

# 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			$V_{GS}$	$\pm 6$	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	$t_p = 10\text{ }\mu\text{s}$		$I_{DM}$	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

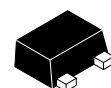
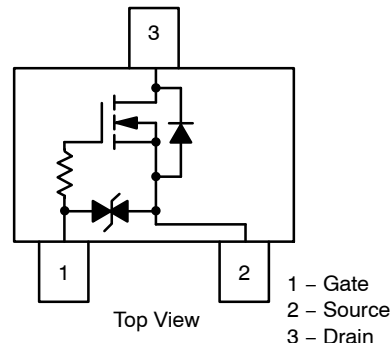


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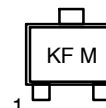
$V_{(BR)DS}$	$R_{DS(on)}$ TYP	$I_D$ Max
20 V	0.20 $\Omega$ @ 4.5 V	890 mA
	0.26 $\Omega$ @ 2.5 V	790 mA
	0.43 $\Omega$ @ 1.8 V	700 mA
	0.56 $\Omega$ @ 1.5 V	200 mA

### 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.

# NTK3134N

## 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
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### 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 $25^\circ\text{C}$		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	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		2.0	
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$			$\pm 0.5$	$\mu\text{A}$

### 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	$\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 780\text{ mA}$		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	$t_{RR}$	$V_{GS} = 0\text{ V}, dI_{SD}/dI_t = 100\text{ A}/\mu\text{s}, I_S = 1.0\text{ A}, V_{DD} = 20\text{ V}$		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  $\mu\text{s}$ , duty cycle = 2%  
 6. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

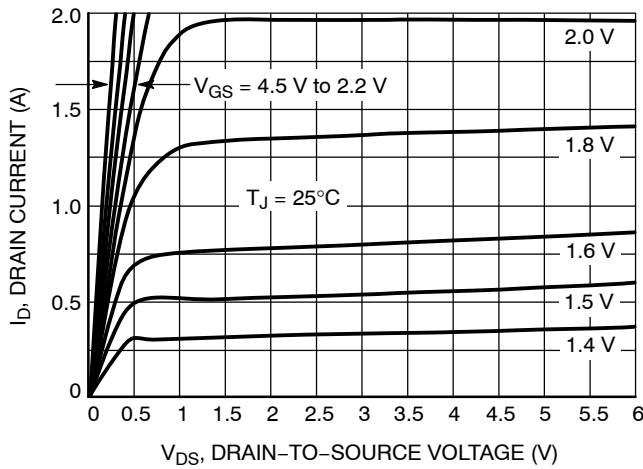


Figure 1. On-Region Characteristics

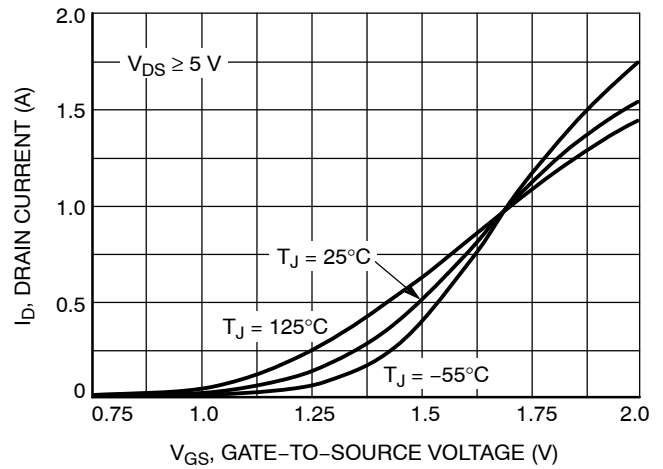


Figure 2. Transfer Characteristics

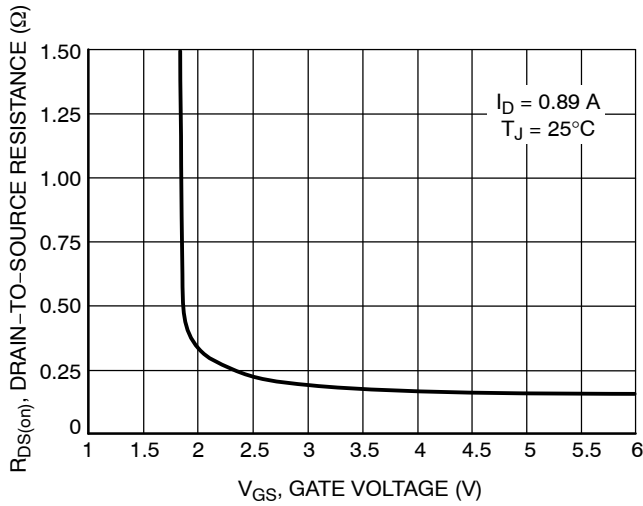


Figure 3. On-Resistance vs. Gate-to-Source Voltage

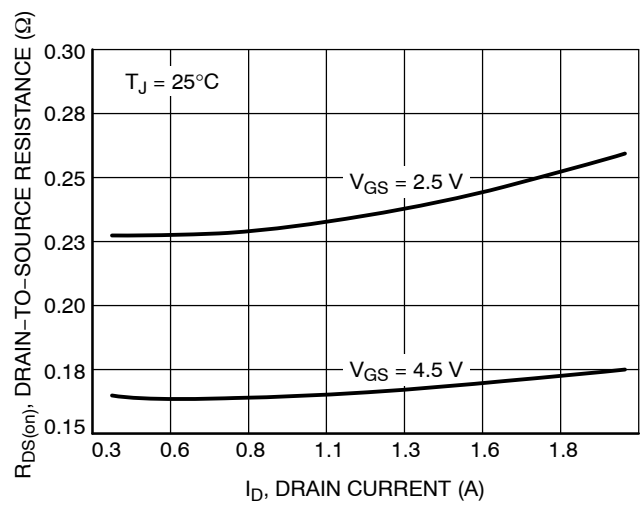


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

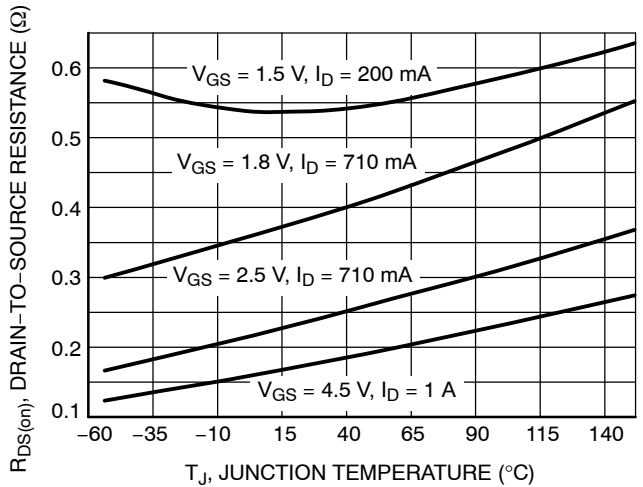


Figure 5. On-Resistance Variation with Temperature

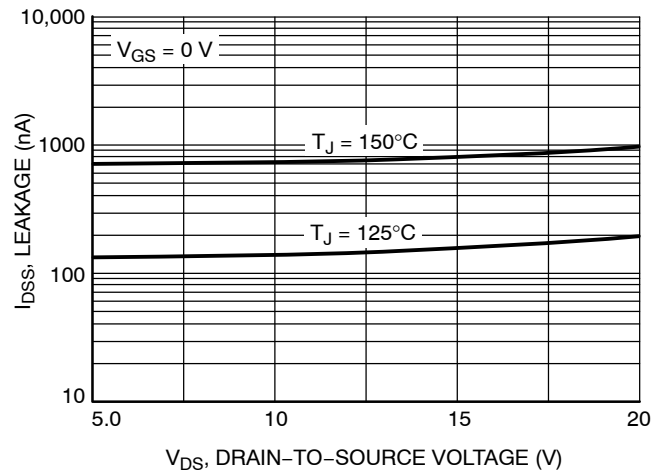


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

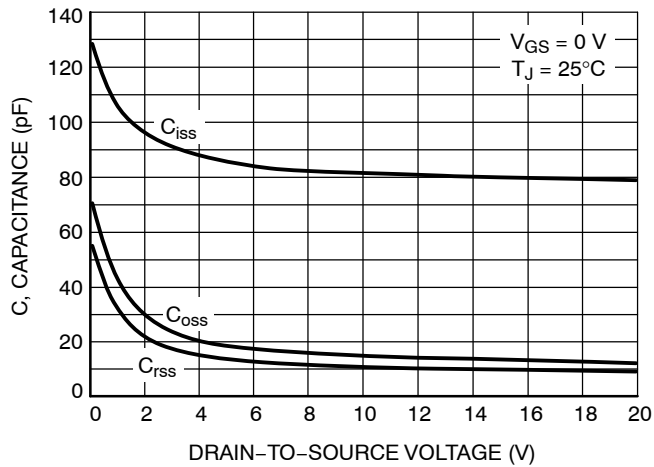


Figure 7. Capacitance Variation

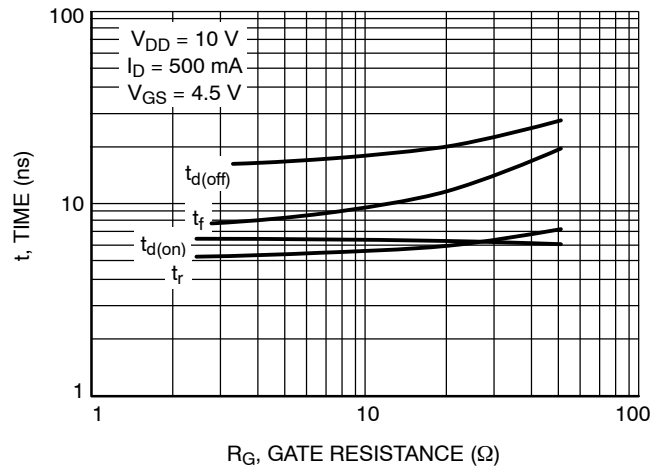


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

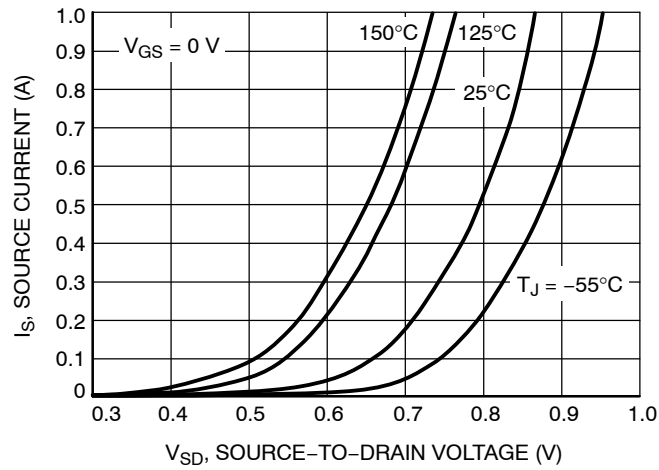
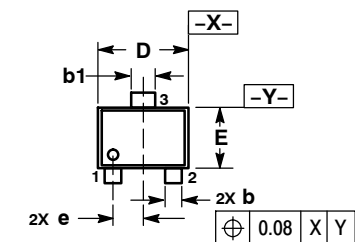


Figure 9. Diode Forward Voltage vs. Current

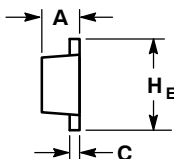
# NTK3134N

## PACKAGE DIMENSIONS

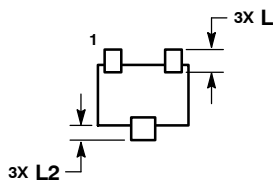
**SOT-723**  
CASE 631AA  
ISSUE D



TOP VIEW



SIDE VIEW



BOTTOM VIEW

### NOTES:

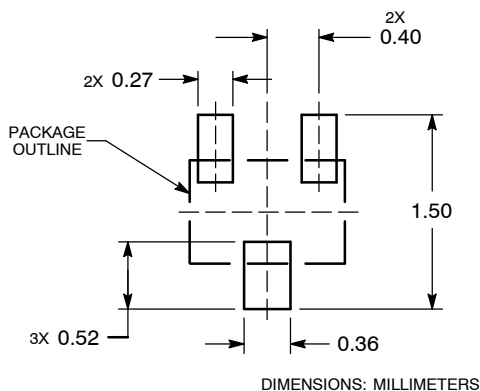
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

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	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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