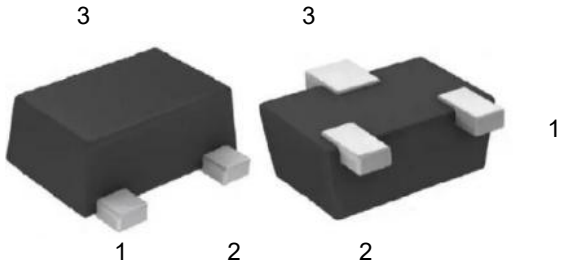
# XN3139KS9

**20V P-Channel MOSFET**

## 1. Features

SOT-723

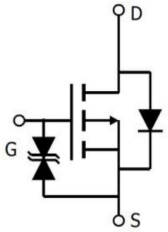
- Advanced Trench Process Technology
- Low Threshold Voltage
- Fast Switching Speed
- Halogen-Free & Lead-Free
- ESD Protected up to 2KV (HBM)




## 2. Mechanical Data

- Case:Molded Plastic,SOT-723 .
- Epoxy:UL 94V-0 rate flame retardant
- Terminals:Plated Leads Solderable perMIL-STD-750,Method-2026.
- Marking: KD
- Mounting Position : Any.

1 Gate
2 Source
3 Drain




## 3. Maximum Ratings and Electrical Characteristics

Rating at 25℃ ambient temperature unless otherwise specified.

| Parameter | Symbol | Value | UNIT |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | -20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±12 | V |
| Continuous Drain Current | $I_D$ | -0.5 | A |
| Pulsed Drain Current [1] | $I_{DM}$ | -2.6 | A |
| Power Dissipation[2] | $P_D$ | 0.18 | W |
| Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55~ +150 | ℃ |

Notes :

1.Pulse width ≤100us, duty cycle ≤1%, limited by Tjmax

2.Device mounted on FR-4 substrate PC board, 2ozcopper, with 1-inch square copper plate in still air.

## 4. Electrical Characteristics

Rating at 25℃ ambient temperature unless otherwise specified.

| Parameter | Symbol | Test Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)\ DSS}$ | $V_{GS}$ = 0V, $I_D$ =-250μA | -20 | | | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ =-20V,$V_{GS}$ = 0V | | | -1 | μA |
| Gate-Body leakage current | $I_{GSS}$ | $V_{GS}$ =±10V, $V_{DS}$ = 0V | | | ±10 | μA |
| **On characteristics** | | | | | | |
| Drain-source on-resistance | $R_{DS(on)}$ | $V_{GS}$ =-4.5V, $I_D$ =-0.5A | | 580 | 850 | mΩ |
| | | $V_{GS}$ =-2.5V, $I_D$ =-0.3A | | 850 | 1200 | mΩ |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =-250μA | -0.3 | | -1.2 | V |
| **Dynamic Characteristics** | | | | | | |
| Input capacitance | $C_{iss}$ | $V_{DS}$ =-10V,$V_{GS}$ =0V,f =1MHz | | 71 | | pF |
| Output capacitance | $C_{oss}$ | | | 20 | | pF |
| Reverse transfer capacitance | $C_{rss}$ | | | 15 | | pF |
| **Switching Characteristics** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ =-10V,$V_{GS}$ =-4.5V,$I_D$=-0.2A | | 1.2 | | nC |
| Gate-source Charge | $Q_{gs}$ | | | 0.37 | | nC |
| Gate-drain Charge | $Q_{gd}$ | | | 0.27 | | nC |
| Turn-on delay time | $t_{d(on)}$ | $V_{GS}$=-4.5V,$V_{DS}$=-10V, $I_D$=-0.2A,$R_{GEN}$=10Ω | | 4 | | ns |
| Turn-on rise time | $t_r$ | | | 19 | | ns |
| Turn-off delay time | $t_{d(off)}$ | | | 16 | | ns |
| Turn-off fall time | $t_f$ | | | 25 | | ns |
| **Source-drain diode characteristics and maximum ratings** | | | | | | |
| Diode forward voltage | $V_{SD}$ | $I_S$=-1A,$V_{GS}$=0V | | 0.7 | 1.2 | V |

## 5. Rating And Characteristic Curves

Fig1：Output Characteristics

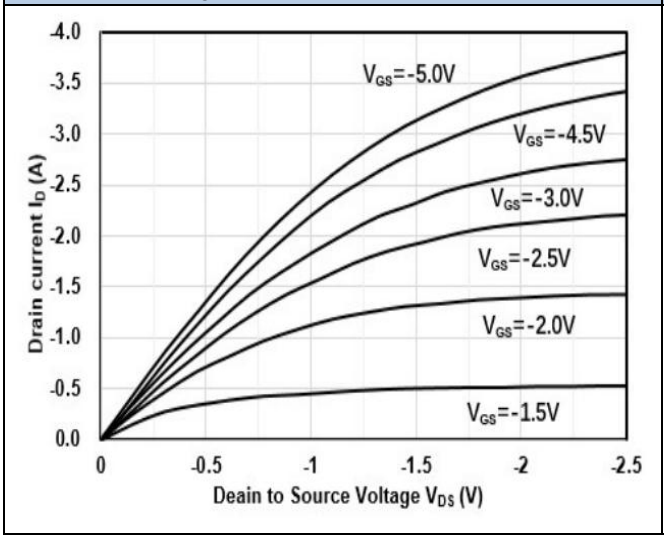



Fig2：Transfer Characteristics

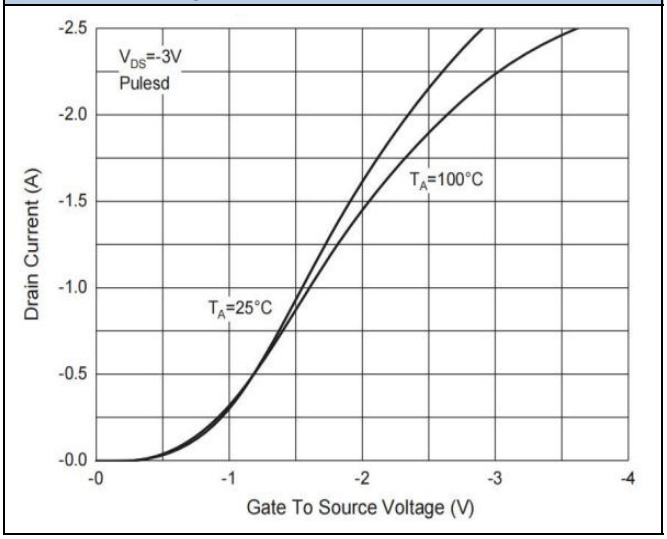



Fig.3 $R_{DS(on)}$ - $I_D$

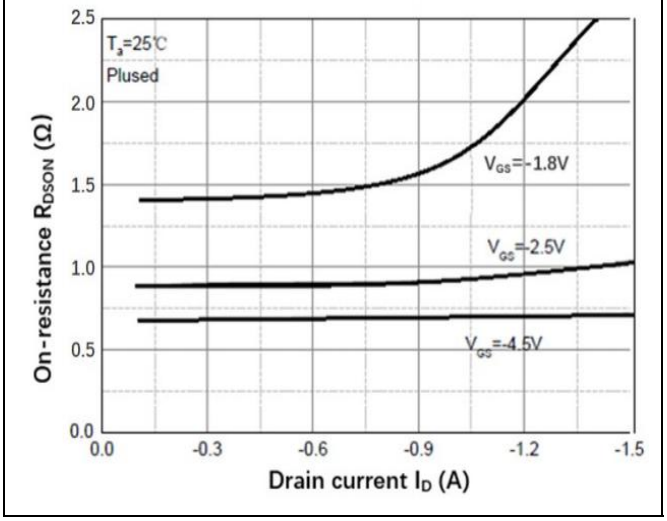



Fig.4 $R_{DS(on)}$ - $V_{GS}$

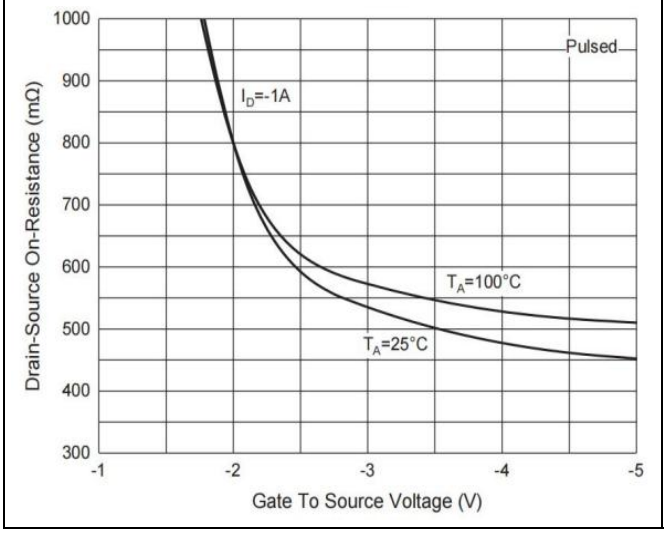



Fig.5 $I_S$ - $V_{SD}$

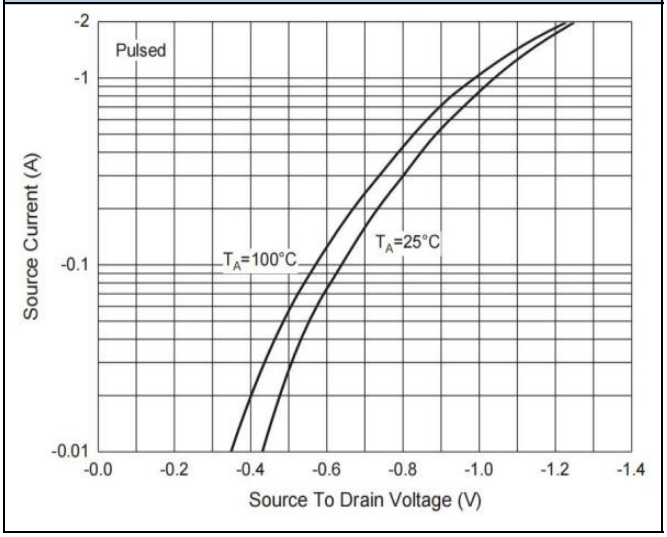
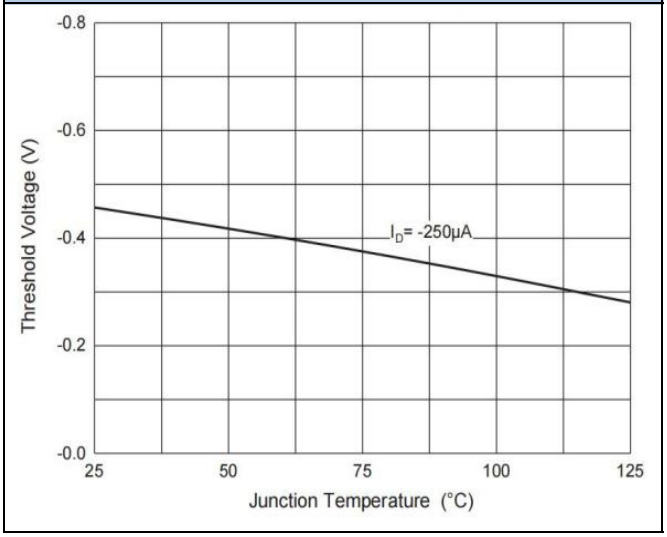
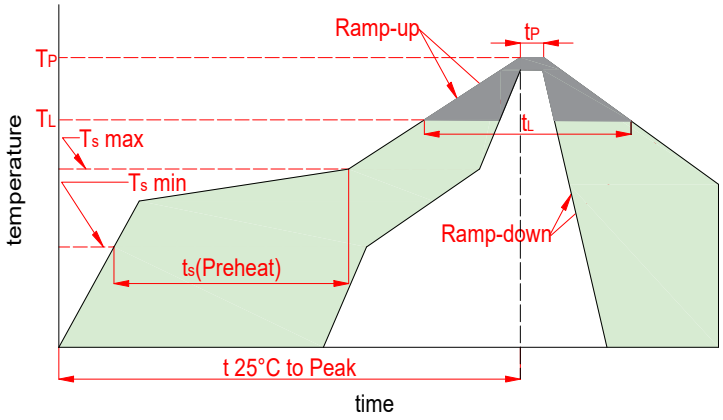



Fig.6 Threshold Voltage

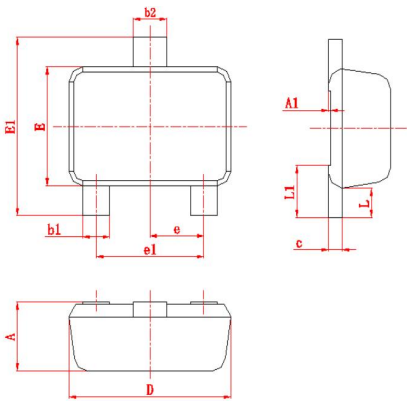


## 6. Soldering Parameters



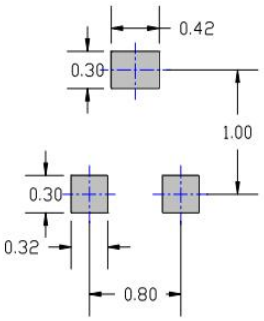

| Reflow Condition | | Lead-free |
|---|---|---|
| Pre Heat | Temp. min($T_s$(min)) | 150℃ |
| | Temp. max($T_s$(min)) | 200℃ |
| | Time(min to max)($t_s$) | 60~120s |
| Aver. ramp up rate(Liquidus Temp.)($T_L$)to peak | | 3℃/s max |
| $T_S$(max) to $T_L$-Ramp-up Rate | | 3℃/s max |
| Reflow | Temp.($T_L$)(Liquidus) | 217℃ |
| | Temp.($t_L$)(Liquidus) | 60~150s |
| Peak Temp.($T_P$) | | $260^{+0/-5}$℃ |
| Time within actual peak Temp.($t_p$) | | 30s max |
| Ramp-down Rate | | 6℃/s max |
| Time 25℃ to peak Tempe.($T_p$) | | 8 minutes max |
| Do not exceed | | 260℃ |

## 7. Dimensions



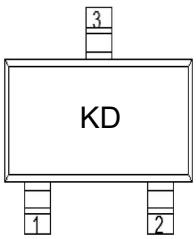

| Dimensions | Inches | | Millimeters | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 0.017 | 0.020 | 0.43 | 0.50 |
| A1 | 0.000 | 0.002 | 0.00 | 0.05 |
| D | 0.045 | 0.049 | 1.15 | 1.25 |
| E | 0.030 | 0.033 | 0.75 | 0.85 |
| E1 | 0.045 | 0.049 | 1.15 | 1.25 |
| e | 0.016 | | 0.40 | |
| e1 | 0.028 | 0.035 | 0.70 | 0.90 |
| b1 | 0.006 | 0.011 | 0.15 | 0.27 |
| b2 | 0.010 | 0.015 | 0.25 | 0.37 |
| c | 0.003 | 0.008 | 0.08 | 0.20 |
| L | 0.005 | 0.011 | 0.12 | 0.28 |
| L1 | 0.012 | | 0.30 | |

Mounting PAD Layout




Unit：mm

## 8. Part Marking System




## 9. Package Information

| Package | Part Number | Tape Width(mm) | Quantity(pcs) |
|---|---|---|---|
| SOT-723 | XN3139KS9 | 8 | 8000 |

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