

20 Watt**1.00x1.00 Inch Package C
4:1 Input Range**

- o Efficiency up to 89%
- o Wide Input Range
- o Soft Start
- o No Minimum Load Required
- o Adjustable Output Voltage
- o Remote ON/OFF Control
- o Over Current Protection
- o Over Voltage Protection
- o Continuous Short Circuit Protection



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT (FULL LOAD)	INPUT CURRENT		%EFF	CAPACITOR LOAD
				NO LOAD	FULL LOAD		
20CRS24X3.3M	9-36 VDC	3.3 VDC	4500 mA	50 mA	703 mA	88	10000 µF
20CRS24X5M		5 VDC	4000 mA				22 mA
20CRS24X12M		12 VDC	1670 mA	700 µF			
20CRS24X15M		15 VDC	1330 mA		±470 µF		
20CRD24X12M		±12 VDC	±833 mA	±330 µF			
20CRD24X15M		±15 VDC	±667 mA				
20CRS48X3.3M	18-75 VDC	3.3 VDC	4500 mA	30 mA	352 mA	88	10000 µF
20CRS48X5M		5 VDC	4000 mA				15 mA
20CRS48X12M		12 VDC	1670 mA	850 µF			
20CRS48X15M		15 VDC	1330 mA		700 µF		
20CRD48X12M		±12 VDC	±833 mA	±470 µF			
20CRD48X15M		±15 VDC	±667 mA		±330 µF		

SPECIFICATIONS

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

INPUT SPECIFICATIONS		
Input Voltage Range		4:1
Undervoltage Lockout	24 V Models Module ON/OFF 48 V Models Module ON/OFF	8.6/7.9 VDC 17.8/15.5 VDC
Start up Time (Nominal Vin and constant resistive Load)		30 mS
Input Current (No-Load)		see table max.
Input Current (Full-Load)		see table
Input Reflected Ripple Current ¹⁾		30 mA p-p
Positive Logic Remote ON/OFF ²⁾	ON OFF OFF idle current	3.0 - 12 VDC or open circuit 0-1.2 VDC or Short Circuit Pin2 and Pin3 5 mA
Input Filter		Pi Type

OUTPUT SPECIFICATIONS		
Voltage Accuracy		±1%
Output Voltage Adjustability (Trim)		Single output ±10% max.
Maximum Output Current		see table
Minimum Output Current		0 mA
Cross Regulation (Dual Output) ³⁾		±5%
Ripple and Noise at 20 MHz BW ⁴⁾	3.3, 5 V 12, 15, ±12, ±15 V	75 mV p-p max. 100 mV p-p max.
Temperature Coefficient		±0.02%/°C
Capacitive Load ⁵⁾		see table
Transient Recovery Time ⁶⁾		250 µS
Short Circuit Protection		Indefinite (hiccup) (Automatic Recovery)
Line Regulation		±0.5% max.
Load Regulation (Io=0% to 100%)	Single Dual	±0.5% max. ±1% max. (balanced load)
Over Voltage Protection (Zener Diode Clamp)	3.3 V 5 V 12 V 15 V ±12 V ±15 V	3.9 V 6.2 V 15 V 18 V ±15 V ±18 V
Over Current Protection		140% of FL.

NOTE:

1. Measured Input reflected ripple current with a simulated source inductance of 12 µH and a source capacitor Cin (47 µF, ESR < 1.0 Ohm at 100 kHz).
2. The remote on/off control pin is referenced to -Vin (pin2).
3. One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
4. Measured with a 1.0 µF ceramic capacitor and 10 µF tantalum capacitor.
5. Tested by minimal Vin and constant resistive load.
6. Tested by normal Vin and 25% load step change (75%-50%-25% of Io).

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GENERAL SPECIFICATION		
Efficiency		see table
I/O Isolation Voltage (3 sec)	Input / Output	1600 VDC
	Input / Case	1600 VDC
	Output / Case	1600 VDC
Isolation Resistance		1000 MOhms min.
Isolation Capacitance		1500 pF max.
Switching Frequency		330 kHz
Operating Ambient Temperature		-40°C to +75°C (see derating curve) -40°C to +55°C (for 100% Load)
Maximum Case Temperature		+105°C
Storage Temperature		-55°C to +125°C
Cooling		Nature Convection
Humidity		95% rel H
Reliability Calculated MTBF (MIL-HDBK-217F)		>560 khrs
Safety Standard (designed to meet)		IEC/EN 60950-1
Radiated Emissions		EN55022 Class A
Conducted Emissions ⁷⁾		EN55022 Class A
ESD		EN61000-4-2 Perf. Criteria A
RS		EN61000-4-3 Perf. Criteria A
EFT ⁸⁾		EN61000-4-4 Perf. Criteria A
Surge ⁸⁾		EN61000-4-5 Perf. Criteria A
CS		EN61000-4-6 Perf. Criteria A
PFMF		EN61000-4-8 Perf. Criteria A
Dimensions		1.00 x 1.00 x 0.40 Inches (25.4 x 25.4 x 10.16 mm)
Case Material		Nickel-coated Copper
Base Material		Non-conductive Black Plastic (UL94V-0 rated)
Pin Material		Ø1.0 mm Brass Solder-coated
Potting Material		Epoxy (UL94V-0 rated)
Weight		19.0 g

NOTE:

7. Input filter meets EN55022 Class A without external components.
 8. An external filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5.
 The filter capacitor M+R Multitronik suggest: Nippon chemi-con KY series, 220 µF/100V.

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ABSOLUTE SPECIFICATIONS

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

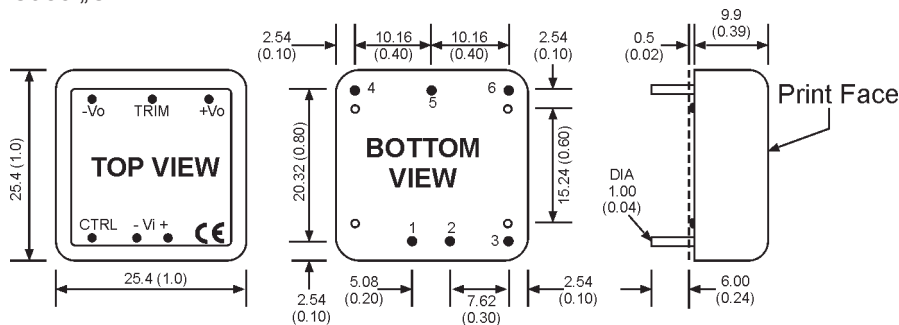
Input Voltage (100 mS)	24 V	50 VDC max.
	48 V	100 VDC max.
Soldering Temperature (1.5 mm from case 10 sec. max.)		+260°C max.

NOTE:

Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

MECHANICAL SPECIFICATIONS

Case „C“



All Dimensions are typical in mm (Inches)

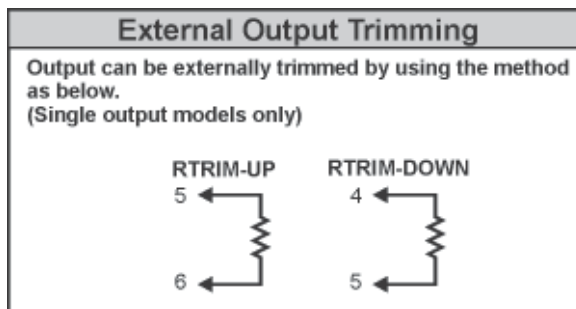
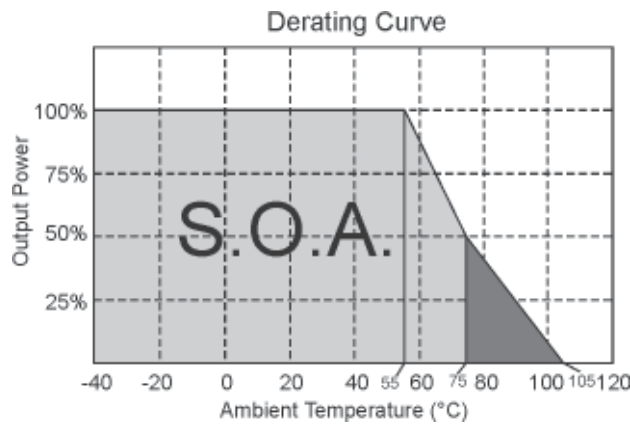
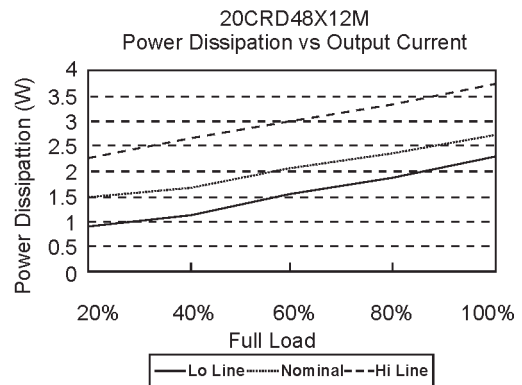
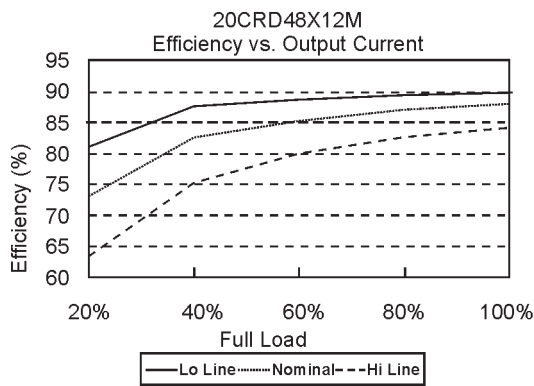
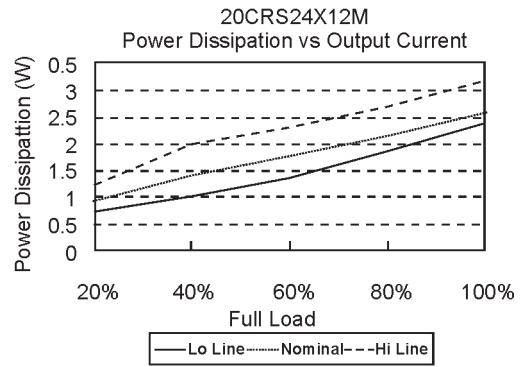
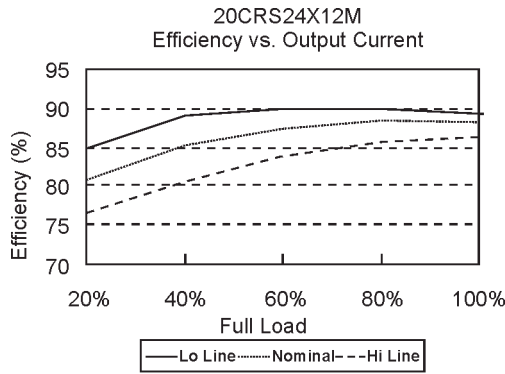
1. Pin diameter: 1.0 ± 0.05 (0.04 ± 0.002)
2. Pin pitch tolerance: ± 0.35 (± 0.014)
3. Case Tolerance: ± 0.5 (± 0.02)
4. Stand-off tolerance: ± 0.1 (± 0.004)

PIN CONNECTIONS		
	Single	Dual
1	+INPUT	+INPUT
2	-INPUT	-INPUT
3	REMOTE CONTROL	REMOTE CONTROL
4	+OUTPUT	+OUTPUT
5	TRIM	COM
6	-OUTPUT	-OUTPUT

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DIAGRAMS



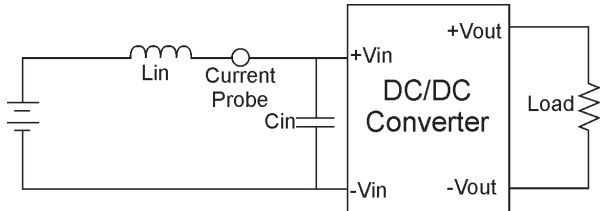
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TEST CONFIGURATIONS

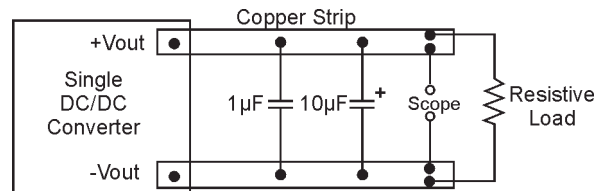
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor L_{in} (12 μ H) and a source capacitor C_{in} (47 μ F, ESR <1.0 Ohms at 100 kHz) at nominal input and full load.



Output Ripple & Noise Measurement Test

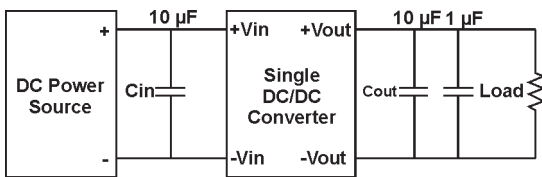
Measured with a 1.0 μ F MLCC capacitor and a 10 μ F tantalum capacitor. The Scope measurement bandwidth is 0-20 MHz.



DESIGN & FEATURE CONFIGURATIONS

Output Ripple & Noise Reduction

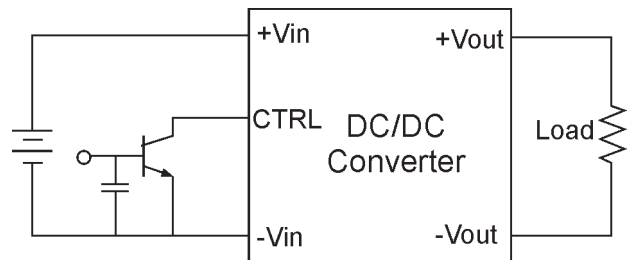
To reduce ripple and noise, it is recommended to use a 1 μ F ceramic disk capacitor and a 10 μ F electrolytic capacitor at the output.



CTRL Modul ON/OFF

Positive logic turns on the module during high logic and off during low logic.

CTRL module on/off can be controlled by an external switch between the control terminal and -Vin terminal. The switch can be an open collector or open drain. For positive logic if the CTRL feature is not used, please leave the CTRL pin floating.



Over Voltage Protection

The module includes an internal output over voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over voltage set point, the module will activate the control loop of internal circuit to clamp the output voltage.

Over Current Protection

The module includes an internal over current protection circuit, which will endure current limiting for an unlimited duration during output over load condition. If the output current exceeds the OCP set point, the module will shut down automatically (hiccup).

The module will try to restart after shut down.

If the over load condition still exists, the module will shut down again.

NOTICE:

The information in this document has been carefully checked. However, no responsibility is assumed for inaccuracies! Specifications can be changed without notice. The latest and most complete information can be found on our website.