

MOS FIELD EFFECT TRANSISTOR

2SK3408

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 ($T_A = 25^\circ\text{C}$)

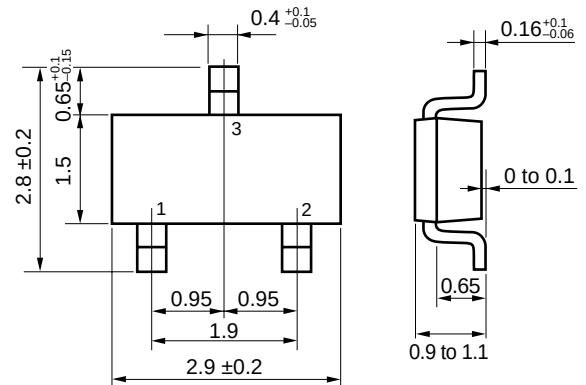
Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	43 ± 5	V
Drain to Gate Voltage ($V_{GS} = 0 \text{ V}$)	V_{DGS}	43 ± 5	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 1.0	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$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

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

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.

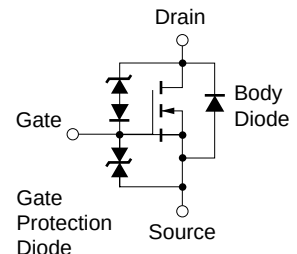
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PACKAGE DRAWING (Unit : mm)



- 1 : Gate
 2 : Source
 3 : Drain

EQUIVALENT CIRCUIT

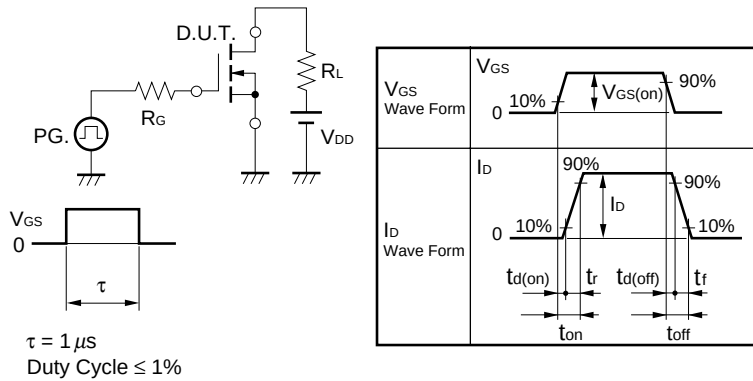


Marking: XF

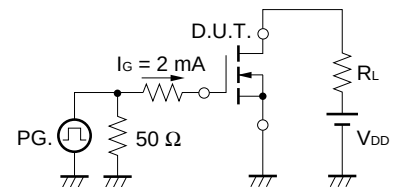
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

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	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V			±10	μA
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	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 0.5 A		185	250	mΩ
	R _{DS(on)3}	V _{GS} = 4.0 V, I _D = 0.5 A		195	260	mΩ
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 Ω		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/μs		16		nC

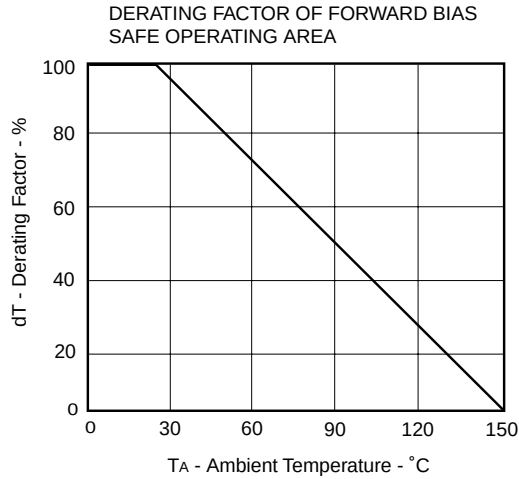
TEST CIRCUIT 1 SWITCHING TIME



TEST CIRCUIT 2 GATE CHARGE

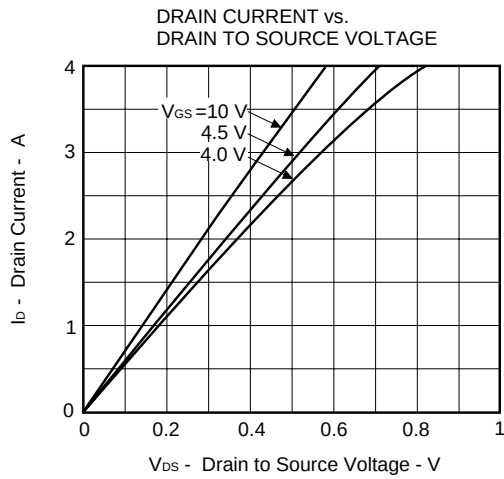
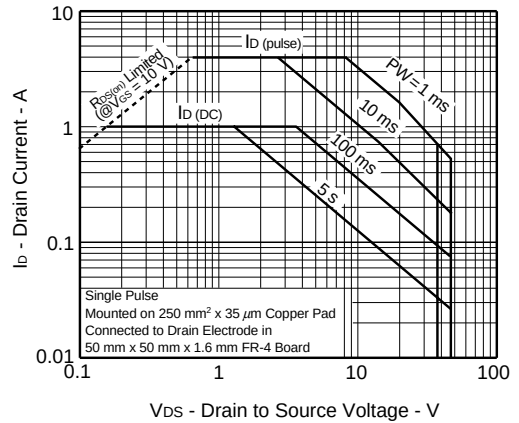


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

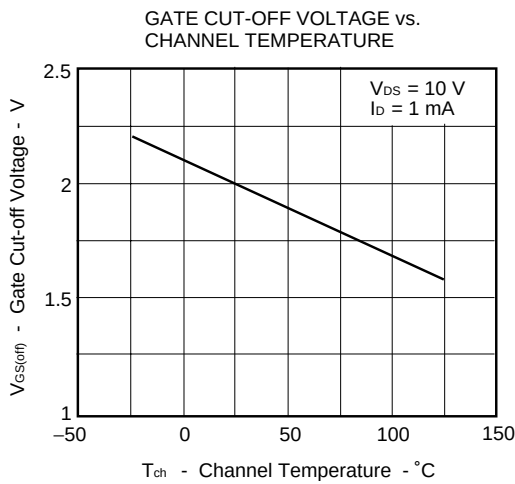
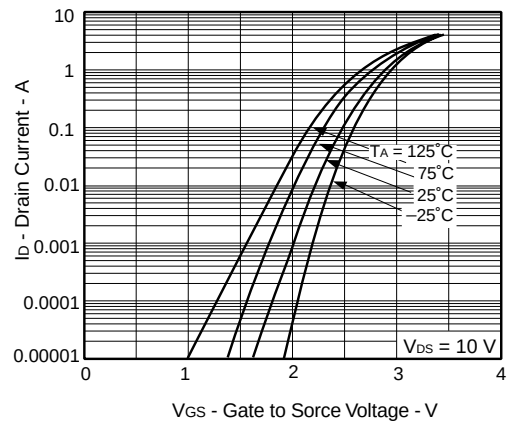


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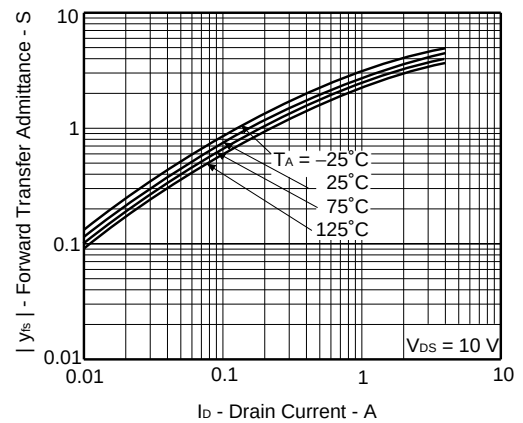
FORWARD BIAS SAFE OPERATING AREA

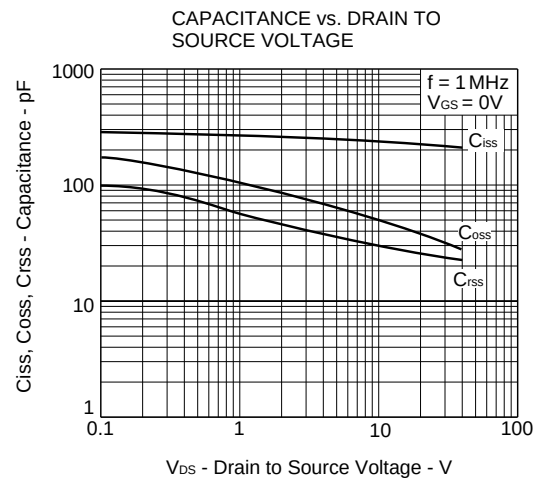
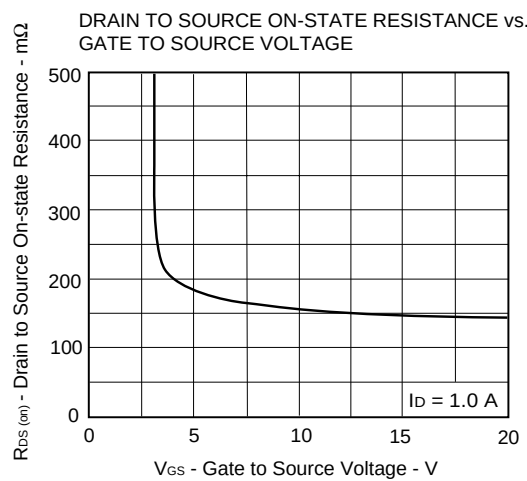
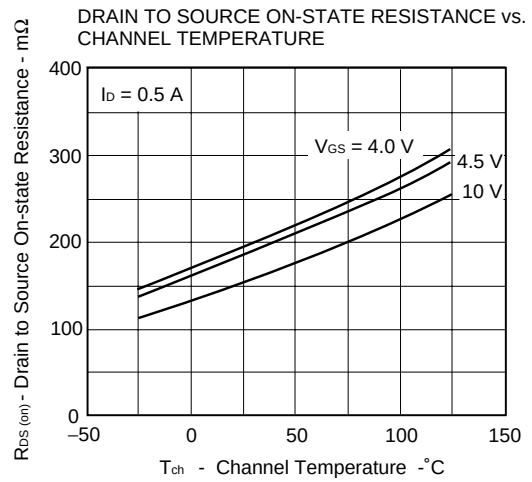
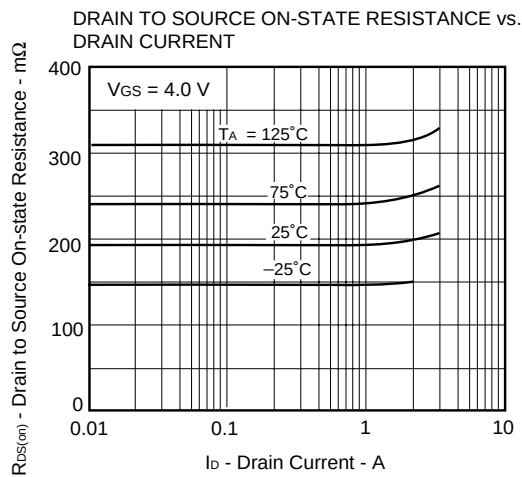
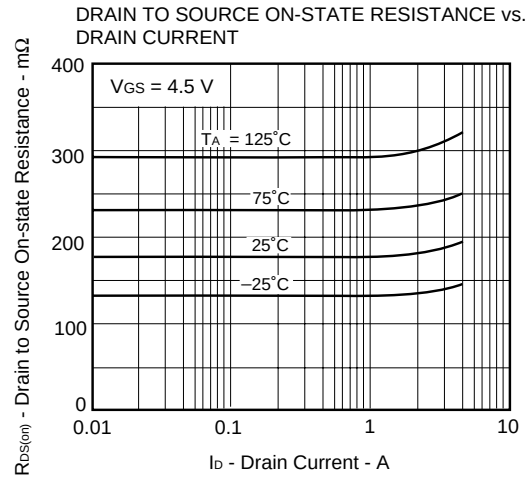
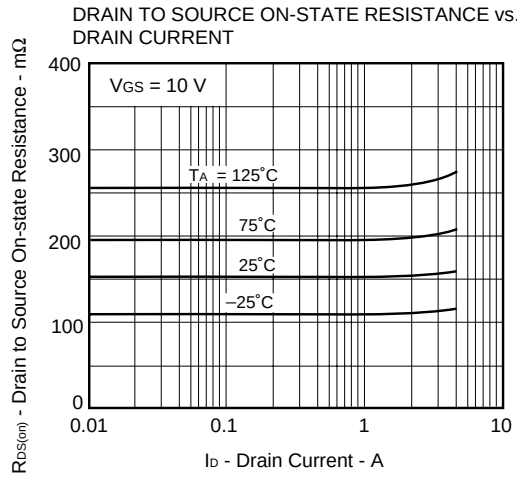


FORWARD TRANSFER CHARACTERISTICS

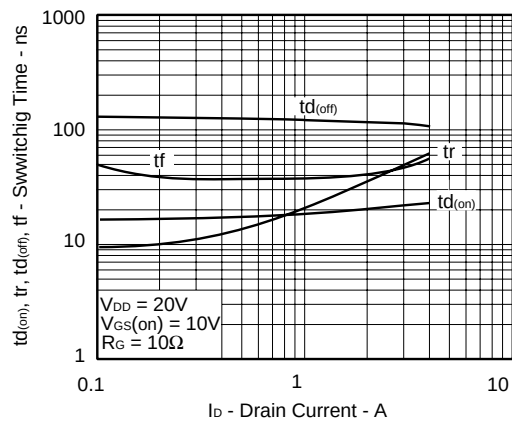


FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT

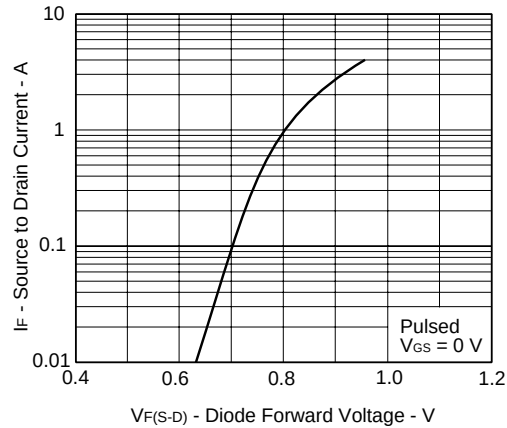




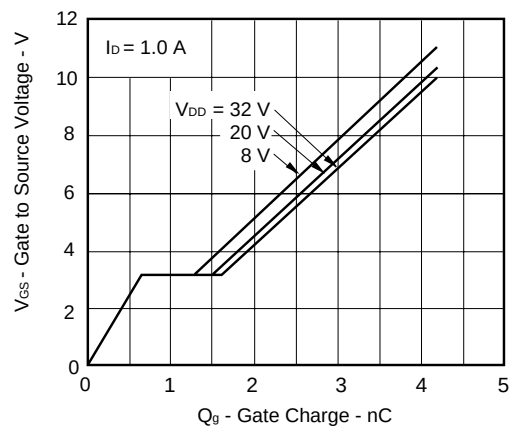
SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

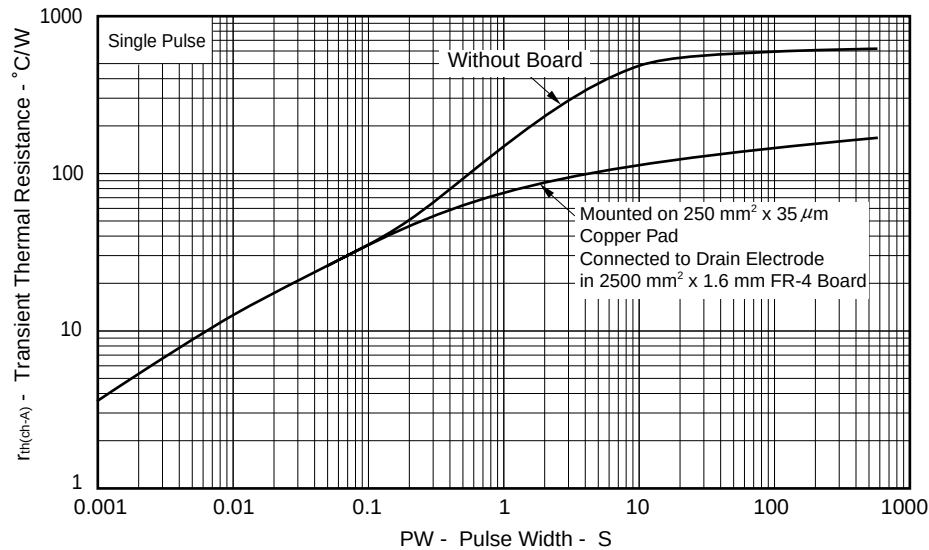


DYNAMIC INPUT CHARACTERISTICS

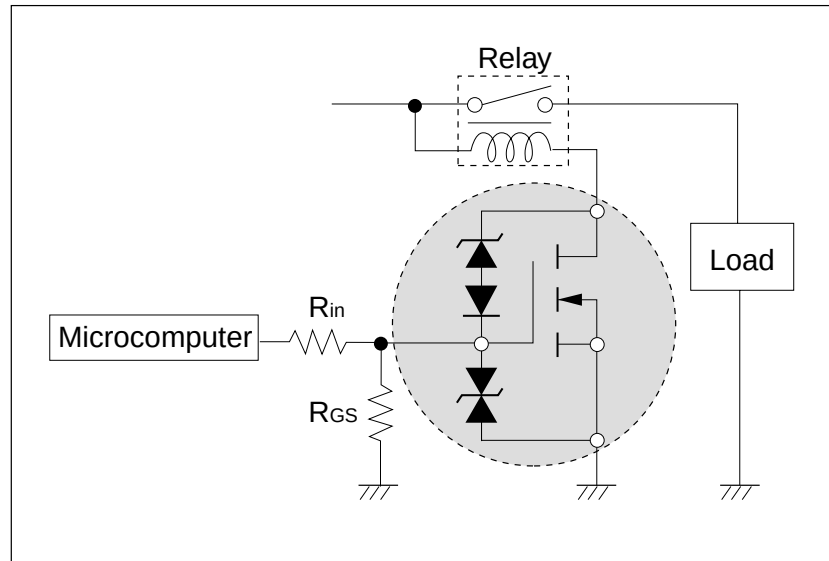


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TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



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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