SiR680LDP

www.vishay.com

Vishay Siliconix



PRODUCT SUMMARY

V _{DS} (V)	80
$R_{DS(on)}$ max. (Ω) at V_{GS} = 10 V	0.0028
$R_{DS(on)}$ max. (Ω) at V_{GS} = 4.5 V	0.00355
Q _g typ. (nC)	40.5
I _D (A)	130
Configuration	Single

FEATURES

N-Channel 80 V (D-S) MOSFET

- TrenchFET[®] Gen IV power MOSFET
- Very low R_{DS} Q_g figure-of-merit (FOM)
- Tuned for the lowest R_{DS} Q_{oss} FOM
- 100 % R_q and UIS tested
- · Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Synchronous rectification
- · Primary side switch
- DC/DC converter
- Solar micro inverter
- Motor drive switch

Industrial

- · Battery and load switch
- N-Channel MOSFET

Package	PowerPAK SO-8
Lead (Pb)-free and halogen-free	SiR680LDP-T1-RE3
Lead (Pb)-free and halogen-free, BLR and IOL	SiR680LDP-T1-UE3

ABSOLUTE MAXIMUM RATING	S (T _A = 25 °C, ι	Inless otherv	vise noted)	
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V _{DS}	80	V
Gate-source voltage		V _{GS}	± 20	v
	T _C = 25 °C		130	
Continuous drain surrent (T. – 150 °C)	T _C = 70 °C		104	
Continuous drain current ($T_J = 150 \ ^{\circ}C$)	T _A = 25 °C	I _D	31.8 ^{b, c}	
	T _A = 70 °C	1	25.4 ^{b, c}	
Pulsed drain current (t = 100 µs)		I _{DM}	300	— A
Continuous comos dusis disele comost	T _C = 25 °C	$T_{\rm C} = 25 ^{\circ}{\rm C}$	94.5	
Continuous source-drain diode current	T _A = 25 °C	I _S	5.6 ^{b, c}	
Single pulse avalanche current		I _{AS}	50	
Single pulse avalanche energy	L = 0.1 mH	E _{AS}	125	mJ
	T _C = 25 °C		104	
Maximum a success disain ation	T _C = 70 °C		66.6	14/
Maximum power dissipation	T _A = 25 °C	P _D	6.25 ^{b, c}	W
	T _A = 70 °C	1	4 b, c	
Operating junction and storage temperature range		T _J , T _{stg}	-55 to +150	*0
Soldering recommendations (peak temperature) ^c			260	°C

THEDMAL DESIGTANCE DATINGS

INERMAL RESISTANCE RATH	143				
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^b	t ≤ 10 s	R _{thJA}	15	20	°C/W
Maximum junction-to-case (drain)	Steady state	R _{thJC}	0.9	1.2	C/ VV

Notes

a. Package limited b. Surface mounted on 1" x 1" FR4 board

t = 10 s c.

See solder profile (www.vishav.com/doc?73257). The PowerPAK SO-8 is a leadless package. The end of the lead terminal is exposed copper d. (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 54 °C/W e.

f.

g. T_C = 25 °C

S23-1058-Rev. C, 04-Dec-2023

1

Document Number: 77478

For technical questions, contact: pmostechsupport@vishay.com

RoHS

D

COMPLIANT HALOGEN FREE

www.vishay.com

SiR680LDP

Vishay Siliconix

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static	•					
Drain-source breakdown voltage	V _{DS}	$V_{GS} = 0 V, I_{D} = 250 \mu A$	80	-	-	V
V _{DS} temperature coefficient	$\Delta V_{DS}/T_{J}$	I _D = 10 mA	-	64	-	
V _{GS(th)} temperature coefficient	$\Delta V_{GS(th)}/T_J$	I _D = 250 μA	-	-2.2	-	mV/°C
Gate-source threshold voltage	V _{GS(th)}	$V_{DS} = V_{GS}$, $I_D = 250 \ \mu A$	1	-	2.5	V
Gate-source leakage	I _{GSS}	$V_{DS} = 0 V, V_{GS} = \pm 20 V$	-	-	100	nA
		$V_{DS} = 80 \text{ V}, V_{GS} = 0 \text{ V}$	-	-	1	
Zero gate voltage drain current	I _{DSS}	$V_{DS} = 80 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 70 ^{\circ}\text{C}$	-	-	15	μA
On-state drain current ^a	I _{D(on)}	$V_{DS} \ge 10 \text{ V}, \text{ V}_{GS} = 10 \text{ V}$	40	-	-	Α
		$V_{GS} = 10 \text{ V}, \text{ I}_{D} = 20 \text{ A}$	-	0.00233	0.0028	6
Drain-source on-state resistance ^a	R _{DS(on)}	$V_{GS} = 4.5 \text{ V}, \text{ I}_{D} = 20 \text{ A}$	-	0.00292	0.00355	Ω
Forward transconductance ^a	g _{fs}	$V_{DS} = 15 \text{ V}, \text{ I}_{D} = 20 \text{ A}$	-	130	-	S
Dynamic ^b	•					1
Input capacitance	C _{iss}		-	7250	-	
Output capacitance	C _{oss}	$V_{DS} = 40 \text{ V}, V_{GS} = 0 \text{ V}, \text{ f} = 1 \text{ MHz}$	-	570	-	pF
Reverse transfer capacitance	C _{rss}		-	23	-	
Total and a share a	0	$V_{DS} = 40 \text{ V}, V_{GS} = 10 \text{ V}, I_{D} = 20 \text{ A}$	-	90	135	
Total gate charge	Qg		-	40.5	62	
Gate-source charge	Q _{gs}	V_{DS} = 40 V, V_{GS} = 4.5 V, I_D = 20 A	-	20	-	nC
Gate-drain charge	Q _{gd}		-	8.8	-	
Output charge	Q _{oss}	$V_{DS} = 40 \text{ V}, V_{GS} = 0 \text{ V}$	-	73	-	
Gate resistance	Rg	f = 1 MHz	0.4	0.95	1.6	Ω
Turn-on delay time	t _{d(on)}		-	16	32	
Rise time	t _r	$V_{DD} = 40 \text{ V}, \text{ R}_{\text{I}} = 2.0 \Omega, \text{ I}_{\text{D}} \cong 20 \text{ A},$	-	66	132	
Turn-off delay time	t _{d(off)}	$V_{\text{GEN}} = 4.5 \text{ V}, \text{ R}_{\text{g}} = 1 \Omega$	-	47	94	
Fall time	t _f		-	12	24	
Turn-on delay time	t _{d(on)}		-	16	32	ns
Rise time	tr	$V_{DD} = 40 \text{ V}, \text{ R}_{\text{I}} = 2.0 \Omega, \text{ I}_{\text{D}} \cong 20 \text{ A},$	-	9	18	
Turn-off delay time	t _{d(off)}	$V_{\text{GEN}} = 10 \text{ V}, \text{ R}_{\text{g}} = 1 \Omega$	-	44	88	
Fall time	t _f		-	9	18	
Drain-Source Body Diode Characteristi	cs		•	•		
Continuous source-drain diode current	I _S	T _C = 25 °C	-	-	94.5	•
Pulse diode forward current	I _{SM}		-	-	300	A
Body diode voltage	V _{SD}	$I_{\rm S} = 5$ A, $V_{\rm GS} = 0$ V	-	0.72	1.1	V
Body diode reverse recovery time	t _{rr}		-	49	98	ns
Body diode reverse recovery charge	Q _{rr}	I _F = 20 A, di/dt = 100 A/μs,	-	77	154	nC
Reverse recovery fall time	ta	$T_a = 25 \text{ °C}$	-	31	-	
Reverse recovery rise time	t _b		-	18	-	ns

Notes

a. Pulse test; pulse width \leq 300 µs, duty cycle \leq 2 %

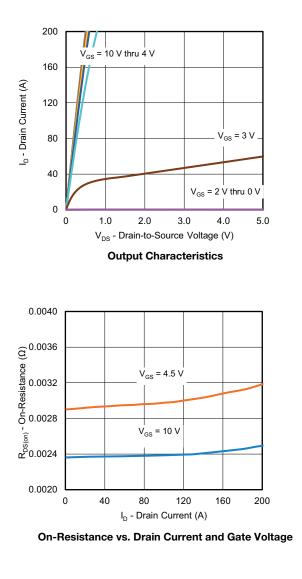
b. Guaranteed by design, not subject to production testing

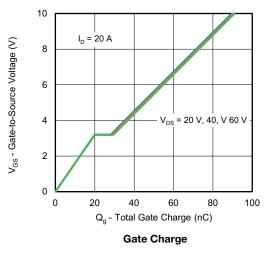
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

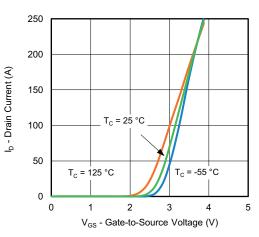


Vishay Siliconix

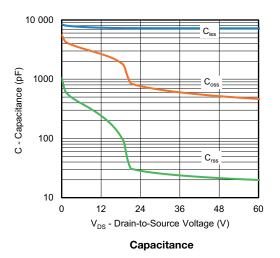
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

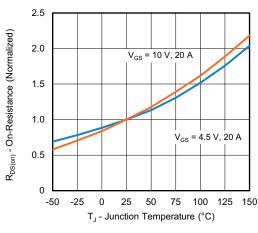






Transfer Characteristics





On-Resistance vs. Junction Temperature

S23-1058-Rev. C, 04-Dec-2023

3

Document Number: 77478

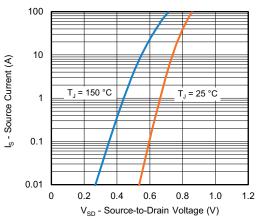
For technical questions, contact: <u>pmostechsupport@vishay.com</u> THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT <u>www.vishay.com/doc?91000</u>



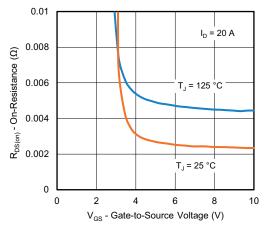
SiR680LDP

Vishay Siliconix

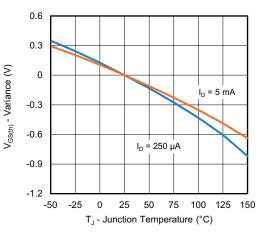
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



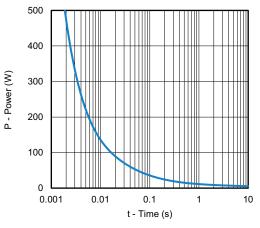
Source-Drain Diode Forward Voltage



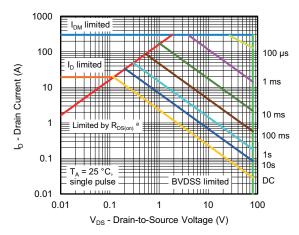
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient

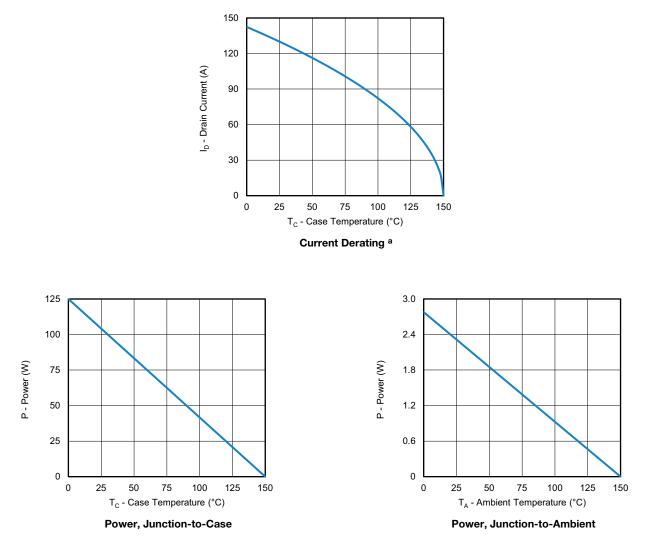


Safe Operating Area, Junction-to-Ambient



Vishay Siliconix

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



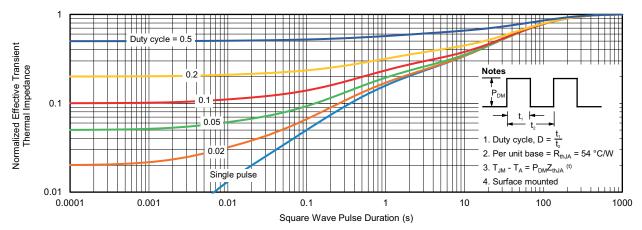
Note

a. 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

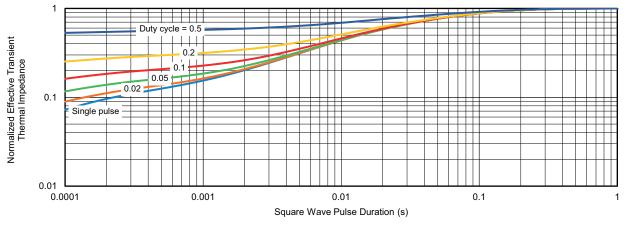


Vishay Siliconix

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/ppg277478.

D2

E3

Backside View of Dual Pad



Vishay Siliconix

PowerPAK[®] SO-8, (Single/Dual)



Notes

1. Inch will govern.

2 Dimensions exclusive of mold gate burrs.

3. Dimensions exclusive of mold flash and cutting burrs.

DIM.		MILLIMETERS			INCHES			
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX		
А	0.97	1.04	1.12	0.038	0.041	0.044		
A1		-	0.05	0	-	0.00		
b	0.33	0.41	0.51	0.013	0.016	0.02		
С	0.23	0.28	0.33	0.009	0.011	0.01		
D	5.05	5.15	5.26	0.199	0.203	0.20		
D1	4.80	4.90	5.00	0.189	0.193	0.19		
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	0.23		
E2	3.48	3.66	3.84	0.137	0.144	0.15		
E3	3.68	3.78	3.91	0.145	0.149	0.154		
E4		0.75 typ.		0.030 typ.				
е		1.27 BSC		0.050 BSC				
К		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.			



Application Note 826

Vishay Siliconix

RECOMMENDED MINIMUM PADS FOR PowerPAK® SO-8 Single



Recommended Minimum Pads Dimensions in Inches/(mm)

Return to Index



Vishay

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.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. 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.

© 2025 VISHAY INTERTECHNOLOGY, INC. ALL RIGHTS RESERVED

Revision: 01-Jan-2025