Automotive N-Channel 100 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	100
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.0210
$R_{DS(on)}$ (Ω) at V_{GS} = 4.5 V	0.0258
I_D (A)	42
Configuration	Single

FEATURES

- TrenchFET® power MOSFET
- AEC-Q101 qualified [d]
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

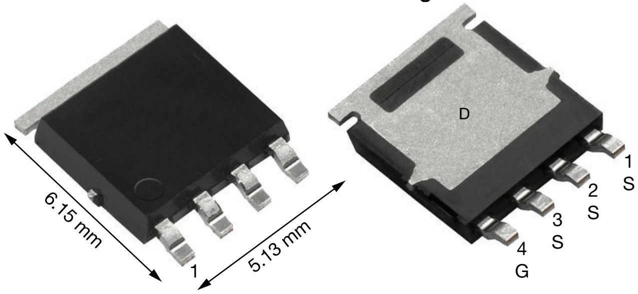
AUTOMOTIVE GRADE

Pb-free

RoHS COMPLIANT

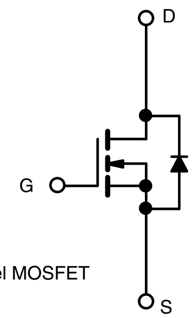
HALOGEN FREE

PowerPAK® SO-8L Single



Top View

Bottom View



N-Channel MOSFET

ORDERING INFORMATION

Package	PowerPAK SO-8L
Lead (Pb)-free and Halogen-free	SQJ488EP-T1-GE3

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

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	T_C = 25 °C [a]	I_D	42	A
	T_C = 125 °C		24	
Continuous Source Current (Diode Conduction) [a]		I_S	60	
Pulsed Drain Current [b]		I_{DM}	170	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	5.8	
Single Pulse Avalanche Energy		E_{AS}	1.68	mJ
Maximum Power Dissipation [b]	T_C = 25 °C	P_D	83	W
	T_C = 125 °C		27	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +175	°C
Soldering Recommendations (Peak Temperature) [e, f]			260	

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount [c]	R_{thJA}	65	°C/W
Junction-to-Case (Drain)		R_{thJC}	1.8	

Notes

a. Package limited.

b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

c. When mounted on 1" square PCB (FR-4 material).

d. Parametric verification ongoing.

e. See solder profile (www.vishay.com/doc?73257). The PowerPAK SO-8L 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.

f. Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.

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SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0, I_D = 250 μA		100	-	-	V
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA		1.5	2.0	2.5	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V	V_{DS} = 100 V	-	-	1	μA
		V_{GS} = 0 V	V_{DS} = 100 V, T_J = 125 °C	-	-	50	
		V_{GS} = 0 V	V_{DS} = 100 V, T_J = 175 °C	-	-	150	
On-State Drain Current [a]	$I_{D(on)}$	V_{GS} = 10 V	V_{DS} ≥ 5 V	30	-	-	A
Drain-Source On-State Resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 7.1 A	-	0.0176	0.0210	Ω
		V_{GS} = 4.5 V	I_D = 6.4 A	-	0.0215	0.0258	
		V_{GS} = 10 V	I_D = 7.1 A, T_J = 125 °C	-	-	0.0360	
		V_{GS} = 10 V	I_D = 7.1 A, T_J = 175 °C	-	-	0.0450	
Forward Transconductance [b]	g_{fs}	V_{DS} = 15 V, I_D = 7.1 A		-	28	-	S
Dynamic [b]							
Input Capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 50 V, f = 1 MHz	-	782	978	pF
Output Capacitance	C_{oss}			-	372	462	
Reverse Transfer Capacitance	C_{rss}			-	44	55	
Total Gate Charge [c]	Q_g	V_{GS} = 10 V	V_{DS} = 50 V, I_D = 15 A	-	18	27	nC
Gate-Source Charge	Q_{gs}			-	2	-	
Gate-Drain Charge [c]	Q_{gd}			-	4.7	-	
Gate Resistance	R_g	f = 1 MHz		1.1	2.2	3.3	Ω
Turn-On Delay Time [c]	$t_{d(on)}$	V_{DD} = 50 V, R_L = 5 Ω I_D ≅ 1 A, V_{GEN} = 10 V, R_g = 6 Ω		-	4	6	ns
Rise Time [c]	t_r			-	11	16	
Turn-Off Delay Time [c]	$t_{d(off)}$			-	20	30	
Fall Time [c]	t_f			-	4.6	7	
Source-Drain Diode Ratings and Characteristics [b]							
Pulsed Current [a]	I_{SM}			-	-	128	A
Forward Voltage	V_{SD}	I_F = 4.7 A, V_{GS} = 0		-	0.78	1.2	V

Notes

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

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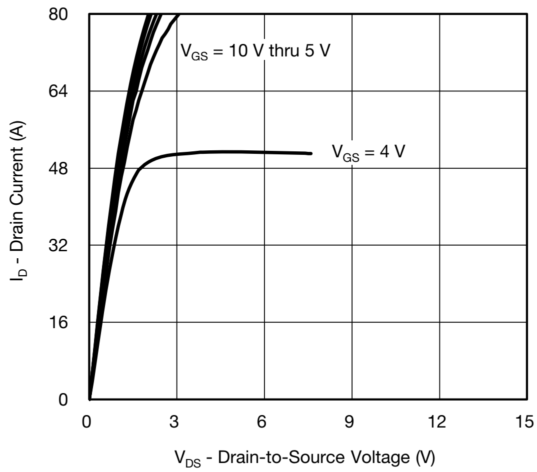
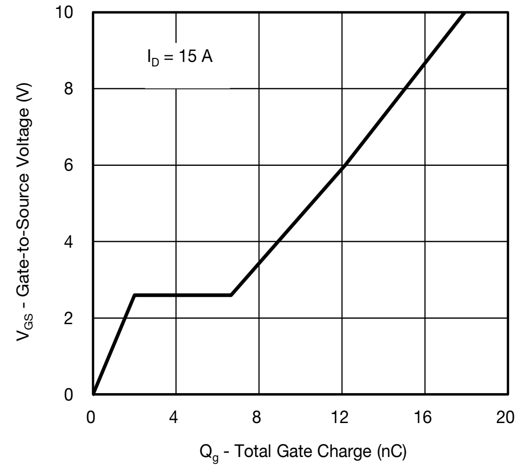
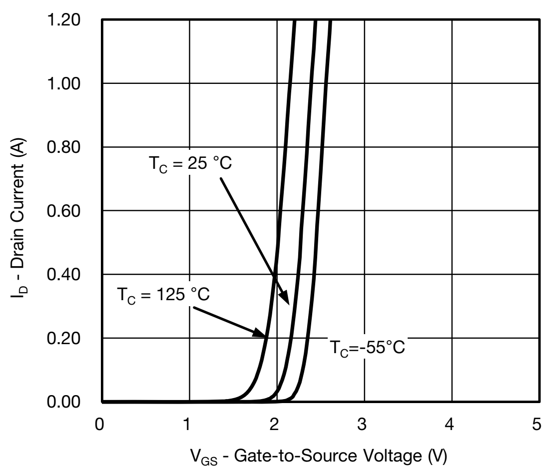
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



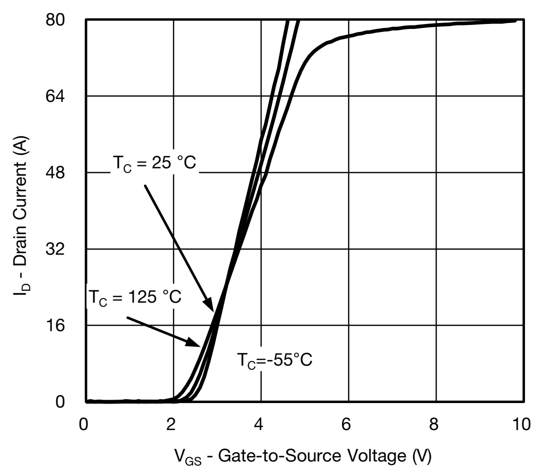
Output Characteristics



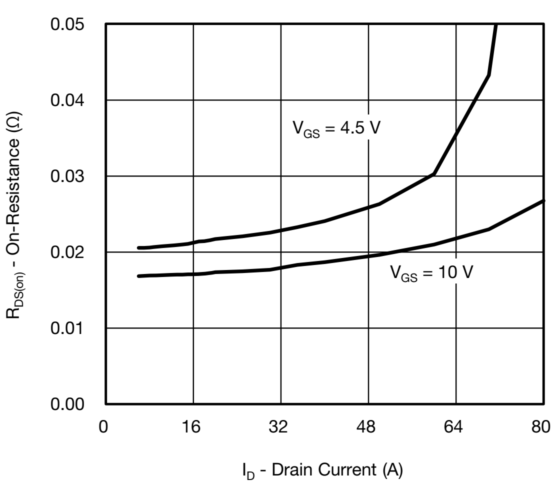
Gate Charge



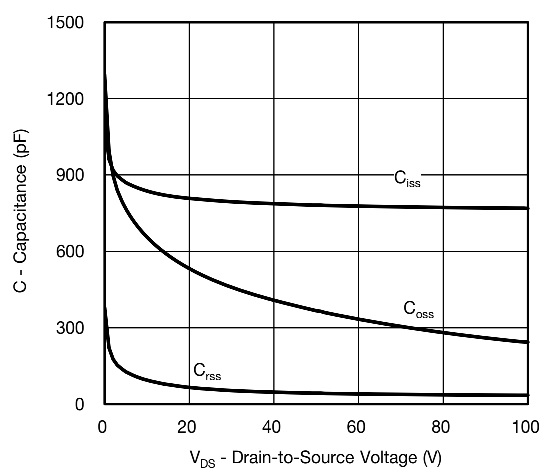
Transfer Characteristics



Transfer Characteristics



On-Resistance vs. Drain Current



Capacitance

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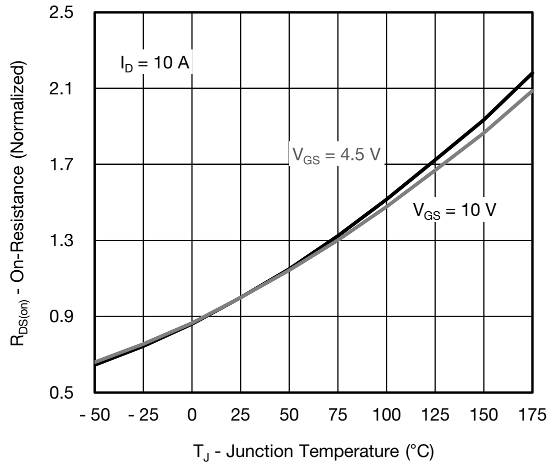
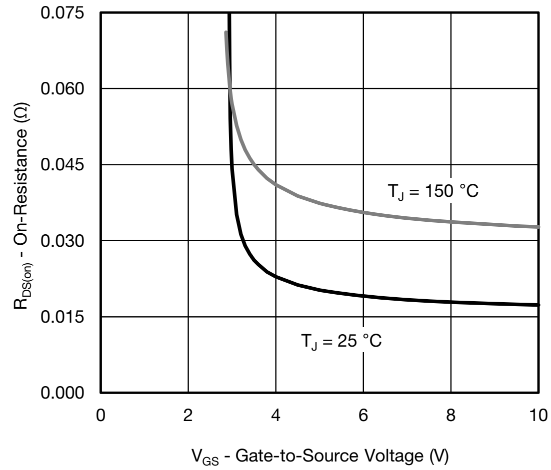
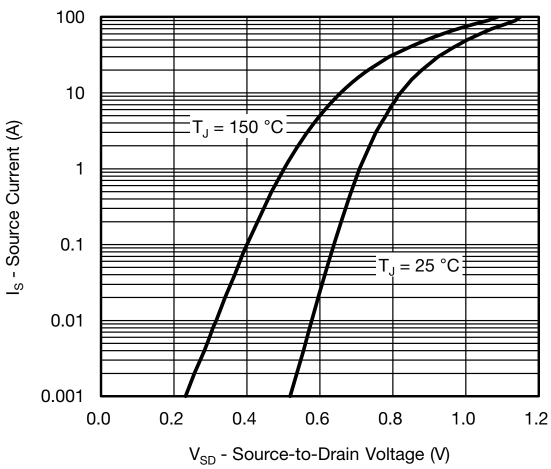


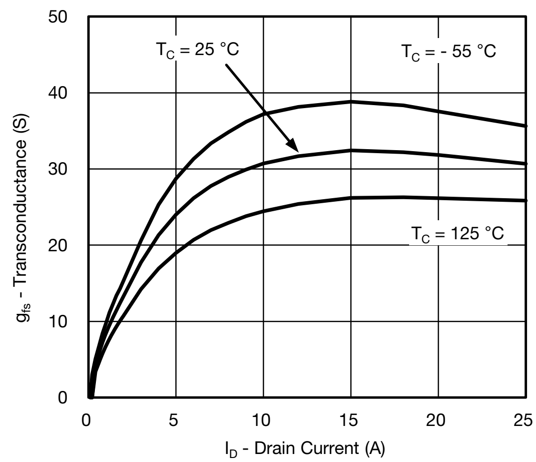
On-Resistance vs. Junction Temperature



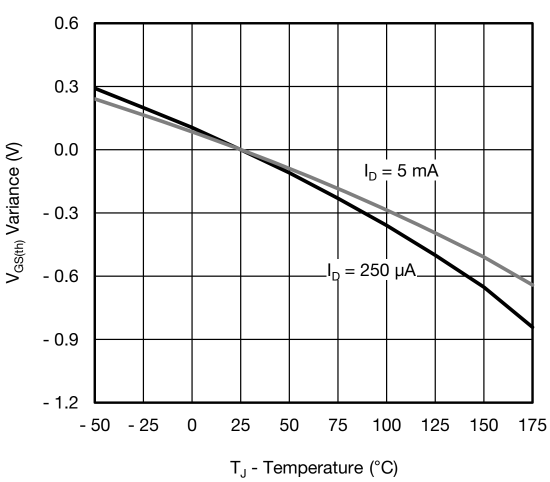
On-Resistance vs. Gate-to Source Voltage



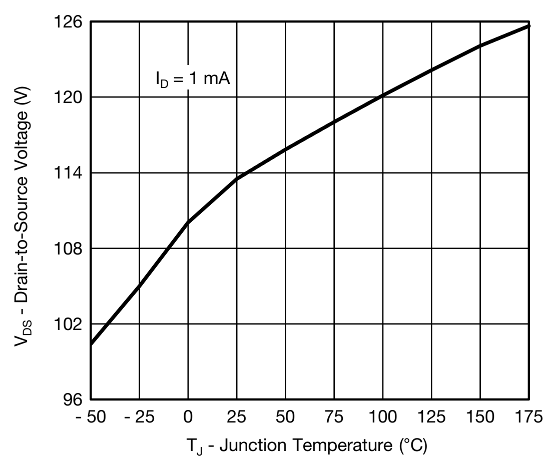
Source Drain Diode Forward Voltage



Transconductance



Threshold Voltage



Drain Source Breakdown vs. Junction Temperature

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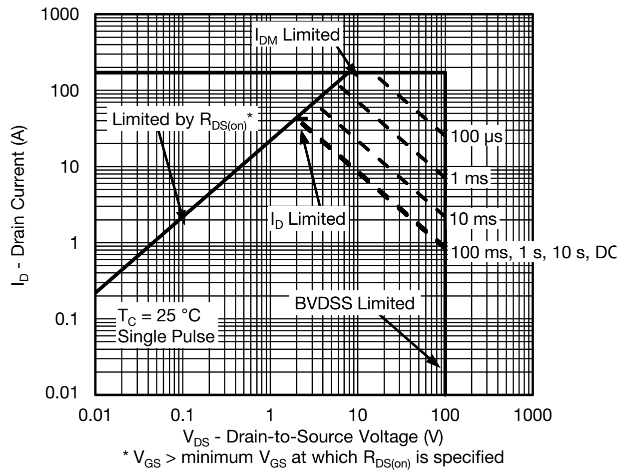
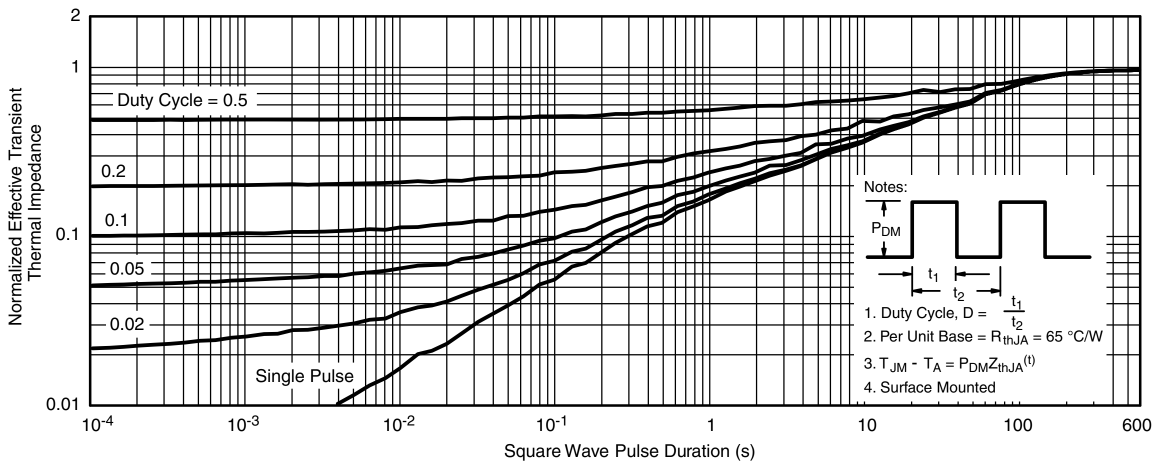


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

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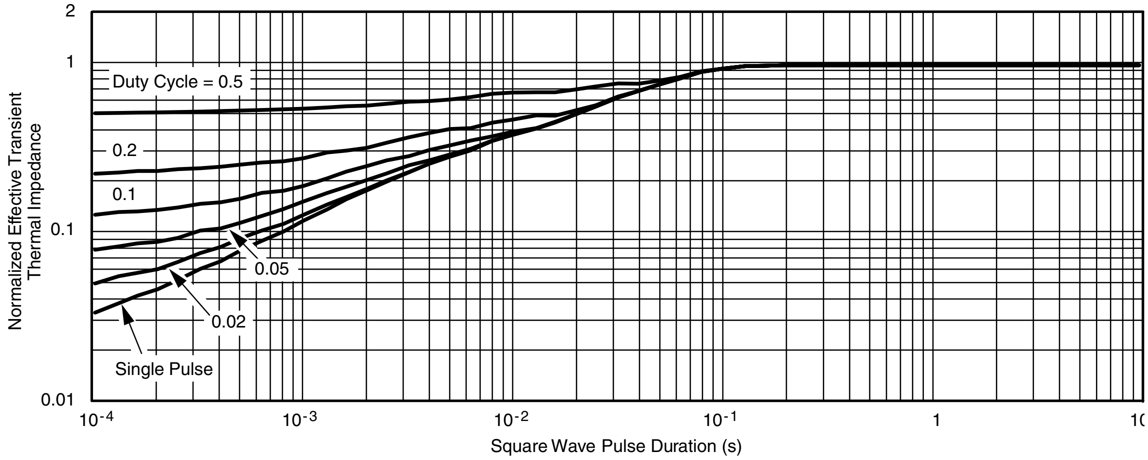

Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction-to-Case (25 °C)

  are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

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PowerPAK® SO-8L

Ordering codes for the SQ rugged series power MOSFETs in the PowerPAK SO-8L package:

DATASHEET PART NUMBER	OLD ORDERING CODE [a]	NEW ORDERING CODE
SQJ200EP	-	**SQJ200EP-T1_GE3**
SQJ202EP	-	**SQJ202EP-T1_GE3**
SQJ401EP	SQJ401EP-T1-GE3	**SQJ401EP-T1_GE3**
SQJ402EP	SQJ402EP-T1-GE3	**SQJ402EP-T1_GE3**
SQJ403EEP	SQJ403EEP-T1-GE3	**SQJ403EEP-T1_GE3**
SQJ403EP	-	**SQJ403EP-T1_GE3**
SQJ410EP	SQJ410EP-T1-GE3	**SQJ410EP-T1_GE3**
SQJ412EP	SQJ412EP-T1-GE3	**SQJ412EP-T1_GE3**
SQJ416EP	-	**SQJ416EP-T1_GE3**
SQJ418EP	-	**SQJ418EP-T1_GE3**
SQJ422EP	SQJ422EP-T1-GE3	**SQJ422EP-T1_GE3**
SQJ423EP	-	**SQJ423EP-T1_GE3**
SQJ431EP	SQJ431EP-T1-GE3	**SQJ431EP-T1_GE3**
SQJ443EP	SQJ443EP-T1-GE3	**SQJ443EP-T1_GE3**
SQJ444EP	-	**SQJ444EP-T1_GE3**
SQJ446EP	-	**SQJ446EP-T1_GE3**
SQJ456EP	SQJ456EP-T1-GE3	**SQJ456EP-T1_GE3**
SQJ457EP	-	**SQJ457EP-T1_GE3**
SQJ459EP	-	**SQJ459EP-T1_GE3**
SQJ460AEP	-	**SQJ460AEP-T1_GE3**
SQJ461EP	SQJ461EP-T1-GE3	**SQJ461EP-T1_GE3**
SQJ463EP	SQJ463EP-T1-GE3	**SQJ463EP-T1_GE3**
SQJ465EP	SQJ465EP-T1-GE3	**SQJ465EP-T1_GE3**
SQJ469EP	SQJ469EP-T1-GE3	**SQJ469EP-T1_GE3**
SQJ474EP	-	**SQJ474EP-T1_GE3**
SQJ476EP	-	**SQJ476EP-T1_GE3**
SQJ479EP	-	**SQJ479EP-T1_GE3**
SQJ486EP	SQJ486EP-T1-GE3	**SQJ486EP-T1_GE3**
SQJ488EP	SQJ488EP-T1-GE3	**SQJ488EP-T1_GE3**
SQJ500AEP	SQJ500AEP-T1-GE3	**SQJ500AEP-T1_GE3**
SQJ840EP	SQJ840EP-T1-GE3	**SQJ840EP-T1_GE3**
SQJ844AEP	SQJ844AEP-T1-GE3	**SQJ844AEP-T1_GE3**
SQJ850EP	SQJ850EP-T1-GE3	**SQJ850EP-T1_GE3**
SQJ858AEP	SQJ858AEP-T1-GE3	**SQJ858AEP-T1_GE3**
SQJ868EP	-	**SQJ868EP-T1_GE3**
SQJ886EP	SQJ886EP-T1-GE3	**SQJ886EP-T1_GE3**
SQJ910AEP	SQJ910AEP-T1-GE3	**SQJ910AEP-T1_GE3**
SQJ912AEP	SQJ912AEP-T1-GE3	**SQJ912AEP-T1_GE3**
SQJ940EP	SQJ940EP-T1-GE3	**SQJ940EP-T1_GE3**
SQJ942EP	SQJ942EP-T1-GE3	**SQJ942EP-T1_GE3**
SQJ951EP	SQJ951EP-T1-GE3	**SQJ951EP-T1_GE3**
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SQJ956EP	SQJ956EP-T1-GE3	**SQJ956EP-T1_GE3**
SQJ960EP	SQJ960EP-T1-GE3	**SQJ960EP-T1_GE3**
SQJ963EP	SQJ963EP-T1-GE3	**SQJ963EP-T1_GE3**
SQJ968EP	SQJ968EP-T1-GE3	**SQJ968EP-T1_GE3**
SQJ980AEP	SQJ980AEP-T1-GE3	**SQJ980AEP-T1_GE3**
SQJ992EP	SQJ992EP-T1-GE3	**SQJ992EP-T1_GE3**

Note

a. Old ordering code is obsolete and no longer valid for new orders

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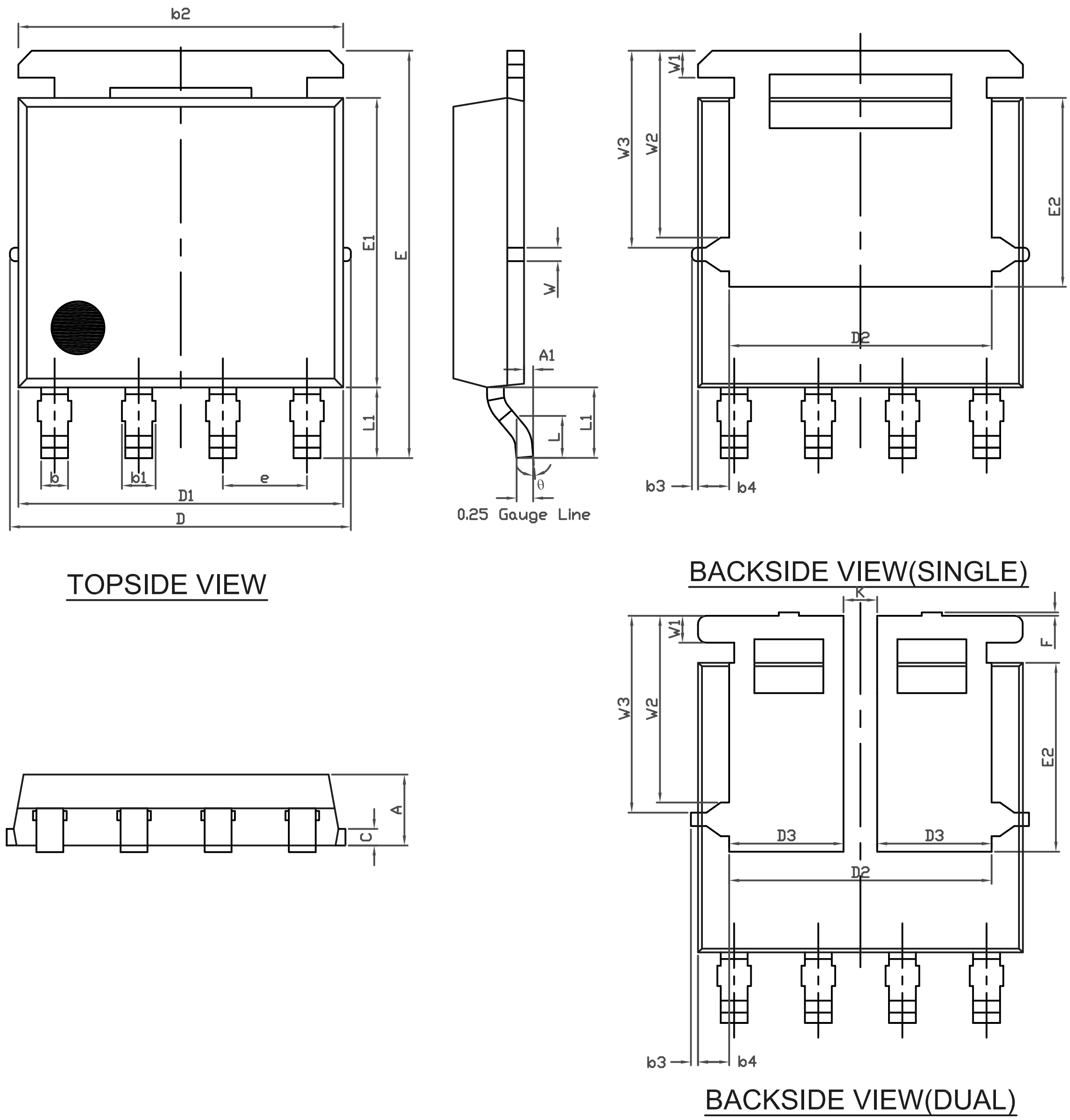
PowerPAK® SO-8L Case Outline for all Parts



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DIM.	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.00	1.07	1.14	0.039	0.042	0.045
A1	0.00	-	0.127	0.00	-	0.005
b	0.33	0.41	0.48	0.013	0.016	0.019
b1	0.44	0.51	0.58	0.017	0.020	0.023
b2	4.80	4.90	5.00	0.189	0.193	0.197
b3	0.094			0.004		
b4	0.47			0.019		
c	0.20	0.25	0.30	0.008	0.010	0.012
D	5.00	5.13	5.25	0.197	0.202	0.207
D1	4.80	4.90	5.00	0.189	0.193	0.197
D2	3.86	3.96	4.06	0.152	0.156	0.160
D3	1.63	1.73	1.83	0.064	0.068	0.072
e	1.27 BSC			0.050 BSC		
E	6.05	6.15	6.25	0.238	0.242	0.246
E1	4.27	4.37	4.47	0.168	0.172	0.176
E2	2.75	2.85	2.95	0.108	0.112	0.116
F	-	-	0.15	-	-	0.006
L	0.62	0.72	0.82	0.024	0.028	0.032
L1	0.92	1.07	1.22	0.036	0.042	0.048
K	0.51			0.020		
W	0.23			0.009		
W1	0.41			0.016		
W2	2.82			0.111		
W3	2.96			0.117		
q	0°	-	10°	0°	-	10°
ECN: C15-1203-Rev. A, 07-Sep-15 DWG: 6044						

Note

- Millimeters will gover

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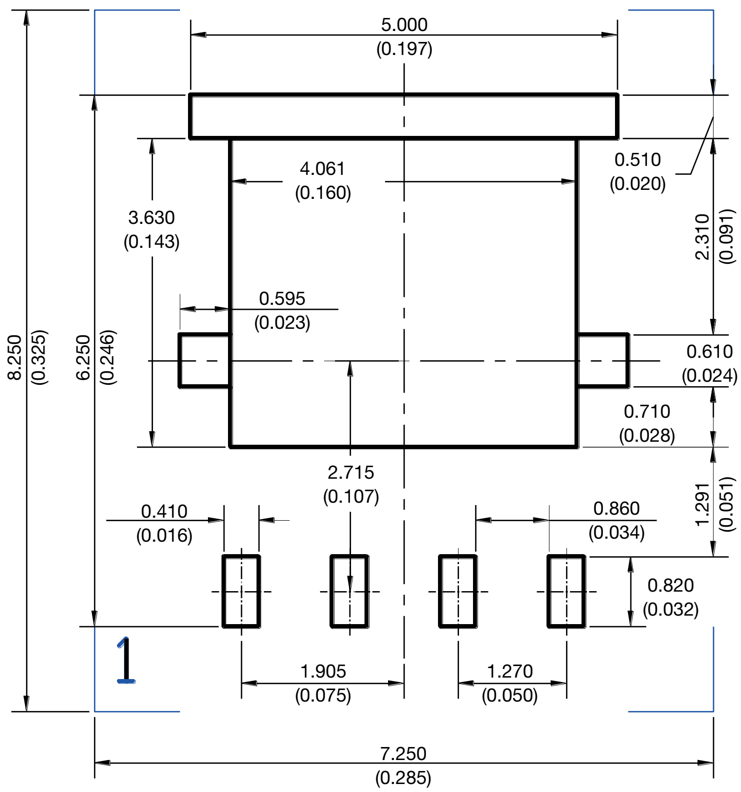
RECOMMENDED MINIMUM PAD FOR PowerPAK® SO-8L SINGLE



Recommended Minimum Pads
Dimensions in mm (inches)

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