

FDC658P

Single P-Channel, Logic Level, PowerTrench™ MOSFET

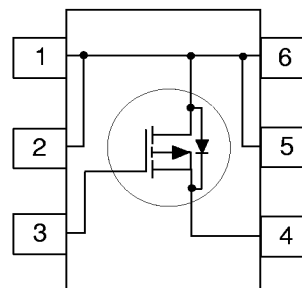
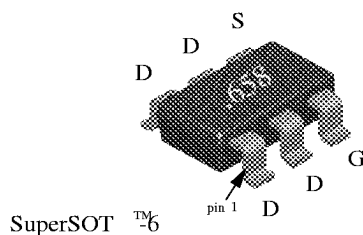
General Description

This P-Channel Logic Level MOSFET is 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 notebook computer applications: load switching and power management, battery charging circuits, and DC/DC conversion.

Features

- -4 A, -30 V. $R_{DS(ON)} = 0.050 \Omega$ @ $V_{GS} = -10$ V
 $R_{DS(ON)} = 0.075 \Omega$ @ $V_{GS} = -4.5$ V.
- Low gate charge (8nC typical).
- High performance trench technology for extremely low $R_{DS(ON)}$.
- 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 (Note 1a)	-4	A
	- Pulsed	-20	
P_D	Maximum Power Dissipation (Note 1a)	1.6	W
	(Note 1b)	0.8	
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)	78	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	30	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS (T _A = 25 °C unless otherwise noted)						
Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = -250 μA	-30			V
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient	I _D = -250 μA, Referenced to 25 °C		-22		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -24 V, V _{GS} = 0 V T _J = 55 °C			-1 -10	μA 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	-1	-1.7	-3	V
ΔV _{GS(th)} /ΔT _J	Gate Threshold Voltage Temp. Coefficient	I _D = -250 μA, Referenced to 25 °C		4.1		mV/°C
R _{DSON}	Static Drain-Source On-Resistance	V _{GS} = -10 V, I _D = -4.0 A T _J = 125 °C V _{GS} = -4.5 V, I _D = -3.4 A		0.041 0.058 0.06	0.05 0.08 0.075	Ω
I _{D(on)}	On-State Drain Current	V _{GS} = -10 V, V _{DS} = -5 V	-20			A
g _{FS}	Forward Transconductance	V _{DS} = -5V, I _D = -4 A		9		S
DYNAMIC CHARACTERISTICS						
C _{iss}	Input Capacitance	V _{DS} = -15 V, V _{GS} = 0 V, f = 1.0 MHz		750		pF
C _{oss}	Output Capacitance			220		pF
C _{rss}	Reverse Transfer Capacitance			100		pF
SWITCHING CHARACTERISTICS (Note 2)						
t _{D(on)}	Turn - On Delay Time	V _{DD} = -15 V, I _D = -1 A, V _{GS} = -10 V, R _{GEN} = 6 Ω		12	22	ns
t _r	Turn - On Rise Time			14	25	ns
t _{D(off)}	Turn - Off Delay Time			24	38	ns
t _f	Turn - Off Fall Time			16	27	ns
Q _g	Total Gate Charge	V _{DS} = -15 V, I _D = -4.0 A, V _{GS} = -5 V		8	12	nC
Q _{gs}	Gate-Source Charge			1.8		nC
Q _{gd}	Gate-Drain Charge			3		nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
I _S	Continuous Source Diode Current				-1.3	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = -1.3 A (Note 2)		-0.76	-1.2	V
Notes:						
1. 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. 78°C/W when mounted on a 1 in ² pad of 2oz Cu on FR-4 board.						
b. 156°C/W when mounted on a minimum pad of 2oz Cu on FR-4 board.						
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%.						

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Typical Electrical Characteristics

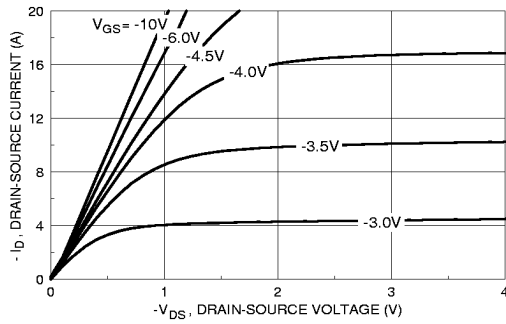


Figure 1. On-Region Characteristics.

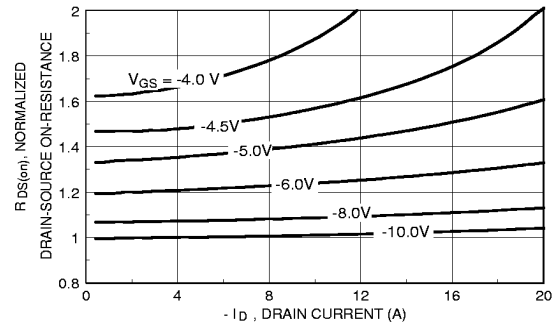


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

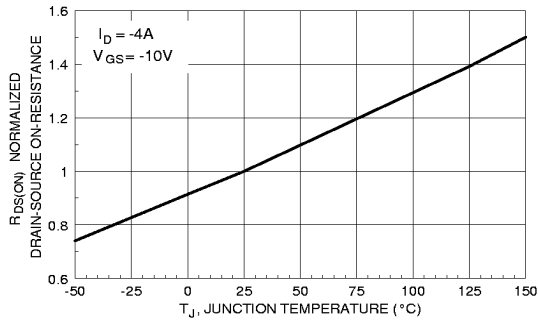


Figure 3. On-Resistance Variation with Temperature.

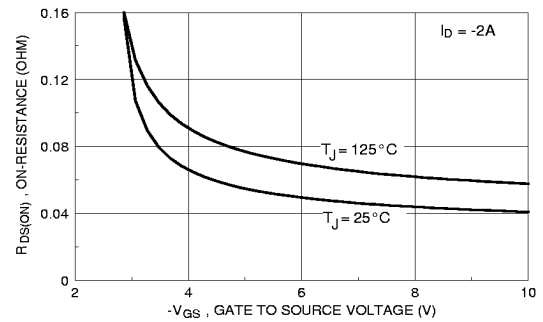


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

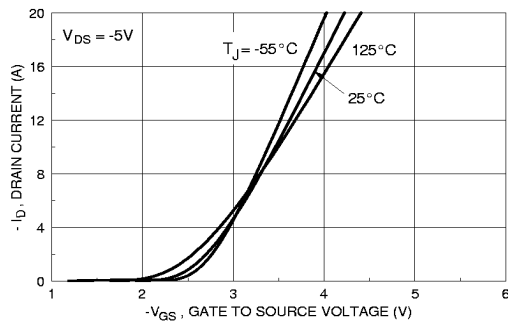


Figure 5. Transfer Characteristics.

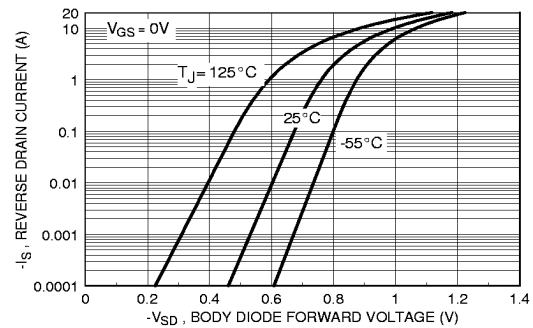


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Electrical Characteristics (continued)

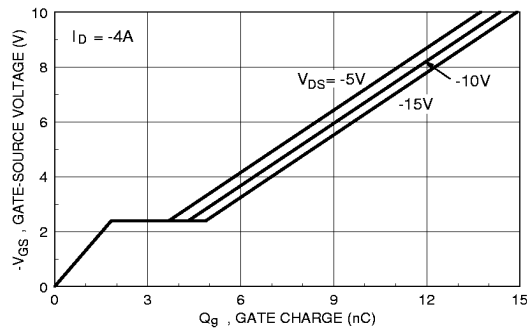


Figure 7. Gate Charge Characteristics.

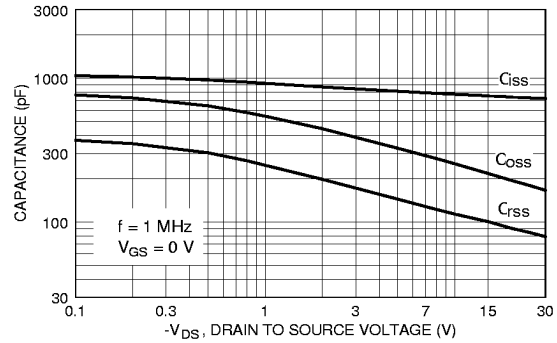


Figure 8. Capacitance Characteristics.

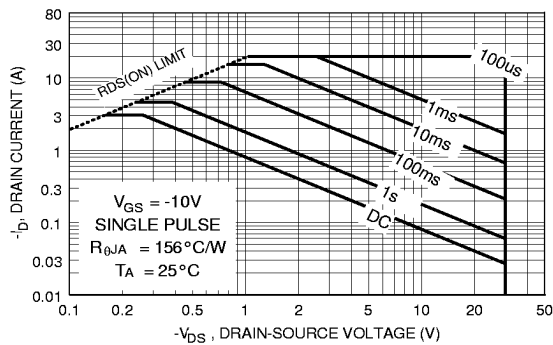


Figure 9. Maximum Safe Operating Area.

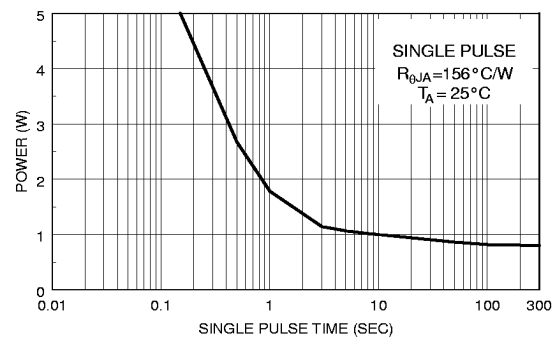


Figure 10. Single Pulse Maximum Power Dissipation.

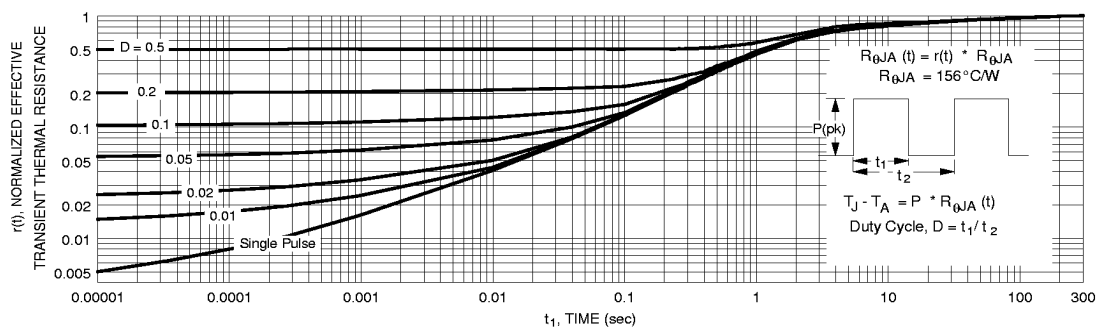
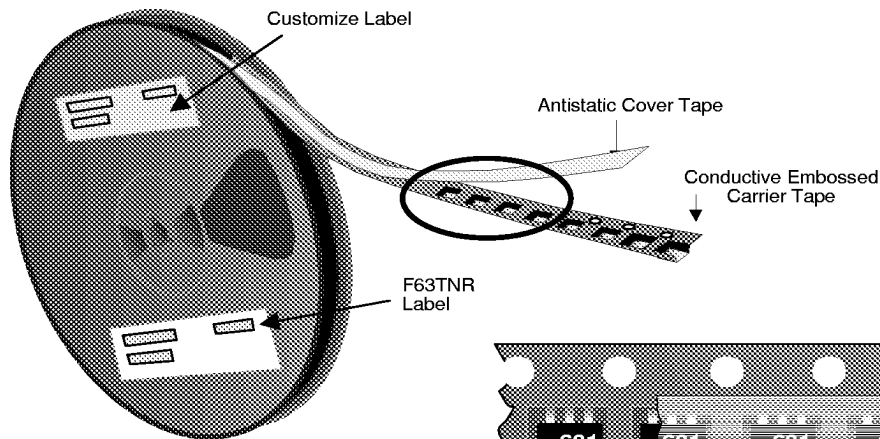


Figure 11. Transient Thermal Response Curve.

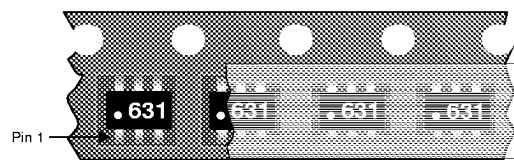
Thermal characterization performed using the conditions described in Note 1b.
Transient thermal response will change depending on the circuit board design.

SuperSOT™-6 Tape and Reel Data and Package Dimensions

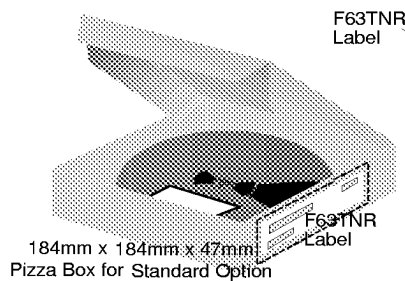
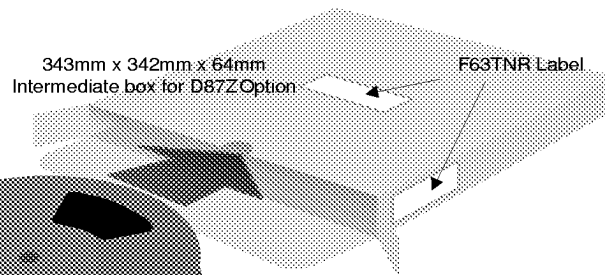
SSOT-6 Packaging
Configuration: Figure 1.0



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		



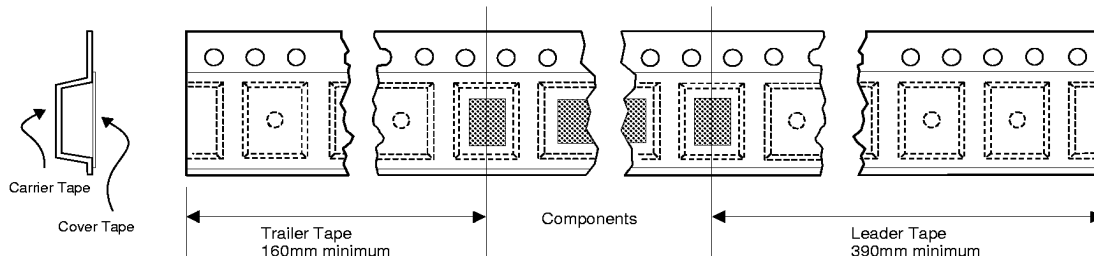
SSOT-6 Unit Orientation



F63TNR Label sample



SSOT-6 Tape Leader Trailer
Configuration: Figure 2.0

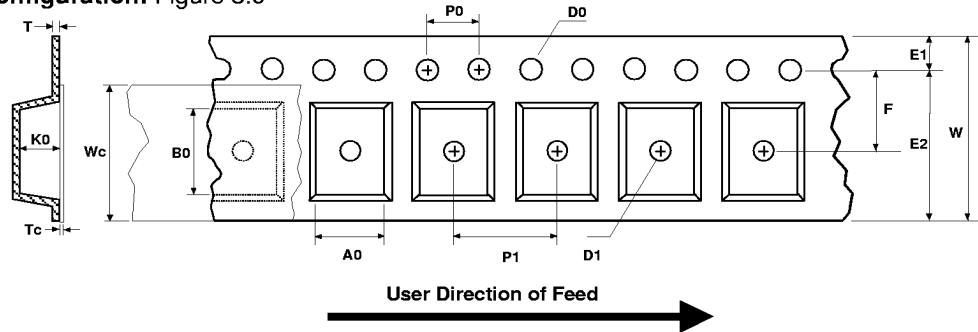


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SuperSOT™-6 Tape and Reel Data and Package Dimensions, continued

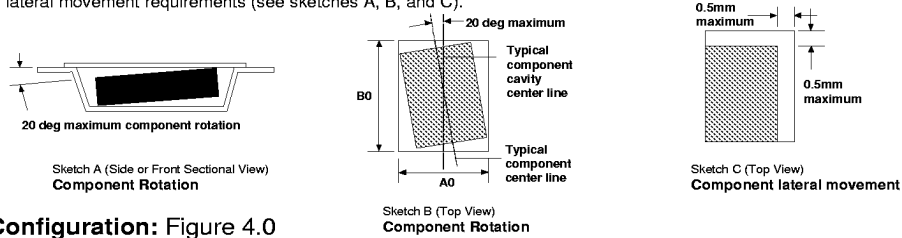
SSOT-6 Embossed Carrier Tape

Configuration: Figure 3.0

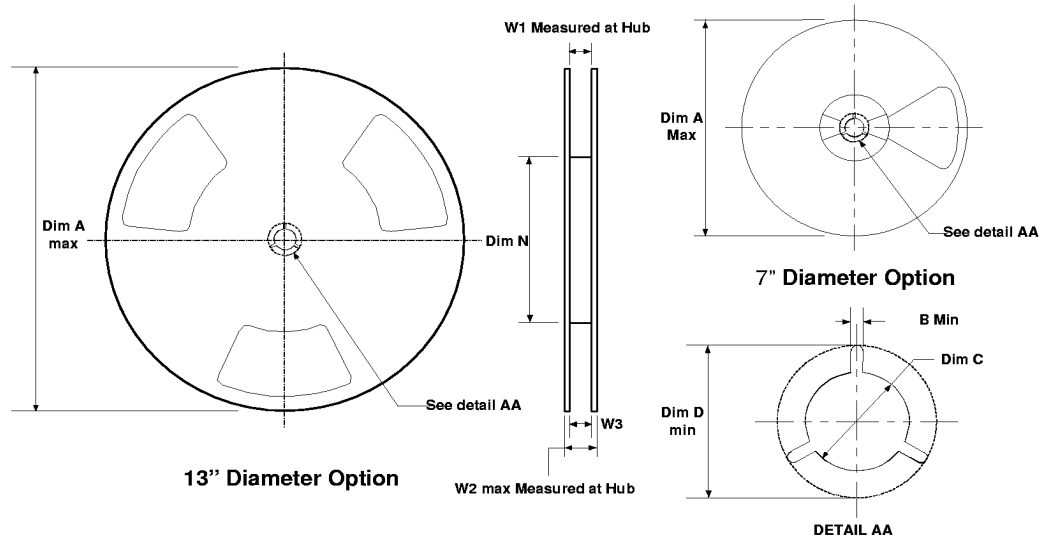


Dimensions are in millimeter														
Pkg type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
SSOT-6 (8mm)	3.23 +/-0.10	3.18 +/-0.10	8.0 +/-0.3	1.55 +/-0.05	1.00 +/-0.125	1.75 +/-0.10	6.25 min	3.50 +/-0.05	4.0 +/-0.1	4.0 +/-0.1	1.37 +/-0.10	0.255 +/-0.150	5.2 +/-0.3	0.06 +/-0.02

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

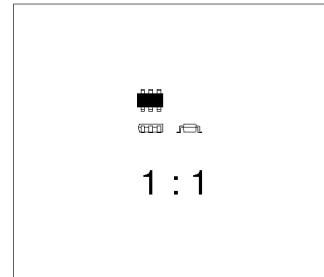
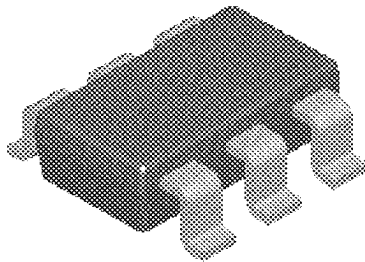


Dimensions are in inches and millimeters									
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
8mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 - 0.429 7.9 - 10.9
8mm	13" Dia	13.00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

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

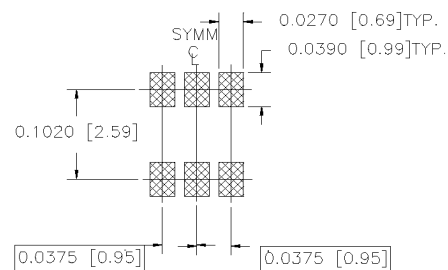
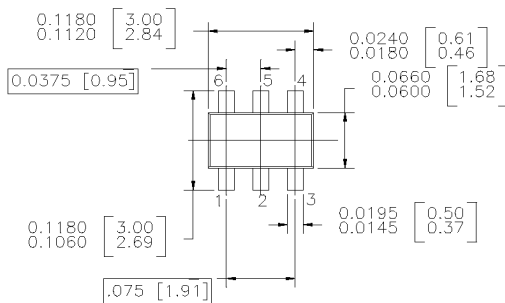
SuperSOT™-6 (FS PKG Code 31, 33)



Scale 1:1 on letter size paper

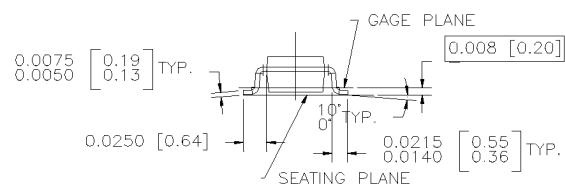
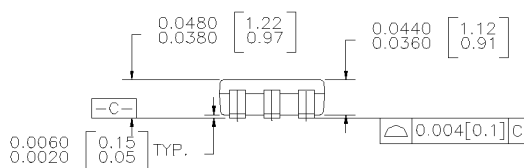
Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0158



LAND PATTERN RECOMMENDATION

CONTROLLING DIMENSION IS INCH
VALUES IN [] ARE MILLIMETERS



SUPER SOT 6 LEADS

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

September 1998, Rev. A