

N-CHANNEL MOS FIELD EFFECT TRANSISTOR  
FOR SWITCHING

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  
 $R_{DS(on)1} = 195 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 0.5 \text{ A)}$   
 $R_{DS(on)2} = 250 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 0.5 \text{ A)}$   
 $R_{DS(on)3} = 260 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 0.5 \text{ A)}$
- Built-in G-S protection diode against ESD.

ORDERING INFORMATION

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

ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

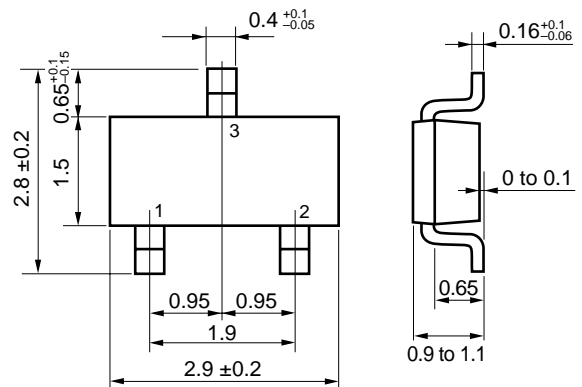
Drain to Source Voltage (V <sub>GS</sub> = 0 V)	V <sub>DSS</sub>	43±5	V
Drain to Gate Voltage (V <sub>GS</sub> = 0 V)	V <sub>DGS</sub>	43±5	V
Gate to Source Voltage (V <sub>DS</sub> = 0 V)	V <sub>GSS</sub>	±20	V
Drain Current (DC) (T <sub>C</sub> = 25°C)	I <sub>D(DC)</sub>	±1.0	A
Drain Current (pulse) <sup>Note1</sup>	I <sub>D(pulse)</sub>	±4.0	A
Total Power Dissipation (T <sub>C</sub> = 25°C)	P <sub>T1</sub>	0.2	W
Total Power Dissipation (T <sub>A</sub> = 25°C) <sup>Note2</sup>	P <sub>T2</sub>	1.25	W
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

- Notes 1. PW ≤ 10 μs, 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.

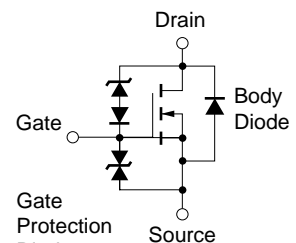
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PACKAGE DRAWING (Unit : mm)



- 1 : Gate  
 2 : Source  
 3 : Drain

EQUIVALENT CIRCUIT

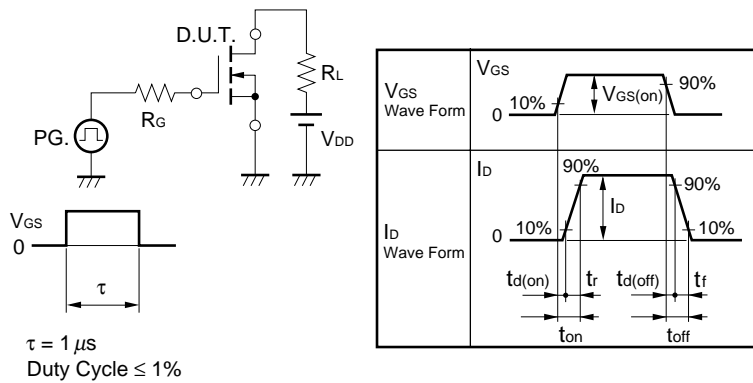


★ Marking: XF

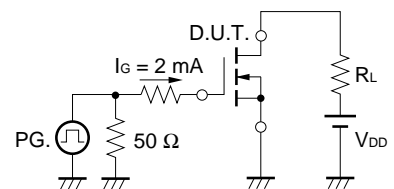
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30.4 V, V <sub>GS</sub> = 0 V			10	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0 V			±10	μA
Gate Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	1.5	2.0	2.5	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.5 A	1	2.0		S
Drain to Source On-state Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.5 A		155	195	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 0.5 A		185	250	mΩ
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = 4.0 V, I <sub>D</sub> = 0.5 A		195	260	mΩ
Input Capacitance	C <sub>iSS</sub>	V <sub>DS</sub> = 10 V		230		pF
Output Capacitance	C <sub>oSS</sub>	V <sub>GS</sub> = 0 V		50		pF
Reverse Transfer Capacitance	C <sub>rSS</sub>	f = 1 MHz		30		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 20 V		18		ns
Rise Time	t <sub>r</sub>	I <sub>D</sub> = 0.5 A		14		ns
Turn-off Delay Time	t <sub>d(off)</sub>	V <sub>GS(on)</sub> = 10 V		115		ns
Fall Time	t <sub>f</sub>	R <sub>G</sub> = 10 Ω		38		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> = 30.4 V		4.0		nC
Gate to Source Charge	Q <sub>GS</sub>	I <sub>D</sub> = 1.0 A		1.0		nC
Gate to Drain Charge	Q <sub>GD</sub>	V <sub>GS</sub> = 10 V		1.0		nC
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 1.0 A, V <sub>GS</sub> = 0 V		0.81		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 1.0 A, V <sub>GS</sub> = 0 V		25		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100 A/μs		16		nC

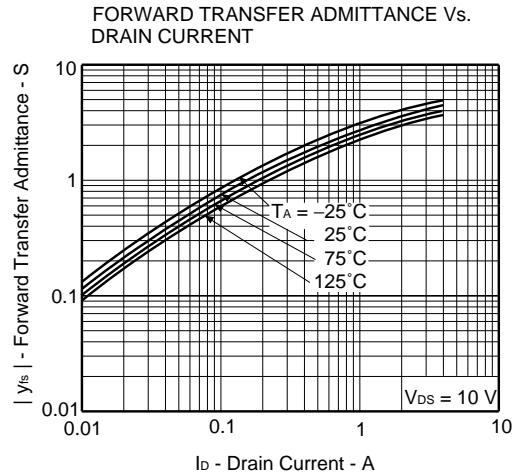
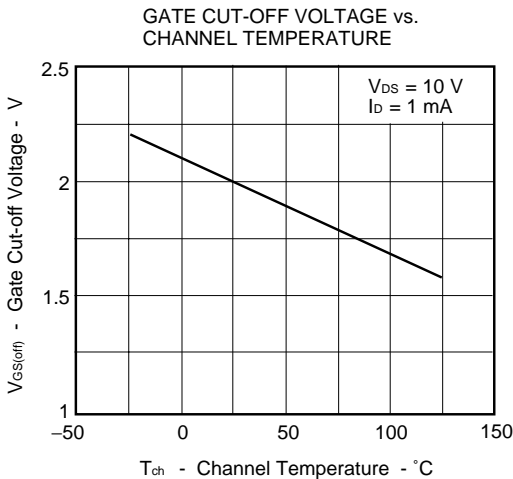
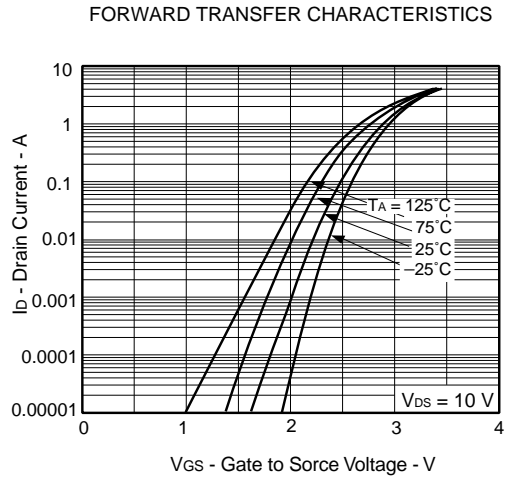
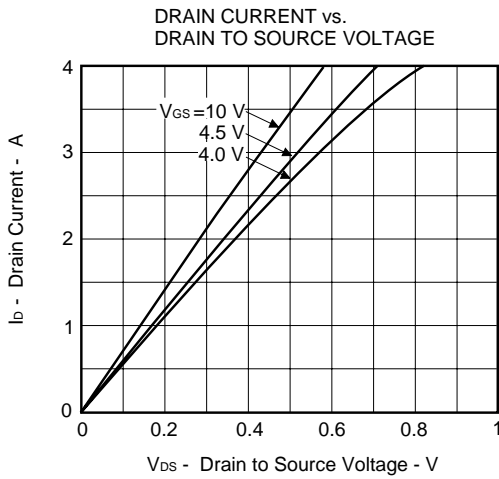
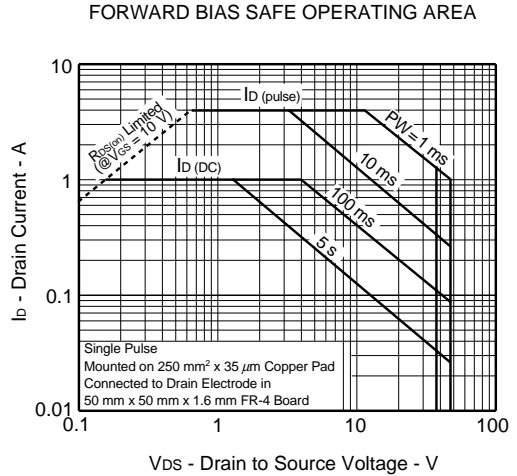
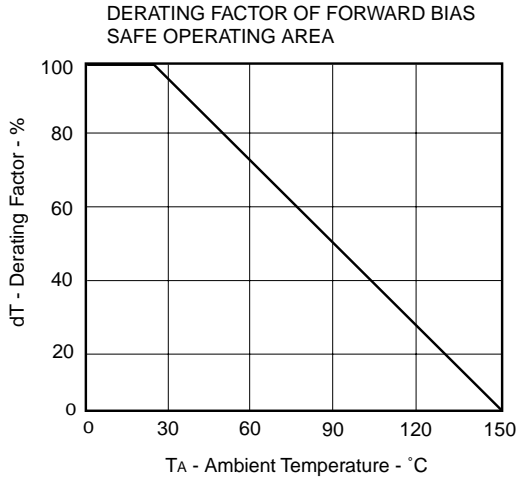
**TEST CIRCUIT 1 SWITCHING TIME**

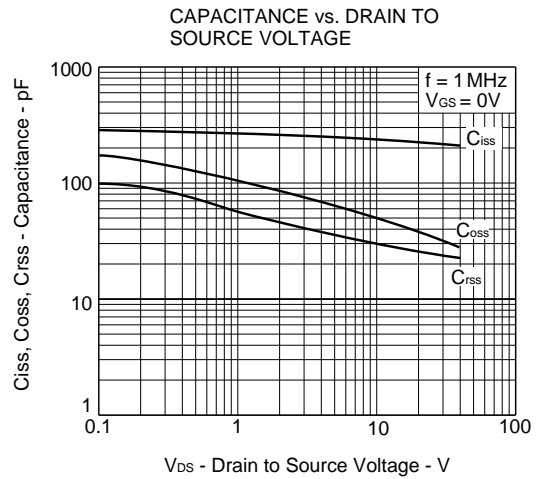
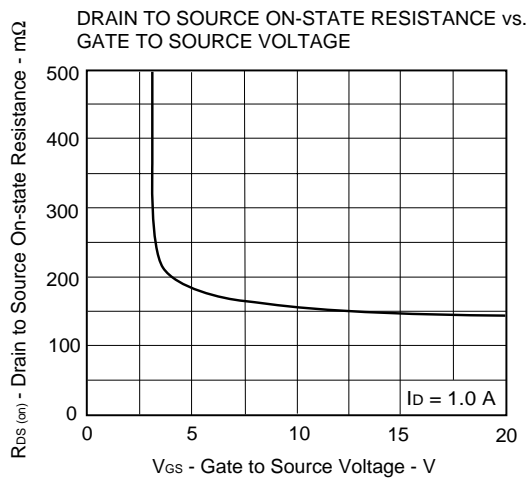
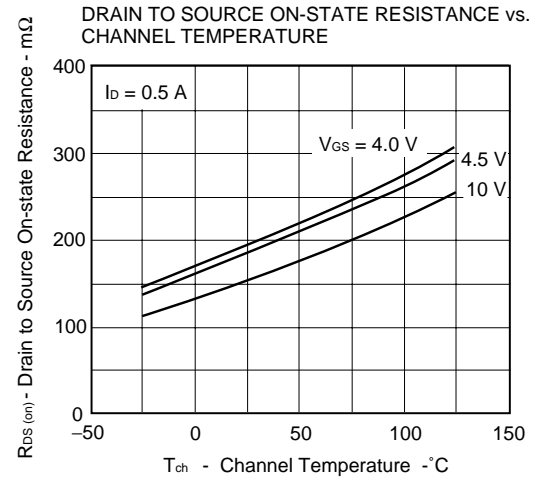
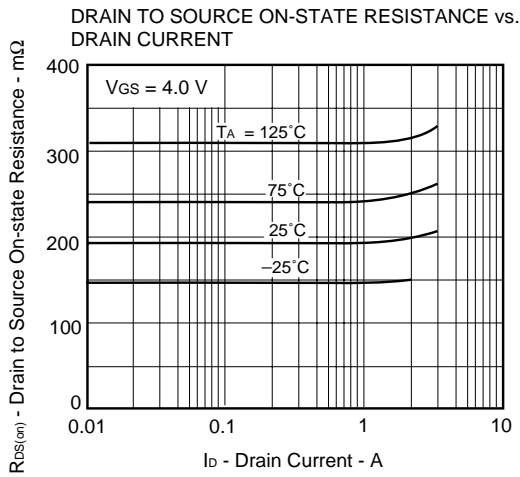
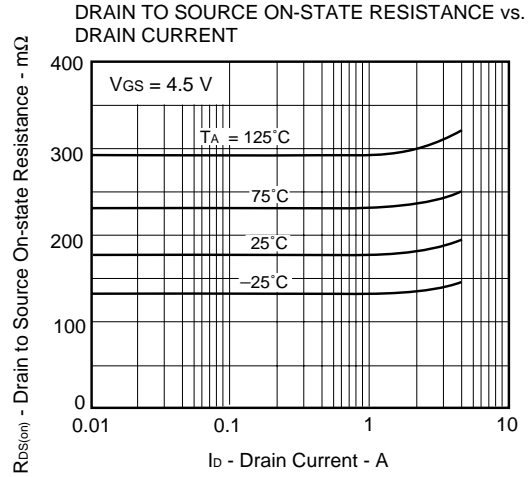
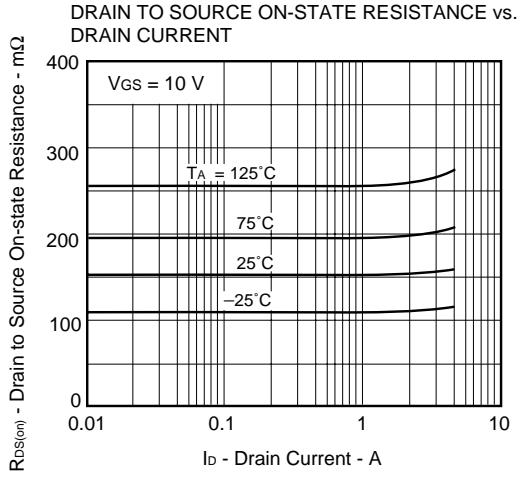


**TEST CIRCUIT 2 GATE CHARGE**

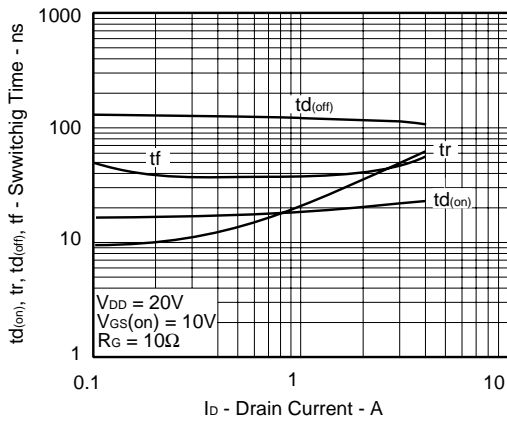


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

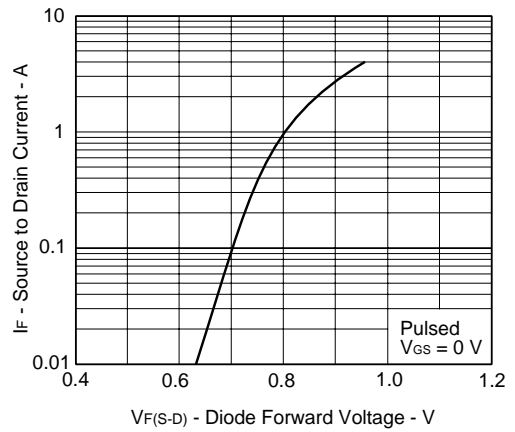




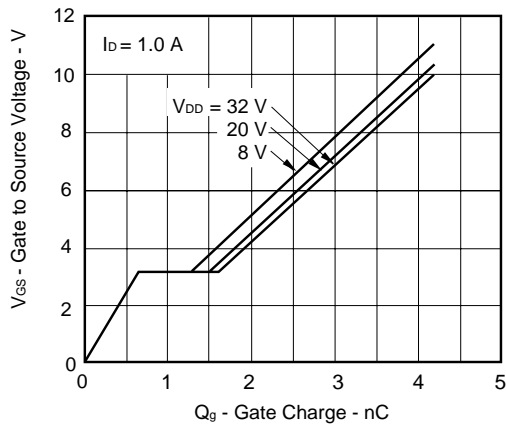
SWITCHING CHARACTERISTICS



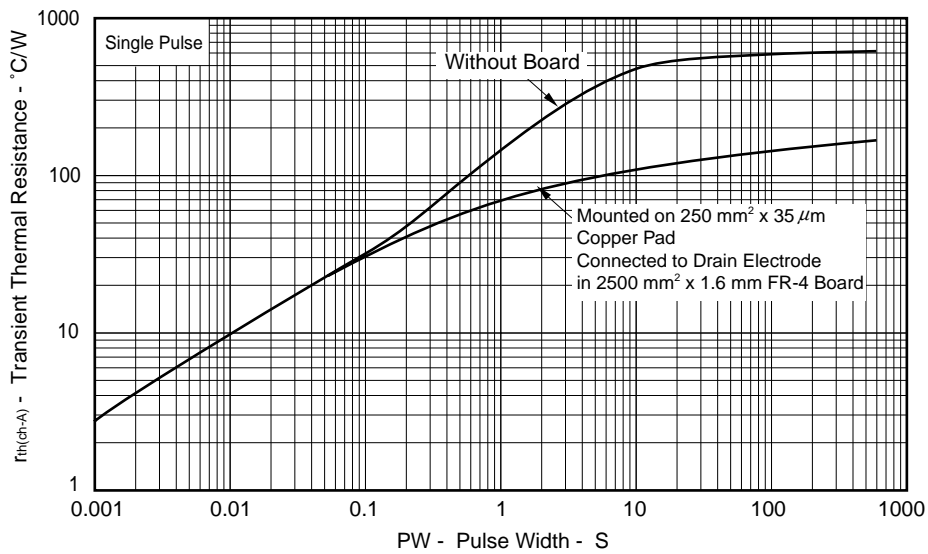
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



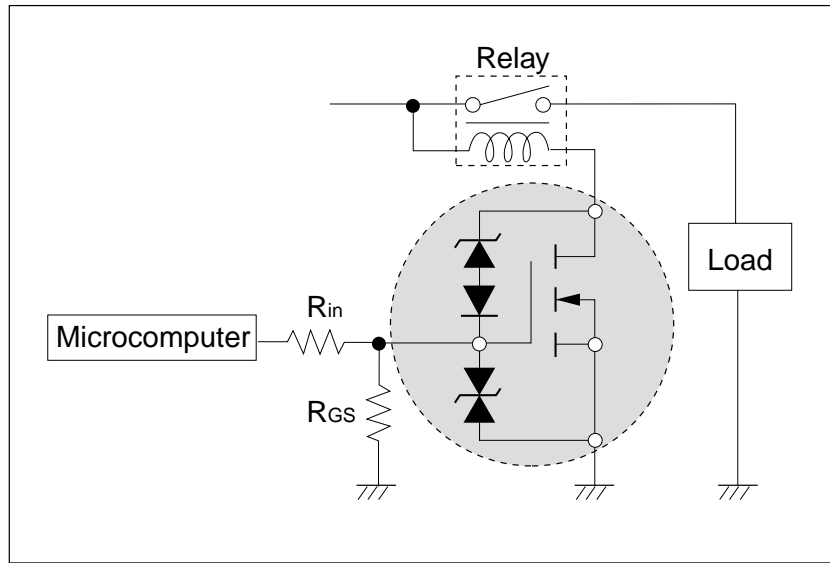
DYNAMIC INPUT CHARACTERISTICS



TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



DYNAMIC CLAMP APPLICATION



- Remarks**
1. Input resistance is necessary to Gate terminal.  
(Range ;  $1k\Omega$  to  $10k\Omega$ , Recommend ;  $3k\Omega$ )
  2. Pull down resistance is necessary between Gate to Source.  
(Several  $10k\Omega$ )

[MEMO]

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