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ON Semiconductor®

# FDS6675

## Single P-Channel, Logic Level, PowerTrench™ MOSFET

### General Description

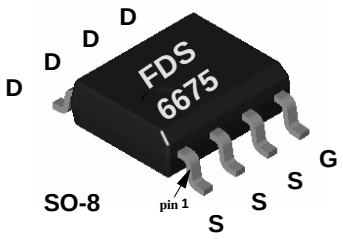
This P-Channel Logic Level MOSFET is produced using ON Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain low gate charge for superior switching performance.

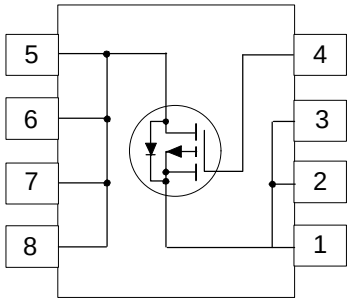
These devices are well suited for notebook computer applications: load switching and power management, battery charging circuits, and DC/DC conversion.

### Features

- -11 A, -30 V. $R_{DS(ON)}$ = 0.014 Ω @ $V_{GS}$ = -10 V,
  $R_{DS(ON)}$ = 0.020 Ω @ $V_{GS}$ = -4.5 V.
- Low gate charge (30nC typical).
- High performance trench technology for extremely low $R_{DS(ON)}$.
- High power and current handling capability.

| SOT-23 | SuperSOT™-6 | SuperSOT™-8 | SO-8 | SOT-223 | SOIC-16 |
|---|---|---|---|---|---|




### Absolute Maximum Ratings

$T_A$ = 25°C unless otherwise noted

| Symbol | Parameter | | FDS6675 | Units |
|---|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | | -30 | V |
| $V_{GSS}$ | Gate-Source Voltage | | ±20 | V |
| $I_D$ | Drain Current - Continuous | (Note 1a) | -11 | A |
| | - Pulsed | | -50 | |
| $P_D$ | Power Dissipation for Single Operation | (Note 1a) | 2.5 | W |
| | | (Note 1b) | 1.2 | |
| | | (Note 1c) | 1 | |
| $T_J$,$T_{STG}$ | Operating and Storage Temperature Range | | -55 to 150 | °C |
| **THERMAL CHARACTERISTICS** | | | | |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | (Note 1a) | 50 | °C/W |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | (Note 1) | 25 | °C/W |


October-2017, Rev. 3

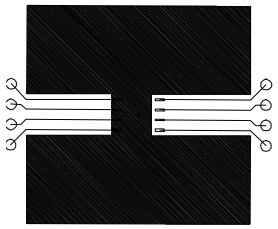
Publication Order Number:
FDS6675/D

## Electrical Characteristics ($T_A$ = 25 °C unless otherwise noted )

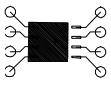
| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = -250 µA | -30 | | | V |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | $I_D$ = -250 µA, Referenced to 25 °C | | -22 | | mV/°C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = -24 V, $V_{GS}$ = 0 V | | | -1 | µA |
| | | $T_J$ = 55°C | | | -10 | µA |
| $I_{GSSF}$ | Gate - Body Leakage, Forward | $V_{GS}$ = 20 V, $V_{DS}$ = 0 V | | | 100 | nA |
| $I_{GSSR}$ | Gate - Body Leakage, Reverse | $V_{GS}$ = -20 V, $V_{DS}$ = 0 V | | | -100 | nA |
| **ON CHARACTERISTICS** (Note 2) | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = -250 µA | -1 | -1.7 | -3 | V |
| $\Delta V_{GS(th)}/\Delta T_J$ | Gate Threshold Voltage Temp. Coefficient | $I_D$ = 250 µA, Referenced to 25 °C | | 4.3 | | mV/°C |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$ = -10 V, $I_D$ = -11 A | | 0.011 | 0.014 | Ω |
| | | $T_J$ =125°C | | 0.016 | 0.023 | |
| | | $V_{GS}$ = -4.5 V, $I_D$ = -9 A | | 0.015 | 0.02 | |
| $I_{D(ON)}$ | On-State Drain Current | $V_{GS}$ = -10 V, $V_{DS}$ = -5 V | -50 | | | A |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = -10 V, $I_D$ = -11 A | | 32 | | S |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = -15 V, $V_{GS}$ = 0 V, f = 1.0 MHz | | 3000 | | pF |
| $C_{oss}$ | Output Capacitance | | | 870 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 360 | | pF |
| **SWITCHING CHARACTERISTICS** (Note 2) | | | | | | |
| $t_{D(on)}$ | Turn - On Delay Time | $V_{DS}$ = -15 V, $I_D$ = -1 A | | 12 | 22 | ns |
| $t_r$ | Turn - On Rise Time | $V_{GEN}$ = -10 V, $R_{GEN}$ = 6 Ω | | 16 | 27 | ns |
| $t_{D(off)}$ | Turn - Off Delay Time | | | 50 | 80 | ns |
| $t_f$ | Turn - Off Fall Time | | | 100 | 140 | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$ = -15 V, $I_D$ = -11 A, | | 30 | 42 | nC |
| $Q_{gs}$ | Gate-Source Charge | $V_{GS}$ = -5 V | | 9 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 11 | | nC |
| **DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS** | | | | | | |
| $I_S$ | Maximum Continuous Drain-Source Diode Forward Current | | | | -2.1 | A |
| $V_{SD}$ | Drain-Source Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ = -2.1 A (Note 2) | | -0.72 | -1.2 | V |

Notes:

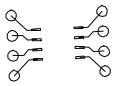
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 50°C/W on a 0.5 in² pad of 2oz copper.



b. 105°C/W on a 0.02 in² pad of 2oz copper.



c. 125°C/W on a 0.003 in² pad of 2oz copper.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width ≤ 300µs, Duty Cycle ≤ 2.0%.

## Typical Electrical Characteristics

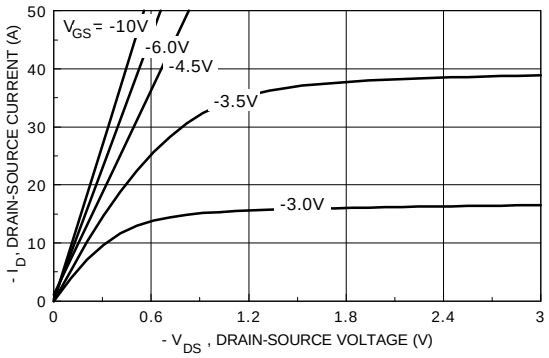



**Figure 1. On-Region Characteristics**.

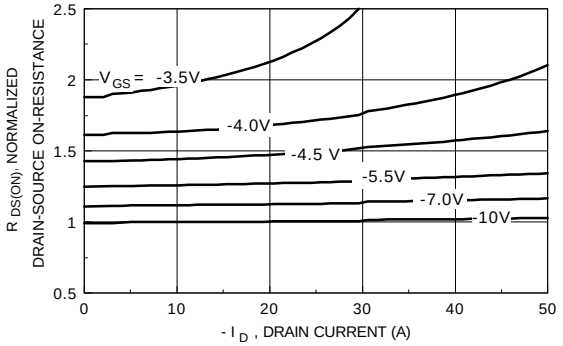



**Figure 2. On-Resistance Variation with Dain Current and Gate Voltage**.

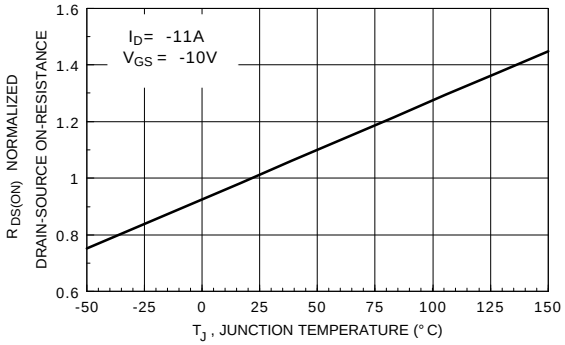



**Figure 3. On-Resistance Variation with Temperature**.

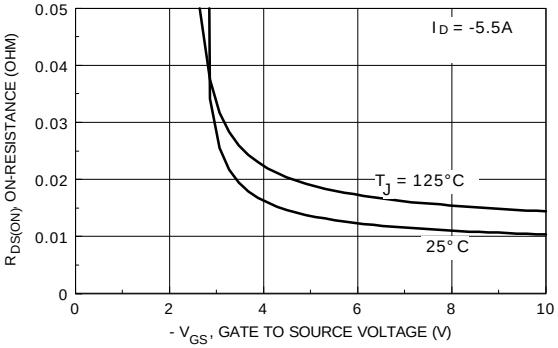



**Figure 4. On-Resistance Variation with Gate-to-Source Voltage.**

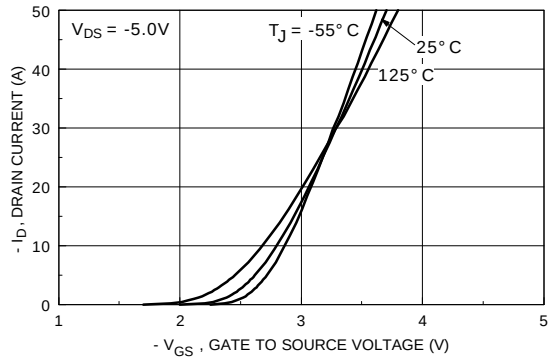



**Figure 5. Transfer Characteristics.**

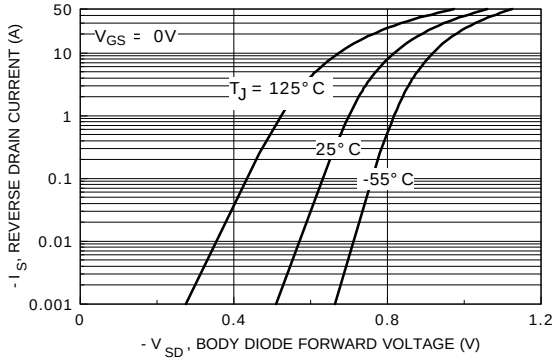



**Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.**

## Typical Electrical Characteristics (continued)

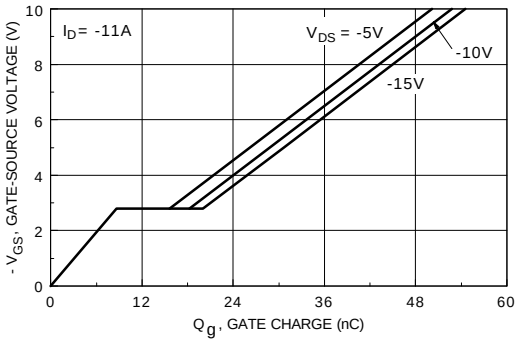



**Figure 7. Gate Charge Characteristics.**

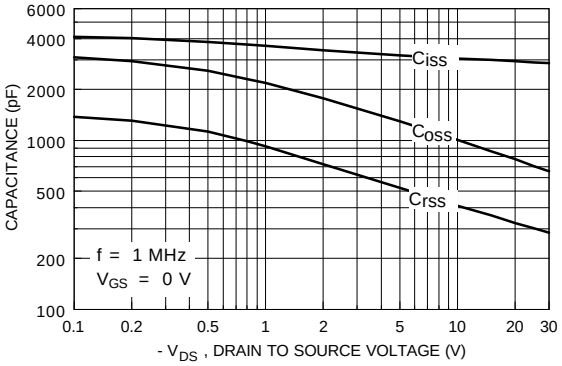



**Figure 8. Capacitance Characteristics.**

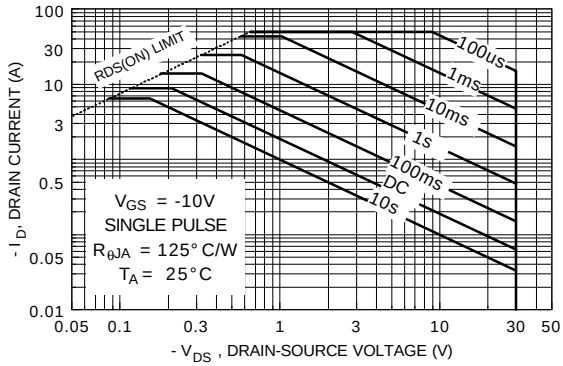



**Figure 9. Maximum Safe Operating Area.**

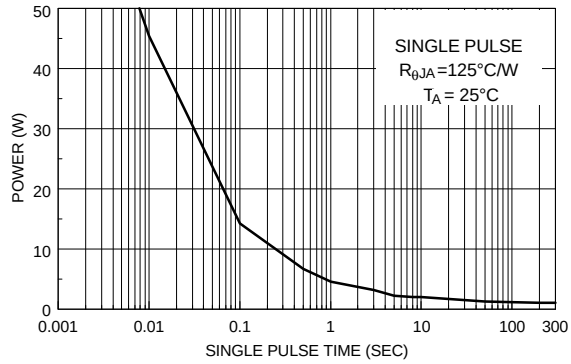



**Figure 10. Single Pulse Maximum Power Dissipation.**

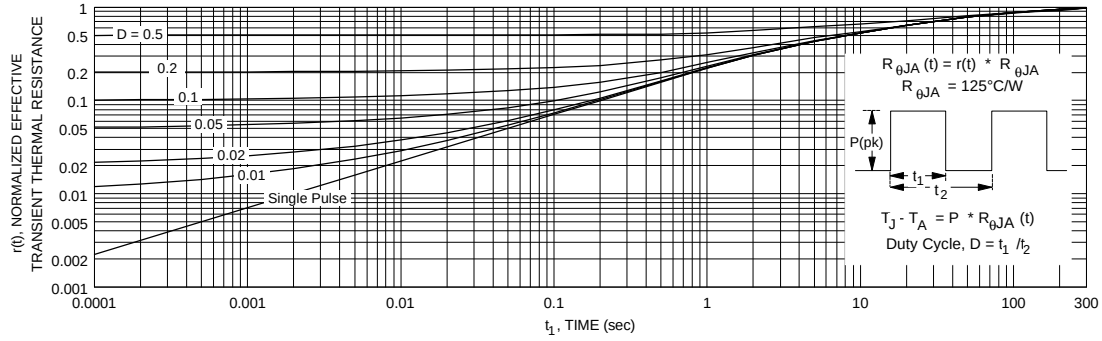


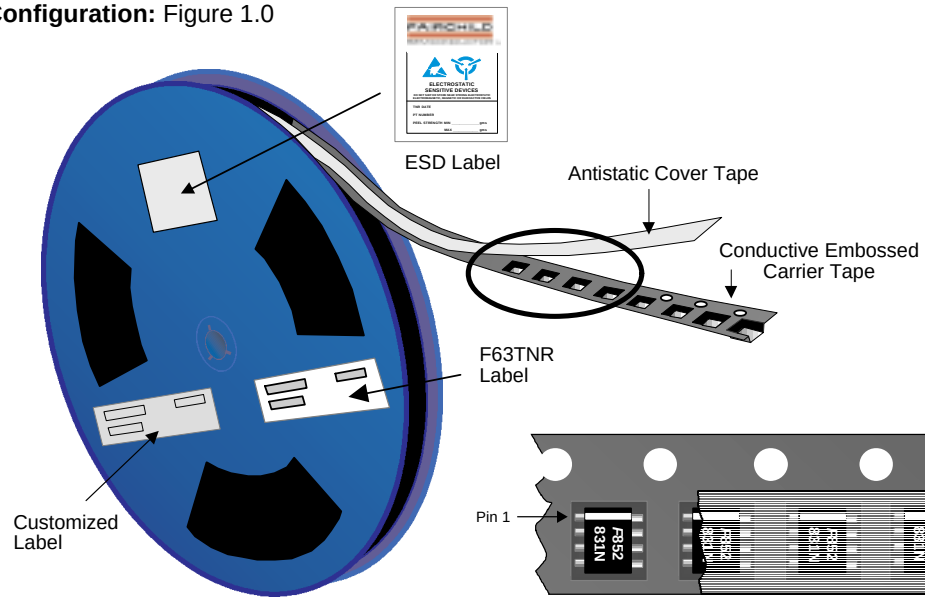

**Figure 11. Transient Thermal Response Curve.**

Thermal characterization performed using the conditions described in Note 1c.
Transient thermal response will change depending on the circuit board design.

# SO-8 Tape and Reel Data and Package Dimensions

FAIRCHILD SEMICONDUCTOR TM

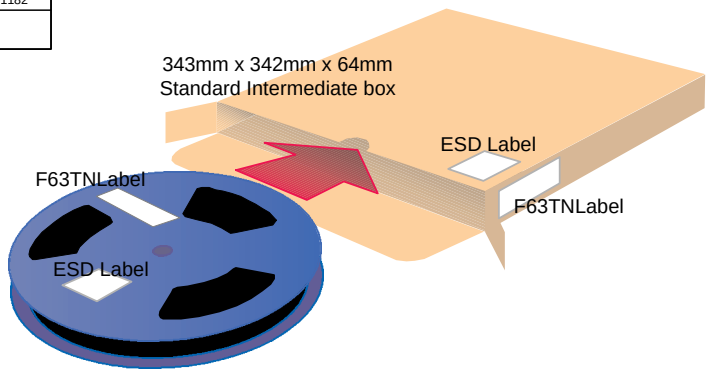
## SOIC(8lds) Packaging Configuration: Figure 1.0



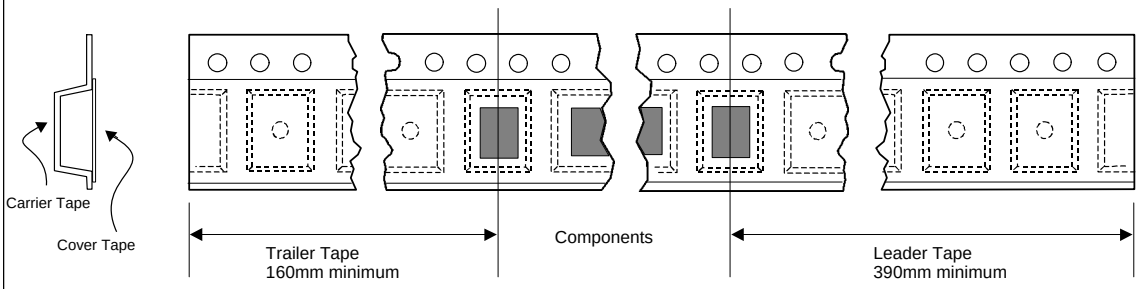

**SOIC-8 Unit Orientation**

| SOIC (8lds) Packaging Information | | | | |
|---|---|---|---|---|
| **Packaging Option** | Standard (no flow code) | L86Z | S62Z | D84Z |
| **Packaging type** | TNR | Rail/Tube | Bag | TNR |
| **Qty per Reel/Tube/Bag** | 2,500 | 95 | 200 | 500 |
| **Reel Size** | 13" Dia | - | - | 7" Dia |
| **Box Dimension (mm)** | 343x64x343 | 530x130x83 | 76x102x127 | 184x187x47 |
| **Max qty per Box** | 5,000 | 30,000 | 1,000 | 2,500 |
| **Weight per unit (gm)** | 0.0774 | 0.0774 | 0.0774 | 0.0774 |
| **Weight per Reel (kg)** | 0.6060 | - | - | 0.1182 |
| **Note/Comments** | | | Bulk | |

F63TNR Label sample

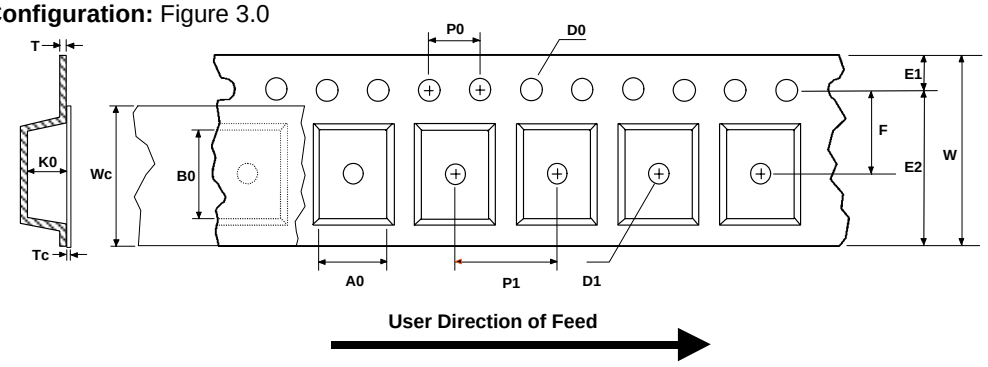




## SOIC(8lds) Tape Leader and Trailer Configuration: Figure 2.0



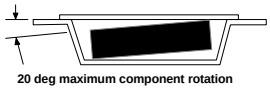
# SO-8 Tape and Reel Data and Package Dimensions, continued

### SOIC(8lds) Embossed Carrier Tape
**Configuration:** Figure 3.0

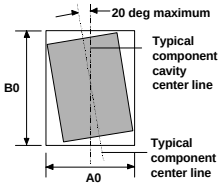



| Dimensions are in millimeter | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pkg type** | **A0** | **B0** | **W** | **D0** | **D1** | **E1** | **E2** | **F** | **P1** | **P0** | **K0** | **T** | **Wc** | **Tc** |
| **SOIC**(8lds) (12mm) | 6.50 +/-0.10 | 5.30 +/-0.10 | 12.0 +/-0.3 | 1.55 +/-0.05 | 1.60 +/-0.10 | 1.75 +/-0.10 | 10.25 min | 5.50 +/-0.05 | 8.0 +/-0.1 | 4.0 +/-0.1 | 2.1 +/-0.10 | 0.450 +/- 0.150 | 9.2 +/-0.3 | 0.06 +/-0.02 |

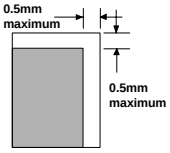
Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).




Sketch A (Side or Front Sectional View)
**Component Rotation**

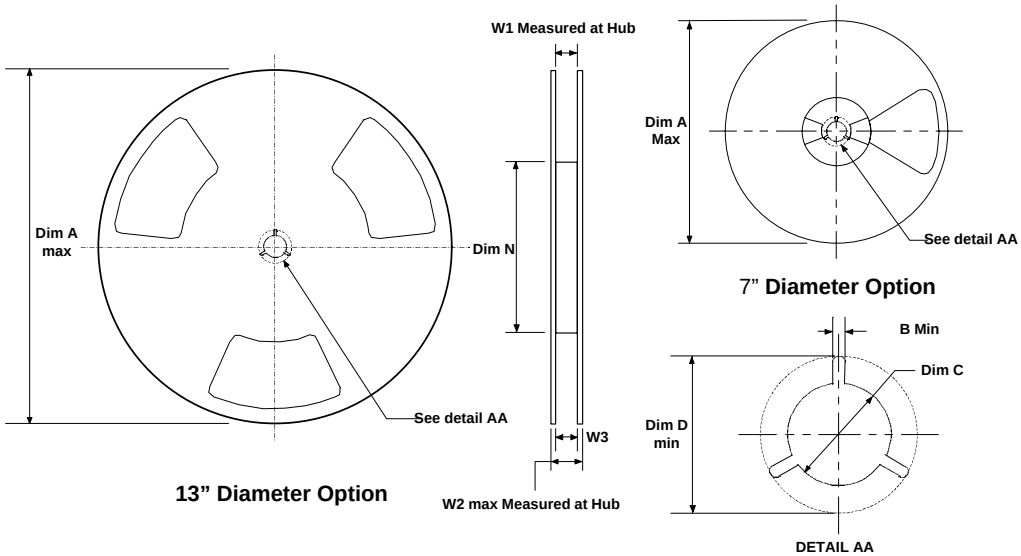



Sketch B (Top View)
**Component Rotation**




Sketch C (Top View)
**Component lateral movement**

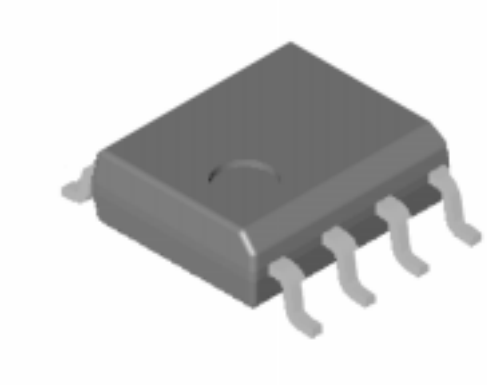
### SOIC(8lds) Reel Configuration: Figure 4.0

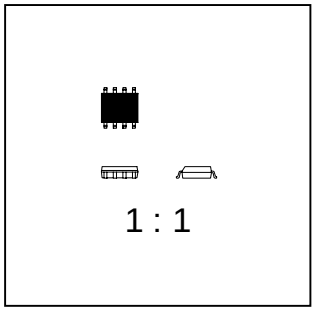



| Dimensions are in inches and millimeters | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Tape Size** | **Reel Option** | **Dim A** | **Dim B** | **Dim C** | **Dim D** | **Dim N** | **Dim W1** | **Dim W2** | **Dim W3 (LSL-USL)** |
| 12mm | 7" Dia | 7.00 177.8 | 0.059 1.5 | 512 +0.020/-0.008 13 +0.5/-0.2 | 0.795 20.2 | 5.906 150 | 0.488 +0.078/-0.000 12.4 +2/0 | 0.724 18.4 | 0.469 – 0.606 11.9 – 15.4 |
| 12mm | 13" Dia | 13.00 330 | 0.059 1.5 | 512 +0.020/-0.008 13 +0.5/-0.2 | 0.795 20.2 | 7.00 178 | 0.488 +0.078/-0.000 12.4 +2/0 | 0.724 18.4 | 0.469 – 0.606 11.9 – 15.4 |

## SO-8 Tape and Reel Data and Package Dimensions, continued

# SOIC-8 (FS PKG Code S1)

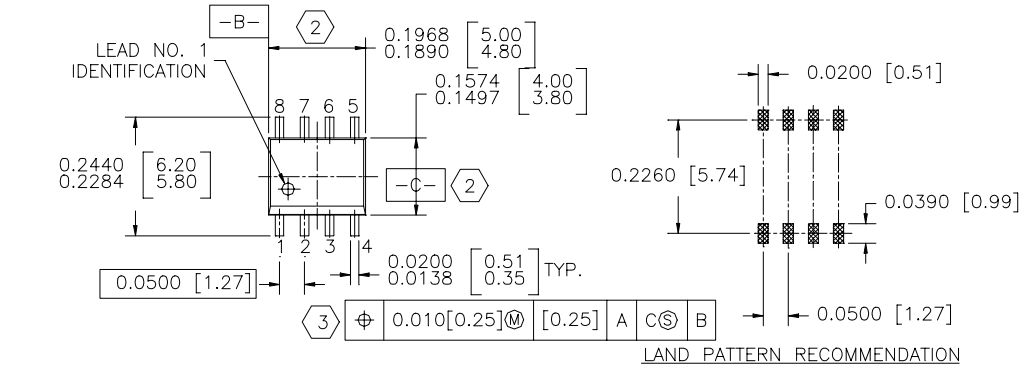


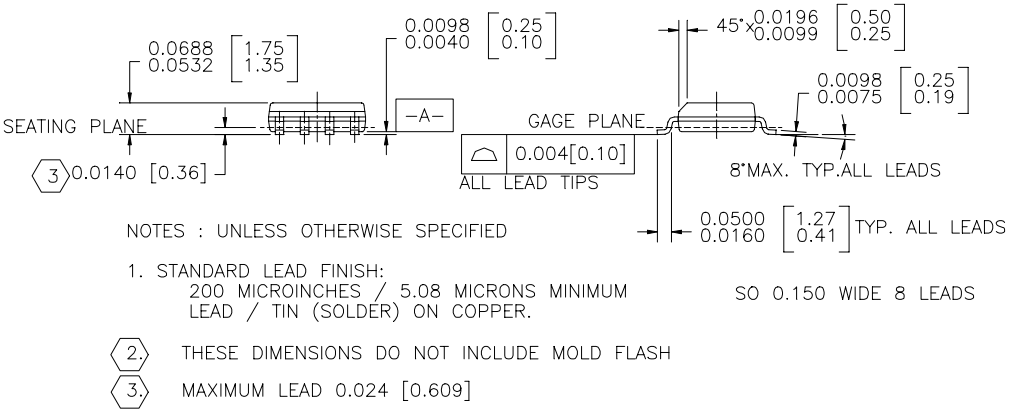



Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0774




NOTES : UNLESS OTHERWISE SPECIFIED

1. STANDARD LEAD FINISH:
   200 MICROINCHES / 5.08 MICRONS MINIMUM
   LEAD / TIN (SOLDER) ON COPPER.

2. THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH

3. MAXIMUM LEAD 0.024 [0.609]

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