FAIRCHILD SEMICONDUCTOR TM

August 2000

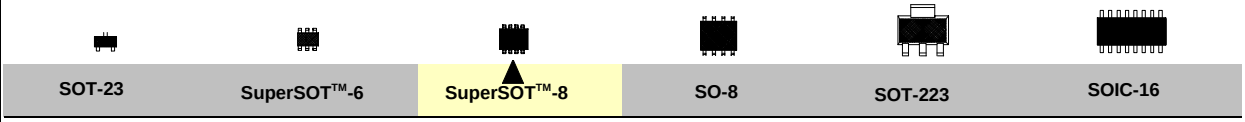
FDR8321L
P-Channel MOSFET With Gate Driver For Load Switch Application

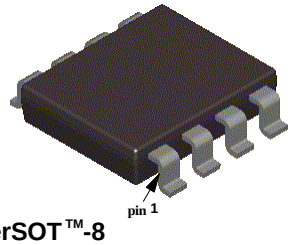
General Description

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 2.5V to 8V 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 SuperSOT™-8 package.

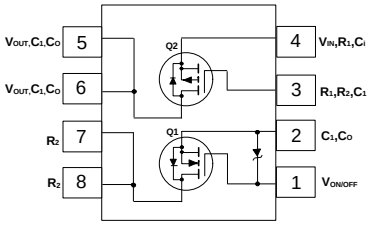
Features

- V_{DROP} = 0.2V @ V_{IN}= 5V, I_L= 2.9A. $R_{DS(ON)}$ = 0.070 Ω
  V_{DROP} = 0.2V @ V_{IN}= 2.5V, I_L= 2A. $R_{DS(ON)}$ = 0.105 Ω.
- $V_{ON/OFF}$ Zener protection for ESD ruggedness (>6KV Human Body Model).
- High density cell design for extremely low on-resistance.

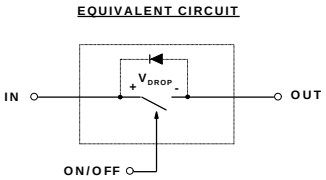




SuperSOT™-8



See Application Circuit



Absolute Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter	FDR8321L	Units
V_{IN}	Input Voltage Range	2.5 - 8	V
$V_{ON/OFF}$	On/Off Voltage Range	1.5 - 8	V
I_L	Load Current @ V_{DROP}= 0.2V - Continuous (Note 1)	2.9	A
	- Pulsed	10	
P_D	Maximum Power Dissipation (Note 2)	0.8	W
T_J,T_{STG}	Operating and Storage Temperature Range	-55 to 150	°C
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

Electrical Characteristics (T_A = 25°C unless otherwise noted)

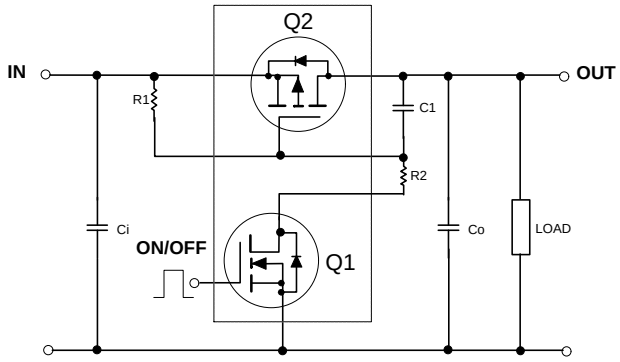
Symbol	Parameter	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
I_{FL}	Forward Leakage Current	V_{IN} = 5 V, $V_{ON/OFF}$ = 0 V			1	µA
ON CHARACTERISTICS (Note 3)						
V_{DROP}	Conduction Voltage Drop	V_{IN} = 5 V, $V_{ON/OFF}$ = 3.3 V, I_L = 2.9 A		0.185	0.2	V
		V_{IN} = 2.5 V, $V_{ON/OFF}$ = 3.3 V, I_L= 2 A		0.18	0.2	
$R_{DS(ON)}$	Q_2 - Static Drain-Source On-Resistance	V_{GS} = -5 V, I_D = -2.9 A		0.06	0.07	Ω
		V_{GS} = -2.5 V, I_D = -2 A		0.09	0.105	
I_L	Load Current	V_{DROP} = 0.2 V, V_{IN} = 5 V, $V_{ON/OFF}$ = 3.3 V	2.9			A
		V_{DROP} = 0.2 V, V_{IN} = 2.5 V, $V_{ON/OFF}$ = 3.3 V	2			

Notes:

1. V_{IN}=5V, $V_{ON/OFF}$=8V, V_{DROP}=0.2V, T_A=25°C
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 $R_{\theta CA}$ is determined by the user's board design. $R_{\theta JA}$ typical =156°C/W when mounted on a minimum 0.0025 in^2 pad on FR-4.
3. Pulse Test: Pulse Width ≤ 300µs, Duty Cycle ≤ 2.0%

FDR8321L Load Switch Application

APPLICATION CIRCUIT



External Component Recommendation

First select R2, 100 - 1kΩ, for Slew Rate control.
C1 ≤ 1000pF can be added in addition to R2 for further In-rush current control.
Then select R1 such that R1/R2 ratio maintains between 10 - 100. R1 is required to turn Q2 off.
For SPICE simulation, users can download a "FDR8321L.MOD" Spice model from Fairchild Web Site at www.fairchildsemi.com

Typical Electrical Characteristics (T_A = 25 °C unless otherwise noted)

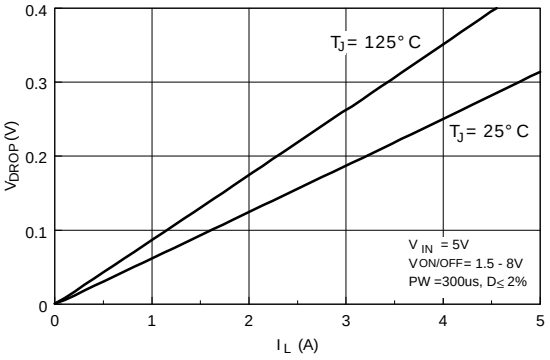


Figure 1. Conduction Voltage Drop versus Load Current at Input Voltage 5V.

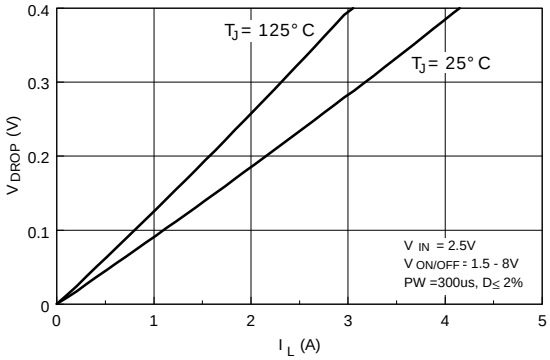


Figure 2. Conduction Voltage Drop versus Load Current at Input Voltage 2.5V.

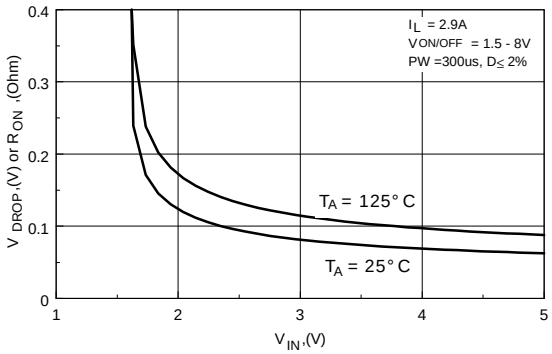


Figure 3. Conduction Voltage Drop versus input Voltage at Load Current 2.9A.

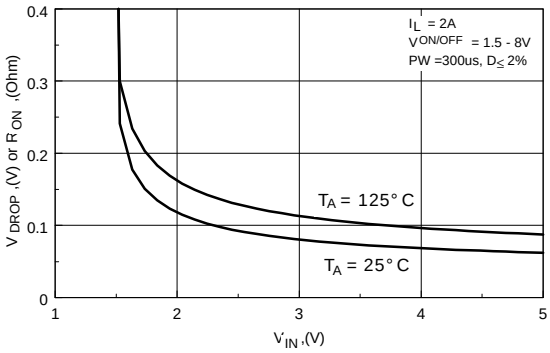


Figure 4. Conduction Voltage Drop versus Input Voltage at Load Current 2A.

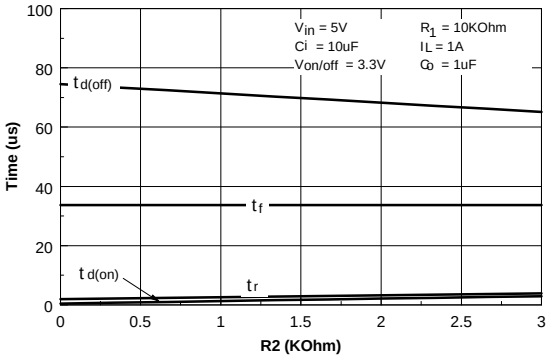


Figure 5. Switching Variation with R_2 at V_{in} = 5V and R_1 = 10KΩ.

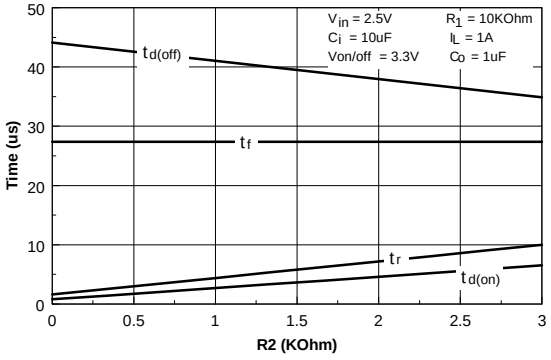


Figure 6. Switching Variation with R_2 at V_{in} = 2.5V and R_1 = 10KΩ.

Typical Electrical Characteristics (T_A = 25 °C unless otherwise noted)

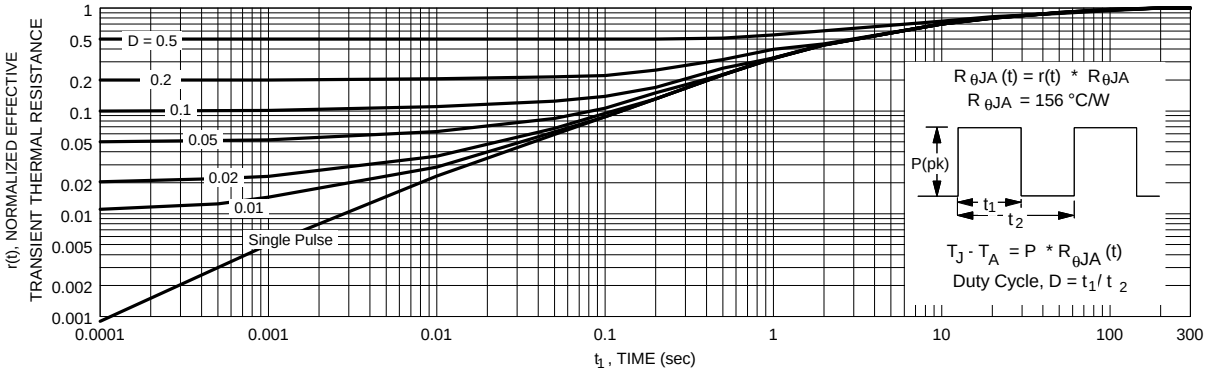


Figure 7. Transient Thermal Response Curve.

Thermal characterization performed on the conditions described in Note 2.

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