

N-Channel 60-V (D-S), 150 °C MOSFET

PRODUCT SUMMARY

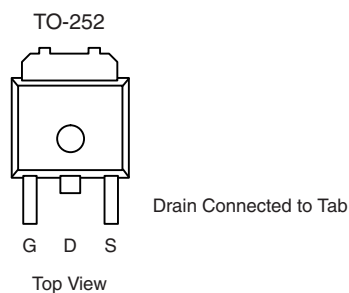
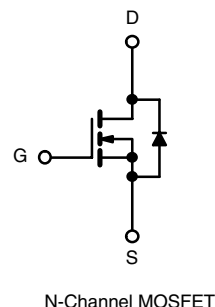
V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ)
60	0.036 at $V_{GS} = 10$ V	12	10.5 nC
	0.042 at $V_{GS} = 4.5$ V	12	

FEATURES

- TrenchFET[®] Power MOSFET
- 100 % R_g & UIS Tested

APPLICATIONS

- LCD TV Inverter
- Push Pull Converter


RoHS
COMPLIANT

Order Number:
SUD50N06-36-E3 (Lead (Pb)-free)


ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	12 ^a
		$T_C = 70$ °C	12 ^a
		$T_A = 25$ °C	5.9 ^b
		$T_A = 70$ °C	4.7 ^b
Pulsed Drain Current	I_{DM}	50	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C	12 ^a
		$T_A = 25$ °C	2.0 ^b
Single Pulse Avalanche Current	I_{AS}	15	
Avalanche Energy	E_{AS}	11.2	mJ
Maximum Power Dissipation	P_D	$T_C = 25$ °C	24
		$T_C = 70$ °C	15.3
		$T_A = 25$ °C	2.4 ^b
		$T_A = 70$ °C	1.5 ^b
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^b	R_{thJA}	43	52	°C/W
Maximum Junction-to-Case	R_{thJC}	4.3	5.2	

Notes:

a. Package limited.

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

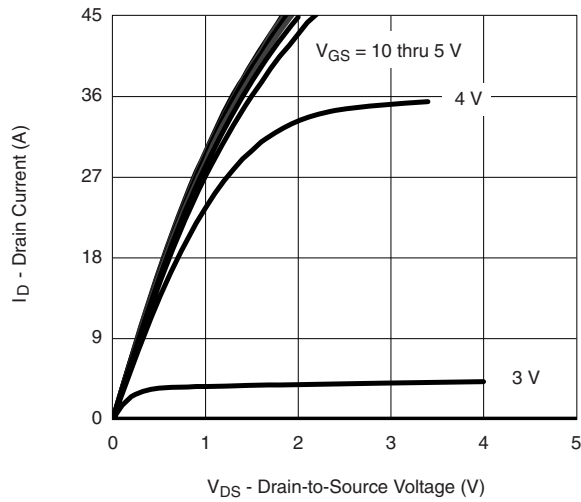
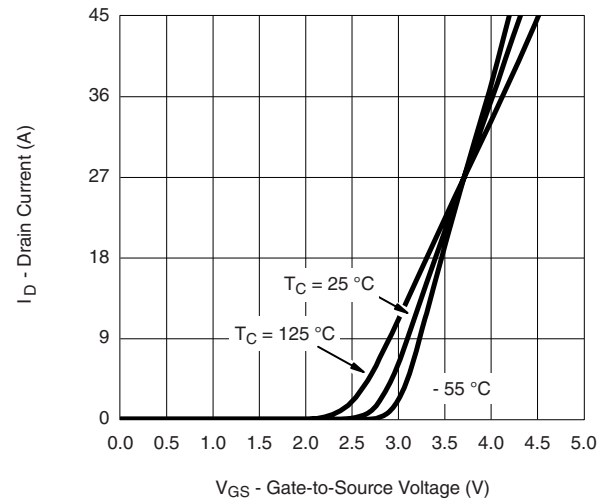
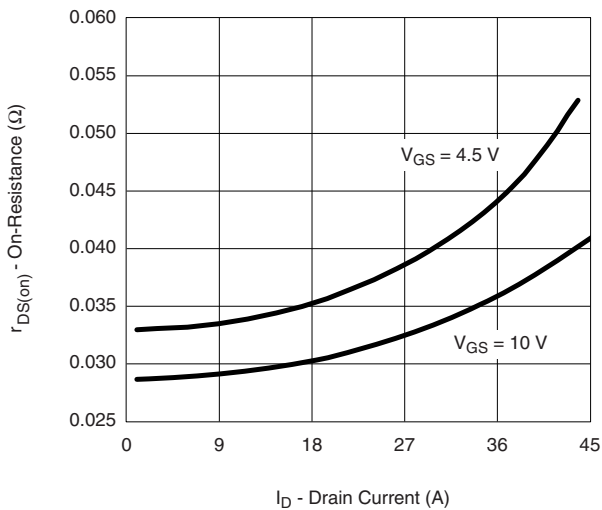
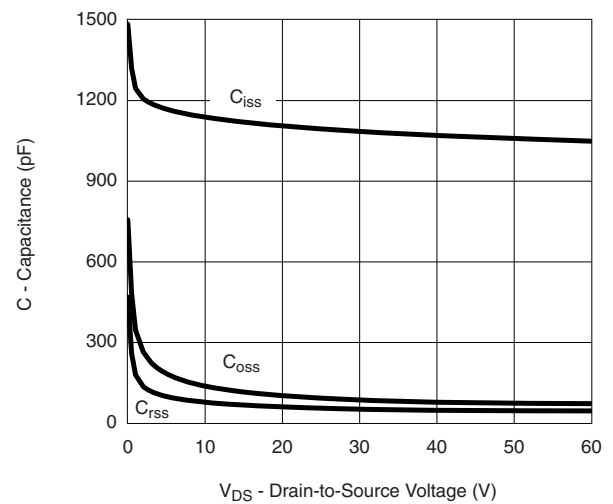
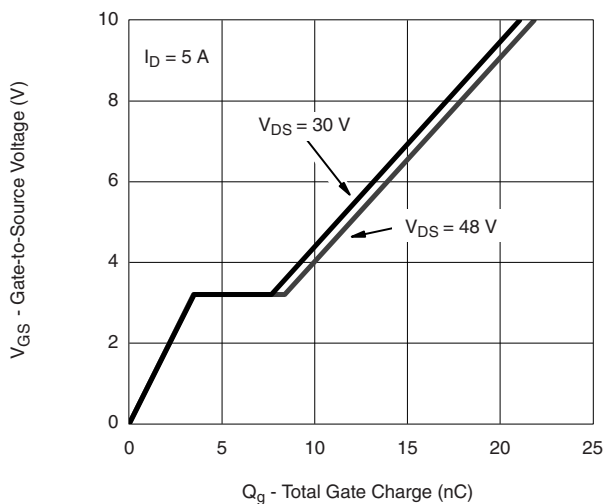
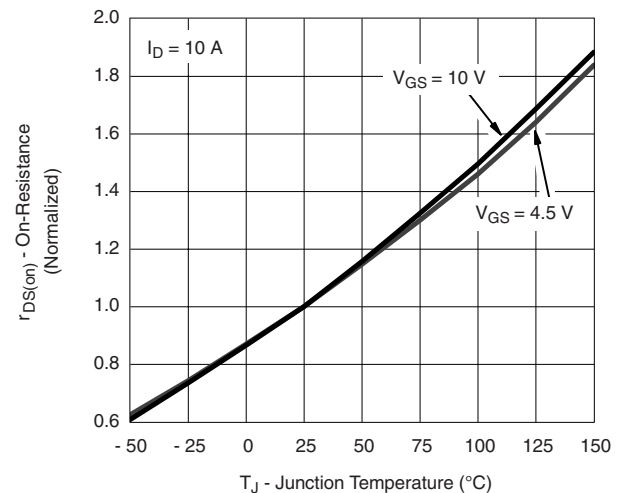
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 1\text{ mA}$	60			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		55		mV/ $^{\circ}\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 6.3		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1.0		3.0	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 70\text{ }^{\circ}\text{C}$			20	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}$, $V_{GS} = 10\text{ V}$	30			A
Drain-Source On-State Resistance ^a	$r_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 10\text{ A}$		0.028	0.036	Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 8\text{ A}$		0.033	0.042	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}$, $I_D = 10\text{ A}$		20		S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{DS} = 30\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		1100		pF
Output Capacitance	C_{oss}			90		
Reverse Transfer Capacitance	C_{rss}			55		
Total Gate Charge	Q_g	$V_{DS} = 30\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 5\text{ A}$		21	32	nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 30\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_D = 5\text{ A}$		10.5	16	
Gate-Drain Charge	Q_{gd}			3.5		
Gate Resistance	R_g			4.2		
Gate Resistance	R_g	$f = 1\text{ MHz}$		3.3	6.5	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}$, $R_L = 1\text{ }\Omega$ $I_D \equiv 30\text{ A}$, $V_{GEN} = 4.5\text{ V}$, $R_g = 1\text{ }\Omega$		18	30	ns
Rise Time	t_r			250	400	
Turn-Off Delay Time	$t_{d(off)}$			35	55	
Fall Time	t_f			68	110	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}$, $R_L = 1\text{ }\Omega$ $I_D \equiv 30\text{ A}$, $V_{GEN} = 10\text{ V}$, $R_g = 1\text{ }\Omega$		6	12	
Rise Time	t_r			9	18	
Turn-Off Delay Time	$t_{d(off)}$			19	30	
Fall Time	t_f			7	14	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			20	A
Pulse Diode Forward Current ^a	I_{SM}				50	
Body Diode Voltage	V_{SD}	$I_S = 5.5\text{ A}$		0.85	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 5.5\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^{\circ}\text{C}$		25	50	ns
Body Diode Reverse Recovery Charge	Q_{rr}			25	50	nC
Reverse Recovery Fall Time	t_a			19		ns
Reverse Recovery Rise Time	t_b			6		

Notes:

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

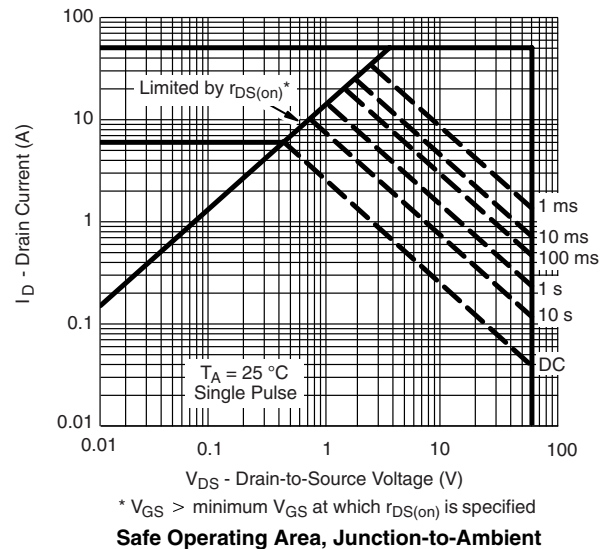
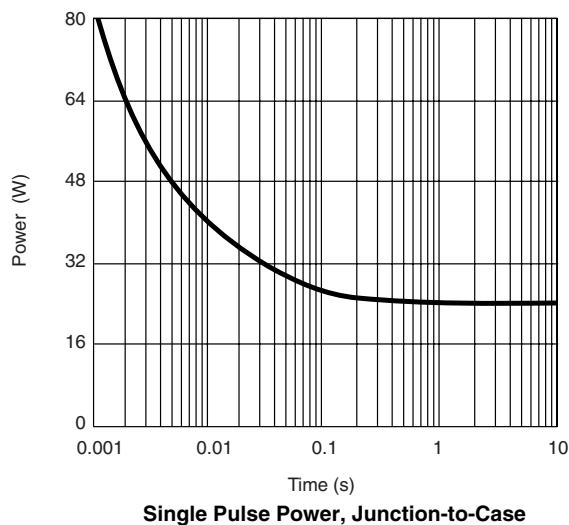
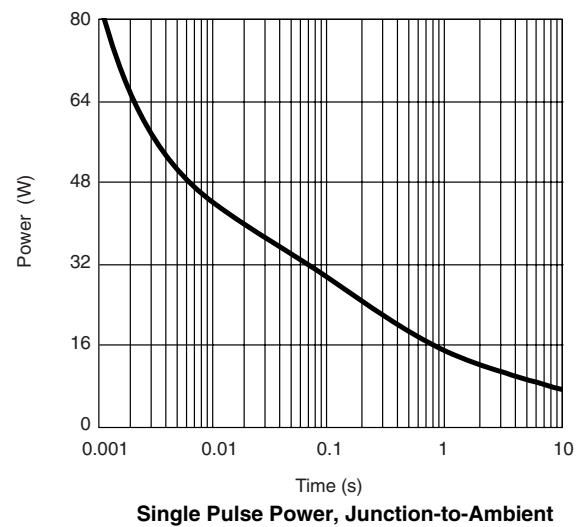
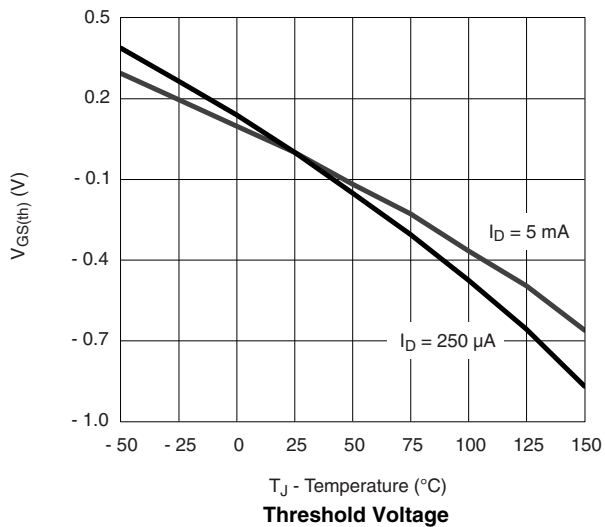
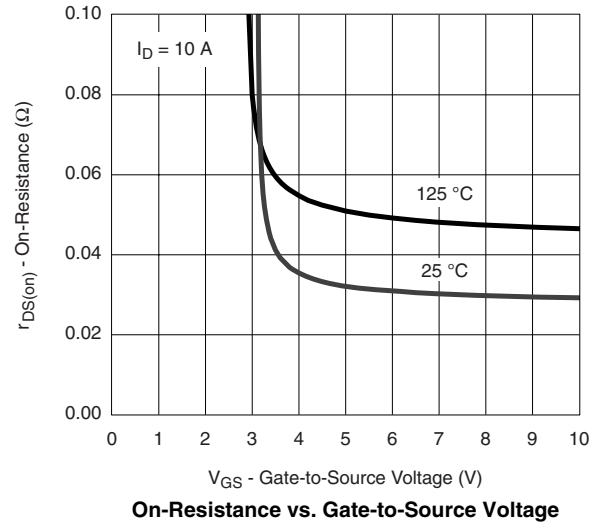
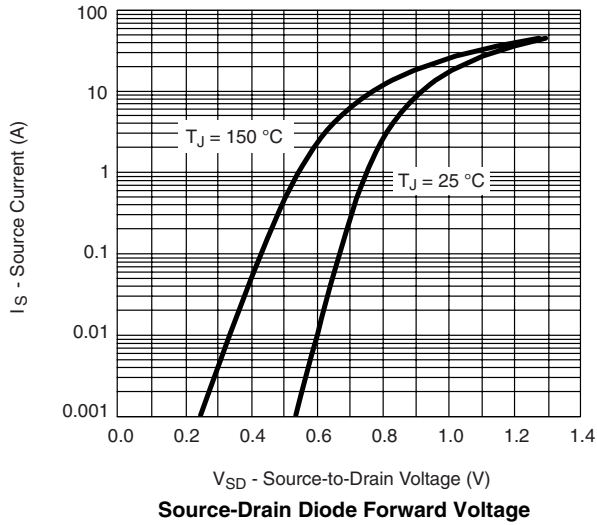
b. Guaranteed by design, not subject to production testing.

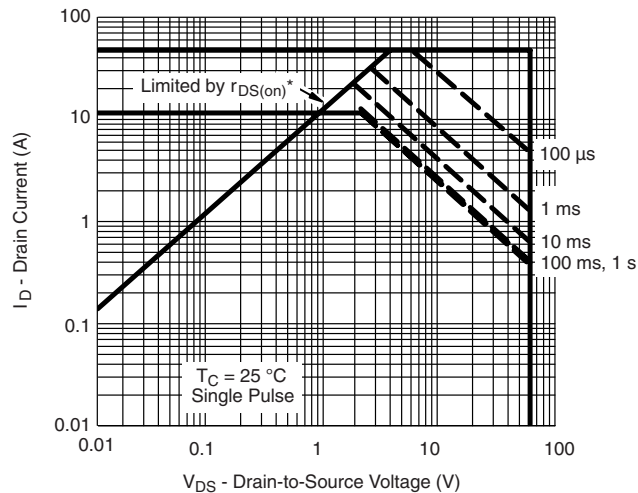
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure 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****Capacitance****Gate Charge****On-Resistance vs. Junction Temperature**

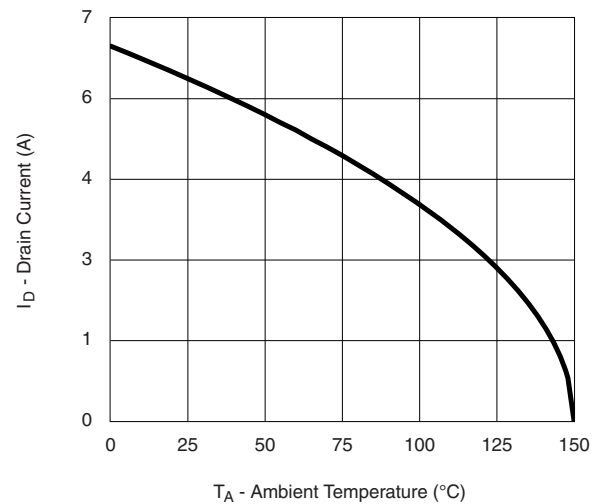
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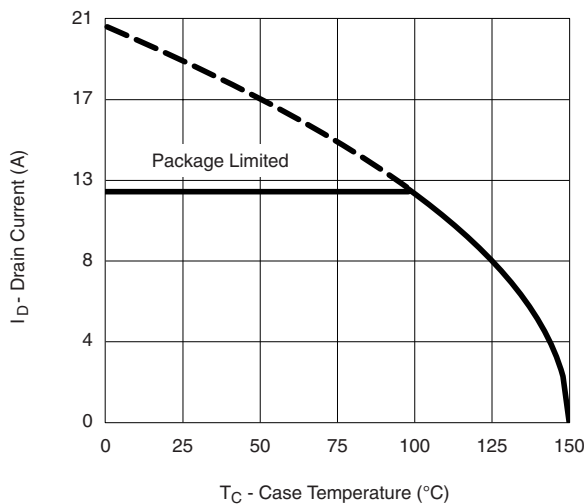
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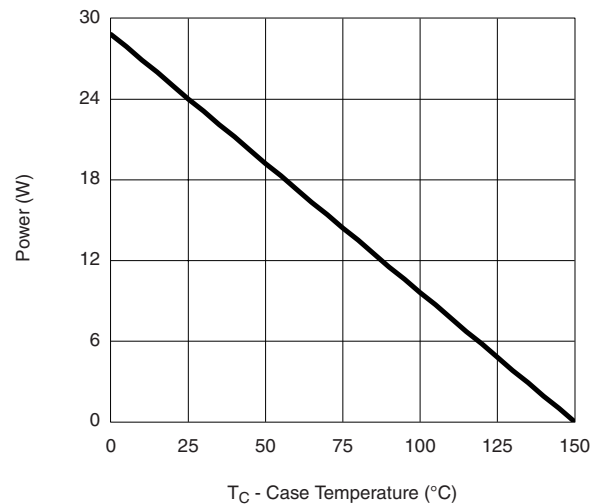
V_{DS} - Drain-to-Source Voltage (V)
* $V_{GS} >$ minimum V_{GS} at which $r_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Case



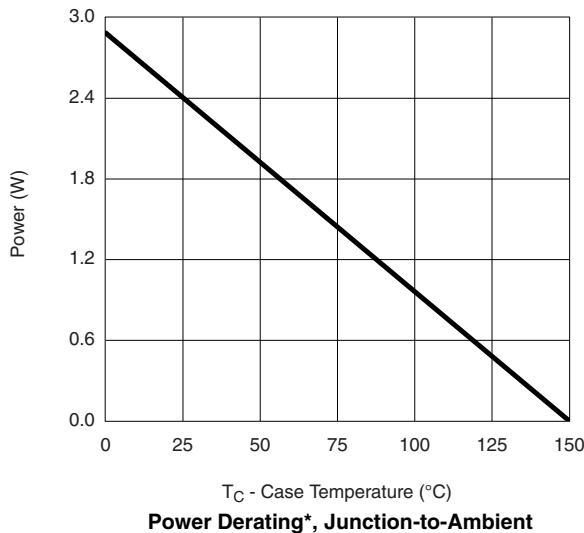
T_A - Ambient Temperature ($^\circ\text{C}$)
Current Derating*, Junction-to-Ambient



T_C - Case Temperature ($^\circ\text{C}$)
Current Derating*, Junction-to-Case

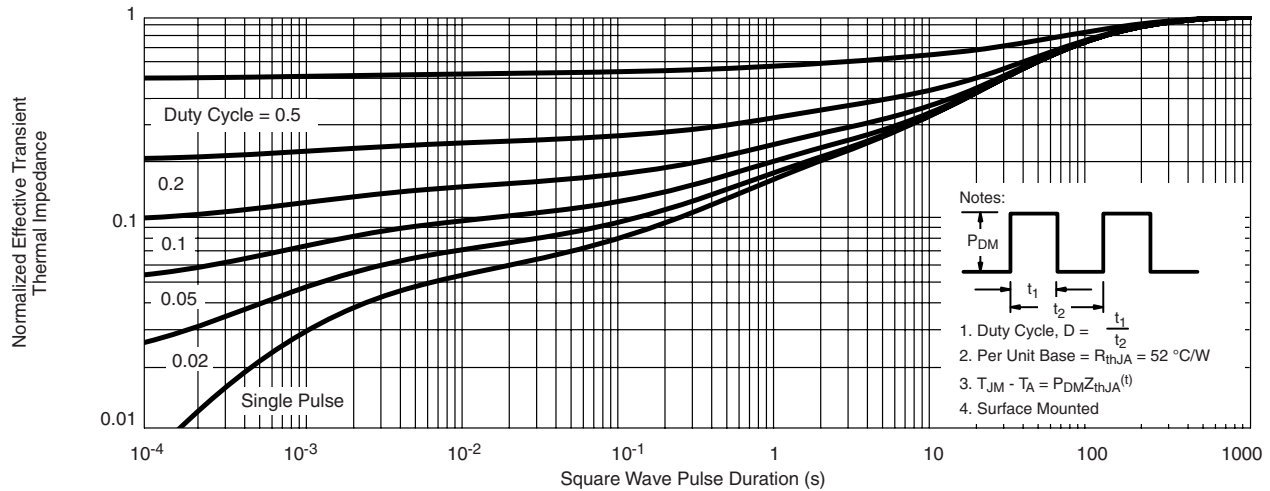
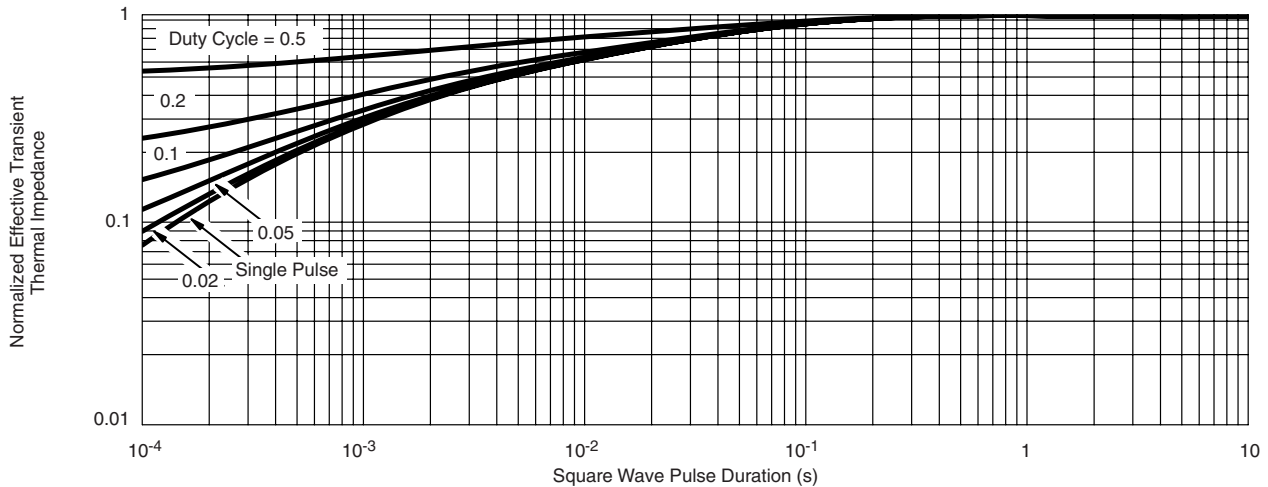


T_C - Case Temperature ($^\circ\text{C}$)
Power Derating*, Junction-to-Case



T_C - Case Temperature ($^\circ\text{C}$)
Power Derating*, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 175^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted**Normalized Thermal Transient Impedance, Junction-to-Ambient****Normalized Thermal Transient Impedance, Junction-to-Case**

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