

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

2SJ687

SWITCHING

P-CHANNEL POWER MOSFET

DESCRIPTION

The 2SJ687 is P-channel MOSFET device and a excellent switch that can be driven by a low power-supply voltage.

FEATURES

- Low on-state resistance
 $R_{DS(on)1} = 7.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5 \text{ V, } I_D = -10 \text{ A)}$
 $R_{DS(on)2} = 9.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = -3.0 \text{ V, } I_D = -10 \text{ A)}$
 $R_{DS(on)3} = 20 \text{ m}\Omega \text{ MAX. (} V_{GS} = -2.5 \text{ V, } I_D = -10 \text{ A)}$
- 2.5 V drive available
- Avalanche capability ratings

ORDERING INFORMATION

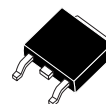
PART NUMBER	LEAD PLATING	PACKING	PACKAGE
2SJ687-ZK-E1-AY ^{Note}	Pure Sn (Tin)	Tape 2500 p/reel	TO-252 (MP-3ZK) 0.27 g TYP.
2SJ687-ZK-E2-AY ^{Note}			

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

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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	-20	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 12	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 20	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 60	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	36	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	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 ^{Note2}	I_{AS}	-20	A
Single Avalanche Energy ^{Note2}	E_{AS}	40	mJ

(TO-252)



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

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = -10 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = -12 \rightarrow 0 \text{ V}$

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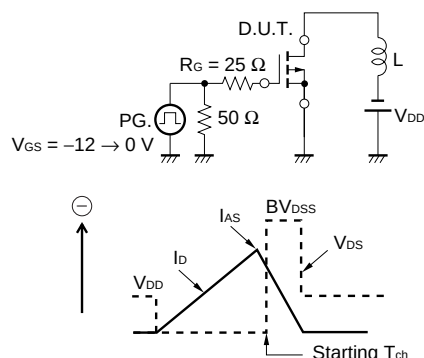
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

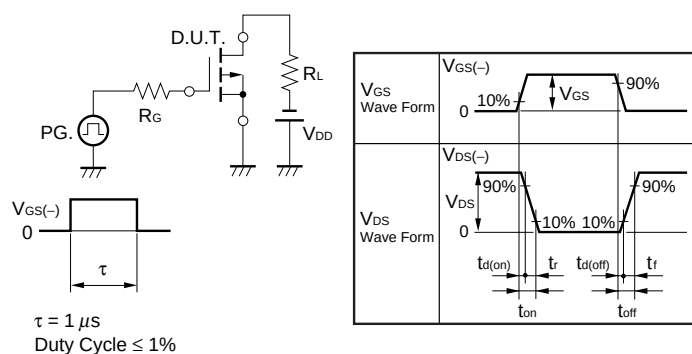
	CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
	Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -20 V, V _{GS} = 0 V			-10	μA
<R>	Gate Leakage Current	I _{GSS}	V _{GS} = ±12 V, V _{DS} = 0 V			±100	nA
<R>	Gate to Source Cut-off Voltage	V _{GS(off)}	V _{DS} = -10 V, I _D = -1 mA	-0.6	-1.2	-1.45	V
	Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = -10 V, I _D = -10 A	20			S
	Drain to Source On-state Resistance ^{Note}	R _{DS(on)1}	V _{GS} = -4.5 V, I _D = -10 A		5.4	7.0	mΩ
		R _{DS(on)2}	V _{GS} = -3.0 V, I _D = -10 A		7.1	9.0	mΩ
		R _{DS(on)3}	V _{GS} = -2.5 V, I _D = -10 A		10.8	20	mΩ
	Input Capacitance	C _{iss}	V _{DS} = -10 V,		4400		pF
	Output Capacitance	C _{oss}	V _{GS} = 0 V,		1070		pF
	Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		760		pF
	Turn-on Delay Time	t _{d(on)}	V _{DD} = -10 V, I _D = -10 A,		36		ns
	Rise Time	t _r	V _{GS} = -4.5 V,		220		ns
	Turn-off Delay Time	t _{d(off)}	R _G = 3 Ω		270		ns
	Fall Time	t _f			310		ns
	Total Gate Charge	Q _G	V _{DD} = -16 V,		57		nC
	Gate to Source Charge	Q _{GS}	V _{GS} = -4.5 V,		12		nC
	Gate to Drain Charge	Q _{GD}	I _D = -20 A		28		nC
	Body Diode Forward Voltage ^{Note}	V _{F(S-D)}	I _F = -20 A, V _{GS} = 0 V		0.85	1.5	V
	Reverse Recovery Time	t _{rr}	I _F = -20 A, V _{GS} = 0 V,		200		ns
	Reverse Recovery Charge	Q _{rr}	di/dt = -100 A/μs		240		nC

Note Pulsed

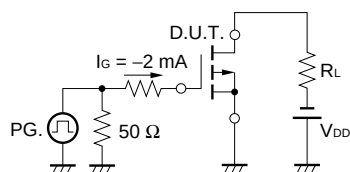
TEST CIRCUIT 1 AVALANCHE CAPABILITY



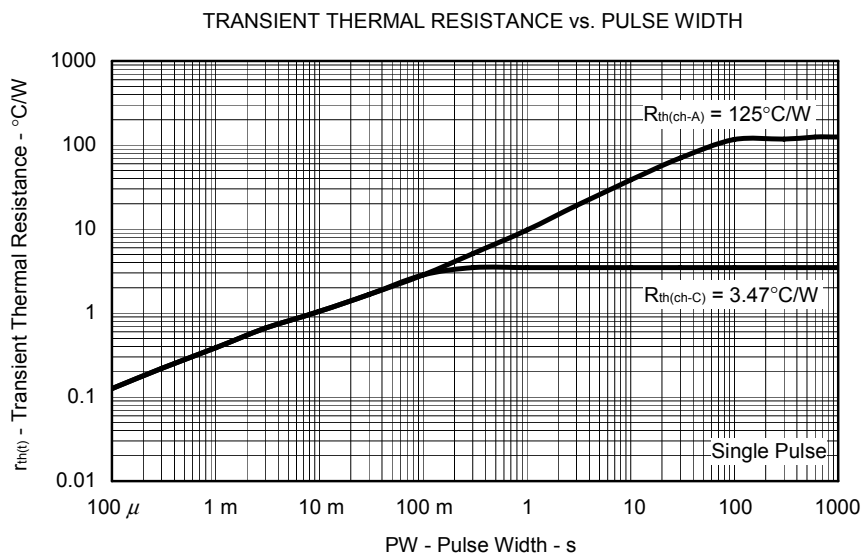
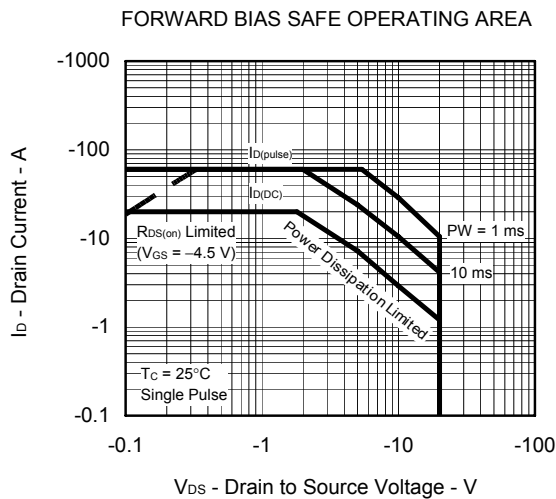
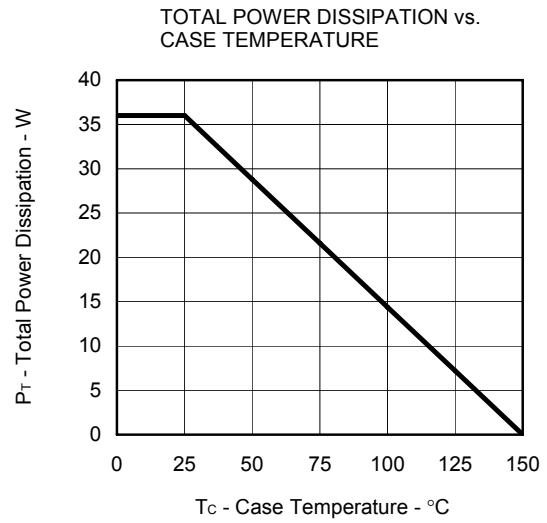
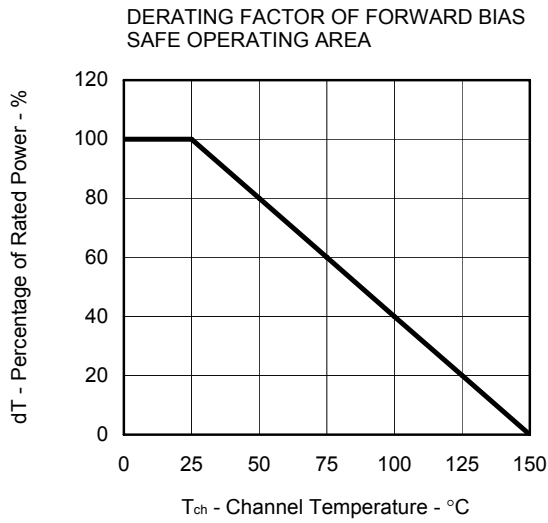
TEST CIRCUIT 2 SWITCHING TIME



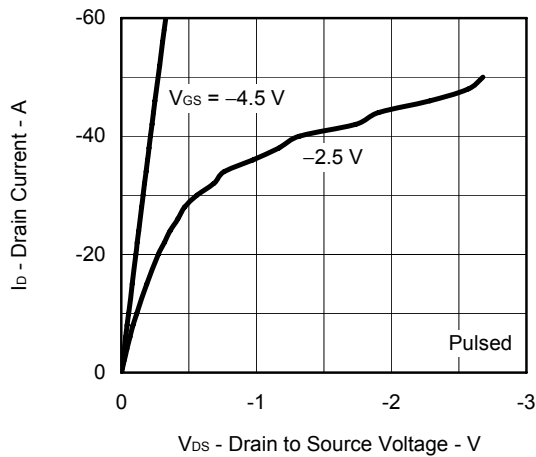
TEST CIRCUIT 3 GATE CHARGE



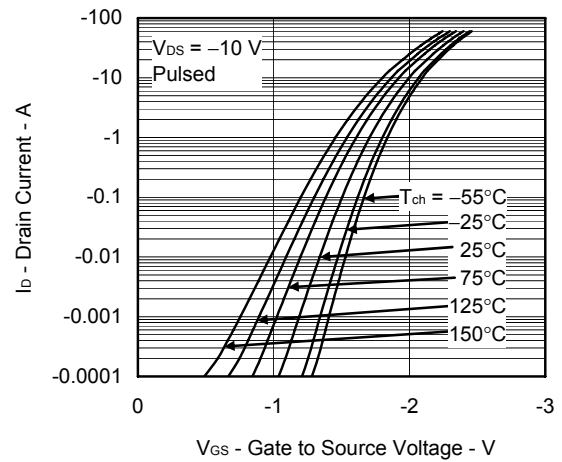
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



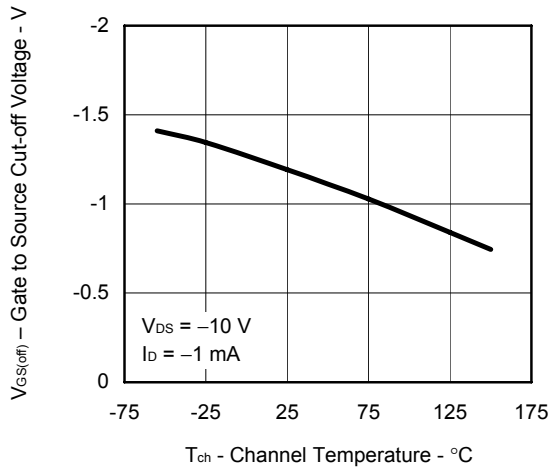
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



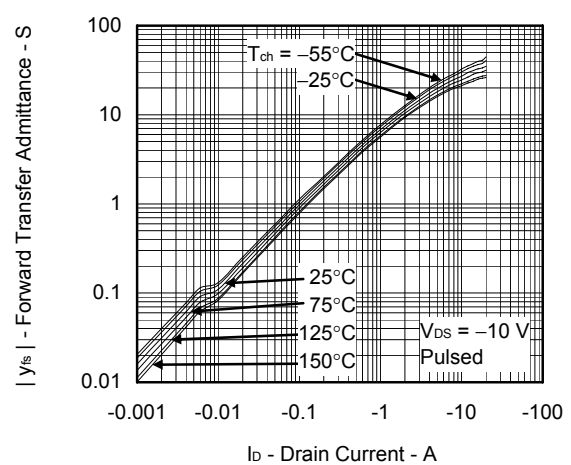
FORWARD TRANSFER CHARACTERISTICS



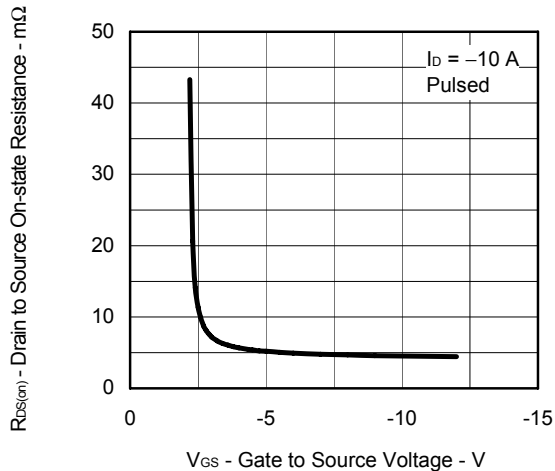
GATE TO SOURCE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



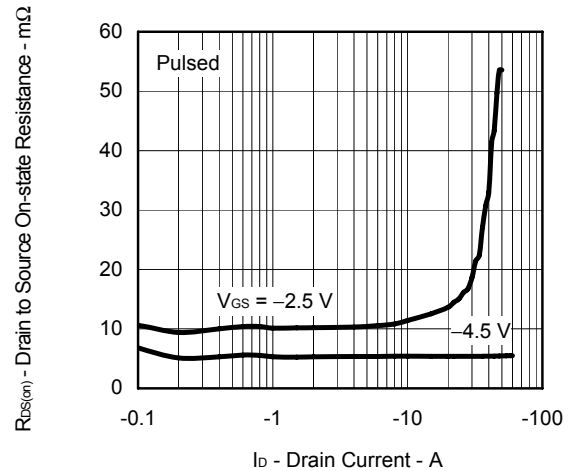
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



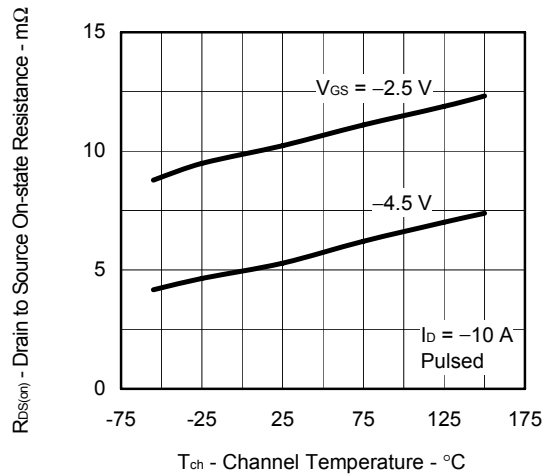
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



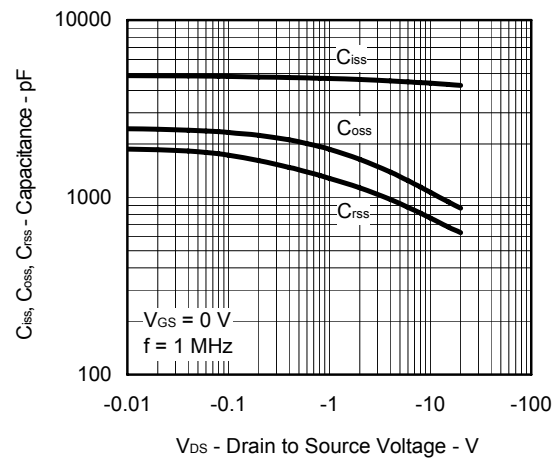
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



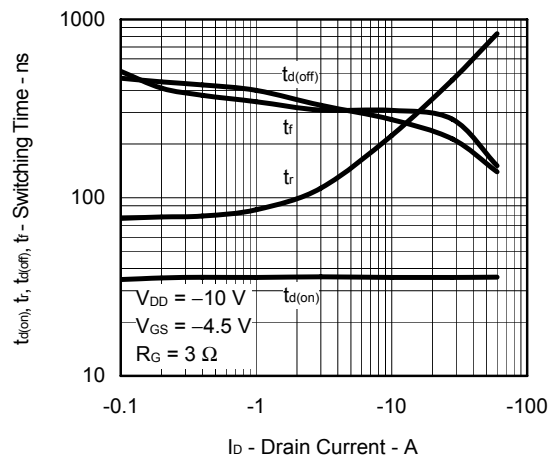
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



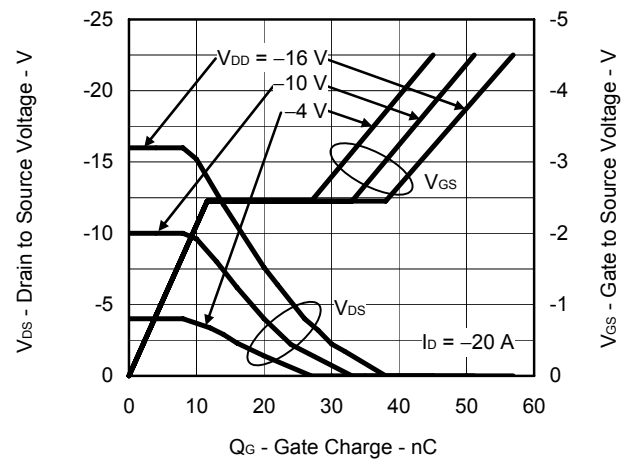
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



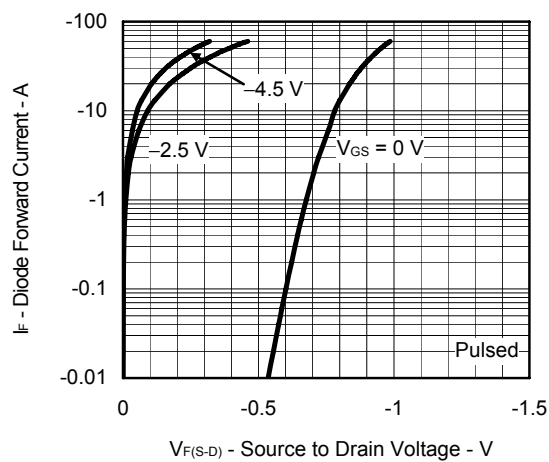
SWITCHING CHARACTERISTICS



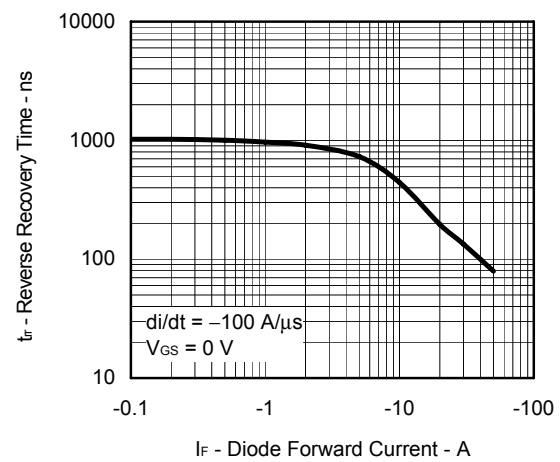
DYNAMIC INPUT/OUTPUT CHARACTERISTICS

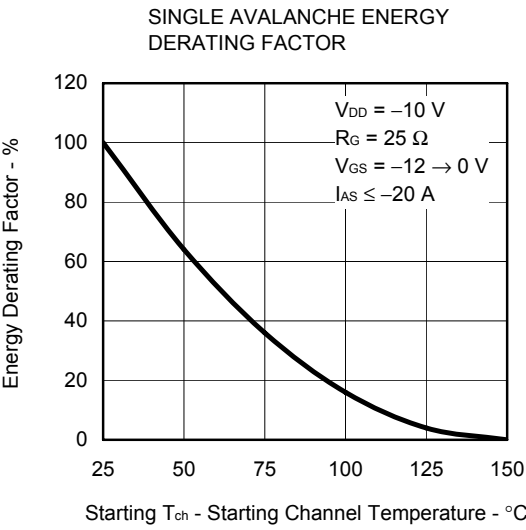
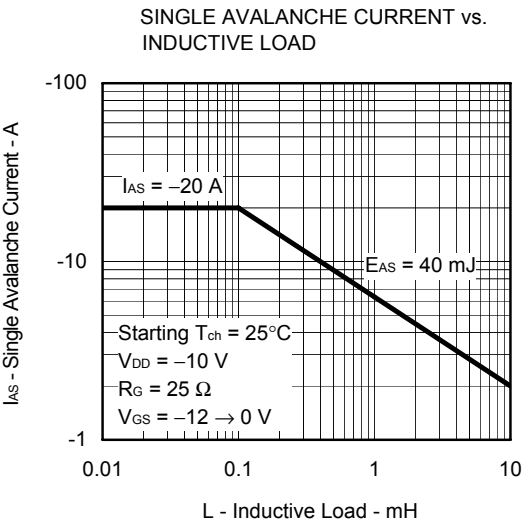


SOURCE TO DRAIN DIODE FORWARD VOLTAGE



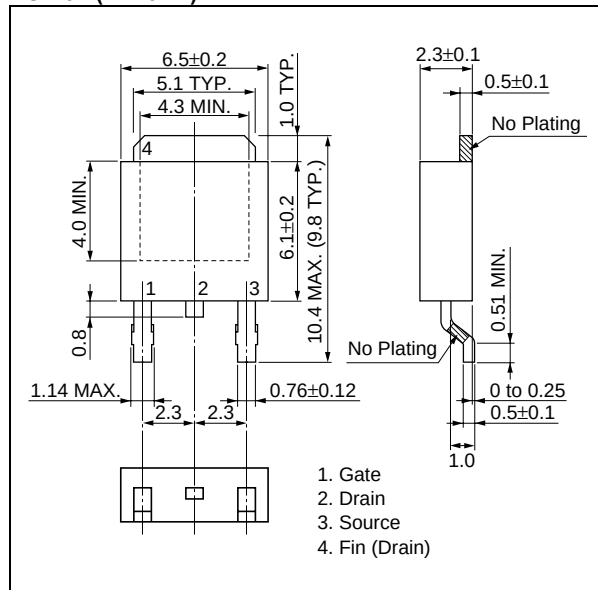
REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



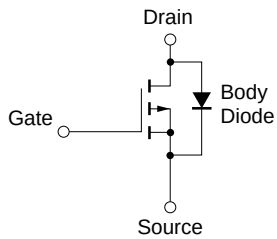


PACKAGE DRAWING (Unit: mm)

TO-252 (MP-3ZK)



EQUIVALENT CIRCUIT



Remark Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

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