

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.

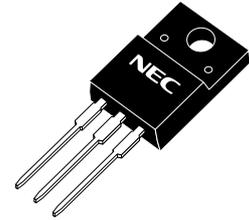
ORDERING INFORMATION

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

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 $\leq 1\%$

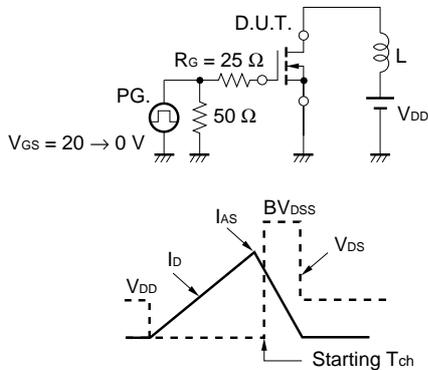
★ **2.** Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 30 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \text{ V} \rightarrow 0 \text{ V}$

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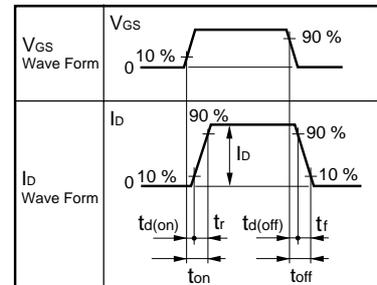
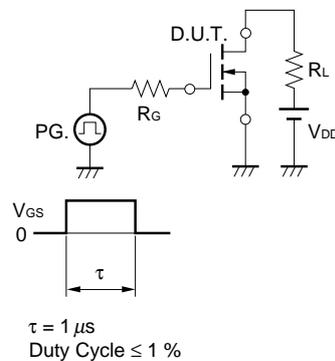
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

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

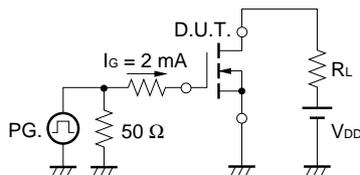
TEST CIRCUIT 1 AVALANCHE CAPABILITY



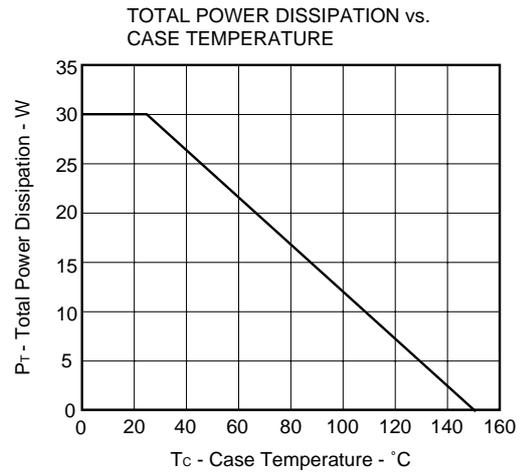
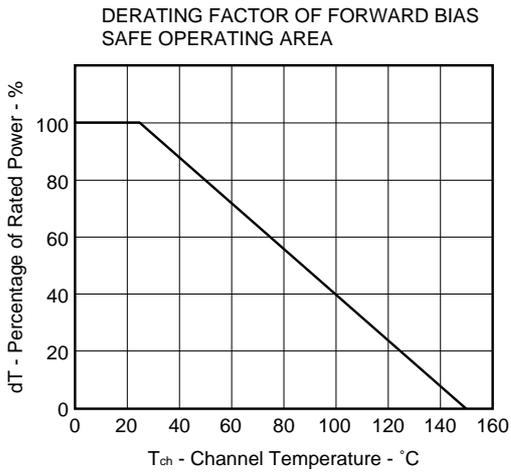
★ **TEST CIRCUIT 2 SWITCHING TIME**



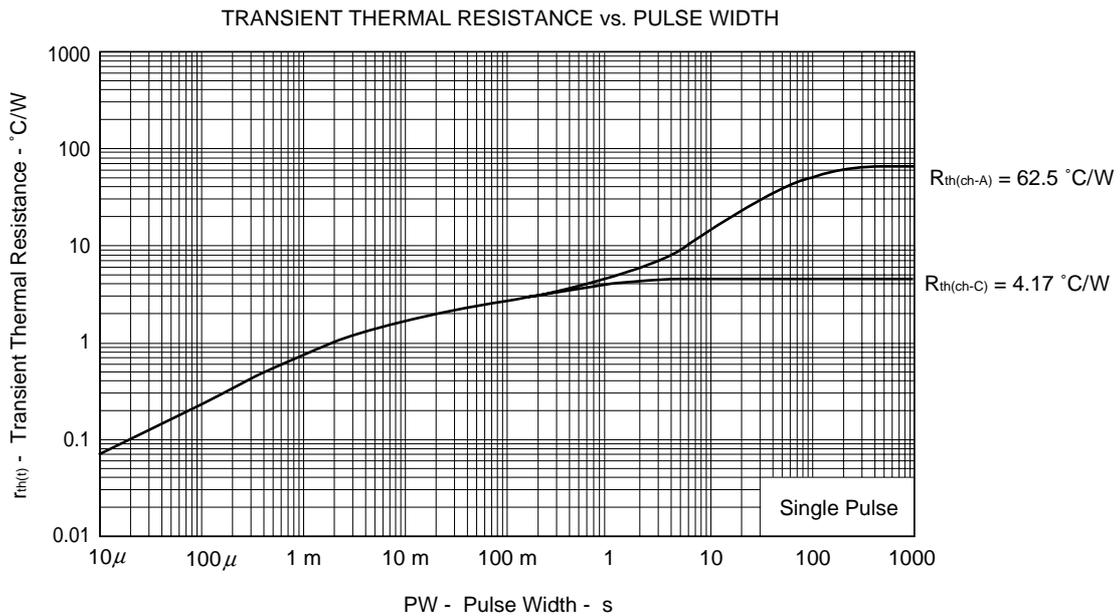
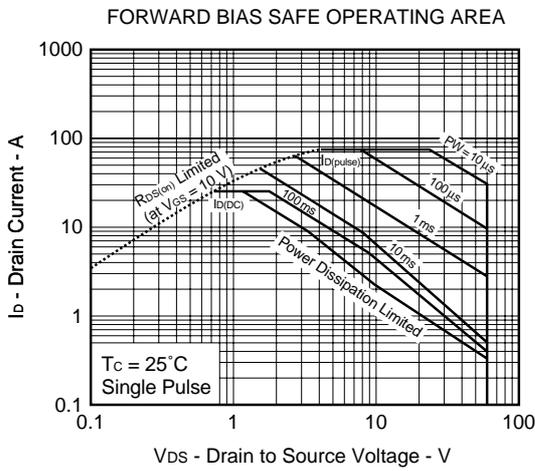
TEST CIRCUIT 3 GATE CHARGE



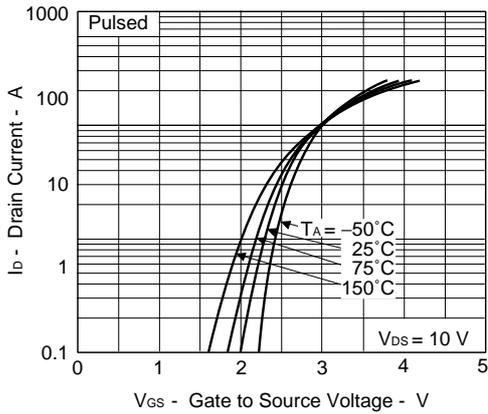
TYPICAL CHARACTERISTICS (T_A = 25 °C)



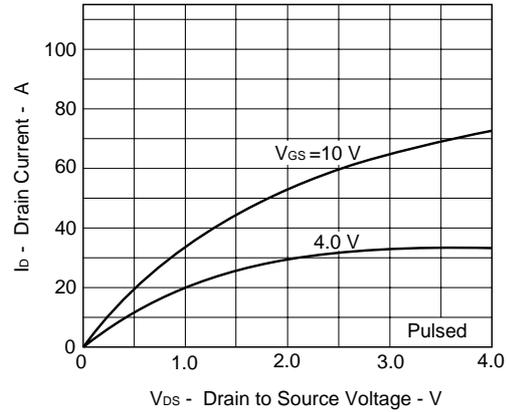
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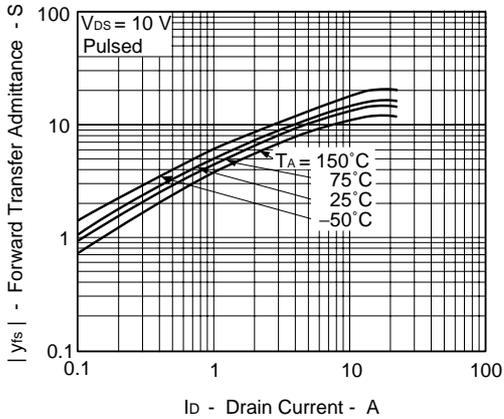
FORWARD TRANSFER CHARACTERISTICS



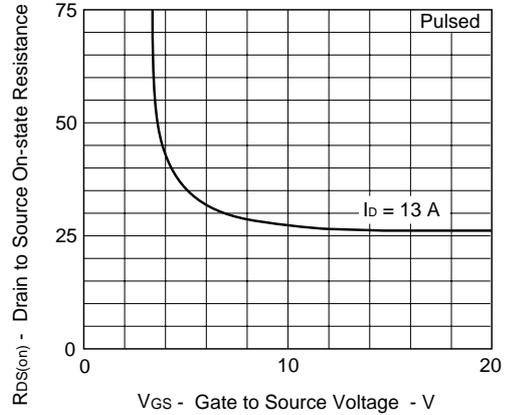
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



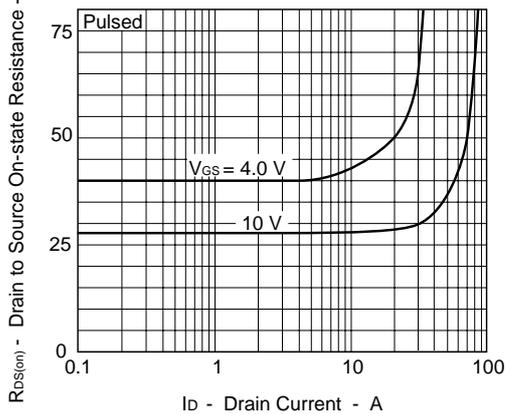
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



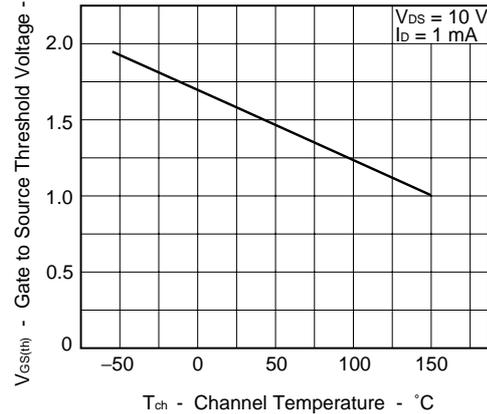
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

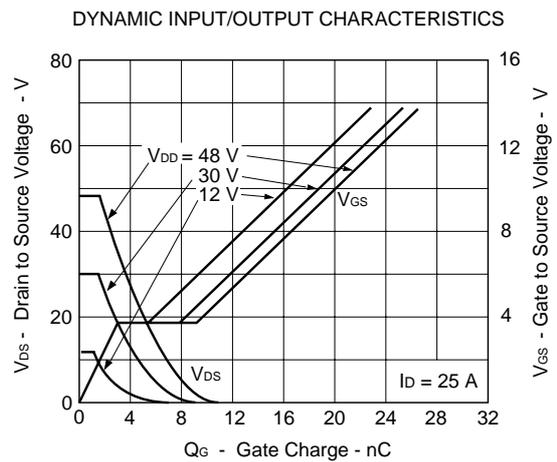
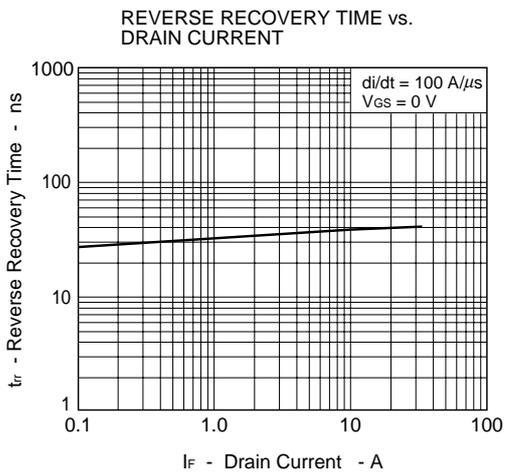
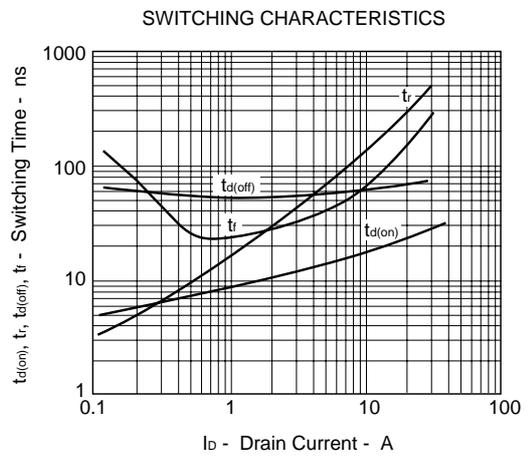
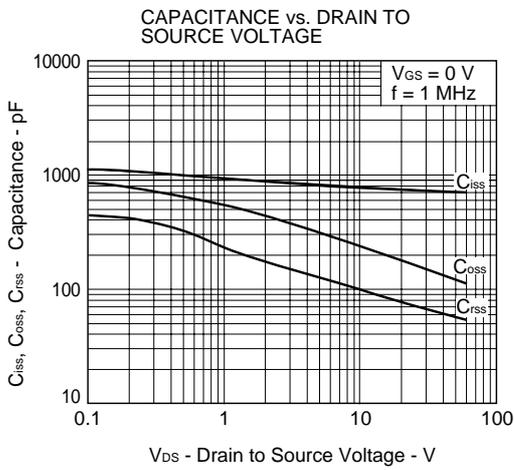
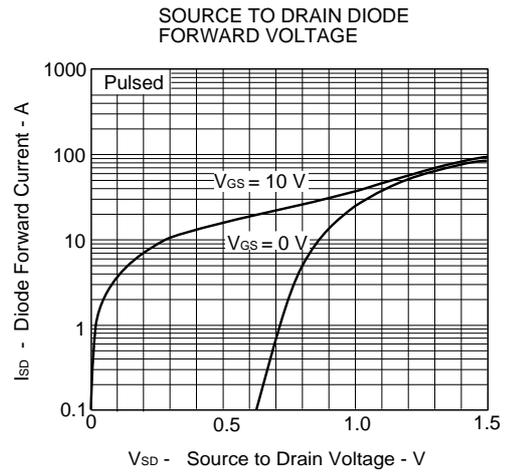
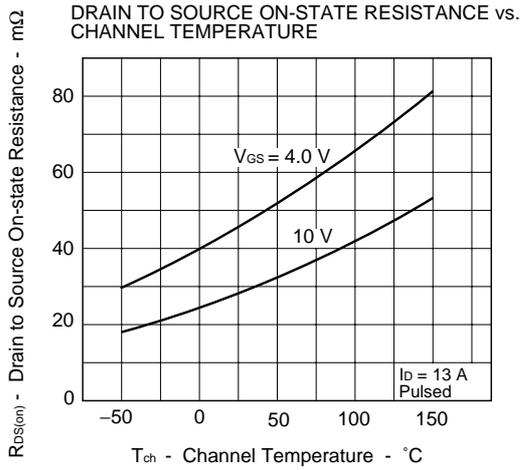


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

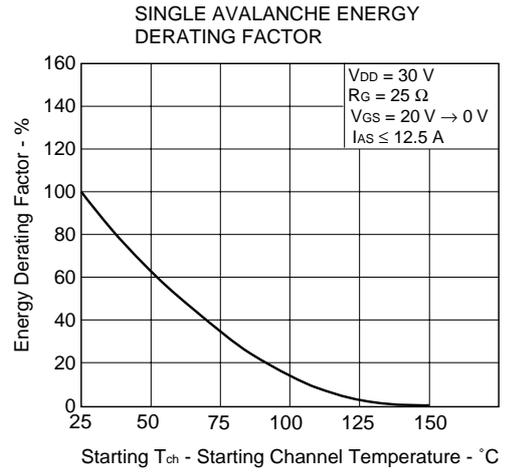
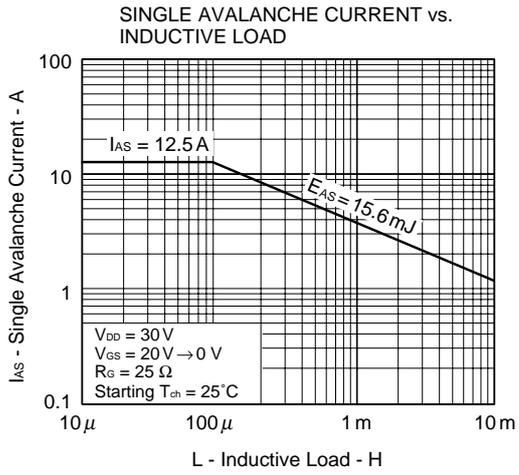


GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



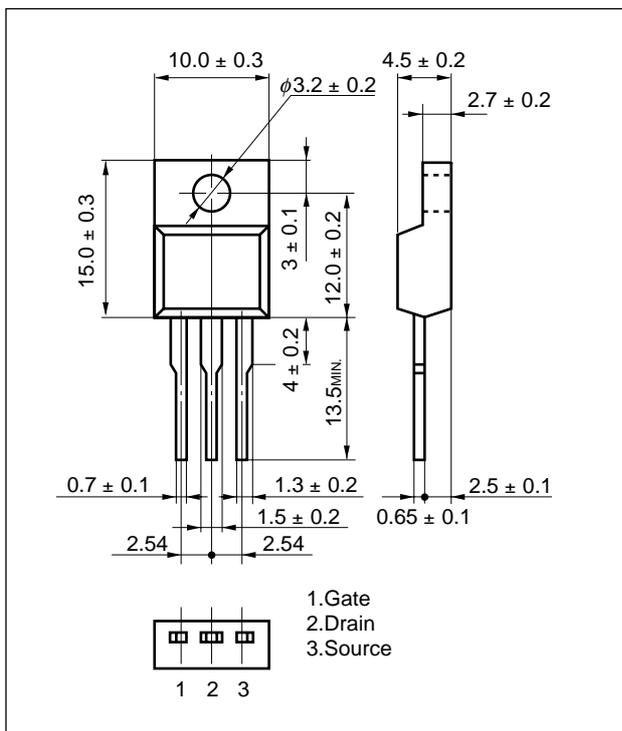


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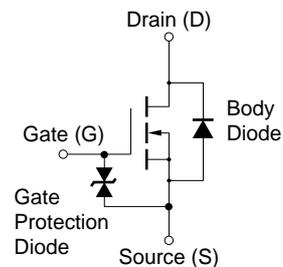


PACKAGE DRAWING

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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