

# PFE600-12-054xA

## 4. INPUT

General Condition:  $T_A = 0 \dots 45 \text{ }^\circ\text{C}$  unless otherwise noted.

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT
$V_{i,nom}$	Nominal Input Voltage	100	230	230	VAC
$V_i$	Input Voltage Ranges	Normal operating ( $V_{i,min}$ to $V_{i,max}$ )		264	VAC
$I_{i,max}$	Max Input Current			8.5	$A_{rms}$
$I_p$	Inrush Current Limitation	$V_{i,min}$ to $V_{i,max}$ , $90^\circ$ , $T_{NTC} = 25 \text{ }^\circ\text{C}$ (see <i>Figure 4</i> )		40	$A_p$
$f_i$	Input Frequency	47	50/60	64	Hz
PF	Power Factor	$V_{i,nom}$ , 50 Hz, $> 0.2 I_{i,nom}$			W/VA
$V_{i,on}$	Turn-on Input Voltage <sup>1)</sup>	Ramping up		87	VAC
$V_{i,off}$	Turn-off Input Voltage <sup>1)</sup>	Ramping down		85	VAC
$\eta$	Efficiency without Fan	$V_{i,nom}$ , $0.1 \cdot I_{i,nom}$ , $V_{x,nom}$ , $T_A = 25 \text{ }^\circ\text{C}$		85.4	%
		$V_{i,nom}$ , $0.2 \cdot I_{i,nom}$ , $V_{x,nom}$ , $T_A = 25 \text{ }^\circ\text{C}$		92.8	
		$V_{i,nom}$ , $0.5 \cdot I_{i,nom}$ , $V_{x,nom}$ , $T_A = 25 \text{ }^\circ\text{C}$		94.5	
		$V_{i,nom}$ , $I_{i,nom}$ , $V_{x,nom}$ , $T_A = 25 \text{ }^\circ\text{C}$		94.0	
$T_{hold}$	Hold-up Time	After last AC zero point, $V_i > 10.8 \text{ V}$ , $V_{SB}$ within regulation, $I_i = 230 \text{ VAC}$ , $P_{x,nom}$		20	ms

1) The Front-End is provided with a minimum hysteresis of 3 V during turn-on and turn-off within the ranges.

### 4.1. INPUT FUSE

Quick-acting 12.5 A input fuses (5 x 20 mm) in series with both the L- and N-line inside the power supply protect against severe defects. The fuses are not accessible from the outside and are therefore not serviceable parts.

### 4.2. INRUSH CURRENT

The AC-DC power supply exhibits an X-capacitance of only 3.2  $\mu\text{F}$ , resulting in a low and short peak current, when the supply is connected to the mains. The internal bulk capacitor will be charged through an NTC which will limit the inrush current.

**NOTE:** Do not repeat plug-in / out operations within a short time, or else the internal in-rush current limiting device (NTC) may not sufficiently cool down and excessive inrush current or component failure(s) may result.

### 4.3. INPUT UNDER-VOLTAGE

If the input voltage exceeds  $V_{i,max,C}$ , the power supply remains on and may get damaged if the voltage exceeds a tolerable level. If the sinusoidal input voltage stays below the input undervoltage lockout threshold  $V_{i,on}$ , the supply will be inhibited. Once the input voltage returns within the normal operating range, the supply will return to normal operation again.

### 4.4. POWER FACTOR CORRECTION

Power factor correction (PFC) is achieved by controlling the input current waveform synchronously with the input voltage. A linear IC is used giving good PFC results over wide input voltage and load ranges. The input current will follow the shape of the input voltage. If for instance the input voltage has a trapezoidal waveform, then the current will also show a trapezoidal waveform.

### 4.5. EFFICIENCY

High efficiency (see *Figure 2*) is achieved by using state-of-the-art silicon power devices in conjunction with soft-transition topologies minimizing switching losses and a full digital control scheme. Synchronous rectifiers on the output reduce the losses in the high current output path. The speed of the fan is digitally controlled to keep all components at an optimal operating temperature regardless of the ambient temperature and load conditions.

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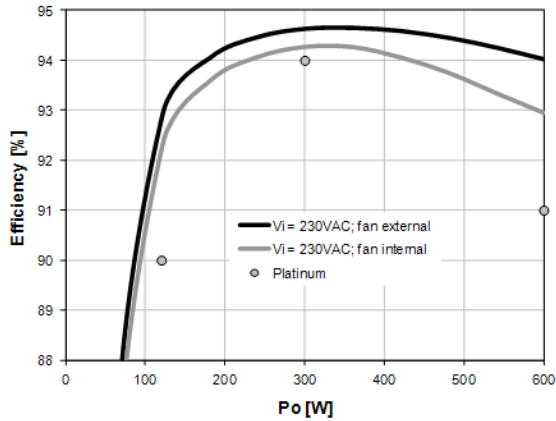


Figure 2 - Efficiency vs. Load current (ratio metric loading)

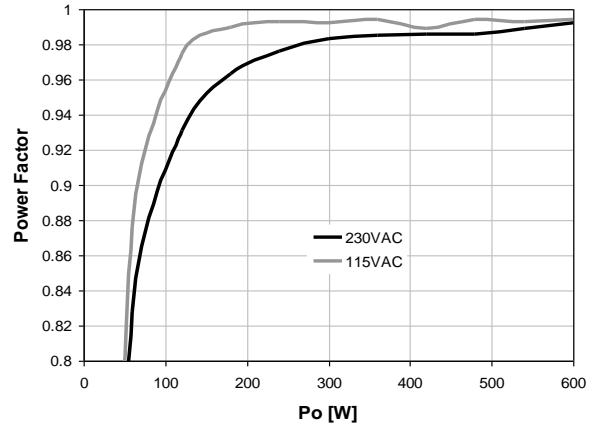


Figure 3 - Power factor vs. Load current

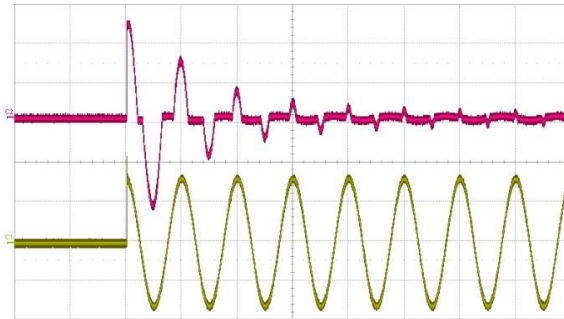


Figure 4 - Inrush current,  $V_{in} = 230V_{ac}$ ,  $90^\circ$   
CH4:  $V_{in}$  (200V/div), CH2:  $I_{in}$  (5 A/div)

## 5. OUTPUT

General Condition:  $T_a = 0 \dots +45^\circ\text{C}$  unless otherwise noted.

PARAMETER	DESCRIPTION / CONDITION	MIN	NOM	MAX	UNIT	
<b>Main Output <math>V_1</math></b>						
$V_{1\text{ nom}}$	Nominal Output Voltage		12.0		VDC	
$V_{1\text{ set}}$	Output Setpoint Accuracy	-0.5		+0.5	% $V_{1\text{ nom}}$	
$dV_{1\text{ tot}}$	Total Regulation	$V_{1\text{ min}}$ to $V_{1\text{ max}}$ , 0 to 100% $I_{1\text{ nom}}$ , $T_a\text{ min}$ to $T_a\text{ max}$		+1	% $V_{1\text{ nom}}$	
$P_{1\text{ nom}}$	Nominal Output Power	$V_1 = 12\text{ VDC}$	600		W	
$I_{1\text{ nom}}$	Nominal Output Current	$V_1 = 12\text{ VDC}$	50.0		ADC	
$V_{1\text{ pp}}$	Output Ripple Voltage	$V_{1\text{ nom}}$ , $I_{1\text{ nom}}$ , 20 MHz BW (See chapter 5.1)		150	mVpp	
$dV_{1\text{ Load}}$	Load Regulation	$V_1 = V_{1\text{ nom}}$ , 0 - 100 % $I_{1\text{ nom}}$		33	mV	
$dV_{1\text{ Line}}$	Line Regulation	$V_1 = V_{1\text{ min}} \dots V_{1\text{ max}}$		0	mV	
$I_{1\text{ max}}$	Current Limitation PFE600-12-054NA	$T_a < 45^\circ\text{C}$	52.5	55	ADC	
	Current Limitation PFE600-12-054RA	$V_1 > 110\text{ VAC}$ , $T_a < 45^\circ\text{C}$	51	55		
		$V_1 > 90\text{ VAC}$ , $T_a < 45^\circ\text{C}$	46	50		
$dI_{\text{share}}$	Current Sharing	Deviation from $I_{1\text{ tot}} / N$ , $I_1 > 10\text{ A}$	-3	+3	A	
$dV_{1\text{ dyn}}$	Dynamic Load Regulation	$\Delta I_1 = 50\%$ $I_{1\text{ nom}}$ , $I_1 = 5 \dots 100\%$ $I_{1\text{ nom}}$ ,	-0.6	0.6	V	
$T_{\text{rec}}$	Recovery Time	$dI/dt = 1\text{ A}/\mu\text{s}$ , recovery within 1% of $V_{1\text{ nom}}$		1	ms	
$t_{\text{AC } V_1}$	Start-up Time from AC	$V_1 = 10.8\text{ VDC}$ (Figure 6)		2	sec	
$t_{\text{V1 rise}}$	Rise Time	$V_1 = 10 \dots 90\%$ $V_{1\text{ nom}}$ (Figure 7)		1	10	ms
$C_{\text{Load}}$	Capacitive Loading $V_1$	$T_a = 25^\circ\text{C}$		30000	$\mu\text{F}$	

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