

MR Series

0.5A Output Current, Non-Isolated DC/DC converter

Features

- 3 Pin SIL, Full SMD Technology
- Non isolated, No need for heatsinks
- Wide Input Range, Step-down switching dc-dc converter
- High voltage input range, up to 28V
- Continuous Short Circuit Protection
- Pin-out compatible with LM78XX three terminals positive Regulator
- Efficiency up to 94%
- Low ripple and noise



The MR series is a family of cost effective 1.65~7.5W single output buck DC-DC converters. These converters are encapsulated in a non-conductive black plastic package 3-pin SIL case, continuous short circuit protection with automatic restart, good line / load regulation and ultra low quiescence current. Devices are filled up with flame retardant resin. Input voltages of 4.5~28, 7~28, 14~28, and 17~28 with output voltage of 3.3, 5, 12 and 15Vdc. High performance features include high efficiency operation up to 94%.

All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified

OUTPUT SPECIFICATIONS		GENERAL SPECIFICATIONS	
Voltage accuracy	±3%	Efficiency	See table
Output Current(Min Load)	5mA, min.	Switching Frequency	570KHz, typ.
Output Current(Full Load)	500mA, max.	Humidity	95% rel H
Line regulation	±0.5%	Reliability Calculated MTBF(MIL-HDBK-217 F)	>4.0Mhrs
Load regulation	(From 10% to 100% Load) ±0.8%	Safety Standard (design to meet)	IEC/EN 60950-1
Ripple & noise (20 MHz bandwidth)(1)	(From 10% to 100% Load) 60mVpk-pk	ABSOLUTE MAXIMUM RATINGS(5)	
Short Circuit Protection	Indefinite(Automatic Recovery)	These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Temperature coefficient	±0.02%/°C	Input Surge Voltage(100ms)	30 Vdc, max.
Capacitor load(2)	(From 2% to 100% Load) See table	Soldering Temperature	260°C, max. (1.5mm from case 10sec Max.)
Transient Recovery Time(3)	250µs, typ.	PHYSICAL SPECIFICATIONS	
Transient Response Deviation(3)	±3%, max.	Case Material	Non-conductive Black Plastic(UL94V-0 rated)
INPUT SPECIFICATIONS		Pin Material	C5191R-H Solder-coated
Input Voltage Range	See table	Potting Material	Epoxy (UL94V-0 rated)
Start up Time	10mS, typ.	Weight	2.0g
(Nominal Vin and constant resistive load)		Dimensions	0.46"x0.29"x0.40"
Input Current (No-Load)	See table	EMC CHARACTERISTICS(6)	
Input Current (Full-Load)	See table	Radiated Emissions	EN55032 CLASS B
Input Filter	Capacitors	Conducted Emissions	EN55032 CLASS B
Input Reflected Ripple Current(4)	35mA pk-pk	ESD	IEC61000-4-2 Perf. Criteria A
ENVIRONMENT SPECIFICATIONS		RS	IEC61000-4-3 Perf. Criteria A
Operating Temperature	-40°C~85°C(See Derating Curve)	EFT	IEC61000-4-4 Perf. Criteria A
Maximum Case Temperature	See table	Surge	IEC61000-4-5 Perf. Criteria A
Storage Temperature	-55°C~125°C	CS	IEC61000-4-6 Perf. Criteria A
Cooling	Nature Convection	PFMF	IEC61000-4-8 Perf. Criteria A

NOTE

1. Ripple/Noise measured with 20MHz bandwidth.
2. Tested by minimal Vin and constant resistive from 2% to 100% load.
3. Tested by normal Vin and 25% load step change (75%-50%-25% of Io).
4. Input reflected ripple current is measured through a source inductor L1(12µH) and a source capacitor C1=47µF at nominal input and Full load.
5. Do not operate the unit(s) exceeding the absolute maximum rating, over rating causes damage to the units.
6. Input filter components (C1, C2, L1) are used to help meet EMI & EMS 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.
7. Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.

PART NUMBER STRUCTURE

MR-783R3-0.5

Series Name

Output Current
0.5 - 0.5A

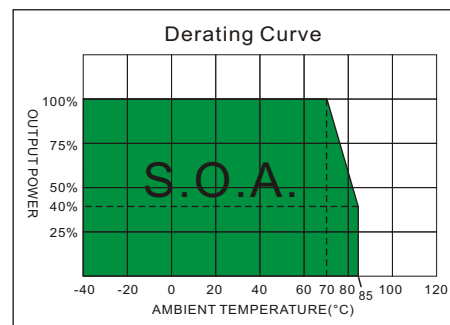
Output Voltage

3R3 - 3.3V

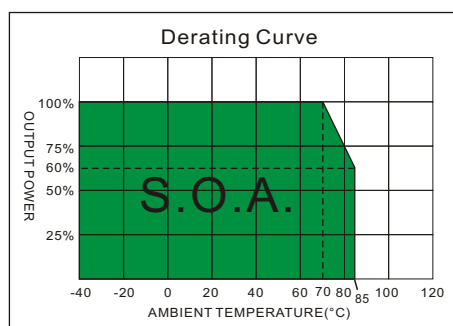
05 - 5V

12 - 12V

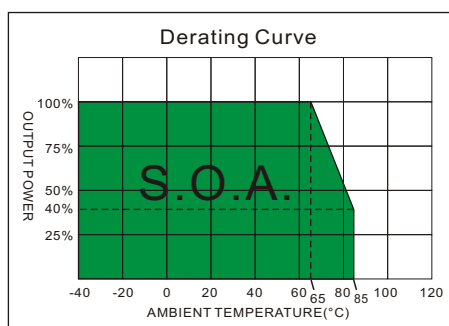
15 - 15V



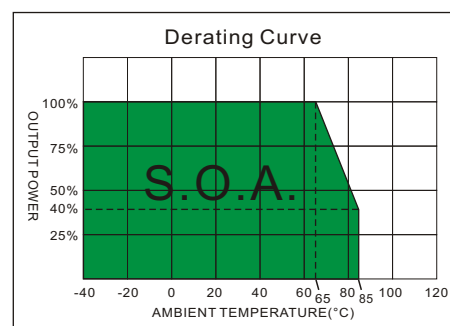
MR-783R3-0.5



MR-7805-0.5



MR-7812-0.5



MR-7815-0.5

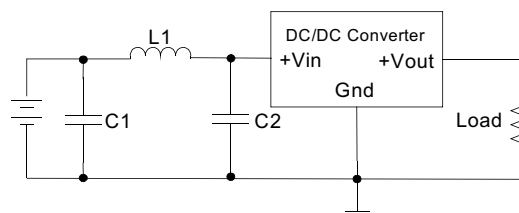
MODEL SELECTION GUIDE

MODEL NUMBER	INPUT	INPUT Current (mA)			OUTPUT		EFFICIENCY		Capacitor Load(μF)
	Voltage Range (Vdc)	No-Load (Max)	Full Load Vin(Min)	Full Load Vin(Max)	Voltage (Vdc)	Current (mA)	Vin (Min) @FL(%)	Vin (Max) @FL(%)	
MR-783R3-0.5	4.5-28	1.0	411.99	78.57	3.3	500	89	75	100
MR-7805-0.5	7-28	1.0	388.20	111.61	5.0	500	92	80	100
MR-7812-0.5	14-28	1.5	455.93	238.10	12.0	500	94	90	100
MR-7815-0.5	17-28	2.0	469.33	291.15	15.0	500	94	92	47

EMC COUNTERMEASURES

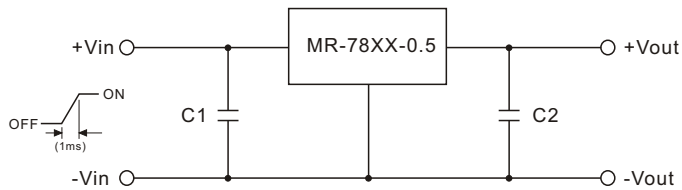
EMC Countermeasures

Input filter components (C1, C2, L1) are used to help meet EMI & EMS 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.



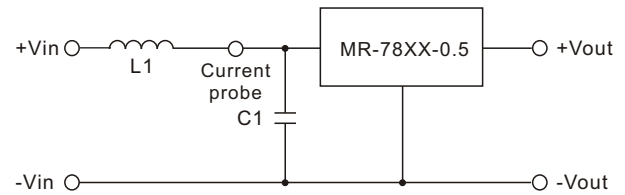
	C1	L1	C2
MR-78XX-0.5	10uF,35V	6.8uH	10uF,35V

STANDARD APPLICATION CIRCUIT



1. To protect the converter during power-up, use soft start Vin and C1=22 μ F
2. C2=47 μ F (Optional)

TEST CONFIGURATIONS

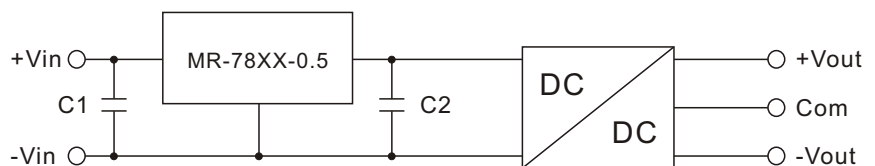


Input reflected ripple current is measured through a source inductor L1(12 μ H) and a source capacitor C1=47 μ F at nominal input and full load.

APPLICATION EXAMPLES

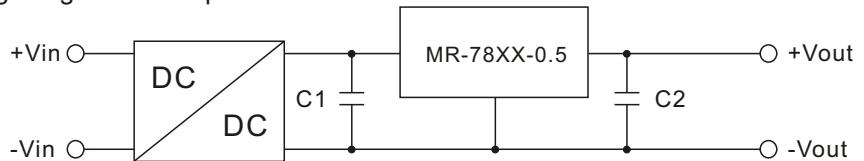
High efficiency, isolated, dual unregulated outputs, one economic way to build up isolated dual output

- Isolated dual outputs
- Wide input range
- C1: Optional
- C2: Required (further decoupling filtering may be necessary between the two converters)

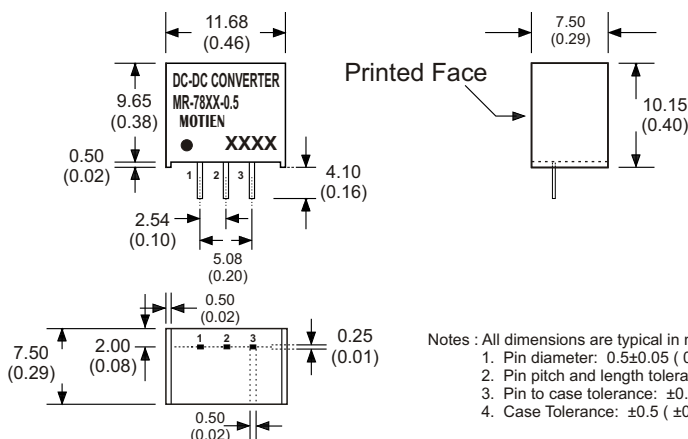


Isolated (up to 6KV), wide input range regulated output

- High isolation voltage
- Improved loading / line regulation
- Wide input voltage range
- Point-of-load Architecture
- C1: Required (further decoupling filtering may be necessary between the two converters)
- C2: Optional



MECHANICAL SPECIFICATIONS



Notes : All dimensions are typical in millimeters (inches).
 1. Pin diameter: 0.5 \pm 0.05 (0.02 \pm 0.002)
 2. Pin pitch and length tolerance: \pm 0.35 (\pm 0.014)
 3. Pin to case tolerance: \pm 0.5 (\pm 0.02)
 4. Case Tolerance: \pm 0.5 (\pm 0.02)

PIN CONNECTIONS

PIN NUMBER	SINGLE
1	+V Input
2	GND
3	+V Output