

# MOS FIELD EFFECT TRANSISTOR 2SK2981

# **SWITCHING N-CHANNEL POWER MOS FET** INDUSTRIAL USE

#### **DESCRIPTION**

This product is N-Channel MOS Field Effect Transistor designed for high current switching applications.

#### **FEATURES**

· Low on-resistance

 $R_{DS(on)1} = 27 \text{ m}\Omega \text{ (MAX.) (Vgs} = 10 \text{ V, Ip} = 10 \text{ A)}$ 

 $R_{DS(on)2} = 40 \text{ m}\Omega \text{ (MAX.) (Vgs} = 4.5 \text{ V, Ip} = 10 \text{ A)}$ 

 $R_{DS(on)3} = 50 \text{ m}\Omega \text{ (MAX.) (Vgs} = 4 \text{ V, ID} = 10 \text{ A)}$ 

- Low Ciss : Ciss = 860 pF (TYP.)
- · Built-in gate protection diode

#### **ORDERING INFORMATION**

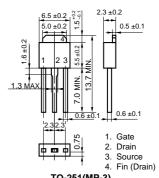
PART NUMBER	PACKAGE		
2SK2981	TO-251		
2SK2981-Z	TO-252		

## ABSOLUTE MAXIMUM RATINGS (TA = 25 °C)

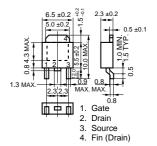
Drain to Source Voltage (Vss = 0)	VDSS	30	V	
Gate to Source Voltage (Vps = 0)	Vgss	±20	٧	
Drain Current (DC)	ID(DC)	±20	Α	
Drain Current (Pulse) Note	ID(pulse)	±80	Α	
Total Power Dissipation (Tc = 25 °C)	Рт	20	W	
Channel Temperature	Tch	150	°C	
Storage Temperature	Tstg	-55 to + 150	°C	

**Note** PW  $\leq$  10  $\mu$ s, Duty cycle  $\leq$  1 %

# PACKAGE DRAWING (Unit: mm)

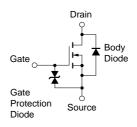


TO-251(MP-3)



TO-252(MP-3Z) (SURFACE MOUNT TYPE)

#### **EQUIVALENT CIRCUIT**



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.

The information in this document is subject to change without notice.



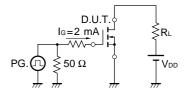
## **ELECTRICAL CHARACTERISTICS (TA = 25 °C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	RDS(on)1	Vgs = 10 V, ID = 10 A		20	27	mΩ
	R <sub>DS(on)2</sub>	V <sub>G</sub> S = 4.5 V, I <sub>D</sub> = 10 A		30	40	mΩ
	R <sub>DS(on)3</sub>	V <sub>G</sub> S = 4 V, I <sub>D</sub> = 10 A		35	50	mΩ
Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA	1.0	1.5	2.0	V
Forward Transfer Admittance	yfs	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 10 A	6.0	13.0		S
Drain Leakage Current	Ipss	Vps = 30 V, Vgs = 0			10	μΑ
Gate to Source Leakage Current	Igss	V <sub>G</sub> S = ±20 V, V <sub>D</sub> S = 0			±10	μΑ
Input Capacitance	Ciss	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0, f = 1 MHz		860		pF
Output Capacitance	Coss			350		pF
Reverse Transfer Capacitance	Crss			160		pF
Turn-on Delay Time	td(on)	ID = 10 A, VGS(on) = 10 V, VDD = 15 V		25		ns
Rise Time	tr	R <sub>G</sub> = 10 Ω		270		ns
Turn-off Delay Time	t <sub>d(off)</sub>			65		ns
Fall Time	<b>t</b> f			65		ns
Total Gate Charge	Q <sub>G</sub>	I <sub>D</sub> = 20 A, V <sub>DD</sub> = 24 V, V <sub>GS</sub> = 10 V		20		nC
Gate to Source Charge	Qgs			3.5		nC
Gate to Drain Charge	Q <sub>GD</sub>			6.5		nC
Body Diode forward Voltage	V <sub>F(S-D)</sub>	IF = 20 A, VGS = 0		0.8		V
Reverse Recovery Time	trr	IF = 20 A, VGS = 0		35		ns
Reverse Recovery Charge	Qrr	di/dt = 100 A/μs		30		nC

### **TEST CIRCUIT 1 SWITCHING TIME**

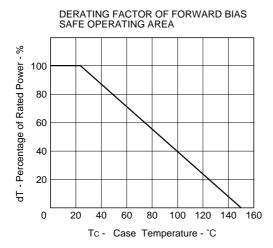
## 

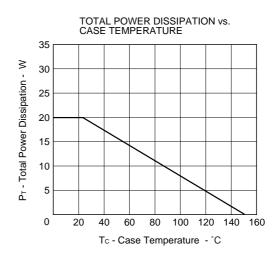
## **TEST CIRCUIT 2 GATE CHARGE**

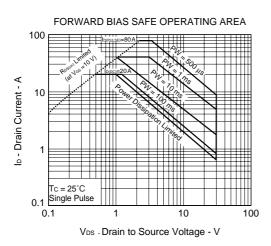


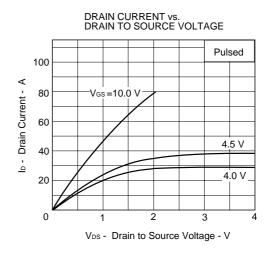


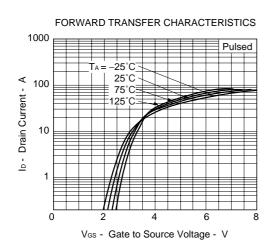
## TYPICAL CHARACTERISTICS (TA = 25 °C)



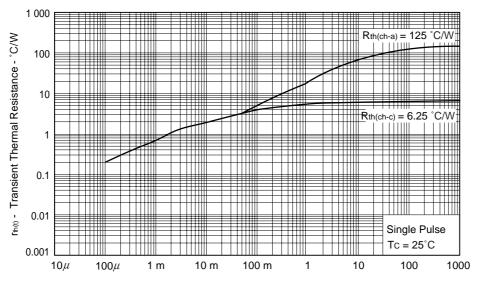




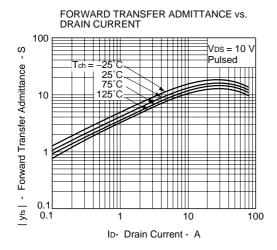


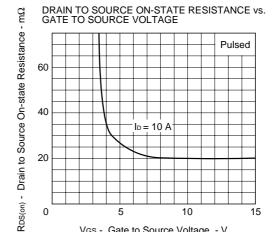


#### TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

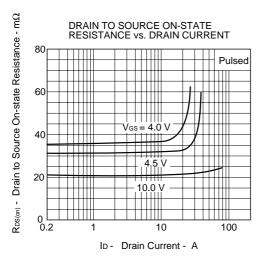


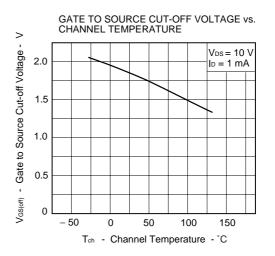
PW - Pulse Width - s



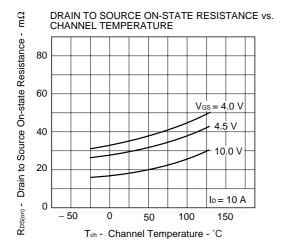


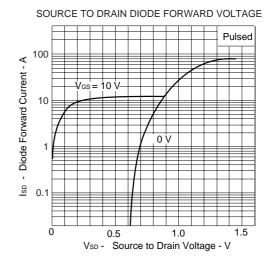
Vgs - Gate to Source Voltage - V

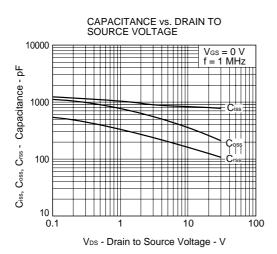


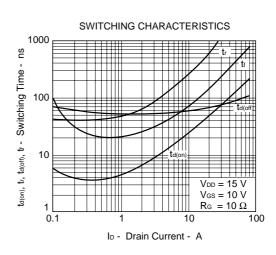


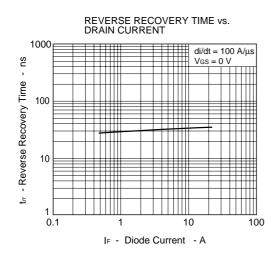


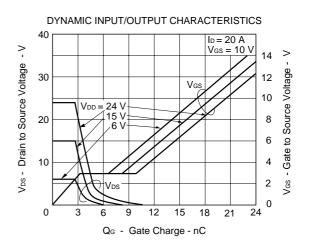












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Anti-radioactive design is not implemented in this product.

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