FAIRCHILD SEMICONDUCTOR TM

April 2001

FDG6331L

Integrated Load Switch

General Description

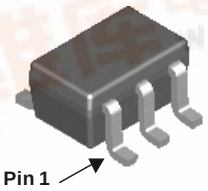
This device is particularly suited for compact power management in portable electronic equipment where 2.5V to 8V input and 0.8A output current capability are needed. This load switch integrates a small N-Channel power MOSFET (Q1) that drives a large P-Channel power MOSFET (Q2) in one tiny SC70-6 package.

Applications

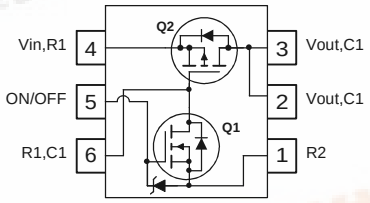
- Power management
- Load switch

Features

- –0.8 A, –8 V. $R_{DS(ON)}$ = 260 mΩ @ V_{GS} = –4.5 V
  $R_{DS(ON)}$ = 330 mΩ @ V_{GS} = –2.5 V
  $R_{DS(ON)}$ = 450 mΩ @ V_{GS} = –1.8 V
- Control MOSFET (Q1) includes Zener protection for ESD ruggedness (>6KV Human body model)
- High performance trench technology for extremely low $R_{DS(ON)}$
- Compact industry standard SC70-6 surface mount package

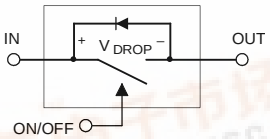


SC70-6



See Application Circuit

Equivalent Circuit



Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{IN}	Gate-Source Voltage (Q2)		± 8	V
$V_{ON/OFF}$	Gate-Source Voltage (Q1)		–0.5 to 8	V
I_{Load}	Load Current – Continuous	(Note 2)	–0.8	A
	– Pulsed	(Note 2)	–2.4	
P_D	Maximum Power Dissipation	(Note 1)	0.3	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range		–55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	415	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
.31	FDG6331L	7''	8mm	3000 units

Electrical Characteristics

T_A = 25°C unless otherwise noted

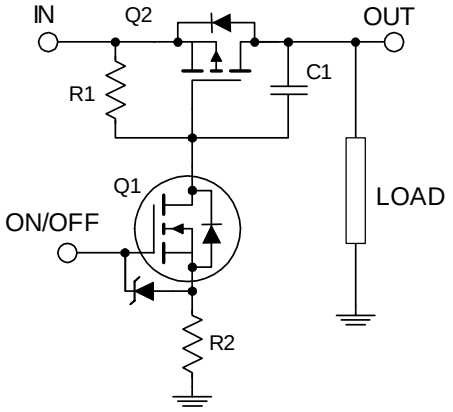
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{IN}	Vin Breakdown Voltage	$V_{ON/OFF}$ = 0 V, I_D = –250 µA	8			V
I_{Load}	Zero Gate Voltage Drain Current	V_{IN} = –6.4 V, $V_{ON/OFF}$ = 0 V			–1	µA
I_{FL}	Leakage Current, Forward	$V_{ON/OFF}$ = 0 V, V_{IN} = 8 V			100	nA
I_{RL}	Leakage Current, Reverse	$V_{ON/OFF}$ = 0 V, V_{IN} = –8 V			–100	nA
On Characteristics (Note 2)						
$V_{ON/OFF\ (th)}$	Gate Threshold Voltage	V_{IN} = $V_{ON/OFF}$, I_D = –250 µA	0.4	0.9	1.5	V
$R_{DS(on)}$	Static Drain–Source On–Resistance (Q2)	V_{IN} = 4.5 V, I_D = –0.8 A V_{IN} =2.5 V, I_D = –0.7 A V_{IN} = 1.8 V, I_D = –0.6 A		155 193 248	260 330 450	mΩ
$R_{DS(on)}$	Static Drain–Source On–Resistance (Q1)	V_{IN} = 4.5 V, I_D = 0.4A V_{IN} = 2.7 V, I_D = 0.2 A		310 380	400 500	mΩ
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				–0.25	A
V_{SD}	Drain–Source Diode Forward Voltage	$V_{ON/OFF}$ = 0 V, I_S = –0.25 A (Note 2)			–1.2	V

Notes:

1. $R_{\theta JA}$ 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.

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

FDG6331L Load Switch Application Circuit



External Component Recommendation:
For additional in-rush current control, R2 and C1 can be added. For more information, see application note AN1030.

Typical Characteristics

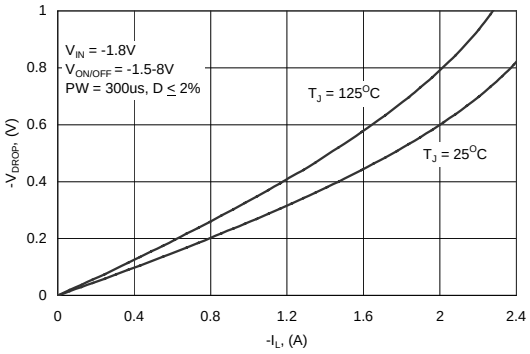


Figure 1. Conduction Voltage Drop Variation with Load Current.

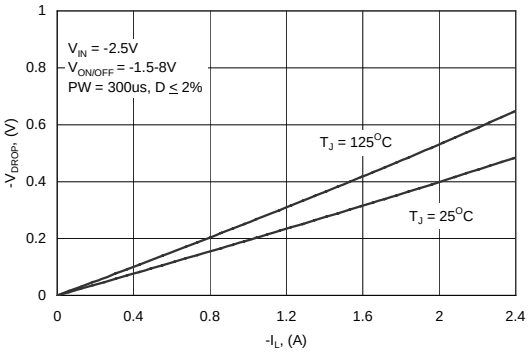


Figure 2. Conduction Voltage Drop Variation with Load Current.

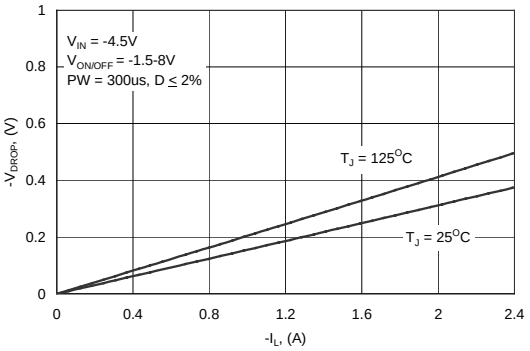


Figure 3. Conduction Voltage Drop Variation with Load Current.

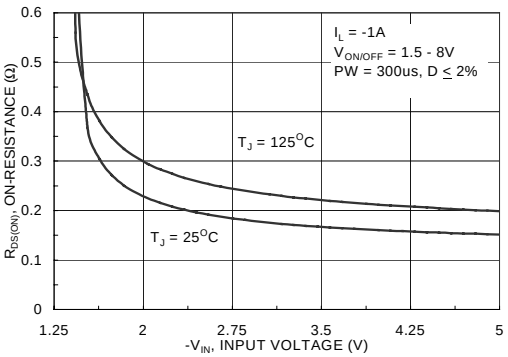


Figure 4. On-Resistance Variation With Input Voltage

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