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

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]	Q_g (Typ.)
- 20	0.041 at V_{GS} = - 4.5 V	- 10.0	22 nC
	0.048 at V_{GS} = - 2.5 V	- 9.32	
	0.058 at V_{GS} = - 1.8 V	- 8.48	
	0.075 at V_{GS} = - 1.5 V	- 7.45	

FEATURES

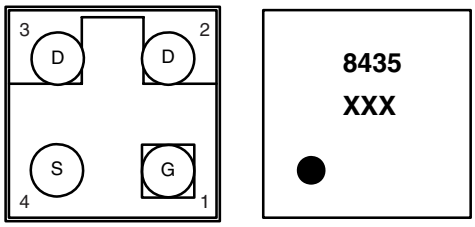
- TrenchFET® Power MOSFET
- Ultra Small MICRO FOOT® Chipscale Packaging Reduces Footprint Area, Profile (0.62 mm) and On-Resistance Per Footprint Area

Pb-free
RoHS COMPLIANT

APPLICATIONS

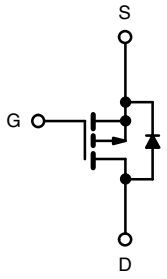
- Low Threshold Load Switch for Portable Devices
  - Low Power Consumption
  - Increased Battery Life

MICRO FOOT



Device Marking: 8435
xxx = Date/Lot Traceability Code

Ordering Information: Si8435DB-T1-E1 (Lead (Pb)-free)



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	- 20	V
Gate-Source Voltage		V_{GS}	± 5	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	- 10.0	A
	T_C = 70 °C		- 8.06	
	T_A = 25 °C		- 6.72[b,c]	
	T_A = 70 °C		- 5.37[b,c]	
Pulsed Drain Current		I_{DM}	- 15	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	- 5.21	
	T_A = 25 °C		- 2.31[b,c]	
Maximum Power Dissipation	T_C = 25 °C	P_D	6.25	W
	T_C = 70 °C		4.0	
	T_A = 25 °C		2.78[b,c]	
	T_A = 70 °C		1.78[b,c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C
Package Reflow Conditions[d]	IR/Convection		260	

Notes:
a. Based on T_C = 25 °C.
b. Surface Mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. Refer to IPC/JEDEC (J-STD-020C), no manual or hand soldering.
e. 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[a,b]		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 72 °C/W.

SPECIFICATIONS T_J = 25 °C, unless otherwise noted

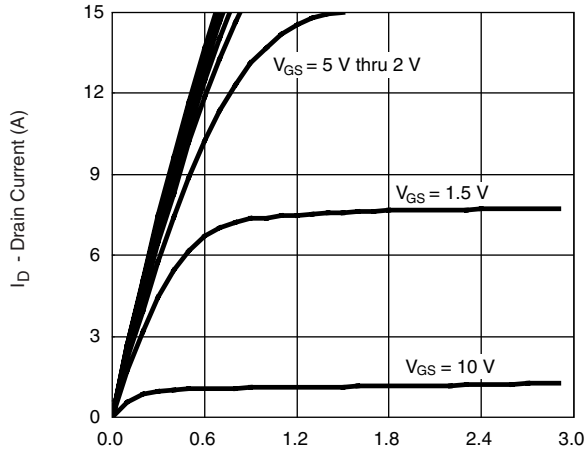
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = - 250 µA	- 20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = - 250 µA		- 15.5		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			2.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 0.35		- 1.0	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 5 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 20 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 20 V, V_{GS} = 0 V , T_J = 70 °C			- 10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \leq$ - 5 V, V_{GS} = - 4.5 V	- 15			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 1 A		0.034	0.041	Ω
		V_{GS} = - 2.5 V, I_D = - 1 A		0.040	0.048	
		V_{GS} = - 1.8 V, I_D = - 1 A		0.048	0.058	
		V_{GS} = - 1.5 V, I_D = - 1 A		0.055	0.075	
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 1 A		10.5	16	S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 10 V, V_{GS} = 0 V, f = 1 MHz		1600		pF
Output Capacitance	C_{oss}			265		
Reverse Transfer Capacitance	C_{rss}			175		
Total Gate Charge	Q_g	V_{DS} = - 10 V, V_{GS} = - 5 V, I_D = - 1 A		23	35	nC
		V_{DS} = - 16 V, V_{GS} = - 4.5 V, I_D = - 1 A		22	33	
Gate-Source Charge	Q_{gs}			3.25		
Gate-Drain Charge	Q_{gd}			1.95		
Gate Resistance	R_g	V_{GS} = - 0.1 V, f = 1 MHz		20		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 10 V, R_L = 10 Ω $I_D \cong$ - 1 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		15	23	ns
Rise Time	t_r			29	44	
Turn-Off Delay Time	$t_{d(off)}$			230	345	
Fall Time	t_f			91	137	

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			- 5.21	A
Pulse Diode Forward Current	I_{SM}				- 15	
Body Diode Voltage	V_{SD}	I_S = - 1 A, V_{GS} = 0 V		0.6	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = - 1 A, dI/dt = 100 A/µs, T_J = 25 °C		116	174	ns
Body Diode Reverse Recovery Charge	Q_{rr}			203	305	nC
Reverse Recovery Fall Time	t_a			45		ns
Reverse Recovery Rise Time	t_b			71		

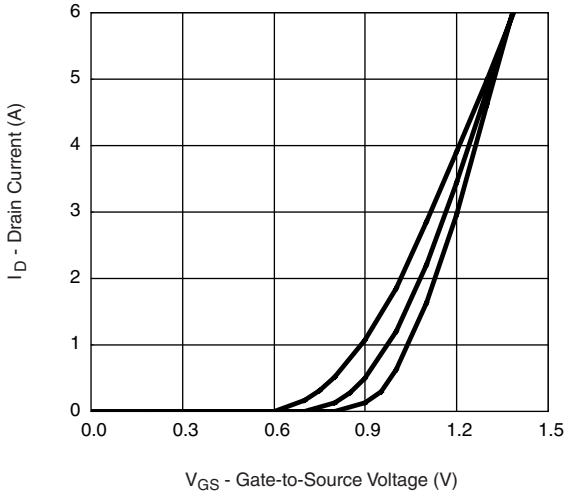
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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 T_A = 25 °C, unless otherwise noted

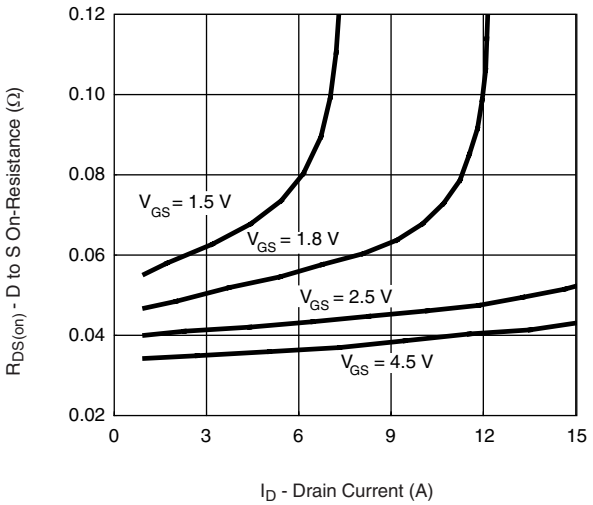


Output Characteristics

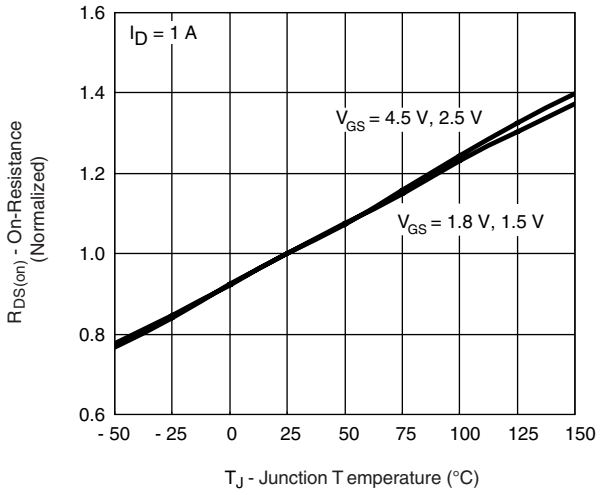


Transfer Characteristics

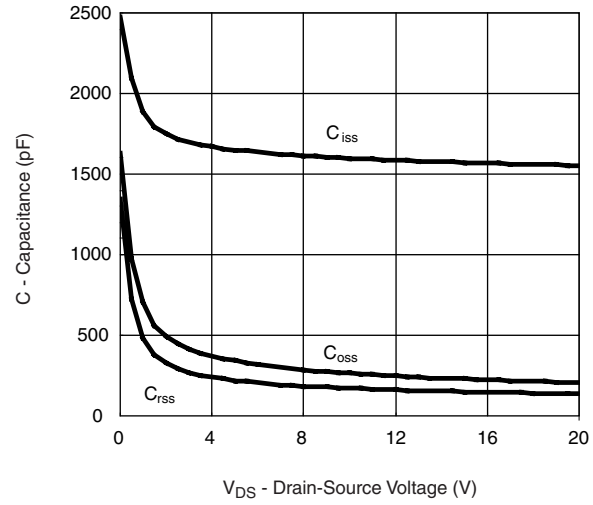
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



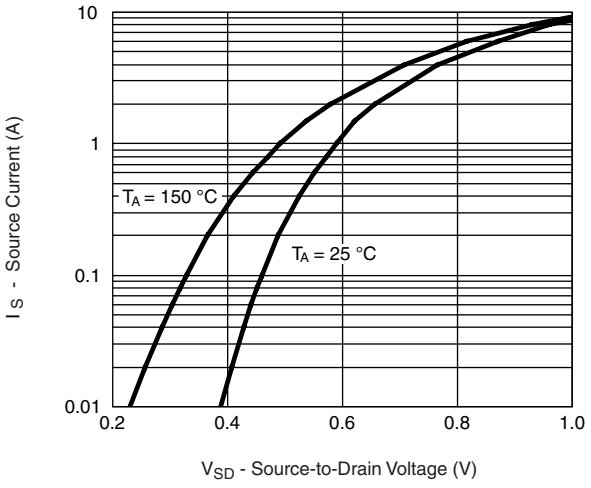
$R_{DS(on)}$ vs. Drain Current



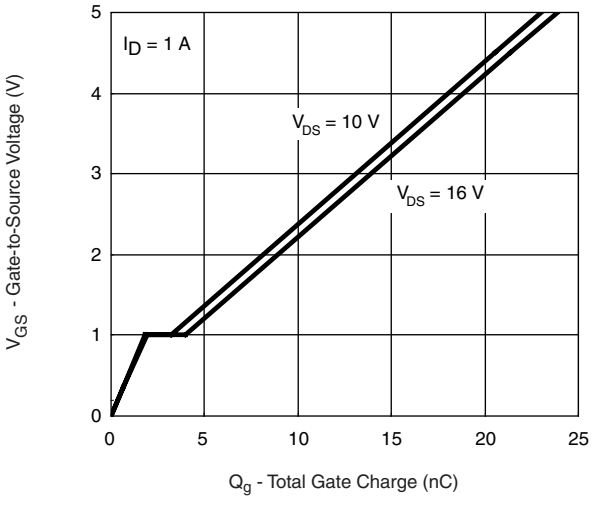
On-Resistance vs. Junction Temperature



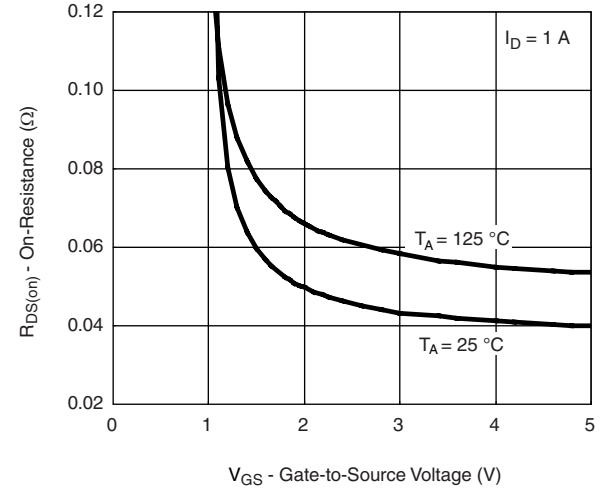
Capacitance



Forward Diode Voltage vs. Temp.

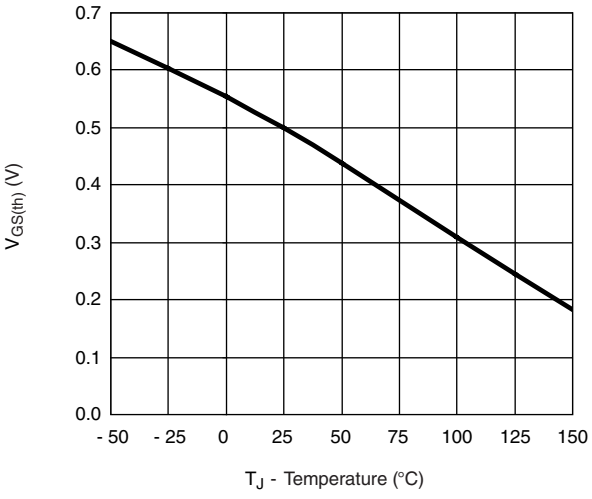


Gate Charge

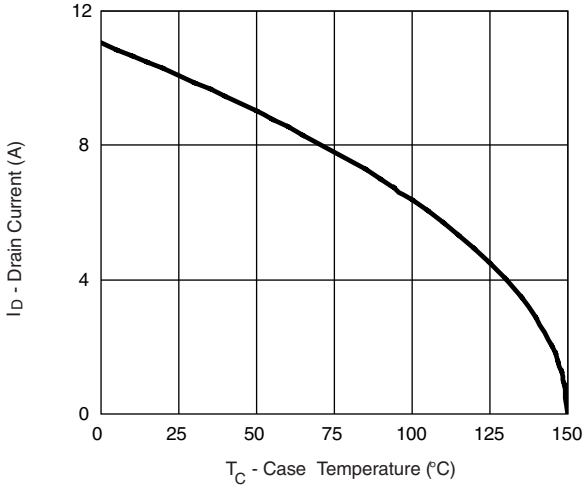


$R_{DS(on)}$ vs. V_{GS} vs Temperature

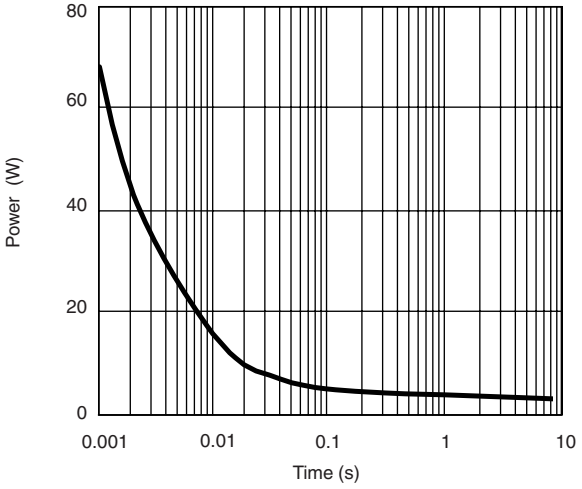
TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



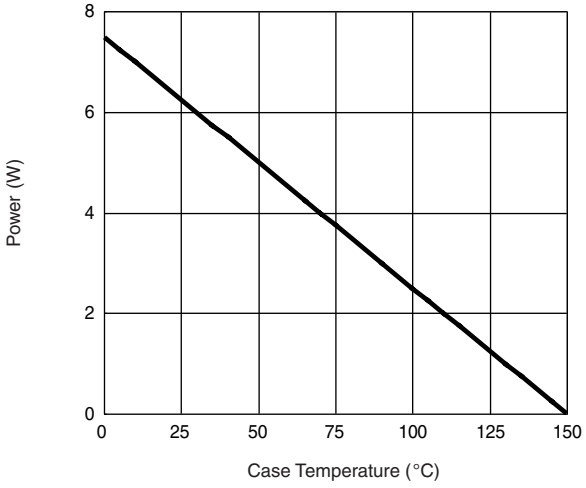
Threshold Voltage



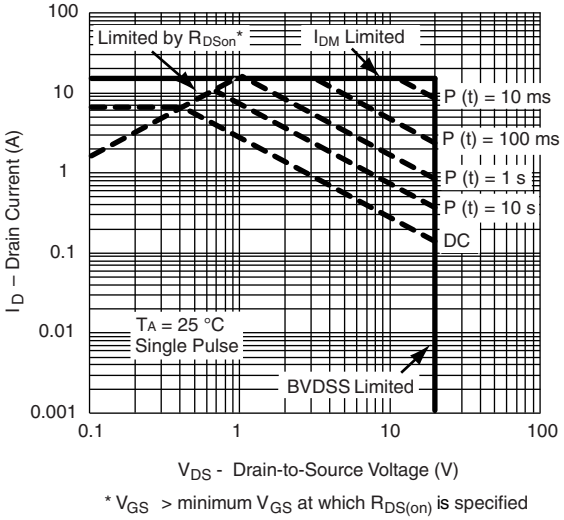
Current Derating**



Single Pulse Power, Juncion-to-Ambient



Power Derating

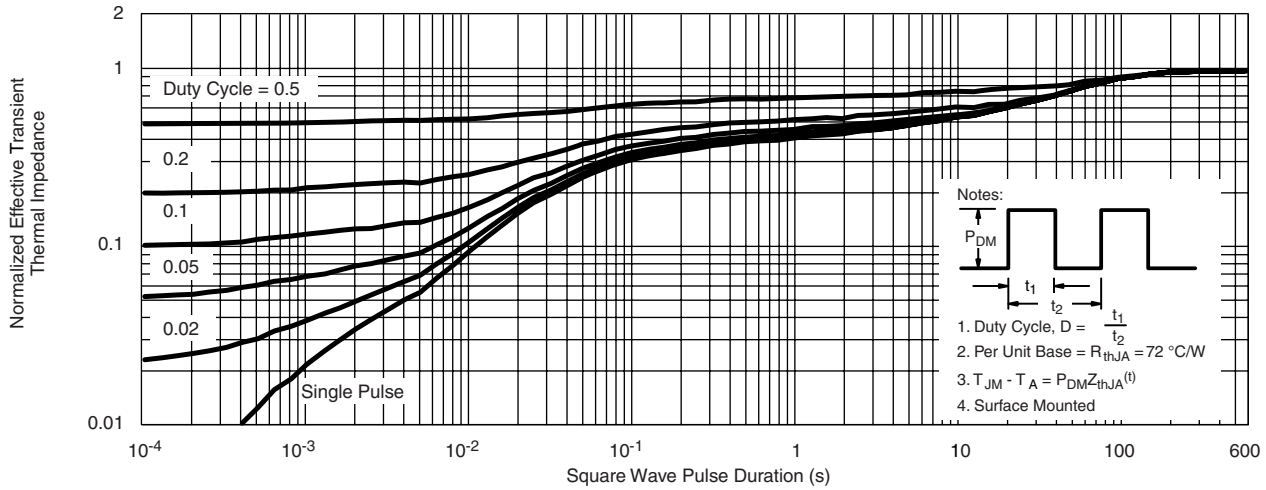


* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

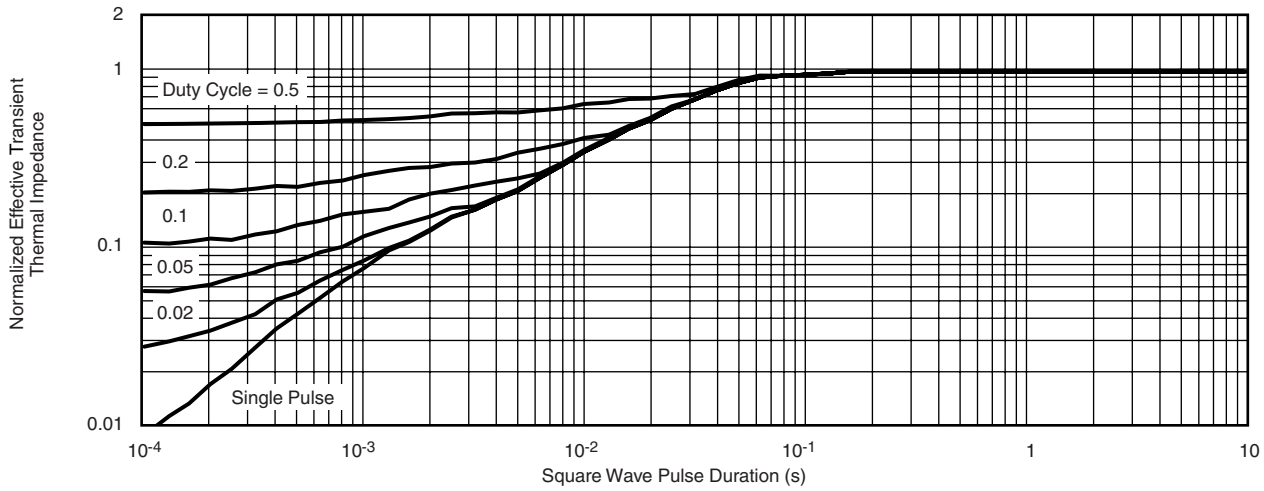
Safe Operating Area, Junction-to-Ambient

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

TYPICAL CHARACTERISTICS T_A = 25 °C, unless otherwise noted



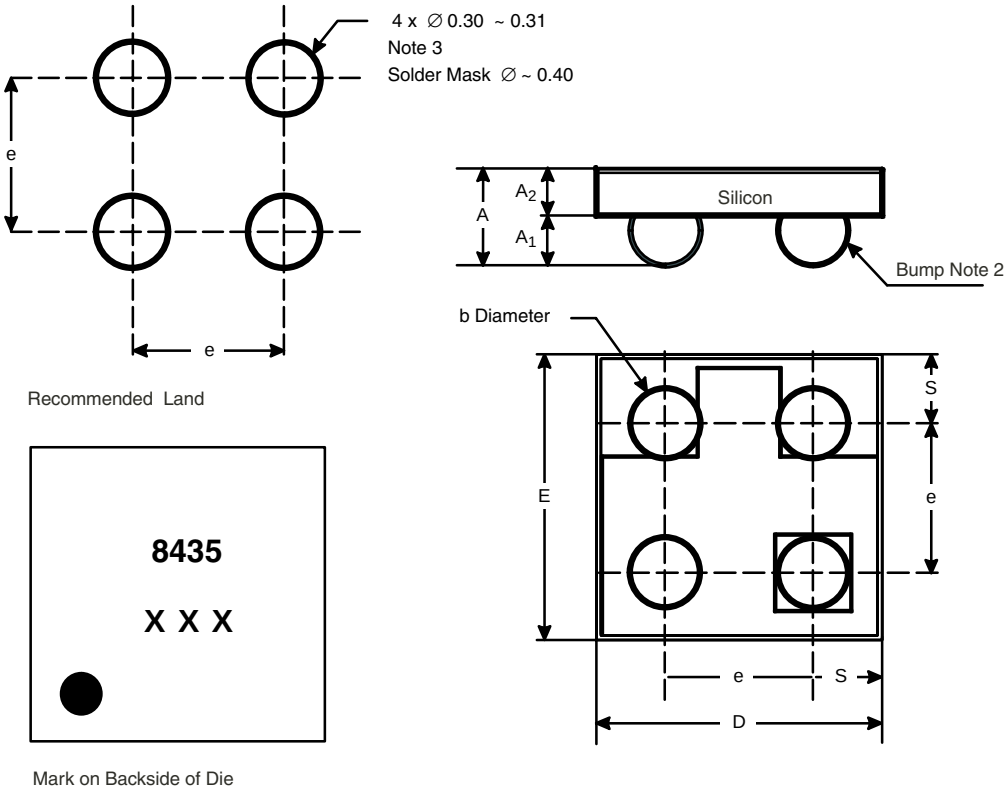
Normalized Thermal Transient Impedance, Junction-to-Ambient



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[a]		Inches	
	Min.	Max.	Min.	Max.
A	0.600	0.650	0.0236	0.0256
A_1	0.260	0.290	0.0102	0.0114
A_2	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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