

FDS3570

80V N-Channel PowerTrench® MOSFET

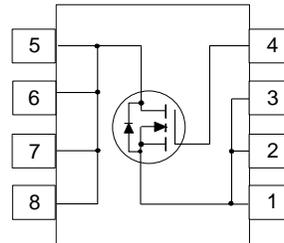
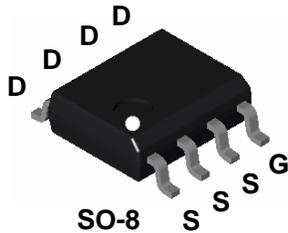
General Description

This N-Channel Logic Level MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers.

These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable $R_{DS(on)}$ specifications resulting in DC/DC power supply designs with higher overall efficiency.

Features

- 9 A, 80 V. $R_{DS(on)} = 0.020 \Omega @ V_{GS} = 10 \text{ V}$
 $R_{DS(on)} = 0.023 \Omega @ V_{GS} = 6 \text{ V}$.
- Fast switching speed.
- High performance trench technology for extremely low $R_{DS(on)}$.
- High power and current handling capability.



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

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	80	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Drain Current - Continuous (Note 1a)	9	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 Junction Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

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

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
FDS3570	FDS3570	13"	12mm	2500 units

Electrical Characteristics T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Drain-Source Avalanche Ratings (Note 2)

W _{DSS}	Single Pulse Drain-Source Avalanche Energy	V _{DD} = 40 V, I _D = 9 A			360	mJ
I _{AR}	Maximum Drain-Source Avalanche Current				9	A

Off Characteristics

BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	80			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		77		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 64 V, V _{GS} = 0 V			1	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	2	2.4	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I _D = 250 μA, Referenced to 25°C		-7		mV/°C
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 9 A V _{GS} = 10 V, I _D = 9 A, T _J = 125°C V _{GS} = 6 V, I _D = 8.4 A		0.015 0.027 0.016	0.020 0.038 0.023	Ω
I _{D(on)}	On-State Drain Current	V _{GS} = 10 V, V _{DS} = 5 V	25			A
g _{FS}	Forward Transconductance	V _{DS} = 5 V, I _D = 7.6 A		40		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz		2750		pF
C _{oss}	Output Capacitance			280		pF
C _{rss}	Reverse Transfer Capacitance			140		pF

Switching Characteristics (Note 2)

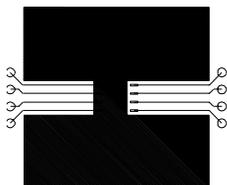
t _{d(on)}	Turn-On Delay Time	V _{DD} = 40 V, I _D = 1 A, V _{GS} = 10 V, R _{GEN} = 6 Ω		20	32	ns
t _r	Turn-On Rise Time			12	24	ns
t _{d(off)}	Turn-Off Delay Time			60	95	ns
t _f	Turn-Off Fall Time			24	38	ns
Q _g	Total Gate Charge	V _{DS} = 40 V, I _D = 9 A, V _{GS} = 10 V		54	76	nC
Q _{gs}	Gate-Source Charge			9.6		nC
Q _{gd}	Gate-Drain Charge			14		nC

Drain-Source Diode Characteristics and Maximum Ratings

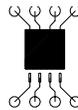
I _S	Maximum Continuous Drain-Source Diode Forward Current			2.1	A	
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 2.1 A (Note 2)		0.72	1.2	V

Notes:

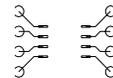
- R_{θJA} is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R_{θJC} is guaranteed by design while R_{θCA} is determined by the user's board design.



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



b) 105° C/W when mounted on a 0.04 in² pad of 2 oz. copper.



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

Scale 1 : 1 on letter size paper

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

Typical Characteristics

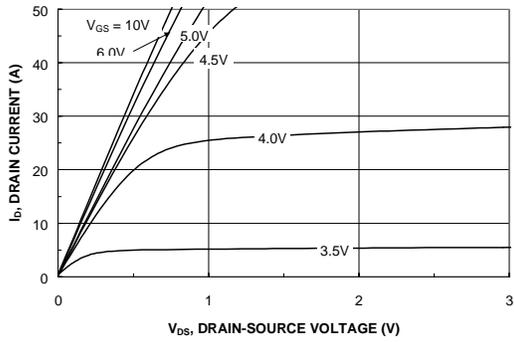


Figure 1. On-Region Characteristics.

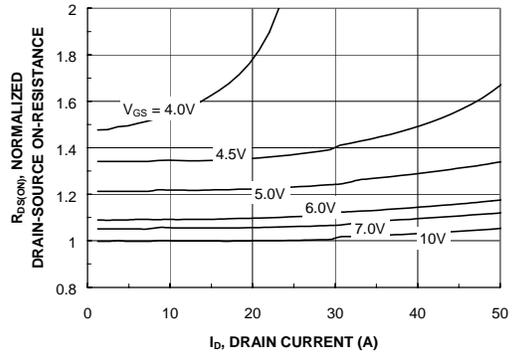


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

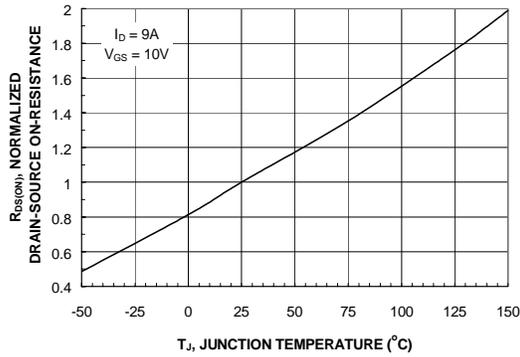


Figure 3. On-Resistance Variation with Temperature.

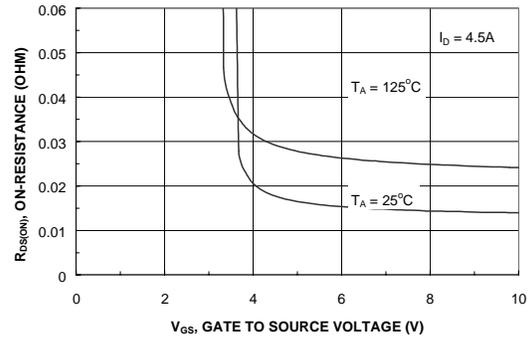


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

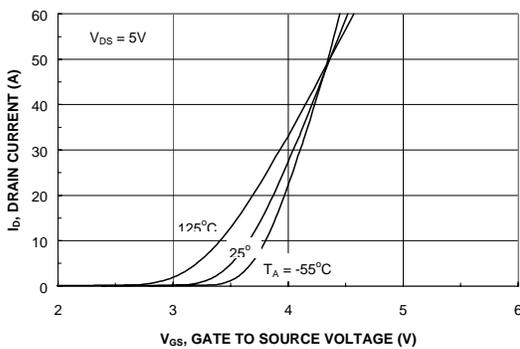


Figure 5. Transfer Characteristics.

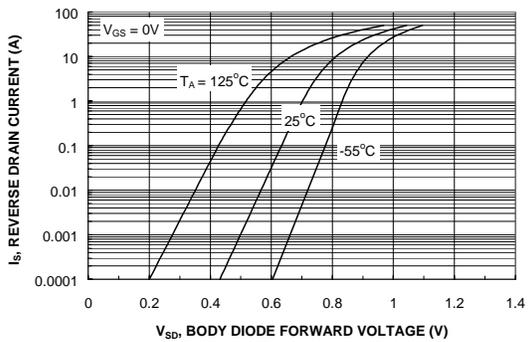
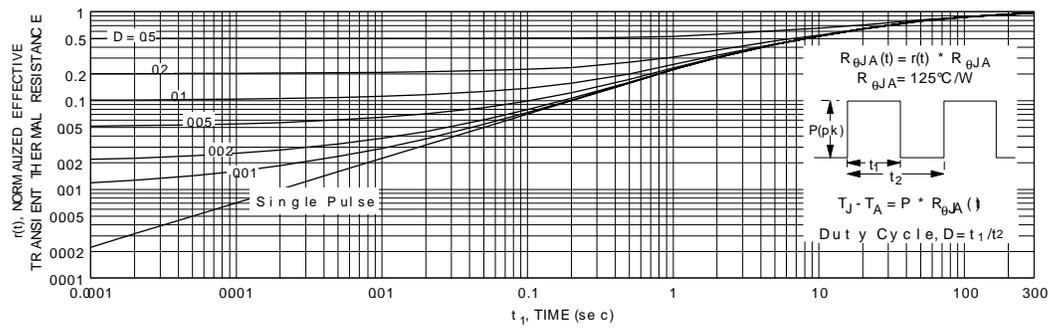
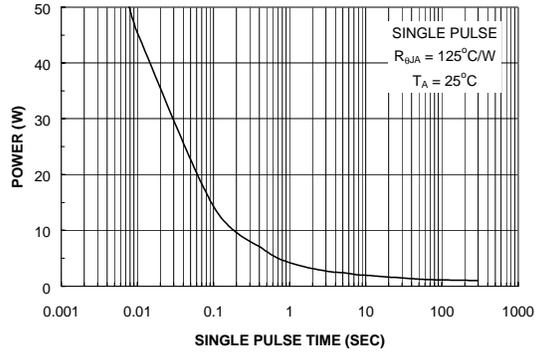
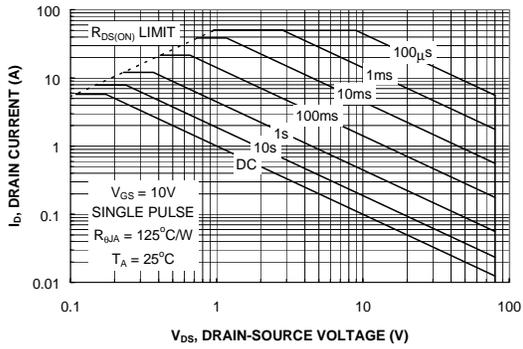
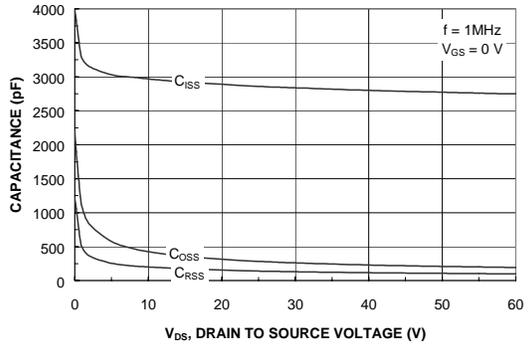
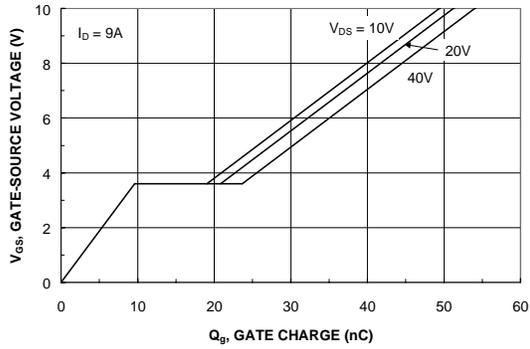


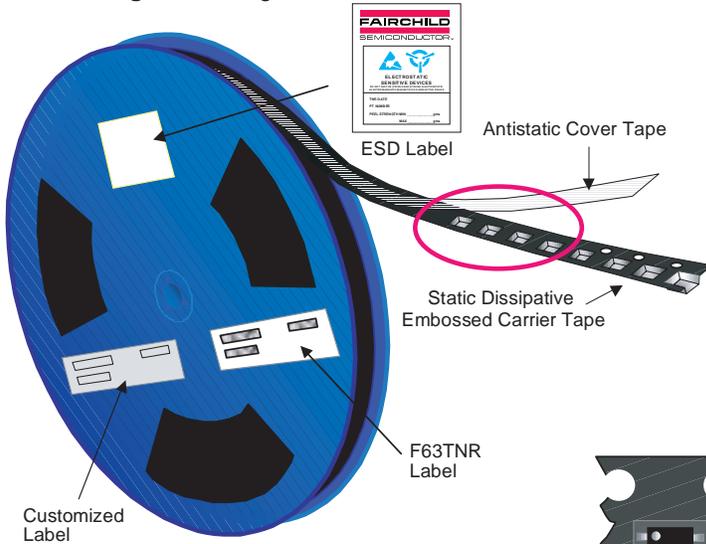
Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.



SOIC-8 Tape and Reel Data



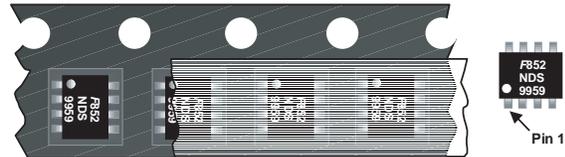
SOIC(8lds) Packaging Configuration: Figure 1.0



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. This 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.

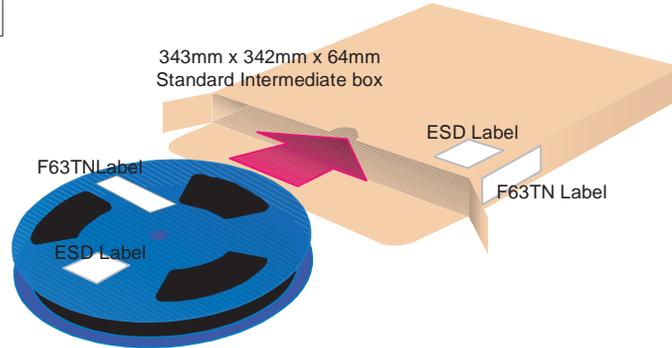


SOIC-8 Unit Orientation

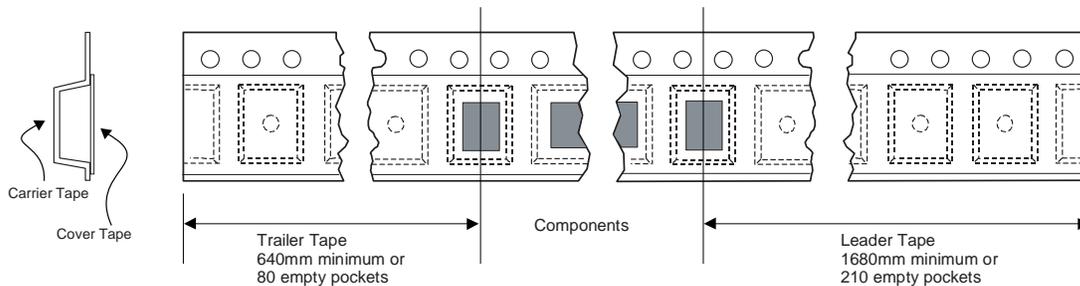
SOIC (8lds) Packaging Information				
Packaging Option	Standard (no flow code)	L86Z	F011	D84Z
Packaging type	TNR	Rail/Tube	TNR	TNR
Qty per Reel/Tube/Bag	2,500	95	4,000	500
Reel Size	13" Dia	-	13" Dia	7" Dia
Box Dimension (mm)	343x64x343	530x130x83	343x64x343	184x187x47
Max qty per Box	5,000	30,000	8,000	1,000
Weight per unit (gm)	0.0774	0.0774	0.0774	0.0774
Weight per Reel (kg)	0.6060	-	0.9696	0.1182
Note/Comments				

F63TNR Label sample

LOT: CBVK741B019	QTY: 2500
FSID: FDS9953A	SPEC:
D/C1: D9842	QTY1: QTY2:
D/C2:	SPEC REV: CPN:
	N/F: F (F63TNR)3

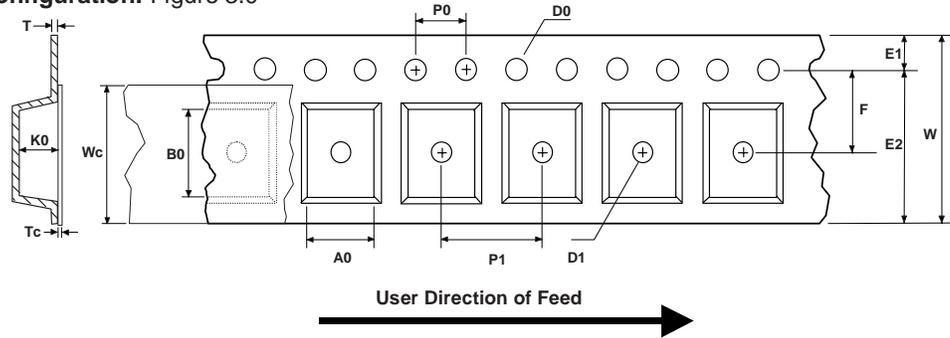


SOIC(8lds) Tape Leader and Trailer Configuration: Figure 2.0



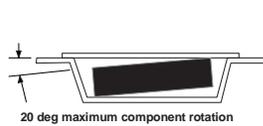
SOIC-8 Tape and Reel Data, continued

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

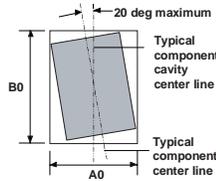


Dimensions are in millimeter														
Pkg type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
SOIC(8lds) (12mm)	6.50 +/-0.10	5.30 +/-0.10	12.0 +/-0.3	1.55 +/-0.05	1.60 +/-0.10	1.75 +/-0.10	10.25 min	5.50 +/-0.05	8.0 +/-0.1	4.0 +/-0.1	2.1 +/-0.10	0.450 +/- 0.150	9.2 +/-0.3	0.06 +/-0.02

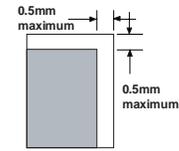
Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)
Component Rotation

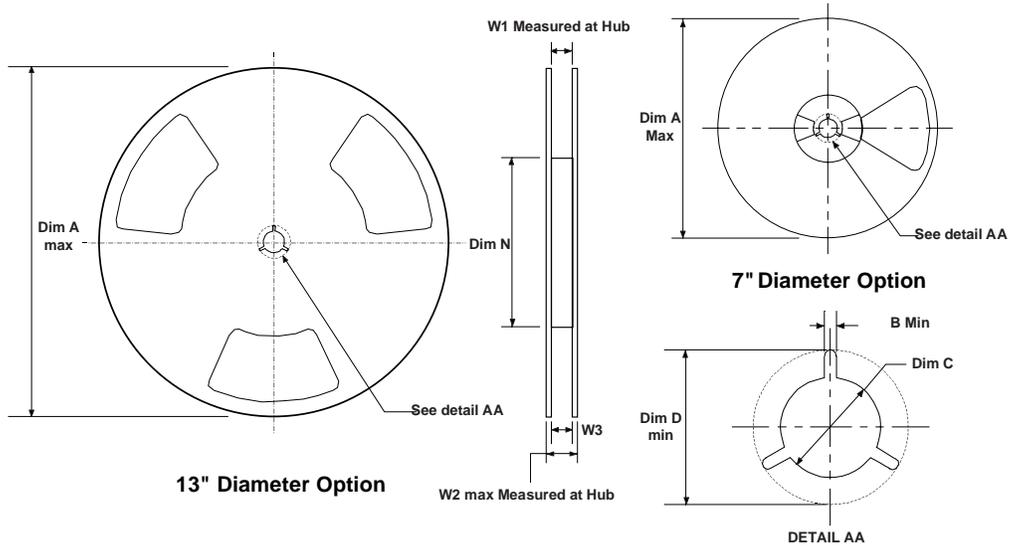


Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

SOIC(8lds) Reel Configuration: Figure 4.0

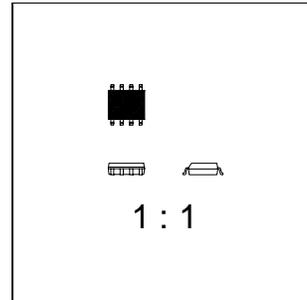
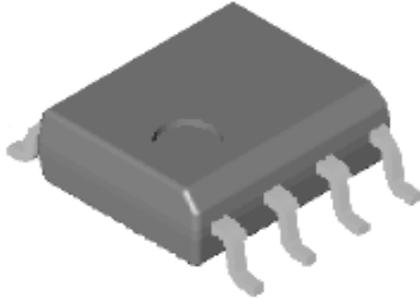


Dimensions are in inches and millimeters									
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
12mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.488 +0.078/-0.000 12.4 +2/0	0.724 18.4	0.469 - 0.606 11.9 - 15.4
12mm	13" Dia	13.00 330	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



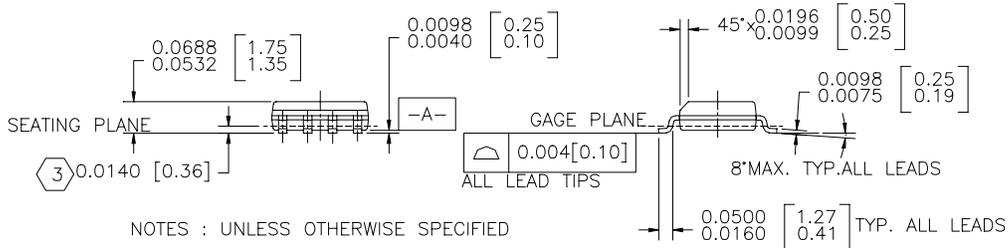
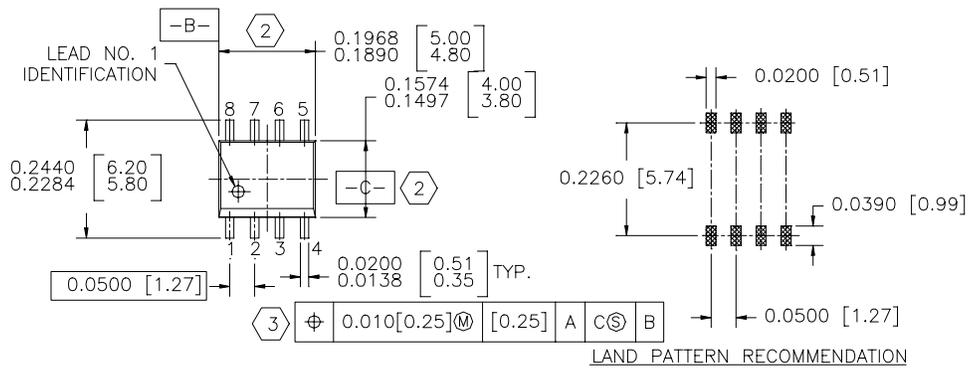
SOIC-8 (FS PKG Code S1)



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

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

SO 0.150 WIDE 8 LEADS

- THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH
- MAXIMUM LEAD 0.024 [0.609]

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DO ^M E TM	ISOP ^L ANAR TM	Quiet Series TM	
E ² CMOS TM	MICROWIRE TM	SILENT SWITCHER [®]	
EnSigna TM	OPTOLOGIC TM	SMART START TM	
FACT TM	OPTOPLANAR TM	SuperSOT TM -3	
FACT Quiet Series TM	PACMAN TM	SuperSOT TM -6	
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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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Datasheet Identification	Product Status	Definition
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No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.