

NTK3134N

Power MOSFET

20 V, 890 mA, Single N-Channel with
ESD Protection, SOT-723

Features

- N-Channel Switch with Low $R_{DS(on)}$
- 44% Smaller Footprint and 38% Thinner than SC89
- Low Threshold Levels Allowing 1.5 V $R_{DS(on)}$ Rating
- Operated at Low Logic Level Gate Drive
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Load/Power Switching
- Interface Switching
- Logic Level Shift
- Battery Management for Ultra Small Portable Electronics

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

| Parameter | | | Symbol | Value | Unit |
|---|------------------------|----------------------------|----------------------------|------------|--------------------|
| Drain-to-Source Voltage | | | V_{DSS} | 20 | V |
| Gate-to-Source Voltage | | | V_{GS} | ± 6 | V |
| Continuous Drain Current (Note 1) | Steady State | $T_A = 25^{\circ}\text{C}$ | I_D | 890 | mA |
| | | $T_A = 85^{\circ}\text{C}$ | | 640 | |
| | $t \leq 5 \text{ s}$ | $T_A = 25^{\circ}\text{C}$ | | 990 | |
| Power Dissipation (Note 1) | Steady State | $T_A = 25^{\circ}\text{C}$ | P_D | 450 | mW |
| | $t \leq 5 \text{ s}$ | | | 550 | |
| Continuous Drain Current (Note 2) | Steady State | $T_A = 25^{\circ}\text{C}$ | I_D | 750 | mA |
| | | $T_A = 85^{\circ}\text{C}$ | | 540 | |
| Power Dissipation (Note 2) | | | $T_A = 25^{\circ}\text{C}$ | P_D | 310 |
| Pulsed Drain Current | $t_p = 10 \mu\text{s}$ | | I_{DM} | 1.8 | A |
| Operating Junction and Storage Temperature | | | T_J, T_{STG} | -55 to 150 | $^{\circ}\text{C}$ |
| 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.

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

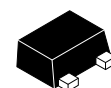
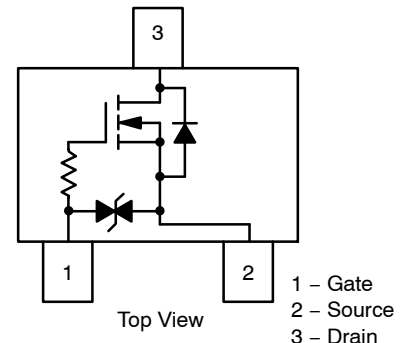


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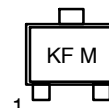
| $V_{(BR)DS}$ | $R_{DS(on)}$ TYP | I_D Max |
|--------------|-----------------------|-----------|
| 20 V | 0.20 Ω @ 4.5 V | 890 mA |
| | 0.26 Ω @ 2.5 V | 790 mA |
| | 0.43 Ω @ 1.8 V | 700 mA |
| | 0.56 Ω @ 1.5 V | 200 mA |

SOT-723 (3-LEAD)



SOT-723
CASE 631AA
STYLE 5

MARKING DIAGRAM



KF = Specific Device Code
M = Date Code

ORDERING INFORMATION

| Device | Package | Shipping† |
|-------------|----------|--------------------|
| NTK3134NT1G | SOT-723* | 4000 / Tape & Reel |
| NTK3134NT1H | | |
| NTK3134NT5G | SOT-723* | 8000 / Tape & Reel |
| NTK3134NT5H | | |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

*These packages are inherently Pb-Free.

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|---|-----------------|-----|------|
| Junction-to-Ambient – Steady State (Note 3) | $R_{\theta JA}$ | 280 | °C/W |
| Junction-to-Ambient – $t = 5$ s (Note 3) | $R_{\theta JA}$ | 228 | |
| Junction-to-Ambient – Steady State Minimum Pad (Note 4) | $R_{\theta JA}$ | 400 | |

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

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

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|-----------|--------|----------------|-----|-----|-----|------|
|-----------|--------|----------------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|---|-------------------|--|-----------------------------|----|-----------|---------------|
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 20 | | | V |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | $I_D = 250\text{ }\mu\text{A}$, Reference to 25°C | | 18 | | mV/°C |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{GS} = 0\text{ V}, V_{DS} = 16\text{ V}$ | $T_J = 25^{\circ}\text{C}$ | | 1.0 | μA |
| | | | $T_J = 125^{\circ}\text{C}$ | | 2.0 | |
| Gate-to-Source Leakage Current | I_{GSS} | $V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$ | | | ± 0.5 | μA |

ON CHARACTERISTICS (Note 5)

| | | | | | | |
|--|------------------|---|------|------|------|----------|
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$ | 0.45 | | 1.2 | V |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | | | 2.4 | | mV/°C |
| Drain-to-Source On Resistance | $R_{DS(on)}$ | $V_{GS} = 4.5\text{ V}, I_D = 890\text{ mA}$ | | 0.20 | 0.35 | Ω |
| | | $V_{GS} = 2.5\text{ V}, I_D = 780\text{ mA}$ | | 0.26 | 0.45 | |
| | | $V_{GS} = 1.8\text{ V}, I_D = 700\text{ mA}$ | | 0.43 | 0.65 | |
| | | $V_{GS} = 1.5\text{ V}, I_D = 200\text{ mA}$ | | 0.56 | 1.2 | |
| Forward Transconductance | g_{FS} | $V_{DS} = 10\text{ V}, I_D = 800\text{ mA}$ | | 1.6 | | S |

CHARGES, CAPACITANCES AND GATE RESISTANCE

| | | | | | | |
|------------------------------|-----------|---|--|-----|-----|----|
| Input Capacitance | C_{ISS} | $V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 16\text{ V}$ | | 79 | 120 | pF |
| Output Capacitance | C_{OSS} | | | 13 | 20 | |
| Reverse Transfer Capacitance | C_{RSS} | | | 9.0 | 15 | |

SWITCHING CHARACTERISTICS, $V_{GS} = 4.5\text{ V}$ (Note 6)

| | | | | | | |
|--------------------|--------------|--|--|------|--|----|
| Turn On Delay Time | $t_{d(ON)}$ | $V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}, I_D = 500\text{ mA}, R_G = 10\text{ }\Omega$ | | 6.7 | | ns |
| Rise Time | t_r | | | 4.8 | | |
| TurnOff Delay Time | $t_{d(OFF)}$ | | | 17.3 | | |
| Fall Time | t_f | | | 7.4 | | |

DRAIN SOURCE DIODE CHARACTERISTICS

| | | | | | | | |
|-------------------------|----------|--|----------------------------|-----|------|-----|----|
| Forward Diode Voltage | V_{SD} | $V_{GS} = 0\text{ V}, I_S = 350\text{ mA}$ | $T_J = 25^{\circ}\text{C}$ | | 0.75 | 1.2 | V |
| Reverse Recovery Time | t_{RR} | $V_{GS} = 0\text{ V}, dI_{SD}/dt = 100\text{ A}/\mu\text{s}, I_S = 1.0\text{ A}, V_{DD} = 20\text{ V}$ | | 8.1 | | ns | |
| Charge Time | t_a | | | 6.4 | | | |
| Discharge Time | t_b | | | 1.7 | | | |
| Reverse Recovery Charge | Q_{RR} | | | 3.0 | | | nC |

5. Pulse Test: pulse width = 300 μs , duty cycle = 2%
6. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

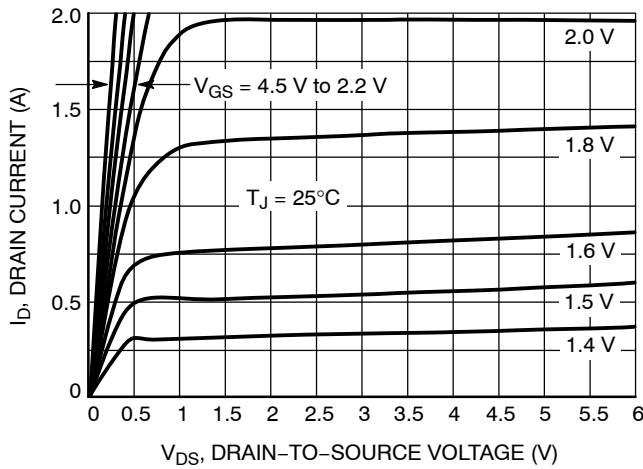


Figure 1. On-Region Characteristics

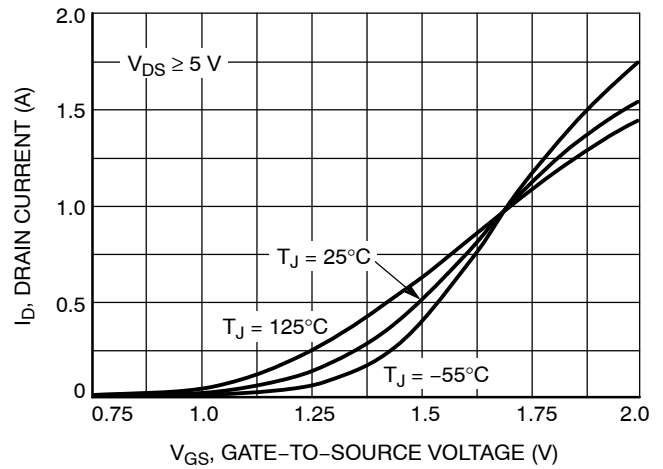


Figure 2. Transfer Characteristics

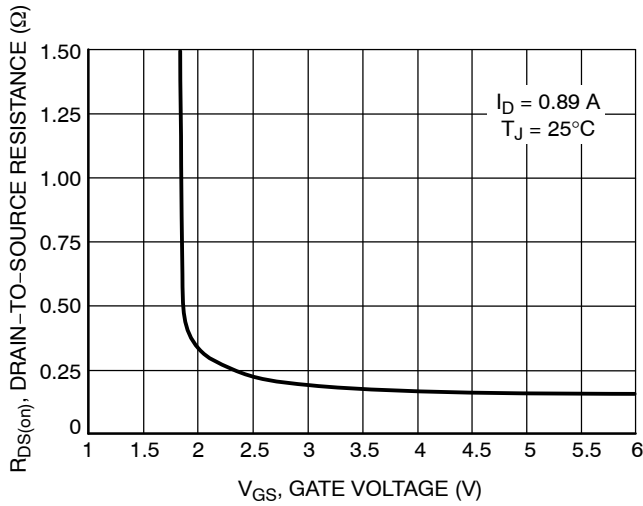


Figure 3. On-Resistance vs. Gate-to-Source Voltage

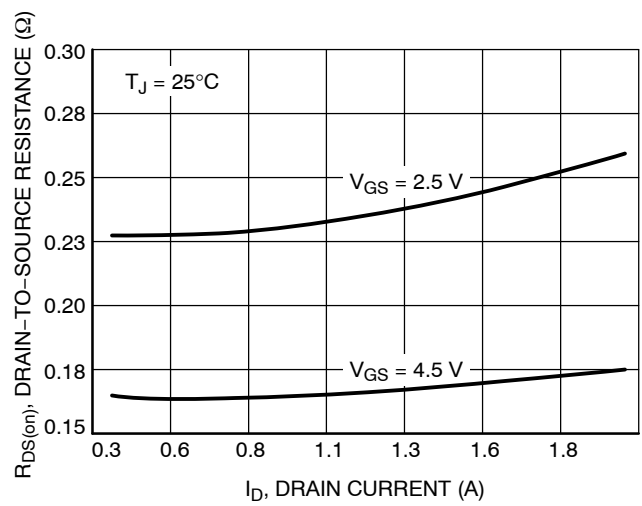


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

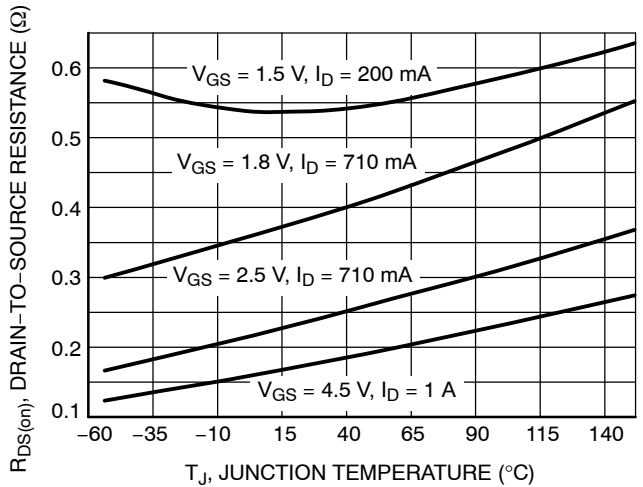


Figure 5. On-Resistance Variation with Temperature

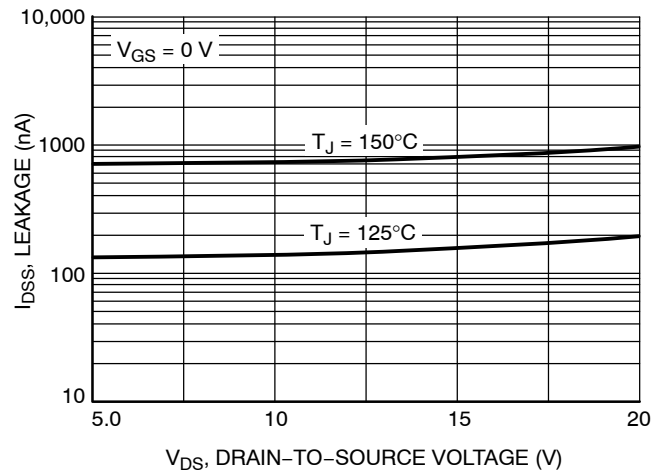


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

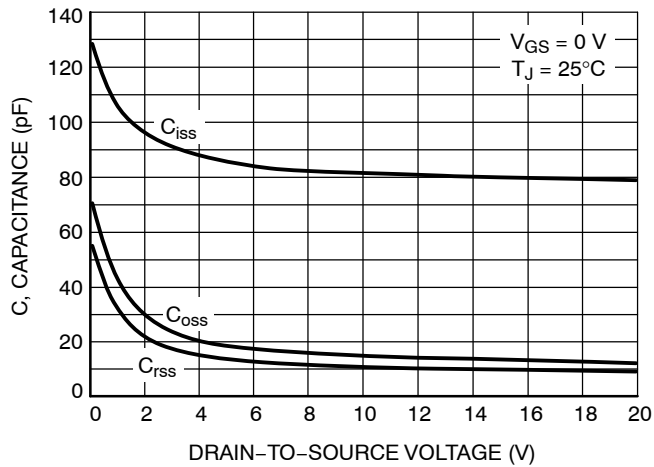


Figure 7. Capacitance Variation

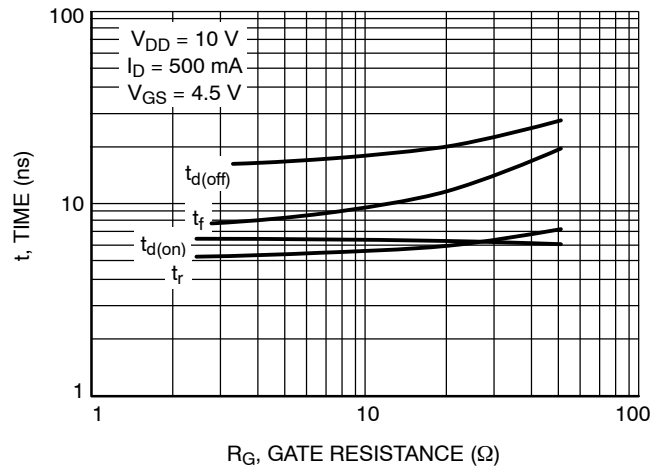


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

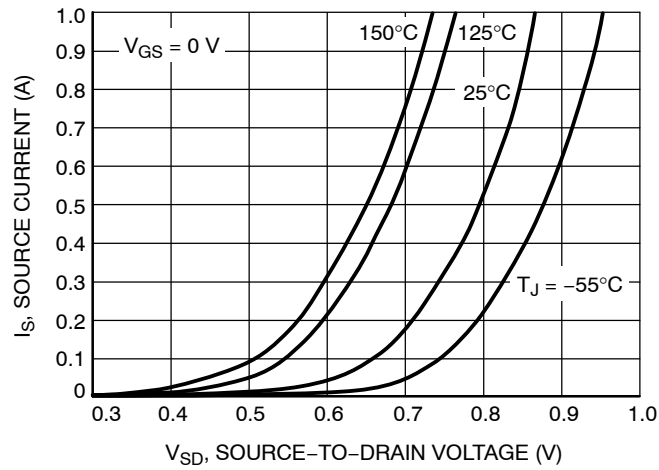
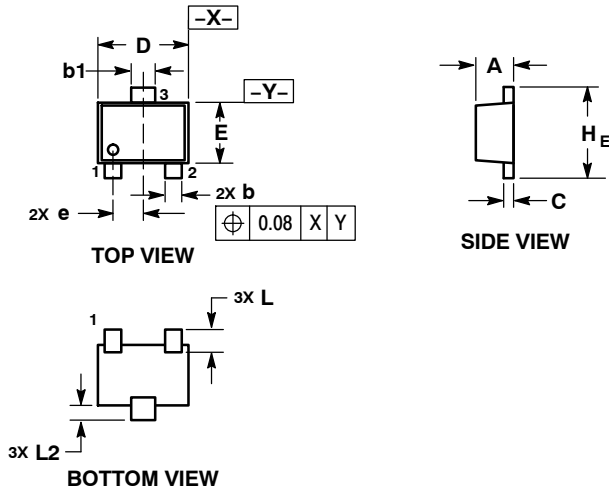


Figure 9. Diode Forward Voltage vs. Current

NTK3134N

PACKAGE DIMENSIONS

SOT-723
CASE 631AA
ISSUE D



NOTES:

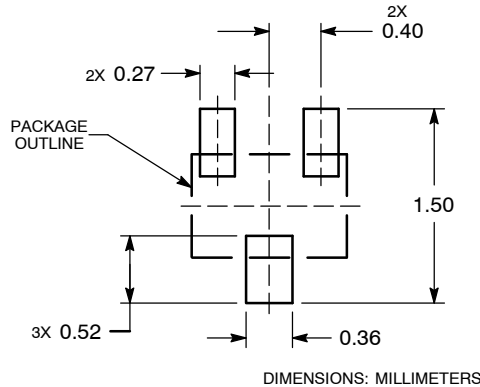
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN | NOM | MAX |
| A | 0.45 | 0.50 | 0.55 |
| b | 0.15 | 0.21 | 0.27 |
| b1 | 0.25 | 0.31 | 0.37 |
| C | 0.07 | 0.12 | 0.17 |
| D | 1.15 | 1.20 | 1.25 |
| E | 0.75 | 0.80 | 0.85 |
| e | 0.40 BSC | | |
| H E | 1.15 | 1.20 | 1.25 |
| L | 0.29 REF | | |
| L2 | 0.15 | 0.20 | 0.25 |


STYLE 5:

1. GATE
2. SOURCE
3. DRAIN

RECOMMENDED SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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