

Small Signal MOSFET

30 V, 0.56 A, Single, N-Channel, Gate ESD Protection, SOT723

Features

- Low Gate Voltage Threshold($V_{GS(th)}$)to Facilitate Drive Circuit Design
- Low Gate Charge for Fast Switching
- ESD Protected Gate
- Minimum Breakdown Voltage Rating of 30 V
- We declare that the material of product is ROHS compliant and halogen free.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

Applications

- Level Shifters
- Level Switches
- Low Side Load Switches
- Portable Applications

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

| Parameter | | Symbol | Value | Unit | |
|---|-------------------------|----------------|--------------------------|------------------|---|
| Drain-to-Source Voltage | | V_{DSS} | 30 | V | |
| Gate-to-Source Voltage | | V_{GS} | ± 20 | V | |
| Continuous Drain Current (Note 1) | Steady State | I_D | $T_A = 25^\circ\text{C}$ | 0.5 | A |
| | | | $T_A = 85^\circ\text{C}$ | 0.37 | |
| Power Dissipation (Note 1) | Steady State | P_D | 0.44 | W | |
| Continuous Drain Current (Note 1) | $t < 5\text{ s}$ | I_D | $T_A = 25^\circ\text{C}$ | 0.56 | A |
| | | | $T_A = 85^\circ\text{C}$ | 0.40 | |
| Power Dissipation (Note 1) | $t < 5\text{ s}$ | P_D | 0.545 | W | |
| Pulsed Drain Current | $t_p = 10\ \mu\text{s}$ | I_{DM} | 1.7 | A | |
| Operating Junction and Storage Temperature | | T_J, T_{stg} | -55 to 150 | $^\circ\text{C}$ | |
| Source Current (Body Diode) | | I_S | 1.0 | A | |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | | T_L | 260 | $^\circ\text{C}$ | |

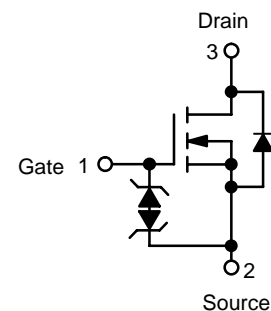
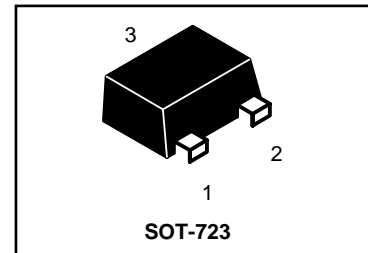
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL RESISTANCE RATINGS

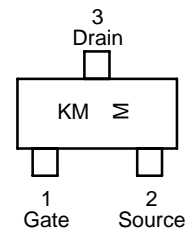
| Parameter | Symbol | Max | Unit |
|---|-----------------|-----|--------------------|
| Junction-to-Ambient – Steady State (Note 1) | $R_{\theta JA}$ | 280 | $^\circ\text{C/W}$ |
| Junction-to-Ambient – $t = 5\text{ s}$ (Note 1) | $R_{\theta JA}$ | 228 | |
| Junction-to-Ambient – Steady State (Note 2) | $R_{\theta JA}$ | 400 | |

1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).
2. Surface-mounted on FR4 board using the minimum recommended pad size.

LNTK4003M3T5G
S-LNTK4003M3T5G



MARKING DIAGRAM



KM = Specific Device Code
M = Month Code

ORDERING INFORMATION

| Device | Package | Shipping |
|----------------------------------|---------|--------------------|
| LNTK4003M3T5G S-LNTK4003M3T5G | SOT723 | 3000/Tape & Reel |
| LNTK4003M3T5G S-LNTK4003M3T5G | SOT723 | 10,000/Tape & Reel |

LNTK4003M3T5G , S-LNTK4003M3T5G

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Units |
|---|-------------------|---|-----|-----|-----------|----------------------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$ | 30 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | | | 40 | | mV/ $^\circ\text{C}$ |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{GS} = 0\text{ V}, V_{DS} = 30\text{ V}, T_J = 25^\circ\text{C}$ | | | 1.0 | μA |
| Gate-to-Source Leakage Current | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$ | | | ± 1.0 | μA |

ON CHARACTERISTICS (Note 3)

| | | | | | | |
|--|------------------|---|-----|------|-----|----------------------|
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$ | 0.8 | | 1.6 | V |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | | | 3.4 | | mV/ $^\circ\text{C}$ |
| Drain-to-Source On Resistance | $R_{DS(on)}$ | $V_{GS} = 4.0\text{ V}, I_D = 10\text{ mA}$ | | 1.0 | 1.5 | Ω |
| | | $V_{GS} = 2.5\text{ V}, I_D = 10\text{ mA}$ | | 1.5 | 2.0 | |
| Forward Transconductance | g_{FS} | $V_{DS} = 3.0\text{ V}, I_D = 10\text{ mA}$ | | 0.33 | | S |

CHARGES AND CAPACITANCES

| | | | | | | |
|------------------------------|--------------|---|--|------|--|----|
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 5.0\text{ V}$ | | 21 | | pF |
| Output Capacitance | C_{oss} | | | 19.7 | | |
| Reverse Transfer Capacitance | C_{rss} | | | 8.1 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS} = 5.0\text{ V}, V_{DS} = 24\text{ V}, I_D = 0.1\text{ A}$ | | 1.15 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 0.15 | | |
| Gate-to-Source Gate Charge | Q_{GS} | | | 0.32 | | |
| Gate-to-Drain Charge | Q_{GD} | | | 0.23 | | |

SWITCHING CHARACTERISTICS (Note 4)

| | | | | | | |
|---------------------|--------------|--|--|------|--|----|
| Turn-On Delay Time | $t_{d(on)}$ | $V_{GS} = 4.5\text{ V}, V_{DD} = 5.0\text{ V}, I_D = 0.1\text{ A}, R_G = 50\ \Omega$ | | 16.7 | | ns |
| Rise Time | t_r | | | 47.9 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 65.1 | | |
| Fall Time | t_f | | | 64.2 | | |

SOURCE-DRAIN DIODE CHARACTERISTICS

| | | | | | | | |
|-----------------------|----------|---|---------------------------|----|------|-----|---|
| Forward Diode Voltage | V_{SD} | $V_{GS} = 0\text{ V}, I_S = 10\text{ mA}$ | $T_J = 25^\circ\text{C}$ | | 0.65 | 0.7 | V |
| | | | $T_J = 125^\circ\text{C}$ | | 0.45 | | |
| Reverse Recovery Time | t_{RR} | $V_{GS} = 0\text{ V}, di_S/dt = 8\text{ A}/\mu\text{s}, I_S = 10\text{ mA}$ | | 14 | | ns | |

- Pulse Test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
- Switching characteristics are independent of operating junction temperatures.

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TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

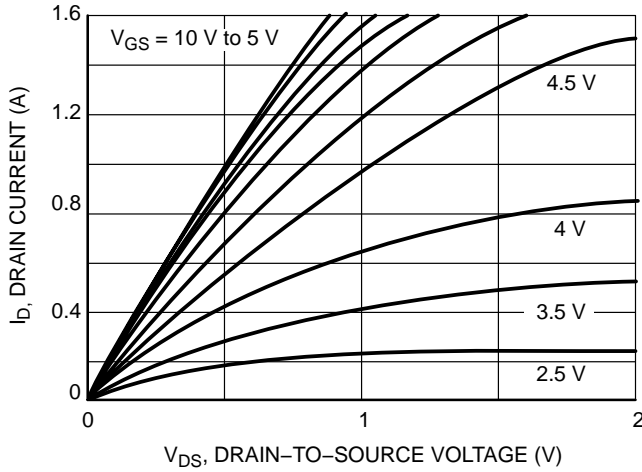


Figure 1. On-Region Characteristics

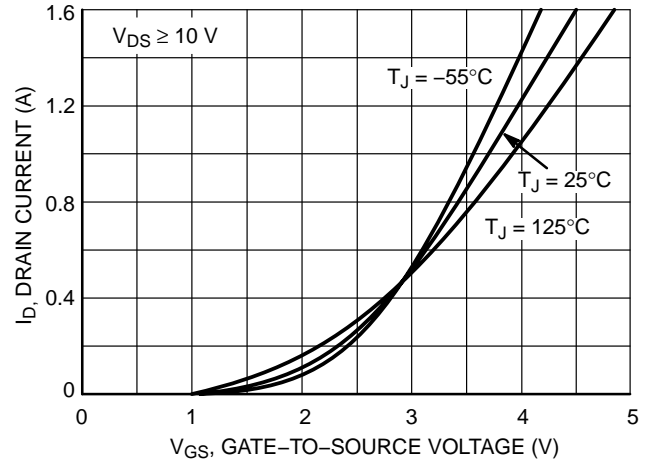


Figure 2. Transfer Characteristics

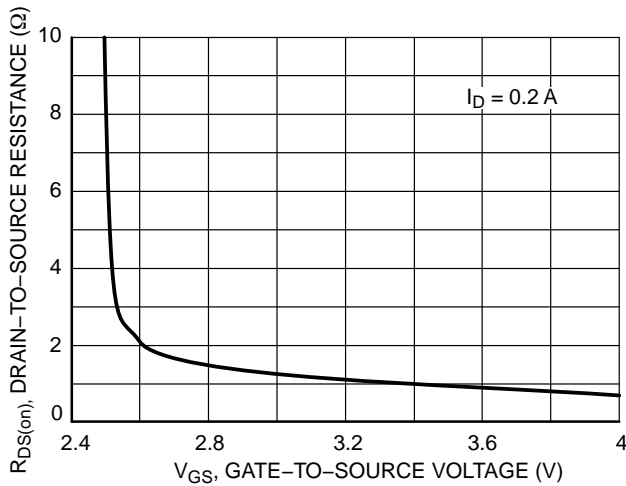


Figure 3. On-Resistance vs. Gate-to-Source Voltage

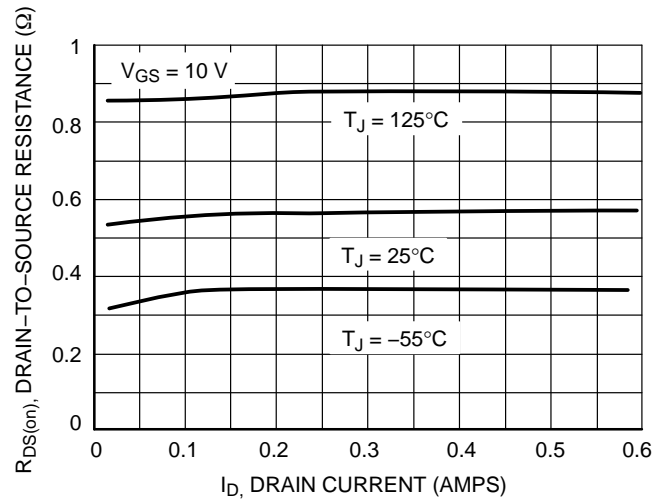


Figure 4. On-Resistance vs. Drain Current and Temperature

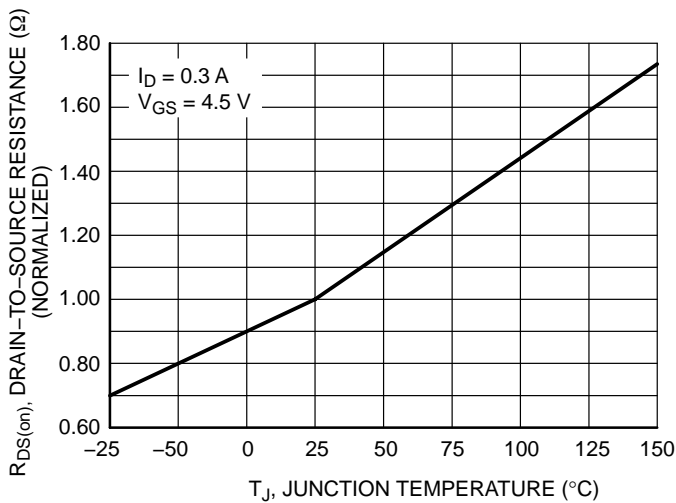


Figure 5. On-Resistance Variation with Temperature

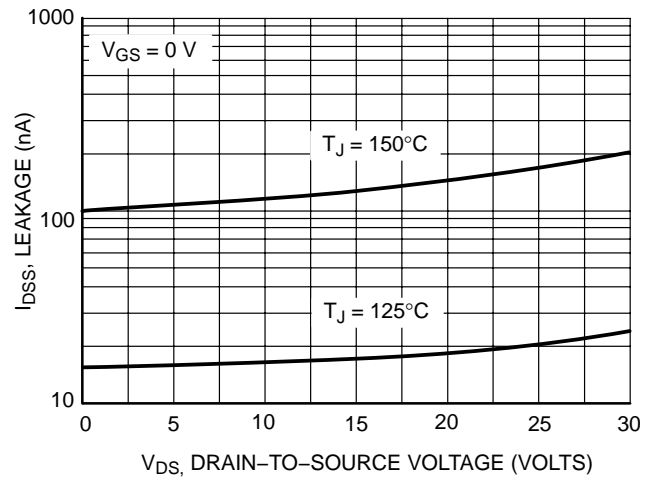


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

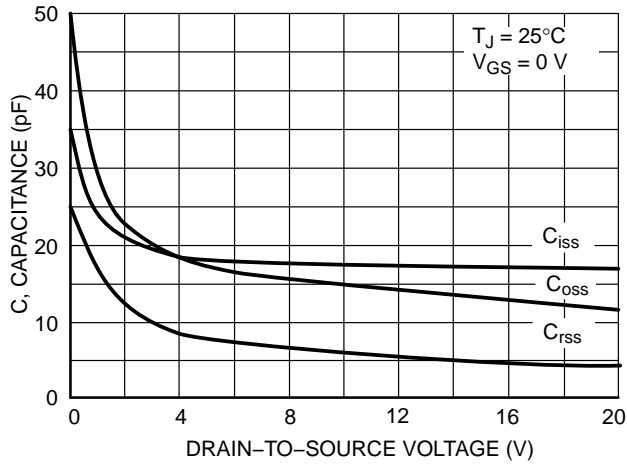


Figure 7. Capacitance Variation

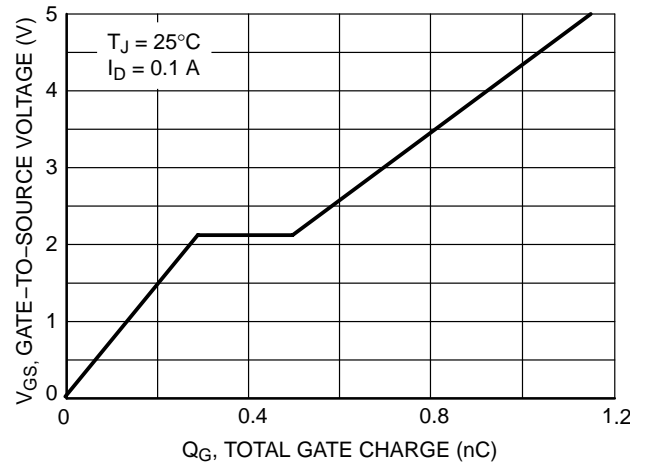


Figure 8. Gate-to-Source & Drain-to-Source Voltage vs. Total Charge

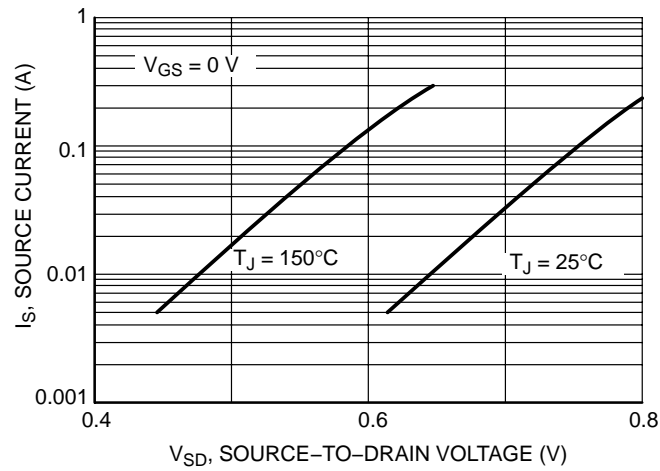
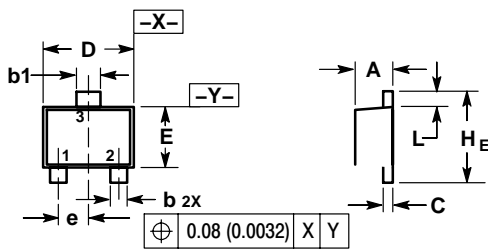


Figure 9. Diode Forward Voltage vs. Current

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SOT-723

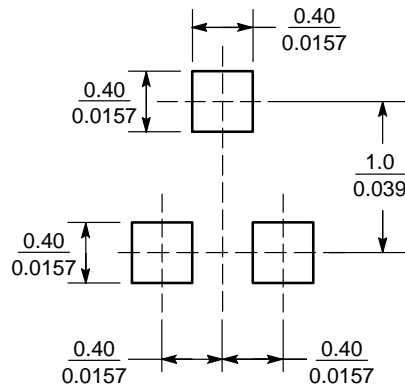


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|-----------|--------|--------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.45 | 0.50 | 0.55 | 0.018 | 0.020 | 0.022 |
| b | 0.15 | 0.20 | 0.27 | 0.0059 | 0.0079 | 0.0106 |
| b1 | 0.25 | 0.3 | 0.35 | 0.010 | 0.012 | 0.014 |
| C | 0.07 | 0.12 | 0.17 | 0.0028 | 0.0047 | 0.0067 |
| D | 1.15 | 1.20 | 1.25 | 0.045 | 0.047 | 0.049 |
| E | 0.75 | 0.80 | 0.85 | 0.03 | 0.032 | 0.034 |
| e | 0.40 BSC | | | 0.016 BSC | | |
| H E | 1.15 | 1.20 | 1.25 | 0.045 | 0.047 | 0.049 |
| L | 0.15 | 0.20 | 0.25 | 0.0059 | 0.0079 | 0.0098 |

SOLDERING FOOTPRINT



(mm / inches)