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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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SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3307 is N-channel MOS Field Effect Transistor designed for high current switching applications.

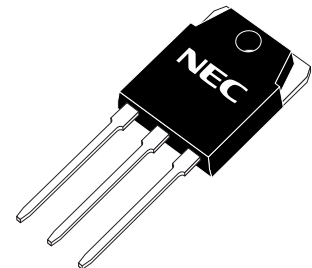
FEATURES

- Super low on-state resistance:
 $R_{DS(on)1} = 9.5 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 35 \text{ A)}$
 $R_{DS(on)2} = 14 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 35 \text{ A)}$
- Low C_{iss} : $C_{iss} = 4650 \text{ pF TYP.}$
- Built-in gate protection diode

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3307	TO-3P

(TO-3P)



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

Drain to Source Voltage	V_{DS}	60	V
Gate to Source Voltage	$V_{GS(AC)}$	± 20	V
Drain Current (DC)	$I_{D(DC)}$	± 70	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 280	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	120	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T2}	3.0	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}	45	A
Single Avalanche Energy ^{Note2}	E_{AS}	202	mJ

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

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

THERMAL RESISTANCE

Channel to Case	$R_{th(ch-C)}$	1.04	$^\circ\text{C/W}$
Channel to Ambient	$R_{th(ch-A)}$	41.7	$^\circ\text{C/W}$

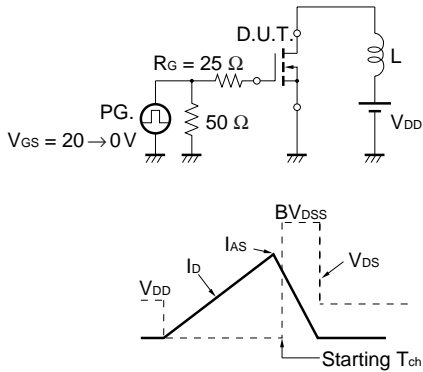
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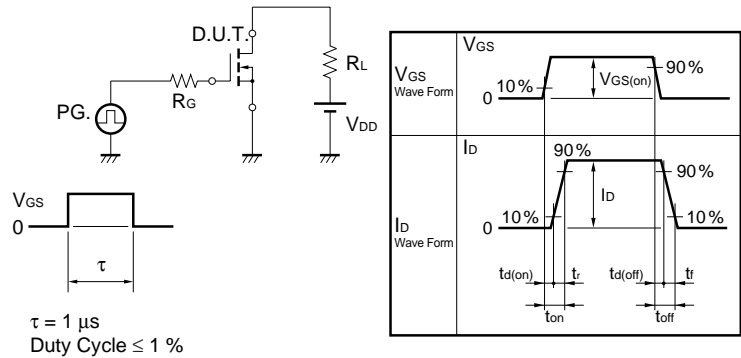
ELECTRICAL CHARACTERISTICS (TA = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$			10	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			± 10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.5	2.0	2.5	V
Forward Transfer Admittance	$ y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 35\text{ A}$	30	47		S
Drain to Source On-state Resistance	$R_{DS(on)1}$	$V_{GS} = 10\text{ V}, I_D = 35\text{ A}$		7.5	9.5	$\text{m}\Omega$
	$R_{DS(on)2}$	$V_{GS} = 4.0\text{ V}, I_D = 35\text{ A}$		10.5	14	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		4650		pF
Output Capacitance	C_{oss}			780		pF
Reverse Transfer Capacitance	C_{rss}			380		pF
Turn-on Delay Time	$t_{d(on)}$	$I_D = 35\text{ A}, V_{GS} = 10\text{ V}, V_{DD} = 30\text{ V},$ $R_G = 10\ \Omega$		90		ns
Rise Time	t_r			1260		ns
Turn-off Delay Time	$t_{d(off)}$			270		ns
Fall Time	t_f			370		ns
Total Gate Charge	Q_G	$I_D = 70\text{ A}, V_{DD} = 48\text{ V}, V_{GS} = 10\text{ V}$		90		nC
Gate to Source Charge	Q_{GS}			14		nC
Gate to Drain Charge	Q_{GD}			24		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 70\text{ A}, V_{GS} = 0\text{ V}$		1.0		V
Reverse Recovery Time	t_{rr}	$I_F = 70\text{ A}, V_{GS} = 0\text{ V},$		60		ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 100\text{ A}/\mu\text{s}$		110		nC

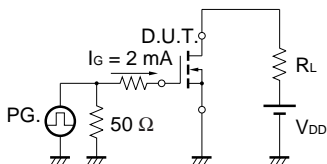
TEST CIRCUIT 1 AVALANCHE CAPABILITY



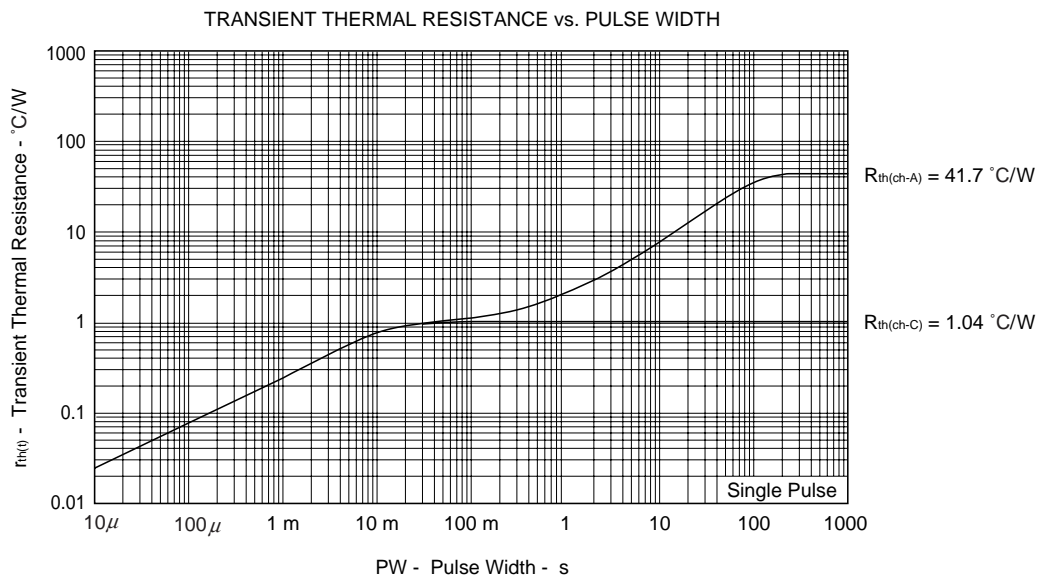
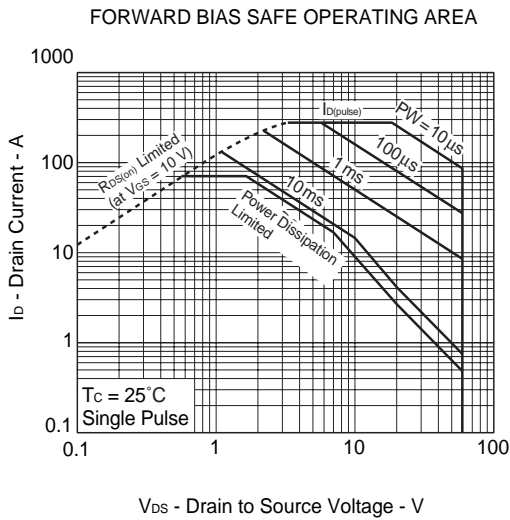
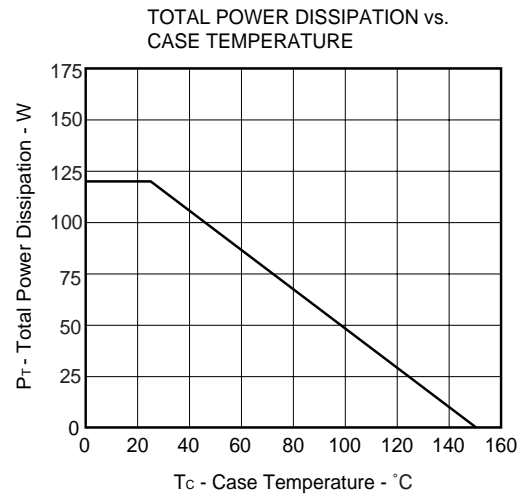
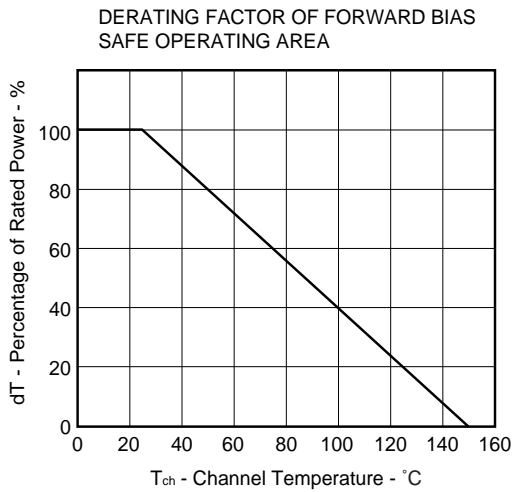
TEST CIRCUIT 2 SWITCHING TIME



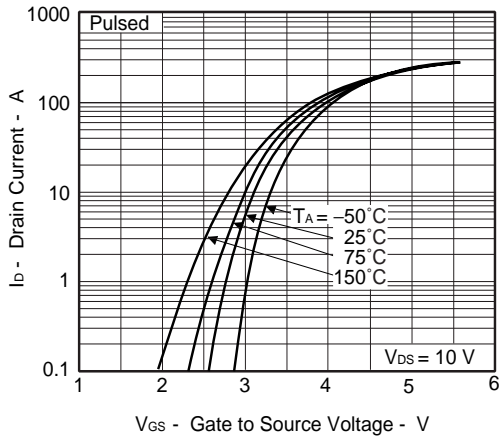
TEST CIRCUIT 3 GATE CHARGE



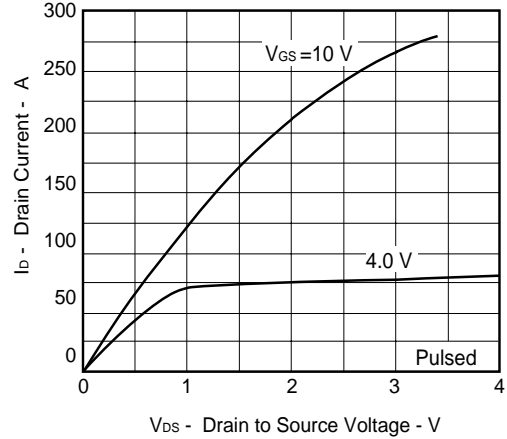
TYPICAL CHARACTERISTICS (T_A = 25°C)



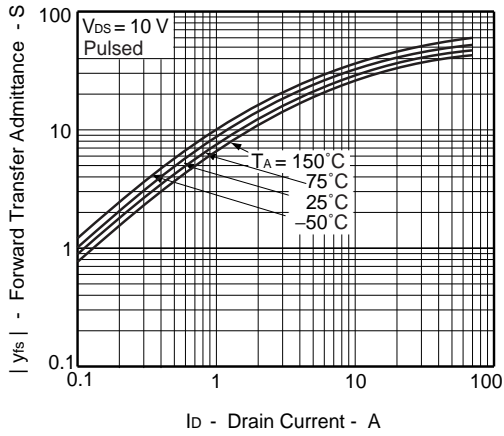
FORWARD TRANSFER CHARACTERISTICS



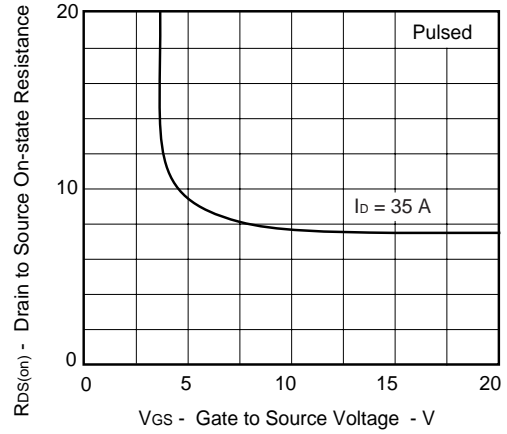
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



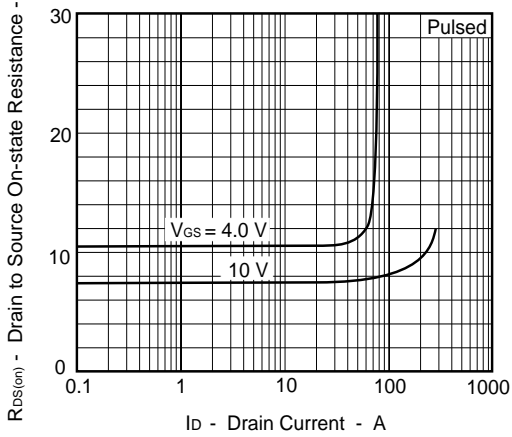
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



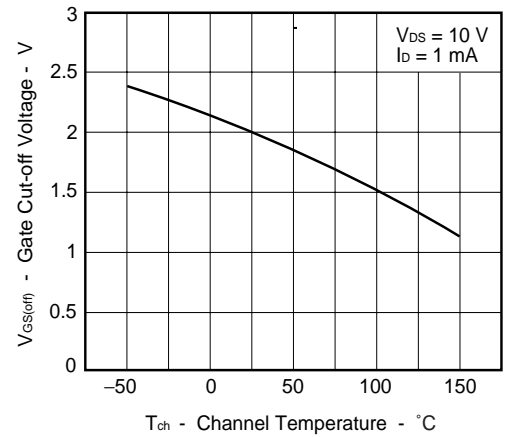
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



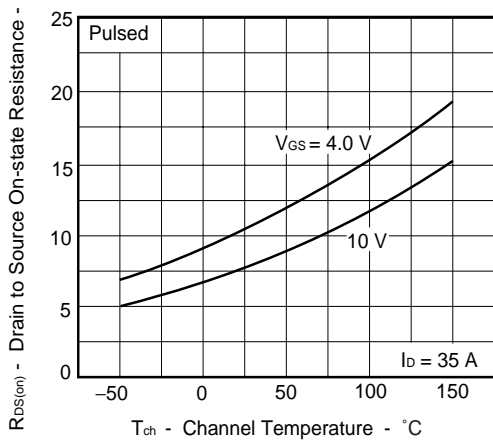
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



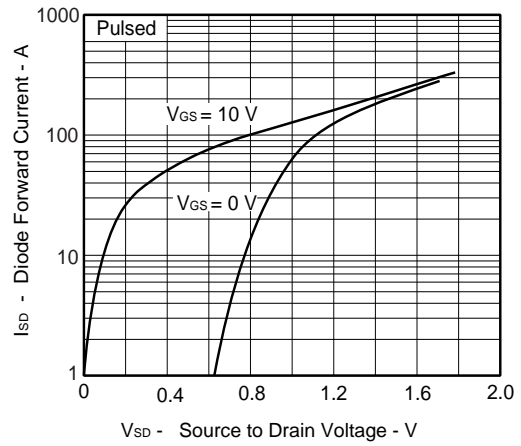
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



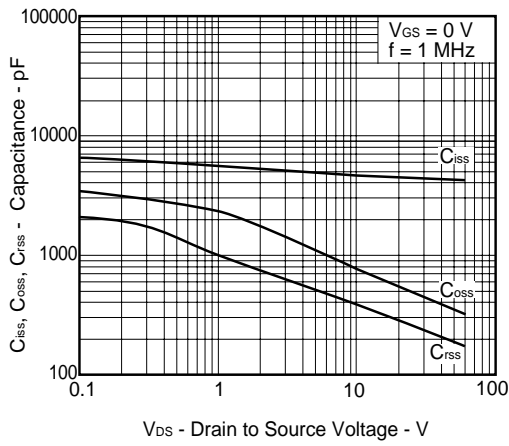
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



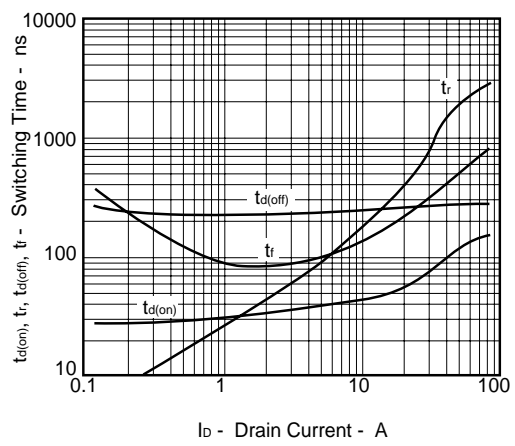
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



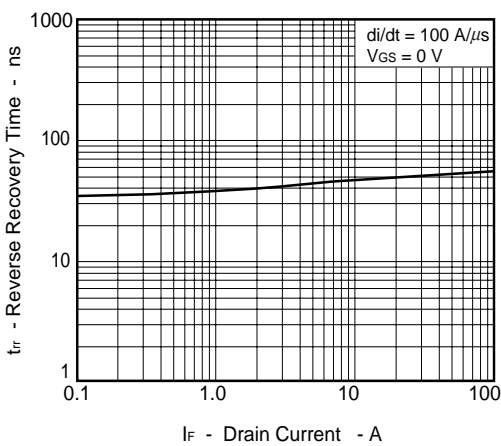
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



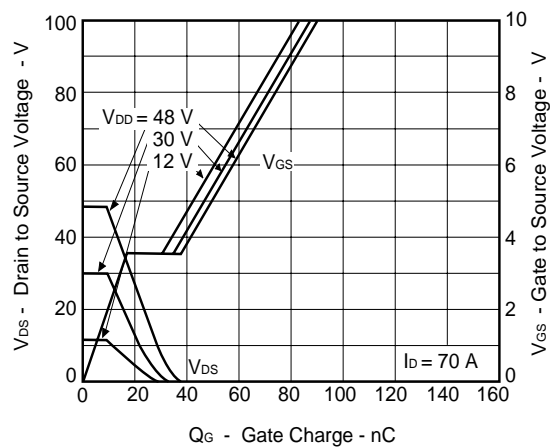
SWITCHING CHARACTERISTICS

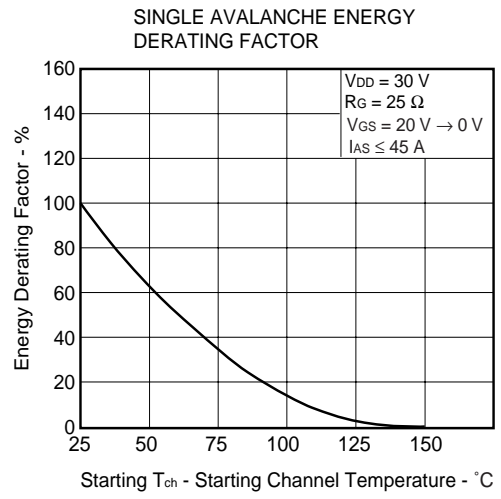
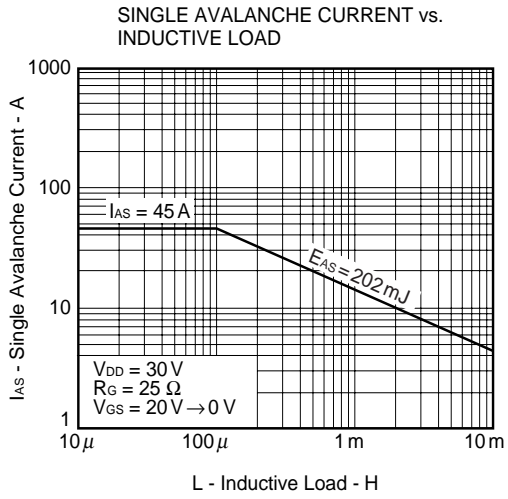


REVERSE RECOVERY TIME vs. DRAIN CURRENT



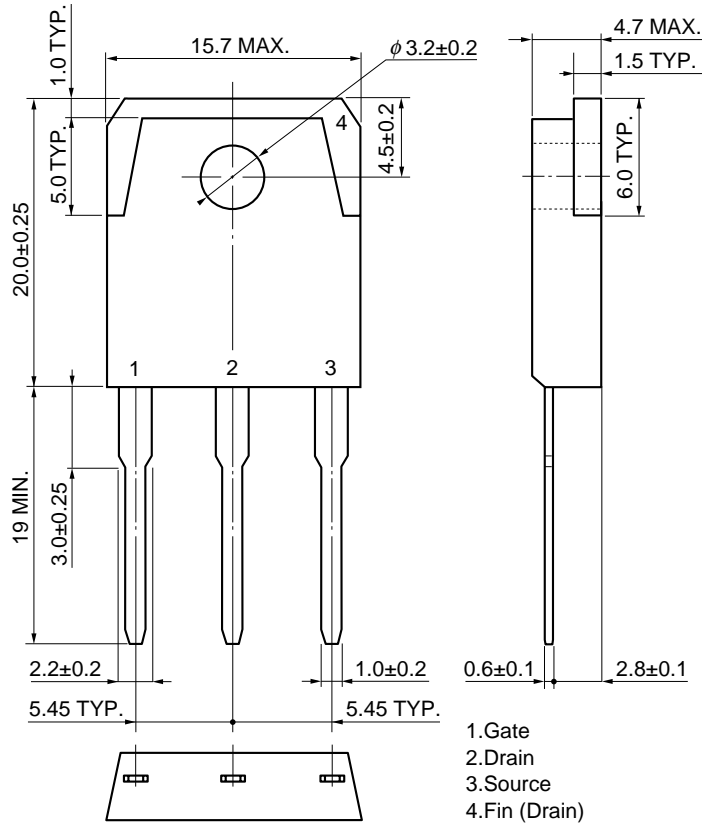
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



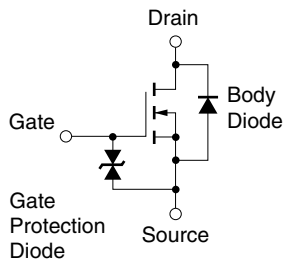


PACKAGE DRAWING (Unit: mm)

<R> TO-3P (MP-88)



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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