

## Description

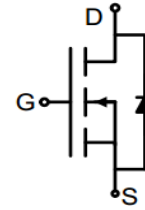
The XPX03N20 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

## General Features

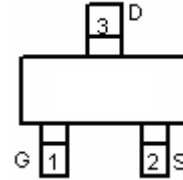
- $V_{DS} = 190V, I_D = 3A$   
 $R_{DS(ON)} < 540m\Omega @ V_{GS}=10V$  (Typ:430m $\Omega$ )  
 $R_{DS(ON)} < 560m\Omega @ V_{GS}=10V$  (Typ:440m $\Omega$ )
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation
- RoHS Compliant

## Application

- Power switching application



Schematic Diagram



Marking and Pin Assignment



SOT-23-3L

## Ordering Information

| Part Number | Marking | Case      | Packaging    |
|-------------|---------|-----------|--------------|
| XPX03N20AS  | G2003A  | SOT-23-3L | 3000pcs/Reel |

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

| Parameter  | Symbol         | Limit      | Unit       |
|--|----------------|------------|------------|
| Drain-Source Voltage                             | $V_{DS}$       | 190        | V          |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 20$   | V          |
| Drain Current-Continuous                         | $I_D$          | 3          | A          |
| Drain Current-Pulsed <sup>(Note 1)</sup>         | $I_{DM}$       | 8          | A          |
| Maximum Power Dissipation                        | $P_D$          | 1.8        | W          |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | $^\circ C$ |

## Thermal Characteristic

|   |                 |    |              |
|---|-----------------|----|--------------|
| Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup> | $R_{\theta JA}$ | 70 | $^\circ C/W$ |
|---|-----------------|----|--------------|

## 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  | $BV_{DSS}$ | $V_{GS}=0V, I_D=250\mu A$ | 190 | -   | -   | V       |
| Zero Gate Voltage Drain Current | $I_{DSS}$  | $V_{DS}=190V, V_{GS}=0V$  | -   | -   | 1   | $\mu A$ |

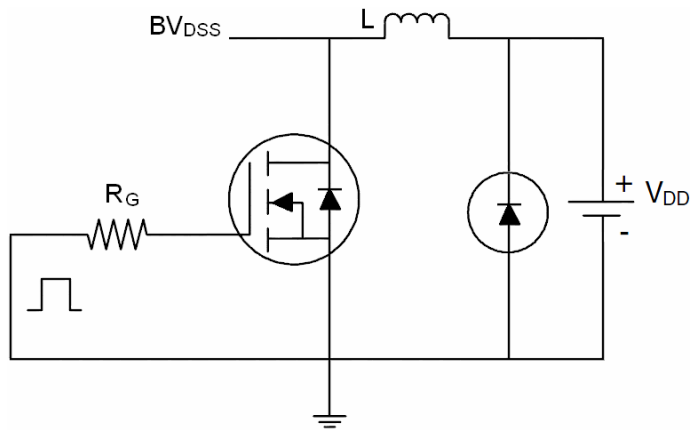
|  |              |  |     |     |           |            |
|--|--------------|--|-----|-----|-----------|------------|
| Gate-Body Leakage Current                            | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                | -   | -   | $\pm 100$ | nA         |
| <b>On Characteristics</b> <sup>(Note 3)</sup>        |              |  |     |     |           |            |
| Gate Threshold Voltage                               | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                              | 1.0 | 1.7 | 3         | V          |
| Drain-Source On-State Resistance                     | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=2A$                                       | -   | 430 | 540       | m $\Omega$ |
| Drain-Source On-State Resistance                     | $R_{DS(ON)}$ | $V_{GS}=4.5V, I_D=2A$                                      | -   | 440 | 560       | m $\Omega$ |
| Forward Transconductance                             | $g_{FS}$     | $V_{DS}=15V, I_D=2A$                                       | -   | 8   | -         | S          |
| <b>Dynamic Characteristics</b> <sup>(Note 4)</sup>   |              |  |     |     |           |            |
| Input Capacitance                                    | $C_{ISS}$    | $V_{DS}=25V, V_{GS}=0V,$<br>$F=1.0MHz$                     | -   | 580 | -         | PF         |
| Output Capacitance                                   | $C_{OSS}$    |  | -   | 90  | -         | PF         |
| Reverse Transfer Capacitance                         | $C_{RSS}$    |  | -   | 3   | -         | PF         |
| <b>Switching Characteristics</b> <sup>(Note 4)</sup> |              |  |     |     |           |            |
| Turn-on Delay Time                                   | $t_{d(on)}$  | $V_{DD}=100V, R_L=15\Omega$<br>$V_{GS}=10V, R_G=2.5\Omega$ | -   | 10  | -         | nS         |
| Turn-on Rise Time                                    | $t_r$        |  | -   | 12  | -         | nS         |
| Turn-Off Delay Time                                  | $t_{d(off)}$ |  | -   | 15  | -         | nS         |
| Turn-Off Fall Time                                   | $t_f$        |  | -   | 15  | -         | nS         |
| Total Gate Charge                                    | $Q_g$        | $V_{DS}=100V, I_D=2A,$<br>$V_{GS}=10V$                     | -   | 12  | -         | nC         |
| Gate-Source Charge                                   | $Q_{gs}$     |  | -   | 2.5 | -         | nC         |
| Gate-Drain Charge                                    | $Q_{gd}$     |  | -   | 3.8 | -         | nC         |
| <b>Drain-Source Diode Characteristics</b>            |              |  |     |     |           |            |
| Diode Forward Voltage <sup>(Note 3)</sup>            | $V_{SD}$     | $V_{GS}=0V, I_S=3A$  | -   | -   | 1.2       | V          |
| Diode Forward Current <sup>(Note 2)</sup>            | $I_S$        |  | -   | -   | 3         | A          |

### Notes:

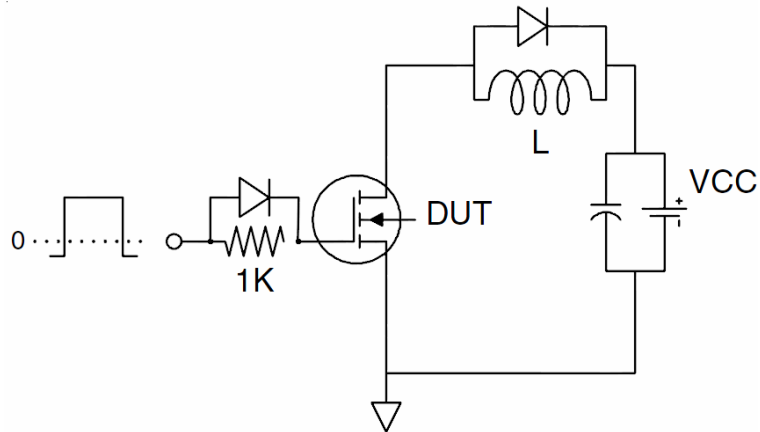
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

**Test Circuit**

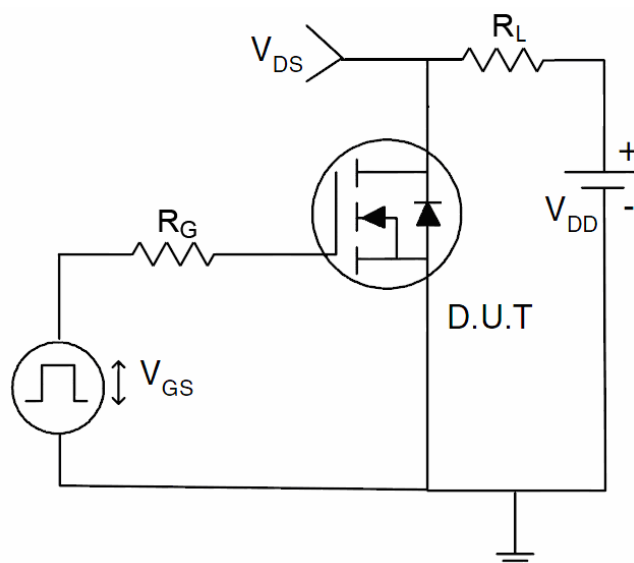
**1)  $E_{AS}$  test circuit**



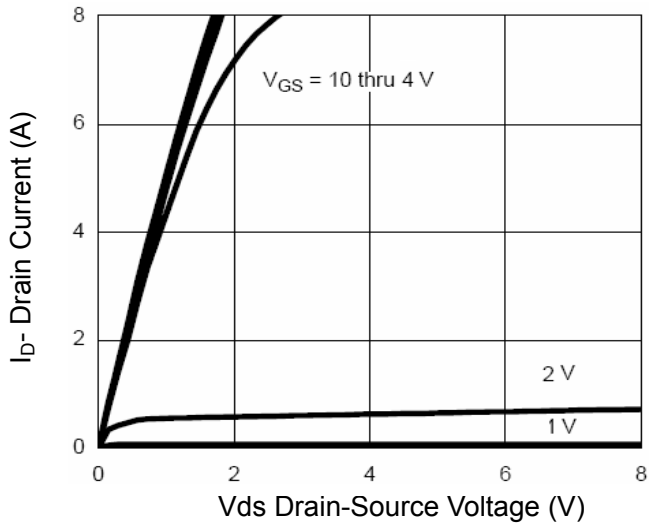
**2) Gate charge test circuit**



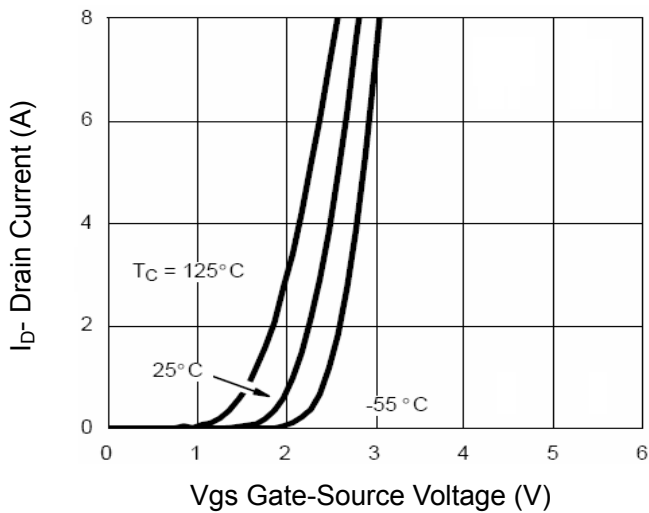
**3) Switch Time Test Circuit**



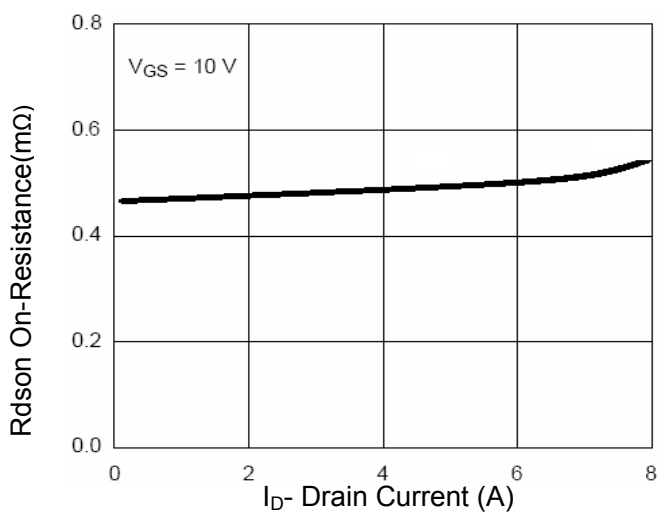
## Typical Electrical and Thermal Characteristics (Curves)



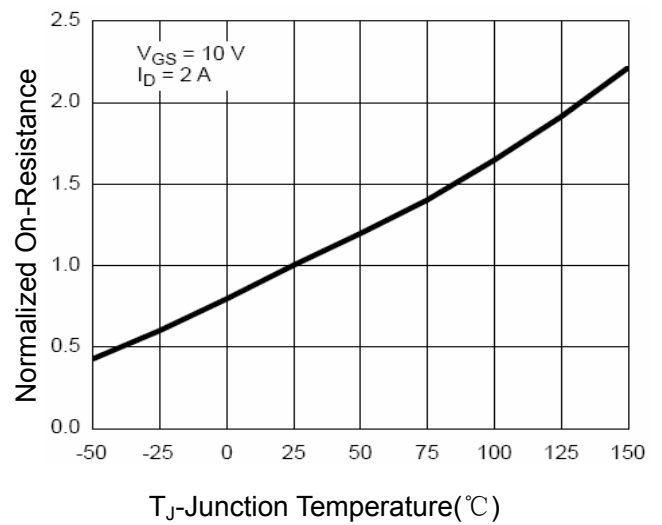
**Figure 1 Output Characteristics**



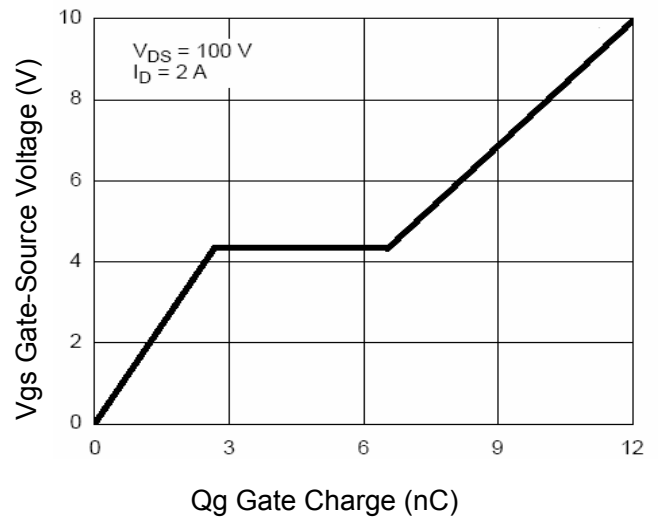
**Figure 2 Transfer Characteristics**



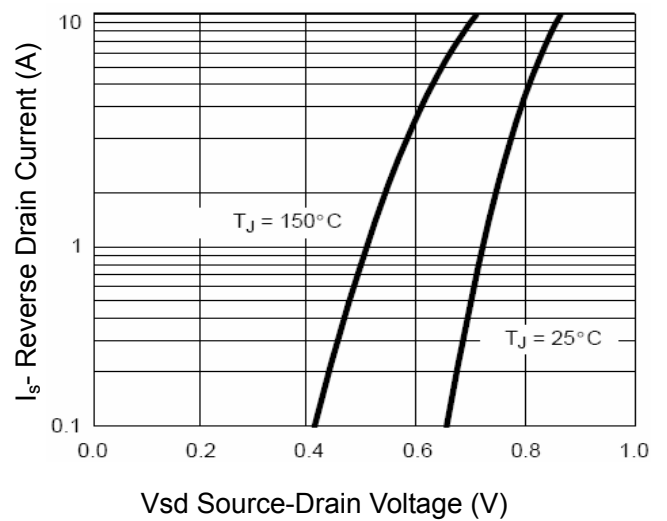
**Figure 3  $R_{DS(on)}$ - Drain Current**



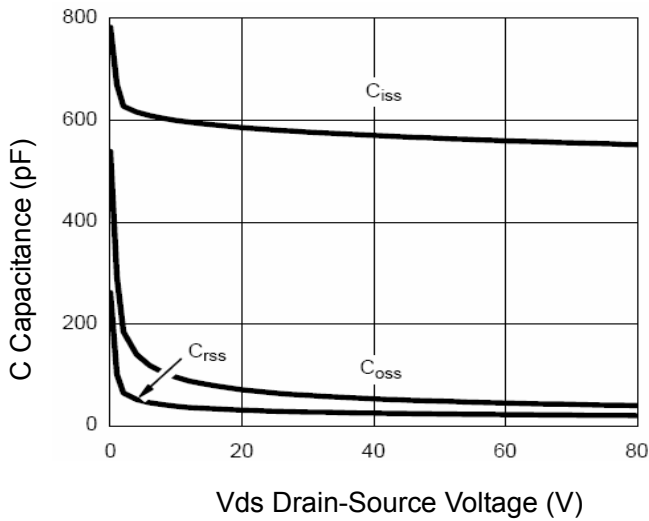
**Figure 4  $R_{DS(on)}$ -Junction Temperature**



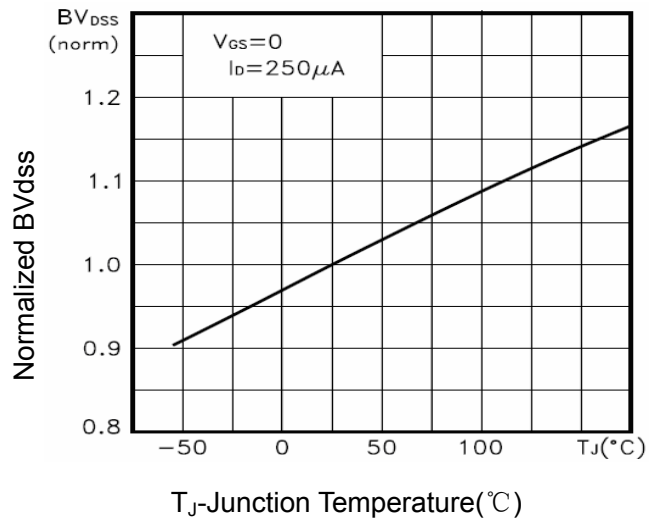
**Figure 5 Gate Charge**



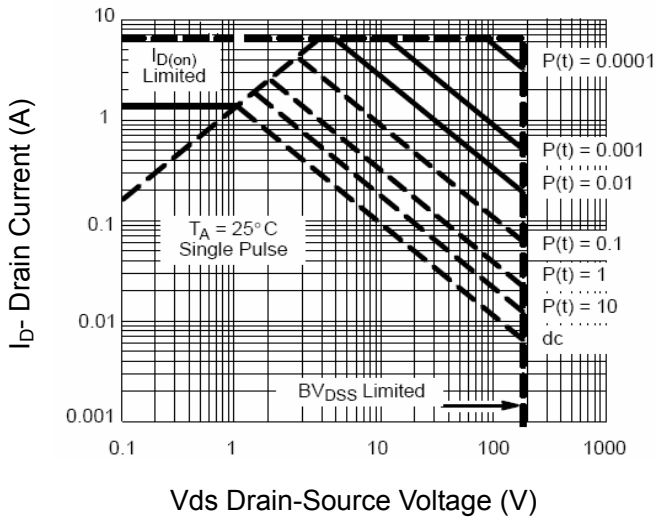
**Figure 6 Source- Drain Diode Forward**



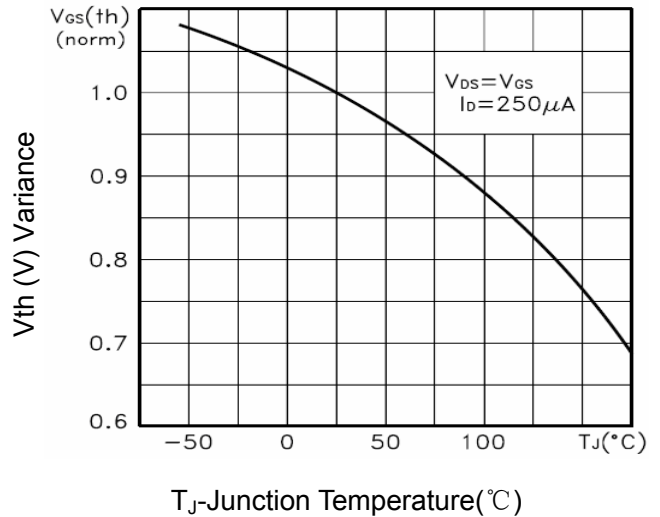
Vds Drain-Source Voltage (V)  
**Figure 7 Capacitance vs Vds**



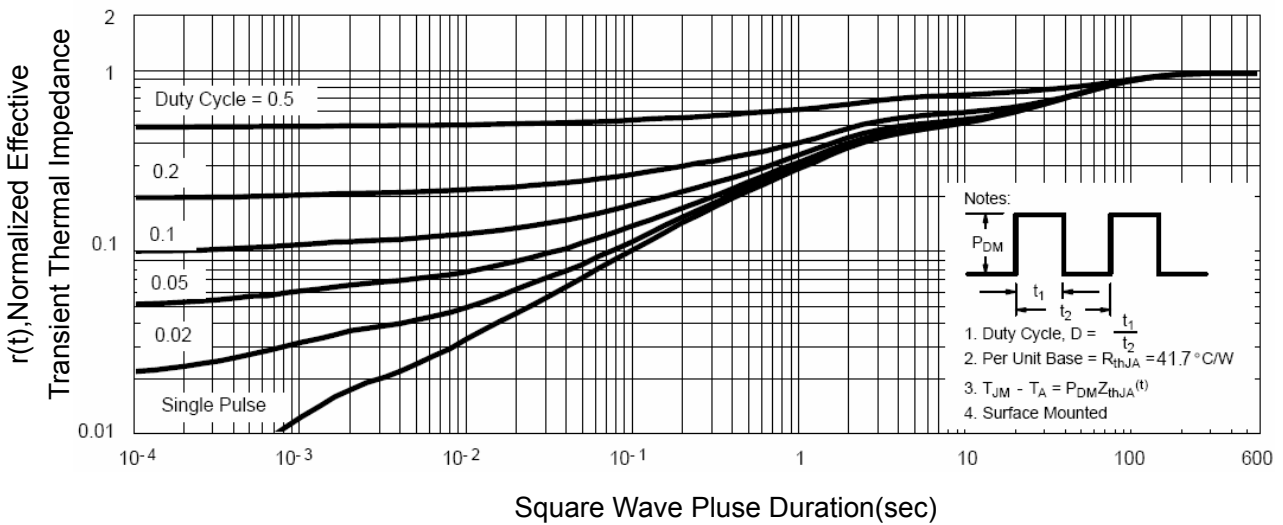
T<sub>J</sub>-Junction Temperature(°C)  
**Figure 9 BV<sub>DSS</sub> vs Junction Temperature**



Vds Drain-Source Voltage (V)  
**Figure 8 Safe Operation Area**

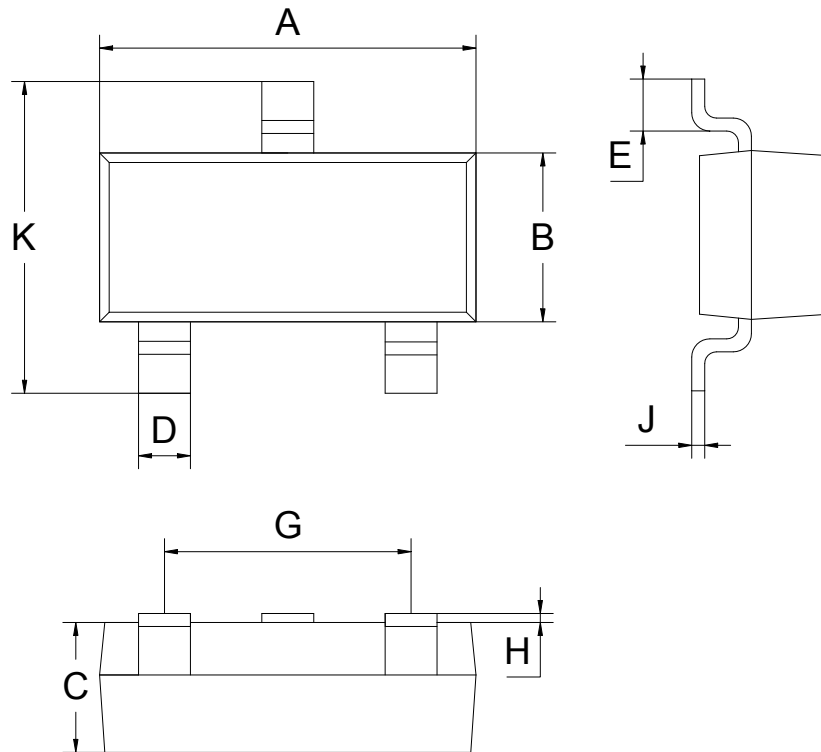


T<sub>J</sub>-Junction Temperature(°C)  
**Figure 10 V<sub>GS(th)</sub> vs Junction Temperature**



**Figure 11 Normalized Maximum Transient Thermal Impedance**

**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 |       |       |       |