

CP2000AC48TEZ-FB2 Compact Power Line High Efficiency Rectifier

Input: 100-120/220-240 Vac; Output: 2250W @ 48Vdc; 5 Vdc @ 4W

RoHS Compliant



Applications

- Wide band power amplifiers

Features

- Efficiency 95%
- Compact 1RU form factor providing 30 W/in³
- 2250W @ 52V from nominal 220 – 240Vac
- 1200W from nominal 100 – 120Vac (for $V_o > 30Vdc$)
- Output voltage programmable from 18V – 58Vdc
- PMBus compliant dual I²C and RS485 serial busses
- Power factor correction (meets EN/IEC 61000-3-2 and EN 60555-2 requirements)
- Output overvoltage and overload protection
- AC Input overvoltage and undervoltage protection
- Over-temperature warning and protection
- Redundant, parallel operation with active load sharing
- Redundant +5V Aux power
- Remote ON/OFF
- Hot insertion/removal (hot plug)
- Four front panel LED indicators
- UL* Recognized to UL60950-1, CAN/ CSA† C22.2 No. 60950-1, and VDE‡ 0805-1 Licensed to IEC60950-1
- CE mark meets 2006/95/EC directive§
- Internally controlled Variable-speed fan
- RoHS Directive 2011/65/EU and amended Directive (EU) 2015/863
- Special Foldback Curve

Description

The CP2000AC48TEZ-FB Rectifier has an extremely wide programmable output voltage capability and fold-back current limiting features. High-density front-to-back airflow is designed for minimal space utilization and is highly expandable for future growth. This custom rectifier incorporates both RS485 and dual-redundant I²C communications busses that allow it to be used in a broad range of applications. Feature set flexibility makes this rectifier an excellent choice for a set of applications requiring operation over a wide output voltage range.

* UL is a registered trademark of Underwriters Laboratories, Inc.

† CSA is a registered trademark of Canadian Standards Association.

‡ VDE is a trademark of Verband Deutscher Elektrotechniker e.V.

§ This product is intended for integration into end-user equipment. All the required procedures for CE marking of end-user equipment should be followed. (The CE mark is placed on selected products.)

** ISO is a registered trademark of the International Organization of Standards.

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Electrical Specifications

Input					
Parameter	Min	Typ	Max	Units	Notes
Startup Input Voltage Low-line Operation High-line Operation			90 200		
Operating Voltage Range Low-line Configuration High-line Configuration	90 200	100, 110, 120 220 - 240	140 265	Vac	
Surges (no damage)	305				
Input Frequency	47		66	Hz	
Input Current			12 13.5	A	At 110 Vac At 240 Vac
Inrush Transient		25	30	Apk	Measured at 25°C for all line conditions; does not include X-Capacitors charging.
Input Leakage Current		2.5	3.5	mA	Measured at 265Vac, 60Hz
Power Factor	0.96	0.98			From 50% to 100% (2250W @ HL, 1200W @ LL). load
Efficiency ¹	30 – 90% of FL	93	95	%	With or'ing function, aux 5V output, dual/redundant I ² C and RS485 communications and POE isolation >30% load Test condition: input; 240Vac, 60hz, output; 52Vdc
	>38V	85		%	
Holdup		20		ms	48Vdc, Measurement starts at zero crossing of the ac voltage, and voltage decayed to 40V. ← For loads below 1200W.
		30			
Ride thru	1/2	1		cycle	Tested at nominal 115V and 230V . Complies to CISPR24 standards
Power Fail Warning ²	3	5		ms	Alarm issued via PFW signal going LO 5 ms prior to the main output decaying below 40Vdc.

Main Output					
Parameter	Min	Typ	Max	Units	Notes
Output Power	1200 2250			W	Above 30Vdc from nominal 90-120Vac upto 55°C. Above 48Vdc from nominal 200-265Vac upto 55°C
Default Set point		48		Vdc	Output floats with respect to frame ground.
Overall Regulation ³	-1 -2		+1 +2	%	0 – 45C, minimum load 2.5A > 45C
Output Voltage Set Range	18		58	Vdc	Analog margining and RS485
	18		58	Vdc	Set by I ² C
Output current	1 1		23 43.3	A	1200W @ 52V @ 90-120Vac. 2250W @ 52V @ 200-240Vac.

¹ At 52Vdc, 240Vrms and 25°C.

² Internal protection circuits may override the PFW signal and may trigger an immediate shutdown.

³ Includes all variations due to specified load range, drift, and environmental conditions.

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Electrical Specifications (continued)

Main Output (continued)															
Parameter		Min	Typ	Max	Units	Notes									
Current Share	$V_o > 42V$ $V_o < 42V$	-5 -10		5 10	%FL	Compared to the average output current delivered by a set of Rectifiers. Loads > 50% FL									
Output Ripple	RMS (5Hz to 20MHz) Peak-to-Peak (5Hz to 20MHz)		60	100 500	mVrms mVp-p	Measured with 20MHz bandwidth under any condition of loading. Minimum load is 1A.									
External Bulk Load Capacitance		0		5,000	μF	External capacitance can be increased but the rectifier will not meet its turn-ON rise time requirement.									
Turn-On Delay			5		s	Monotonic Turn_On from 30% to 100% of Vnom above -5°C operation. Monotonic Turn_On from 60% to 100% of Vnom below -5°C operation.									
Rise Time - Standard (PMBus)			100		ms										
-Telecom (RS-485) ⁴			5		s										
Overshoot				2	%										
Load Step Response				50	%FL	$\Delta I/\Delta t$ slew rate 1A/ μs . Settling time to within regulation requirements. Minimum load of 2.5 amperes required.									
ΔI			2.0		Vdc										
ΔV			2		ms										
Response Time															
Power Limit – high line		2250			W										
	Power limit – low line	1200			W										
The overload current limit threshold should be set \cong 5% above the load envelope shown here															
Hine Line															
$V_o(V)$	18	20	23	25	28	32	36	38	48	50	53	56	58		
$I_o(A)$	20.7	24.3	29.7	33.3	38.6	43.4	45.8	46.9	46.9	45	42.5	40.2	38.8		
Permissible Load Boundary															
	Low Line														
	$V_o(V)$	18	20	23	25	28	32	36	38	48	50	53	56	58	
	$I_o(A)$	20.7	24.3	29.7	33.3	38.6	37.5	33.3	31.6	25	24	22.6	21.4	20.7	

⁴ Below -5°C, the rise time is approximately 5 minutes to protect the bulk capacitors.

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	Contract terms are for supporting all loads inside the load map. The customer will develop a control interface which maintains the operating voltage and current so as to not exceed the load map.
System Power Up	Units should be able to be plugged in one at a time and guarantee system start up. Units should stay in current limit for approximately 20 seconds to guarantee restart.

Electrical Specifications (continued)

Main Output (continued)						
Over-voltage	Delayed			60	Vdc	200msec delayed shutdown to be implemented. Instantaneous shutdown above this point.
	Immediate Latchoff			65	Vdc	
Three restart attempts may be implemented within a one minute window prior to a latched shutdown						
Over-temperature Warning		5			°C	Implemented prior to commencement of an OT shutdown Below the maximum rating of the device being protected
Shutdown		20			°C	
Auto-recoverable	Temperature hysteresis of approximately 10°C provided between shutdown and restart.					
Overcurrent events that exceed the envelope by 5% will hiccup continuously at a frequency of approximately once every 20 seconds. For voltage set- points below 42V, a tracking Under Voltage shutdown occurs at 2 volts below set-point. UV must exhibit for more than 1 second before shutdown. UV shutdown will exhibit the same 20 second hiccup behavior.						

Electrical Specifications (continued)					
Auxiliary Output					
Parameter	Min	Typ	Max	Units	Notes
Output Voltage Setpoint		5		Vdc	
Output Current	0.005		0.75	A	
Overall Regulation	-10		+5	%	Within ±5% when load is < 0.5A.
Ripple and Noise		50	100	mVpk-pk	20MHz bandwidth
Over-voltage Clamp			7	Vdc	
Over-current Limit	110		175	%FL	

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Environmental, EMC, Reliability Specifications					
Environmental					
Parameter	Min	Typ	Max	Units	Notes
Ambient Temperature Operating Derating	-40 ⁵	1	55 2	°C °C	Air inlet from sea level to 5,000 feet. Per 1,000 feet above 5,000 feet.
Storage Temperature	-40		85	°C	
Humidity	5		95	%	Relative humidity, non-condensing
Altitude	-60 -200		4000 13000	m ft	For operation above 2500m (5000 ft.), maximum operating temperature is derated by 2°C per 305m (1000 ft.).
Shock and Vibration					IPC9592 sections 5.2.8 – 5.2.13
Earthquake Rating	4			Zone	Per Telcordia GR-63-CORE, all floors, when installed in CP Shelf.
Acoustic Noise		55		dBA	Noise is proportional to fan speed, load and ambient temperature.
Harmonic Emissions	Per EN/IEC61000-3-2				
Radiated Emissions ⁶	Exceeds FCC and CISPR22 (EN55022) - Class A by a 6dB margin				
Conducted Emissions - ac	Exceeds FCC and CISPR22 (EN55022) Class A Telcordia GR-1089-CORE - Class A by a 6dB margin				
ESD	Error free per EN/IEC 61000-4-2 Level 3 (6 kV contact discharge, 8 kV air discharge).				
Radiated Immunity	Error free per EN/IEC 61000-4-3 Level 3 (10 V/m).				
Electrical Fast Transient Burst	Error free per EN/IEC 61000-4-4 Level 3 (2 kV, 5 kHz repetition rate)				
Lightning Surge, Error Free Damage Free	EN/IEC61000-4-5 Level 4 (4 kV common mode, 2 kV differential mode). ANSI C62.41 Level A3 (6 kV common and differential mode)				
Line sags and interruptions	IPC9592A issued May 2010 ; 1 cycle interruption or 25% sag (115V, 230V – nominal for UUT) for 2 seconds the output shall stay above 40Vdc at full load. [Note: An input sag below 80V may cause an immediate shutdown.]				
Conducted Immunity	Error free per EN/IEC 61000-4-6 Level 3 (10Vrms).				
Reliability (calculated)		450,000		Hours	At ambient of 25°C at full load per Telcordia SR-332, issue 2, Reliability Prediction for Electronic Equipment, Method I Case III.
Isolation Input-Chassis/Signals Input - Output Output-Chassis Output-Chassis/Signals	1500 3000 500 2250			Vrms Vrms Vdc Vdc	Per EN60950. Consult factory for testing to this requirement Internal Lineage standard, GR_947 POE compliant Rectifier, Per IEEE802.3.
Service Life		10		Years	25°C ambient, full load excluding fans.

⁵ Designed to start and work at an ambient as low as -40°C, but may not meet operational limits until above -5°C

⁶ Radiated emissions compliance was met using a Lineage Power shelf. This shelf includes output common and differential mode capacitors that assist in meeting compliance.

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