



N-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω) (Max.)	I_D (A) ^{a, g}	Q_g (Typ.)
30	0.0037 at $V_{GS} = 10$ V	30 ^g	15.4 nC
	0.0050 at $V_{GS} = 4.5$ V	30 ^g	

FEATURES

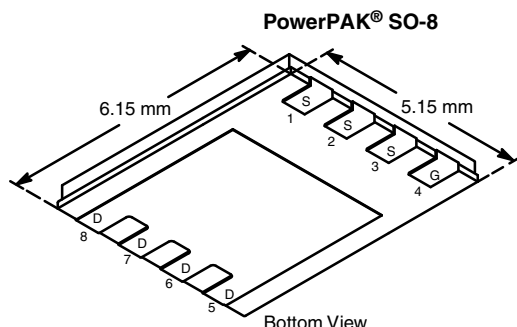
- TrenchFET[®] Gen IV Power MOSFET
- 100 % R_g and UIS Tested
- Material categorization:
For definitions of compliance please see
www.vishay.com/doc?99912



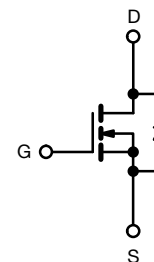
RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- High Power Density DC/DC
- Synchronous Rectification
- VRMs and Embedded DC/DC



Ordering Information:
SiRA10DP-T1-GE3 (Lead (Pb)-free and Halogen-free)



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	+ 20, - 16	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	$T_C = 25^\circ\text{C}$	30 ^g
		$T_C = 70^\circ\text{C}$	30 ^g
		$T_A = 25^\circ\text{C}$	25 ^{b, c}
		$T_A = 70^\circ\text{C}$	23 ^{b, c}
Pulsed Drain Current ($t = 300 \mu\text{s}$)	I_{DM}	80	A
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$	30 ^g
		$T_A = 25^\circ\text{C}$	4.2 ^{b, c}
Single Pulse Avalanche Current	I_{AS}	20	mJ
Single Pulse Avalanche Energy	E_{AS}	20	
Maximum Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	40
		$T_C = 70^\circ\text{C}$	26
		$T_A = 25^\circ\text{C}$	5 ^{b, c}
		$T_A = 70^\circ\text{C}$	3.2 ^{b, c}
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature) ^{d, e}		260	

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, f}	R_{thJA}	21	25	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Case (Drain)	R_{thJC}	2.5	3.1	

Notes:

- Based on $T_C = 25^\circ\text{C}$.
- Surface mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- See solder profile (www.vishay.com/doc?73257). The PowerPAK SO-8 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 solder interconnection.
- Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.
- Maximum under steady state conditions is $70^\circ\text{C}/\text{W}$.
- Package limited.

SiRA10DP

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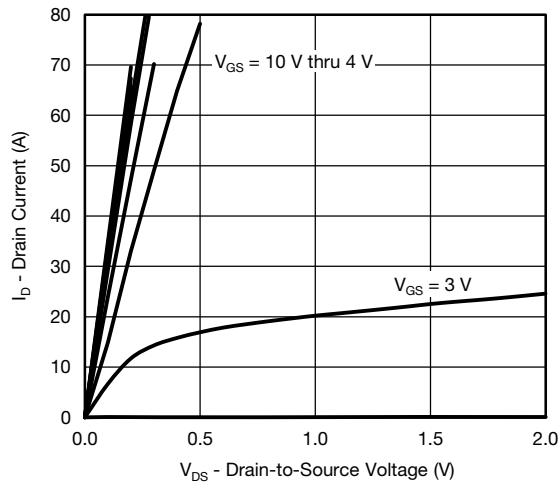
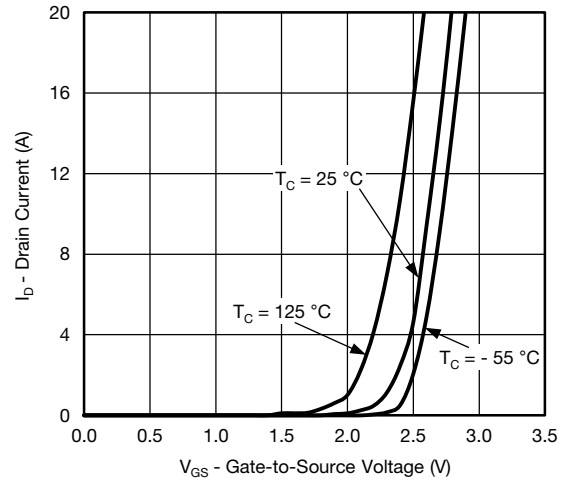
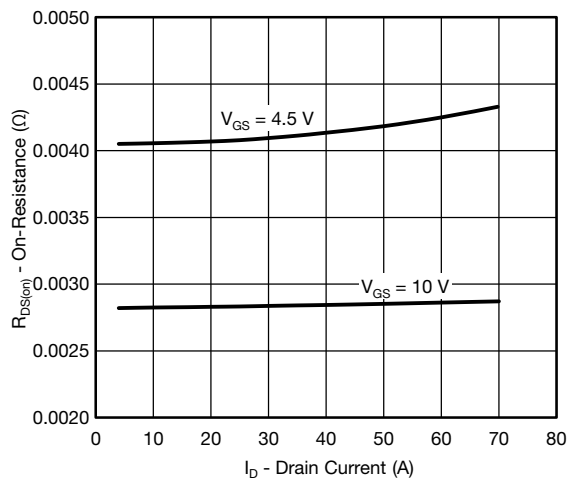
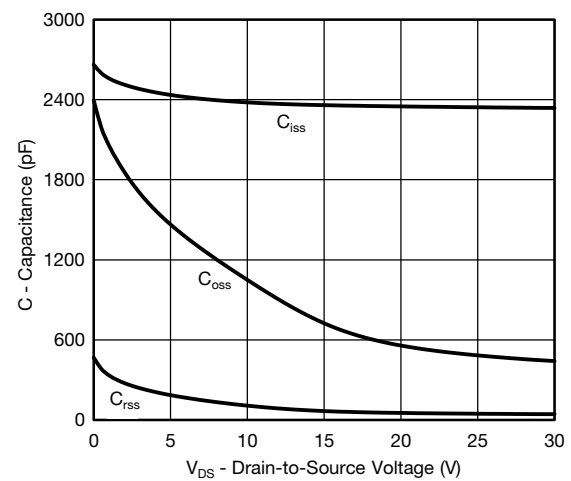
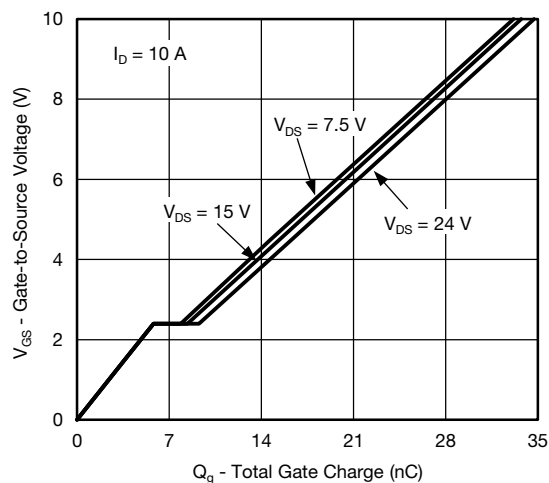
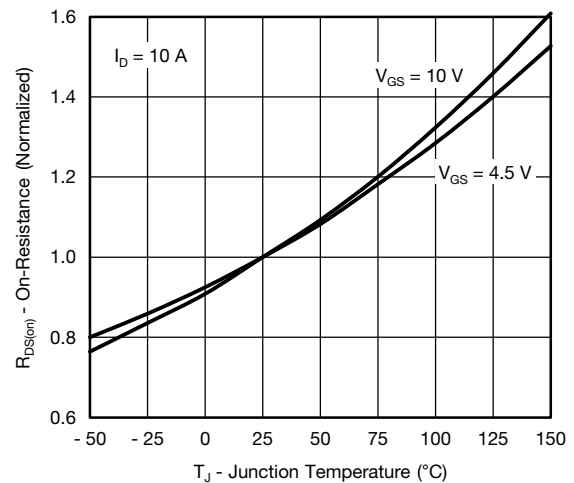
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	30			V	
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		17		mV/°C	
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 5			
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.1		2.2	V	
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = + 20, - 16 V			± 100	nA	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			1	μA	
		V _{DS} = 30 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	25			A	
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 10 A		0.0028	0.0037	Ω	
		V _{GS} = 4.5 V, I _D = 7 A		0.0041	0.0050		
Forward Transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 10 A		52		S	
Dynamic ^b							
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, f = 1 MHz		2425		pF	
Output Capacitance	C _{oss}			730			
Reverse Transfer Capacitance	C _{rss}			65			
C _{rss} /C _{iss} Ratio				0.027	0.054		
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 10 A		34	51	nC	
Gate-Source Charge	Q _{gs}	V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 10 A		15.4	23.1		
Gate-Drain Charge	Q _{gd}			5.8			
Output Charge	Q _{oss}			2.6			
Gate Resistance	R _g	V _{DS} = 15 V, V _{GS} = 0 V		20			
Turn-On Delay Time	t _{d(on)}	f = 1 MHz	0.3	1.7	3.4	Ω	
Rise Time	t _r		V _{DD} = 15 V, R _L = 1.5 Ω I _D ≅ 10 A, V _{GEN} = 10 V, R _g = 1 Ω		10	20	ns
Turn-Off Delay Time	t _{d(off)}				10	20	
Fall Time	t _f				27	50	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 1.5 Ω I _D ≅ 10 A, V _{GEN} = 4.5 V, R _g = 1 Ω			10	20	
Rise Time	t _r			20	40		
Turn-Off Delay Time	t _{d(off)}			15	30		
Fall Time	t _f			25	50		
				10	20		
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			30	A	
Pulse Diode Forward Current ^a	I _{SM}				80		
Body Diode Voltage	V _{SD}	I _S = 10 A		0.8	1.2	V	
Body Diode Reverse Recovery Time	t _{rr}	I _F = 10 A, dI/dt = 100 A/μs, T _J = 25 °C		31	62	ns	
Body Diode Reverse Recovery Charge	Q _{rr}			19	40	nC	
Reverse Recovery Fall Time	t _a			14		ns	
Reverse Recovery Rise Time	t _b			17			

Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

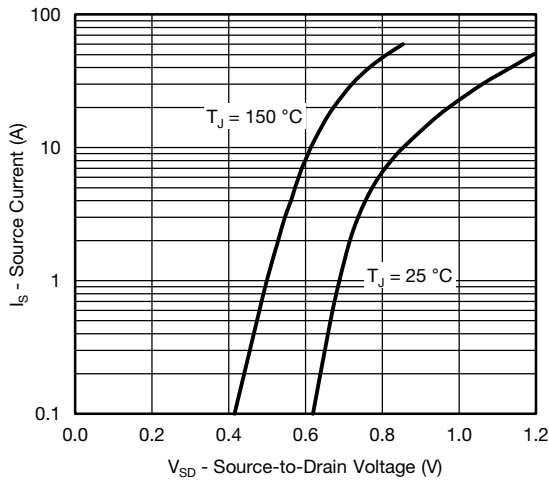
b. Guaranteed by design, not subject to production testing.

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.

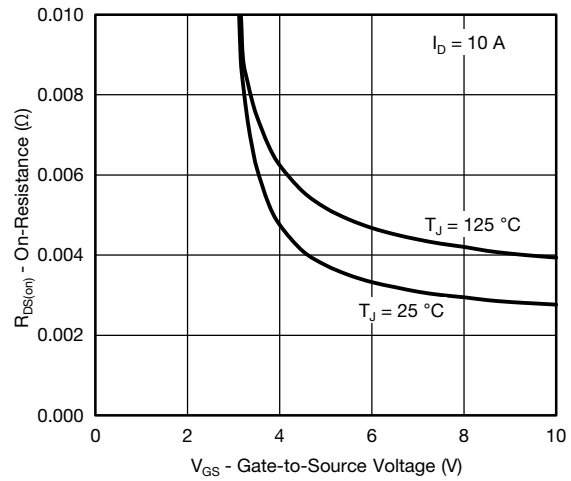

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

SiRA10DP

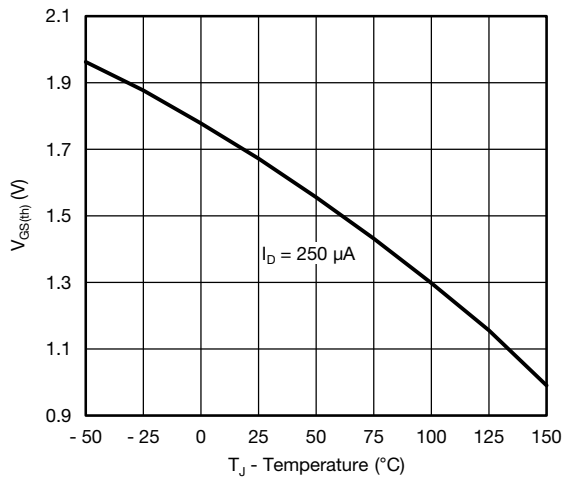
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**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

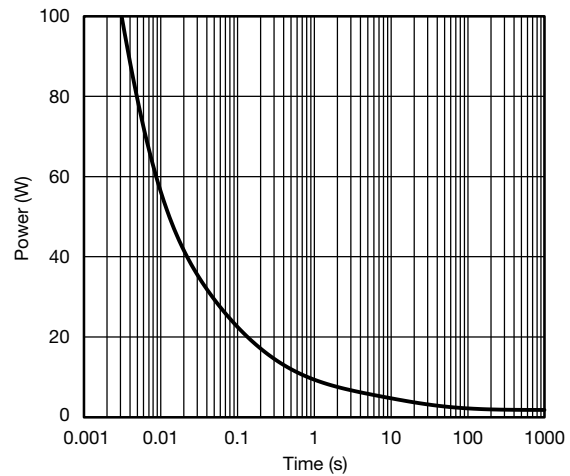
Source-Drain Diode Forward Voltage



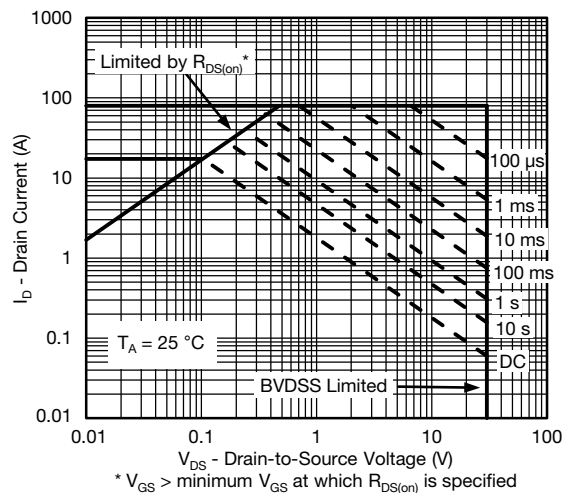
On-Resistance vs. Gate-to-Source Voltage



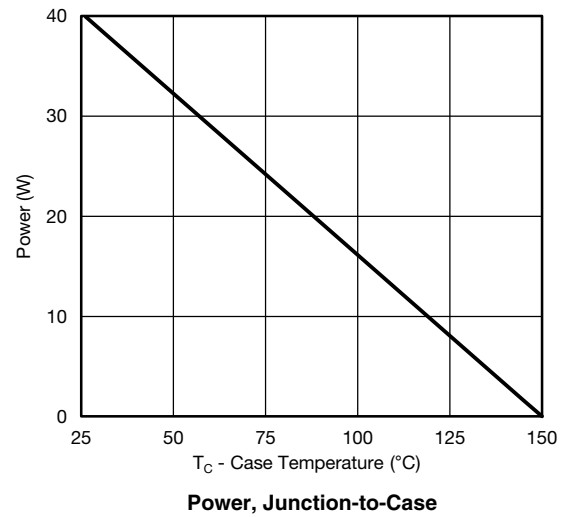
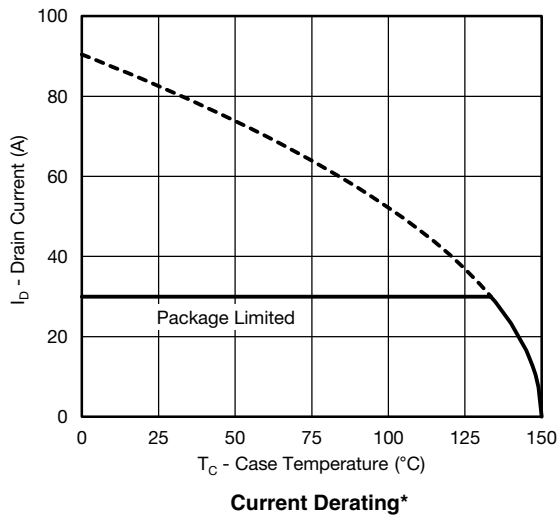
Threshold Voltage



Single Pulse Power, Junction-to-Ambient



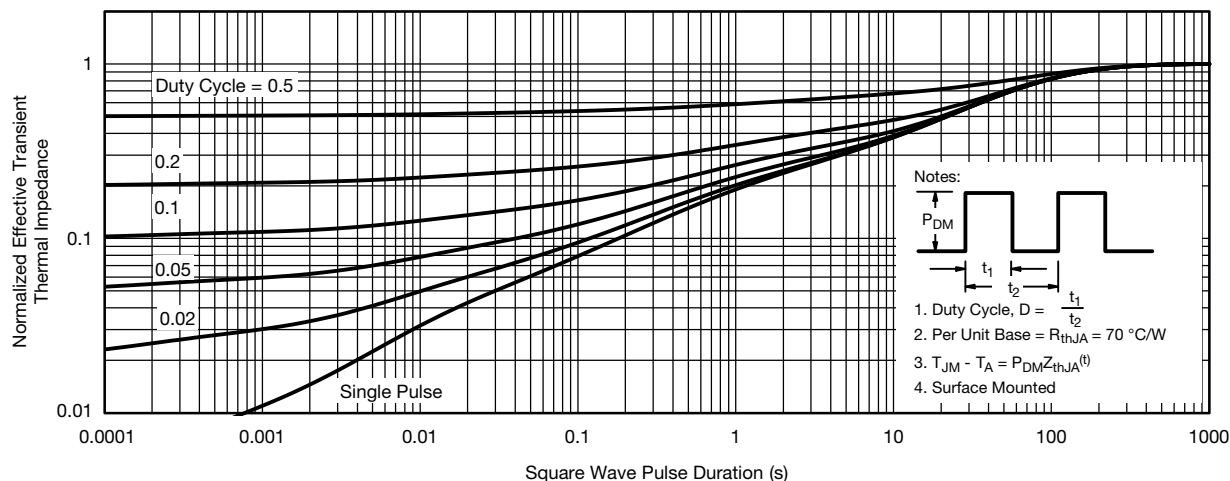
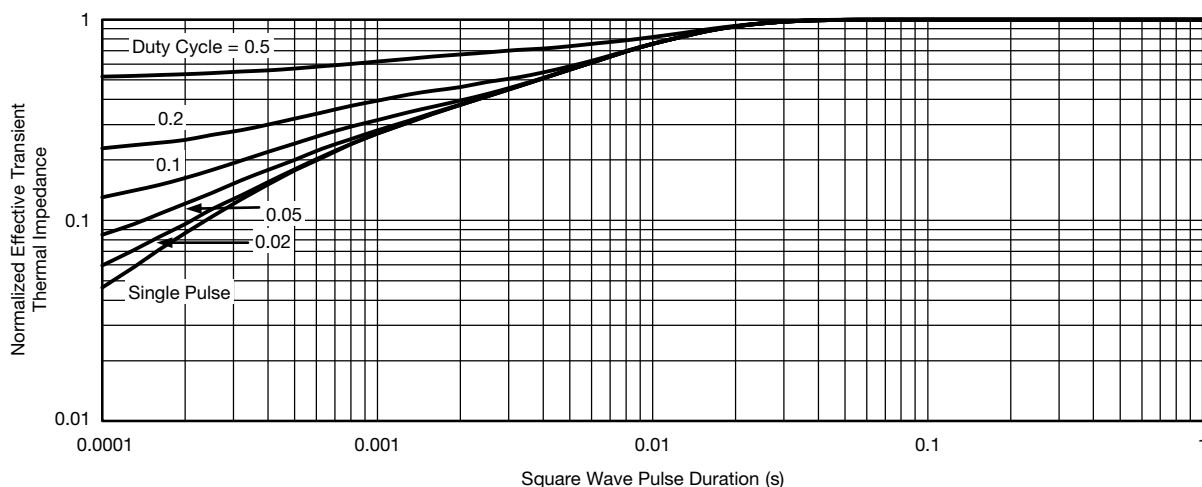
Safe Operating Area


TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


* 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.

SiRA10DP

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**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)**Normalized Thermal Transient Impedance, Junction-to-Ambient****Normalized Thermal Transient Impedance, Junction-to-Case**

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?63820.

PowerPAK® SO-8, (Single/Dual)



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.97	1.04	1.12	0.038	0.041	0.044
A1		-	0.05	0	-	0.002
b	0.33	0.41	0.51	0.013	0.016	0.020
c	0.23	0.28	0.33	0.009	0.011	0.013
D	5.05	5.15	5.26	0.199	0.203	0.207
D1	4.80	4.90	5.00	0.189	0.193	0.197
D2	3.56	3.76	3.91	0.140	0.148	0.154
D3	1.32	1.50	1.68	0.052	0.059	0.066
D4	0.57 typ.			0.0225 typ.		
D5	3.98 typ.			0.157 typ.		
E	6.05	6.15	6.25	0.238	0.242	0.246
E1	5.79	5.89	5.99	0.228	0.232	0.236
E2 (for AL product)	3.30	3.48	3.66	0.130	0.137	0.144
E2 (for other product)	3.48	3.66	3.84	0.137	0.144	0.151
E3	3.68	3.78	3.91	0.145	0.149	0.154
E4 (for AL product)	0.58 typ.			0.023 typ.		
E4 (for other product)	0.75 typ.			0.030 typ.		
e	1.27 BSC			0.050 BSC		
K (for AL product)	1.45 typ.			0.057 typ.		
K (for other product)	1.27 typ.			0.050 typ.		
K1	0.56	-	-	0.022	-	-
H	0.51	0.61	0.71	0.020	0.024	0.028
L	0.51	0.61	0.71	0.020	0.024	0.028
L1	0.06	0.13	0.20	0.002	0.005	0.008
θ	0°	-	12°	0°	-	12°
W	0.15	0.25	0.36	0.006	0.010	0.014
M	0.125 typ.			0.005 typ.		
ECN: C13-0702-Rev. K, 20-May-13						
DWG: 5881						

RECOMMENDED MINIMUM PADS FOR PowerPAK® SO-8 Single



Recommended Minimum Pads
Dimensions in Inches/(mm)

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