DC DC

Part Num

VR-78MXX SERIES

0.5A OUTPUT CURRENT, NON-ISOLATED DC/DC CONVERTER

Features

- 3 Pin SIL
- Non isolated,No need for heatsinks
- Wide Input Range,Step-down switching dc-dc converter
- Full SMD Technology
- Continuous Short Circuit Protection
- Pin-out compatible with LM78MXX three terminals positive Regulator
- Efficiency up to 97%
- -40 ~ 85°C Operation Temperature Range

CE

The VR series is a family of cost effective 0.75~7.5W 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 and good line / load regulation . Devices are filled up with flame retardant resin .Input voltages of 4.75~30, 4.75~34, 6.5~34, 8~34, 9~34, 11~34,15~34and18~34 with output voltage of 1.5, 1.8, 2.5, 3.3, 5, 6.5, 7.2, 9,12, 15Vdc. High performance features include high efficiency operation up to 97%. Standard features include an input range of 4.75~34Vdc tolerance and low output noise and ripple.

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

OUTPUT SPECIFICATIONS		
Voltage accuracy		±2%
Line regulation		±0.5%
Load regulation	(From 10% to 100% Load)	±0.6%
Ripple & noise (20 MHz bandwidth)(1)		60mV pk-pk
Short Circuit Protection		Indefinite(Automatic Recovery)
Temperature coefficient		±0.02%/°C
Capacitor load(2)		See table

INPUT SPECIFICATIONS	
Voltage Range	See table
Max. Input Current	See table
No-Load Input Current	See table
Input Filter	Capacitors
Input Reflected Ripple Current(3)	35mA pk-pk

GENERAL SPECIFICATIONS	
Efficiency	See table
Switching Frequency	330kHz typ
Humidity	95% rel H
Reliability Calculated MTBF(MIL-HDBK-217 F)	>4.5Mhrs

ENVIRONMENT SPECIFICATIONS	
Operating Temperature	-40°C~85°C(See Derating Curve)
Maximum Case Temperature	100°C
Storage Temperature	-40°C~125°C
Cooling	Nature Convection

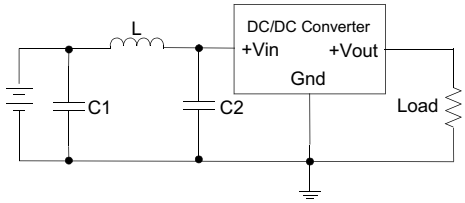
PHYSICAL SPECIFICATIONS	
Case Material	Non-conductive Black Plastic(UL94V-0 rated)
Pin Material	0.5mm Alloy42 Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	1.8g
Dimensions	0.46"x0.29"x0.40"

EMC CHARACTERISTICS		
Radiated Emissions	EN55022	CLASS B
Conducted Emissions(4)	EN55022	CLASS B
ESD	EN61000-4-2	Perf. Criteria B
RS	EN61000-4-3	Perf. Criteria A
EFT(5)	EN61000-4-4	Perf. Criteria B
CS	EN61000-4-6	Perf. Criteria A
PFMF	EN61000-4-8	Perf. Criteria A

ABSOLUTE MAXIMUM RATINGS(6)	
These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Input Voltage	-0.3~34 Vdc max
Soldering Temperature (1.5mm from case 10sec.)	260°C

NOTE

1.Ripple/Noise measured with 20MHz bandwidth.
2.Tested by minimal Vin and constant resistive load.
3.Measured Input reflected ripple current with a simulated source inductance of 12uH.
4.Input filter components (C1, C2, 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.
5.An external filter capacitor is required if the module has to meet EN61000-4-4.
The filter capacitor Motien suggest: Nippon chemi-con KY series, 220uF/100V.
6.Do not operate the unit(s) exceeding the absolute maximum rating, over rating causes damage to the units.
7.Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.



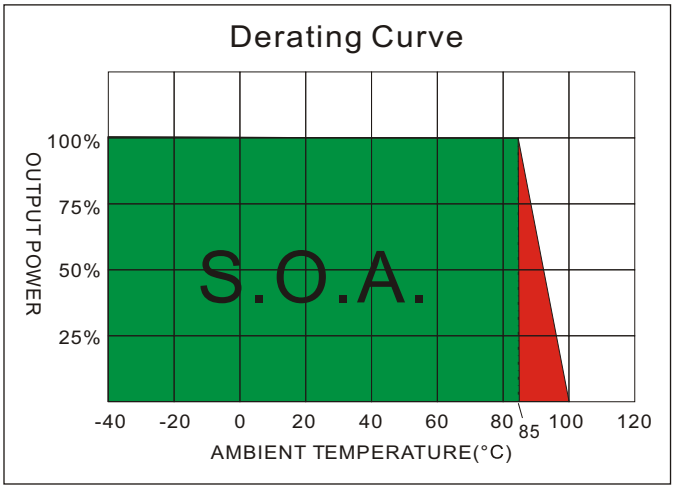
	C1	L	C2
VR-78MXX	470uF,35V	6.4uH	470uF,35V

0.5A OUTPUT CURRENT, NON-ISOLATED DC/DC CONVERTER

PART NUMBER STRUCTURE

VR - 78M 3R3

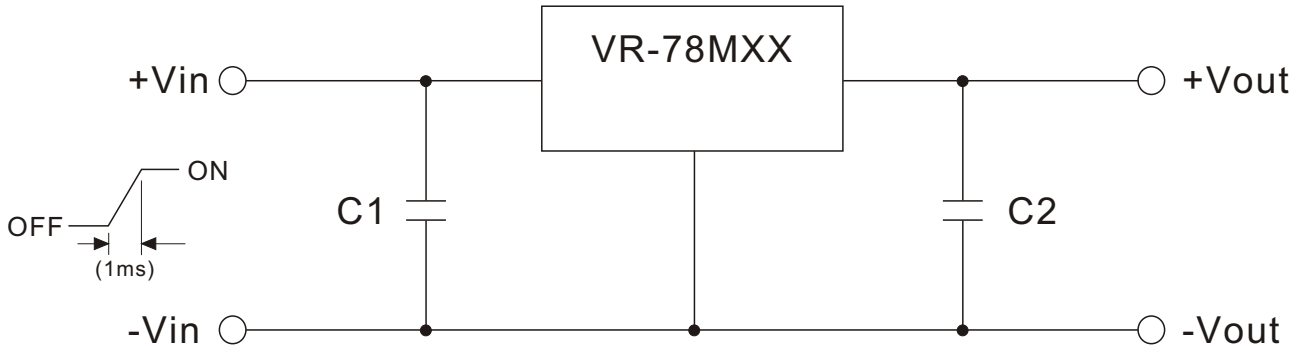
- **VR** — Series Name
- **78M** — For 78M Series Regulator I.C.
  - Output Current - 0.5A
- **3R3** — Output Voltage
  - **1R5** - 1.5V
  - **1R8** - 1.8V
  - **2R5** - 2.5V
  - **3R3** - 3.3V
  - **5** - 5V
  - **6R5** - 6.5V
  - **7R2** - 7.2V
  - **9** - 9V
  - **12** - 12V
  - **15** - 15V



MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current (mA) No-Load (Max)	INPUT Current (mA) Full Load Vin(Min)	INPUT Current (mA) Full Load Vin(Max)	OUTPUT Voltage (Vdc)	OUTPUT Current (mA)	EFFICIENCY Vin (Min) @FL(%)	EFFICIENCY Vin (Max) @FL(%)	Capacitor Load(uF)
VR-78M1R5	4.75-30	8.0	202.00	38.00	1.5	500	78	65	220
VR-78M1R8	4.75-34	8.0	231.00	38.00	1.8	500	82	70	220
VR-78M2R5	4.75-34	8.0	302.00	48.00	2.5	500	87	76	220
VR-78M3R3	4.75-34	8.0	381.00	60.00	3.3	500	91	81	220
VR-78M05	6.5-34	8.0	409.00	86.00	5.0	500	94	85	220
VR-78M6R5	8.0-34	8.0	427.00	108.00	6.5	500	95	88	220
VR-78M7R2	9.0-34	8.0	421.00	118.00	7.2	500	95	89	220
VR-78M09	11-34	8.0	426.00	144.00	9.0	500	96	92	220
VR-78M12	15-34	8.0	412.00	188.00	12	500	97	94	220
VR-78M15	18-34	8.0	430.00	232.00	15	500	97	95	220

Standard Application Circuit

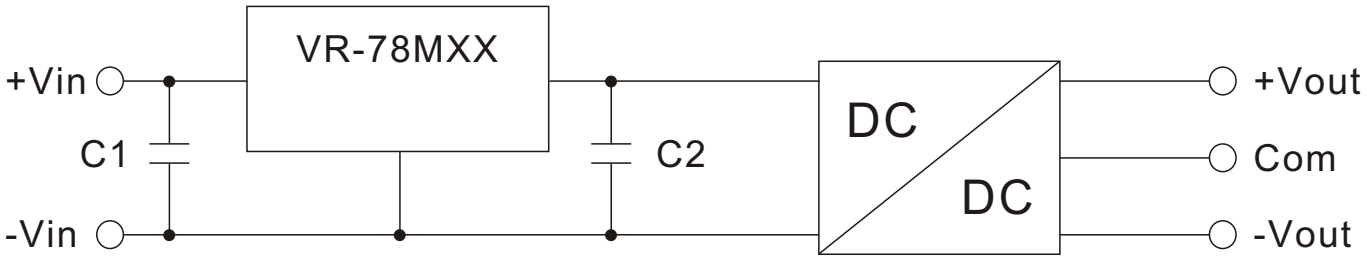


1.To protect the converter during power-up, use soft start Vin and C1=47uF
2.C2=100uF(Optional)

0.5A OUTPUT CURRENT, NON-ISOLATED DC/DC CONVERTER

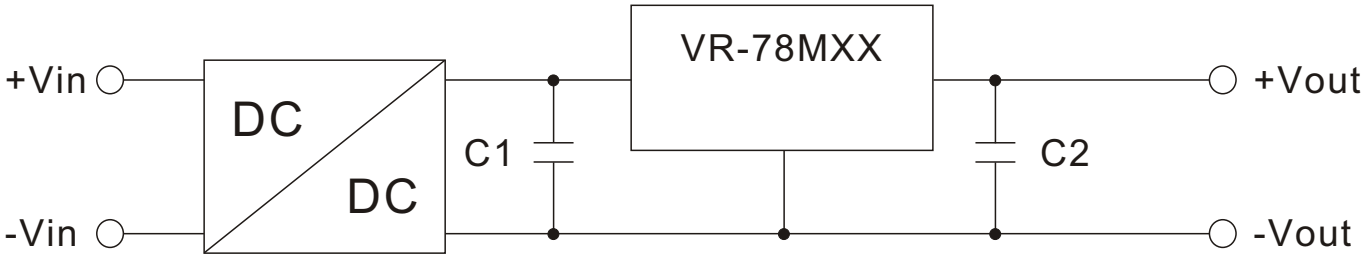
Application Examples

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



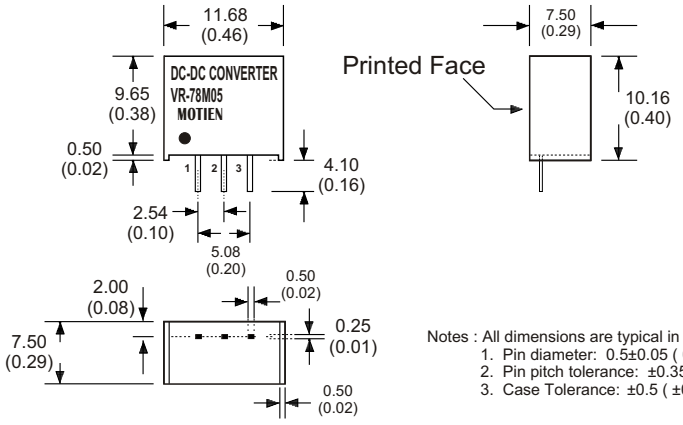
- Isolated dual outputs
- Wide input range 4.75V to 34V
- C1: Optional
- C2: Required (further decoupling filtering may be necessary between the two converters)

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



- High isolation voltage
- Wide input voltage range
- Improved loading / line regulation
- 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±0.05 (0.02±0.002)
2. Pin pitch tolerance: ±0.35 (±0.014)
3. Case Tolerance: ±0.5 (±0.02)

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

Data sheets are subject to change without notice