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[Vishay/Siliconix](#)
[SI8461DB-T2-E1](#)

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www.vishay.com

Si8461DB

Vishay Siliconix

P-Channel 20 V (D-S) MOSFET



RoHS
COMPLIANT
HALOGEN
FREE

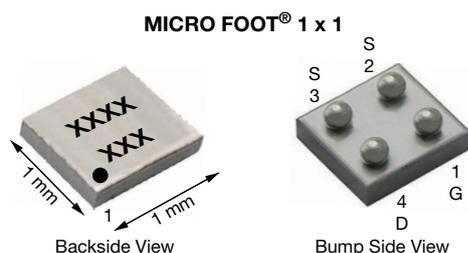
PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^{a, e}	Q _g (TYP.)
-20	0.100 at V _{GS} = -4.5 V	-3.7	9.5 nC
	0.118 at V _{GS} = -2.5 V	-3.4	
	0.140 at V _{GS} = -1.8 V	-3.1	
	0.205 at V _{GS} = -1.5 V	-2	

FEATURES

- TrenchFET[®] power MOSFET
- Ultra small 1 mm x 1 mm maximum outline
- Ultra-thin 0.548 mm maximum height
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912

APPLICATIONS

- Load switch
- Battery switch
- Charger switch

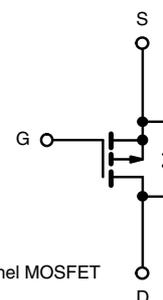


Marking Code: xxxx = 8461

xxx = Date / lot traceability code

Ordering Information:

Si8461DB-T2-E1 (lead (Pb)-free and halogen-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}	± 8	
Continuous Drain Current (T _J = 150 °C)	T _A = 25 °C	I _D	-3.7 ^a	A
	T _A = 70 °C		-3 ^a	
	T _A = 25 °C		-2.5 ^b	
	T _A = 70 °C		-1.9 ^b	
Pulsed Drain Current		I _{DM}	-20	
Continuous Source-Drain Diode Current	T _C = 25 °C	I _S	-1.5 ^a	
	T _A = 25 °C		-0.65 ^b	
Maximum Power Dissipation	T _A = 25 °C	P _D	1.8 ^a	W
	T _A = 70 °C		1.1 ^a	
	T _A = 25 °C		0.78 ^b	
	T _A = 70 °C		0.5 ^b	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	-55 to +150	°C
Package Reflow Conditions ^c	VPR		260	
	IR/Convection		260	

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum Junction-to-Ambient ^{f, g}	t = 10 s	R _{thJA}	55	70	°C/W
Maximum Junction-to-Ambient ^{h, i}	t = 10 s		125	160	

Notes

- Surface mounted on 1" x 1" FR4 board with full copper, t = 10 s.
- Surface mounted on 1" x 1" FR4 board with minimum copper, t = 10 s.
- Refer to IPC/JEDEC[®] (J-STD-020), no manual or hand soldering.
- In this document, any reference to case represents the body of the MICRO FOOT device and foot is the bump.
- Based on T_A = 25 °C.
- Surface mounted on 1" x 1" FR4 board with full copper.
- Maximum under steady state conditions is 100 °C/W.
- Surface mounted on 1" x 1" FR4 board with minimum copper.
- Maximum under steady state conditions is 190 °C/W.



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SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-20	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$	-	-12	-	mV/ $^\circ\text{C}$
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		-	2.5	-	
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.4	-	-1	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$	-	-	-1	μA
		$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ }^\circ\text{C}$	-	-	-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}, V_{GS} = -4.5\text{ V}$	-10	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -1.5\text{ A}$	-	0.083	0.100	Ω
		$V_{GS} = -2.5\text{ V}, I_D = -1.5\text{ A}$	-	0.098	0.118	
		$V_{GS} = -1.8\text{ V}, I_D = -1\text{ A}$	-	0.115	0.140	
		$V_{GS} = -1.5\text{ V}, I_D = -0.5\text{ A}$	-	0.136	0.205	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -1\text{ A}$	-	7	-	S
Dynamic ^b						
Input Capacitance	C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	-	610	-	pF
Output Capacitance	C_{oss}		-	120	-	
Reverse Transfer Capacitance	C_{rss}		-	95	-	
Total Gate Charge	Q_g	$V_{DS} = -10\text{ V}, V_{GS} = -8\text{ V}, I_D = 1\text{ A}$	-	16	24	nC
		$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = 1\text{ A}$	-	9.5	15	
Gate-Source Charge	Q_{gs}	$V_{DS} = -10\text{ V}, V_{GS} = -4.5\text{ V}, I_D = 1\text{ A}$	-	0.9	-	
Gate-Drain Charge	Q_{gd}		-	2.6	-	
Gate Resistance	R_g	$V_{GS} = -0.1\text{ V}, f = 1\text{ MHz}$	-	6.5	-	Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$	-	15	25	ns
Rise Time	t_r		-	25	40	
Turn-Off Delay Time	$t_{d(off)}$		-	35	55	
Fall Time	t_f		-	10	15	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong -1\text{ A}, V_{GEN} = -8\text{ V}, R_g = 1\text{ }\Omega$	-	7	15	
Rise Time	t_r		-	12	20	
Turn-Off Delay Time	$t_{d(off)}$		-	32	50	
Fall Time	t_f		-	12	20	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_A = 25\text{ }^\circ\text{C}$	-	-	-1.5	A
Pulse Diode Forward Current	I_{SM}		-	-	-20	
Body Diode Voltage	V_{SD}	$I_S = -1\text{ A}, V_{GS} = 0\text{ V}$	-	-0.8	-1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -1\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$	-	15	30	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	10	20	nC
Reverse Recovery Fall Time	t_a		-	9	-	ns
Reverse Recovery Rise Time	t_b		-	6	-	

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.

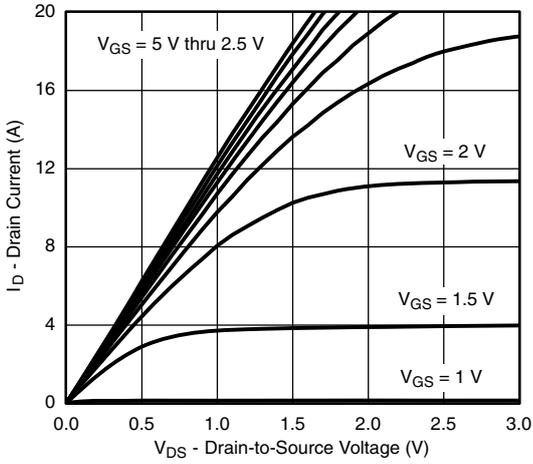
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



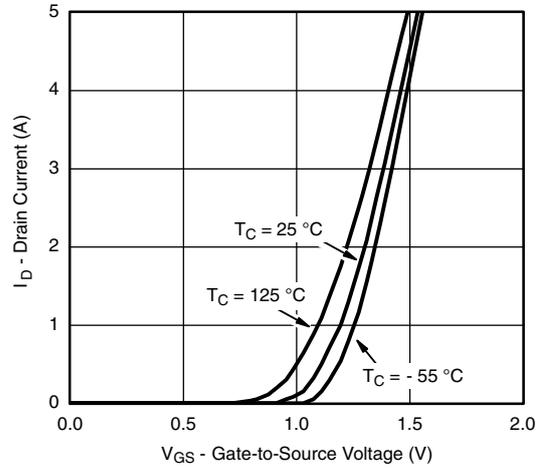
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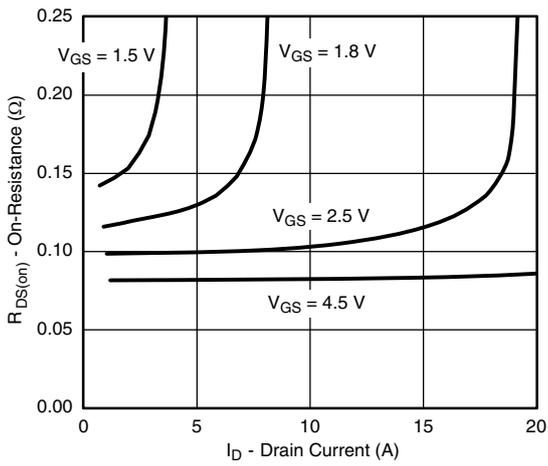
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



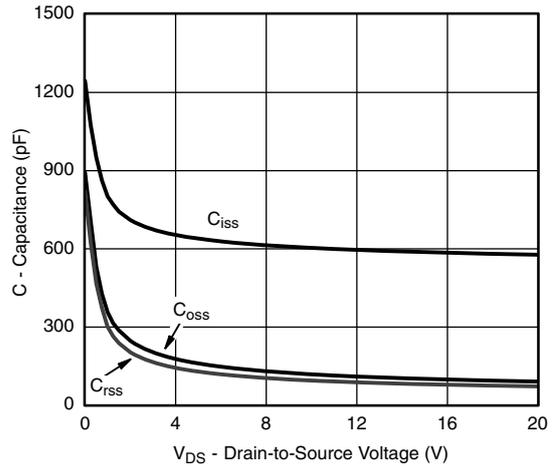
Output Characteristics



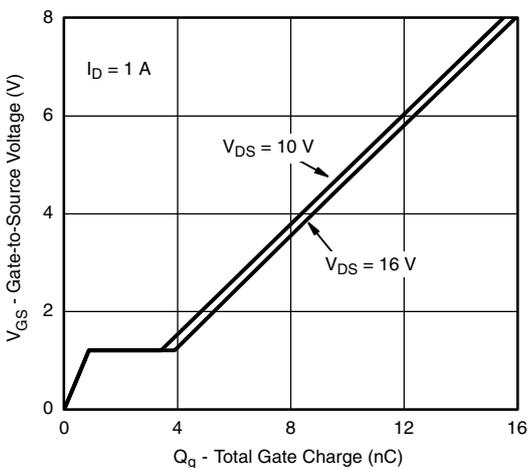
Transfer Characteristics



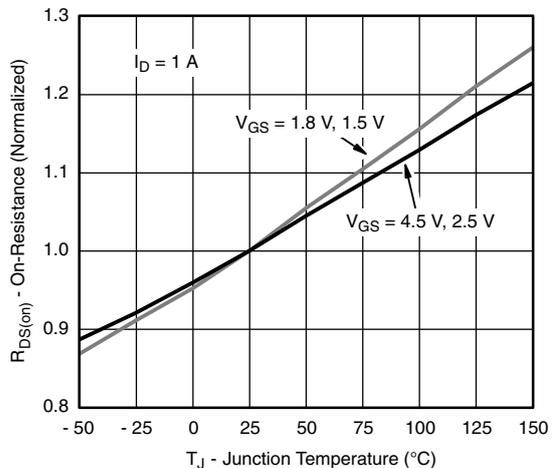
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



Gate Charge



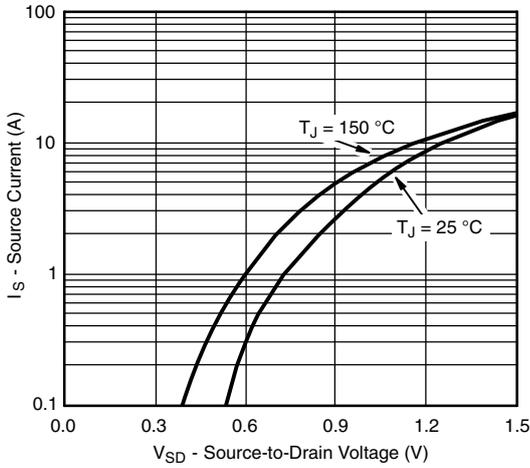
On-Resistance vs. Junction Temperature



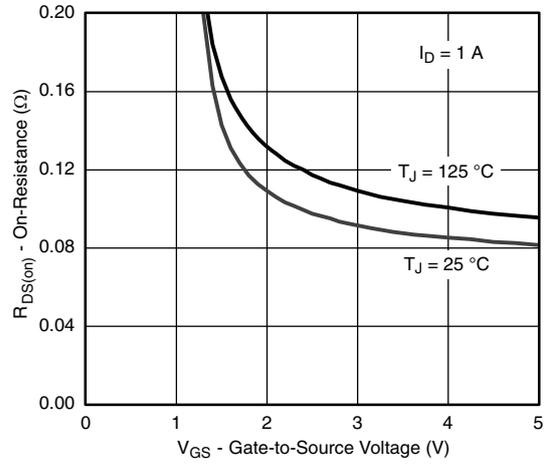
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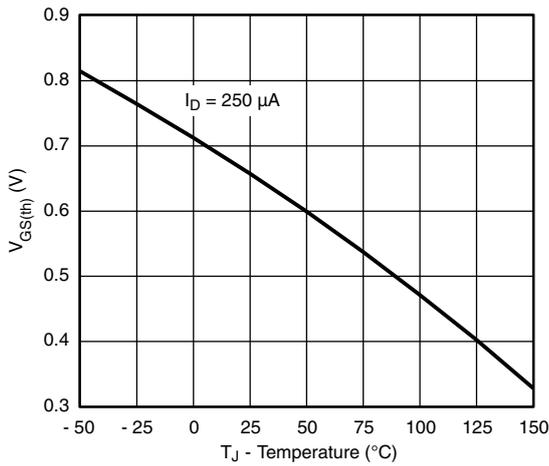
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



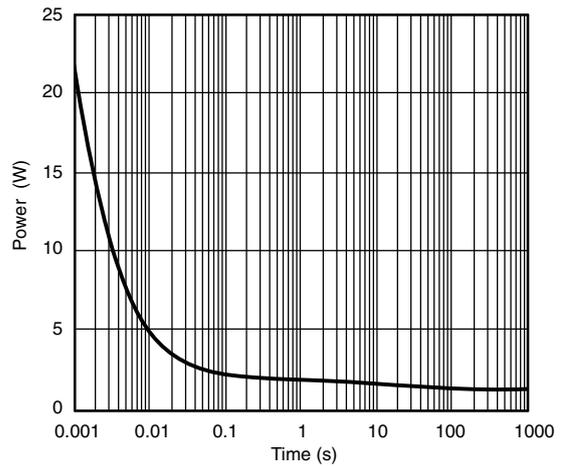
Source-Drain Diode Forward Voltage



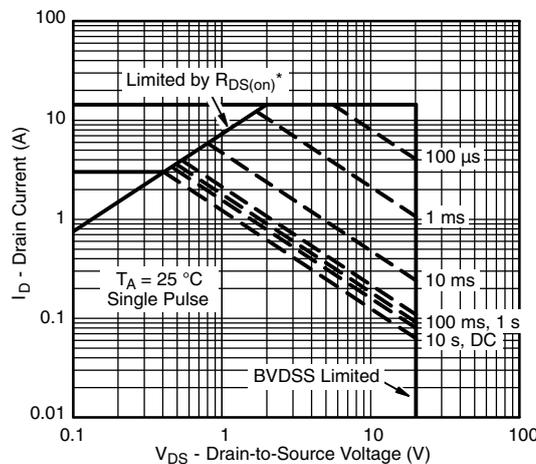
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



Safe Operating Area, Junction-to-Ambient

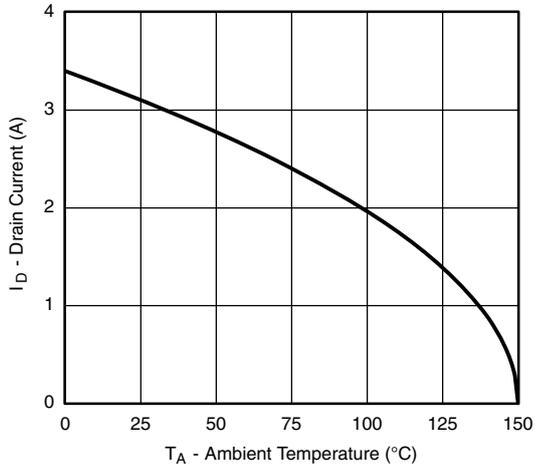


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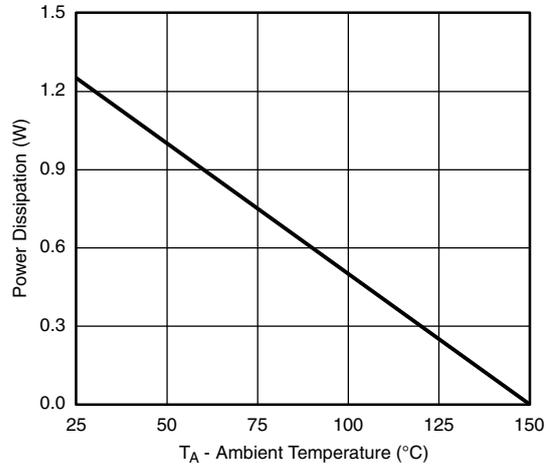
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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



Power Derating

Note

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

Note

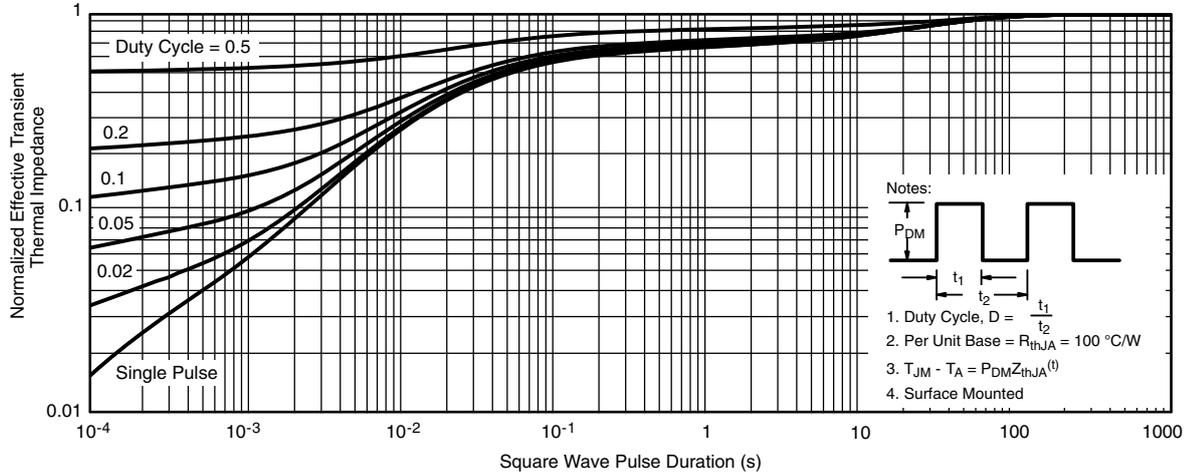
- The power dissipation P_D is based on T_J (max.) = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.



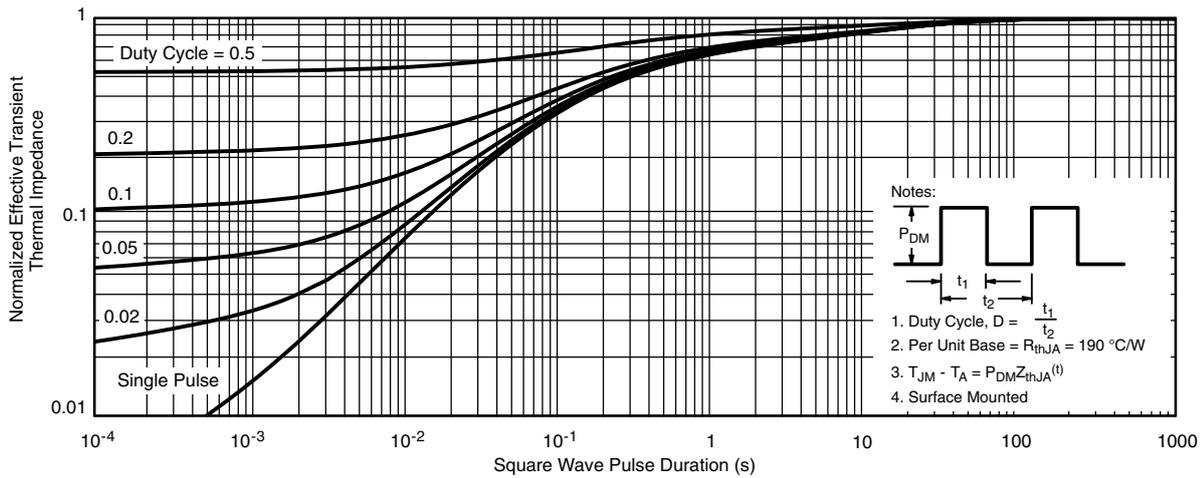
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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



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



Normalized Thermal Transient Impedance, Junction-to-Ambient (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?65001.

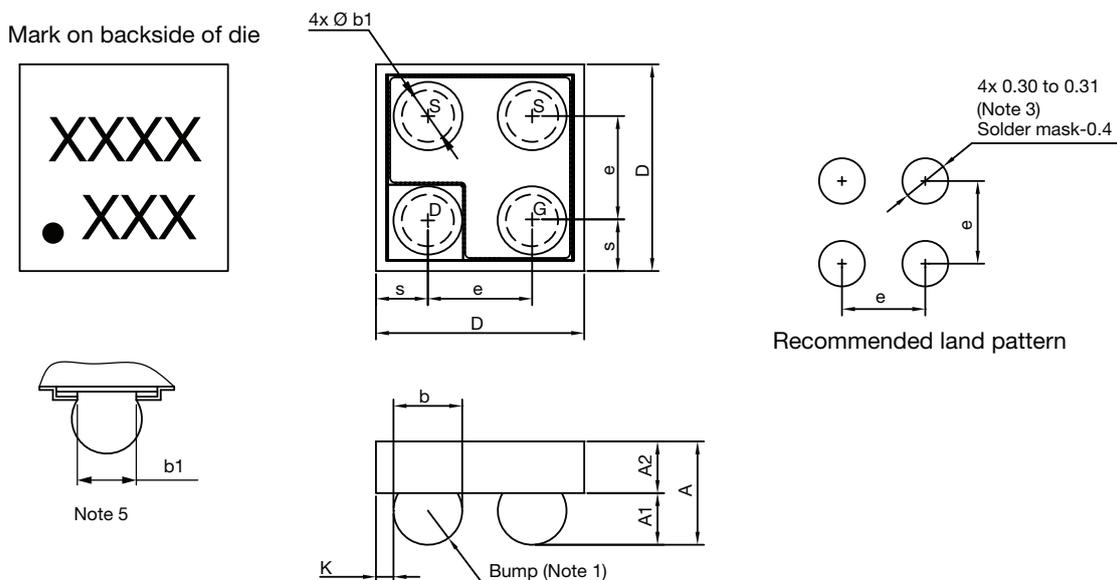


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Package Information

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MICRO FOOT®: 4-Bumps (1 mm x 1 mm, 0.5 mm Pitch, 0.286 mm Bump Height)



Notes

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

DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.458	0.504	0.550	0.0180	0.0198	0.0217
A1	0.214	0.250	0.286	0.0084	0.0098	0.0113
A2	0.244	0.254	0.264	0.0096	0.0100	0.0104
b	0.297	0.330	0.363	0.0117	0.0130	0.0143
b1	0.250			0.0098		
e	0.500			0.0197		
s	0.210	0.230	0.250	0.0083	0.0091	0.0096
D	0.920	0.960	1.000	0.0362	0.0378	0.0394
K	0.029	0.065	0.102	0.0011	0.0026	0.0040

Note

- Use millimeters as the primary measurement.

ECN: T15-0176-Rev. A, 27-Apr-15
 DWG: 6039



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