

# MOSFET – Dual, P-Channel with ESD Protection, Small Signal, SOT-563

**-20 V, -430 mA**

## NTZD3152P

### Features

- Low  $R_{DS(on)}$  Improving System Efficiency
- Low Threshold Voltage
- ESD Protected Gate
- Small Footprint 1.6 x 1.6 mm
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

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

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

| Parameter   | Symbol                        | Value                            | Unit             |
|---|-------------------------------|----------------------------------|------------------|
| Drain-to-Source Voltage   | $V_{DS}$                      | -20                              | V                |
| Gate-to-Source Voltage  | $V_{GS}$                      | $\pm 6.0$                        | V                |
| Continuous Drain Current (Note 2)                                 | Steady State                  | $T_A = 25\text{ }^\circ\text{C}$ | -430             |
|   |                               | $T_A = 85\text{ }^\circ\text{C}$ | -310             |
| Power Dissipation (Note 2)  | Steady State                  | $P_D$                            | 250              |
| Continuous Drain Current (Note 2)                                 | $t \leq 5\text{ s}$           | $T_A = 25\text{ }^\circ\text{C}$ | -455             |
|   |                               | $T_A = 85\text{ }^\circ\text{C}$ | -328             |
| Power Dissipation (Note 2)  | $t \leq 5\text{ s}$           | $P_D$                            | 280              |
| Pulsed Drain Current  | $t_p = 10\text{ }\mu\text{s}$ | $I_{DM}$                         | -750             |
| Operating Junction and Storage Temperature                        | $T_J, T_{STG}$                | -55 to 150                       | $^\circ\text{C}$ |
| Source Current (Body Diode)                                       | $I_S$                         | -350                             | mA               |
| Lead Temperature for Soldering Purposes (1/8" from case for 10 s) | $T_L$                         | 260                              | $^\circ\text{C}$ |

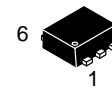
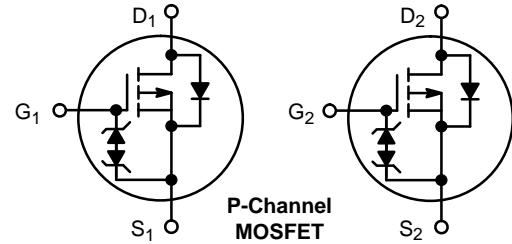
### THERMAL RESISTANCE RATINGS

| Parameter  | Symbol          | Max | Unit                      |
|--|-----------------|-----|---------------------------|
| Junction-to-Ambient – Steady State (Note 2)        | $R_{\theta JA}$ | 500 | $^\circ\text{C}/\text{W}$ |
| Junction-to-Ambient – $t \leq 5\text{ s}$ (Note 2) |                 | 447 |                           |

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.

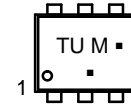
- Surface mounted on FR4 board using 1 in. sq. pad size (Cu. area = 1.127 in. sq. [1 oz.] including traces).

| $V_{(BR)DSS}$ | $R_{DS(on)}$ Typ      | $I_D$ Max |
|---------------|-----------------------|-----------|
| -20 V         | 0.5 $\Omega$ @ -4.5 V | -430 mA   |
|               | 0.6 $\Omega$ @ -2.5 V |           |
|               | 1.0 $\Omega$ @ -1.8 V |           |



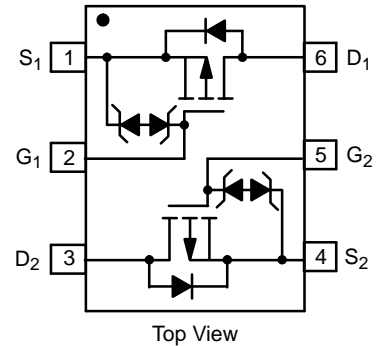
SOT-563-6  
CASE 463A

### MARKING DIAGRAM



- TU = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

### PINOUT: SOT-563



### ORDERING INFORMATION

| Device       | Package           | Shipping†          |
|--------------|-------------------|--------------------|
| NTZD3152PT1G | SOT-563 (Pb-Free) | 4000 / Tape & Reel |

### DISCONTINUED (Note 1)

|              |                   |                    |
|--------------|-------------------|--------------------|
| NTZD3152PT1H | SOT-563 (Pb-Free) | 4000 / Tape & Reel |
| NTZD3152PT5H | SOT-563 (Pb-Free) | 8000 / 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](#).

- DISCONTINUED:** These devices are not recommended for new design. Please contact your onsemi representative for information. The most current information on these devices may be available on [www.onsemi.com](#).

# NTZD3152P

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

| Parameter   | Symbol            | Test Condition                                       | Min                               | Typ | Max       | Unit          |
|---|-------------------|--|-----------------------------------|-----|-----------|---------------|
| <b>OFF CHARACTERISTICS</b>                                |                   |  |                                   |     |           |               |
| Drain-to-Source Breakdown Voltage                         | $V_{(BR)DSS}$     | $V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$ | -20                               |     |           | V             |
| Drain-to-Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ |  |                                   | 18  |           | mV/°C         |
| Zero Gate Voltage Drain Current                           | $I_{DSS}$         | $V_{GS} = 0\text{ V}, V_{DS} = -16\text{ V}$         | $T_J = 25\text{ }^\circ\text{C}$  |     | -1.0      | $\mu\text{A}$ |
|   |                   |  | $T_J = 125\text{ }^\circ\text{C}$ |     | -2.0      |               |
| Gate-to-Source Leakage Current                            | $I_{GSS}$         | $V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$     |                                   |     | $\pm 2.0$ | $\mu\text{A}$ |

## ON CHARACTERISTICS (Note 3)

|  |                  |  |       |      |      |          |
|--|------------------|--|-------|------|------|----------|
| Gate Threshold Voltage                     | $V_{GS(TH)}$     | $V_{GS} = V_{DS}, I_D = -250\text{ }\mu\text{A}$ | -0.45 |      | -1.0 | V        |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ |  |       | -1.9 |      | mV/°C    |
| Drain-to-Source On Resistance              | $R_{DS(on)}$     | $V_{GS} = -4.5\text{ V}, I_D = -430\text{ mA}$   |       | 0.5  | 0.9  | $\Omega$ |
|  |                  | $V_{GS} = -2.5\text{ V}, I_D = -300\text{ mA}$   |       | 0.6  | 1.2  |          |
|  |                  | $V_{GS} = -1.8\text{ V}, I_D = -150\text{ mA}$   |       | 1.0  | 2.0  |          |
| Forward Transconductance                   | $g_{FS}$         | $V_{DS} = -10\text{ V}, I_D = -430\text{ mA}$    |       | 1.0  |      | S        |

## CHARGES AND CAPACITANCES

|                              |              |   |  |     |     |    |
|------------------------------|--------------|---|--|-----|-----|----|
| Input Capacitance            | $C_{ISS}$    | $V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = -16\text{ V}$      |  | 105 | 175 | pF |
| Output Capacitance           | $C_{OSS}$    |   |  | 15  | 30  |    |
| Reverse Transfer Capacitance | $C_{RSS}$    |   |  | 10  | 20  |    |
| Total Gate Charge            | $Q_{G(TOT)}$ | $V_{GS} = -4.5\text{ V}, V_{DS} = -10\text{ V}, I_D = -215\text{ mA}$ |  | 1.7 | 2.5 | nC |
| Threshold Gate Charge        | $Q_{G(TH)}$  |   |  | 0.1 |     |    |
| Gate-to-Source Charge        | $Q_{GS}$     |   |  | 0.3 |     |    |
| Gate-to-Drain Charge         | $Q_{GD}$     |   |  | 0.4 |     |    |

## SWITCHING CHARACTERISTICS (Note 4)

|                     |              |   |  |    |  |    |
|---------------------|--------------|---|--|----|--|----|
| Turn-On Delay Time  | $t_{d(on)}$  | $V_{GS} = -4.5\text{ V}, V_{DD} = -10\text{ V}, I_D = -215\text{ mA}, R_G = 10\text{ }\Omega$ |  | 10 |  | ns |
| Rise Time           | $t_r$        |   |  | 12 |  |    |
| Turn-Off Delay Time | $t_{d(off)}$ |   |  | 35 |  |    |
| Fall Time           | $t_f$        |   |  | 19 |  |    |

## DRAIN-SOURCE DIODE CHARACTERISTICS

|                       |          |  |                                  |  |      |      |    |
|-----------------------|----------|--|----------------------------------|--|------|------|----|
| Forward Diode Voltage | $V_{SD}$ | $V_{GS} = 0\text{ V}, I_S = -350\text{ mA}$  | $T_J = 25\text{ }^\circ\text{C}$ |  | -0.8 | -1.2 | V  |
| Reverse Recovery Time | $t_{RR}$ | $V_{GS} = 0\text{ V}, di_{SD}/dt = 100\text{ A}/\mu\text{s}, I_S = -350\text{ mA}$ |                                  |  | 13   |      | ns |

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  $\leq 2\%$ .

4. Switching characteristics are independent of operating junction temperatures.

# NTZD3152P

## TYPICAL PERFORMANCE CURVES ( $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted)

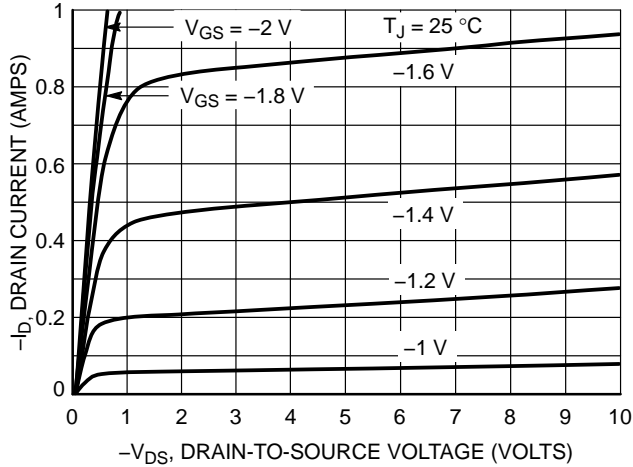


Figure 1. On-Region Characteristics

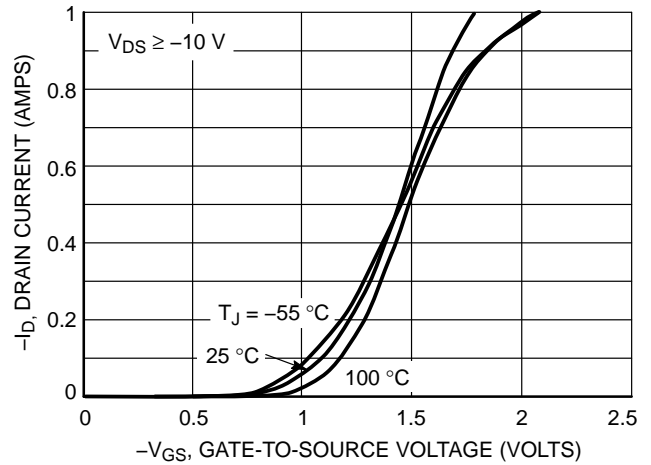


Figure 2. Transfer Characteristics

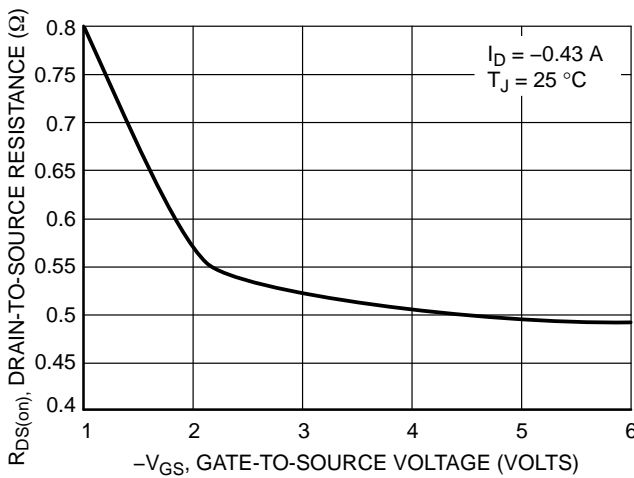


Figure 3. On-Resistance vs. Gate-to-Source Voltage

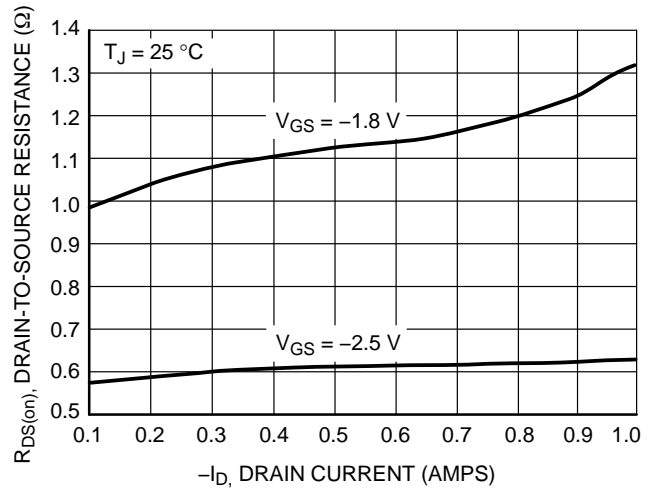


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

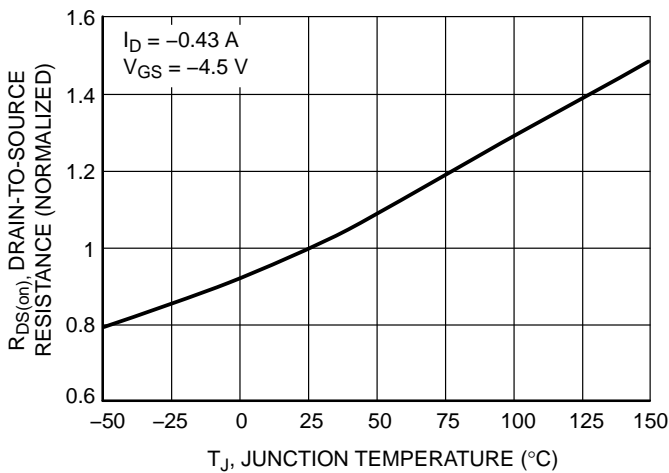


Figure 5. On-Resistance Variation with Temperature

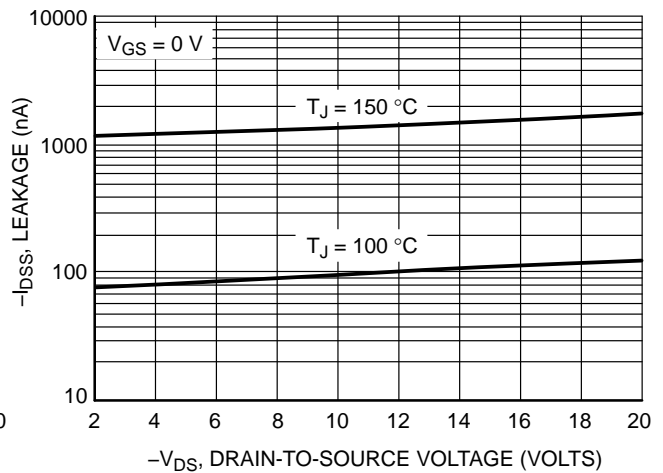


Figure 6. Drain-to-Source Leakage Current vs. Voltage

# NTZD3152P

## TYPICAL PERFORMANCE CURVES ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

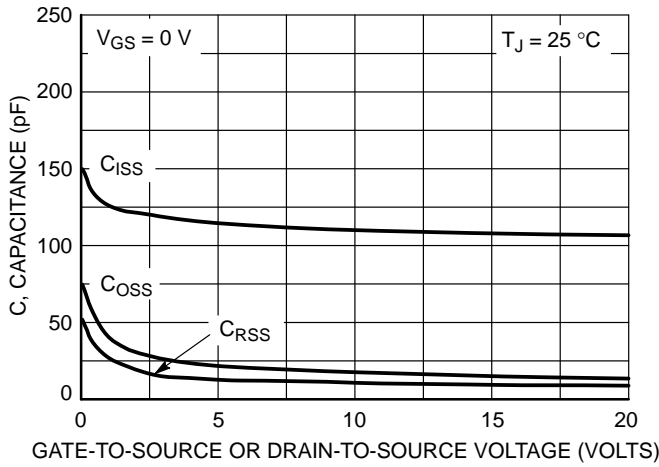


Figure 7. Capacitance Variation

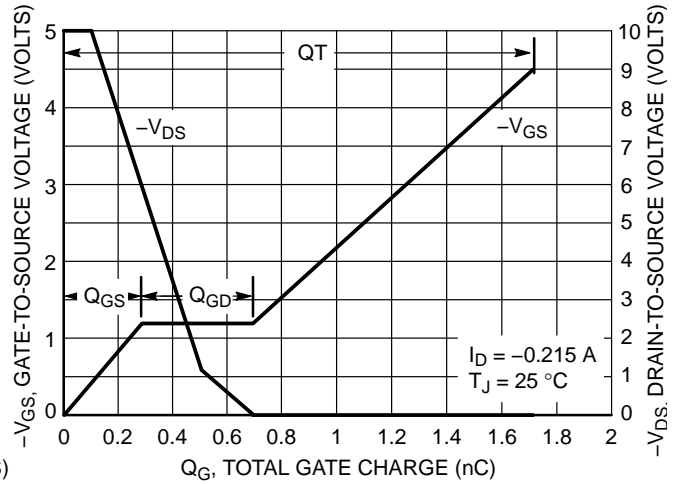


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

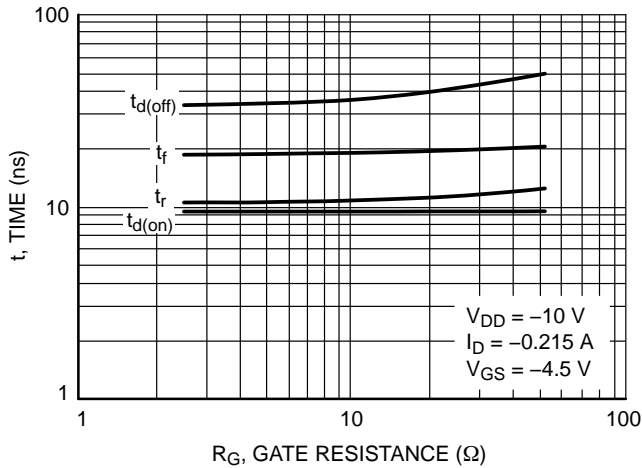


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

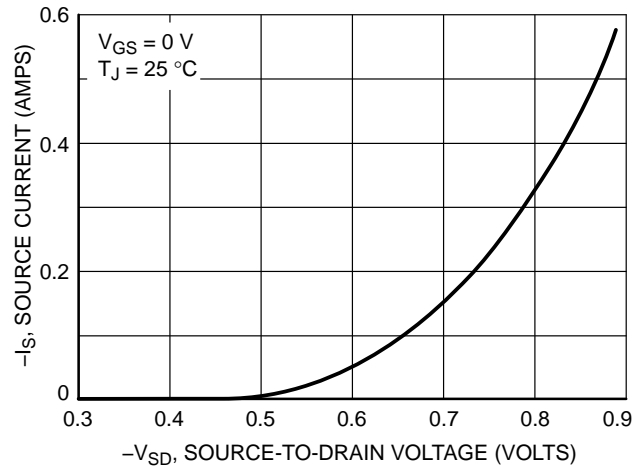


Figure 10. Diode Forward Voltage vs. Current

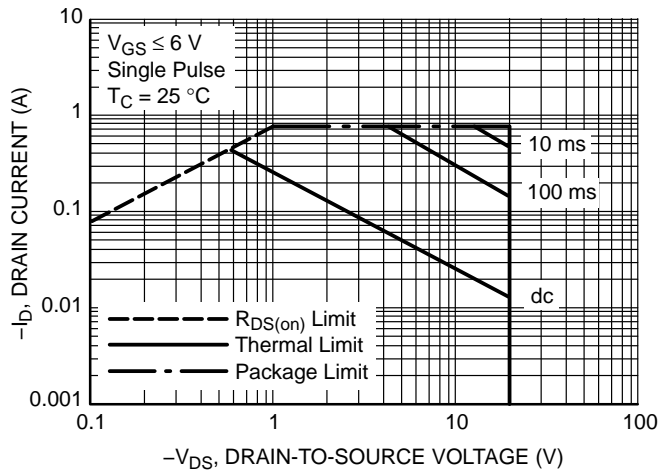


Figure 11. Safe Operating Area

# NTZD3152P

## REVISION HISTORY

| Revision | Description of Changes   | Date       |
|----------|--|------------|
| 7        | Rebranded the Data Sheet to <b>onsemi</b> format.<br>NTZD3152PT1H, NTZD3152PT5H OPNs marked as Discontinued. | 10/16/2025 |

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.

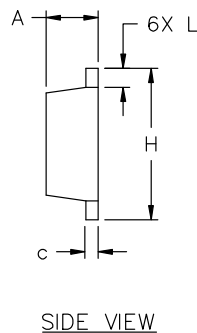
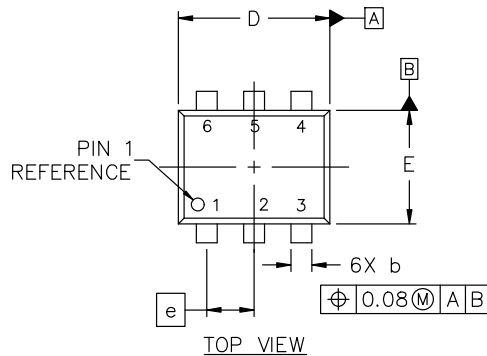


SOT-563-6 1.60x1.20x0.55, 0.50P  
CASE 463A  
ISSUE J

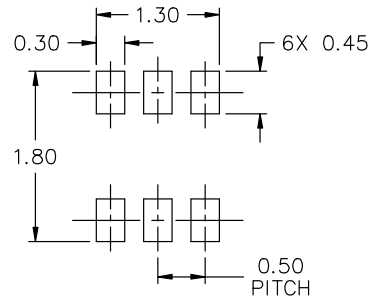
DATE 15 FEB 2024

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSION ARE IN 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   | 0.50        | 0.55 | 0.60 |
| b   | 0.17        | 0.22 | 0.27 |
| c   | 0.08        | 0.13 | 0.18 |
| D   | 1.50        | 1.60 | 1.70 |
| E   | 1.10        | 1.20 | 1.30 |
| e   | 0.50 BSC    |      |      |
| H   | 1.50        | 1.60 | 1.70 |
| L   | 0.10        | 0.20 | 0.30 |



STYLE 1:  
PIN 1. EMITTER 1  
2. BASE 1  
3. COLLECTOR 2  
4. EMITTER 2  
5. BASE 2  
6. COLLECTOR 1

STYLE 2:  
PIN 1. EMITTER 1  
2. EMITTER 2  
3. BASE 2  
4. COLLECTOR 2  
5. BASE 1  
6. COLLECTOR 1

STYLE 3:  
PIN 1. CATHODE 1  
2. CATHODE 1  
3. ANODE/ANODE 2  
4. CATHODE 2  
5. CATHODE 2  
6. ANODE/ANODE 1

STYLE 4:  
PIN 1. COLLECTOR  
2. COLLECTOR  
3. BASE  
4. EMITTER  
5. COLLECTOR  
6. COLLECTOR

STYLE 5:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE  
4. ANODE  
5. CATHODE  
6. CATHODE

STYLE 6:  
PIN 1. CATHODE  
2. ANODE  
3. CATHODE  
4. CATHODE  
5. CATHODE  
6. CATHODE

STYLE 7:  
PIN 1. CATHODE  
2. ANODE  
3. CATHODE  
4. CATHODE  
5. ANODE  
6. CATHODE

STYLE 8:  
PIN 1. DRAIN  
2. DRAIN  
3. GATE  
4. SOURCE  
5. DRAIN  
6. DRAIN

STYLE 9:  
PIN 1. SOURCE 1  
2. GATE 1  
3. DRAIN 2  
4. SOURCE 2  
5. GATE 2  
6. DRAIN 1

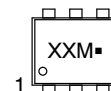
STYLE 10:  
PIN 1. CATHODE 1  
2. N/C  
3. CATHODE 2  
4. ANODE 2  
5. N/C  
6. ANODE 1

STYLE 11:  
PIN 1. EMITTER 2  
2. BASE 2  
3. COLLECTOR 1  
4. EMITTER 1  
5. BASE 1  
6. COLLECTOR 2

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.

GENERIC MARKING DIAGRAM\*



XX = Specific Device Code  
M = Month 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.

|                  |                                 |  |
|------------------|---------------------------------|--|
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| DESCRIPTION:     | SOT-563-6 1.60x1.20x0.55, 0.50P | PAGE 1 OF 1  |

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