Size: 2in x 1in x 0.40in
(50.8mm x 25.4mm x 10.2mm)

FEATURES

- 4:1 Wide Input Voltage Ranges
- High Efficiency up to 92%
- Remote ON/OFF Control
- Six-Sided Continuous Shielding
- Low Stand-by Power Consumption
- No Minimum Load Required
- Single and Dual Outputs
- 1600VDC I/O Isolation
- 60 Watts Maximum Output Power
- Short Circuit, Over Voltage, Over Load, & Over Temp. Protection
- CE Mark
- RoHS & REACH Compliant
- IEC/UL/EN60950-1, 62368-1 Safety Approvals
- Optional Heatsinks Available

APPLICATIONS

- Automation
- Datacom
- IPC
- Industrial
- Measurement
- Datacom

DESCRIPTION

The CRW60 series of DC/DC power converters provides 60 Watts of output power in an industry standard 2.00” x 1.00” x 0.40” package and footprint. This series has single and dual output models with 4:1 ultra wide input voltage ranges of 9-36VDC and 18-75VDC. Some features include high efficiency up to 92%, 1600VDC I/O isolation, six-sided shielding, and remote ON/OFF control. These converters are also protected against short circuit, over voltage, over load, and over temperature conditions. All models are RoHS compliant and have IEC/UL/EN60950-1, 62368-1 safety approvals. This series is best suited for use in automation, datacom, IPC, industrial, measurement, and datacom applications.

MODEL SELECTION TABLE

SINGLE OUTPUT MODELS

Model Number	Input Voltage Range	Output Voltage	Output Current		Output Ripple & Noise	No Load Input Current	Output Power	Efficiency	Maximum Capacitive Load
			Min Load	Max Load					
CRW24S33-60	24 VDC (9 - 36 VDC)	3.3 VDC	0mA	12A	75mVp-p	10mA	39.6W	90%	32,000µF
CRW24S05-60		5 VDC	0mA	12A	75mVp-p	10mA	60W	92%	30,000µF
CRW24S12-60		12 VDC	0mA	5A	100mVp-p	10mA	60W	92%	5850µF
CRW24S15-60		15 VDC	0mA	4A	100mVp-p	10mA	60W	92%	3900µF
CRW24S24-60		24 VDC	0mA	2.5A	150mVp-p	10mA	60W	92%	2000µF
CRW48S33-60	48 VDC (18 - 75 VDC)	3.3 VDC	0mA	12A	75mVp-p	10mA	39.6W	90%	32,000µF
CRW48S05-60		5 VDC	0mA	12A	75mVp-p	10mA	60W	92%	30,000µF
CRW48S12-60		12 VDC	0mA	5A	100mVp-p	10mA	60W	92%	5850µF
CRW48S15-60		15 VDC	0mA	4A	100mVp-p	10mA	60W	92%	3900µF
CRW48S24-60		24 VDC	0mA	2.5A	150mVp-p	10mA	60W	91%	2000µF

DUAL OUTPUT MODELS

Model Number	Input Voltage Range	Output Voltage	Output Current		Output Ripple & Noise	No Load Input Current	Output Power	Efficiency	Maximum Capacitive Load
			Min Load	Max Load					
CRW24D12-60	24 VDC (9 - 36 VDC)	±12 VDC	0mA	±2.5A	100mVp-p	10mA	60W	91%	±3900µF
CRW24D15-60		±15 VDC	0mA	±2A	100mVp-p	10mA	60W	91%	±2400µF
CRW24D24-60		±24 VDC	0mA	±1.25A	150mVp-p	10mA	60W	91%	±1000µF
CRW48D12-60	48 VDC (18 - 75 VDC)	±12 VDC	0mA	±2.5A	100mVp-p	10mA	60W	91%	±3900µF
CRW48D15-60		±15 VDC	0mA	±2A	100mVp-p	10mA	60W	91%	±2400µF
CRW48D24-60		±24 VDC	0mA	±1.25A	150mVp-p	10mA	60W	91%	±1000µF

SPECIFICATIONS: CRW60 SERIES

All specifications are typical at 25°C, Nominal Input, and Full Load unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
INPUT SPECIFICATIONS						
Input Voltage Range	24VDC nominal input models		9	24	36	VDC
	48VDC nominal input models		18	48	75	
Start-Up Voltage	24VDC nominal input models				9	VDC
	48VDC nominal input models				18	
Shutdown Voltage	24VDC nominal input models		7	8	8.8	VDC
	48VDC nominal input models		15	16	17.5	
Input Surge Voltage (1sec, max.)	24VDC nominal input models				50	VDC
	48VDC nominal input models				100	
Input Current	No Load		See Table			
Input Filter			Pi type			
OUTPUT SPECIFICATIONS						
Output Voltage			See Table			
Voltage Accuracy			-1.0		+1.0	%
Line Regulation	Low Line to High Line at Full Load		-0.2		+0.2	%
Load Regulation	No Load to Full Load	Single Output Models	-0.5		+0.5	%
		Dual Output Models	-1.0		+1.0	
Cross Regulation	Asymmetrical load 25% / 100% FL, Dual Output Models		-5.0		+5.0	%
Voltage Adjustability	Single Output Models	3.3V, 5V, & 12V Output Models	-10		+10	%
		15V & 24V Outputs Models	-10		+20	
Output Power			See Table			
Output Current			See Table			
Minimum Load			0			%
Maximum Capacitive Load			See Table			
Ripple & Noise (20MHz BW)	Measured with a 10µF/25V X7R MLCC	3.3V & 5V Output Models		75	100	mVp-p
	Measured with a 10µF/25V X7R MLCC	12V & 15V Output Models		100	125	
	Measured with a 4.7µF/50V X7R MLCC	24V Output Models		150	200	
Transient Response Recovery Time	25% Load Step Change			250		µs
Start-Up Time	Constant Resistive Load	Power Up		60		ms
		Remote On/Off		60		
Temperature Coefficient			-0.02		+0.02	%/°C
PROTECTION						
Short Circuit Protection			Continuous, automatic recovery			
Over Load Protection	% of Rated Iout; Hiccup Mode			150		%
Over Voltage Protection	Zener diode clamp	3.3V Output Models		3.9		VDC
		5V Output Models		6.2		
		12V Output Models		15		
		15V Output Models		20		
		24 V Output Models		30		
Over Temperature Protection				+115		°C
GENERAL SPECIFICATIONS						
Efficiency			See Table			
Switching Frequency			225	250	275	kHz
Isolation Voltage	1 minute	Input to Output	1600			VDC
		Input (Output) to Case	1600			
Isolation Resistance	500VDC		1			GΩ
Isolation Capacitance					2200	pF
REMOTE ON/OFF (See Note 3)						
Positive Logic (standard)	Referenced to –Vin pin	DC/DC ON	Open or 3V ~ 12 VDC			
		DC/DC OFF	Short or 0 ~ 1.2 VDC			
Negative Logic (optional)	Referenced to –Vin pin	DC/DC ON	Short or 0 ~ 1.2 VDC			
		DC/DC OFF	Open or 3V ~ 12 VDC			
Input Current of Ctrl Pin			-0.5		+0.5	mA
Remote OFF Input Current				3		mA

SPECIFICATIONS: CRW60 SERIES

All specifications are typical at 25°C, Nominal Input, and Full Load unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
ENVIRONMENTAL SPECIFICATIONS						
Operating Ambient Temperature	With Derating	Standard	-40		+105	°C
		M3 Version	-55		+105	
Maximum Case Temperature					+105	°C
Storage Temperature			-55		+125	°C
Thermal Impedance (See Note 4)	Without Heatsink			10.8		°C/W
	With Heatsink	HC1		8.3		
		HC2		7.0		
		HC3		5.7		
Relative Humidity			5		95	% RH
Thermal Shock			MIL-STD-810F			
Vibration			MIL-STD-810F			
MTBF	MIL-HDBK-217F, Full Load		858,200			hours
PHYSICAL SPECIFICATIONS						
Weight			1.16oz (33g)			
Dimensions (L x W x H)			2.00in x 1.00in x 0.40in (50.8mm x 25.4mm x 10.2 mm)			
Case Material			Copper			
Base Material			FR4 PCB			
Potting Material			Silicon (UL94-V0)			
Shielding			Six-sided			
SAFETY & EMC CHARACTERISTICS						
Safety Approvals (See Note 4)	IEC/UL/EN60950-1, 62368-1		CB: UL(Demko)			
EMI (See Note 1)	EN55032		Class A, Class B			
ESD	EN61000-4-2	Air ±8kV and Contact ±6kV	Perf. Criteria A			
Radiated Immunity	EN61000-4-3	20 V/m	Perf. Criteria A			
Fast Transient (See Note 2)	EN61000-4-4	±2kV	Perf. Criteria A			
Surge (See Note 2)	EN61000-4-5	±2kV	Perf. Criteria A			
Conducted Immunity	EN61000-4-6	10 Vrms	Perf. Criteria A			
Power Frequency Magnetic Field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A			

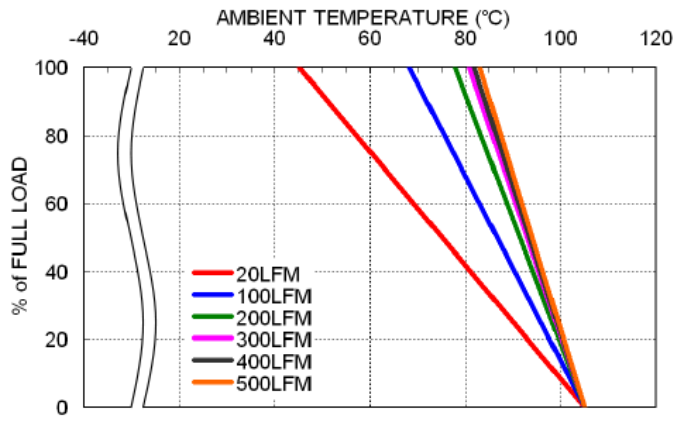
NOTES

1. The CRW60 series can only meet EMI Class A or Class B with external components added. Please contact factory for more information.
2. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
   For 24VDC nominal input models we recommend connecting an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ58A, 58V, 3000 Watt peak pulse power) diode in parallel.
   For 48VDC nominal input models we recommend connecting an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ120A, 120V, 3000 Watt peak pulse power) diode connected in parallel.
3. Both positive logic and negative logic remote ON/OFF control is available. Positive logic remote ON/OFF comes standard; for negative logic remote ON/OFF add the suffix "R" to the model number (Ex: CRW48S12-60R).
4. This product is Listed to applicable standards and requirements by UL.

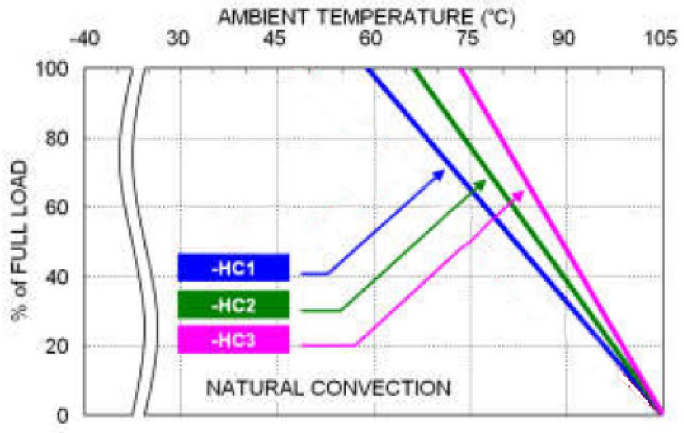
CAUTION: This power module is not internally fused. An input line fuse must always be used.
**Due to advances in technology, specifications subject to change without notice.*

DERATING GRAPHS

CRW48S12-60 Derating Curve

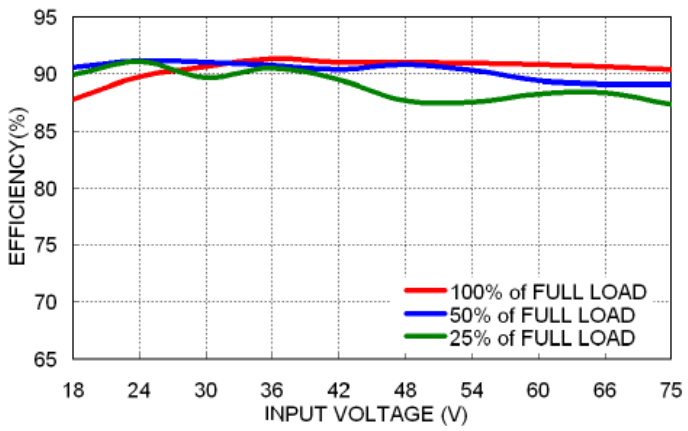


CRW48S12-60 Derating Curve with Heatsink

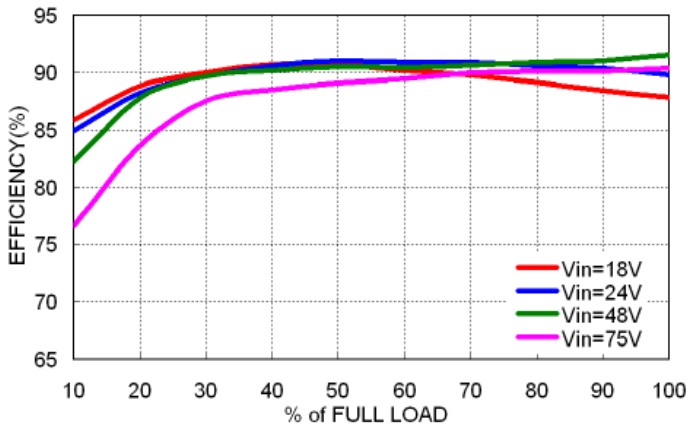


DERATING GRAPHS

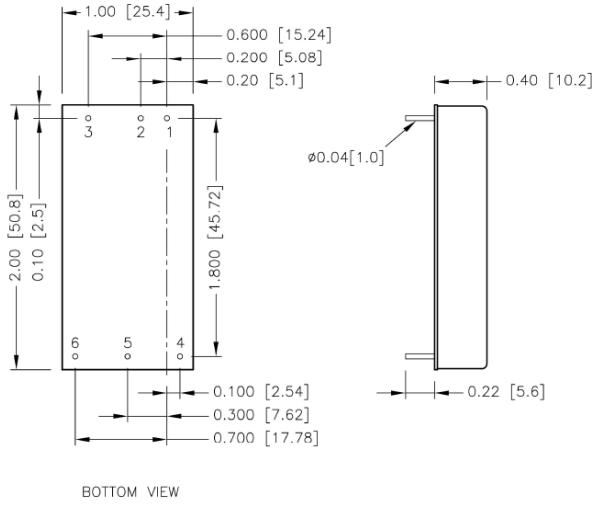
CRW48S12-60 Efficiency vs Input Voltage



CRW48S12-60 Efficiency vs Output Load



MECHANICAL DRAWINGS



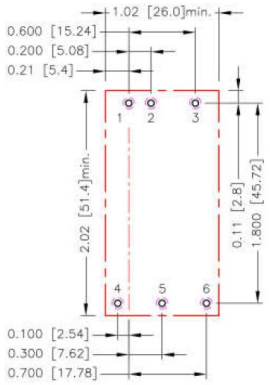
Pin Connection

Pin	Single	Dual
1	+Vin	+Vin
2	--Vin	-Vin
3	Ctrl	Ctrl
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout

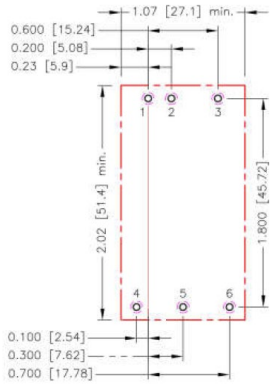
Note:
1. All dimensions in inch [mm]
   Tolerance: x.xx±0.02 [x.x±0.5]
   x.xxx±0.010 [x.xx±0.25]
2. Pin dimension tolerance ±0.004 [0.10]

RECOMMENDED PAD LAYOUT

Standard



-HC1, -HC2, -HC3



All dimensions in inch [mm]
Pad size (lead free recommended)
Through Hole 1.2.3.4.5.6:ϕ0.051 [1.30]
Top View Pad 1.2.3.4.5.6: ϕ0.064 [1.63]
Bottom View Pad 1.2.3.4.5.6: ϕ0.102 [2.60]

FUSE CONSIDERATION

This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from single stand-alone operation to an integrated part of sophisticated power architecture.
To maximum flexibility, internal fusing is not included, however, to achieve maximum safety and system protection, always use an input line fuse.
The input line fuse suggest as below:

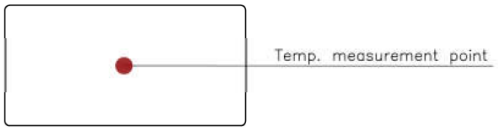
Model	Fuse Rating (A)	Fuse Type
24Vin Models	10A	Fast-Acting
48Vin Models	6.3A	Slow-Blow

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

THERMAL CONSIDERATION

The power module operates in a variety of thermal environments.
However, sufficient cooling should be provided to help ensure reliable operation of the unit.
Heat is removed by conduction, convection, and radiation to the surrounding environment.
Proper cooling can be verified by measuring the point in the figure below.
The temperature at this location should not exceed “Maximum Case Temperature”
When operating, adequate cooling must be provided to maintain the test point temperature at or below “Maximum Case Temperature”
You can limit this temperature to a lower value for extremely high reliability.

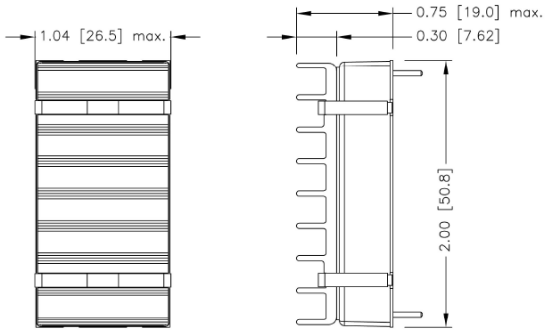
■ Thermal test condition with vertical direction by natural convection (20LFM).



TOP VIEW

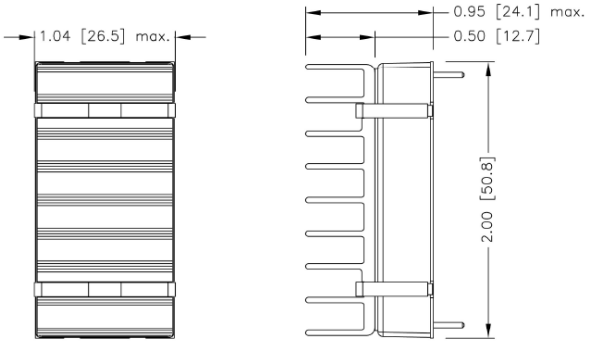
HEATSINK OPTIONS

“-HC1” 7GA0120P01-F



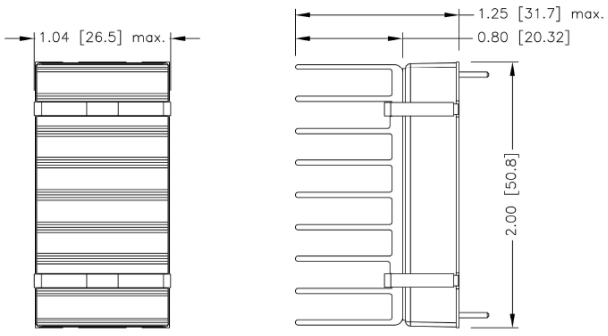
SIDE VIEW

‘-HC2” 7GA0121P01-F



SIDE VIEW

“-HC3” 7GA0122P01-F



SIDE VIEW

All dimensions in inch [mm]
Tolerance: x.xx±0.02 [x.x±0.5]
x.xxx±0.010 [x.xx±0.25]

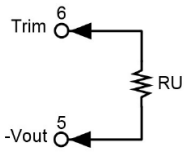
OUTPUT VOLTAGE ADJUSTMENT

Output voltage set point adjustment allows the user to increase or decrease the output voltage set point of the module.
This is accomplished by connecting an external resistor between the Trim pin and either the +output or -output pins.
With an external resistor between the Trim and -Output pin, the output voltage set point increases.
With an external resistor between the Trim and +Output pin, the output voltage set point decreases.
The external Trim resistor needs to be at least 1/8W of rated power.

EXTERAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.

Trim-Up



3.3VDC Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630
RU (kΩ)	57.93	26.165	15.577	10.283	7.106	4.988	3.476	2.341	1.459	0.753

5VDC Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.050	5.100	5.150	5.200	5.250	5.300	5.350	5.400	5.450	5.500
RU (kΩ)	36.57	16.58	9.917	6.585	4.586	3.253	2.302	1.588	1.032	0.588

12VDC Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200
RU (kΩ)	367.91	165.95	98.636	64.977	44.782	31.318	21.701	14.488	8.897	4.391

15VDC Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	15.150	15.300	15.450	15.600	15.750	15.900	16.050	16.200	16.350	16.500
RU (kΩ)	419.81	199.91	126.60	89.95	67.96	53.30	42.83	34.98	28.87	23.92

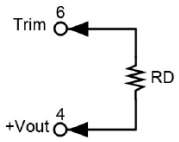
ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	16.650	16.800	16.950	17.100	17.250	17.400	17.550	17.700	17.850	18.00
RU (kΩ)	19.98	16.65	13.83	11.42	9.32	7.49	5.87	4.43	3.15	1.99

24VDC Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	24.240	24.480	24.720	24.960	25.200	25.440	25.680	25.920	26.160	26.400
RU (kΩ)	1275.2	606.60	383.73	272.30	205.44	160.87	129.03	105.15	86.58	71.72

ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	26.640	26.880	27.120	27.360	27.600	27.840	28.080	28.320	28.560	28.800
RU (kΩ)	59.56	49.43	40.86	33.51	27.15	21.57	16.66	12.29	8.38	4.86

Trim-Down



3.3VDC Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.970
RU (kΩ)	69.47	31.235	18.49	12.117	8.294	5.745	3.924	2.559	1.497	0.647

5VDC Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.500
RU (kΩ)	45.533	20.612	12.306	8.152	5.66	3.999	2.812	1.922	1.23	0.676

12VDC Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800
RU (kΩ)	460.99	207.95	123.6	81.423	56.118	39.249	27.199	18.160	11.132	5.509

15VDC Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500
RU (kΩ)	284.89	128.68	76.61	50.58	34.96	24.55	17.11	11.53	7.19	3.72

24VDC Output Models

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	23.760	23.520	23.280	23.040	22.800	22.560	22.320	22.080	21.840	21.600
RU (kΩ)	838.15	376.78	222.98	146.09	99.95	69.19	47.22	30.74	17.93	7.68

MODEL NUMBER SETUP

CRW	48	S	12	-	60	R	H	M3
Series Name	Input Voltage	Output Quantity	Ouptut Voltage		Output Power	Remote ON/OFF	Heatsink	Operating Temperature
	24: 9-36 VDC	**S:** Single Output	**33:** 3.3 VDC		**60:** 60 Watts	**Blank:** Positive Logic	**Blank:** No Heatsink	**Blank:** -40~105°C with Derating
	48: 18-75 VDC		**05:** 5 VDC			**R:** Negative Logic	**HC1:** 7GA0120P01-F; H=0.3”	**M3:** -55~105°C with Derating
			12: 12 VDC				**HC2:** 7GA0121P01-F; H=0.5”	
			15: 15 VDC				**HC3:** 7GA0122P01-F; H=0.8”	
			24: 24 VDC					
		D: Dual Output	**12:** ±12 VDC					
			15: ±15 VDC					
			24: ±24 VDC					

COMPANY INFORMATION

Wall Industries, Inc. has created custom and modified units for over 50 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001: 2015 certification is just one example of our commitment to producing a high quality, well-documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

Contact **Wall Industries** for further information:

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Exeter, NH 03833