



New Product

Si1304BDL  
Vishay Siliconix

## N-Channel 30-V (D-S) MOSFET

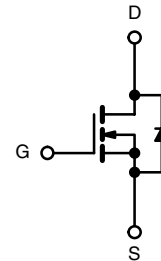
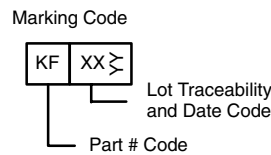
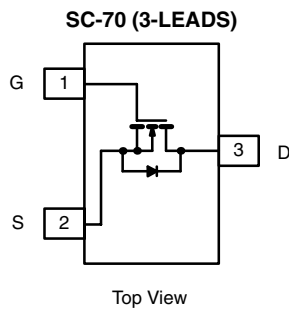


RoHS  
COMPLIANT

PRODUCT SUMMARY			
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>	$Q_g$ (Typ)
30	0.270 @ $V_{GS} = 4.5$ V	0.90	1.1
	0.385 @ $V_{GS} = 2.5$ V	0.75	

### FEATURES

- TrenchFET® Power MOSFET
- 100%  $R_g$  Tested



Ordering Information: Si1304BDL-T1-E3

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		$V_{DS}$	30	V
Gate-Source Voltage		$V_{GS}$	$\pm 12$	
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ )	$T_C = 25^\circ\text{C}$	$I_D$	0.90	A
	$T_C = 70^\circ\text{C}$		0.71	
	$T_A = 25^\circ\text{C}$		0.85 <sup>b, c</sup>	
	$T_A = 70^\circ\text{C}$		0.68 <sup>b, c</sup>	
Pulsed Drain Current		$I_{DM}$	4	
Continuous Source-Drain Diode Current	$T_C = 25^\circ\text{C}$	$I_S$	0.31	
	$T_A = 25^\circ\text{C}$		0.28 <sup>b, c</sup>	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	$P_D$	0.37	W
	$T_C = 70^\circ\text{C}$		0.24	
	$T_A = 25^\circ\text{C}$		0.34 <sup>b, c</sup>	
	$T_A = 70^\circ\text{C}$		0.22 <sup>b, c</sup>	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b, d</sup>	$t \leq 5$ sec	$R_{thJA}$	315	375	$^\circ\text{C/W}$
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	285	340	

Notes:

- Based on  $T_C = 25^\circ\text{C}$ .
- Surface mounted on 1" x 1" FR4 board.
- $t = 5$  sec
- Maximum under steady state conditions is 360  $^\circ\text{C/W}$ .

SPECIFICATIONS (T <sub>J</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
V <sub>DS</sub> Temperature Coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	I <sub>D</sub> = 250 μA		27.3		mV/°C
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub> /T <sub>J</sub>			3		
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	0.6		1.3	V
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±12 V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 70 °C			5	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 4.5 V	4			A
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.9		0.216	0.270	Ω
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 0.75		0.308	0.385	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 0.9		2		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V, f = 1 MHz		100		pF
Output Capacitance	C <sub>oss</sub>			30		
Reverse Transfer Capacitance	C <sub>rss</sub>			20		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.9		1.8	2.7	nC
		V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 0.9		1.1	1.7	
Gate-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 0.9		0.4		
Gate-Drain Charge	Q <sub>gd</sub>			0.6		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		1.5	2.3	Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 15 V, R <sub>L</sub> = 22 Ω I <sub>D</sub> ≅ 0.68 A, V <sub>GEN</sub> = 4.5 V, R <sub>g</sub> = 1 Ω		10	15	ns
Rise Time	t <sub>r</sub>			30	45	
Turn-Off Delay Time	t <sub>d(off)</sub>			5	25	
Fall Time	t <sub>f</sub>			10	15	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			0.31	A
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				4	
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = 0.28 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 0.28 A, di/dt = 100 A/μs, T <sub>J</sub> = 25 °C		50	75	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>			105	160	nC
Reverse Recovery Fall Time	t <sub>a</sub>			34		ns
Reverse Recovery Rise Time	t <sub>b</sub>			16		

## Notes

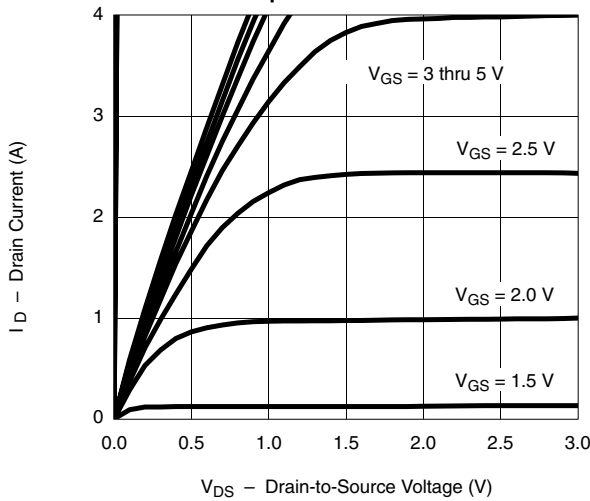
- Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.

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.

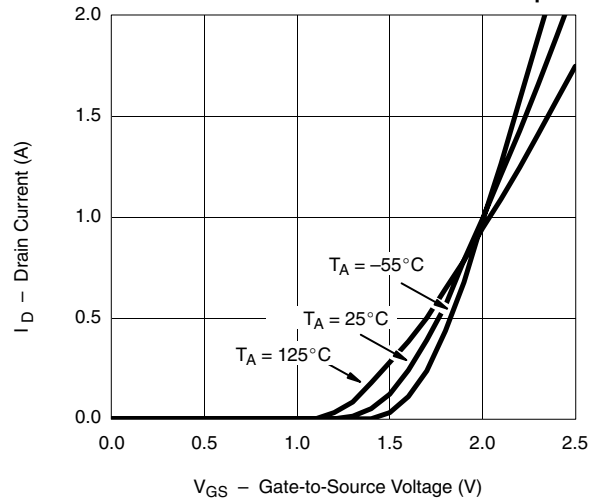


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

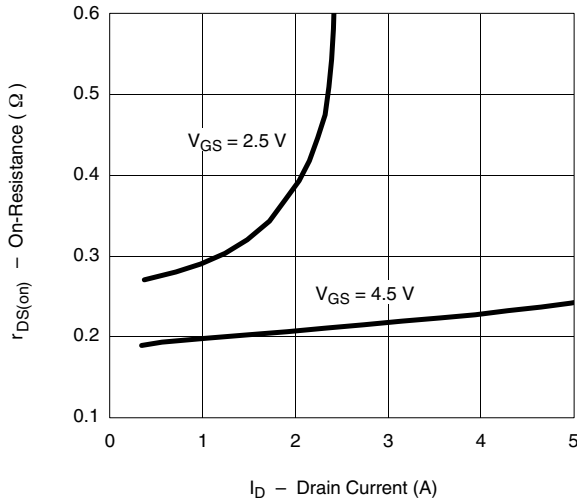
**Output Characteristics**



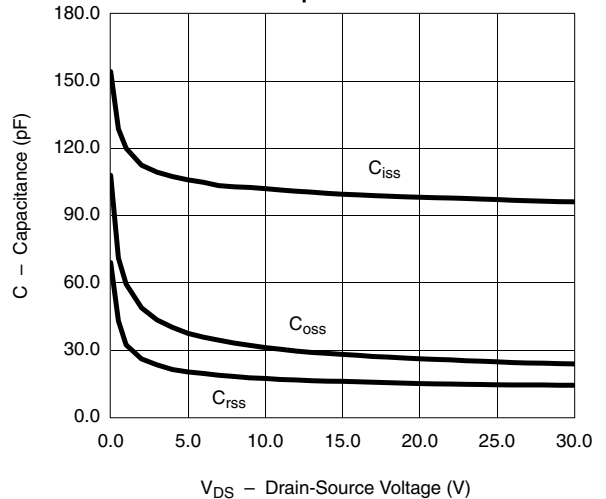
**Transfer Characteristics curves vs. Temp**



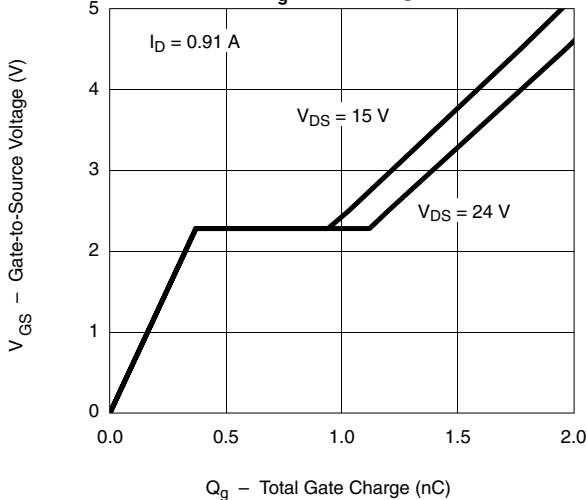
**On-Resistance vs. Drain Current**



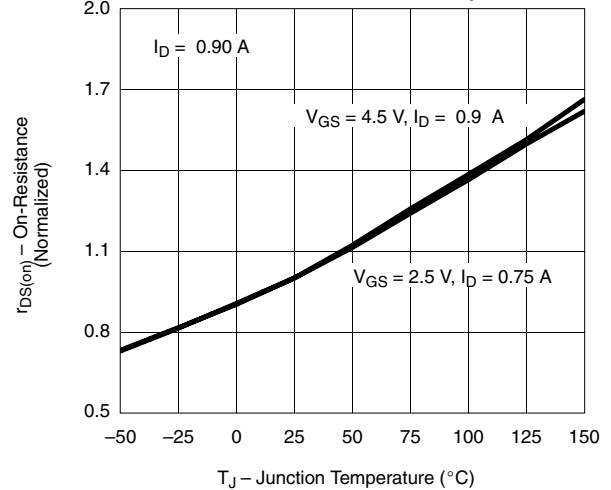
**Capacitance**



**Qg—Gate Charge**

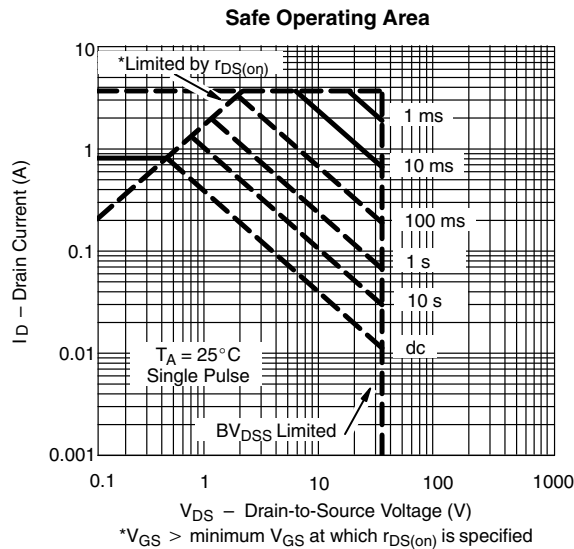
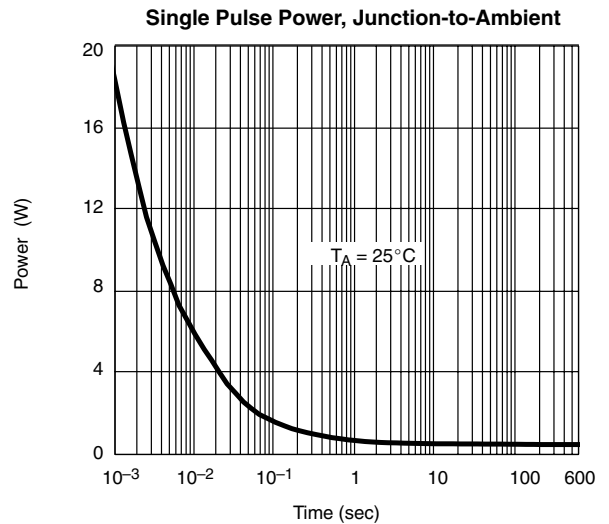
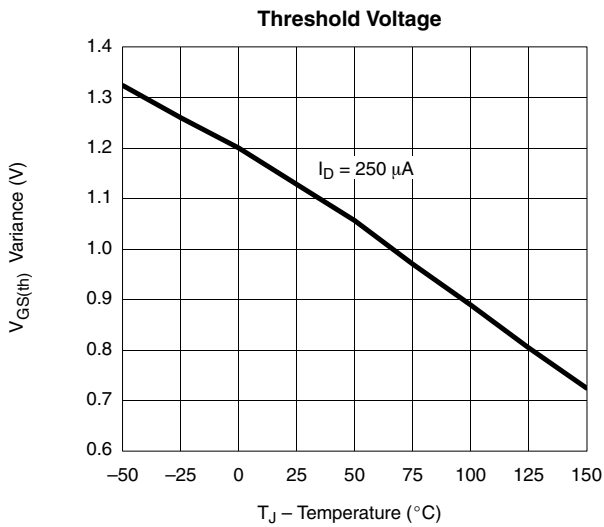
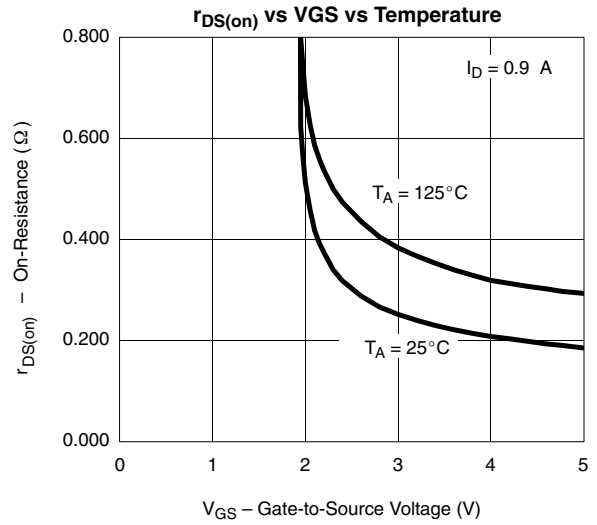
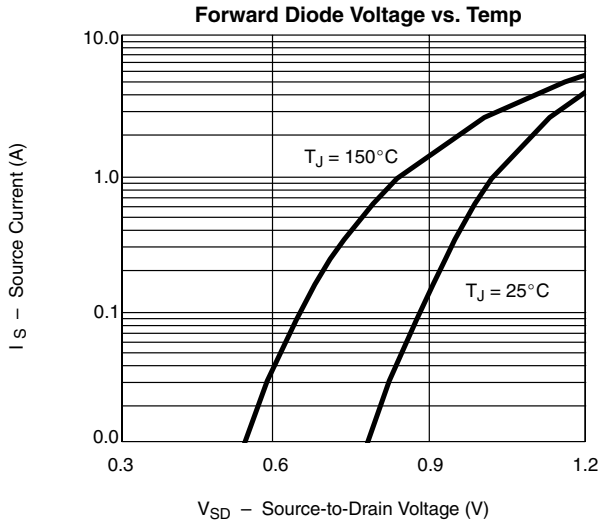


**On-Resistance vs. Junction Temperature**





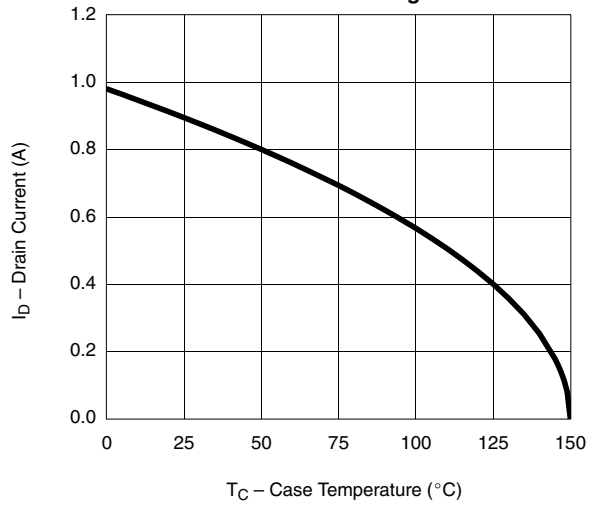
**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**



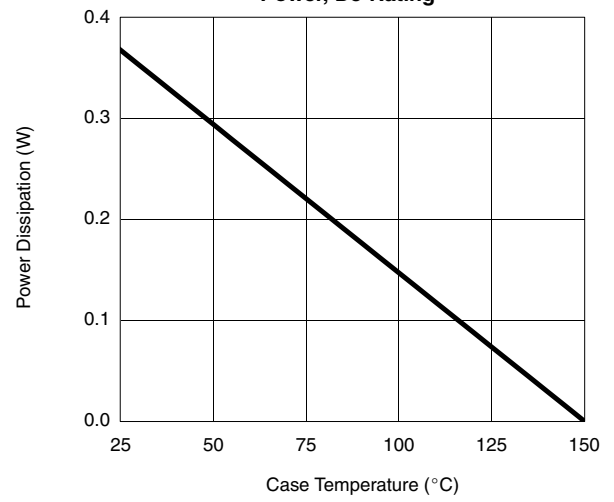


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

Current De-Rating\*



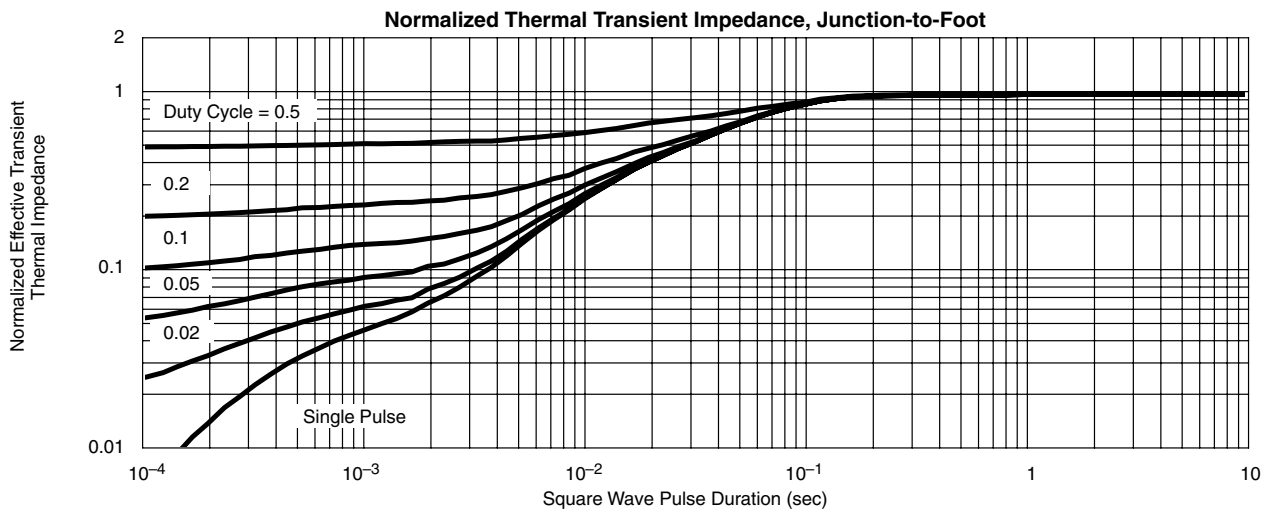
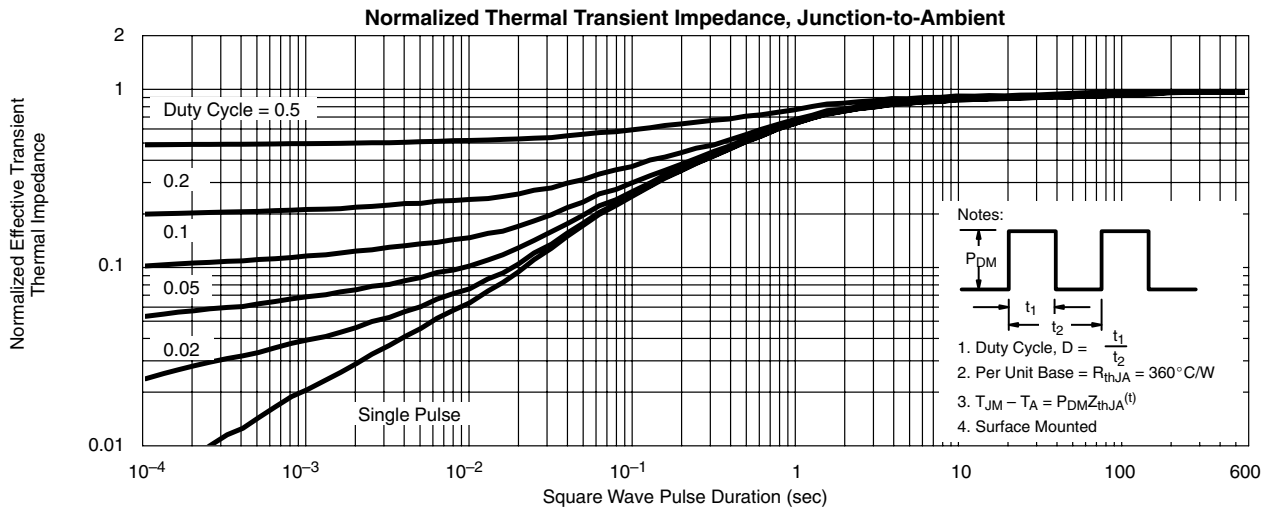
Power, De-Rating



\*The power dissipation  $P_D$  is based on  $T_{J(max)} = 150^\circ\text{C}$ , 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 NOTED)**



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