

# MOSFET – P-Channel, POWERTRENCH®

**-150 V, -0.8 A, 1.2 Ω**

## FDN86265P



SOT-23/SUPERSOT™ -23, 3 LEAD,  
1.4x2.9  
CASE 527AG

### General Description

This P-Channel MOSFET is produced using onsemi's advanced POWERTRENCH process that has been optimized for the on-state resistance and yet maintain superior switching performance.

### Features

- Max  $r_{DS(on)}$  = 1.2 Ω at  $V_{GS} = -10$  V,  $I_D = -0.8$  A  
Max  $r_{DS(on)}$  = 1.4 Ω at  $V_{GS} = -6$  V,  $I_D = -0.7$  A
- Very Low RDS-on Mid Voltage P-Channel Silicon Technology Optimised for Low Qg
- This Product is Optimised for Fast Switching Applications as Well as Load Switch Applications
- 100% UIL Tested
- Pb-Free, Halide Free and RoHS Compliant

### Applications

- Active Clamp Switch
- Load Switch

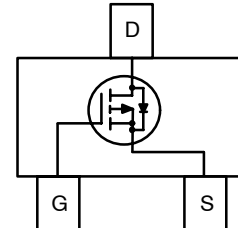
### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted.)

| Symbol                            | Parameter   | Value       | Unit |
|-----------------------------------|---|-------------|------|
| V <sub>DS</sub>                   | Drain to Source Voltage                             | -150        | V    |
| V <sub>GS</sub>                   | Gate to Source Voltage                              | ±25         | V    |
| I <sub>D</sub>                    | Drain Current<br>– Continuous (Note 1a)<br>– Pulsed | -0.8<br>-5  | A    |
| E <sub>AS</sub>                   | Single Pulse Avalanche Energy (Note 3)              | 6           | mJ   |
| P <sub>D</sub>                    | Power Dissipation (Note 1a)<br>(Note 1b)            | 1.5<br>0.6  | W    |
| T <sub>J</sub> , T <sub>STG</sub> | Operating and Storage Junction Temperature Range    | -55 to +150 | °C   |

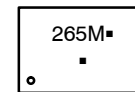
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted.)

| Symbol           | Parameter   | Value | Unit |
|------------------|---|-------|------|
| R <sub>θJC</sub> | Thermal Resistance, Junction to Case (Note 1)     | 75    | °C/W |
| R <sub>θJA</sub> | Thermal Resistance, Junction to Ambient (Note 1a) | 80    | °C/W |



### MARKING DIAGRAM



265 = Specific Device Code  
M = Month Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

| Device    | Package                             | Shipping†             |
|-----------|-------------------------------------|-----------------------|
| FDN86265P | SOT-23<br>(Pb-Free/<br>Halide Free) | 3000 /<br>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](#).

# FDN86265P

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted.)

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

### OFF CHARACTERISTICS

|                                      |   |   |      |      |      |       |
|--------------------------------------|---|---|------|------|------|-------|
| BV <sub>DSS</sub>                    | Drain to Source Breakdown Voltage         | I <sub>D</sub> = -250 μA, V <sub>GS</sub> = 0 V | -150 | -    | -    | V     |
| ΔBV <sub>DSS</sub> / ΔT <sub>J</sub> | Breakdown Voltage Temperature Coefficient | I <sub>D</sub> = -250 μA, referenced to 25°C    | -    | -129 | -    | mV/°C |
| I <sub>DSS</sub>                     | Zero Gate Voltage Drain Current           | V <sub>DS</sub> = -120 V, V <sub>GS</sub> = 0 V | -    | -    | -1   | μA    |
| I <sub>GSS</sub>                     | Gate-Body Leakage                         | V <sub>GS</sub> = ±25 V, V <sub>DS</sub> = 0 V  | -    | -    | ±100 | nA    |

### ON CHARACTERISTICS (Note 2)

|  |  |   |    |                      |                   |       |
|--|--|---|----|----------------------|-------------------|-------|
| V <sub>GS(th)</sub>                    | Gate to Source Threshold Voltage                         | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250 μA  | -2 | -3.3                 | -4                | V     |
| ΔV <sub>GS(th)</sub> / ΔT <sub>J</sub> | Gate to Source Threshold Voltage Temperature Coefficient | I <sub>D</sub> = -250 μA, referenced to 25°C  | -  | 5                    | -                 | mV/°C |
| r <sub>DS(on)</sub>                    | Static Drain to Source On Resistance                     | V <sub>GS</sub> = -10 V, I <sub>D</sub> = -0.8 A<br>V <sub>GS</sub> = -6 V, I <sub>D</sub> = -0.7 A<br>V <sub>GS</sub> = -10 V, I <sub>D</sub> = -0.8 A, T <sub>J</sub> = 125°C | -  | 0.85<br>0.96<br>1.54 | 1.2<br>1.4<br>2.2 | Ω     |
| g <sub>FS</sub>                        | Forward Transconductance                                 | V <sub>DS</sub> = -10 V, I <sub>D</sub> = -0.8 A  | -  | 1.5                  | -                 | S     |

### DYNAMIC CHARACTERISTICS

|                  |                              |   |     |     |     |    |
|------------------|------------------------------|---|-----|-----|-----|----|
| C <sub>ISS</sub> | Input Capacitance            | V <sub>DS</sub> = -75 V, V <sub>GS</sub> = 0 V, f = 1 MHz | -   | 158 | 210 | pF |
| C <sub>OSS</sub> | Output Capacitance           |   | -   | 17  | 25  | pF |
| C <sub>RSS</sub> | Reverse Transfer Capacitance |   | -   | 1.6 | 5   | pF |
| R <sub>g</sub>   | Gate Resistance              |   | 0.1 | 3.3 | 6.7 | Ω  |

### SWITCHING CHARACTERISTICS

|                     |                               |  |   |     |     |     |
|---------------------|-------------------------------|--|---|-----|-----|-----|
| t <sub>d(on)</sub>  | Turn-On Delay Time            | V <sub>DD</sub> = -75 V, I <sub>D</sub> = -0.8 A,<br>V <sub>GS</sub> = -10 V, R <sub>GEN</sub> = 6 Ω | -   | 5.7 | 12  | ns  |
| t <sub>r</sub>      | Rise Time                     |  | -   | 2.2 | 10  | ns  |
| t <sub>d(off)</sub> | Turn-Off Delay Time           |  | -   | 7.9 | 16  | ns  |
| t <sub>f</sub>      | Fall Time                     |  | -   | 9.9 | 20  | ns  |
| Q <sub>g</sub>      | Total Gate Charge             |  | V <sub>GS</sub> = 0 V to -10 V, V <sub>DD</sub> = -75 V, I <sub>D</sub> = -0.8 A, | -   | 2.9 | 4.1 |
| Q <sub>gs</sub>     | Gate to Source Gate Charge    | V <sub>DD</sub> = -75 V, I <sub>D</sub> = -0.8 A   | -   | 0.8 | -   | nC  |
| Q <sub>gd</sub>     | Gate to Drain "Miller" Charge |  | -   | 0.8 | -   | nC  |

### DRAIN-SOURCE DIODE CHARACTERISTICS

|                 |                                       |   |   |       |      |    |
|-----------------|---------------------------------------|---|---|-------|------|----|
| V <sub>SD</sub> | Source to Drain Diode Forward Voltage | V <sub>GS</sub> = 0 V, I <sub>S</sub> = -0.8 A (Note 2) | - | -0.86 | -1.3 | V  |
| t <sub>rr</sub> | Reverse Recovery Time                 | I <sub>F</sub> = -0.8 A, di/dt = 100 A/μs               | - | 49    | 78   | ns |
| Q <sub>rr</sub> | Reverse Recovery Charge               |   | - | 70    | 112  | nC |

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.

### NOTES:

- R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R<sub>θJC</sub> is guaranteed by design while R<sub>θCA</sub> is determined by the user's board design.



a) 80°C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz. copper.



b) 180°C/W when mounted on a minimum pad.

- Pulse Test: Pulse Width < 300 μs, Duty Cycle < 2.0%.
- Starting T<sub>J</sub> = 25°C; N-ch: L = 3 mH, I<sub>AS</sub> = -2 A, V<sub>DD</sub> = -150 V, V<sub>GS</sub> = -10 V. 100% test at L = 0.1 mH, I<sub>AS</sub> = -9 A.

TYPICAL CHARACTERISTICS

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

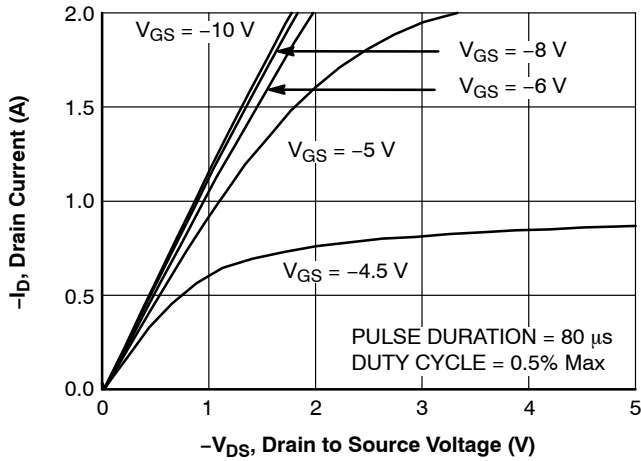


Figure 1. On Region Characteristics

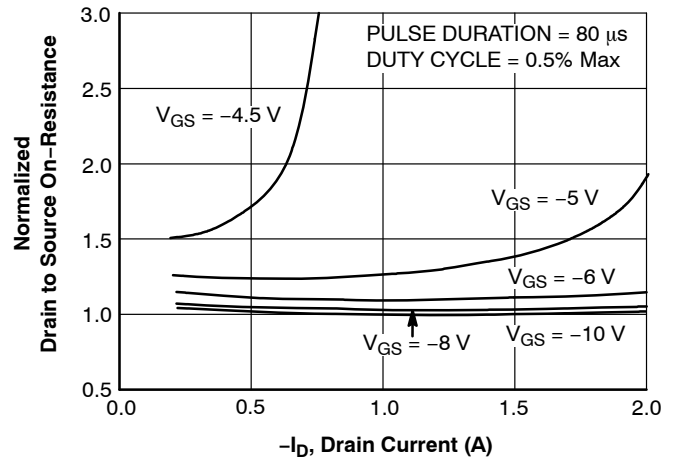


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

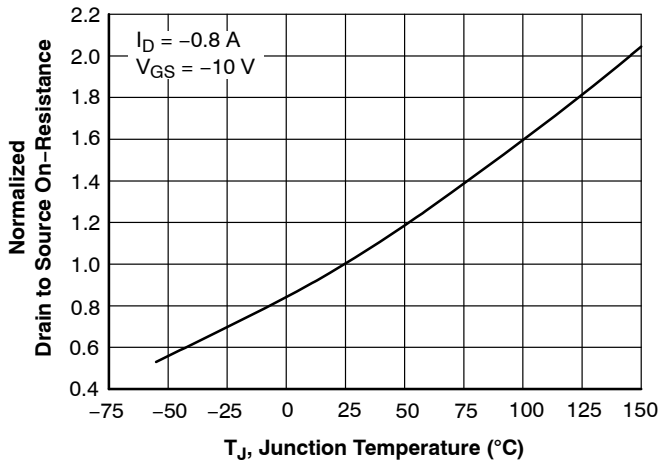


Figure 3. Normalized On Resistance vs. Junction Temperature

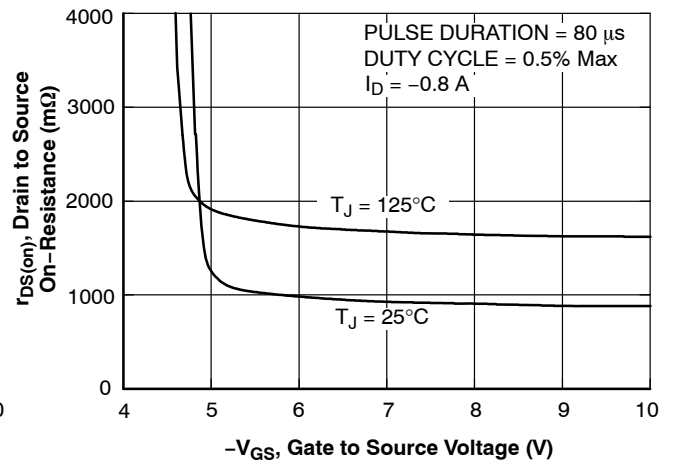


Figure 4. On-Resistance vs. Gate to Source Voltage

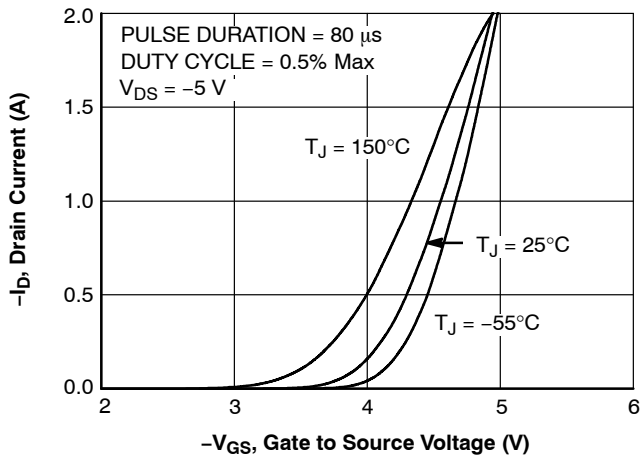


Figure 5. Transfer Characteristics

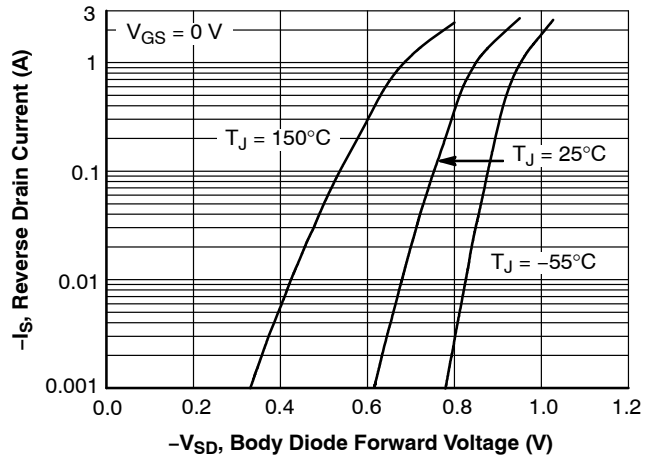


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

# FDN86265P

## TYPICAL CHARACTERISTICS (CONTINUED)

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

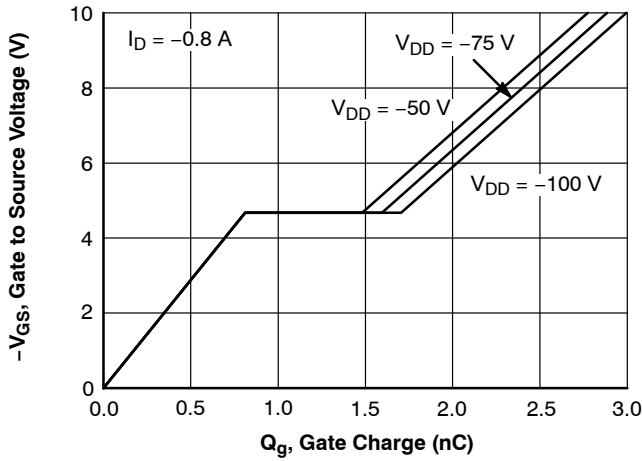


Figure 7. Gate Charge Characteristics

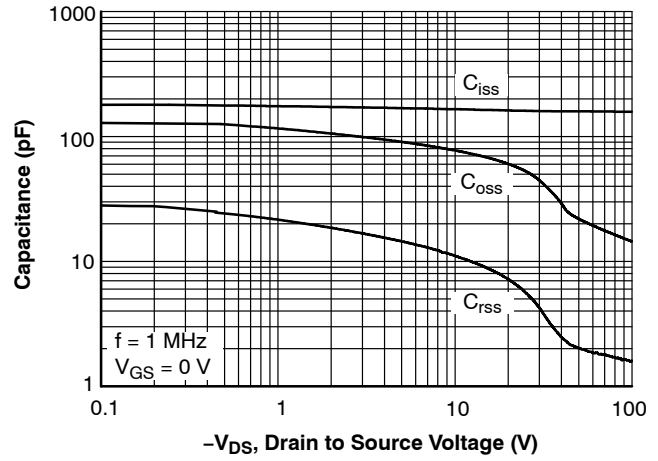


Figure 8. Capacitance vs. Drain to Source Voltage

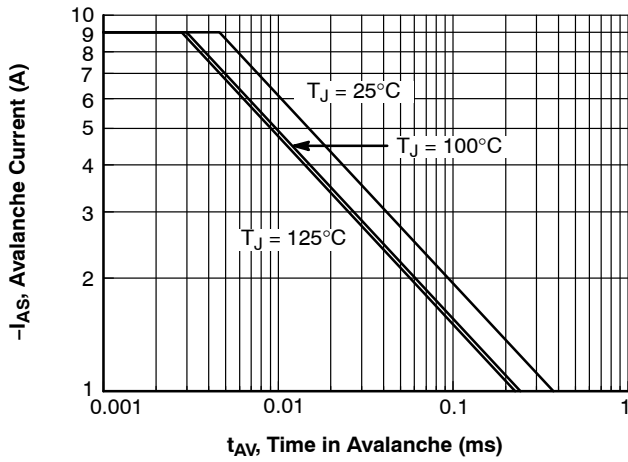


Figure 9. Unclamped Inductive Switching Capability

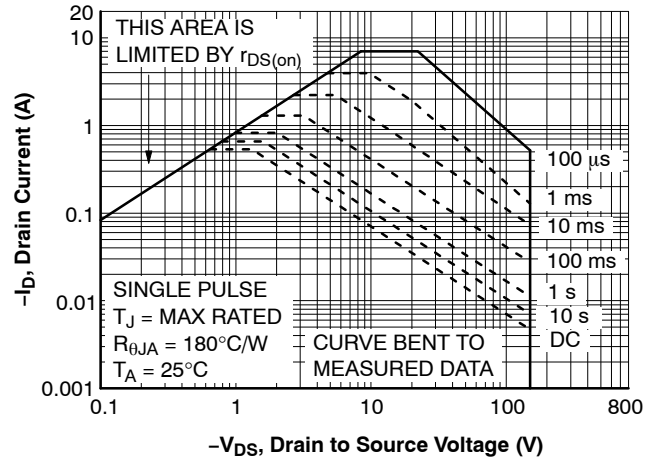


Figure 10. Forward Bias Safe Operating Area

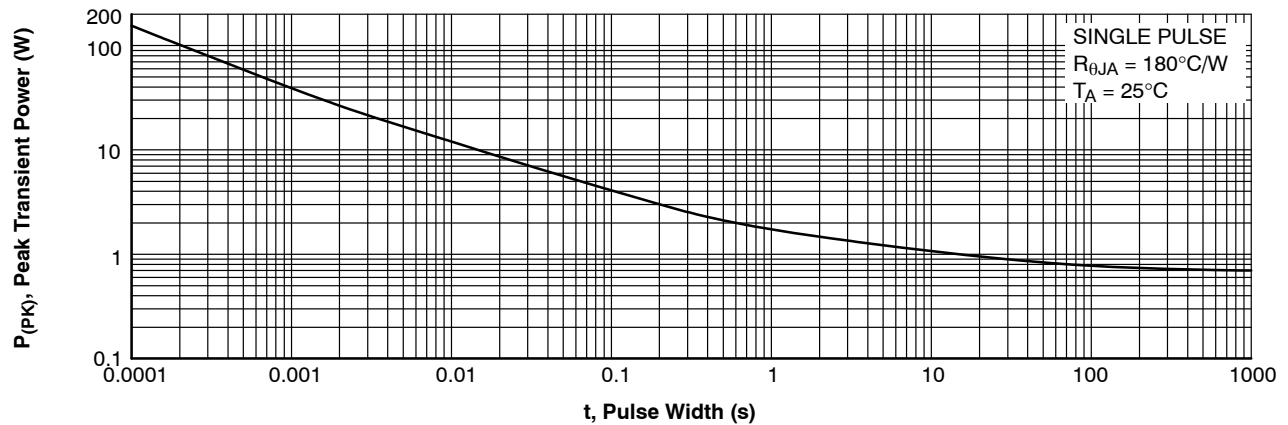


Figure 11. Single Pulse Maximum Power Dissipation

# FDN86265P

## TYPICAL CHARACTERISTICS (CONTINUED)

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

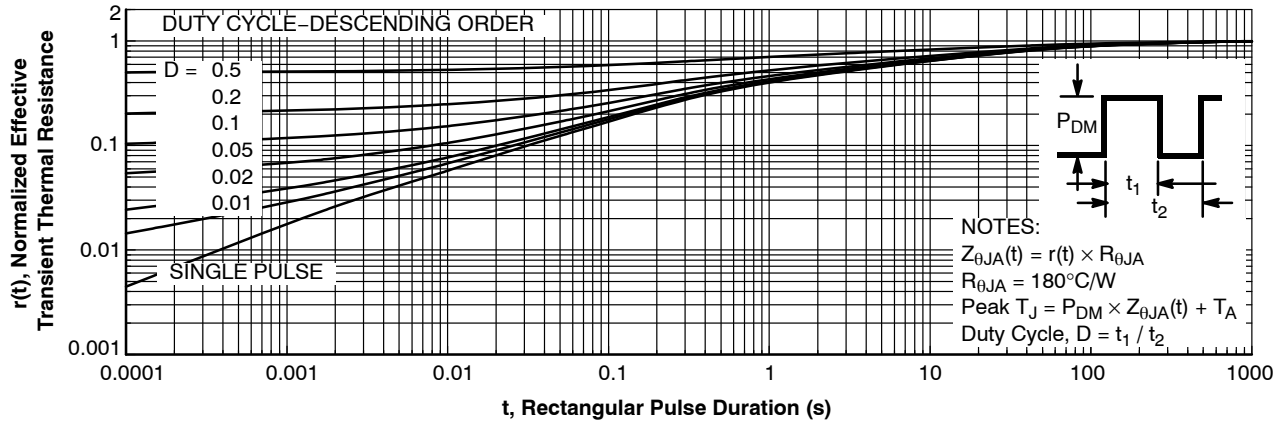


Figure 12. Junction-to-Ambient Transient Thermal Response Curve

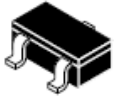
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# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

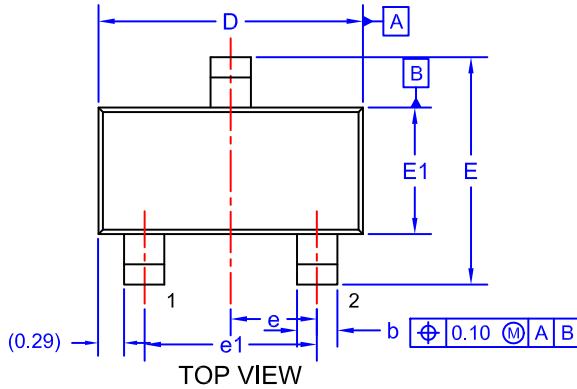
ON Semiconductor®



### SOT-23/SUPERSOT™ -23, 3 LEAD, 1.4x2.9

CASE 527AG  
ISSUE A

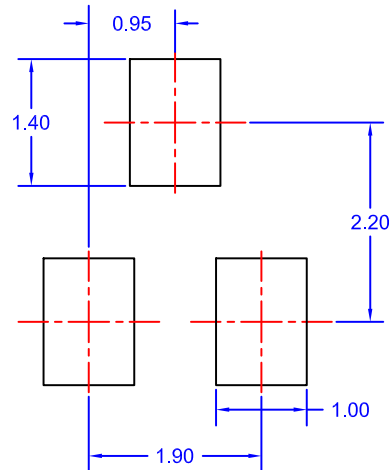
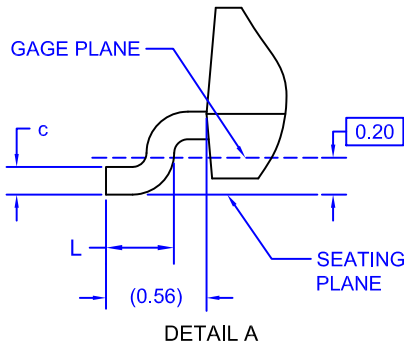
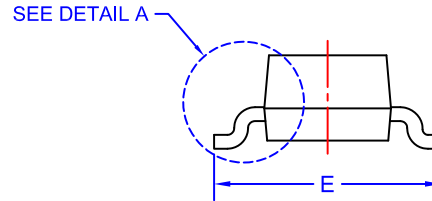
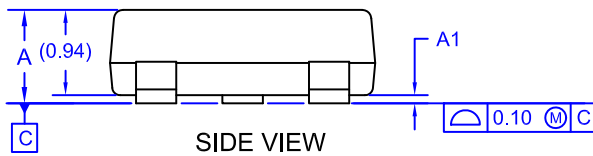
DATE 09 DEC 2019



NOTES: UNLESS OTHERWISE SPECIFIED

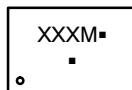
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.

| DIM | MIN.     | NOM.  | MAX.  |
|-----|----------|-------|-------|
| A   | 0.85     | 0.95  | 1.12  |
| A1  | 0.00     | 0.05  | 0.10  |
| b   | 0.370    | 0.435 | 0.508 |
| c   | 0.085    | 0.150 | 0.180 |
| D   | 2.80     | 2.92  | 3.04  |
| E   | 2.31     | 2.51  | 2.71  |
| E1  | 1.20     | 1.40  | 1.52  |
| e   | 0.95 BSC |       |       |
| e1  | 1.90 BSC |       |       |
| L   | 0.33     | 0.38  | 0.43  |



\*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\*



- XXX = Specific Device Code
- M = Month Code
- = Pb-Free Package

(Note: Microdot may be in either location)

\*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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