NEC

MOS FIELD EFFECT TRANSISTOR
2SK1399

N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR HIGH SPEED SWITCHING

DESCRIPTION

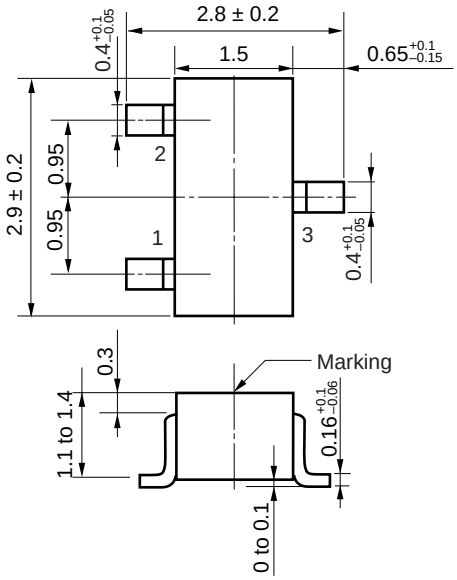
The 2SK1399 is an N-channel vertical type MOS FET which can be driven by 2.5-V power supply.

The 2SK1399 is driven by low voltage and does not require consideration of driving current, it is suitable for appliances including VCR cameras and headphone stereos which need power saving.

FEATURES

- Can be driven by a 3.0-V power source
- Not necessary to consider driving current because of it is high input impedance
- Possible to reduce the number of parts by omitting the bias resistor
- Can be used complementary with the 2SJ185

PACKAGE DRAWING (Unit : mm)



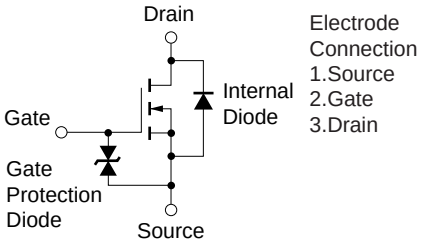
ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK1399	SC-59 (Mini Mold)

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

	Drain to Source Voltage	V_{DSS}	50	V
★	Gate to Source Voltage	V_{GSS}	±7.0	V
	Drain Current (DC)	$I_{D(DC)}$	±100	mA
	Drain Current (pulse) **Note**	$I_{D(pulse)}$	±200	mA
	Total Power Dissipation	P_T	200	mW
	Channel Temperature	T_{ch}	150	°C
	Operating Temperature	T_{opt}	–55 to +80	°C
	Storage Temperature	T_{stg}	–55 to +150	°C

EQUIVALENT CIRCUIT



Marking: G12

Note PW ≤ 10 ms, Duty Cycle ≤ 50 %

Remark Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

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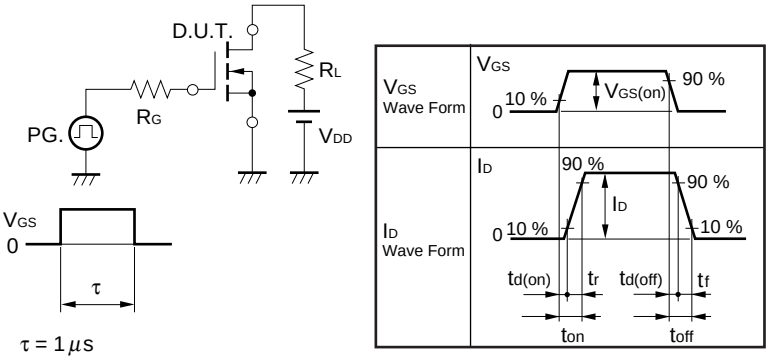
The mark ★ shows major revised points.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

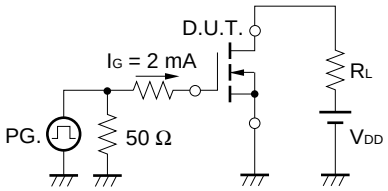
	CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
	Drain Cut-off Current	I_{DSS}	V_{DS} = 50 V, V_{GS} = 0 V			10	μA
★	Gate Leakage Current	I_{GSS}	V_{GS} = ±7.0 V, V_{DS} = 0 V			±5.0	μA
	Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 3.0 V, I_D = 1.0 μA	0.9	1.2	1.5	V
	Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 3.0 V, I_D = 10 mA	20	38		mS
	Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 2.5 V, I_D = 10 mA		22	40	Ω
		$R_{DS(on)2}$	V_{GS} = 4.0 V, I_D = 10 mA		14	20	Ω
	Input Capacitance	C_{iss}	V_{DS} = 3.0 V		8		pF
	Output Capacitance	C_{oss}	V_{GS} = 0 V		7		pF
★	Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		3		pF
	Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 3.0 V		15		ns
	Rise Time	t_r	I_D = 20 mA		100		ns
	Turn-off Delay Time	$t_{d(off)}$	$V_{GS(on)}$ = 3.0 V		30		ns
	Fall Time	t_f	R_G = 10 Ω, R_L = 150 Ω		35		ns

★ **TEST CIRCUIT 1 SWITCHING TIME**



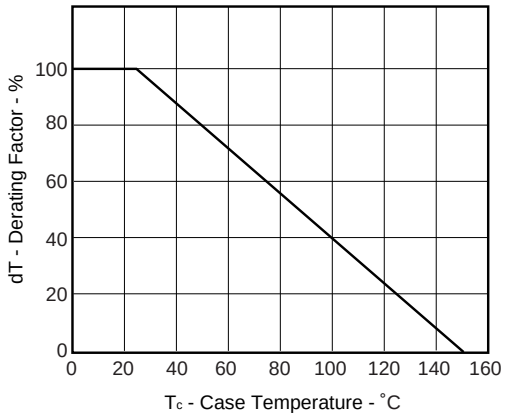
τ = 1 μs
Duty Cycle ≤ 1 %

TEST CIRCUIT 2 GATE CHARGE

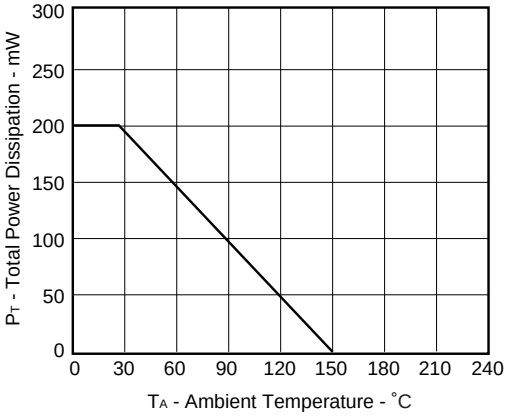


TYPICAL CHARACTERISTICS (T_A = 25°C)

DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



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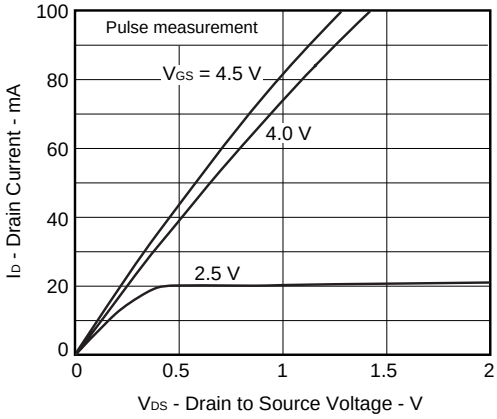
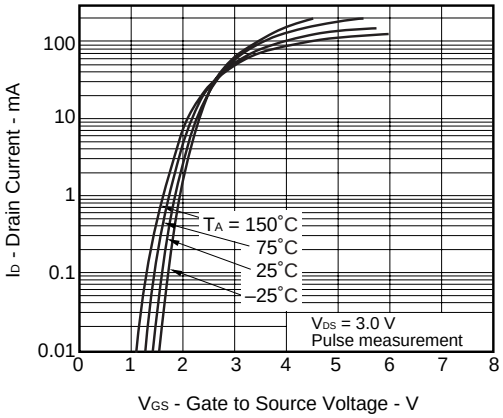
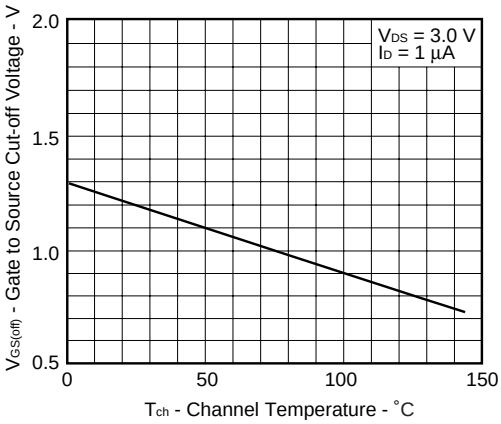
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



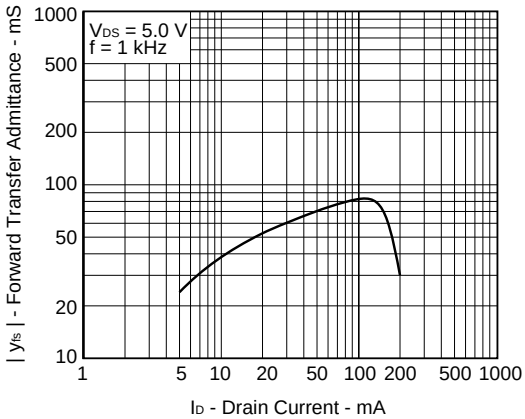
TRANSFER CHARACTERISTICS



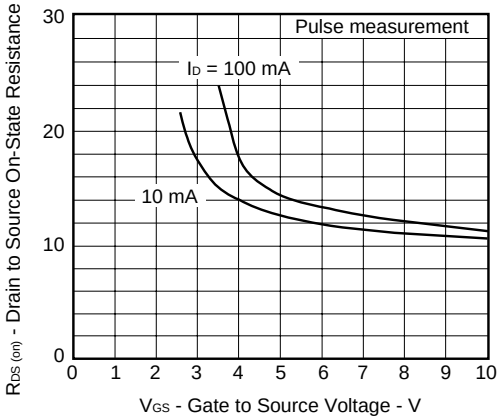
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



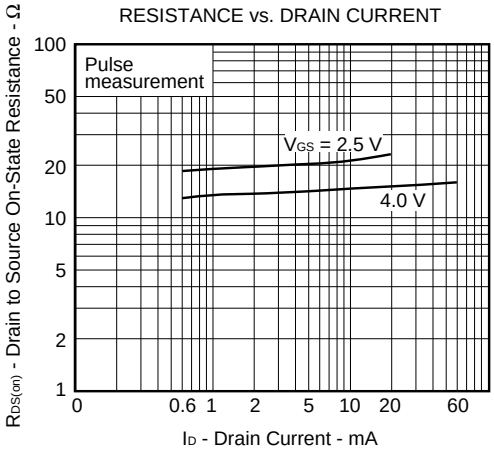
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



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



DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



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