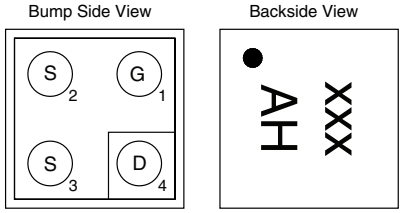
N-Channel 30 V (D-S) MOSFET

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)

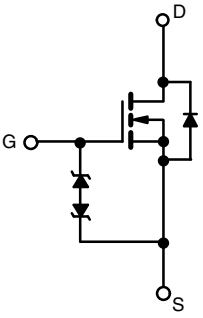
FEATURES

- 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

Pb-free
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	I_D	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 µs)		I_{DM}	8	
Continuous Source-Drain Diode Current	T_A = 25 °C	I_S	0.7[a]	
	T_A = 25 °C		0.4[b]	
Maximum Power Dissipation	T_A = 25 °C	P_D	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]	t ≤ 5 s	R_{thJA}	105	135	°C/W
Maximum Junction-to-Ambient[b, e]			200	260	

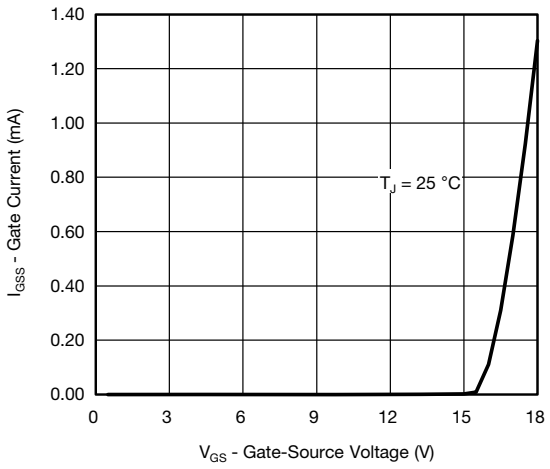
Notes:
a. Surface mounted on 1" x 1" FR4 board with full copper, t = 5 s.
b. Surface mounted on 1" x 1" FR4 board with minimum copper, t = 5 s.
c. Refer to IPC/JEDEC (J-STD-020), no manual or hand soldering.
d. Maximum under steady state conditions is 185 °C/W.
e. Maximum under steady state conditions 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	$\Delta V_{DS}/T_J$	I_D = 250 µA		30		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 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]	$I_{D(on)}$	$V_{DS} \geq$ 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 $I_D \cong$ 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 $I_D \cong$ 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		

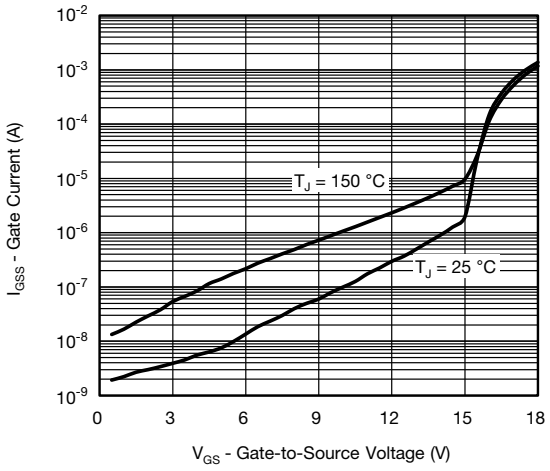
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing.

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.

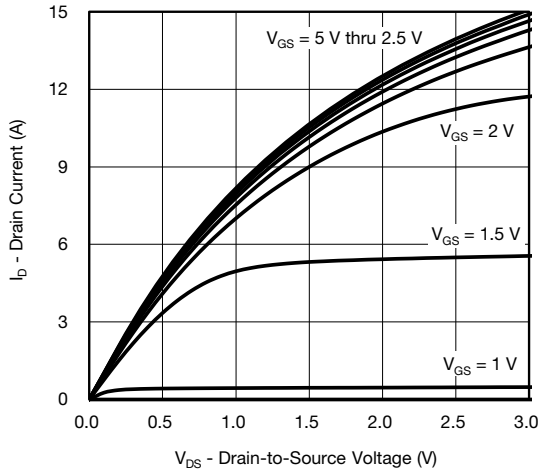
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



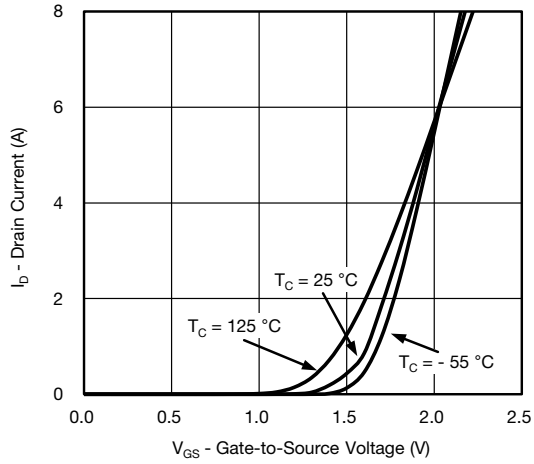
Gate Current vs. Gate-Source Voltage



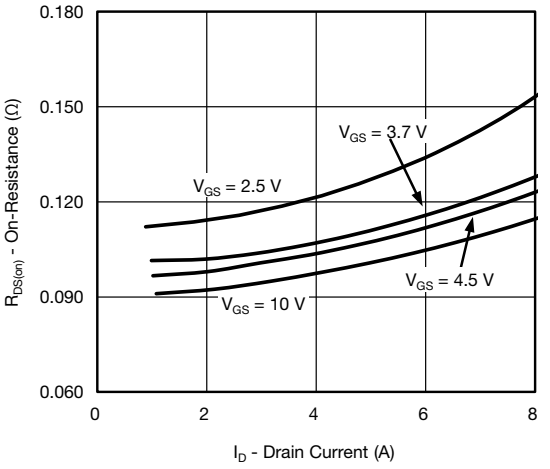
Gate Current vs. Gate-Source Voltage



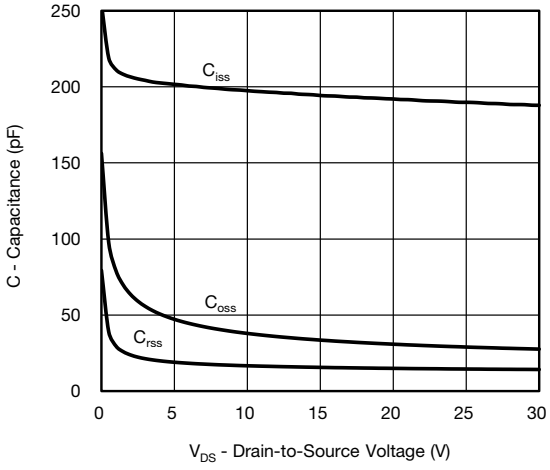
Output Characteristics



Transfer Characteristics

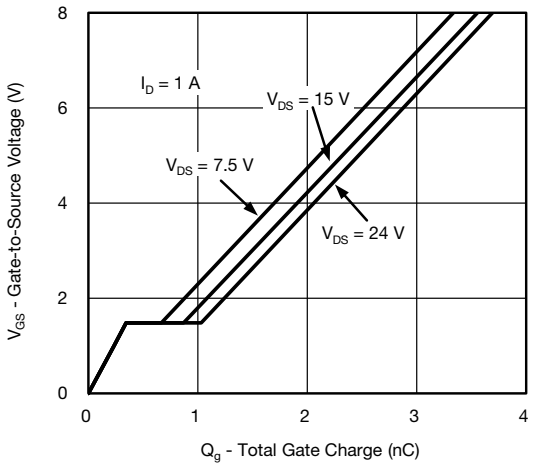


On-Resistance vs. Drain Current

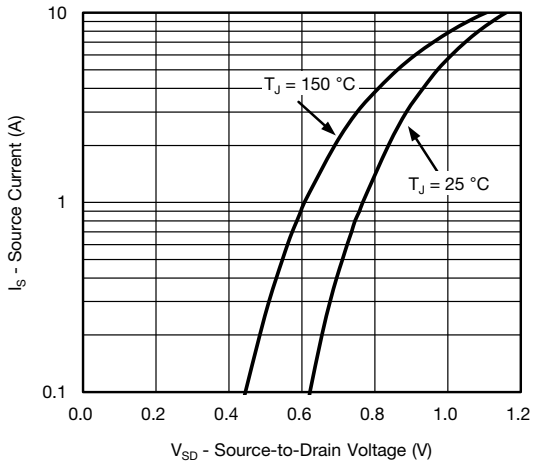


Capacitance vs. Drain-to-Source Voltage

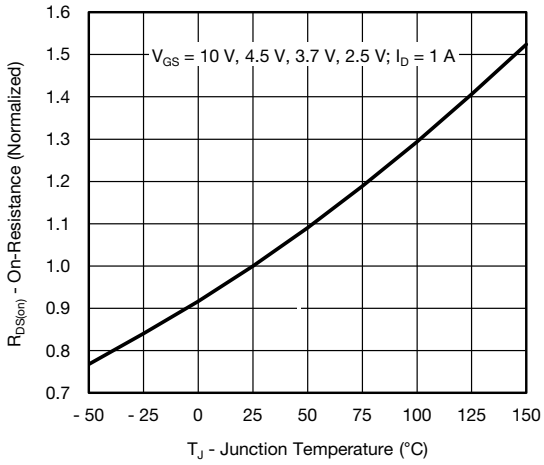
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



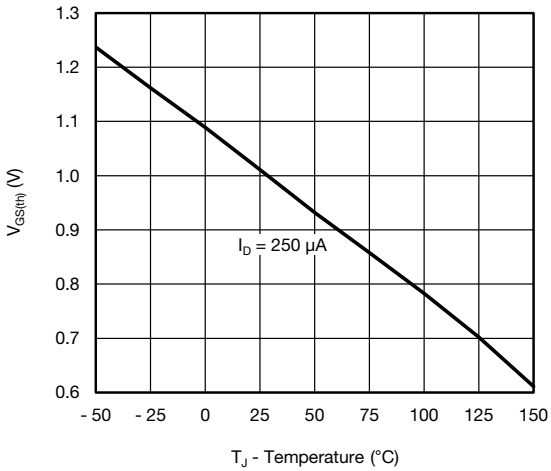
Gate Charge



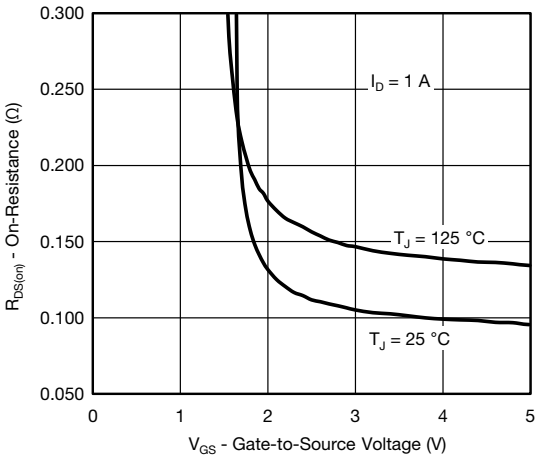
Source-Drain Diode Forward Voltage



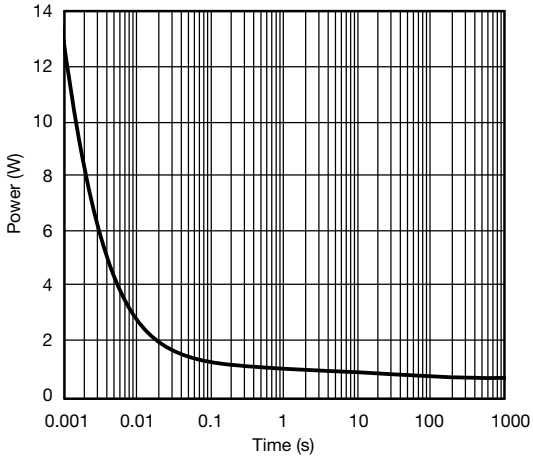
On-Resistance vs. Junction Temperature



Threshold Voltage



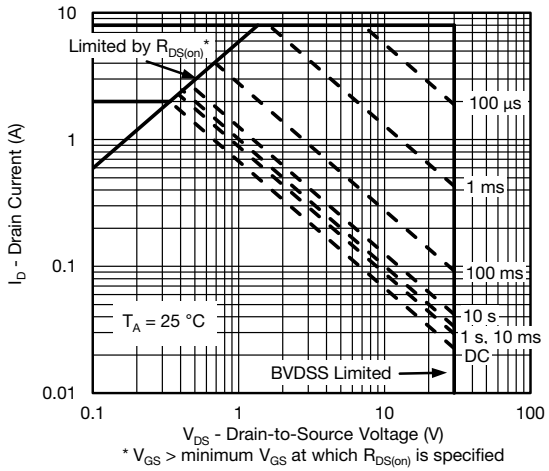
On-Resistance vs. Gate-to-Source Voltage



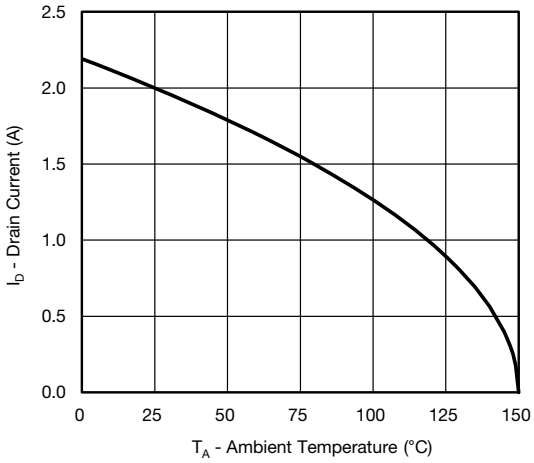
Single Pulse Power (Junction-to-Ambient)

For technical questions, contact: pmostechsupport@vishay.com
Document Number: 62834
S13-0626-Rev. A, 25-Mar-13

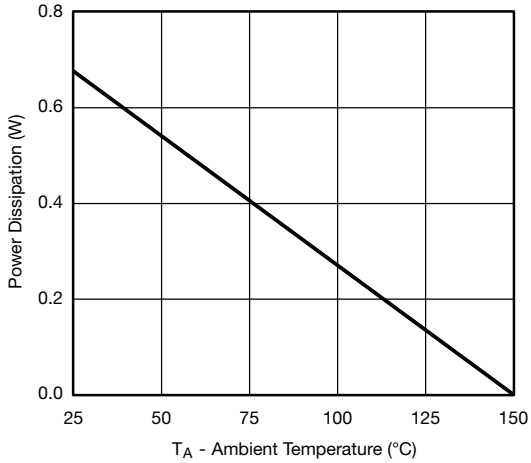
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Safe Operating Area, Junction-to-Ambient



Current Derating*

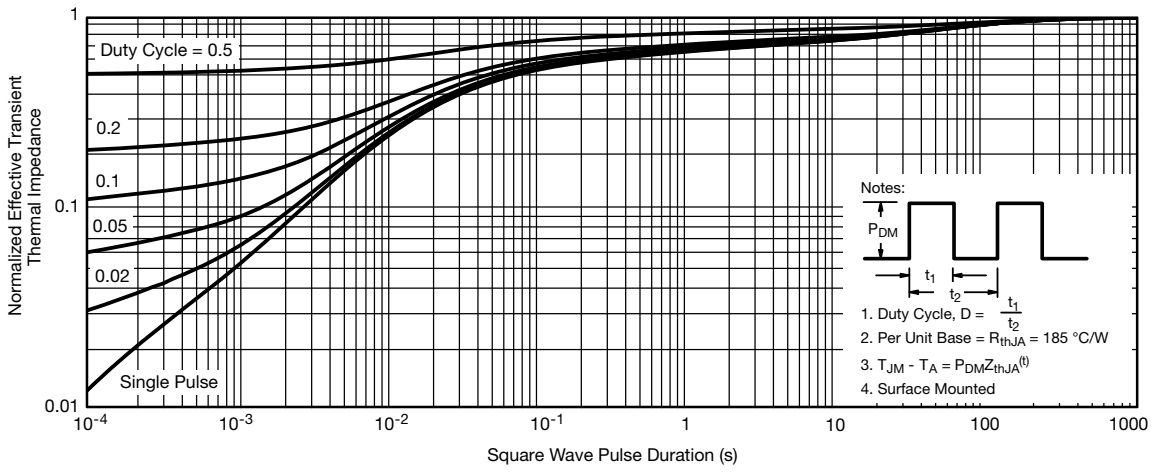


Power Derating

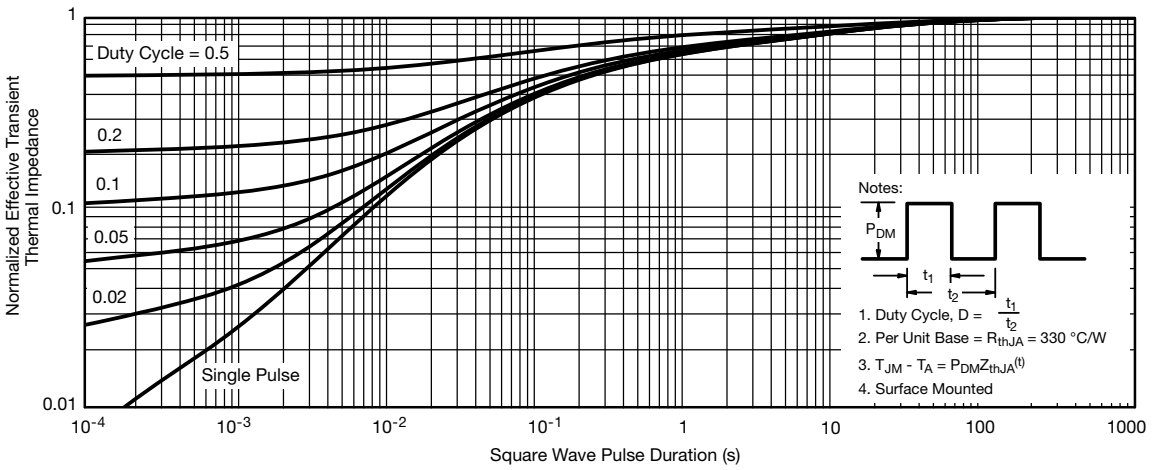
Note:
When mounted on 1" x 1" FR4 with full copper.

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



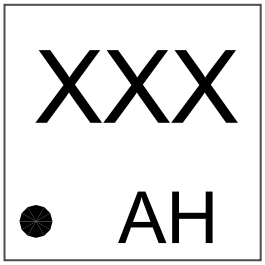
Normalized Thermal Transient Impedance, Junction-to-Ambient (On 1" x 1" FR4 board with maximum copper)



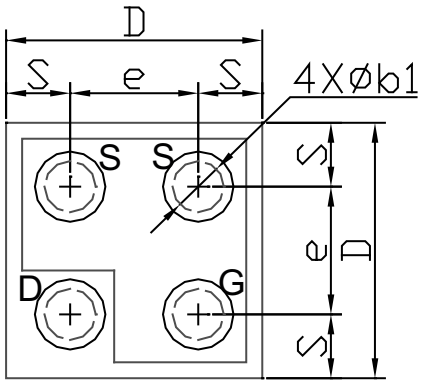
Normalized Thermal Transient Impedance, Junction-to-Ambient (on 1" x 1" FR4 board with minimum copper)

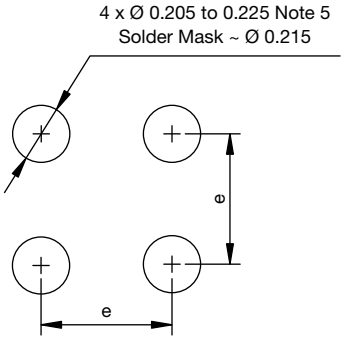
PACKAGE OUTLINE

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

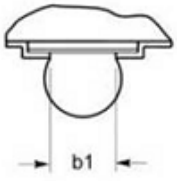


Mark on Backside of die

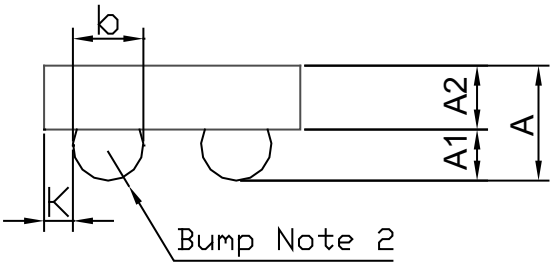




Recommended Land



NOTE 4



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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