

Features

- 4:1 Wide Input Range
- Operating Temperature Range: -40~105°C
- Approved to cURus, UKCA, CE
- Approved to IEC/UL/EN62368-1
- Efficiency upto 91%
- EMC Class A & B Dependent on Inpu
- Single & Dual 15W Output Models
- Available with optional heatsink (HC)
- Six Sided Shielding



Ideal Power's 43RCD20-xyzW 20W Series DIP DC/DC Converters are certified to cURus, UKCA, CE, RoHS, REACH & IEC/UL/EN 62368-1, EN 50155 Standards and comply with the relevant Efficiency Regulations. These are primarily used in ITE, Video & Audio, Railway Industries and customised solutions are available upon request.

Part Number Structure

43RCD20 -	48	S	05	W -	M3	A	HS
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Remote On/Off Options	Remote ON/OFF & Trim Options	Assembly Options
	24:9~36 48:18~75 110:36~160	S: Single D: Dual	3P3:3.3 05:5 5P1:5.1 12:12 15:15 24:24	4:1	□: Standard -40°C~105°C With derating M3: M3 Version -55°C~105°C With derating	□: Negative logic A: Positive logic B: Without Ctrl pin C: Negative logic without Trim pin D: Without Ctrl & Trim pin E: Positive logic Without Trim pin	☐: None HC1: 7GA0117P01-F; H=0.3" HC2: 7GA0118P01-F; H=0.5" HC3: 7GA0119P01-F; H=0.8"
			12: ±12 15: ±15 24: ±24				

Models

Model Number	Input	Output	Output Current	Input Current	Efficiency	Maximum
43RCD20-24S3P3W	9 ~ 36	3.3	5500	10	88	8000
43RCD20-24S05W	9 ~ 36	5	4000	10	89	5000
43RCD20-24S5P1W	9 ~ 36	5.1	4000	10	89	5000
43RCD20-24S12W	9 ~ 36	12	1670	7	89	850
43RCD20-24S15W	9 ~ 36	15	1330	7	89	700
43RCD20-24S24W	9 ~ 36	24	833	10	91	220
43RCD20-24D12W	9 ~ 36	±12	±833	7	89	±500
43RCD20-24D15W	9 ~ 36	±15	±667	7	90	±350
43RCD20-24D24W	9 ~ 36	±24	±417	12	91	±100
43RCD20-48S3P3W	18 ~ 75	3.3	5500	10	89	8000
43RCD20-48S05W	18 ~ 75	5	4000	10	90	5000
43RCD20-48S5P1W	18 ~ 75	5.1	4000	10	90	5000
43RCD20-48S12W	18 ~ 75	12	1670	5	89	850
43RCD20-48S15W	18 ~ 75	15	1330	5	90	700
43RCD20-48S24W	18 ~ 75	24	833	8	91	220
43RCD20-48D12W	18 ~ 75	±12	±833	5	89	±500
43RCD20-48D15W	18 ~ 75	±15	±667	5	90	±350
43RCD20-48D24W	18 ~ 75	±24	±417	10	91	±100
43RCD20-110S3P3W	36 ~ 160	3.3	5500	6	88	8000
43RCD20-110S05W	36 ~ 160	5	4000	6	90	5000
43RCD20-110S5P1W	36 ~ 160	5.1	4000	6	90	5000
43RCD20-110S12W	36 ~ 160	12	1670	6	90	850
43RCD20-110S15W	36 ~ 160	15	1330	6	90	700
43RCD20-110S24W	36 ~ 160	24	833	6	91	220
43RCD20-110D12W	36 ~ 160	±12	±833	6	90	±500
43RCD20-110D15W	36 ~ 160	±15	±667	6	90	±350
43RCD20-110D24W	36 ~ 160	±24	±417	6	91	±100

Input Specifications

Parameter	Conditions		Min	Typ	Max	Unit
Operating input voltage range	24Vin(nom)		9	24	36	VDC
	48Vin(nom)		18	48	75	
	110Vin(nom)		36	110	160	
Start up voltage	24Vin(nom)				9	VDC
	48Vin(nom)				18	
	110Vin(nom)				36	
Shutdown voltage	24Vin(nom)		7.5	8	8.8	VDC
	48Vin(nom)		15.5	16	17.5	
	110Vin(nom)		32	34	35.5	
Start up time	Constant resistive load	Power up		30	40	ms
		Remote ON/OFF		30	40	
Input surge voltage	1 second, max.	24Vin(nom)			50	VDC
		48Vin(nom)			100	
		110Vin(nom)			185	
Input filter	Pi type					
Remote ON/OFF	Referred to –Vin pin	Positive logic	DC-DC ON	Open or 3 ~ 15VDC		
		(Option)	DC-DC OFF	Short or 0 ~ 1.2VDC		
		Negative logic	DC-DC ON	Short or 0 ~ 1.2VDC		
		(Standard)	DC-DC OFF	Open or 3 ~ 15VDC		
		Input current of Ctrl pin		-0.5		+1.0
		Remote off input current		2.5		mA

Output Specifications

Parameter	Conditions		Min	Typ	Max	Unit
Voltage accuracy			-1.0		+1.0	%
Line regulation	Low Line to High Line at Full Load	Single	-0.2		+0.2	%
		Dual	-0.5		+0.5	
Load regulation	No Load to Full Load	Single	-0.2		+0.2	%
		Dual	-1.0		+1.0	
	10% Load to 90% Load	Single	-0.1		+0.1	
		Dual	-0.8		+0.8	
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Voltage adjustability	Single output	15Vout, 24Vout	-10		+20	%
		Others	-10		+10	
Ripple and noise	Measured by 20MHz bandwidth					
		Single				
	With a 22µF/25V X7R MLCC	3.3Vout, 5Vout		75		
	With a 22µF/25V X7R MLCC	12Vout, 15Vout		100		
	With a 4.7µF/50V X7R MLCC	24Vout		125		
		Dual				
	With a 10µF/25V X7R MLCC for each	12Vout, 15Vout		100		
	With a 4.7µF/50V X7R MLCC for each	24Vout		125		
Temperature coefficient			-0.02		+0.02	%/°C
Transient response recovery time	25% load step change			250		µs
Over voltage protection	3.3Vout		3.7		5.4	VDC
	5Vout, 5.1Vout		5.6		7.0	
	12Vout		13.5		19.6	
	15Vout		16.8		20.5	
	24Vout		29.1		32.5	
Overload protection	% Of lout rated			170		
Short circuit protection						Continuous, automatic recovery

General Specifications

Parameter	Conditions		Min	Typ	Max	Unit
Isolation voltage	1 minute	110Vin(nom)	Input to Output	3000		VDC
			Input (Output) to Case	2250		
	1 minute	24Vin, 48Vin	Input to Output	2250		
			Input (Output) to Case	1600		
Isolation resistance	500VDC		1			GΩ
Isolation capacitance					2000	pF
Switching frequency	110Vin(nom)	3.3Vout, 5Vout, 5.1Vout	220	245	270	kHz
			270	300	330	
	24Vin, 48Vin	3.3Vout, 5Vout, 5.1Vout				
			Others			
Safety approvals	IEC/ EN/ UL62368-1					UL:E193009 CB:UL(Demko)
Standard approvals	EN50155 EN45545-2					
Case material						Copper
Base material						FR4 PCB
Potting material						Silicone (UL94 V-0)
Weight						16g (0.58oz)
MTBF	MIL-HDBK-217F, Full load					1.201 x 10 ⁶ hrs

Environmental Specifications

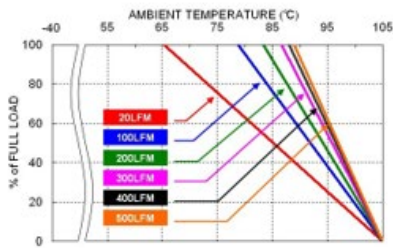
Parameter	Conditions		Min	Typ	Max	Unit
Operating ambient temperature	Standard type M3 version	With derating	-40		+105	°C
		With derating	-55		+105	
Maximum case temperature					105	
Storage temperature range			-55		+125	
Thermal impedance	Natural convection	Without Heat-sink		17.0		°C/W
		With Heat-sink	HC1	15.3		
			HC2	12.9		
			HC3	10.9		
Thermal shock						MIL-STD-810F
Shock						EN61373, MIL-STD-810F
Vibration						EN61373, MIL-STD-810F
Relative humidity						5% to 95% RH

EMC Specifications

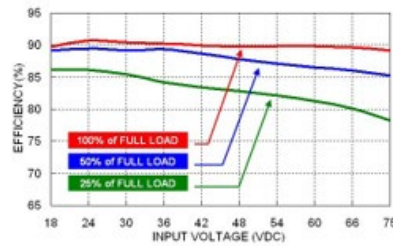
Parameter	Conditions		Level	
EMI	EN50121-3-2	Without external components		
	EN55032,	110Vin	With an aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 47μF/200V)	Class A
		24Vin, 48Vin All	Without external components With external components	Class A Class B
EMS	EN55024 and EN50121-3-2			
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria A	
Radiated immunity	EN61000-4-3	20 V/m	Perf. Criteria A	
Fast transient	EN61000-4-4	±2kV	Perf. Criteria A	
	43RCD20-24□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ58A, 58V, 3000Watt peak pulse power) in parallel.		
	43RCD20-48000W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V).		
	43RCD20-110000W	With an aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150μF/200V) and a TVS (SMBJ300A, 300V, 600Watt peak pulse power) in parallel.		
Surge	EN61000-4-5	±2kV	Perf. Criteria A	
	43RCD20-24000W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V) and a TVS (SMDJ58A, 58V, 3000Watt peak pulse power) in parallel.		
	43RCD20-48000W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220μF/100V).		
	43RCD20-110000W	With an aluminum electrolytic capacitor (Nippon chemi-con KXJ series, 150μF/200V) and a TVS (SMBJ300A, 300V, 600Watt peak pulse power) in parallel.		
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A	
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A	

CAUTION: This power module is not internally fused. An input line fuse must always be used.

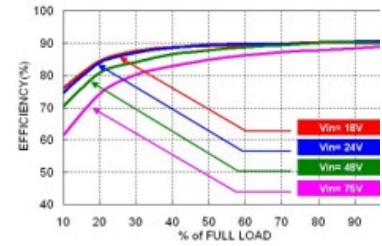
Characteristic Curve



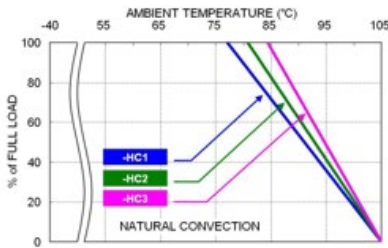
43RCD20-48S05W Derating Curve



43RCD20-48S05W Efficiency vs. Input Load



43RCD20-48S05W Efficiency vs. Output Load



43RCD20-48S05W Derating Curve with Heat-sink

Fuse Consideration

This power module is not internally fused. An input line fuse must always be used.

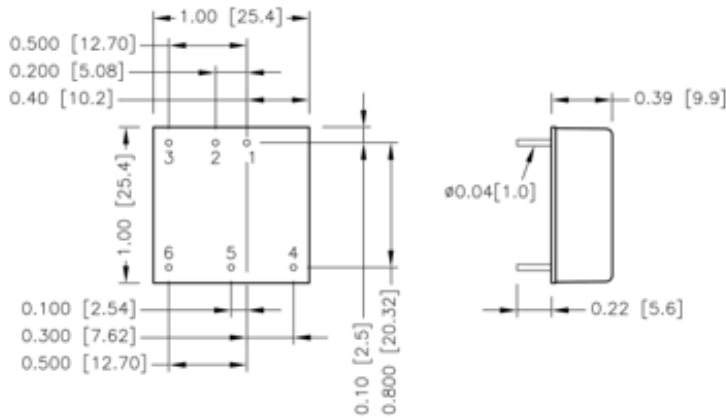
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.

To 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
43RCD20-24S□□W	4	Slow-Blow
43RCD20-48S□□W	2	Slow-Blow
43RCD20-110S□□W	1	Slow-Blow

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

Mechanical Drawing

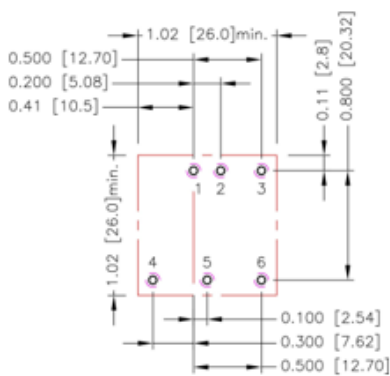


1. All dimensions in inch [mm]

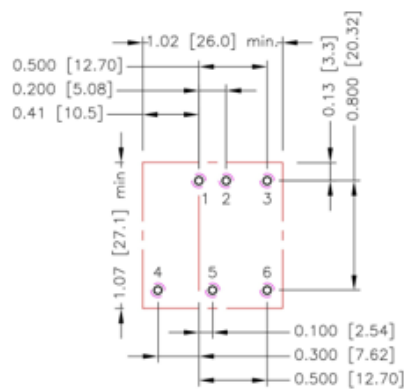
PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	Ctrl	Ctrl
4	+Vout	+Vout
5	Trim	Common
6	-Vout	-Vout

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: $\varnothing 0.051 [1.30]$

Top view pad 1.2.3.4.5.6: $\varnothing 0.064 [1.63]$

Bottom view pad 1.2.3.4.5.6: $\varnothing 0.102 [2.60]$

Thermal Considerations

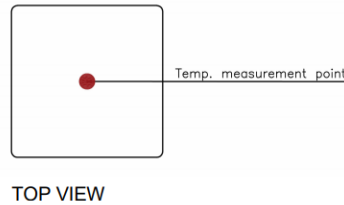
The power module operates in a variety of thermal environments.

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 as the figure below.

The temperature at this location should not exceed “Maximum case temperature”.

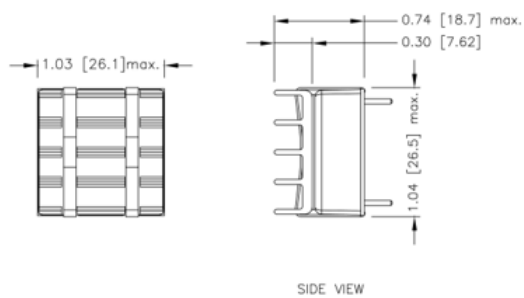
When operating, adequate cooling must be provided to maintain the test point temperature at or below “Maximum case temperature”. You can limit this Temperature to a lower value for extremely high reliability.

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

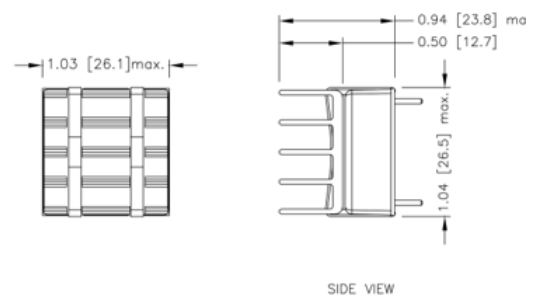


Heat-Sink Type Options

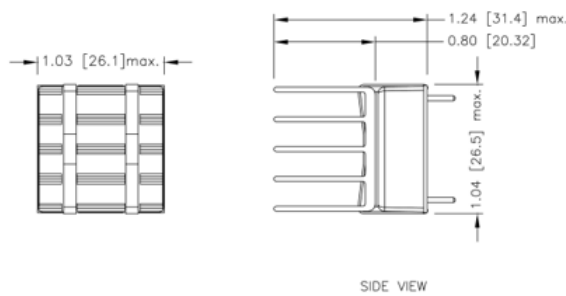
43RCD20-□□□□W-HC1
7GA0117P01-F



43RCD20-□□□□W-HC1
7GA0118P01-F



43RCD20-□□□□W-HC3
7GA0119P01-F



1. All dimensions in inch [mm]
2. 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 1/16W of rated power.

■ Trim Up Equation

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

■ Trim Down Equation

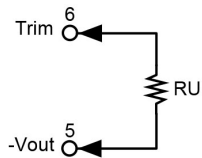
$$R_D = \left[\frac{(V_{o,down} - L) \times G}{(V_o - V_{o,down})} - H \right] \Omega$$

Module	G	H	K	L
43RCD20-00S3P3W	5110	2050	0.8	2.5
43RCD20-00S05W	5110	2050	2.5	2.5
43RCD20-00S5P1W	5110	2050	2.5	2.5
43RCD20-00S12W	10000	5110	9.5	2.5
43RCD20-00S15W	10000	5110	12.5	2.5
43RCD20-00S24W	56000	13000	21.5	2.5

EXTERNAL OUTPUT TRIMMING

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

Trim-Up



□□S3P3W

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

□□S05W

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

□□S5P1W

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.151	5.202	5.253	5.304	5.355	5.406	5.457	5.508	5.559	5.610
RU (kΩ)	248.440	123.195	81.447	60.573	48.048	39.698	33.734	29.261	25.782	22.999

□□S12W

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)	203.223	99.057	64.334	46.973	36.557	29.612	24.652	20.932	18.038	15.723

□□S15W

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

□□S24W

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

□□S24W

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

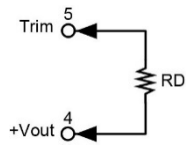
Ideal Power Limited

14 Larks Way, Tree Beech Enterprise Park, Gunn, Barnstaple, Devon, EX32 7NZ.

www.idealpower.co.uk | +44 (0) 845 260 3400

Trim-Up (Continued)

□□S24W										
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	21.314	19.407	17.702	16.167

Trim-down


□□S3P3W										
	1	2	3	4	5	6	7	8	9	10
	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.970
	116.719	54.779	34.133	23.810	17.616	13.486	10.537	8.325	6.604	5.228

□□S05W										
	1	2	3	4	5	6	7	8	9	10
	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.500
	248.340	120.590	78.007	56.715	43.940	35.423	29.340	24.778	21.229	18.390

□□S5P1W										
	1	2	3	4	5	6	7	8	9	10
	5.049	4.998	4.947	4.869	4.845	4.794	4.743	4.692	4.641	4.590
	253.350	123.095	79.677	57.968	44.942	36.258	30.056	25.404	21.786	18.891

□□S12W										
	1	2	3	4	5	6	7	8	9	10
	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800
	776.557	380.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057

□□S15W										
	1	2	3	4	5	6	7	8	9	10
	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500
	818.223	401.557	262.668	193.223	151.557	123.779	103.938	89.057	77.483	68.223

□□S24W										
	1	2	3	4	5	6	7	8	9	10
	23.760	23.520	23.280	23.040	22.800	22.560	22.320	22.080	21.840	21.600
	4947.667	2439.333	1603.222	1185.167	934.333	767.111	647.667	558.083	488.407	432.667