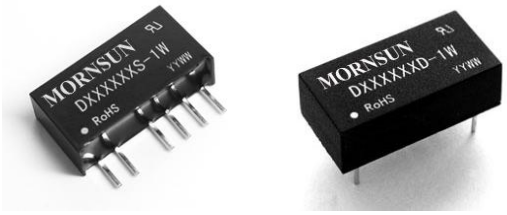
MORNSUN®

D_(N)S-1W & D_(N)D-1W Series

1W, FIXED INPUT ISOLATED & UNREGULATED TWIN OUTPUT DC-DC CONVERTER



RoHS

FEATURES

- High Efficiency up to 80%
- Small Footprint
- 1KVDC Isolation
- Temperature Range: -40°C to +85°C
- Internal SMD Construction
- No External Component Required
- Industry Standard Pinout
- RoHS Compliance
- Meet UL60950

APPLICATIONS

The D_(N)S-1W & D_(N)D-1W series are specially designed for applications where a group of polar power supplies are isolated from the input power supply in a distributed power supply system on a circuit board.

These products apply to:

1) Where the voltage of the input power supply is fixed (Voltage variation ≤ ±10%);
2) Where isolation is necessary between input and output (Isolation voltage ≤1000VDC);
3) Where the regulation of the output voltage and the output ripple noise are not demanding.

Such as: purely digital circuits, ordinary low frequency analog circuits, and IGBT power device driving circuits.

MODEL SELECTION

D050505S-1W

- Rated Power
- Package Style
- The 2nd Output Voltage
- The 1st Output Voltage
- Input Voltage
- Product Series

PRODUCT PROGRAM

Part number	Input		output			Efficiency (%, Typ.)	Certificate
	Voltage (VDC)		Voltage (VDC)	Current (mA)			
	Nominal	Range		Max.	Min.		
D050505(N)S-1W	5	4.5-5.5	5/5	100/100	10/10	70	UL
~~D050909(N)S-1W~~			~~9/9~~	~~56/56~~	~~6/6~~	~~76~~	~~UL~~
D051212S-1W			12/12	42/42	4/4	77	UL
D051515(N)S-1W			15/15	33/33	3/3	78	UL
D050505D-1W			5/5	100/100	10/10	70	UL
D050909D-1W			9/9	56/56	6/6	76	UL
D051212D-1W			12/12	42/42	4/4	77	UL
~~D051515D-1W~~			~~15/15~~	~~33/33~~	~~3/3~~	~~78~~	~~UL~~
D120505(N)S-1W	12	10.8-13.2	5/5	100/100	10/10	72	UL
D120909S-1W			9/9	56/56	6/6	78	UL
D121212(N)S-1W			12/12	42/42	4/4	78	UL
D121515S-1W			15/15	33/33	3/3	80	UL
D120505(N)D-1W			5/5	100/100	10/10	72	UL
D120909ND-1W			9/9	56/56	6/6	78	UL
D240505(N)S-1W	24	21.6-26.4	5/5	100/100	10/10	71	UL
D240909(N)S-1W			9/9	56/56	6/6	74	UL
D241212S-1W			12/12	42/42	4/4	76	UL
D241515(N)S-1W			15/15	33/33	3/3	76	UL
D240505D-1W			5/5	100/100	10/10	71	UL
D240909(N)D-1W			9/9	56/56	6/6	74	UL
D241212D-1W			12/12	42/42	4/4	76	UL
D241515D-1W			15/15	33/33	3/3	76	UL

Note:
1.Models listed with strike-through text have been officially discontinued.
2. D_NS/ND-1W series: No UL

COMMON SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Units
Storage humidity				95	%
Operating temperature		-40		85	°C
Storage temperature		-55		125	
Lead temperature	1.5mm from case for 10 seconds			300	
Temp. rise at full load			15	25	
Short circuit protection*				1	s
Cooling		Free air convection			
Case material		Plastic (UL94-V0)			
MTBF		3500			k hours
Weight	D_(N)S-1W series		2.1		g
	D_(N)D-1W series		2.5		

*Supply voltage must be discontinued at the end of short circuit duration.

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ISOLATION SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Units
Isolation voltage	Tested for 1 minute and 1mA max(Vin/Vout)	1000			VDC
	Tested for 1 minute and 1mA max(Vo1/Vo2)	1000			
Isolation resistance	Test at 500VDC (Vin/Vout)	1000			MΩ
	Test at 500VDC (Vo1/Vo2)	1000			
Isolation capacitance	(Vin/Vout)		130		pF
	(Vo1/Vo2)		130		

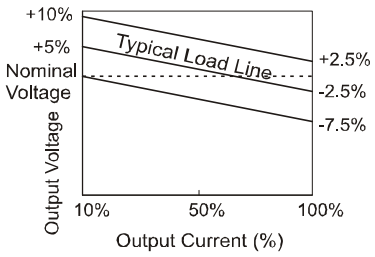
OUTPUT SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Units
Output power		0.1		1	W
Line regulation	For Vin change of ±1%			±1.2	%
Load regulation	10% to 100% load (5V output)		12.8	15	
	10% to 100% load (9V output)		8.3	15	
	10% to 100% load (12V output)		6.8	15	
	10% to 100% load (15V output)		6.3	15	
Output voltage accuracy		See tolerance envelope graph			
Temperature drift	100% full load			±0.03	%/℃
Ripple & Noise*	20MHz Bandwidth		50	75	mVp-p
Switching frequency	Full load, nominal input		100		kHz

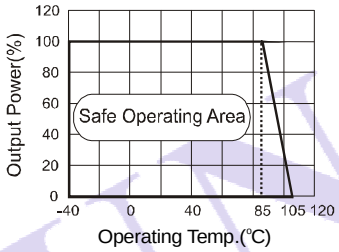
*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

TYPICAL CHARACTERISTICS

Tolerance Envelope Graph



Temperature Derating Graph



APPLICATION NOTE

1) Requirement on output load

To ensure this module can operate efficiently and reliably, a minimum load is specified for this kind of DC/DC converter in addition to a maximum load (namely full load). During operation, make sure the specified range of input voltage is not exceeded, the minimum output load ***could not be less than 10% of the full load***. If the actual output power is very small, please connect a resistor with proper resistance at the output end in parallel to increase the load, or use our company's products with a lower rated output power.

2) Recommended testing and application circuit

If you want to further decrease the input/output ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 1).

It should also be noted that the inductance and the frequency of the "LC" filtering network should be staggered with the DC/DC frequency to avoid mutual interference. However, the capacitance of the output filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor sees (Table 1).

3) Output Voltage Regulation and Over-voltage Protection Circuit

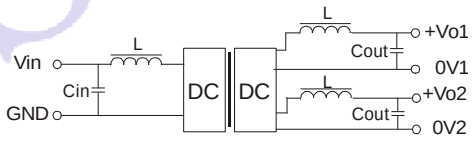
The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (Figure 2).

4) Overload Protection

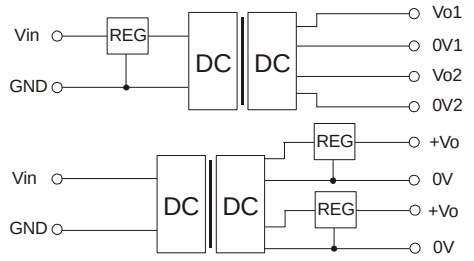
Under normal operating conditions, the output circuit of these products has no protection against over-current and short-circuits. The simplest method is to connect a self-recovery fuse in series at the input end or add a circuit breaker to the circuit.

5) No parallel connection or plug and play

RECOMMENDED CIRCUIT



(Figure 1)



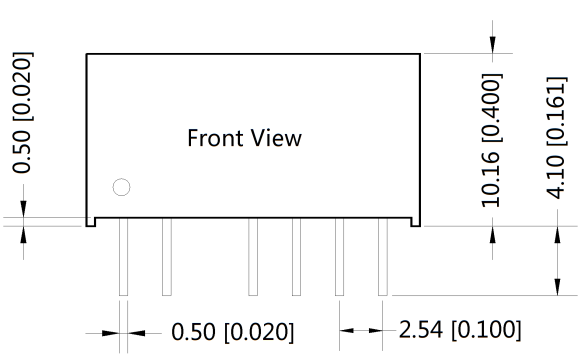
(Figure 2)

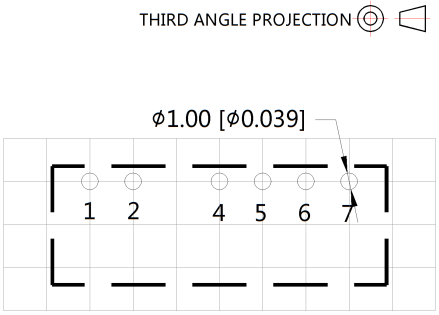
EXTERNAL CAPACITOR TABLE (TABLE 1)

Vin (VDC)	Cin (μF)	Vout(VDC)	Cout (μF)
5	4.7	5	4.7
12	2.2	9	2.2
24	1	12	1
--	--	15	0.47

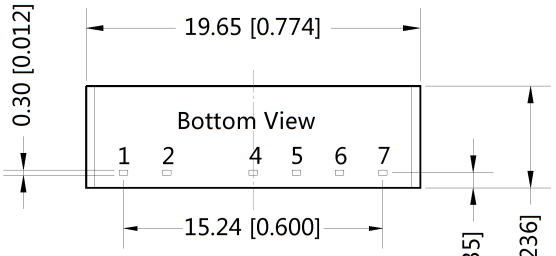
It's not recommended to connect any external capacitor in the application field with less than 0.5 watt output.

OUTLINE DIMENSIONS & PIN CONNECTIONS D_(N)S-1W





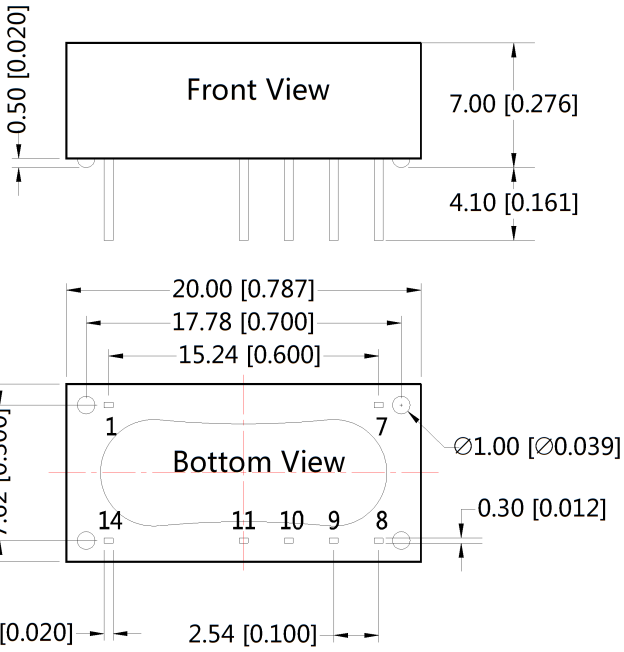
Note : Grid 2.54*2.54mm

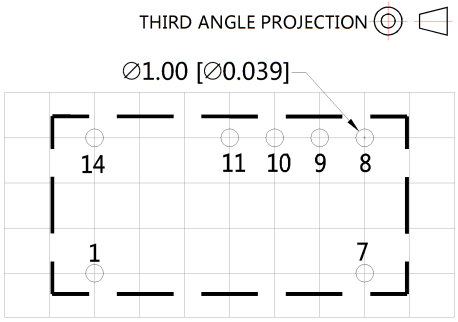


Note:
Unit:mm[inch]
Pin section tolerances:±0.10[±0.004]
General tolerances:±0.25[±0.010]

Pin-Out		
Pin	D_S-1W	D_NS-1W
1	Vin	Vin
2	GND	GND
4	0V1	+Vo1
5	+Vo1	0V1
6	0V2	+Vo2
7	+Vo2	0V2

OUTLINE DIMENSIONS & PIN CONNECTIONS D_(N)D-1W





Note : Grid 2.54*2.54mm

Note:
Unit :mm[inch]
Pin section tolerances :±0.10[±0.004]
General tolerances:±0.25[±0.010]

Pin-Out		
Pin	D_D-1W	D_ND-1W
1	GND	GND
7	NC	NC
8	+Vo2	0V2
9	0V2	+Vo2
10	+Vo1	0V1
11	0V1	+Vo1
14	Vin	Vin

NC:No connection

Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed, and that will reduce the life of product.
2. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
3. Only typical models listed, other models may be different, please contact our technical person for more details.
4. In this datasheet, all the test methods of indications are based on corporate standards.