



### PRODUCT OVERVIEW

The D1U86P-W-1600-12-HBxDC products are high efficiency 1600 watt, power factor corrected front end supplies with a 12V main output and a 12V (30W) standby. They have current sharing and up to 8 supplies may be operated in parallel. The supplies may be hot plugged, they recover from overtemperature faults, and have logic and PMBus monitoring and control. Their low profile 1U package and >38.6W/cubic inch power density make them ideal for delivering reliable, efficient power to servers, workstations, storage systems and other 12V distributed power systems.

### FEATURES

- 1600W output power
- 94% minimum efficiency at 50% load
- 12V main output
- 12V standby output of 30W
- 1U height: 3.4" x 7.75" x 1.59"
- 38.6 Watts per cubic inch density
- N+1 redundancy, including hot plugging (up to 8 in parallel)
- Current sharing on 12V main output
- Overvoltage, overcurrent, overtemperature protection
- Internal cooling fan (variable speed)
- PMBus™ / I<sup>2</sup>C interface monitoring and control
- RoHS compliant

### ORDERING GUIDE

Part Number	Power Output; AC Line			Main Output	Standby Output	Airflow
	(90-264V)	(108-264V)	(180-264V)			
D1U86P-W-1600-12-HB4DC	1200W	1350W	1600W	12V	12V	Back to front
D1U86P-W-1600-12-HB3DC						Front to Back

### INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Nom.	Max.	Units
Input Voltage Operating Range		90	115/230	264	Vac
Frequency		47	50/60	63	Hz
Turn-on Voltage	Ramp up	81		89	Vac
Turn-off Voltage	Ramp down	70.5	73	78	
Maximum Input Current	1200W, 100Vac			14.1	Arms
Inrush Current	At 264Vac at 25°C cold start			35	Apk
Power Factor	At 230Vac, half load		0.98		
Efficiency (230Vac) excluding fan load	20% load	90			%
	50% load	94			
	100% load	91			

### OUTPUT VOLTAGE CHARACTERISTICS

Output Voltage	Parameter	Conditions	Min.	Typ.	Max.	Units
12V	Voltage Set Point	50% load	12.17	12.2	12.23	Vdc
	Line and Load Regulation		11.4		12.6	
	Droop			3.10		mV/A
	Ripple Voltage & Noise <sup>1</sup>	20MHz Bandwidth			120	mV p-p
	Output Current (230 Vac) <sup>2</sup>		0		133.4	A
	Output Current (120 Vac) <sup>2</sup>		0		112.5	A
	Output Current (100 Vac) <sup>2</sup>		0		100.0	A
12VSB	Load Capacitance				10,000	µF
	Voltage Set Point	50% load	11.97	12.0	12.02	Vdc
	Ripple Voltage & Noise <sup>1</sup>	20MHz Bandwidth			120	mV p-p
	Output Current		0		2.5	A

<sup>1</sup> Ripple and noise measured with a parallel combination of a 1.0µF ceramic and 10µF tantalum capacitor on each of the power module outputs. A short coaxial cable connected directly to the input of a scope is required.

<sup>2</sup> To meet ripple and transient step load specifications a minimum load of 4A is required.



Available now at  
<http://power.murata.com/en/3d/acdc.html>



OUTPUT CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Output Rise Monotonicity	No voltage excursion				
Startup Time	AC ramp up		1.5	3	s
Transient Response	12V, 50% load step, 1.0A $\mu$ s di/dt		600		mV
	12VSB, 50% load step, 1.0A $\mu$ s di/dt		600		
Current sharing accuracy (up to 8 in parallel) <sup>3</sup>	At 100% load			$\pm$ 5	%
Hot Swap Transients	All outputs remain in regulation			5	%
Holdup Time	At full load	12			ms

<sup>3</sup> Load current of 100% applies to each power module max load connected in an N+1 configuration; therefore the total load will be "N" x 100% . The share accuracy of  $\pm$ 5% is a fixed percentage irrespective of total loading and number of units connected in parallel.

ENVIRONMENTAL CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Storage Temperature Range		-40		85	°C
Operating Temperature Range		0		55	
Operating Humidity	Noncondensing	5		90	%
Storage Humidity		5		95	
Altitude (without derating at 45°C)		3000			m
Shock	30G non operating				
Vibration	10-500Hz, 0.5G (non-operational)				
MTBF	Per Telcordia SR-322 M1C1@ 40°C	559K			hrs
Acoustic				65	dBa/@1m
Safety Approvals	CSA 60950-1-07+A1:2011 ANSI/UL 60950-1-2011, Second Edition IEC 60950-1:2005 (2nd Edition) + A1:2009 EN 60950-1:2006 +A11:2009 +A1:2010				
Input Fuse	Power Supply has internal 16A/250V fast blow fuse on the AC line input				
Weight				2.33/1.06	lbs/Kg

PROTECTION CHARACTERISTICS						
Output Voltage	Parameter	Conditions	Min.	Typ.	Max.	Units
	Overtemperature (intake)	An OTP warning will be issued via the PMBus™ interface when the air inlet exceeds 65°C; however the power module shall not shut down until critical internal hotspot temperatures are exceeded.		65		°C
12V	Overvoltage	Latching	13.2		14.4	V
	Overcurrent at 220Vac	Shutdown of the output followed by auto- recovery after one second. The output shall attempt three such auto-recovery attempts and then enter a permanent latched state. Recovery of the permanent latched state shall require cycling of the incoming AC source or toggling of the PSON# signal.	140		153	A
	Overcurrent at 120Vac		118		129	
12VSB	Overvoltage	Latching	13.2		14.4	V
	Overcurrent	Autorecovery	2.75		3	A

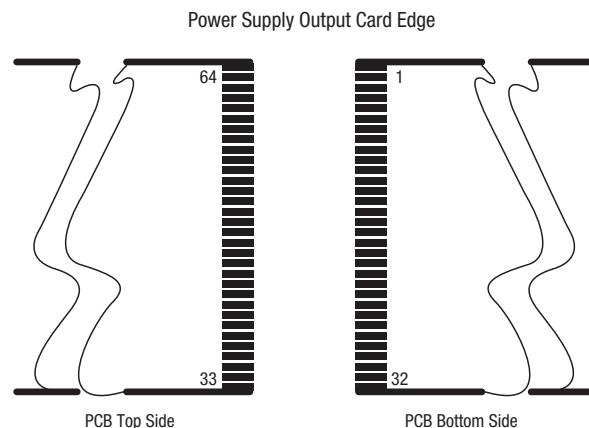
ISOLATION CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Insulation Safety Rating / Test Voltage	Input to Output - Reinforced	3000			Vrms
	Input to Chassis - Basic	1500			Vrms
Isolation	Output to Chassis	500			Vdc
Leakage Current	1.5mA at 264Vac, 50/60Hz				

EMISSIONS AND IMMUNITY		
Characteristic	Standard	Compliance
Input Current Harmonics	IEC/EN 61000-3-2	Complies
Voltage Fluctuation and Flicker	IEC/EN 61000-3-3	Complies
Conducted Emissions	FCC 47 CFR Part 15/CISPR 22/EN55022	Class A, 6dB margin
ESD Immunity	IEC/EN 61000-4-2	Level 3 criteria A
Radiated Field Immunity	IEC/EN 61000-4-3	Level 3 criteria B
Electrical Fast Transient Immunity	IEC/EN 61000-4-4	Level 3 criteria A
Surge Immunity	IEC/EN 61000-4-5	Level 3 criteria A
Radiated Field Conducted Immunity	IEC/EN 61000-4-6	Level 3 criteria A
Magnetic Field Immunity	IEC/EN 61000-4-8	3 A/m criteria B
Voltage dips, interruptions	IEC/EN 61000-4-11	230V <sub>in</sub> , 100% load, Phase 0°, Dip 100% Duration 10ms (A) 230V <sub>in</sub> , 50% load, Phase 0°, Dip 100% Duration 20ms (VSB:A, V1:A) 230V <sub>in</sub> , 100% load, Phase 0°, Dip 100% Duration > 20ms (VSB, V1:B)

STATUS INDICATORS AND CONTROL SIGNALS			
Signal	Description		
PSON#	Low = main output on; PSON# can be permanently tied to GND within the host system.		
PRESENT#	Short pin pulled down on p/s; pulled up to either 3.3V or 12V (max) in the host system. For 3.3V use a 5.11KΩ resistor; for 12V, use a 21KΩ resistor.		
PS INTERRUPT	Open drain PMBus™ signal; can be left open if not used.		
ADDR	PMBus™ Address; ADDR can be grounded or left open if not used. If grounded, the address will be 000, if it is open, the default address will be 111.		
ISHARE	Analog representation of main output current; can be left open if not used.		
PSOK <sup>4</sup>	A three level signal based on AC input and DC output status; can be left open if not used.		
I <sup>2</sup> C CLOCK	I <sup>2</sup> C clock		
I <sup>2</sup> C DATA	I <sup>2</sup> C data		
	LED State	Mode	Operating Condition
1.	Off	AC Turn-off	AC Input is below minimum power-supply turn-on specification
2.	Green – blinking 1Hz	Standby	Power supply standby output is operating within normal parameters and main output is disabled
3.	Green – solid	Power-good	Power supply standby & main outputs are operating within normal parameters and delivering power
4.	Yellow – blinking 1Hz	Warning	Warning condition in power supply has been detected
5.	Yellow – solid	Fault	Fault condition in power supply has been detected.

<sup>3</sup> See truth table below for operation.

OUTPUT CONNECTOR AND SIGNAL SPECIFICATION			
Pin#	Function	Pin Type	Description
14-26, 39-51	RTN	Power Ground	Power and Standby Return
1-13, 52-64	12V	Power	12V Output
37	12VSB	Power	12V Standby Output
38	PSINTERRUPT	Output	Active low; interrupt line for power supply fault & warning detection as per PMBus spec
36	PRESENT#	Input	Power Supply Present Signal (shortest pin)
35	PSOK	Analog output	Combination of there power supply output indicator signals: 1. AC input OK 2. Power Good 3. Power Supply Fault
34	ISHARE	Analog I/O	Analog representation of main output current. Typical analog voltage shall be 60.15mV/Amp of main output current.
33	PSON#	Input	Power Supply on/off control signal
32	SCL	Input	SMBus/PMBus Clock
31	SDA	I/O	SMBus/PMBus Data
30	GND	Analog I/O	Power Supply Signal Ground
29	N/A	N/A	Reserved; no User connection
28	N/A	N/A	Reserved; no User connection
27	ADDR	Analog input	PMBus Address

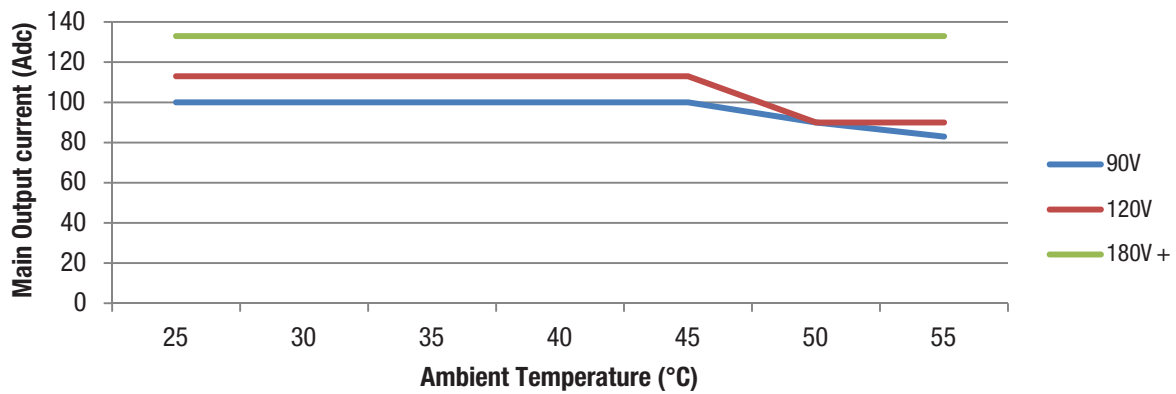


### CONNECTOR AND SIGNAL SPECIFICATION<sup>4</sup> PSOK TRUTH TABLE VS. ANALOG OUTPUT

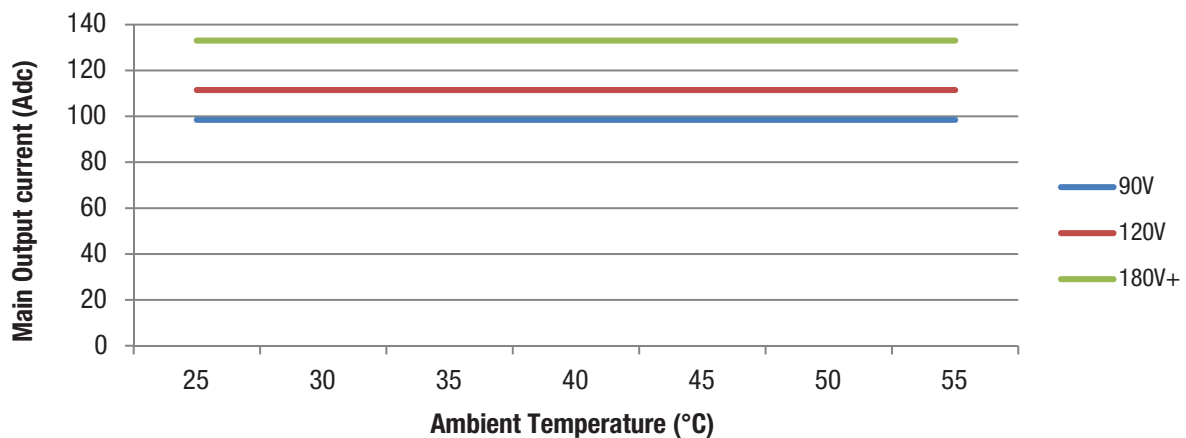
DC_OK_H	PWR_GOOD_H	PS_FAULT_L	PSOK		OPERATION MODE
0	0	1	< 0.1Vdc	VDD = 3.3Vdc	No DC Input
0	1	1	(1/3) VDD		Invalid
1	0	1	(2/3) VDD		Standby
1	1	1	VDD		Power Good
X	X	0	0.2-0.4Vdc		PS Fault

### DERATING CURVES

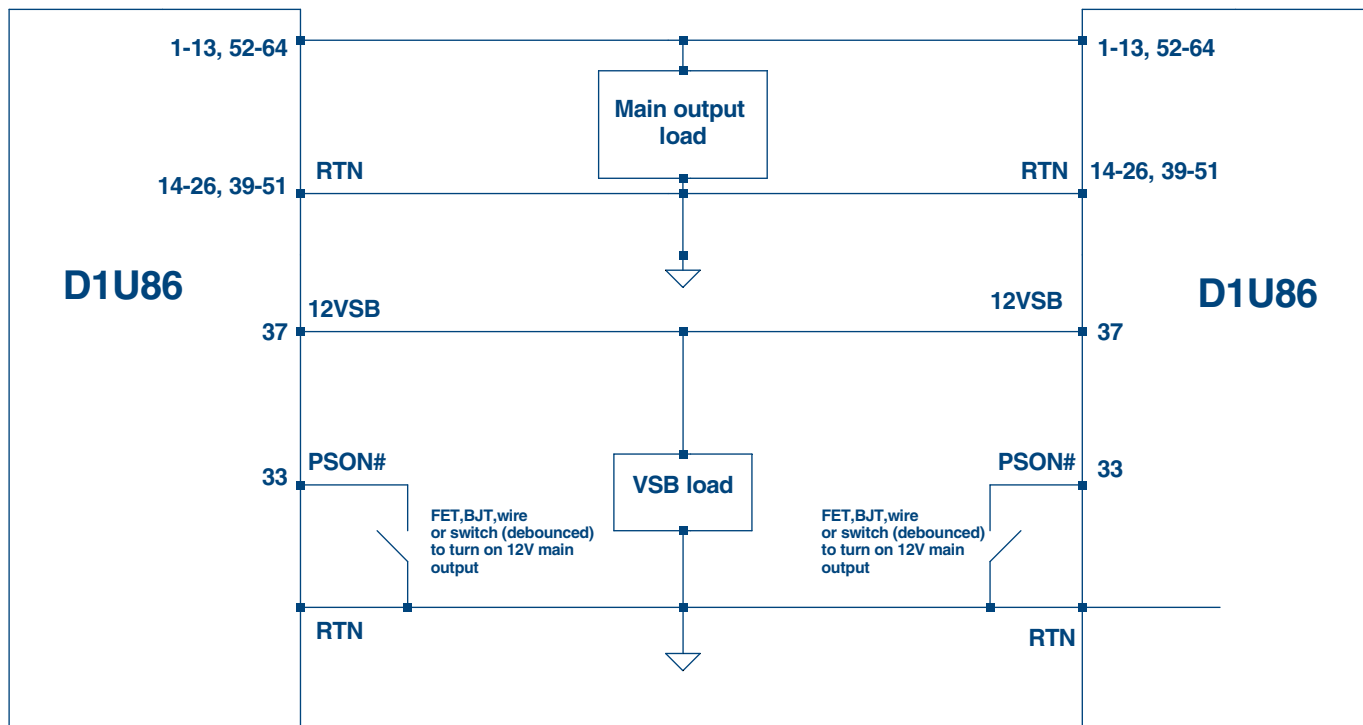
Output Current Derating vs. Ambient Temperature (back to front airflow)  
 D1U86P-W-1600-HB4DC; VSB 1.0A  
 12Vdc @90Vac - 113A to 45°C; derates to 90A at 50°C



Output Current Derating vs. Ambient Temperature (front to back airflow)  
 D1U86P-W-1600-12-HB3DC; VSB 2.5A (No Derating)



**WIRING DIAGRAM FOR OUTPUT**

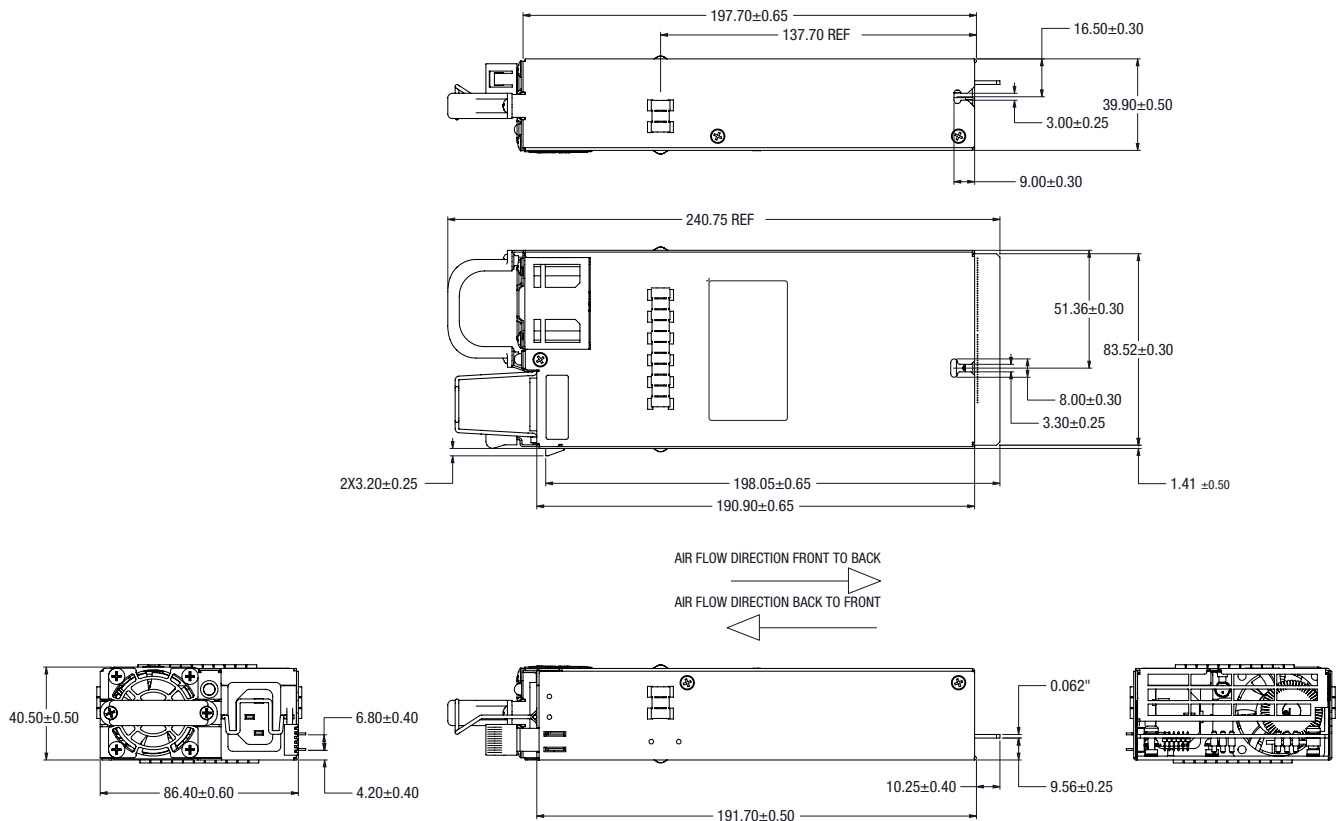


**CURRENT SHARING NOTES**

Main Output: Current share is achieved using the droop method. Nominal output voltage (12.20V) is achieved at 50% load and output voltage droops at a rate of 3.10mv per amp increase. Startup of parallel power supplies is not internally synchronized. If more than 1600W combined power is needed, start-up synchronization must be provided by using a common PS\_ON signal. To account for ±5% full load current sharing accuracy and the reduction in full load output voltage due to droop, available output power must be derated by 10% when units are operated in parallel.

Standby output can be tied together for redundancy but total combined output power must not exceed 30W, Internal MOSFET ORING devices are used

**MECHANICAL DIMENSIONS**



AC input connector: IEC 320-C14  
 3.4" x 7.78" x 1.59" [86.4mm x 197.7mm x 40.5mm]

**MATING CONNECTOR**

Part Number	Description
FCI 10053363-200LF	Right Angle
FCI 10046971-001LF	Vertical

**OPTIONAL ACCESSORIES**

Description	Part Number
12V D1U86P Output Connector Card	D1U86P-12-CONC

**APPLICATION NOTES**

Document Number	Description
ACAN-50	D1U86P Output Connector Card
ACAN-51	D1U86P Communication Protocol

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