

# 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  $\pm 30$  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 ( $V_{DS} = 0 \text{ V}$ )	$V_{GSS}$	$\pm 30$	V
Drain Current(DC) ( $T_C = 25^\circ\text{C}$ )	$I_{D(DC)}$	$\pm 14$	A
Drain Current(pulse) <sup>Note1</sup>	$I_{D(pulse)}$	$\pm 42$	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 <sup>Note2</sup>	$I_{AS}$	14	A
Single Avalanche Energy <sup>Note2</sup>	$E_{AS}$	98	mJ

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

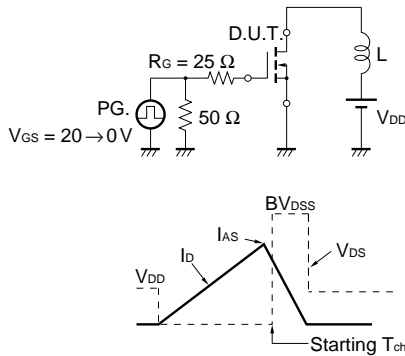
2. Starting  $T_{ch} = 25^\circ\text{C}$ ,  $V_{DD} = 100 \text{ V}$ ,  $R_G = 25 \Omega$ ,  $V_{GS} = 20 \text{ V} \rightarrow 0 \text{ V}$

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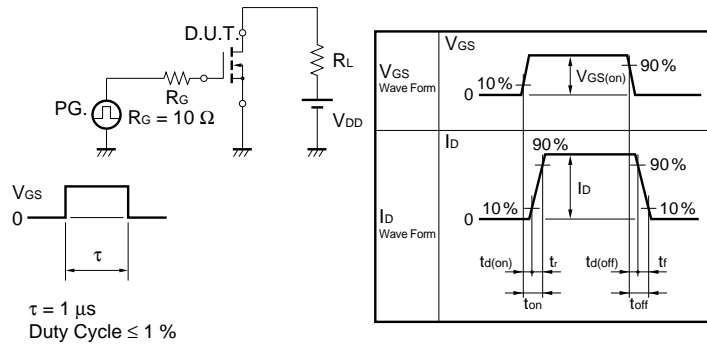
**ELECTRICAL CHARACTERISTICS (TA = 25°C)**

Characteristics	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Drain Leakage Current	$I_{DSS}$	$V_{DS} = 200\text{ V}, V_{GS} = 0\text{ V}$			100	$\mu\text{A}$
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$			$\pm 10$	$\mu\text{A}$
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		$\mu\text{C}$

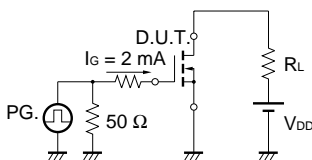
**TEST CIRCUIT 1 AVALANCHE CAPABILITY**



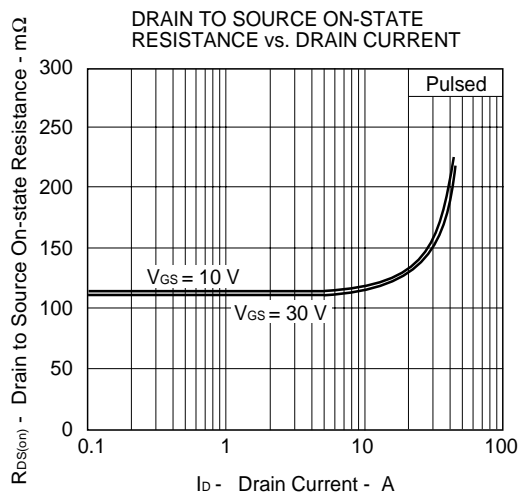
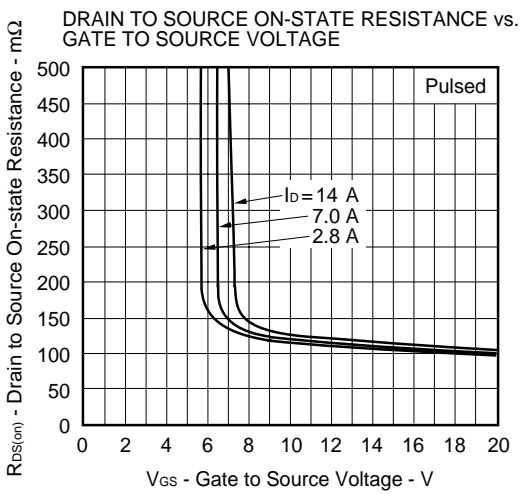
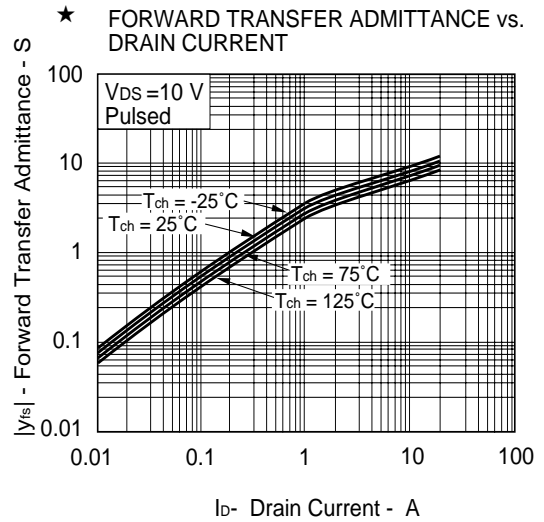
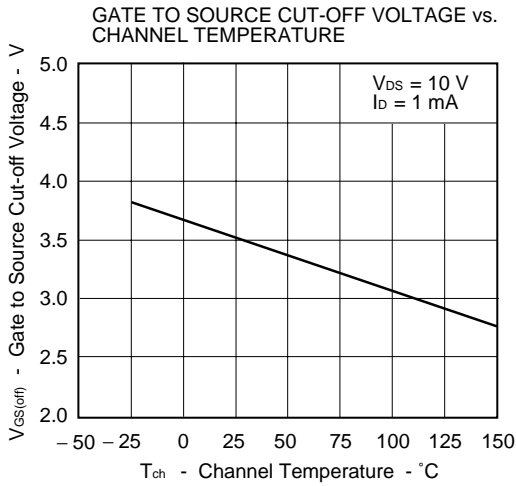
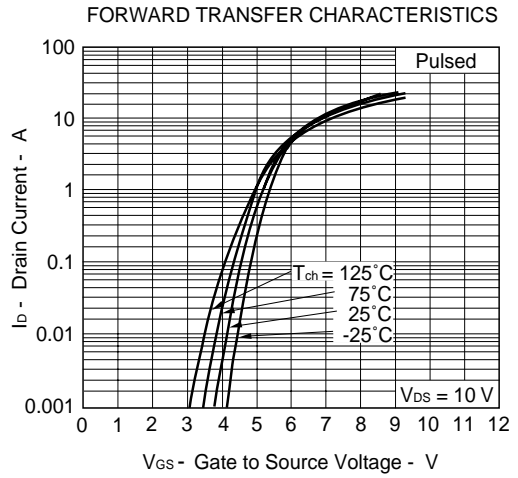
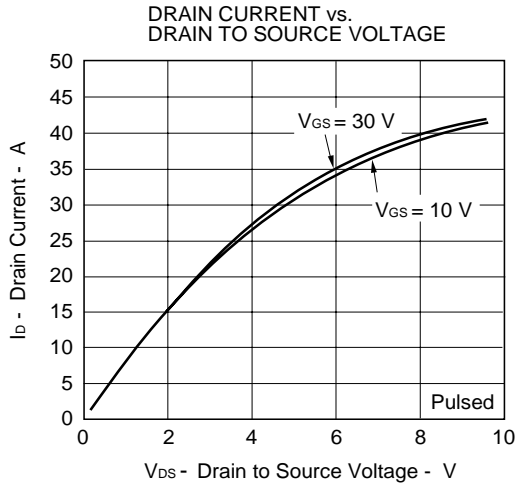
**TEST CIRCUIT 2 SWITCHING TIME**

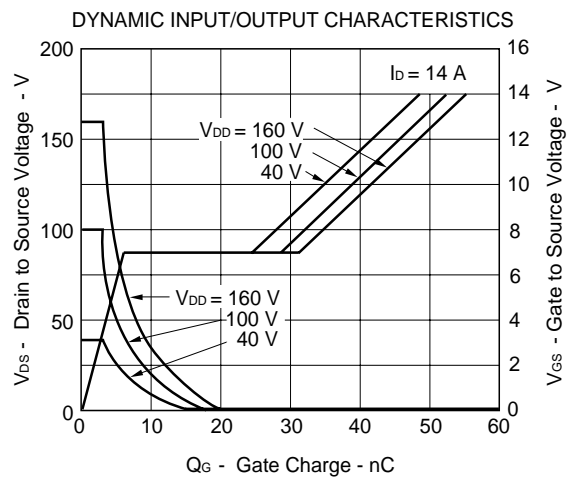
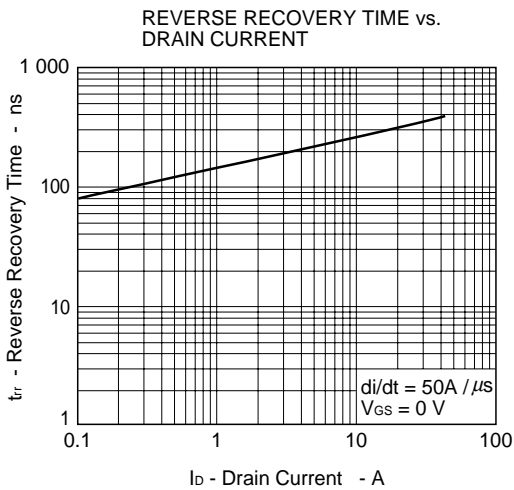
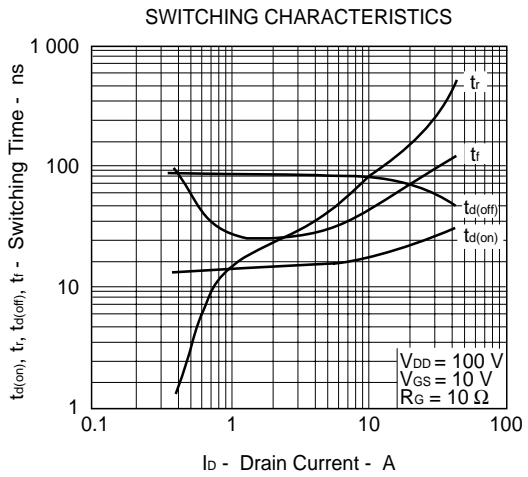
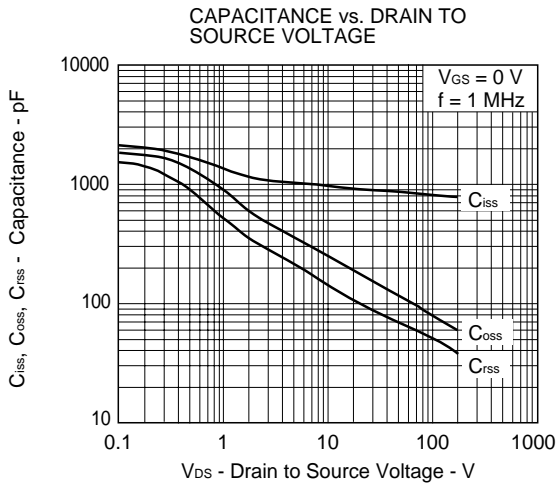
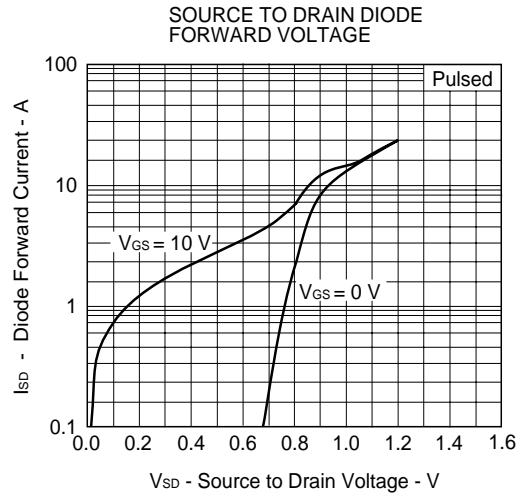
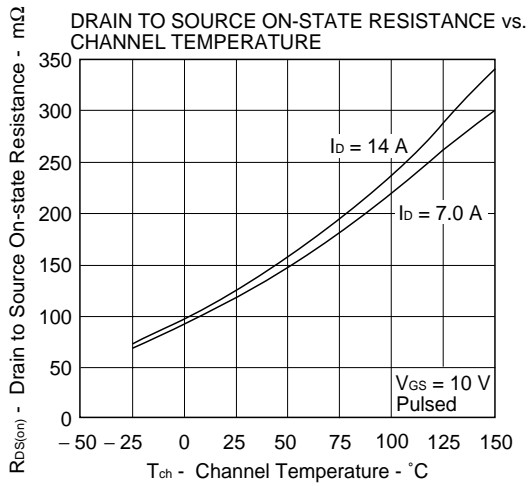


**TEST CIRCUIT 3 GATE CHARGE**

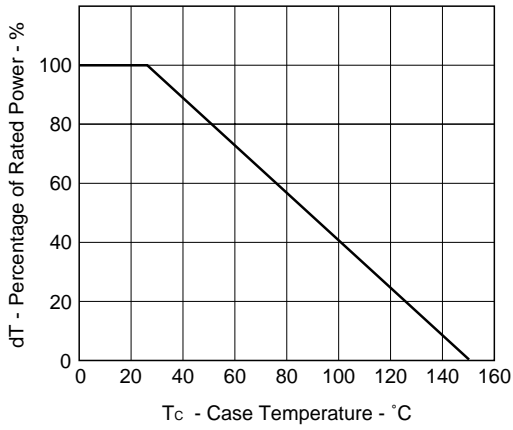


TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

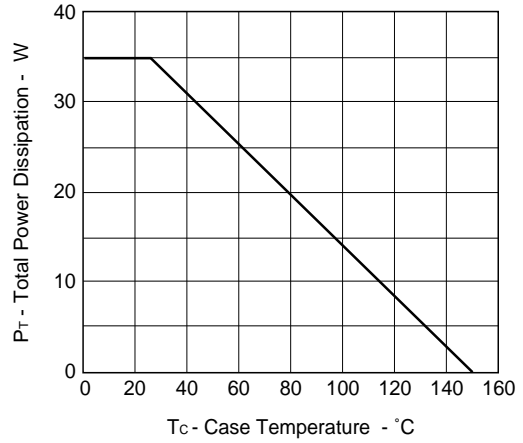




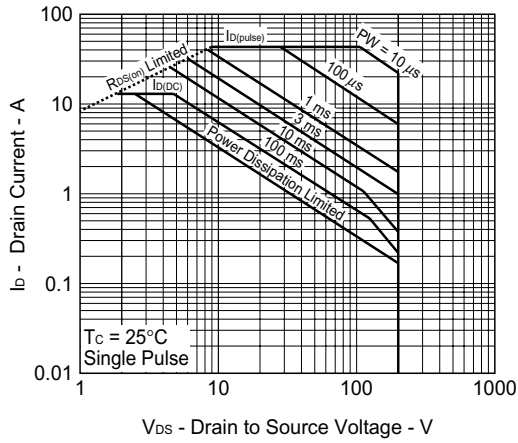
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



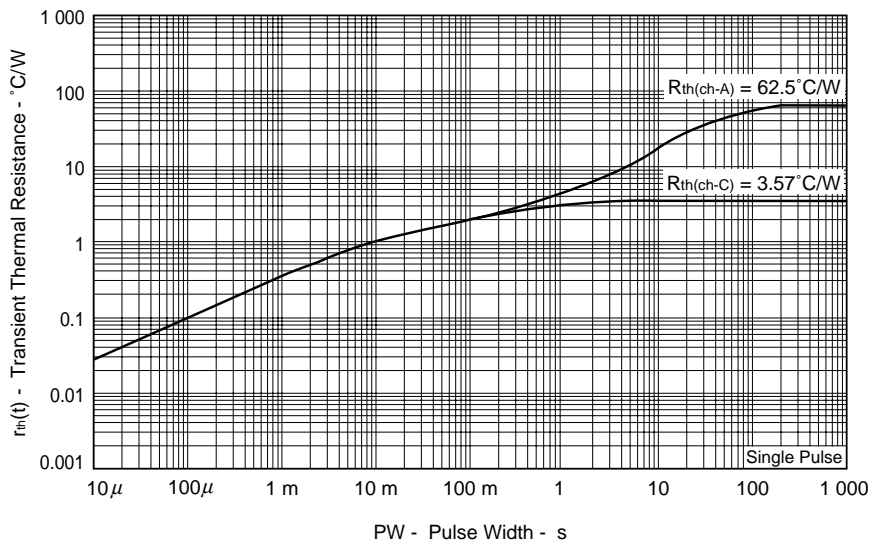
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE

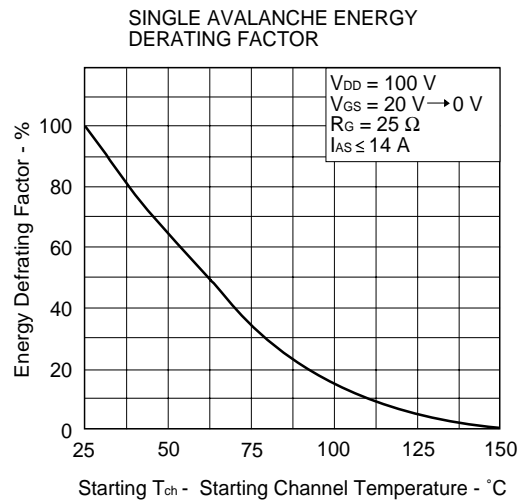
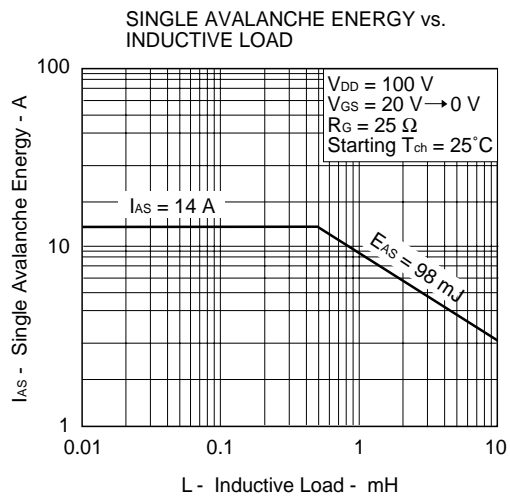


★ FORWARD BIAS SAFE OPERATING AREA



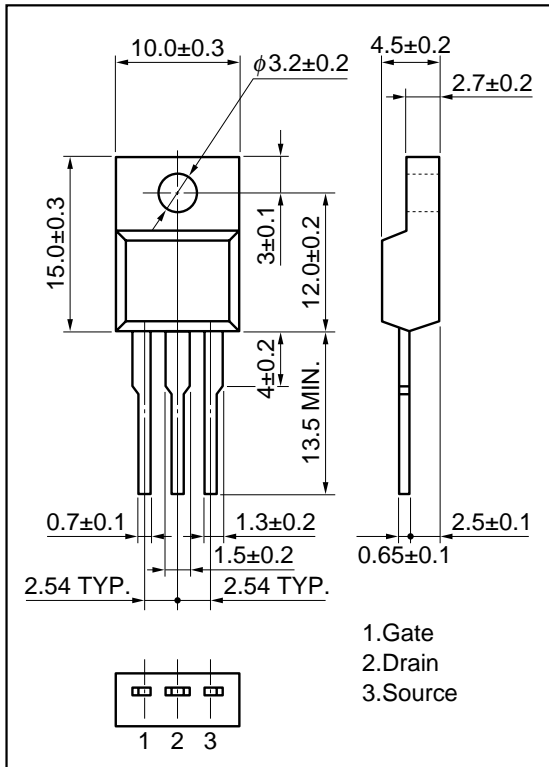
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



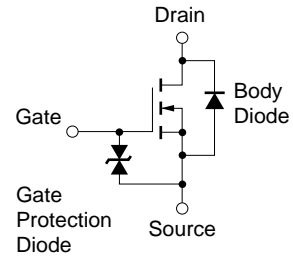


PACKAGE DRAWING(Unit : mm)

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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