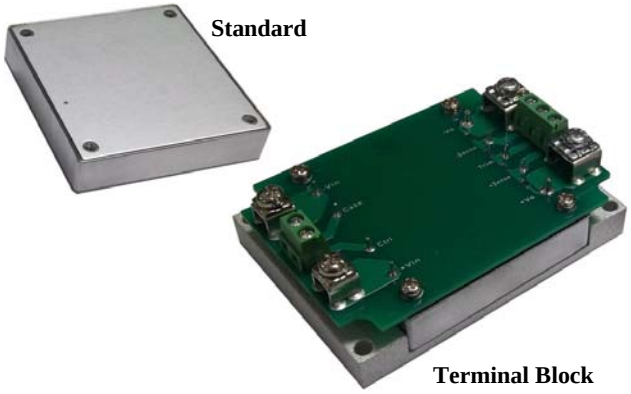
Wall Industries, Inc.

DATASHEET
Rev. C

DC100 SERIES

2:1 Wide Input Voltage Ranges
100 Watts, Single Outputs
Industry Standard Half-Brick Footprint
DC/DC Power Converters



APPLICATIONS

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

OPTIONS

- Pin Length
- Heatsinks
- Thru-Hole Inserts
- Negative Logic Remote On/Off
- Terminal Block
- Terminal Block with EMC Filter

FEATURES

- Soft-Start
- RoHS Compliant
- 2:1 Wide Input Voltage Ranges
- Up to 100 Watts Output Power
- Single Outputs Ranging from 3.3VDC to 48VDC
- Output Current up to 25A
- Under Voltage Lockout
- Six-Sided Shielding
- High Efficiency up to 93%
- No Minimum Load Requirements
- Adjustable Output Voltage
- Industry Standard Half-Brick Footprint
- Remote On/Off Control
- Input to Output Basic Insulation: 2250VDC
- Threaded Inserts and Thru-Hole Inserts Available
- Input Reverse Protection
- Short Circuit, Over Voltage, Over Current, and Over Temperature Protection
- UL60950-1, EN60950-1, and IEC60950-1 Safety Approvals
- Several Mechanical Options Available

DESCRIPTION

The DC100 series of DC/DC power converters provides up to 100 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 2:1 wide input voltage ranges of 9~18VDC, 18~36VDC and 36~75VDC. Some features include high efficiency up to 93%, adjustable output voltage, positive remote on/off control, and six-sided shielding. These converters also have short circuit, over voltage, over current, over temperature, and input reverse protection. The DC100 series is RoHS 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, terminal block, pin length, heatsinks, and thru-hole inserts. Please call factory for more details.

SPECIFICATIONS: DC100 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
INPUT SPECIFICATIONS						
Input Voltage Range		12VDC nominal input models	9	12	18	VDC
		24VDC nominal input models	18	24	36	
		48VDC nominal input models	36	48	75	
Start-up Voltage		12VDC nominal input models			9	VDC
		24VDC nominal input models			18	
		48VDC nominal input models			36	
Shutdown Voltage		12VDC nominal input models		7.5		VDC
		24VDC nominal input models		16		
		48VDC nominal input models		34		
Input Surge Voltage (100ms)		12VDC nominal input models			36	VDC
		24VDC nominal input models			50	
		48VDC nominal input models			100	
Input Current		No Load	See Table			
Input Filter *(See Note 11)*			Pi Type			
Input Reverse Protection *(See Note 14)*			Parallel diode			
OUTPUT SPECIFICATIONS						
Output Voltage			See Table			
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 Accuracy		Full load an nominal Vin	-1		+1	%
Voltage Adjustability *(See Note 7)*			-20		+10	%
Output Power			See Table			
Output Current			See Table			
Minimum Load			0			%
Ripple & Noise (peak to peak)		20MHz Bandwidth	See Table			
Transient Response Recovery Time		25% load step change		200		µs
Start-Up Time	Power Up	Nominal input and constant resistive load		25		ms
	Remote On/Off			25		ms
Remote Sense *(See Note 8)*				10		% Vo
Temperature Coefficient			-0.02		+0.02	%/°C
PROTECTION						
Over Voltage Protection Threshold		Hiccup	115		130	% Vo
Over Current Protection Threshold			110		140	% Io
Short Circuit Protection			Hiccup, automatic recovery			
Over Temperature Protection					+115	°C
GENERAL SPECIFICATIONS						
Efficiency		Nominal input voltage and full load	See Table			
Switching Frequency			255	300	330	KHz
Isolation Voltage	I/P to O/P (Basic Insulation)	For 1 minute	2250			VDC
	I/P to Case	For 1 minute	1600			VDC
	O/P to Case	For 1 minute	1600			VDC
Isolation Resistance			1			GΩ
Isolation Capacitance					2500	pF
Maximum Capacitive Load		Minimum input and constant resistive load	See Table			

SPECIFICATIONS: DC100 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
REMOTE ON/OFF CONTROL *(See Note 6)*						
Positive Logic (standard)	DC/DC ON		Open or 3V < Vr < 12V			
	DC/DC OFF		Short or 0V < Vr < 1.2V			
Negative Logic (optional)	DC/DC ON		Short or 0V < Vr < 1.2V			
	DC/DC OFF		Open or 3V < Vr < 12V			
Input Current of Remote Control Pin		Nominal Vin	-0.5		1	mA
Remote Off State Input Current		Nominal Vin		3		mA
ENVIRONMENTAL SPECIFICATIONS						
Operating Case Temperature Range		Standard	-40		+115	°C
		Terminal Block type	-40		+105	
Storage Temperature		Standard	-55		+125	°C
		Terminal Block type	-40		+105	
Relative Humidity			5		95	% RH
Thermal Shock			MIL-STD-810F			
Vibration			MIL-STD-810F			
Thermal Impedance *(See Note 9)*		Standard		6.7		°C/Watt
		With 0.24" Heatsink		5.4		
		With 0.45" Heatsink		4.7		
MTBF *(See Note 1)*		BELLCORE TR-NWT-000332	1,010,000 hours			
		MIL-HDBK-217F	74,160 hours			
PHYSICAL SPECIFICATIONS						
Weight		Standard	3.42oz (97g)			
		"T" suffix models	7.05oz (200g)			
		"TF" suffix models	8.47oz (240g)			
		"TF1" suffix models	26.10oz (740g)			
Dimensions (L x W x H)		Standard	2.4x2.28x0.5 inches (61x57.9x12.7 mm)			
		"T" suffix models	3.35x2.4x1.1 inches (85x61x28 mm)			
		"TF" suffix models	3.35x2.4x1.27 inches (85x61x32.3 mm)			
		"TF1" suffix models	4x3.5x3.5 inches (101.6x88.9x88.9 mm)			
Case Material			Metal			
Base Material			FR4 PCB			
Potting Material			Silicon (UL94-V0)			
Shielding			Six-sided			
SAFETY & EMC CHARACTERISTICS						
Safety Approvals			IEC60950-1, UL60950-1, EN60950-1			
EMI *(See Note 11)*	Standard	EN55022	Class A			
	TF or TF1 Option	EN55022	Class A			
ESD		EN61000-4-2	Air ±8KV Contact ±6KV			Perf. Criteria A
Radiated Immunity		EN61000-4-3	10 V/m			Perf. Criteria A
Fast Transient *(See Note 11)*		EN61000-4-4	±2KV			Perf. Criteria A
Surge *(See Note 11)*		EN61000-4-5 EN55024	±1KV			Perf. Criteria A
Conducted Immunity		EN61000-4-6	10 Vrms			Perf. Criteria A

MODEL SELECTION TABLE

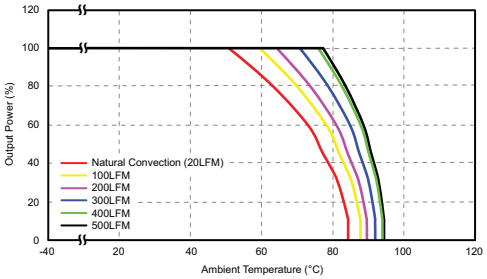
Model Number	Input Voltage	Output Voltage	Output Current		No Load [2] Input Current	Ripple & Noise [3] [4]	Output Power	Maximum Capacitive Load [5]	Efficiency [3]
			Min. load	Full load					
DC100-12S3.3	12 VDC (9 – 18 VDC)	3.3VDC	0mA	25A	155mA	75mVp-p	82.5W	75700µF	90%
DC100-12S05		5 VDC	0mA	20A	150mA	75mVp-p	100W	40000µF	91%
DC100-12S12		12 VDC	0mA	8.4A	180mA	100mVp-p	100W	7000µF	91%
DC100-12S15		15 VDC	0mA	6.7A	180mA	100mVp-p	100W	4460µF	91%
DC100-12S24		24 VDC	0mA	4.2A	90mA	200mVp-p	100W	1750µF	90%
DC100-12S28		28 VDC	0mA	3.6A	100mA	200mVp-p	100W	1280µF	90%
DC100-12S48		48 VDC	0mA	2.1A	100mA	300mVp-p	100W	430µF	90%
DC100-24S3.3	24 VDC (18 – 36 VDC)	3.3VDC	0mA	25A	90mA	75mVp-p	82.5W	75700µF	91%
DC100-24S05		5 VDC	0mA	20A	150mA	75mVp-p	100W	40000µF	93%
DC100-24S12		12 VDC	0mA	8.4A	185mA	100mVp-p	100W	7000µF	93%
DC100-24S15		15 VDC	0mA	6.7A	185mA	100mVp-p	100W	4460µF	93%
DC100-24S24		24 VDC	0mA	4.2A	85mA	200mVp-p	100W	1750µF	92%
DC100-24S28		28 VDC	0mA	3.6A	85mA	200mVp-p	100W	1280µF	92%
DC100-24S48		48 VDC	0mA	2.1A	85mA	300mVp-p	100W	430µF	92%
DC100-48S3.3	48 VDC (36 – 75 VDC)	3.3VDC	0mA	25A	80mA	75mVp-p	82.5W	75700µF	91%
DC100-48S05		5 VDC	0mA	20A	90mA	75mVp-p	100W	40000µF	93%
DC100-48S12		12 VDC	0mA	8.4A	90mA	100mVp-p	100W	7000µF	93%
DC100-48S15		15 VDC	0mA	6.7A	90mA	100mVp-p	100W	4460µF	93%
DC100-48S24		24 VDC	0mA	4.2A	40mA	200mVp-p	100W	1750µF	92%
DC100-48S28		28 VDC	0mA	3.6A	40mA	200mVp-p	100W	1280µF	92%
DC100-48S48		48 VDC	0mA	2.1A	40mA	300mVp-p	100W	430µF	92%

NOTES

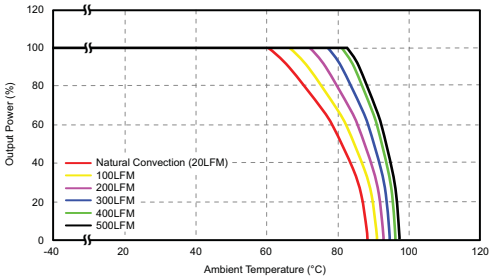
1. BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C.
   MIL-HDBK-217F Notice2 @Ta=25°C, Full load (Ground, Benign, controlled environment).
2. Typical value at nominal input voltage and no load.
3. Typical value at nominal input voltage and full load.
4. The ripple and noise of 48VDC output voltage models is measured with a 2.2µF/100V X7R 1812 MLCC;
   The ripple and noise of all other output voltages is measured with a 4.7µF/50V X7R 1812 MLCC.
5. Test by minimum input and constant resistive load.
6. The CTRL pin voltage is referenced to –INPUT. To order negative logic remote on/off control add the suffix "R" to the model number.
7. 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_U and R_D for a particular output voltage see page 5.
8. 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.
9. (1) Thermal test conditions for vertical direction are by natural convection (20LFM).
   (2) Heat sink is optional. See the "Product Options" table on page 6 for suffix options.
10. The DC100 series can only meet EN55022 Class A or Class B with external components added. Please contact factory for more information.
11. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. We recommend connecting one aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF /100V, ESR 48mΩ) in parallel.
12. CASE GROUNDING: EMI can be reduced when you connect the four screw bolts to the shield plane.
13. This series comes with several different options: negative remote on/off control, heatsinks, pin length, thru-hole inserts, and terminal blocks. See the "Product Options" table on page 6 for more ordering information.
14. **CAUTION:** This power converter is not internally fused. An input line fuse must always be used.

DERATING CURVES

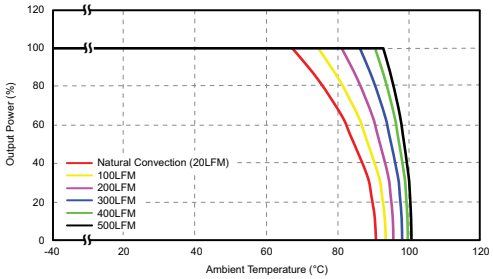
DC100-48S05 Derating Curve



DC100-48S05 Derating Curve
With 0.24" Height Heatsink (See Note 9)

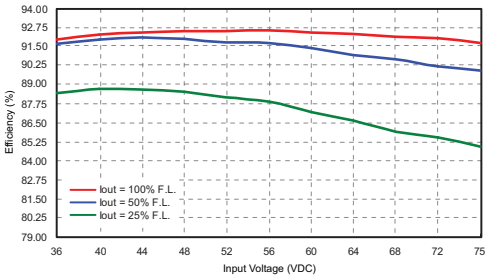


DC100-48S05 Derating Curve
With 0.45" Height Heatsink (See Note 9)

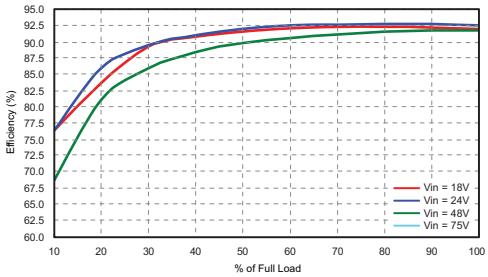


EFFICIENCY GRAPHS

DC100-48S05 Efficiency vs Input Voltage



DC100-48S05 Efficiency vs Output Load

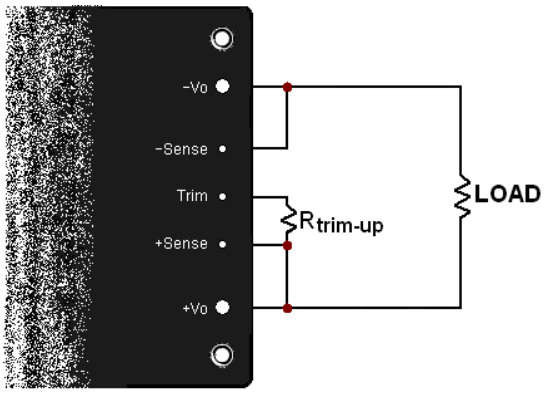


OUTPUT VOLTAGE ADJUSTMENT

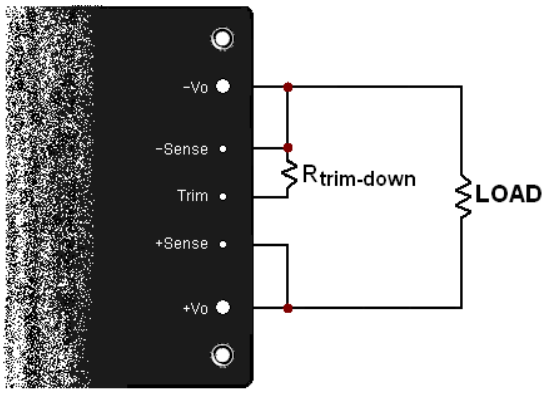
Output is adjustable for 10% trim up or -20% trim down of nominal output voltage by connecting an external resistor between the TRIM pin and either the +SENSE or -SENSE pins. With an external resistor between the TRIM and -SENSE pin, the output voltage set decreases. With an external between the TRIM 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.

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

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



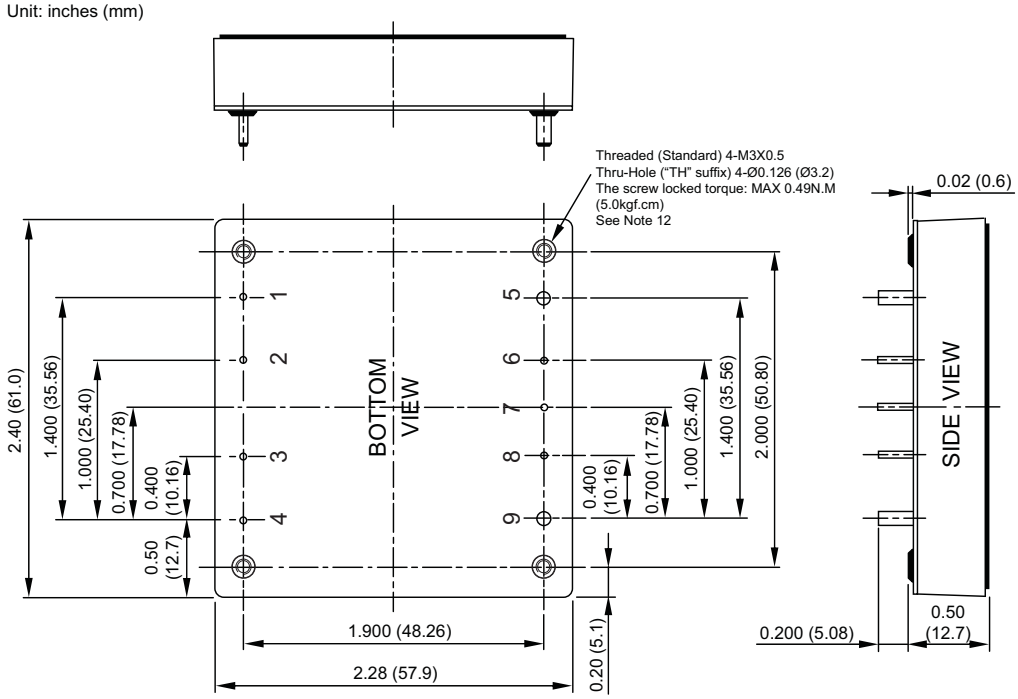
TRIM UP



TRIM DOWN

MECHANICAL DRAWING

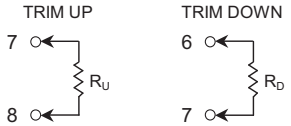
Unit: inches (mm)



PIN CONNECTIONS		
PIN	DEFINE	DIAMETER
1	- INPUT	0.04 in.
2	CASE	0.04 in.
3	CTRL	0.04 in.
4	+ INPUT	0.04 in.
5	- OUTPUT	0.08 in.
6	- SENSE	0.04 in.
7	TRIM	0.04 in.
8	+ SENSE	0.04 in.
9	+ OUTPUT	0.08 in.

EXTERNAL OUTPUT TRIMMING

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



NOTES

1. Tolerance: x.xx±0.02 (x.x±0.5)
   x.xxx±0.01 (x.xx±0.25)
2. Pin Pitch Tolerance: ±0.01 (±0.25)
3. Pin Dimension Tolerance: ±0.004 (±0.1)

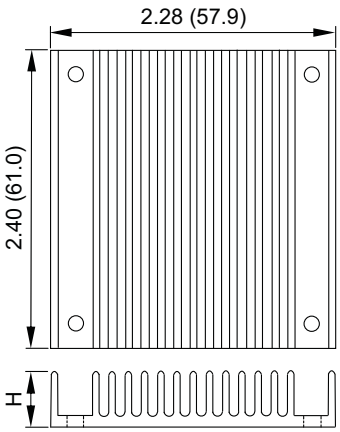
Product Options		Suffix	Product Options		Suffix
Negative Remote ON/OFF Logic	0.200" pin length	R	Heatsink [1]	H = 0.45" Vertical	H
	0.145" pin length	RL		H = 0.24" Horizontal	H1
Positive Remote ON/OFF Logic	0.200" pin length	None		H = 0.24" Vertical	H2
	0.145" pin length	S		H = 0.45" Horizontal	H3
Thru-Hole Inserts (No Thread) [1]	Ø0.126 thru-hole (no thread) inserts	TH	Terminal Block [2][3]	Wall Mounted	T
				Wall Mounted with EMC Filter [2]	TF
				Wall Mounted with Fin Type Heatsink and EMC Filter [2][3]	TF1

NOTES

1. Models with thru-hole inserts cannot be equipped with a heatsink.
2. Models with EMC filter (suffix "TF" and "TF1") meet EN55011, EN55022 Class A.
3. "TF1" models have an ambient operating temperature of -40°C to +85°C (without derating).

HEATSINK OPTIONS

Vertical Fin Orientation (Suffixes "H", "H2")

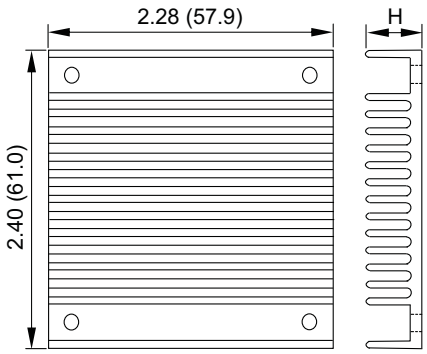


Unit: inches (mm)

Heatsink Options

H = 0.24 inches ("H2" suffix)
H = 0.45 inches ("H" suffix)

Horizontal Fin Orientation (Suffixes "H1", "H3")



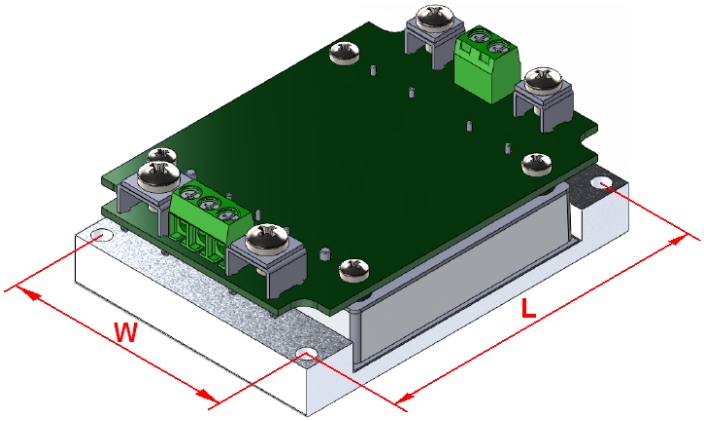
Unit: inches (mm)

Heatsink Options

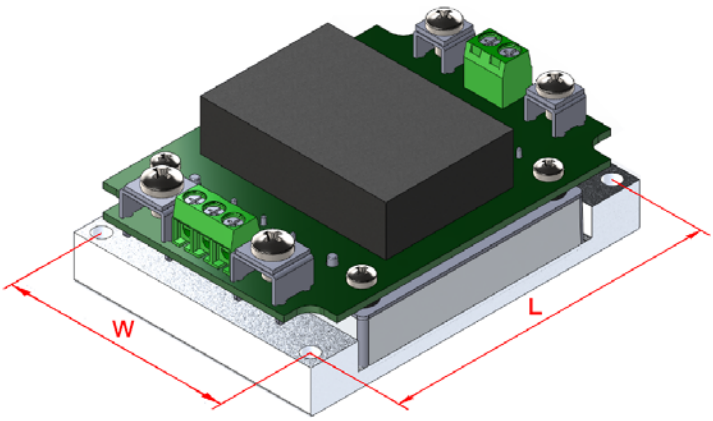
H = 0.24 inches ("H1" suffix)
H = 0.45 inches ("H3" suffix)

TERMINAL BLOCK OPTIONS

Wall Mounted without EMC Filter (Suffix "T")



Wall Mounted with EMC Filter (Suffix "TF")



Terminal Block Type	T	TF [2]	TF1 [2] [3]
Weight	7.05oz (200g)	8.47oz (240g)	26.10oz (740g)
Dimensions	3.35 x 2.4 x 1.1 inches (85 x 61 x 28 mm)	3.35 x 2.4 x 1.27 inches (85 x 61 x 32.3 mm)	4.0 x 3.5 x 3.5 inches (101.6 x 88.9 x 88.9 mm)
Thru-Hole Inserts (WxL)	2.126 x 3.071 inches (54.00 x 78.00 mm)	2.126 x 3.071 inches (54.00 x 78.00 mm)	2.126 x 3.071 inches (54.00 x 78.00 mm)

MODEL NUMBER SETUP

DC	100	-	24	S	12
Series Name	**Output Power**		**Input Voltage**	**Single Output**	**Output Voltage**
	100: 100 Watts		**12:** 9~18 VDC **24:** 18~36 VDC **48:** 36~75 VDC	**S:** single	**3.3:** 3.3 VDC **05:** 5 VDC **12:** 12 VDC **15:** 15 VDC **24:** 24 VDC **28:** 28 VDC **48:** 48 VDC

R	TH	H	TF
Remote On/Off & Pin Length	**Thru-Hole Inserts [1]**	**Heatsink [1]**	**Terminal Block [2] [3]**
None: positive Logic, 0.200" pin length **S:** positive Logic, 0.145" pin length **R:** negative Logic, 0.200" pin length **RL:** negative Logic, 0.145" pin length	**None:** threaded inserts **TH:** Ø0.126 thru-hole inserts [1]	**None:** no heatsink **H:** 0.45" vertical **H1:** 0.24" horizontal **H2:** 0.24" vertical **H3:** 0.45" horizontal	**None:** no terminal block **T:** wall mounted **TF:** wall mounted with EMC filter [2] **TF1:** wall mounted with fin type heatsink and EMC filter [2] [3]

NOTES

1. Models with thru-hole inserts cannot be equipped with a heatsink.
2. Models with EMC filter (suffix "TF" and "TF1") meet EN55011, EN55022 Class A.
3. "TF1" models have an ambient operating temperature of -40°C to +85°C (without derating).

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.

Contact **Wall Industries** for further information:

Phone:	☎(603)778-2300
Toll Free:	☎(888)587-9255
Fax:	☎(603)778-9797
E-mail:	sales@wallindustries.com
Web:	www.wallindustries.com
Address:	5 Watson Brook Rd. Exeter, NH 03833