

NTA7002N, NVTA7002N

MOSFET – Single, N-Channel, Small Signal, Gate ESD Protection, SC-75

30 V, 154 mA

Features

- Low Gate Charge for Fast Switching
- Small 1.6 x 1.6 mm Footprint
- ESD Protected Gate
- 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 Load Switch
- Level Shift
- Portable Applications such as Cell Phones, Media Players, Digital Cameras, PDA's, Video Games, Hand-Held Computers, etc.

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

| Parameter | Symbol | Value | Unit |
|---|---------------------------|------------|------------------|
| Drain-to-Source Voltage | V_{DS} | 30 | V |
| Gate-to-Source Voltage | V_{GS} | ± 10 | V |
| Continuous Drain Current (Note 1) | I_D | 154 | mA |
| Power Dissipation (Note 1) | P_D | 300 | mW |
| Pulsed Drain Current | $t_p \leq 10 \mu\text{s}$ | I_{DM} | 618 mA |
| Operating Junction and Storage Temperature | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |
| Continuous Source Current (Body Diode) | I_{SD} | 154 | mA |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | 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.

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Max | Unit |
|---|-----------------|-----|--------------------|
| Junction-to-Ambient – Steady State (Note 1) | $R_{\theta JA}$ | 416 | $^\circ\text{C/W}$ |

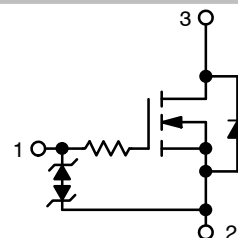
1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).



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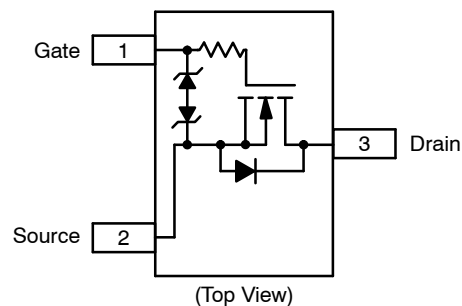
| $V_{(BR)DSS}$ | $R_{DS(on)}$ Typ @ V_{GS} | I_D MAX (Note 1) |
|---------------|--------------------------------|-----------------------|
| 30 V | 1.4 Ω @ 4.5 V | 154 mA |
| | 2.3 Ω @ 2.5 V | |



N-Channel

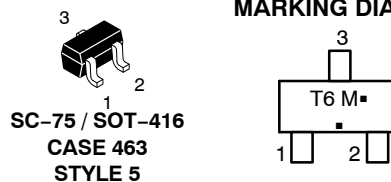
PIN CONNECTIONS

SC-75 (3-Leads)



(Top View)

MARKING DIAGRAM



T6 = Specific Device Code

M = Date Code

▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

NTA7002N, NVT A7002N

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|-----------|--------|----------------|-----|-----|-----|------|
|-----------|--------|----------------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|-----------------------------------|----------------------|---|----|--|------|----|
| Drain-to-Source Breakdown Voltage | V _{(BR)DSS} | V _{GS} = 0 V, I _D = 100 μA | 30 | | | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{GS} = 0 V, V _{DS} = 30 V | | | 1.0 | μA |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{GS} = 0 V, V _{DS} = 20 V, T = 85 °C | | | 1.0 | μA |
| Gate-to-Source Leakage Current | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±10 V | | | ±25 | μA |
| Gate-to-Source Leakage Current | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±5 V | | | ±1.0 | μA |
| Gate-to-Source Leakage Current | I _{GSS} | V _{DS} = 0 V, V _{GS} = ±5 V T = 85 °C | | | ±1.0 | μA |

ON CHARACTERISTICS (Note 2)

| | | | | | | |
|-------------------------------|---------------------|---|-----|-----|-----|----|
| Gate Threshold Voltage | V _{GS(TH)} | V _{DS} = V _{GS} , I _D = 100 μA | 0.5 | 1.0 | 1.5 | V |
| Drain-to-Source On Resistance | R _{DS(on)} | V _{GS} = 4.5 V, I _D = 154 mA | | 1.4 | 7.0 | Ω |
| | | V _{GS} = 2.5 V, I _D = 154 mA | | 2.3 | 7.5 | |
| Forward Transconductance | g _{FS} | V _{DS} = 3 V, I _D = 154 mA | | 80 | | mS |

CAPACITANCES

| | | | | | | |
|------------------------------|------------------|--|--|------|-----|----|
| Input Capacitance | C _{ISS} | V _{DS} = 5.0 V, f = 1 MHz, V _{GS} = 0 V | | 11.5 | 20 | pF |
| Output Capacitance | C _{OSS} | | | 10 | 15 | |
| Reverse Transfer Capacitance | C _{RSS} | | | 3.5 | 6.0 | |

SWITCHING CHARACTERISTICS (Note 3)

| | | | | | | |
|---------------------|---------------------|--|--|----|--|----|
| Turn-On Delay Time | t _{d(ON)} | V _{GS} = 4.5 V, V _{DS} = 5.0 V, I _D = 75 mA, R _G = 10 Ω | | 13 | | ns |
| Rise Time | t _r | | | 15 | | ns |
| Turn-Off Delay Time | t _{d(OFF)} | | | 98 | | |
| Fall Time | t _f | | | 60 | | |

DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | |
|-----------------------|-----------------|--|--|------|-----|---|
| Forward Diode Voltage | V _{SD} | V _{GS} = 0 V, I _S = 154 mA | | 0.77 | 0.9 | V |
|-----------------------|-----------------|--|--|------|-----|---|

2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES

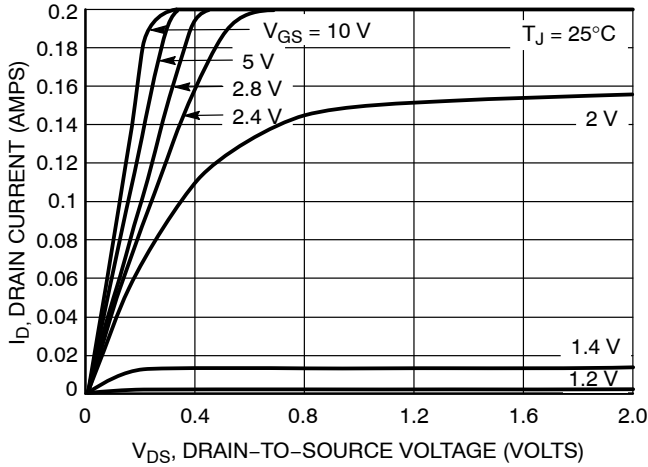


Figure 1. On-Region Characteristics

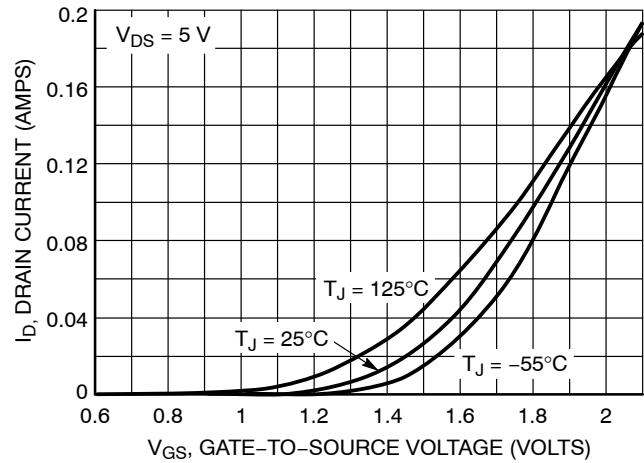


Figure 2. Transfer Characteristics

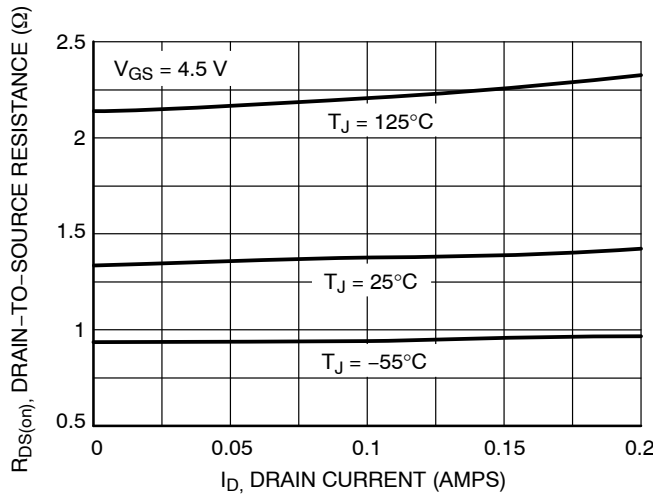


Figure 3. On-Resistance vs. Drain Current and Temperature

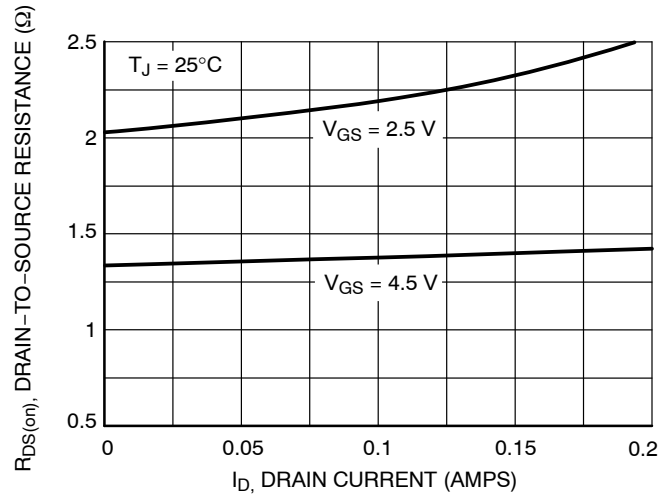


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

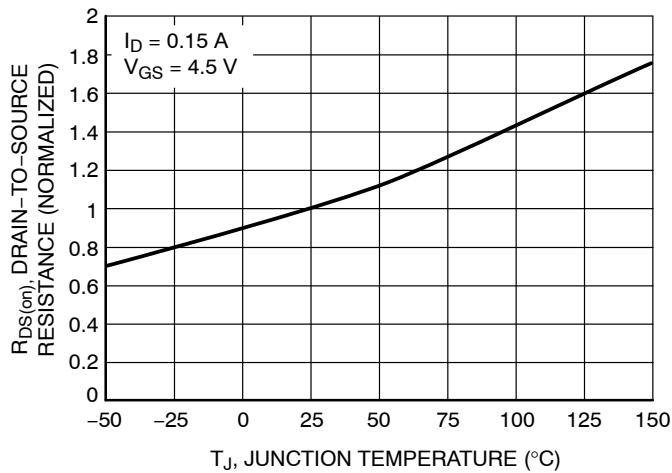


Figure 5. On-Resistance Variation with Temperature

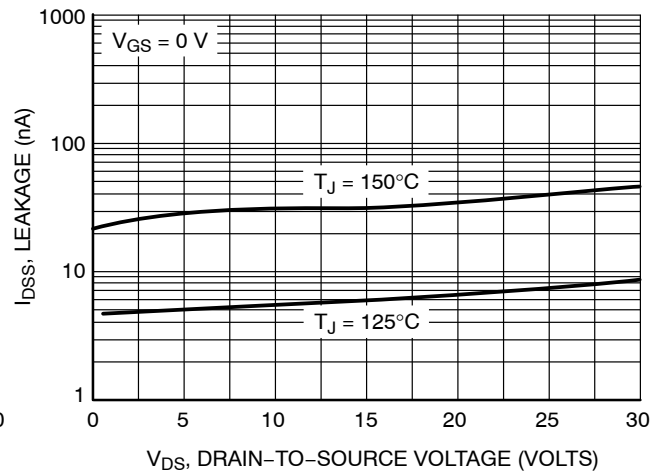
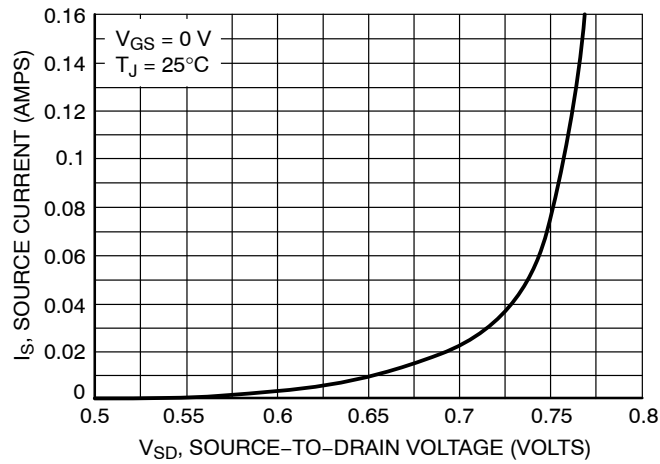
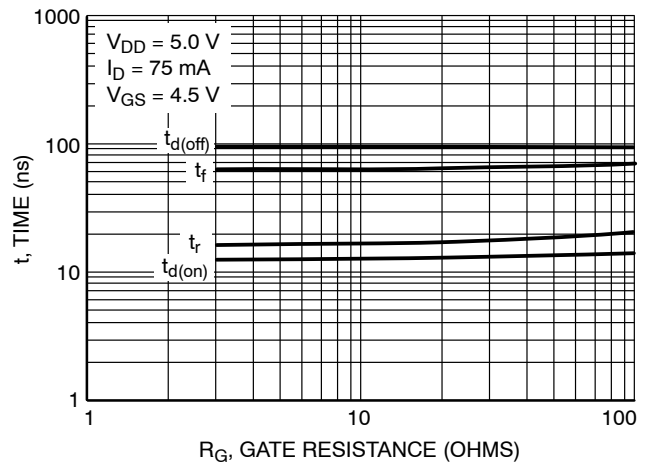
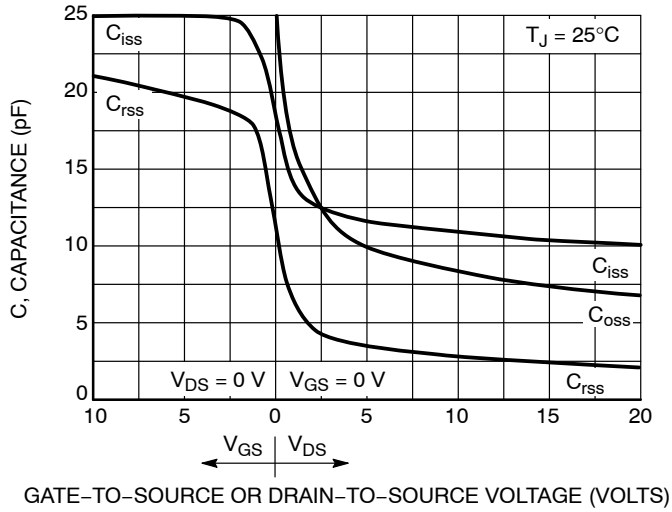


Figure 6. Drain-to-Source Leakage Current vs. Voltage

NTA7002N, NVTA7002N

TYPICAL PERFORMANCE CURVES



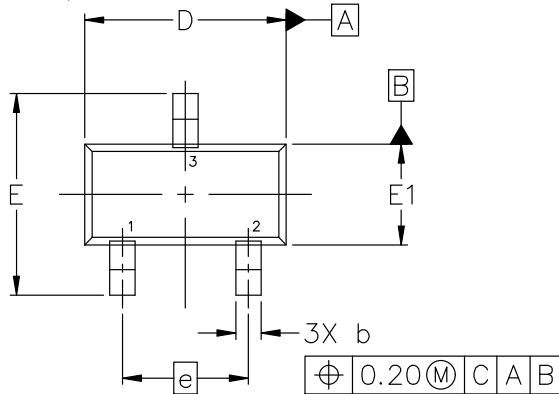
ORDERING INFORMATION

| Device | Package | Shipping [†] |
|--------------|--------------------|-----------------------|
| NTA7002NT1G | SC-75 (Pb-Free) | 3000 / Tape & Reel |
| NVTA7002NT1G | SC-75 (Pb-Free) | 3000 / Tape & Reel |

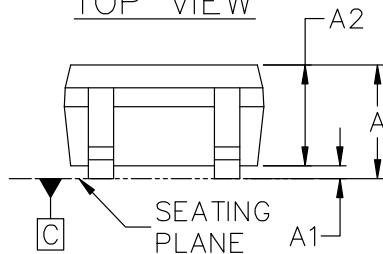
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

SC75-3 1.60x0.80x0.80, 1.00P
CASE 463
ISSUE H

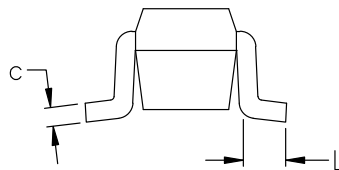
DATE 01 FEB 2024



TOP VIEW

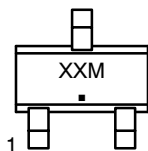


SIDE VIEW



END VIEW

GENERIC MARKING DIAGRAM*



XX = Specific Device Code
M = Date Code
▪ = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

STYLE 1:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

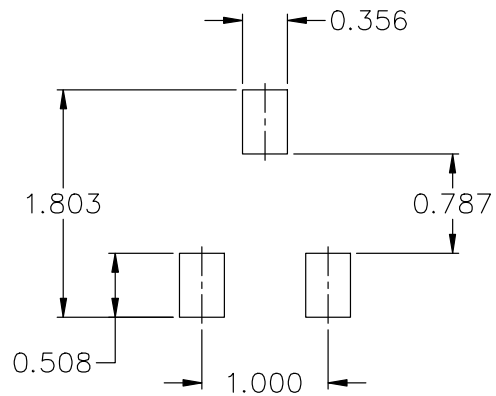
STYLE 2:
PIN 1. ANODE
2. N/C
3. CATHODE

STYLE 3:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. ANODE

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

| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.70 | 0.80 | 0.90 |
| A1 | 0.00 | 0.05 | 0.10 |
| A2 | 0.80 REF. | | |
| b | 0.15 | 0.20 | 0.30 |
| c | 0.10 | 0.15 | 0.25 |
| D | 1.55 | 1.60 | 1.65 |
| E | 1.50 | 1.60 | 1.70 |
| E1 | 0.70 | 0.80 | 0.90 |
| e | 1.00 BSC | | |
| L | 0.10 | 0.15 | 0.20 |



RECOMMENDED MOUNTING 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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