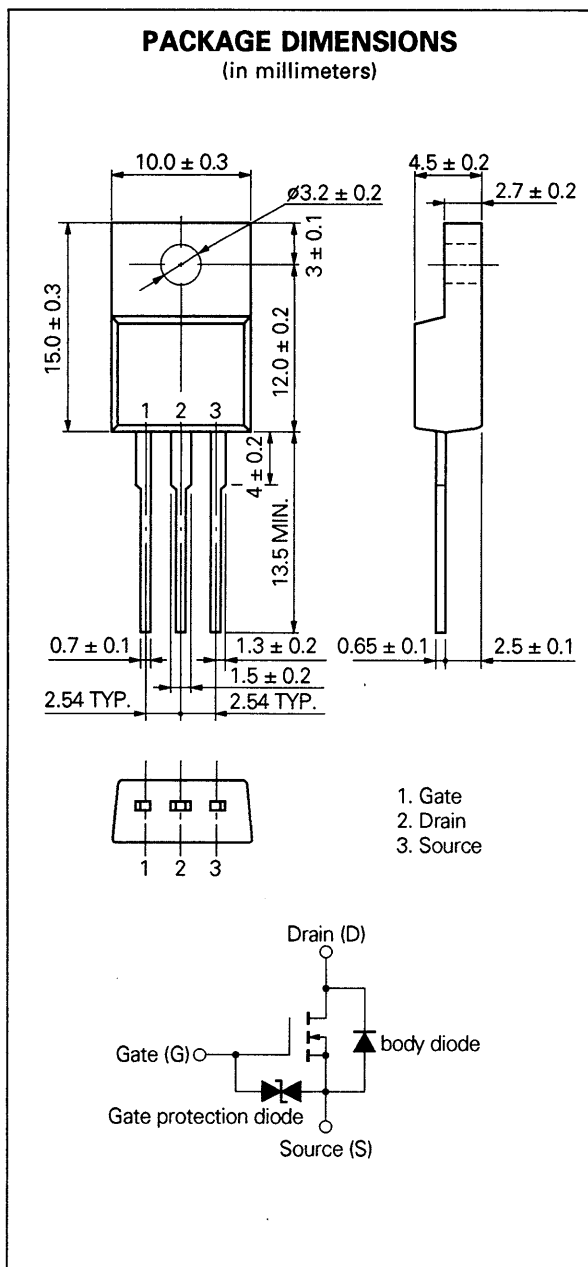


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P1 98.2

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE



DESCRIPTION

The 2SK2234 is N-channel Power MOS Field Effect Transistor designed for high voltage switching applications.

FEATURES

- Low On-state Resistance
 $R_{DS(on)} = 0.6 \Omega$ MAX. ($V_{GS} = 10 V, I_D = 4.0 A$)
- Low C_{iss} $C_{iss} = 1500 pF$ TYP.
- Built-in G-S Gate Protection Diodes
- High Avalanche Capability Ratings

QUALITY GRADE

Standard
Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures		
Storage Temperature	-55 to +150	°C
Channel Temperature	150	°C MAX.
Maximum Power Dissipation		
Total Power Dissipation ($T_c = 25 \text{ }^\circ\text{C}$)	40	W
Total Power Dissipation ($T_a = 25 \text{ }^\circ\text{C}$)	2.0	W
Maximum Voltages and Currents ($T_a = 25 \text{ }^\circ\text{C}$)		
V_{DS}	Drain to Source Voltage	500 V
V_{GS}	Gate to Source Voltage	± 30 V
$I_{D(DC)}$	Drain Current (DC)	± 8.0 A
$I_{D(pulse)^*}$	Drain Current (pulse)	± 32 A
Maximum Avalanche Capability Ratings**		
I_{AS}	Single Avalanche Current	12 A
E_{AS}	Single Avalanche Energy	362 mJ

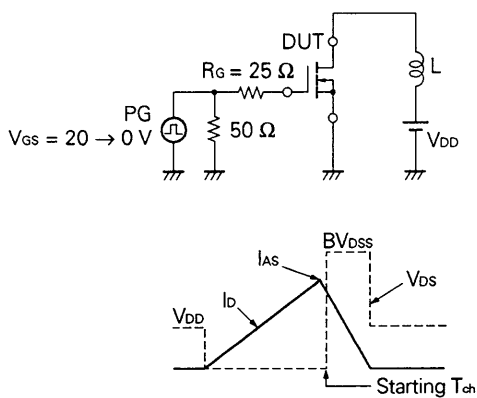
* $PW \leq 10 \mu s, Duty Cycle \leq 1 \%$

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

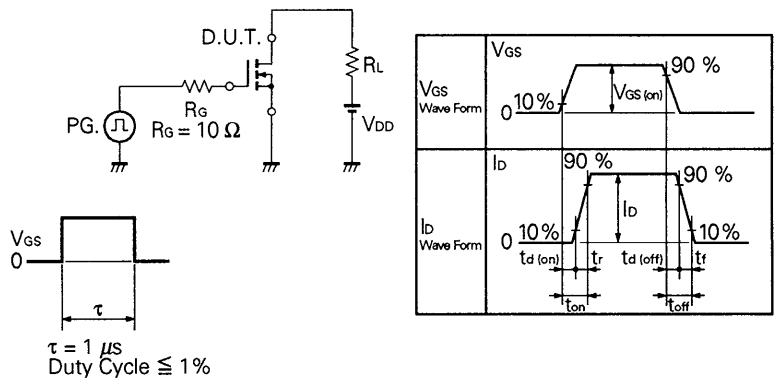
ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-state Resistance	R _{DS(on)}		0.5	0.6	Ω	V _{GS} = 10 V, I _D = 4 A
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 = 4 A
Drain Leakage Current	I _{DSS}			100	μA	V _{DS} = 500 V, V _{GS} = 0
Gate to Source Leakage Current	I _{GSS}			±10	μA	V _{GS} = ±20 V, V _{DS} = 0
Input Capacitance	C _{iss}		1 500		pF	V _{DS} = 10 V V _{GS} = 0 f = 1 MHz
Output Capacitance	C _{oss}		480		pF	
Reverse Transfer Capacitance	C _{res}		200		pF	
Turn-On Delay Time	t _{d(on)}		23		ns	V _{GS} = 10 V V _{DD} = 150 V I _D = 4 A, R _G = 10 Ω R _L = 37.5 Ω
Rise Time	t _r		23		ns	
Turn-Off Delay Time	t _{d(off)}		104		ns	
Fall Time	t _f		21		ns	
Total Gate Charge	Q _G		57		nC	V _{GS} = 10 V I _D = 8 A V _{DD} = 400 V
Gate to Source Charge	Q _{GS}		8.6		nC	
Gate to Drain Charge	Q _{GD}		3.4		nC	
Diode Forward Voltage	V _{F(S-D)}		1.0		V	I _F = 8 A, V _{GS} = 0
Reverse Recovery Time	t _{rr}		435		ns	I _F = 8 A di/dt = 50 A/μs
Reverse Recovery Charge	Q _{rr}		2.1		μC	

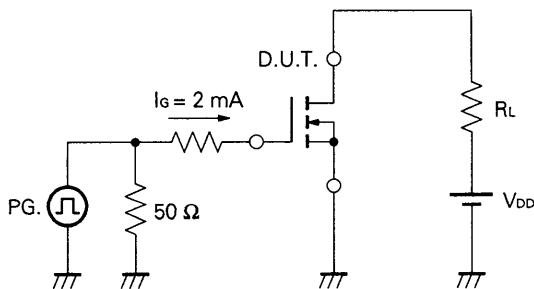
Test Circuit 1: Avalanche Capability



Test Circuit 2: Switching Time

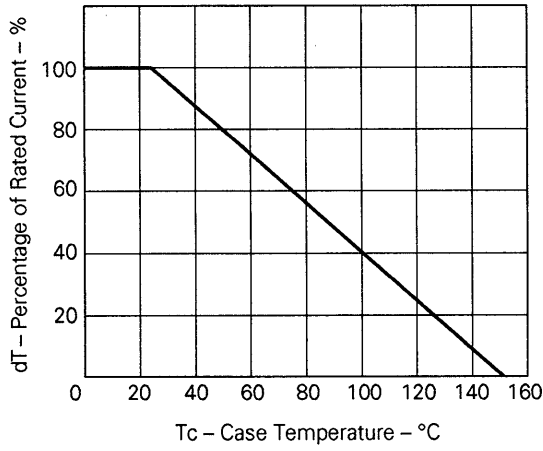


Test Circuit 3: Gate Charge

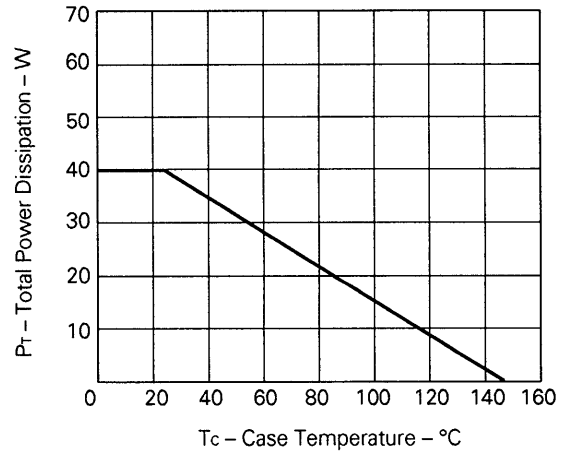


TYPICAL CHARACTERISTICS ($T_a = 25\text{ }^\circ\text{C}$)

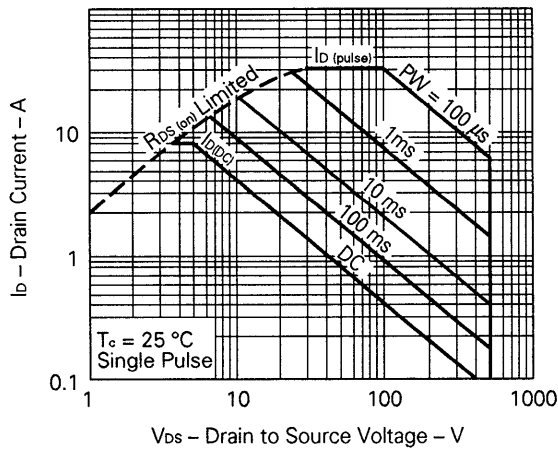
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



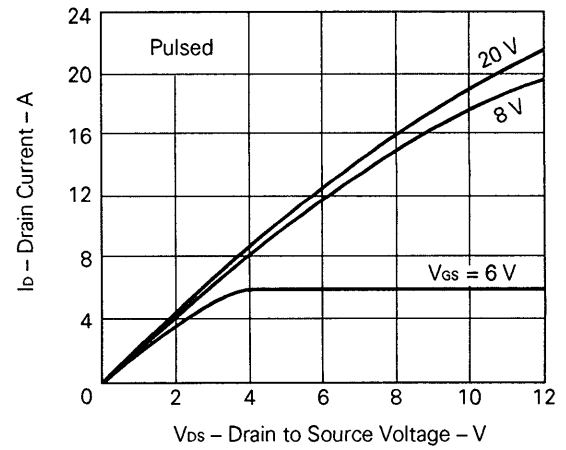
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



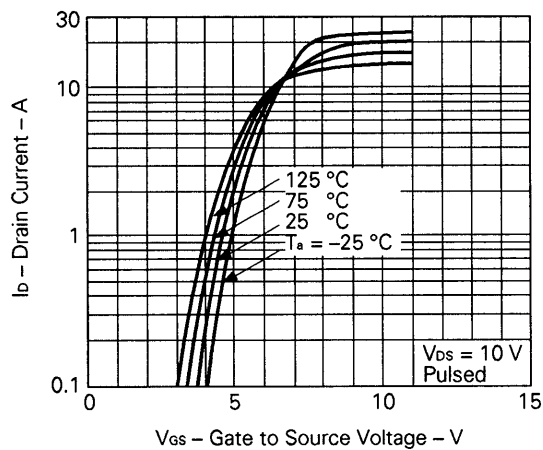
FORWARD BIAS SAFE OPERATING AREA



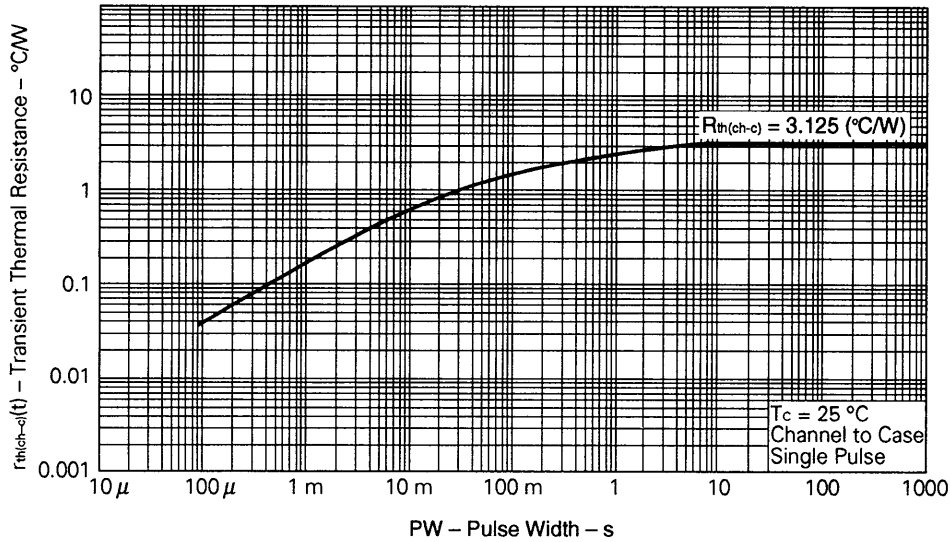
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



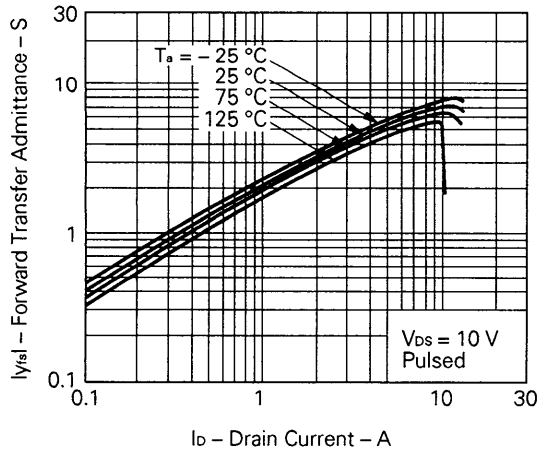
TRANSFER CHARACTERISTICS



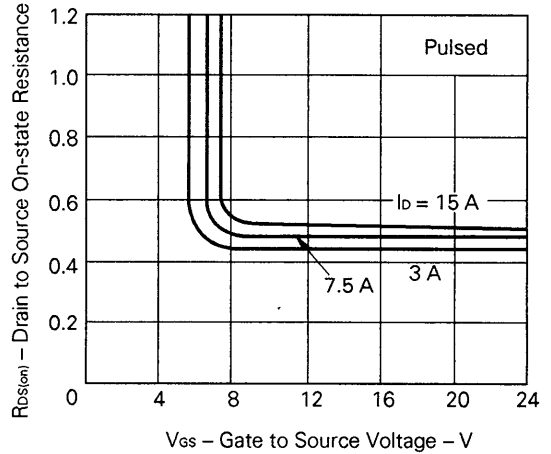
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



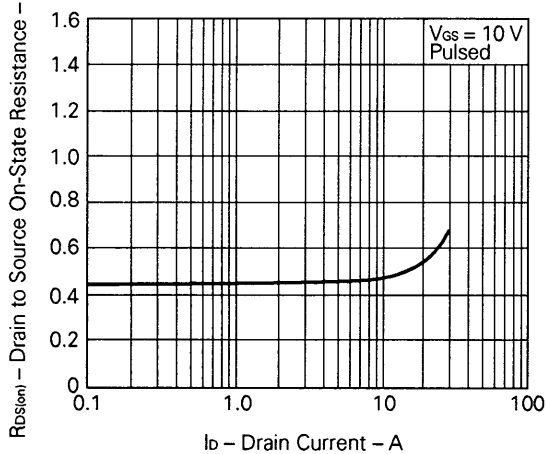
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



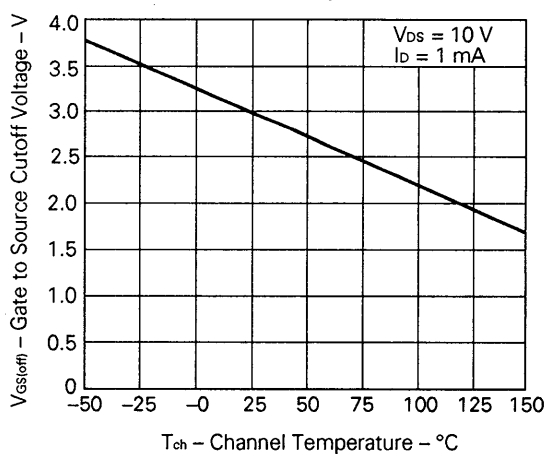
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



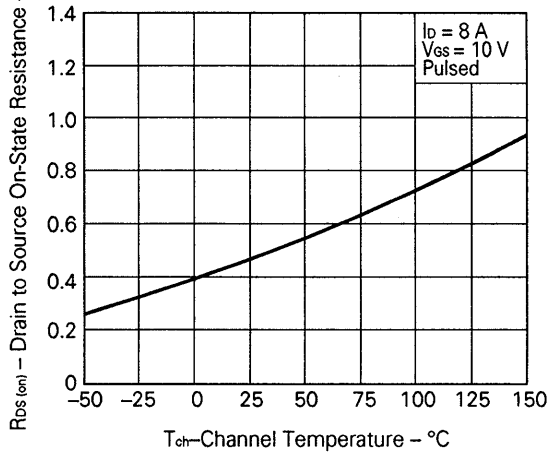
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



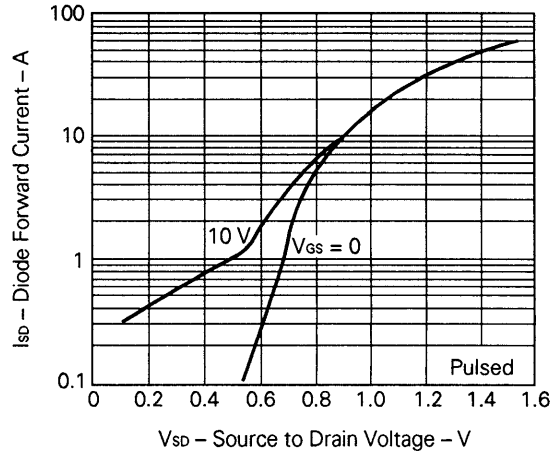
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



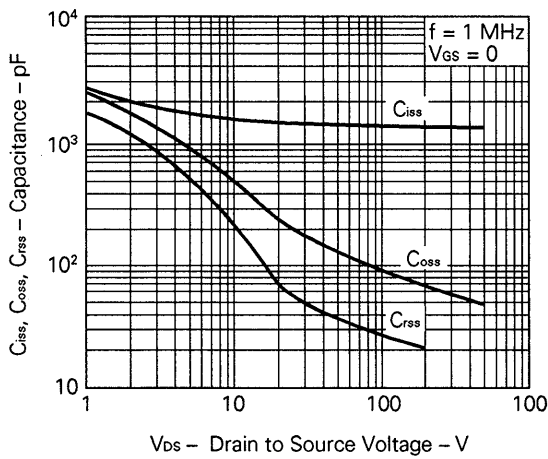
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



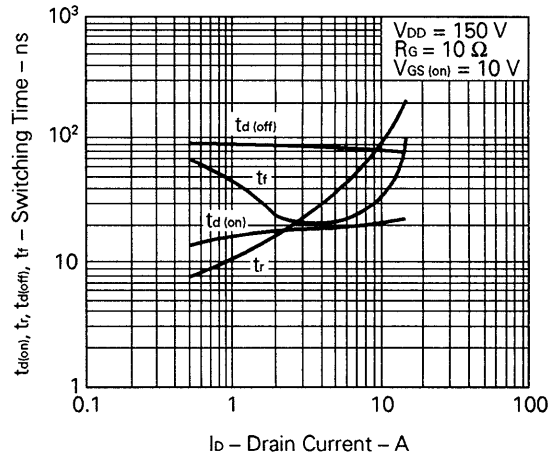
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



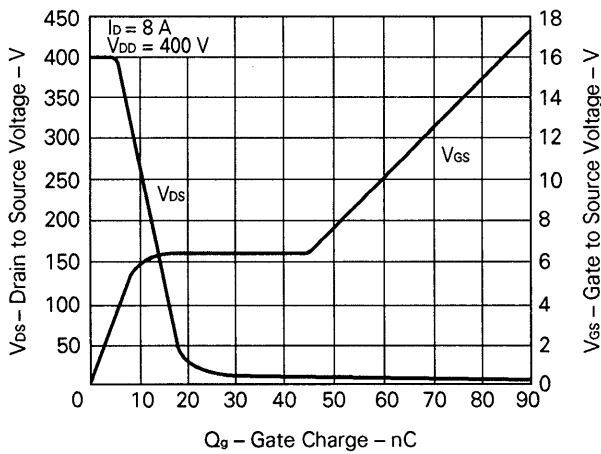
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



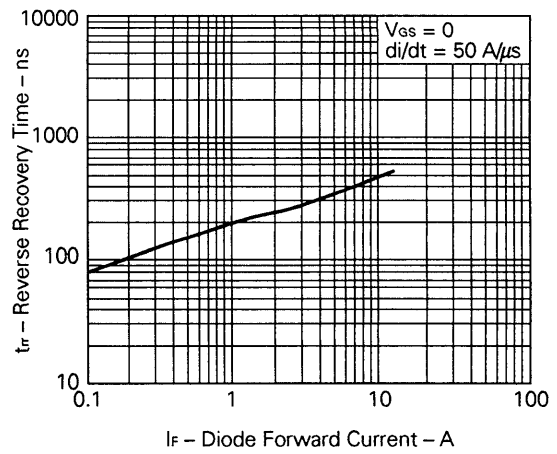
SWITCHING CHARACTERISTICS

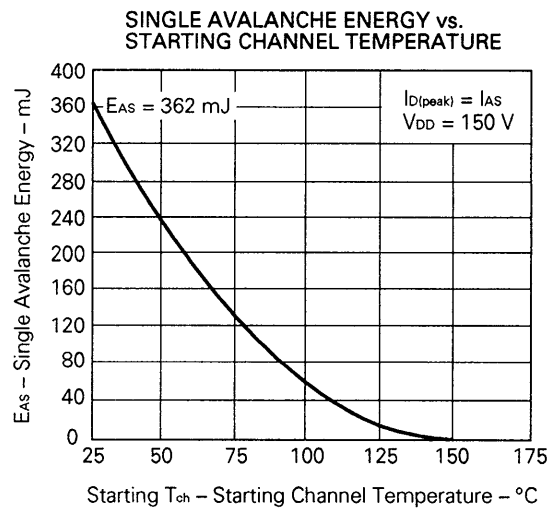
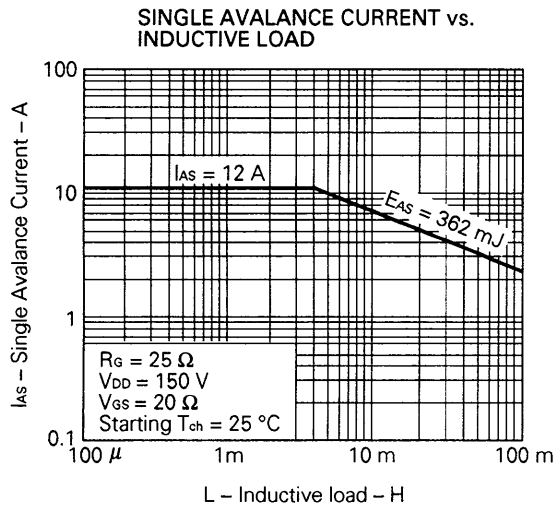


DYNAMIC INPUT CHARACTERISTICS



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT





Reference

Application note name	No.
Safe operating area of Power MOS FET.	TEA-1034
Application circuit using Power MOS FET.	TEA-1035
Quality control of NEC semiconductors devices.	TEI-1202
Quality control guide of semiconductors devices.	MEI-1202
Assembly manual of semiconductors devices.	IEI-1207

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