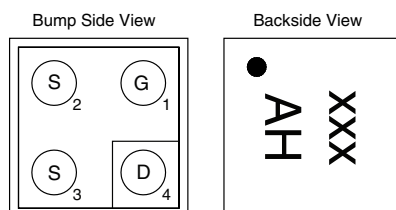


N-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω) Max.	I_D (A) ^a	Q_g (Typ.)
30	0.109 at $V_{GS} = 10$ V	2.3	2.4 nC
	0.116 at $V_{GS} = 4.5$ V	2.3	
	0.123 at $V_{GS} = 3.7$ V	2.2	
	0.142 at $V_{GS} = 2.5$ V	2.0	

MICRO FOOT



Device Marking: xxx = Date/Lot Traceability Code
AH

Ordering Information: Si8816EDB-T2-E1 (Lead (Pb)-free and Halogen-free)

FEATURES

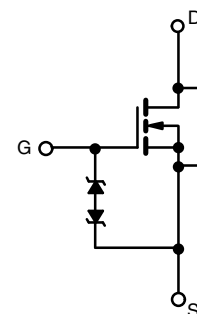
- TrenchFET[®] Power MOSFET
- Ultra Small 0.8 mm x 0.8 mm Outline
- Ultra Thin 0.4 mm max. Height
- Typical ESD Protection 1700 V (HBM)
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Load Switch
- OVP Switch
- High Speed Switching
- DC/DC Converters
- For Smart Phones, Tablet PCs and Mobile Computing



N-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}	± 12	
Continuous Drain Current ($T_J = 150$ °C)	$T_A = 25$ °C	2.3 ^a	A
	$T_A = 70$ °C	1.9 ^a	
	$T_A = 25$ °C	1.5 ^b	
	$T_A = 70$ °C	1.2 ^b	
Pulsed Drain Current ($t = 300$ μ s)	I_{DM}	8	
Continuous Source-Drain Diode Current	$T_A = 25$ °C	0.7 ^a	
	$T_A = 25$ °C	0.4 ^b	
Maximum Power Dissipation	$T_A = 25$ °C	0.9 ^a	W
	$T_A = 70$ °C	0.6 ^a	
	$T_A = 25$ °C	0.5 ^b	
	$T_A = 70$ °C	0.3 ^b	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) ^c		260	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, d}	R_{thJA}	105	135	°C/W
Maximum Junction-to-Ambient ^{b, e}		200	260	

Notes:

- Surface mounted on 1" x 1" FR4 board with full copper, $t = 5$ s.
- Surface mounted on 1" x 1" FR4 board with minimum copper, $t = 5$ s.
- Refer to IPC/JEDEC (J-STD-020), no manual or hand soldering.
- Maximum under steady state conditions is 185 °C/W.
- Maximum under steady state conditions is 330 °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	30			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		30		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 3.2		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.6		1.4	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 4.5 V			± 0.1	μA
		V _{DS} = 0 V, V _{GS} = ± 12 V			± 1	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			1	
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C			10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	10			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 1 A		0.087	0.109	Ω
		V _{GS} = 4.5 V, I _D = 1 A		0.093	0.116	
		V _{GS} = 3.7 V, I _D = 1 A		0.096	0.123	
		V _{GS} = 2.5 V, I _D = 0.5 A		0.110	0.142	
Forward Transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 1 A		10		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		195		pF
Output Capacitance	C _{oss}			35		
Reverse Transfer Capacitance	C _{rss}			15		
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 1 A		4.4	8	nC
		V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 1 A		2.4	4.5	
Gate-Source Charge	Q _{gs}			0.35		
Gate-Drain Charge	Q _{gd}			0.55		
Gate Resistance	R _g	f = 1 MHz		4		Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 15 Ω I _D ≅ 1 A, V _{GEN} = 4.5 V, R _g = 1 Ω		15	30	ns
Rise Time	t _r			20	40	
Turn-Off Delay Time	t _{d(off)}			20	40	
Fall Time	t _f			10	20	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 15 Ω I _D ≅ 1 A, V _{GEN} = 10 V, R _g = 1 Ω		5	10	
Rise Time	t _r			10	20	
Turn-Off Delay Time	t _{d(off)}			15	30	
Fall Time	t _f			5	10	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			0.7	A
Pulse Diode Forward Current	I _{SM}				8	
Body Diode Voltage	V _{SD}	I _S = 1 A, V _{GS} = 0 V		0.75	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 1 A, dI/dt = 100 A/μs, T _J = 25 °C		16	30	ns
Body Diode Reverse Recovery Charge	Q _{rr}			6	12	nC
Reverse Recovery Fall Time	t _a			13.5		ns
Reverse Recovery Rise Time	t _b			2.5		

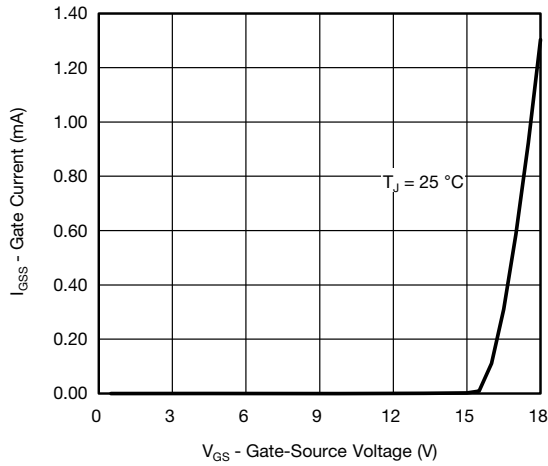
Notes:

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

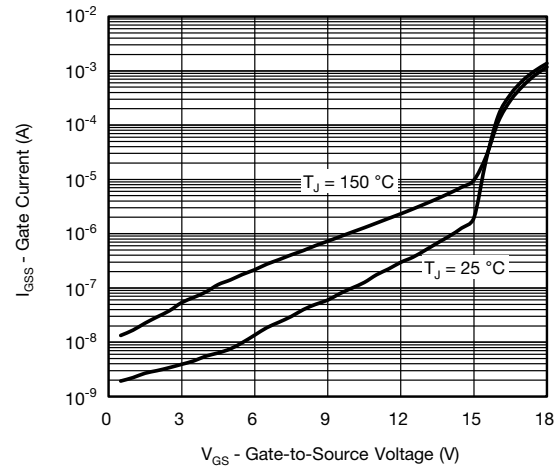
b. Guaranteed by design, not subject to production testing.

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.

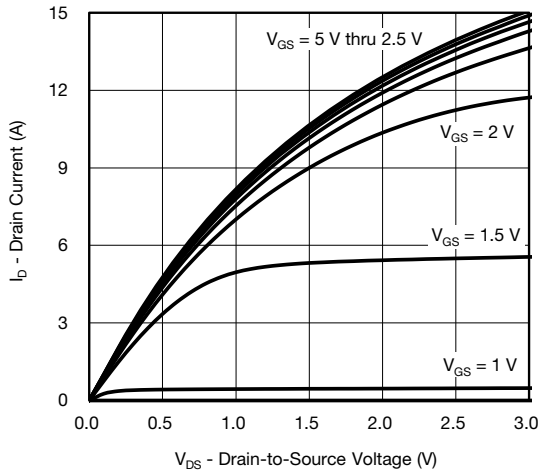
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



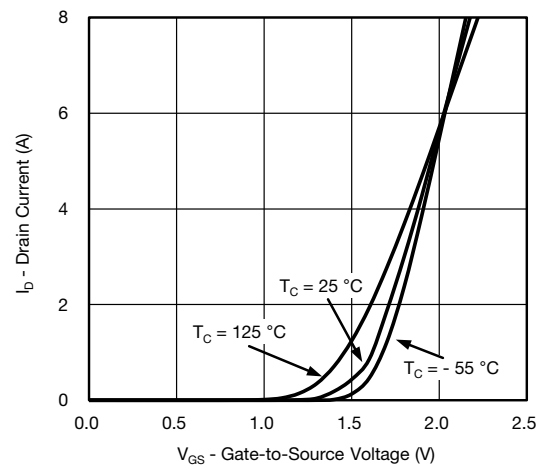
Gate Current vs. Gate-Source Voltage



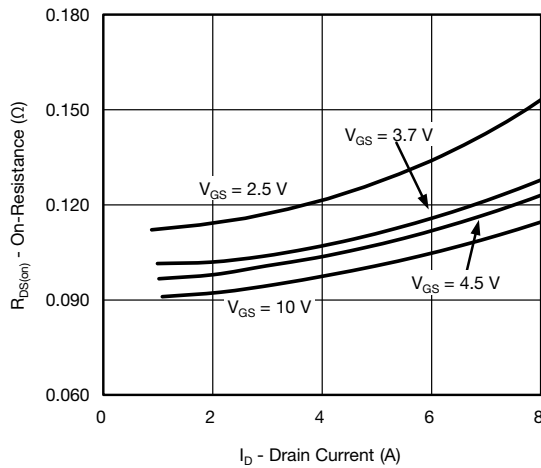
Gate Current vs. Gate-Source Voltage



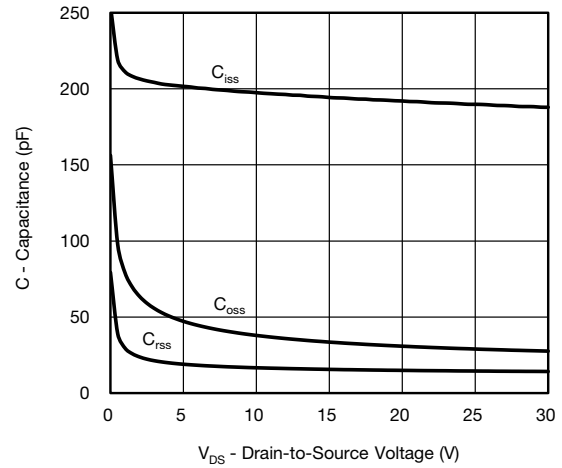
Output Characteristics



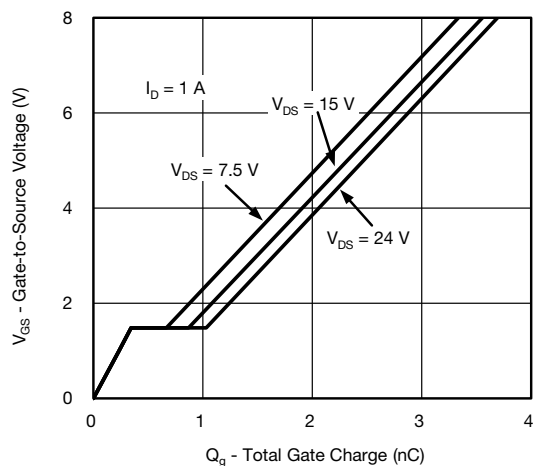
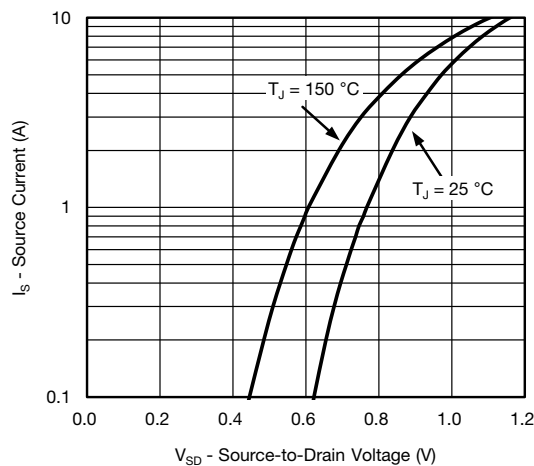
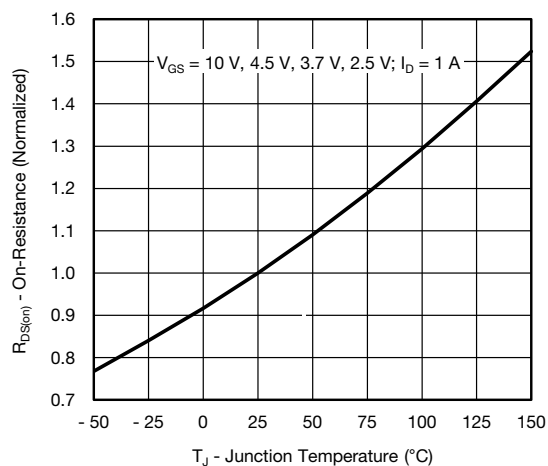
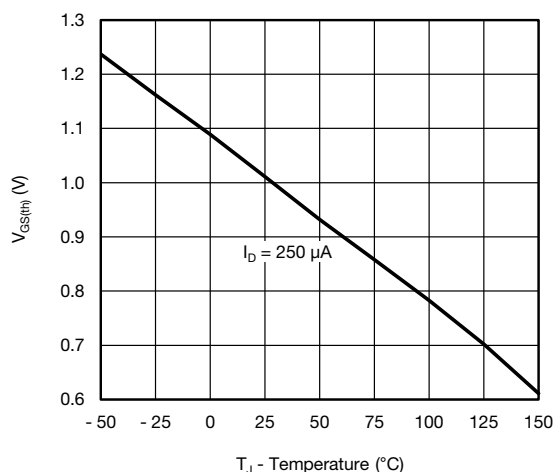
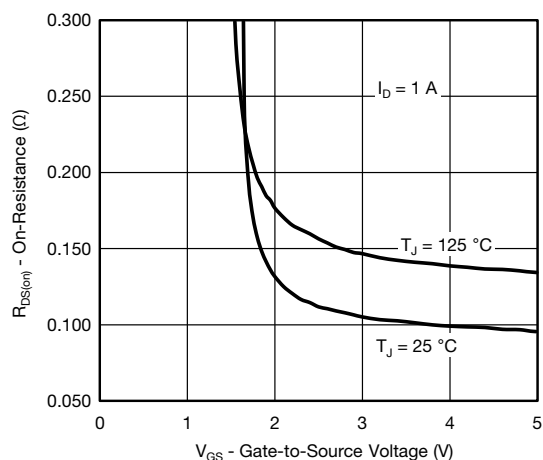
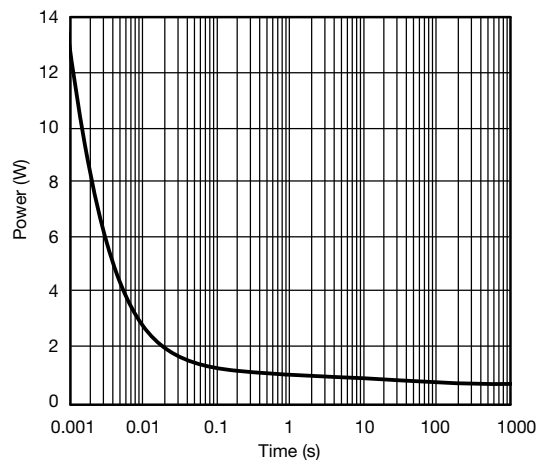
Transfer Characteristics



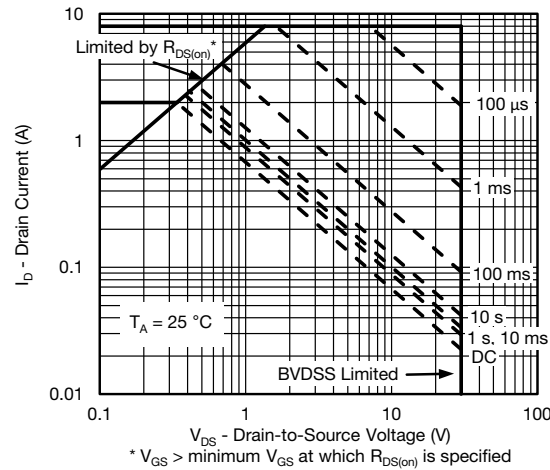
On-Resistance vs. Drain Current



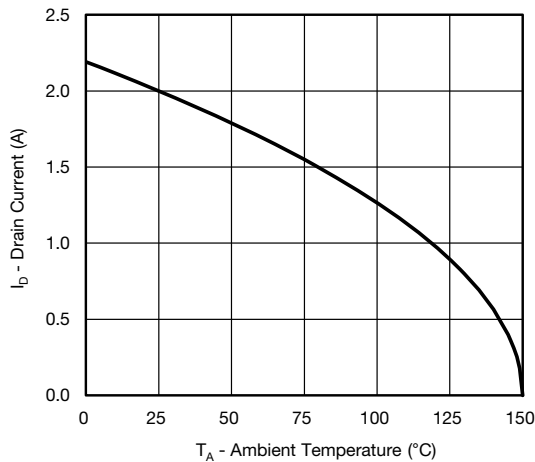
Capacitance vs. Drain-to-Source Voltage

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**Gate Charge****Source-Drain Diode Forward Voltage****On-Resistance vs. Junction Temperature****Threshold Voltage****On-Resistance vs. Gate-to-Source Voltage****Single Pulse Power (Junction-to-Ambient)**

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



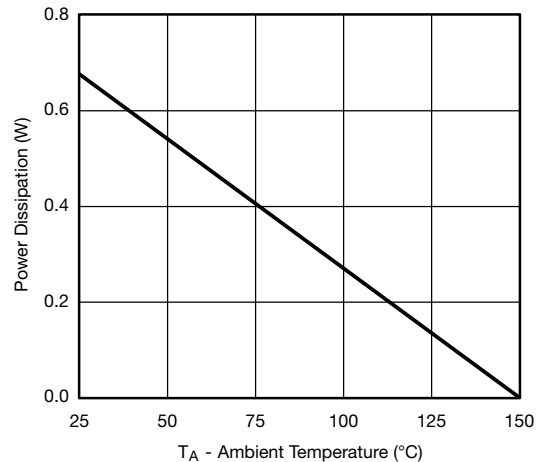
Safe Operating Area, Junction-to-Ambient



Current Derating*

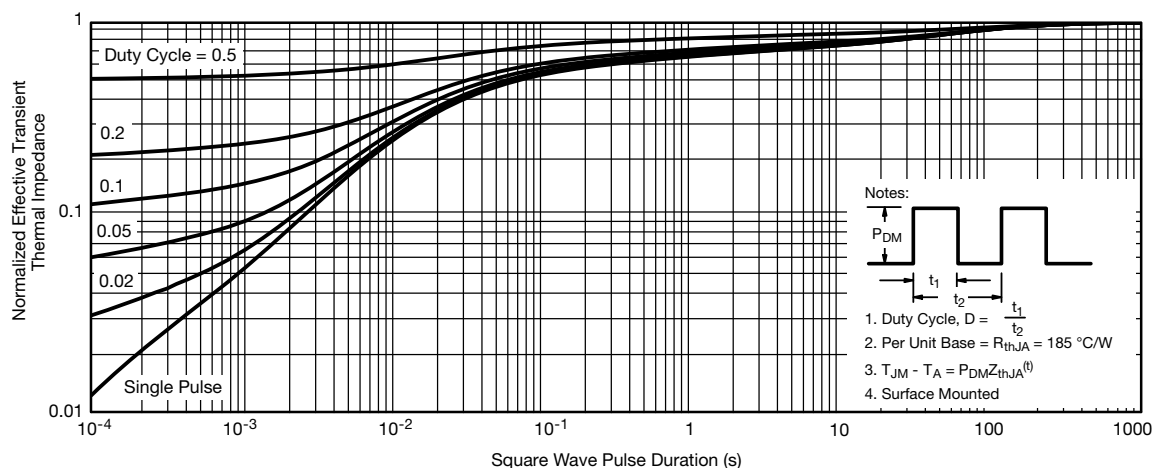
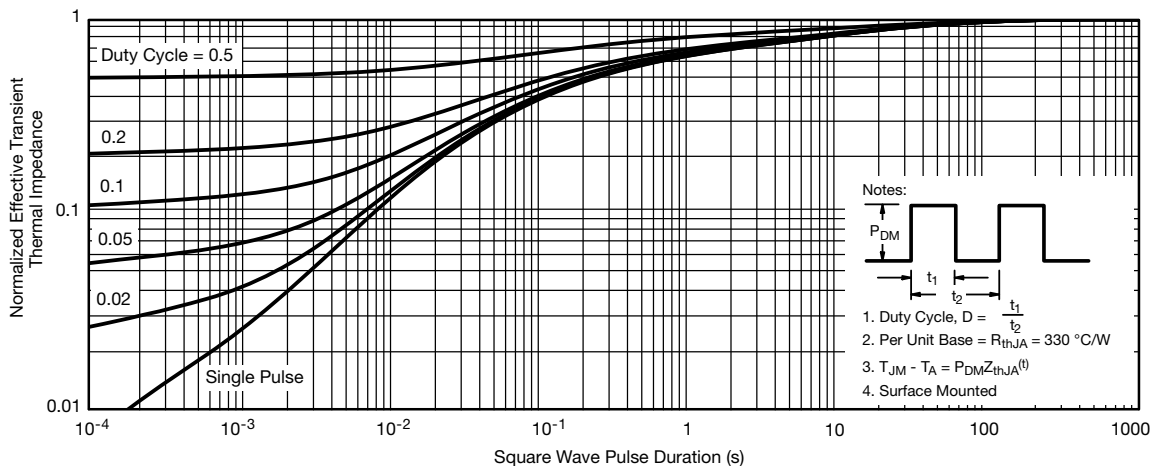
Note:

When mounted on 1" x 1" FR4 with full copper.



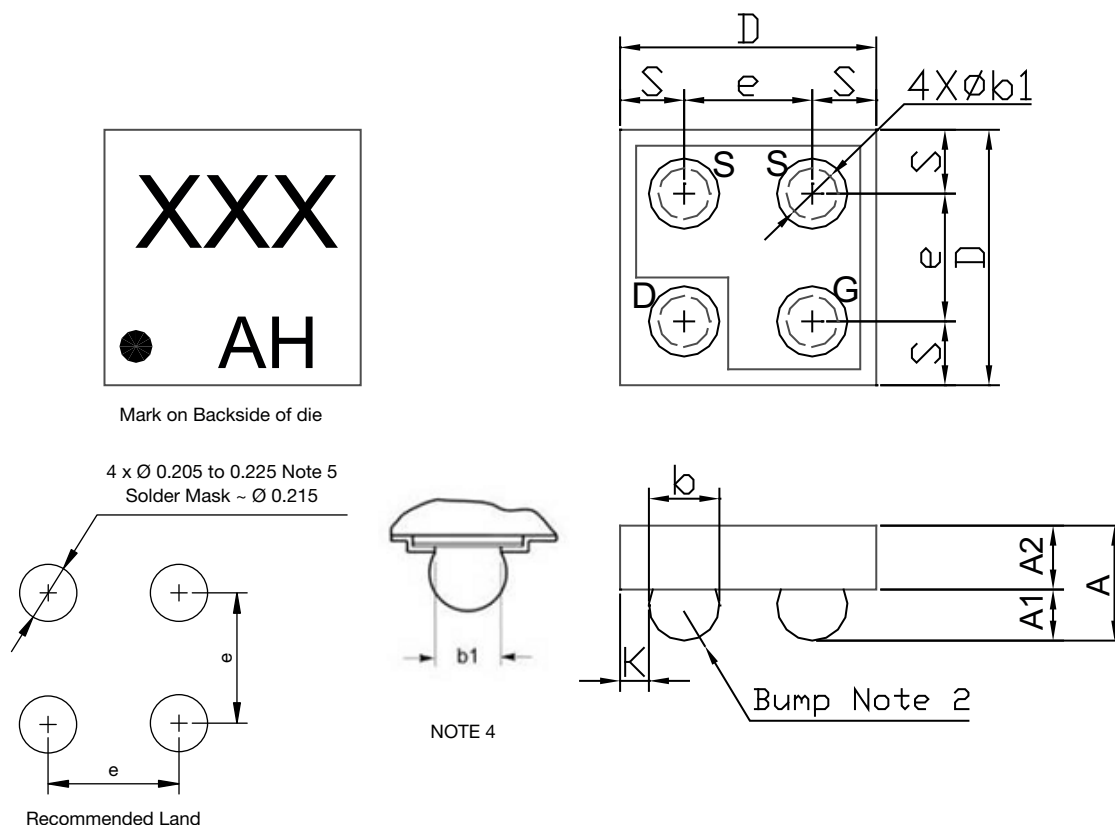
Power Derating

* The power dissipation P_D is based on $T_{J(max)} = 150^\circ\text{C}$, using junction-to-ambient 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)**Normalized Thermal Transient Impedance, Junction-to-Ambient (On 1" x 1" FR4 board with maximum copper)****Normalized Thermal Transient Impedance, Junction-to-Ambient (on 1" x 1" FR4 board with minimum copper)**

PACKAGE OUTLINE

MICRO FOOT 0.8 mm x 0.8 mm: 4-BUMP (0.4 mm PITCH)



Notes (Unless otherwise specified):

1. Laser mark on the backside surface of die.
2. Bumps are 95.5 % Sn, 3.8 % Ag, 0.7 % Cu.
3. * is location of pin 1.
4. "b1" is the diameter of the solderable substrate surface, defined by an opening in the solder resist layer solder mask defined.
5. Non-solder mask defined copper landing pad.

Dim.	Millimeters ^a			Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	0.320	0.360	0.400	0.0125	0.0141	0.0157
A ₁	0.136	0.160	0.184	0.0053	0.0062	0.0072
A ₂	0.199	0.200	0.201	0.0078	0.0078	0.0079
b	0.200	0.220	0.240	0.0078	0.0086	0.0094
b ₁	0.175			0.0068		
e	0.400			0.0157		
s	0.180	0.200	0.220	0.0070	0.0078	0.0086
D	0.760	0.800	0.840	0.0299	0.0314	0.0330
K	0.060	0.090	0.120	0.0023	0.0035	0.0047

Notes:

- a. Use millimeters as the primary measurement.

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