

Load Switch with Level-Shift

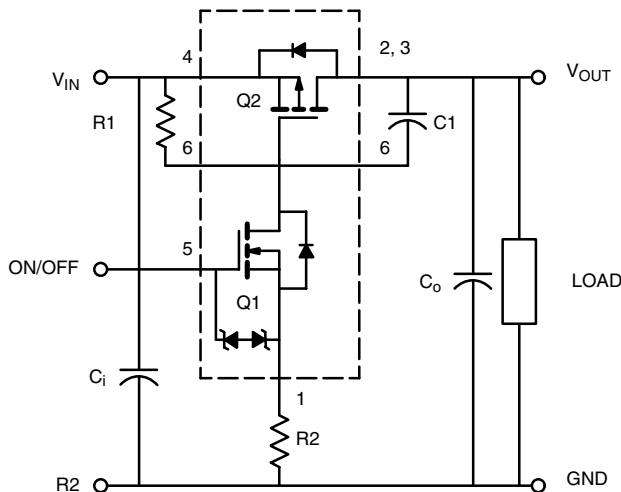
PRODUCT SUMMARY

V_{DS2} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
1.8 to 8	0.215 at $V_{IN} = 4.5$ V	± 1.2
	0.300 at $V_{IN} = 2.5$ V	± 1.0
	0.440 at $V_{IN} = 1.8$ V	± 0.7

DESCRIPTION

The Si1865DL 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 Si1865DL operates on supply lines from 1.8 V to 8 V, and can drive loads up to 1.2 A.

APPLICATION CIRCUITS



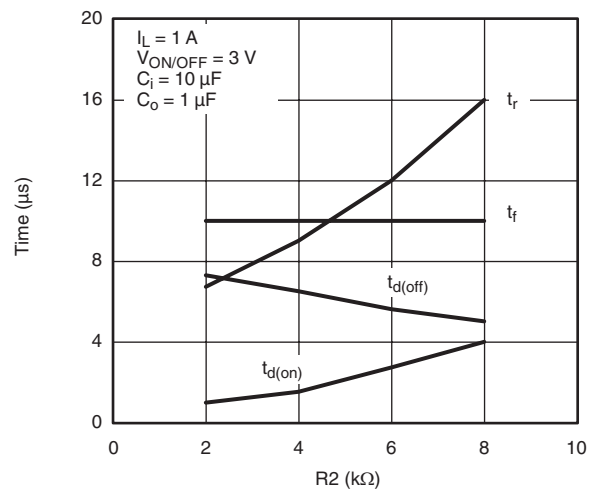
Si1865DL

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- 215 m Ω Low $R_{DS(on)}$ TrenchFET[®]
- 1.8 V to 8 V Input
- 1.5 V to 8 V Logic Level Control
- Low Profile, Small Footprint SC70-6 Package
- 2000 V ESD Protection On Input Switch, $V_{ON/OFF}$
- Adjustable Slew-Rate
- 1.8 V Rated
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available



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

Switching Variation
R2 at $V_{IN} = 2.5$ V, $R1 = 20$ k Ω

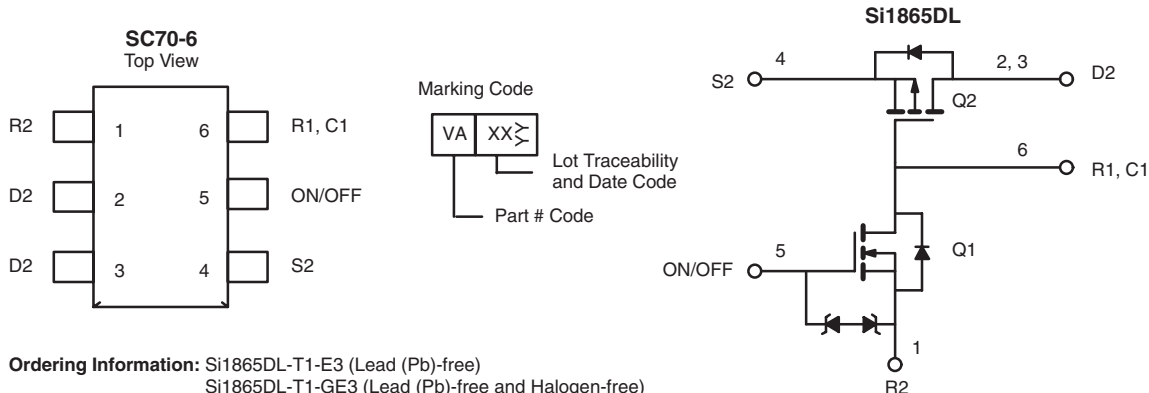
COMPONENTS

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

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

The Si1865DL is ideally suited for high-side load switching in portable applications. The integrated n-channel level-shift devices 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	
Load Current	Continuous ^{a, b}	± 1.2	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	$^\circ\text{C}$
ESD Rating, MIL-STD-883C 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	$^\circ\text{C/W}$
Maximum Junction-to-Foot (Q2)	R_{thJC}	180	220	

SPECIFICATIONS $T_J = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF Characteristics						
Reverse Leakage Current	V_{IN}	$V_{IN} = 8\text{ V}, V_{ON/OFF} = 0\text{ V}$			1	μA
Diode Forward Voltage	I_Q	$I_S = - 0.4\text{ A}$		0.85	1.1	V
ON Characteristics						
Input Voltage	V_{IN}		1.8		8	V
On-Resistance (P-Channel) at 1 A	$R_{DS(on)}$	$V_{ON/OFF} = 1.5, V_{IN} = 4.5\text{ V}, I_D = 1.2\text{ A}$		0.180	0.215	Ω
		$V_{ON/OFF} = 1.5, V_{IN} = 2.5\text{ V}, I_D = 1.0\text{ A}$		0.250	0.300	
		$V_{ON/OFF} = 1.5, V_{IN} = 1.8\text{ V}, I_D = 0.7\text{ A}$		0.367	0.440	
On-State (P-Channel) Drain-Current	$I_{D(on)}$	$V_{IN-OUT} \leq 0.2\text{ V}, V_{IN} = 5\text{ V}, V_{ON/OFF} = 1.5\text{ A}$	1			A
		$V_{IN-OUT} \leq 0.3\text{ V}, V_{IN} = 3\text{ V}, V_{ON/OFF} = 1.5\text{ A}$	1			

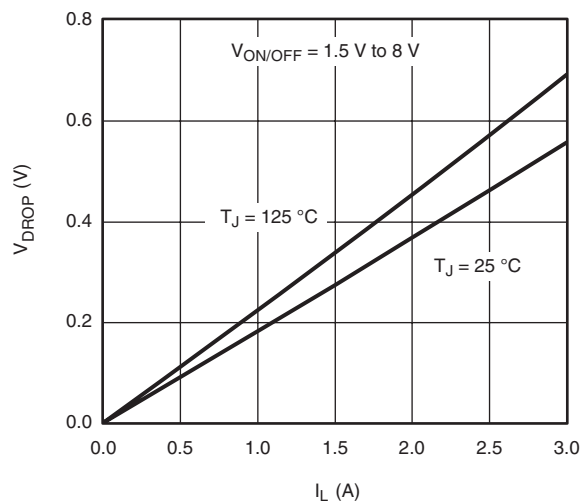
Notes:

a) Surface mounted on FR4 board.

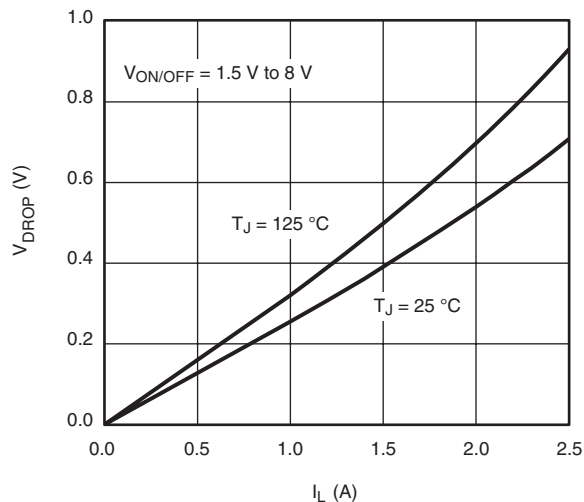
b) $V_{IN} = 8\text{ V}, V_{ON/OFF} = 8\text{ V}, T_A = 25^\circ\text{C}$.c) Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

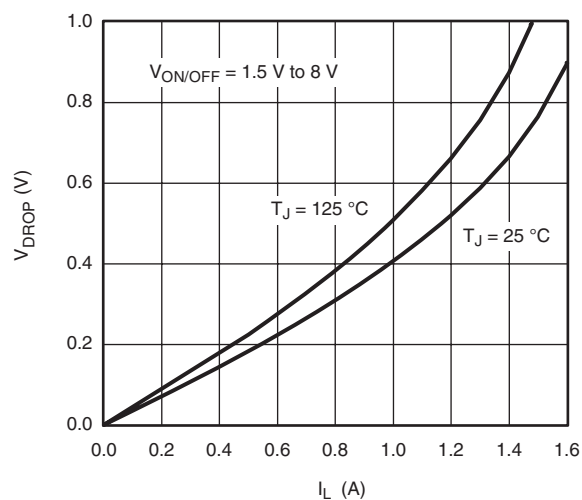
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



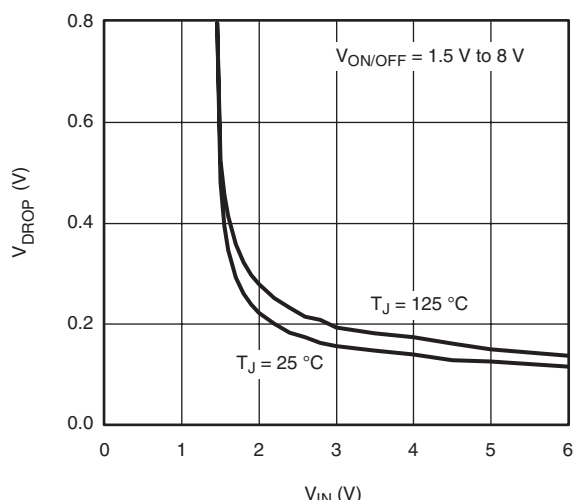
V_{DROP} vs. I_L at $V_{IN} = 4.5$ V



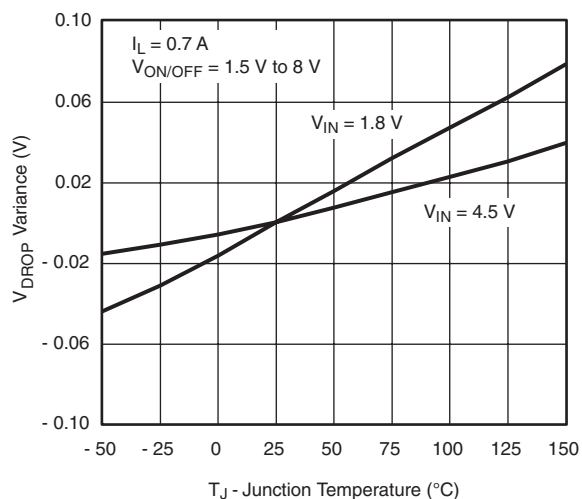
V_{DROP} vs. I_L at $V_{IN} = 2.5$ V



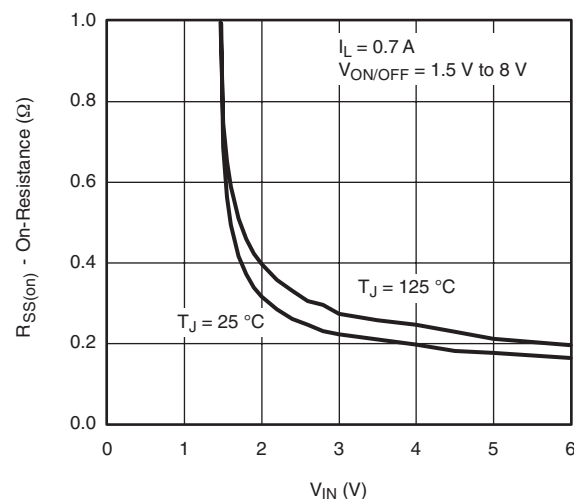
V_{DROP} vs. I_L at $V_{IN} = 1.8$ V



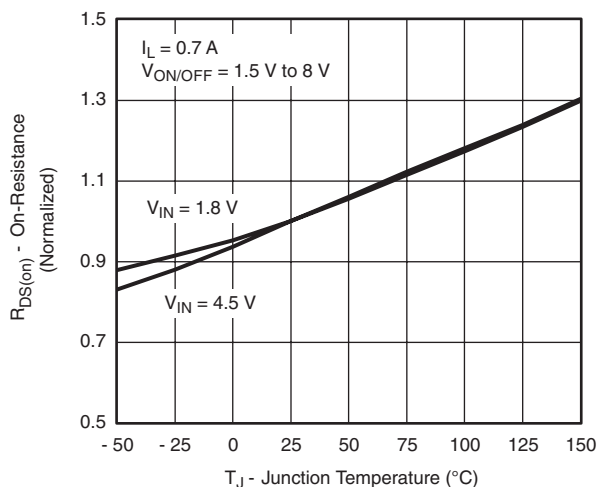
V_{DROP} vs. I_L at $I_L = 0.7$ A



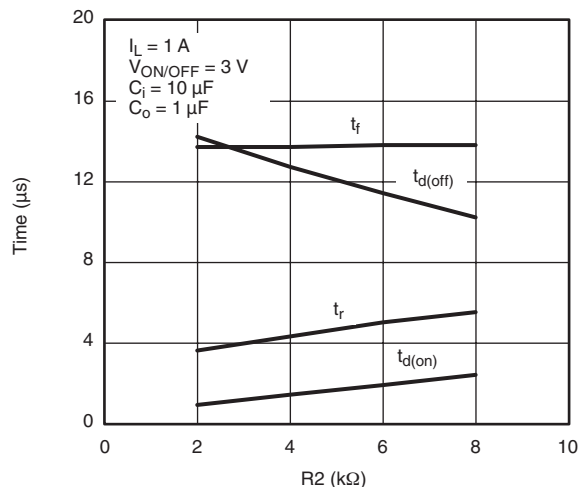
V_{DROP} Variance vs. Junction Temperature



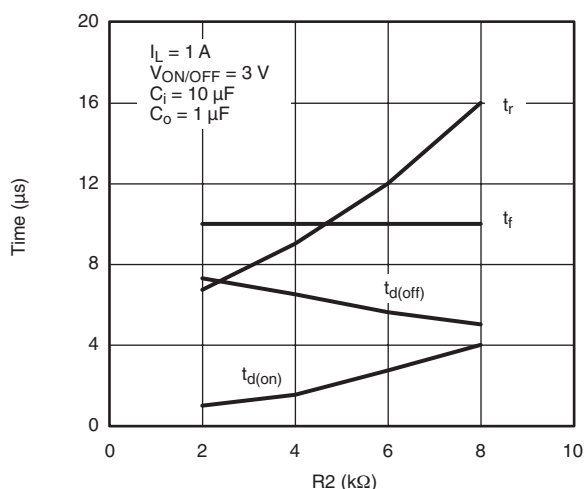
On-Resistance vs. Input Voltage

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

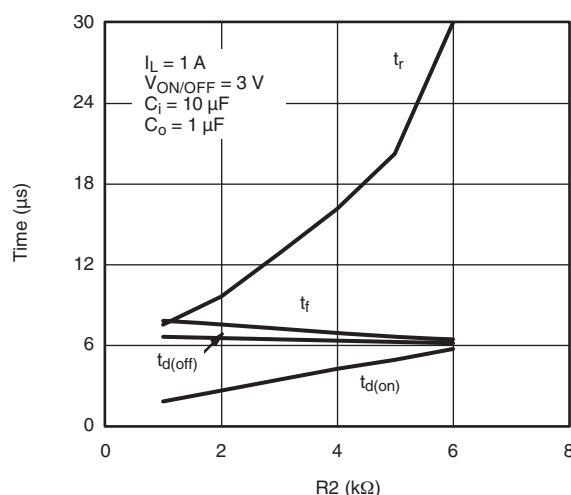
Normalized On-Resistance vs. Junction Temperature



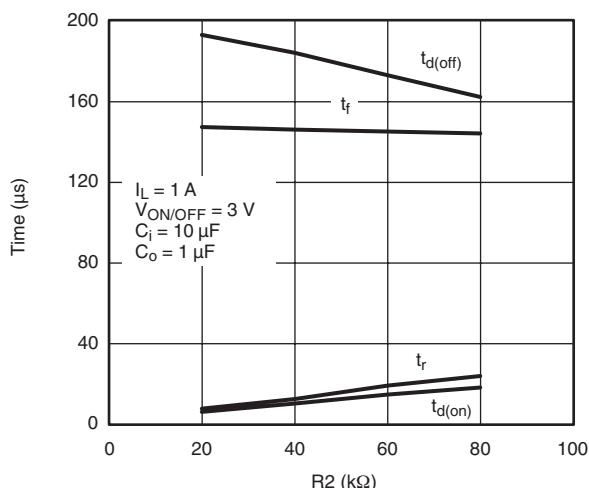
Switching Variation
R2 at $V_{IN} = 1.8$ V, $R_1 = 20$ k Ω



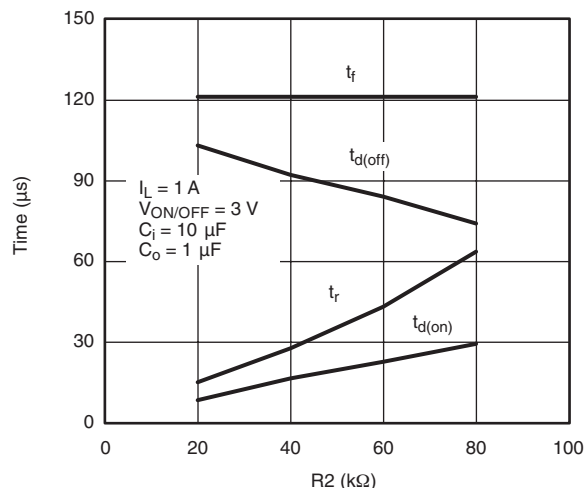
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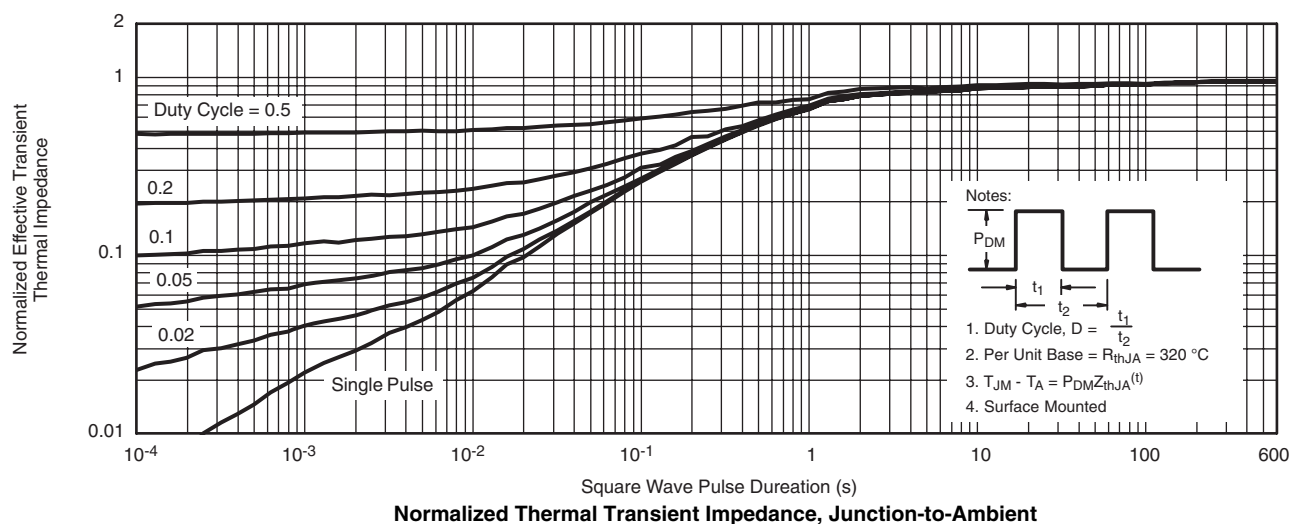
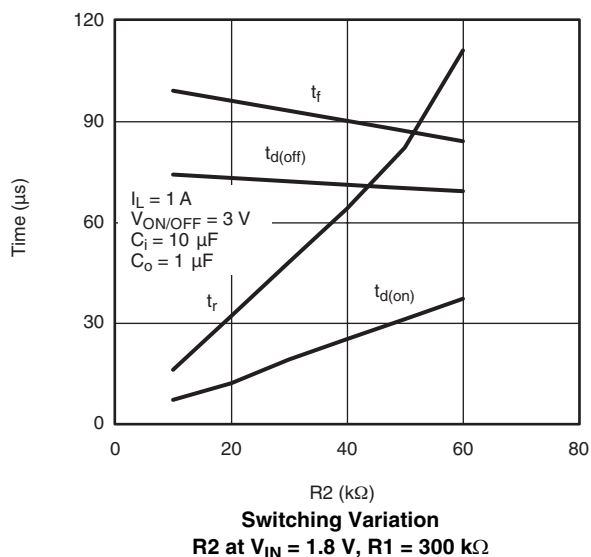


Switching Variation
R2 at $V_{IN} = 4.5$ V, $R_1 = 300$ k Ω



Switching Variation
R2 at $V_{IN} = 2.5$ V, $R_1 = 300$ k Ω

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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