ON Semiconductor®

FDC6331L

Integrated Load Switch

General Description

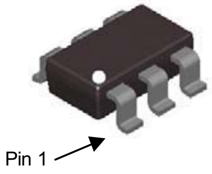
This device is particularly suited for compact power management in portable electronic equipment where 2.5V to 8V input and 2.8A output current capability are needed. This load switch integrates a small N-Channel power MOSFET (Q1) that drives a large P-Channel power MOSFET (Q2) in one tiny SuperSOT^{TM}-6 package.

Applications

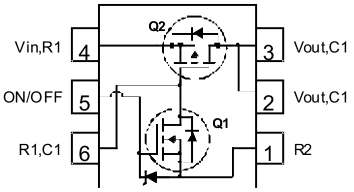
- Load switch
- Power management

Features

- –2.8 A, –8 V. $R_{DS(ON)}$ = 55 mΩ @ V_{GS} = –4.5 V
  $R_{DS(ON)}$ = 70 mΩ @ V_{GS} = –2.5 V
  $R_{DS(ON)}$ = 100 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 $R_{DS(ON)}$

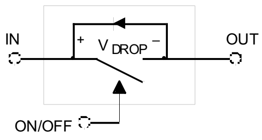


SuperSOT™-6



See Application Circuit

Equivalent Circuit



Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{IN}	Maximum Input Voltage		± 8	V
$V_{ON/OFF}$	High level ON/OFF voltage range		–0.5 to 8	V
I_{Load}	Load Current – Continuous	(Note 1)	2.8	A
	– Pulsed		9	
P_D	Maximum Power Dissipation	(Note 1)	0.7	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 1)	180	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	60	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
.331	FDC6331L	7”	8mm	3000 units

October-2017, Rev. 4

Electrical Characteristics

T_A = 25°C unless otherwise noted

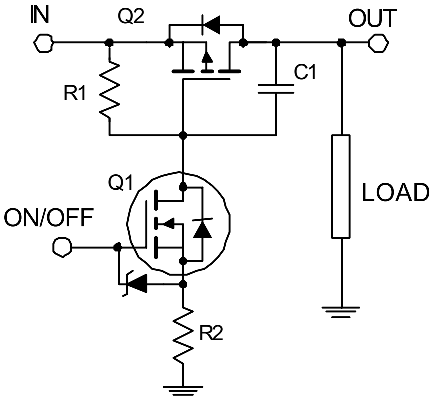
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{IN}	Vin Breakdown Voltage	$V_{ON/OFF}$ = 0 V, I_D = –250 µA	8			V
I_{Load}	Zero Gate Voltage Drain Current	V_{IN} = 6.4 V, $V_{ON/OFF}$ = 0 V			–1	µA
I_{FL}	Leakage Current, Forward	$V_{ON/OFF}$ = 0 V, V_{IN} = 8 V			–100	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_{GS} = –4.5 V, I_D = –2.8A V_{GS} = –2.5 V, I_D = –2.5 A V_{GS} = –1.8 V, I_D = –2.0 A		34 45 64	55 70 100	mΩ
$R_{DS(on)}$	Static Drain–Source On–Resistance (Q1)	V_{GS} = 4.5 V, I_D = 0.4A V_{GS} = 2.7 V, I_D = 0.2 A		3.1 3.8	4 5	Ω
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				–0.6	A
V_{SD}	Drain–Source Diode Forward Voltage	$V_{ON/OFF}$ = 0 V, I_S = –0.6 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%.

FDC6331L 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.

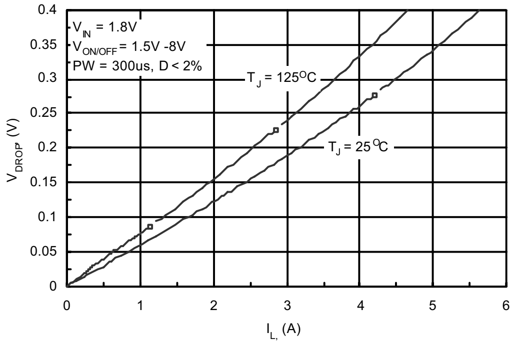


Figure 1. Conduction Voltage Drop Variation with Load Current.

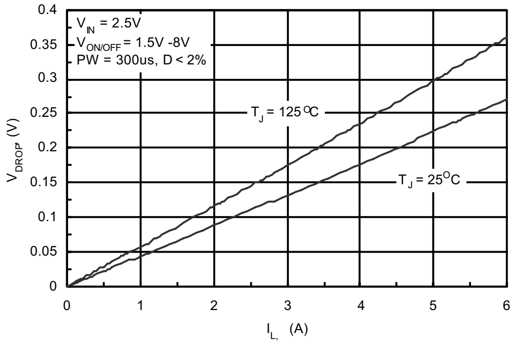
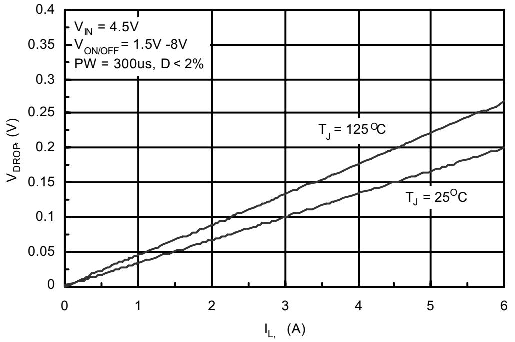


Figure 2. Conduction Voltage Drop Variation with Load Current.

Figure 3. Conduction Voltage Drop Variation with Load Current.



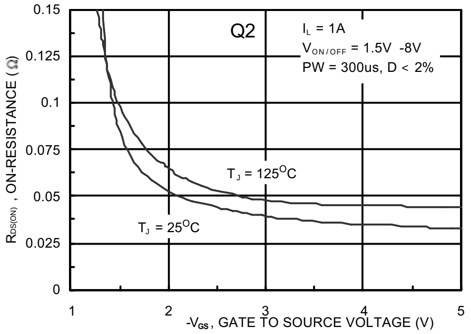


Figure 4. On-Resistance Variation With Input Voltage

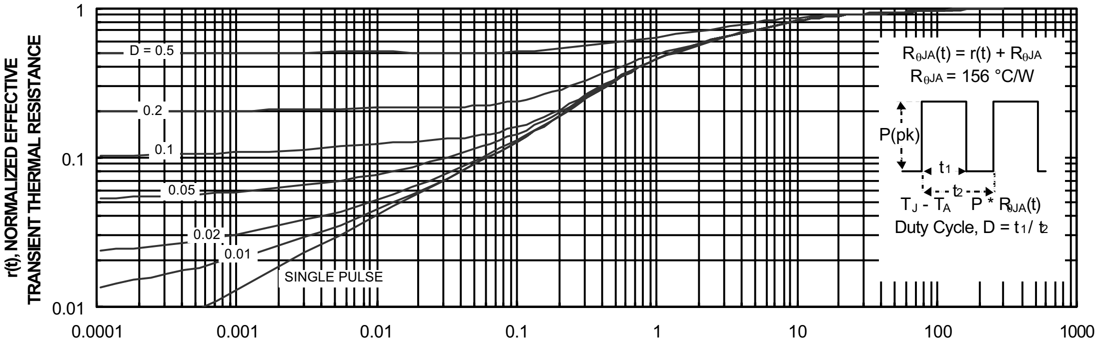


Figure 5. Transient Thermal Response Curve.

Thermal characterization performed on the conditions described in Note 2.
Transient thermal response will change depends on the circuit board design.

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