

F2000ERW Series

Low Cost, Compact 20W, 2:1 Input Range DC/DC Converters



Key Features:

- 20W Output Power
- 2:1 Input Voltage Range
- 1,500 VDC Isolation
- Single & Dual Outputs
- Efficiency to 86%
- Compact 1.6 x 2 In. Case
- -40°C to +71°C Operation
- Industry Standard Pin-Out
- **Lowest Cost!!**



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Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Start Voltage	12 VDC Input	8.6	8.8	9.0	VDC
	24 VDC Input	17.5	17.8	18.0	
	48 VDC Input	34.0	35.0	36.0	
Input Filter	LC Filter				
Short Circuit Input Power			3,500		mW

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy			±1.0	±3.0	%
Output Voltage Balance	Dual Output, Balanced Loads		±0.5		%
Line Regulation	Vin = Min to Max		±0.2	±0.5	%
Load Regulation	Iout = 10% to 100%		±0.5	±1.0	%
Ripple & Noise (20 MHz)	See Note 1		75	150	mV P - P
Output Power Protection	See Note 3	120	130	150	%
Transient Recovery Time (Note 4)	25% Load Step Change		200	300	µSec
Transient Response Deviation			±2.0	±5.0	%
Temperature Coefficient			±0.02		%/°C
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds	1,500			VDC
Isolation Resistance	500 VDC	500			MΩ
Isolation Capacitance	100 kHz, 1V		1,000		pF
Switching Frequency			300		kHz

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+71	°C
Storage Temperature Range		-50		+105	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	2.0 x 1.6 x 0.41 Inches (50.8 x 40.6 x 10.5 mm)
Case Material	Metal With Non-Conductive Base (UL94-V0)
Weight	1.37 Oz (39g)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	100			kHours

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	12 VDC Input	-0.7		20.0	VDC
	24 VDC Input	-0.7		40.0	
	48 VDC Input	-0.7		80.0	
Lead Temperature	1.5 mm From Case for 10 Sec			300	°C
Internal Power Dissipation	All Models			5,000	mW

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

Model Selection Guide

Model Number	Input				Output			Efficiency (% Typ)	Overvoltage Protection (VDC)	Capacitive Load (μF Max.)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
F2001ERW	12	9.0 - 18.0	1,937	40	3.3	5,400	540	86	4.29	13,000	4,000
F2002ERW	12	9.0 - 18.0	2,109	40	5.0	4,000	400	79	6.5	6,800	4,000
F2003ERW	12	9.0 - 18.0	2,057	40	12.0	1,670	167	81	15.6	2,200	4,000
F2004ERW	12	9.0 - 18.0	2,032	40	15.0	1,330	133	82	19.5	755	4,000
F2005ERW	12	9.0 - 18.0	2,008	40	24.0	830	83	83	31.2	500	4,000
F2006ERW	12	9.0 - 18.0	2,083	40	±5.0	±2,000	±200	80	±6.5	±3,400	4,000
F2007ERW	12	9.0 - 18.0	2,032	40	±12.0	±833	±84	82	±15.6	±680	4,000
F2008ERW	12	9.0 - 18.0	2,032	40	±15.0	±666	±67	82	±19.5	±450	4,000
F2009ERW	12	9.0 - 18.0	2,008	40	±24.0	±416	±42	83	±31.2	±220	4,000
F2011ERW	24	18.0 - 36.0	968	20	3.3	5,400	540	86	4.29	13,000	2,000
F2012ERW	24	18.0 - 36.0	1,028	20	5.0	4,000	400	81	6.5	6,800	2,000
F2013ERW	24	18.0 - 36.0	1,004	20	12.0	1,670	167	83	15.6	2,200	2,000
F2014ERW	24	18.0 - 36.0	980	20	15.0	1,330	133	85	19.5	755	2,000
F2015ERW	24	18.0 - 36.0	968	20	24.0	830	83	86	31.2	500	2,000
F2016ERW	24	18.0 - 36.0	1,028	20	±5.0	±2,000	±200	81	±6.5	±3,400	2,000
F2017ERW	24	18.0 - 36.0	968	20	±12.0	±833	±84	86	±15.6	±680	2,000
F2018ERW	24	18.0 - 36.0	968	20	±15.0	±666	±67	86	±19.5	±450	2,000
F2019ERW	24	18.0 - 36.0	968	20	±24.0	±416	±42	86	±31.2	±220	2,000
F2021ERW	48	36.0 - 75.0	479	10	3.3	5,400	540	87	4.29	13,000	1,000
F2022ERW	48	36.0 - 75.0	502	10	5.0	4,000	400	83	6.5	6,800	1,000
F2023ERW	48	36.0 - 75.0	496	10	12.0	1,670	167	84	15.6	2,200	1,000
F2024ERW	48	36.0 - 75.0	496	10	15.0	1,330	133	84	19.5	755	1,000
F2025ERW	48	36.0 - 75.0	484	10	24.0	830	83	86	31.2	500	1,000
F2026ERW	48	36.0 - 75.0	514	10	±5.0	±2,000	±200	81	±6.5	±3,400	1,000
F2027ERW	48	36.0 - 75.0	484	10	±12.0	±833	±84	86	±15.6	±680	1,000
F2028ERW	48	36.0 - 75.0	484	10	±15.0	±666	±67	86	±19.5	±450	1,000
F2029ERW	48	36.0 - 75.0	484	10	±24.0	±416	±42	86	±31.2	±220	1,000

Notes:

- When measuring output ripple, it is recommended that an external ceramic capacitor (approx 1 μF to 10 μF) be placed from the +Vout to the -Vout pins or single output units and from each output to common for dual output units.
- These converters are specified for operation without external components. However, in some applications the addition of input/output capacitors will enhance stability and reduce output ripple. Recommended capacitor values are given in the table at right. For applications requiring very low output noise levels, a simple LC filter should be effective.
- Overload protection is provided by a power limiting circuit. Long term operation under overload conditions may cause damage to the unit.
- Transient recovery is measured to within a 1% error band for a load step change of 75% to 100%.
- These units should not be operated with a load under 10% of full load. Operation at no-load will not damage the unit, but they may not meet all specifications.
- A simple external circuit may be used to adjust the converter output. To adjust the output DOWN, connect a 5%, 3W resistor between the plus output pin and the Vout trim pin. To adjust the output UP, connect a 5%, 3W resistor between the minus output pin and the Vout trim pin. For UP/Down trimming capability, connect a 10 kW potentiometer between the plus and minus outputs with the wiper arm connected to the Vout trim pin.
- These units should not be operated over +71°C (see derating curve). Exceeding +71°C may damage the unit.
- It is recommended that a fuse be used on the input of a power supply for protection. See the Model Selection table above for the correct rating.

Vin	Input Capacitor	Output Capacitor
12 VDC	100 μF	1,000 μF per 1A of Iout
24 VDC	100 μF	1,000 μF per 1A of Iout
48 VDC	100 μF	1,000 μF per 1A of Iout

Remote ON/OFF

Parameter	Min	Max	Units
Supply On	0.5	40.0 or Open	VDC
Supply Off	Grnd	<0.5	VDC
Control Common	Referenced to Gnd		

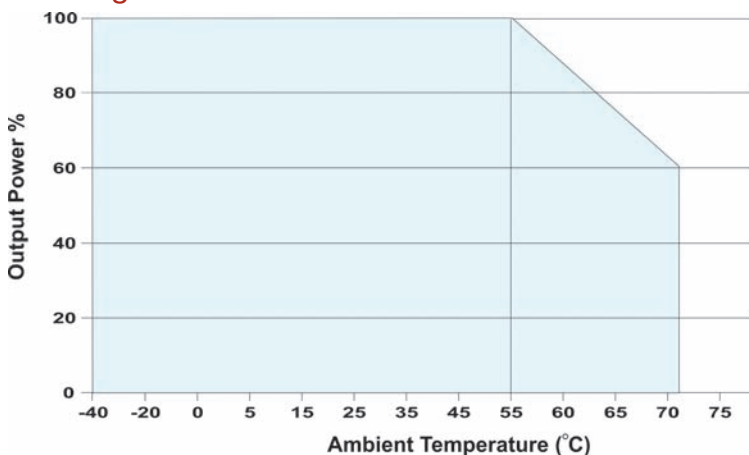
Remote ON/OFF Notes:

- Maximum sink current at the on/off pin (pin 6) during a logic low is 100 μA.
- Maximum allowable leakage current of a switch connected to the on/off terminal (Pin 6) at logic high (2.5V to 100V) is 5 μA.

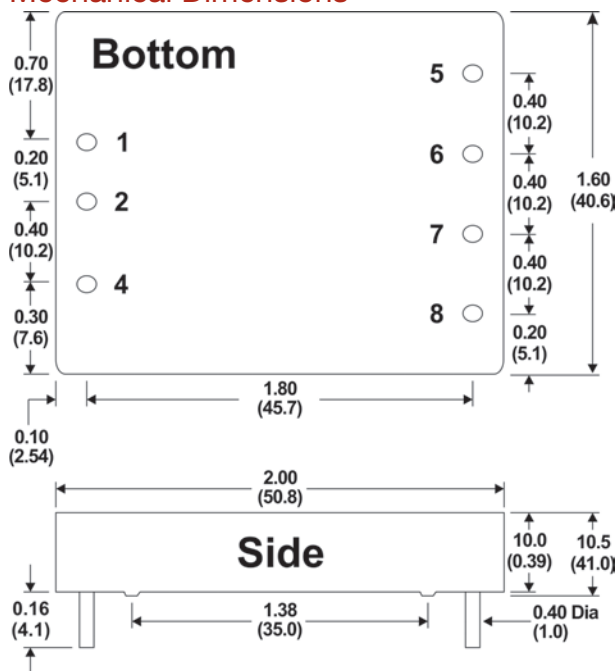
Pin Connections

Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
4	Remote On/Off	
5	No Pin	+Vout
6	+Vout	Comm.
7	-Vout	-Vout
8	Trim	Trim

Derating Curve



Mechanical Dimensions



Mechanical Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.01 (±0.25)



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