

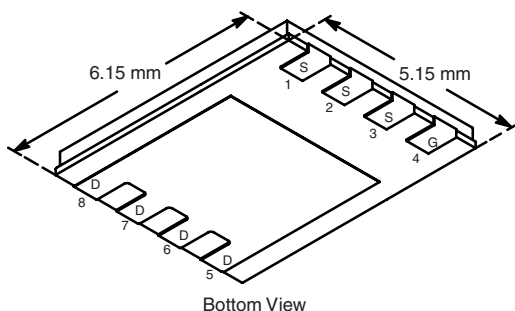


N-Channel 250-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^g	Q_g (Typ.)
250	0.118 at $V_{GS} = 10$ V	18.4	32
	0.124 at $V_{GS} = 6$ V	18.0	

PowerPAK SO-8



Ordering Information: Si7190DP-T1-GE3 (Lead (Pb)-free and Halogen-free)

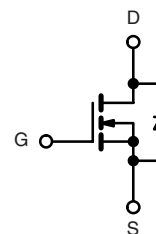
FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Low Thermal Resistance PowerPAK® Package
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC


RoHS
 COMPLIANT
 HALOGEN
FREE

APPLICATIONS

- Primary Side Switch
- Industrial
- POL



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	250	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	18.4	A
		14.7	
		4.4 ^{b, c}	
		3.5 ^{b, c}	
Pulsed Drain Current	I_{DM}	30	A
Continuous Source-Drain Diode Current	I_S	30 ^a	
		4.5 ^{b, c}	
Avalanche Current	I_{AS}	7	mJ
Single-Pulse Avalanche Energy	E_{AS}	2.4	
Maximum Power Dissipation	P_D	96	W
		61.5	
		5.4 ^{b, c}	
		3.5 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature) ^{d, e}		260	

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, f}	$t \leq 10$ s	R_{thJA}	18	23	$^\circ\text{C/W}$
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	1.0	1.3	

Notes:

a. Package limited.

b. Surface Mounted on 1" x 1" FR4 board.

c. $t = 10$ s.
 d. See Solder Profile (www.vishay.com/ppg?73461). 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.

e. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

f. Maximum under Steady State conditions is 65°C/W .g. Based on $T_C = 25^\circ\text{C}$.

Si7190DP

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**SPECIFICATIONS** $T_J = 25\text{ }^{\circ}\text{C}$, unless otherwise noted

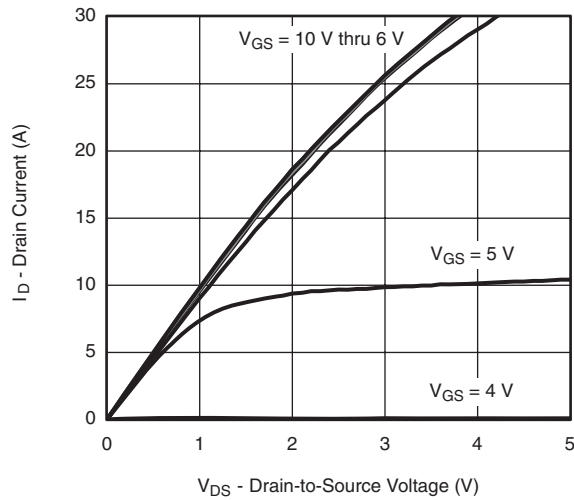
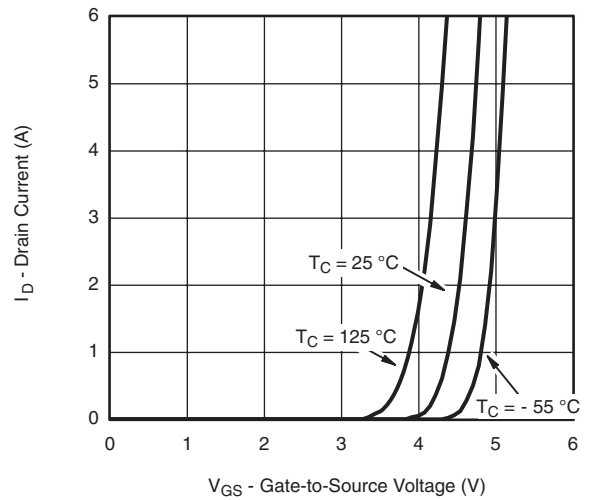
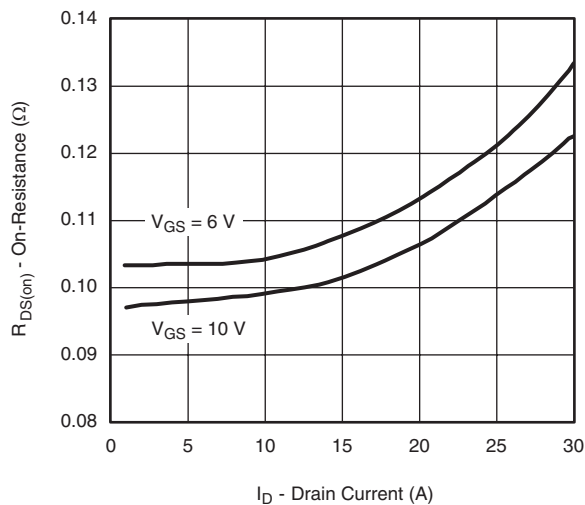
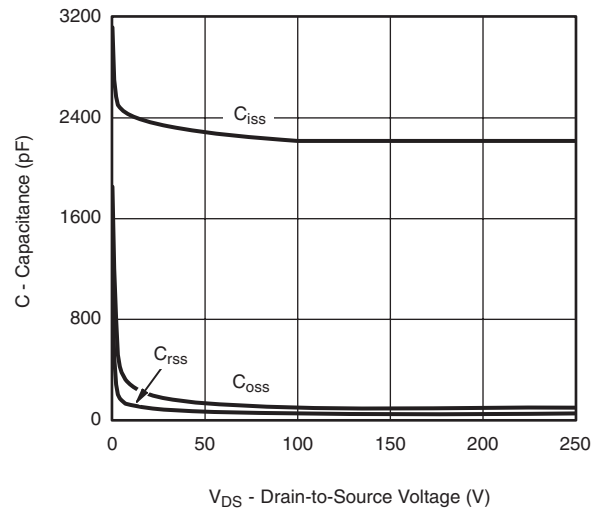
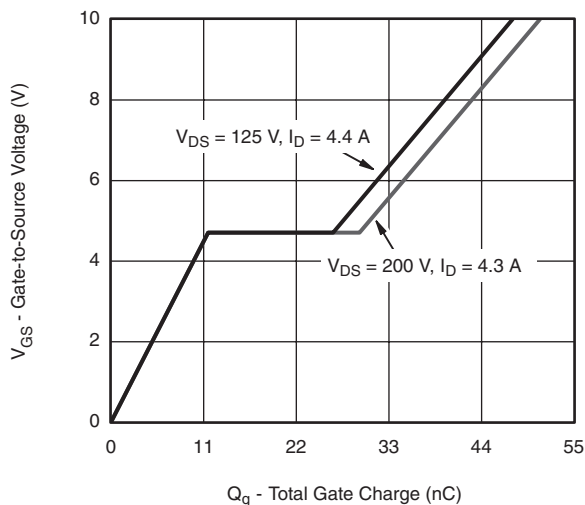
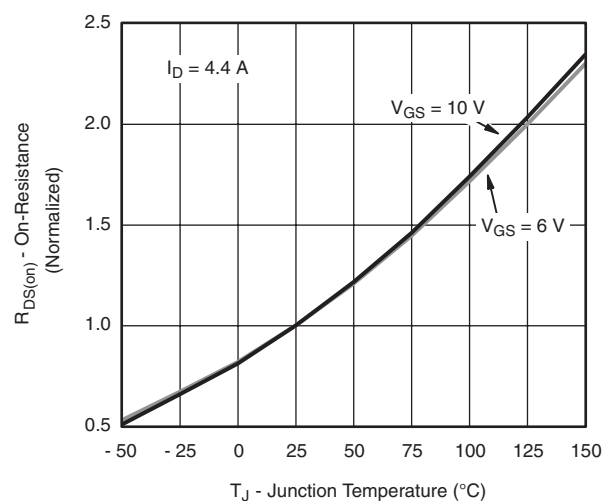
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 1 mA	250			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		258		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 9.8		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2		4	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} = 250 V, V _{GS} = 0 V			1	μA
		V _{DS} = 250 V, V _{GS} = 0 V, T _J = 55 °C			10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	20			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 4.4 A		0.098	0.118	Ω
		V _{GS} = 6 V, I _D = 4.3 A		0.103	0.124	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 4.4 A		19		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 125 V, V _{GS} = 0 V, f = 1 MHz		2214		pF
Output Capacitance	C _{oss}			96		
Reverse Transfer Capacitance	C _{rss}			50		
Total Gate Charge	Q _g	V _{DS} = 125 V, V _{GS} = 10 V, I _D = 4.4 A		48	72	nC
		V _{DS} = 125 V, V _{GS} = 6 V, I _D = 4.4 A		32	48	
Gate-Source Charge	Q _{gs}			12		
Gate-Drain Charge	Q _{gd}			15		
Gate Resistance	R _g	f = 1 MHz	0.2	0.9	1.8	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 125 V, R _L = 35.7 Ω I _D ≅ 3.5 A, V _{GEN} = 6 V, R _g = 1 Ω		21	32	ns
Rise Time	t _r			14	21	
Turn-Off Delay Time	t _{d(off)}			24	36	
Fall Time	t _f			10	20	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 125 V, R _L = 35.7 Ω I _D ≅ 3.5 A, V _{GEN} = 10 V, R _g = 1 Ω		13	20	
Rise Time	t _r			12	18	
Turn-Off Delay Time	t _{d(off)}			28	42	
Fall Time	t _f			9	18	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			30	A
Pulse Diode Forward Current ^a	I _{SM}				30	
Body Diode Voltage	V _{SD}	I _S = 3.5 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 3.5 A, dI/dt = 100 A/μs, T _J = 25 °C		87	131	ns
Body Diode Reverse Recovery Charge	Q _{rr}			300	450	nC
Reverse Recovery Fall Time	t _a			62		ns
Reverse Recovery Rise Time	t _b			25		

Notes:

a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

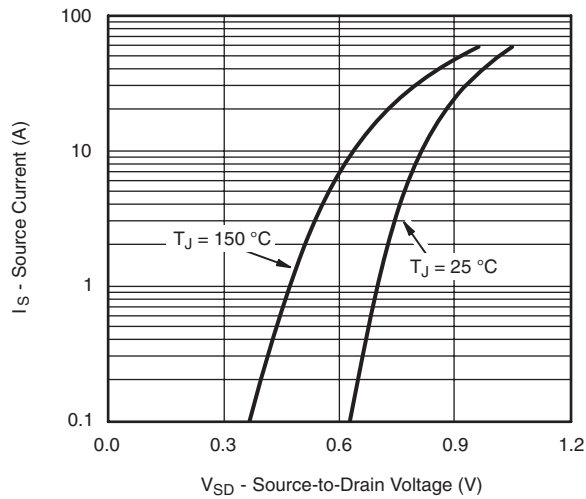
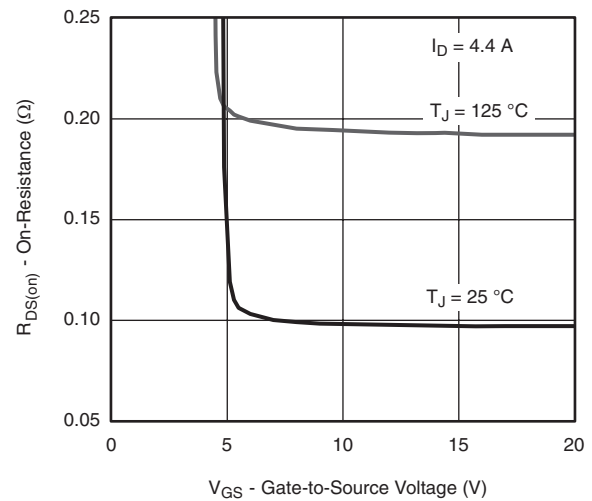
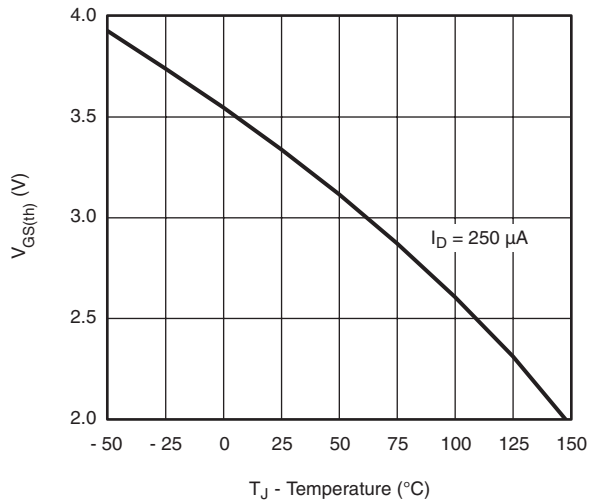
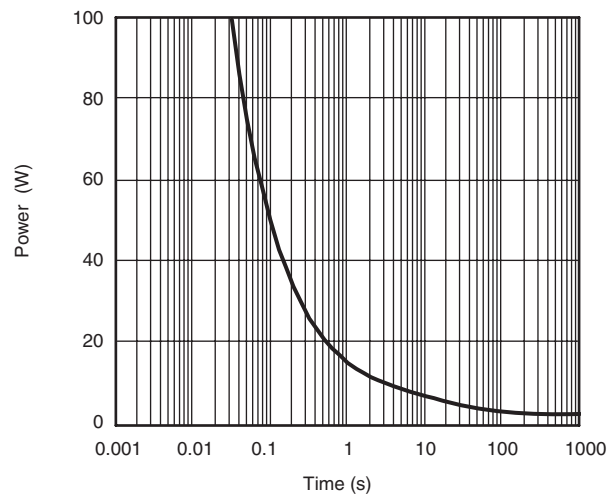
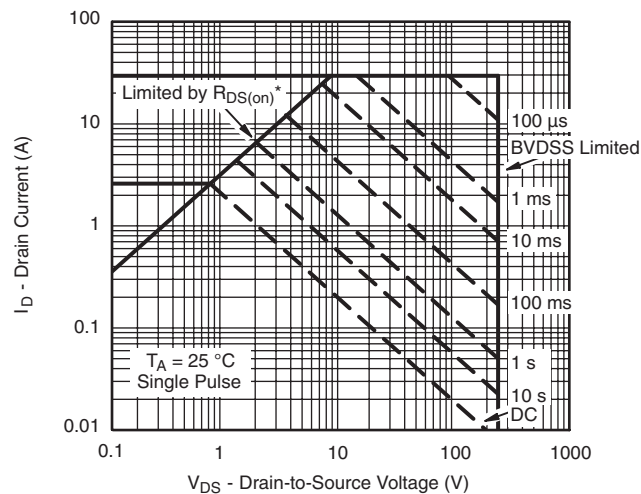
b. Guaranteed by design, not subject to production testing.

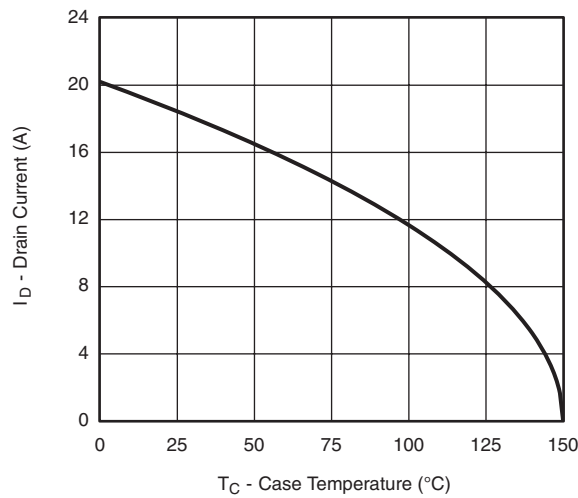
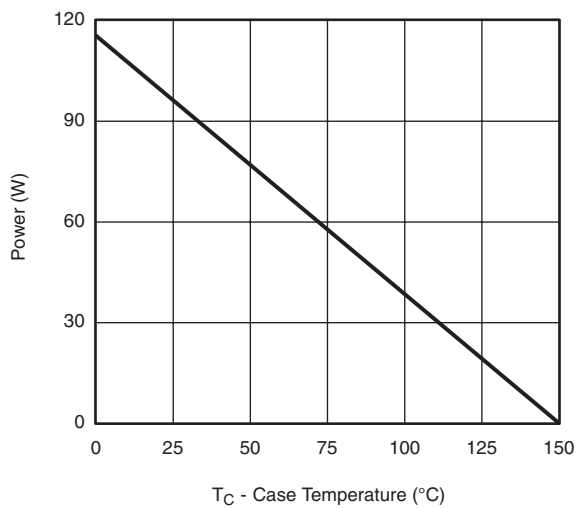
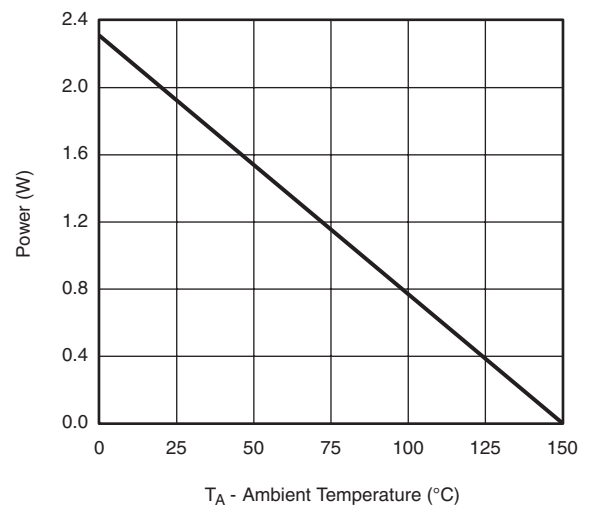
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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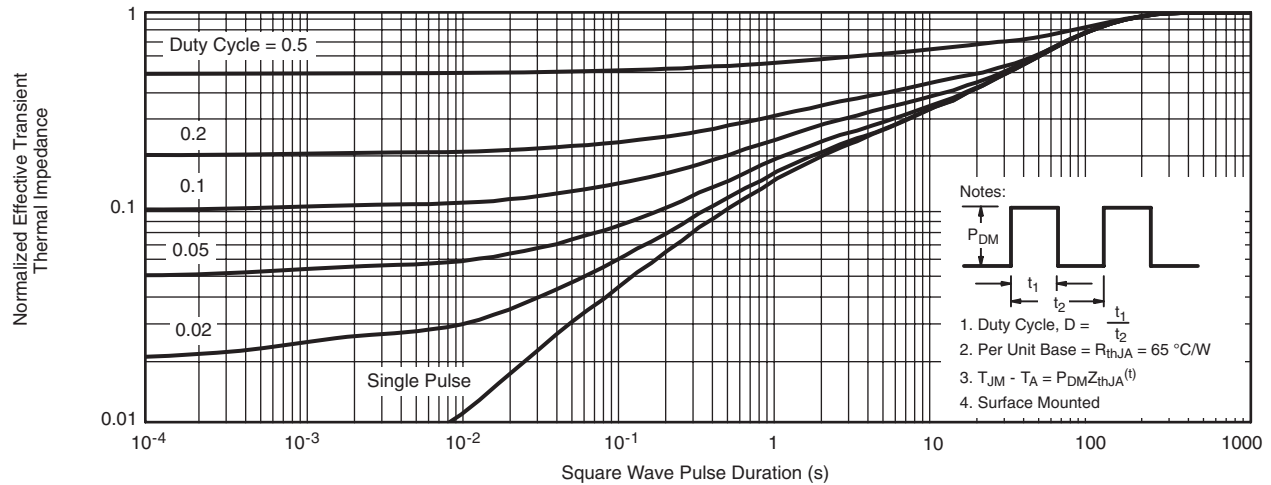
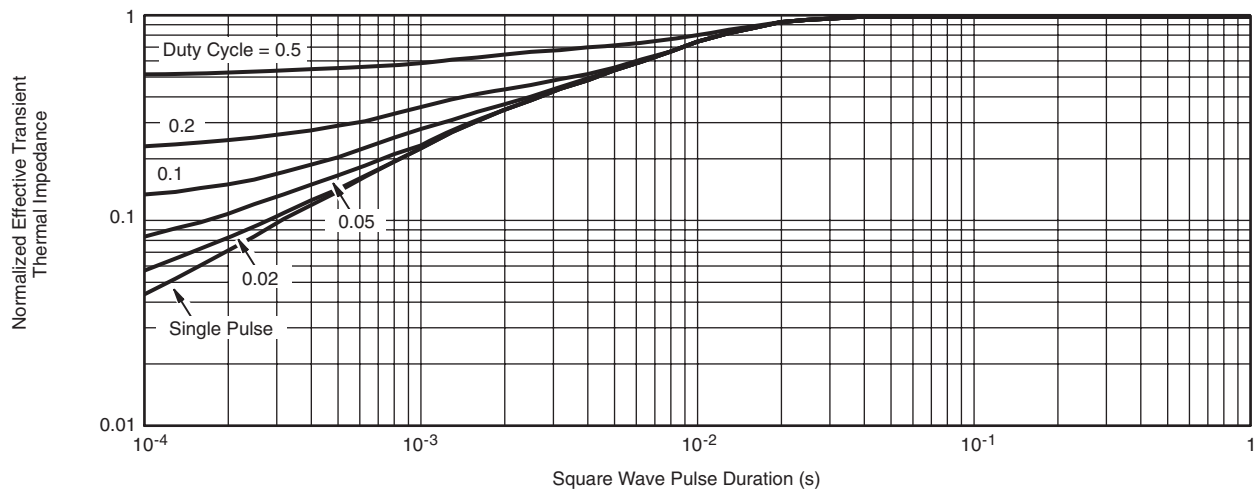
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**Source-Drain Diode Forward Voltage****On-Resistance vs. Gate-to-Source Voltage****Threshold Voltage****Single Pulse Power, Junction-to-Ambient*** $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified**Safe Operating Area, Junction-to-Ambient**


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

Current Derating*

Power, Junction-to-Case

Power, Junction-to-Ambient

* 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.

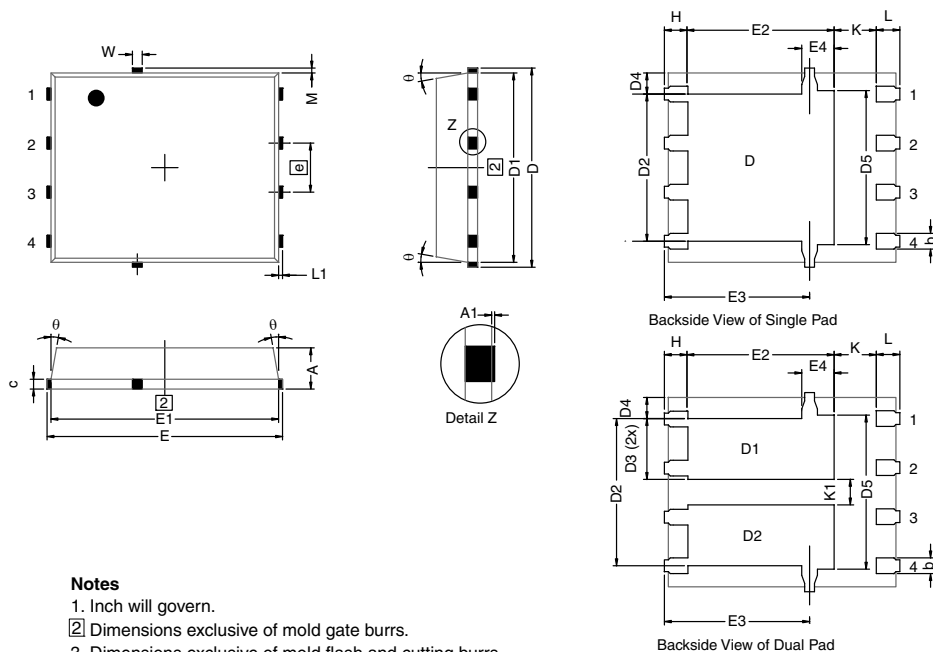
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**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted**Normalized Thermal Transient Impedance, Junction-to-Ambient****Normalized Thermal Transient Impedance, Junction-to-Case**

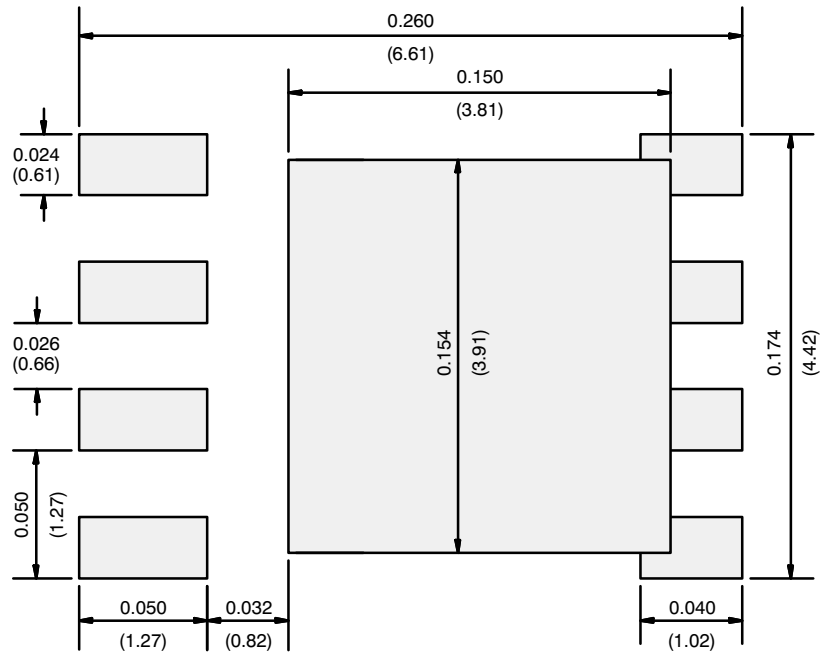
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PowerPAK® SO-8, (Single/Dual)



DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	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
c	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.		
e	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	-	-
H	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
M	0.125 typ.			0.005 typ.		
ECN: C13-0702-Rev. K, 20-May-13						
DWG: 5881						

RECOMMENDED MINIMUM PADS FOR PowerPAK® SO-8 Single



Recommended Minimum Pads
Dimensions in Inches/(mm)

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