

**DESCRIPTION**

The PHP and PIP bidirectional Transient Voltage Suppressor (TVS) modules are designed for applications requiring “across the line” ac power protection. They are used in applications where extreme voltage transients can permanently damage voltage-sensitive systems or components. These devices are most often used when discrete TVS components do not have sufficient power requirements to suppress high power surges.

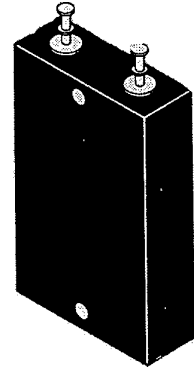
These modules can be used to protect equipment from induced lightning, power surges, and transients originating from inductive switching or power interrupt. They are used for both commercial and military applications, including telecommunications, central office switching and PABX, CATV distribution, aircraft, shipboard, computers, distributed data processing and power supplies.

For military applications, the PHP module sub-assemblies are packaged in a hermetically sealed glass-to-metal package and are also optionally screened in accordance with MIL-S-19500/507. The PHP series modules can have design consistency with the following military requirements as controlling specifications:

- MIL-STD-1399, Section 300
- MIL-STD-704
- MIL-E-16400
- MIL-PRF-19500/507

**IMPORTANT:** For the most current data, consult MICROSEMI's website: <http://www.microsemi.com>

**APPEARANCE**



**CASE 11**

**FEATURES**

- 7,500 and 15,000 Watts Peak Pulse Power dissipation (see Figure 1)
- Working rms voltages ( $V_{WM(RMS)}$ ) available in ranges from 8.4 to 500 Volts
- Fast response
- Options for screening in accordance with MIL-PRF-19500 for JAN, JANTX, JANTXV, and JANS are available by adding MQ, MX, MV, or MSP prefixes respectively to part numbers
- PHP module sub-assemblies are packaged in a hermetically sealed glass-to-metal package
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B

**MAXIMUM RATINGS**

- 7,500 watts Peak Pulse power dissipation at 10/1000  $\mu$ s pulse and 25°C for PHP or PIP8.4, 24, and 30 (see Figure 1, 2 and 3)
- 15,000 watts Peak Pulse power dissipation at 10/1000  $\mu$ s pulse and 25°C for PHP or PIP60, 120, 208, 250, 440 and 500
- Operating and Storage temperatures: -65°C to +150°C
- Average Steady State power dissipation at 50°C: 7.5 watts
- $t_{clamping}$  (0 volts to BV): Less than  $1 \times 10^{-8}$  seconds

**APPLICATIONS / BENEFITS**

- Designed for Military (PHP Series) and Commercial (PIP Series)
  - Protection from switching transients and induced RF
  - Protection from ESD, and EFT per IEC 61000-4-2 and IEC 61000-4-4
  - Secondary lightning protection per IEC61000-4-5 with 42 Ohms source impedance up to Class 5\*\*
  - Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance up to Class 4\*\*
  - Secondary lightning protection per IEC61000-4-5 with 2 Ohms source impedance up to Class 4\*\*
- \*\* Example Class levels are for lower voltage types with higher Peak Pulse Current ratings

**MECHANICAL AND PACKAGING**

- CASE: Molded case.
- TERMINAL: Silver plated brass.
- POLARITY: Bidirectional.
- WEIGHT: 50 grams (approx.).
- MOUNTING POSITION: Any
- Maximum Torque for Mounting: 15 in-lbs

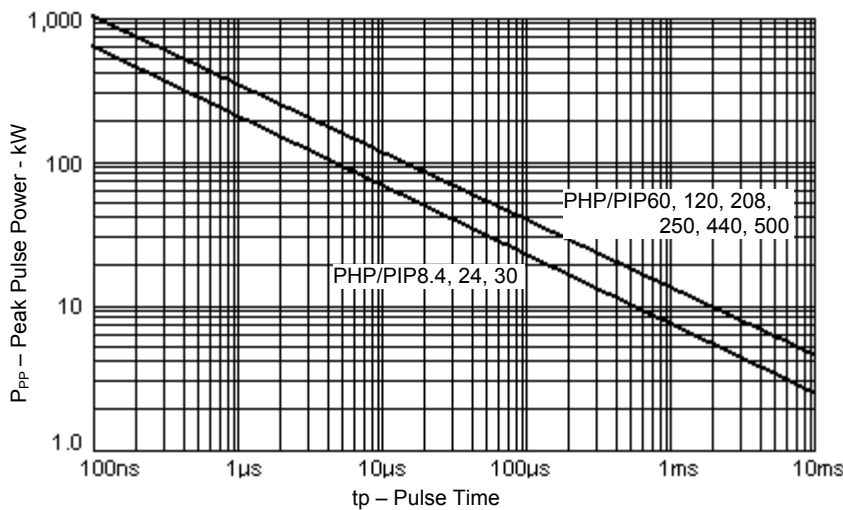
**ELECTRICAL CHARACTERISTICS**

MICROSEMI PART NUMBER	WORKING RMS VOLTAGE $V_{WM(RMS)}$ VOLTS AC	REVERSE STANDOFF VOLTAGE (NOTE 1) $V_{WM}$ VOLTS DC	MINIMUM BREAKDOWN VOLTAGE $V_{(BR)}$ @ $I_{(BR)}$ VOLTS mA		MAXIMUM REVERSE CURRENT $I_D$ @ $V_{WM}$ MICRO AMPERES	MAXIMUM CLAMPING VOLTAGE $V_C$ @ $I_{PP}$ VOLTS DC	MAXIMUM PEAK PULSE CURRENT (FIG. 3) $I_{PP}$ A	MAXIMUM PEAK PULSE POWER (1 ms) $P_{PP}$ KILOWATTS
			$V_{(BR)}$ VOLTS	$I_{(BR)}$ mA				
PHP8.4	8.4	12.0	14	10	250	22	341	7.5
PHP24	24.0	34.0	40	10	250	67	112	7.5
PHP30	30.0	42.5	50	1.0	250	84	90	7.5
PHP60	60.0	85.0	100	1.0	250	167	90	15.0
PHP120*	120.0	170.0	200	1.0	250	319	47	15.0
PHP208	208.0	295.0	347	1.0	250	536	28	15.0
PHP250*	250.0	354.0	418	1.0	250	652	23	15.0
PHP440	440.0	623.0	735	1.0	250	1138	13.2	15.0
PHP500*	500.0	708.0	835	1.0	250	1292	11.6	15.0
PIP8.4	8.4	12.0	14	10	250	22	341	7.5
PIP24	24.0	34.0	40	10	250	67	112	7.5
PIP30	30.0	42.5	50	1.0	250	84	90	7.5
PIP60	60.0	85.0	100	1.0	250	167	90	15.0
PIP120*	120.0	170.0	200	1.0	250	319	47	15.0
PIP208	208.0	295.0	347	1.0	250	536	28	15.0
PIP250*	250.0	354.0	418	1.0	250	652	23	15.0
PIP440	440.0	623.0	735	1.0	250	1138	13.2	15.0
PIP500*	500.0	708.0	835	1.0	250	1292	11.6	15.0

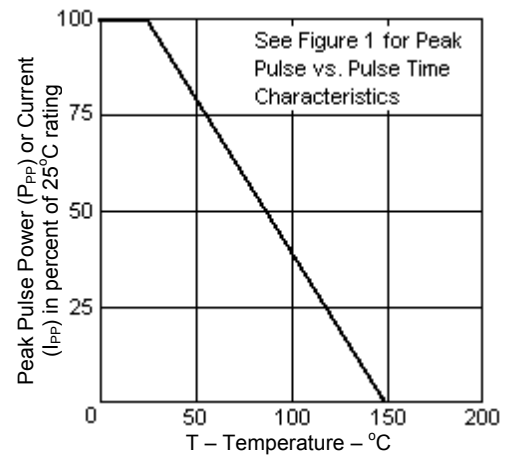
Special Voltages available from factory. \*Recommended for marine applications.

**NOTE 1:** A TVS is normally selected according to the reverse "Standoff Voltage" ( $V_{WM}$ ) which should be equal to or greater than the dc or continuous peak operating voltage level.

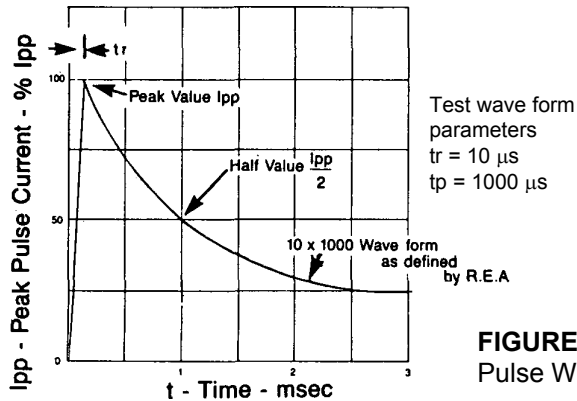
**OUTLINE AND CIRCUIT**



**FIGURE 1**  
Peak Pulse Power vs. Pulse Time

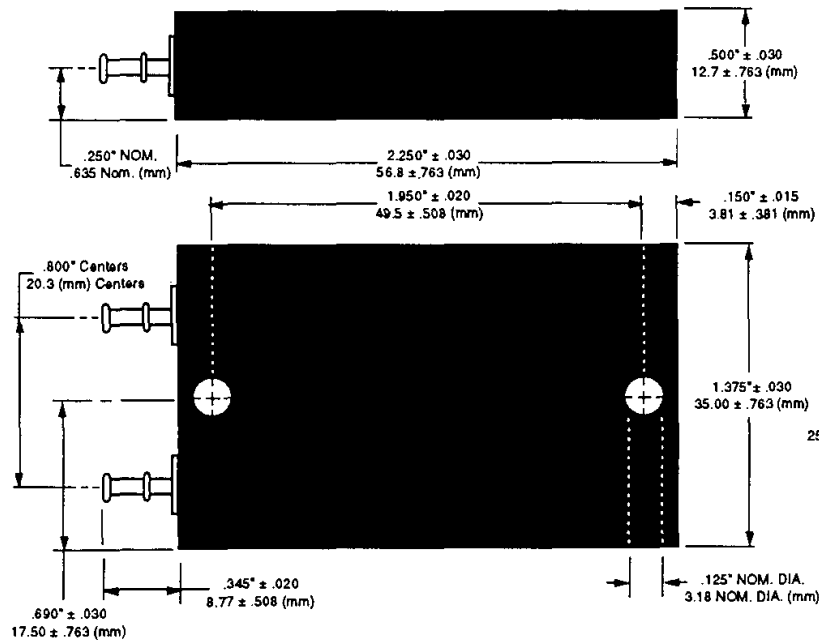


**FIGURE 2**  
Pulse Waveform



**FIGURE 3**  
Pulse Waveform (Derating Curve)

**PACKAGE DIMENSIONS**



**Case 11**  
**60KS200C**

**MILITARY APPLICATIONS:** PHP series sub-assemblies are packaged in a hermetically sealed glass-to-metal components with design consistency to MIL-PRF-19500/507.

**COMMERCIAL APPLICATIONS:** PIP series sub-assemblies are packaged with molded epoxy components.