NTGS3441, NVGS3441

Power MOSFET
1 Amp, 20 Volts, P−Channel TSOP−6

Features

- Ultra Low $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Miniature TSOP−6 Surface Mount Package
- NV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free and are RoHS Compliant

Applications

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

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

Rating	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	−20	V
Gate−to−Source Voltage − Continuous	V_{GS}	±8.0	V
Thermal Resistance Junction−to−Ambient (Note 1) Total Power Dissipation @ T_A = 25°C Drain Current − Continuous @ T_A = 25°C − Pulsed Drain Current (T_p < 10 μS)	 $R_{\theta JA}$ P_d I_D I_{DM}	 244 0.5 −1.65 −10	 °C/W W A A
Thermal Resistance Junction−to−Ambient (Note 2) Total Power Dissipation @ T_A = 25°C Drain Current − Continuous @ T_A = 25°C − Pulsed Drain Current (T_p < 10 μS)	 $R_{\theta JA}$ P_d I_D I_{DM}	 128 1.0 −2.35 −14	 °C/W W A A
Thermal Resistance Junction−to−Ambient (Note 3) Total Power Dissipation @ T_A = 25°C Drain Current − Continuous @ T_A = 25°C − Pulsed Drain Current (T_p < 10 μS)	 $R_{\theta JA}$ P_d I_D I_{DM}	 62.5 2.0 −3.3 −20	 °C/W W A A
Operating and Storage Temperature Range	T_J, T_{stg}	−55 to 150	°C
Maximum Lead Temperature for Soldering Purposes for 10 Seconds	T_L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

ON Semiconductor®

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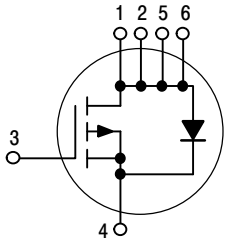
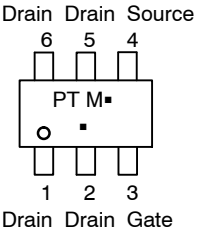
1 AMPERE
20 VOLTS
$R_{DS(on)}$ = 90 mΩ

P−Channel



TSOP−6
CASE 318G
STYLE 1

MARKING DIAGRAM & PIN ASSIGNMENT



PT = Specific Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping†
NTGS3441T1G	TSOP−6 (Pb−Free)	3000 / Tape & Reel
NVGS3441T1G	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 Specifications Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Notes 4 & 5)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = −10 μA)		$V_{(BR)DSS}$	−20	–	–	Vdc
Zero Gate Voltage Drain Current (V_{GS} = 0 Vdc, V_{DS} = −20 Vdc, T_J = 25°C) (V_{GS} = 0 Vdc, V_{DS} = −20 Vdc, T_J = 70°C)		I_{DSS}	– –	– –	−1.0 −5.0	μAdc
Gate−Body Leakage Current (V_{GS} = −8.0 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	–	–	−100	nAdc
Gate−Body Leakage Current (V_{GS} = +8.0 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	–	–	100	nAdc
ON CHARACTERISTICS						
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = −250 μAdc)		$V_{GS(th)}$	−0.45	−1.05	−1.50	Vdc
Static Drain−Source On−State Resistance (V_{GS} = −4.5 Vdc, I_D = −3.3 Adc) (V_{GS} = −2.5 Vdc, I_D = −2.9 Adc)		$R_{DS(on)}$	– –	0.069 0.117	0.090 0.135	Ω
Forward Transconductance (V_{DS} = −10 Vdc, I_D = −3.3 Adc)		g_{FS}	–	6.8	–	Mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = −5.0 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	–	480	–	pF
Output Capacitance		C_{oss}	–	265	–	pF
Reverse Transfer Capacitance		C_{rss}	–	100	–	pF
SWITCHING CHARACTERISTICS						
Turn−On Delay Time	(V_{DD} = −20 Vdc, I_D = −1.6 Adc, V_{GS} = −4.5 Vdc, R_g = 6.0 Ω)	$t_{d(on)}$	–	13	25	ns
Rise Time		t_r	–	23.5	45	ns
Turn−Off Delay Time		$t_{d(off)}$	–	27	50	ns
Fall Time		t_f	–	24	45	ns
Total Gate Charge	(V_{DS} = −10 Vdc, V_{GS} = −4.5 Vdc, I_D = −3.3 Adc)	Q_{tot}	–	6.2	14	nC
Gate−Source Charge		Q_{gs}	–	1.3	–	nC
Gate−Drain Charge		Q_{gd}	–	2.5	–	nC
BODY−DRAIN DIODE RATINGS						
Diode Forward On−Voltage	(I_S = −1.6 Adc, V_{GS} = 0 Vdc)	V_{SD}	–	−0.88	−1.2	Vdc
Diode Forward On−Voltage	(I_S = −3.3 Adc, V_{GS} = 0 Vdc)	V_{SD}	–	−0.98	–	Vdc
Reverse Recovery Time	(I_S = −1.6 Adc, dI_S/dt = 100 A/μs)	t_{rr}	–	30	60	ns

4. Indicates Pulse Test: P.W. = 300 μsec max, Duty Cycle = 2%.
5. Handling precautions to protect against electrostatic discharge are mandatory.

TYPICAL ELECTRICAL CHARACTERISTICS

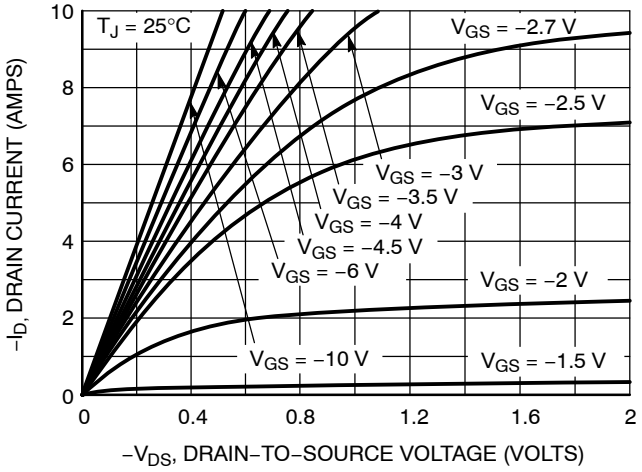


Figure 1. On−Region Characteristics

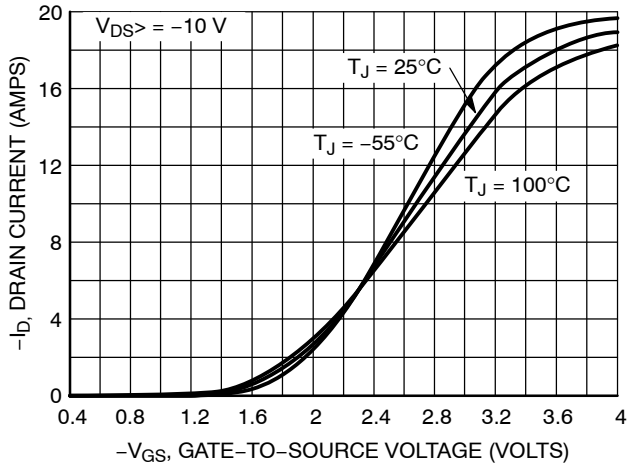


Figure 2. Transfer Characteristics

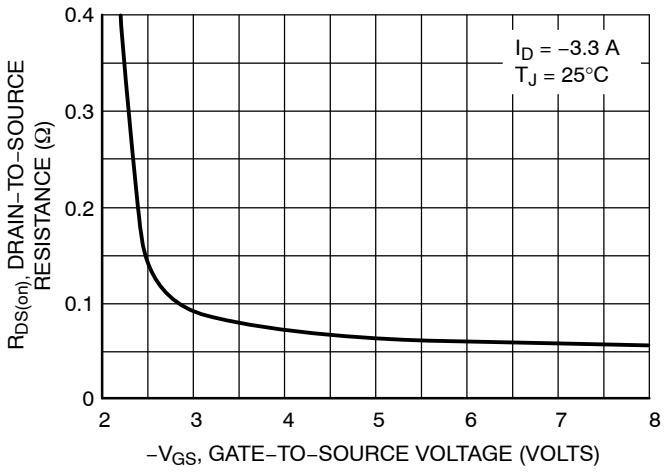


Figure 3. On−Resistance vs. Gate−to−Source Voltage

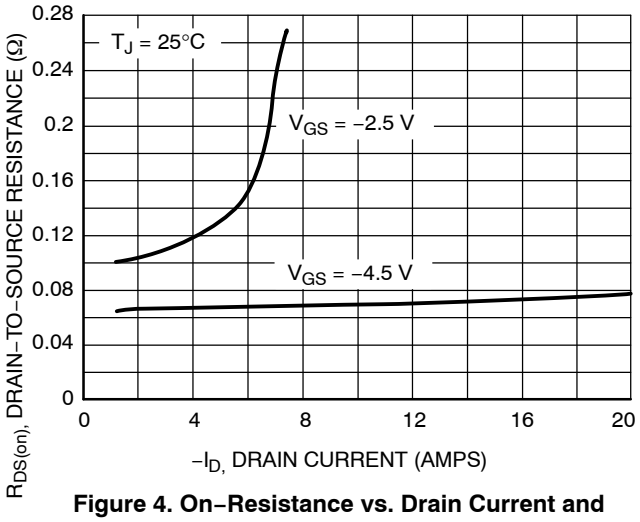


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

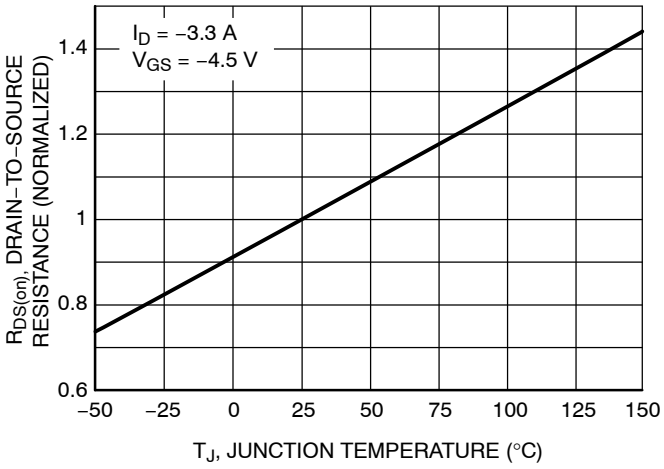


Figure 5. On−Resistance Variation with Temperature

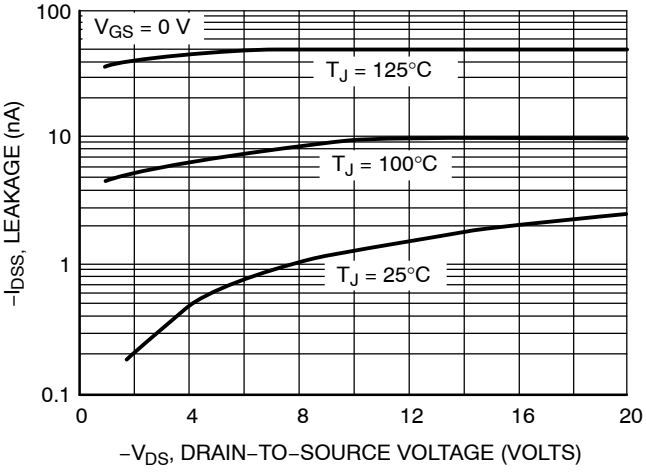


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL ELECTRICAL CHARACTERISTICS

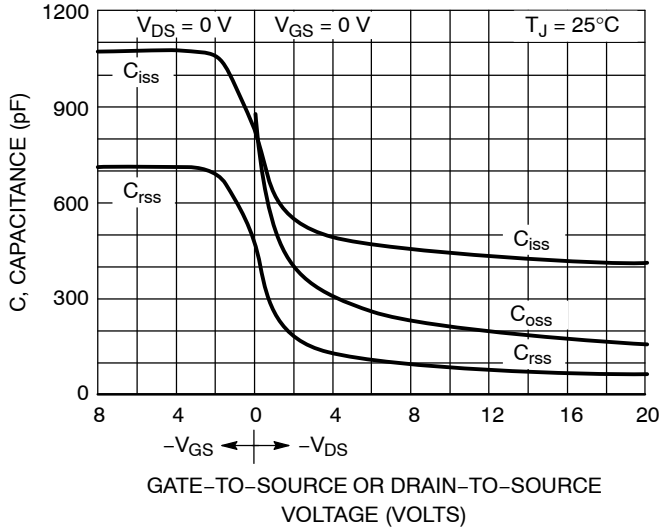


Figure 7. Capacitance Variation

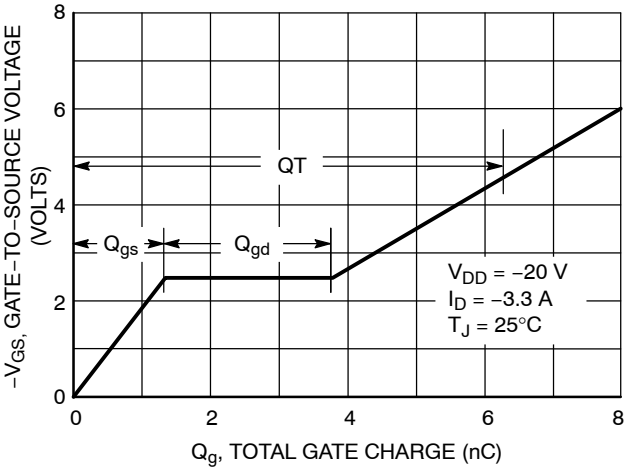


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

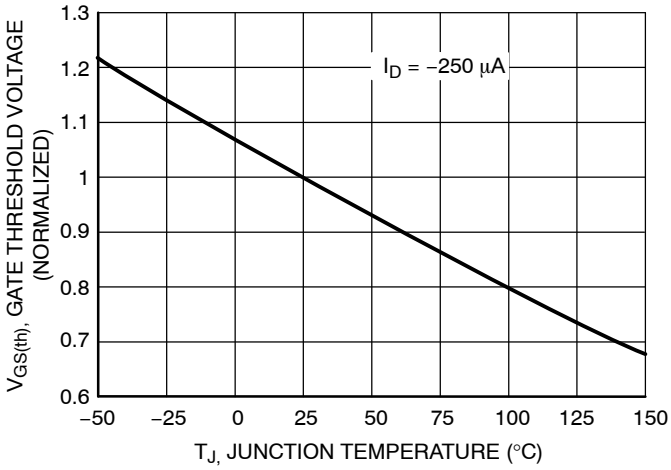


Figure 9. Gate Threshold Voltage Variation with Temperature

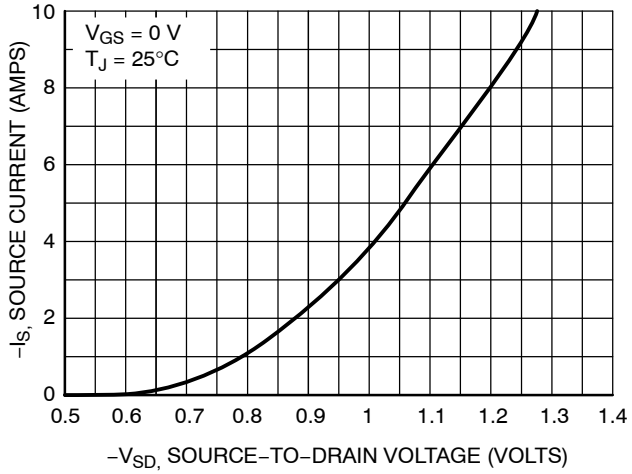


Figure 10. Diode Forward Voltage vs. Current

TYPICAL ELECTRICAL CHARACTERISTICS

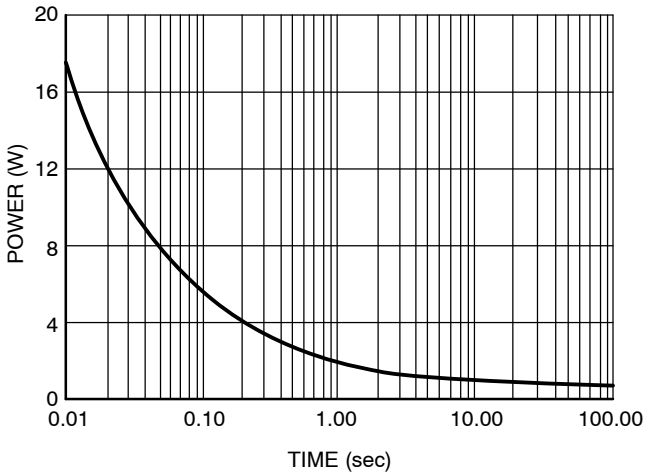


Figure 11. Single Pulse Power

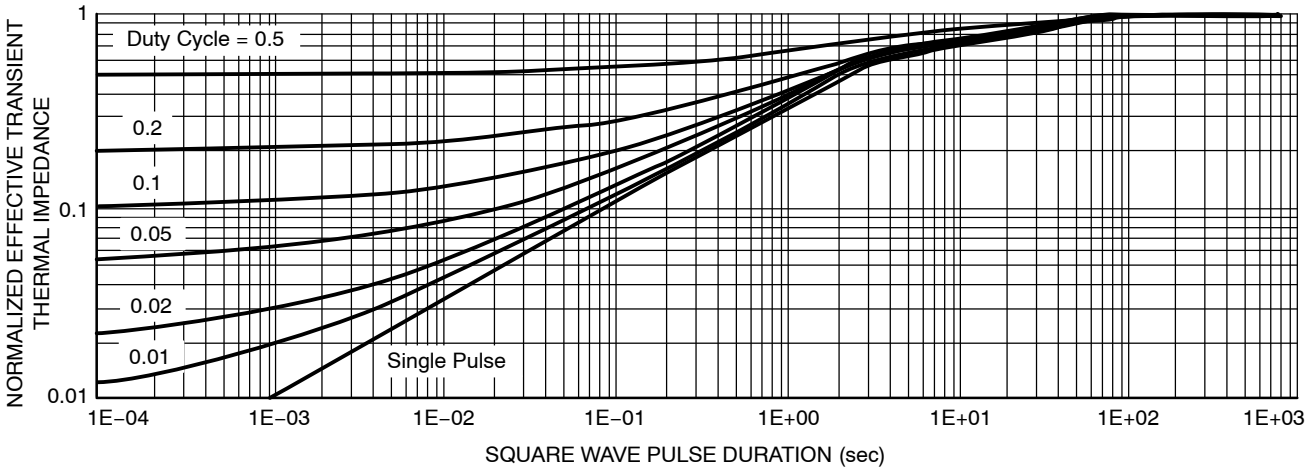
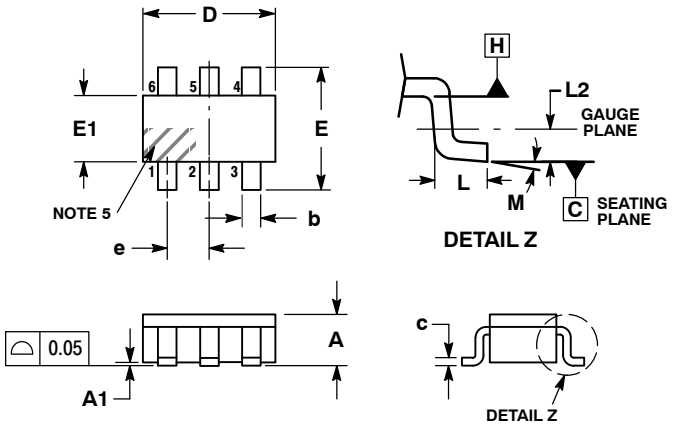


Figure 12. Normalized Thermal Transient Impedance, Junction−to−Ambient

PACKAGE DIMENSIONS

TSOP−6
CASE 318G−02
ISSUE V

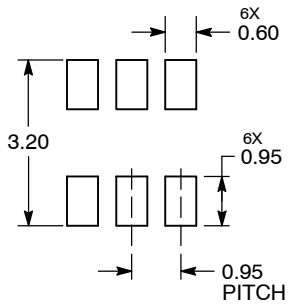


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

	MILLIMETERS		
DIM	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
b	0.25	0.38	0.50
c	0.10	0.18	0.26
D	2.90	3.00	3.10
E	2.50	2.75	3.00
E1	1.30	1.50	1.70
e	0.85	0.95	1.05
L	0.20	0.40	0.60
L2		0.25 BSC	
M	0°	–	10°

STYLE 1:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

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