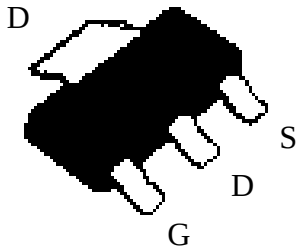
# N-Channel Enhancement Mode Power MOSFET

## Description:

The KLN1N60B is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The SOT-223 package is universally preferred for all commercial-industrial surface mount applications.

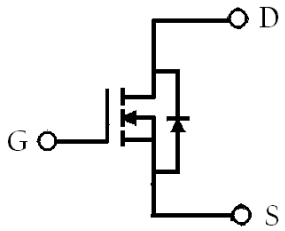
SOT-223




## Features:

- Single Drive Requirement
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free package

| | |
|---|---|
| **$BV_{DSS}$** | **600V** |
| **$I_{D}$@$V_{GS}$=10V, $T_A$=25°C** | **0.4A** |
| **$I_{D}$@$V_{GS}$=10V, $T_C$=25°C** | **0.9A** |
| **$R_{DSON}$@$V_{GS}$=10V, $I_D$=0.2A** | **7.4Ω (typ)** |




G：Gate　D：Drain　S：Source

## Ordering Information

| Device | Package | Shipping |
|---|---|---|
| KLN1N60B | SOT-223<br>(Pb-free lead plating and halogen-free package) | 2500 pcs / tape & reel |

## Absolute Maximum Ratings (Ta=25°C)

| Parameter | | Symbol | Limits | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 600 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±30 | |
| Continuous Drain Current @$V_{GS}$=10V, $T_C$=25°C | | $I_D$ | 0.9 | A |
| Continuous Drain Current @$V_{GS}$=10V,$T_C$=100°C | | | 0.57 | |
| Continuous Drain Current @$V_{GS}$=10V,$T_A$=25°C | | | 0.4 | |
| Continuous Drain Current @$V_{GS}$=10V,$T_A$=100°C | | | 0.25 | |
| Pulsed Drain Current | | $I_{DM}$ | 1.6 *1 | |
| Single Pulse Avalanche Current | | $I_{AS}$ | 1 | |
| Single Pulse Avalanche Energy @L=10mH, $I_D$=1A, $V_{DD}$=50V | | $E_{AS}$ | 5 *2 | mJ |
| Total Power Dissipation | $T_C$=25℃ | $P_D$ | 15 | W |
| | $T_C$=100℃ | | 6 | |
| | $T_A$=25℃ | | 3.1 | |
| | $T_A$=100℃ | | 1.2 | |
| Operating Junction and Storage Temperature Range | | Tj, Tstg | -55~+150 | °C |

## Thermal Data

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal Resistance, Junction-to-case, max | $R_{\theta JC}$ | 8.2 | °C/W |
| Thermal Resistance, Junction-to-ambient, max | $R_{\theta JA}$ | 40 *3 | |

Note : 1. Pulse width limited by maximum junction temperature.
2. Guaranteed by design, not by 100% tested.
3. Surface mounted on 1 in² copper pad of FR-4 board, 120°C/W when mounted on minimum copper pad.

## Characteristics ($T_C$=25°C, unless otherwise specified)

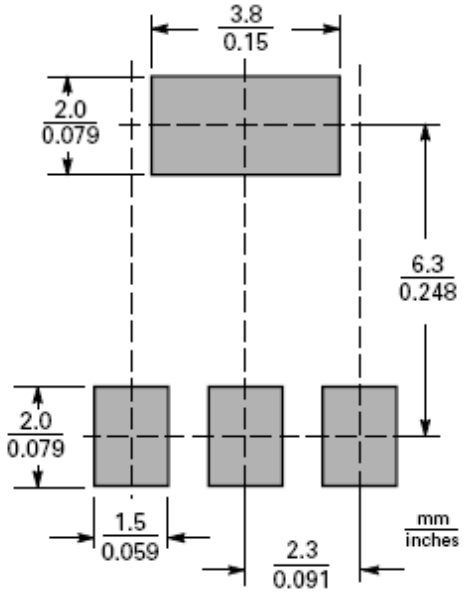
| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|
| **Static** | | | | | |
| $BV_{DSS}$ | 600 | - | - | V | $V_{GS}$=0V, $I_D$=250μA |
| $\Delta BV_{DSS}/\Delta Tj$ | - | 0.6 | - | V/°C | Reference to 25°C, $I_D$=250μA |
| $V_{GS(th)}$ | 2.0 | - | 4.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$=250μA |
| $G_{FS}$ *1 | - | 6.8 | - | S | $V_{DS}$ =15V, $I_D$=0.2A |
| $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$=±30V, $V_{DS}$=0V |
| $I_{DSS}$ | - | - | 1 | μA | $V_{DS}$ =600V, $V_{GS}$ =0V |
| | - | - | 10 | | $V_{DS}$ =480V, $V_{GS}$ =0V, Tj=125°C |
| $R_{DS(ON)}$ *1 | - | 7.4 | 9.5 | Ω | $V_{GS}$ =10V, $I_D$=0.2A |
| **Dynamic** | | | | | |
| Ciss | - | 135 | - | pF | $V_{GS}$=0V, $V_{DS}$=25V, f=1MHz |
| Coss | - | 24.3 | - | | |
| Crss | - | 10.7 | - | | |

## Characteristics ($T_C$=25°C, unless otherwise specified)

| Symbol | Min. | Typ. | Max. | Unit | Test Conditions |
|---|---|---|---|---|---|
| Qg *1, 2 | - | 5 | - | nC | $V_{DS}$=480V, $V_{GS}$=10V, $I_D$=1A |
| Qgs *1, 2 | - | 2.4 | - | | |
| Qgd *1, 2 | - | 0.9 | - | | |
| $t_{d(ON)}$ *1, 2 | - | 5.6 | - | ns | $V_{DS}$=300V, $I_D$=1A, $V_{GS}$=10V, $R_{GS}$=25Ω |
| tr *1, 2 | - | 7.8 | - | | |
| $t_{d(OFF)}$ *1, 2 | - | 11.6 | - | | |
| $t_f$ *1, 2 | - | 12.6 | - | | |
| **Source-Drain Diode** | | | | | |
| $I_S$ *1 | - | - | 0.4 | A | |
| $I_{SM}$ *3 | - | - | 1.6 | | |
| $V_{SD}$ *1 | - | 0.67 | 1.5 | V | $I_S$=0.4A, $V_{GS}$=0V |
| trr | - | 190 | - | ns | $I_F$=1A, $dI_F/dt$=100A/μs |
| Qrr | - | 340 | - | nC | |

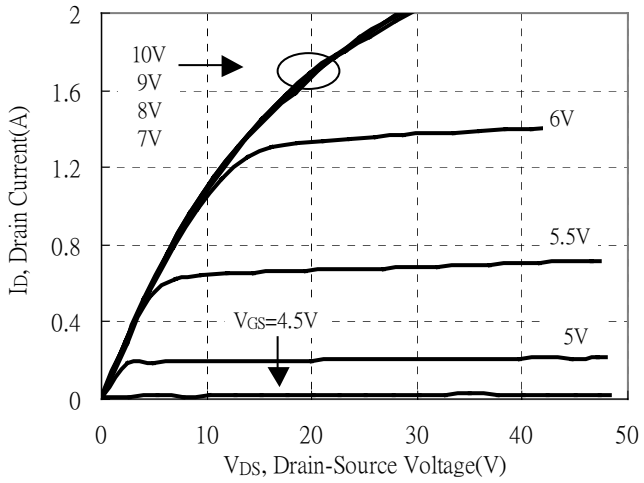
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
*2.Independent of operating temperature
*3.Pulse width limited by maximum junction temperature.

## Recommended soldering footprint

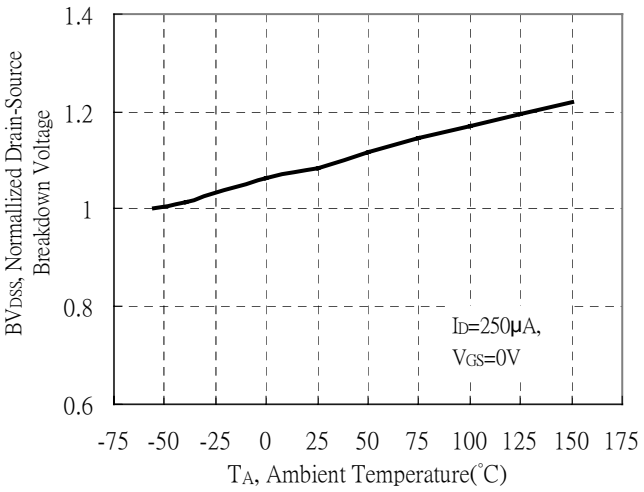


## Typical Characteristics

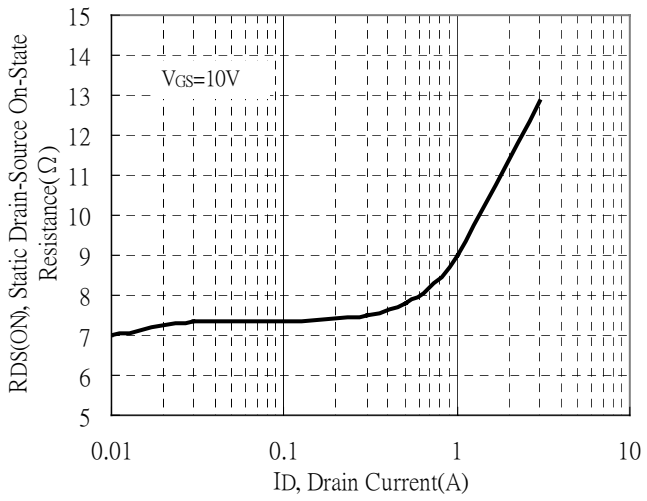
Typical Output Characteristics



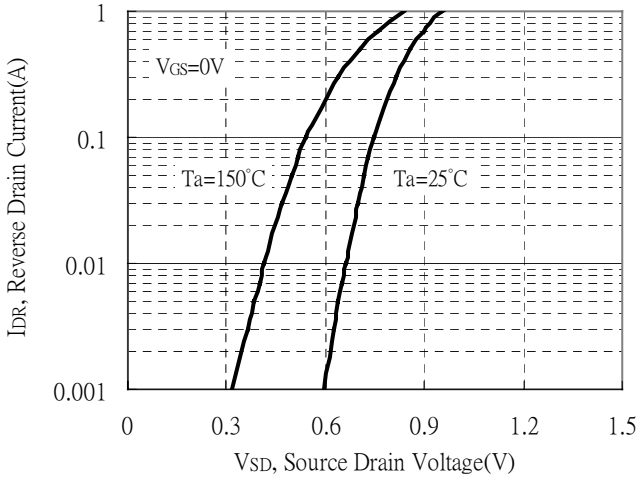

Brekdown Voltage vs Ambient Temperature



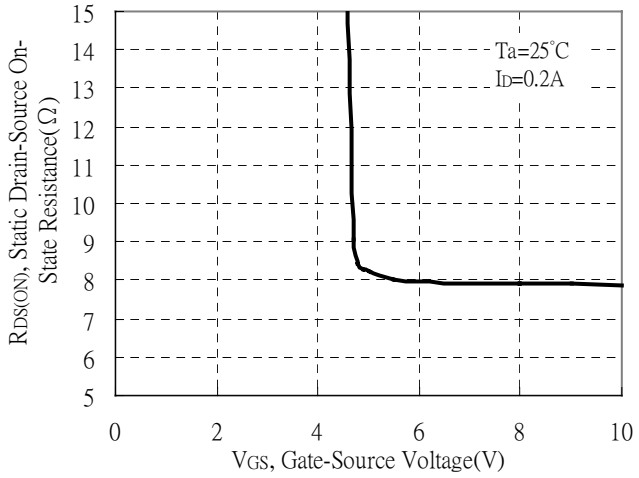

Static Drain-Source On-State resistance vs Drain Current



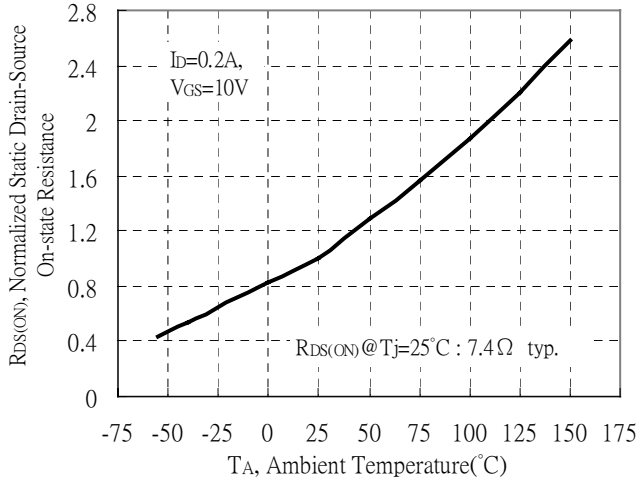

Body Diode Forward Voltage Variation vs Source Current and Temperature




Static Drain-Source On-State Resistance vs Gate-Source Voltage

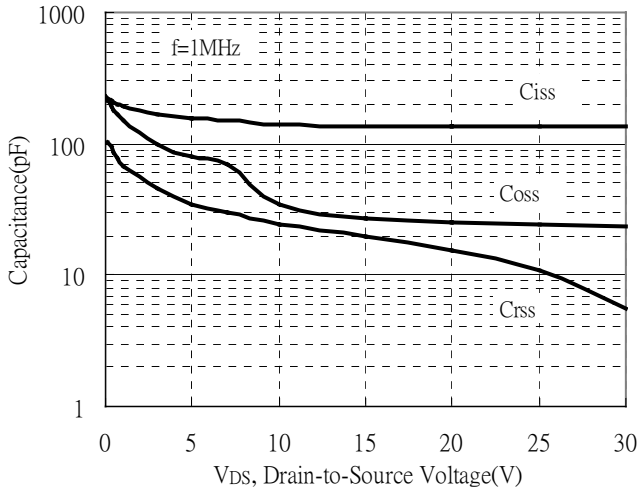



Static Drain-Source On-resistance vs Ambient Temperature

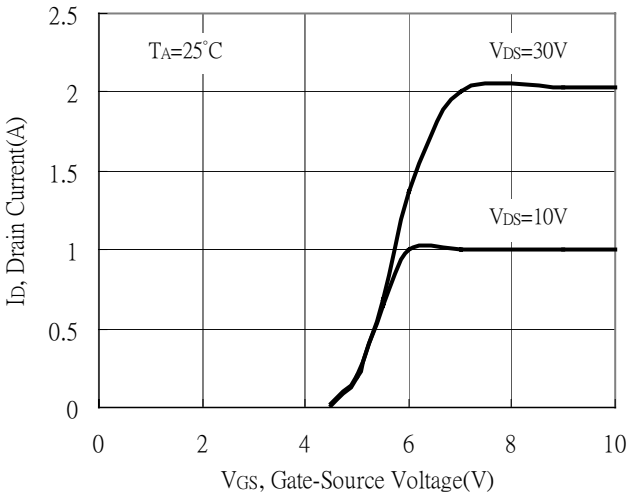


## Typical Characteristics(Cont.)

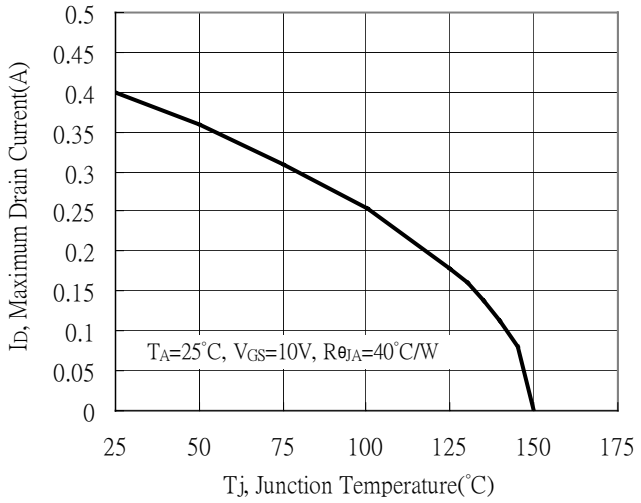
Capacitance vs Reverse Voltage



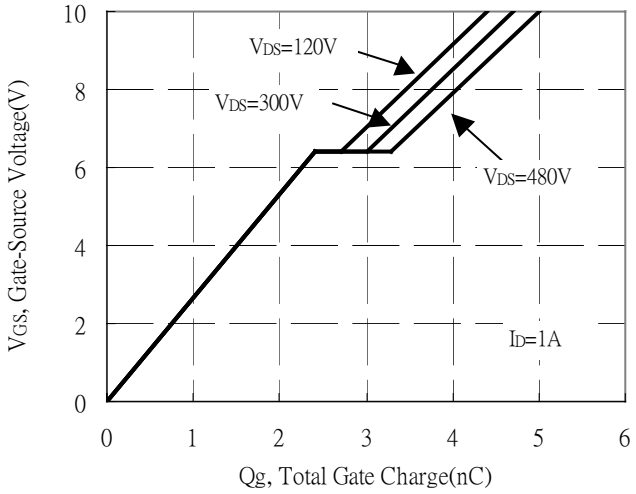

Drain Current vs Gate-Source Voltage



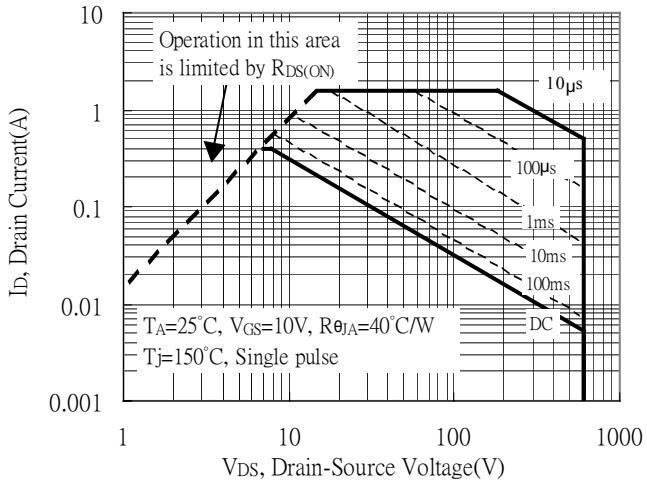

Maximum Drain Current vs Junction Temperature



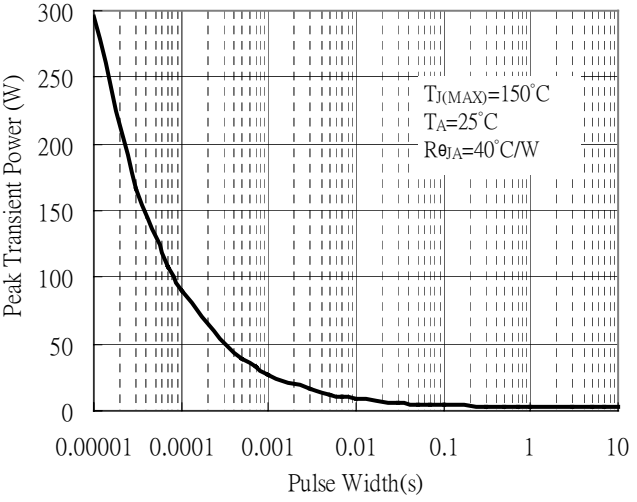

Gate Charge Characteristics




Maximum Safe Operating Area

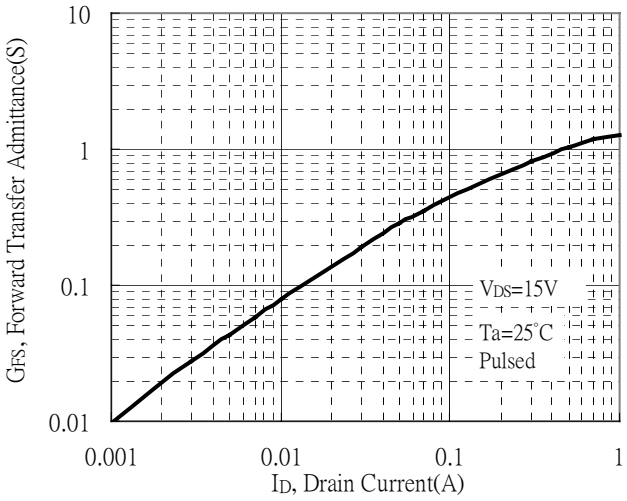



Single Pulse Maximum Power Dissipation

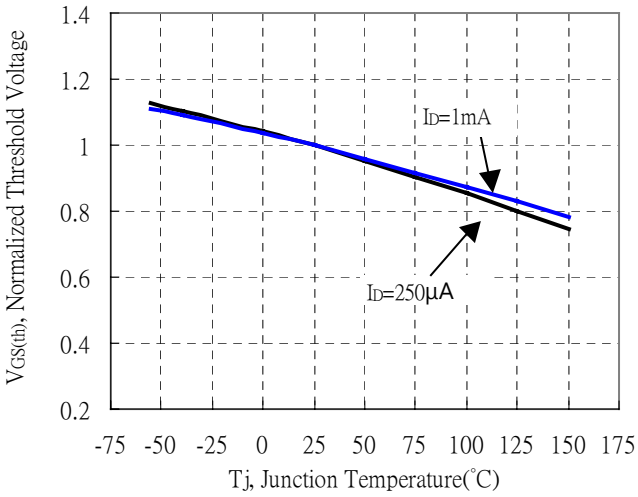


## Typical Characteristics(Cont.)

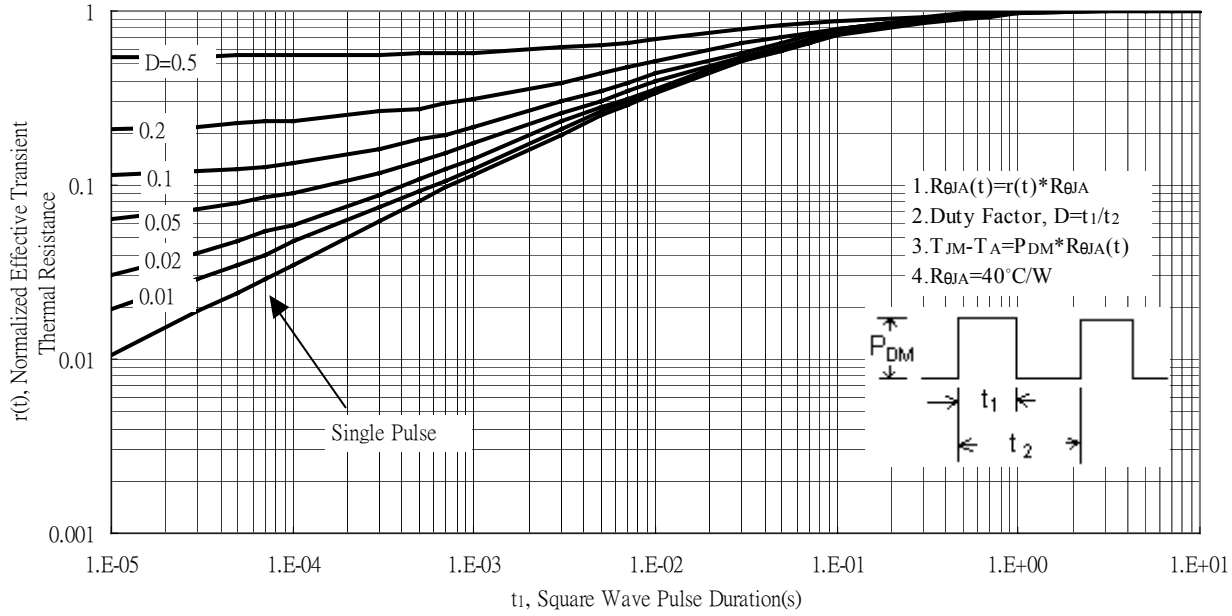
Forward Transfer Admittance vs Drain Current



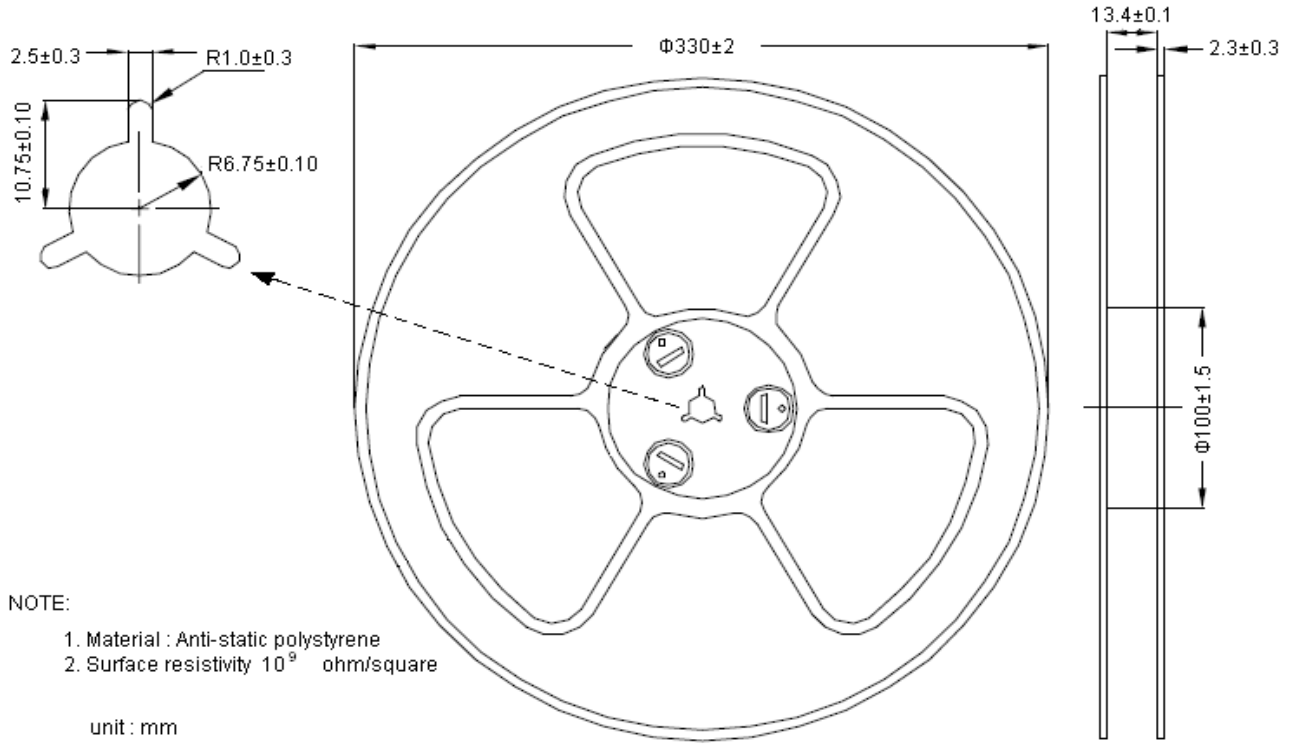

Threshold Voltage vs Junction Tempearture




Transient Thermal Response Curves



## Reel Dimension

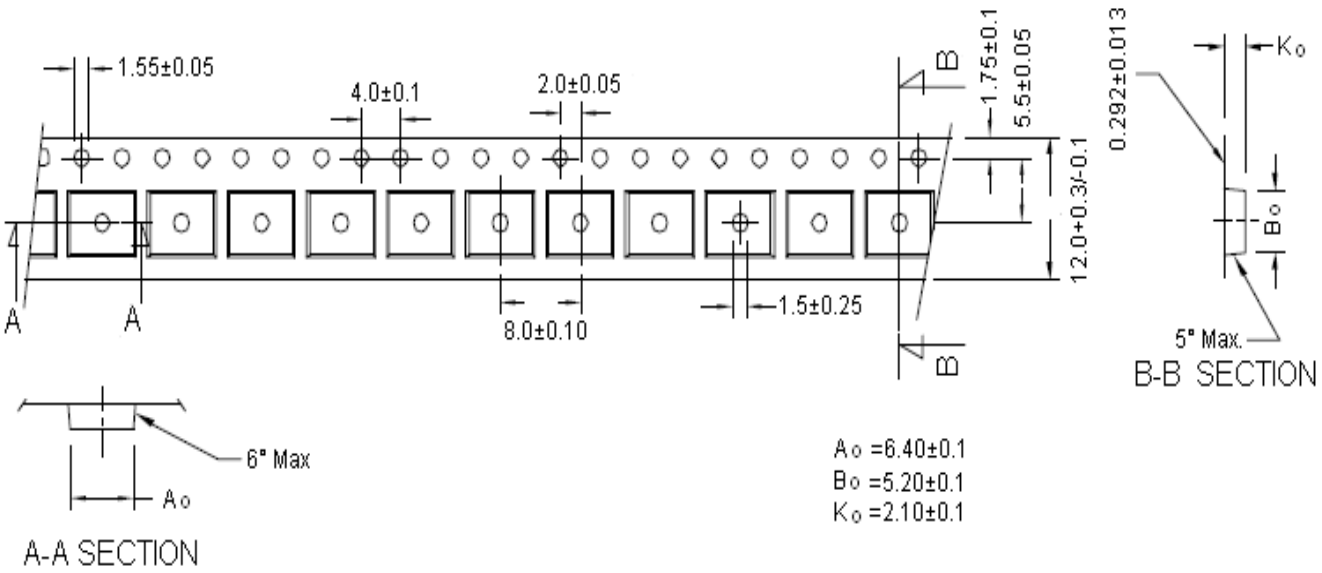



NOTE:

1. Material : Anti-static polystyrene
2. Surface resistivity $10^9$ ohm/square

unit : mm

## Carrier Tape Dimension



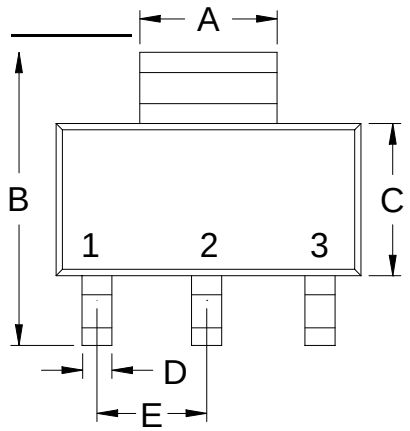

Ao =6.40±0.1
Bo =5.20±0.1
Ko =2.10±0.1

Notes:

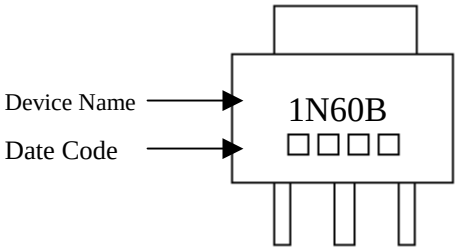
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

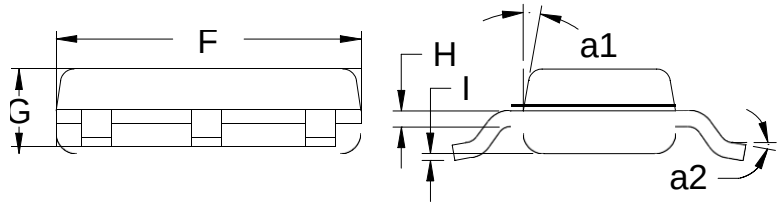
Uni : millimeter

## SOT-223 Dimension




Marking:




Style: Pin 1.Gate 2.Drain 3.Source

3-Lead SOT-223 Plastic
Surface Mounted Package

*: Typical

| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|---|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.1142 | 0.1220 | 2.90 | 3.10 | G | 0.0551 | 0.0709 | 1.40 | 1.80 |
| B | 0.2638 | 0.2874 | 6.70 | 7.30 | H | 0.0098 | 0.0138 | 0.23 | 0.35 |
| C | 0.1299 | 0.1457 | 3.30 | 3.70 | I | 0.0008 | 0.0039 | 0.02 | 0.10 |
| D | 0.0236 | 0.0315 | 0.60 | 0.80 | a1 | *13° | - | *13° | - |
| E | *0.0906 | - | *2.30 | - | a2 | 0 ° | 10 ° | 0 ° | 10 ° |
| F | 0.2480 | 0.2638 | 6.30 | 6.70 | | | | | |