

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

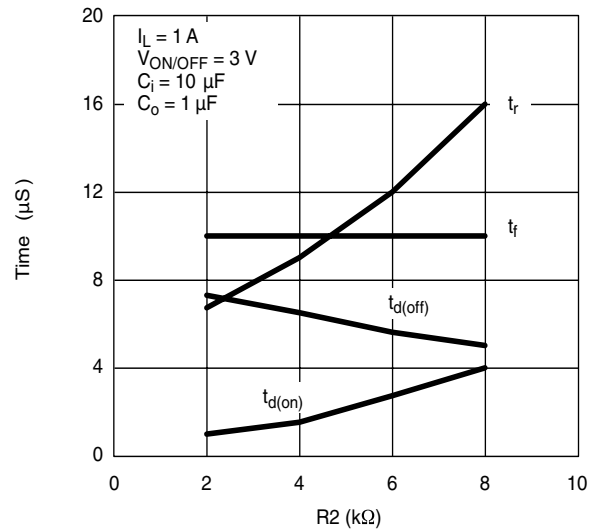
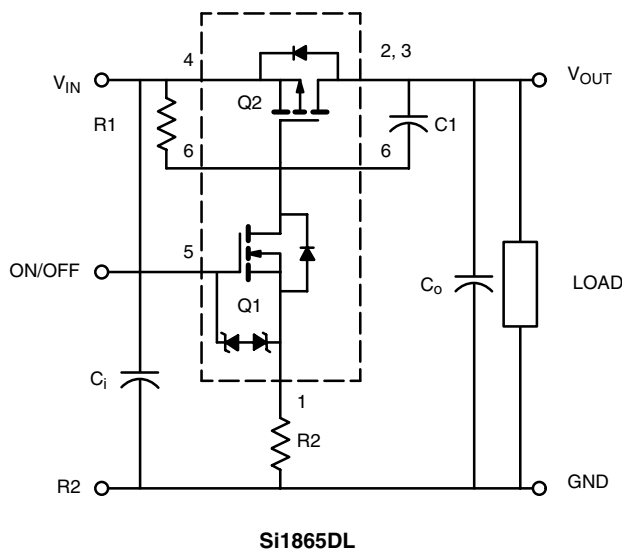
FEATURES

- 215 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 SC70-6 Package
- 2000 V ESD Protection On Input Switch, $V_{ON/OFF}$
- Adjustable Slew-Rate
- 1.8 V Rated



RoHS*
COMPLIANT

APPLICATION CIRCUITS



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

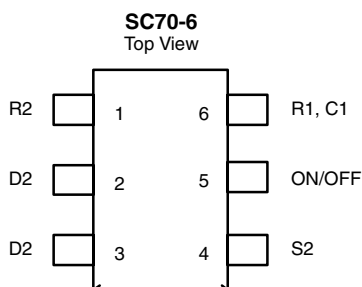
COMPONENTS		
R1	Pull-Up Resistor	Typical 10k Ω to 1 m Ω **
R2	Optional Slew-Rate Control	Typical 0 to 100 k Ω **
C1	Optional Slew-Rate Control	Typical 1000 pF

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

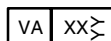
*Pb containing terminations are not RoHS compliant, exemptions may apply.

The Si1865DL 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



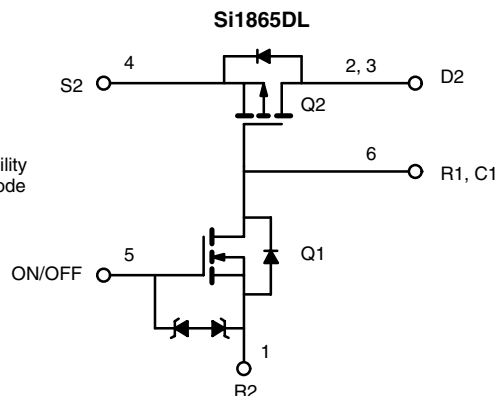
Marking Code

Lot Traceability
and Date Code

Part # Code

Ordering Information: Si1865DL-T1

Si1865DL-T1-E3 (Lead (Pb)-free)



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	I_{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	$r_{DS(on)}$	$V_{ON/OFF} = 1.5\text{ V}, V_{IN} = 4.5\text{ V}, I_D = 1.2\text{ A}$		0.180	0.215	Ω	
		$V_{ON/OFF} = 1.5\text{ V}, V_{IN} = 2.5\text{ V}, I_D = 1.0\text{ A}$		0.250	0.300		
		$V_{ON/OFF} = 1.5\text{ V}, V_{IN} = 1.8\text{ V}, I_D = 0.7\text{ A}$		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:

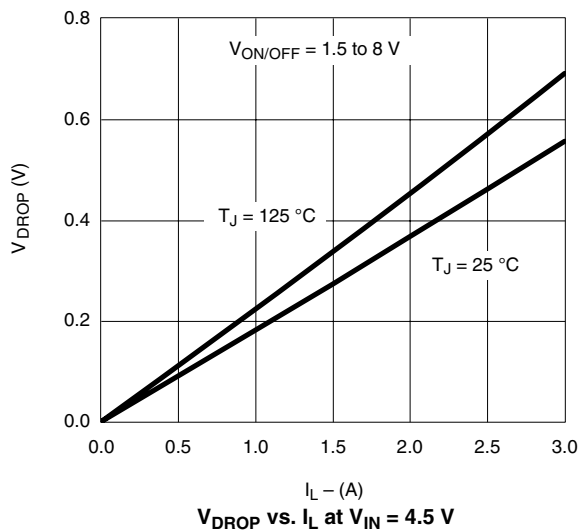
a) Surface Mounted on FR4 Board.

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 $\leq 2\%$.

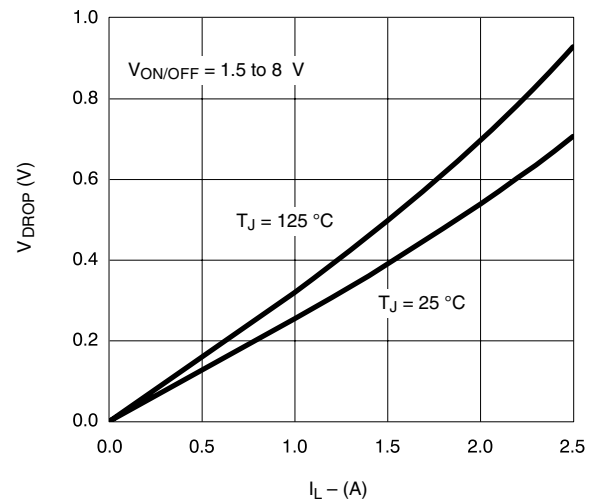
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



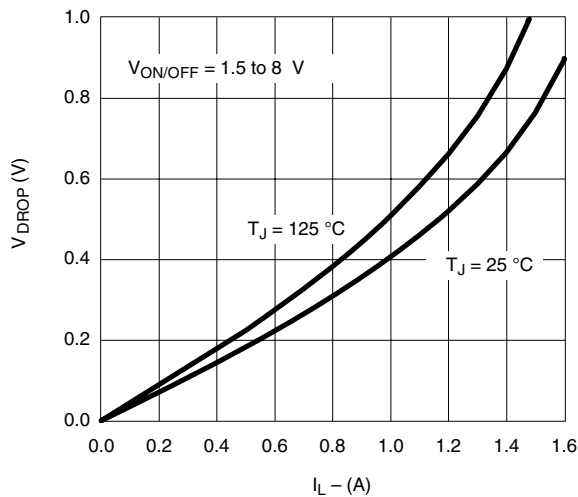
TYPICAL CHARACTERISTICS 25 °C, unless noted



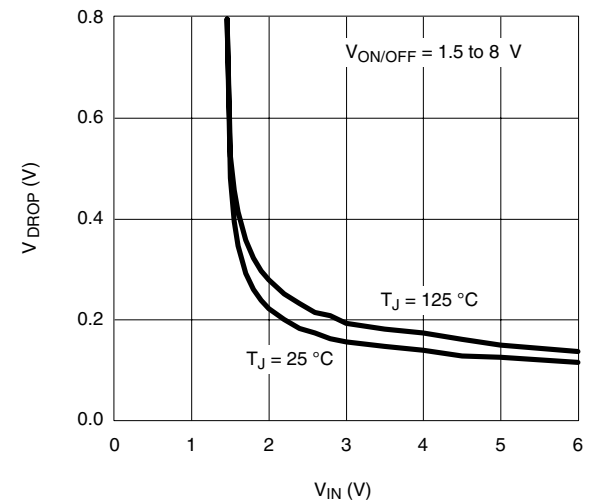
V_{DROP} vs. I_L at $V_{IN} = 4.5$ V



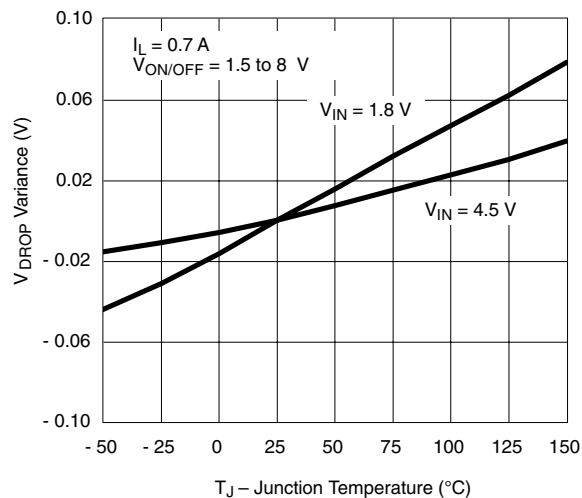
V_{DROP} vs. I_L at $V_{IN} = 2.5$ V



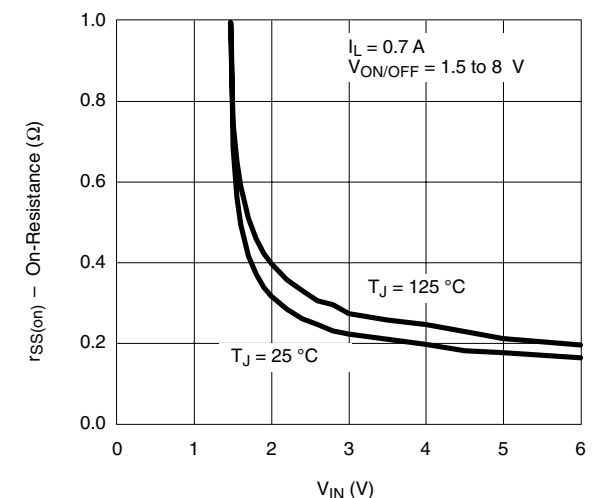
V_{DROP} vs. I_L at $V_{IN} = 1.8$ V



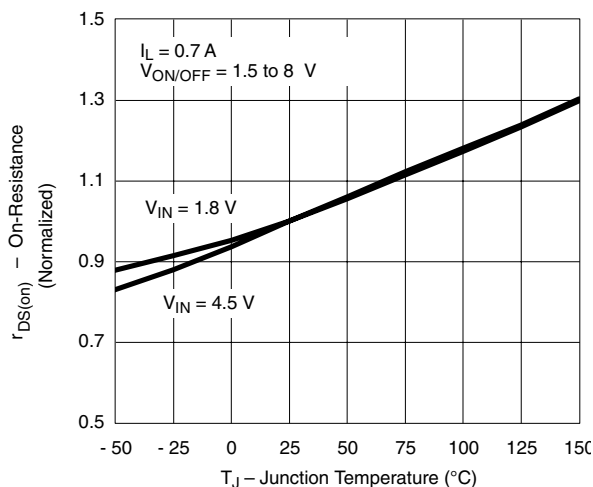
V_{DROP} vs. I_L at $I_L = 0.7$ V



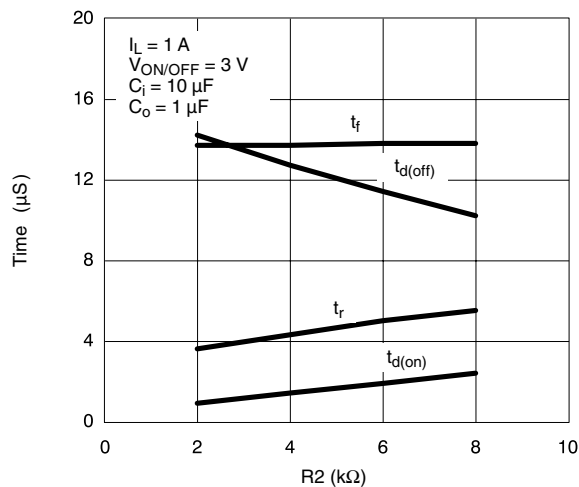
V_{DROP} Variance vs. Junction Temperature



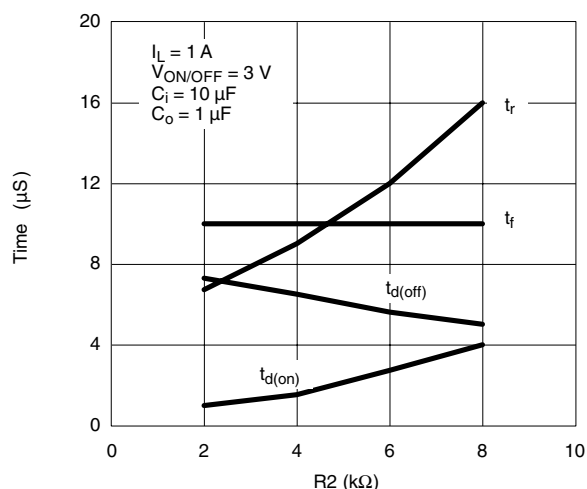
On-Resistance vs. Input Voltage

TYPICAL CHARACTERISTICS 25 °C, unless noted

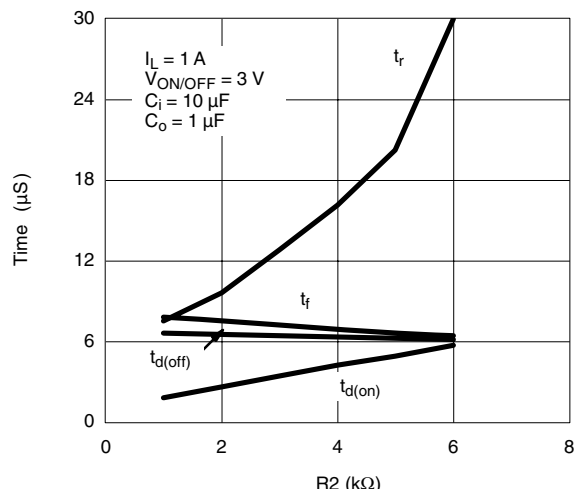
Normalized On-Resistance vs. Junction Temperature



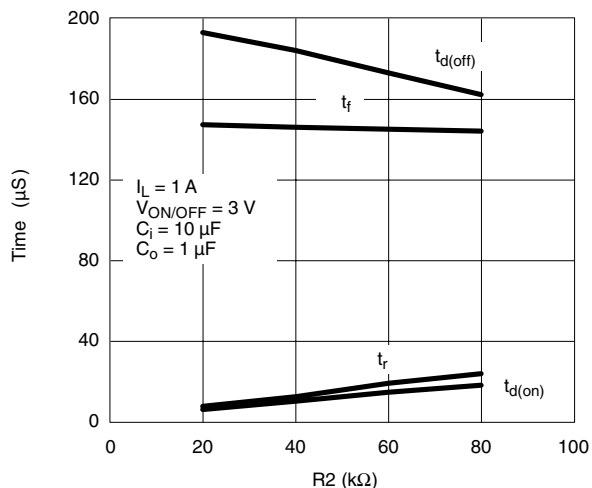
Switching Variation
R2 at $V_{IN} = 1.8$ V, $R_1 = 20$ k Ω



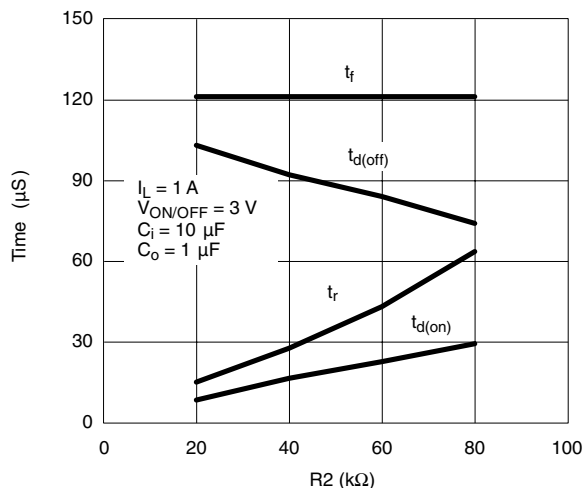
Switching Variation
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Switching Variation
R2 at $V_{IN} = 1.8$ V, $R_1 = 20$ k Ω

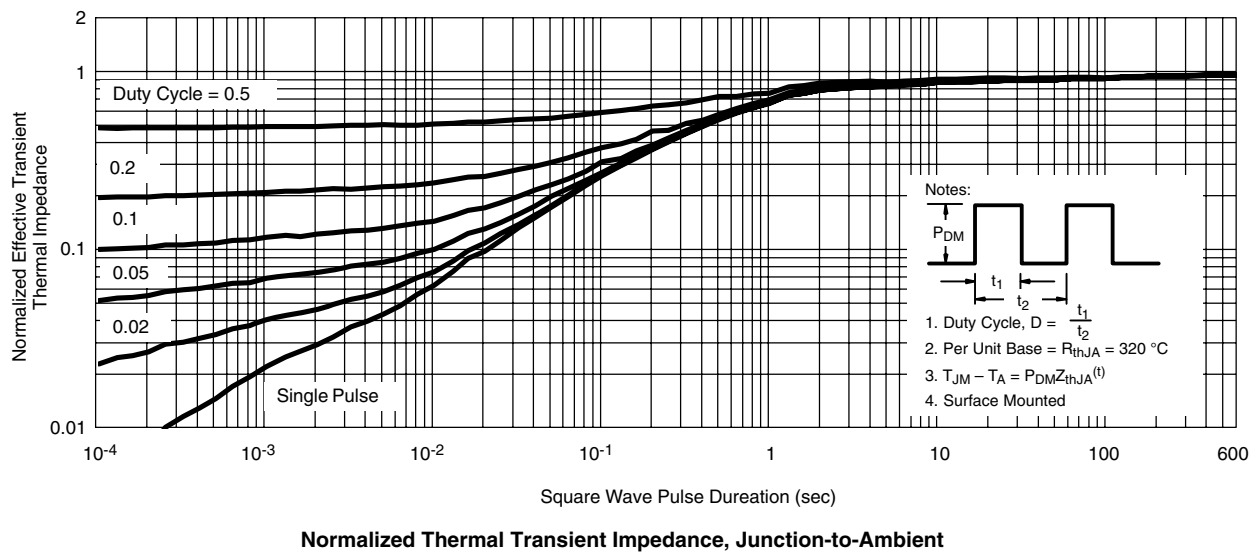
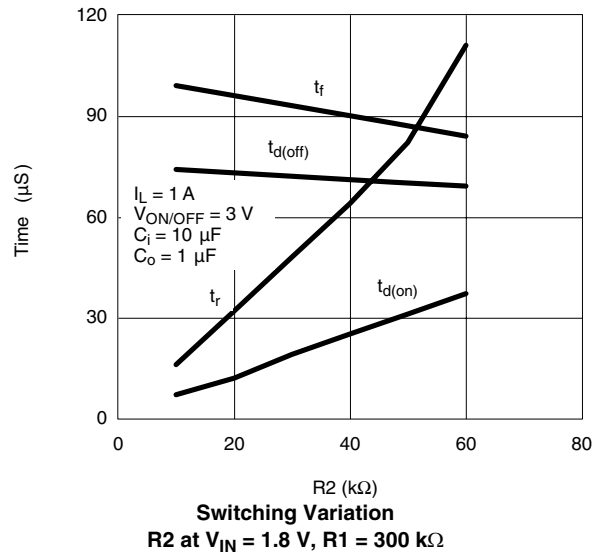


Switching Variation
R2 at $V_{IN} = 4.5$ V, $R_1 = 300$ k Ω



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

TYPICAL CHARACTERISTICS 25 °C, unless noted



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