N-Channel 25 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]	Q_g (Typ.)
25	0.0027 at V_{GS} = 10 V	36	49 nC
	0.0033 at V_{GS} = 4.5 V	29	

FEATURES

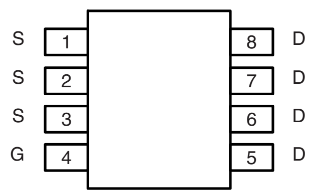
- **Halogen-free According to IEC 61249-2-21 Definition**
- Low Q_{gd}
- 100 % R_g Tested
- UIS and Capacitance Tested
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT
HALOGEN FREE Available

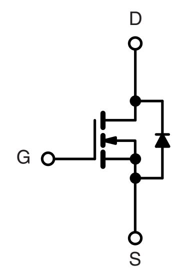
APPLICATIONS

- Synchronous Buck - Low Side
  - Notebook
  - Server
  - Workstation
- Synchronous Rectifier - POL

SO-8



Top View



N-Channel MOSFET

Ordering Information: Si4632DY-T1-E3 (Lead (Pb)-free)
Si4632DY-T1-GE3 (Lead (Pb)-free and Halogen-free)

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	25	V
Gate-Source Voltage		V_{GS}	± 16	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	40	A
	T_C = 70 °C		32	
	T_A = 25 °C		27[b, c]	
	T_A = 70 °C		21[b, c]	
Pulsed Drain Current		I_{DM}	70	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	7.0	
	T_A = 25 °C		3.0[b, c]	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	30	
Avalanche Energy		E_{AS}	45	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	7.8	W
	T_C = 70 °C		5.0	
	T_A = 25 °C		3.5[b, c]	
	T_A = 70 °C		2.2[b, c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[b, d]	t ≤ 5 s	R_{thJA}	29	35	°C/W
Maximum Junction-to-Foot (Drain)	Steady	R_{thJF}	13	16	

Notes:
a. Based on T_C = 25 °C.
b. Surface mounted on 1" x 1" FR4 board.
c. t = 5 s.
d. Maximum under steady state conditions is 125 °C/W.

SPECIFICATIONS (T_J = 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	25			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		23		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 6		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	1.2		2.6	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 16 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 25 V, V_{GS} = 0 V			1	µA
		V_{DS} = 25 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = ≥ 5 V, V_{GS} = 10 V	30			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 20 A		0.0022	0.0027	Ω
		V_{GS} = 4.5 V, I_D = 15 A		0.0027	0.0033	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 20 A		73		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz	3275	7450	11175	pF
Output Capacitance	C_{oss}		495	990	1485	
Reverse Transfer Capacitance	C_{rss}		230	460	690	
Total Gate Charge	Q_g	V_{DS} = 15 V, V_{GS} = 10 V, I_D = 20 A		108	161	nC
		V_{DS} = 15 V, V_{GS} = 4.5 V, I_D = 20 A		49	73	
Gate-Source Charge	Q_{gs}			19		
Gate-Drain Charge	Q_{gd}			11		
Gate Resistance	R_g	f = 1 MHz		1.3	2.0	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 1.5 Ω I_D ≅ 10 A, V_{GEN} = 4.5 V, R_g = 1 Ω		42	65	ns
Rise Time	t_r			115	175	
Turn-Off DelayTime	$t_{d(off)}$			55	85	
Fall Time	t_f			14	23	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 15 V, R_L = 1.5 Ω I_D ≅ 10 A, V_{GEN} = 10 V, R_g = 1 Ω		20	30	
Rise Time	t_r			69	105	
Turn-Off DelayTime	$t_{d(off)}$			58	90	
Fall Time	t_f			8	15	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I_S	T_C = 25 °C			7	A
Pulse Diode Forward Current[a]	I_{SM}				70	
Body Diode Voltage	V_{SD}	I_S = 3 A		0.75	1.1	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 13 A, dI/dt = 100 A/µs, T_J = 25 °C		44	70	ns
Body Diode Reverse Recovery Charge	Q_{rr}			42	65	nC
Reverse Recovery Fall Time	t_a			22		ns
Reverse Recovery Rise Time	t_b			22		

Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 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.

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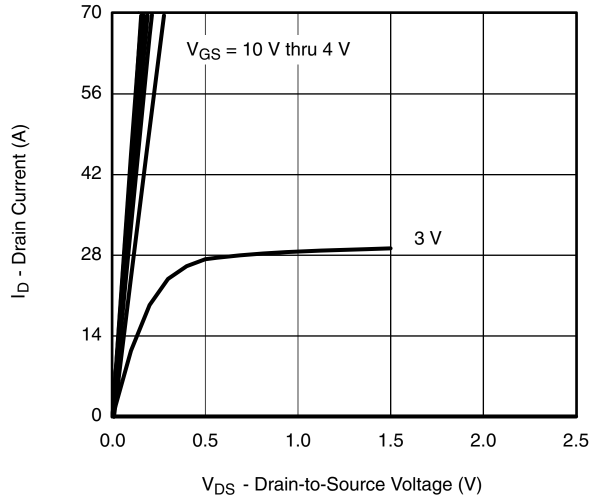
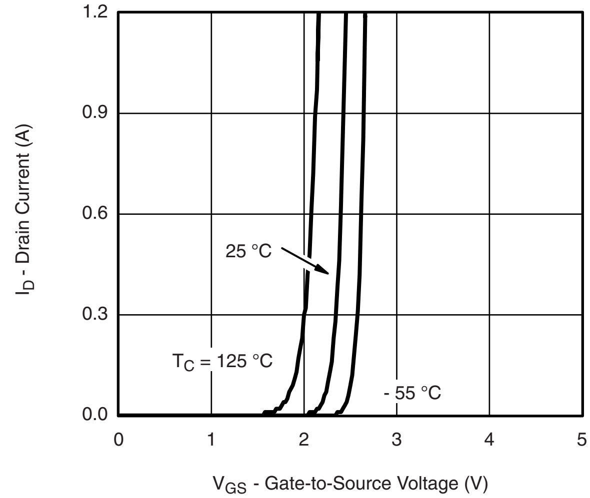
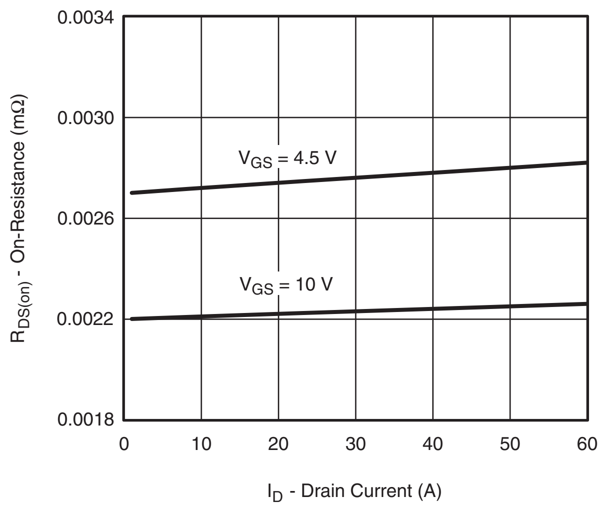
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



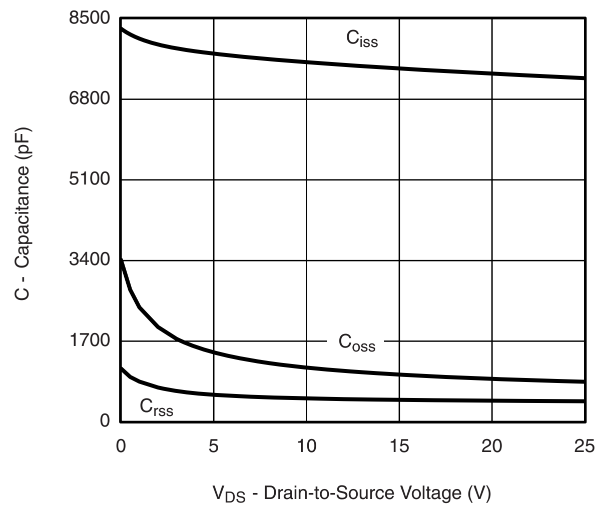
Output Characteristics



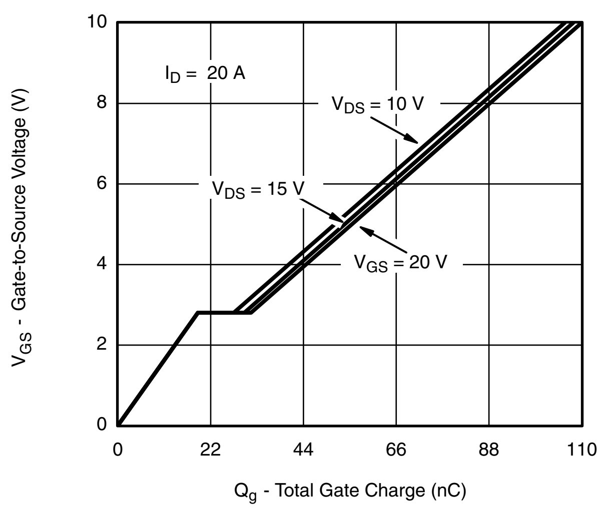
Transfer Characteristics



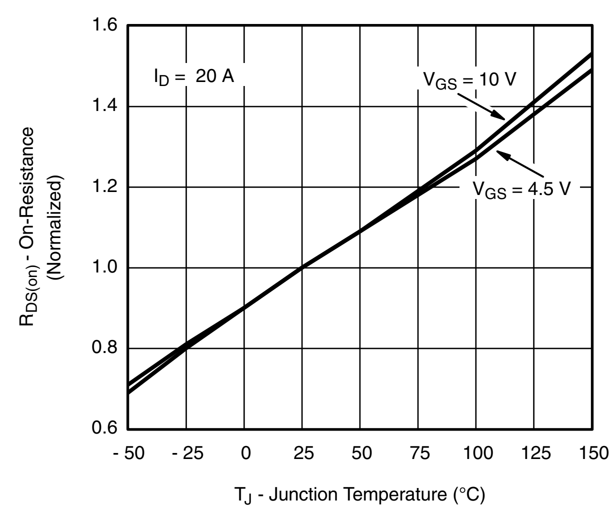
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

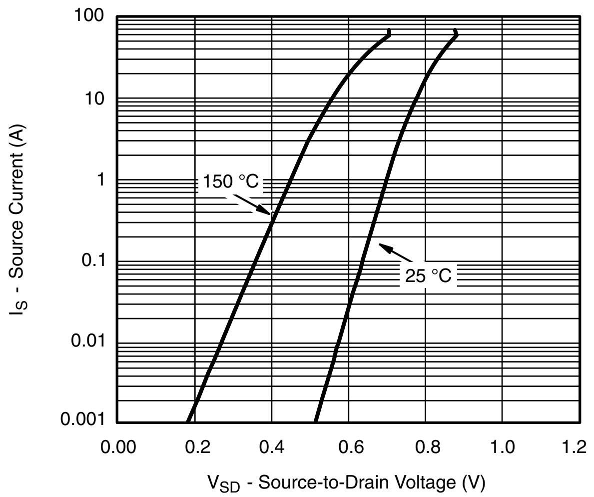


Gate Charge

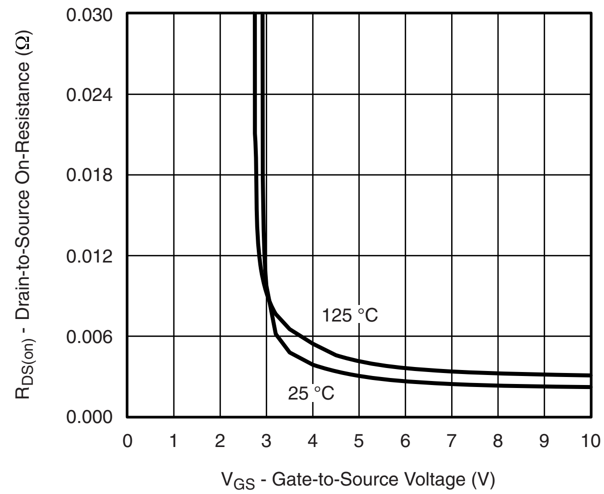


On-Resistance vs. Junction Temperature

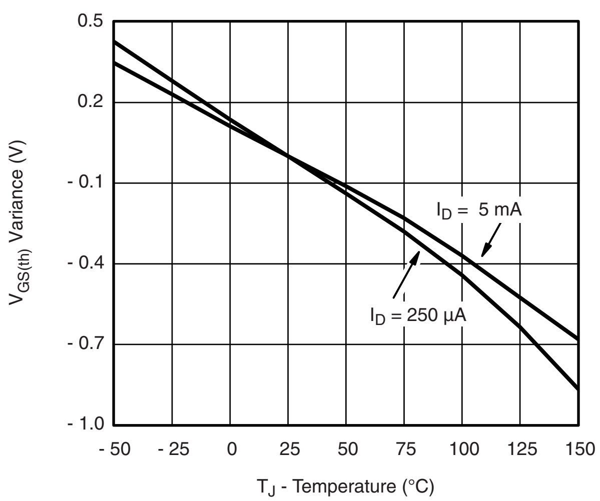
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



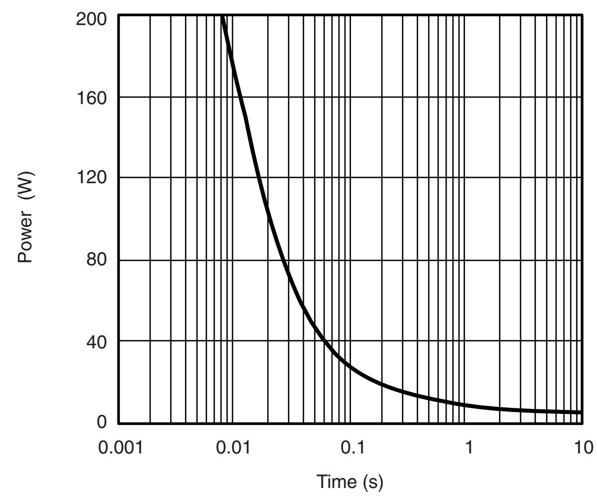
Source-Drain Diode Forward Voltage



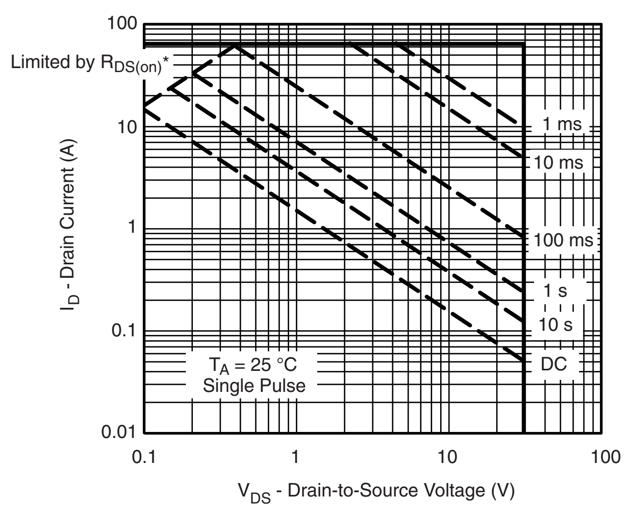
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



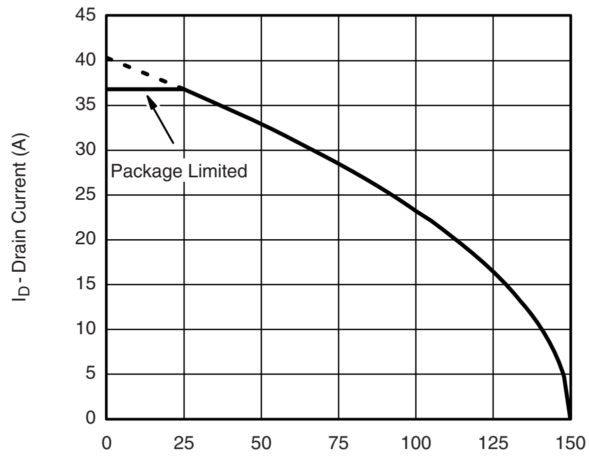
Single Pulse Power, Junction-to-Ambient



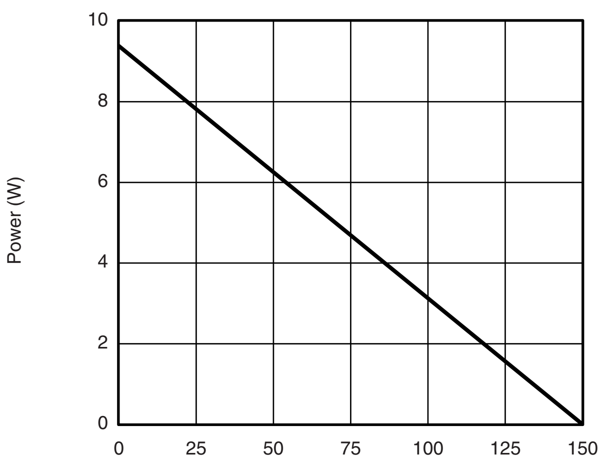
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

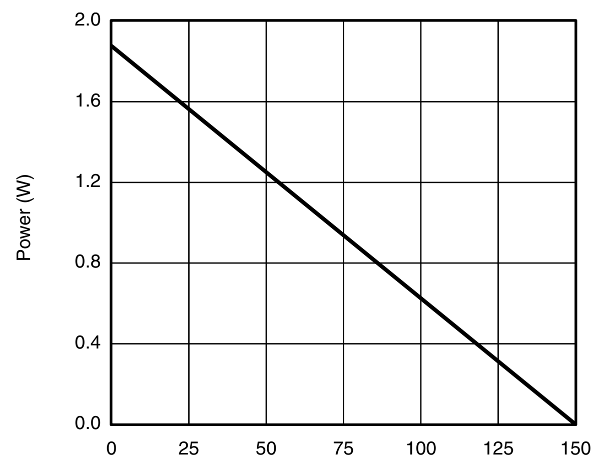
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



Current Derating*



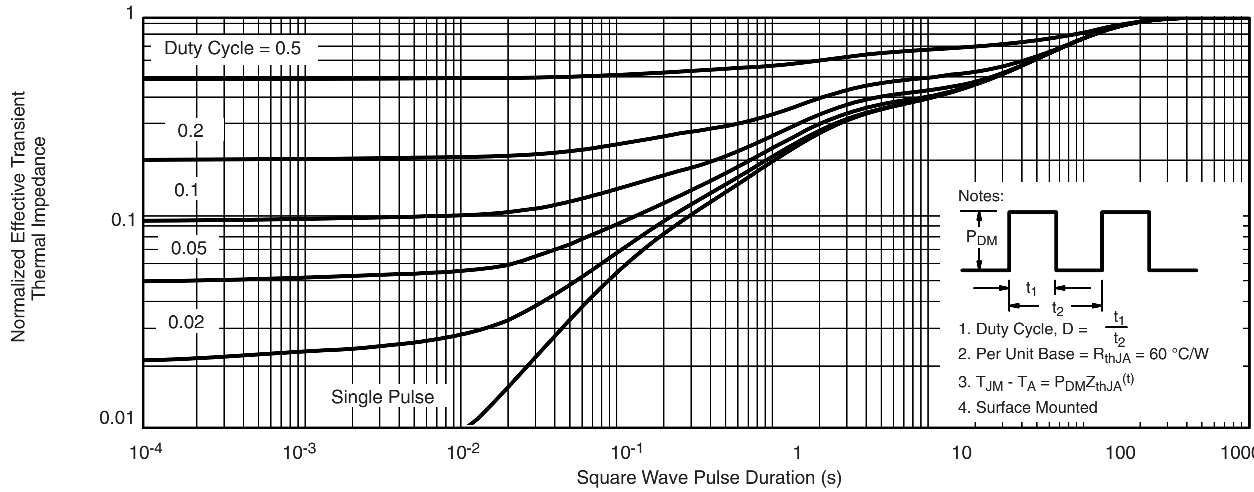
Power, Junction-to-Foot



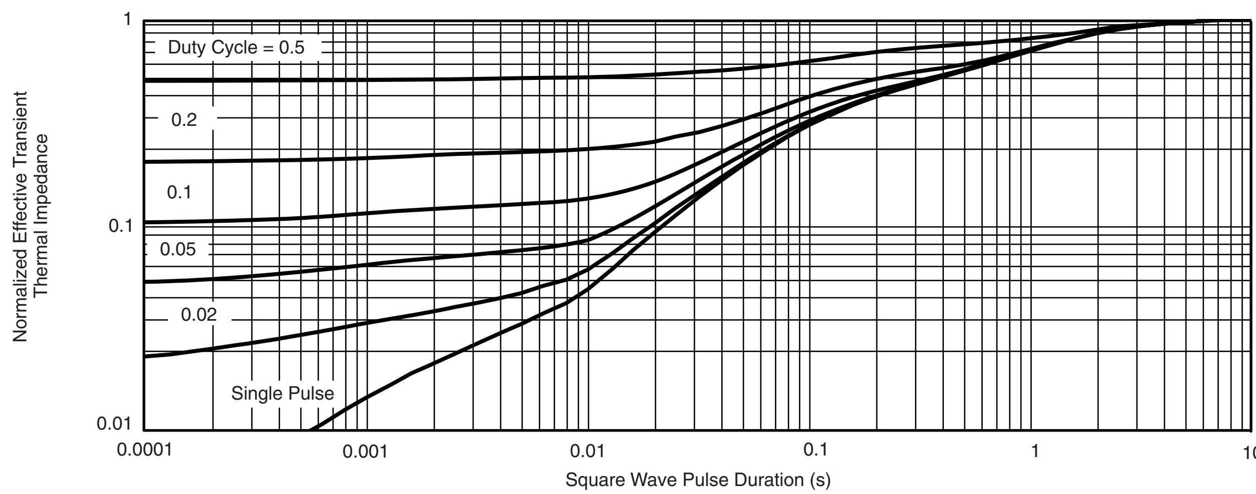
Power, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)}$ = 150 °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 (T_A = 25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

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