



## FEATURES

- Compact 2.55"x5"x0.56" package
- 600W power at -10°C to +100°C
- Power density >84W per in<sup>3</sup>
- Up to 89% efficiency
- 90-264Vac global input range
- 12V at 50mA standby output
- DC OK signal
- Temperature monitoring output
- Harmonic correction to EN61000-3-2
- cUL & VDE approved to 60950-1
- Output remote ON/OFF control

## DESCRIPTION

The PF600 AC-DC converter module provides a highly-integrated, high-density solution for the front-end of a 48Vdc distributed power architecture (DPA). This unit delivers the full-rated 600W of output power over the input range of 90-264Vac while providing harmonic correction to EN61000-3-2.

Unlike competitive offerings, the PF600 provides a full-isolated output, permitting implementations with either isolated or non-isolated DC-DC converters.

The wide input voltage range of 85-264Vac facilitates use in products designed for global deployment. The isolated output also permits the user to polarize the output as the specific application may require.

The high-efficiency architecture and baseplate-cooled design simplify thermal management. The low-profile package makes this an ideal choice for 1U and 2U chassis applications where density and efficiency are strategic design considerations.

Proprietary design techniques combined with automated manufacturing in fully ISO-9001 certified facilities results in a compact, reliable, and efficient product that provides a cost-effective solution.

With global safety agency approvals, the PF600 is a comprehensive solution to a complex problem bounded by the competing pressures of development cycle time, efficiency, cost, and packaging

# PF600 SERIES

600W AC/DC Front-End Power Module

**OBSOLETE PRODUCT**  
Contact factory for replacement model

## SELECTION GUIDE

Model Number	Power	Main Output	Standby Output	Production Status
PF600-1	600W	48V@12.5A	12V@50mA	Consult Factory

## INPUT CHARACTERISTICS

Parameter	Conditions	Min	Typ	Max	Units
Input Operating Voltage	All line, load <sup>1</sup> & environmental	85		264	Vac
Input Frequency		47		66	Hz
Input Current				5.5	Arms
Power Factor	I <sub>o</sub> >25%	0.95	0.98	0.99	
Inrush Current	240Vac, avg. over 1 cycle			10	Arms
Quiescent Input Power	SB output unloaded, output inhibited, 230Vac			2.5	W
	Output enabled but unloaded			44	W

## OUTPUT CHARACTERISTICS

Parameter	Conditions	Min	Typ	Max	Units
Output Power	90-264Vac	0		600	W
Main Output Voltage (V <sub>o</sub> )	All line, load, temp, & 90% load step	36	48	59	Vdc
	5%-100% static load, 0-100°C	44.5	48	50.5	Vdc
Main Output Current (I <sub>o</sub> )		0		12.5	A
Standby Output Voltage (V <sub>sb</sub> )		10	12	14	Vdc
Standby Output Current (I <sub>sb</sub> )		0		50	mA
PARD (V <sub>o</sub> )	100kHz-20MHz		850		mVp-p
	Low freq ripple		2.2		Vp-p
PARD (V <sub>sb</sub> )	20MHz bandwidth			500	mVp-p
Turn-On Delay (V <sub>o</sub> )			1	2	sec
Output Holdup Time	Full load, 470uF bulk cap <sup>2</sup>		20		msec
Isolation, Pri-Sec		3			kVac
Isolation, Pri-Chassis		1.5			kVac
Isolation, Sec-Chassis		500			Vac

## GENERAL CHARACTERISTICS

Parameter	Conditions	Min	Typ	Max	Units
Efficiency	600W load, 90Vac		86		%
	600W load, 264Vac		89		%
Switching Frequency		255	300	345	kHz
MTBF	MIL-HDBK-217F, 100°C	436			khrs
Weight	Unpackaged		260		g

Notes: 1 Full 600W power available at input voltages above 90Vac; de-rate output to 550W at 85Vac.

2 An external bulk capacitor is connected to terminals C+ and C- (pins 4 & 5) is required for operation. The minimum required capacitance is 100uF; the maximum value is 1000uF. The ripple current rating for this capacitor should exceed 3Arms at 300kHz. The minimum voltage rating for the bulk capacitor is 450Vdc. Additional information on holdup time is available in application note ACAN-10.

## GENERAL CHARACTERISTICS

Parameter	Conditions	Min	Typ	Max	Units
Efficiency	Full load, 240Vac		79	81	%
Switching Frequency	PFC Converter		100		kHz
	Main Converter		130		kHz
MTBF	Calculated per Telcordia SR-332, Issue 1, 50°C, 250lfm, ground benign	200			khrs
Weight	Unpackaged		620		g

## PROTECTION

Parameter	Conditions/Response	Inception			Units
		Min	Typ	Max	
Output Overload Protection <sup>5</sup>	Vo; output short circuit; automatic recovery <sup>3</sup>		16	20	A
	Vsb; output short circuit; automatic recovery <sup>4</sup>		150		mA
Thermal Shutdown	Automatic Recovery	100	105	125	°C
Input Undervoltage Protection	No damage will result from operation at voltages below the specified range. Available power will decrease below 90Vac, and at a voltage below 85Vac (typically 82Vac) the main output is switched off.		82		Vac
Input Protection	An input fuse is required external to the PF600 module. Recommended maximum rating is 10A, 250V HBC.			10	A

## STATUS & CONTROL SIGNALS

Name	Description
Remote ON/OFF	An isolated pair (INH+, pin 10, and INH-, pin 11) provides for the inhibiting or enabling of the main output, Vo. Logic 1 (>3V) or leaving the pins open enables the output; a short between the pair or a logic 0 (<0.5V) inhibits the output. The standby output remains active during the output inhibit.
DC OK (DCOK)	An open-drain logic output (DCOK+, pin 12) referenced to the power output return (Vo-, pin 7) monitors the main output voltage (Vo). During normal operation, this is a logic 0 until the output voltage falls below the minimum threshold (36.0V -39.5V). This signal presents high impedance when the unit is unpowered and until the output voltage has risen above a threshold between 38.0V and 41.5V for a period between 140ms and 460ms. A separate return pin (DCOK-, pin 13) is provided for this signal, with a low-value resistance to the output return.
Temperature Monitor	The open circuit voltage present between the inhibit pair (INH+ and INH-, pins 10 & 11) falls as the internal temperature rises. This voltage does not exceed 10V; the converter will be disabled when this voltage falls below approximately 3V. Additional information is available in Application Note ACAN-16.

## ENVIRONMENTAL CHARACTERISTICS

Parameter	Conditions	Min	Typ	Max	Units
Ambient/Operating Temperature	Baseplate temperature	-10		100	°C
Ambient Storage Temperature		-55		125	°C
Operating Humidity	Non-condensing	10		90	%
Storage Humidity	Non-condensing	5		90	%

### Notes:

- Overload response is hiccup mode with a typical duty cycle of 35ms on and 1600ms off.
- Overload of the auxiliary output may affect operation for the PF600.
- Output current limit inception occurs between 13.1A and 15.6A (115%±10%) at working output voltages. Over the full range of output voltage, the available current will be between 6A and 20A. When the output voltage falls under an overload condition, the output is disabled after a short time (typically 35ms at short circuit) and retries at intervals of about 2 seconds until the overload condition is cleared.

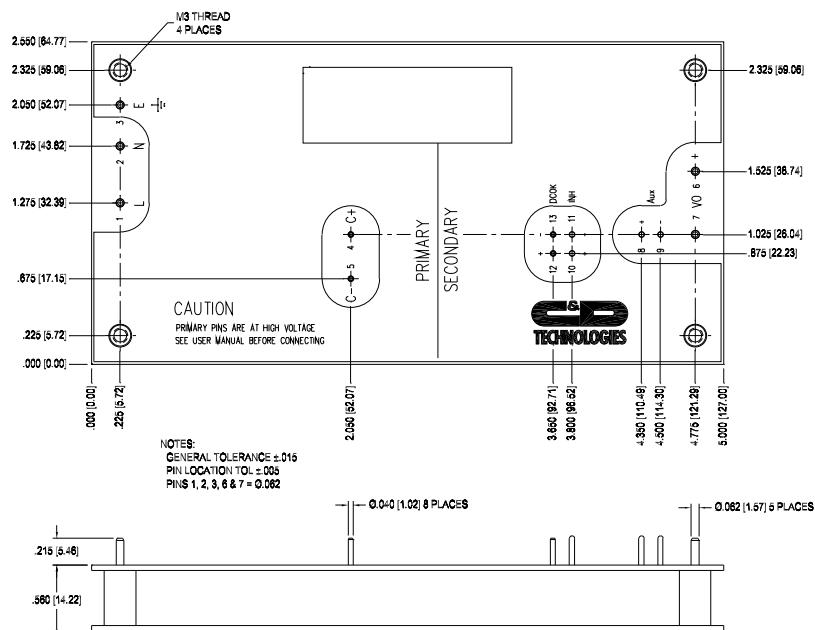
## CERTIFICATIONS

Agency/Characteristic	Standard
UL	UL60950-1
CSA	CSA60950-1 (per cUL)
VDE	EN60950-1
CE	LVD Directive; self-certified
SELV	Self-Certified
Vibration	MIL-STD-810F, Method 514.5, Procedure I; self-certified
Shock	MIL-STD-810F, Method 516.5, Procedure I; self-certified

## TERMINATIONS

Ref	Name	Function	Pin Dia.	Direction	X pos in. (mm)	Y pos in. (mm)
P1	L	Input Line	0.060"	In		
P2	N	Input Neutral	0.060"	In		
P3	E	Input Earth Ground	0.060"	Baseplate		
P4	C+	Capacitor positive	0.040"	In/Out		
P5	C-	Capacitor negative	0.040"	In/Out		
P6	Vo+	Positive output	0.060"	Out		
P7	Vo-	Negative output	0.060"	Out		
P8	Vaux+	Auxiliary output positive	0.040"	Out		
P9	Vaux-	Auxiliary output return (isolated from other pins)	0.040"	Out		
P10	INH+	Inhibit / Temperature Monitor	0.040"	In/Out		
P11	INH-	Return for P10	0.040"	In/out		
P12	DCOK+	Output good signal, negative going	0.040"	Out		
P13	DCOK-	Return for P12, connected to P7 via 47Ω resistor	0.040"	Ref		

## MECHANICAL DIMENSIONS



ELECTROMAGNETIC COMPATABILITY (EMC)	
Characteristic	Standard
Input Current Harmonics	EN61000-3-2, Class A
EMC Susceptibility & Immunity	The PF600 module requires external circuitry to achieve compliance with the various standards for EMC, including but not limited to EN61000-4-x, FCC Part 15, and EN55022. Most notably, a filter and other voltage-limiting circuitry is required at the input when the unit is to be supplied from AC mains. These are necessary not only for EMC compliance, but also to prevent differential transient voltages from being applied between the input terminals of the module that could damage the unit. Additional information on input protection is available in application notes ACAN-12 and ACAN-13.

ABSOLUTE MAXIMUM RATINGS					
Parameter	Conditions	Inception			
		Min	Typ	Max	Units
Input Voltage	RMS			280	Vac
	Peak, continuous			400	V
	Peak, single event			500	V
Ambient Temperature		-55		+125	°C
Signal Inputs & Outputs	Voltage	-0.3		15	V
	Current	-10		+10	mA

APPLICATION NOTES		
Name	Description	File Location
ACAN-09	Series and Parallel Operation of the PF600	<a href="http://www.murata-ps.com/data/apnotes/acan-09.pdf">http://www.murata-ps.com/data/apnotes/acan-09.pdf</a>
ACAN-10	Output Holdup and Ridethrough for the PF600	<a href="http://www.murata-ps.com/data/apnotes/acan-10.pdf">http://www.murata-ps.com/data/apnotes/acan-10.pdf</a>
ACAN-11	AC Power Fail Warning Circuit for the PF600	<a href="http://www.murata-ps.com/data/apnotes/acan-11.pdf">http://www.murata-ps.com/data/apnotes/acan-11.pdf</a>
ACAN-12	EN61000-4-* Transient Immunity for the PF600	<a href="http://www.murata-ps.com/data/apnotes/acan-12.pdf">http://www.murata-ps.com/data/apnotes/acan-12.pdf</a>
ACAN-13	Input Fusing and Inrush Control for the PF600	<a href="http://www.murata-ps.com/data/apnotes/acan-13.pdf">http://www.murata-ps.com/data/apnotes/acan-13.pdf</a>
ACAN-15	Thermal Management for the PF600	<a href="http://www.murata-ps.com/data/apnotes/acan-15.pdf">http://www.murata-ps.com/data/apnotes/acan-15.pdf</a>
ACAN-16	Temperature Monitoring Function for the PF600	<a href="http://www.murata-ps.com/data/apnotes/acan-16.pdf">http://www.murata-ps.com/data/apnotes/acan-16.pdf</a>
ACAN-17	Recommendations for Handling of the PF600	<a href="http://www.murata-ps.com/data/apnotes/acan-17.pdf">http://www.murata-ps.com/data/apnotes/acan-17.pdf</a>
ACAN-18	Output Filtering for the PF600	<a href="http://www.murata-ps.com/data/apnotes/acan-18.pdf">http://www.murata-ps.com/data/apnotes/acan-18.pdf</a>
ACAN-22	Constraints on the Load Characteristics for the PF600	<a href="http://www.murata-ps.com/data/apnotes/acan-22.pdf">http://www.murata-ps.com/data/apnotes/acan-22.pdf</a>
ACAN-23	Load Enable Function for the PF600 in DPA Applications	<a href="http://www.murata-ps.com/data/apnotes/acan-23.pdf">http://www.murata-ps.com/data/apnotes/acan-23.pdf</a>
ACAN-24	PF600-1 Evaluation Board	<a href="http://www.murata-ps.com/data/apnotes/acan-24.pdf">http://www.murata-ps.com/data/apnotes/acan-24.pdf</a>

ISO9001  
CERTIFIED

#### SAFETY AGENCY RATINGS

Input Voltage	120/240Vac
Input Current	3A
Input Power	270W

Murata Power Solutions, Inc.

11 Cabot Boulevard, Mansfield, MA 02048-1151 U.S.A.

Tel: (508) 339-3000 (800) 233-2765 Fax: (508) 339-6356

**www.murata-ps.com email: sales@murata-ps.com ISO 9001 REGISTERED**

01/15/09

Murata Power Solutions, Inc. makes no representation that the use of its products in the circuits described herein, or the use of other technical information contained herein, will not infringe upon existing or future patent rights. The descriptions contained herein do not imply the granting of licenses to make, use, or sell equipment constructed in accordance therewith. Specifications are subject to change without notice.

© 2009 Murata Power Solutions, Inc.

<b>USA:</b>	Mansfield (MA), Tel: (508) 339-3000, email: <a href="mailto:sales@murata-ps.com">sales@murata-ps.com</a>
<b>Canada:</b>	Toronto, Tel: (866) 740-1232, email: <a href="mailto:toronto@murata-ps.com">toronto@murata-ps.com</a>
<b>UK:</b>	Milton Keynes, Tel: +44 (0)1908 615232, email: <a href="mailto:mk@murata-ps.com">mk@murata-ps.com</a>
<b>France:</b>	Montigny Le Bretonneux, Tel: +33 (0)1 34 60 01 01, email: <a href="mailto:france@murata-ps.com">france@murata-ps.com</a>
<b>Germany:</b>	München, Tel: +49 (0)89-544334-0, email: <a href="mailto:munich@murata-ps.com">munich@murata-ps.com</a>
<b>Japan:</b>	Tokyo, Tel: 3-3779-1031, email: <a href="mailto:sales_tokyo@murata-ps.com">sales_tokyo@murata-ps.com</a> Osaka, Tel: 6-6354-2025, email: <a href="mailto:sales_osaka@murata-ps.com">sales_osaka@murata-ps.com</a>
<b>China:</b>	Shanghai, Tel: +86 215 027 3678, email: <a href="mailto:shanghai@murata-ps.com">shanghai@murata-ps.com</a> Guangzhou, Tel: +86 208 221 8066, email: <a href="mailto:guangzhou@murata-ps.com">guangzhou@murata-ps.com</a>
<b>Singapore:</b>	Parkway Centre, Tel: +65 6348 9096, email: <a href="mailto:singapore@murata-ps.com">singapore@murata-ps.com</a>

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Murata:

[PF600-1](#) [PF600L-1](#) [PF600T-1](#)