

To our customers,

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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
INDUSTRIAL USE

DESCRIPTION

The 2SK3454 is N-channel MOS FET device that features a low on-state resistance and excellent switching characteristics, and designed for high voltage applications such as DC/DC converter.

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3454	Isolated TO-220

FEATURES

- Gate voltage rating ± 30 V
- Low on-state resistance
 $R_{DS(on)} = 0.63 \Omega$ MAX. ($V_{GS} = 10$ V, $I_D = 4.0$ A)
- Low input capacitance
 $C_{iss} = 400$ pF TYP. ($V_{DS} = 10$ V, $V_{GS} = 0$ V)
- Built-in gate protection diode
- Isolated TO-220 package

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

Drain to Source Voltage ($V_{GS} = 0$ V)	V_{DSS}	250	V
Gate to Source Voltage ($V_{DS} = 0$ V)	V_{GSS}	± 30	V
Drain Current(DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 7.0	A
Drain Current(pulse) ^{Note1}	$I_{D(pulse)}$	± 21	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}	30	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}	7.0	A
Single Avalanche Energy ^{Note2}	E_{AS}	49	mJ

Notes1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

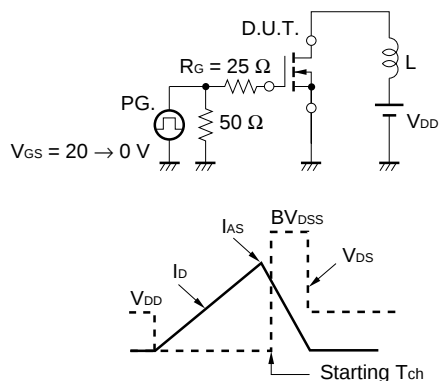
2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 125$ V, $R_G = 25 \Omega$, $V_{GS} = 20$ V $\rightarrow 0$ V

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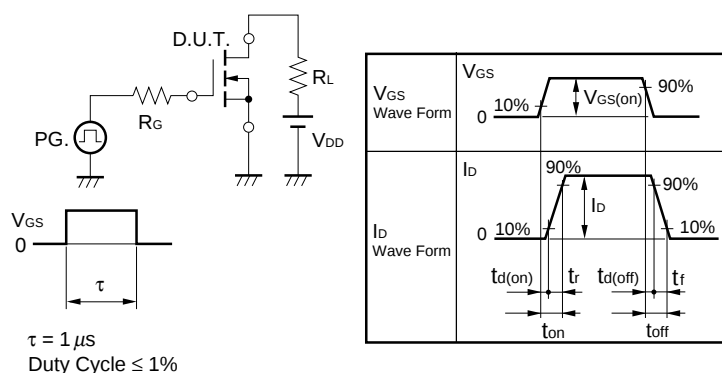
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Characteristics	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Drain Leakage Current	I _{DSS}	V _{DS} = 250 V, V _{GS} = 0 V			100	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V			±10	μA
Gate to Source Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 1 mA	2.5		4.5	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 4.0 A	1.0			S
Drain to Source On-state Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 4.0 A		0.5	0.63	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V		400		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		110		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		55		pF
Turn-on Delay Time	T _{d(on)}	V _{DD} = 125 V, I _D = 4.0 A		11		ns
Rise Time	T _r	V _{GS(on)} = 10 V		18		ns
Turn-off Delay Time	T _{d(off)}	R _G = 10 Ω		32		ns
Fall Time	T _f			15		ns
Total Gate Charge	Q _G	V _{DD} = 200 V		18		nC
Gate to Source Charge	Q _{GS}	V _{GS} = 10 V		3.5		nC
Gate to Drain Charge	Q _{GD}	I _D = 7.0 A		10		nC
Diode Forward Voltage	V _{F(S-D)}	I _F = 7.0 A, V _{GS} = 0 V		1.0		V
Reverse Recovery Time	T _{rr}	I _F = 7.0 A, V _{GS} = 0 V		250		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 50 A/μs		1.0		μC

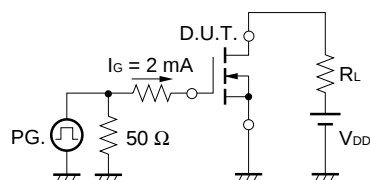
TEST CIRCUIT 1 AVALANCHE CAPABILITY



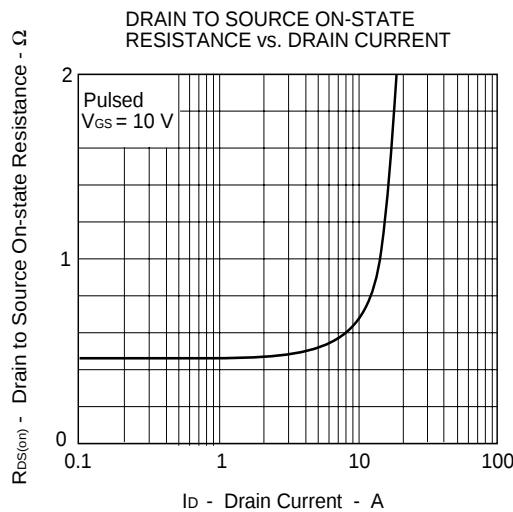
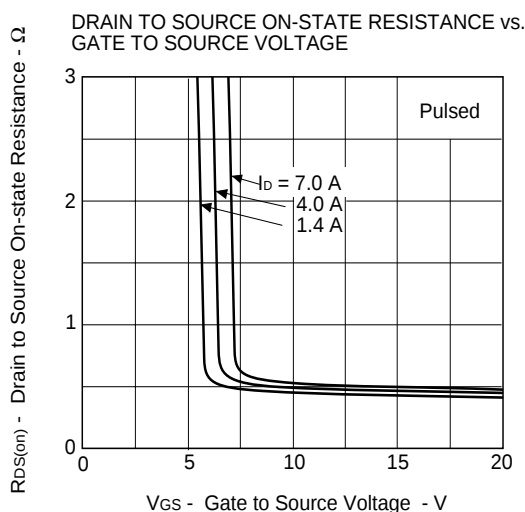
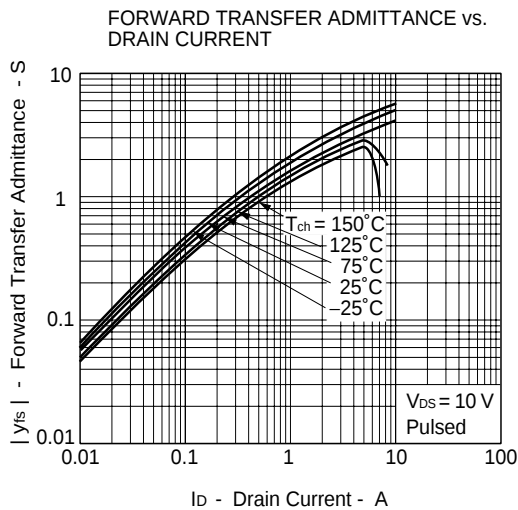
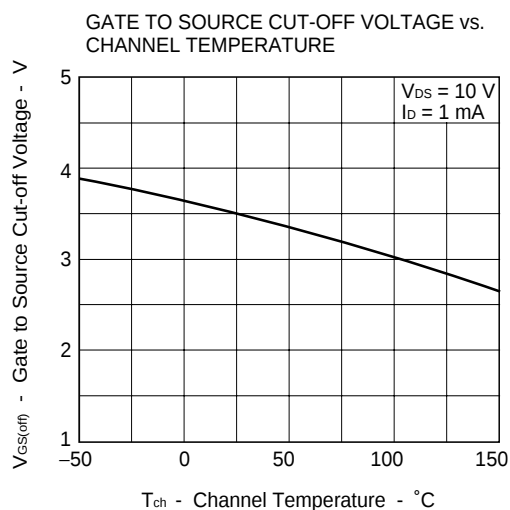
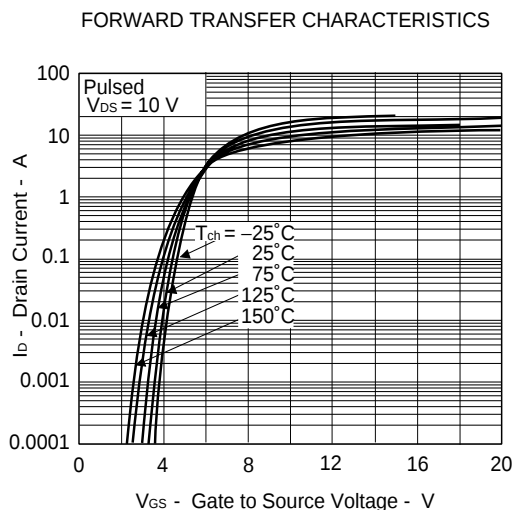
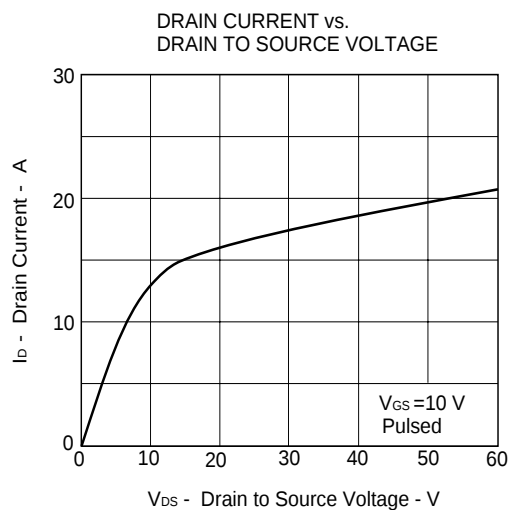
TEST CIRCUIT 2 SWITCHING TIME



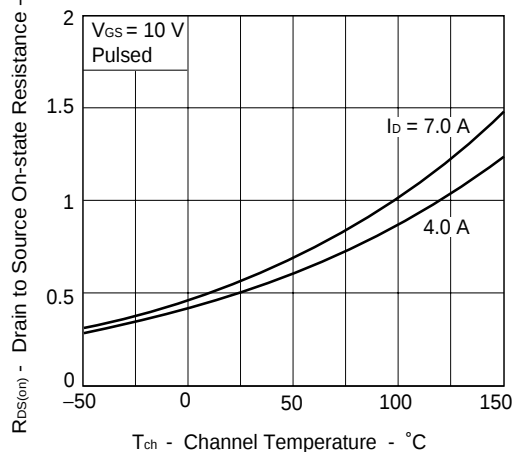
TEST CIRCUIT 3 GATE CHARGE



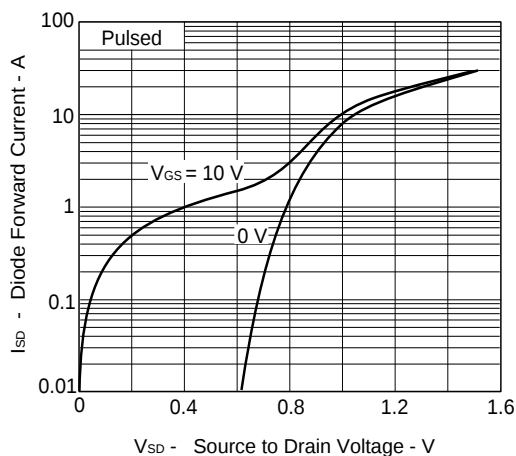
TYPICAL CHARACTERISTICS



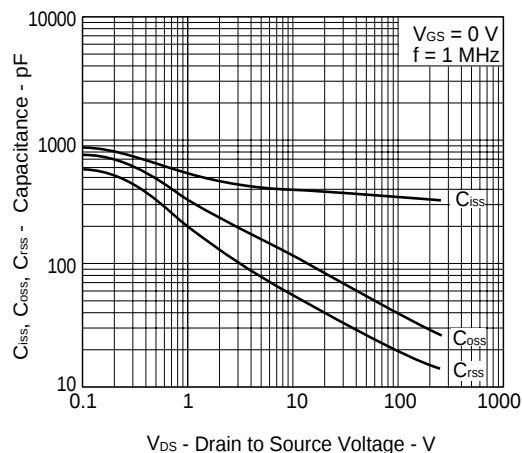
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



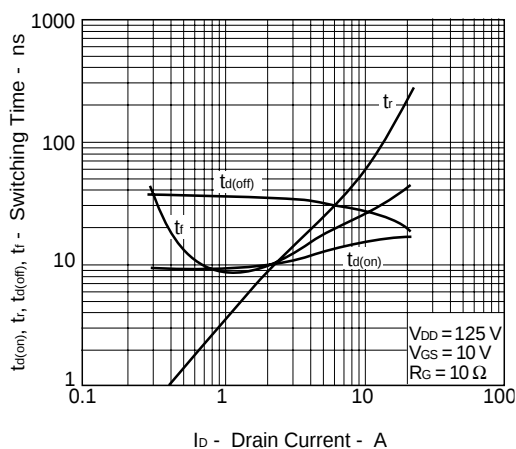
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



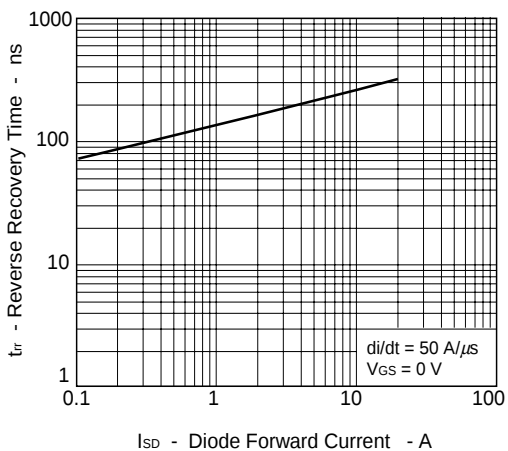
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



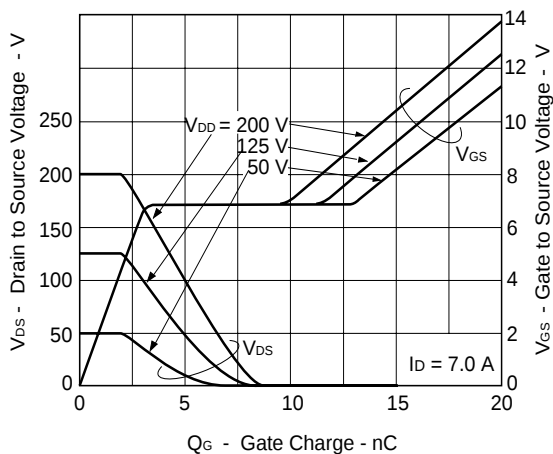
SWITCHING CHARACTERISTICS



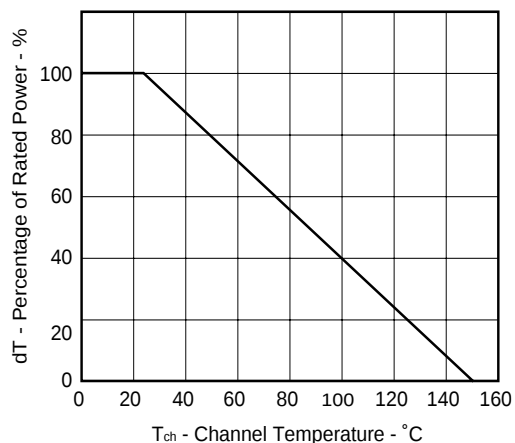
REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



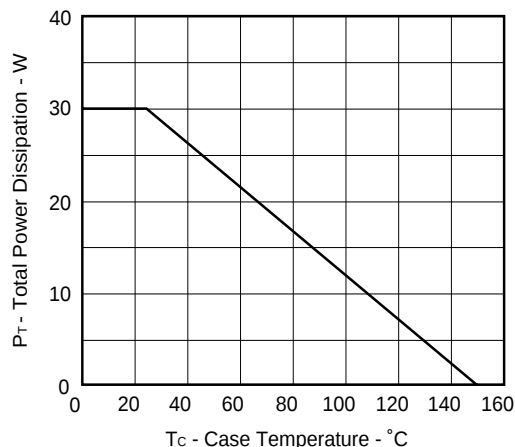
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



DERATING FACTOR OF FORWARD BIAS
SAFE OPERATING AREA

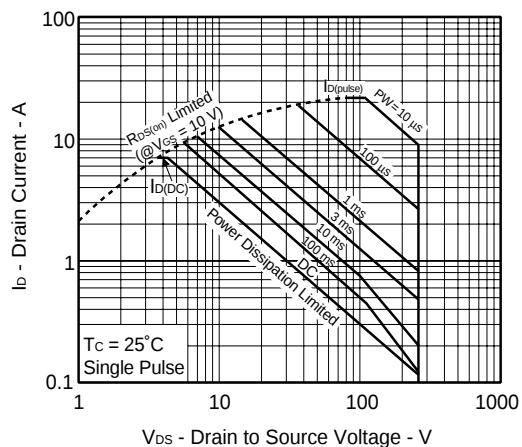


TOTAL POWER DISSIPATION vs.
CASE TEMPERATURE



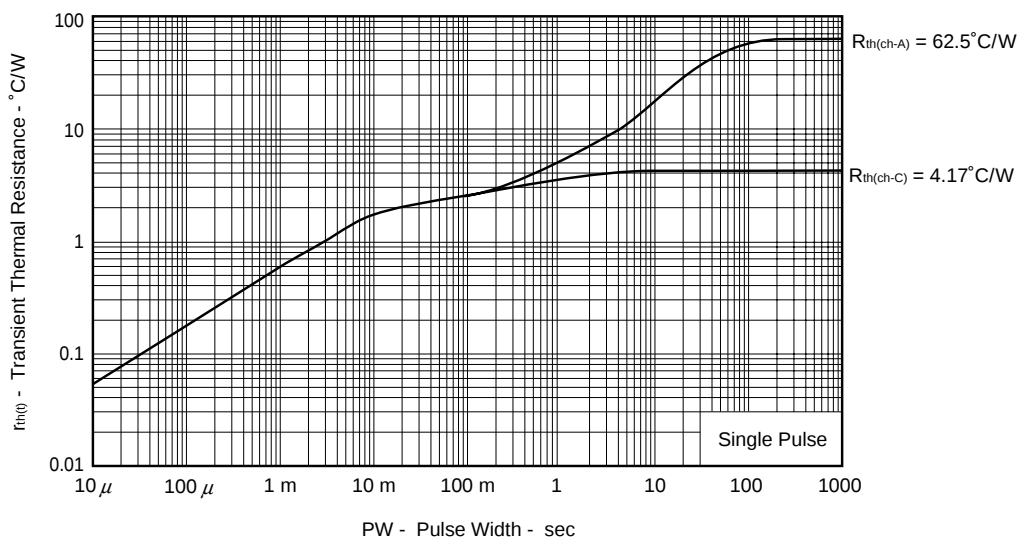
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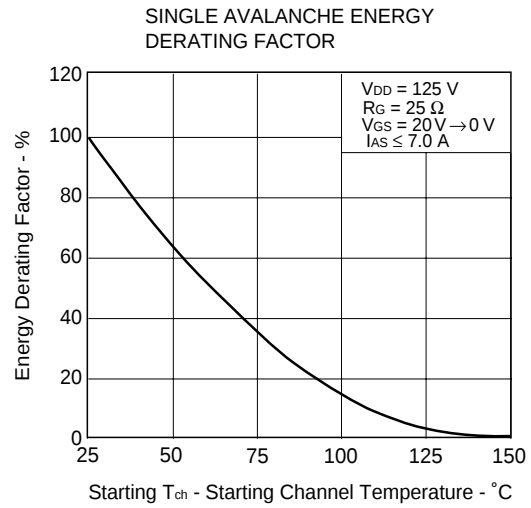
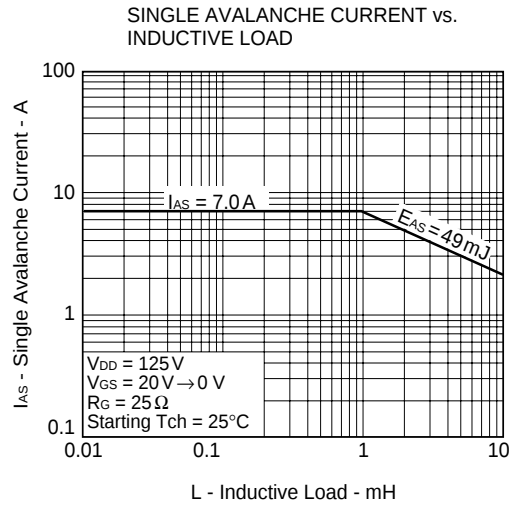
FORWARD BIAS SAFE OPERATING AREA



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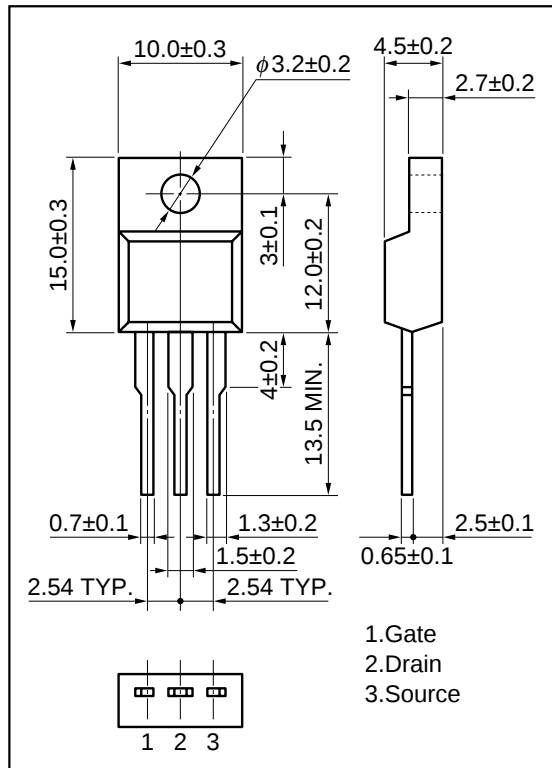
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



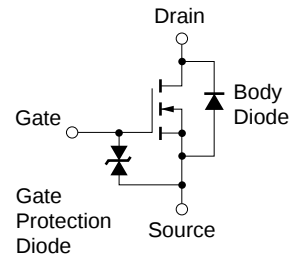


PACKAGE DRAWING (Unit: mm)

Isolated TO-220 (MP-45F)



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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