

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

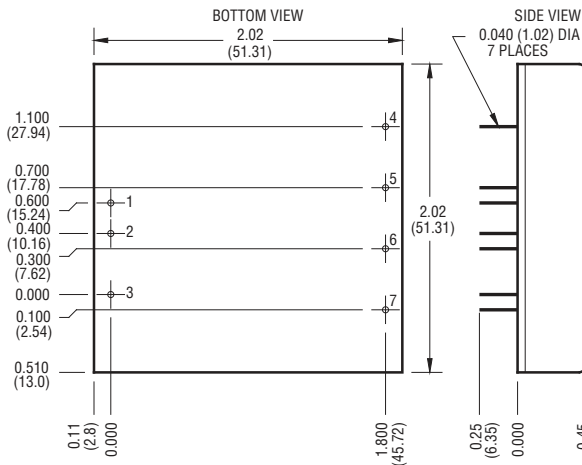
- RoHS lead solder exemption compliant
- Remote on/off and trim
- Water-washable case
- Overcurrent protection and thermal shutdown
- Efficiencies to 85%
- Low input-to-output capacitance
- 700V to 1544V isolation
- Five-sided shielded case



Model Selection

| 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 |

Model numbers highlighted in yellow or shaded are not recommended for new designs.



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.
- (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.

| 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 | TYP | 3 | mA |
| 4V and 48V Models | TYP | 5 | mA |
| Isolation (2) | | | |
| Breakdown Voltage | | | |
| Input to Output 12V , 24V | MIN | 700 | VDC |
| Input to Output 48V | MIN | 1544 | VDC |
| 10 A Leakage | | | |
| 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 | -40 | i C |
| | MAX | 90 | |
| Case Functional Range (3) | MIN | -50 | i C |
| | MAX | 100 | |
| Storage Range | MIN | -55 | i C |
| | MAX | 105 | |
| Thermal Shutdown Case Temperature | TYP | 105 | i C |
| Thermal Impedance (4) | TYP | 9.5 | i 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 | | |

| Input Parameters (1) | | | | | | | | |
|--|-----|------------|-------------|-------------|------------|-------------|-------------|-------------------|
| Model | | DFA20E12D5 | DFA20E12D12 | DFA20E12D15 | DFA20E24D5 | DFA20E24D12 | DFA20E48D15 | Units |
| Voltage Range | MIN | 9.0 | | | 18.0 | | | VDC |
| | MAX | 18.0 | | | 36.0 | | | |
| Reflected Ripple (2) | TYP | 350 | | | 140 | | | mA _{PP} |
| | TYP | 100 | | | 40 | | | mA _{rms} |
| Input Current No Load Full Load | TYP | 12 | 12 | 12 | 12 | 12 | 12 | mA |
| | TYP | 1750 | 2170 | 2210 | 875 | 1010 | 1030 | |
| 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 | 36.0 | | | | | | VDC |
| | MAX | 72.0 | | | | | | |
| Reflected Ripple (2) | TYP | 90 | | | | | | mA _{PP} |
| | TYP | 25 | | | | | | mA _{rms} |
| Input Current No Load Full Load | TYP | 12 | | 12 | | 12 | | mA |
| | TYP | 440 | | 505 | | 520 | | |
| 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 | 4.95 | | 11.90 | 14.90 | VDC |
| | TYP | 5.00 | | 12.00 | 15.00 | |
| | MAX | 5.05 | | 12.10 | 15.10 | |
| Output Balance Plus to Minus Output, Full Load | | TYP | | < 0.5 | | % |
| | | MAX | | 1.0 | | |
| Rated Load Range | MIN | 0.0 | | 0.0 | 0.0 | A |
| | MAX | 1.7 | | 0.85 | 0.7 | |
| Load Regulation (3) | TYP | 0.3 | | 0.1 | 0.2 | % |
| | MAX | 0.7 | | 0.6 | 0.6 | |
| Cross Regulation (4) | TYP | 3 | | 3 | 3 | % |
| Line Regulation Vin = Min-Max VDC | TYP | < 0.1 | | < 0.2 | < 0.2 | % |
| | MAX | 0.8 | | 0.8 | 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 | 50 | | | | ppm/°C |
| | MAX | 150 | | | | |
| 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.

NOTES

- (1) All parameters measured at Tc=25°C, nominal input voltage and full rated load unless otherwise noted.
- (2) Noise 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 0.5V 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.

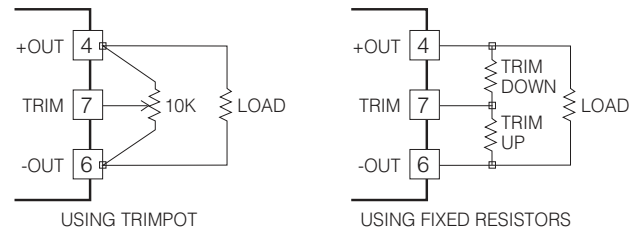
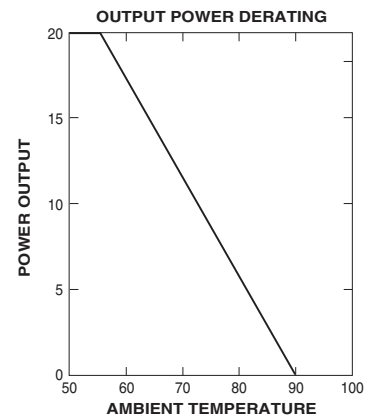
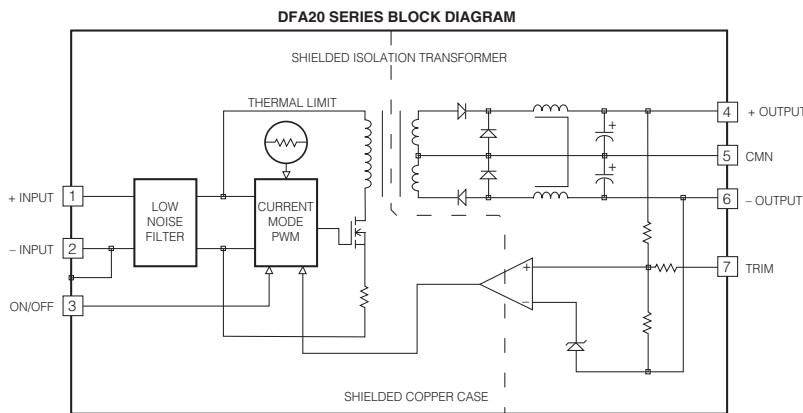
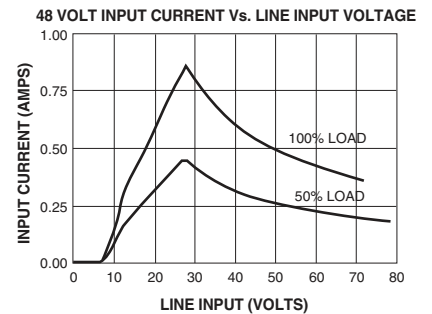
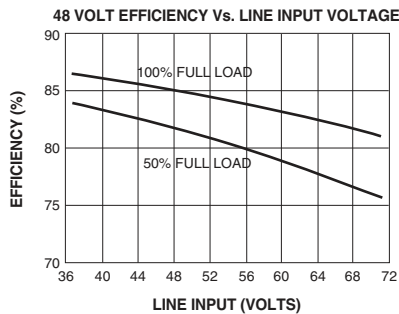
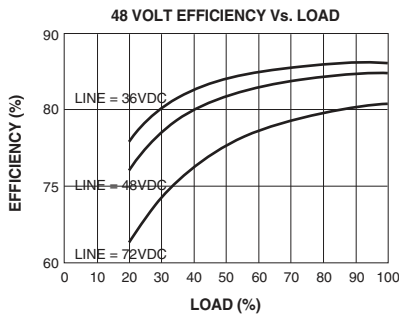
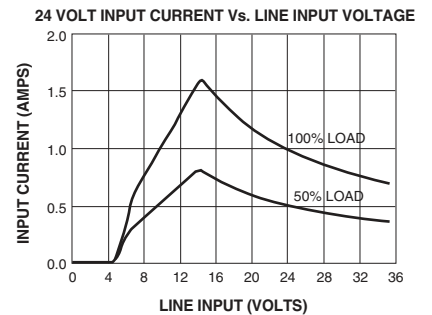
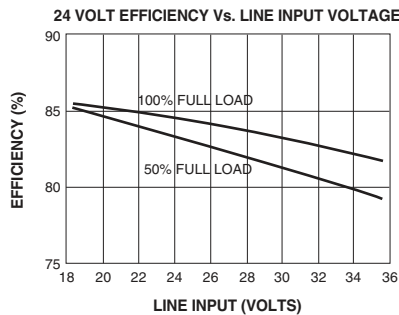
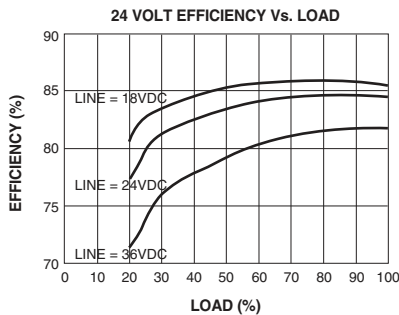
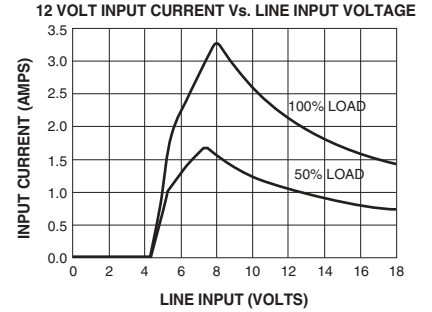
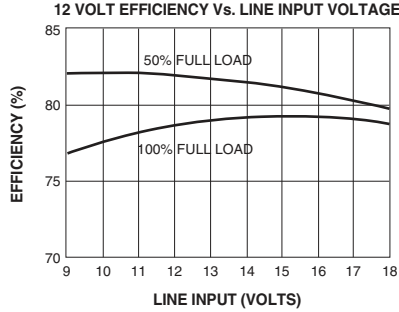
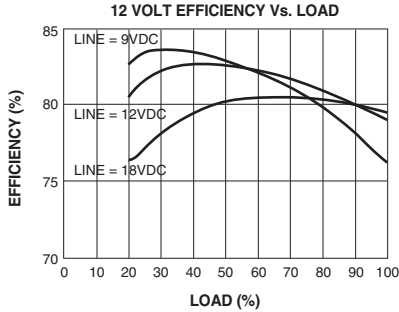


Figure 1.



Typical Performance: (T_c=25 C, V_{in}=Nom VDC, Rated Load)



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%.
 ± 15 volt models add approximately 1%.

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