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April 1st, 2010
Renesas Electronics Corporation

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DATA SHEET

RENESAS

# MOS FIELD EFFECT TRANSISTOR
# 2SK1824

## N-CHANNEL MOS FET FOR SWITCHING

### DESCRIPTION

The 2SK1824 is a N-channel vertical type MOS FET that is driven at 2.5 V.

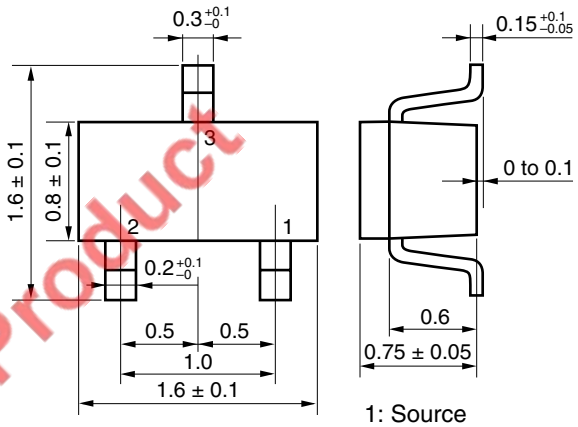
Because this MOS FET can be driven on a low voltage and because it is not necessary to consider the drive current, the 2SK1824 is ideal for driving the actuator of power-saving systems, such as VCR cameras and headphone stereo systems.

Moreover, the 2SK1824 is housed in a super small mini-mold package so that it can help increase the mounting density on the printed circuit board and lower the mounting cost, contributing to miniaturization of the application systems.

### FEATURES

- Small mounting area: about 60% of the conventional mini-mold package (SC-70)
- Can be automatically mounted
- Can be directly driven by 3-V IC

### ★ PACKAGE DRAWING (Unit: mm)



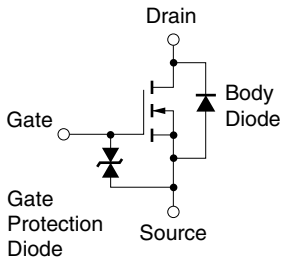

1: Source
2: Gate
3: Drain

### ★ ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|---|---|
| 2SK1824 | SC-75 (USM) |

**Marking: B1**

### EQUIVALENT CIRCUIT




### 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) | $V_{GSS}$ | ±7.0 | V |
| Drain Current (DC) | $I_{D(DC)}$ | ±100 | mA |
| Drain Current (pulse) Note1 | $I_{D(pulse)}$ | ±200 | mA |
| Total Power Dissipation Note2 | $P_T$ | 200 | mW |
| Channel Temperature | $T_{ch}$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | –55 to +150 | °C |

**Notes 1.** PW ≤ 10 ms, Duty Cycle ≤ 50%

**2.** Mounted on ceramic substrate of 3.0 $cm^2$ x 0.64 mm

**Remark** The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device 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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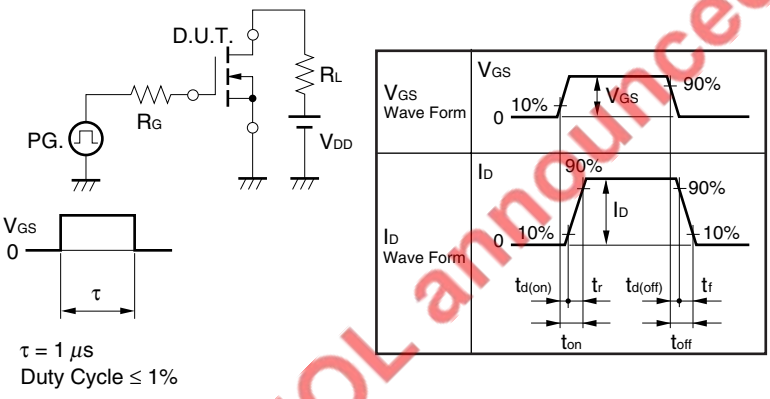
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## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 30 V, $V_{GS}$ = 0 V | | | 1.0 | μA |
| Gate Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±5.0 V, $V_{DS}$ = 0 V | | ±0.1 | ±3.0 | μA |
| Gate Cut-off Voltage | $V_{GS(off)}$ | $V_{DS}$ = 3.0 V, $I_D$ = 10 μA | 0.8 | 1.0 | 1.5 | V |
| Forward Transfer Admittance Note | $\|y_{fs}\|$ | $V_{DS}$ = 3.0 V, $I_D$ = 10 mA | 20 | 50 | | mS |
| Drain to Source On-state Resistance Note | $R_{DS(on)1}$ | $V_{GS}$ = 2.5 V, $I_D$ = 1.0 mA | | 7.0 | 13 | Ω |
| | $R_{DS(on)2}$ | $V_{GS}$ = 4.0 V, $I_D$ = 10 mA | | 5.0 | 8.0 | Ω |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 5.0 V | | 16 | | pF |
| Output Capacitance | $C_{oss}$ | $V_{GS}$ = 0 V | | 14 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | f = 1 MHz | | 2.0 | | pF |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$ = 5.0 V, $I_D$ = 10 mA | | 15 | | ns |
| Rise Time | $t_r$ | $V_{GS}$ = 5.0 V | | 20 | | ns |
| Turn-off Delay Time | $t_{d(off)}$ | $R_G$ = 10 Ω | | 100 | | ns |
| Fall Time | $t_f$ | | | 100 | | ns |

**Note** Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2%

★ **TEST CIRCUIT SWITCHING TIME**




τ = 1 μs
Duty Cycle ≤ 1%

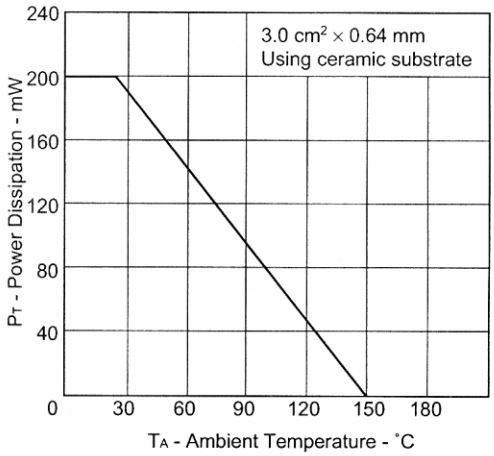
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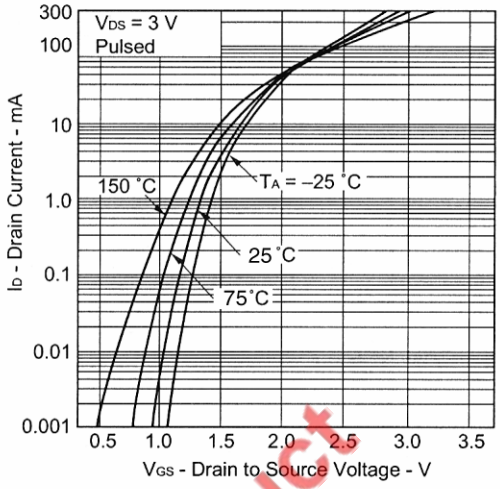
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## TYPICAL CHARACTERISTICS ($T_A$ = 25°C)

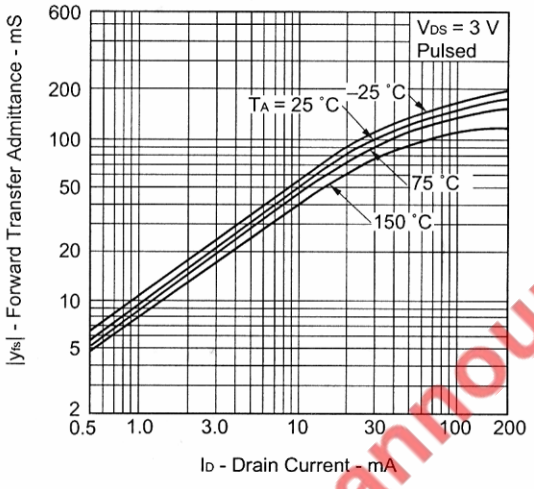
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



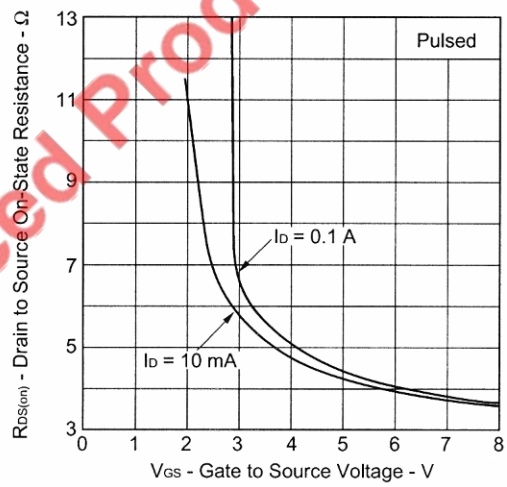

TRANSFER CHARACTERISTICS



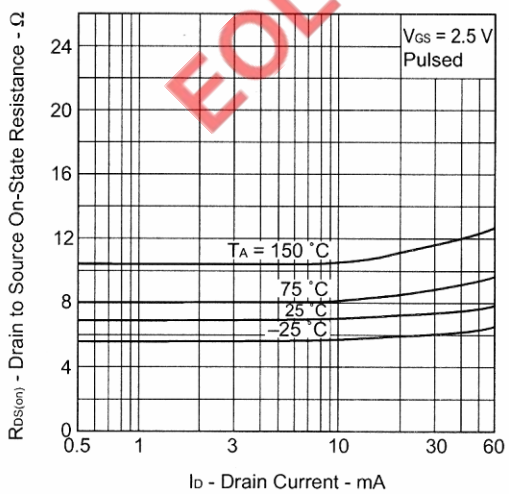

FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



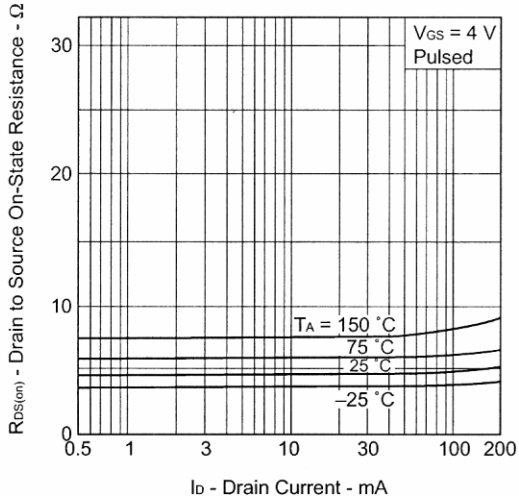

DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE




DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT




DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

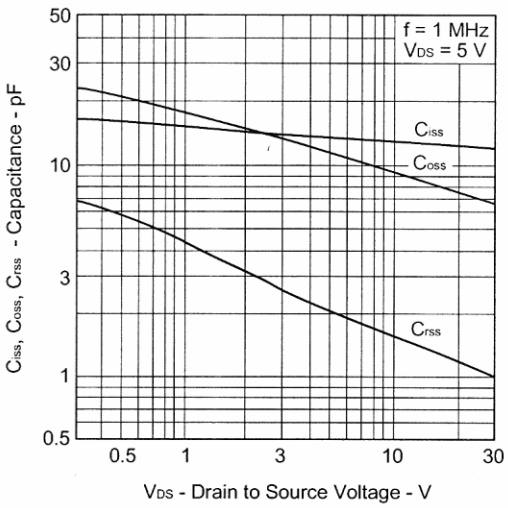



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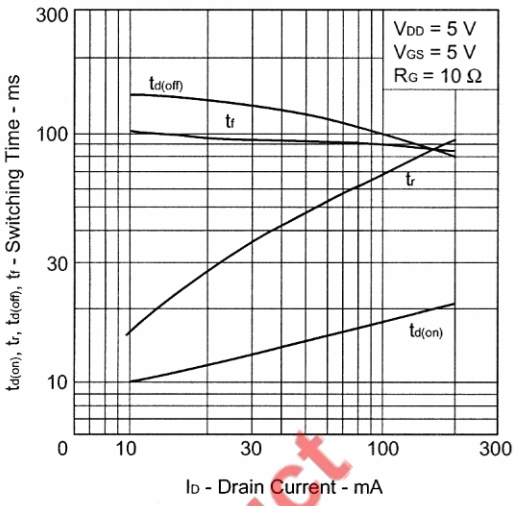


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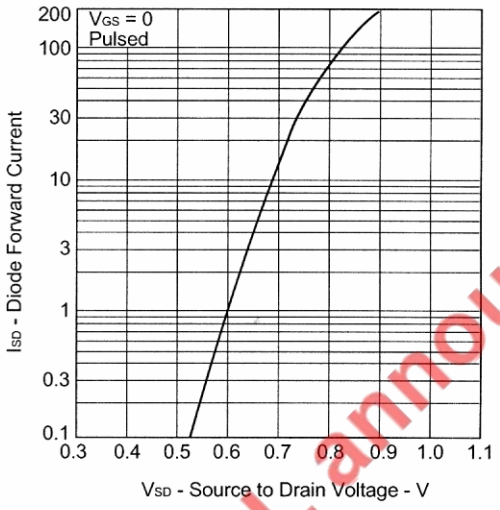
CAPACITANCE vs.
DRAIN TO SOURCE VOLTAGE




SWITCHING CHARACTERISTICS




SOURCE TO DRAIN DIODE
FORWARD VOLTAGE




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