

DC-DC CONVERTERS

REGULATED, 2:1 WIDE INPUT RANGE, 6 WATTS

MEDICAL APPLICATIONS

TWA6/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 μ 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 μ F
4.5 - 9	3.3	1800	10	81.5	TWA6-5S33/MHIA5	2100
4.5 - 9	5	1200	10	86	TWA6-5S5/MHIA5	1500
4.5 - 9	12	500	15	86	TWA6-5S12/MHIA5	260
4.5 - 9	15	400	15	86	TWA6-5S15/MHIA5	210
4.5 - 9	24	250	20	87	TWA6-5S24/MHIA5	75
9 - 18	3.3	1800	10	83.5	TWA6-12S33/MHIA5	2100
9 - 18	5	1200	10	86	TWA6-12S5/MHIA5	1500
9 - 18	12	500	10	89	TWA6-12S12/MHIA5	260
9 - 18	15	400	10	89	TWA6-12S15/MHIA5	210
9 - 18	24	250	10	88.5	TWA6-12S24/MHIA5	75
18 - 36	3.3	1800	6	83	TWA6-24S33/MHIA5	2100
18 - 36	5	1200	6	86	TWA6-24S5/MHIA5	1500
18 - 36	12	500	6	89	TWA6-24S12/MHIA5	260
18 - 36	15	400	6	89	TWA6-24S15/MHIA5	210
18 - 36	24	250	6	88.5	TWA6-24S24/MHIA5	75
36 - 72	3.3	1800	4	82.5	TWA6-48S33/MHIA5	2100
36 - 72	5	1200	4	86.5	TWA6-48S5/MHIA5	1500
36 - 72	12	500	4	88	TWA6-48S12/MHIA5	260
36 - 72	15	400	4	88.5	TWA6-48S15/MHIA5	210
36 - 72	24	250	4	88	TWA6-48S24/MHIA5	75

TWA6/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 μ F
4.5 - 9	± 5	± 600	25	84	TWA6-5-5/MHIA5	± 860
4.5 - 9	± 12	± 250	25	86.5	TWA6-5-12/MHIA5	± 150
4.5 - 9	± 15	± 200	25	87.5	TWA6-5-15/MHIA5	± 110
9 - 18	± 5	± 600	10	84	TWA6-12-5/MHIA5	± 860
9 - 18	± 12	± 250	10	89	TWA6-12-12/MHIA5	± 150
9 - 18	± 15	± 200	10	88	TWA6-12-15/MHIA5	± 110
18 - 36	± 5	± 600	6	85	TWA6-24-5/MHIA5	± 860
18 - 36	± 12	± 250	6	88.5	TWA6-24-12/MHIA5	± 150
18 - 36	± 15	± 200	6	88	TWA6-24-15/MHIA5	± 110
36 - 72	± 5	± 600	4	85	TWA6-48-5/MHIA5	± 860
36 - 72	± 12	± 250	4	88	TWA6-48-12/MHIA5	± 150
36 - 72	± 15	± 200	4	88	TWA6-48-15/MHIA5	± 110

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

Input Specifications		
Operating input voltage range, Vdc	4.5-9	5Vin(nom)
	9-18	12Vin(nom)
	18-36	24Vin(nom)
	36-72	48Vin(nom)
Start up voltage, Vdc	4.5 Min.	5Vin(nom)
	9 Min.	12Vin(nom)
	18 Min.	24Vin(nom)
	36 Min.	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 Typ.	Power up
	30 Typ.	Remote ON/OFF
Input surge voltage, Vdc		3 seconds, max.
	16 Max.	5Vin(nom)
	25 Max.	12Vin(nom)
	50 Max.	24Vin(nom)
Input filter		48Vin(nom)
		Pi type
Reflected Ripple Current, mAp-p	20	
Remote ON/OFF		Referred to -Vin pin
	Open or 0 - 1.2 Vdc	DC-DC ON
	2.2 - 12 Vdc	DC-DC OFF
	-0.5- 1 mA	Input current of Ctrl pin
	2.5 mA	Remote off input current

Output Specifications		
Output power, Watts	6 Max.	
Voltage accuracy, %	± 1.0	
Line regulation, %		Low Line to High Line at Full Load
	± 0.2	Single
Load regulation, %	± 0.5	Dual
		No Load to Full Load
Cross regulation, %	± 0.2	Single
	± 1.0	Dual
Ripple and noise, mVp-p	± 5	Asymmetrical load 25%/100%FL, Dual
		Measured by 20MHz bandwidth
	30	With a 10 μ F/25V X7R MLCC, 3.3Vout, 5Vout
	40	With a 10 μ F/25V X7R MLCC, 12Vout, 15Vout
Temperature coefficient, %/°C	50	With a 4.7 μ F/50V X7R MLCC, 24Vout
	± 0.02 Max.	
Transient response recovery time, μ s	250 Typ.	25% load step change
Over voltage protection, continuous clamp, Vdc	3.7-5.4	3.3Vout
	5.6-7.0	5Vout
	13.5-19.6	2Vout
	18.3-22.0	15Vout
Over load protection, %	29.1-32.5	24Vout
	150	% of lout rated; Hiccup mode
Short circuit protection	Continuous, automatics recovery	

TWA6/MHIA5 SERIES

General Specifications

Isolation voltage, Vac	1 minute	Input to Output	5000 Min.	
Leakage current, μ A	24VAC, 60Hz		2 Typ.	
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 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 ⁵ hrs, MIL-HDBK-217F Ta25 $^{\circ}$ C, Full load (G/B, controlled environment)

EMC Specifications

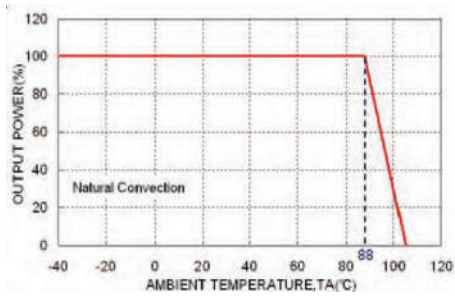
Specifications	Conditions		Level
EMI ⁽¹⁾	EN55011, EN55022 and FCC Part 18		Class A
			Class B
ESD	EN61000-4-2	Air $\pm$ 8kV and Contact $\pm$ 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3	10V/m	Perf. Criteria A
Fast transient	EN61000-4-4	$\pm$ 2kV	Perf. Criteria A
Surge	EN61000-4-5	$\pm$ 2kV	Perf.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

Note:

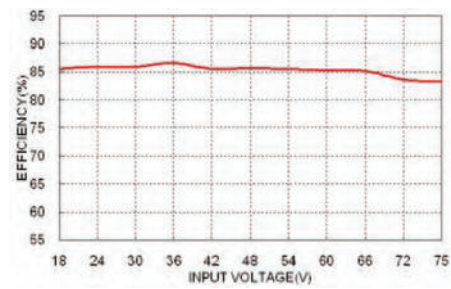
- The TWA6/MHIA5 series can meet EMI Class A with no external filter. And Class B only with external components. For further information, please contact Polytron Devices, Inc.

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

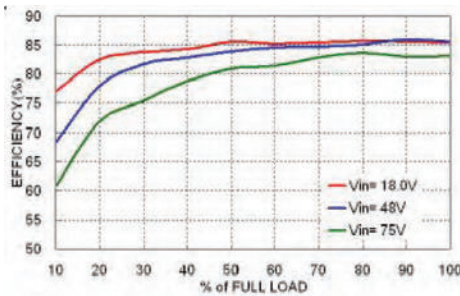
Characteristic Curve



TWA6-48S5/MHIA5 Derating Curve



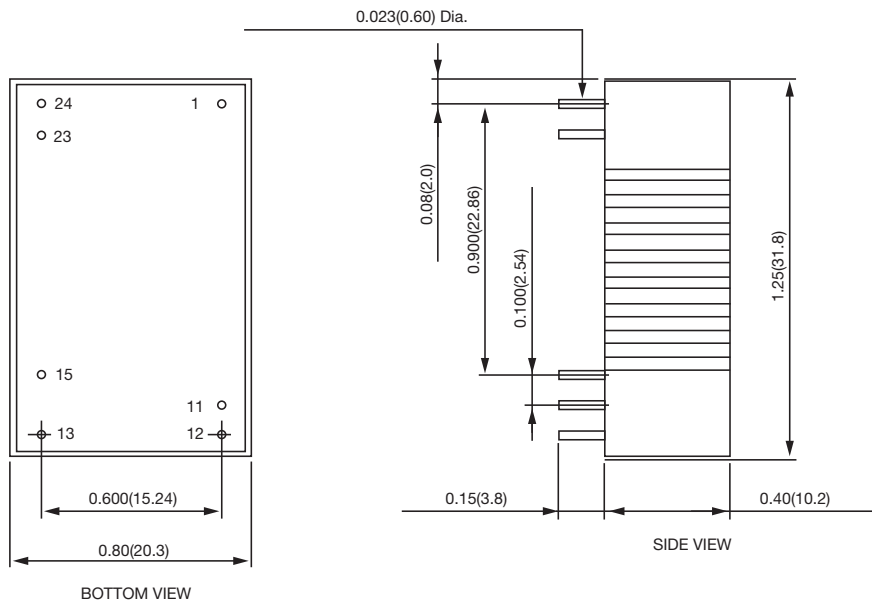
TWA6-48S5/MHIA5 Efficiency vs. Input Voltage



TWA6-48S5/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)

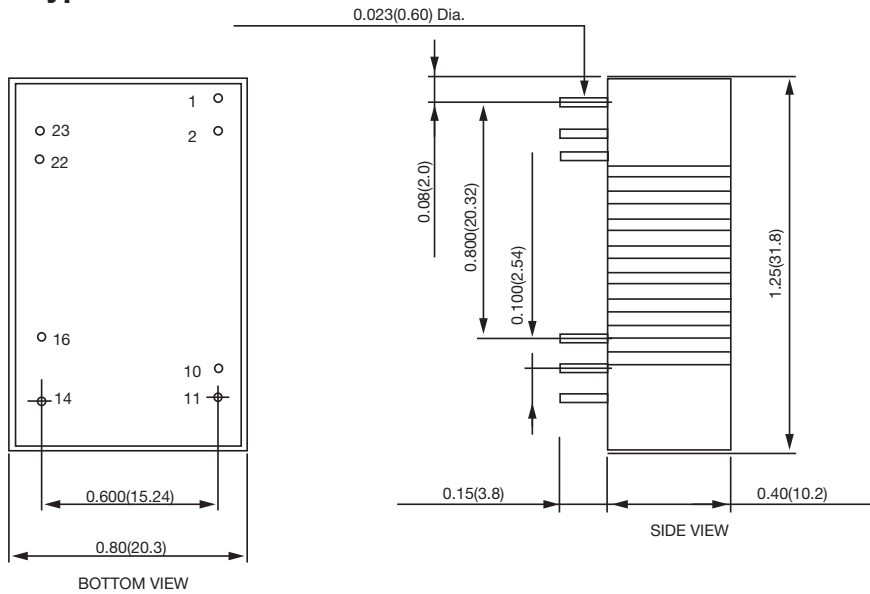
Pin 11 is "NC" when single output is without Trim pin

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 ± 0.01 (0.25)
4. Pin dimension tolerance ± 0.004 (0.1)

TWA6/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

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 ± 0.01 (0.25)

4. Pin dimension tolerance ± 0.004 (0.1)