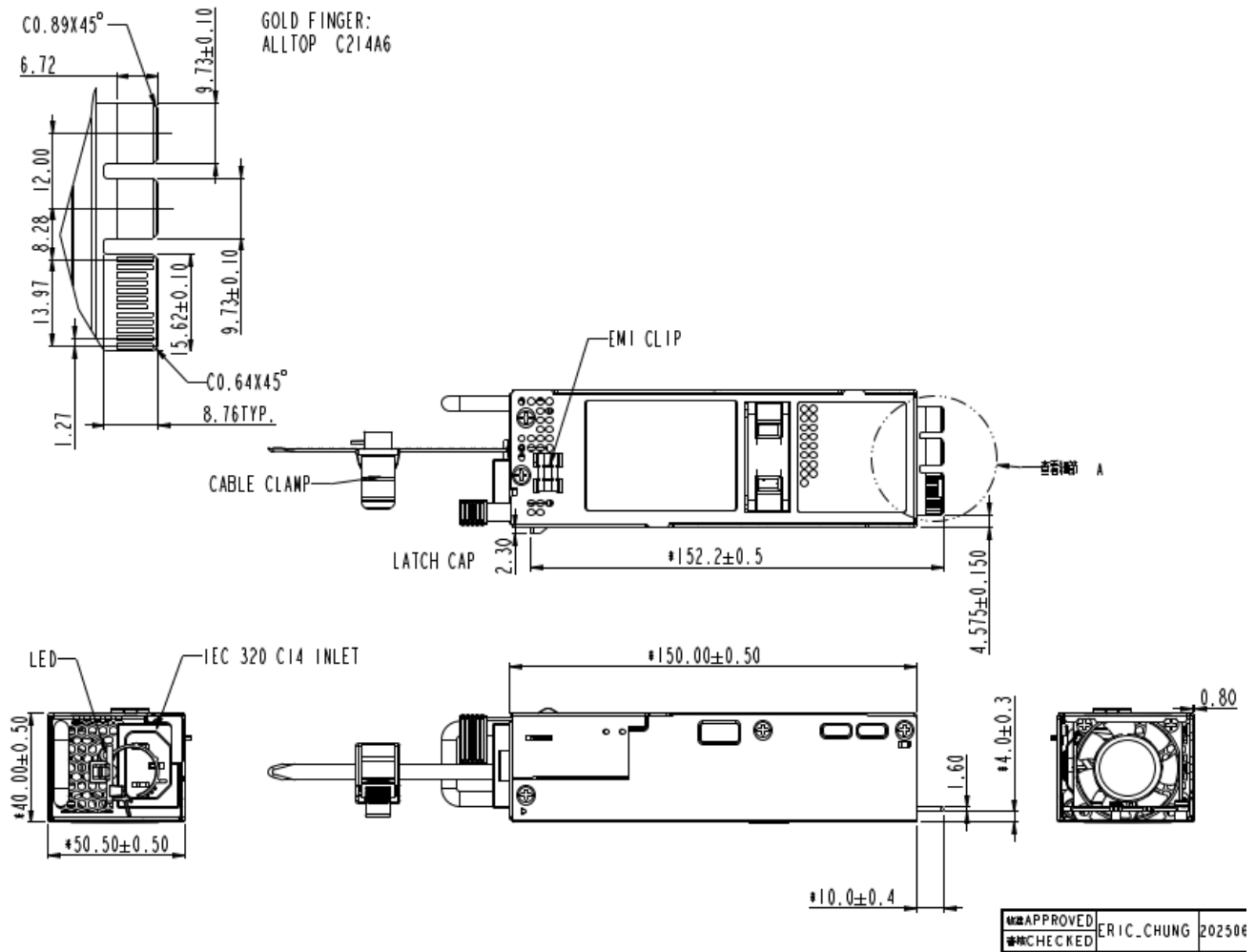


TECHNICAL DATA

PRESENT	Power supply present signal
LED	Solid Green: PSU Normal mode Solid Amber: PSU Fault mode Blinking Green: PSU Standby Mode NO LED: PSU Off Mode

Outline Dimension and Drawing

Depth	150mm ± 0.5 mm
Width	50.5mm ± 0.5 mm
Height	40mm ± 0.5 mm
Output Connector	PSU: card edger System: ALLTOP C214A6

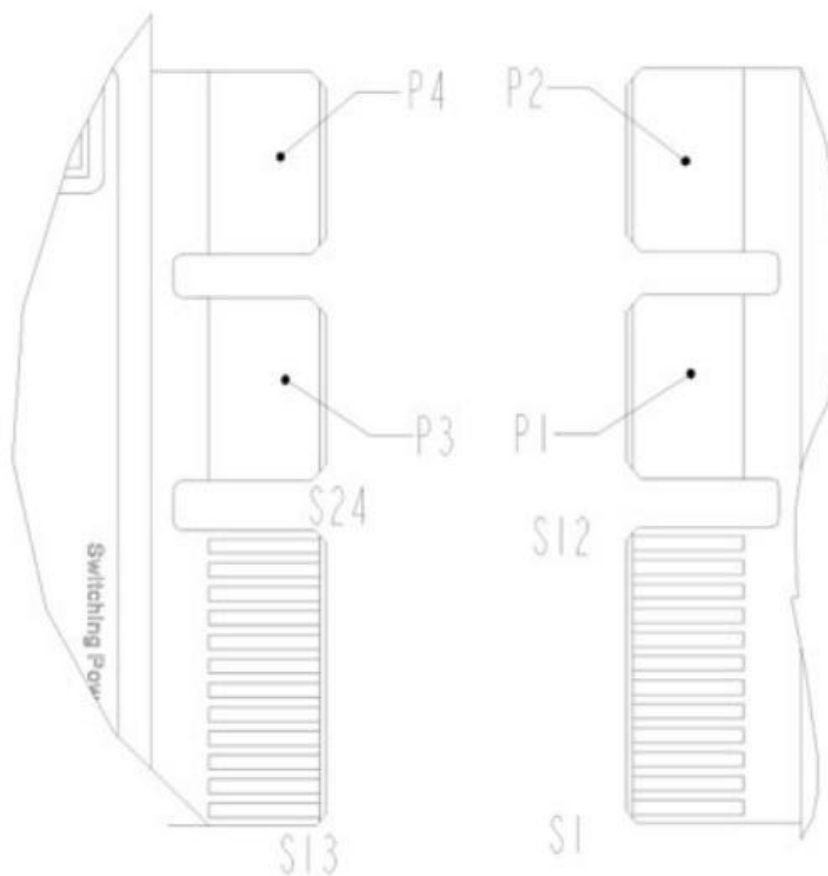




TECHNICAL DATA

Pin Assignment

Top		BOTTOM	
P4	GND	P2	+12V
P3	GND	P1	+12V
S24	5Vsb	S12	5Vsb
S23	5Vsb	S11	5Vsb
S22	A2 (Address)	S10	A1 (Address)
S21	Reserved	S9	PW_OK
S20	Reserved	S8	PS_ON
S19	AC_OK	S7	PS_KILL
S18	Reserved	S6	SCL
S17	Reserved	S5	SDA
S16	Reserved	S4	SMB_ALERT
S15	A0 (Address)	S3	I_Share
S14	PRESENT	S2	+12VRS-
S13	Reserved	S1	+12VRS+



TOP SIDE

BOTTOM SIDE





TECHNICAL DATA

PMBus

PSU NO.	FRU/PSU	A2 (Address)	A1 (Address)	A0 (Address)
0	0xA0/0xB0	L	L	L
1	0xA2/0xB2	L	L	H
2	0xA4/0xB4	L	H	L
3	0xA6/0xB6	L	H	H
4	0xA8/0xB8	H	L	L
5	0xAA/0xBA	H	L	H

Parameter	Value
PMBus Revision	Version1.2, 100kHz
Input Voltage Accuracy	±2%
Input Current Accuracy	±0.1A, input current under 2A, ±5%, input current over 2A
Input Power Accuracy	±5W, input power under 100W, ±5%, input power over 100W
+12V Output Voltage Accuracy	±2%
+12V Output Current Accuracy	±0.5A, Output current under 5A, ±10%, Output current over 5A
5Vsb Output Voltage Accuracy	±2%
5Vsb Output Current Accuracy	±0.3A
Total Output Power Accuracy	±15W

Command Code	Command Name	PMBus Transaction Type: Writing Data	PMBus Transaction Type: Reading Data	# of Data Bytes	Limits	Comment
03h	CLEAR_FAULTS	Send Byte	N/A	0		
18h	SMBALERT_MASK	Write Word	Block Write-Block Read Process Call	2		
20h	VOUT_MODE	N/A	Read Word	2		Exponent = -9
3Ah	FAN_CONFIG_1_2	N/A	Read Byte	1		
3Bh	FAN_COMMAND_1	N/A	Read Word	2	0 ~ 100	Linear 11
40h	VOUT_OV_FAULT_LIMIT	N/A	Read Word	2		
42h	VOUT_OV_WARN_LIMIT	N/A	Read Word	2		
43h	VOUT_UV_WARN_LIMIT	N/A	Read Word	2		
44h	VOUT_UV_FAULT_LIMIT	N/A	Read Word	2		
46h	IOUT_OC_FAULT_LIMIT	N/A	Read Word	2		
48h	IOUT_OC_LV_FAULT_LIMIT	N/A	Read Word	2		
4Ah	IOUT_OC_WARN_LIMIT	N/A	Read Word	2		
4Bh	IOUT_UC_FAULT_LIMIT	N/A	Read Word	2		
4Fh	OT_FAULT_LIMIT	N/A	Read Word	2		
51h	OT_WARN_LIMIT	N/A	Read Word	2		
52h	UT_WARN_LIMIT	N/A	Read Word	2		
53h	UT_FAULT_LIMIT	N/A	Read Word	2		
55h	VIN_OV_FAULT_LIMIT	N/A	Read Word	2		
57h	VIN_OV_WARN_LIMIT	N/A	Read Word	2		
58h	VIN_UV_WARN_LIMIT	N/A	Read Word	2		





TECHNICAL DATA

PMBus

Command Code	Command Name	PMBus Transaction Type: Writing Data	PMBus Transaction Type: Reading Data	# of Data Bytes	Limits	Comment
59h	VIN_UV_FAULT_LIMIT	N/A	Read Word	2		
5Bh	IIN_OC_FAULT_LIMIT	N/A	Read Word	2		
5Dh	IIN_OC_WARN_LIMIT	N/A	Read Word	2		
68h	POUT_OP_FAULT_LIMIT	N/A	Read Word	2		
6Ah	POUT_OP_WARN_LIMIT	N/A	Read Word	2		
6Bh	PIN_OP_WARN_LIMIT	N/A	Read Word	2		
78h	STATUS_BYTE	Write Byte	Read Byte	1		
79h	STATUS_WORD	Write Word	Read Word	2		
7Ah	STATUS_VOUT	Write Byte	Read Byte	1		
7Bh	STATUS_IOUT	Write Byte	Read Byte	1		
7Ch	STATUS_INPUT	Write Byte	Read Byte	1		
7Dh	STATUS_TEMPERATURE	Write Byte	Read Byte	1		
7Eh	STATUS_CML	Write Byte	Read Byte	1		
7Fh	STATUS_OTHER	Write Byte	Read Byte	1		
80h	STATUS_MFR_SPECIFIC	Write Byte	Read Byte	1		
81h	STATUS_FANS_1_2	Write Byte	Read Byte	1		
82h	STATUS_FANS_3_4	Write Byte	Read Byte	1		
88h	READ_VIN	N/A	Read Word	2		Linear 11
89h	READ_IIN	N/A	Read Word	2		Linear 11
8Ah	READ_VCAP	N/A	Read Word	2		Linear 11
8Bh	READ_VOUT	N/A	Read Word	2		Linear 16
8Ch	READ_IOUT	N/A	Read Word	2		Linear 11
8Dh	READ_TEMPERATURE_1	N/A	Read Word	2		Linear 11
8Eh	READ_TEMPERATURE_2	N/A	Read Word	2		Linear 11
8Fh	READ_TEMPERATURE_3	N/A	Read Word	2		Linear 11
90h	READ_FAN_SPEED_1	N/A	Read Word	2		Linear 11
94h	READ_DUTY_CYCLE	N/A	Read Word	2		Linear 11
95h	READ_FREQUENCY	N/A	Read Word	2		Linear 11
96h	READ_POUT	N/A	Read Word	2		Linear 11
97h	READ_PIN	N/A	Read Word	2		Linear 11
98h	PMBUS_REVISION	N/A	Read Byte	1		V1.2
99h	MFR_ID	N/A	Block Read	7	"PHIHONG"	
9Ah	MFR_MODEL	N/A	Block Read	13	"AQ350A-120A-R"	
9Bh	MFR_REVISION	N/A	Block Read	4	"XXXX"	
9Ch	MFR_LOCATION	N/A	Block Read	7	"XXXXXXX"	





TECHNICAL DATA

PMBus

Command Code	Command Name	PMBus Transaction Type: Writing Data	PMBus Transaction Type: Reading Data	# of Data Bytes	Limits	Comment
9Dh	MFR_DATE	N/A	Block Read	6	"YYMMDD"	
9Eh	MFR_SERIAL	N/A	Block Read	24		Refer to FRU Data Linear 11
A0h	MFR_VIN_MIN	N/A	Read Word	2		Linear 11
A1h	MFR_VIN_MAX	N/A	Read Word	2		Linear 11
A2h	MFR_IIN_MAX	N/A	Read Word	2		Linear 11
A3h	MFR_PIN_MAX	N/A	Read Word	2		Linear 11
A4h	MFR_VOUT_MIN	N/A	Read Word	2		Linear 16
A5h	MFR_VOUT_MAX	N/A	Read Word	2		Linear 16
A6h	MFR_IOUT_MAX	N/A	Read Word	2		Linear 11
A7h	MFR_POUT_MAX	N/A	Read Word	2		Linear 11
A8h	MFR_TAMBIENT_MAX	N/A	Read Word	2		Linear 11
A9h	MFR_TAMBIENT_MIN	N/A	Read Word	2		Linear 11
CEh	STB_SETTING_ENABLE	Write Word	N/A	2		
CFh	STB_VOLTAGE_SETTING	Write Byte	N/A	1		
D0h	MFR_DEVICE_CODE	N/A	Block Read	4	"SPDD"	
D1h	ISP_KEY	Block Write	N/A	4		
D2h	ISP_STATUS	Write Byte	Read Byte	1		
D4h	ISP_MEMORY	Block Write	N/A	16		
D9h	FW_VERSION	N/A	Block Read	6	A?B?C?	FW_VERSION
E4h	MFR_PAGE	Write Byte	Read Byte	1		
E5h	MFR_POS_TOTAL	N/A	Block Read	4		
E6h	MFR_POS_LAST	N/A	Block Read	4		
E7h	CLEAR_HISTORY	Send Byte	N/A	0		
EAh	MFR_DEBUG_INFORMATION	N/A	Block Read	5		
EBh	PSU_FEATURES	Write Byte	Read Byte	1		
ECh	MFR_SAMPLE_SET	N/A	Block Read	160		
F0h	MFR_FACTORY_MODE	Write Byte	Read Byte	1		

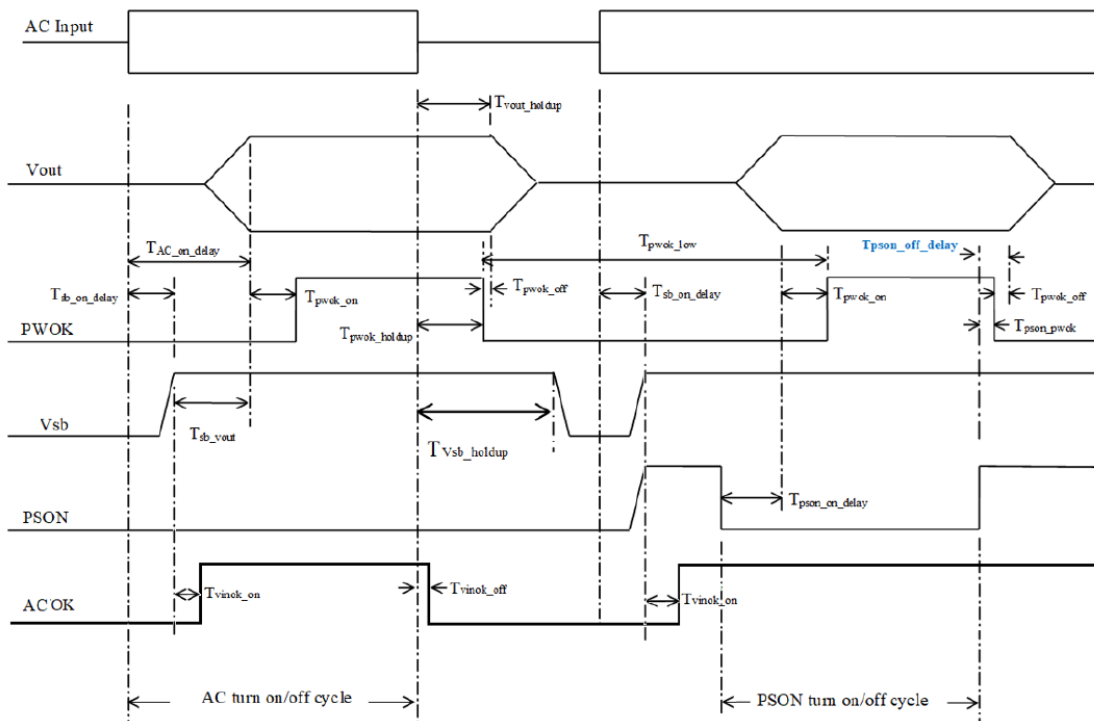




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Timing

Item	Description	Min	Max	Units
Tvout_rise	Output voltage rise time from 10% to 90%	2	20	mS
Tsb_on_delay	Delay from input applied to 5Vsb on		1500	mS
Tvinok_on	Delay from 5Vsb on to AC_OK high	0	50	mS
Tsb_Vout	Delay from 5Vsb on to +12V on	50	1000	mS
Tac_on_delay	Delay from input applied to +12V on		3000	mS
Tpwok_on	Delay from +12V on to PW_OK high	380	420	mS
Tvinok_off	Delay from input loss to AC_OK low	1	4	mS
Tpwok_holdup	Delay from input loss to PW_OK low	10		mS
Tpwok_off	Delay from PW_OK low to +12V off	1		mS
Tvout_holdup	Delay from input loss to +12V off	11		mS
Tvsb_holdup	Delay from input loss to 5Vsb off	70		mS
Tpson_on_delay	Delay from PS_ON low to +12V on	5	400	mS
Tpson_pwok	Delay from PS_ON high to PW_OK low		3	mS
Tpson_off_delay	Delay from PS_ON high to +12V off		5	mS





TECHNICAL DATA

Over Current Warning (OCW) (Optional)

Item	OCW1	OCW2	OCW3
Default Set Point Threshold	100%	125%	140%
Set Point Tolerance	-5% / +0%	-0% / 5%	-0% / 5%
Hysteresis	5%	5%	5%
Programmable Threshold Capability	YES	Below default set point	YES
Programmable Range	15% - 120%	N/A	Assertion: 25% - 140% ,De-assertion: setpoint -5%
Averaging Window Default Set Point	250mS	5mS	1mS
Averaging Window Set Point Tolerance	+/-50uS	+/-50uS	+/-50uS
Averaging Window Programmable Capability	YES	NO	YES
Averaging Window Range	1mS – 250mS	N/A	1mS – 5mS

Firmware Update

Item	Description
In system firmware update	PSU stay in ON state
FW Image 1	Boot Loader Image
FW Image 2	Main Program
FW Image 3	Backup Program
Microcontroller	1. Secondary housekeeping; 2. Primary controller (optional);3. Secondary controller (optional)
LED	Updating: Blinking Amber Update failed (incorrect checksum): Solid Amber

Firmware Security (Optional)

Item	Description
SPDM Revision	Ver 1.2
Root of Trust (RoT)	Immutable boot code control
Code Protection	Read/Write/Erase/Debugging
Code Signing Authentication	Using Public key (secured storage)
Device Authentication	Using Private key (secured storage)

Environment

Item	Description
Operation Temperature	0C to 50C, (50C to with 70C Power de-rating)
Operating Humidity	20% to 90%
Storage Temperature	-10C to 70C
Storage Humidity	5% to 95%
Operating Altitude	5000 meters
Airflow Direction	Normal (from output gold finger to AC inlet)

EMC and Hi-Pot

Item	Description
Conducted Emissions	Class A
Radiated Emissions	Class A
Harmonics EN61000-3-2	Class D
ESD IEC61000-4-2	4kV Contact / 8kV Air
Radiated Immunity IEC61000-4-3	80-1000Mhz 3V/m, Criteria A
EFT IEC61000-4-4	1KV, Criteria A
Surge IEC61000-4-5	AC Input, CM±2.0KV, DM±1.0KV





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Item	Description
Conducted Immunity IEC61000-4-6	150KHz-80MHz, 3Vrms, Criteria A
Voltage Dips IEC61000-4-11	30%/10mS Criteria A ;60%/100mS Criteria A; 95%/500mS Criteria B
Hi-Pot	3000Vac/1min, input to output; 1500Vac/1min, input to case

Safety

UL	UL 60950 & UL 62368-1
CUL	CSA C22.2 NO.60950-1 & NO. 62368-1
TUV	TUV EN-60950-1 & EN-62368-1
CE	
CB	
CCC/CQC	
BSMI	
KC+KCC	(Optional)
BIS	(Optional)

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