

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 Option for Green Manufacturing (G Suffix)

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	$^\circ\text{C/W}$ Watts
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	Amps Amps
Thermal Resistance Junction-to-Ambient (Note 2) Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$R_{\theta JA}$ P_d	128 1.0	$^\circ\text{C/W}$ Watts
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	Amps Amps
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	$^\circ\text{C/W}$ Watts
Drain Current - Continuous @ $T_A = 25^\circ\text{C}$ - Pulsed Drain Current ($t_p < 10 \mu\text{s}$)	I_D I_{DM}	5.1 2.0	Amps Amps
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	$^\circ\text{C}$

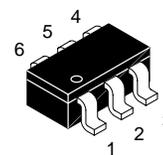
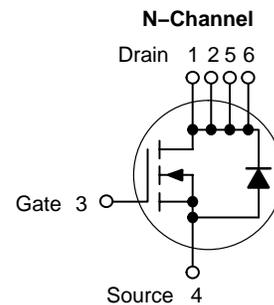
1. Minimum FR-4 or G-10PCB, operating to steady state.
2. Mounted onto a 2" square FR-4 board (1" sq. 2 oz. cu. 0.06" thick single-sided), operating to steady state.
3. Mounted onto a 2" square FR-4 board (1" sq. 2 oz. cu. 0.06" thick single-sided), $t < 5.0$ seconds.



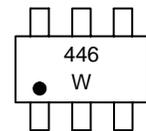
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$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
20 V	36 m Ω @ 4.5 V	5.1 A



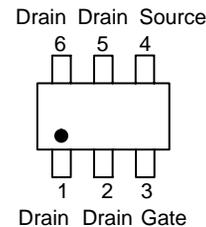
MARKING DIAGRAM



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°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage (V _{GS} = 0 Vdc, I _D = 0.25 mAdc) Temperature Coefficient (Positive)	V _{(BR)DSS}	20 -	- 22	- -	Vdc mV/°C
Zero Gate Voltage Collector Current (V _{DS} = 20 Vdc, V _{GS} = 0 Vdc) (V _{DS} = 20 Vdc, V _{GS} = 0 Vdc, T _J = 85°C)	I _{DSS}	- -	- -	1.0 25	μAdc
Gate-Body Leakage Current (V _{GS} = ±12 Vdc, V _{DS} = 0)	I _{GSS(f)} I _{GSS(r)}	- -	- -	100 -100	nAdc

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage I _D = 0.25 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 Vdc, I _D = 5.1 Adc) (V _{GS} = 2.5 Vdc, I _D = 4.4 Adc)	R _{DS(on)}	- -	36 44	45 55	mΩ
Forward Transconductance (V _{DS} = 10 Vdc, I _D = 5.1 Adc)	g _{FS}	-	12	-	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	(V _{DS} = 10 Vdc, V _{GS} = 0 Vdc, f = 1.0 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 Vdc, I _D = 1.0 Adc, V _{GS} = 4.5 Vdc, R _G = 6.0 Ω)	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 Vdc, I _D = 5.1 Adc, V _{GS} = 4.5 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 Adc, V _{GS} = 0 Vdc) (I _S = 1.7 Adc, V _{GS} = 0 Vdc, T _J = 85°C)	V _{SD}	- -	0.74 0.66	1.1 -	Vdc
Reverse Recovery Time		(I _S = 1.7 Adc, V _{GS} = 0 Vdc, di _S /dt = 100 A/μs)	t _{rr}	-	20	-
	t _a		-	11	-	
	t _b		-	9.0	-	
Reverse Recovery Stored Charge		Q _{RR}	-	0.01	-	μC

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

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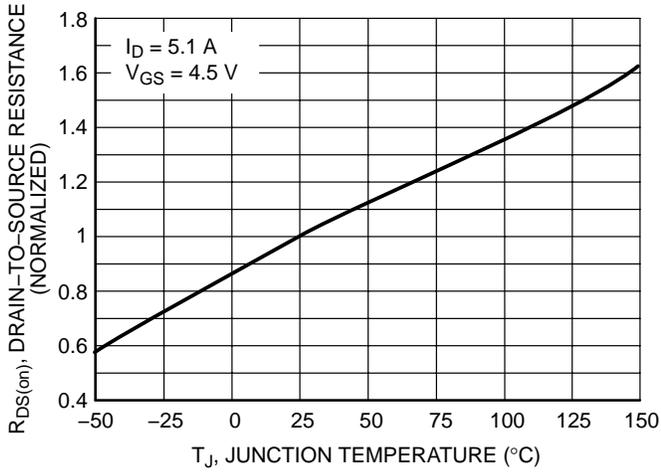


Figure 1. On-Resistance Variation with Temperature

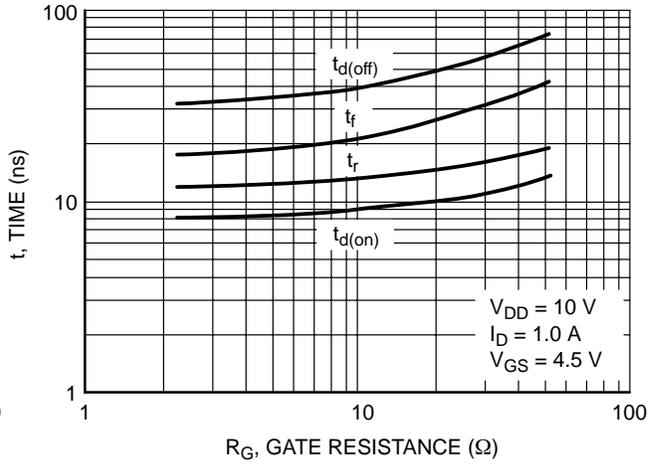
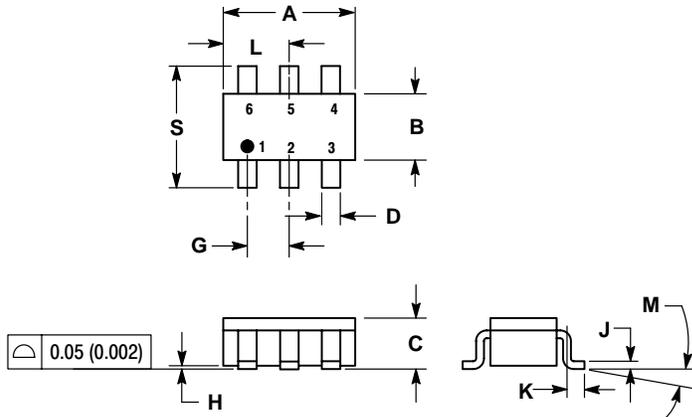


Figure 2. Resistive Switching Time Variation vs. Gate Resistance

NTGS3446

PACKAGE DIMENSIONS

TSOP-6
CASE 318G-02
ISSUE H



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.

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:

- PIN 1: DRAIN
 2: DRAIN
 3: GATE
 4: SOURCE
 5: DRAIN
 6: DRAIN

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