M40A Series

40W 4:1 Regulated Single & Dual output

ALL PSU electronic power solutions

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

CE

The M40A series is a family of cost effective 40W single & dual output DC-DC converters. These converters combine nickle-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, ±15Vdc. High performance features include high efficiency operation up to 92% and output voltage accuracy of ±1% maximum.

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

OUTPUT SPECIFICATIONS

Output Voltage Accuracy		±1%
Output Voltage Adjustability **(Trim) (1)**		±10%, max.
Maximum Output Current		See table
Line Regulation		±0.5%, max.
Load Regulation**(Single, Io=0% to 100%)**		±0.5%, max.
Load Regulation**(Dual,Io=1% to 100%)**		±1.0%, max.
Cross Regulation **(Dual Output) (2)**		±5%
Ripple&Noise **(3)**	**3.3V&5.0V output:**	50mVpk-pk, max.
	Dual output:	150mVpk-pk, max.
	All other output:	75mVpk-pk, max.
Over Voltage Protection (Zener diode clamp)	3.3V output	3.9V
	5V output	6.2V
	12V output	15V
	15V output	18V
	±12V output	±15V
	±15V output	±18V
Over Load Protection		130% of FL, typ.
Short Circuit Protection		Indefinite(hiccup) (Automatic Recovery)
Temperature Coefficient		±0.02%/°C
Capacitive Load **(4)**		See table
Transient Recovery Time **(5)**		250us, typ.
Transient Response Deviation**(5)**		±3%, max.

INPUT SPECIFICATIONS

Input Voltage Range		See table
Under Voltage Lockout		
24V Modes	Module ON / OFF	8.6Vdc / 7.9Vdc, typ.
48V Modes	Module ON / OFF	17.8Vdc / 16Vdc, typ.
Start up Time (Nominal Vin and constant resistive load)		25mS, typ.
Input Filter		Pi Type
Input Current(No-Load)		See table, typ.
Input Current(Full-Load)		See table, max.
Input Reflected Ripple Current**(6)**		20mApk-pk, typ.

Remote On/Off (CTRL)**(7)**

ON: 3.0 ... 12Vdc or open circuit

OFF: 0 ... 1.2Vdc or Short circuit pin2 and pin 3

OFF idle current: 5.0 mA, typ.

PHYSICAL SPECIFICATIONS

Case Material	Nickel-coated Copper
Pin Material	Φ1.0mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	65.0g
Dimensions	2.00"x2.00"x0.40"

GENERAL SPECIFICATIONS

Efficiency	See table, typ.
I/O Isolation Voltage(60sec)	
Input/Output	1600Vdc
Case/Input & Output	1600Vdc
Isolation Resistance	1000 MΩ, min.
Isolation Capacitance	2500 pF, max.
Switching frequency	270kHz, typ.
Humidity	95% rel H
Reliability Calculated MTBF(MIL-HDBK-217 F)	>151 khrs
Safety Standard	IEC/EN 60950-1 , 62368-1 UL/cUL 60950-1 , 62368-1
Safety Approvals	EN 60950-1 , 62368-1

EMC CHARACTERISTICS

Radiated Emissions**(8)**	EN55032	CLASSA
Conducted Emissions**(8)**	EN55032	CLASSA
ESD	IEC 61000-4-2	Perf. Criteria A
RS	IEC 61000-4-3	Perf. Criteria A
EFT**(9)**	IEC 61000-4-4	Perf. Criteria A
Surge **(9)**	IEC 61000-4-5	Perf. Criteria A
CS	IEC 61000-4-6	Perf. Criteria A
PFMF	IEC 61000-4-8	Perf. Criteria A

ENVIRONMENTAL SPECIFICATIONS

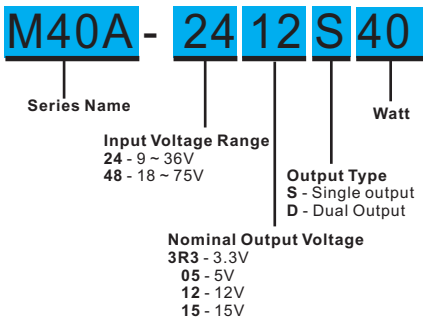
Operating Ambient Temperature	-40°C ~ +85°C(See Derating Curve) -40°C ~ +55°C(For 100% load)
Maximum Case Temperature	105°C
Storage Temperature	-55°C ~ +125°C
Over Temperature Protection (Case)	110°C, typ.
Cooling	Nature Convection

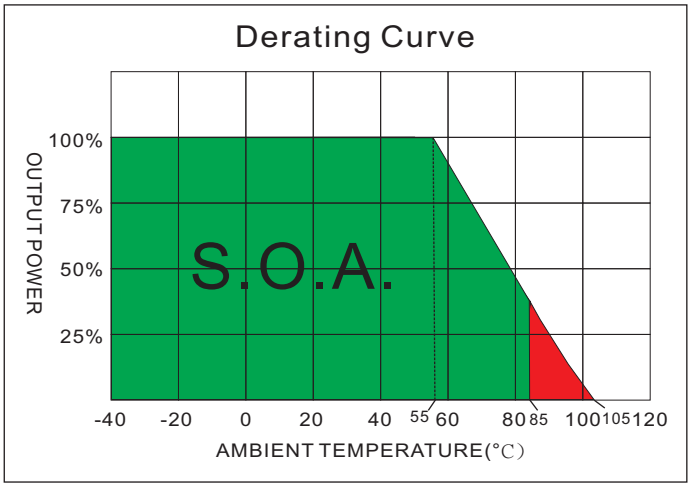
ABSOLUTE SPECIFICATIONS (10)

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

Input Surge Voltage(100mS)	
24 Models	50 Vdc, max.
48 Models	100 Vdc, max.
Soldering Temperature (1.5mm from case 10sec max.)	260°C, max.

PART NUMBER STRUCTURE





MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current No-Load (mA)	INPUT Current Full Load (mA)	OUTPUT Voltage (Vdc)	OUTPUT Current Min. load (mA)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(uF)
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

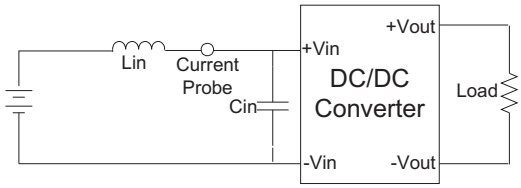
NOTE

1. 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.
2. One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
3. Measured with 20MHz bandwidth and 1.0uF ceramic capacitor.
4. Tested by minimal Vin and constant resistive load.
5. Tested by normal Vin and 25% load step change (75%-50%-25% of Io).
6. Measured Input reflected ripple current with a simulated source inductance of 12uH.
7. The remote on/off control pin is referenced to -Vin(pin2).
8. The M40A-40W series can meet EN55032 Class A With an external filter in parallel with the input pins .
9. An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5. The filter capacitor Motien suggest: Nippon chemi-con KY series, 220uF/100V.
10. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

TEST CONFIGURATIONS

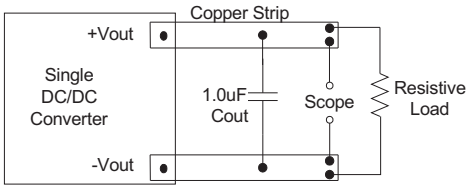
Input Reflected Ripple Current Test Step

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



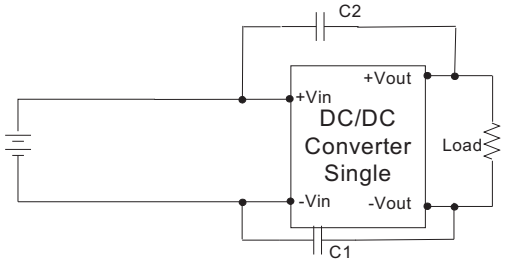
Output Ripple & Noise Measurement Test

Use a capacitor Cout(1.0uF) measurement. The Scope measurement bandwidth is 0-20MHz.

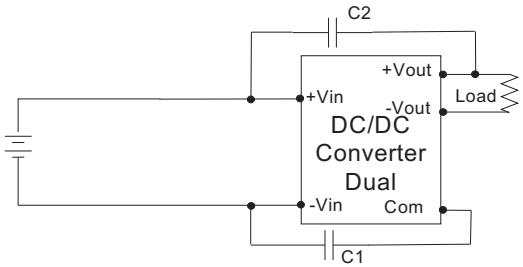


EMI Filter

Input filter components (C1,C2) 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.



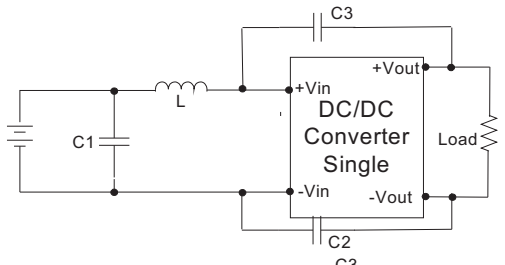
	C1,C2
M40A-24XXXXXX	1206,1000PF, 2KV
M40A-48XXXXXX	1206,1000PF, 2KV



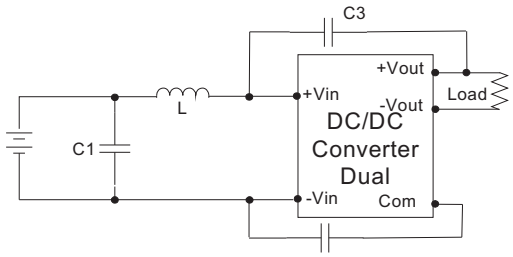
	C1,C2
M40A-24XXXXXX	1206,1000PF, 2KV
M40A-48XXXXXX	1206,1000PF, 2KV

EMI Filter

Input filter components (C1,C2,C3, 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.

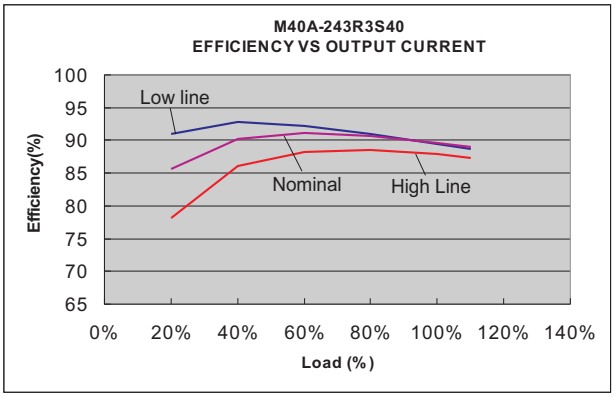


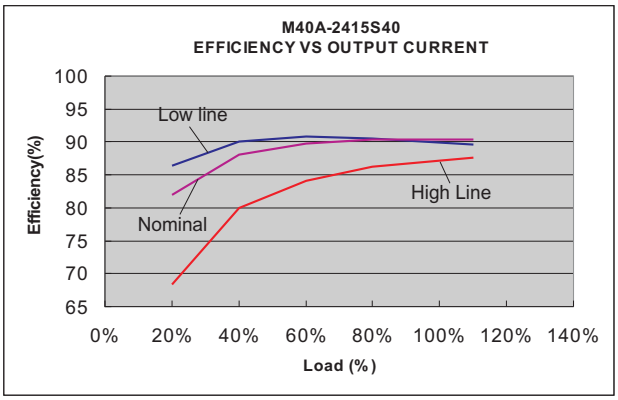
	C1	L	C2,C3
M40A-24XXXXXX	100uF, 100V	12uH	1206,1000PF, 2KV
M40A-48XXXXXX	100uF, 100V	12uH	1206,1000PF, 2KV

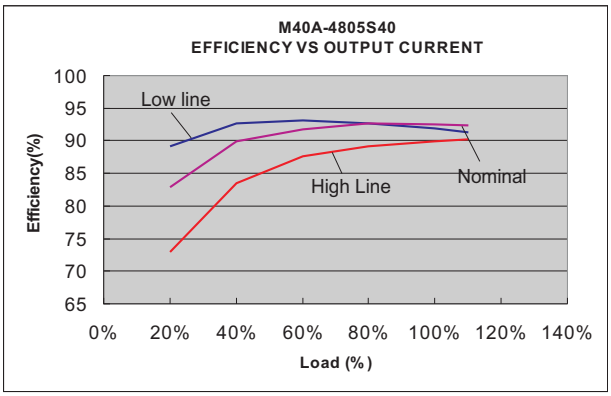


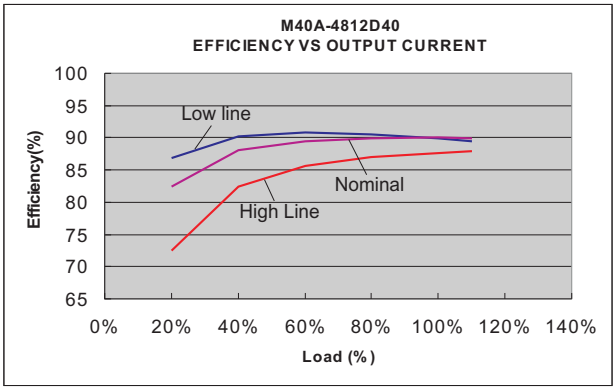
	C1	L	C2,C3
M40A-24XXXXXX	100uF, 100V	12uH	1206,1000PF, 2KV
M40A-48XXXXXX	100uF, 100V	12uH	1206,1000PF, 2KV

ELECTRICAL CHARACTERISTIC CURVES

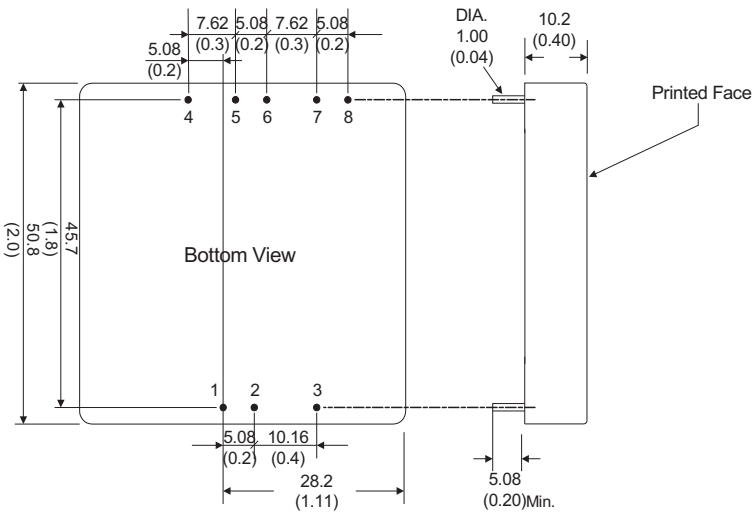








MECHANICAL SPECIFICATIONS

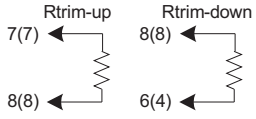


PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	-Sense	+Vout
5	+Sense	Com
6	+Vout	Com
7	-Vout	-Vout
8	Trim	Trim

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)

EXTERNAL OUTPUT TRIMMING

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



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