DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR
2SK3306

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SK3306 is N-Channel DMOS 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.

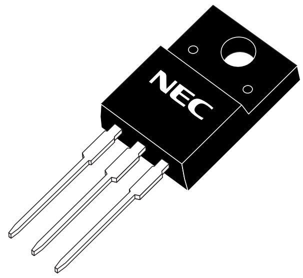
ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3306	Isolated TO-220 (MP-45F)

FEATURES

- Low gate charge :
  ★ Q_G = 13 nC TYP. (V_{DD} = 400 V, V_{GS} = 10 V, I_D = 5.0 A)
- Gate voltage rating : ±30 V
- Low on-state resistance :
  $R_{DS(on)}$ = 1.5 Ω MAX. (V_{GS} = 10 V, I_D = 2.5 A)
- Avalanche capability ratings
- Isolated TO-220(MP-45F) package

(Isolated TO-220)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	500	V
Gate to Source Voltage (V_{DS} = 0 V)	$V_{GSS(AC)}$	±30	V
Drain Current (DC)	$I_{D(DC)}$	±5	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±20	A
Total Power Dissipation (T_C = 25°C)	P_T	35	W
Total Power Dissipation (T_A = 25°C)	P_T	2.0	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C
Single Avalanche Current Note2	I_{AS}	5.0	A
Single Avalanche Energy Note2	E_{AS}	125	mJ

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1 %
2. Starting T_{ch} = 25 °C, V_{DD} = 150 V, R_G = 25 Ω, V_{GS} = 20 V → 0 V

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

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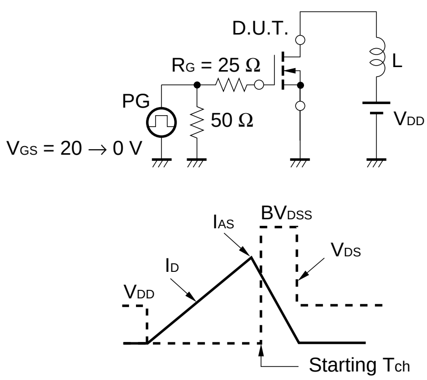
The mark ★ shows major revised points.

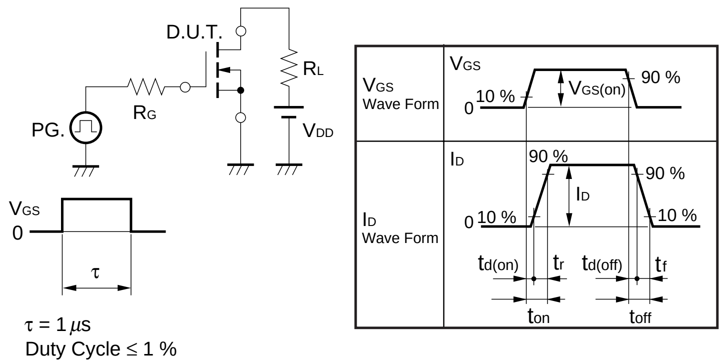
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Leakage Current	I_{DSS}			100	μA	V_{DS} = 500 V, V_{GS} = 0 V
★ Gate to Source Leakage Current	I_{GSS}			±100	nA	V_{GS} = ±30 V, V_{DS} = 0 V
Gate to Source Cut-off Voltage	$V_{GS(off)}$	2.5		3.5	V	V_{DS} = 10 V, I_D = 1 mA
★ Forward Transfer Admittance	$\|y_{fs}\|$	1.0	3.0		S	V_{DS} = 10 V, I_D = 2.5 A
★ Drain to Source On-state Resistance	$R_{DS(on)}$		1.35	1.5	Ω	V_{GS} = 10 V, I_D = 2.5 A
★ Input Capacitance	C_{iss}		700		pF	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz
Output Capacitance	C_{oss}		115		pF	
Reverse Transfer Capacitance	C_{rss}		6		pF	
Turn-on Delay Time	$t_{d(on)}$		16		ns	V_{DD} = 150 V, I_D = 2.5 A, $V_{GS(on)}$ = 10 V,
Rise Time	t_r		3		ns	R_G = 10 Ω, R_L = 60 Ω
Turn-off Delay Time	$t_{d(off)}$		33		ns	
Fall Time	t_f		5.5		ns	
★ Total Gate Charge	Q_G		13		nC	V_{DD} = 400 V, $V_{GS(on)}$ = 10 V, I_D = 5.0 A
★ Gate to Source Charge	Q_{GS}		4		nC	
★ Gate to Drain Charge	Q_{GD}		4.5		nC	
★ Body Diode Forward Voltage	$V_{F(S-D)}$		1.0		V	I_F = 5.0 A, V_{GS} = 0 V
Reverse Recovery Time	t_{rr}		0.7		μs	I_F = 5.0 A, V_{GS} = 0 V, di/dt = 50 A/μs
★ Reverse Recovery Charge	Q_{rr}		3.3		μC	

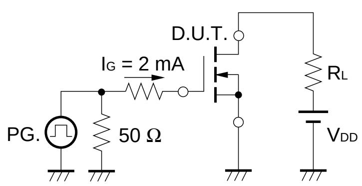
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

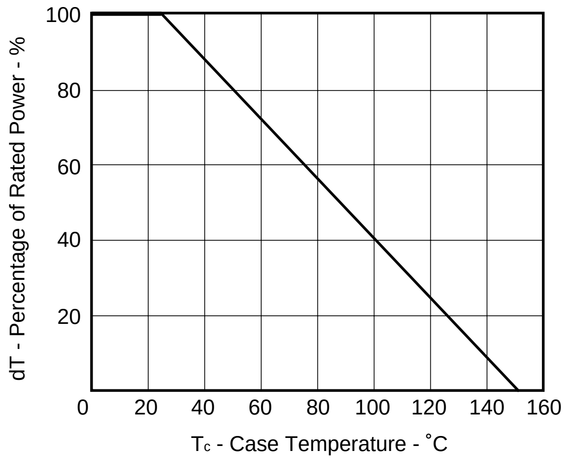


TEST CIRCUIT 3 GATE CHARGE

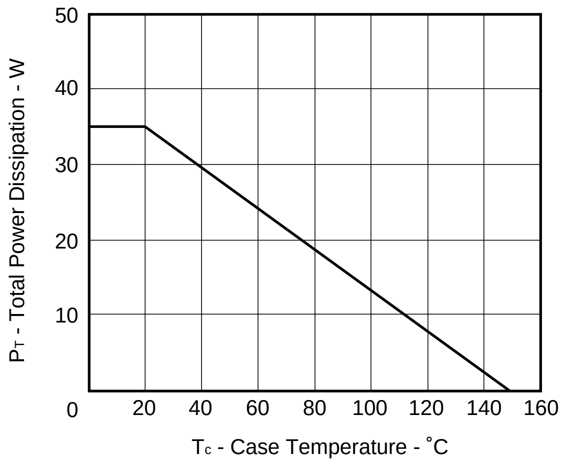


TYPICAL CHARACTERISTICS(T_A = 25 °C)

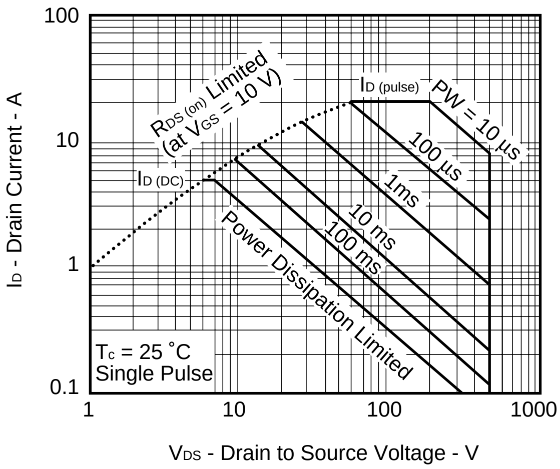
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



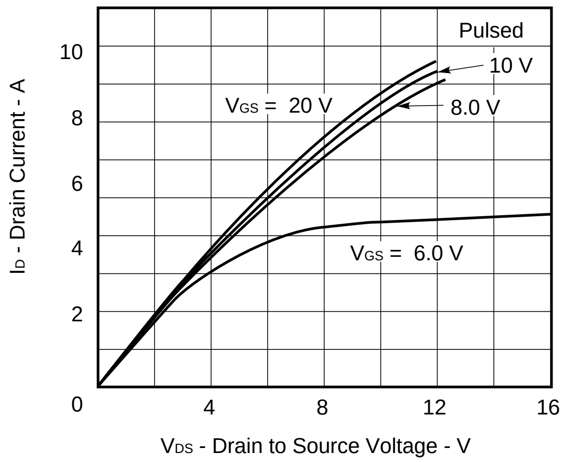
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



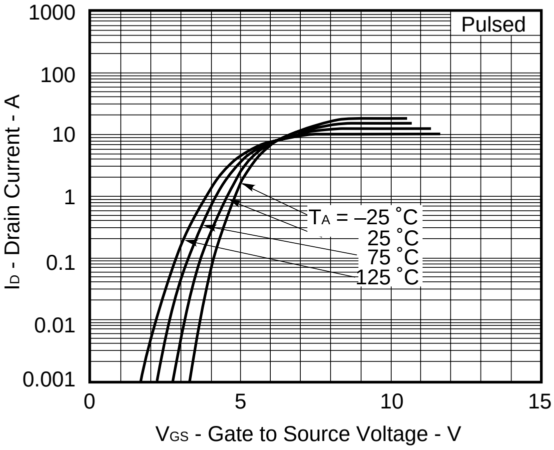
FORWARD BIAS SAFE OPERATING AREA



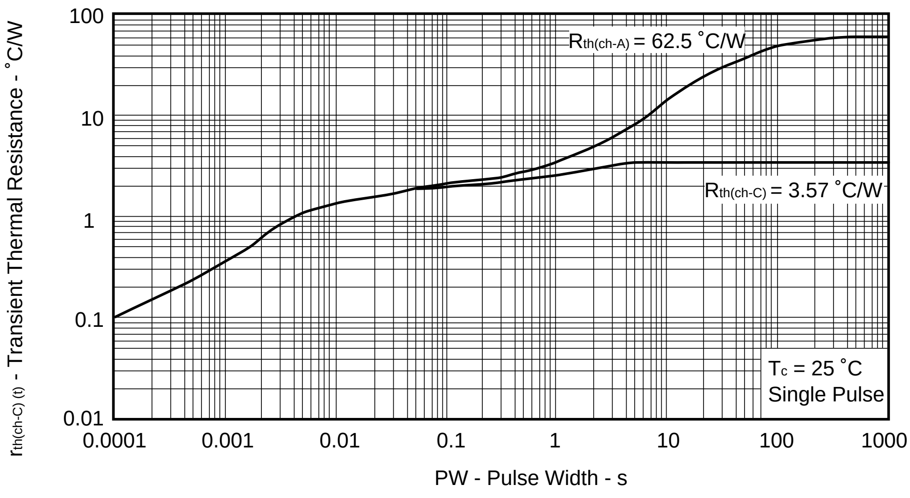
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



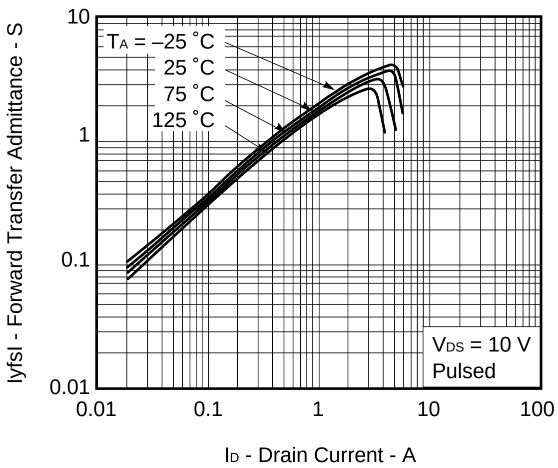
DRAIN CURRENT vs. GATE TO SOURCE VOLTAGE



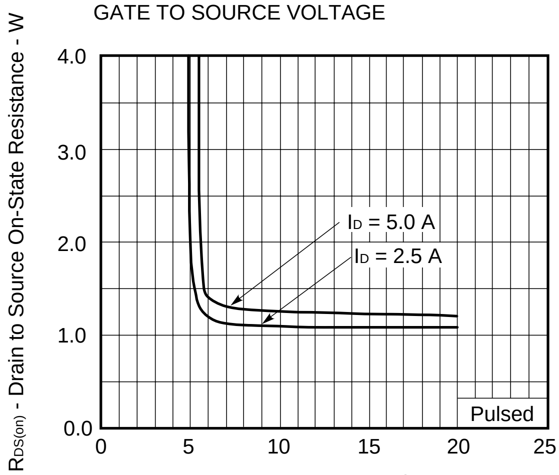
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



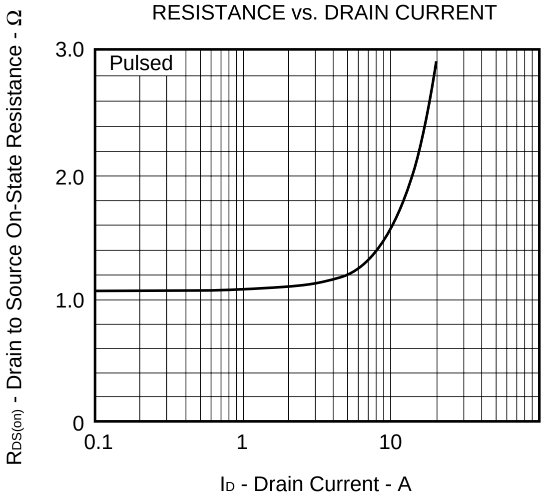
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



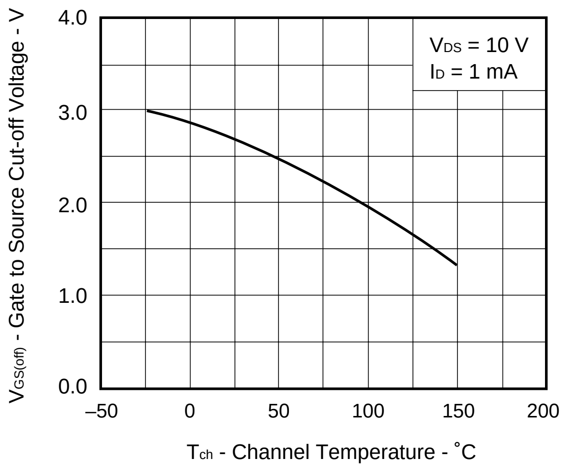
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



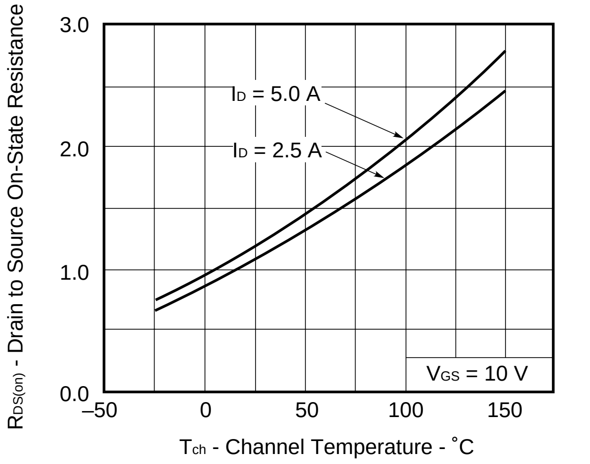
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



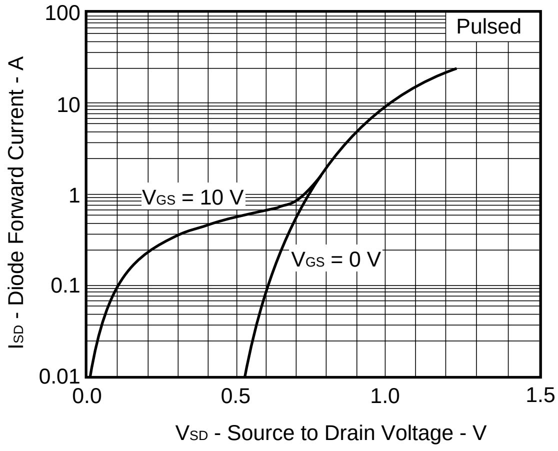
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



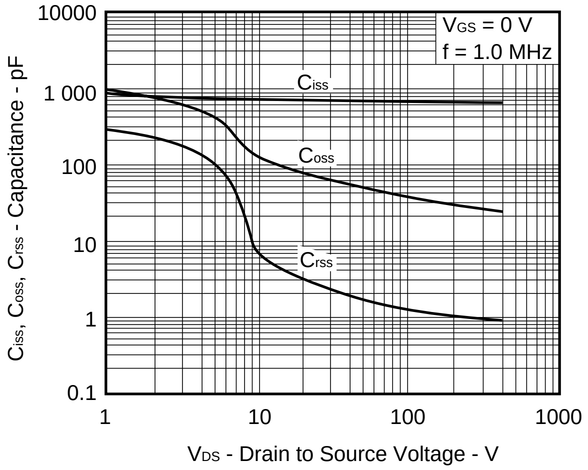
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



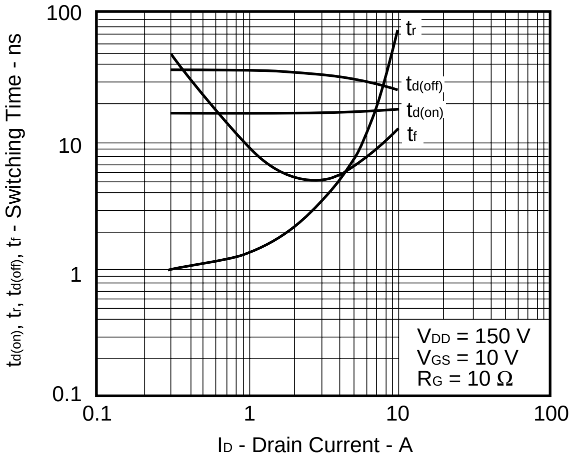
SOURCE TO DRAIN DIODE
FORWARD VOLTAGE



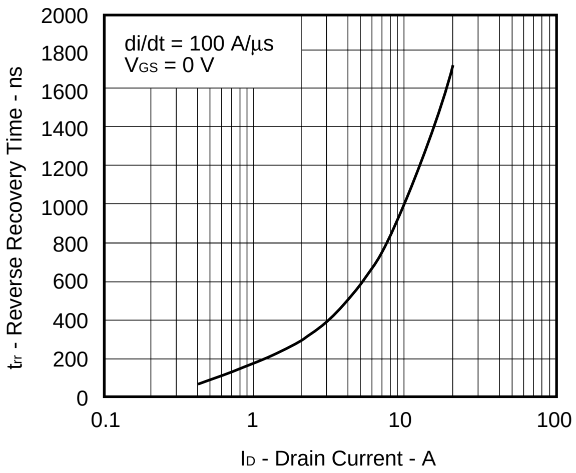
CAPACITANCE vs. DRAIN TO
SOURCE VOLTAGE



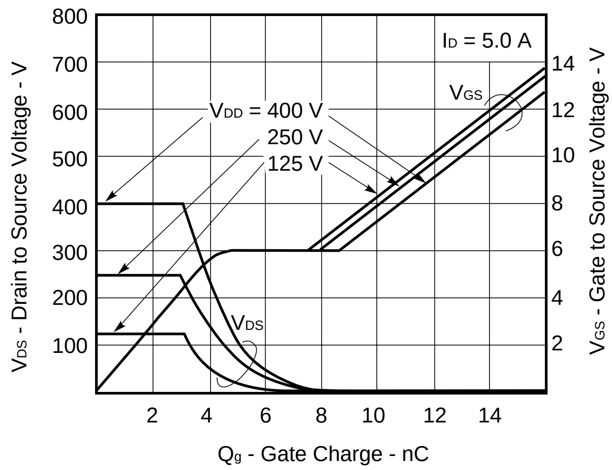
SWITCHING CHARACTERISTICS



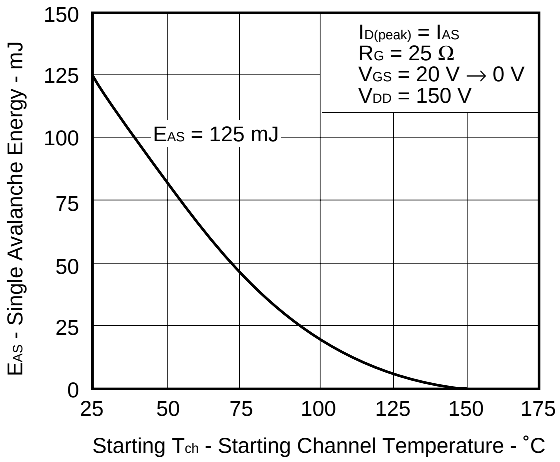
REVERSE RECOVERY TIME vs.
DRAIN CURRENT



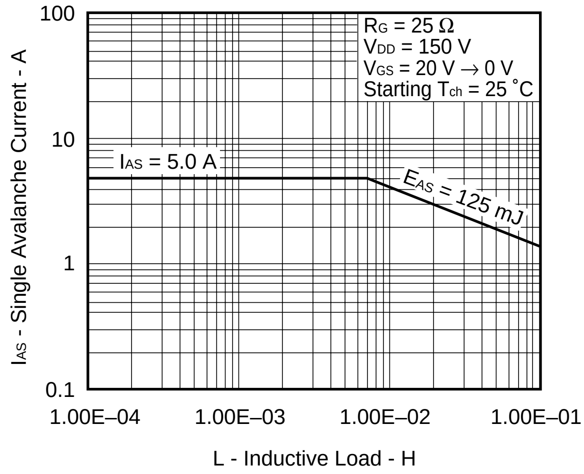
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SINGLE AVALANCHE ENERGY vs STARTING CHANNEL TEMPERATURE

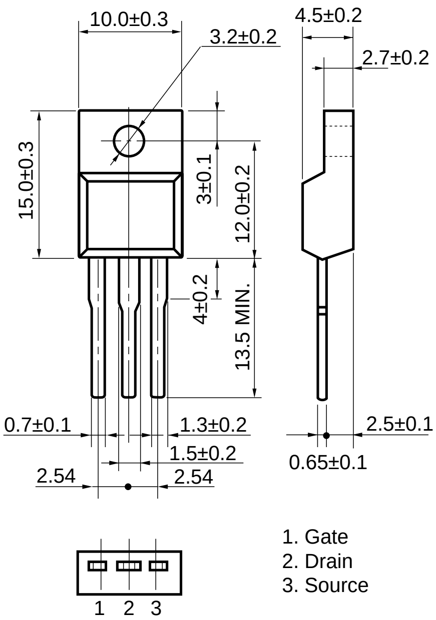


SINGLE AVALANCHE CURRENT vs INDUCTIVE LOAD



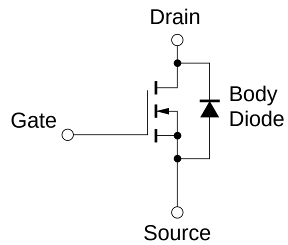
PACKAGE DRAWING (Unit: mm)

Isolated TO-220(MP-45F)



1. Gate
2. Drain
3. Source

EQUIVALENT CIRCUIT



★ **Remark** Strong electric field, when exposed to this device, 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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