



# P-DUKE POWER

## MAD40 Single Series

2 X 3 Inch AC-DC POWER SUPPLIES  
Up to 40 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

UL US CB CE UK CA

FC POWER SAVE

2 x MOPP	4000 VAC Reinforced Insulation	ADJ. Output Voltage	Internal EN55032 Class Filter <b>B</b>	LOW Leakage Current	LOW Standby Power	Operating Altitude <b>5000</b> meter	Protection Class I Class II	OCP	OVP	SCP
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### PART NUMBER STRUCTURE

M	A	D	40	U	S	12	C	-	□
Application	Package Code	Dimension Code	Output Power (W)	Input Voltage (VAC)	Output Quantity	Output Voltage (VDC)	Protection Type		Connector Options
<b>Medical Application</b> A: Open type U: U chassis type E: Enclosed type D: Din rail type				U: Universal 85 ~ 264	S: Single	05: 5 7P5: 7.5 09: 9 12: 12 121: 12 15: 15 151: 15 18: 18 24: 24 28: 28 36: 36 48: 48 53: 53	C: CLASS I D: CLASS II  □: CLASS I (※NRND) B: CLASS II (※NRND)		□: JST M: Molex T: Terminal Block
							※NRND: Not recommended for new designs		

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

Model Number	Input Range	Output Voltage	Output Current Natural Convection	Max. Output Power	Input Power @No Load	Efficiency	Maximum Capacitor Load
	VAC	VDC	A	W	W	%	μF
MAD40US05C MUD40US05C MED40US05C MDD40US05C	85 ~ 264	5	8	40	0.11	90	16000
MAD40US7P5C MUD40US7P5C MED40US7P5C MDD40US7P5C	85 ~ 264	7.5	5.34	40	0.11	90	7120
MAD40US09C MUD40US09C MED40US09C MDD40US09C	85 ~ 264	9	4.45	40	0.11	91	4945
MAD40US12C MUD40US12C MED40US12C MDD40US12C	85 ~ 264	12	3.34	40	0.11	92	2785
MAD40US121C MUD40US121C MED40US121C MDD40US121C	85 ~ 264	12	3.34	40	0.11	90	2785
MAD40US15C MUD40US15C MED40US15C MDD40US15C	85 ~ 264	15	2.67	40	0.11	92	1780
MAD40US151C MUD40US151C MED40US151C MDD40US151C	85 ~ 264	15	2.67	40	0.11	90	1780
MAD40US18C MUD40US18C MED40US18C MDD40US18C	85 ~ 264	18	2.23	40	0.11	91	1250
MAD40US24C MUD40US24C MED40US24C MDD40US24C	85 ~ 264	24	1.67	40	0.11	92	700
MAD40US28C MUD40US28C MED40US28C MDD40US28C	85 ~ 264	28	1.43	40	0.11	91	510
MAD40US36C MUD40US36C MED40US36C MDD40US36C	85 ~ 264	36	1.12	40	0.11	92	310
MAD40US48C MUD40US48C MED40US48C MDD40US48C	85 ~ 264	48	0.84	40	0.11	93	175
MAD40US53C MUD40US53C MED40US53C MDD40US53C	85 ~ 264	53	0.77	40	0.11	92.5	140

INPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating input voltage range	AC input	85		264	VAC
	DC input	120		370	VDC
Input frequency	AC input	47		63	Hz
Input current	100VAC and Full Load			1.0	A
	240VAC and Full Load			0.5	A
No load input power	230VAC		0.11		Watts
Leakage current	264VAC		75		μA
Start up time				1000	ms
Rise time			20		ms
Hold up time	115VAC and Full Load		25		ms
Input inrush current	230VAC		60		A
Input protection	Internal fuse in line and neutral			T3.15A/250VAC	

OUTPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Output power				40	Watts
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	5Vout		+0.7	%
		Others	-0.5	+0.5	
	10% Load to 90% Load	5Vout	-0.6	+0.6	
		Others	-0.4	+0.4	
Voltage adjustability	Single output	53Vout		+10	%
		Others	-10	+10	
Minimum load			0		%
Ripple and noise	Measured by 20MHz bandwidth With a 10μF/25V 1206 X7R MLCC	5Vout, 7.5Vout, 9Vout	75		mVp-p
		12Vout, 15Vout, 18Vout	75		
	With a 1μF/50V 1206 X7R MLCC	24Vout, 28Vout, 36Vout	75		
		48Vout, 53Vout	150		
Temperature coefficient		-0.02		+0.02	%/°C
Transient response	Load step from 50 ~ 75% change at 2.5A/μs	Peak deviation		3	%Vout
		Recovery time		600	μs
Over voltage protection	% of Vout(nom); Latch mode	125		140	%
Over load protection	% of Iout rated; Hiccup mode		145		%
Short circuit protection					Continuous, automatic 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	5Vout		70	kHz
		Others		120	
Safety approvals	IEC/ EN/ ANSI/AAMI ES 60601-1 IEC/ EN/ UL 62368-1				UL:E360199 UL:E193009 CB:UL(Demko)
Weight		MAD		114g (4.02oz)	
		MUD		154g (5.43oz)	
		MED		169g (5.96oz)	
		MDD		190g (6.70oz)	
MTBF	MIL-HDBK-217F, Full load				3.010 x 10 <sup>6</sup> hrs

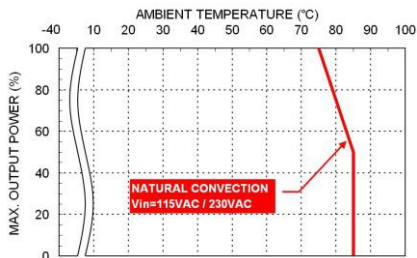
## ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	Natural convection With derating	-40		+85	°C
Storage temperature range		-40		+85	°C
Operating altitude				5000	m
Shock					IEC60068-2-27
Vibration					IEC60068-2-6
Relative humidity	Non-condensing				5% to 95% RH

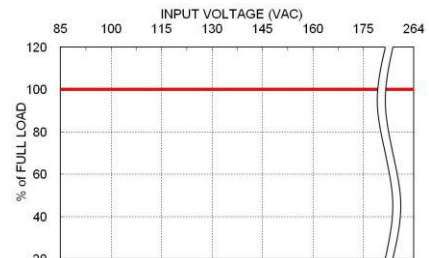
## EMC SPECIFICATIONS

Parameter	Conditions	Level
EMI	EN55011, EN55032, EN60601-1-2 and FCC Part 18 / 15 External components may be required for class I application.	Conducted Class B Radiated Class B
Harmonic currents	EN61000-3-2 Full Load	Class A
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	

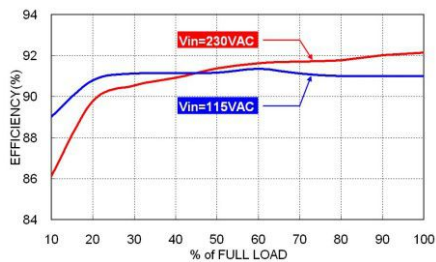
## CHARACTERISTIC CURVE



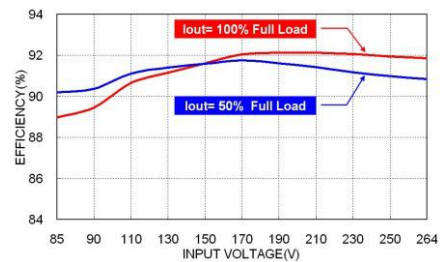
Derating Curve vs. Ambient Temperature



MAD40 Derating Curve vs. Input Voltage



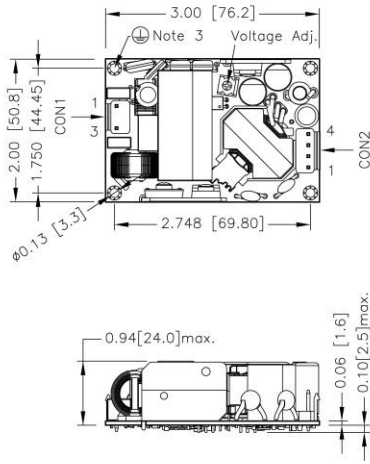
MAD40US24B Efficiency vs. Output Load



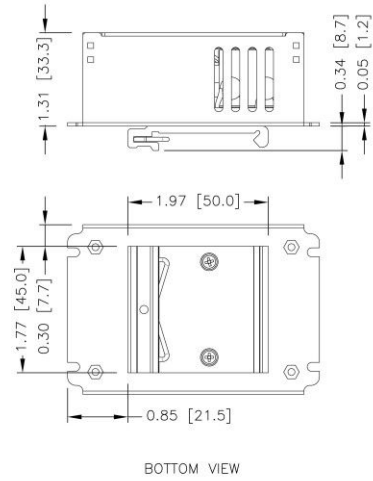
MAD40US24B Efficiency vs. Input Voltage

## MECHANICAL DRAWING

### MAD Open type



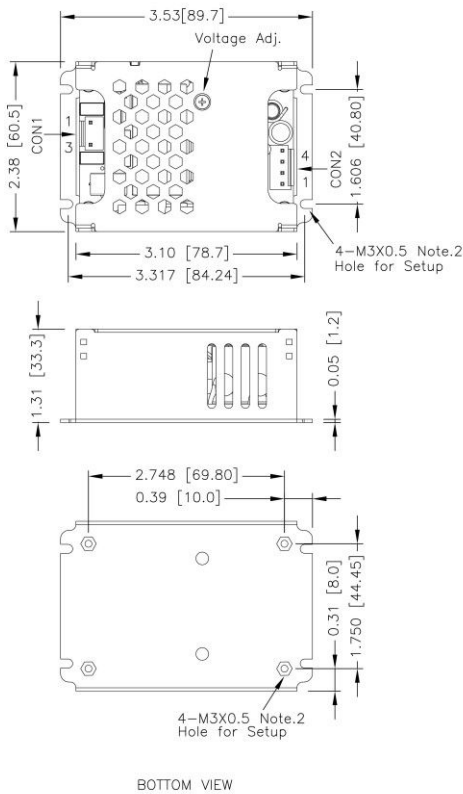
### MDD Din rail type



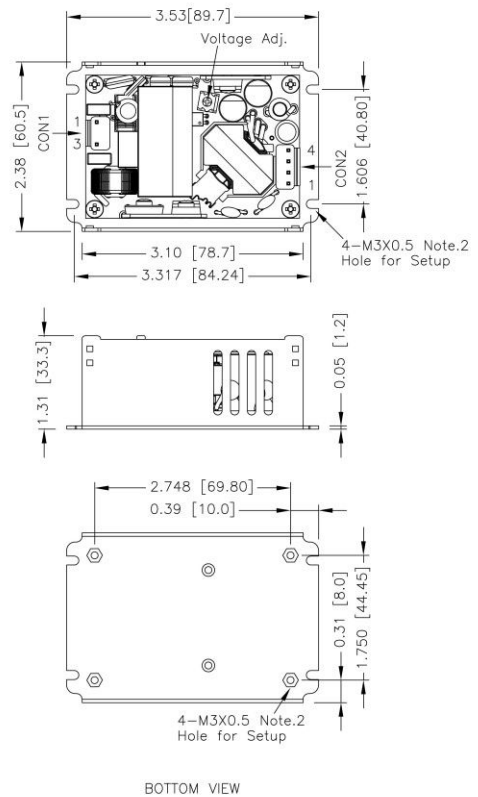
- All dimensions in inch [mm]  
Tolerance :  $x.xx \pm 0.02$  [ $x.x \pm 0.5$ ]  $x.xxx \pm 0.010$  [ $x.xx \pm 0.25$ ]
- The screw locked torque: MAX 5.0kgf-cm/0.49N-m
- The screws holes can be considered as PE connection for CLASS I application.

- All dimensions in inch [mm]  
Tolerance :  $x.xx \pm 0.02$  [ $x.x \pm 0.5$ ]  $x.xxx \pm 0.010$  [ $x.xx \pm 0.25$ ]

### MED Enclosed type



### MUD U chassis type



- All dimensions in inch [mm]  
Tolerance :  $x.xx \pm 0.02$  [ $x.x \pm 0.5$ ]  $x.xxx \pm 0.010$  [ $x.xx \pm 0.25$ ]
- The screw locked torque: MAX 5.0kgf-cm/0.49N-m

- All dimensions in inch [mm]  
Tolerance :  $x.xx \pm 0.02$  [ $x.x \pm 0.5$ ]  $x.xxx \pm 0.010$  [ $x.xx \pm 0.25$ ]
- The screw locked torque: MAX 5.0kgf-cm/0.49N-m

## CONNECTOR CONNECTIONS

### CON1 – Input Connector

Pin Number	AC Input	DC Input
		M□D40USXXC · M□D40USXXD
Pin 1	Line	DC+
Pin 3	Neutral	DC-

### CON2 – Output Connector

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

\*Either one of four screws holes of Chassis type can be considered as PE connection for CLASS I application.

## CONNECTOR OPTIONS

Blank:

JST Type



Mates with housing  
CON1: **VHR-3N**  
CON2: **VHR-4N**

Crimp terminals  
CON1: **SVH-21T-P1.1**  
CON2: **SVH-21T-P1.1**

-M



Molex Type

Mates with housing  
CON1: **09-50-8031**  
CON2: **09-50-8041**

Crimp terminals  
CON1: **SD-2478**  
CON2: **SD-2478**

-T



Terminal Block

Mates with  
**Screw locked torque**  
**MAX 2Kgf.cm/0.2N.m**

**Wire dimension range**  
**26 ~ 16AWG**