# NTGS3455T1

# MOSFET
# -3.5 Amps, -30 Volts
## P−Channel TSOP−6

**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

**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<br>Junction−to−Ambient (Note 1.)<br>Total Power Dissipation @ $T_A$ = 25°C<br>Drain Current<br>− Continuous @ $T_A$ = 25°C<br>− Pulsed Drain Current ($T_p$ < 10 μS)<br>Maximum Operating Power Dissipation<br>Maximum Operating Drain Current | <br>$R_{\theta JA}$<br>$P_d$<br><br>$I_D$<br>$I_{DM}$<br>$P_d$<br>$I_D$ | <br>62.5<br>2.0<br>−3.5<br><br>−20<br>1.0<br>−2.5 | <br>°C/W<br>Watts<br>Amps<br><br>Amps<br>Watts<br>Amps |
| Thermal Resistance<br>Junction−to−Ambient (Note 2.)<br>Total Power Dissipation @ $T_A$ = 25°C<br>Drain Current<br>− Continuous @ $T_A$ = 25°C<br>− Pulsed Drain Current ($T_p$ < 10 μS)<br>Maximum Operating Power Dissipation<br>Maximum Operating Drain Current | <br>$R_{\theta JA}$<br>$P_d$<br><br>$I_D$<br>$I_{DM}$<br>$P_d$<br>$I_D$ | <br>128<br>1.0<br><br>−2.5<br>−14<br>0.5<br>−1.75 | <br>°C/W<br>Watts<br><br>Amps<br>Amps<br>Watts<br>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 |

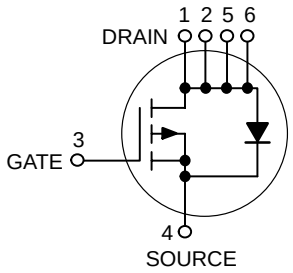
1. Mounted onto a 2″ square FR−4 board (1″ sq. 2 oz. cu. 0.06″ thick single sided), t < 5.0 seconds.
2. Mounted onto a 2″ square FR−4 board (1″ sq. 2 oz. cu. 0.06″ thick single sided), operating to steady state.

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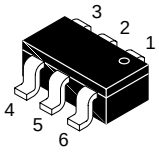
**http://onsemi.com**

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

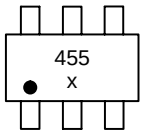
**P−Channel**




**MARKING DIAGRAM**

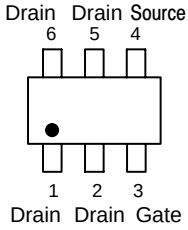



**TSOP−6**
**CASE 318G**
**STYLE 1**




455 = Device Code
x = Date Code

**PIN ASSIGNMENT**




**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.

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**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 is mandatory.

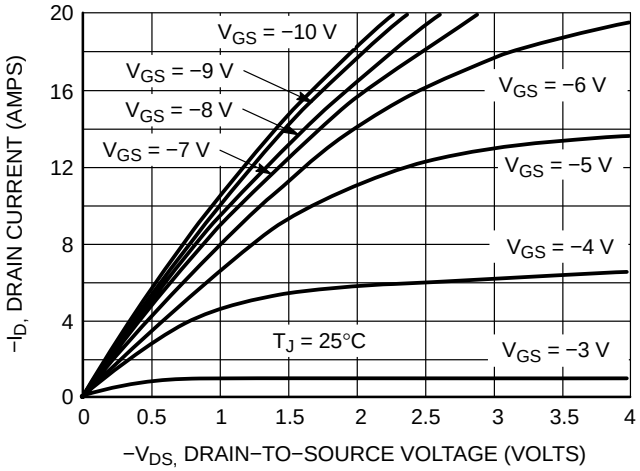



**Figure 1. On−Region Characteristics**

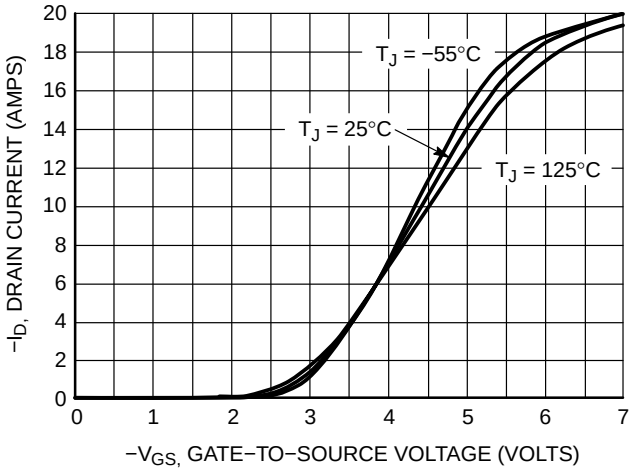



**Figure 2. Transfer Characteristics**

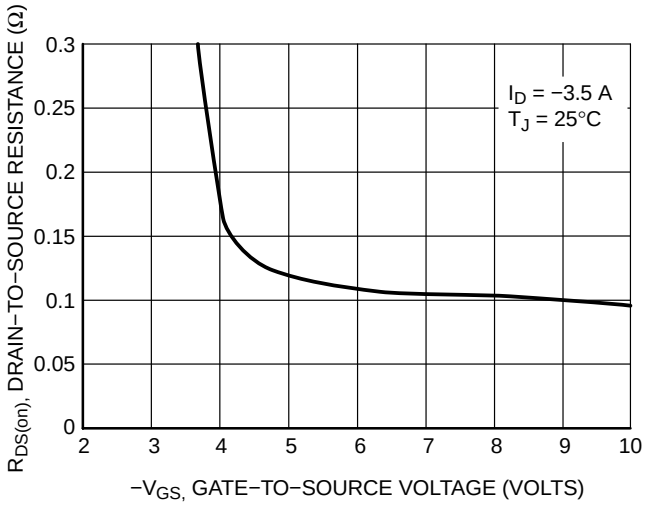



**Figure 3. On−Resistance vs. Gate−to−Source Voltage**

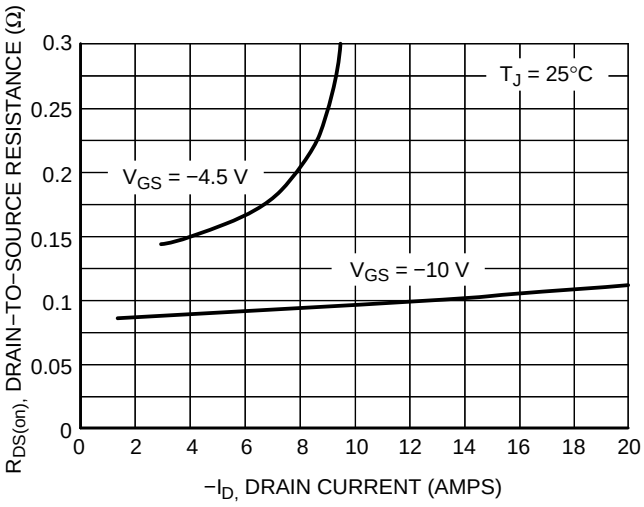



**Figure 4. On−Resistance vs. Drain Current and Gate Voltage**

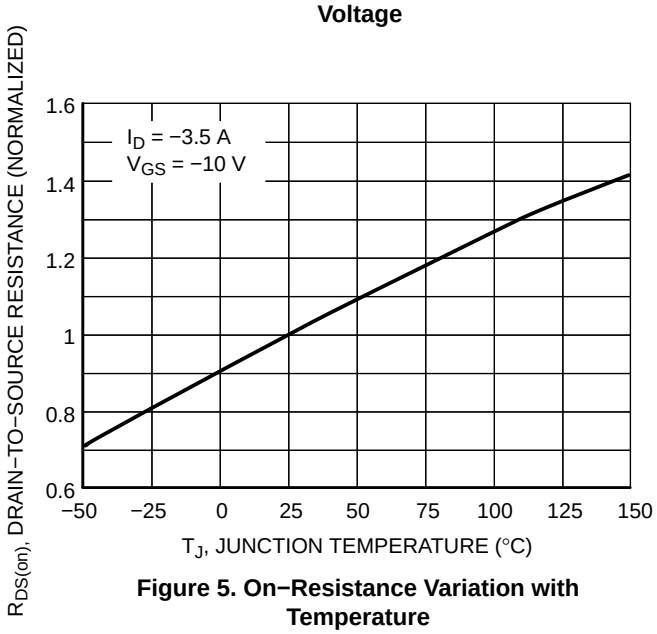



**Figure 5. On−Resistance Variation with Temperature**

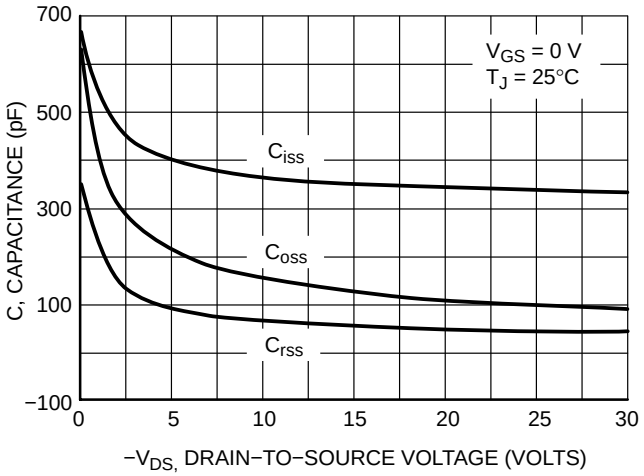



**Figure 6. Capacitance Variation**

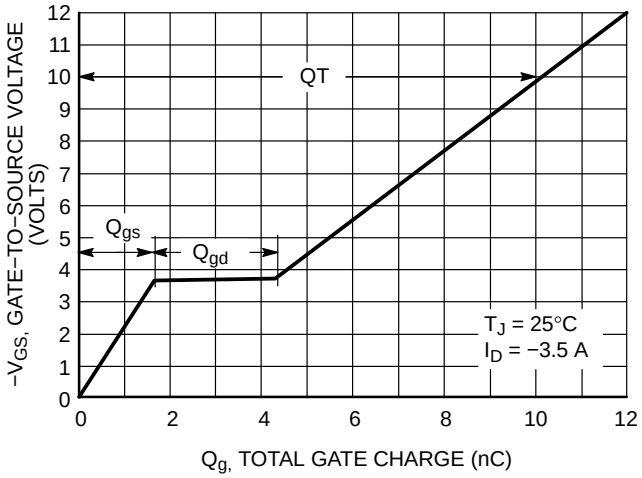



**Figure 7. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge**

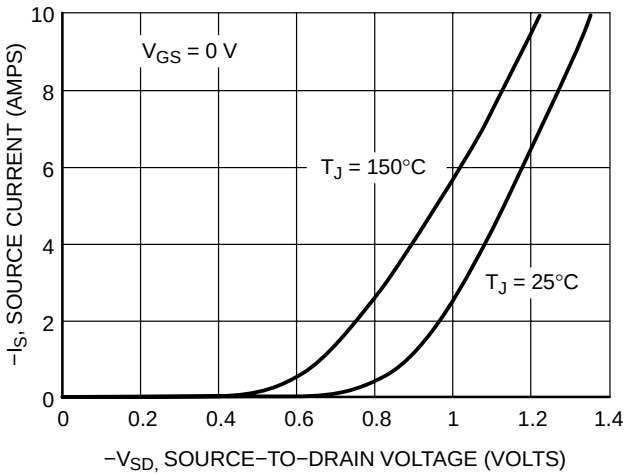



**Figure 8. Diode Forward Voltage vs. Current**

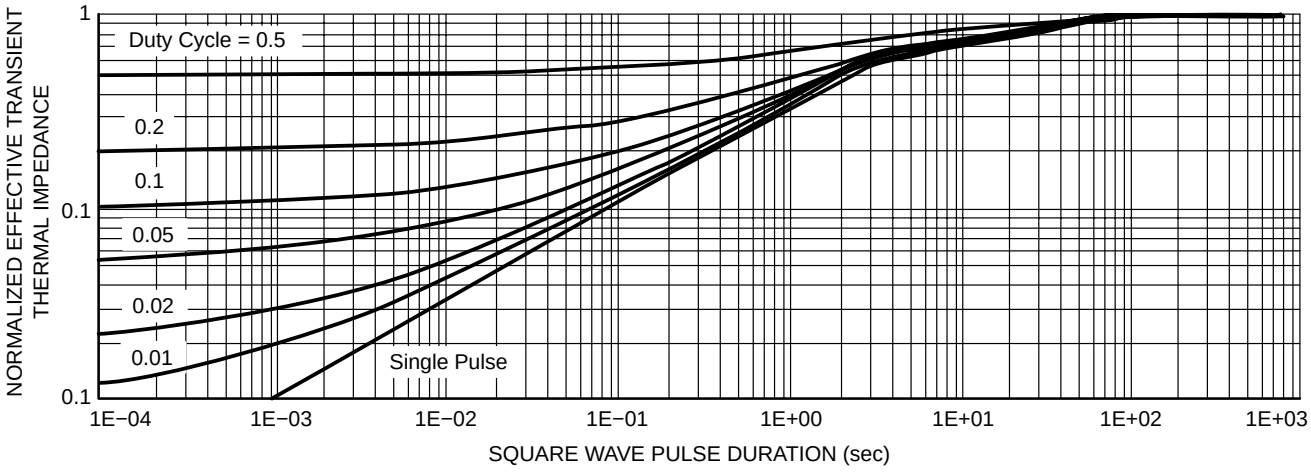



**Figure 9. Normalized Thermal Transient Impedance, Junction−to−Ambient**

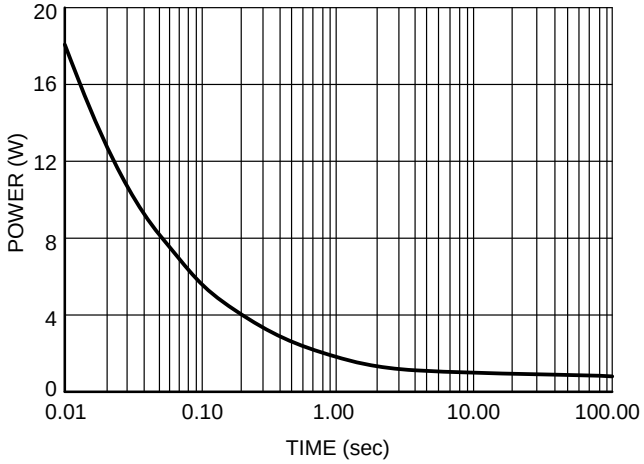
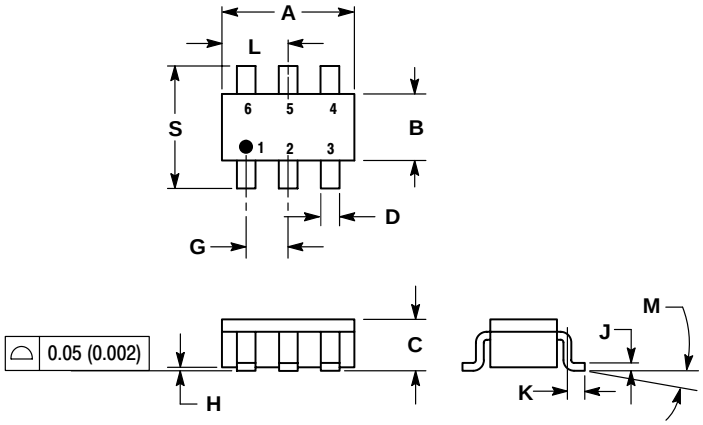



**Figure 10. Single Pulse Power**

## PACKAGE DIMENSIONS

**TSOP−6**
CASE 318G−02
ISSUE G




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.

| | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| DIM | 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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