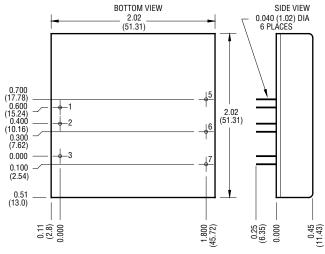


# DFA20 SERIES SINGLE OUTPUT

#### **DESCRIPTION**

The compact DFA20 Series provides power densities up to 11 watts per cubic inch (0.67 watts per cm³). Ideal for battery operated industrial, medical control and remote data collection systems, this converter has fully filtered inputs and outputs. Complete overload protection with independent pulse-by-pulse current limiting and an overtemperature shutdown ensures reliable system operation. The output of the converter is electrically isolated, thereby allowing the output to be configured as a positive or negative output voltage.

Selection Chart							
Model		Range C (4)	Output	Output mA			
	Min	Max	VDC				
DFA20E12S3.3	9	18	3.3	4000			
DFA20E12S5	9	18	5	4000			
DFA20E12S12	9	18	12	1700			
DFA20E12S15	9	18	15	1400			
DFA20E24S3.3	18	36	3.3	4000			
DFA20E24S5	18	36	5	4000			
DFA20E24S12	18	36	12	1700			
DFA20E24S15	18	36	15	1400			
DFA20E48S3.3	36	72	3.3	4000			
DFA20E48S5	36	72	5	4000			
DFA20E48S12	36	72	12	1700			
DFA20E48\$15	36	72	15	1400			



Mechanical tolerances unless otherwise noted:

X.XX dimensions: ±0.020 inches X.XXX dimensions: ±0.005 inches

#### NOTES

- (1) All parameters measured at Tc = 25°C, nominal input voltage and full rated load unless otherwise noted. Refer to the Technical Reference Section for the definition of terms, measurement circuits and other information.
- (2) The Case is tied to the -Input, Pin 2.
- (3) The functional temperature range is intended to give an additional data point for use in evaluating this power supply. At the low functional temperature the power supply will function with no side effects, however, sustained operation at the high functional temperature will reduce expected operational life. The data sheet specifications are not guaranteed beyond the case operating range.
- (4) The case thermal impedance is specified as the case temperature rise over ambient per package watt dissipated.

#### **FEATURES**

- Remote ON/OFF and TRIM
- Overcurrent Protection and Thermal Shutdown
- Efficiencies to 83%
- 700V Isolation, Up to 1544V on 48V Converters
- Power Density up to 11 Watts per Cubic Inch
- Five-Side Shielded Case
- Extended Range Input (2:1)

General Specifications (1)						
All Mod	Units					
ON/OFF Function						
ON Logic Level or Pin Open	MIN	>1.6	VDC			
OFF Logic Level or Tie Pin to -Input	MAX	<0.7	VDC			
Open Circuit Voltage	TYP	2.5	VDC			
Input Resistance	TYP	20	Kohms			
Converter Idle Current ON/OFF Pin Low 12V Models 24V and 48V Models	TYP TYP	3 5	mA mA			
Isolation (2)						
Isolation Voltage Input to Output 12V, 24V Input to Output 48V 10µA Leakage	MIN MIN	700 1544	VDC			
Input to Output Capacitance	TYP	290	pF			
Output Trim Function						
Trim Range	MIN	±5	%			
Input Resistance	MIN	10	Kohms			
Open Circuit Voltage	TYP	2.5	VDC			
Environmental						
Case Operating Range, To No Derating	MIN MAX	-40 85	°C			
Case Functional Range (3)	MIN MAX	-50 100	°C			
Storage Range	MIN MAX	-55 105	°C			
Thermal Shutdown Case Temperature	TYP	105	°C			
Thermal Impedance (4)	TYP	9.5	°C/Watt			
General						
MTBF (Calculated)	TYP	800,000	HRS			
Unit Weight	TYP	2.3 / 65	oz / gm			
Chassis Mounting Kit 12V, 2	CM2B1					
48V	CM2A1					

Pin	Function			
1	+INPUT			
2	-INPUT			
3	ON/OFF			
4	NO PIN			
5	+OUT			
6	-OUT			
7	TRIM			

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## DFA20 SERIES - SINGLE OUTPUT

Input Parameters (1)								
Model		DFA20E12S3.3	DFA20E12S5	DFA20E12S12	DFA20E12S15	DFA20E24S3.3	DFA20E24S5	Units
Voltage Range	MIN MAX	9 18 18 36			VDC			
Poffested Binale (0)		350				140		mA <sub>PP</sub>
Reflected Ripple (2)	TYP	100			40		mA <sub>rms</sub>	
Input Current Full Load No Load	TYP TYP	1.46 16	2.12 16	2.15 16	2.21 16	0.70 10	1.01 10	A mA
Efficiency	TYP	76	79	79	79	80	83	%
Switching Frequency	TYP			2	20			kHz
Maximum Input Overvoltage, 100ms Maximum	MAX	24			45		VDC	
Turn-on Time, 1% Output Error	TYP	10				ms		
Model		DFA20E24S12	DFA20E24S15	DFA20E48S3.3	DFA20E48S5	DFA20E48S12	DFA20E48S15	Units
Voltage Range	MIN MAX	18 36				36 72	VDC	
Deflected Discle (0)	TYP	140			90	mA <sub>PP</sub>		
Reflected Ripple (2)	TYP	40	)	25				mA <sub>rms</sub>
Input Current No Load Full Load	TYP TYP	10 1.00	10 1.02	8 0.35	8 0.50	8 0.51	8 0.51	mA A
Efficiency	TYP	85	86	80	83	84	85	%
Switching Frequency	TYP	220				kHz		
Maximum Input Overvoltage, 100ms Maximum	MAX	45		85				VDC
Turn-on Time, 1% Output Error	TYP	10				ms		

Output Parameters (1)							
Model		DFA20E12S3.3 DFA20E24S3.3 DFA20E48S3.3	DFA20E12S5 DFA20E24S5 DFA20E48S5	DFA20E12S12 DFA20E24S12 DFA20E48S12	DFA20E12S15 DFA20E24S15 DFA20E48S15	Units	
Output Voltage		3.33	5	12	15	VDC	
Output Voltage Accuracy	MIN TYP MAX	3.30 3.33 3.36	4.95 5.00 5.05	11.90 12.00 12.10	14.90 15.00 15.10	VDC	
Rated Load Range	MIN MAX	0.0 4.0	0.0 4.0	0.0 1.7	0.0 1.4	А	
Load Regulation 25% Max-Max Load	TYP MAX	1					
Line Regulation Vin = Min-Max VDC	TYP MAX	0.5 1.0		%			
Short Term Stability (3)	TYP	< 0.05				%/24Hrs	
Input Ripple Rejection (4)	TYP	> 40					
Noise, 0-20MHz bw (2)	TYP	75					
RMS Noise, 0.01-1MHz	TYP	15					
Temperature Coefficient	TYP MAX	50 150				ppm/°C	
Short Circuit Protection to Common for all Outputs	•	Continuous, with Thermal Protection				•	

#### NOTES

- (1) All parameters measured at Tc=25°C, nominal input voltage and full rated load unless otherwise noted. Refer to the Technical Reference Section for the definition of terms, measurement circuits and other information.
- (2) Noise is measured per Technical Reference Section. Measurement bandwidth is 0-20 MHz for peak-peak measurements, 10 kHz to 1 MHz for RMS measurements. Output noise is measured with a 0.01 µF ceramic in parallel with a 1 µF/35V Tantalum capacitor located 1\* away from the converter to simulate your PCB's standard decoupling. Input reflected ripple is measured into a 10 µH source impedance.
- (3) Short term stability is specified after a 30 minute warmup at full load, constant line and recording the drift over a 24 hour period.
- (4) The input ripple rejection is specified for DC to 120 Hz ripple with a modulation amplitude of 1% of Vin.



## DFA20 SERIES — SINGLE OUTPUT

#### **DFA20 SERIES APPLICATION NOTES:**

#### External Capacitance Requirements

No external capacitance is required for operation of the DFA20 Series. The use of input capacitors with less than  $0.5\Omega$  ESR may cause peaking in the input filter and degrade filter performance. External output capacitance is not required for operation, however it is recommended that  $1\mu F$  to  $10\mu F$  of tantalum and 0.001 to  $0.1\mu F$  ceramic capacitance be selected for reduced system noise. Additional output capacitance may be added for increased filtering, but should not exceed  $400\mu F$ .

#### Negative Outputs

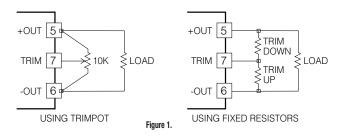
A negative output voltage may be obtained by connecting the +OUT to circuit ground and connecting -OUT as the negative output.

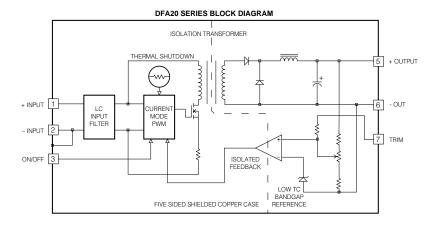
### Remote ON/OFF Operation

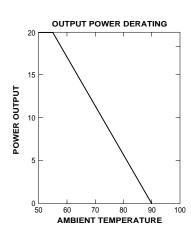
The remote ON/OFF pin may be left floating if this function is not used. It is recommended to drive this pin with an open collector arrangement or a relay contact. When the ON/OFF pin is pulled low with respect to the -INPUT, the converter is placed in a low power drain state.

#### Output TRIM

The TRIM pin may be used to adjust the output  $\pm 5\%$  from the nominal setting. This function allows adjustment for voltage drops in the system wiring, as well 5.2 volt outputs for ECL applications. Figure 1 shows the proper connections to use this function. A trimpot value of  $10 \text{K}\Omega$  should be used for 3.3 and 5 volt outputs. A trimpot value of  $20 \text{K}\Omega$  should be used for 12 and 15 volt outputs. If the TRIM function is not required the pin may be left floating.







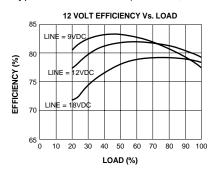
NUCLEAR AND MEDICAL APPLICATIONS Power-One products are not authorized for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems without the express written consent of the President of Power-One, Inc.

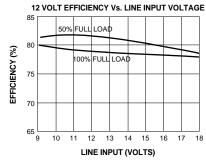
TECHNICAL REVISIONS The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.

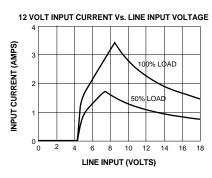


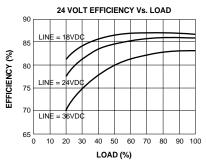
## DFA20 SERIES — SINGLE OUTPUT

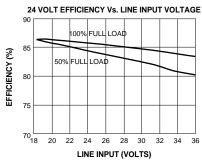
Typical Performance: (Tc=25°C, Vin=Nom VDC, Rated Load)

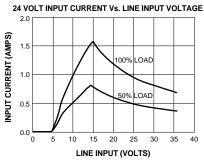


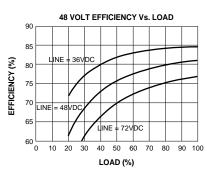


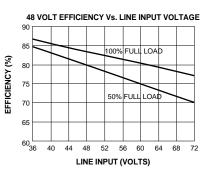


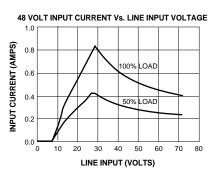












#### **OUTPUT VOLTAGE Vs. OUTPUT LOAD** NORMALIZED OUTPUT (%) 100 80 CURRENT LIMIT MODE 60 40 20 20 40 60 80 100 120 140 OUTPUT LOAD (%)

#### NOTES ON USING THE CURVES

- The input currents are for 20 watts of output power. For ±5 volt output models the current is approximately 15% less.
- The efficiency curves are for 12 volt output models. To use for other models adjust as follows: ±5 volt models subtract approximately 3%. ±15volt models add approximately 1%.

For the Most Up-To-Date Information

