

## Automotive Dual N-Channel 40 V (D-S) 175 °C MOSFET

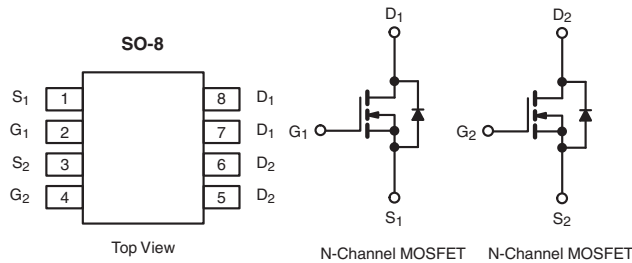
PRODUCT SUMMARY	
$V_{DS}$ (V)	40
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 10$ V	0.035
$R_{DS(on)}$ ( $\Omega$ ) at $V_{GS} = 4.5$ V	0.055
$I_D$ (A)	7
Configuration	Dual

### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Compliant to RoHS Directive 2002/95/EC
- AEC-Q101 Qualified<sup>c</sup>
- Find out more about Vishay's Automotive Grade Product Requirements at: [www.vishay.com/applications](http://www.vishay.com/applications)



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



ORDERING INFORMATION	
Package	SO-8
Lead (Pb)-free and Halogen-free	SQ4940EY-T1-GE3

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		$V_{DS}$	40	V
Gate-Source Voltage		$V_{GS}$	$\pm 20$	
Continuous Drain Current	$T_C = 25$ °C	$I_D$	7	A
	$T_C = 125$ °C		4	
Continuous Source Current (Diode Conduction)		$I_S$	3	
Pulsed Drain Current <sup>a</sup>		$I_{DM}$	28	
Single Pulse Avalanche Energy	L = 0.1 mH	$I_{AS}$	17	
Single Pulse Avalanche Current		$E_{AS}$	14	
Maximum Power Dissipation <sup>a</sup>	$T_C = 25$ °C	$P_D$	3.3	W
	$T_C = 125$ °C		1.1	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	- 55 to + 175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount <sup>b</sup>	$R_{thJA}$	110	°C/W
Junction-to-Foot (Drain)		$R_{thJF}$	45	

### Notes

- Pulse test; pulse width  $\leq 300$   $\mu$ s, duty cycle  $\leq 2$  %.
- When mounted on 1" square PCB (FR-4 material).
- Parametric verification ongoing.

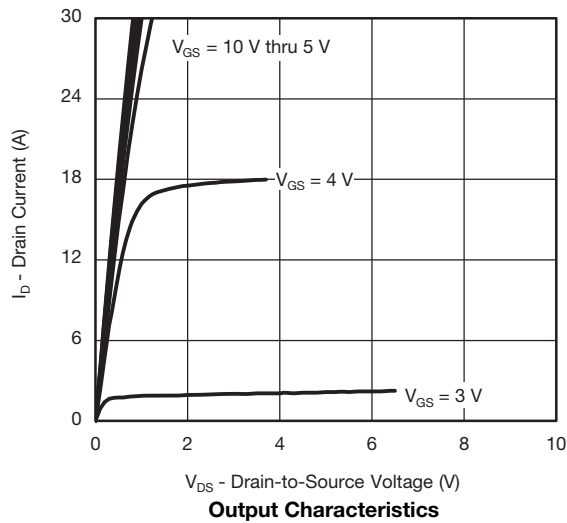
<b>SPECIFICATIONS</b> ( $T_C = 25\text{ }^\circ\text{C}$ , unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
<b>Static</b>							
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$		40	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$		1.5	2.0	2.5	
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 20\text{ V}$		-	-	$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$	-	-	1.0	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$ , $T_J = 125\text{ }^\circ\text{C}$	-	-	50	
		$V_{GS} = 0\text{ V}$	$V_{DS} = 40\text{ V}$ , $T_J = 175\text{ }^\circ\text{C}$	-	-	150	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{GS} = 10\text{ V}$	$V_{DS} \geq 5\text{ V}$	25	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 6\text{ A}$	-	0.026	0.035	$\Omega$
		$V_{GS} = 10\text{ V}$	$I_D = 6\text{ A}$ , $T_J = 125\text{ }^\circ\text{C}$	-	-	0.056	
		$V_{GS} = 10\text{ V}$	$I_D = 6\text{ A}$ , $T_J = 175\text{ }^\circ\text{C}$	-	-	0.067	
		$V_{GS} = 4.5\text{ V}$	$I_D = 5\text{ A}$	-	0.035	0.055	
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}$ , $I_D = 6\text{ A}$		-	17	-	S
<b>Dynamic<sup>b</sup></b>							
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	-	663	830	$\mu\text{F}$
Output Capacitance	$C_{oss}$			-	102	130	
Reverse Transfer Capacitance	$C_{rss}$			-	52	65	
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{GS} = 10\text{ V}$	$V_{DS} = 20\text{ V}$ , $I_D = 5.7\text{ A}$	-	14	21	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			-	2	-	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			-	2.9	-	
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 20\text{ V}$ , $R_L = 20\text{ }\Omega$ $I_D \cong 1\text{ A}$ , $V_{GEN} = 10\text{ V}$ , $R_g = 1\text{ }\Omega$		-	8	12	ns
Rise Time <sup>c</sup>	$t_r$			-	8	12	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			-	19	28	
Fall Time <sup>c</sup>	$t_f$			-	7	11	
<b>Source-Drain Diode Ratings and Characteristics<sup>b</sup></b>							
Pulsed Current <sup>a</sup>	$I_{SM}$			-	-	28	A
Forward Voltage	$V_{SD}$	$I_F = 2\text{ A}$ , $V_{GS} = 0\text{ V}$		-	0.8	1.1	V

**Notes**

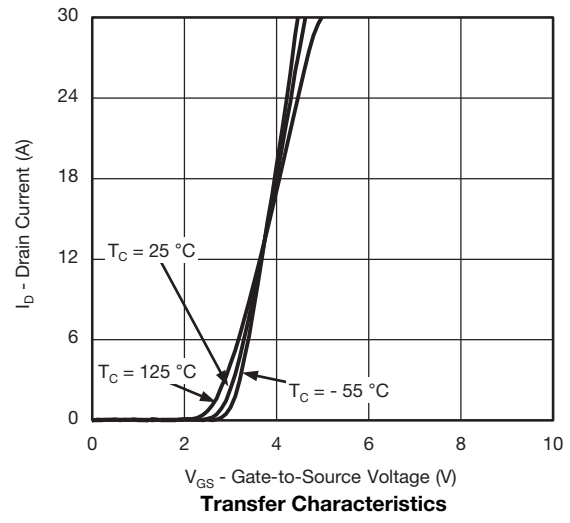
- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

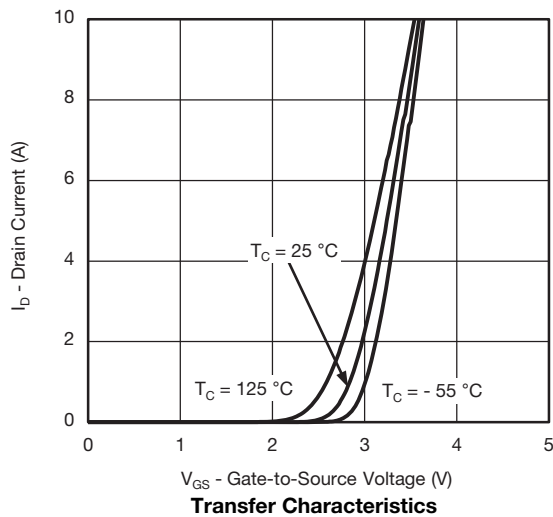
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



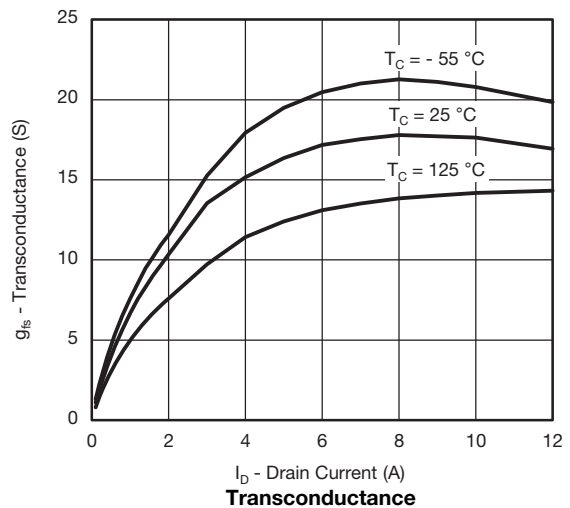
**Output Characteristics**



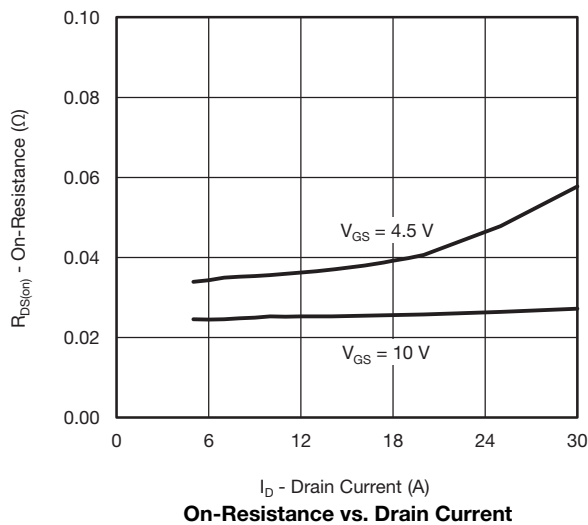
**Transfer Characteristics**



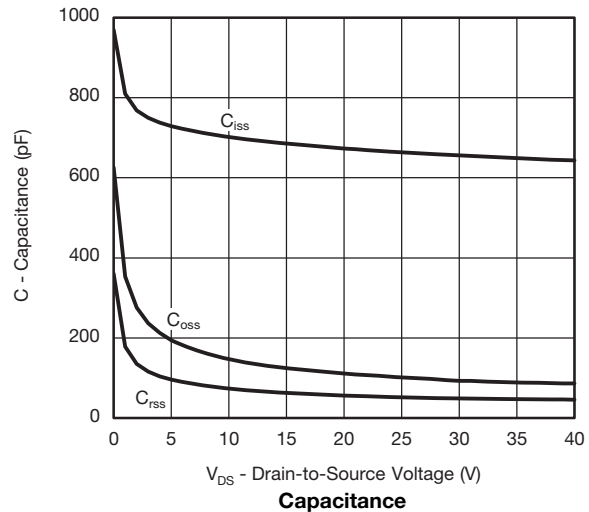
**Transfer Characteristics**



**Transconductance**

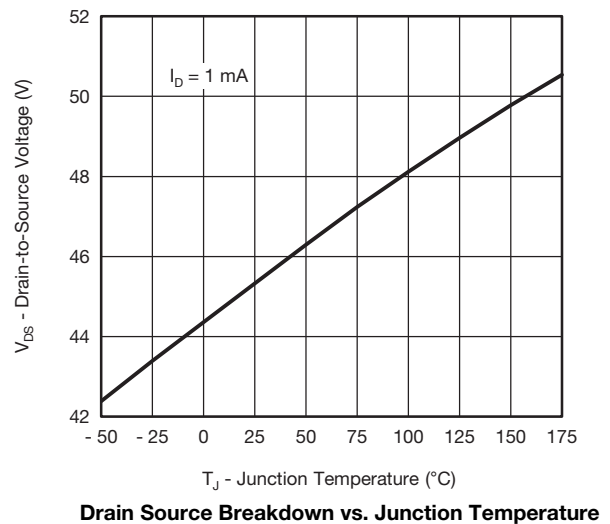
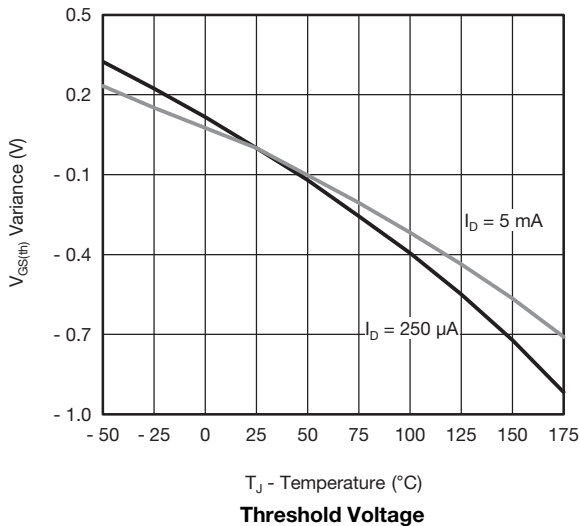
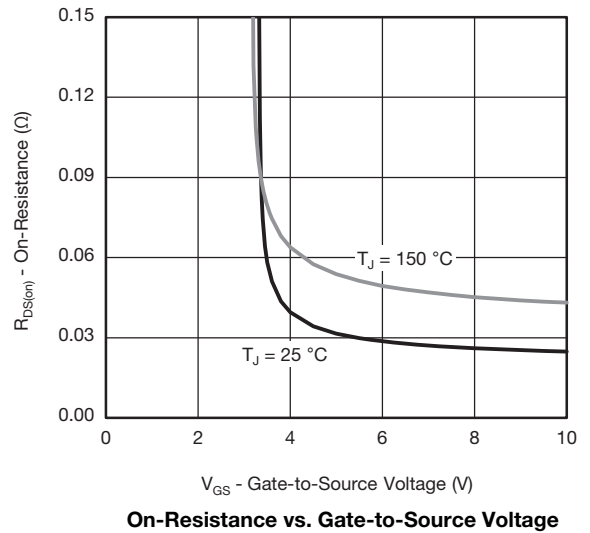
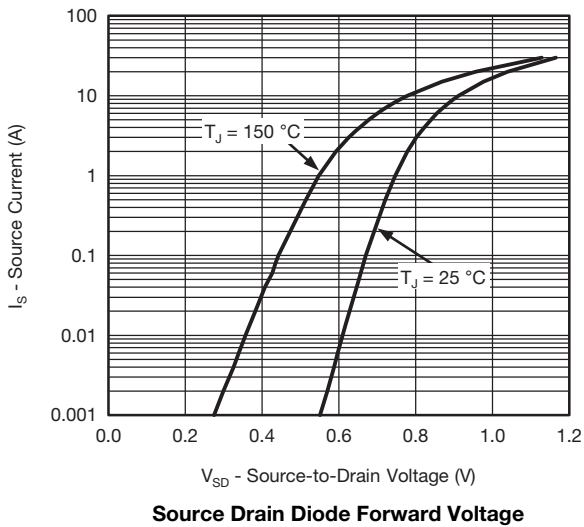
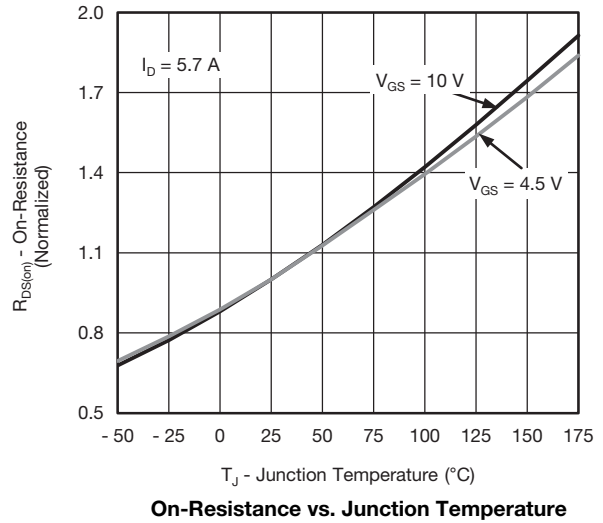
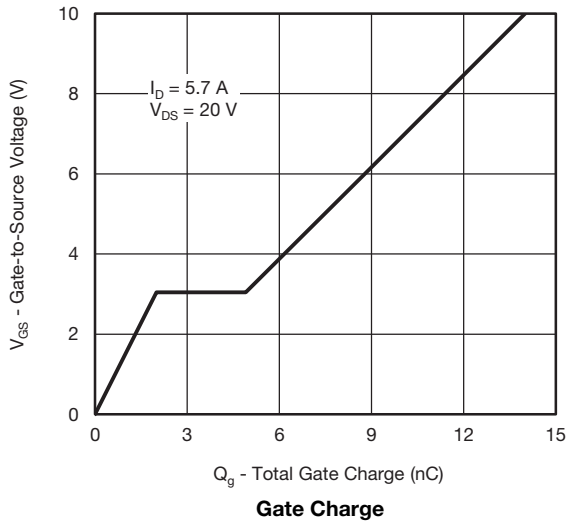


**On-Resistance vs. Drain Current**

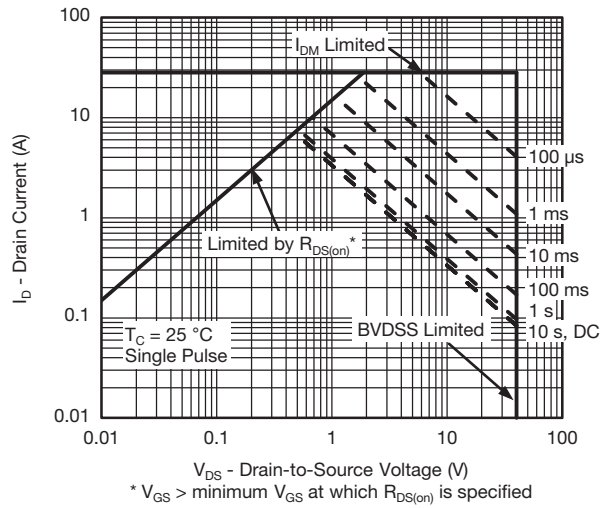


**Capacitance**

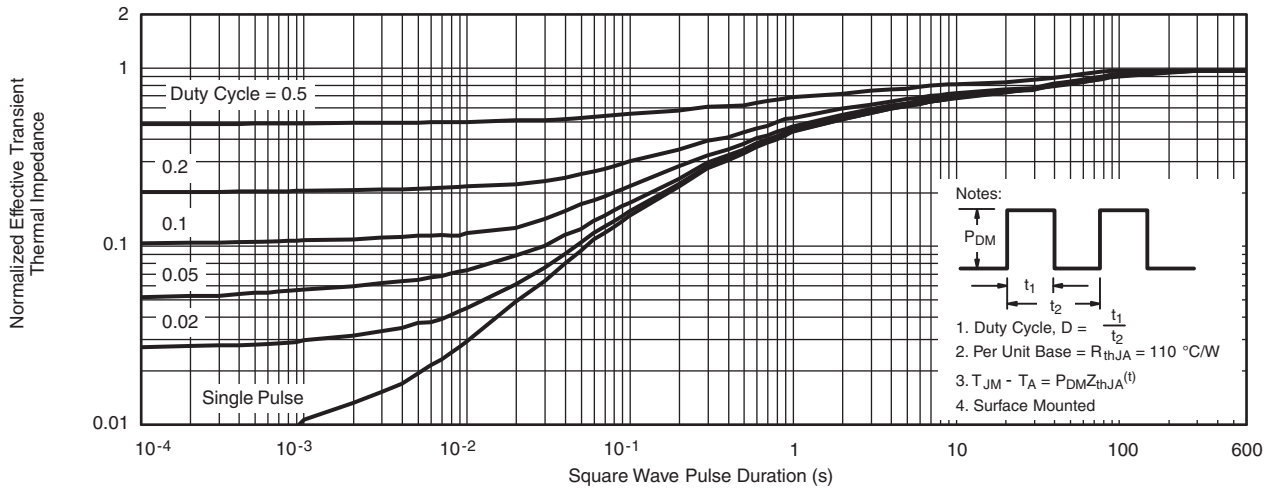
**TYPICAL CHARACTERISTICS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



**THERMAL RATINGS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)

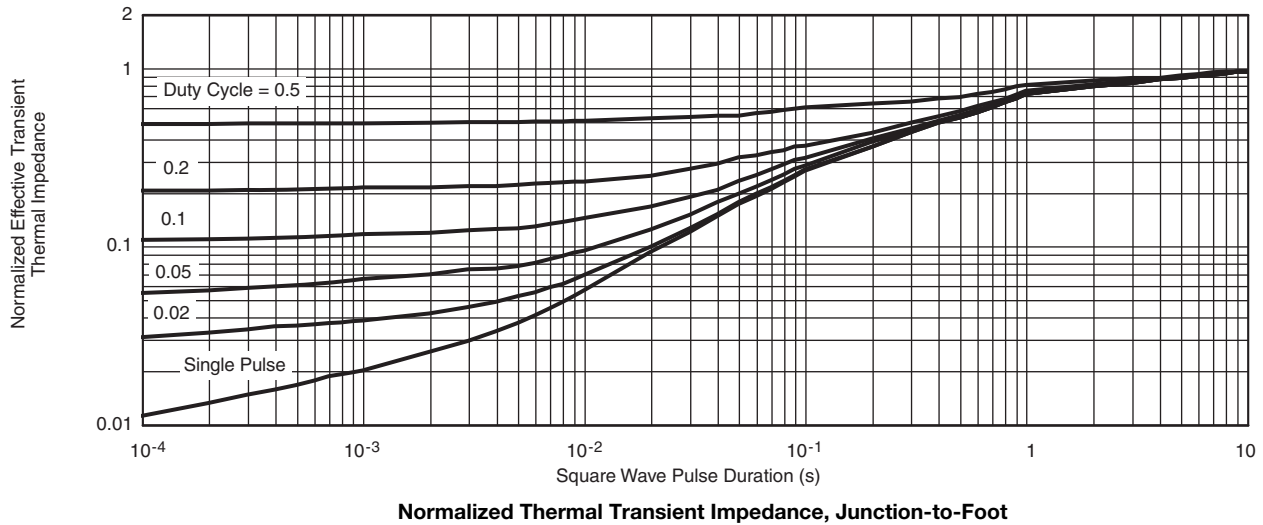


**Safe Operating Area**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

**THERMAL RATINGS** ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)



**Note**

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction-to-Foot (25 °C)
 are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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