FAIRCHILD SEMICONDUCTOR™

August 2001

FDC6331L

Integrated Load Switch

General Description

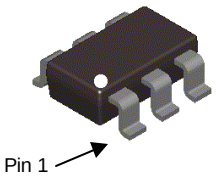
This device is particularly suited for compact power management in portable electronic equipment where 2.5V to 8V input and 2.8A output current capability are needed. This load switch integrates a small N-Channel power MOSFET (Q1) that drives a large PChannel power MOSFET (Q2) in one tiny SuperSOT™-6 package.

Applications

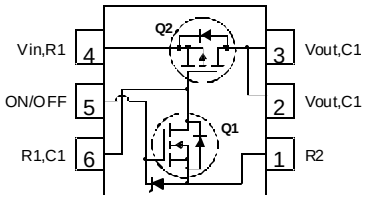
- Load switch
- Power management

Features

- –2.8 A, –8 V. $R_{DS(ON)}$ = 55 mΩ @ V_{GS} = –4.5 V
  $R_{DS(ON)}$ = 70 mΩ @ V_{GS} = –2.5 V
  $R_{DS(ON)}$ = 100 mΩ @ V_{GS} = –1.8 V
- Control MOSFET (Q1) includes Zener protection for ESD ruggedness (>6KV Human body model)
- High performance trench technology for extremely low $R_{DS(ON)}$

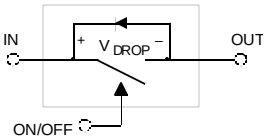


SuperSOT™-6



See Application Circuit

Equivalent Circuit



Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{IN}	Maximum Input Voltage		± 8	V
$V_{ON/OFF}$	High level ON/OFF voltage range		–0.5 to 8	V
I_{Load}	Load Current – Continuous	(Note 1)	–2.8	A
	– Pulsed		–9	
P_D	Maximum Power Dissipation	(Note 1)	0.7	W
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 1)	180	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	60	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
.331	FDC6331L	7”	8mm	3000 units

Electrical Characteristics

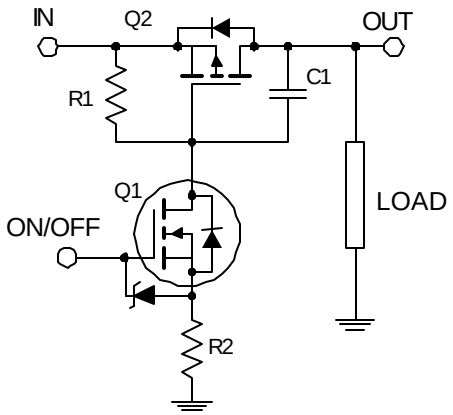
T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{IN}	Vin Breakdown Voltage	$V_{ON/OFF}$ = 0 V, I_D = –250 µA	8			V
I_{Load}	Zero Gate Voltage Drain Current	V_{IN} = 6.4 V, $V_{ON/OFF}$ = 0 V			–1	µA
I_{FL}	Leakage Current, Forward	$V_{ON/OFF}$ = 0 V, V_{IN} = 8 V			–100	nA
I_{RL}	Leakage Current, Reverse	$V_{ON/OFF}$ = 0 V, V_{IN} = –8 V			100	nA
On Characteristics (Note 2)						
$V_{ON/OFF\ (th)}$	Gate Threshold Voltage	V_{IN} = $V_{ON/OFF}$, I_D = –250 µA	0.4	0.9	1.5	V
$R_{DS(on)}$	Static Drain–Source On–Resistance (Q2)	V_{IN} = 4.5 V, I_D = –2.8A		34	55	mΩ
		V_{IN} = 2.5 V, I_D = –2.5 A		45	70	
		V_{IN} = 1.8 V, I_D = –2.0 A		64	100	
$R_{DS(on)}$	Static Drain–Source On–Resistance (Q1)	V_{IN} = 4.5 V, I_D = 0.4A		3.1	4	Ω
		V_{IN} = 2.7 V, I_D = 0.2 A		3.8	5	
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				–0.6	A
V_{SD}	Drain–Source Diode Forward Voltage	$V_{ON/OFF}$ = 0 V, I_S = –0.6 A (Note 2)			–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 $R_{\theta JA}$ is determined by the user's board design.

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

FDC6331L Load Switch Application Circuit



External Component Recommendation:
For additional in-rush current control, R2 and C1 can be added. For more information, see application note AN1030.

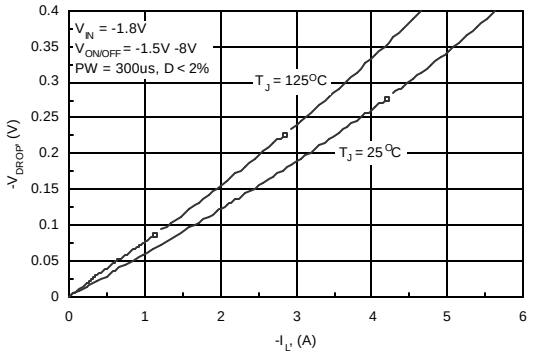


Figure 1. Conduction Voltage Drop Variation with Load Current.

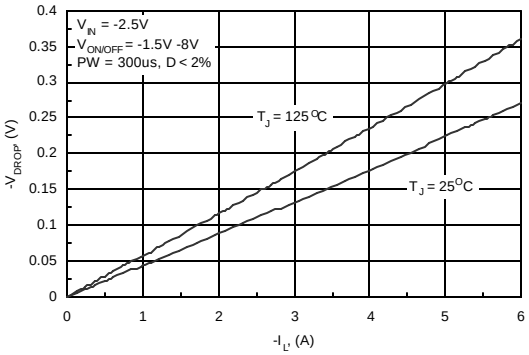


Figure 2. Conduction Voltage Drop Variation with Load Current.

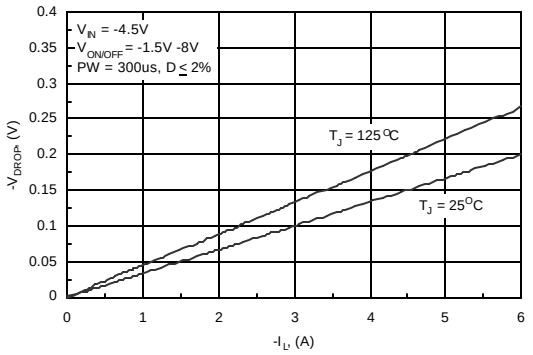


Figure 3. Conduction Voltage Drop Variation with Load Current.

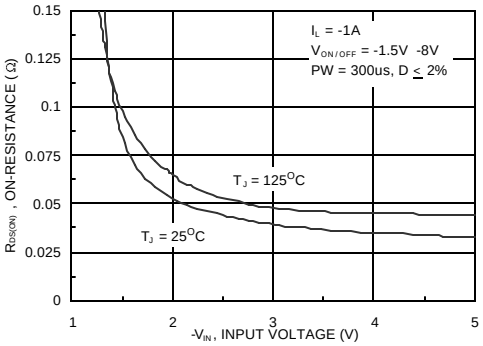
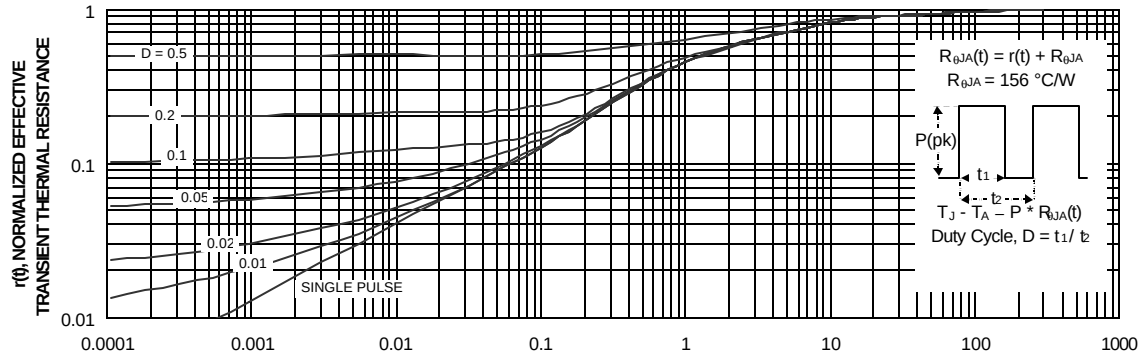


Figure 4. On-Resistance Variation With Input Voltage



SuperSOT™-6 Tape and Reel Data

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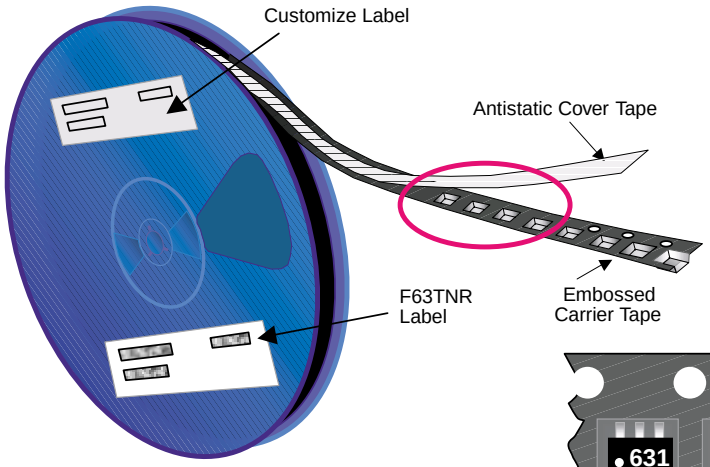
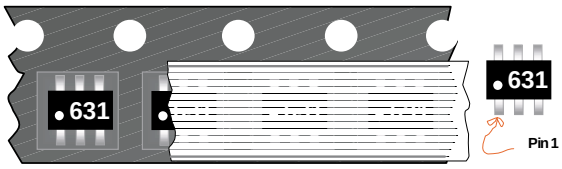
SSOT-6 Packaging Configuration: Figure 1.0



Packaging Description:

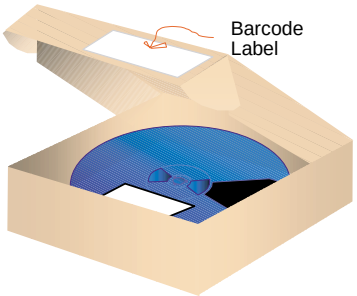
SSOT-6 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 177cm diameter reel. The reels are dark blue in color and is made of polystyrene plastic (anti-static coated). Other option comes in 10,000 units per 13" or 330cm diameter reel. This and some other options are described in the Packaging Information table.

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

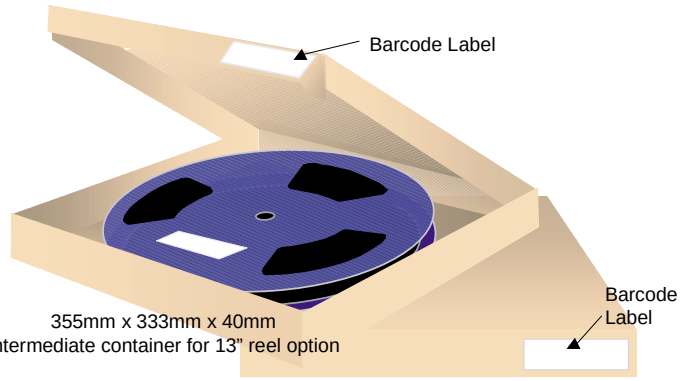


SSOT-6 Unit Orientation

SSOT-6 Packaging Information		
Packaging Option	Standard (no flow code)	D87Z
Packaging type	TNR	TNR
Qty per Reel/Tube/Bag	3,000	10,000
Reel Size	7" Dia	13"
Box Dimension (mm)	193x183x80	355x333x40
Max qty per Box	15,000	30,000
Weight per unit(gm)	0.0158	0.0158
Weight per Reel (kg)	0.1440	0.4700
Note/Comments		



193mm x 183mm x 80mm
Pizza Box for Standard Option

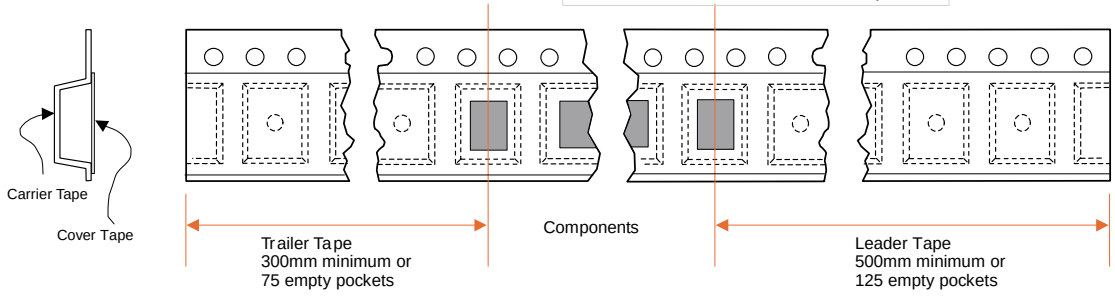


355mm x 333mm x 40mm
Intermediate container for 13" reel option

Barcode Label sample

LOT: CBVK741B019 QTY: 3000
FSID: FDC633N SPEC:
D/C1: D9842AB QTY1: SPEC REV:
D/C2: QTY2: CPN:
FAIRCHILD SEMICONDUCTOR CORPORATION (F63T

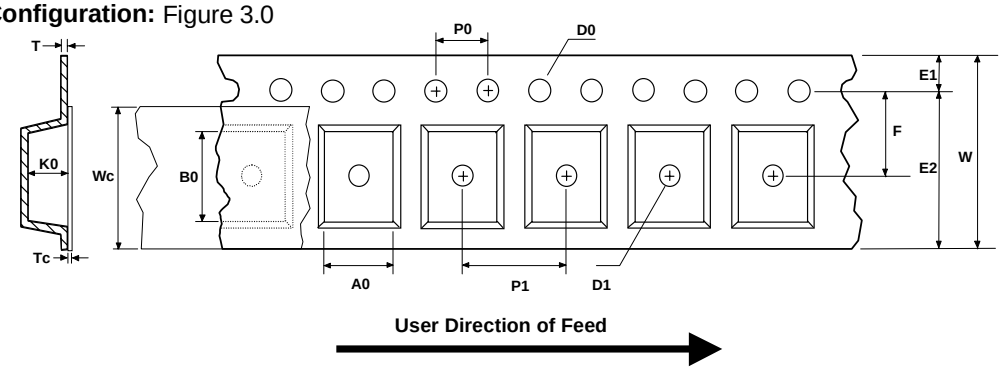
SSOT-6 Tape Leader and Trailer Configuration: Figure 2.0



SuperSOT™-6 Tape and Reel Data, continued

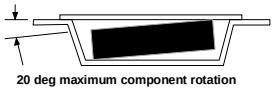
SSOT-6 Embossed Carrier Tape

Configuration: Figure 3.0

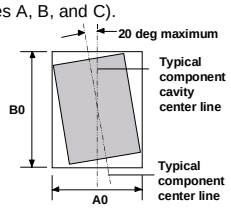


Dimensions are in millimeter														
Pkg type	**A0**	**B0**	**W**	**D0**	**D1**	**E1**	**E2**	**F**	**P1**	**P0**	**K0**	**T**	**Wc**	**Tc**
SSOT-6 (8mm)	3.23 +/-0.10	3.18 +/-0.10	8.0 +/-0.3	1.55 +/-0.05	1.125 +/-0.125	1.75 +/-0.10	6.25 min	3.50 +/-0.05	4.0 +/-0.1	4.0 +/-0.1	1.37 +/-0.10	0.255 +/-0.150	5.2 +/-0.3	0.06 +/-0.02

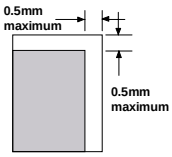
Notes: A0, B0, and K0 dimensions are determined with respect to the EIA/Jedec RS-481 rotational and lateral movement requirements (see sketches A, B, and C).



Sketch A (Side or Front Sectional View)
Component Rotation

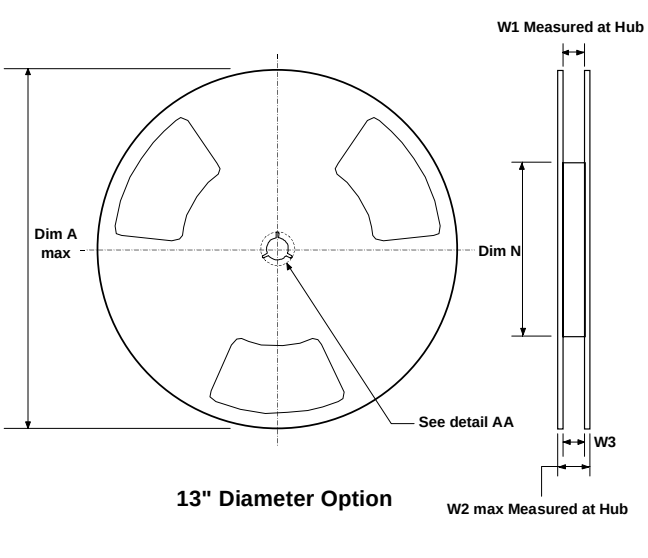


Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

SSOT-6 Reel Configuration: Figure 4.0

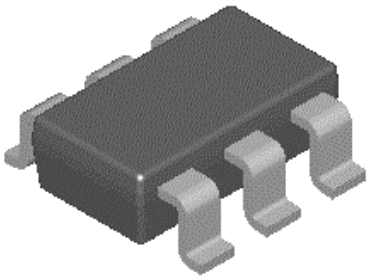


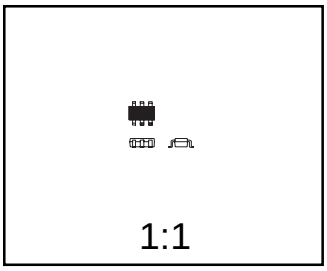
Dimensions are in inches and millimeters									
Tape Size	**Reel Option**	**Dim A**	**Dim B**	**Dim C**	**Dim D**	**Dim N**	**Dim W1**	**Dim W2**	**Dim W3 (LSL-USL)**
8mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 – 0.429 7.9 – 10.9
8mm	13" Dia	13.00 330	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	4.00 100	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 – 0.429 7.9 – 10.9

SuperSOT™-6 Package Dimensions

FAIRCHILD SEMICONDUCTOR™

SuperSOT™-6 (FS PKG Code 31, 33)

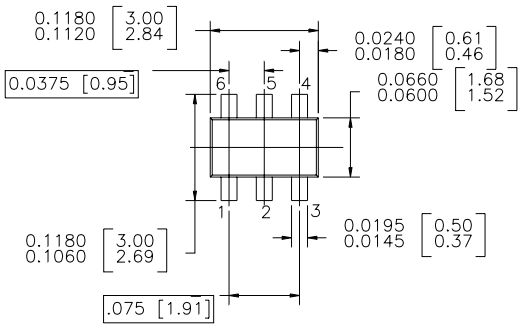


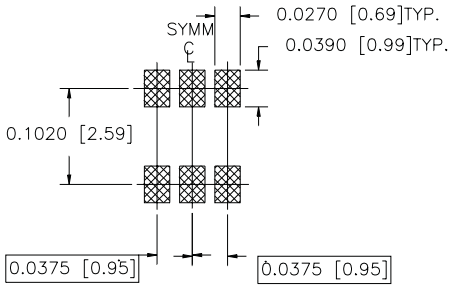


Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0158





LAND PATTERN RECOMMENDATION

CONTROLLING DIMENSION IS INCH
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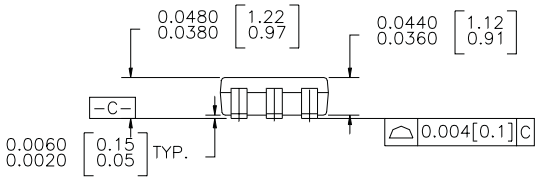

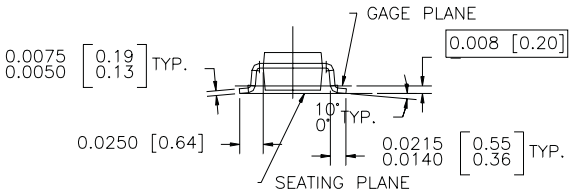

NOTES : UNLESS OTHERWISE SPECIFIED

1.0 STANDARD LEAD FINISH : 150 MICROINCHES 93.81 MICROMETERS)
MINIMUM TIN / LEAD (SOLDER) ON COPPER.

2.0 NO JEDEC REGISTRATION AS OF JULY 1996

SUPER SOT 6 LEADS

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DenseTrench™	GTO™	Power247™	SuperSOT™-6	
DOME™	HiSeC™	PowerTrench®	SuperSOT™-8	
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E^2CMOS™	LittleFET™	QS™	TinyLogic™	
EnSigna™	MicroFET™	QT Optoelectronics™	TruTranslation™	
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FACT Quiet Series™	MICROWIRE™	SILENT SWITCHER®	UltraFET®	

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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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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.
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