

NTGS4141N

Power MOSFET

30 V, 7.0 A, Single N-Channel, TSOP-6

Features

- Low $R_{DS(on)}$
- Low Gate Charge
- Pb-Free Package is Available

Applications

- Load Switch
- Notebook PC
- Desktop PC

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

Rating		Symbol	Value	Unit	
Drain-to-Source Voltage		V_{DSS}	30	V	
Gate-to-Source Voltage		V_{GS}	± 20	V	
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	I_D	5.0	A
			$T_A = 85^\circ\text{C}$	3.6	
	$t \leq 10$ s	$T_A = 25^\circ\text{C}$	7.0		
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	P_D	1.0	W
			$t \leq 10$ s	2.0	
Continuous Drain Current (Note 2)	Steady State	$T_A = 25^\circ\text{C}$	I_D	3.5	A
		$T_A = 85^\circ\text{C}$	2.5		
Power Dissipation (Note 2)		$T_A = 25^\circ\text{C}$	P_D	0.5	W
Pulsed Drain Current	$t_p = 10$ μs	I_{DM}	21	A	
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$	
Source Current (Body Diode)		I_S	2.0	A	
Single Pulse Drain-to-Source Avalanche Energy ($V_{DD} = 30$ V, $I_L = 10.4$ A, $V_{GS} = 10$ V, $L = 1.0$ mH, $R_G = 25$ Ω)		EAS	54	mJ	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS

Rating	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	125	$^\circ\text{C/W}$
Junction-to-Ambient – $t \leq 10$ s (Note 1)	$R_{\theta JA}$	62.5	
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	248	

1. Surface-mounted on FR4 board using 1 inch 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 (Cu area = 0.0773 in sq).

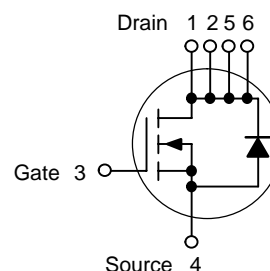


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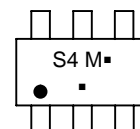
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
30 V	21.5 m Ω @ 10 V	7.0 A
	30 m Ω @ 4.5 V	

N-Channel



TSOP-6
CASE 318G
STYLE 1

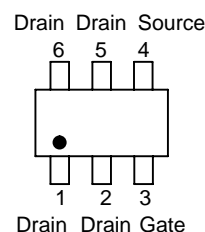
MARKING DIAGRAM



S4 = Device Code
M = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

PIN ASSIGNMENT



ORDERING INFORMATION

Device	Package	Shipping†
NTGS4141NT1	TSOP-6	3000/Tape & Reel
NTGS4141NT1G	TSOP-6 (Pb-Free)	3000/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.

NTGS4141N

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	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J			18.4		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 = 125°C		10	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250 μA	1.0		3.0	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J			5.7		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 7.0 A		21.5	25	mΩ
		V _{GS} = 4.5 V, I _D = 6.0 A		30	35	
Forward Transconductance	g _{FS}	V _{DS} = 10 V, I _D = 7.0 A		30		S

CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 24 V		560		pF
Output Capacitance	C _{OSS}			115		
Reverse Transfer Capacitance	C _{RSS}			75		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 15 V, I _D = 7.0 A		12		nC
Threshold Gate Charge	Q _{G(TH)}			0.85		
Gate-to-Source Charge	Q _{GS}			1.9		
Gate-to-Drain Charge	Q _{GD}			3.0		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 15 V, I _D = 7.0 A		6.0		nC
Threshold Gate Charge	Q _{G(TH)}			0.8		
Gate-to-Source Charge	Q _{GS}			1.85		
Gate-to-Drain Charge	Q _{GD}			3.0		
Gate Resistance	R _G			2.8		Ω

SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	t _{d(ON)}	V _{GS} = 10 V, V _{DS} = 24 V, I _D = 7.0 A, R _G = 3.0 Ω		6.0		ns
Rise Time	t _r			15		
Turn-Off Delay Time	t _{d(OFF)}			18		
Fall Time	t _f			4.0		

DRAIN - SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 2.0 A	T _J = 25°C	0.78	1.0	V
			T _J = 125°C	0.63		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V di _S /dt = 100 A/μs, I _S = 2.0 A		15		ns
Charge Time	t _a			9.0		
Discharge Time	t _b			6.0		
Reverse Recovery Charge	Q _{RR}			8.0		

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

NTGS4141N

TYPICAL PERFORMANCE CURVES

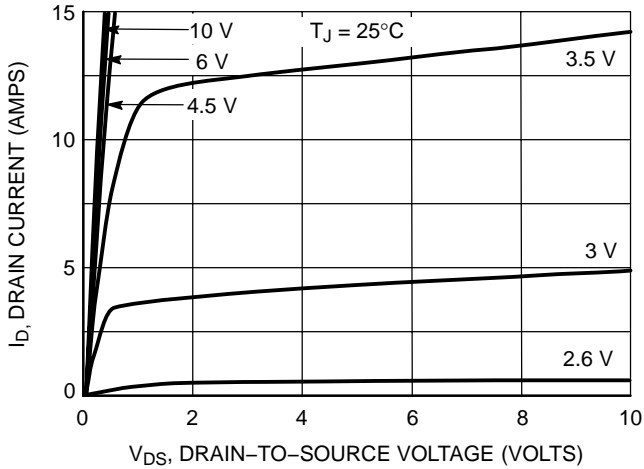


Figure 1. On-Region Characteristics

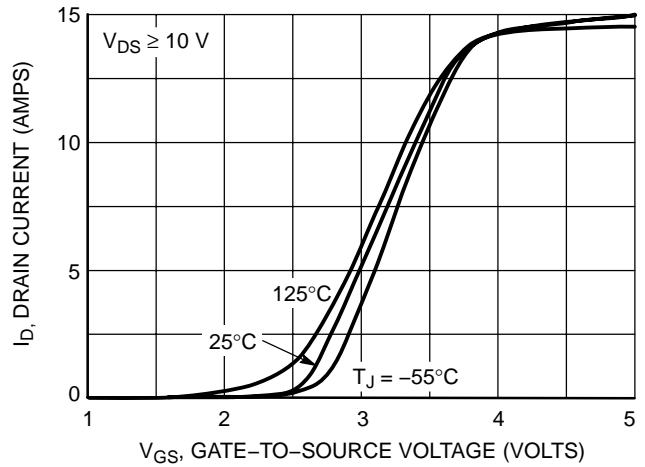


Figure 2. Transfer Characteristics

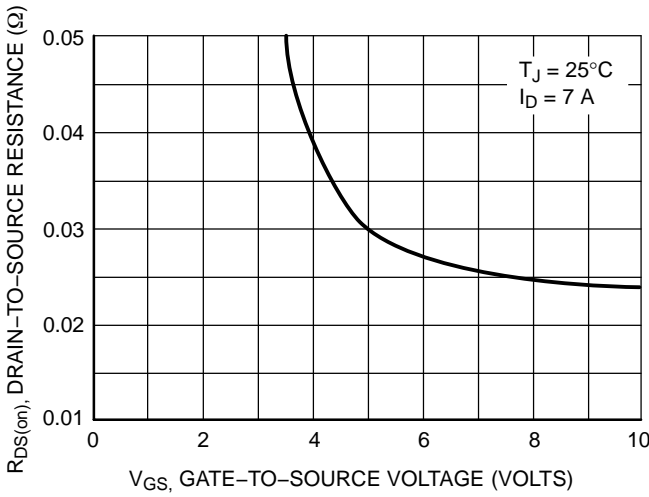


Figure 3. On-Resistance vs. Gate-to-Source Voltage

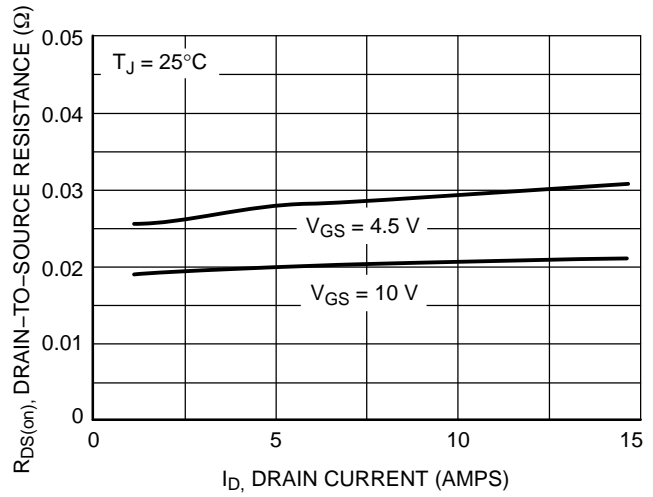


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

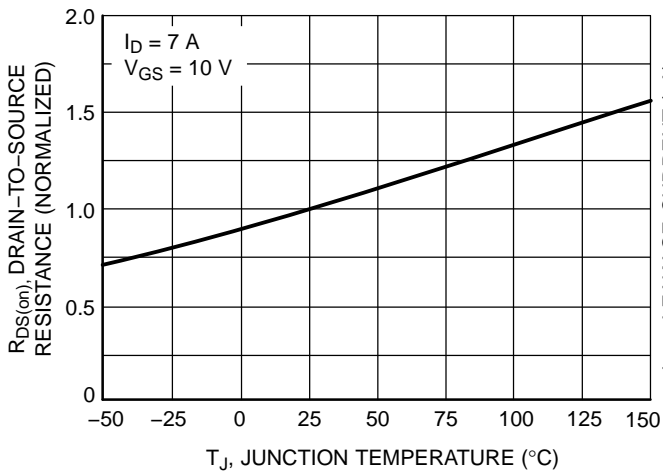


Figure 5. On-Resistance Variation with Temperature

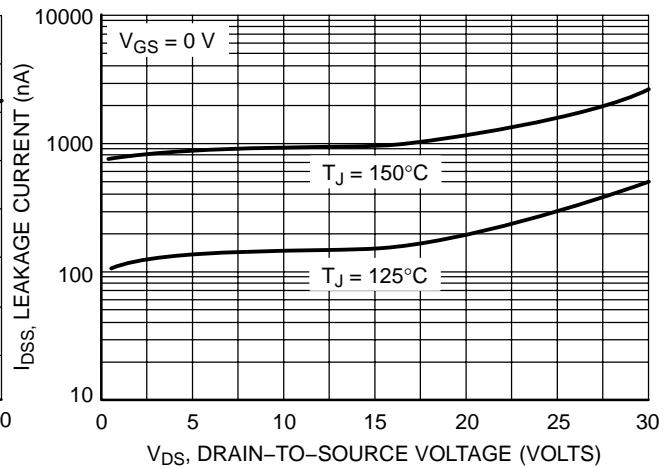


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL PERFORMANCE CURVES

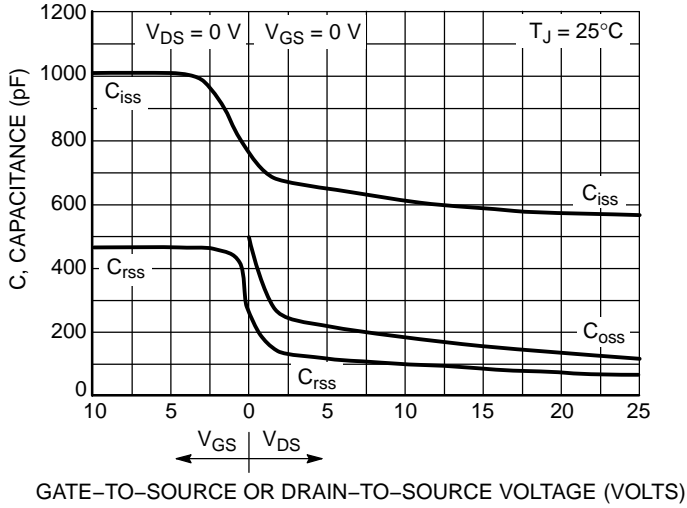


Figure 7. Capacitance Variation

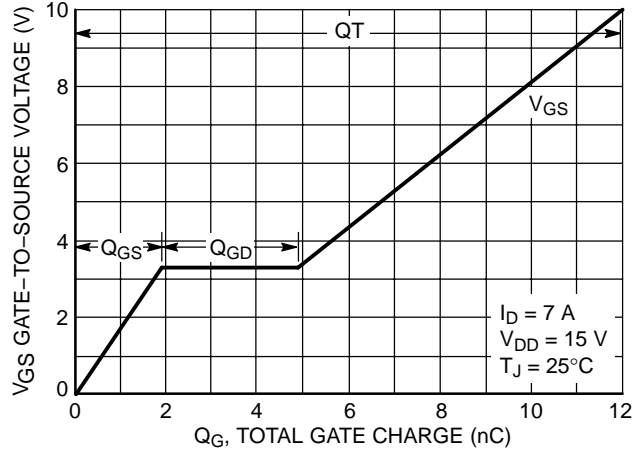


Figure 8. Gate-To-Source and Drain-To-Source Voltage vs. Total Charge

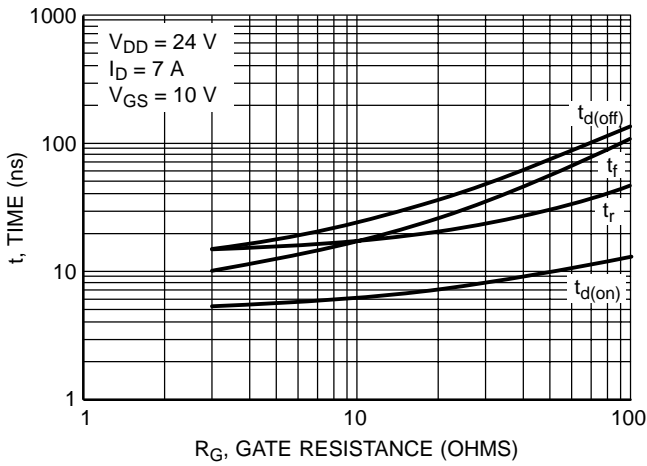


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

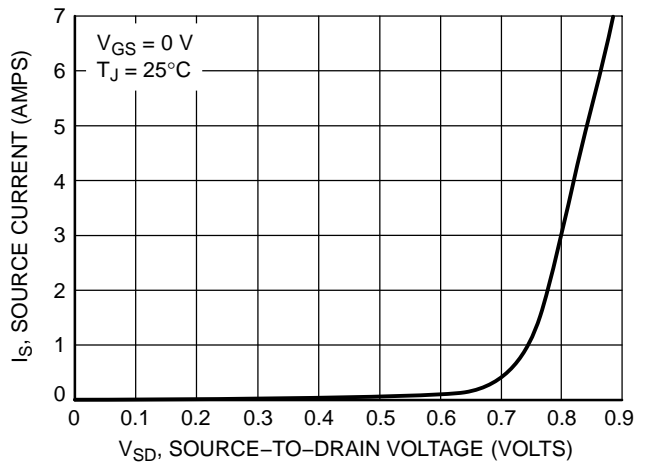


Figure 10. Diode Forward Voltage vs. Current

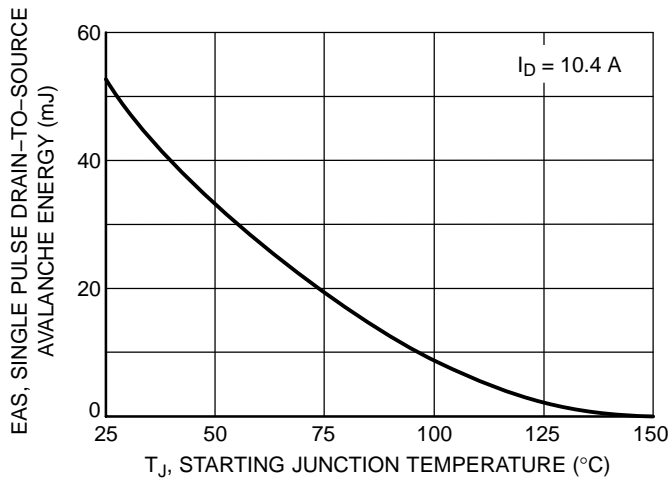
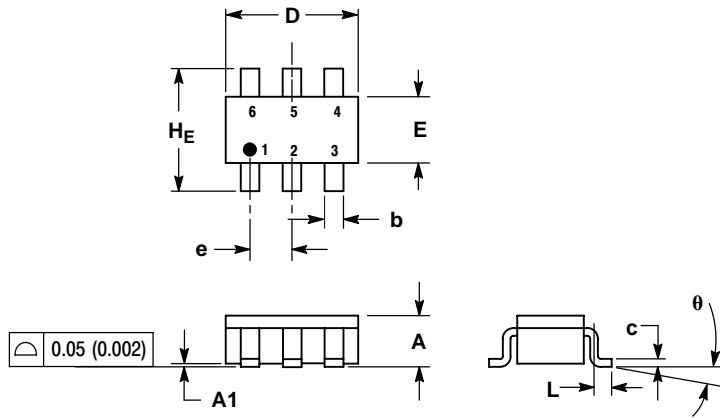


Figure 11. Maximum Avalanche Energy vs. Starting Junction Temperature

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PACKAGE DIMENSIONS

TSOP-6
CASE 318G-02
ISSUE P



NOTES:

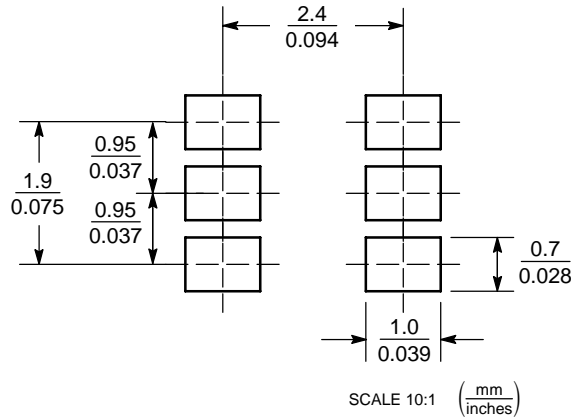
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	1.00	1.10	0.035	0.039	0.043
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.25	0.38	0.50	0.010	0.014	0.020
c	0.10	0.18	0.26	0.004	0.007	0.010
D	2.90	3.00	3.10	0.114	0.118	0.122
E	1.30	1.50	1.70	0.051	0.059	0.067
e	0.85	0.95	1.05	0.034	0.037	0.041
L	0.20	0.40	0.60	0.008	0.016	0.024
HE	2.50	2.75	3.00	0.099	0.108	0.118
θ	0°	-	10°	0°	-	10°

STYLE 1:

- PIN 1. DRAIN
- DRAIN
- GATE
- SOURCE
- DRAIN
- 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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