

## P-Channel 30-V (D-S) MOSFET with Schottky Diode

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
- 30	0.200 at $V_{GS} = -10$ V	$\pm 1.8$
	0.360 at $V_{GS} = -4.5$ V	$\pm 1.2$

### SCHOTTKY PRODUCT SUMMARY

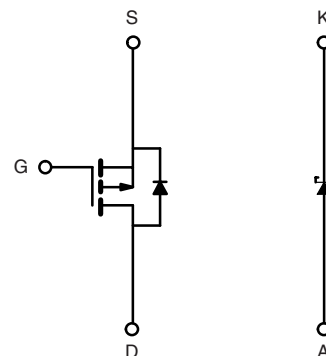
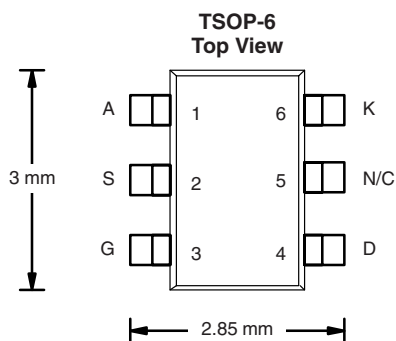
$V_{KA}$ (V)	$V_F$ (V) Diode Forward Voltage	$I_F$ (A)
30	0.5 V at 0.5 A	0.5

### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- LITTLE FOOT® Plus
- Compliant to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**  
Available



P-Channel MOSFET

Ordering Information: Si3851DV-T1-E3 (Lead (Pb)-free)  
Si3851DV-T1-GE3 (Lead (Pb)-free and Halogen-free)

### ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$ , unless otherwise noted

Parameter		Symbol	5 s	Steady State	Unit
Drain-Source Voltage (MOSFET and Schottky)		V <sub>DS</sub>	- 30		V
Reverse Voltage (Schottky)		V <sub>KA</sub>	30		
Gate-Source Voltage (MOSFET)		V <sub>GS</sub>	± 20	± 20	
Continuous Drain Current (T <sub>J</sub> = 150 °C) (MOSFET) <sup>a</sup>	T <sub>A</sub> = 25 °C	I <sub>D</sub>	± 1.8	± 1.6	A
	T <sub>A</sub> = 70 °C		± 1.5	± 1.2	
Pulsed Drain Current (MOSFET)		I <sub>DM</sub>	± 7		
Continuous Source Current (MOSFET Diode Conduction) <sup>a</sup>		I <sub>S</sub>	- 1.05	- 0.75	
Average Forward Current (Schottky)		I <sub>F</sub>	0.5		
Pulsed Foward Current (Schottky)		I <sub>FM</sub>	7		
Maximum Power Dissipation (MOSFET) <sup>a</sup>	T <sub>A</sub> = 25 °C	P <sub>D</sub>	1.15	0.83	W
	T <sub>A</sub> = 70 °C		0.73	0.53	
Maximum Power Dissipation (Schottky) <sup>a</sup>	T <sub>A</sub> = 25 °C		1.0	0.76	
	T <sub>A</sub> = 70 °C		0.64	0.48	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C

Notes:

a. Surface mounted on 1" x 1" FR4 board.

**THERMAL RESISTANCE RATINGS**

Parameter		Device	Symbol	Typical	Maximum	Unit
Junction-to-Ambient	$t \leq 5 \text{ s}$	MOSFET	$R_{thJA}$	93	110	$^{\circ}\text{C/W}$
		Schottky		103	125	
	Steady State	MOSFET		130	150	
		Schottky		140	165	
Junction-to-Foot	Steady State	MOSFET	$R_{thJF}$	75	90	
		Schottky		80	95	

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

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = -250 \mu\text{A}$	- 1			V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 20 \text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -24 \text{ V}$ , $V_{GS} = 0 \text{ V}$			- 1	$\mu\text{A}$
		$V_{DS} = -24 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 75^{\circ}\text{C}$			- 10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq -5 \text{ V}$ , $V_{GS} = -10 \text{ V}$	- 5			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10 \text{ V}$ , $I_D = -1.8 \text{ A}$		0.165	0.200	$\Omega$
		$V_{GS} = -4.5 \text{ V}$ , $I_D = -1.2 \text{ A}$		0.298	0.360	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15 \text{ V}$ , $I_D = -1.8 \text{ A}$		2.4		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -1.05 \text{ A}$ , $V_{GS} = 0 \text{ V}$		- 0.83	- 1.10	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -15 \text{ V}$ , $V_{GS} = -5 \text{ V}$ , $I_D = -1.8 \text{ A}$		2.4	3.6	nC
Gate-Source Charge	$Q_{gs}$			0.9		
Gate-Drain Charge	$Q_{gd}$			0.8		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15 \text{ V}$ , $R_L = 15 \Omega$ $I_D \cong -1 \text{ A}$ , $V_{GEN} = -10 \text{ V}$ , $R_g = 6 \Omega$		8	12	ns
Rise Time	$t_r$			12	18	
Turn-Off Delay Time	$t_{d(off)}$			12	18	
Fall Time	$t_f$			7	11	
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -1.05 \text{ A}$ , $dI/dt = 100 \text{ A}/\mu\text{s}$		30	60	

Notes:

a. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

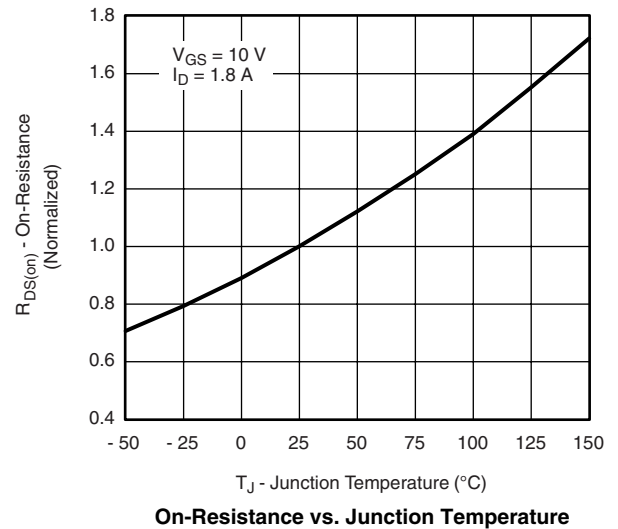
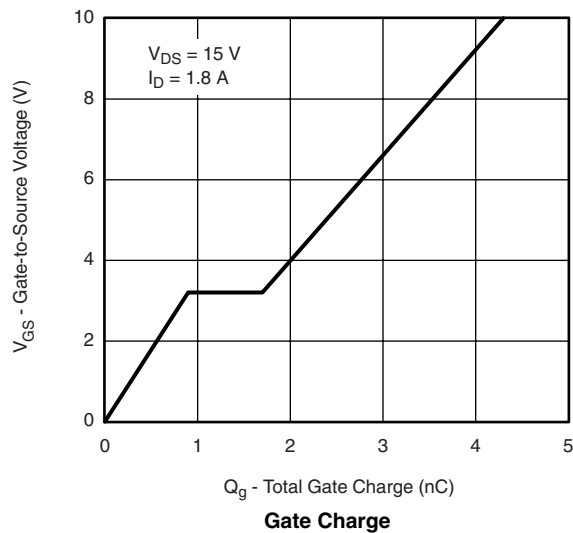
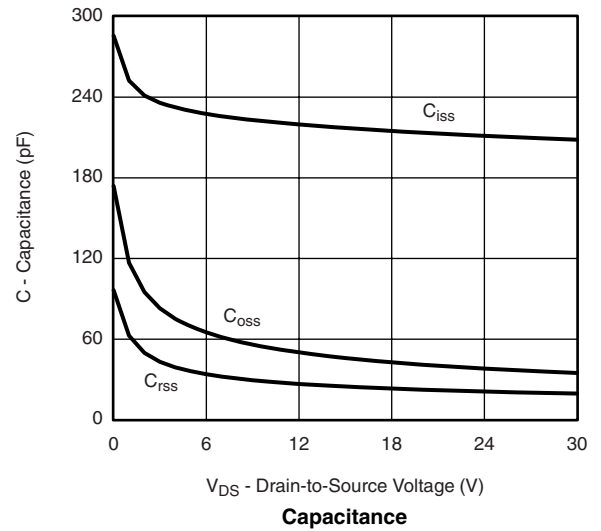
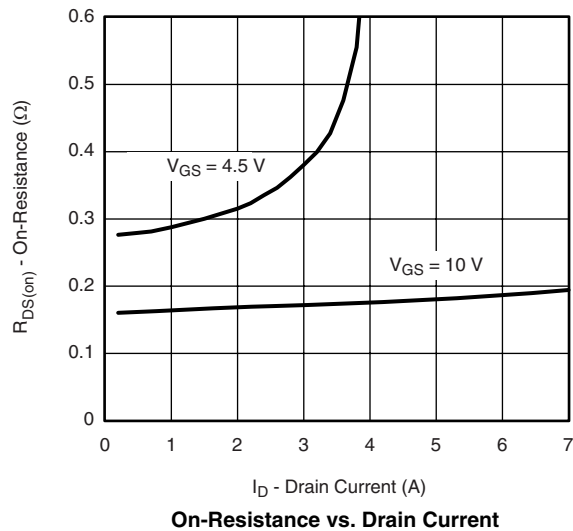
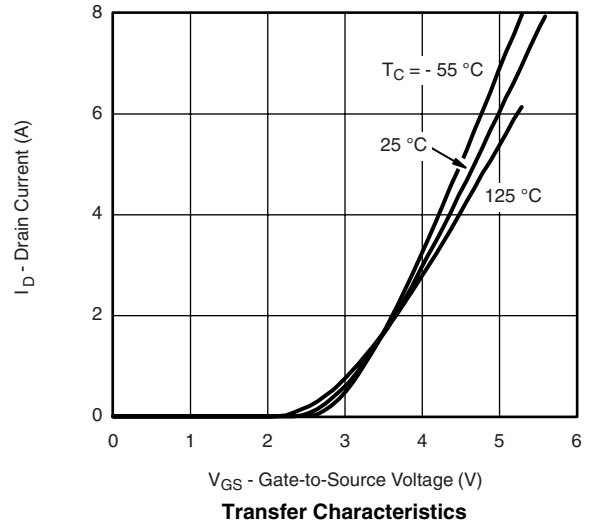
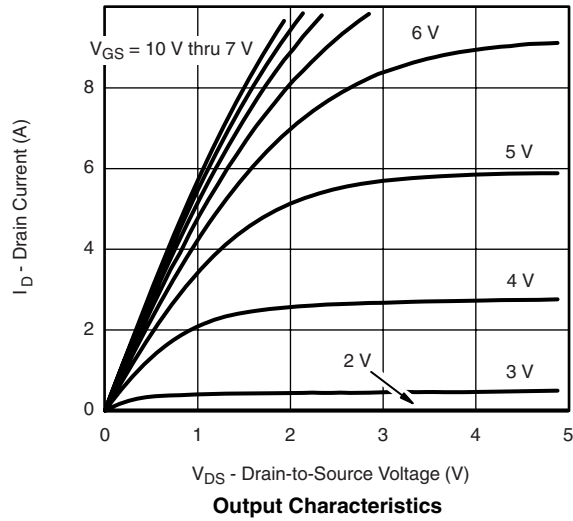
b. Guaranteed by design, not subject to production testing.

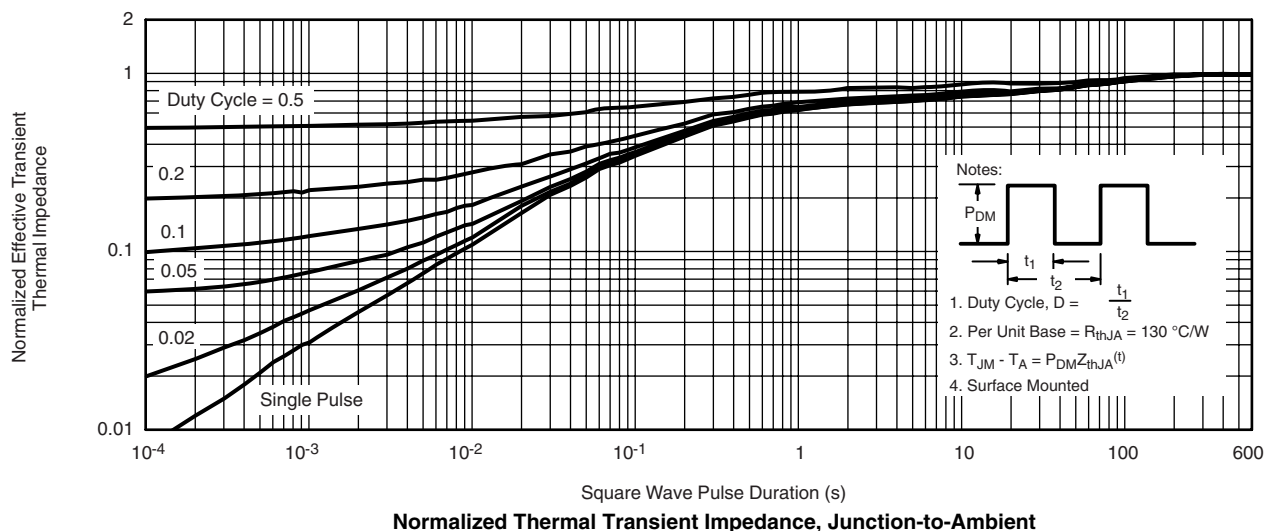
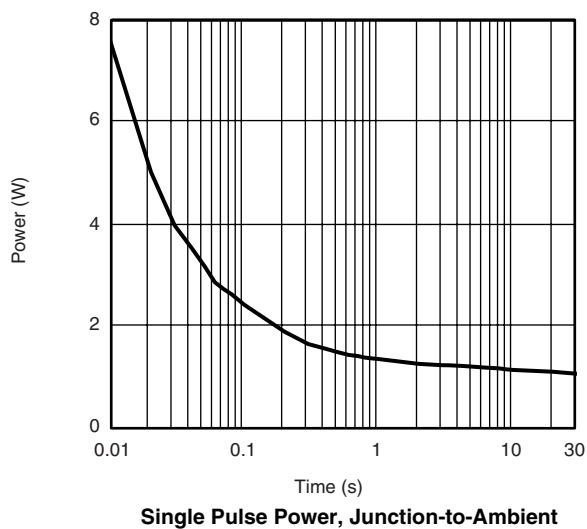
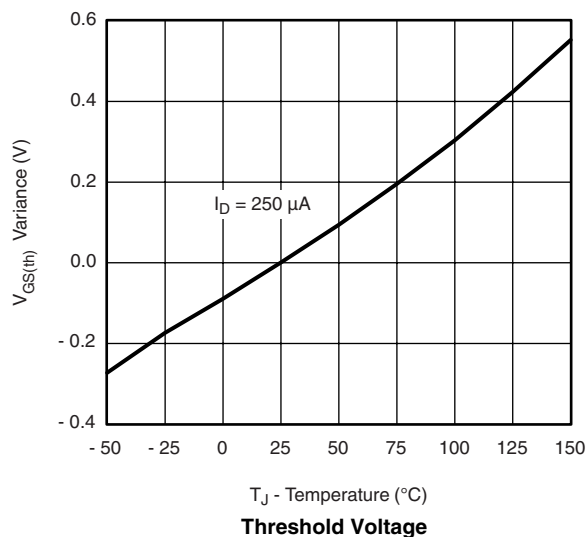
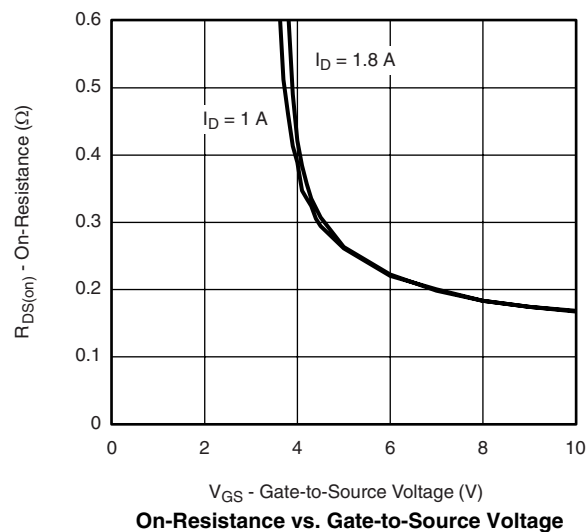
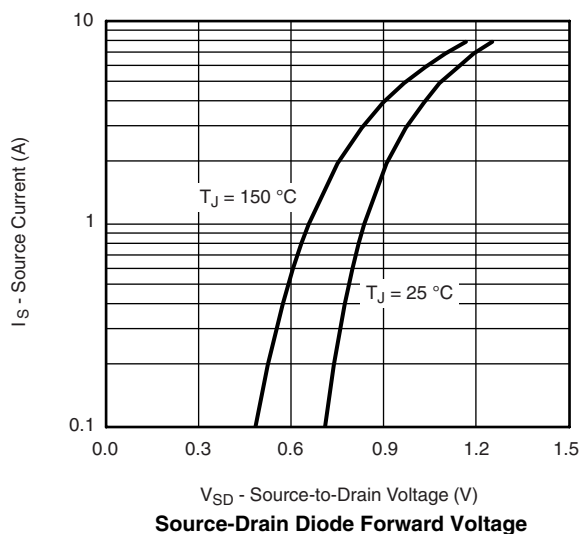
**SCHOTTKY SPECIFICATIONS**  $T_J = 25^{\circ}\text{C}$ , unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	$V_F$	$I_F = 0.5 \text{ A}$		0.45	0.5	V
		$I_F = 0.5 \text{ A}$ , $T_J = 125^{\circ}\text{C}$		0.35	0.4	
Maximum Reverse Leakage Current	$I_{rm}$	$V_R = 30 \text{ V}$		0.002	0.100	mA
		$V_R = 30 \text{ V}$ , $T_J = 75^{\circ}\text{C}$		0.06	1	
		$V_R = 30 \text{ V}$ , $T_J = 125^{\circ}\text{C}$		1.5	10	
Junction Capacitance	$C_T$	$V_R = 10 \text{ V}$		24		pF

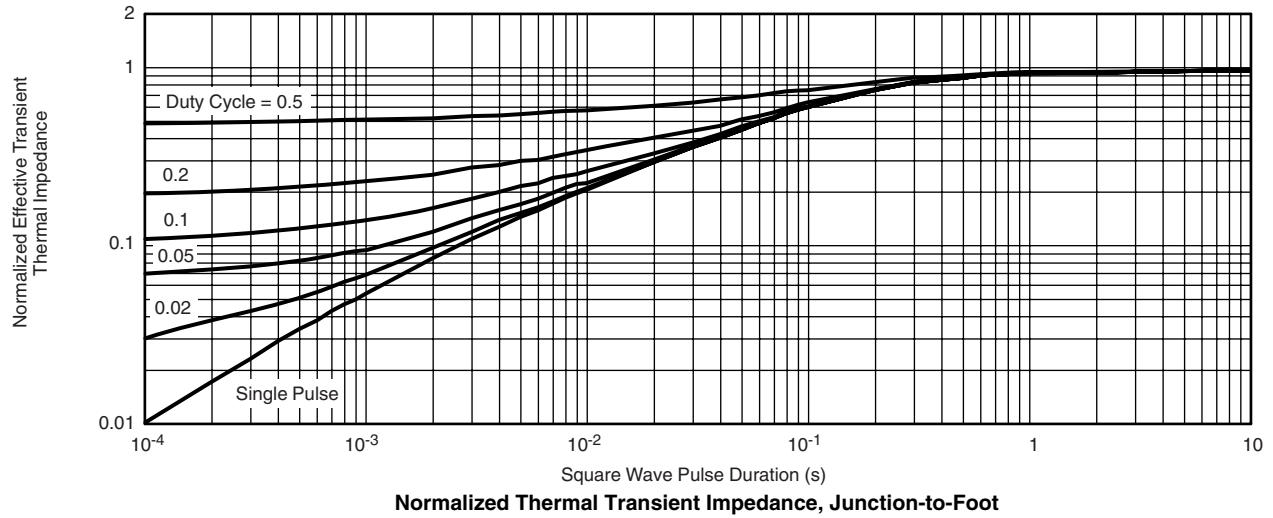
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

## MOSFET TYPICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$ , unless otherwise noted

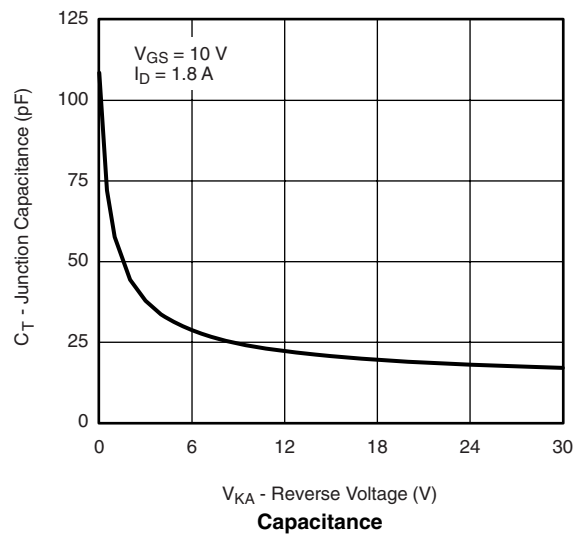
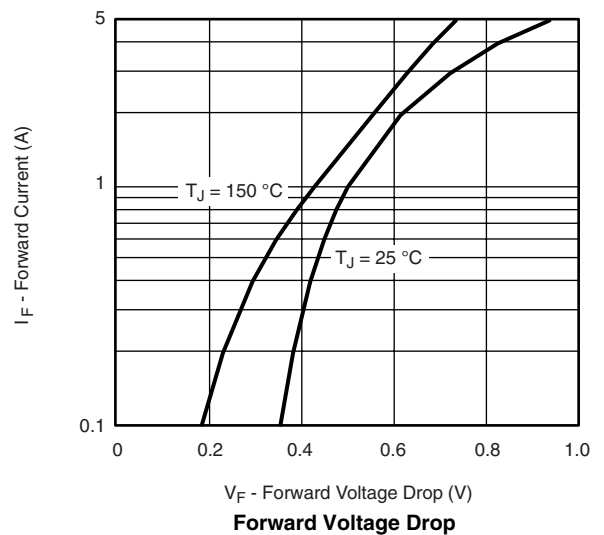
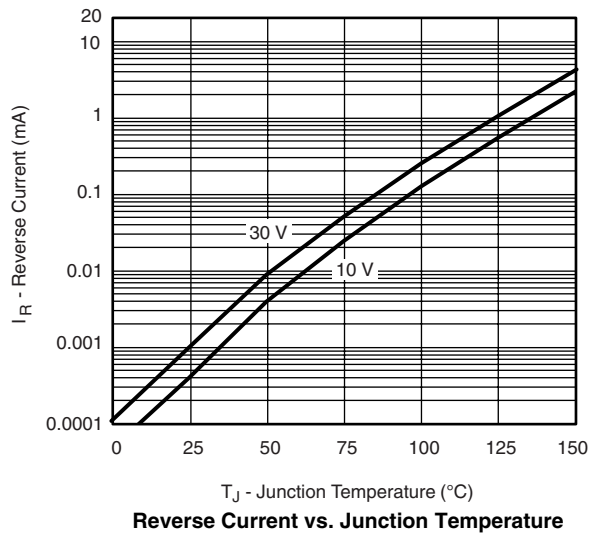


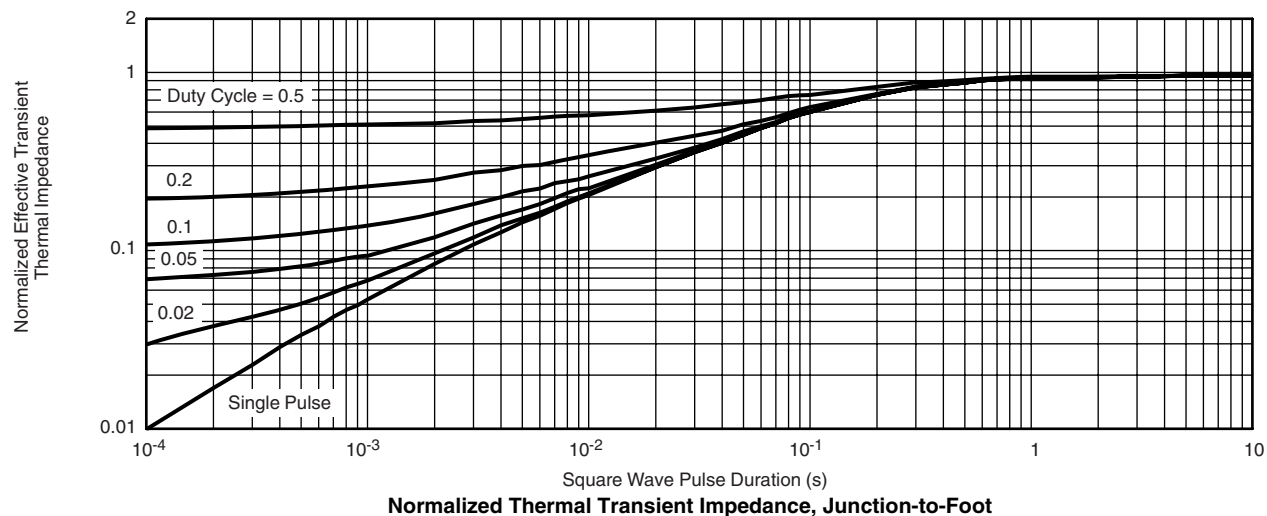
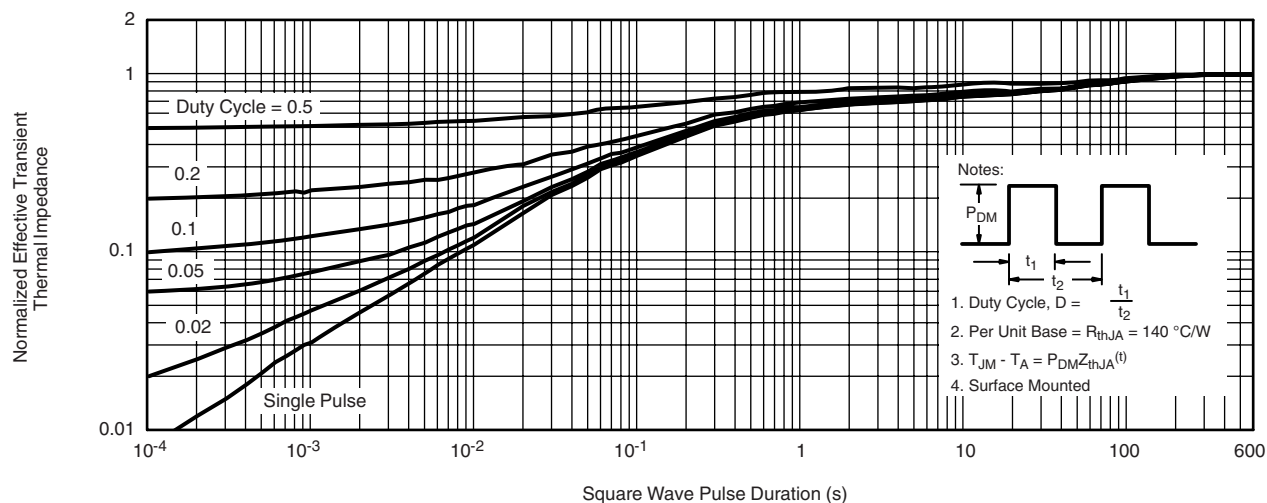
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