

M40A Series

40W 4:1 Regulated Single & Dual output

Features

- Wide 4:1 Input Range
- Full SMD Technology
- 1600 VDC Isolation
- Efficiency up to 92%
- -40 ~ 85°C Operation Temperature Range
- Adjustable Output Voltage
- Remote On/Off Control (CTRL)
- Continuous Short Circuit Protection
- Over Current Protection
- Over Voltage Protection
- Over Temperature Protection
- Soft Start



The M40A series is a family of cost effective 40W single & dual output DC-DC converters. These converters combine nickel-coated copper package in a 2"x2" case with high performance features such as Active Clamp Technology, continuous short circuit protection with automatic restart and tight line / load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 24 and 48 with output voltage of 3.3, 5, 12, 15, ± 12 , ± 15 Vdc. High performance features include high efficiency operation up to 92% and output voltage accuracy of $\pm 1\%$ maximum.

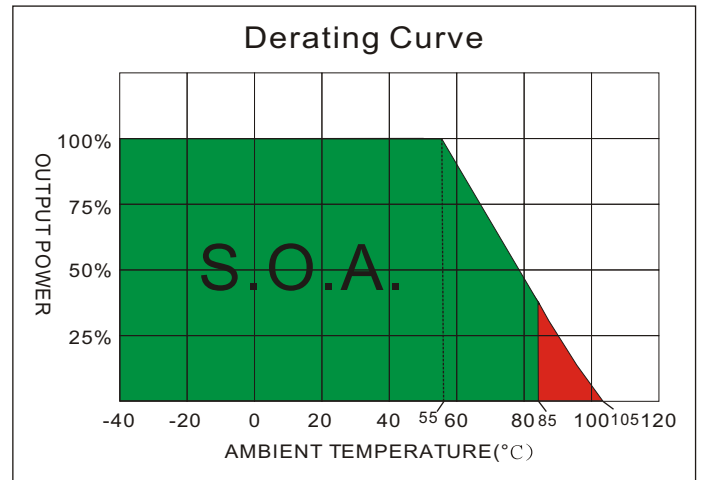
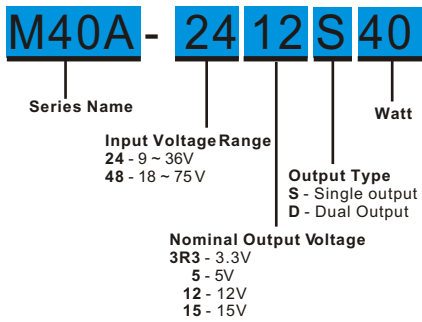
ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED.

OUTPUT SPECIFICATIONS		GENERAL SPECIFICATIONS	
Output Voltage Accuracy	$\pm 1\%$	Efficiency	See table, typ.
Output Voltage Adjustability (Trim) (1)	$\pm 10\%$, max.	I/O Isolation Voltage(3 sec)	
Maximum Output Current	See table	Input/Output	1600Vdc
Line Regulation	$\pm 0.5\%$, max.	Case/Input & Output	1600Vdc
Load Regulation(Single, $I_o=0\%$ to 100%)	$\pm 0.5\%$, max.	Isolation Resistance	1000 M Ω , min.
Load Regulation(Dual, $I_o=1\%$ to 100%)	$\pm 1.0\%$, max.	Isolation Capacitance	2500 pF, max.
Cross Regulation (Dual Output) (2)	$\pm 5\%$	Switching frequency	270kHz, typ.
Ripple&Noise (3)	3.3V&5.0V output: 50mVpk-pk, max. Dual output: 150mVpk-pk, max. All other output: 75mVpk-pk, max.	Humidity	95% rel H
Over Voltage Protection (Zener diode clamp)	3.3V output 3.9V 5V output 6.2V 12V output 15V 15V output 18V ± 12 V output ± 15 V ± 15 V output ± 18 V	Reliability Calculated MTBF(MIL-HDBK-217 F)	>151 khrs
Over Load Protection	130% of FL, typ.	Safety Standard (design to meet)	IEC/EN 60950-1
Short Circuit Protection	Indefinite(hiccup) (Automatic Recovery)	EMC CHARACTERISTICS	
Temperature Coefficient	$\pm 0.02\%/^{\circ}\text{C}$	Radiated Emissions(8)	EN55022 CLASSA
Capacitive Load (4)	See table	Conducted Emissions(8)	EN55022 CLASSA
Transient Recovery Time (5)	250us, typ.	ESD	EN61000-4-2 Perf. Criteria A
Transient Response Deviation(5)	$\pm 3\%$, max.	RS	EN61000-4-3 Perf. Criteria A
INPUT SPECIFICATIONS		EFT(9)	EN61000-4-4 Perf. Criteria A
Input Voltage Range	See table	Surge (9)	EN61000-4-5 Perf. Criteria A
Under Voltage Lockout		CS	EN61000-4-6 Perf. Criteria A
24V Modes Module ON / OFF	8.6Vdc / 7.9Vdc, typ.	PFMF	EN61000-4-8 Perf. Criteria A
48V Modes Module ON / OFF	17.8Vdc / 16Vdc, typ.	ENVIRONMENTAL SPECIFICATIONS	
Start up Time (Nominal Vin and constant resistive load)	25mS, typ.	Operating Ambient Temperature	-40°C ~ +85°C(See Derating Curve) -40°C ~ +55°C(For 100% load)
Input Filter	Pi Type	Maximum Case Temperature	105°C
Input Current(No-Load)	See table, typ.	Storage Temperature	-55°C ~ +125°C
Input Current(Full-Load)	See table, max.	Over Temperature Protection (Case)	110°C, typ.
Input Reflected Ripple Current(6)	20mApk-pk, typ.	Cooling	Nature Convection
Remote On/Off (CTRL)(7)		ABSOLUTE SPECIFICATIONS (10)	
ON: 3.0 ... 12Vdc or open circuit		These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
OFF: 0 ... 1.2Vdc or Short circuit pin2 and pin 3		Input Surge Voltage(100mS)	
OFF idle current: 5.0 mA, typ.		24 Models	50 Vdc, max.
		48 Models	100 Vdc, max.
		Soldering Temperature (1.5mm from case 10sec. max.)	260°C, max.
		PHYSICAL SPECIFICATIONS	
		Case Material	Nickel-coated Copper
		Pin Material	$\varnothing 1.0$ mm Brass Solder-coated
		Potting Material	Epoxy (UL94V-0 rated)
		Weight	60.0g
		Dimensions	2.00"x2.00"x0.40"

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M40A - 40W 4:1 Regulated Single & Dual output

PART NUMBER STRUCTURE



MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL(%)	Capacitor Load(uF)
		No-Load (mA)	Full Load (mA)		Min. load (mA)	Full load (mA)		
M40A-243R3S40	9-36	80	1598	3.3	0	10000	89	25000
M40A-2405S40	9-36	100	1893	5	0	8000	91	13000
M40A-2412S40	9-36	50	1925	12	0	3350	90	2300
M40A-2415S40	9-36	50	1904	15	0	2650	90	1500
M40A-483R3S40	18-75	60	799	3.3	0	10000	89	25000
M40A-4805S40	18-75	60	936	5	0	8000	92	13000
M40A-4812S40	18-75	30	963	12	0	3350	90	2300
M40A-4815S40	18-75	30	941	15	0	2650	91	1500
M40A-2412D40	9-36	60	1919	±12	0	±1650	89	±1200
M40A-2415D40	9-36	60	1962	±15	0	±1350	89	±750
M40A-4812D40	18-75	30	948	±12	0	±1650	90	±1200
M40A-4815D40	18-75	30	970	±15	0	±1350	90	±750

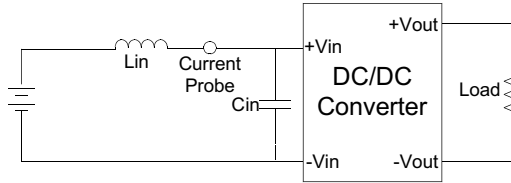
NOTE

- For the Single output: Maximum output deviation is 10% inclusive of remote sense and trim. If remote sense is not being used, the +sense should be connected to its corresponding +OUTPUT and likewise the -sense should be connected to its corresponding -OUTPUT.
- One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
- Measured with 20MHz bandwidth and 1.0uF ceramic capacitor.
- Tested by minimal Vin and constant resistive load.
- Tested by normal Vin and 25% load step change (75%-50%-25% of Io).
- Measured Input reflected ripple current with a simulated source inductance of 12uH.
- The remote on/off control pin is referenced to -Vin(pin2).
- The M40A-40W series can meet EN55022 Class A With an external filter in parallel with the input pins .
- An external filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5. The filter capacitor Motien suggest: Nippon chemi-con KY series, 220uF/100V.
- Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

TEST CONFIGURATIONS

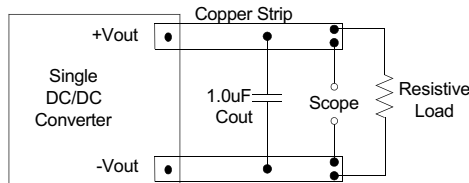
Input Reflected Ripple Current Test Step

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



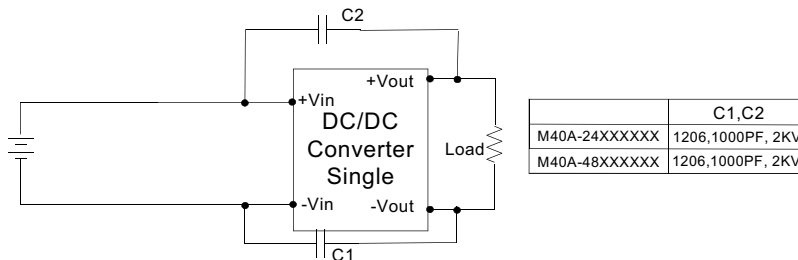
Output Ripple & Noise Measurement Test

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

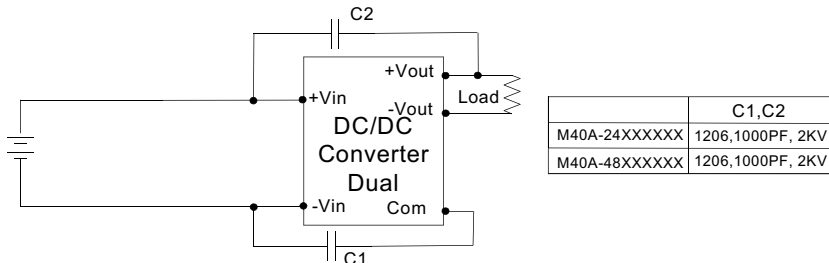


EMI Filter

Input filter components (C_1, C_2) are used to help meet 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.



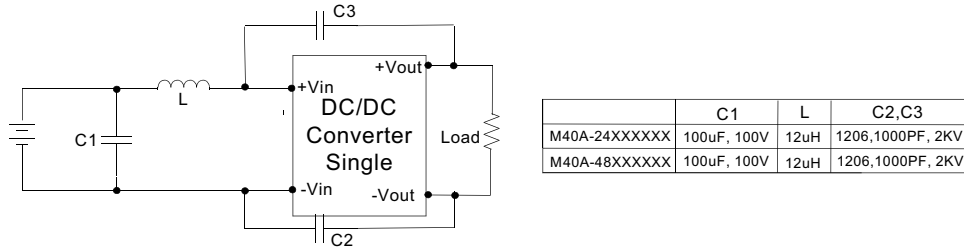
C1,C2	
M40A-24XXXXXX	1206,1000PF, 2KV
M40A-48XXXXXX	1206,1000PF, 2KV



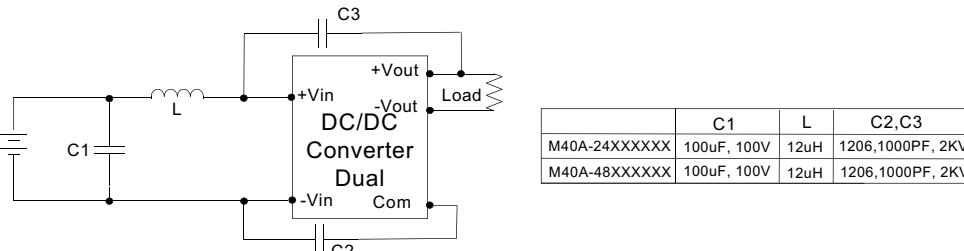
C1,C2	
M40A-24XXXXXX	1206,1000PF, 2KV
M40A-48XXXXXX	1206,1000PF, 2KV

EMI Filter

Input filter components (C_1, C_2, C_3, L) are used to help meet conducted 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.

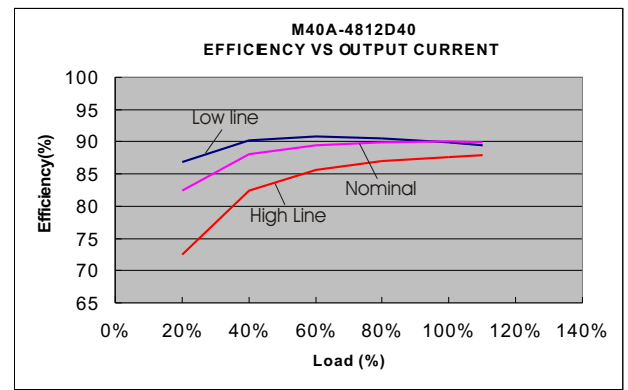
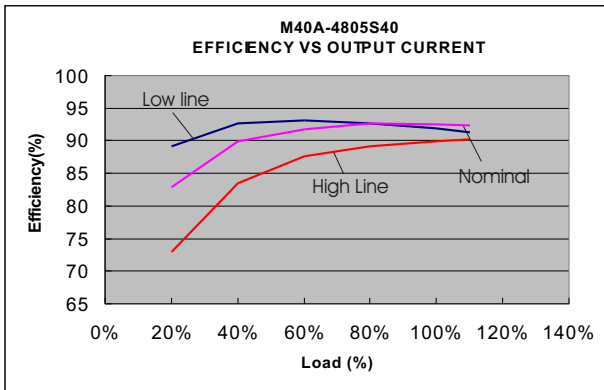
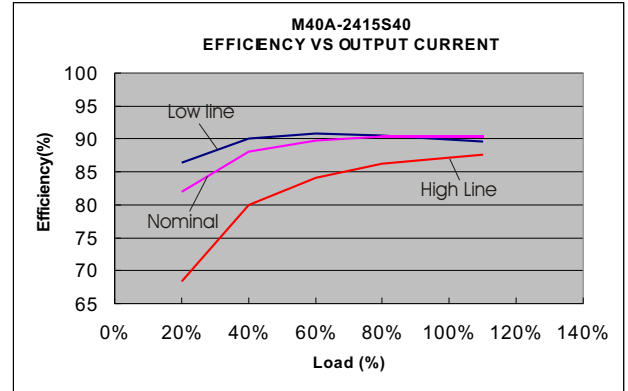
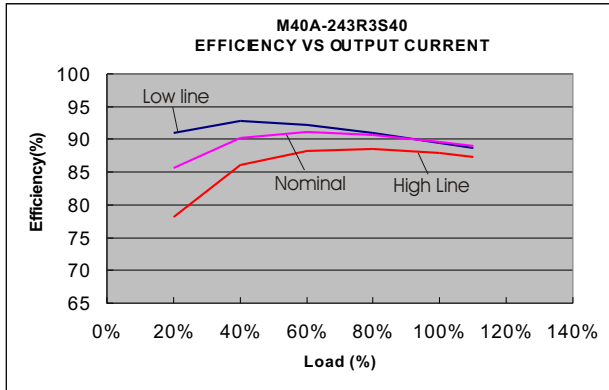


	C1	L	C2,C3
M40A-24XXXXXX	100uF, 100V	12uH	1206,1000PF, 2KV
M40A-48XXXXXX	100uF, 100V	12uH	1206,1000PF, 2KV

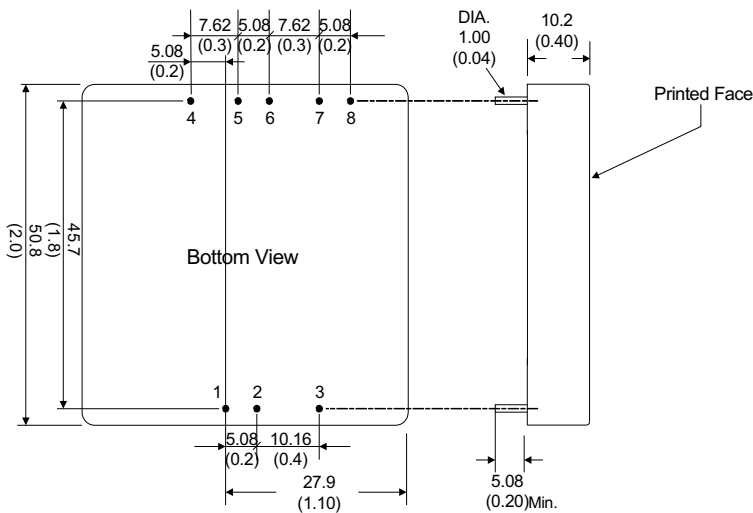


	C1	L	C2,C3
M40A-24XXXXXX	100uF, 100V	12uH	1206,1000PF, 2KV
M40A-48XXXXXX	100uF, 100V	12uH	1206,1000PF, 2KV

M40A - 40W 4:1 Regulated Single & Dual output



MECHANICAL SPECIFICATIONS



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

PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	-Sense	+Vout
5	+Sense	Com
6	+Vout	Com
7	-Vout	-Vout
8	Trim	Trim

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method as below. () for dual output trim.

