# NTGS3455T1

# MOSFET
# -3.5 Amps, -30 Volts

## P−Channel TSOP−6

ON Semiconductor®

http://onsemi.com

| $V_{(BR)DSS}$ | $R_{DS(on)}$ TYP | $I_D$ Max |
|---|---|---|
| −30 V | 100 mΩ @ −10 V | −3.5 A |

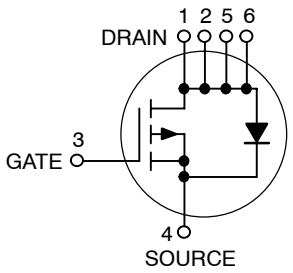
### Features

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

### Applications

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

**P−Channel**




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

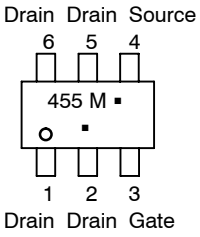
| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain−to−Source Voltage | $V_{DSS}$ | −30 | Volts |
| Gate−to−Source Voltage − Continuous | $V_{GS}$ | ±20.0 | Volts |
| Thermal Resistance Junction−to−Ambient (Note 1) | $R_{\theta JA}$ | 62.5 | °C/W |
| Total Power Dissipation @ $T_A$ = 25°C | $P_d$ | 2.0 | Watts |
| Drain Current − Continuous @ $T_A$ = 25°C | $I_D$ | −3.5 | Amps |
| − Pulsed Drain Current ($T_p$ < 10 μS) | $I_{DM}$ | −20 | Amps |
| Maximum Operating Power Dissipation | $P_d$ | 1.0 | Watts |
| Maximum Operating Drain Current | $I_D$ | −2.5 | Amps |
| Thermal Resistance Junction−to−Ambient (Note 2) | $R_{\theta JA}$ | 128 | °C/W |
| Total Power Dissipation @ $T_A$ = 25°C | $P_d$ | 1.0 | Watts |
| Drain Current − Continuous @ $T_A$ = 25°C | $I_D$ | −2.5 | Amps |
| − Pulsed Drain Current ($T_p$ < 10 μS) | $I_{DM}$ | −14 | Amps |
| Maximum Operating Power Dissipation | $P_d$ | 0.5 | Watts |
| Maximum Operating Drain Current | $I_D$ | −1.75 | Amps |
| 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 |

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

**MARKING DIAGRAM & PIN ASSIGNMENT**


**TSOP−6**
**CASE 318G**
**STYLE 1**




455 = 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† |
|---|---|---|
| NTGS3455T1 | TSOP−6 | 3000 Tape & Reel |
| NTGS3455T1G | 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.

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted) (Notes 3 & 4)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain−Source Breakdown Voltage ($V_{GS}$ = 0 Vdc, $I_D$ = −10 μA) | | $V_{(BR)DSS}$ | −30 | – | – | Vdc |
| Zero Gate Voltage Drain Current ($V_{GS}$ = 0 Vdc, $V_{DS}$ = −30 Vdc, $T_J$ = 25°C)<br>($V_{GS}$ = 0 Vdc, $V_{DS}$ = −30 Vdc, $T_J$ = 70°C) | | $I_{DSS}$ | –<br>– | –<br>– | −1.0<br>−5.0 | μAdc |
| Gate−Body Leakage Current ($V_{GS}$ = −20.0 Vdc, $V_{DS}$ = 0 Vdc) | | $I_{GSS}$ | – | – | −100 | nAdc |
| Gate−Body Leakage Current ($V_{GS}$ = +20.0 Vdc, $V_{DS}$ = 0 Vdc) | | $I_{GSS}$ | – | – | 100 | nAdc |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage ($V_{DS}$ = $V_{GS}$, $I_D$ = −250 μAdc) | | $V_{GS(th)}$ | −1.0 | −1.87 | −3.0 | Vdc |
| Static Drain−Source On−State Resistance ($V_{GS}$ = −10 Vdc, $I_D$ = −3.5 Adc)<br>($V_{GS}$ = −4.5 Vdc, $I_D$ = −2.7 Adc) | | $R_{DS(on)}$ | –<br>– | 0.094<br>0.144 | 0.100<br>0.170 | Ω |
| Forward Transconductance ($V_{DS}$ = −15 Vdc, $I_D$ = −3.5 Adc) | | $g_{FS}$ | – | 6.0 | – | mhos |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Total Gate Charge | ($V_{DS}$ = −15 Vdc, $V_{GS}$ = −10 Vdc, $I_D$ = −3.5 Adc) | $Q_{tot}$ | – | 9.0 | 13 | nC |
| Gate−Source Charge | | $Q_{gs}$ | – | 2.5 | – | |
| Gate−Drain Charge | | $Q_{gd}$ | – | 2.0 | – | |
| Input Capacitance | ($V_{DS}$ = −5.0 Vdc, $V_{GS}$ = 0 Vdc, f = 1.0 MHz) | $C_{iss}$ | – | 480 | – | pF |
| Output Capacitance | | $C_{oss}$ | – | 220 | – | |
| Reverse Transfer Capacitance | | $C_{rss}$ | – | 60 | – | |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| Turn−On Delay Time | ($V_{DD}$ = −20 Vdc, $I_D$ = −1.0 Adc, $V_{GS}$ = −10 Vdc, $R_g$ = 6.0 Ω) | $t_{d(on)}$ | – | 10 | 20 | ns |
| Rise Time | | $t_r$ | – | 15 | 30 | |
| Turn−Off Delay Time | | $t_{d(off)}$ | – | 20 | 35 | |
| Fall Time | | $t_f$ | – | 10 | 20 | |
| Reverse Recovery Time | ($I_S$ = −1.7 Adc, $dI_S/dt$ = 100 A/μs) | $t_{rr}$ | – | 30 | – | ns |
| **BODY−DRAIN DIODE RATINGS** | | | | | | |
| Diode Forward On−Voltage | ($I_S$ = −1.7 Adc, $V_{GS}$ = 0 Vdc) | $V_{SD}$ | – | −0.90 | −1.2 | Vdc |
| Diode Forward On−Voltage | ($I_S$ = −3.5 Adc, $V_{GS}$ = 0 Vdc) | $V_{SD}$ | – | −1.0 | – | Vdc |

3. Indicates Pulse Test: P.W. = 300 μsec max, Duty Cycle = 2%.
4. Class 1 ESD rated − Handling precautions to protect against electrostatic discharge are mandatory.

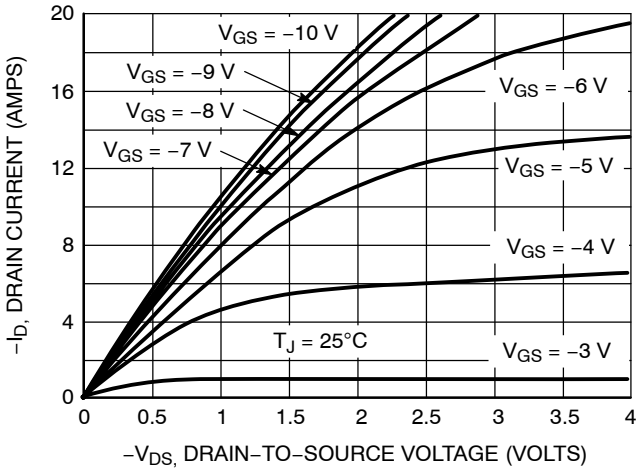



**Figure 1. On−Region Characteristics**

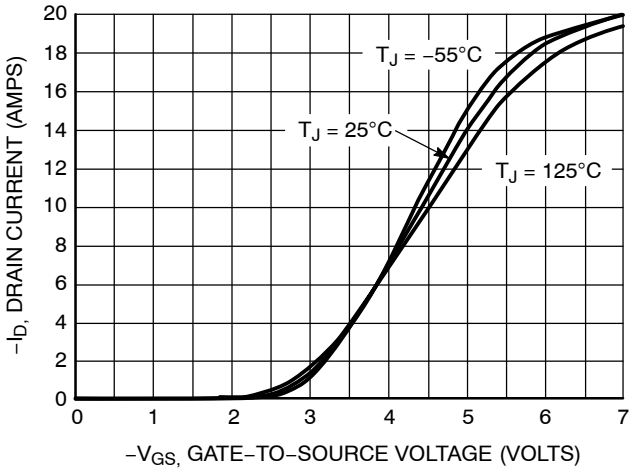



**Figure 2. Transfer Characteristics**

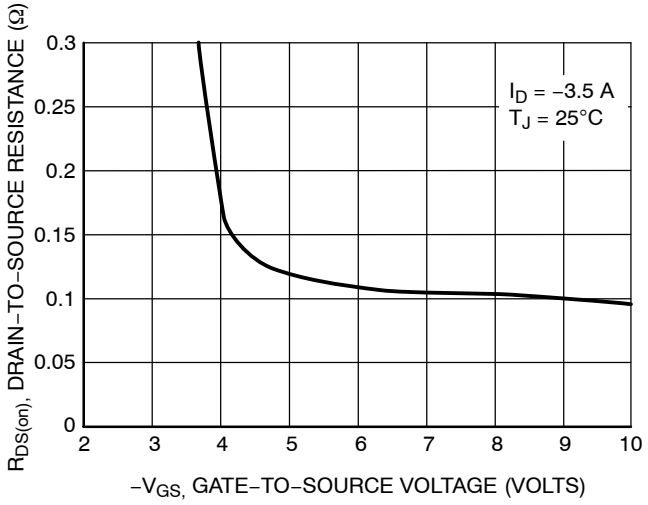



**Figure 3. On−Resistance vs. Gate−to−Source Voltage**

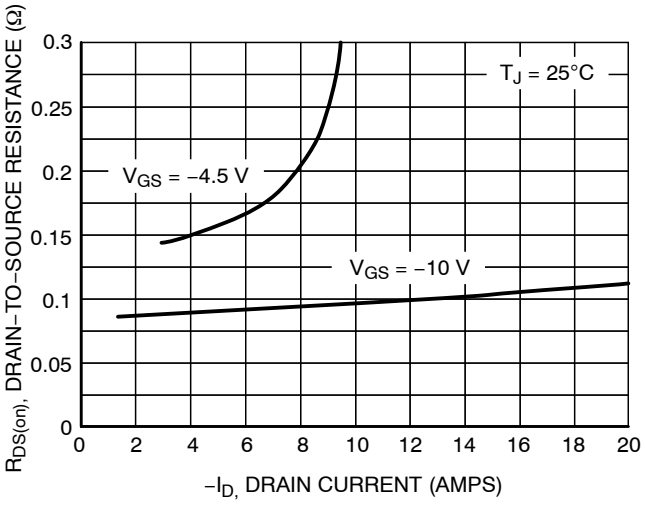



**Figure 4. On−Resistance vs. Drain Current and Gate Voltage**

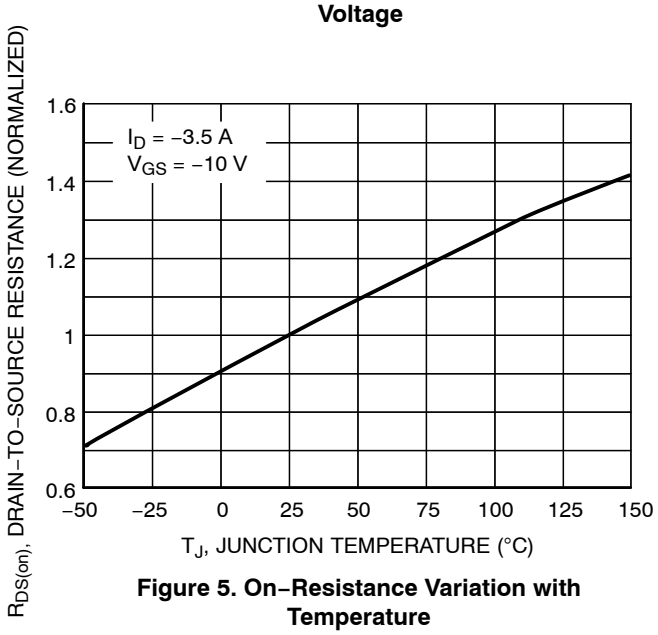



**Figure 5. On−Resistance Variation with Temperature**

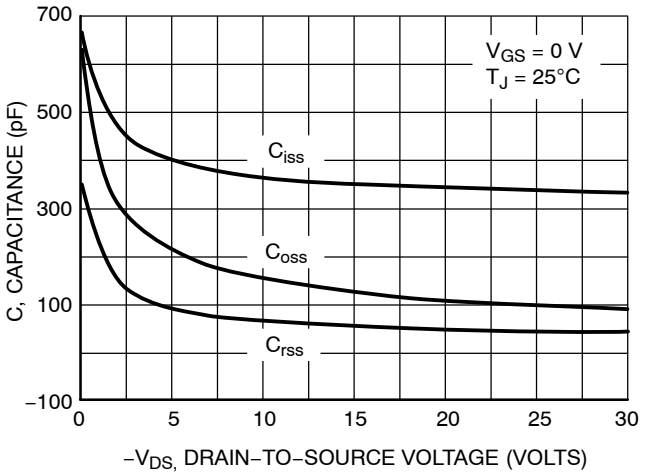



**Figure 6. Capacitance Variation**

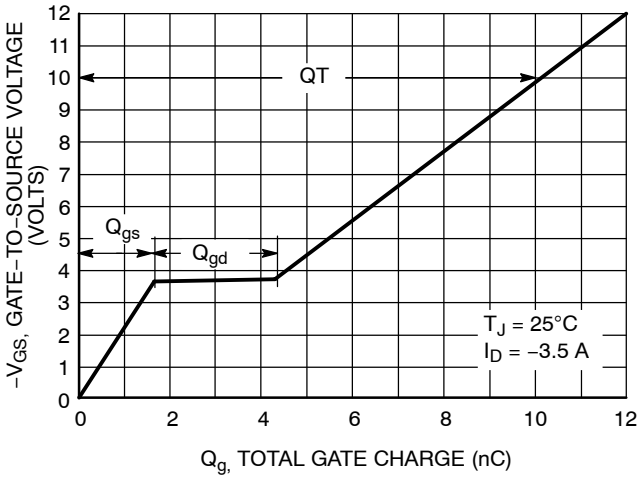



**Figure 7. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge**

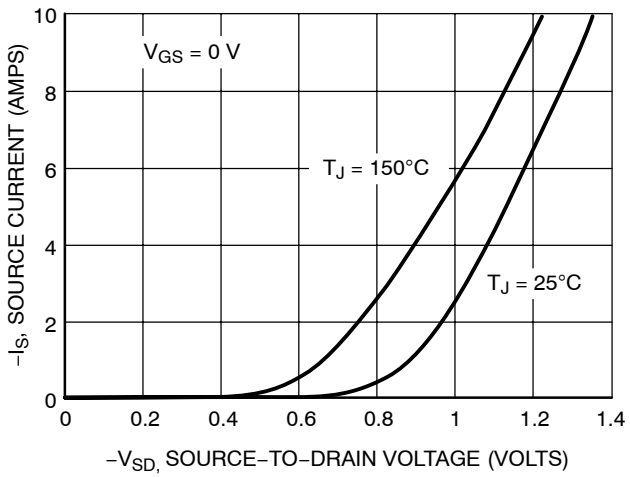



**Figure 8. Diode Forward Voltage vs. Current**

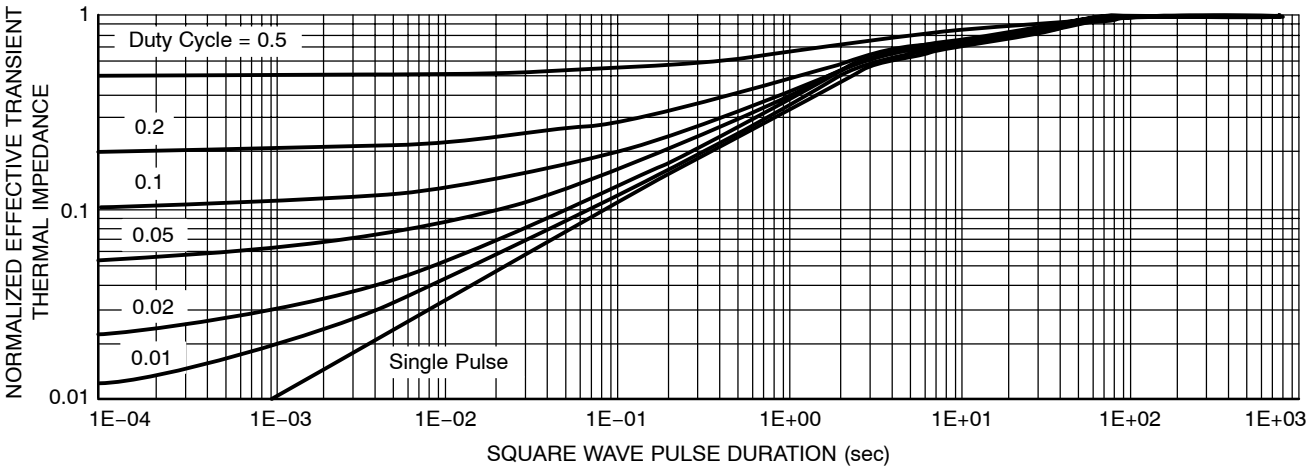



**Figure 9. Normalized Thermal Transient Impedance, Junction−to−Ambient**

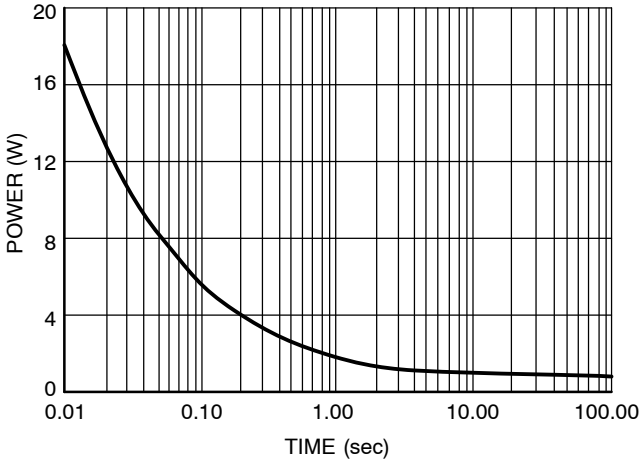
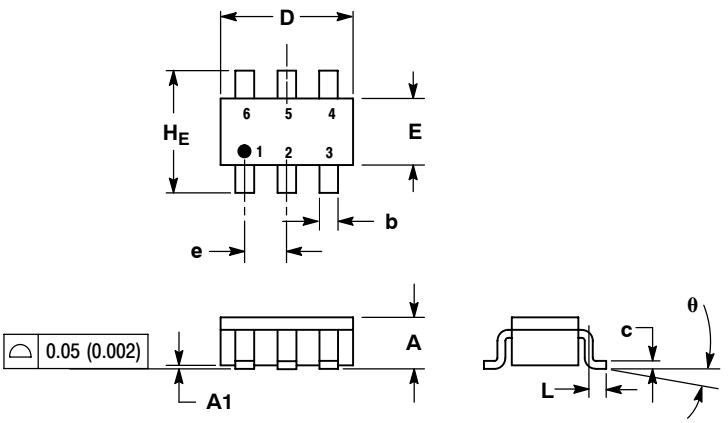



**Figure 10. Single Pulse Power**

## PACKAGE DIMENSIONS

**TSOP−6**
CASE 318G−02
ISSUE P

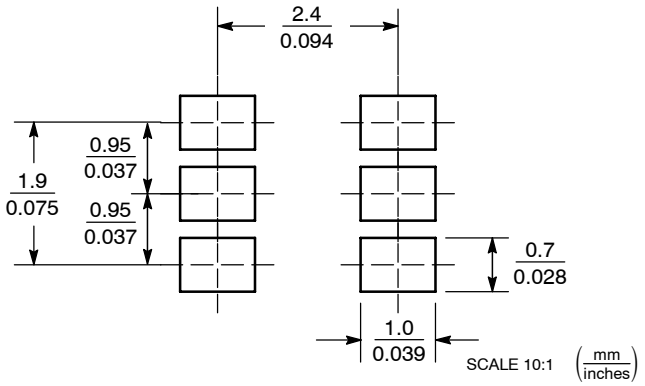



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| | MILLIMETERS | | | INCHES | | |
|---|---|---|---|---|---|---|
| DIM | 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 |
| $H_E$ | 2.50 | 2.75 | 3.00 | 0.099 | 0.108 | 0.118 |
| θ | 0° | – | 10° | 0° | – | 10° |

STYLE 1:
PIN 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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