NEC

MOS FIELD EFFECT TRANSISTOR
2SK1658

N-CHANNEL MOS FET
FOR SWITCHING

DESCRIPTION

The 2SK1658 is an N -channel vertical type MOS FET which can be driven by 2.5 V power supply.

As the MOS FET is low Gate Leakage Current, it is suitable for appliances including Filter Circuit.

FEATURES

- Directly driven by ICs having a 3 V power supply.
- Has low Gate Leakage Current

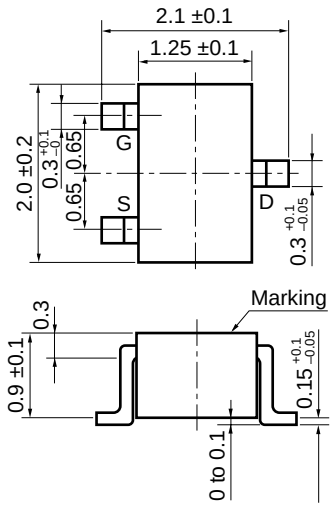
  I_{GSS} = ±5 nA MAX. (V_{GS} = ±3.0 V)

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

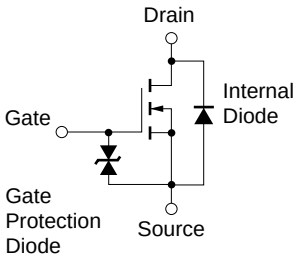
Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	30	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±7	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)}$	±100	mA
Drain Current (pulse) **Note**	$I_{D(pulse)}$	±200	mA
Total Power Dissipation (T_A = 25°C)	P_T	150	mW
Channel Temperature	T_{ch}	150	°C
Operating Temperature	T_{opt}	–55 to +80	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Note. PW ≤ 10 ms, Duty Cycle ≤ 50%

PACKAGE DRAWING (Unit : mm)



EQUIVALENT CIRCUIT



Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device is actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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The mark ★ shows major revised points.

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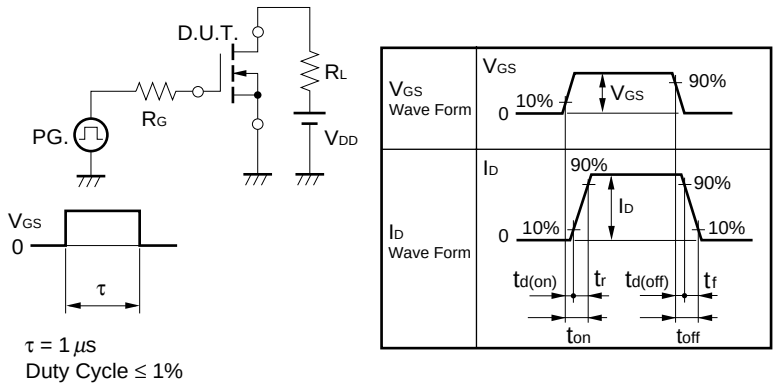
★ ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V			10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±3.0 V, V_{DS} = 0 V			±5.0	nA
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	40		mS
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 2.5 V, I_D = 10 mA		25	45	Ω
	$R_{DS(on)2}$	V_{GS} = 4.0 V, I_D = 10 mA		18	25	Ω
Input Capacitance	C_{iss}	V_{DS} = 3.0 V		15		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		10		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		1.5		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 3.0 V, I_D = 10 mA		50		ns
Rise Time	t_r	V_{GS} = 3.0 V		23		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		34		ns
Fall Time	t_f	R_L = 300 Ω		43		ns

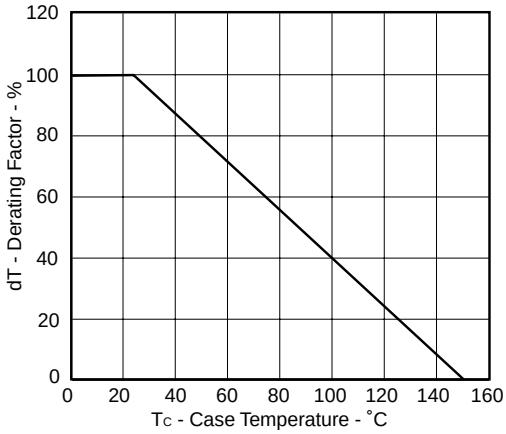
TEST CIRCUIT SWITCHING TIME



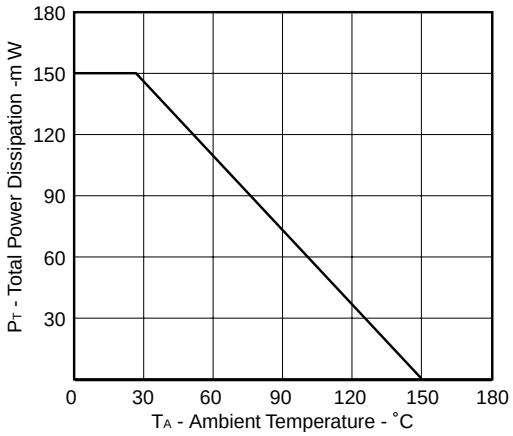
τ = 1 μs
Duty Cycle ≤ 1%

TYPICAL CHARACTERISTICS (T_A = 25°C)

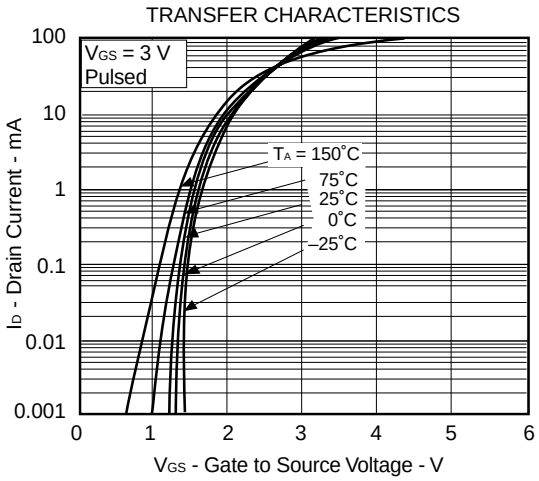
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



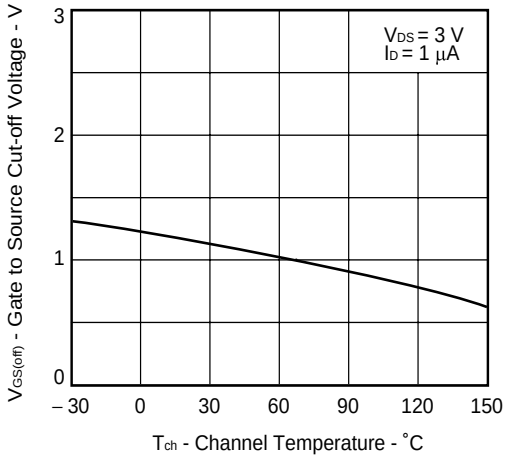
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



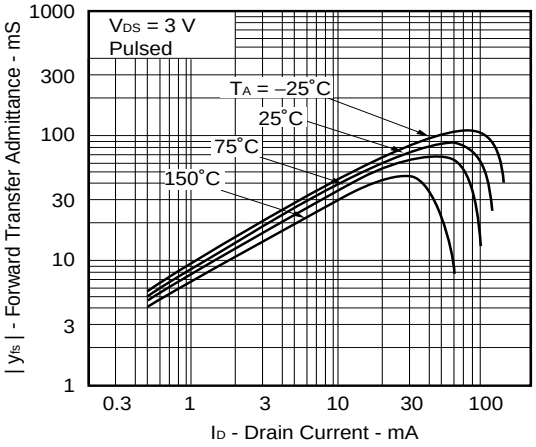
TRANSFER CHARACTERISTICS



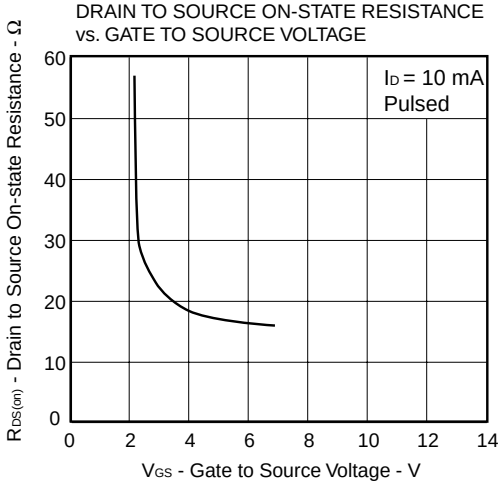
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



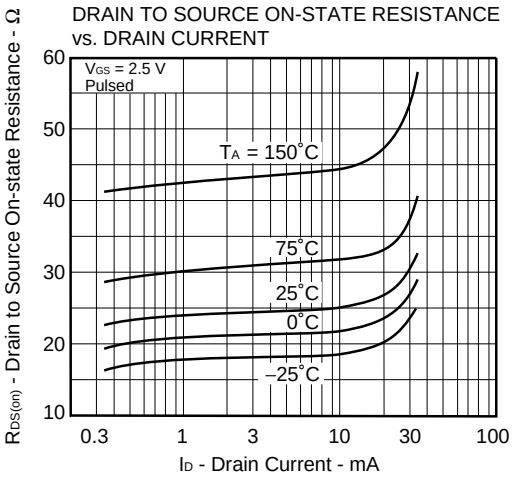
FORWARD TRANSFER ADMMITTANCE vs. DRAIN CURRENT



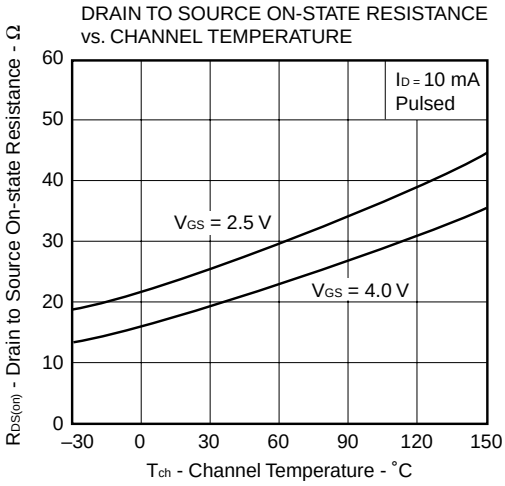
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



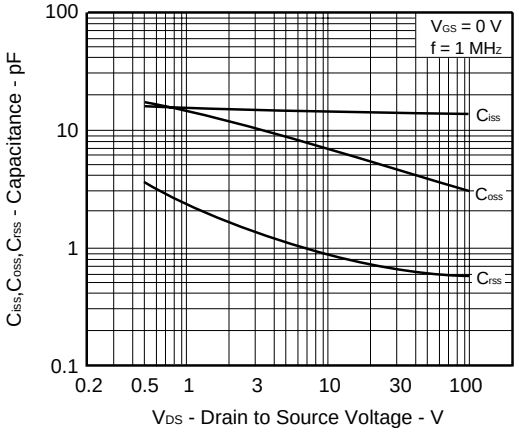
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



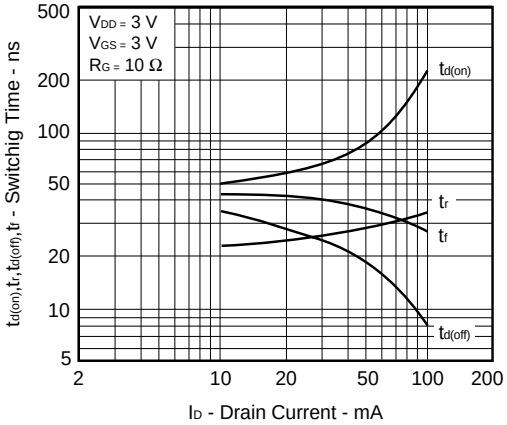
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



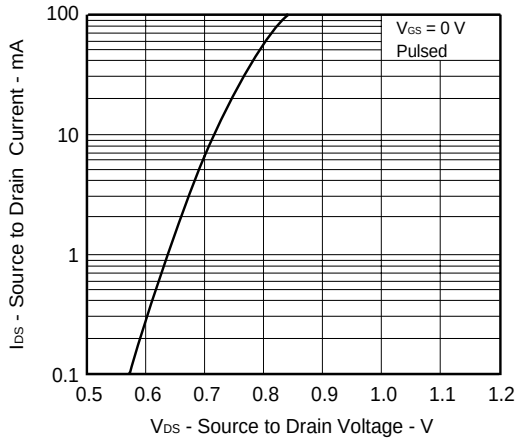
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



RECOMMENDED SOLDERING CONDITIONS

Recommended solder conditions for this product are described below.

For details on recommended soldering conditions, refer to Information Document **"Semiconductor Device Mounting Technology Manual" (C10535E)**.

For soldering methods and conditions other than those recommended, consult NEC.

Surface Mount Type

2SK1658

Soldering Method	Soldering Conditions	Symbol of Recommended Conditions
Infrared reflow	Package peak temperature: 235°C, Time: 30 seconds MAX. (210°C MIN.), Number of times: 3 MAX.	IR35-00-3
VPS	Package peak temperature: 215°C, Time: 40 seconds MAX. (200°C MIN.), Number of times: 3 MAX.	VP15-00-3
Wave soldering	Soldering bath temperature: 260°C MAX., Time: 10 seconds MAX., Number of times: 1, Preheating temperature: 120°C MAX. (package surface temperature)	WS60-00-1

Caution Do not use two or more soldering methods in combination.

[MEMO]

[MEMO]

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