



Certificate Number: Q10561



Certificate Number: E17276

## P4KE SERIES

**$V_{BR}$  : 6.8 - 440 Volts**

**$P_{PK}$  : 400 Watts**

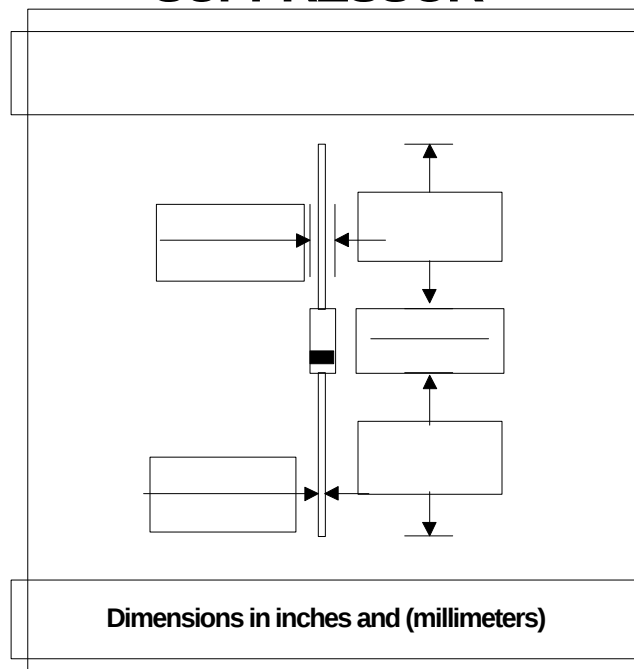
### FEATURES :

- \* 400W surge capability at 1ms
- \* Excellent clamping capability
- \* Low zener impedance
- \* Fast response time : typically less than 1.0 ps from 0 volt to  $V_{BR(min.)}$
- \* Typical  $I_R$  less than 1 A above 10V

### MECHANICAL DATA

- \* Case : DO-41 Molded plastic
- \* Epoxy : UL94V-O rate flame retardant
- \* Lead : Axial lead solderable per MIL-STD-202, method 208 guaranteed
- \* Polarity : Color band denotes cathode end except Bipolar.
- \* Mounting position : Any
- \* Weight : 0.339 gram

## TRANSIENT VOLTAGE SUPPRESSOR



### DEVICES FOR BIPOLAR APPLICATIONS

**For bi-directional use C or CA Suffix**

**Electrical characteristics apply in both directions**

### MAXIMUM RATINGS

| Peak Power Dissipation at $T_a = 25^\circ\text{C}$ , $T_p=1\text{ms}$ (Note1)                                   | $P_{PK}$       | Minimum 400   | Watts            |
|-----------------------------------------------------------------------------------------------------------------|----------------|---------------|------------------|
| Steady State Power Dissipation at $T_L = 75^\circ\text{C}$<br>Lead Lengths 0.375", (9.5mm) (Note2)              | $P_D$          | 1.0           | Watt             |
| Peak Forward Surge Current, 8.3ms Single Half<br>Sine-Wave Superimposed on Rated Load<br>(JEDEC Method) (Note3) | $I_{FSM}$      | 40            | Amps.            |
| Operating and Storage Temperature Range                                                                         | $T_J, T_{STG}$ | - 65 to + 175 | $^\circ\text{C}$ |

**Note :**



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## ELECTRICAL CHARACTERISTICS

Rating at = 25 °C ambient temperature unless otherwise specified

| TYPE     | Breakdown Voltage @ It<br>( Note 1 ) |      |      | Working Peak<br>Reverse<br>Voltage | Maximum<br>Reverse Leakage<br>@ VRWM | Maximum<br>Reverse<br>Current | Maximum<br>Clamping<br>Voltage @ IRSM | Maximum<br>Temperature<br>Co-efficient<br>of VBR |      |      |      |      |
|----------|--------------------------------------|------|------|------------------------------------|--------------------------------------|-------------------------------|---------------------------------------|--------------------------------------------------|------|------|------|------|
|          | VBR (V)                              |      | It   |                                    |                                      |                               |                                       |                                                  | VRWM | IR   | IRSM | VRSM |
|          | Min.                                 | Max. | (mA) |                                    |                                      |                               |                                       |                                                  | (V)  | ( A) | (A)  | (V)  |
| P4KE6.8  | 6.12                                 | 7.48 | 10   | 5.50                               | 1000                                 | 38.0                          | 10.8                                  | 0.057                                            |      |      |      |      |
| P4KE6.8A | 6.45                                 | 7.14 | 10   | 5.80                               | 1000                                 | 40.0                          | 10.5                                  | 0.057                                            |      |      |      |      |
| P4KE7.5  | 6.75                                 | 8.25 | 10   | 6.05                               | 500                                  | 36.0                          | 11.7                                  | 0.061                                            |      |      |      |      |
| P4KE7.5A | 7.13                                 | 7.88 | 10   | 6.40                               | 500                                  | 37.0                          | 11.3                                  | 0.061                                            |      |      |      |      |
| P4KE8.2  | 7.38                                 | 9.02 | 10   | 6.63                               | 200                                  | 33.0                          | 12.5                                  | 0.065                                            |      |      |      |      |
| P4KE8.2A | 7.79                                 | 8.61 | 10   | 7.02                               | 200                                  | 35.0                          | 12.1                                  | 0.065                                            |      |      |      |      |
| P4KE9.1  | 8.19                                 | 10.0 | 1.0  | 7.37                               | 50                                   | 30.0                          | 13.8                                  | 0.068                                            |      |      |      |      |
| P4KE9.1A | 8.65                                 | 9.55 | 1.0  | 7.78                               | 50                                   | 31.0                          | 13.4                                  | 0.068                                            |      |      |      |      |
| P4KE10   | 9.00                                 | 11.0 | 1.0  | 8.10                               | 10                                   | 28.0                          | 15.0                                  | 0.073                                            |      |      |      |      |
| P4KE10A  | 9.50                                 | 10.5 | 1.0  | 8.55                               | 10                                   | 29.0                          | 14.5                                  | 0.073                                            |      |      |      |      |
| P4KE11   | 9.90                                 | 12.1 | 1.0  | 8.92                               | 5.0                                  | 26.0                          | 16.2                                  | 0.075                                            |      |      |      |      |
| P4KE11A  | 10.5                                 | 11.6 | 1.0  | 9.40                               | 5.0                                  | 27.0                          | 15.6                                  | 0.075                                            |      |      |      |      |
| P4KE12   | 10.8                                 | 13.2 | 1.0  | 9.72                               | 5.0                                  | 24.0                          | 17.3                                  | 0.078                                            |      |      |      |      |
| P4KE12A  | 11.4                                 | 12.6 | 1.0  | 10.2                               | 5.0                                  | 25.0                          | 16.7                                  | 0.078                                            |      |      |      |      |
| P4KE13   | 11.7                                 | 14.3 | 1.0  | 10.5                               | 5.0                                  | 22.0                          | 19.0                                  | 0.081                                            |      |      |      |      |
| P4KE13A  | 12.4                                 | 13.7 | 1.0  | 11.1                               | 5.0                                  | 23.0                          | 18.2                                  | 0.081                                            |      |      |      |      |
| P4KE15   | 13.5                                 | 16.5 | 1.0  | 12.1                               | 5.0                                  | 19.0                          | 22.0                                  | 0.084                                            |      |      |      |      |
| P4KE15A  | 14.3                                 | 15.8 | 1.0  | 12.8                               | 5.0                                  | 20.0                          | 21.2                                  | 0.084                                            |      |      |      |      |
| P4KE16   | 14.4                                 | 17.6 | 1.0  | 12.9                               | 5.0                                  | 18.0                          | 23.5                                  | 0.086                                            |      |      |      |      |
| P4KE16A  | 15.2                                 | 16.8 | 1.0  | 13.6                               | 5.0                                  | 19.0                          | 22.5                                  | 0.086                                            |      |      |      |      |
| P4KE17   | 15.3                                 | 18.7 | 1.0  | 13.7                               | 5.0                                  | 17.0                          | 25.0                                  | 0.087                                            |      |      |      |      |
| P4KE17A  | 16.2                                 | 17.9 | 1.0  | 14.5                               | 5.0                                  | 18.0                          | 24.0                                  | 0.087                                            |      |      |      |      |
| P4KE18   | 16.2                                 | 19.8 | 1.0  | 14.5                               | 5.0                                  | 16.0                          | 26.5                                  | 0.088                                            |      |      |      |      |
| P4KE18A  | 17.1                                 | 18.9 | 1.0  | 15.3                               | 5.0                                  | 17.0                          | 25.5                                  | 0.088                                            |      |      |      |      |
| P4KE20   | 18.0                                 | 22.0 | 1.0  | 16.2                               | 5.0                                  | 14.0                          | 29.1                                  | 0.090                                            |      |      |      |      |
| P4KE20A  | 19.0                                 | 21.0 | 1.0  | 17.1                               | 5.0                                  | 15.0                          | 27.7                                  | 0.090                                            |      |      |      |      |
| P4KE22   | 19.8                                 | 24.2 | 1.0  | 17.8                               | 5.0                                  | 13.0                          | 31.9                                  | 0.092                                            |      |      |      |      |
| P4KE22A  | 20.9                                 | 23.1 | 1.0  | 18.8                               | 5.0                                  | 14.0                          | 30.6                                  | 0.092                                            |      |      |      |      |
| P4KE24   | 21.6                                 | 26.4 | 1.0  | 19.4                               | 5.0                                  | 12.0                          | 34.7                                  | 0.094                                            |      |      |      |      |
| P4KE24A  | 22.8                                 | 25.2 | 1.0  | 20.5                               | 5.0                                  | 13.0                          | 33.2                                  | 0.094                                            |      |      |      |      |
| P4KE27   | 24.3                                 | 29.7 | 1.0  | 21.8                               | 5.0                                  | 11.0                          | 39.1                                  | 0.096                                            |      |      |      |      |
| P4KE27A  | 25.7                                 | 28.4 | 1.0  | 23.1                               | 5.0                                  | 11.2                          | 37.5                                  | 0.096                                            |      |      |      |      |
| P4KE30   | 27.0                                 | 33.0 | 1.0  | 24.3                               | 5.0                                  | 10.0                          | 43.5                                  | 0.097                                            |      |      |      |      |
| P4KE30A  | 28.5                                 | 31.5 | 1.0  | 25.6                               | 5.0                                  | 10.0                          | 41.4                                  | 0.097                                            |      |      |      |      |
| P4KE33   | 29.7                                 | 36.3 | 1.0  | 26.8                               | 5.0                                  | 9.0                           | 47.7                                  | 0.098                                            |      |      |      |      |
| P4KE33A  | 31.4                                 | 34.7 | 1.0  | 28.2                               | 5.0                                  | 9.0                           | 45.7                                  | 0.098                                            |      |      |      |      |
| P4KE36   | 32.4                                 | 39.6 | 1.0  | 29.1                               | 5.0                                  | 8.0                           | 52.0                                  | 0.099                                            |      |      |      |      |
| P4KE36A  | 34.2                                 | 37.8 | 1.0  | 30.8                               | 5.0                                  | 8.4                           | 49.9                                  | 0.099                                            |      |      |      |      |
| P4KE39   | 35.1                                 | 42.9 | 1.0  | 31.6                               | 5.0                                  | 7.4                           | 56.4                                  | 0.100                                            |      |      |      |      |
| P4KE39A  | 37.1                                 | 41.0 | 1.0  | 33.3                               | 5.0                                  | 7.8                           | 53.9                                  | 0.100                                            |      |      |      |      |
| P4KE43   | 38.7                                 | 47.3 | 1.0  | 34.8                               | 5.0                                  | 6.8                           | 61.9                                  | 0.101                                            |      |      |      |      |
| P4KE43A  | 40.9                                 | 45.2 | 1.0  | 36.8                               | 5.0                                  | 7.1                           | 59.3                                  | 0.101                                            |      |      |      |      |
| P4KE47   | 42.3                                 | 51.7 | 1.0  | 38.1                               | 5.0                                  | 6.2                           | 67.8                                  | 0.101                                            |      |      |      |      |
| P4KE47A  | 44.7                                 | 49.4 | 1.0  | 40.2                               | 5.0                                  | 6.5                           | 64.8                                  | 0.101                                            |      |      |      |      |
| P4KE51   | 45.9                                 | 56.1 | 1.0  | 41.3                               | 5.0                                  | 5.7                           | 73.5                                  | 0.102                                            |      |      |      |      |
| P4KE51A  | 48.5                                 | 53.6 | 1.0  | 43.6                               | 5.0                                  | 6.0                           | 70.1                                  | 0.102                                            |      |      |      |      |
| P4KE56   | 50.4                                 | 61.6 | 1.0  | 45.4                               | 5.0                                  | 5.2                           | 80.5                                  | 0.103                                            |      |      |      |      |
| P4KE56A  | 53.2                                 | 58.8 | 1.0  | 47.8                               | 5.0                                  | 5.5                           | 77.0                                  | 0.103                                            |      |      |      |      |

## ELECTRICAL CHARACTERISTICS

Rating at = 25 °C ambient temperature unless otherwise specified

| TYPE     | Breakdown Voltage @ $I_t$<br>( Note 1 ) |      |       | Working Peak<br>Reverse<br>Voltage<br>$V_{RWM}$ | Maximum<br>Reverse Leakage<br>@ $V_{RWM}$<br>$I_R$ | Maximum<br>Reverse<br>Current<br>$I_{RSM}$ | Maximum<br>Clamping<br>Voltage @ $I_{RSM}$<br>$V_{RSM}$ | Maximum<br>Temperature<br>Co-efficient |       |           |           |             |
|----------|-----------------------------------------|------|-------|-------------------------------------------------|----------------------------------------------------|--------------------------------------------|---------------------------------------------------------|----------------------------------------|-------|-----------|-----------|-------------|
|          | $V_{BR}$ (V)                            |      | $I_t$ |                                                 |                                                    |                                            |                                                         | $V_{RWM}$                              | $I_R$ | $I_{RSM}$ | $V_{RSM}$ | of $V_{BR}$ |
|          | Min.                                    | Max. | (mA)  |                                                 |                                                    |                                            |                                                         | (V)                                    | ( A ) | (A)       | (V)       | (% / °C)    |
| P4KE62   | 55.8                                    | 68.2 | 1.0   | 50.2                                            | 5.0                                                | 4.7                                        | 89.0                                                    | 0.104                                  |       |           |           |             |
| P4KE62A  | 58.9                                    | 65.1 | 1.0   | 53.0                                            | 5.0                                                | 5.0                                        | 85.0                                                    | 0.104                                  |       |           |           |             |
| P4KE68   | 61.2                                    | 74.8 | 1.0   | 55.1                                            | 5.0                                                | 4.3                                        | 98.0                                                    | 0.104                                  |       |           |           |             |
| P4KE68A  | 64.6                                    | 71.4 | 1.0   | 58.1                                            | 5.0                                                | 4.6                                        | 92.0                                                    | 0.104                                  |       |           |           |             |
| P4KE75   | 67.5                                    | 82.5 | 1.0   | 60.7                                            | 5.0                                                | 3.9                                        | 108                                                     | 0.105                                  |       |           |           |             |
| P4KE75A  | 71.3                                    | 78.8 | 1.0   | 64.1                                            | 5.0                                                | 4.1                                        | 103                                                     | 0.105                                  |       |           |           |             |
| P4KE82   | 73.8                                    | 90.2 | 1.0   | 66.4                                            | 5.0                                                | 3.6                                        | 118                                                     | 0.105                                  |       |           |           |             |
| P4KE82A  | 77.9                                    | 86.1 | 1.0   | 70.1                                            | 5.0                                                | 3.7                                        | 113                                                     | 0.105                                  |       |           |           |             |
| P4KE91   | 81.9                                    | 100  | 1.0   | 73.7                                            | 5.0                                                | 3.2                                        | 131                                                     | 0.106                                  |       |           |           |             |
| P4KE91A  | 86.5                                    | 95.5 | 1.0   | 77.8                                            | 5.0                                                | 3.4                                        | 125                                                     | 0.106                                  |       |           |           |             |
| P4KE100  | 90.0                                    | 110  | 1.0   | 81.0                                            | 5.0                                                | 2.9                                        | 144                                                     | 0.106                                  |       |           |           |             |
| P4KE100A | 95.0                                    | 105  | 1.0   | 85.5                                            | 5.0                                                | 3.1                                        | 137                                                     | 0.106                                  |       |           |           |             |
| P4KE110  | 99.0                                    | 121  | 1.0   | 89.2                                            | 5.0                                                | 2.7                                        | 158                                                     | 0.107                                  |       |           |           |             |
| P4KE110A | 105                                     | 116  | 1.0   | 94.0                                            | 5.0                                                | 2.8                                        | 152                                                     | 0.107                                  |       |           |           |             |
| P4KE120  | 108                                     | 132  | 1.0   | 97.2                                            | 5.0                                                | 2.4                                        | 173                                                     | 0.107                                  |       |           |           |             |
| P4KE120A | 114                                     | 126  | 1.0   | 102                                             | 5.0                                                | 2.5                                        | 165                                                     | 0.107                                  |       |           |           |             |
| P4KE130  | 117                                     | 143  | 1.0   | 105                                             | 5.0                                                | 2.2                                        | 187                                                     | 0.107                                  |       |           |           |             |
| P4KE130A | 124                                     | 137  | 1.0   | 111                                             | 5.0                                                | 2.3                                        | 179                                                     | 0.107                                  |       |           |           |             |
| P4KE150  | 135                                     | 165  | 1.0   | 121                                             | 5.0                                                | 2.0                                        | 215                                                     | 0.108                                  |       |           |           |             |
| P4KE150A | 143                                     | 158  | 1.0   | 128                                             | 5.0                                                | 2.0                                        | 207                                                     | 0.108                                  |       |           |           |             |
| P4KE160  | 144                                     | 176  | 1.0   | 130                                             | 5.0                                                | 1.8                                        | 230                                                     | 0.108                                  |       |           |           |             |
| P4KE160A | 152                                     | 168  | 1.0   | 136                                             | 5.0                                                | 1.9                                        | 219                                                     | 0.108                                  |       |           |           |             |
| P4KE170  | 153                                     | 187  | 1.0   | 138                                             | 5.0                                                | 1.7                                        | 244                                                     | 0.108                                  |       |           |           |             |
| P4KE170A | 162                                     | 179  | 1.0   | 145                                             | 5.0                                                | 1.8                                        | 234                                                     | 0.108                                  |       |           |           |             |
| P4KE180  | 162                                     | 198  | 1.0   | 146                                             | 5.0                                                | 1.6                                        | 258                                                     | 0.108                                  |       |           |           |             |
| P4KE180A | 171                                     | 189  | 1.0   | 154                                             | 5.0                                                | 1.7                                        | 246                                                     | 0.108                                  |       |           |           |             |
| P4KE200  | 180                                     | 220  | 1.0   | 162                                             | 5.0                                                | 1.5                                        | 287                                                     | 0.108                                  |       |           |           |             |
| P4KE200A | 190                                     | 210  | 1.0   | 171                                             | 5.0                                                | 1.53                                       | 274                                                     | 0.108                                  |       |           |           |             |
| P4KE220  | 198                                     | 242  | 1.0   | 175                                             | 5.0                                                | 1.16                                       | 344                                                     | 0.108                                  |       |           |           |             |
| P4KE220A | 209                                     | 231  | 1.0   | 185                                             | 5.0                                                | 1.22                                       | 328                                                     | 0.108                                  |       |           |           |             |
| P4KE250  | 225                                     | 275  | 1.0   | 202                                             | 5.0                                                | 1.11                                       | 360                                                     | 0.110                                  |       |           |           |             |
| P4KE250A | 237                                     | 263  | 1.0   | 214                                             | 5.0                                                | 1.16                                       | 344                                                     | 0.110                                  |       |           |           |             |
| P4KE300  | 270                                     | 330  | 1.0   | 243                                             | 5.0                                                | 0.93                                       | 430                                                     | 0.110                                  |       |           |           |             |
| P4KE300A | 285                                     | 315  | 1.0   | 256                                             | 5.0                                                | 0.97                                       | 414                                                     | 0.110                                  |       |           |           |             |
| P4KE350  | 315                                     | 385  | 1.0   | 284                                             | 5.0                                                | 0.79                                       | 504                                                     | 0.110                                  |       |           |           |             |
| P4KE350A | 332                                     | 368  | 1.0   | 300                                             | 5.0                                                | 0.83                                       | 482                                                     | 0.110                                  |       |           |           |             |
| P4KE400  | 360                                     | 440  | 1.0   | 324                                             | 5.0                                                | 0.70                                       | 574                                                     | 0.110                                  |       |           |           |             |
| P4KE400A | 380                                     | 420  | 1.0   | 342                                             | 5.0                                                | 0.73                                       | 548                                                     | 0.110                                  |       |           |           |             |
| P4KE440  | 396                                     | 484  | 1.0   | 356                                             | 5.0                                                | 0.95                                       | 631                                                     | 0.110                                  |       |           |           |             |
| P4KE440A | 418                                     | 462  | 1.0   | 376                                             | 5.0                                                | 1.00                                       | 602                                                     | 0.110                                  |       |           |           |             |

( 1 )  $V_{BR}$  measured after  $I_t$  applied for 300 s.,  $I_t$  = square wave pulse or equivalent.

( 2 )  $V_F$  = 3.5  $V_{max}$ ,  $I_F$  = 25 Amps. ( 6.8 Volts thru 91Volts )

$V_F$  = 5.0  $V_{max}$ ,  $I_F$  = 25 Amps. ( 100 Volts thru 440 Volts ) per 1/2 square or equivalent sine wave.

PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

( 3 ) For Bipolar types having  $V_R$  of 10 Volts and under, the  $I_R$  limit is doubled.

## RATING AND CHARACTERISTIC CURVES ( P4KE SERIES )

FIG.1 - PULSE DERATING CURVE

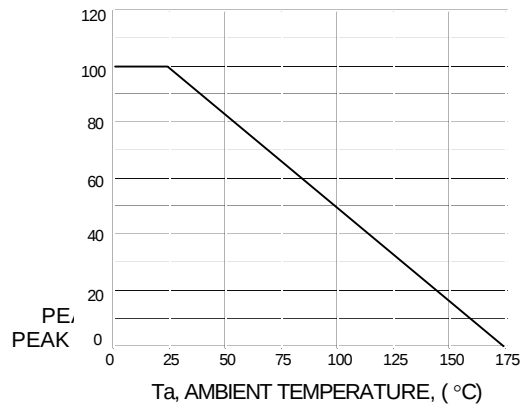


FIG.2 - MAXIMUM NON-REPETITIVE SURGE CURRENT

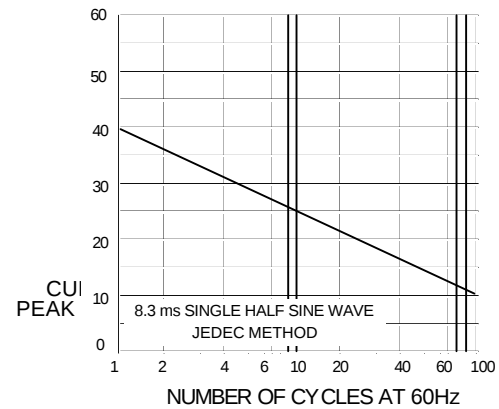


FIG.3 - STEADY STATE POWER DERATING

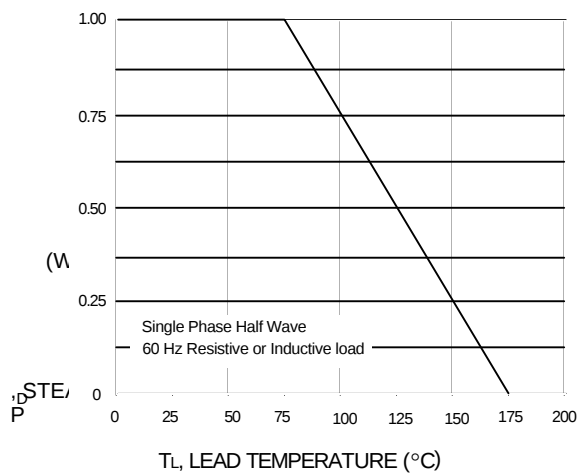


FIG.4 - PULSE RATING CURVE

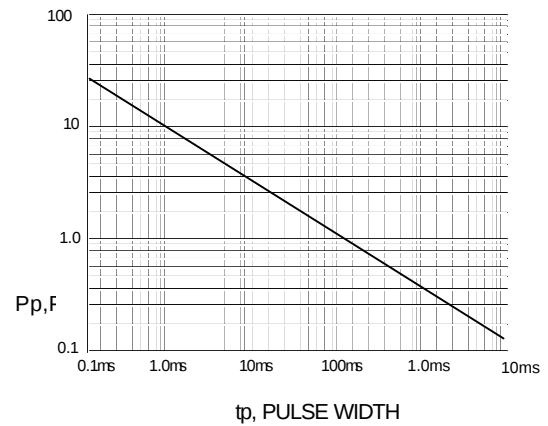


FIG.5 - PULSE WAVEFORM

