

# NTGS3433T1

## MOSFET -3.3 Amps, -12 Volts P-Channel TSOP-6

### Features

- Ultra Low  $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Miniature TSOP-6 Surface Mount Package

### Applications

- Power Management in Portable and Battery-Powered Products, i.e.: Cellular and Cordless Telephones, and PCMCIA Cards

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DSS}$	-12	Volts
Gate-to-Source Voltage - Continuous	$V_{GS}$	$\pm 8.0$	Volts
Thermal Resistance Junction-to-Ambient (Note 1)	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_d$	2.0	Watts
Drain Current		-3.3	Amps
- Continuous @ $T_A = 25^\circ\text{C}$	$I_D$		
- Pulsed Drain Current ( $T_p < 10 \mu\text{s}$ )	$I_{DM}$	-20	Amps
Maximum Operating Power Dissipation	$P_d$	1.0	Watts
Maximum Operating Drain Current	$I_D$	-2.35	Amps
Thermal Resistance Junction-to-Ambient (Note 2)	$R_{\theta JA}$	128	$^\circ\text{C/W}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_d$	1.0	Watts
Drain Current			
- Continuous @ $T_A = 25^\circ\text{C}$	$I_D$	-2.35	Amps
- Pulsed Drain Current ( $T_p < 10 \mu\text{s}$ )	$I_{DM}$	-14	Amps
Maximum Operating Power Dissipation	$P_d$	0.5	Watts
Maximum Operating Drain Current	$I_D$	-1.65	Amps
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	$^\circ\text{C}$

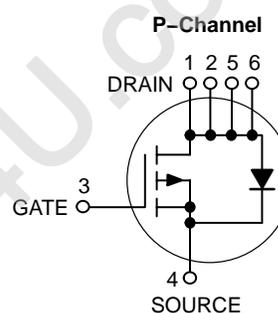
- 1 Mounted onto a 2" square FR-4 board (1" sq. 2 oz. cu. 0.06" thick single sided),  $t < 5.0$  seconds.
- 2 Mounted onto a 2" square FR-4 board (1" sq. 2 oz. cu. 0.06" thick single sided), operating to steady state.



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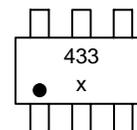
<http://onsemi.com>

$V_{DSS}$	$R_{DS(ON)}$ TYP	$I_D$ MAX
-12 V	75 m $\Omega$ @ $V_{GS} = -4.5$ V	-3.3 A



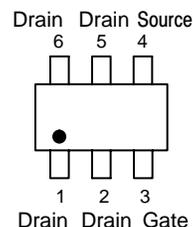
TSOP-6  
CASE 318G  
STYLE 1

### MARKING DIAGRAM



433 = Device Code  
x = Date Code

### PIN ASSIGNMENT



### ORDERING INFORMATION

Device	Package	Shipping†
NTGS3433T1	TSOP-6	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.

# NTGS3433T1

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted) (Notes 3 & 4)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-Source Breakdown Voltage ( $V_{GS} = 0\text{ Vdc}$ , $I_D = -10\ \mu\text{A}$ )	$V_{(BR)DSS}$	-12	-	-	Vdc
Zero Gate Voltage Drain Current ( $V_{GS} = 0\text{ Vdc}$ , $V_{DS} = -8\text{ Vdc}$ , $T_J = 25^\circ\text{C}$ ) ( $V_{GS} = 0\text{ Vdc}$ , $V_{DS} = -8\text{ Vdc}$ , $T_J = 70^\circ\text{C}$ )	$I_{DSS}$	-	-	-1.0 -5.0	$\mu\text{Adc}$
Gate-Body Leakage Current ( $V_{GS} = -8.0\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )	$I_{GSS}$	-	-	-100	nAdc
Gate-Body Leakage Current ( $V_{GS} = +8.0\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )	$I_{GSS}$	-	-	100	nAdc

### ON CHARACTERISTICS

Gate Threshold Voltage ( $V_{DS} = V_{GS}$ , $I_D = -250\ \mu\text{Adc}$ )	$V_{GS(th)}$	-0.50	-0.70	-1.50	Vdc
Static Drain-Source On-State Resistance ( $V_{GS} = -4.5\text{ Vdc}$ , $I_D = -3.3\text{ Adc}$ ) ( $V_{GS} = -2.5\text{ Vdc}$ , $I_D = -2.9\text{ Adc}$ )	$R_{DS(on)}$	-	0.055 0.075	0.075 0.095	$\Omega$
Forward Transconductance ( $V_{DS} = -10\text{ Vdc}$ , $I_D = -3.3\text{ Adc}$ )	$g_{FS}$	-	7.0	-	mhos

### DYNAMIC CHARACTERISTICS

Total Gate Charge	$(V_{DS} = -10\text{ Vdc}$ , $V_{GS} = -4.5\text{ Vdc}$ , $I_D = -3.3\text{ Adc}$ )	$Q_{tot}$	-	7.0	15	nC
Gate-Source Charge		$Q_{gs}$	-	2.0	-	
Gate-Drain Charge		$Q_{gd}$	-	3.5	-	
Input Capacitance	$(V_{DS} = -5.0\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ , $f = 1.0\text{ MHz}$ )	$C_{iss}$	-	550	-	pF
Output Capacitance		$C_{oss}$	-	450	-	
Reverse Transfer Capacitance		$C_{rss}$	-	200	-	

### SWITCHING CHARACTERISTICS

Turn-On Delay Time	$(V_{DD} = -10\text{ Vdc}$ , $I_D = -1.0\text{ Adc}$ , $V_{GS} = -4.5\text{ Vdc}$ , $R_g = 6.0\ \Omega$ )	$t_{d(on)}$	-	20	30	ns
Rise Time		$t_r$	-	20	30	
Turn-Off Delay Time		$t_{d(off)}$	-	110	120	
Fall Time		$t_f$	-	100	115	
Reverse Recovery Time	$(I_S = -1.7\text{ Adc}$ , $di_S/dt = 100\text{ A}/\mu\text{s}$ )	$t_{rr}$	-	30	-	ns

### BODY-DRAIN DIODE RATINGS

Diode Forward On-Voltage	$(I_S = -1.7\text{ Adc}$ , $V_{GS} = 0\text{ Vdc}$ )	$V_{SD}$	-	-0.80	-1.5	Vdc
Diode Forward On-Voltage	$(I_S = -3.3\text{ Adc}$ , $V_{GS} = 0\text{ Vdc}$ )	$V_{SD}$	-	-0.90	-	Vdc

3. Indicates Pulse Test: P.W. = 300  $\mu\text{sec}$  max, Duty Cycle = 2%.

4. Class 1 ESD rated – Handling precautions to protect against electrostatic discharge is mandatory.

# NTGS3433T1

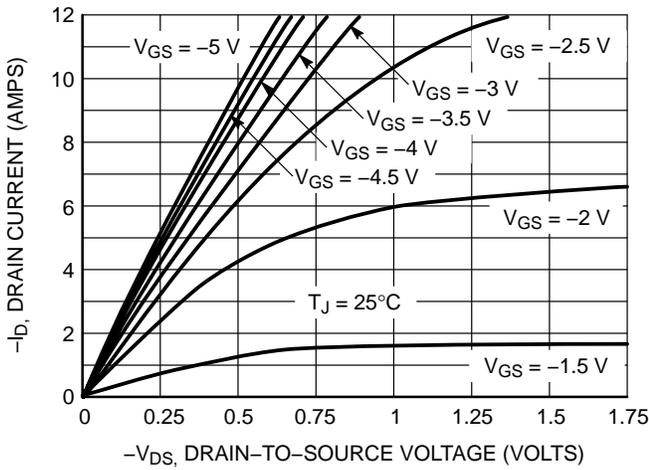


Figure 1. On-Region Characteristics

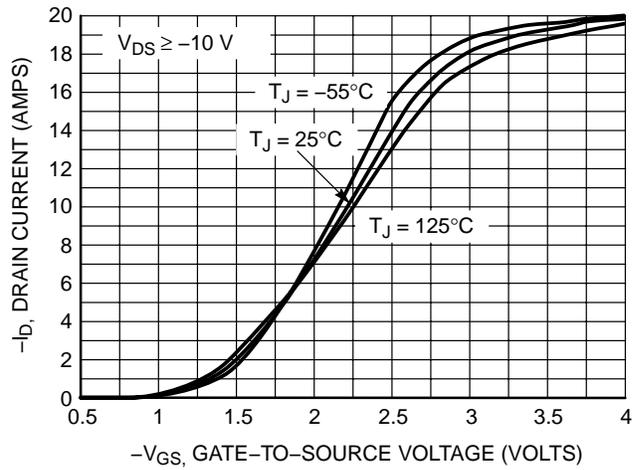


Figure 2. Transfer Characteristics

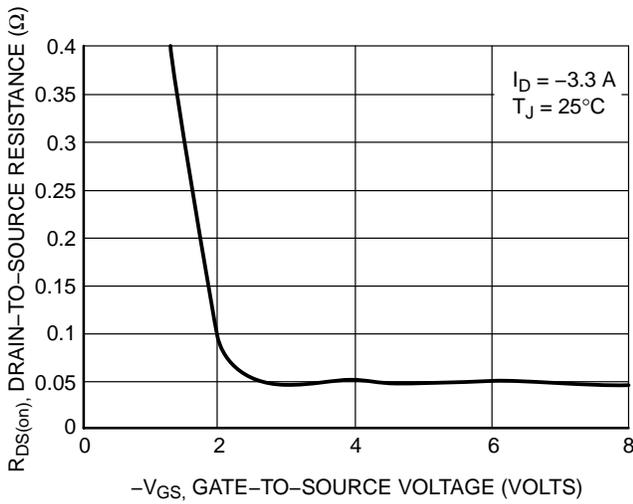


Figure 3. On-Resistance vs. Gate-to-Source Voltage

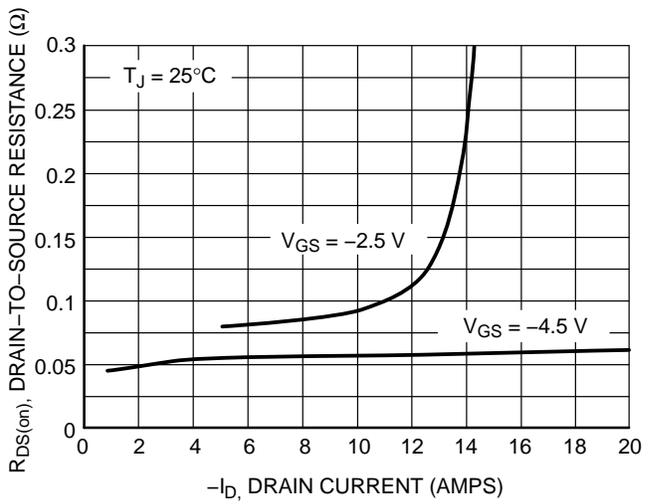


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

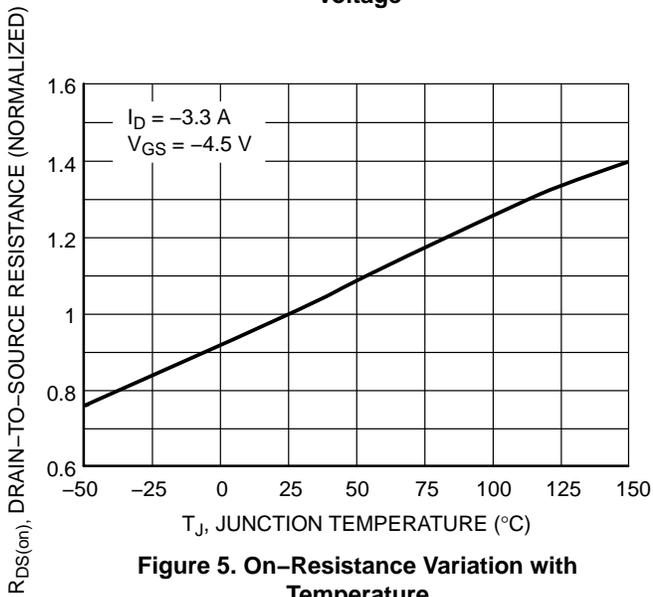


Figure 5. On-Resistance Variation with Temperature

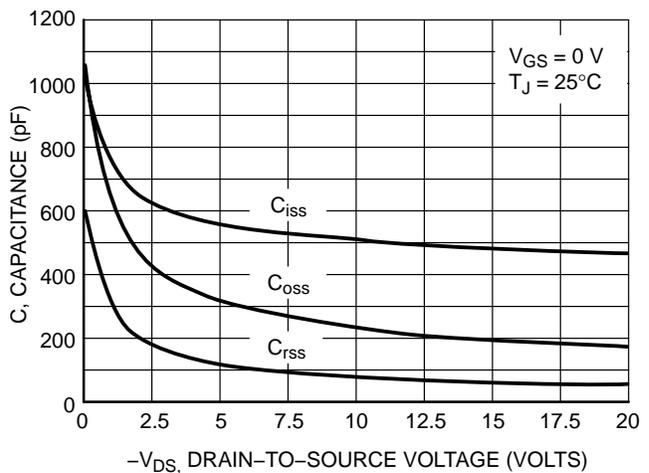
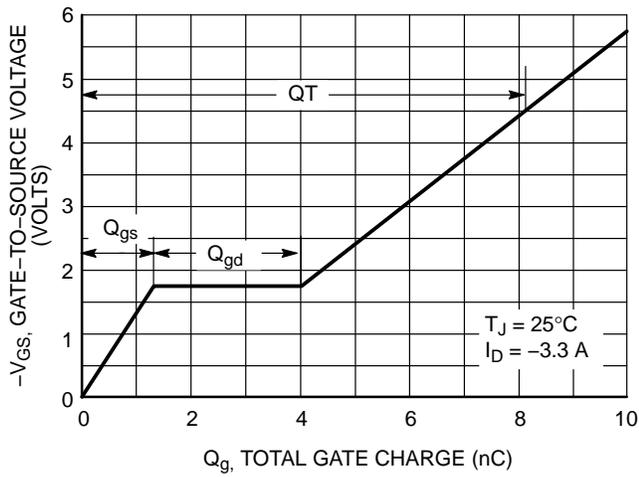
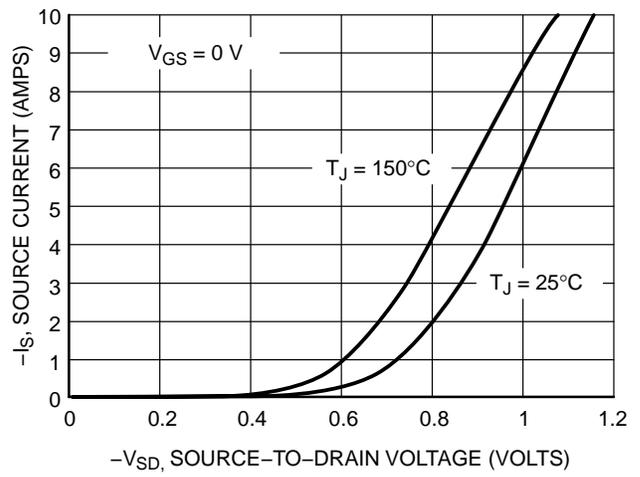


Figure 6. Capacitance Variation

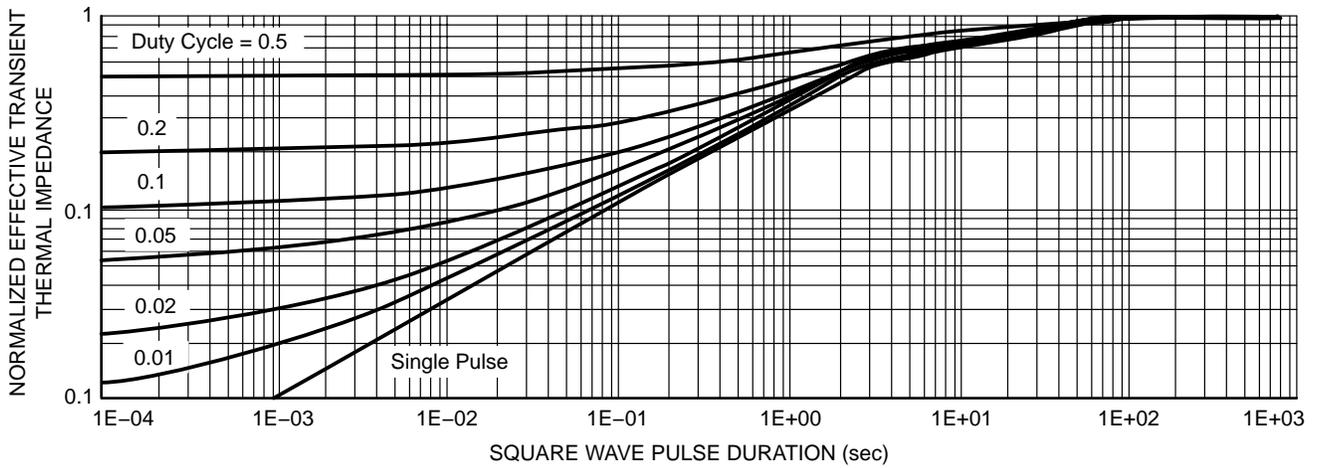
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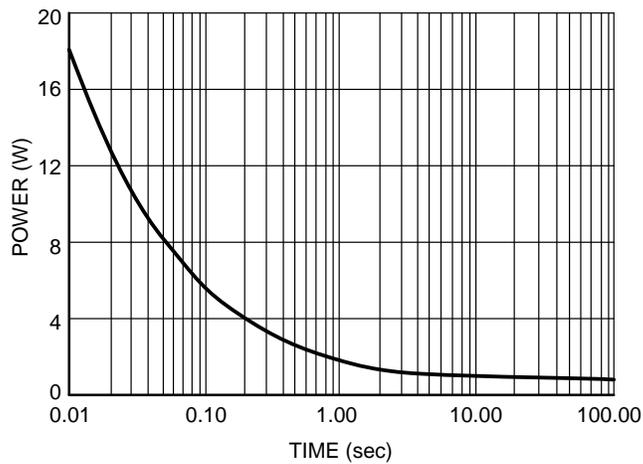
**Figure 7. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge**



**Figure 8. Diode Forward Voltage vs. Current**



**Figure 9. Normalized Thermal Transient Impedance, Junction-to-Ambient**

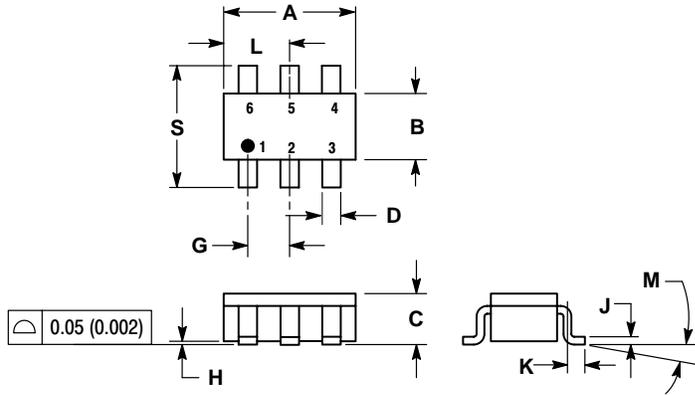


**Figure 10. Single Pulse Power**

# NTGS3433T1

## PACKAGE DIMENSIONS

TSOP-6  
CASE 318G-02  
ISSUE L



### NOTES:

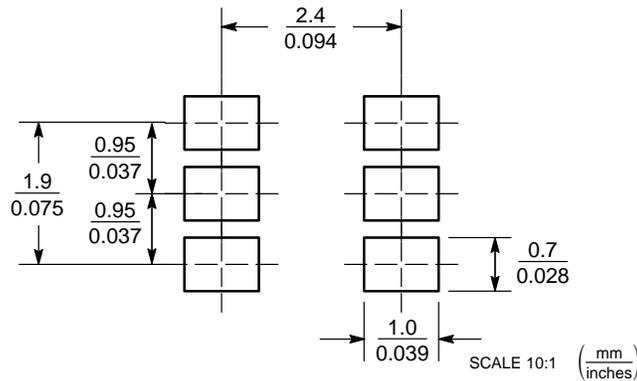
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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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