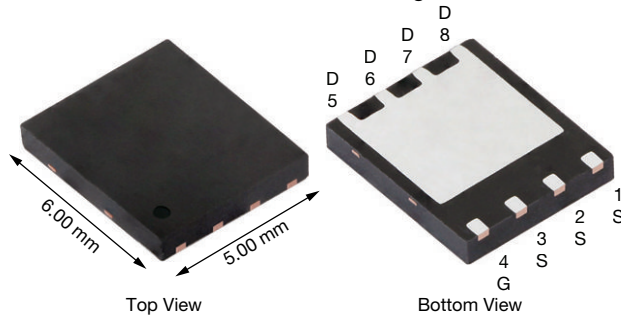


P-Channel 30 V (D-S) MOSFET

PowerPAK® SO-8S Single


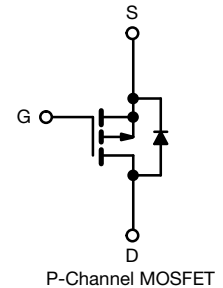
FEATURES

- Leadership $R_{DS(on)}$ minimizes power loss from conduction
- 100 % R_g and UIS tested
- Enhance power dissipation and lower R_{thJC}
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE

APPLICATIONS

- Adapter and charger switch
- Load switch
- Motor drive control
- Battery management



PRODUCT SUMMARY	
V_{DS} (V)	-30
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 10$ V	0.0015
$R_{DS(on)}$ max. (Ω) at $V_{GS} = 7.5$ V	0.0023
Q_g typ. (nC)	170
I_D (A) ^a	-227
Configuration	Single

ORDERING INFORMATION

Package	PowerPAK SO-8S
Lead (Pb)-free and halogen-free	SiRS4301DP-T1-GE3

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	-30	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current ($T_J = 150$ °C)	I_D	$T_C = 25$ °C	-227
		$T_C = 70$ °C	-182
		$T_A = 25$ °C	-53.7 ^{b, c}
		$T_A = 70$ °C	-43.0 ^{b, c}
Pulsed drain current ($t = 100$ μ s)	I_{DM}	-350	A
Continuous source-drain diode current	I_S	$T_C = 25$ °C	-110
		$T_A = 25$ °C	-6.1 ^{b, c}
Single pulse avalanche current	I_{AS}	-50	A
Single pulse avalanche energy	E_{AS}	125	mJ
Maximum power dissipation	P_D	$T_C = 25$ °C	132
		$T_C = 70$ °C	84
		$T_A = 25$ °C	7.4 ^{b, c}
		$T_A = 70$ °C	4.7 ^{b, c}
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +150	°C
Soldering recommendations (peak temperature) ^c		260	°C

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYPICAL	MAXIMUM	UNIT
Maximum junction-to-ambient ^b	R_{thJA}	13	17	°C/W
Maximum junction-to-case (drain)	R_{thJC}	0.73	0.95	

Notes

- $T_C = 25$ °C
- Surface mounted on 1" x 1" FR4 board
- $t = 10$ s
- See solder profile (www.vishay.com/doc?73257). The PowerPAK SO-8S 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
- Re-work conditions: manual soldering with a soldering iron is not recommended for leadless components
- Maximum under steady state conditions is 45 °C/W



SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	-30	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	$I_D = -10\text{ mA}$	-	-30	-	mV/ $^\circ\text{C}$
$V_{GS(th)}$ temperature coefficient	$\Delta V_{GS(th)}/T_J$	$I_D = -250\text{ }\mu\text{A}$	-	5.6	-	
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\text{ }\mu\text{A}$	-1	-	-2.3	V
Gate-source leakage	I_{GSS}	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -30\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{DS} = -30\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 55\text{ }^\circ\text{C}$	-	-	10	
Drain-source on-state resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}$, $I_D = -20\text{ A}$	-	0.0012	0.0015	Ω
		$V_{GS} = -4.5\text{ V}$, $I_D = -20\text{ A}$	-	0.0018	0.0023	
Forward transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}$, $I_D = -20\text{ A}$	-	125	-	S
Dynamic ^b						
Input capacitance	C_{iss}	$V_{DS} = -15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$	-	19 750	-	pF
Output capacitance	C_{oss}		-	2070	-	
Reverse transfer capacitance	C_{rss}		-	1175	-	
Total gate charge	Q_g	$V_{DS} = -10\text{ V}$, $V_{GS} = -10\text{ V}$, $I_D = -20\text{ A}$	-	365	548	nC
		$V_{DS} = -10\text{ V}$, $V_{GS} = -4.5\text{ V}$, $I_D = -20\text{ A}$	-	170	255	
Gate-source charge	Q_{gs}		-	64	-	
Gate-drain charge	Q_{gd}		-	55	-	
Output charge	Q_{oss}	$V_{DS} = -15\text{ V}$, $V_{GS} = 0\text{ V}$	-	43	-	
Gate resistance	R_g	$f = 1\text{ MHz}$	0.5	2.4	4.8	Ω
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -15\text{ V}$, $R_L = 1.5\text{ }\Omega$, $I_D \cong -10\text{ A}$, $V_{GEN} = -10\text{ V}$, $R_g = 1\text{ }\Omega$	-	22	44	ns
Rise time	t_r		-	28	56	
Turn-off delay time	$t_{d(off)}$		-	210	420	
Fall time	t_f		-	90	180	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -15\text{ V}$, $R_L = 1.5\text{ }\Omega$, $I_D \cong -10\text{ A}$, $V_{GEN} = -4.5\text{ V}$, $R_g = 1\text{ }\Omega$	-	80	160	
Rise time	t_r		-	160	320	
Turn-off delay time	$t_{d(off)}$		-	210	420	
Fall time	t_f		-	140	280	
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	$T_C = 25\text{ }^\circ\text{C}$	-	-	110	A
Pulse diode forward current	I_{SM}		-	-	350	
Body diode voltage	V_{SD}	$I_S = -10\text{ A}$, $V_{GS} = 0\text{ V}$	-	0.75	1.2	V
Body diode reverse recovery time	t_{rr}	$I_F = -10\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $T_J = 25\text{ }^\circ\text{C}$	-	48	96	ns
Body diode reverse recovery charge	Q_{rr}		-	51	102	nC
Reverse recovery fall time	t_a		-	23	-	ns
Reverse recovery rise time	t_b		-	25	-	

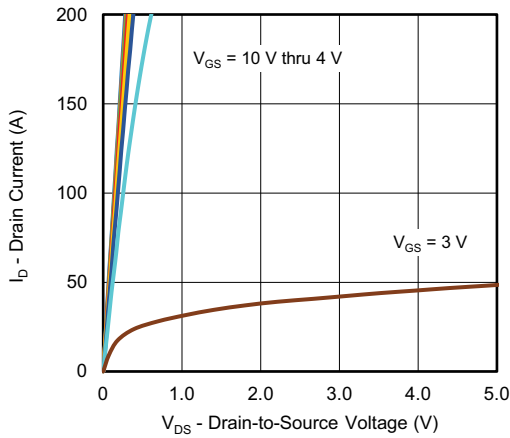
Notes

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

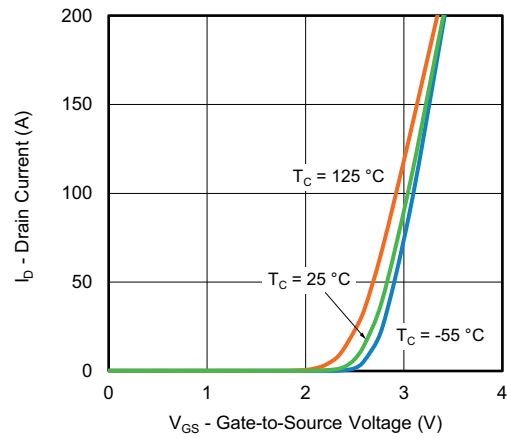
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



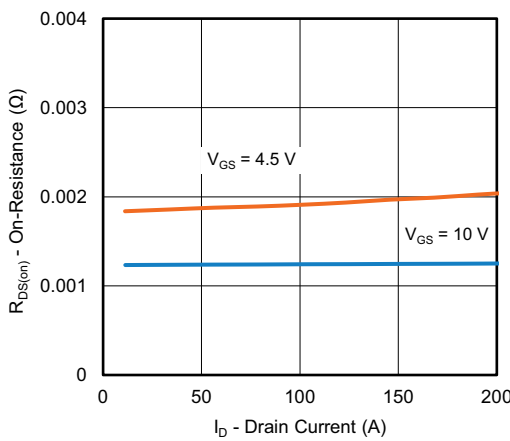
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



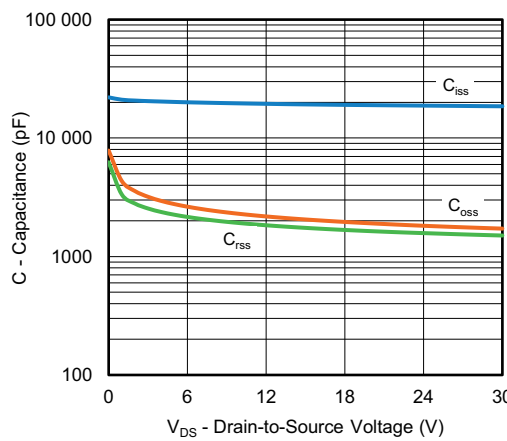
Output Characteristics



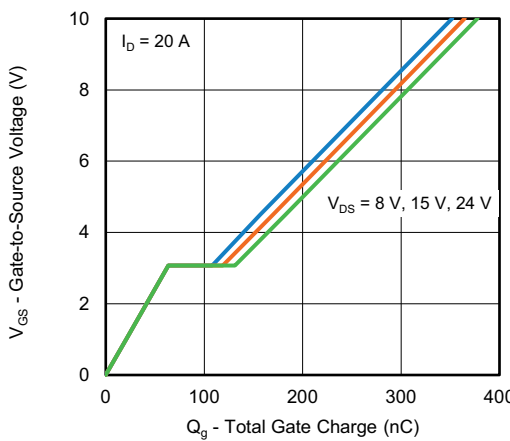
Transfer Characteristics



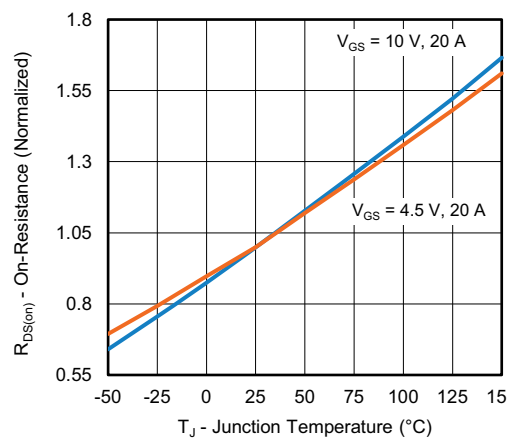
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



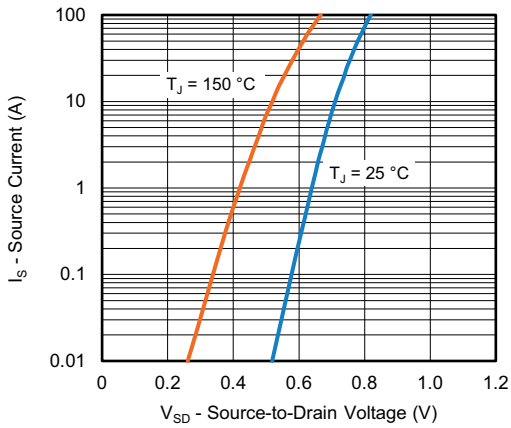
Gate Charge



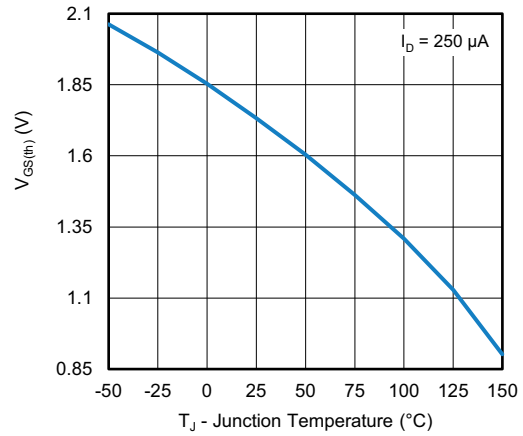
On-Resistance vs. Junction Temperature



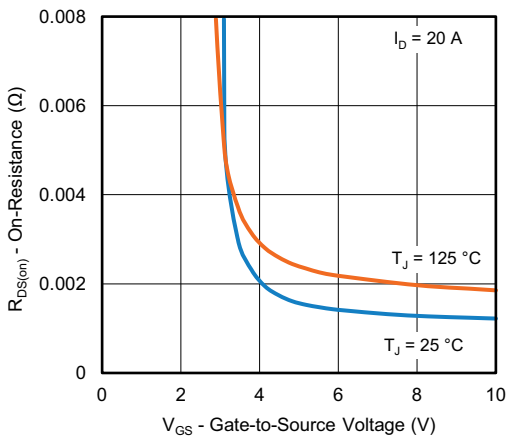
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



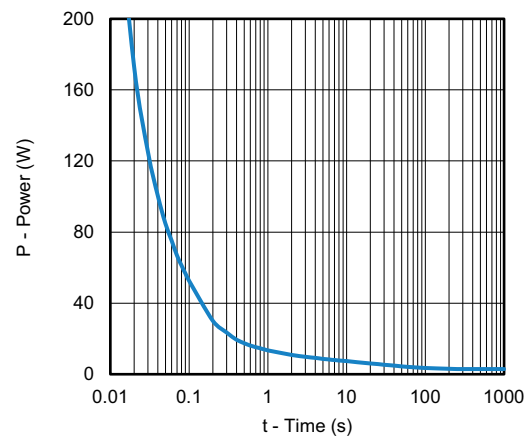
Source-Drain Diode Forward Voltage



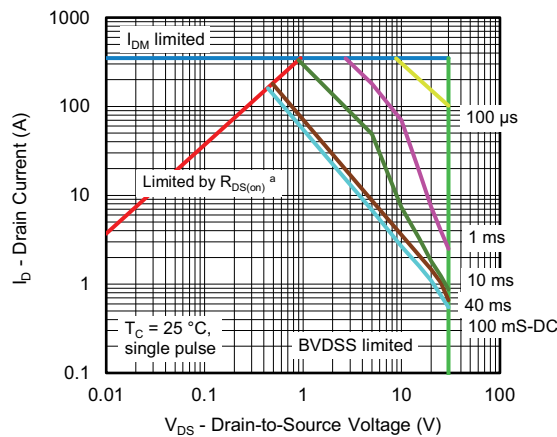
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage



Single Pulse Power, Junction-to-Ambient



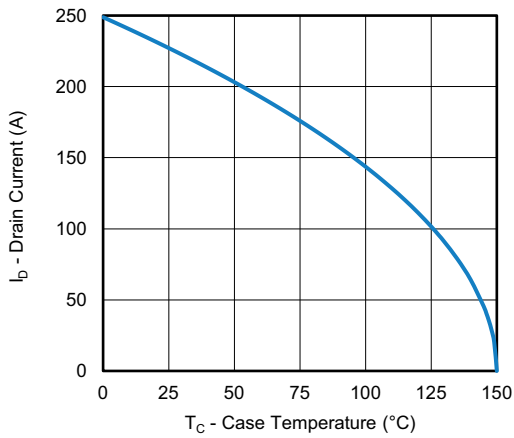
Safe Operating Area, Junction-to-Case

Note

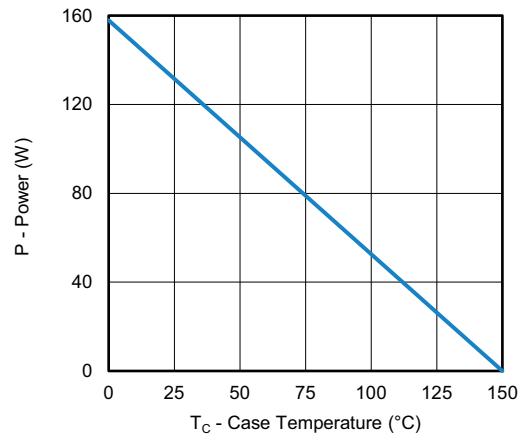
a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating ^a



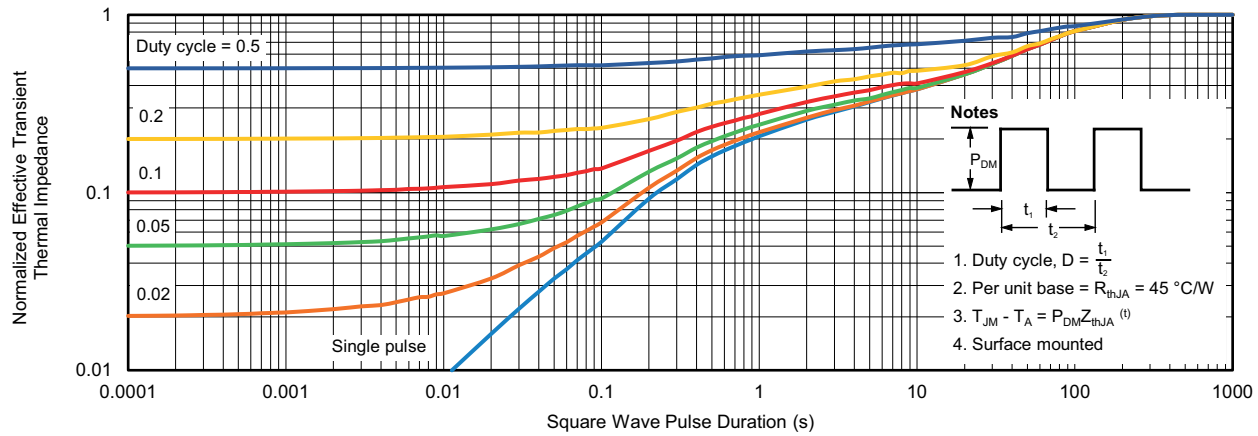
Power, Junction-to-Case

Note

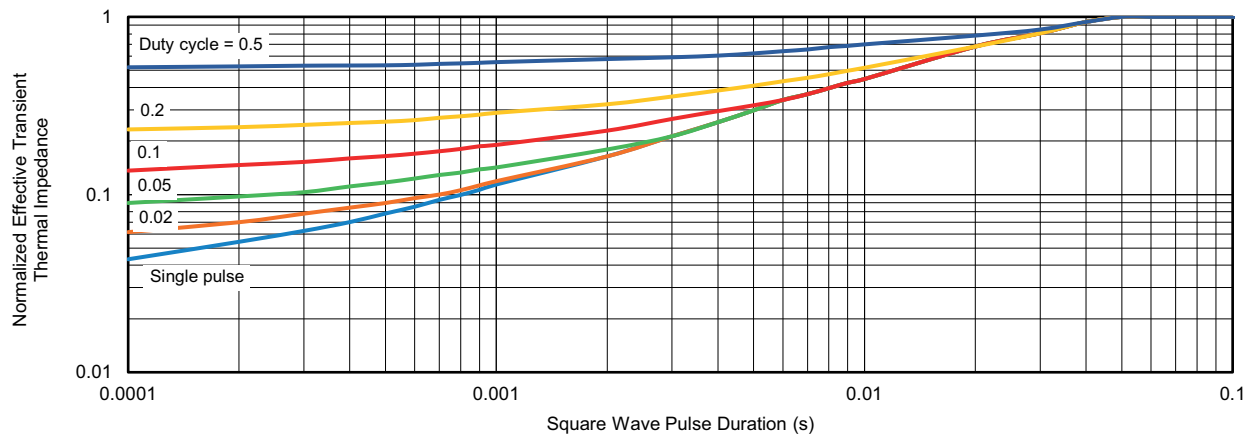
- a. The power dissipation P_D is based on T_J max. = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



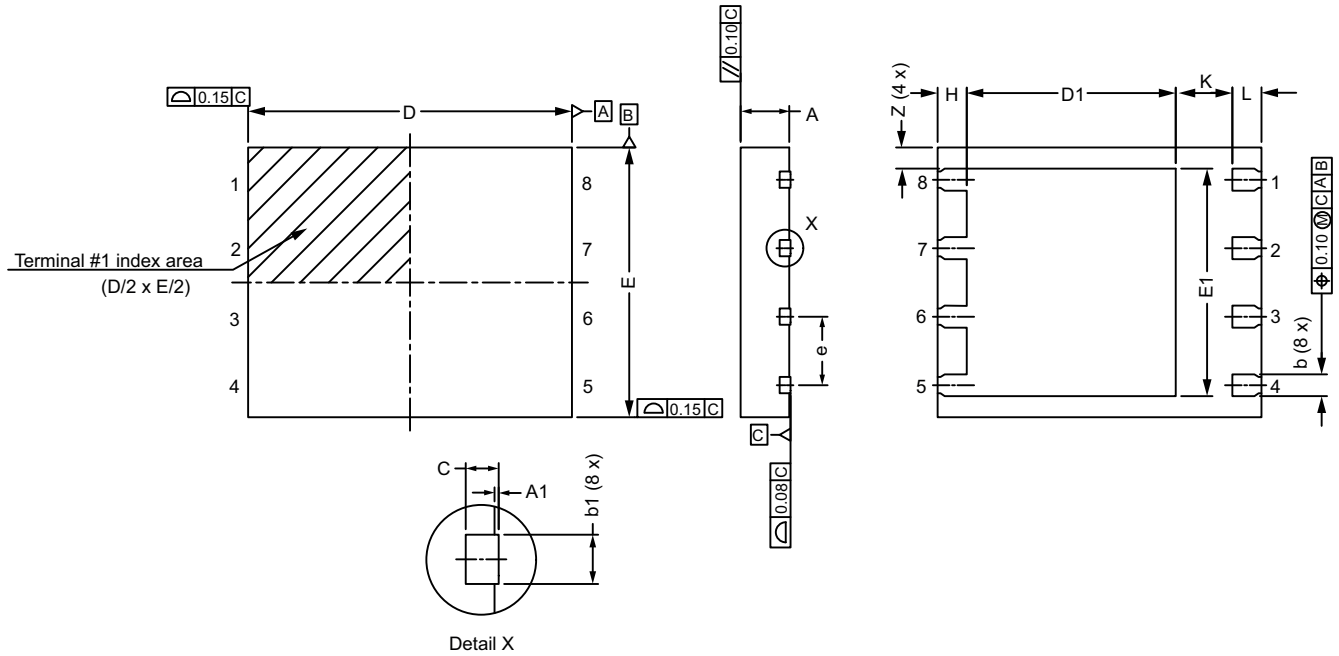
Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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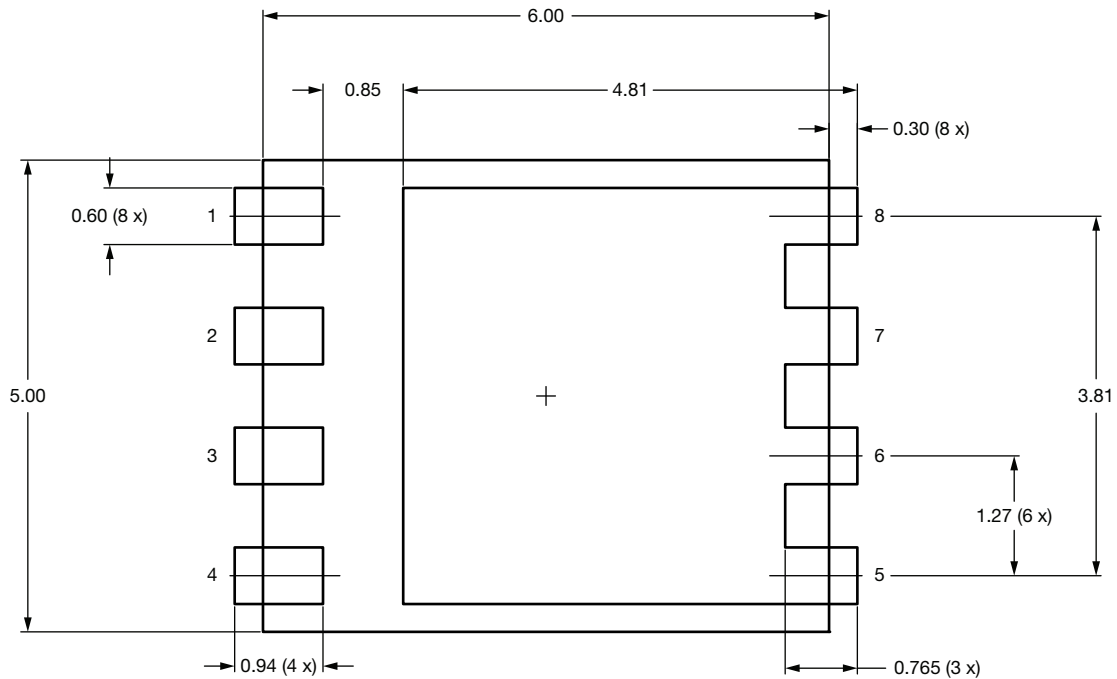
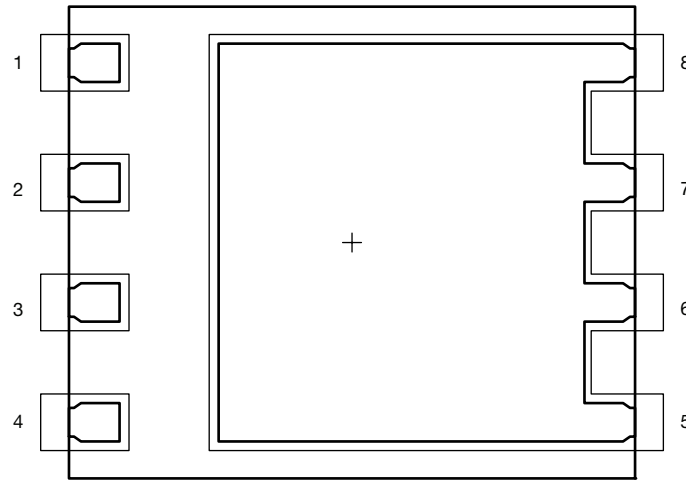
PowerPAK® SO-8S BWL



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.85	0.90	0.95	0.033	0.035	0.037
A1	-	-	0.05	-	-	0.002
b	0.31	0.41	0.51	0.012	0.016	0.020
b1	0.20	0.30	0.40	0.008	0.012	0.016
c	0.20 ref.			0.008 ref.		
D	5.90	6.00	6.10	0.232	0.236	0.240
D1	3.78	3.88	3.98	0.149	0.153	0.157
E	4.90	5.00	5.10	0.193	0.197	0.201
E1	4.12	4.22	4.32	0.162	0.166	0.170
e	1.27 BSC			0.050 BSC		
H	0.44	0.54	0.64	0.017	0.021	0.025
K	1.05 ref.			0.041 ref.		
L	0.44	0.54	0.64	0.017	0.021	0.025
Z	0.39 ref.			0.015 ref.		
ECN: C20-0936-Rev. A, 03-Aug-2020						
DWG: 6082						



Recommended Land Pattern PowerPAK[®] SO-8S BWL





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