# PD75W Series

**HALF-BRICK DC-DC CONVERTER**

**4:1 ULTRA WIDE INPUT RANGE**
**UP TO 75Watts**

## FEATURES

- NO MINIMUM LOAD REQUIRED
- 3000VAC REINFORCED INSULATION FOR 110VIN
  2250VDC BASIC INSULATION FOR 24VIN AND 48VIN
- UL60950-1, EN60950-1, & IEC60950-1 SAFETY APPROVALS
- COMPLIANCE TO EN50155 AND EN45545-2 RAILWAY STANDARD
- CE MARKED
- COMPLIANT TO RoHS II & REACH

## APPLICATIONS

- RAILWAY SYSTEM
- WIRELESS NETWORK
- TELECOM/DATACOM
- INDUSTRY CONTROL SYSTEM
- DISTRIBUTED POWER ARCHITECTURES
- SEMICONDUCTOR EQUIPMENT

| 3000VAC ISOLATION | 2250VDC ISOLATION | REMOTE CONTROL | UVP | OCP | SCP | OVP | OTP |
|---|---|---|---|---|---|---|---|

## TECHNICAL SPECIFICATION

All specifications are typical at nominal input, full load and 25℃otherwise noted

| Model Number | Input Range VDC | Output Voltage VDC | Output Current @Full Load A | Input Current @ No Load mA | Efficiency % | Maximum Capacitor Load µF |
|---|---|---|---|---|---|---|
| PD75-24S3P3W | 9 ~ 36 | 3.3 | 20 | 85 | 87 | 60600 |
| PD75-24S05W | 9 ~ 36 | 5 | 15 | 120 | 88 | 30000 |
| PD75-24S12W | 9 ~ 36 | 12 | 6.3 | 185 | 88 | 5250 |
| PD75-24S15W | 9 ~ 36 | 15 | 5 | 185 | 88 | 3330 |
| PD75-24S24W | 9 ~ 36 | 24 | 3.2 | 85 | 87 | 1330 |
| PD75-24S28W | 9 ~ 36 | 28 | 2.7 | 85 | 87 | 960 |
| PD75-24S48W | 9 ~ 36 | 48 | 1.6 | 85 | 87 | 330 |
| PD75-48S3P3W | 18 ~ 75 | 3.3 | 20 | 60 | 88 | 60600 |
| PD75-48S05W | 18 ~ 75 | 5 | 15 | 60 | 90 | 30000 |
| PD75-48S12W | 18 ~ 75 | 12 | 6.3 | 90 | 90 | 5250 |
| PD75-48S15W | 18 ~ 75 | 15 | 5 | 50 | 89 | 3330 |
| PD75-48S24W | 18 ~ 75 | 24 | 3.2 | 50 | 88 | 1330 |
| PD75-48S28W | 18 ~ 75 | 28 | 2.7 | 50 | 88 | 960 |
| PD75-48S48W | 18 ~ 75 | 48 | 1.6 | 50 | 87 | 330 |
| PD75-110S3P3W | 43 ~ 160 | 3.3 | 20 | 10 | 89 | 60600 |
| PD75-110S05W | 43 ~ 160 | 5 | 15 | 10 | 91 | 30000 |
| PD75-110S12W | 43 ~ 160 | 12 | 6.3 | 10 | 91 | 5250 |
| PD75-110S15W | 43 ~ 160 | 15 | 5 | 10 | 91 | 3330 |
| PD75-110S24W | 43 ~ 160 | 24 | 3.2 | 10 | 90 | 1330 |
| PD75-110S28W | 43 ~ 160 | 28 | 2.7 | 10 | 90 | 960 |
| PD75-110S48W | 43 ~ 160 | 48 | 1.6 | 10 | 90 | 330 |

## PART NUMBER STRUCTURE

PD75 - 48 S 05 W - P TH HS

**Series Name**

**Input Voltage (VDC)**
**24:** 9~36
**48:** 18~75
**110:** 43~160

**Output Quantity**
**S:**Single

**Output Voltage (VDC)**
**3P3:**3.3
**05:**5
**12:**12
**15:**15
**24:**24
**28:**28
**48:**48

**Input Range**
4:1

**Ctrl and Pin Options**
□:Negative logic, 0.200" pin length
**L:**Negative logic, 0.145" pin length
**P:**Positive logic, 0.200" pin length
**S:**Positive logic, 0.145"pin length

**Through hole type** (1)
□: Thread
**TH:** No thread

**Assembly Option**
□ : None

**Heat-sink type:**
**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

**Terminal block type** (2)**:**
**T:** Wall mounted
**TF:** Wall mounted with EMC filter(3)
**TF1:** Wall mounted with EMC filter can be connected to PE (3)

(1) The module can’t equip Heat-sink with TH option.
(2) Terminal block type only for 0.200” pin length.
(3) EMI filter meet EN55011, EN55022 Class A.

## INPUT SPECIFICATIONS

| Parameter | Conditions | | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Operating input voltage range | | 24Vin(nom)<br>48Vin(nom)<br>110Vin(nom) | | 9 24 36 18 48 75<br>43 | <br>110 | <br>160 | <br>VDC |
| Start up voltage | | 24Vin(nom)<br>48Vin(nom)<br>110Vin(nom) | | | | 9<br>18<br>43 | <br>VDC |
| Shutdown voltage | | 24Vin(nom)<br>48Vin(nom)<br>110Vin(nom) | | | 7.5<br>16<br>36 | | <br>VDC |
| Start up time | Constant resistive load | Power up | 110Vin(nom)<br>Others | | 60<br>25 | | <br>ms |
| | | Remote ON/OFF | 110Vin(nom)<br>Others | | 60<br>25 | | |
| Input surge voltage | 1 second, max. | 24Vin(nom)<br>48Vin(nom)<br>110Vin(nom) | | | | 50<br>100<br>185 | <br>VDC |
| Input filter (1) | | | | | Pi type | | |
| Remote ON/OFF | Referred to –Vin pin | Negative logic (Standard)<br>Positive logic (Option) | DC-DC ON<br>DC-DC OFF<br>DC-DC ON<br>DC-DC OFF | | Short or 0 ~ 1.2VDC<br>Open or 3 ~ 12 VDC<br>Open or 3 ~ 12 VDC<br>Short or 0 ~ 1.2VDC | | |
| | | Input current of Ctrl pin | | -0.5 | | 1 | mA |
| | | Remote off input current | | | 3 | | mA |

## OUTPUT SPECIFICATIONS

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| 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 | % of Vout(nom)<br>If remote sense is not being used, Sense pins should be connected to corresponding polarity OUTPUT pins. | | | 10 | % |
| Ripple and noise | Measured by 20MHz bandwidth<br>With a 4.7µF/50V X7R MLCC 3.3Vout, 5Vout<br>With a 4.7µF/50V X7R MLCC 12Vout, 15Vout<br>With a 4.7µF/50V X7R MLCC 24Vout, 28Vout<br>With a 2.2µF/100V X7R MLCC 48Vout | | 75<br>100<br>200<br>300 | 100<br>125<br>250<br>350 | mVp-p |
| Temperature coefficient | | -0.02 | | +0.02 | %/℃ |
| Transient response recovery time | 25% load step change | | 200 | 250 | µs |
| Over voltage protection | % of Vout(nom); Hiccup mode | 115 | | 130 | % |
| Over load protection | % of Iout rated; Hiccup mode 110Vin(nom)<br>Others | <br>110 | 150 | <br>140 | % |
| Short circuit protection | | Continuous, automatics recovery | | | |

## GENERAL SPECIFICATIONS

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Isolation voltage | 1 minute (Reinforced insulation) 110Vin(nom) Input to Output<br>Input (Output) to Case | 3000<br>1500 | | | VAC |
| | 1 minute (Basic insulation) Others Input to Output<br>Input (Output) to Case | 2250<br>1600 | | | VDC |
| Isolation resistance | 500VDC | 1 | | | GΩ |
| Isolation capacitance | | | | 2500 | pF |
| Switching frequency | | 270 | 300 | 330 | kHz |
| Safety approvals | | | | | UL60950-1<br>EN60950-1<br>IEC60950-1 |
| Case material | 24Vin(nom) and 48Vin(nom)<br>110Vin(nom) | | | | Metal Aluminum base-plate with plastic case |
| Base material | 24Vin(nom) and 48Vin(nom) | | | | FR4 PCB |
| Potting material | | | | | Silicone (UL94 V-0) |
| Weight | Module stand alone<br>PD75-S_W - [illegible]<br>PD75-S_W - [illegible]F<br>PD75-S_W - [illegible]F1 | | | | 97g (3.42oz)<br>200g (7.05oz)<br>280g (9.88oz)<br>287g (10.12oz) |
| MTBF | MIL-HDBK-217F, Full load | | | | $3.362\times10^5$ hrs |

## ENVIRONMENTAL SPECIFICATIONS

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Operating case temperature | Base-plate | -40 | | +105 | ℃ |
| Over temperature protection | | | +115 | | ℃ |
| Storage temperature range | Terminal block type<br>Others | -40<br>-55 | | +105<br>+125 | ℃ |

| | | |
|---|---|---|
| Thermal impedance (2) | Vertical direction by natural convection (20LFM)<br>Module without assembly option<br>Heat-sink type with 0.24" Height<br>Heat-sink type with 0.45" Height | <br>6.7<br>℃/W<br>5.4<br>4.7 |
| Thermal shock | | MIL-STD-810F |
| Shock | | EN61373, MIL-STD-810F |
| Vibration | | EN61373, MIL-STD-810F |
| Relative humidity | | 5% to 95% RH |

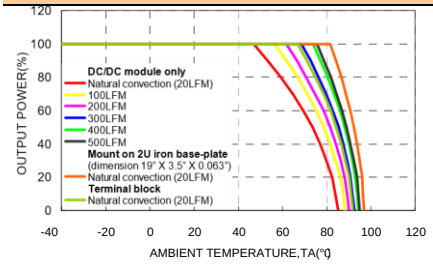
## EMC SPECIFICATIONS

| Parameter | Conditions | | Level |
|---|---|---|---|
| EMI (3) | EN55011, EN55022 | | Class A<br>Class B |
| ESD | EN61000-4-2 | Air ±8kV and Contact ±6kV | Perf. Criteria A |
| Radiated immunity | EN61000-4-3 | 20V/m | Perf. Criteria A |
| Fast transient (4) | EN61000-4-4 | ±2kV | Perf. Criteria A |
| Surge (4) | EN61000-4-5 | EN55024 ±2kV and EN50155 ±2kV | Perf. Criteria A |
| Conducted immunity | EN61000-4-6 | 10Vr.m.s | Perf. Criteria A |
| Power frequency magnetic field | EN61000-4-8 | 100A/m continuous; 1000A/m 1 second | Perf. Criteria A |

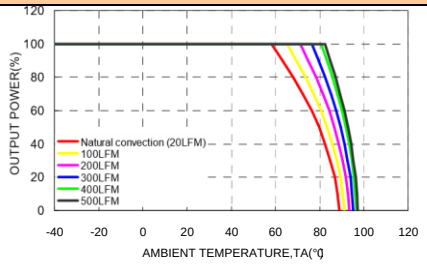
**Note:**

1. Input source impedance: The power module will operate as specifications without external components, assuming that the source voltage has a very low impedance and reasonable input voltage regulation. Highly inductive source impedances can affect the stability of the power module. Since real-world voltage source has finite impedance, performance can be improved by adding external filter capacitor.
   The PD75-24S W recommended 4.7μF/50V X7R MLCC or Nippon Chemi-con KY series, 68μF /100V or better capacitor.
2. (1)Thermal test condition with vertical direction by natural convection (20LFM).
   (2)The heat-sink is optional and P/N: 7G-0021A-F , 7G-0022A-F , 7G-0023A-F , 7G-0024A-F. Please refer to heat-sink selection guide.
3. The standard module meets EMI Class A or Class B with external components. For further information, please contact with MEGA.
4. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
   The PD75-24S W and PD75-48S W recommended 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220μF/100V) to connect in parallel.
   The PD75-110S W recommended 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KXJ series, 150μF/200V) to connect in parallel.
5. CASE GROUNDING：Connecting four screw bolts to shield plane will help to reduce the EMI.
6. For further information, please contact with MEGA. **CAUTION:** This power module is not internally fused. An input line fuse must always be used.

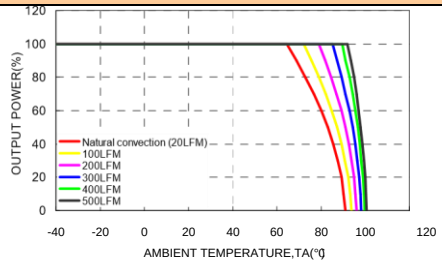
## CHARACTERISTIC CURVE



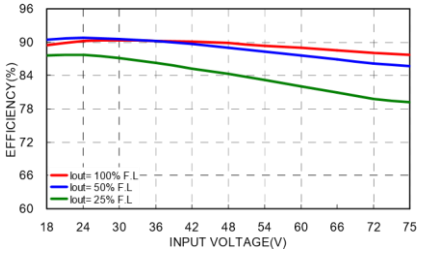

PD75-48S05W Derating Curve (Note 2)



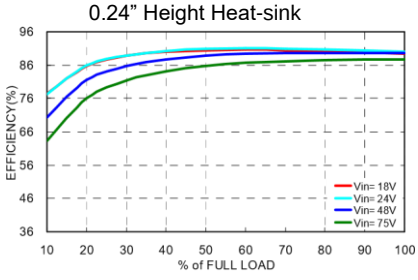

PD75-48S05W Derating Curve (Note 2) With 0.24" Height Heat-sink




PD75-48S05W Derating Curve (Note 2) With 0.45" Height Heat-sink



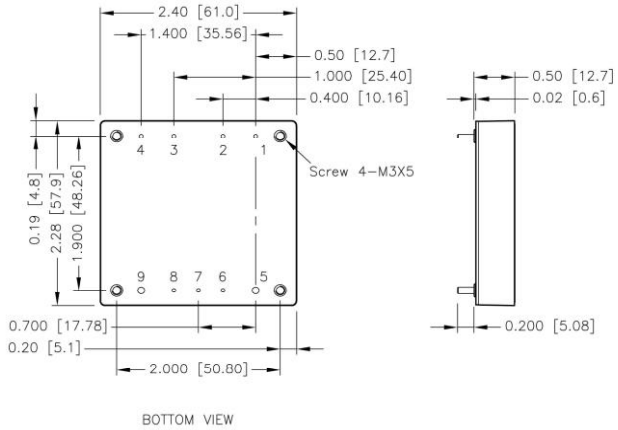

PD75-48S05W Efficiency vs. Input Voltage




PD75-48S05W Efficiency vs. Output Load

## MECHANICAL DRAWING

**PD75-24S_W, PD75-48S_W**

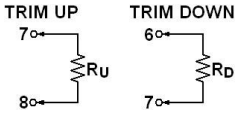



PIN CONNECTION

| 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 |

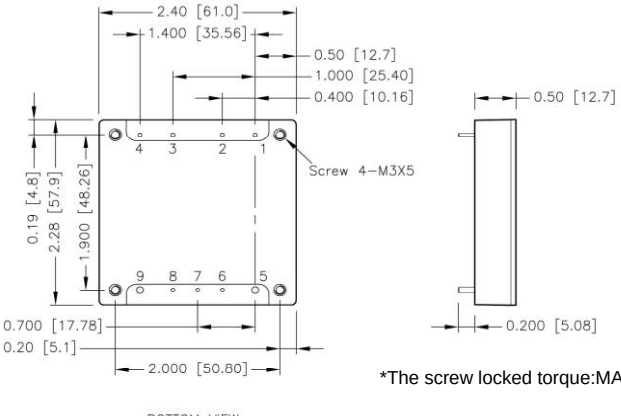
Output can be externally trimmed by using the method shown.

**EXTERNAL OUTPUT TRIMMING**




*The screw locked torque:MAX 5.0kgf-cm(0.49N-m)

**PD75-110S_W**




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

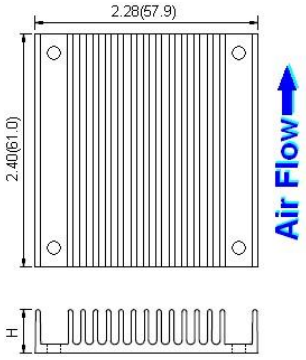
$$R_D = \frac{100 - 2\,k\Omega}{\Delta\%}$$

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.

*The screw locked torque:MAX 3.5kgf-cm(0.34N-m)

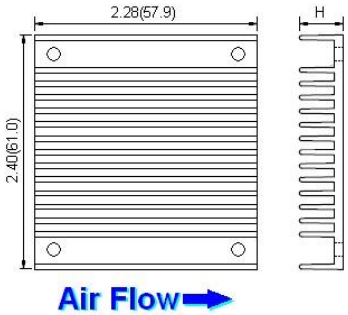
## HEAT-SINK TYPE OPTIONS

Vertical Fin Orientation, Suffix:-HS, -HS2




Horizontal Fin Orientation, Suffix:-HS1, -HS3

*The Vertical

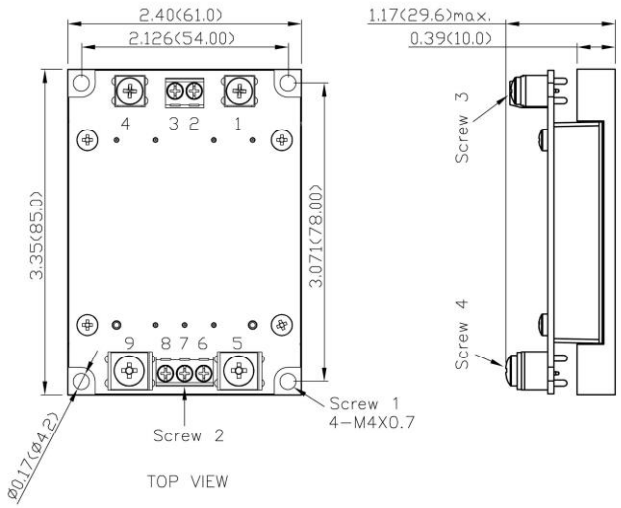



| | |
|---|---|
| **HS:** | Height H=0.45” vertical fin, 7G-0021A-F |
| **HS1:** | Height H=0.24” horizontal fin, 7G-0022A-F |
| **HS2:** | Height H=0.24” vertical fin, 7G-0023A-F |
| **HS3:** | Height H=0.45” horizontal fin, 7G-0024A-F |

1. All dimensions in inch (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)
x.xxx±0.01 (x.xx±0.25)

## TERMINAL BLOCK TYPE OPTION

**PD75-S_W -T**



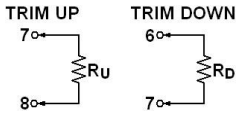

**TERMINAL CONNECTION : -T, -TF**

| NO. | DEFINE |
|---|---|
| 1 | -Vin |
| 2 | Case / NC* |
| 3 | Ctrl |
| 4 | +Vin |
| 5 | -Vout |
| 6 | -Sense |
| 7 | Trim |
| 8 | +Sense |
| 9 | +Vout |

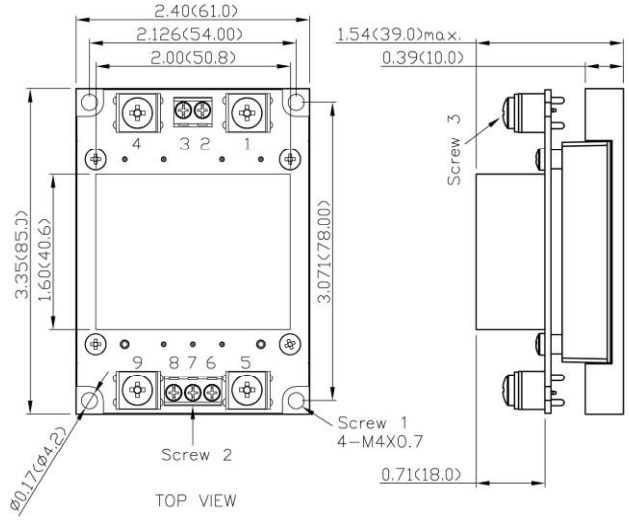
***** Terminal 2 is “NC” for HAE75-110S__W-TF

**EXTERNAL OUTPUT TRIMMING**

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




**HAE75-S_W -TF**

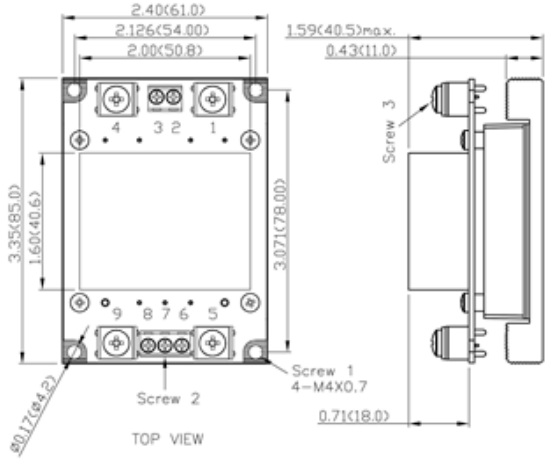



$$R_U = \frac{V_{OUT}(100 + \Delta\% - (100 + 2\Delta\%)}{1.225\ \Delta\%}\ k\Omega \qquad \Delta\%$$

$$R_D = \frac{100 - 2}{\Delta\%}\ k\Omega$$

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, 4 locked torque:
   MAX 12.0kgf-cm/ 1.18N-m

**PD75-S_W -TF1**




**TERMINAL CONNECTION : -TF1**

| NO. | DEFINE |
|---|---|
| 1 | -Vin |
| 2 | NC |
| 3 | Ctrl |
| 4 | +Vin |
| 5 | -Vout |
| 6 | -Sense |
| 7 | Trim |
| 8 | +Sense |
| 9 | +Vout |