

# MOSFET – Single, N-Channel with ESD Protection, Small Signal, SC-75 and SC-89

20 V, 915 mA

NTA4153N, NTE4153N,  
NVA4153N, NVE4153N

## Features

- Low  $R_{DS(on)}$  Improving System Efficiency
- Low Threshold Voltage, 1.5 V Rated
- ESD Protected Gate
- NV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- Pb-Free Packages are Available

## Applications

- Load/Power Switches
- Power Supply Converter Circuits
- Battery Management
- Portables like Cell Phones, PDAs, Digital Cameras, Pagers, etc.

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

| Parameter                                                         |                        |                        | Symbol                               | Value      | Units |
|-------------------------------------------------------------------|------------------------|------------------------|--------------------------------------|------------|-------|
| Drain-to-Source Voltage                                           |                        |                        | V <sub>DSS</sub>                     | 20         | V     |
| Gate-to-Source Voltage                                            |                        |                        | V <sub>GS</sub>                      | ±6.0       | V     |
| Continuous Drain Current (Note 1)                                 | Steady State           | T <sub>A</sub> = 25 °C | I <sub>D</sub>                       | 915        | mA    |
|                                                                   |                        | T <sub>A</sub> = 85 °C |                                      | 660        |       |
| Power Dissipation (Note 1)                                        | Steady State           |                        | P <sub>D</sub>                       | 300        | mW    |
| Pulsed Drain Current                                              | t <sub>p</sub> = 10 μs |                        | I <sub>DM</sub>                      | 1.3        | A     |
| Operating Junction and Storage Temperature                        |                        |                        | T <sub>J</sub> ,<br>T <sub>STG</sub> | –55 to 150 | °C    |
| Continuous Source Current (Body Diode)                            |                        |                        | I <sub>S</sub>                       | 280        | mA    |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) |                        |                        | T <sub>L</sub>                       | 260        | °C    |

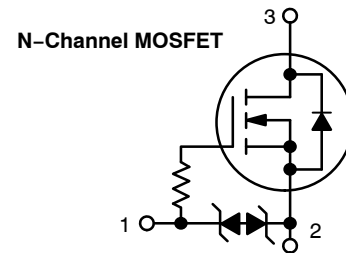
## THERMAL RESISTANCE RATINGS

| Parameter                                   | Symbol          | Value | Units              |
|---------------------------------------------|-----------------|-------|--------------------|
| Junction-to-Ambient – Steady State (Note 1) | $R_{\theta JA}$ | 416   | $^\circ\text{C/W}$ |
| SC-75 / SOT-416<br>SC-89                    |                 | 400   |                    |

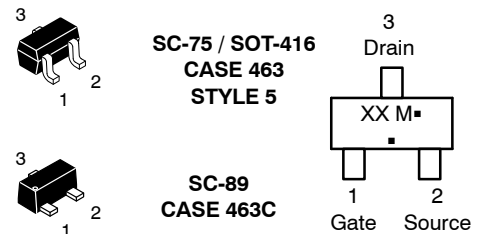
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

| $V_{(BR)DSS}$ | $R_{DS(on)}$ TYP       | $I_D$ MAX |
|---------------|------------------------|-----------|
| 20 V          | 0.127 $\Omega$ @ 4.5 V | 915 mA    |
|               | 0.170 $\Omega$ @ 2.5 V |           |
|               | 0.242 $\Omega$ @ 1.8 V |           |
|               | 0.500 $\Omega$ @ 1.5 V |           |

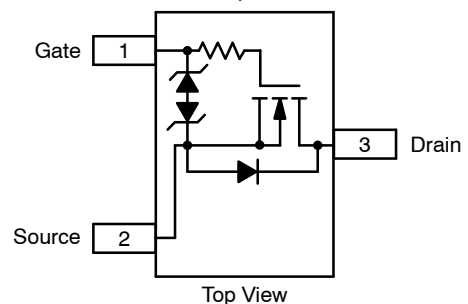


## MARKING DIAGRAM & PIN ASSIGNMENT



XX = Device Code  
M = Date Code\*  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)  
\* Date Code orientation may vary depending upon manufacturing location.

## SC-75, SC-89



## ORDERING INFORMATION

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

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 4.

# NTA4153N, NTE4153N, NVA4153N, NVE4153N

## ELECTRICAL CHARACTERISTICS ( $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise stated)

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

### OFF CHARACTERISTICS

|                                                           |                   |                                                     |    |      |           |                        |
|-----------------------------------------------------------|-------------------|-----------------------------------------------------|----|------|-----------|------------------------|
| Drain-to-Source Breakdown Voltage                         | $V_{(BR)DSS}$     | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 20 | 26   |           | V                      |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ |                                                     |    | 18.4 |           | mV/ $^{\circ}\text{C}$ |
| Zero Gate Voltage Drain Current                           | $I_{DSS}$         | $V_{GS} = 0\text{ V}, V_{DS} = 16\text{ V}$         |    |      | 100       | nA                     |
| Gate-to-Source Leakage Current                            | $I_{GSS}$         | $V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$    |    |      | $\pm 1.0$ | $\mu\text{A}$          |

### ON CHARACTERISTICS (Note 2)

|                                            |                  |                                                 |      |       |     |                        |
|--------------------------------------------|------------------|-------------------------------------------------|------|-------|-----|------------------------|
| Gate Threshold Voltage                     | $V_{GS(TH)}$     | $V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$ | 0.45 | 0.76  | 1.1 | V                      |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ |                                                 |      | -2.15 |     | mV/ $^{\circ}\text{C}$ |
| Drain-to-Source On Resistance              | $R_{DS(on)}$     | $V_{GS} = 4.5\text{ V}, I_D = 600\text{ mA}$    |      | 127   | 230 | m $\Omega$             |
|                                            |                  | $V_{GS} = 2.5\text{ V}, I_D = 500\text{ mA}$    |      | 170   | 275 |                        |
|                                            |                  | $V_{GS} = 1.8\text{ V}, I_D = 350\text{ mA}$    |      | 242   | 700 |                        |
|                                            |                  | $V_{GS} = 1.5\text{ V}, I_D = 40\text{ mA}$     |      | 500   | 950 |                        |
| Forward Transconductance                   | $g_{FS}$         | $V_{DS} = 10\text{ V}, I_D = 400\text{ mA}$     |      | 1.4   |     | S                      |

### CHARGES AND CAPACITANCES

|                              |              |                                                                   |  |      |  |    |
|------------------------------|--------------|-------------------------------------------------------------------|--|------|--|----|
| Input Capacitance            | $C_{ISS}$    | $V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 16\text{ V}$   |  | 110  |  | pF |
| Output Capacitance           | $C_{OSS}$    |                                                                   |  | 16   |  |    |
| Reverse Transfer Capacitance | $C_{RSS}$    |                                                                   |  | 12   |  |    |
| Total Gate Charge            | $Q_{G(TOT)}$ | $V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}, I_D = 0.2\text{ A}$ |  | 1.82 |  | nC |
| Threshold Gate Charge        | $Q_{G(TH)}$  |                                                                   |  | 0.2  |  |    |
| Gate-to-Source Charge        | $Q_{GS}$     |                                                                   |  | 0.3  |  |    |
| Gate-to-Drain Charge         | $Q_{GD}$     |                                                                   |  | 0.42 |  |    |

### SWITCHING CHARACTERISTICS (Note 3)

|                     |              |                                                                                           |  |     |  |    |
|---------------------|--------------|-------------------------------------------------------------------------------------------|--|-----|--|----|
| Turn-On Delay Time  | $t_{d(ON)}$  | $V_{GS} = 4.5\text{ V}, V_{DD} = 10\text{ V}, I_D = 0.2\text{ A}, R_G = 10\text{ }\Omega$ |  | 3.7 |  | ns |
| Rise Time           | $t_r$        |                                                                                           |  | 4.4 |  |    |
| Turn-Off Delay Time | $t_{d(OFF)}$ |                                                                                           |  | 25  |  |    |
| Fall Time           | $t_f$        |                                                                                           |  | 7.6 |  |    |

### DRAIN-SOURCE DIODE CHARACTERISTICS

|                       |          |                                            |                                     |  |      |     |   |
|-----------------------|----------|--------------------------------------------|-------------------------------------|--|------|-----|---|
| Forward Diode Voltage | $V_{SD}$ | $V_{GS} = 0\text{ V}, I_S = 200\text{ mA}$ | $T_J = 25\text{ }^{\circ}\text{C}$  |  | 0.67 | 1.1 | V |
|                       |          |                                            | $T_J = 125\text{ }^{\circ}\text{C}$ |  | 0.54 |     |   |

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.

2. Pulse Test: pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL ELECTRICAL CHARACTERISTICS

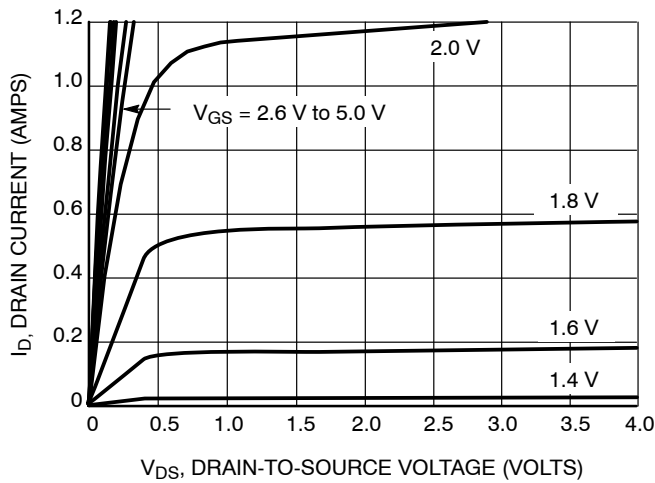


Figure 1. On-Region Characteristics

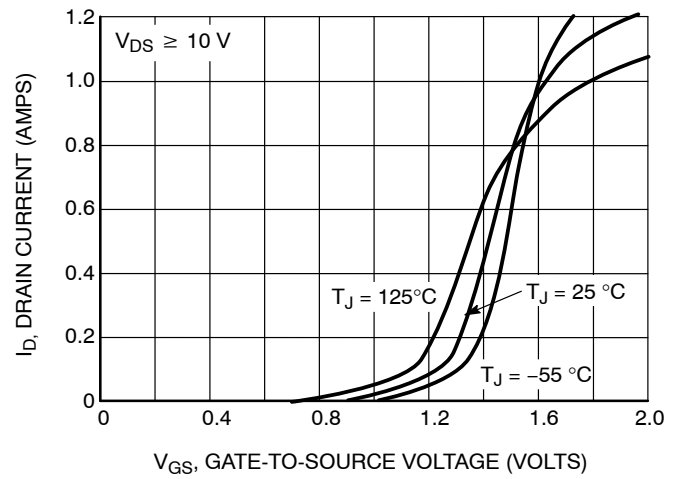


Figure 2. Transfer Characteristics

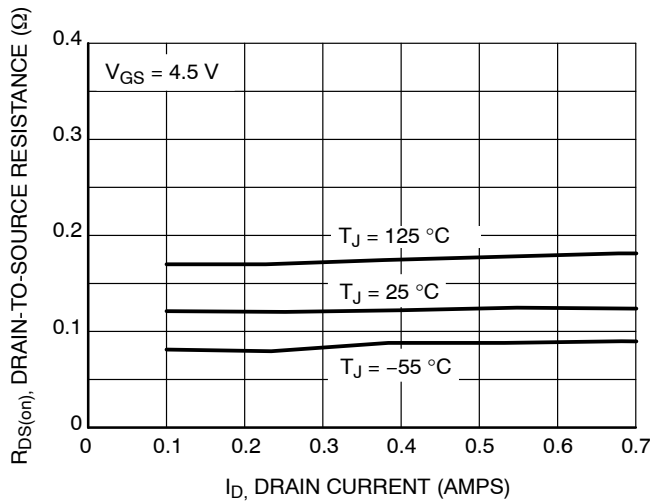


Figure 3. On-Resistance vs. Drain Current and Temperature

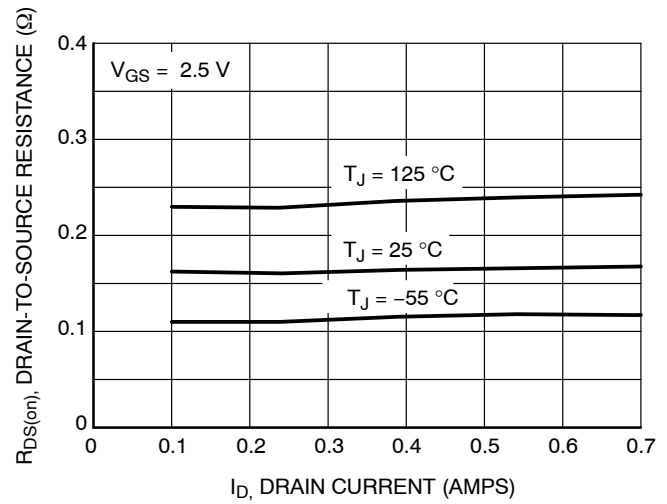


Figure 4. On-Resistance vs. Drain Current and Temperature

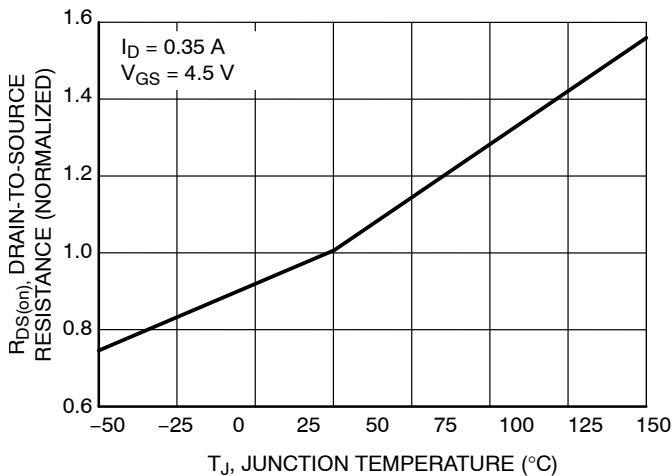


Figure 5. On-Resistance Variation with Temperature

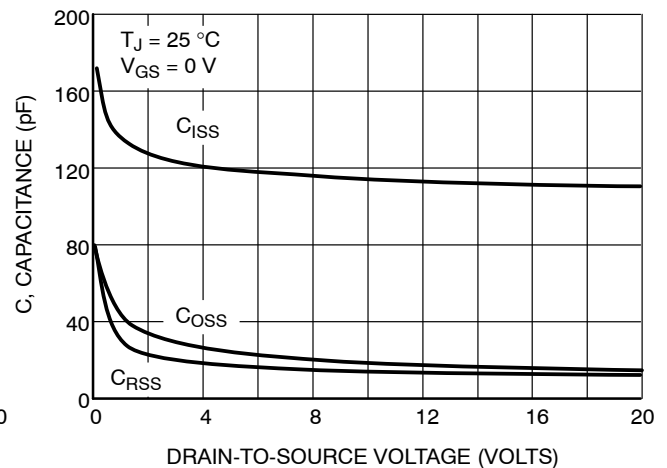


Figure 6. Capacitance Variation

TYPICAL ELECTRICAL CHARACTERISTICS

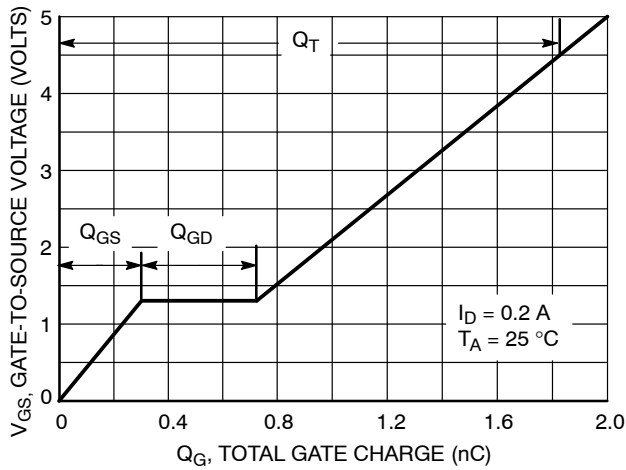


Figure 7. Gate-to-Source Voltage vs. Total Gate Charge

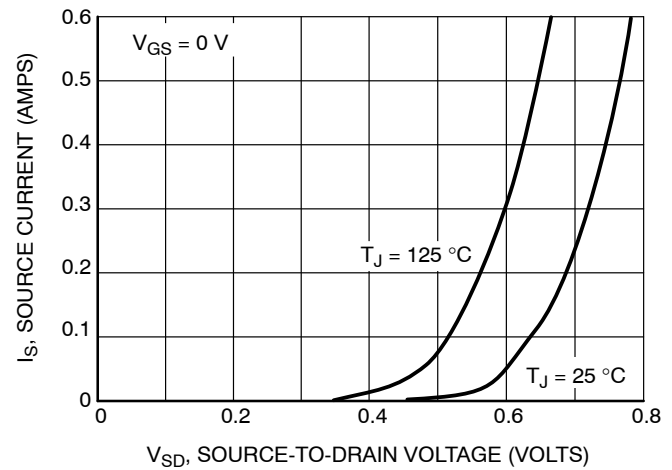


Figure 8. Diode Forward Voltage vs. Current

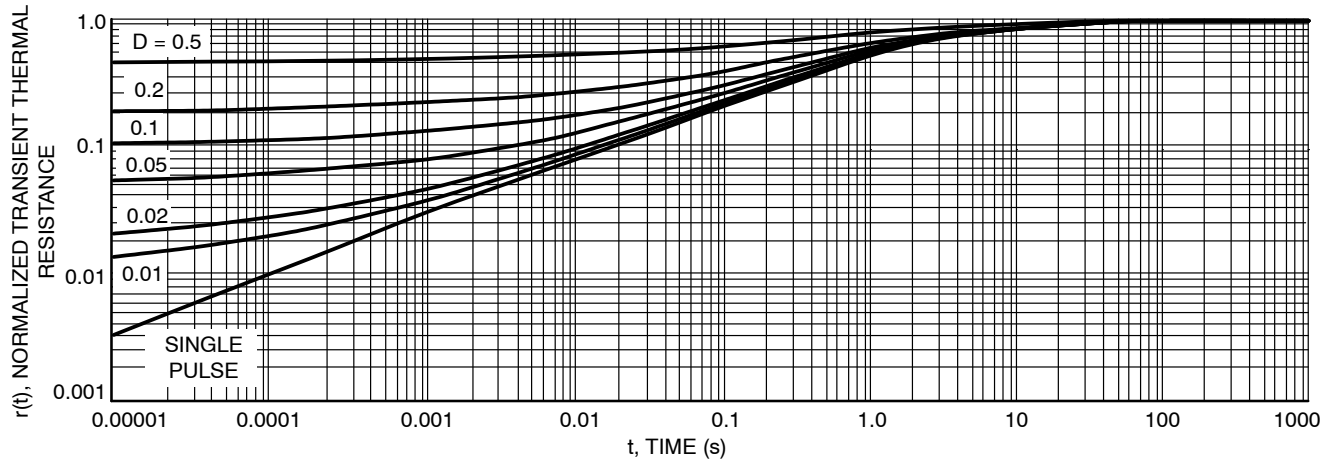


Figure 9. Normalized Thermal Response

ORDERING INFORMATION

| Device      | Marking | Package                   | Shipping <sup>†</sup> |
|-------------|---------|---------------------------|-----------------------|
| NTA4153NT1G | TR      | SC-75 / SOT-416 (Pb-Free) | 3000 / Tape & Reel    |
| NTE4153NT1G | TP      | SC-89 (Pb-Free)           | 3000 / Tape & Reel    |
| NVA4153NT1G | VR      | SC-75 / SOT-416 (Pb-Free) | 3000 / Tape & Reel    |
| NVE4153NT1G | VP      | SC-89 (Pb-Free)           | 3000 / Tape & Reel    |

DISCONTINUED (Note 4)

|            |    |                 |                    |
|------------|----|-----------------|--------------------|
| NTA4153NT1 | TR | SC-75 / SOT-416 | 3000 / Tape & Reel |
|------------|----|-----------------|--------------------|

<sup>†</sup>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.

4. **DISCONTINUED:** These devices are not available. Please contact your **onsemi** representative for information. The most current information on these devices may be available on [www.onsemi.com](http://www.onsemi.com).

## NTA4153N, NTE4153N, NVA4153N, NVE4153N

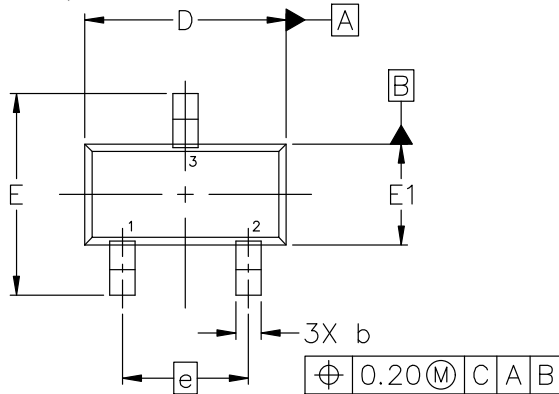
### REVISION HISTORY

| Revision | Description of Changes                            | Date      |
|----------|---------------------------------------------------|-----------|
| 1        | Rebranded the Data Sheet to <b>onsemi</b> format. | 1/14/2026 |

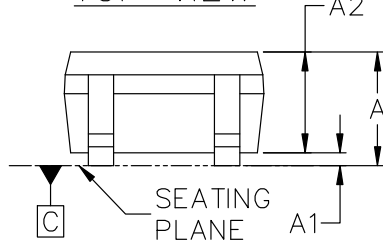
This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

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

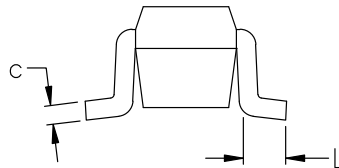
DATE 01 FEB 2024



TOP VIEW

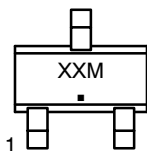


SIDE VIEW



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

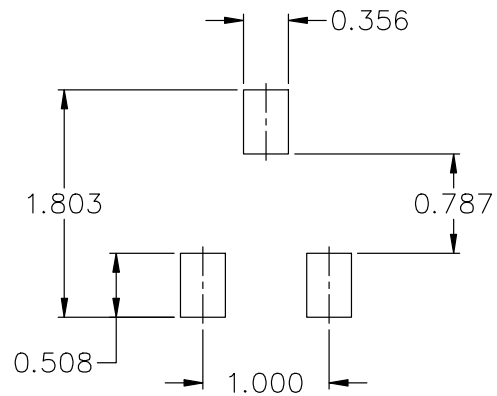
STYLE 2:  
PIN 1. ANODE  
2. N/C  
3. CATHODE

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 |

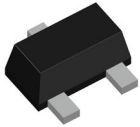


RECOMMENDED MOUNTING FOOTPRINT\*

\* FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

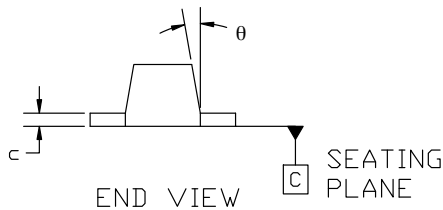
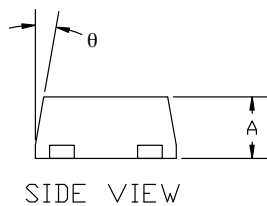
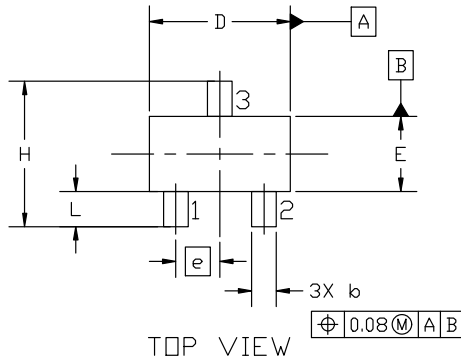
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| DESCRIPTION:     | SC75-3 1.60x0.80x0.80, 1.00P | PAGE 1 OF 1                                                                                                                                                                      |

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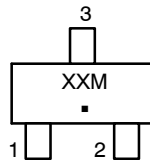


**SC-89 3-LEAD, 1.60x0.85x0.70, 0.50P**  
**CASE 463C**  
**ISSUE D**

DATE 20 FEB 2024



**GENERIC  
MARKING DIAGRAM\***



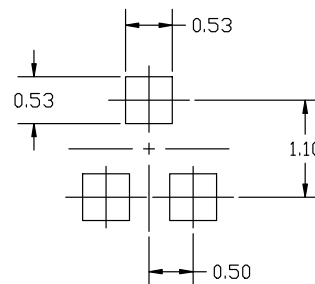
XX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

\*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.

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 0.60        | 0.70 | 0.80 |
| b   | 0.23        | 0.28 | 0.33 |
| c   | 0.10        | 0.15 | 0.20 |
| D   | 1.50        | 1.60 | 1.70 |
| E   | 0.75        | 0.85 | 0.95 |
| e   | 0.50 BSC    |      |      |
| H   | 1.50        | 1.60 | 1.70 |
| L   | 0.30        | 0.40 | 0.50 |
| θ   | ---         | ---  | 10°  |



**RECOMMENDED MOUNTING  
FOOTPRINT**

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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

|                         |                                            |                                                                                                                                                                                  |
|-------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| <b>DESCRIPTION:</b>     | <b>SC-89 3-LEAD, 1.60x0.85x0.70, 0.50P</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                               |

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