

Load Switch with Level-Shift

PRODUCT SUMMARY		
V_{DS2} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
1.8 to 8	0.080 @ $V_{IN} = 4.5$ V	± 2.7
	0.110 @ $V_{IN} = 2.5$ V	± 2.2
	0.175 @ $V_{IN} = 1.8$ V	± 1.7



ESD Protected
3000 V
1.8-V Rated

FEATURES

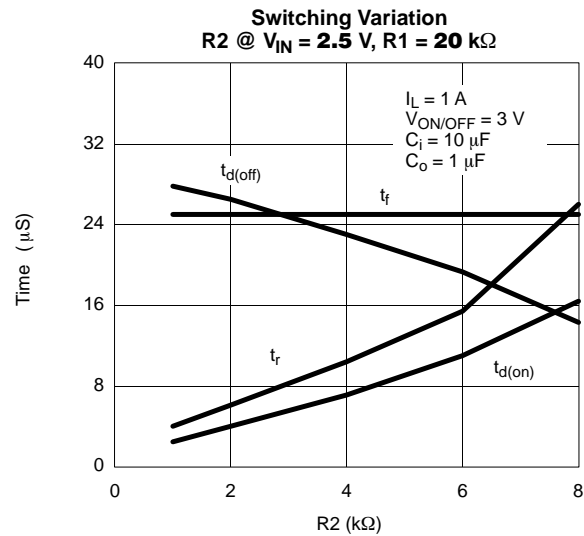
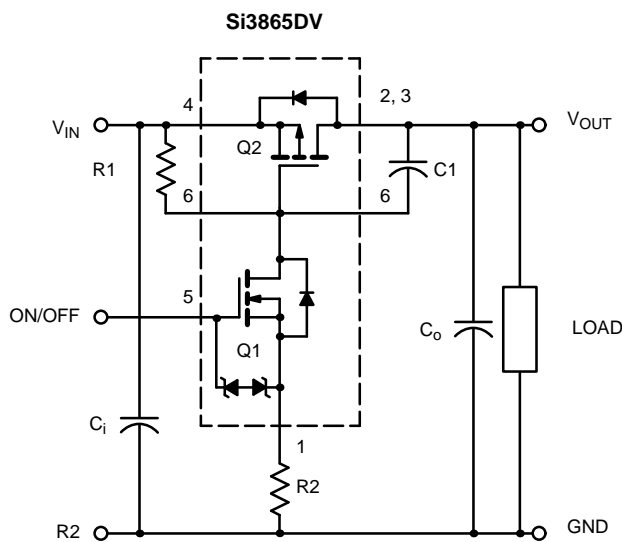
- 80-m Ω Low $r_{DS(on)}$ TrenchFET™
- 1.8 to 8-V Input
- 1.5 to 8-V Logic Level Control
- Low Profile, Small Footprint TSOP-6 Package
- 3000-V ESD Protection On Input Switch, $V_{ON/OFF}$
- Adjustable Slew-Rate

DESCRIPTION

The Si3865DV includes a p- and n-channel MOSFET in a single TSOP-6 package. The low on-resistance p-channel TrenchFET® is tailored for use as a load switch. The n-channel, with an external resistor, can be used as a

level-shift to drive the p-channel load-switch. The n-channel MOSFET has internal ESD protection and can be driven by logic signals as low as 1.5-V. The Si3865DV operates on supply lines from 1.8 to 8-V, and can drive loads up to 2.7 A.

APPLICATION CIRCUITS



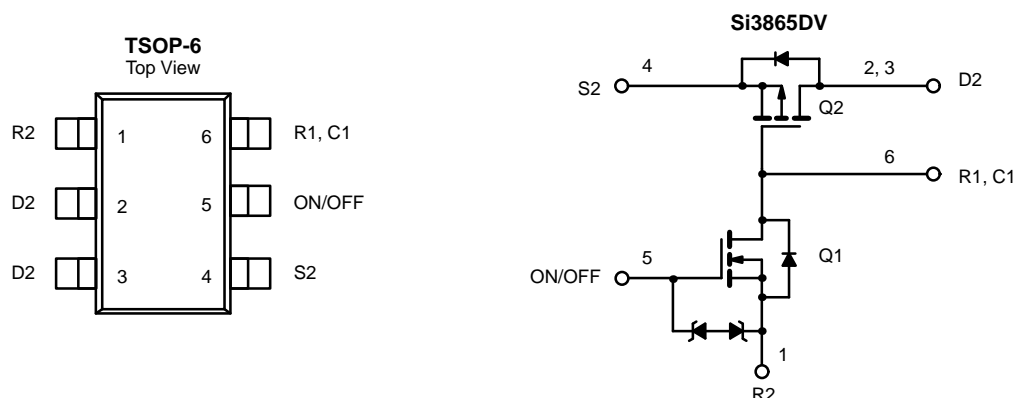
Note: For R2 switching variations with other $V_{IN}/R1$ combinations See Typical Characteristics

COMPONENTS

Component	Description	Typical Value
R1	Pull-Up Resistor	Typical 10 k Ω to 1 m Ω *
R2	Optional Slew-Rate Control	Typical 0 to 100 k Ω *
C1	Optional Slew-Rate Control	Typical 1000 pF

*Minimum R1 value should be at least 10 x R2 to ensure Q1 turn-on.

The Si3865DV is ideally suited for high-side load switching in portable applications. The integrated n-channel level-shift device saves space by reducing external components. The slew rate is set externally so that rise-times can be tailored to different load types.

FUNCTIONAL BLOCK DIAGRAM

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Limit	Unit
Input Voltage	V_{IN}	8	V
ON/OFF Voltage	$V_{ON/OFF}$	8	V
Load Current	Continuous ^{a, b}	± 2.7	A
	Pulsed ^{b, c}	± 6	
Continuous Intrinsic Diode Conduction ^a	I_S	-1	A
Maximum Power Dissipation ^a	P_D	0.83	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$
ESD Rating, MIL-STD-883D Human Body Model (100 pF, 1500 Ω)	ESD	3	kV

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (continuous current) ^a	R_{thJA}	120	150	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Foot (Q2)	R_{thJC}	35	50	$^\circ\text{C}/\text{W}$

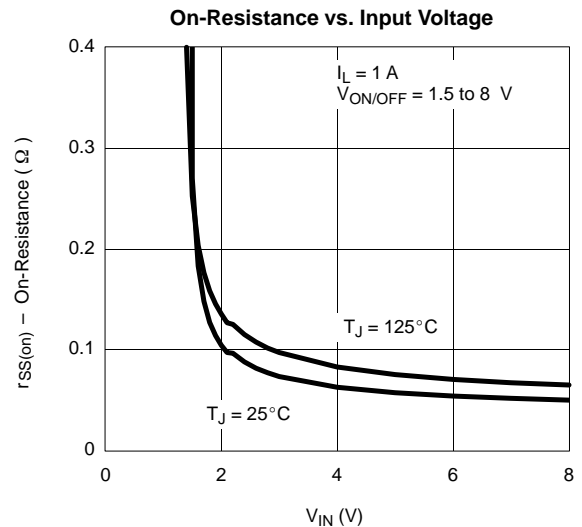
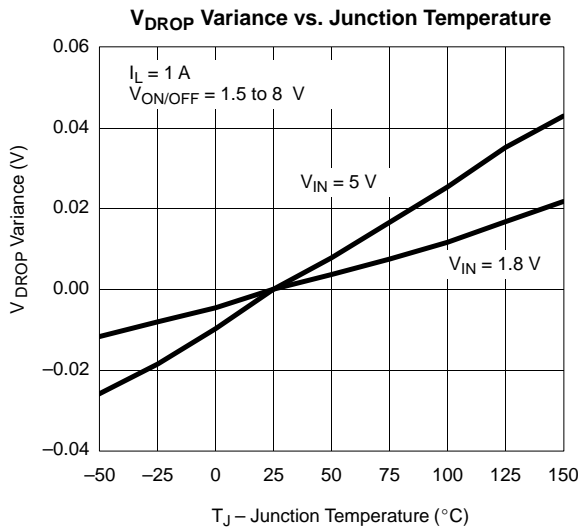
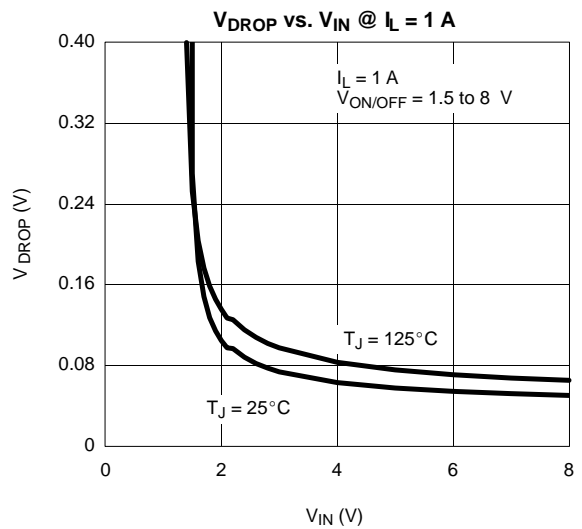
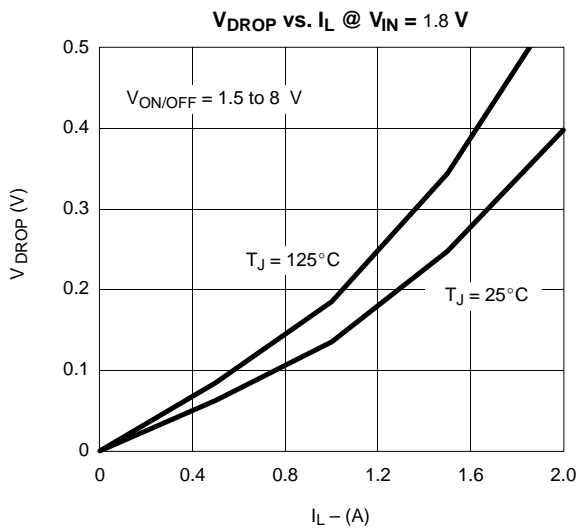
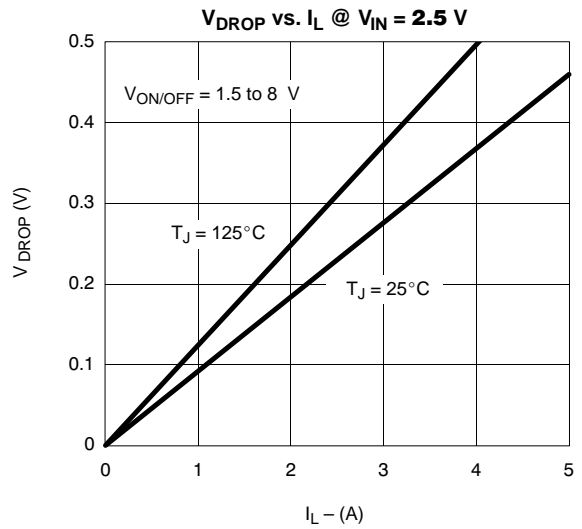
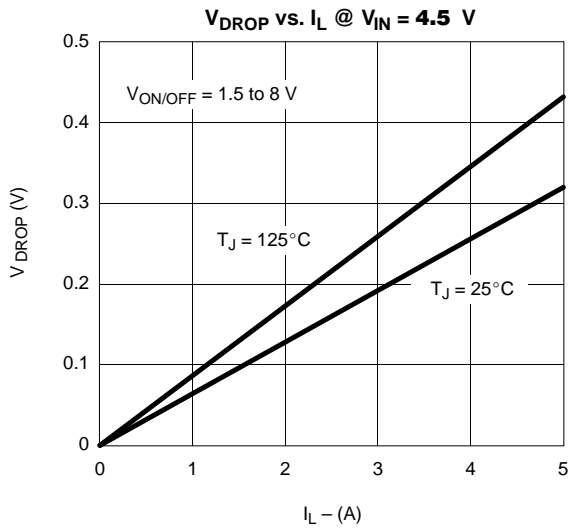
SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF Characteristics						
Reverse Leakage Current	I_{FL}	$V_{IN} = 8\text{ V}, V_{ON/OFF} = 0\text{ V}$			1	μA
Diode Forward Voltage	V_{SD}	$I_S = -1\text{ A}$		-0.7	-1	V
ON Characteristics						
Input Voltage Range	V_{IN}		1.8		8	V
On-Resistance (p-channel) @ 1 A	$r_{DS(on)}$	$V_{ON/OFF} = 1.5\text{ V}$ $I_D = 1\text{ A}$	$V_{IN} = 4.5\text{ V}$	0.064	0.080	Ω
			$V_{IN} = 2.5\text{ V}$	0.092	0.110	
			$V_{IN} = 1.8\text{ V}$	0.135	0.175	
On-State (p-channel) Drain-Current	$I_{D(on)}$	$V_{IN-OUT} \leq 0.2\text{ V}, V_{IN} = 5\text{ V}, V_{ON/OFF} = 1.5\text{ V}$	1			A
		$V_{IN-OUT} \leq 0.3\text{ V}, V_{IN} = 3\text{ V}, V_{ON/OFF} = 1.5\text{ V}$	1			

Notes

- Surface Mounted on FR4 Board.
- $V_{IN} = 8\text{ V}, V_{ON/OFF} = 8\text{ V}, T_A = 25^\circ\text{C}$.
- Pulse test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

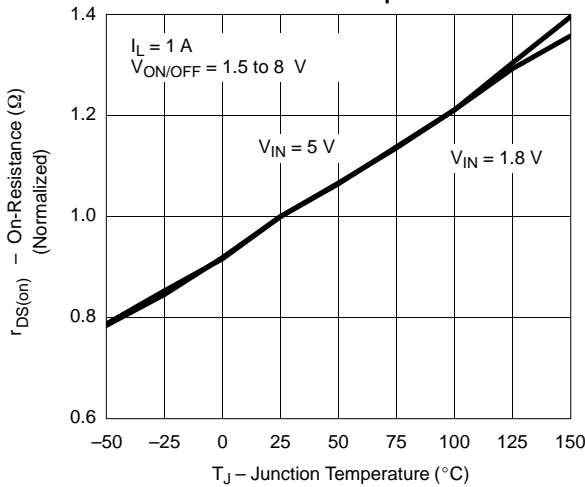
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)



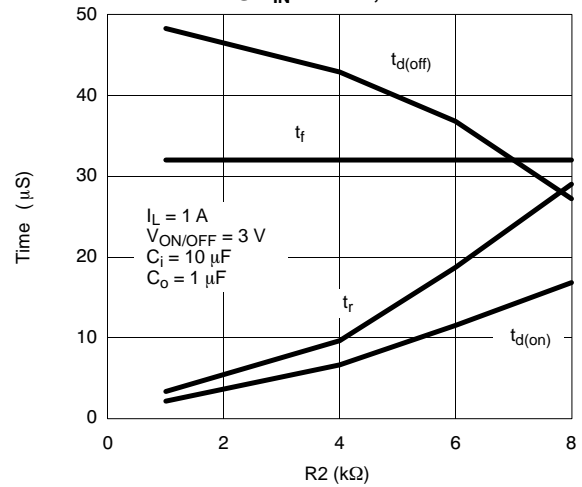


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

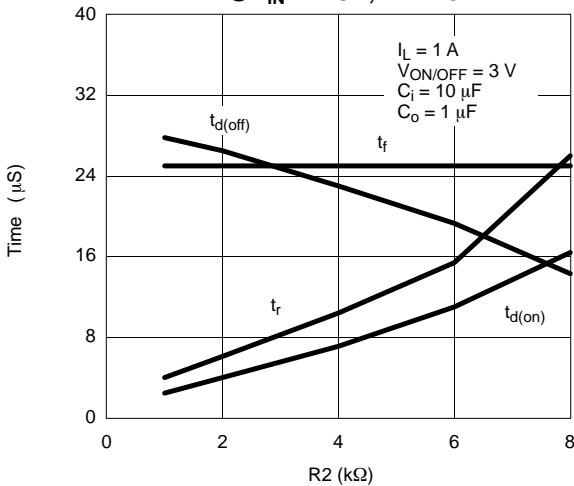
Normalized On-Resistance vs. Junction Temperature



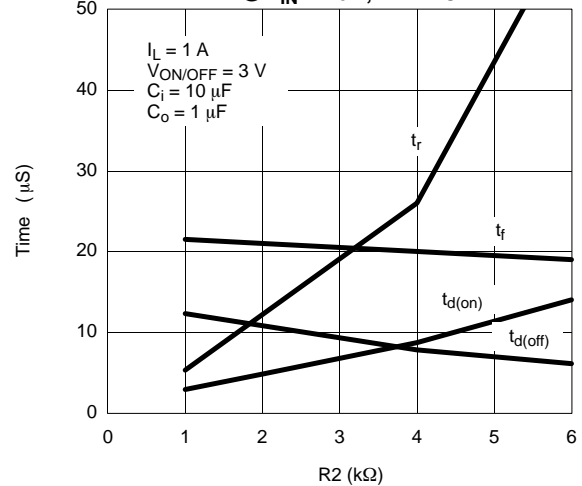
Switching Variation R2 @ V_IN = 4.5 V, R1 = 20 kΩ



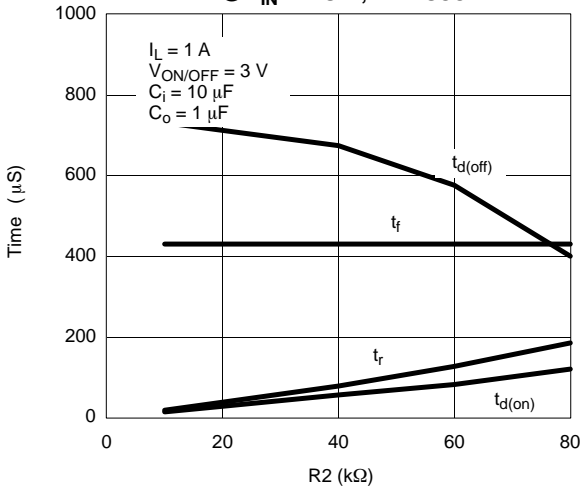
Switching Variation R2 @ V_IN = 2.5 V, R1 = 20 kΩ



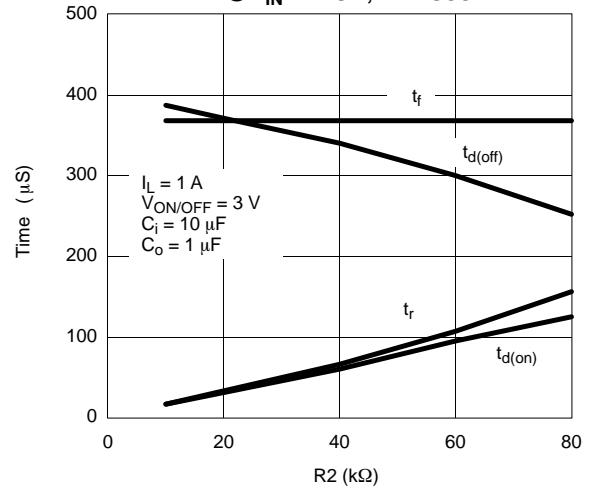
Switching Variation R2 @ V_IN = 1.8 V, R1 = 20 kΩ



Switching Variation R2 @ V_IN = 4.5 V, R1 = 300 kΩ



Switching Variation R2 @ V_IN = 2.5 V, R1 = 300 kΩ



TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

