

FDC6561AN

Dual N-Channel Logic Level PowerTrench™ MOSFET

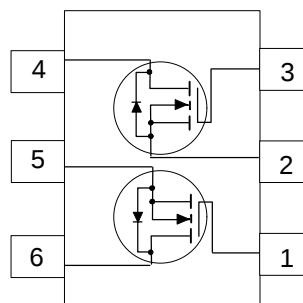
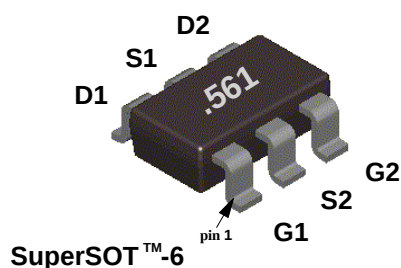
General Description

These N-Channel Logic Level MOSFETs are produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain low gate charge for superior switching performance.

These devices are well suited for all applications where small size is desirable but especially low cost DC/DC conversion in battery powered systems.

Features

- 2.5 A, 30 V. $R_{DS(ON)} = 0.095 \Omega @ V_{GS} = 10 V$
 $R_{DS(ON)} = 0.145 \Omega @ V_{GS} = 4.5 V$
- Very fast switching.
- Low gate charge (2.1nC typical).
- SuperSOT™-6 package: small footprint (72% smaller than standard SO-8); low profile (1mm thick).



Absolute Maximum Ratings

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

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage - Continuous	± 20	V
I_D	Drain Current - Continuous - Pulsed	2.5	A
		10	
P_D	Maximum Power Dissipation (Note 1a) (Note 1b) (Note 1c)	0.96	W
		0.9	
		0.7	
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	130	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	60	$^\circ\text{C/W}$

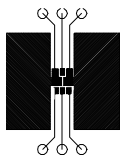
ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30			V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to $25\text{ }^\circ\text{C}$		23.6		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$T_J = 55\text{ }^\circ\text{C}$			10	μA
I_{GSSF}	Gate - Body Leakage, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
I_{GSSR}	Gate - Body Leakage, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
ON CHARACTERISTICS (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1	1.8	3	V
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold VoltageTemp.Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to $25\text{ }^\circ\text{C}$		-4		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$		0.082	0.095	Ω
		$T_J = 125\text{ }^\circ\text{C}$		0.122	0.152	
		$V_{GS} = 4.5\text{ V}, I_D = 2.0\text{ A}$		0.113	0.145	
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10\text{ V}, V_{DS} = 5\text{ V}$	10			A
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}, I_D = 2.5\text{ A}$		5		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		220		pF
C_{oss}	Output Capacitance			50		pF
C_{rss}	Reverse Transfer Capacitance			25		pF
SWITCHING CHARACTERISTICS (Note 2)						
$t_{D(on)}$	Turn - On Delay Time	$V_{DD} = 5\text{ V}, I_D = 1\text{ A},$ $V_{GS} = 10\text{ V}, R_{GEN} = 6\text{ }\Omega$		6	12	ns
t_r	Turn - On Rise Time			10	18	ns
$t_{D(off)}$	Turn - Off Delay Time			12	22	ns
t_f	Turn - Off Fall Time			2	6	ns
Q_g	Total Gate Charge	$V_{DS} = 15\text{ V}, I_D = 2.5\text{ A}$ $V_{GS} = 5\text{ V}$		2.3	3.2	nC
Q_{gs}	Gate-Source Charge			0.7	1	nC
Q_{gd}	Gate-Drain Charge			0.9	1.3	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
I_S	Continuous Source Diode Current				0.75	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 0.75\text{ A}$ (Note 2)		0.78	1.2	V

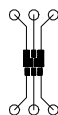
Notes:

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.

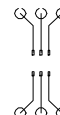
2. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$.



a. 130°C/W on a 0.125 in^2 pad of 2oz copper.



b. 140°C/W on a 0.005 in^2 pad of 2oz copper.



c. 180°C/W on a minimum pad.

Typical Electrical Characteristics

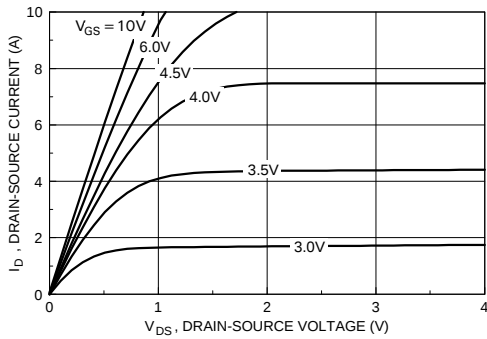


Figure 1. On-Region Characteristics.

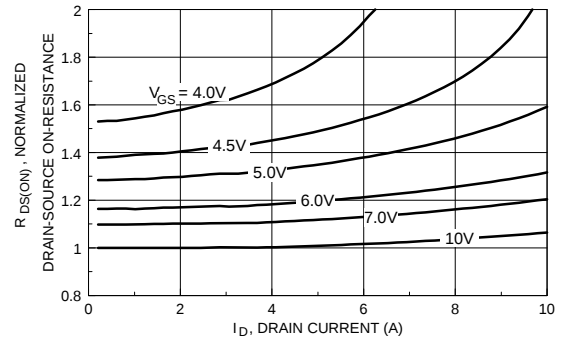


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

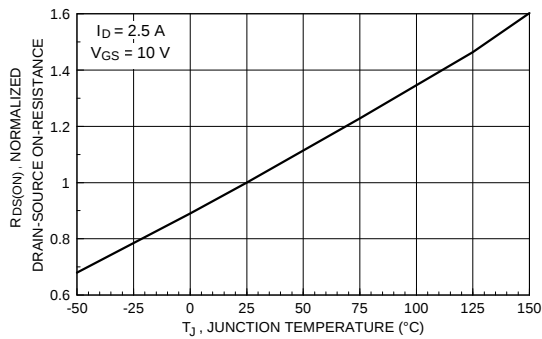


Figure 3. On-Resistance Variation with Temperature.

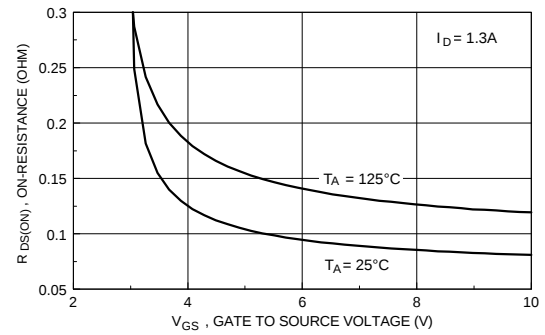


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

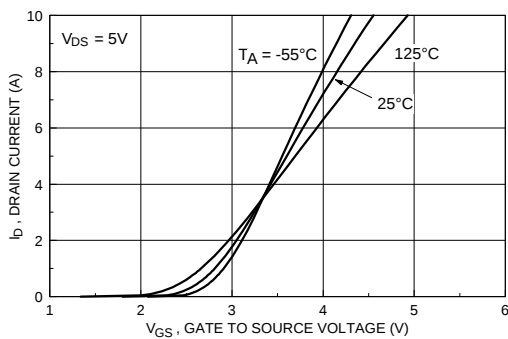


Figure 5. Transfer Characteristics.

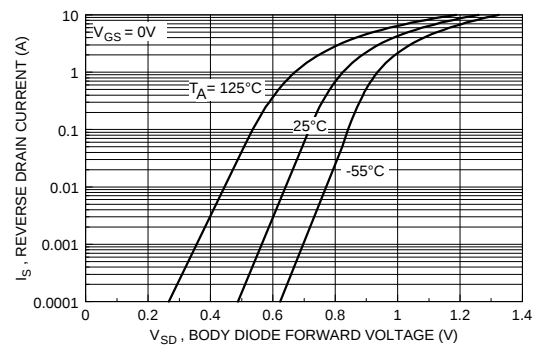


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Electrical Characteristics (continued)

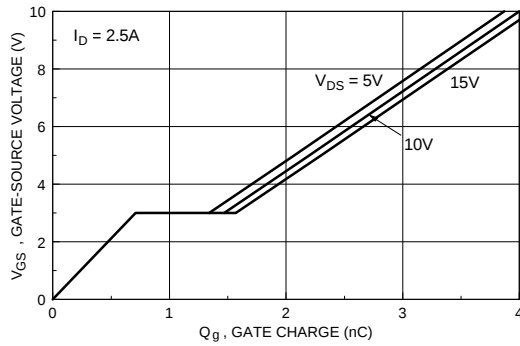


Figure 7. Gate Charge Characteristics.

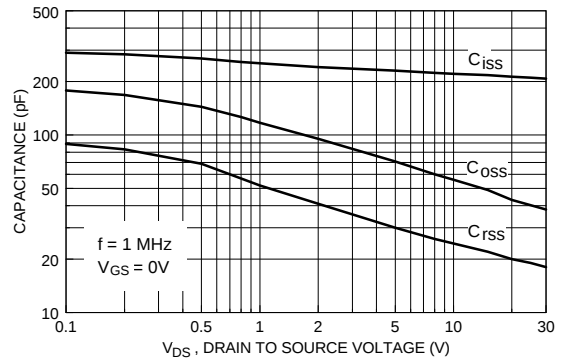


Figure 8. Capacitance Characteristics.

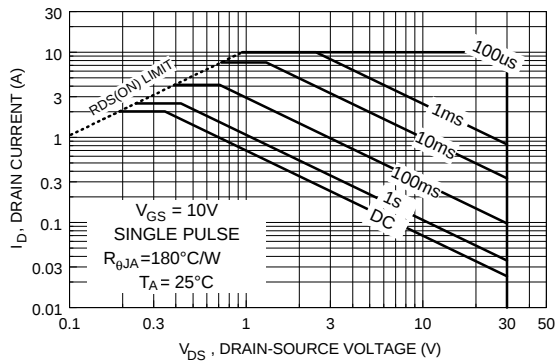


Figure 9. Maximum Safe Operating Area.

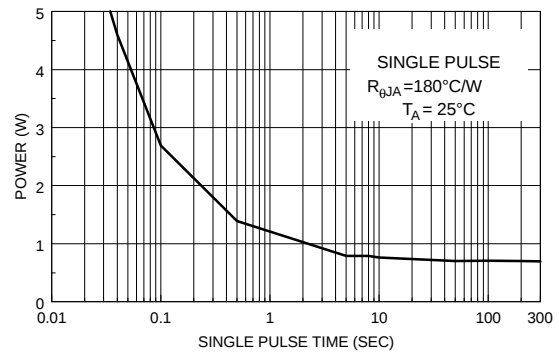


Figure 10. Single Pulse Maximum Power Dissipation.

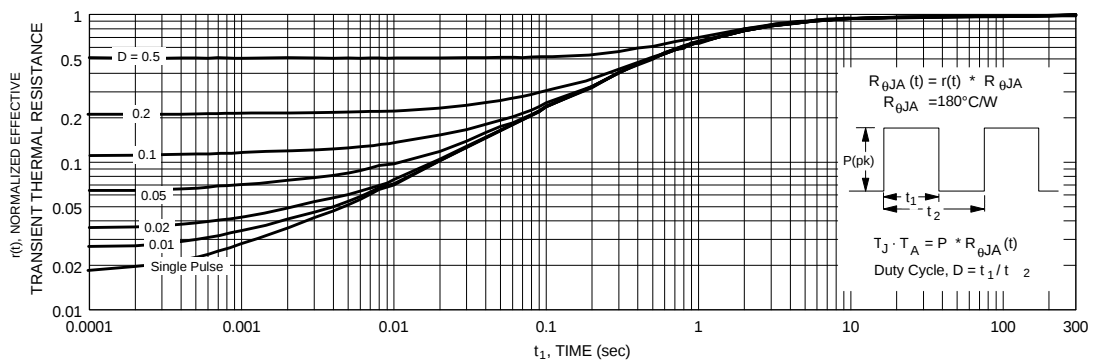
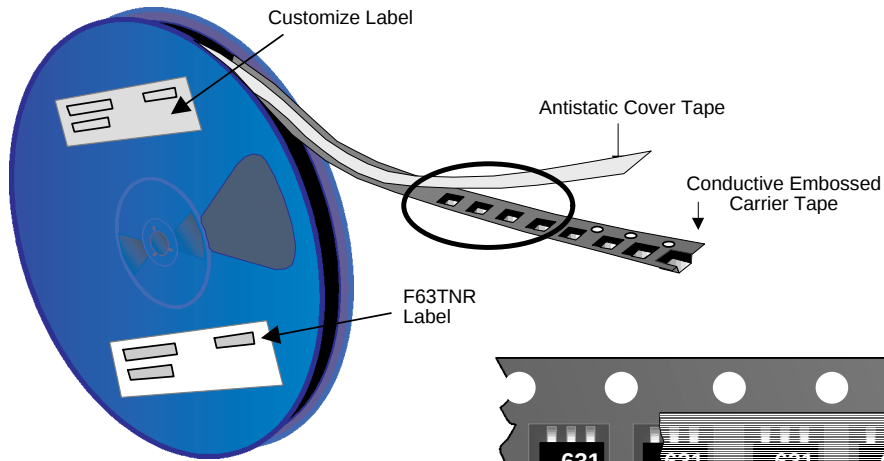


Figure 11. Transient Thermal Response Curve.

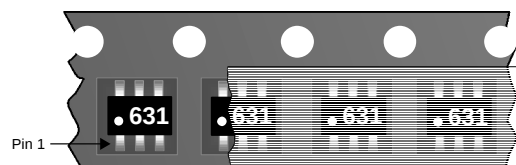
Thermal characterization performed using the conditions described in Note 1c.
Transient thermal response will change depending on the circuit board design.

SuperSOT™-6 Tape and Reel Data and Package Dimensions

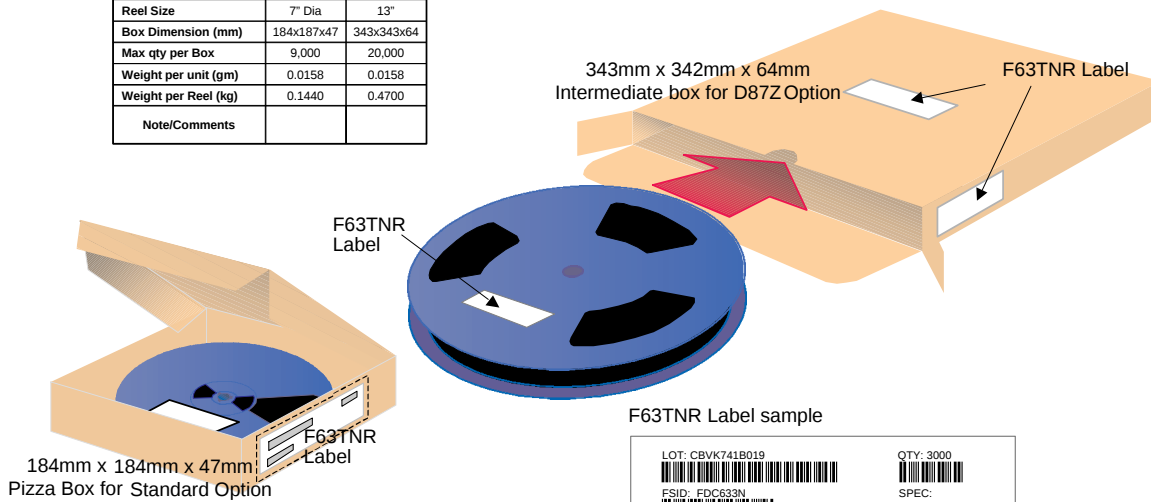
SSOT-6 Packaging Configuration: Figure 1.0



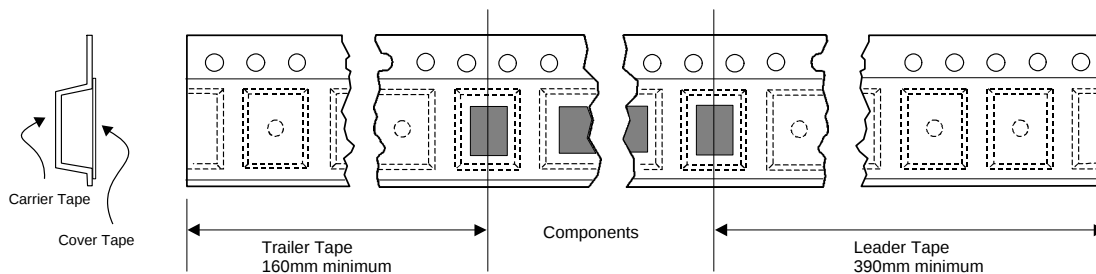
SSOT-6 Packaging Information		
Packaging Option	Standard (no flow code)	D87Z
Packaging type	TNR	TNR
Qty per Reel/Tube/Bag	3,000	10,000
Reel Size	7" Dia	13"
Box Dimension (mm)	184x187x47	343x343x64
Max qty per Box	9,000	20,000
Weight per unit (gm)	0.0158	0.0158
Weight per Reel (kg)	0.1440	0.4700
Note/Comments		



SSOT-6 Unit Orientation

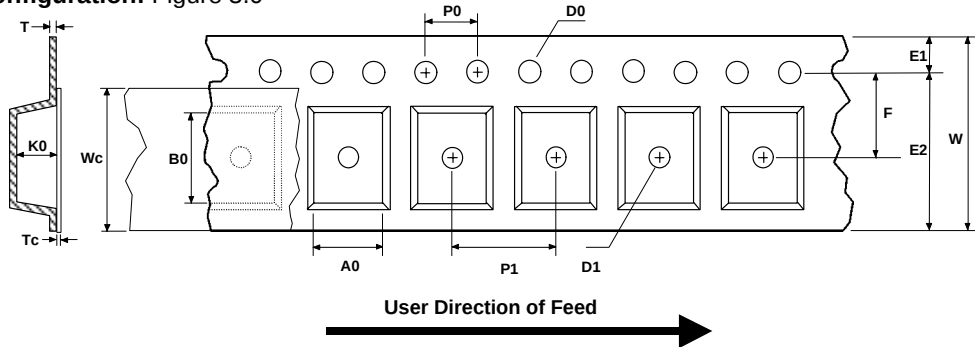


SSOT-6 Tape Leader Trailer Configuration: Figure 2.0



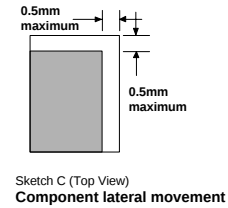
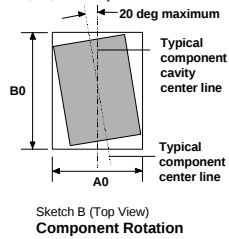
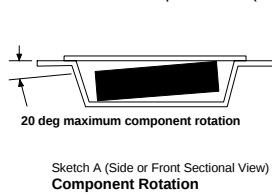
SuperSOT™-6 Tape and Reel Data and Package Dimensions, continued

SSOT-6 Embossed Carrier Tape Configuration: Figure 3.0

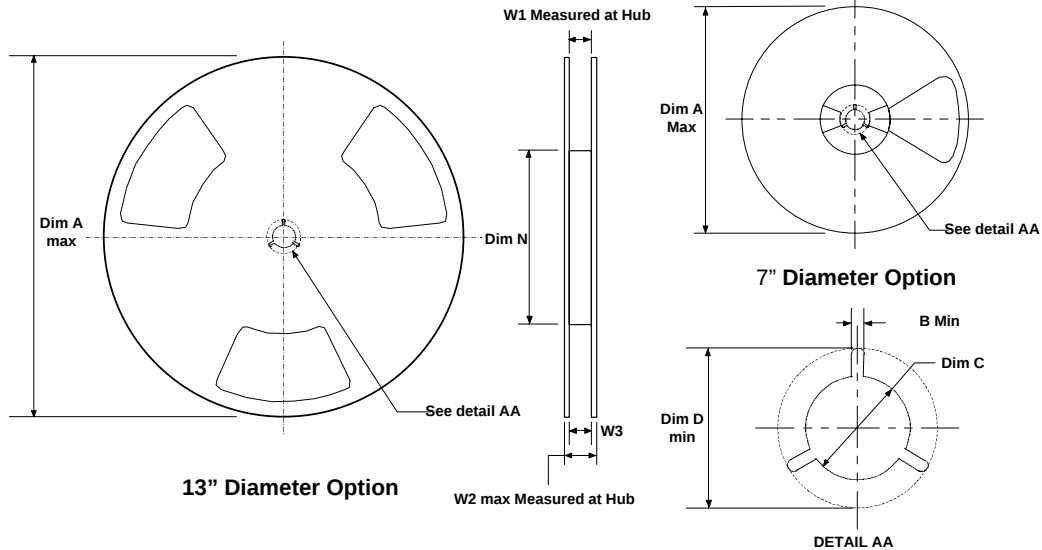


Dimensions are in millimeter														
Pkg type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
SSOT-6 (8mm)	3.23 +/-0.10	3.18 +/-0.10	8.0 +/-0.3	1.55 +/-0.05	1.00 +/-0.125	1.75 +/-0.10	6.25 min	3.50 +/-0.05	4.0 +/-0.1	4.0 +/-0.1	1.37 +/-0.10	0.255 +/-0.150	5.2 +/-0.3	0.06 +/-0.02

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).



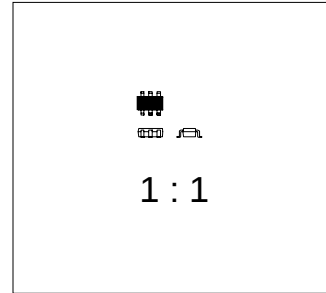
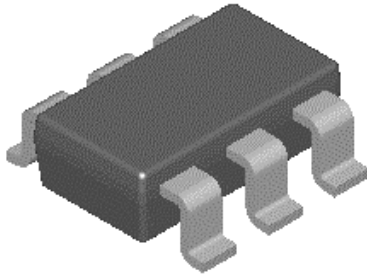
SSOT-6 Reel Configuration: Figure 4.0



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 Tape and Reel Data and Package Dimensions, continued

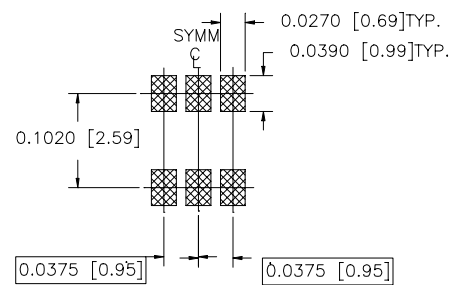
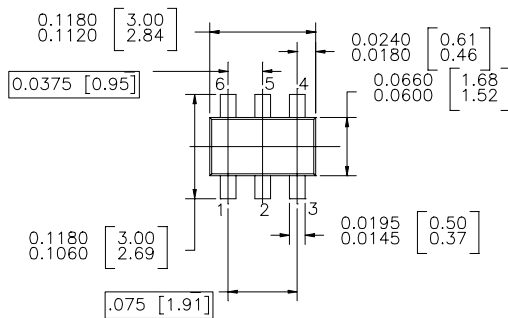
SuperSOT™-6 (FS PKG Code 31, 33)



Scale 1:1 on letter size paper

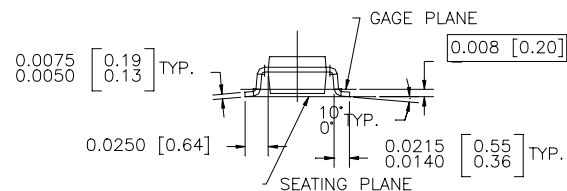
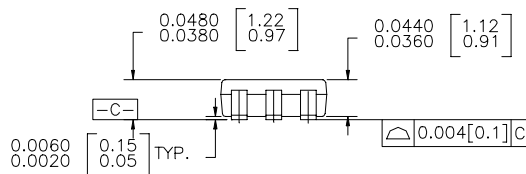
Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0158



LAND PATTERN RECOMMENDATION

CONTROLLING DIMENSION IS INCH
VALUES IN [] ARE MILLIMETERS



NOTES : UNLESS OTHERWISE SPECIFIED

1.0 STANDARD LEAD FINISH : 150 MICRONS (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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FAST [®]	SuperSOT™-3	
FAST ^r ™	SuperSOT™-6	
GTO™	SuperSOT™-8	
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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.
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