

MOS FIELD EFFECT TRANSISTOR  
**2SK2478**

**SWITCHING  
 N-CHANNEL POWER MOS FET  
 INDUSTRIAL USE**

**DESCRIPTION**

The 2SK2478 is N-Channel MOS Field Effect Transistor designed for high voltage switching applications.

**FEATURES**

- Low On-Resistance  
 $R_{DS(on)} = 7.5 \Omega$  ( $V_{GS} = 10 V, I_D = 1.0 A$ )
- Low  $C_{iss}$   $C_{iss} = 485 pF$  TYP.
- High Avalanche Capability Ratings
- Isolated TO-220 Package

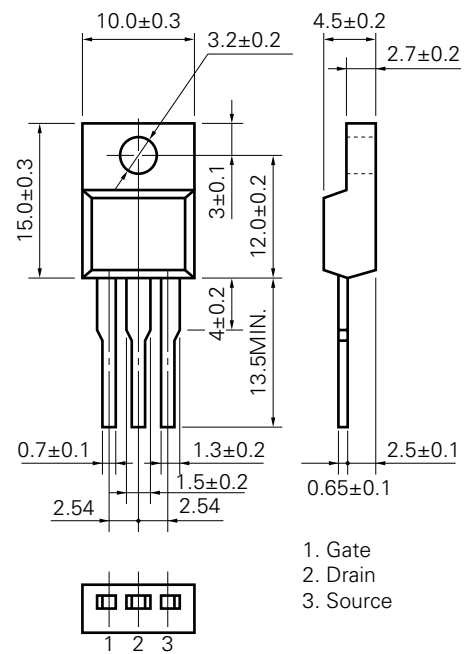
**ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ )**

Drain to Source Voltage	$V_{BSS}$	900	V
Gate to Source Voltage	$V_{GSS}$	$\pm 30$	V
Drain Current (DC)	$I_{D(DC)}$	$\pm 2.0$	A
Drain Current (pulse)*	$I_{D(pulse)}$	$\pm 8.0$	A
Total Power Dissipation ( $T_c = 25^\circ C$ )	$P_{T1}$	30	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**	$I_{AS}$	2.0	A
Single Avalanche Energy**	$E_{AS}$	16.5	mJ

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

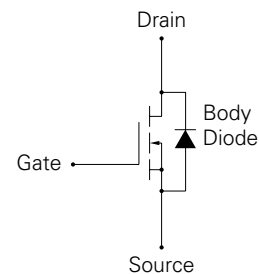
\*\* Starting  $T_{ch} = 25^\circ C, R_G = 25 \Omega, V_{GS} = 20 V \rightarrow 0$

**PACKAGE DIMENSIONS  
 (in millimeter)**



1. Gate
2. Drain
3. Source

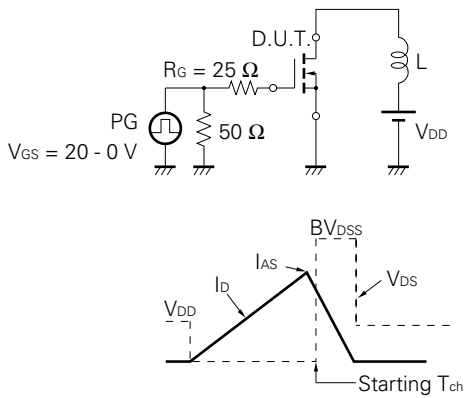
**MP-45F (ISOLATED TO-220)**



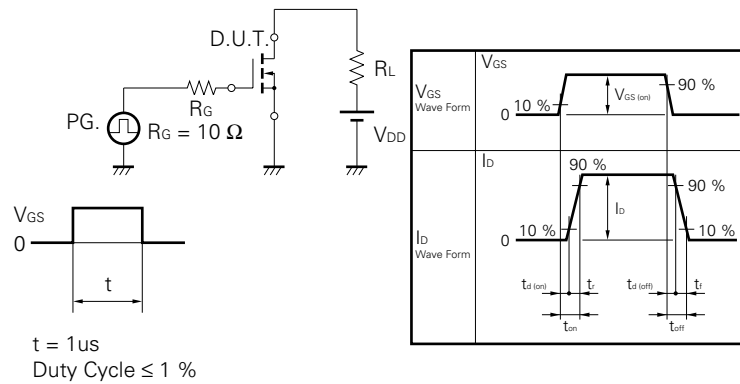
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-Resistance	R <sub>DS(on)</sub>		5.0	7.5	Ω	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 1.0 A
Gate to Source Cutoff Voltage	V <sub>GS(off)</sub>	2.5		3.5	V	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA
Forward Transfer Admittance	y <sub>fs</sub>	0.6			S	V <sub>DS</sub> = 20 V, I <sub>D</sub> = 1.0 A
Drain Leakage Current	I <sub>DSS</sub>			100	μA	V <sub>DS</sub> = V <sub>DSS</sub> , V <sub>GS</sub> = 0
Gate to Source Leakage Current	I <sub>GSS</sub>			±100	nA	V <sub>GS</sub> = ±30 V, V <sub>DS</sub> = 0
Input Capacitance	C <sub>iss</sub>		485		pF	V <sub>DS</sub> = 10 V
Output Capacitance	C <sub>oss</sub>		75		pF	V <sub>GS</sub> = 0
Reverse Transfer Capacitance	C <sub>rss</sub>		10		pF	f = 1 MHz
Turn-On Delay Time	t <sub>d(on)</sub>		11		ns	I <sub>D</sub> = 1.0 A
Rise Time	t <sub>r</sub>		3		ns	V <sub>GS</sub> = 10 V
Turn-Off Delay Time	t <sub>d(off)</sub>		35		ns	V <sub>DD</sub> = 150 V
Fall Time	t <sub>f</sub>		8		ns	R <sub>G</sub> = 150 Ω
Total Gate Charge	Q <sub>G</sub>		17		nC	I <sub>D</sub> = 2.0 A
Gate to Source Charge	Q <sub>GS</sub>		3		nC	V <sub>DD</sub> = 450 V
Gate to Drain Charge	Q <sub>GD</sub>		8		nC	V <sub>GS</sub> = 10 V
Body Diode Forward Voltage	V <sub>F(S-D)</sub>		1.0		V	I <sub>F</sub> = 2.0 A, V <sub>GS</sub> = 0
Reverse Recovery Time	t <sub>rr</sub>		580		ns	I <sub>F</sub> = 2.0 A, V <sub>GS</sub> = 0
Reverse Recovery Charge	Q <sub>rr</sub>		2.3		μC	di/dt = 50 A/μs

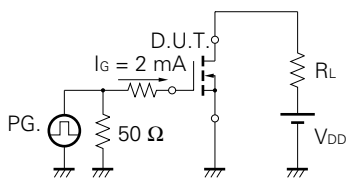
**Test Circuit 1 Avalanche Capability**



**Test Circuit 2 Switching Time**

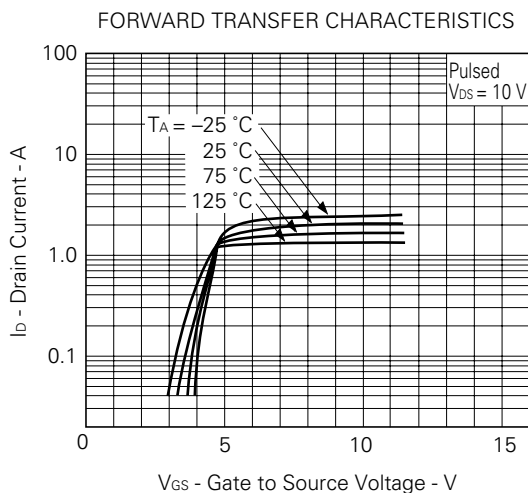
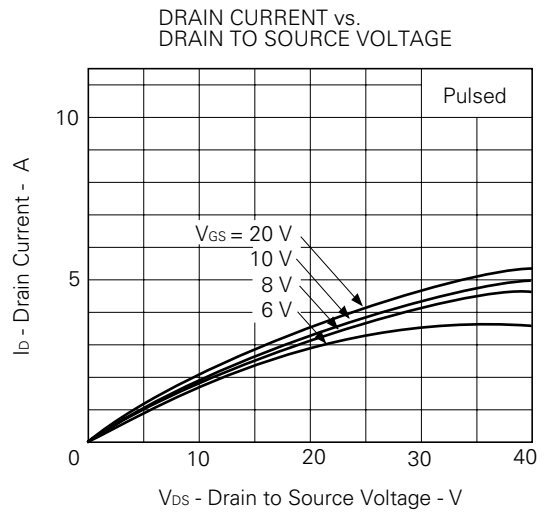
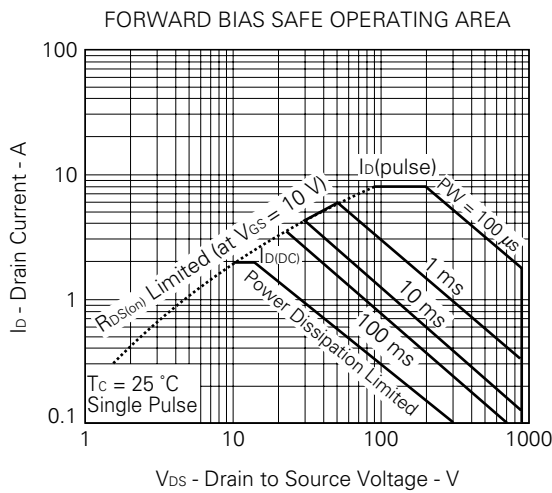
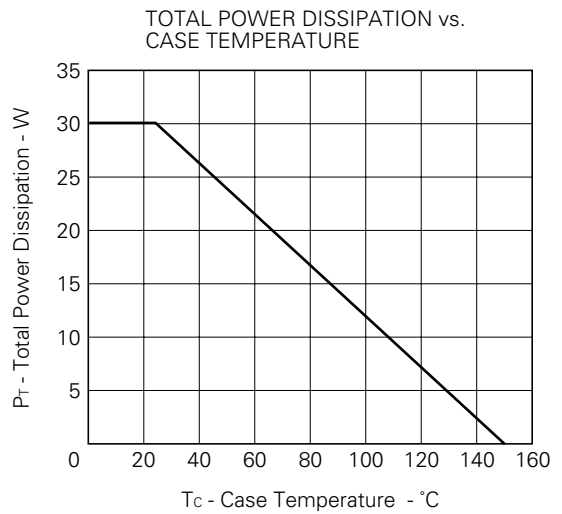
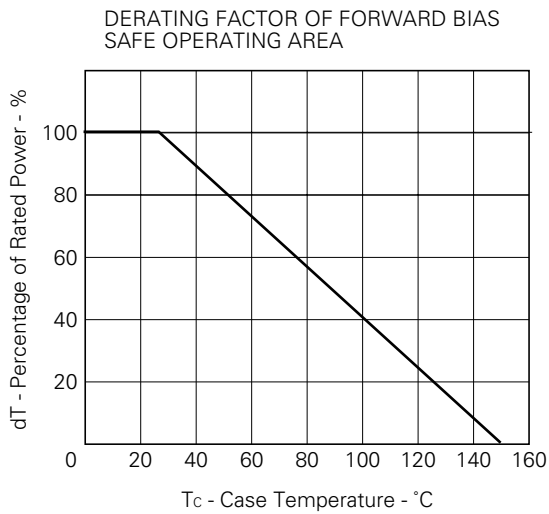


**Test Circuit 3 Gate Charge**

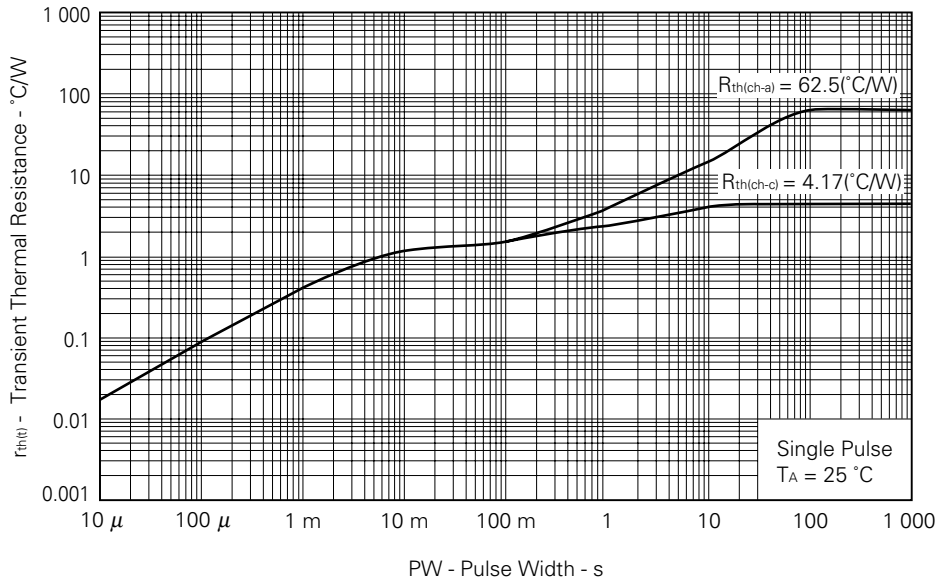


The application circuits and their parameters are for references only and are not intended for use in actual design-in's.

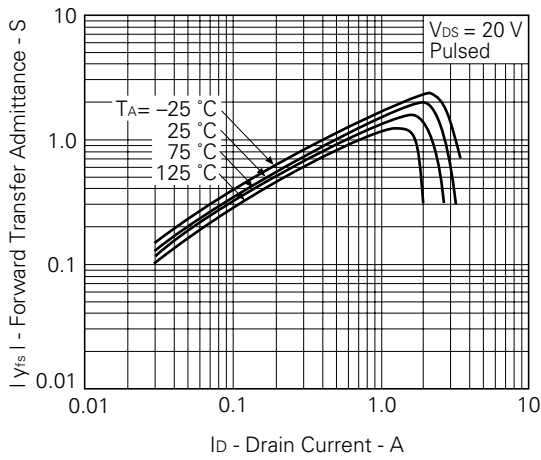
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)



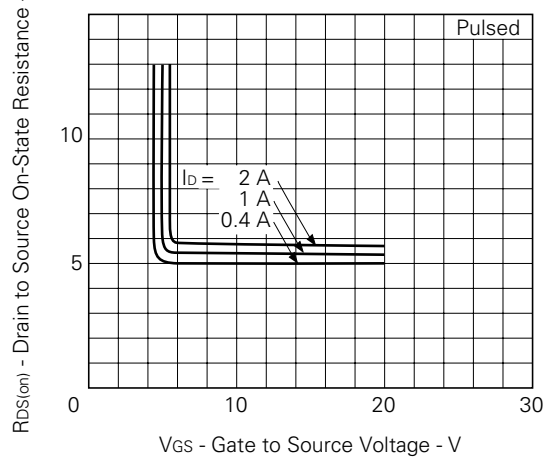
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



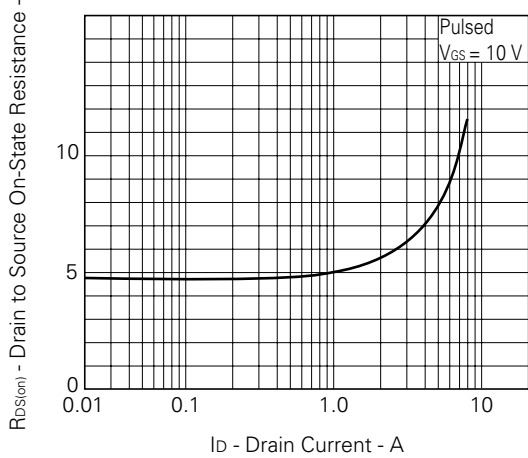
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



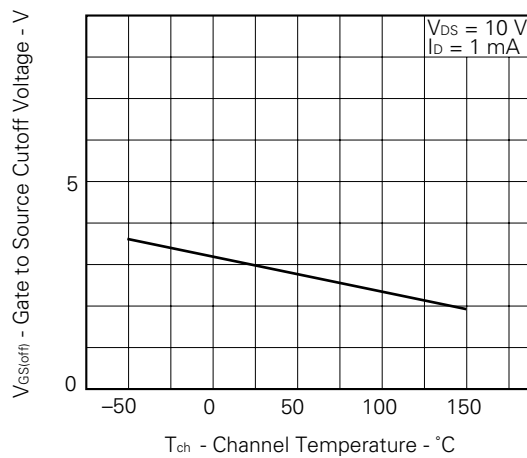
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

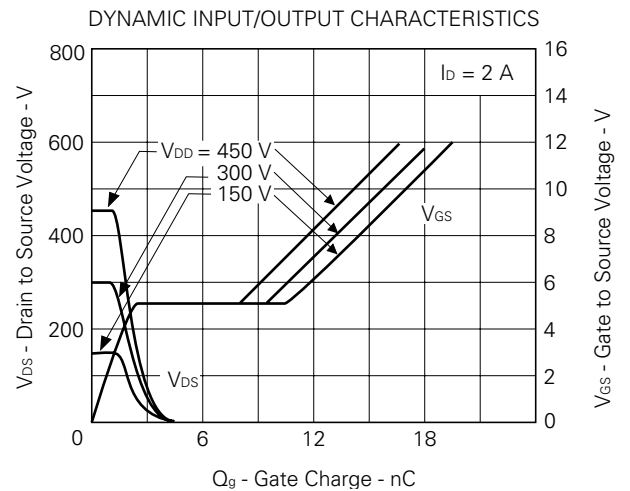
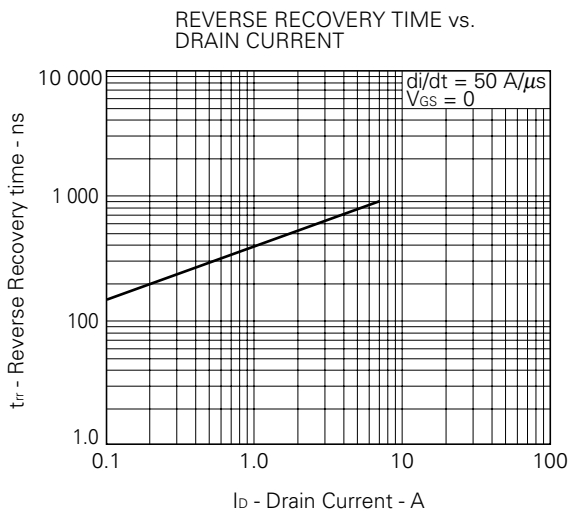
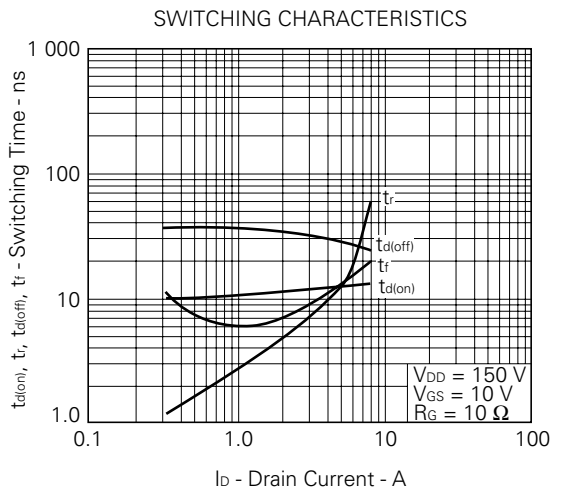
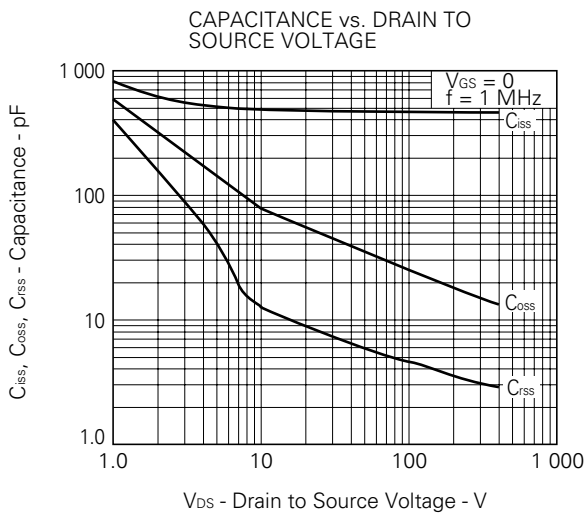
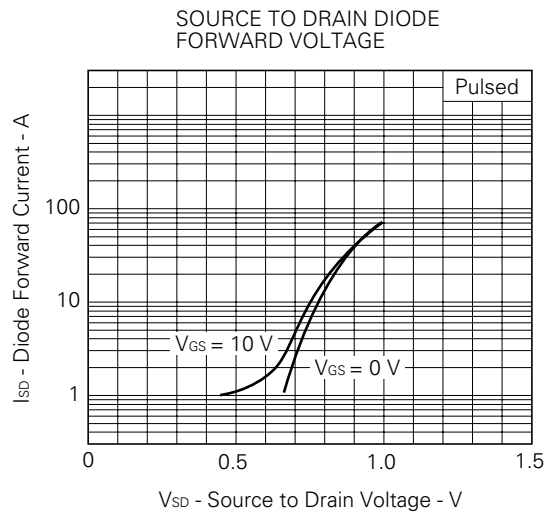
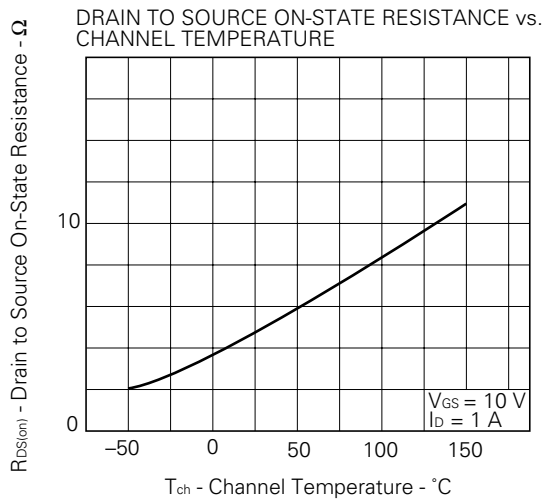


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

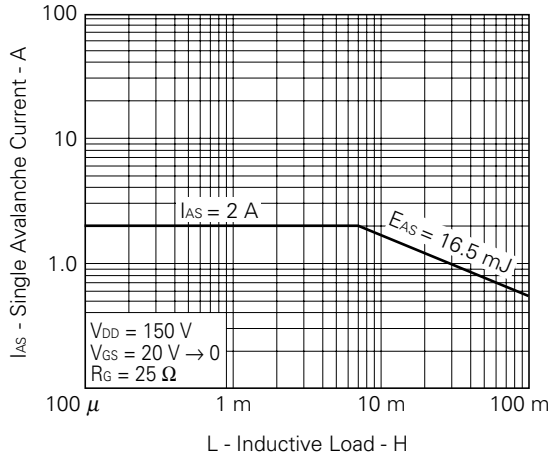


GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE

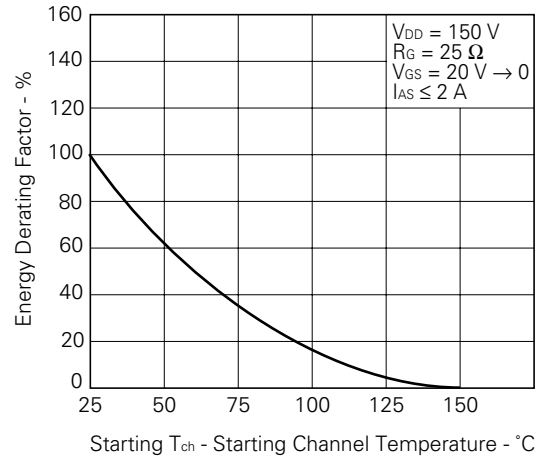




SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY DERATING FACTOR



**REFERENCE**

Document Name	Document No.
NEC semiconductor device reliability/quality control system.	TEI-1202
Quality grade on NEC semiconductor devices.	IEI-1209
Semiconductor device mounting technology manual.	IEI-1207
Semiconductor device package manual.	IEI-1213
Guide to quality assurance for semiconductor devices.	MEI-1202
Semiconductor selection guide.	MF-1134
Power MOS FET features and application switching power supply.	TEA-1034
Application circuits using Power MOS FET.	TEA-1035
Safe operating area of Power MOS FET.	TEA-1037

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