MR08xxRUI Series

Ultra-Wide Input, 8W Compact DIP, Railway DC/DC Converters



Key Features:

- 8W Output Power
- Ultra-Wide Input Range
- Compact DIP Case
- 3,000 VDC I/O Isolation
- Meets EN 50155
- Single & Dual Outputs
- 40°C to +85°C Operation
- Industry Standard Pin-Out

RoHS

Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Input

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range	24 VDC Input	13.0	24.0	70.0	VDC
	110 VDC Input	42.0	110.0	176.0	
Input Start Voltage	24 VDC Input			12.6	VDC
	110 VDC Input			41.0	
Under Voltage Shutdown	24 VDC Input	11.4			VDC
	110 VDC Input	37.0			
Input Filter	π (Pi) Filter				
Start Up Time	Nominal Input, Full Load		30		mS

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy			±1.0		%
Line Regulation	V_{IN} = Min to Max			±0.5	%
Load Regulation	I_{OUT} = 0% to 100%			±0.5	%
Cross Regulation, Dual Output	See Note 2			±5.0	%
Ripple & Noise (20 MHz)	See Note 3			75	mV P - P
Transient Recovery Time, See Note 4	25% Load Step Change		250		μSec
Transient Response Deviation			±3.0		%
Output Power Protection	See Note 5		160		% I_{OUT}
Temperature Coefficient			±0.02		%/°C
Output Short Circuit Protection	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage (Input/Output)	60 Seconds	3,000			VDC
Isolation Voltage (Case/Input, Output)	60 Seconds	1,000			
Isolation Resistance	500 VDC	1,000			MΩ
Isolation Capacitance	100 kHz/1V		1,000		pF
Switching Frequency	24 VDC Input		330		kHz
	110 VDC Input		220		

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions	EN 50121-3-2	30 - 230 MHz	40 dBμV
		230 - 1,000 MHz	47 dBμV
Conducted Emissions, See Note 6	EN 50121-3-2	0.15 - 0.5 MHz	99 dBμV
		0.5 - 30.0 MHz	93 dBμV
ESD	EN 50121-3-2	A	Air ±8 kV
			Contact ±6 kV
RS	EN 50121-3-2	A	20 V/m
EFT, See Note 7	EN 50121-3-2	A	2.0 kV
Surge, See Note 7	EN 50121-3-2	A	2.0 kV
CS	EN 50121-3-2	A	10V
PFMF	EN 61000-4-8	A	10 A/m

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40		+85	°C
Operating Temperature Range	Case			+105	°C
Storage Temperature Range		-55		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing		95		%

Physical

Case Size	See Mechanical Drawing (Page 2)
Case Material	Copper With Nickel Coating (UL94V-0)
Weight	0.63 Oz (18g)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	800			kHours

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	24 VDC Input	-0.7		100.0	VDC
	110 VDC Input	-0.7		185.0	
Lead Temperature	1.5 mm From Case For 10 Sec			260	°C

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

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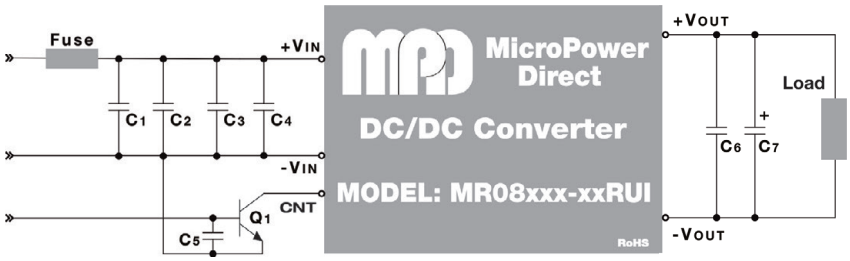
Model Selection Guide

Model Number	Input				Output		Over Voltage Protection (VDC Typ)	Input Reflected Ripple (mA P-P Typ)	Max Capacitive Load (µF Max)	Efficiency (%, Typ)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)					
	Nominal	Range	Full-Load	No-Load							
MR0802S-03RUI	24	13.0 - 70.0	397	30	3.3	2,400	3.9	20	1,330	83	800
MR0802S-05RUI	24	13.0 - 70.0	387	20	5.0	1,600	6.2	20	1,330	86	800
MR0802S-12RUI	24	13.0 - 70.0	391	10	12.0	665	15.0	20	330	85	800
MR0802S-15RUI	24	13.0 - 70.0	388	10	15.0	535	18.0	20	220	86	800
MR0802D-05RUI	24	13.0 - 70.0	401	10	±5.0	±800	±6.2	20	900	83	800
MR0802D-12RUI	24	13.0 - 70.0	394	10	±12.0	±335	±15.0	20	220	85	800
MR0802D-15RUI	24	13.0 - 70.0	385	10	±15.0	±265	±18.0	20	100	86	800
MR0811S-03RUI	110	42.0 - 176.0	88	10	3.3	2,400	3.9	20	1,330	81	200
MR0811S-05RUI	110	42.0 - 176.0	86	10	5.0	1,600	6.2	20	1,330	84	200
MR0811S-12RUI	110	42.0 - 176.0	86	5	12.0	665	15.0	20	330	84	200
MR0811S-15RUI	110	42.0 - 176.0	87	5	15.0	535	18.0	20	220	83	200
MR0811D-05RUI	110	42.0 - 176.0	90	10	±5.0	±800	±6.2	20	900	80	200
MR0811D-12RUI	110	42.0 - 176.0	89	5	±12.0	±335	±15.0	20	220	82	200
MR0811D-15RUI	110	42.0 - 176.0	87	5	±15.0	±265	±18.0	20	100	83	200

Notes:

1. The specified maximum capacitive load is for each output.
2. When measuring cross regulation, the load on one output is varied from 25% to 100% while the other output is held at 100%.
3. When measuring output ripple, it is recommended that an external 0.1 µF ceramic capacitor be placed in parallel with a 10 µF electrolytic capacitor from the +VOUT pin to the -VOUT pin for single output units and from each output to common for dual output units. This is illustrated by capacitors C6 and C7 in the typical connection diagram at right.
4. Transient recovery is measured to within a 1% error band for a 75% - 50% - 25% load change.
5. Output overload protection is provided by a "hiccup mode" circuit with auto-recovery.
6. The input capacitors shown in the connection diagram (C2, C3 & C4) are used on 110V input models to achieve 79 dBµV from 0.15 - 0.5 MHz and 73 dBµV from 0.5 - 30 MHz. They are ceramic, 1 µF, 250V capacitors and should be mounted as close to the unit as possible.
7. To meet the EFT and surge requirements of EN 50121-3-2, an external input capacitor is required, as shown in the connection diagram at right (C1). For the 24 VIN models a single 330 µF/100V electolytic capacitor is recommended. For the 110 VIN models, two 100 µF/250V electrolytic capacitors connected in parallel are recommended.
8. Operation at no-load will not damage these units. However, they may not meet all specifications.
9. It is recommended that a fuse be used on the input of a power supply for protection. See the table above for the correct rating.

Recommended Input/Ouput Components



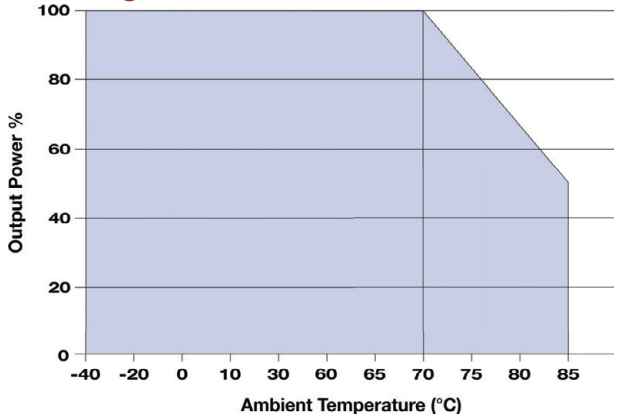
Remote ON/OFF Control

All models of the **MR08xxx-RUI** series include an on/off control input (Pin 1). This input uses positive logic to enable/disable the unit. When the input is "high", the unit operates, when it is "low", the unit is off.

The chart at right gives the specifications for the control input. In the diagram above, an open collector switch is used (Q1). The control input should be left floating if it is not being used. Shorting the control pin to the -VIN input (pins 2 & 3) will turn the unit off.

Parameter	Min.	Typ.	Max.	Units
Unit On	3.0		12.0	VDC
Unit Off	0.0		1.2	VDC
Off Idle Current		5.0		mA
Control Common	Referenced To Negative Input (Pin 2)			

Derating Curve

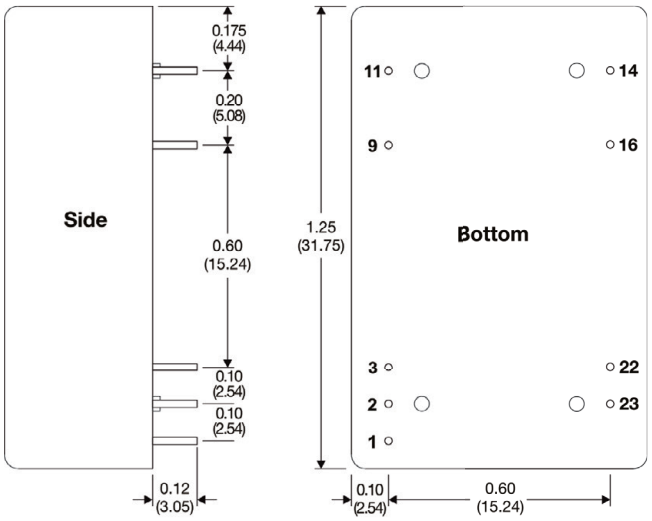


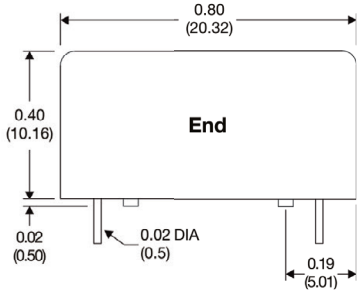
Pin Connections

Pin	Single	Dual
1	Remote ON/OFF	Remote ON/OFF
2	-VIN	-VIN
3	-VIN	-VIN
9	No Pin	Common
11	NC	-VOUT
14	+VOUT	+VOUT
16	-VOUT	Common
22	+VIN	+VIN
23	+VIN	+VIN

NC: No Connection

Mechanical Dimensions





Mechanical Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.02 (±0.50)

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