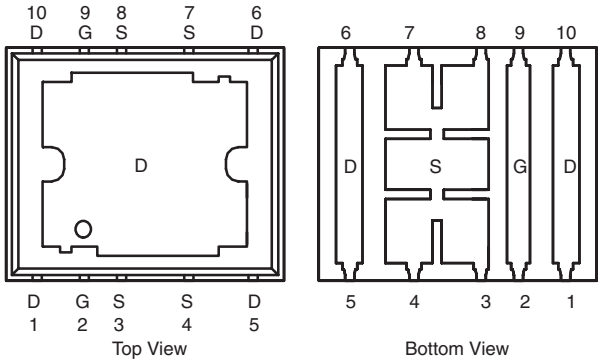
N-Channel 150-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]	Q_g (Typ.)
150	0.038 at V_{GS} = 10 V	37	46 nC
	0.040 at V_{GS} = 6 V	36	

Package Drawing
www.vishay.com/doc?64713

PolarPAK



Top surface is connected to pins 1, 5, 6, and 10

Ordering Information: SiE804DF-T1-GE3 (Lead (Pb)-free and Halogen-free)

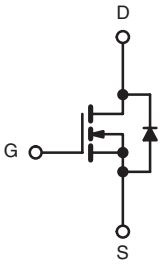
FEATURES

- **Halogen-free According to IEC 61249-2-21**
- TrenchFET® Power MOSFET
- Ultra Low Thermal Resistance Using Top-Exposed PolarPAK® Package for Double-Sided Cooling
- Leadframe-Based New Encapsulated Package
  - Die Not Exposed
  - Same Layout Regardless of Die Size, > 100 V
- 100 % R_g and UIS Tested

RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Primary Side Switch
- Half-Bridge



N-Channel MOSFET

For Related Documents
www.vishay.com/ppg?69091

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	150	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	37	A
	T_C = 70 °C		29	
	T_A = 25 °C		7.5[b, c]	
	T_A = 70 °C		6[b, c]	
Pulsed Drain Current		I_{DM}	50	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	37	
	T_A = 25 °C		4.3[b, c]	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	25	
Single Pulse Avalanche Energy		E_{AS}	62	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	125	W
	T_C = 70 °C		80	
	T_A = 25 °C		5.2[b, c]	
	T_A = 70 °C		3.3[b, c]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature)[d, e]			260	

Notes:
a. T_C = 25 °C.
b. Surface Mounted on 1" x 1" FR4 board.
c. t = 10 s.
d. See Solder Profile *(www.vishay.com/doc?73257)*. The PolarPAK 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.

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[a, b]	$t \leq 10$ s	R_{thJA}	20	24	°C/W
Maximum Junction-to-Case (Drain Top)	Steady State	R_{thJC} (Drain)	0.8	1	
Maximum Junction-to-Case (Source)[a, c]		R_{thJC} (Source)	2.2	2.7	

Notes:
a. Surface Mounted on 1" x 1" FR4 board.
b. Maximum under Steady State conditions is 68 °C/W.
c. Measured at source pin (on the side of the package).

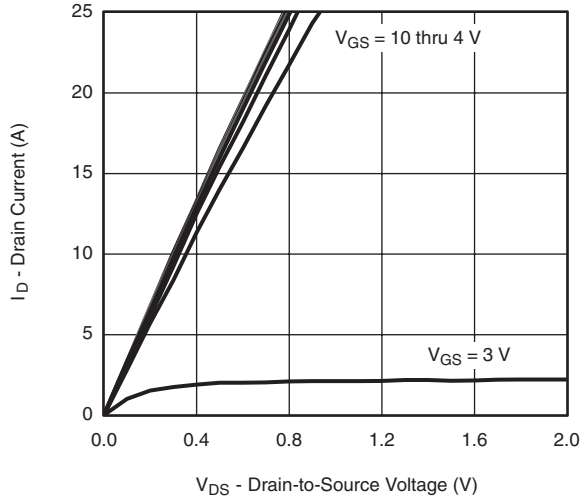
SPECIFICATIONS T_J = 25 °C, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	150			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = 250 µA		175		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 7		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D = 250 µA	1		3	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 150 V, V_{GS} = 0 V			1	µA
		V_{DS} = 150 V, V_{GS} = 0 V, T_J = 55 °C			10	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	25			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 7.6 A		0.031	0.038	Ω
		V_{GS} = 6 V, I_D = 7.4 A		0.032	0.040	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 7.6 A		40		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		3000		pF
Output Capacitance	C_{oss}			210		
Reverse Transfer Capacitance	C_{rss}			110		
Total Gate Charge	Q_g	V_{DS} = 50 V, V_{GS} = 10 V, I_D = 7.6 A		70	105	nC
		V_{DS} = 50 V, V_{GS} = 6 V, I_D = 7.6 A		46	70	
Gate-Source Charge	Q_{gs}			11		
Gate-Drain Charge	Q_{gd}			19		
Gate Resistance	R_g	f = 1 MHz		2.1	4.2	Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 75 V, R_L = 12.5 Ω $I_D \cong$ 6 A, V_{GEN} = 6 V, R_g = 1 Ω		20	30	ns
Rise Time	t_r			15	25	
Turn-Off Delay Time	$t_{d(off)}$			40	60	
Fall Time	t_f			12	20	
Switching Time	$t_{d(on)}$	V_{DD} = 75 V, R_L = 12.5 Ω $I_D \cong$ 6 A, V_{GEN} = 10 V, R_g = 1 Ω		15	25	
	t_r			10	15	
	$t_{d(off)}$			42	65	
	t_r			10	15	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	T_C = 25 °C			37	A
Pulse Diode Forward Current[a]	I_{SM}				25	
Body Diode Voltage	V_{SD}	I_S = 6 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 6 A, dI/dt = 100 A/µs, T_J = 25 °C		70	110	ns
Body Diode Reverse Recovery Charge	Q_{rr}			220	330	nC
Reverse Recovery Fall Time	t_a			54		ns
Reverse Recovery Rise Time	t_b			16		

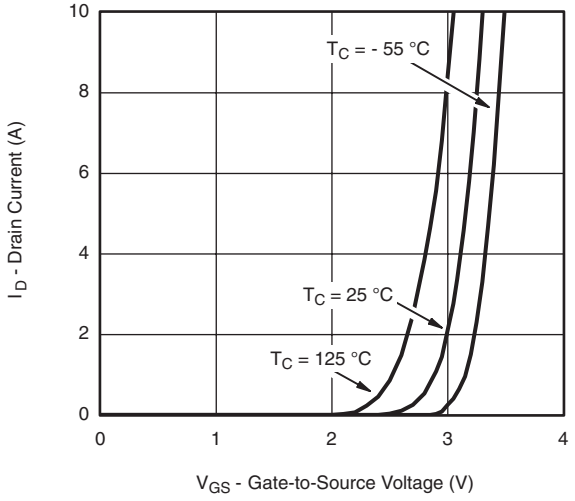
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing.

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.

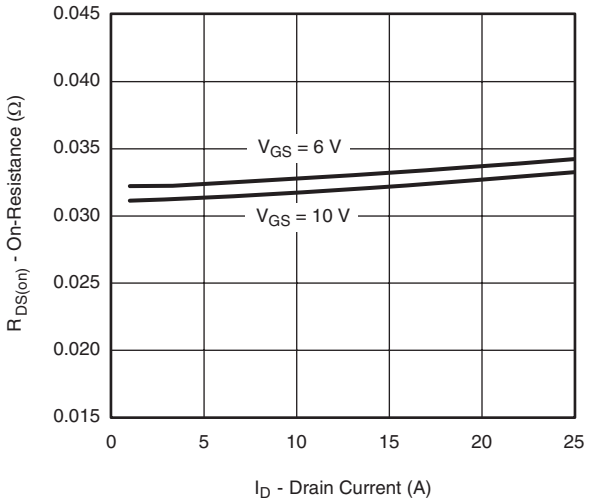
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



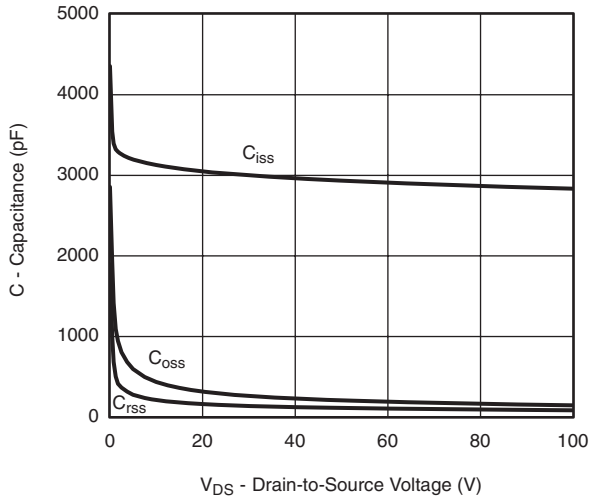
Output Characteristics



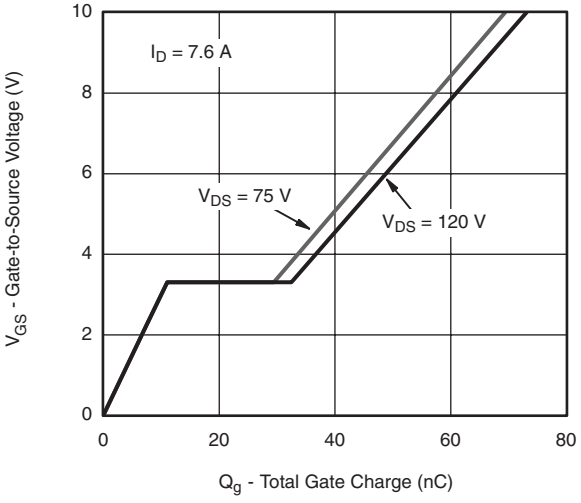
Transfer Characteristics



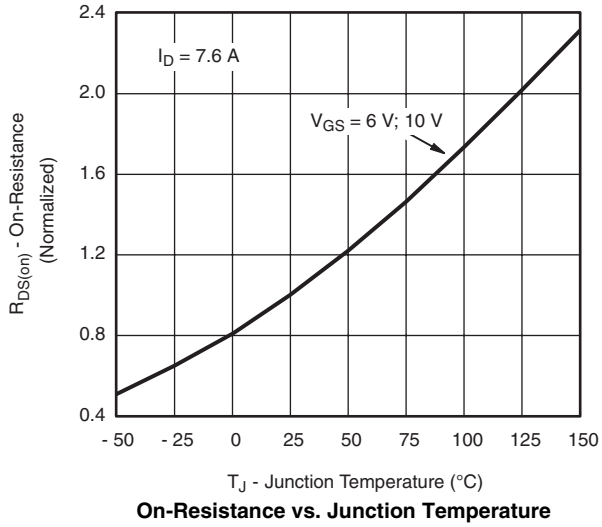
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

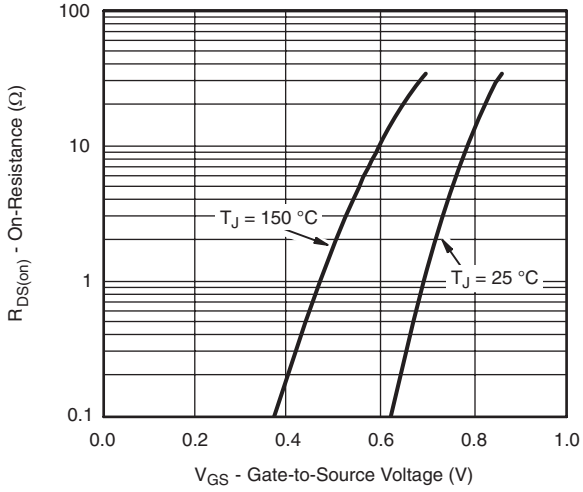


Gate Charge

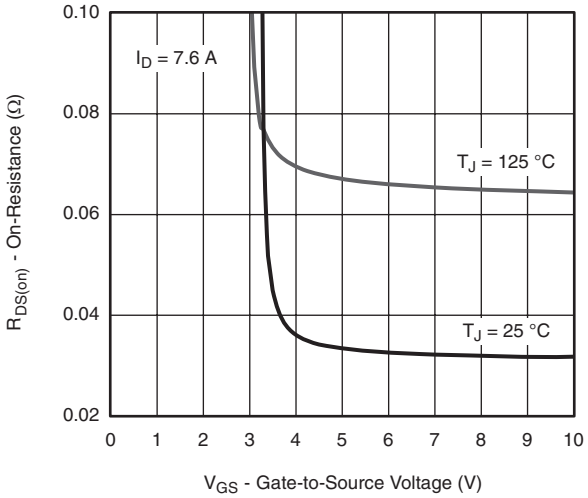


On-Resistance vs. Junction Temperature

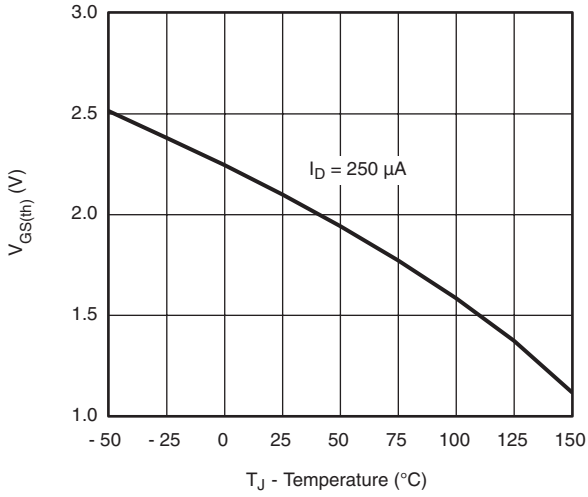
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



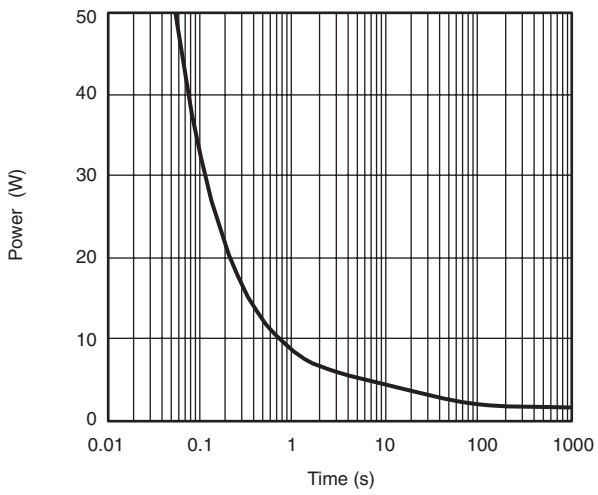
Source-Drain Diode Forward Voltage



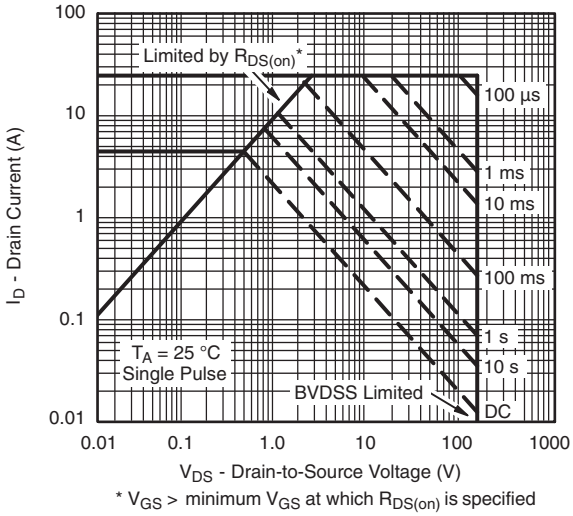
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



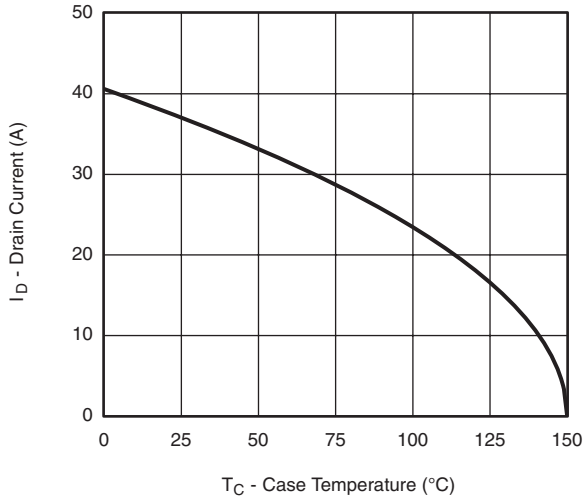
Single Pulse Power, Junction-to-Ambient



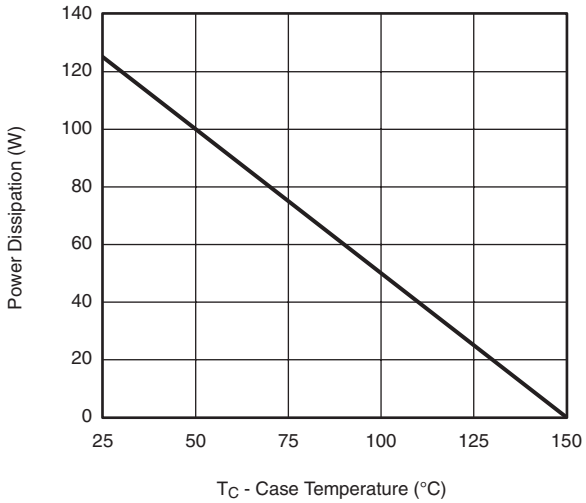
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



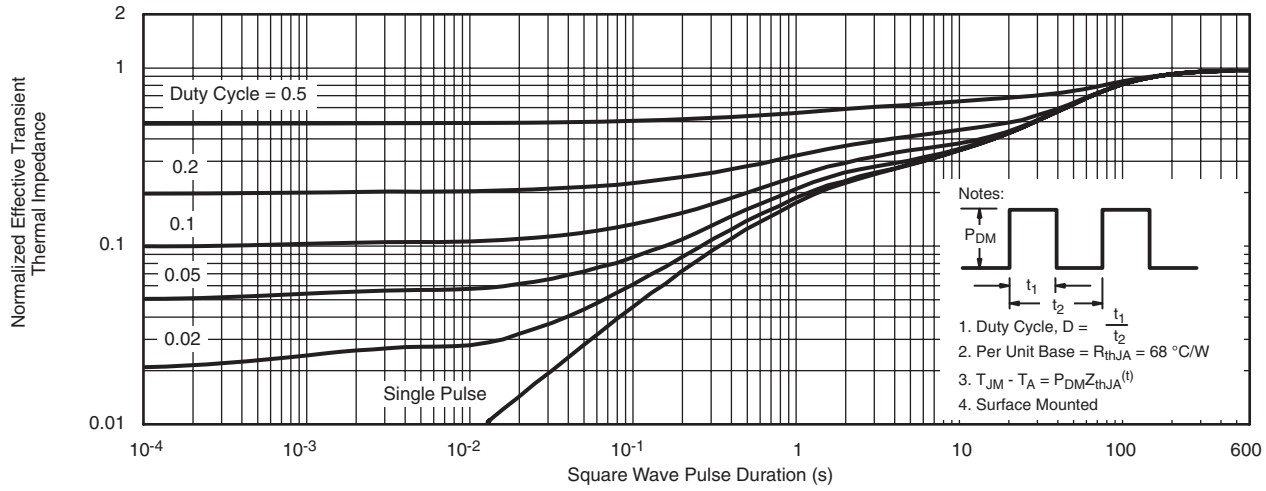
Current Derating*



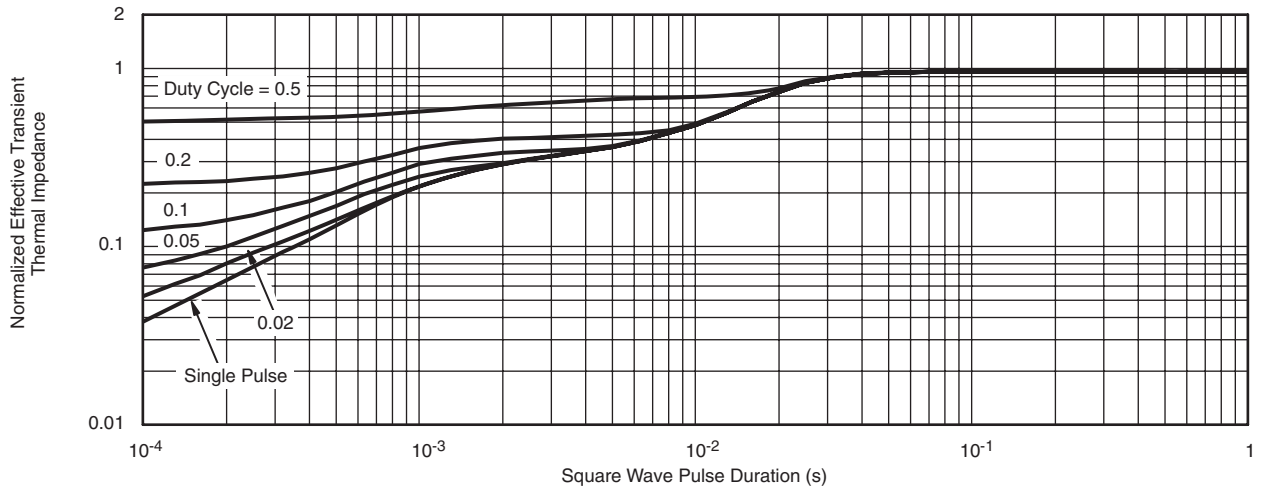
Power Derating, Junction-to-Case

* 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.

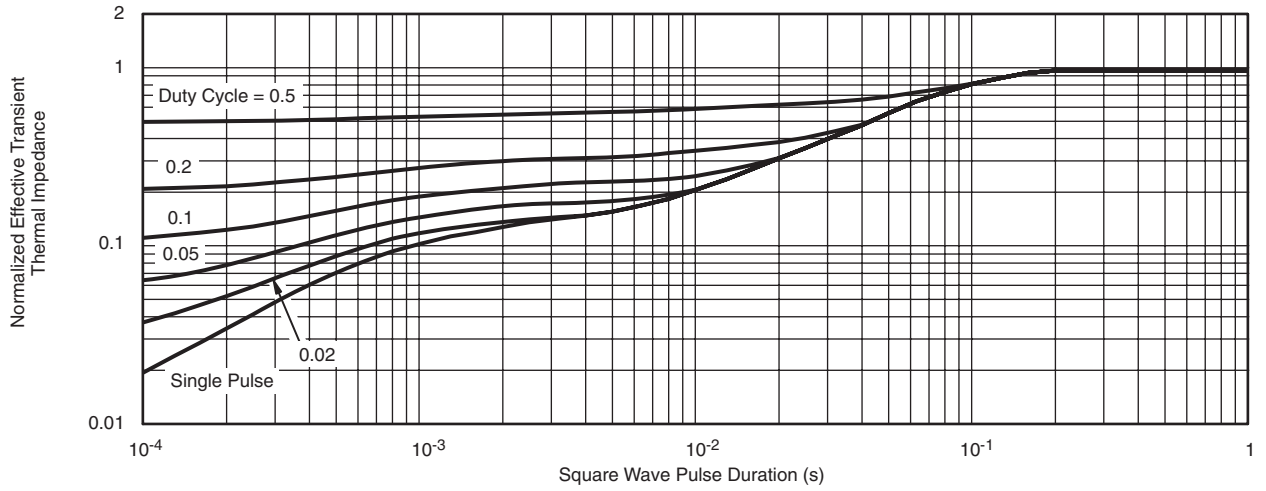
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case (Drain Top)

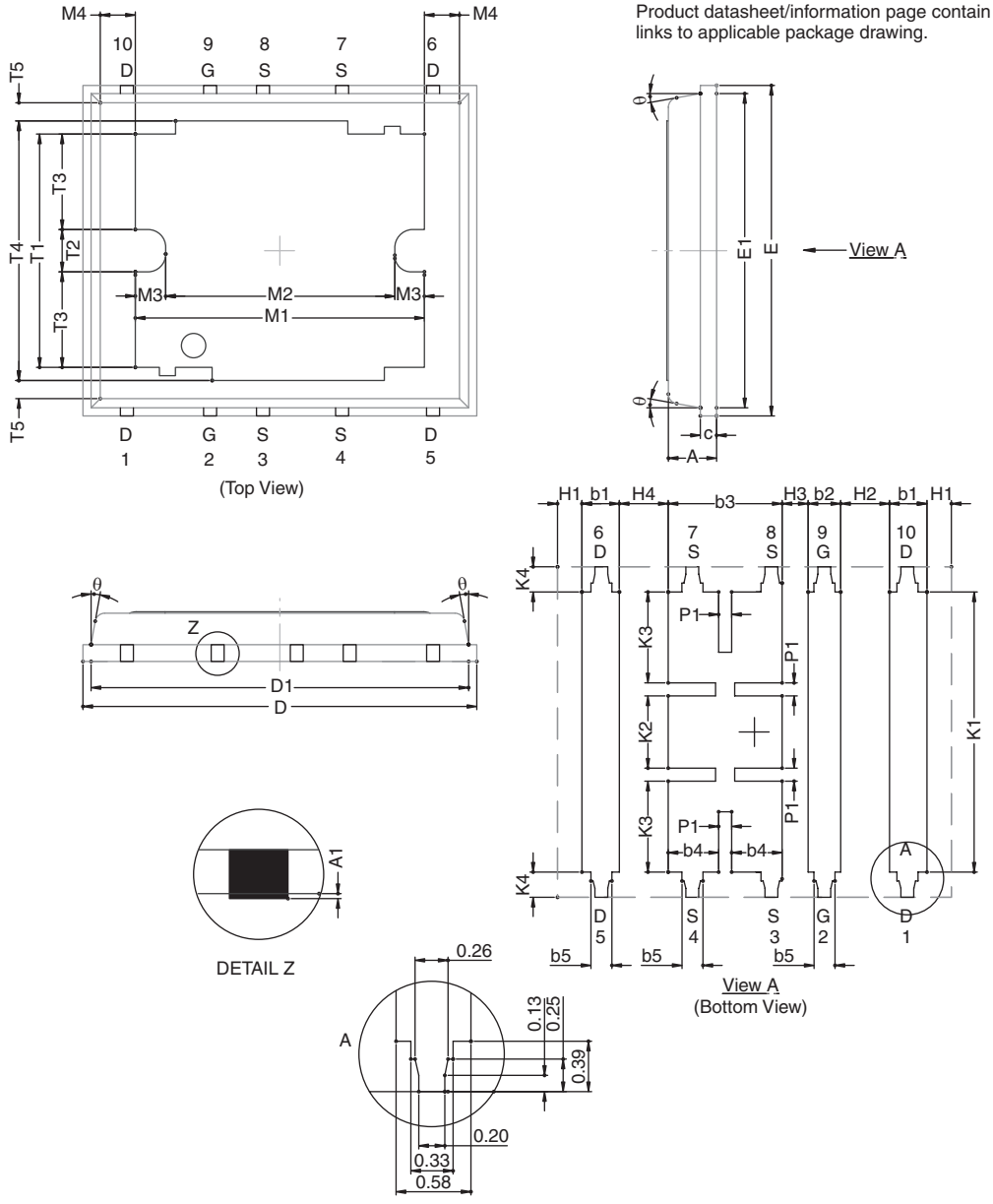


Normalized Thermal Transient Impedance, Junction-to-Source

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?69091.

PolarPAK™ OPTION LH

Product datasheet/information page contain links to applicable package drawing.

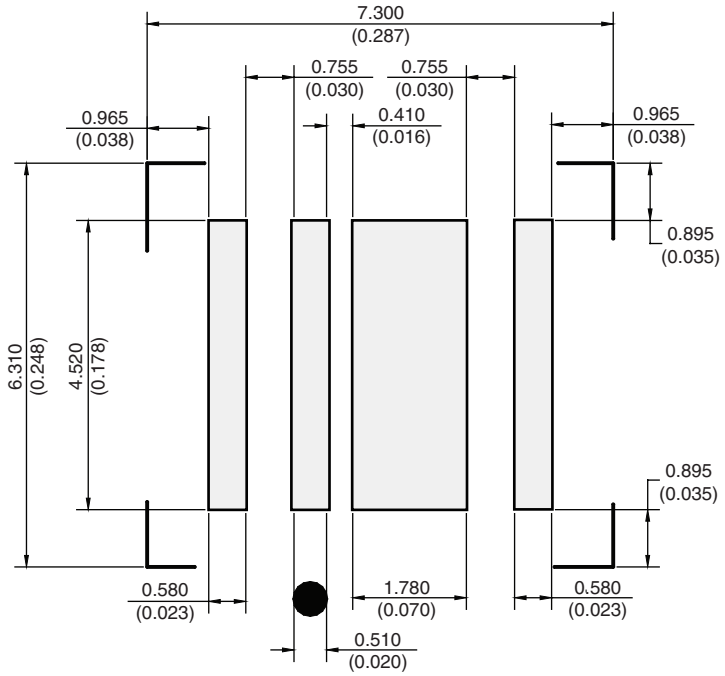


DIM	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.75	0.80	0.85	0.030	0.031	0.033
A1	0.00	-	0.05	0.000	-	0.002
b1	0.48	0.58	0.68	0.019	0.023	0.027
b2	0.41	0.51	0.61	0.016	0.020	0.024
b3	1.68	1.78	1.88	0.066	0.070	0.074
b4	0.64	0.79	0.94	0.025	0.031	0.037
b5	0.23	0.33	0.43	0.009	0.013	0.017
c	0.20	0.25	0.30	0.008	0.010	0.012
D	6.00	6.15	6.30	0.236	0.242	0.248
D1	5.74	5.89	6.04	0.226	0.232	0.238
E	5.01	5.16	5.31	0.197	0.203	0.209
E1	4.75	4.90	5.05	0.187	0.193	0.199
H1	0.23	-	-	0.009	-	-
H2	0.71	-	0.81	0.028	-	0.032
H3	0.31	0.41	0.51	0.012	0.016	0.020
H4	0.71	-	0.81	0.028	-	0.032
I1	4.22	4.37	4.52	0.166	0.172	0.178
J1	1.08	1.13	1.18	0.043	0.044	0.046
K1	1.37	-	-	0.054	-	-
K2	0.24	-	-	0.009	-	-
M1	4.30	4.50	4.70	0.169	0.177	0.185
M2	3.43	3.58	3.73	0.135	0.141	0.147
M3	0.22	-	-	0.009	-	-
M4	0.05	-	-	0.002	-	-
P1	0.15	0.20	0.25	0.006	0.008	0.010
T1	3.48	3.64	4.10	0.137	0.143	0.161
T2	0.56	0.76	0.95	0.022	0.030	0.037
T3	1.20	-	-	0.047	-	-
T4	3.90	-	-	0.153	-	-
T5	0	0.18	0.36	0.000	0.007	0.014
θ	0°	10°	12°	0°	10°	12°
ECN: T-08955-Rev. A, 29-Dec-08 DWG: 5982						

Notes

Millimeters govern over inches.

RECOMMENDED MINIMUM PADS FOR HIGH VOLTAGE PolarPAK® Option xH



Dimensions in mm (inches)
No external traces within border corners
Dot indicate gate pin (part marking)

Return to Index

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