

# NTK3043N

## MOSFET – Power, N-Channel with ESD Protection, SOT-723 20 V, 285 mA

### Features

- Enables High Density PCB Manufacturing
- 44% Smaller Footprint than SC-89 and 38% Thinner than SC-89
- Low Voltage Drive Makes this Device Ideal for Portable Equipment
- Low Threshold Levels,  $V_{GS(TH)} < 1.3$  V
- Low Profile (< 0.5 mm) Allows It to Fit Easily into Extremely Thin Environments such as Portable Electronics
- Operated at Standard Logic Level Gate Drive, Facilitating Future Migration to Lower Levels Using the Same Basic Topology
- These are Pb-Free and Halogen-Free Devices

### Applications

- Interfacing, Switching
- High Speed Switching
- Cellular Phones, PDAs

### 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		$V_{GS}$	$\pm 10$	V	
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	255	mA	
		$T_A = 85^\circ\text{C}$	185		
		$t \leq 5$ s	285		
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	440	mW	
		$t \leq 5$ s	545		
Continuous Drain Current (Note 2)	Steady State	$T_A = 25^\circ\text{C}$	210	mA	
		$T_A = 85^\circ\text{C}$	155		
Power Dissipation (Note 2)		$T_A = 25^\circ\text{C}$	310	mW	
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	$I_{DM}$	400	mA	
Operating Junction and Storage Temperature		$T_J, T_{STG}$	-55 to 150	°C	
Source Current (Body Diode) (Note 2)		$I_S$	286	mA	
Lead Temperature for Soldering Purposes (1/8" from case for 10 seconds)		$T_L$	260	°C	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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.

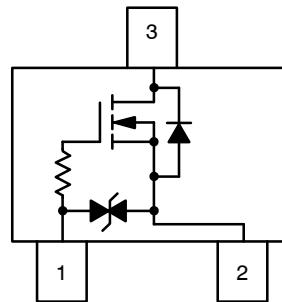


ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)

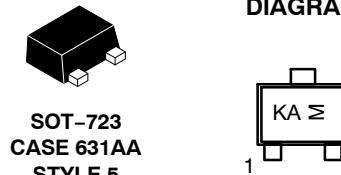
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	$I_D$ Max
20 V	1.5 Ω @ 4.5 V	285 mA
	2.4 Ω @ 2.5 V	
	5.1 Ω @ 1.8 V	
	6.8 Ω @ 1.65 V	

### Top View



1 – Gate  
2 – Source  
3 – Drain

### MARKING DIAGRAM



SOT-723  
CASE 631AA  
STYLE 5

KA = Device Code  
M = Date Code

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
NTK3043NT1G	SOT-723*	4000 / Tape & Reel
NTK3043NT5G	SOT-723*	8000 / Tape & Reel

<sup>†</sup>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.

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

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

## OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{GS} = 0$ V, $I_D = 100$ $\mu\text{A}$	$V_{(BR)DSS}$	20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$I_D = 100$ $\mu\text{A}$ , Reference to $25^\circ\text{C}$	$V_{(BR)DSS}/T_J$		27		$\text{mV}/^\circ\text{C}$
Zero Gate Voltage Drain Current	$V_{GS} = 0$ V, $V_{DS} = 16$ V	$I_{DSS}$			1	$\mu\text{A}$
					10	
Gate-to-Source Leakage Current	$V_{DS} = 0$ V, $V_{GS} = \pm 5$ V	$I_{GSS}$			1	$\mu\text{A}$

## ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS} = V_{DS}$ , $I_D = 250$ $\mu\text{A}$	$V_{GS(\text{TH})}$	0.4		1.3	V
Gate Threshold Temperature Coefficient		$V_{GS(\text{TH})}/T_J$		-2.4		$\text{mV}/^\circ\text{C}$
Drain-to-Source On Resistance	$V_{GS} = 4.5$ V, $I_D = 10$ mA	$R_{DS(\text{ON})}$		1.5	3.4	$\Omega$
	$V_{GS} = 4.5$ V, $I_D = 255$ mA			1.6	3.8	
	$V_{GS} = 2.5$ V, $I_D = 1$ mA			2.4	4.5	
	$V_{GS} = 1.8$ V, $I_D = 1$ mA			5.1	10	
	$V_{GS} = 1.65$ V, $I_D = 1$ mA			6.8	15	
Forward Transconductance	$V_{DS} = 5$ V, $I_D = 100$ mA	$g_{FS}$		0.275		S
Gate Resistance	$T_A = 25^\circ\text{C}$	$R_G$		2.2		$\text{k}\Omega$

## CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	$V_{GS} = 0$ V, $f = 1$ MHz, $V_{DS} = 10$ V	$C_{ISS}$		11		pF
Output Capacitance		$C_{OSS}$		8.3		
Reverse Transfer Capacitance		$C_{RSS}$		2.7		

SWITCHING CHARACTERISTICS,  $V_{GS} = 4.5$  V (Note 4)

Turn-On Delay Time	$V_{GS} = 4.5$ V, $V_{DD} = 5$ V, $I_D = 10$ mA, $R_G = 6$ $\Omega$	$t_{d(\text{ON})}$		13		ns
Rise Time		$t_r$		15		
Turn-Off Delay Time		$t_{d(\text{OFF})}$		94		
Fall Time		$t_f$		55		

## DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{GS} = 0$ V, $I_S = 286$ mA	$T_J = 25^\circ\text{C}$	$V_{SD}$		0.83	1.2	V
		$T_J = 125^\circ\text{C}$			0.69		
Reverse Recovery Time	$V_{GS} = 0$ V, $V_{DD} = 20$ V, $dISD/dt = 100$ A/ $\mu\text{s}$ , $I_S = 286$ mA	$t_{RR}$	$Q_{RR}$		9.1		ns
		$t_a$			7.1		
		$t_b$			2.0		
					3.7		

5. Pulse Test: pulse width  $\leq 300$   $\mu\text{s}$ , duty cycle  $\leq 2\%$ 

6. Switching characteristics are independent of operating junction temperatures

## TYPICAL PERFORMANCE CURVES

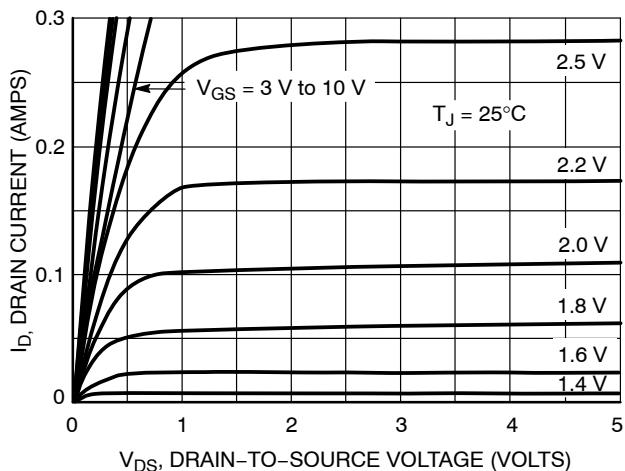


Figure 1. On-Region Characteristics

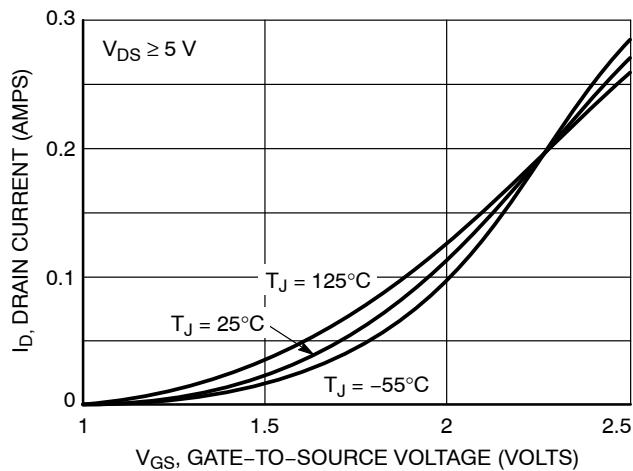


Figure 2. Transfer Characteristics

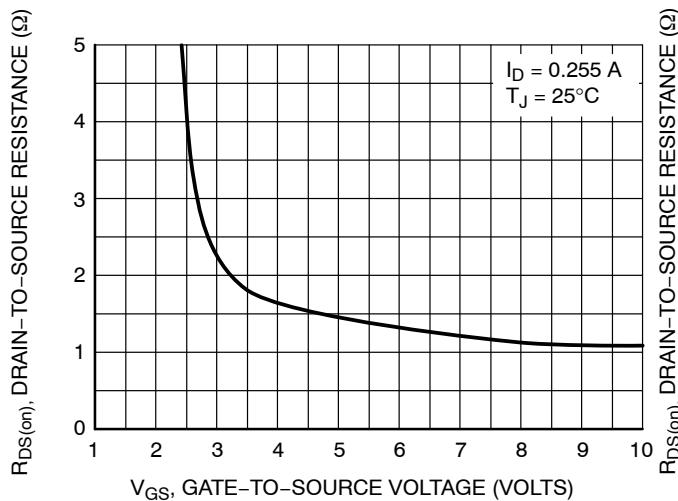


Figure 3. On-Resistance vs. Gate-to-Source Voltage

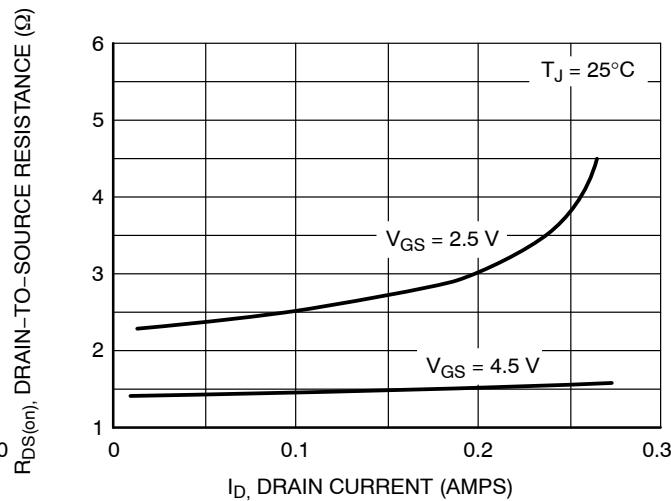


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

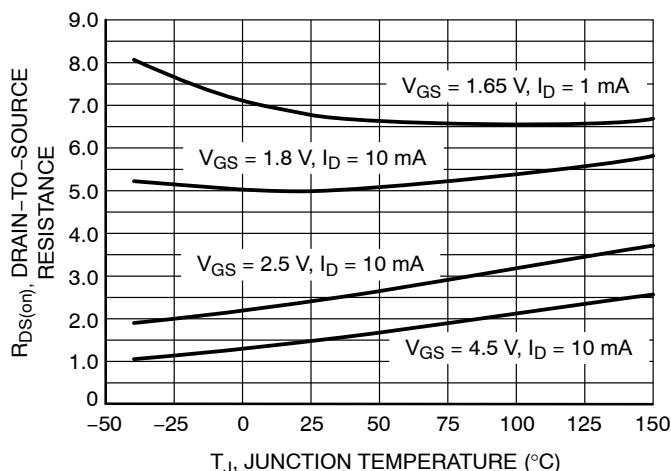


Figure 5. On-Resistance Variation with Temperature

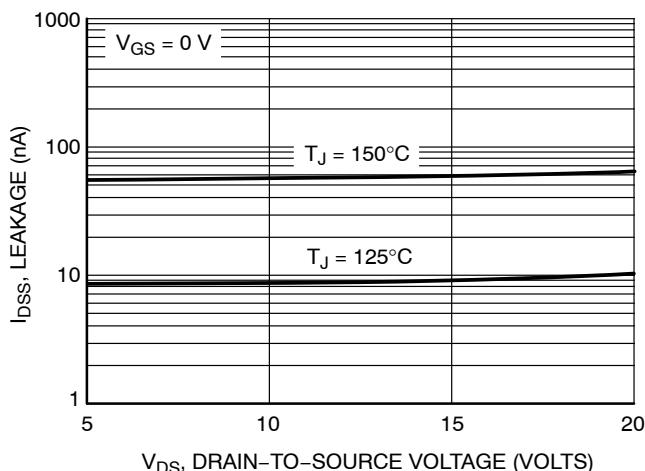


Figure 6. Drain-to-Source Leakage Current vs. Voltage

## TYPICAL PERFORMANCE CURVES

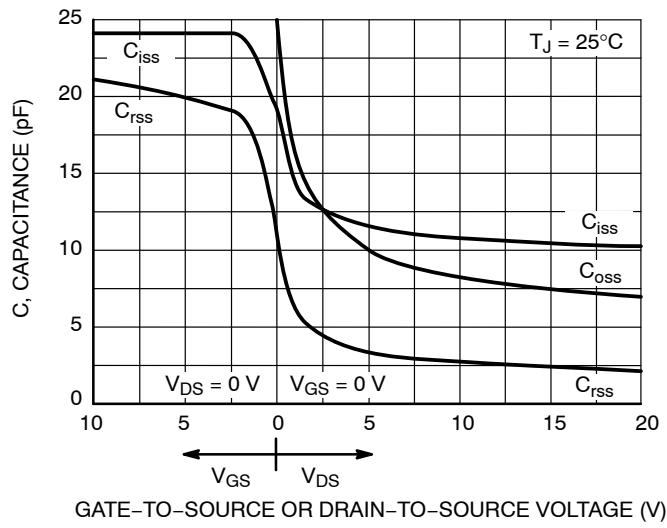


Figure 7. Capacitance Variation

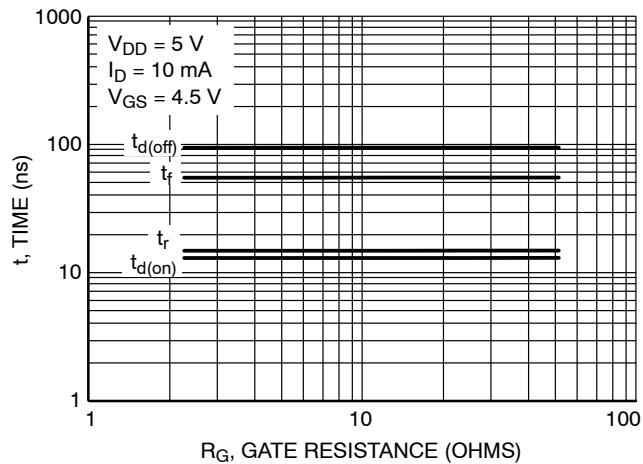


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

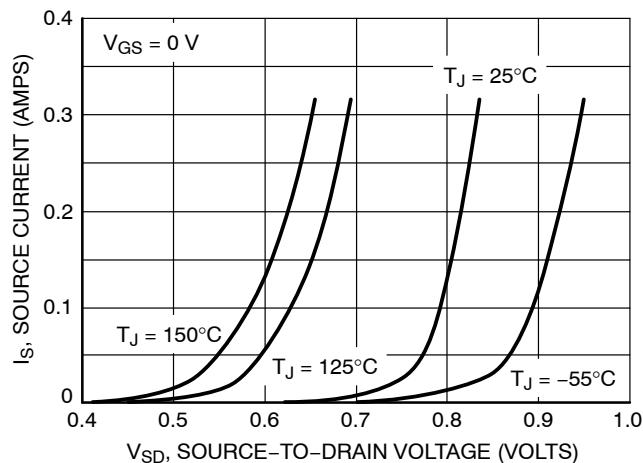
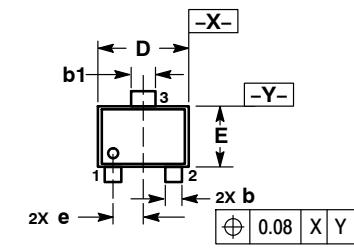


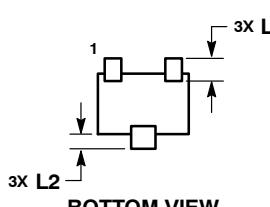
Figure 9. Diode Forward Voltage vs. Current



SCALE 4:1



TOP VIEW



BOTTOM VIEW

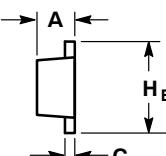
STYLE 1:  
PIN 1. BASE  
2. Emitter  
3. Collector

STYLE 2:  
PIN 1. ANODE  
2. NC  
3. CATHODE

STYLE 3:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 4:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

STYLE 5:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN



SIDE VIEW

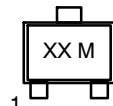
NOTES:

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_E	1.15	1.20	1.25
L	0.29 REF		
L2	0.15	0.20	0.25

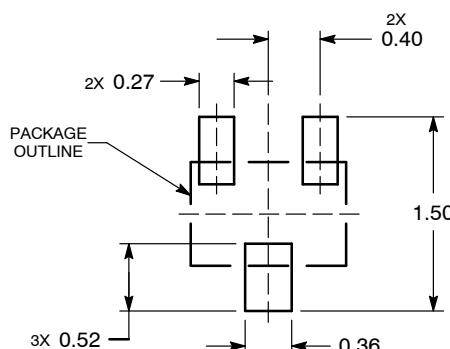
DATE 10 AUG 2009

**GENERIC  
MARKING DIAGRAM\***



XX = Specific Device Code  
M = Date Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G", may or not be present.



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.

DOCUMENT NUMBER:	98AON12989D	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOT-723	PAGE 1 OF 1

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent\\_Marking.pdf](http://www.onsemi.com/site/pdf/Patent_Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Email Requests to: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

ON Semiconductor Website: [www.onsemi.com](http://www.onsemi.com)

### TECHNICAL SUPPORT

#### North American Technical Support:

Voice Mail: 1 800-282-9855 Toll Free USA/Canada

Phone: 011 421 33 790 2910

#### Europe, Middle East and Africa Technical Support:

Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative