

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 $\leq 1 \%$

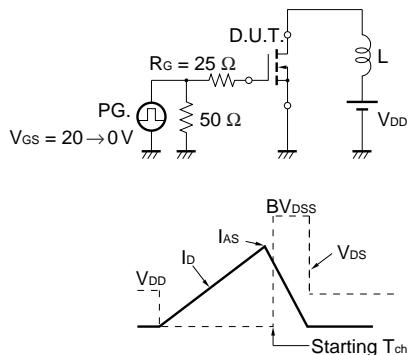
2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 100 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \text{ V} \rightarrow 0 \text{ V}$

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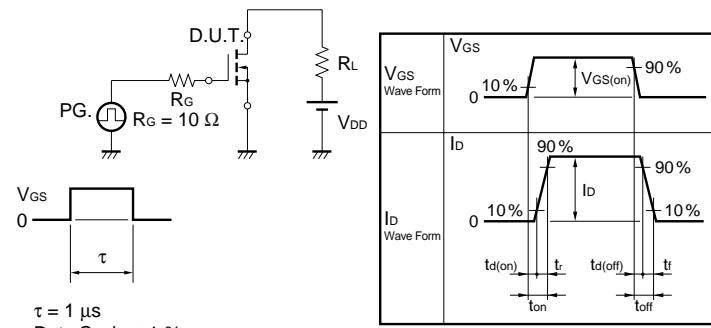
ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

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	$V_{GS(\text{off})}$	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	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}	$V_{DS} = 10 \text{ V}$ $V_{GS} = 0 \text{ V}$ $f = 1 \text{ MHz}$		1000		pF
Output Capacitance	C_{oss}			300		pF
Reverse Transfer Capacitance	C_{rss}			150		pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 100 \text{ V}, I_D = 7.0 \text{ A}$ $V_{GS(on)} = 10 \text{ V}$ $R_G = 10 \Omega$		25		ns
Rise Time	t_r			70		ns
Turn-off Delay Time	$t_{d(off)}$			80		ns
Fall Time	t_f			40		ns
Total Gate Charge	Q_G	$V_{DD} = 160 \text{ V}$ $V_{GS} = 10 \text{ V}$ $I_D = 14 \text{ A}$		40		nC
Gate to Source Charge	Q_{GS}			7		nC
Gate to Drain Charge	Q_{GD}			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}	$I_F = 14 \text{ A}, V_{GS} = 0 \text{ V}$ $di/dt = 50 \text{ A}/\mu\text{s}$		300		ns
Reverse Recovery Charge	Q_{rr}			1.5		μC

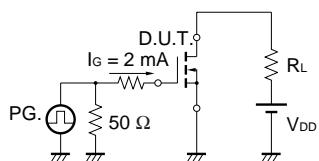
TEST CIRCUIT 1 AVALANCHE CAPABILITY

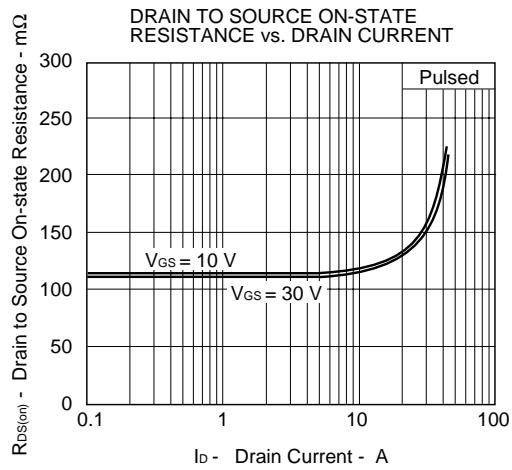
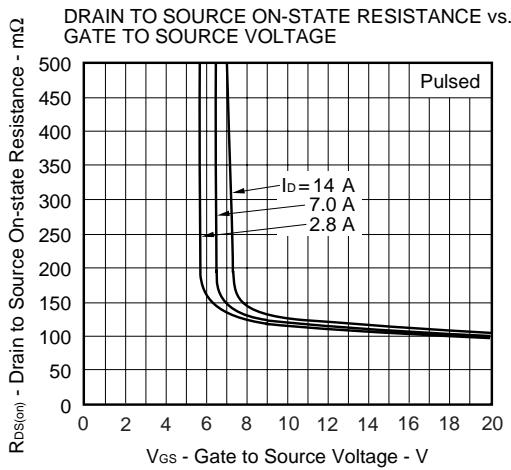
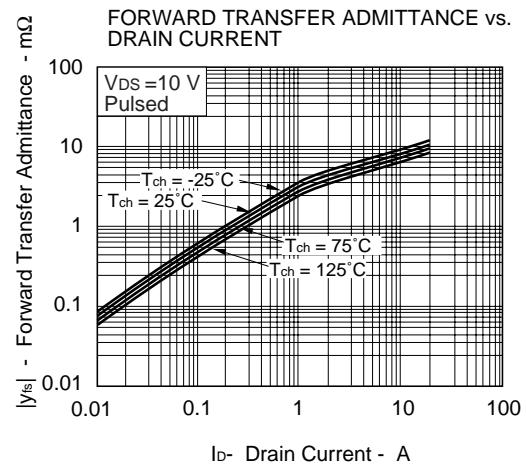
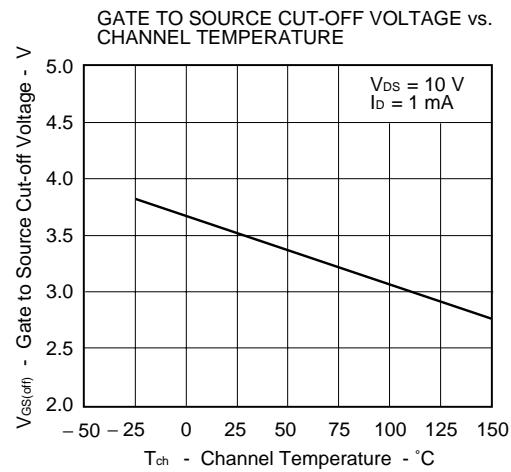
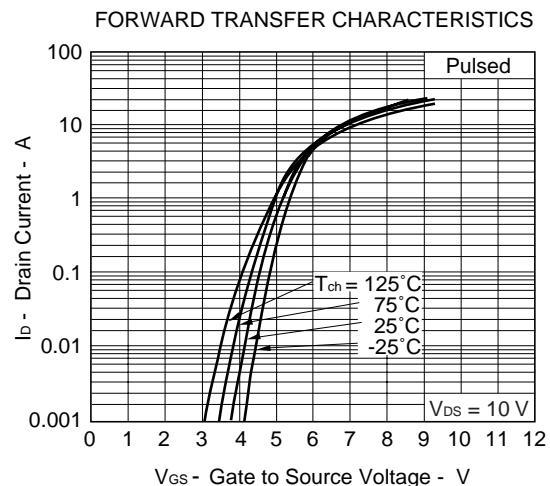
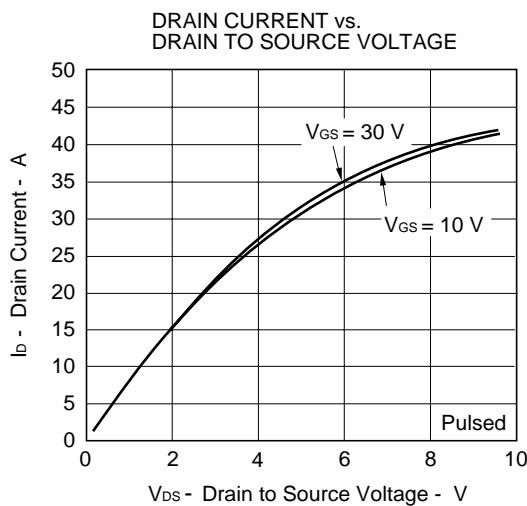


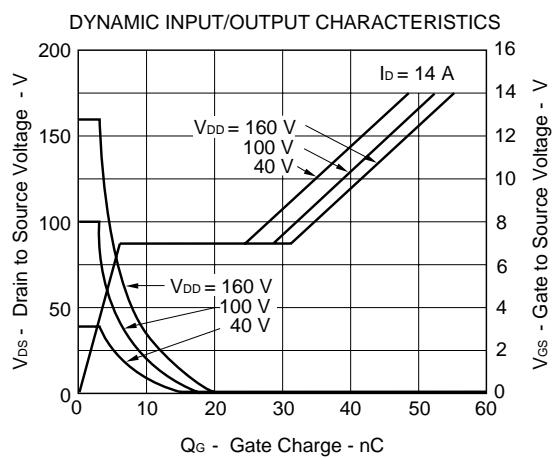
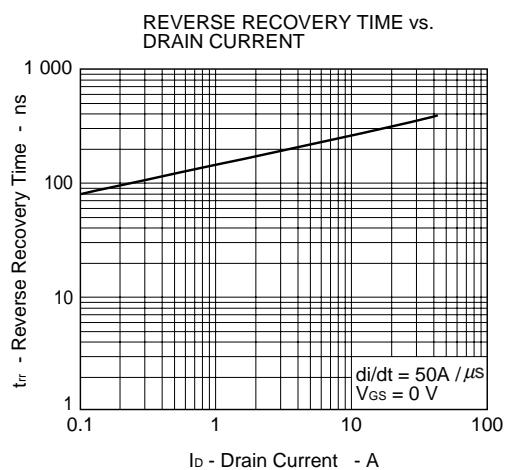
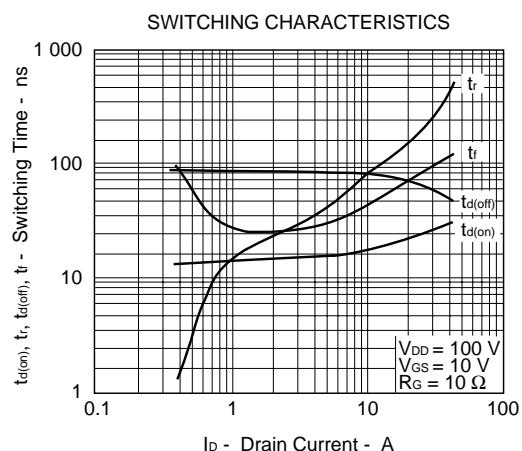
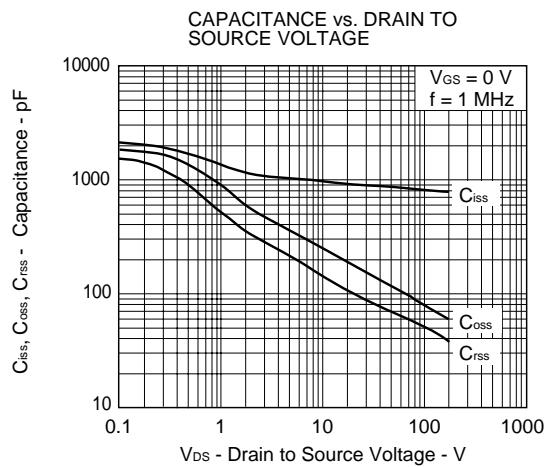
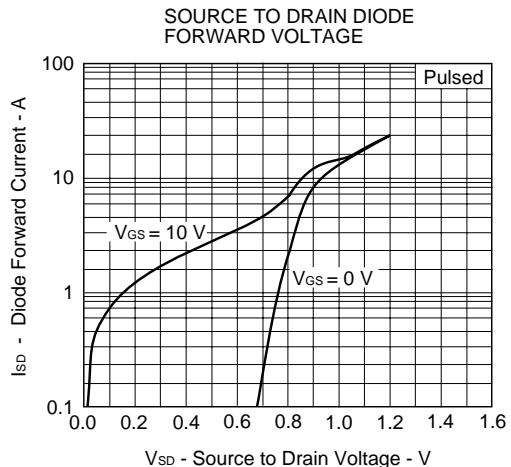
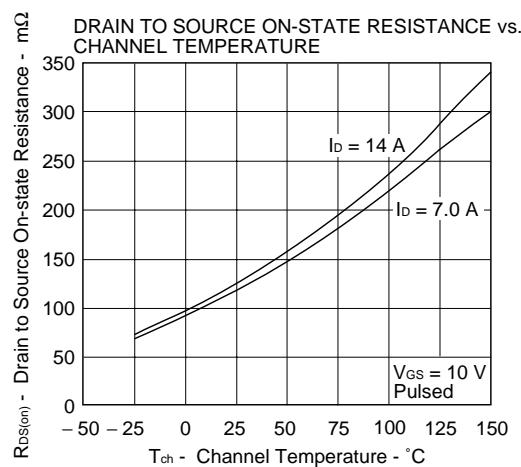
TEST CIRCUIT 2 SWITCHING TIME

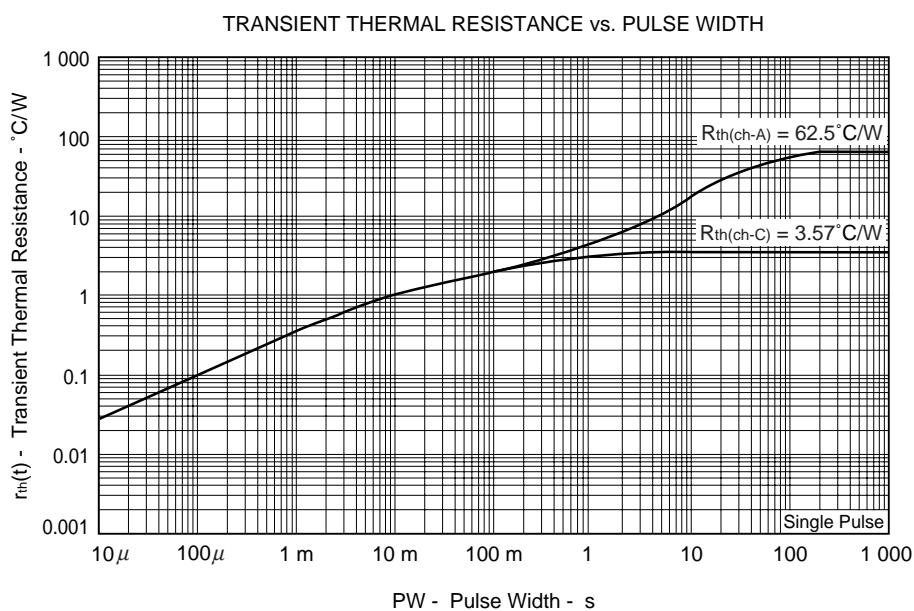
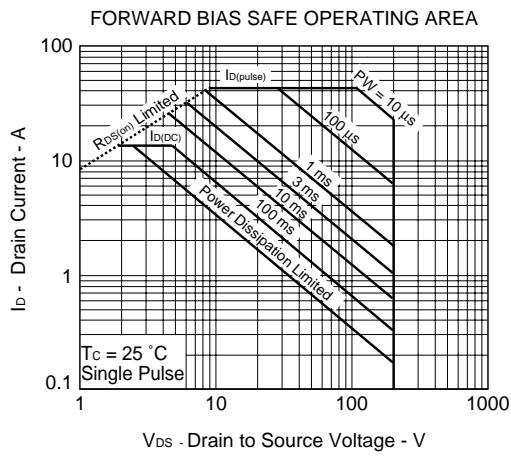
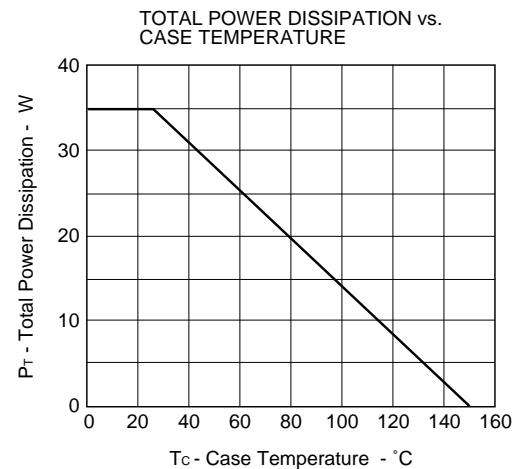
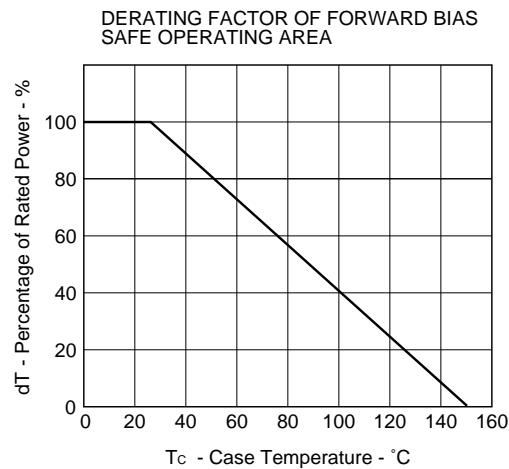


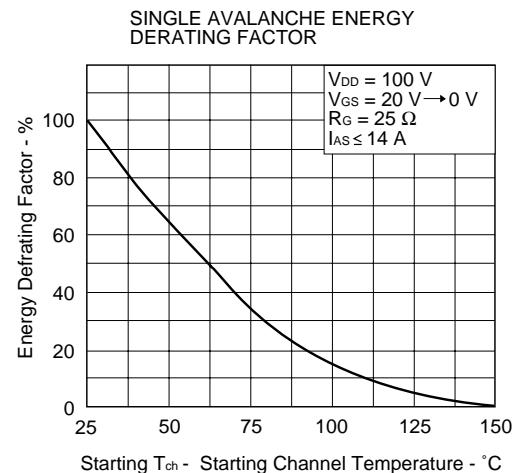
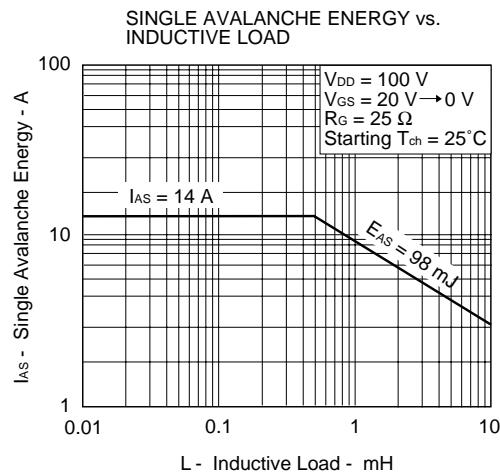
TEST CIRCUIT 3 GATE CHARGE



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

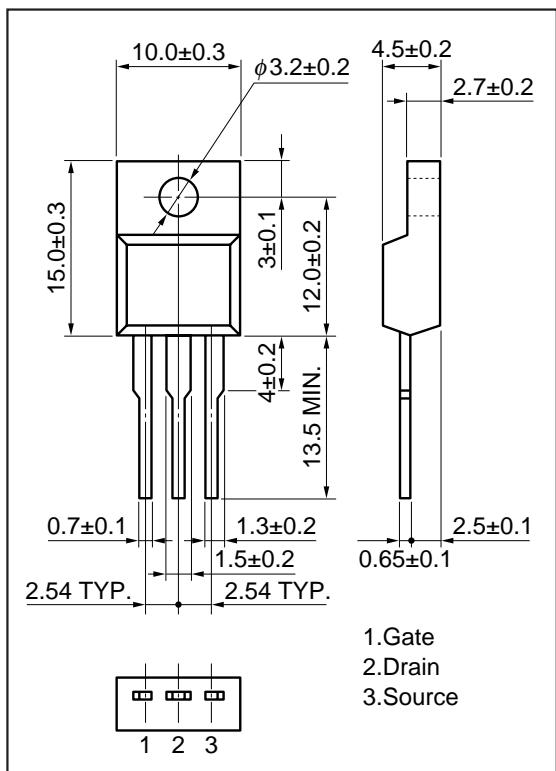




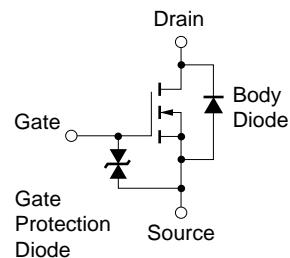


PACKAGE DRAWING(Unit : mm)

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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