

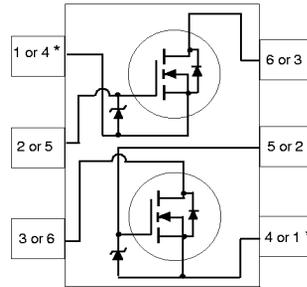
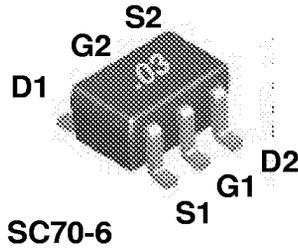
FDG6303N Dual N-Channel, Digital FET

General Description

These dual N-Channel logic level enhancement mode field effect transistors are produced using Fairchild's proprietary, high cell density, DMOS technology. This very high density process is especially tailored to minimize on-state resistance. This device has been designed especially for low voltage applications as a replacement for bipolar digital transistors and small signal MOSFETS.

Features

- 25 V, 0.50 A continuous, 1.5 A Peak.
 $R_{DS(ON)} = 0.45 \Omega @ V_{GS} = 4.5 V$,
 $R_{DS(ON)} = 0.60 \Omega @ V_{GS} = 2.7 V$.
- Very low level gate drive requirements allowing direct operation in 3 V circuits ($V_{GS(th)} < 1.5 V$).
- Gate-Source Zener for ESD ruggedness (>6kV Human Body Model).
- Compact industry standard SC70-6 surface mount package.



Absolute Maximum Ratings $T_A = 25^\circ C$ unless otherwise noted

Symbol	Parameter	FDG6303N	Units
V_{DSS}	Drain-Source Voltage	25	V
V_{GSS}	Gate-Source Voltage	8	V
I_D	Drain/Output Current	- Continuous	0.5
		- Pulsed	1.5
P_D	Maximum Power Dissipation (Note 1)	0.3	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150	$^\circ C$
ESD	Electrostatic Discharge Rating MIL-STD-883D Human Body Model (100 pF / 1500 Ω)	6.0	kV

THERMAL CHARACTERISTICS

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	415	$^\circ C/W$
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* The pinouts are symmetrical; pin 1 and pin 4 are interchangeable.

DMOS Electrical Characteristics ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	25			V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C		26		$\text{mV}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 20\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
				$T_J = 55^\circ\text{C}$	10	μA
I_{GSS}	Gate - Body Leakage Current	$V_{GS} = 8\text{ V}$, $V_{DS} = 0\text{ V}$			100	nA
ON CHARACTERISTICS (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	0.65	0.8	1.5	V
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Temp. Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C		-2.6		$\text{mV}/^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 4.5\text{ V}$, $I_D = 0.5\text{ A}$		0.34	0.45	Ω
			$T_J = 125^\circ\text{C}$	0.55	0.77	
			$V_{GS} = 2.7\text{ V}$, $I_D = 0.2\text{ A}$	0.44	0.6	
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 2.7\text{ V}$, $V_{DS} = 5\text{ V}$	0.5			A
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}$, $I_D = 0.5\text{ A}$		1.45		S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	$V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1.0\text{ MHz}$		50		pF
C_{oss}	Output Capacitance			28		pF
C_{rss}	Reverse Transfer Capacitance			9		pF
SWITCHING CHARACTERISTICS (Note 2)						
$t_{D(on)}$	Turn - On Delay Time	$V_{DD} = 5\text{ V}$, $I_D = 0.5\text{ A}$, $V_{GS} = 4.5\text{ V}$, $R_{GDN} = 50\text{ }\Omega$		3	6	ns
t_r	Turn - On Rise Time			8.5	18	ns
$t_{D(off)}$	Turn - Off Delay Time			17	30	ns
t_f	Turn - Off Fall Time			13	25	ns
Q_g	Total Gate Charge	$V_{DS} = 5\text{ V}$, $I_D = 0.5\text{ A}$, $V_{GS} = 4.5\text{ V}$		1.64	2.3	nC
Q_{gs}	Gate-Source Charge			0.38		nC
Q_{gd}	Gate-Drain Charge			0.45		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
I_S	Maximum Continuous Source Current				0.25	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}$, $I_S = 0.25\text{ A}$ (Note 2)		0.8	1.2	V

Notes:

- $R_{\theta JA}$ 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. $R_{\theta JA} = 415^\circ\text{C}/\text{W}$ on minimum pad mounting on FR-4 board in still air.
- Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

Typical Electrical Characteristics

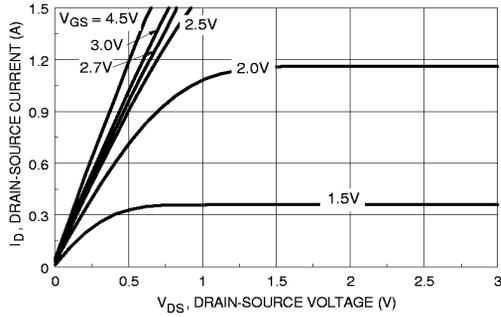


Figure 1. On-Region Characteristics.

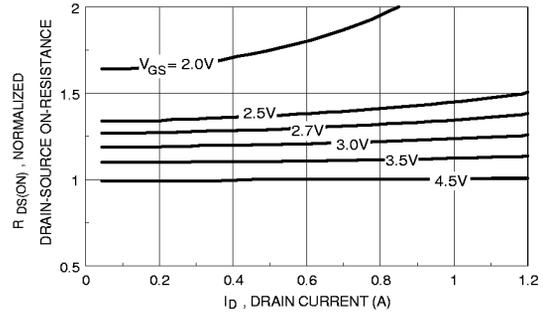


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

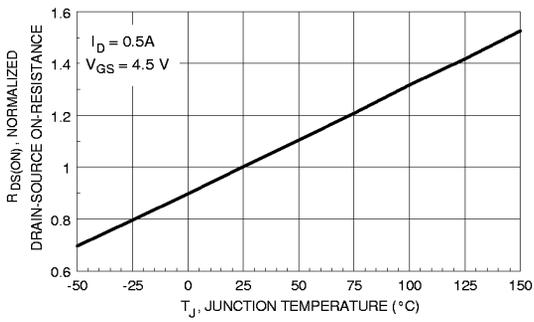


Figure 3. On-Resistance Variation with Temperature.

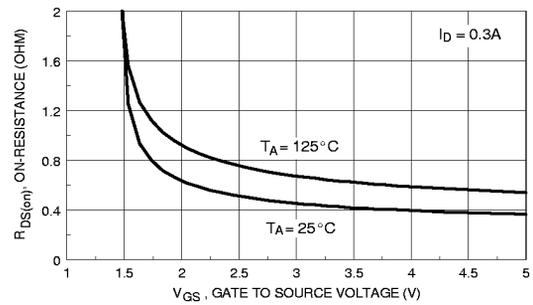


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

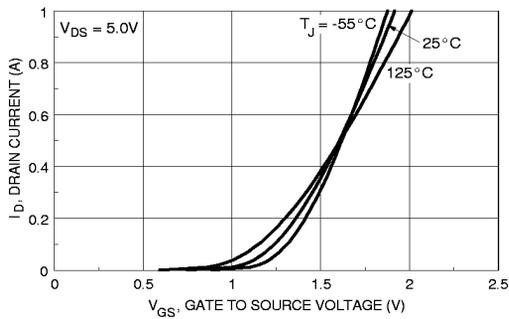


Figure 5. Transfer Characteristics.

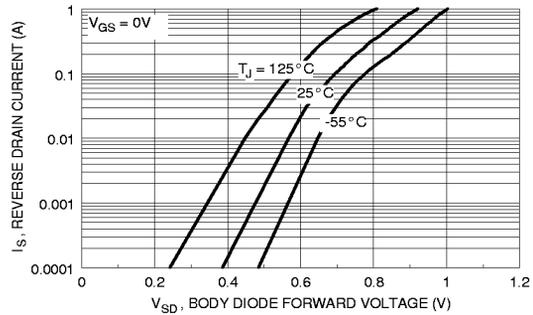


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Electrical Characteristics (continued)

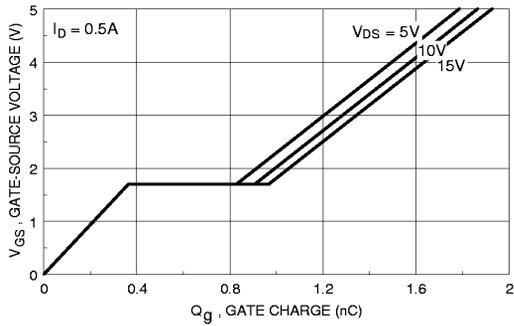


Figure 7. Gate Charge Characteristics.

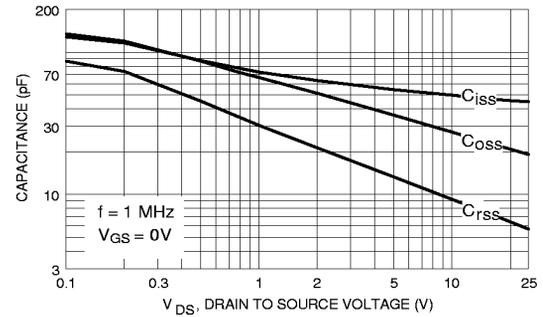


Figure 8. Capacitance Characteristics.

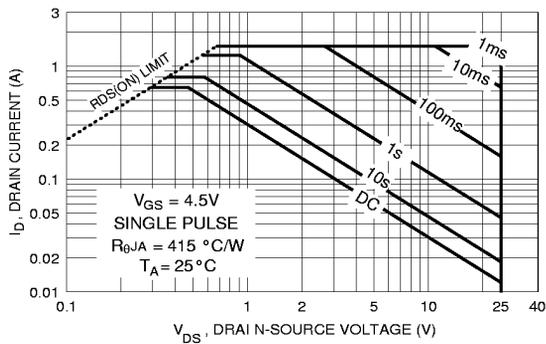


Figure 9. Maximum Safe Operating Area.

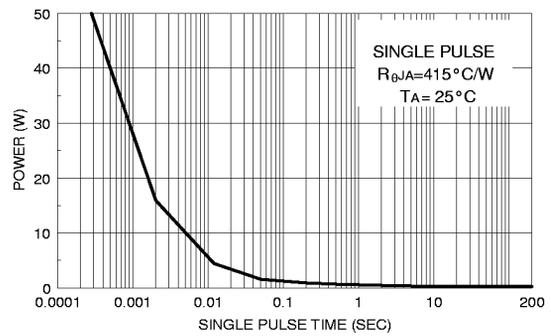


Figure 10. Single Pulse Maximum Power Dissipation.

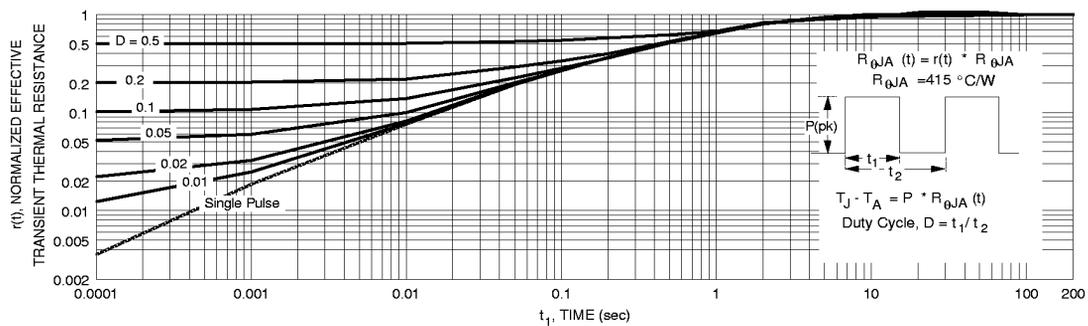
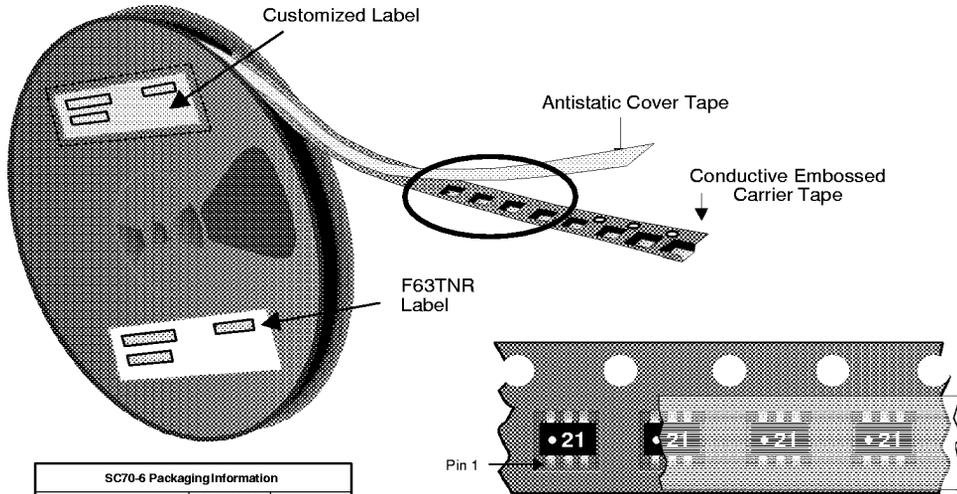


Figure 11. Transient Thermal Response Curve.

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

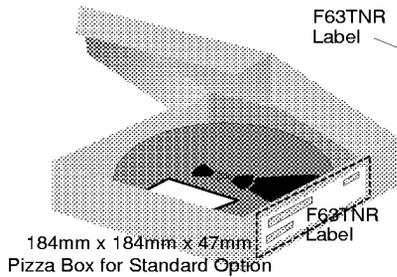
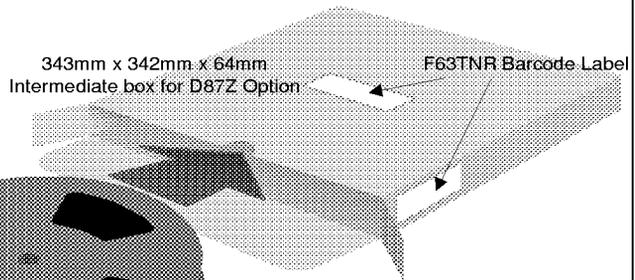
SC70-6 Tape and Reel Data and Package Dimensions

SC70-6 Packaging Configuration: Figure 1.0



SC70-6 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)	0.0055	0.0055
Weight per Reel (kg)	0.1140	0.3960
Note/Comments		

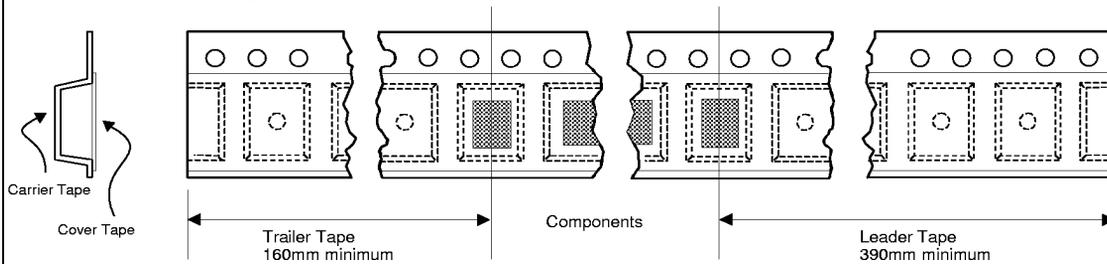
SC70-6 Unit Orientation



F63TNR Label sample



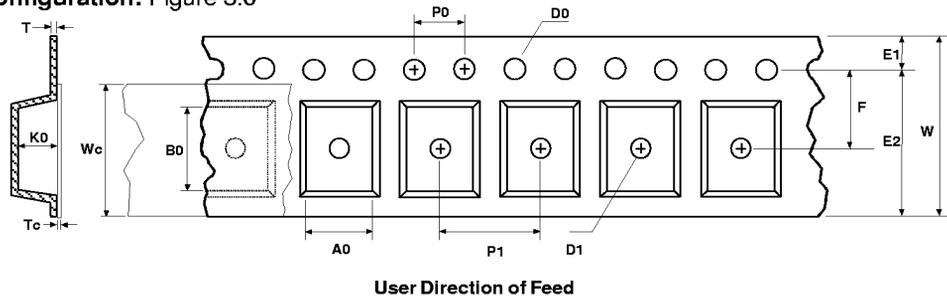
SC70-6 Tape Leader and Trailer Configuration: Figure 2.0



December 1998, Rev. B

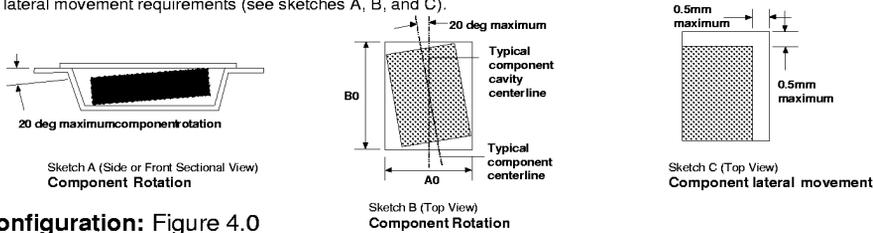
SC70-6 Tape and Reel Data and Package Dimensions, continued

SC70-6 Embossed Carrier Tape Configuration: Figure 3.0

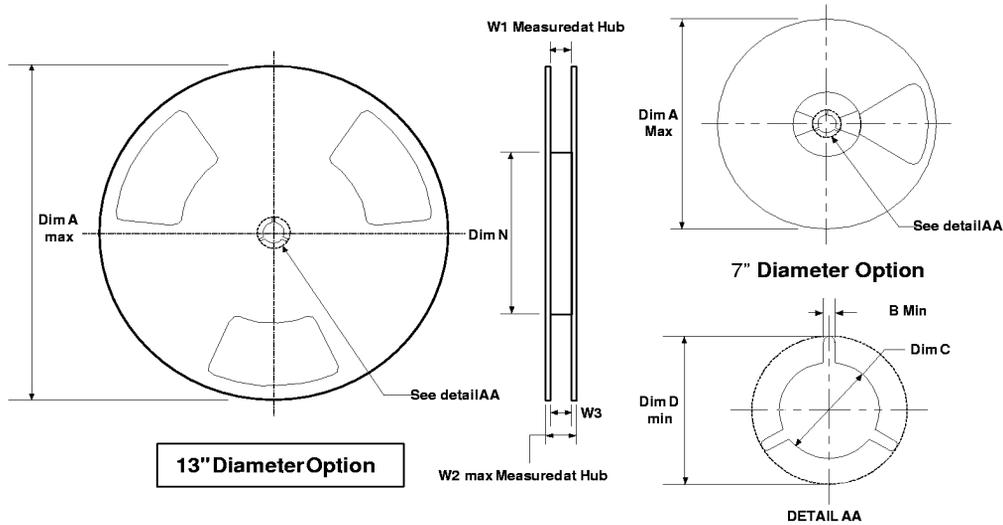


Dimensions are in millimeter														
Pkg type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
SC70-6 (8mm)	3.24 ±0.10	2.34 ±0.10	8.0 ±0.3	1.55 ±0.05	1.00 ±0.125	1.75 ±0.10	6.25 min	3.50 ±0.05	4.0 ±0.1	4.0 ±0.1	1.20 ±0.10	0.255 ±0.150	5.2 ±0.3	0.06 ±0.02

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).



SC70-6 Reel Configuration: Figure 4.0

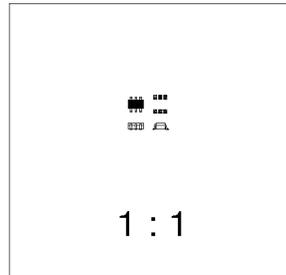
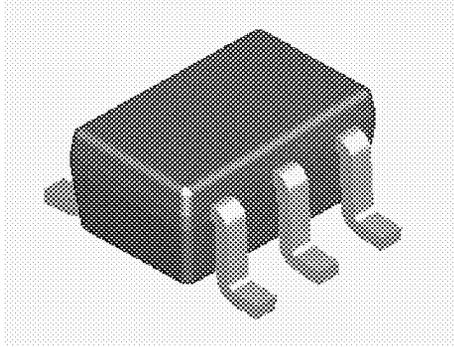


Dimensions are in inches and millimeters									
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
8mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.331 +0.059/-0.000 8.4 +1.5/0	0.567 14.4	0.311 - 0.429 7.9 - 10.9
8mm	13" Dia	13.00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

December 1998, Rev. B

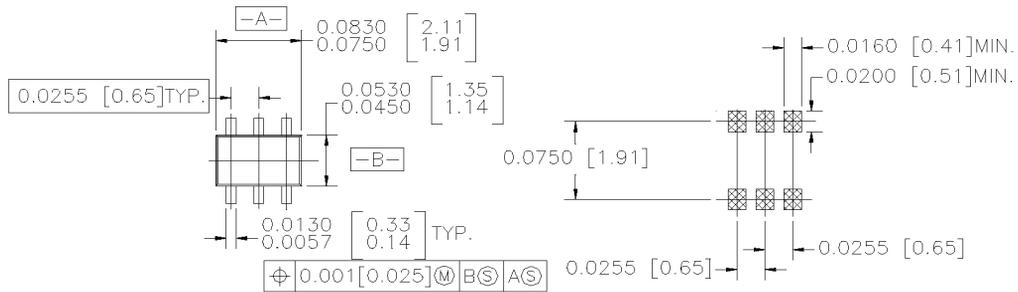
SC70-6 Tape and Reel Data and Package Dimensions, continued

SC70-6 (FS PKG Code 76)

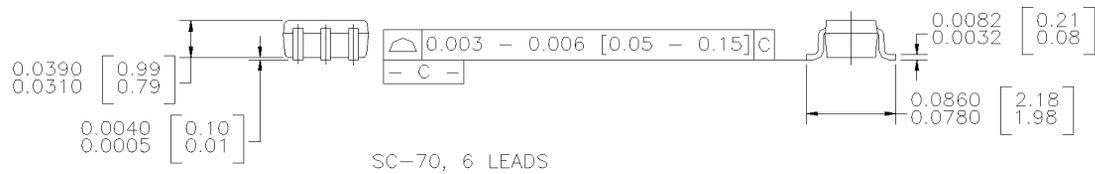


Scale 1:1 on letter size paper

Part Weight per unit (gram): 0.0055



LAND PATTERN RECOMMENDATION



September 1998, Rev. A