

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	I _D	14	A
Continuous @ T _a = 25°C (Note 1)		12	
Continuous @ T _a = 25°C (Note 2)		9.0	
Continuous @ T _a = 25°C (Note 3)		40	
Single Pulse (tp = 10 μs)	I _{DM}		
Total Power Dissipation	P _D	2.5	W
T _A = 25°C (Note 1)		1.66	
T _A = 25°C (Note 2)		0.93	
T _A = 25°C (Note 3)			
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	R _{θJA}	50	°C/W
Junction-to-Ambient (Note 1)		75	
Junction-to-Ambient (Note 2)		135	
Junction-to-Ambient (Note 3)			

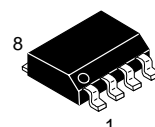
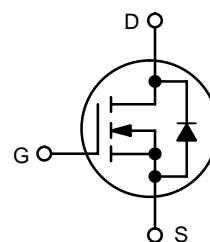
1. Surface-mounted on FR4 board using minimum recommended pad size (Cu area 0.412 in²), t < 10 s.
2. Surface-mounted on FR4 board using 1" pad size (Cu area 1.127 in²) steady state.
3. Surface-mounted on FR4 board using minimum recommended pad size (Cu area 0.412 in²), steady state.



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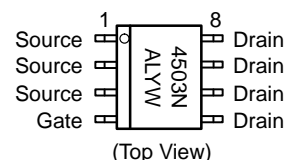
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V _{(BR)DSS}	R _{DS(on)} TYP	I _D MAX (Note 1)
28 V	7.0 mΩ @ 10 V	14 A
	8.8 mΩ @ 4.5 V	



SO-8
CASE 751
STYLE 12

MARKING DIAGRAM/ PIN ASSIGNMENT



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.

NTMS4503N

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

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
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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	t _r		–	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, dI _{SD} /dt = 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

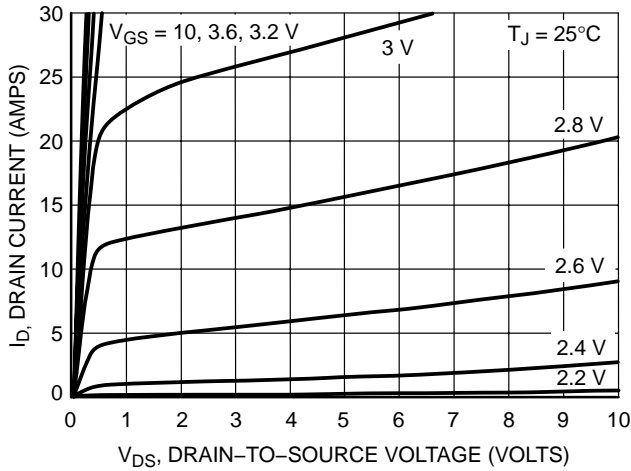


Figure 1. On-Region Characteristics

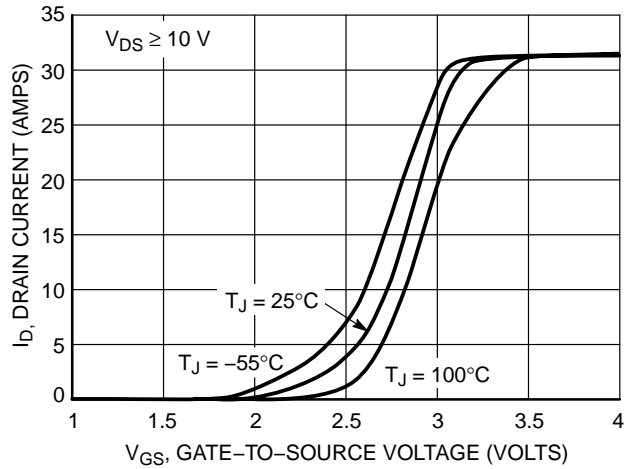


Figure 2. Transfer Characteristics

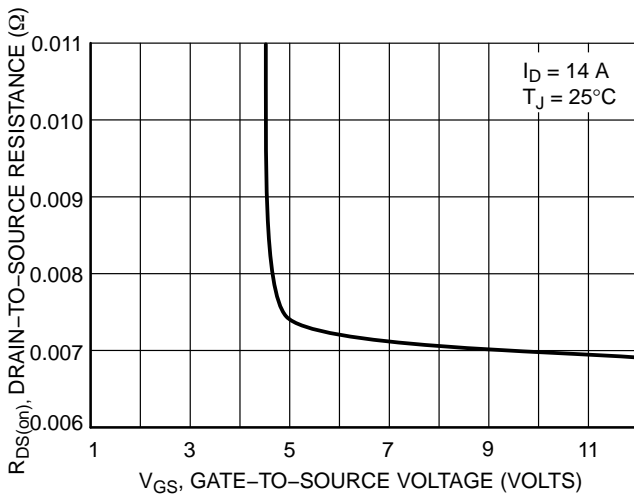


Figure 3. On-Resistance vs. Gate-to-Source Voltage

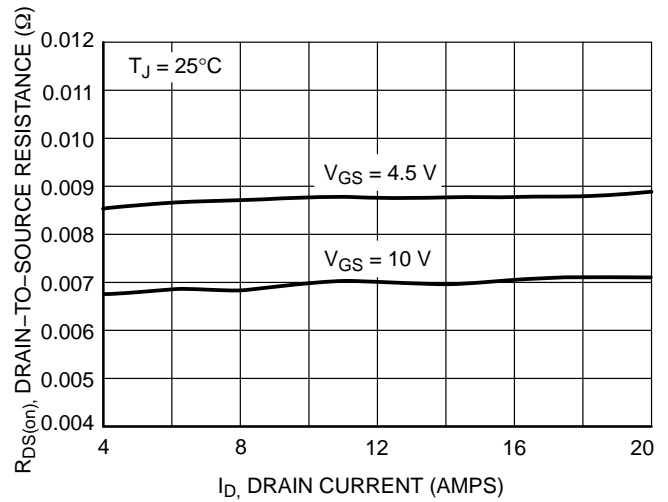


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

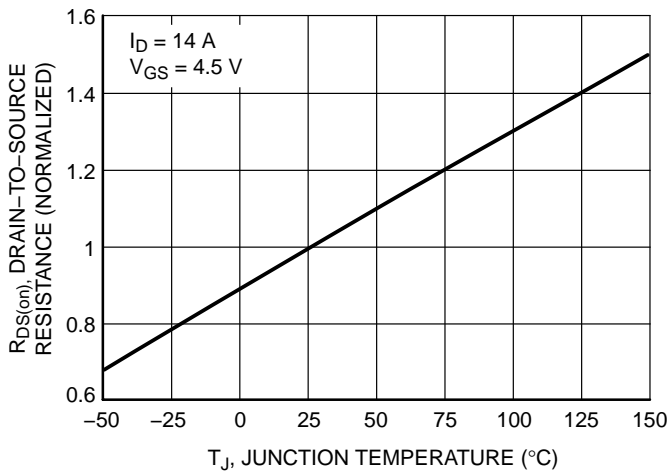


Figure 5. On-Resistance Variation with Temperature

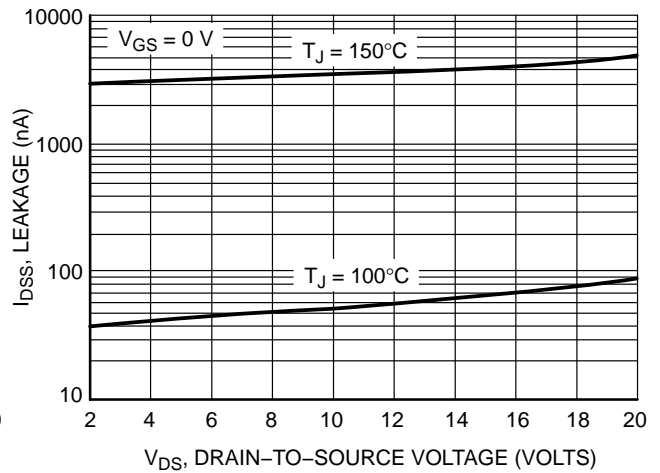


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES

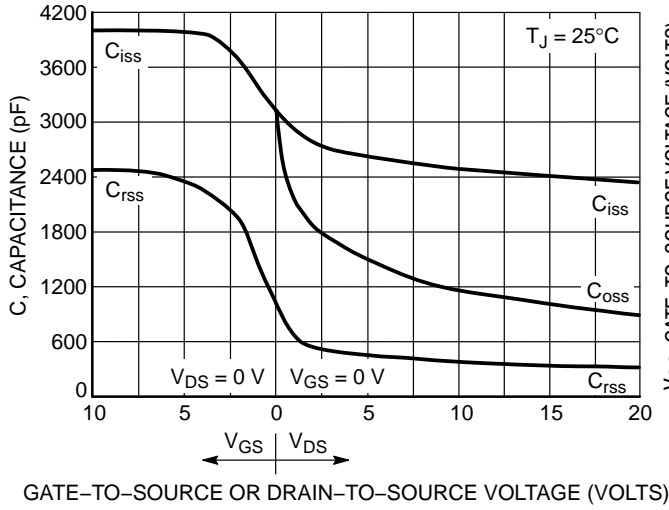


Figure 7. Capacitance Variation

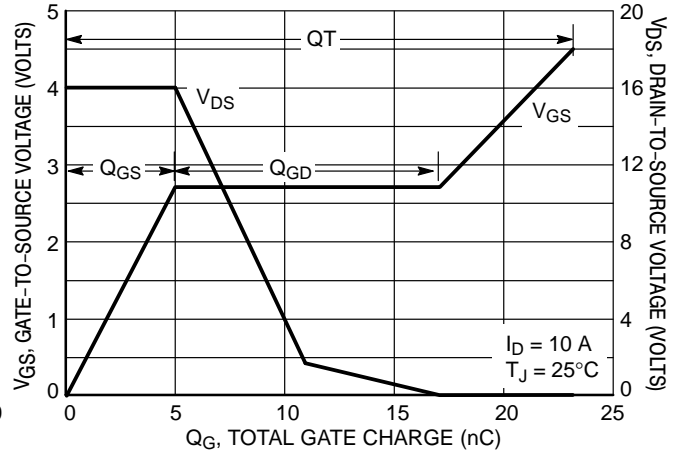


Figure 8. Gate-To-Source and Drain-To-Source Voltage vs. Total Charge

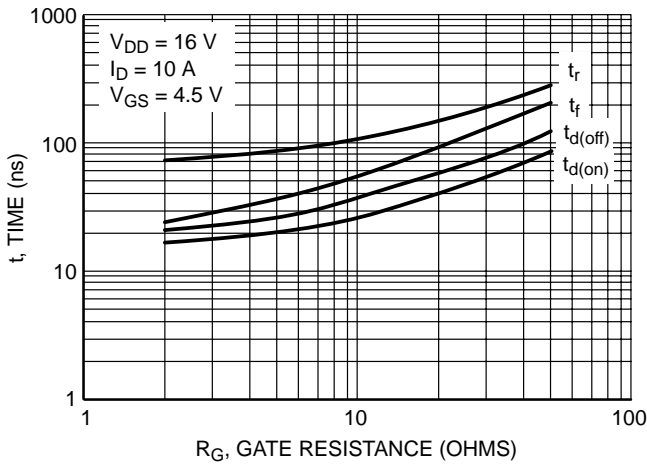


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

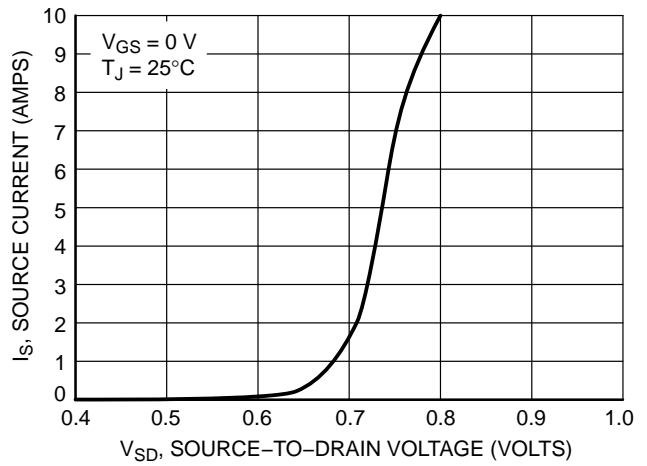
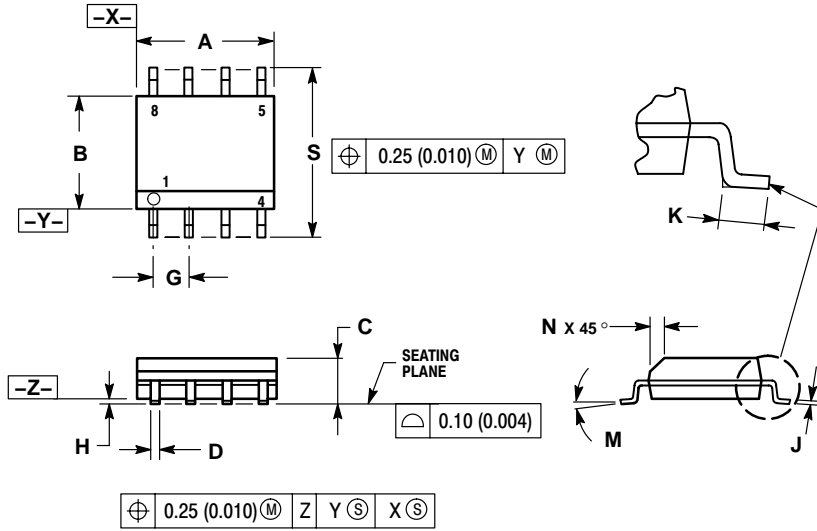


Figure 10. Diode Forward Voltage vs. Current

NTMS4503N

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.

DIM	MILLIMETERS		INCHES	
	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

NTMS4503N

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