GE Energy

Advanced Data Sheet

CCR0512FP Power Supply

90 - 264V_{ac} Input; 12V_{dc}, 500W Output

Features

- Conduction cooling for fan less operation
- Compact 0.5U Profile
- Overall Dimensions:
  0.877 in. x 3.35 in. x 8.790 in.
- 12V_{dc}, 500W Output
- 10.8 to 13.2V_{dc} Output Voltage Programmability
- 80 PLUS™ GOLD™ Standard efficiency
- Universal AC input with Active PFC
- Hot Plugability
- Redundant Parallel Operation
- Active Load Sharing (Single Wire)
- Analog, I²C or PMBus^ means of control and monitoring
- Remote On/Off
- Remote Sense (up to 0.25V of total compensation)
- No Minimum Load Requirements
- Three visual LED Indicators; Input, Output and Fault status
- +3.3V/1A Standby Output
- UL*Recognized to UL60950-1, CAN/*CSA*† C22.2 No.60950-1, and EN60950-1(VDE‡ 0805-1) Licensed
- CE mark meets 2006/95/EC directive§
- ISO** 9001 and ISO 14001 certified manufacturing facility
- Compliant to RoHS EU Directive 2002/95/EC

Applications

- Test Equipment
- Network Support Equipment
- Storage Area Networks (SAN)
- Network Attached Storage (NAS)
- Servers

Description

The CCR0512FP power supply is a universal ac input, 12V_{dc}, 500W output fan-less conduction cooled, 0.5U thick product designed for environments, where conduction or system airflow is available for cooling. The 0.5U form factor makes locating the supply very flexible and space efficient. The supply meets the 80 PLUS GOLD™ efficiency standards, and significantly exceeds the GOLD limits at several load levels. The supply includes capability for hot plug and redundant load sharing applications. Standard features include remote sense, output voltage programmability, active load sharing, status LEDs, 3.3V_{dc} standby output, and analog, I²C and PMBus control and communication interfaces.

^PMBus name and logo are registered trademarks of SMIF, Inc.
* *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 of the required procedures of end-use equipment should be followed.
** ISO is a registered trademark of the International Organization of Standards

imagination at work

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Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage. These conditions 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 data sheet's specifications sections. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

Parameter	Min	Max	Unit
Input Voltage - Continuous	90	264	V_{ac}
Operating Ambient Temperature (see Thermal Considerations section) Operating Case Temperature (Cold Plate)	-10 -10	50 90	°C °C
Storage Temperature	-40	90	°C
Humidity (non-condensing)	30	95	%
Altitude		2250	m
Isolation Voltage – Input to Output Input to Chassis Output and Signal/Comm pin to Chassis		2600 1500 100	V_{dc} V_{dc} V_{dc}

Electrical Specifications

Unless otherwise indicated, specifications apply over all operating input voltage, resistive load, and temperature conditions.

Parameter	Min	Typ	Max	Unit
Input				
Operating Voltage	90	115/230	264	V_{ac}
Source Frequency	47	50/60	63	Hz
Turn On Voltage	76		84	V_{ac}
Turn Off Voltage	68		74	V_{ac}
Current, V_{IN} = 90V_{ac}			TBD	A_{RMS}
Fuse Rating, 250V_{ac}		15		A
Power Factor, 230V_{ac}, 100% Load		0.98		%
Inrush Transient Current, V_{IN} = 264V_{ac}, T_A = 25°C		40		A_{PEAK}
Input Idling Power, Load = 0%, V_{OUT1} = 12V_{dc}, V_{STB} = 3.3V_{dc}		4.1		W
Input Standby Power, V_{OUT1} = 0V_{dc}, V_{STB} = 3.3V_{dc}		TBD		W
Efficiency: V_{IN} = 230V_{ac}, 20% load		88.0		%
50% load		92.0		%
100% load		92.0		%
V_{IN} = 115V_{ac}, 20% load		87.0		%
50% load		90.5		%
100% load		90.0		%
Holdup Time, V_{IN} = 90V_{ac} to 264V_{ac} 100% load, C_{OUT} = 2,200 µF, V_{OUT}≥ 10.8V_{dc}		12		ms
Leakage Current to earth ground, V_{IN} = 264V_{ac}		3.5		mA
Output 1 – Main Output				
Voltage Set-point (50% load)	11.98	12.00	12.02	V_{dc}
Voltage Programming Limits	10.8		13.2	V_{dc}
Voltage Tolerance (due to set point, temperature, load, and line regulation)	-2		2	$\%V_{OUT, set}$
Load Regulation	-0.05		0.05	V_{dc}
Line Regulation	-0.02		+0.02	V_{dc}
Ripple and Noise (C_{OUT} = 0.1µF ceramic || with 10µF tantalum capacitor) Peak-to-peak (20MHz Bandwidth)			 120	 mV_{p-p}
Dynamic Load Response (50% to 100% load transient, 1A/µs slew rate) Voltage deviation Settling Time			 5 1.5	 $\%V_{OUT, set}$ ms
Current Range	0		42	A_{dc}
Current Limit Inception	107		135	$\%I_{O,max}$
Current Sharing Accuracy, >20% load	-5		5	$\%I_{O,max}$
External Capacitance Range	0		10,000	µF
Turn On Delay Time from AC Input			2	s
Turn On Delay Time from Remote On, V_{IN} within limits			40	ms
Rise Time (from 10% to 90% of final value)			50	ms
Voltage Overshoot			5	$\%V_{OUT, set}$
Turn Off Delay Time from Remote On, V_{IN} within limits			40	ms
Over Voltage Protection	13.8	14.8	15.8	V_{dc}

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Electrical Specifications (continued)

Parameter	Min	Typ	Max	Unit
Output 2 – Standby ($_{STB}$) Output				
Voltage Set-point (50% load)	3.24	3.3	3.26	V_{dc}
Voltage Tolerance (due to set point, temperature, load, and line regulation)	-5		5	$\%V_{OUT, set}$
Load Regulation	-0.17		+0.17	V_{dc}
Line Regulation	-0.17		+0.17	V_{dc}
Ripple and Noise (C_{OUT} = 0.1µF ceramic || with 10µF tantalum capacitor) Peak-to-peak (20MHz Bandwidth)			 100	 mV_{p-p}
Dynamic Load Response (50% to 100% load transient, 1A/µs slew rate) Voltage deviation Settling Time			 5 1.5	 $\%V_{OUT, set}$ ms
Current Range	0		1.0	A_{dc}
Current Limit Inception	150		135	$\%I_{O,max}$
External Capacitance	0		TBD	µF

General Specifications

Parameter	Symbol	Typ	Unit
Calculated Reliability based on Telcordia SR-332 Issue 2: Method 1 Case 3 (V_{IN}=230V_{ac}, I_{o1} = 34A, I_{o1} = 0.8A, T_A = 40ºC, airflow 200LFM, 90% confidence)	FIT MTBF		10^9/Hours Hours
Weight			g oz.

Feature Specification

Parameter	Min	Typ	Max	Unit
Remote On Signal, High turns supply on	2.0		12.0	V_{dc}
Remote Off Signal, Low turns supply off	0.0		0.8	V_{dc}
Maximum Remote On/Off Sink Current			4	mA
Output Current Monitoring Signal ±250mV		0.1		V/A
Overtemperature Shutdown		TBD		ºC
Overtemperature Recovery		TBD		ºC
AC Power Fail Warning	2			ms

Environmental Specifications

Parameter	Specification
Radiated Emissions	FCC and CISPR22 (EN55022) Class A with 3dB margin
Conducted Emissions	FCC and CISPR22 (EN55022) Class A with 3dB margin
ESD	EN61000 4.2, Level 3, Class A, No errors
Radiated Susceptibility	EN61000 4.3, Level 3, Class A, No errors
Electrical Fast Transient Common Mode	EN61000 4.4, Level 3, Class A, No errors
Surge Immunity	EN61000 4.5, Level 3, Class A, No errors
Conducted RF Immunity	EN61000 4.6, Level 3, Class A, No errors
Voltage Dips	EN61000 4.11, Level 3, Class B, No errors
Input Harmonics	EN61000-3-2
Shock & Vibration Operational test	NEBS GR-63-CORE Level 3Frequency range: 20 – 2000Hz Time duration: Minimum 30 minutes Acceleration: 6Grms

Safety Specifications

Parameter	Specification
Isolation Voltage Input to Output	2600V_{dc} (1 minute)
Isolation Voltage Input to Chassis	1500V_{dc}
Isolation Output/Signal GND to Chassis	100V_{dc}
Insulation Resistance Input to Output	>10MΩ
Safety Certifications	

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Characteristic Curves

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Safety Considerations

The CCR0512 power supply is intended for inclusion in other equipment and the user must ensure that it is in compliance with all the requirements of the end application.
This product is only for inclusion within other equipment and must not be operated as a stand-alone product.

Thermal Considerations

The power supply can be operated in a variety of thermal environments; however sufficient cooling should be provided to ensure reliable operation.

Considerations include ambient temperature, airflow, power supply dissipation and the need for increased reliability. A reduction in the operating temperature of the power supply will result in increased reliability. The thermal data presented here is based on measurements taken in a wind tunnel.

Feature Descriptions

Standby Power Supply

A standby output, V_{STB} in the CCR0512 power supply of 3.3V_{dc}, comes on when AC input in the operating range is applied.

Remote Sense

The power supply has both positive and negative remote sense connections that can be connected to the positive and negative rails of the main output near the load. Care should be taken in routing the sense lines to ensure that noise is not picked up or that additional filtering elements that affect the stability of the power supply are not used. The power supply will operate without the remote sense connections being made, however if remote sense near the load is not used it is recommended that the remote sense lines be connected directly to the main output terminals.

Overcurrent Protection

To provide protection in a fault condition (output overload), the power supply is equipped with internal current-limiting circuitry and can endure current limiting continuously. At the point of current-limit inception, the unit enters hiccup mode. The power supply operates normally once the output current is brought back into its specified range.

Overvoltage Protection

Overvoltage protection is a feature of the CCR0512 power supply that protects both the load and the power supply from an output overvoltage condition. When an overvoltage occurs, the power supply shuts down and goes into hiccup mode until the overvoltage condition is removed. It is not necessary to recycle the input to restart the power supply when this protection is activated.

Overtemperature Protection

The CCR0512 also features overtemperature protection in order to provide additional protection in a fault condition. The power supply is equipped with a thermal shutdown circuit which detects excessive internal temperatures and shuts the unit down. In the event of an over temperature condition, the unit protects itself by providing a low warning signal for 10 seconds (typical) and then shutting off. Once the power supply goes into overtemperature shutdown, it will cool before attempting to restart.

Input Undervoltage Lockout

At input voltages below the input undervoltage lockout limit, power supply operation is disabled. The power supply will begin to operate at an input voltage above the undervoltage lockout turn-on threshold.

DC OK

The CCR0512 provides a DC OK signal that indicates when the output has come up and is in regulation. This is an open-collector type signal that goes high when the output is available and within regulation.

Paralleling/Load Share

This power supply can be paralleled to provide larger load currents than can be delivered from a single power supply. Up to four power supplies may be paralleled. Paralleling is accomplished by connecting the Current Share signals of multiple power supplies together. At load current levels above 20%, the output currents of multiple power supplies will be within ±5% of the full load value.

If remote sense is used when paralleling is employed, the remote sense connection points should be common to both power supplies.

The supply is equipped with internal Or-ring mosfets in the + V_{OUT} leg and designed for hot swap operation.

Signal Considerations

Output Voltage Programming (V P_{rog})

Analog input signal - voltage determining the rectifier output voltage.

V_{OUT} = 10.8V+ (V_{prog} X 0.96)V, for V_{prog} from 0V to 2.5V
V_{OUT} = 13.2V, for V_{prog} changed from 2.5V to 3.0V
V_{OUT} = 12V, for V_{prog} higher than 3.0V or left open

Output Current Monitoring

Analog output signal. Voltage proportional to the power supply output current (0.1V/AMP) +/- 250mv.

Load Share/Paralleling

Analog signal. Single wire connection. Unit will load share within ±5% of full load.

Remote ON-OFF

TTL compatible. Open collector (High) for normal operation. Sink current: 4mA. Max collector voltage: 12V_{dc}
Logic 1 (TTL High) or open enables unit (ON); Logic 0 (TTL Low) or short shuts unit down (OFF). Cycling this signal resets the over-voltage protection memory.

AC OK

TTL compatible. Open collector (High) for normal operation. Sink current: 4mA. Max collector voltage: 12V_{dc}
AC OK indicates that AC is applied within the specified input range for the rectifier.

DC OK

TTL compatible. Open collector (High) for normal operation.

Sink current: 4mA. Max collector voltage: 12V_{dc}

Over Temperature Warning

TTL compatible. Open collector (High) for normal operation. Sink current: 4mA. Max collector voltage: 12V_{dc}. In the event of an over temperature condition, the unit protects itself by providing a low warning signal for 10 seconds (typical) and then shutting off. Auto restart after the condition is cleared.

Fault Signal

TTL compatible. Open collector (High) for normal operation. Sink current: 4mA. Max collector voltage: 12V_{dc}
This alarm is an opto-isolated open collector signal referenced to +V_{OUT} Return or chassis ground.
The signal indicates that a failure has been detected in the unit (OTP, OVP, AC Fail or No Input).

Signal Return

The signal return is the referenced for all the signals and is internally connected to the output return (+V_{OUT} leg).

Missing Module

Digital signal delivered when the rectifier is present (active low, strap to return signal)

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Visual Indicators (LEDs)

AC OK (Green)
DC OK (Green)
FAULT (Red)

#	Condition	LED Indicators			Monitoring Signals			
		AC OK	DC OK	FAULT	FAULT	DC OK	AC OK	TEMP OK
1	Normal Operation	green	green	off	high	high	high	high
2	Input Out of Range	off	off	off	high	low	low	high
3	Over Voltage	green	off	red	low	low	high	high
4	Over Current	green	blinking	off	high	blinking	low	high
5	Over Temperature	green	off	blinking	low	low	high	low
6	Temperature Warning	green	green	blinking	high	high	high	low

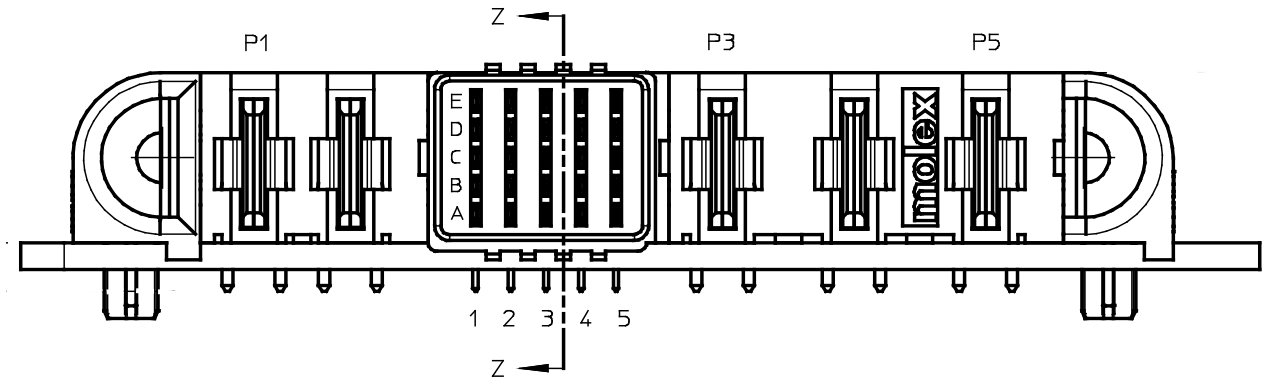
NOTES:

1. Condition # 2 has two modules plugged in. The second module provided back bias to the module with no-input applied.
2. Blinking: 0.5 seconds ON and 0.5 seconds OFF.

Connector Information

Connector On Power Supply	Mating Connector
Molex part # 46437-1154	Molex part # 46436-1154 (Right Angle Mounting)

Pin No.	Function	Pin No.	Function	Pin No.	Function
A1	V_{stb} (3.3V)	C1	SDA (I^2C bus)	E1	Remote ON/OFF
A2	V_{stb} (3.3V) Return	C2	SCL (I^2C bus)	E2	DC OK
A3	Signal Return	C3	I_{share}	E3	AC OK
A4	Write Protect (WP)	C4	N/C	E4	Interrupt (/SMBALERT)
A5	Remote Sense (+)	C5	Over Temperature Warning	E5	RTN
B1	Remote Sense (-)	D1	I^2C Address (A0)	P1	$+V_{OUT}$
B2	Fault	D2	I^2C Address (A1)	P2	V_{OUT} RTN
B3	I Monitor (IMON)	D3	I^2C Address (A2)	P3	SAFETY GND
B4	Module Enable	D4	V_{prog}	P4	AC NETURAL
B5	PSU Present	D5	OVP Test Point	P5	AC LINE



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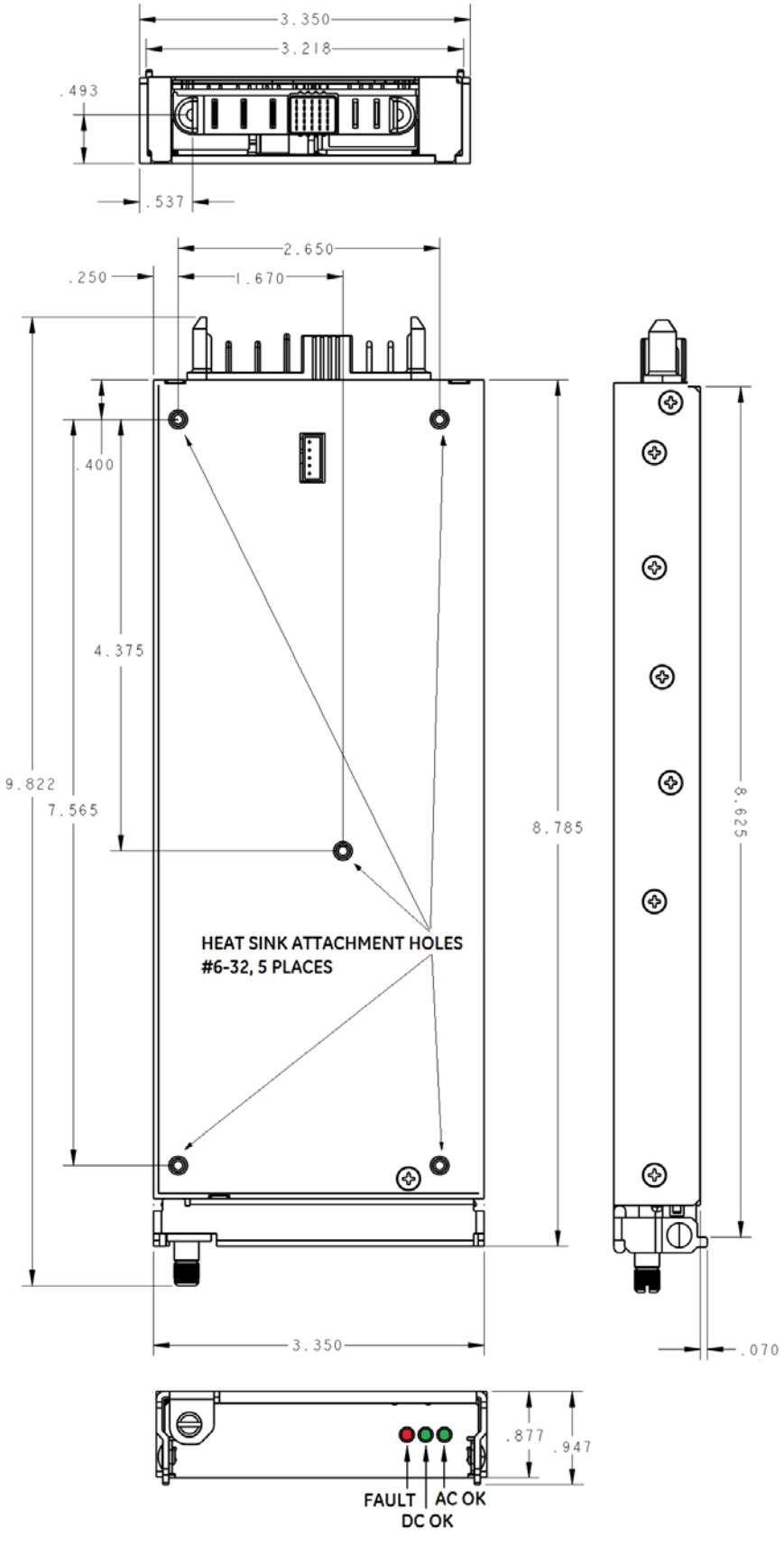
Mechanical Outline

Dimensions are in inches.
Tolerances: x.xxx in. ± 0.02 in. [unless otherwise indicated]



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Ordering Information

Please contact your GE Power Electronics' Sales Representative for pricing, availability and optional features.

Device Codes

Product Code	Input Voltage	Output Power	Output Ratings	Comcode
CCR0512FPHXXZ01A	90-264V_{ac}	500W	12V_{dc}/42A, 3.3V_{dc}/1.0A	CCR0512FPHXXZ01A

Contact Us

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