

NTGS3446

Power MOSFET 5.1 Amps, 20 Volts N-Channel TSOP-6

Features

- Ultra Low $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Logic Level Gate Drive
- Diode Exhibits High Speed, Soft Recovery
- Avalanche Energy Specified
- I_{DSS} Specified at Elevated Temperature
- Pb-Free Package is Available

Applications

- Power Management in portable and battery-powered products, i.e. computers, printers, PCMCIA cards, cellular and cordless
- Lithium Ion Battery Applications
- Notebook PC

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	20	V
Gate-to-Source Voltage	V_{GS}	± 12	V
Thermal Resistance Junction-to-Ambient (Note 1) Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$ P_d	244 0.5	$^\circ\text{C/W}$ W
Drain Current - Continuous @ $T_A = 25^\circ\text{C}$ - Pulsed Drain Current ($t_p < 10 \mu\text{s}$)	I_D I_{DM}	2.5 10	A A
Thermal Resistance Junction-to-Ambient (Note 2) Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$ P_d	128 1.0	$^\circ\text{C/W}$ W
Drain Current - Continuous @ $T_A = 25^\circ\text{C}$ - Pulsed Drain Current ($t_p < 10 \mu\text{s}$)	I_D I_{DM}	3.6 14	A A
Thermal Resistance Junction-to-Ambient (Note 3) Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$ P_d	62.5 2.0	$^\circ\text{C/W}$ W
Drain Current - Continuous @ $T_A = 25^\circ\text{C}$ - Pulsed Drain Current ($t_p < 10 \mu\text{s}$)	I_D I_{DM}	5.1 20	A A
Source Current (Body Diode)	I_S	5.1	A
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$
Maximum Lead Temperature for Soldering Purposes for 10 seconds	T_L	260	$^\circ\text{C}$

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. Minimum FR-4 or G-10PCB, operating to steady state.
2. Mounted onto a 2" square FR-4 board (1" sq. 2 oz. cu. 0.06" thick single-sided), operating to steady state.
3. Mounted onto a 2" square FR-4 board (1" sq. 2 oz. cu. 0.06" thick single-sided), $t < 5.0$ seconds.

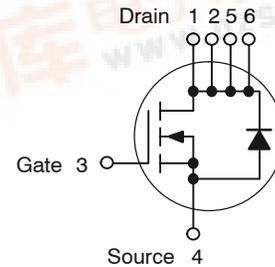


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$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
20 V	36 m Ω @ 4.5 V	5.1 A

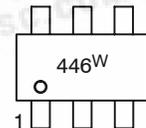
N-Channel



MARKING DIAGRAM

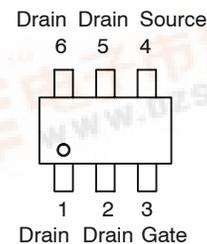


TSOP-6
CASE 318G
STYLE 1



446 = Device Code
W = Work Week

PIN ASSIGNMENT



ORDERING INFORMATION

Device	Package	Shipping†
NTGS3446T1	TSOP-6	3000/Tape & Reel
NTGS3446T1G	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.



NTGS3446

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage ($V_{GS} = 0\text{ Vdc}$, $I_D = 0.25\text{ mAdc}$) Temperature Coefficient (Positive)	$V_{(BR)DSS}$	20 -	- 22	- -	Vdc mV/°C
Zero Gate Voltage Collector Current ($V_{DS} = 20\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) ($V_{DS} = 20\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 85^\circ\text{C}$)	I_{DSS}	- -	- -	1.0 25	μAdc
Gate-Body Leakage Current ($V_{GS} = \pm 12\text{ Vdc}$, $V_{DS} = 0$)	$I_{GSS(f)}$ $I_{GSS(r)}$	- -	- -	100 -100	nAdc

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage $I_D = 0.25\text{ mA}$, $V_{DS} = V_{GS}$ Temperature Coefficient (Negative)	$V_{GS(th)}$	0.6 -	0.85 -2.5	1.2 -	Vdc mV/°C
Static Drain-to-Source On-Resistance ($V_{GS} = 4.5\text{ Vdc}$, $I_D = 5.1\text{ Adc}$) ($V_{GS} = 2.5\text{ Vdc}$, $I_D = 4.4\text{ Adc}$)	$R_{DS(on)}$	- -	36 44	45 55	m Ω
Forward Transconductance ($V_{DS} = 10\text{ Vdc}$, $I_D = 5.1\text{ Adc}$)	g_{FS}	-	12	-	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = 10\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	C_{iss}	-	510	750	pF
Output Capacitance		C_{oss}	-	200	350	
Transfer Capacitance		C_{rss}	-	60	100	

SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	$(V_{DD} = 10\text{ Vdc}$, $I_D = 1.0\text{ Adc}$, $V_{GS} = 4.5\text{ Vdc}$, $R_G = 6.0\ \Omega$)	$t_{d(on)}$	-	9.0	16	ns
Rise Time		t_r	-	12	20	
Turn-Off Delay Time		$t_{d(off)}$	-	35	60	
Fall Time		t_f	-	20	35	
Gate Charge	$(V_{DS} = 10\text{ Vdc}$, $I_D = 5.1\text{ Adc}$, $V_{GS} = 4.5\text{ Vdc}$)	Q_T	-	8.0	15	nC
		Q_{gs}	-	2.0	-	
		Q_{gd}	-	2.0	-	

SOURCE-DRAIN DIODE CHARACTERISTICS

Forward On-Voltage (Note 4)	$(I_S = 1.7\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$) $(I_S = 1.7\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 85^\circ\text{C}$)	V_{SD}	-	0.74 0.66	1.1 -	Vdc
Reverse Recovery Time		$(I_S = 1.7\text{ Adc}$, $V_{GS} = 0\text{ Vdc}$, $di_S/dt = 100\text{ A}/\mu\text{s}$)	t_{rr}	-	20	-
	t_a		-	11	-	
	t_b		-	9.0	-	
Reverse Recovery Stored Charge		Q_{RR}	-	0.01	-	μC

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

5. Switching characteristics are independent of operating junction temperature.

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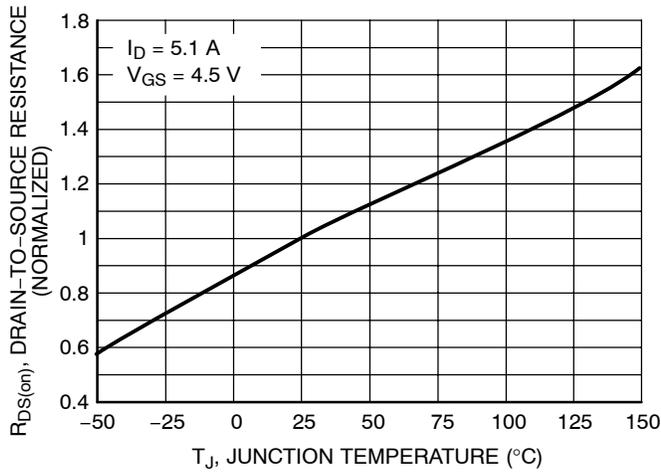


Figure 1. On-Resistance Variation with Temperature

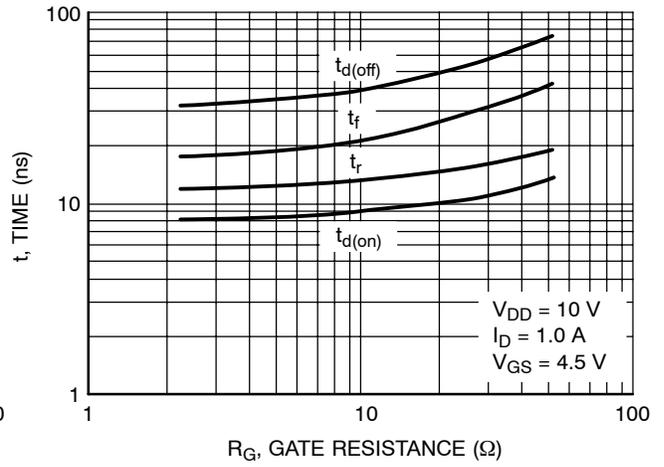
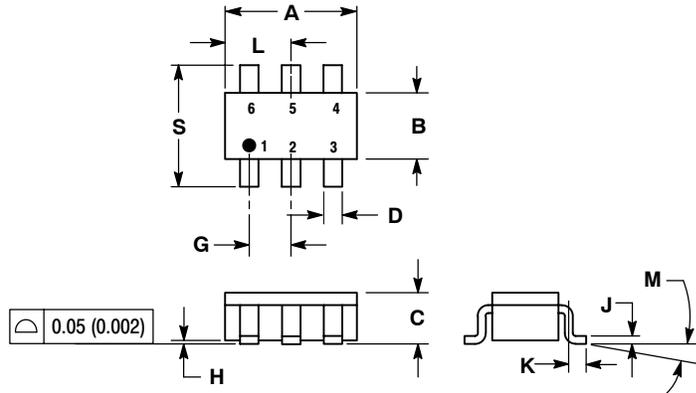


Figure 2. Resistive Switching Time Variation vs. Gate Resistance

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PACKAGE DIMENSIONS

TSOP-6 CASE 318G-02 ISSUE N



NOTES:

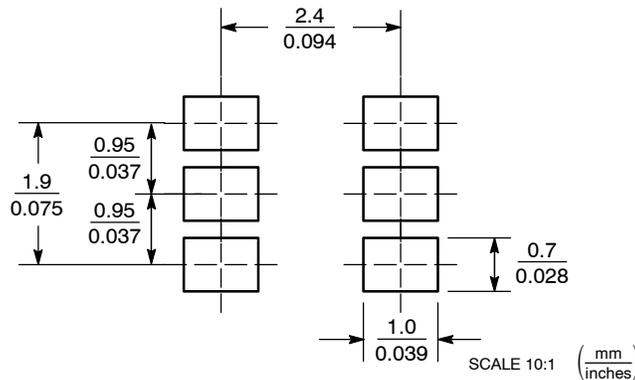
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.1142	0.1220
B	1.30	1.70	0.0512	0.0669
C	0.90	1.10	0.0354	0.0433
D	0.25	0.50	0.0098	0.0197
G	0.85	1.05	0.0335	0.0413
H	0.013	0.100	0.0005	0.0040
J	0.10	0.26	0.0040	0.0102
K	0.20	0.60	0.0079	0.0236
L	1.25	1.55	0.0493	0.0610
M	0°	10°	0°	10°
S	2.50	3.00	0.0985	0.1181

STYLE 1:

1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. 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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