

MOS FIELD EFFECT TRANSISTOR

2SK3053

SWITCHING

N-CHANNEL POWER MOS FET

INDUSTRIAL USE

DESCRIPTION

The 2SK3053 is N-Channel MOS Field Effect Transistor designed for high current switching applications in consumer instruments.

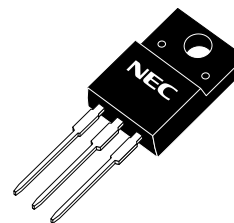
ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3053	Isolated TO-220

FEATURES

- Low On-State Resistance
 $R_{DS(on)1} = 45 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 13 \text{ A)}$
 $R_{DS(on)2} = 70 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 13 \text{ A)}$
- Low C_{iss} : $C_{iss} = 790 \text{ pF TYP.}$
- Built-in Gate Protection Diode
- Isolated TO-220 package

(Isolated TO-220)



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

Drain to Source Voltage	V_{DSS}	60	V
Gate to Source Voltage	$V_{GSS(AC)}$	± 20	V
Gate to Source Voltage	$V_{GSS(DC)}$	+20, -10	V
Drain Current (DC)	$I_{D(DC)}$	± 25	A
Drain Current (Pulse) ^{Note1}	$I_{D(pulse)}$	± 75	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_T	30	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_T	2.0	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}	12.5	A
Single Avalanche Energy ^{Note2}	E_{AS}	15.6	mJ

Notes 1. $PW \leq 10 \mu\text{s}$, Duty cycle $\leq 1 \%$

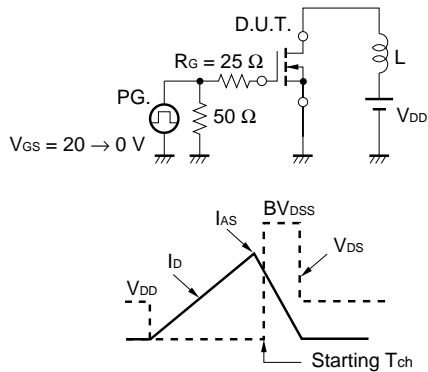
★ **2.** Starting $T_{ch} = 25 \text{ }^\circ\text{C}$, $V_{DD} = 30 \text{ V}$, $R_G = 25 \text{ }\Omega$, $V_{GS} = 20 \text{ V} \rightarrow 0 \text{ V}$

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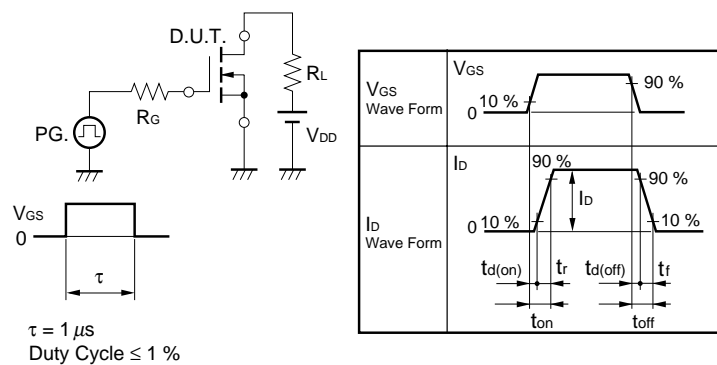
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 10 V, I _D = 13 A		28	45	mΩ
	R _{DS(on)2}	V _{GS} = 4.0 V, I _D = 13 A		46	70	mΩ
Gate to Source Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	1.0	1.6	2.0	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 13 A	8.0	16		S
Drain Leakage Current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V			10	μA
Gate to Source Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±10	μA
Input Capacitance	C _{iss}	V _{DS} = 10 V		790		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		240		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		100		pF
Turn-on Delay Time	t _{d(on)}	I _D = 13 A		20		ns
★ Rise Time	t _r	V _{GS} = 10 V		200		ns
Turn-off Delay Time	t _{d(off)}	V _{DD} = 30 V		65		ns
Fall Time	t _f	R _G = 10 Ω		95		ns
Total Gate Charge	Q _G	I _D = 25 A		20		nC
Gate to Source Charge	Q _{GS}	V _{DD} = 48 V		3.0		nC
★ Gate to Drain Charge	Q _{GD}	V _{GS} = 10 V		6.5		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 25 A, V _{GS} = 0 V		1.0		V
Reverse Recovery Time	t _{rr}	I _F = 25 A, V _{GS} = 0 V		40		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		45		nC

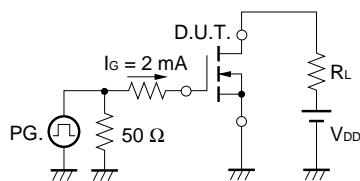
TEST CIRCUIT 1 AVALANCHE CAPABILITY



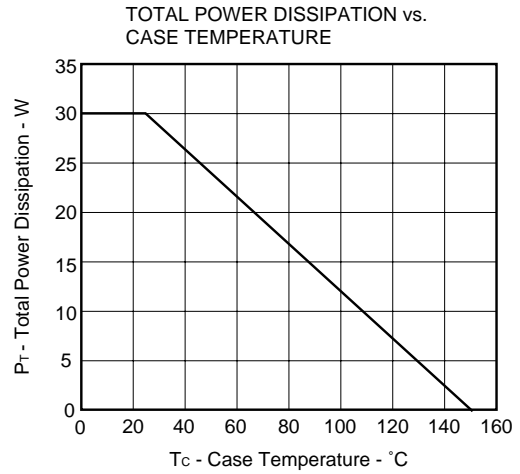
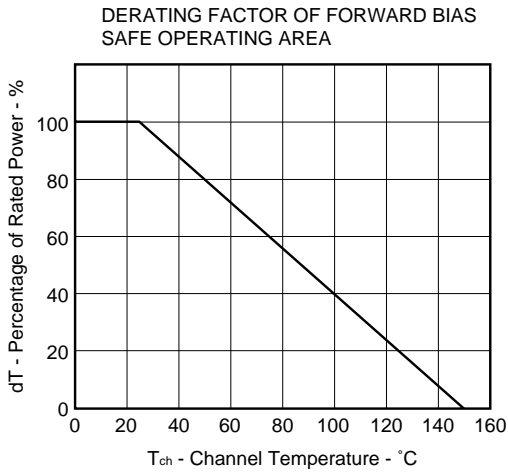
TEST CIRCUIT 2 SWITCHING TIME



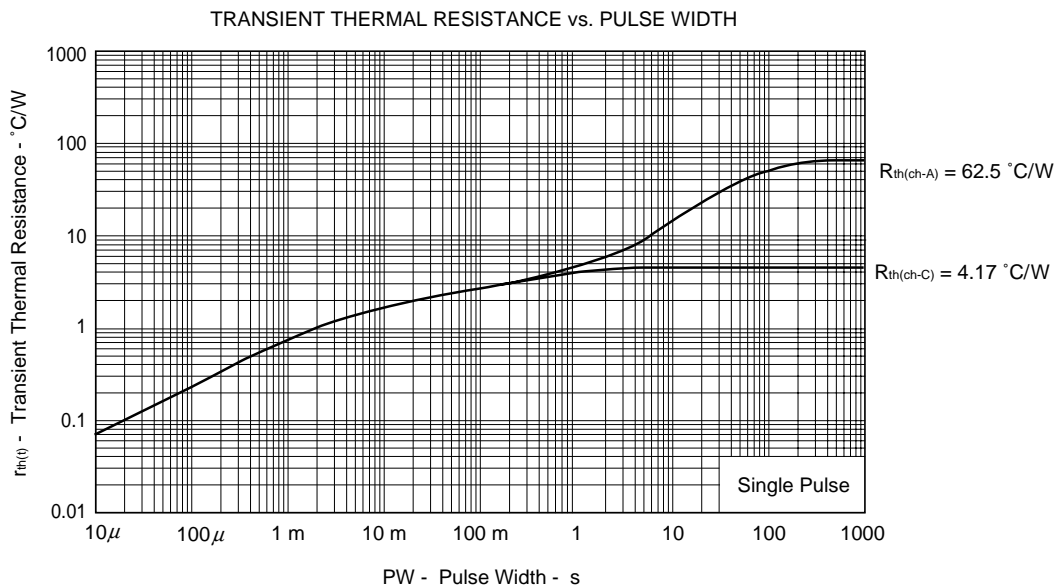
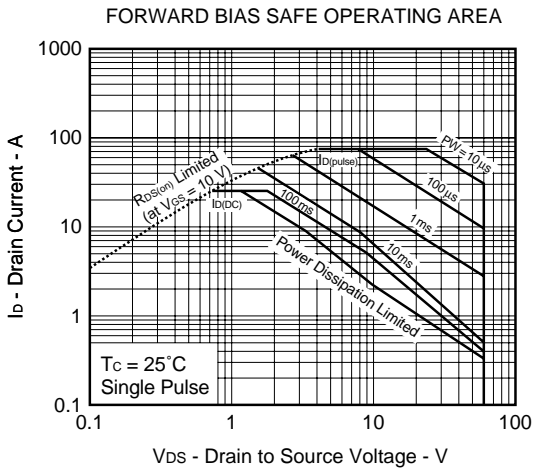
TEST CIRCUIT 3 GATE CHARGE



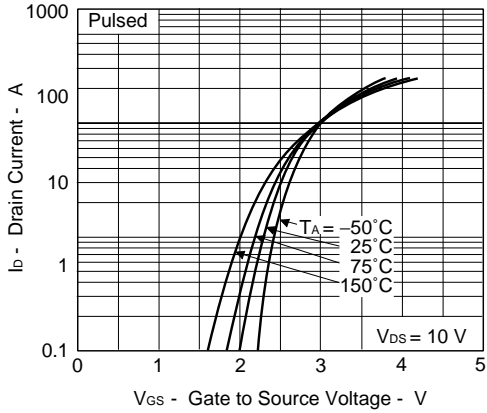
TYPICAL CHARACTERISTICS (TA = 25 °C)



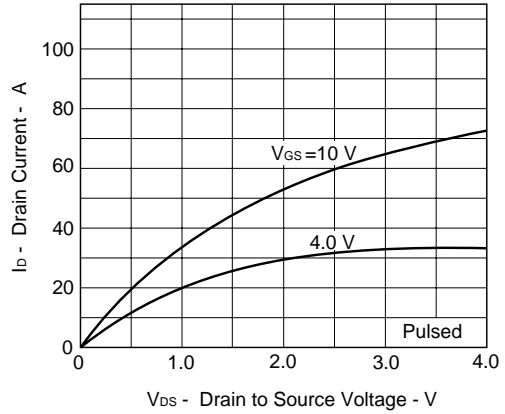
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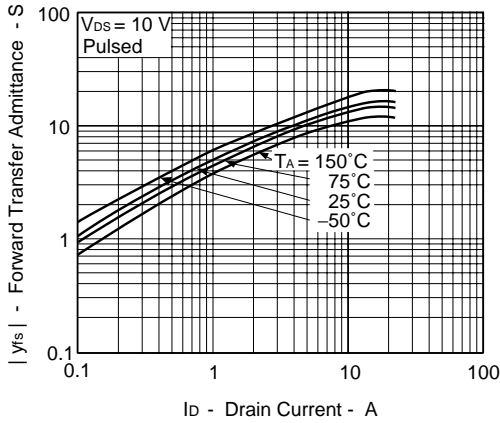
FORWARD TRANSFER CHARACTERISTICS



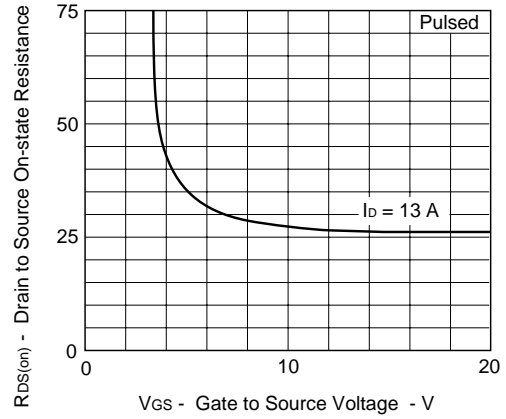
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



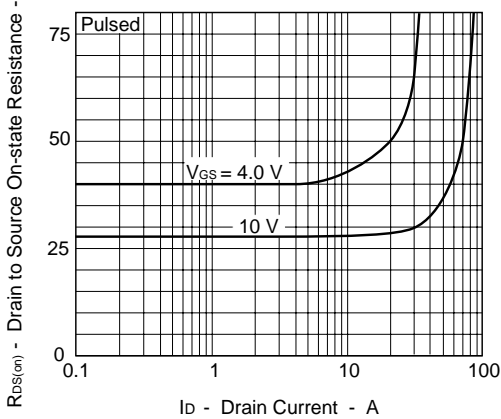
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



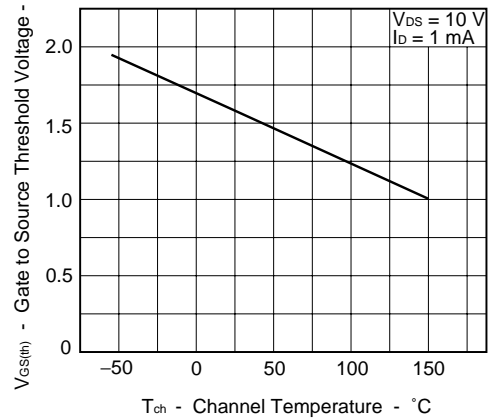
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



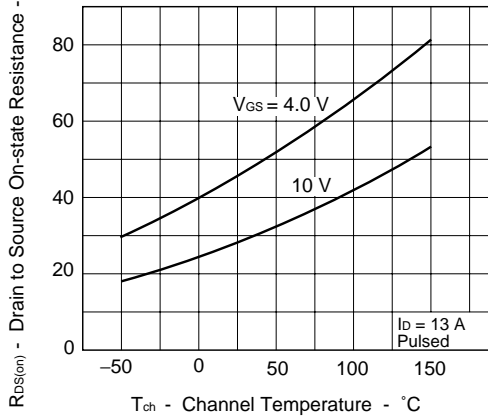
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



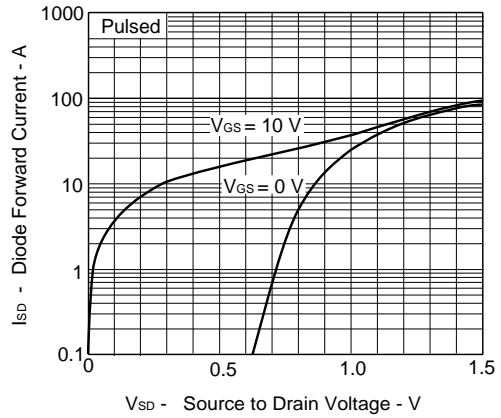
GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



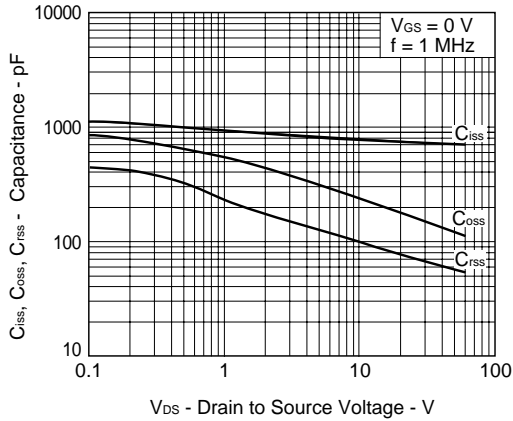
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



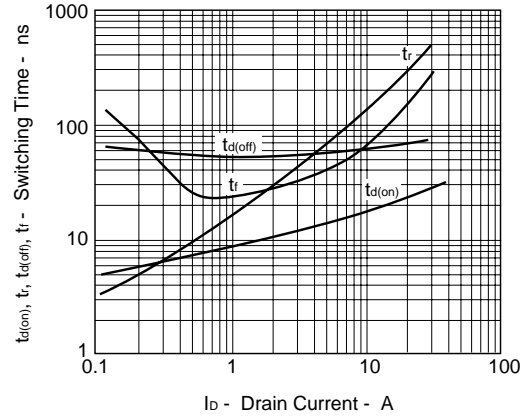
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



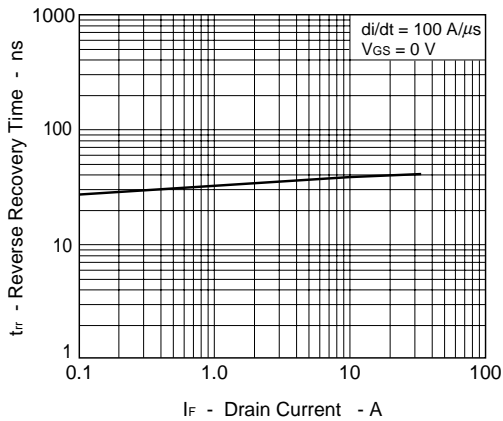
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



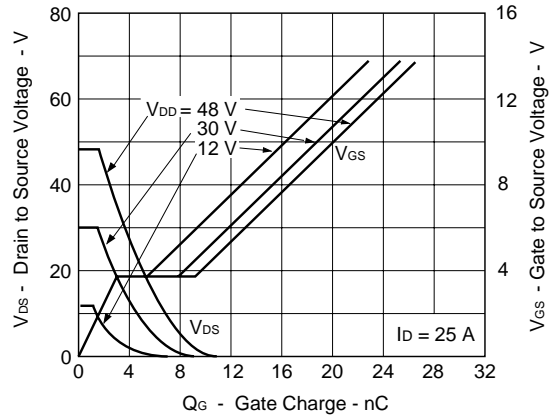
SWITCHING CHARACTERISTICS



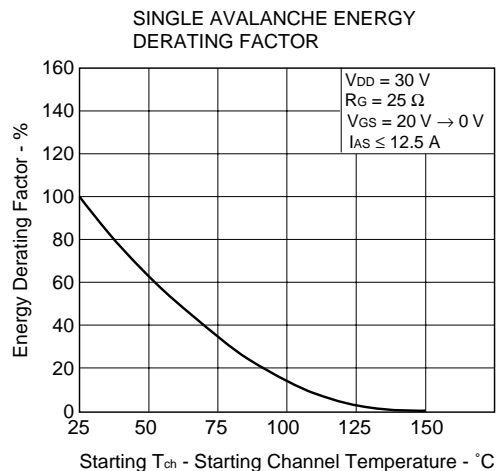
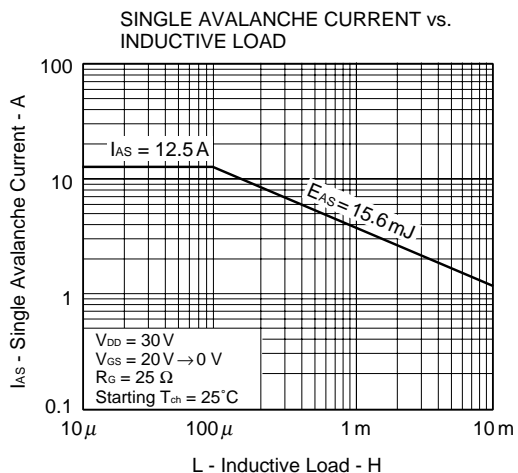
REVERSE RECOVERY TIME vs. DRAIN CURRENT



DYNAMIC INPUT/OUTPUT CHARACTERISTICS

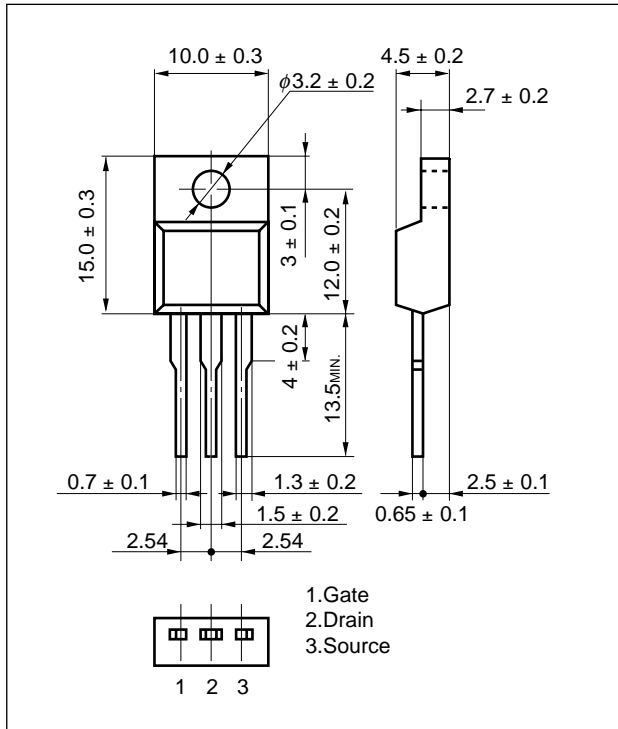


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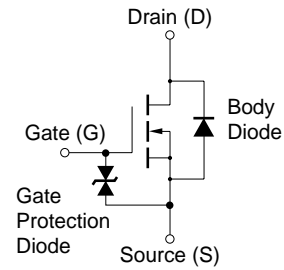


PACKAGE DRAWING

Isolated TO-220 (MP-45F)



EQUIVALENT CIRCUIT



- Remark 1.** This product is designed for consumer application and isn't suitable for automotive application.
- 2.** 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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