D1U74T-W-3200-12-HB4C

73.5mm M-CRPS-185 1U Front End AC-DC Power Supply

PRODUCT OVERVIEW

D1U74T-W-3200-12-HB4C is a compact 3200 W highly-efficient, front-end power supply module featuring a 12Vdc main and a 12Vdc standby output, active current sharing, multi-function status LED, hardware logic signals and PMBus™ 1.2 compliant digital communications bus.

This product is compliant with Open Compute Project M-CRPS, and backward-compatible with Intel CRPS, configured at the factory for power-up in CRPS mode. The low profile, ultra-high-power density 97.8 W/In^3 package is ideal for delivering reliable, efficient power to servers, workstations, storage networking systems, high-performance computing, and other 12V distributed power architectures.

FEATURES

- M-CRPS 185mm x 74mm form-factor
- 73.5mm x 185.0mm x 40.0mm1 (2.89" x 7.28" x 1.57")
- 3208.6W total output capability 220-240Vac Nom.
- IEC60320-C22 AC input connector
- CRPS-compliant connection alignment height of 8.5mm
- HVDC 240VDC capability[3]
- Wide temperature -5°C to +55°C temperature range
- CLEAResult 80+ Certified Titanium
- 12Vdc Main output, 3208.6W
- 12Vdc Standby output, 36W
- Compact Package, >97W per cubic inch
- N+1 redundancy
- Active current sharing (main 12Vdc)
- Integral ORING isolation devices for both outputs
- Overvoltage, overcurrent, overtemperature fault protection
- Internal cooling fan, variable speed controlled
- Compliant with M-CRPS v1.02
- Two-Year Warranty

[1] The maximum height of 40mm is limited by the 40mm fan. Chassis height is 39mm.

Safety Certifications:

ORDERING GUIDE

Part Number	Total Output Power		Main Output	Standby Output	Airflow
D1U74T-W-3200-12-HB4C	100-110 Vac	1321.6 W	12.2Vdc	12.2Vdc	B - F
	110-180 Vac	1439.6 W			
	180-200 Vac	2745 W			
	192-200 Vdc				
	200-220 Vac	2842.6 W			
	200-220 Vdc				
	220-240 Vac	3208.6 W			
	220-240 Vdc				

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Nom.	Max.	Units
Input Operating Range	AC Input	90	100-240	264	Vac
	HVDC[1]	192	240	310	Vdc
Input Source Frequency		47	50/60	63	Hz
Input Current	High Line (100-240 Vac)			15.8	Arms
	HVDC (240 Vdc)			15.8	Adc
Inrush Current[2]	Cold Start @ 264 Vac			35	Apk
Power Factor[4]	230Vac 100% Load	0.99			W/VA
Efficiency; 230Vac, excluding fan load 80 Plus® Titanium[3]	10% load	90			%
	20% load	94			
	50% load	96			
	100% load	94			

[1] Only in regions where safety regulations permit.

[2] Excludes EMI filter capacitors.

[3] Complies with the requirements of CLEAResult® 80PLUS® Titanium, Power factor and efficiency requirements.

OUTPUT VOLTAGE CHARACTERISTICS

Output	Parameter	Conditions	Min.	Typ.	Max.	Units
12V	Output Set Point Accuracy	50% load; Tamb =25°C	12.17	12.20	12.23	Vdc
	Line and Load Regulation[2]	Measured at PSU side of connector	12.10	12.20	12.23	Vdc
	Ripple Voltage & Noise[1,2]	20MHz Bandwidth; minimum load capacitance			120	mV p-p
	Output Current	100 – 110 Vac Continuous	1		108.33	A
		110 – 180 Vac Continuous	1		118	
		180 – 200 Vac Continuous 192 – 200 Vdc Continuous	1		225	
		200 – 220 Vac Continuous 200 – 220 Vdc Continuous	1		233	
		220 – 240 Vac Continuous 220 – 240 Vdc Continuous	1		263	
	Load Capacitance		2,000		70,000	µF
12VSB	Output Set Point Accuracy	50% load; Tamb =25°C	11.95	12.20	12.45	Vdc
	Line and Load Regulation[3]	Measured at PSU side of connector	11.59	12.20	12.81	
	Ripple Voltage & Noise[1,3]	20MHz bandwidth; minimum load			120	mV p-p
	Output Current		0.1		3	A
	Load Capacitance		0		4700	µF

[1] Ripple and noise are measured with 0.1µF of ceramic capacitance and 10µF of tantalum capacitance on each of the power supply outputs. A short coaxial cable to the scope termination is used and minimum output bus capacitance specified in above table. To help reduce switching ripple further, an additional 2,200uF low ESR electrolytic capacitor (or equivalent) can be placed in parallel.
[2] Minimum load of 1A to comply with these limits.
[3] Minimum load of 0.1A to meet these limits.

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Dynamic load response	60% step load, >5A output load, 2.5A/us, 1,000uF output cap load[1]		±7		%
	60% step load, >5A output load, 2.5A/us, 2,200uF output cap load[1]		±6		
Current sharing accuracy	13.3-100% (of full load per power supply; steady-state load)[2]		±2		
Holdup Time	100% load	10			ms

[1] The regulation limit is based on the drooped voltage.
[2] Based on individual power supply to total average; Sampled over 20ms moving window for 500ms after load change.

PROTECTION CHARACTERISTICS						
Output	**Parameter**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
Ambient	Overtemperature [2,3]		60		70	
Main 12V	Overcurrent (high line)	May OTP shutdown after 20 seconds	101		115	%
		Enter 115% CC mode after 15 ms	115		155	
		Enter 155% CC mode after 2 ms	155		167	
	Short-circuit	Latching[1]; percentage of full load, immediate shutdown.	>441			A
	Overvoltage	Latching[1]	13.6		14.5	Vdc
12VSB	Overcurrent	OCP: >10ms; automatically recovers after removal of the fault condition.		3.8		A
	Short-circuit	Immediate shutdown automatically recovers after removal of the fault condition.	9			
	Overvoltage	Automatically recovers after removal of the fault condition.	14		15	Vdc

[1] Latch-off reset requires the elimination of the fault condition, and then recycling either the AC input or PS_ON re-cycle to resume operation.

[2] Operating the power supply above the maximum specified operating temperature is considered an abnormal condition. It can negatively impact power operational life and is not recommended.

[3] As reported by the internal power supply PMBus intake air temperature sensor.

[4] A fault on any output other than Standby does not cause the Standby output to turn off.

ENVIRONMENTAL CHARACTERISTICS					
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
Storage Temperature Range		-40		70	°C
Operating Temperature Range (Sea Level)[1]	1321.6W (100-110Vac) Continuous	-5		55	
	1439.6W (110-180Vac) Continuous				
	2745W (180-200Vac / 192-200Vdc) Continuous				
	2842.6W (200-220Vac / 200-220Vdc) Continuous				
	3208.6W (220-240Vac / 220-240Vdc) Continuous				
Humidity	Operating; non-condensing	5		85	%
	Non-operating; non-condensing	5		95	
Altitude, Operating	Derate 1°C per 140 meters from PSU at 263A > 950 meters at 55°C	-50		3050	m
Altitude Non-Operating		-50		15,200	
Shock	Non-operating, faired square wave w/velocity change at 200 in/sec.			40	G
Operational Vibration	Half sine sweep; Pulse duration of 2 msec ±10%			82	
	Random vibration, 7, 20, 140, 312, 400, 600, 800Hz			0.5	Grms
MTBF	Tamb = 55°C; 75% Load; nominal AC input	250K			Hrs.
Operating Life	Tamb = 55°C; 20% time at 20% load; 80% of the time at 80% load; nominal AC input	5			Years
Weight			1.06		kg
Input Fuses	**Caution**: A single fast blow type 20A 420V internal fuse is provided as a series protective element in the input "line" connection.				

[1] Based on component power supply in free-air environment. Results might vary when installed in an end-user system due to the effects of system imposed back-pressure.

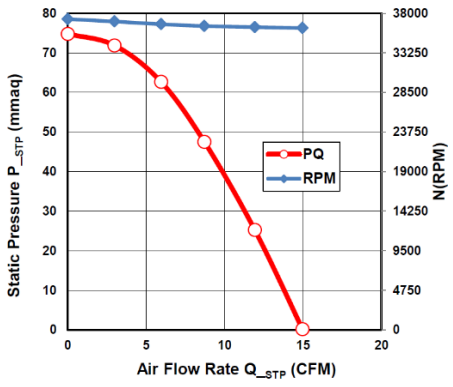
ISOLATION CHARACTERISTICS					
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**	**Units**
Insulation Safety Rating/Test Voltage	Input to Output - Reinforced	4242			Vdc
	Input to Chassis - Basic	2500			

EMISSIONS AND IMMUNITY		
Characteristic	**Standard**	**Compliance**
Input Current Harmonics	IEC/EN 61000-3-2	Complies with Class A limits
Voltage Fluctuation and Flicker	IEC/EN 61000-3-3	Complies
Conducted Emissions	FCC 47 CFR Part15/CISPR22/EN55032	Class A
ESD Immunity	IEC/EN 61000-4-2	±8KV Contact; ±15KV air discharge; Criteria A[2]
Radiated Field Immunity	IEC/EN 61000-4-3	3V/m, 1KHz, 80% AM, 80MHz to 1GHz Criteria A[2]
Electrical Fast Transients/Burst Immunity	IEC/EN 61000-4-4	[1] Level 3 (2kV), criteria A[2]
Surge Immunity	IEC/EN 61000-4-5	[1] Level 3 (3kV Line-Earth, 2kV Line-Line), criteria A[2]
RF Conducted Immunity	IEC/EN 61000-4-6	Level 2 (3V/M) criteria A[2]
Voltage Dips, Interruptions	IEC/EN 61000-4-11	230Vin, 100% load, Phase 0°, Dip 100% Duration 10ms (VSB:A,V1:B) 230Vin, 50% load, Phase 0°, Dip 100% Duration 20ms (VSB:A, V1:B) 230Vin, 100% load, Phase 0°, Dip 100% Duration > 20ms (VSB, V1:B)
Safety Approval Standards (planned)	UL62368-1: 2018 (3rd Edition) (Information Technology Equipment – Safety - Part 1: General Requirements) CAN/CSA-C22.2 No. 62368-1: 2018 (3rd Edition) (Information Technology Equipment - Safety - Part 1: General Requirements) TUV: EN 62368-1:2020/A11:2020 CQC: GB4943.1-2022 BSMI: CNS15598-1 (June/109) KC: K62368-1 (2021-08) IRAM: IEC 62368-1: 2018 BIS: IEC 60950-1: 2005, AMD1:2009, AMD2:2013 CB: IEC 62368-1:2018 (3rd Edition)	

[1] Measured at the power supply's AC input connector.
[2] Installed in the system.

AIRFLOW PERFORMANCE (requires update)

P-Q CURVE (Fan speed: 100% duty cycle, test method: AMCA 210-07)



Note: Free inlet and free outlet; Performance to be verified by end-users in their system.

STATUS AND CONTROL SIGNALS			
Signal Name	**I/O**	**Description**	**Interface Details**
PWOK Pin Table	O	This is a power "OK" signal and is pulled to a logic level "high" to indicate all outputs are operating within the regulation limits It is pulled to a logic level "low" in response removal of the AC source, or the output falling below regulation limits.	Max. source current: 0.2mA Sink Current: 0.4mA max. Rise/Fall time: 100us max.
VINOK Pin Table	O	The VINOK signal and is pulled to a logic level "high" to indicate the input source is present and within operational limits. It is pulled to a logic level "low" in response removal of the input source, or if the source falls below operational limits.	Source current: 4mA max. Sink Current: 10mA max. Rise/Fall time: 100us max.
SMBAlert#[7] Pin Table	O	SMBALERT# is a PMBus™ 1.2 complaint signal driven low to alert the system that a warning/fault has occurred. The signal is issued in response to any STATUS event flags (such as STATUS_INPUT, STATUS_IOUT, STATUS_TEMPERATURE).	Pull-up: 10kΩ Rise/Fall time: 100us max.
PSON# Pin Table	I	This is a FW configurable signal that provides main 12V output on/off control. It is configurable as a two or three state signal, as follows: • Two State Signal; this is the default setting; pulled to a logic level "low to enable the Main 12V output. Pulled to a logic level "high" or leaving the signal "open", disables the Main 12V output. • Three State Signal; when configured as three-state input, the PSON# signal shall be able to detect logic 0, logic 1 and high impedance (pin floating).	Source current: 4mA max. Sink Current: 10mA max. Rise/Fall time: 100us max.
A0 & A1	I	The power supply configures its slave and FRU address via the voltage levels of the A0 and A1 input pins. Up to six (6) addresses can be set combining logic states and analog voltage levels for these signals. • A0 Input; the A0 input pin shall be an analog input, and able to detect a voltage from 0 to 3.3V to select between logic level addressing mode, and analog queue addressing mode. The power module shall sample the A1 and A0 pins and average the voltage to facilitate this. • A1 Input; Used in conjunction with A0 for logic level address selection; the A1 input is also used to configure a further function (not covered in the scope of this datasheet; refer to ACAN-145 for details.	A0 pulled up via 47kΩ A1 is pulled up via 330KΩ
SCL Pin Table	I/O	Serial clock input to PSU compatible with PMBus™ 1.2.	pull-up: 100kΩ
SDA Pin Table	I/O	Serial data line compatible with PMBus™ 1.2.	pull-up 100kΩ
Remote Sense (RS+ & RS-) and PSKILL Pin Table	I	A remote sensing pair called Remote Sense (RS+) for the positive terminal and Return Sense (RS-) for the negative terminal to compensate voltage droops at the point of load. In addition, the Return Sense (RS-) pin shall be dual purpose acting as a PSKILL (for insertion/extraction of the power module from the host system).	
ISHARE Pin table	I/O	This signal is an analog DC voltage that forms a common ISHARE bus with all parallel connected power modules, within the host system, and changes in proportion to load. Each power module uses this signal to control its ISHARE bus voltage thereby maintaining current share performance. The DC bus voltage for a single PSU @ 100% high line full load is 8Vdc and 4Vdc for two PSUs sharing the same load equally.	Analog voltage: 0 to +8V for 0 – FL Support up to 10 V for 2.5 x FL.
CR Pin table	I/O	CR signals from all load-sharing power supply modules can be tied together to form a common Cold redundancy bus, required for cold redundant operation, compliant with CRPS Common Requirement Specification. This bus functions as follows: • Pull-up bus voltage: Bus pull-up is provided by the single PSU assigned the roll of "COLD_REDUNDANT ACTIVE". Only the PSU assigned this roll provides the pull-up path and is why this PSU is referred to as the "Master." • Each bus-connected PSU drives the CR signal low when any fault is detected. • Each bus connected PSU powers on its main output rapidly within 100µs after detection of LOW state.	Pulled 680R to internal bias supply voltage of the "ACTIVE" & "MASTER" PSU; Pull-Down = 40k Ω
IMON Pin table	O	Current signal that reflects Main 12V output current. This signal is capable of parallel connection with other IMON signals, of parallel connected power modules, in the system to provide a total system current (of the combined number of power modules).	0 to 2mA (representing 0 to 200% of rated current) or 10uA/A with a range of 0 to 200% of rated current.

Note: Signal-Related Notes are on the next page.

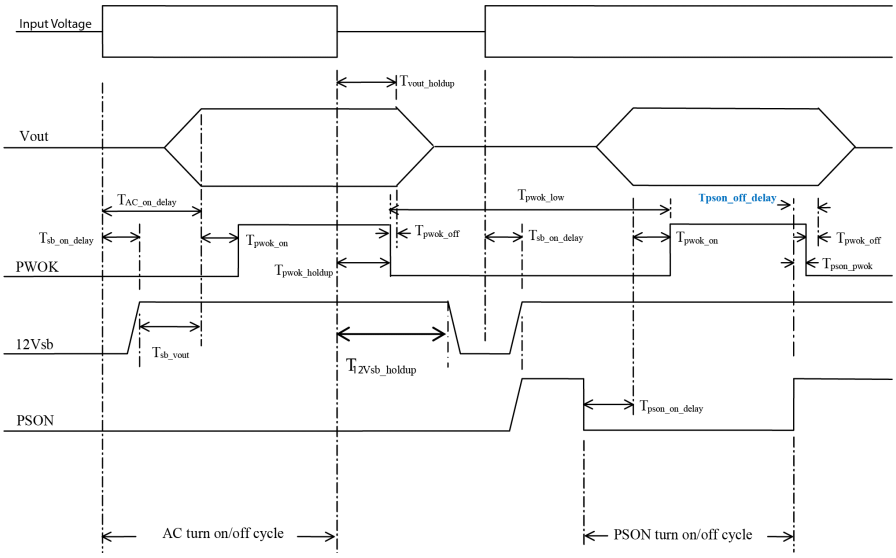
Signal Related Notes:

1. Internal 3.3Vdc rail is derived from VSB and an internal housekeeping rail ("diode ORed") and is compatible with the voltage levels of TTL and CMOS logic families.
2. Logic level "high": 2.1Vdc to 3.46Vdc, Logic level "low": 0 to 0.8Vdc measured under 20 MHz BW.
3. Pulldowns are referenced to VSB return.
4. This product supports "SMBALERT_MASK" providing flexibility for the System/Host to configure Fault/Warning bits SMBAERT# supports. Refer to the MCRPS specifications for additional details.
5. R-C low pass filters with BW ≤ 300 kHz are recommended on system side for PWOK, SMB_ALERT and VIN_GOOD to prevent false trigger by noise due to system layout variations.
6. See ACAN-145 for more details.

STATUS LED	
The handle provides the status indication and is illuminated by a bi-color LED defined as follows:	
PSU Status	**LED Status**
Output on and OK.	Green
AC power is not present.	Off
Standby state; AC present; Main output off, VSB on.	1Hz Blink Green
The power supply module is in cold standby state or always standby state as defined in the Cold Redundancy section of CRPS Common Requirement Specification.	1Hz Blink Green
No AC power; however, AC input power is applied to a parallel connected power supply module.	Off
Power supply critical event causing a shutdown; failure, overcurrent, short circuit, overvoltage, fan failure, over temperature.	Amber
Power supply warning events where the power supply continues to operate; high temperature, high power, high current, slow fan.	1 Hz Blink Amber
Power supply firmware updating.	2Hz Blink Green

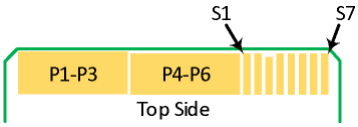
TIMING CHARACTERISTICS

Timing Diagram

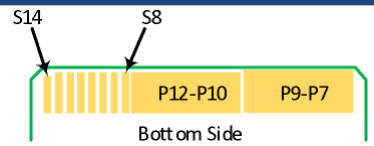


Item	Description	Min.	Max.	Units
Tvout_rise	Output voltage rise time for 12V and 12VSB from 10% to within regulation limits.	10	70	ms
Tsb_on_delay	Delay from Input Voltage being applied to 12VSB being within regulation.	-	1500	ms
Tac_on_delay	Delay from Input Voltage being applied to all output voltages being within regulation.	-	3000	ms
Tvout_holdup	Time that the 12V output voltage remains within regulation after loss of Input Voltage. **Note:** For 70% of rated load only.	11	-	ms
Tpwok_holdup	Delay from loss of Input Voltage to de-assertion of PWOK. Note: for 70% of rated load only.	5	10	ms
Tpson_off_delay	Delay from PSON# de-asserted to power supply turning off.	-	5	ms
Tpson_on_delay	Delay from PSON# active to output voltages within regulation limits.	5	400	ms
Tpson_pwok	Delay from PSON# deactivate to PWOK de-assertion.	-	5	ms
Tpwok_on	Delay from output voltages within regulation limits to PWOK assertion at turn on.	380	420	ms
Tpwok_off	Delay from PWOK de-asserted to output voltages dropping out of regulation limits.	1	6	ms
Tsb_vout	Delay from 12VSB being in regulation to outputs being in regulation, at turn-on of input voltage.	50	1000	ms
12VSB_holdup	Time the 12VSB output voltage stays within regulation after loss of input voltage.	70	-	ms

DC OUTPUT & SIGNAL INTERFACE (POWER MODULE SIDE, CARD EDGE)



Pin	Name	Sequence	Description
P1, P2, P3	PWR Return	Long	GND[1] (12V Main,12VSB Output and signal return)
P4, P5, P6	12V Output	STD	12V Main Output
S1	SDA	STD	PMBus data line
S2	SCL	STD	PMBus clock line
S3	PSON#	Short	Active low; 12V main output on/off control
S4	SMBAlert#	STD	Active low; I²C alert signal (interrupt)
S5	Return Sense/PS_KILL	STD	12V main output Remote Sense Return and PS_KILL dual function
S6	+12V Remote Sense	STD	12V Main output remote sense positive lead
S7	PWOK	STD	Hardware status signal

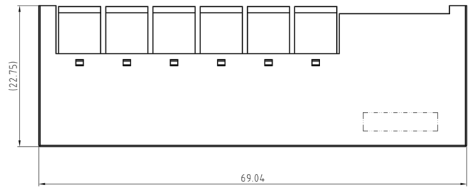


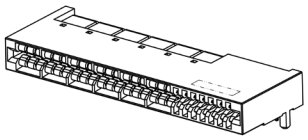
Pin	Name	Sequence	Description
P7, P8, P9	PWR Return	Long	GND[1] (12V Main,12VSB Output and signal return)
P10, P11, P12	12V Output	STD	12V Main Output
S8	A0	STD	PMBus address A0
S9	A1	STD	PMBus address A1 / DSSI
S10	VSB	STD	12V standby output
S11	CR	STD	Cold Redundancy Bus
S12	12V Load Share	STD	12V Main Output load share bus
S13	IMON[2] /PRESENT_L	Short	Programmable
S14	VIN_OK	STD	Indicates AC voltage is present and within operating range

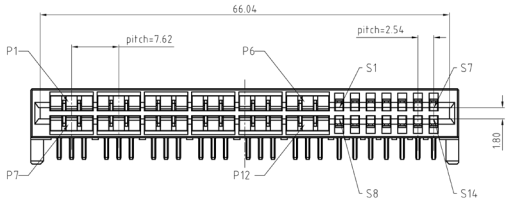
[1] Connected to P/E via chassis ground within the power supply module.
[2] Current source signal from 0 – 2 mA reflecting the 12 V main output current from 0 – 2 x FL. Operating voltage range from 0 – 3.3 V.
[3] Dual purpose (configurable) signal pin.

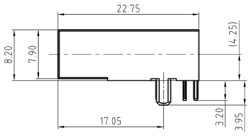
MATING SIDE OUTPUT CONNECTOR

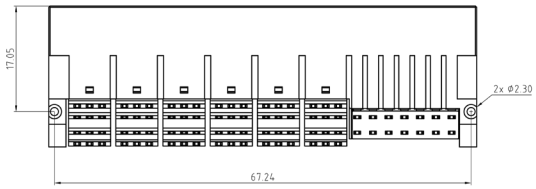
Compatible With FCI Amphenol HPG12P14SRT153T



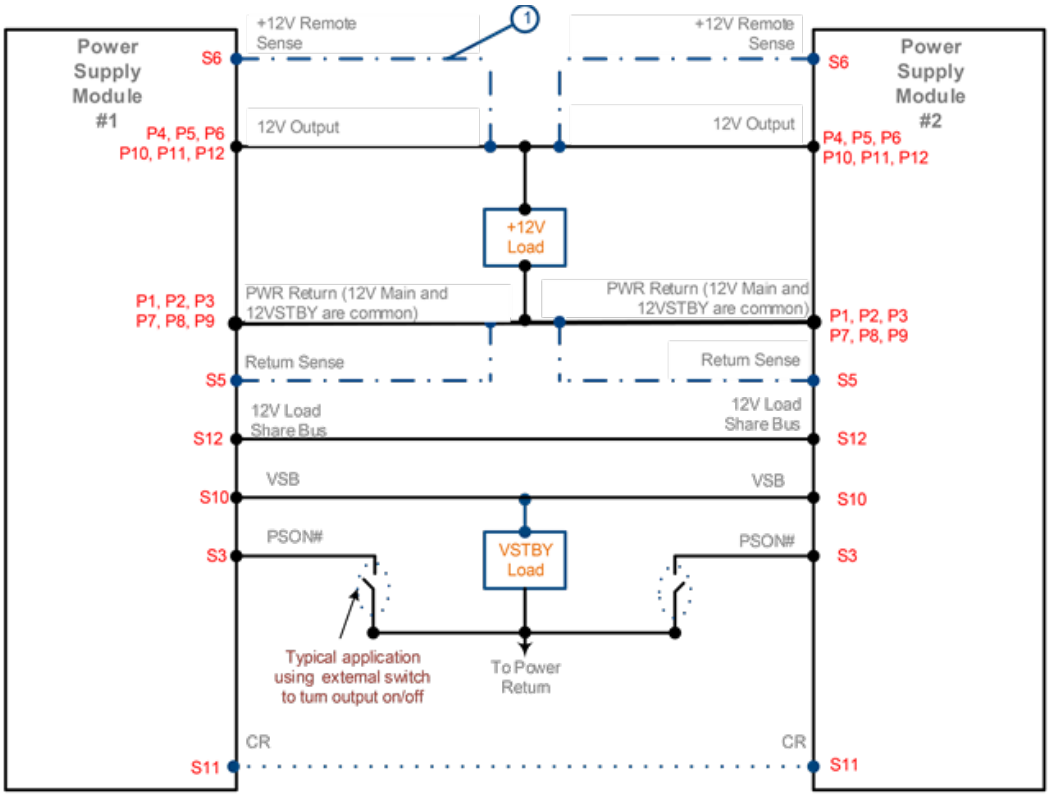








WIRING DIAGRAM

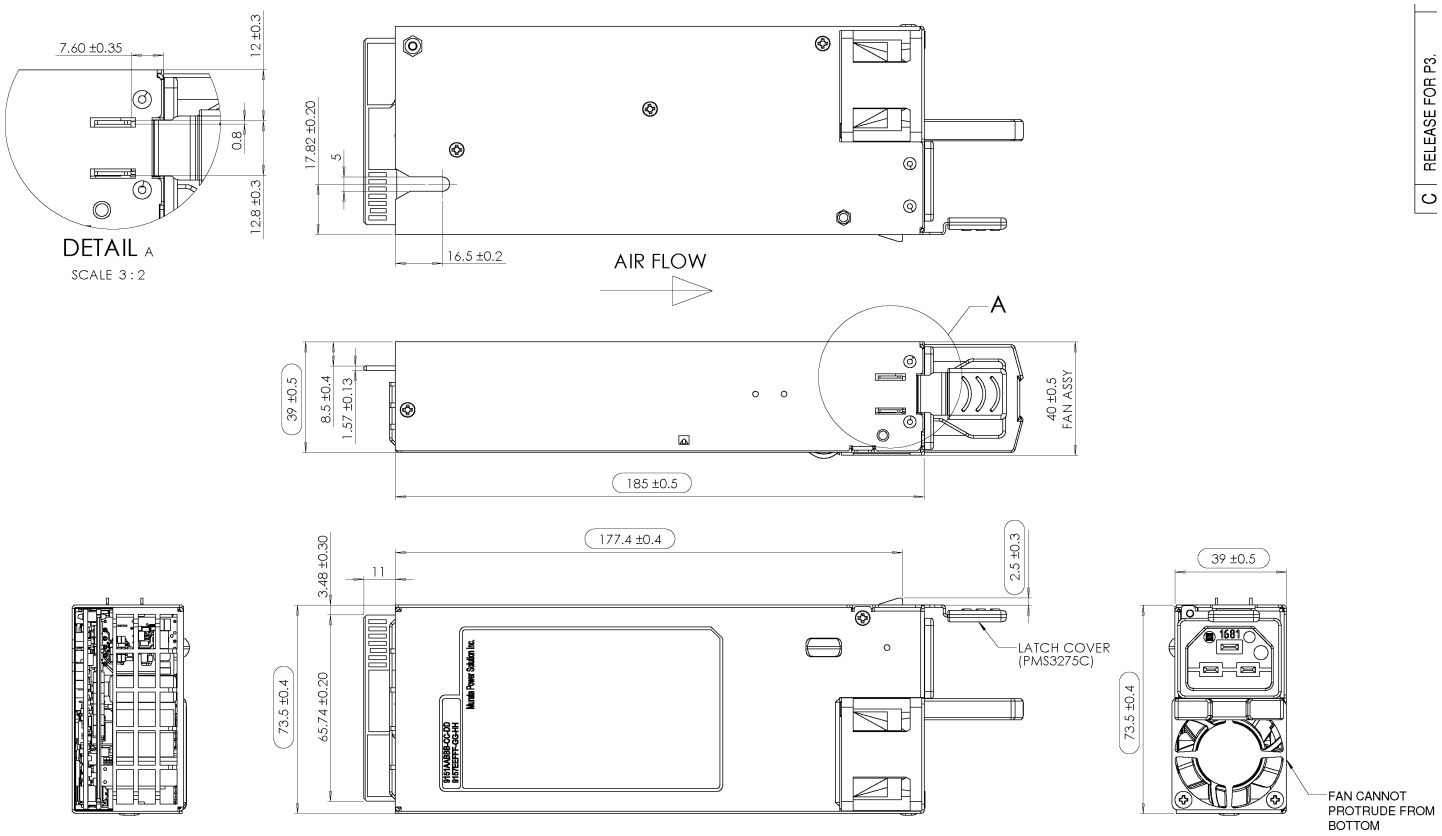


1) Dotted lines show optional remote sense connections. Optional remote sense lines can be attached to a load that is a distance away from the power supply to improve regulation at the load.

Current Sharing Notes:

1. Main output: Current sharing is achieved using the active current share method, plus additional "droop" characteristic.
2. Current sharing can be achieved with, or without, the +12V Remote Sense and Return Sense connected to the common load.
3. The Main 12V output and 12V STBY output has an internal ORING MOSFET for additional redundancy/internal short protection.
4. The current sharing pin is connected between sharing units (forming an ISHARE bus). It is an input or output (bi-directional analog bus) as the voltage on the line controls the current share between sharing units. A power supply responds to a change in this voltage; however, a power supply can also change the voltage depending on the load drawn from it. On a single unit the voltage on the pin (and the common ISHARE bus reads 8Vdc at 100% load (power module capability). For two units sharing the same load, this reads approximately 4Vdc for perfect current sharing (for example, 50% power capability per unit).
5. The load for both the Main 12V and the 12VSB rails at initial startup shall not be allowed to exceed the capability of a single unit. The load can be increased after the assertion of PW_OK signal to allow all sharing units to achieve steady-state regulation.

MECHANICAL DRAWING



1. AC input connector: IEC 60320-C22.
2. This drawing is a graphical representation of the product and might not show all the fine details.
3. Textures, screw head patterns, molded parts might appear different from this illustration. Contact Murata Power Solutions for the 3D-model details.
4. Dimensions in mm.
5. Latch cover is green (Pantone PM3275C).
6. Subject to change. Contact factory for the latest version.

APPLICATION NOTES

Document Number	Description	Notes
ACAN-145	PMBus Protocol	Contact Murata Power Solutions for details.
ACAN-82	D1U74T-12-CONC2.7K Connector Interface Card	

OPTIONAL ACCESSORIES

Document Number	Description
D1U74T-12-CONC2.7K	Connector Interface Card

Murata Power Solutions, Inc.
129 Flanders Rd.
Westborough, MA 01581 USA
ISO 9001 REGISTERED