

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

ORDERING INFORMATION

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

ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

Drain to Source Voltage ($V_{GS} = 0 V$)	Vdss	43±5	V
Drain to Gate Voltage (V _{GS} = 0 V)	Vdgs	43±5	V
Gate to Source Voltage ($V_{DS} = 0 V$)	Vgss	±20	V
Drain Current (DC) (Tc = 25°C)	D(DC)	±1.0	А
Drain Current (pulse) ^{Note1}	D(pulse)	±4.0	А
Total Power Dissipation (Tc = 25°C)	PT1	0.2	W
Total Power Dissipation $(T_A = 25^{\circ}C)^{Note2}$	P _{T2}	1.25	W
Channel Temperature	Tch	150	°C
Storage Temperature	Tstg	–55 to +150	°C

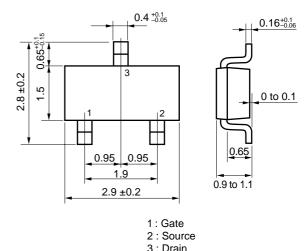
Notes 1. PW \leq 10 μ s, Duty Cycle \leq 1%

- **2.** Mounted on FR-4 Board, $t \le 5$ 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.

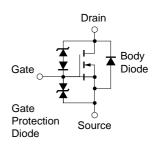
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PACKAGE DRAWING (Unit : mm)



EQUIVALENT CIRCUIT

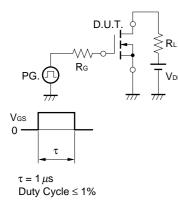


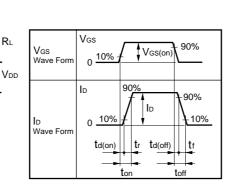
Marking: XF

ELECTRICAL CHARACTERISTICS (TA = 25°C)

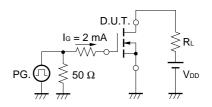
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	IDSS	Vds = 30.4 V, Vgs = 0 V			10	μA
Gate Leakage Current	lgss	$V_{GS} = \pm 16 V$, $V_{DS} = 0 V$			±10	μA
Gate Cut-off Voltage	VGS(off)	$V_{DS} = 10 V, I_{D} = 1 mA$	1.5	2.0	2.5	V
Forward Transfer Admittance	y _{fs}	$V_{DS} = 10 V$, $I_D = 0.5 A$	1	2.0		S
Drain to Source On-state Resistance	RDS(on)1	Vgs = 10 V, Id = 0.5 A		155	195	mΩ
	RDS(on)2	$V_{GS} = 4.5 \text{ V}, \text{ ID} = 0.5 \text{ A}$		185	250	mΩ
	RDS(on)3	$V_{GS} = 4.0 \text{ V}, \text{ Id} = 0.5 \text{ A}$		195	260	mΩ
Input Capacitance	Ciss	V _{DS} = 10 V		230		pF
Output Capacitance	Coss	Vgs = 0 V		50		pF
Reverse Transfer Capacitance	Crss	f = 1 MHz		30		pF
Turn-on Delay Time	td(on)	Vdd = 20 V		18		ns
Rise Time	tr	ID = 0.5 A		14		ns
Turn-off Delay Time	td(off)	$V_{GS(on)} = 10 V$		115		ns
Fall Time	tr	R _G = 10 Ω		38		ns
Total Gate Charge	QG	V _{DS} = 30.4 V		4.0		nC
Gate to Source Charge	Q _{GS}	ID = 1.0 A		1.0		nC
Gate to Drain Charge	Qgd	Vgs = 10 V		1.0		nC
Body Diode Forward Voltage	VF(S-D)	IF = 1.0 A, VGS = 0 V		0.81		V
Reverse Recovery Time	trr	IF = 1.0 A, VGS = 0 V		25		ns
Reverse Recovery Charge	Qrr	di/dt = 100 A/ <i>μ</i> s		16		nC

TEST CIRCUIT 1 SWITCHING TIME





TEST CIRCUIT 2 GATE CHARGE





1.5

1

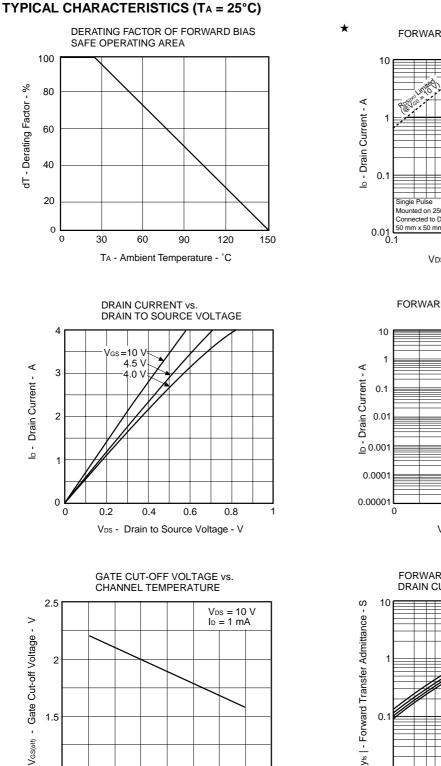
-50

0

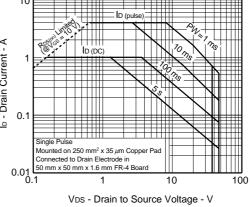
 T_{ch}

50

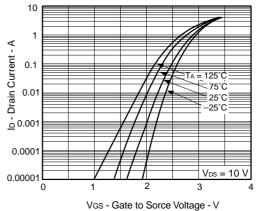
- Channel Temperature - °C



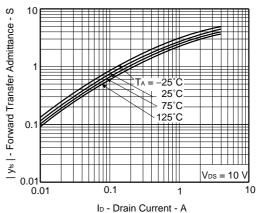
FORWARD BIAS SAFE OPERATING AREA



FORWARD TRANSFER CHARACTERISTICS



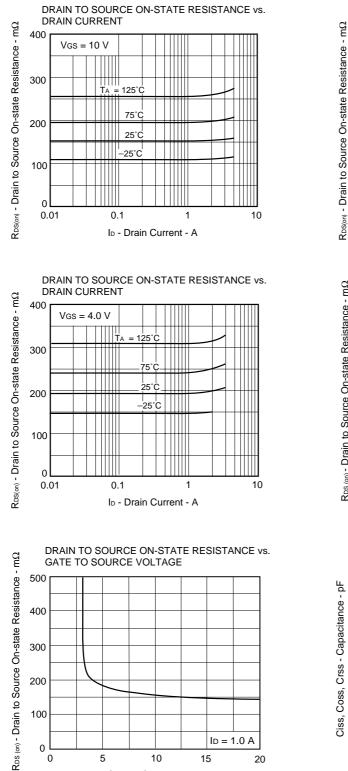
FORWARD TRANSFER ADMITTANCE Vs. DRAIN CURRENT



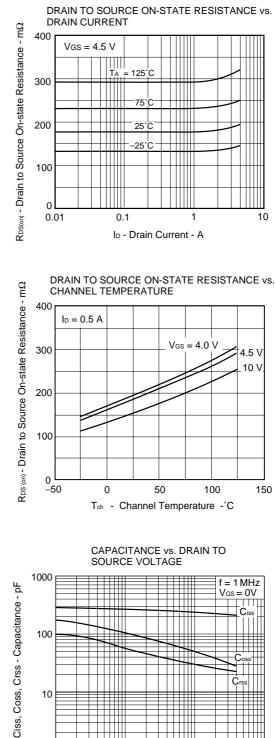
150

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100



VGS - Gate to Source Voltage - V



V_{DS} - Drain to Source Voltage - V

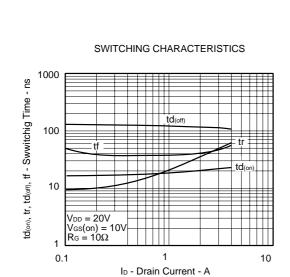
10

100

Data Sheet D15016EJ3V0DS

1

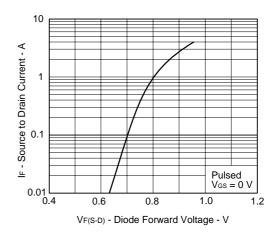
0.1



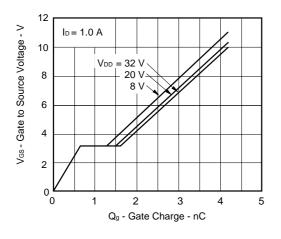
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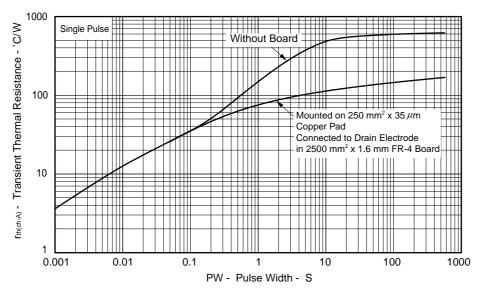
SOURCE TO DRAIN DIODE FORWARD VOLTAGE





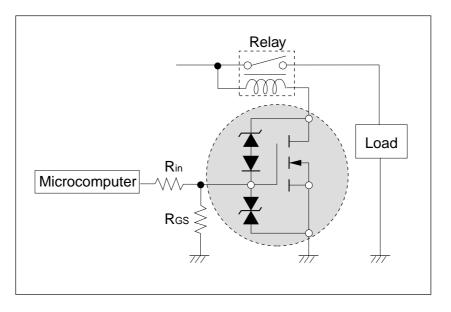






Data Sheet D15016EJ3V0DS

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 $10k\Omega$)

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[MEMO]

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