Power MOSFET

20 V, 285 mA, P−Channel with ESD Protection, SOT−723

NTK3043P
S-NTK3043P

Features

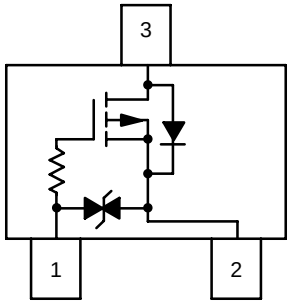
- Enables High Density PCB Manufacturing
- 44% Smaller Footprint than SC−89 and 38% Thinner than SC−89
- Low Voltage Drive Makes this Device Ideal for Portable Equipment
- Low Threshold Levels, $V_{GS(TH)}$ < 1.3 V
- Low Profile (< 0.5 mm) Allows It to Fit Easily into Extremely Thin Environments such 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 Devices
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

Applications

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

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

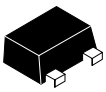
MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

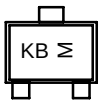
Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	20	V
Gate−to−Source Voltage			V_{GS}	±10	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	255	mA
		T_A = 85°C		185	
	t ≤ 5 s	T_A = 25°C		285	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	440	mW
	t ≤ 5 s			545	
Continuous Drain Current (Note 2)	Steady State	T_A = 25°C	I_D	210	mA
		T_A = 85°C		155	
Power Dissipation (Note 2)		T_A = 25°C	P_D	310	mW
Pulsed Drain Current	t_p = 10 μs		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 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.

MARKING DIAGRAM





SOT−723
CASE 631AA

KB = Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping †
NTK3043P S-NTK3043P	SOT−723*	8000 / Tape & Reel

†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°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 μA		$V_{(BR)DSS}$	20			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	I_D = 100 μA, Reference to 25°C		$V_{(BR)DSS}/T_J$		27		mV/°C
Zero Gate Voltage Drain Current	V_{GS} = 0 V, V_{DS} = 16 V	T_J = 25°C	I_{DSS}			1	μA
		T_J = 125°C				10	
Gate−to−Source Leakage Current	V_{DS} = 0 V, V_{GS} = ±5 V		I_{GSS}			1	μA
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA		$V_{GS(TH)}$	0.4		1.3	V
Gate Threshold Temperature Coefficient			$V_{GS(TH)}/T_J$		−2.4		mV/°C
Drain−to−Source On Resistance	V_{GS} = 4.5V, I_D = 10 mA		$R_{DS(ON)}$		1.5	3.4	Ω
	V_{GS} = 4.5V, 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
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, VGS= 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 Ω		$t_{d(ON)}$		13		ns
Rise Time			t_r		15		
Turn−Off Delay Time			$t_{d(OFF)}$		94		
Fall Time			t_f		55		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{GS} = 0 V, I_S= 286 mA	T_J = 25°C	V_{SD}		0.83	1.2	V
		T_J = 125°C			0.69		
Reverse Recovery Time	V_{GS} = 0 V, V_{DD} = 20 V, dISD/dt = 100 A/μs, I_S = 286 mA		t_{RR}		9.1		ns
Charge Time			t_a		7.1		
Discharge Time			t_b		2.0		
Reverse Recovery Charge			Q_{RR}		3.7		nC

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

TYPICAL PERFORMANCE CURVES

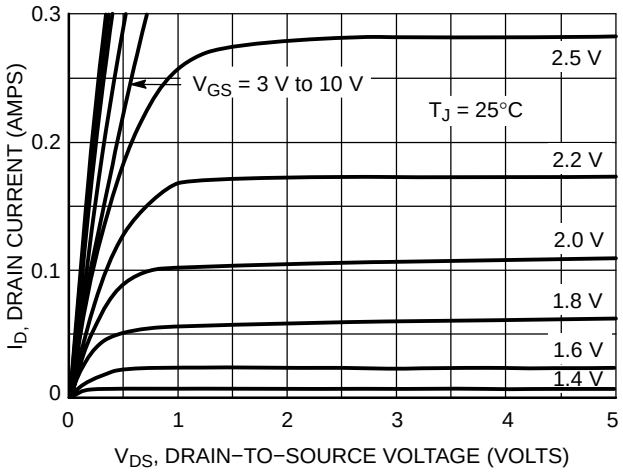


Figure 1. On−Region Characteristics

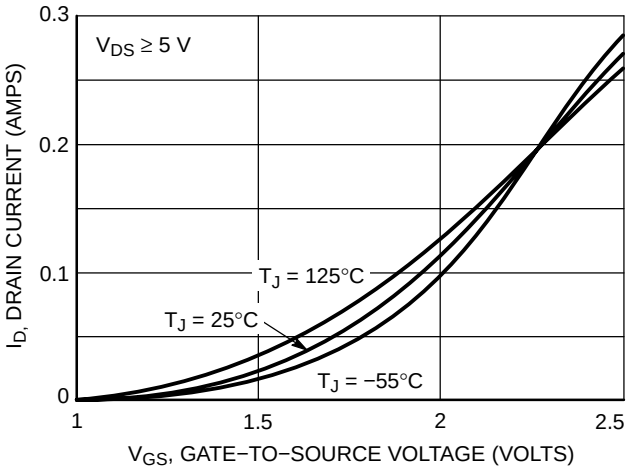


Figure 2. Transfer Characteristics

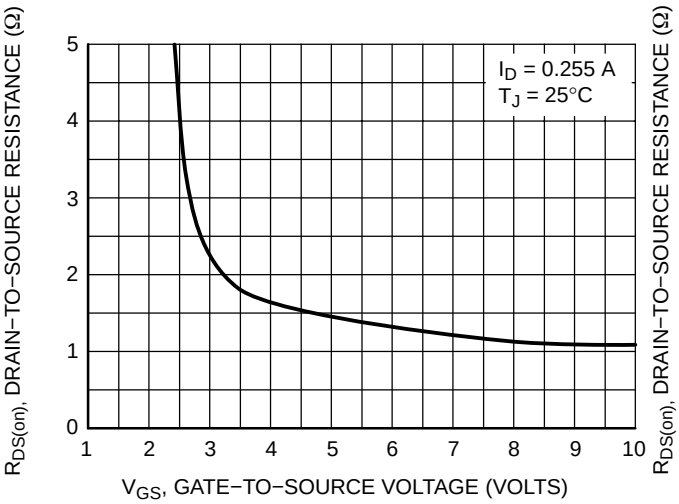


Figure 3. On−Resistance vs. Gate−to−Source Voltage

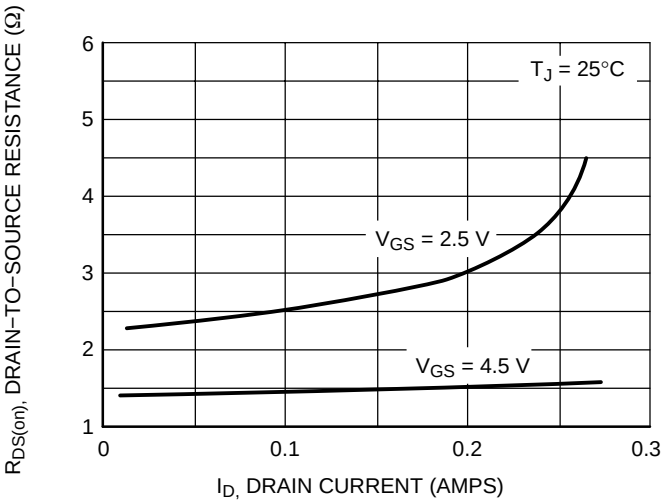


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

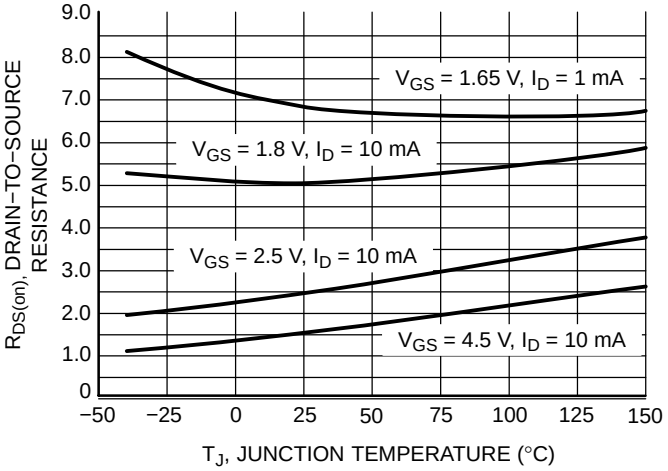


Figure 5. On−Resistance Variation with Temperature

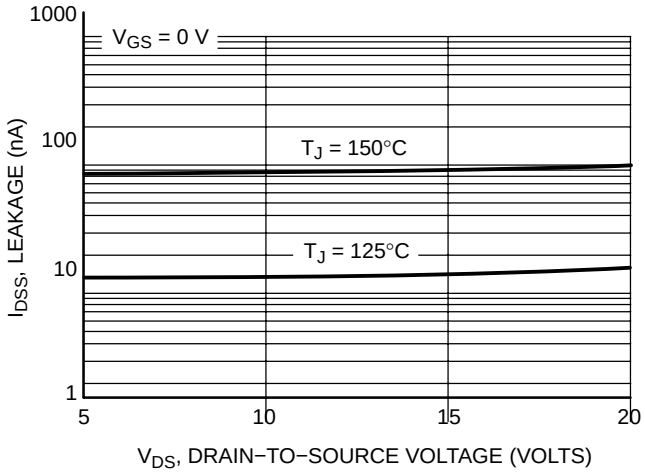


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES

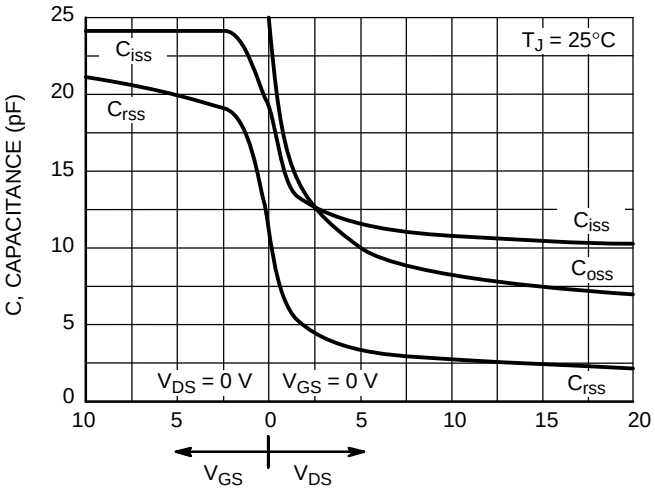


Figure 7. Capacitance Variation

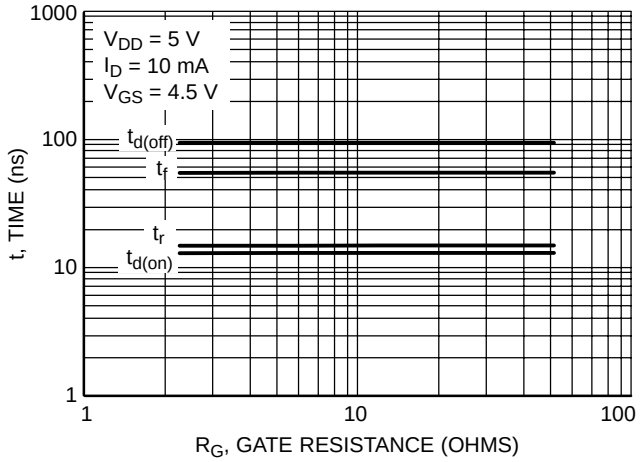


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

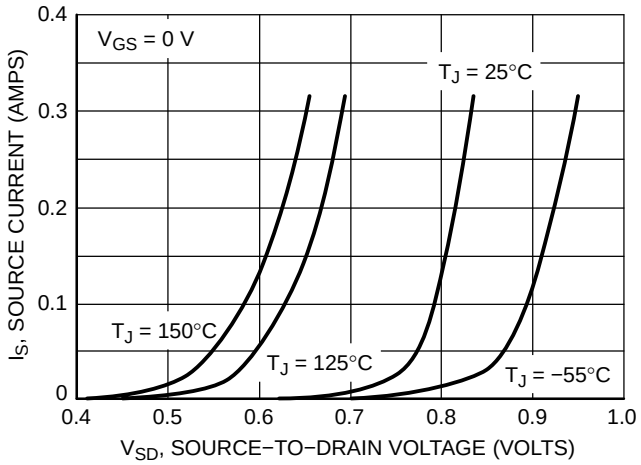
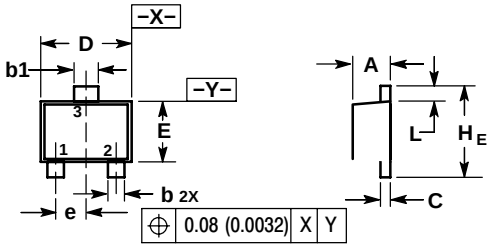


Figure 9. Diode Forward Voltage vs. Current

PACKAGE DIMENSIONS

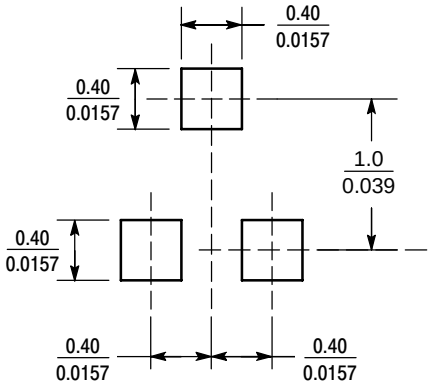
SOT−723



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.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.45	0.50	0.55	0.018	0.020	0.022
b	0.15	0.21	0.27	0.0059	0.0083	0.0106
b1	0.25	0.31	0.37	0.010	0.012	0.015
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*



SCALE 20:1 (mm / inches)