

## Features

- 4:1 Wide Input Range
- Operating Temperature Range: -40~105°C
- Approved to cURus, UKCA, CE, RoHS & REACH
- Approved to IEC/UL/EN62368-1 & EN50155
- Efficiency up to 92%
- EMC Class A & B Dependent on Input
- Single & Dual 30W Output Models
- Available with optional heatsink (HC)
- Six-Sided Shielding



Ideal Power's 43RCD30-xyzW 30W Series PCB Mount 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

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Operating Temp Options	Remote ON/OFF & Trim Options	Assembly Options	
RCD30 -	48	S	05	W	-	M3	A	HC1
	<b>24:</b> 9~36 <b>48:</b> 18~75 <b>110:</b> 36~160	<b>S:</b> Single	<b>3P3:</b> 3.3 <b>05:</b> 5 <b>5P1:</b> 5.1 <b>12:</b> 12 <b>15:</b> 15 <b>24:</b> 24	4:1	<input type="checkbox"/> : Standard -40°C~105°C With derating <b>M3:</b> M3Version -55°C~105°C With derating	<input type="checkbox"/> : Negative logic <b>A:</b> Positive logic <b>B:</b> Without Ctrl pin C: Negative logic without Trim pin <b>D:</b> Without Ctrl & Trim pin <b>E:</b> Positive logic without	<input type="checkbox"/> : None <b>HC1:</b> 7GA0117P01-F; H=0.3" <b>HC2:</b> 7GA0118P01-F; H=0.5" <b>HC3:</b> 7GA0119P01-F; H=0.8"	

**Models**

Model Number	Input	Output	Output Current	Input Current	Efficiency	Maximum
43RCD30-24S3P3W	9 ~ 36	3.3	7000	10	88	10000
43RCD30-24S05W	9 ~ 36	5	6000	10	89	7200
43RCD30-24S5P1W	9 ~ 36	5.1	6000	10	89	7200
43RCD30-24S12W	9 ~ 36	12	2500	10	89	1200
43RCD30-24S15W	9 ~ 36	15	2000	10	89	1000
43RCD30-24S24W	9 ~ 36	24	1250	10	90	375
43RCD30-24D12W	9 ~ 36	±12	±1250	10	89	±750
43RCD30-24D15W	9 ~ 36	±15	±1000	10	91	±500
43RCD30-24D24W	9 ~ 36	±24	±625	12	91	±180
43RCD30-48S3P3W	18 ~ 75	3.3	7000	10	88	10000
43RCD30-48S05W	18 ~ 75	5	6000	10	90	7200
43RCD30-48S5P1W	18 ~ 75	5.1	6000	10	90	7200
43RCD30-48S12W	18 ~ 75	12	2500	8	90	1200
43RCD30-48S15W	18 ~ 75	15	2000	8	91	1000
43RCD30-48S24W	18 ~ 75	24	1250	8	92	375
43RCD30-48D12W	18 ~ 75	±12	±1250	8	91	±750
43RCD30-48D15W	18 ~ 75	±15	±1000	8	91	±500
43RCD30-48D24W	18 ~ 75	±24	±625	7	92	±180
43RCD30-110S3P3W	36 ~ 160	3.3	7000	7	88	10000
43RCD30-110S05W	36 ~ 160	5	6000	7	90	7200
43RCD30-110S5P1W	36 ~ 160	5.1	6000	7	90	7200
43RCD30-110S12W	36 ~ 160	12	2500	7	90	1200
43RCD30-110S15W	36 ~ 160	15	2000	7	90	1000
43RCD30-110S24W	36 ~ 160	24	1250	7	91	375
43RCD30-110D12W	36 ~ 160	±12	±1250	7	90	±750
43RCD30-110D15W	36 ~ 160	±15	±1000	7	90	±500

**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)			38	
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 Short or	
		(Option)	DC-DC OFF	0 ~ 1.2VDC Short or 0 ~ 1.2VDC	
		Negative logic	DC-DC ON	Open or 3 ~ 15VDC	
		(Standard)	DC-DC OFF		
		Input current of Ctrl pin	-0.5	+1.0	mA
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, 5.1Vout		75	mVp-p	
		With 2pcs of 22µF/25V X7R MLCC	12Vout, 15Vout		100		
		With 2pcs of 6.8µF/50V X7R MLCC	24Vout		100		
		Dual					
		With a 10µF/25V X7R MLCC for each output	12Vout, 15Vout		100		
		With a 4.7µF/50V X7R MLCC for each output	24Vout		100		
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		18.3		22.0		
	24Vout		29.1		32.5		
Overload protection	% Of Iout 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		1600	
	1 minute	24Vin, 48Vin	Input to Output			
			Input (Output) to Case			
Isolation resistance	500VDC		1		GΩ	
Isolation capacitance					2000	pF
Switching frequency	110Vin(nom)	3.3Vout, 5Vout	220	245	270	kHz
		Others	270	300	330	
	24Vin, 48Vin	3.3Vout, 5Vout				
		Others				
Safety approvals	IEC/ EN/ UL62368-1				24Vin, 48Vin CB:UL(Demko)	
Standard approvals	EN50155					
	EN45545-2					
Case material					Copper	
Base material					FR4 PCB	

**General Specifications (Continued)**

Potting material	Silicone (UL94 V-0)	
Weight	18g (0.63oz)	
MTBF	MIL-HDBK-217F, Full load	1.259 x 10 <sup>6</sup> hrs

**Environmental Specifications**

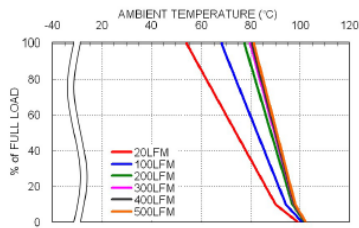
Parameter	Conditions		Min	Typ	Max	Unit
Operating ambient temperature	Standard type	With derating	-40		+105	°C
	M3 version	With derating	-55		+105	
Maximum case temperature					105	°C
				115		
Storage temperature range			-55		+125	°C
Thermal impedance	Natural convection	Without Heat-sink		15.0		°C/W
		With Heat-sink	HC1	11.1		
			HC2	9.6		
			HC3	8.2		
Thermal shock						MIL-STD-810F
Shock						EN61373, MIL-STD-810F
Vibration						EN61373, MIL-STD-810F
Relative humidity						5% to 95% RH

**EMC Specifications**

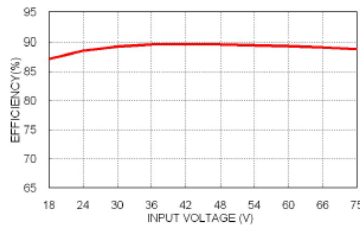
Parameter	Conditions		Level
EMI	EN55032, EN55011	With external components.	Class A
			Class B
ESD	EN61000-4-2	Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	20 V/m	Perf. Criteria A
Fast transient	EN61000-4-4	±2kV	Perf. Criteria A
	43RCD30-24□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V)	
	43RCD30-48□□□W		
	43RCD30-110□□□W	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
	43RCD30-24□□□W	With an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V)	
	43RCD30-48□□□W		
	43RCD30-110□□□W	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.

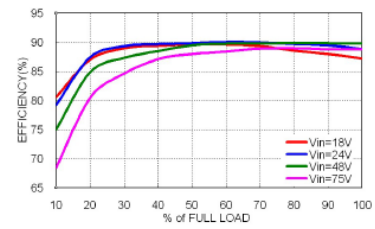
## Characteristic Curve



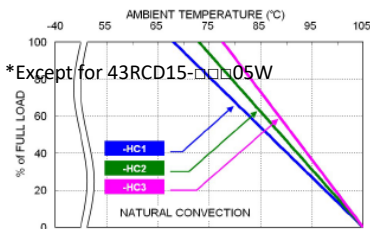
43RCD30-48S05W Derating Curve



43RCD30-48S05W Efficiency vs. Input Voltage



43RCD30-48S05W Efficiency vs. Output Load



43RCD30-48S05W Derating Curve  
With Heat-sink

## Fuse Consideration

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

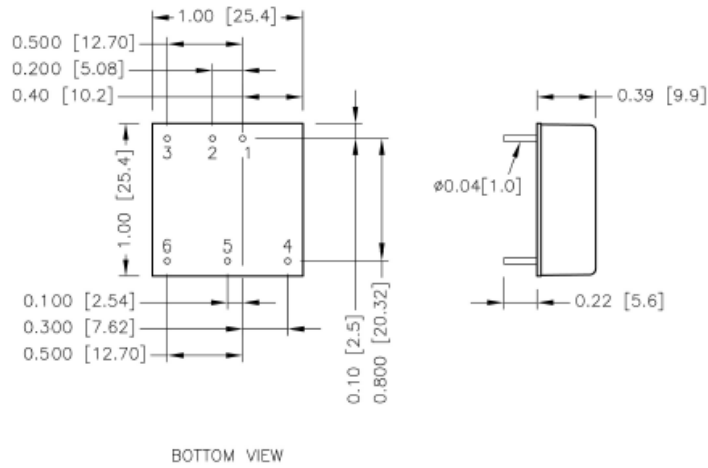
This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.

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
43RCD30-24□□□W	6	Slow-Blow
43RCD30-48□□□W	3	Slow-Blow
43RCD30-110□□□W	1.5	Slow-Blow

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

## Mechanical Drawing

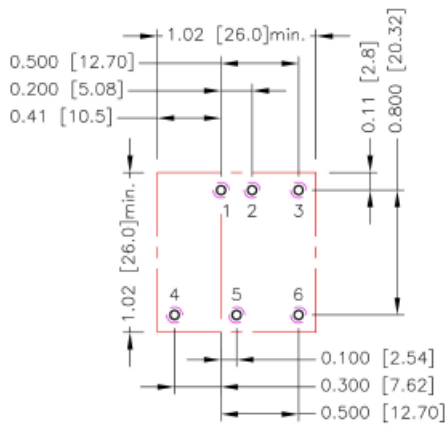


## Pin Connection

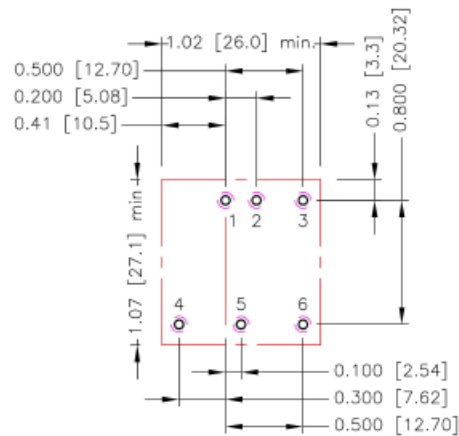
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Ctrl	Ctrl
4	+Vout	+Vout
5	Trim	Common
6	-Vout	-Vout

## 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: Ø0.051[1.30]

Top view pad 1.2.3.4.5.6: Ø0.064[1.63]

Bottom view pad 1.2.3.4.5.6: Ø0.102[2.60]

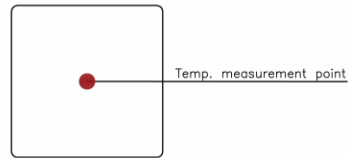
### Thermal Considerations

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.

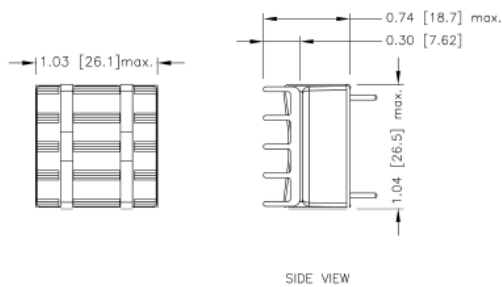
- Thermal test condition with vertical direction by natural convection (20LFM).



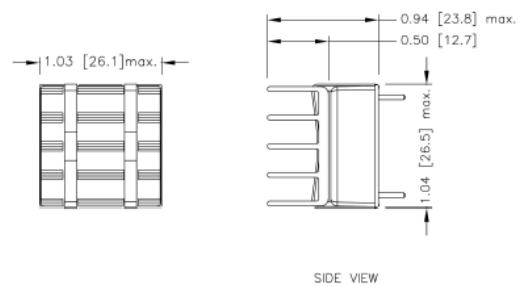
TOP VIEW

### Heat-Sink Type Options

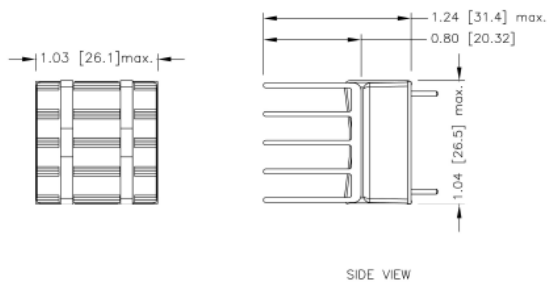
43RCD30-□□□□□W-HC  
7GA0117P01-F



43RCD30-□□□□□W-HC2  
7GA0118P01-F



43RCD30-□□□□□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

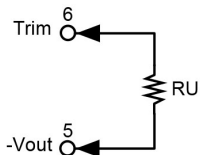
$$R_D = \left[ \frac{(V_{o,down} - L) \times G}{(V_o - V_{o,down})} - H \right] \Omega$$

Module	G	H	K	L
43RCD30-□□S3P3W	5110	2050	0.8	2.5
43RCD30-□□S05W	5110	2050	2.5	2.5
43RCD30-□□S5P1W	5110	2050	2.6	2.5
43RCD30-□□S12W	10000	5110	9.5	2.5
43RCD30-□□S15W	10000	5110	12.5	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
□□S05P1W										
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
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

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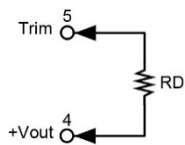


**Trim-Up (Continued)**

□□S24W										
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)	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										
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

□□S05W										
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

□□S05P1W										
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.049	4.998	4.947	4.869	4.845	4.794	4.743	4.692	4.641	4.590
RD (kΩ)	253.350	123.095	79.677	57.968	44.942	36.258	30.056	25.404	21.786	18.891

□□S12W										
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

□□S15W										
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	123.779	103.938	89.057	77.483	68.223

□□S24W										
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	488.407	432.667