# NTK3134N

# Power MOSFET

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

ON Semiconductor®

http://onsemi.com

### Features

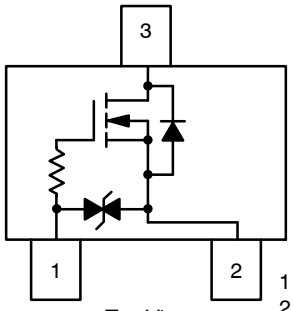
- N−Channel Switch with Low $R_{DS(on)}$
- 44% Smaller Footprint and 38% Thinner than SC89
- Low Threshold Levels Allowing 1.5 V $R_{DS(on)}$ Rating
- Operated at Low Logic Level Gate Drive
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

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

| $V_{(BR)DSS}$ | $R_{DS(on)}$ 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)**

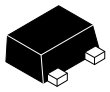



**MAXIMUM RATINGS** ($T_J$ = 25°C unless otherwise stated)

| 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°C | $I_D$ | 890 | mA |
| | | $T_A$ = 85°C | | 640 | |
| | t ≤ 5 s | $T_A$ = 25°C | | 990 | |
| Power Dissipation (Note 1) | Steady State | $T_A$ = 25°C | $P_D$ | 450 | mW |
| | t ≤ 5 s | | | 550 | |
| Continuous Drain Current (Note 2) | Steady State | $T_A$ = 25°C | $I_D$ | 750 | mA |
| | | $T_A$ = 85°C | | 540 | |
| Power Dissipation (Note 2) | | $T_A$ = 25°C | $P_D$ | 310 | mW |
| Pulsed Drain Current | $t_p$ = 10 μs | | $I_{DM}$ | 1.8 | A |
| Operating Junction and Storage Temperature | | | $T_J$, $T_{STG}$ | −55 to 150 | °C |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | | | $T_L$ | 260 | °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



**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°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 V, $I_D$ = 250 μA | | 20 | | | V |
| Drain−to−Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | $I_D$ = 250 μA, Reference to 25°C | | | 18 | | mV/°C |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 16 V | $T_J$ = 25°C | | | 1.0 | μA |
| | | | $T_J$ = 125°C | | | 2.0 | |
| Gate−to−Source Leakage Current | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±4.5 V | | | | ±0.5 | μA |
| **ON CHARACTERISTICS** (Note 5) | | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = 250 μA | | 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 V, $I_D$ = 890 mA | | | 0.20 | 0.35 | Ω |
| | | $V_{GS}$ = 2.5 V, $I_D$ = 780 mA | | | 0.26 | 0.45 | |
| | | $V_{GS}$ = 1.8 V, $I_D$ = 700 mA | | | 0.43 | 0.65 | |
| | | $V_{GS}$ = 1.5 V, $I_D$ = 200 mA | | | 0.56 | 1.2 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = 10 V, $I_D$ = 800 mA | | | 1.6 | | S |
| **CHARGES, CAPACITANCES AND GATE RESISTANCE** | | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$ = 0 V, f = 1 MHz, $V_{DS}$ = 16 V | | | 79 | 120 | pF |
| Output Capacitance | $C_{OSS}$ | | | | 13 | 20 | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | | 9.0 | 15 | |
| **SWITCHING CHARACTERISTICS, $V_{GS}$ = 4.5 V** (Note 6) | | | | | | | |
| Turn On Delay Time | $t_{d(ON)}$ | $V_{GS}$ = 4.5 V, $V_{DS}$ = 10 V, $I_D$ = 500 mA, $R_G$ = 10 Ω | | | 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 V, $I_S$ = 350 mA | $T_J$ = 25°C | | 0.75 | 1.2 | V |
| Reverse Recovery Time | $t_{RR}$ | $V_{GS}$ = 0 V, $d_{ISD}/d_t$ = 100 A/μs, $I_S$ = 1.0 A, $V_{DD}$ = 20 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

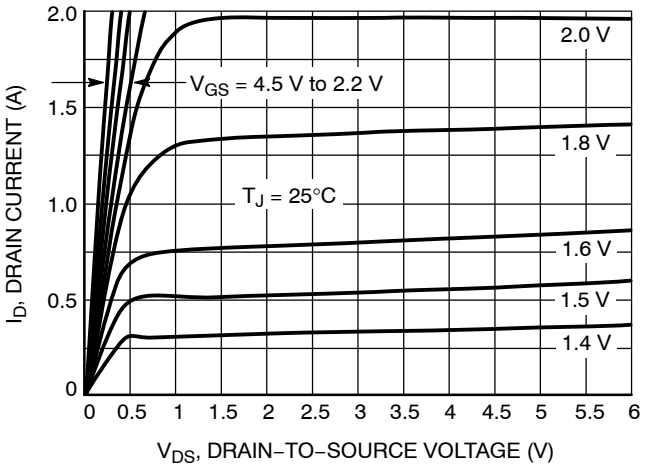



**Figure 1. On−Region Characteristics**

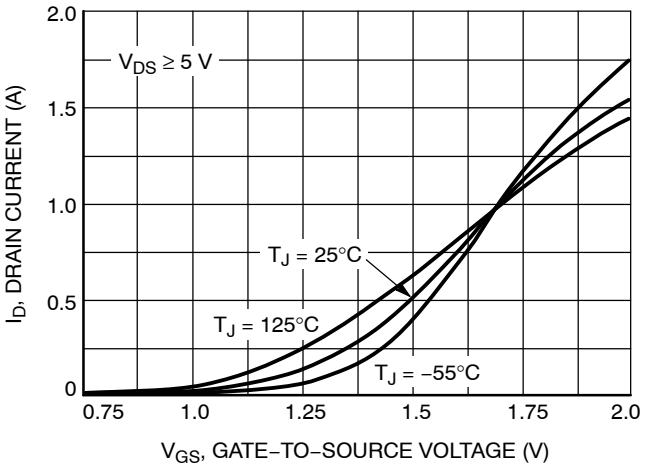



**Figure 2. Transfer Characteristics**

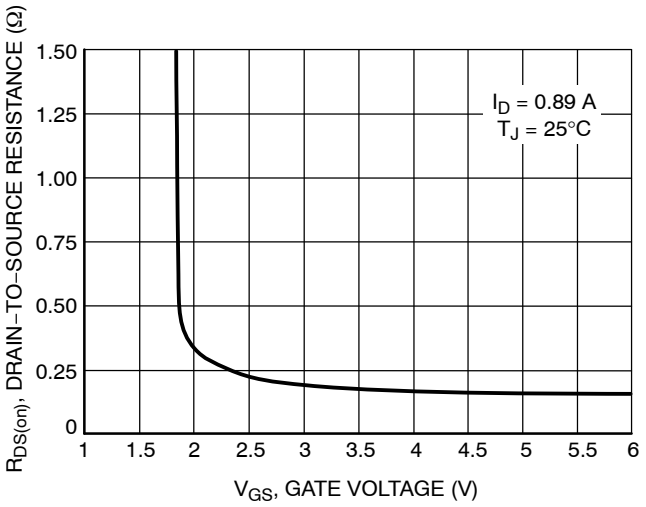



**Figure 3. On−Resistance vs. Gate−to−Source Voltage**

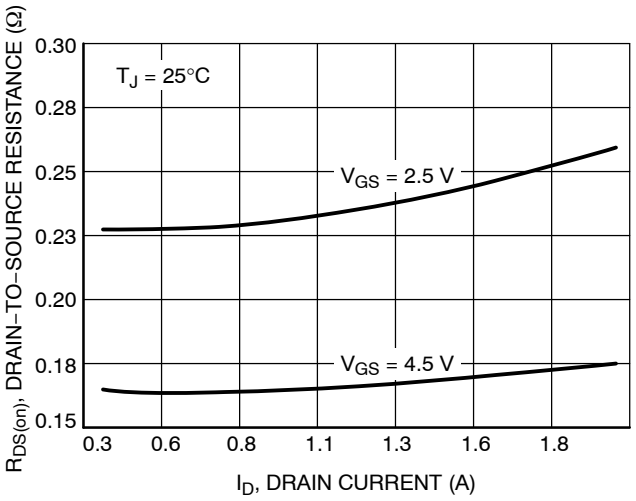



**Figure 4. On−Resistance vs. Drain Current and Gate Voltage**

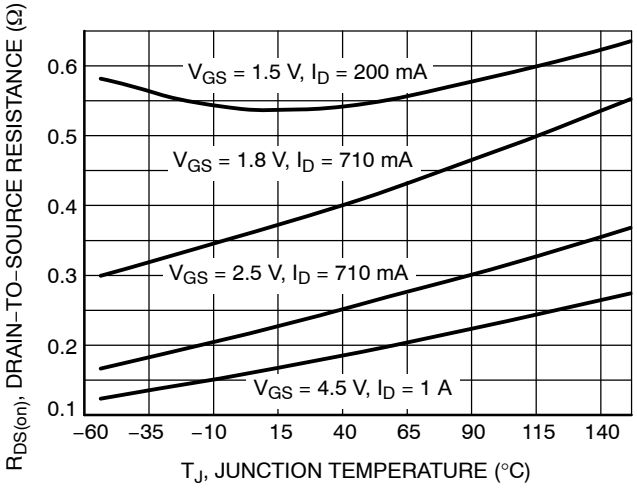



**Figure 5. On−Resistance Variation with Temperature**

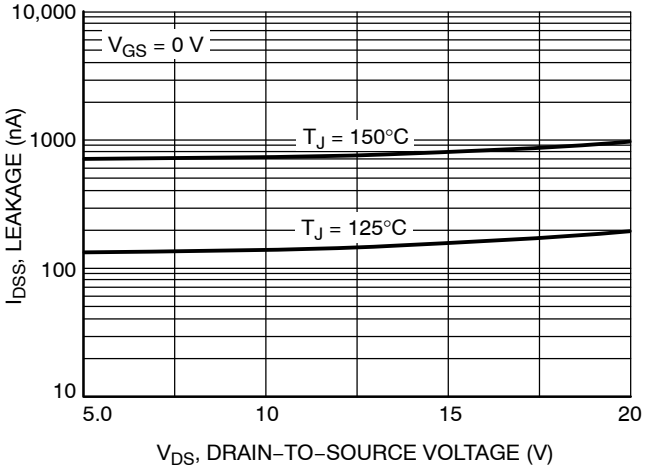



**Figure 6. Drain−to−Source Leakage Current vs. Voltage**

## TYPICAL CHARACTERISTICS

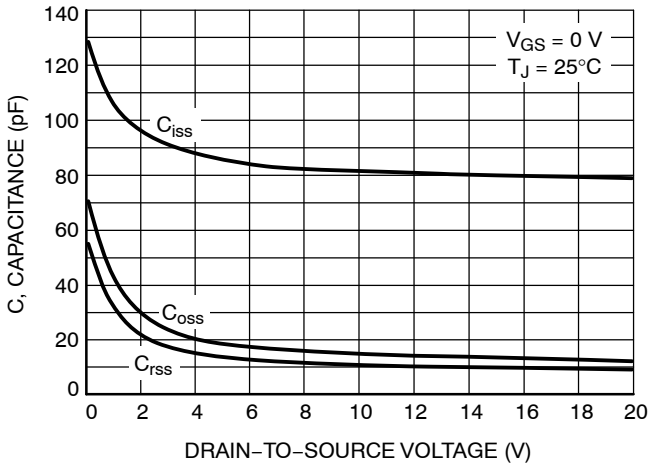



**Figure 7. Capacitance Variation**

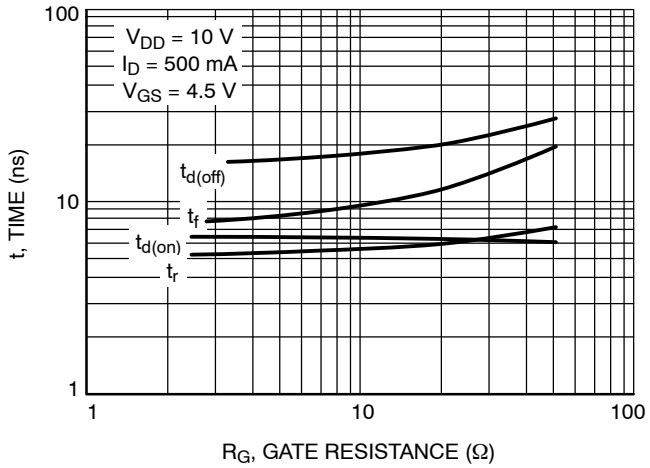



**Figure 8. Resistive Switching Time Variation vs. Gate Resistance**

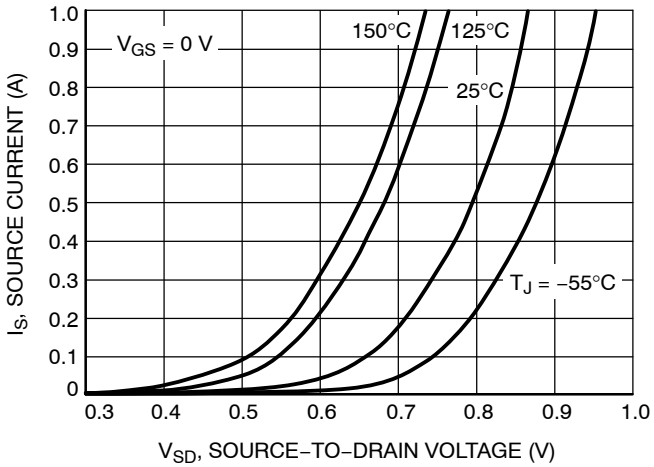
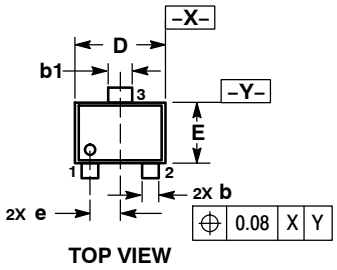


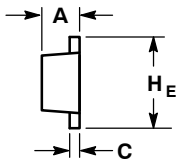

**Figure 9. Diode Forward Voltage vs. Current**

## PACKAGE DIMENSIONS

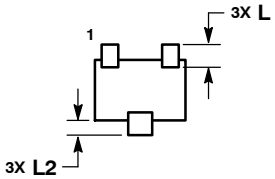
**SOT−723**
CASE 631AA
ISSUE D




TOP VIEW




SIDE VIEW



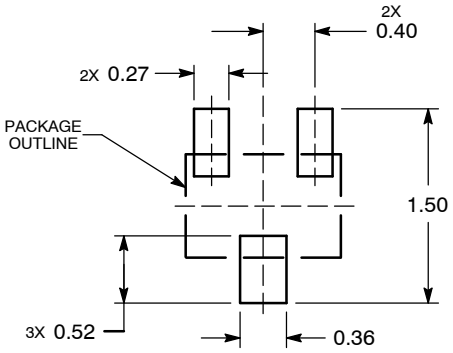

BOTTOM VIEW

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.

| | MILLIMETERS | | |
|---|---|---|---|
| DIM | 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:
PIN 1. GATE
2. SOURCE
3. DRAIN

## RECOMMENDED SOLDERING FOOTPRINT*




DIMENSIONS: MILLIMETERS

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



### PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT**:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
**Phone**: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
**Fax**: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
**Email**: orderlit@onsemi.com

**N. American Technical Support**: 800−282−9855 Toll Free USA/Canada
**Europe, Middle East and Africa Technical Support:**
Phone: 421 33 790 2910
**Japan Customer Focus Center**
Phone: 81−3−5817−1050

**ON Semiconductor Website**: **www.onsemi.com**

**Order Literature**: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

**NTK3134N/D**