



Power Mate Technology, Inc MAD65 Single Series

2 X 3 Inch AC-DC POWER SUPPLIES
Up to 65 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

Internal
EN55032
Class
Filter **B**

LOW
Leakage
Current

LOW
Standby
Power

Operating
Altitude
5000
meter

Protection
Class I
Class II

OCP

OVP

SCP

PART NUMBER STRUCTURE

M	A	D	65	U	S	12	C	-	□
Application	Package Code	Dimension Code	Output Power (W)	Input Voltage (VAC)	Output Quantity	Output Voltage (VDC)	Protection Type		Connector Options
Medical Application	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 15:15 18:18 24:24 241:24 28:28 281:28 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
MAD65US05C MUD65US05C MED65US05C MDD65US05C	85 ~ 264	5	10	50	0.11	90	20000
MAD65US7P5C MUD65US7P5C MED65US7P5C MDD65US7P5C	85 ~ 264	7.5	8.67	65	0.11	90	11560
MAD65US09C MUD65US09C MED65US09C MDD65US09C	85 ~ 264	9	7.23	65	0.11	91	8033
MAD65US12C MUD65US12C MED65US12C MDD65US12C	85 ~ 264	12	5.42	65	0.11	92.5	4520
MAD65US15C MUD65US15C MED65US15C MDD65US15C	85 ~ 264	15	4.34	65	0.11	93.5	2900
MAD65US18C MUD65US18C MED65US18C MDD65US18C	85 ~ 264	18	3.62	65	0.11	93.0	2015
MAD65US24C MUD65US24C MED65US24C MDD65US24C	85 ~ 264	24	2.71	65	0.11	93.5	1130
MAD65US241C MUD65US241C MED65US241C MDD65US241C	85 ~ 264	24	2.71	65	0.11	92	1130
MAD65US28C MUD65US28C MED65US28C MDD65US28C	85 ~ 264	28	2.33	65	0.11	93.5	830
MAD65US281C MUD65US281C MED65US281C MDD65US281C	85 ~ 264	28	2.33	65	0.11	91.5	830
MAD65US36C MUD65US36C MED65US36C MDD65US36C	85 ~ 264	36	1.81	65	0.11	92.5	520

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
MAD65US48C MUD65US48C MED65US48C MDD65US48C	85 ~ 264	48	1.36	65	0.11	93	285
MAD65US53C MUD65US53C MED65US53C MDD65US53C	85 ~ 264	53	1.24	65	0.11	92.5	235

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			1.6	A	
	240VAC and Full Load			0.9		
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		16		ms	
Input inrush current	230VAC		60		A	
Input protection	Internal fuse in line and neutral				T3.15A/250VAC	

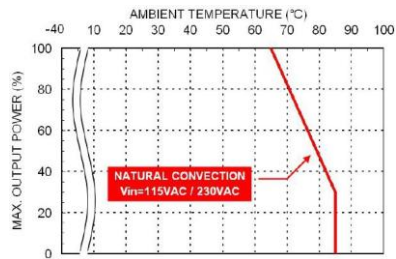
OUTPUT SPECIFICATIONS						
Parameter	Conditions	Min.	Typ.	Max.	Unit	
Output power				65	Watts	
Initial set voltage accuracy	230VAC and Full Load	-1.0		+1.0	%	
Line regulation	Low Line to High Line at Full Load	-0.2		+0.2	%	
Load regulation	No Load to Full Load	5Vout		+0.7	%	
		Others	-0.5	+0.5		
	10% Load to 90% Load	5Vout		+0.6	%	
		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 Input (Output) to F.G.	4000 2500			VAC
Isolation resistance	500VDC		0.1			GΩ
Switching frequency	230VAC	5Vout 7.5Vout 9Vout Others		60 80 70 120		kHz
Safety approvals	IEC/ EN/ ANSI/AAMI ES 60601-1 IEC/ EN/ UL 62368-1					UL:E360199 UL:E193009 CB:UL(Demko)
Weight		MAD MUD MED MDD				117g (4.13oz) 157g (5.54oz) 172g (6.07oz) 193g (6.81oz)
MTBF	MIL-HDBK-217F, Full load					1.257 x 10 ⁶ hrs

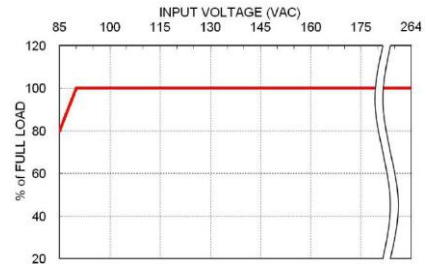
ENVIRONMENTAL SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating ambient temperature	Natural convection	With derating	-40		+85	°C
Storage temperature range			-40		+85	°C
Operating altitude					5000	m
Shock						IEC60068-2-27
Vibration						IEC60068-2-6
Relative humidity	Non-condensing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

EMC SPECIFICATIONS						
Parameter	Conditions		Level			
EMI	EN55011, EN55032, EN60601-1-2 and FCC Part 18 / 15		Conducted			Class B
	External components may be required for class I application.		Radiated			Class B
Harmonic currents	EN61000-3-2	Full Load				Class A
Voltage flicker	EN61000-3-3					
EMS	EN55024 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					

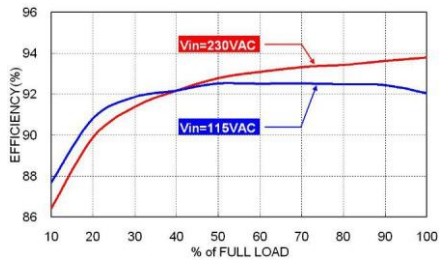
CHARACTERISTIC CURVE



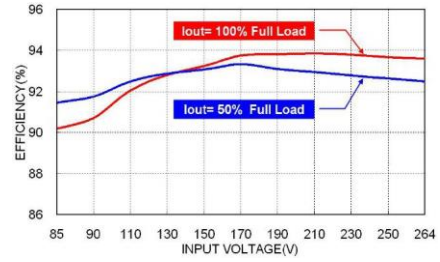
Derating Curve vs. Ambient Temperature



Derating Curve vs. Input Voltage



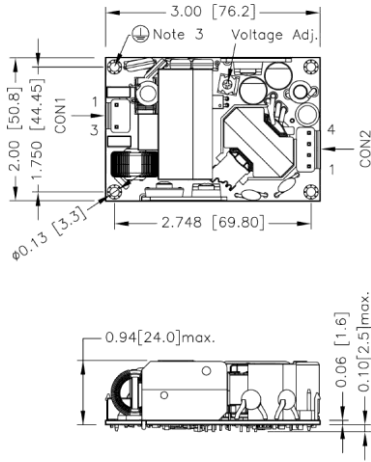
Efficiency VS Output Load
M□D65US24C



Efficiency VS Input Voltage
M□D65US24C

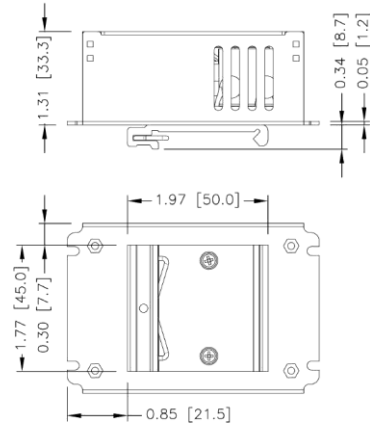
MECHANICAL DRAWING

MAD Open type



FRONT VIEW

MDD Din rail type

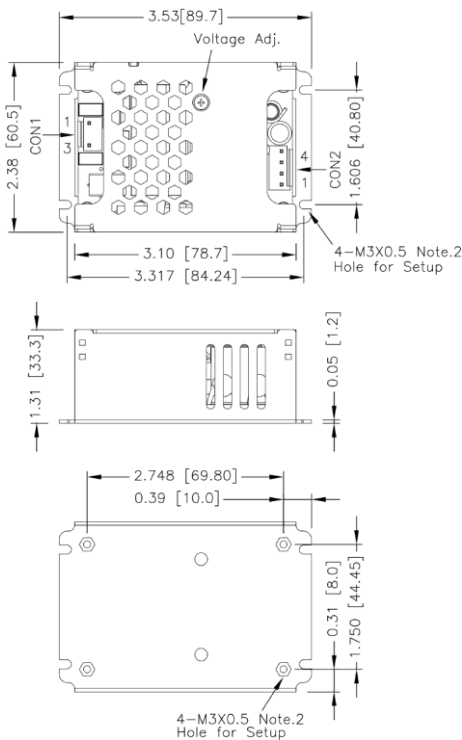


BOTTOM VIEW

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 5.0kgf-cm/0.49N-m
3. The screws holes can be considered as PE connection for CLASS I application.

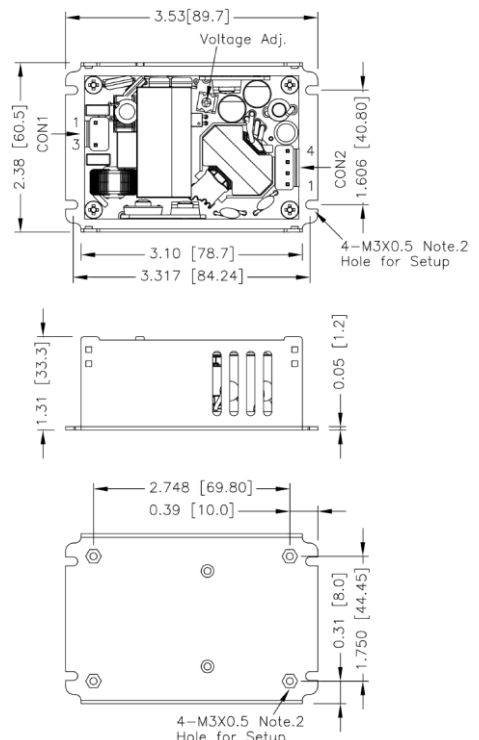
1. All dimensions in inch [mm]
Tolerance : x.xx±0.02 [x.x±0.5] x.xxx±0.010 [x.xx±0.25]

MED Enclosed type



BOTTOM VIEW

MUD U chassis type



BOTTOM VIEW

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 5.0kgf-cm/0.49N-m

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 5.0kgf-cm/0.49N-m




CONNECTOR CONNECTIONS

CON1 – Input Connector		
Pin Number	AC Input	DC Input
		M=D65USXXC, M=D65USXXD
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	-M	Molex Type	-T	Terminal Block
	Mates with housing CON1: VHR-3N CON2: VHR-4N		Mates with housing CON1: 09-50-8031 CON2: 09-50-8041		Mates with Screw locked torque MAX 2Kgf.cm/0.2N.m
	Crimp terminals CON1: SVH-21T-P1.1 CON2: SVH-21T-P1.1		Crimp terminals CON1: SD-2478 CON2: SD-2478		Wire dimension range 26 ~ 16AWG