

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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MOS FIELD EFFECT TRANSISTOR

2SK4080

SWITCHING

N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK4080 is N-channel MOS FET device that features a low on-state resistance and excellent switching characteristics, and designed for low voltage high current applications such as DC/DC converter with synchronous rectifier.

FEATURES

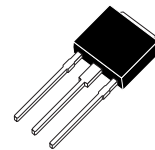
- Low on-state resistance
 $R_{DS(on)1} = 9.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 24 \text{ A)}$
- Low Q_{GD} : $Q_{GD} = 6.3 \text{ nC TYP.}$
- 4.5 V drive available

ORDERING INFORMATION

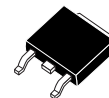
PART NUMBER	PACKAGE
2SK4080(1)-S27-AY ^{Note}	TO-251 (MP-3-b)
2SK4080-ZK-E1-AY ^{Note}	TO-252 (MP-3ZK)
2SK4080-ZK-E2-AY ^{Note}	TO-252 (MP-3ZK)

Note Pb-free (This product does not contain Pb in external electrode.)

(TO-251)



(TO-252)



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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	30	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 48	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 144	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	29	W
Total Power Dissipation	P_{T2}	1.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	$-55 \text{ to } +150$	$^\circ\text{C}$
Single Avalanche Current ^{Note2}	I_{AS}	21	A
Single Avalanche Energy ^{Note2}	E_{AS}	44.1	mJ

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

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 15 \text{ V}$, $R_G = 25 \text{ }\Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$, $L = 100 \text{ }\mu\text{H}$

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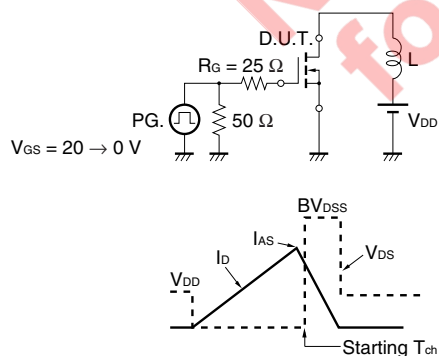
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

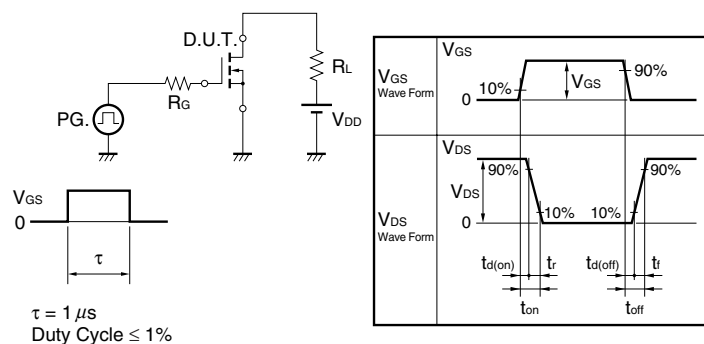
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±100	nA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	1.5	2.0	2.5	V
Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = 10 V, I _D = 12 A	7	14		S
Drain to Source On-state Resistance ^{Note}	R _{DS(on)1}	V _{GS} = 10 V, I _D = 24 A		7.0	9.0	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 24 A		10.2	15	mΩ
Input Capacitance	C _{iss}	V _{DS} = 10 V		1670		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		290		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		150		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 15 V		10		ns
Rise Time	t _r	I _D = 30 A		5.3		ns
Turn-off Delay Time	t _{d(off)}	V _{GS} = 12 V		42		ns
Fall Time	t _f	R _G = 3 Ω		6.1		ns
Total Gate Charge	Q _{G1}	V _{DD} = 15 V, V _{GS} = 12 V, I _D = 30 A		32		nC
	Q _{G2}	V _{DD} = 15 V, V _{GS} = 4.5 V, I _D = 30 A		13		nC
Gate to Source Charge	Q _{GS}	V _{DD} = 15 V		4.6		nC
Gate to Drain Charge	Q _{GD}	I _D = 30 A		6.3		nC
Gate Resistance	R _G			2.4		Ω
Body Diode Forward Voltage ^{Note}	V _{F(S-D)}	I _F = 30 A, V _{GS} = 0 V		0.94	1.5	V
Reverse Recovery Time	t _{rr}	I _F = 30 A, V _{GS} = 0 V		29		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		23		nC

Note Pulsed

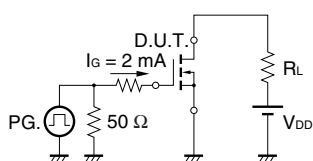
TEST CIRCUIT 1 AVALANCHE CAPABILITY



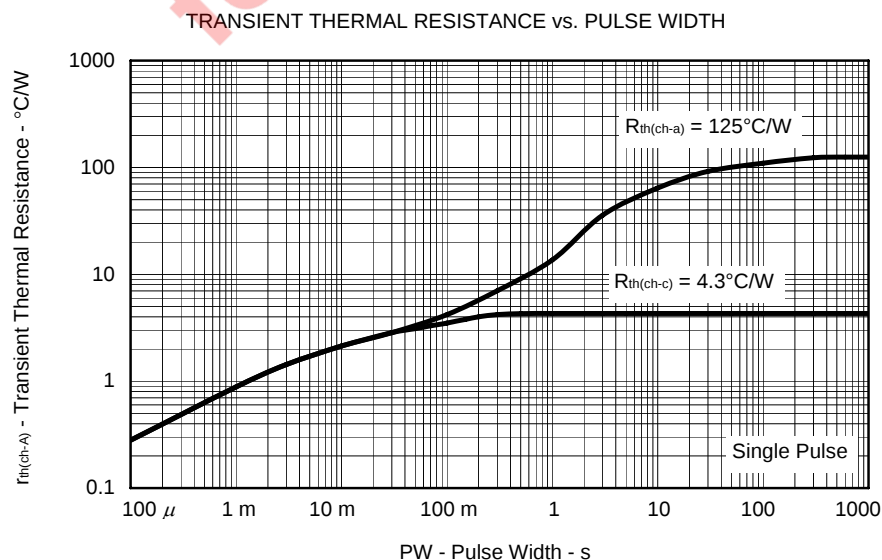
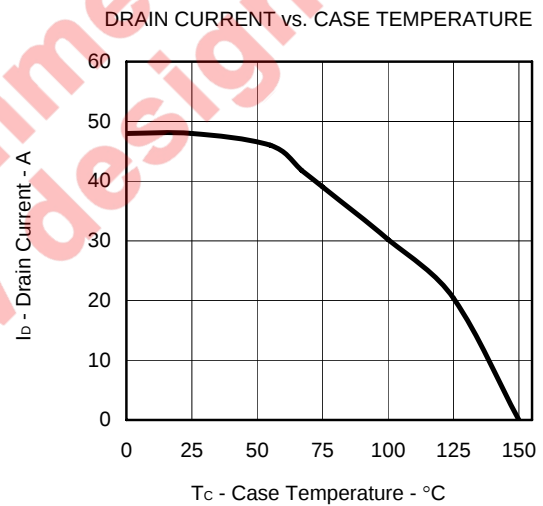
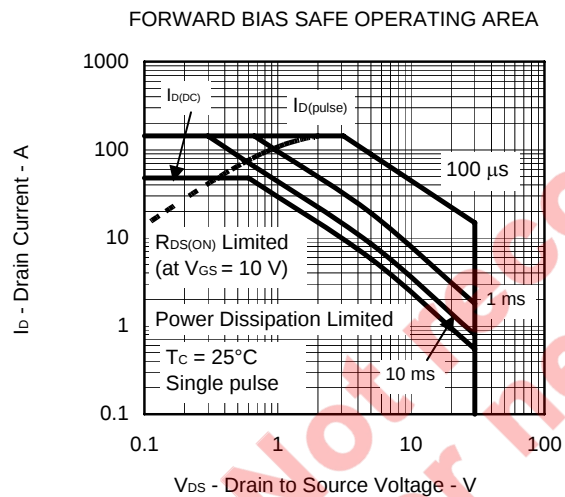
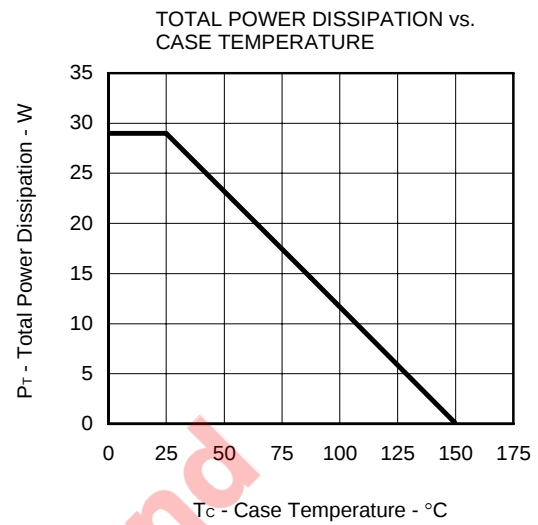
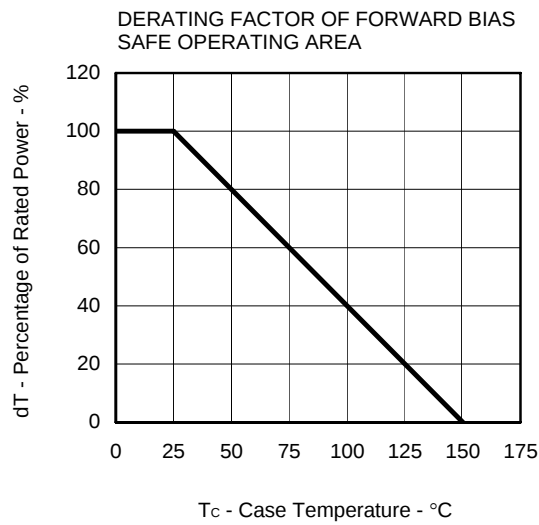
TEST CIRCUIT 2 SWITCHING TIME



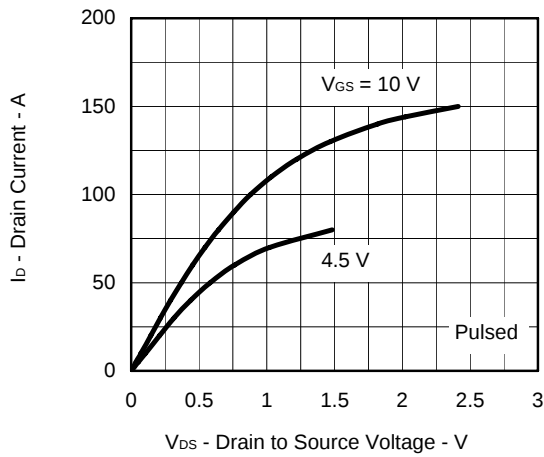
TEST CIRCUIT 3 GATE CHARGE



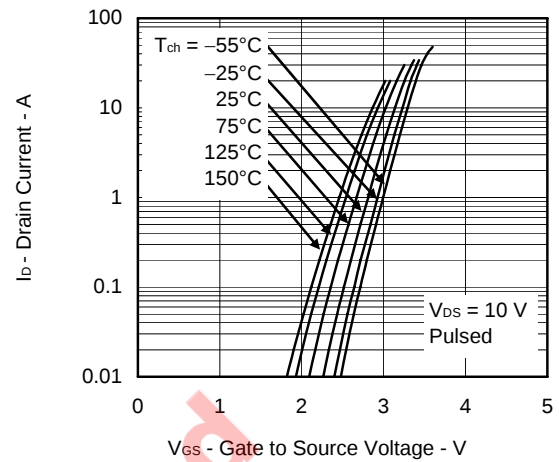
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



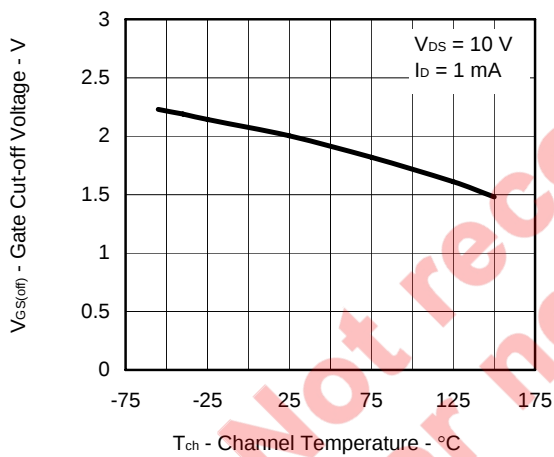
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



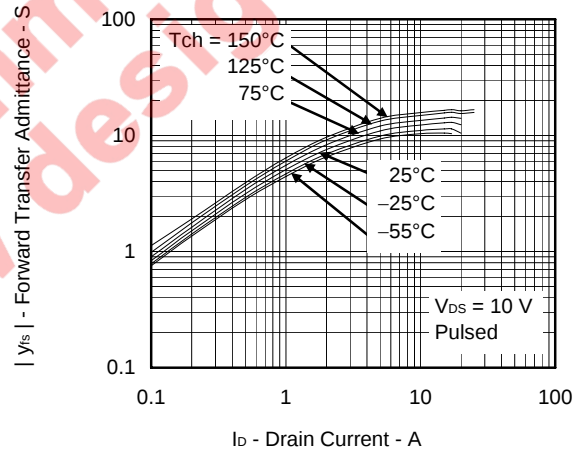
FORWARD TRANSFER CHARACTERISTICS



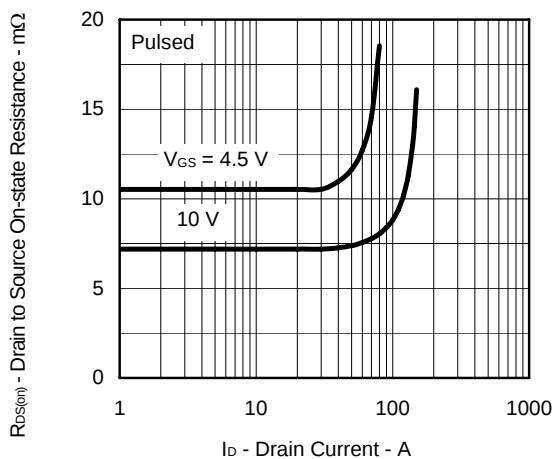
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



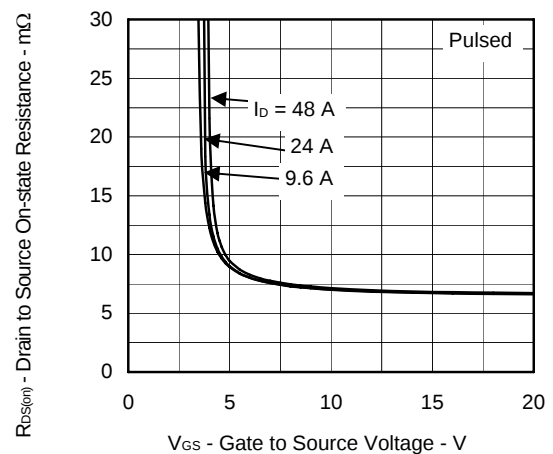
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT

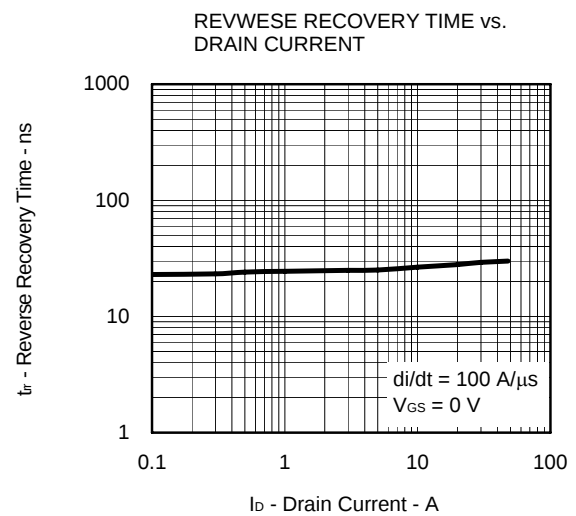
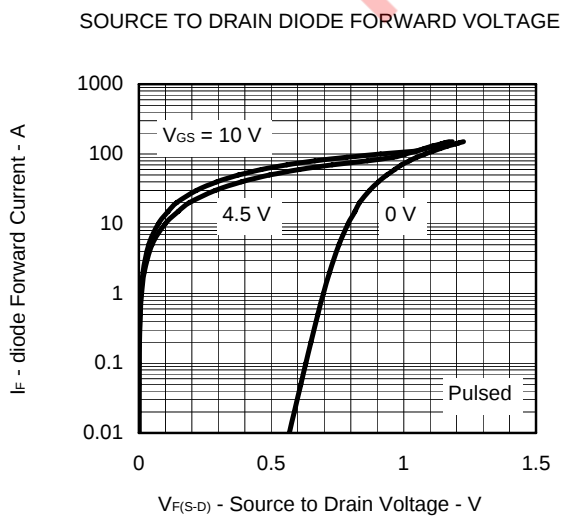
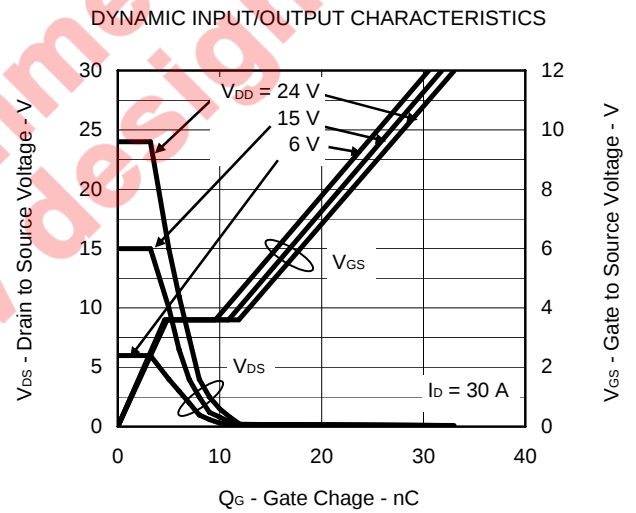
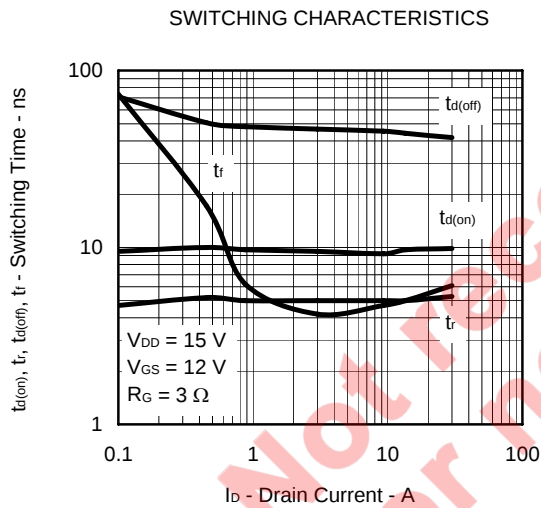
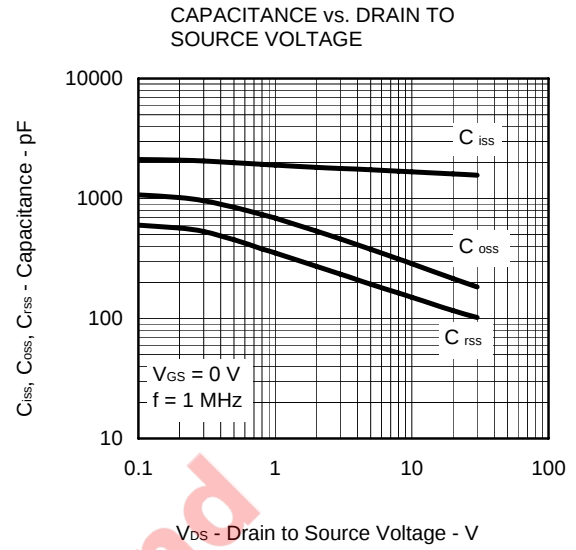
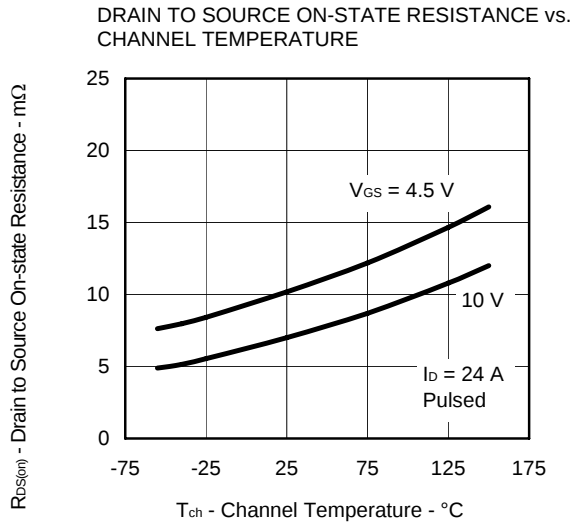


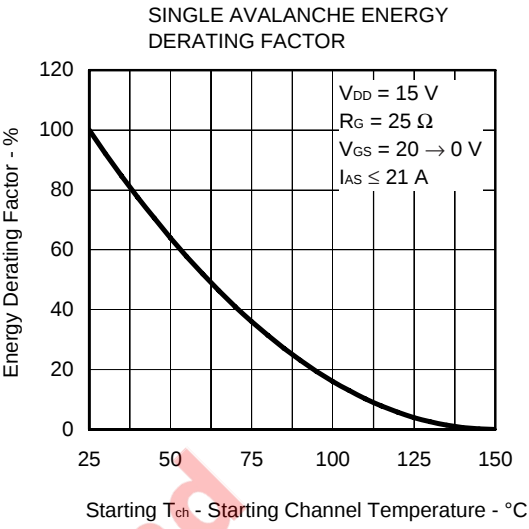
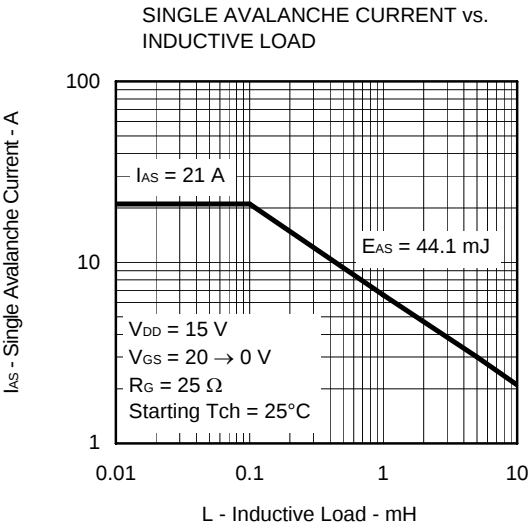
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



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





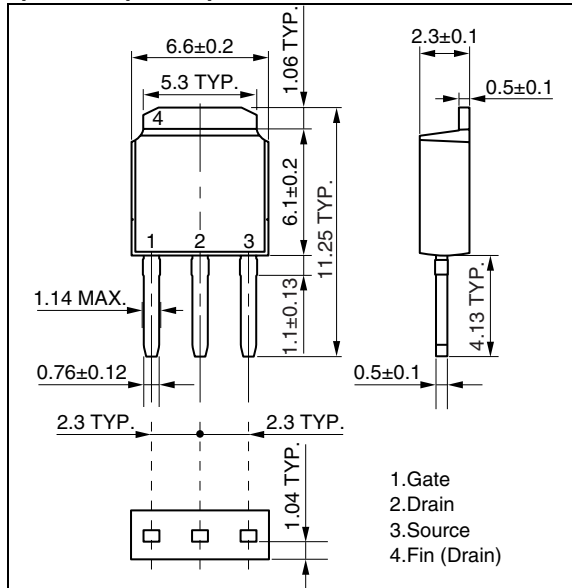


Not recommended
for new design

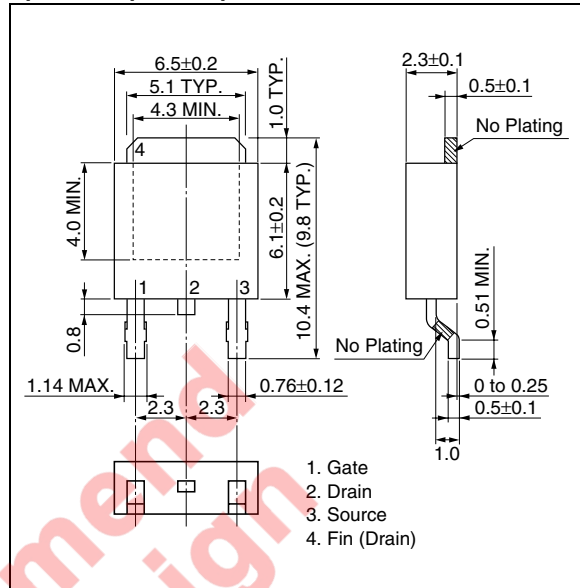
PACKAGE DRAWINGS (Unit: mm)

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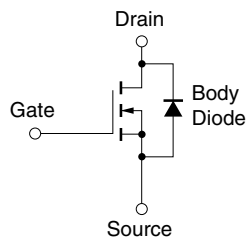
1) TO-251 (MP-3-b)



2) TO-252 (MP-3ZK)



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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