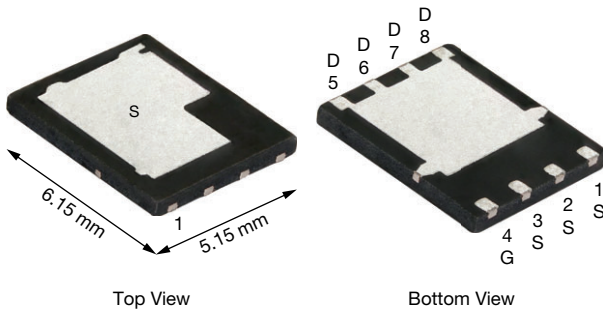


N-Channel 150 V (D-S) 175 °C MOSFET

PowerPAK® SO-8DC

FEATURES

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


RoHS
 COMPLIANT
 HALOGEN
FREE
APPLICATIONS

- Synchronous rectification
- Primary side switch
- DC/DC converters
- OR-ing and hot swap switch
- Power supplies
- Motor drive control
- Battery management



N-Channel MOSFET

PRODUCT SUMMARY

V_{DS} (V)	150
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.0088
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 7.5$ V	0.010
Q_g typ. (nC)	24.5
I_D (A)	78
Configuration	Single

ORDERING INFORMATION

Package	PowerPAK SO-8DC
Lead (Pb)-free and halogen-free	SiDR578EP-T1-RE3

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	V
Continuous drain current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	78 ^a
		$T_C = 70$ °C	65 ^a
		$T_A = 25$ °C	17.4 ^{b, c}
		$T_A = 70$ °C	14.5 ^{b, c}
Pulsed drain current ($t = 100$ μ s)	I_{DM}	200	A
Continuous source-drain diode current	I_S	$T_C = 25$ °C	136
		$T_A = 25$ °C	6.8 ^{b, c}
Single pulse avalanche current	I_{AS}	30	
Single pulse avalanche energy	E_{AS}	45	mJ
Maximum power dissipation	P_D	$T_C = 25$ °C	150
		$T_C = 70$ °C	105
		$T_A = 25$ °C	7.5 ^{b, c}
		$T_A = 70$ °C	5.25 ^{b, c}
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature) ^{d, e}		260	

Notes

- Package limited
- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s
- See solder profile (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



THERMAL RESISTANCE RATINGS					
PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^{a, b}	$t \leq 10$ s	R_{thJA}	15	20	°C/W
Maximum junction-to-case (drain)	Steady state	R_{thJC}	0.8	1	
Maximum junction-to-case (source)	Steady state	R_{thJC}	1.1	1.4	

Notes

- a. Surface mounted on 1" x 1" FR4 board
- b. Maximum under steady state conditions is 54 °C/W

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, $I_D = 1$ mA	150	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	$I_D = 10$ mA	-	108	-	mV/°C
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$	$I_D = 250$ μ A	-	-7.0	-	
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250$ μ A	2	-	4	V
Gate-source leakage	I_{GSS}	$V_{DS} = 0$ V, $V_{GS} = \pm 20$ V	-	-	100	nA
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 120$ V, $V_{GS} = 0$ V	-	-	1	μ A
		$V_{DS} = 120$ V, $V_{GS} = 0$ V, $T_J = 70$ °C	-	-	15	
Drain-source on-state resistance ^a	$R_{DS(on)}$	$V_{GS} = 10$ V, $I_D = 20$ A	-	0.0073	0.0088	Ω
		$V_{GS} = 7.5$ V, $I_D = 20$ A	-	0.00825	0.010	
Forward transconductance ^a	g_{fs}	$V_{DS} = 15$ V, $I_D = 20$ A	-	62	-	S
Dynamic ^b						
Input capacitance	C_{iss}	$V_{DS} = 75$ V, $V_{GS} = 0$ V, $f = 1$ MHz	-	2540	-	pF
Output capacitance	C_{oss}		-	325	-	
Reverse transfer capacitance	C_{rss}		-	6.6	-	
Total gate charge	Q_g	$V_{DS} = 75$ V, $V_{GS} = 10$ V, $I_D = 20$ A	-	32.5	49	nC
Gate-source charge	Q_{gs}	$V_{DS} = 75$ V, $V_{GS} = 7.5$ V, $I_D = 20$ A	-	24.5	37	
Gate-drain charge	Q_{gd}		-	15.3	-	
Output charge	Q_{oss}		$V_{DS} = 75$ V, $V_{GS} = 0$ V	-	3.1	
Gate resistance	R_g	$f = 1$ MHz	0.5	1.35	2.3	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 75$ V, $R_L = 3.75$ Ω , $I_D \cong 20$ A, $V_{GEN} = 10$ V, $R_g = 1$ Ω	-	16	32	ns
Rise time	t_r		-	22	44	
Turn-off delay time	$t_{d(off)}$		-	23	46	
Fall time	t_f		-	23	46	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 75$ V, $R_L = 3.75$ Ω , $I_D \cong 20$ A, $V_{GEN} = 7.5$ V, $R_g = 1$ Ω	-	18	36	
Rise time	t_r		-	68	136	
Turn-off delay time	$t_{d(off)}$		-	21	42	
Fall time	t_f		-	24	48	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	$T_C = 25$ °C	-	-	94	A
Pulse diode forward current	I_{SM}		-	-	200	
Body diode voltage	V_{SD}	$I_S = 5$ A, $V_{GS} = 0$ V	-	0.75	1.1	V
Body diode reverse recovery time	t_{rr}	$I_F = 20$ A, $di/dt = 100$ A/ μ s, $T_J = 25$ °C	-	85	170	ns
Body diode reverse recovery charge	Q_{rr}		-	200	400	nC
Reverse recovery fall time	t_a		-	65	-	ns
Reverse recovery rise time	t_b		-	20	-	

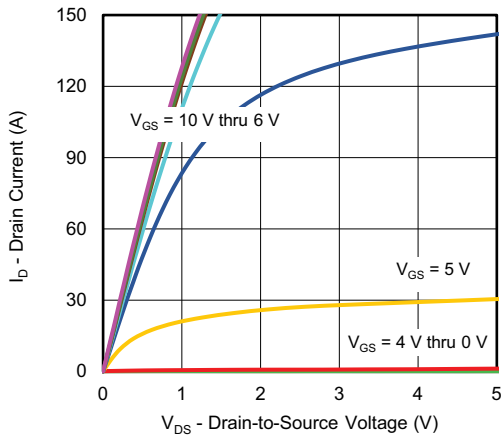
Notes

- a. Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %
- b. Guaranteed by design, not subject to production testing

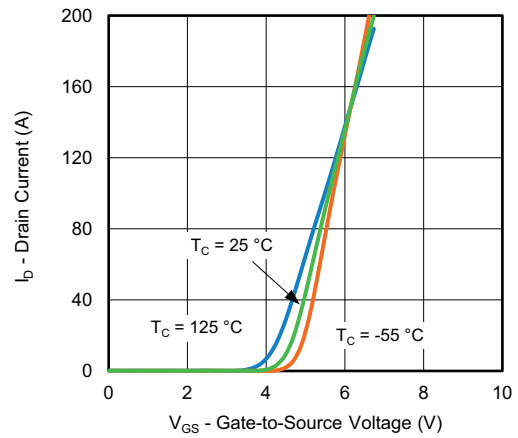
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



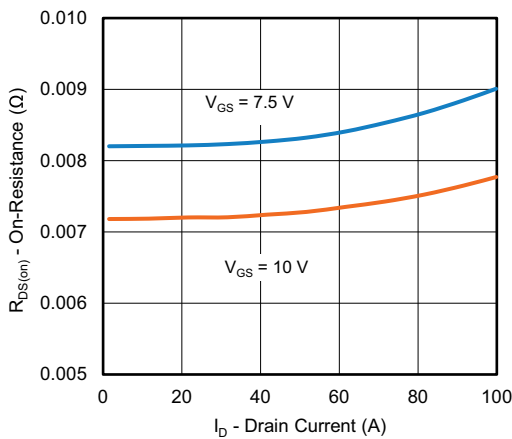
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



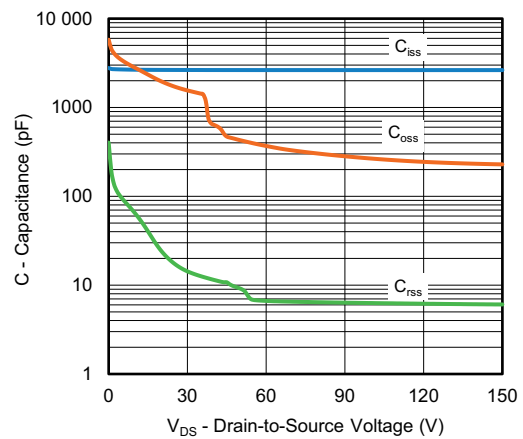
Output Characteristics



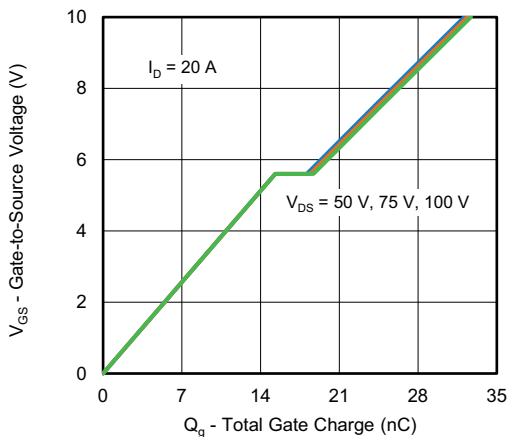
Transfer Characteristics



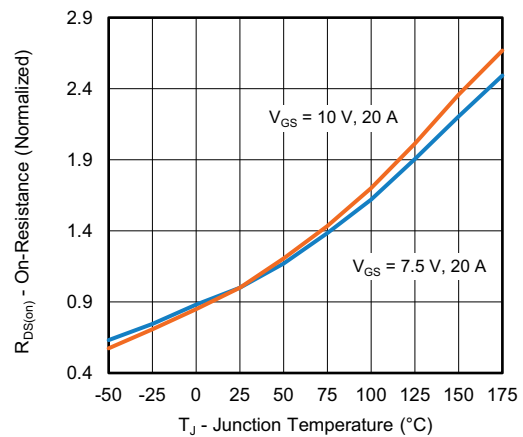
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



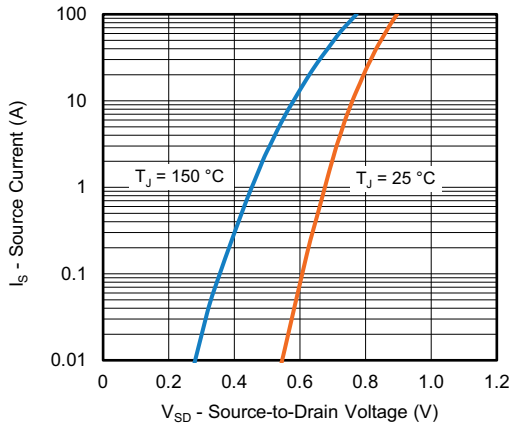
Gate Charge



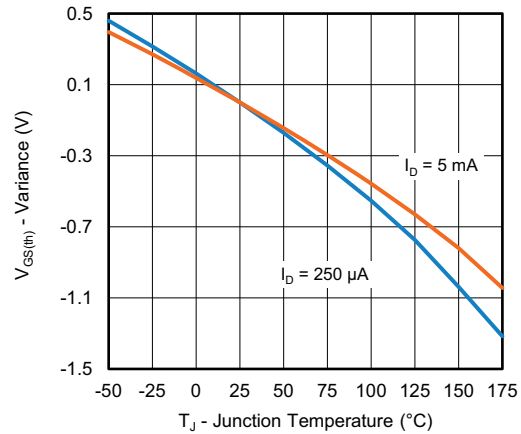
On-Resistance vs. Junction Temperature



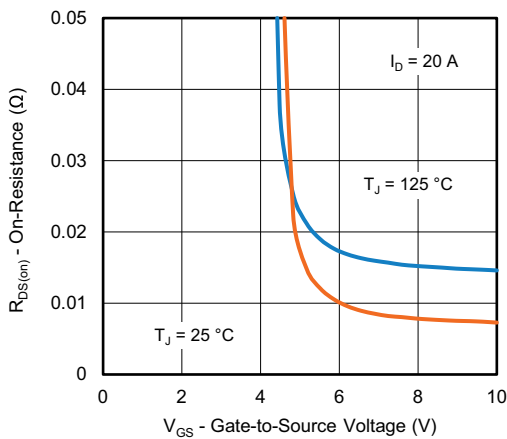
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



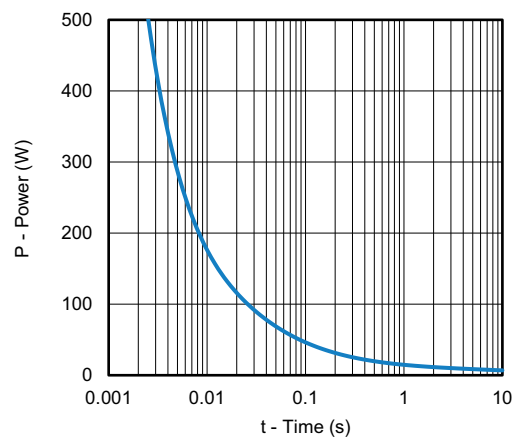
Source-Drain Diode Forward Voltage



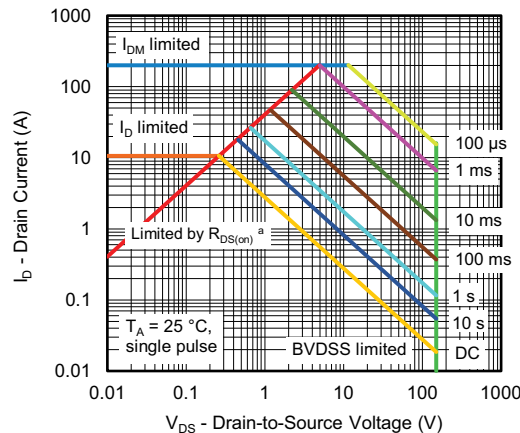
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



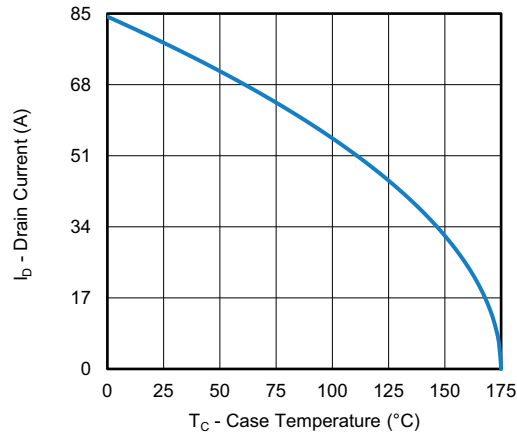
Single Pulse Power, Junction-to-Ambient



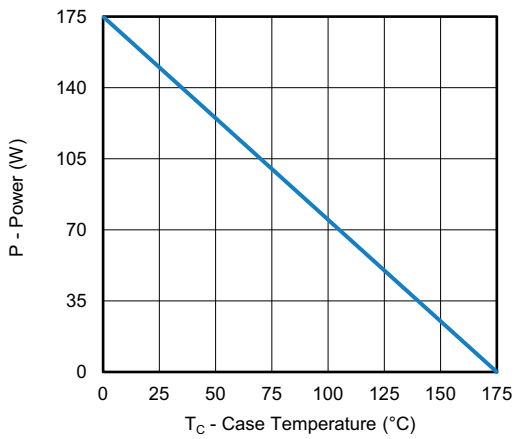
Safe Operating Area, Junction-to-Ambient



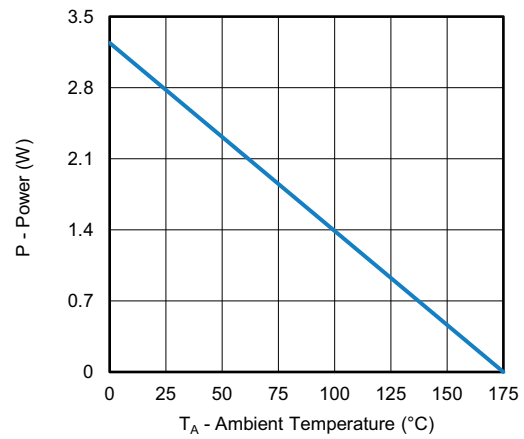
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



Power, Junction-to-Case



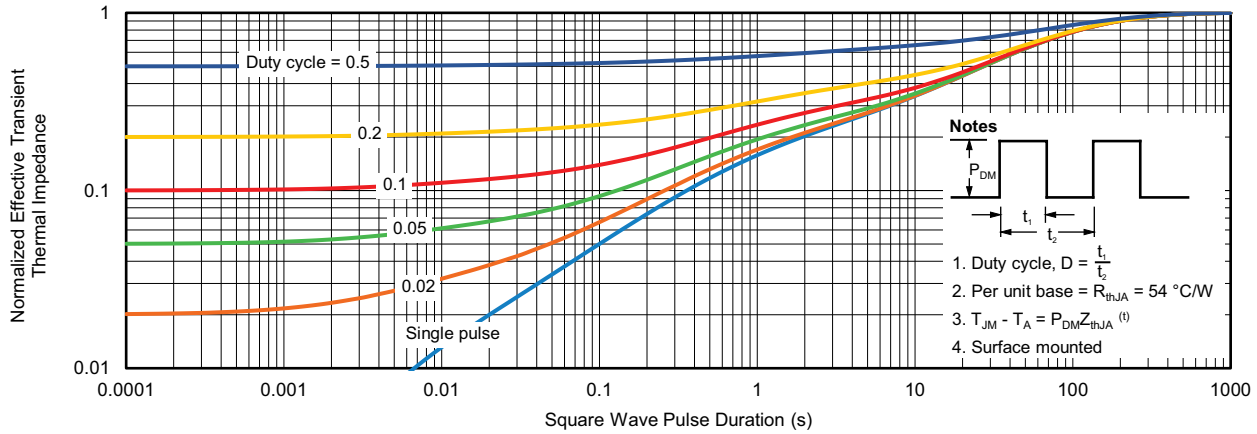
Power, Junction-to-Ambient

Note

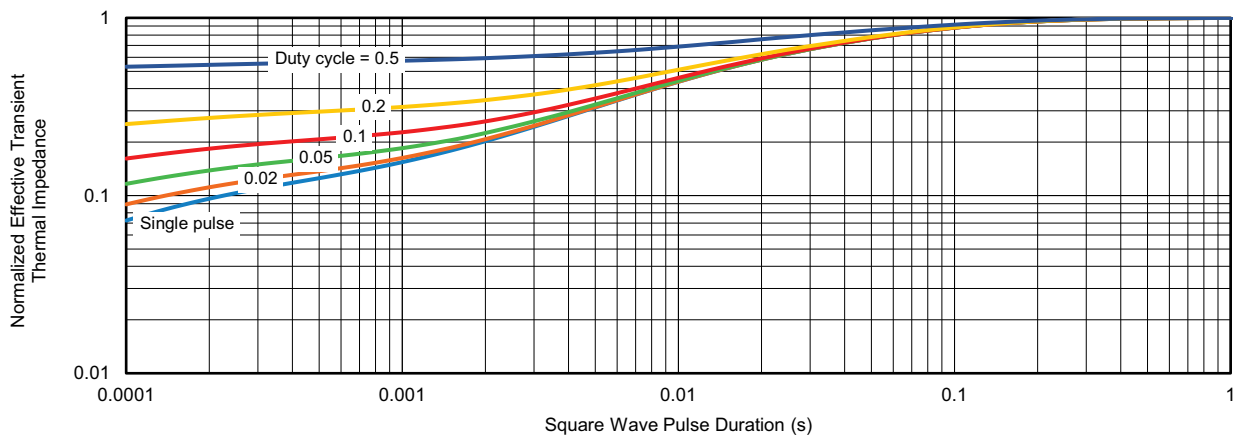
- a. The power dissipation P_D is based on $T_J \text{ max.} = 175 \text{ °C}$, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient

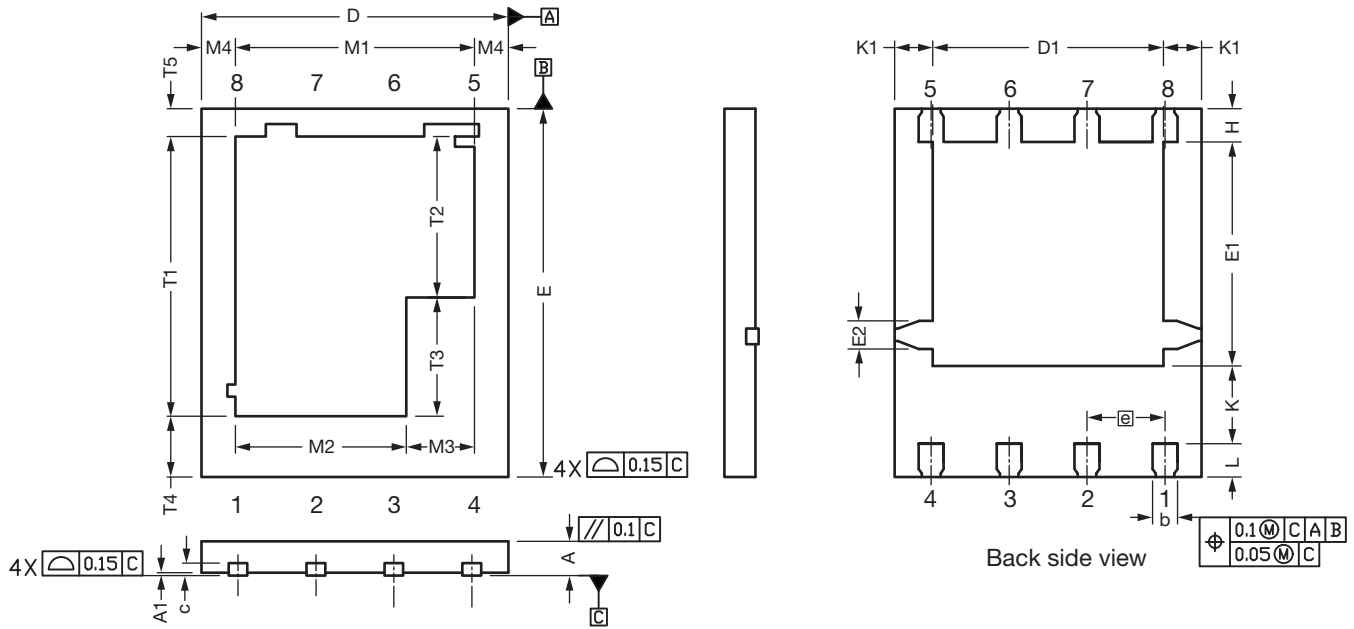


Normalized Thermal Transient Impedance, Junction-to-Case

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?63159.



PowerPAK® SO-8 Double Cooling Case Outline



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.51	0.56	0.61	0.020	0.022	0.024
A1	0.00	0.02	0.05	0.000	0.001	0.002
b	0.36	0.41	0.46	0.014	0.016	0.018
c	0.15	0.20	0.25	0.006	0.008	0.010
D	4.90	5.00	5.10	0.193	0.197	0.201
D1	3.71	3.76	3.81	0.146	0.148	0.150
e	1.27 BSC			0.050 BSC		
E	5.90	6.00	6.10	0.232	0.236	0.240
E1	3.60	3.65	3.70	0.142	0.144	0.146
E2	0.46 typ.			0.018 typ.		
H	0.49	0.54	0.59	0.019	0.021	0.023
K	1.22	1.27	1.32	0.048	0.050	0.052
K1	0.64 typ.			0.025 typ.		
L	0.49	0.54	0.59	0.019	0.021	0.023
M1	3.8	3.90	4.00	0.150	0.154	0.158
M2	2.69	2.79	2.89	0.106	0.110	0.114
M3	1.01	1.11	1.21	0.040	0.044	0.048
M4	0.56 typ.			0.022 typ.		
N	8			8		
T1	4.46	4.56	4.66	0.176	0.180	0.184
T2	2.53	2.63	2.73	0.100	0.104	0.108
T3	1.83	1.93	2.03	0.072	0.076	0.080
T4	0.97 typ.			0.038 typ.		
T5	0.48 typ.			0.019 typ.		

ECN: T24-0304-Rev. C, 29-Jul-2024
DWG: 6048

RECOMMENDED MINIMUM PADS FOR PowerPAK® SO-8 Single



Recommended Minimum Pads
Dimensions in Inches/(mm)

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