

DATA SHEET



SM40-2412D40

40.0 W 4:1 Wide Input Dual Output Regulated DC/DC converter



Note: This data sheet only for reference.

ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED.

OUTPUT SPECIFICATIONS		GENERAL SPECIFICATIONS	
Output Voltage	±12Vdc, ±1%	Efficiency	87%, Min
Maximum Output Current	±1650mA	I/O Isolation Voltage(3 sec)	
Line Regulation	±0.5%, max	Input/Output	1600Vdc
Load Regulation(I _o =1% to 100%)	±1.0%, max	Case/Input & Output	1600Vdc
Cross Regulation (Dual Output) (1)	±5%	Isolation Resistance	1000 MΩ, min
Ripple&Noise (2)	±150mVp-p, max	Isolation Capacitance	2500 pF, Max
Over Voltage Protection (Zener diode clamp)	±15V	Switching frequency	270kHz, typ
Over Load Protection	130% of FL, typ	Humidity	95% rel H
Short Circuit Protection	Indefinite(hiccup) (Automatic Recovery)	Reliability Calculated MTBF(MIL-HDBK-217 F)	>151 khrs
Temperature Coefficient	±0.02%/°C	Safety Standard (designed to meet)	IEC/EN 60950-1
Capacitive Load (3)	±1200uF, max	PHYSICAL SPECIFICATIONS	
Transient Recovery Time (4)	250us, typ	Case Material	Nickel-coated Copper
Transient Response Deviation(4)	±3%, max	Base Material	Non-conductive Black Plastic(UL94V-0 rated)
INPUT SPECIFICATIONS		Pin Material	Ø1.0mm Brass Solder-coated
Input Voltage Range	9Vdc~36Vdc	Potting Material	Epoxy (UL94V-0 rated)
Under Voltage Lockout		Weight	60.0g
Module ON / OFF	8.6Vdc /7.9Vdc, typ	Dimensions	2.00"x2.00"x0.40"
Start up Time (Nominal Vin and constant resistive load)	20mS, typ	EMC CHARACTERISTICS	
Input Filter	Pi Type	Radiated Emissions(7)	EN55022 CLASS A
Input Current(No-Load)	60mA, max	Conducted Emissions(7)	EN55022 CLASS A
Input Current(Full-Load)	1896mA, typ	ESD	EN61000-4-2 Perf. Criteria A
Input Reflected Ripple Current(5)	20mA _{p-p} , typ	RS	EN61000-4-3 Perf. Criteria A
Remote On/Off(6)		EFT(8)	EN61000-4-4 Perf. Criteria A
ON: 3.0 ... 12Vdc or open circuit		Surge (8)	EN61000-4-5 Perf. Criteria A
OFF: 0 ... 1.2Vdc or short circuit pin2 and pin 3		CS	EN61000-4-6 Perf. Criteria A
OFF idle current: 5 mA, typ		PFMF	EN61000-4-8 Perf. Criteria A
ENVIRONMENTAL SPECIFICATIONS		In the preparations for certification	
Operating Ambient Temperature	-40°C ~ +85°C(See Derating Curve) -40°C ~ +55°C(For 100% load)	ABSOLUTE SPECIFICATIONS (9)	
Maximum Case Temperature	105°C	These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Over Temperature Protection (case)	110°C	Input Voltage(100mS)	-0.7~50 Vdc
Storage Temperature	-40°C ~ +125°C	Soldering Temperature	260°C max
Cooling	Nature Convection	(1.5mm from case 10 sec. Max.)	

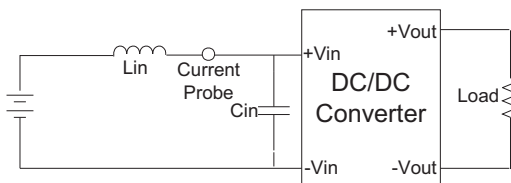
NOTE

1. One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
2. Measured with 20MHz bandwidth and 1.0uF ceramic capacitor.
3. Tested by minimal Vin and constant resistive load.
4. Tested by normal Vin and 25% load step change (75%-50%-25% of I_o).
5. Measured Input reflected ripple current with a simulated source inductance of 12uH.
6. The remote on/off control pin is referenced to -Vin(pin2).
7. Input filter components (C1,C3,C4, L) are used to help meet conducted and radiated emissions requirement for the module, which application refer to the EMI Filter of design & feature configuration..
These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.
8. An external filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5.
The filter capacitor SCHMID-M suggest: Nippon chemi-con KY series, 220uF/100V.
9. Exceeding the absolute ratings of the unit could cause damage.
It is not allowed for continuous operating.

TEST CONFIGURATIONS

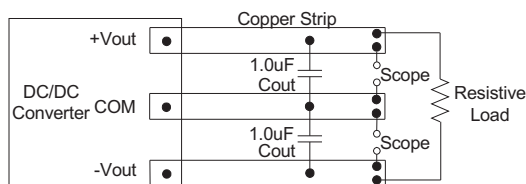
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor L_{in} (12 μ H) and a source capacitor C_{in} (47 μ F, ESR < 1.0 Ω at 100KHz) at nominal input and full load.



Output Ripple & Noise Measurement Test

Use a capacitor C_{out} (1.0 μ F) measurement. The Scope measurement bandwidth is 0-20MHz.

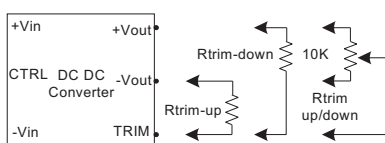


DESIGN & FEATURE CONFIGURATIONS

Output Voltage Trim

Output voltage trim function allows the user to increase or decrease the output voltage set point, the module may be connected with an external resistor (R_{trim}) between TRIM pin and either +Vout or -Vout. By adjusting R_{trim} , the output voltage can be changed by $\pm 10\%$ of nominal the output voltage.

A 10K, 1 or 10 turn trimpot is usually specified for continuous trimming. The TRIM pin should be left open if the function is not used. When using the TRIM function, the output voltage of the module is usually increased, which increases the output power of the module with the same output current. Care should be taken ensure that The maximum output power of the module remains at or below the maximum rated power.

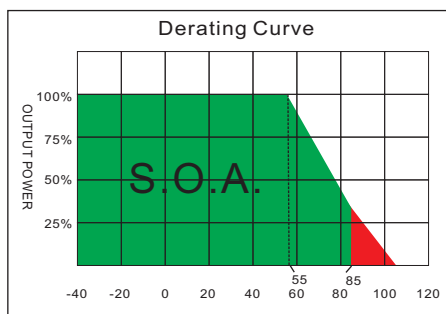


Trim down	-5	-10	%
Vout=	22.80	21.60	Volts
Rtrim-down	29.116	3.122	KOhms

Trim up	+5	+10	%
Vout=	25.20	26.40	Volts
Rtrim-up	30.309	6.085	Kohms

Thermal Derating

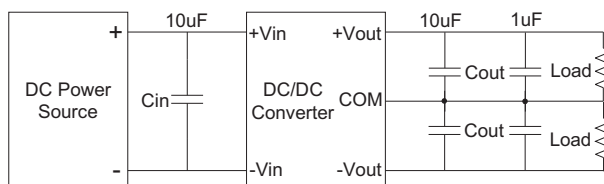
To enhance the system reliability, the power module should always be operated below the maximum operating temperature. If the temperature exceed the maximum operating temperature, Reliability of the unit may be affected.



DESIGN & FEATURE CONFIGURATIONS

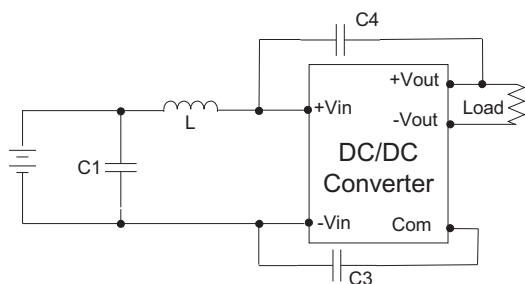
Output Ripple & Noise Reduction

To reduce ripple and noise, it is recommended to use a 10uF ceramic disk capacitor and a 10uF electrolytic capacitor to at the output.



EMI Filter

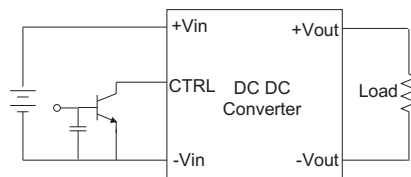
Input filter components (C1,C3,C4, L) are used to help meet conducted and radiated emissions requirement for the module. These components should be mounted as close as possible to the module; And all leads should be minimized to decrease radiated noise.



	C1	L	C3,C4
SM40A-24XXXXXX	100uF, 100V	12uH	1206,1000PF, 2KV
SM40A-48XXXXXX	100uF, 100V	12uH	1206,1000PF, 2KV

CTRL Module ON / OFF

Positive logic turns on the module during high logic and off during low logic. Ctrl module on/off can be controlled by an external switch between the ctrl terminal and -Vin terminal. The switch can be an open collector or open drain. For positive logic if the ctrl feature is not used, please leave the ctrl pin floating.



Over Voltage Protection

The module includes an internal output over voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over voltage set point, the module will activate the control loop of internal circuit to clamp the output voltage.

Over Current Protection

The module includes an internal over current protection circuit, which will endure current limiting for an unlimited duration during output over load condition. If the output current exceeds the OCP set point, the module will shut down automatically (hiccup). The module will try to restart after shut down. If the over load condition still exists, the module will shut down again.

ELECTRICAL CHARACTERISTIC CURVES

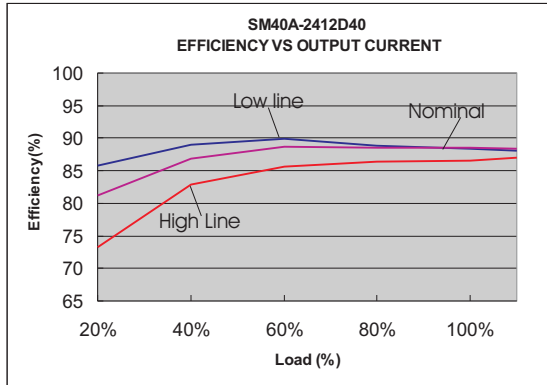


Figure 1: Efficiency vs. load current for minimal, nominal, and maximum input voltage at 25°C.

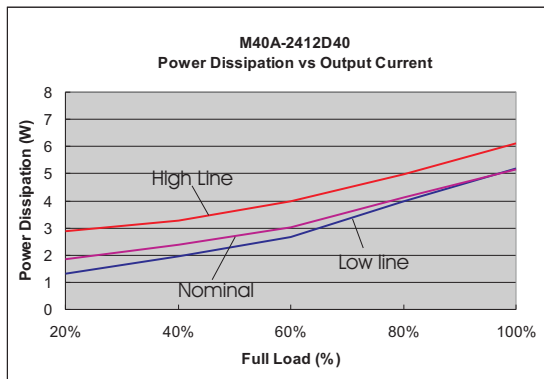


Figure 2: Power dissipation vs. load current for minimal, nominal, and maximum input voltage at 25°C.

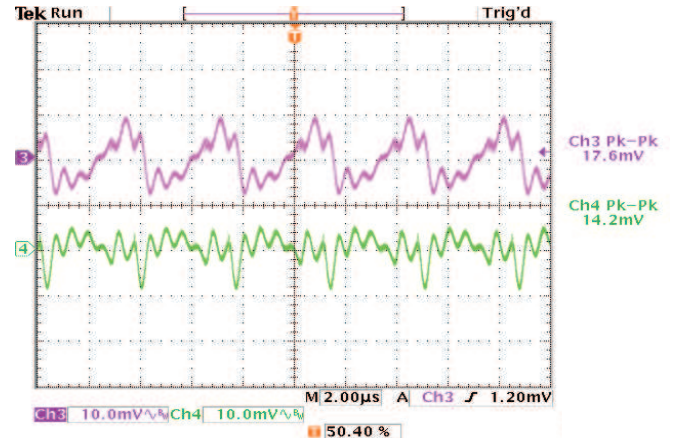


Figure 3: Output voltage ripple at nominal input voltage and rated load current ($I_o = \pm 1.65A$) (10mV/div, 2µs/div)
Load capacitance: 1.0µF ceramic capacitor.
Bandwidth: 20MHz.

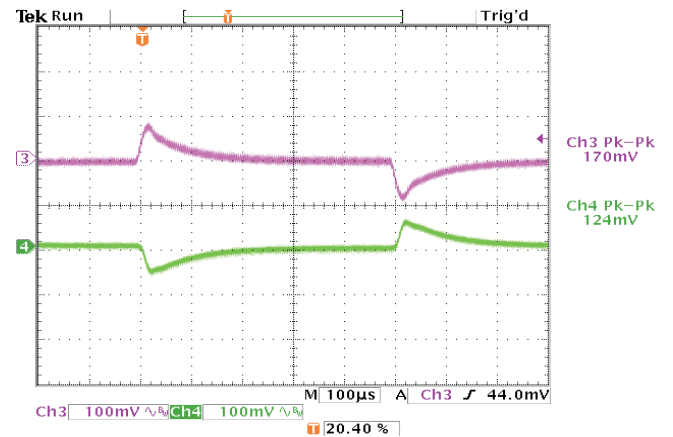
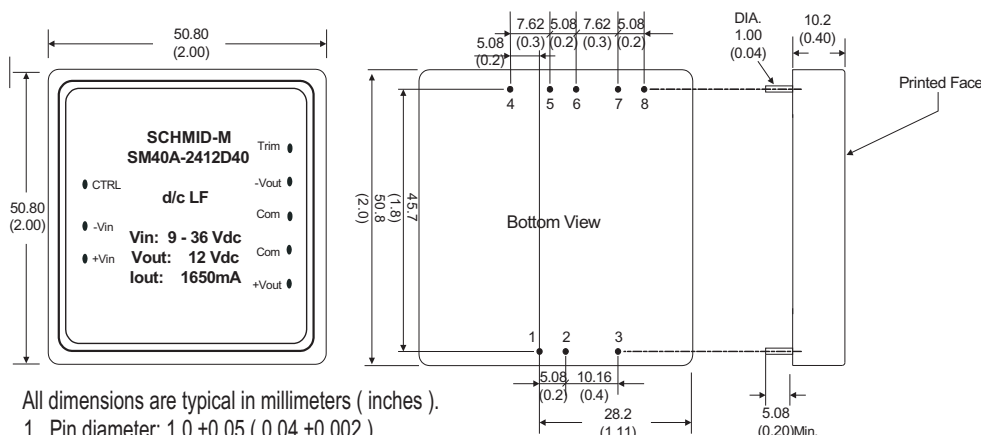


Figure 4: Output voltage response to step-change in load current (50%-75%-50% of I_{out} , max).
Load capacitance: 1µF ceramic capacitor.
Bandwidth: 20MHz.

MECHANICAL DIMENSION



All dimensions are typical in millimeters (inches).
 1. Pin diameter: 1.0 ± 0.05 (0.04 ± 0.002)
 2. Pin pitch tolerance: ± 0.35 (± 0.014)
 3. Case Tolerance: ± 0.5 (± 0.02)

PIN #	DESCRIPTION
1	+Vin
2	-Vin
3	CTRL
4	+Vout
5	Com
6	Com
7	-Vout
8	Trim