

Features

- 2:1 Input Range
- Operating Temperature Range: -40~105°C
- Approved to cURus, UKCA, CE, RoHS & REACH
- Safety Standards to IEC/UL/EN62368-1, EN45545-2 & EN50155
- Efficiency up to 93%
- EMC Class A & B
- Single output 9~75V DC
- Available with optional Heatsink



Ideal Power's 43HAE100-xSyW 100W Series Pin Connection DC/DC Converters are certified to cURus, UKCA, CE, RoHS, REACH & IEC/UL/EN 62368-1, EN45545-2, EN50155 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

DIP Type

43HAE100- 48 S 05 W - P HS

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Remote On/Off Options	Assembly Options
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24: 8.5~36
9~36
48: 18~36
110: 36~75

S: Single

3P3: 3.3
05: 5
12: 12
15: 15
24: 24
28: 28
48: 48

4:1

: Negative logic;
0.20" pin length
L: Negative logic;
0.145" pin length
P: Positive logic;
0.20" pin length
S: Positive logic;
0.145" pin length

: None

Heat-sink type

HS: 7G-7G-0021A-F; H=0.45"
HS1: 7G-0022A-F; H=0.24"
HS2: 7G-0023A-F; H=0.24"
HS3: 7G-0024A-F; H=0.45"
HS4: 7GA0127P01-F; H=0.65"
HS5: 7GA0128P01-F; H=1"

Through hole type

TH: No thread*

*The module can't equip Heat-sink with TH option.

Part Number Structure

Wall Mounted Type

HAE100 - 48 S 05 W - P TF1 R

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range	Remote On/Off Options	Assembly Options	Conformal Coating Options
	24: 8.5~36 9~36 48: 18~36 110: 36~75	S: Single	3P3: 3.3 05: 5 12: 12 15: 15 24: 24 28: 28 48: 48	4:1	□: Negative logic; 0.20" pin length P: Positive logic; 0.20" pin length	T: Without EMC filter TF1: Integrated EMC filter and meets EN55032 Class A can be connected to PE	□: None R: Conformal Coating

Models

Model Number	Input Range	Output Voltage	Output Current @Full Load A	Input Current @No Load mA	Efficiency %	Maximum Capacitor Load μ F
43HAE100-24S3P3W	9 ~ 36	3.3	25	20	91	75700
43HAE100-24S05W	9 ~ 36	5	20	25	93	40000
43HAE100-24S12W	8.5 ~ 36	12	8.4	25	90	7000
43HAE100-24S15W	8.5 ~ 36	15	6.7	25	91	4460
43HAE100-24S24W	8.5 ~ 36	24	4.2	25	90	1750
43HAE100-24S28W	8.5 ~ 36	28	3.6	25	90	1280
43HAE100-24S48W	8.5 ~ 36	48	2.1	35	90	430
43HAE100-48S3P3W	16.5 ~ 75	3.3	25	15	91	75700
43HAE100-48S05W	16.5 ~ 75	5	20	15	93	40000
43HAE100-48S12W	16.5 ~ 75	12	8.4	20	90	7000
43HAE100-48S15W	16.5 ~ 75	15	6.7	20	91	4460
43HAE100-48S24W	16.5 ~ 75	24	4.2	20	90	1750
43HAE100-48S28W	16.5 ~ 75	28	3.6	20	92	1280
43HAE100-48S48W	16.5 ~ 75	48	2.1	25	91	430
43HAE100-110S3P3W	43 ~ 160	3.3	25	10	87	75700
43HAE100-110S05W	43 ~ 160	5	20	10	90	40000
43HAE100-110S12W	43 ~ 160	12	8.4	10	90	7000
43HAE100-110S15W	43 ~ 160	15	6.7	10	90	4460
43HAE100-110S24W	43 ~ 160	24	4.2	10	90	1750
43HAE100-110S28W	43 ~ 160	28	3.6	10	90	1280
43HAE100-110S48W	43 ~ 160	48	2.1	10	91	430

Input Specifications

Parameter	Conditions		Min	Typ	Max	Unit	
Operating input voltage range	24Vin(nom)	3.3 & 5Vout	9	24	36	VDC	
		Others	8.5	24	36		
	48Vin(nom)		16.5	48	75		
	110Vin(nom)		43	110	160		
Start-up voltage	24Vin(nom)		--	--	9	VDC	
	48Vin(nom)		--	--	18		
	110Vin(nom)		--	--	43		
Shutdown voltage	24Vin(nom)		7.3	7.5	8.1	VDC	
	48Vin(nom)		15.5	16	16.3		
	110Vin(nom)		33.0	34.5	36.0		
Start-up time	Constant resistive load	Power up	110Vin(nom)	--	75	--	ms
		Remote ON/OFF	110Vin(nom)	--	75	--	
Input surge voltage	1 second, max.	12Vin(nom)		--	--	50	VDC
		24Vin(nom)		--	--	100	
		48Vin(nom))		--	--	185	
Input filter	Pi type						
Remote ON/OFF	Referred to –Vin pin	Negative logic (standard)	DC-DC ON	Short or 0 ~ 1.2VDC			mA
			DC-DC OFF	Open or 3 ~ 12 VDC			
		Positive logic (standard)	DC-DC ON	Open or 3 ~ 12 VDC			
			DC-DC OFF	Short or 0 ~ 1.2VDC			
		Input current of Ctrl pin	-0.5		1		
		Remote off input current		3			

Output Specifications

Parameter	Conditions		Min	Typ	Max	Unit
Voltage accuracy			-1.0	--	+1.0	%
Line regulation	Low Line to High Line at Full Load		-0.1	--	+0.1	%
Load regulation	No Load to Full Load		-0.1	--	+0.1	%
Voltage adjustability	Maximum output deviation is inclusive of remote sense		-20	--	+10	%
Remote sense	% of Vout(nom) If remote sense is not being used, Sense pins should be connected to corresponding polarity OUTPUT pins.			--	10	%
Ripple and noise	Measured by 20MHz bandwidth					
	With a 4.7µF/50V X7R MLCC	3.3Vout, 5Vout	--	75	--	mVp-p
	With a 4.7µF/50V X7R MLCC	12Vout, 15Vout	--	100	--	
	With a 4.7µF/50V X7R MLCC	24Vout, 28Vout	--	200	--	
With a 2.2µF/100V X7R MLCC	48Vout	--	300	--		
Temperature coefficient			-0.02	--	+0.02	%/°C
Transient response recovery time	25% load step change		--	200	250	µs
Over voltage protection	% of Vout(nom); Hiccup mode		115	--	130	
Overload protection	% of Iout rated; Hiccup mode	24Vin(nom) & 48Vin(nom)	110		150	%
		110Vin(nom)	--	150	--	
Short circuit protection	Continuous, automatic recovery					

General Specifications

Parameter	Conditions		Min	Typ	Max	Unit
Isolation voltage	1 minute (Reinforced insulation)	110Vin(nom) Input to Output	3000	--	--	V AC
		Input (Output) to Case	1500	--	--	
	1 minute	Others Input to Output	3000	--	--	V DC
			Input (Output) to Case	1600	--	
Isolation resistance	500VDC		1	--	--	GΩ
Isolation capacitance			--	--	2500	pF
Switching frequency		24Vin(nom) and 48Vin(nom)	225	250	275	kHz
		110Vin(nom)	270	300	330	
Safety approvals	IEC/ EN/ UL 62368-1				UL:E193009 CB:UL(Demko)	
Standard approvals	EN50155 EN45545-2					
Case material		24Vin(nom) and 48Vin(nom) 110Vin(nom)				Metal Aluminum base-plate with plastic case
Base material		24Vin(nom) and 48Vin(nom)				FR4 PCB
Potting material						Silicone (UL94 V-0)
Weight		Module stand alone				105g (3.70oz)
		43HAE100-□□S□□W -T				235g (8.29oz)
		43HAE100-□□S□□W-TF1				287g (10.12oz)
MTBF	MIL-HDBK-217F, Full load					4.087 x 10 ⁵ hrs

Environmental Specifications

Parameter	Conditions	Min	Typ	Max	Unit
Operating case temperature		-40	--	+105	
Maximum case temperature		--	--	105	
Over temperature protection		--	115	--	°C
Storage temperature range	Terminal block type	-40	--	+105	
	Others	-55	--	+125	
Thermal impedance	Module without assembly options	--	6.7	--	°C/W
	Heat-sink type with 0.24" Height	--	5.4	--	
	Heat-sink type with 0.45" Height	--	4.7	--	
	Heat-sink type with 0.65" Height	--	3.6	--	
	Heat-sink type with 1" Height	--	2.9	--	
Thermal shock					MIL-STD-810F
Shock					EN61373, MIL-STD-810F
Vibration					EN61373, MIL-STD-810F
Relative humidity					5% to 95% RH

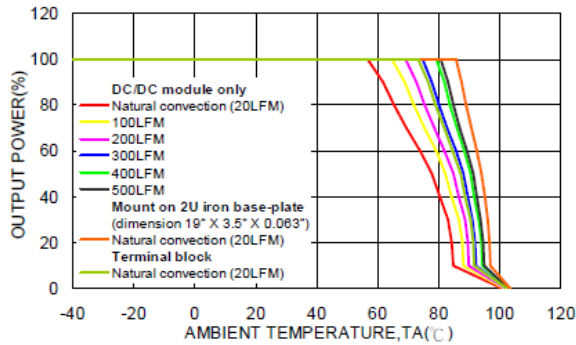
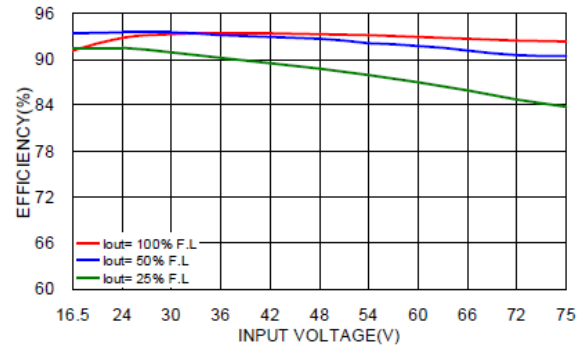
EMC Specifications

Parameter	Conditions		Level
EMI	EN55032, EN50121-3-2	43HAE100-□□S□□W-TF1 With external components *Connecting four screw bolts to shield plane will help to reduce the EMI.	Class A 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
	43HAE100-24S□□W 43HAE100-48S□□W	With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220µF/100V)	
	43HAE100-110S□□W	With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KXJ series, 150µF/200V)	
Surge	EN61000-4-5	± 2kV	Perf. Criteria A
	43HAE100-24S□□W 43HAE100-48S□□W	With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220µF/100V)	
	43HAE100-110S□□W	With 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KXJ series, 150µF/200V)	
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

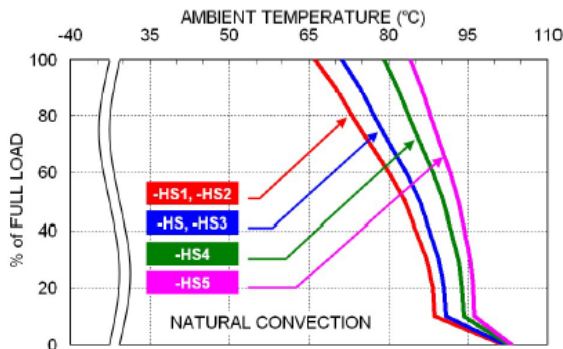
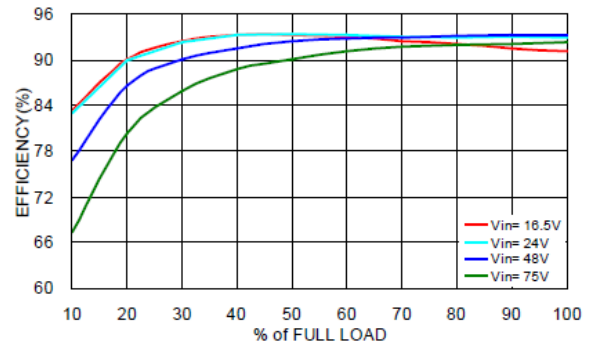
Note:

Input source impedance: The power module will operate as specifications without external components if the source voltage has a very low impedance and reasonable input voltage regulation. Highly inductive source impedances can affect the stability of the power module. Since real-world voltage source has finite impedance, performance can be improved by adding external filter capacitor. The 43HAE100-24S□□W and 43HAE100-48S□□W recommended Nippon Chemi-con KY series, 100µF/100V. The 43HAE100-110S□□W recommended Ruby-con BXF series, 68µF/200V.

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

Characteristic Curve

 43HAE100-48S05W Derating Curve
 (See Thermal Considerations)


43HAE100-48S05W Efficiency vs. Input Voltage


 43HAE100-48S05W Derating Curve with Heat-sink
 (See Thermal Considerations)


43HAE100-48S05W Efficiency vs. Output Load

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.

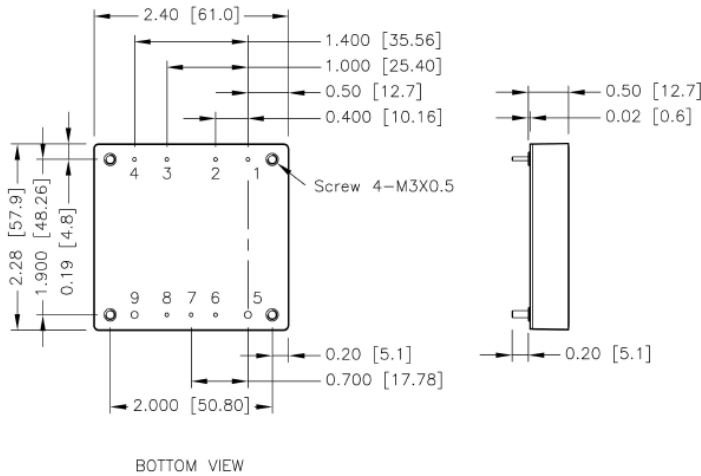
The input line fuse suggest as below :

Model	Fuse Rating (A)	Fuse Type
43HAE100-24S□□W	20	Fast-Acting
43HAE100-48S□□W	10	Fast-Acting
43HAE100-110S□□W	5	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

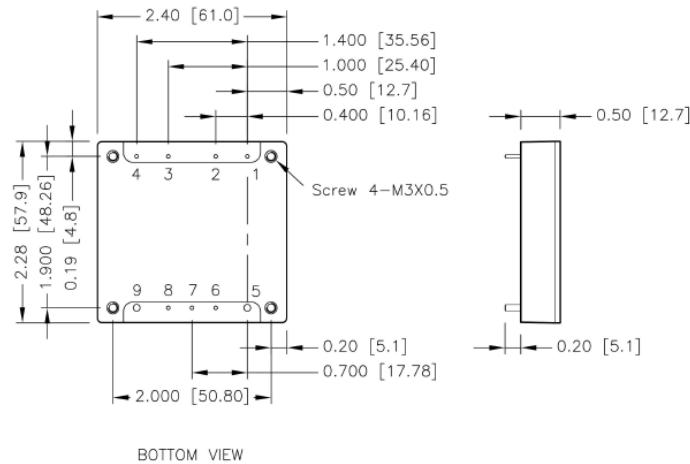
43HAE100-24S□□W, 43HAE100-48S□□W



BOTTOM VIEW

■ The screw locked torque: MAX 5.0kgf-cm/0.49N-m

43HAE100-110S□□W



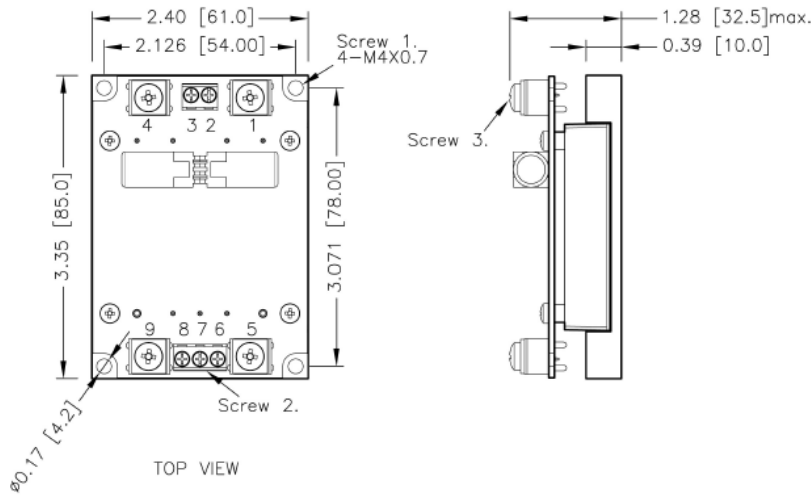
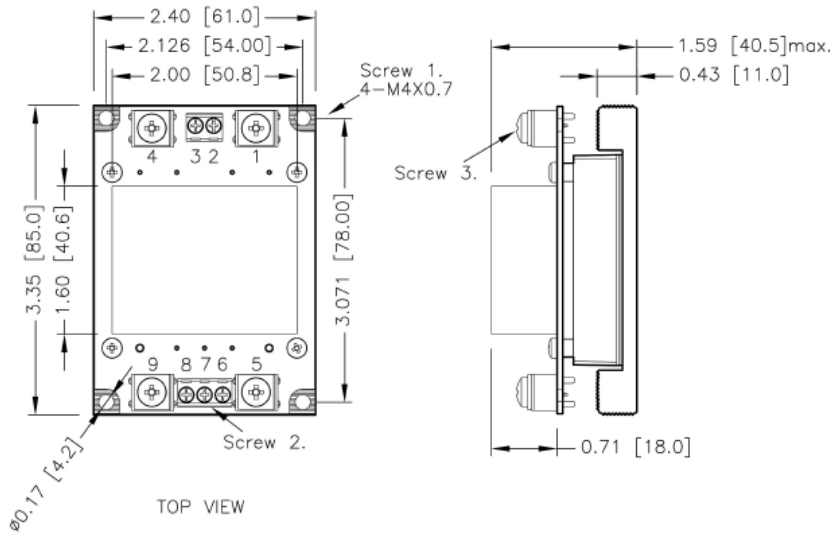
BOTTOM VIEW

■ The screw locked torque: MAX 3.5kgf-cm/0.34N-m

Pin Connection

Pin	Define	Diameter
1	-Vin	0.04 Inch
2	Case	0.04 Inch
3	Ctrl	0.04 Inch
4	+Vin	0.04 Inch
5	-Vout	0.08 Inch
6	-Sense	0.04 Inch
7	Trim	0.04 Inch
8	+Sense	0.04 Inch
9	+Vout	0.08 Inch

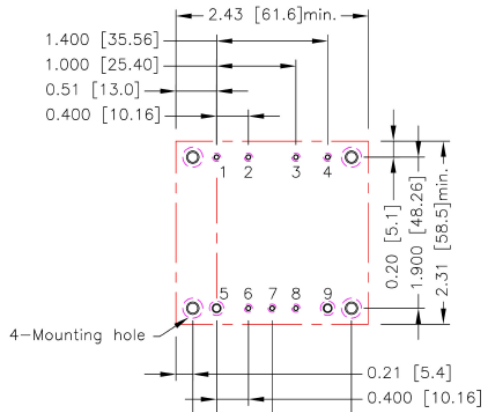
- All dimensions in inch [mm]
- Tolerance :x.xx±0.02 [x.x±0.5]
x.xxx±0.01 [x.xx±0.25]
- Pin dimension tolerance ±0.004[0.10]

Terminal Block Type Option
43HAE100-□□S□□ W-T

43HAE100-□□S□□ W-TF1

TERMINAL CONNECTION

Pin	Define
1	-Vin
2	Case
3	Ctrl
4	+Vin
5	-Vout
6	-Sense
7	Trim
8	+Sense
9	+Vout

- All dimensions in inch [mm]
- Tolerance :x.xx±0.02 [x.x±0.5]
x.xxx±0.01 [x.xx±0.25]
- Screw 1 locked torque: MAX 11.2kgf-cm/ 1.10N-m
- Screw 2 locked torque: MAX 5.2kgf-cm/ 0.51N-m
- Screw 3 locked torque: MAX 12.0kgf-cm/ 1.18N-m

Recommended Pad Layout

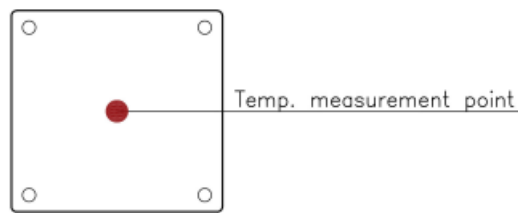


All dimensions in inch[mm]
 Pad size(lead free recommended)
 Through hole 1,2,3,4,6,7,8: $\Phi 0.051[1.30]$
 Through hole 5,9: $\Phi 0.091[2.30]$
 Through hole of mounting: $\Phi 0.126[3.20]$
 Top view pad 1,2,3,4,6,7,8: $\Phi 0.064[1.63]$
 Top view pad 5,9: $\Phi 0.113[2.88]$
 Top view pad of mounting: $\Phi 0.157[4.00]$
 Bottom view pad 1,2,3,4,6,7,8: $\Phi 0.102[2.60]$

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).
- The iron base-plate dimension is 19" X 3.5" X 0.063" (The height is EIA standard 2U).
- The heat-sink is optional and P/N: 7G-0021A-F, 7G-0022A-F, 7G-0023A-F, 7G-0024A-F, 7GA0127P01-F, 7GA0128P01-F.

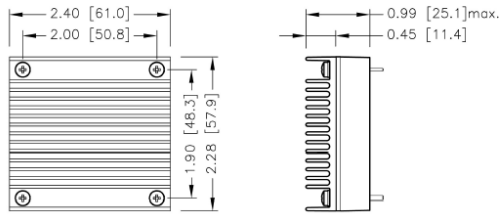


BASE PLATE

Heat-Sink Type Options

43HAE100-□□S□□ W-HS

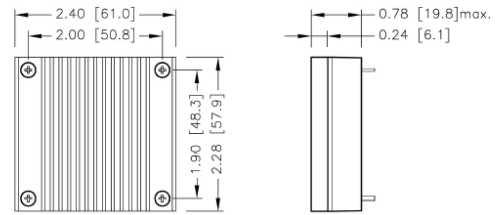
7G-0021A-F



SIDE VIEW

43HAE100-□□S□□W -HS1

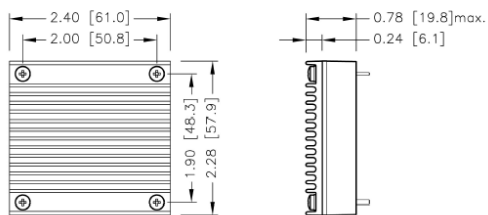
7G-0022A-F



SIDE VIEW

43HAE100-□□S□□ W-HS2

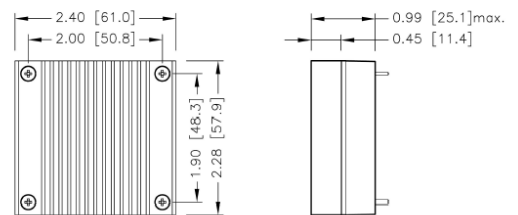
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SIDE VIEW

43HAE100-□□S□□W -HS3

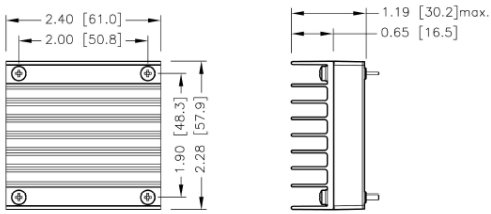
7G-0024A-F



SIDE VIEW

43HAE100-□□S□□ W-HS4

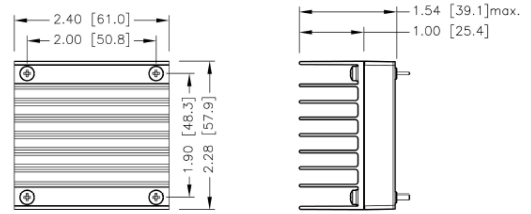
7GA0127P01-F



SIDE VIEW

43HAE100-□□S□□ W-HS5

7GA0128P01-F



SIDE VIEW

- All dimensions in inch [mm]
- Tolerance :x.xx±0.02 [x.x±0.5]
x.xxx±0.01 [x.xx±0.25]

Output Voltage Adjustment

Output voltage is adjustable for 10% trim up or -20% trim down of nominal output voltage by connecting an external resistor between the Trim pin and either the +Sense or -Sense pins. With an external resistor between the Trim and -Sense pin, the output voltage set point decreases. With an external resistor between the Trim and +Sense pin, the output voltage set point increases. Maximum output deviation is +10% inclusive of remote sense. The external TRIM resistor needs to be at least 1/8W of rated power.

Trim Up Equation

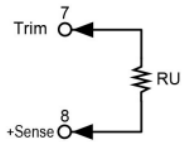
$$R_U = \left(\frac{V_{OUT}(100 + \Delta\%) - 100 + 2\Delta\%}{1.225\Delta\%} \right) k\Omega$$

Trim Down Equation

$$R_D = \left(\frac{100}{\Delta\%} - 2 \right) k\Omega$$

Trim Up
EXTERNAL OUTPUT TRIMMING

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



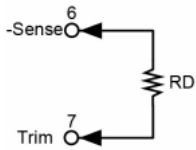
□□S3P3W										
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630
RU (kΩ)	170.082	85.388	57.156	43.041	34.571	28.925	24.892	21.867	19.515	17.633
□□S05W										
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.40	5.45	5.50
RU (kΩ)	310.245	156.163	104.803	79.122	63.714	53.442	46.105	40.602	36.322	32.898
□□S12W										
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20
RU (kΩ)	887.388	447.592	300.993	227.694	183.714	154.395	133.452	117.745	105.528	95.755
□□S15W										
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50
RU (kΩ)	1134.735	572.490	385.075	291.367	235.143	197.660	170.886	150.806	135.188	122.694
□□S24W										
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	24.24	24.48	24.72	24.96	25.20	25.44	25.68	25.92	26.16	26.40
RU (kΩ)	1876.776	947.184	637.320	482.388	389.429	327.456	283.190	249.990	224.168	203.510
□□S28W										
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	28.28	28.56	28.84	29.12	29.40	29.68	29.96	30.24	30.52	30.80
RU (kΩ)	2206.571	1113.714	749.429	567.286	458.000	385.143	333.102	294.071	263.714	239.429
□□S48W										
ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	48.48	48.96	49.44	49.92	50.40	50.88	51.36	51.84	52.32	52.80
RU (kΩ)	3855.551	1946.367	1309.973	991.776	800.857	673.578	582.665	514.480	461.447	419.020

Ideal Power Limited

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

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

Trim Down



□□S□□W

ΔV (%)	1	2	3	4	5	6	7	8	9	10
RD (k Ω)	98.000	48.000	31.333	23.000	18.000	14.667	12.286	10.500	9.111	8.000
ΔV (%)	11	12	13	14	15	16	17	18	19	20
RD (k Ω)	7.091	6.333	5.692	5.143	4.667	4.250	3.882	3.556	3.263	3.000