August 2000

FAIRCHILD SEMICONDUCTOR TM

FDR8521L

P-Channel MOSFET With Gate Driver For Load Switch Application

General Description

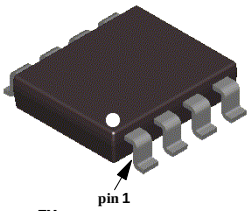
This device is designed for configuration as a load switch and is particularly suited for power management in portable battery powered electronic equipment. Designed to operate from 3V to 20V input and supply up to 2.9A, the device features a small N-Channel MOSFET (Q1) together with a large P-Channel Power MOSFET (Q2) in a single SO-8 package.

Applications

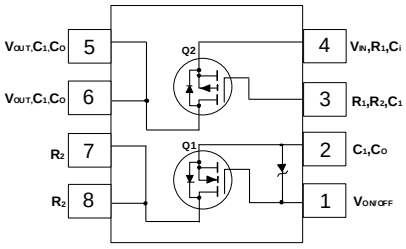
- Power management
- Load switch

Features

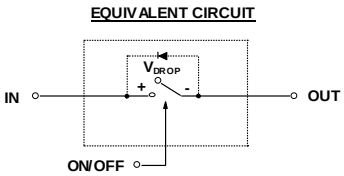
- V_{DROP} = 0.07 V @ V_{IN} = 12 V, I_L = 1 A.$R_{(ON)}$ = 0.07 Ω
  V_{DROP} = 0.115 V @ V_{IN} = 5 V, I_L = 1 A.$R_{(ON)}$ = 0.115 Ω.
- V_{DROP} = 0.2 V @ V_{IN} = 12 V, I_L =2.9 A.$R_{(ON)}$ = 0.07 Ω
  V_{DROP} = 0.2 V @ V_{IN} = 5 V,I_L = 1.8 A.$R_{(ON)}$ = 0.115 Ω.
- Control MOSFET (Q1) includes Zener protection for ESD ruggedness (>6kV Human Body Model).
- High density cell design for extremely low on-resistance.



SuperSOT™-8



See Application Circuit



Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{IN}	Input Voltage Range	(Note 1)	3 - 20	V
$V_{ON/OFF}$	On/Off Voltage Range		2.5 - 8	V
I_D	Load Current - Continuous	(Note 2)	2.9	A
	- Pulsed		8	
P_D	Maximum Power Dissipation	(Note 2)	0.8	W
T_J, T_{stg}	Operating and Storage Temperature Range		-55 to +150	°C
ESD	Electrostatic Discharge Rating MIL-STD-883D Human-Body-Model (100pf/1500 Ohm)		6	kV

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 2)	156	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 2)	40	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
8521L	FDR8521L	13''	12mm	3000 units

Electrical Characteristics

T_A=25°C unless otherwise noted

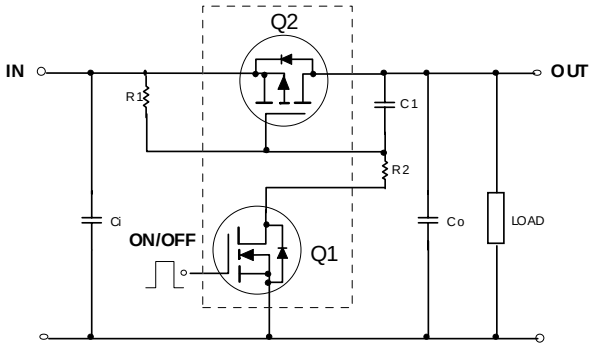
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
OFF Characteristics						
I_{FL}	Forward Leakage Current	V_{IN} = 20 V, $V_{ON/OFF}$ = 250 µA			1	µA
ON Characteristics (Note 3)						
V_{DROP}	Conduction Voltage	V_{IN} = 12 V, $V_{ON/OFF}$ = 3.3 V, I_L = 1 A V_{IN} = 5 V, $V_{ON/OFF}$ = 3.3 V, I_L = 1 A V_{IN} = 12 V, $V_{ON/OFF}$ = 3.3 V, I_L = 2.9 A V_{IN} = 5 V, $V_{ON/OFF}$ = 3.3 V, I_L = 1.8 A		0.053 0.085	0.070 0.115 0.200 0.200	V
$R_{(ON)}$	Q_2 - Static On-Resistance	V_{GS} = -12 V, I_D = 2.9 A V_{GS} = -5 V, I_D = 1.8 A		0.054 0.090	0.070 0.115	Ω
I_L	Load Current	V_{DROP} = 0.2 V, V_{IN} = 12 V, $V_{ON/OFF}$ = 3.3 V V_{DROP} = 0.2 V, V_{IN} = 5 V, $V_{ON/OFF}$ = 3.3 V	2.9 1.8			A

Notes:

1. Range of V_{IN} can be up to 25V, but R_1 and R_2 must be scaled such that V_{GS} of Q2 does not exceed -20V.
2. $R_{\theta JA}$ 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.
3. Pulse Test: Pulse Width < 300µs, Duty Cycle < 2.0%.

FDR8521L Load Switch Application

APPLICATION CIRCUIT



External Component Recommendation:

For applications where Co ≤ 1µF.

For slew rate control, select R2 in the range of 470 - 10kΩ .

For additional in-rush current control,C1 ≤ 1000pF can be added.

Select R1 so that the R1/R2 ratio ranges from 10 - 100. R1 is required to turn Q2 off.

Typical Characteristics (continued)

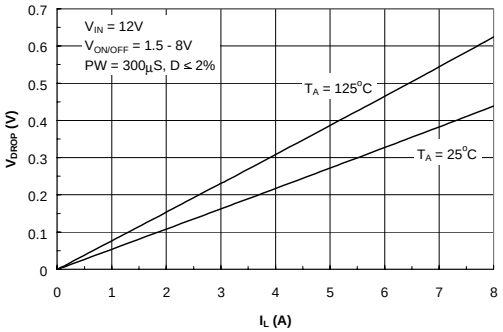


Figure 1. Conduction Voltage Drop Variation with Load Current.

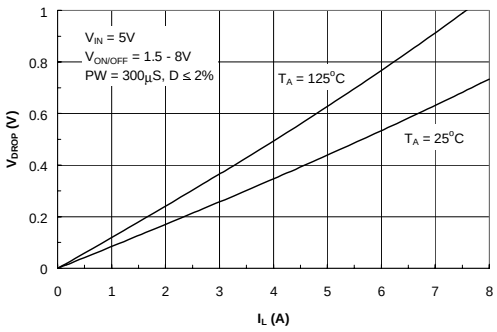


Figure 2. Conduction Voltage Drop Variation with Load Current.

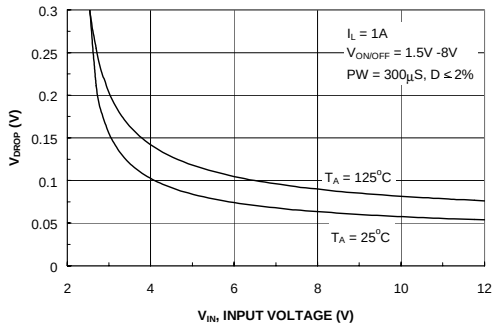


Figure 3. On-Resistance Variation with Input Voltage.

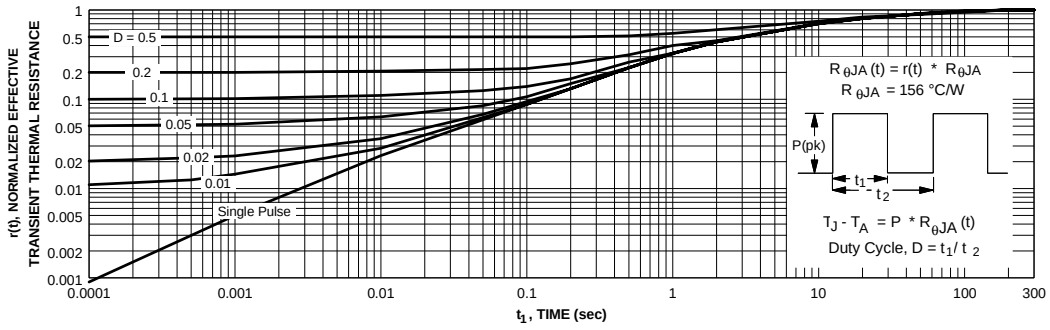


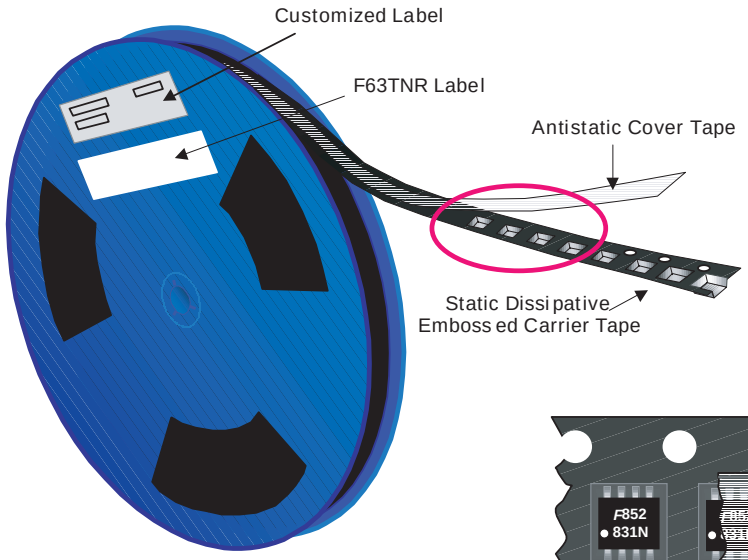
Figure 4.Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 2. Transient themal response will change depending on the circuit board design.

SuperSOT™-8 Tape and Reel Data and Package Dimensions

FAIRCHILD SEMICONDUCTOR™

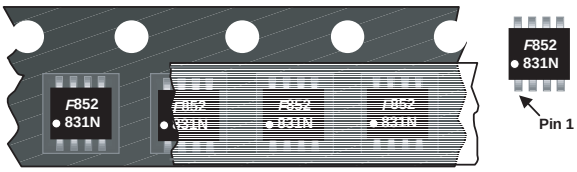
SSOT-8 Packaging Configuration: Figure 1.0



Packaging Description:

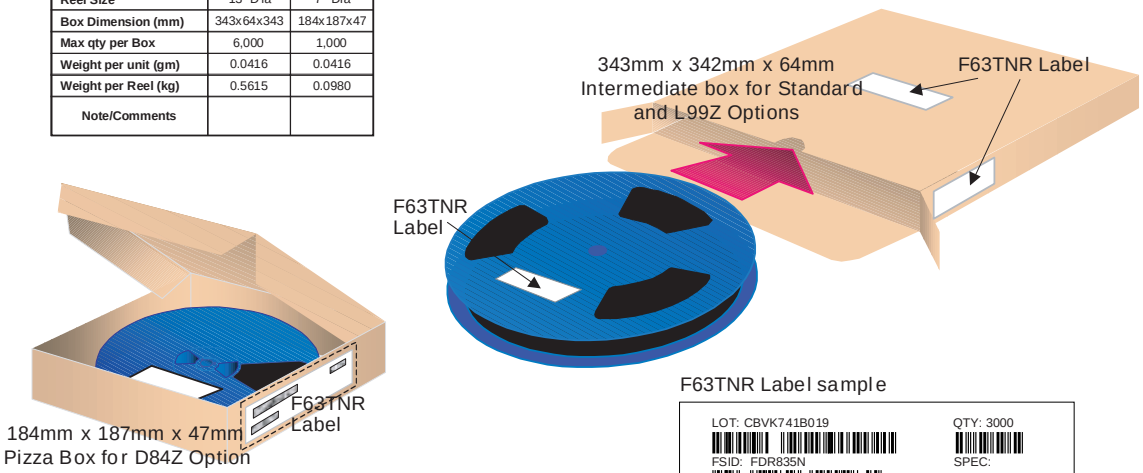
SSOT-8 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 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.

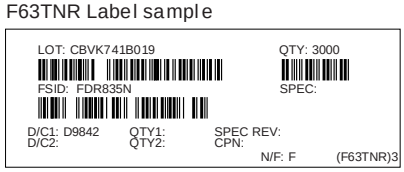


SSOT-8 Unit Orientation

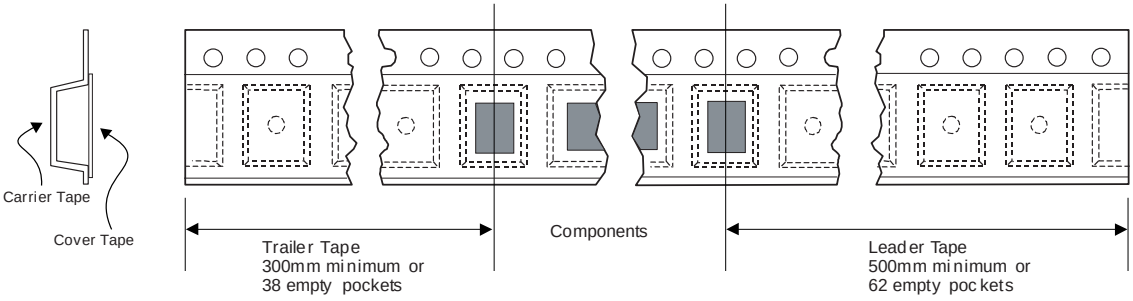
SSOT-8 Packaging Information		
Packaging Option	Standard (no flow code)	D84Z
Packaging type	TNR	TNR
Qty per Reel/Tube/Bag	3,000	500
Reel Size	13" Dia	7" Dia
Box Dimension (mm)	343x64x343	184x187x47
Max qty per Box	6,000	1,000
Weight per unit (gm)	0.0416	0.0416
Weight per Reel (kg)	0.5615	0.0980
Note/Comments		



F63TNR Label sample



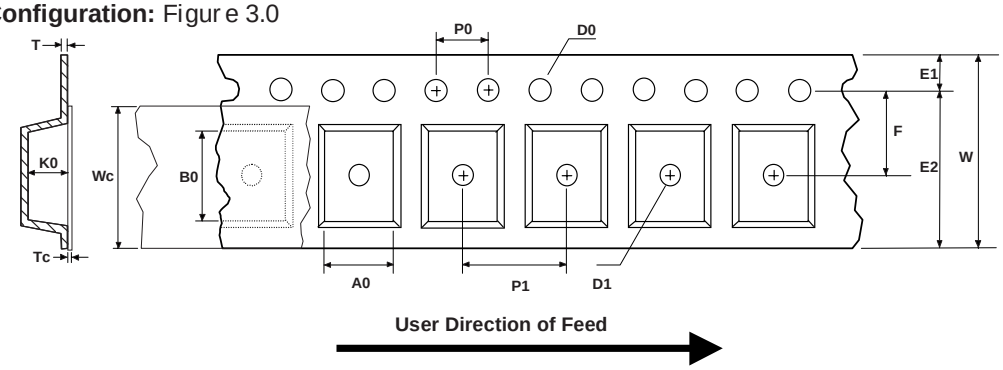
SSOT-8 Tape Leader and Trailer Configuration: Figure 2.0



SuperSOT™-8 Tape and Reel Data and Package Dimensions, continued

SSOT-8 Embossed Carrier Tape

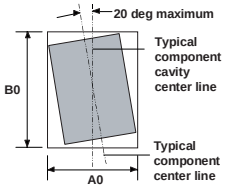
Configuration: Figure 3.0



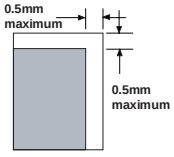
Dimensions are in millimeter														
Pkg type	**A0**	**B0**	**W**	**D0**	**D1**	**E1**	**E2**	**F**	**P1**	**P0**	**K0**	**T**	**Wc**	**Tc**
SSOT-8 (12mm)	4.47 +/-0.10	5.00 +/-0.10	12.0 +/-0.3	1.55 +/-0.05	1.50 +/-0.10	1.75 +/-0.10	10.25 min	5.50 +/-0.05	8.0 +/-0.1	4.0 +/-0.1	1.37 +/-0.10	0.280 +/-0.150	9.5 +/-0.025	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

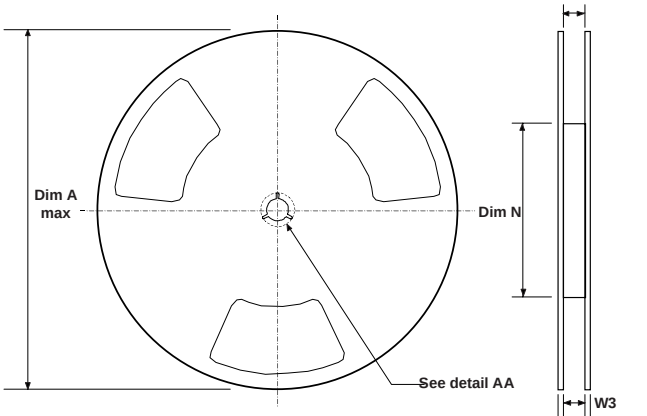


Sketch B (Top View)
Component Rotation

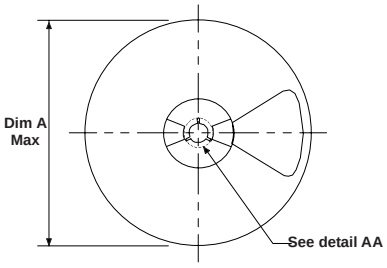


Sketch C (Top View)
Component lateral movement

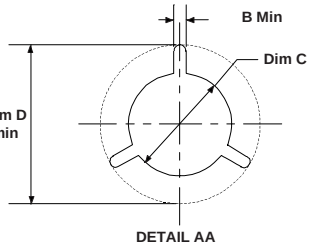
SSOT-8 Reel Configuration: Figure 4.0



13" Diameter Option



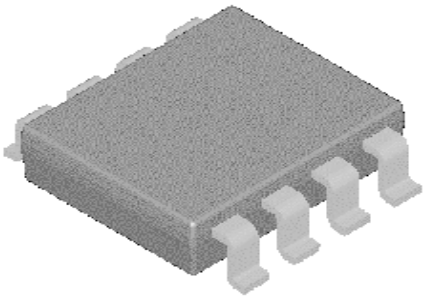
7" Diameter Option

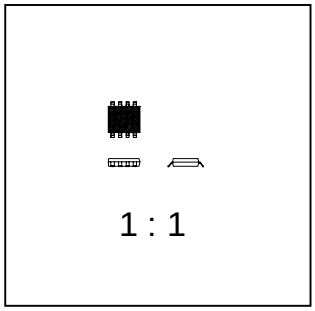


Dimensions are in inches and millimeters									
Tape Size	**Reel Option**	**Dim A**	**Dim B**	**Dim C**	**Dim D**	**Dim N**	**Dim W1**	**Dim W2**	**Dim W3 (LSL-USL)**
12mm	7" Dia	7.00 177.8	0.059 1.5	512 +0.020/-0.008 13 +0.5/-0.2	0.795 20.2	5.906 150	0.488 +0.078/-0.000 12.4 +2/0	0.724 18.4	0.469 – 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

SuperSOT™-8 Tape and Reel Data and Package Dimensions, continued

SuperSOT™-8 (FS PKG Code 34, 35)

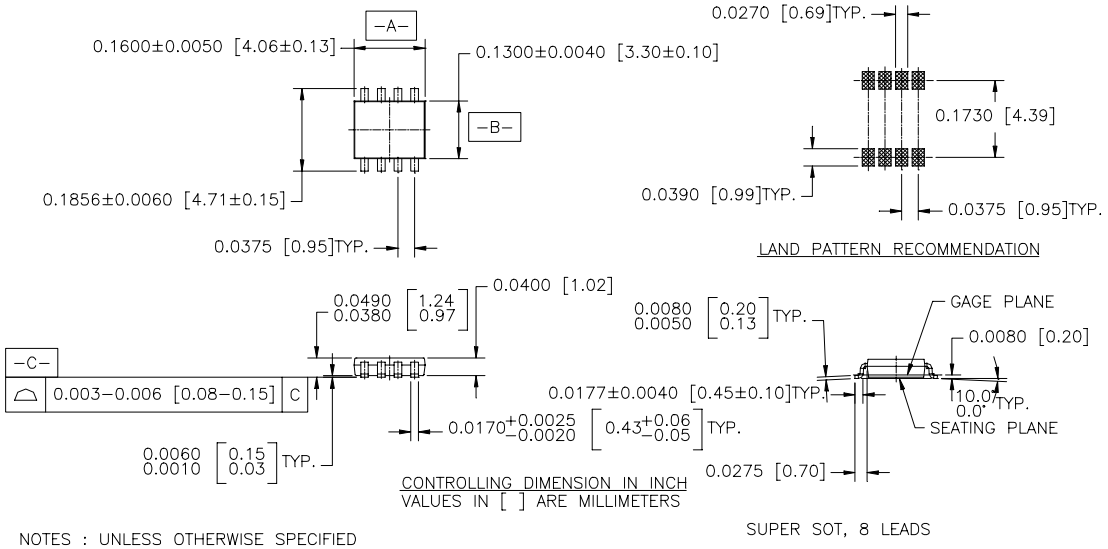




Scale 1:1 on letter size paper

Dimensions shown below are in:
inches [millimeters]

Part Weight per unit (gram): 0.0416



NOTES : UNLESS OTHERWISE SPECIFIED

1. STANDARD LEAD FINISH TI BE 200 MICROINCHES / 5.08 MICROMETERS MINIMUM TIN/LEAD (SOLDER) ON COPPER.
2. NO JEDEC REGISTRATION AS JAN. 1996

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