



N-Channel Reduced Q_g, Fast Switching MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	$R_{DS(on)}\left(\Omega\right)$	I _D (A)	
30	0.008 at V _{GS} = 10 V	18	
30	0.011 at V _{GS} = 4.5 V	15	

FEATURES

Halogen-free According to IEC 61249-2-21 Available



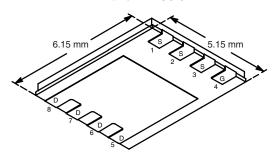
- PWM Optimized for High Efficiency
- New Low Thermal Resistance
- PowerPAK® Package with Low 1.07 mm Profile
- 100 % R_g Tested





HALOGEN FREE

PowerPAK SO-8



Bottom View

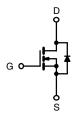
Ordering Information: Si7860DP-T1

Si7860DP-T1-E3 (Lead (Pb)-free)

Si7860DP-T1-GE3 (Lead (Pb)-free and Halogen-free)

APPLICATIONS

- **Buck Converter**
 - High Side or Low Side
- Synchronous Rectifier
 - Secondary Rectifier



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS	T _A = 25 °C, unles	ss otherwise n	oted		
Parameter		Symbol	10 s	Steady State	Unit
Drain-Source Voltage		V_{DS}	30		V
Gate-Source Voltage		V_{GS}	± 20		V
Continuous Drain Current /T = 150 °C\8	T _A = 25 °C	I _D	18	11	
Continuous Drain Current (T _J = 150 °C) ^a	T _A = 70 °C		15	8	
Pulsed Drain Current		I _{DM}	± 50		Α
Continuous Source Current (Diode Continuous) ^a		I _S	4.1	1.5	
Avalanche Current	anche Current L = 0.1 mH		30		
Single Pulse Avalanche Energy	L = 0.1 IIII	E _{AS}	45		mJ
Manianum Danian Dissinational	T _A = 25 °C	P _D	5	1.8	W
Maximum Power Dissipation ^a	T _A = 70 °C		3.2	1.1	
Operating Junction and Storage Temperature Range		T _J , T _{stg}	- 55 to 150		°C
Soldering Recommendations (Peak Temperature)b,c			260		

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Manifestore Investigate Ambient (MOCFFT)	t ≤ 10 s	R _{thJA}	20	25	°C/W
Maximum Junction-to-Ambient (MOSFET) ^a	Steady State		56	70	
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	1.8	2.3	

- a. Surface Mounted on 1" x 1" FR4 board.
- b. See Solder Profile (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.
- c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

^{*} Pb containing terminations are not RoHS compliant, exemptions may apply.

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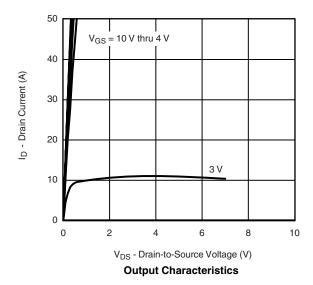
Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit
Static						
Gate Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	1.0		3.0	V
Gate-Body Leakage	I _{GSS}	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zava Cata Valtaga Dvaia Current	1	V _{DS} = 30 V, V _{GS} = 0 V			1	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V, T _J = 70 °C			5	μΑ
On-State Drain Current ^a	I _{D(on)}	$V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$	40			Α
	D	V _{GS} = 10 V, I _D = 18 A		0.0066	0.008	
Drain-Source On-State Resistance ^a	R _{DS(on)}	$V_{GS} = 4.5 \text{ V}, I_D = 15 \text{ A}$		0.0090	0.011	Ω
Forward Transconductance ^a	9 _{fs}	V _{DS} = 15 V, I _D = 18 A		60		S
Diode Forward Voltage ^a	V_{SD}	I _S = 3 A, V _{GS} = 0 V		0.70	1.1	V
Dynamic ^b	<u> </u>					
Total Gate Charge	Qg			13	18	
Gate-Source Charge	Q_{gs}	$V_{DS} = 15 \text{ V}, V_{GS} = 4.5 \text{ V}, I_{D} = 18 \text{ A}$		5		nC
Gate-Drain Charge	Q_{gd}			4.0		
Gate Resistance	R_g		0.5	1.7	3.2	Ω
Turn-On Delay Time	t _{d(on)}			18	27	
Rise Time	t _r	V_{DD} = 15 V, R_L = 15 Ω		12	18	
Turn-Off Delay Time	t _{d(off)}	$I_D\cong$ 1 A, V_{GEN} = 10 V, R_g = 6 Ω		46	70	ns
Fall Time	t _f			19	30	
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 3 A, dI/dt = 100 A/μs		40	70	

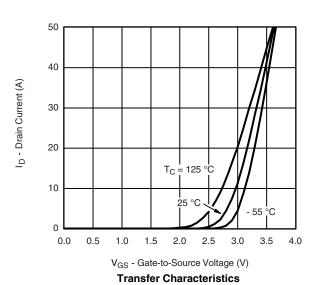
Notes:

- a. Pulse test; pulse width \leq 300 μ 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



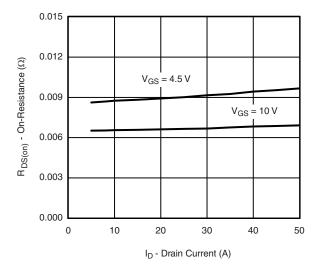




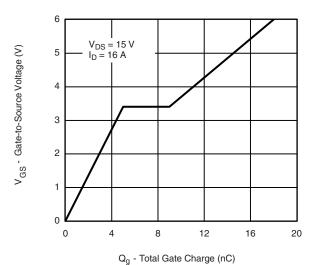




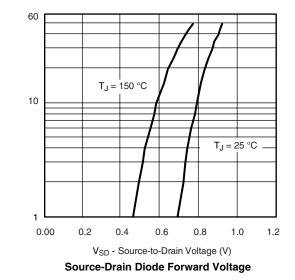
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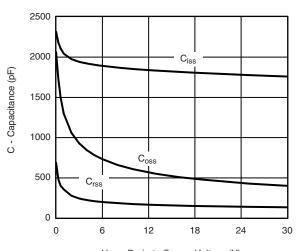


On-Resistance vs. Drain Current

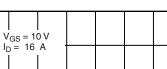


Gate Charge

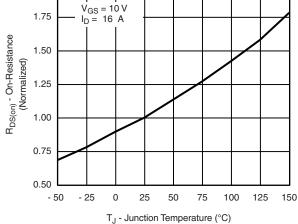




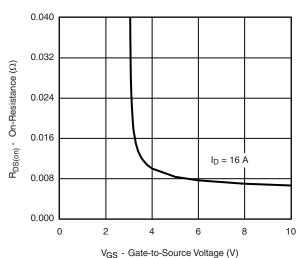
V_{DS} - Drain-to-Source Voltage (V) Capacitance



2.00



On-Resistance vs. Junction Temperature



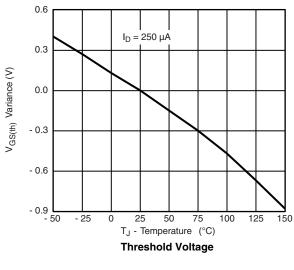
On-Resistance vs. Gate-to-Source Voltage

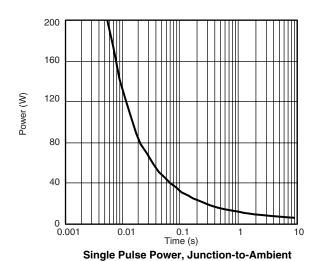
Is - Source Current (A)

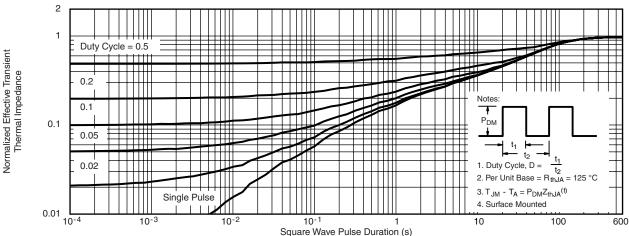
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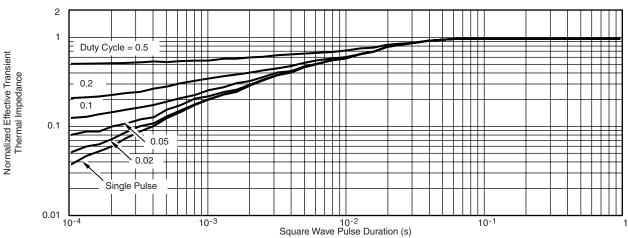
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted







Normalized Thermal Transient Impedance, Junction-to-Ambient



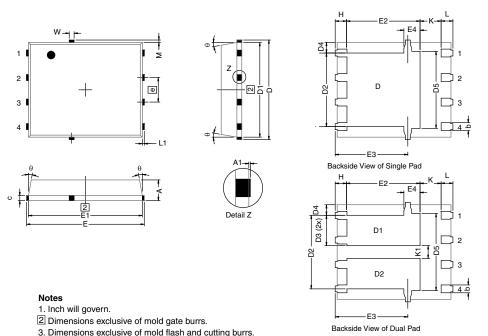
Normalized Thermal Transient Impedance, Junction-to-Case

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?71854.



DWG: 5881

PowerPAK® SO-8, (Single/Dual)

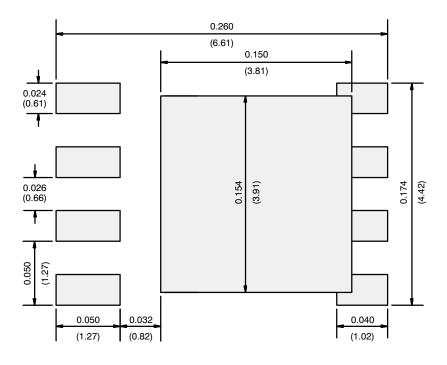


DIM.	MILLIMETERS			INCHES			
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
Α	0.97	1.04	1.12	0.038	0.041	0.044	
A1		=	0.05	0	-	0.002	
b	0.33	0.41	0.51	0.013	0.016	0.020	
С	0.23	0.28	0.33	0.009	0.011	0.013	
D	5.05	5.15	5.26	0.199	0.203	0.207	
D1	4.80	4.90	5.00	0.189	0.193	0.197	
D2	3.56	3.76	3.91	0.140	0.148	0.154	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