

## P-Channel 1.2-V (G-S) MOSFET

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 at V <sub>GS</sub> = - 4.5 V	- 11.7	21 nC
	0.042 at V <sub>GS</sub> = - 2.5 V	- 10.7	
	0.052 at V <sub>GS</sub> = - 1.8 V	- 9.6	
	0.069 at V <sub>GS</sub> = - 1.5 V	- 8.3	
	0.098 at V <sub>GS</sub> = - 1.2 V	- 1.02	

### FEATURES

- TrenchFET<sup>®</sup> Power MOSFET
- Industry First 1.2 V Rated MOSFET
- Ultra Small MICRO FOOT<sup>®</sup> Chipscale Packaging Reduces Footprint Area, Profile (0.62 mm) and On-Resistance Per Footprint Area

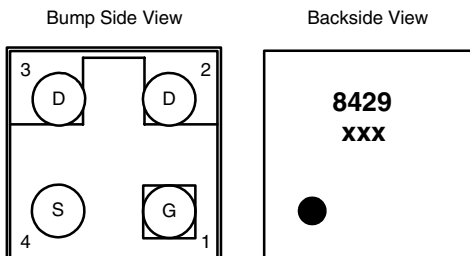


**RoHS**  
COMPLIANT

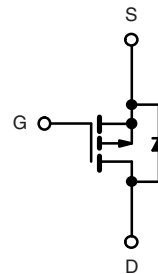
### APPLICATIONS

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

### MICRO FOOT



Device Marking: 8429  
xxx = Date/Lot Traceability Code



Ordering Information: Si8429DB-T1-E1 (Lead (Pb)-free)

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)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	- 11.7
		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	A
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	
		T <sub>A</sub> = 25 °C	- 2.5 <sup>b, c</sup>
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	6.25
		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	°C
Package Reflow Conditions <sup>d</sup>	IR/Convection	260	

Notes:

- Based on T<sub>C</sub> = 25 °C.
- Surface Mounted on 1" x 1" FR4 board.
- t = 10 s.
- 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 $R_{thJF}$	16	20	

## Notes:

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

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

**SPECIFICATIONS**  $T_J = 25\text{ °C}$ , unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-8			V
$V_{DS}$ Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		-7.5		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-2.2		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.35		-0.8	V
		$V_{DS} = V_{GS}, I_D = -5\text{ mA}$		-0.6		
Gate-Source Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 5\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 8\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -8\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ °C}$			-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	
		$V_{GS} = -1.2\text{ V}, I_D = -1\text{ A}$		0.065	0.098	
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
				21	32	
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	$t_{d(on)}$	$V_{DD} = -4\text{ V}, R_L = 4\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 6\text{ }\Omega$		12	20	ns
Rise Time	$t_r$			25	40	
Turn-Off Delay Time	$t_{d(off)}$			260	390	
				155	240	
Fall Time	$t_f$					



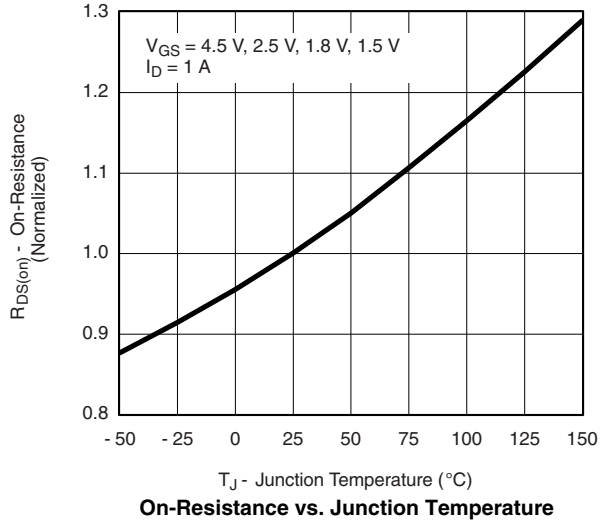
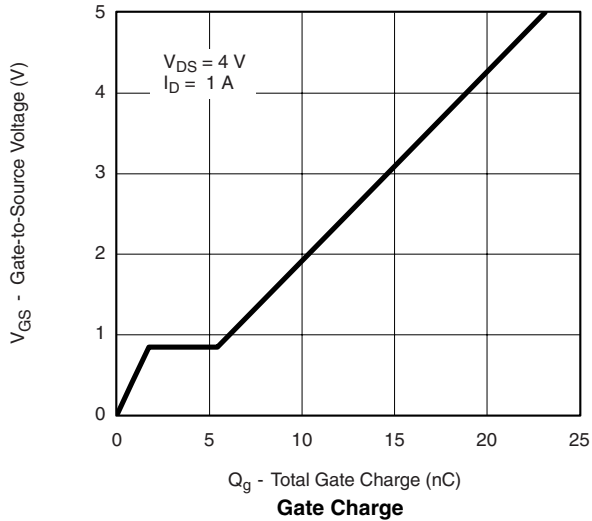
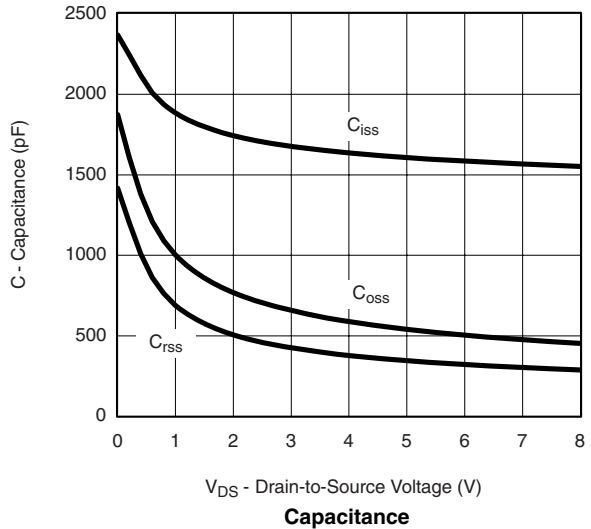
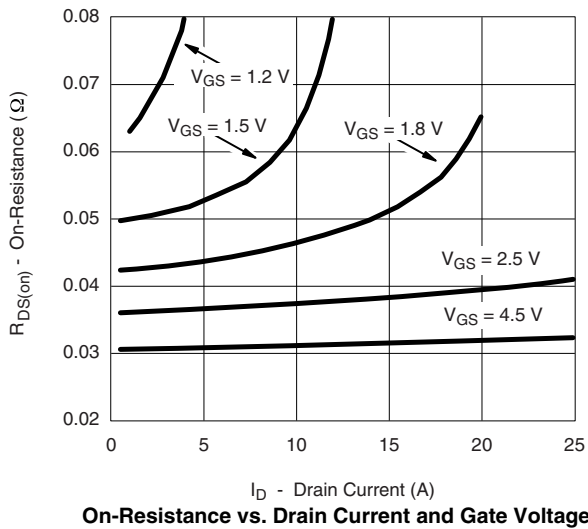
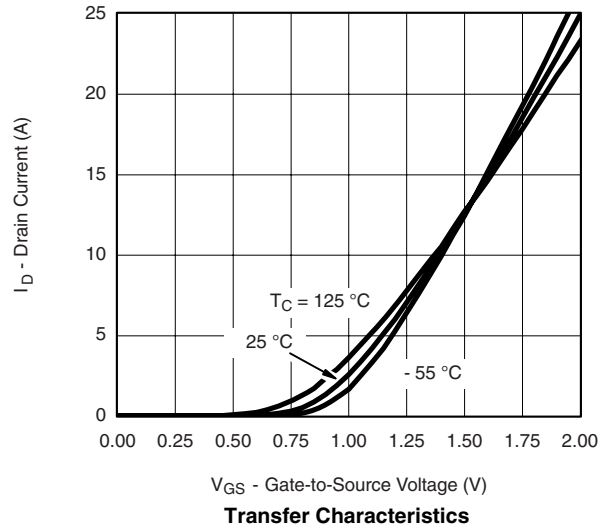
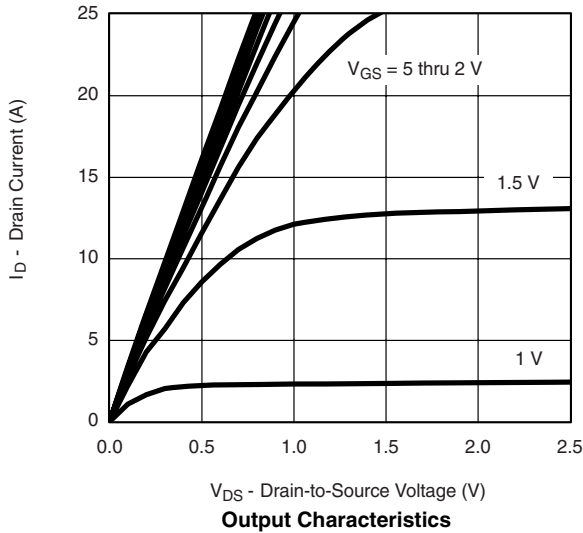
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Source-Drain Diode Current	$I_S$	$T_C = 25\text{ }^\circ\text{C}$			- 2.5	A
Pulse Diode Forward Current	$I_{SM}$				- 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	$t_{rr}$	$I_F = - 1\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		150	250	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			150	230	nC
Reverse Recovery Fall Time	$t_a$			57		ns
Reverse Recovery Rise Time	$t_b$			93		

Notes:

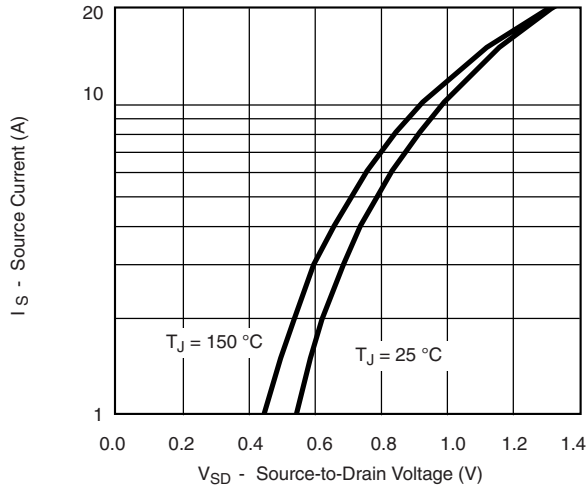
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

*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.*

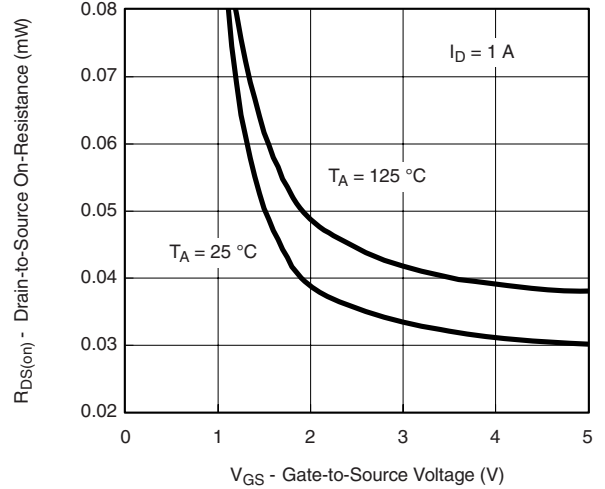
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



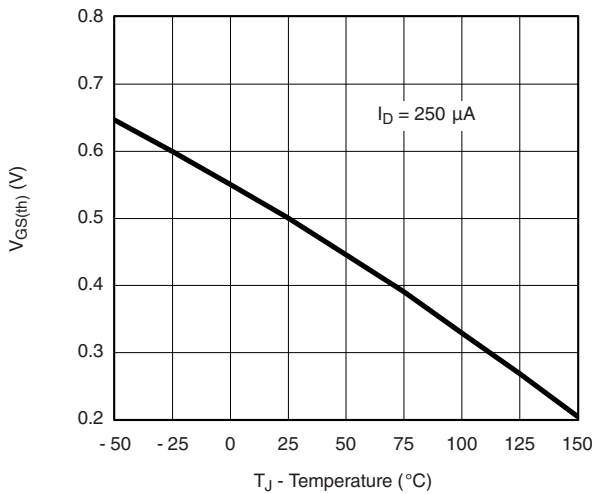
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



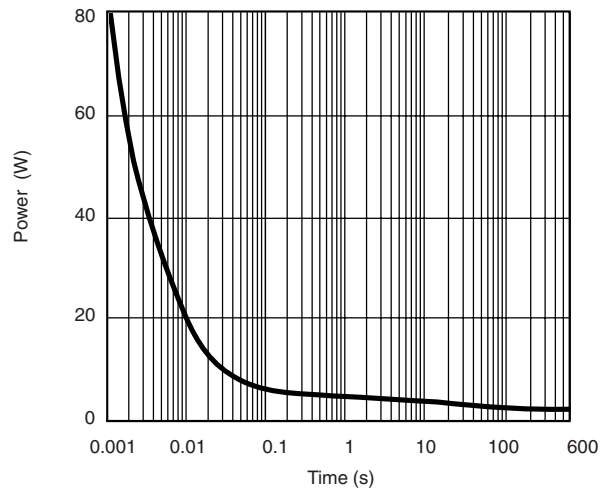
**Source-Drain Diode Forward Voltage**



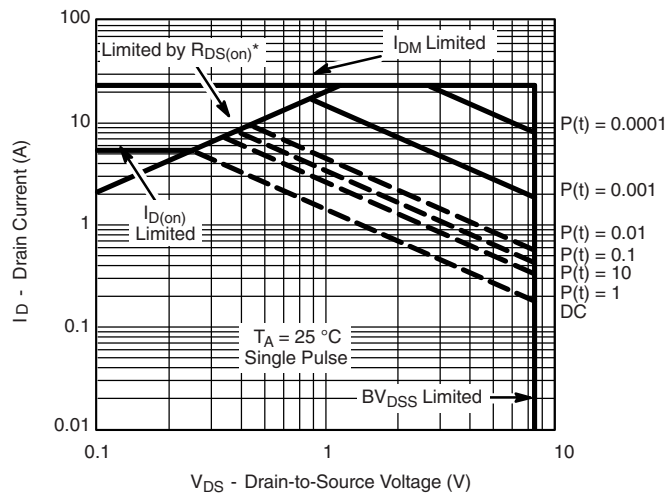
**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



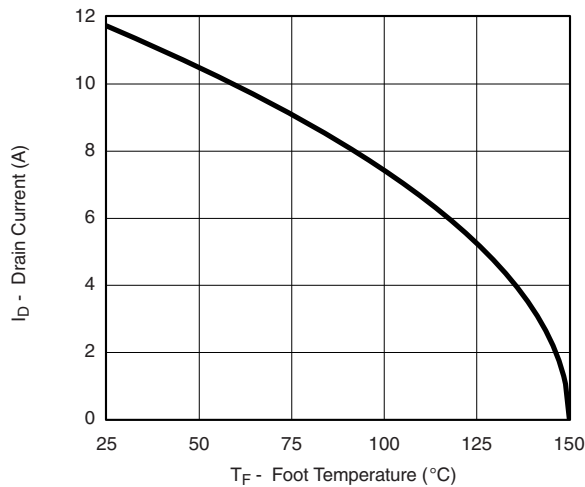
**Single Pulse Power, Junction-to-Ambient**



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

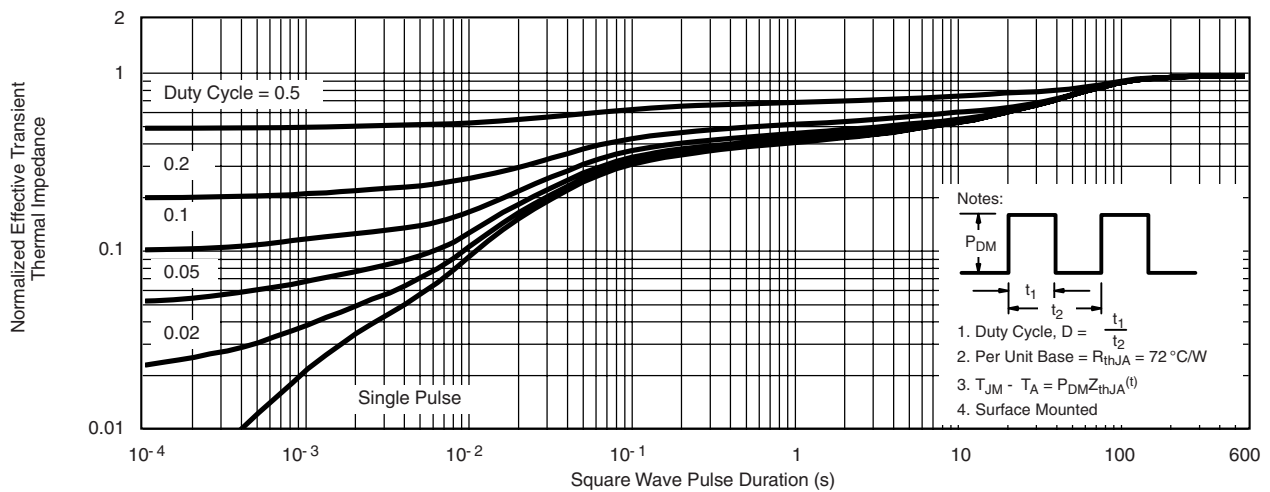
**Safe Operating Area, Junction-to-Ambient**

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted

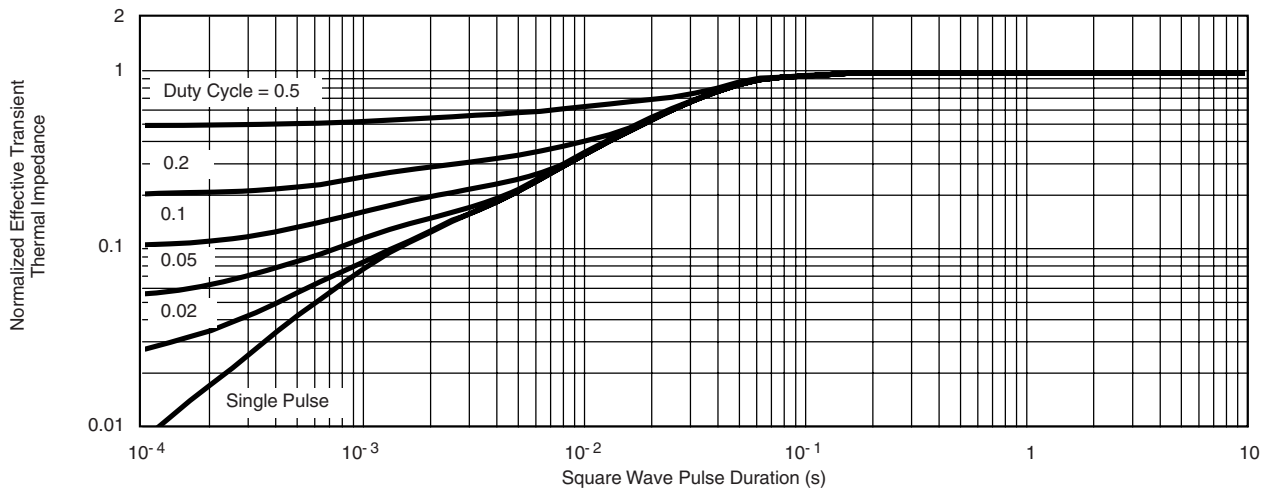


**Current Derating\***

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



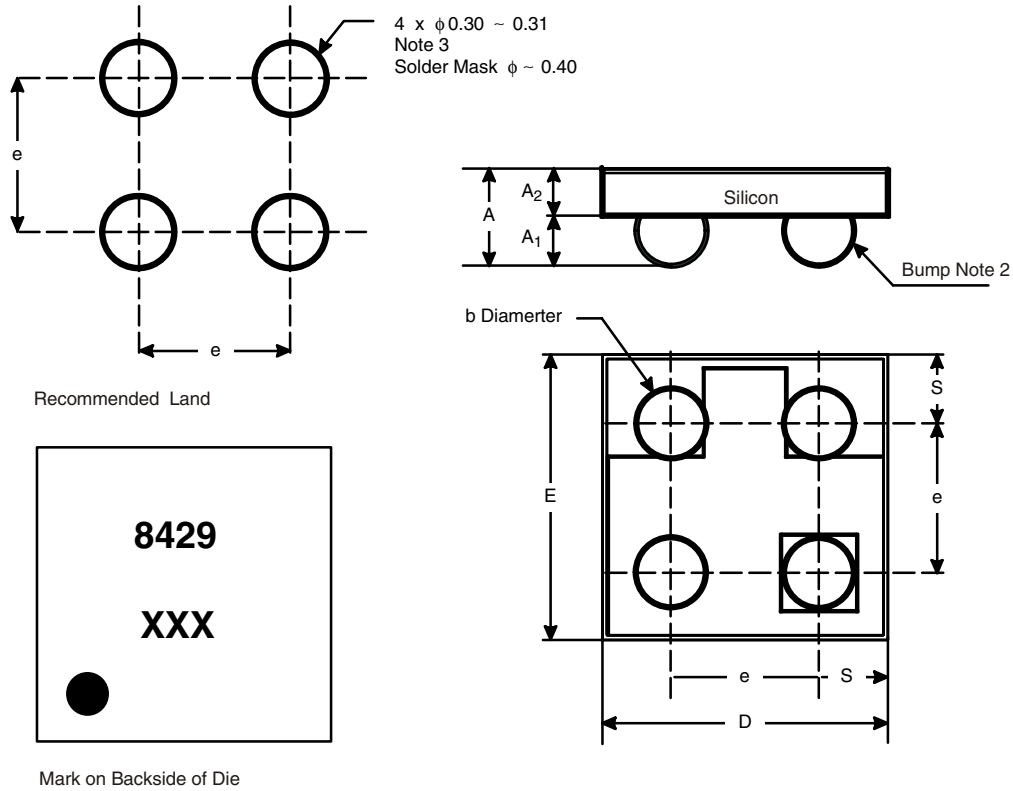
**Normalized Thermal Transient Impedance, Junction-to-Ambient**



**Normalized Thermal Transient Impedance, Junction-to-Foot**

**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 <sup>a</sup>		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

Notes:

- a. Use millimeters as the primary measurement

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