FEATURES

- SMT Technology
- High Power Density
- Efficiency up to 85%
- 1500VDC I/O Isolation
- Short Circuit Protection
- Remote ON/OFF Control
- MTBF > 1,000,000 Hours
- Industry Standard Pin-out
- 2:1 Wide Input Voltage Range
- EMI Complies with EN55022 Class A
- Operating Temperature: -40°C to +71°C

DESCRIPTION

The MSKW series of DC/DC converters provide a maximum of 5 watts in a "gull-wing" SMT package. These converters operate over 2:1 wide input voltage ranges of 9-18, 18-36, or 36-75VDC. This series also has single output voltages of 3.3, 5, 12, and 15VDC and dual output voltages of ±5, ±12, and ±15VDC. These converters have a typical full load efficiency of 85%, remote ON/OFF, and continuous short circuit protection. The -40°C~+71°C operating temperature make these converters ideal for data communication equipment, mobile battery driven equipment, process/machine control equipment, telecommunication equipment, computer peripheral systems, distributed power systems, mixed analog/digital subsystems, and industrial robot systems. The EN55022 Class A conducted noise compliance minimizes design time, cost, and eliminates the need for external filter components.

SPECIFICATIONS: *MSKW Series*

All specifications are based on 25°C, Nominal Input Voltage, and Maximum Output Current unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS	Min	Nom	Max	Unit
INPUT (V_{in})					
Input Voltage Range	12V nominal input models	9	12	18	VDC
	24V nominal input models	18	24	36	
	48V nominal input models	36	48	75	
Start Voltage	12V nominal input models	7.5	8	9	VDC
	24V nominal input models	14	16	18	
	48V nominal input models	30	33	36	
Under Voltage Shutdown	12V nominal input models	6.5	7	8	VDC
	24V nominal input models	13	15	17	
	48V nominal input models	28	31	34	
Input Surge Voltage (1000ms)	12V nominal input models	-0.7		25	VDC
	24V nominal input models	-0.7		50	
	48V nominal input models	-0.7		100	
Reverse Polarity Input Current	All models			1	A
Input Filter	All models	Pi Filter			
Reflected Ripple Current		See Rating Chart			
Short Circuit Input Power	All models		1000	3000	mW
OUTPUT (V_o)					
Output Voltage		See Rating Chart			
Output Voltage Accuracy			±0.5	±1.0	%
Output Voltage Balance	Dual Output, Balanced Loads		±0.5	±2.0	%
Load Regulation	Io = 20% to 100%		±0.3	±1.0	
Line Regulation	Vin = min. to max.		±0.1	±0.3	%
Output Power				5	W
Output Current		See Rating Chart			
Ripple & Noise (20MHz)			50	85	mV_{pk-pk}
Ripple & Noise (20MHz)	Over Line, Over Load, and Over Temperature			100	mV_{pk-pk}
Ripple & Noise (20MHz)				15	mVrms
Transient Response Deviation	25% Load Step Change		±2	±6	%
Transient Recovery Time	25% Load Step Change		250	500	µs
REMOTE ON/OFF CONTROL					
Supply On		2.5 to 5.5VDC or open circuit			
Supply Off		-0.7		0.8	VDC
Device Standby Input Current				10	mA
Control Input Current (ON)	Vin = min to max			-200	µA
Control Input Current (OFF)	Vin = min to max			-300	µA
Control Common		Referenced to negative input			
PROTECTION					
Short Circuit Protection		continuous			
Over Power Protection		115	140	165	%
Input Fuse Recommendation	12V nominal input models	1500mA slow-blow type			
	24V nominal input models	700mA slow-blow type			
	48V nominal input models	350mA slow-blow type			
GENERAL					
Efficiency		See Rating Chart			
Switching Frequency		200	260	350	KHz
Isolation Voltage Rated	60 seconds	1500			VDC
Isolation Voltage Test	Flash Test for 1 second	1650			VDC
Isolation Resistance	500VDC	1000			MΩ
Isolation Capacitance	100KHz, 1V		650	750	pF
Internal Power Dissipation				2500	mW
Max. Capacitive Load		See Rating Chart			

SPECIFICATIONS *(CONTINUED)*

All specifications are based on 25°C, Nominal Input Voltage, and Maximum Output Current unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS	Min	Nom	Max	Unit
ENVIRONMENTAL					
Operating Temperature (Ambient)		-40		+71	°C
Operating Temperature (Case)		-40		+90	°C
Storage Temperature		-40		+125	°C
Lead Temperature	1.5mm from case for 10 seconds			260	°C
Humidity				95	%
Cooling		Free air convection			
Temperature Coefficient			±0.01	±0.02	%/°C
Moisture Sensitivity Level (MSL) Temperature	IPC/JEDEC J-STD-20	Level 2			
MTBF	MIL-HDBK-217F @ 25°C, Ground Benign	1000			Khours
Conducted EMI		EN55022 Class A			
PHYSICAL					
Weight		14 grams			
Dimensions (L x W x H)		1.31 x 0.81 x 0.40 inches 33.4 x 20.6 x 10.2 mm			
Case Material		Non-conductive black plastic			
Flammability		UL94V-0			

OUTPUT VOLTAGE / CURRENT RATING CHARTS

SINGLE OUTPUT MODELS

Model Number	Input Voltage	Output Voltage	Output Current		Input Current		Reflected Ripple Current	Efficiency (Typ)	Maximum Capacitive Load
			Min	Max	No Load	Max Load			
MSKW12S33W4	12 VDC (9 ~ 18 VDC)	3.3 VDC	120mA	1200mA	45mA	434mA	25mA	76%	680µF
MSKW12S5W5		5 VDC	100mA	1000mA		521mA		80%	680µF
MSKW12S12W5		12 VDC	41.7mA	417mA		502mA		83%	680µF
MSKW12S15W5		15 VDC	33.3mA	333mA		502mA		83%	680µF
MSKW24S33W4	24 VDC (18 ~ 36 VDC)	3.3 VDC	120mA	1200mA	15mA	212mA	15mA	78%	680µF
MSKW24S5W5		5 VDC	100mA	1000mA		254mA		82%	680µF
MSKW24S12W5		12 VDC	41.7mA	417mA		245mA		85%	680µF
MSKW24S15W5		15 VDC	33.3mA	333mA		245mA		85%	680µF
MSKW48S33W4	48 VDC (36 ~ 75 VDC)	3.3 VDC	120mA	1200mA	6mA	106mA	10mA	78%	680µF
MSKW48S5W5		5 VDC	100mA	1000mA		127mA		82%	680µF
MSKW48S12W5		12 VDC	41.7mA	417mA		123mA		85%	680µF
MSKW48S15W5		15 VDC	33.3mA	333mA		122mA		85%	680µF

DUAL OUTPUT MODELS

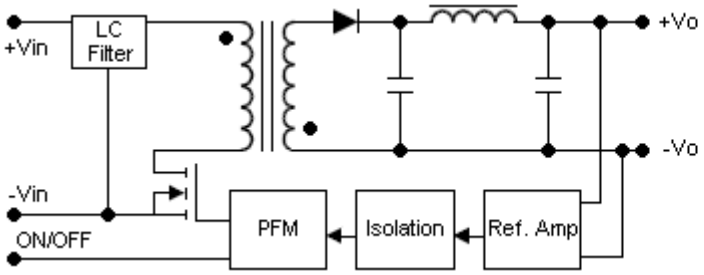
Model Number	Input Voltage	Output Voltage	Output Current		Input Current		Reflected Ripple Current	Efficiency (Typ)	Maximum Capacitive Load
			Min	Max	No Load	Max Load			
MSKW12D5W5	12 VDC (9 ~ 18 VDC)	±5 VDC	±50mA	±500mA	45mA	521mA	25mA	80%	100µF
MSKW12D12W5		±12 VDC	±20.8mA	±208mA		501mA		83%	100µF
MSKW12D15W5		±15 VDC	±16.7mA	±167mA		503mA		83%	100µF
MSKW24D5W5	24 VDC (18 ~ 36 VDC)	±5 VDC	±50mA	±500mA	15mA	254mA	15mA	82%	100µF
MSKW24D12W5		±12 VDC	±20.8mA	±208mA		245mA		85%	100µF
MSKW24D15W5		±15 VDC	±16.7mA	±167mA		246mA		85%	100µF
MSKW48D5W5	48 VDC (36 ~ 75 VDC)	±5 VDC	±50mA	±500mA	6mA	127mA	10mA	82%	100µF
MSKW48D12W5		±12 VDC	±20.8mA	±208mA		122mA		85%	100µF
MSKW48D15W5		±15 VDC	±16.7mA	±167mA		123mA		85%	100µF

NOTES

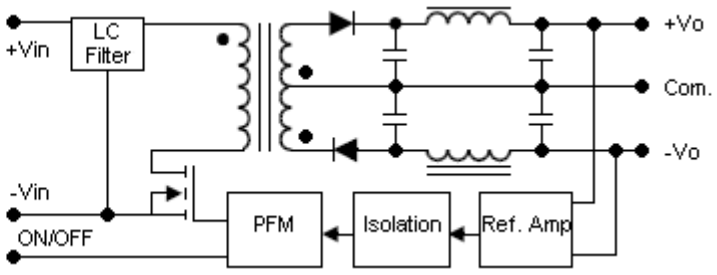
1. Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
2. The MSKW series requires a minimum output loading to maintain specified regulations. Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.
3. All DC/DC converters should be externally fused at the front end for protection.
4. Other input and output voltages may be available, please contact factory.
5. It is not recommended to use the water-washing process on SMT units.

BLOCK DIAGRAMS

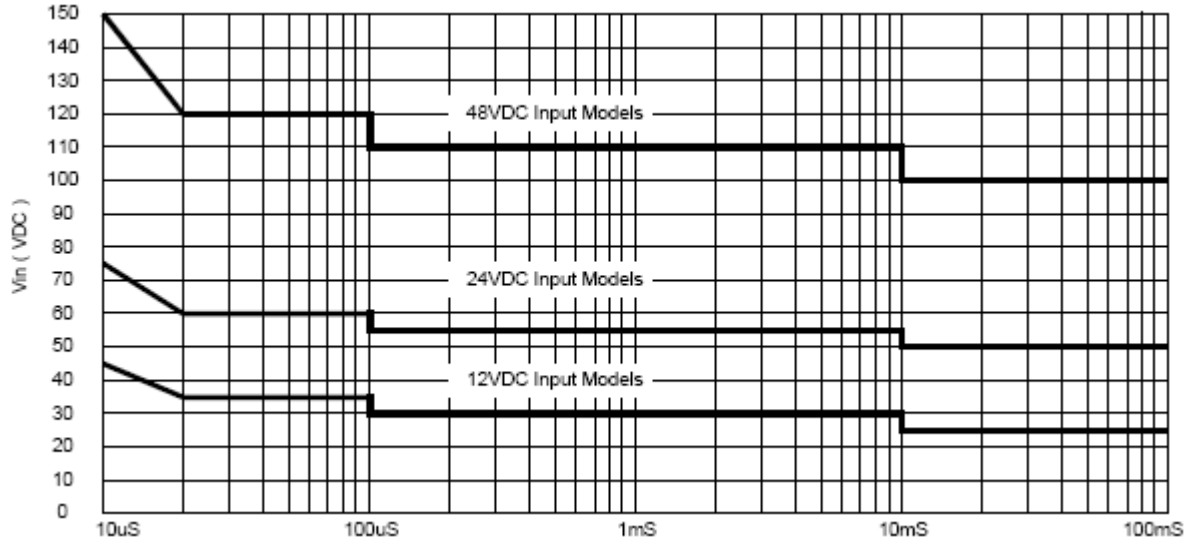
Single Output



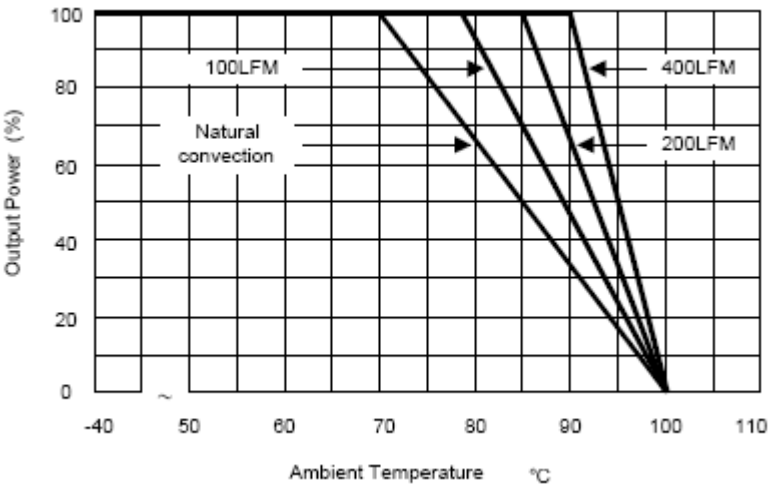
Dual Output



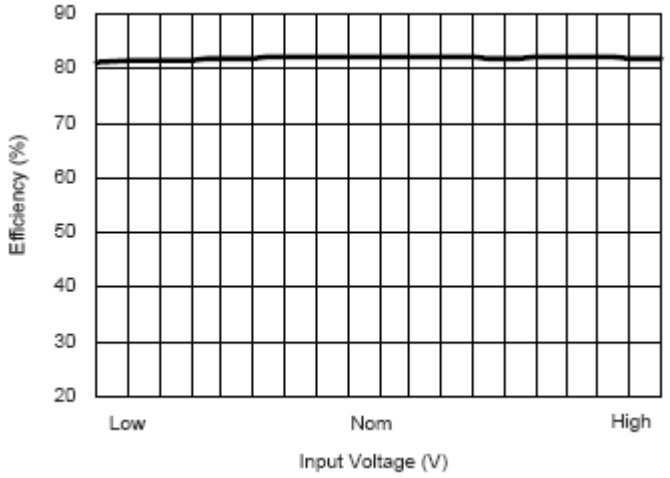
INPUT VOLTAGE TRANSIENT RATING



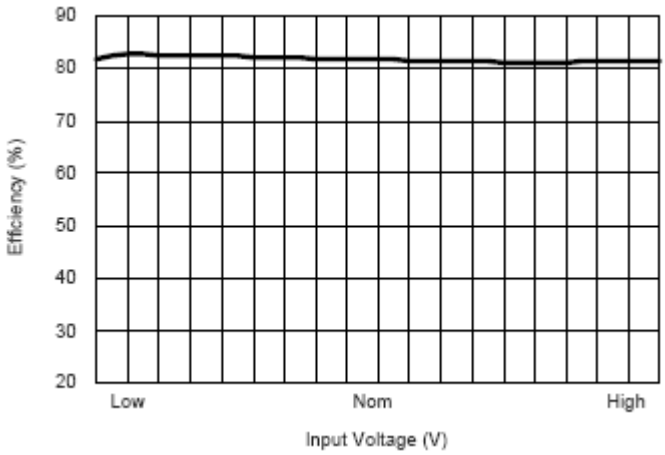
DERATING CURVE



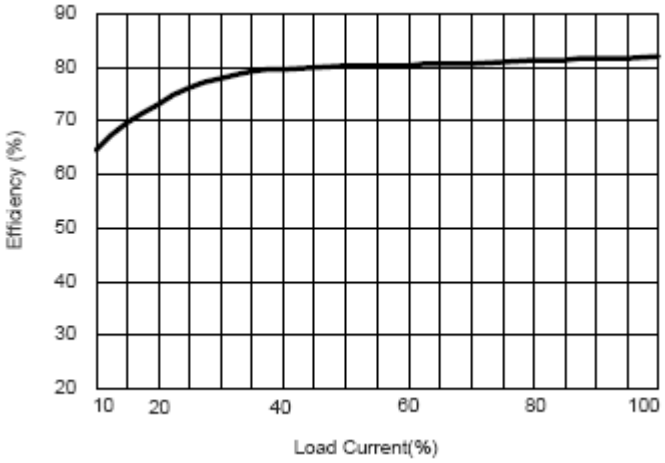
Efficiency vs Input Voltage (Single Output)



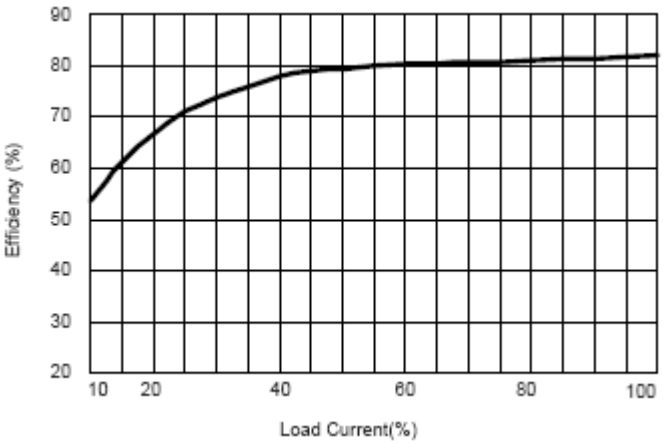
Efficiency vs Input Voltage (Dual Output)



Efficiency vs Output Load (Single Output)

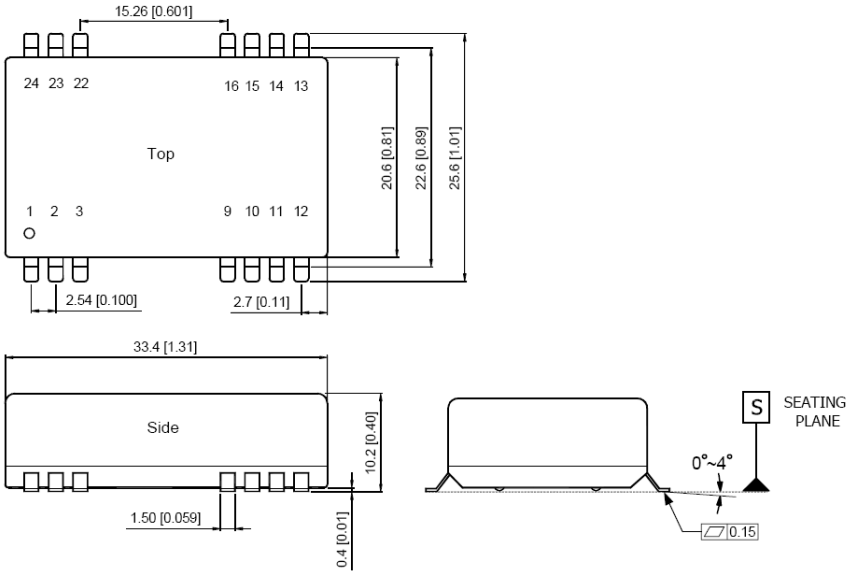


Efficiency vs Output Load (Dual Output)



MECHANICAL DRAWING

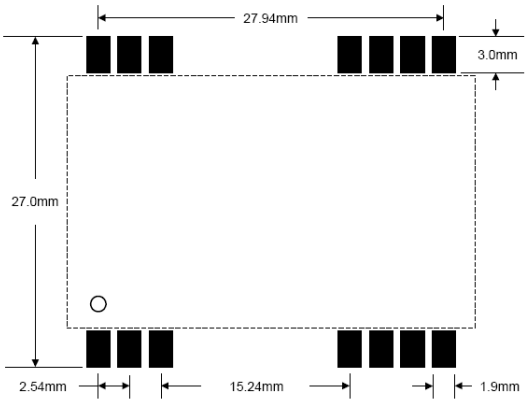
Unit: mm [inches]



1. Tolerance: X.X±0.25 [X.XX±0.01]
   X.XX±0.13 [X.XXX±0.005]
2. Pin: ±0.05 [±0.002]

CONNECTING PIN PATTERNS

Top View (2.54mm / 0.1 inch grids)



PIN CONNECTIONS		
PIN	**Single Output**	**Dual Output**
1	Remote On/Off	Remote On/Off
2	-Vin	-Vin
3	-Vin	-Vin
9	NC	Common
10	NC	NC
11	NC	-Vout
12	NC	NC
13	NC	NC
14	+Vout	+Vout
15	NC	NC
16	-Vout	Common
22	+Vin	+Vin
23	+Vin	+Vin
24	NC	NC

NC: No Connection

DESIGN & FEATURE CONSIDERATONS

Over Current Protection

To provide protection in a fault (output over load) condition the unit is equipped with internal current limiting circuitry and can endure current limiting for an unlimited duration. At the point of current limit inception the unit shifts from voltage control to current control. The unit operates normally once the output current is brought back to its specified range.

Input Source / Remote On/Off

Positive logic remote on/off turns the module ON during a logic high voltage on the remote on/off pin, and turns the module OFF during a logic low voltage on the remote on/off pin. To turn the power module ON and OFF, the user must supply a switch to control the voltage between the on/off terminal and the -Vin terminal. The switch can be an open collector or equivalent.

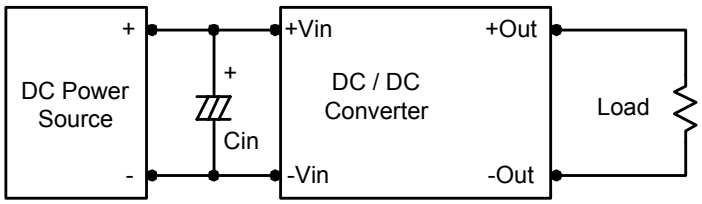
A logic low is –0.7V to 0.8V.

A logic high is 2.5V to 5.5V.

The maximum sink current of the switch at the on/off terminal during a logic low is 300μA. The maximum sink current of the switch at the on/off terminal = 2.5 to 5.5V is 200μA or open.

Input Source Impedance

The power module should be connected to a low ac-impedance input source. Highly inductive source impedances can affect the stability of the power module. In applications where power is supplied over long lines and output loading is high, it may be necessary to use a capacitor at the input to ensure startup. A capacitor mounted close to the power module helps ensure stability of the unit, it is recommended to use a good quality low Equivalent Series Resistance (ESR < 1.0Ω at 100KHz) capacitor of 3.3μF for the 12V input models and a 2.2μF for the 24V and 48V input models.



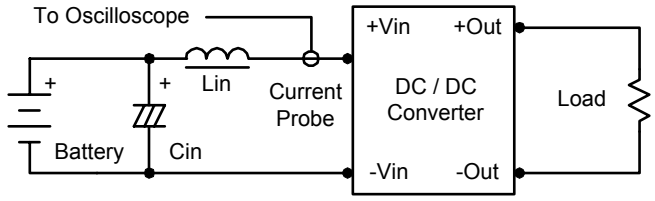
Maximum Capacitive Load

The MSKW series has a limit of maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time. For optimal performance we recommend 100μF maximum capacitive load for dual outputs and 680μF capacitive load for single outputs. The maximum capacitance can be found in the Output Voltage / Current Rating Chart.

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor Lin (4.7μH) and Cin (220μF, ESR < 1.0Ω at 100KHz) to simulate source impedance.



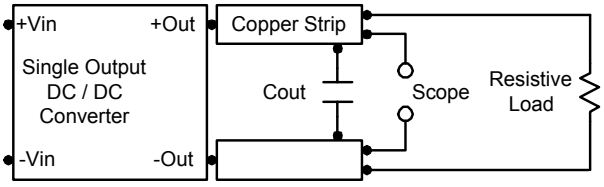
Capacitor Cin offsets possible battery impedance.

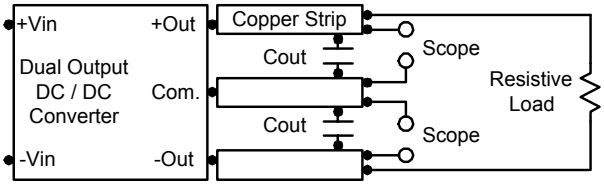
Current ripple is measured at the input terminals of the module. Measurement bandwidth is 0 ~ 500KHz.

Peak-to-Peak Output Noise Measurement Test

Use a Cout 0.47µF ceramic capacitor.

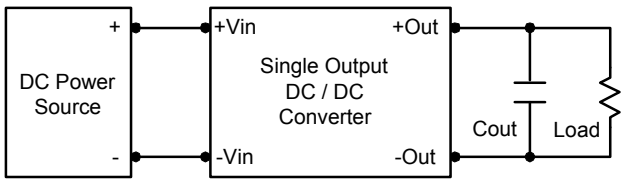
Scope measurement should be made by using a BNC socket; measurement bandwidth is 0 ~ 20MHz. Position the load between 50mm and 75mm from the DC/DC Converter.

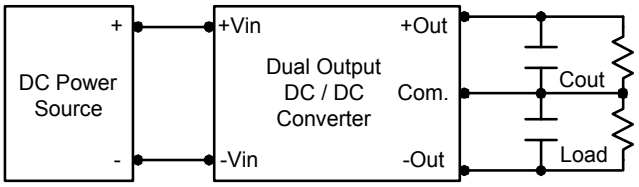




Output Ripple Reduction

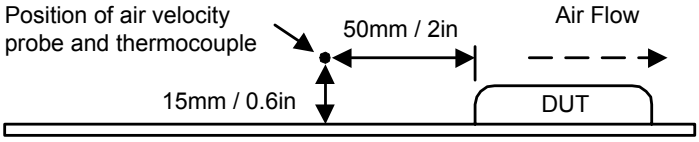
A good quality low ESR capacitor placed as close as possible across the load will give the best ripple and noise performance. To reduce output ripple, it is recommended to use 3.3µF capacitors at the output.





Thermal Considerations

Many conditions affect the thermal performance of the power module, such as orientation, airflow over the module, and board spacing. To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 90°C. The derating curves are determined from measurements obtained in an experimental apparatus.



COMPANY INFORMATION:

Wall Industries, Inc. has created custom and modified units for over 40 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on time and on budget. Our ISO9001-2000 certification is just one example of our commitment to producing a high quality, well-documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

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