

## DC-DC CONVERTERS

REGULATED, 2:1 WIDE INPUT RANGE, 3 WATTS

MEDICAL APPLICATIONS

TWA3/MHIA SERIES



### FEATURES

- 2:1 Wide Input Voltage Range
- Clearance and Creepage Distance :8.0mm/2MOPP
- 5000VAC Input to Output 2MOPP Isolation
- Built-In EMI Class A Filter
- 2 $\mu$ A Patient Leakage Current
- Safety Meets UL, CE and ANSI/AAMI ES60601-1, EN60601-1 and IEC60601-1
- CE Mark
- RoHS Compliant to 2011/65/EU
- Operating Temperature Range: -40°- +105° C (with derating)
- Miniature DIP Package
- High Efficiency: To 89%
- Reinforced Insulation

### SELECTION GUIDE (SINGLE) All specifications are typical at nominal input, full load and 25°C, unless otherwise noted.

Input Voltage Range Vdc	Output Voltage Vdc	Output Current at Full Load mA	Input Current at No Load mA	Efficiency %	Model Number*	Maximum Capacitor Load $\mu$ F
4.5 - 9	3.3	1000	10	81	TWA3-5S33/MHIA5	1050
4.5 - 9	5	600	10	84.5	TWA3-5S5/MHIA5	750
4.5 - 9	12	250	15	85.5	TWA3-5S12/MHIA5	130
4.5 - 9	15	200	15	87.5	TWA3-5S15/MHIA5	100
4.5 - 9	24	125	20	85.5	TWA3-5S24/MHIA5	39
9 - 18	3.3	1000	10	82	TWA3-12S33/MHIA5	1050
9 - 18	5	600	10	84.5	TWA3-12S5/MHIA5	750
9 - 18	12	250	10	87	TWA3-12S12/MHIA5	130
9 - 18	15	200	10	87	TWA3-12S15/MHIA5	100
9 - 18	24	125	10	87	TWA3-12S24/MHIA5	39
18 - 36	3.3	1000	6	82	TWA3-24S33/MHIA5	1050
18 - 36	5	600	6	84.5	TWA3-24S5/MHIA5	750
18 - 36	12	250	6	87	TWA3-24S12/MHIA5	130
18 - 36	15	200	6	87	TWA3-24S15/MHIA5	100
18 - 36	24	125	6	87	TWA3-24S24/MHIA5	39
36 - 72	3.3	1000	4	81	TWA3-48S33/MHIA5	1050
36 - 72	5	600	4	84	TWA3-48S5/MHIA5	750
36 - 72	12	250	4	87	TWA3-48S12/MHIA5	130
36 - 72	15	200	4	86.5	TWA3-48S15/MHIA5	100
36 - 72	24	125	4	86.5	TWA3-48S24/MHIA5	39

\* For Case Style "B" Use Suffix "B" after Model Number

## TWA3/MHIA5 SERIES

### SELECTION GUIDE (DUAL) All specifications are typical at nominal input, full load and 25°C, unless otherwise noted.

Input Voltage Range Vdc	Output Voltage Vdc	Output Current at Full Load mA	Input Current at No Load mA	Efficiency %	Model Number*	Maximum Capacitor Load $\mu$ F
4.5 - 9	$\pm$ 5	$\pm$ 300	25	83	TWA3-5-5/MHIA5	$\pm$ 430
4.5 - 9	$\pm$ 12	$\pm$ 125	25	86	TWA3-5-12/MHIA5	$\pm$ 75
4.5 - 9	$\pm$ 15	$\pm$ 100	25	86	TWA3-5-15/MHIA5	$\pm$ 56
9 - 18	$\pm$ 5	$\pm$ 300	10	83.5	TWA3-12-5/MHIA5	$\pm$ 430
9 - 18	$\pm$ 12	$\pm$ 125	10	87.5	TWA3-12-12/MHIA5	$\pm$ 75
9 - 18	$\pm$ 15	$\pm$ 100	10	86.5	TWA3-12-15/MHIA5	$\pm$ 56
18 - 36	$\pm$ 5	$\pm$ 300	6	83	TWA3-24-5/MHIA5	$\pm$ 430
18 - 36	$\pm$ 12	$\pm$ 125	6	87	TWA3-24-12/MHIA5	$\pm$ 75
18 - 36	$\pm$ 15	$\pm$ 100	6	86	TWA3-24-15/MHIA5	$\pm$ 56
36 - 72	$\pm$ 5	$\pm$ 300	4	83	TWA3-48-5/MHIA5	$\pm$ 430
36 - 72	$\pm$ 12	$\pm$ 125	4	86	TWA3-48-12/MHIA5	$\pm$ 75
36 - 72	$\pm$ 15	$\pm$ 100	4	86	TWA3-48-15/MHIA5	$\pm$ 56

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Input Specifications			Output Specifications			
Operating input voltage range, Vdc	9-18	12Vin(nom)	Output power, Watts	3 Max.		
	18-36	24Vin(nom)	Voltage accuracy, %	$\pm$ 1.0		
	36-72	48Vin(nom)	Line regulation, %	Low Line to High Line at Full Load		
Start up voltage, Vdc	4.5 Max.	5Vin(nom)		$\pm$ 0.2	Single	
	9 Max.	12Vin(nom)		$\pm$ 0.5	Dual	
	18 Max.	24Vin(nom)	Load regulation, %	No Load to Full Load		
	36 Max.	48Vin(nom)		$\pm$ 0.2	Single	
Shutdown voltage, Vdc	4 Typ.	5Vin(nom)	$\pm$ 1.0	Dual		
	8 Typ.	12Vin(nom)	Cross regulation, %	$\pm$ 5		
	16Typ.	24Vin(nom)		Asymmetrical load 25%/100%FL, Dual		
	33 Typ.	48Vin(nom)	Measured by 20MHz bandwidth			
Start up time, ms	Constant resistive load		Ripple and noise, mVp-p	30		
	30	Power up		With a 10 $\mu$ F/25V X7R MLCC, 3.3Vout, 5Vout		
	30	Remote ON/OFF		40		
Input surge voltage, Vdc	3 seconds, max.		50		With a 4.7 $\mu$ F/50V X7R MLCC, 24Vout	
	16 Max.	5Vin(nom)	Temperature coefficient, %/ $^{\circ}$ C	$\pm$ 0.02 Max.		
	25 Max.	12Vin(nom)		Transient response recovery time, $\mu$ s	250 Typ. 25% load step change	
	50 Max.	24Vin(nom)	Over voltage protection, Vdc		3.7-5.4 3.3Vout	
100 Max.	48Vin(nom)	5.6-7.0 5Vout				
Input filter	Pi type			13.5-19.6 12Vout		
				18.3-22.0 15Vout		
Reflected Ripple Current, mA p-p	20		29.1-32.5 24Vout			
Remote ON/OFF	Referred to -Vin pin		Over load protection, %	150 Typ. % of lout rated; Hiccup mode		
	Open or 0 - 1.2 Vdc	DC-DC ON		Short circuit protection	Continuous, automatics recovery	
	2.2 - 12 Vdc	DC-DC OFF				
	-0.5 Min., 1 Max., mA	Input current of Ctrl pin				
	2.5 mA Typ.	Remote off input current				

## TWA3/MHIA5 SERIES

### General Specifications

Isolation voltage, Vac	1 minute	Input to Output	5000 Min.	
Leakage current, $\mu$ A	24VAC, 60Hz		2 Min.	
Isolation capacitance, pF			12 Typ.	17 Max.
Switching frequency, kHz			300 Typ.	

### Environmental Specifications

Operating ambient temperature, $^{\circ}$ C	Without derating	-40 Min.	+94 Max.
	With derating	+77 Min.	+105 Max.
Storage temperature range, $^{\circ}$ C		-55 Min.	+125 Max.
Thermal impedance, $^{\circ}$ C/W	Natural convection (20LFM)		18 Typ.
Thermal shock		MIL-STD-810F	
Vibration		MIL-STD-810F	
Relative humidity		5% to 95% RH	

### Physical Specifications

Clearance/creepage	8 mm
Design meet safety standard	ANSI/AAMI, ES60601-1, IEC60601-1, EN60601-1
Case material	Nickel coated copper
Base material	Non-conductive, black, plastic
Potting material	Silicone (UL94 V-0)
Weight	14g (0.48oz)
Dimensions	1.25" $\times$ 0.80" $\times$ 0.40" (31.8 $\times$ 20.3 $\times$ 10.2 mm)
MTBF	8.638 $\times$ 10 <sup>5</sup> hrs, MIL-HDBK-217F Ta25 $^{\circ}$ C, Full load (G/B, controlled environment)

### EMC Specifications

Specifications	Conditions	Level
EMI <sup>(1)</sup>	EN55011, EN55022 and FCC Part 18	Class A
		Class B
ESD	EN61000-4-2 Air $\pm$ 8kV and Contact $\pm$ 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10V/m	Perf. Criteria A
Fast transient	EN61000-4-4 $\pm$ 2kV	Perf. Criteria A
Surge	EN61000-4-5 $\pm$ 2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6 10Vr.m.s	Perf. Criteria A

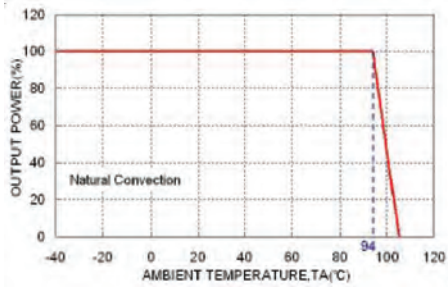
**Note:**

- The TWA3/MHIA5 series can meet EMI Class A with no external filter. And Class B only with external components. For further information, please contact Polytron Devices, Inc.

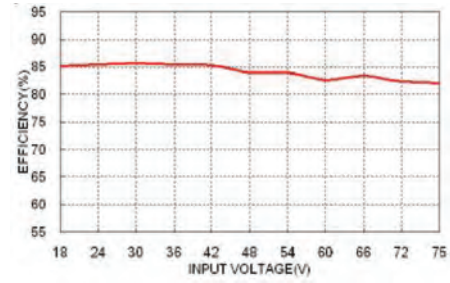
**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

**TWA3/MHIA5 SERIES**

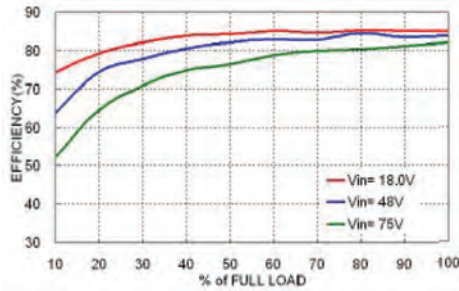
**Characteristic Curve**



TWA3-48S5/MHIA5 Derating Curve



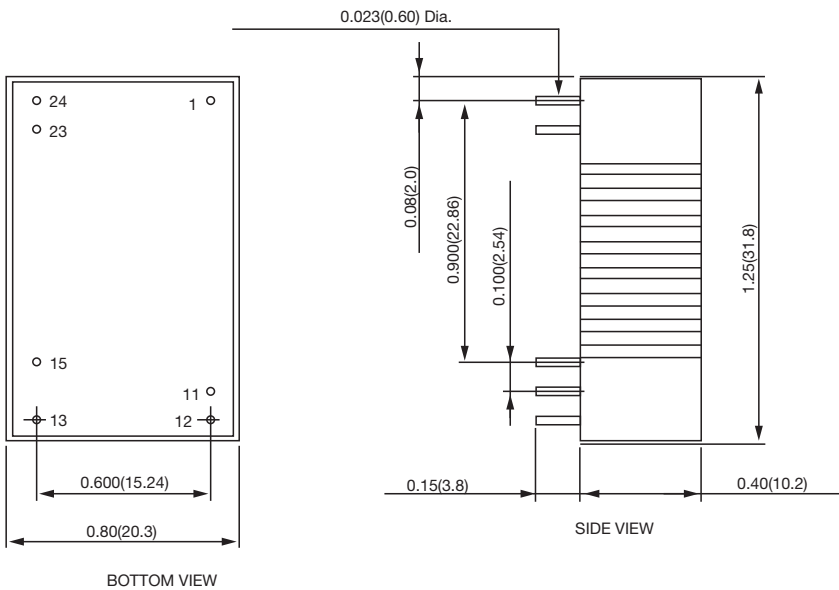
TWA3-48S5/MHIA5 Efficiency vs. Input Voltage



TWA3-48S5/MHIA5 Efficiency vs. Output Load

**Mechanical Drawing**

**A Type**



**DIP PIN CONNECTION**

PIN	SINGLE	DUAL
1	+Input	+Input
11	No pin	Common
12	-Output	No pin
13	+Output	-Output
15	No pin	+Output
23	-Input	-Input
24	-Input	-Input

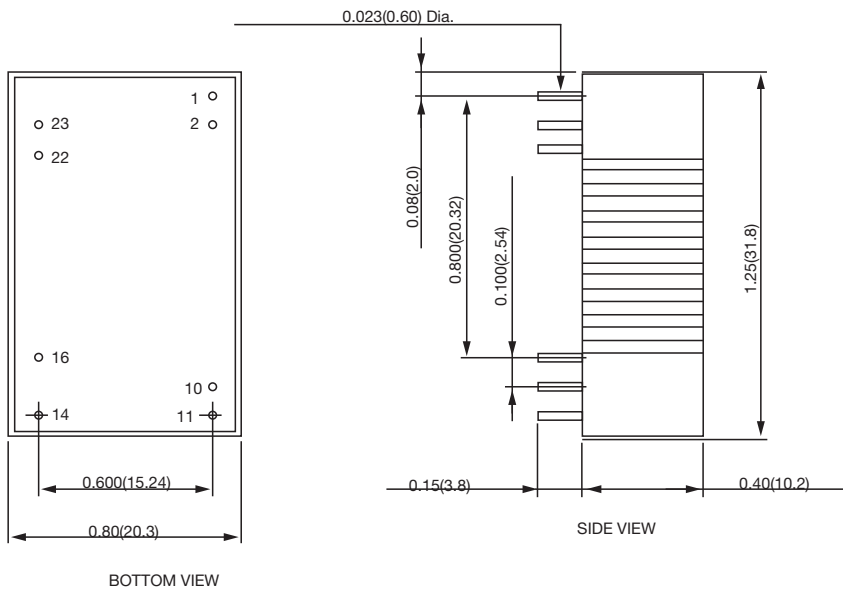
\*\* Pin 11 is "No pin" when single output is with Trim option (Suffix-T)

Pin 11 is "NC" when single output is without Trim pin

1. All dimensions in inch (mm)
2. Tolerance:  $x.xx \pm 0.02$  ( $x.x \pm 0.5$ )  $x.xxx \pm 0.01$  ( $x.xx \pm 0.25$ )
3. Pin pitch tolerance  $\pm 0.01$  (0.25)
4. Pin dimension tolerance  $\pm 0.004$  (0.1)

**Mechanical Drawing**

**B Type**



**DIP PIN CONNECTION**

PIN	SINGLE	DUAL
1	CTRL (Option)	CTRL (Option)
2	-Input	-Input
10	Trim (Option)	Trim (Option)
11	No pin/ NC(**)	-Output
14	+Output	+Output
16	-Output	Common
22	+Input	+Input
23	+Input	+Input

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Pin 11 is "NC" when single output is without Trim pin

1. All dimensions in inch (mm)
2. Tolerance:  $x.xx \pm 0.02$  ( $x.x \pm 0.5$ )  $x.xxx \pm 0.01$  ( $x.xx \pm 0.25$ )
3. Pin pitch tolerance  $\pm 0.01$  (0.25)
4. Pin dimension tolerance  $\pm 0.004$  (0.1)