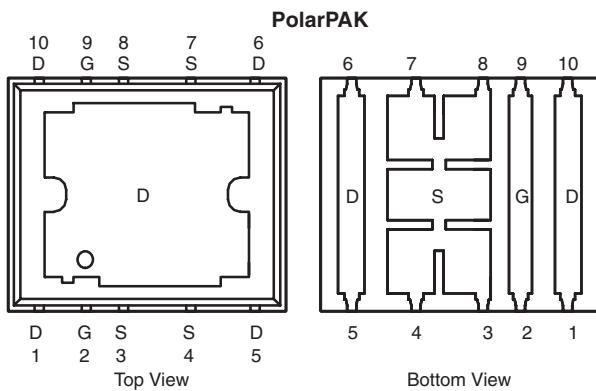


N-Channel 25-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
25	0.0052 at $V_{GS} = 10$ V	45	11.2 nC
	0.0068 at $V_{GS} = 4.5$ V	45	

Package Drawing

www.vishay.com/doc?68797

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

Ordering Information: SiE878DF-T1-GE3 (Lead (Pb)-free) and Halogen-free

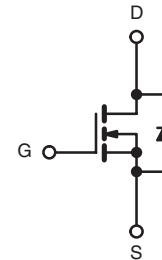
FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Gen III 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
- Low Q_{gd}/Q_{gs} Ratio Helps Prevent Shoot-Through
- 100 % R_g and UIS Tested
- Compliant to RoHS directive 2002/95/EC



APPLICATIONS

- VRM, POL
- DC/DC Conversion
- Server
- High-Side Switch



N-Channel MOSFET

For Related Documents

www.vishay.com/ppg?65456

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	25	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150$ °C)	I_D	45 ^a	A
		42.5	
		24 ^{b, c}	
		19 ^{b, c}	
Pulsed Drain Current	I_{DM}	100	
Continuous Source-Drain Diode Current	I_S	20.8	
		4.3 ^{b, c}	
Single Pulse Avalanche Current	I_{AS}	25	
Avalanche Energy	E_{AS}	31	mJ
Maximum Power Dissipation	P_D	25	W
		16	
		5.2 ^{b, c}	
		3.3 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	
Soldering Recommendations (Peak Temperature) ^{d, e}		260	°C

Notes:

- $T_C = 25$ °C. Package limited.
- Surface Mounted on 1" x 1" FR4 board.
- $t = 10$ s.
- See Solder Profile (www.vishay.com/ppg?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.
- Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

SiE878DF

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THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{a, b}	Steady State	R_{thJA}	20	24	°C/W
Maximum Junction-to-Case (Drain Top)		R_{thJC} (Drain)	4	5	
Maximum Junction-to-Case (Source) ^{a, c}		R_{thJC} (Source)	5.5	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).

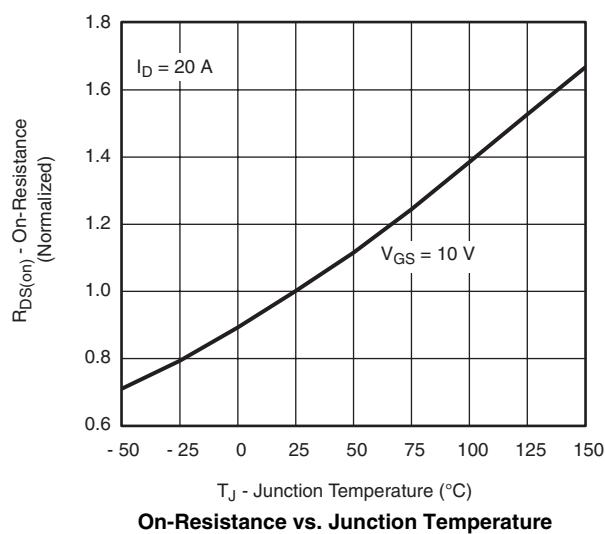
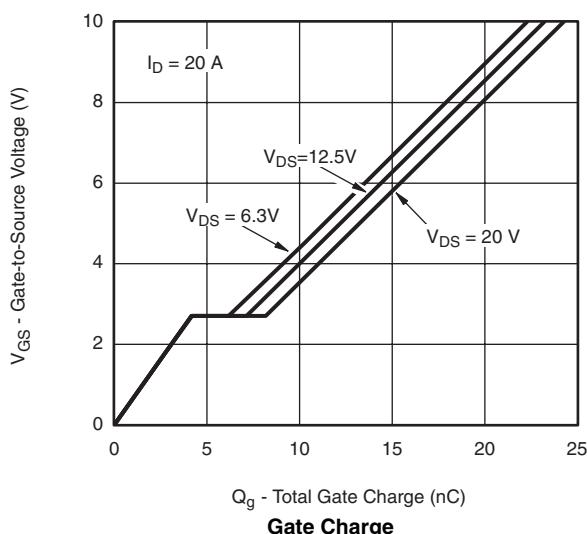
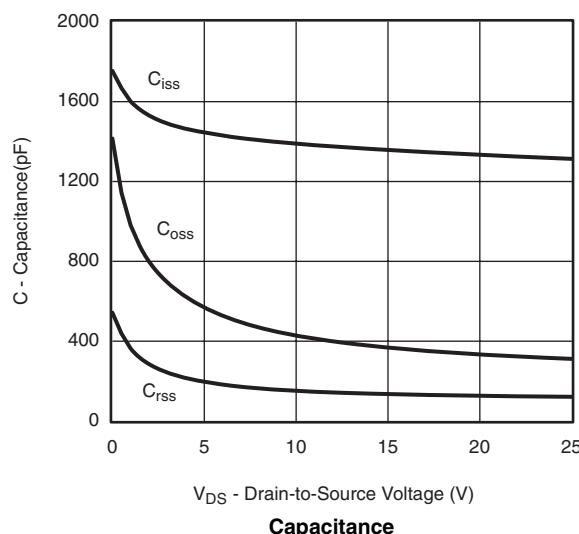
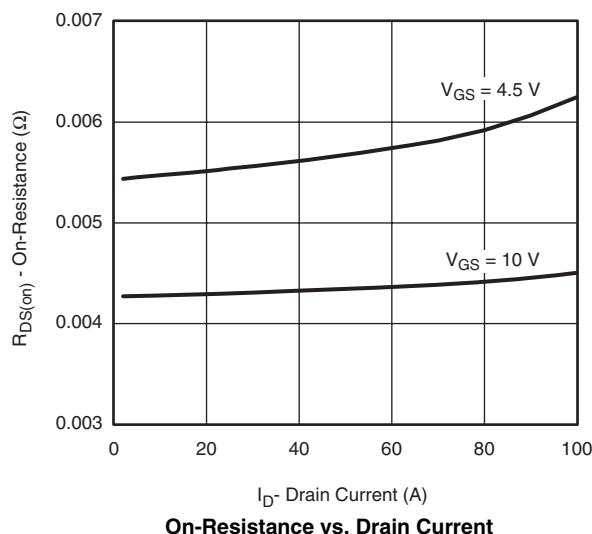
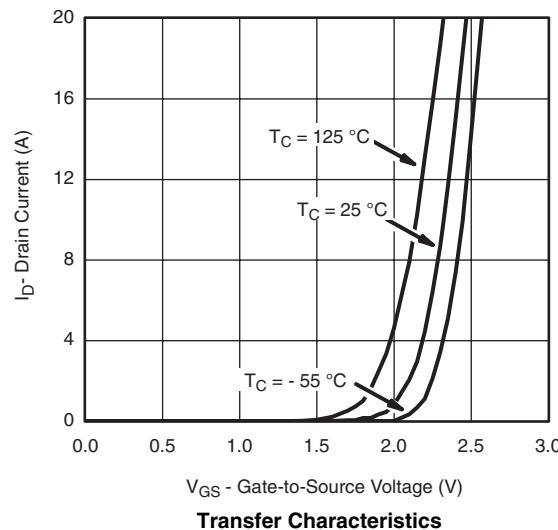
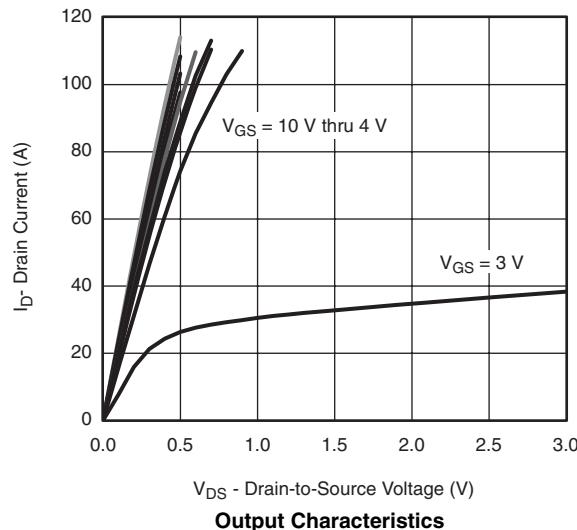
SPECIFICATIONS $T_J = 25$ °C, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0$ V, $I_D = 250$ μA	25			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250$ μA		25		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			- 5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250$ μA	1		2.2	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 20$ V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 25$ V, $V_{GS} = 0$ V			1	μA
		$V_{DS} = 25$ 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, $I_D = 20$ A		0.0042	0.0052	Ω
		$V_{GS} = 4.5$ V, $I_D = 20$ A		0.0055	0.0068	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15$ V, $I_D = 20$ A		74		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 12.5$ V, $V_{GS} = 0$ V, $f = 1$ MHz		1400		pF
Output Capacitance	C_{oss}			400		
Reverse Transfer Capacitance	C_{rss}			145		
Total Gate Charge	Q_g	$V_{DS} = 12.5$ V, $V_{GS} = 10$ V, $I_D = 20$ A	24	36		nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 12.5$ V, $V_{GS} = 4.5$ V, $I_D = 20$ A	11.2	17		
Gate-Drain Charge	Q_{gd}		4.2			
Gate Resistance	R_g		3			
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 12.5$ V, $R_L = 1.25$ Ω $I_D \geq 10$ A, $V_{GEN} = 4.5$ V, $R_g = 1$ Ω	0.2	1.2	2.4	Ω
Rise Time	t_r		15	25		ns
Turn-Off Delay Time	$t_{d(off)}$		15	25		
Fall Time	t_f		22	35		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 12.5$ V, $R_L = 1.25$ Ω $I_D \geq 10$ A, $V_{GEN} = 10$ V, $R_g = 1$ Ω	12	20		ns
Rise Time	t_r		10	15		
Turn-Off Delay Time	$t_{d(off)}$		10	15		
Fall Time	t_f		20	30		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25$ °C			20.8	A
Pulse Diode Forward Current ^a	I_{SM}				60	
Body Diode Voltage	V_{SD}	$I_S = 10$ A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 10$ A, $dl/dt = 100$ A/μs, $T_J = 25$ °C	30	45		ns
Body Diode Reverse Recovery Charge	Q_{rr}		24	36		
Reverse Recovery Fall Time	t_a		14			
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.

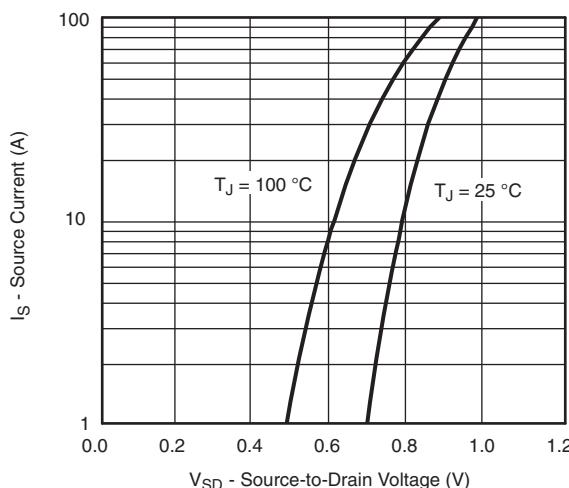
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


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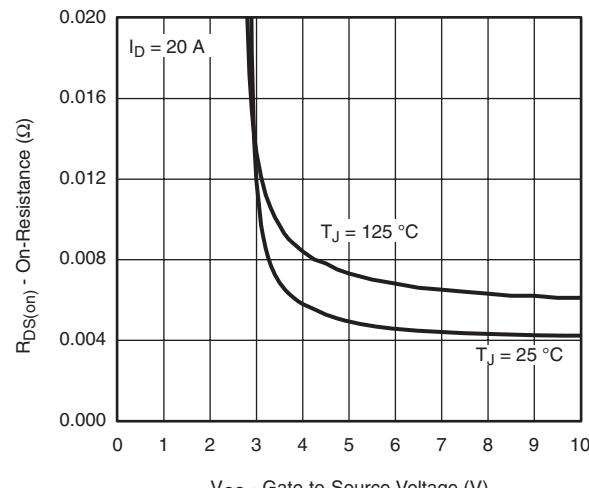
Vishay Siliconix



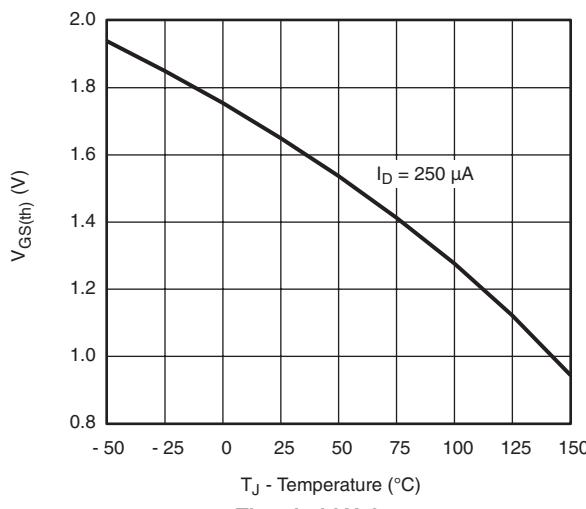
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



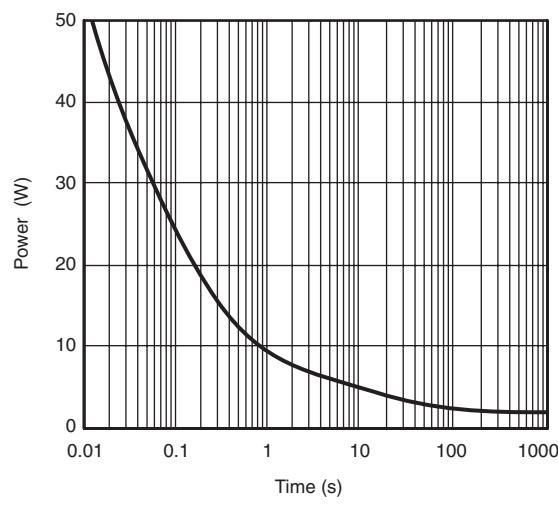
Source-Drain Diode Forward Voltage



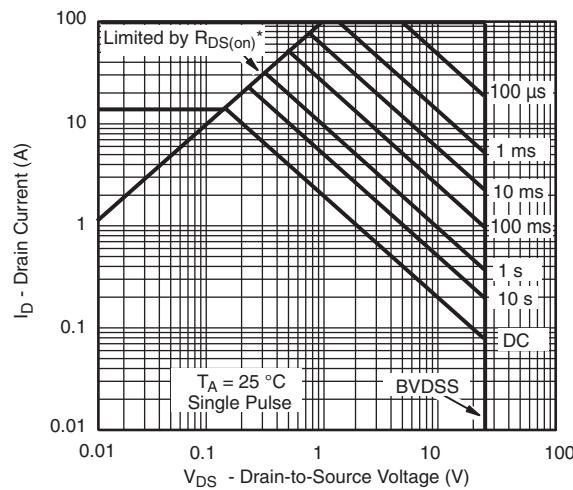
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

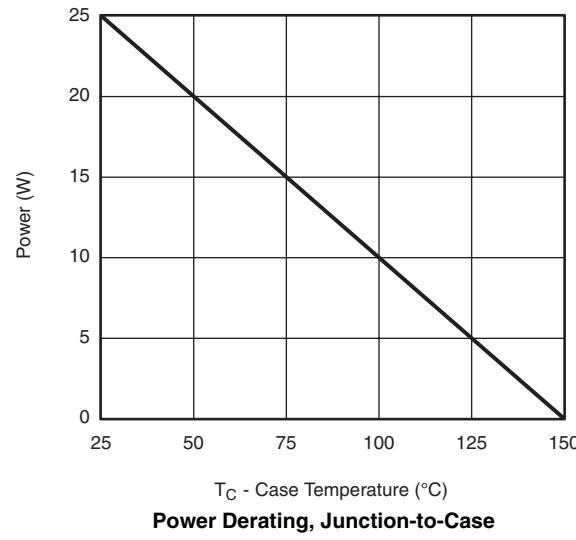
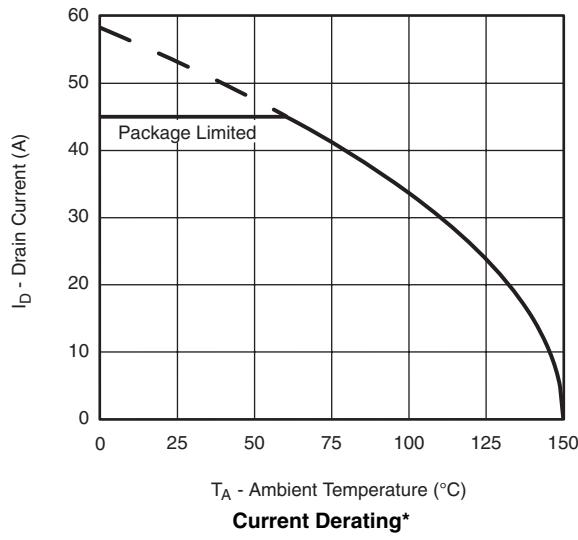


Single Pulse Power, Junction-to-Ambient



Safe Operating Area, Junction-to-Ambient

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

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted


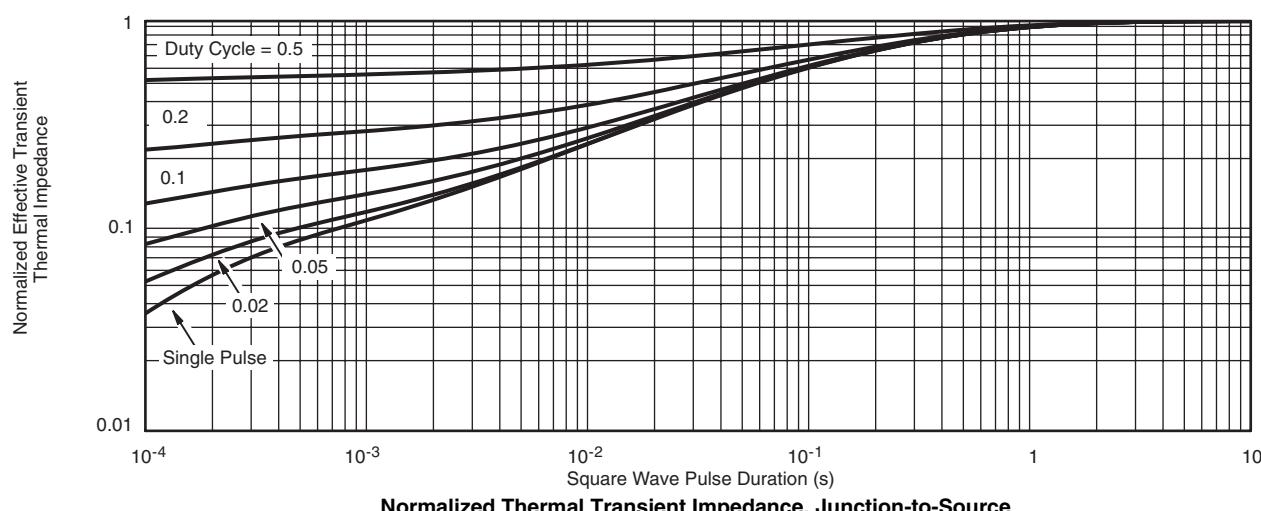
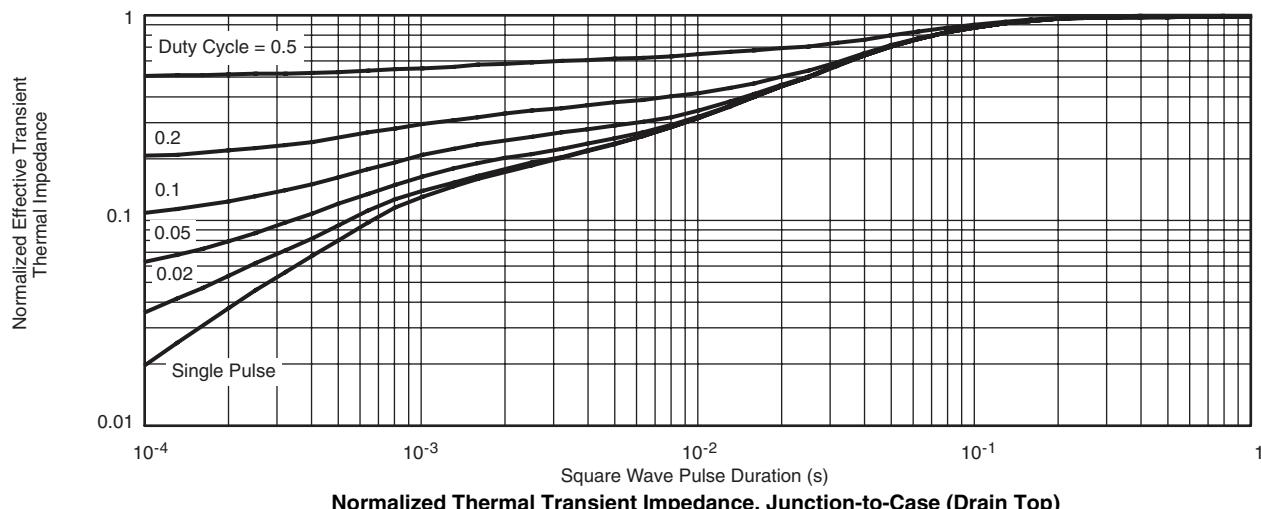
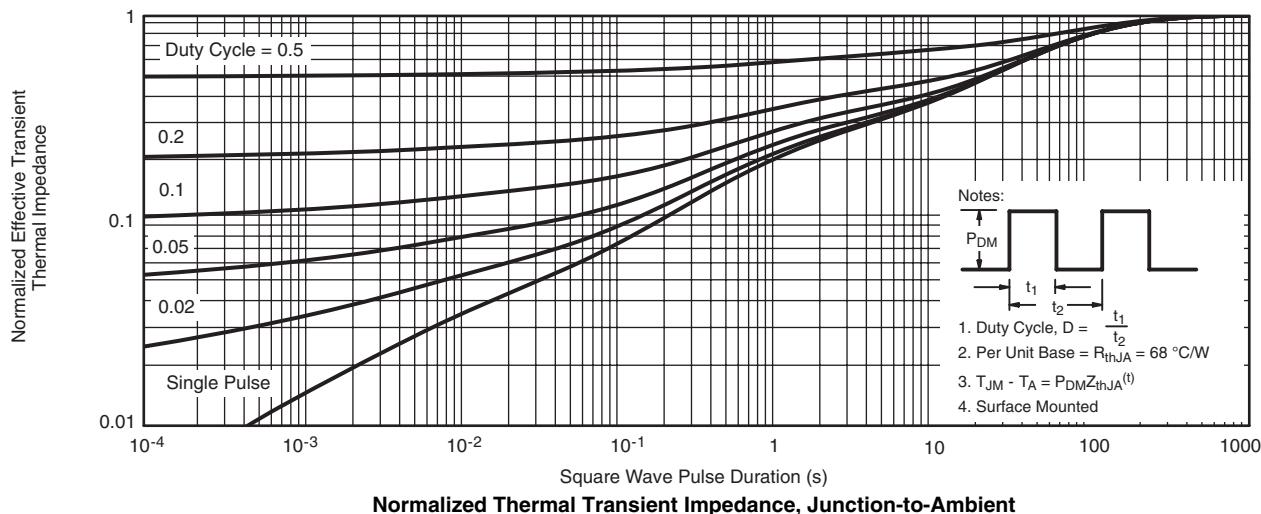
* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

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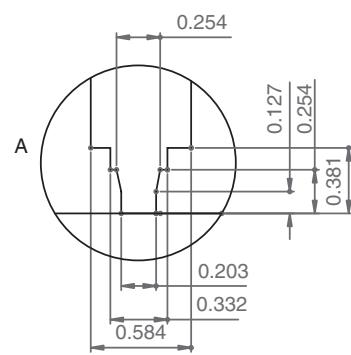
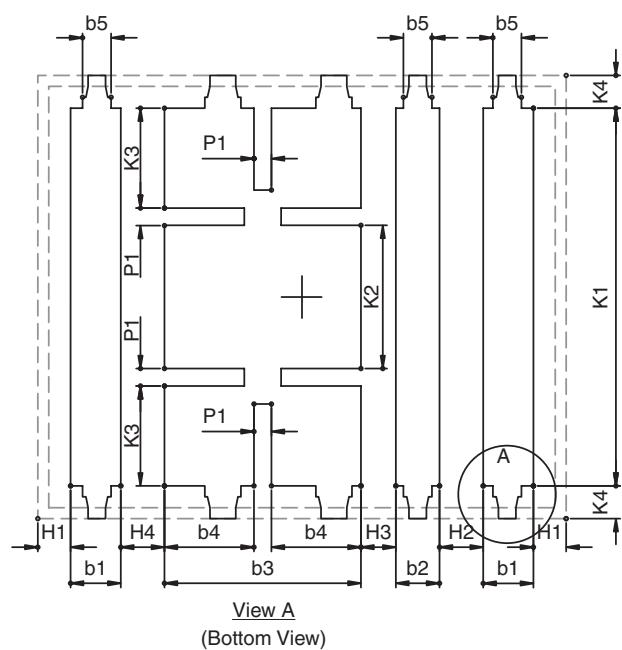
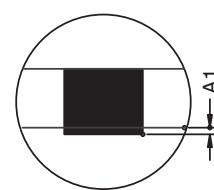
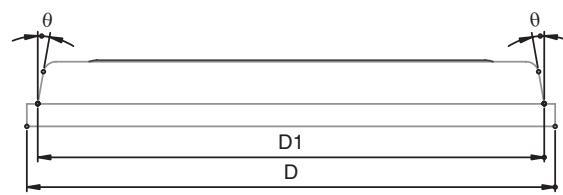
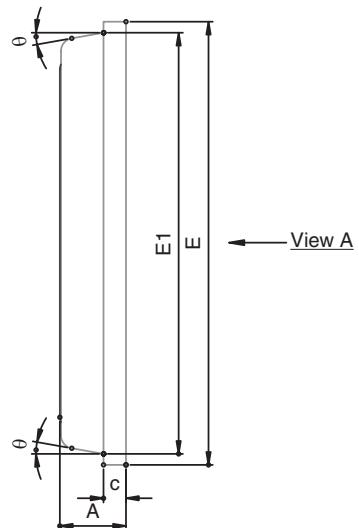
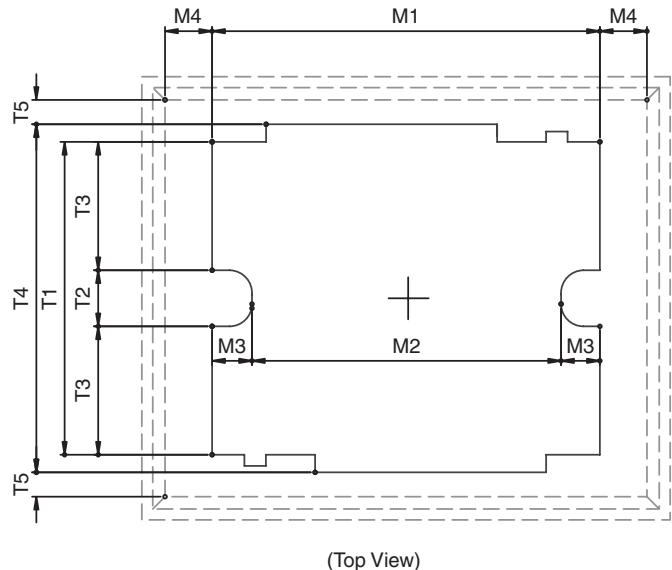


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



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/pga265456.

POLARPAK™ OPTION U



Package Information

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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	2.19	2.29	2.39	0.086	0.090	0.094
b4	0.89	1.04	1.19	0.035	0.041	0.047
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	0.45	-	0.56	0.018	-	0.022
H3	0.31	0.41	0.51	0.012	0.016	0.020
H4	0.45	-	0.56	0.018	-	0.022
K1	4.22	4.37	4.52	0.166	0.172	0.178
K2	1.62	1.67	1.72	0.064	0.066	0.068
K3	1.16	-	-	0.046	-	-
K4	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°

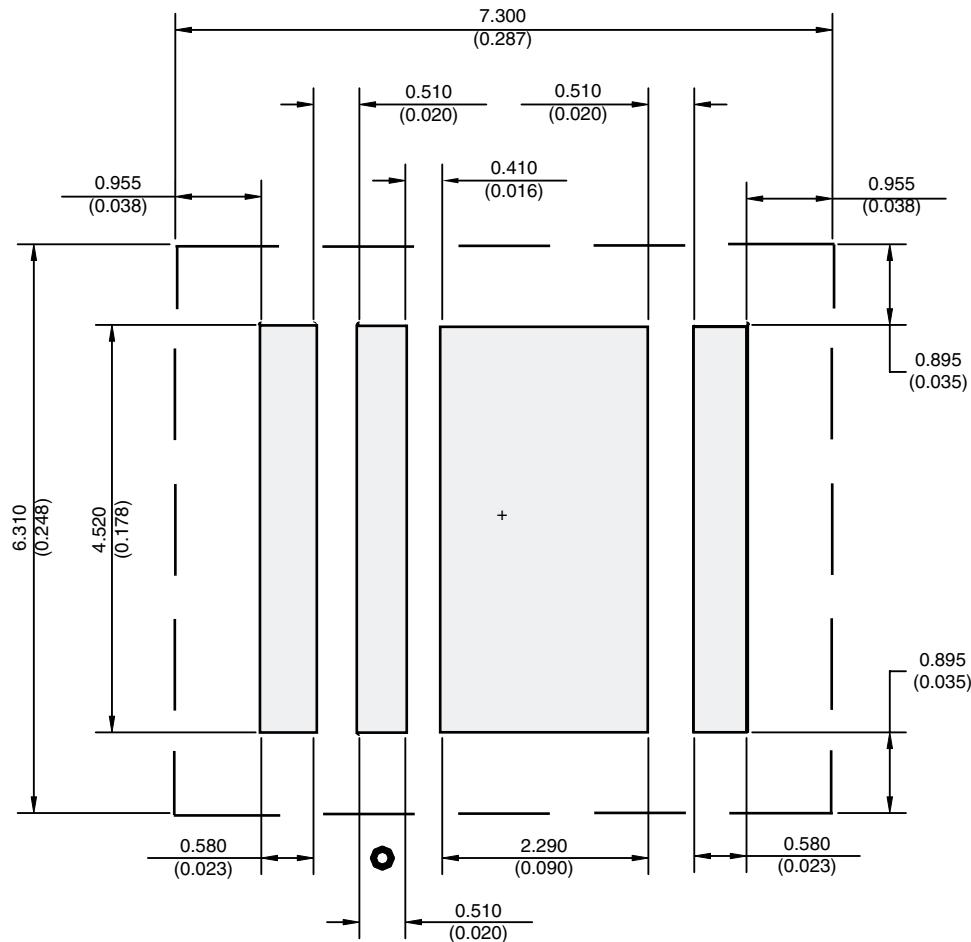
ECN: T-08441-Rev. A, 11-Aug-08

DWG: 5966

Notes

Millimeters govern over inches.

RECOMMENDED MINIMUM PADS FOR PolarPAK® Option L and S



Recommended Minimum for PolarPAK Option L and S

Dimensions in mm/(Inches)

No External Traces within Broken Lines

Dot indicates Gate Pin (Part Marking)

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Mouser Electronics

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