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[Vishay/Siliconix](#)
[SI5913DC-T1-GE3](#)

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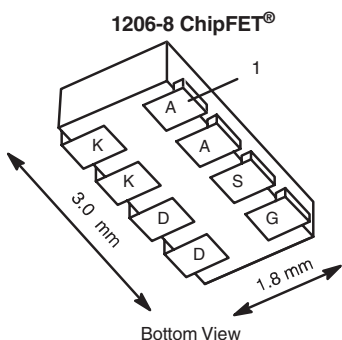


Si5913DC
Vishay Siliconix

P-Channel 20 V (D-S) MOSFET with Schottky Diode

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
- 20	0.084 at V _{GS} = - 10 V	- 4 ^f	4 nC
	0.108 at V _{GS} = - 4.5 V	- 4 ^f	
	0.175 at V _{GS} = - 2.5 V	- 3.5	

SCHOTTKY PRODUCT SUMMARY		
V _{KA} (V)	V _f (V) Diode Forward Voltage	I _F (A) ^a
20	0.5 at 1 A	2



Marking Code
 DJ XX Lot Traceability and Date Code
 Part # Code

Ordering Information: SI5913DC-T1-E3 (Lead (Pb)-free)
 SI5913DC-T1-GE3 (Lead (Pb)-free and Halogen-free)

FEATURES

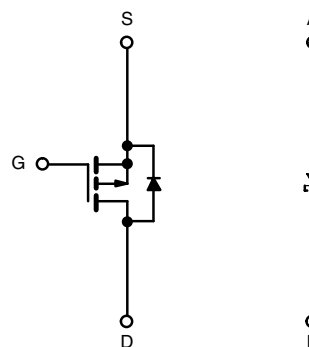
- Halogen-free According to IEC 61249-2-21 Definition
- LITTLE FOOT[®] Plus Schottky Power MOSFET
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- HDD
- DC/DC Converter
- Asynchronous Rectification



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T _A = 25 °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage (MOSFET)	V _{DS}	- 20	V
Reverse Voltage (Schottky)	V _{KA}	20	
Gate-Source Voltage (MOSFET)	V _{GS}	± 12	
Continuous Drain Current (T _J = 150 °C) (MOSFET)	I _D	T _C = 25 °C	- 4 ^f
		T _C = 70 °C	- 4 ^f
		T _A = 25 °C	- 3.7 ^{b, c}
		T _A = 70 °C	- 2.9 ^{b, c}
Pulsed Drain Current (MOSFET)	I _{DM}	- 15	A
Continuous Source-Drain Diode Current (MOSFET Diode Conduction)	I _S	T _C = 25 °C	
		T _A = 25 °C	- 1.4 ^{b, c}
Average Forward Current (Schottky)	I _F	2 ^b	W
Pulsed Forward Current (Schottky)	I _{FM}	5	
Maximum Power Dissipation (MOSFET)	P _D	T _C = 25 °C	3.1
		T _C = 70 °C	2.0
		T _A = 25 °C	1.7 ^{b, c}
		T _A = 70 °C	1.1 ^{b, c}
Maximum Power Dissipation (Schottky)	P _D	T _C = 25 °C	3.1
		T _C = 70 °C	2.0
		T _A = 25 °C	1.3 ^{b, c}
		T _A = 70 °C	0.8 ^{b, c}
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C
Soldering Recommendation (Peak Temperature) ^{g, h}		260	

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THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient (MOSFET) ^{b, d}	t ≤ 5 s	R _{thJA}	62	74	°C/W
Maximum Junction-to-Foot (Drain) (MOSFET)	Steady State	R _{thJF}	32	40	
Maximum Junction-to-Ambient (Schottky) ^{b, e}	t ≤ 5 s	R _{thJA}	77	95	
Maximum Junction-to-Foot (Drain) (Schottky)	Steady State	R _{thJF}	33	40	

Notes:

 a. Based on T_C = 25 °C.

b. Surface mounted on 1" x 1" FR4 board.

c. t = 5 s

d. Maximum under steady state conditions is 115 °C/W.

e. Maximum under steady state conditions is 130 °C/W.

f. Package limited.

 g. See Solder Profile (www.vishay.com/doc?73257). The ChipFET is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side soldering interconnection.

h. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.

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	- 20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = - 250 μA		- 20		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J		3			
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 0.6		- 1.5	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 12 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 20 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 20 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	- 15			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 3.7 A		0.070	0.084	Ω
		V _{GS} = - 4.5 V, I _D = - 3.2 A		0.090	0.108	
		V _{GS} = - 2.5 V, I _D = - 2.5 A		0.140	0.175	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 10 V, I _D = - 3.7 A		6		S
Dynamic^b						
Input Capacitance	C _{iss}	V _{DS} = - 10 V, V _{GS} = 0 V, f = 1 MHz		330		pF
Output Capacitance	C _{oss}			80		
Reverse Transfer Capacitance	C _{rss}			57		
Total Gate Charge	Q _g	V _{DS} = - 10 V, V _{GS} = - 10 V, I _D = - 3.7 A		8	12	nC
		V _{DS} = - 10 V, V _{GS} = - 4.5 V, I _D = - 3.7 A		4	6	
Gate-Source Charge	Q _{gs}	V _{DS} = - 10 V, V _{GS} = - 4.5 V, I _D = - 3.7 A		0.8		
Gate-Drain Charge	Q _{gd}			1.4		
Gate Resistance	R _g	f = 1 MHz	1.2	6	12	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 10 V, R _L = 3.4 Ω I _D ≅ - 2.9 A, V _{GEN} = - 10 V, R _g = 1 Ω		3	6	ns
Rise Time	t _r			10	20	
Turn-Off Delay Time	t _{d(off)}			16	24	
Fall Time	t _f			8	15	
Turn-On Delay Time	t _{d(on)}	V _{DD} = - 10 V, R _L = 3.4 Ω I _D ≅ - 2.9 A, V _{GEN} = - 4.5 V, R _g = 1 Ω		18	27	
Rise Time	t _r			40	60	
Turn-Off Delay Time	t _{d(off)}			18	27	
Fall Time	t _f			10	15	



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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	$T_C = 25\text{ }^\circ\text{C}$			- 1.2	A
Pulse Diode Forward Current	I_{SM}				- 15	
Body Diode Voltage	V_{SD}	$I_S = - 2.9\text{ A}, V_{GS} = 0\text{ V}$		- 0.75	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = - 2.9\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		23	35	ns
Body Diode Reverse Recovery Charge	Q_{rr}			14	21	nC
Reverse Recovery Fall Time	t_a			11		ns
Reverse Recovery Rise Time	t_b			12		

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.

SCHOTTKY SPECIFICATIONS $T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	$I_F = 1\text{ A}$		0.42	0.50	V
		$I_F = 1\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.36	0.43	
Maximum Reverse Leakage Current	I_{rm}	$V_r = 5\text{ V}$		0.015	0.08	mA
		$V_r = 5\text{ V}, T_J = 85\text{ }^\circ\text{C}$		0.50	5.00	
		$V_r = 20\text{ V}$		0.02	0.10	
		$V_r = 20\text{ V}, T_J = 85\text{ }^\circ\text{C}$		0.7	7.00	
		$V_r = 20\text{ V}, T_J = 125\text{ }^\circ\text{C}$		5	50	
Junction Capacitance	C_T	$V_r = 10\text{ V}$		60		pF

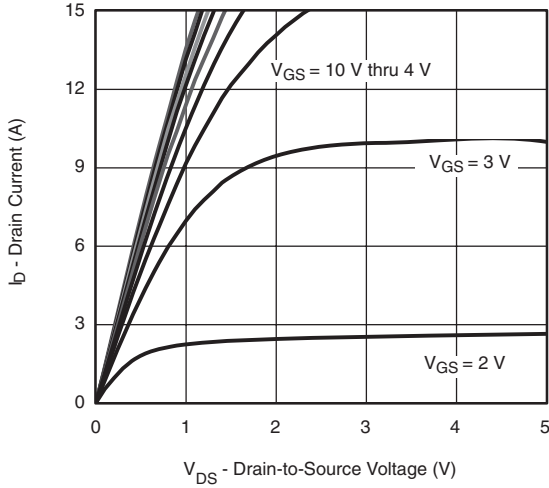
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

Si5913DC

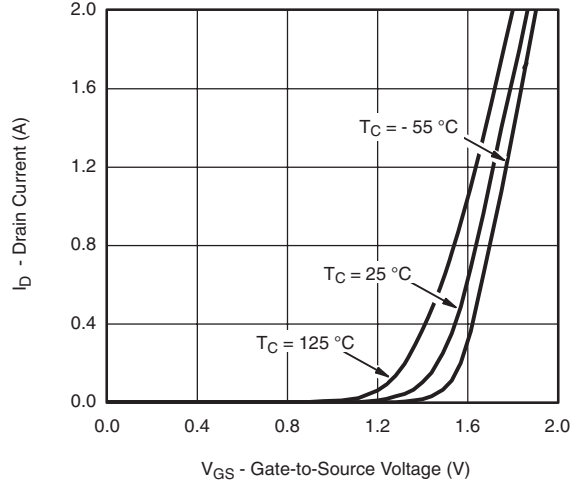
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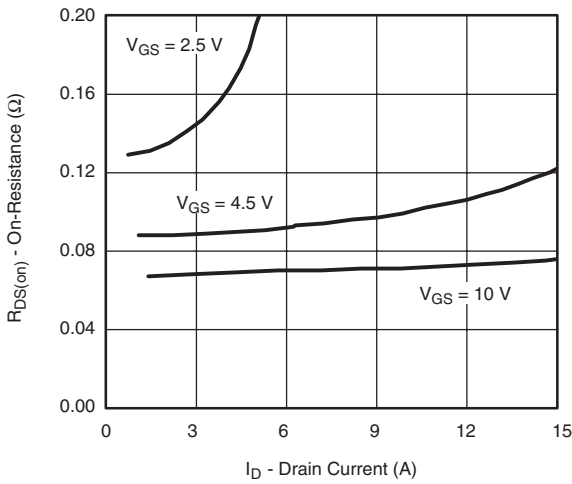
MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



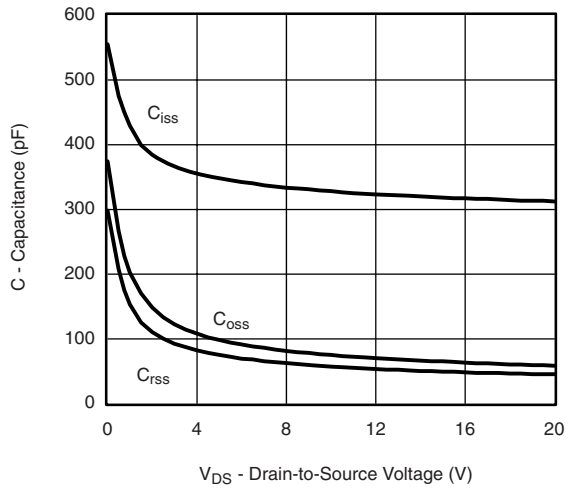
Output Characteristics



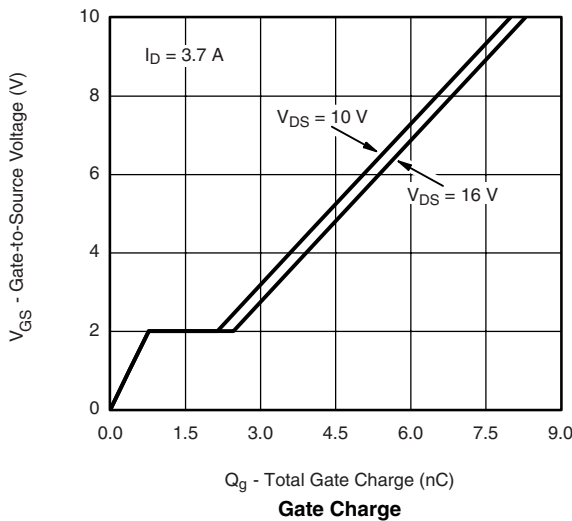
Transfer Characteristics



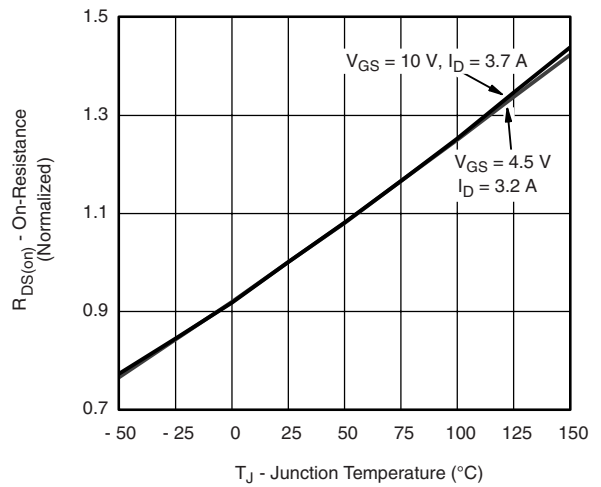
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



Gate Charge

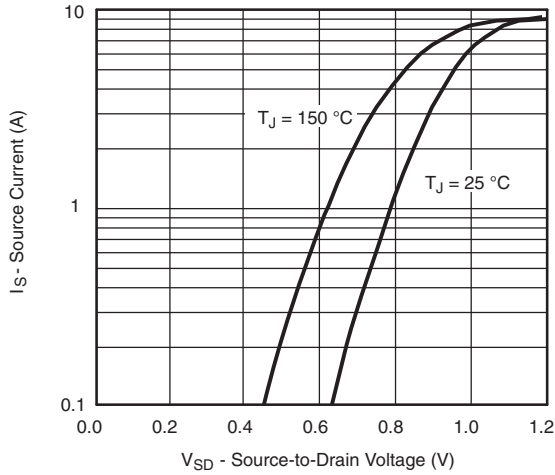


On-Resistance vs. Junction Temperature

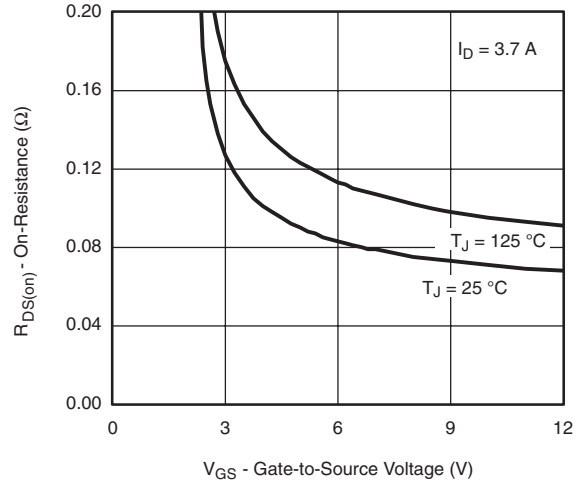


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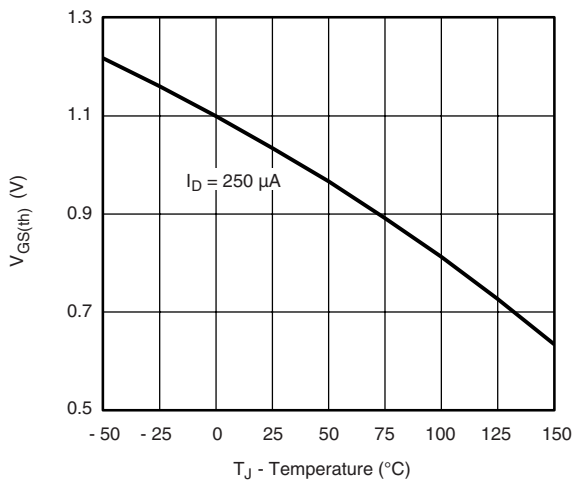
MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



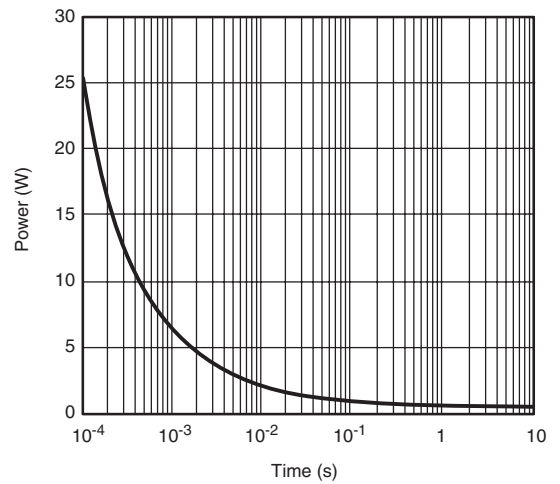
Source-Drain Diode Forward Voltage



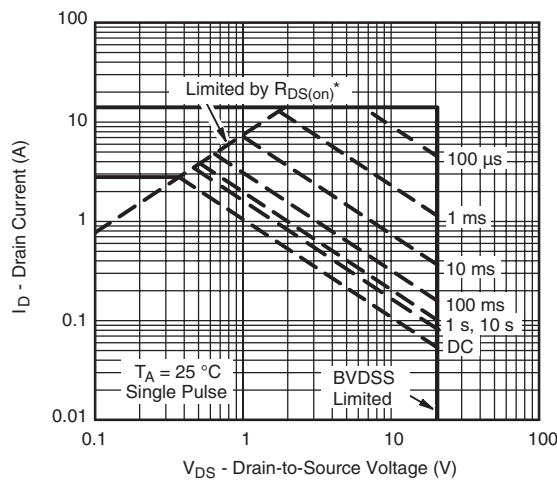
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

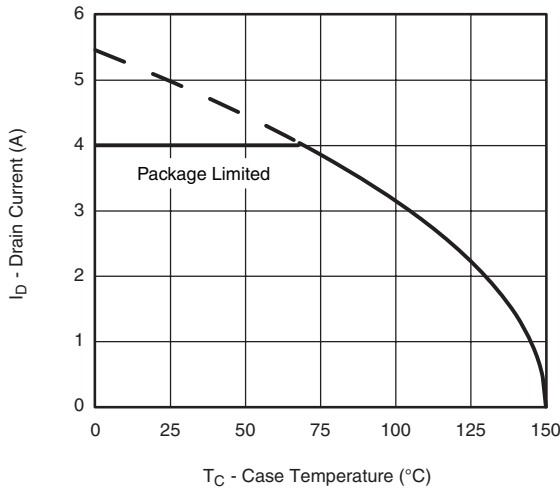
Safe Operating Area, Junction-to-Case

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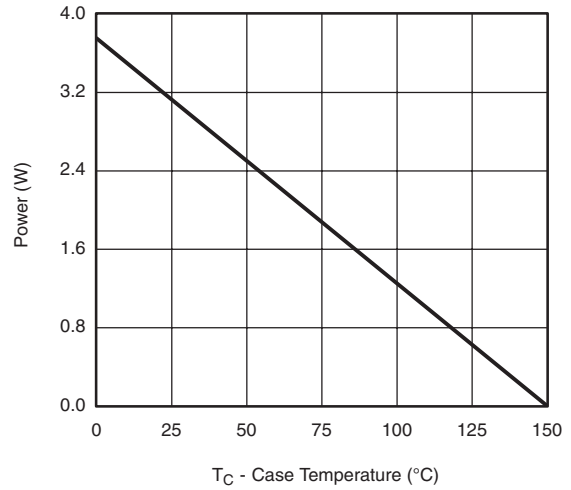
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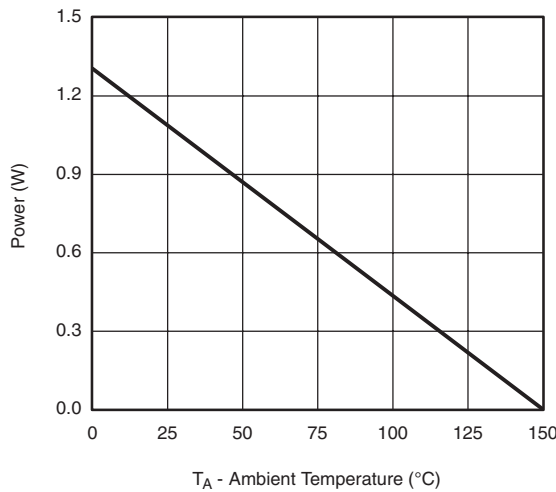
MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



T_C - Case Temperature ($^\circ\text{C}$)
Current Derating*



T_C - Case Temperature ($^\circ\text{C}$)
Power Derating, Junction-to-Foot



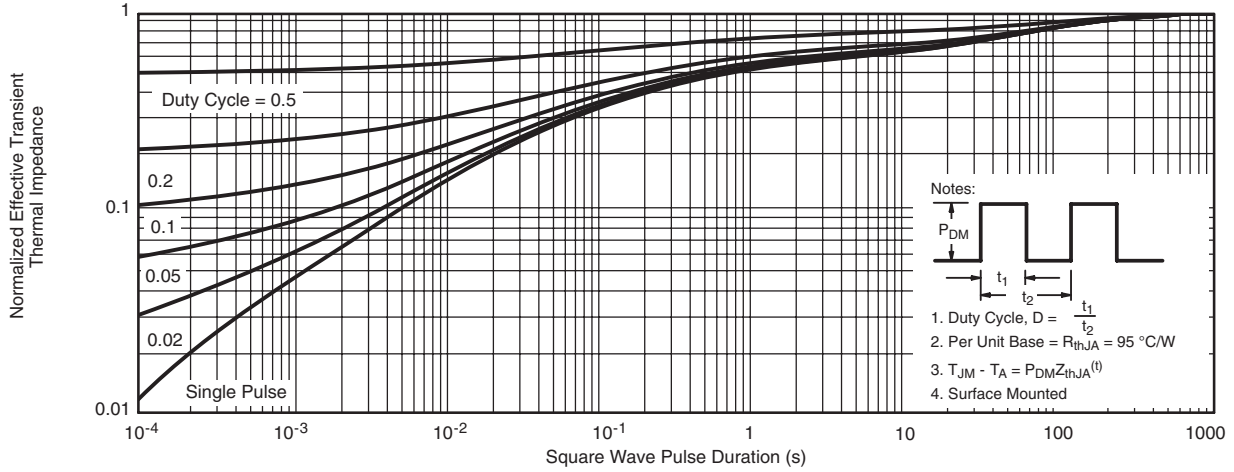
T_A - Ambient Temperature ($^\circ\text{C}$)
Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150\text{ }^\circ\text{C}$, 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.

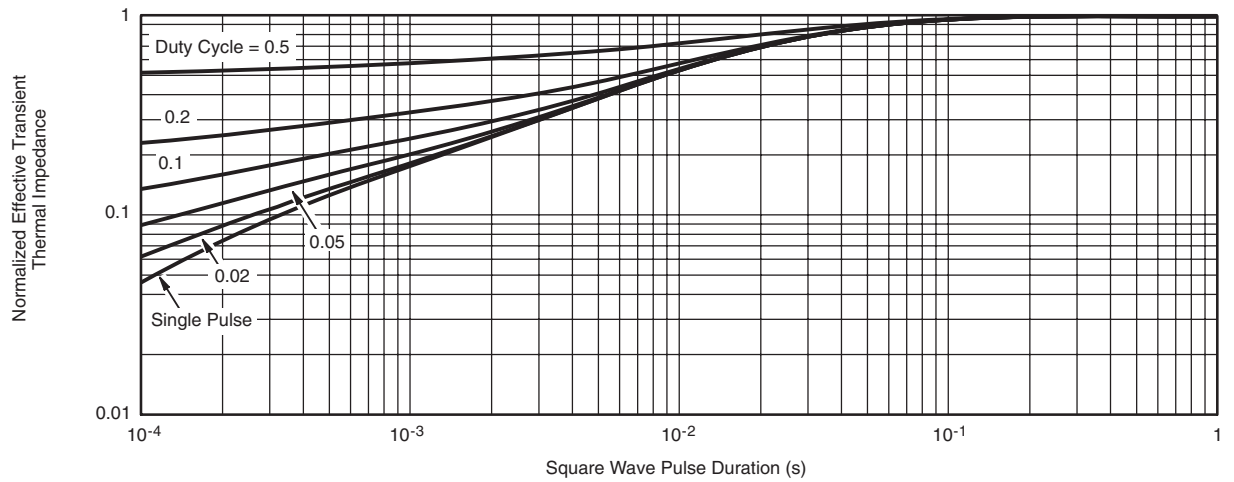


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MOSFET TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



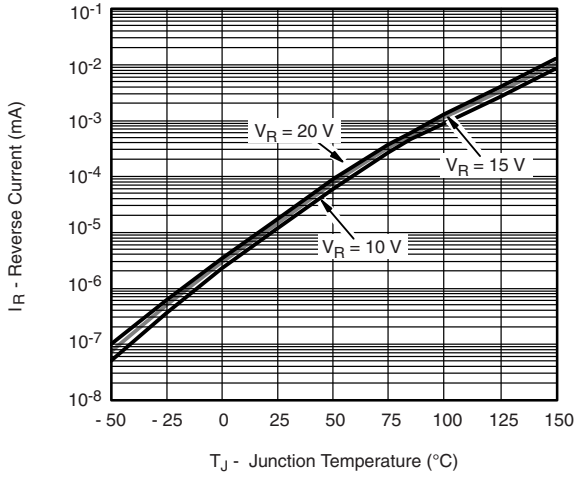
Normalized Thermal Transient Impedance, Junction-to-Foot

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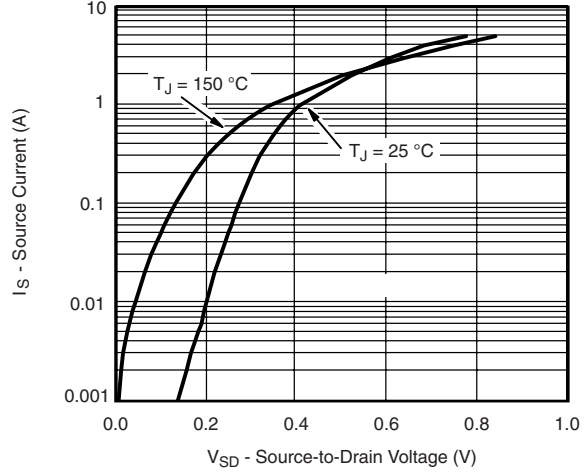
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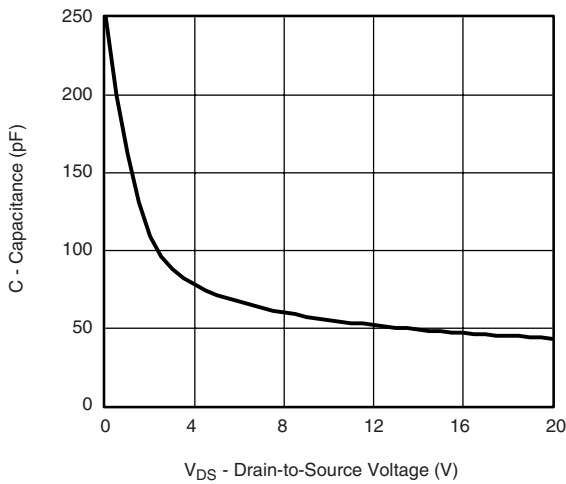
SCHOTTKY TYPICAL CHARACTERISTICS $T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted



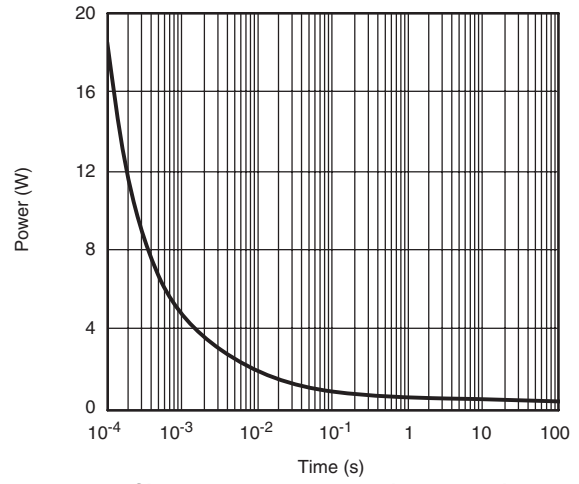
Reverse Current vs. Junction Temperature



Forward Diode Voltage



Capacitance

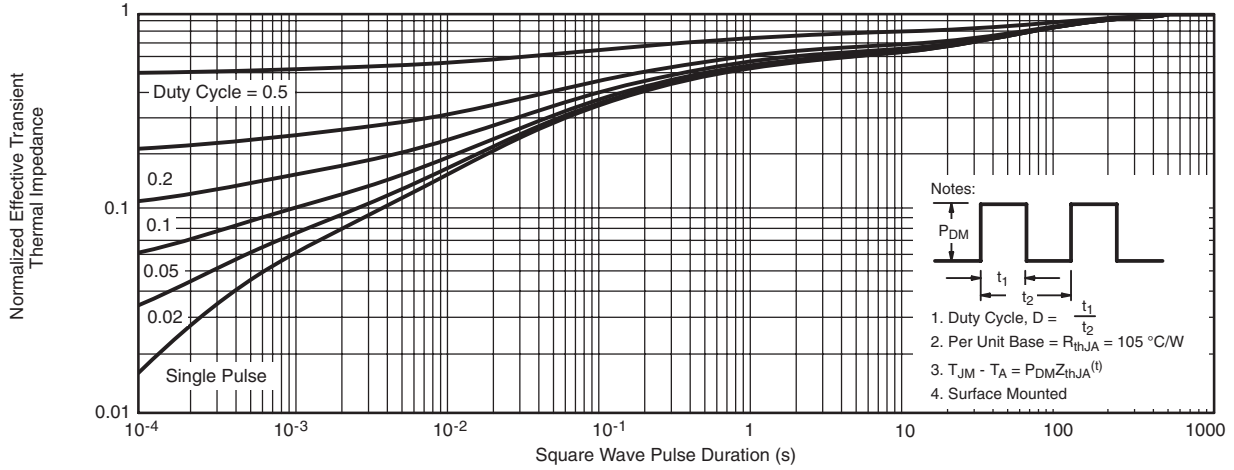


Single Pulse Power, Junction-to-Ambient

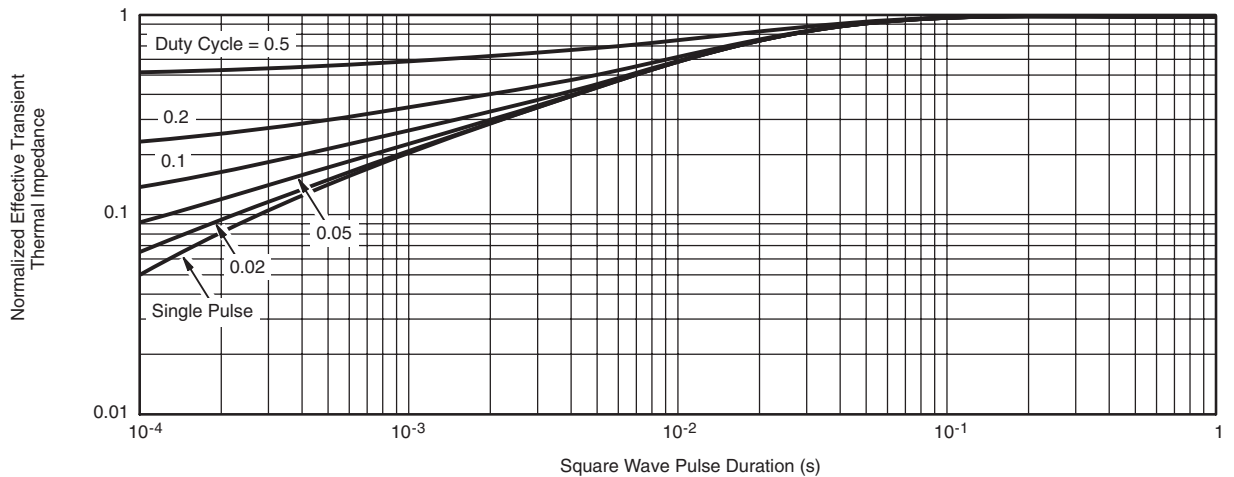


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SCHOTTKY TYPICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

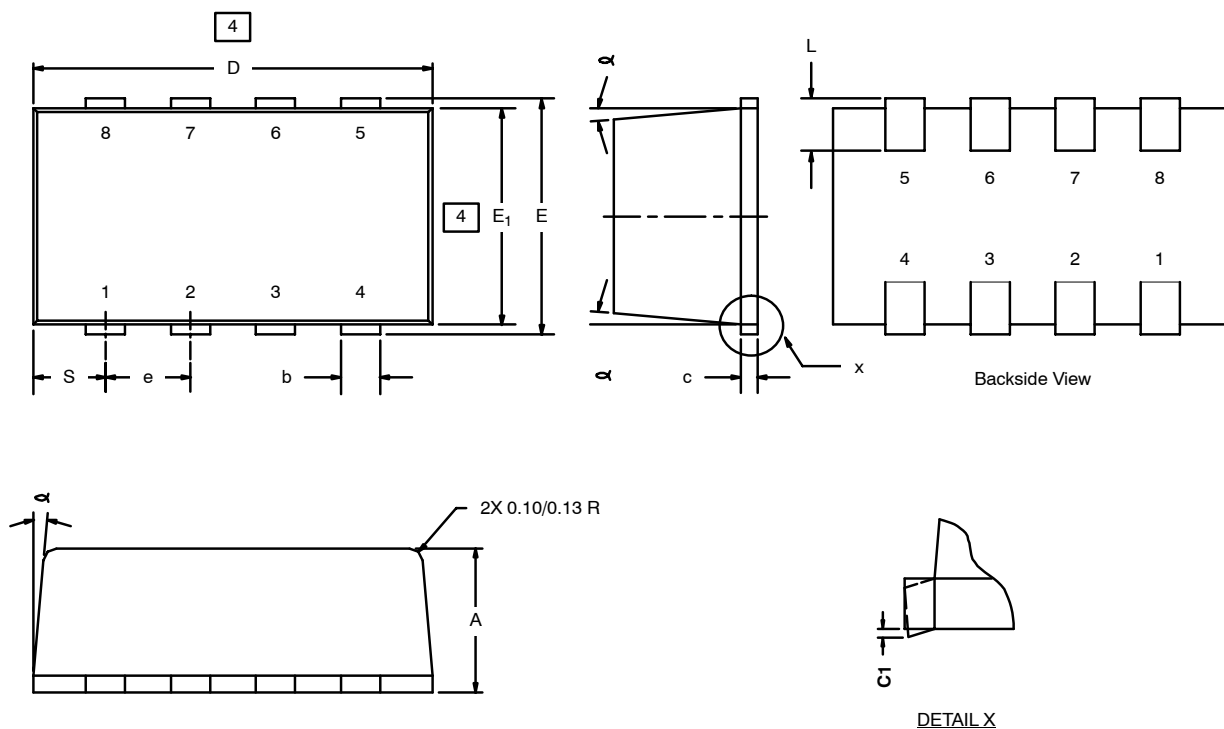
Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package/tape drawings, part marking, and reliability data, see www.vishay.com/ppg?68920.



Package Information

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1206-8 ChipFET®



NOTES:

1. All dimensions are in millimeters.
2. Mold gate burrs shall not exceed 0.13 mm per side.
3. Leadframe to molded body offset is horizontal and vertical shall not exceed 0.08 mm.
4. Dimensions exclusive of mold gate burrs.
5. No mold flash allowed on the top and bottom lead surface.

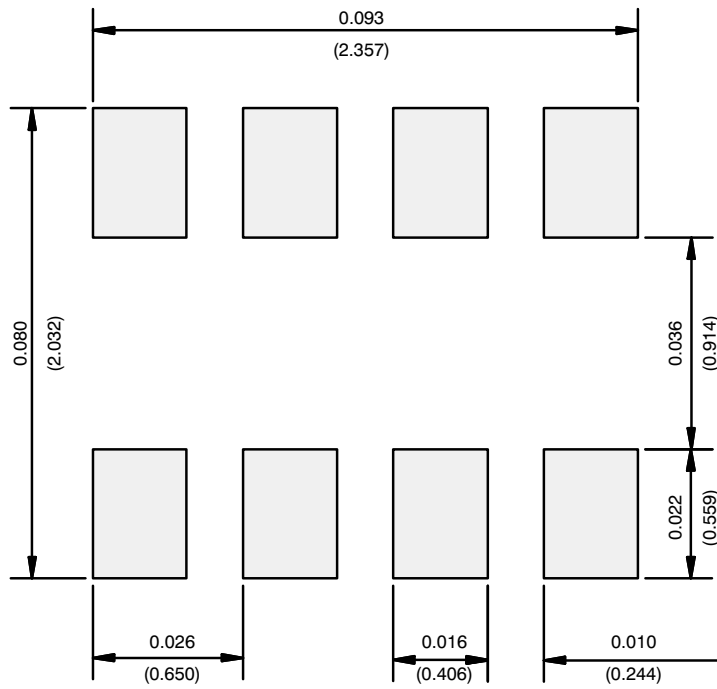
Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	1.00	-	1.10	0.039	-	0.043
b	0.25	0.30	0.35	0.010	0.012	0.014
c	0.1	0.15	0.20	0.004	0.006	0.008
c1	0	-	0.038	0	-	0.0015
D	2.95	3.05	3.10	0.116	0.120	0.122
E	1.825	1.90	1.975	0.072	0.075	0.078
E₁	1.55	1.65	1.70	0.061	0.065	0.067
e	0.65 BSC			0.0256 BSC		
L	0.28	-	0.42	0.011	-	0.017
S	0.55 BSC			0.022 BSC		
α	5°Nom			5°Nom		
ECN: C-03528—Rev. F, 19-Jan-04 DWG: 5547						

Application Note 826

Vishay Siliconix



RECOMMENDED MINIMUM PADS FOR 1206-8 ChipFET®



Recommended Minimum Pads
 Dimensions in Inches/(mm)

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