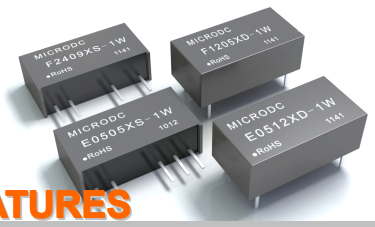
MICRODC
Professional Power Module

E-X(S)D-1W&F-X(S)D-1W Series

Isolated 1W Dual&Single Output DC/DC Converters



FEATURES

- RoHS compliant
- Efficiency up to 79%
- Power density up to 0.85W/cm^3
- Wide temperature performance at full 1 Watt load,-40°C to 85 °C
- Single and dual output
- UV 94V-0 package material
- No heatsink required
- Footprint 1.17cm^2
- Industry standard pinout
- Power sharing on dual output
- 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

E①05②05③X④ S⑤-1W⑥

①Product Series ②Input Voltage
③Output Voltage ④Fixed Input
⑤SIP Package ⑥Rated Power

APPLICATIONS

The E_X(S)D-1W&F_X(S)D-1W series of industrial temperature range DC/DC converters are the standard building blocks for on-board distributed power systems. They are ideally suited for providing local supplies on control system boards with the added benefit of 3kVDC galvanic isolation to reduce switching noise.Available in SIP and DIP with dual and single output pin out.All of the rated power may be drawn from a single pin provided the total load does not exceed 1 watt.

RoHS MICRODC Green Technology

CE REACH

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)
F0505XD-1W	5	5	200	294	68	23	4241
F0509XD-1W	5	9	111	267	75	30	3376
F0512XD-1W	5	12	84	260	77	26	2555
F0515XD-1W	5	15	67	256	78	27	1838
F0505XS-W25	5	5	50	72	70	20	1500
F0505XS-W5	5	5	100	125	80	21	1810
F0505XS-1W	5	5	200	294	68	23	4241
F0509XS-1W	5	9	111	267	75	30	3376
F0512XS-1W	5	12	84	260	77	26	2555
F0515XS-1W	5	15	67	256	78	27	1838
F1205XD-1W	12	5	200	121	69	26	2664
F1209XD-1W	12	9	111	113	74	35	2295
F1212XD-1W	12	12	84	108	77	43	1883
F1215XD-1W	12	15	67	108	77	42	1462
F1205XS-1W	12	5	200	121	69	26	2664
F1209XS-1W	12	9	111	113	74	35	2295
F1212XS-1W	12	12	84	108	77	43	1883
F1215XS-1W	12	15	67	108	77	42	1462
F1505XS-1W	15	5	200	93	67	21	2747
F1512XS-1W	15	12	84	85	75	45	1365
F1515XS-1W	15	15	67	84	77	50	941
E0505XD-1W	5	±5	±100	280	71.5	21	3106
E0509XD-1W	5	±9	±55	263	76	24	2258
E0512XD-1W	5	±12	±42	256	78	26	1579
E0515XD-1W	5	±15	±33	253	79	27	1065
E0505XS-1W	5	±5	±100	280	71.5	21	3106
E0509XS-1W	5	±9	±55	263	76	24	2258
E0512XS-1W	5	±12	±42	256	78	26	1579
E0515XS-1W	5	±15	±33	253	79	27	1065
E1205XD-1W	12	±5	±100	117	71	27	2148
E1209XD-1W	12	±9	±55	113	74	35	1705
E1212XD-1W	12	±12	±42	111	75	42	1287
E1215XD-1W	12	±15	±33	110	76	41	924
E1205XS-1W	12	±5	±100	117	71	29	2148
E1209XS-1W	12	±9	±55	113	74	35	1705
E1212XS-1W	12	±12	±42	111	75	42	1287
E1215XS-1W	12	±15	±33	110	76	41	924
E1505XS-1W	15	±5	±100	91	69	39	1941
E1512XS-1W	15	±12	±42	87	75	68	789
E1515XS-1W	15	±15	±33	84	77	84	522

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[2]	1 second
Lead temperature 1.5mm from case for 10 seconds	300℃
Internal power dissipation	560mW
Input voltage VIN,E/F05 types	7V
Input voltage VIN,E/F12 types	15V
Input voltage VIN,E/F15 types	18V

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℃ to 120℃	0.1		1	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High Vin to low Vin		1.0	1.2	%%

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
	Continuous operation,15V input types	13.5	15	16.5	V
Reflected ripple current			20	40	MA p-p

ISOLATION CHARACTERISTICS

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

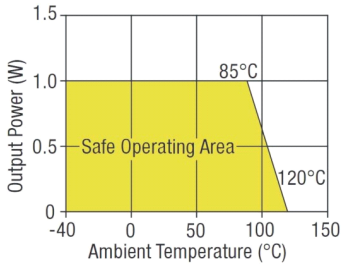
GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	5V input types		120	135	kHz
	12V input types		150	170	kHz
	15V input types		90	110	kHz

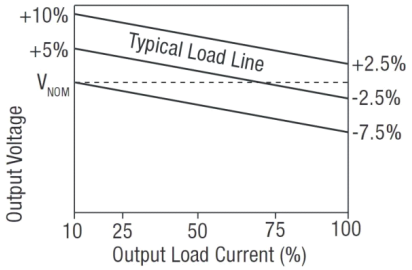
TEMPERATURE CHARACTERISTICS

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



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","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_X(S)D&F_X(S)D-1W 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?"

For a part holding no specific agency approvals, such as the E&F series ,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-amissible 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. The E_X(S)D&F_X(S)D-1W series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. 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.

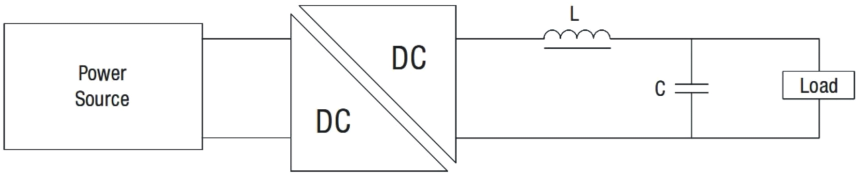
This consideration equally applies to agency recognized parts for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

OUTPUT RIPPLE REDUCTION

By using the values of inductance and capacitance stated, the output ripple at the rated load is lowered to 5mV p-p max.

Component selection
Capacitor: Ceramic chip capacitors are recommended. It is required that the ESR(Equivalent Series Resistance)should be as low as possible.X7R types are recommended. The voltage rating should be at least twice(except for 15V output),the rated output voltage of the DC/DC converter.

Inductor: The rated current of the inductor should not be less than of the output of the DC/DC converter. At the rated current, the DC resistance of the inductor should be such that the voltage drop across the inductor is <2% of the rated voltage of the DC/DC converter. The SRF(Self Resonant Frequency) should be >20MHz.



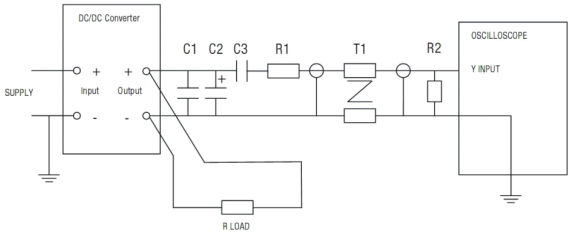
CHARACTERISATION TEST METHODS

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
C3	100nF multilayer ceramic capacitor, general purpose
R1	450Ω resistor, carbon film,+/-1% tolerance
R2	50Ω BNC termination
T1	3T of the caox 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.	

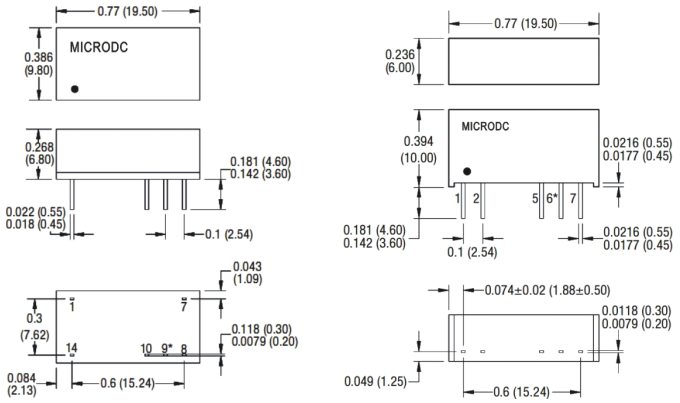
Differential Mode Noise Test Schematic



PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package | SIP package



*Pin not fitted on single output variants.

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: 2.4g (DIP) 2.1g (SIP)

PIN CONNECTIONS

SINGLE OUTPUT VARIANTS

PIN CONNECTIONS-14 PIN DIP	
pin	Function
1	-VIN
7	NC
8	+VOUT
10	-VOUT
14	+VIN

PIN CONNECTIONS-7 PIN SIP	
pin	Function
1	+VIN
2	-VIN
5	-VOUT
7	+VOUT

DUAL OUTPUT VARIANTS

PIN CONNECTIONS-14 PIN DIP	
pin	Function
1	-VIN
7	NC
8	+VOUT
9	0V
10	-VOUT
14	+VIN

PIN CONNECTIONS-7 PIN SIP	
pin	Function
1	+VIN
2	-VIN
5	-VOUT
6	0V
7	+VOUT

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package14 Pin DIP Package | 7 Pin SIP Package

*Hole not required for single output variants.

TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube | 7 Pin SIP Tube

Unless otherwise stated all dimensions in inches ±0.02(mm ±0.5mm).
Tube length(14 Pin DIP):20.47(520mm±2mm).
Tube length(7 Pin SIP):20.47(520mm±2mm).

Tube Quantity:10

MICRODC Professional Power Module

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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.