

## N-Channel 20 V (D-S) Fast Switching MOSFET



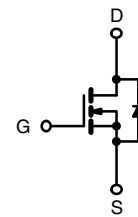
### FEATURES

- TrenchFET® power MOSFET
- New low thermal resistance PowerPAK® package with low 1.07 mm profile
- 100 %  $R_g$  tested
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATIONS

- Synchronous rectifier low output voltage
- Portable computer battery selection or protection



N-Channel MOSFET

PRODUCT SUMMARY	
$V_{DS}$ (V)	20
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 4.5$ V	0.0065
$R_{DS(on)}$ max. ( $\Omega$ ) at $V_{GS} = 2.5$ V	0.0090
$Q_g$ typ. (nC)	38
$I_D$ (A)	22
Configuration	Single

ORDERING INFORMATION	
Package	PowerPAK SO-8
Lead (Pb)-free	Si7448DP-T1-E3
Lead (Pb)-free and halogen-free	Si7448DP-T1-GE3

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C, unless otherwise noted)					
PARAMETER		SYMBOL	10 s	STEADY STATE	UNIT
Drain-source voltage		$V_{DS}$	20	20	V
Gate-source voltage		$V_{GS}$	$\pm 12$	$\pm 12$	
Continuous drain current ( $T_J = 150$ °C) <sup>a</sup>	$T_A = 25$ °C	$I_D$	22	13.4	A
	$T_A = 70$ °C		17.6	10.7	
Pulsed drain current		$I_{DM}$	50	50	
Continuous source current (diode conduction) <sup>a</sup>		$I_S$	4.3	1.6	W
Maximum power dissipation <sup>a</sup>	$T_A = 25$ °C	$P_D$	5.2	1.9	
	$T_A = 70$ °C		3.3	1.2	
Operating junction and storage temperature range		$T_J, T_{stg}$	-55 to +150		°C
Soldering recommendations (peak temperature) <sup>b, c</sup>			260		

THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient <sup>a</sup>	$t \leq 10$ s	$R_{thJA}$	19	24	°C/W
	Steady state		52	65	
Maximum junction-to-case (drain)	Steady state	$R_{thJC}$	1.5	1.8	

### Notes

- Surface mounted on 1" x 1" FR4 board
- See solder profile ([www.vishay.com/doc?73257](http://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



SPECIFICATIONS ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>Static</b>						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.6	-	1.5	V
Gate-body leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$	-	-	$\pm 100$	nA
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}, T_J = 85^\circ\text{C}$	-	-	20	
On-state drain current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 4.5\text{ V}$	50	-	-	A
Drain-source on-state resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 22\text{ A}$	-	0.0054	0.0065	$\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 19\text{ A}$	-	0.0075	0.0090	
Forward transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 22\text{ A}$	-	90	-	S
Diode forward voltage <sup>a</sup>	$V_{SD}$	$I_S = 3\text{ A}, V_{GS} = 0\text{ V}$	-	0.8	1.2	V
<b>Dynamic <sup>b</sup></b>						
Total gate charge	$Q_g$	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}, I_D = 21\text{ A}$	-	38	50	nC
Gate-source charge	$Q_{gs}$		-	8	-	
Gate-drain charge	$Q_{gd}$		-	8.5	-	
Gate resistance	$R_g$		0.2	0.9	1.1	$\Omega$
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 10\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$	-	22	35	ns
Rise time	$t_r$		-	22	35	
Turn-off delay time	$t_{d(off)}$		-	125	190	
Fall time	$t_f$		-	60	90	
Source-drain reverse recovery time	$t_{rr}$	$I_F = 3\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	-	60	90	

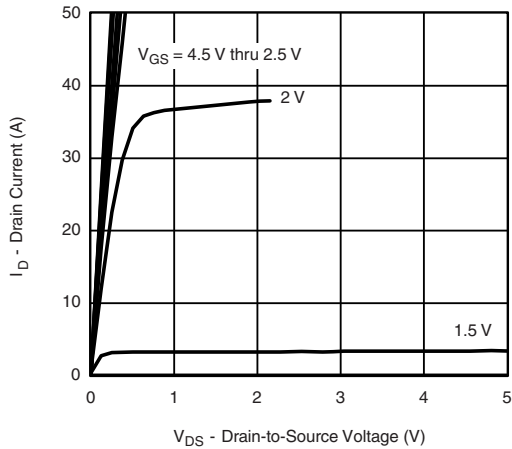
**Notes**

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

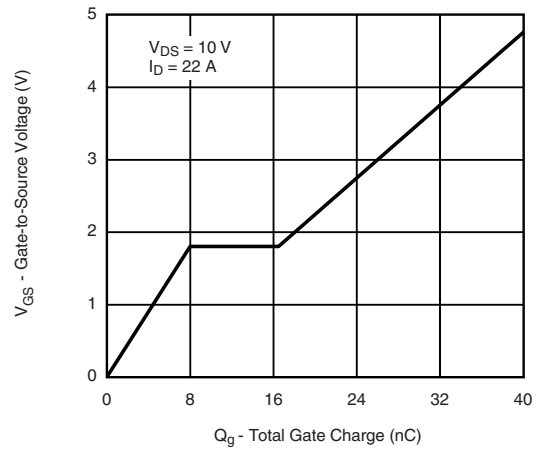
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



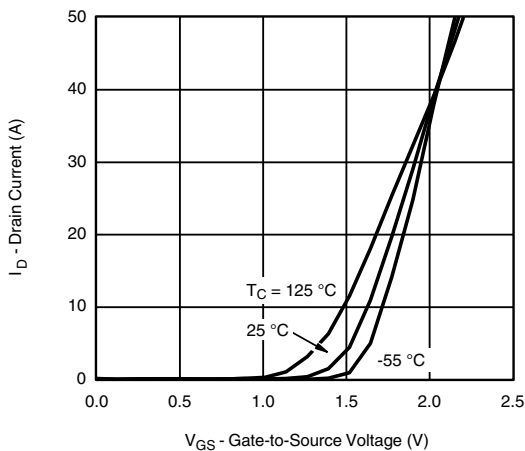
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



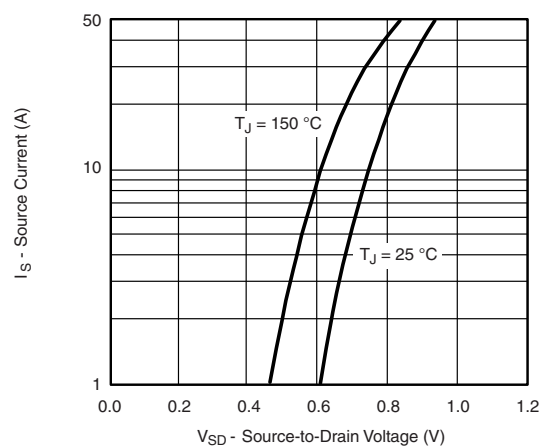
Output Characteristics



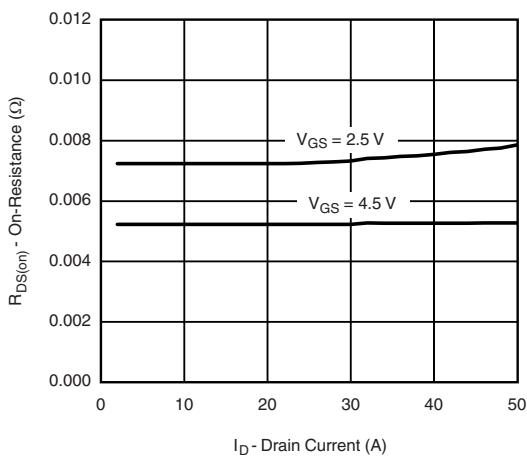
Gate Charge



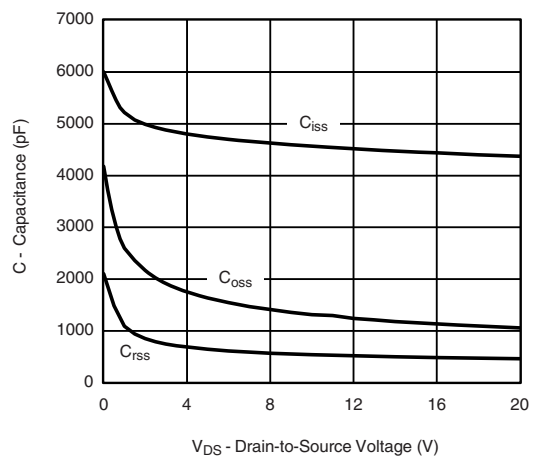
Transfer Characteristics



Source-Drain Diode Forward Voltage



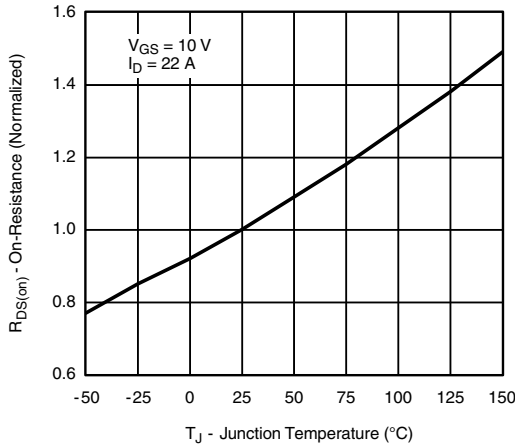
On-Resistance vs. Drain Current



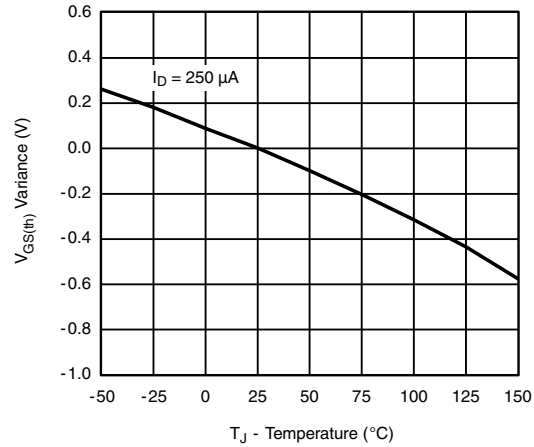
Capacitance



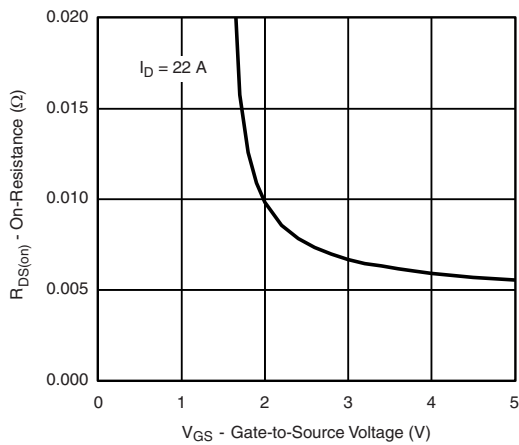
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



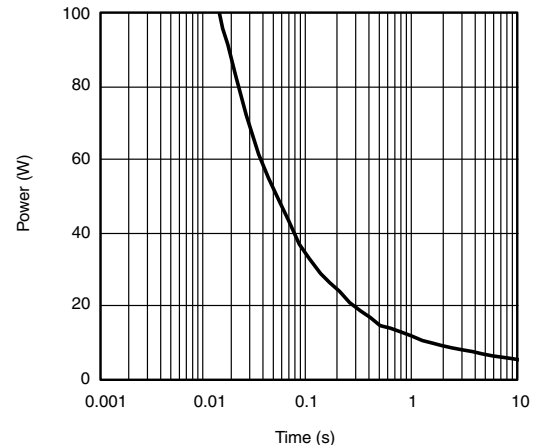
On-Resistance vs. Junction Temperature



Threshold Voltage



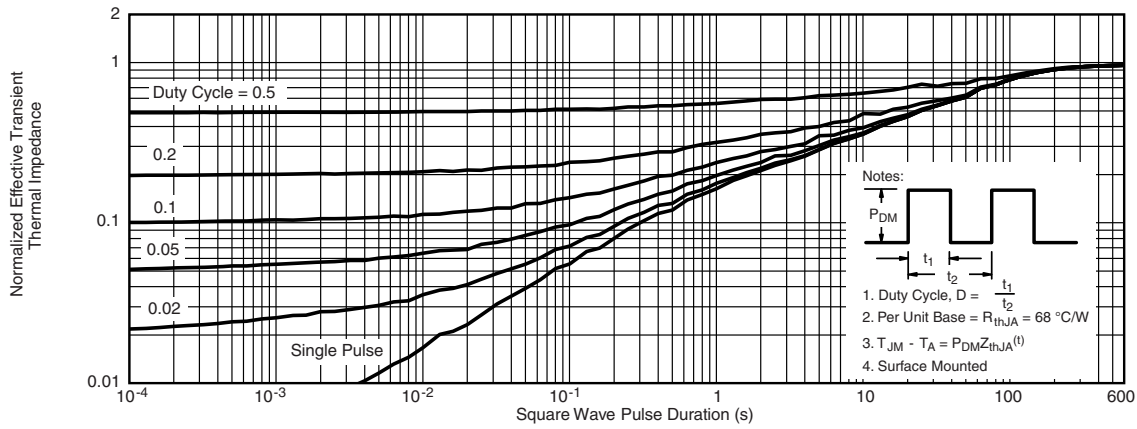
On-Resistance vs. Gate-to-Source Voltage



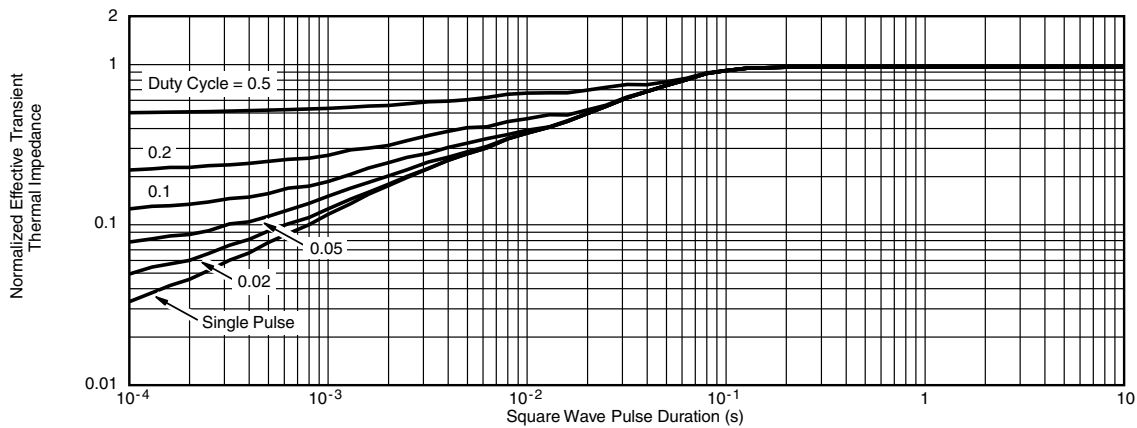
Single Pulse Power, Junction-to-Ambient



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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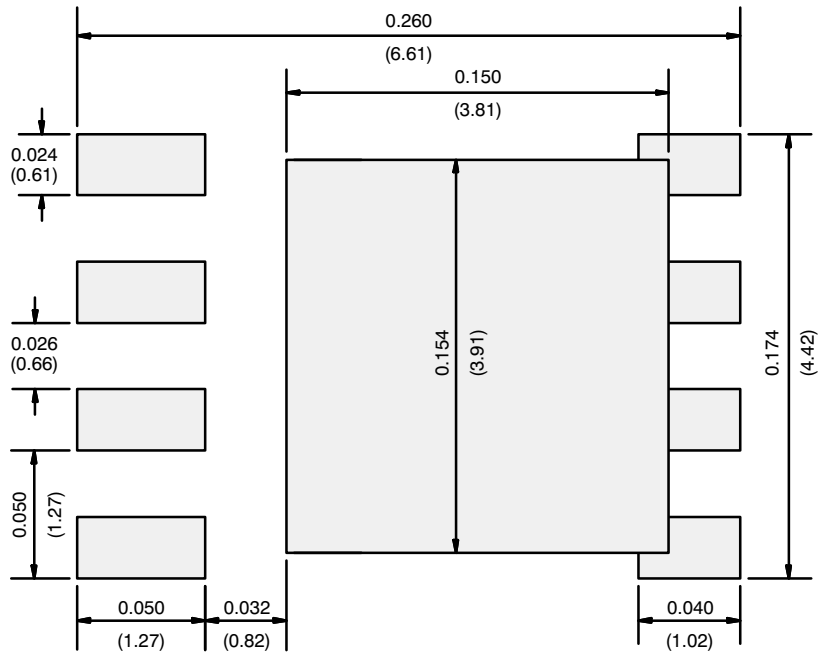
# PowerPAK<sup>®</sup> SO-8, (Single/Dual)



- 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.
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	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	0.75 typ.			0.030 typ.		
e	1.27 BSC			0.050 BSC		
K	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: S17-0173-Rev. L, 13-Feb-17						
DWG: 5881						

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



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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