



FEATURES

- ◆RoHS compliant
- ◆Efficiency up to 79%
- ◆Power density up to 0.85W/cm³
- ◆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 1.17cm²
- ◆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

AM^①1D^②05^③05^④SH30Z^{⑤⑥}

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

APPLICATIONS

The AM1D-SH30Z&AM1D-DH30Z 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.



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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)
AM1D-0505SH30Z	5	5	200	294	68	23	4241
AM1D-0509SH30Z	5	9	111	267	75	30	3376
AM1D-0512SH30Z	5	12	84	260	77	26	2555
AM1D-0515SH30Z	5	15	67	256	78	27	1838
AM1D-1205SH30Z	12	5	200	121	69	26	2664
AM1D-1209SH30Z	12	9	111	113	74	35	2295
AM1D-1212SH30Z	12	12	84	108	77	43	1883
AM1D-1215SH30Z	12	15	67	108	77	42	1462
AM1D-1505SH30Z	15	5	200	93	67	21	2747
AM1D-1512SH30Z	15	12	84	85	75	45	1365
AM1D-1515SH30Z	15	15	67	84	77	50	941
AM1D-2405SH30Z	24	5	200	108	70	21	2667
AM1D-2409SH30Z	24	12	84	93	71	45	2298
AM1D-2412SH30Z	24	15	67	85	72	50	1883
AM1D-2415SH30Z	24	24	41	66	72	50	941
AM1D-0505DH30Z	5	±5	±100	280	71.5	21	3106
AM1D-0509DH30Z	5	±9	±55	263	76	24	2258
AM1D-0512DH30Z	5	±12	±42	256	78	26	1579
AM1D-0515DH30Z	5	±15	±33	253	79	27	1065
AM1D-1205DH30Z	12	±5	±100	117	71	29	2148
AM1D-1209DH30Z	12	±9	±55	113	74	35	1705
AM1D-1212DH30Z	12	±12	±42	111	75	42	1287
AM1D-1215DH30Z	12	±15	±33	110	76	41	924
AM1D-1505DH30Z	15	±5	±100	91	69	39	1941
AM1D-1512DH30Z	15	±12	±42	87	75	68	789
AM1D-1515DH30Z	15	±15	±33	84	77	84	522
AM1D-2405DH30Z	24	±5	±100	117	71	29	2148
AM1D-2409DH30Z	24	±9	±55	113	74	35	1705
AM1D-2412DH30Z	24	±12	±42	111	75	42	1287
AM1D-2415DH30Z	24	±15	±33	110	76	41	924

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power ¹	TA=-40°C to 120°C	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

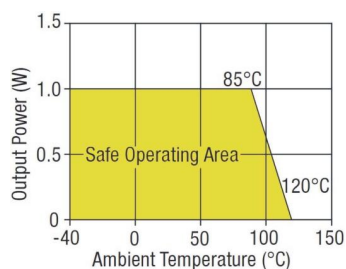
GENERAL CHARACTERISTICS

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

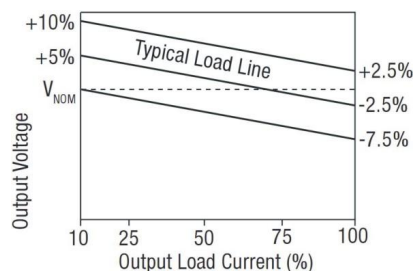
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	°C
Storage		-50		125	°C
Case Temperature above ambient	5V output types			28	°C
	All other output types			25	°C

TEMPERATURE DERATING GRAPH



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



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 AM1D-SH30Z & AM1D-DH30Z 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 AM1D-SH30Z & AM1D-DH30Z 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.

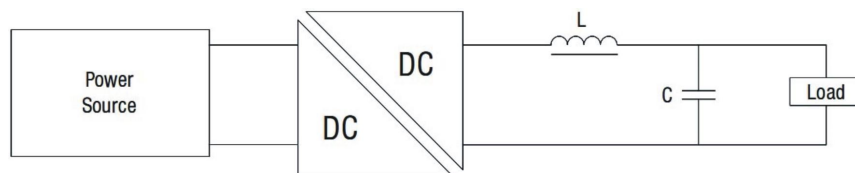
OUTPUT RIPPLE REDUCTION

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.



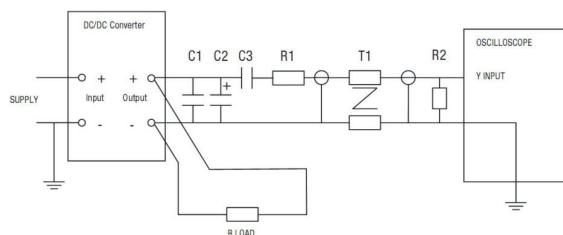
CHARACTERISATION TEST METHODS

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 coax cable through a ferrite toroid
R LOAD	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.	

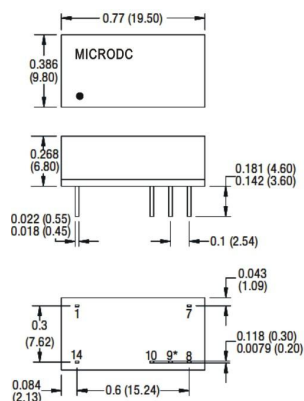
Differential Mode Noise Test Schematic



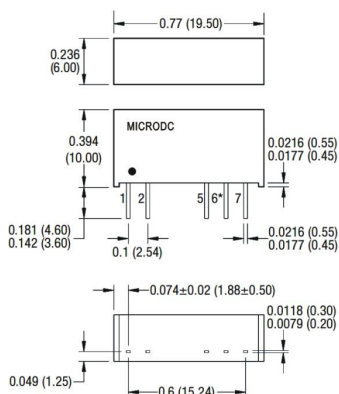
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



*Pin not fitted on single output variants.

All dimensions in inches ± 0.01 (mm ± 0.25 mm). 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

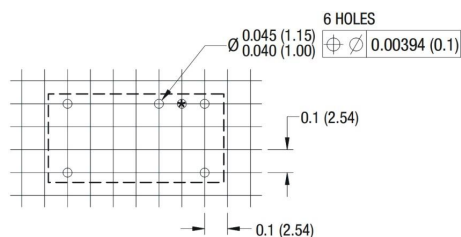
DUAL OUTPUT VARIANTS

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

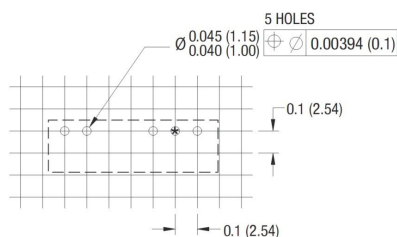
PIN CONNECTIONS-7 PIN SIP	
pin	Function
1	+VIN
2	-VIN
5	-VOUT
6	0V
7	+VOUT

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



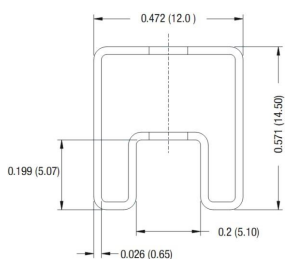
7 Pin SIP Package



*Hole not required for single output variants.

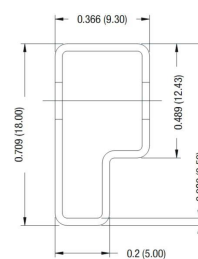
TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



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

7 Pin SIP Tube



Tube Quantity: 10

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.