

SWITCHING N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3113 is N-channel DMOS FET device that features a low gate charge and excellent switching characteristic, and designed for high voltage applications such as switching power supply, AC adapter.

FEATURES

- Low on-state resistance
 $R_{DS(on)} = 4.4 \Omega$ MAX. ($V_{GS} = 10$ V, $I_D = 1.0$ A)
- Low gate charge
 $Q_G = 9$ nC TYP. ($V_{DD} = 450$ V, $V_{GS} = 10$ V, $I_D = 2.0$ A)
- Gate voltage rating ± 30 V
- Avalanche capability ratings

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

Drain to Source Voltage ($V_{GS} = 0$ V)	V_{DSS}	600	V
Gate to Source Voltage ($V_{DS} = 0$ V)	V_{GSS}	± 30	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 2.0	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 8.0	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	20	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$) ^{Note2}	P_{T2}	1.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to $+150$	$^\circ\text{C}$
Single Avalanche Current ^{Note3}	I_{AS}	2.0	A
Single Avalanche Energy ^{Note3}	E_{AS}	2.7	mJ

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

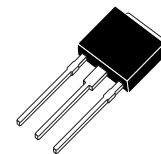
2. Mounted on glass epoxy board of 40 mm x 40 mm x 1.6 mm

3. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 150$ V, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0$ V

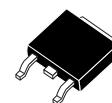
★ ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3113	TO-251 (MP-3)
2SK3113-Z	TO-252 (MP-3Z)

(TO-251)



(TO-252)

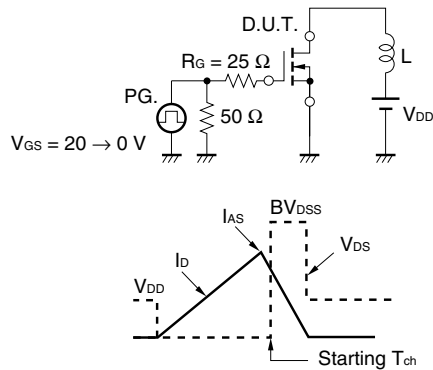


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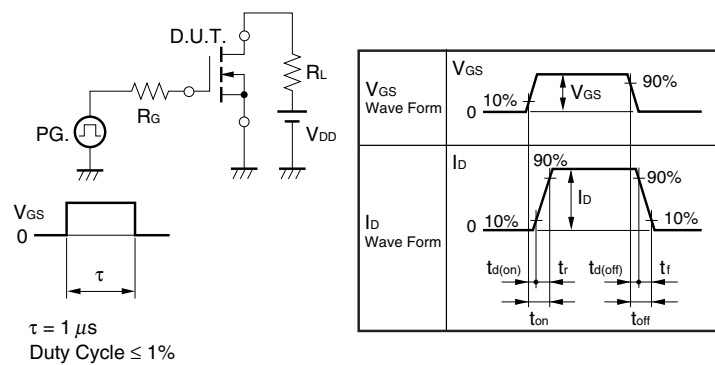
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 600 V, V _{GS} = 0 V			100	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V			±10	μA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	2.5		3.5	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 1.0 A	0.5			S
Drain to Source On-state Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 1.0 A		3.3	4.4	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V		290		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		60		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		5		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 150 V, I _D = 1.0 A		7		ns
Rise Time	t _r	V _{GS} = 10 V		2		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω, R _L = 10 Ω		22		ns
Fall Time	t _f			9		ns
Total Gate Charge	Q _G	V _{DD} = 450 V		9		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		2.4		nC
Gate to Drain Charge	Q _{GD}	I _D = 2.0 A		2		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 2.0 A, V _{GS} = 0 V		0.9		V
Reverse Recovery Time	t _{rr}	I _F = 2.0 A, V _{GS} = 0 V		0.9		μs
Reverse Recovery Charge	Q _{rr}	di/dt = 50 A/μs		2.0		μC

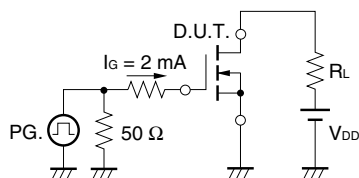
TEST CIRCUIT 1 AVALANCHE CAPABILITY



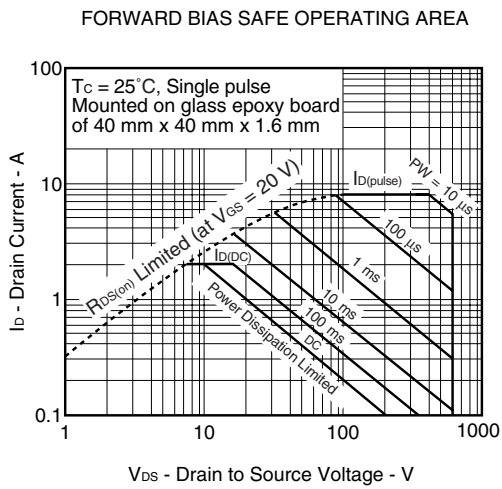
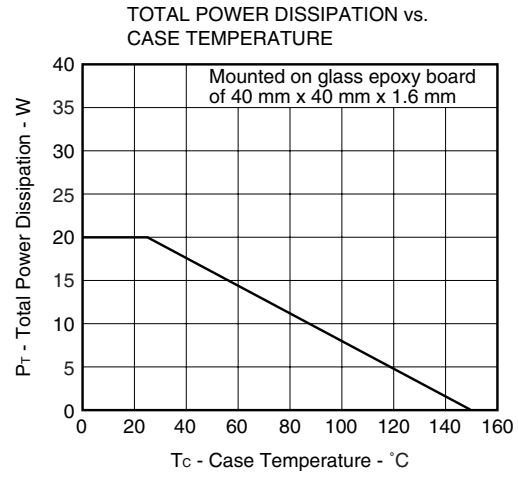
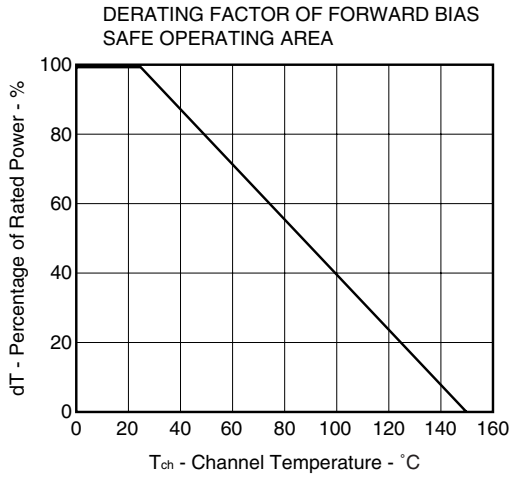
TEST CIRCUIT 2 SWITCHING TIME



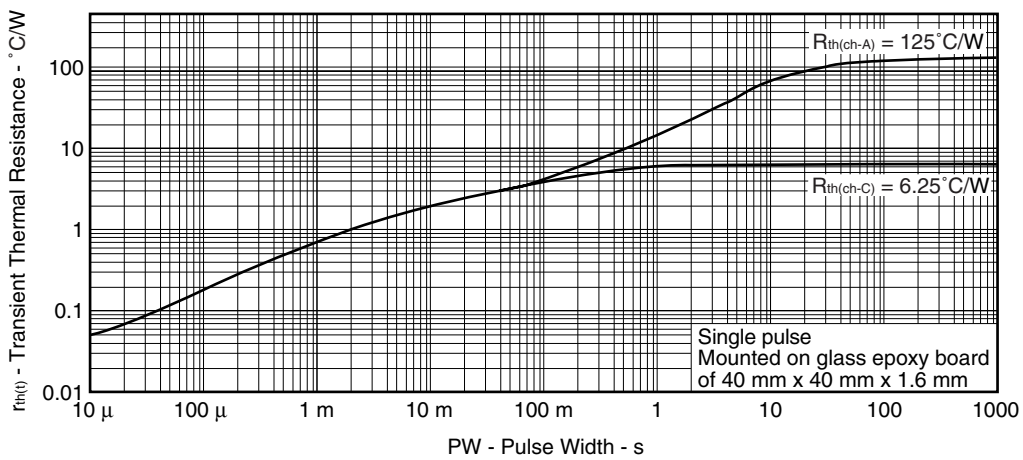
TEST CIRCUIT 3 GATE CHARGE



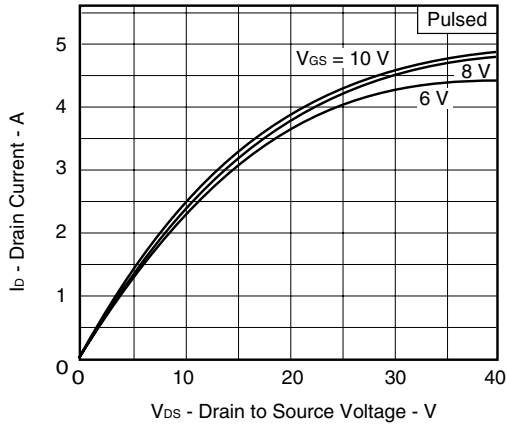
★ TYPICAL CHARACTERISTICS (T_A = 25°C)



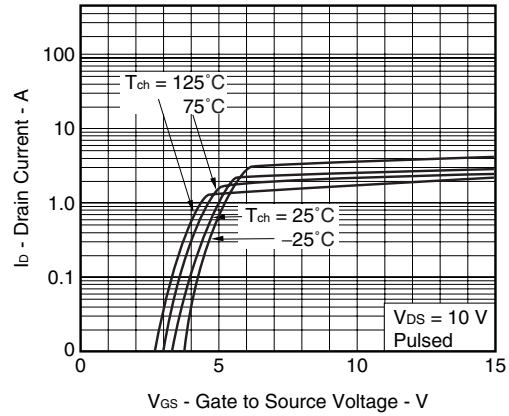
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



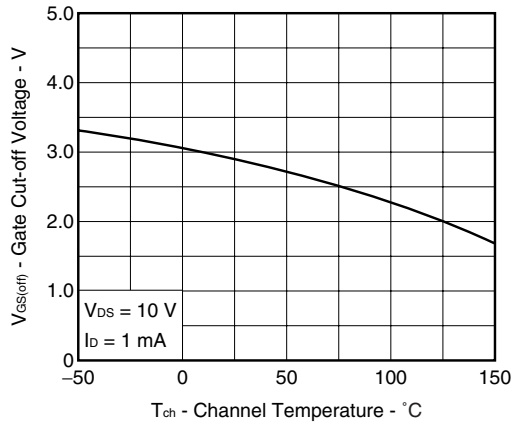
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



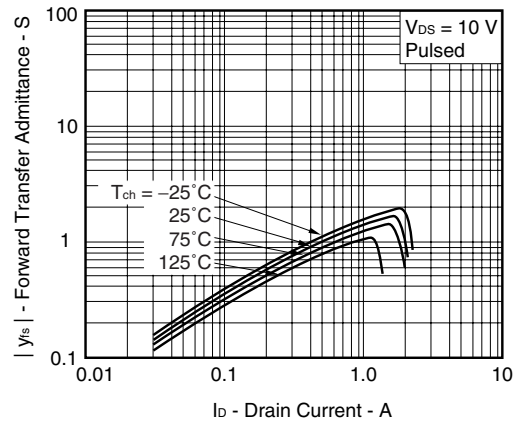
FORWARD TRANSFER CHARACTERISTICS



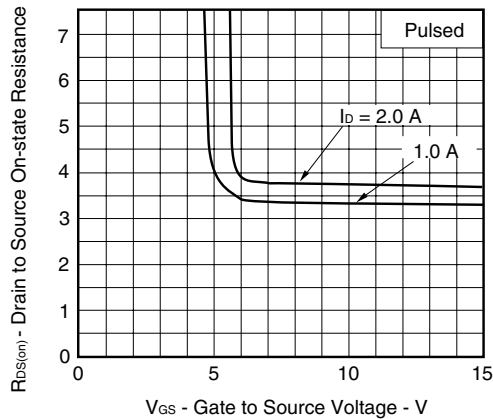
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



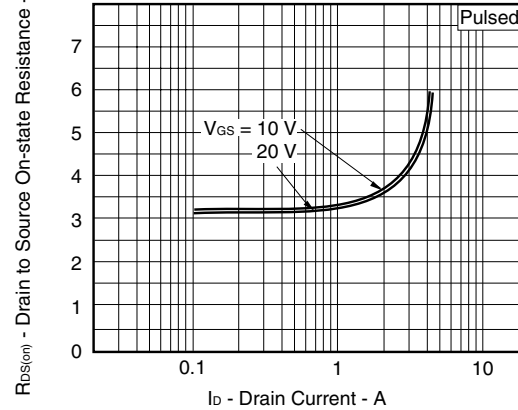
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT

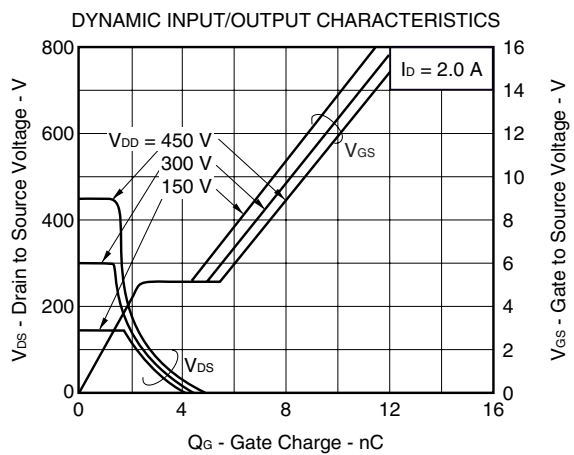
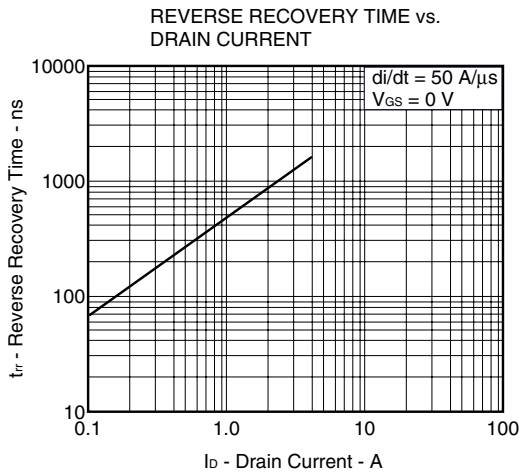
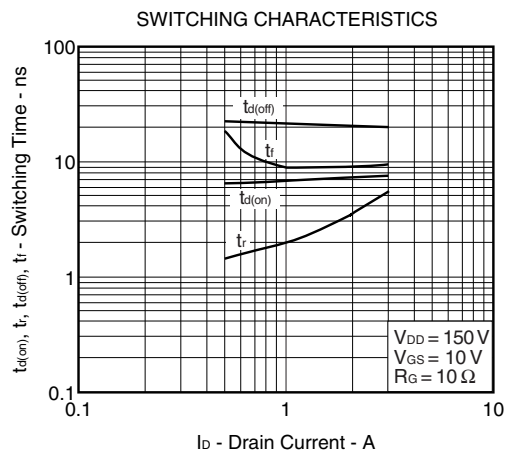
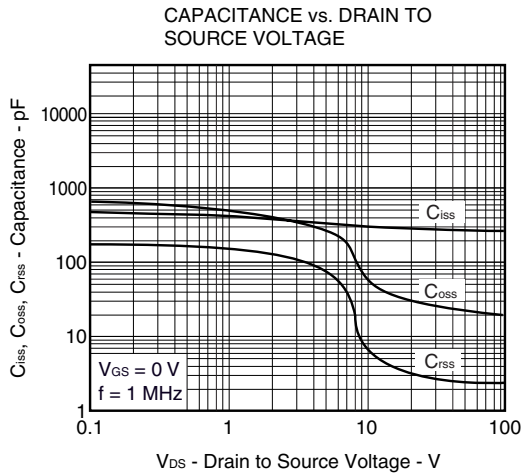
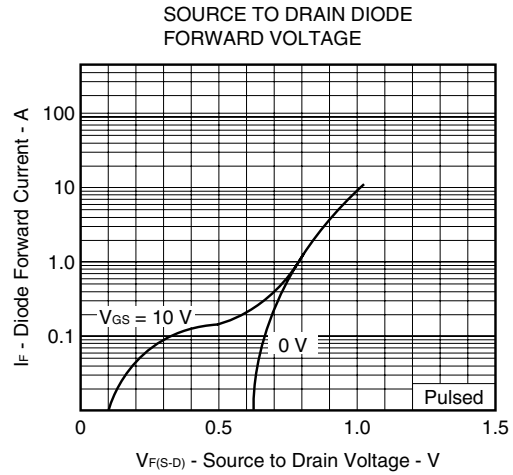
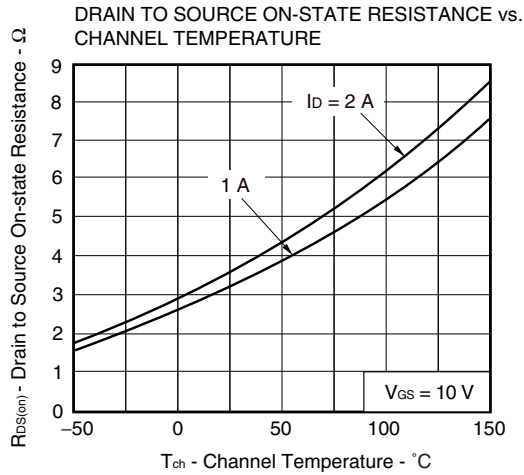


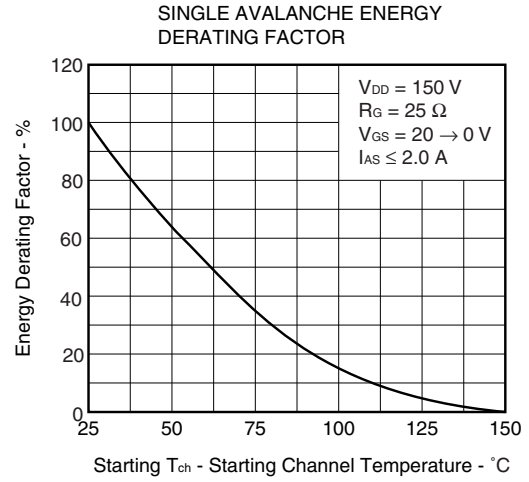
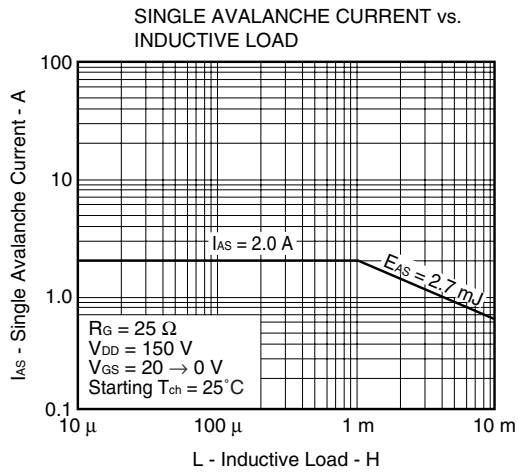
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

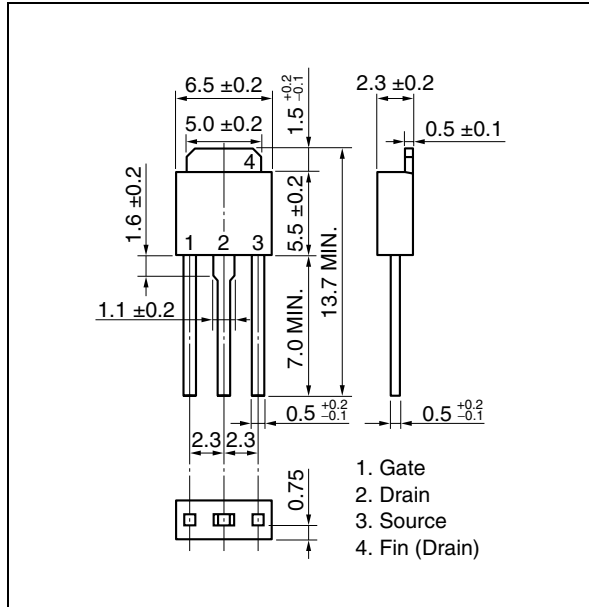




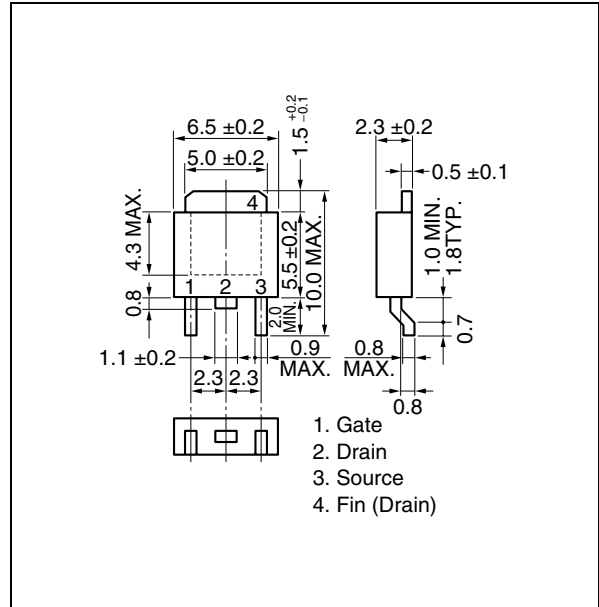


★ PACKAGE DRAWINGS (Unit: mm)

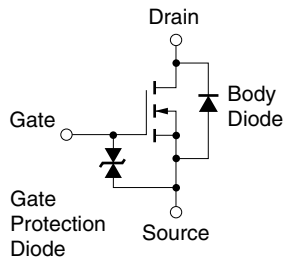
1) TO-251 (MP-3)



2) TO-252 (MP-3Z)



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.

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