

Excellent Integrated System Limited

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[Vishay/Siliconix](#)
[SI1869DH-T1-E3](#)

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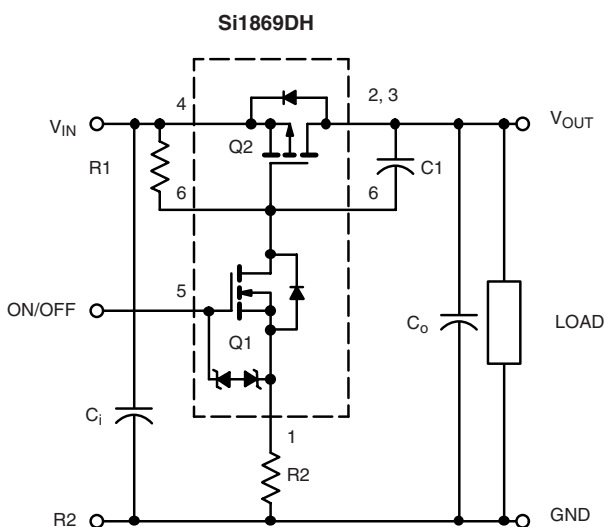
Load Switch with Level-Shift

PRODUCT SUMMARY		
V _{DS2} (V)	R _{DS(on)} (Ω)	I _D (A)
1.8 to 20	0.165 at V _{IN} = 4.5 V	± 1.2
	0.222 at V _{IN} = 2.5 V	± 1.0
	0.303 at V _{IN} = 1.8 V	± 0.7

DESCRIPTION

The Si1869DH 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 Si1869DH operates on supply lines from 1.8 V to 20 V, and can drive loads up to 1.2 A.

APPLICATION CIRCUITS



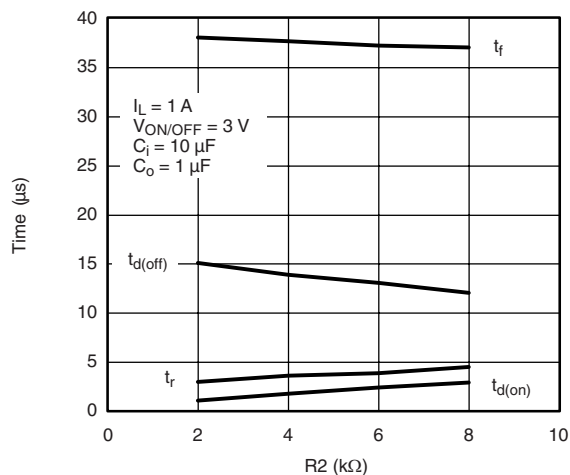
FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFETs: 1.8 V Rated
- ESD Protected: 2000 V On Input Switch, V_{ON/OFF}
- 165 mΩ Low R_{DS(on)}
- 1.8 to 20 V Input
- 1.5 to 8 V Logic Level Control
- Low Profile, Small Footprint SC70-6 Package
- Adjustable Slew-Rate
- Compliant to RoHS Directive 2002/95/EC



APPLICATIONS

- Level Shift for Portable Devices



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 kΩ

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

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

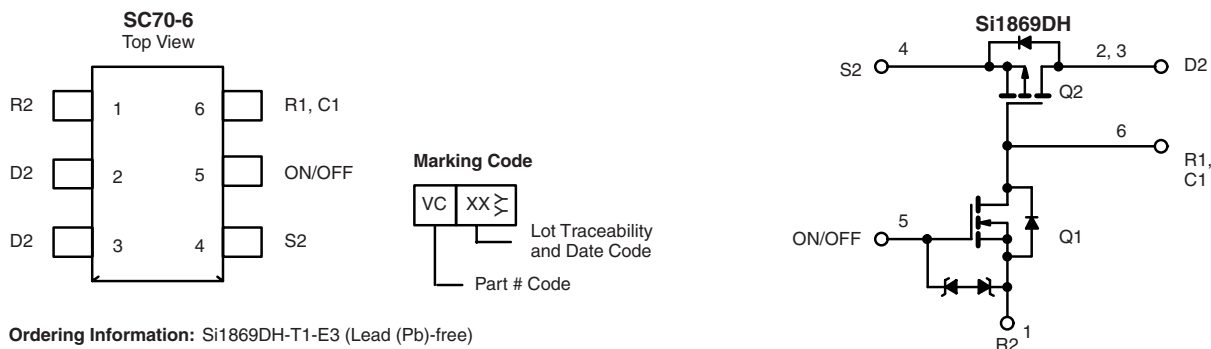
The Si1869DH is ideally suited for high-side load switching in portable applications. The integrated n-channel level-shift device saves space by reducing external components. The slew rate is set externally so that rise-times can be tailored to different load types.

Si1869DH

Vishay Siliconix



FUNCTIONAL BLOCK DIAGRAM



Ordering Information: Si1869DH-T1-E3 (Lead (Pb)-free)
Si1869DH-T1-GE3 (Lead (Pb)-free and Halogen-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage (D2-S2)	V_{DS}	- 20	V	
Input Voltage	V_{IN}	20		
ON/OFF Voltage	$V_{ON/OFF}$	8		
Load Current	I_L	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	1.0	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	2	kV	

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (Continuous Current) ^a	R_{thJA}	100	125	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Foot (Q2)	R_{thJF}	44	55	

SPECIFICATIONS $T_J = 25^\circ\text{C}$ unless otherwise noted						
Parameter	Symbol	Test Conditions	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}	$I_S = -0.4\text{ A}$	0.4	0.6	1.1	V
ON Characteristics						
Input Voltage Range	V_{IN}		1.8		20	V
Drain to Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 20			
On-Resistance (P-Channel) at 1 A	$R_{DS(on)}$	$V_{ON/OFF} = 1.5\text{ V}, V_{IN} = 4.5\text{ V}, I_D = 1.2\text{ A}$		0.132	0.165	Ω
		$V_{ON/OFF} = 1.5\text{ V}, V_{IN} = 2.5\text{ V}, I_D = 1.0\text{ A}$		0.177	0.222	
		$V_{ON/OFF} = 1.5\text{ V}, V_{IN} = 1.8\text{ V}, I_D = 0.7\text{ A}$		0.242	0.303	
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:

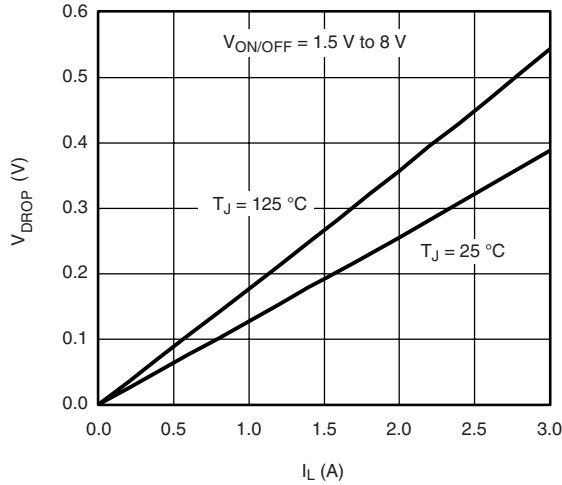
- Surface mounted on FR4 board.
- $V_{IN} = 20\text{ V}, V_{ON/OFF} = 8\text{ V}, T_A = 25^\circ\text{C}$.
- Pulse test: pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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.

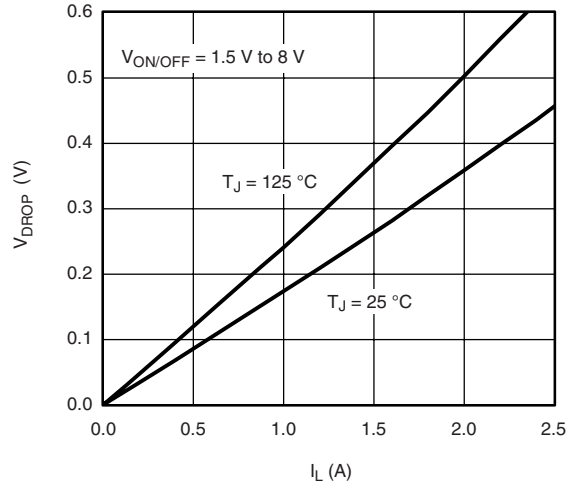


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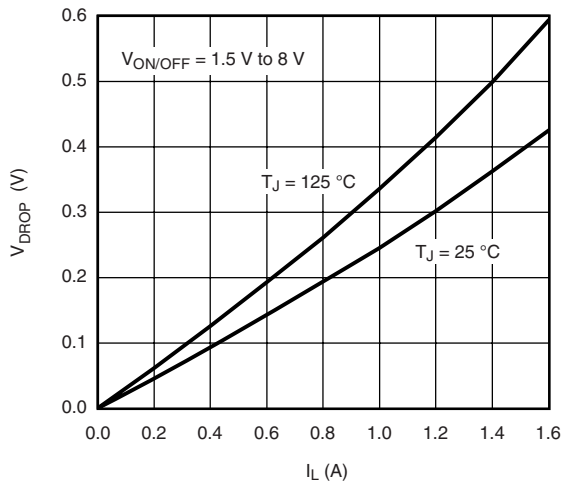
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



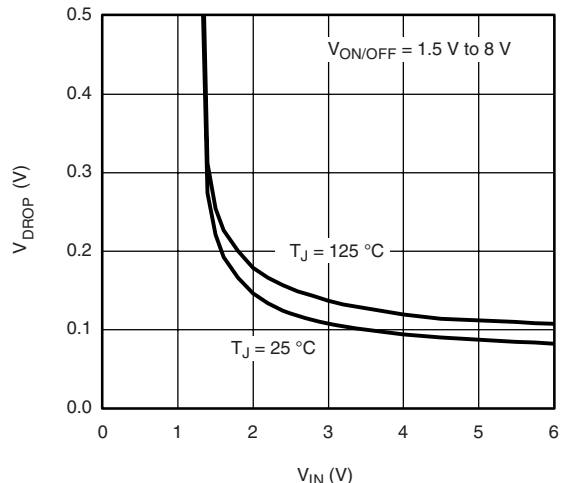
V_{DROP} vs. I_L at V_{IN} = 4.5 V



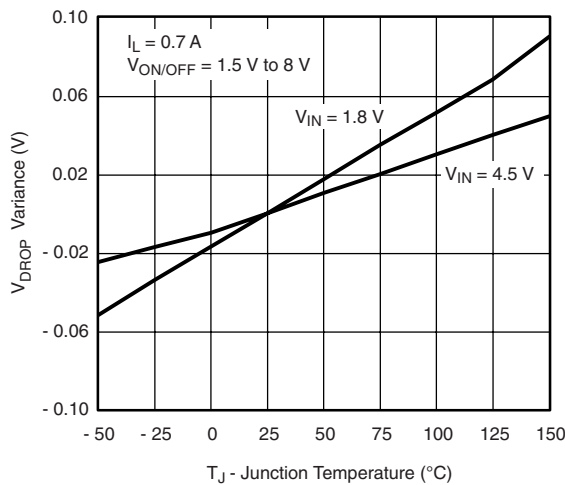
V_{DROP} vs. I_L at V_{IN} = 2.5 V



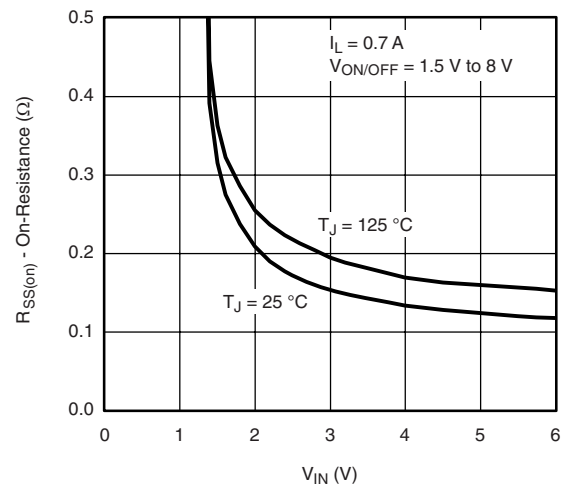
V_{DROP} vs. I_L at V_{IN} = 1.8 V



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



V_{DROP} Variance vs. Junction Temperature



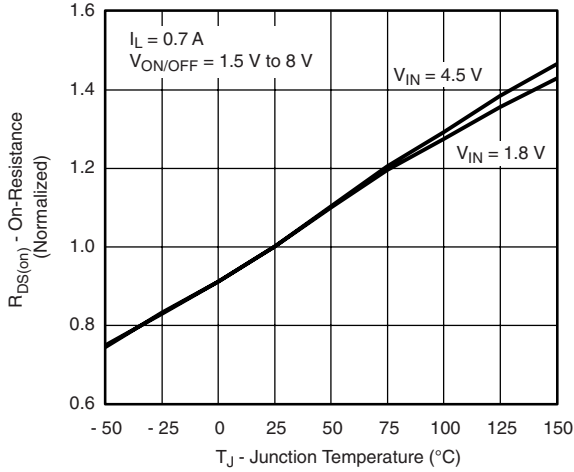
On-Resistance vs. Input Voltage

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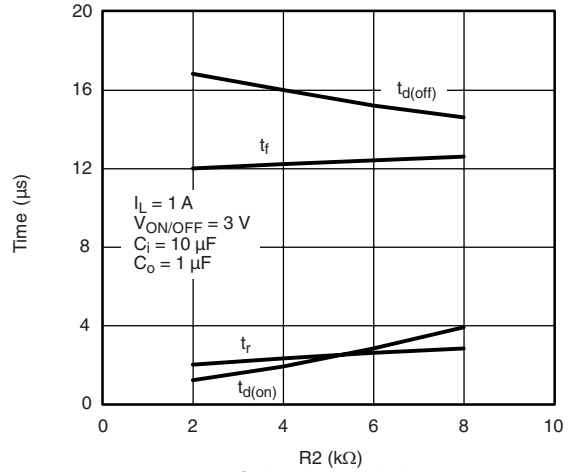
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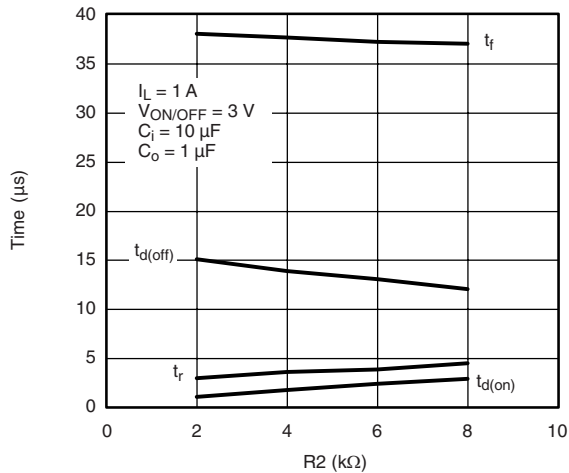
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



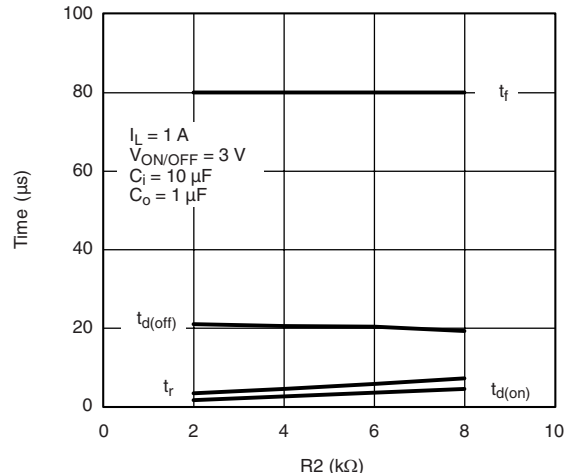
Normalized On-Resistance vs. Junction Temperature



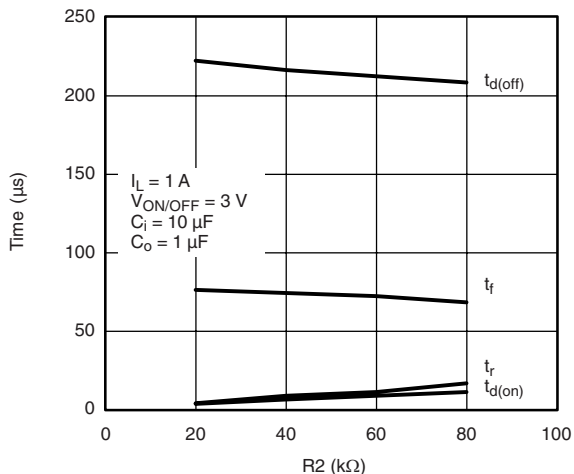
Switching Variation R2 at V_IN = 4.5 V, R1 = 20 kΩ



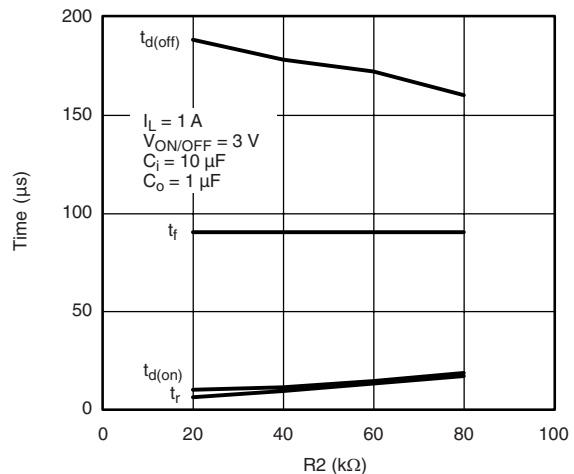
Switching Variation R2 at V_IN = 2.5 V, R1 = 20 kΩ



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



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

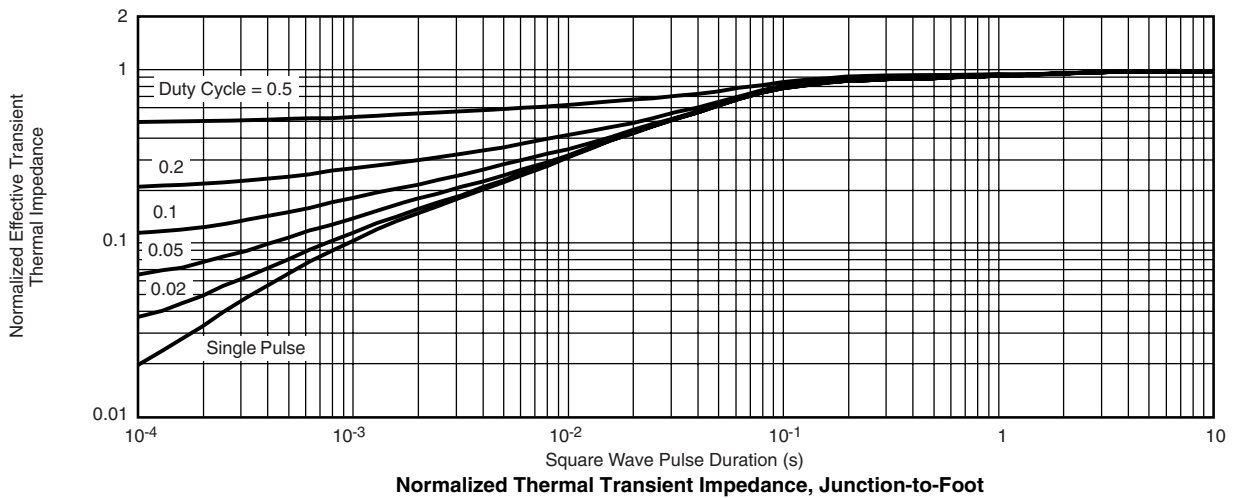
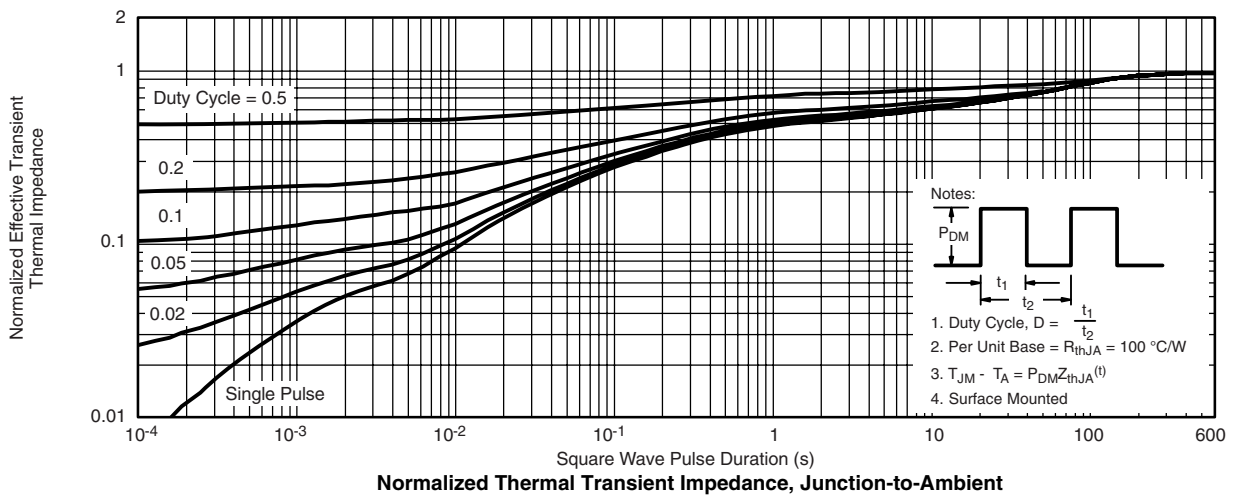
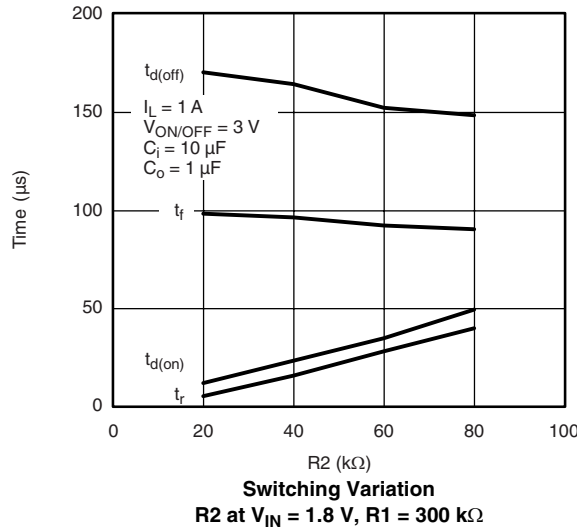


Switching Variation R2 at V_IN = 2.5 V, R1 = 300 kΩ



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TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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