

NTMS4700N

Power MOSFET

30 V, 14.5 A, Single N-Channel, SO-8



ON Semiconductor®

<http://onsemi.com>

Features

- Ultra Low $R_{DS(on)}$ (at 4.5 V_{GS}), Low Gate Resistance and Low Q_G
- Optimized for High Side Control Applications
- High Speed Switching Capability
- Pb-Free Package is Available

Applications

- Notebook Computer Vcore Applications
- Network Applications
- DC-DC Converters

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

Rating		Symbol	Value	Unit
Drain-to-Source Voltage		V _{DSS}	30	V
Gate-to-Source Voltage – Continuous		V _{GS}	±20	V
Continuous Drain Current (Note 1)	Steady State	I _D	T _A = 25°C	A
			T _A = 70°C	
	t ≤ 10 s		T _A = 25°C	
Power Dissipation (Note 1)	Steady State	P _D	T _A = 25°C	W
	t ≤ 10 s			
Continuous Drain Current (Note 2)	Steady State	I _D	T _A = 25°C	A
			T _A = 70°C	
Power Dissipation (Note 2)		P _D	T _A = 25°C	W
Pulsed Drain Current	tp = 10 μs	I _{DM}	40	A
Operating and Storage Temperature		T _J , T _{stg}	–55 to 150	°C
Source Current (Body Diode)		I _S	2.5	A
Single Pulse Drain-to-Source Avalanche Energy (V _{DD} = 25 V, V _{GS} = 10 V, I _{PK} = 7.5 A, L = 10 mH, R _G = 25 Ω)		E _{AS}	280	mJ
Lead Temperature for Soldering Purposes (1/8 in from case for 10 s)		T _L	260	°C

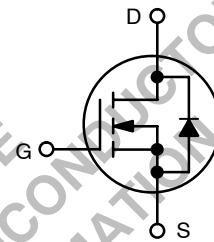
THERMAL RESISTANCE RATINGS

Rating	Symbol	Value	Unit
Junction-to-Lead – Steady State	R _{θJL}	16	°C/W
Junction-to-Ambient – Steady State (Note 1)	R _{θJA}	80	
Junction-to-Ambient – t ≤ 10 s (Note 1)	R _{θJA}	50	
Junction-to-Ambient – Steady State (Note 2)	R _{θJA}	145	

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

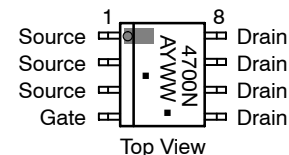
1. Surface-mounted on FR4 board using 1 in sq. pad size (Cu area 1.127 in sq. [1 oz] including traces).
2. Surface-mounted on FR4 board using minimum recommended pad size (Cu area 0.412 in sq.).

V _{(BR)DSS}	R _{DS(on)} TYP	I _D MAX
30 V	6.0 mΩ @ 10 V	14.5 A
	7.3 mΩ @ 4.5 V	



SO-8
CASE 751
STYLE 12

MARKING DIAGRAM / PIN ASSIGNMENT



4700N = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping
NTMS4700NR2	SO-8	2500/Tape & Reel
NTMS4700NR2G	SO-8 (Pb-Free)	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.

NTMS4700N

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

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			18		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 24\text{ V}$	$T_J = 25^\circ\text{C}$		1.0	μA
			$T_J = 125^\circ\text{C}$		50	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	1.0		3.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			5.0		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$		7.3	10	m Ω
		$V_{GS} = 10\text{ V}, I_D = 13\text{ A}$		6.0	7.2	
Forward Transconductance	g_{FS}	$V_{DS} = 15\text{ V}, I_D = 10\text{ A}$		25		S

CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 24\text{ V}$		1600		pF
Output Capacitance	C_{OSS}			700		
Reverse Transfer Capacitance	C_{RSS}			200		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 10\text{ A}$		16	24	nC
Threshold Gate Charge	$Q_{G(TH)}$			3.0		
Gate-to-Source Charge	Q_{GS}			5.0		
Gate-to-Drain Charge	Q_{GD}			7.0		
Gate Resistance	R_G			1.4		Ω

SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 10\text{ V}, V_{DD} = 15\text{ V}, I_D = 1.0\text{ A}, R_G = 3.0\text{ }\Omega$		10		ns
Rise Time	t_r			5.0		
Turn-Off Delay Time	$t_{d(OFF)}$			29.5		
Fall Time	t_f			28.5		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 10\text{ A}$	$T_J = 25^\circ\text{C}$		0.75	1.0	V
			$T_J = 125^\circ\text{C}$		0.55		
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s}, I_S = 10\text{ A}$		40			ns
Charge Time	t_a			18			
Discharge Time	t_b			22			
Reverse Recovery Charge	Q_{RR}			36			nC

3. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

4. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES

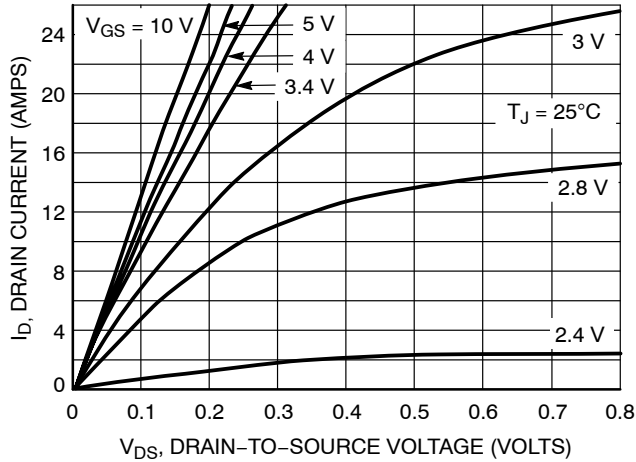


Figure 1. On-Region Characteristics

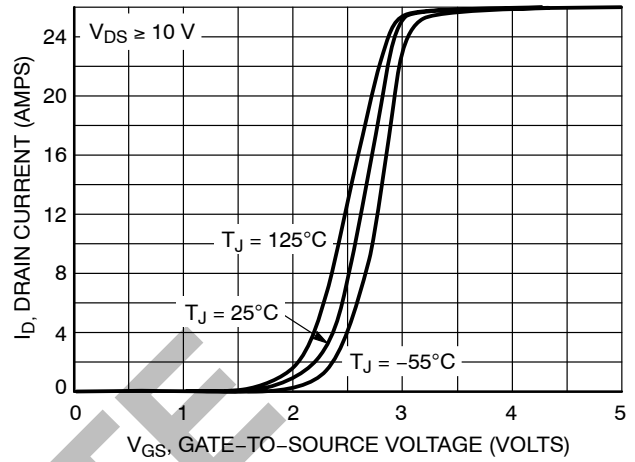


Figure 2. Transfer Characteristics

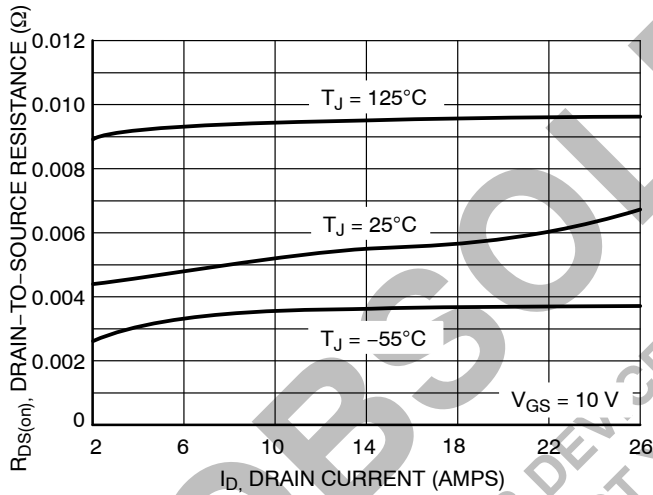


Figure 3. On-Resistance vs. Drain Current and Temperature

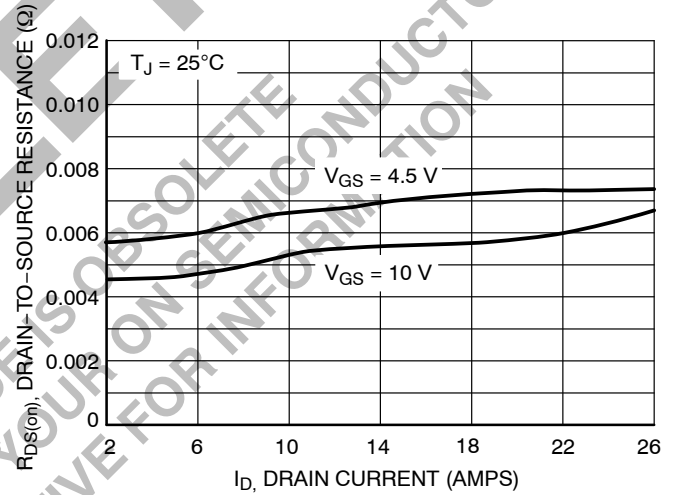


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

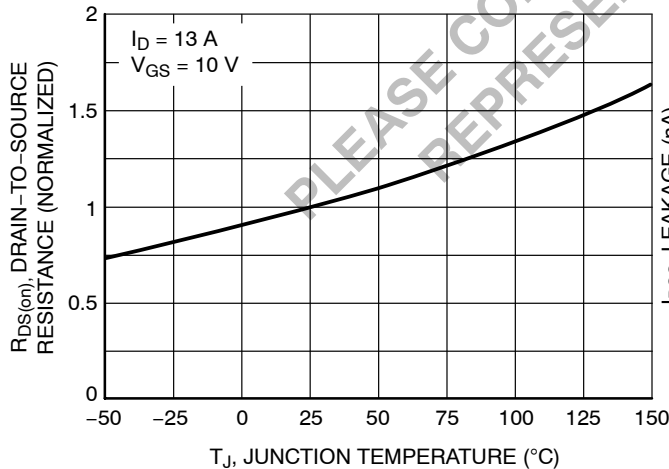


Figure 5. On-Resistance Variation with Temperature

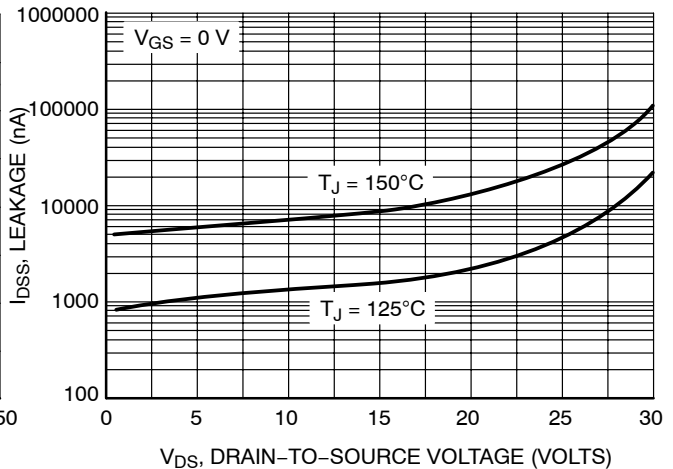
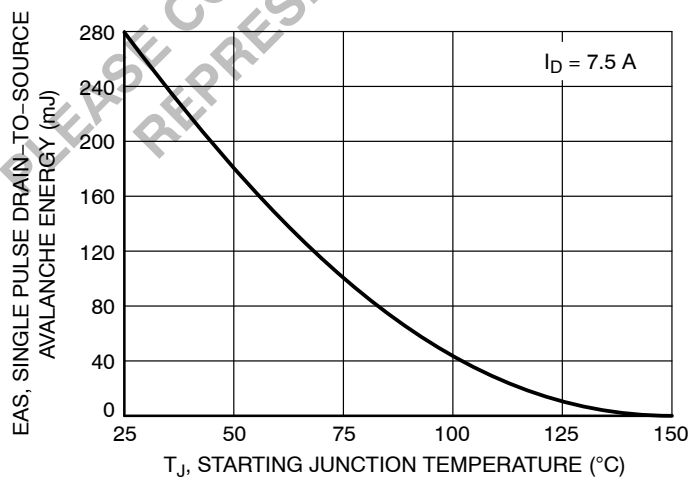
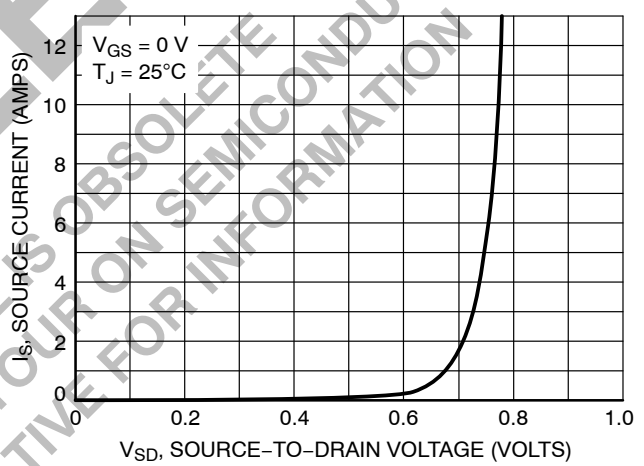
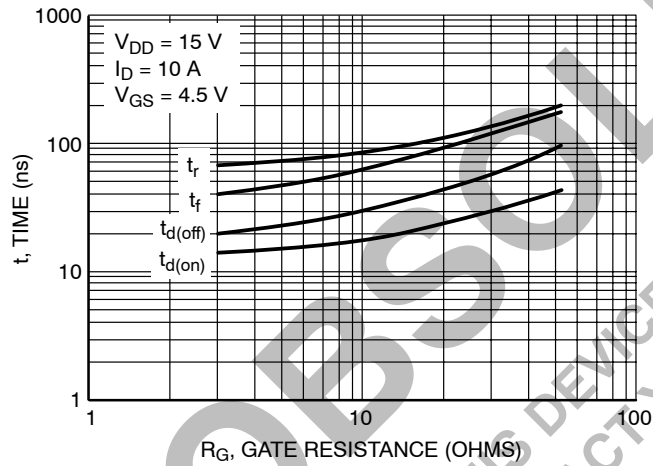
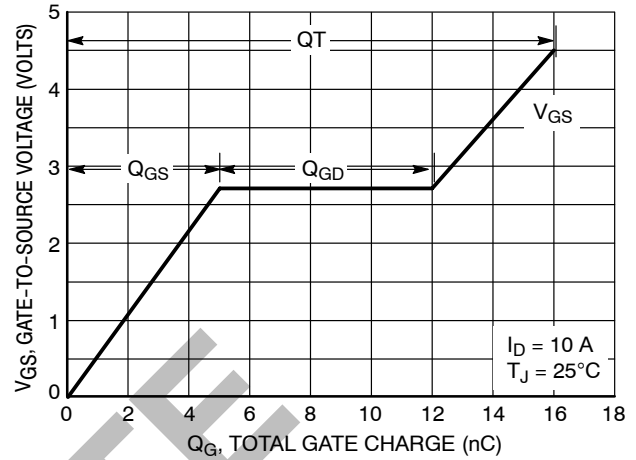
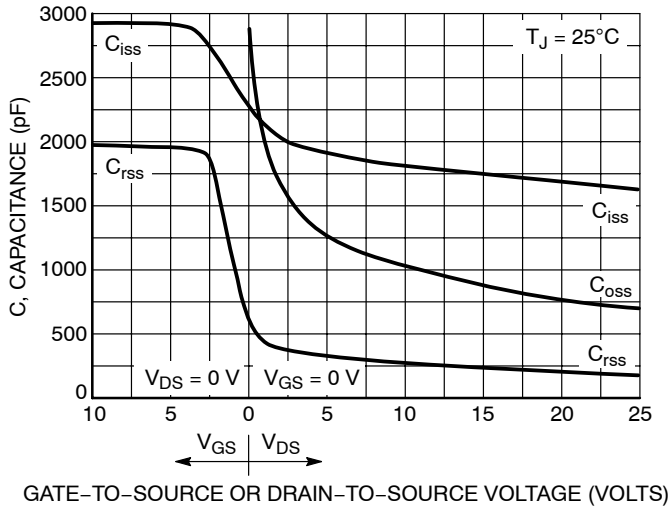


Figure 6. Drain-to-Source Leakage Current vs. Voltage

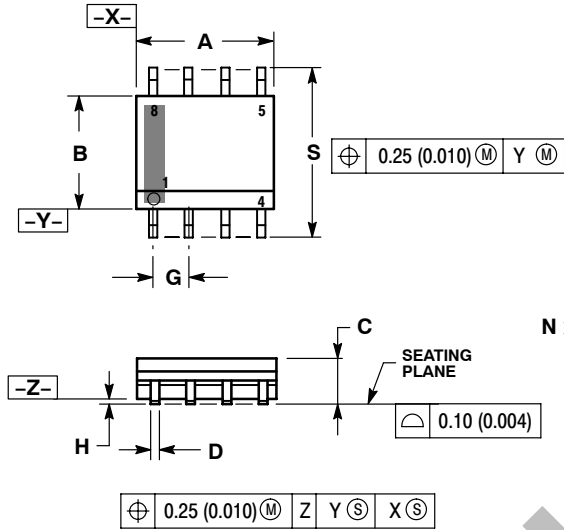
TYPICAL PERFORMANCE CURVES



NTMS4700N

PACKAGE DIMENSIONS

SO-8
CASE 751-07
ISSUE AG



NOTES:

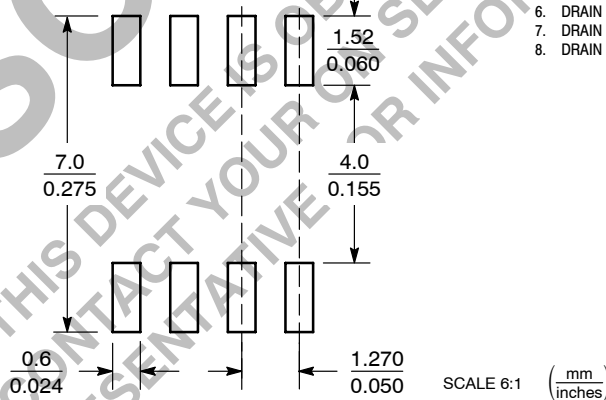
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL 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

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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