

**DESCRIPTION**

The PIP & PHP series of transient voltage suppression modules are designed to protect military and commercial electronic equipment from overvoltages caused by lightning, power interrupt, inductive load switching, AC line fluctuations, and NEMP. These modules find applications in both commercial and military environments, including telecommunications, shipboard and aircraft, power distribution, computers, and power supplies. For military applications, the PHP module sub-assemblies are metallurgically bonded and packaged in a hermetically sealed package. TVS modules are most often used in applications where discrete TVS diodes do not have high enough surge handling capability to suppress large power surges.

**SCREENING:**

100% Screening is available per MIL-S-19500/516. For ordering use the following suffix:

H1 - Submodule screening

H2 - Submodule & module screening

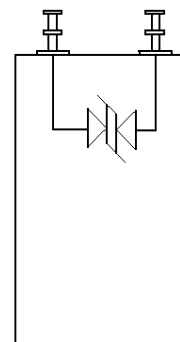
H3 - Submodule & module screening + Group B & C

**FEATURES:**

- 7500 & 15000 watts Peak Pulse Power ( $t_p = 10 \times 1000\mu s$ )
- **PIP** series designed for industrial applications.
- **PHP** series designed for aerospace applications.
- Bidirectional
- Custom voltages available from factory.

**MECHANICAL CHARACTERISTICS:**

- Molded Case
- Readily solderable terminals
- Marking : Logo, part number, and date code

**SCHEMATIC****MAXIMUM RATINGS**

| RATING                                           | SYMBOL | VALUE        | UNIT  |
|--------------------------------------------------|--------|--------------|-------|
| Peak Pulse Power ( $t_p = 10 \times 1000\mu s$ ) | Ppk    | 7500 & 15000 | Watts |
| Operating Temperature                            | Tj     | -65 to +150  | °C    |
| Storage Temperature                              | Tstg   | -65 to +150  | °C    |

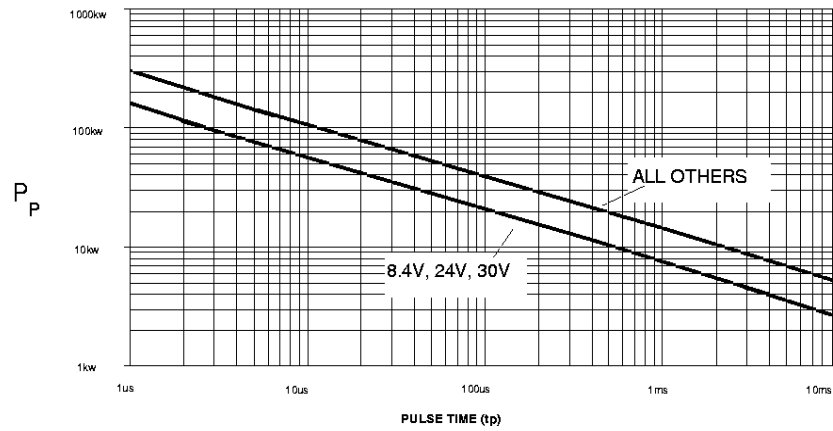
**ELECTRICAL CHARACTERISTICS @ 25°C**

| PART NUMBER<br>(COMMERCIAL) | AVERAGE RMS VOLTAGE<br>VOLTS AC | REVERSE STAND-OFF VOLTAGE<br>V <sub>RWM</sub> | REVERSE LEAKAGE CURRENT<br>I <sub>R</sub> | MINIMUM BREAKDOWN VOLTAGE<br>V <sub>BR</sub> @ I <sub>R</sub> | TEST CURRENT<br>I <sub>T</sub> | MAXIMUM CLAMPING VOLTAGE<br>V <sub>c</sub> @ I <sub>pp</sub> | PEAK PULSE CURRENT<br>I <sub>pp</sub><br>$t_p = 10/1000\mu s$ | MAXIMUM PEAK PULSE POWER<br>P <sub>pp</sub><br>$t_p = 10/1000\mu s$ |
|-----------------------------|---------------------------------|-----------------------------------------------|-------------------------------------------|---------------------------------------------------------------|--------------------------------|--------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------|
|                             | (V)                             | (V)                                           | ( $\mu A$ )                               | (V)                                                           | (mA)                           | (V)                                                          | (A)                                                           | (kw)                                                                |
| PIP 8.4                     | 8.4                             | 12.0                                          | 250                                       | 14                                                            | 10                             | 22                                                           | 341                                                           | 7.5                                                                 |
| PIP 24                      | 24.0                            | 34.0                                          | 250                                       | 40                                                            | 10                             | 67                                                           | 112                                                           | 7.5                                                                 |
| PIP 30                      | 30.0                            | 42.5                                          | 250                                       | 50                                                            | 1                              | 84                                                           | 90                                                            | 7.5                                                                 |
| PIP 60                      | 60.0                            | 85.0                                          | 250                                       | 100                                                           | 1                              | 167                                                          | 90                                                            | 15.0                                                                |
| PIP 120                     | 120.0                           | 170.0                                         | 250                                       | 200                                                           | 1                              | 319                                                          | 47                                                            | 15.0                                                                |
| PIP 208                     | 208.0                           | 295.0                                         | 250                                       | 347                                                           | 1                              | 536                                                          | 28                                                            | 15.0                                                                |
| PIP 250                     | 250.0                           | 354.0                                         | 250                                       | 418                                                           | 1                              | 652                                                          | 23                                                            | 15.0                                                                |
| PIP 440                     | 440.0                           | 623.0                                         | 250                                       | 735                                                           | 1                              | 1138                                                         | 13.2                                                          | 15.0                                                                |
| PIP 500                     | 500.0                           | 708.0                                         | 250                                       | 835                                                           | 1                              | 1292                                                         | 11.6                                                          | 15.0                                                                |
| PHP 8.4                     | 8.4                             | 12.0                                          | 250                                       | 14                                                            | 10                             | 22                                                           | 341                                                           | 7.5                                                                 |
| PHP 24                      | 24.0                            | 34.0                                          | 250                                       | 40                                                            | 10                             | 67                                                           | 112                                                           | 7.5                                                                 |
| PHP 30                      | 30.0                            | 42.5                                          | 250                                       | 50                                                            | 1                              | 84                                                           | 90                                                            | 7.5                                                                 |
| PHP 60                      | 60.0                            | 85.0                                          | 250                                       | 100                                                           | 1                              | 167                                                          | 90                                                            | 15.0                                                                |
| PHP 120                     | 120.0                           | 170.0                                         | 250                                       | 200                                                           | 1                              | 319                                                          | 47                                                            | 15.0                                                                |
| PHP 208                     | 208.0                           | 295.0                                         | 250                                       | 347                                                           | 1                              | 536                                                          | 28                                                            | 15.0                                                                |
| PHP 250                     | 250.0                           | 354.0                                         | 250                                       | 418                                                           | 1                              | 652                                                          | 23                                                            | 15.0                                                                |
| PHP 440                     | 440.0                           | 623.0                                         | 250                                       | 735                                                           | 1                              | 1138                                                         | 13.2                                                          | 15.0                                                                |
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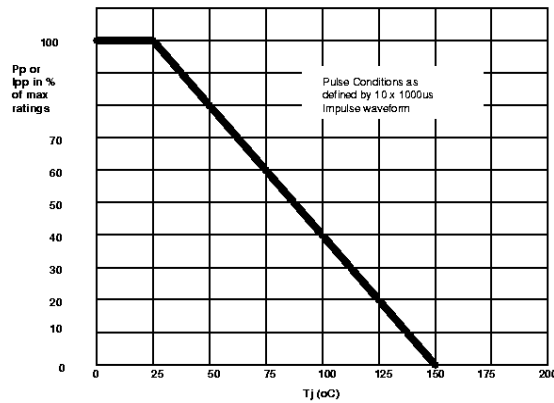
**MILITARY APPLICATIONS :** PHP series sub-assemblies are packaged in a hermetically sealed case.

**COMMERCIAL APPLICATIONS :** PIP series sub-assemblies are packaged in a molded epoxy case.

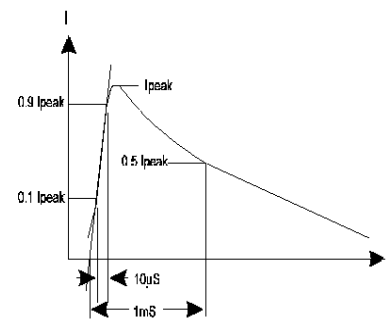
### PEAK PULSE POWER vs. PULSE TIME



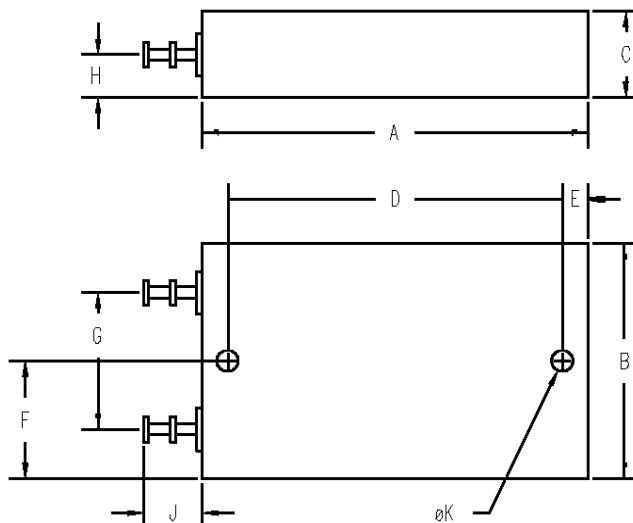
### PULSE DERATING CURVE



### 10x1000μs IMPULSE WAVEFORM



### MECHANICAL OUTLINE



| DIM N | INCHES |      | MM   |      | NOTE |
|-------|--------|------|------|------|------|
|       | MIN    | MAX  | MIN  | MAX  |      |
| A     | 2.22   | 2.28 | 56.3 | 58.0 |      |
| B     | 1.35   | 1.40 | 34.2 | 35.6 |      |
| C     | .47    | .53  | 11.9 | 13.5 |      |
| D     | 1.93   | 1.97 | 49.0 | 50.1 |      |
| E     | .135   | .165 | 3.4  | 4.2  |      |
| F     | .66    | .72  | 16.7 | 18.3 |      |
| G     | .77    | .83  | 19.5 | 21.1 |      |
| H     | .22    | .28  | 5.5  | 7.2  |      |
| J     | .325   | .365 | 8.2  | 9.3  |      |
| K     | .120   | .130 | 3.0  | 3.3  | DIA. |