FAIRCHILD SEMICONDUCTOR TM

August 1998

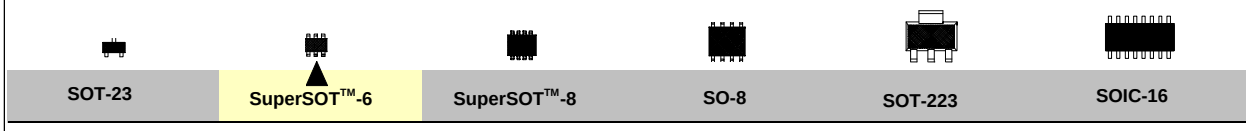
FDC6325L
Integrated Load Switch

General Description

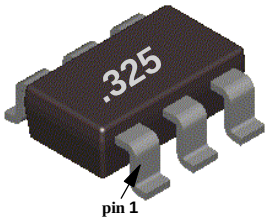
This device is particularly suited for compact power management in portable electronic equipment where 2.5V to 8V input and 1.8A output current capability are needed. This load switch integrates a small N-Channel power MOSFET (Q1) which drives a large P-Channel power MOSFET (Q2) in one tiny SuperSOT™-6 package.

Features

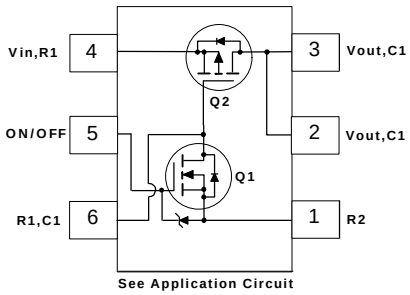
- V_{DROP}=0.2V @ V_{IN}=5V, I_L=1.5A. $R_{(ON)}$ = 0.13Ω
  V_{DROP}=0.2V @ V_{IN}=3.3V, I_L=1.2A. $R_{(ON)}$ = 0.16Ω
  V_{DROP}=0.2V @ V_{IN}=2.5V, I_L=1A. $R_{(ON)}$ = 0.18Ω.
- SuperSOT™-6 package design using copper lead frame for superior thermal and electrical capabilities.

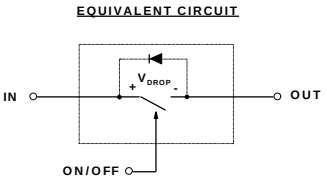


SOT-23 | SuperSOT™-6 | SuperSOT™-8 | SO-8 | SOT-223 | SOIC-16



SuperSOT ™-6





Absolute Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter		FDC6325L	Units
V_{IN}	Input Voltage Range		2.5 - 8	V
$V_{ON/OFF}$	On/Off Voltage Range		1.5 - 8	V
I_L	Load Current	- Continuous (Note 1)	1.8	A
		- Pulsed (Note 1 & 3)	5	
P_D	Maximum Power Dissipation (Note 2)		0.7	W
T_J,T_{STG}	Operating and Storage Temperature Range		-55 to 150	°C
ESD	Electrostatic Discharge Rating MIL-STD-883D Human Body Model (100pf/1500Ohm)		6	kV
THERMAL CHARACTERISTICS				
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 2)		180	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 2)		60	°C/W

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

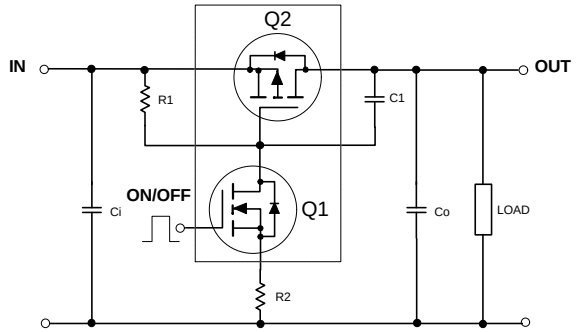
Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
I_{FL}	Forward Leakage Current	V_{IN} = 8 V, $V_{ON/OFF}$ = 0 V			1	µA
ON CHARACTERISTICS (Note 3)						
V_{DROP}	Conduction Voltage Drop	V_{IN} = 5 V, $V_{ON/OFF}$ = 3.3 V, I_L = 1.5 A		0.15	0.2	V
		V_{IN} = 3.3 V, $V_{ON/OFF}$ = 3.3 V, I_L = 1.2 A		0.145	0.2	
		V_{IN} = 2.5 V, $V_{ON/OFF}$ = 3.3 V, I_L = 1 A		0.13	0.2	
$R_{(ON)}$	Q_2 - Static On-Resistance	V_{GS} = -5 V, I_D = -1.8 A		0.115	0.13	Ω
		V_{GS} = -3.3 V, I_D = -1.6 A		0.13	0.16	
		V_{GS} = -2.5 V, I_D = -1.5 A		0.155	0.18	
I_L	Load Current	V_{DROP} = 0.13 V, V_{IN} = 5 V, $V_{ON/OFF}$ = 3.3 V	1			A
		V_{DROP} = 0.16 V, V_{IN} = 3.3 V, $V_{ON/OFF}$ = 3.3 V	1			
		V_{DROP} = 0.2 V, V_{IN} = 2.5V, $V_{ON/OFF}$ = 3.3 V	1			

Notes:

1. V_{IN}=8V, $V_{ON/OFF}$=8V, T_A=25°C
2. $R_{\theta JA}$ 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.
3. Pulse Test: Pulse Width ≤ 300µs, Duty Cycle ≤ 2.0%.

FDC6325L Load Switch Application

APPLICATION CIRCUIT



External Component Recommendation

For Co £ 1uF applications:
First select R2, 100 - 1kW, for Slew Rate control. C1 £ 1000pF can be added in addition to R2 for further In-rush current control.
Then select R1 such that R1/R2 ratio maintains between 10 - 100. R1 is required to turn Q2 off.
For SPICE simulation, users can download a "FDC6325L.MOD" Spice model from Fairchild Web Site at www.fairchildsemi.com

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

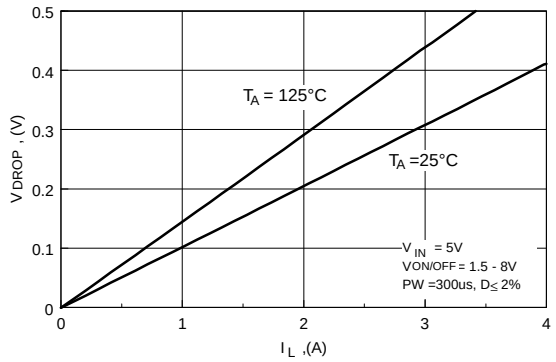


Figure 1. Conduction Voltage Drop Variation with Load Current.

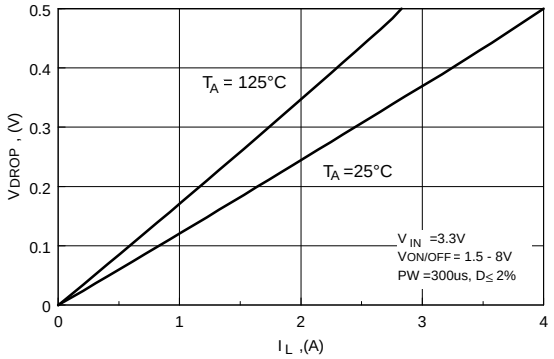


Figure 2. Conduction Voltage Drop Variation with Load Current.

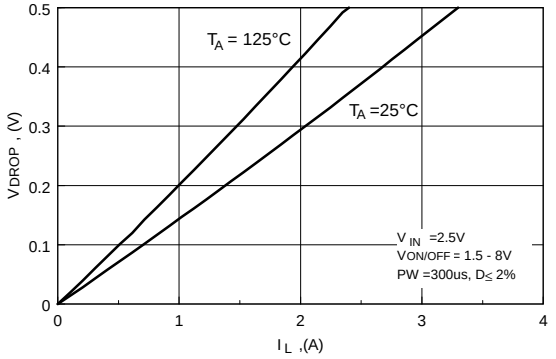


Figure 3. Conduction Voltage Drop Variation with Load Current.

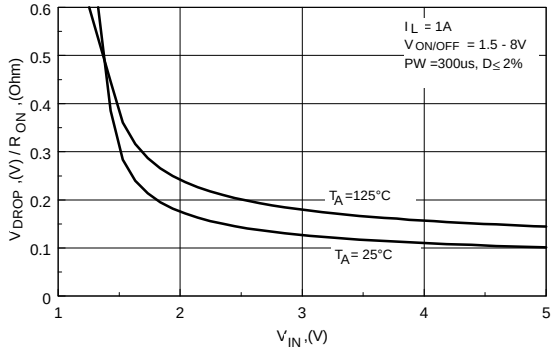


Figure 4. On-Resistance Variation with Input Voltage.

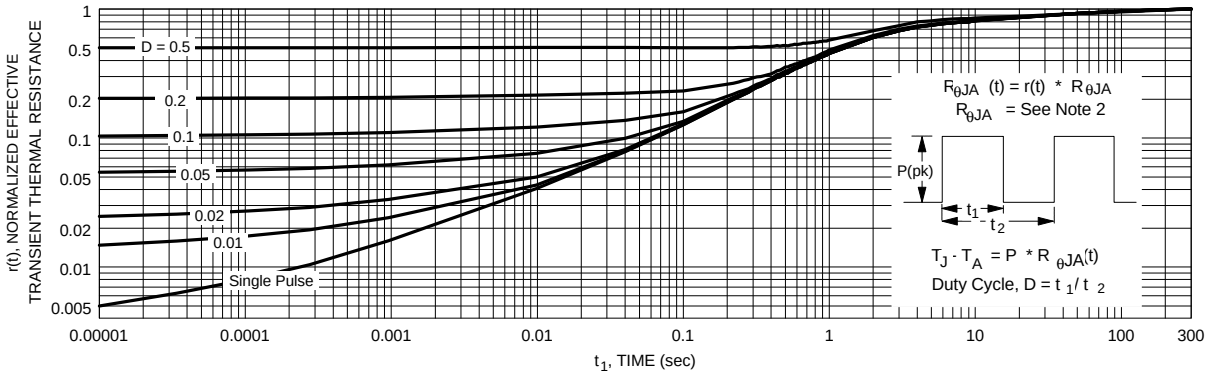


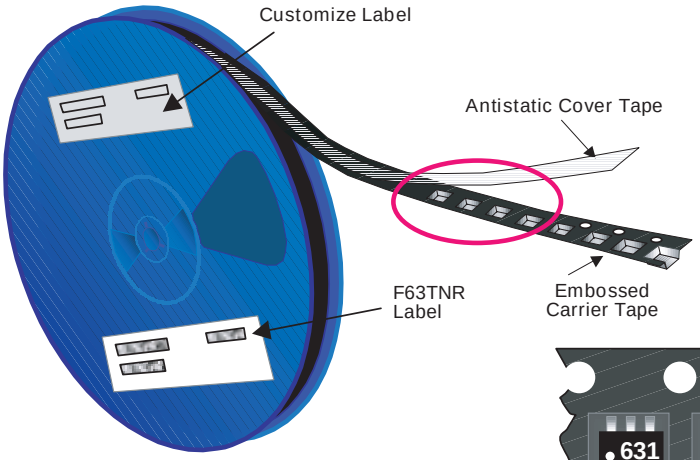
Figure 5. Transient Thermal Response Curve.

Thermal characterization performed on the conditions described in Note 2.
Transient thermal response will change depends on the circuit board design.

SuperSOT™-6 Tape and Reel Data and Package Dimensions

FAIRCHILD SEMICONDUCTOR™

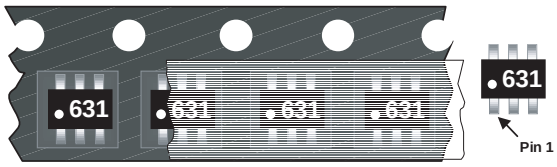
SSOT-6 Packaging Configuration: Figure 1.0



Packaging Description:

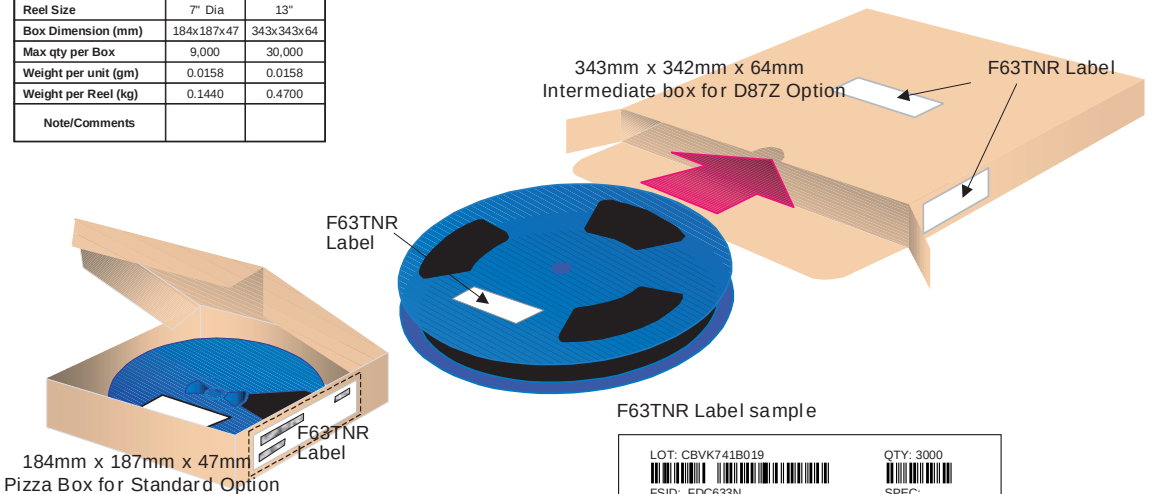
SSOT-6 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in 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 three 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.

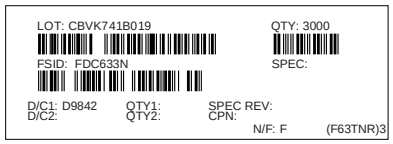


SSOT-6 Unit Orientation

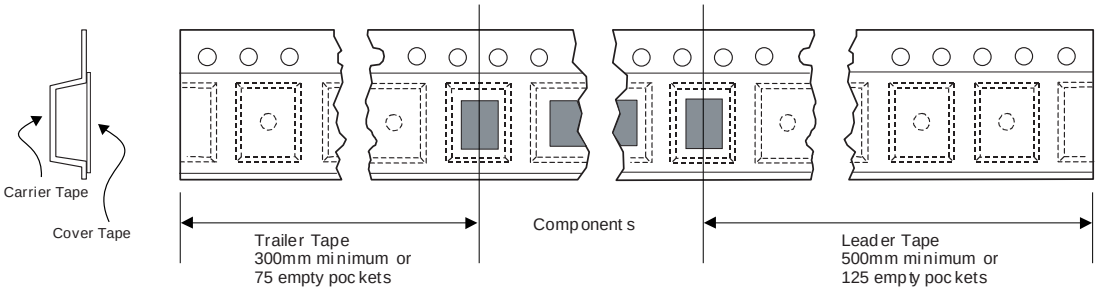
SSOT-6 Packaging Information		
Packaging Option	Standard (no flow code)	D87Z
Packaging type	TNR	TNR
Qty per Reel/Tube/Bag	3,000	10,000
Reel Size	7" Dia	13"
Box Dimension (mm)	184x187x47	343x343x64
Max qty per Box	9,000	30,000
Weight per unit (gm)	0.0158	0.0158
Weight per Reel (kg)	0.1440	0.4700
Note/Comments		



F63TNR Label sample



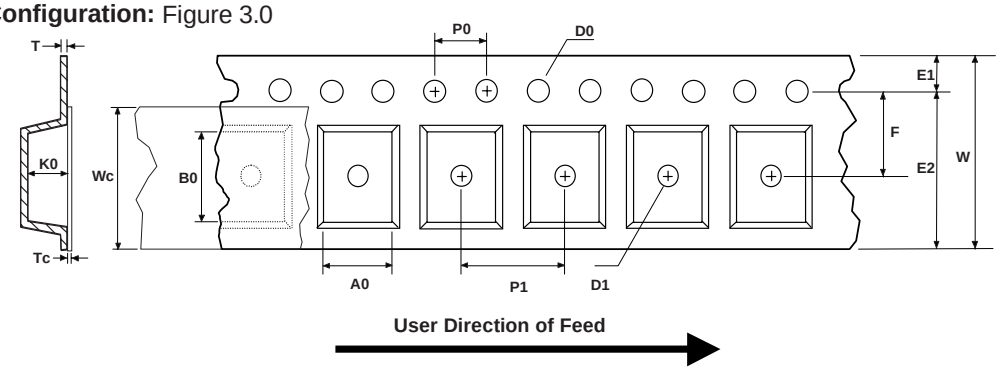
SSOT-6 Tape Leader and Trailer Configuration: Figure 2.0



SuperSOT™-6 Tape and Reel Data and Package Dimensions, continued

SSOT-6 Embossed Carrier Tape

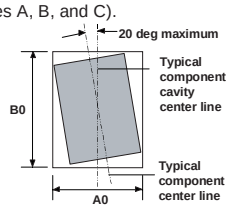
Configuration: Figure 3.0



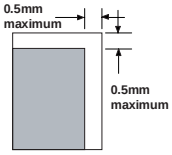
Dimensions are in millimeter														
Pkg type	**A0**	**B0**	**W**	**D0**	**D1**	**E1**	**E2**	**F**	**P1**	**P0**	**K0**	**T**	**Wc**	**Tc**
SSOT-6 (8mm)	3.23 +/-0.10	3.18 +/-0.10	8.0 +/-0.3	1.55 +/-0.05	1.125 +/-0.125	1.75 +/-0.10	6.25 min	3.50 +/-0.05	4.0 +/-0.1	4.0 +/-0.1	1.37 +/-0.10	0.255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

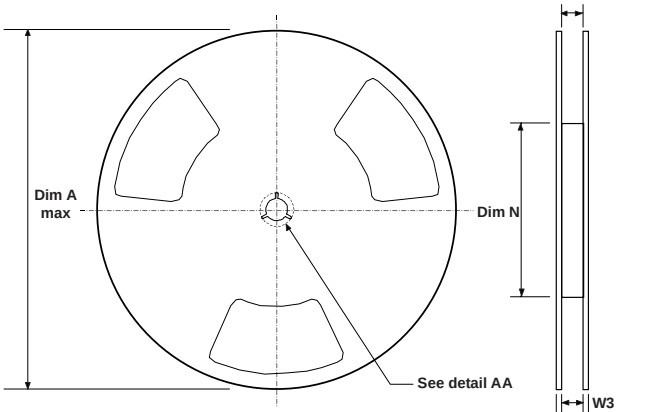


Sketch B (Top View)
Component Rotation

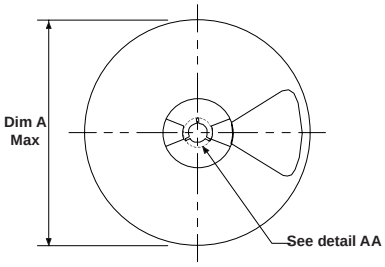


Sketch C (Top View)
Component lateral movement

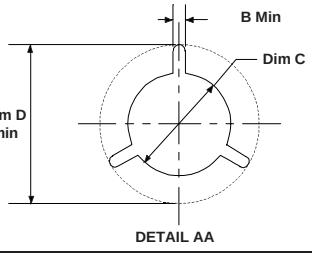
SSOT-6 Reel Configuration: Figure 4.0



13" Diameter Option



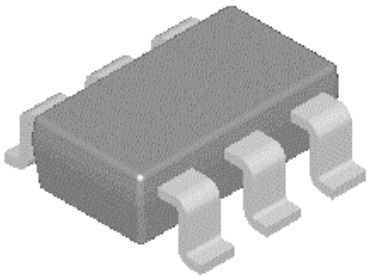
7" Diameter Option

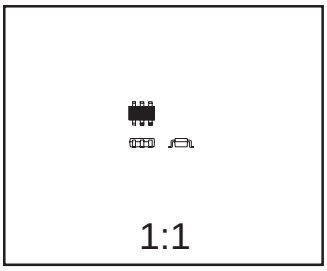


Dimensions are in inches and millimeters									
Tape Size	**Reel Option**	**Dim A**	**Dim B**	**Dim C**	**Dim D**	**Dim N**	**Dim W1**	**Dim W2**	**Dim W3 (LSL-USL)**
8mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 –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

SuperSOT -6 (FS PKG Code 31, 33)

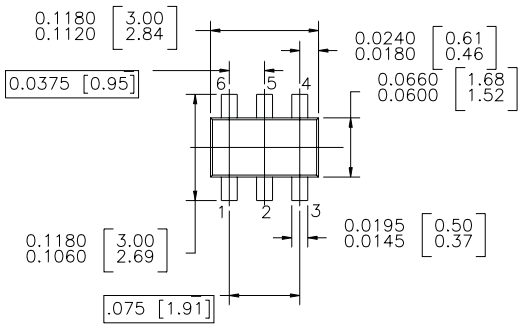


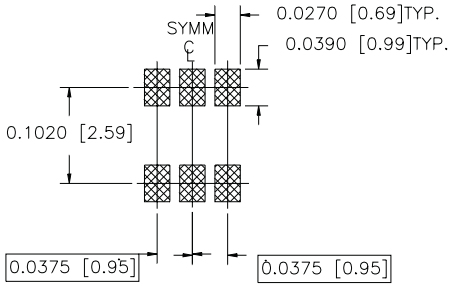


Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0158





LAND PATTERN RECOMMENDATION

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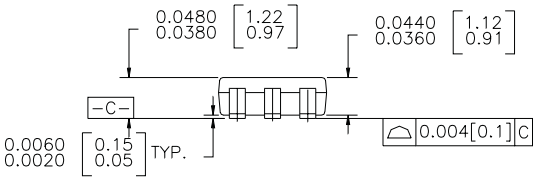

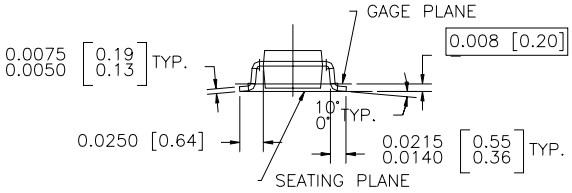

NOTES : UNLESS OTHERWISE SPECIFIED

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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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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Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
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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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