24V & 48V Nominal Input Models



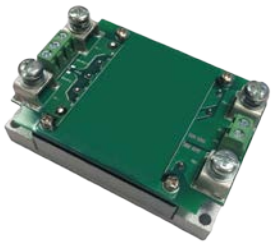
Size: 2.40 x 2.28 x 0.50 inches

110V Nominal Input Models



Size: 2.40 x 2.28 x 0.50 inches

Wall Mounted Models



Size: 3.35 x 2.40 x 1.27 inches

Wall Mounted with EMC Filter Models



Size: 3.35 x 2.40 x 1.47 inches

OPTIONS

- Pin Length
- Sync Pin
- Case Pin
- Heatsinks
- Thru-Hole Inserts
- Negative Logic Remote On/Off
- Wall Mounted
- Wall Mounted with EMC Filter
- Wall Mounted with EMC Filter and can be connected to PE

FEATURES

- Railway Applications
- Soft-Start
- 4:1 Ultra Wide Input Voltage Ranges
- 165~240 Watts Output Power
- Output Current up to 57A
- Under Voltage Lockout
- No Minimum Load Requirements
- Adjustable Output Voltage
- Remote On/Off Control
- Industry Standard Half-Brick Footprint
- High Efficiency up to 91%
- Single Outputs Ranging from 3.3VDC to 48VDC
- Input to Output Basic Insulation: 2250VDC
- Threaded Inserts and Thru-Hole Inserts Available
- Short Circuit, Over Voltage, Over Current, and Over Temp. Protection
- Six-Sided Shielding for 24VDC & 48VDC Input Models
- Compliant to RoHS EU Directive 2011/65/EU
- CE Mark Meets 2006/95/EC, 2011/95/EC, and 2004/108/EC
- UL60950-1, EN60950-1, IEC60950-1, & EN50155 Safety Approvals
- Several Mechanical Options Available

APPLICATIONS

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

DESCRIPTION

The DCHBW200 series of DC/DC power converters provides up to 240 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 91%, adjustable output voltage, and remote on/off control. These converters also have short circuit, over voltage, over current, and over temperature protection. The DCHBW200 series is RoHS compliant and has UL60950-1, EN60950-1, IEC60950-1, and EN50155 safety approvals. Several different options are available for this series including negative remote on/off control, terminal block, pin length, heatsinks, sync pin, case pin, 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					
DCHBW200-24S3.3	24 VDC (9 - 36 VDC)	3.3 VDC	0mA	50A	75mVp-p	25mA	165W	151,000µF	87%
DCHBW200-24S05		5 VDC	0mA	36A	75mVp-p	30mA	180W	72,000µF	90%
DCHBW200-24S12	24 VDC (8.5 - 36 VDC)	12 VDC	0mA	15A	100mVp-p	30mA	180W	12,500µF	89%
DCHBW200-24S15		15 VDC	0mA	12A	100mVp-p	30mA	180W	8000µF	90%
DCHBW200-24S24		24 VDC	0mA	7.5A	200mVp-p	35mA	180W	3100µF	90%
DCHBW200-24S28		28 VDC	0mA	6.5A	200mVp-p	40mA	182W	2300µF	90%
DCHBW200-24S48		48 VDC	0mA	3.7A	300mVp-p	45mA	177.6W	770µF	89%
DCHBW200-48S3.3	48 VDC (16.5 - 75 VDC)	3.3 VDC	0mA	50A	75mVp-p	20mA	165W	151,000µF	88%
DCHBW200-48S05		5 VDC	0mA	40A	75mVp-p	20mA	200W	80,000µF	91%
DCHBW200-48S12		12 VDC	0mA	18A	100mVp-p	20mA	216W	15,000µF	90%
DCHBW200-48S15		15 VDC	0mA	14A	100mVp-p	20mA	210W	9300µF	91%
DCHBW200-48S24		24 VDC	0mA	9A	200mVp-p	20mA	216W	3700µF	90%
DCHBW200-48S28		28 VDC	0mA	7.5A	200mVp-p	25mA	210W	2600µF	91%
DCHBW200-48S48		48 VDC	0mA	4.5A	300mVp-p	25mA	216W	930µF	90%
DCHBW200-110S3.3	110 VDC (43 - 160 VDC)	3.3 VDC	0mA	57A	75mVp-p	10mA	188W	172,000µF	87%
DCHBW200-110S05		5 VDC	0mA	44A	75mVp-p	10mA	220W	88,000µF	89%
DCHBW200-110S12		12 VDC	0mA	20A	100mVp-p	10mA	240W	16,600µF	89%
DCHBW200-110S15		15 VDC	0mA	16A	100mVp-p	10mA	240W	10,600µF	90%
DCHBW200-110S24		24 VDC	0mA	10A	200mVp-p	10mA	240W	4100µF	89%
DCHBW200-110S28		28 VDC	0mA	8.5A	200mVp-p	15mA	238W	3000µF	90%
DCHBW200-110S48		48 VDC	0mA	5A	300mVp-p	15mA	240W	1000µF	89%

SPECIFICATIONS: DCHBW200 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	24VDC nominal input models	3.3Vout & 5Vout Others	9 8.5	24 24	36 36	VDC
	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			See Table		
Input Filter (See Note 1)				Pi type		
Sync Pin Signal (See Note 2)			-0.3		5.6	VDC
OUTPUT SPECIFICATIONS						
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	Maximum output deviation is inclusive of remote sense		-20		+10	%
Remote Sense (See Note 3)	% 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 (20MHz bandwidth)	With a 1µF/25V X7R MLCC and a 22µF/25V POS-CAP	3.3Vout & 5Vout		75	100	mVp-p
	With a 1µF/25V X7R MLCC and a 22µF/25V POS-CAP	12Vout & 15Vout		100	125	
	With a 4.7µF/50V X7R MLCC	24Vout & 28Vout		200	250	
	With a 2.2µF/100V X7R MLCC	48Vout		300	350	
Transient Response Recovery Time	25% load step change			250		µs
Start-Up Time	Constant resistive load	Power Up Remote On/Off		75 75		ms
Temperature Coefficient			-0.02		+0.02	%/°C
REMOTE ON/OFF CONTROL						
Positive Logic (standard)	Referenced to –Input pin	DC/DC ON DC/DC OFF	3.0 0		12 1.2	VDC
Negative Logic (optional)	Referenced to –Input pin	DC/DC ON DC/DC OFF	0 3.0		1.2 12	VDC
Input Current of CTRL Pin	Nominal Vin		-0.5		1	mA
Remote OFF Input Current	Nominal Vin			3		mA
PROTECTION						
Short Circuit Protection				hiccup, automatic recovery		
Over Load Protection	% of rated Iout; hiccup mode		120		150	%
Over Voltage Protection	% of nominal Vout; hiccup mode		115		130	%
Over Temperature Protection				+120		°C
ENVIRONMENTAL SPECIFICATIONS						
Operating Case Temperature	Base-plate		-40		+115	°C
Storage Temperature	Terminal block types Others		-40 -55		+105 +125	°C
Thermal Impedance (See Note 4)	Vertical direction by natural convection (20LFM). Only mounted on iron base-plate 0.24” height heatsink 0.45” height heatsink			6.1 2.8 5.1 4.6		°C/W
Relative Humidity			5		95	% RH
Thermal Shock				EN61373, MIL-STD-810F		
Vibration				EN61373, MIL-STD-810F		
MTBF	BELLCORE TR-NWT-000332 Case 1: 50% Stress, Ta=40°C MIL-HDBK-217F Ta=25°C, full load (G/B, controlled environment)		1,010,000 74,160			hours

SPECIFICATIONS: DCHBW200 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
GENERAL SPECIFICATIONS						
Efficiency	Nominal input voltage and full load		See Table			
Switching Frequency			225	250	275	kHz
Isolation Voltage	1 minute (basic insulation)	Input to Output	2250			VDC
		Input to Case	1600			VDC
		Output to Case	1600			VDC
Isolation Resistance	500VDC		1			GΩ
Isolation Capacitance					2500	pF
PHYSICAL SPECIFICATIONS						
Weight	Standard models		3.70oz (105g)			
	"T" suffix models		8.29oz (235g)			
	"TF" suffix models		9.88oz (280g)			
	"TF1" suffix models		12.16oz (344.73g)			
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)			
Shielding	24VDC & 48VDC nominal input models		Six-sided			
SAFETY CHARACTERISTICS						
Safety Approvals			IEC60950-1, UL60950-1, EN60950-1, EN50155			
EMI (See Note 5)	EN55011, EN55022		Class A			
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 6)	EN61000-4-4	±2kV	Perf. Criteria A			
Surge (See Note 6)	EN61000-4-5	EN55024 ±2kV and EN50155 ±2kV	Perf. Criteria A			
Conducted Immunity	EN61000-4-6	10 Vrms	Perf. Criteria A			

NOTES

1. 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.

2. (1) Multiple DCHBW200 series modules can be synchronized together simply by connecting the module SYNC pins together. Care should be taken to ensure the ground potential differences between the modules are minimized.
   (2) In this configuration all of the modules will be synchronized to the highest frequency module.
   (3) Up to three modules can be synchronized using this technique.
   (4) More relevant information in the application notes.

3. 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.

4. (1) Thermal test conditions for vertical direction are by natural convection (20LFM).
   (2) The aluminum 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 9 for suffix options.

5. The DCHBW200 standard models (without assembly options) can only meet EMI Class A or Class B with external components added.

6. 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 (Ruby-con BXF series, 100µF/250V) in parallel.

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 6.

8. CASE GROUNDING: EMI can be reduced when you connect the four screw bolts to the shield plane.

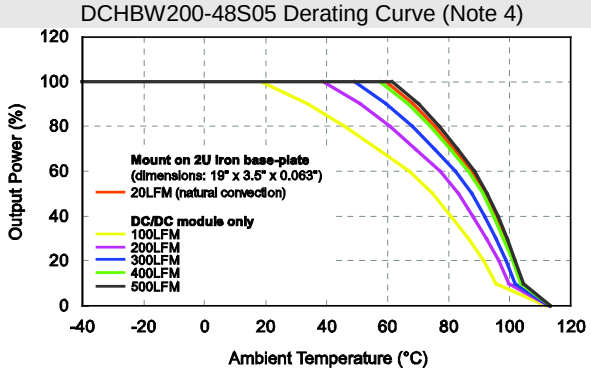
9. This series comes with several different options: negative remote on/off control, heatsinks, case pin, sync pin, pin length, terminal block, and thru-hole inserts. See the "Model Number Setup" table on page 9 for more ordering information.

10. Screws are M5 x 0.8 x 8mm long, cross recessed/slot, pan head with washer and lock washer.

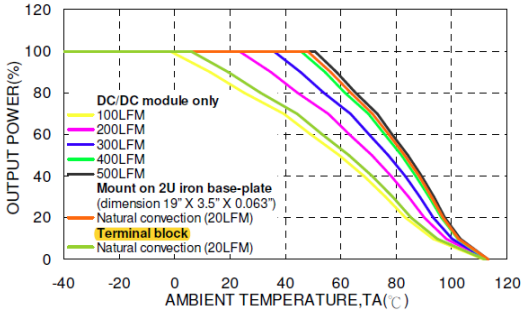
CAUTION: This power converter is not internally fused. An input line fuse must always be used.

CHARACTERISTIC CURVES

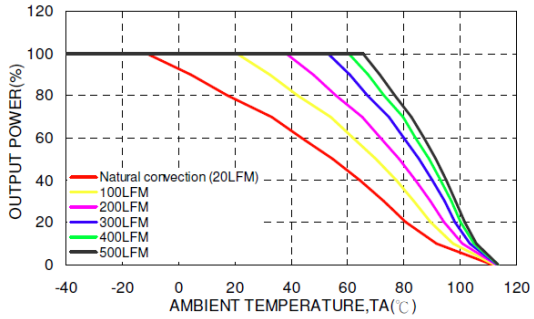
DCHBW200-48S05 Derating Curve (Note 4)



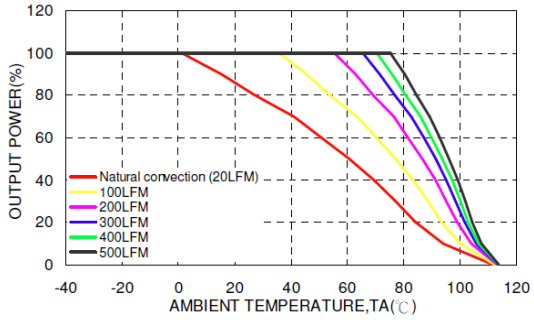
Derating Output Current Vs. Ambient Temperature and Airflow



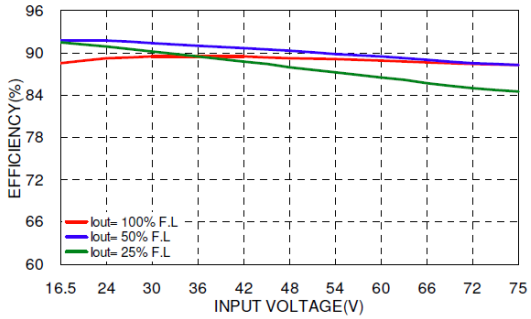
DCHBW200-48S05 Derating Curve with 0.24" Height Heatsink (Note 4)



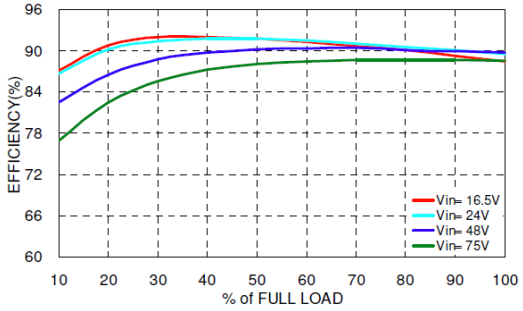
DCHBW200-48S05 Derating Curve with 0.45" Height Heatsink (Note 4)



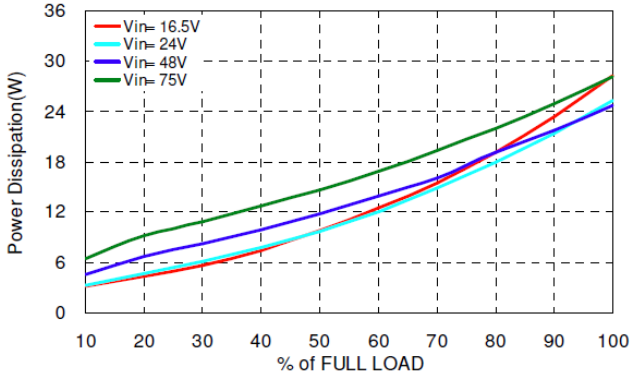
DCHBW200-48S05 Efficiency vs Input Voltage, Full Load



DCHBW200-48S05 Efficiency vs Output Current

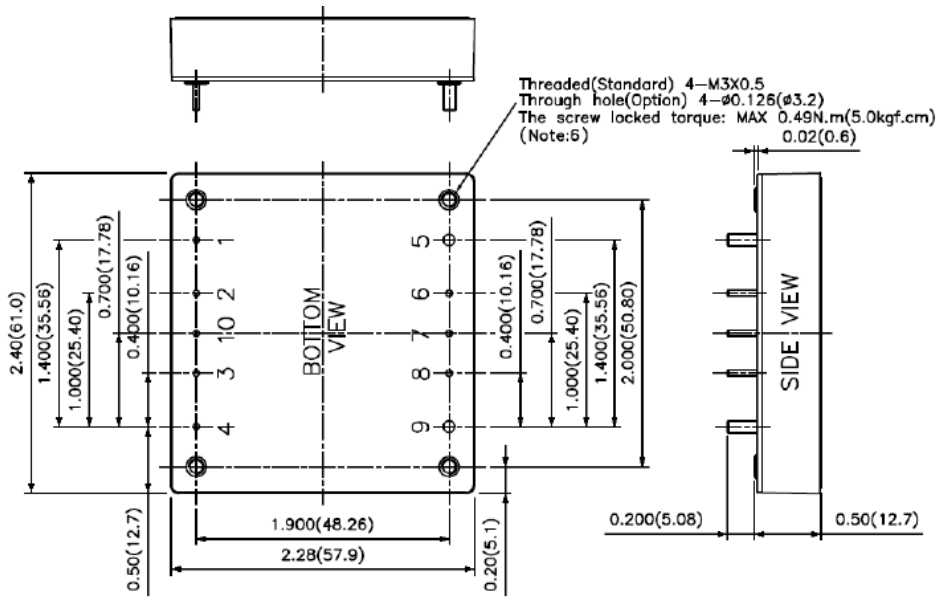


Power Dissipation vs. Output Current

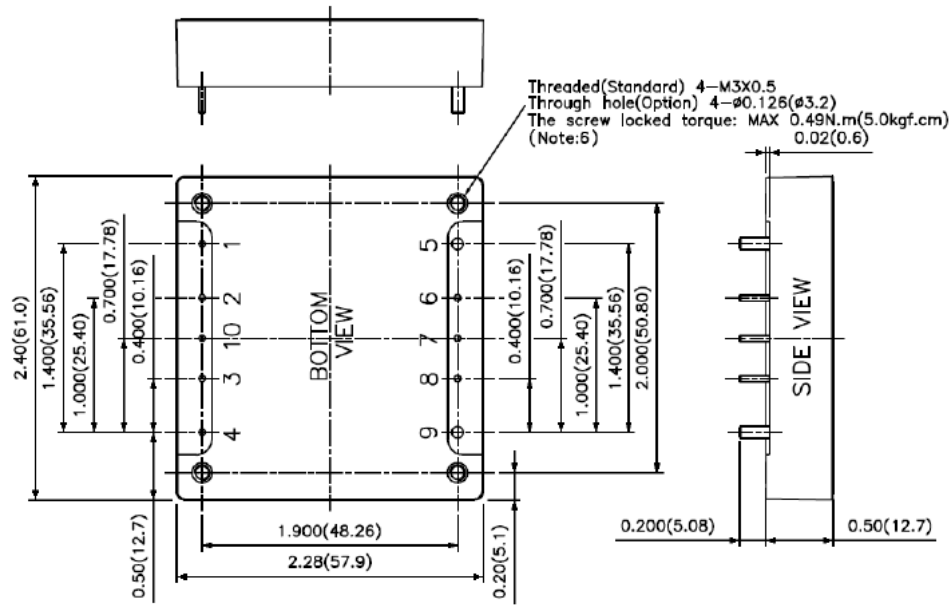


MECHANICAL DRAWINGS

METAL CASE (24VDC & 48VDC Nominal Input Models)



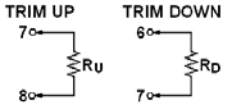
PLASTIC CASE (110VDC Nominal Input Models)



PIN CONNECTION

PIN	DEFINE	DIAMETER
1	-INPUT	0.04”
2	CASE (Option)	0.04”
3	CTRL	0.04”
4	+INPUT	0.04”
5	-OUTPUT	0.08”
6	-SENSE	0.04”
7	TRIM	0.04”
8	+SENSE	0.04”
9	+OUTPUT	0.08”
10	SYNC (Option)	0.04”

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

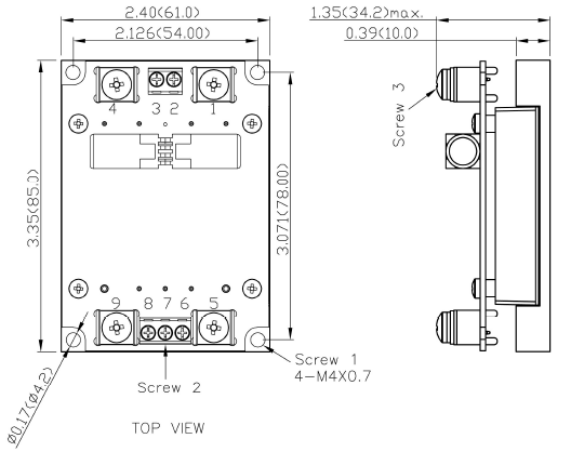


$$R_U = \left(\frac{V_{OUT}\ (100\ + \Delta\%)}{1.225\ \Delta\%} - \frac{(100\ + 2\Delta\%)}{\Delta\%} \right) k\Omega$$

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

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. Pin pitch tolerance ±0.01 (0.25)
4. Pin dimension tolerance ±0.004 (0.1)

Terminal Block without EMC Filter, Suffix: -T

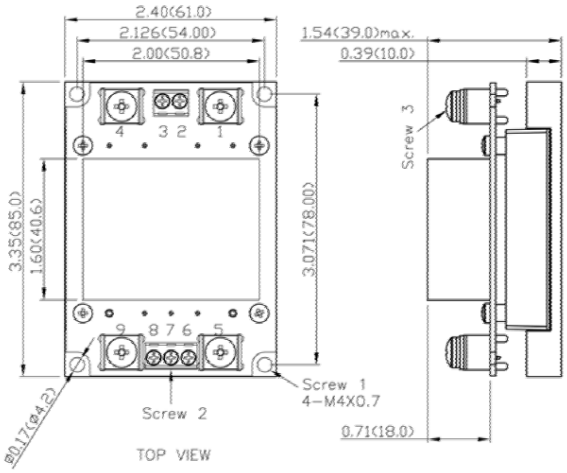


TERMINAL CONNECTION

No.	DEFINE	WIRE RANGE
1	-Vin	14AWG to 16AWG
2	NC	NA
3	Ctrl	14AWG to 18AWG
4	+Vin	14AWG to 16AWG
5	-Vout	10AWG to 12AWG
6	-Sense	14AWG to 18AWG
7	Trim	14AWG to 18AWG
8	+Sense	14AWG to 18AWG
9	+Vout	10AWG to 12AWG

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. The screw 1 locked torque: MAX 11.2kgf-cm (1.10N-m)
4. The screw 2 locked torque: MAX 5.2kgf-cm (0.51N-m)
5. The screw 3 locked torque: MAX 12kgf-cm (1.18N-m)

Terminal Block with EMC Filter (EN55022 Class A), Suffix: -TF

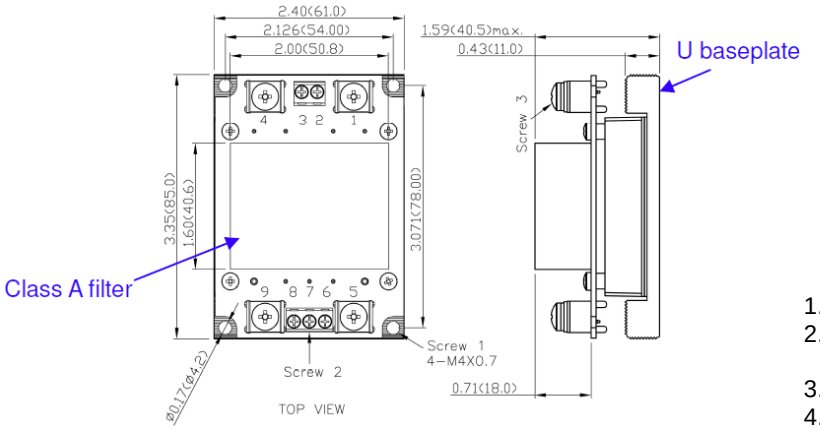


TERMINAL CONNECTION

NO.	DEFINE	WIRE RANGE
1	-Vin	14AWG to 16AWG
2	NC	NA
3	Ctrl	14AWG to 18AWG
4	+Vin	14AWG to 16AWG
5	-Vout	10AWG to 12AWG
6	-Sense	14AWG to 18AWG
7	Trim	14AWG to 18AWG
8	+Sense	14AWG to 18AWG
9	+Vout	10AWG to 12AWG

1. All dimensions inch (mm)
2. Tolerance: X.XX±0.02 (X.X±0.05)
   X.XXX±0.01 (X.XX±0.25)
3. The screw 1 locked torque: MAX 11.2kgf-cm (1.10N-m)
4. The screw 2 locked torque: MAX 5.2kgf-cm (0.51N-m)
5. The screw 3 locked torque: MAX 12kgf-cm (1.18N-m)

Terminal Block with EMC Filter (EN55022 Class A) can be connected to PE ⏚, Suffix: -TF1



TERMINAL CONNECTION

NO.	DEFINE	WIRE RANGE
1	-Vin	14AWG to 16AWG
2	NC	NA
3	Ctrl	14AWG to 18AWG
4	+Vin	14AWG to 16AWG
5	-Vout	10AWG to 12AWG
6	-Sense	14AWG to 18AWG
7	Trim	14AWG to 18AWG
8	+Sense	14AWG to 18AWG
9	+Vout	10AWG to 12AWG

1. All dimensions inch (mm)
2. Tolerance: X.XX±0.02 (X.X±0.5)
   X.XX±0.01 (X.XX±0.25)
3. The screw 1 locked torque: MAX 11.2kgf-cm (1.10N-m)
4. The screw 2 locked torque: MAX 5.2kgf-cm (0.51N-m)
5. The screw 3 locked torque: MAX 12kgf-cm (1.18N-m)

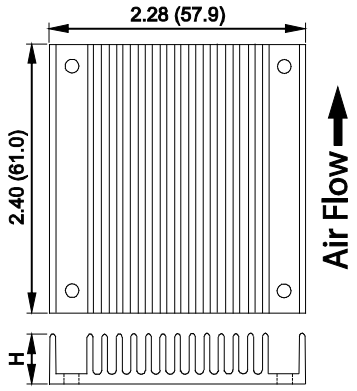
PRODUCT OPTIONS

Product Options		Suffix	Product Options		Suffix
Negative Remote ON/OFF Logic	0.200" pin length	R	Heatsinks	H = 0.45" Vertical Fin	H
	0.145" pin length	RL		H = 0.24" Horizontal Fin	H1
Positive Remote ON/OFF Logic	0.200" pin length	None		H = 0.24" Vertical Fin	H2
	0.145" pin length	S		H = 0.45" Horizontal Fin	H3
Thru-Hole Inserts	Ø0.126 thru-hole (no thread) inserts	TH (1)	Terminal Block	Wall Mounted	T (3)
Sync Pin		SY (2)		Wall Mounted with EMC Filter	TF (3)(4)
Case Pin		CP (2)		Wall Mounted with EMC Filter and can be connected to PE	TF1 (3)(4)

NOTES
1. Model with thru-hole inserts cannot be equipped with a heatsink.
2. No "SY" or "CP" function for terminal block types.
3. Only 0.200" pin length is available with terminal block options.
4. Models with EMC filter meet EN55011, EN55022 Class A.

HEATSINK OPTIONS

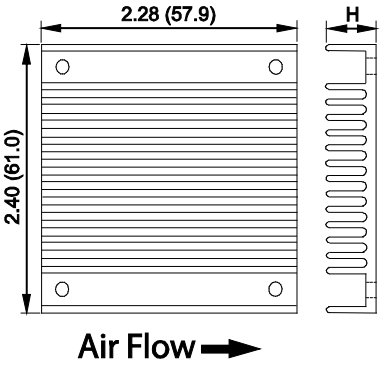
Vertical Fin Orientation (Suffixes "H", "H2")



Heatsink Options
H = 0.24" (H2 suffix)
H = 0.45" (H suffix)

NOTES
1. Unit: inches (mm)
2. Tolerance: x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)
3. All dimensions are for reference only

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

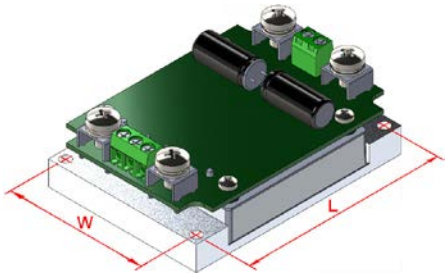


Heatsink Options
H = 0.24" (H2 suffix)
H = 0.45" (H suffix)

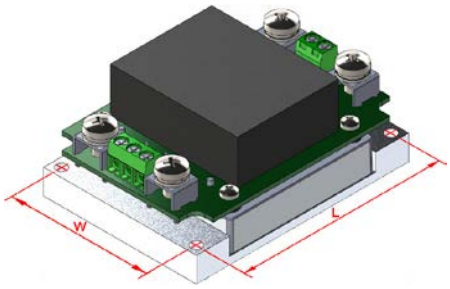
NOTES
1. Unit: inches (mm)
2. Tolerance: x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)
3. All dimensions are for reference only

TERMINAL BLOCK OPTIONS

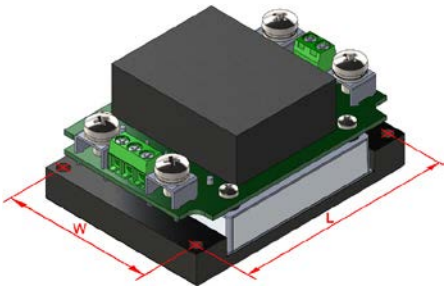
Wall Mounted (Suffix T)



Wall Mounted with EMC Filter (Suffix TF)



Wall Mounted with EMC Filter (Suffix TF1)



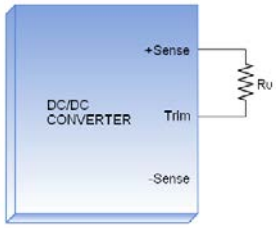
Terminal Block Type	T	TF	TF1
Weight	8.29oz (235g)	9.88oz (280g)	10.12oz (287g)
Dimensions	3.35 x 2.40 x 1.27 inches (85.0 x 61.0 x 32.3 mm)	3.35 x 2.40 x 1.47 inches (85.0 x 61.0 x 37.3 mm)	3.35 x 2.40 x 1.53 inches (85.0 x 61.0 x 38.8 mm)
Thru-Hole (WxL)	2.126 x 3.071 inches (54.00 x 78.00 mm), 4-Ø0.17 inches (Ø4.3mm)		

NOTES
1. Models with thru-hole inserts cannot be equipped with a heatsink.
2. No "SY" or "CP" function for terminal block type.

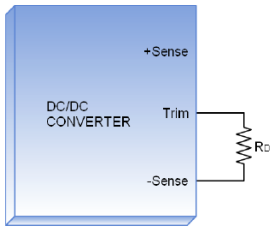
OUTPUT VOLTAGE ADJUSTMENT

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 resistor 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 or trim table below. The external TRIM resistor needs to be at least 1/8W resistor.

Trim Up



Trim Down



Output voltage adjustment configurations

TRIM EQUATION

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

TRIM TABLES

DCHBW-xxS3.3 TRIM-UP

Trim-Up (%)	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

DCHBW-xxS05 TRIM UP

Trim-Up (%)	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

DCHBW-xxS12 TRIM UP

Trim-Up (%)	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

DCHBW-xxS15 TRIM UP

Trim-Up (%)	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

DCHBW-xxS24 TRIM UP

Trim-Up (%)	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

DCHBW-xxS28 TRIM UP

Trim-Up (%)	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

DCHBW-xxS48 TRIM UP

Trim-Up (%)	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	671.578	582.665	514.480	461.447	419.020

DCHBW-xxSxx

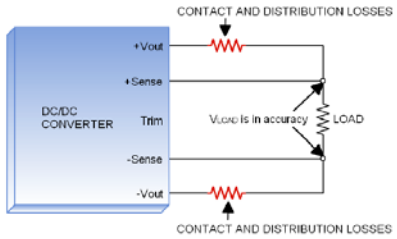
Trim-Down (%)	1	2	3	4	5	6	7	8	9	10
RD (kΩ)	98.000	48.000	31.333	23.000	18.000	14.667	12.286	10.500	9.111	8.000
Trim-Down (%)	11	12	13	14	15	16	17	18	19	20
RD (kΩ)	7.091	6.333	5.692	5.143	4.667	4.250	3.882	3.556	3.263	3.000

REMOTE SENSE

To minimize the effects of distribution losses by regulating the voltage at the Remote Sense pin. The voltage between the Sense pin and OUTPUT pin must not exceed 10% of Vout, i.e.

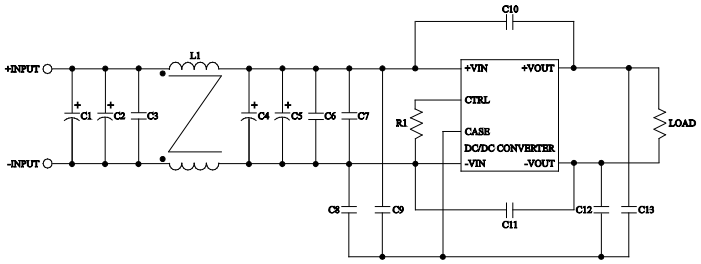
[+Vout to –Vout] – [+Sense to –Sense] ≤10% Vout

The voltage between +Vout and –Vout terminals must not exceed the minimum output overvoltage protection threshold. This limit includes any increase in voltage due to remote sense compensation and trim function. If remote sense feature is not being used to regulate the output at the point of load, then connect +Sense to +Vout and –Sense to –Vout.



EMI CONSIDERATIONS

Recommended Schematic for EN55011, EN55022 Conducted Emission Class A Limits



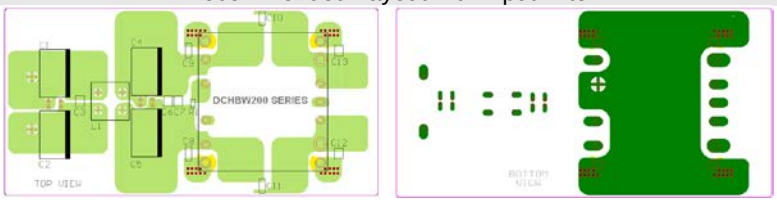
DCHBW200-24SXX MODELS			
Component	Value	Voltage	Reference
C1, C2, C4	330µF	50V	Nippon chemi-con KY series
C3, C6, C7	4.7µF	50V	1812 MLCC
C8, C9, C10, C11, C13	1000pF	3KV	1808 MLCC
C12	3300pF	3KV	1808 MLCC
L1	45µH±35%	-	Common Choke, P/N: PMT-092

DCHBW200-48SXX MODELS			
Component	Value	Voltage	Reference
C1, C2, C4	100µF	100V	Nippon chemi-con KY Series
C3, C6, C7	2.2µF	100V	1812 MLCC
C8, C9, C10, C11, C12, C13	1000pF	3KV	1808 MLCC
L1	224µH±35%	-	Common Choke P/N: PMT-087

DCHBW200-110SXX MODELS			
Component	Value	Voltage	Reference
C1, C2, C5	100µF	250V	Rubycon BXF series
C3, C6, C7	1µF	250V	1812 MLCC
C8, C9, C10, C11, C13	1000pF	3KV	1808 MLCC
L1	521µF±35%	-	Common Choke P/N: PMT-088

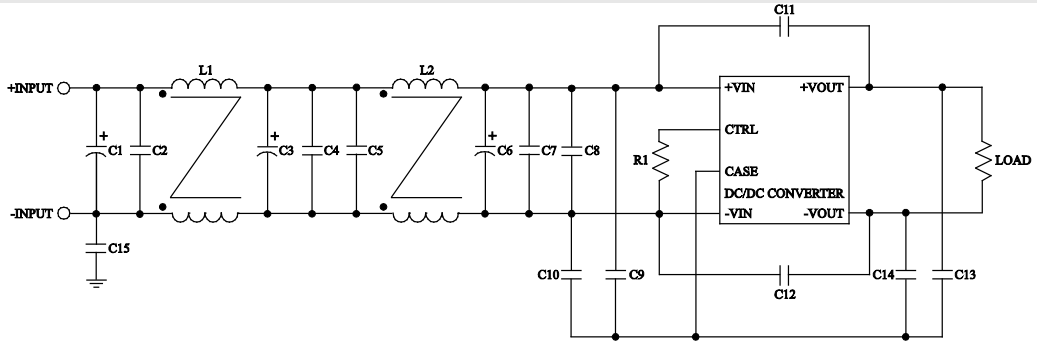
NOTES: 1. See page 9 for common mode choke.
2. While testing, connect the screws to the shield plane to reduce EMI.

Recommended Layout with Input Filter



EMI CONSIDERATIONS

Recommended Schematic for EN55011, EN55022 Conducted Emission Class B Limits



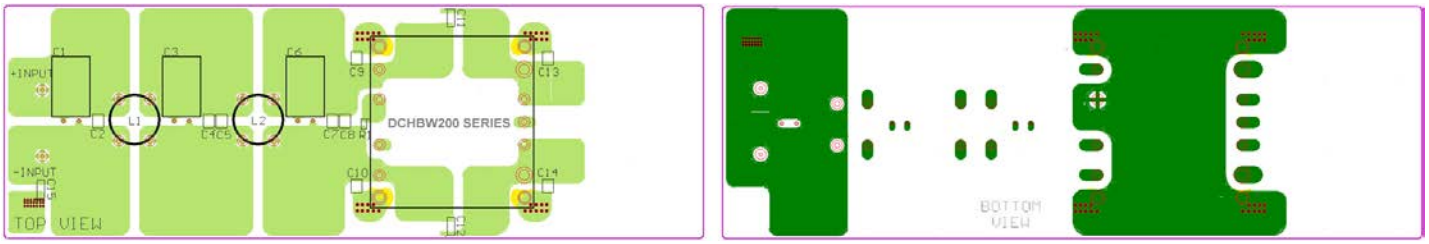
DCHBW200-24SXX MODELS			
Component	Value	Voltage	Reference
C1, C3, C6	330µF	50V	Nippon chemi-con KY series
C2, C4, C5, C7, C8	4.7µF	50V	1812 MLCC
C9, C10, C13, C14	10nF	2KV	1812 MLCC
C11	1000pF	3KV	1808 MLCC
C12	4700pF	3KV	1812 MLCC
L1, L2	45µH±35%	-	Common Choke, P/N: PMT-092

DCHBW200-48SXX MODELS			
Component	Value	Voltage	Reference
C1, C3, C6	100µF	100V	Nippon chemi-con KY Series
C2, C4, C5, C7, C8	2.2µF	100V	1812 MLCC
C9, C10, C13, C14	10nF	2KV	1812 MLCC
C11	2200pF	3KV	1808 MLCC
C12	4700pF	3KV	1812 MLCC
C15	1000pF	2KV	1808 MLCC
L1, L2	224µH±35%	-	Common Choke P/N: PMT-087

DCHBW200-110SXX MODELS			
Component	Value	Voltage	Reference
C1, C3, C6	100µF	250V	Rubycon BXF series
C2, C4, C5, C7, C8	1µF	250V	1812 MLCC
C9, C10	2200pF	2KV	1808 MLCC
C13, C14, C15	1000pF	2KV	1808 MLCC
C11, C12	2200pF	3KV	1808 MLCC
L1, L2	521µF±35%	-	Common Choke P/N: PMT-088

NOTES: 1. See page 9 for common mode choke.
2. While testing, connect the screw bolts to the shield plane to reduce EMI.

Recommended Layout with Input Filter

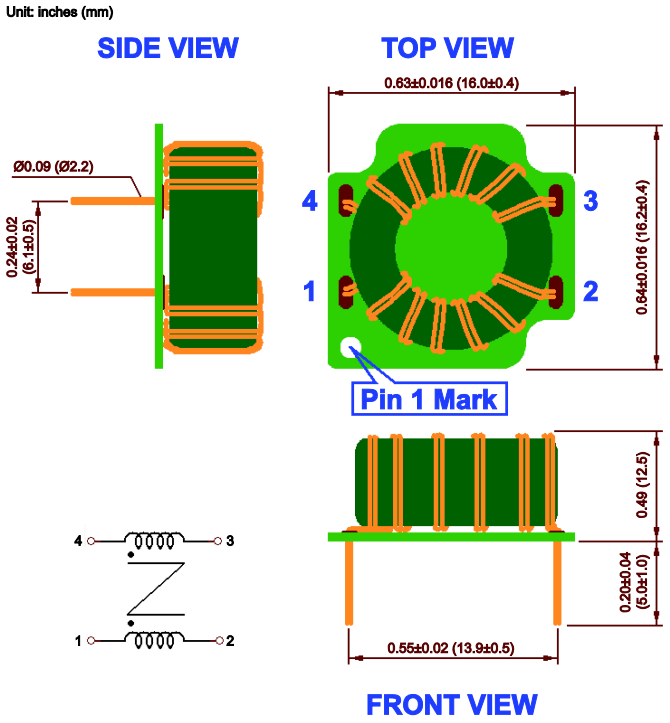


COMMON MODE CHOKES

PMT-092	Inductance: 45µH±35% Impedance: 1.4mΩ, max. Rated Current: 31.4A, max. Recommended Through Hole: Ø2.4mm
PMT-087	Inductance: 224µH±35% Impedance: 4.16mΩ, max. Rated Current: 15.4A, max. Recommended Through Hole: Ø1.8mm
PMT-088	Inductance: 521µH±35% Impedance: 14.25mΩ, max. Rated Current: 7.7A, max. Recommended Through Hole: Ø1.0mm

Measurement Instrument (Test Conditions):

L:	HP 4263B LCR Meter (100KHz/100mV)
DCR:	HIOKI 3540mΩ HITESTER
IDC:	Agilent 34401A Meter



MODEL NUMBER SETUP

DCHBW	200	-	24	S	12	R
Series Name	Output Power		Input Voltage	Output Quantity	Ouptut Voltage	Remote On/Off & Pin Length
	200: 200 Watts		**24:** 8.5-36 VDC 9-36 VDC **48:** 16.5-75 VDC **110:** 43-160 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	**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

Y	C	TH	H	TF
Sync Pin [2]	Case Pin [2]	Thru-Hole Inserts [1]	Heatsink [1]	Terminal Block [3] [4]
SY: sync pin	**CP:** case pin	**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 EMI filter **TF1:** wall mounted with EMI filter and can be connected to PE

NOTES
1. Models with thru-hole inserts cannot be equipped with a heatsink.
2. No "SY" or "CP" function for terminal block type.
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.

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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.

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