PD100HAE Series

HALF-BRICK DC-DC CONVERTER

2:1 WIDE INPUT RANGE
UP TO 100 Watts

FEATURES

- NO MINIMUM LOAD REQUIRED
- 2250VDC INPUT TO OUTPUT BASIC INSULATION
- UL60950-1, EN60950-1, & IEC60950-1 SAFETY APPROVALS
- CE MARKED
- COMPLIANT TO RoHS II & REACH

APPLICATIONS

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

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
PD100HAE-12S3P3	9 ~ 18	3.3	25	155	90	75700
PD100HAE-12S05	9 ~ 18	5	20	150	91	40000
PD100HAE-12S12	9 ~ 18	12	8.4	180	91	7000
PD100HAE-12S15	9 ~ 18	15	6.7	180	91	4460
PD100HAE-12S24	9 ~ 18	24	4.2	90	90	1750
PD100HAE-12S28	9 ~ 18	28	3.6	100	90	1280
PD100HAE-12S48	9 ~ 18	48	2.1	100	90	430
PD100HAE-24S3P3	18 ~ 36	3.3	25	90	91	75700
PD100HAE-24S05	18 ~ 36	5	20	150	93	40000
PD100HAE-24S12	18 ~ 36	12	8.4	185	93	7000
PD100HAE-24S15	18 ~ 36	15	6.7	185	93	4460
PD100HAE-24S24	18 ~ 36	24	4.2	85	92	1750
PD100HAE-24S28	18 ~ 36	28	3.6	85	92	1280
PD100HAE-24S48	18 ~ 36	48	2.1	85	92	430
PD100HAE-48S3P3	36 ~ 75	3.3	25	80	91	75700
PD100HAE-48S05	36 ~ 75	5	20	90	93	40000
PD100HAE-48S12	36 ~ 75	12	8.4	90	93	7000
PD100HAE-48S15	36 ~ 75	15	6.7	90	93	4460
PD100HAE-48S24	36 ~ 75	24	4.2	40	92	1750
PD100HAE-48S28	36 ~ 75	28	3.6	40	92	1280
PD100HAE-48S48	36 ~ 75	48	2.1	40	92	430

PART NUMBER STRUCTURE

PD100HAE 48 S 05 - P TH HS

-

Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Ctrl and Pin Options	Through hole type(1)	Assembly Option
	12:9~18 **24:**18~36 **48:**36~75	**S:**Single	**3P3:**3.3 **05:**5 **12:**12 **15:**15 **24:**24 **28:**28 **48:**48	□: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	□: Thread **TH:** No thread	□: 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 EN55022 Class A.

INPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range		12Vin(nom) 24Vin(nom) 48Vin(nom)	9 18 36	12 24 48	18 36 75	VDC
Start up voltage		12Vin(nom) 24Vin(nom) 48Vin(nom)			9 18 36	VDC
Shutdown voltage		12Vin(nom) 24Vin(nom) 48Vin(nom)		7.5 16 34		VDC
Start up time	Constant resistive load	Power up Remote ON/OFF		25 25		ms
Input surge voltage	1 second, max.	12Vin(nom) 24Vin(nom) 48Vin(nom)			36 50 100	VDC
Input filter				Pi type		
Remote ON/OFF	Referenced to –Vin pin	Negative logic (Standard) DC-DC ON DC-DC OFF Positive logic (Option) DC-DC ON DC-DC OFF		Short or 0 ~ 1.2VDC Open or 3 ~ 12 VDC Open or 3 ~ 12 VDC 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 s nse	-20		+10	%
Remote sense	% of Vout(nom) If remote sense is not being used, Sense pins shou d be connected to corresponding polarity OUTPUT pins.			10	%
Ripple and noise	Measured by 20MHz bandwidth With a 4.7µF/50V X7R MLCC 3.3Vout, 5Vout With a 4.7µF/50V X7R MLCC 12Vout, 15Vout With a 4.7µF/50V X7R MLCC 24Vout, 28Vout With a 2.2µF/100V X7R MLCC 48Vout		75 100 200 300		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	110		140	%
Short circuit protection		Continuous, automatics recovery			

GENERAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage	1 minute (Basic insulation)	Input to Output Input (Output) to Case	2250 1600			VDC
Isolation resistance	500VDC		1			GΩ
Isolation capacitance					2500	pF
Switching frequency			270	300	330	kHz
Safety approvals						UL60950-1 EN60950-1 IEC60950-1
Case material						Metal
Base material						FR4 PCB
Potting material						Silicone (UL94 V-0)
Weight		Module stand alone PD100HAE-xxSxx-Γ PD100HAE-xxSxx-ΓF PD100HAE-xxSxx-ΓF1				97g (3.42oz) 200g (7.05oz) 280g (9.88oz) 287g (10.12oz)
MTBF	MIL-HDBK-217F, Full load					3.311×10^5 hrs

ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating case temperature		-40		+105 ℃	
Over temperature protection			+115		℃
Storage temperature range	Terminal block type Others	-40 -55		+105 +125	℃
Thermal impedance [1]	Vertical direction by natural convection (20LFM) Module without assembly option Heat-sink type with 0.24" Height Heat-sink type with 0.45" Height		6.7 5.4 4.7		℃/W
Thermal shock					MIL-STD-810F

Vibration		MIL-STD-810F
Relative humidity		5% to 95% RH

EMC SPECIFICATIONS

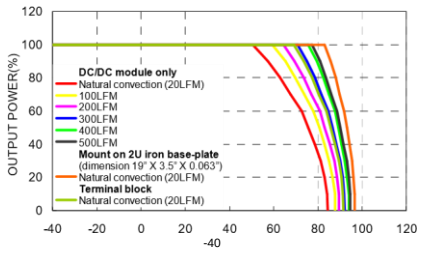
Parameter	Conditions		Level
EMI [2]	EN55022		Class A Class B
ESD	EN61000-4-2	Air ±8kV and Contact ±6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10V/m	Perf. Criteria A
Fast transient [3]	EN61000-4-4	±2kV	Perf. Criteria A
Surge [3]	EN61000-4-5	EN55024 ±2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6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

Note:

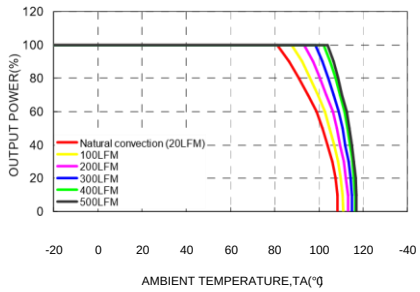
1. (1)Thermal test condition with vertical direction by natural convection (20LFM).
   (2) The heat-sink is optional and P/N: 7G-0021A-F , 7G-0022A-F , 7G-0023A-F , 7G-0024A-F. Please refer to heat-sink selection guide.
2. The PD100HAE series standard module meets EN55022 Class A and Class B with external components.
3. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
   Recommended 2 pcs of aluminum electrolytic capacitor (Nippon Chemi-con KY series, 220μF/100V) to connect in parallel.
4. CASE GROUNDING：Connecting four screw bolts to shield plane will help to reduce the EMI.
5. For further information, please contact with MEGA.

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

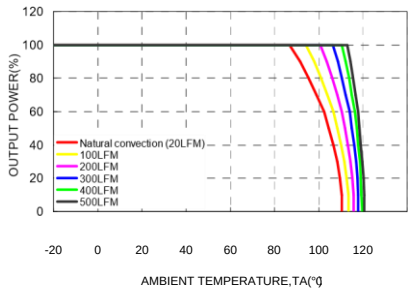
CHARACTERISTIC CURVE



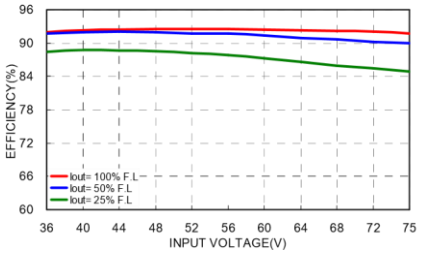
PD100HAE-48S05 Derating Curve (Note 1)



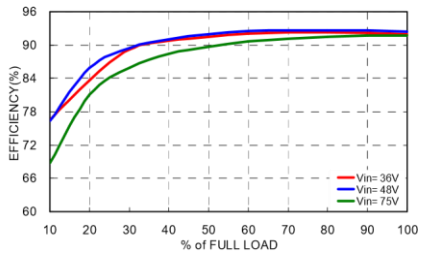
PD100HAE-48S05 Derating Curve (Note 1)
With 0.24" Height Heat-sink



PD100HAE-48S05 Derating Curve (Note 1)
With 0.45" Height Heat-sink

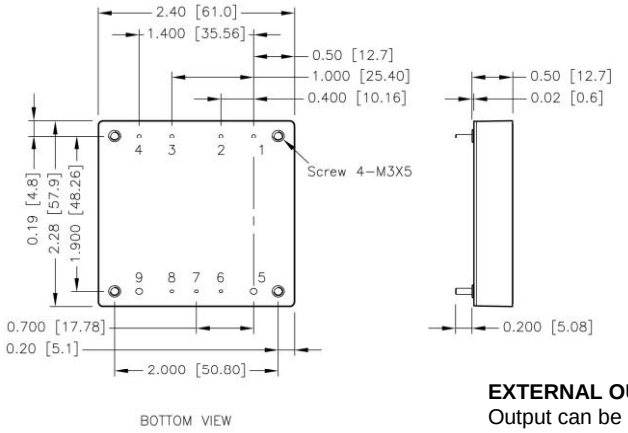


PD100HAE-48S05 Efficiency vs. Input Voltage



PD100HAE-48S05 Efficiency vs. Output Load

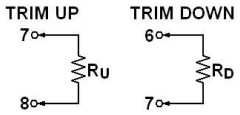
MECHANICAL DRAWING



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



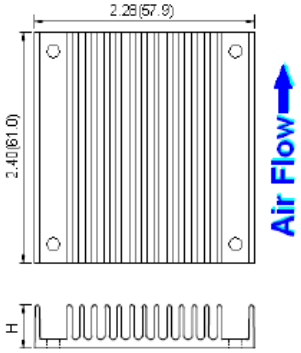
$$R_U = \left(\frac{V_{OUT}\ (100\ + \Delta\%)}{1.225\ \Delta\%} - \frac{(100\ + 2\Delta\%)}{\Delta\%} \right) k\Omega$$

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

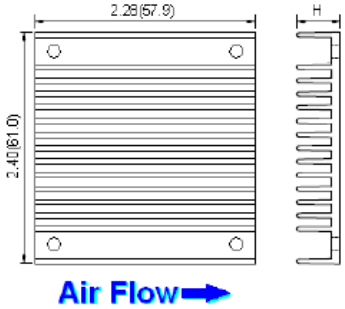
1. All dimensions in inch (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)
   x.xxx±0.01 (x.xx±0.25)
3. Pin pitch tolerance ±0.01 (0.25)
4. Pin dimension tolerance ±0.004(0.1)
5. Mounting screws should always be used.
6. The screw locked torque:
   MAX 5.0kgf-cm(0.49N-m)

HEAT-SINK TYPE OPTIONS

Vertical Fin Orientation, Suffix:-HS, -HS2



Horizontal Fin Orientation, Suffix:-HS1, -HS3

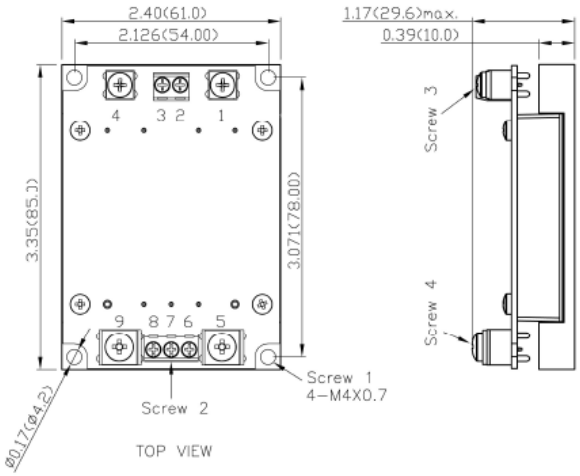


HS:	Height H=0.45" vertical fin, 7G-0021A-F
HS1:	Height H=0.24" horizontal fin, 7G-0022A-F
HS2:	Height H=0.24" vertical fin, 7G-0023A-F
HS3:	Height H=0.45" horizontal fin, 7G-0024A-F

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

PD100HAE-xxSxx-T

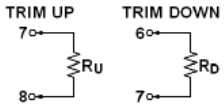


TERMINAL CONNECTION : -T,-TF

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

EXTERNAL OUTPUT TRIMMING

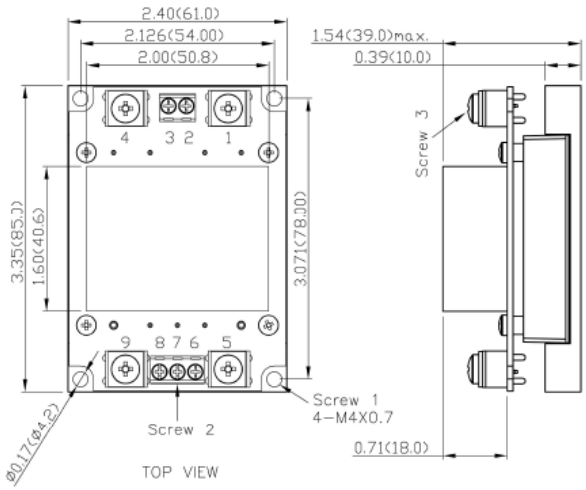
Output can be externally trimmed by using the method shown below.



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

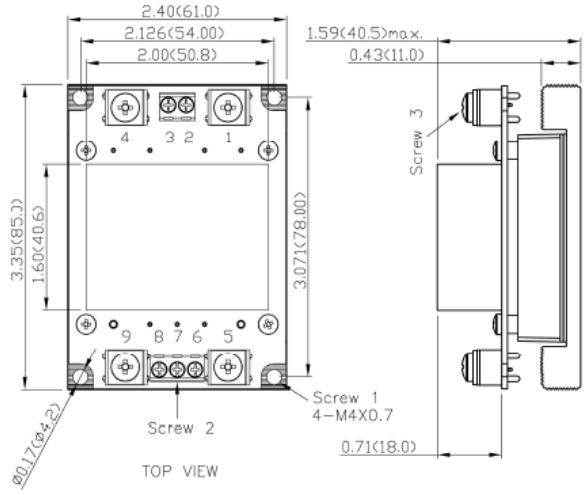
$$R_D = \left(\frac{100}{\Delta\%} - 2 \right) k\Omega$$

PD100HAE-xxSxx-TF



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

PD100HAE-xxSxx-TF1



TERMINAL CONNECTION : -TF1

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