

NTF3055L108, NVF3055L108

Power MOSFET

3.0 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

- NVF 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 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 | V_{GS} | ± 15 | Vdc |
| – Continuous | | ± 20 | Vpk |
| – Non-repetitive ($t_p \leq 10\text{ ms}$) | | | |
| Drain Current | I_D | 3.0 | Adc |
| – Continuous @ $T_A = 25^\circ\text{C}$ (Note 1) | | 1.4 | Apk |
| – Continuous @ $T_A = 100^\circ\text{C}$ (Note 2) | | 9.0 | |
| – Single Pulse ($t_p \leq 10\text{ }\mu\text{s}$) | I_{DM} | | |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1) | P_D | 2.1 | Watts |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 2) | | 1.3 | Watts |
| Derate above 25°C | | 0.014 | 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 $T_J = 25^\circ\text{C}$ ($V_{DD} = 25\text{ Vdc}$, $V_{GS} = 5.0\text{ Vdc}$, $I_{L(pk)} = 7.0\text{ Apk}$, $L = 3.0\text{ mH}$, $V_{DS} = 60\text{ Vdc}$) | E_{AS} | 74 | mJ |
| Thermal Resistance | $R_{\theta JA}$ | 72.3 | $^\circ\text{C/W}$ |
| – Junction-to-Ambient (Note 1) | | 114 | |
| – Junction-to-Ambient (Note 2) | | | |
| Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds | T_L | 260 | $^\circ\text{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

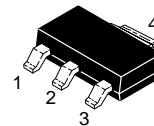
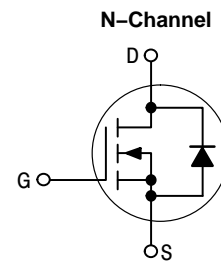


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3.0 A, 60 V

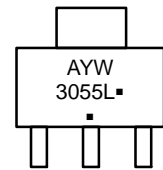
$R_{DS(on)} = 120\text{ m}\Omega$



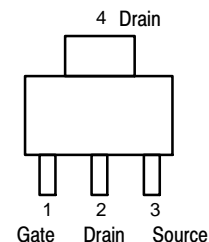
SOT-223
CASE 318E
STYLE 3

MARKING DIAGRAM

3055L = Device Code
A = Assembly Location
Y = Year
W = Work Week
■ = 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.

NTF3055L108, NVF3055L108

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

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

OFF CHARACTERISTICS

| | | | | | |
|---|---------------|---------|----------|-----------|-----------------------------|
| Drain-to-Source Breakdown Voltage (Note 3) ($V_{GS} = 0\text{ Vdc}$, $I_D = 250\text{ }\mu\text{Adc}$) Temperature Coefficient (Positive) | $V_{(BR)DSS}$ | 60 – | 68 68 | – – | Vdc mV/ $^\circ\text{C}$ |
| Zero Gate Voltage Drain Current ($V_{DS} = 60\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) ($V_{DS} = 60\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $T_J = 150^\circ\text{C}$) | I_{DSS} | – – | – – | 1.0 10 | μAdc |
| Gate-Body Leakage Current ($V_{GS} = \pm 15\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$) | I_{GSS} | – | – | ± 100 | nAdc |

ON CHARACTERISTICS (Note 3)

| | | | | | |
|---|--------------|----------|----------------|-----------|-----------------------------|
| Gate Threshold Voltage (Note 3) ($V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{Adc}$) Threshold Temperature Coefficient (Negative) | $V_{GS(th)}$ | 1.0 – | 1.68 4.6 | 2.0 – | Vdc mV/ $^\circ\text{C}$ |
| Static Drain-to-Source On-Resistance (Note 3) ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 1.5\text{ Adc}$) | $R_{DS(on)}$ | – | 92 | 120 | m Ω |
| Static Drain-to-Source On-Resistance (Note 3) ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 3.0\text{ Adc}$) ($V_{GS} = 5.0\text{ Vdc}$, $I_D = 1.5\text{ Adc}$, $T_J = 150^\circ\text{C}$) | $V_{DS(on)}$ | – | 0.290 0.250 | 0.43 – | Vdc |
| Forward Transconductance (Note 3) ($V_{DS} = 7.0\text{ Vdc}$, $I_D = 3.0\text{ Adc}$) | g_{fs} | – | 5.7 | – | Mhos |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|----------------------|---|-----------|---|-----|-----|----|
| Input Capacitance | $(V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0\text{ V}$, $f = 1.0\text{ MHz}$) | C_{iss} | – | 313 | 440 | pF |
| Output Capacitance | | C_{oss} | – | 112 | 160 | |
| Transfer Capacitance | | C_{rss} | – | 40 | 60 | |

SWITCHING CHARACTERISTICS (Note 4)

| | | | | | | |
|---------------------|---|--------------|---|-----|----|----|
| Turn-On Delay Time | $(V_{DD} = 30\text{ Vdc}$, $I_D = 3.0\text{ Adc}$, $V_{GS} = 5.0\text{ Vdc}$, $R_G = 9.1\text{ }\Omega$) (Note 3) | $t_{d(on)}$ | – | 11 | 25 | ns |
| Rise Time | | t_r | – | 35 | 70 | |
| Turn-Off Delay Time | | $t_{d(off)}$ | – | 22 | 45 | |
| Fall Time | | t_f | – | 27 | 60 | |
| Gate Charge | $(V_{DS} = 48\text{ Vdc}$, $I_D = 3.0\text{ Adc}$, $V_{GS} = 5.0\text{ Vdc}$) (Note 3) | Q_T | – | 7.6 | 15 | nC |
| | | Q_1 | – | 1.4 | – | |
| | | Q_2 | – | 4.0 | – | |

SOURCE-DRAIN DIODE CHARACTERISTICS

| | | | | | | |
|--------------------------------|--|-----------------|--------|--------------|----------|-----|
| Forward On-Voltage | (I _S = 3.0 Adc, V _{GS} = 0 Vdc) (I _S = 3.0 Adc, V _{GS} = 0 Vdc, T _J = 150°C) (Note 3) | V _{SD} | – – | 0.87 0.72 | 1.0 – | Vdc |
| Reverse Recovery Time | (I _S = 3.0 Adc, V _{GS} = 0 Vdc, dI _S /dt = 100 A/μs) (Note 3) | t _{rr} | – | 35 | – | ns |
| | | t _a | – | 21 | – | |
| | | t _b | – | 14 | – | |
| Reverse Recovery Stored Charge | | Q _{RR} | – | 0.044 | – | μC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

4. Switching characteristics are independent of operating junction temperatures.

TYPICAL ELECTRICAL CHARACTERISTICS

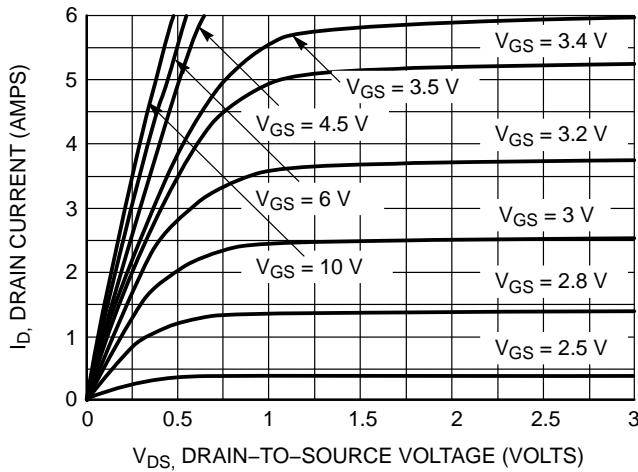


Figure 1. On-Region Characteristics

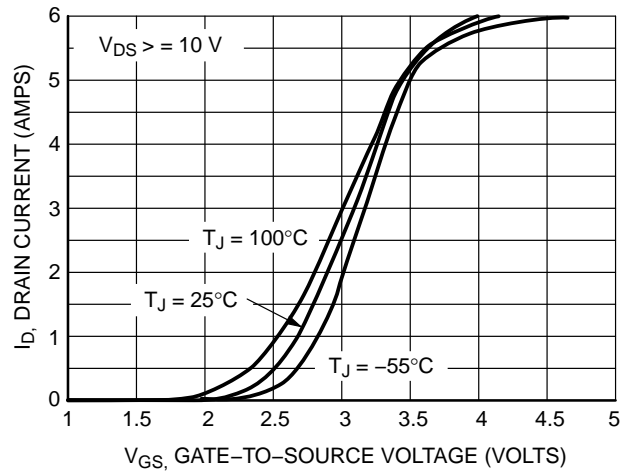


Figure 2. Transfer Characteristics

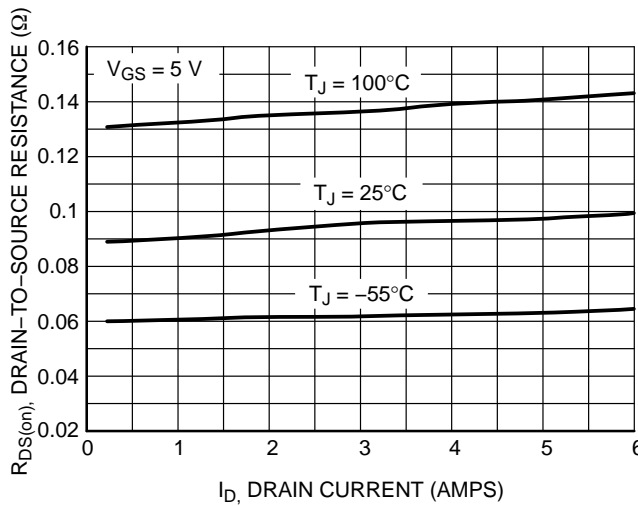


Figure 3. On-Resistance vs. Gate-to-Source Voltage

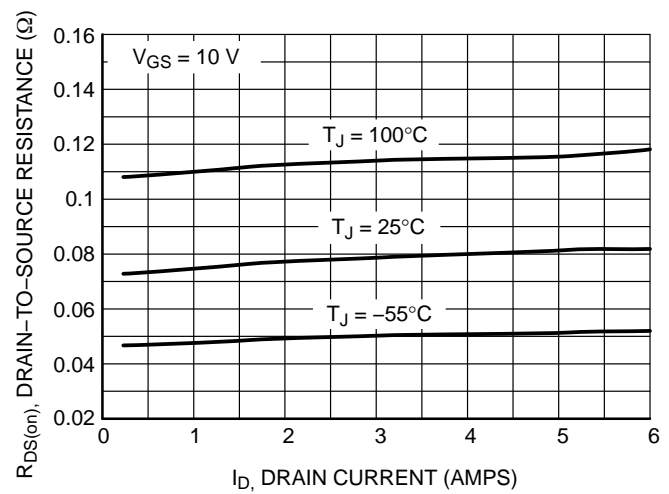


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

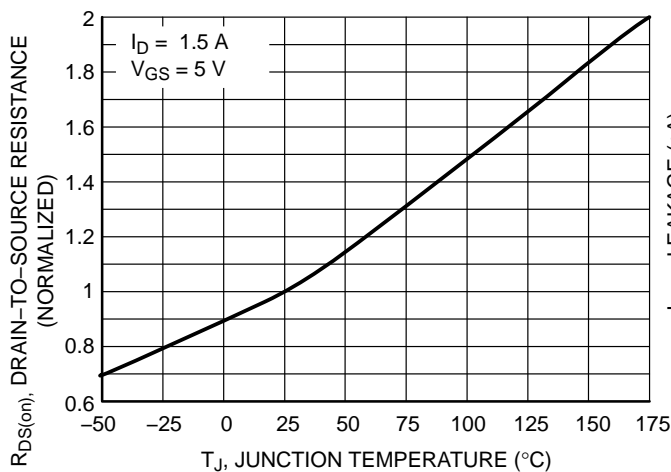


Figure 5. On-Resistance Variation with Temperature

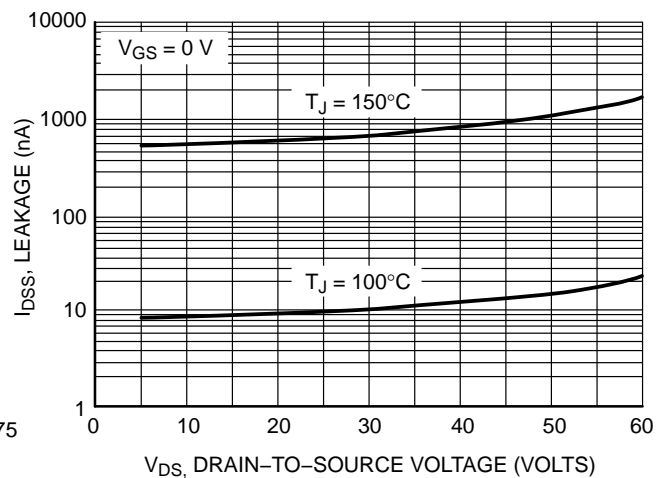


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL ELECTRICAL CHARACTERISTICS

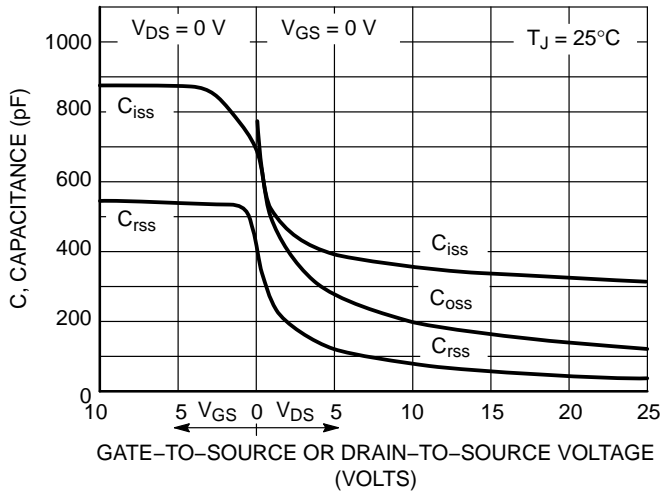


Figure 7. Capacitance Variation

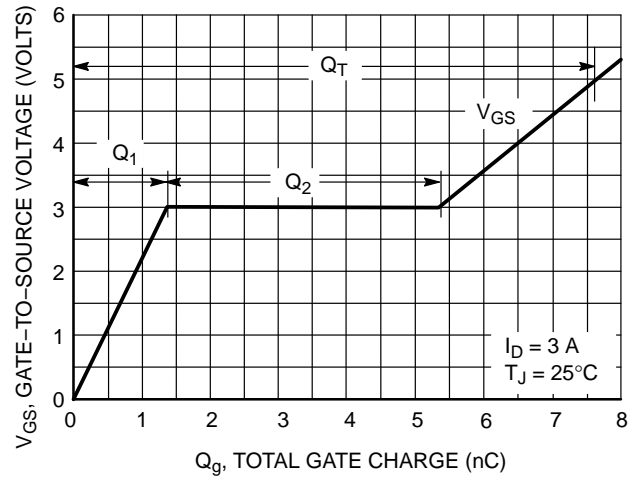


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

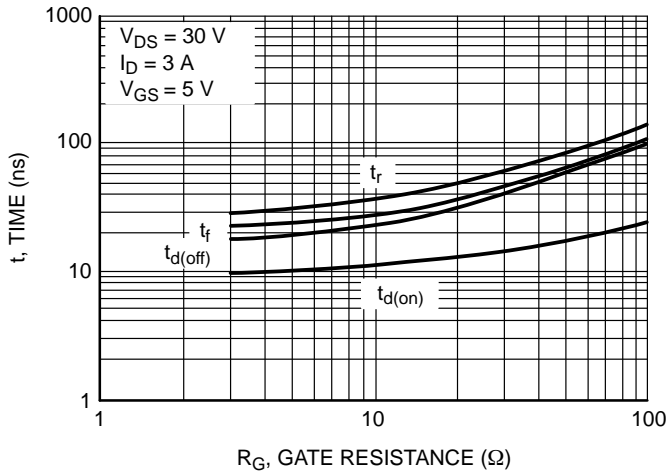


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

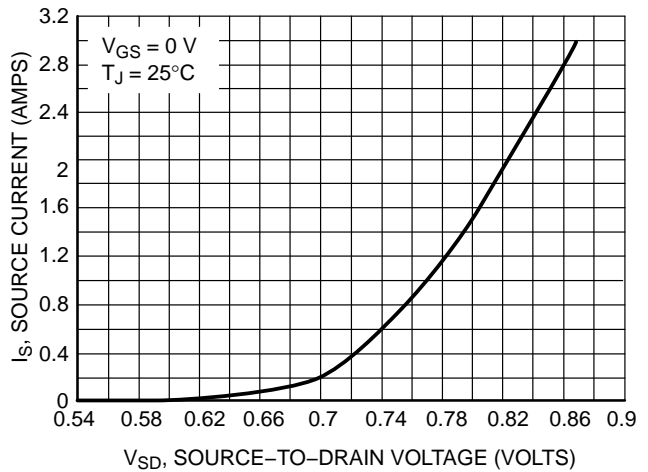


Figure 10. Diode Forward Voltage vs. Current

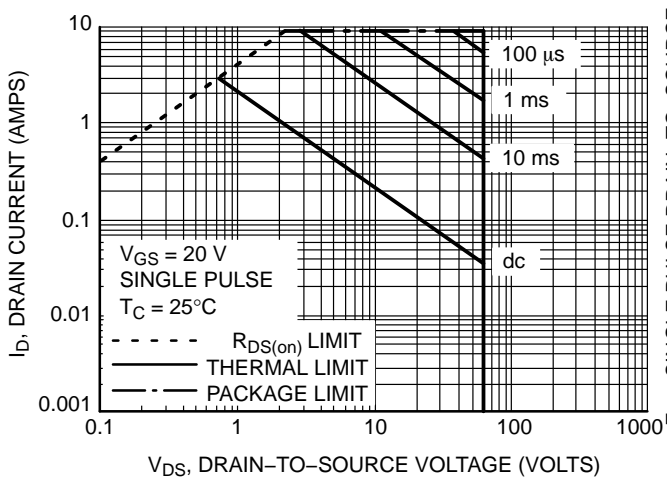


Figure 11. Maximum Rated Forward Biased Safe Operating Area

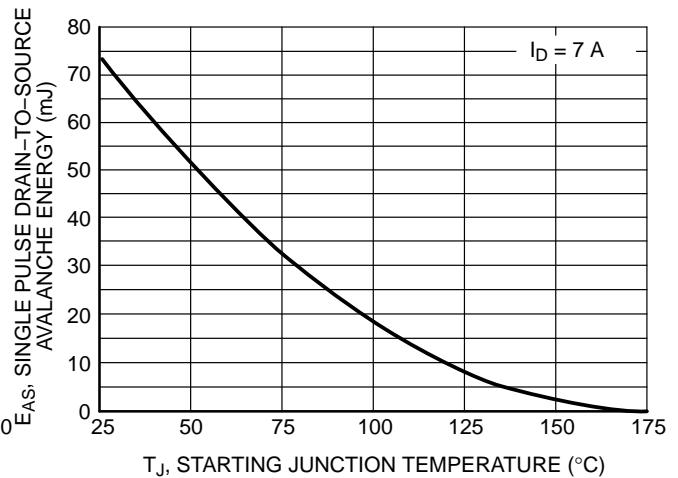


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

NTF3055L108, NVF3055L108

TYPICAL ELECTRICAL CHARACTERISTICS

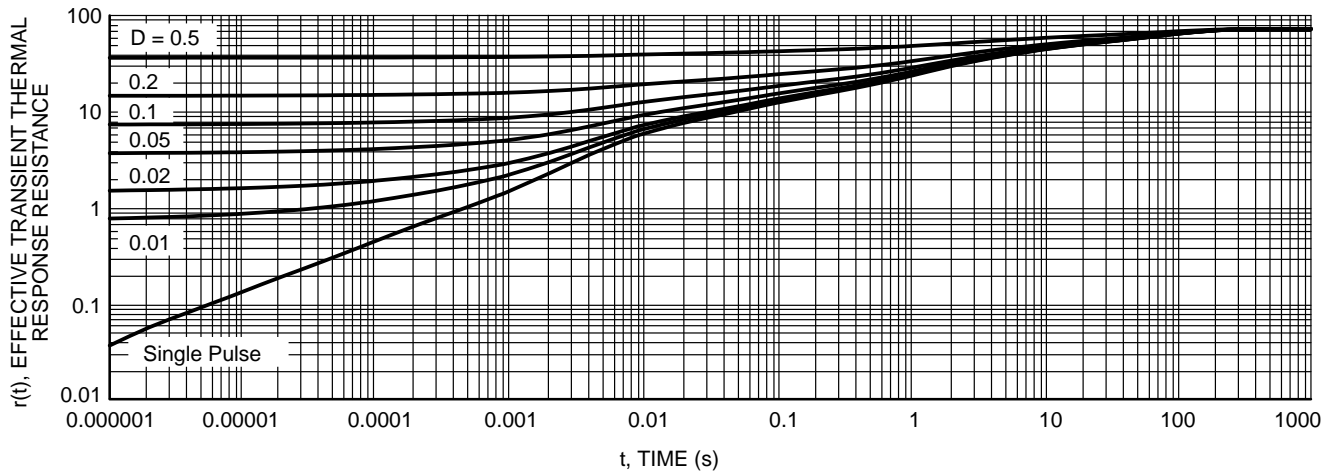


Figure 13. Thermal Response

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|----------------|-------------------------------|-----------------------|
| NTF3055L108T1G | SOT-223 (TO-261) (Pb-Free) | 1000 / Tape & Reel |
| NVF3055L108T1G | SOT-223 (TO-261) (Pb-Free) | 1000 / 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.

