TECHNICAL DATA
DATA SHEET 5112 REV. -

3000W Single-Phase Power Factor Correction Converters

Description

Harmonic current distortion is a common power quality problem. Its adverse effects include degradation of system voltage waveforms, reduction of power factor, etc. The 3000W single-phase ac-dc converter with Power Factor Correction (PFC) is designed to reduce harmonic currents and achieve near unity power factor in single-phase systems with frequency ranging from 45 Hz to 65Hz. The 3000W PFC converter is composed of a rectifier bridge followed by a boost dc-dc converter employing average current control.

Features

- Single-phase AC input, 180VAC ~ 265VAC input voltage, 45Hz ~ 65 Hz input frequency
- 395VDC output voltage
- Up to 3000W output power
- 50kHz switching frequency
- Near unity power factor
- Maximum 6% total harmonic current distortion at 220VAC, 3000W
- Over voltage, under voltage, over temperature protection, and instantaneous input current protection.
- Base plate rated to 100 °C

Block Diagram

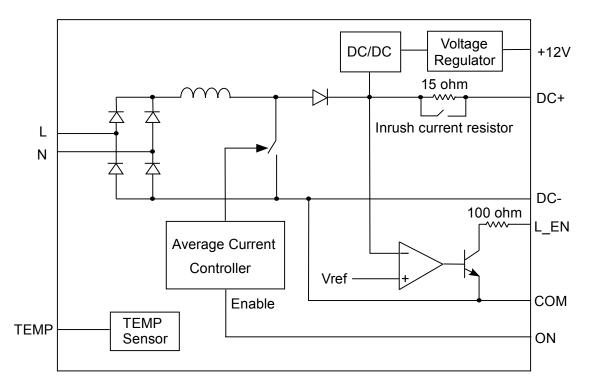


Figure 1 Block diagram of 3000W single-phase PFC Converter

PFCU-3000

TECHNICAL DATA DATA SHEET 5112 REV. -

Table 1 Electrical Characteristics (T_A=25 °C, unless otherwise specified)

Table 1 Electrical Characteristics (T _A =25 °C, unless ot PARAMETER			SYMBOL	MIN	TYP	MAX	UNIT
INPUT							
Input Voltage			V _{in}	180		265	VAC
Input Frequency			f	45		65	Hz
Startup Input Voltage					160		V
Soft Start Time I_0 =0 A, Output filter capacitor = 1400 μ F				0.7		1.5	sec
Inrush Current I ₀ =0 A					22	50	Α
OUTPUT							
Output Voltage	I ₀ =0.8A I ₀ =8.0A		V ₀	390	395	400	V
				380	385	390	V
Output Power (See note 1)			P ₀			3000	W
PROTECTION							
Over Output Voltage Protection (Latching)					460		VDC
Over Instantaneous Input Current Protection (Auto Recovery)					59		Α
Thermal Protection (Auto Recovery)					100		°C
MISCELLANEOUS							
Operating Temperature (See note 2)			T _A	-55		100	°C
Thermal Resistance (Junction to Case)			R _{ejc}		0.09		°C/W
Isolation (Input to Case)						1500	VAC
ELECTRICAL PERFORI	MANCE						
Power Factor			PF		0.99		
Total Harmonic Current Distortion (See note 1)	I ₀ =4 A	V _{in} = 180VAC	ATHD		4	6	%
		V _{in} = 220VAC			4	6	
		V _{in} = 265VAC			6	7	
	I ₀ =8 A	V _{in} = 180VAC					
		V _{in} = 220VAC			5	6	%
		V _{in} = 265VAC					
Efficiency	I ₀ =4 A	V _{in} = 180VAC	η		92		%
		V _{in} = 220VAC			93		
		V _{in} = 265VAC			94		
	I ₀ =8 A	V _{in} = 180VAC			90		%
		V _{in} = 220VAC			92		
		V _{in} = 265VAC			93		

PFCU-3000

TECHNICAL DATA
DATA SHEET 5112 REV. -

Note: 1) When the output power is below 10% of the rated power, the input current will be significantly distorted. However, the output voltage remains in regulation.

2) Not tested on actual units. Ensured by design.

PIN Description

SYMBOL	DESCRIPTION		
N, L	AC line inputs		
DC+, DC-	DC outputs		
L_EN	Load enable pin. Open collector output with an internal 100 ohm resistor. Maximum collector current is 100mA. When Vo is lower than 365V, L_EN is shorted to "COM".		
ON	PFC enable pin. When "ON" pin is connected to COM, PFC is enabled. Otherwise, PFC is disabled and Vo is the rectified AC input voltage.		
СОМ	Control Signal Reference. Connected to "DC-"internally.		
12V	Bias Voltage Supply. Output current up to 20mA.		
TEMP	Substrate temperature sensor output. 10mV/ Kelvin Or (TEMP \times 100 $-$ 273) $^{\circ}$ C		

TYPICAL APPLICATION

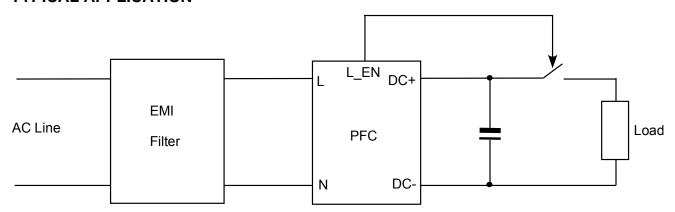


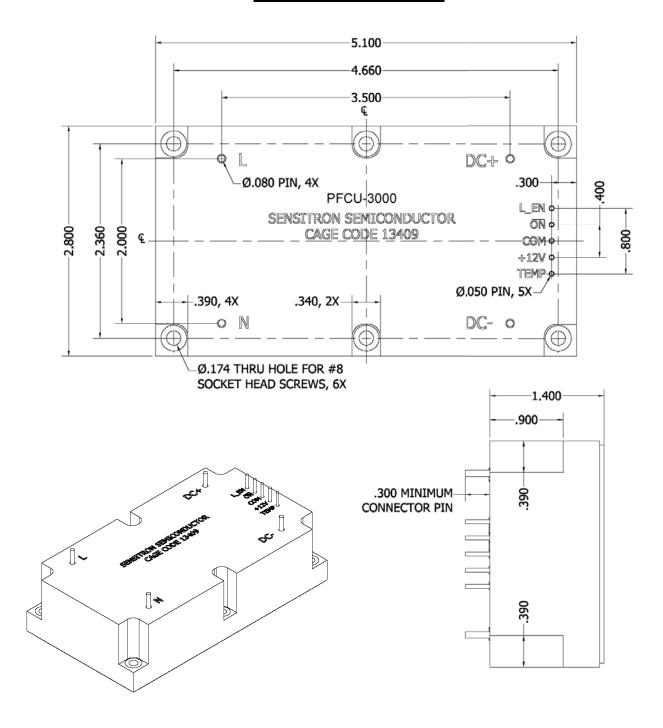
Figure 2. Typical application of 3000W single-phase PFC converter

Figure 2 illustrates the configuration of 3000W single-phase PFC converter in a typical application. External capacitor filter is required at the PFC converter output. Selection of the output capacitor is usually determined by the switching frequency ripple current, the second harmonic ripple current, the DC voltage, the output ripple voltage and the hold-up time. All electrical characteristics in this datasheet are tested with an output capacitor of $1400\mu F$, which generates maximum 20V peak-peak 2^{nd} harmonic ripple voltage.

The inrush current is limited by an internal 15 ohm surge resistor. To reduce power loss, the resistor is shorted after the PFC is powered up for 350m sec, no matter if the PFC converter is enabled. Having a heavy load connected to the PFC output during start-up time will delay the charge of the output capacitor, and may result in high input current spikes. If customer load does not have under voltage lockout, it is recommended to insert a switch (e.g. a relay), controlled by the pin "L_EN", between the load and the output capacitor, as shown in Figure 2. "L_EN" changes its status when the output voltage reaches 365VDC. The logic of "L_EN" is configurable.

TECHNICAL DATA DATA SHEET 5112 REV. -

MECHANICAL OUTLINE



PFCU-3000

TECHNICAL DATA DATA SHEET 5112 REV. -

DISCLAIMER:

- 1- The information given herein, including the specifications and dimensions, is subject to change without prior notice to improve product characteristics. Before ordering, purchasers are advised to contact the Sensitron Semiconductor sales department for the latest version of the datasheet(s).
- 2- In cases where extremely high reliability is required (such as use in nuclear power control, aerospace and aviation, traffic equipment, medical equipment, and safety equipment), safety should be ensured by using semiconductor devices that feature assured safety or by means of users' fail-safe precautions or other arrangement.
- 3- In no event shall Sensitron Semiconductor be liable for any damages that may result from an accident or any other cause during operation of the user's units according to the datasheet(s). Sensitron Semiconductor assumes no responsibility for any intellectual property claims or any other problems that may result from applications of information, products or circuits described in the datasheets.
- 4- In no event shall Sensitron Semiconductor be liable for any failure in a semiconductor device or any secondary damage resulting from use at a value exceeding the absolute maximum rating.
- 5- No license is granted by the datasheet(s) under any patents or other rights of any third party or Sensitron Semiconductor.
- 6- The datasheet(s) may not be reproduced or duplicated, in any form, in whole or part, without the expressed written permission of Sensitron Semiconductor.
- 7- The products (technologies) described in the datasheet(s) are not to be provided to any party whose purpose in their application will hinder maintenance of international peace and safety nor are they to be applied to that purpose by their direct purchasers or any third party. When exporting these products (technologies), the necessary procedures are to be taken in accordance with related laws and regulations.