NEC

MOS FIELD EFFECT TRANSISTOR

2SK2159

N-CHANNEL MOS FET
FOR HIGH-SPEED SWITCHING

The 2SK2159 is an N-channel vertical type MOS FET featuring an operating voltage as low as 1.5 V. Because it can be driven on a low voltage and it is not necessary to consider driving current, the 2SK2159 is suitable for driving actuators of low-voltage portable systems such as headphone stereo sets and camcorders.

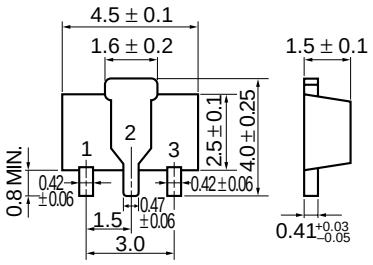
FEATURES

- Capable of drive gate with 1.5 V
- Small $R_{DS(on)}$

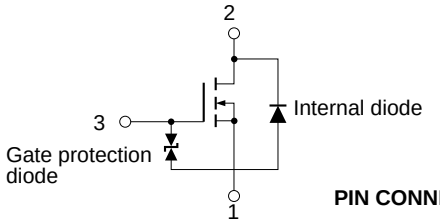
  $R_{DS(on)}$ = 0.7 Ω MAX. @V_{GS} = 1.5 V, I_D = 0.1 A

  $R_{DS(on)}$ = 0.3 Ω MAX. @V_{GS} = 4.0 V, I_D = 1.0 A

PACKAGE DIMENSIONS
(in millimeters)



EQUIVALENT CIRCUIT



PIN CONNECTION

1. Source (S)
2. Drain (D)
3. Gate (G)

Marking: NW

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

PARAMETER	SYMBOL	TEST CONDITIONS	RATINGS	UNIT
Drain to Source Voltage	V_{DSS}	V_{GS} = 0	60	V
Gate to Source Voltage	V_{GSS}	V_{DS} = 0	±14	V
Drain Current (DC)	$I_{D(DC)}$		±2.0	A
Drain Current (pulse)	$I_{D(pulse)}$	PW ≤ 10 ms, Duty Cycle ≤ 50 %	±4.0	A
Total Power Dissipation	P_T	Mounted on 16 cm^2 × 0.7 mm ceramic substrate.	2.0	W
Channel Temperature	T_{ch}		150	°C
Storage Temperature	T_{stg}		–55 to +150	°C

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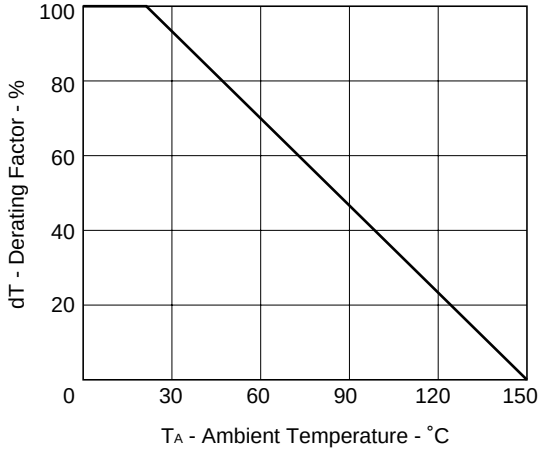
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

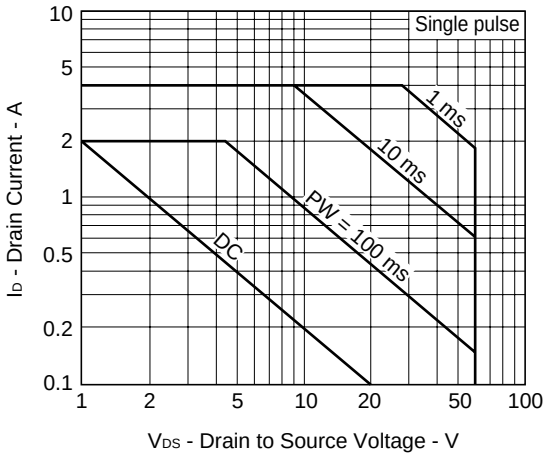
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain Cut-off Current	I_{DSS}	V_{DS} = 60 V, V_{GS} = 0			1.0	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±14 V, V_{DS} = 0			±10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	0.5	0.9	1.1	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 1.0 A	0.4			S
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 1.5 V, I_D = 0.1 A		0.55	0.7	Ω
Drain to Source On-state Resistance	$R_{DS(on)2}$	V_{GS} = 2.5 V, I_D = 1.0 A		0.27	0.5	Ω
Drain to Source On-state Resistance	$R_{DS(on)3}$	V_{GS} = 4.0 V, I_D = 1.0 A		0.22	0.3	Ω
Input Capacitance	C_{iss}	V_{DS} = 10 V, V_{GS} = 0, f = 1.0 MHz		319		pF
Output Capacitance	C_{oss}			109		pF
Reverse Transfer Capacitance	C_{rss}			22		pF
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 25 V, I_D = 1.0 A, $V_{GS(on)}$ = 3 V, R_G = 10 Ω, R_L = 25 Ω		38		ns
Rise Time	t_r			128		ns
Turn-Off Delay Time	$t_{d(off)}$			237		ns
Fall Time	t_f			130		ns

TYPICAL CHARACTERISTICS (T_A = 25 ˚C)

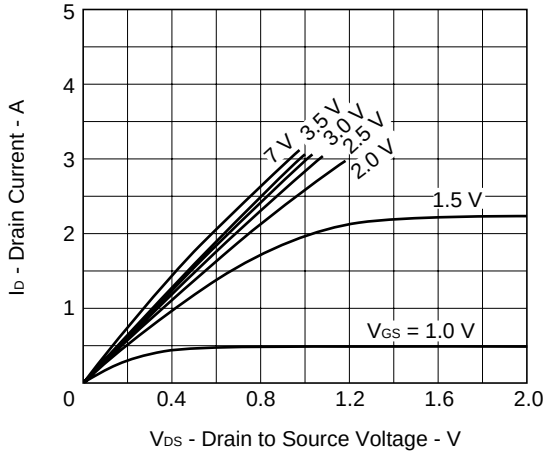
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



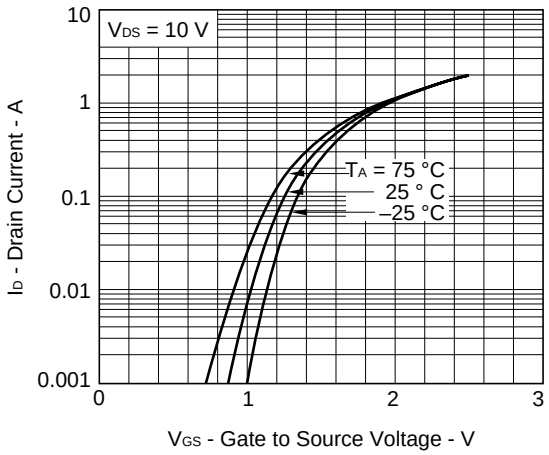
FORWARD BIAS SAFE OPERATING AREA



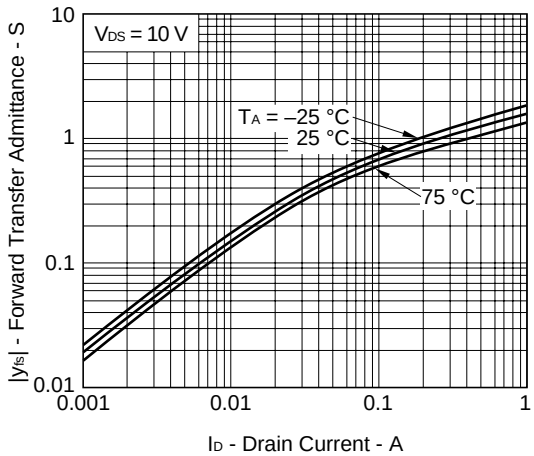
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



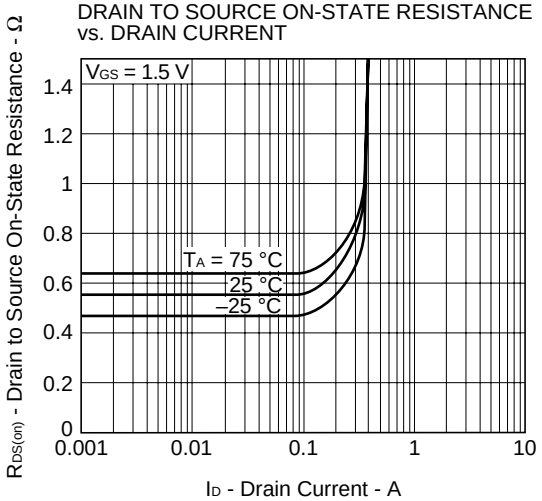
TRANSFER CHARACTERISTICS



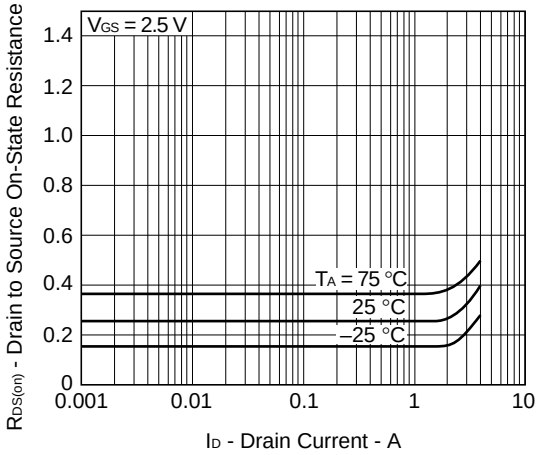
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



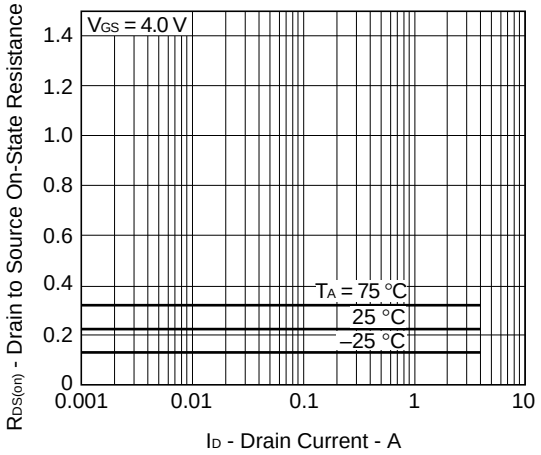
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



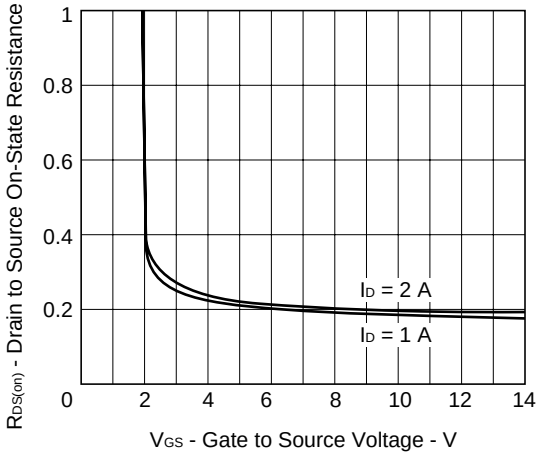
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



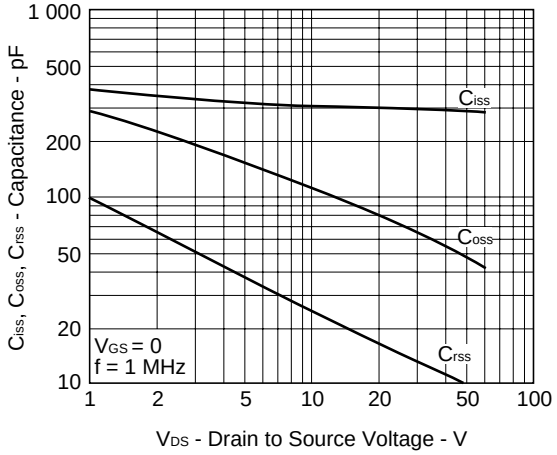
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



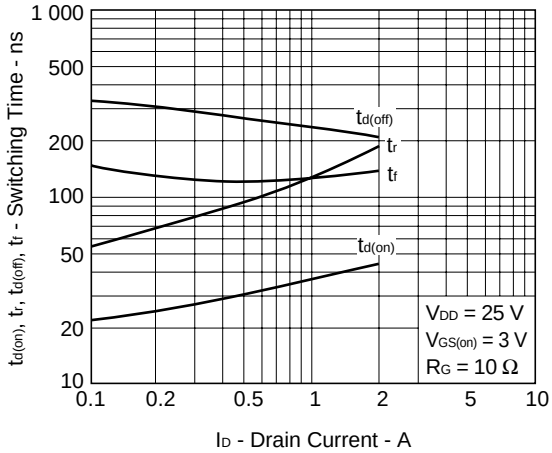
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



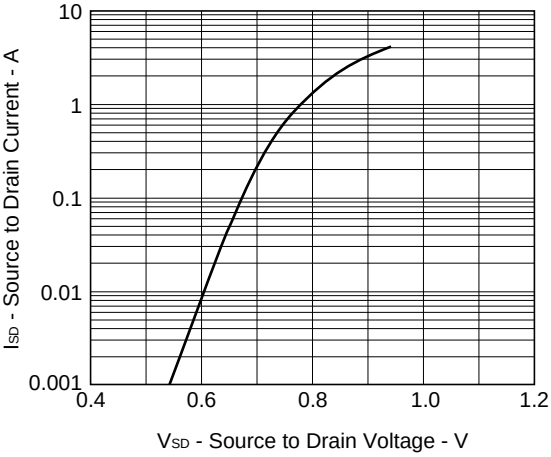
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



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