2SK209-VB Datasheet
P-Channel 60 V (D-S) MOSFET

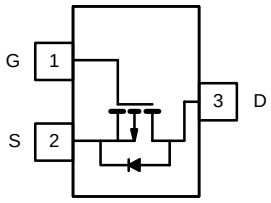
PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	$V_{GS(th)}$ (V)	I_D (mA)
- 60	3 at V_{GS} = - 10 V	- 1 to - 3	-500

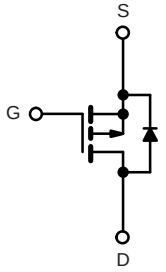
FEATURES

- **Halogen-free According to IEC 61249-2-21 Definition**
- Trench Power MOSFET
- High-Side Switching
- Low On-Resistance: 3 Ω
- Low Threshold: - 2 V (typ.)
- Fast Swtiching Speed: 20 ns (typ.)
- Low Input Capacitance: 20 pF (typ.)
- Compliant to RoHS Directive 2002/95/EC

Pb-free
RoHS COMPLIANT

TO-236
(SOT-23)





P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	- 60	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current[a]	T_A = 25 °C	I_D	- 500	mA
	T_A = 100 °C		- 350	
Pulsed Drain Current[b]		I_{DM}	-1500	
Power Dissipation[a]	T_A = 25 °C	P_D	460	mW
	T_A = 100 °C		240	
Maximum Junction-to-Ambient[a]		R_{thJA}	350	°C/W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

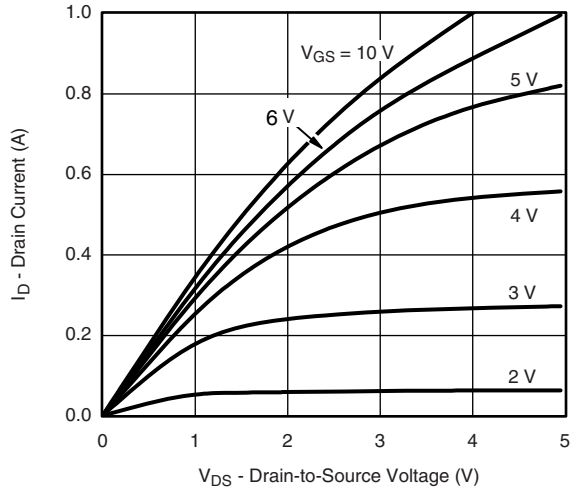
Notes:
a. Surface mounted on FR4 board.
b. Pulse width limited by maximum junction temperature.

SPECIFICATIONS T_A = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Limits**			**Unit**
			Min.	**Typ.[a]**	**Max.**	
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = - 10 µA	- 60			V
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 1		- 3	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 10	µA
		V_{DS} = 0 V, V_{GS} = ± 10 V			± 200	nA
		V_{DS} = 0 V, V_{GS} = ± 10 V, T_J = 85 °C			± 500	
		V_{DS} = 0 V, V_{GS} = ± 5 V			± 100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 60 V, V_{GS} = 0 V			- 25	
		V_{DS} = - 60 V, V_{GS} = 0 V, T_J = 85 °C			- 250	
On-State Drain Current[a]	$I_{D(on)}$	V_{GS} = - 10 V, V_{DS} = - 4.5 V	- 50			mA
		V_{GS} = - 10 V, V_{DS} = - 10 V	- 600			
Drain-Source On-Resistance[a]	$R_{DS(on)}$	V_{GS} = - 4.5 V, I_D = - 25 mA		4		Ω
		V_{GS} = - 10 V, I_D = - 100 mA		3		
		V_{GS} = - 10 V, I_D = - 100 mA, T_J =125 °C		9		
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 100 mA	80			mS
Diode Forward Voltage	V_{SD}	I_S = - 100 mA, V_{GS} = 0 V			- 1.4	V
Dynamic						
Total Gate Charge	Q_g	V_{DS} = - 30 V, V_{GS} = - 15 V $I_D \cong$ - 100 mA		2.0		nC
Gate-Source Charge	Q_{gs}			1.2		
Gate-Drain Charge	Q_{gd}			0.8		
Input Capacitance	C_{iss}	V_{DS} = - 25 V, V_{GS} = 0 V f = 1 MHz		23		pF
Output Capacitance	C_{oss}			10		
Reverse Transfer Capacitance	C_{rss}			5		
Switching[b]						
Turn-On Time	$t_{d(on)}$	V_{DD} = - 25 V, R_L = 150 Ω $I_D \cong$ - 200 mA, V_{GEN} = - 10 V, R_g = 10 Ω		20		ns
Turn-Off Time	$t_{d(off)}$			35		

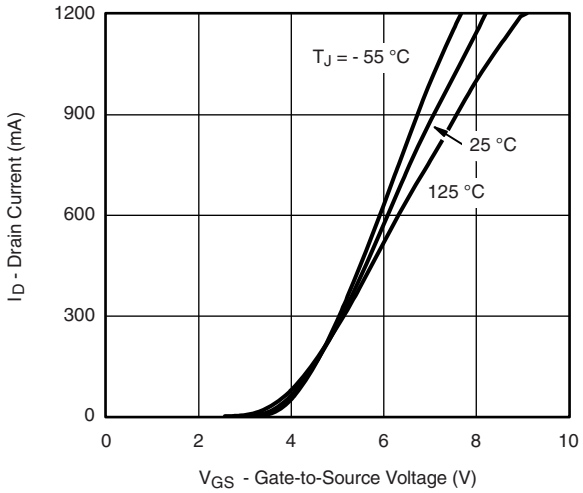
Notes:
a. Pulse test: PW ≤ 300 µs duty cycle ≤ 2 %.
b. Switching time is essentially independent of operating temperature.

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.

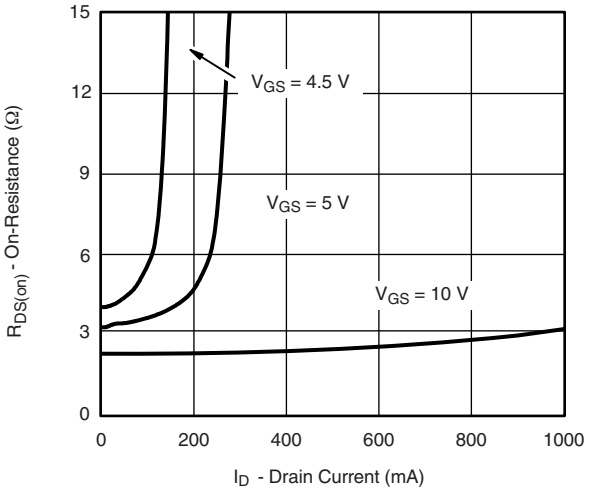
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



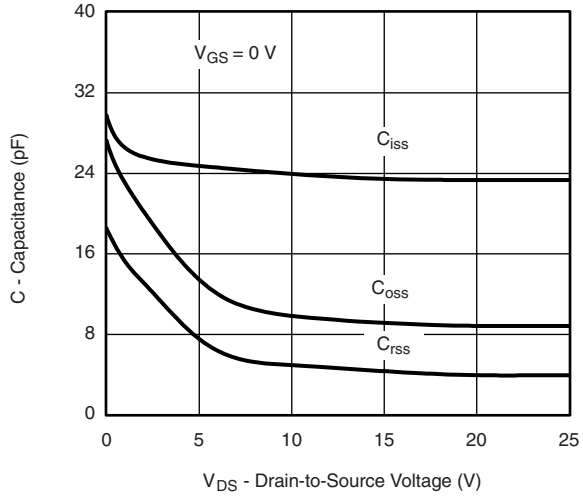
Output Characteristics



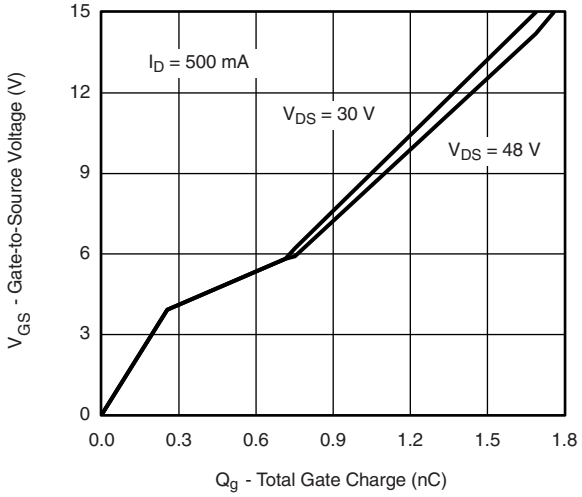
Transfer Characteristics



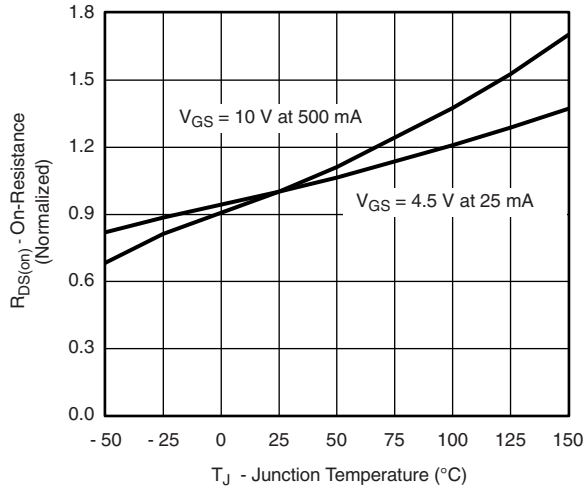
On-Resistance vs. Drain Current



Capacitance

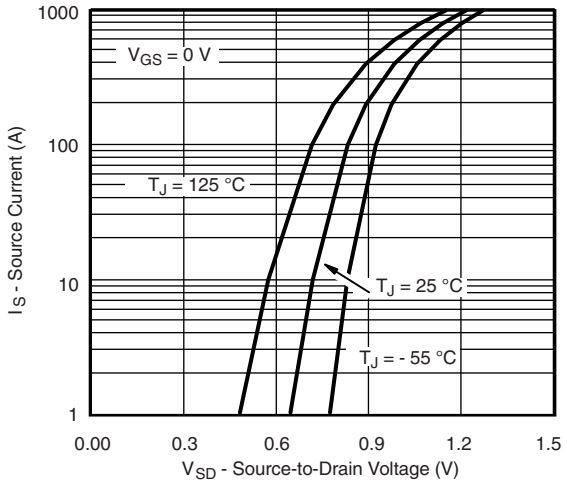


Gate Charge

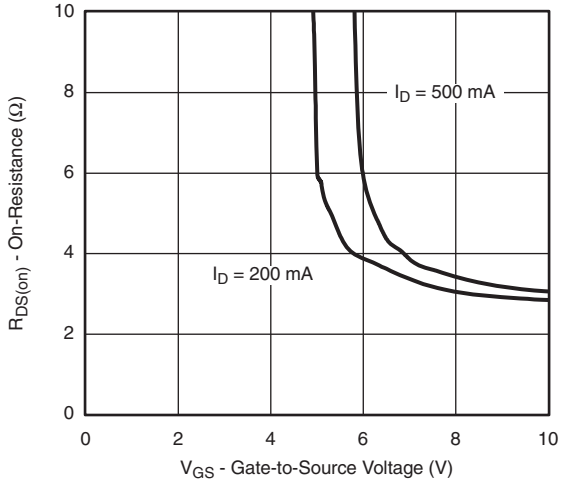


On-Resistance vs. Junction Temperature

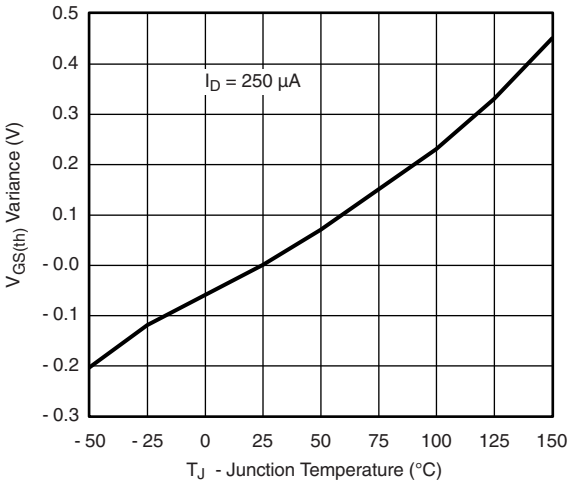
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



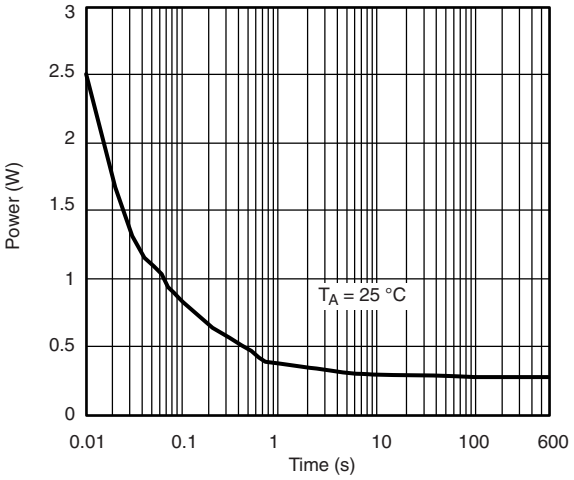
Source-Drain Diode Forward Voltage



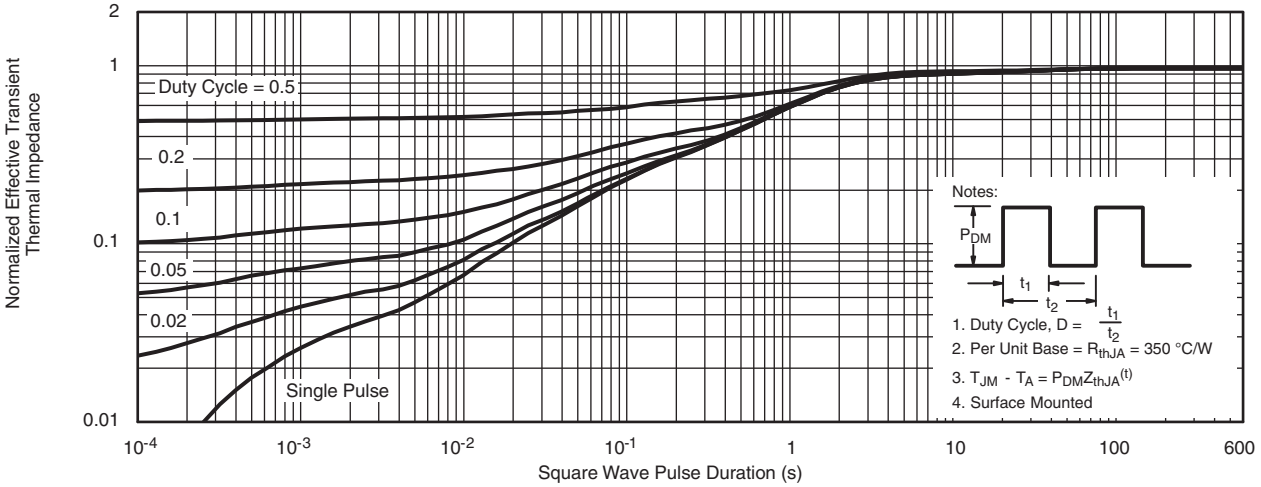
On-Resistance vs. Gate-Source Voltage



Threshold Voltage Variance Over Temperature

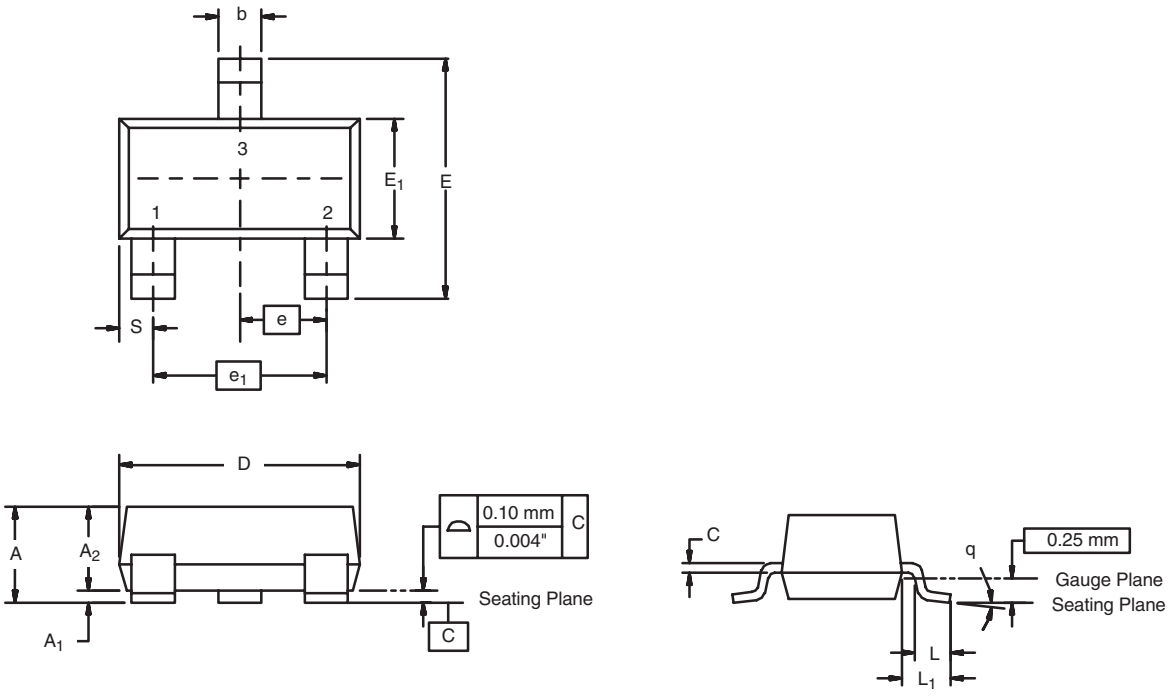


Single Pulse Power, Junction-to-Ambient



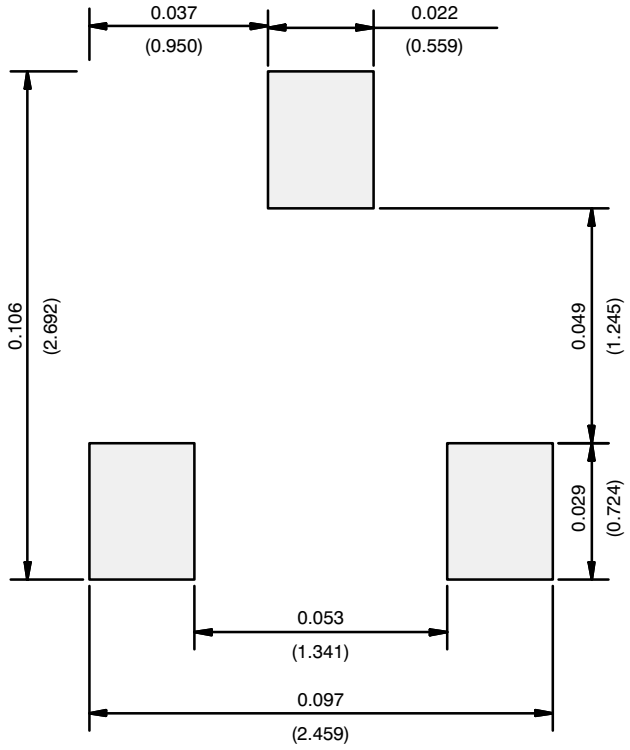
Normalized Thermal Transient Impedance, Junction-to-Ambient

SOT-23 (TO-236): 3-LEAD



Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	0.89	1.12	0.035	0.044
A_1	0.01	0.10	0.0004	0.004
A_2	0.88	1.02	0.0346	0.040
b	0.35	0.50	0.014	0.020
c	0.085	0.18	0.003	0.007
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E_1	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 Ref	
e_1	1.90 BSC		0.0748 Ref	
L	0.40	0.60	0.016	0.024
L_1	0.64 Ref		0.025 Ref	
S	0.50 Ref		0.020 Ref	
q	3°	8°	3°	8°
ECN: S-03946-Rev. K, 09-Jul-01 DWG: 5479				

RECOMMENDED MINIMUM PADS FOR SOT-23



Recommended Minimum Pads
Dimensions in Inches/(mm)

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