FAIRCHILD

SEMICONDUCTOR ™

FDR6674A

## 30V N-Channel PowerTrench® MOSFET

General Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for "low side" synchronous rectifier operation, providing an extremely low $R_{DS(ON)}$ in a small package.

Applications

- Synchronous rectifier
- DC/DC converter

Features

- 11.5 A, 30 V. $R_{DS(ON)}$ = 9.5 mΩ @ V_{GS} = 4.5 V
  $R_{DS(ON)}$ = 8.5 mΩ @ V_{GS} = 10 V

- High performance trench technology for extremely low $R_{DS(ON)}$

- High power and current handling capability in a smaller footprint than SO8

SuperSOT™-8
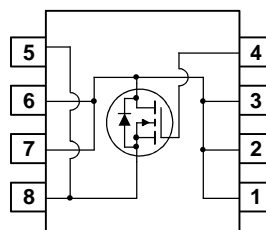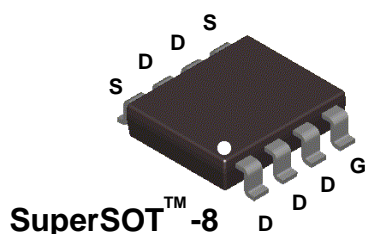
Absolute Maximum Ratings $T_A=25^{\circ}C$ unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		30	V
V_{GSS}	Gate-Source Voltage		±12	V
I_D	Drain Current – Continuous	(Note 1a)	11.5	A
	– Pulsed		50	
P_D	Power Dissipation for Single Operation	(Note 1a)	1.8	W
		(Note 1b)	1.0	
		(Note 1c)	0.9	
T_J, T_{STG}	Operating and Storage Junction Temperature Range		-55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	70	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	20	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
.6674A	FDR6674A	13''	12mm	2500 units

Electrical Characteristics $T_A = 25°C$ unless otherwise noted

| Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0$ V, $I_D = 250$ μA	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250$ μA, Referenced to 25°C		23		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24$ V, $V_{GS} = 0$ V			1	μA
I_{GSSF}	Gate–Body Leakage, Forward	$V_{GS} = 12$ V, $V_{DS} = 0$ V			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	$V_{GS} = -12$ 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	0.8	1.2	2	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250$ μA, Referenced to 25°C		-4		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = 4.5$ V, $I_D = 10.5$ A $V_{GS} = 4.5$ V, $I_D = 10.5$ A, T_J 125°C $V_{GS} = 10$ V, $I_D = 11.5$ A		8.2 11.5 6.8	9.5 16 8	mΩ
$I_{D(on)}$	On–State Drain Current	$V_{GS} = 4.5$ V, $V_{DS} = 5$ V	50			A
g_{FS}	Forward Transconductance	$V_{DS} = 10$ V, $I_D = 11.5$ A		75		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 15$ V, $V_{GS} = 0$ V, f = 1.0 MHz		5070		pF
C_{oss}	Output Capacitance			550		pF
C_{rss}	Reverse Transfer Capacitance			230		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = 10$ V, $I_D = 1$ A, $V_{GS} = 4.5$ V, $R_{GEN} = 6$ Ω		17	25	ns
t_r	Turn–On Rise Time			18	25	ns
$t_{d(off)}$	Turn–Off Delay Time			69	100	ns
t_f	Turn–Off Fall Time			29	42	ns
Q_g	Total Gate Charge	$V_{DS} = 15$ V, $I_D = 11.5$ A, $V_{GS} = 4.5$V		33	46	nC
Q_{gs}	Gate–Source Charge			7.5		nC
Q_{gd}	Gate–Drain Charge			6.8		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)		0.7	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.
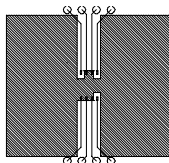
a) 70°/W when mounted on a 1in^2 pad of 2 oz copper
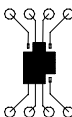
b) 125°/W when mounted on a .04 in^2 pad of 2 oz copper
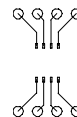
c) 135°/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

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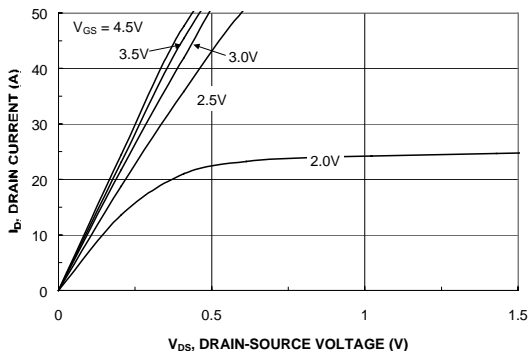
Typical Characteristics
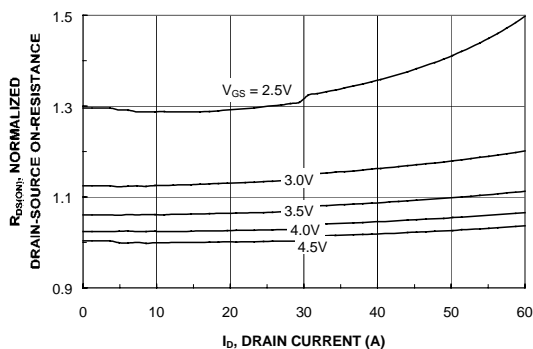

Figure 1. On-Region Characteristics.

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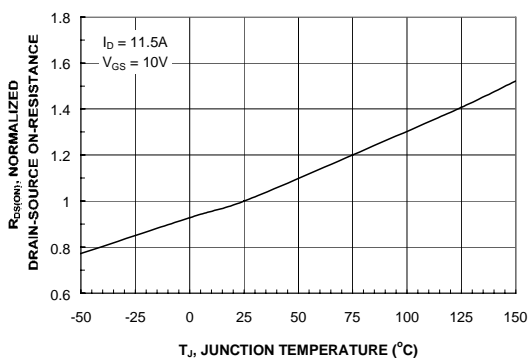Drain Current and Gate Voltage.

Figure 3. On-Resistance Variation
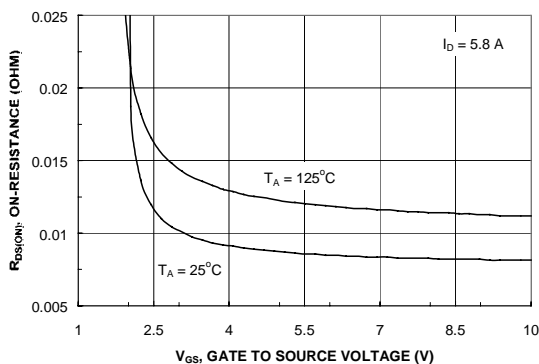withTemperature.

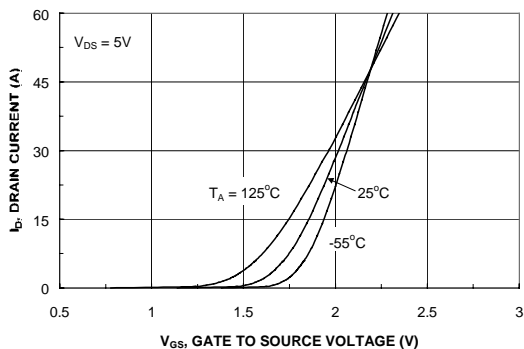Figure 4. On-Resistance Variation with
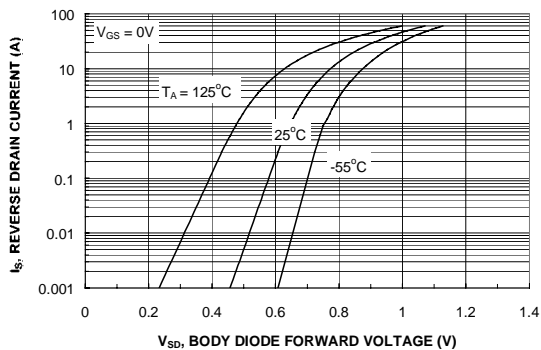Gate-to-Source Voltage.

Figure 5. Transfer Characteristics.

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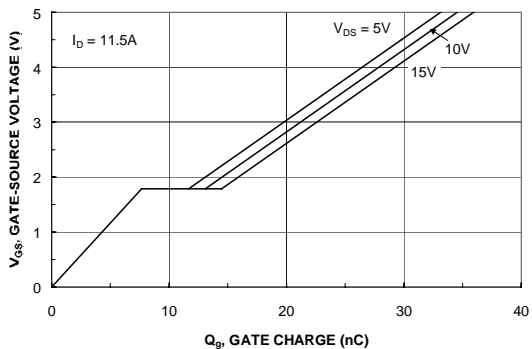
Typical Characteristics

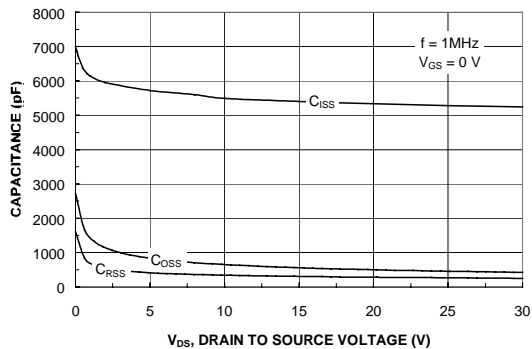**Figure 7. Gate Charge Characteristics.**

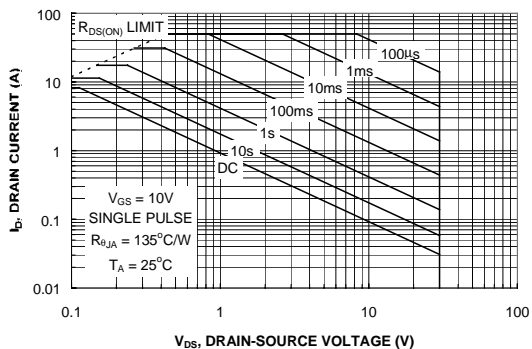**Figure 8. Capacitance Characteristics.**

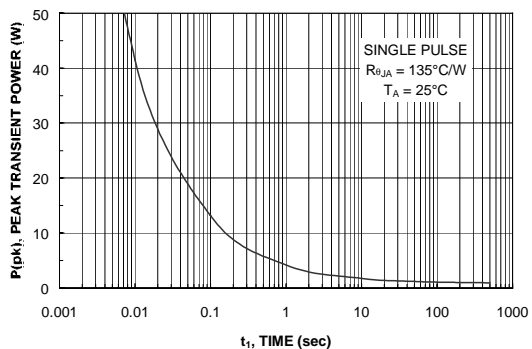**Figure 9. Maximum Safe Operating Area.**

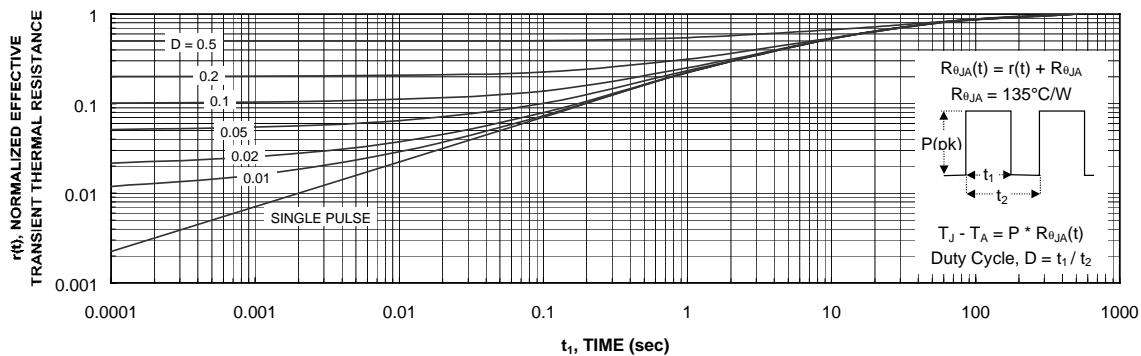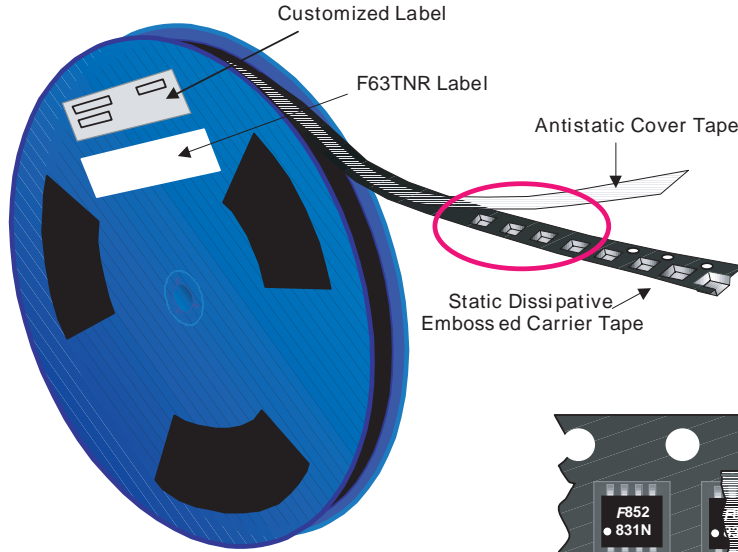**Figure 10. Single Pulse Maximum
Power Dissipation.**

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.

SuperSOT™-8 Tape and Reel Data

SSOT-8 Packaging
Configuration: Figure 1.0

Customized Label

F63TNR Label

Antistatic Cover Tape

Static Dissipative
Embossed Carrier Tape
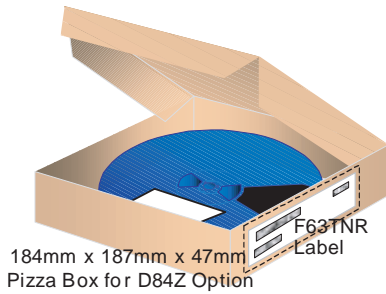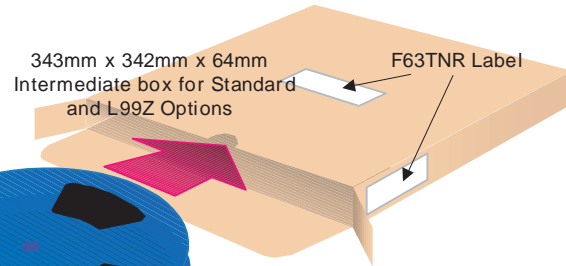
Packaging Description:

SSOT-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 3,000 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.

*F*852
● 831N

Pin 1
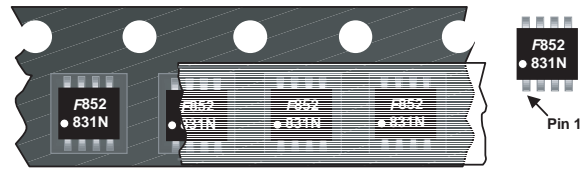
SSOT-8 Unit Orientation

SSOT-8 Packaging Information

Packaging Option	Standard (no flow code)	D84Z
Packaging type	TNR	TNR
Qty per Reel/Tube/Bag	3,000	500
Reel Size	13" Dia	7" Dia
Box Dimension (mm)	343x64x343	184x187x47
Max qty per Box	6,000	1,000
Weight per unit (gm)	0.0416	0.0416
Weight per Reel (kg)	0.5615	0.0980
Note/Comments		

343mm x 342mm x 64mm
Intermediate box for Standard
and L99Z Options

F63TNR Label

F63TNR
Label

F63TNR
Label

184mm x 187mm x 47mm
Pizza Box for D84Z Option

F63TNR Label sample

LOT: CBVK741B019	QTY: 3000
FSID: FDR835N	SPEC:

D/C1: D9842	QTY1:	SPEC REV:
D/C2:	QTY2:	CPN:
		N/F: F (F63TNR)3
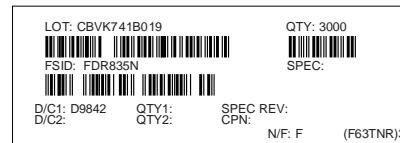
SSOT-8 Tape Leader and Trailer
Configuration: Figure 2.0

Carrier Tape

Cover Tape

Trailer Tape
300mm minimum or
38 empty pockets

Components

Leader Tape
500mm minimum or
62 empty pockets
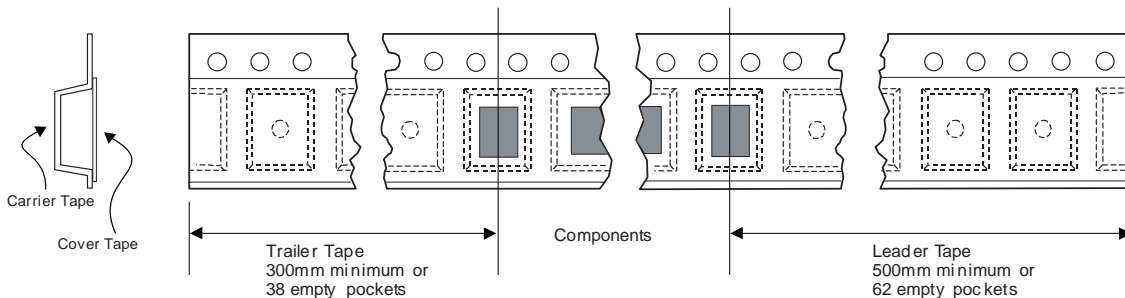
SuperSOT™-8 Tape and Reel Data, continued

SSOT-8 Embossed Carrier Tape
Configuration: Figure 3.0

User Direction of Feed
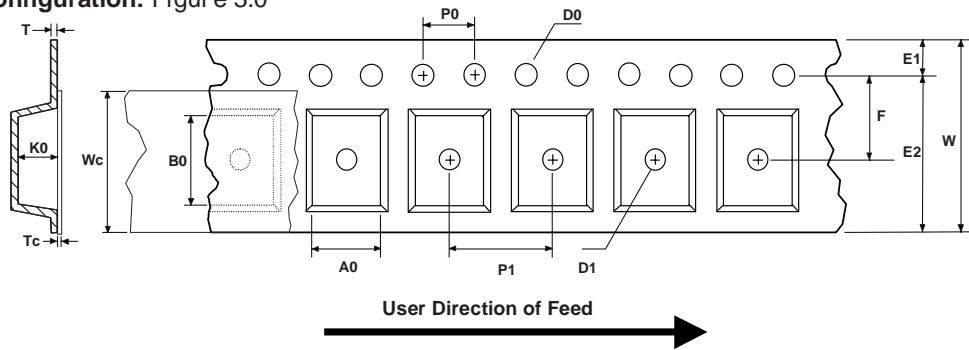
Dimensions are in millimeter													
Pkg type	**A0**	**B0**	**W**	**D0**	**D1**	**E1**	**E2**	**F**	**P1**	**P0**	**K0**	**T**	**Wc**	**Tc**
SSOT-8 (12mm)	4.47 +/-0.10	5.00 +/-0.10	12.0 +/-0.3	1.55 +/-0.05	1.50 +/-0.10	1.75 +/-0.10	10.25 min	5.50 +/-0.05	8.0 +/-0.1	4.0 +/-0.1	1.37 +/-0.10	0.280 +/-0.150	9.5 +/-0.025	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).

20 deg maximum component rotation

Sketch A (Side or Front Sectional View)
Component Rotation

Sketch B (Top View)
Component Rotation

Sketch C (Top View)
Component lateral movement
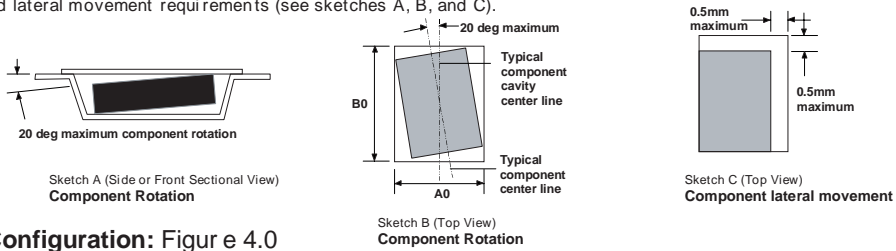
SSOT-8 Reel Configuration: Figure 4.0

13" Diameter Option

7" Diameter Option

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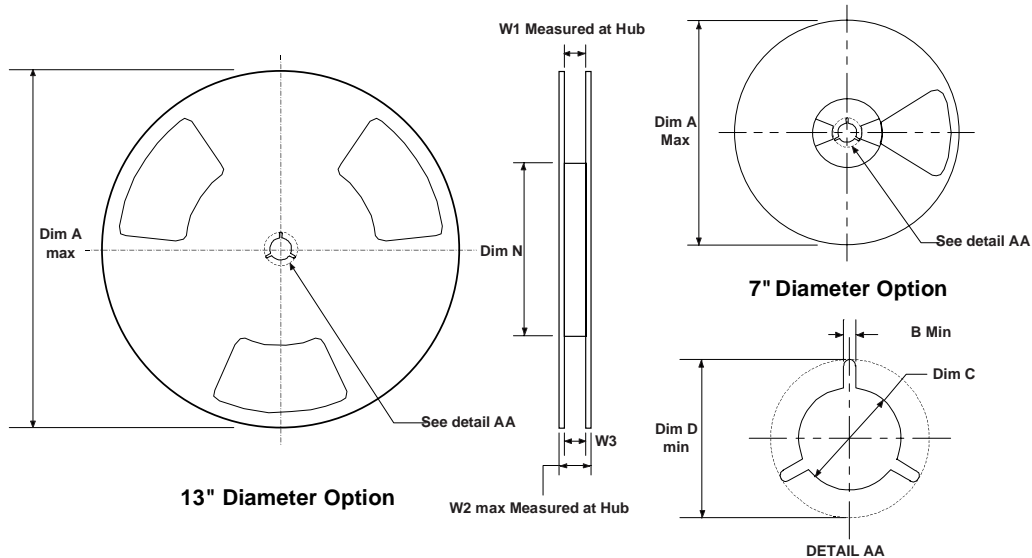
Dimensions are in inches and millimeters									
Tape Size	**Reel Option**	**Dim A**	**Dim B**	**Dim C**	**Dim D**	**Dim N**	**Dim W1**	**Dim W2**	**Dim W3 (LSL-USL)**
12mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	5.906 150	0.488 +0.078/-0.000 12.4 +2/0	0.724 18.4	0.469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

SuperSOT™-8 Package Dimensions

SuperSOT™-8 (FS PKG Code 34, 35)

1 : 1
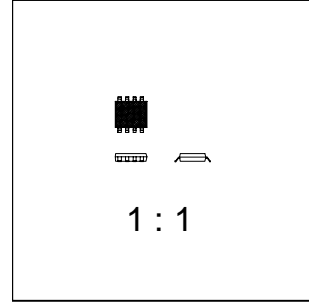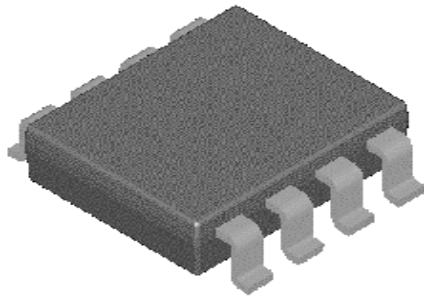
Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0416

0.1600±0.0050 [4.06±0.13]

−A−

0.1300±0.0040 [3.30±0.10]

−B−

0.1856±0.0060 [4.71±0.15]

0.0375 [0.95]TYP.

0.0270 [0.69]TYP.

0.1730 [4.39]

0.0390 [0.99]TYP.

0.0375 [0.95]TYP.

LAND PATTERN RECOMMENDATION

0.0490 / 0.0380 [1.24 / 0.97]

0.0400 [1.02]

0.0080 / 0.0050 [0.20 / 0.13] TYP.

GAGE PLANE

0.0080 [0.20]

−C−

0.003−0.006 [0.08−0.15] C

0.0177±0.0040 [0.45±0.10]TYP.

10.0° TYP.
0.0°

SEATING PLANE

0.0060 / 0.0010 [0.15 / 0.03] TYP.

0.0170 +0.0025 −0.0020 [0.43 +0.06 −0.05] TYP.

CONTROLLING DIMENSION IN INCH
VALUES IN [ ] ARE MILLIMETERS

0.0275 [0.70]

SUPER SOT, 8 LEADS

NOTES : UNLESS OTHERWISE SPECIFIED

1. STANDARD LEAD FINISH TI BE 200 MICROINCHES / 5.08 MICROMETERS
   MINIMUM TIN/LEAD (SOLDER) ON COPPER.

2. NO JEDEC REGISTRATION AS JAN. 1996

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CoolFET™	GlobalOptoisolator™	PowerTrench ®	SuperSOT™-8
CROSSVOLT™	GTO™	QFET™	SyncFET™
DenseTrench™	HiSeC™	QS™	TinyLogic™
DOME™	ISOPLANAR™	QT Optoelectronics™	UHC™
EcoSPARK™	LittleFET™	Quiet Series™	UltraFET ®
E²CMOS™	MicroFET™	SILENT SWITCHER ®	VCX™
EnSigna™	MICROWIRE™	SMART START™	
FACT™	OPTOLOGIC™	Star* Power™	
FACT Quiet Series™	OPTOPLANAR™	Stealth™	

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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.

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.
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.