P-DUKE POWER

MAD150 Series

2 x 3 Inch AC-DC POWER SUPPLIES
Up to 150 Watts

5 YEARS WARRANTY

RoHS COMPLIANT

REACH COMPLIANT





+85°C / -40°C AMBIENT TEMP.

Medical
Automation
Datacom
IPC
Industry
Measurement
Telecom
Automobile
Boat
Charger
PV
Railway

2 x MOPP
4000 VAC Reinforced Insulation
ADJ. Output Voltage
Protection Class I & II
Internal EN55032 Class B Filter
LOW Leakage Current
LOW Standby Power
Operating Altitude 5000 meter
OCP
OVP
SCP
OTP

PART NUMBER STRUCTURE

MAD150 U S 12 A - M □

Series Name	Universal Input (VAC)	Output Quantity	Output Voltage (VDC)	Connector Options	Package Options
	85~264	**Single**	**12:**12V **15:**15V **18:**18V **24:**24V **28:**28V **36:**36V **48:**48V **54:**54V	**M:** Molex **J:** JST **T:** Terminal Block	□: Open type **E1:** Enclosed type **D1:** Din rail type

TECHNICAL SPECIFICATION All specifications are typical at 230VAC input, full load and 25℃ unless otherwise noted

Model Number	Input Range	Output Voltage	Output Current		Input Power @ No Load	Efficiency	Maximum Capacitor Load
			Natural Convection	Forced Air Cooling With 10 CFM			
	VAC	VDC	A	A	W	%	μF
MAD150US12A	85 ~ 264	12	10.84	12.5	0.2	92	8600
MAD150US15A	85 ~ 264	15	8.67	10	0.2	92	5400
MAD150US18A	85 ~ 264	18	7.23	8.34	0.2	92	4000
MAD150US24A	85 ~ 264	24	5.42	6.25	0.2	93	2200
MAD150US28A	85 ~ 264	28	4.65	5.36	0.2	93	1500
MAD150US36A	85 ~ 264	36	3.62	4.17	0.2	93	1000
MAD150US48A	85 ~ 264	48	2.71	3.13	0.2	94	560
MAD150US54A	85 ~ 264	54	2.42	2.79	0.2	94	470

INPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating input voltage range	AC input DC input	85 88		264 370	VAC VDC
Input frequency	AC input	47		63	Hz
Input current	100VAC and at 150W Full Load 240VAC and at 150W Full Load			3 1.5	A
No load input power	230VAC		0.2		Watts
Leakage current	264VAC			100	μA
Power factor		0.95			
Start up time				1500	ms
Rise time			15		ms
Hold up time	115VAC and 130W	10			ms
Input inrush current	230VAC Cold start at 25℃		80		A
Input protection	Internal fuse		T4.0A/250VAC		

OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Output power	Forced air cooling with 10CFM				150	
	Natural convection				130	Watts
	* Please refer to the derating curve for detailed rating. * For further information, please contact with P-DUKE.					
Output peak power	Peak power				200	Watts
	Peak power time			10		s
	Peak power duty			20		%
	Average operation power (% of Full Load)			50		%
	* Please refer to the Definition of peak power rating. * For further information, please contact with P-DUKE.					
Initial set voltage accuracy	230VAC and Full Load		-1.0		+1.0	%
Line regulation	Low Line to High Line at Full Load		-0.2		+0.2	%
Load regulation	No Load to Full Load		-0.5		+0.5	%
	10% Load to 90% Load		-0.4		+0.4	
Voltage adjustability	At Full Load Condition		-7		+7	%
	At Peak Power Up to 200W Condition		-7		+2	%
Minimum load	No minimum load required			0		%
Ripple and noise	Measured by 20MHz bandwidth					
	With a 1μF/25V 1206 X7R MLCC	12Vout		120		mVp-p
		15Vout		150		
		18Vout		180		
	With a 1μF/50V 1206 X7R MLCC	24Vout		240		mVp-p
		28Vout		280		
	With a 0.1μF/100V 1206 X7R MLCC	36Vout, 48Vout, 54Vout		360		mVp-p
Temperature coefficient			-0.02		+0.02	%/℃
Transient response	Load step from 75 ~ 50% change at 2.5A/μs	Peak deviation		3		% Vout
		Recovery time		600		μs
Over voltage protection	% of Vout(nom); Latch mode		110		135	%
Over load protection	% of Iout rated; Hiccup mode			160		%
Short circuit protection	Output short circuit is defined to be a short circuit load of less than 0.1 ohm		Continuous, automatics recovery			

GENERAL SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage	1 minute (2MOPP insulation)	Input to Output	4000			VAC
		Input (Output) to F.G.	2500			
Isolation resistance	500VDC		0.1			GΩ
Switching frequency	230VAC, Full load			100		kHz
Safety approvals	IEC/ EN/ ANSI/AAMI ES 60601-1				UL:E360199	
	IEC/ EN/ UL 62368-1				UL:E193009 CB:UL(Demko)	
Weight		Open type			134g (4.70oz)	
		Enclosed type			190g (6.70oz)	
		Din rail type			212g (7.48oz)	
MTBF	MIL-HDBK-217F Ta=25℃, Full load				7.245 x 10^5 hrs	

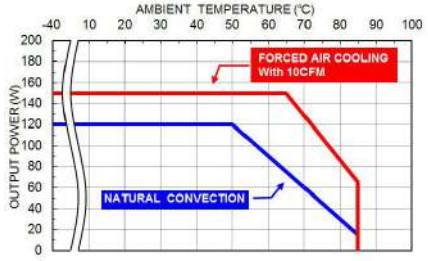
ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+85	℃
Storage temperature range		-40		+85	℃
Over temperature protection	Internal thermistor; Hiccup mode		125		℃
Operating altitude				5000	m
Thermal shock				MIL-STD-810F	
Shock				IEC60068-2-27	
Vibration				IEC60068-2-6	
Relative humidity	Non-condensing			5% to 95% RH	

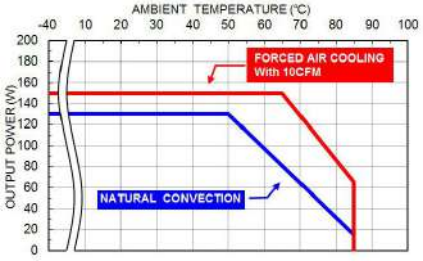
EMC SPECIFICATIONS

Parameter	Conditions		Level	
EMI	EN55011, EN55032, EN60601-1-2, and FCC Part 18 / 15		Conducted	Class B
	*Unnecessary to connect with safety earth for CLASS II application. *The power supply is placed on a 482.6*177.8*2mm metal plate for testing.		Radiated Class I Class II*	 Class B Class B
Harmonic currents	EN61000-3-2	Full Load		Class D
Voltage flicker	EN61000-3-3			
EMS	EN55035 and EN60601-1-2			
ESD	EN61000-4-2			Perf. Criteria A
Radiated immunity	EN61000-4-3	20 V/m		Perf. Criteria A
Fast transient	EN61000-4-4	± 2kV		Perf. Criteria A
Surge	EN61000-4-5	DM ± 1kV and CM ± 2kV		Perf. Criteria A
Conducted immunity	EN61000-4-6	20 Vr.m.s		Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	30 A/m		Perf. Criteria A
Dip and interruptions	EN61000-4-11			

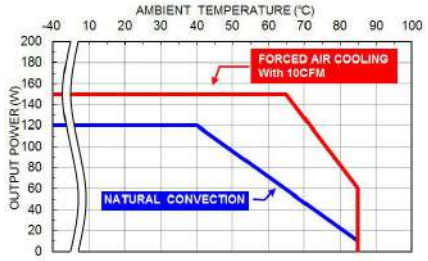
CHARACTERISTIC CURVE



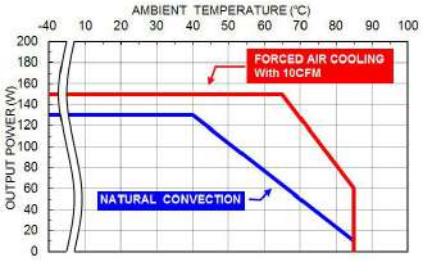
Derating Curve vs. Ambient Temperature
Vin=115VAC Open type



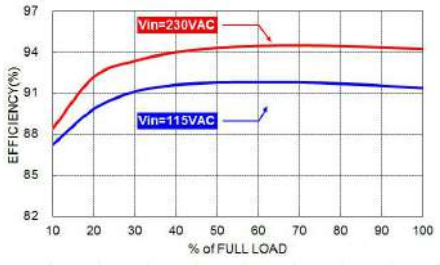
Derating Curve vs. Ambient Temperature
Vin=230VAC Open type



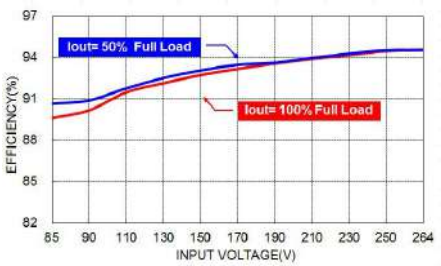
Derating Curve vs. Ambient Temperature
Vin=115VAC Enclosed type / Din rail type



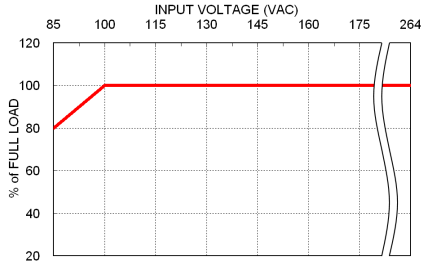
Derating Curve vs. Ambient Temperature
Vin=230VAC Enclosed type / Din rail type



Efficiency vs. Output Load
MAD150US24 with Forced air cooling



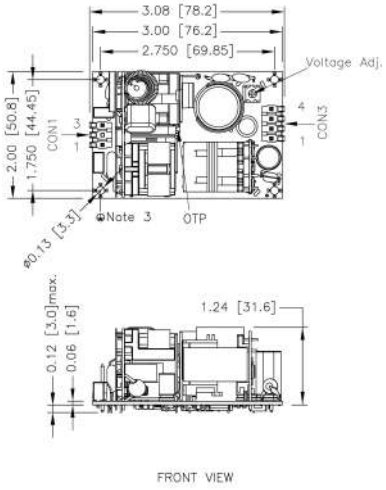
Efficiency vs. Input Voltage
MAD150US24 with Forced air cooling



Derating Curve vs. Input Voltage
MAD150

MECHANICAL DRAWING

Open type



FRONT VIEW

CONNECTORS CONNECTIONS

CON1 – Input Connector

Pin 3	Line
Pin 1	Neutral

Mates with
Molex housing : **09-93-0300**
Molex crimp terminals : **2478**

CON3 – Output Connector

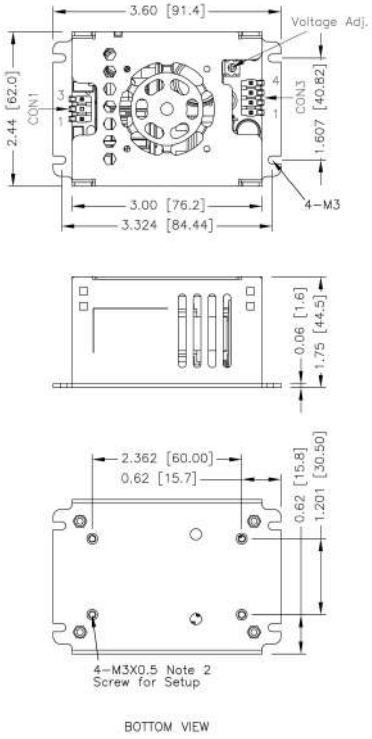
Pin 1,2	+Vout
Pin 3,4	-Vout

Mates with
Molex housing : **09-93-0400**
Molex crimp terminals : **2478**

1. All dimensions in inch [mm]
   Tolerance : x.xx±0.02 [x.x±0.5]
   x.xxx±0.010 [x.xx±0.25]
2. The screw locked torque: MAX 3.4kgf-cm/0.33N-m
3. The screws holes can be considered as PE connection for CLASS I application.
4. Unnecessary to connect with safety earth for CLASS II application.

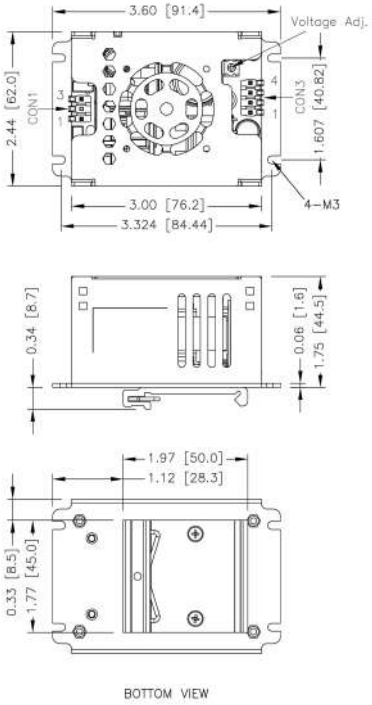
MECHANICAL DRAWING(CONTINUED)

Enclosed type



1. All dimensions in inch [mm]
   Tolerance : x.xx±0.02 [x.x±0.5]
   x.xxx±0.010 [x.xx±0.25]
2.The screw locked torque: MAX 4.2Kgf-cm/0.41N-m

Din rail type



1. All dimensions in inch [mm]
   Tolerance : x.xx±0.02 [x.x±0.5]
   x.xxx±0.010[x.xx±0.25]

CONNECTORS CONNECTIONS

CON1 – Input Connector

Pin 3	Line
Pin 1	Neutral

CON3 – Output Connector

Pin 1,2	+Vout
Pin 3,4	-Vout

CONNECTOR OPTIONS

- J	JST Type	- M	Molex Type	- T	Terminal Block
	Mates with housing: **VHR-3N**		Mates with housing: **09-93-0300**		Screw locked torque MAX 2Kgf.cm/0.2N.m
CON1	Crimp terminals: **SVH-21T-P1.1**	**CON1**	Crimp terminals: **2478**	**CON1**	Wire dimension range 26 ~ 18AWG
	Mates with housing: **VHR-4N**		Mates with housing: **09-93-0400**		Screw locked torque MAX 2.5Kgf.cm/0.25N.m
CON3	Crimp terminals: **SVH-21T-P1.1**	**CON3**	Crimp terminals: **2478**	**CON3**	Wire dimension range 24 ~ 14AWG

P-DUKE Technology Co., Ltd.

Tel +886-4-2359-0668
Fax +886-4-2359-1337
Email sales@pduke.com
Web www.pduke.com
Add No. 36, 22nd Rd., Taichung Industrial Park, Taichung, Taiwan, R.O.C.