

FEATURES

- ◆RoHS compliant
- ◆Efficiency up to 80%
- ◆Power density up to 1.33W/cm³
- ◆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

E^①05^②05^③S^⑤-2W^⑥

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

APPLICATIONS

The E_S-2W&F_S-2W series of industrial temperature range DC/DC converters, available in industry standard SIP packaging offers a power upgrade path from the E_S-2w&F_S-2w series. The E_S-2W&F_S-2W series offers 3kVDC isolation with 5V output minimum efficiency of 80% at 2W. The unregulated E_S-2W&F_S-2W 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 ¹ (KHRS)
F0505S-2W	5	5	400	470	83	28	3998
F0509S-2W	5	9	222	455	86	36	3718
F0512S-2W	5	12	167	450	87	36	3328
F0515S-2W	5	15	133	450	87	34	2855
F1205S-2W	12	5	400	200	83	33	3532
F1209S-2W	12	9	222	190	87	53	2417
F1212S-2W	12	12	167	190	88	62	2246
F1215S-2W	12	15	133	185	89	56	2020
E0505S-2W	5	±5	±200	470	83	28	2324
E0509S-2W	5	±9	±111	455	86	33	2158
E0512S-2W	5	±12	±83	450	87	35	1931
E0515S-2W	5	±15	±67	450	87	31	1655
E1205S-2W	12	±5	±200	200	84	35	1952
E1209S-2W	12	±9	±111	190	87	50	2021
E1212S-2W	12	±12	±83	190	87	53	1821
E1215S-2W	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 ²	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.

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power ¹	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

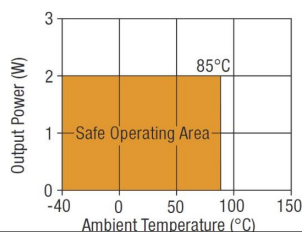
GENERAL CHARACTERISTICS

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

TEMPERATURE CHARACTERISTICS

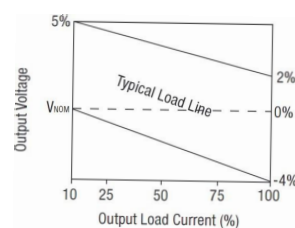
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	°C
Storage		-50		125	°C
Case Temperature above ambient	5V output types			28	°C
	All other output types			25	°C

TEMPERATURE DERATING GRAPH

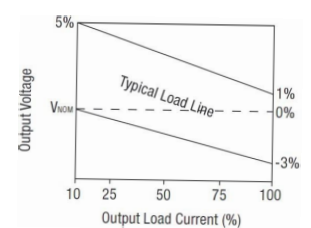


TOLERANCE ENVELOPE

E-S-2W/F-S-2W



3.3V in, 3V out type only



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!

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_S-2W&F_S-2W 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?"

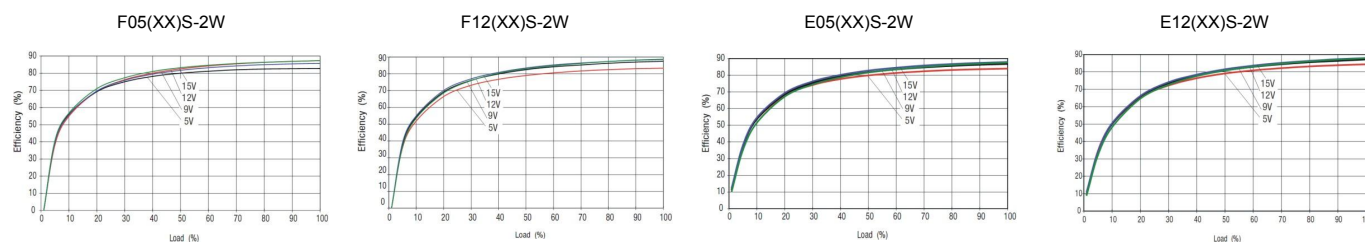
The E_S-2W&F_S-2W series has been recognized by Underwriters Laboratory for functional insulation. Both input and output should normally be maintained within SELV limits i.e. Less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part 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

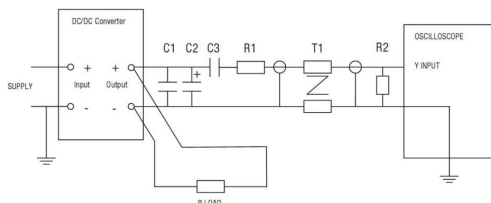
Ripple & Noise Characterization Method

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	450Ω resistor, carbon film, +/-1% tolerance
R2	50Ω 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

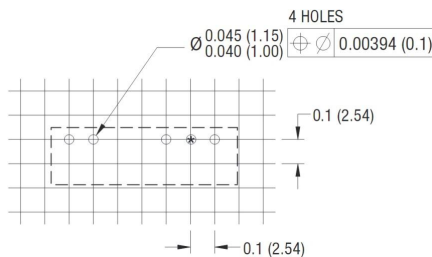


PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS		PIN CONNECTIONS																											
E-S-2W	F-S-2W	SINGLE OUTPUT VARIANTS	DUAL OUTPUT VARIANTS																										
		<table border="1"> <thead> <tr> <th colspan="2">F-S-2W</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-S-2W		pin	Function	1	+VIN	2	-VIN	5	-VOUT	7	+VOUT	<table border="1"> <thead> <tr> <th colspan="2">E-S-2W</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-S-2W		pin	Function	1	+VIN	2	-VIN	5	-VOUT	6	0V	7	+VOUT
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<p>All dimensions in inches ± 0.01(mm ± 0.25mm). All pins on a 0.1(2.54) pitch and within ± 0.01(0.25) of true position. Weight: 2.8g</p>																													

RECOMMENDED FOOTPRINT DETAILS

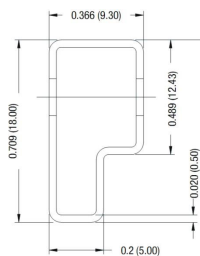
7 Pin SIP Package



*Hole not required for single output variants.
Unless otherwise stated all dimensions in inches ± 0.02 (mm ± 0.5 mm).

TUBE OUTLINE DIMENSIONS

7 Pin SIP Tube



Unless otherwise stated all dimensions in inches ± 0.02 (mm ± 0.5 mm).
Tube length(7 Pin SIP):20.47(520mm ± 2 mm).

Tube Quantity:25

RoHS COMPLIANT INFORMATION

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds.

The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

REACH COMPLIANT INFORMATION

This series has proven that this product does not contain harmful chemicals, it also has harmful chemical substances through the registration, inspection and approval.