

NTF3055L175

Preferred Device

Power MOSFET 2.0 A, 60 V, Logic Level

N-Channel SOT-223

Designed for low voltage, high speed switching applications in power supplies, converters and power motor controls and bridge circuits.

Features

- Pb-Free Packages are Available

Applications

- Power Supplies
- Converters
- Power Motor Controls
- Bridge Circuits

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

| Rating | Symbol | Value | Unit |
|---|------------------------------------|----------------------|-------------------------------|
| Drain-to-Source Voltage | V_{DS} | 60 | Vdc |
| Drain-to-Gate Voltage ($R_{GS} = 1.0\text{ M}\Omega$) | V_{DGR} | 60 | Vdc |
| Gate-to-Source Voltage Continuous Non-repetitive ($t_p \leq 10\text{ ms}$) | V_{GS} | ± 15 ± 20 | Vdc Vpk |
| Drain Current Continuous @ $T_A = 25^\circ\text{C}$ Continuous @ $T_A = 100^\circ\text{C}$ Single Pulse ($t_p \leq 10\text{ }\mu\text{s}$) | I_D I_D I_{DM} | 2.0 1.2 6.0 | Adc Adc Apk |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1) Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 2) Derate above 25°C | P_D | 2.1 1.3 0.014 | W W W/ $^\circ\text{C}$ |
| Operating and Storage Temperature Range | T_J, T_{stg} | -55 to 175 | $^\circ\text{C}$ |
| Single Pulse Drain-to-Source Avalanche Energy – Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 25\text{ Vdc}$, $V_{GS} = 5.0\text{ Vdc}$, $I_{L(pk)} = 3.6\text{ A}$, $L = 10\text{ mH}$, $V_{DS} = 60\text{ Vdc}$) | E_{AS} | 65 | mJ |
| Thermal Resistance Junction-to-Ambient (Note 1) Junction-to-Ambient (Note 2) | $R_{\theta JA}$ $R_{\theta JA}$ | 72.3 114 | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds | T_L | 260 | $^\circ\text{C}$ |

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.

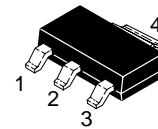
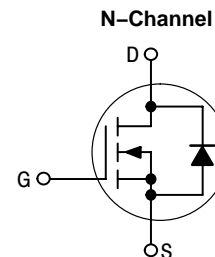
1. When surface mounted to an FR4 board using 1" pad size, 1 oz. (Cu. Area 0.995 in²).
2. When surface mounted to an FR4 board using minimum recommended pad size, 2–2.4 oz. (Cu. Area 0.272 in²).



ON Semiconductor®

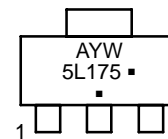
<http://onsemi.com>

2.0 AMPERES, 60 VOLTS
 $R_{DS(on)} = 175\text{ m}\Omega$



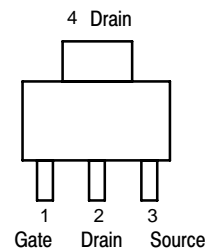
SOT-223
CASE 318E
STYLE 3

MARKING DIAGRAM



A = Assembly Location
Y = Year
W = Work Week
5L175 = Device Code
▪ = Pb-Free Package
(Note: Microdot may be in either location)

PIN ASSIGNMENT



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

NTF3055L175

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | |
|---|----------------------|---------|--------------|-----------|--------------|
| Drain-to-Source Breakdown Voltage (Note 3) (V _{GS} = 0 Vdc, I _D = 250 μAdc) Temperature Coefficient (Positive) | V _{(BR)DSS} | 60 – | 72.8 74.4 | – – | Vdc mV/°C |
| Zero Gate Voltage Drain Current (V _{DS} = 60 Vdc, V _{GS} = 0 Vdc) (V _{DS} = 60 Vdc, V _{GS} = 0 Vdc, T _J = 150°C) | I _{DSS} | – – | – – | 1.0 10 | μAdc |
| Gate-Body Leakage Current (V _{GS} = ± 15 Vdc, V _{DS} = 0 Vdc) | I _{GSS} | – | – | ± 100 | nAdc |

ON CHARACTERISTICS (Note 3)

| | | | | | |
|---|---------------------|----------|--------------|-----------|--------------|
| Gate Threshold Voltage (Note 3) (V _{DS} = V _{GS} , I _D = 250 μAdc) Threshold Temperature Coefficient (Negative) | V _{GS(th)} | 1.0 – | 1.7 4.2 | 2.0 – | Vdc mV/°C |
| Static Drain-to-Source On-Resistance (Note 3) (V _{GS} = 5.0 Vdc, I _D = 1.0 Adc) | R _{DS(on)} | – | 155 | 175 | mΩ |
| Static Drain-to-Source On-Resistance (Note 3) (V _{GS} = 5.0 Vdc, I _D = 2.0 Adc) (V _{GS} = 5.0 Vdc, I _D = 1.0 Adc, T _J = 150°C) | V _{DS(on)} | – | 0.32 0.57 | 0.42 – | Vdc |
| Forward Transconductance (Note 3) (V _{DS} = 8.0 Vdc, I _D = 1.5 Adc) | g _{fs} | – | 3.2 | – | Mhos |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|----------------------|--|------------------|---|-----|-----|----|
| Input Capacitance | (V _{DS} = 25 Vdc, V _{GS} = 0 V, f = 1.0 MHz) | C _{iss} | – | 194 | 270 | pF |
| Output Capacitance | | C _{oss} | – | 70 | 100 | |
| Transfer Capacitance | | C _{rss} | – | 29 | 40 | |

SWITCHING CHARACTERISTICS (Note 4)

| | | | | | | |
|---------------------|---|---------------------|-----|------|----|----|
| Turn-On Delay Time | (V _{DD} = 30 Vdc, I _D = 2.0 Adc, V _{GS} = 5.0 Vdc, R _G = 9.1 Ω) (Note 3) | t _{d(on)} | – | 10.2 | 20 | ns |
| Rise Time | | t _r | – | 21 | 40 | |
| Turn-Off Delay Time | | t _{d(off)} | – | 14.3 | 30 | |
| Fall Time | | t _f | – | 15.3 | 30 | |
| Gate Charge | (V _{DS} = 48 Vdc, I _D = 2.0 Adc, V _{GS} = 5.0 Vdc) (Note 3) | Q _T | – | 5.1 | 10 | nC |
| | Q ₁ | – | 1.4 | – | | |
| | Q ₂ | – | 2.5 | – | | |

SOURCE-DRAIN DIODE CHARACTERISTICS

| | | | | | | |
|--------------------------------|--|-----------------|--------|--------------|----------|-----|
| Forward On-Voltage | (I _S = 2.0 Adc, V _{GS} = 0 Vdc) (I _S = 2.0 Adc, V _{GS} = 0 Vdc, T _J = 150°C) (Note 3) | V _{SD} | – – | 0.84 0.68 | 1.0 – | Vdc |
| Reverse Recovery Time | (I _S = 2.0 Adc, V _{GS} = 0 Vdc, dI _S /dt = 100 A/μs) (Note 3) | t _{rr} | – | 28.3 | – | ns |
| | | t _a | – | 15.6 | – | |
| | | t _b | – | 12.7 | – | |
| Reverse Recovery Stored Charge | | Q _{RR} | – | 0.027 | – | μC |

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
4. Switching characteristics are independent of operating junction temperatures.

NTF3055L175

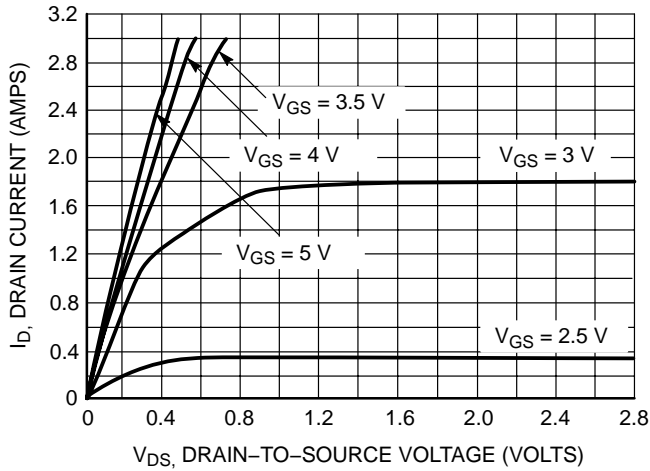


Figure 1. On-Region Characteristics

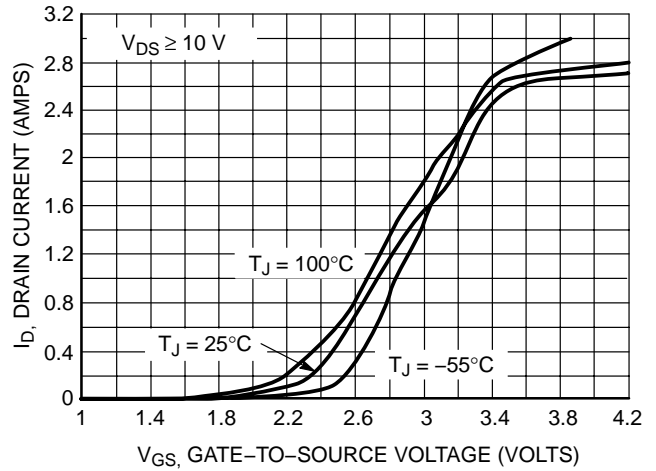


Figure 2. Transfer Characteristics

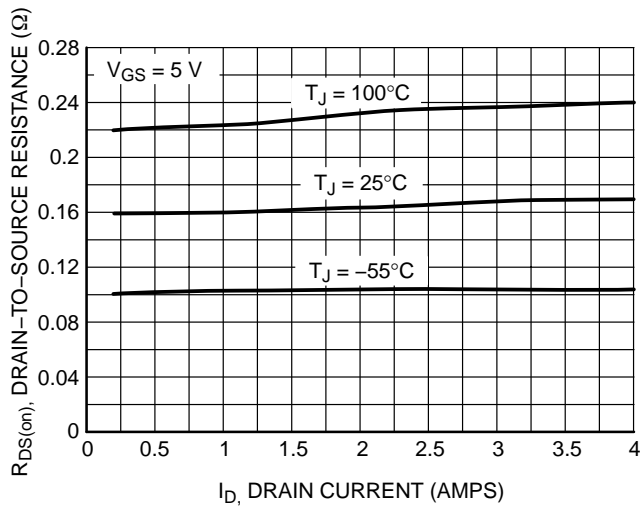


Figure 3. On-Resistance versus Gate-to-Source Voltage

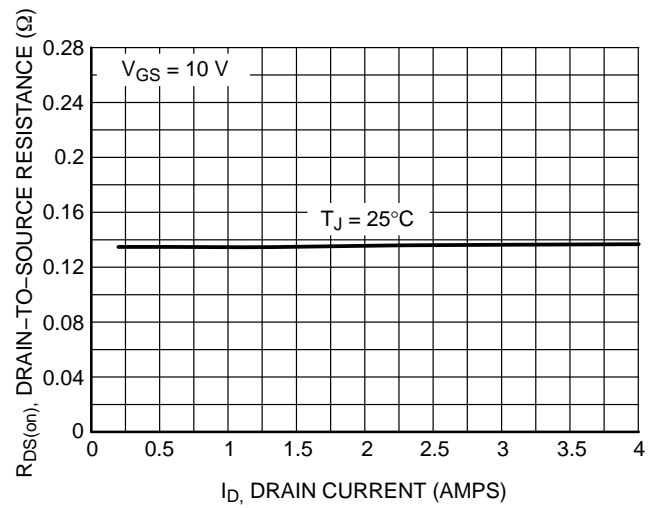


Figure 4. On-Resistance versus Drain Current and Gate Voltage

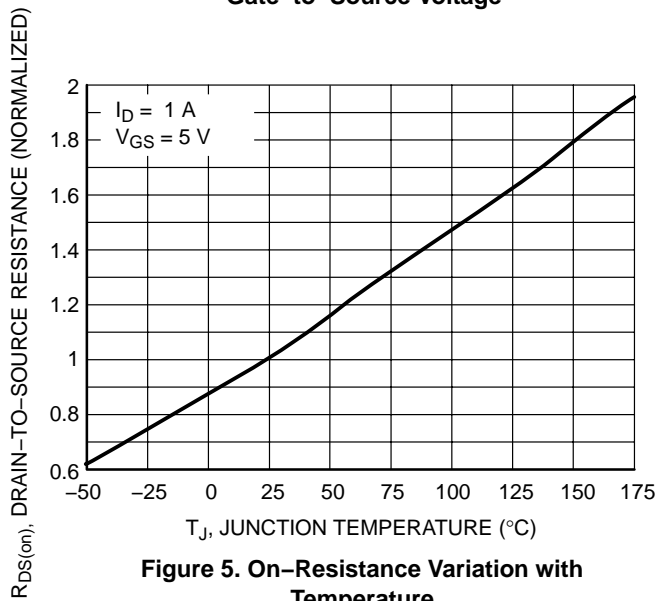


Figure 5. On-Resistance Variation with Temperature

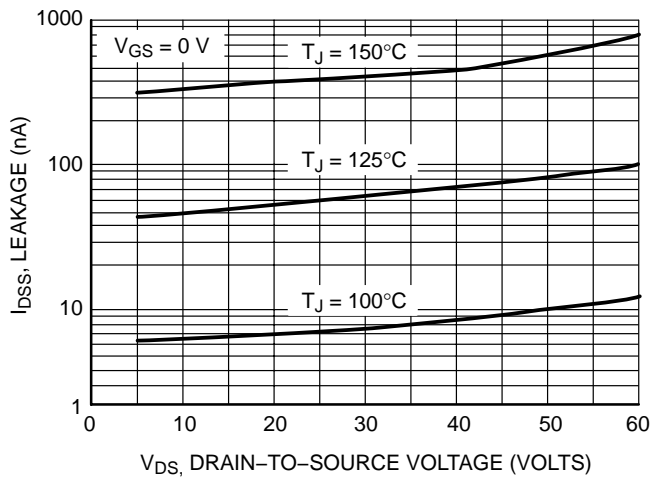


Figure 6. Drain-to-Source Leakage Current versus Voltage

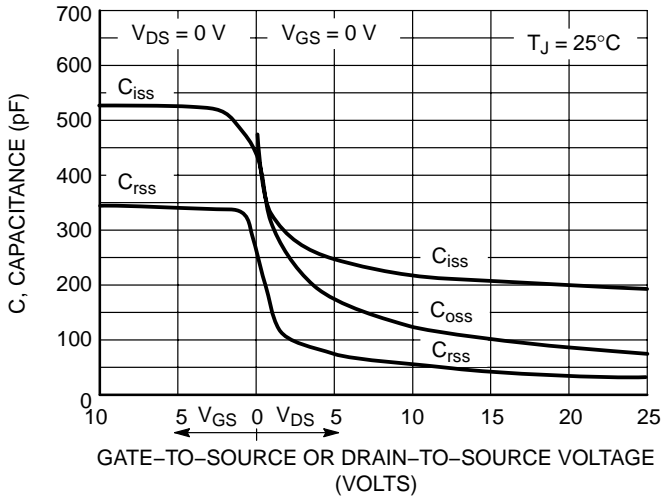


Figure 7. Capacitance Variation

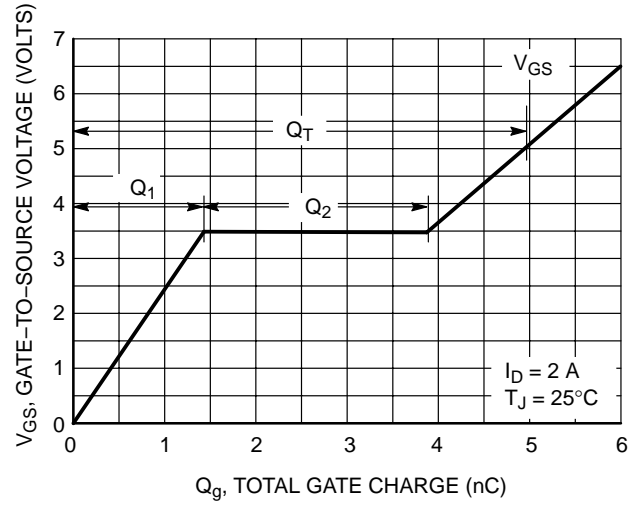


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

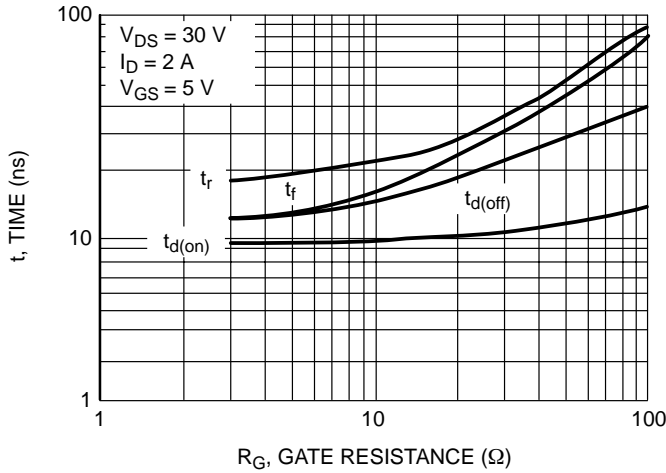


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

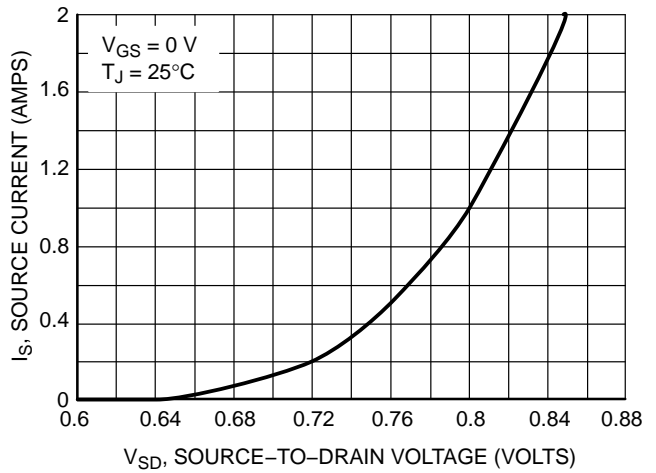


Figure 10. Diode Forward Voltage versus Current

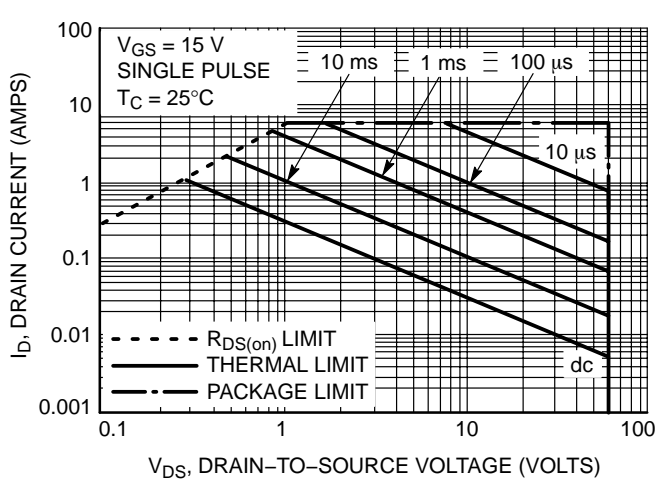


Figure 11. Maximum Rated Forward Biased Safe Operating Area

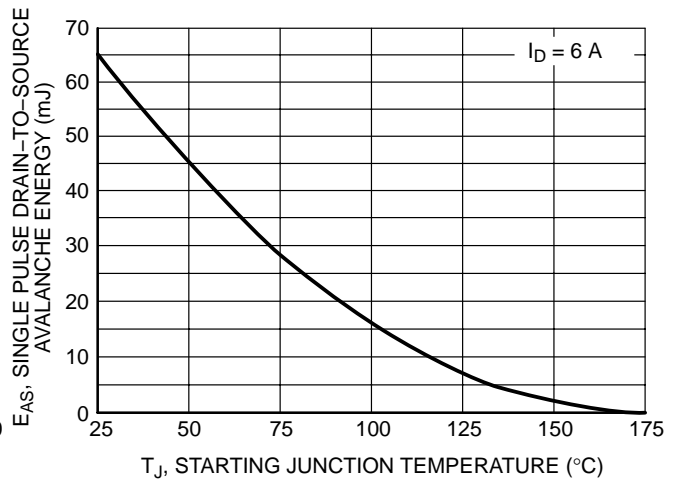


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

NTF3055L175

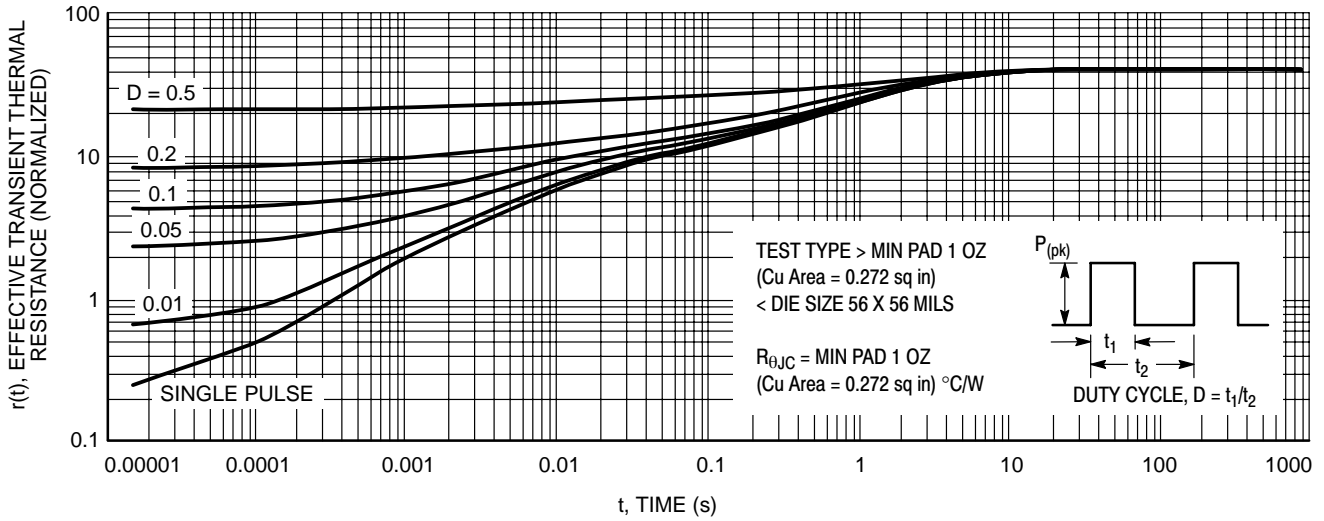


Figure 13. Thermal Response

ORDERING INFORMATION

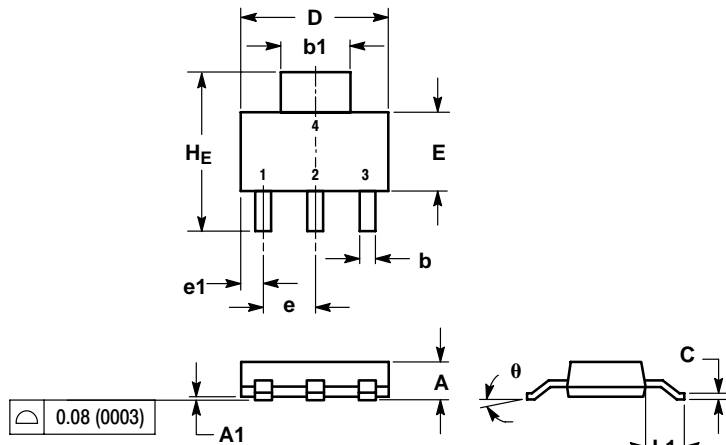
| Device | Package | Shipping† |
|-----------------|-------------------------------|--------------------|
| NTF3055L175T1 | SOT-223 (TO-261) | 1000 / Tape & Reel |
| NTF3055L175T1G | SOT-223 (TO-261) (Pb-Free) | |
| NTF3055L175T3 | SOT-223 (TO-261) | 4000 / Tape & Reel |
| NTF3055L175T3G | SOT-223 (TO-261) (Pb-Free) | |
| NTF3055L175T3LF | SOT-223 (TO-261) | |

†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.

NTF3055L175

PACKAGE DIMENSIONS

SOT-223 (TO-261) CASE 318E-04 ISSUE L

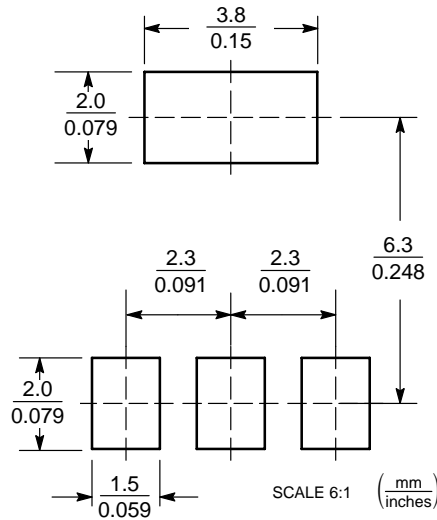


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 1.50 | 1.63 | 1.75 | 0.060 | 0.064 | 0.068 |
| A1 | 0.02 | 0.06 | 0.10 | 0.001 | 0.002 | 0.004 |
| b | 0.60 | 0.75 | 0.89 | 0.024 | 0.030 | 0.035 |
| b1 | 2.90 | 3.06 | 3.20 | 0.115 | 0.121 | 0.126 |
| c | 0.24 | 0.29 | 0.35 | 0.009 | 0.012 | 0.014 |
| D | 6.30 | 6.50 | 6.70 | 0.249 | 0.256 | 0.263 |
| E | 3.30 | 3.50 | 3.70 | 0.130 | 0.138 | 0.145 |
| e | 2.20 | 2.30 | 2.40 | 0.087 | 0.091 | 0.094 |
| e1 | 0.85 | 0.94 | 1.05 | 0.033 | 0.037 | 0.041 |
| L1 | 1.50 | 1.75 | 2.00 | 0.060 | 0.069 | 0.078 |
| H | 6.70 | 7.00 | 7.30 | 0.264 | 0.276 | 0.287 |
| θ | 0° | - | 10° | 0° | - | 10° |

- STYLE 3:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. 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.

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85062-1312 USA
Phone: 480-829-7710 or 800-344-3860 Toll Free USA/Canada
Fax: 480-829-7709 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your local Sales Representative.