

Si9953DY*

Dual P-Channel Enhancement Mode MOSFET

General Description

These P-Channel Enhancement Mode MOSFETs are produced using Fairchild Semiconductor's advance process that has been especially tailored to minimize on-state resistance and yet maintain superior switching performance.

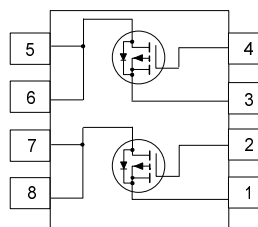
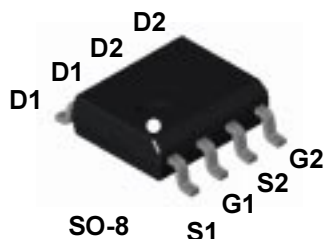
These devices are well suited for low voltage and battery powered applications where low in-line power loss and fast switching are required.

Applications

- Battery switch
- Load switch
- Motor controls

Features

- -2.3 A, -20 V. $R_{DS(on)} = 0.250 \Omega @ V_{GS} = -10 V$
 $R_{DS(on)} = 0.400 \Omega @ V_{GS} = -4.5 V.$
- Low gate charge.
- Fast switching speed.
- High power and current handling capability.



Absolute Maximum Ratings T_a=25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V _{DSS}	Drain-Source Voltage	-20	V
V _{GSS}	Gate-Source Voltage	±20	V
I _D	Drain Current - Continuous (Note 1a)	-2.3	A
	- Pulsed	-10	
P _D	Power Dissipation for Dual Operation	2.0	W
	Power Dissipation for Single Operation (Note 1a)	1.6	
	(Note 1b)	1.0	
	(Note 1c)	0.9	
T _J , T _{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

R _{θJA}	Thermal Resistance, Junction-to-Ambient	62.5	°C/W
R _{θJC}	Thermal Resistance, Junction-to-Case (Note 1)	40	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
9953	Si9953DY	13"	12mm	2500 units

* Die and manufacturing source subject to change without prior notification.

Electrical Characteristics

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$, Referenced to 25°C		-16		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$ $V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}, T_J = 55^\circ\text{C}$			-2 -25	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-1.0			V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$, Referenced to 25°C		3.5		mV/ $^\circ\text{C}$
$R_{D(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{ V}, I_D = -1\text{ A}$ $V_{GS} = -10\text{ V}, I_D = -1\text{ A}, T_J = 125^\circ\text{C}$ $V_{GS} = -4.5\text{ V}, I_D = -0.5\text{ A}$		0.11 0.15 0.24	0.25 0.30 0.40	Ω
$I_{D(on)}$	On-State Drain Current	$V_{GS} = -10\text{ V}, V_{DS} = -5\text{ V}$ $V_{GS} = -4.5\text{ V}, V_{DS} = -5\text{ V}$	-10 -1.5			A
g_{FS}	Forward Transconductance	$V_{DS} = -15\text{ V}, I_D = -2.3\text{ A}$		4		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		350		pF
C_{oss}	Output Capacitance			260		pF
C_{rss}	Reverse Transfer Capacitance			100		pF

Switching Characteristics (Note 2)

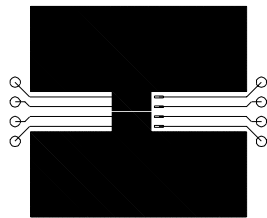
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -10\text{ V}, I_D = -1\text{ A}, R_L = 10\ \Omega$ $V_{GS} = -10\text{ V}, R_{GEN} = 6\ \Omega$		9	40	ns
t_r	Turn-On Rise Time			21	40	ns
$t_{d(off)}$	Turn-Off Delay Time			21	90	ns
t_f	Turn-Off Fall Time			8	50	ns
t_{rr}	Drain-Source Reverse Recovery Time	$I_F = -1.7\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$			100	nS
Q_g	Total Gate Charge	$V_{DS} = -10\text{ V}, I_D = -2.3\text{ A},$ $V_{GS} = -10\text{ V}$		10	25	nC
Q_{gs}	Gate-Source Charge			1.6		nC
Q_{gd}	Gate-Drain Charge			3.4		nC

Drain-Source Diode Characteristics and Maximum Ratings

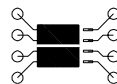
I_S	Maximum Continuous Drain-Source Diode Forward Current			-1.7		A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = -1.7\text{ A}$ <small>(Note 2)</small>		-0.8	-1.2	V

Notes:

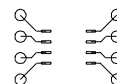
- $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) 78°C/W when mounted on a 0.5 in^2 pad of 2 oz. copper.



b) 125°C/W when mounted on a 0.02 in^2 pad of 2 oz. copper.



c) 135°C/W when mounted on a minimum pad of 2 oz. copper.

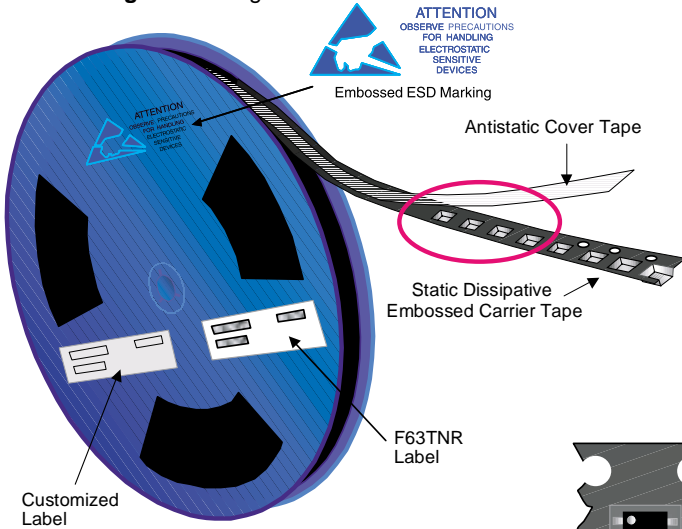
Scale 1 : 1 on letter size paper

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

SOIC-8 Tape and Reel Data



SOIC(8lds) Packaging Configuration: Figure 1.0

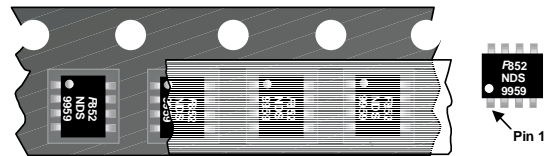


Packaging Description:

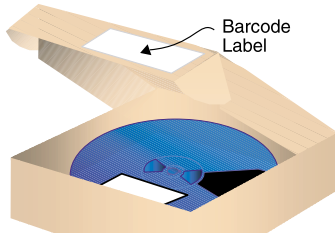
SOIC-8 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2,500 units per 13" or 330cm diameter reel. The reels are dark blue in color and is made of polystyrene plastic (anti-static coated). Other option comes in 500 units per 7" or 177cm diameter reel. This and some other options are further described in the Packaging Information table.

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

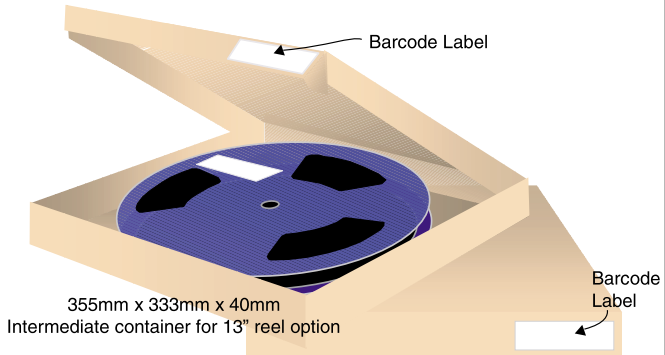
Packaging Option	Standard (no flow code)	L86Z	F011	D84Z
Packaging type	TNR	Rail/Tube	TNR	TNR
Qty per Reel/Tube/Bag	2,500	95	4,000	500
Reel Size	13" Dia	-	13" Dia	7" Dia
Box Dimension (mm)	355x333x40	530x130x83	355x333x40	193x183x80
Max qty per Box	5,000	30,000	8,000	2,000
Weight per unit (gm)	0.0774	0.0774	0.0774	0.0774
Weight per Reel (kg)	0.6060	-	0.9696	0.1182
Note/Comments				



SOIC-8 Unit Orientation



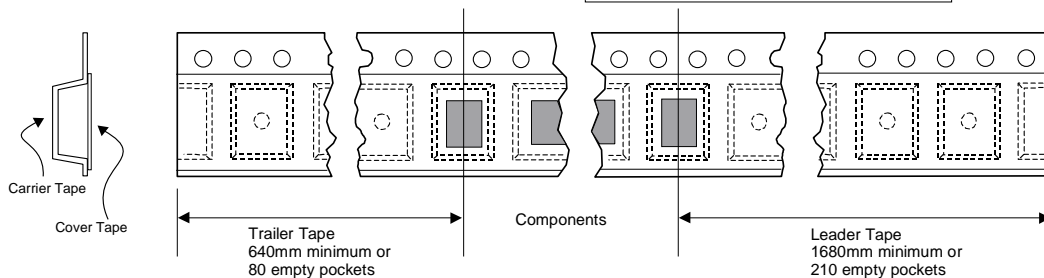
193mm x 183mm x 80mm
Pizza Box for Standard Option



F63TNR Label sample

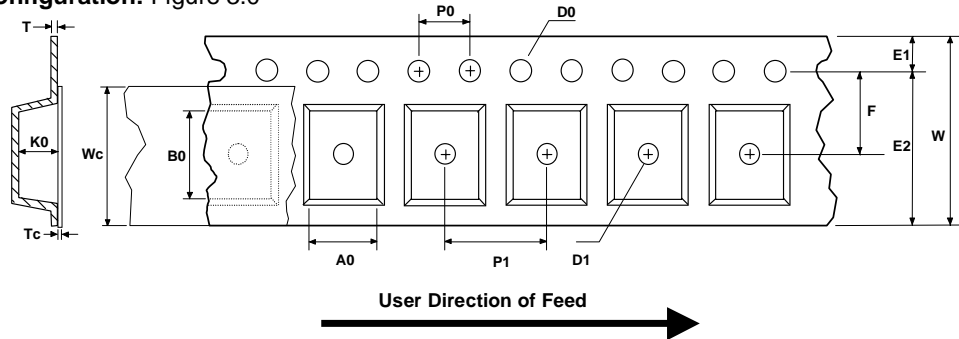


SOIC(8lds) Tape Leader and Trailer Configuration: Figure 2.0



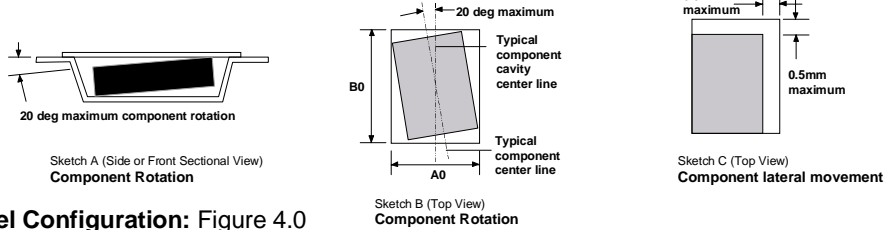
SOIC-8 Tape and Reel Data, continued

SOIC(8lds) Embossed Carrier Tape Configuration: Figure 3.0

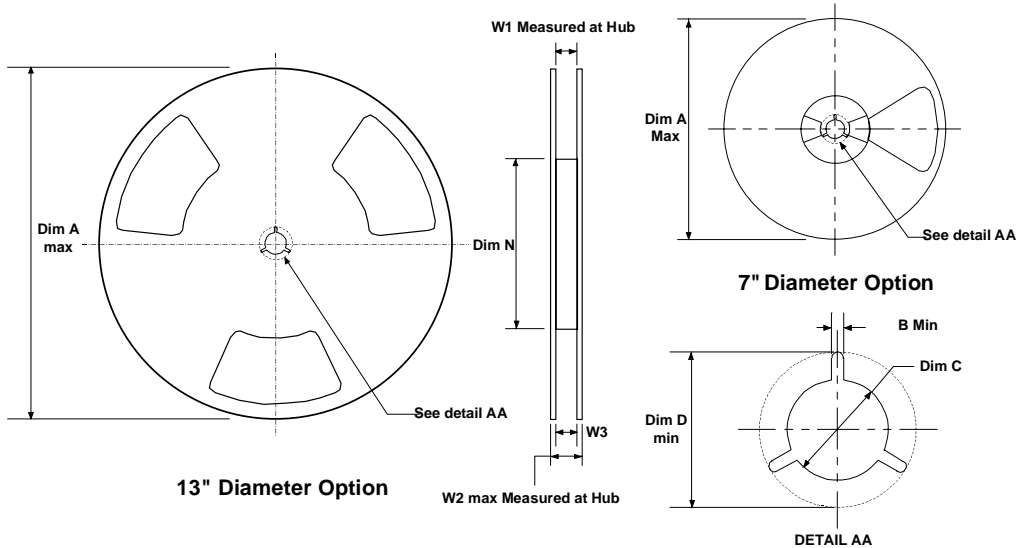


Dimensions are in millimeter														
Pkg type	A0	B0	W	D0	D1	E1	E2	F	P1	P0	K0	T	Wc	Tc
SOIC(8lds) (12mm)	5.30 +/-0.10	6.50 +/-0.10	12.0 +/-0.3	1.55 +/-0.05	1.60 +/-0.10	1.75 +/-0.10	10.25 min	5.50 +/-0.05	8.0 +/-0.1	4.0 +/-0.1	2.1 +/-0.10	0.450 +/- 0.150	9.2 +/-0.3	0.06 +/-0.02

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).



SOIC(8lds) Reel Configuration: Figure 4.0

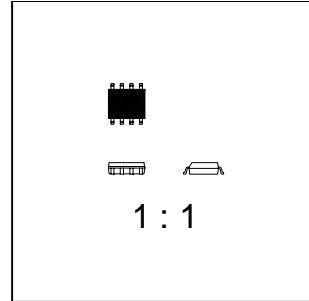
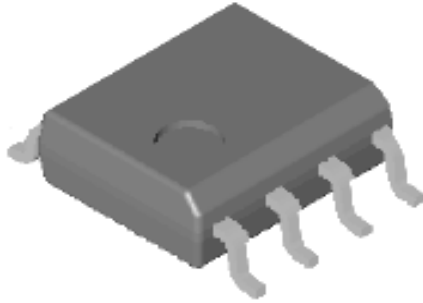


Dimensions are in inches and millimeters									
Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
12mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.488 +0.078/-0.000 12.4 +2/0	0.724 18.4	0.469 - 0.606 11.9 - 15.4
12mm	13" Dia	13.00 330	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	7.00 178	0.488 +0.078/-0.000 12.4 +2/0	0.724 18.4	0.469 - 0.606 11.9 - 15.4

SOIC-8 Package Dimensions



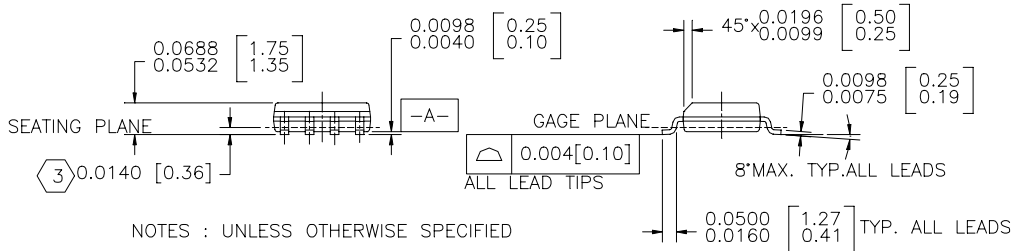
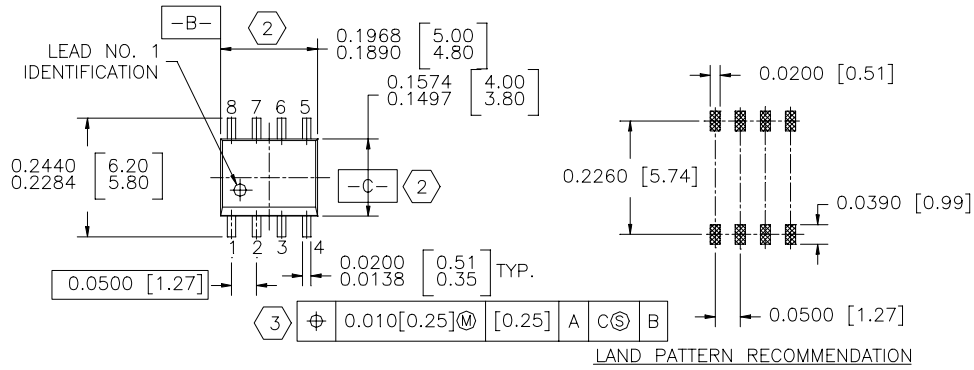
SOIC-8 (FS PKG Code S1)



Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0774



NOTES : UNLESS OTHERWISE SPECIFIED

- STANDARD LEAD FINISH:
200 MICROINCHES / 5.08 MICRONS MINIMUM
LEAD / TIN (SOLDER) ON COPPER.

SO 0.150 WIDE 8 LEADS

- THESE DIMENSIONS DO NOT INCLUDE MOLD FLASH
- MAXIMUM LEAD 0.024 [0.609]

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