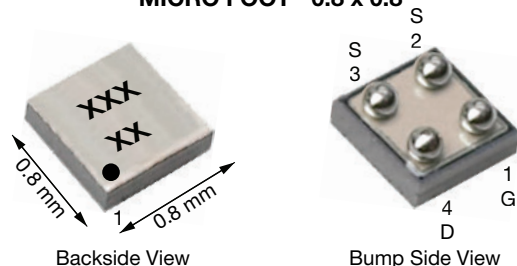


P-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY

V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (TYP.)
-20	0.090 at V _{GS} = -4.5 V	-2.6	6 nC
	0.119 at V _{GS} = -2.5 V	-2.3	
	0.155 at V _{GS} = -1.8 V	-2	

MICRO FOOT® 0.8 x 0.8



Marking Code: xx = AE

xxx = Date/Lot traceability code

Ordering Information:

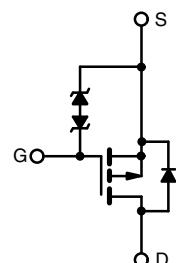
Si8809EDB-T2-E1 (lead (Pb)-free and halogen-free)

FEATURES

- TrenchFET® power MOSFET
- Ultra small 0.8 mm x 0.8 mm outline
- Ultra thin 0.357 mm height
- Typical ESD protection 1000 V HBM
- High speed switching
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Portable devices such as cell phones, smart phones, tablet PCs and media players
 - Load switch
 - Battery switch



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}	± 8	
Continuous Drain Current (T _J = 150 °C)	I _D	T _A = 25 °C	A
		T _A = 70 °C	
		T _A = 25 °C	
		T _A = 70 °C	
Pulsed Drain Current (t = 300 μs)	I _{DM}	-13	A
Continuous Source-Drain Diode Current	I _S	T _A = 25 °C	
		T _A = 25 °C	
Maximum Power Dissipation	P _D	T _A = 25 °C	W
		T _A = 70 °C	
		T _A = 25 °C	
		T _A = 70 °C	
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.

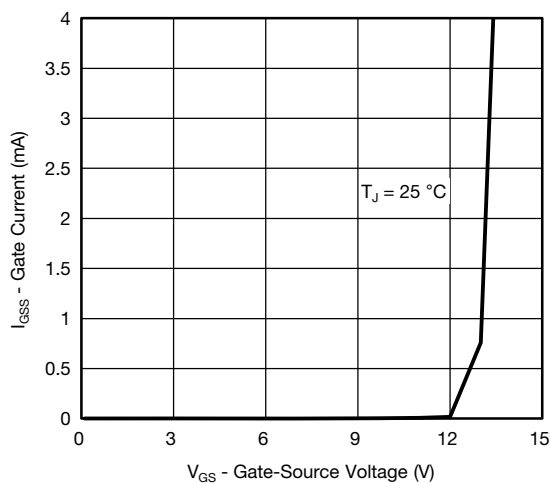
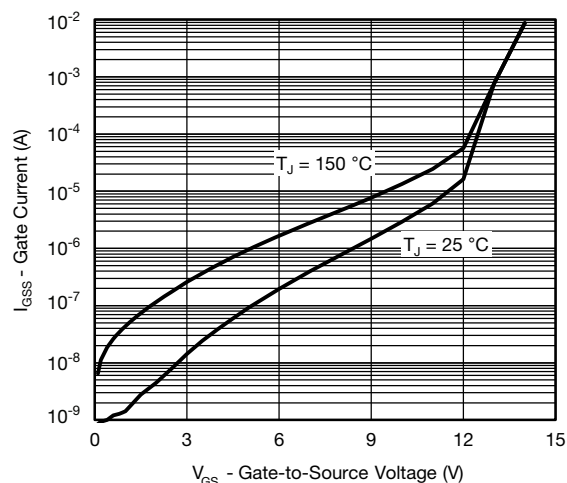
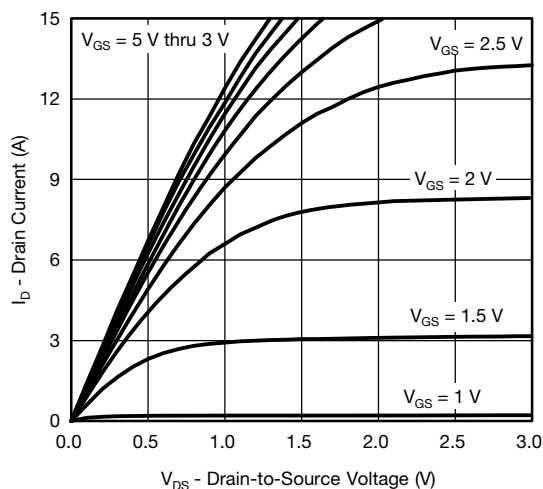
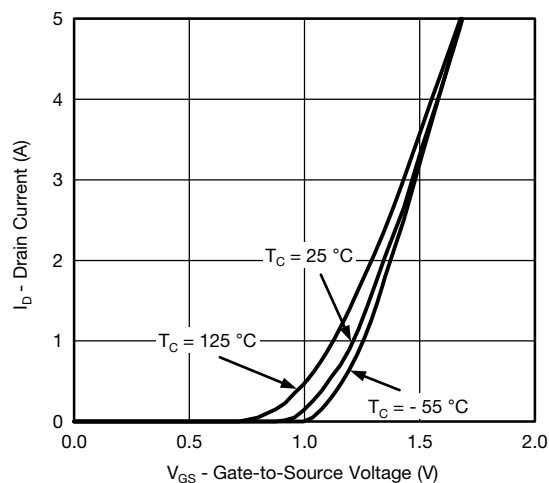
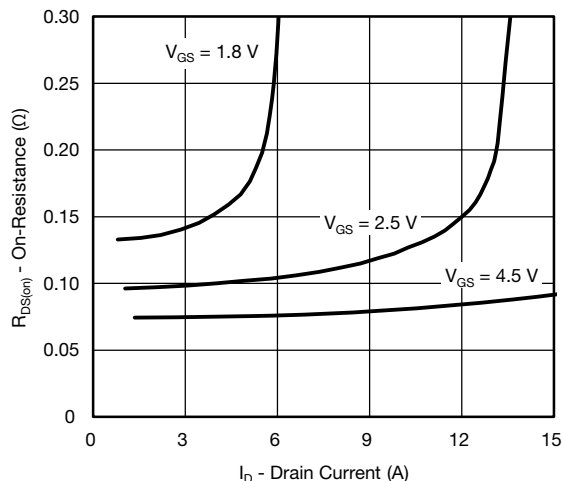
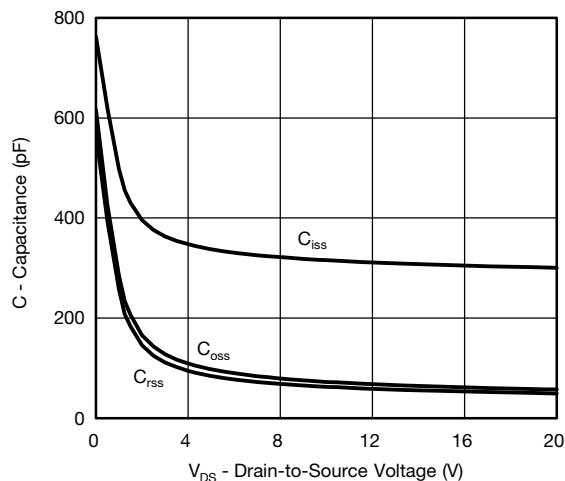


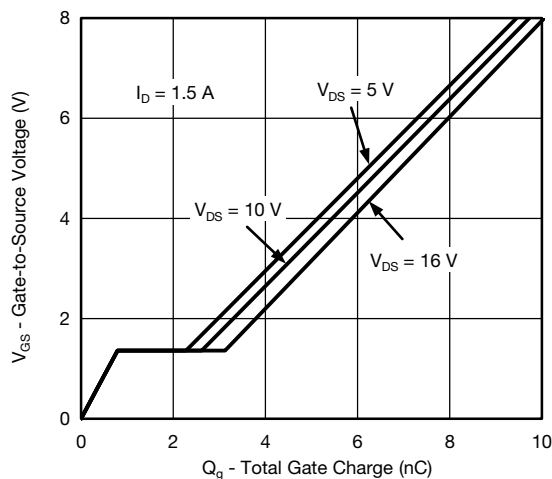
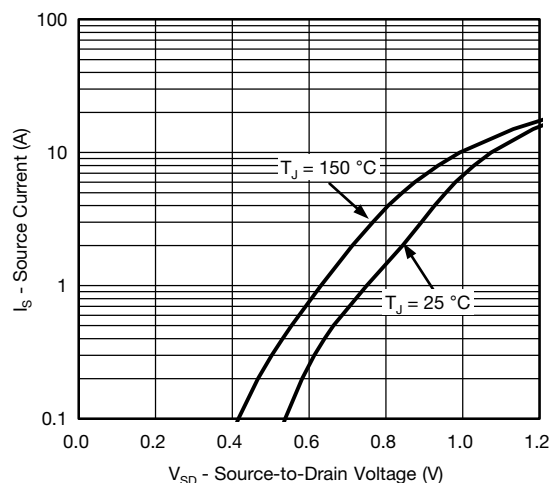
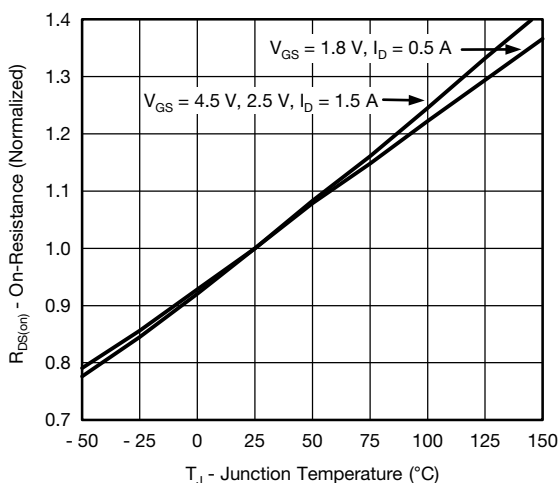
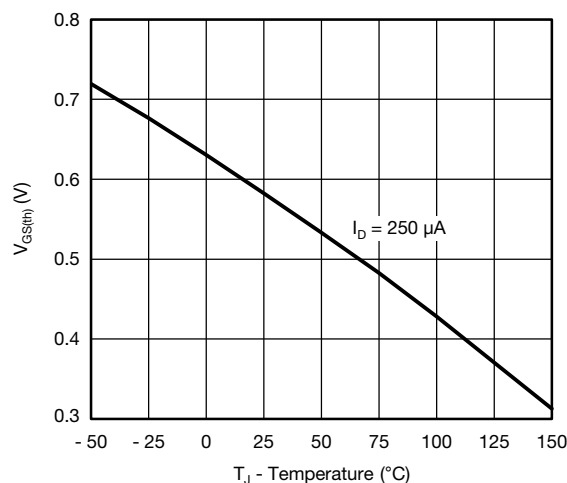
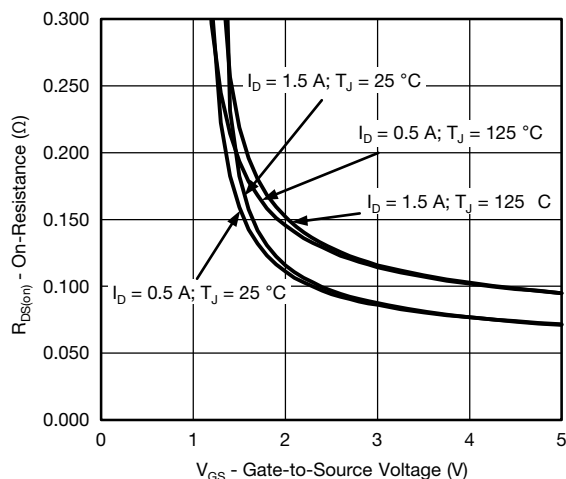
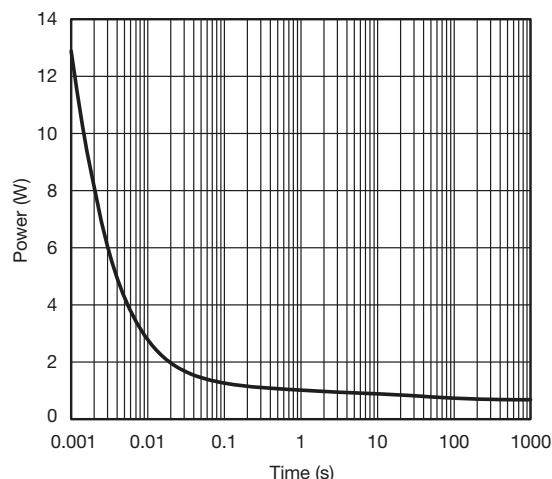
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0, I _D = -250 μA	-20	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = -250 μA	-	-9	-	mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J		-	2.1	-	
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250 μA	-0.4	-	-0.9	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 4.5 V	-	-	± 1	μA
		V _{DS} = 0 V, V _{GS} = ± 8 V	-	-	± 10	
Zero Gate Voltage Drain Current	I _{DSS}	V = -20 V, V _{GS} = 0 V	-	-	-1	
		V _{DS} = -20 V, V _{GS} = 0 V, T _J = 55 °C	-	-	-10	
On-State Drain Current ^a	I _{D(on)}	V ≤ -10 V, V _{GS} = -4.5 V	-5	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = -4.5 V, I _D = -1.5 A	-	0.075	0.090	Ω
		V _{GS} = -2.5 V, I _D = -1.5 A	-	0.097	0.119	
		V _{GS} = -1.8 V, I _D = -0.5 A	-	0.125	0.155	
Forward Transconductance ^a	g _{fs}	V _{DS} = -10 V, I _D = -1.5 A	-	8	-	S
Dynamic ^b						
Total Gate Charge	Q _g	V _{DS} = -10 V, V _{GS} = -8 V, I _D = -1.5 A	-	9.8	15	nC
		V _{DS} = -10 V, V _{GS} = -4.5 V, I _D = -1.5 A	-	6	10	
Gate-Source Charge	Q _{gs}		-	0.8	-	
Gate-Drain Charge	Q _{gd}		-	1.85	-	
Gate Resistance	R _g	f = 1 MHz	-	10	-	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = -10 V, R _L = 3.7 Ω I _D ≅ -1.5 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)}		-	30	60	
Fall Time	t _f		-	10	20	
Turn-On Delay Time	t _{d(on)}	V _{DD} = -10 V, R _L = 3.7 Ω I _D ≅ -1.5 A, V _{GEN} = -8 V, R _g = 1 Ω	-	10	20	
Rise Time	t _r		-	10	20	
Turn-Off Delay Time	t _{d(off)}		-	25	50	
Fall Time	t _f		-	7	15	
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}		-	-	-13	
Body Diode Voltage	V _{SD}	I _S = -1.5 A, V _{GS} = 0	-	-0.8	-1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = -1.5 A, di/dt = 100 A/μs, T _J = 25 °C	-	20	40	ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	10	20	nC
Reverse Recovery Fall Time	t _a		-	15	-	ns
Reverse Recovery Rise Time	t _b		-	5	-	

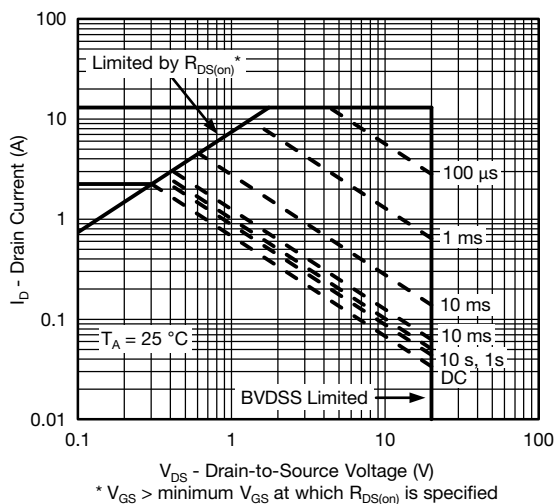
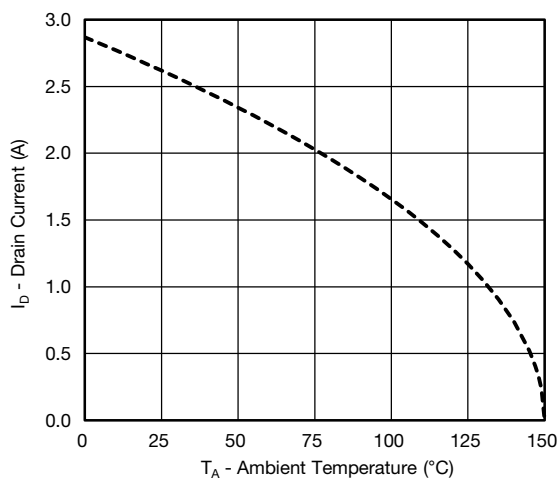
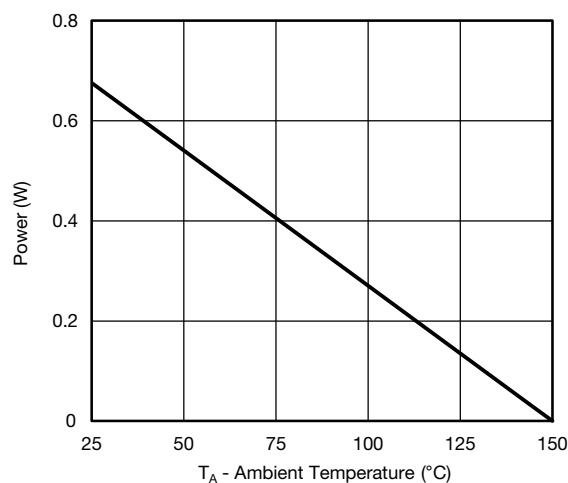
Notes

- 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

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)

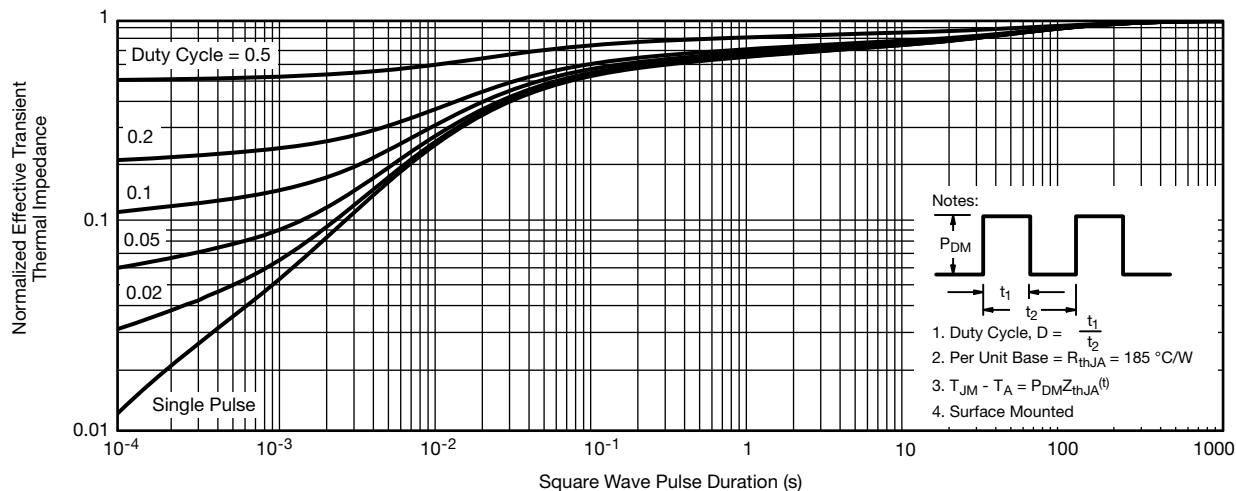
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Safe Operating Area, Junction-to-Ambient

Current Derating*

Power Derating
Note

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

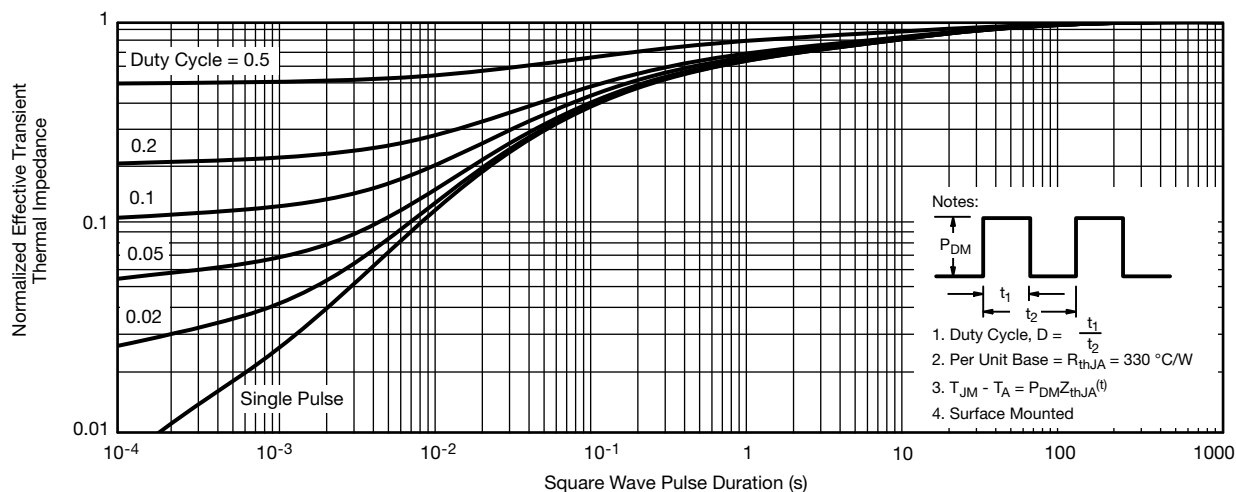
* The power dissipation P_D is based on $T_{J(max)} = 150\text{ }^{\circ}\text{C}$, using junction-to-ambient thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls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

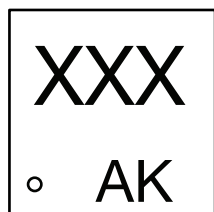


Normalized Thermal Transient Impedance, Junction-to-Ambient (On 1" x 1" FR4 Board with Minimum Copper)

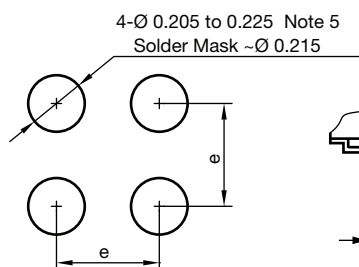
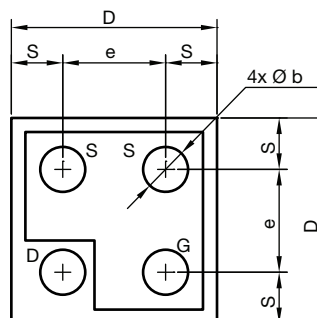
Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?63301.



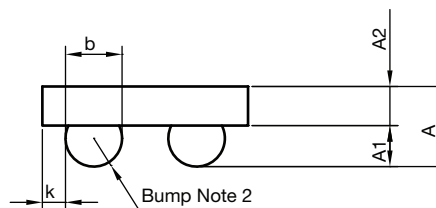
MICRO FOOT®: 4-Bump (0.8 mm x 0.8 mm, 0.4 mm Pitch)



Mark on Backside of die



Note 4



Notes

- (1) Laser mark on the backside surface of die
- (2) Bumps are 95.5 % Sn,3.8 % Ag,0.7 % Cu
- (3) "i" is the 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	0.328	0.365	0.402	0.0129	0.0144	0.0158
A1	0.136	0.160	0.184	0.0053	0.0062	0.0072
A2	0.192	0.205	0.218	0.0076	0.0081	0.0086
b	0.200	0.220	0.240	0.0078	0.0086	0.0094
b1	0.175			0.0068		
e	0.400			0.0157		
S	0.160	0.180	0.200	0.0062	0.0070	0.0078
D	0.720	0.760	0.800	0.0283	0.0299	0.0314
K	0.040	0.070	0.100	0.0015	0.0027	0.0039

Note

- a. Use millimeters as the primary measurement.

ECN: T15-0053-Rev. A, 16-Feb-15
DWG: 6033



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