

VR-78XX-1.0 Series

1A 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 LM78XX three terminals positive Regulator
- Efficiency up to 94%
- -40 ~ 60°C Operation Temperature Range



The VR series is a family of cost effective 1.5~5W 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 4.75~18, and 6.5~18 with output voltage of 1.5, 1.8, 2.5, 3.3, 5, Vdc. High performance features include high efficiency operation up to 94%. Standard features include an input range of 4.75~18Vdc tolerance and low output noise and ripple.

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

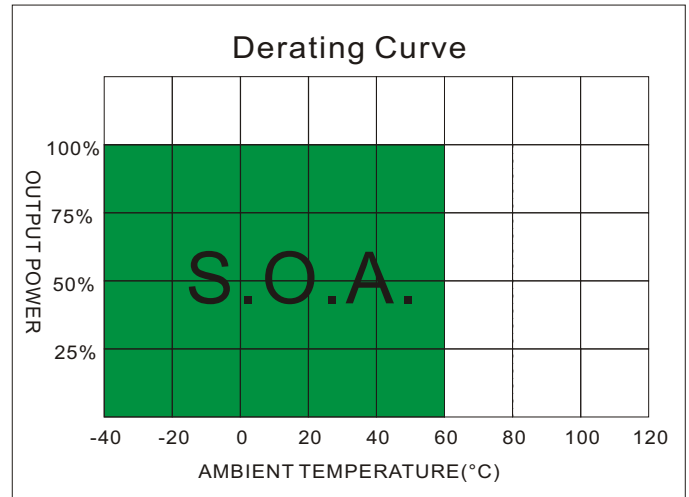
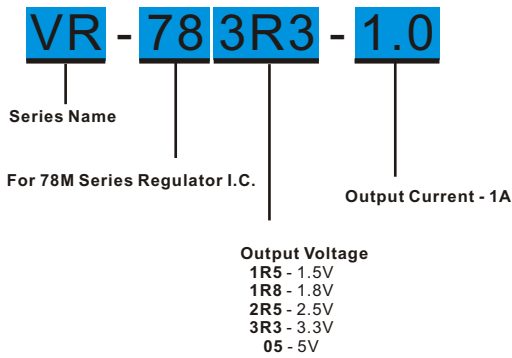
OUTPUT SPECIFICATIONS		PHYSICAL SPECIFICATIONS	
Voltage Accuracy	±2%, max.	Case Material	Non-conductive Black Plastic(UL94V-0 rated)
Line Regulation	±0.5%, max.	Pin Material	C5191R-H Solder-coated
Load Regulation	(From 10% to 100% Load) ±0.6%, max.	Potting Material	Epoxy (UL94V-0 rated)
Ripple & Noise (20 MHz bandwidth)(1)	60mVpk-pk, max.	Weight	2.0g
Short Circuit Protection	Indefinite(Automatic Recovery)	Dimensions	0.46"x0.29"x0.40"
Temperature Coefficient	±0.02%/°C	EMC CHARACTERISTICS	
Capacitor Load(2)	See table, max.	Radiated Emissions	EN55032 CLASS B
INPUT SPECIFICATIONS		Conducted Emissions(4)	EN55032 CLASS B
Input Voltage Range	See table	ESD	IEC61000-4-2 Perf. Criteria A
Input Current (No-Load)	See table, max.	RS	IEC61000-4-3 Perf. Criteria A
Input Current (Full Load)	See table, typ.	EFT(5)	IEC61000-4-4 Perf. Criteria A
Input Filter	Capacitors	CS	IEC61000-4-6 Perf. Criteria A
Input Reflected Ripple Current(3)	40mApk-pk, typ.	PFMF	IEC61000-4-8 Perf. Criteria A
GENERAL SPECIFICATIONS		ABSOLUTE MAXIMUM RATINGS(6)	
Efficiency	See table, typ.	These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Switching Frequency	330kHz, typ.	Input Surge Voltage (100ms)	20Vdc, max.
Humidity	95% rel H	Soldering Temperature	260°C, max.
Reliability Calculated MTBF(MIL-HDBK-217 F)	>4.3Mhrs	(1.5mm from case 10sec max.)	
ENVIRONMENT SPECIFICATIONS			
Operating Temperature	-40°C~60°C		
Maximum Case Temperature	100°C		
Storage Temperature	-40°C~125°C		
Cooling	Nature Convection		

NOTE

1. Ripple/Noise measured with 20MHz bandwidth. Load condition : 10% ~ 100%, output noise arise when load is under 10%.
2. Tested by minimal Vin and constant resistive load.
3. Measured Input reflected ripple current with a simulated source inductance of 12μH.
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 IEC61000-4-4.
The filter capacitor Motien suggest: Nippon chemi-con KY series, 220μF/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.

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PART NUMBER STRUCTURE



MODEL SELECTION GUIDE

MODEL NUMBER	INPUT	INPUT Current			OUTPUT	OUTPUT Current		EFFICIENCY		Capacitor Load @FL (μF, max.)
	Voltage Range (Vdc)	No-Load (mA, max.)	Full Load (mA, typ.)		Voltage (Vdc)	Min. Load (mA)	Full Load (mA)	Full Load (% , typ.)		
			@Min. Vin	@Max. Vin				@Min. Vin	@Max. Vin	
VR-781R5-1.0	4.75 - 18	10	416	119	1.5	100	1000	78	72	220
VR-781R8-1.0	4.75 - 18	10	474	135	1.8	100	1000	82	76	220
VR-782R5-1.0	4.75 - 18	10	619	176	2.5	100	1000	87	81	220
VR-783R3-1.0	4.75 - 18	10	790	221	3.3	100	1000	90	85	220
VR-7805-1.0	6.5 - 18	10	836	319	5.0	100	1000	94	89	220

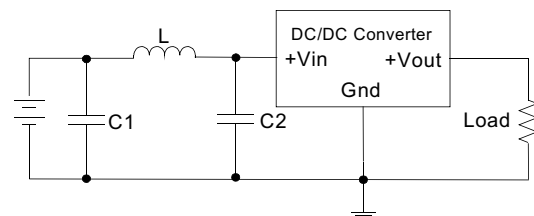
EMC COUNTERMEASURES

EMC Countermeasures

Input filter components (C1, C2, L) are used to help meet conducted emissions requirement for the module.

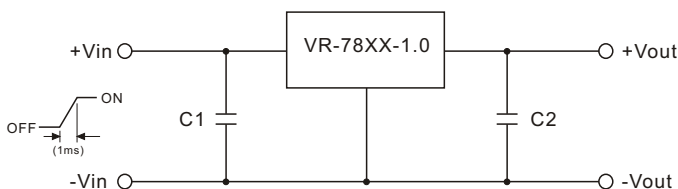
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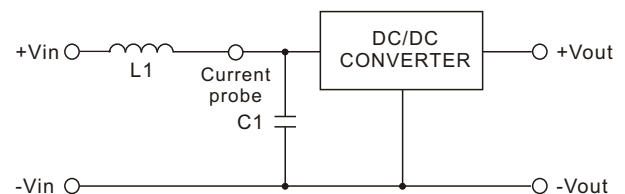
	C1	L	C2
VR-78XX-1.0	470μF,35V	6.4μH	470μF,35V

STANDARD APPLICATION CIRCUIT



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

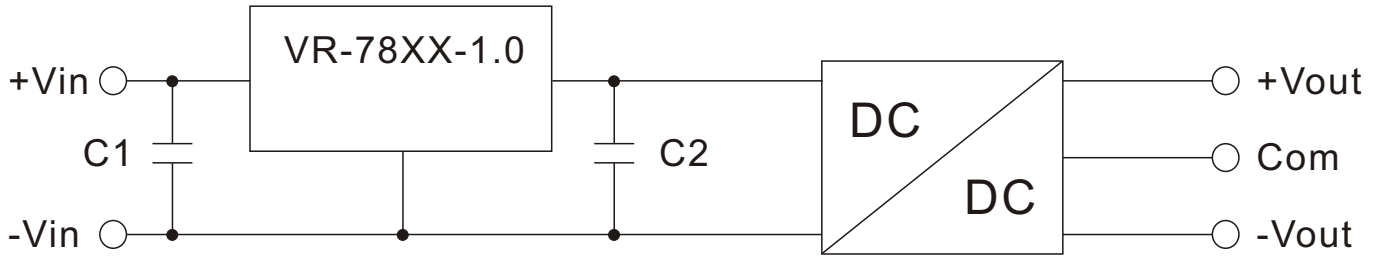
TEST CONFIGURATIONS



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

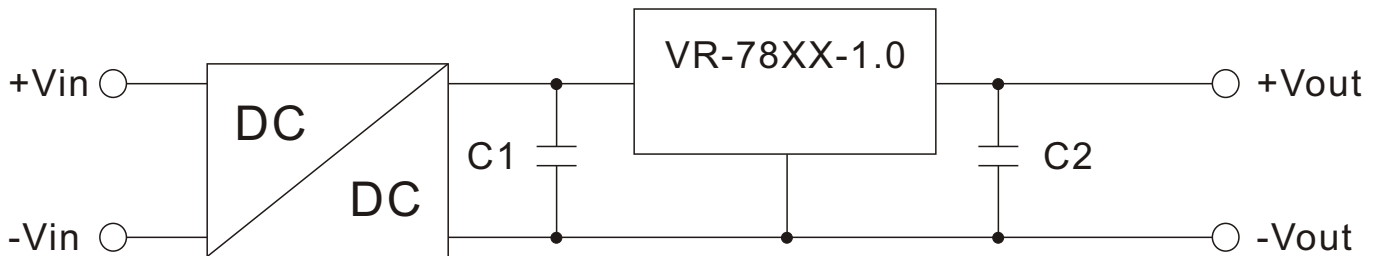
APPLICATION EXAMPLES

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



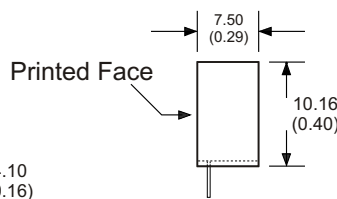
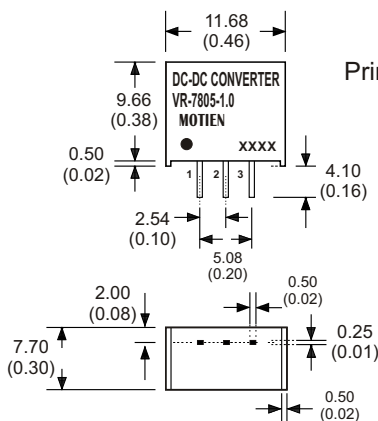
- Isolated dual outputs
- Wide input range 4.75V to 18V
- C1: Optional
- C2: Required (further decoupling filtering may be necessary between the two converters)

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 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