

24V & 48V Input Models



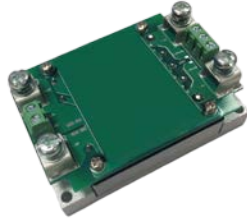
Size: 2.40 x 2.28 x 0.50in

110V Input Models



Size: 2.40 x 2.28 x 0.50in

Terminal Block Models  
("T" suffix)



Size: 3.35 x 2.40 x 1.27in

Terminal Block w/ EMC Filter  
("TF" suffix)



Size: 3.35 x 2.40 x 1.47in

Terminal Block w/ EMC Filter  
("TF1" suffix)



Size: 3.35 x 2.40 x 1.53in

**OPTIONS**

- Pin Length
- Heatsinks
- Thru-Hole Inserts
- Negative Logic Remote On/Off
- Terminal Block
- Terminal Block with Aluminum Base-plate and EMC Filter
- Terminal Block with Anodized Aluminum Base-plate and EMC Filter, Can be Connected to PE

**FEATURES**

- Railway Applications
- Soft-Start
- 4:1 Ultra Wide Input Voltage Ranges
- 82.5~100.8 Watts Output Power
- High Efficiency up to 93%
- Under Voltage Lockout
- No Minimum Load Requirements
- Adjustable Output Voltage
- Remote On/Off Control
- Industry Standard Half-Brick Footprint
- Single Outputs Ranging from 3.3VDC to 48VDC
- 2250VDC Basic Insulation for 24VIN & 48VIN
- 3000VAC Reinforced Insulation for 110VDC Nominal Input Models
- Threaded Inserts and Thru-Hole Inserts Available
- Short Circuit, Over Voltage, Over Current, and Over Temp. Protection
- Compliant to RoHS II & REACH
- CE Mark Meets 2006/95/EC, 2011/95/EC, and 2004/108/EC
- UL60950-1, EN60950-1, & IEC60950-1 Safety Approvals

**APPLICATIONS**

- Railway Systems
- Wireless Networks
- Telecom / Datacom
- Industry Control Systems
- Distributed Power Architectures
- Semiconductor Equipment
- Military Applications

**DESCRIPTION**

The DCHBW100 series of DC/DC power converters provides up to 100.8 Watts of output power in an industry standard half-brick package and footprint. This series consists of single output models ranging from 3.3VDC to 48VDC with 4:1 ultra wide input voltage ranges. Some features include high efficiency up to 93%, adjustable output voltage, and remote on/off control. These converters also have short circuit, over voltage, over current, and over temperature protection. The DCHBW100 series is RoHS II compliant and has UL60950-1, EN60950-1, and IEC60950-1 safety approvals. Several different options are available for this series including negative remote on/off control, terminal block, pin length, heatsinks, and thru-hole inserts.

**MODEL SELECTION TABLE**

Model Number	Input Voltage Range	Output Voltage	Output Current		Ripple & Noise	No Load Input Current	Output Power	Maximum Capacitive Load	Efficiency
			Min Load	Max Load					
DCHBW100-24S3.3	24 VDC (9 - 36 VDC)	3.3 VDC	0mA	25A	75mVp-p	20mA	82.5W	75,700µF	91%
DCHBW100-24S05		5 VDC	0mA	20A	75mVp-p	25mA	100W	40,000µF	93%
DCHBW100-24S12	24 VDC (8.5 - 36 VDC)	12 VDC	0mA	8.4A	100mVp-p	25mA	100.8W	7000µF	90%
DCHBW100-24S15		15 VDC	0mA	6.7A	100mVp-p	25mA	100.5W	4460µF	91%
DCHBW100-24S24		24 VDC	0mA	4.2A	200mVp-p	25mA	100.8W	1750µF	90%
DCHBW100-24S28		28 VDC	0mA	3.6A	200mVp-p	25mA	100.8W	1280µF	90%
DCHBW100-24S48		48 VDC	0mA	2.1A	300mVp-p	35mA	100.8W	430µF	90%
DCHBW100-48S3.3	48 VDC (16.5 - 75 VDC)	3.3 VDC	0mA	25A	75mVp-p	15mA	82.5W	75,700µF	91%
DCHBW100-48S05		5 VDC	0mA	20A	75mVp-p	15mA	100W	40,000µF	93%
DCHBW100-48S12		12 VDC	0mA	8.4A	100mVp-p	20mA	100.8W	7000µF	90%
DCHBW100-48S15		15 VDC	0mA	6.7A	100mVp-p	20mA	100.5W	4460µF	91%
DCHBW100-48S24		24 VDC	0mA	4.2A	200mVp-p	20mA	100.8W	1750µF	90%
DCHBW100-48S28		28 VDC	0mA	3.6A	200mVp-p	20mA	100.8W	1280µF	92%
DCHBW100-48S48		48 VDC	0mA	2.1A	300mVp-p	25mA	100.8W	430µF	91%
DCHBW100-110S3.3	110 VDC (43 - 160 VDC)	3.3 VDC	0mA	25A	75mVp-p	10mA	82.5W	75,700µF	87%
DCHBW100-110S05		5 VDC	0mA	20A	75mVp-p	10mA	100W	40,000µF	90%
DCHBW100-110S12		12 VDC	0mA	8.4A	100mVp-p	10mA	100.8W	7000µF	90%
DCHBW100-110S15		15 VDC	0mA	6.7A	100mVp-p	10mA	100.5W	4460µF	90%
DCHBW100-110S24		24 VDC	0mA	4.2A	200mVp-p	10mA	100.8W	1750µF	90%
DCHBW100-110S28		28 VDC	0mA	3.6A	200mVp-p	10mA	100.8W	1280µF	90%
DCHBW100-110S48		48 VDC	0mA	2.1A	300mVp-p	10mA	100.8W	430µF	91%

**SPECIFICATIONS: DCHBW100 SERIES**

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	
<b>INPUT SPECIFICATIONS</b>						
Operating Input Voltage Range	24VDC nominal input models	3.3Vout & 5Vout	9	24	36	VDC
		Others	8.5	24	36	
	48VDC nominal input models		16.5	48	75	
	110VDC nominal input models		43	110	160	
Start-Up Voltage	24VDC nominal input models				9	VDC
	48VDC nominal input models				18	
	110VDC nominal input models				43	
Shutdown Voltage	24VDC nominal input models		7.3		8.1	VDC
	48VDC nominal input models		15.5		16.3	
	110VDC nominal input models		33.0		36.0	
Input Surge Voltage (1sec, max.)	24VDC nominal input models				50	VDC
	48VDC nominal input models				100	
	110VDC nominal input models				185	
Input Current	No Load					
Input Filter (See Note 1)					See Table Pi type	
<b>OUTPUT SPECIFICATIONS</b>						
Output Voltage					See Table	
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 (See Note 6)	Maximum output deviation is inclusive of remote sense		-20		+10	%
Remote Sense (See Note 2)	% of nominal Vout				10	%
Output Power					See Table	
Output Current					See Table	
Minimum Load		0				%
Maximum Capacitive Load	Minimum input and constant resistive load				See Table	
Ripple & Noise (See Note 7)	With a 1µF/25V X7R MLCC and a 22µF/25V POS-CAP	3.3Vout & 5Vout		75		mVp-p
	With a 1µF/25V X7R MLCC and a 22µF/25V POS-CAP	12Vout & 15Vout		100		
	With a 4.7µF/50V X7R MLCC	24Vout & 28Vout		200		
	With a 2.2µF/100V X7R MLCC	48Vout		300		
Transient Response Recovery Time	25% load step change			200	250	µs
Start-Up Time	Constant resistive load	Power Up		75		ms
		Remote On/Off		75		
Temperature Coefficient			-0.02		+0.02	%/°C
<b>REMOTE ON/OFF CONTROL</b>						
Positive Logic (standard)	Referenced to -Vin pin	DC/DC ON		Open or 3 ~ 12VDC		
		DC/DC OFF		Short or 0 ~ 1.2VDC		
Negative Logic (optional)	Referenced to -Vin pin	DC/DC ON		Open or 3 ~ 12VDC		
		DC/DC OFF		Short or 0 ~ 1.2VDC		
Input Current of CTRL Pin	Nominal Vin		-0.5		1	mA
Remote OFF Input Current	Nominal Vin			3		mA
<b>PROTECTION</b>						
Short Circuit Protection				Continuous, automatic recovery		
Over Load Protection	% of rated Iout; hiccup mode	24VDC & 48VDC Input Models	120		150	%
		110VDC Input Models		150		
Over Voltage Protection	% of nominal Vout; hiccup mode		115		130	%
Over Temperature Protection				+115		°C
<b>ENVIRONMENTAL SPECIFICATIONS</b>						
Operating Case Temperature	Base-plate		-40		+115	°C
Storage Temperature	Terminal block types		-40		+105	°C
	Others		-55		+125	
Thermal Impedance (See Note 3)	Vertical direction by natural convection (20LFM)			6.7		°C/W
	Module without assembly options			5.4		
	0.24" height heatsink			4.7		
Relative Humidity			5		95	% RH
Thermal Shock				MIL-STD-810F		
Shock				EN61373, MIL-STD-810F		
Vibration				EN61373, MIL-STD-810F		
MTBF	MIL-HDBK-217F Ta=25°C, full load		408,700			hours

**SPECIFICATIONS: DCHBW100 SERIES**

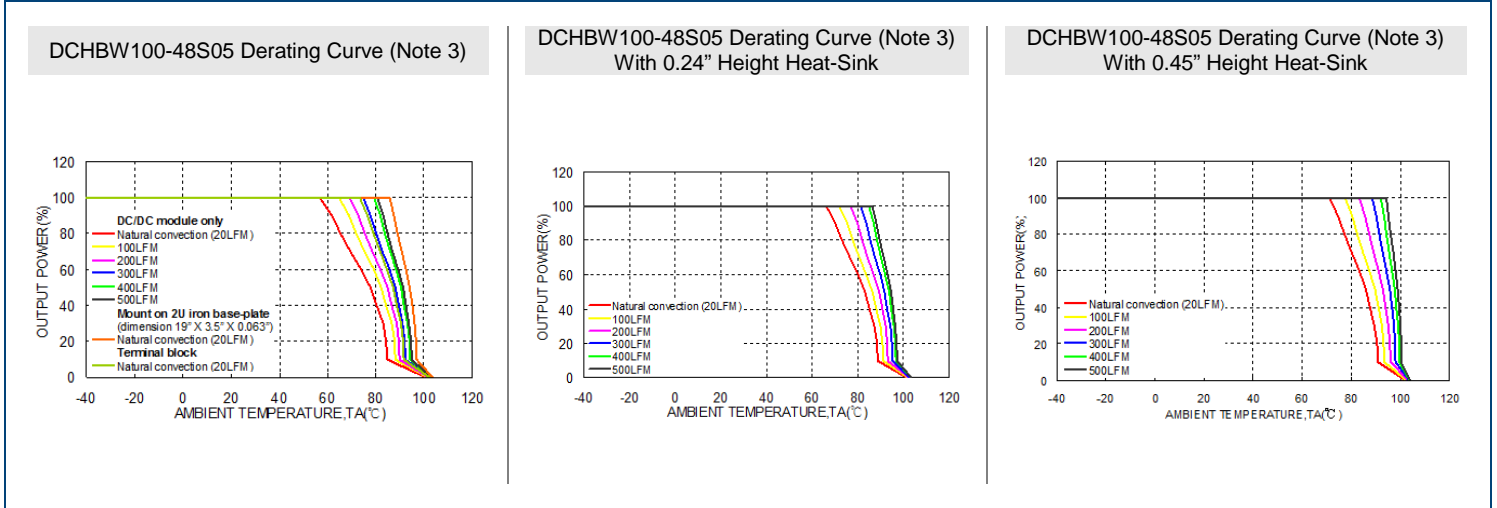
All specifications are based on 25°C, Nominal Input Voltage, and Maximum Output Current unless otherwise noted.  
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS	Min	Typ	Max	Unit
<b>GENERAL SPECIFICATIONS</b>					
Efficiency	Nominal input voltage and full load	See Table			
Switching Frequency	24VDC & 48VDC nominal input models	225	250	275	kHz
	110VDC nominal input models	270	300	330	kHz
Isolation Voltage	1 minute (reinforced insulation) 110VDC nominal input models	Input to Output	3000		VAC
		Input to Case	1500		VAC
		Output to Case	1500		VAC
	1 minute (basic insulation) 24VDC & 48VDC nominal input models	Input to Output	2250		VDC
		Input to Case	1600		VDC
		Output to Case	1600		VDC
Isolation Resistance	500VDC	1			GΩ
Isolation Capacitance				2500	pF
<b>PHYSICAL SPECIFICATIONS</b>					
Weight	Standard models	3.70oz (105g)			
	"T" suffix models	8.29oz (235g)			
	"TF" suffix models	9.88oz (280g)			
	"TF1" suffix models	10.12oz (287g)			
Dimensions (L x W x H)	Standard models	2.40 x 2.28 x 0.50 inches (61.0 x 57.9 x 12.7 mm)			
	"T" suffix models	3.35 x 2.40 x 1.27 inches (85.0 x 61.0 x 32.3 mm)			
	"TF" suffix models	3.35 x 2.40 x 1.47 inches (85.0 x 61.0 x 37.3 mm)			
	"TF1" suffix models	3.35 x 2.40 x 1.53 inches (85.0 x 61.0 x 38.8 mm)			
Case Material	24VDC & 48VDC nominal input models	Metal			
	110VDC nominal input models	Aluminum base-plate with plastic case			
Base Material	24VDC & 48VDC nominal input models	FR4 PCB			
Potting Material		Silicon (UL94-V0)			
<b>SAFETY &amp; EMC CHARACTERISTICS</b>					
Safety Approvals		UL60950-1, EN60950-1, EN50155			
EMI (See Note 4)	EN55011, EN55022	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 (See Note 5)	EN61000-4-4	±2kV		Perf. Criteria A	
Surge (See Note 5)	EN61000-4-5	EN55024 ±2kV and EN50155 ±2kV		Perf. Criteria A	
Conducted Immunity	EN61000-4-6	10 Vrms		Perf. Criteria A	
Power Frequency Magnetic Field	EN61000-4-8	100A/m Continuous; 1000A/m 1 Second		Perf. Criteria A	

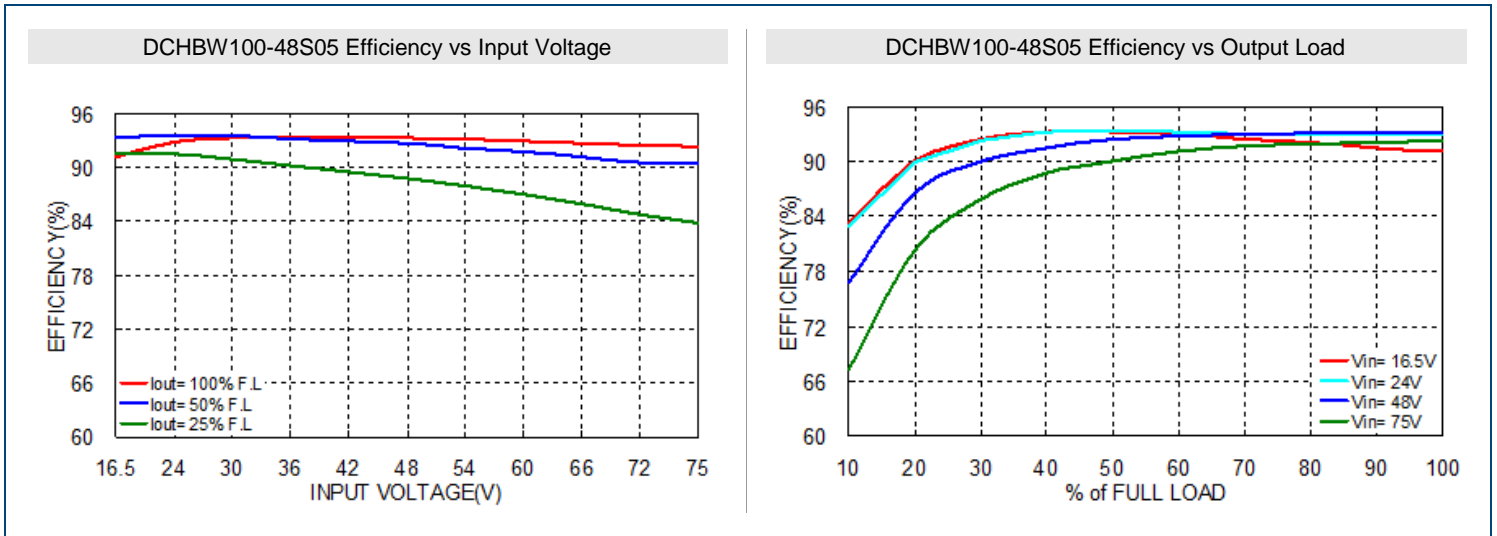
**NOTES**

- Input Source Impedance: These converters will operate under all listed specifications without external components assuming that the source voltage has very low impedance and reasonable input voltage regulation. Highly inductive source impedances can affect the stability of the converter. Since real world voltage sources have finite impedance, performance can be improved by adding an external filter capacitor.
    - For 24VDC & 48VDC nominal input models, we recommend Nippon chemi-con KY series, 100µF/100V.
    - For 110VDC nominal input models, we recommend Ruby-con BXF series, 68µF/200V.
  - Maximum output deviation is +10% inclusive of remote sense and trim. 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.
  - (1) Thermal test conditions for vertical direction are by natural convection (20LFM).  
 (2) The iron base-plate dimensions are 19" x 3.5" x 0.063" (the height is EIA standard 2U).  
 (3) Heat sink is optional. See the "Model Number Setup" table on page 8 for suffix options.
  - The DCHBW100 standard models (no assembly options) can meet EN55011, EN55022 Class A or Class B with additional external components.
  - An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. For 24VDC & 48VDC nominal input models, we recommend connecting two aluminum electrolytic capacitors (Nippon chemi-con KY series, 220µF/100V) in parallel. For 110VDC nominal input models, we recommend connecting three aluminum electrolytic capacitors (Nippon chemi-con KXJ series, 150µF/200V) in parallel.
  - 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 R<sub>U</sub> and R<sub>D</sub> for a particular output voltage see page 6.
  - Measured by 20MHz bandwidth.
  - CASE GROUNDING: EMI can be reduced when you connect the four screw bolts to the shield plane.
  - This series comes with several different options: negative remote on/off control, heatsinks, case pin, sync pin, pin length, terminal block, and thru-hole inserts. See the "Model Number Setup" table on page 8 for more ordering information.
- CAUTION:** This power converter is not internally fused. An input line fuse must always be used.  
*Due to advances in technology, specifications are subject to change without notice.*

DERATING CURVES

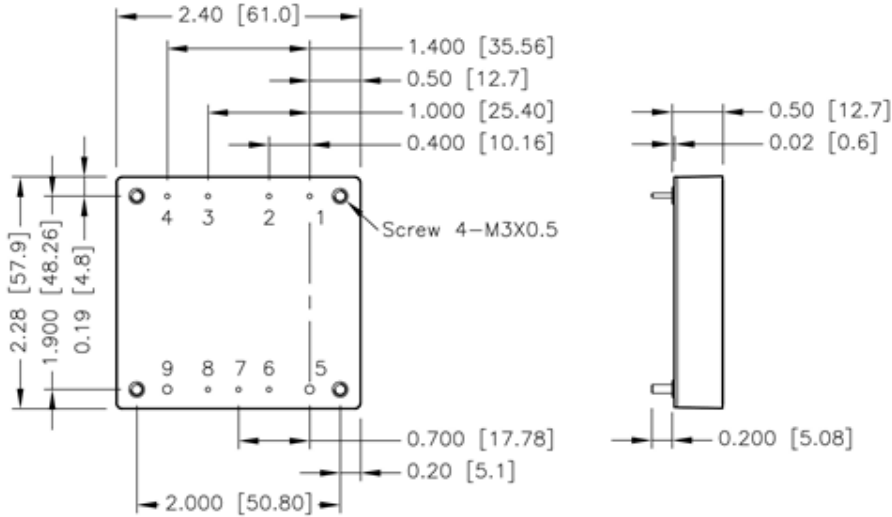


EFFICIENCY GRAPHS



MECHANICAL DRAWINGS

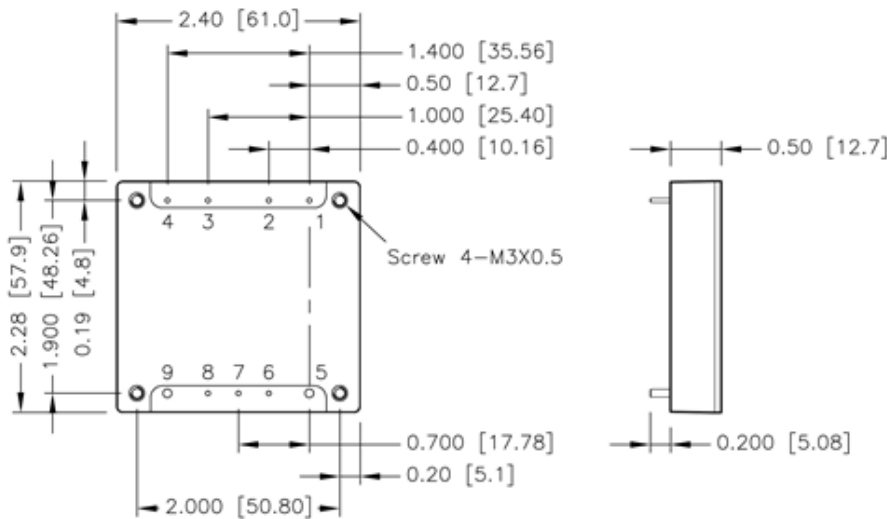
24VDC & 48VDC Nominal Input Models



BOTTOM VIEW

\* Screw locked torque: MAX 5.0kgf-cm (0.49N-m)

110VDC Nominal Input Models



BOTTOM VIEW

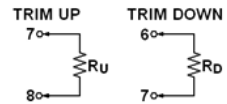
\* Screw locked torque: MAX 3.5kgf-cm (0.34N-m)

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

EXTERNAL OUTPUT TRIMMING

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



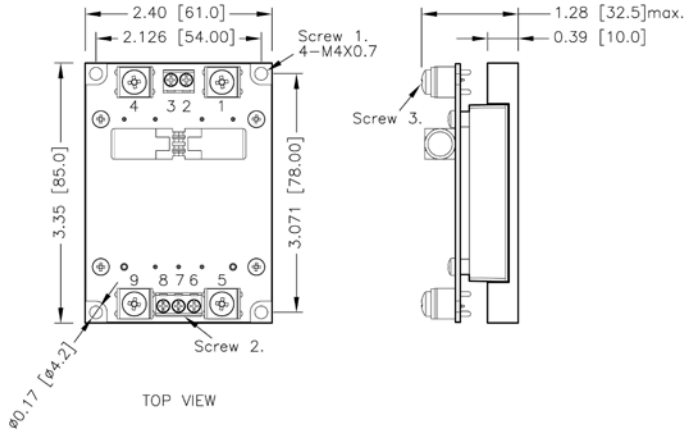
$$R_U = \left( \frac{V_{OUT} (100 + \Delta\%) - (100 + 2\Delta\%)}{1.225 \Delta\%} \right) k\Omega$$

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

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 (0.1)
5. Mounting Screws should always be used.

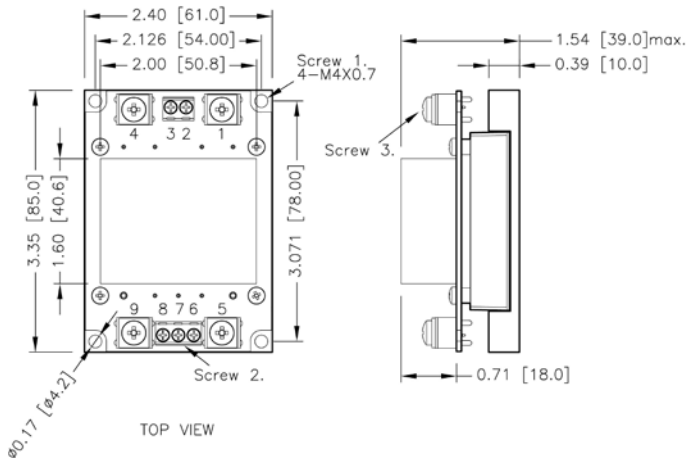
TERMINAL BLOCK OPTIONS

Terminal Block Models ("T" suffix)



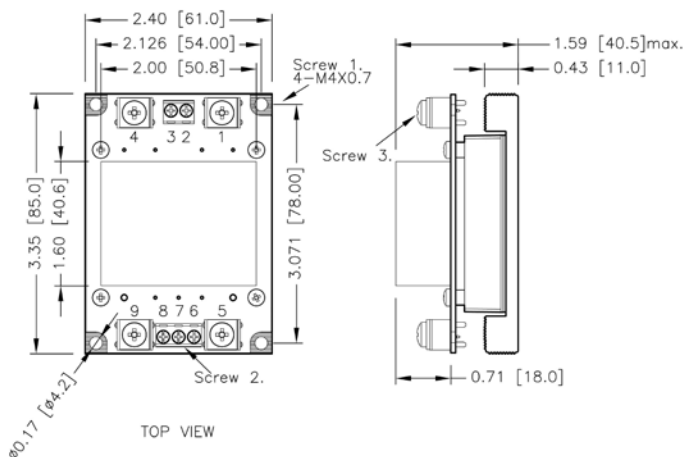
TOP VIEW

Terminal Block w/ EMC Filter ("TF" suffix)



TOP VIEW

Terminal Block w/ EMC Filter that Can be Connected to PE ("TF1" suffix)



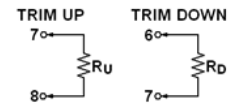
TOP VIEW

PIN CONNECTION

PIN	DEFINE
1	-Vin
2	NC
3	Ctrl
4	+Vin
5	-Vout
6	-Sense
7	Trim
8	+Sense
9	+Vout

EXTERNAL OUTPUT TRIMMING

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



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

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

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. Screw 1 locked torque:  
MAX 11.2kgf-cm/1.10N-m
4. Screw 2 locked torque:  
MAX 5.2kgf-cm/0.51N-m
5. Screw 3 locked torque:  
MAX 12.0kgf-cm/1.18N-m



**HEATSINK OPTIONS**

Vertical Fin Orientation (Suffixes "H", "H2")	Horizontal Fin Orientation (Suffixes "H1", "H3")	Notes								
		<table border="1"> <tr> <td>HS:</td> <td>Height H=0.45" Vertical fin, 7G-0021A-F</td> </tr> <tr> <td>HS1:</td> <td>Height H=0.24" horizontal fin, 7G-0022A-F</td> </tr> <tr> <td>HS2:</td> <td>Height H=0.24" vertical fin, 7G-0023A-F</td> </tr> <tr> <td>HS3:</td> <td>Height H=0.45" horizontal fin, 7G-0024A-F</td> </tr> </table>	HS:	Height H=0.45" Vertical fin, 7G-0021A-F	HS1:	Height H=0.24" horizontal fin, 7G-0022A-F	HS2:	Height H=0.24" vertical fin, 7G-0023A-F	HS3:	Height H=0.45" horizontal fin, 7G-0024A-F
HS:	Height H=0.45" Vertical fin, 7G-0021A-F									
HS1:	Height H=0.24" horizontal fin, 7G-0022A-F									
HS2:	Height H=0.24" vertical fin, 7G-0023A-F									
HS3:	Height H=0.45" horizontal fin, 7G-0024A-F									
		<p>1. All dimensions in inch (mm) 2. Tolerance: x.xx (x.xx±0.5)           x.xxx±0.01 (x.xx±0.25)</p>								

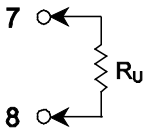
**TERMINAL BLOCK OPTIONS**

Terminal Block with Al Base-plate (Suffix T)	Terminal Block with Al Base-plate and EMC Filter (Suffix TF)	Terminal Block with Anodized Al Base-plate and EMC Filter (Suffix TF1)	
Terminal Block Type	T	TF	TF1
Weight	8.29oz (235g)	9.88oz (280g)	10.12oz (287g)
Dimensions	3.35 x 2.40 x 1.27 inches (85.0 x 61.0 x 32.3 mm)	3.35 x 2.40 x 1.47 inches (85.0 x 61.0 x 37.3 mm)	3.35 x 2.40 x 1.53 inches (85.0 x 61.0 x 38.8 mm)
Thru-Hole (WxL)	2.126 x 3.071 inches (54.00 x 78.00 mm), 4-Ø0.17 inches (Ø4.3mm)		
<b>NOTES</b>			
1. Terminal block models (suffix "T", "TF", and "TF1") cannot be equipped with a heatsink.			
2. Only 0.200" pin length is available with terminal block options.			
3. Models with EMC filter (suffix "TF" and "TF1") meet EN55011, EN55022 Class A.			

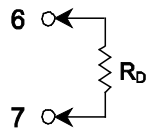
**OUTPUT VOLTAGE ADJUSTMENT**

Output 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 between the TRIM and +SENSE pin, the output voltage set point increases. Maximum output deviation is +10% inclusive of remote sense. The value of the external resistor can be obtained by the equations below. The external TRIM resistor needs to be at least 1/8W resistor.

**Trim Up**

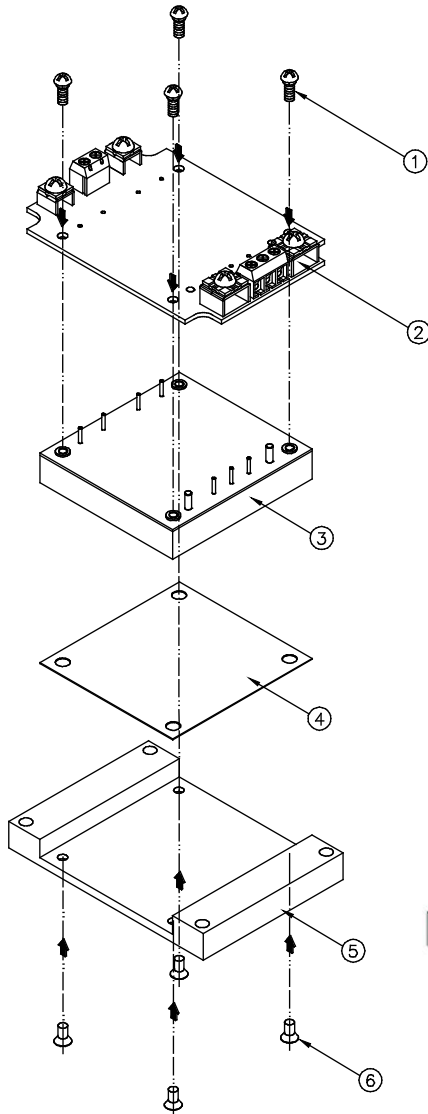
$$R_U = \left( \frac{V_{OUT}(100 + \Delta\%)}{1.225\Delta\%} - \frac{(100 + 2\Delta\%)}{\Delta\%} \right) K\Omega$$


**Trim Down**

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


**APPLICATION NOTES**

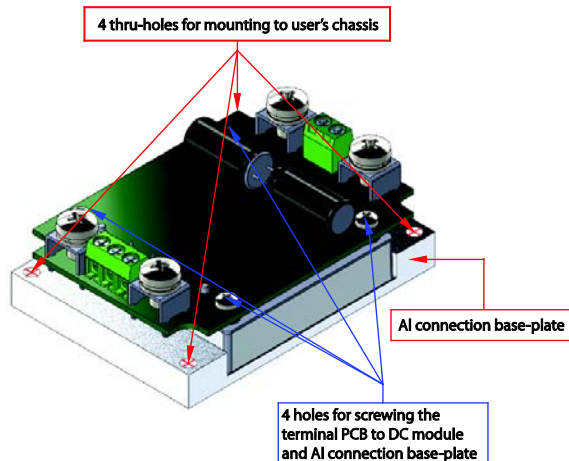
**Assembly**



- ① Round-Head screw and spring washer (see note)
- ② Terminal block
- ③ DC/DC converter
- ④ Thermal pad
- ⑤ Aluminum connection base-plate
- ⑥ Flat-head screw M3X0.5-6L (see note)

**Note: Information for Assemble Screw**

1. Tools: Automatic screwdriver
2. Torque: 4~5 kgf.cm
3. Assembly Sequence of Screw  
Screw in opposite angles first, then fasten all four screws





MODEL NUMBER SETUP

DCHBW	100	-	24	S	12	R
Series Name	Output Power		Input Voltage	Output Quantity	Ouput Voltage	Remote On/Off & Pin Length
	<b>100:</b> 100 Watts		<b>24:</b> 8.5-36 VDC 9-36 VDC <b>48:</b> 16.5-75 VDC <b>110:</b> 43-160 VDC	<b>S:</b> Single	<b>3.3:</b> 3.3 VDC <b>05:</b> 5 VDC <b>12:</b> 12 VDC <b>15:</b> 15 VDC <b>24:</b> 24 VDC <b>28:</b> 28 VDC <b>48:</b> 48 VDC	<b>None:</b> Positive Logic, 0.200" pin length <b>S:</b> Positive Logic, 0.145" pin length <b>R:</b> Negative Logic, 0.200" pin length <b>RL:</b> Negative Logic, 0.145" pin length

TH	H	TF
Thru-Hole Inserts <sup>(1)</sup>	Heatsink <sup>(1) (2)</sup>	Terminal Block <sup>(2) (3) (4)</sup>
<b>None:</b> Threaded Inserts <b>TH:</b> Ø0.126 Thru-Hole Inserts <sup>(1)</sup>	<b>None:</b> No Heatsink <b>H:</b> 0.45" Vertical 7G-0021A-F <b>H1:</b> 0.24" Horizontal 7G-0022A-F <b>H2:</b> 0.24" Vertical 7G-0023A-F <b>H3:</b> 0.45" Horizontal 7G-0024A-F	<b>None:</b> No Terminal Block <b>T:</b> Terminal block with aluminum base-plate <b>TF:</b> Terminal block with aluminum base-plate and EMC filter <b>TF1:</b> Terminal block with anodized aluminum base-plate and EMC filter, can be connected to Protective Earth (PE)

NOTES

1. Models with thru-hole inserts cannot be equipped with a heatsink.
2. Terminal block models (suffix "T", "TF", and "TF1") cannot be equipped with a heatsink.
3. Only 0.200" pin length is available with terminal block options.
4. Models with EMI filter (suffix "TF" and "TF1") meet EN55011, EN55022 Class A.

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.

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