

# AP5N10SL

## N-Channel Power MOSFET

### Description

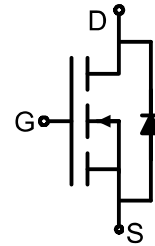
The AP5N10S uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications. It is ESD protected.

### General Features

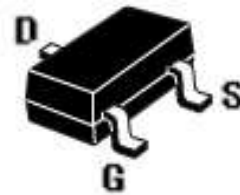
- |           |                             |       |
|-----------|-----------------------------|-------|
| $V_{DSS}$ | $R_{DS(ON)}$<br>@ 10V (typ) | $I_D$ |
| 100V      | 108mΩ                       | 5A    |
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation

### Application

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply
- Motor control



Schematic diagram



SOT23-3L

### Absolute Maximum Ratings ( $T_A=25^{\circ}C$ unless otherwise noted)

| Parameter  | Symbol         | Limit      | Unit |
|--|----------------|------------|------|
| Drain-Source Voltage                             | $V_{DS}$       | 100        | V    |
| Gate-Source Voltage                              | $V_{GS}$       | ±20        | V    |
| Drain Current-Continuous                         | $I_D$          | 5          | A    |
| Drain Current-Pulsed <sup>(Note 1)</sup>         | $I_{DM}$       | 21         | A    |
| Maximum Power Dissipation                        | $P_D$          | 5          | W    |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | °C   |

### Thermal Characteristic

|   |                 |      |      |
|---|-----------------|------|------|
| Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup> | $R_{\theta JA}$ | 41.7 | °C/W |
|---|-----------------|------|------|

### Electrical Characteristics ( $T_A=25^{\circ}C$ unless otherwise noted)

| Parameter                       | Symbol     | Condition                 | Min | Typ | Max | Unit |
|---------------------------------|------------|---------------------------|-----|-----|-----|------|
| <b>Off Characteristics</b>      |            |                           |     |     |     |      |
| Drain-Source Breakdown Voltage  | $BV_{DSS}$ | $V_{GS}=0V, I_D=250\mu A$ | 100 | 107 | -   | V    |
| Zero Gate Voltage Drain Current | $I_{DSS}$  | $V_{DS}=80V, V_{GS}=0V$   | -   | -   | 800 | nA   |

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|   |              |   |     |     |           |            |
|---|--------------|---|-----|-----|-----------|------------|
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                       | -   | -   | $\pm 100$ | nA         |
| <b>On Characteristics</b> (Note 3)        |              |   |     |     |           |            |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                                     | 0.8 | 1.2 | 1.8       | V          |
| Drain-Source On-State Resistance          | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=3A$  |     | 108 | 135       | m $\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=5V, I_D=2.9A$   | -   | 8   | -         | S          |
| <b>Dynamic Characteristics</b> (Note4)    |              |   |     |     |           |            |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=25V, V_{GS}=0V,$<br>$F=1.0MHz$                            | -   | 210 | -         | PF         |
| Output Capacitance                        | $C_{oss}$    |   | -   | 30  | -         | PF         |
| Reverse Transfer Capacitance              | $C_{rss}$    |   | -   | 14  | -         | PF         |
| <b>Switching Characteristics</b> (Note 4) |              |   |     |     |           |            |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=50V, I_D=5A, R_L=15\Omega$<br>$V_{GS}=10V, R_G=2.5\Omega$ | -   | 15  | -         | nS         |
| Turn-on Rise Time                         | $t_r$        |   | -   | 3.4 | -         | nS         |
| Turn-Off Delay Time                       | $t_{d(off)}$ |   | -   | 21  | -         | nS         |
| Turn-Off Fall Time                        | $t_f$        |   | -   | 3.1 | -         | nS         |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=50V, I_D=5A,$<br>$V_{GS}=10V$                             |     | 4.5 |           | nC         |
| Gate-Source Charge                        | $Q_{gs}$     |   | -   | 1.5 | -         | nC         |
| Gate-Drain Charge                         | $Q_{gd}$     |   | -   | 1.2 | -         | nC         |
| <b>Drain-Source Diode Characteristics</b> |              |   |     |     |           |            |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=6A$   | -   | -   | 1.2       | V          |
| Diode Forward Current (Note 2)            | $I_S$        |   | -   | -   | 5         | A          |

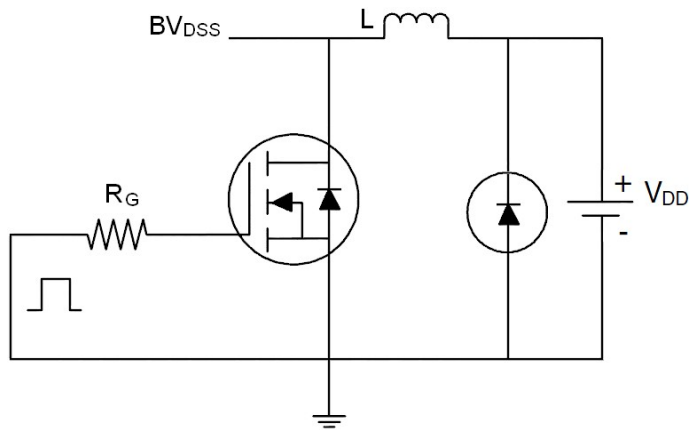
### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

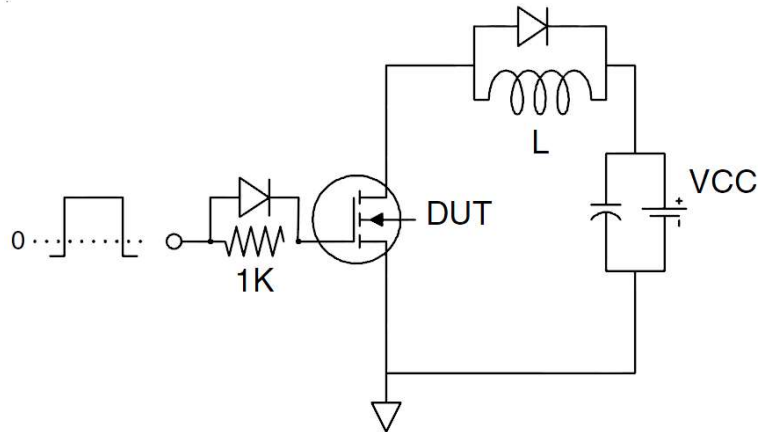
**N-Channel Power MOSFET**

**Test Circuit**

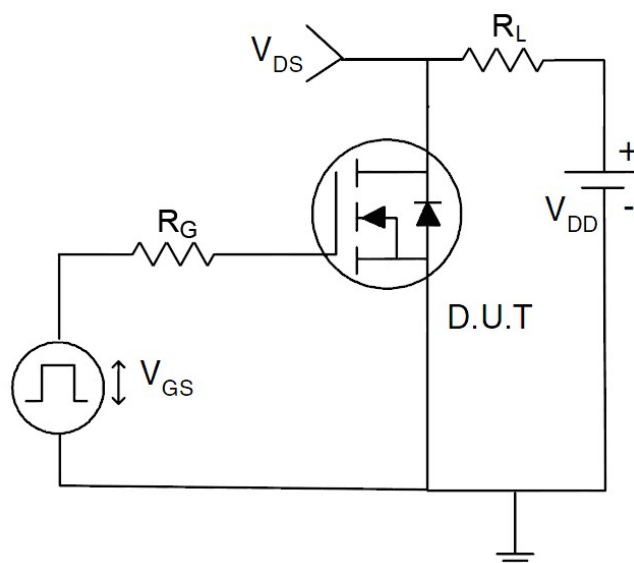
1)  $E_{AS}$  test circuit



2) Gate charge test circuit



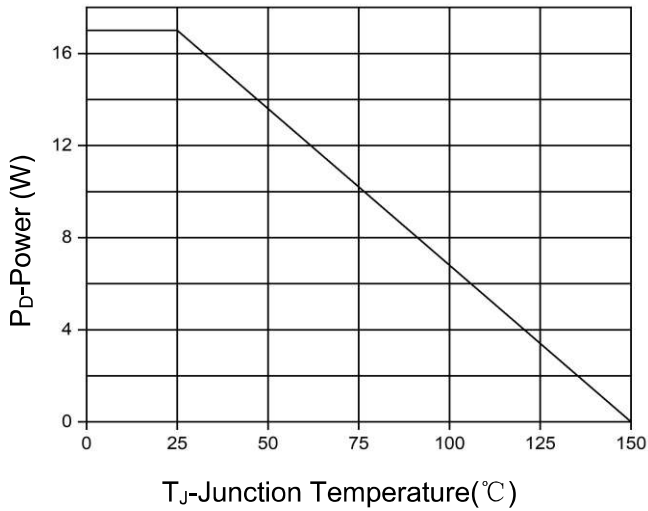
3) Switch Time Test Circuit



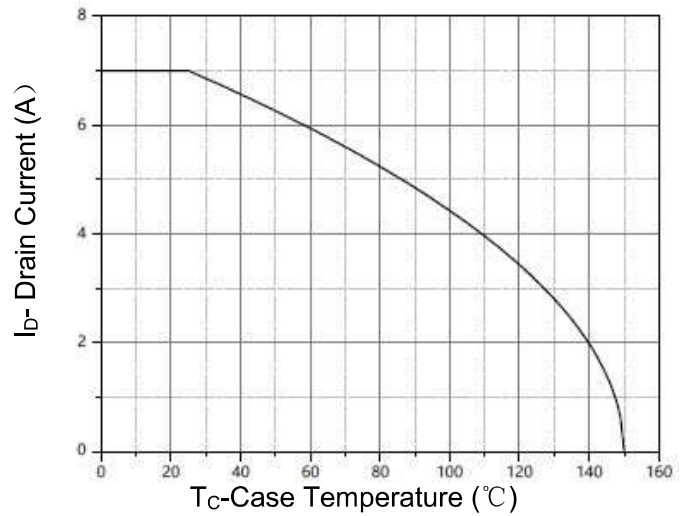
**AP5N10SL**

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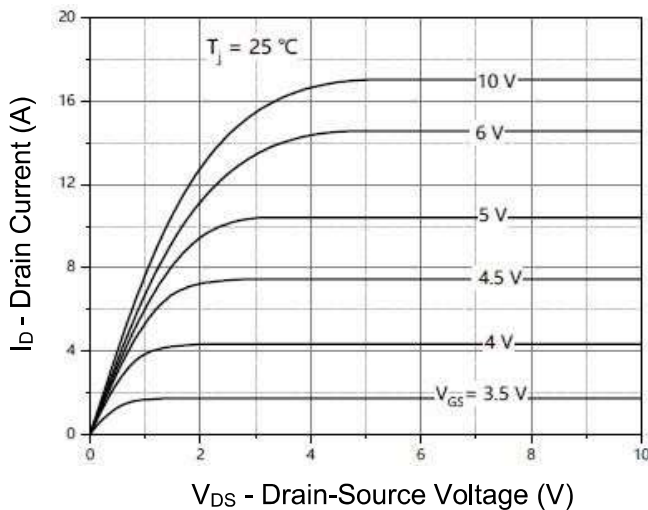
**Typical Electrical and Thermal Characteristics (curves)**



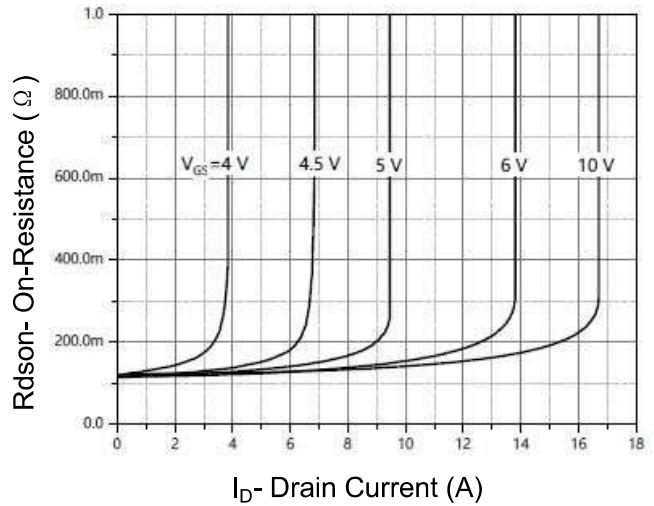
**Figure 1. Power Dissipation**



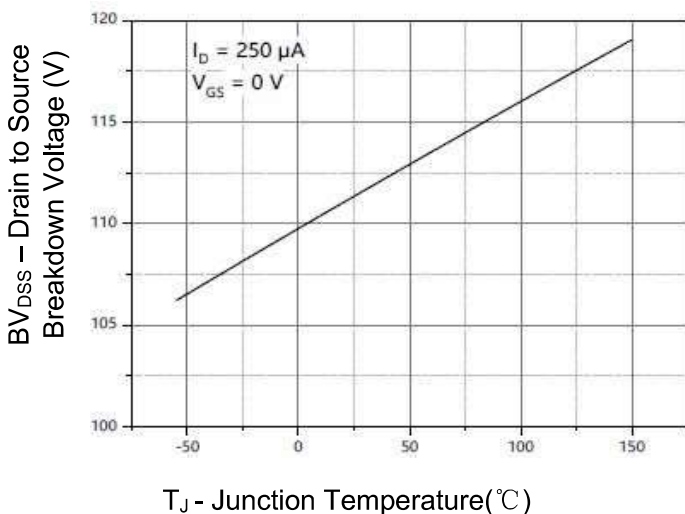
**Figure 2. Drain Current**



**Figure 3. Output characteristics**



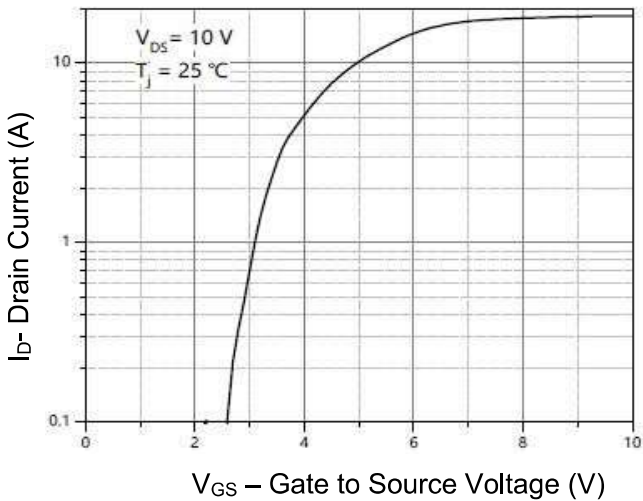
**Figure 4. Drain-Source On-state resistance**



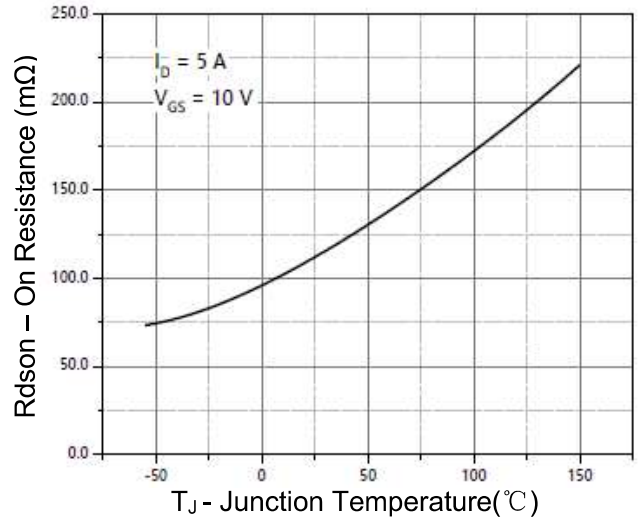
**Figure 5. Drain-source breakdown voltage**

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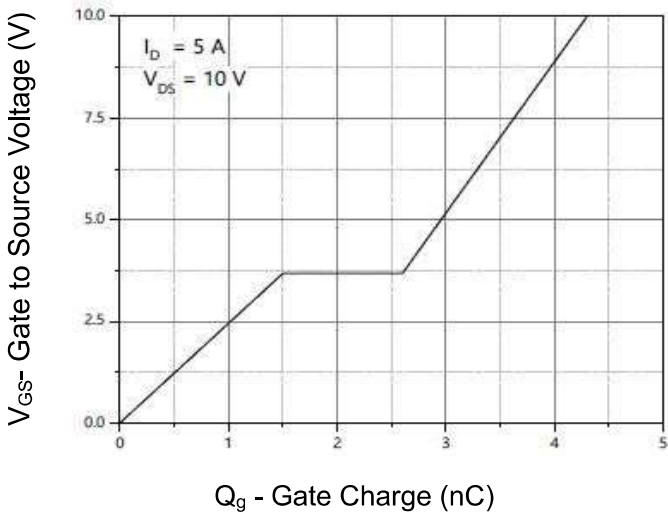
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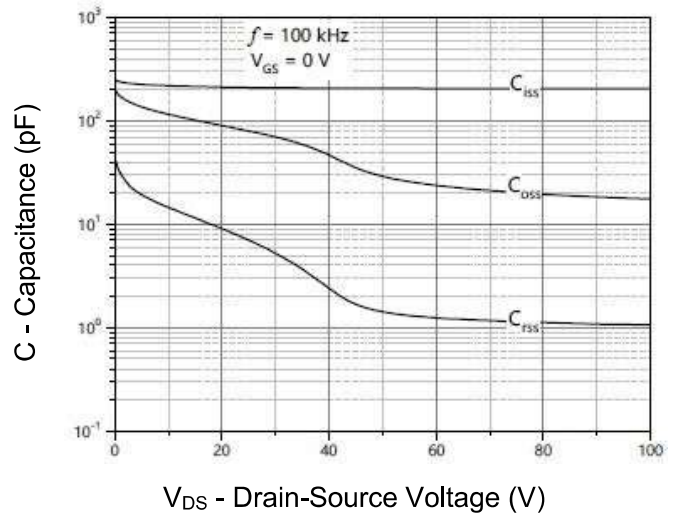
**Figure 6. Transfer Characteristics**



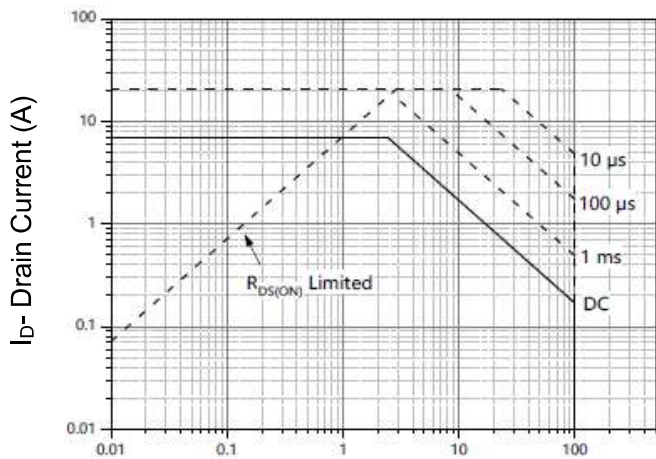
**Figure 7. Drain-Source On-State Resistance**



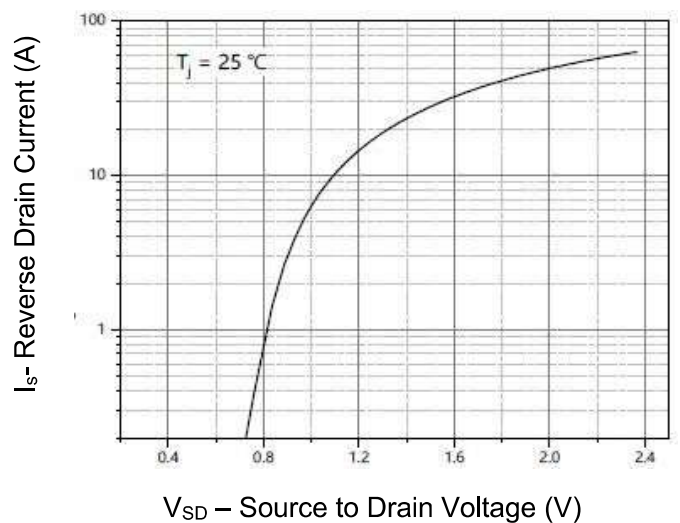
**Figure 8. Gate Charge**



**Figure 9 . Capacitance vs Vds**



**Figure 10. Safe Operation Area**

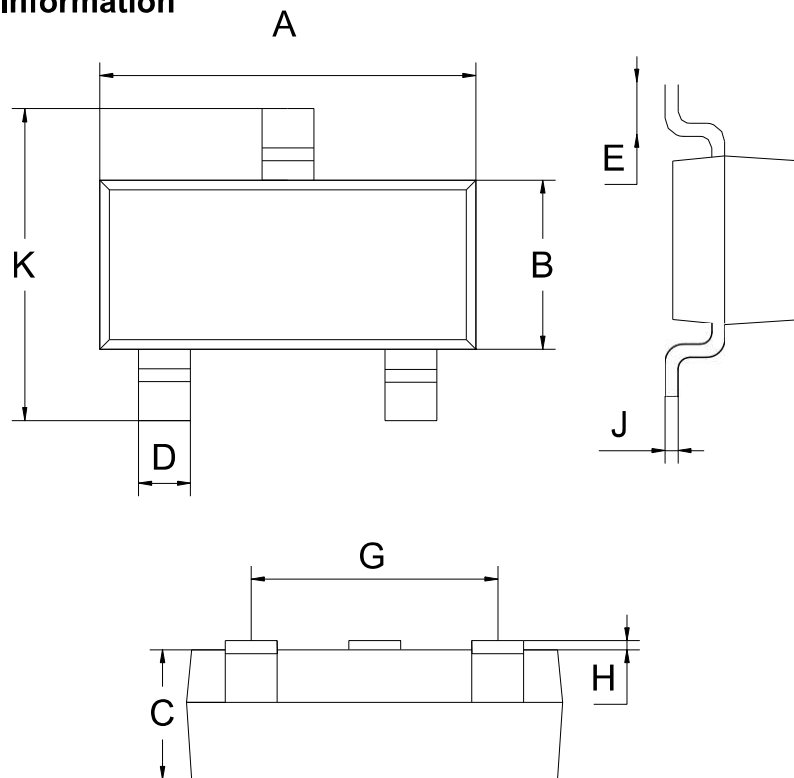


**Figure 11. Source- Drain Diode Forward**

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**SOT-23-3L Package Information**



| SOT-23-3L            |       |       |       |
|----------------------|-------|-------|-------|
| Dim                  | MIN   | NOM   | MAX   |
| A                    | 2.80  | 2.90  | 3.00  |
| B                    | 1.50  | 1.60  | 1.70  |
| C                    | 1.00  | 1.10  | 1.20  |
| D                    | 0.30  | 0.40  | 0.50  |
| E                    | 0.25  | 0.40  | 0.55  |
| G                    | 1.90  |       |       |
| H                    | 0.00  | -     | 0.10  |
| J                    | 0.047 | 0.127 | 0.207 |
| K                    | 2.60  | 2.80  | 3.00  |
| All Dimensions in mm |       |       |       |