



# 10 WATT Single & Dual Output

Regulated, 4:1 Wide Input Range

**MEDICAL**  
DC/DC Converters



## FEATURES

- **4:1 Wide Input Voltage Range**
- **Operating Temperature Range: -40° to +105° C (with derating)**
- **Miniature DIP Package**
- **High Efficiency: To 89%**
- **Reinforced Insulation**
- **Clearance and Creepage Distance: 8.0 mm/2MOPP**
- **5000 Vac Input/Output 2MOPP Isolation**
- **Built-In EMI Class A Filter**
- **2uA Patient Leakage Current**
- **Medical Safety Approvals Including: UL, CE and ANSI/AAMI ES60601-1, EN60601-1 and IEC60601-1**
- **RoHS Compliant to 2011/65/EU**

**TWB10/MHIA5 Series**

**Specifications** - All specifications are typical at nominal input, full load and 25° C.

### INPUT

Voltage Range.....	24VDC nominal input	9 -36VDC
	48VDC nominal input	18 -75VDC
Input filter.....	Pi Filter	
Input Surge Voltage.....	24VDC input.....	50VDC 100ms, max.
	48VDC input.....	100VDC 100ms, max.
Input Reflected Ripple Current .....	20mA <sub>p-p</sub>	
Start up Time. ....	Constant resistive load.....	Power up.....30ms
		Remote ON/OFF.....30ms
Startup Voltage.....	24VDC input.....	9VDC, max.
	48VDC input.....	18VDC, max.
Shutdown Voltage.....	24VDC input.....	8VDC
	48VDC input.....	16VDC
Remote ON/OFF (Only for B-Type Pin connection option)	Referenced to - INPUT pin	
	DC-DC ON.....	Open or 0 - 1.2VDC
	DC-DC OFF.....	2.2 - 12VDC
	Input Current of Remote Control Pin.....	-0.5 - 1mA
	Remote off state input current.....	2.5mA

### OUTPUT

Output Power.....	10 Watts max.	
Voltage Accuracy.....	±1.0%	
Line Regulation.....	LL to HL at Full Load.....	Single.....±0.2%
		Dual.....±0.5%
Load Regulation.....	No Load to Full Load.....	Single.....±0.2%
		Dual.....±1.0%
Cross Regulation.....	Asymmetrical Load 25% / 100% FL.....	Dual.....±5%
Ripple and Noise.....	Measured by 20MHz band width	
	With a 10µF/25V X7R MLCC.....	3.3Vout, 5Vout.....30mVp-p
		12Vout, 15Vout.....40mVp-p
	With a 4.7µF/50V X7R MLCC.....	24Vout.....50mVp-p
Temperature Coefficient.....	±0.2% / °C, max.	
Transient Response recovery Time .....	25% load step change.....	250µs
	3.3 Vout.....	3.7 - 5.4VDC
	5Vout.....	5.6 - 7.0VDC
Over voltage protection.....	Continuous clamp.....	12Vout.....13.5 - 19.6VDC
		15Vout.....18.3 - 22.0VDC
		24Vout.....29.1 - 32.5 VDC
Overload Protection.....	% of Iout rated; Hiccup mode.....150%	
Short Circuit Protection.....	Continuous, automatic recovery	

**Additional specifications on next page.**

**GENERAL**

Efficiency.....See table  
 Isolation Voltage .....Input to Output.....5000VAC, min. 1 minute  
 Isolation Capacitance .....12-17pF  
 Leakage Current.....24VAC, 60HZ.....2µA  
 Switching Frequency.. .....300kHz Typ.  
 Clearance/Creepage.. .....8mm  
 Approvals and Standard .....ANSI/AAMI, ES60601-1, IEC6060-1, EN60601-1  
 Case Material .....Nickel Coated Copper  
 Base Material .....Non-conductive black plastic  
 Potting Material .....Silicon (UL94-V0)  
 Dimensions .....1.25 x 0.80 x 0.40 inches  
 .....(31.8 x 20.3 x 10.2 mm)  
 Weight .....14g (0.48 oz.)  
 MTBF.. MIL-HDBK-217F Ta25°C, Full load (G/B, controlled environment)...8.638 x 10<sup>5</sup> hrs

**ENVIRONMENTAL**

Operating Ambient Temperature .....without derating.....-40°C - +77°C  
 .....with derating.....+77°C - +105°C  
 Storage Temperature Range.....-55°C - +125°C  
 Thermal Impedance.....Natural Convection (20LFM).....18°C/Watt  
 Thermal Shock.....MIL-STD-810F  
 Vibration.....MIL-STD-810F  
 Relative Humidity.....5% to 95% RH

**EMC CHARACTERISTICS**

EMI (Note 1).....EN55011, EN55022 .....Class A, Class B  
 and FCC Part 18.....  
 ESD..... EN61000-4-2 Air ±8KV Contact ±6KV .....Perf. Criteria A  
 Radiated Immunity.....EN61000-4-3.....10 V/m.....Perf. Criteria A  
 Fast Transient.....EN61000-4-4.....±2KV.....Perf. Criteria A  
 Surge.....EN61000-4-5.....±2KV.....Perf. Criteria A  
 Conducted Immunity.....EN61000-4-6.....10Vr.m.s.....Perf. Criteria A

\* For Case "B", use suffix "B" after Model Number.  
 Case "A" does not require any suffix.

**SELECTION GUIDE**

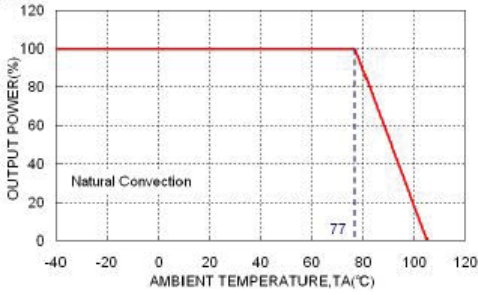
	Input Voltage Nominal (Range) (Vdc)	Output Voltage (Vdc)	Output Current (mA)	Output Ripple & Noise	Input Current	Efficiency (%)	Model Number* *	Capacitor Load max.
					No load (mA)			
<b>SINGLE OUTPUT VOLTAGE</b>	24(9-36)	3.3	2500	30m Vp-p	6	83	TWB10-24S33/MHIA5	3000µF
	24(9-36)	5	2000	30m Vp-p	6	86.5	TWB10-24S5/MHIA5	2500µF
	24(9-36)	12	830	40m Vp-p	6	89	TWB10-24S12/MHIA5	430µF
	24(9-36)	15	670	40m Vp-p	6	89	TWB10-24S15/MHIA5	350µF
	24(9-36)	24	416	50m Vp-p	6	89	TWB10-24S24/MHIA5	125µF
	48(18-75)	3.3	2500	30m Vp-p	4	82.5	TWB10-48S33/MHIA5	3000µF
	48(18-75)	5	2000	30m Vp-p	4	86.5	TWB10-48S5/MHIA5	2500µF
	48(18-75)	12	830	40m Vp-p	4	89	TWB10-48S12/MHIA5	430µF
	48(18-75)	15	670	40m Vp-p	4	89	TWB10-48S15/MHIA5	350µF
	48(18-75)	24	416	50m Vp-p	4	86.5	TWB10-48S24/MHIA5	125µF
<b>DUAL OUTPUT VOLTAGE</b>	24(9-36)	±5	±1000	30m Vp-p	6	85	TWB10-24-5/MHIA5	+/-1440µF
	24(9-36)	±12	±416	40m Vp-p	6	89	TWB10-24-12/MHIA5	+/-250µF
	24(9-36)	±15	±333	40m Vp-p	6	88	TWB10-24-15/MHIA5	+/-180µF
	48(18-75)	±5	±1000	30m Vp-p	4	85	TWB10-48-5/MHIA5	+/-1440µF
	48(18-75)	±12	±416	40m Vp-p	4	88	TWB10-48-12/MHIA5	+/-250µF
	48(18-75)	±15	±333	40m Vp-p	4	88	TWB10-48-15/MHIA5	+/-180µF

**Notes:**

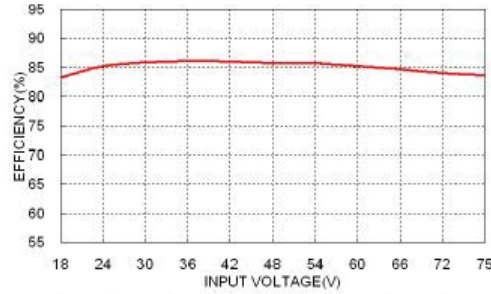
- The TWB10/MHIA5 Series can meet EMI Class A with no external filter. And Class B only with external components. For more detailed information, please contact Polytron Devices, Inc.

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

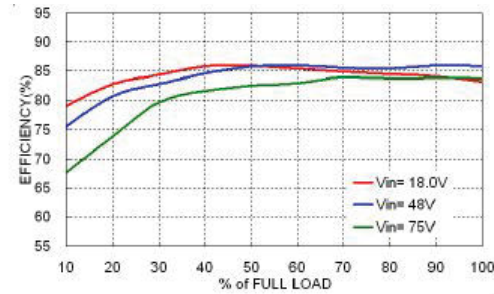
**Mechanical specifications on next page.**



TWB10-48S5/MHIA5 Derating Curve

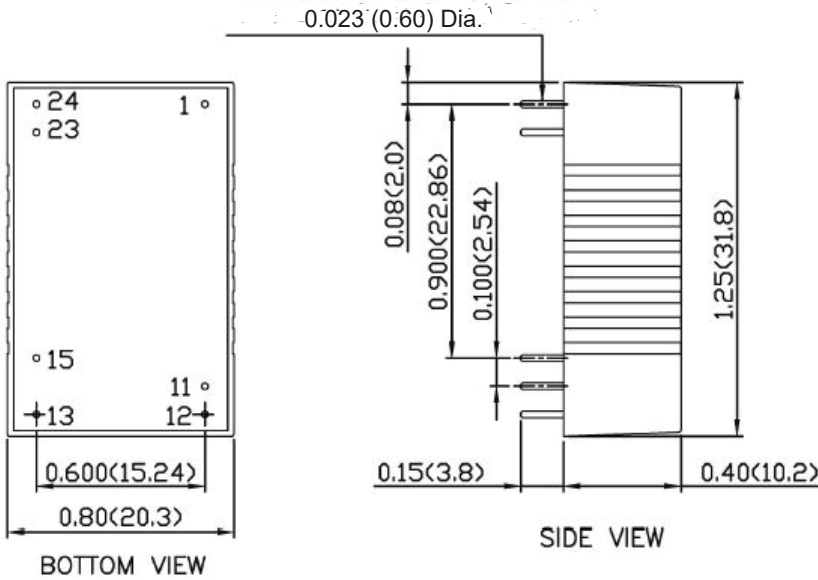


TWB10-48S5/MHIA5 Efficiency VS Input Voltage



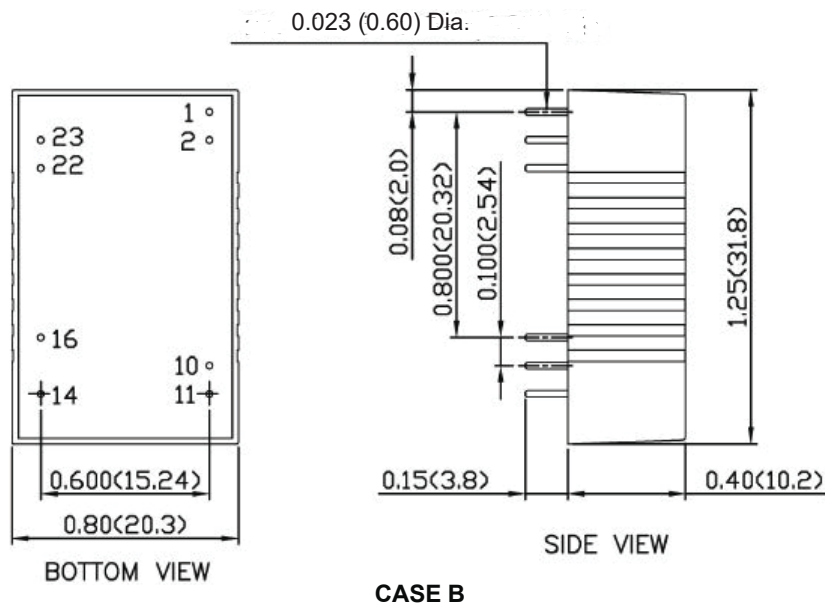
TWB10-48S5/MHIA5 Efficiency VS Output Load

**MECHANICAL DRAWINGS**



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

1. All dimensions in inches (mm)
2. Tolerance: X.XX±0.02 (X.X±0.5)  
X.XXX±0.01 (X.XX±0.25)
3. Pin pitch tolerance: ±0.01 (0.25)
4. Pin dimension tolerance: ±0.004 (0.1)



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

\*\* : The Pin 11 is "NO PIN" when single output  
With Trim option (Suffix - T)  
The Pin 11 is "NC" when single output  
Without Trim pin.

1. All dimensions in inches (mm)
2. Tolerance: X.XX±0.02 (X.X±0.5)  
X.XXX±0.01 (X.XX±0.25)
3. Pin pitch tolerance: ±0.01 (0.25)
4. Pin dimension tolerance: ±0.004 (0.1)