

CP3000/3500AC54TE Global Platform High Efficiency Rectifier

Input: 100-120/200-277 Vac; Default Output: ± 54 Vdc @ 3000W/3500W; 5 Vdc @ 10W

RoHS Compliant



Features

- Efficiency meets 80plus Titanium requirements
- Compact 1RU form factor with 40 W/in³ density
- Constant power from 52 – 58V_{DC}
- 3000 or 3500W from nominal 200-277V_{AC}
- 1500W from nominal 100 – 120V_{AC}
- Output voltage programmable from 42V – 58V_{DC}
- ON/OFF control of the main output
- Comprehensive input, output and overtemp. protection
- PMBus compliant dual I²C serial bus and RS485
- Precision measurement reporting such as input power consumption, input/output voltage & current
- Remote firmware upgrade capable
- Power factor correction (meets EN/IEC 61000-3-2 and EN 60555-2 requirements)
- Redundant, parallel operation with active load sharing
- Redundant +5V @ 2A Aux power
- Internally controlled Variable-speed fan
- Hot insertion/removal (hot plug)
- Four front panel LED indicators
- UL and cUL approved to UL/CSA †62368-1, TUV (EN62368-1), CE Mark[§] (for LVD) and CB Report available
- RoHS Directive 2011/65/EU and amended Directive (EU) 2015/863
- Compliant to REACH Directive (EC) No 1907/2006

Applications

- 48V_{DC} distributed power architectures
- Routers/ VoIP/Soft and other Telecom Switches
- LAN/WAN/MAN applications
- File servers, Enterprise Networks, Indoor wireless
- SAN/NAS/iSCSI applications

Description

The CP3000/3500AC54TEP Rectifiers provide significantly higher power density in the same form factor and efficiency improvements in the Compact Power Line of Rectifiers. The only difference between these rectifiers is output power limit. High-density front-to-back airflow is designed for minimal space utilization and is highly expandable for future growth. Wide-input enables the rectifier to be deployed internationally into a wide range of commercially available voltage sources. Configured with both dual-redundant I²C and RS485 based communications busses, so that it could be positioned into a broad range of applications. Feature set flexibility makes this rectifier an excellent choice for applications requiring modular AC to - 48V_{DC} intermediate voltages, such as in distributed power.

* 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 CE marking procedures 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

† The PMBus name and logo are registered trademarks of the System Management Interface Forum (SMIF)

CP3000/3500AC54TE Global Platform High Efficiency Rectifier

Input: 100-120/200-277 Vac; Default Output: ± 54 Vdc @ 3500W; 5 Vdc @ 10W

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only, functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Symbol	Min	Max	Unit
Input Voltage: Continuous	V_{IN}	0	300	V _{AC}
Operating Ambient Temperature ¹	T_A	-10	75	°C
Storage Temperature	T_{stg}	-40	85	°C
I/O Isolation voltage to Frame (100% factory Hi-Pot tested)			1500	V _{AC}

Electrical Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, $V_o=54V_{DC}$, resistive load, and temperature conditions.

INPUT					
Parameter	Symbol	Min	Typ	Max	Unit
Startup Voltage Low-line Operation High-line Operation	V_{IN}	80	85	90 185	V _{AC}
Operating Voltage Range Low-line Configuration High-line Configuration		90 185	100 – 120 200 - 277	140 300	
Voltage Swell (no damage)		305			
Turn OFF Voltage Hysteresis		75 5	80	85	
Frequency	F_{IN}	47		66	Hz
Source Impedance (NEC allows 2.5% of source voltage drop inside a building)			0.2		Ω
Operating Current; at 110V _{AC} at 240V _{AC}	I_{IN}		15.5 16		A _{AC}
Inrush Transient (220V _{RMS} , 25°C, excluding X-Capacitor charging)	I_{IN}		25	40	A _{PK}
Idle Power (at 240V _{AC} , 25°C) 54V OFF 54V ON @ $I_o=0$	P_{IN}		9 18		W
Leakage Current (300V _{AC} , 60Hz)	I_{IN}		2.5	3.5	mA
Power Factor (50 – 100% load)	PF	0.97	0.995		
Efficiency ² , 240V _{AC} @ 25°C 10% of FL 20% of FL 50% of FL FL	η	90 94 96 91			%
Holdup time (output allowed to decay down to 40V _{DC}) For loads below 1500W	T		10 15		ms
Ride through (at 240V _{AC} , 25°C)	T	1/2	1		cycle
Power Good Warning ³ (main output allowed to decay to 40V _{DC})	PG	3	5		ms
Isolation (per EN62368-1) (consult factory for testing to this requirement) Input-Chassis/Signals Input - Output	V	1500 3000			V _{AC} V _{AC}

¹ See the derating guidelines under the Environmental Specifications section

² Fan disabled, 5V output at 0 load.

³ Internal protection circuits may override the PG signal and may trigger an immediate shutdown. PG should not indicate normal (HI) until the main output is within regulation. PG should be asserted if the main output is about to shut down for any detectable reason.

CP3000/3500AC54TE Global Platform High Efficiency Rectifier

Input: 100-120/200-277 Vac; Default Output: ± 54 Vdc @ 3500W; 5 Vdc @ 10W

Electrical Specifications (continued)

54V _{DC} MAIN OUTPUT					
Parameter	Symbol	Min	Typ	Max	Unit
Output Power @ low line input 100 – 120V _{AC} @ high line input 200 – 277V _{AC}	W	1500 3000/3500			W _{DC}
Factory set default set point			54		V _{DC}
Overall regulation (load, temperature, aging) 0 - 45°C LOAD > 2.5A > 45°C	V _{OUT}	-1 -2		+1 +2	%
Output Voltage Set Range ⁴ - analog margining - Set either by I ² C or RS485		44 42		58 58	V _{DC}
Output Current - @ 1500W (100 – 120Vac), 54V/52V @ 3000W (200 – 277V _{AC}), 54V/52V @ 3500W (200 – 277V _{AC}), 54V/52V	I _{OUT}	1 1 1		27.8/28.9 55.5/57.8 64.8/67.3	A _{DC}
Current Share (> 50% FL)		-5		5	%FL
Proportional Current Share between different rectifiers ⁵ (> 50% FL)			<7		%FL
Output Ripple (20MHz bandwidth, load > 1A) RMS (5Hz to 20MHz) Peak-to-Peak (5Hz to 20MHz) Psophometric Noise	V _{OUT}			100 250 ⁶ 9 ⁷	mV _{rms} mV _{p-p} mV _{rms}
External Bulk Load Capacitance	C _{OUT}	0uF to at least 36000uF			μF
Turn-On (monotonic turn-ON from 30 – 100% of V _{nom} above 5°C) Delay Rise Time – PMBus mode Rise Time - RS-485 mode ⁸ Output Overshoot	T V _{OUT}		5 100 5		s ms s %
Load Step Response (I _{O,START} > 2.5A) ΔI ⁹ ΔV, V _{AC} < 285 _{AC} ΔV, V _{AC} ≥ 285 _{AC} Response Time	I _{OUT} V _{OUT} V _{OUT} T			50 2.0 3.2 2	%FL V _{DC} V _{DC} ms
Overload - Power limit @ high line down to 52V _{DC} Power limit @ low line down to 52V _{DC} High line current limit ¹⁰ if V _{out} > 39V _{DC} [3000W/3500W] Low line current limit Output shutdown (commences as voltage decays below this level) System power up	P _{OUT} P _{OUT} I _{OUT} I _{OUT} V _{OUT}	3000/3500 1500 59/68 30			W _{DC} W _{DC} A _{DC} A _{DC} V _{DC}
	Upon insertion the rectifier will delay an overload shutdown for 20 seconds allowing for the insertion and startup of multiple rectifiers within a system.				
Overvoltage - 200ms delayed shutdown Immediate shutdown Latched shutdown	V _{OUT}	> 65		< 60	V _{DC}
	Three restart attempts are implemented within a 1 minute window prior to a latched shutdown.				
Over-temperature warning (prior to commencement of shutdown) Shutdown (below the max device rating being protected) Restart attempt Hysteresis (below shutdown level)	T		5 20 10		°C
Isolation Output-Chassis (Standard, non-POE compliant) Output-Chassis/Signals (POE compliant per IEEE802.3)	V	500 2250			V _{DC} V _{DC}

⁴ When V_O > 57V_{DC} or when V_{IN} > 270V_{AC} and V_O < 48V_{DC} power derating starts at 50°C⁵ With existing CP platform of rectifiers⁶ 500mV_{p-p} max above 280V_{AC}, 300mV_{p-p} max for POE product⁷ Complies with ANSI TI.523-2001 section 4.9.2 emissions max limit of 20mV flat unweighted wideband noise limits⁸ Below -5°C, the rise time is approximately 5 minutes to protect the bulk capacitors. Rise time can be changed to 100ms, contact factory for details.⁹ di/dt (output current slew rate) 1A/μs.¹⁰ Above 280V_{AC} the current limit reduces to 50A when V_{OUT} ≤ 45V_{DC} and to 25A when V_{OUT} ≤ 45V_{DC} and T_{AMB} > 55C.

CP3000/3500AC54TE Global Platform High Efficiency Rectifier

Input: 100-120/200-277 Vac; Default Output: ± 54 Vdc @ 3500W; 5 Vdc @ 10W

5V _{DC} Auxiliary output						
Parameter	Symbol	Min	Typ	Max	Unit	
Output Voltage Setpoint	V _{OUT}		5		V _{DC}	
Overall Regulation		-3		+3	%	
Output Current		0.005		2	A	
Ripple and Noise (20mHz bandwidth)			50	100	mV _{p-p}	
Over-voltage Clamp				7	V _{DC}	
Over-current Limit		110		175	%FL	

The 5V_{DC} should be ON before availability of the 54V_{DC} main output and should turn OFF only if insufficient input voltage exists to provide reliable 5V_{DC} power. The PG# signal should have indicated a warning that power would get turned OFF and the 54V_{DC} main output should be OFF way before interruption of the 5V_{DC} output.

General Specifications

Parameter	Min	Typ	Max	Units	Notes
Reliability		450,000		Hours	Full load, 25°C ; MTBF per SR232 Reliability protection for electronic equipment, issue 2, method I, case III,
Service Life		10		Years	Full load, excluding fans
Unpacked Weight		2.18/4.8		Kgs/Lbs	
Packed Weight		2.45/5.4		Kgs/Lbs	
Heat Dissipation	190 Watts or 648 BTUs @ 80% load, 250 Watts or 853 BTUs @ 100% load				

Signal Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions. Signals are referenced to Logic_GRD unless noted otherwise. Fault, PG#, OTW, Alert, SCL, SDA need to be pulled HI by external pull-up resistors. Max sink current: 5mA

Parameter	Symbol	Min	Typ	Max	Unit
ON/OFF 54V output OFF	V _{OUT}	0.7V _{DD}	—	5	V _{DC}
54V output ON (should be connected to Logic_GRD)	V _{OUT}	0	—	0.5	V _{DC}
Margining (through adjusting Vprog)		44		58	V _{DC}
Voltage control range	V _{control}	0		3.3	V _{DC}
Programmed output voltage range	V _{OUT}	44		58	V _{DC}
Voltage adjustment resolution (8-bit A/D)	V _{control}		3.3		mV _{DC}
Output configured to 54V _{DC}	V _{control}	3.0		3.3	V _{DC}
Output configured to 44V _{DC}	V _{control}	0		0.1	V _{DC}
$\Delta V \leq 10V_{DC}$, settling time to new value ¹¹	T _{control}		150	200	ms
Interlock	[short pin shorted to VOUT(-) on system side]				
Module Present	[short pin shorted to Logic_GRD internally]				
Over Temperature Warning (OTW#) Logic HI (temperature normal)	V	0.7V _{DD}	—	12	V _{DC}
Sink current [note: open collector output FET]	I	—	—	5	mA
Logic LO (temperature is too high)	V	0	—	0.4	V _{DC}
Power Good (PG) Logic HI (normal) [open collector output FET]	V	0.7V _{DD}	—	12	V _{DC}
Logic LO (temperature is too high)	V	0	—	0.4	V _{DC}
Protocol select Logic HI - Analog/PMBus™ mode	V _{IH}	2.7	—	3.5	V _{DC}
Logic – intermediate – RS485 mode	V _{II}	1.0	—	2.65	V _{DC}
Logic LO – DSP reprogram mode	V _{IL}	0	—	0.4	V _{DC}
Fault# Logic HI (No fault is present)	V	0.7V _{DD}	—	12	V _{DC}
Logic LO (Fault is present)	V	0	—	0.4	V _{DC}
Alert# (Alert#_0, Alert#_1) Logic HI (No Alert - normal)	V	0.7V _{DD}	—	12	V _{DC}
Logic LO (Alert# is set)	V	0	—	0.4	V _{DC}
SCL, SDA (SCL_0/1, SDA_0/1) Logic HI	V	2.1	—	12	V _{DC}
Logic LO (Alert# is set)	V	0	—	0.4	V _{DC}

¹¹ Reducing the output voltage may take longer at light load due to capacitive discharge

CP3000/3500AC54TE Global Platform High Efficiency Rectifier

Input: 100-120/200-277 Vac; Default Output: ± 54 Vdc @ 3500W; 5 Vdc @ 10W

Digital Interface Specifications

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
PMBus Signal Interface Characteristics¹²						
Input Logic High Voltage (CLK, DATA)		V	2.1		12	V _{DC}
Input Logic Low Voltage (CLK, DATA)		V	0		0.8	V _{DC}
Input high sourced current (CLK, DATA)		I	0		10	μ A
Output Low sink Voltage (CLK, DATA, ALERT#)	I _{OUT} =3.5mA	V			0.4	V _{DC}
Output Low sink current (CLK, DATA, ALERT#)		I	3.5			mA
Output High open drain leakage current (CLK, DATA, ALERT#)	V _{OUT} =3.6V	I	0		10	μ A
PMBus Operating frequency range	Slave Mode	FPMB	10		400	kHz
Measurement System Characteristics						
Clock stretching		T _{stretch}			25	ms
I _{OUT} measurement range		I _{rng}	0		80	A _{DC}
I _{OUT} measurement accuracy 25°C	> 12.8A < 12.8A	I _{out(acc)}	-1 5		+1 5	% of FL %
I _{OUT} measurement accuracy 0 - 40°C ¹³	> 12.8A	I _{out(acc)}	-2		+2	% of FL
V _{OUT} measurement range		V _{out(rng)}	0		70	V _{DC}
V _{OUT} measurement accuracy ¹⁴		V _{out(acc)}	-1		+1	%
Temp measurement range		Temp _(rng)	0		150	°C
Temp measurement accuracy ¹⁵		Temp _(acc)	-4		+4	°C
V _{IN} measurement range		V _{in(rng)}	0		320	V _{AC}
V _{IN} measurement accuracy @ 25°C	V _{IN} > 120V _{AC} V _{IN} < 120V _{AC}	V _{in(acc)}	-1.25 -2		+1.25 2	%
I _{IN} measurement range		I _{in(rng)}	0		30	I _{AC}
I _{IN} measurement accuracy - standard measurement @ 25°C		I _{in(acc)}	-4		+4	% of FL
I _{IN} measurement accuracy - improved measurement @ 25°C	> 1A \leq 1A	I _{in(acc)}	-2.5 -400		2.5 400	% mA
P _{IN} measurement range		P _{in(rng)}	0		4000	W _{in}
P _{IN} measurement accuracy – standard measurement @ 25°C	> 350W < 350W	P _{in(acc)}	-5	35	+5 50	% W
P _{IN} measurement accuracy – improved measurement @ 25°C	> 500W 100 – 500W < 100W	P _{in(acc)}	-1.5 -2.0 -20	1 1.5 15	+1.5 +2.0 20	% % W
Fan Speed measurement range			0		30k	RPM
Fan Speed measurement accuracy			-10		10	%
Fan speed control range			0		100	%

¹² Clock, Data, and Alert# need to be pulled up to V_{DD} externally.¹³ **Below 20% of FL;** 10 – 20% of FL: ± 0.64 A; 5 – 10% of FL: ± 0.45 A; 2.5 – 5% of FL: ± 0.32 A.¹⁴ Above 2.5A of load current¹⁵ Within 30° of the default warning and fault levels.

Per visualizzare il catalogo completo siete invitati ad [effettuare il login sul sito](#) oppure ad [effettuare la registrazione gratuita](#).