

N-CHANNEL MOS FET  
FOR HIGH-SPEED SWITCHING

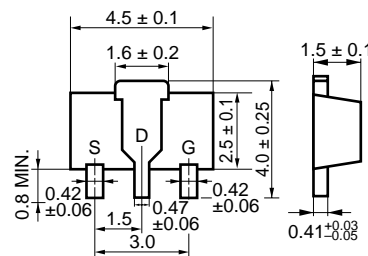
The 2SK2109 is a N-channel MOS FET of a vertical type and is a switching element that can be directly driven by the output of an IC operating at 5 V.

This product has a low ON resistance and superb switching characteristics and is ideal for driving the actuator, such as motors and DC/DC converters.

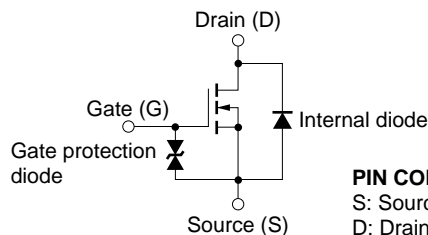
FEATURES

- Low ON resistance  
 $R_{DS(on)} = 1.0 \Omega$  MAX. @  $V_{GS} = 4.0 V$ ,  $I_D = 0.3 A$
- High switching speed  
 $t_{on} + t_{off} < 100 ns$
- Low parasitic capacitance

PACKAGE DIMENSIONS (in mm)



EQUIVALENT CIRCUIT



**PIN CONNECTIONS**  
 S: Source  
 D: Drain  
 G: Gate

Marking: NS

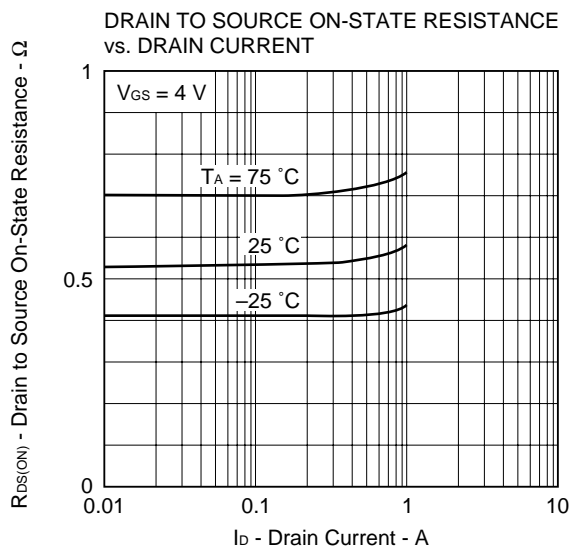
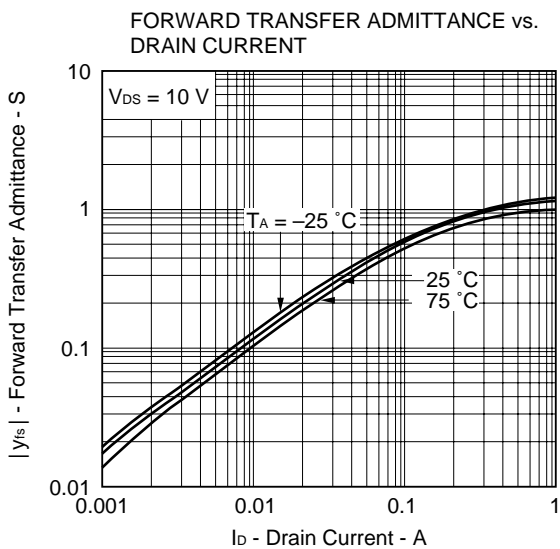
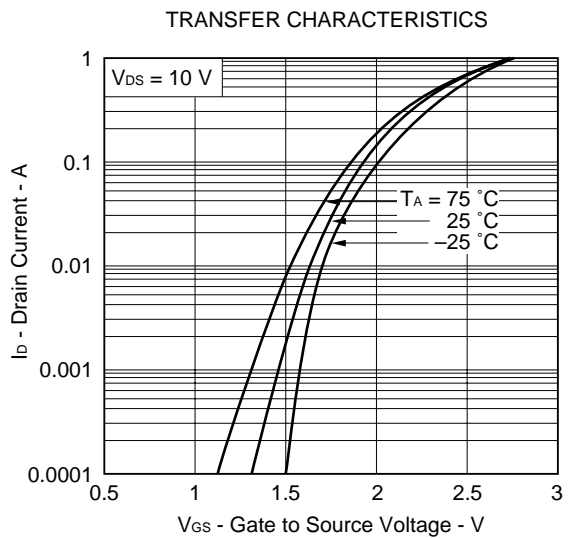
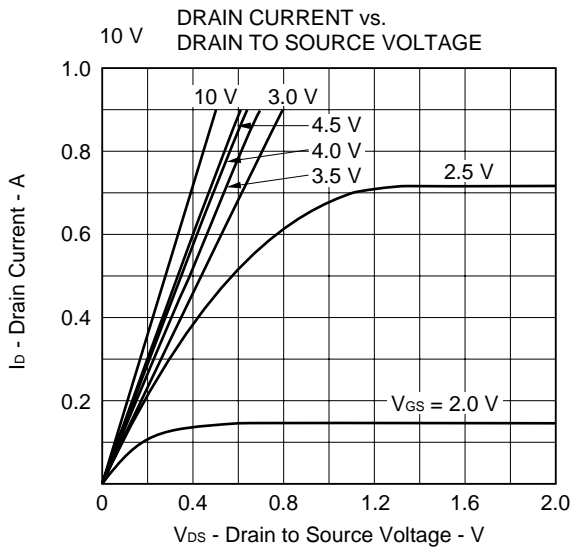
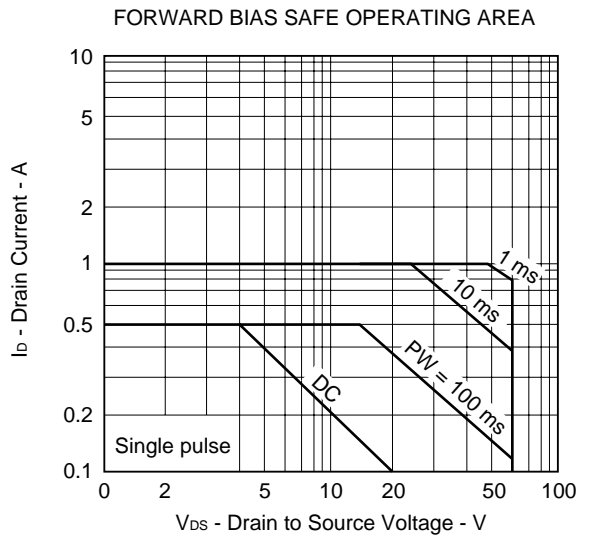
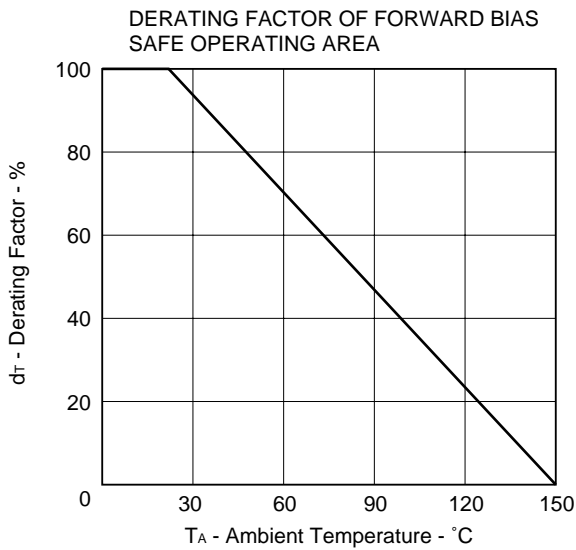
ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ )

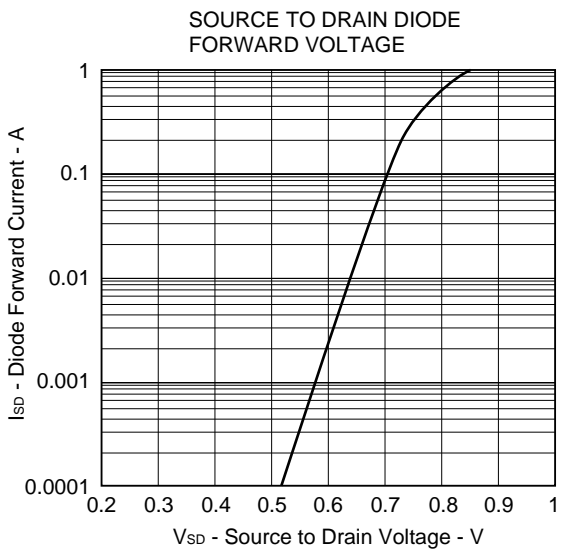
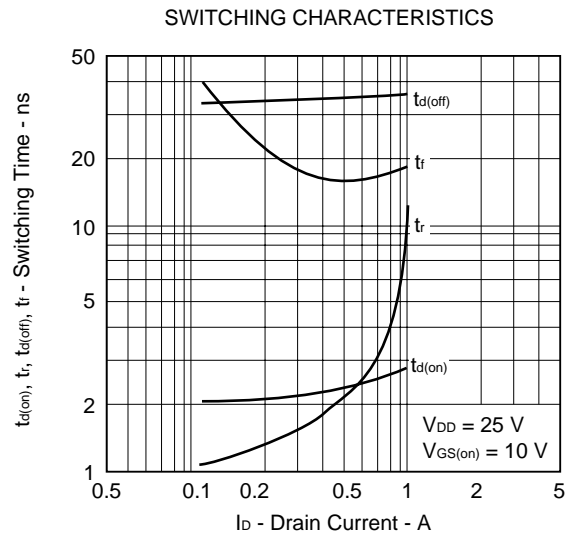
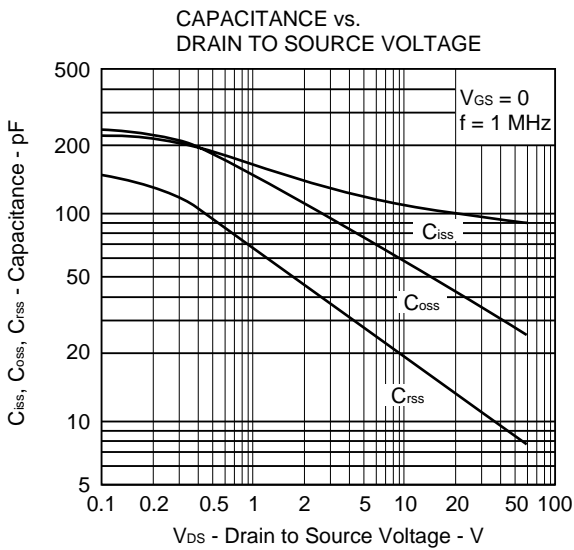
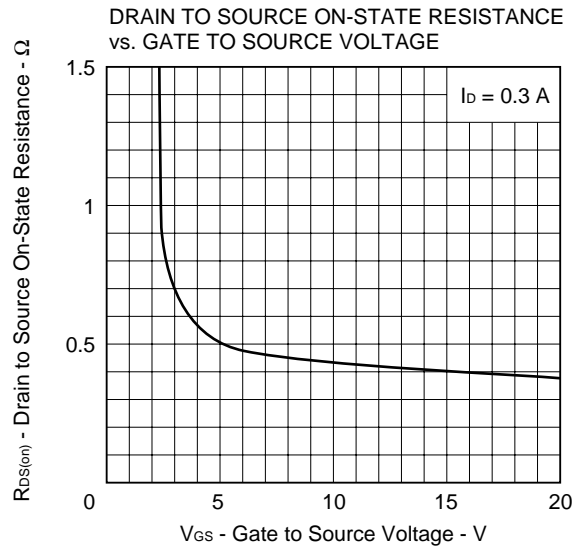
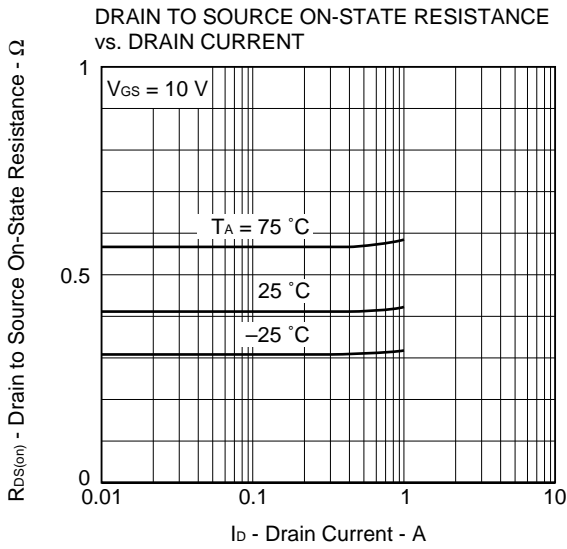
PARAMETER	SYMBOL	TEST CONDITIONS	RATING	UNIT
Drain to Source Voltage	$V_{DSS}$	$V_{GS} = 0$	60	V
Gate to Source Voltage	$V_{GSS}$	$V_{DS} = 0$	$\pm 20$	V
Drain Current (DC)	$I_{D(DC)}$		$\pm 0.5$	A
Drain Current (Pulse)	$I_{D(pulse)}$	$PW \leq 10 ms$ , Duty cycle $\leq 50 \%$	$\pm 1.0$	A
Total Power Dissipation	$P_T$	16 cm <sup>2</sup> × 0.7 mm, ceramic substrate used	2.0	W
Channel Temperature	$T_{ch}$		150	°C
Storage Temperature	$T_{stg}$		-55 to +150	°C

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain Cut-Off Current	I <sub>DSS</sub>	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0			1.0	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0			±10	μA
Gate Cut-Off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	0.8	1.5	2.0	V
Forward Transfer Admittance	y <sub>ts</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.3 A	0.4			S
Drain to Source On-State Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 0.3 A		0.55	1.0	Ω
Drain to Source On-State Resistance	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.3 A		0.41	0.8	Ω
Input Capacitance	C <sub>iSS</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0, f = 1.0 MHz		111		pF
Output Capacitance	C <sub>oSS</sub>			55		pF
Reverse Transfer Capacitance	C <sub>rSS</sub>			19		pF
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 25 V, I <sub>D</sub> = 0.3 A V <sub>GS(on)</sub> = 10 V, R <sub>G</sub> = 10 Ω R <sub>L</sub> = 83 Ω		2.2		ns
Rise Time	t <sub>r</sub>			1.5		ns
Turn-Off Delay Time	t <sub>d(off)</sub>			35		ns
Fall Time	t <sub>f</sub>			19		ns

TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)





**REFERENCE**

Document Name	Document No.
NEC semiconductor device reliability/quality control system	TEI-1202
Quality grade on NEC semiconductor devices	IEI-1209
Semiconductor device mounting technology manual	C10535E
Guide to quality assurance for semiconductor devices	MEI-1202
Semiconductor selection guide	X10679E

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Anti-radioactive design is not implemented in this product.