

Load Switch with Level-Shift

PRODUCT SUMMARY		
V_{DS2} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
1.8 to 8	0.600 @ $V_{IN} = 4.5$ V	± 0.6
	0.850 @ $V_{IN} = 2.5$ V	± 0.5
	1.200 @ $V_{IN} = 1.8$ V	± 0.4

FEATURES

- TrenchFET® Power MOSFET
- Lead Free
- 600-m Ω Low $r_{DS(on)}$
- 1.8- to 8-V Input
- 1.5- to 8-V Logic Level Control
- Lead Free

APPLICATIONS

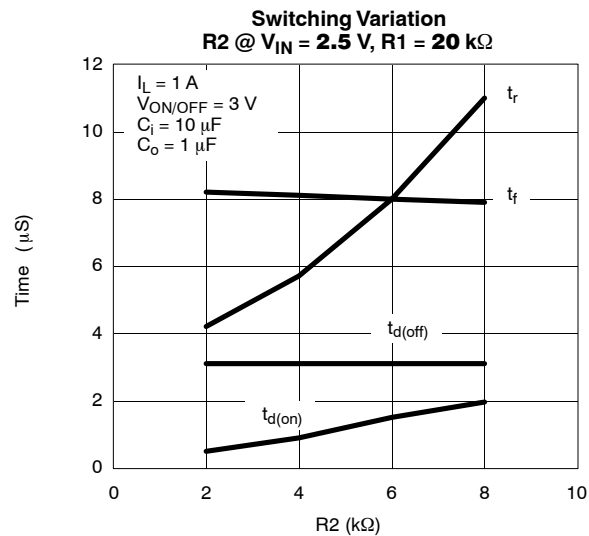
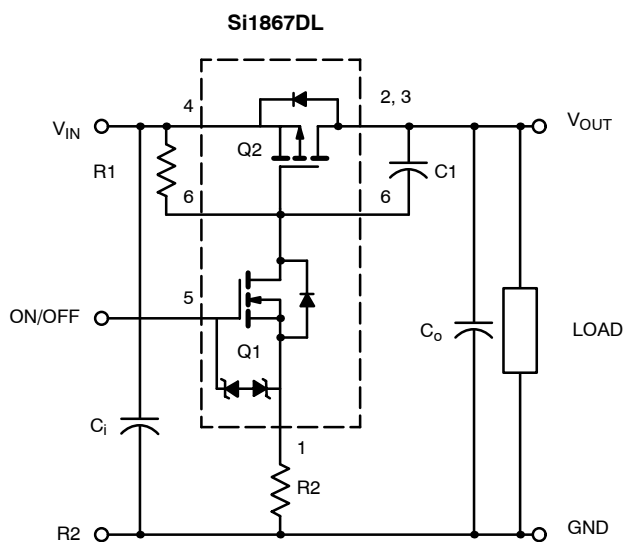
- Load Switch with Level-Shift for Portable Applications

DESCRIPTION

The Si1867DL includes a p- and n-channel MOSFET in a single SC70-6 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 Si1867DL operates on supply lines from 1.8 to 8 V, and can drive loads up to 0.6 A.

APPLICATION CIRCUITS

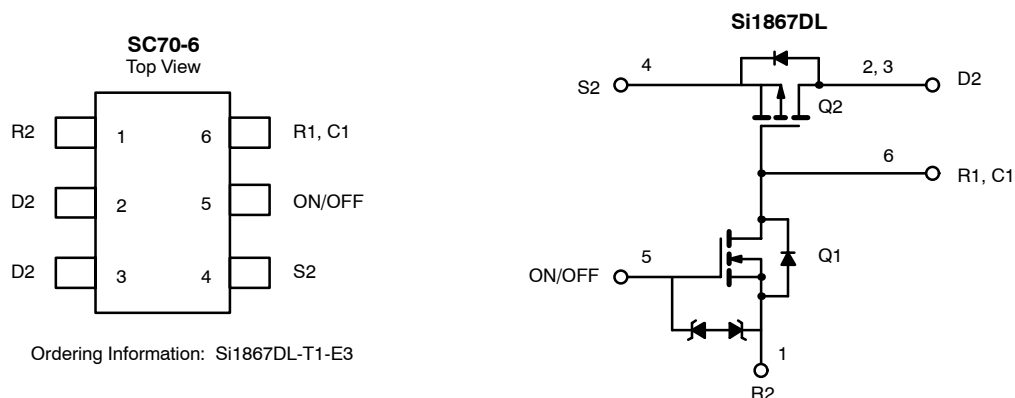


Note: For R2 switching variations with other $V_{IN}/R1$ combinations See Typical Characteristics

COMPONENTS		
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 Si1867DL 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 °C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Limit	Unit
Input Voltage	V _{IN}	8	V
ON/OFF Voltage	V _{ON/OFF}	8	
Load Current	Continuous ^{a, b}	±0.6	A
	Pulsed ^{b, c}	±3	
Continuous Intrinsic Diode Conduction ^a	I _S	-0.4	
Maximum Power Dissipation ^a	P _D	0.4	W
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to 150	°C
ESD Rating, MIL-STD-883D Human Body Model (100 pF, 1500 Ω)	ESD	2	kV

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (continuous current) ^a	R _{thJA}	260	320	°C/W
Maximum Junction-to-Foot (Q2)	R _{thJF}	190	230	

SPECIFICATIONS (T_J = 25 °C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF Characteristics						
Reverse Leakage Current	I _{FL}	V _{IN} = 8 V, V _{ON/OFF} = 0 V			1	μA
Diode Forward Voltage	V _{SD}	I _S = -0.4 A		0.85	1.1	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 V, V _{IN} = 4.5 V, I _D = 0.6 A		0.480	0.600	Ω
		V _{ON/OFF} = 1.5 V, V _{IN} = 2.5 V, I _D = 0.5 A		0.690	0.850	
		V _{ON/OFF} = 1.5 V, V _{IN} = 1.8 V, I _D = 0.4 A		0.950	1.200	
On-State (p-channel) Drain-Current	I _{D(on)}	V _{IN-OUT} ≤ 0.2 V, V _{IN} = 5 V, V _{ON/OFF} = 1.5 V	1			A
		V _{IN-OUT} ≤ 0.3 V, V _{IN} = 3 V, V _{ON/OFF} = 1.5 V	1			

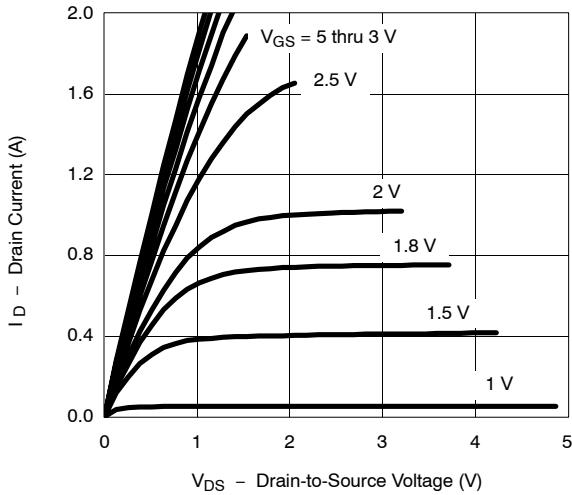
Notes

- Surface Mounted on FR4 Board.
- V_{IN} = 8 V, V_{ON/OFF} = 8 V, T_A = 25 °C.
- Pulse test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

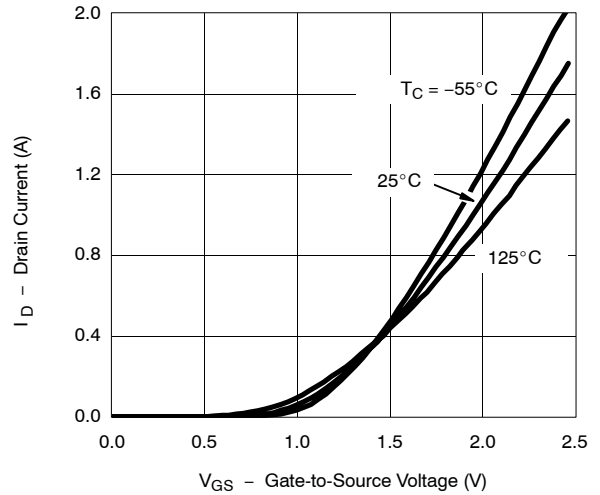


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

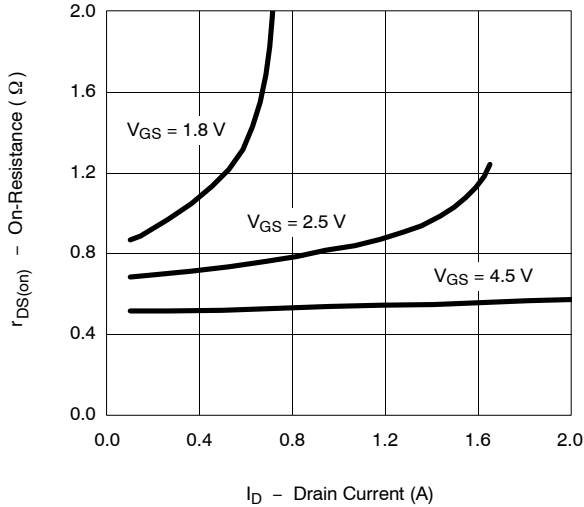
Output Characteristics



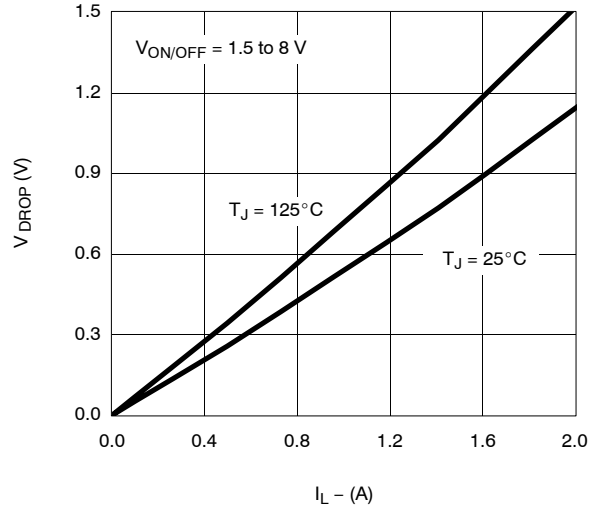
Transfer Characteristics



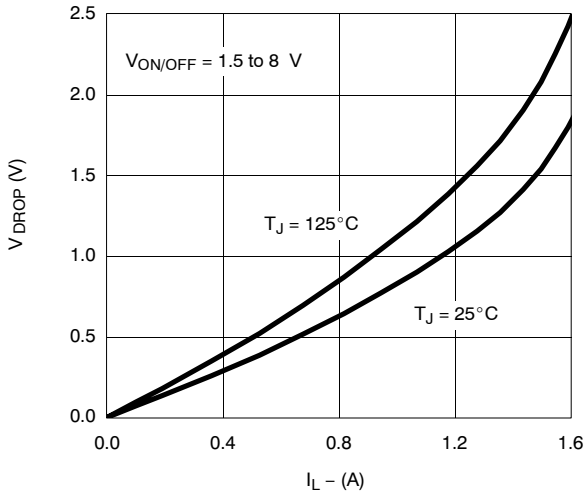
On-Resistance vs. Drain Current



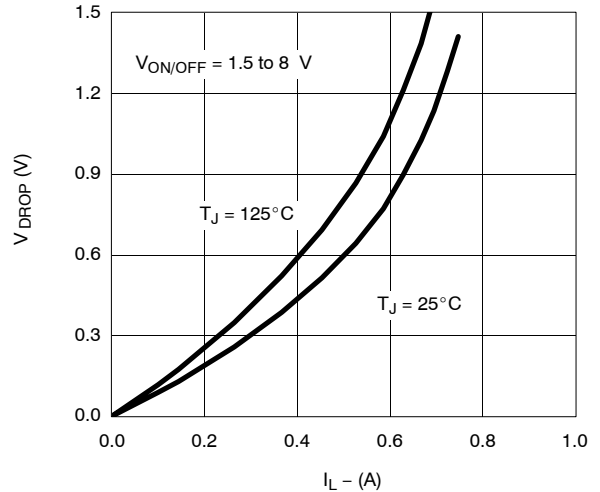
V_{DROD} vs. I_L @ $V_{IN} = 4.5$ V



V_{DROD} vs. I_L @ $V_{IN} = 2.5$ V

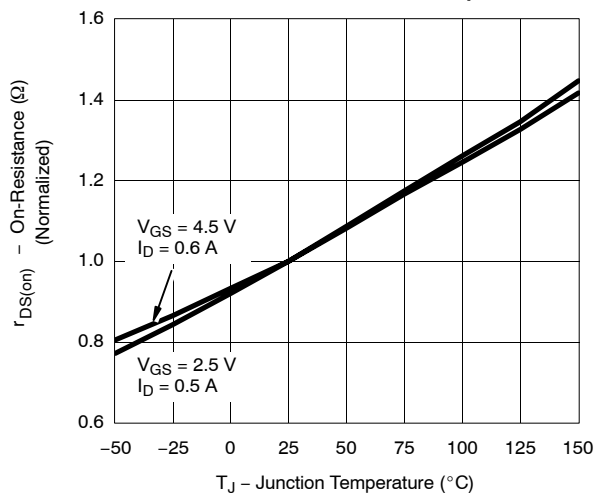


V_{DROD} vs. I_L @ $V_{IN} = 1.8$ V

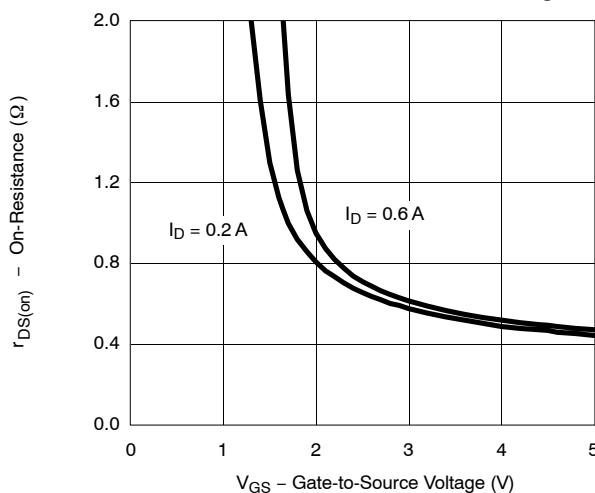


TYPICAL CHARACTERISTICS (25 °C UNLESS NOTED)

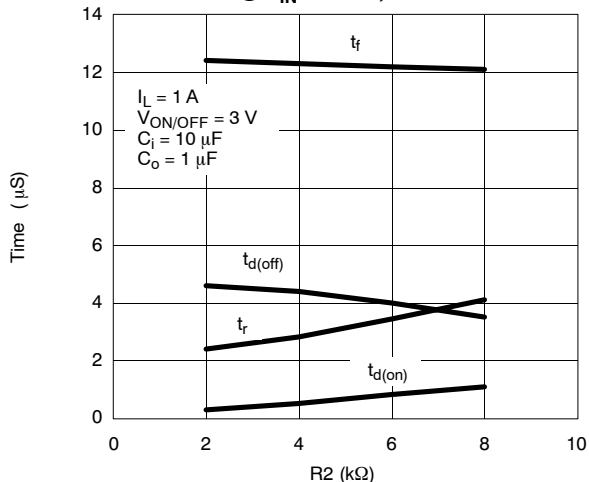
On-Resistance vs. Junction Temperature



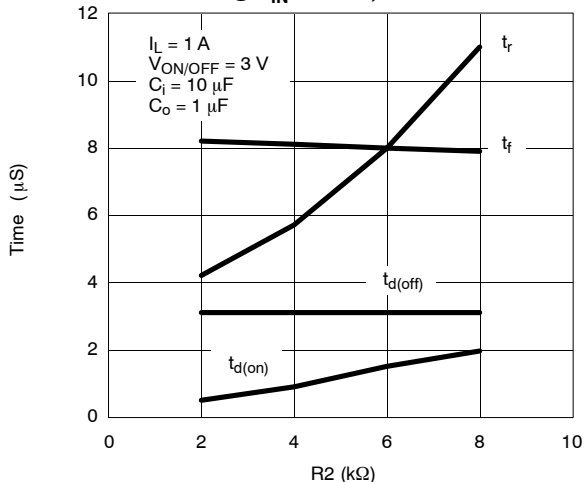
On-Resistance vs. Gate-to-Source Voltage



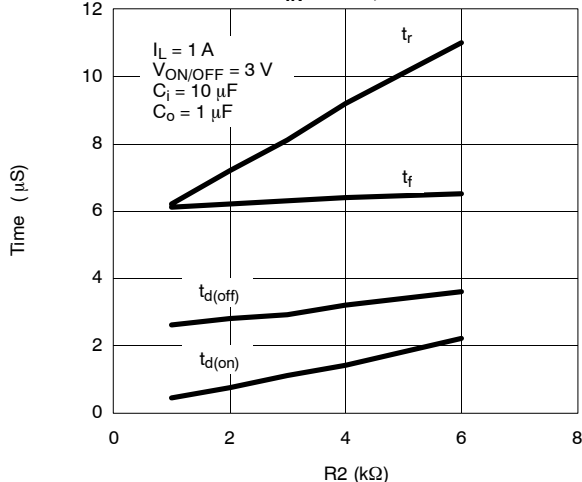
**Switching Variation
R2 @ V_IN = 4.5 V, R1 = 20 kΩ**



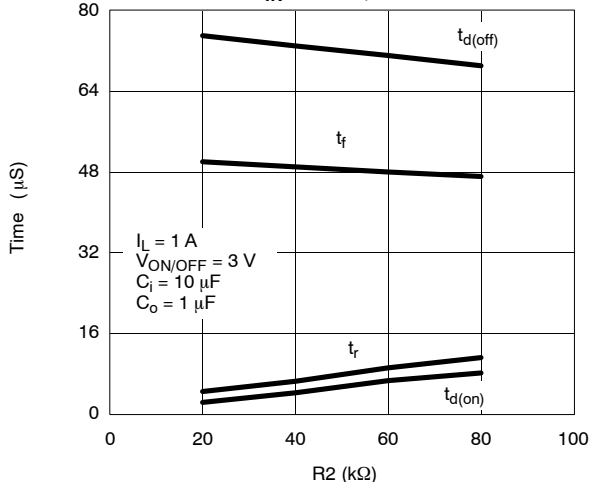
**Switching Variation
R2 @ V_IN = 2.5 V, R1 = 20 kΩ**



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



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



TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

