

FDB6021P-VB 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	0.008 at $V_{GS} = -10$ V	- 75	56 nC
	0.011 at $V_{GS} = -4.5$ V	- 65	

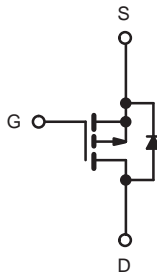
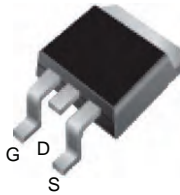
FEATURES

- Halogen-free
- Trench Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested


RoHS
 COMPLIANT

APPLICATIONS

- Load Switch
- Notebook Adaptor Switch

D²PAK (TO-263)

P-Channel MOSFET

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	- 30	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	$T_C = 25$ °C	I_D	- 75	A
	$T_C = 70$ °C		- 65	
	$T_A = 25$ °C		-55 ^{a, b}	
	$T_A = 70$ °C		-45 ^{a, b}	
Pulsed Drain Current		I_{DM}	- 200	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	I_S	- 4.1	
	$T_A = 25$ °C		- 2.2 ^{a, b}	
Avalanche Current	L = 0.1 mH	I_{AS}	- 75	mJ
Single-Pulse Avalanche Energy		E_{AS}	280	
Maximum Power Dissipation	$T_C = 25$ °C	P_D	250	W
	$T_C = 70$ °C		205	
	$T_A = 25$ °C		3.7 ^{a, b}	
	$T_A = 70$ °C		2.7 ^{a, 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 ^{a, c}	$t \leq 10$ s	R_{thJA}	38	46	°C/W
Maximum Junction-to-Foot	Steady State	R_{thJF}	20	25	

Notes:

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

 b. $t = 10$ s.

c. Maximum under Steady State conditions is 85 °C/W.

 d. Based on $T_C = 25$ °C.

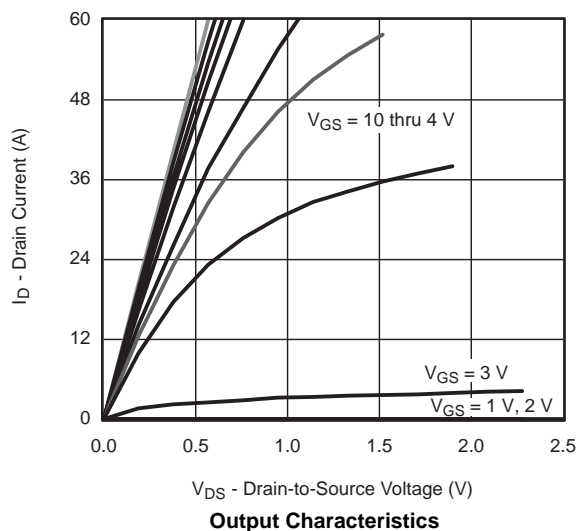
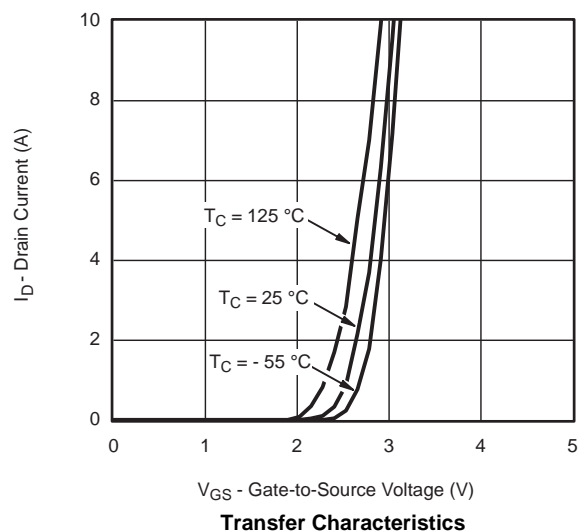
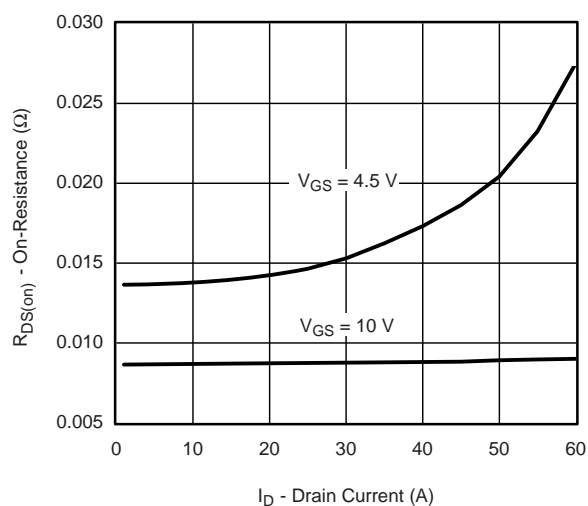
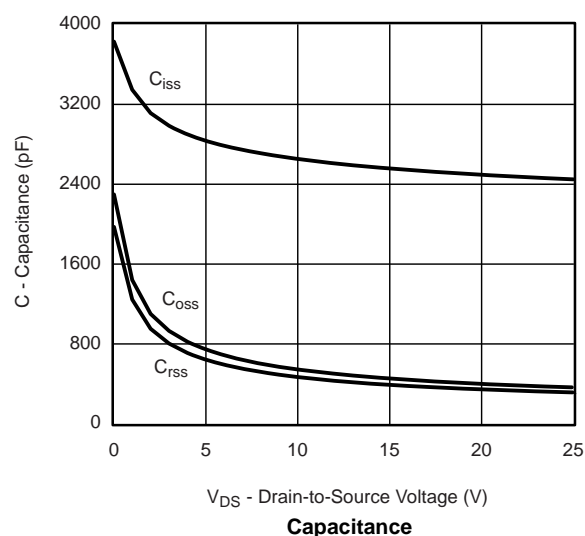
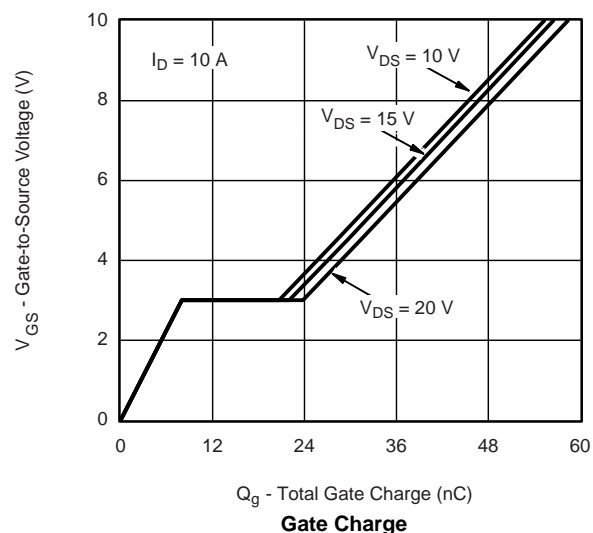
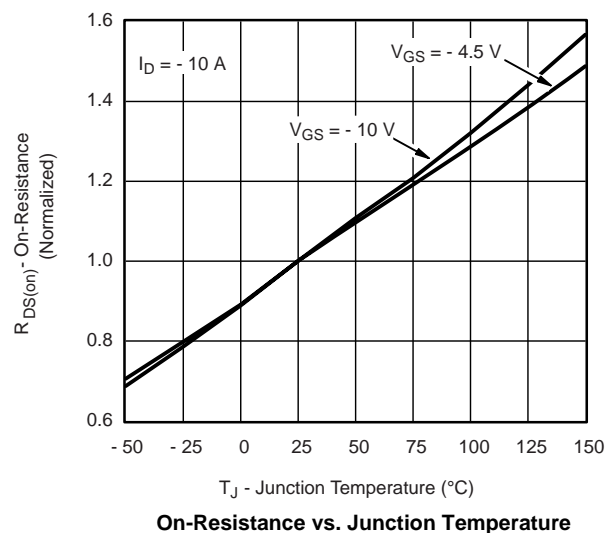
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted								
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit		
Static								
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	- 30			V		
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 34		mV/ $^{\circ}\text{C}$		
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			5.3				
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	- 1.0		- 2.5	V		
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 25\text{ V}$			± 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	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$, $I_D = -10\text{ A}$		0.008		Ω		
		$V_{GS} = -4.5\text{ V}$, $I_D = -8\text{ A}$		0.011				
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}$, $I_D = -10\text{ A}$		28		S		
Dynamic ^b								
Input Capacitance	C_{iss}	$V_{DS} = -15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		4550		pF		
Output Capacitance	C_{oss}			1455				
Reverse Transfer Capacitance	C_{rss}			570				
Total Gate Charge	Q_g	$V_{DS} = -15\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -10\text{ A}$		115		nC		
Gate-Source Charge	Q_{gs}	$V_{DS} = -15\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -10\text{ A}$		56				
Gate-Drain Charge	Q_{gd}			8				
Gate Resistance	R_g			22				
Turn-On Delay Time	$t_{d(on)}$	$f = 1\text{ MHz}$	0.5	2.2	4.4	Ω		
Rise Time	t_r		$V_{DD} = -15\text{ V}$, $R_L = 1.5\text{ }\Omega$ $I_D \cong -10\text{ A}$, $V_{GEN} = -10\text{ V}$, $R_g = 1\text{ }\Omega$		13		25	ns
Turn-Off DelayTime	$t_{d(off)}$				12		24	
Fall Time	t_f				40		70	
Turn-On Delay Time	$t_{d(on)}$			9	18			
Rise Time	t_r	$V_{DD} = -15\text{ V}$, $R_L = 1.5\text{ }\Omega$ $I_D \cong -10\text{ A}$, $V_{GEN} = -4.5\text{ V}$, $R_g = 1\text{ }\Omega$		48	80			
Turn-Off DelayTime	$t_{d(off)}$			92	160			
Fall Time	t_f			34	60			
				19	35			
Drain-Source Body Diode Characteristics								
Continous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			- 4.1	A		
Pulse Diode Forward Current	I_{SM}				- 60			
Body Diode Voltage	V_{SD}	$I_S = -3\text{ A}$, $V_{GS} = 0\text{ V}$		- 0.75	- 1.2	V		
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -10\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^{\circ}\text{C}$		27	45	ns		
Body Diode Reverse Recovery Charge	Q_{rr}			16	27	nC		
Reverse Recovery Fall Time	t_a			12		ns		
Reverse Recovery Rise Time	t_b			15				

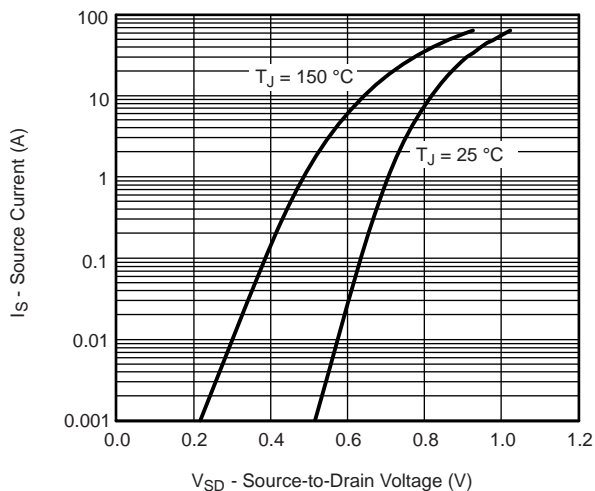
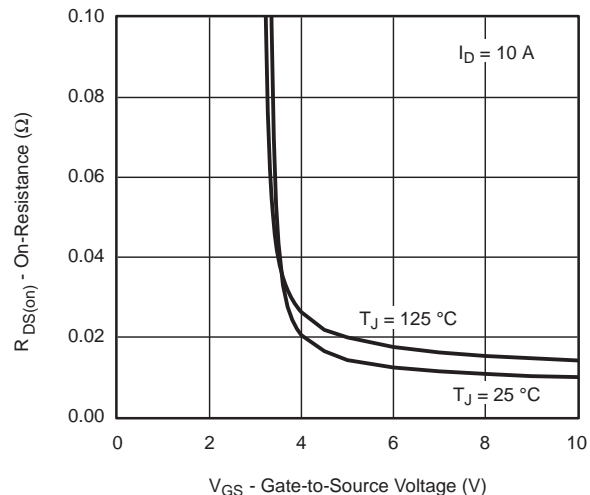
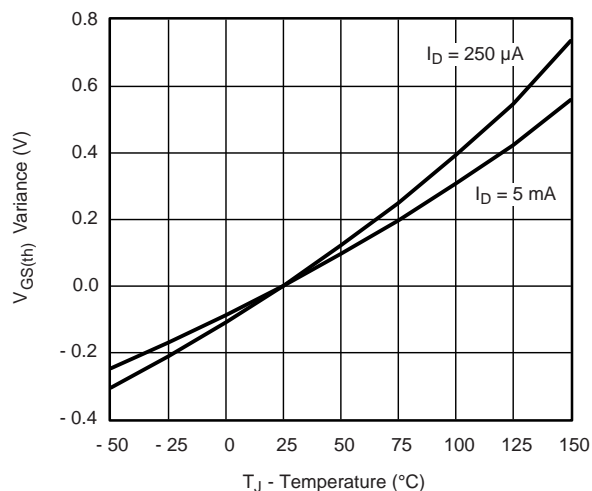
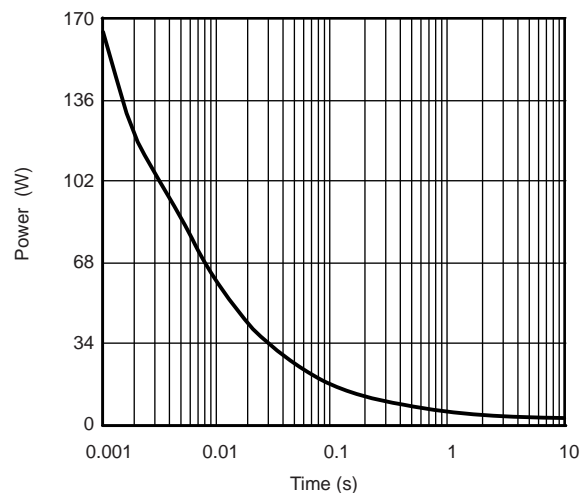
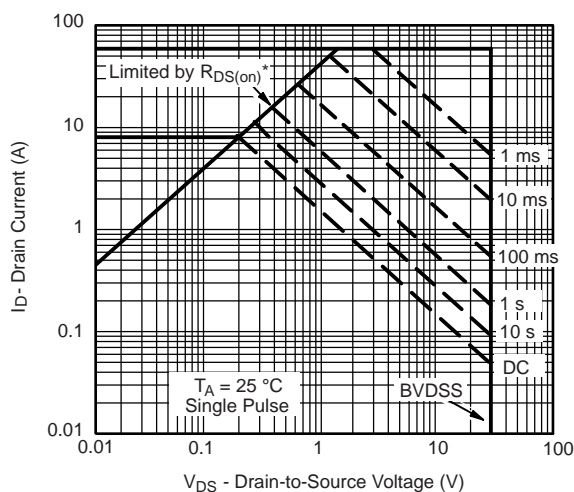
Notes:

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

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

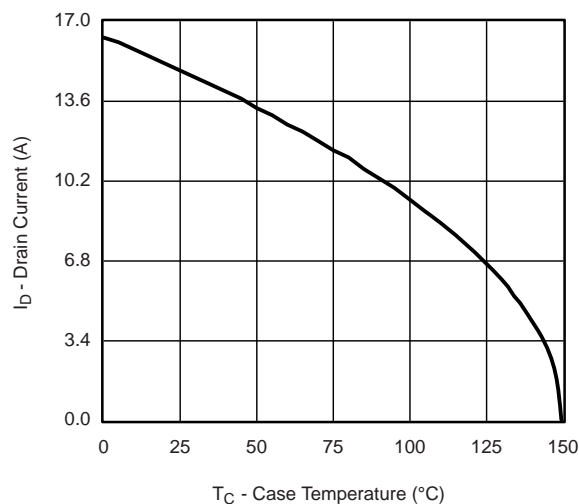
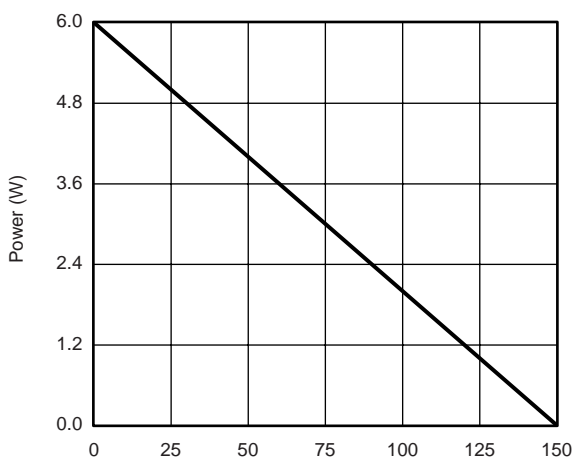
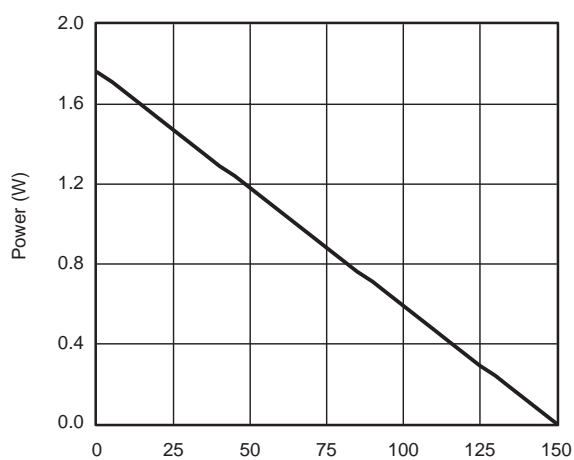
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

Threshold Voltage

Single Pulse Power, Junction-to-Ambient


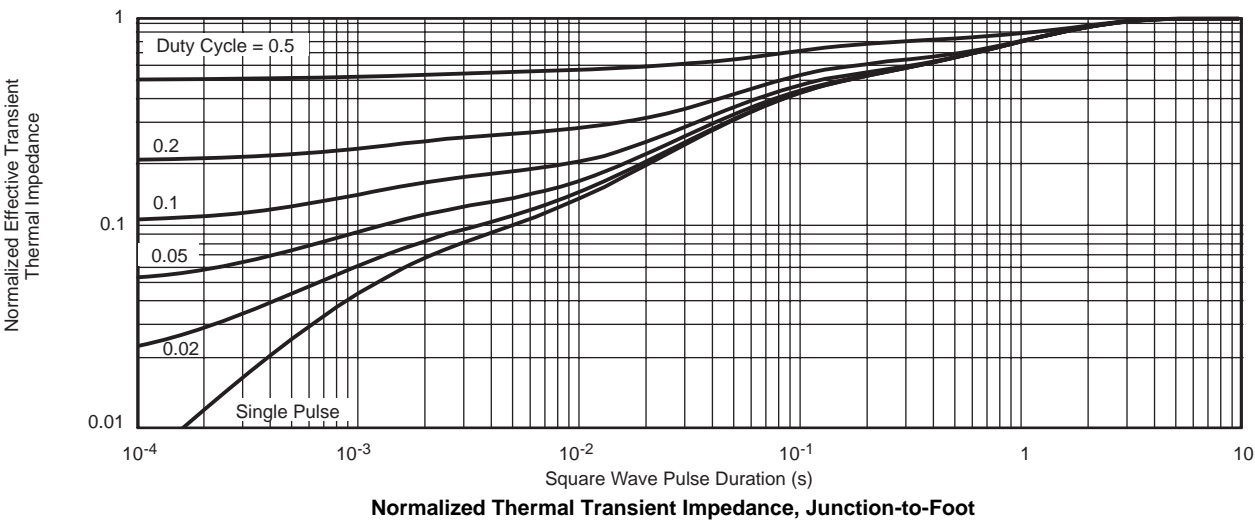
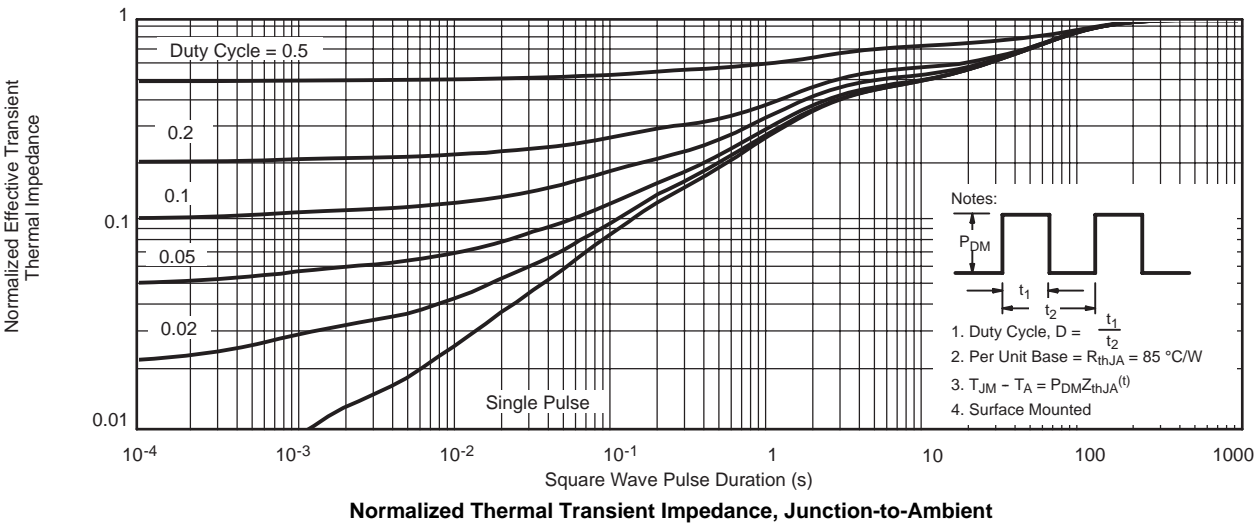
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

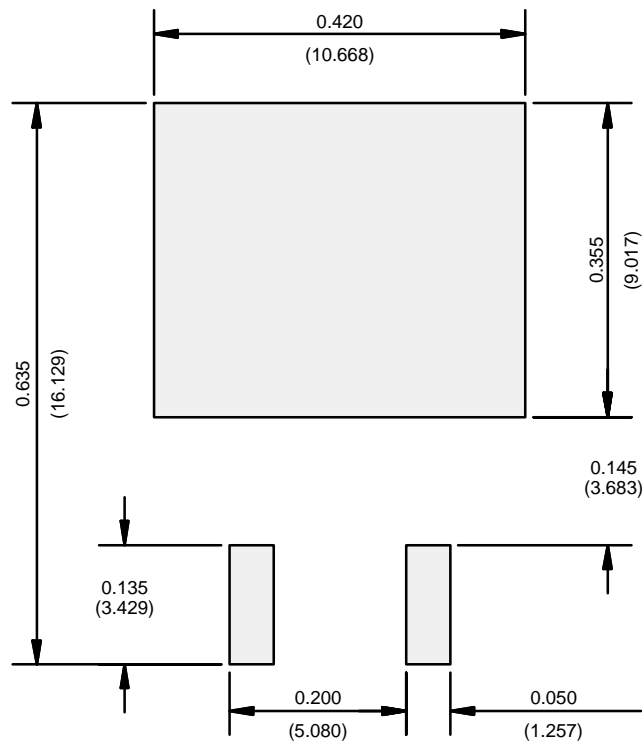
Safe Operating Area

MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Current Derating*

Power, Junction-to-Foot

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



RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead

Recommended Minimum Pads
Dimensions in Inches/(mm)

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