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With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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75W DC-DC Half-Brick Regulated Single Output Converter

MHB75 series



Features :

- Half-brick size (2.28"X2.4"X0.5") with industry standard pin out
- 2:1 wide input range
- Protections: Short circuit / Over current / Over voltage / Over temperature
- High efficiency up to 89%
- 1500VDC I/O isolation
- Built-in remote ON/OFF control
- Built-in remote sense function
- Trimming output $\pm 10\%$
- Five-sided shield metal case
- Optional heat sinks for extended operating temperature
- Output 2.5V/3.3V/15V available
- Approvals: UL / CUL / CE
- 3 years warranty



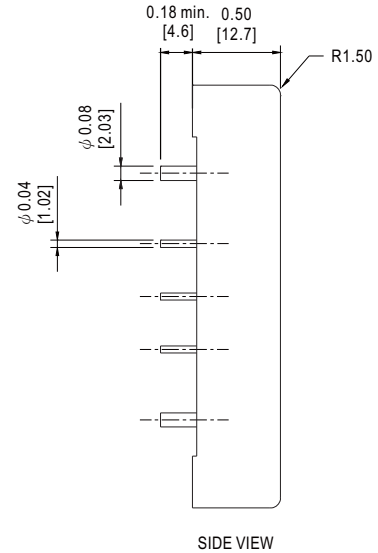
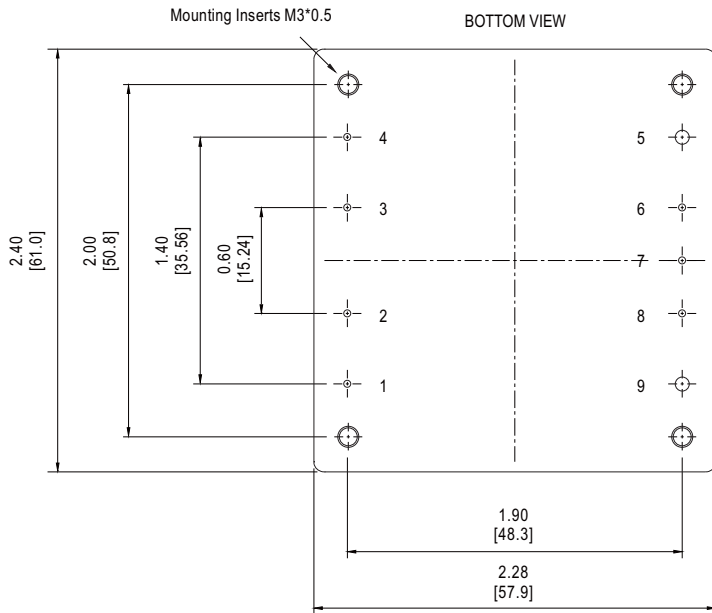
SPECIFICATION

MODEL		MHB75-12S05	MHB75-12S12	MHB75-12S24	MHB75-24S05	MHB75-24S12	MHB75-24S24	MHB75-48S05	MHB75-48S12	MHB75-48S24	
OUTPUT	DC VOLTAGE	5V	12V	24V	5V	12V	24V	5V	12V	24V	
	CURRENT RANGE	0 ~ 15A	0 ~ 6.25A	0 ~ 3.13A	0 ~ 15A	0 ~ 6.25A	0 ~ 3.13A	0 ~ 15A	0 ~ 6.25A	0 ~ 3.13A	
	RATED POWER	75W									
	RIPPLE & NOISE (max.) Note.2	75mVp-p	100mVp-p	240mVp-p	75mVp-p	100mVp-p	240mVp-p	75mVp-p	100mVp-p	240mVp-p	
	VOLTAGE ACCURACY Note.3	$\pm 1.0\%$									
	LINE REGULATION	$\pm 0.2\%$									
	LOAD REGULATION	$\pm 0.2\%$									
	SWITCHING FREQUENCY (Typ.)	400KHz for 12/24Vin, 300KHz for 48Vin									
	EXTERNAL TRIM ADJ. RANGE (Typ.)	$\pm 10\%$									
EXTERNAL CAPACITIVE LOAD (max.)	10000uF	10000uF	2000uF	10000uF	10000uF	2000uF	10000uF	10000uF	2000uF		
INPUT	RATED DC INPUT	12VDC			24VDC			48VDC			
	VOLTAGE RANGE	9 ~ 18VDC			18 ~ 36VDC			36 ~ 75VDC			
	SURGE VOLTAGE (100ms max.)	25VDC			50VDC			100VDC			
	UNDER VOLTAGE LOCKOUT	Power up: 8.8VDC, Power down: 8VDC			Power up: 17VDC, Power down: 16VDC			Power up: 34VDC, Power down: 32.5VDC			
	EFFICIENCY (Typ.)	83%	87%	87%	84%	88%	88%	84%	89%	89%	
	DC CURRENT	FULL LOAD	7570mA	7200mA	7200mA	3780mA	3650mA	3650mA	1900mA	1800mA	1800mA
		NO LOAD	50mA			50mA			50mA		
FILTER	Pi-network										
PROTECTION	OUTPUT OVER CURRENT	110 ~ 150% rated output power Protection type : Over current limiting, recovers automatically after fault condition is removed									
	OUTPUT OVER VOLTAGE (Typ.)	115 ~ 140% rated output voltage Protection type : Output voltage clamp by TVS diode									
	OUTPUT SHORT CIRCUIT	Protection type : Can be continuous, recovers automatically after fault condition is removed									
	OVER TEMPERATURE	100°C $\pm 5^\circ\text{C}$ of case temperature									
FUNCTION OPERATING	REMOTE CONTROL	Please refer to "Remote ON/OFF Control" for details									
	OUTPUT TRIMMING	$\pm 10\%$, Please refer to "External Output Trimming" for details									
ENVIRONMENT	WORKING TEMPERATURE (Typ.)	-40 ~ +100°C ; Thermal shutdown at 100°C $\pm 5^\circ\text{C}$ of case temperature (please refer to "Thermal Curve")									
	WORKING HUMIDITY	0% ~ 95% RH max.									
	STORAGE TEMP., HUMIDITY	-55 ~ +105°C, 0 ~ 95% RH									
	TEMP. COEFFICIENT	$\pm 0.03\%/^\circ\text{C}$ (0~60°C)									
SAFETY & EMC (Note 4)	SAFETY STANDARDS	UL60950-1, EAC TP TC 004 approved									
	ISOLATION VOLTAGE	I/P-O/P:1500VDC, I/P-Case:1500VDC, O/P-Case:1500VDC									
	ISOLATION RESISTANCE	I/P-O/P:100M Ohms / 500VDC / 25°C / 70% RH									
	EMC EMISSION	Compliance to EN55032 (CISPR32) Class A with external components (please refer to "EMC Suggestion Circuit"), EAC TP TC 020									
OTHERS	EMC IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8; EN55024, light industry level, criteria A, EAC TP TC 020									
	CASE MATERIAL	Aluminum									
	MTBF	1000K hrs typ. MIL-HDBK-217F (25°C)									
	DIMENSION	57.9*61*12.7mm (2.28"*2.40"*0.5") (L*W*H)									
NOTE	WEIGHT	92g									
		1. All parameters NOT specially mentioned are measured at 12,24,48VDC input, rated load and 25°C of ambient temperature. 2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 1uf ceramic & 10uf tantalum capacitor across output. 3. The power supply need to connect "+Vout" to "+R.S" and "-Vout" to "-R.S". 4. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies."									

Mechanical Specification

Unit:inch[mm]

All Dimensions In Inches [mm]
 Tolerance Inches: X.XX= ±0.02 , X.XXX= ±0.010
 Millimeters: X.X= ±0.5 , X.XX=±0.25



Pin No. Assignment

Pin No.	Assignment	Pin No.	Assignment	Pin No.	Assignment
1	+Vin	4	-Vin	7	Trim
2	R.C.	5	-Vout	8	+R.S.
3	Case	6	-R.S.	9	+Vout

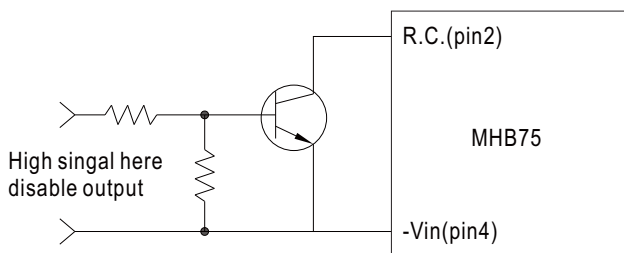
Remote ON/OFF Control

The MHB75 series allow the user to switch the power ON and OFF electronically by their remote ON/OFF feature. The MHB75 series are available with "Positive Logic" (standard) or "Negative Logic" (option).

Logic table

Logic State(pin2)	Positive logic	Negative logic
Logic Low-Switch Closed	Power OFF(<0.8Vdc)	Power ON(<0.8Vdc)
Logic High-Switch Open	Power ON(Open circuit)	Power OFF(Open circuit)

- Note: 1.Logic compatibility : R.C.(pin2) ~ -Vin(pin4).
- 2.Suffix "N" to the model number with Negative logic remote ON/OFF.



Example control circuit(positive logic)

■ External Output Trimming

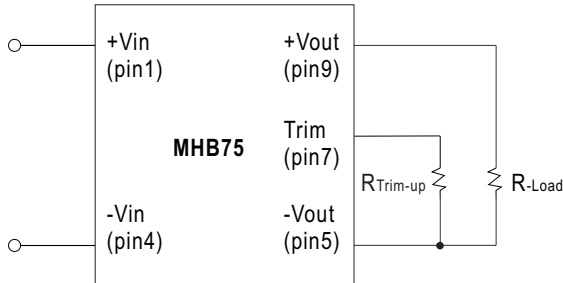


Figure 1 : Trim-up voltage setup

The value of $R_{Trim-up}$ defined as:

$$R_{Trim-up} = \frac{(R1-R2 \times (V_o - V_{o, nom}))}{(V_o - V_{o, nom})} (K\Omega)$$

Where: $R_{Trim-up}$ is the external resistor in Kohm.

$V_{o, nom}$ is the nominal output voltage.

V_o is the desired output voltage.

$R1$ and $R2$ are inside the unit and list in Table 1

Output Voltage(V)	R1 (Kohm)	R2 (Kohm)
5V	5.8	8.25
12V	19.656	13.304
24V	42.215	16.923

Table 1

For example, to Trim-up the output voltage of 5.0V model (MHB75-48S05)

by 8% to 5.4V, $R_{Trim-up}$ is calculated

as follows:

$$V_o - V_{o, nom} = 5.4 - 5.0 = 0.4V$$

$$R1 = 5.8 \text{ Kohm}$$

$$R2 = 8.25 \text{ Kohm}$$

$$R_{Trim-up} = \frac{5.8 - 8.25 \times 0.4}{0.4} = 6.25 (K\Omega)$$

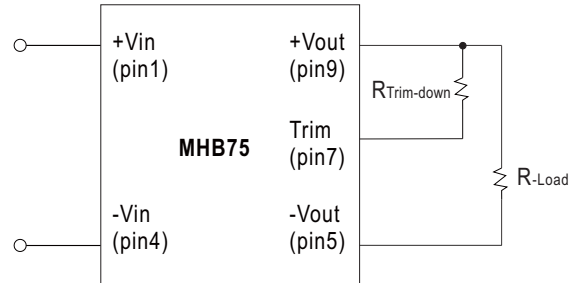


Figure 2 : Trim-down voltage setup

The value of $R_{Trim-down}$ defined as:

$$R_{Trim-down} = \frac{(R1 - R2 \times (V_o, nom - V_o))}{(V_o, nom - V_o)} (K\Omega)$$

Where: $R_{Trim-down}$ is the external resistor in Kohm.

$V_{o, nom}$ is the nominal output voltage.

V_o is the desired output voltage.

$R1$ and $R2$ are inside the unit and list in Table 2.

Output Voltage(V)	R1 (Kohm)	R2 (Kohm)
5V	5.8	10.57
12V	86.45	60.1
24V	430	130

Table 2

For example, to Trim-down the output

Voltage of 5.0V model (MHB75-48S05)

by 8% to 4.6V, $R_{Trim-down}$ is

calculated as follows :

$$V_{o, nom} - V_o = 5.0 - 4.6 = 0.4 V$$

$$R1 = 5.8 \text{ Kohm}$$

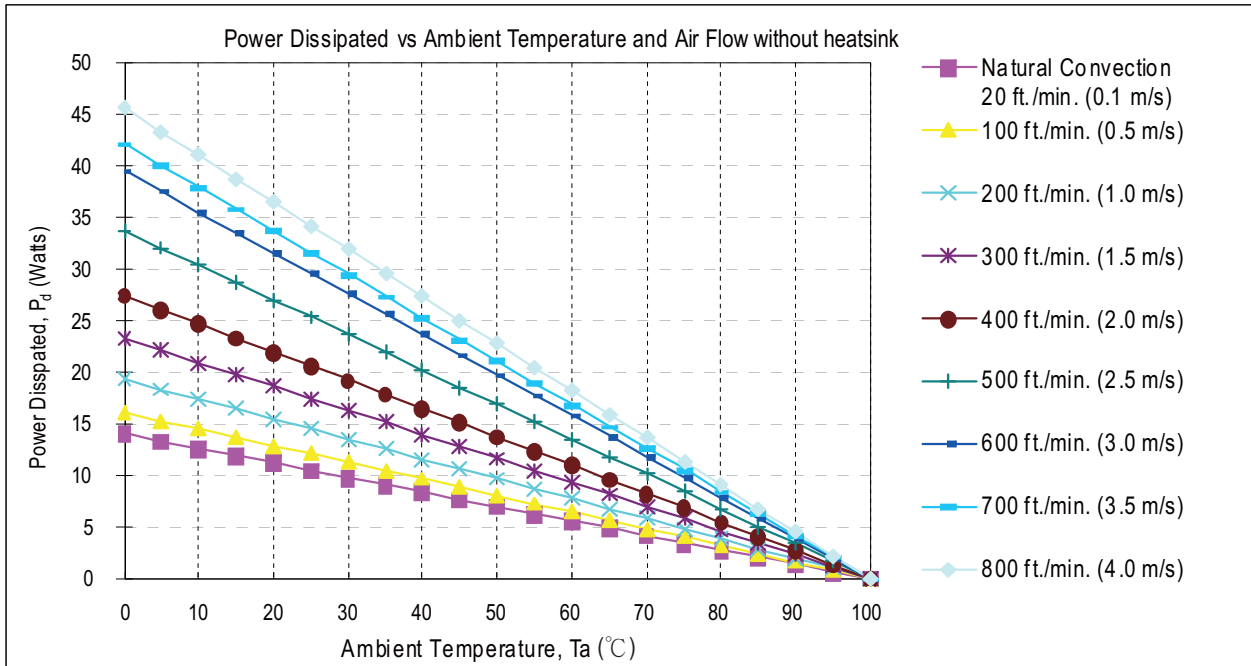
$$R2 = 10.57 \text{ Kohm}$$

$$R_{Trim-down} = \frac{5.8 - 10.57 \times 0.4}{0.4} = 3.93 (K\Omega)$$

Thermal Curve

The operating case temperature range of MHB-75 series is -40°C to +100°C. When operate the MHB-75 series, proper de-rating or cooling is needed.

The maximum case temperature under any operating condition should not be exceed 100°C. The following curve is the de-rating curve of MHB-75 series without heat sink.



Air Flow Rate	Typical Rca	Air Flow Rate	Typical Rca
Natural convection 20ft./min. (0.1m/s)	7.12°C/W	500 ft./min. (2.5m/s)	2.96°C/W
100 ft./min. (0.5m/s)	6.21°C/W	600 ft./min. (3.0m/s)	2.53°C/W
200 ft./min. (1.0m/s)	5.17°C/W	700 ft./min. (3.5m/s)	2.37°C/W
300 ft./min. (1.5m/s)	4.29°C/W	800 ft./min. (4.0m/s)	2.19°C/W
400 ft./min. (2.0m/s)	3.64°C/W		

Rca : Thermal resistance from case to ambience

Example:

What is the minimum airflow necessary for a MHB75-48S12 operates at nominal line, an output current of 6.25A, and a maximum ambient temperature of 40°C?

Solution:

Given: Vin=48Vdc, Vo=12Vdc, Io=6.25A, η (unit efficiency)=89%

Determine Power dissipation (Pd):

$$P_d = P_i - P_o = P_o(1 - \eta) / \eta$$

$$P_d = 12 \times 6.25 \times (1 - 0.89) / 0.89 = 9.27 \text{ Watts}$$

Determine airflow:

Given: Pd=9.27W and Ta=40°C

Check Thermal Curve above:

minimum airflow= 100 ft./min.

Verifying: The maximum temperature rise $\Delta T = P_d \times R_{ca} = 9.27 \times 6.21 = 57.57^\circ\text{C}$

The maximum case temperature $T_c = T_a + \Delta T = 97.57^\circ\text{C} < 100^\circ\text{C}$

Where: The Rca is thermal resistance from case to ambience.

The Ta is ambient temperature and the Tc is case temperature.

■ Case Heat Sink (Optional)

Unit:mm

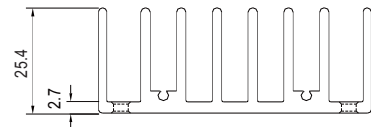
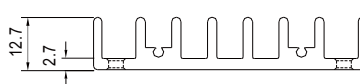
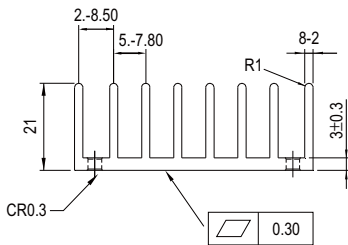
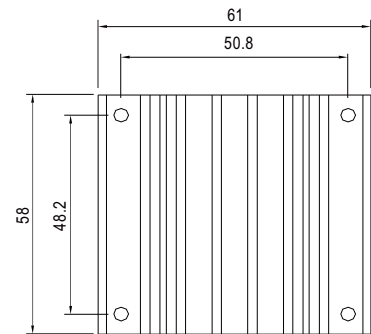
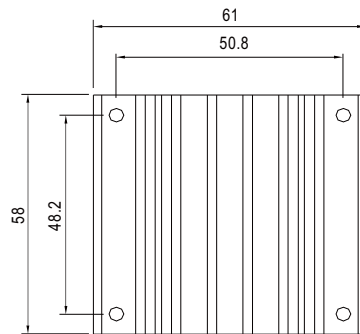
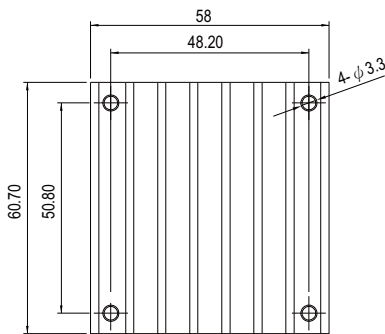
Model No.: M-C308 (Vertical Fins)



Model No.: M-C091(Horizontal Fins)



Model No.: M-C092 (Horizontal Fins)



Rca:

- 3.90°C / W (typ.), at natural convection
- 1.74°C / W (typ.), at 100ft./min.(LFM)
- 1.33°C / W (typ.), at 200ft./min.(LFM)
- 1.12°C / W (typ.), at 300ft./min.(LFM)
- 0.97°C / W (typ.), at 400ft./min.(LFM)

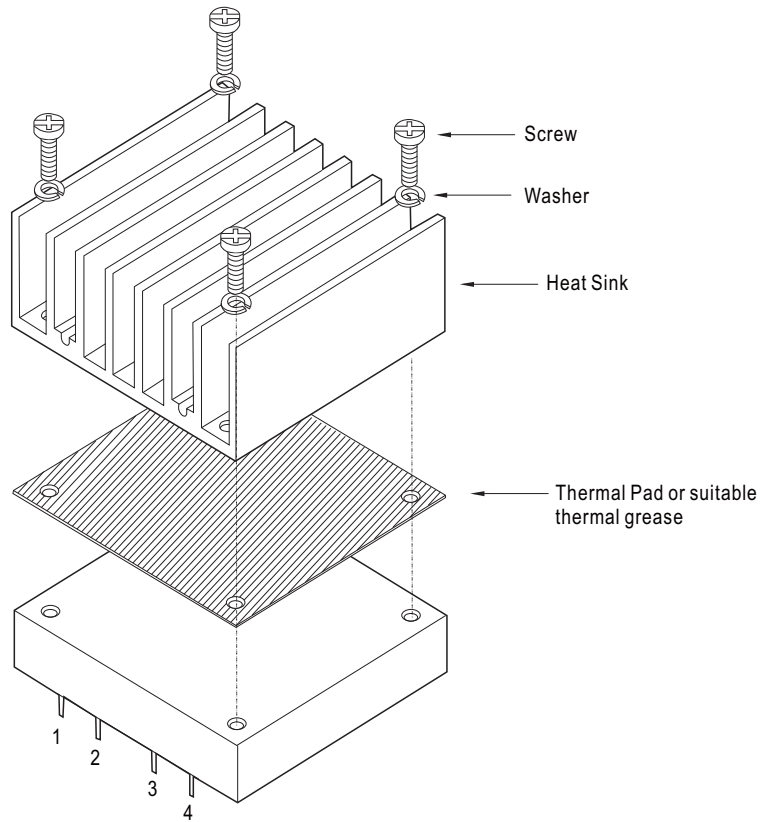
Rca:

- 4.70°C / W (typ.), at natural convection
- 2.89°C / W (typ.), at 100ft./min.(LFM)
- 2.30°C / W (typ.), at 200ft./min.(LFM)
- 1.88°C / W (typ.), at 300ft./min.(LFM)
- 1.59°C / W (typ.), at 400ft./min.(LFM)

Rca:

- 3.00°C / W (typ.), at natural convection
- 1.44°C / W (typ.), at 100ft./min.(LFM)
- 1.17°C / W (typ.), at 200ft./min.(LFM)
- 1.04°C / W (typ.), at 300ft./min.(LFM)
- 0.95°C / W (typ.), at 400ft./min.(LFM)

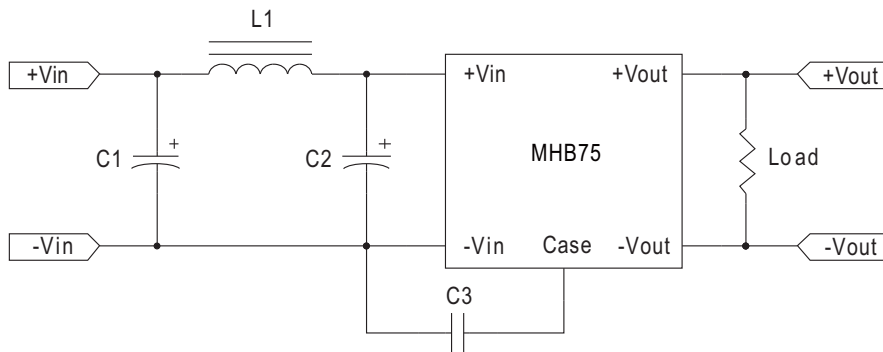
■ Heatsink Assembly



Heat Sink Order No.:
 M-C308
 M-C091
 M-C092
 Thermal Pad: 56.9x60x0.25mm
 Screw: SMP+SW M3x8L

■ EMC Suggestion Circuit

※Required external components to meet EN55022 class A conducted emission are as below:



Model No.	C1	C2	C3	L1
MHB75-12S□	100uF/50V ESR<0.33Ω	100uF/50V ESR<0.33Ω	1000pF	1.5uH
MHB75-24S□	100uF/50V ESR<0.33Ω	100uF/50V ESR<0.33Ω	1000pF	1.5uH
MHB75-48S□	33uF/100V ESR<0.46Ω	33uF/100V ESR<0.46Ω	2200pF	8.3uH

□ =05,12,24