Project Number	PYW000234-18010	Product Model	BCF-1300S54CP
Version	S01	Development Engineer	HaoYang

Prepared	Hao Yang	Date	2023.04.25
Check	Xuejia Yang	Date	2023.04.25
Approval	Tingwang Shen	Date	2023.04.25

Update Details：

Product Technical Specification

PYW

PYW ELECTRONICS TECH. CO.,LTD.

1.0 Input:

1.1 Input Voltage

Input	Minimum	Nominal	Maximum	Units
AC	90	100~240VAC	264	**Vrms**
Frequency	47	50/60	63	**Hz**
DC	180	240	400	**V**

* Any long period of time for 265Vac~300Vac input shall not cause damage to the power supply.

1.2 Input Current

15A max at 100~127Vac and 7A max at 200~240Vac or 240Vdc input.

1.3 AC Line Fuse

The power supply has a 15A/420V fuse in the live line wire of the input. The line fusing shall be acceptable for all safety agency requirements. The input fuse shall be a slow blow type. The input inrush current shall not cause the AC line fuse to blow under any conditions. All protection circuits in the power supply shall not cause the AC fuse to blow unless a component in the power supply has failed.

1.4 AC Line Inrush Current

AC line inrush current shall not exceed 45A peak at cold start for up to one quarter of the AC cycle, after which, the input current should be no more than the specified maximum input current. The peak inrush current shall be less than the ratings of its critical components (including input fuse, bulk rectifier, and surge limiting device). Ignore the instantaneous charge current for X, Y caps, but the peak current during time should <0.2ms.The power supply must meet the inrush requirements for any rated AC voltage, during cold start at any phase of AC voltage and under 25℃ ambient temperature.

1.5 Power Factor

The power supply must meet the power factor requirements stated in the Energy Star. These requirements are stated as below table. Tested at 230Vac 50Hz or 115Vac 60Hz.

Output power	20% load	50% load	100% load
Power factor	0.92	0.96	0.98

ITHD	25%	15%	10%

1.6 AC Line Sag and Surge Requirement

AC line transient conditions are defined as “sag” and “surge”. “Sag” is defined as the AC line voltage drops below nominal voltage, “Surge” is defined as the AC line voltage rises above nominal voltage. The power supply should meet below AC line sag an surge conditions.

AC Line Sag Transient Performance

Duration	Sag	Operating AC Voltage	Frequency	Requirement
0.5 AC cycle	95%	100~240VAC	50/60Hz	Full load and no loss of function and performance
>1.0 AC cycle	>30%	100~240VAC	50/60Hz	Loss of function acceptable, self-recoverable.

AC Line Surge Transient Performance

Duration	Surge	Operating AC Voltage	Frequency	Requirement
Continuous	10%	100~240VAC	50/60Hz	No loss of function and performance
0 to 0.5 AC cycle	30%	100~240VAC	50/60Hz	

1.7 AC Line Dropout

An AC line dropout is defined to be when the AC input drops to 0VAC at any phase of the AC line for any length of time. During an AC dropout the power supply must meet dynamic voltage regulation requirements. An AC line dropout of any duration shall not cause tripping of control signals or protection circuits. If the AC dropout lasts longer than the holdup time, the power supply should recover and meet all turn on requirements. The power supply shall meet the AC dropout requirement over rated AC voltages and frequencies. A dropout of the AC line for any duration shall not cause damage to the power supply.

AC Power Holdup Requirement	Loading	PWOK Holdup time(ms)
	Full Load	12.0

1.8 Leakage Current

The RMS AC leakage current, measured per applicable safety standards test methods.

And should meet 1.75mA max at 264Vac/50Hz input.

2.0 Output:

2.1 Output Rating Table

Input Range	**Input:** 90-264Vac/180-400Vdc	
Output	+54V(adjustable from 48V to 56V)	+12Vsb
Max load	24A	3A
Min load	0.5A	0.0A
Regulation	±2%	
Ripple & Noise	1% MAX	

⁎The max continuous output power is 1300W for 90-264Vac/180-400Vdc input.

⁎ The ripple & noise is measured over a bandwidth of 10Hz to 20MHz at the power supply output connectors. A 10µF electrical capacitor in parallel with a 0.1µF ceramic capacitor is placed at the point of measurement.(When the power supply is not tested with the system, need to add minimum capacitive load 470uF(Low ESR type).)

2.2 Power Supply Timing

Below figure & table shows the power supply timing requirements:

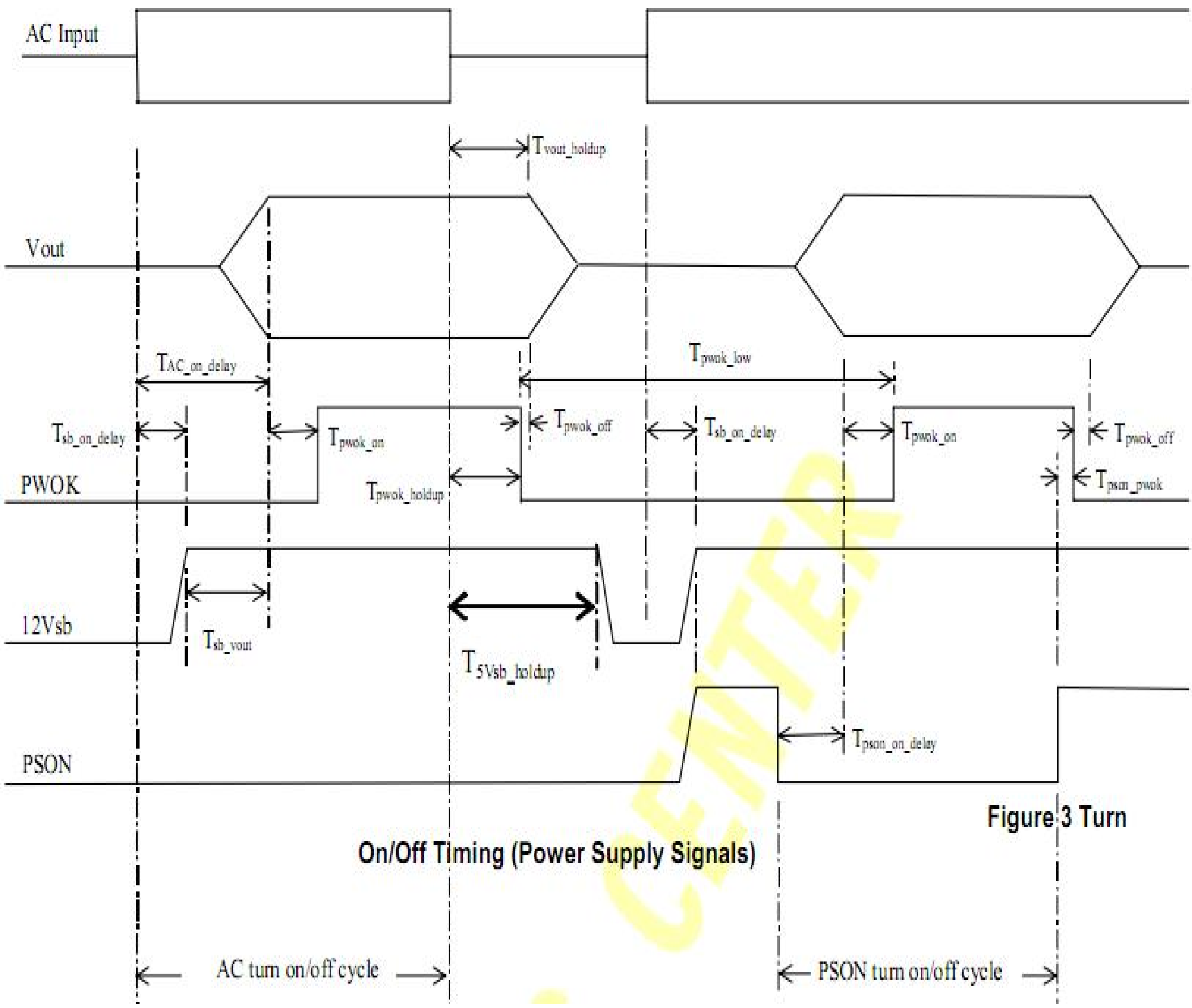


Figure 3 Turn

On/Off Timing (Power Supply Signals)

Item	Description	Min	Max	Units
Tsb_on_delay	Delay from AC applied to +12Vsb being within regulation		1500	ms
Tac_on_delay	Delay from AC applied to +54V being within regulation		3000	ms
Tvout_rise	Output voltage rise from 10% to 90% time for +54V	5	70	ms
Tvout_rise	Output voltage rise from 10% to 90% time for +12Vsb	1	25	ms
Tsb_vout	Delay from +12Vsb being in regulation to +54V being in regulation at AC turn on	50	1000	ms
Tpson_on_delay	Delay from PSON active to output voltages being within regulation limits	130	150	ms
Tpwok_on	Delay from output voltages within regulation limits to PWOK asserted at turn on	100	500	ms
Tvout_holdup	Time +54V output stay within regulation after loss of AC	13		ms
Tpwok_holdup	Delay from loss of AC to de-assertion of PWOK	12		ms
T12Vsb_hold up	Time the +12Vsb output voltage stays within regulation after loss of AC	70		ms

Tpwok_off	Delay from PWOK de-asserted to output voltages dropping out of regulation limits	1		ms
Tpwok_low	Duration of PWOK being in the de-asserted state during an OFF/ON cycle using AC or the PSON signal	100		ms
Tpson_pwok	PWOK being de-asserted delay from PSON deactivate		5	ms

2.3 Tsb-on &Tac-on Delay Time

The Tsb-on delay time for +12Vsb should be ≤ 1.5s at rated input when full load.

TheTac-on delay time for +54V should be ≤3s at rated input when full load.

2.4 Rise Time(Tvout _rise)

The +54V must rise from 10% to 95% within regulation limits within 5 to 70ms.

For +12Vsb, it is allowed to rise from 1.0 to 25ms. All outputs must rise monotonically.

2.5 Main Output Delay Time(Tsb_vout)

The +54V main output being in regulation delay from +12Vsb being in regulation should be 50 to 1000ms when at AC turn on.

2.6 Tpson_on_delay

The +54V output must be within regulation after PSON active for 130 to 150ms.

2.7 Power Work OK Delay(Tpwok_on)

PWOK should delay from +54V output within regulation for 100 to 500ms.

2.8 Hold Up Time(Tvout_holdup)

The holdup time for +54V≧13ms& PWOK≧12ms at any phase of rated voltage input when full load. The holdup time for +12Vsb should ≧70ms.

2.9 Power Fail Delay Time(Tpwok_off)

+54V dropping out of regulation delay from PWOK should≥1ms when power off at full load.

2.10 Duration Time for PWOK(Tpwok_low)

The duration time of PWOK when OFF/ON cycle using AC or the PSON signal should ≥ 100ms

2.11 PWOK Delay PSON Deactivate(Tpson_pwok)

PWOK being de-asserted should delay from PSON deactivate ≤ 5ms

2.12 Power Efficiency

Below table provides minimum efficiency requirement at various loading conditions.

Load	230Vac/50Hz Input and 25℃ Ambient Temperature		
	+54V	+12Vsb	Requirement

20% Full Load	4.8A	0.48A	90%
50% Full Load	12A	1.2A	93%
Full Load	24A	2.40A	92%

＊Add external +12Vcc for fan and the fan power is not included in efficiency calculation.

2.13 Turn on Overshoot

The turn-on overshoot due to application of AC input or remote enable shall be < 5% of the nominal output voltage for any application of input voltage within the specified range.

Overshoot/undershoot on turn on or restart must meet under all loading conditions, including minimum output capacitance on all output voltages.

2.14 No Load Condition

The power supply shall not be damaged nor cause abnormal operation at any load conditions including no load. The power supply shall be able to turn on and off under no load condition. The on and off waveforms shall be monotonic. The input power is less than 10w at 230Vac input and no load.

2.15 Output Regulation

All outputs shall remain within the tolerances in section 2.1 table under all allowable load and temperature conditions during load variations on the other output voltage, any combination of the following conditions. The outputs will be measured at the output terminals,.

- Input operating rated range
- Specified load range
- Cross regulation on dual or multiple outputs units
- Specified environmental conditions

2.16 Capacitive Loading

The power supply shall be stable and meet all requirements with following capacitive loading conditions, including start up with full load.

Output	+54V	+12Vsb
Capacitor	500uF~3000uF	20uF~1000µF

2.17 Dynamic Loading

The output voltages should remain within regulation for the step loading with capacitive load specified in the below stable, The load transient repetition is tested between 50Hz and 5kHz at 50% duty cycles. And +54V’s min load is 0.5A when do dynamic loading test.

Output	ΔStep Load Size	Load Slew Rate	Frequency	Test Capacitive Load
+12Vsb	1.0A	0.25A/uS	50Hz~5kHz	22uF
+54V	60% of Max Load	0.5A/uS	50Hz~5kHz	1000uF

2.18 Current Sharing

All outputs shall be capable of operating in a redundant current share mode. A maximum (four) of power supplies may be operated in parallel. All outputs shall incorporate an isolation diode for fault isolation. The +12Vsb current sharing shall be a droop type. The +54V current sharing shall be a single wire type. Connecting the load share bus pins of each power supply together shall enable the current share feature. With the current share pins tied together, the +54V output load current shall be balanced to within 10% when output at over 50% full load. For example 1+1 redundant mode the current sharing precision calculating formula is ｜Iout1-Iout2｜/(Iout1+Iout2).Shorting or opening of a current share pin shall not cause the output voltage to go out of steady state regulation. For full load the LS voltage shall be 8 V for a single power supply. The LS pin's voltage VS load requirements are as below table and curve when single power supply:

Item	Description	Min	Nominal	Max	Unit
VLS	Max Load(70A)	7.6	8.0	8.4	Volt
VLS	No Load(0A)	0.0	0.125	0.175	Volt

2.19 Hot Swap Requirement

Hot swapping is the process of inserting and extracting a power supply from an operating power system. During this process the output voltage shall remain within the limits. The hot swap test must be conducted when the system is operating under static, dynamic and no loading conditions. The power supply shall use a latching mechanism to prevent insertion and extraction of the power supply when the AC power cord is inserted into the power supply. The power supplies must be able to operate in a hot-swap/redundant configuration.

2.20 Grounding

The output ground of the pins of the power supply provides the output power return path. The output connector ground pins shall be connected to the safety ground (power supply enclosure). This grounding should be well designed to ensure passing the max allowed common mode noise levels. The power supply shall be provided with a reliable protective earth ground. All secondary return circuits shall be connected to protective earth ground.

2.21 Residual Voltage Immunity in Standby Mode

The power supply should be immune to any residual voltage placed on its outputs (Typically a leakage voltage through the system from standby output) up to 500mV. There shall be no additional heat generated, nor stressing of any internal components with this voltage applied to any individual or all outputs simultaneously. It also should not trip the protection circuits during turn on.

The residual voltage at the power supply outputs for no load condition shall not exceed 100mV when AC voltage is applied and the PSON# signal is de-asserted.

3.0 Protection:

When the input UVP/OVP, +54V output's UVP/OCP, +12Vsb output's UVP/OCP/OVP, unit's OTP or high ambient temperature protection is triggered, the power supply will shut down and self -recovery when the fault condition removed. If +54V output's OVP is triggered, the power supply will shut down and latched off. The latch state can be cleared by toggling the PSON signal or by an AC power interruption of 5 seconds nominal. If the auxiliary converter's OTP is triggered, the power supply will shut down and auto-restart immediately for single module but auto-restart in about 5 seconds when under redundant state.

3.1 Input Under and Over Voltage Protection

The input UVP should be 74Vac ±5Vac or 150Vdc±10Vdc and recover point should be 84Vac ±5Vac or 180Vdc ±10Vdc;The input OVP should be 320Vac±10Vac or 420Vdc ±10Vdc and recover point should be 310Vac±10Vac or 410Vdc ±10Vdc.

3.2 Output Over Current Protection

The power supply should have over current protection to prevent the outputs from exceeding limits. If the +54V's OCP or +12Vsb's OCP occurred, the power supply should shut down and self -recovery after the over current condition removed.

+12Vsb OCP range: 3.5~5.5A; +54V OCP range: 24-32A for 90~264Vac input and 180~400Vdc Input.

+54V Main output	**Input**	**Alert**	**LED**
Over current warning	24-28A	Low	1Hz Blink Orange
Over current protection	28-32A	Low	Orange
Over current recovery	24-32A	High	Green
Peak Load(50ms)	32-36A		
+12Vsb	**Total Range Input**	**Alert**	**LED**
Over current warning	3.2~OCP	Low	1Hz Blink Orange
Over current protection	3.4~5.5A	Low	2.5±0.5s Orange/0.5±0.3s OFF

3.3 Output Short Circuit Protection

The power supply shall be protected from damage due to faults between output (+54V or +12Vsb) and GND. Short circuit of the power supply outputs shall not result in fire hazard, shock hazard, or damage to the power supply. Components shall not be damaged during the short circuit conditions. If the +54V shorted to GND, the power supply will shut down and self-recovery after the short circuit condition removed. All outputs shut down upon a short circuit of the +12Vsb and when the short is removed, the power supply shall self-recovery.

3.3 Output Over and Under Voltage Protection

The power supply should have over and under voltage protection to prevent the outputs from exceeding limits or abnormal operation. If the +54V's UVP or +12Vsb's UVP/OVP occurred, the power supply should shut down and self-recovery after the fault condition removed. If the +54V's OVP occurred, the power supply will shut down and latched off. The latch state can be cleared by toggling the PSON signal or by an AC power interruption of 5seconds nominal.

+54V UVP range:43~46Vdc ; +12Vsb UVP range:9.0~10.5Vdc;

+54V OVP range:58~62Vdc ; +12Vsb OVP range:13.3~14.5Vdc;

The over and under voltage protection should tested at +54V/2.0A, +12Vsb/0.2A load condition.

3.4 Over Temperature Protection

The power supply will be protected against over temperature conditions caused by loss of fan cooling or excessive ambient temperature. In over temperature protection (OTP) condition the PSU will shutdown. When the power supply temperature drops to within specified limits, the power supply shall restore power automatically, while the +12Vsb remains always on.

There are three temp sensors in the power supply, The first is on the main board to sense the PFC MosFet's copper temperature, it will trigger primary OTP and self-recovery when the PFC MosFet's temperature return to a safe point. The second is on the transformer PCB board to sense the synchronous MosFET's copper temperature, it will trigger second OTP when the sensor resistor's temperature reached limit and self-recovery. The power supply will shut down if the ambient temperature reached limit, and self-recovery when the ambient temperature return to normally. Before the second and third OTP triggered, there is warming first, and the trigger points are as below table.

The temp sensors	Over temperature warning	Over temperature protection	Self-recovery temperature
Third (Component)	100±10℃	105±10℃	58±10℃
Fourth (Ambient)	63±5℃	68±5℃	58±5℃

4.0 Reliability Requirement:

4.1 Environment Limits:

Item	Unit	Min	Nominal	Max	Notes
Operating Temperature	℃	-10	35	55	The power supply should start up at -40℃, But no electrical property requirement
Storage Temperature	℃	-40	25	70	Non-operating, maximum rate of change of 20℃/hour.
Relative Humidity	%	10		90	Operating, non-condensing
		5		95	Non-operating, non-condensing
Operating Altitude	m	0		5000	The power supply's max operating ambient temperature is defined at sea level. The max operating ambient temperature should drops at a slew of 0.33℃/100m altitude raised.
Storage Altitude	m	0		15000	
Mechanical Shock	50G trapezoidal wave, velocity change =170in./sec				Non-operating. Three drops in each of six directions are applied to each of the samples

4.2Random Vibration

Non-operating:

Sine sweep: 5~500Hz @0.5gRMS at 0.5 octave/min; dwell 15 min at each of 3 resonant points;

Random profile: 5Hz @0.01g^2/Hz (slope up); 20~500Hz @0.02g^2/Hz (flat);

Input acceleration = 3.13gRMS; 10min.per axis for 3 axis on all samples.

4.3 Thermal Shock (Shipping)

Non-operating: -40~70℃, 50 cycles, 30℃/min ≧ transition time ≧ 15℃/min, duration of exposure to temperature extremes for each half cycle shall be 30 minutes.

4.4 MTBF and Life

The power supply shall have a reliability requirement as below table when under full load and 100Vac/60Hz or 230Vac/50Hz input .:

Item	Requirement	Notes
Life Time	≧5 years at 35℃ ambient	Should ≧ 7 years at 25℃ ambient when mating with customer's system.
CMTBF(Calculated MTBF)	≧ 250,000 hours, at 35℃ ambient temperature and full load.	Telcordia Technologies SR-332 (Method I Case 3)
Electrolytic capacitor	≧5 years	35 ℃ ambient and full load using

calculated life		capacitors supplier's equation
Fan L10 Life	≧5years	35℃ ambient and full load
Fan Noise	60dB(220Vac input)	33℃ ambient and full load
Annual Return Rate	≦0.1%	

5.0 HI-POT and Grounding:

5.1 Primary to Secondary

10mA max 1500Vac, 50/60Hz or 0.5mA max 2121Vdc for 60 seconds when power supply.

10mA max 3000Vac, 50/60Hz or 0.5mA max 4242Vdc for 60seconds when PCBA.

5.2 Primary to Earth

10mA max 1500Vac, 50/60Hz or 0.5mA max 2121Vdc for 60seconds.

5.3 Grounding Resistance

Earth ground to ground 32A 60 seconds, 100 mΩ max.

6.0 Safety and EMC Requirement:

6.1 Safety Compliance

1. UL-CUL 2. CE 3.FCC 4. CCC

6.2 EMI and EMS Requirement

EMI(Electromagnetic Interference) Requirements Table

Item	Description and Requirement	Criterion	Notes
Radiated Emissions	Frequency：30MHz～1GHz Class A with 6dB Margin	EN 55022	230V/50Hz input
		FCC Part 15	120V/60Hz input
		VCCI V-3	100V/50Hz input
Conducted Emissions	Frequency：150KHz～30MHz Class A with 6dB Margin	EN 55022	230V/50Hz input
		FCC Part 15	120V/60Hz input
		VCCI V-3	100V/50Hz input
Harmonic	EN 61000-3-2 Class A	EN 61000-3-2	230V/50Hz input
Voltage Flicker	Pst≦1.0 and Plt≦0.65 Voltage change ≦3.3％ Relative Voltage change ≦4％ The voltage changed over 3.3%	EN 61000-3-3	230V/50Hz input

	duration time should ≦500ms		

EMS(Electromagnetic Susceptibility) Requirements Table

Item	Description and Requirement	Level	Criterion
Surge	Different Mode：±1KV， Common Mode：±2KV	A	EN61000-4-5 EN 55024
Electrical Fast Transient Group (EFT)	±2KV	A	EN61000-4-4 EN 55024 YD/T 1082
Electrical Static Discharge (ESD)	Touch：±6KV Air：±8KV	A	EN61000-4-2 EN 55024
Radiated Susceptibility(RS)	80M～800MHz 3V/m 800M～960MHz 10V/m 960M～1GHz 3V/m 1.4G～2GHz 10V/m 2G～2.7GHz 3V/m80% AM	A	EN 61000-4-3
Conducted Susceptibility(CS)	150KHz～80MHz 3V, 80% AM	A	EN 61000-4-6 EN 55024
Voltage Dips and Interruptions	0% Ut : 10ms 70% Ut : 500ms 0% Ut : 5000ms	A C C	EN 61000-4-11 EN 61000-4-29 EN 55024 / 60601 GB 19286

Performance criterion of the voltage fluctuation immunity test:

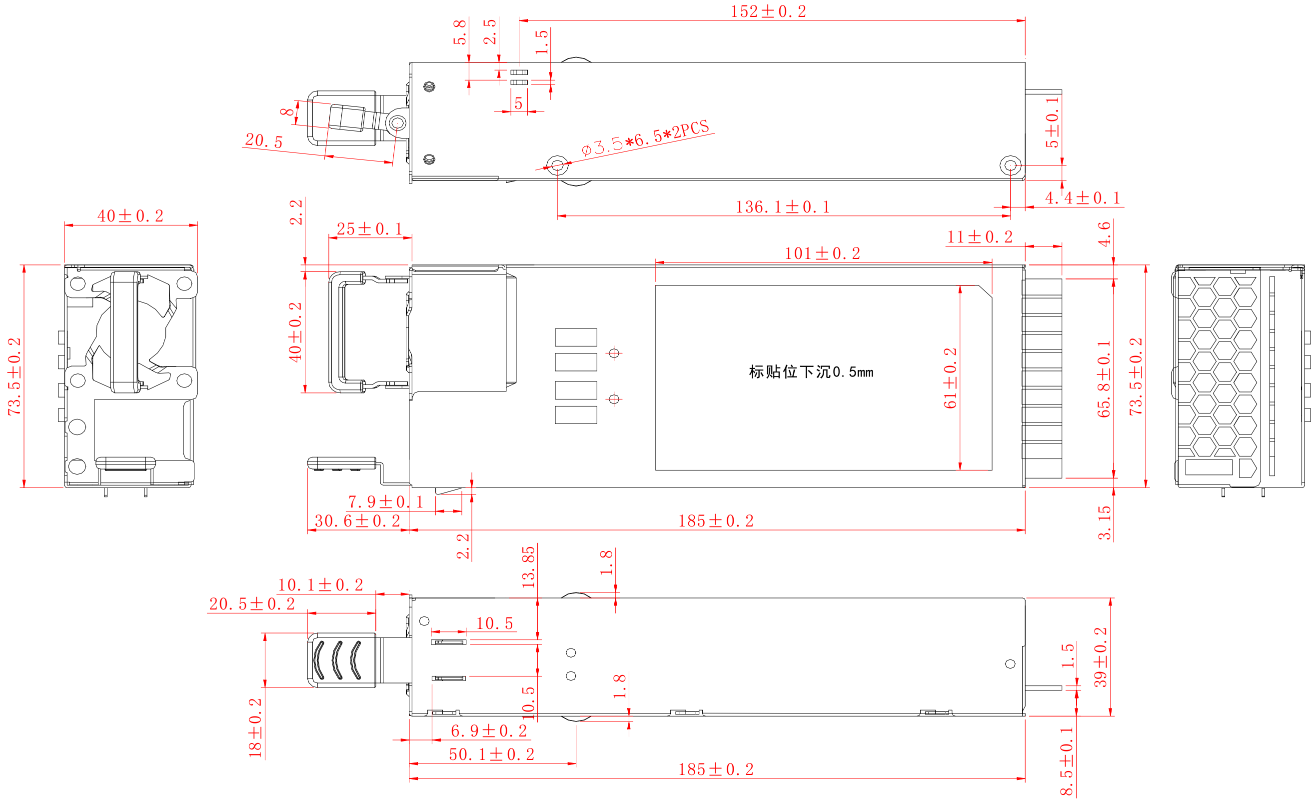
A: The power supply should have no loss of function or degradation of performance according to its specification during the test.

B: Temporary loss of function or degradation of performance is acceptable, but all the outputs should be in an acceptable range and should can recover to normally after the test. The power supply shouldn't loss any of outputs, reset or any abnormal warning when doing the test with H3C system.

C: Temporary loss of function or shut down is acceptable, but the power supply should can restart with an operator intervention or auto-restart to normally after the test.

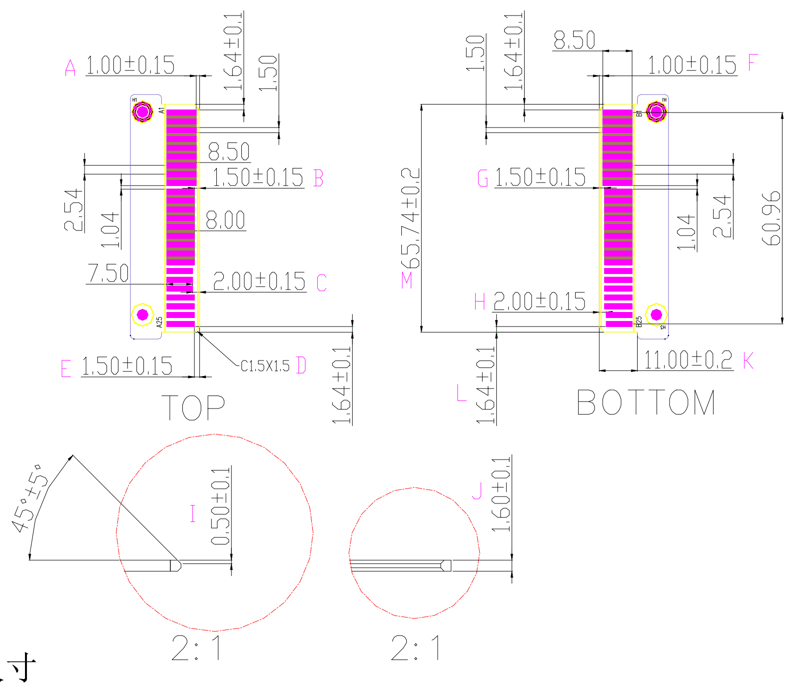
7.0 Dimensions and Output Terminals:

7.1 Outline:185mm*73.5mm*40mm



7.2 Output connector

Pin	Name	Pin	Name
A1	GND	B1	GND
A2	GND	B2	GND
A3	GND	B3	GND
A4	GND	B4	GND
A5	GND	B5	GND
A6	GND	B6	GND
A7	GND	B7	GND
A8	GND	B8	GND
A9	GND	B9	GND
A10		B10	
A11		B11	
A12		B12	
A13		B13	
A14	+54V	B14	+54V
A15		B15	
A16		B16	
A17		B17	
A18		B18	
A19	SDA	B19	A0
A20	SCL	B20	A1
A21	PSON	B21	12Vsb
A22	Alert	B22	SM-Bus
A23	GND Sense	B23	+12Vbus
A24	+54V Sense	B24	Present
A25	PWOK	B25	Input OK



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7.3 Output Terminal Description

Output Terminals

Signal	Description
GND	Outputs' return and it's also connected with the case.
+54V	The main output voltage.
PMBus*SDA	I2C Data bus.
PMBus*SCL	I2C Clock bus,100kHzMax.
A0(SMBus*address)	Address set Pin.
A1(SMBus*address)	Address set Pin.
PSON	Remote ON/OFF control signal: When the PSON signal is low, the power supply will turn on the +54V main output , and turn off when it's high.
+12Vsb	The auxiliary output voltage.
Alert	Power supply warning signal: When this pin get low signal will notice system the power supply has some fault occurred.
SM-Bus	Power supply cold redundancy control signal.
GND Sense	+54V output GND return sense for feedback.
+54V Sense	+54V output voltage sense for feedback.
+54Vbus	+54V output load sharing bus.
PWOK	Power supply work OK signal.
Present	The power online signal, connected to GND in the power supply.
Input OK	Input voltage OK signal, low level means input voltage is in range.

8.0 Control and Indicator Function

8.1 Control and Status Signals

All control signals shall be TTL compatible with respect to the output return and shall be isolated from the primary circuit and be SELV(safety extra-low voltage circuit) rated.

8.2 Signal Ripple & Noise Requirement

Some significant signals should have a ripple and noise requirement as below table.

Signal	SCL High	SDA High	PSON Low or High	Alert Low or High	PWOK Low or High	Input OK Low or High	Present Low
Test @ 20MHz	300mV						

Test @ 250MHz	500mV

8.3 Input OK Signal

Input OK signal is a input voltage OK signal and will be asserted low to indicate the power supply's input voltage are within range. If the input voltage is out of range, the input OK signal will be pulled to a high state. This signal accepts an open collector/drain input from the system and a 1KΩ resistor pull-up to +3.3Vs located in power supply.

AC Fail Signal Characteristic

Signal Type	Power State	Logic Level (Min)	Logic Level (Max)
AC Fail Signal=Low	Input OK	0V	0.4V
AC Fail Signal =High	Input Fail of Range	2.4V	3.46V

8.4 PSON Input Signal

The PSON signal is required to remotely turn on/off the power supply. PSON is an active low signal that turn on the +54V power rail. When this signal is not pulled low by the system, or left open, the outputs (except the +12Vsb) turn off. This signal is pulled to a standby voltage by a pull-up resistor internal to the power supply. Refer to section2.2 for the timing diagram. This signal accepts an open collector/drain input from the system and a 10KΩ resistor pull-up to +3.3Vs located in power supply.

PSON Signal Characteristic

Signal Type	Power State	Logic Level (Min)	Logic Level (Max)
PSON=Low	ON	0V	1.0V
PSON=High or Open	OFF	2.0V	3.46V
Source Current (Low)	ON		4mA

8.5 PWOK(Power OK) Output Signal

PWOK is a power OK signal and will be pulled high when 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. The start of the PWOK delay time shall inhibited as long as any power supply output is in current limit. This signal is open collector/drain output and a0.27KΩ resistor pull-up to +3.3Vs in power supply.

PWOK Signal Characteristic

Signal Type	Power State	Logic Level (Min)	Logic Level (Max)
PWOK=Low	Power Not OK	0V	0.4V
PWOK=High	Power OK	2.4V	3.46V

Sink Current (Low)	/		0.4mA
Source Current (High)	/		2mA
PWOK Rise and Fail Time	/		0.1ms

8.6 Alert Signal

This is low active, sideband and open collector signal indicates that the power supply is experiencing a problem, warning or fault that the user should investigate. The signal shall activate in the case of critical component temperature reached a warning threshold, general failure, over current, over voltage, under voltage, failed fan. It's also to be asserted in parallel with LED turning solid Amber or blink Amber. This signal is open collector output and a 2K Ω resistor pull-up to +3.3Vs in power supply.

Alert Signal Characteristic

Signal Type	Power State	Logic Level (Min)	Logic Level (Max)
Alert= High	Power OK	2.4V	3.46V
Alert= Low	Alert to system	0V	0.4V
Sink Current, Alert=Low	/		4mA
Alert Rise and Fail Time	/		0.1ms

Power Supply Alert Timing Requirements (Software)

Item	Description	PMBus Command	Min	Max
T54V_Alert	Timing from Alert going low to 54V output voltage dropping to 11.4Vdc	STATUS_INPUT	1ms	
Tover_temp	Hot spot temp>warning threshold, Over temp warning	STATUS_ TEMPERATURE		1s
Tover_current	Iout over current > warning. Iout OC warning	STATUS_ IOUT		1s

8.7 SDA and SCL Signal

SDA and SCL pins (for I^2C bus) is designed to operate at 3.3 volts. The pull-up resistors are 10K Ω to +3.3Vs in power supply.

8.8 A0, A1 Signal

PSU module address line0 and line1. This signal line is provided for determining the address for the specific PSU FRU and SMBus address. Two 10K Ω resistor pull-up to +3.3Vs located in the PSU. The address line should be either float or pull low with equal to or less than 100ohm in the motherboard design.

8.9 SM_Bus Signal

Power supplies that support cold redundancy can be enabled to go into a low power state (that is cold redundant / standby redundant mode state) in order to provide increased power usage efficiency when system loads are such that both power supplies are not needed. When the power subsystem is in cold redundant mode, only the needed power supply to support the best power delivery efficiency is ON. Any additional power supplies; including the redundant power supply, is in cold standby state. Each power supply has an additional signal (SM_Bus—Standby Mode Bus) that is dedicated to supporting cold redundancy. This signal is a common bus between all power supplies in the system. SM_BUS is asserted when there is a fault in any power supply or the power supplies output voltage falls below the V fault threshold or the system's load >84% etc. Asserting the SM_Bus signal causes all power supplies in cold standby state to power ON. Enabling power supplies to maintain best efficiency is achieved by looking at the load share bus voltage and comparing it to a programmed voltage level through a PMBus command. Whenever there is no active power supply on the cold redundancy bus driving a high level on the bus all power supplies are ON no matter their defined cold redundant roll (active or cold standby). This guarantees that incorrect programming of the cold redundancy states of the power supply will never cause the power subsystem to shut down or become over loaded. The default state of the power subsystem is all power supplies ON. There needs to be at least one power supply in cold redundant active state or standard redundant state to allow the cold standby state power supplies to go into cold standby mode.

SM_Bus Signal Characteristic

Signal Type	Power State	Logic Level (Min)	Logic Level (Max)
SM_Bus=Low	Active Redundant Mode	0V	0.4V
SM_Bus=High	Standby Redundant Mode	2.4V	3.46V

8.10 FRU (Field Replacement Unit) Signal

Five pins will be allocated for the FRU information on the power supply connector. One pin is the serial clock (SCL). The seconds pin is used for serial data (SDA). Three pins are for address lines A0-A1 to indicate to the power supply's EEPROM which position the power supply is located in the system. The SCL and SDA signals are pulled up by system, the address lines are pulled up in power supply.

FRU Signals

A1	A0	EEPROM Address	MCU Address	PSU
0	0	A0	B0	1
0	1	A2	B2	2
1	0	A4	B4	3

8.11 EEPROM

The power supply shall have an ID EEPROM, which contains power supply specific information: specifically assemble part number, serial number, assembly deviation, special configurations, test history, field test history, and field trace-ability data. This data is stored in a EEPROM device located inside of the power supply. This device will be programmed by the unit vendor with detailed information on the unit. This device shall have its highest order address bit (A2 internally wired to ground). The A0 & A1 address bit are wired to the output connector and includes an internal 10K Ω resistor pull-up to the +3.3Vs.

EEPROM DATA

Dec Addr	Hex Addr	Column Name	Code Type	Content	Hex data	Comments

8.12 LED Indicators

There will be a dual color LED lamp on the case's front panel, the color is green and amber to indicate the power supply status. There will be a(slow) blinking green to indicate that AC is applied to the PSU and the standby voltage is available. It shall go steady to indicate that all the power outputs are available. This same LED will (slowly) blink or be solid ON amber to indicate that the power supply has failed or reached a warning status and therefore a replacement of the unit is/maybe necessary. The LED operation is defined as below table.

The LED shall be visible on the power supply's exterior face. The LED locations shall meet ESD requirements. The LED shall be securely mounted in such a way that incidental pressure on the LED will not cause it to become displaced.

LED State Requirement

Power Supply Status	LED Status
Output ON and OK	Green
No AC power to all power supplies.	OFF
AC present/Only +12Vsb on (PS off)	1Hz Blink Green
AC cord unplugged or AC power lost; with a seconds power supply in parallels still with AC input power.	Orange
Power supply warning events when the power supply continuous to operate: high temperature, fan fail.	1Hz Blink Orange

Power supply critical event causing a shutdown：UVP, OVP, OCP, OTP.	Orange
When the power in cold redundant state.	0.33Hz Blink Green1s off and 2s Green

9.0 Firmware:

9.1 PMBUS Command Supported

STATUS_WORD Command

Byte	Bit No.	Status Bit Name	Meaning	Support
Low	7	BUSY	A fault was declared because the device was busy and unable to respond.	No
	6	OFF	This bit is asserted if the unit is not providing power to the output, regardless of the reason, including simply not being enabled.	Yes
	5	VOUT_OV	An output over voltage fault has occurred	Yes
	4	IOUT_OC	An output over current fault has occurred	Yes
	3	VIN_UV	An input under voltage fault has occurred	Yes
	2	TEMPERATURE	A temperature fault or warning has occurred	Yes
	1	CML	A communications, memory or logic fault has occurred	No
	0	NONE OF THE ABOVE	A fault or warning not listed in bits [7:1] of this byte has occurred	No
High	7	VOUT	An output voltage fault or warning has occurred	Yes
	6	IOUT/POUT	An output current or output power fault or warning has occurred	Yes
	5	INPUT	An input voltage, input current, or input power fault or warning has occurred	Yes
	4	MFR	A manufacturer specific fault or warning has occurred	No
	3	POWER_ GOOD#	The POWER_GOOD signal, if present, is negated	Yes
	2	FANS	A fan or airflow fault or warning has occurred	Yes
	1	OTHER	A bit in STATUS_OTHER is set	Yes
	0	UNKNOWN	A fault type not given in bits [15:1] of the SATUS_WORD has been detected	No

STATUS_VOUT Command

Bit	Meaning	Support
7	VOUT Over voltage Fault	Yes
6	VOUT Over voltage Warning	No
5	VOUT Under voltage Warning	No

4	VOUT Under voltage Fault	Yes
3	VOUT_MAX Warning (An attempt has been made to set the output voltage to value higher than allowed by the VOUT_MAX command)	No
2	TON_MAX_FAULT	No
1	TOFF_MAX Warning	No
0	VOUT Tracking Error	No

STATUS_IOUT Command

Bit	Meaning	Support
7	IOUT Over current Fault	Yes
6	IOUT Over current And Low Voltage Shutdown Fault	No
5	IOUT Over current Warning	Yes
4	IOUT Undercurrent Fault	No
3	Current Share Fault	No
2	Power Limiting	No
1	POUT Overpower Fault	Yes
0	POUT Overpower Warning	Yes

STATUS_INPUT Command

Bit	Meaning	Support
7	VIN Over voltage Fault	Yes
6	VIN Over voltage Warning	No
5	VIN Under voltage Warning	No
4	VIN Under voltage Fault	Yes
3	Unit Off For Insufficient Input Voltage	No
2	IIN Over current Fault	No
1	IIN Over current Warning	No
0	PIN Overpower Warning	No

STATUS_TEMPERATURE Command

Bit	Meaning	Support
7	Over temperature Fault	Yes
6	Over temperature Warning	Yes

5	Under temperature Warnings	No
4	Under temperature Fault	No
3	Reserved	No
2	Reserved	
1	Reserved	
0	Reserved	

STATUS_FAN_1_2 Command

Bit	Meaning	Support
7	Fan 1 Fault	Yes
6	Fan 2 Fault	No
5	Fan 1 Warning	Yes
4	Fan 2 Warning	No
3	Fan 1 Speed Overridden	No
2	Fan 2 Speed Overridden	No
1	Airflow Fault	No
0	Airflow Warning	No

STATUS _OTHER Command

Bit	Meaning	Support
7	Transformer primary and secondary communication failures(Mfr. Defined)	Yes
6	PFC voltage ok check(Mfr. Defined)	Yes
5	Input A Fuse Or Circuit Breaker Fault	No
4	Input B Fuse Or Circuit Breaker Fault	No
3	Input A OR-ing Device Fault	No
2	Input B OR-ing Device Fault	No
1	Output OR-ing Device Fault	No
0	Reserved	No

Supported Command Summary

CMD Code	Name	Type	Bytes	Conditions
03h	CLEAR_FAULTS	Send Byte	0	
19h	CAPABILITY	Read Byte	1	

1Ah	QUERY	Block Read	1	
30h	COEFFICIENT	Block Write Block Read Process Call	5	
78h	STATUS_BYTE	Read Byte	1	
79h	STATUS_WORD	Read Word	2	
7Ah	STATUS_VOUT	Read Byte	1	
7Bh	STATUS_IOUT	Read Byte	1	
7Ch	STATUS _INPUT	Read Byte	1	
7Dh	STATUS_TEMPERATURE	Read Byte	1	
7Fh	STATUS _OTHER	Read Byte	1	
80h	READ_VIN_TYPE	Read Byte	1	00:NO AC; 01:AC; 02:HVDC
81h	STATUS_FANS_1_2	Read Byte	1	
84h	READ_Vsb_OUT(Mfr. Defined)	Read Word	2	
85h	READ_Isb_OUT(Mfr. Defined)	Read Word	2	
86h	READ_EIN	Block Read	6	
87h	READ_EOUT	Block Read	6	
88h	READ_VIN	Read Word	2	
89h	READ_IIN	Read Word	2	
8Bh	READ_VOUT	Read Word	2	
8Ch	READ_IOUT	Read Word	2	
8Eh	READ_TEMPERATURE_2	Read Word	2	
90h	READ_FAN_SPEED_1	Read Word	2	Rpm value
96h	READ_POUT	Read Word	2	
97h	READ_PIN	Read Word	2	
98h	PMBUS_REVISION	Read Byte	1	V1.2
99h	MFR_ID	Read Block	14	See MFR Data table
9Ah	MFR_MODEL	Read Block	14	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
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
D0h	SMART_ON_CONFIG	Write Byte Read Byte	1	00h Standard Redundancy 01h Smart On Active 02h Smart Standby 03h Smart Standby 04h Smart Standby
D1h	MFR_SECOND_REVISION	Read Block	16	See MFR Data table
D8h	MFR_PRIMARY_REVISION	Read Block	16	See MFR Data table

MFR Data table

CMD Code	Name	Conditions
99h	MFR_ID	PYW
9Ah	MFR_MODEL	BCF-1300S54CP
A0h	MFR_VIN_MIN	90
A1h	MFR_VIN_MAX	264
A4h	MFR_VOUT_MIN	46.56
A5h	MFR_VOUT_MAX	57.68
A6h	MFR_IOUT_MAX	24
A7h	MFR_POUT_MAX	1300
A8h	MFR_TAMBIENT_MAX	55
A9h	MFR_TAMBIENT_MIN	0
D1h	MFR_SECOND_REVISION	1.0
D8h	MFR_PRIMARY_REVISION	1.0

■Statement

Class A statement

Warning

This is a class A product, which may cause radio interference in living environment.

In this case, it may be necessary for users to take practical measures against their interference.