

# HAE75W SERIES

DC / DC Single Output: 75 Watts



PCB Model

Terminal Block Model

## Features

- 4:1 wide Input range option 9~36V & 18~75V
- Single output, up to 15A
- Industry Standard Half-Brick package
- High efficiency up to 90%
- Regulated output & Short circuit protection
- 2250VDC isolation
- Five sided continuous copper shield
- Remote ON / OFF, Negative or Positive Logic
- High operating temperature +84°C
- Zero load operation
- External Output voltage trim
- Terminal block option –T ( see options )
- A range of heatsink options ( see options page )

## Specifications:

<b>Input Voltage</b>	<b>24VDC</b> ( 9 ~ 36 ) <b>48VDC</b> ( 18 ~ 75 )	<b>Efficiency</b>	Model dependant 86 ~ 88%
<b>Input Filter</b>	Pi type ( see note 14 )	<b>Isolation</b>	Input – Output: 2250VDC Input / Output – Case: 1600VDC
<b>Start-up Voltage</b>	24V input: 8.5V typ. 48V input: 17.7V typ.	<b>Isolation Cap.</b>	2500pF
<b>Input Surge Voltage.</b>	24V: 50VDC. 48V: 100VDC ( 100mS )	<b>Switching Freq.</b>	300KHz
<b>Input Reverse Voltage Protection</b>	External input fuse required	<b>Safety</b>	Designed to meet EN60950-1, UL60950-1
<b>Start Up time</b>	Typically 25mS constant resistive load	<b>Case Material</b>	Metal
<b>Remote ON/OFF Negative Logic</b>	DC-DC ON Short or $0V < V_r < 1.2V$ DC-DC OFF Open or $3.0V < V_r < 12V$	<b>Base Material</b>	FR4 PCB
<b>Positive Logic -P</b>	DC-DC ON Open or $3.0V < V_r < 12V$ DC-DC OFF Short or $0V < V_r < 1.2V$	<b>Potting</b>	Epoxy UL94-V0
	Input current of remote control pin: 0.5mA Remote off state input current: 3mA	<b>Dimensions</b>	61 X 57.9 X 12.7mm
<b>Output power</b>	75 watts	<b>Weight</b>	97g
<b>Voltage Accuracy</b>	±1.0%	<b>MTBF</b>	7.416 x 104Hrs
<b>Voltage Trim</b>	+10% to -20% External voltage trim	<b>Operating Temp</b>	-40°C to +35°C ( without derating ) +35°C to +84°C ( with derating ) See derating graphs
<b>Minim Load</b>	Zero	<b>Case Temp</b>	+105°C maximum case temperature
<b>Line Regulation</b>	See table	<b>Over Temp. Protection</b>	Shutdown approx 115°C case temperature
<b>Load Regulation</b>	See table	<b>Thermal Impedance</b>	6.7°C / watt without heatsink 5.4°C / watt with 0.24" height optional heatsink 4.7°C / watt with 0.45" height optional heatsink
<b>Remote Sense</b>	10% of Vout nominal ( Note 8 )	<b>Thermal shock</b>	MIL-STD-810F
<b>Ripple &amp; noise</b>	See table. 20MHZ bandwidth	<b>Vibration</b>	MIL-STD-810F
<b>Temp. Coefficient</b>	±0.02% / °C	<b>Humidity</b>	5-95% RH
<b>Transient Response</b>	200uS ( 25% load step change )	<b>EMC</b>	EN55022 Class A ( see note 12 )
<b>Over Voltage Protection</b>	Set at 110 ~130% of Voltage output nominal	<b>ESD</b>	EN61000-4-2
<b>Overload Protection</b>	Set at 110 ~ 150% of output load	<b>Radiated Immunity</b>	EN61000-4-3
<b>Short Circuit protection</b>	Continuous hiccup mode	<b>Fast Transients</b>	EN61000-4-4
		<b>Surge</b>	EN61000-4-5
		<b>Conducted Immunity</b>	EN61000-4-6

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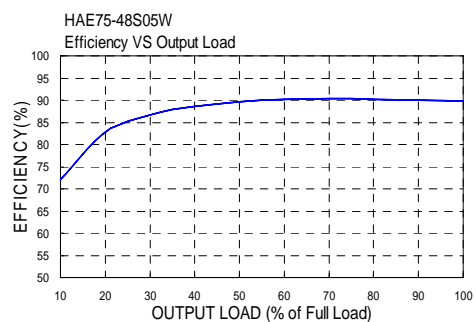
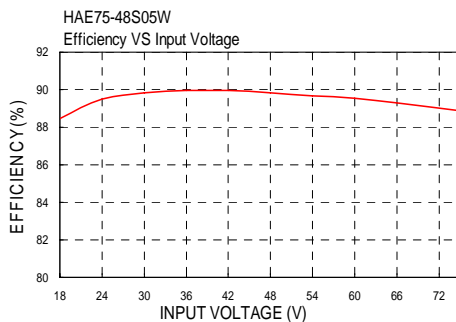
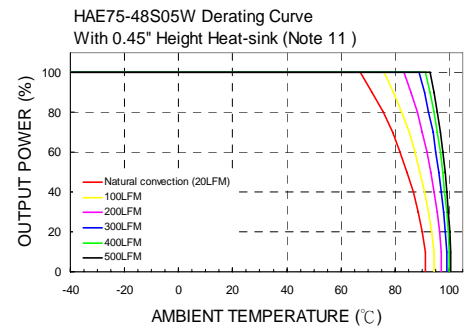
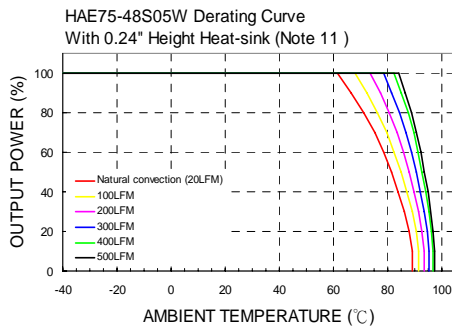
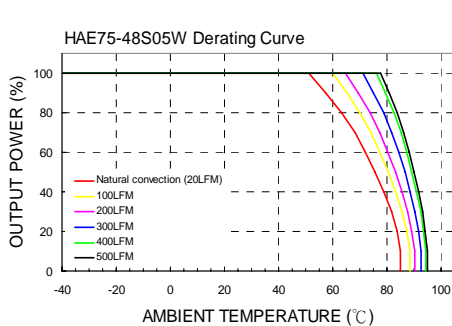
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Model Number	Input Range	Output V	Output A	Line Regulation	Load Regulation	Output (4) (5) Ripple & Noise	Input Current		Eff (4) (%)
							No Load (3)	Full Load (2)	
HAE75-24S3P3W-P	9 – 36 VDC	3.3 V	20 A	7mV	10mV	75mVp-p	100mA	3.216 A	87
HAE75-24S05W-P	9 – 36 VDC	5 V	15 A	10mV	15mV	75mVp-p	185mA	3.613 A	88
HAE75-24S12W-P	9 – 36 VDC	12 V	6.3 A	24mV	30mV	100mVp-p	185mA	3.642 A	88
HAE75-24S15W-P	9 – 36 VDC	15 V	5 A	30mV	38mV	100mVp-p	185mA	3.613 A	88
HAE75-24S24W-P	9 – 36 VDC	24 V	3.2 A	48mV	48mV	200mVp-p	85mA	3.743 A	87
HAE75-24S28W-P	9 – 36 VDC	28 V	2.7 A	56mV	56mV	200mVp-p	85mA	3.684 A	87
HAE75-24S48W-P	9 – 36 VDC	48 V	1.6 A	96mV	72mV	300mVp-p	85mA	3.743 A	87
HAE75-48S3P3W-P	18 – 75 VDC	3.3 V	20 A	7mV	10mV	75mVp-p	80mA	1.590 A	88
HAE75-48S05W-P	18 – 75 VDC	5 V	15 A	10mV	15mV	75mVp-p	90mA	1.766 A	90
HAE75-48S12W-P	18 – 75 VDC	12 V	6.3 A	24mV	30mV	100mVp-p	90mA	1.780 A	90
HAE75-48S15W-P	18 – 75 VDC	15 V	5 A	30mV	38mV	100mVp-p	90mA	1.786 A	89
HAE75-48S24W-P	18 – 75 VDC	24 V	3.2 A	48mV	48mV	200mVp-p	50mA	1.850 A	88
HAE75-48S28W-P	18 – 75 VDC	28 V	2.7 A	56mV	56mV	200mVp-p	50mA	1.821 A	88
HAE75-48S48W-P	18 – 75 VDC	48 V	1.6 A	96mV	72mV	300mVp-p	50mA	1.871 A	87

**Notes:**

- BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C.  
MIL-HDBK-217F Notice2 @Ta=25 , Full load(Ground, Benign, controlled environment).
- Maximum value at nominal input voltage and full load.
- Typical value at nominal input voltage and no load.
- Typical value at nominal input voltage and full load.
- The ripple and noise of output voltage 48V is measured with a 2.2µF/100V X7R MLCC; The ripple and noise of other output voltage is measured with a 4.7µF/50V X7R MLCC.
- The remote ON/OFF control pin voltage is referenced to -Vin. The positive logic and pin length are optional. To order positive logic ON-OFF control add the suffix -P (Ex: HAE75-48S05W-P).
- Output voltage is adjustable for 10% trim up or -20% trim down of nominal output voltage by connecting a single resistor between TRIM and +SENSE pins for trim up or between TRIM and -SENSE pins for trim down. To calculate the value of the resistor Ru and Rd for a particular output voltage uses the following equation:
 
$$R_U = \left( \frac{V_{OUT}(100 + \Delta\%) - (100 + 2\Delta\%)}{1.225\Delta\%} - \frac{(100 + 2\Delta\%)}{\Delta\%} \right) K\Omega$$

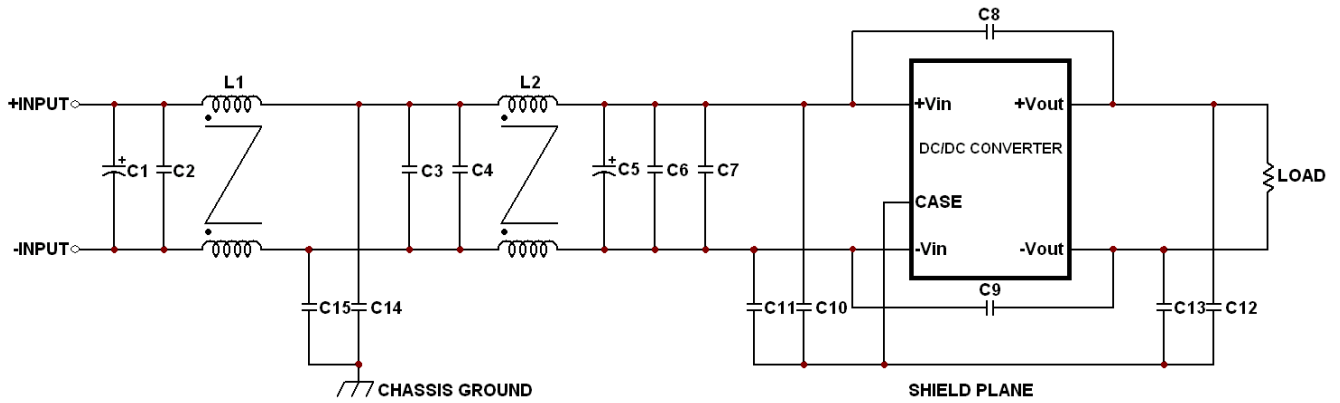
$$R_D = \left( \frac{100}{\Delta\%} - 2 \right) K\Omega$$
- Maximum output deviation is +10% inclusive of remote sense. If remote sense is not being used, the +SENSE should be connected to its corresponding +OUTPUT and likewise the -SENSE should be connected to its corresponding -OUTPUT.
- Internal fusing is not included, so we suggest to use an input line fuse.
- Test condition with vertical direction by natural convection (20LFM).
- Heat sink is optional and P/N: 7G-0021A-F , 7G-0022A-F , 7G-0023A-F , 7G-0024A-F.
- The HAE75W series meets EMC characteristics only with external components connected before the input pin to the converter. If customer only need to meet EN61000-4-4 and EN61000-4-5, an external input filter capacitor is required  
The filter capacitor Power Mate suggest: Nippon chemi-con KY series, 220µF /100V, ESR 48mΩ.
- CASE GROUNDING : When you connect the case pin and the four screw bolts to shield plane, the EMI could be better reduced.
- An external input capacitor is recommended for 24Vin model. Power Mate suggest: 4.7µF/50V X7R MLCC or Nippon chemi-con KY series, 68µF /100V, ESR 110mΩ or better capacitor. For terminal block version, the capacitor has included in as standard, it isn't required external capacitor.



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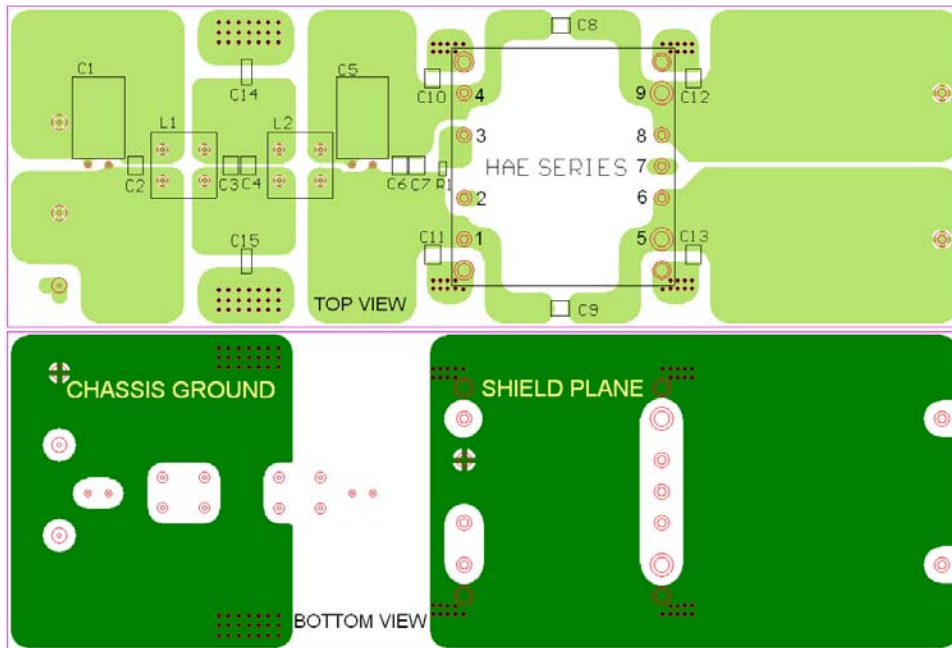
## EMI Filter For EN55022 Class B Recommendation



### Recommended Filter for EN55022 Class B Compliance

The components used in the above figure, together with the manufacturers' part numbers for these components, are as follows:

	C1,C5	C2,C3,C4,C6,C7	C8	C9	C10,C11,C12,C13	C14,C15	L1	L2
HAE75-24SXXW	100 $\mu$ F/50V	4.7 $\mu$ F/50V 1812 MLCC	1000pF/3KV 1808 MLCC	1000pF/3KV 1808 MLCC	10nF/2KV 1812 MLCC	1000pF/3KV 1808 MLCC	Common Choke PMT-073 305 $\mu$ H	Common Choke PMT-073 305 $\mu$ H
HAE75-48SXXW	100 $\mu$ F/100V	2.2 $\mu$ F/100V 1812 MLCC	1000pF/3KV 1808 MLCC	4700pF/3KV 1812 MLCC	10nF/2KV 1812 MLCC	1000pF/3KV 1808 MLCC	Common Choke PMT-064 1400 $\mu$ H	Common Choke PMT-072 156 $\mu$ H

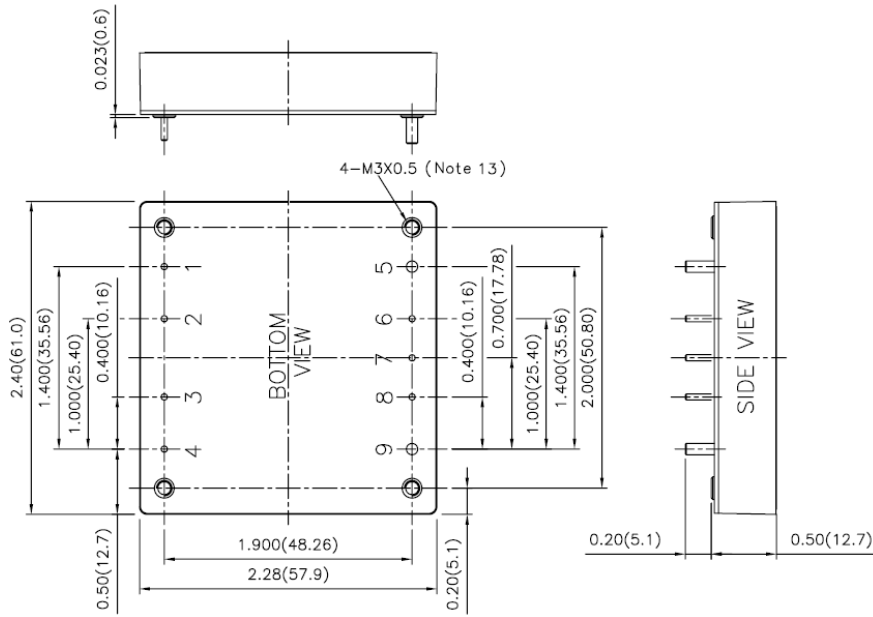


### Recommended EN55022 Class B Filter Circuit Layout

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## Mechanical Drawing



1. Pin 1,2,3,4,6,7,8. DIA. 0.040 (1.02mm)  
Pin 5,9. DIA. 0.080 (2.03mm)
2. All dimensions in inches (mm)
3. Tolerance :x.xx±0.02 (x.x±0.5)  
x.xxx±0.01 (x.xx±0.25)
4. Pin pitch tolerance ±0.01 (0.25)
5. Pin dimension tolerance ±0.004(0.1)

PIN CONNECTION		
PIN	Define	Diameter
1	- INPUT	0.04 Inches
2	CASE	0.04 Inches
3	CTRL	0.04 Inches
4	+ INPUT	0.04 Inches
5	- OUTPUT	0.08 Inches
6	- SENSE	0.04 Inches
7	TRIM	0.04 Inches
8	+ SENSE	0.04 Inches
9	+ OUTPUT	0.08 Inches

**EXTERNAL OUTPUT TRIMMING**

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

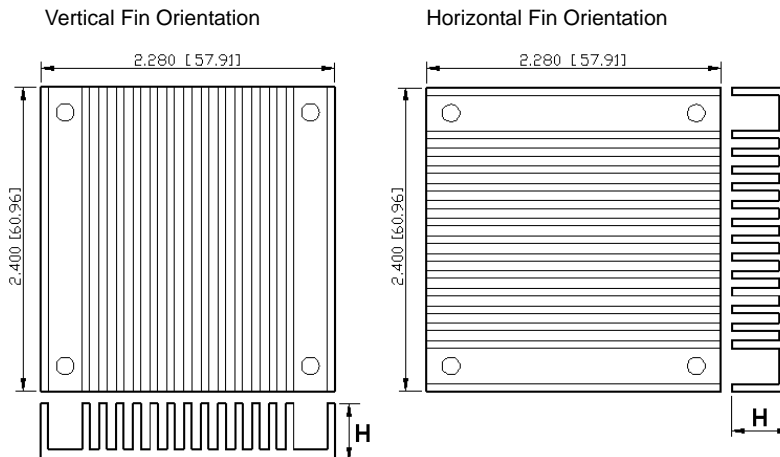
TRIM UP

TRIM DOWN

## Options:

Product option		Suffix	Product option		Suffix		
Remote ON/OFF	Negative logic	0.20" pin length	-	Heat-sink	H= 0.24" Vertical 7G-0023A-F	- HS2	
		0.145" pin length	- L		H= 0.45" Vertical 7G-0021A-F	- HS	
		0.11" pin length	- K		H= 0.24" Horizontal 7G-0022A-F	- HS1	
	Positive logic	0.20" pin length	- P		H= 0.45" Horizontal 7G-0024A-F	- HS3	
		0.145" pin length	- S		Terminal Block	Without EMC filter	- T
		0.11" pin length	- M		Without EMC filter with Din Rail Clip	- TDR	
				With EMC filter	- TF		
				With EMC filter and Din Rail Clip	- TFDR		

## Heat-Sink Type (Suffix-HS)



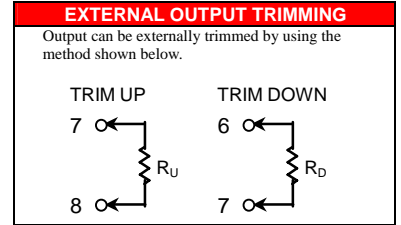
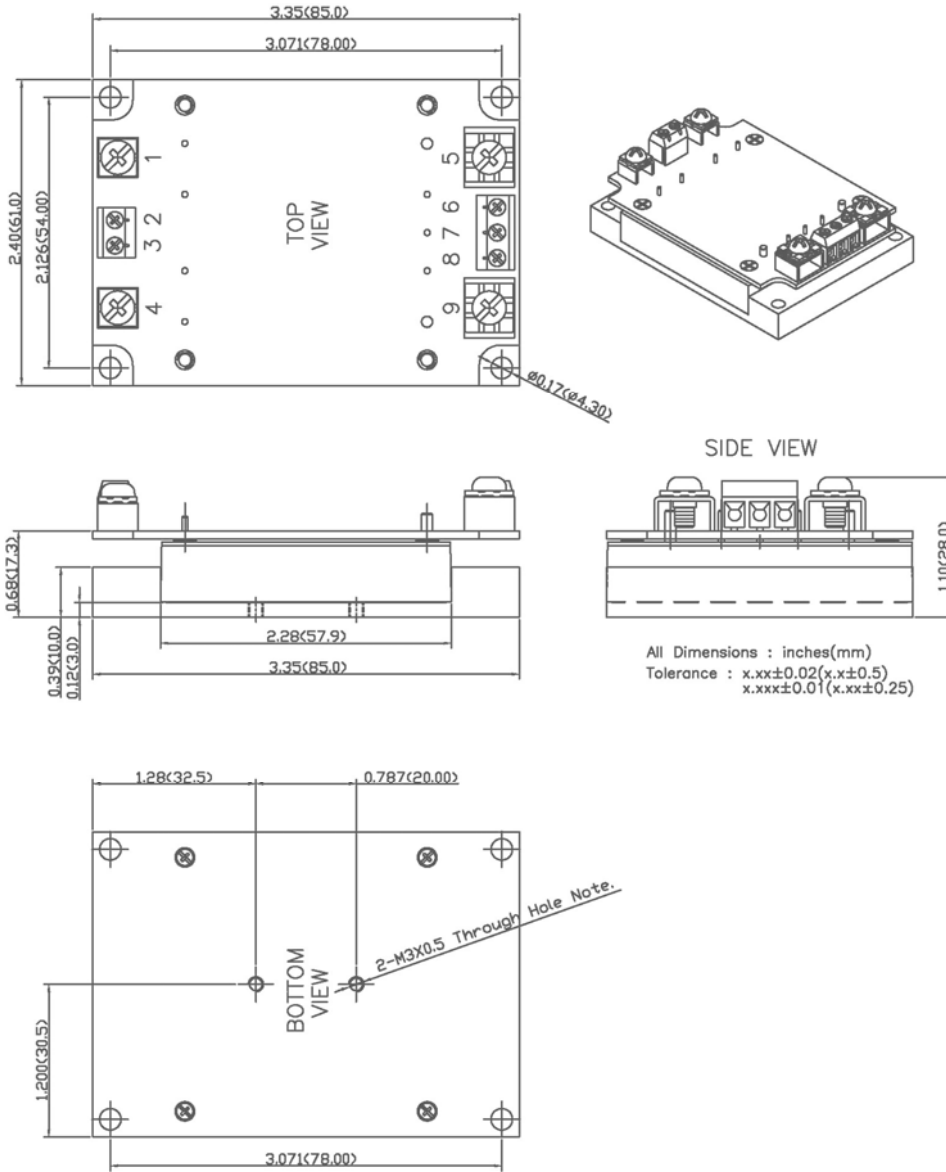
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## Terminal Block Type Options:

Note : Terminal Block without EMC Filter (Suffix-T), Terminal Block without EMC Filter with Din Rail Clip (Suffix-TDR), Terminal Block with EMC Filter (Suffix-TF) and Terminal Block with EMC Filter and Din Rail Clip (Suffix-TFDR)  
 The terminal block type of HAE75W can meet the EMC characteristics with an EMC filter. Followings are the mechanical drawings for reference. Pin assignments are same as standard type.

### 1) Terminal Block without EMC Filter (Suffix-T)



**TERMINAL CONNECTION**

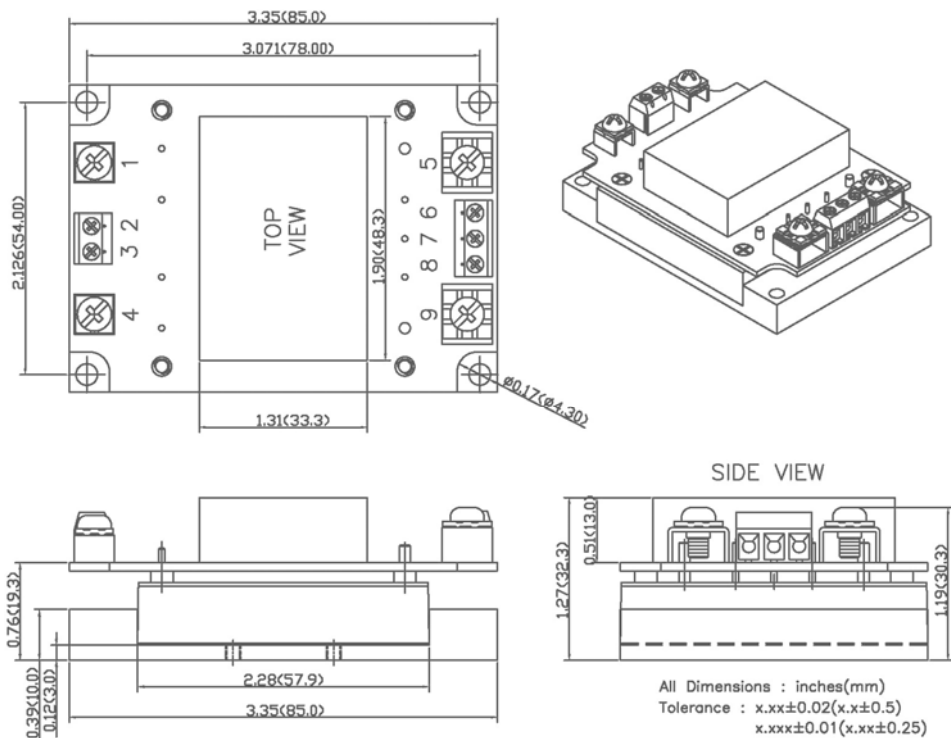
Terminal	Define	wire range
1	- INPUT	14 AWG to 16 AWG
2	CASE	14 AWG to 18 AWG
3	CTRL	14 AWG to 18 AWG
4	+ INPUT	14 AWG to 16 AWG
5	- OUTPUT	10 AWG to 12 AWG
6	- SENSE	14 AWG to 18 AWG
7	TRIM	14 AWG to 18 AWG
8	+ SENSE	14 AWG to 18 AWG
9	+ OUTPUT	10 AWG to 12 AWG

Note: The thickness of heat sink is 3.0mm typically. Customer shall take care as select the screw to avoid damaging the converter.

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## 2) Terminal Block with EMC Filter (Suffix-TF)



Note: The thickness of heat sink is 3.0mm typically. Customer shall take care as select the screw to avoid damaging the converter.

## 3) Terminal Block with Din Rail Clip (Suffix: -TDR, -TFDR)

