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[SQ9945AEY-T1-E3](#)

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SQ9945AEY

Vishay Siliconix

Automotive Dual N-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY	
V _{DS} (V)	60
R _{DS(on)} (Ω) at V _{GS} = 10 V	0.080
I _D (A)	± 3.7
Configuration	Dual

FEATURES

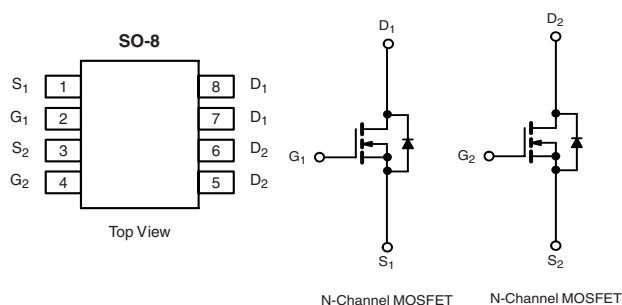
- TrenchFET® Power MOSFET
- Package with Low Thermal Resistance

AEC-Q101 RELIABILITY

- Passed all AEC-Q101 Reliability Testing
- Characterization Ongoing



RoHS*
COMPLIANT



ORDERING INFORMATION	
Package	SO-8
Lead (Pb)-free	SQ9945AEY-T1-E3
SnPb	SQ9945AEY-T1

ABSOLUTE MAXIMUM RATINGS T _C = 25 °C, unless otherwise noted				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V _{DS}	60	V
Gate-Source Voltage		V _{GS}	± 20	
Continuous Drain Current ^a	T _C = 25 °C	I _D	- 3.7	A
	T _C = 70 °C		- 3.2	
Continuous Source Current (Diode Conduction) ^a		I _S	2	
Pulsed Drain Current ^b		I _{DM}	25	
Single Pulse Avalanche Energy	L = 0.1 mH	E _{AS}	-	mJ
Single Pulse Avalanche Current		I _{AS}	-	A
Maximum Power Dissipation ^b	T _C = 25 °C	P _D	2.4	W
	T _A = 70 °C		1.7	
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 ^c	R _{thJA}	-	°C/W
Junction-to-Case (Drain)		R _{thJC}	-	

Notes

- Package limited.
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
- When mounted on 1" square PCB (FR-4 material).

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

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SPECIFICATIONS T _C = 25 °C, unless otherwise noted							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		-	-	-	V
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		1.0	-	3.0	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 60 V	-	-	1.0	μA
		V _{GS} = 0 V	V _{DS} = 60 V	-	-	10	
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 55 °C	-	-	-	
On-State Drain Current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	20	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 3.7 A	-	0.060	0.080	Ω
		V _{GS} = 10 V	I _D = 30 A, T _J = 125 °C	-	-	-	
		V _{GS} = 10 V	I _D = 30 A, T _J = 175 °C	-	-	-	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 3.7 A		-	-	11	S
Dynamic ^b							
Input Capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	-	-	pF
Output Capacitance	C _{oss}			-	-	-	
Reverse Transfer Capacitance	C _{rss}			-	-	-	
Total Gate Charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 30 V, I _D = 3.7 A	-	11	20	nC
Gate-Source Charge ^c	Q _{gs}			-	2	-	
Gate-Drain Charge ^c	Q _{gd}			-	2	-	
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 30 Ω I _D ≅ 1 A, V _{GEN} = 10 V, R _g = 6 Ω		-	9	20	ns
Rise Time ^c	t _r			-	10	20	
Turn-Off Delay Time ^c	t _{d(off)}			-	21	40	
Fall Time ^c	t _f			-	8	20	
Source-Drain Diode Ratings and Characteristics T _C = 25 °C ^b							
Pulsed Current ^a	I _{SM}			-	-	-	A
Forward Voltage	V _{SD}	I _F = 85 A, V _{GS} = 0 V		-	-	-	V
Reverse Recovery Time	t _{rr}	I _F = 2 A, dI/dt = 100 A/μs		-	45	80	ns
Peak Reverse Recovery Current	I _{RM(REC)}			-	-	-	A
Reverse Recovery Charge	Q _{rr}			-	-	-	μC

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.

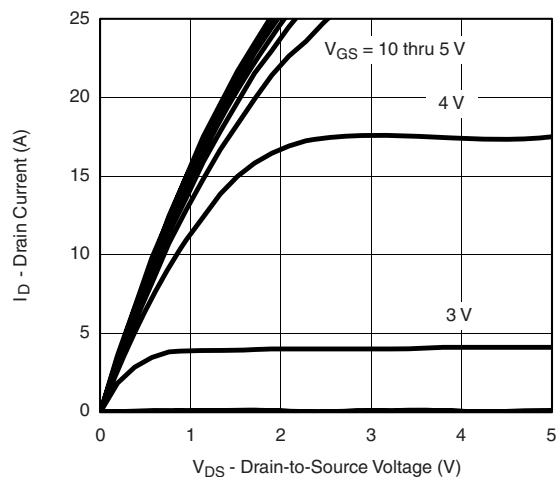
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



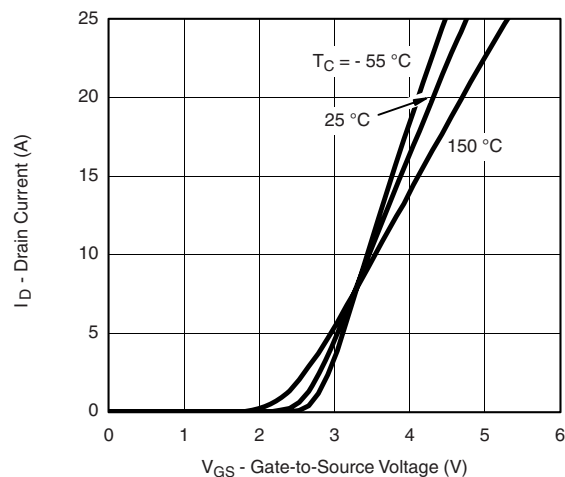
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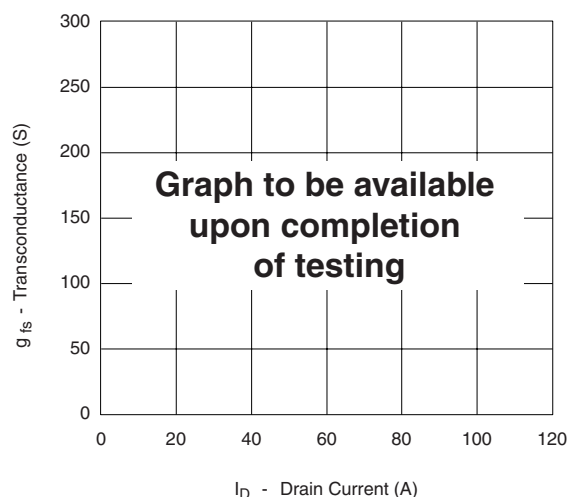
TYPICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, unless otherwise noted



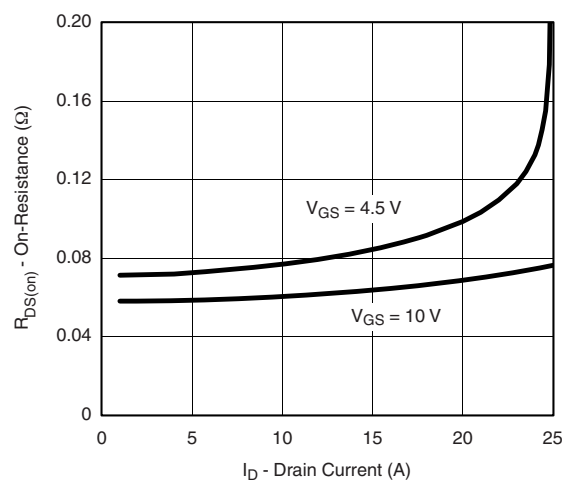
Output Characteristics



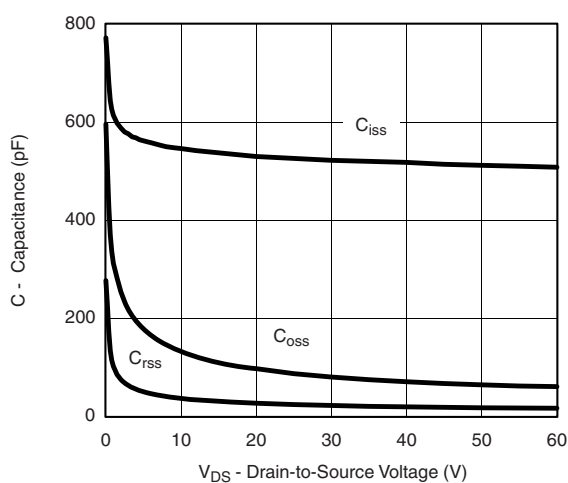
Transfer Characteristics



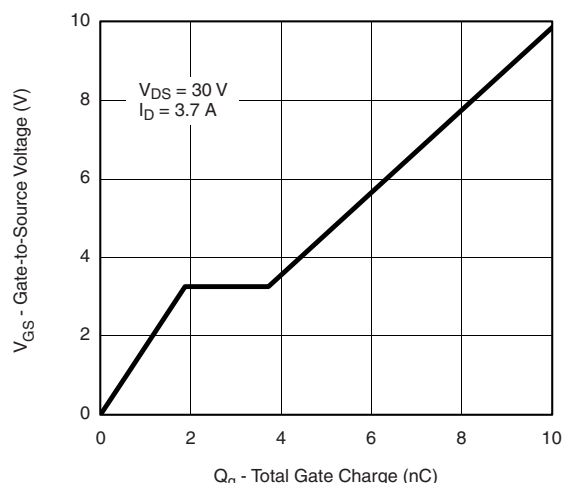
Transconductance



On-Resistance vs. Drain Current



Capacitance



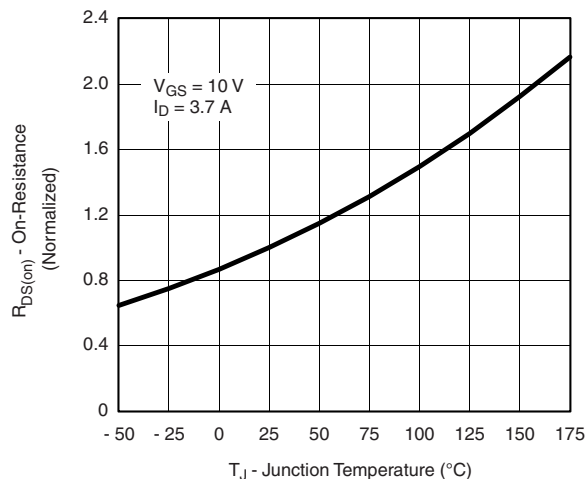
Gate Charge

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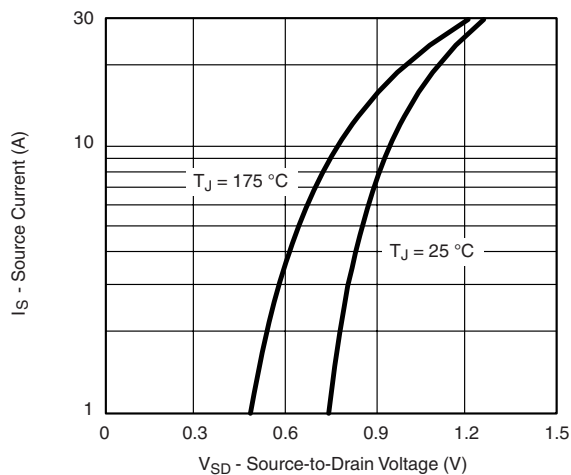
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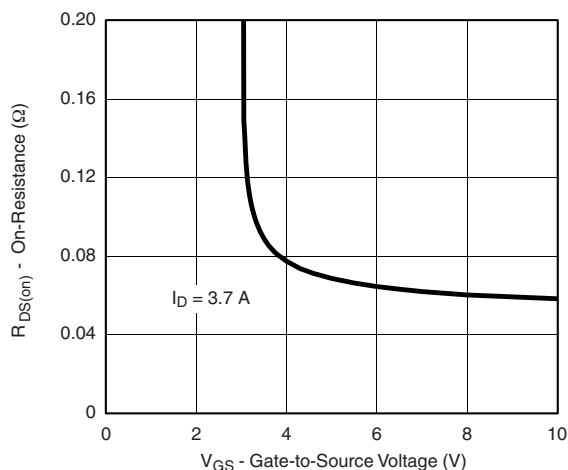
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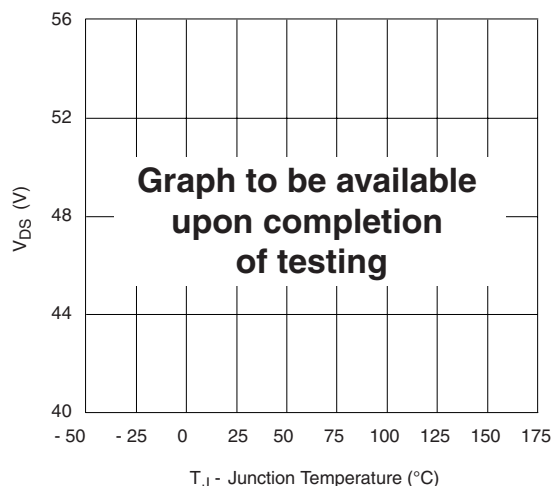
On-Resistance vs. Junction Temperature



Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



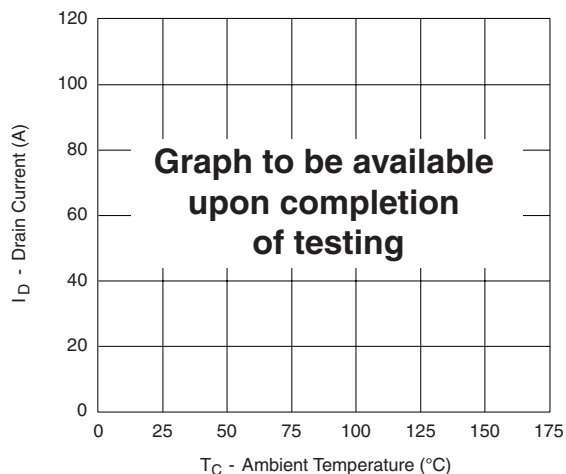
Drain Source Breakdown vs. Junction Temperature



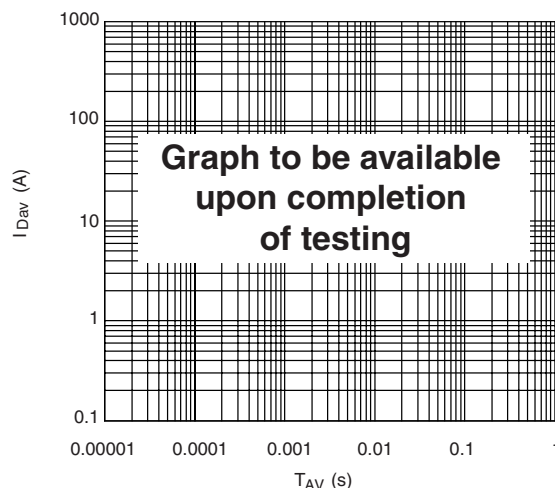
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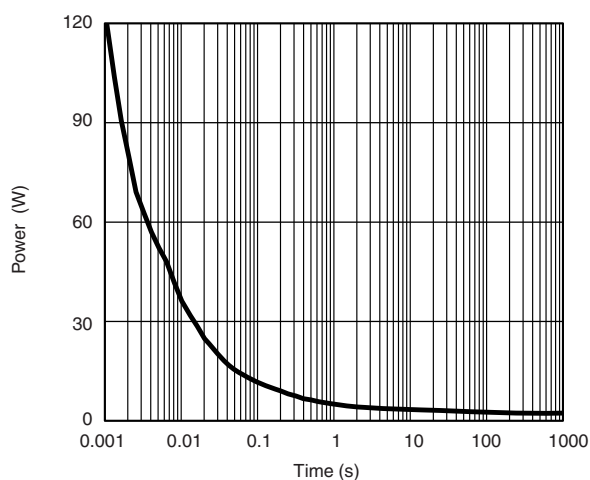
THERMAL RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted



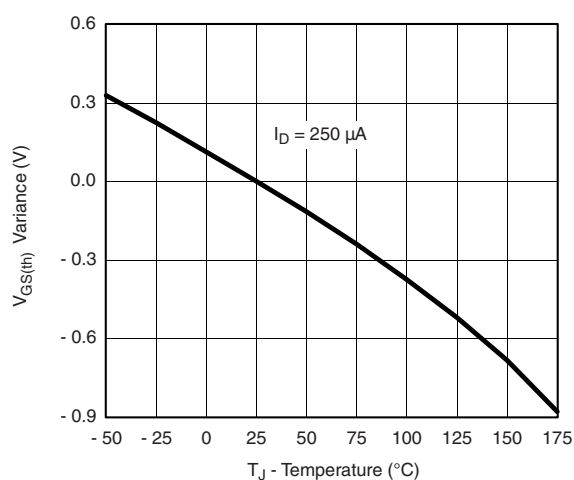
Maximum Drain Current vs. Ambient Temperature



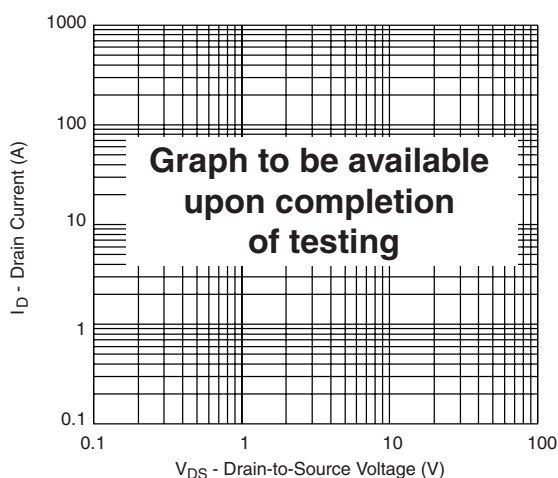
Avalanche Current vs. Time



Single Pulse Power, Junction-to-Ambient



Threshold Voltage



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

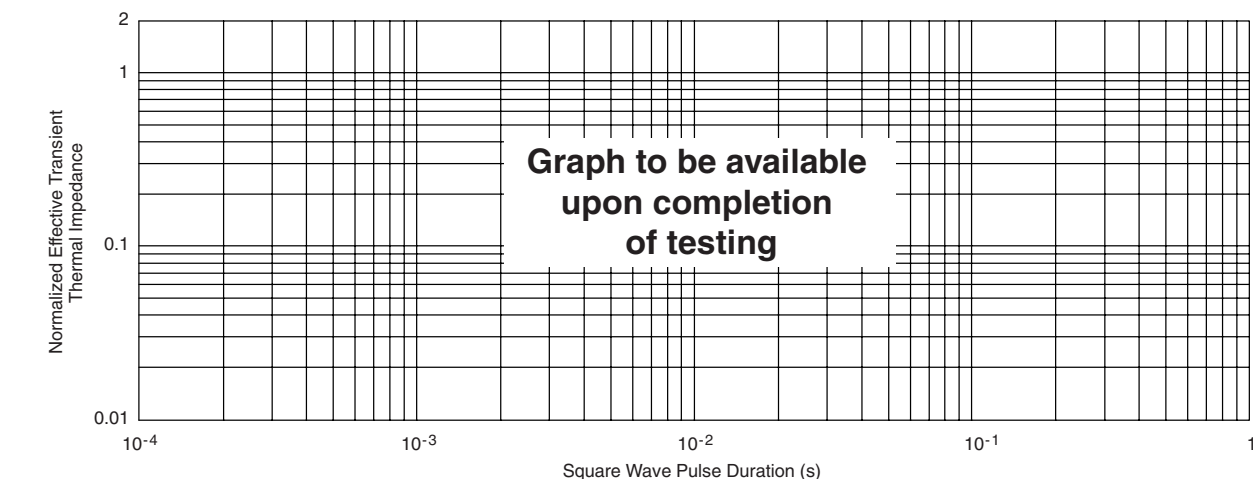
Safe Operating Area

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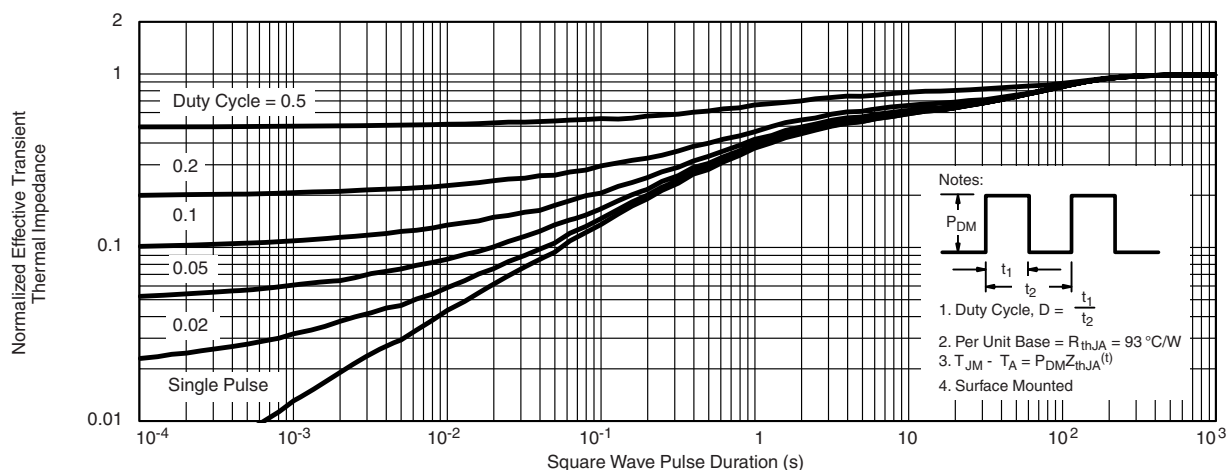
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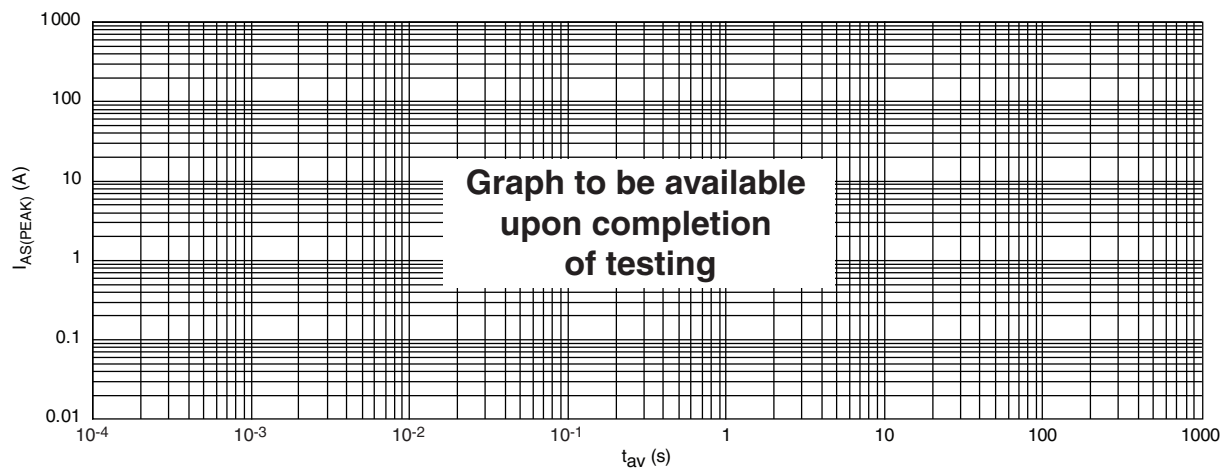
THERMAL RATINGS $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Ambient



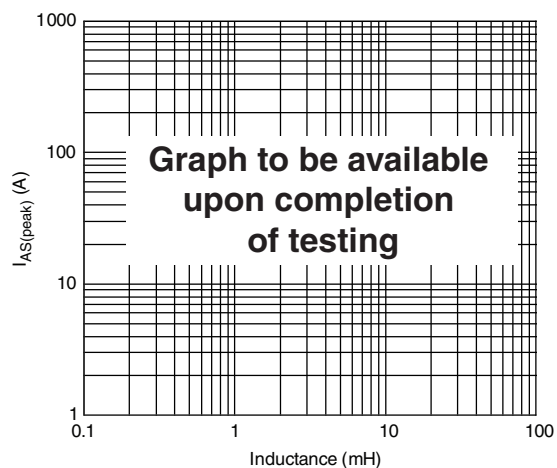
Single Pulse Avalanche Current (Peak) vs. Time in Avalanche



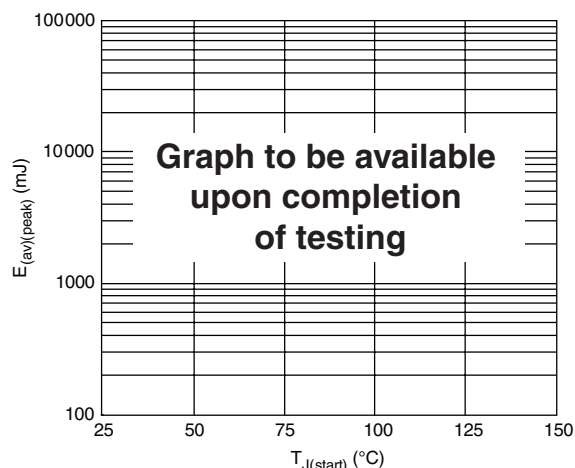
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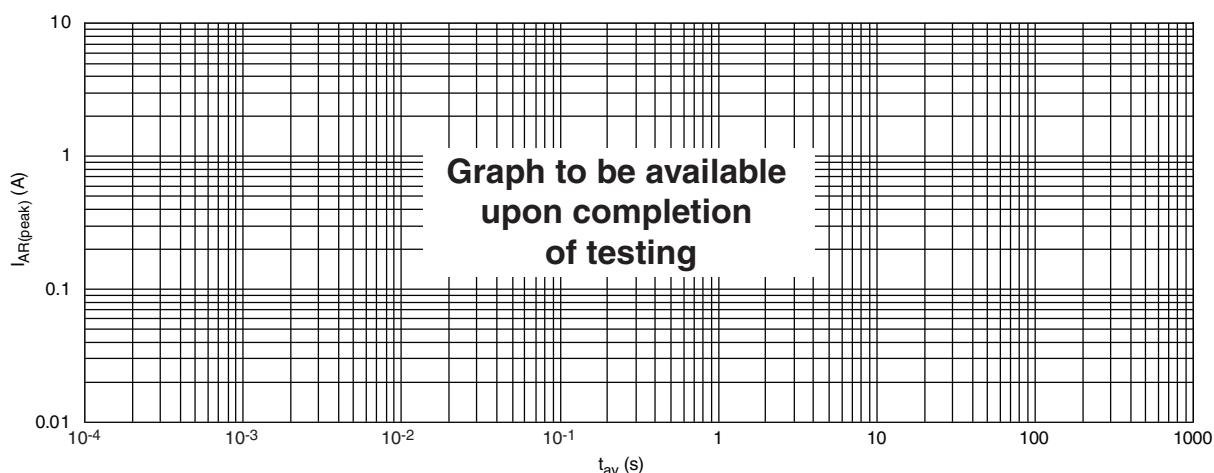
THERMAL RATINGS $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted



Single Pulse Avalanche Current (Peak) vs. Inductance



Single Pulse Avalanche Energy (Peak) vs. $T_{J(\text{start})}$



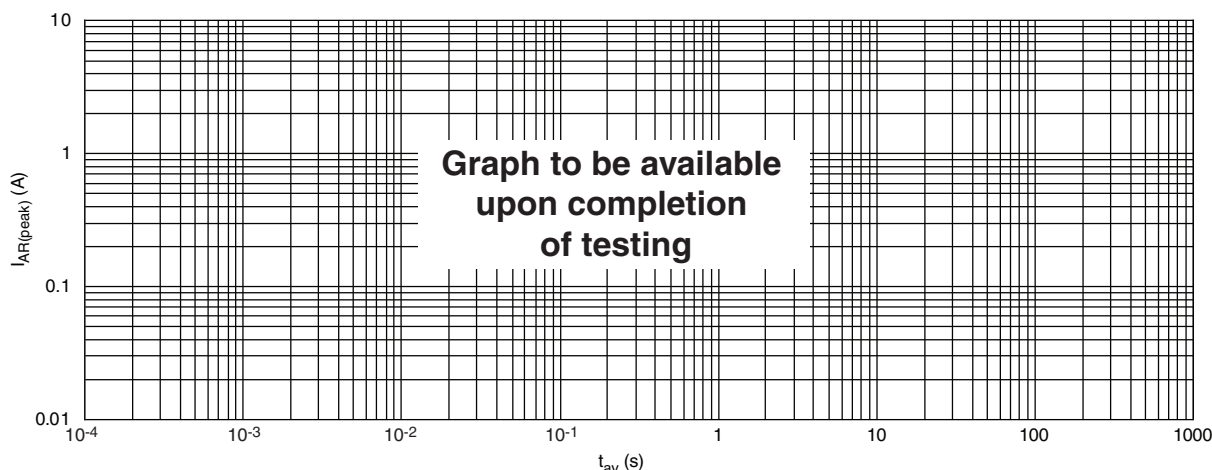
Repetitive Avalanche Current (Peak) vs. Time in Avalanche at $T_A = 25\text{ }^{\circ}\text{C}$

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



Repetitive Avalanche Current (Peak) vs. Time in Avalanche at $T_A = 150\text{ }^{\circ}\text{C}$

Note

The characteristics shown in the six graphs

- Normalized Transient Thermal Impedance Junction to Ambient ($25\text{ }^{\circ}\text{C}$)
- Single Pulse Avalanche Current (Peak) vs. Time in Avalanche
- Single Pulse Avalanche Current (Peak) vs. Inductance
- Single Pulse Avalanche Energy (Peak) vs. $T_{J(\text{start})}$
- Repetitive Avalanche Current (Peak) vs. Time in Avalanche at $T_A = 25\text{ }^{\circ}\text{C}$
- Repetitive Avalanche Current (Peak) vs. Time in Avalanche at $T_A = 150\text{ }^{\circ}\text{C}$

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.

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see <http://www.vishay.com/ppg?74499>.



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