NEC

N-CHANNEL MOS FIELD EFFECT POWER TRANSISTOR

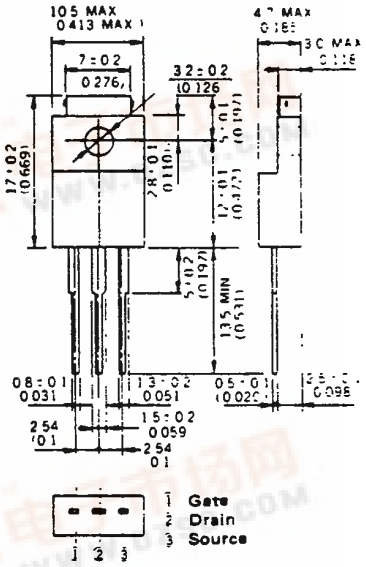
2SK591

DESCRIPTION The 2SK591 is N-Channel MOS Field Effect Power Transistor designed for solenoid, motor and lamp driver.

FEATURES

- 4 V Gate Drive — Logic level —
- Low $R_{DS(on)}$
- No Secondary Breakdown

PACKAGE DIMENSIONS
in millimeters (inches)



ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures
- Storage Temperature . . . . . −55 to + 150 °C
- Channel Temperature . . . . . 150 °C Maximum

Maximum Power Dissipations
- Total Power Dissipation (T_a = 25 °C) . . . 2.0 W
- Total Power Dissipation (T_c = 25 °C) . . . 35 W

Maximum Voltages and Currents (T_a = 25 °C)
- V_{DSS} Drain to Source Voltage . . . . . 60 V
- V_{GSS} Gate to Source Voltage . . . . . ±20 V
- $I_{D(DC)}$ Drain Current (DC) . . . . . ±15 A
- $I_{D(pulse)}$ Drain Current (pulse)* . . . . . ±60 A

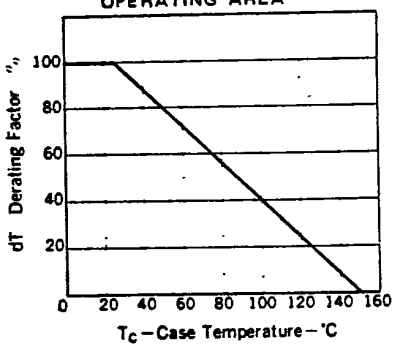
*PW ≦ 300 μs, Duty Cycle ≦ 10 %

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

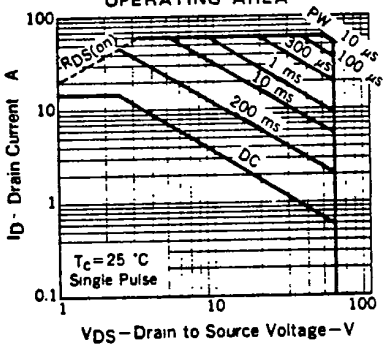
SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
$R_{DS(on)}$	Drain to Source On-State Resistance			0.055	Ω	V_{GS} = 10 V, I_D = 6 A
$R_{DS(on)}$	Drain to Source On-State Resistance			0.070	Ω	V_{GS} = 4 V, I_D = 6 A
$V_{GS(off)}$	Gate to Source Cutoff Voltage	1		2.5	V	V_{DS} = 10 V, I_D = 1 mA
$\|Y_{fs}\|$	Forward Transfer Admittance	5			S	V_{DS} = 10 V, I_D = 6 A
I_{DSS}	Drain Leakage Current			10	μA	V_{DS} = 60 V, V_{GS} = 0
I_{GSS}	Gate to Source Leakage Current			±100	nA	V_{GS} = ±20 V, V_{DS} = 0
C_{iss}	Input Capacitance		1800		pF	V_{DS} = 10V V_{GS} = 0 f = 1 MHz
C_{oss}	Output Capacitance		800		pF	
C_{rss}	Reverse Transfer Capacitance		350		pF	
$t_{d(on)}$	Turn On Delay Time		20		ns	I_D = 6 A, V_{CC} ≒ 30 V R_L = 5 Ω, $V_{GS(on)}$ = 10 V R_{in} = 10 Ω
t_r	Rise Time		85		ns	
$t_{d(off)}$	Turn Off Delay Time		240		ns	
t_f	Fall Time		230		ns	

TYPICAL CHARACTERISTICS (T_a = 25 °C)

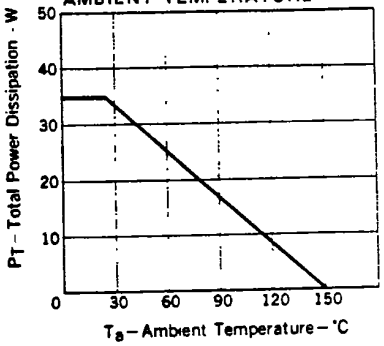
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



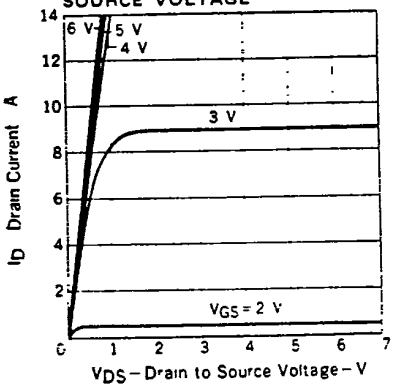
FORWARD BIAS SAFE OPERATING AREA



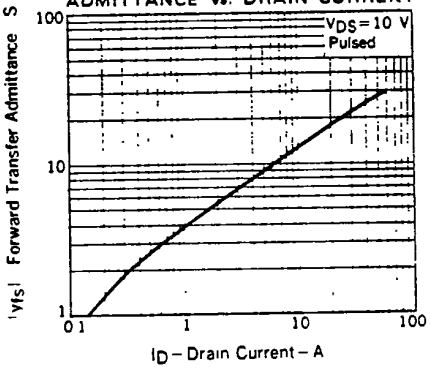
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



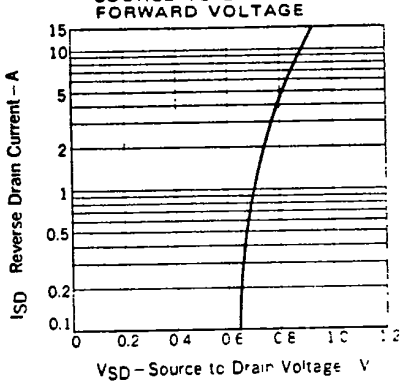
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



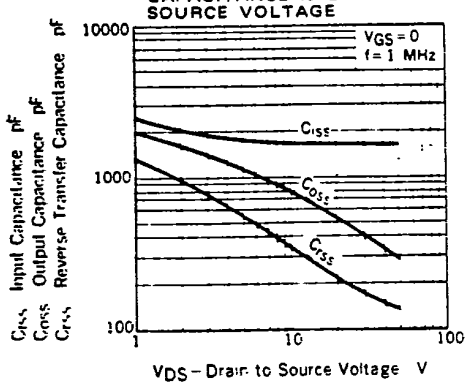
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



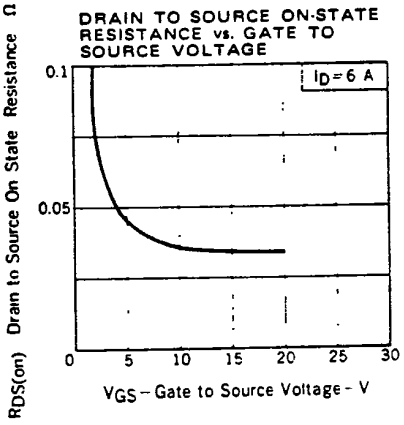
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



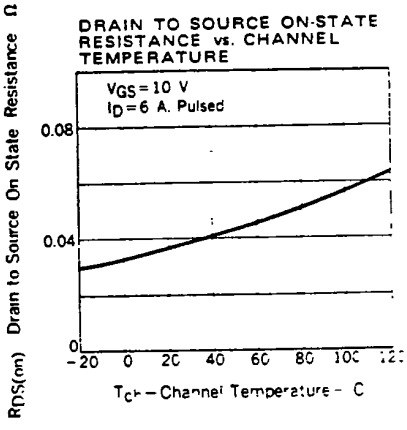
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE

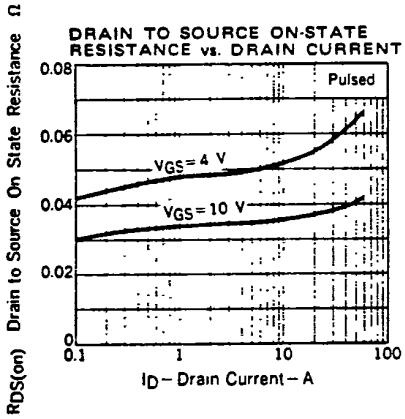


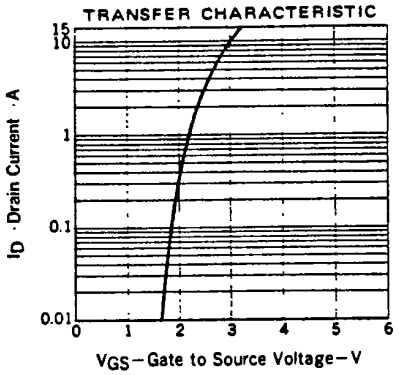
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

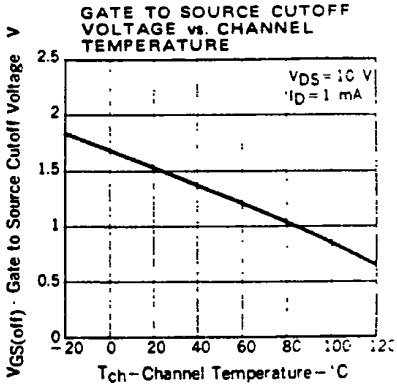


DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE









SWITCHING TIME TEST CIRCUIT