



# MOS FIELD EFFECT TRANSISTOR 2SK3454

## 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  $\pm 30$  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 ( $V_{GS} = 0$ V)	$V_{GSS}$	$\pm 30$	V
Drain Current(DC) ( $T_c = 25^\circ\text{C}$ )	$I_{D(DC)}$	$\pm 7.0$	A
Drain Current(pulse) <sup>Note1</sup>	$I_{D(pulse)}$	$\pm 21$	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 <sup>Note2</sup>	$I_{AS}$	7.0	A
Single Avalanche Energy <sup>Note2</sup>	$E_{AS}$	49	mJ

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

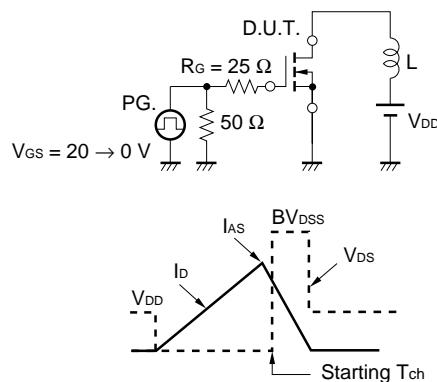
**2.** Starting  $T_{ch} = 25^\circ\text{C}$ ,  $V_{DD} = 125$  V,  $R_G = 25 \Omega$ ,  $V_{GS} = 20$  V  $\rightarrow 0$  V

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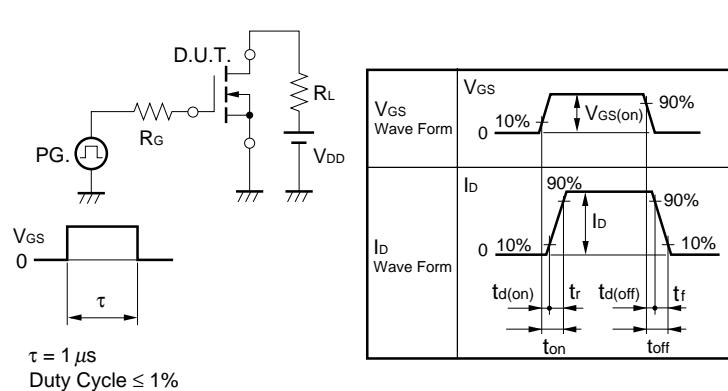
ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ C$ )

Characteristics	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Drain Leakage Current	$I_{DSS}$	$V_{DS} = 250 V, V_{GS} = 0 V$			100	$\mu A$
Gate Leakage Current	$I_{GSS}$	$V_{GS} = \pm 30 V, V_{DS} = 0 V$			$\pm 10$	$\mu A$
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	$\Omega$
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	$T_{d(off)}$	$R_G = 10 \Omega$		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	$Q_{rr}$	$di/dt = 50 A/\mu s$		1.0		$\mu C$

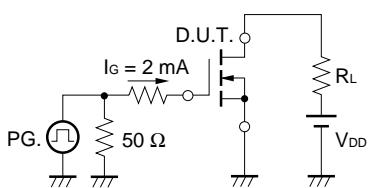
## TEST CIRCUIT 1 AVALANCHE CAPABILITY



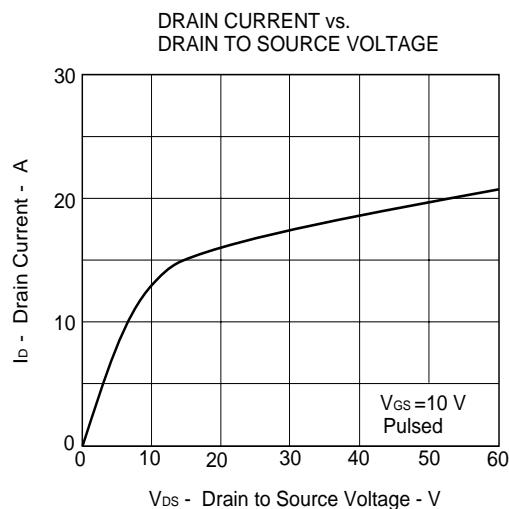
## TEST CIRCUIT 2 SWITCHING TIME



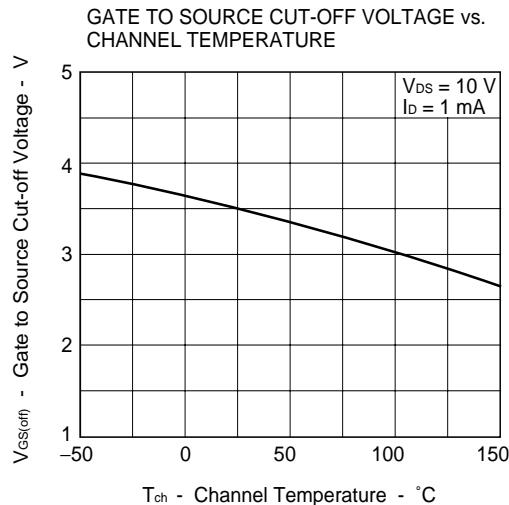
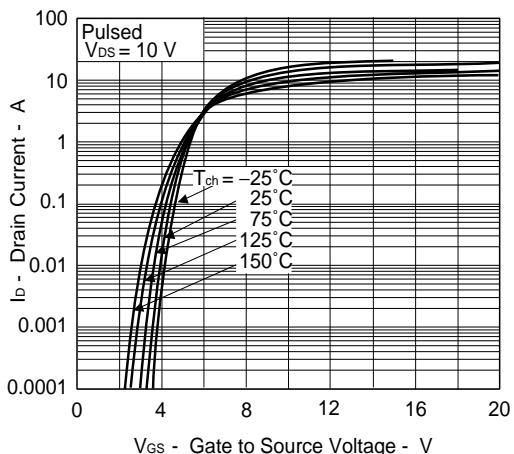
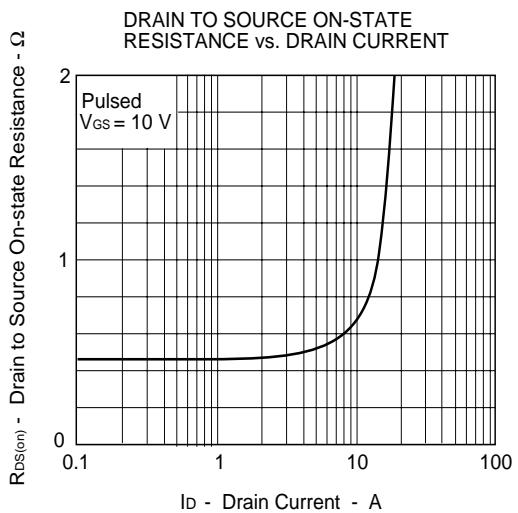
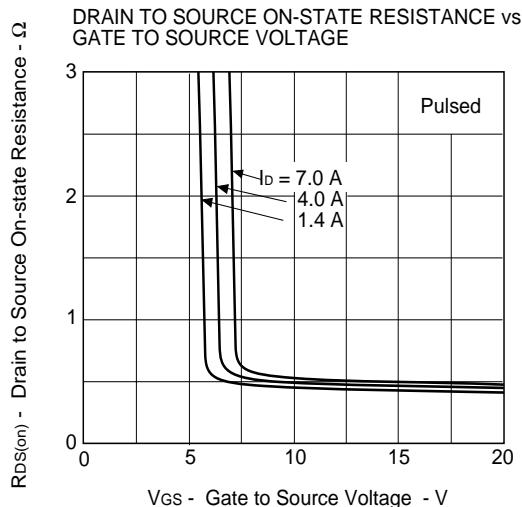
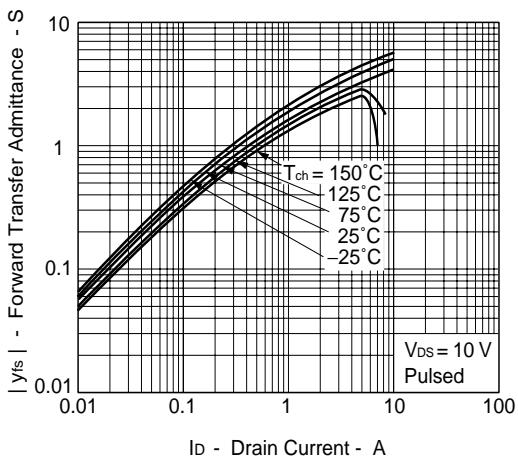
## TEST CIRCUIT 3 GATE CHARGE

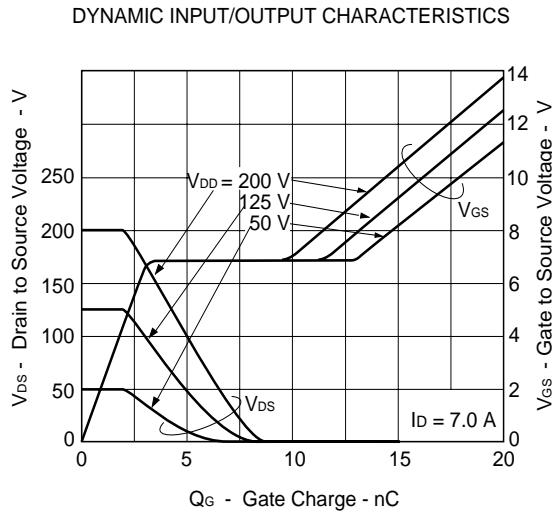
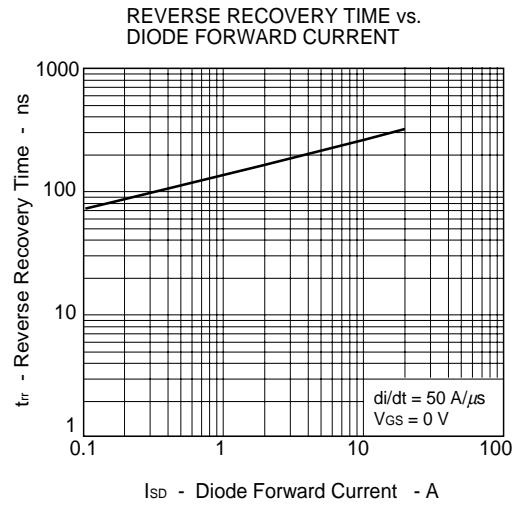
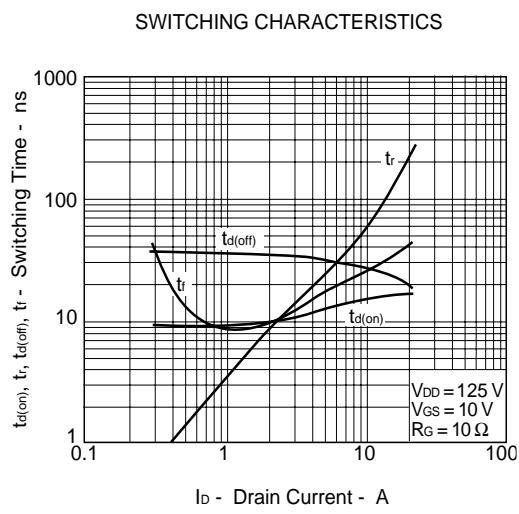
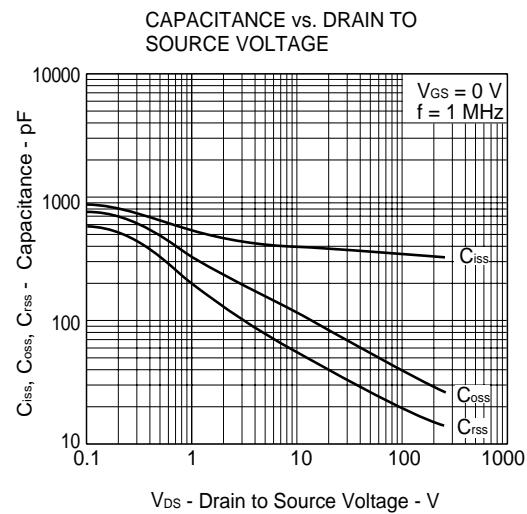
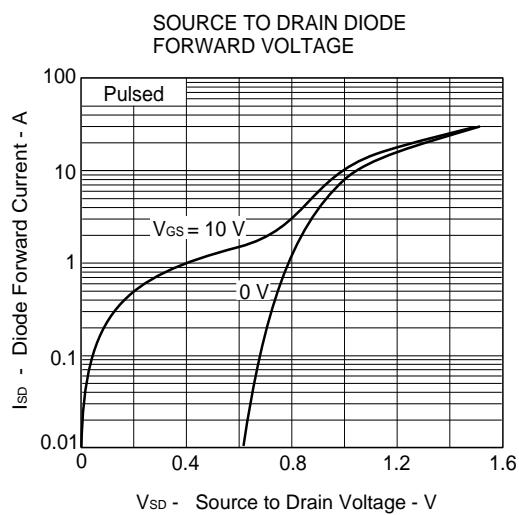
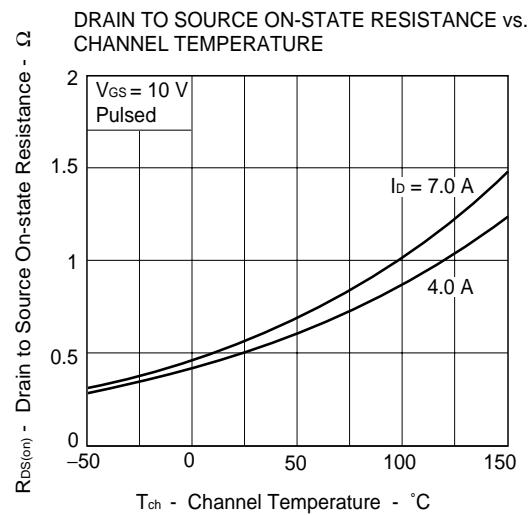


## TYPICAL CHARACTERISTICS

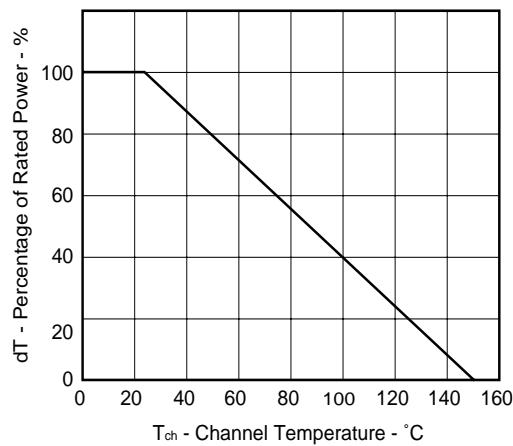


## FORWARD TRANSFER CHARACTERISTICS

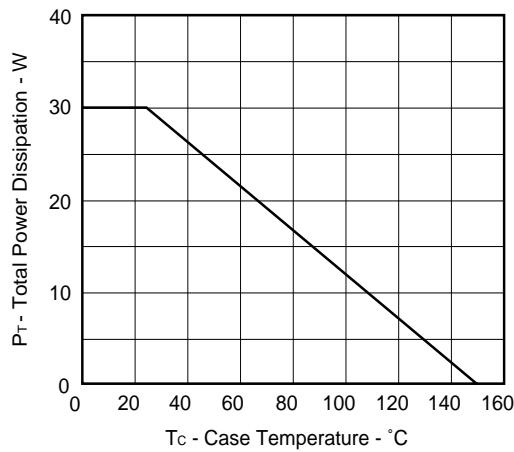
FORWARD TRANSFER ADMITTANCE vs.  
DRAIN CURRENT



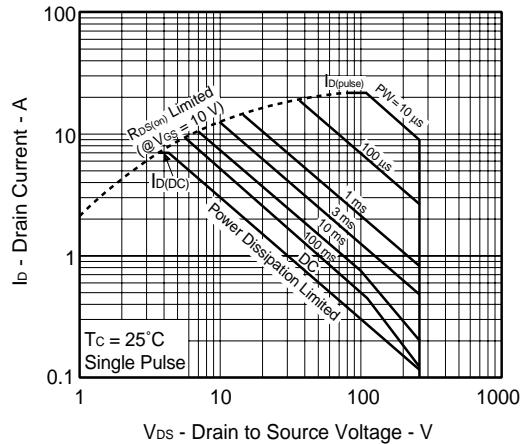
DERATING FACTOR OF FORWARD BIAS  
SAFE OPERATING AREA



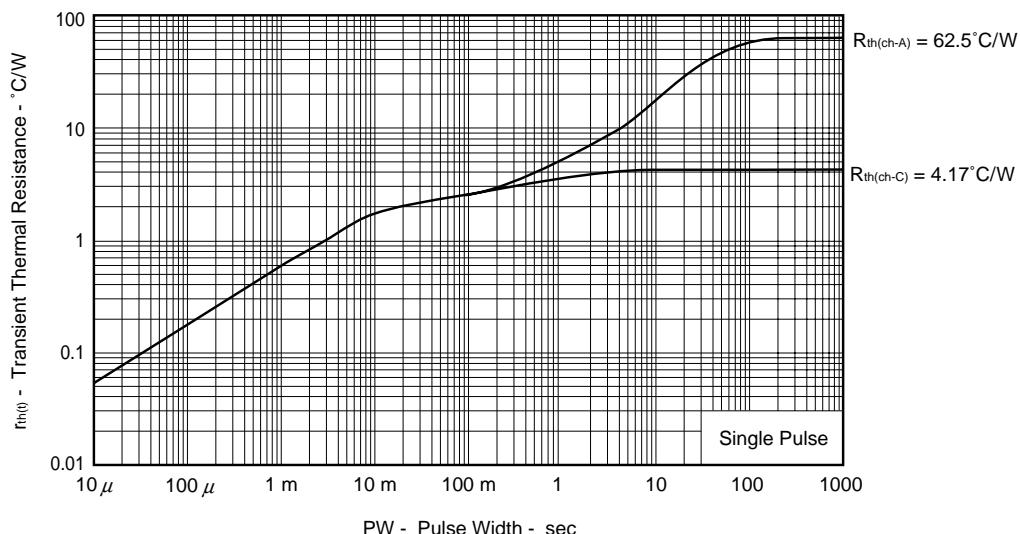
TOTAL POWER DISSIPATION vs.  
CASE TEMPERATURE

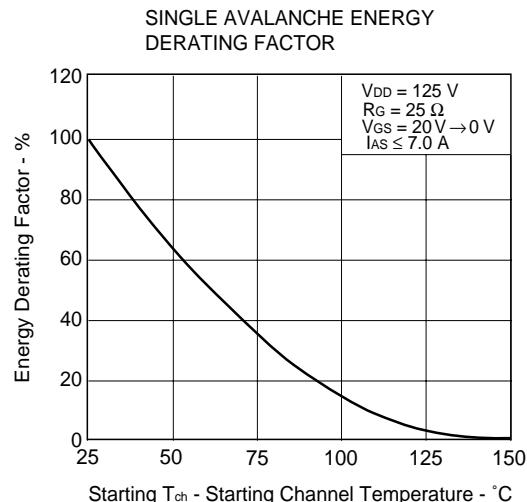
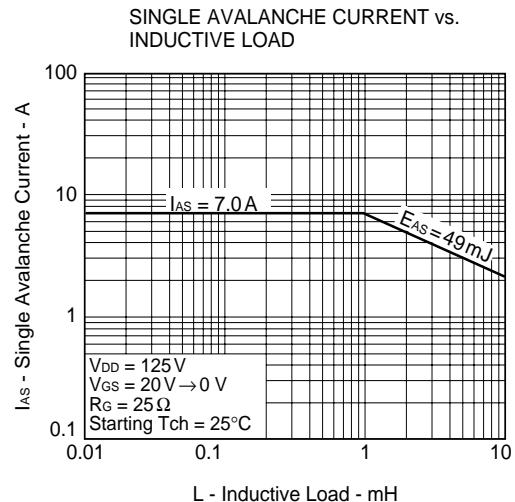


★ FORWARD BIAS SAFE OPERATING AREA



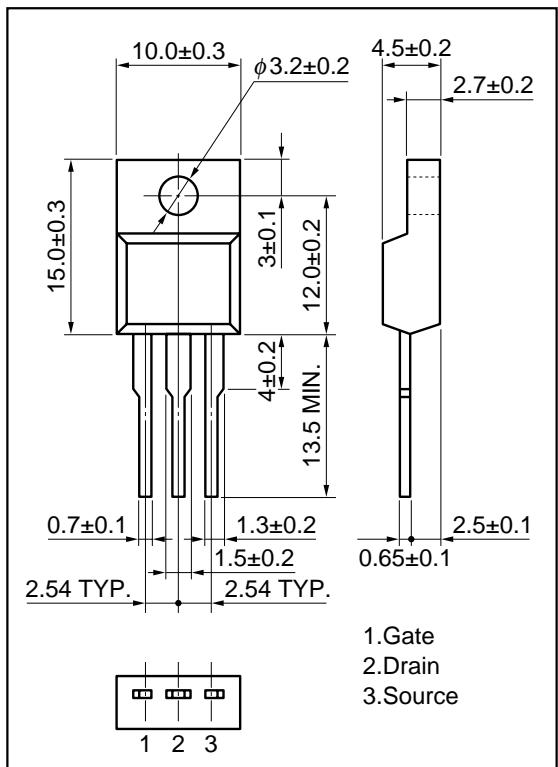
★ TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



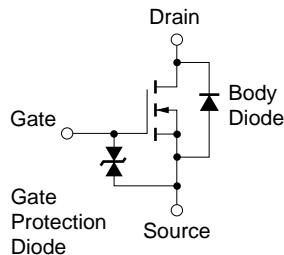


## PACKAGE DRAWING (Unit: mm)

## 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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