

Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

[Vishay/Siliconix](#)
[SI8404DB-T1-E1](#)

For any questions, you can email us directly:

sales@integrated-circuit.com



Si8404DB
Vishay Siliconix

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

PRODUCT SUMMARY

V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
8	0.031 at V _{GS} = 4.5 V	12.2	20 nC
	0.033 at V _{GS} = 2.5 V	11.6	
	0.035 at V _{GS} = 1.8 V	11.2	
	0.043 at V _{GS} = 1.5 V	10.2	

FEATURES

- TrenchFET[®] Power MOSFET
- Industry First 1.5 V Rated MOSFET
- Ultra Small MICRO FOOT[®] ChipScale Packaging Reduces Footprint Area, Profile (0.62 mm) and On-Resistance Per Footprint Area



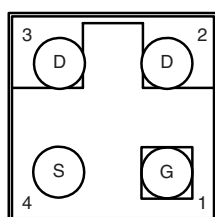
RoHS
COMPLIANT

APPLICATIONS

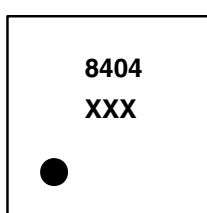
- Low Threshold Load Switch for Portable Devices
 - Low Power Consumption
 - Increased Battery Life

MICRO FOOT

Bump Side View

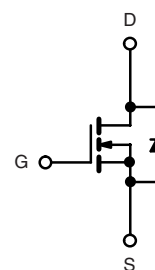


Backside View



Device Marking: 8404
xxx = Date/Lot Traceability Code

Ordering Information: Si8404DB-T1-E1 (Lead (Pb)-free)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	8	V
Gate-Source Voltage	V _{GS}	± 5	
Continuous Drain Current (T _J = 150 °C)	I _D	12.2	A
		9.8	
		8.1 ^{b,c}	
		6.5 ^{b,c}	
Pulsed Drain Current	I _{DM}	20	A
Continuous Source-Drain Diode Current	I _S	5.2	
		2.3 ^{b,c}	
Maximum Power Dissipation	P _D	6.25	W
		4	
		2.78 ^{b,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.

Si8404DB

Vishay Siliconix



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 $T_J = 25\text{ °C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	8			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250\text{ }\mu\text{A}$		8.9		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 2.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.35		1.0	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = 5\text{ V}$			100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 8\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 8\text{ V}, V_{GS} = 0\text{ V}, T_J = 70\text{ °C}$			10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq 5\text{ V}, V_{GS} = 4.5\text{ V}$	20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 1\text{ A}$		0.025	0.031	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 1\text{ A}$		0.027	0.033	
		$V_{GS} = 1.8\text{ V}, I_D = 1\text{ A}$		0.029	0.035	
		$V_{GS} = 1.5\text{ V}, I_D = 1\text{ A}$		0.032	0.043	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 4\text{ V}, I_D = 1\text{ A}$		8.3	13	S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 4\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		1950		pF
Output Capacitance	C_{oss}			610		
Reverse Transfer Capacitance	C_{rss}			350		
Total Gate Charge	Q_g	$V_{DS} = 4\text{ V}, V_{GS} = 5\text{ V}, I_D = 1\text{ A}$		22	33	nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 4\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 1\text{ A}$		20	30	
Gate-Drain Charge	Q_{gd}			3.5		
Gate Resistance	R_g			1.8		
Gate Resistance	R_g	$V_{GS} = 0.1\text{ V}, f = 1\text{ MHz}$		13		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 4\text{ V}, R_L = 4\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		8	12	ns
Rise Time	t_r			12	18	
Turn-Off Delay Time	$t_{d(off)}$			110	165	
Fall Time	t_f			40	60	



Si8404DB

Vishay Siliconix

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^{\circ}\text{C}$			6.25	A
Pulse Diode Forward Current	I_{SM}				20	
Body Diode Voltage	V_{SD}	$I_S = 1\text{ A}$, $V_{GS} = 0\text{ V}$		0.6	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -1\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^{\circ}\text{C}$		104	156	ns
Body Diode Reverse Recovery Charge	Q_{rr}			88	132	nC
Reverse Recovery Fall Time	t_a			26		ns
Reverse Recovery Rise Time	t_b			78		

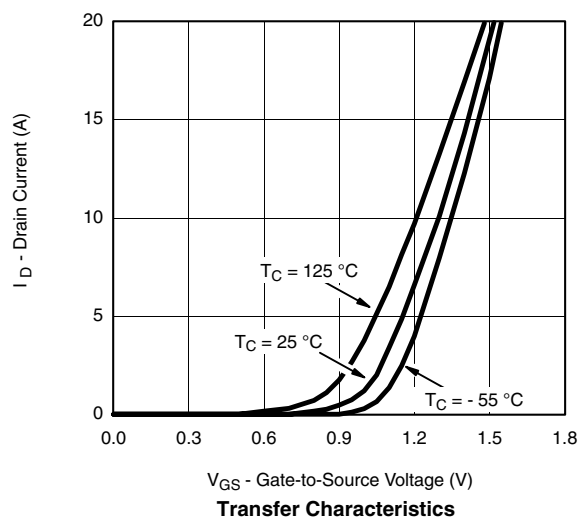
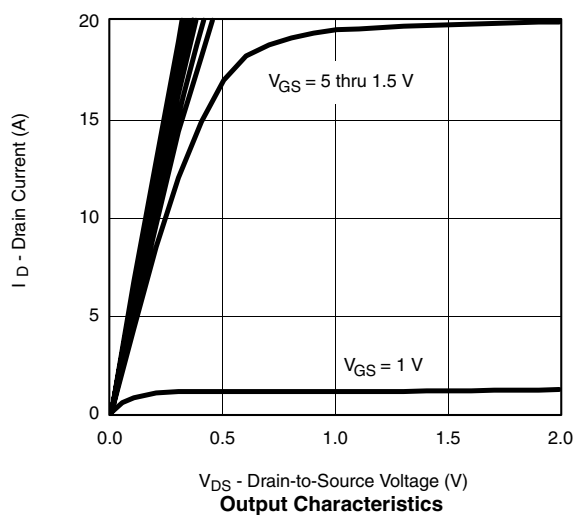
Notes:

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 $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted

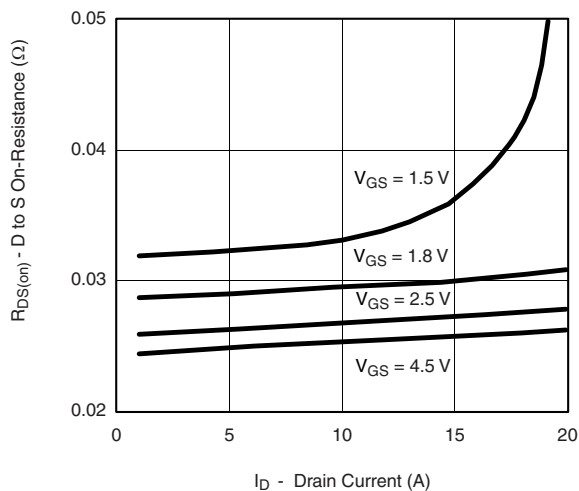


Si8404DB

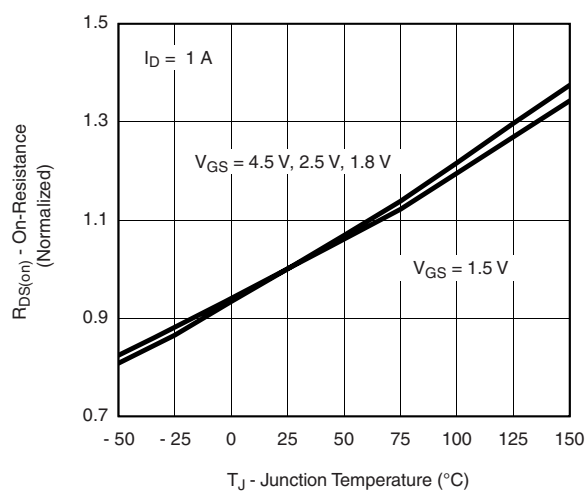
Vishay Siliconix



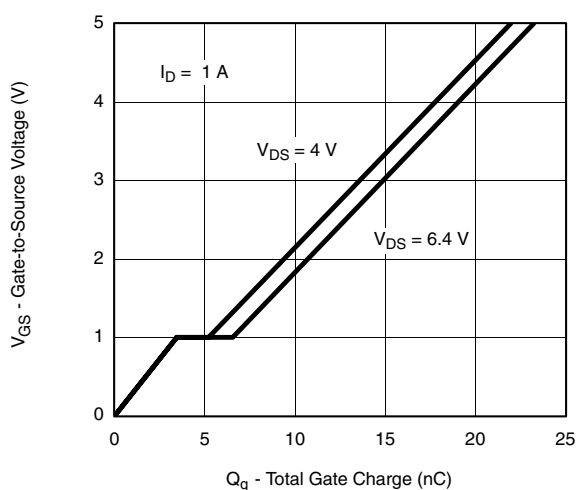
TYPICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, unless otherwise noted



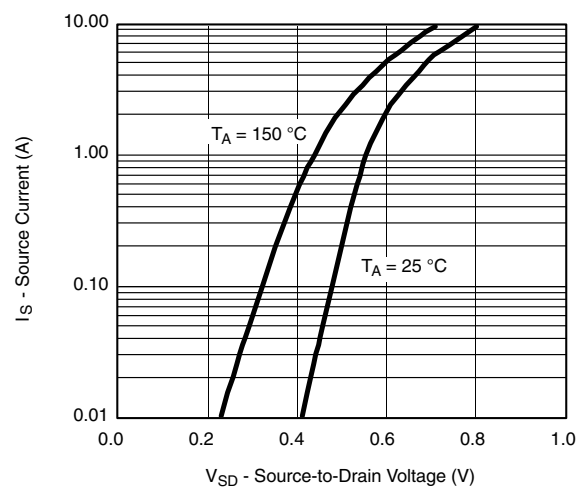
$R_{DS(on)}$ vs. Drain Current



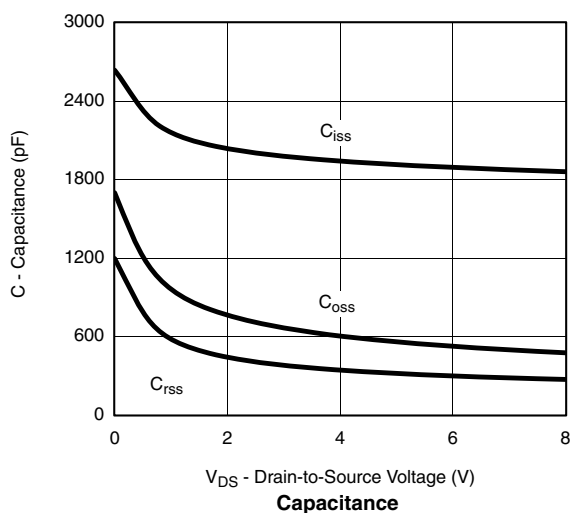
On-Resistance vs. Junction Temperature



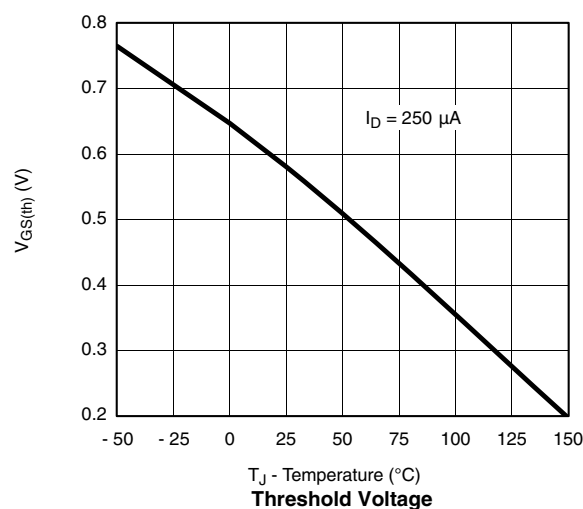
Gate Charge



Forward Diode Voltage vs Temp



Capacitance



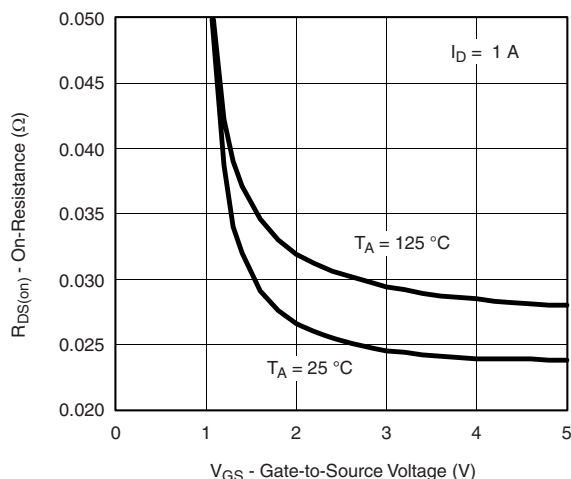
Threshold Voltage



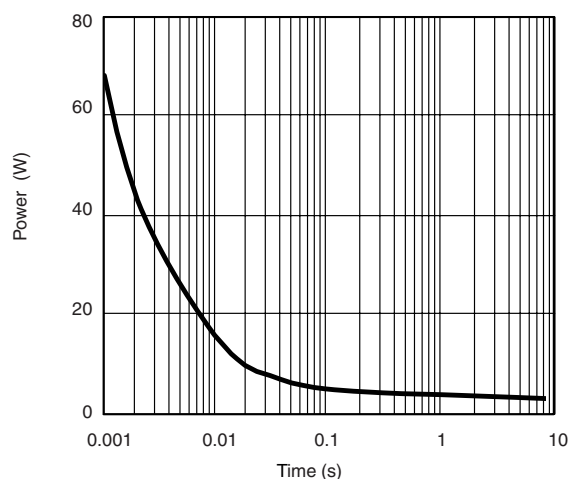
Si8404DB

Vishay Siliconix

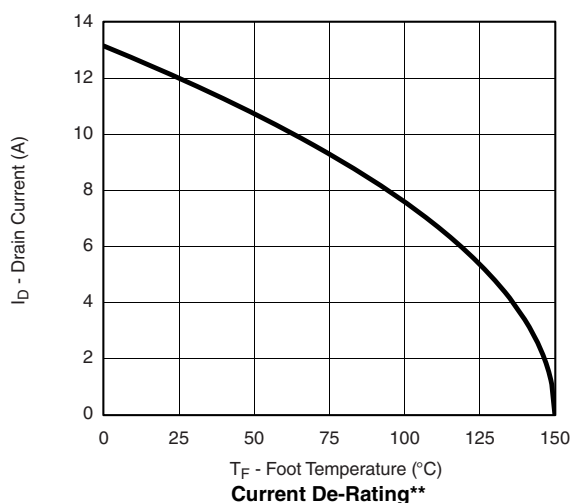
TYPICAL CHARACTERISTICS $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted



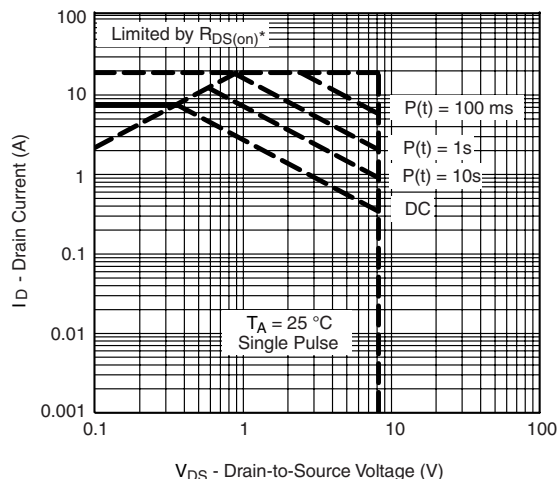
$R_{DS(on)}$ vs V_{GS} vs Temperature



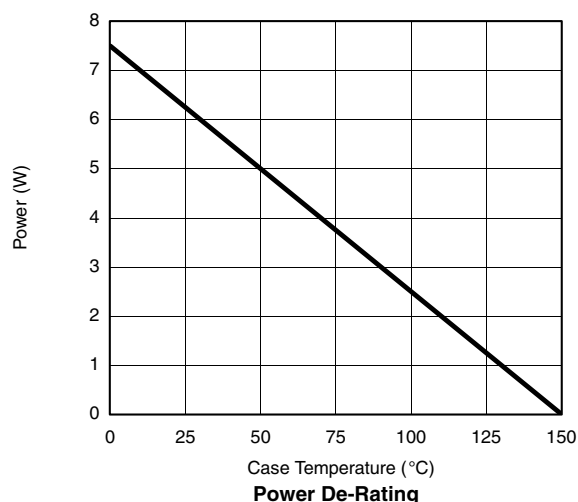
Single Pulse Power, Junction-to-Ambient



T_F - Foot Temperature ($^{\circ}\text{C}$)
Current De-Rating**



V_{DS} - Drain-to-Source Voltage (V)
* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area, Junction-to-Ambient



Power De-Rating

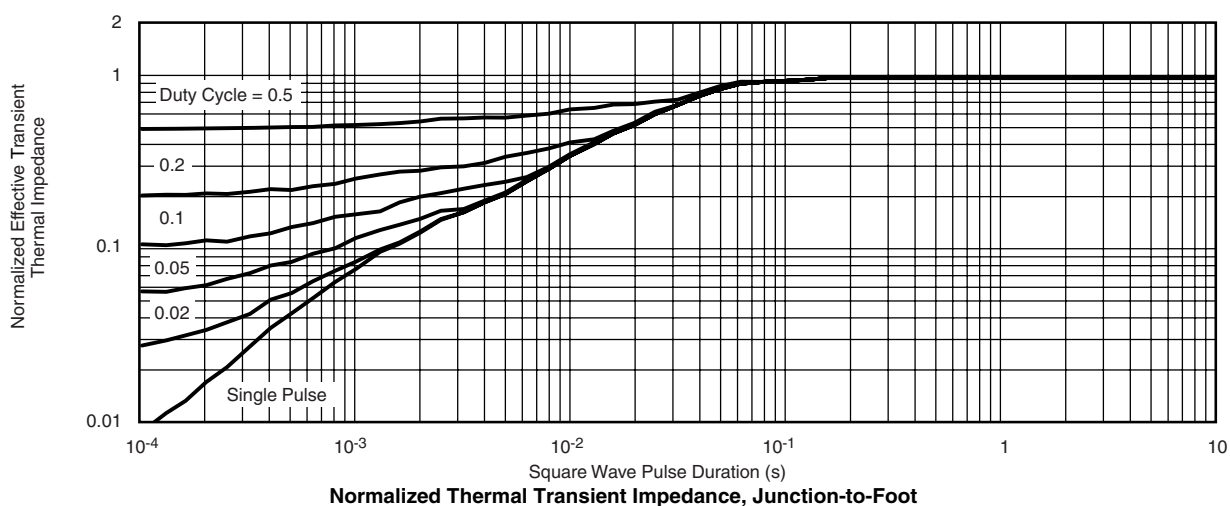
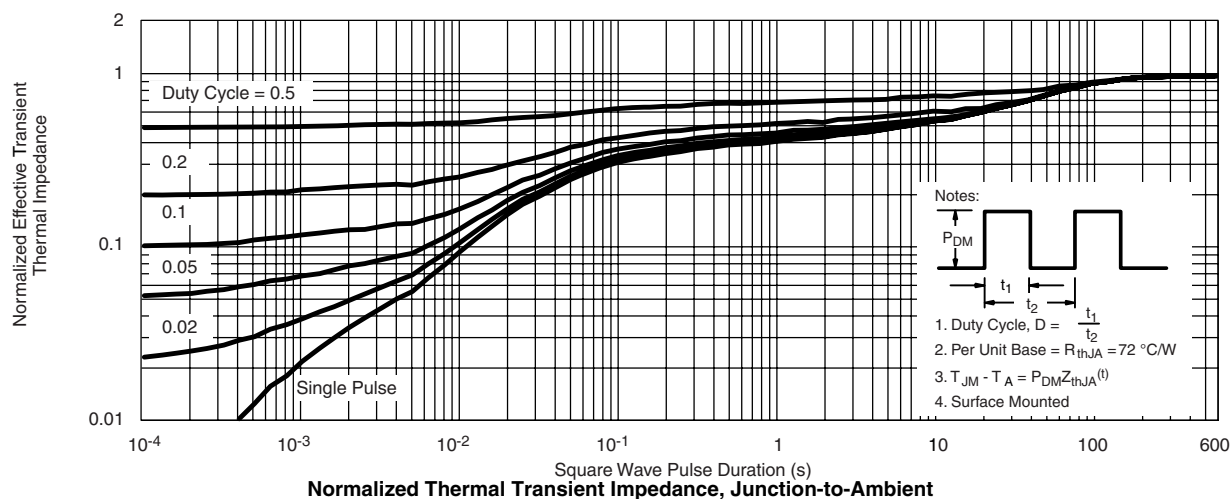
** The power dissipation P_D is based on $T_{J(max)} = 150\text{ }^{\circ}\text{C}$, using junction-to-foot thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls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

Si8404DB

Vishay Siliconix



TYPICAL CHARACTERISTICS $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted



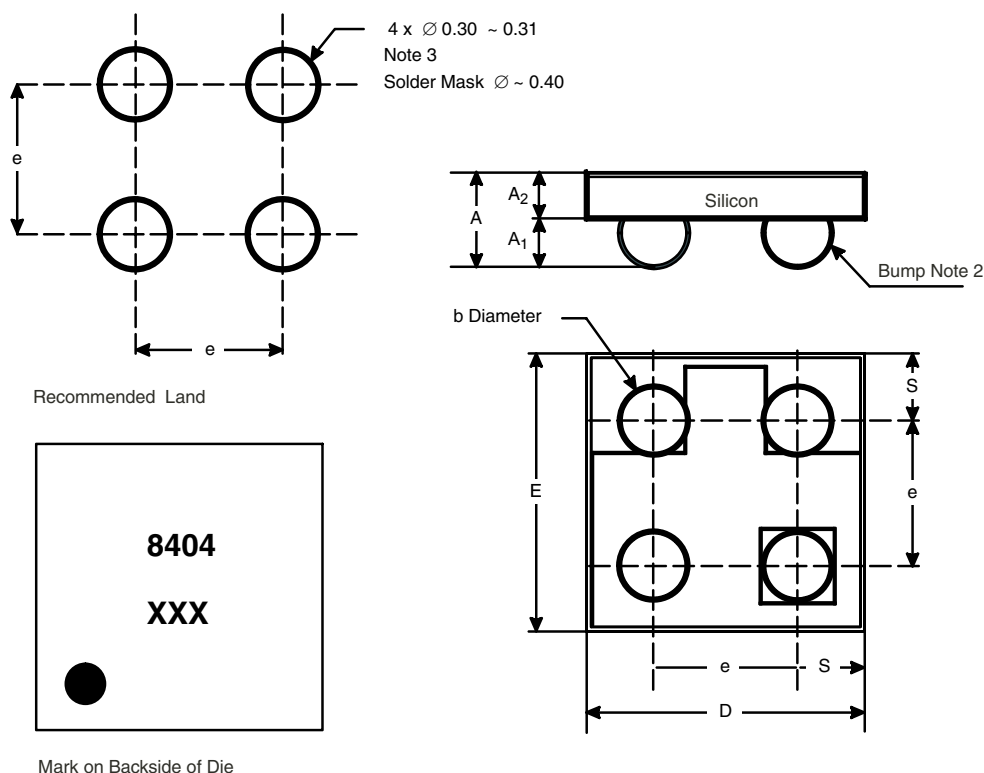


Si8404DB

Vishay Siliconix

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 95.5/3.8/0.7 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.

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 <http://www.vishay.com/ppg?73518>.



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.