

MR-78XX-1.0 Series

1A 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 93%
- Low ripple and noise



The MR-78XX-1.0 series is a family of cost effective 3.3~5W 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 7~28 and 8~28 with output voltage of 3.3 and 5Vdc. High performance features include high efficiency operation up to 93%.



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

OUTPUT SPECIFICATIONS		GENERAL SPECIFICATIONS	
Voltage Accuracy	±3%, max.	Efficiency	See table, typ.
Output Current (Min Load)	100mA, min.	Switching Frequency	330KHz, typ.
Output Current (Full Load)	1000mA, max.	Humidity	95% rel H
Line regulation	±1%, max.	Reliability Calculated MTBF(MIL-HDBK-217 F)	>3.8Mhrs
Load regulation	(From 10% to 100% Load) ±1.5%, max.	Safety Standard (design to meet)	IEC/EN 60950-1
Ripple & Noise (1)	(From 10% to 100% Load) 100mVpk-pk, max.	ABSOLUTE MAXIMUM RATINGS(5)	
Short Circuit Protection	Continuous (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)	30Vdc, max.
Capacitor Load(2)	(From 2% to 100% Load) See table	Soldering Temperature	260°C, max.
Transient Recovery Time(3)	250µs, typ.	(1.5mm from case 10sec max.)	
Transient Response Deviation(3)	±3%, max.	PHYSICAL SPECIFICATIONS	
INPUT SPECIFICATIONS		Case Material	Non-conductive Black Plastic(UL94V-0 rated)
Input Voltage Range	See table	Pin Material	C5191R-H Solder-coated
Start up Time	10mS, typ.	Potting Material	Epoxy (UL94V-0 rated)
(Nominal Vin and constant resistive load)		Weight	2.1g
Input Current (No-Load)	See table, typ.	Dimensions	0.46"x0.29"x0.40"
Input Current (Full-Load)	See table, typ.	EMC CHARACTERISTICS	
Input Filter	Capacitors	Radiated Emissions (8)	EN55032 CLASS B
Input Reflected Ripple Current(4)	35mA pk-pk, typ.	Conducted Emissions (8)	EN55032 CLASS B
ENVIRONMENT SPECIFICATIONS		ESD	IEC61000-4-2 Perf. Criteria A
Operating Temperature	-40°C~85°C(See Derating Curve)	RS	IEC61000-4-3 Perf. Criteria A
Maximum Case Temperature	105°C	EFT (9)	IEC61000-4-4 Perf. Criteria A
Storage Temperature	-55°C ~ +125°C	Surge (9)	IEC61000-4-5 Perf. Criteria A
Cooling (7)	Nature Convection	CS	IEC61000-4-6 Perf. Criteria A
		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. Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.
7. "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
8. The MR-78XX-1.0 series can meet EN55032 Class B 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 suggest: Nippon chemi-con KY series, 330µF/100V.

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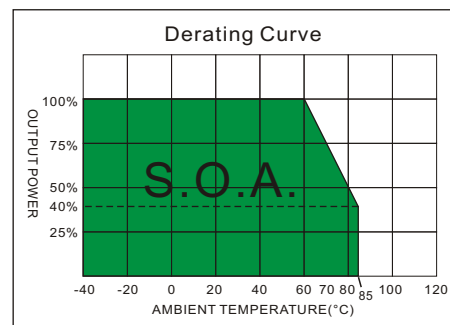
PART NUMBER STRUCTURE

MR-783R3-1.0

Series Name

Output Current
1.0 - 1.0A

Output Voltage
3R3 - 3.3V
05 - 5V



MODEL SELECTION GUIDE

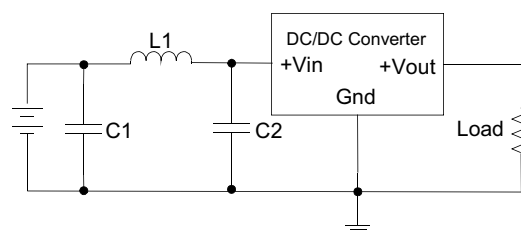
MODEL NUMBER	INPUT	INPUT Current			OUTPUT	OUTPUT Current		EFFICIENCY		Capacitor Load @FL
	Voltage Range (Vdc)	No-Load (mA, typ.)	Full Load (mA, typ.)		Voltage (Vdc)	Min. Load (mA)	Full Load (mA)	Full Load (% , typ.)		Load @FL (μF, max.)
MR-783R3-1.0	7 - 28	1.5	529.70	143.73	3.3	100	1000	89	82	220
MR-7805-1.0	8 - 28	1.5	672.04	207.64	5.0	100	1000	93	86	220

EMC COUNTERMEASURES

EMI Countermeasures

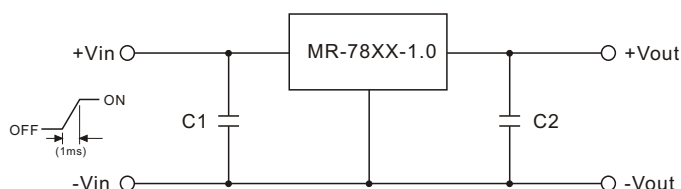
Input filter components (C1, C2, L1) are used to help meet EMI requirement for the module.

These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



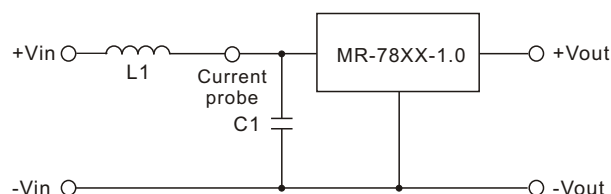
	C1	L1	C2
MR-78XX-1.0	10μF, 50V	22μH	10μF, 50V

STANDARD APPLICATION CIRCUIT



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

TEST CONFIGURATIONS

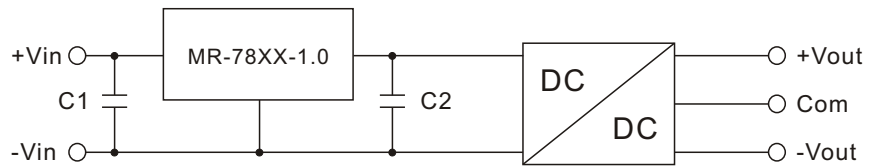


Input reflected ripple current is measured through a source inductor L1(12μH) and a source capacitor C1=47μF at nominal input and full load.

APPLICATION EXAMPLES

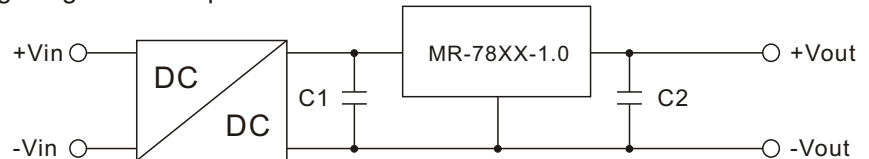
High efficiency, isolated, dual unregulated outputs, one economic way to build up isolated dual output

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

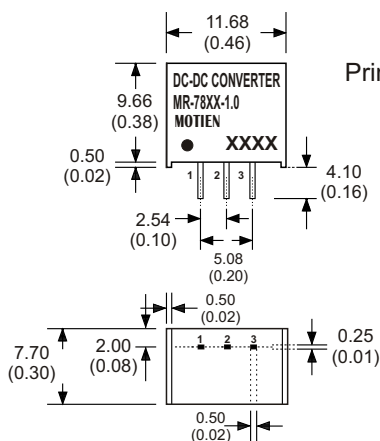


Isolated (up to 6KV), wide input range regulated output

- 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



Printed Face

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

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