FAIRCHILD SEMICONDUCTOR TM

September 1999
DISTRIBUTION GROUP*

Si4532DY

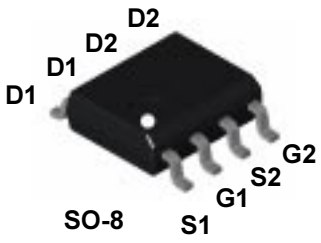
Dual N- and P-Channel Enhancement Mode Field Effect Transistor

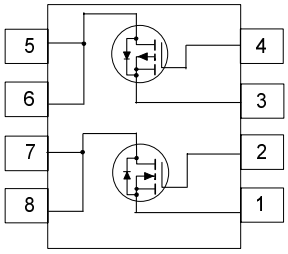
General Description

These dual N- and P-Channel enhancement mode power field effect transistors are produced using Fairchild's propretary, high cell density, DMOS technology. This very high density process is especially tailored to minimize on-state resistance and provide superior switching performance. These devices are particularly suited for low voltage applications such as notebook computer power management and other battery powered circuits where fast switching, low in-line power loss, and resistance to transients are needed.

Features

- N-Channel 3.9A, 30V. $R_{DS(ON)}$ = 0.065Ω @V_{GS} = 10V
  $R_{DS(ON)}$ = 0.095Ω @V_{GS} = 4.5V.
- P-Channel -3.5A,-30V. $R_{DS(ON)}$= 0.085Ω @V_{GS} = -10V
  $R_{DS(ON)}$= 0.190 Ω @V_{GS} = -4.5V.
- High density cell design for extremely low $R_{DS(ON)}$.
- High power and current handling capability in a widely used surface mount package.
- Dual (N & P-Channel) MOSFET in surface mount package.





Absolute Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter		N-Channel	P-Channel	Units
V_{DSS}	Drain-Source Voltage		30	-30	V
V_{GSS}	Gate-Source Voltage		20	-20	V
I_D	Drain Current - Continuous	(Note 1a)	3.9	-3.5	A
	- Pulsed		20	-20	
P_D	Power Dissipation for Dual Operation		2		W
	Power Dissipation for Single Operation	(Note 1a)	1.6		
		(Note 1b)	1		
		(Note 1c)	0.9		
T_J, T_{STG}	Operating and Storage Junction Temperature Range		-55 to +150		°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	40	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
4532	Si4532DY	13"	12mm	2500 units

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

Electrical Characteristics

T_A = 25°C unless otherwise noted

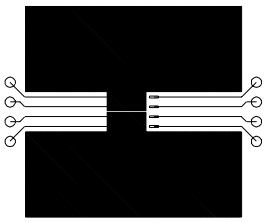
Symbol	Parameter	Test Conditions	Type	Min	Typ	Max	Units
Off Characteristics							
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	N-Ch	30			V
		V_{GS} = 0 V, I_D = -250 μA	P-Ch	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V	N-Ch			1	μA
		V_{DS} = -24 V, V_{GS} = 0 V	P-Ch			-1	μA
I_{GSSF}	Gate-Body Leakage, Forward	V_{GS} = 20 V, V_{DS} = 0 V	All			100	nA
I_{GSSR}	Gate-Body Leakage, Reverse	V_{GS} = -20 V, V_{DS} = 0 V	All			-100	nA
On Characteristics (Note 2)							
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	N-Ch	1		3	V
		V_{DS} = V_{GS}, I_D = -250 μA	P-Ch	-1		-3	V
$R_{DS(on)}$	Static Drain-Source On Resistance	V_{GS} = 10 V, I_D = 3.9 A	N-Ch		0.053	0.065	Ω
		V_{GS} = 4.5 V, I_D = 3.1 A			0.081	0.095	
		V_{GS} = -10 V, I_D = -2.5 A	P-Ch		0.06	0.085	
		V_{GS} = -4.5 V, I_D = -1.8 A			0.095	0.19	
$I_{D(on)}$	On-State Drain Current	V_{GS} = 10 V, V_{DS} = 5 V	N-Ch	15			A
		V_{GS} = -10 V, V_{DS} = -5 V	P-Ch	-15			
g_{FS}	Forward Transconductance	V_{DS} = 15 V, I_D = 3.9 A	N-Ch		7		S
		V_{DS} = -15 V, I_D = -2.5 A	P-Ch		5		
Dynamic Characteristics							
C_{iss}	Input Capacitance	V_{DS} = 10 V, V_{GS} = 0 V, f = 1.0 MHz	N-Ch		235		pF
			P-Ch		420		
C_{oss}	Input Capacitance	V_{DS} = -10 V, V_{GS} = 0 V, f = 1.0 MHz	N-Ch		150		pF
			P-Ch		140		
C_{rss}	Reverse Transfer Capacitance		N-Ch		49		pF
			P-Ch		60		

Electrical Characteristics (continued)

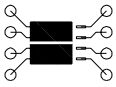
Symbol	Parameter	Test Conditions	Type	Min	Typ	Max	Units
Switching Characteristics (Note 2)							
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 10 V, I_D = 1 A, V_{GS} = 10 V, R_{GEN} = 6 Ω	N-Ch		7	13	ns
			P-Ch		9	18	
t_r	Turn-On Rise Time		N-Ch		18	29	ns
			P-Ch		8	16	
$t_{d(off)}$	Turn-Off Delay Time	V_{DD} = -10 V, I_D = -2.5 A, V_{GS} = -10 V, R_{GEN} = 6 Ω	N-Ch		15	27	ns
			P-Ch		18	29	
t_f	Turn-Off Fall Time		N-Ch		0.8	8	ns
			P-Ch		6	12	
t_{rr}	Drain-Source Reverse Recovery Time	I_F = 1.7 A, di/dt = 100A/μs	N-Ch			80	nS
		I_F = -1.7 A, di/dt = 100A/μs	P-Ch			80	
Q_g	Total Gate Charge	V_{DS} = 10 V, I_D = 3.9 A, V_{GS} = 10 V	N-Ch		3.7	15	nC
			P-Ch		5	15	
Q_{gs}	Gate-Source Charge	V_{DS} = -10 V, I_D = -2.5 A, V_{GS} = -10 V	N-Ch		0.9		nC
			P-Ch		1.7		
Q_{gd}	Gate-Drain Charge		N-Ch		1.9		nC
			P-Ch		1.8		
Drain-Source Diode Characteristics and Maximum Ratings							
I_S	Maximum Continuous Drain-Source Diode Forward Current		N-Ch			1.7	A
			P-Ch			-1.7	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 1.7 A (Note 2)	N-Ch		0.75	1.2	V
		V_{GS} = 0 V, I_S = -1.7 A (Note 2)	P-Ch		-0.75	-1.2	V

Notes:

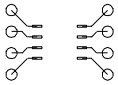
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) 78° C/W when mounted on a 0.05 in² pad of 2 oz. copper.



b) 125° C/W when mounted on a 0.02 in² pad of 2 oz. copper.



c) 135° C/W when mounted on a minimum mounting pad.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

SO-8 Tape and Reel Data and Package Dimensions

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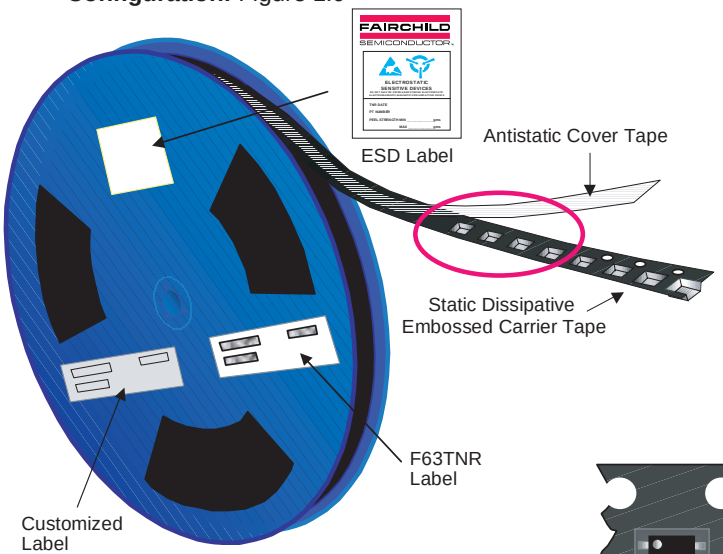
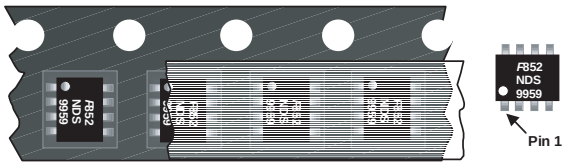
SOIC(8lds) Packaging Configuration: Figure 1.0



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.

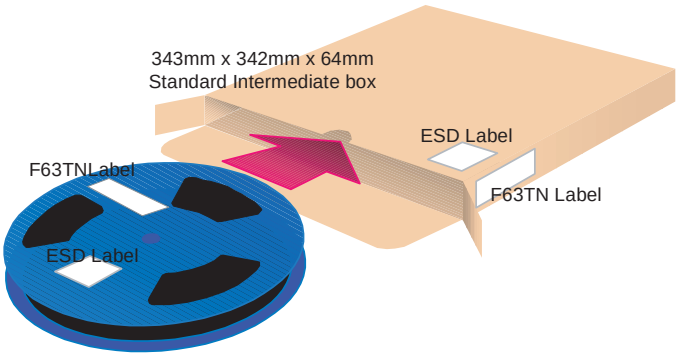


SOIC-8 Unit Orientation

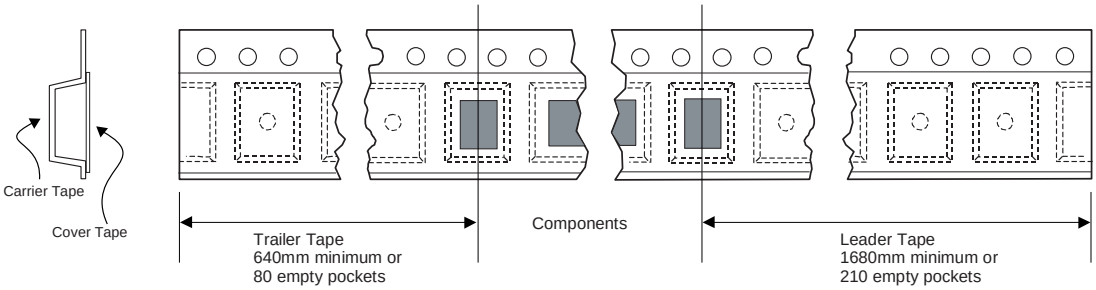
SOIC (8lds) Packaging Information				
Packaging Option	Standard (no flow code)	L86Z	F011	D84Z
Packaging type	TNR	Rail/Tube	TNR	TNR
Qty per Reel/Tube/Bag	2,500	95	4,000	500
Reel Size	13" Dia	-	13" Dia	7" Dia
Box Dimension (mm)	343x64x343	530x130x83	343x64x343	184x187x47
Max qty per Box	5,000	30,000	8,000	1,000
Weight per unit (gm)	0.0774	0.0774	0.0774	0.0774
Weight per Reel (kg)	0.6060	-	0.9696	0.1182
Note/Comments				

F63TNR Label sample

LOT: CBVK741B019 QTY: 2500
FSID: FDS9953A SPEC:
D/C1: D9842 QTY1: SPEC REV:
D/C2: QTY2: CPN:
N/F: F (F63TNR)3

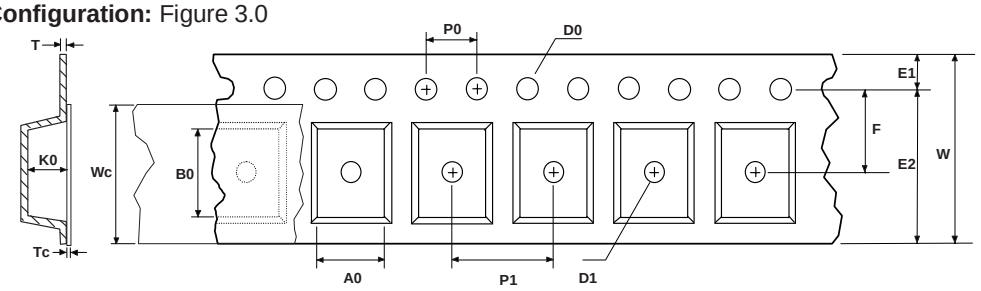


SOIC(8lds) Tape Leader and Trailer Configuration: Figure 2.0



SO-8 Tape and Reel Data and Package Dimensions, continued

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

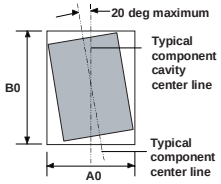


User Direction of Feed

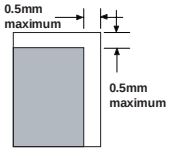
Dimensions are in millimeter														
Pkg type	**A0**	**B0**	**W**	**D0**	**D1**	**E1**	**E2**	**F**	**P1**	**P0**	**K0**	**T**	**Wc**	**Tc**
SOIC(8lds) (12mm)	6.50 +/-0.10	5.30 +/-0.10	12.0 +/-0.3	1.55 +/-0.05	1.60 +/-0.10	1.75 +/-0.10	10.25 min	5.50 +/-0.05	8.0 +/-0.1	4.0 +/-0.1	2.1 +/-0.10	0.450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

Sketch A (Side or Front Sectional View)
Component Rotation

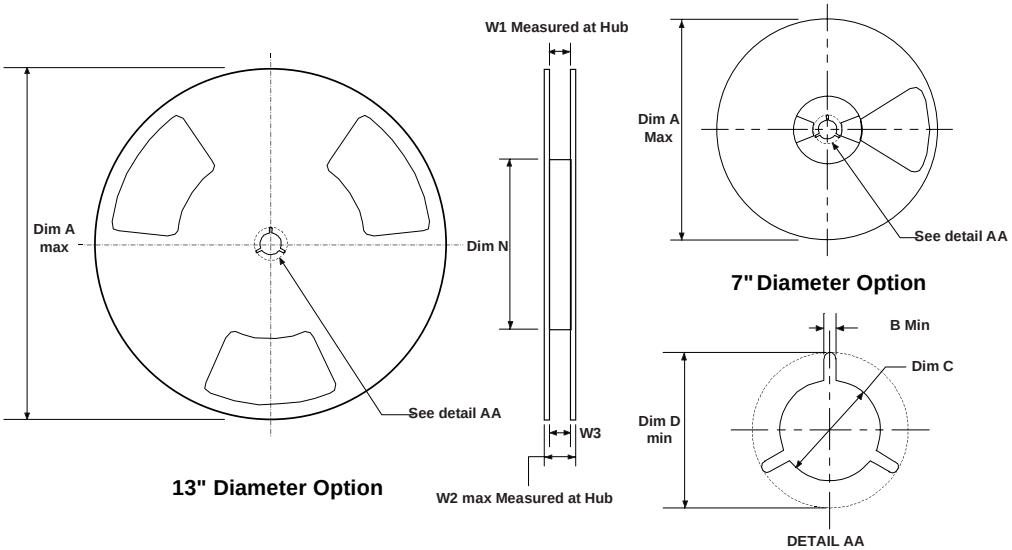


Sketch B (Top View)
Component Rotation



Sketch C (Top View)
Component lateral movement

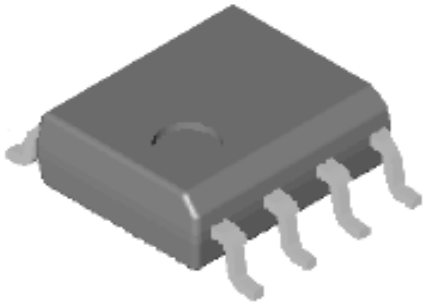
SOIC(8lds) Reel Configuration: Figure 4.0

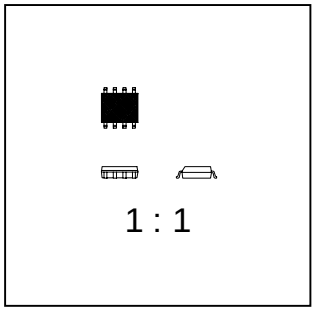


Dimensions are in inches and millimeters									
Tape Size	**Reel Option**	**Dim A**	**Dim B**	**Dim C**	**Dim D**	**Dim N**	**Dim W1**	**Dim W2**	**Dim W3 (LSL-USL)**
12mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	2.165 55	0.488 +0.078/-0.000 12.4 +2/0	0.724 18.4	0.469 –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

SO-8 Tape and Reel Data and Package Dimensions, continued

SOIC-8 (FS PKG Code S1)

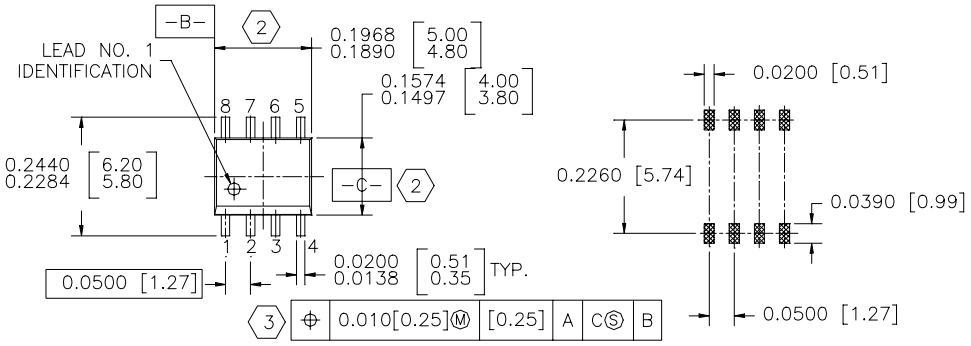


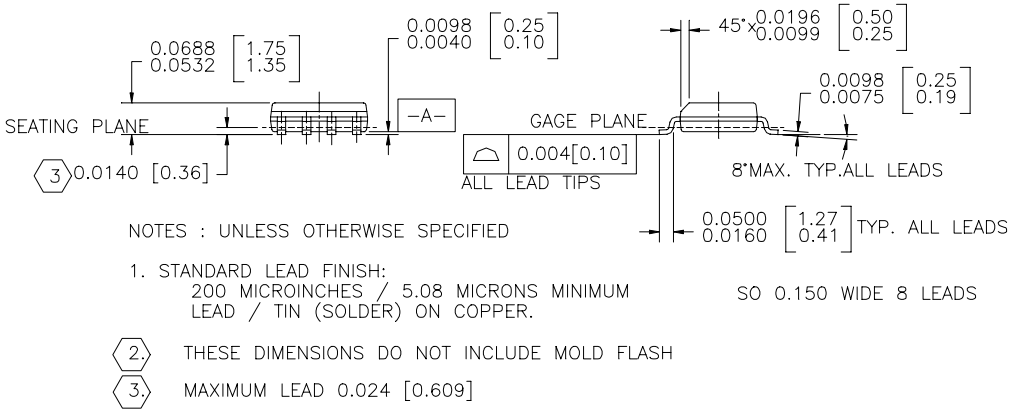


Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0774





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   LEAD / TIN (SOLDER) ON COPPER.

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3. MAXIMUM LEAD 0.024 [0.609]

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