

# Automotive Dual P-Channel 60 V (D-S) 175 °C MOSFET

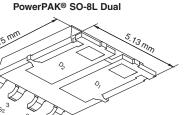
PRODUCT SUMMARY	
V <sub>DS</sub> (V)	- 60
$R_{DS(on)}(\Omega)$ at $V_{GS} = -10 \text{ V}$	0.085
$R_{DS(on)}(\Omega)$ at $V_{GS} = -4.5 \text{ V}$	0.115
I <sub>D</sub> (A) per leg	- 8
Configuration	Dual

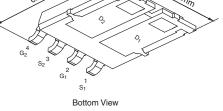
#### **FEATURES**

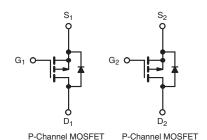
- Halogen-free According to IEC 61249-2-21 **Definition**
- TrenchFET® Power MOSFET
- AEC-Q101 Qualified<sup>d</sup>
- 100 % R<sub>g</sub> and UIS Tested
- Compliant to RoHS Directive 2002/95/EC











ORDERING INFORMATION	
Package	PowerPAK SO-8L
Lead (Pb)-free and Halogen-free	SQJ963EP-T1-GE3

ABSOLUTE MAXIMUM RATING	<b>S</b> ( $T_C = 25$ °C, unles	s otherwise noted	d)	
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V <sub>DS</sub>	- 60	V
Gate-Source Voltage		V <sub>GS</sub>	± 20	V
Continuos Dunio Comment	T <sub>C</sub> = 25 °C <sup>a</sup>		- 8	
Continuous Drain Current	T <sub>C</sub> = 125 °C	I <sub>D</sub>	- 7	
Continuous Source Current (Diode Conduc	tion) <sup>a</sup>	I <sub>S</sub>	- 8	Α
Pulsed Drain Current <sup>b</sup>		I <sub>DM</sub>	- 25	
Single Pulse Avalanche Current	1 0111	I <sub>AS</sub>	- 20	
Single Pulse Avalanche Energy	L = 0.1 mH	E <sub>AS</sub>	20	mJ
Maximum Bayyar Dissinationb	T <sub>C</sub> = 25 °C	D	27	10/
Maximum Power Dissipation <sup>b</sup>	T <sub>C</sub> = 125 °C	$P_{D}$	9	W
Operating Junction and Storage Temperatu	ire Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to + 175	°C
Soldering Recommendations (Peak Temperature) <sup>e, f</sup>			260	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		SYMBOL	LIMIT	UNIT
Junction-to-Ambient	PCB Mount <sup>c</sup>	R <sub>thJA</sub>	85	°C/W
Junction-to-Case (Drain)		$R_{thJC}$	5.5	C/VV

### **Notes**

- a. Package limited.
- b. Pulse test; pulse width  $\leq$  300 µs, duty cycle  $\leq$  2 %.
- c. When mounted on 1" square PCB (FR4 material).
- d. Parametric verification ongoing.
- e. See solder profile (www.vishav.com/doc?73257). The PowerPAK SO-8L. 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.



PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT	
Static		-						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> =	$V_{GS} = 0 \text{ V}, I_D = -250 \mu\text{A}$		-	-	V	
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =	V <sub>GS</sub> , I <sub>D</sub> = - 250 μA	- 1.5	- 2.0	- 2.5	1 '	
Gate-Source Leakage	I <sub>GSS</sub>	V <sub>DS</sub> =	$0 \text{ V}, \text{ V}_{GS} = \pm 20 \text{ V}$	-	-	± 100	nA	
		$V_{GS} = 0 V$	V <sub>DS</sub> = - 60 V	-	-	- 1		
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = - 60 V, T <sub>J</sub> = 125 °C	-	-	- 50	μΑ	
		V <sub>GS</sub> = 0 V	V <sub>DS</sub> = - 60 V, T <sub>J</sub> = 175 °C	-	-	- 150	•	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>GS</sub> = - 10 V	V <sub>DS</sub> ≤ - 5 V	- 12	-	-	Α	
		V <sub>GS</sub> = - 10 V	I <sub>D</sub> = - 3.5 A	-	0.067	0.085	Ω	
Dunin Course On Otata Basistanas		V <sub>GS</sub> = - 10 V	I <sub>D</sub> = - 3.5 A, T <sub>J</sub> = 125 °C	-	-	0.143		
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 10 V	I <sub>D</sub> = - 3.5 A, T <sub>J</sub> = 175 °C	-	-	0.176		
		V <sub>GS</sub> = - 4.5 V	I <sub>D</sub> = - 2.5 A	-	0.087	0.115		
Forward Transconductanceb	9 <sub>fs</sub>	V <sub>DS</sub> = - 15 V, I <sub>D</sub> = - 3.5 A		-	10	-	S	
Dynamic <sup>b</sup>	1				·	ı		
Input Capacitance	C <sub>iss</sub>			-	912	1140		
Output Capacitance	C <sub>oss</sub>	$V_{GS} = 0 V$	V DS = - 30 V, f = 1 MHz	-	100	125	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>			-	60	75		
Total Gate Charge <sup>c</sup>	Qg			-	26.5	40		
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>	V <sub>GS</sub> = - 10 V	V <sub>DS</sub> = - 30 V, I <sub>D</sub> = - 4.3 A	-	3.8	-	nC	
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>	1		-	5.8	-		
Gate Resistance	R <sub>g</sub>	f = 1 MHz		3.4	6.9	10.4	Ω	
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>				11	17	ns	
Rise Time <sup>c</sup>	t <sub>r</sub>	$V_{DD} = \text{-} 30 \text{ V},  R_L = 8.8  \Omega$ $I_D \cong \text{-} 3.4 \text{ A},  V_{GEN} = \text{-} 10 \text{ V},  R_g = 1  \Omega$		-	13	20		
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			-	36	54		
Fall Time <sup>c</sup>	t <sub>f</sub>			-	8	12		
Source-Drain Diode Ratings and Chara	acteristics <sup>b</sup>					<u> </u>		
Pulsed Current <sup>a</sup>	I <sub>SM</sub>			-	-	- 25	Α	
	+	I <sub>F</sub> = - 3 A, V <sub>GS</sub> = 0 V				ļ		

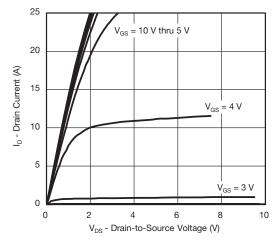
#### Notes

- a. Pulse test; pulse width  $\leq 300~\mu s,~duty~cycle \leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

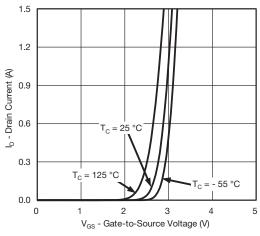
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



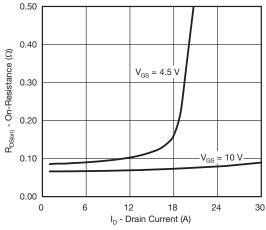
### **TYPICAL CHARACTERISTICS** (T<sub>A</sub> = 25 °C, unless otherwise noted)



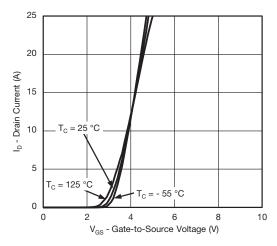
### **Output Characteristics**



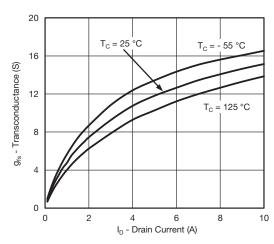
#### **Transfer Characteristics**



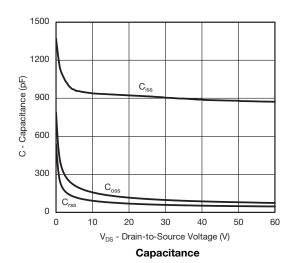
On-Resistance vs. Drain Current



**Transfer Characteristics** 

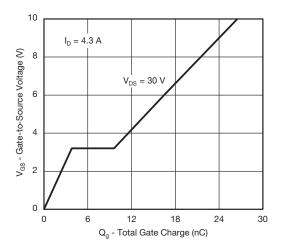


Transconductance

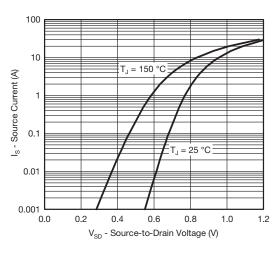




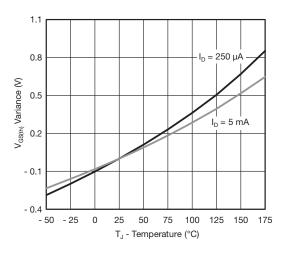
### **TYPICAL CHARACTERISTICS** (T<sub>A</sub> = 25 °C, unless otherwise noted)



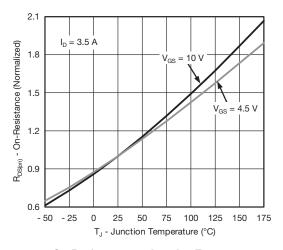
### **Gate Charge**



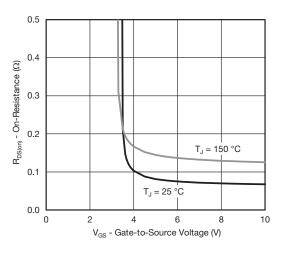
**Source Drain Diode Forward Voltage** 



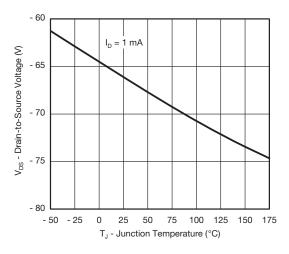
**Threshold Voltage** 



On-Resistance vs. Junction Temperature



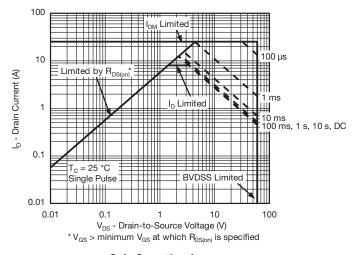
On-Resistance vs. Gate-to-Source Voltage



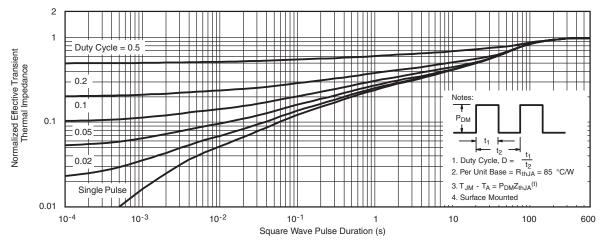
**Drain Source Breakdown vs. Junction Temperature** 



## **THERMAL RATINGS** ( $T_A = 25$ °C, unless otherwise noted)

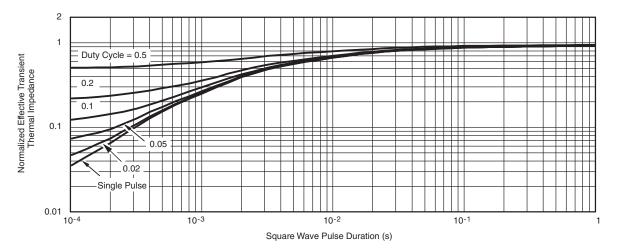


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

### THERMAL RATINGS (T<sub>A</sub> = 25 °C, unless otherwise noted)



#### 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.

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 <a href="https://www.vishay.com/ppg?67581">www.vishay.com/ppg?67581</a>.



# PowerPAK® SO-8L

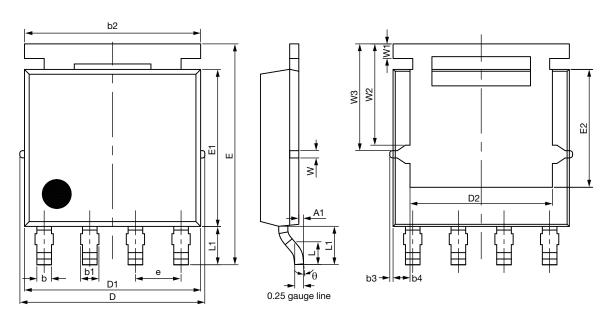
Ordering codes for the SQ rugged series power MOSFETs in the PowerPAK SO-8L package:

SQJ200EP   SQJ200EPTIGE3     SQJ202EPTIGE3   SQJ202EPTIGE3     SQJ401EP   SQJ401EPTIGE3     SQJ402EPTIGE3   SQJ402EPTIGE3     SQJ402EPTIGE3   SQJ403EEPTIGE3     SQJ403EEPTIGE3   SQJ403EEPTIGE3     SQJ403EPTIGE3   SQJ403EPTIGE3     SQJ410EP   SQJ410EPTIGE3     SQJ410EPTIGE3   SQJ412EPTIGE3     SQJ412EP   SQJ412EPTIGE3     SQJ412EPTIGE3   SQJ412EPTIGE3     SQJ43EPTIGE3   SQJ43EPTIGE3     SQJ43EPTIGE3   SQJ43EPTIGE3     SQJ43EPTIGE3   SQJ43EPTIGE3     SQJ43EPTIGE3   SQJ43EPTIGE3     SQJ43EPTIGE3   SQJ43EPTIGE3     SQJ43EPTIGE3   SQJ43EPTIGE3     SQJ44SEP   SQJ45EPTIGE3     SQJ44SEPTIGE3   SQJ44SEPTIGE3     SQJ44SEPTIGE3   SQJ44SEPTIGE3     SQJ44SEPTIGE3   SQJ44SEPTIGE3     SQJ44SEPTIGE3   SQJ44SEPTIGE3     SQJ46GEP   SQJ46GEPTIGE3     SQJ46GEPTIGE3   SQJ46GEPTIGE3     SQJ46GEPTIGE3   SQJ46GEPTIGE3     SQJ46GEPTIGE3   SQJ46GE	DATASHEET PART NUMBER	OLD ORDERING CODE a	NEW ORDERING CODE
SOJ401EP   SOJ401EP-T1-GE3   SOJ402EP-T1-GE3     SOJ402EP   SOJ402EP-T1-GE3   SOJ402EP-T1-GE3     SOJ403EEP   SOJ403EEP-T1-GE3   SOJ403EEP-T1-GE3     SOJ403EP   -   SOJ403EP-T1-GE3     SOJ40EP   SOJ40EP-T1-GE3   SOJ40EP-T1-GE3     SOJ410EP   SOJ412EP-T1-GE3   SOJ412EP-T1-GE3     SOJ42EP-T1-GE3   SOJ42EP-T1-GE3   SOJ42EP-T1-GE3     SOJ43EP   SOJ43EP-T1-GE3   SOJ43EP-T1-GE3     SOJ43EP   SOJ43EP-T1-GE3   SOJ43EP-T1-GE3     SOJ43EP-T1-GE3   SOJ43EP-T1-GE3   SOJ43EP-T1-GE3     SOJ44GEP   -   SOJ45GP-T1-GE3     SOJ45GEP   SOJ45GP-T1-GE3   SOJ45GP-T1-GE3     SOJ46GEP   -   SOJ45GP-T1-GE3     SOJ46GEP   SOJ46GP-T1-GE3   SOJ46GP-T1-GE3     SOJ46GEP-T1-GE3   SOJ46GP-T1-GE3   SOJ46GP-T1-GE3	SQJ200EP	-	SQJ200EP-T1_GE3
SQJ402EP   SQJ403EP-TI-GE3   SQJ403EP-TI-GE3     SQJ403EP-TI-GE3   SQJ403EP-TI-GE3   SQJ403EP-TI-GE3     SQJ403EP   -   SQJ403EP-TI-GE3     SQJ410EP   SQJ410EP-TI-GE3   SQJ410EP-TI-GE3     SQJ412EP   SQJ412EP-TI-GE3   SQJ412EP-TI-GE3     SQJ43EP   SQJ43EP-TI-GE3   SQJ43EP-TI-GE3     SQJ43EP   SQJ43EP-TI-GE3   SQJ43EP-TI-GE3     SQJ43EP   SQJ43EP-TI-GE3   SQJ43EP-TI-GE3     SQJ43EP   SQJ45EP-TI-GE3   SQJ43EP-TI-GE3     SQJ45EP-TI-GE3   SQJ45EP-TI-GE3   SQJ45EP-TI-GE3     SQJ45EP-TI-GE3   SQJ45EP-TI-GE3   SQJ45EP-TI-GE3     SQJ45EP-TI-GE3   SQJ45EP-TI-GE3   SQJ45EP-TI-GE3     SQJ46GEP-TI-GE3   SQJ46GEP-TI-GE3   SQJ46GEP-TI-GE3     SQJ46GEP   SQJ46GEP-TI-GE3   SQJ46GEP-TI-GE3     SQJ46GEP-TI-GE3	SQJ202EP	-	SQJ202EP-T1_GE3
SQJ403EEP   SQJ403EPT-TI-GE3   SQJ403EP-TI-GE3     SQJ403EP   SQJ403EP-TI-GE3   SQJ405EP-TI-GE3     SQJ410EP   SQJ410EP-TI-GE3   SQJ412EP-TI-GE3     SQJ412EP   SQJ412EP-TI-GE3   SQJ412EP-TI-GE3     SQJ431EP   SQJ431EP-TI-GE3   SQJ431EP-TI-GE3     SQJ431EP   SQJ431EP-TI-GE3   SQJ431EP-TI-GE3     SQJ443EP-TI-GE3   SQJ443EP-TI-GE3   SQJ443EP-TI-GE3     SQJ443EP-TI-GE3   SQJ446EP-TI-GE3   SQJ446EP-TI-GE3     SQJ45GEP   SQJ45GEP-TI-GE3   SQJ45GEP-TI-GE3     SQJ45GEP   SQJ45GEP-TI-GE3   SQJ46GEP-TI-GE3     SQJ46GEP-TI-GE3   SQJ46GEP-TI-GE3   SQJ46	SQJ401EP	SQJ401EP-T1-GE3	SQJ401EP-T1_GE3
SQJ403EP   SQJ410EP   SQJ410EPT1-GE3   SQJ410EPT1_GE3     SQJ412EP   SQJ412EPT1-GE3   SQJ412EPT1_GE3   SQJ412EPT1_GE3     SQJ42EP   SQJ42EPT1-GE3   SQJ42EPT1_GE3   SQJ43EPT1_GE3     SQJ43EP   SQJ43EPT1_GE3   SQJ43EPT1_GE3   SQJ43EPT1_GE3     SQJ443EP   SQJ443EPT1_GE3   SQJ443EPT1_GE3   SQJ443EPT1_GE3     SQJ446EP   SQJ456EPT1_GE3   SQJ45EPT1_GE3   SQJ45EPT1_GE3     SQJ456EP   SQJ456EPT1_GE3   SQJ45EPT1_GE3   SQJ45EPT1_GE3     SQJ460AEP   SQJ46EPT1_GE3   SQJ46EPT1_GE3   SQJ46EPT1_GE3     SQJ461EP   SQJ46EPT1_GE3   SQJ46EPT1_GE3   SQJ46EPT1_GE3     SQJ463EP   SQJ46SEPT1_GE3   SQJ46SEPT1_GE3   SQJ46SEPT1_GE3     SQJ46SEP   SQJ46SEPT1_GE3   SQJ46SEPT1_GE3   SQJ46SEPT1_GE3     SQJ46SEP   SQJ46SEPT1_GE3   SQJ46SEPT1_GE3   SQJ46SEPT1_GE3     SQJ48SEP   SQJ48SEPT1_GE3   SQJ48SEPT1_GE3   SQJ48SEPT1_GE3     SQJ48SEP   SQJ48SEPT1_GE3   SQJ48SEPT1_GE3   SQJ48SEPT1_GE3     SQJ44EPT1_GE3   SQJ48SEPT1_GE3   SQJ48GEPT	SQJ402EP	SQJ402EP-T1-GE3	SQJ402EP-T1_GE3
SQJ410EP   SQJ410EP-T1-GE3   SQJ410EP-T1-GE3     SQJ412EP   SQJ412EP-T1-GE3   SQJ412EP-T1-GE3     SQJ422EP   SQJ422EP-T1-GE3   SQJ422EP-T1-GE3     SQJ431EP   SQJ431EP-T1-GE3   SQJ431EP-T1-GE3     SQJ445EP   SQJ443EP-T1-GE3   SQJ443EP-T1-GE3     SQJ446EP   -   SQJ446EP-T1-GE3     SQJ456EP   SQJ456EP-T1-GE3   SQJ456EP-T1-GE3     SQJ456EP   -   SQJ456EP-T1-GE3     SQJ456EP   -   SQJ466EP-T1-GE3     SQJ461EP   -   SQJ461EP-T1-GE3     SQJ461EP   -   SQJ461EP-T1-GE3     SQJ463EP   -   SQJ463EP-T1-GE3     SQJ463EP   -   SQJ463EP-T1-GE3     SQJ465EP   SQJ465EP-T1-GE3   SQJ465EP-T1-GE3     SQJ466EP   SQJ466EP-T1-GE3   SQJ466EP-T1-GE3     SQJ486EP   SQJ486EP-T1-GE3   SQJ486EP-T1-GE3     SQJ486EP   SQJ486EP-T1-GE3   SQJ486EP-T1-GE3     SQJ486EP   SQJ486EP-T1-GE3   SQJ486EP-T1-GE3     SQJ484EP-T1-GE3   SQJ484EP-T1-GE3   SQJ484EP-T1-GE3     SQJ80	SQJ403EEP	SQJ403EEP-T1-GE3	SQJ403EEP-T1_GE3
SQJ412EP   SQJ412EP-T1-GE3   SQJ422EP-T1-GE3     SQJ422EP   SQJ422EP-T1-GE3   SQJ422EP-T1-GE3     SQJ431EP   SQJ431EP-T1-GE3   SQJ432EP-T1-GE3     SQJ443EP   SQJ443EP-T1-GE3   SQJ443EP-T1-GE3     SQJ443EP   SQJ45GEP   SQJ44GEP-T1-GE3     SQJ45GEP   SQJ45GEP-T1-GE3   SQJ45GEP-T1-GE3     SQJ45GEP   SQJ45GEP-T1-GE3   SQJ46GEP-T1-GE3     SQJ46GAEP   SQJ46GEP-T1-GE3   SQJ46GEP-T1-GE3     SQJ46GEP   SQJ46GEP-T1-GE3   SQJ46GEP-T1-GE3     SQJ48GEP   SQJ48GEP-T1-GE3   SQJ46GEP-T1-GE3     SQJ48GEP   SQJ48GEP-T1-GE3   SQJ46GEP-T1-GE3     SQJ48GEP-T1-GE3   SQJ46GEP-T1-GE3   SQJ46GEP-T1-GE3     SQJ48GEP-T1-GE3   SQJ46GEP-T1-GE3   SQJ46GEP-T1-GE3     SQJ40AEP-T1-GE3   SQJ46GEP-T1-GE3   SQJ46GEP-T1-GE3     SQJ46GEP-T	SQJ403EP	-	SQJ403EP-T1_GE3
SQJ422EP   SQJ422EP-T1-GE3   SQJ422EP-T1-GE3     SQJ431EP   SQJ431EP-T1-GE3   SQJ431EP-T1-GE3     SQJ443EP   SQJ443EP-T1-GE3   SQJ443EP-T1-GE3     SQJ446EP   SQJ446EP   SQJ446EP-T1-GE3     SQJ456EP   SQJ456EP-T1-GE3   SQJ456EP-T1-GE3     SQJ459EP   SQJ456EP-T1-GE3   SQJ450EP-T1-GE3     SQJ460AEP   SQJ461EP   SQJ461EP-T1-GE3   SQJ461EP-T1-GE3     SQJ463EP   SQJ463EP-T1-GE3   SQJ463EP-T1-GE3   SQJ463EP-T1-GE3     SQJ463EP   SQJ463EP-T1-GE3   SQJ463EP-T1-GE3   SQJ469EP-T1-GE3     SQJ469EP   SQJ469EP-T1-GE3   SQJ469EP-T1-GE3   SQJ469EP-T1-GE3     SQJ469EP   SQJ469EP-T1-GE3   SQJ469EP-T1-GE3   SQJ469EP-T1-GE3     SQJ469EP   SQJ469EP-T1-GE3   SQJ460EP-T1-GE3   SQJ460EP-T1-GE3     SQJ460EP   SQJ469EP-T1-GE3   SQJ460EP-T1-GE3   SQJ460EP-T1-GE3     SQJ840EP   SQJ460EP-T1-GE3   SQJ460EP-T1-GE3   SQJ460EP-T1-GE3     SQJ840EP   SQJ460EP-T1-GE3   SQJ860EP-T1-GE3   SQJ860EP-T1-GE3     SQJ850EP   SQJ460EP-T1-GE3   SQJ860EP-T1-GE3	SQJ410EP	SQJ410EP-T1-GE3	SQJ410EP-T1_GE3
SQJ431EP   SQJ431EP-T1-GE3   SQJ431EP-T1-GE3     SQJ443EP   SQJ443EP-T1-GE3   SQJ443EP-T1-GE3     SQJ446EP   -   SQJ456EP-T1-GE3     SQJ456EP   SQJ456EP-T1-GE3   SQJ456EP-T1-GE3     SQJ459EP   -   SQJ456EP-T1-GE3     SQJ459EP   -   SQJ456EP-T1-GE3     SQJ461EP   -   SQJ461EP-T1-GE3     SQJ461EP   SQJ461EP-T1-GE3   SQJ461EP-T1-GE3     SQJ463EP   SQJ463EP-T1-GE3   SQJ463EP-T1-GE3     SQJ463EP   SQJ463EP-T1-GE3   SQJ463EP-T1-GE3     SQJ465EP   SQJ466EP-T1-GE3   SQJ469EP-T1-GE3     SQJ469EP   SQJ466EP-T1-GE3   SQJ469EP-T1-GE3     SQJ469EP   SQJ466EP-T1-GE3   SQJ469EP-T1-GE3     SQJ468EP   SQJ466EP-T1-GE3   SQJ469EP-T1-GE3     SQJ460AEP   SQJ460EP-T1-GE3   SQJ460EP-T1-GE3     SQJ460EP   SQJ460EP-T1-GE3   SQJ460EP-T1-GE3     SQJ460EP   SQJ460EP-T1-GE3   SQJ460EP-T1-GE3     SQJ460EP   SQJ460EP-T1-GE3   SQJ460EP-T1-GE3     SQJ460EP   SQJ460EP-T1-GE3   SQJ460EP-T1-GE3	SQJ412EP	SQJ412EP-T1-GE3	SQJ412EP-T1_GE3
SQJ443EP   SQJ443EP-T1-GE3   SQJ443EP-T1_GE3     SQJ446EP   -   SQJ46EP-T1_GE3     SQJ456EP   SQJ456EP-T1-GE3   SQJ456EP-T1_GE3     SQJ459EP   -   SQJ456EP-T1_GE3     SQJ460AEP   -   SQJ460EP-T1_GE3     SQJ461EP   SQJ461EP-T1-GE3   SQJ461EP-T1_GE3     SQJ463EP   SQJ465EP-T1-GE3   SQJ465EP-T1_GE3     SQJ465EP   SQJ465EP-T1-GE3   SQJ465EP-T1_GE3     SQJ469EP   SQJ469EP-T1-GE3   SQJ469EP-T1_GE3     SQJ469EP   SQJ469EP-T1-GE3   SQJ469EP-T1_GE3     SQJ468EP   SQJ468EP-T1-GE3   SQJ469EP-T1_GE3     SQJ468EP   SQJ468EP-T1-GE3   SQJ468EP-T1_GE3     SQJ468EP   SQJ468EP-T1-GE3   SQJ468EP-T1_GE3     SQJ468EP   SQJ468EP-T1-GE3   SQJ46AEP-T1_GE3     SQJ46AEP-T1-GE3   SQJ46AEP-T1_GE3   SQJ46AEP-T1_GE3     SQJ44AEP   SQJ46AEP-T1-GE3   SQJ46AEP-T1_GE3     SQJ46AEP   SQJ46AEP-T1-GE3   SQJ46AEP-T1_GE3     SQJ46AEP   SQJ46AEP-T1-GE3   SQJ46AEP-T1_GE3     SQJ46AEP-T1-GE3   SQJ46AEP-T1_GE3	SQJ422EP	SQJ422EP-T1-GE3	SQJ422EP-T1_GE3
SQJ446EP   SQJ456EP   SQJ456EP   SQJ456EP-T1-GE3   SQJ456EP-T1-GE3     SQJ459EP   -   SQJ459EP-T1_GE3   SQJ460AEP-T1_GE3     SQJ461EP   -   SQJ461EP-T1_GE3   SQJ461EP-T1_GE3     SQJ463EP   SQJ463EP-T1_GE3   SQJ465EP-T1_GE3   SQJ465EP-T1_GE3     SQJ465EP   SQJ469EP-T1-GE3   SQJ469EP-T1_GE3   SQJ469EP-T1_GE3     SQJ469EP   SQJ469EP-T1-GE3   SQJ469EP-T1_GE3   SQJ469EP-T1_GE3     SQJ488EP   SQJ486EP-T1-GE3   SQJ486EP-T1_GE3   SQJ486EP-T1_GE3     SQJ488EP   SQJ486EP-T1-GE3   SQJ480EP-T1_GE3   SQJ480EP-T1_GE3     SQJ460EP   SQJ480EP-T1-GE3   SQJ480EP-T1_GE3   SQJ480EP-T1_GE3     SQJ440EP   SQJ48AEP-T1-GE3   SQJ480EP-T1_GE3   SQJ480EP-T1_GE3     SQJ440EP   SQJ444EP-T1-GE3   SQJ480EP-T1_GE3   SQJ485EP-T1_GE3     SQJ485AEP   SQJ485AEP-T1-GE3   SQJ485EP-T1_GE3   SQJ485EP-T1_GE3     SQJ486EP   SQJ486EP-T1-GE3   SQJ486EP-T1_GE3   SQJ486EP-T1_GE3     SQJ4910AEP   SQJ490EP-T1-GE3   SQJ490EP-T1_GE3   SQJ490EP-T1_GE3     SQJ4910AEP<	SQJ431EP	SQJ431EP-T1-GE3	SQJ431EP-T1_GE3
SQJ456EP   SQJ456EP-T1-GE3   SQJ456EP-T1_GE3     SQJ459EP   -   SQJ459EP-T1_GE3     SQJ460AEP   -   SQJ460AEP-T1_GE3     SQJ461EP   SQJ461EP-T1-GE3   SQJ461EP-T1_GE3     SQJ463EP   SQJ463EP-T1-GE3   SQJ465EP-T1_GE3     SQJ465EP   SQJ465EP-T1-GE3   SQJ465EP-T1_GE3     SQJ466EP   SQJ466EP-T1-GE3   SQJ469EP-T1_GE3     SQJ466EP   SQJ486EP-T1-GE3   SQJ469EP-T1_GE3     SQJ486EP   SQJ486EP-T1-GE3   SQJ486EP-T1_GE3     SQJ488EP   SQJ488EP-T1-GE3   SQJ488EP-T1_GE3     SQJ500AEP   SQJ500AEP-T1-GE3   SQJ840EP-T1_GE3     SQJ840EP   SQJ840EP-T1-GE3   SQJ840EP-T1_GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1_GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1_GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1_GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1_GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ910AEP-T1_GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ910AEP-T1_GE3     SQJ961EP   SQJ961EP-T1-GE3 </td <td>SQJ443EP</td> <td>SQJ443EP-T1-GE3</td> <td>SQJ443EP-T1_GE3</td>	SQJ443EP	SQJ443EP-T1-GE3	SQJ443EP-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     SQJ486EP   SQJ488EP-T1-GE3   SQJ486EP-T1_GE3     SQJ488EP   SQJ488EP-T1-GE3   SQJ488EP-T1_GE3     SQJ500AEP   SQJ500AEP-T1-GE3   SQJ500AEP-T1_GE3     SQJ500AEP   SQJ500AEP-T1-GE3   SQJ800EP-T1_GE3     SQJ840EP-T1_GE3   SQJ840EP-T1_GE3   SQJ840EP-T1_GE3     SQJ850EP-T1_GE3   SQJ850EP-T1_GE3   SQJ850EP-T1_GE3     SQJ850EP-T1_GE3   SQJ850EP-T1_GE3   SQJ850EP-T1_GE3     SQJ858AEP   SQJ858AEP-T1_GE3   SQJ850EP-T1_GE3     SQJ86EP   SQJ86EP-T1-GE3   SQJ86EP-T1_GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ910AEP-T1_GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ910AEP-T1_GE3     SQJ912AEP   SQJ912AEP-T1-GE3   SQJ912AEP-T1_GE3     SQJ95EP	SQJ446EP	-	SQJ446EP-T1_GE3
SQJ460AEP   -   SQJ461EP   SQJ461EP-T1_GE3   SQJ461EP-T1_GE3     SQJ463EP   SQJ463EP-T1-GE3   SQJ463EP-T1_GE3   SQJ465EP-T1_GE3   SQJ465EP-T1_GE3     SQJ465EP   SQJ465EP-T1-GE3   SQJ465EP-T1_GE3   SQJ466EP-T1_GE3   SQJ466EP-T1_GE3     SQJ466EP   SQJ466EP-T1-GE3   SQJ486EP-T1_GE3   SQJ486EP-T1_GE3   SQJ486EP-T1_GE3     SQJ488EP   SQJ486EP-T1-GE3   SQJ486EP-T1_GE3   SQJ486EP-T1_GE3   SQJ486EP-T1_GE3     SQJ500AEP   SQJ500AEP-T1-GE3   SQJ480EP-T1_GE3   SQJ840EP-T1_GE3   SQJ840EP-T1_GE3     SQJ844EP   SQJ844EP-T1-GE3   SQJ840EP-T1_GE3   SQJ850EP-T1_GE3   SQJ850EP-T1_GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1_GE3   SQJ850EP-T1_GE3   SQJ850EP-T1_GE3     SQJ858AEP   SQJ858AEP-T1-GE3   SQJ858AEP-T1_GE3   SQJ858AEP-T1_GE3   SQJ858AEP-T1_GE3     SQJ850EP   SQJ856EP-T1-GE3   SQJ950AEP-T1_GE3   SQJ950AEP-T1_GE3     SQJ910AEP   SQJ910AEP-T1_GE3   SQJ910AEP-T1_GE3   SQJ942EP-T1_GE3     SQJ940EP   SQJ940EP-T1_GE3   SQJ942EP-T1_GE3   SQJ942EP-T1_GE3     SQJ951	SQJ456EP	SQJ456EP-T1-GE3	SQJ456EP-T1_GE3
SQJ461EP   SQJ461EP-T1-GE3   SQJ461EP-T1-GE3     SQJ463EP   SQJ463EP-T1-GE3   SQJ465EP-T1-GE3     SQJ465EP   SQJ465EP-T1-GE3   SQJ465EP-T1-GE3     SQJ469EP   SQJ469EP-T1-GE3   SQJ469EP-T1-GE3     SQJ486EP   SQJ486EP-T1-GE3   SQJ486EP-T1-GE3     SQJ488EP   SQJ488EP-T1-GE3   SQJ488EP-T1-GE3     SQJ488EP   SQJ488EP-T1-GE3   SQJ488EP-T1-GE3     SQJ500AEP   SQJ500AEP-T1-GE3   SQJ480EP-T1-GE3     SQJ840EP   SQJ840EP-T1-GE3   SQJ840EP-T1-GE3     SQJ840EP   SQJ840EP-T1-GE3   SQJ840EP-T1-GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1-GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1-GE3     SQJ850EP-T1-GE3   SQJ850EP-T1-GE3   SQJ850EP-T1-GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1-GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ950EP-T1-GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ910AEP-T1-GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ940EP-T1-GE3     SQJ940EP   SQJ940EP-T1-GE3   SQJ942EP-T1-GE3     SQJ951EP <td>SQJ459EP</td> <td>-</td> <td>SQJ459EP-T1_GE3</td>	SQJ459EP	-	SQJ459EP-T1_GE3
SQJ463EP   SQJ463EP-T1-GE3   SQJ463EP-T1-GE3     SQJ465EP   SQJ465EP-T1-GE3   SQJ465EP-T1-GE3     SQJ469EP   SQJ469EP-T1-GE3   SQJ469EP-T1-GE3     SQJ486EP   SQJ486EP-T1-GE3   SQJ486EP-T1-GE3     SQJ486EP   SQJ488EP-T1-GE3   SQJ488EP-T1-GE3     SQJ488EP   SQJ488EP-T1-GE3   SQJ488EP-T1-GE3     SQJ500AEP   SQJ500AEP-T1-GE3   SQJ500AEP-T1-GE3     SQJ840EP   SQJ840EP-T1-GE3   SQJ840EP-T1-GE3     SQJ844AEP   SQJ840EP-T1-GE3   SQJ850EP-T1-GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1-GE3     SQJ858AEP   SQJ858EP-T1-GE3   SQJ858AEP-T1-GE3     SQJ866EP   SQJ866EP-T1-GE3   SQJ866EP-T1-GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ910AEP-T1-GE3     SQJ912AEP   SQJ910AEP-T1-GE3   SQJ910AEP-T1-GE3     SQJ940EP   SQJ940EP-T1-GE3   SQJ940EP-T1-GE3     SQJ942EP   SQJ942EP-T1-GE3   SQJ942EP-T1-GE3     SQJ951EP   SQJ951EP-T1-GE3   SQJ951EP-T1-GE3     SQJ956EP   SQJ956EP-T1-GE3   SQJ956EP-T1-GE3     SQJ960EP	SQJ460AEP	-	SQJ460AEP-T1_GE3
SQJ465EP   SQJ465EP-T1-GE3   SQJ465EP-T1_GE3     SQJ469EP   SQJ469EP-T1-GE3   SQJ469EP-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     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1_GE3     SQJ858AEP   SQJ858AEP-T1-GE3   SQJ858AEP-T1_GE3     SQJ866EP   SQJ866EP-T1-GE3   SQJ866EP-T1_GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ910AEP-T1_GE3     SQJ912AEP   SQJ912AEP-T1-GE3   SQJ912AEP-T1_GE3     SQJ940EP   SQJ940EP-T1-GE3   SQJ940EP-T1_GE3     SQJ940EP   SQJ940EP-T1-GE3   SQJ940EP-T1_GE3     SQJ951EP   SQJ951EP-T1-GE3   SQJ951EP-T1_GE3     SQJ956EP   SQJ956EP-T1-GE3   SQJ956EP-T1_GE3     SQJ960EP-T1-GE3   SQJ960EP-T1_GE3   SQJ960EP-T1_GE3     SQJ	SQJ461EP	SQJ461EP-T1-GE3	SQJ461EP-T1_GE3
SQJ469EP   SQJ469EP-T1-GE3   SQJ469EP-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   SQJ850EP-T1_GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1_GE3     SQJ858AEP   SQJ858AEP-T1-GE3   SQJ858AEP-T1_GE3     SQJ866EP   SQJ866EP-T1-GE3   SQJ866EP-T1_GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ910AEP-T1_GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ912AEP-T1_GE3     SQJ940EP   SQJ940EP-T1-GE3   SQJ940EP-T1_GE3     SQJ942EP   SQJ940EP-T1-GE3   SQJ942EP-T1_GE3     SQJ951EP   SQJ951EP-T1-GE3   SQJ951EP-T1_GE3     SQJ952EP   SQJ956EP-T1-GE3   SQJ956EP-T1_GE3     SQJ956EP   SQJ956EP-T1-GE3   SQJ966EP-T1_GE3     SQJ960EP   SQJ960EP-T1-GE3   SQJ960EP-T1_GE3     SQJ966EP   SQJ966EP-T1-GE3   SQJ966EP-T1_GE3     SQJ968EP <td>SQJ463EP</td> <td>SQJ463EP-T1-GE3</td> <td>SQJ463EP-T1_GE3</td>	SQJ463EP	SQJ463EP-T1-GE3	SQJ463EP-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   SQJ865EP-T1_GE3     SQJ866EP   SQJ866EP-T1-GE3   SQJ866EP-T1_GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ910AEP-T1_GE3     SQJ912AEP   SQJ912AEP-T1-GE3   SQJ912AEP-T1_GE3     SQJ940EP   SQJ940EP-T1-GE3   SQJ942EP-T1_GE3     SQJ942EP   SQJ942EP-T1-GE3   SQJ942EP-T1_GE3     SQJ951EP   SQJ951EP-T1-GE3   SQJ951EP-T1_GE3     SQJ952EP   -   SQJ955EP-T1_GE3     SQJ956EP   SQJ956EP-T1-GE3   SQJ956EP-T1_GE3     SQJ960EP   SQJ960EP-T1-GE3   SQJ960EP-T1_GE3     SQJ960EP-T1_GE3   SQJ960EP-T1_GE3   SQJ960EP-T1_GE3     SQJ963EP   SQJ966EP-T1-GE3   SQJ966EP-T1_GE3     SQJ966EP-T1_GE3 <td>SQJ465EP</td> <td>SQJ465EP-T1-GE3</td> <td>SQJ465EP-T1_GE3</td>	SQJ465EP	SQJ465EP-T1-GE3	SQJ465EP-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   SQJ850EP-T1_GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1_GE3     SQJ858AEP   SQJ858AEP-T1-GE3   SQJ856EP-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     SQJ952EP   -   SQJ956EP-T1_GE3     SQJ956EP   SQJ960EP-T1-GE3   SQJ960EP-T1_GE3     SQJ960EP   SQJ963EP-T1-GE3   SQJ963EP-T1_GE3     SQJ963EP   SQJ968EP-T1-GE3   SQJ968EP-T1_GE3     SQJ968EP   SQJ968EP-T1-GE3   SQJ968EP-T1_GE3	SQJ469EP	SQJ469EP-T1-GE3	SQJ469EP-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     SQJ866EP   SQJ866EP-T1-GE3   SQJ866EP-T1_GE3     SQJ910AEP   SQJ910AEP-T1-GE3   SQJ910AEP-T1_GE3     SQJ912AEP   SQJ912AEP-T1-GE3   SQJ940EP-T1_GE3     SQJ940EP   SQJ940EP-T1-GE3   SQJ940EP-T1_GE3     SQJ942EP   SQJ942EP-T1-GE3   SQJ942EP-T1_GE3     SQJ951EP   SQJ951EP-T1-GE3   SQJ951EP-T1_GE3     SQJ952EP   -   SQJ956EP-T1_GE3     SQJ956EP   SQJ956EP-T1-GE3   SQJ956EP-T1_GE3     SQJ960EP   SQJ960EP-T1-GE3   SQJ960EP-T1_GE3     SQJ963EP   SQJ960EP-T1-GE3   SQJ963EP-T1_GE3     SQJ968EP   SQJ968EP-T1-GE3   SQJ968EP-T1_GE3     SQJ968EP   SQJ968EP-T1-GE3   SQJ968EP-T1_GE3	SQJ486EP	SQJ486EP-T1-GE3	SQJ486EP-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     SQJ858AEP   SQJ858AEP-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     SQJ952EP   -   SQJ955EP-T1_GE3     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     SQJ968EP-T1_GE3   SQJ960EP-T1_GE3   SQJ960EP-T1_GE3	SQJ488EP	SQJ488EP-T1-GE3	SQJ488EP-T1_GE3
SQJ844AEP   SQJ844AEP-T1-GE3   SQJ844AEP-T1_GE3     SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1_GE3     SQJ858AEP   SQJ858AEP-T1-GE3   SQJ858AEP-T1_GE3     SQJ866EP   SQJ886EP-T1-GE3   SQJ866EP-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     SQJ952EP   -   SQJ952EP-T1_GE3     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     SQJ968EP-T1_GE3   SQJ968EP-T1_GE3   SQJ968EP-T1_GE3	SQJ500AEP	SQJ500AEP-T1-GE3	SQJ500AEP-T1_GE3
SQJ850EP   SQJ850EP-T1-GE3   SQJ850EP-T1_GE3     SQJ858AEP   SQJ858AEP-T1-GE3   SQJ858AEP-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     SQJ952EP   -   SQJ952EP-T1_GE3     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     SQJ968EP-T1_GE3   SQJ968EP-T1_GE3   SQJ968EP-T1_GE3     SQJ968EP-T1_GE3   SQJ968EP-T1_GE3   SQJ968EP-T1_GE3	SQJ840EP	SQJ840EP-T1-GE3	SQJ840EP-T1_GE3
SQJ858AEP   SQJ858AEP-T1-GE3   SQJ858AEP-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     SQJ952EP   -   SQJ952EP-T1_GE3     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     SQJ968EP-T1_GE3   SQJ968EP-T1_GE3   SQJ968EP-T1_GE3     SQJ968EP-T1_GE3   SQJ968EP-T1_GE3   SQJ968EP-T1_GE3	SQJ844AEP	SQJ844AEP-T1-GE3	SQJ844AEP-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     SQJ952EP   -   SQJ952EP-T1_GE3     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     SQJ968EP-T1_GE3   SQJ968EP-T1_GE3   SQJ968EP-T1_GE3     SQJ968EP-T1_GE3   SQJ968EP-T1_GE3   SQJ968EP-T1_GE3     SQJ968EP-T1_GE3   SQJ968EP-T1_GE3   SQJ968EP-T1_GE3	SQJ850EP	SQJ850EP-T1-GE3	SQJ850EP-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     SQJ952EP   -   SQJ952EP-T1_GE3     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     SQJ960AEP   SQJ980AEP-T1-GE3   SQJ980AEP-T1_GE3	SQJ858AEP	SQJ858AEP-T1-GE3	SQJ858AEP-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     SQJ952EP   -   SQJ952EP-T1_GE3     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	SQJ886EP	SQJ886EP-T1-GE3	SQJ886EP-T1_GE3
SQJ940EP   SQJ940EP-T1-GE3   SQJ940EP-T1_GE3     SQJ942EP   SQJ942EP-T1-GE3   SQJ942EP-T1_GE3     SQJ951EP   SQJ951EP-T1-GE3   SQJ951EP-T1_GE3     SQJ952EP   -   SQJ952EP-T1_GE3     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	SQJ910AEP	SQJ910AEP-T1-GE3	SQJ910AEP-T1_GE3
SQJ942EP SQJ942EP-T1-GE3 SQJ942EP-T1_GE3   SQJ951EP SQJ951EP-T1-GE3 SQJ951EP-T1_GE3   SQJ952EP - SQJ952EP-T1_GE3   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	SQJ912AEP	SQJ912AEP-T1-GE3	SQJ912AEP-T1_GE3
SQJ951EP   SQJ951EP-T1-GE3   SQJ951EP-T1_GE3     SQJ952EP   -   SQJ952EP-T1_GE3     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	SQJ940EP	SQJ940EP-T1-GE3	SQJ940EP-T1_GE3
SQJ952EP   -   SQJ952EP-T1_GE3     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	SQJ942EP	SQJ942EP-T1-GE3	SQJ942EP-T1_GE3
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	SQJ951EP	SQJ951EP-T1-GE3	SQJ951EP-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	SQJ952EP	-	SQJ952EP-T1_GE3
SQJ963EP   SQJ963EP-T1-GE3   SQJ963EP-T1_GE3     SQJ968EP   SQJ968EP-T1-GE3   SQJ968EP-T1_GE3     SQJ980AEP   SQJ980AEP-T1-GE3   SQJ980AEP-T1_GE3	SQJ956EP	SQJ956EP-T1-GE3	SQJ956EP-T1_GE3
SQJ968EP   SQJ968EP-T1-GE3   SQJ968EP-T1_GE3     SQJ980AEP   SQJ980AEP-T1-GE3   SQJ980AEP-T1_GE3	SQJ960EP	SQJ960EP-T1-GE3	SQJ960EP-T1_GE3
SQJ980AEP   SQJ980AEP-T1-GE3   SQJ980AEP-T1_GE3	SQJ963EP	SQJ963EP-T1-GE3	SQJ963EP-T1_GE3
	SQJ968EP	SQJ968EP-T1-GE3	SQJ968EP-T1_GE3
SQJ992EP	SQJ980AEP	SQJ980AEP-T1-GE3	SQJ980AEP-T1_GE3
	SQJ992EP	SQJ992EP-T1-GE3	SQJ992EP-T1_GE3

#### Note

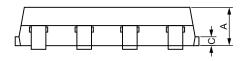
a. Old ordering code is obsolete and no longer valid for new orders

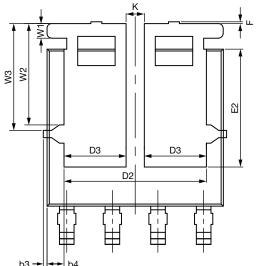
# PowerPAK® SO-8L Case Outline for Non-Al Parts





Backside view (single)





Backside view (dual)

Revision: 16-May-16 1 Document Number: 69003





www.vishay.com

Vishay Siliconix

DIM	MILLIMETERS		INCHES			
DIM.	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
Α	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	
С	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
е		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	3.18	3.28	3.38	0.125	0.129	0.133
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		
θ	0°	-	10°	0°	-	10°

ECN: T16-0221-Rev. D, 16-May-16

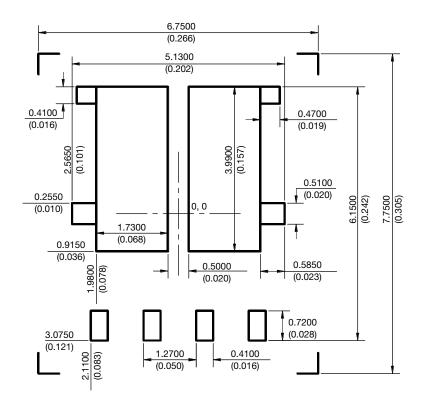
DWG: 5976

### Note

Millimeters will gover



### RECOMMENDED MINIMUM PAD FOR PowerPAK® SO-8L DUAL



Recommended Minimum Pads Dimensions in mm (inches) Keep-out 6.75 (0.266) x 7.75 (0.305)



# **Legal Disclaimer Notice**

Vishay

# **Disclaimer**

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

# **Material Category Policy**

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.

Revision: 02-Oct-12 Document Number: 91000

# **ПОСТАВКА** ЭЛЕКТРОННЫХ КОМПОНЕНТОВ

многоканальный

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001 Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

# Данный компонент на территории Российской Федерации Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

### http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г. Москва, ул. Щербаковская д. 3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru moschip.ru\_6 moschip.ru\_4 moschip.ru\_9