Standard



Size: 1in x 1in x 0.39in (25.4mm x 25.4mm x 9.9mm)

Optional Heatsink ("-HS" suffix)



Size: 1in x 1.19in x 0.65in (25.4mm x 30.1mm x 16.5mm)

OPTIONS

- Operating Temperature
  -Standard -40~105ºC
  -M3 -55~105ºC
- Remote On/Off Logic
- Heatsink

APPLICATIONS

- Railway
- Military
- Automation
- Datacom/Telecom
- IPC
- Measurement

FEATURES

- 4:1 Wide Input Voltage Range
- Low Standby Power
- RoHS & REACH Compliant
- 3000VDC Isolation Voltage
- Optional Heatsink
- High Efficiency
- Remote On/Off
- Six Sided Shielding
- Over Voltage, Over Load, and Short Circuit Protection
- IEC/UL/EN60950-1 & IEC/UL/EN62368-1 Safety Approvals

DESCRIPTION

The RDW15 series of DC/DC converters offers up to 15 watts of output power in an ultra-compact 1" x 1" x 0.39" package with optional heatsink. This series consists of single and dual output models with a wide 4:1 input voltage range and low standby power. This series features high efficiency, remote on/off, six sided shielding, as well as 3000VDC isolation voltage. The RDW15 series also has over voltage, over load, and short circuit protection and is RoHS and REACH compliant. It also has IEC/UL/EN60950-1 and IEC/UL/EN62368-1 safety approvals and is useful in many applications. Please contact factory for ordering details.

MODEL SELECTION TABLE

Single Output Models

Model Number[1]	Input Voltage Range	Output Voltage	Output Current @Full Load	Ripple & Noise	No Load Input Current	Efficiency	Maximum Capacitive Load	Output Power
RDW15-24S03	24VDC (9~36VDC)	3.3VDC	4500mA	75mVp-p	12mA	88%	5200µF	15W
RDW15-24S05		5VDC	3000mA	75mVp-p	12mA	90%	3600µF	
RDW15-24S12		12VDC	1300mA	100mVp-p	12mA	89%	600µF	
RDW15-24S15		15VDC	1000mA	100mVp-p	12mA	90%	500µF	
RDW15-24S24		24VDC	625mA	125mVp-p	12mA	91%	200µF	
RDW15-48S03	48VDC (18~75VDC)	3.3VDC	4500mA	75mVp-p	10mA	88%	5200µF	15W
RDW15-48S05		5VDC	3000mA	75mVp-p	10mA	90%	3600µF	
RDW15-48S12		12VDC	1300mA	100mVp-p	10mA	89%	600µF	
RDW15-48S15		15VDC	1000mA	100mVp-p	10mA	90%	500µF	
RDW15-48S24		24VDC	625mA	125mVp-p	10mA	91%	200µF	
RDW15-110S03	110VDC (36~160VDC)	3.3VDC	4500mA	75mVp-p	8mA	88%	5200µF	15W
RDW15-110S05		5VDC	3000mA	75mVp-p	8mA	89%	3600µF	
RDW15-110S12		12VDC	1300mA	100mVp-p	8mA	89%	600µF	
RDW15-110S15		15VDC	1000mA	100mVp-p	8mA	89%	500µF	
RDW15-110S24		24VDC	625mA	125mVp-p	8mA	90%	200µF	

MODEL SELECTION TABLE

Dual Output Models

Model Number[1]	Input Voltage Range	Output Voltage	Output Current @Full Load	Ripple & Noise	No Load Input Current	Efficiency	Maximum Capacitive Load	Output Power
RDW15-24D05	24VDC (9~36VDC)	±5VDC	±1500mA	75mVp-p	12mA	87%	±1500µF	15W
RDW15-24D12		±12VDC	±625mA	100mVp-p	12mA	90%	±360µF	
RDW15-24D15		±15VDC	±500mA	100mVp-p	12mA	90%	±250µF	
RDW15-24D24		±24VDC	±315mA	125mVp-p	10mA	91%	±100µF	
RDW15-48D05	48VDC (18~75VDC)	±5VDC	±1500mA	75mVp-p	10mA	87%	±1500µF	15W
RDW15-48D12		±12VDC	±625mA	100mVp-p	10mA	90%	±360µF	
RDW15-48D15		±15VDC	±500mA	100mVp-p	10mA	90%	±250µF	
RDW15-48D24		±24VDC	±315mA	125mVp-p	10mA	90%	±100µF	
RDW15-110D05	110VDC (36~160VDC)	±5VDC	±1500mA	75mVp-p	8mA	86%	±1500µF	15W
RDW15-110D12		±12VDC	±625mA	100mVp-p	8mA	89%	±360µF	
RDW15-110D15		±15VDC	±500mA	100mVp-p	8mA	89%	±250µF	
RDW15-110D24		±24VDC	±315mA	125mVp-p	8mA	90%	±100µF	

SPECIFICATIONS

All specifications are based on 25°C, Nominal Input Voltage, and Maximum Output Current 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	24Vin Nominal		9	24	36	VDC
	48Vin Nominal		18	48	75	
	110Vin Nominal		36	110	160	
Start-Up Voltage	24Vin Nominal				9	VDC
	48Vin Nominal				18	
	110Vin Nominal				38	
Shutdown Voltage	24Vin Nominal		7.5	8	8.8	VDC
	48Vin Nominal		15.5	16	17.5	
	110Vin Nominal		32	34	35.5	
Input Surge Voltage	1 Second, Max.	24Vin Nominal			50	VDC
		48Vin Nominal			100	
		110Vin Nominal			185	
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	Single Output Models	-0.2		+0.2	%
		Dual Output Models	-0.5		+0.5	
Load Regulation	No Load to Full Load	Single Output Models	-0.2		+0.2	%
		Dual Output Models	-1.0		+1.0	
	10% Load to 90% Load	Single Output Models	-0.1		+0.1	
		Dual Output Models	-0.8		+0.8	
Voltage Adjustability	Single Output Models	15Vout, 24Vout	-10		+20	%
		Others	-10		+10	
Cross Regulation	Asymmetrical Load 25%/100% FL	Dual Output Models	-5.0		+5.0	%
Output Power				See Table		
Output Current				See Table		
Maximum Capacitive Load				See Table		
Ripple & Noise (20MHz BW)	With 10µF/6.3V X7R MLCC	3.3V, 5V Single Output Models		75		mVp-p
	With 1µF/25V X7R MLCC	12V, 15V Single Output Models		100		
	With a 2.2µF/50V X7R MLCC	24V Single Output Models		125		
	With a 10µF/6.3V X7R MLCC for each output	5V Dual Output Models		75		
	With a 1µF/25V X7R MLCC for each output	12V, 15V Dual Output Models		100		
	With a 2.2µF/50V X7R MLCC for each output	24V Dual Output Models		125		
Transient Response Recovery Time	25% Load Step Change			250		µs
Start-Up Time	Constant Resistive Load	Power Up		30	40	mA
		Remote ON/OFF		30	40	
Temperature Coefficient			-0.02		-0.02	%/ºC
REMOTE ON/OFF CONTROL[2]						
Positive Logic (Standard)	DC-DC ON			Open or 3~15VDC		
	DC-DC OFF			Short or 0~1.2VDC		
Negative Logic (Optional)	DC-DC ON			Short or 0~1.2VDC		
	DC-DC OFF			Open or 3~15VDC		
Input Current of CTRL Pin			-0.5		+1.0	mA
Remote OFF Input Current				2.5		mA
PROTECTION						
Short Circuit Protection				Continuous, Automatic Recovery		
Over Load Protection	% of Iout Rated			170		%
Over Voltage Protection	3.3V Output		3.7		5.4	VDC
	5V Output		5.6		7.0	
	12V Output		13.5		19.6	
	15V Output		18.3		22.0	
	24V Output		29.1		32.5	

SPECIFICATIONS

All specifications are based on 25°C, Nominal Input Voltage, and Maximum Output Current 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[3]	Standard Type with derating		-40		+105	ºC
	M3 Version ("-M3" Suffix)		-55		+105	
Storage Temperature			-55		125	ºC
Thermal Impedance	Without Heat-Sink			17.0		ºC/W
	With Heatsink			15.3		
Relative Humidity			5		95	%RH
Maximum Case Temperature					+105	ºC
Thermal Shock			MIL-STD-810F			
Shock			EN61373, MIL-STD-810F			
Vibration			EN61373, MIL-STD-810F			
MTBF	MIL-HDBK-217F, Full Load			1,672,000		Hours
GENERAL SPECIFICATIONS						
Efficiency			See Table			
Switching Frequency	3.3V, 5V Output Models		220	245	270	kHz
	Other Models		270	300	330	
Isolation Voltage	1 Minute	Input to Output	3600			VDC
		Input (Output) to Case	1600			
Isolation Resistance	500VDC		1			GΩ
Isolation Capacitance					2000	pF
PHYSICAL SPECIFICATIONS						
Weight			0.58oz (16.5g)			
Dimensions (L x W x H)	Standard		1in x 1in x 0.39in (25.4mm x 25.4mm x 9.9mm)			
	Heatsink Option ("-HS Suffix")		1in x 1.19in x 0.65in (25.4mm x 30.1mm x 16.5mm)			
Case Material			Copper			
Base Material			FR4 PCB			
Potting Material			Silicone (UL94 V-0)			
Shielding			Six-Sided			
SAFETY CHARACTERISTICS						
Safety Approvals	IEC/UL/EN60950-1 IEC/UL/EN62368-1		UL: E193009 CB: UL(Demko)			
Standard Approvals	EN50155 EN45545-2					
EMI	EN55032, EN550111	Without External Components	Class A			
		With External Components	Class B			
ESD	EN61000-4-2	Air ±8kV and Contact ±6kV	Perf. Criteria A			
Radiated Immunity	EN61000-4-3	10V/m	Perf. Criteria A			
Fast Transient[4]	EN61000-4-4	±2kV	Perf. Criteria A			
Surge[4]	EN61000-4-5	±2kV	Perf. Criteria A			
Conducted Immunity	EN61000-4-6	10Vr.m.s.	Perf. Criteria A			
Power Frequency Magnetic Field	EN61000-4-8	100A/m continuous; 100A/m 1 second	Perf. Criteria A			

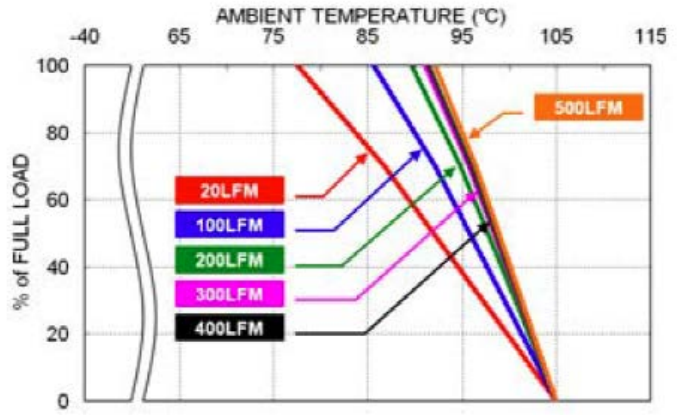
NOTES

1. Several options are available for this series that affect model number setup. See Model Number Setup for more information.
2. Referred to –Vin pin.
3. RDW15-xxxD05 Models meets the railway TX temperature requirement as power derating to 7W output power.
   The other models meet the railway TX temperature requirement as power derating to 10W output power.
4. 24Vin Nominal models: with aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ58A, 58V, 3000 Watt peak pulse power) in parallel.
   48Vin Nominal models: with an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V).
   110Vin Nominal models: with an aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150µF/200V) and a TVS (SMBJ300A, 300V, 600 Watt peak pulse power) in parallel.

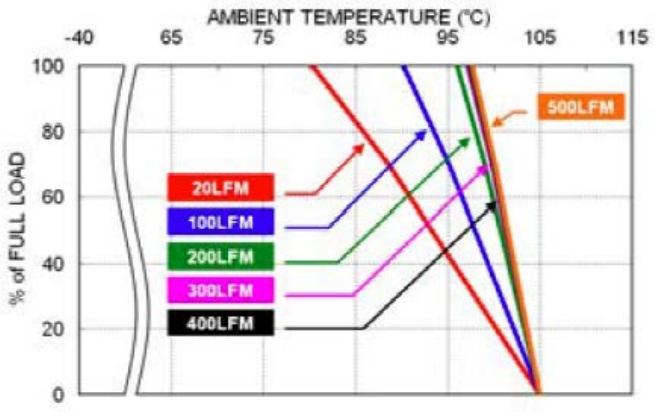
CAUTION: This power module is note internally fused. An input line fuse must always be used.
**Due to advances in technology, specifications subject to change without notice.*

DERATING CURVES

RDW15-24S05 Derating Curve

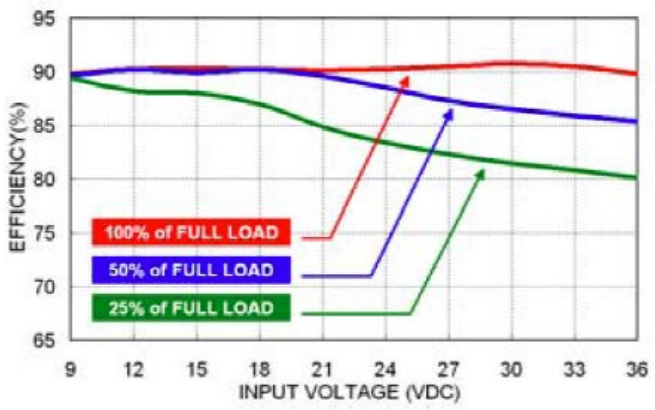


RDW15-24S05 Derating Curve with Heatsink

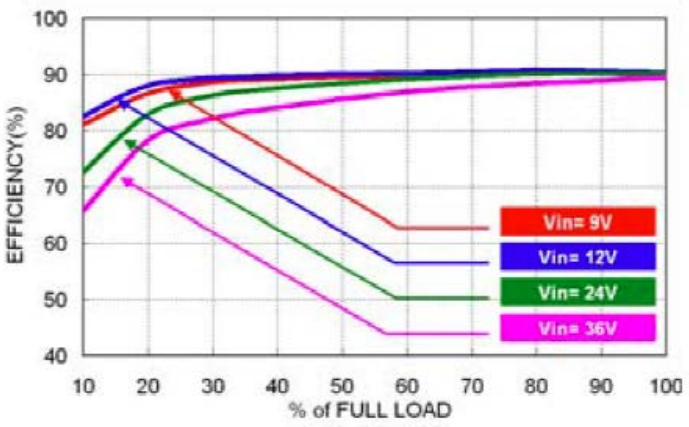


EFFICIENCY GRAPHS

RDW15-24S05 Efficiency vs. Input Voltage

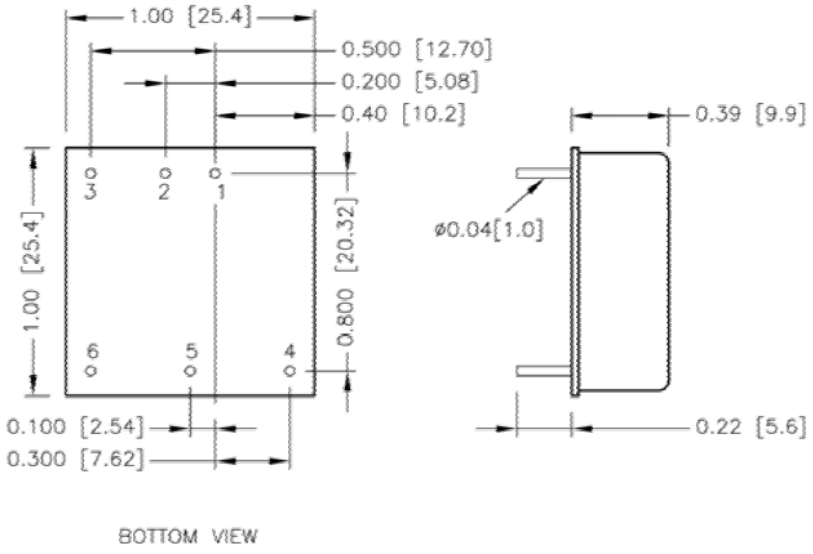


RDW15-24S05 Efficiency vs. Output Load



MECHANICAL DRAWINGS

Standard Package



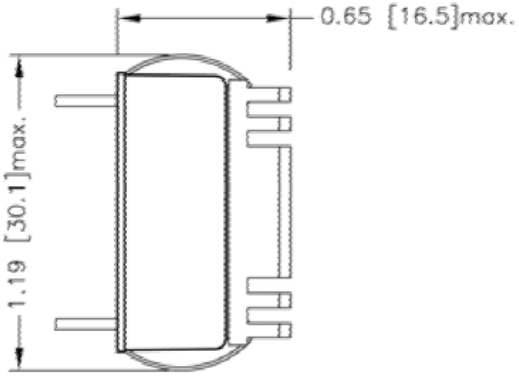
BOTTOM VIEW

PIN CONNECTION

PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	Ctrl	Ctrl
4	+Vout	+Vout
5	Trim	Common
6	-Vout	-Vout

Notes:
1. All dimensions in inch [mm]
2. Tolerance: x.xx±0.02 [x.x±0.5]
   x.xxx±0.01 [x.xx±0.25]
3. Pin pitch tolerance ±0.01 [0.25]
4. Pin dimension tolerance ±0.004 [0.10]

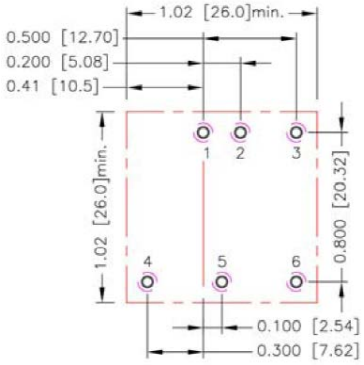
Heatsink with Clamps (“-HS” Suffix)



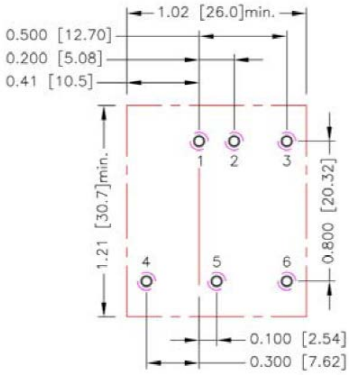
All dimensions in inch [mm]

RECOMMENDED PAD LAYOUT

Standard



"-HS" Suffix



All dimensios 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

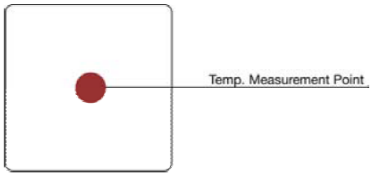
This power module is not internally fused. An input line fuse must always be used.
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.
To maximize flexibility, internal fusing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

Modules	Fuse Rating	Fuse Type
24Vin Nominal Models	3.15A	Slow-Blow
48Vin Nominal Models	1.6A	Slow-Blow
110Vin Nominal Models	1.A	Slow-Blow

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

THERMAL CONSIDERATIONS

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

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 1/16W of rated power.

Trim Up Equation

$$R_U = \left[\frac{G \times L}{(V_{O,up}-L-K)} - H \right] \Omega$$

Trim Down Equation

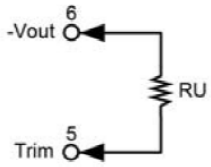
$$R_D = \left[\frac{(V_{o,down}-L) \times G}{(V_o-V_{o,down})} - H \right] \Omega$$

Trim Constants

Module	G	H	K	L
RDW15-xxS03	5110	2050	0.8	2.5
RDW15-xxS05	5110	2050	2.5	2.5
RDW15-xxS12	10000	5110	9.5	2.5
RDW15-xxS15	10000	5110	12.5	2.5
RDW15-xxS24	56000	13000	21.5	2.5

EXTERNAL OUTPUT TRIMMING
Output can be externally trimmed by using the method shown below

Trim-Up



RDW15-xxS03 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)	385.071	191.511	126.990	94.730	75.374	62.470	53.253	46.340	40.963	36.662

RDW15-xxS05 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)	253.450	125.700	83.117	61.825	49.050	40.533	34.450	29.888	26.339	23.500

RDW15-xxS12

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	21.960	13.080	13.200
RU (kΩ)	203.223	99.057	64.334	46.973	36.557	29.612	24.652	20.932	18.038	15.723

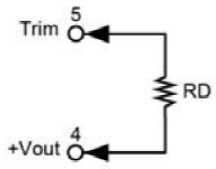
RDW15-xxS15

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)	161.557	78.223	50.446	36.557	28.223	22.668	18.700	15.723	13.409	11.557
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	18.000
RU (kΩ)	10.042	8.779	7.711	6.795	6.001	5.307	4.694	4.149	3.662	3.223

RDW15-xxS24

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)	570.333	278.667	181.444	132.833	103.667	84.222	70.333	59.917	51.815	45.333
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)	40.030	35.611	31.872	28.667	25.889	23.458	31.314	19.407	17.702	16.167

Trim-Down



RDW15-xxS03

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
RD (kΩ)	116.719	54.779	34.133	23.810	17.616	13.486	10.537	8.325	6.604	5.228

RDW15-xxS05

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
RD (kΩ)	248.340	120.590	78.007	56.715	43.940	35.423	29.340	24.778	21.229	18.390

RDW15-xxS12

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
RD (kΩ)	776.557	380.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057

RDW15-xxS15

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
RD (kΩ)	818.223	401.557	262.668	193.223	151.557	132.779	103.938	89.057	77.483	68.223

RDW15-xxS24

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
RD (kΩ)	4947.667	2439.333	1603.222	1185.167	934.333	767.111	647.667	558.083	448.407	432.667

MODEL NUMBER SETUP

RDW	15	-	24	S	05	M3
Series Name	Output Power		Input Voltage	Output Quantity	Ouptut Voltage	Operating Temperature Options
			24: 9~36VDC	**S:** Single	**03:** 3.3VDC	**Blank:** Standard -40~105ºC with derating
			48: 18~75VDC		**05:** 5VDC	**M3:** M3 Version -55~105ºC with derating
			110: 36~160VDC		**12:** 12VDC	
					15: 15VDC	
					24: 24VDC	
				D: Dual	**05:** ±5VDC	
					12: ±12VDC	
					15: ±15VDC	
					24: ±24VDC	

A	HS
Remote ON/OFF & Trim Option	Heatsink
Blank: Positive Logic	**Blank:** None
A: Negative Logic	**HS:** Heatsink with Clamp
B: Without Ctrl Pin	
C: Positive Logic without Trim pin	
D: Without Ctrl & Trim Pin	
E: Negative Logic without Trim Pin	

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 ISO9001-2008 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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