

MOS FIELD EFFECT TRANSISTOR 2SK3110

SWITCHING N-CHANNEL POWER MOS FET INDUSTRIAL USE

DESCRIPTION

The 2SK3110 is N channel MOS FET device that features a low on-state resistance and excellent switching characteristics, and designed for high voltage applications such as DC/DC converter, actuator driver.

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3110	Isolated TO-220

FEATURES

- Gate voltage rating ± 30 V
- Low on-state resistance
 $R_{DS(on)} = 180 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 7.0 \text{ A)}$
- Low input capacitance
 $C_{iss} = 1000 \text{ pF TYP. (} V_{DS} = 10 \text{ V, } V_{GS} = 0 \text{ V)}$
- Built-in gate protection diode
- Avalanche capability rated
- Isolated TO-220 package

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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	200	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 30	V
Drain Current(DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 14	A
Drain Current(pulse) ^{Note1}	$I_{D(pulse)}$	± 42	A
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T1}	2.0	W
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T2}	35	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$
Single Avalanche Current ^{Note2}	I_{AS}	14	A
Single Avalanche Energy ^{Note2}	E_{AS}	98	mJ

Note1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1 \%$

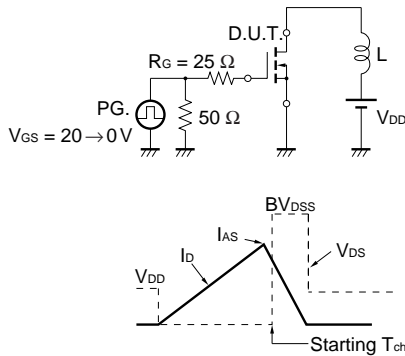
2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 100 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \text{ V} \rightarrow 0 \text{ V}$

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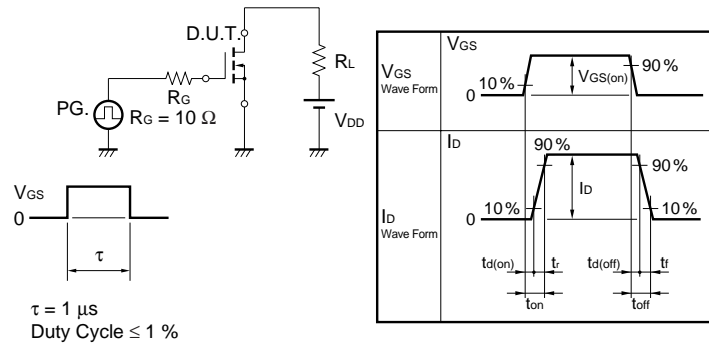
ELECTRICAL CHARACTERISTICS (TA = 25°C)

Characteristics	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Drain Leakage Current	I_{DSS}	$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}$			100	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$			± 10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	2.5		4.5	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 7.0\text{ A}$	3.0			S
Drain to Source On-state Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 7.0\text{ A}$		120	180	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}$		1000		pF
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$		300		pF
Reverse Transfer Capacitance	C_{rss}	$f = 1\text{ MHz}$		150		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 100\text{ V}, I_D = 7.0\text{ A}$		25		ns
Rise Time	t_r	$V_{GS(on)} = 10\text{ V}$		70		ns
Turn-off Delay Time	$t_{d(off)}$	$R_G = 10\ \Omega$		80		ns
Fall Time	t_f			40		ns
Total Gate Charge	Q_G	$V_{DD} = 160\text{ V}$		40		nC
Gate to Source Charge	Q_{GS}	$V_{GS} = 10\text{ V}$		7		nC
Gate to Drain Charge	Q_{GD}	$I_D = 14\text{ A}$		25		nC
Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 14\text{ A}, V_{GS} = 0\text{ V}$		1.0		V
Reverse Recovery Time	t_{rr}	$I_F = 14\text{ A}, V_{GS} = 0\text{ V}$		300		ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 50\text{ A}/\mu\text{s}$		1.5		μC

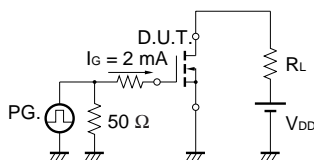
TEST CIRCUIT 1 AVALANCHE CAPABILITY



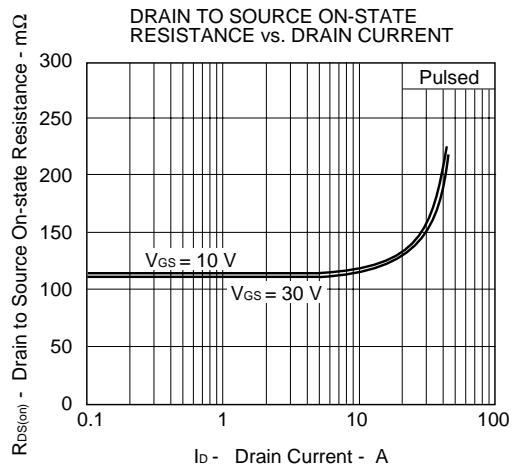
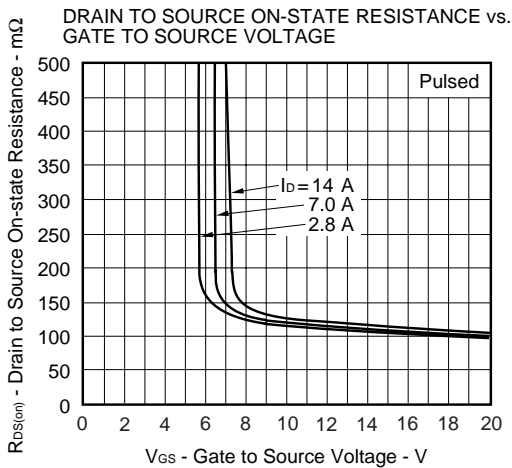
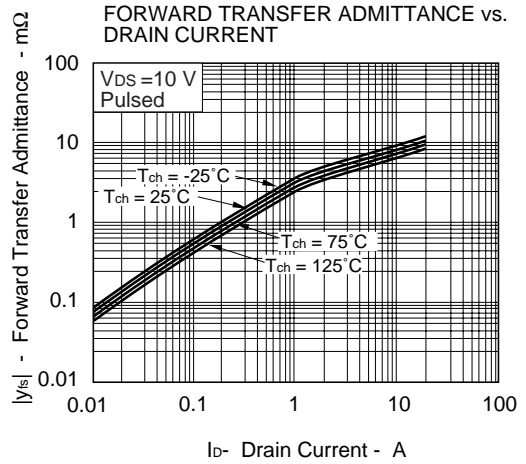
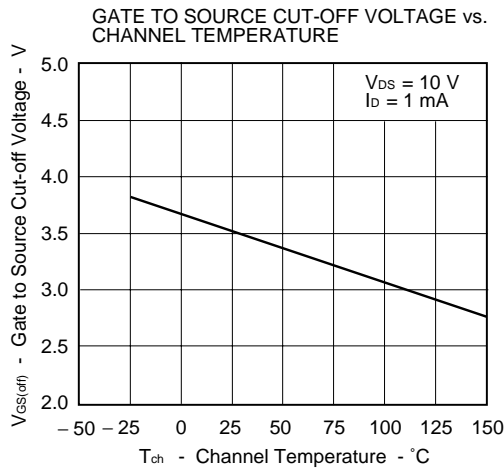
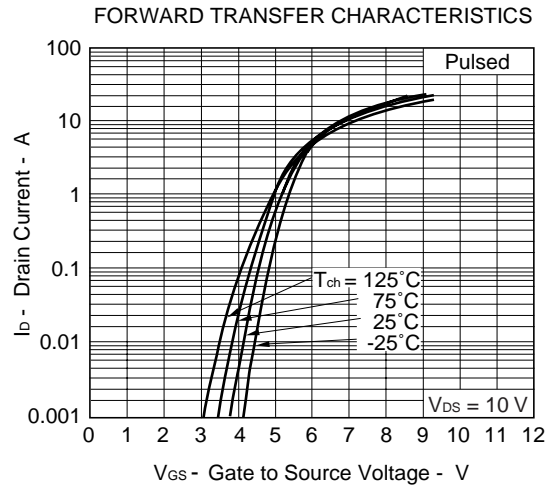
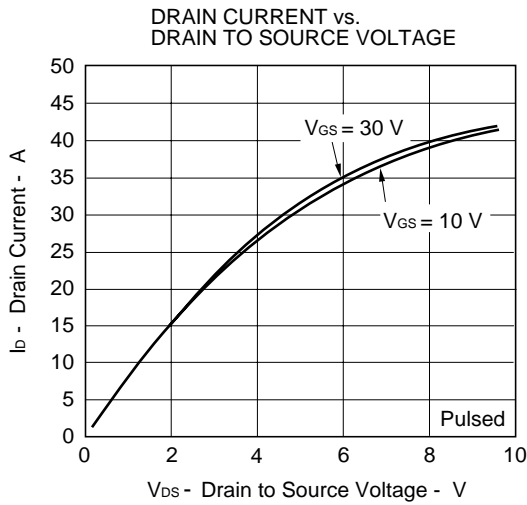
TEST CIRCUIT 2 SWITCHING TIME

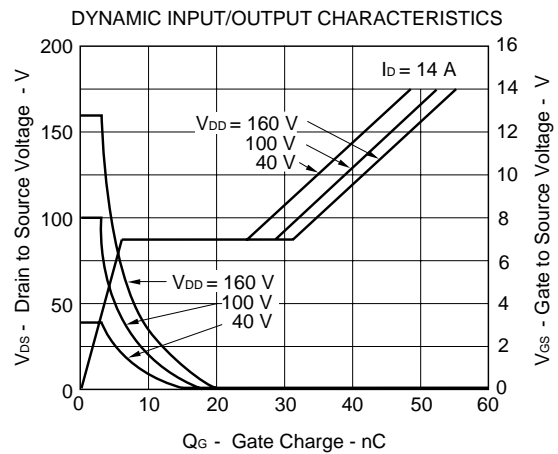
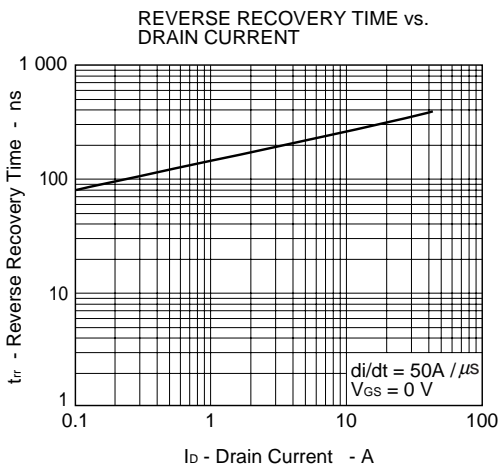
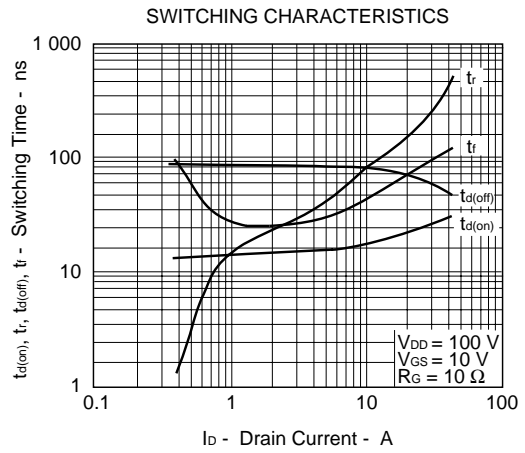
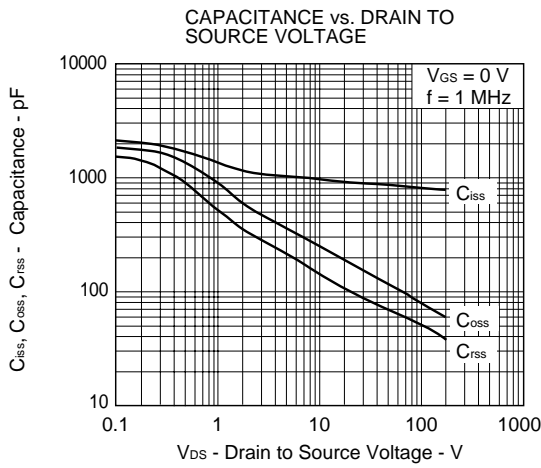
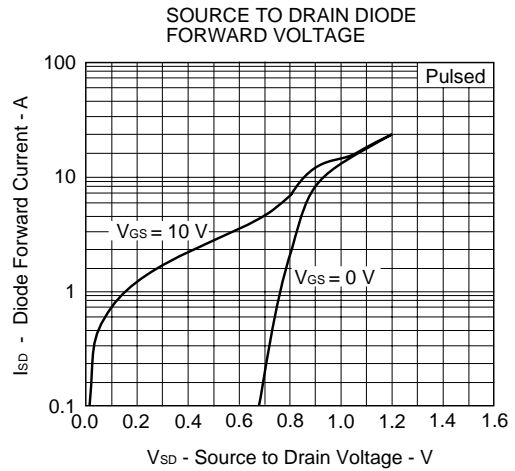
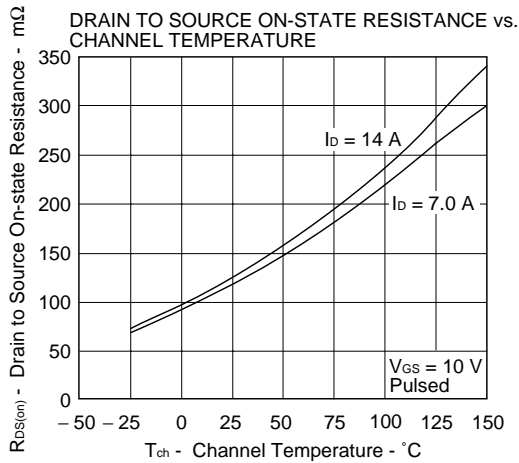


TEST CIRCUIT 3 GATE CHARGE

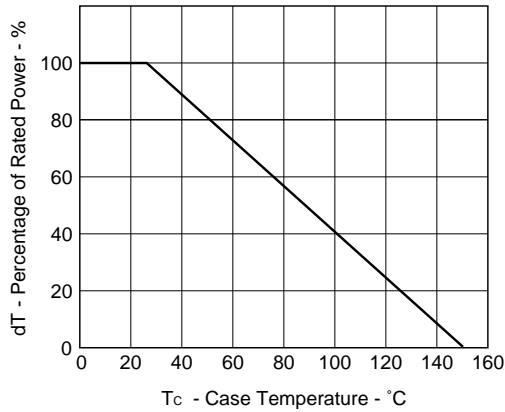


★ TYPICAL CHARACTERISTICS (T_A = 25°C)

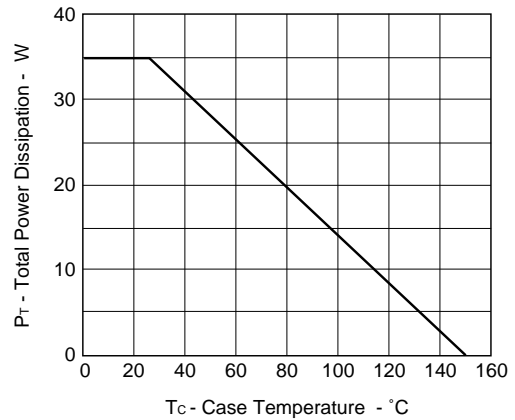




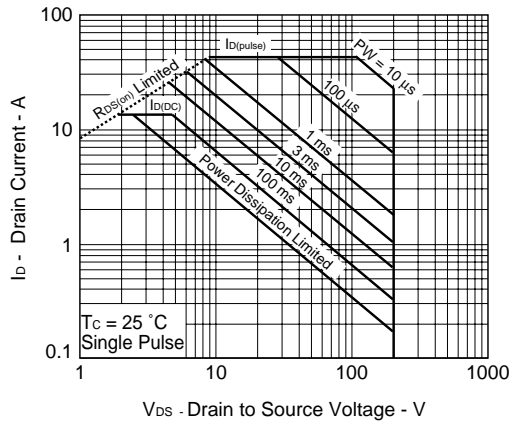
DERATING FACTOR OF FORWARD BIAS
SAFE OPERATING AREA



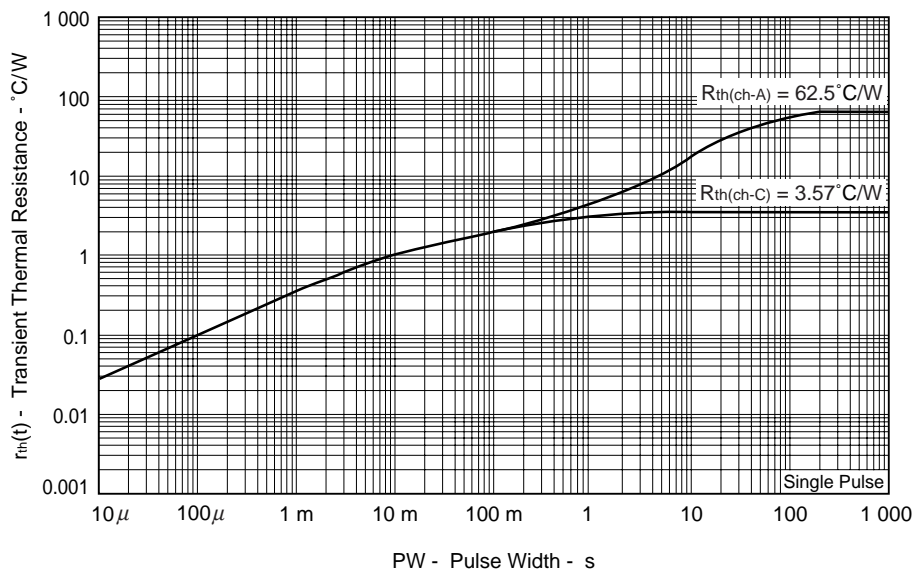
TOTAL POWER DISSIPATION vs.
CASE TEMPERATURE

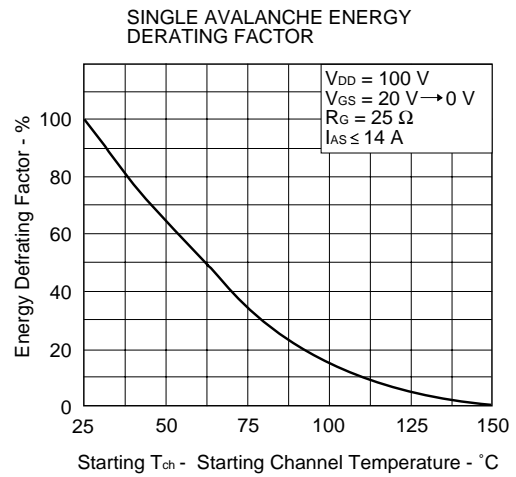
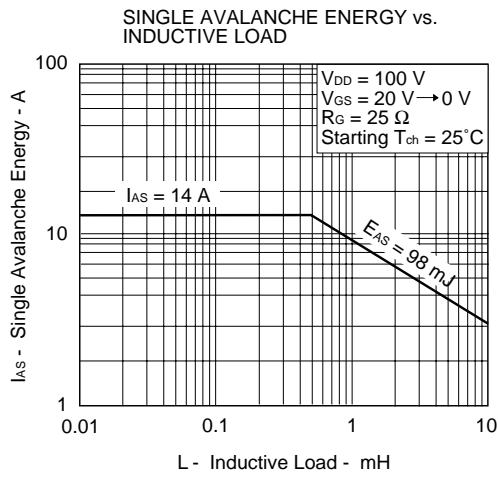


FORWARD BIAS SAFE OPERATING AREA



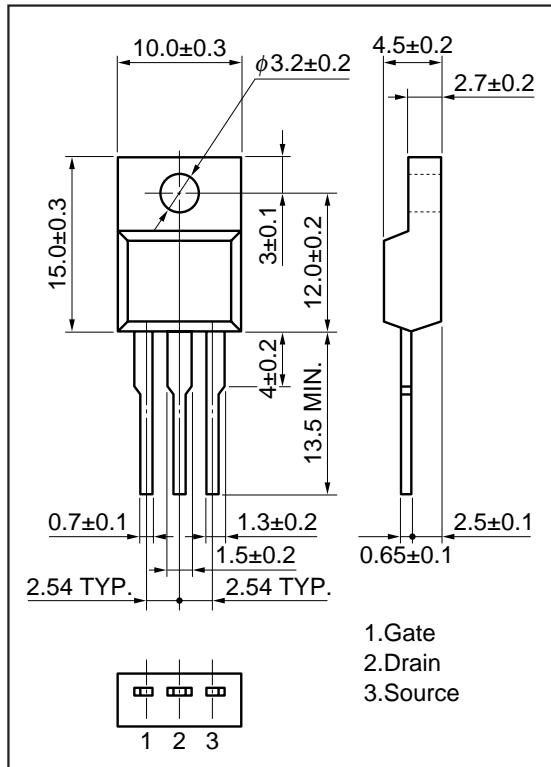
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



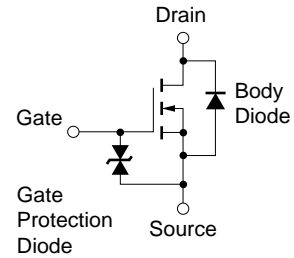


PACKAGE DRAWING(Unit : mm)

Isolated TO-220 (MP-45F)



EQUIVALENT CIRCUIT



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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