

## FEATURES

- ◆RoHS compliant
- ◆Efficiency up to 80%
- ◆Power density up to 1.33W/cm<sup>3</sup>
- ◆Wide temperature performance at full 2 Watt load, -40°C to 85 °C
- ◆Single and dual output
- ◆UV 94V-0 package material
- ◆No heat sink required
- ◆Industry standard pinout
- ◆5V and 12V input
- ◆3KVDC isolation (1 minute)
- ◆5V,9V,12V and 15V output
- ◆Internal SMD construction
- ◆Fully encapsulated with toroidal Magnetics
- ◆No external components required
- ◆MTTF up to 4.2 million hours
- ◆No electrolytic or tantalum capacitors
- ◆PCB mounting

## MODEL SELECTION

2E<sup>①</sup>05<sup>②</sup>05<sup>③</sup>X<sup>④</sup>S<sup>⑤</sup>

- ① Product Series
- ② Input Voltage
- ③ Output Voltage
- ④ Fixed Input
- ⑤ SIP7 Package

## APPLICATIONS

The E\_XS&F\_XS series of industrial temperature range DC/DC converters, available in industry standard SIP packaging offers a power upgrade path from the \_XS-1w&F\_XS-1w series. The E\_XS&F\_XS series offers 3kVDC isolation with 5V output minimum efficiency of 80% at 2W. The unregulated E\_XS&F\_XS series has superior output voltage set point accuracy of 6% in conjunction with excellent load regulation for this converter type. Unbalanced loading capabilities on dual output variants, all of the rated output power may be drawn from a single output.

## SELECTION GUIDE

Order code	Input Voltage (V)	Output Voltage (V)	Output Current (MA)	Input Current (Rated Load) (MA)	Efficiency (%)	Isolation Capacitance (PF)	MTTF <sup>1</sup> (KHRS)
2F0505XS	5	5	400	470	83	28	3998
2F0509XS	5	9	222	455	86	36	3718
2F0512XS	5	12	167	450	87	36	3328
2F0515XS	5	15	133	450	87	34	2855
2F1205XS	12	5	400	200	83	33	3532
2F1209XS	12	9	222	190	87	53	2417
2F1212XS	12	12	167	190	88	62	2246
2F1215XS	12	15	133	185	89	56	2020
2E0505XS	5	±5	±200	470	83	28	2324
2E0509XS	5	±9	±111	455	86	33	2158
2E0512XS	5	±12	±83	450	87	35	1931
2E0515XS	5	±15	±67	450	87	31	1655
2E1205XS	12	±5	±200	200	84	35	1952
2E1209XS	12	±9	±111	190	87	50	2021
2E1212XS	12	±12	±83	190	87	53	1821
2E1215XS	12	±15	±67	190	87	57	1574

## INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max	Units
Voltage range	Continuous operation, 5V input types	4.5	5	5.5	V
	Continuous operation, 12V input types	10.8	12	13.2	V
Reflected ripple current			7.5	15	MA

## ABSOLUTE MAXIMUM RATINGS

Short-circuit protection <sup>2</sup>	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	550mW
Input voltage VIN, E/F05 types	7V
Input voltage VIN, E/F12 types	15V

1. Calculated using MIL-HDBK-217FN2 calculation model with nominal input voltage at full load.

2. Supply voltage must be disconnected at the end of the short circuit duration.

All specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified.



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### OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power <sup>1</sup>	TA=-40°C to 85°C	0.2		2	W
Voltage Set Point	See tolerance envelope				
Line regulation	High Vin to low Vin		1.05	1.2	%%

### ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 minute	3000			VDC
Resistance	Viso=1000VDC	10			GΩ

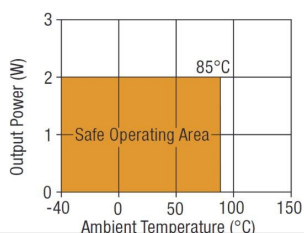
### GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	5V input types		60		kHz
	12V input types		60		kHz

### TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	°C
Storage		-50		125	°C
Case Temperature above ambient	5V output types			28	°C
	All other output types			25	°C

### TEMPERATURE DERATING GRAPH

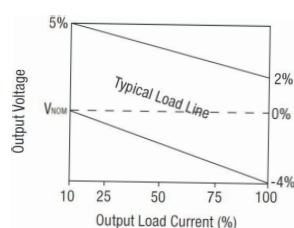


1. See derating graph.

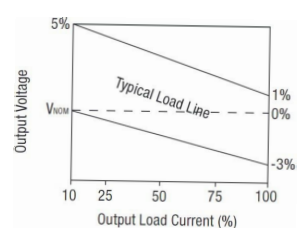
All specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified. Another 24V & 48V products, please inquire Our technical department!

### TOLERANCE ENVELOPE

2E-XS/2F-XS



3.3V in, 3V out type only



### TECHNICAL NOTES

#### ISOLATION VOLTAGE

"Hi Pot Test", "Flash Tested", "Withstand Voltage", "Proof Voltage", "Dielectric Withstand Voltage" & "Isolation Test Voltage" are all terms that relate to the same thing, a test voltage. Applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation. Professional Power Module E\_XS&F\_XS series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 3KVDC for 1 minute.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

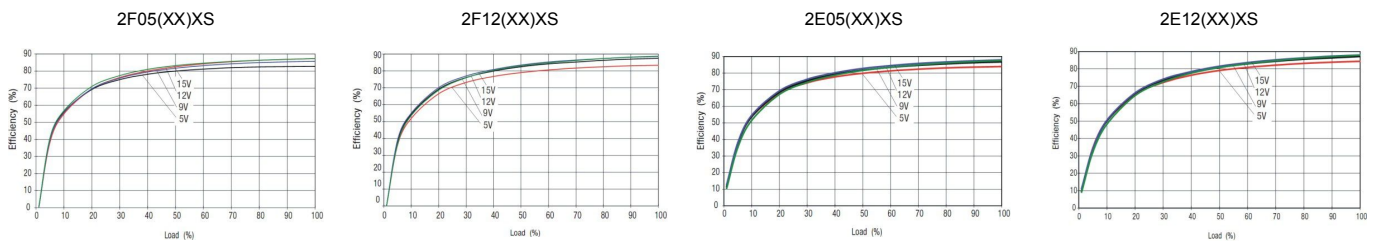
The E\_XS&F\_XS series has been recognized by Underwriters Laboratory for functional insulation. both input and output should normally be maintained within SELV limits i.e. Less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier, but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

#### REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials. Construction and environment. We therefore strongly advise against repeated high voltage isolation testing. but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

### EFFICIENCY VS LOAD



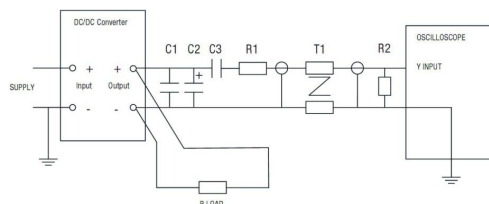
### CHARACTERISATION TEST METHODS

#### Ripple & Noise Characterization Method

Ripple and noise measurements are performed with the following test configuration.

C1	1uF X7R multilayer ceramic capacitor, voltage rating to be a minimum of 3 times the output voltage of the DC/DC converter
C2	10uF tantalum capacitor, voltage rating to be a minimum of 1.5 times the output voltage of the DC/DC converter with an ESR of less than 100mΩ at 100KHz
C3	100nF multilayer ceramic capacitor, general purpose
R1	450 Ω resistor, carbon film, +/-1% tolerance
R2	50 Ω BNC termination
T1	3T of the coxa cable through a ferrite toroid
RLOAD	Resistive load to the maximum power rating of the DC/DC converter. Connections should be made via twisted wires
Measured values are multiplied by 10 to obtain the specified values.	

#### Differential Mode Noise Test Schematic



### PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS		PIN CONNECTIONS																											
E-XS	F-XS	SINGLE OUTPUT VARIANTS	DUAL OUTPUT VARIANTS																										
<p>All dimensions in inches <math>\pm 0.01</math>(mm <math>\pm 0.25</math>mm). All pins on a 0.1(2.54) pitch and within <math>\pm 0.01</math>(0.25) of true position. Weight: 2.8g</p>		<table border="1"> <thead> <tr> <th colspan="2">F-XS</th> </tr> <tr> <th>pin</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+VIN</td> </tr> <tr> <td>2</td> <td>-VIN</td> </tr> <tr> <td>5</td> <td>-VOUT</td> </tr> <tr> <td>7</td> <td>+VOUT</td> </tr> </tbody> </table>	F-XS		pin	Function	1	+VIN	2	-VIN	5	-VOUT	7	+VOUT	<table border="1"> <thead> <tr> <th colspan="2">E-XS</th> </tr> <tr> <th>pin</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+VIN</td> </tr> <tr> <td>2</td> <td>-VIN</td> </tr> <tr> <td>5</td> <td>-VOUT</td> </tr> <tr> <td>6</td> <td>0V</td> </tr> <tr> <td>7</td> <td>+VOUT</td> </tr> </tbody> </table>	E-XS		pin	Function	1	+VIN	2	-VIN	5	-VOUT	6	0V	7	+VOUT
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RECOMMENDED FOOTPRINT DETAILS	
7 Pin SIP Package	
<p>4 HOLES  <math>\varnothing 0.045</math> (1.15)  <math>\varnothing 0.040</math> (1.00) <math>\varnothing 0.00394</math> (0.1)</p> <p>0.1 (2.54)</p> <p>0.1 (2.54)</p>	
<p>*Hole not required for single output variants.            Unless otherwise stated all dimensions in inches <math>\pm 0.02</math>(mm <math>\pm 0.5</math>mm).</p>	

TUBE OUTLINE DIMENSIONS	
7 Pin SIP Tube	
<p>0.366 (9.30)</p> <p>0.708 (18.00)</p> <p>0.488 (12.43)</p> <p>0.020 (0.50)</p> <p>0.2 (5.00)</p>	
<p>Unless otherwise stated all dimensions in inches <math>\pm 0.02</math>(mm <math>\pm 0.5</math>mm).            Tube length(7 Pin SIP):20.47(520mm <math>\pm 2</math>mm).</p>	
<p>Tube Quantity:25</p>	