DFA20 SERIES
DUAL OUTPUT

DESCRIPTION

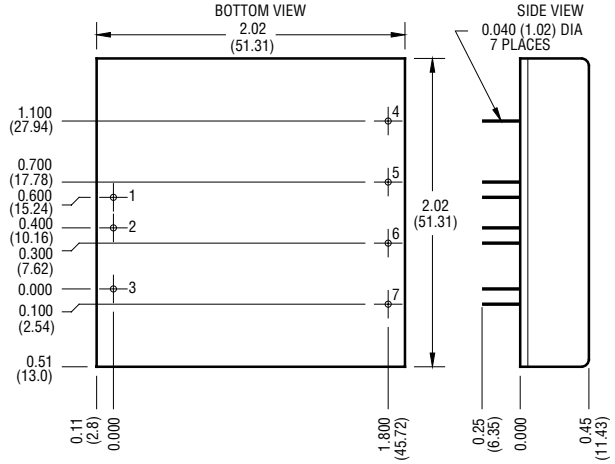
The compact, dual output DFA20 series provides power densities up to 11 watts per cubic inch (0.67 watts per cm³). Ideal for battery operated industrial, medical control and remote data collection systems, this converter has fully filtered inputs and outputs. Complete overload protection with independent pulse-by-pulse current limiting and an overtemperature shutdown ensures reliable system operation. Converters with 48 volt inputs are isolated to 1544 volts.

FEATURES

- Remote ON/OFF and TRIM
- Water Washable Case
- Overcurrent Protection and Thermal Shutdown
- Efficiencies to 85%
- Low Input to Output Capacitance
- 700Volt to 1544Volt Isolation
- Five-Side Shielded Case
- Extended Range Input (2:1)

Selection Chart

Model	Input Range VDC		Output VDC	Output mA
	Min	Max		
DFA20E12D5	9	18	±5	1700
DFA20E12D12	9	18	±12	850
DFA20E12D15	9	18	±15	700
DFA20E24D5	18	36	±5	1700
DFA20E24D12	18	36	±12	850
DFA20E24D15	18	36	±15	700
DFA20E48D5	36	72	±5	1700
DFA20E48D12	36	72	±12	850
DFA20E48D15	36	72	±15	700



Mechanical tolerances unless otherwise noted:
X.XX dimensions: ±0.020 inches
X.XXX dimensions: ±0.005 inches

Pin	Function
1	+INPUT
2	-INPUT
3	ON/OFF
4	+OUTPUT
5	COMMON
6	-OUTPUT
7	TRIM

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.

General Specifications (1)

All Models			Units
ON/OFF Function			
ON Logic Level or Leave 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 4V and 48V Models	 TYP TYP	 3 5	 mA mA
Isolation (2)			
Breakdown Voltage Input to Output 12V , 24V Input to Output 48V 10 μA Leakage	 MIN MIN	 700 1544	VDC
Input to Output Capacitance	TYP	500	pF
Output Trim Function			
Trim Range	MIN	±5	%
Input Resistance	MIN	60	Kohms
Environmental			
Case Functional Range, Tc No Derating	MIN MAX	-40 90	°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, 24V	CM2B2		
Chassis Mounting Kit 48V	CM2A2		

NOTES (cont)

(2) Case is electrically connected to Pin 2, -Input.

(3) The functional case operating range is intended to give an additional data point for evaluating this converter. Sustained operation at the higher operating range 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.

DFA20 SERIES – DUAL OUTPUT

Input Parameters (1)								
Model		**DFA20E12D5**	**DFA20E12D12**	**DFA20E12D15**	**DFA20E24D5**	**DFA20E24D12**	**DFA20E48D15**	**Units**
Voltage Range	MIN MAX	9.0 18.0			18.0 36.0			VDC
Reflected Ripple (2)	TYP	350			140			mA_{PP}
	TYP	100			40			mA_{rms}
Input Current No Load Full Load	TYP TYP	12 1750	12 2170	12 2210	12 875	12 1010	12 1030	mA
Efficiency	TYP	81	78	79	81	84	85	%
Switching Frequency	TYP	220						kHz
Maximum Input Overvoltage, 100 ms maximum	MAX	24			45			VDC
Turn-on Time, 1% Output Error	TYP	6						ms
Model		**DFA20E48D5**		**DFA20E48D12**		**DFA20E48D15**		**Units**
Voltage Range	MIN MAX	36.0 72.0						VDC
Reflected Ripple (2)	TYP	90						mA_{PP}
	TYP	25						mA_{rms}
Input Current No Load Full Load	TYP TYP	12 440		12 505		12 520		mA
Efficiency	TYP	81		84		84		%
Switching Frequency	TYP	220						kHz
Maximum Input Overvoltage, 100 ms maximum	MAX	85						VDC
Turn-on Time, 1% Output Error	TYP	10						ms

Output Parameters (1)					
Model		**DFA20E12D5 DFA20E24D5 DFA20E48D5**	**DFA20E12D12 DFA20E24D12 DFA20E48D12**	**DFA20E12D15 DFA20E24D15 DFA20E48D15**	**Units**
Output Voltage		±5	±12	±15	VDC
Output Voltage Accuracy	MIN TYP MAX	4.95 5.00 5.05	11.90 12.00 12.10	14.90 15.00 15.10	VDC
Output Balance Plus to Minus Output, Full Load	TYP MAX	< 0.5 1.0			%
Rated Load Range	MIN MAX	0.0 1.7	0.0 0.85	0.0 0.7	A
Load Regulation (3)	TYP MAX	0.3 0.7	0.1 0.6	0.2 0.6	%
Cross Regulation (4)	TYP	3	3	3	%
Line Regulation Vin = Min-Max VDC	TYP MAX	< 0.1 0.8	< 0.2 0.8	< 0.2 0.8	%
Short Term Stability (5)	TYP	< 0.05			%/24Hrs
Long Term Stability	TYP	< 0.2			%/kHrs
Input Ripple Rejection (6)	TYP	> 40			dB
Noise, 0-20MHz bw (2)	TYP	50	50	50	mV_{PP}
RMS Noise, 0.01-1 MHz bw	TYP	15	10	10	mV_{rms}
Temperature Coefficient	TYP MAX	50 150			ppm/°C
Short Circuit Protection to Common for all Outputs		Continuous, Current Limit and Thermal Protection			

Specification notes for this page are located on the next page.

DFA20 SERIES – DUAL OUTPUT

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 1µF tantalum located 1" away from the converter to simulate PCB standard decoupling. Input reflected ripple is measured into a 1 µH source impedance.

(3) Load regulation for the outputs is specified as the voltage change when both outputs are changed from maximum to minimum at the same time.

(4) Cross regulation is defined as the change in one output when the other output is changed from full load to 25% of full load. The converter can be run at no load on either or both outputs with no damage.

(5) Short term stability is specified after a 30 minute warmup at full load, constant line and recording the drift over a 24 hour period.

(6) The input ripple rejection is specified for DC to 120 Hz ripple with a modulation amplitude of 1% of Vin.

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 0.5Ω 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 1µF to 10µF of tantalum and 0.001 to 0.1µF ceramic capacitance be selected for reduced system noise. Additional output capacitance may be added for increased filtering, but should not exceed 400µF.

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 ±5% from the nominal setting. This function allows adjustment for voltage drops in the system wiring. Figure 1 shows the proper connections to use this function. If the TRIM function is not required the pin may be left floating.

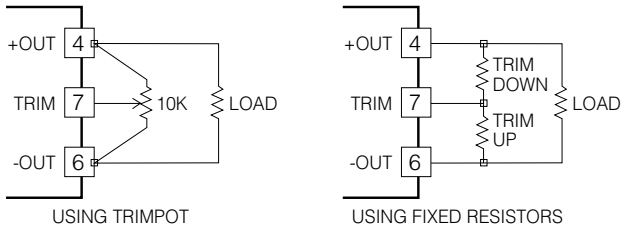
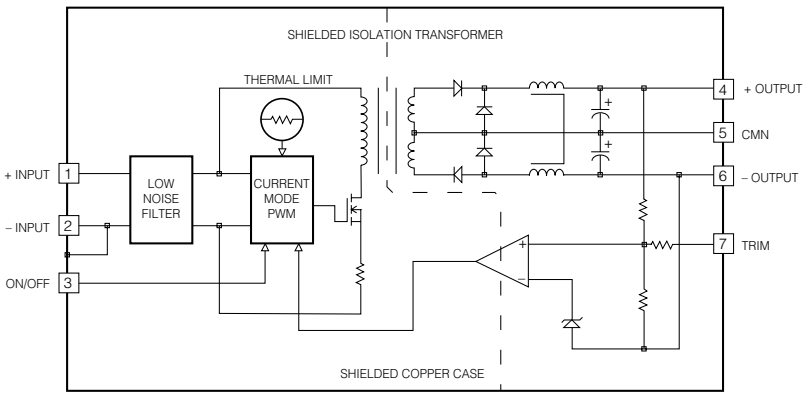
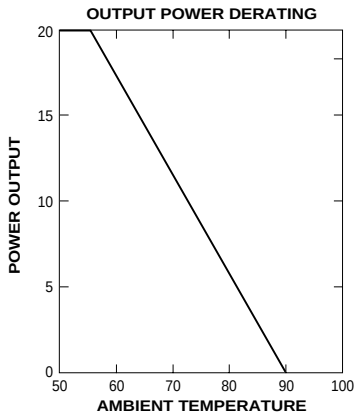


Figure 1.

DFA20 SERIES BLOCK DIAGRAM

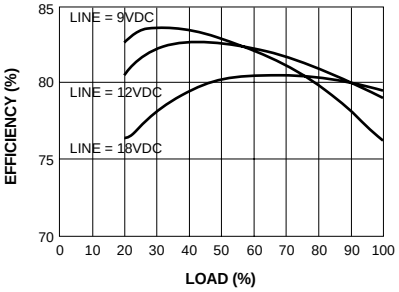




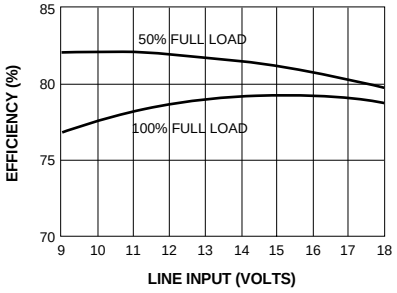
DFA20 SERIES – DUAL OUTPUT

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

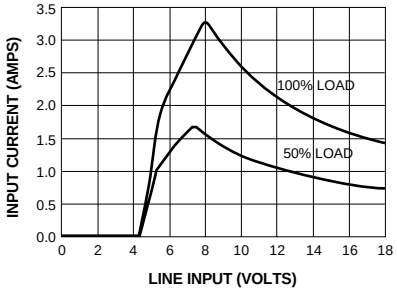
12 VOLT EFFICIENCY Vs. LOAD



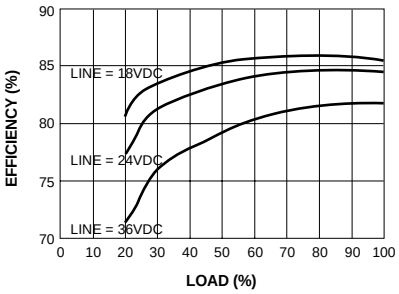
12 VOLT EFFICIENCY Vs. LINE INPUT VOLTAGE



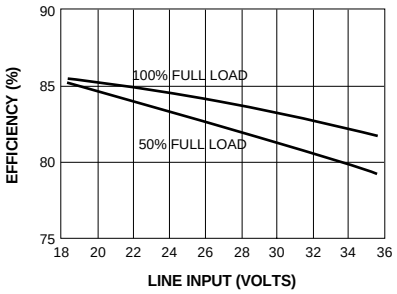
12 VOLT INPUT CURRENT Vs. LINE INPUT VOLTAGE



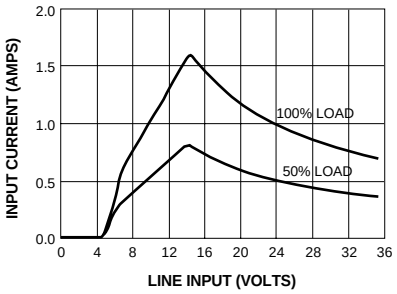
24 VOLT EFFICIENCY Vs. LOAD



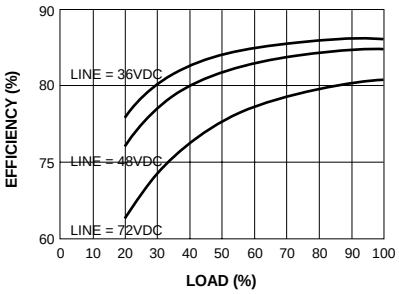
24 VOLT EFFICIENCY Vs. LINE INPUT VOLTAGE



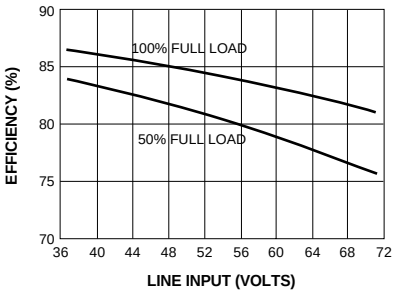
24 VOLT INPUT CURRENT Vs. LINE INPUT VOLTAGE



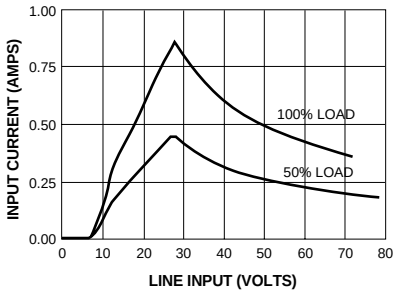
48 VOLT EFFICIENCY Vs. LOAD



48 VOLT EFFICIENCY Vs. LINE INPUT VOLTAGE



48 VOLT INPUT CURRENT Vs. LINE INPUT VOLTAGE



NOTES ON USING THE CURVES

1) The input currents are for 20 watts of output power. For ±5 volt output models the current is approximately 15% less.

2) 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%.