NEC

DATA SHEET

MOS FIELD EFFECT TRANSISTOR

2SK2109

N-CHANNEL MOS FET
FOR HIGH-SPEED SWITCHING

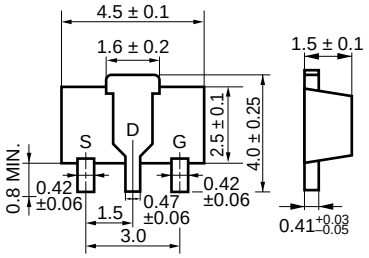
The 2SK2109 is a N-channel MOS FET of a vertical type and is a switching element that can be directly driven by the output of an IC operating at 5 V.

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.

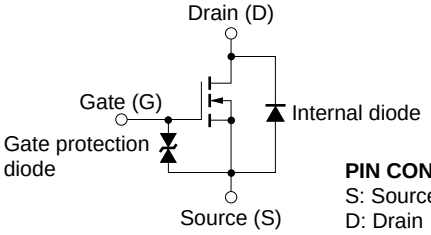
FEATURES

- Low ON resistance
  $R_{DS(on)}$ = 1.0 Ω 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 ˚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	±20	V
Drain Current (DC)	$I_{D(DC)}$		±0.5	A
Drain Current (Pulse)	$I_{D(pulse)}$	PW ≤ 10 ms, Duty cycle ≤ 50 %	±1.0	A
Total Power Dissipation	P_T	16 cm^2 × 0.7 mm, ceramic substrate used	2.0	W
Channel Temperature	T_{ch}		150	˚C
Storage Temperature	T_{stg}		–55 to +150	˚C

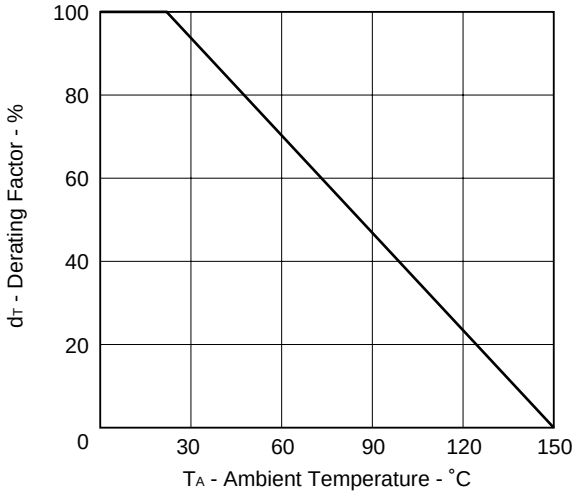
Document No. D11229EJ2V0DS00 (2nd edition)
Date Published June 1996 P
Printed in Japan

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

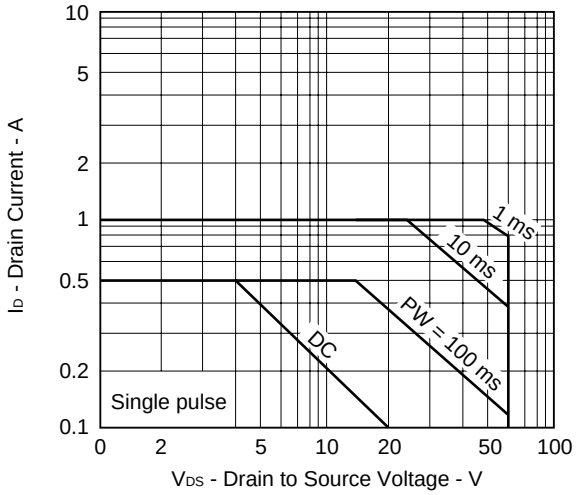
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain Cut-Off Current	I_{DSS}	V_{DS} = 60 V, V_{GS} = 0			1.0	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±20 V, V_{DS} = 0			±10	μA
Gate Cut-Off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	0.8	1.5	2.0	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 0.3 A	0.4			S
Drain to Source On-State Resistance	$R_{DS(on)1}$	V_{GS} = 4.0 V, I_D =0.3 A		0.55	1.0	Ω
Drain to Source On-State Resistance	$R_{DS(on)2}$	V_{GS} = 10 V, I_D = 0.3 A		0.41	0.8	Ω
Input Capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0, f = 1.0 MHz		111		pF
Output Capacitance	C_{oss}			55		pF
Reverse Transfer Capacitance	C_{rss}			19		pF
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 25 V, I_D = 0.3 A $V_{GS(on)}$ = 10 V, R_G = 10 Ω R_L = 83 Ω		2.2		ns
Rise Time	t_r			1.5		ns
Turn-Off Delay Time	$t_{d(off)}$			35		ns
Fall Time	t_f			19		ns

TYPICAL CHARACTERISTICS (T_A = 25 ˚C)

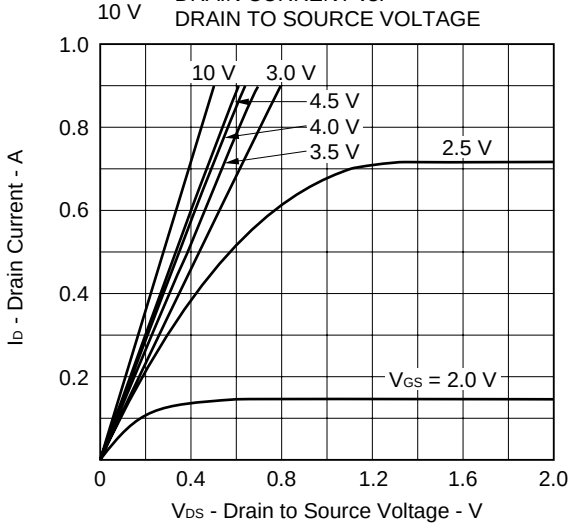
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



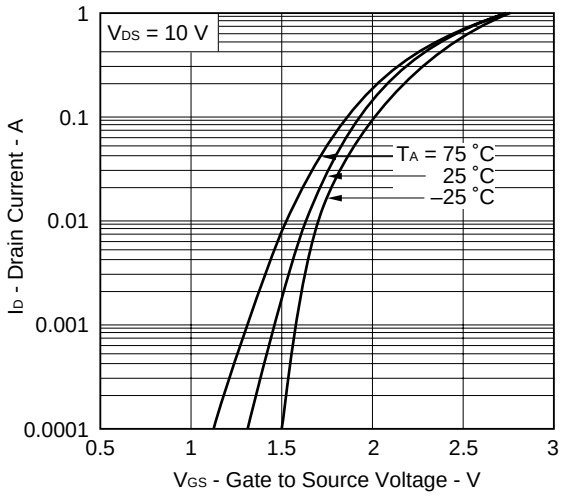
FORWARD BIAS SAFE OPERATING AREA



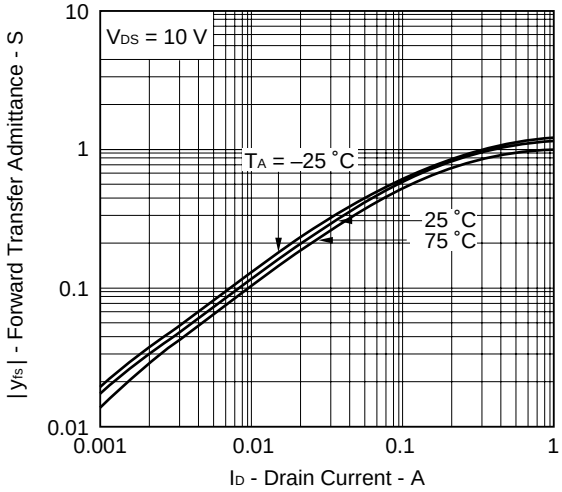
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



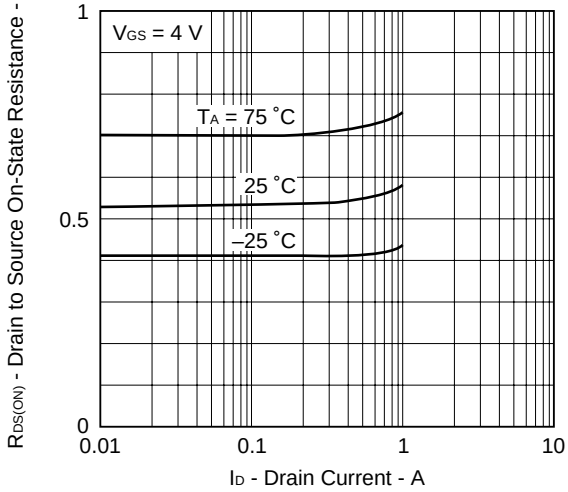
TRANSFER CHARACTERISTICS



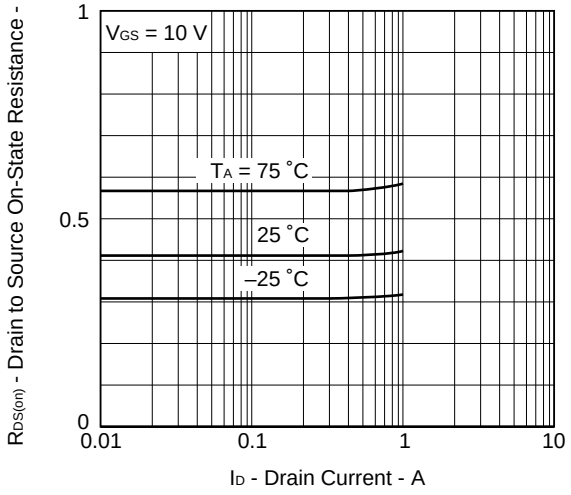
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



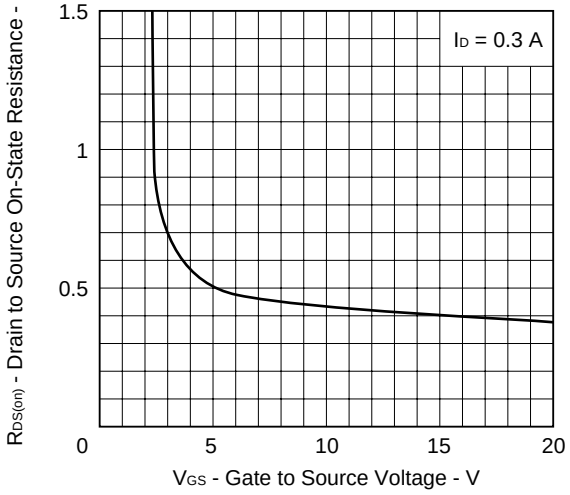
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



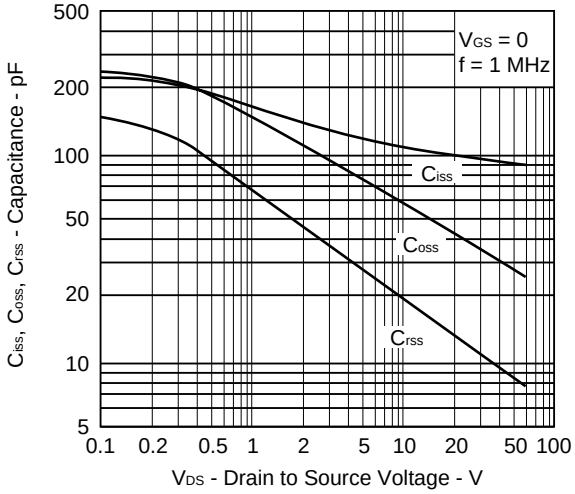
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



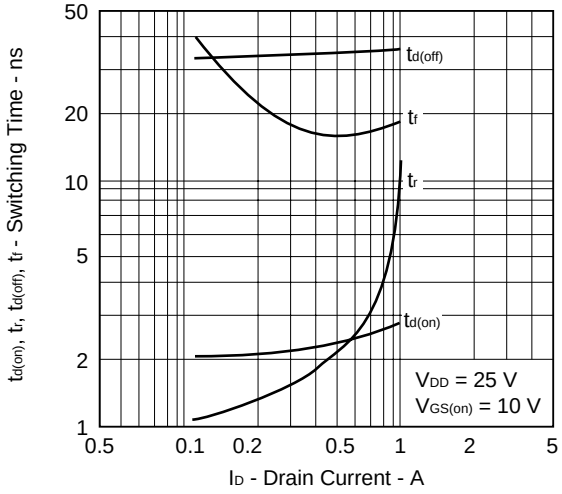
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



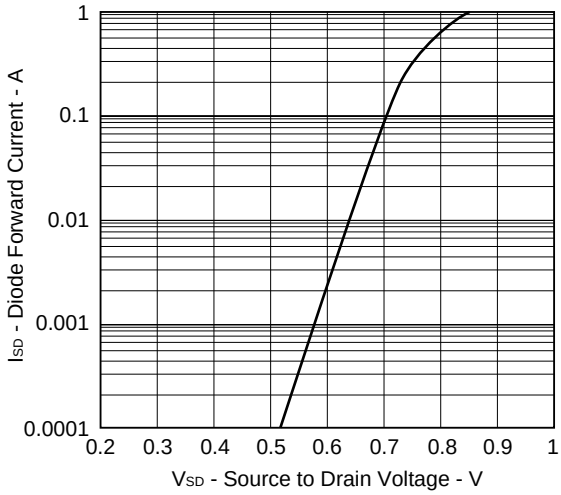
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



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

[MEMO]