POLYTRON DEVICES

DATA SHEET

DC-DC CONVERTERS

2:1 INPUT RANGE, UP TO 2 WATTS

MEDICAL APPLICATIONS

MTWA2 SERIES

FEATURES

- 2:1 Wide Input Voltage Range: 4.5-12Vdc Input, 9-18Vdc and 18-36 Vdc and 36-75Vdc
- 5000Vac Input to Output 2MOPP Isolation
- Remote On/Off
- Low Leakage Current
- Operating Altitude: 5000 Meters
- High Efficiency
- Over Voltage, Short Circuit and Under Voltage Protection
- No Minimum Load Required
- Miniature DIP16 Package (0.95" × 0.57" × 0.41")
- Miniature SMD16 Package (0.95" × 0.57" × 0.40")
- IEC 60601-1 Medical safety approval
- RoHS Compliant to 2011/65/EU

SELECTION GUIDE All specifications are typical at 230Vac input, full load and 25°C, unless otherwise noted.

Input Range Vdc	Output Voltage Vdc	Output Current at Full Load mA	Input Current at No Load mA	Efficiency %	Maximum Capacitor Load µF	Model Number*
4.5 - 12	3.3	600	60	75	1000	MTWA2-5S33
4.5 - 12	5	400	60	78	1000	MTWA2-5S5
4.5 - 12	9	222	60	78	430	MTWA2-5S9
4.5 - 12	12	167	70	82	220	MTWA2-5S12
4.5 - 12	15	134	80	82	170	MTWA2-5S15
4.5 - 12	24	83	80	82	100	MTWA2-5S24
9 - 18	3.3	600	30	76	1000	MTWA2-12S33
9 - 18	5	400	40	78	1000	MTWA2-12S5
9 - 18	9	222	40	79	430	MTWA2-12S9
9 - 18	12	167	40	82	220	MTWA2-12S12
9 - 18	15	134	45	82	170	MTWA2-12S15
9 - 18	24	83	45	81	100	MTWA2-12S24
18 - 36	3.3	600	20	76	1000	MTWA2-24S33
18 - 36	5	400	20	79	1000	MTWA2-24S5
18 - 36	9	222	25	80	430	MTWA2-24S9
18 - 36	12	167	25	81	220	MTWA2-24S12
18 - 36	15	134	25	81	170	MTWA2-24S15
18 - 36	24	83	25	81	100	MTWA2-24S24
36 - 75	3.3	600	10	76	1000	MTWA2-48S33
36 - 75	5	400	10	78	1000	MTWA2-48S5
36 - 75	9	222	12	79	430	MTWA2-48S9
36 - 75	12	167	12	80	220	MTWA2-48S12
36 - 75	15	134	12	82	170	MTWA2-48S15
36 - 75	24	83	12	81	100	MTWA2-48S24

* Surface Mount Package: **Suffix "SM"** after Model Number
Standard Package. **No Suffix**

MTWA2 SERIES

SELECTION GUIDE (CONTINUED)

Input Range Vdc	Output Voltage Vdc	Output Current at Full Load mA	Input Current at No Load mA	Efficiency %	Maximum Capacitor Load µF	Model Number*
4.5 - 12	±12	±83	80	82	±170	MTWA2-5-12
4.5 - 12	±15	±67	90	80	±100	MTWA2-5-15
9 - 18	±12	±83	45	81	±170	MTWA2-12-12
9 - 18	±15	±67	45	81	±100	MTWA2-12-15
18 - 36	±12	±83	25	81	±170	MTWA2-24-12
18 - 36	±15	±67	25	81	±100	MTWA2-24-15
36 - 75	±12	±83	12	81	±170	MTWA2-48-12
36 - 75	±15	±67	12	81	±100	MTWA2-48-15

* Surface Mount Package: **Suffix "SM"** after Model Number
Standard Package. **No Suffix**

Input Specifications

Voltage range, Vdc	4.5 Min., 5 Typ., 12 Max.	5 Vin (nom)
	9 Min., 12 Typ., 18 Max.	12 Vin (nom)
	18 Min., 24 Typ., 36 Max.	24 Vin (nom)
	36 Min., 48 Typ., 75 Max.	28 Vin (nom)
Start up voltage, Vdc	4.5 Max.	5 Vin (nom)
	9 Max.	12 Vin (nom)
	18 Max.	24 Vin (nom)
	36 Max.	28 Vin (nom)
Shutdown voltage, Vdc	2 Min., 3 Typ., 4 Max.	5 Vin (nom)
	6 Min., 7 Typ., 8 Max.	12 Vin (nom)
	13 Min., 15 Typ., 17 Max.	24 Vin (nom)
	29 Min., 32 Typ., 35 Max.	28 Vin (nom)
Start up time, ms	10 Typ., 20 Max.	Constant resistive load, Power up, Remote ON/OFF
Input surge voltage, Vdc	15 Max.	5 Vin (nom)
	25 Max.	12 Vin (nom)
	50 Max.	24 Vin (nom)
	100 Max.	28 Vin (nom)
Input filter	Capacitor type	
Remote ON/OFF, mA	Open or high impedance	Referred to –Vin pin and Ctrl pin, DC-DC ON
	2 Min., 3 Typ., 4 Max.	Applied current, DC-DC OFF
	2.5 Typ.	Remote OFF input current

Output Specifications

Voltage accuracy, %	-1 Min., 1 Max.	
Line regulation, %	-0.2 Min., 0.2 Max.	Low line to high line at full load
Load regulation, %	-1 Min., 1 Max.	No load to full load, Single
	-1 Min., 1 Max.	Dual
	-0.5 Min., 0.5 Max.	10% load to 90% load, Single
	-0.8 Min., 0.8 Max.	Dual
Cross regulation, %	-5 Min., 5 Max.	Asymmetrical load 25%/100% FL, Dual
Ripple and noise, mVp-p	50 Typ.	Measured by 20MHz bandwidth
Temperature coefficient, %/°C	-0.02 Min., 0.02 Max.	
Transient response recovery time, µs	500 Typ.	25% load step change
Over voltage protection, Vdc	4 Min., 6.5 Max.	3.3Vout
	6 Min., 8 Max.	5Vout
	10 Min., 14 Max.	9Vout
	13 Min., 19 Max.	12Vout
	16 Min., 22 Max.	15Vout
	25 Min., 35 Max.	24Vout
Short circuit protection	Continuous, automatic recovery	

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MTWA2 SERIES

General Specifications

Isolation voltage, Vac	1 minute, reinforced insulation for 250 Vac working voltage	5000 Min.		
Isolation capacitance, pF			16 Typ.	20 Max.
Leakage currect, µA	240 Vac, 60 Hz			2 Max.
Switching frequency, kHz		100 Min.		
Clearance/creepage, mm		8 Min.		

Environmental Specifications

Operating ambient temperature, ºC	With derating	-40 Min.		+105 Max.
Maximum case temperature, ºC				+105 Max.
Storage temperature range, ºC		-55 Min.		+125 Max.
Operating altitude, m				5000 Max.
Thermal shock		MIL-STD-810-F		
Shock		MIL-STD-810-F		
Vibration		MIL-STD-810-F		
Relative humidity		5% to 95% RH		
Load-free reflow solder process	SMD type only	IPC J-STD-020E		
Moisture sensitivity level (MSL)	SMD type only	IPC J-STD-033C, Level 2		

Physical Specifications

Design meet safety standard	EN/IEC/ANSI/AAMI ES60601-1, EN/IEC/UL 60950-1, 62368-1	
Case material	Non-conductive black plastic	
Base material	Non-conductive black plastic	
Potting material	Silicone, (UL94 V-0)	
Dimensions	0.95" × 0.57" × 0.40" (24.3 × 14.4 × 10.2 mm)	SMD Type
	0.95" × 0.57" × 0.41" (24.3 × 14.4 × 10.5 mm)	DIP Type
Weight	7g (0.24oz)	
MTBF	6.809 × 10^6 hrs , MIL-HDBK-217F, Full load	

EMC Specifications

Specifications	Conditions		Level
EMI	EN55011, EN55032 and FCC Part 18	With external components	Class A, Class B
ESD	EN61000-4-2	Air ±15KV and Contact ±8KV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10V/m	Perf. Criteria A
Fast transient[1]	EN61000-4-4	±2KV	Perf. Criteria A
Surge[1]	EN61000-4-5	±1KV	Perf. Criteria A
Conducted immunity	EN61000-4-6	10 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	100A/m continuous; 1000A/m 1 second	Perf. Criteria A

Note:

1. The MTWA2-5-XX recommended an aluminum electrolytic capacitor (Nippon Chemi-con KY series, 1000µF/25V) and a TVS (SMAJ18A, 18V, 400Watt peak pulse power) to connect in parallel.
   The MTWA2-12-XX recommended an external input filter capacitor (Nippon Chemi-con KY series, 470µF/50V).
   The MTWA2-24-XX recommended an external input filter capacitor (Nippon Chemi-con KY series, 470µF/50V).
   The MTWA2-48-XX recommended an external input filter capacitor (Nippon Chemi-con KY series, 220µF/100V).
2. For further information, please contact Polytron Devices.

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

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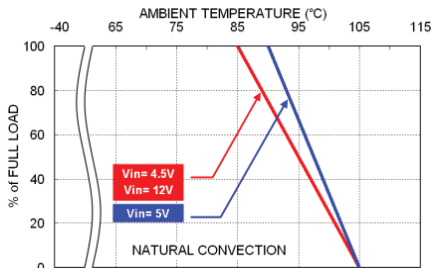
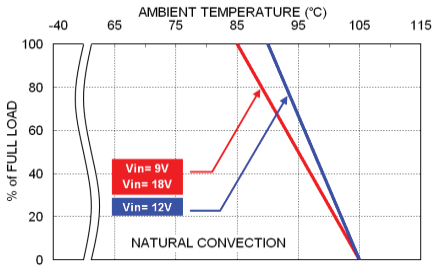
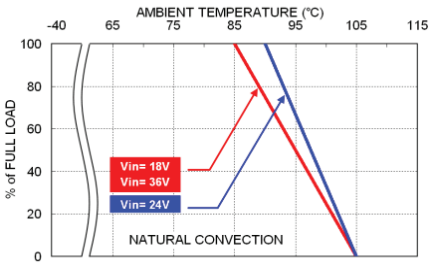
Characteristic Curve



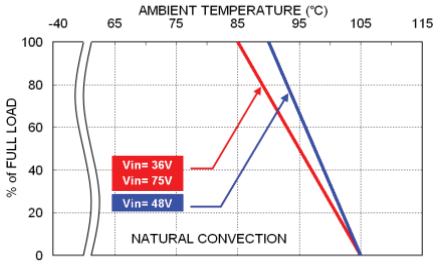
MTWA2-5-XX Derating Curve



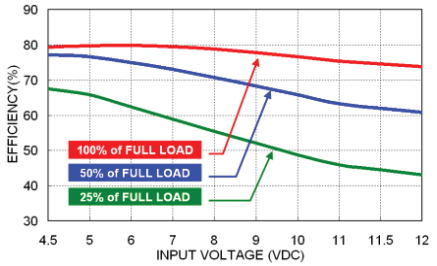
MTWA2-12-XX Derating Curve



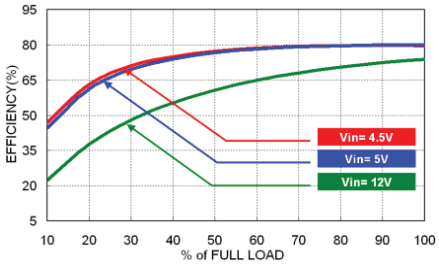
MTWA2-24-XX Derating Curve



MTWA2-48-XX Derating Curve



MTWA2-5S5 Efficiency vs. Input Voltage



MTWA2-5S5 Efficiency vs. Output Current

Fuse Consideration

Modules	Fuse Rating (A)	Fuse Type
MTWA2-5SXX, MTWA2-5-XX	1	Slow-Blow
MTWA2-12SXX, MTWA2-12-XX	0.5	Slow-Blow
MTWA2-24SXX, MTWA2-24-XX	0.315	Slow-Blow
MTWA2-48SXX, MTWA2-48-XX	0.16	Slow-Blow

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

This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.

To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system production, always use an input line fuse.

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

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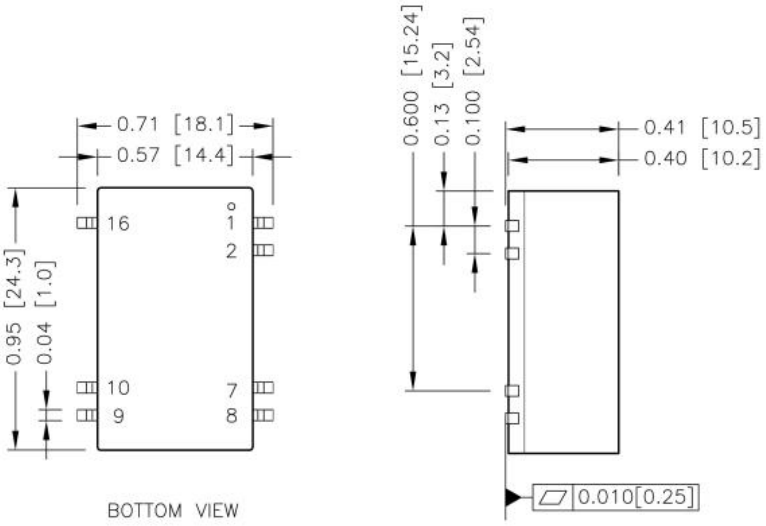
MTWA2 SERIES

Mechanical Drawing

SMD Type: Suffix “SM” after Model Number

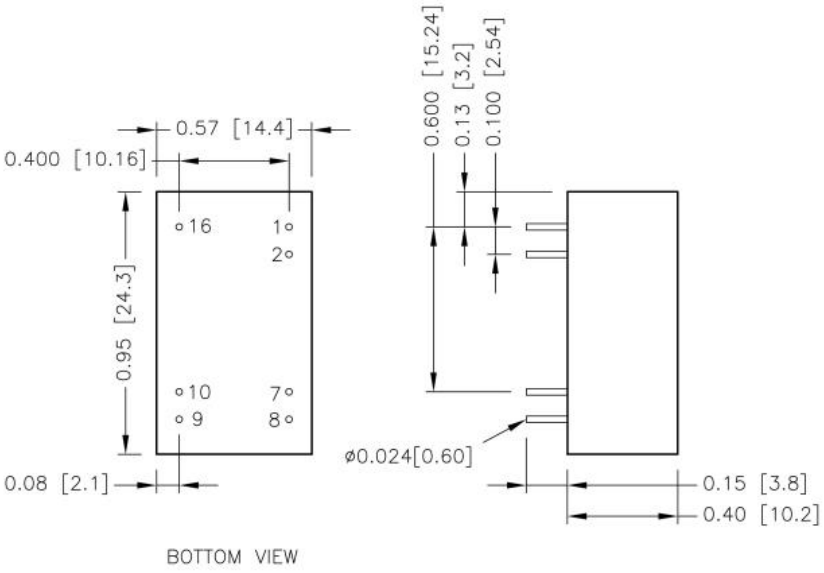


PIN CONNECTION

PIN	SINGLE	DUAL
1	-Vin	-Vin
2	Ctrl	Ctrl
7	NC	NC
8	NC	Common
9	+Vout	+Vout
10	-Vout	-Vout
16	+Vin	+Vin

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 dimension tolerance ±0.004(0.10)**

DIP Type: No Suffix



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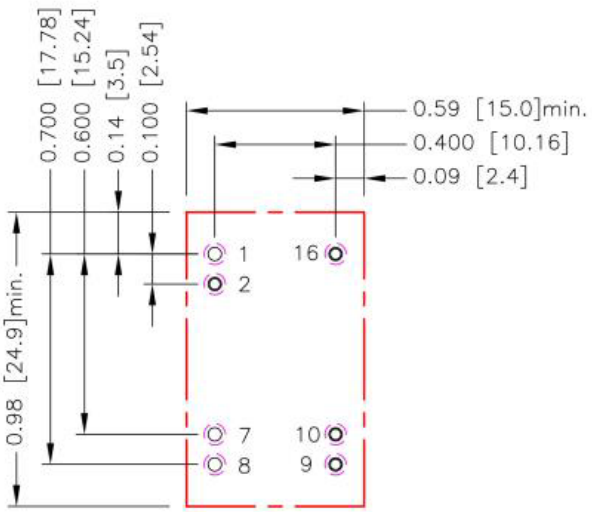
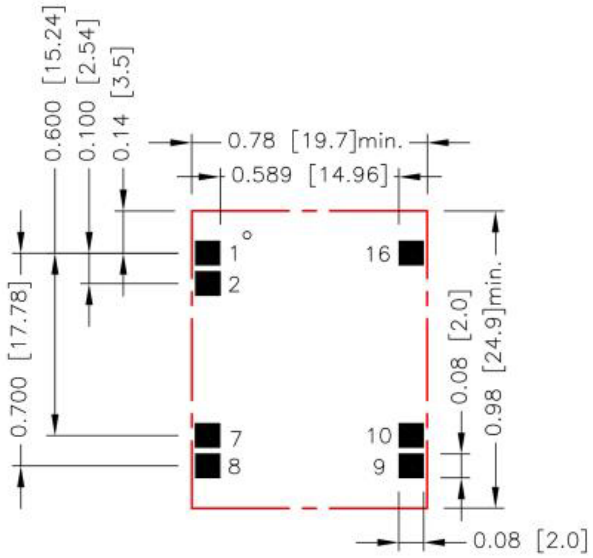
Recommended Pad Layout

SMD Type: Suffix “SM” after Model Number



1. **All dimensions in inch (mm)**
2. **Pad Size (lead free recommended)**
3. **Through hole 1.2.7.8.9.10.16: ø0.035(0.90)**
4. **Top view pad 1.2.7.8.9.10.16: ø0.044(1.13)**
5. **Bottom view pad 1.2.7.8.9.10.16: ø0.07(1.80)**
6. **There should be at least 8mm between primary and secondary circuit**

DIP Type: No Suffix



1. **All dimensions in inch (mm)**
2. **Pad Size (lead free recommended)**
3. **Top view pad: 0.080 × 0.080 (2.00 × 2.00)**
4. **There should be at least 8mm between primary and secondary circuit**

Thermal Considerations

The power module operates in a variety of thermal environments.

However, sufficient cooling should be provided to help ensure reliable operation of the unit.

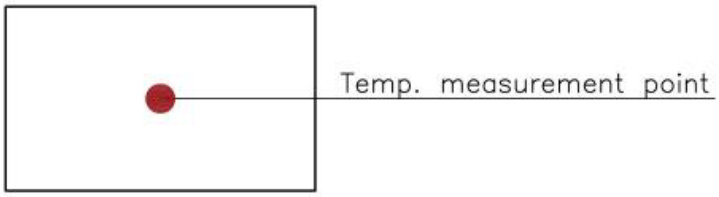
Heat is removed by conduction, convection and radiation to the surrounding Environment.

Proper cooling can be verified by measuring the point as the figure below.

The temperature at this location should not exceed “Maximum case temperature”.

When Operating, adequate cooling must be provided to maintain the test point temperature at or below “Maximum case temperature”.

You can limit this Temperature to a lower value for extremely high reliability.



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