

VBQF2317 Datasheet

P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^d	Q_g (Typ.)
- 30	0.021 at $V_{GS} = - 10$ V	- 24 ^e	15 nC
	0.027 at $V_{GS} = - 4.5$ V	- 18.7	

FEATURES

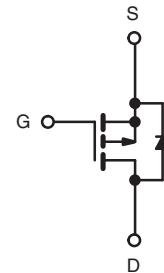
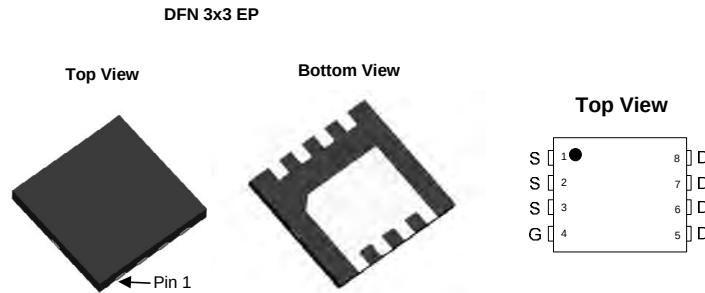
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Notebook PC
- Load Switch
- Battery Switch
- Adaptor Switch



P-Channel MOSFET

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}	± 20	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	$T_C = 25^\circ\text{C}$	- 24 ^e	A
	$T_C = 70^\circ\text{C}$	- 23.8	
	$T_A = 25^\circ\text{C}$	- 10.5 ^{a, b}	
	$T_A = 70^\circ\text{C}$	- 8.3 ^{a, b}	
Pulsed Drain Current	I_{DM}	- 50	A
Continuous Source-Drain Diode Current	$T_C = 25^\circ\text{C}$	- 23.2	
	$T_A = 25^\circ\text{C}$	- 2.9 ^{a, b}	
Avalanche Current	$L = 0.1$ mH	- 20	mJ
Single-Pulse Avalanche Energy	E_{AS}	20	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	27.8	W
	$T_C = 70^\circ\text{C}$	17.8	
	$T_A = 25^\circ\text{C}$	3.5 ^{a, b}	
	$T_A = 70^\circ\text{C}$	2.2 ^{a, b}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature) ^{f, g}		260	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, c}	R_{thJA}	29	36	$^\circ\text{C/W}$
Maximum Junction-to-Case	R_{thJC}	3.6	4.5	

Notes:

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

b. $t = 10$ s.

c. Maximum under Steady State conditions is 81 $^\circ\text{C/W}$.

d. Based on $T_C = 25^\circ\text{C}$.

e. Package Limited.

f. The DFN 3 x 3 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.

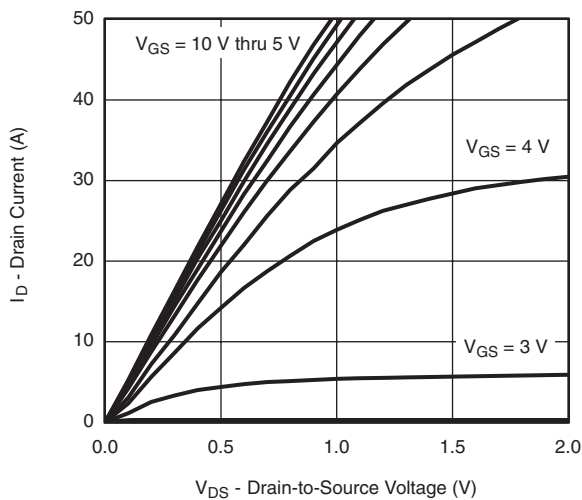
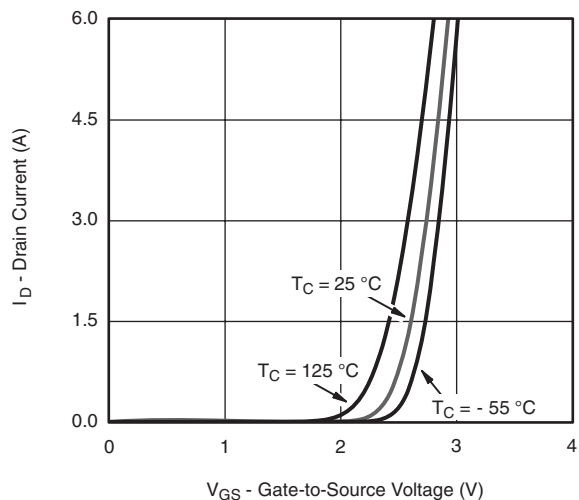
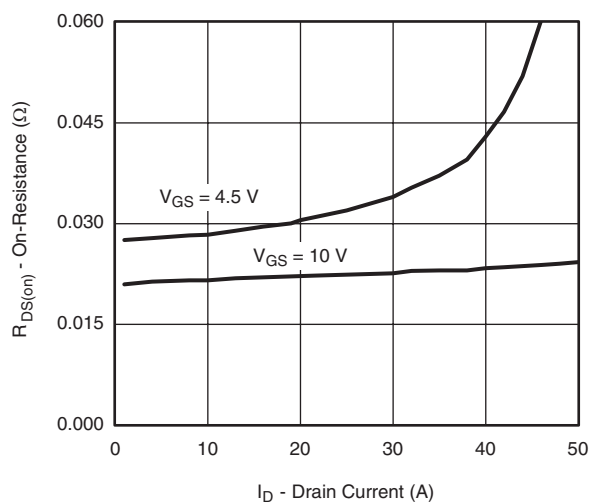
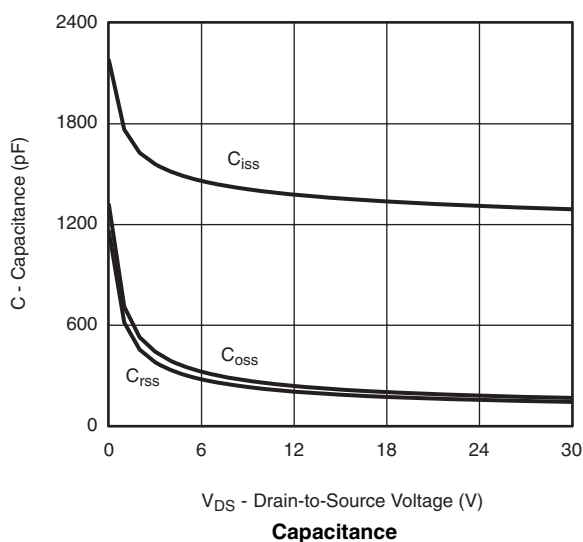
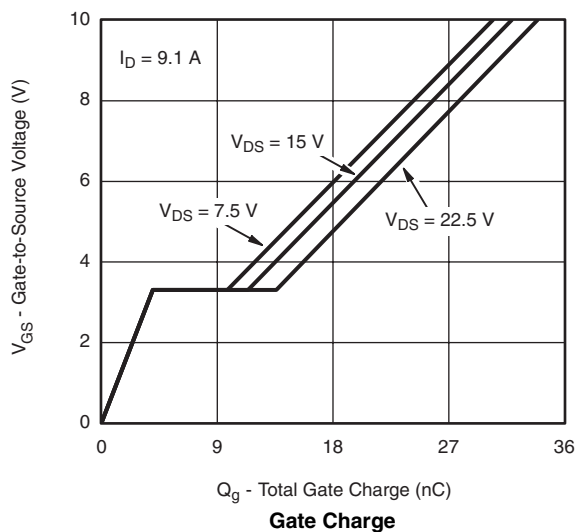
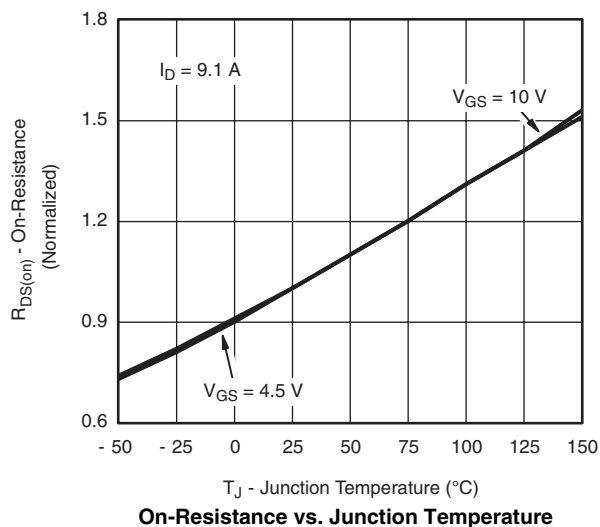
g. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

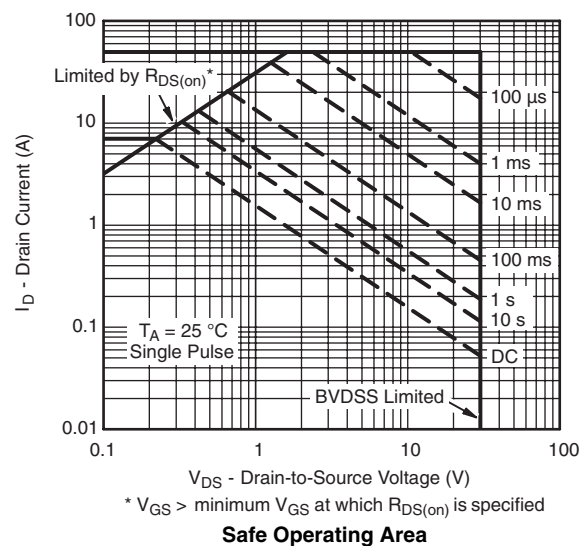
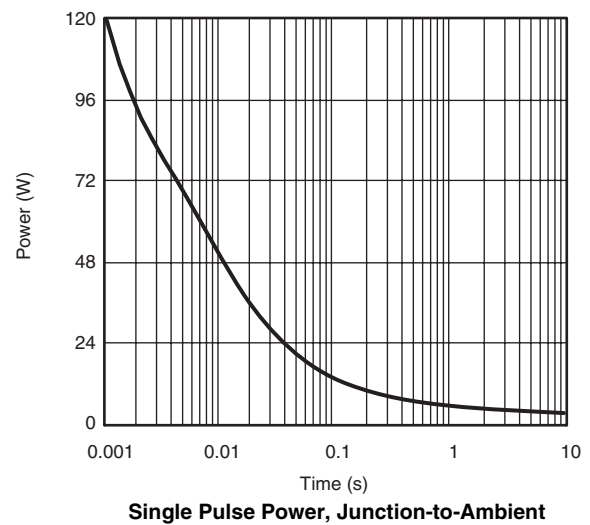
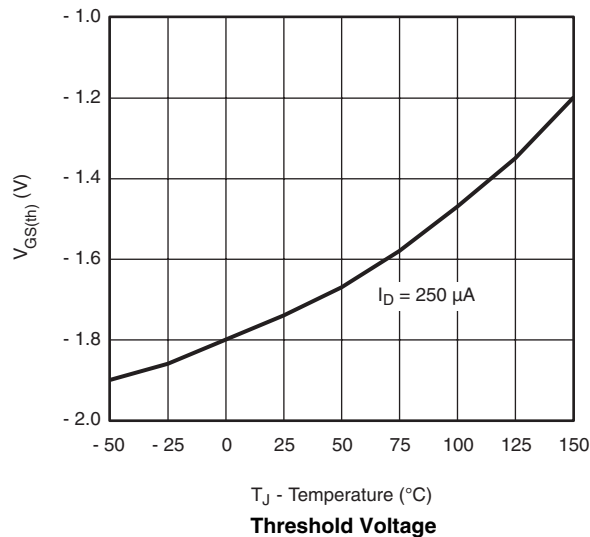
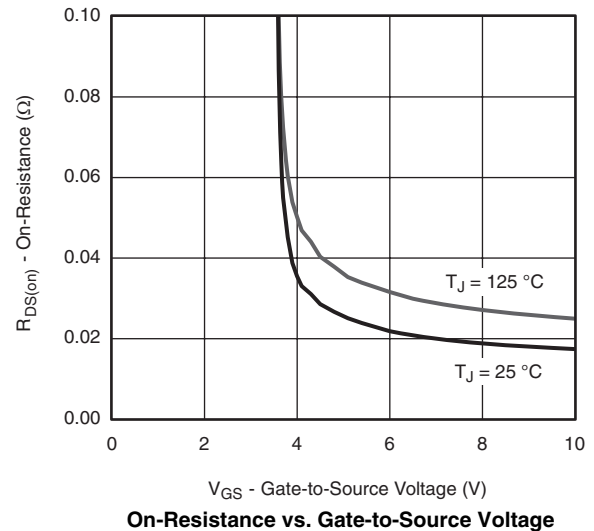
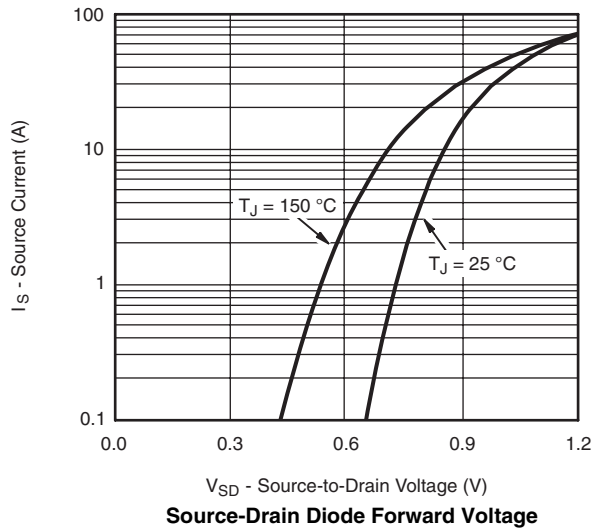
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 31		mV/ $^{\circ}\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			4.5		
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}	$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -30\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^{\circ}\text{C}$			- 5	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq -10\text{ V}, V_{GS} = -10\text{ V}$	- 30			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -10.5\text{ A}$		0.021		Ω
		$V_{GS} = -4.5\text{ V}, I_D = -8.3\text{ A}$		0.027		
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -10.5\text{ A}$		23		S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{DS} = -15\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		1350		pF
Output Capacitance	C_{oss}			215		
Reverse Transfer Capacitance	C_{rss}			185		
Total Gate Charge	Q_g	$V_{DS} = -15\text{ V}, V_{GS} = -10\text{ V}, I_D = -10.5\text{ A}$		32	50	nC
		$V_{DS} = -15\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -10.5\text{ A}$		15	25	
Q_{gs}			4			
Q_{gd}			7.5			
Gate Resistance	R_g	$f = 1\text{ MHz}$	1.2	5.8	11.6	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 1.8\text{ }\Omega$ $I_D \equiv -8.4\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		10	15	ns
Rise Time	t_r			8	15	
Turn-Off DelayTime	$t_{d(off)}$			45	70	
Fall Time	t_f			12	25	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}, R_L = 1.8\text{ }\Omega$ $I_D \equiv -8.4\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		42	70	
Rise Time	t_r			35	60	
Turn-Off DelayTime	$t_{d(off)}$			40	70	
Fall Time	t_f			16	30	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			- 23.2	A
Pulse Diode Forward Current	I_{SM}				- 50	
Body Diode Voltage	V_{SD}	$I_S = -8.4\text{ A}, V_{GS} = 0\text{ V}$		- 0.85	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -8.4\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^{\circ}\text{C}$		34	60	ns
Body Diode Reverse Recovery Charge	Q_{rr}			22	40	nC
Reverse Recovery Fall Time	t_a			11		ns
Reverse Recovery Rise Time	t_b			23		

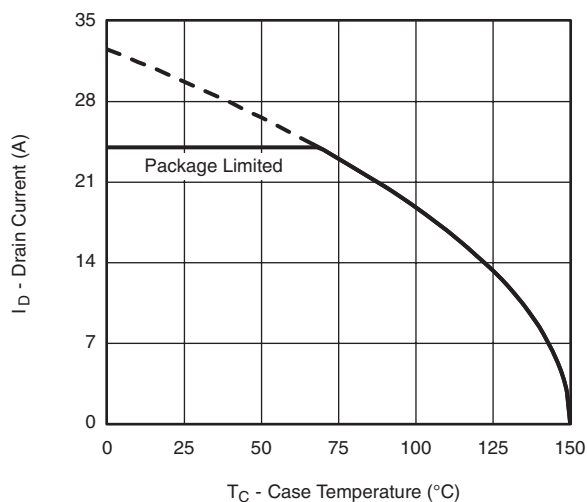
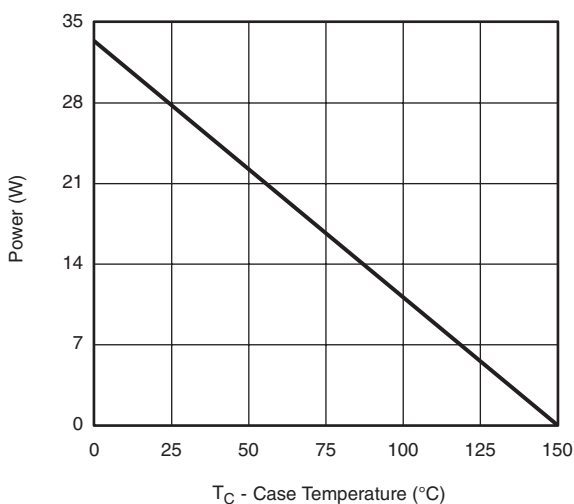
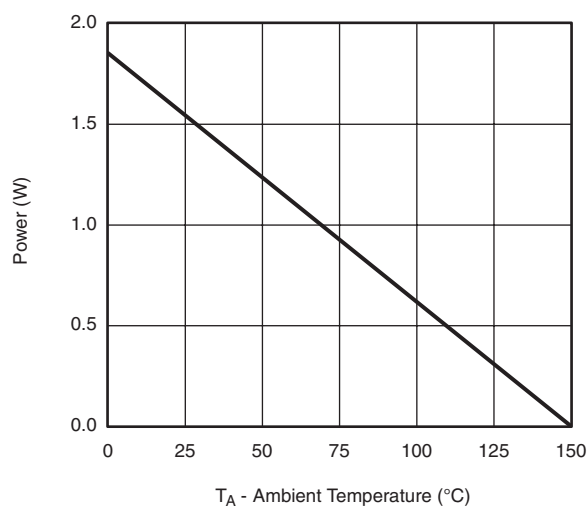
Notes:

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

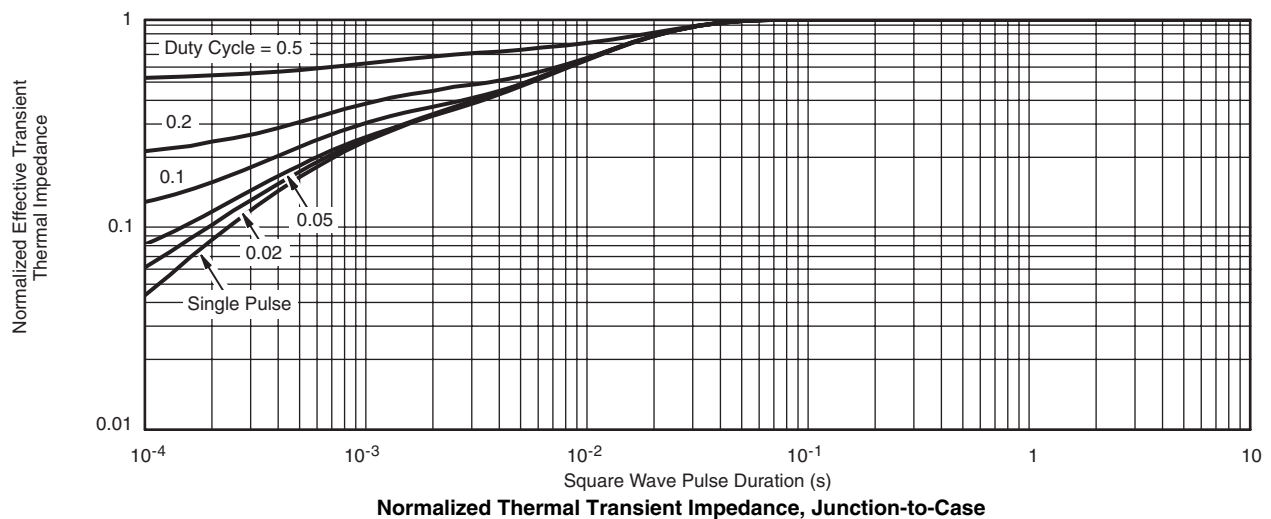
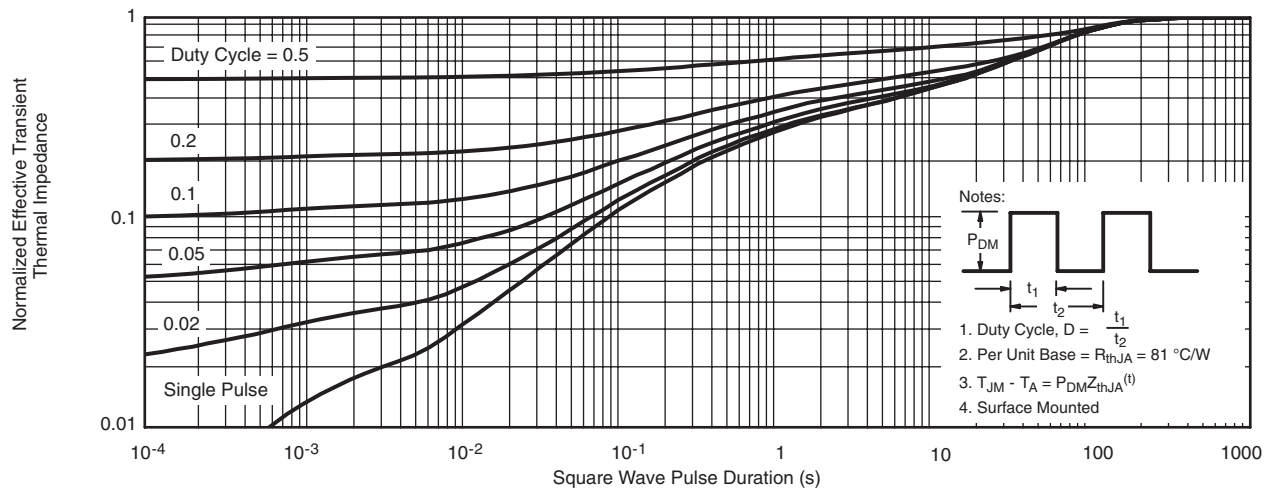
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Current Derating*

Power, Junction-to-Case

Power Derating, 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 25 °C, unless otherwise noted


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