SUPLET®

Technical Specification

Common Redundant Power Supply (CRPS)

SAC1300AA

100Vac to 127Vac Input; 12Vdc/82A, 12Vsb/3A Output
200Vac to 240Vac input; 12Vdc/106.5A, 12Vsb/3A Output
180Vdc to 300Vdc input; 12Vdc/106.5A, 12Vsb/3A Output

RoHS Compliant

Features

- 1300W output power
- 90Vac-264Vac/180-300Vdc Input
- 80PLUS® Platinum efficiency
- N+1 Redundant(N=4max)
- Hot-pluggable
- Active current sharing
- PMBus® compliant
- Conducted/Radiated EMI Class A Limits
- 40mm*73.5mm*185mm(H*W*D)

Applications

- Repeaters
- Transmitters
- Enterprise Networks
- Industrial equipments
- Switches

Description

The SAC1300AA is a common redundant power supply (CRPS). It can operate from 90Vac to 264Vac and 180Vdc to 300Vdc input, and +12/+12Vsb dual outputs. The output power, output voltage and output current can be reported to system. It provides input over/under protection, output over current protection, output over voltage protection, output short circuit and over temperature protection. The parallel number of PSU is limited to 4.

Electrical Specifications

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

Input Characteristics

Parameters		Units	Specifications			Notes & conditions
			Min.	Typ.	Max.	
AC Input Voltage Range		Vac	90	-	264	
DC Input Voltage Range		Vdc	180	-	300	
AC Rated Input Voltage Range		Vac	100	-	127	
		Vac	200	-	240	
DC Rated Input Voltage		Vdc	-	240	-	
Maximum input current	100≤Vrms≤127	A	-	-	12	Maximum rated input current is being tested at 100Vac and 200Vac
	200≤Vrms≤264	A	-	-	8	
	240Vdc	A			7	
Frequency		Hz	47	50/60	63	
Power factor	10% load		0.91	-	-	230Vac/50Hz and 115Vac/60Hz
	20% load		0.97	-	-	
	50% load		0.98	-	-	
	100% load		0.99	-	-	
Input Inrush Current		A	-	-	25	240Vac, 25℃, cold start, duration 1200ms
		A	-	-	25	240Vdc, 25℃, cold start, duration 1200ms
iTHD	10%load	%	15	-	-	230Vac/50Hz, 115Vac/60Hz
	20%load	%	10	-	-	

	50%load	%	8	-	-	
	100%load	%	5	-	-	

Output Characteristics

Parameters		Units	Specifications			Notes & conditions
			Min.	Typ.	Max.	
Output Voltage set point	12V Main	Vdc	11.4	12	12.6	
	12Vsb	Vdc	11.4	12	12.6	
Voltage Regulation	12V Main	%Vo	-	-	±5	
	12Vsb	%Vo	-	-	±5	
Output Current	12V Main	A	-	-	82	90~140Vac
	12V Main	A	-	-	106.5	180~264Vac
	12Vsb	A	-	-	3	
Output Power	12V main	W	-	1000	-	90~140Vac
	12V main	W	-	1300	-	180~264Vac
Dynamic Load	12V Main	V	11.4	-	12.6	Frequency Range: 50Hz-10kHz Step Load Size:60% of max load Slew Rate:2.5A/uS Test Capacitive Load:2200uF Min Load:1.0A
	12Vsb	V	11.4	-	12.6	Frequency Range: 50Hz-10kHz Step Load Size:1.0A Slew Rate:2.5A/uS Test Capacitive Load:100uF
Capacitive Load	12V Main	μF	2200	-	22,000	
	12Vsb	μF	100	-	3,100	
Ripple and Noise	12V Main	mVp-p	-	-	120	10Hz~20MHz bandwidth, being tested with only PS capacitance plus 10uF ordinary aluminum electrolytic and 0.1uF Ceramic capacitor
	12V Main	mVp-p	-	-	105	

	12Vsb	mVp-p	-	-	120	
Turn on/off Overshoot		%Vo	-	-	±10	
Output Rise Time	12V Main	mS	10	-	70	Time for Vo to rise from 10% of Vo(nom) to 95% of Vo(nom), 100% load
	12Vsb	mS	1	-	25	Time for Vo to rise from 10% of Vo(nom) to 95% of Vo(nom), 100% load
Turn on Delay Time	12V Main	S	-	-	3	
	12Vsb	S	-	-	1.5	
Hold Time	12V Main	mS	12	-	-	100% Load
		mS	17	-	-	50% Load
	12Vsb	mS	70	-	-	100% Load
Current Share		%	-	-	±4	50%~100%load
		%	-	-	±5	20%~50%load
		%	-	-	±10	10%~20%load
Hot-plugging			Support hot-plugging, no insulation breakdown at input terminals			

Alarm Characteristics

Parameter	Units	Specifications			Notes & conditions
		Min.	Typ.	Max.	
Input Under Voltage Alarm	Vac	75	78	81	
	Vdc	162	165	168	
Input Under Voltage Alarm Recovery	Vac	81	84	87	
	Vdc	167	170	173	
Input Over Voltage Alarm	Vac	302	305	308	

	Vdc	327	330	333	
Input Over Voltage Alarm Recovery	Vac	295	298	301	
	Vdc	323	326	329	
Output Current Alarm	%	110	-	120	Slow over current warning Trip timing 25mS~50mS Rating load to max. value
	%	135	-	145	Fast over current warning Trip timing 500uS~700uS Rating load to max. value Latch and hold for 50~150mS
Over Temperature Alarm	℃	59	62	65	Automatic recovery

Protection Characteristics

Parameter		Units	Specifications			Notes & conditions
			Min.	Typ.	Max.	
Input Under Voltage Protection		Vac	72	75	78	50% load, hysteresis≥5Vac
		Vdc	157	160	163	
Input Under Voltage Protection Recovery		Vac	81	84	87	
		Vdc	167	170	173	
Input Over Voltage Protection		Vac	305	308	311	
		Vdc	333	336	339	
Input Over Voltage Protection Recovery		Vac	295	298	301	
		Vdc	323	326	329	
Output Under Voltage Protection	12V Main	Vdc	10	-	11	
	12Vsb	Vdc	10	-	11	
Output Over Voltage Protection	12V Main	Vdc	13.5	-	14.5	12V OVP shall re-try three times and then keep latch-off, the interval of retry is 3 Sec Latch-off.

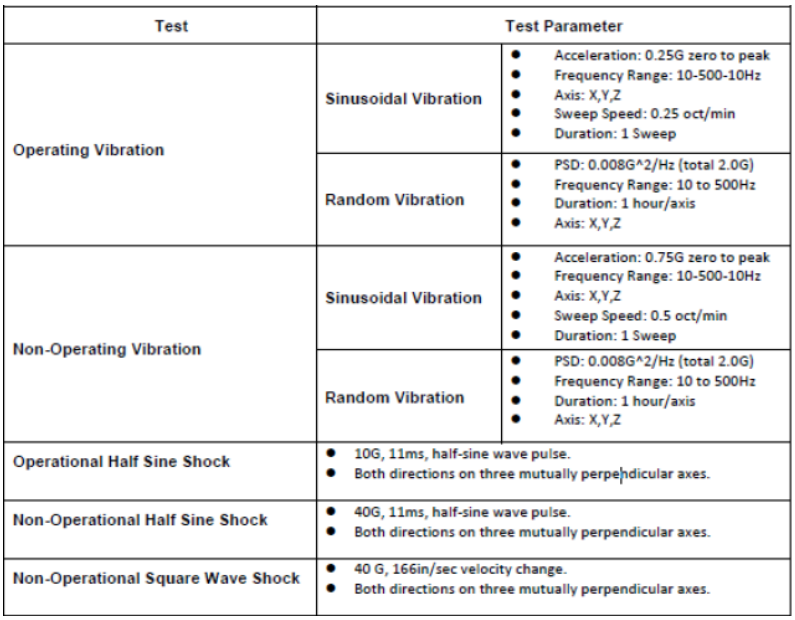
	12Vsb	Vdc	13.5	-	14.5	For VSB rail, time interval is 1 Sec but no latch-off, the VSB shall keep retry until fault removed. The tolerance on time is 100mS
Output Over Current Protection	12V main	%	125	-	135	Slow over current protection Trip timing 50mS~100mS Rating load to max. value Shutdown, latch
	12V main	%	145	-	155	Fast over current protection Trip timing 10mS~15mS Rating load to max. value Shutdown, latch
	12Vsb	A	3.5	-	5	Trip timing 10mS Rating load to max. value Shutdown, hiccup mode
Short Circuit Protection	12V main		shuts down, latch off			
	12Vsb		Automatic recovery			
Over Temperature Protection		℃	62	65	68	Automatic recovery

General Characteristics

Parameter		Units	Specifications			Notes & conditions
			Min.	Typ.	Max.	
Efficiency	10%load	%	85	-	-	230Vac It is measured at 20-25°C after supply has run for 30 minutes.
	20%load	%	90	-	-	
	50%load	%	94	-	-	
	100%load	%	91	-	-	
Cooling		Air cooling				
Failure isolation		It can be isolated after the PSU is failure				

Environment Characteristics

Parameter	Units	Specifications			Notes & conditions
		Min.	Typ.	Max.	
Operating temperature(1)	℃	-5	25	55	Maximum rate of change is 10 °C /hr.

Non-Operating Ambient	℃	-40	-	85	Maximum rate of change is 20 °C /hr
Storage temperature	℃	-40	-	70	
Operating Humidity	%(H)	5	-	90	Non-condensing
Non-Operating Humidity	%(H)	-	-	95	Non-condensing
Operating Altitude(2)	m	-	-	5000	
Non-Operating Altitude	m	-	-	15,200	
Thermal shock(none-operating)	Minimum -40°C to Maximum +70°C, transition time not to exceed 5 minutes. Duration of exposure to temperature extremes will be 20 minutes				
Mechanical Shock and Random Vibration					

Test	Test Parameter	
Operating Vibration	Sinusoidal Vibration	● Acceleration: 0.25G zero to peak ● Frequency Range: 10-500-10Hz ● Axis: X,Y,Z ● Sweep Speed: 0.25 oct/min ● Duration: 1 Sweep
	Random Vibration	● PSD: 0.008G^2/Hz (total 2.0G) ● Frequency Range: 10 to 500Hz ● Duration: 1 hour/axis ● Axis: X,Y,Z
Non-Operating Vibration	Sinusoidal Vibration	● Acceleration: 0.75G zero to peak ● Frequency Range: 10-500-10Hz ● Axis: X,Y,Z ● Sweep Speed: 0.5 oct/min ● Duration: 1 Sweep
	Random Vibration	● PSD: 0.008G^2/Hz (total 2.0G) ● Frequency Range: 10 to 500Hz ● Duration: 1 hour/axis ● Axis: X,Y,Z
Operational Half Sine Shock	● 10G, 11ms, half-sine wave pulse. ● Both directions on three mutually perpendicular axes.	
Non-Operational Half Sine Shock	● 40G, 11ms, half-sine wave pulse. ● Both directions on three mutually perpendicular axes.	
Non-Operational Square Wave Shock	● 40 G, 166in/sec velocity change. ● Both directions on three mutually perpendicular axes.	

Note:

1) The PSU allows a power de-rating operating once the operating temperature is 5°C over specified temperature and the acceptable output load is 80% of output load.

2) The system ambient supports at 950m (3,000feet) altitude.

Maximum operating temperature is de-rated 1℃ per 125m above 950m.

Safety Specification

Items	Notes & conditions
Safety certification	IEC60950、UL60950、EN60950 and GB4943
Isolation voltage (Primary-Secondary)	3000Vac(4242Vdc) isolation voltage, test duration 1 minute, leak current less than 10mA, no arcing or breakdown
Isolation resistance (input-output)	Isolation resistance ≥10MΩ at 90% relative humidity, non-condensing and 500Vdc test voltage
Leakage current (input-ground)	875uA (230Vac, 60Hz input)
Leakage resistance	<0.1Ω(40A/2min)

EMC Specification

Parameters		Class	Notes & conditions
Conducted Emission		CLASS A, 6dB margin	FCC, EN 55032(CISPR 22)
Radiated Emission		CLASS A, 6dB margin	FCC, EN 55032(CISPR 22)
ESD	Air	+/-15kV	EN 61000-4-2 Criterion A
	Contact	+/-8kV	EN 61000-4-2 Criterion A
RS		80~1000MHz, 10V/m	EN61000-4-3 Criterion A
CS		AC Power Port; DC Power Port; Signal Ports and Telecommunication Ports: 0.15 ~ 80 MHz, 10Vrms	EN61000-4-6 Criterion A
Power frequency magnetic field immunity test		50 Hz or 60 Hz, 1A/m	IEC 61000-4-8 Criterion A
Electrical fast transient/burst		AC Power Port 1kV/2kV	EN61000-4-4 Criterion A (for 1kV) , Criteria B (For 2kV)
Surge		AC Power Port ~ line to line: 2kV/(2ohm), line to earth (ground): 2kV/(2ohm)	EN55024: 1998/A1: 2001/A2:2003, EN 61000-4-5: Ed. 1.1:2001-04 Criteria A Applied stress over than specified but less than 6kV for Line to Line or Line to GND shall not get fire.
Voltage dips, short interruptions		i) >95% reduction for 0.5 period, ii) 30% reduction for 25 period, iii) >95% reduction for 250 period	EN61000-4-11 Criteria B

Performances Criterion
Criteria A, The apparatus shall continue to operate as intended. No degradation of performance.
Criteria B, The apparatus shall continue to operate as intended, no degradation of performance beyond spec limits after test.
Criteria C, Temporary loss of function is allowed provided the function is self-recoverable or can be restored by the operation of the controls.

Control Signal

PS-ON signal

PSON# signal is required to remotely turn on/off the power supply module. PSON# is an active low signal that turns on the +12V power rail. When the signal is at logic high voltage, +12V output will be turned off (except for 12Vsb). This signal is pulled to standby voltage by a pull-up resistor internal to the power module. It is required to provide 5mA or above pull-down current from external. Refer to following Table for timing diagram.

PSON# Signal Characteristic

Signal type	Pull-up to internal V_{CC} located in power supply	
PSON#=Low	PSUON	
PSON#= Open or High	PSUOFF	
	MIN	MAX
Logic level low(PSUON)	0V	1V
Logic level high(PSUOFF)	2.0 V	3.46 V
Source current, $V_{PSON\#}$ =low		4 mA

PWOK

PWOK is a power OK signal and will be pulled HIGH by the power supply to indicate that all the outputs are within the regulation limits of the power supply. When any Output voltage falls below regulation limits or when AC power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, PWOK will be de-asserted to a LOW state. See the following table for a representation of the timing characteristics of PWOK. The start of the PWOK delay time shall inhibited as long as any power supply output is in current limit.

PWOK# Signal Characteristic

Signal Type	Accepts an open collector/drain input from the system. Pull up to VSB located in power supply.	
PWOK = High	Power OK	
PWOK = LOW	Power Not OK	
	MIN	MAX
Logic level Low, Isink = 400uA	0V	0.4V
Logic level High, Isource = 200uA	2.4V	3.46V
Source current, PWOK = high		2mA

Sink current, PWOK = low		400uA
PWOK rise and fall time		100us

Power Good (PWOK or P_GOOD)

This signal should be asserted high by the power supply to indicate that all outputs are within the regulation thresholds. Conversely, this signal should be de-asserted to a low state when any of the DC outputs voltage falls below its under voltage threshold, or when mains power has been removed for a time sufficiently long so that power supply operation can't be guaranteed.

This signal will have an internal pull-up resistor to internal 3.3V sources.

Signal type	Pull-up to VSB located in the power supply.	
PWOK or P_Good= High	DC Outputs O.K.	
PWOK or P_Good= Low	DC Outputs N.G.	
	Minimum	Maximum
Logical Level Low, I_{SINK}= 400 uA	0V	0.4V
Logical Level High, I_{SOURCE}= 500 uA	2.4V	3.46V
Sink current, PWOK = low		400 uA
Source current, PWOK = high		500 uA
PWOK delay: T_{PWOK_ON}	100mS	500mS
Power down delay: T_{PWOK_OFF}	1 mS	
PWOK or P_Good Rise &Fall Time		100 uSec

PRESENT#

This pin will be tied to Standby return through a resistor. System side should have a pull-up resistor which limits the max current 4mA to go through from this signal pin to the power supply, the pull-down resistor shall be 0 ohm with 1206 package or short PRESENT# to ground directly.

Load Share Signal

This input / output will allow two or more power supplies to share output current between them. If one of the supplies fails the remaining supplies must pick up the entire load without any of the outputs dropping out of regulation. A defective supply that is connected to the output voltage bus will not have adverse effect on the operation of the remaining function supplies.

Total Load	Number of supplies	V_{LS}(V) Minimum	V_{LS} (V) Nominal	V_{LS}(V) Maximum
100%	2	3.8	4	4.2
50%	2	1.8	2	2.2
20%	2	0.64	0.8	0.96
100%	1	7.76	8	8.24

50%	1	3.8	4	4.2
20%	1	1.4	1.6	1.8
0%	1	0	0	0.3

SMBalert Signal

This signal indicates that the power supply is experiencing a problem that the user should investigate. This shall be asserted due to Critical events or Warning events. The Signal shall activate in case of critical component temperature reached a warning threshold point, general failure, over-current, over voltage, under voltage, failed fan. This signal may also indicate the power supply is reaching its end of life or is operating in an environment exceeding the specified limits.

This signal is to be asserted in parallel with LED turning solid Amber or blink Amber.

SMBAlert# Signal Characteristic

Signal type	Pull-up to internal 3.3Vsb located in power supply.	
SMBAlert#= High	OK	
SMBAlert#= low	Power Alert to system	
	Minimum	Maximum
Logical Level Low, I_{SINK} = 4 mA	0V	0.4 V
Logical Level High, I_{SINK}= 50 uA	2.4V	3.46 V
Sink current, Alert#=low		4 mA
Sink current, Alert#=high		50 uA
Alert# fall time		10 uSec

Address_A0 / A1

This signal is defined by end user system for PMBus communication, to allocate address of power supply unit in particular slot location. This signal has an internal resistor to internal 3.3 V located in power supply. The address of power supply unit must be set by user system for PMBUS communication reliability.

Signal type	Pull-up to internal 3.3 V located in power supply	
	Minimum	Maximum
Logical Level Low	0V	0.66V
Logical Level High	2.64V	3.46V

PMBus CLOCK_SCL & DATA_SDA

SCL is the SMBus clock input to the supply, SDA is the bi-directional SMBus data path to /from the supply. Both signals have a pull-up resistor to 3.3 V internal located in power supply. The pull-up must be diode isolated to prevent an unpowered/ faulted supply from loading the signal. It must be designed to not glitch bus during hot plug and unplugging. The PMBus operation frequency is 100 kHz. It shall conform to SMBus V2.0 signaling protocol standards. And this specification is based on the PMBus specification parts I and II, revision 1.2. The hardware setting in SDA and SCL is

Inner Pulled up Resistor to internal 3.3V = 10k ohm / 0603.
Inner Filter MAX capacitor less than 68pF.
Inner serial Resistor (Rs) = 10 ohm / 0603.

Note:

1. Once the internal communication between primary and second DSP/MCU fault is detected, the Fan speed shall be run at full speed until the fault is removed.

REMOTE SENSE + / REMOTE SENSE –

These signals are analog Input / Output 12VOUT Main Voltage Sense. Both are analog input / output voltage sense lines to compensate for power path voltage drop. These low level analog signals should be isolated from digital circuit noise. When one or more remote sense lines are opened, regulation measured at the power supply output connector must be maintained within regulation defined, plus or minus an additional 200 mV but no more than 300 mV.

VIN_GOOD#

This signal is an output to indicate AC power is existence and is within operation range. It should act from high to low level within 4 mS only for Vin drops out to zero and input voltage brown-out events. The 4mS timing is defined as Vin = 0 to Vin_GOOD signal low level.

Signal type	Pull-up 1kΩ to internal 3.3 Vlocated in power supply	
VIN_GOOD= High	Input voltage is in operating range	
VIN_GOOD = low	Input voltage is out of operating range	
	Minimum	Maximum
Logical Level Low,I_{SINK} = 4 mA	0V	0.4 V
Logical Level High,I_{SINK}= 50 uA	2.4V	3.46 V
Sink current,VIN_GOOD #=low		4 mA
Sink current,VIN_GOOD #=high		50 uA
VIN_GOOD #rise and fall time		400 uSec

Smart Redundant Bus

This signal should be connected together at system board for smart redundant function. Please refer to the PMBus specification for detail.

LED Indicators

The power supply may have a single Bi-color (Green-Amber) Configuration, the below table shows the behavior of LED states

Power Supply Condition	**LED State**
12V Output is normal	GREEN

No AC power to all power supplies	OFF
AC present/Only VSB on (PS off) or PS in Smart redundant state	1 Hz Blink GREEN
AC cord unplugged or AC power lost; with a second power supply in parallel still with AC input power.	AMBER
Power supply warning events where the power supply continues to operate; high temp, high power, high current and slow FAN.	1 Hz Blink AMBER
Power supply critical event causing a shutdown; failure, OCP, SCP,OVP, Fan Fail and OTP	AMBER
Power supply FW updating	2 Hz Blink GREEN

Timing

These are the timing requirements for the power supply operation. All outputs must rise monotonically. Table below shows the timing requirements for the power supply being turned on and off via the AC input, with PSON# held low and the PSON# signal, with the AC input applied.

ITEM	DESCRIPTION	MIN	MAX	UNITS
T_{VSB_RISE}	Standby voltage rise time for V_{SB}	1	25	mS
T_{12VOUT_RISE}	Output voltage rise time for $12V_{OUT}$	10	70	
$T_{VSB\_ON\_DELAY}$	Delay from AC being applied to $12V_{SB}$ being within regulation.	--	1500	
$T_{AC\_ON\_DELAY}$	Delay from AC being applied to $12V_{OUT}$ output voltage being within regulation.	--	3000	
T_{12VOUT_HOLDUP}	Time $12V_{OUT}$ output voltage stays within regulation after loss of AC with 100% load.	13	--	
T_{PWOK_HOLDUP}	Delay from loss of AC to de-assertion of PWOK with 100% load.	12	--	
$T_{PSON\#\_OFF\_DELAY}$	Delay from PSON# de-asserted to power supply turning off.@ half load	--	5	
$T_{PSON\#\_ON\_DELAY}$	Delay from PSON# active to output voltages within regulation limits.	5	400	
$T_{PSON\#\_PWOK}$	Delay from PSON# deactivate to PWOK being de- asserted.	--	5	
T_{PWOK_ON}	Delay from output voltages within regulation limits to PWOK asserted at turn on.	100	500	
T_{PWOK_OFF}	Delay from PWOK de-asserted to output voltages dropping out of regulation limits.	1	--	
T_{PWOK_LOW}	Duration of PWOK being in the de-asserted state during an off/on cycle using AC or the PSON# signal.	100	--	
T_{VSB_12VOUT}	Delay from V_{SB} being in regulation to $12V_{OUT}$ output voltage being in regulation at AC turn on.	50	1000	
T_{VSB_HOLDUP}	Time the VSB standby voltage stays within regulation after loss of AC.	70	--	
$T_{AC\_OFF\_VINGOOD}$	The time interval between AC Drop to zero to VIN_GOOD signal gets asserted.	--	4	
$T_{VINGOOD\_PWOK}$	VIN_GOOD shall be get asserted 1ms prior to PWOK during ac loss event.	1	--	

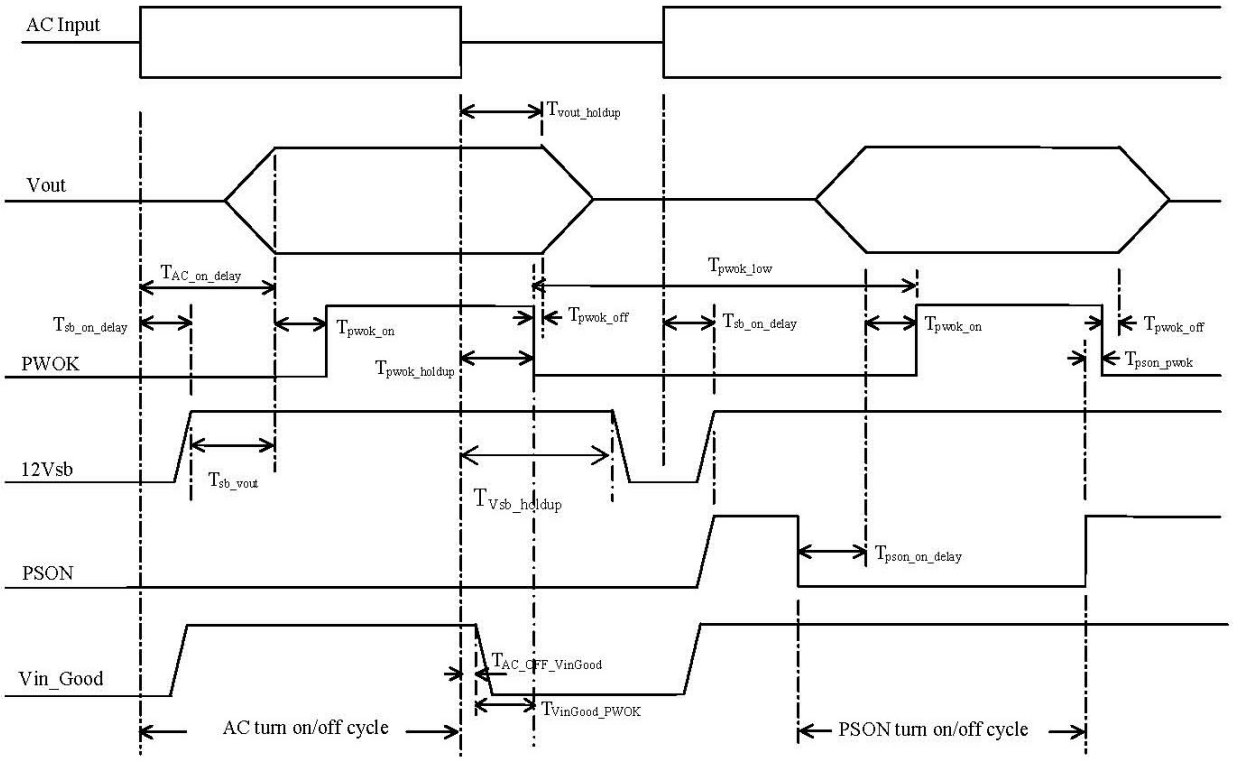


Figure 1 Timing Diagram

Fan Speed Control

The power supply shall incorporate a 40 x 28 mm^2 fan for cooling the power supply when installed in the system. The airflow direction shall be from the card edge connector side to the AC inlet side of the power supply (DC->AC) or opposite direction (AC->DC). The Fan speed control must have close loop algorithm based on both the critical component temperature and the ambient temperature (Inlet temperature). Thus ensure the PSU Fan will always ramp to maximum speed under any condition to protect the power supply from overheating.

These conditions include high ambient temperatures, loading, AC input, and airflow impedance.

Under any steady state operating condition (steady state power output level and steady state inlet air temperature), fan oscillation shall be controlled such that associated sound power level variation falls within roughly 10% mean speed. This condition may be treated as steady state fan speed condition. After the new load and/or cooling condition steady state is established, transition to the steady state fan speed shall take place within 60 Sec.

PMBus

Accuracy for V_{IN}, I_{IN}, P_{IN}, $12V_{OUT}$, I_{OUT}, P_{OUT}

Required Accuracy

	10% - <20% Load	>= 20% - 50% Load	> 50% - 100% Load
P_{IN} / E_{IN}	+/- 10W or +/- 5%	+/- 2% or +/-10W	+/- 2%
V_{IN}	+/- 5%	+/- 2%	+/- 2%
I_{IN}	+/-5% or +/-0.2A	+/-2% or +/-0.2A	+/-2%
FAN	+/- 500 rpm		
$12V_{OUT}$	+/- 2%		
I_{OUT}	+/-5% or +/-1 A	+/-2%	+/-2%
P_{OUT}	+/- 10W or +/- 5%	+/-2% or +/- 10W	+/-2%
AMB Temperature	+/- 3°C		

Smart Redundancy

Redundant power supplies in a system shall power ON or OFF depending upon loading state. Power supply ON or OFF (in the Smart Standby state) shall power on quickly to maintain full redundancy in the system. PSU in Cold Standby state should keep a low consumption Pin < 5W, the measurement procedure and setting shall refer to 80 plus protocol.

System on-Line Bootloader

The power supply unit has Bootloader function through PMBUS communication. The 12VDC is disable when the Bootloader function is implemented. Please refer FW spec for detail.

PMBUS commands

All commands have to support PEC and none-PEC.

CMD code	CMD name	SMBus Transaction Type	Data Bytes Length	Format	Value Range	Power On Default Value
00h	PAGE	R/W Byte	1		n/a	00h
01h	OPERATION	R/W Byte	1		n/a	80h
02h	ON_OFF_CONFIG	R/W Byte	1		n/a	1Dh
03h	CLEAR_FAULTS	Send Byte	0		n/a	
05h	PAGE_PLUS_WRITE	Block Write	Variable		n/a	
06h	PAGE_PLUS_READ	Block Write-Block Read Process Call	Variable		n/a	
10h	WRITE_PROTECT	R/W Byte	1		n/a	00h
16h	RESTORE_USER_ALL	Send Byte	0		n/a	

19h	CAPABILITY	Read Byte	1		n/a	B0h
1Ah	QUERY	Block Write-Block Read Process Call	1		n/a	
1Bh	SMBALERT_MASK	Write Word/ Block Write-Block Read Process Call	2		n/a	
20h	VOUT_MODE	Read Byte	1		n/a	17h
21h	VOUT_COMMAND	R/W Word	2		n/a	
3Ah	FAN_CONFIG_1_2	R/W Byte	1		90h or D0h	90h
3Bh	FAN_COMMAND_1	R/W Word	2	Linear-11	0 - 100% or 0 - Max rpm	0
40h	VOUT_OV_FAULT_LIMIT	Read Only	2	Linear-16		115% of regulation
41h	VOUT_OV_FAULT_RESPONSE	R/W Byte	1			59H
42h	VOUT_OV_WARN_LIMIT	R/W Word	2	Linear-16	95% ~ 116% of regulation	112.5% of regulation
43h	VOUT_UV_WARN_LIMIT	R/W Word	2	Linear-16	83% ~ 105% of regulation	91.6% of regulation
44h	VOUT_UV_FAULT_LIMIT	Read Only	2	Linear-16		87.5% of regulation
46h	IOUT_OC_FAULT_LIMIT	R/W Word	2	Linear-11	0% ~ 150% max load	130% of max load
47h	IOUT_OC_FAULT_RESPONSE	R/W Byte	1			59h
4Ah	IOUT_OC_ WARN_LIMIT	R/W Word	2	Linear-11	0% ~ 200% of max load	115% of max load
4Fh	OT_FAUL_LIMIT	R/W Word	2	Linear-11	0~512C	65C
50h	OT_FAULT_RESPONSE	R/W Byte	1			C1h
51h	OT_WARN_LIMIT	R/W Word	2	Linear-11	0C ~ 512C	62C

55h	VIN_OV_ FAULT_ LIMIT	Read Word	2	Linear-11	n/a	305V
56h	VIN_OV_ FAULT_ RESPONSE	Read Byte	1		n/a	C1h
57h	VIN_OV_ WARN_LIMIT	Read Word	2	Linear-11	n/a	305V
58h	VIN_UV_ WARN_LIMIT	Read Word	2	Linear-11	n/a	78V
59h	VIN_UV_ FAUL_LIMIT	Read Word	2	Linear-11	n/a	75V
5Ah	VIN_UV_ FAUL_ RESPONSE	Read Byte	1		n/a	C1h
5Bh	IIN_OC_FAULT_LIMIT	Read Word	2	Linear-11	n/a	130% of max load
5Dh	IIN_OC_WARN_LIMIT	Read Word	2	Linear-11	n/a	125% of max load
78h	READ_STATUS_BYTE	Read Byte	1	**bit field**	n/a	
79h	STATUS_WORD	Read Word	2	**bit field**	n/a	
7Ah	STATUS_VOUT	R/W Byte	1	**bit field**	n/a	
7Bh	STATUS_IOUT	R/W Byte	1	**bit field**	n/a	
7Ch	STATUS_INPUT	R/W Byte	1	**bit field**	n/a	
7Dh	STATUS_TEMPERATURE	R/W Byte	1	**bit field**	n/a	
7Eh	STATUS_CML	R/W Byte	1	**bit field**	n/a	

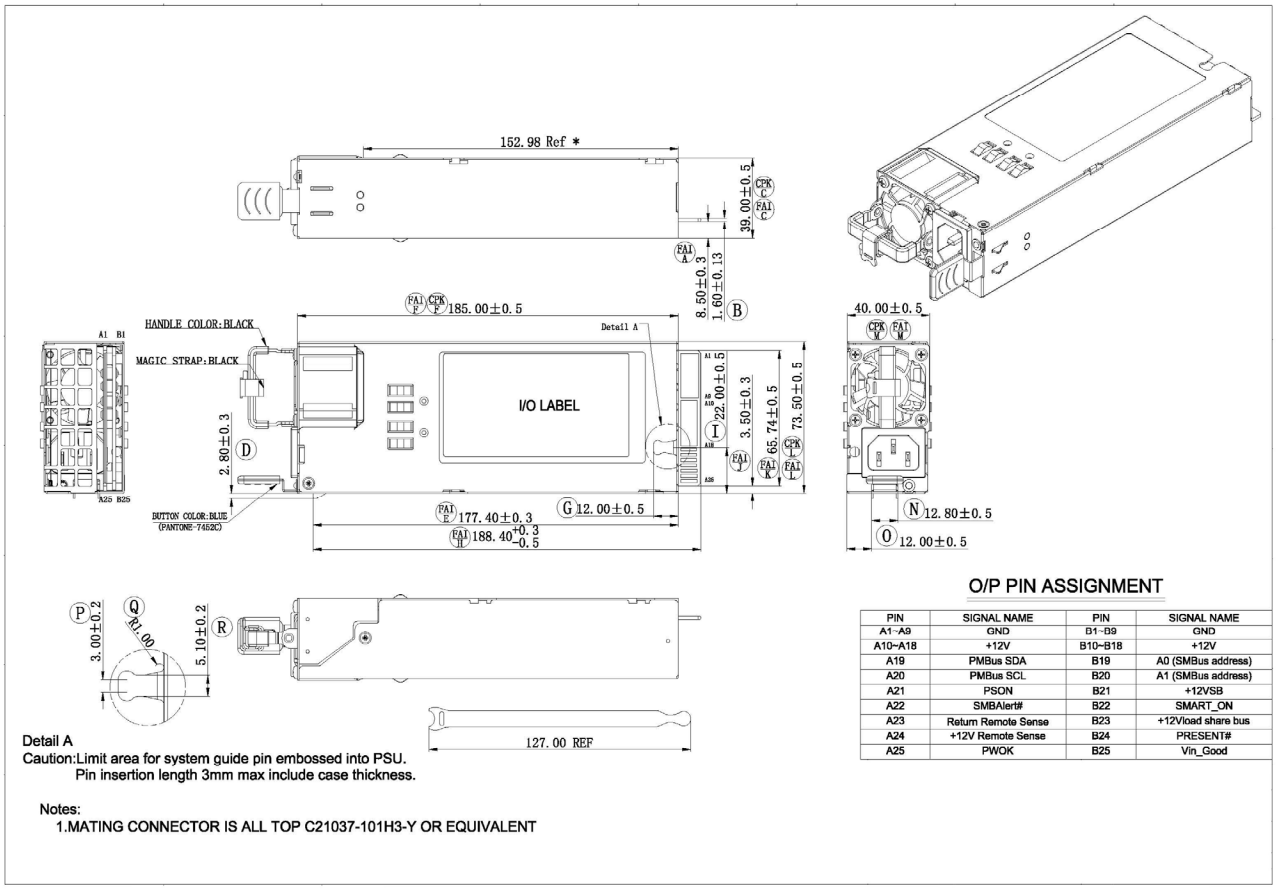
7Fh	STATUS_OTHER	R/W Byte	1	**bit field**	n/a	
80h	STATUS_MFR_SPECIFIC	Read Only	1	**bit field**	n/a	
81h	STATUS_FANS_1_2	R/W Byte	1	**bit field**	n/a	
88h	READ_VIN	Read Word	2	Linear-11		
89h	READ_IIN	Read Word	2	Linear-11		
8Bh	READ_VOUT	Read Word	2	Linear-16		
8Ch	READ_IOUT	Read Word	2	Linear-11		
8Dh	READ_TEMPERATURE_1 (Ambient)	Read Word	2	Linear-11		25℃
8Eh	READ_TEMPERATURE_2 (Secondary Hot Spot)	Read Word	2	Linear-11		25℃
8Fh	READ_TEMPERATURE_3 (Primary Hot Spot)	Read Word	2	Linear-11		25℃
90h	READ_FAN_SPEED_1	Read Word	2	Linear-11		
94h	MFR_READ_FAN_DUTY_CYCLE	Read Word	2	Linear-11	n/a	
96h	READ_POUT	Read Word	2	Linear-11		
97h	READ_PIN	Read Word	2	Linear-11		
98h	PMBUS_REVISION	Read Byte	1	hex integer	n/a	22h
99h	MFR_ID	Block Read	5	ASCII	n/a	"SUPLET"
9Ah	MFR_MODEL	Block Read	12	ASCII	n/a	“SAC1300AA”
9Bh	MFR_REVISION	Block Read	3	ASCII	n/a	"A01"
9Ch	MFR_LOCATION	Block Read	3	ASCII	n/a	“PRC”
9Dh	MFR_DATE	Block Read	4	ASCII	n/a	YYWW
9Eh	MFR_SERIAL	Block Read	14	ASCII	n/a	Available words are 14bytes in according to P.O.
A0h	MFR_VIN_MIN	Read Word	2	Linear-11	n/a	Refer HW Spec
A1h	MFR_VIN_MAX	Read Word	2	Linear-11	n/a	Refer HW Spec
A2h	MFR_IIN_MAX	Read Word	2	Linear-11	n/a	Refer HW Spec
A3h	MFR_PIN_MAX	Read Word	2	Linear-11	n/a	Refer HW Spec
A4h	MFR_VOUT_MIN	Read Word	2	Linear-16	n/a	Refer HW Spec
A5h	MFR_VOUT_MAX	Read Word	2	Linear-16	n/a	Refer HW Spec
A6h	MFR_IOUT_MAX	Read Word	2	Linear-11	n/a	Refer HW Spec
A7h	MFR_POUT_MAX	Read Word	2	Linear-11	n/a	Refer HW Spec

A8h	MFR_TAMBIENT_MAX	Read Word	2	Linear-11	n/a	Refer HW Spec
A9h	MFR_TAMBIENT_MIN	Read Word	2	Linear-11	n/a	Refer HW Spec
D0h	COLD_REDUNDANCY_CONFIG	R/W Byte	1			00h
D4h	MFR_FWUPLOAD_COMPATIBILITY	Read Word	2			
D5h	MFR_FWUPLOAD_CAPABILITY	Read Byte	1			
D6h	MFR_FWUPLOAD_MODE	Read Byte	1			
D7h	MFR_FWUPLOAD	Block Write	32			
D8h	MFR_FWUPLOAD_STATUS	Read Word	2			
D9h	MFR_FW_REVISION	Block Read	4			
E4h	MFR_PAGE_X	R/W Byte	1		0<=x<=4 Or FFh	FFh
E5h	MFR_POS_TOTAL	Read Custom	4			
E6h	MFR_POS_LAST	Read Custom	4			

Mechanical Characteristics

Outline dimension
Width: 73.5mm
Height: 40mm
Depth: 185mm excluding golden finger

Dimensions as below

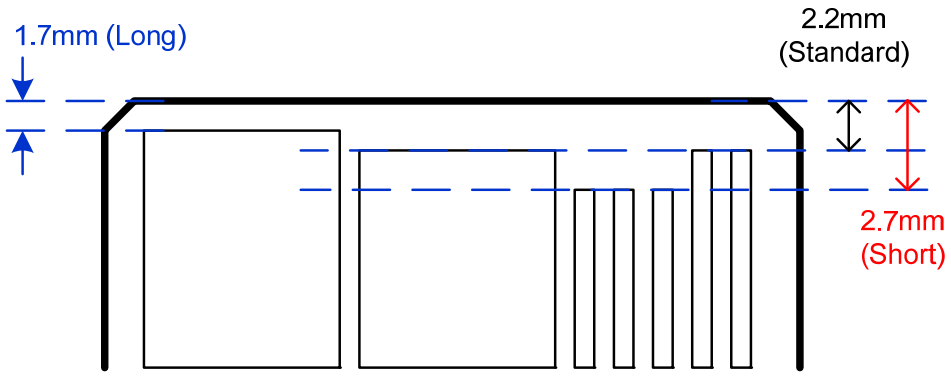


O/P PIN ASSIGNMENT

PIN	SIGNAL NAME	PIN	SIGNAL NAME
A1~A9	GND	B1~B9	GND
A10~A18	+12V	B10~B18	+12V
A19	PMBus SDA	B19	A0 (SMBus address)
A20	PMBus SCL	B20	A1 (SMBus address)
A21	PSON	B21	+12VSB
A22	SMBAlert#	B22	SMART_ON
A23	Return Remote Sense	B23	+12Vload share bus
A24	+12V Remote Sense	B24	PRESENT#
A25	PWOK	B25	Vin_Good

Pin No.	Pin Name	Pin Type	Pin Length	Description
A1~A9 B1~B9	GND	$12V_{OUT}$ main & V_{SB} Return	Long	$12V_{OUT}$main&V_{SB}Return
A10~A18 B10~B18	$12V_{OUT}$	$12V_{OUT}$ main output	Standard	$12V_{OUT}$mainoutput
A19	SDA	I / O	Short	SMBus / PMBusData
A20	SCL	I / O	Short	SMBus / PMBusClock
A21	PSON#	Input	Short	Activelow;$12V_{OUT}$main output on/off control
A22	SMBAlert#	Output	Short	Active low; I^2C alert signal(interrupt)

A23	RETURN Sense	Analog Input	Standard	12V_{OUT}main output Remote Sense-
A24	12V_{OUT} Remote Sense	Analog Input	Standard	12V_{OUT}main output remote sense+
A25	PWOK	Output	Standard	Active high; indicate 12V_{OUT}main is valid
B19	A0	Input	Standard	PMBus address 0
B20	A1	Input	Standard	PMBus address 1
B21	12V Standby V_{SB}	Aux Power	Standard	Standby voltage
B22	Smart Redundant Bus	I / O	Standard	Cold Redundancy Bus
B23	12V_{OUT} Load Share Bus	Analog Output	Standard	12V_{OUT} main output load current sharing
B24	Present	Input	Short	Power Supply Present
B25	VIN_GOOD	Output	Short	Indicate the status of input voltage



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