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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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Not recommended
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MOS FIELD EFFECT TRANSISTOR

2SK3455B

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3455B is N-channel MOS FET device that features a low gate charge and excellent switching characteristics, and designed for high voltage applications such as switching power supply, AC adapter.

FEATURES

- Low gate charge
 $Q_G = 30 \text{ nC TYP. (} V_{DD} = 400 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 12 \text{ A)}$
- Gate voltage rating : $\pm 30 \text{ V}$
- Low on-state resistance
 $R_{DS(on)} = 0.60 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 6.0 \text{ A)}$
- Avalanche capability ratings
- Isolated TO-220 package

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

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	500	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 30	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 12	A
Drain Current (Pulse) ^{Note1}	$I_{D(pulse)}$	± 36	A
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T1}	2.0	W
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T2}	50	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	A
Single Avalanche Energy ^{Note2}	E_{AS}	103	mJ

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

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

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3455B-S17-AY ^{Note}	Isolated TO-220

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

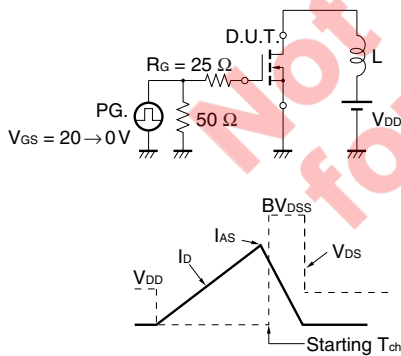
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

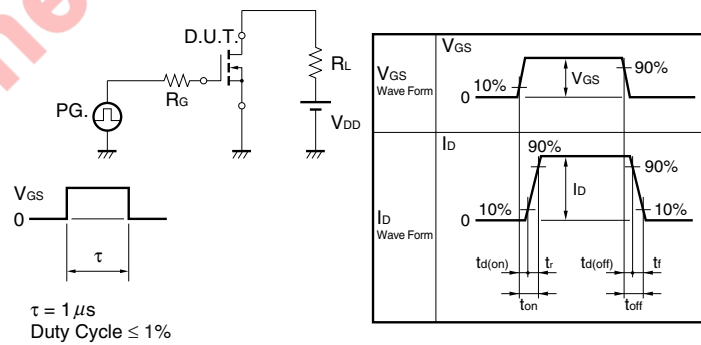
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{bss}	V _{DS} = 500 V, V _{GS} = 0 V			100	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V			±100	nA
Gate Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	2.5		3.5	V
Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = 10 V, I _D = 6.0 A	2.0			S
Drain to Source On-state Resistance ^{Note}	R _{DS(on)}	V _{GS} = 10 V, I _D = 6.0 A		0.50	0.60	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V		1800		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		280		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		8		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 150 V, I _D = 6.0 A		24		ns
Rise Time	t _r	V _{GS} = 10 V		14		ns
Turn-off Delay Time	t _{d(off)}	R _G = 10 Ω		36		ns
Fall Time	t _f			7		ns
Total Gate Charge	Q _G	V _{DD} = 400 V		30		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		10		nC
Gate to Drain Charge	Q _{GD}	I _D = 12 A		11		nC
Body Diode Forward Voltage ^{Note}	V _{F(S-D)}	I _F = 12 A, V _{GS} = 0 V		0.9		V
Reverse Recovery Time	t _{rr}	I _F = 12 A, V _{GS} = 0 V		440		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 100 A/μs		2.6		μC

Note Pulsed

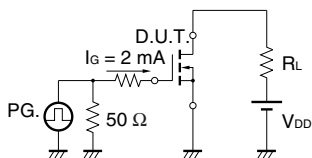
TEST CIRCUIT 1 AVALANCHE CAPABILITY



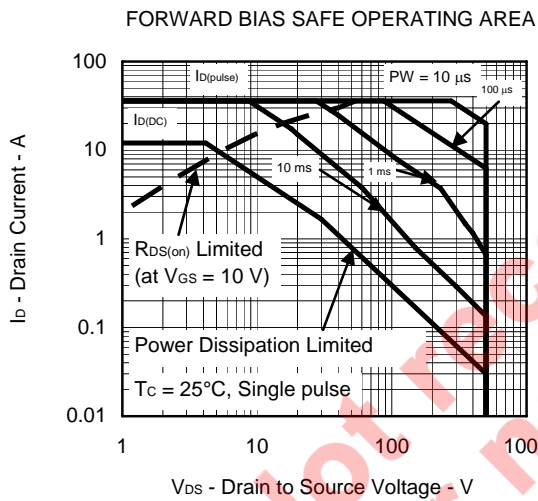
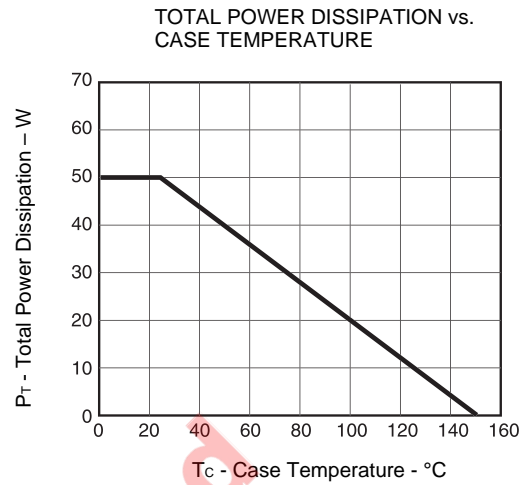
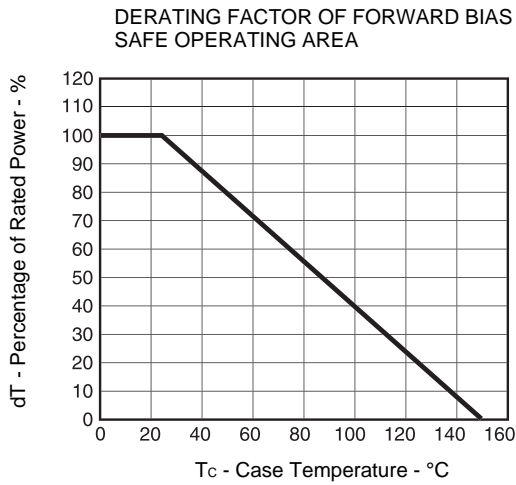
TEST CIRCUIT 2 SWITCHING TIME



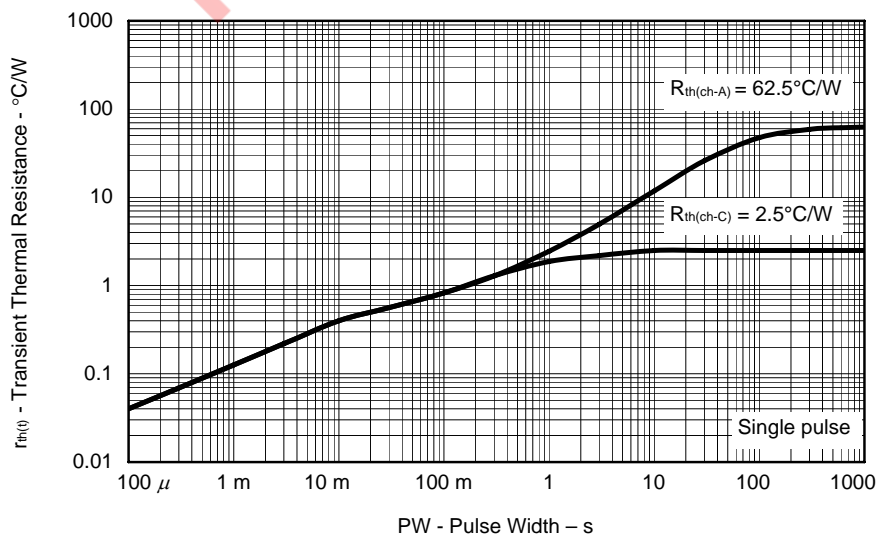
TEST CIRCUIT 3 GATE CHARGE



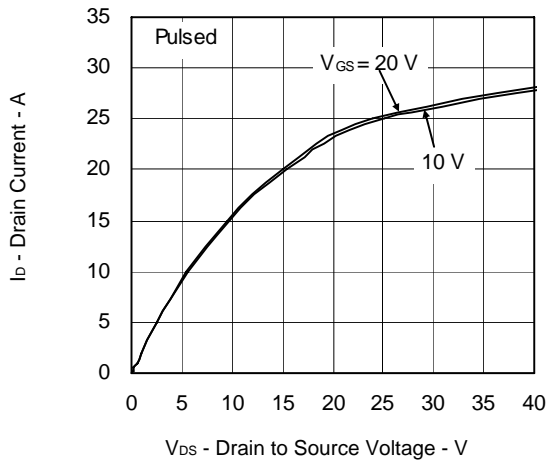
TYPICAL CHARACTERISTICS (T_A = 25°C)



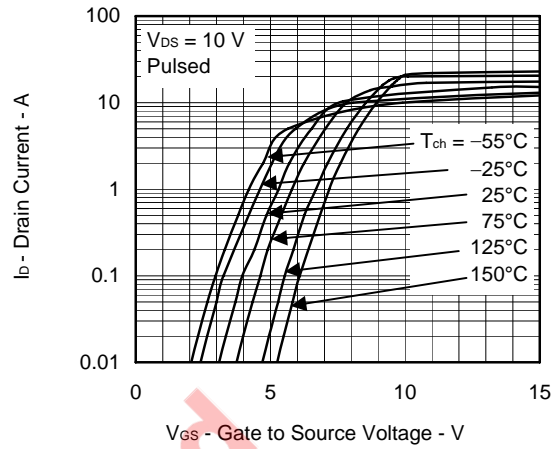
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



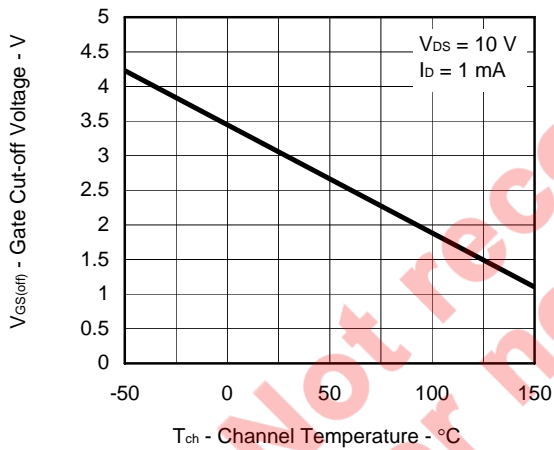
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



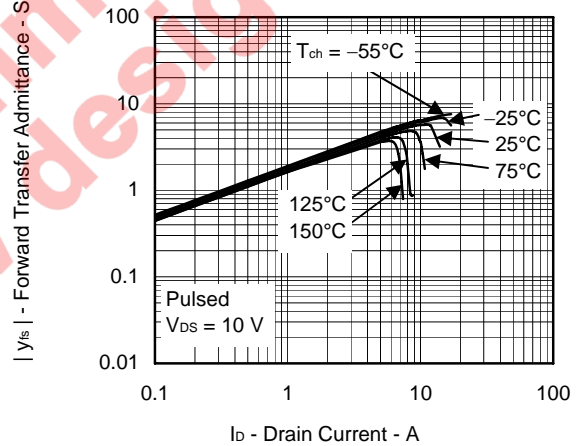
FORWARD TRANSFER CHARACTERISTICS



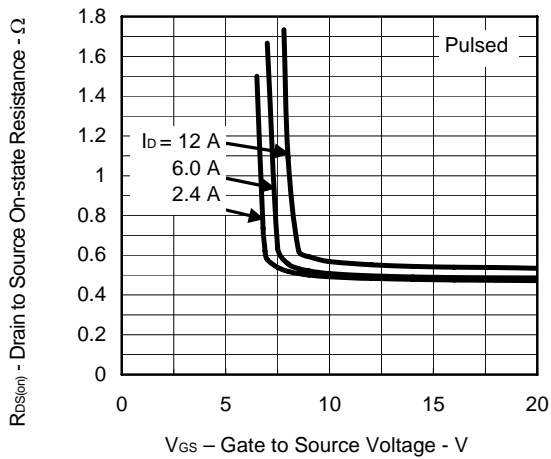
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



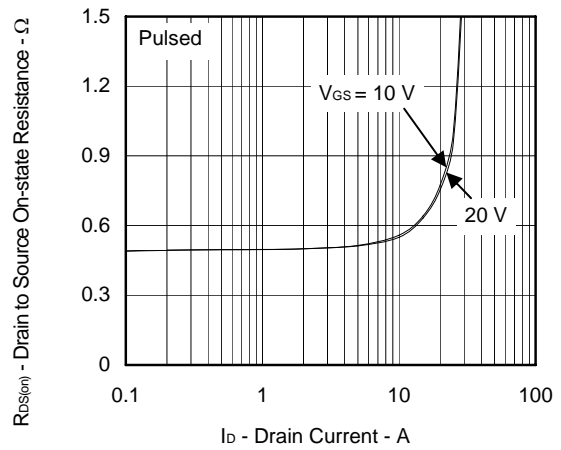
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



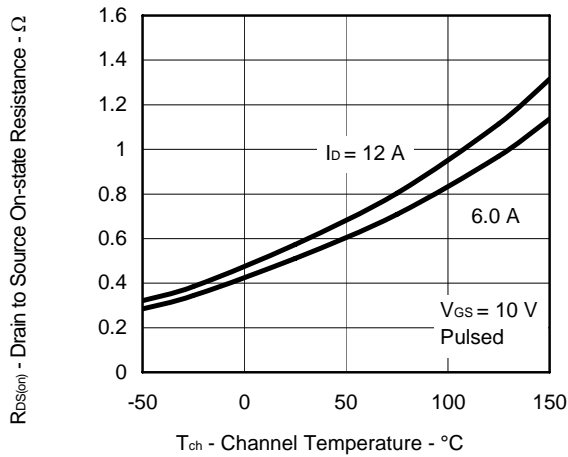
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



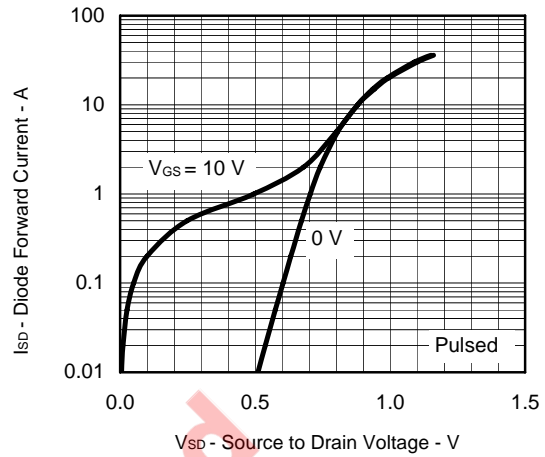
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



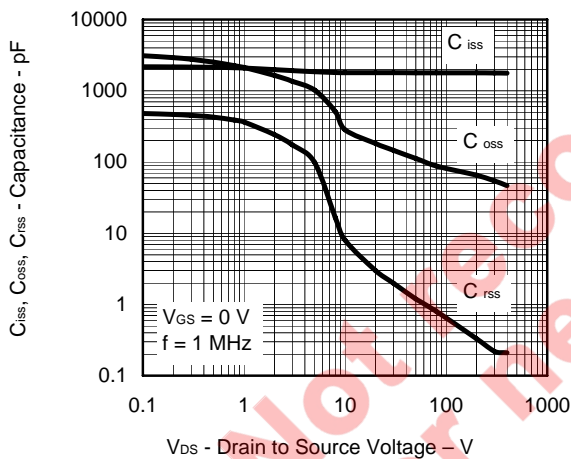
$\langle R \rangle$ DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



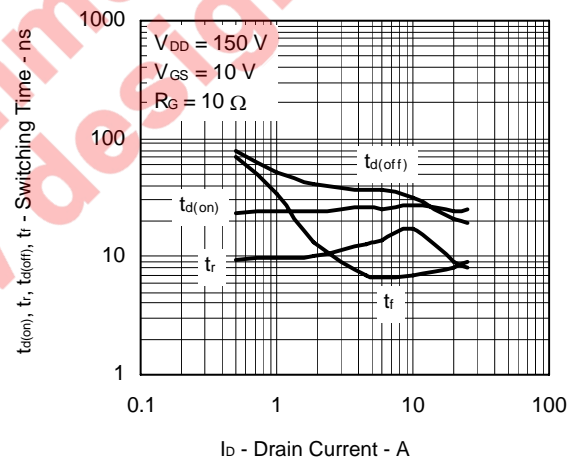
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



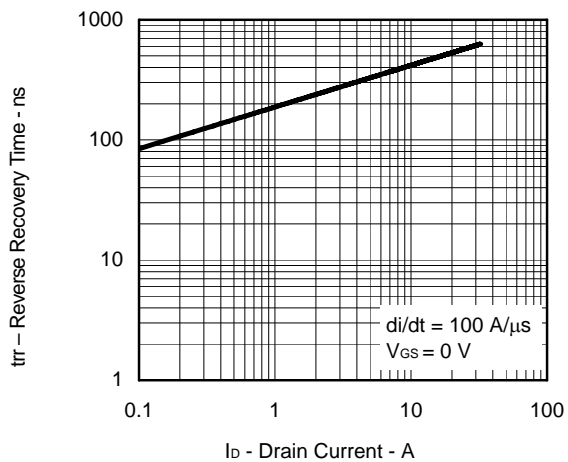
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



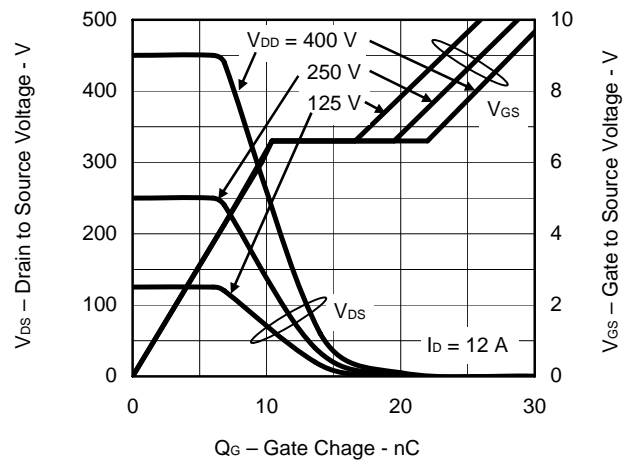
SWITCHING CHARACTERISTICS



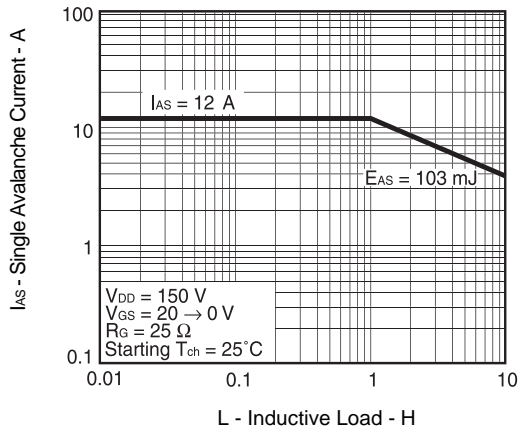
REVERSE RECOVERY TIME vs. DRAIN CURRENT



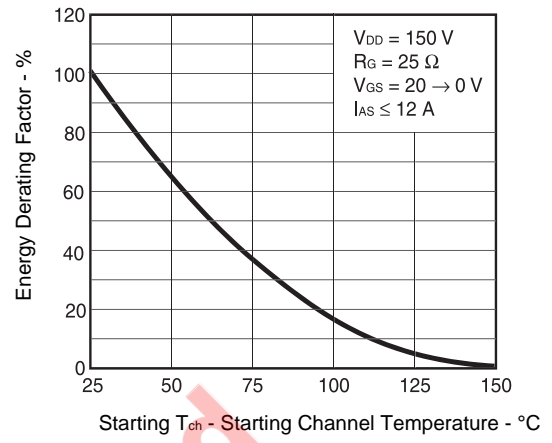
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY DERATING FACTOR

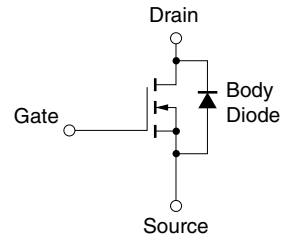
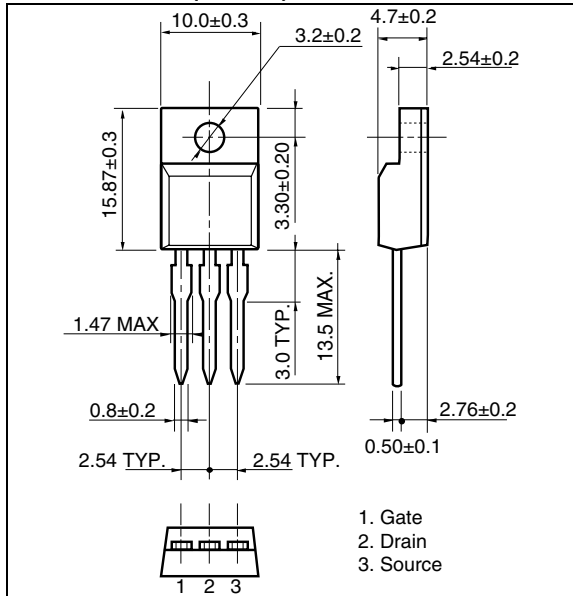


Not recommended for new design

PACKAGE DRAWING (Unit: mm)

EQUIVALENT CIRCUIT

Isolated TO-220 (MP-45F)



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.

Not recommended for new design

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