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Vishay/Siliconix
SI1867DL-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 8	0.600 at V_{IN} = 4.5 V	± 0.6
	0.850 at V_{IN} = 2.5 V	± 0.5
	1.200 at V_{IN} = 1.8 V	± 0.2

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 V to 8 V, and can drive loads up to 0.6 A.

FEATURES

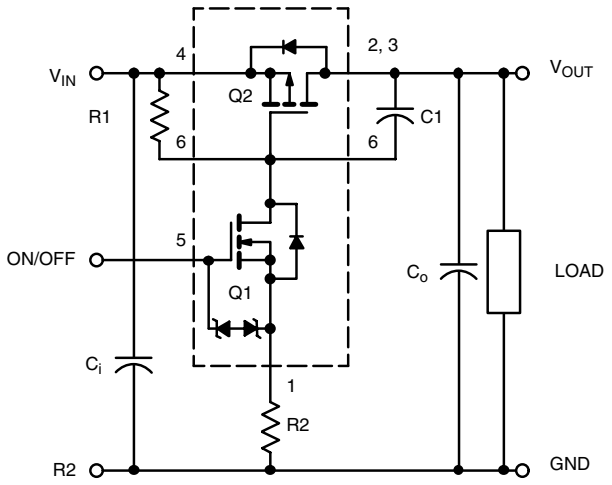
- **Halogen-free According to IEC 61249-2-21 Definition**
- TrenchFET® Power MOSFET
- 600 mΩ Low $R_{DS(on)}$
- 1.8 V to 8 V Input
- 1.5 V to 8 V Logic Level Control
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT
HALOGEN FREE Available

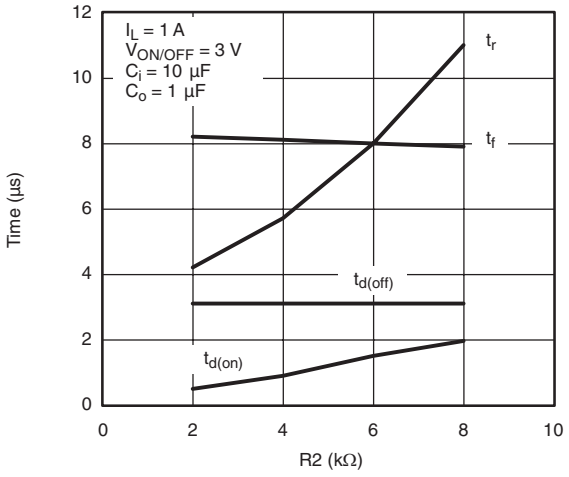
APPLICATIONS

- Load Switch with Level-Shift for Portable Applications

APPLICATION CIRCUITS



Si1867DL



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

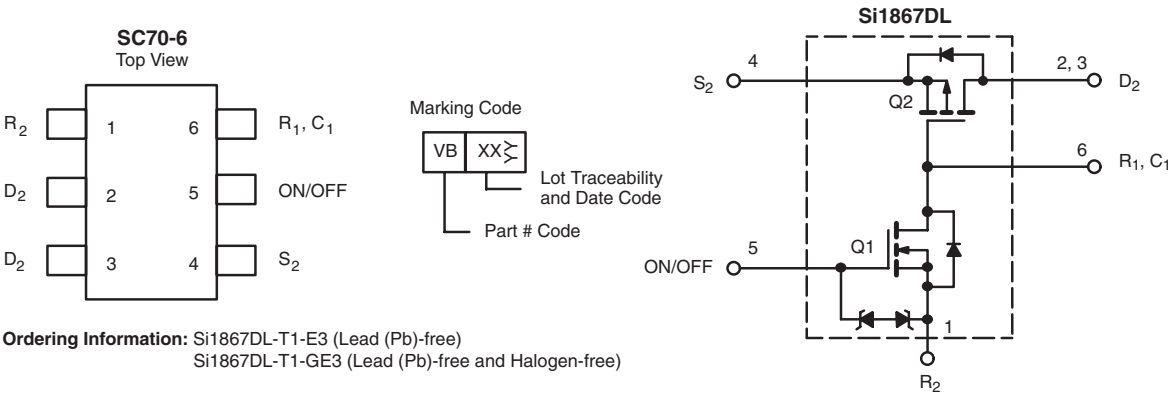
* Minimum R1 value should be least 10 x R2 to ensure Q1 turn-on.

The Si1867DL is ideally suited for high-side load switching in portable applications. The integrated n-channel level-shift devices saves space by reducing external components. The slew rate is set externally so that rise-times can be tailored to different load types.

Si1867DL

Vishay Siliconix

FUNCTIONAL BLOCK DIAGRAM



Ordering Information: Si1867DL-T1-E3 (Lead (Pb)-free)
Si1867DL-T1-GE3 (Lead (Pb)-free and Halogen-free)

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]	I_L	± 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-833D 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	

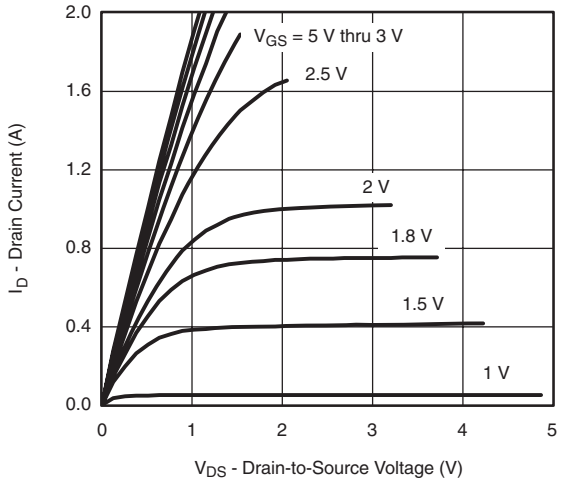
SPECIFICATIONS T_J = 25 °C unless otherwise noted

Parameter	Symbol	Test Conditions	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	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 V, I_D = 0.6 A		0.480	0.600	Ω
		$V_{ON/OFF}$ = 1.5 , V_{IN} = 2.5 V, I_D = 0.5 A		0.690	0.850	
		$V_{ON/OFF}$ = 1.5 , V_{IN} = 1.8 V, I_D = 0.2 A		0.950	1.200	
On-State (P-Channel) Drain-Current	$I_{D(on)}$	$V_{IN-OUT} \leq$ 0.2 V, V_{IN} = 5 V, $V_{ON/OFF}$ = 1.5 V	1			A
		$V_{IN-OUT} \leq$ 0.3 V, V_{IN} = 3 V, $V_{ON/OFF}$ = 1.5 V	1			

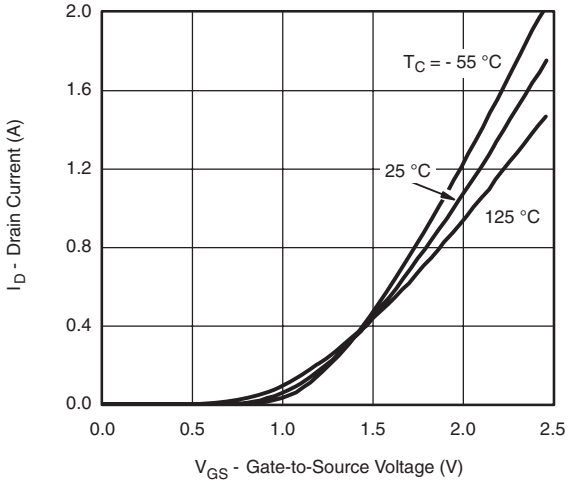
Notes:
a) Surface mounted on FR4 board.
b) V_{IN} = 8 V, $V_{ON/OFF}$ = 8 V, T_A = 25 °C.
c) Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.

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.

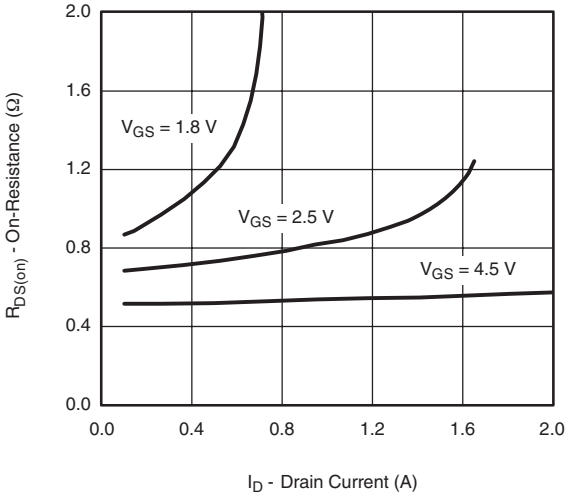
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



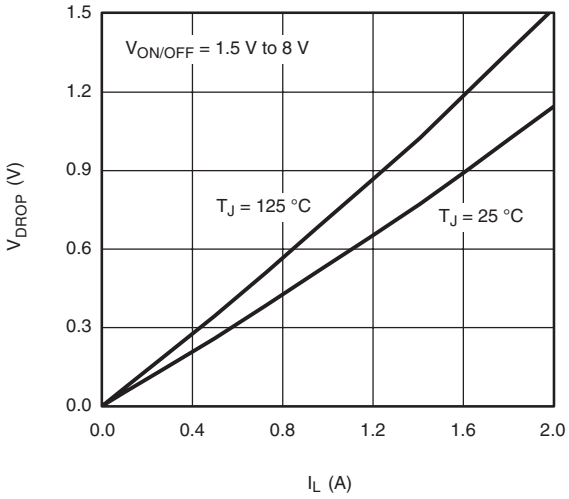
Output Characteristics



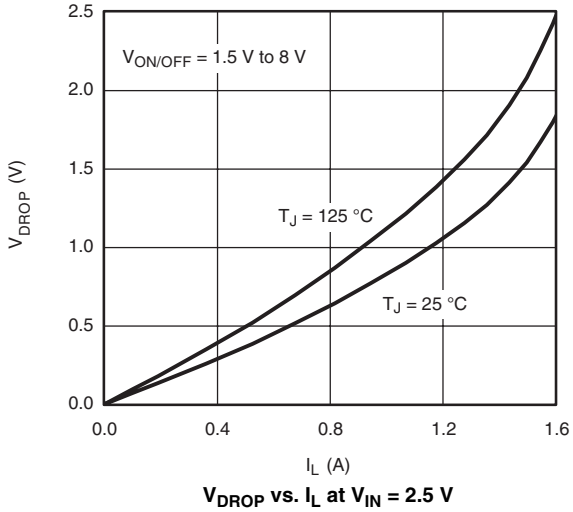
Transfer Characteristics



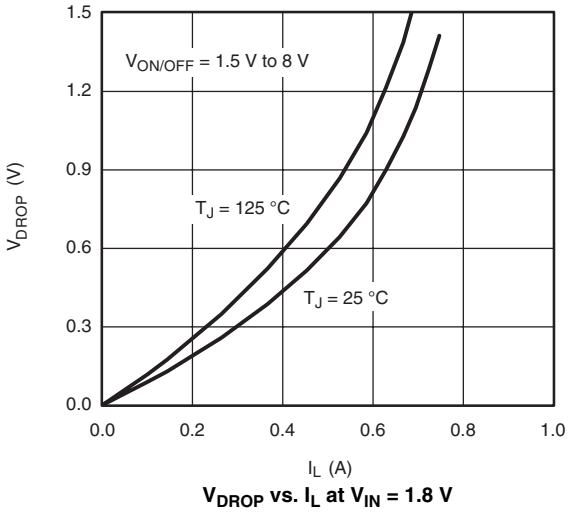
On-Resistance vs. Drain Current



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

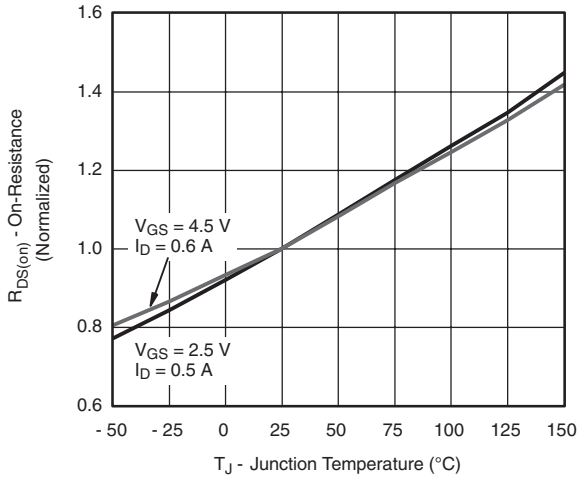


V_{DROP} vs. I_L at V_{IN} = 2.5 V

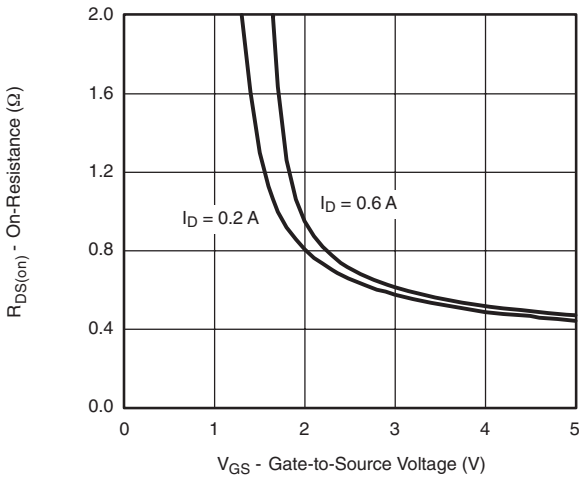


V_{DROP} vs. I_L at V_{IN} = 1.8 V

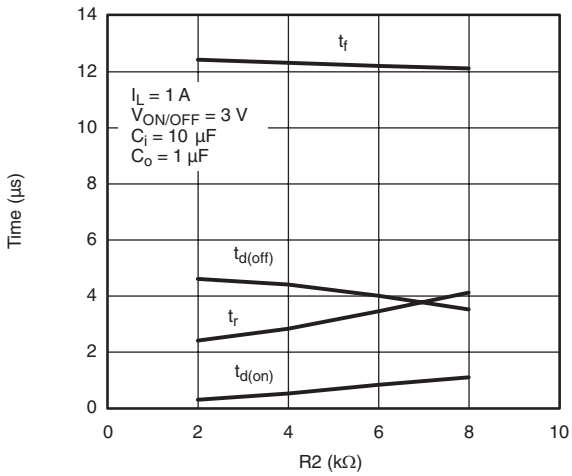
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



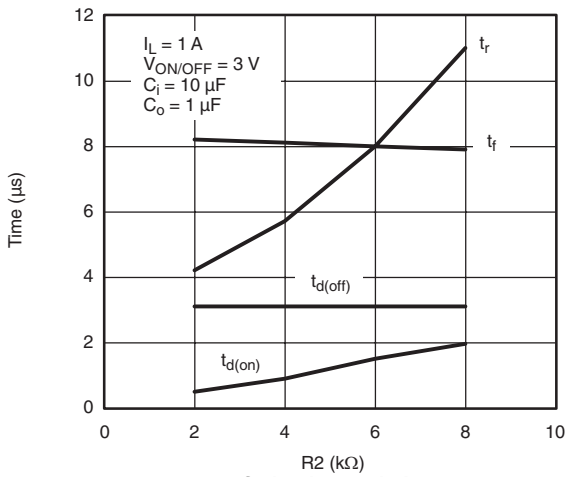
On Resistance vs. Junction Temperature



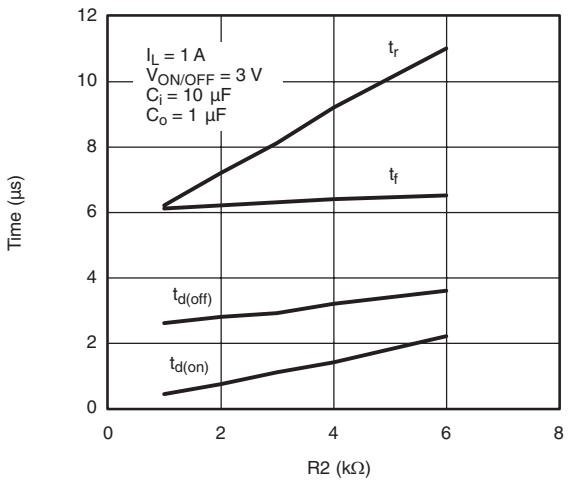
On-Resistance vs. Gate-to-Source Voltage



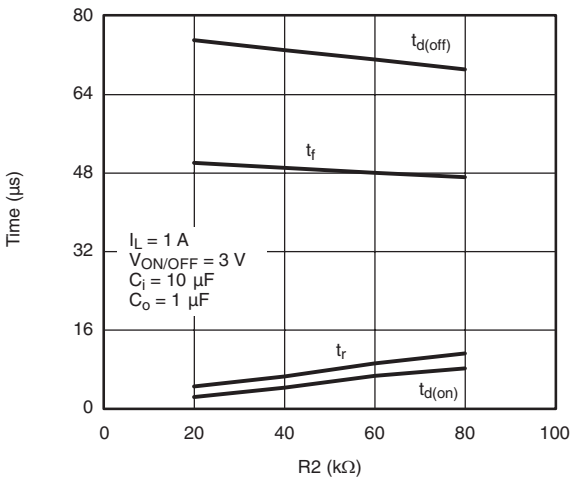
Switching Variation
R2 at V_{IN} = 4.5 V, R1 = 20 kΩ



Switching Variation
R2 at V_{IN} = 2.5 V, R1 = 20 kΩ

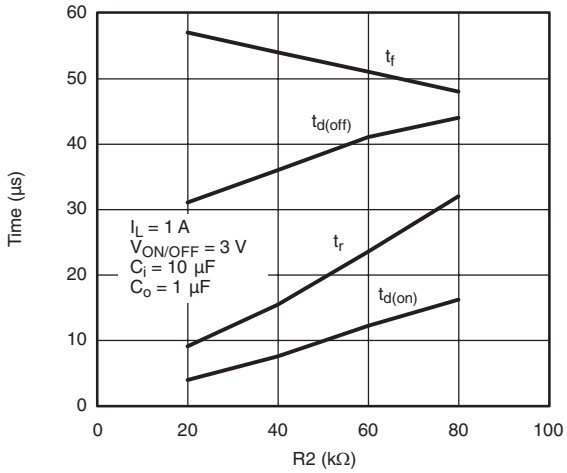


Switching Variation
R2 at V_{IN} = 1.8 V, R1 = 20 kΩ

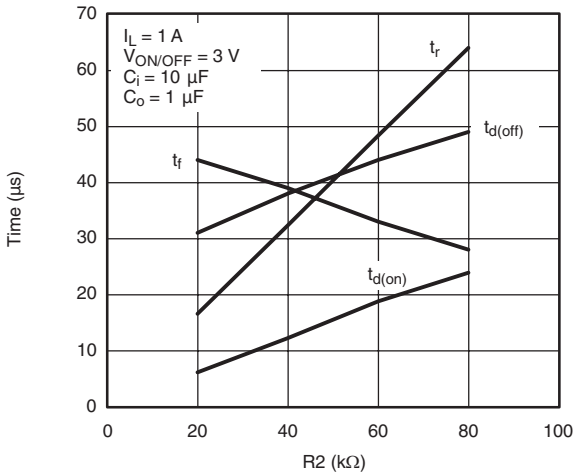


Switching Variation
R2 at V_{IN} = 4.5 V, R1 = 300 kΩ

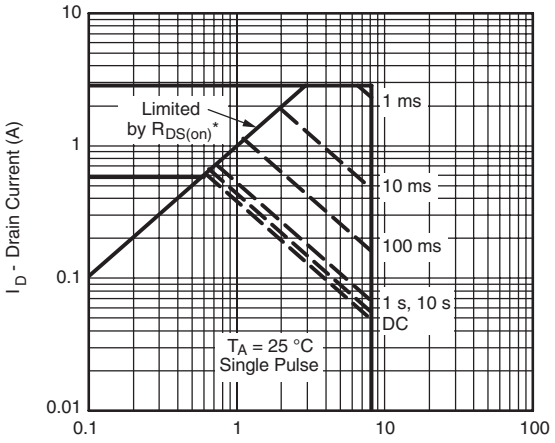
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Switching Variation
R2 at V_{IN} = 2.5 V, R1 = 300 kΩ

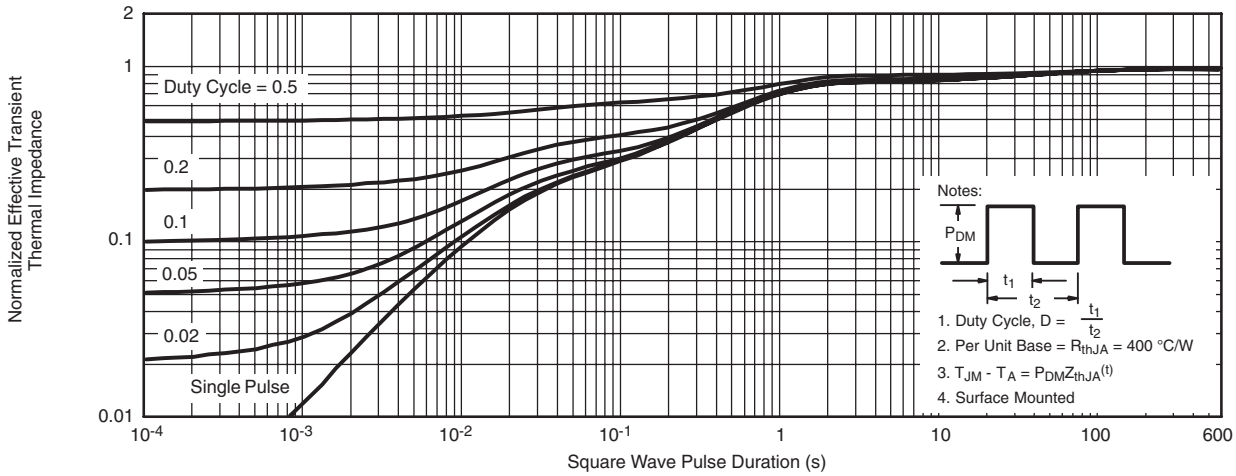


Switching Variation
R2 at V_{IN} = 1.8 V, R1 = 300 kΩ



* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient

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