

FDS6575

P-Channel 2.5V Specified PowerTrench[®] MOSFET

General Description

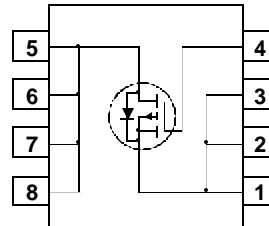
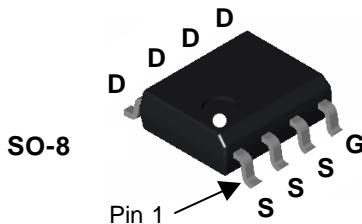
This PChannel 2.5V specified MOSFET is a rugged gate version of Fairchild Semiconductor's advanced PowerTrench process. It has been optimized for power management applications with a wide range of gate drive voltage (2.5V – 8V).

Applications

- Power management
- Load switch
- Battery protection

Features

- –10 A, –20 V. $R_{DS(ON)} = 13 \text{ m}\Omega$ @ $V_{GS} = -4.5 \text{ V}$
 $R_{DS(ON)} = 17 \text{ m}\Omega$ @ $V_{GS} = -2.5 \text{ V}$
- Low gate charge
- High performance trench technology for extremely low $R_{DS(ON)}$
- High current and power handling capability



Absolute Maximum Ratings

$T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	–20	V
V_{GSS}	Gate-Source Voltage	± 8	V
I_D	Drain Current – Continuous	(Note 1a)	A
	– Pulsed	–10	
P_D	Power Dissipation for Single Operation	2.5	W
		1.5	
		1.2	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	–55 to +175	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	50	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1c)	125	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	25	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
FDS6575	FDS6575	13"	12mm	2500 units

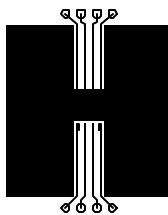
Electrical Characteristics

$T_A = 25^\circ\text{C}$ unless otherwise noted

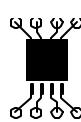
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{\text{GS}} = 0 \text{ V}$, $I_D = -250 \mu\text{A}$	-20			V
$\frac{\Delta \text{BV}_{\text{DSS}}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250 \mu\text{A}$, Referenced to 25°C		-13		mV°C
I_{SS}	Zero Gate Voltage Drain Current	$V_{\text{DS}} = -16 \text{ V}$, $V_{\text{GS}} = 0 \text{ V}$		-1		μA
I_{GSSF}	Gate-Body Leakage, Forward	$V_{\text{GS}} = 8 \text{ V}$, $V_{\text{DS}} = 0 \text{ V}$		100		nA
I_{GSSR}	Gate-Body Leakage, Reverse	$V_{\text{GS}} = -8 \text{ V}$, $V_{\text{DS}} = 0 \text{ V}$		-100		nA
On Characteristics (Note 2)						
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{\text{DS}} = V_{\text{GS}}$, $I_D = -250 \mu\text{A}$	-0.4	-0.6	-1.5	V
$\frac{\Delta V_{\text{GS(th)}}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250 \mu\text{A}$, Referenced to 25°C		3		mV°C
$R_{\text{DS(on)}}$	Static Drain-Source On-Resistance	$V_{\text{GS}} = -4.5 \text{ V}$, $I_D = -10 \text{ A}$ $V_{\text{GS}} = -2.5 \text{ V}$, $I_D = -9 \text{ A}$ $V_{\text{GS}} = -4.5 \text{ V}$, $I_D = -10 \text{ A}$, $T_J = 125^\circ\text{C}$		8.5 11 11	13 17 20	$\text{m}\Omega$
$I_{\text{D(on)}}$	On-State Drain Current	$V_{\text{GS}} = -4.5 \text{ V}$, $V_{\text{DS}} = -5 \text{ V}$	-50			A
g_{FS}	Forward Transconductance	$V_{\text{DS}} = -5 \text{ V}$, $I_D = -10 \text{ A}$		57		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{\text{DS}} = -10 \text{ V}$, $V_{\text{GS}} = 0 \text{ V}$, $f = 1.0 \text{ MHz}$		4951		pF
C_{oss}	Output Capacitance			884		pF
C_{rss}	Reverse Transfer Capacitance			451		pF
Switching Characteristics (Note 2)						
$t_{\text{d(on)}}$	Turn-On Delay Time	$V_{\text{DD}} = -10 \text{ V}$, $I_D = -1 \text{ A}$, $V_{\text{GS}} = -4.5 \text{ V}$, $R_{\text{GEN}} = 6 \Omega$		16	29	ns
t_r	Turn-On Rise Time			9	18	ns
$t_{\text{d(off)}}$	Turn-Off Delay Time			196	314	ns
t_f	Turn-Off Fall Time			78	125	ns
Q_g	Total Gate Charge	$V_{\text{DS}} = -10 \text{ V}$, $I_D = -10 \text{ A}$, $V_{\text{GS}} = -4.5 \text{ V}$		53	74	nC
Q_{gs}	Gate-Source Charge			6		nC
Q_{gd}	Gate-Drain Charge			12		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	$V_{\text{GS}} = 0 \text{ V}$, $I_{\text{S}} = -2.1 \text{ A}$ (Note 2)		-0.6	-1.2	V

Notes:

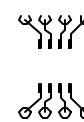
- R_{thJA} is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R_{thJC} is guaranteed by design while R_{thCA} is determined by the user's board design.



a) 50 °C/W when mounted on a 1 in² pad of 2 oz copper



b) 105 °C/W when mounted on a .04 in² pad of 2 oz copper



c) 125 °C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

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

Typical Characteristics

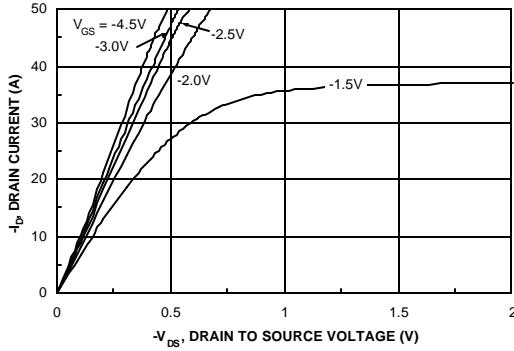


Figure 1. On-Region Characteristics.

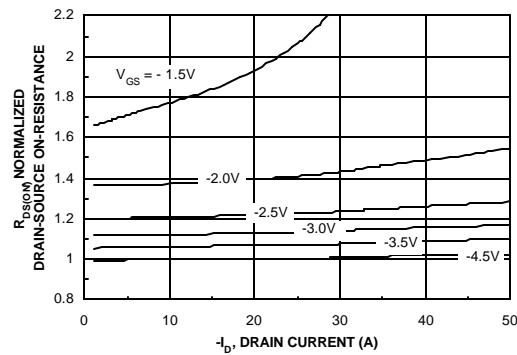


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

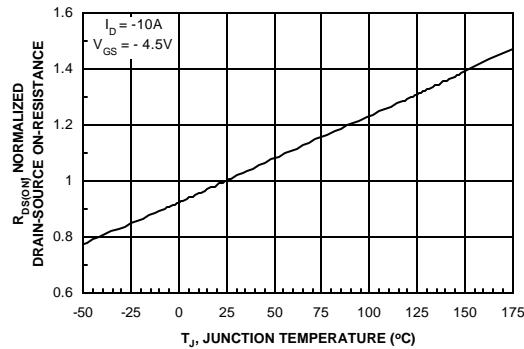


Figure 3. On-Resistance Variation with Temperature.

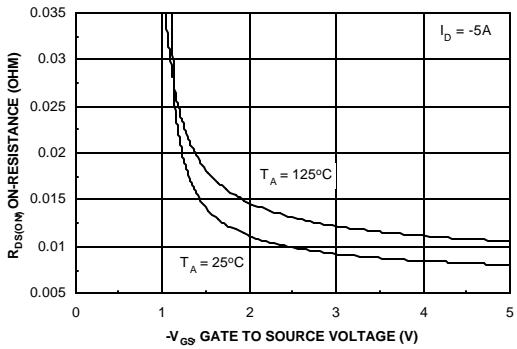


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

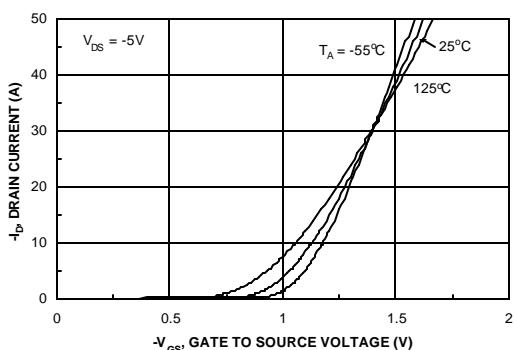


Figure 5. Transfer Characteristics.

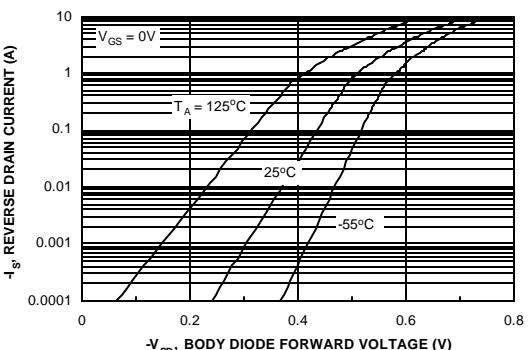


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

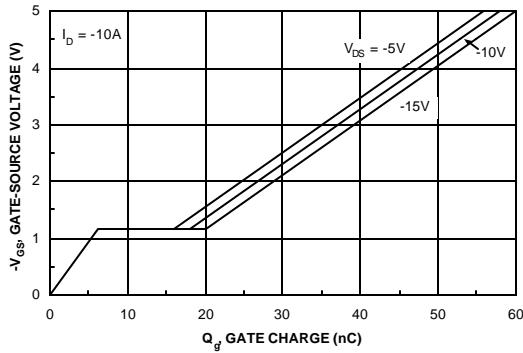


Figure 7. Gate Charge Characteristics.

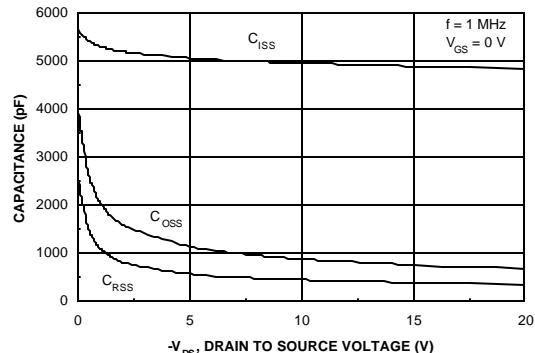


Figure 8. Capacitance Characteristics.

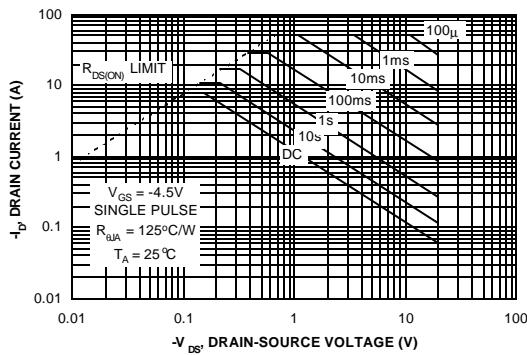


Figure 9. Maximum Safe Operating Area.

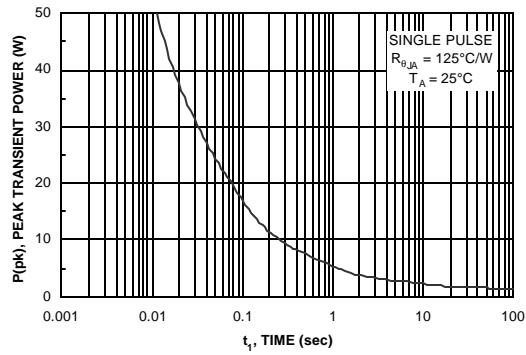


Figure 10. Single Pulse Maximum Power Dissipation.

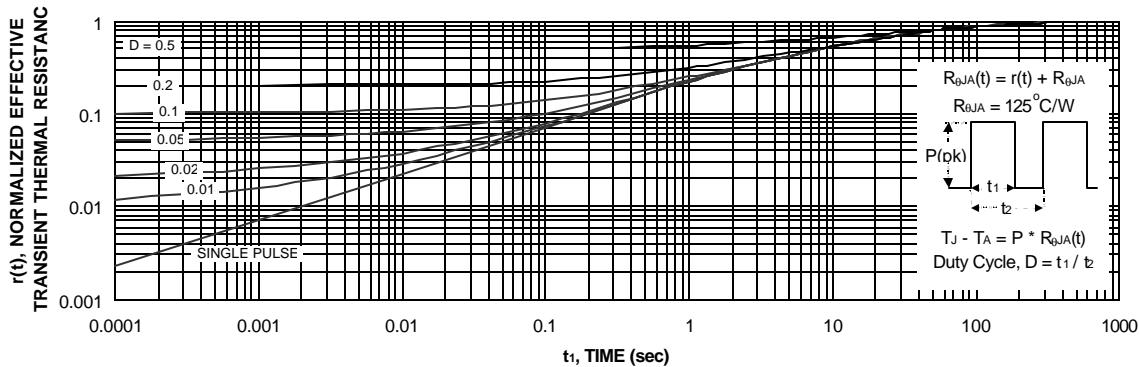


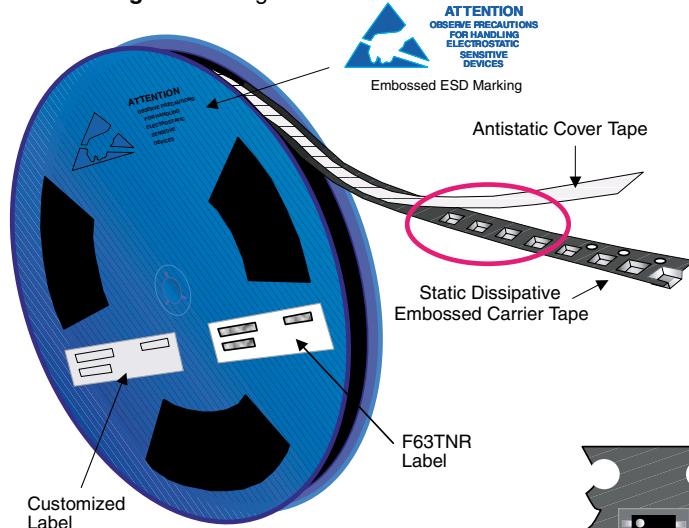
Figure 11. Transient Thermal Response Curve.

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

SOIC-8 Tape and Reel Data



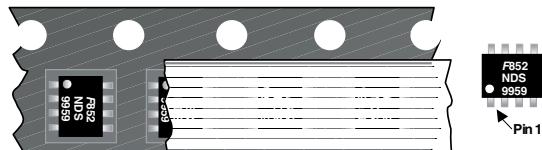
SOIC(8lds) Packaging Configuration: Figure 1.0



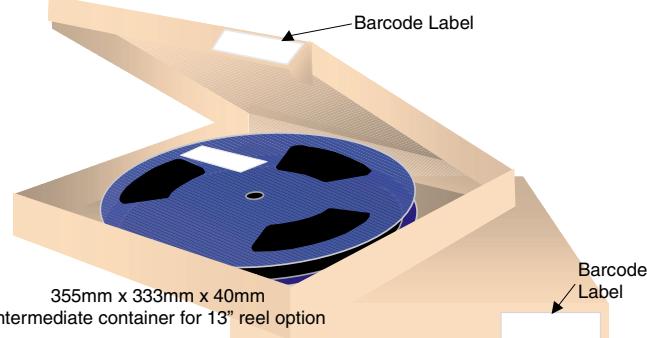
Packaging Description:

SOIC-8 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2,500 units per 13" or 330cm diameter reel. The reels are dark blue in color and is made of polystyrene plastic (anti-static coated). Other option comes in 500 units per 7" or 177cm diameter reel. The and some other options are further described in the Packaging Information table.

These full reels are individually barcode labeled and placed inside a standard intermediate box (illustrated in figure 1.0) made of recyclable corrugated brown paper. One box contains two reels maximum. And these boxes are placed inside a barcode labeled shipping box which comes in different sizes depending on the number of parts shipped.



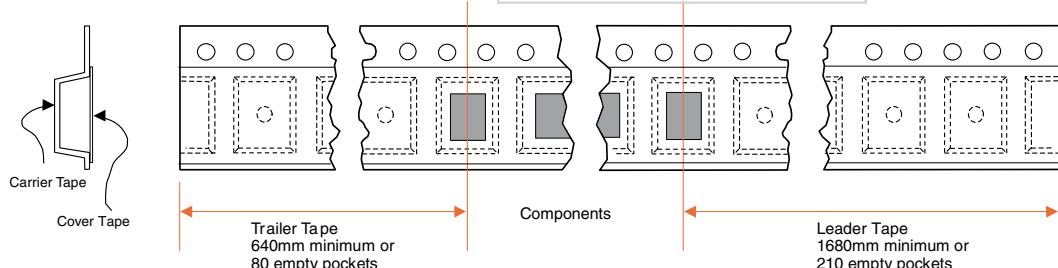
SOIC-8 Unit Orientation



Barcode Label sample



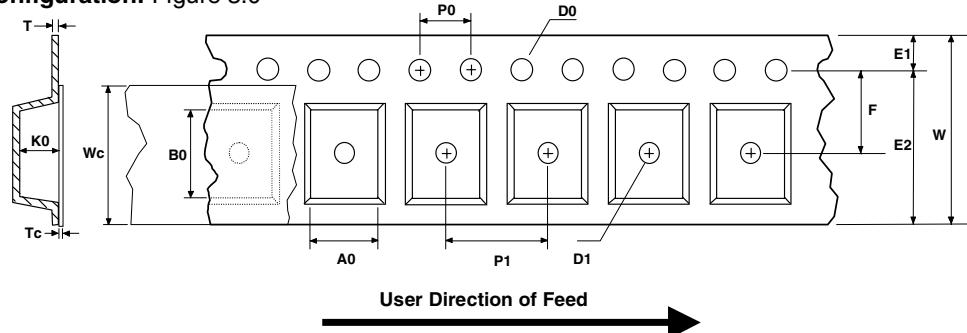
SOIC(8lds) Tape Leader and Trailer Configuration: Figure 2.0



SOIC-8 Tape and Reel Data, continued

SOIC(8lds) Embossed Carrier Tape

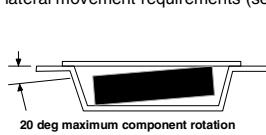
Configuration: Figure 3.0



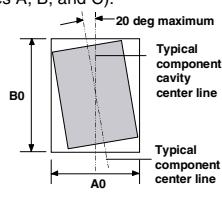
User Direction of Feed

Dimensions are in millimeter														
Pkg type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
SOIC(8lds) (12mm)	5.30 +/-0.10	6.50 +/-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

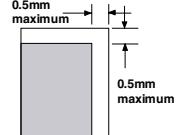
Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)
Component Rotation

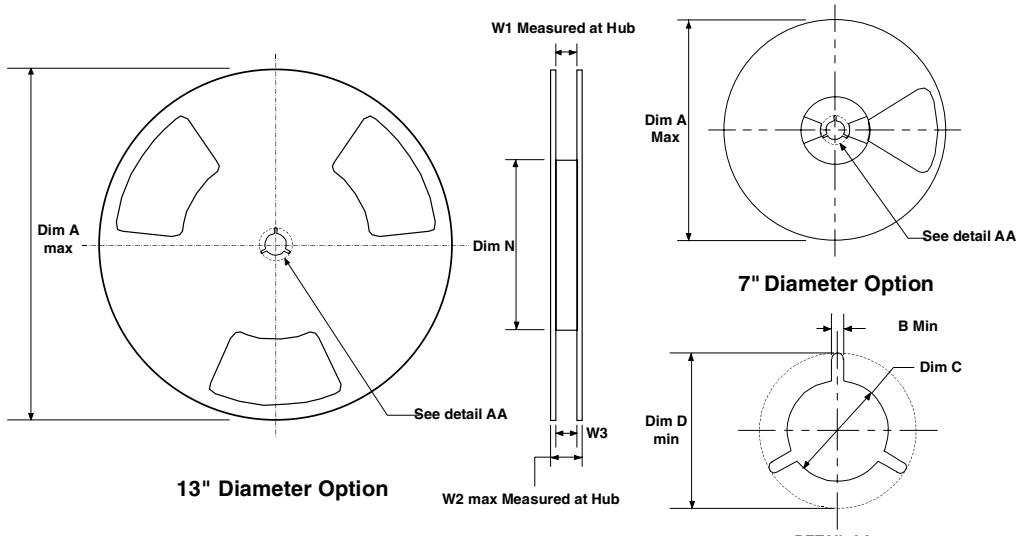


Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

SOIC(8lds) Reel Configuration: Figure 4.0



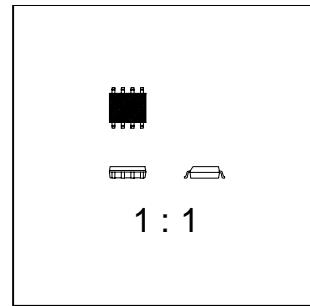
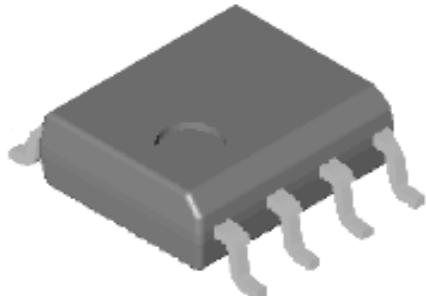
Dimensions are in inches and millimeters

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	2.165 55	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

SOIC-8 Package Dimensions

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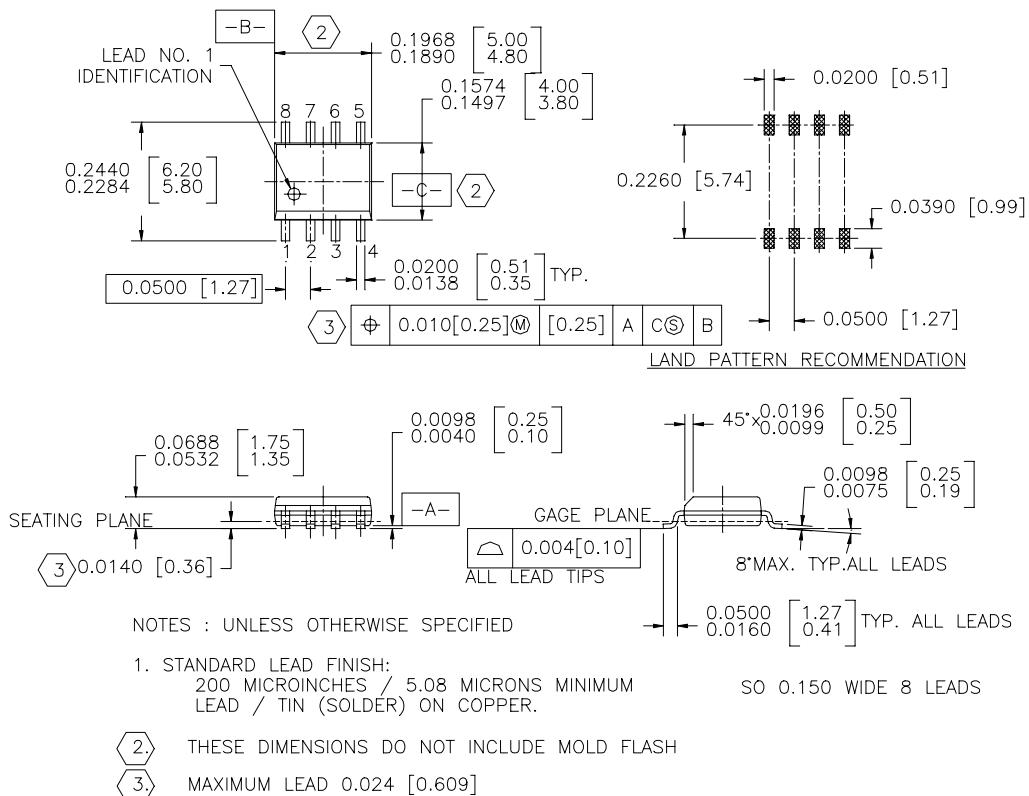
SOIC-8 (FS PKG Code S1)



Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0774



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DenseTrench TM	GTOT TM	Power247 TM	SuperSOT TM -6	
DOME TM	HiSeC TM	PowerTrench [®]	SuperSOT TM -8	
EcoSPARK TM	ISOPLANAR TM	QFET TM	SyncFET TM	
E ² CMOS TM	LittleFET TM	QS TM	TinyLogic TM	
EnSigna TM	MicroFET TM	QT Optoelectronics TM	TruTranslation TM	
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PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
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