

MOS FIELD EFFECT TRANSISTOR

2SK2357/2SK2358

SWITCHING N-CHANNEL POWER MOS FET INDUSTRIAL USE

DESCRIPTION

The 2SK2357/2SK2358 is N-Channel MOS Field Effect Transistor designed for high voltage switching applications.

FEATURES

- Low On-Resistance
2SK2357: $R_{DS(on)} = 0.9 \Omega$ ($V_{GS} = 10 V, I_D = 3.0 A$)
2SK2358: $R_{DS(on)} = 1.0 \Omega$ ($V_{GS} = 10 V, I_D = 3.0 A$)
- Low C_{iss} $C_{iss} = 1050 pF$ TYP.
- High Avalanche Capability Ratings
- Isolate TO-220 Package

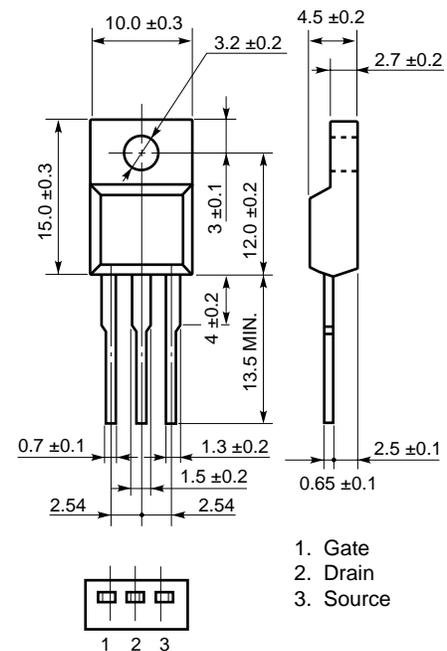
ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ C$)

Drain to Source Voltage (2SK2357/2358)	V_{DSS}	450/500	V
Gate to Source Voltage	V_{GSS}	± 30	V
Drain Current (DC)	$I_{D(DC)}$	± 6.0	A
Drain Current (pulse)*	$I_{D(pulse)}$	± 24	A
Total Power Dissipation ($T_c = 25^\circ C$)	P_{T1}	35	W
Total Power Dissipation ($T_a = 25^\circ C$)	P_{T2}	2.0	W
Channel Temperature	T_{ch}	150	$^\circ C$
Storage Temperature	T_{stg}	-55 to +150	$^\circ C$
Single Avalanche Current**	I_{AS}	6.0	A
Single Avalanche Energy**	E_{AS}	17	mJ

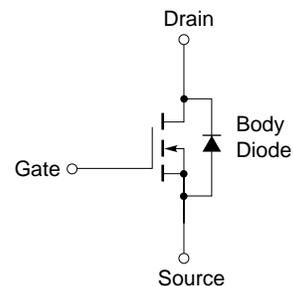
* $PW \leq 10 \mu s$, Duty Cycle $\leq 1\%$

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

PACKAGE DIMENSIONS (in millimeters)



MP-45F (ISOLATED TO-220)

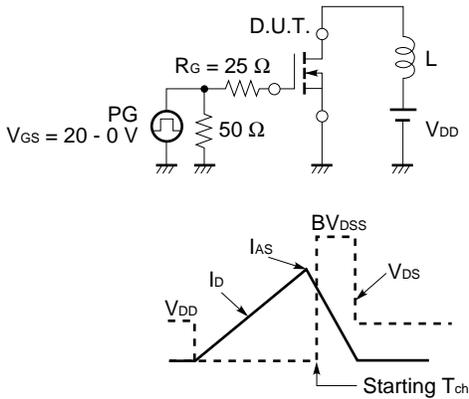


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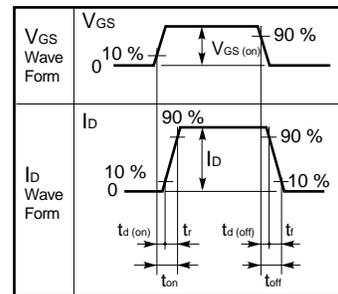
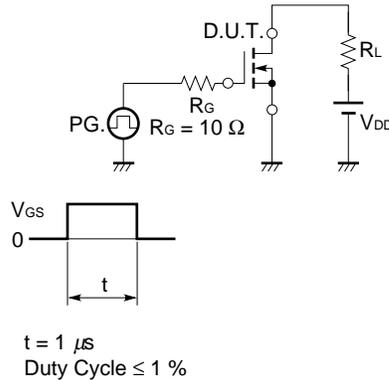
ELECTRICAL CHARACTERISTICS (Ta = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-Resistance	R _{DS(on)}		0.7	0.9	Ω	V _{GS} = 10 V, I _D = 3.0 A
			0.8	1.0		2SK2358
Gate to Source Cutoff Voltage	V _{GS(off)}	2.5		3.5	V	V _{DS} = 10 V, I _D = 1 mA
Forward Transfer Admittance	y _{fs}	3.0			S	V _{DS} = 10 V, I _D = 3.0 A
Drain Leakage Current	I _{DSS}			100	μA	V _{DS} = V _{DSS} , V _{GS} = 0
Gate to Source Leakage Current	I _{GSS}			±100	nA	V _{GS} = ±30 V, V _{DS} = 0
Input Capacitance	C _{iss}		1050		pF	V _{DS} = 10 V
Output Capacitance	C _{oss}		200		pF	V _{GS} = 0
Reverse Transfer Capacitance	C _{rss}		26		pF	f = 1 MHz
Turn-On Delay Time	t _{d(on)}		14		ns	I _D = 3.0 A
Rise Time	t _r		9		ns	V _{GS(on)} = 10 V
Turn-Off Delay Time	t _{d(off)}		56		ns	V _{DD} = 150 V
Fall Time	t _f		14		ns	R _G = 10 Ω, R _L = 50 Ω
Total Gate Charge	Q _G		27		nC	I _D = 6.0 A
Gate to Source Charge	Q _{GS}		5.5		nC	V _{DD} = 400 V
Gate to Drain Charge	Q _{GD}		12		nC	V _{GS} = 10 V
Body Diode Forward Voltage	V _{F(S-D)}		1.0		V	I _F = 6.0 A, V _{GS} = 0
Reverse Recovery Time	t _{rr}		300		ns	I _F = 6.0 A, V _{GS} = 0
Reverse Recovery Charge	Q _{rr}		1.5		nC	di/dt = 50 A/μs

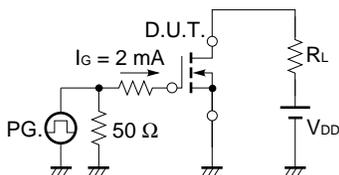
Test Circuit 1 Avalanche Capability



Test Circuit 2 Switching Time



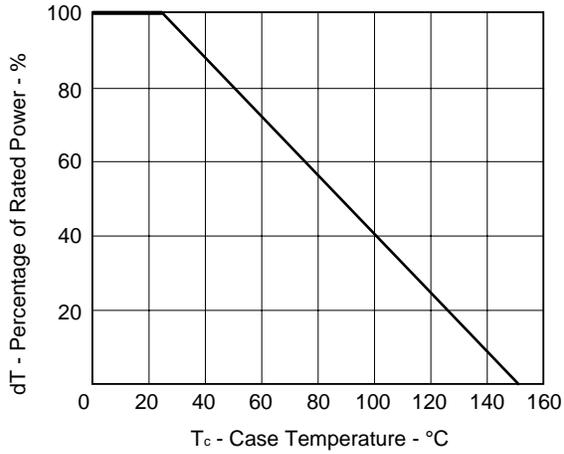
Test Circuit 3 Gate Charge



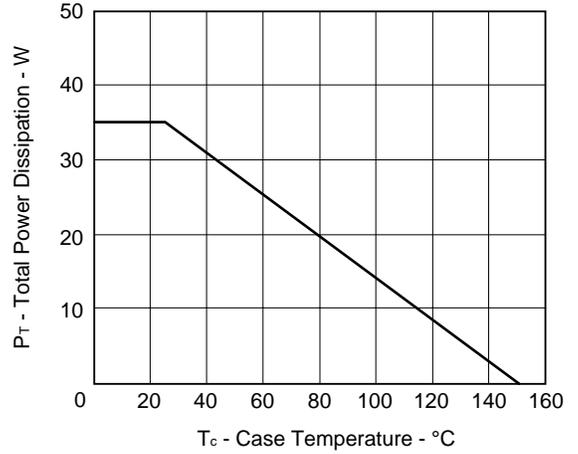
The application circuits and their parameters are for references only and are not intended for use in actual design-in's.

TYPICAL CHARACTERISTICS (T_A = 25 °C)

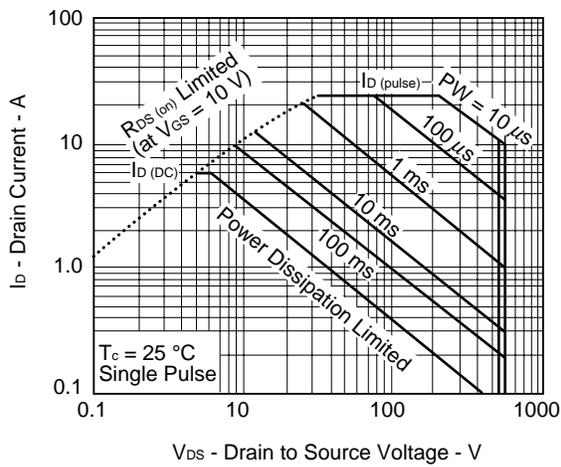
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



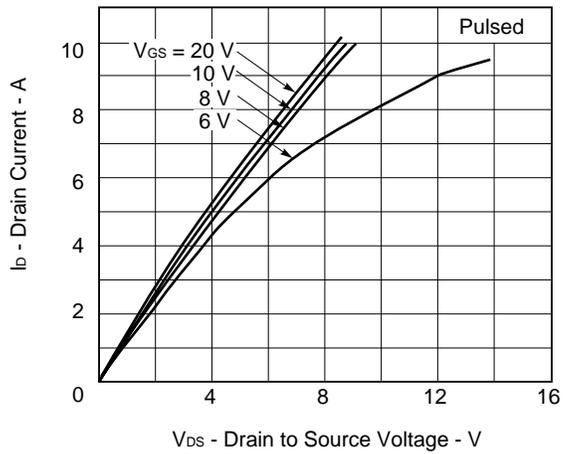
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



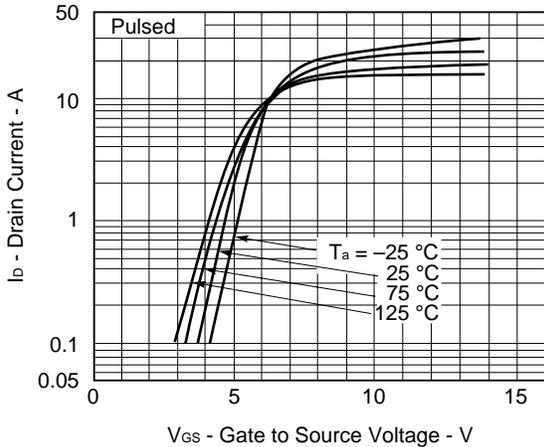
FORWARD BIAS SAFE OPERATING AREA



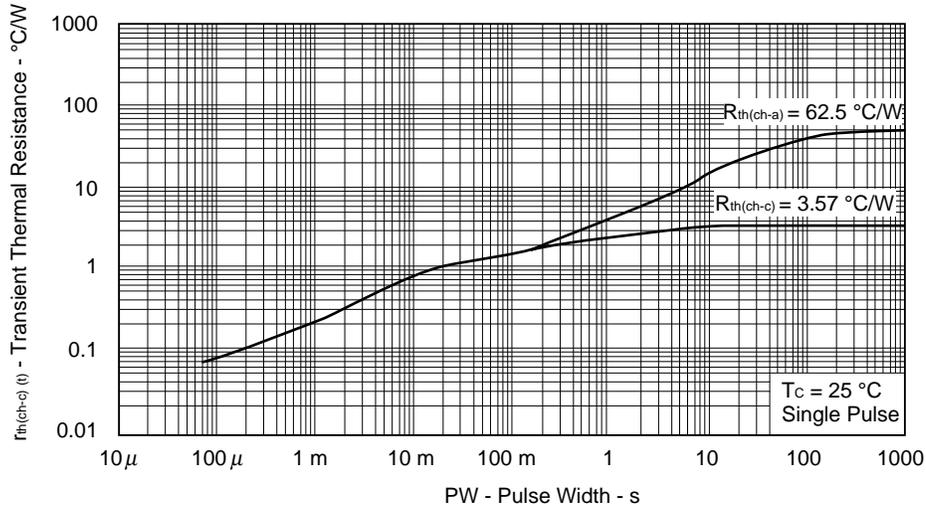
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



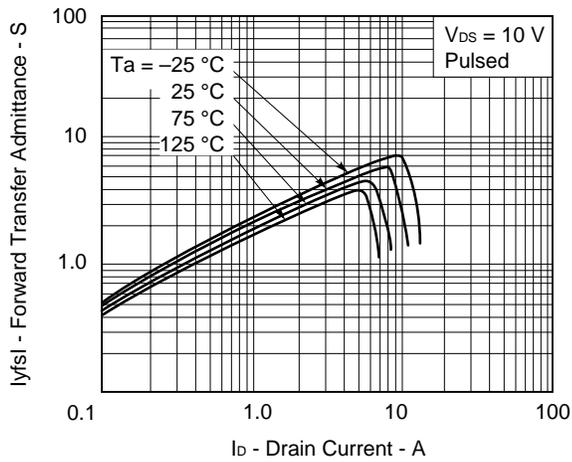
DRAIN CURRENT vs. GATE TO SOURCE VOLTAGE



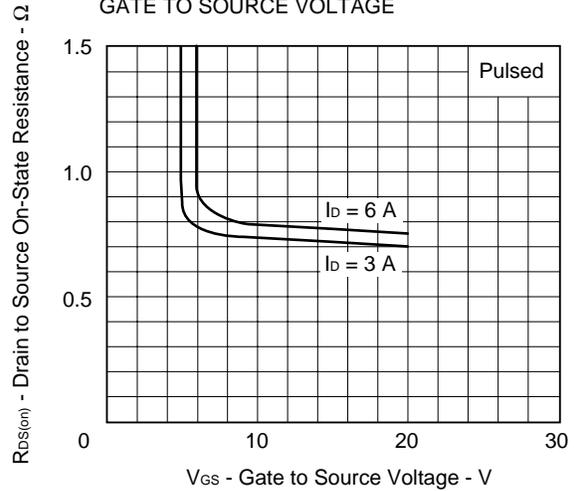
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



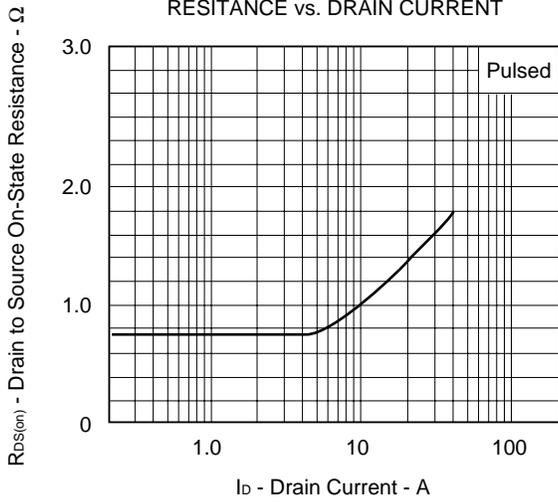
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



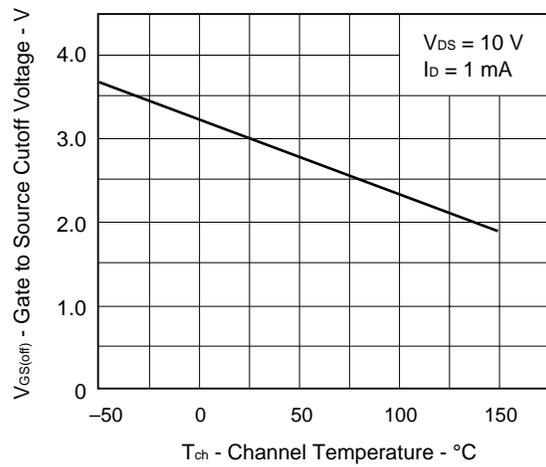
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

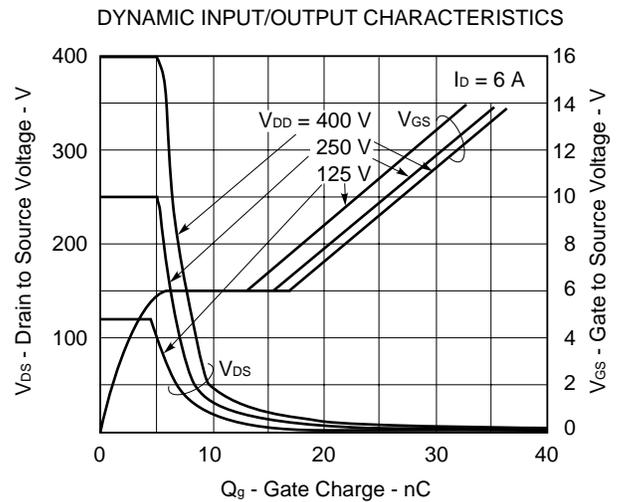
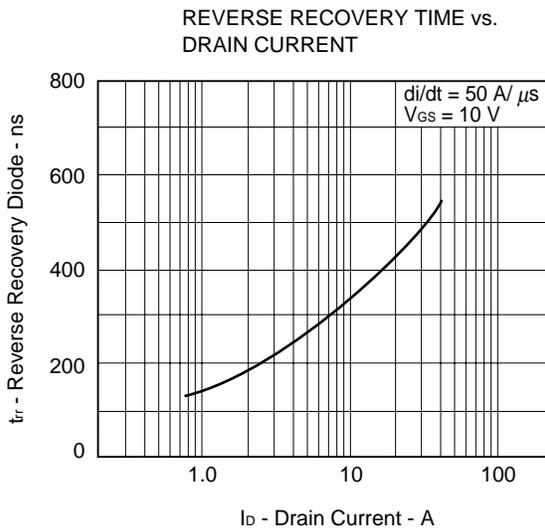
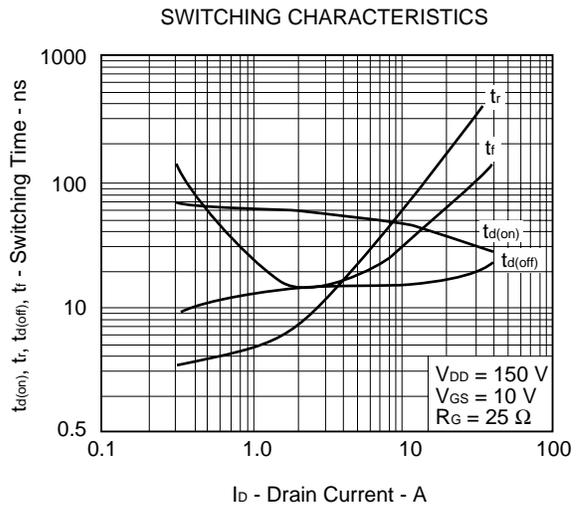
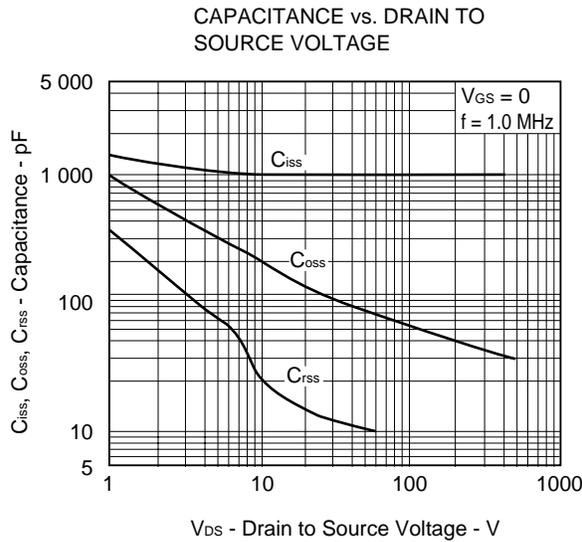
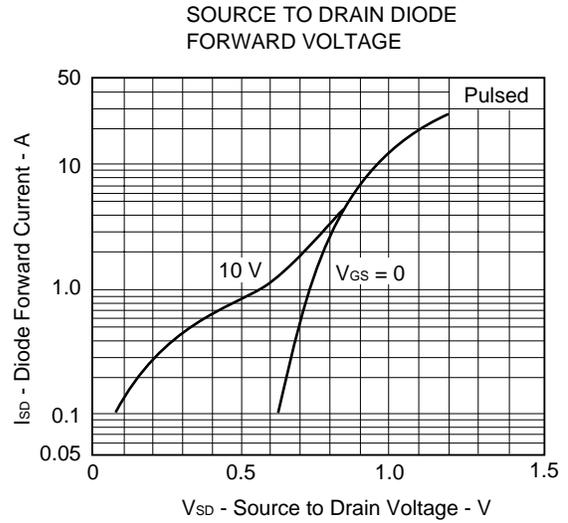
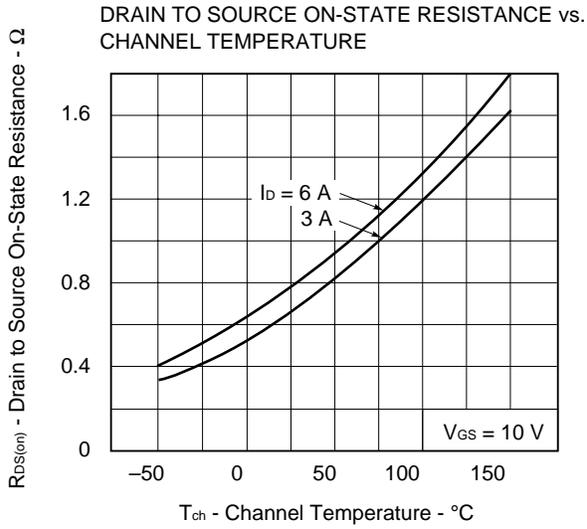


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

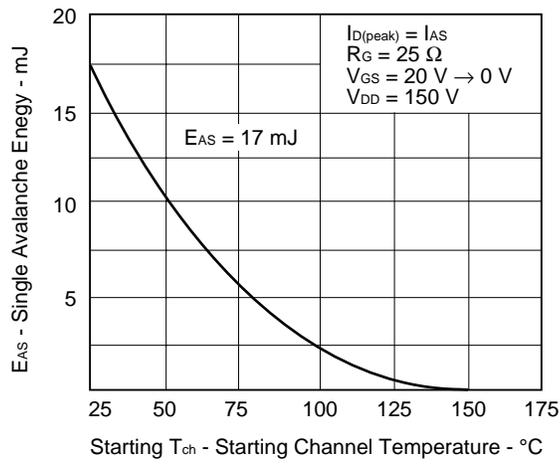


GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE

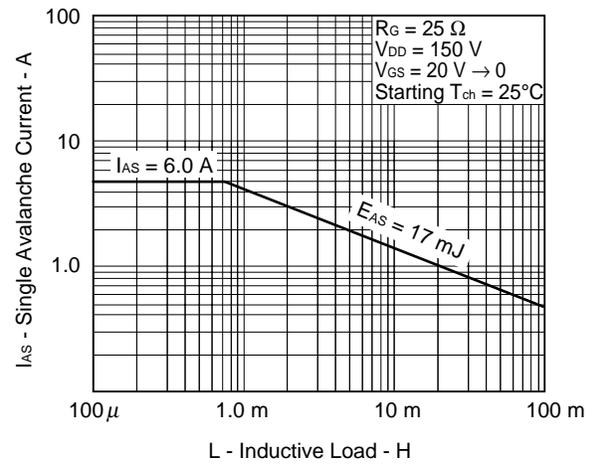




SINGLE AVALANCHE ENERGY vs
STARTING CHANNEL TEMPERATURE



SINGLE AVALANCHE CURRENT vs
INDUCTIVE LOAD



REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system.	C11745E
Quality grades on NEC semiconductor devices.	C11531E
Semiconductor device mounting technology manual.	C10535E
IC package manual.	C10943X
Guide to quality assurance for semiconductor devices.	MEI-1202
Semiconductor selection guide.	X10679E
Power MOS FET features and application switching to power supply.	D12971E
Application circuits using Power MOS FET.	D12972E
Safe operating area of Power MOS FET.	D13085E

The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device is 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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Anti-radioactive design is not implemented in this product.