



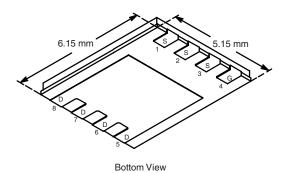
## N-Channel 25-V (D-S) MOSFET

PRODUC	PRODUCT SUMMARY					
V <sub>DS</sub> (V)	$R_{DS(on)}\left(\Omega\right)$	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)			
25	0.007 at V <sub>GS</sub> = 10 V	30 <sup>a</sup>	8.4 nC			
25	0.009 at V <sub>GS</sub> = 4.5 V	30 <sup>a</sup>	8.4 110			

## **FEATURES**

- Halogen-free
- TrenchFET® Power MOSFET
- 100 % R<sub>g</sub> Tested
- 100 % UIS Tested



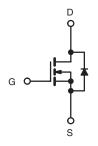


### PowerPAK SO-8

Ordering Information: SiR850DP-T1-GE3 (Lead (Pb)-free and Halogen-free)

### **APPLICATIONS**

- Synchronous Buck
  - High-Side



N-Channel MOSFET

Parameter	Symbol	Limit	Unit		
Drain-Source Voltage		V <sub>DS</sub>	25	V	
Gate-Source Voltage		V <sub>GS</sub>	± 20		
	T <sub>C</sub> = 25 °C		30 <sup>a</sup>		
Continuous Drain Current (T = 150 °C)	T <sub>C</sub> = 70 °C		30 <sup>a</sup>		
Continuous Drain Current (T <sub>J</sub> = 150 °C)	T <sub>A</sub> = 25 °C	l <sub>D</sub>	20.1 <sup>b, c</sup>	A	
	T <sub>A</sub> = 70 °C		16.1 <sup>b, c</sup>	A	
Pulsed Drain Current	•	I <sub>DM</sub>	70		
Avalanche Current	I = 0.1 mH	I <sub>AS</sub>	35		
valanche Energy L = 0.1 mH		E <sub>AS</sub>	61	mJ	
Continuous Source-Drain Diode Current	T <sub>C</sub> = 25 °C		30 <sup>a</sup>	Α	
Continuous Source-Diam Diode Current	T <sub>A</sub> = 25 °C	I <sub>S</sub>	4 <sup>b, c</sup>		
	T <sub>C</sub> = 25 °C		41.7		
Maximum Daylar Dissination	T <sub>C</sub> = 70 °C		26.7	w	
Maximum Power Dissipation	T <sub>A</sub> = 25 °C	P <sub>D</sub>	4.8 <sup>b, c</sup>	VV	
	T <sub>A</sub> = 70 °C		3.1 <sup>b, c</sup>		
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	g - 55 to 150		
Soldering Recommendations (Peak Tempera		260	~C		

THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>b, f</sup>	t ≤ 10 s	$R_{thJA}$	21	26	°C/W	
Maximum Junction-to-Case (Drain)	Steady State	R <sub>thJC</sub>	2.4	3.0	)/ <b>VV</b>	

- a. Based on T<sub>C</sub> = 25 °C. Package limited.
  b. Surface Mounted on 1" x 1" FR4 board.
- c. t = 10 s.
- d. See Solder Profile (http://www.vishay.com/ppg?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.
- e. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.
- f. Maximum under Steady State conditions is 70 °C/W.

## SiR850DP

# Vishay Siliconix



Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit
Static	-				I	1
Drain-Source Breakdown Voltage	V <sub>DS</sub>	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	25			V
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	J 050 A		27		
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I <sub>D</sub> = 250 μA		- 5.5		mV/°C
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}$ , $I_D = 250 \mu A$	1		3	V
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
7 0		V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V			1	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55 ^{\circ}\text{C}$			5	μΑ
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$	50			Α
	Б	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		0.0058	0.007	
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 15 A		0.0073	0.009	Ω
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A		85		S
Dynamic <sup>b</sup>					L	1
Input Capacitance	C <sub>iss</sub>			1120		
Output Capacitance	C <sub>oss</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		290		pF
Reverse Transfer Capacitance	C <sub>rss</sub>			100		1
Total Oats Observe		$V_{DS} = 12.5 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 20 \text{ A}$		19	30	
Total Gate Charge	Qg			8.4	13	
Gate-Source Charge	Q <sub>gs</sub>	V <sub>DS</sub> = 12.5 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 20 A		3.3		nC
Gate-Drain Charge	$Q_{gd}$			2.0		
Gate Resistance	$R_g$	f = 1 MHz		1.0	2.0	Ω
Turn-On Delay Time	t <sub>d(on)</sub>			20	30	
Rise Time	t <sub>r</sub>	$V_{DD}$ = 12.5 V, $R_L$ = 12.5 $\Omega$		20	30	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ 1.0 A, $V_{GEN}$ = 4.5 V, $R_g$ = 1 $\Omega$		30	45	
Fall Time	t <sub>f</sub>			11	20	
Turn-On Delay Time	t <sub>d(on)</sub>			14	25	ns
Rise Time	t <sub>r</sub>	$V_{DD}$ = 12.5 V, $R_L$ = 12.5 $\Omega$		15	25	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ 1.0 A, $V_{GEN}$ = 10 V, $R_g$ = 1 $\Omega$		30	45	
Fall Time	t <sub>f</sub>			8	15	
<b>Drain-Source Body Diode Characteristi</b>	cs			•		
Continuous Source-Drain Diode Current	I <sub>S</sub>	$T_C = 25  ^{\circ}C$			30	Α
Pulse Diode Forward Current	I <sub>SM</sub>				70	_ ^
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = 4.0 A, V <sub>GS</sub> = 0 V		0.75	1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>			23	45	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> = 4.0 A, dI/dt = 100 A/μs, T <sub>.I</sub> = 25 °C		15	30	nC
Reverse Recovery Fall Time	t <sub>a</sub>	i <sub>F</sub> - +.0 Λ, αι/αι = 100 Α/μ5, 1 <sub>J</sub> = 25 °C		12		ns
Reverse Recovery Rise Time	t <sub>b</sub>			11		

- a. Pulse test; pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.

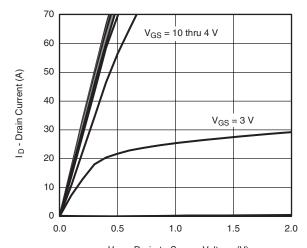
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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





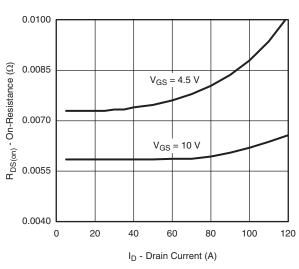


## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

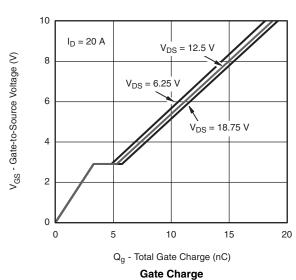


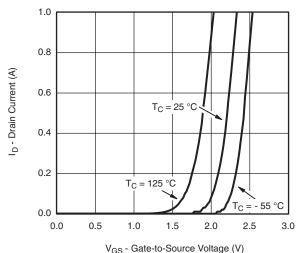
V<sub>DS</sub> - Drain-to-Source Voltage (V)

### **Output Characteristics**

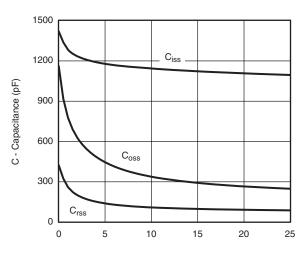


On-Resistance vs. Drain Current and Gate Voltage



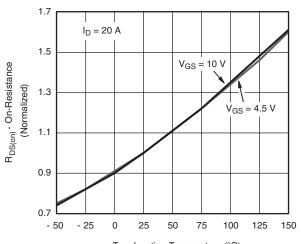


### **Transfer Characteristics**



V<sub>DS</sub> - Drain-to-Source Voltage (V)

### Capacitance

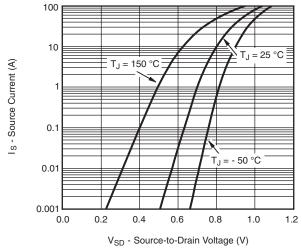


T<sub>J</sub> - Junction Temperature (°C)

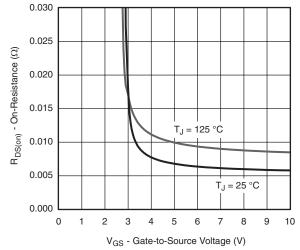
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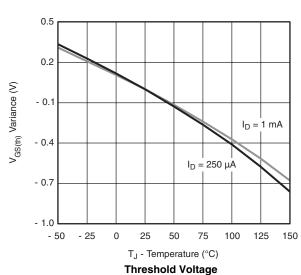
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

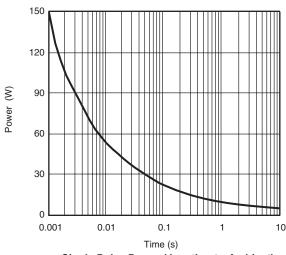


Source-Drain Diode Forward Voltage

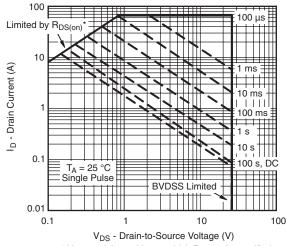


On-Resistance vs. Gate-to-Source Voltage





Single Pulse Power (Junction-to-Ambient)

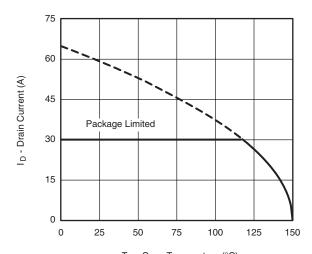


\* V<sub>GS</sub> > minimum V<sub>GS</sub> at which R<sub>DS(on)</sub> is specified

Safe Operating Area, Junction-to-Ambient

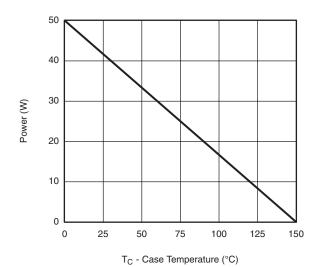


### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

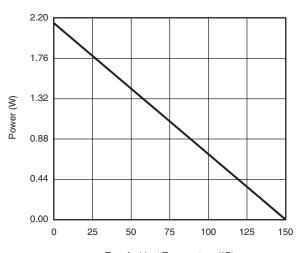


T<sub>C</sub> - Case Temperature (°C)

### **Current Derating\***



Power, Junction-to-Case



T<sub>A</sub> - Ambient Temperature (°C)

Power, Junction-to-Ambient

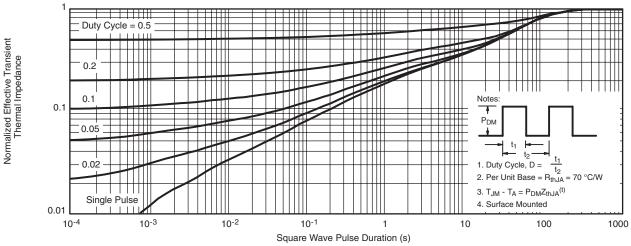
Document Number: 68825 S-82287-Rev. B, 22-Sep-08

<sup>\*</sup> 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.

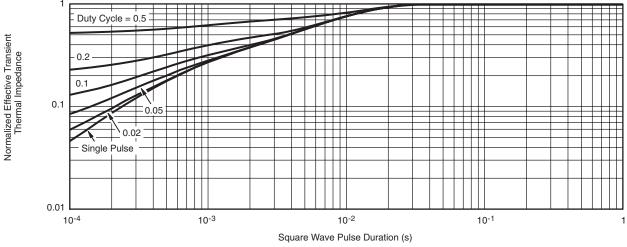
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### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



### Normalized Thermal Transient Impedance, Junction-to-Ambient



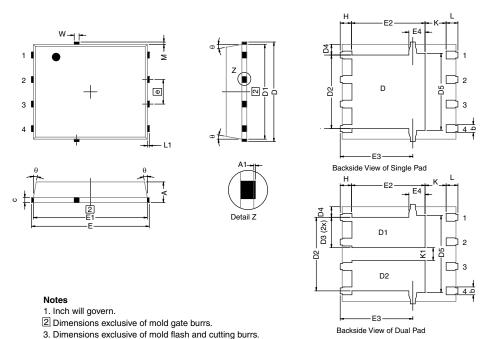
Normalized Thermal Transient Impedance, Junction-to-Case

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 <a href="http://www.vishay.com/ppg?68825">http://www.vishay.com/ppg?68825</a>.



DWG: 5881

# PowerPAK® SO-8, (Single/Dual)

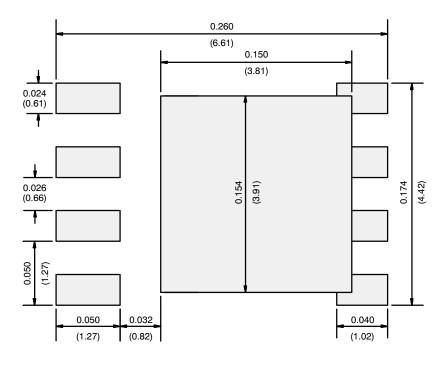


	MILLIMETERS			INCHES			
DIM.	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
А	0.97	1.04	1.12	0.038	0.041	0.044	
A1		-	0.05	0	-	0.002	
b	0.33	0.41	0.51	0.013	0.016	0.020	
С	0.23	0.28	0.33	0.009	0.011	0.013	
D	5.05	5.15	5.26	0.199	0.203	0.207	
D1	4.80	4.90	5.00	0.189	0.193	0.197	
D2	3.56	3.76	3.91	0.140	0.148	0.154	
D3	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.			
е	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	-	=	
Н	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	
М	0.125 typ.			0.005 typ.			

Revison: 20-May-13 Document Number: 71655



## RECOMMENDED MINIMUM PADS FOR PowerPAK® SO-8 Single



Recommended Minimum Pads Dimensions in Inches/(mm)

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APPLICATION NOTE



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Revision: 02-Oct-12 Document Number: 91000