NTMS4503N

Power MOSFET

28 V, 14 A, N−Channel, SO−8

Features

- Low RDS(on)
- High Power and Current Handling Capability
- Low Gate Charge

Applications

- DC/DC Converters
- Motor Drives
- Synchronous Rectifier − POL
- Buck Low−Side

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

Rating	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	28	V
Gate−to−Source Voltage − Continuous	V_{GS}	±20	V
Drain Current Continuous @ T_a = 25°C (Note 1) Continuous @ T_a = 25°C (Note 2) Continuous @ T_a = 25°C (Note 3) Single Pulse (tp = 10 μs)	I_D I_{DM}	 14 12 9.0 40	A
Total Power Dissipation T_A = 25°C (Note 1) T_A = 25°C (Note 2) T_A = 25°C (Note 3)	P_D	 2.5 1.66 0.93	W
Operating and Storage Temperature	T_J, T_{stg}	−55 to 150	°C
Single Pulse Drain−to−Source Avalanche Energy − Starting T_J = 25°C (V_{DD} = 30 V, V_{GS} = 10 V, I_L = 12.2 A, L = 1.0 mH, R_G = 25 Ω)	E_{AS}	75	mJ
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	T_L	260	°C

THERMAL RESISTANCE RATINGS

Rating	Symbol	Value	Unit
Thermal Resistance Junction−to−Ambient (Note 1) Junction−to−Ambient (Note 2) Junction−to−Ambient (Note 3)	$R_{\theta JA}$	 50 75 135	°C/W

1. Surface−mounted on FR4 board using minimum recommended pad size (Cu area 0.412 in^2), t < 10 s.
2. Surface−mounted on FR4 board using 1″ pad size (Cu area 1.127 in^2) steady state.
3. Surface−mounted on FR4 board using minimum recommended pad size (Cu area 0.412 in^2), steady state.

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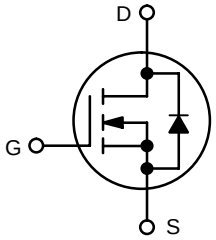
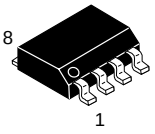
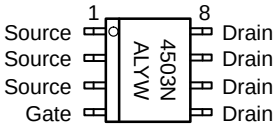
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX (Note 1)
28 V	7.0 mΩ @ 10 V	14 A
	8.8 mΩ @ 4.5 V	





SO−8
CASE 751
STYLE 12

MARKING DIAGRAM/ PIN ASSIGNMENT



(Top View)

4503N = Specific Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
W = Work Week

ORDERING INFORMATION

Device	Package	Shipping†
NTMS4503NR2	SO−8	2500/Tape & Reel

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

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Characteristic	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		28	31	−	V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	−		−	22	−	mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 24 V	T_J = 25°C	−	−	1.0	μA
			T_J = 100°C	−	−	25	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V		−	−	±100	nA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		1.0	−	2.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	−		−	−5.0	−	mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 14 A		−	7.0	8.0	mΩ
		V_{GS} = 4.5 V, I_D = 10 A		−	8.8	9.8	
Forward Transconductance	g_{FS}	V_{DS} = 10 V, I_D = 14 A		−	30	−	S
CHARGES, CAPACITANCES AND GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 16 A		−	2400	−	pF
Output Capacitance	C_{OSS}			−	1000	−	
Reverse Transfer Capacitance	C_{RSS}			−	375	−	
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 16 V, I_D = 10 A		−	23	−	nC
Threshold Gate Charge	$Q_{G(TH)}$			−	2.0	−	
Gate−to−Source Charge	Q_{GS}			−	5.0	−	
Gate−to−Drain Charge	Q_{GD}			−	12	−	
SWITCHING CHARACTERISTICS, V_{GS} = V (Note 5)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DD} = 16 V, I_D = 10 A, R_G = 2.0 Ω		−	18.5	−	ns
Rise Time	tr			−	70	−	
Turn−Off Delay Time	$t_{d(OFF)}$			−	21	−	
Fall Time	t_f			−	23	−	
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 10 A	T_J = 25°C	−	0.82	1.2	V
			T_J = 125°C	−	0.65	−	
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, d_{ISD}/d_t = 100 A/μs, I_S = 14 A		−	48	−	ns
Charge Time	T_a			−	23	−	
Discharge Time	T_b			−	25	−	
Reverse Recovery Charge	Q_{RR}			−	25	−	nC

4. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
5. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES

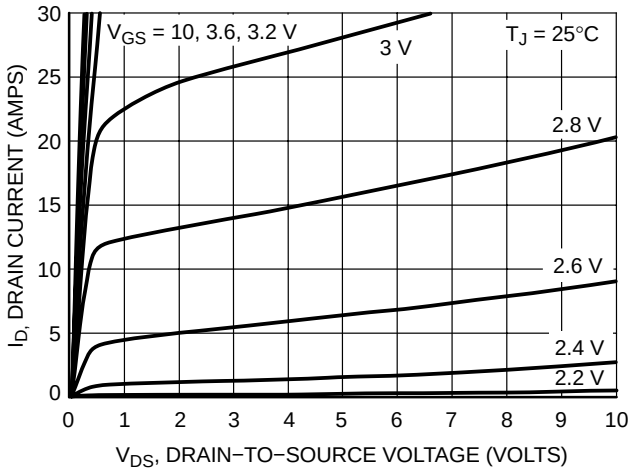


Figure 1. On−Region Characteristics

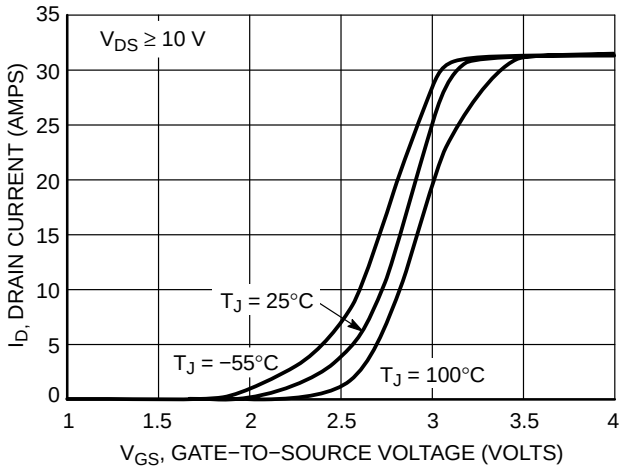


Figure 2. Transfer Characteristics

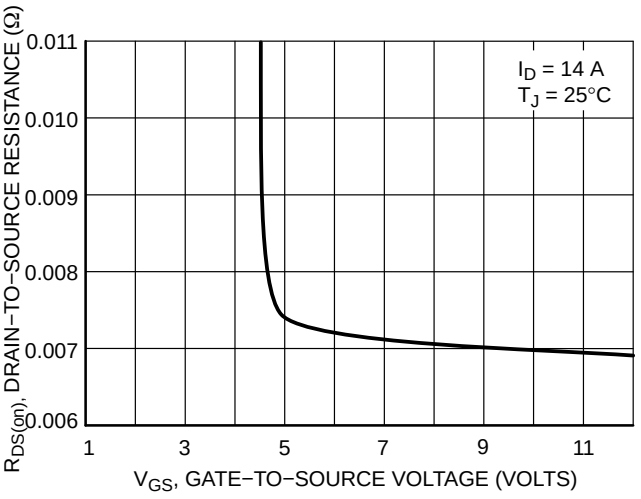


Figure 3. On−Resistance vs. Gate−to−Source Voltage

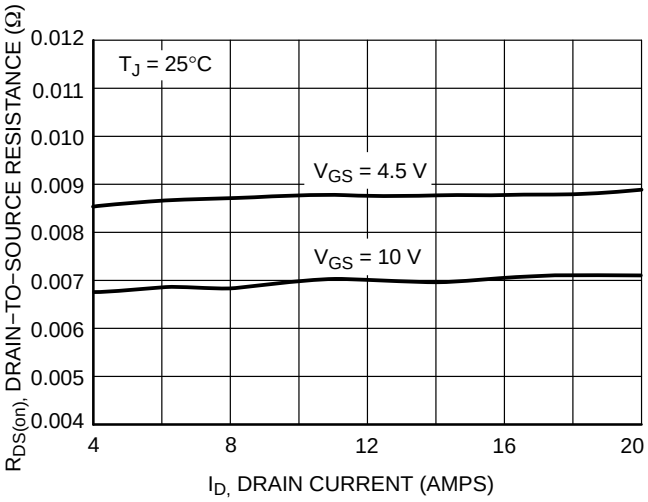


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

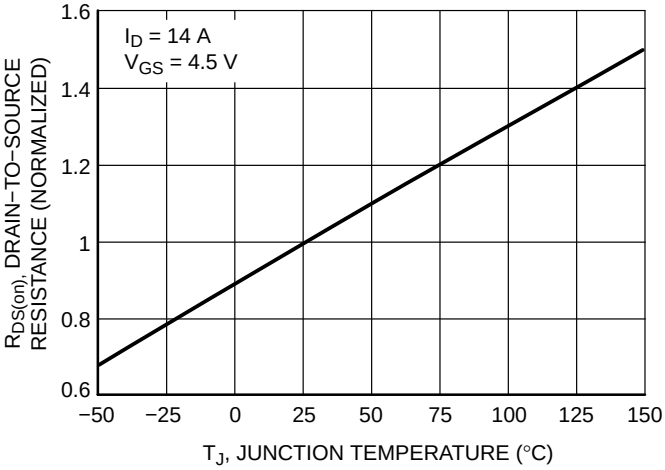


Figure 5. On−Resistance Variation with Temperature

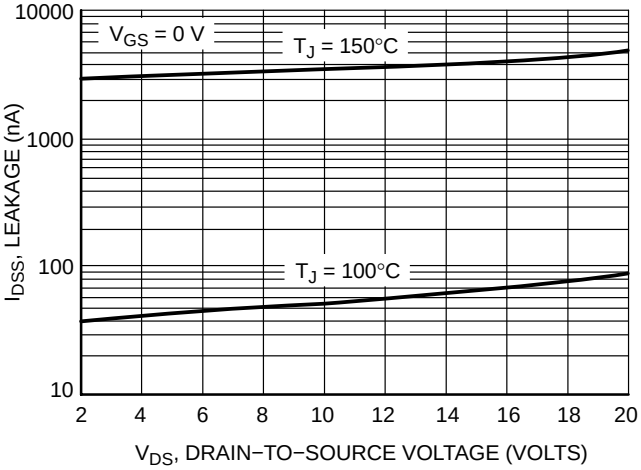


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES

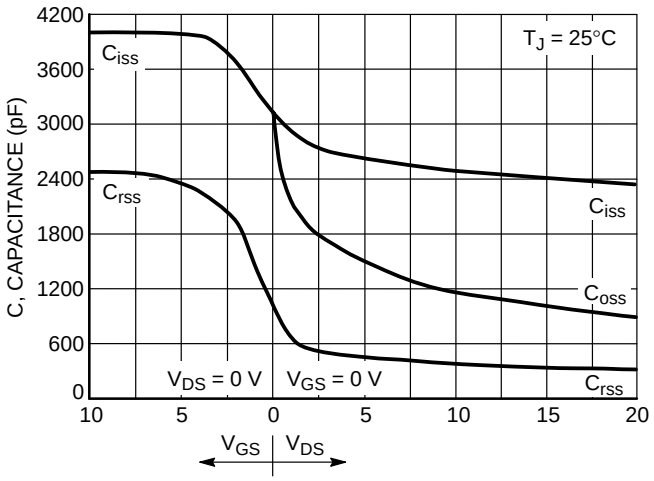


Figure 7. Capacitance Variation

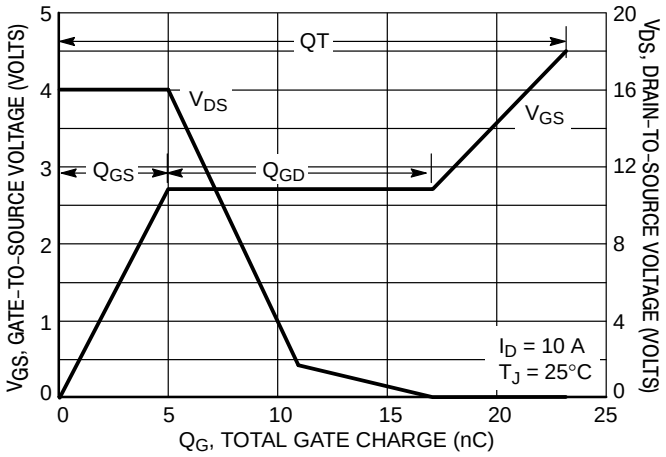


Figure 8. Gate−To−Source and Drain−To−Source Voltage vs. Total Charge

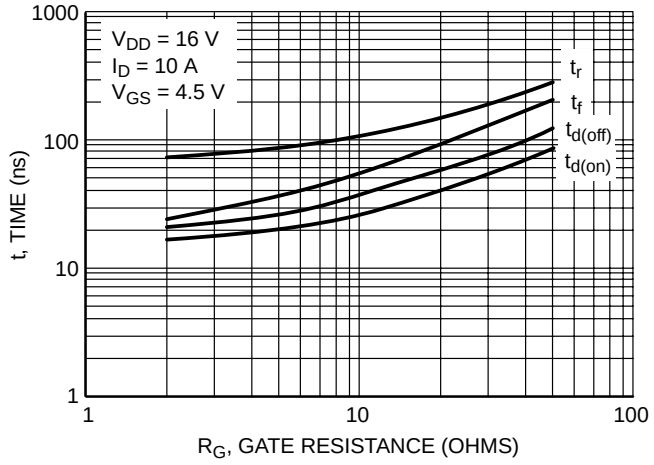


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

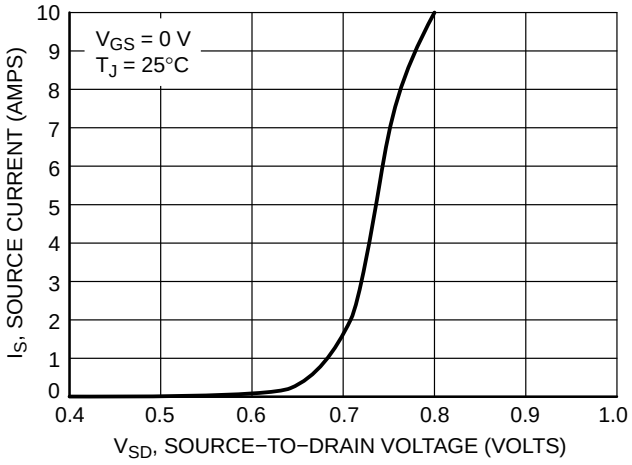
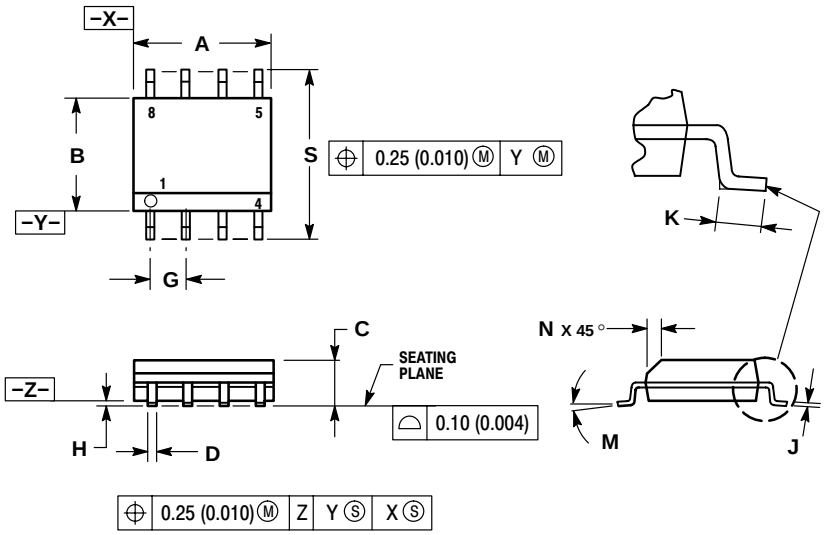


Figure 10. Diode Forward Voltage vs. Current

PACKAGE DIMENSIONS

SO−8
CASE 751−07
ISSUE AA



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. 751−01 THRU 751−06 ARE OBSOLETE. NEW STANDARD IS 751−07.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0 °	8 °	0 °	8 °
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

STYLE 12:
PIN 1. SOURCE
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN
7. DRAIN
8. DRAIN

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