

## DC-DC CONVERTERS

### REGULATED, 2:1 WIDE INPUT RANGE, 10 WATTS

#### MEDICAL APPLICATIONS

#### TWA10/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	2500	10	80	TWA10-5S33/MHIA5	3000
4.5 - 9	5	2000	10	84	TWA10-5S5/MHIA5	2500
4.5 - 9	12	830	15	86.5	TWA10-5S12/MHIA5	430
4.5 - 9	15	670	15	87	TWA10-5S15/MHIA5	350
4.5 - 9	24	416	20	85.5	TWA10-5S24/MHIA5	125
9 - 18	3.3	2500	10	83	TWA10-12S33/MHIA5	3000
9 - 18	5	2000	10	85.5	TWA10-12S5/MHIA5	2500
9 - 18	12	830	10	88	TWA10-12S12/MHIA5	430
9 - 18	15	670	10	89	TWA10-12S15/MHIA5	350
9 - 18	24	416	10	89	TWA10-12S24/MHIA5	125
18 - 36	3.3	2500	6	83	TWA10-24S33/MHIA5	3000
18 - 36	5	2000	6	86.5	TWA10-24S5/MHIA5	2500
18 - 36	12	830	6	89	TWA10-24S12/MHIA5	430
18 - 36	15	670	6	89	TWA10-24S15/MHIA5	350
18 - 36	24	416	6	89	TWA10-24S24/MHIA5	125
36 - 72	3.3	2500	4	82.5	TWA10-48S33/MHIA5	3000
36 - 72	5	2000	4	86.5	TWA10-48S5/MHIA5	2500
36 - 72	12	830	4	89	TWA10-48S12/MHIA5	430
36 - 72	15	670	4	89	TWA10-48S15/MHIA5	350
36 - 72	24	416	4	88.5	TWA10-48S24/MHIA5	125

## TWA10/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	$\pm$ 1000	25	83	TWA10-5-5/MHIA5	$\pm$ 1440
4.5 - 9	$\pm$ 12	$\pm$ 416	25	85.5	TWA10-5-12/MHIA5	$\pm$ 250
4.5 - 9	$\pm$ 15	$\pm$ 333	25	86.5	TWA10-5-15/MHIA5	$\pm$ 180
9 - 18	$\pm$ 5	$\pm$ 1000	10	84	TWA10-12-5/MHIA5	$\pm$ 1440
9 - 18	$\pm$ 12	$\pm$ 416	10	89	TWA10-12-12/MHIA5	$\pm$ 250
9 - 18	$\pm$ 15	$\pm$ 333	10	88	TWA10-12-15/MHIA5	$\pm$ 180
18 - 36	$\pm$ 5	$\pm$ 1000	6	85	TWA10-24-5/MHIA5	$\pm$ 1440
18 - 36	$\pm$ 12	$\pm$ 416	6	89	TWA10-24-12/MHIA5	$\pm$ 250
18 - 36	$\pm$ 15	$\pm$ 333	6	88	TWA10-24-15/MHIA5	$\pm$ 180
36 - 72	$\pm$ 5	$\pm$ 1000	4	85	TWA10-48-5/MHIA5	$\pm$ 1440
36 - 72	$\pm$ 12	$\pm$ 416	4	88	TWA10-48-12/MHIA5	$\pm$ 250
36 - 72	$\pm$ 15	$\pm$ 333	4	88	TWA10-48-15/MHIA5	$\pm$ 180

### Input Specifications

Operating input voltage range, Vdc	9-18	12Vin(nom)
	18-36	24Vin(nom)
	36-72	48Vin(nom)
Start up voltage, Vdc	4.5 Max.	5Vin(nom)
	9 Max.	12Vin(nom)
	18 Max.	24Vin (nom)
	36 Max.	48Vin (nom)
Shutdown voltage, Vdc	4 Typ.	5Vin(nom)
	8 Typ.	12Vin(nom)
	16 Typ.	24Vin (nom)
	33 Typ.	48Vin (nom)
Start up time, ms	Constant resistive load	
	30	Power up
	30	Remote ON/OFF
Input surge voltage, Vdc	3 seconds, Max.	
	16 Max.	5Vin(nom)
	25 Max.	12Vin(nom)
	50 Max.	24Vin (nom)
Input reflected ripple current, mA <sub>p-p</sub>	20	
Input filter	Pi type	
Remote ON/OFF	Referred to -INPUT pin	
	Open or 0 - 1.2 Vdc	DC-DC ON
	2.2 - 12 Vdc	DC-DC OFF
	-0.5 - 1 mA	Input current of Remote Ctrl pin
	2.5 mA	Remote off input current

### Output Specifications

Output power, Watts	10 Max.	
Voltage accuracy, %	$\pm$ 1.0	
Line regulation, %	Low Line to High Line at Full Load	
	$\pm$ 0.2	Single
	$\pm$ 0.5	Dual
Load regulation, %	No Load to Full Load	
	$\pm$ 0.2	Single
Cross regulation, %	$\pm$ 1.0	Dual
	$\pm$ 5	Asymmetrical load 25%/100%FL, Dual
Ripple and noise, mV <sub>p-p</sub>	Measured by 20MHz bandwidth	
	30	With a 10 $\mu$ F/25V X7R MLCC, 3.3Vout, 5Vout
	40	With a 10 $\mu$ F/25V X7R MLCC, 12Vout, 15Vout
Temperature coefficient, %/°C	50	With a 4.7 $\mu$ F/50V X7R MLCC, 24Vout
	$\pm$ 0.02	
Transient response recovery time, $\mu$ s	250 Typ.	25% load step change
Over voltage protection, continuous clamp, Vdc	Continuous clamp	
	3.7-5.0	3.3Vout
	5.6-7.0	5Vout
	13.5-16.0	12Vout
	18.3-22.0	15Vout
Over load protection, %	29.1-34.5	24Vout
	150	% of lout rated; Hiccup mode
Short circuit protection	Continuous, automatics recovery	

## TWA10/MHIA5 SERIES

### General Specifications

Isolation voltage, Vac	1 minute	Input to Output	5000 Min.	
Leakage current, $\mu$ A	240VAC, 60Hz			2 Max.
Isolation capacitance, pF			12 Min.	17 Max.
Switching frequency, kHz			300 Typ.	

### Environmental Specifications

Operating ambient temperature, $^{\circ}$ C	Without derating	-40 Min.	+77 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-V0)
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

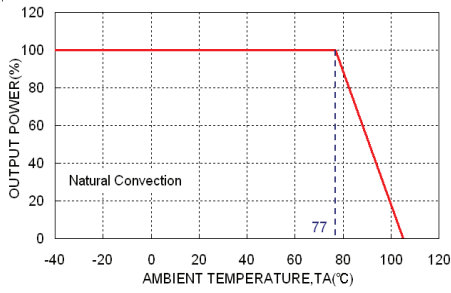
Specifications	Conditions	Level
EMI <sup>(1)</sup>	EN55011, EN55022 and FCC Part 18	Class A
		Class B
ESD	EN61000-4-2 Air $\pm$ 8kV and Contact $\pm$ 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10V/m	Perf. Criteria A
Fast transient	EN61000-4-4 $\pm$ 2kV	Perf. Criteria A
Surge	EN61000-4-5 $\pm$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

**Note:**

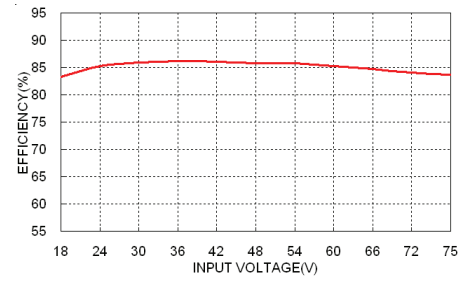
- The TWA10/MHIA5 series can meet EMI Class A with no external filter. And Class B only with external components. For further information, please contact Polytron Devices, Inc.

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

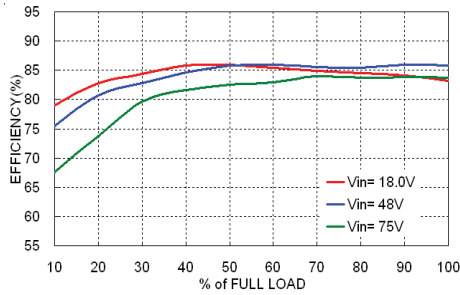
## Characteristic Curve



TWA10-48S5/MHIA5 Derating Curve



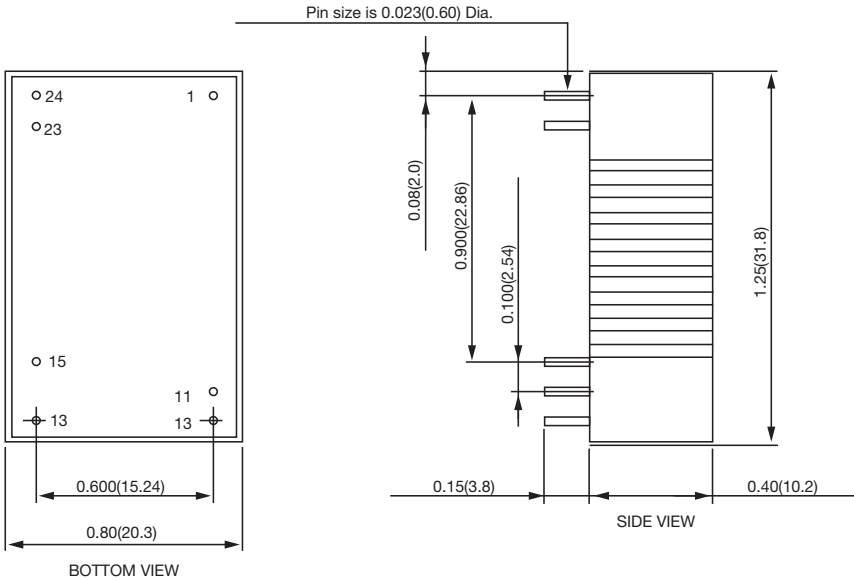
TWA10-48S5/MHIA5 Efficiency vs. Input Voltage



TWA10-48S5/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)

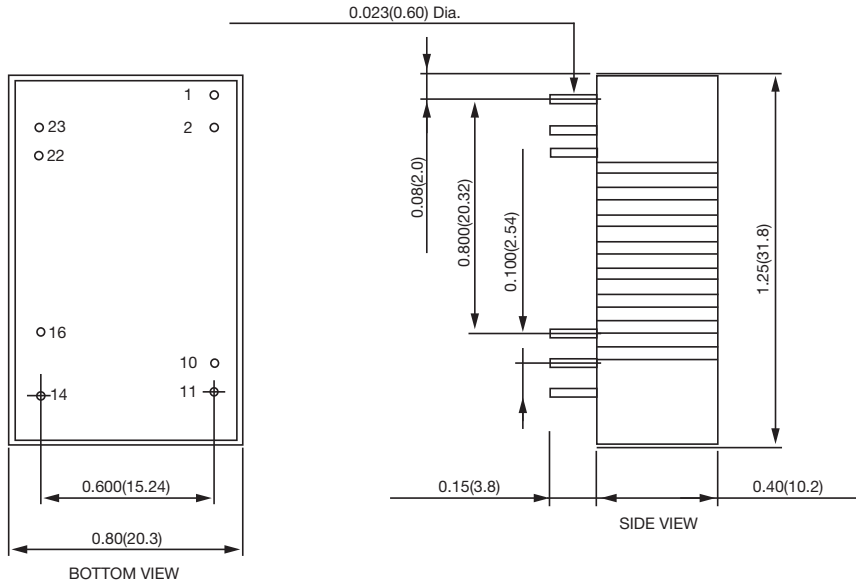
Pin 11 is "NC" when single output is without Trim pin

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)

## TWA10/MHIA5 SERIES

### 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

\*\* 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

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