規格書
SPECIFICATION

品名 STYLE NAME :	REDUNDANT SWITCHING POWER SUPPLY
型號 MODEL NO. :	DM1P2-5500V4V
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Revision

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1.0 Scope

This specification defines the performance characteristics of a grounded, DC input,500 watts, 5 output level power supply. This specification also defines world wide safety requirements and manufactures process test requirements.

DM1P2-5500V4V power system is a 1+1 Redundant power system consisting of two DM1P-2500V power modules and one DM1P2-5500V4V power system frame.

2.0 Input requirements

2.1 DC Input Voltage, (Rating: -36~-72Vdc, Nomal: -48Vdc)

2.2 DC Inrush Current

40 amps max. @ -48VDC Input (at 25 degrees ambient cold start for each power unit)

High-Frequency peak amplitudes lasting less than 50uS (i.e.those caused by EMI capacitors)shall be ignored.

2.3 Steady-state current

-36~-72 Vdc / 19 ～9 amp (14 amp at 48VDC)

2.4 Efficiency

The maximum power supply system efficiency shall be 80%, measured at nominal input voltage -48Vdc and full loading.

NOTE:

(The different harness conditions and/or the accuracy of measurement instruments affect the test result of output voltage and efficiency. Harness conditions are such as cable length, wire gauge, the connector types, total harness amounts.)

3.0 Output requirements

3.1 Output Current / Loading

The Table 2 define current rating. The power supply shall meet both static and dynamic voltage regulation requirements for minimum load condition

Output	+5V	+3.3V	+12V	-12V	+5VS
Max. Load	32A	25A	41A	0.5A	3.5A
Min. Load	0.5A	0.5A	2A	0.1	0.1A

Table 2 – Output Current:

+5V and +3.3V Max. power:170W

Total power:500W (MAX)

3.2 DC Voltage Regulation

The power supply output voltages must stay within the following voltage limits when operating at steady state and dynamic loading conditions. All outputs are measured with reference to the return remote sense (ReturnS) signal. The +5V, +12V, -12V and +5VSB outputs are measure at the power supply connectors' references to ReturnS. The +3.3V is measured at its remote sense signal (+3.3VS+) located at the signal connector.

Output Voltage	+5V	+3.3V	+12V	-12V	+5VSB
Load Reg.	+5/-5%	+5/-5%	+5/-5%	+10/-10%	+5/-5%
Line Reg.	±1%	±1%	±1%	±1%	±1%

Table 6 – Regulation

3.3 Ripple and noise

The maximum allowed ripple/noise output of the power supply is defined in Table 25. This is measured over a bandwidth of 0 Hz to 20 MHz at the power supply output connectors. A 100μF tantalum capacitor in parallel with a 0.1 μF ceramic capacitor are placed at the point of measurement.

Output Volatage	Ripple	Ripple+Noise
+5V	50mV(P-P)	50mV(P-P)
+12V	120mV(P-P)	120mV(P-P)
-12V	120mV(P-P)	120mV(P-P)
+3.3V	50mV(P-P)	50mV(P-P)
+5Vsb	50mV(P-P)	50mV(P-P)

Table 7:Ripple and noise

3.4 Dynamic Loading

The output voltages shall remain within the limits specified in Table 5 for the step loading and within the limits specified in Table 9 for the capacitive loading. The load transient repetition rate shall be tested between 50Hz and 5kHz at duty cycle ranging from 10%-90%. The load transient repetition rate is only a test specification. The △ step load may occur anywhere within the MIN load to the MAX load range.

Output	**Δ Step Load Size**	**Load Slew Rate**	**Capacitive Load**
+3.3 V	30% of max load	0.5 A/μs	1000 μF
+5 V	30% of max load	0.5 A/μs	1000 μF
12V1+12V2+12V3+12V4	65% of max load	0.5 A/μs	2200 μF
+5 VSB	25% of max load	0.5 A/μs	1 μF

Table 8: Transient Load Requirements

3.5 Capacitive Loading

The power supply shall be stable and meet all requirements with the following capacitive loading ranges.

Output	MIN	MAX	Units
+3.3 V	10	12,000	µF
+5 V	10	12,000	µF
+12 V	10	11,000	µF
-12 V	1	350	µF
+5 VSB	1	350	µF

Table 9: Capacitive Loading Conditions

3.6 Timing Requirements

These are the timing requirements for the power assembly operation. The output voltages must rise from 10% to within regulation limits (Tvout_rise) within 5 to 20mS. The +5V, +3.3V and +12V output voltages should start to rise at about the same time. All outputs must rise monotonically. The +5V output needs to be greater than the +3.3V output during any point of the voltage rise. The +5V output must never be greater than the

+3.3V output by more than 2.25V. Each output voltage shall reach regulation within 50 ms (Tvout_on) of each other during turn on of the power supply. Each output voltage shall fall out of regulation within 400 ms (Tvout_off) of each other during turn off. Figure 1 and figure 2 show the turn On and turn Off timing requirement. In Figure 2, the timing is shown with both DC and PSON# controlling the On/Off of the power supply.

Item	Description	MIN	MAX	Units
Tvout_rise	Output voltage rise time from each main output.		20	ms
Tsb_rise	Ouput voltage rise time for the 5VSB output.		25	ms
Tvout_on	All main outputs must be within regulation of each other within this time.		50	ms
Tvout_off	All main outputs must leave regulation within this time.		400	ms

Table 10: Output Voltage Timing

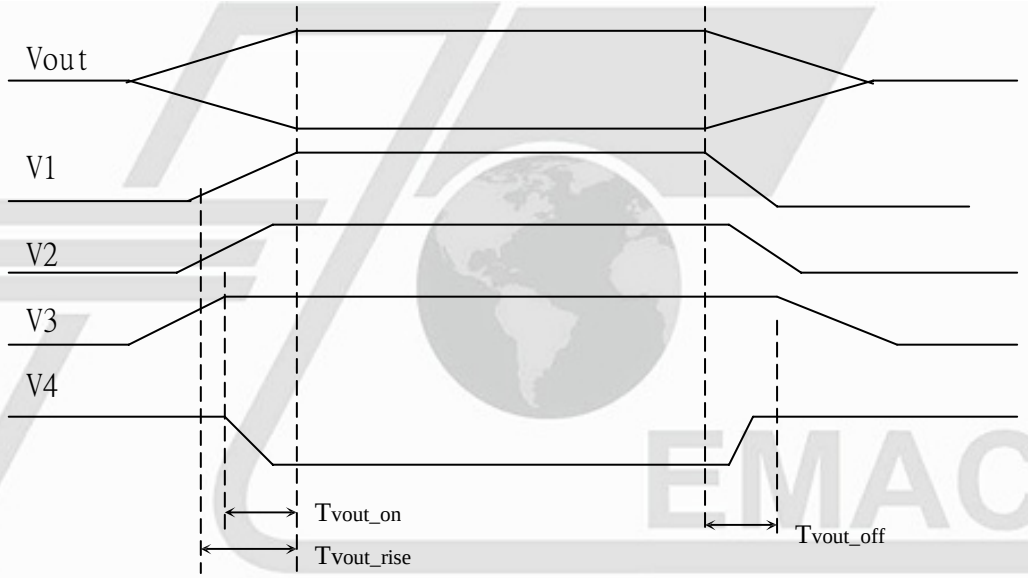

Figure 1: Output Voltage Timing

Item	Description	MIN	MAX	UNITS
Tsb_on_delay	Delay from DC being applied to 5VSB being within regulation.		2000	ms
Tdc_on_delay	Delay from DC being applied to all output voltages being within regulation.		2500	ms
Tsb_vout	Delay from 5VSB being in regulation to O/Ps being in regulation at DC turn on.	5	1000	ms
Tpwok_on	Delay from output voltages within regulation limits to PWOK asserted at turn on.	100	500	ms
Tpwok_holdup	Delay from loss of DC to deassertion of PWOK.	0.3		ms
Tvout_holdup	Time all output voltages stay within regulation after loss of DC.	1.6		ms
Tpwok_off	Delay from PWOK deasserted to output voltages (3.3V, 5V, 12V, -12V) dropping out of regulation limits.	1		ms
Tsb_holdup	Time 5VSB output voltage stays within regulation after loss of DC.	2		ms
Tpson_on_delay	Delay from PSON# active to output voltages within regulation limits.	5	400	ms
Tpson_pwok	Delay from PSON# deactive to PWOK being deasserted.		50	ms

Table 11: Turn OnlOff Timing

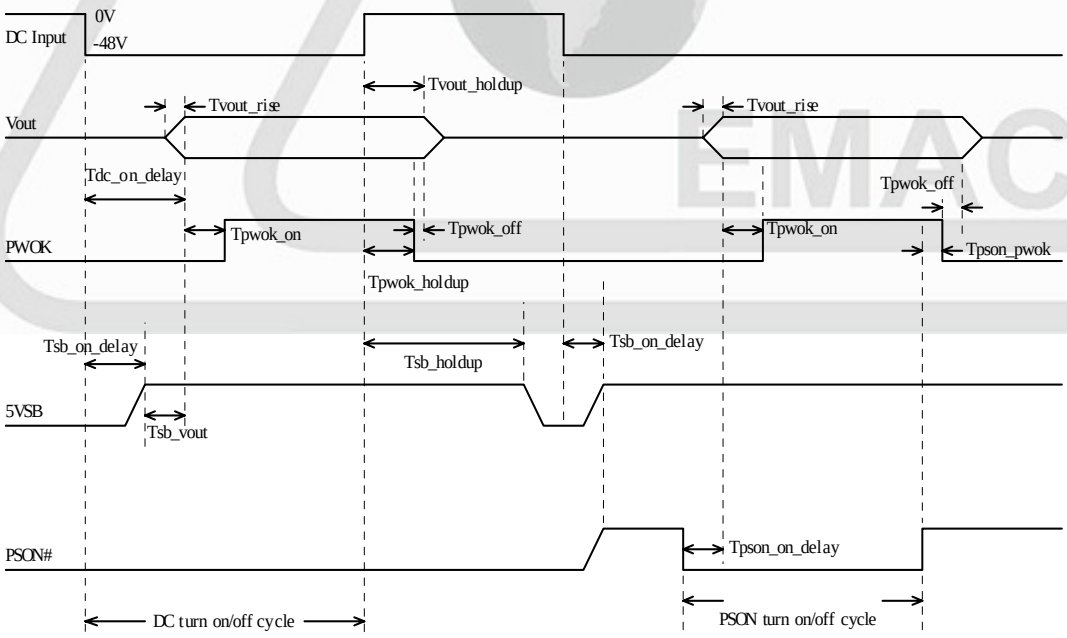

Figure 2: Turn On/Off Timing(Single Power Supply)

3.7 Remote on/off control

The PSON# signal is required to remotely turn on/off the power supply. PSON# is an active low signal that turns on the +5V, +3.3V, +12V and –12V power rails. When this signal is not pulled low by the system, or left open, the outputs (except the +5VSB) turn off. This signal is pulled to a standby voltage by a pull-up resistor internal to the power supply. Refer to Fefer to Figure 10 for timing diagram.

Signal Type	Accepts an open collector/drain input from the system. Pull-up to VSB located in power supply.	
PSON# = Low	ON	
PSON# = Open or High	OFF	
	MIN	**MAX**
Logic level low (power supply ON)	0 V	1.0 V
Logic level high (power supply OFF)	2.0 V	5.25 V
Source current, Vpson = low		4 mA
Power up delay: Tpson_on_delay	5 ms	400 ms
PWOK delay: T pson_pwok		50 ms

Table 13: PSON# Signal Characteristic

3.8 Overshoot at Turn-on / Turn-off

Any output overshoot at turn on shall be less than 10% of the nominal output value.

Any overshoot shall recover to within regulation in less than 10ms.

3.9 standby outputs

The 5VSB output shall be present when an DC input greater than the power supply

turn on voltage is applied.

4.0 Protection

Protection circuits inside the power supply shall cause only the power supply's main outputs to shutdown. If the power supply latches off due to a protection circuit tripping, either a AC cycle OFF for 15 sec, or PSON# cycle HIGH for 1 sec must be able to restart the power supply.

4.1 Over power protection(one unit power supply)

The power supply shall provide over power protection on the power supply latches all DC output into a shutdown state. Over power of this type shall cause no damage to power supply, after over load is removed and a power on/off cycle is initiated, the power supply will restart.

Trigger point total power min. 110%, max. 160%.

4.2 Over voltage protection

The power supply shall shut down in a latch off mode when the output voltage exceeds the over voltage limit shown in Table 14.

Voltage	Minimum	Maximum	Shutdown Mode
+5V	+5.7V	+6.5V	Latch Off
+3.3V	+3.7V	+4.3V	Latch Off
+12V	+13.3V	+15V	Latch Off

Table 14-Over Voltage Protection

4.3 Short Circuit Protecton

4.3.1: A short circuit placed on any DC output to DC return shall cause no damage.

4.3.2: The power supply shall be latched in case any short circuit is taken place at +5V,+3.3V,+12V output.

4.3.3: The power supply shall be auto-recovered in case any short circuit is taken place at +5VSB.

5.0 Environmental Requirements

5.1 Temperature

Operating Temperature Range:	0°C ~ 40°C
Non-Operating Temperature Range:	-20°C ~ 80°C

5.2 Humidity

Operating Humidity Range:	20% ~ 80%RH non-condensing
Non-Operating Humidity Range:	10% ~ 90%RH non-condensing

5.3 Altitude

Operating Altitude Range:	Sea level to 10,000 ft
Non-Operating Altitude Range:	Sea level to 40,000 ft

6.0 Safety

The power supply must be certified to the safety standard listed following:

6.1 Underwriters laboratory (UL).
The power supply designed to meet UL 60950.

6.2 Canadian standards association (CUL)
The power supply designed to meet CSA C22.2 No. 60950.

6.3 TUV

The power supply shall be designed to meet TUV EN-60950.

6.4 CCC Standards

The power supply shall be designed to meet GB9254-2008, GB4943.1-2011, GB17625.1-2012.

6.5 Power Line Transient.

The power supply shall be designed to meet the following standards

a.) EN 61000-4-2(ESD) Criterion B, ± 4KV by contact, ±8KV by air.

b.) EN 61000-4-4(EFT) Criterion B, ± 1KV.

c.) EN 61000-4-5(SURGE) Criterion B, Line-Line ± 1KV
Line-Earth ± 2KV.

6.6 RFI / EMI Standards

The power supply shall comply with the following radiated and conducted Emissions standards,

a.) FCC part 15. class A.

b.) CISPR 22 (EN 55032). class A.

6.7 Production Line Testing

100% of the power supply production must have the following test performed. Each power shall be marked indicating the testing was done and passed. Typically this is done by stamping or labeling the power supply with “Hi-pot test OK”.

6.7 Hi-Pot Testing

Primary to secondary	: 2000 VAC for 60 sec.
Primary to FG	: 1500 VAC for 60 sec.
For production purpose:	
Primary to FG	: 1500 VAC for 1 sec.

6.9 Insulation resistance

Primary to secondary	: 20 meg. Ohm min. 500 VDC
Primary to FG	: 20 meg. Ohm min. 500VDC

7.0 Reliability

7.1 Burn in

All products shipped to customer must be burn in. The burn in shall be performed at high line voltage.

7.2 MTBF

The MTBF of the power supply shall be calculated utilizing the Part-Count Analysis method of MIL-HDBK-217F.

The calculated MTBF of the power supply is 208,670 hours at ambient temperature 25 degree.anical requirements

8.0 Mechanical requirements

Physical dimension : 217mm (D) x 85mm (W) x 84mm (H)

Module dimension : 180mm * 81.5mm * 40.3mm (D*W*H)

9.0 Redundant Function

9.1 Hot Swap Requirements

The redundant power supply modules shall be hot swappable. Hot swapping a power supply 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 specified in Table 3 with the capacitive load specified Table 5. The Sub-system shall not exceed the maximum inrush current as specified in section 2.2. The power supply can be hot swapped by the following methods:

● DC power source connecting separately to each module. Up to two power supplies may be on a single DC power source.

Extraction: The DC power will be disconnected from the power supply first and then the power supply is extracted from the sub-system. This could occur in standby mode or powered on mode. Insertion: The module is inserted into the cage and then DC power will be connected to the power supply module.

● For power modules with DC docking at the same time as DC outputside.

Extraction: The module is extracted from the cage and DC input/output disconnect at the same time. This could occur in standby or power on mode. No damage or arcing shall occur to the DC input/output contacts which could cause damage. Insertion: The DC connect at the same time as the module is inserted into the cage. No damage to the connector contacts shall occur. The module may power on or come up into standby mode.

Many variations of the above are possible. Supplies need to be compatible with these different variations depending upon the sub-system construction. In general, a failed (off by internal latch or external control) supply may be removed, then replaced with a good power supply(must use the same model) , however, hot swap needs to work with operational as well as failed power supplies. The newly inserted power supply may get turned on by inserting the supply into the system or by system management recognizing an inserted supply and explicitly turning it on.

9.2 LED INDICATORS

There shall be a single green color LED on power cage to indicate power supply status. The GREEN LED shall turn ON to indicate that all the power outputs are available or one module is dummy. The LED off indicate that one module has failed or shutdown due to protection.

9.3 TTL INDICATORS.

There shall be an open-collect TTL to indicate power supply status. The TTL shall pull high to 5.0v indicate that all the power outputs are available or one module is dummy. The TTL shall pull low(under 1.0V) indicate that the one module has failed or shutdown due to protection.