

IRL5602STRL-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	

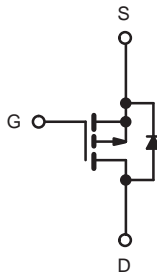
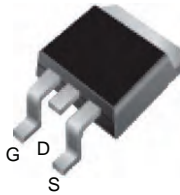
FEATURES

- 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	- 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	A
Continuous Source-Drain Diode Current	$T_C = 25$ °C	- 4.1	
	$T_A = 25$ °C	- 2.2 ^{a, b}	
Avalanche Current	I_{AS}	- 75	mJ
Single-Pulse Avalanche Energy	E_{AS}	280	
Maximum Power Dissipation	$T_C = 25$ °C	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}	R_{thJA}	38	46	°C/W
Maximum Junction-to-Foot	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.

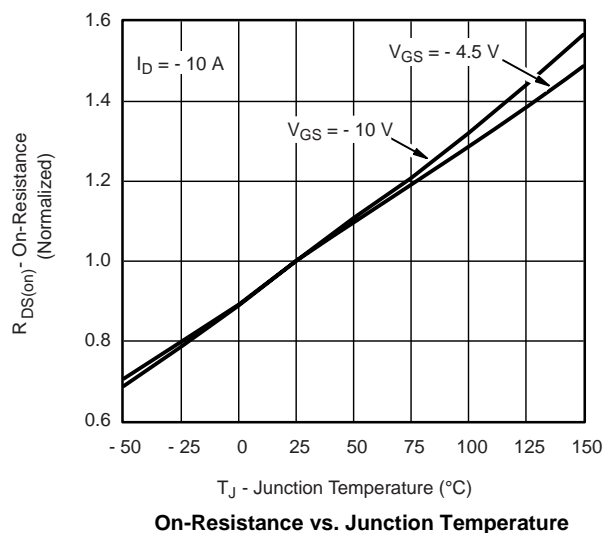
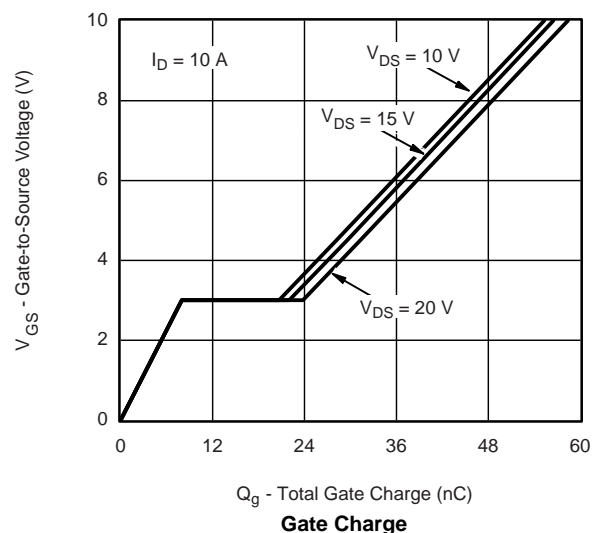
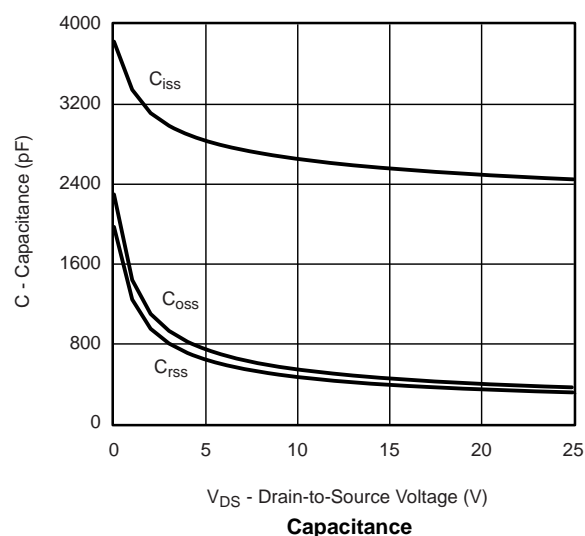
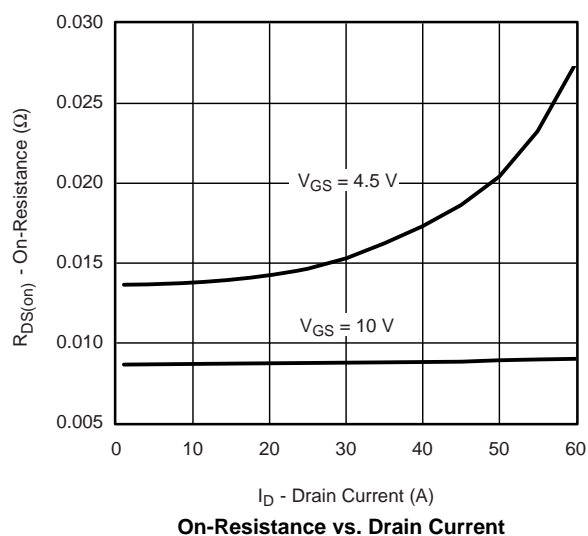
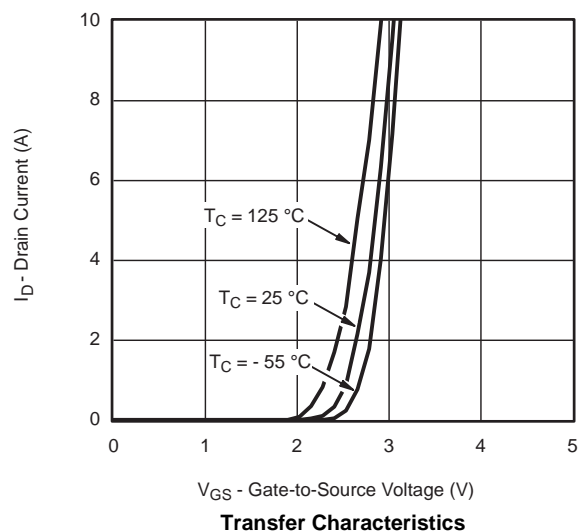
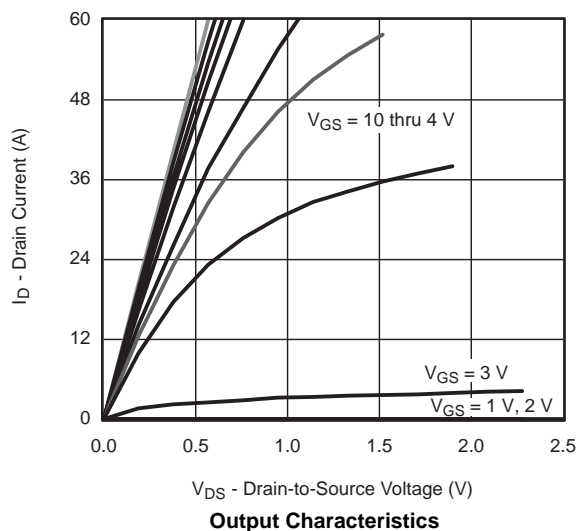
SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	- 30			V	
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		- 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
Turn-Off DelayTime	$t_{d(off)}$				12		24
Fall Time	t_f				40		70
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -15\text{ V}$, $R_L = 1.5\text{ }\Omega$ $I_D \cong -10\text{ A}$, $V_{GEN} = -4.5\text{ V}$, $R_g = 1\text{ }\Omega$			9	18	
Rise Time	t_r			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:

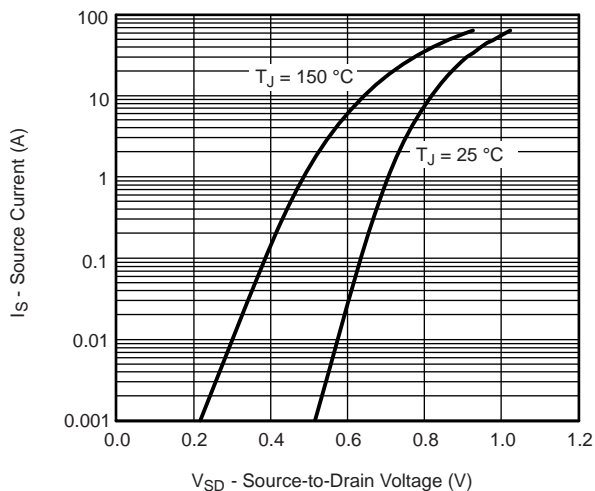
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

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.

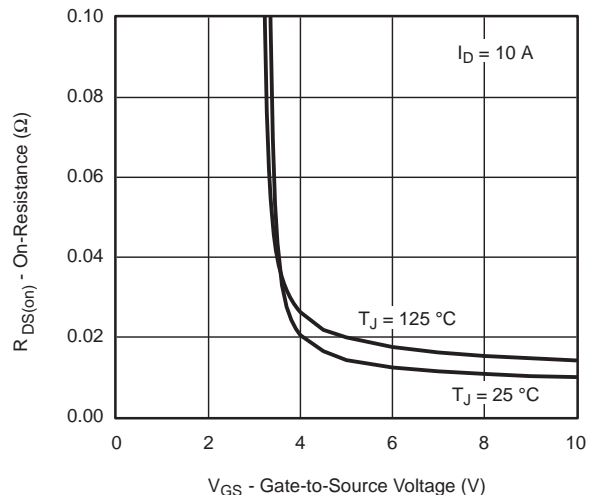
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



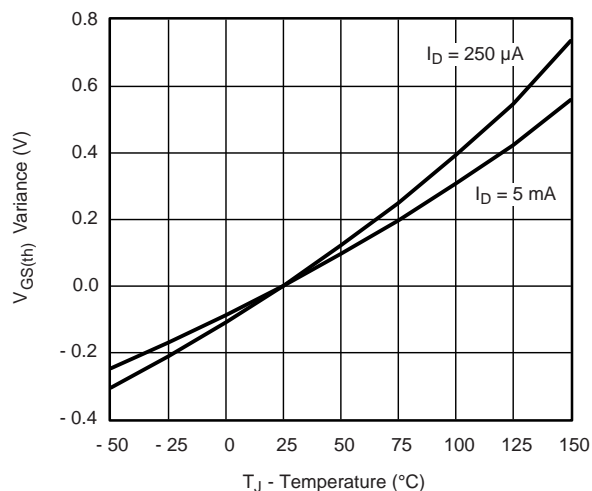
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



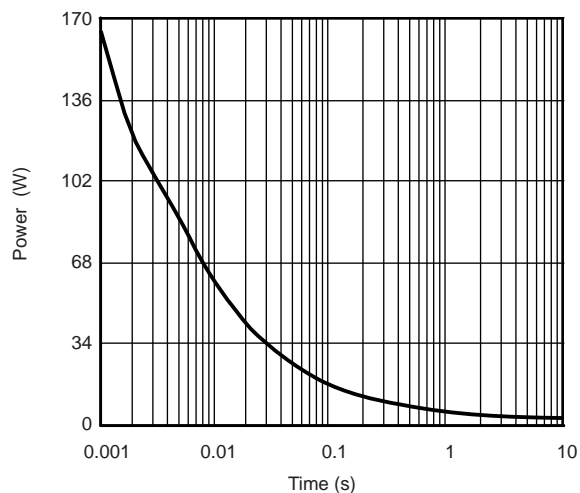
Source-Drain Diode Forward Voltage



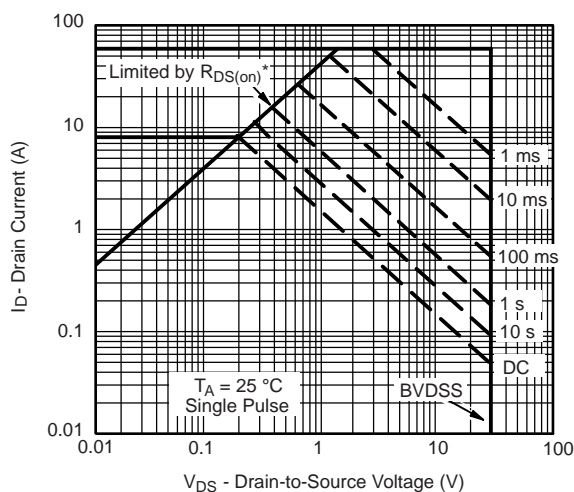
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



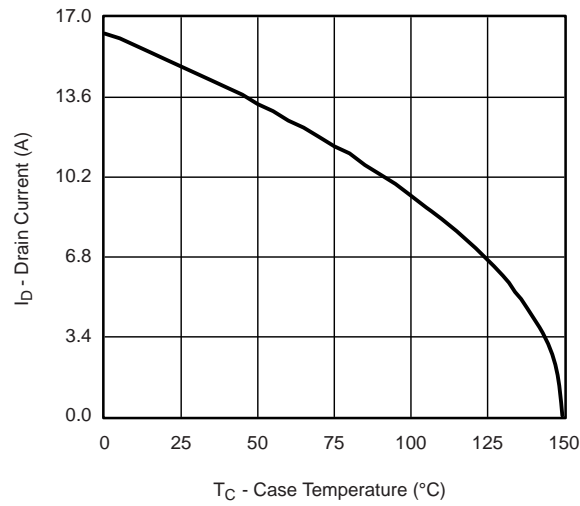
Single Pulse Power, Junction-to-Ambient



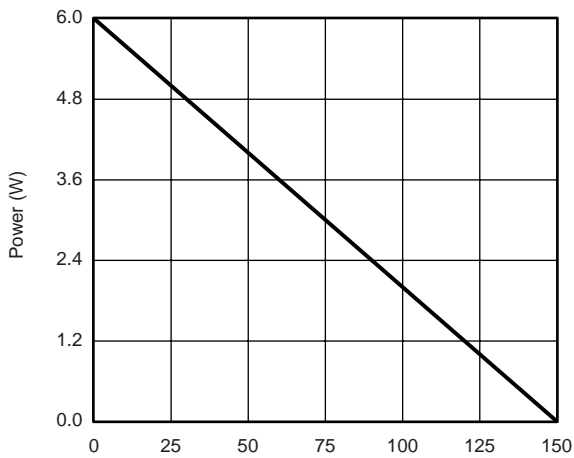
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

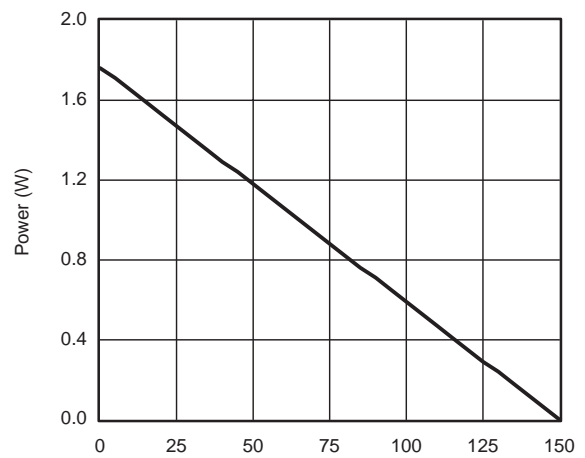
MOSFET TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



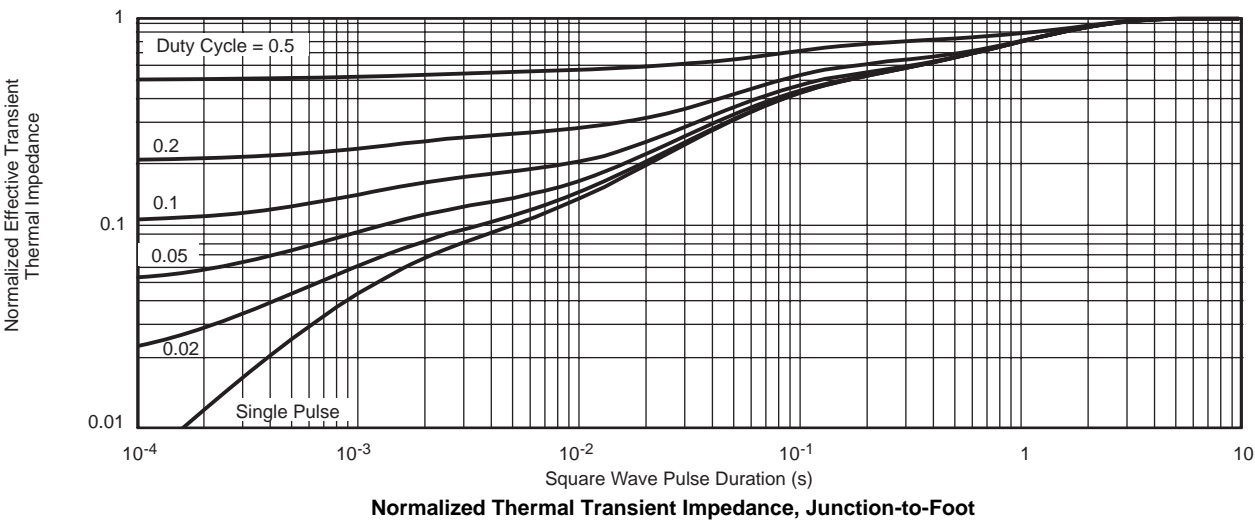
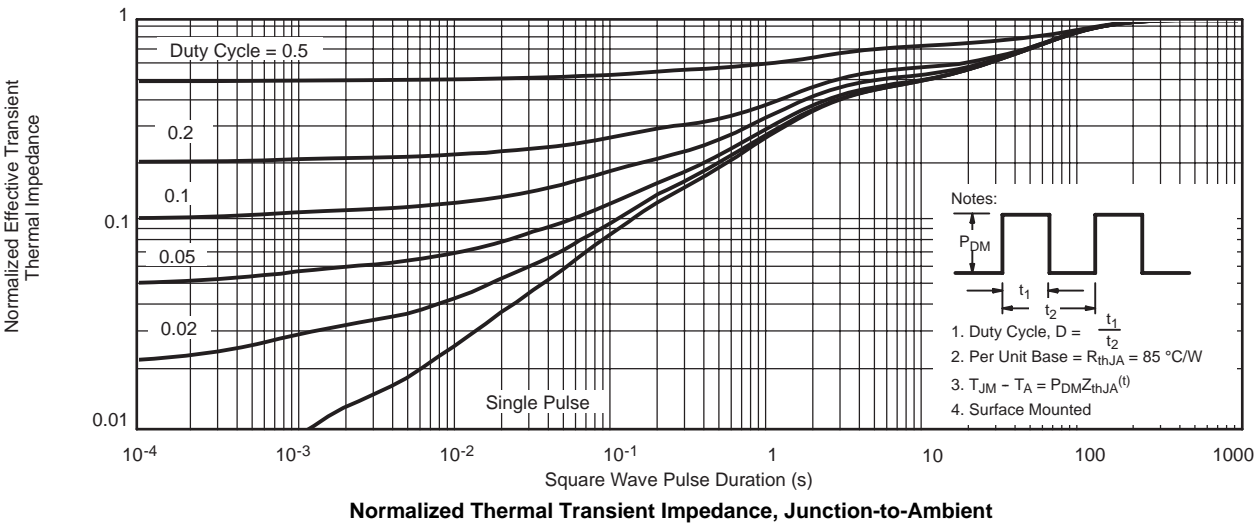
Power, Junction-to-Foot



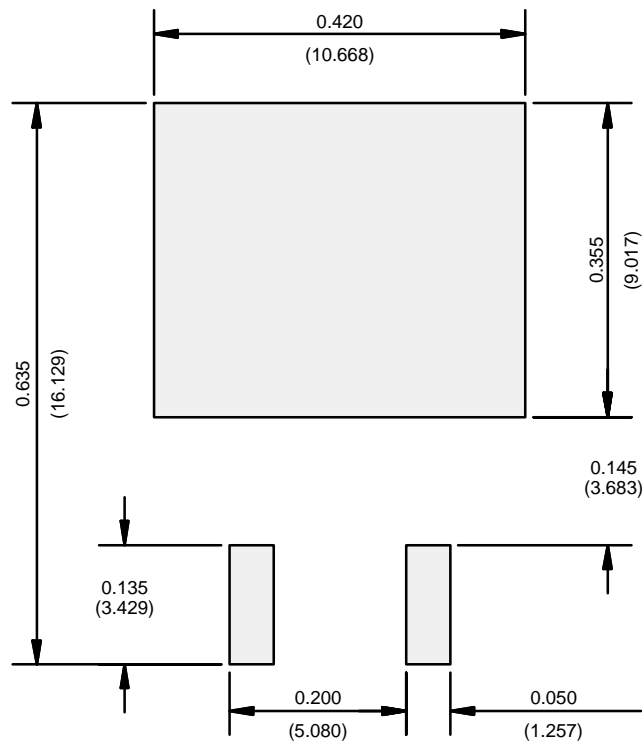
Power Derating, Junction-to-Ambient

* 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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