# 2SK3408

## DESCRIPTION

The 2SK3408 is a switching device which can be driven directly by a 4-V power source.

The 2SK3408 features a low on-state resistance and excellent switching characteristics, and is suitable for applications such as power switch of dynamic clamp of relay and so on.

## FEATURES

- Can be driven by a 4-V power source
- Low on-state resistance
  $R_{DS(on)1}$ = 195 mΩ MAX. ($V_{GS}$ = 10 V, $I_D$ = 0.5 A)
  $R_{DS(on)2}$ = 250 mΩ MAX. ($V_{GS}$ = 4.5 V, $I_D$ = 0.5 A)
  $R_{DS(on)3}$ = 260 mΩ MAX. ($V_{GS}$ = 4.0 V, $I_D$ = 0.5 A)
- Built-in G-S protection diode against ESD.

## ORDERING INFORMATION

| PART NUMBER | PACKAGE |
| --- | --- |
| 2SK3408 | SC-96 Mini Mold (Thin Type) |

## PACKAGE DRAWING (Unit : mm)
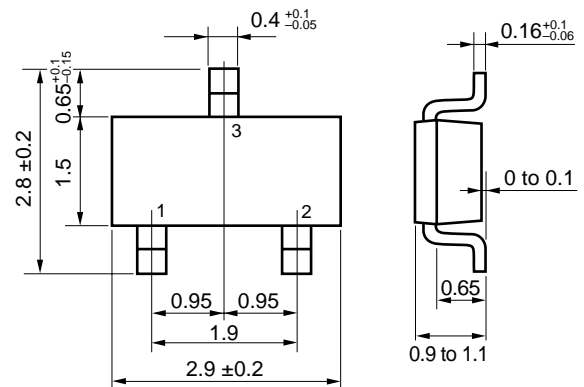


1 : Gate
2 : Source
3 : Drain

## EQUIVALENT CIRCUIT



Marking: XF

## ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C)

| | | | |
| --- | --- | --- | --- |
| Drain to Source Voltage ($V_{GS}$ = 0 V) | $V_{DSS}$ | 43±5 | V |
| Drain to Gate Voltage ($V_{GS}$ = 0 V) | $V_{DGS}$ | 43±5 | V |
| Gate to Source Voltage ($V_{DS}$ = 0 V) | $V_{GSS}$ | ±20 | V |
| Drain Current (DC) ($T_C$ = 25°C) | $I_{D(DC)}$ | ±1.0 | A |
| Drain Current (pulse) **Note1** | $I_{D(pulse)}$ | ±4.0 | A |
| Total Power Dissipation ($T_C$ = 25°C) | $P_{T1}$ | 0.2 | W |
| Total Power Dissipation ($T_A$ = 25°C) **Note2** | $P_{T2}$ | 1.25 | W |
| Channel Temperature | $T_{ch}$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | −55 to +150 | °C |

**Notes 1.** PW ≤ 10 $\mu$s, Duty Cycle ≤ 1%
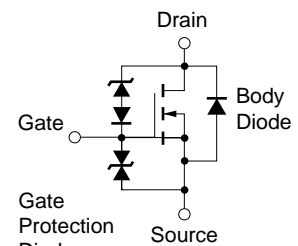**2.** Mounted on FR-4 Board, t ≤ 5 sec.

**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.

# 2SK3408

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

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 30.4 V, $V_{GS}$ = 0 V | | | 10 | $\mu$A |
| Gate Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±16 V, $V_{DS}$ = 0 V | | | ±10 | $\mu$A |
| Gate Cut-off Voltage | $V_{GS(off)}$ | $V_{DS}$ = 10 V, $I_D$ = 1 mA | 1.5 | 2.0 | 2.5 | V |
| Forward Transfer Admittance | $| y_{fs} |$ | $V_{DS}$ = 10 V, $I_D$ = 0.5 A | 1 | 2.0 | | S |
| Drain to Source On-state Resistance | $R_{DS(on)1}$ | $V_{GS}$ = 10 V, $I_D$ = 0.5 A | | 155 | 195 | m$\Omega$ |
| | $R_{DS(on)2}$ | $V_{GS}$ = 4.5 V, $I_D$ = 0.5 A | | 185 | 250 | m$\Omega$ |
| | $R_{DS(on)3}$ | $V_{GS}$ = 4.0 V, $I_D$ = 0.5 A | | 195 | 260 | m$\Omega$ |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 10 V | | 230 | | pF |
| Output Capacitance | $C_{oss}$ | $V_{GS}$ = 0 V | | 50 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | f = 1 MHz | | 30 | | pF |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$ = 20 V | | 18 | | ns |
| Rise Time | $t_r$ | $I_D$ = 0.5 A | | 14 | | ns |
| Turn-off Delay Time | $t_{d(off)}$ | $V_{GS(on)}$ = 10 V | | 115 | | ns |
| Fall Time | $t_f$ | $R_G$ = 10 $\Omega$ | | 38 | | ns |
| Total Gate Charge | $Q_G$ | $V_{DS}$ = 30.4 V | | 4.0 | | nC |
| Gate to Source Charge | $Q_{GS}$ | $I_D$ = 1.0 A | | 1.0 | | nC |
| Gate to Drain Charge | $Q_{GD}$ | $V_{GS}$ = 10 V | | 1.0 | | nC |
| Body Diode Forward Voltage | $V_{F(S-D)}$ | $I_F$ = 1.0 A, $V_{GS}$ = 0 V | | 0.81 | | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$ = 1.0 A, $V_{GS}$ = 0 V | | 25 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | di/dt = 100 A/$\mu$s | | 16 | | nC |

**TEST CIRCUIT 1  SWITCHING TIME**
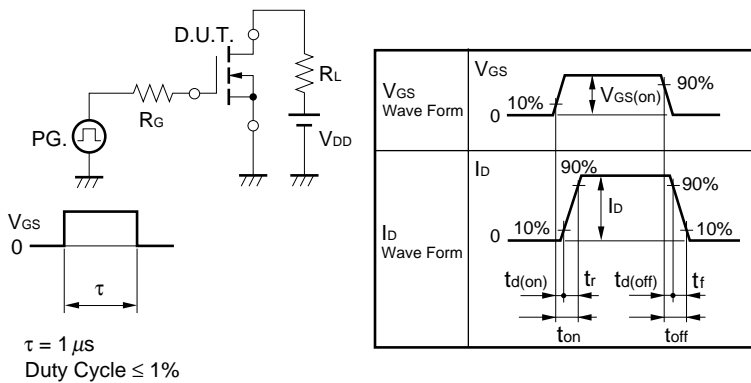
**TEST CIRCUIT 2  GATE CHARGE**



$\tau$ = 1 $\mu$s
Duty Cycle $\leq$ 1%