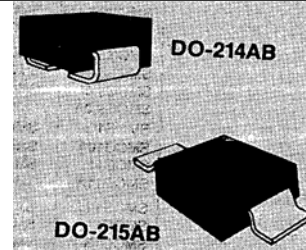


**TRANSIENT VOLTAGE SUPPRESSORS**
**DESCRIPTION**

These surface mount Transient Voltage Suppressors (TVSs) are used for protecting sensitive components requiring low clamping voltage levels. They are rated at high current impulses typically generated by inductive switching transients. They are also optionally available as RoHS Compliant (annealed matte-Tin finish) with an e3 suffix added to the part number. Other benefits are achieved with low-profile surface mount J-bend or Gull-wing terminals for stress-relief and lower weight. Its low-flat profile provides easier insertion or automatic handling benefits compared to other MELF style packages. Options for screening to avionics grade with MA prefix or similar to JAN, JANTX, JANTXV, and JANS by using MQ, MX, MV or MSP respectively for part number prefixes for screening in accordance with MIL-PRF-19500/500.

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

**APPEARANCE**

**FEATURES**

- Reliability data per JESD22-A108, JESD22-A104, JESD22-A113-B, JESD22-A101-B, and JESD22-A102
- Thermally efficient surface mount with J-bends or Gull wings termination for stress relief (flat handling surface and easier placement)
- Optional 100% screening for avionics grade available by adding MA prefix to part number for added 100% temperature cycle -55°C to +125°C (10X), surge (3X), 24 hours HTRB and post test ( $V_{BR}$  and  $I_D$ )
- Options for screening in accordance with MIL-PRF-19500/500 for JAN, JANTX, and JANTXV are available by adding MQ, MX, or MV prefixes respectively to part numbers. For example, designate a MXSMCJ5629A for a JANTX screen.
- RoHS Compliant devices available by adding "e3" suffix

**APPLICATIONS / BENEFITS**

- Working Standoff Voltages: 5.5 volts to 171 volts
- Metallurgically bonded
- For high reliability transient voltage suppression in low profile surface mount locations requiring easy placement and strain relief
- Light weight for airborne or satellite applications
- Superior surge quality to protect from ESD and EFT transients per IEC61000-4-2 and -4-4
- Lightning surge protection per IEC61000-4-5 for Class 1 and 2 with source impedance of 42 Ohms as well as Class 3 and 4 selectively at lower voltages ( $V_{WM}$ ) and higher surge current ( $I_{PP}$ ) ratings herein
- Protects sensitive components such as ICs, CMOS, Bipolar, BiCMOS, ECL, DTL,  $T^2L$ , etc.

**MAXIMUM RATINGS**

- Operating temperature: -55°C to +150°C
- Storage temperature: -55°C to +150°C
- 1500 Watts of Peak Pulse Power at 10/1000  $\mu$ s as shown in Figure 3 (see Figure 1 for other  $t_P$  values)
- Thermal resistance: 20°C/W Junction to Lead
- Impulse repetition rate (duty factor): 0.01%
- 5.0 Watt steady-state maximum power at  $T_L = 25^\circ\text{C}$
- $t_{clamping}$  (0V to  $V_{(BR)}$  min): 50 picoseconds max (theoretical)
- Forward voltage  $V_F$  @ 100 Amps 8.3 ms: 3.5 V max.
- Solder Temperature: 260 °C for 10 s maximum

**MECHANICAL AND PACKAGING**

- Molded epoxy package meets UL94V-0
- Terminals: Tin-Lead or RoHS Compliant annealed matte-Tin plating solderable per MIL-STD-750, method 2026
- Body marked with P/N without SMCJ or SMCG letters (ie. 5629A, 5640, 5655A, 5662, 5665A, etc.)
- Cathode indicated by band
- Weight: 0.25 grams (approximate)
- Tape & Reel packaging per EIA-481 (2500 units/reel)

**ELECTRICAL CHARACTERISTICS @ 25°C**

| MICROSEMI<br>Part Number | MICROSEMI<br>Part Number | Breakdown<br>Voltage*<br>( $V_{BR}$ ) |      | Test<br>Current<br>( $I_{(BR)}$ ) | Rated<br>Standoff<br>Voltage<br>( $V_{WM}$ ) | Maximum<br>Standby<br>Current<br>( $I_D$ at $V_{WM}$ ) | Maximum Peak<br>Reverse Voltage<br>( $V_C$ max. at $I_{PP}$ ) | Maximum Peak<br>Pulse Current<br>( $I_{PP}$ ) |
|--------------------------|--------------------------|---------------------------------------|------|-----------------------------------|----------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------|
|                          |                          | MIN.                                  | MAX. |                                   |                                              |                                                        |                                                               |                                               |
| Modified<br>"G"          | Modified<br>"J"          |                                       |      |                                   |                                              |                                                        |                                                               |                                               |
| Bend Lead                | Bend Lead                | Vdc                                   | Vdc  | mAdc                              | V                                            | $\mu$ Adc                                              | V                                                             | A                                             |
| SMCG5629                 | SMCJ5629                 | 6.12                                  | 7.48 | 10                                | 5.50                                         | 1000                                                   | 10.8                                                          | 139                                           |
| SMCG5629A                | SMCJ5629A                | 6.45                                  | 7.14 | 10                                | 5.80                                         | 1000                                                   | 10.5                                                          | 143                                           |
| SMCG5630                 | SMCJ5630                 | 6.75                                  | 8.25 | 10                                | 6.05                                         | 500                                                    | 11.7                                                          | 128                                           |
| SMCG5630A                | SMCJ5630A                | 7.13                                  | 7.88 | 10                                | 6.40                                         | 500                                                    | 11.3                                                          | 132                                           |
| SMCG5631                 | SMCJ5631                 | 7.38                                  | 9.02 | 10                                | 6.63                                         | 200                                                    | 12.5                                                          | 120                                           |
| SMCG5631A                | SMCJ5631A                | 7.79                                  | 8.61 | 10                                | 7.02                                         | 200                                                    | 12.1                                                          | 124                                           |
| SMCG5632                 | SMCJ5632                 | 8.19                                  | 10.0 | 1                                 | 7.37                                         | 50                                                     | 13.8                                                          | 109                                           |
| SMCG5632A                | SMCJ5632A                | 8.65                                  | 9.55 | 1                                 | 7.78                                         | 50                                                     | 13.4                                                          | 112                                           |
| SMCG5633                 | SMCJ5633                 | 9.00                                  | 11.0 | 1                                 | 8.10                                         | 10                                                     | 15.0                                                          | 100                                           |
| SMCG5633A                | SMCJ5633A                | 9.5                                   | 10.5 | 1                                 | 8.55                                         | 10                                                     | 14.5                                                          | 103                                           |
| SMCG5634                 | SMCJ5634                 | 9.9                                   | 12.1 | 1                                 | 8.92                                         | 5                                                      | 16.2                                                          | 93                                            |
| SMCG5634A                | SMCJ5634A                | 10.5                                  | 11.6 | 1                                 | 9.40                                         | 5                                                      | 15.6                                                          | 96                                            |

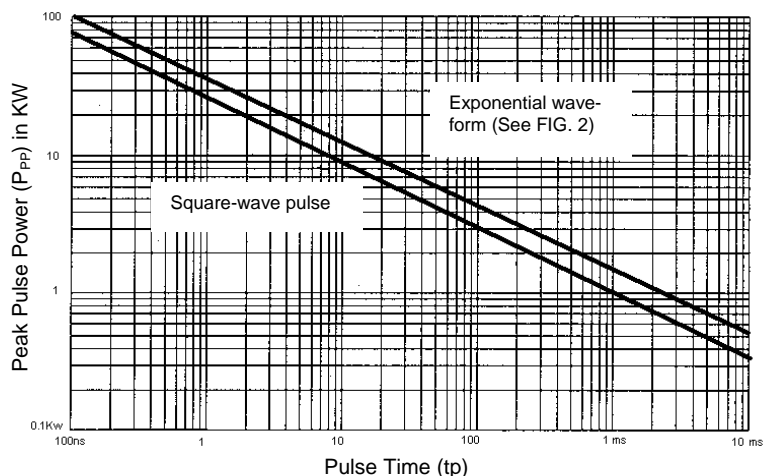
**TRANSIENT VOLTAGE SUPPRESSORS**

| MICROSEMI<br>Part Number     | MICROSEMI<br>Part Number     | Breakdown<br>Voltage*<br>(V <sub>BR</sub> ) |       | Test<br>Current<br>(I <sub>BR</sub> ) | Rated<br>Standoff<br>Voltage<br>(V <sub>WM</sub> ) | Maximum<br>Standby<br>Current<br>(I <sub>D</sub> at V <sub>WM</sub> ) | Maximum Peak<br>Reverse Voltage<br>(V <sub>C</sub> max. at I <sub>PP</sub> ) | Maximum Peak<br>Pulse Current<br>(I <sub>PP</sub> ) |
|------------------------------|------------------------------|---------------------------------------------|-------|---------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------------------------------------|
|                              |                              | MIN.                                        | MAX.  |                                       |                                                    |                                                                       |                                                                              |                                                     |
| Modified<br>"G"<br>Bend Lead | Modified<br>"J"<br>Bend Lead | Vdc                                         | Vdc   | mAdc                                  | V                                                  | μAdc                                                                  | V                                                                            | A                                                   |
| SMCG5635                     | SMCJ5635                     | 10.8                                        | 13.2  | 1                                     | 9.72                                               | 5                                                                     | 17.3                                                                         | 87                                                  |
| SMCG5635A                    | SMCJ5635A                    | 11.4                                        | 12.6  | 1                                     | 10.2                                               | 5                                                                     | 16.7                                                                         | 90                                                  |
| SMCG5636                     | SMCJ5636                     | 11.7                                        | 14.3  | 1                                     | 10.5                                               | 5                                                                     | 19.0                                                                         | 79                                                  |
| SMCG5636A                    | SMCJ5636A                    | 12.4                                        | 13.7  | 1                                     | 11.1                                               | 5                                                                     | 18.2                                                                         | 82                                                  |
| SMCG5637                     | SMCJ5637                     | 13.5                                        | 16.5  | 1                                     | 12.1                                               | 5                                                                     | 22.0                                                                         | 68                                                  |
| SMCG5637A                    | SMCJ5637A                    | 14.3                                        | 15.8  | 1                                     | 12.8                                               | 5                                                                     | 21.2                                                                         | 71                                                  |
| SMCG5638                     | SMCJ5638                     | 14.4                                        | 17.6  | 1                                     | 12.9                                               | 5                                                                     | 23.5                                                                         | 64                                                  |
| SMCG5638A                    | SMCJ5638A                    | 15.2                                        | 16.8  | 1                                     | 13.6                                               | 5                                                                     | 22.5                                                                         | 67                                                  |
| SMCG5639                     | SMCJ5639                     | 16.2                                        | 19.8  | 1                                     | 14.5                                               | 5                                                                     | 26.5                                                                         | 56.5                                                |
| SMCG5639A                    | SMCJ5639A                    | 17.1                                        | 18.9  | 1                                     | 15.3                                               | 5                                                                     | 25.2                                                                         | 59.5                                                |
| SMCG5640                     | SMCJ5640                     | 18.0                                        | 22.0  | 1                                     | 16.2                                               | 5                                                                     | 29.1                                                                         | 51.5                                                |
| SMCG5640A                    | SMCJ5640A                    | 19.0                                        | 21.0  | 1                                     | 17.1                                               | 5                                                                     | 27.7                                                                         | 54                                                  |
| SMCG5641                     | SMCJ5641                     | 19.8                                        | 24.2  | 1                                     | 17.8                                               | 5                                                                     | 31.9                                                                         | 47                                                  |
| SMCG5641A                    | SMCJ5641A                    | 20.9                                        | 23.1  | 1                                     | 18.8                                               | 5                                                                     | 30.6                                                                         | 49                                                  |
| SMCG5642                     | SMCJ5642                     | 21.6                                        | 26.4  | 1                                     | 19.4                                               | 5                                                                     | 34.7                                                                         | 43                                                  |
| SMCG5642A                    | SMCJ5642A                    | 22.8                                        | 25.2  | 1                                     | 20.5                                               | 5                                                                     | 33.2                                                                         | 45                                                  |
| SMCG5643                     | SMCJ5643                     | 24.3                                        | 29.7  | 1                                     | 21.8                                               | 5                                                                     | 39.1                                                                         | 38.5                                                |
| SMCG5643A                    | SMCJ5643A                    | 25.7                                        | 28.4  | 1                                     | 23.1                                               | 5                                                                     | 37.5                                                                         | 40                                                  |
| SMCG5644                     | SMCJ5644                     | 27.0                                        | 33.0  | 1                                     | 24.3                                               | 5                                                                     | 43.5                                                                         | 34.5                                                |
| SMCG5644A                    | SMCJ5644A                    | 28.5                                        | 31.5  | 1                                     | 25.6                                               | 5                                                                     | 41.4                                                                         | 36                                                  |
| SMCG5645                     | SMCJ5645                     | 29.7                                        | 36.3  | 1                                     | 26.8                                               | 5                                                                     | 47.7                                                                         | 31.5                                                |
| SMCG5645A                    | SMCJ5645A                    | 31.4                                        | 34.7  | 1                                     | 28.2                                               | 5                                                                     | 45.7                                                                         | 33                                                  |
| SMCG5646                     | SMCJ5646                     | 32.4                                        | 39.6  | 1                                     | 29.1                                               | 5                                                                     | 52.0                                                                         | 29                                                  |
| SMCG5646A                    | SMCJ5646A                    | 34.2                                        | 37.8  | 1                                     | 30.8                                               | 5                                                                     | 49.9                                                                         | 30                                                  |
| SMCG5647                     | SMCJ5647                     | 35.1                                        | 42.9  | 1                                     | 31.6                                               | 5                                                                     | 56.4                                                                         | 26.5                                                |
| SMCG5647A                    | SMCJ5647A                    | 37.1                                        | 41.0  | 1                                     | 33.3                                               | 5                                                                     | 53.9                                                                         | 28                                                  |
| SMCG5648                     | SMCJ5648                     | 38.7                                        | 47.3  | 1                                     | 34.8                                               | 5                                                                     | 61.9                                                                         | 24                                                  |
| SMCG5648A                    | SMCJ5648A                    | 40.9                                        | 45.2  | 1                                     | 36.8                                               | 5                                                                     | 59.3                                                                         | 25.3                                                |
| SMCG5649                     | SMCJ5649                     | 42.3                                        | 51.7  | 1                                     | 38.1                                               | 5                                                                     | 67.8                                                                         | 22.2                                                |
| SMCG5649A                    | SMCJ5649A                    | 44.7                                        | 49.4  | 1                                     | 40.2                                               | 5                                                                     | 64.8                                                                         | 23.2                                                |
| SMCG5650                     | SMCJ5650                     | 45.9                                        | 56.1  | 1                                     | 41.3                                               | 5                                                                     | 73.5                                                                         | 20.4                                                |
| SMCG5650A                    | SMCJ5650A                    | 48.5                                        | 53.6  | 1                                     | 43.6                                               | 5                                                                     | 70.1                                                                         | 21.4                                                |
| SMCG5651                     | SMCJ5651                     | 50.4                                        | 61.6  | 1                                     | 45.4                                               | 5                                                                     | 80.5                                                                         | 18.6                                                |
| SMCG5651A                    | SMCJ5651A                    | 53.2                                        | 58.8  | 1                                     | 47.8                                               | 5                                                                     | 77.0                                                                         | 19.5                                                |
| SMCG5652                     | SMCJ5652                     | 55.8                                        | 68.2  | 1                                     | 50.2                                               | 5                                                                     | 89.0                                                                         | 16.9                                                |
| SMCG5652A                    | SMCJ5652A                    | 58.9                                        | 65.1  | 1                                     | 53.0                                               | 5                                                                     | 85.0                                                                         | 17.7                                                |
| SMCG5653                     | SMCJ5653                     | 61.2                                        | 74.8  | 1                                     | 55.1                                               | 5                                                                     | 98.0                                                                         | 15.3                                                |
| SMCG5653A                    | SMCJ5653A                    | 64.6                                        | 71.4  | 1                                     | 58.1                                               | 5                                                                     | 92.0                                                                         | 16.3                                                |
| SMCG5654                     | SMCJ5654                     | 67.5                                        | 82.5  | 1                                     | 60.7                                               | 5                                                                     | 108                                                                          | 13.9                                                |
| SMCG5654A                    | SMCJ5654A                    | 71.3                                        | 78.8  | 1                                     | 64.1                                               | 5                                                                     | 103                                                                          | 14.6                                                |
| SMCG5655                     | SMCJ5655                     | 73.8                                        | 90.2  | 1                                     | 66.4                                               | 5                                                                     | 118                                                                          | 12.7                                                |
| SMCG5655A                    | SMCJ5655A                    | 77.9                                        | 86.1  | 1                                     | 70.1                                               | 5                                                                     | 113                                                                          | 13.3                                                |
| SMCG5656                     | SMCJ5656                     | 81.9                                        | 100.0 | 1                                     | 73.7                                               | 5                                                                     | 131                                                                          | 11.4                                                |
| SMCG5656A                    | SMCJ5656A                    | 86.5                                        | 95.5  | 1                                     | 77.8                                               | 5                                                                     | 125                                                                          | 12.0                                                |
| SMCG5657                     | SMCJ5657                     | 90                                          | 110   | 1                                     | 81.0                                               | 5                                                                     | 144                                                                          | 10.4                                                |
| SMCG5657A                    | SMCJ5657A                    | 95                                          | 105   | 1                                     | 85.5                                               | 5                                                                     | 137                                                                          | 11.0                                                |
| SMCG5658                     | SMCJ5658                     | 99                                          | 121   | 1                                     | 89.2                                               | 5                                                                     | 158                                                                          | 9.5                                                 |
| SMCG5658A                    | SMCJ5658A                    | 105                                         | 116   | 1                                     | 94.0                                               | 5                                                                     | 152                                                                          | 9.9                                                 |
| SMCG5659                     | SMCJ5659                     | 108                                         | 132   | 1                                     | 97.2                                               | 5                                                                     | 173                                                                          | 8.7                                                 |
| SMCG5659A                    | SMCJ5659A                    | 114                                         | 126   | 1                                     | 102                                                | 5                                                                     | 165                                                                          | 9.1                                                 |
| SMCG5660                     | SMCJ5660                     | 117                                         | 143   | 1                                     | 105                                                | 5                                                                     | 187                                                                          | 8.0                                                 |
| SMCG5660A                    | SMCJ5660A                    | 124                                         | 137   | 1                                     | 111                                                | 5                                                                     | 179                                                                          | 8.4                                                 |
| SMCG5661                     | SMCJ5661                     | 135                                         | 165   | 1                                     | 121                                                | 5                                                                     | 215                                                                          | 7.0                                                 |
| SMCG5661A                    | SMCJ5661A                    | 143                                         | 158   | 1                                     | 128                                                | 5                                                                     | 207                                                                          | 7.2                                                 |
| SMCG5662                     | SMCJ5662                     | 144                                         | 176   | 1                                     | 130                                                | 5                                                                     | 230                                                                          | 6.5                                                 |
| SMCG5662A                    | SMCJ5662A                    | 152                                         | 168   | 1                                     | 136                                                | 5                                                                     | 219                                                                          | 6.8                                                 |
| SMCG5663                     | SMCJ5663                     | 153                                         | 187   | 1                                     | 138                                                | 5                                                                     | 244                                                                          | 6.2                                                 |
| SMCG5663A                    | SMCJ5663A                    | 162                                         | 179   | 1                                     | 145                                                | 5                                                                     | 234                                                                          | 6.4                                                 |
| SMCG5664                     | SMCJ5664                     | 162                                         | 198   | 1                                     | 146                                                | 5                                                                     | 258                                                                          | 5.8                                                 |
| SMCG5664A                    | SMCJ5664A                    | 171                                         | 189   | 1                                     | 154                                                | 5                                                                     | 246                                                                          | 6.1                                                 |
| SMCG5665                     | SMCJ5665                     | 180                                         | 220   | 1                                     | 162                                                | 5                                                                     | 287                                                                          | 5.2                                                 |
| SMCG5665A                    | SMCJ5665A                    | 190                                         | 210   | 1                                     | 171                                                | 5                                                                     | 274                                                                          | 5.5                                                 |

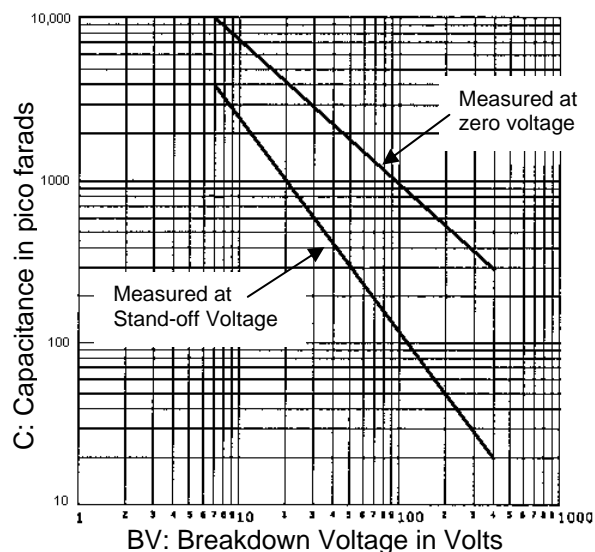
**NOTE 1:** A TVS is normally selected according to the rated "Stand Off Voltage" V<sub>WM</sub> which should be equal to or greater than the dc or continuous peak operating voltage level.

\* V<sub>BR</sub> is measured after I<sub>BR</sub> has been applied for ≤ 300 ms. No suffix is 10% tolerance and suffix A is 5% tolerance for V<sub>BR</sub>.

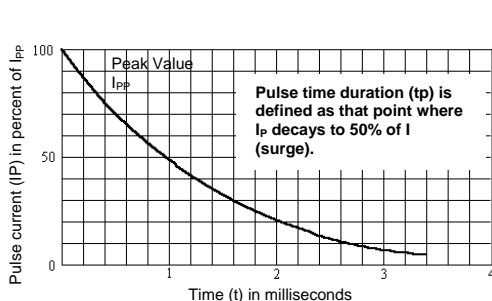
**OUTLINE AND CIRCUIT**



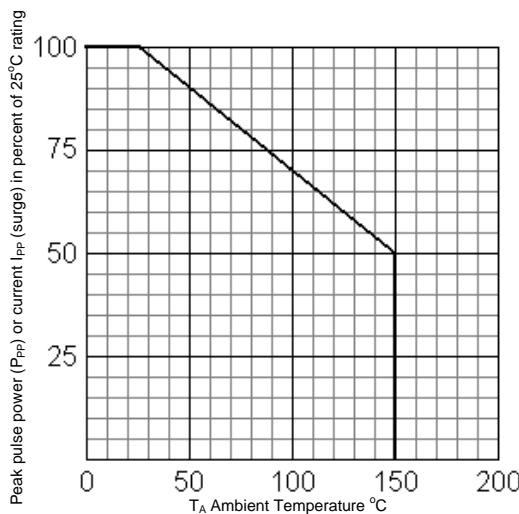
**FIGURE 1** Non-repetitive peak pulse power rating curve.  
Note: Peak power defined as peak voltage times peak current.



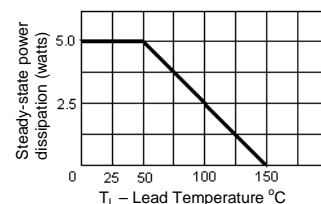
**FIGURE 5** TYPICAL CAPACITANCE vs. BREAKDOWN VOLTAGE



**FIGURE 2**  
Pulse wave form for exponential surge

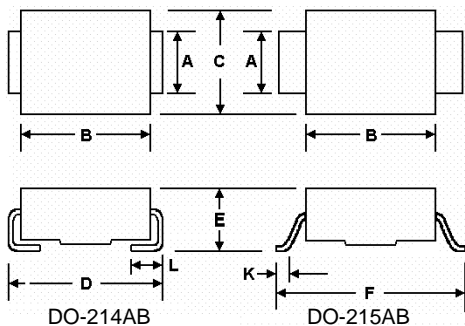


**FIGURE 3** Derating curve



**FIGURE 4**  
Steady-state power derating curve

**PACKAGE DIMENSIONS**



**DIMENSIONS IN INCHES**

|     | A    | B    | C    | D    | E    | F    | K    | L    |
|-----|------|------|------|------|------|------|------|------|
| MIN | .115 | .260 | .220 | .305 | .077 | .380 | .025 | .30  |
| MAX | .121 | .280 | .245 | .320 | .104 | .400 | .040 | .060 |

**DIMENSIONS IN MILLIMETERS**

|     | A    | B    | C    | D    | E    | F     | K     | L     |
|-----|------|------|------|------|------|-------|-------|-------|
| MIN | 2.92 | 6.60 | 5.59 | 7.75 | 1.95 | 9.65  | 0.635 | 0.760 |
| MAX | 3.07 | 7.11 | 6.22 | 8.13 | 2.65 | 10.16 | 1.016 | 1.520 |