



New Product

Si8419DB

Vishay Siliconix

www.DataSheet4U.com

## P-Channel 1.5-V (G-S) MOSFET



Product Is Completely Pb-free

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	r <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ)
-8	0.035 @ V <sub>GS</sub> = -4.5 V	-11.7	21 nC
	0.042 @ V <sub>GS</sub> = -2.5 V	-10.7	
	0.052 @ V <sub>GS</sub> = -1.8 V	-9.6	
	0.069 @ V <sub>GS</sub> = -1.5 V	-8.3	

### FEATURES

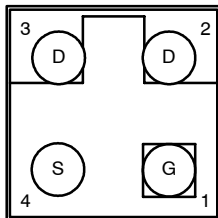
- TrenchFET® Power MOSFET
- Industry First 1.5-V Rated MOSFET
- Ultra Small MICRO FOOT® Chipscale Packaging Reduces Footprint Area, Profile (0.62 mm) and On-Resistance Per Footprint Area

### APPLICATIONS

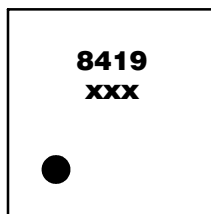
- Low Threshold Load Switch for Portable Devices
  - Low Power Consumption
  - Increased Battery Life

### MICRO FOOT

Bump Side View

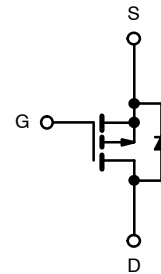


Backside View



Device Marking: 8419  
xxx = Date/Lot Traceability Code

Ordering Information: Si8419DB-T1—E1



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V <sub>DS</sub>	-8	V
Gate-Source Voltage		V <sub>GS</sub>	±5	
Continuous Drain Current (T <sub>J</sub> = 150°C)	T <sub>C</sub> = 25°C	I <sub>D</sub>	-11.7	A
	T <sub>C</sub> = 70°C		-9.4	
	T <sub>A</sub> = 25°C		-7.8 <sup>b, c</sup>	
	T <sub>A</sub> = 70°C		-6.3 <sup>b, c</sup>	
Pulsed Drain Current		I <sub>DM</sub>	-25	
Continuous Source-Drain Diode Current	T <sub>C</sub> = 25°C	I <sub>S</sub>	-5.7	
	T <sub>A</sub> = 25°C		-2.5 <sup>b, c</sup>	
Maximum Power Dissipation	T <sub>C</sub> = 25°C	P <sub>D</sub>	6.25	W
	T <sub>C</sub> = 70°C		4	
	T <sub>A</sub> = 25°C		2.77 <sup>b, c</sup>	
	T <sub>A</sub> = 70°C		1.77 <sup>b, c</sup>	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	-55 to 150	
Package Reflow Conditions <sup>d</sup>	VPR		260	°C
	IR/Convection		260	

Notes:

- Based on T<sub>C</sub> = 25°C.
- Surface Mounted on 1" x 1" FR4 Board.
- t = 10 sec
- Refer to IPC/JEDEC (J-STD-020C), no manual or hand soldering.
- In this document, any reference to the Case represents the body of the MICRO FOOT device and Foot is the bump.

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a, b</sup>		$R_{thJA}$	35	45	°C/W
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJB}$	16	20	

## Notes:

- a. Surface Mounted on 1" x 1" FR4 Board.  
b. Maximum under steady state conditions is 85°C/W.

SPECIFICATIONS ( $T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-8			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\ \mu\text{A}$		-7.5		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-2.2		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-0.35		-0.8	V
		$V_{DS} = V_{GS}, I_D = -5\ \text{mA}$		-0.6		
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\ \text{V}, V_{GS} = 5\ \text{V}$			-100	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 8\ \text{V}, V_{GS} = 0\ \text{V}$			-1	$\mu\text{A}$
		$V_{DS} = -8\ \text{V}, V_{GS} = 0\ \text{V}, T_J = 70^\circ\text{C}$			-10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \leq 5\ \text{V}, V_{GS} = -4.5\ \text{V}$	-5			A
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = -4.5\ \text{V}, I_D = -1\ \text{A}$		0.029	0.035	$\Omega$
		$V_{GS} = -2.5\ \text{V}, I_D = -1\ \text{A}$		0.035	0.042	
		$V_{GS} = -1.8\ \text{V}, I_D = -1\ \text{A}$		0.043	0.052	
		$V_{GS} = -1.5\ \text{V}, I_D = -1\ \text{A}$		0.051	0.069	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -4\ \text{V}, I_D = -1\ \text{A}$		0.7	1.2	S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -4\ \text{V}, V_{GS} = 0\ \text{V}, f = 1\ \text{MHz}$		1640		pF
Output Capacitance	$C_{oss}$			590		
Reverse Transfer Capacitance	$C_{rss}$			380		
Total Gate Charge	$Q_g$	$V_{DS} = -4\ \text{V}, V_{GS} = -5\ \text{V}, I_D = -1\ \text{A}$		24	26	nC
			$V_{DS} = -4\ \text{V}, V_{GS} = -4.5\ \text{V}, I_D = 1\ \text{A}$		21	
Gate-Source Charge	$Q_{gs}$	$V_{DS} = -4\ \text{V}, V_{GS} = -4.5\ \text{V}, I_D = 1\ \text{A}$		1.8		
Gate-Drain Charge	$Q_{gd}$			3.7		
Gate Resistance	$R_g$	$V_{GS} = -0.1\ \text{V}, f = 1\ \text{MHz}$		22		$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -4\ \text{V}, R_L = 4\ \Omega$ $I_D \cong -1\ \text{A}, V_{GEN} = -4.5\ \text{V}, R_g = 6\ \Omega$		12	20	ns
Rise Time	$t_r$			25	40	
Turn-Off Delay Time	$t_{d(off)}$			260	390	
Fall Time	$t_f$			155	240	



SPECIFICATIONS ( $T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25^\circ\text{C}$			-2.5	A
Pulse Diode Forward Current	$I_{SM}$				-25	
Body Diode Voltage	$V_{SD}$	$I_S = -1\text{ A}, V_{GS} = 0\text{ V}$		-0.7	-1.1	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = -1\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25^\circ\text{C}$		150	250	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			0.15	0.23	nC
Reverse Recovery Fall Time	$t_a$			57		ns
Reverse Recovery Rise Time	$t_b$			93		

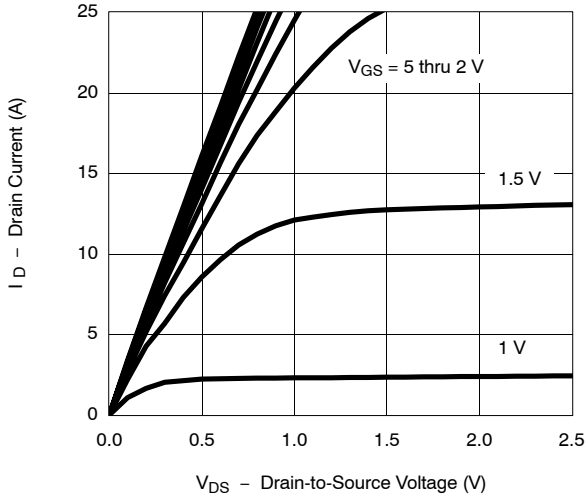
## Notes

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

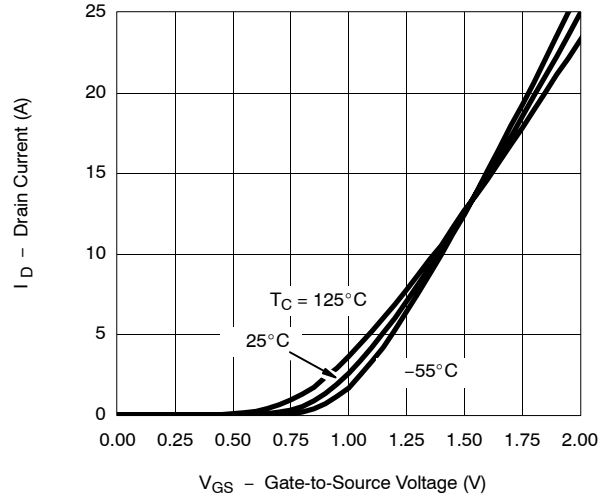
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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

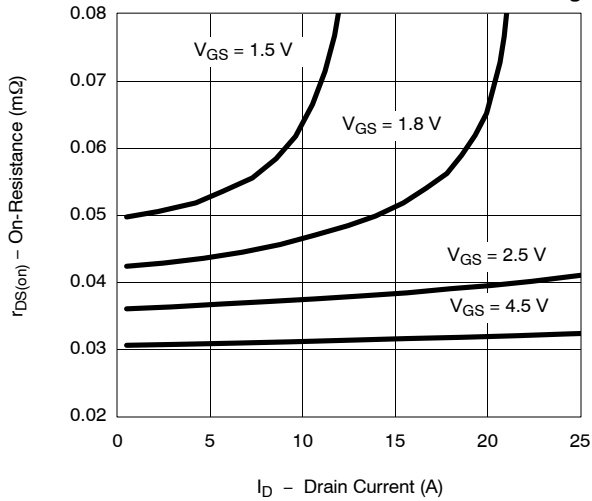
**Output Characteristics**



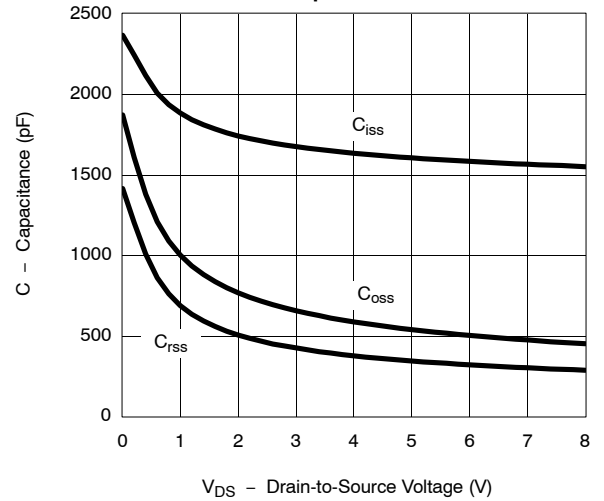
**Transfer Characteristics**



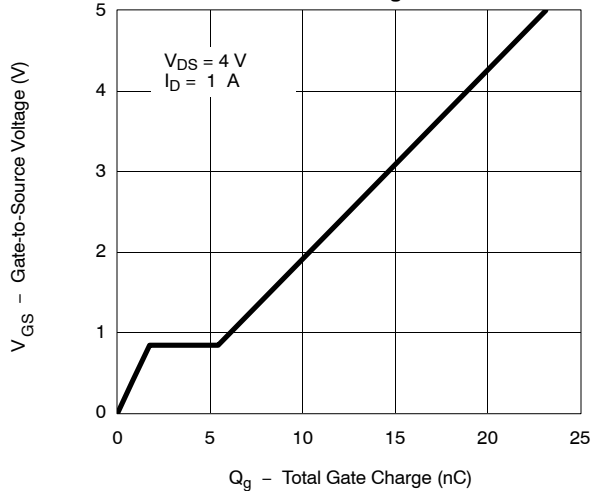
**On-Resistance vs. Drain Current and Gate Voltage**



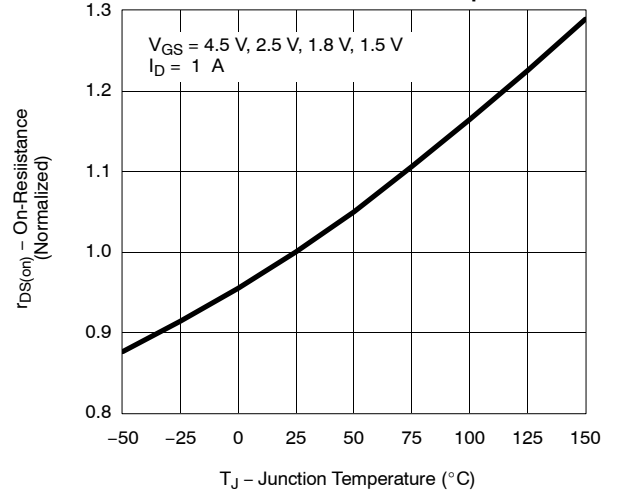
**Capacitance**



**Gate Charge**



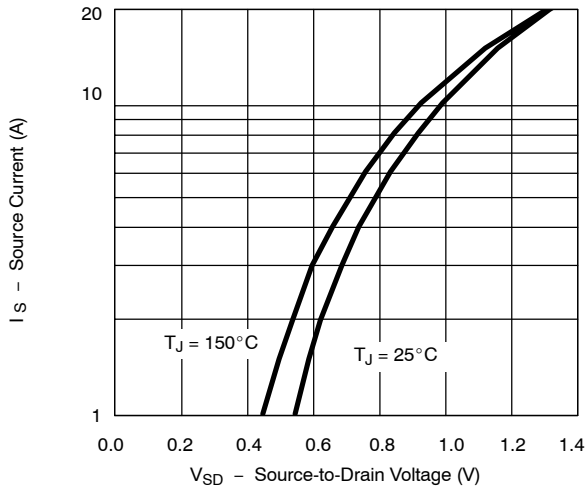
**On-Resistance vs. Junction Temperature**



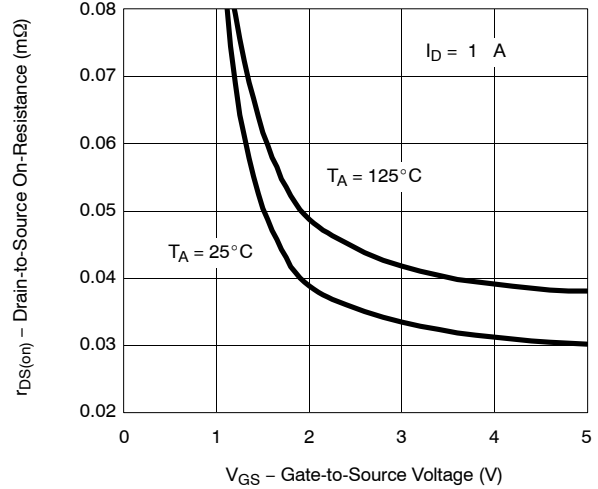


**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

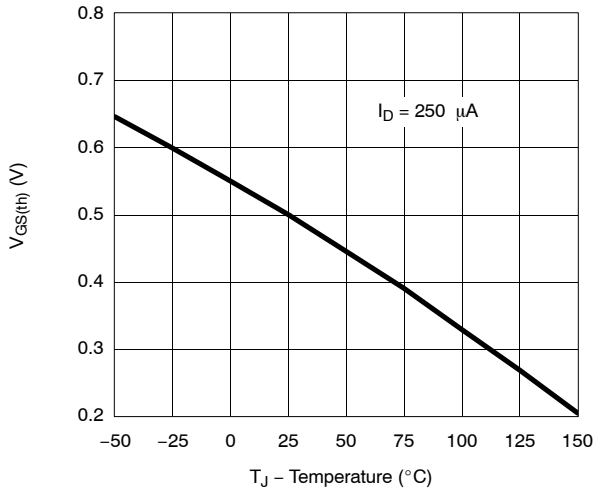
Source-Drain Diode Forward Voltage



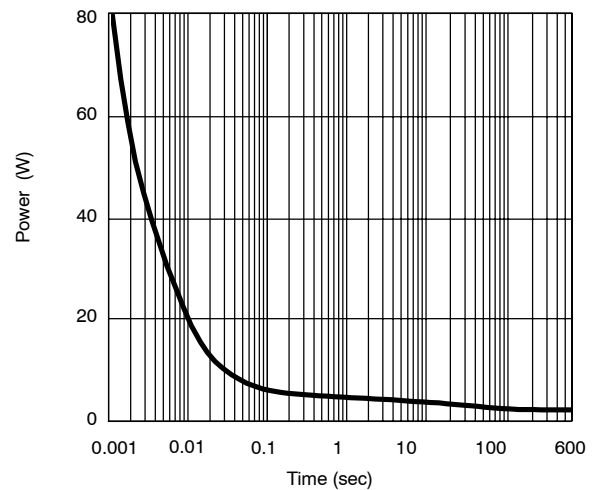
On-Resistance vs. Gate-to-Source Voltage



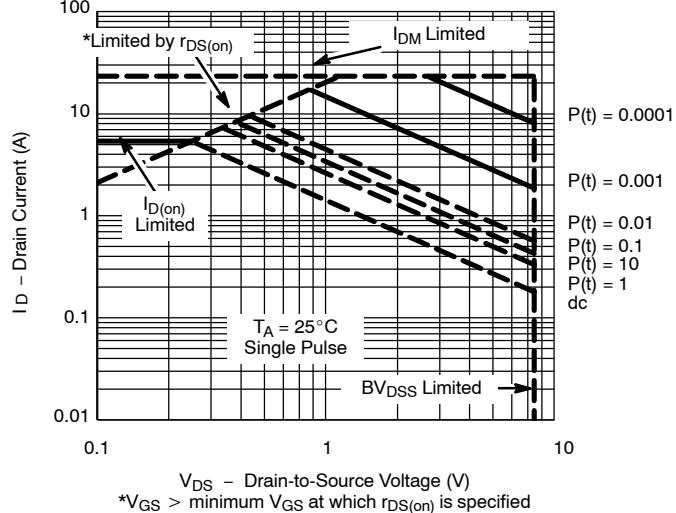
Threshold Voltage



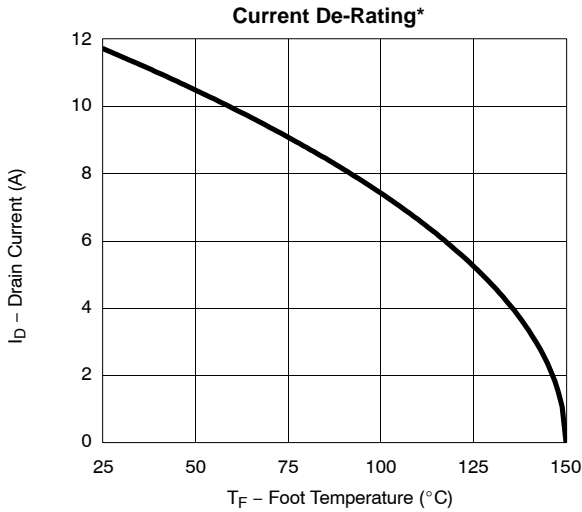
Single Pulse Power, Junction-To-Ambient



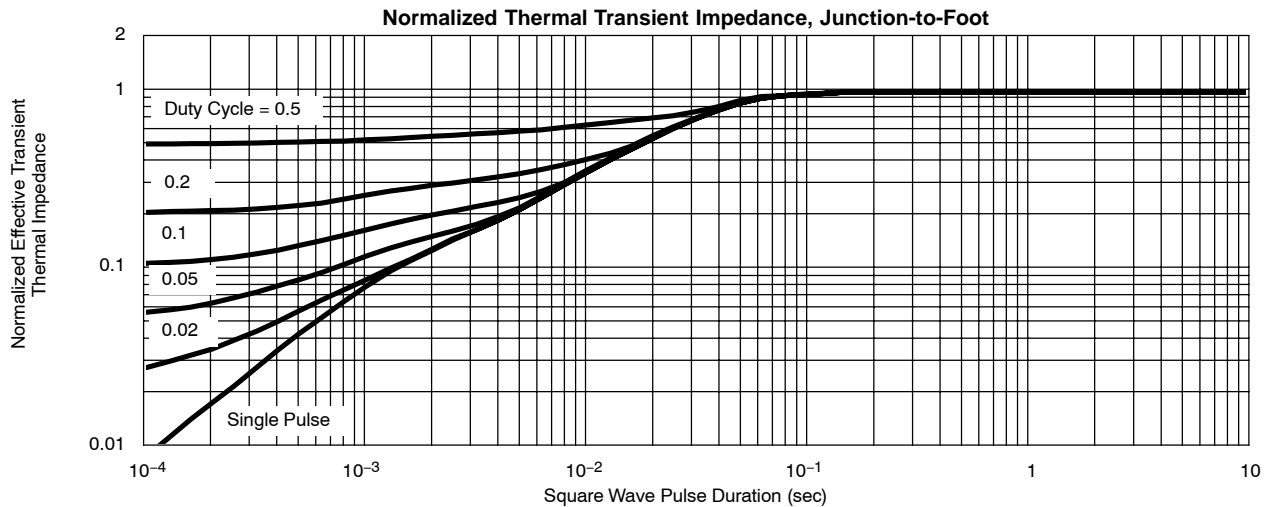
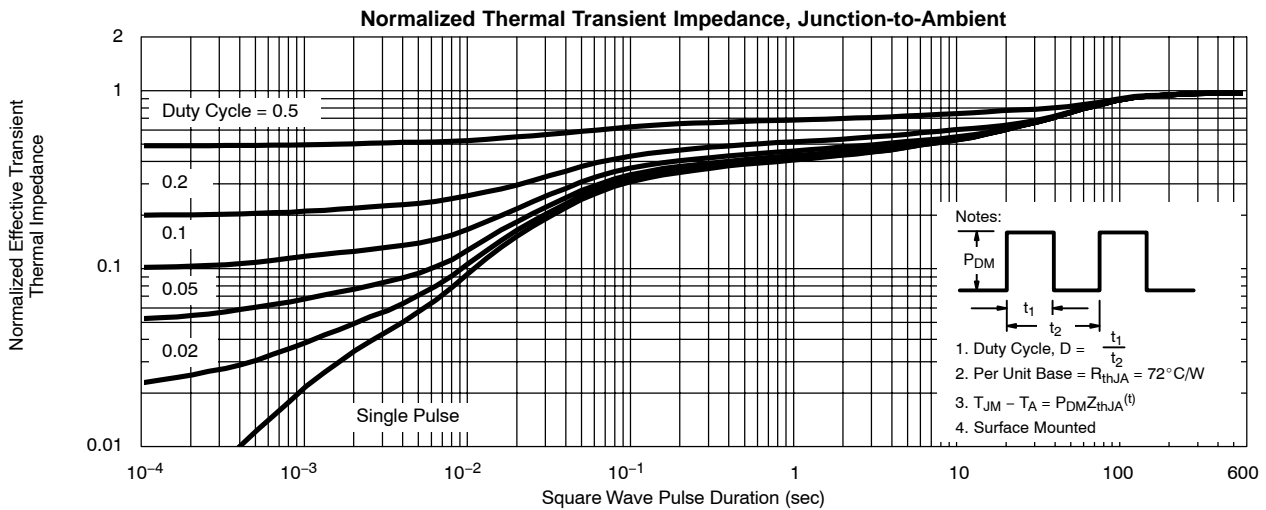
Safe Operating Area, Junction-to-Ambient



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

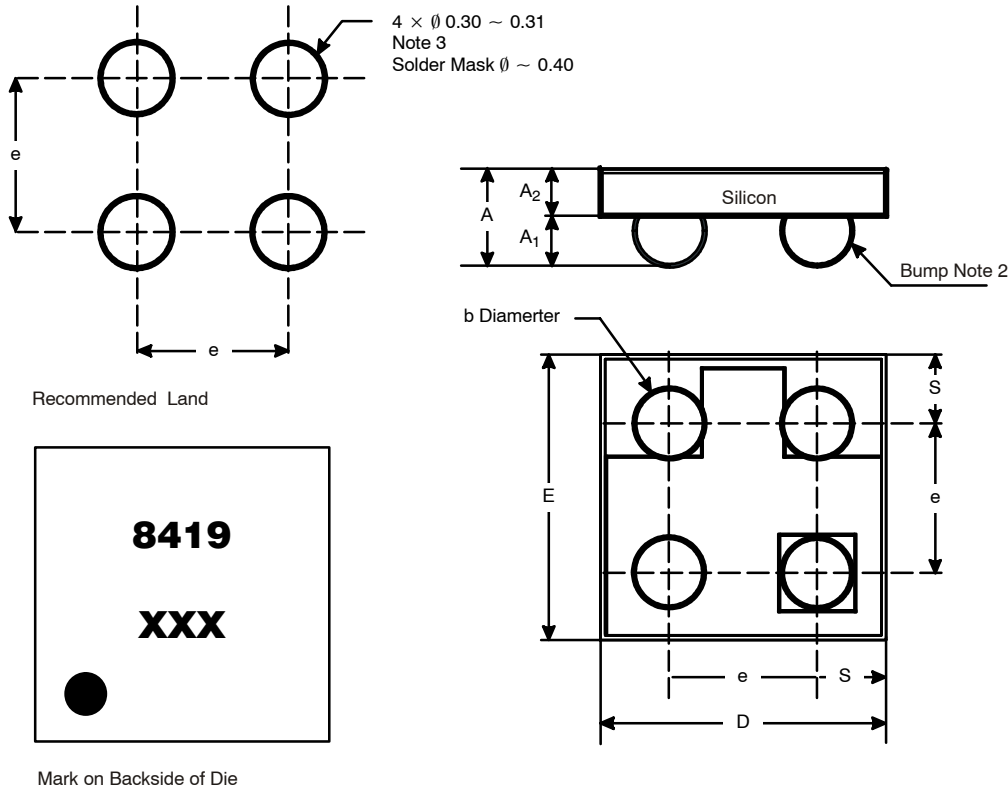


\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 150^\circ\text{C}$ , using junction-to-foot thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



**PACKAGE OUTLINE**

**MICRO FOOT: 4-BUMP (2 X 2, 0.8-mm PITCH)**



NOTES (Unless Otherwise Specified):

1. Laser mark on the silicon die back, coated with a thin metal.
2. Bumps are Sn/Ag/Cu.
3. Non-solder mask defined copper landing pad.
4. The flat side of wafers is oriented at the bottom.

Dim	MILLIMETERS*		INCHES	
	Min	Max	Min	Max
A	0.600	0.650	0.0236	0.0256
A <sub>1</sub>	0.260	0.290	0.0102	0.0114
A <sub>2</sub>	0.340	0.360	0.0134	0.0142
b	0.370	0.410	0.0146	0.0161
D	1.520	1.600	0.0598	0.0630
E	1.520	1.600	0.0598	0.0630
e	0.750	0.850	0.0295	0.0335
S	0.370	0.380	0.0146	0.0150

\* Use millimeters as the primary measurement.

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