

CRW-20W Series

20W Ultra Wide Input Range Regulated Single & Dual output



Features

- Ultra Wide Input Range
- 3000 VDC Isolation
- Efficiency up to 90%
- Operating Temperature Range -40 ~ 100°C max.
- Adjustable Output Voltage
- Remote ON/OFF Control (CTRL)
- Continuous Short Circuit Protection
- Over Load Protection
- Over Voltage Protection
- Under Voltage lock-out circuit
- EN50155 approval for Railway applications
- Built-in EMI filter meets EN50121-3-2 without external components



PART NUMBER STRUCTURE

CRW - **24** **12** **S** **20** **K**
(1) (2) (3) (4) (5) (6)

(1) Series

(2) Input Voltage Range

24 - 13-70 V
110 - 42-176 V

(4) Output Type

S - Single Output
D - Dual Output

(3) Output Voltage

3R3 - 3.3 V
05 - 5.0 V
12 - 12 V
15 - 15 V

(5) Watt

(6) K- Heat sink case

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ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED

Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current		Efficiency @FL (% , typ.)	Capacitive Load @FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)		
CRW-243R3S20K	13 ~ 70	10	711	3.3	0	4500	87	7000
CRW-2405S20K	13 ~ 70	10	936	5	0	4000	89	5000
CRW-2412S20K	13 ~ 70	10	926	12	0	1670	90	850
CRW-2415S20K	13 ~ 70	10	926	15	0	1330	90	700
CRW-1103R3S20K	42 ~ 176	10	158	3.3	0	4500	85.5	7000
CRW-11005S20K	42 ~ 176	10	208	5	0	4000	87.5	5000
CRW-11012S20K	42 ~ 176	10	211	12	0	1670	86	850
CRW-11015S20K	42 ~ 176	10	209	15	0	1330	87	700
CRW-2405D20K	13 ~ 70	10	963	±5	0	±2000	86.5	±1000
CRW-2412D20K	13 ~ 70	10	916	±12	0	±833	91	±680
CRW-2415D20K	13 ~ 70	10	926	±15	0	±666	90	±470
CRW-11005D20K	42 ~ 176	10	214	±5	0	±2000	85	±1000
CRW-11012D20K	42 ~ 176	10	209	±12	0	±833	87	±680
CRW-11015D20K	42 ~ 176	10	209	±15	0	±666	87	±470

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INPUT SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range	24V Input		13	24	70	VDC
	110V Input		42	110	176	
Under Voltage Protection	24V Input	Module ON		12.3		VDC
		Module OFF		11.6		
	110V Input	Module ON		40.5		
		Module OFF		38.4		
Input Filter			Pi Type			
Input Reflected Ripple Current (1)				20		mApk-pk
Start up Time	Nominal Vin and constant resistive load			30		ms
Remote ON/OFF Control (2)	Module ON (Open Circuit)		3.0		12	VDC
	Module OFF (Short circuit pin 2 and pin 3)		0		1.2	
	OFF idle current			3.0		mA
Recommended input fuse (slow blow)	24V Input		3			A
	110V Input		1			
Note :						
1. Measured with a simulated source inductance of 12μH and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz).						
2. The remote ON/OFF control pin is referenced to –Vin (pin2).						

OUTPUT SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			-1.0		+1.0	%
Output Voltage Adjustability (Trim)	For Single output		-10		+10	%
Line Regulation			-0.5		+0.5	%
Load Regulation	From 0% to 100% Load	Single Output	-0.5		+0.5	%
		Dual Output (balanced load)	-1.0		+1.0	
Cross Regulation	Asymmetrical Load 25% / 100% for Dual Output		-5		+5	%
Ripple & Noise (1)	20MHz bandwidth				75	mVpk-pk
Over Voltage Protection (Zener diode clamp)	3.3V Output			3.9		VDC
	5V Output			6.2		
	12V Output			15		
	15V Output			18		
Over Current Protection				170		% of FL
Short Circuit Protection			Indefinite (hiccup) (Automatic Recovery)			
Temperature Coefficient			-0.02		+0.02	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load		See Table			
Transient Recovery Time	Nominal Vin and 25% load step change (75%-50%-25% of Io)	For All models		250		µs
Transient Response Deviation		3.3V Single Output	-5		+5	%
		Other Output	-3		+3	
Note :						
1. Measured with a 10µF MLCC.						

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ABSOLUTE MAXIMUM RATINGS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	24V Input			100	VDC
	110V Input			185	
Soldering Temperature	1.5mm from case 10sec max.			260	°C

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

GENERAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, and rated for 60sec	3000			VDC
	Case-I/O, and rated for 60sec	1600			
Isolation Resistance	Input-output	1000			MΩ
Isolation Capacitance	Input-output		2000		pF
Switching Frequency	24V Models		330		kHz
	110V Models		245		
MTBF	MIL-HDBK-217 F @ 25°C	190			k hours
Safety Approval	IEC / EN / UL 62368-1	Designed to meet			
Environmental compliance		RoHS			

ENVIRONMENT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve	-40		100	°C
Maximum Case Temperature				105	°C
Thermal Impedance		11.5			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65 LFM			

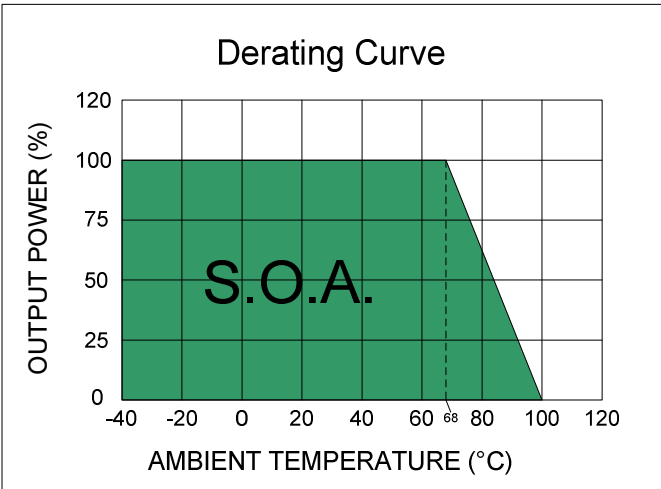
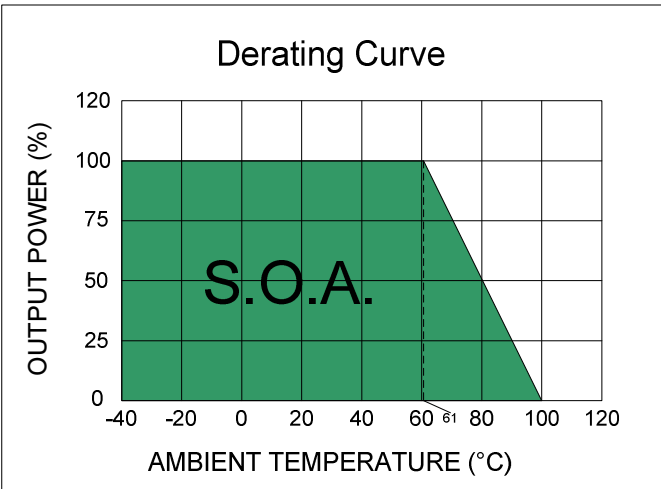
EMC SPECIFICATIONS

Parameter	Standard	Condition	Criterion
Conducted Emissions	EN50121-3-2	99dBμV from 0.15-0.5MHz , 93dBμV from 0.5-30MHz	
Radiated Emissions	EN50121-3-2	40dBμV from 30-230MHz , 47dBμV from 230-1000MHz	
ESD	IEC 61000-4-2	Contact: ± 6kV	A
RS	IEC 61000-4-3	20V/m	A
EFT	IEC 61000-4-4	±2kV with external components	A
Surge	IEC 61000-4-5	±2kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	100A/m	A

PHYSICAL SPECIFICATIONS

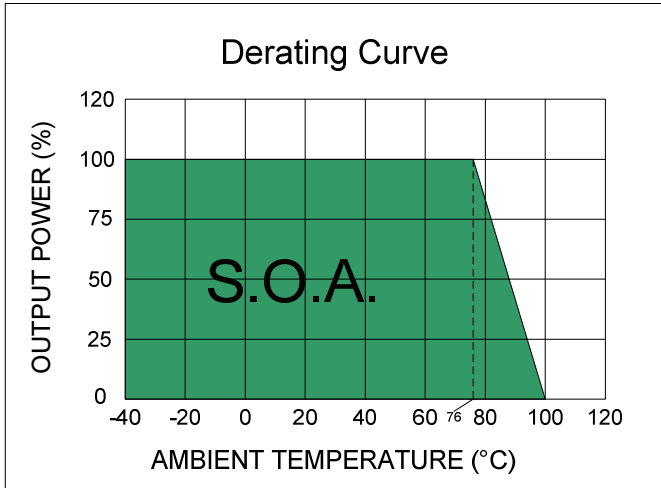
Parameter	Value
Case Material	Aluminum
Base Material	Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	Ø1.0mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	22.7g, typ.
Dimensions	1.09" x 1.09" x 0.65"

ELECTRICAL CHARACTERISTIC CURVES



Efficiency 85% ~ 86% Models

Efficiency 87% ~ 89% Models



Efficiency 90% ~ 91% Models

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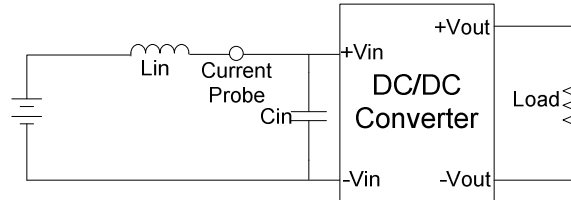
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TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

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



DESIGN & FEATURE CONFIGURATIONS

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.

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.

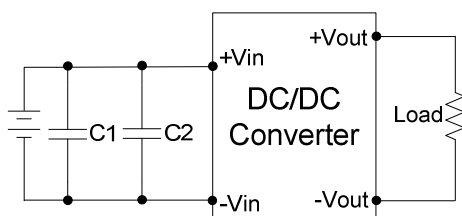
Remote Module ON / OFF

Positive logic turns on the module during high logic and off during low logic. Remote module ON/OFF can be controlled by an external switch between the CTRL terminal and -Vin terminal. For positive logic if the remote feature is not used, please leave the CTRL pin floating.

DESIGN & FEATURE CONFIGURATIONS

EMS Filter

The Circuit is used to meet Surge & EFT test.



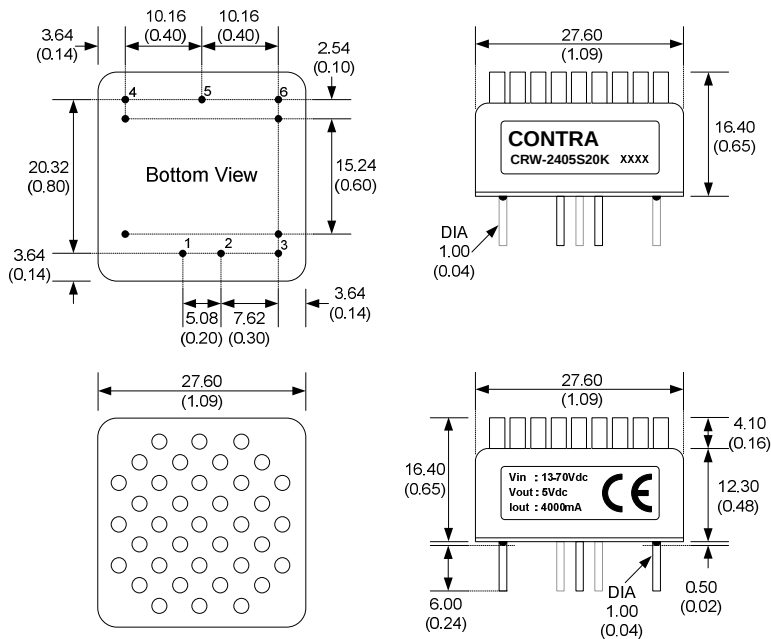
	C1	C2
CRW-24XXX20	NIPPON Chemi-con KY series 330 μF , 100V	
CRW-110XXX20	Ruby-con BXF series 100 μF , 250V	Ruby-con BXF series 100 μF , 250V

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MECHANICAL SPECIFICATIONS



Notes : All dimensions are typical in millimeters (inches).

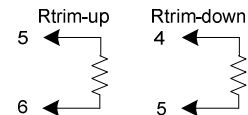
1. Pin diameter: 1.0 ± 0.05 (0.04 ± 0.002)
2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
3. Case tolerance: ± 0.5 (± 0.02)
4. Stand-off tolerance: ± 0.1 (± 0.004)

PIN CONNECTIONS

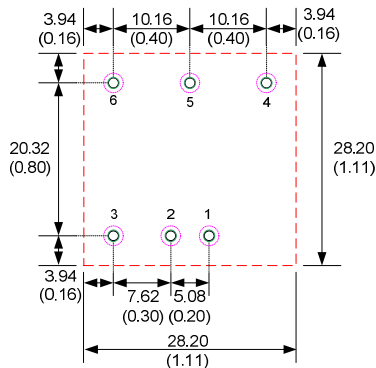
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	+Vout	+Vout
5	Trim	COM
6	-Vout	-Vout

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method as below. (single output models only)



RECOMMENDED FOOTPRINT DETAILS



Notes : 1. All dimensions are typical in millimeters (inches).

- Through hole (black) 1~6: $\varnothing 1.3$ (0.051)
- Top view pad (green) 1~6: $\varnothing 1.5$ (0.059)
- Bottom view pad (pink) 1~6: $\varnothing 2.6$ (0.102)