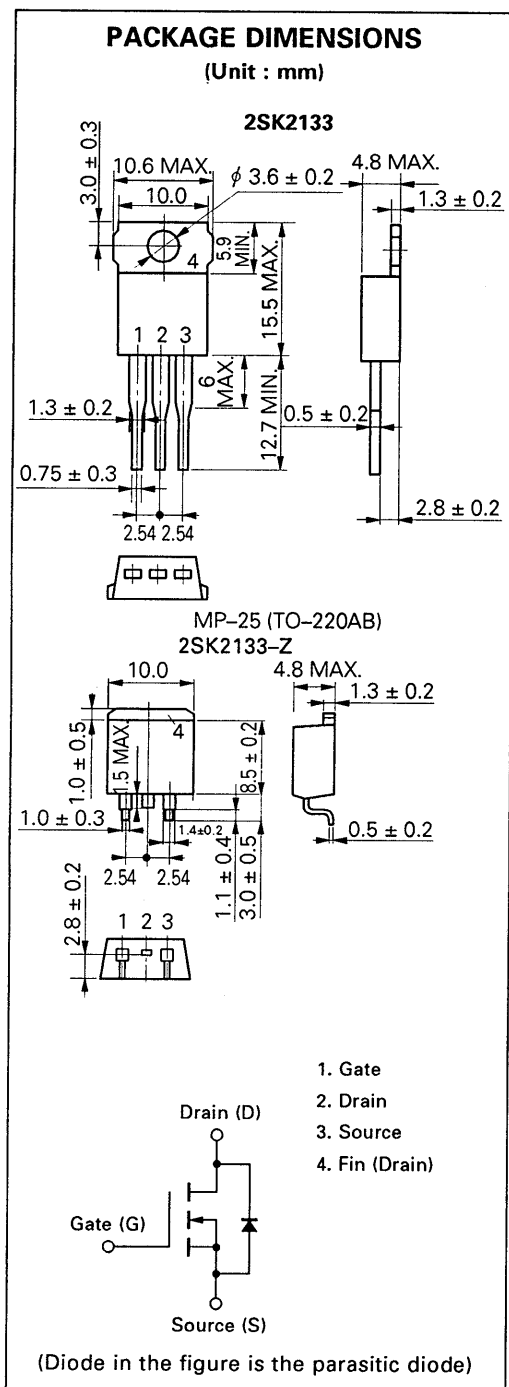


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P1 98.2

MOS FIELD EFFECT POWER TRANSISTORS 2SK2133, 2SK2133-Z

SWITCHING N-CHANNEL POWER MOS FET INDUSTRIAL USE



DESCRIPTION

The 2SK2133, 2SK2133-Z are N-channel Power MOS Field Effect Transistors designed for high voltage switching applications.

FEATURES

- Low On-state Resistance
 $R_{DS(on)} = 0.21 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 8.0 \text{ A)}$
- Low C_{iss} $C_{iss} = 1090 \text{ pF TYP.}$
- 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 ($T_a = 25 \text{ °C}$)	1.5	W
Total Power Dissipation ($T_c = 25 \text{ °C}$)	75	W

Maximum Voltages and Currents ($T_a = 25 \text{ °C}$)

V_{DS}	Drain to Source Voltage	250	V
V_{GS}	Gate to Source Voltage	±30	V
$I_{D(DS)}$	Drain Current (DC)	±16	A
$I_{D(pulse)*}$	Drain Current (pulse)	±64	A

Maximum Avalanche Capability Ratings**

I_{AS}	Single Avalanche Current	16	A
E_{AS}	Single Avalanche Energy	320	mJ

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

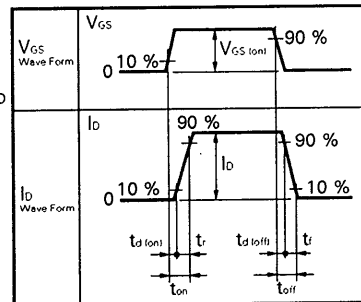
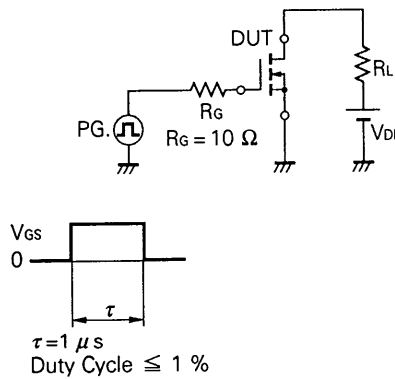
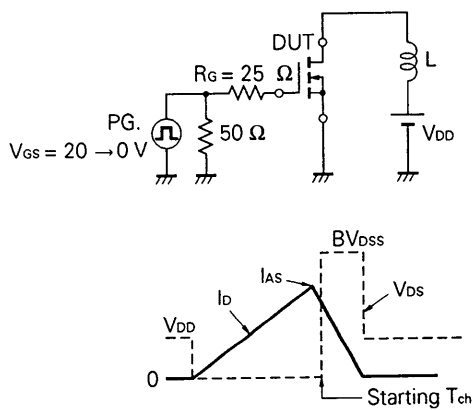
** Starting $T_{ch} = 25 \text{ °C}$, $R_G = 25 \Omega$, $V_{GS} = 20 \text{ V} \rightarrow 0$

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

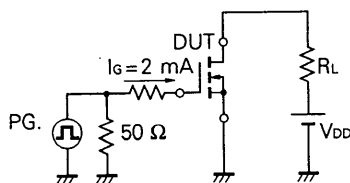
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-state Resistance	R _{DS(on)}		0.21	0.26	Ω	V _{GS} = 10 V, I _D = 8.0 A
Gate to Source Cutoff Voltage	V _{GS(off)}	2.0		4.0	V	V _{DS} = 10 V, I _D = 1 mA
Forward Transfer Admittance	y _{fe}	4.0			S	V _{DS} = 10 V, I _D = 8.0 A
Drain Leakage Current	I _{DSS}			100	μA	V _{DS} = 250 V, V _{GS} = 0
Gate to Source Leakage Current	I _{GSS}			±10	μA	V _{GS} = ±30 V, V _{DS} = 0
Input Capacitance	C _{iss}		1 090		pF	V _{DS} = 10 V
Output Capacitance	C _{oss}		420		pF	V _{GS} = 0
Reverse Transfer Capacitance	C _{rss}		80		pF	f = 1 MHz
Turn-On Delay Time	t _{d(on)}		20		ns	V _{GS} = 10 V
Rise Time	t _r		40		ns	V _{DD} = 150 V
Turn-Off Delay Time	t _{d(off)}		60		ns	I _D = 8.0 A, R _G = 10 Ω
Fall Time	t _f		20		ns	R _L = 18.75 Ω
Total Gate Charge	Q _G		25		nC	V _{GS} = 10 V
Gate to Source Charge	Q _{GS}		8.0		nC	I _D = 16 A
Gate to Drain Charge	Q _{GD}		14		nC	V _{DD} = 200 V
Diode Forward Voltage	V _{F(S-D)}		1.0		V	I _F = 16 A, V _{GS} = 0
Reverse Recovery Time	t _{rr}		400		ns	I _F = 16 A
Reverse Recovery Charge	Q _{rr}		2.0		μC	di / dt = 50 A / μs

Test Circuit 1 : Avalanche Capability

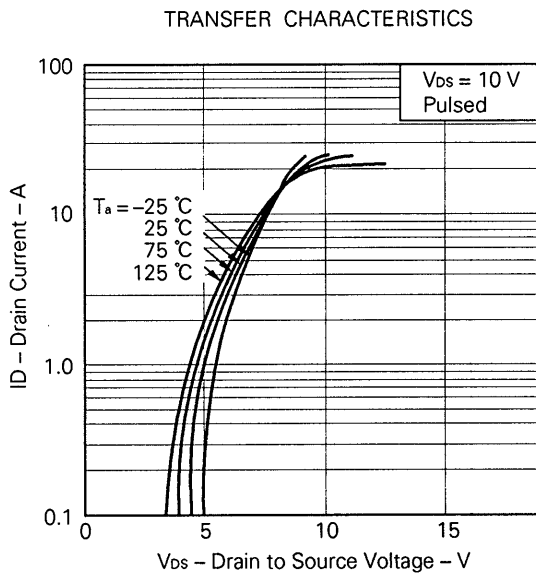
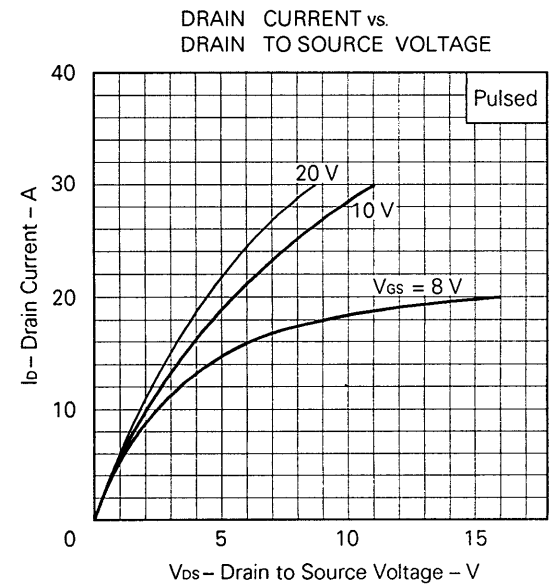
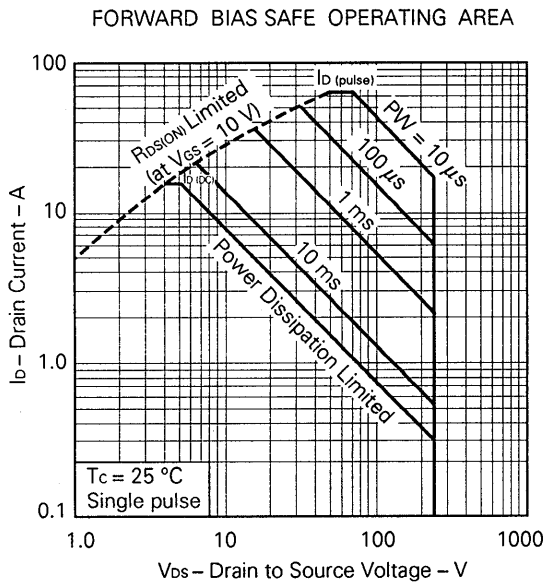
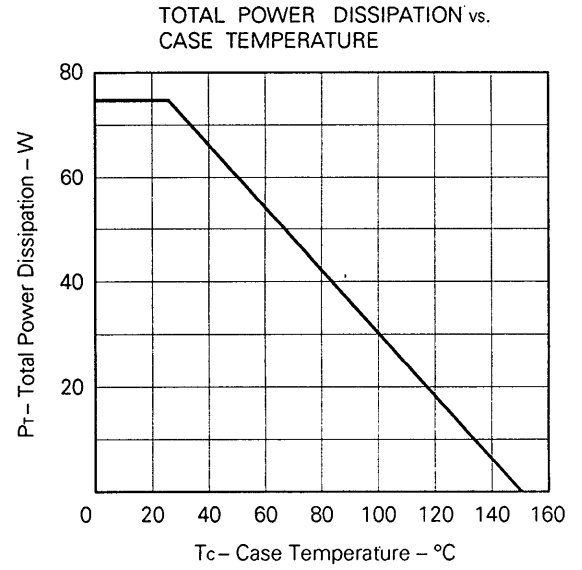
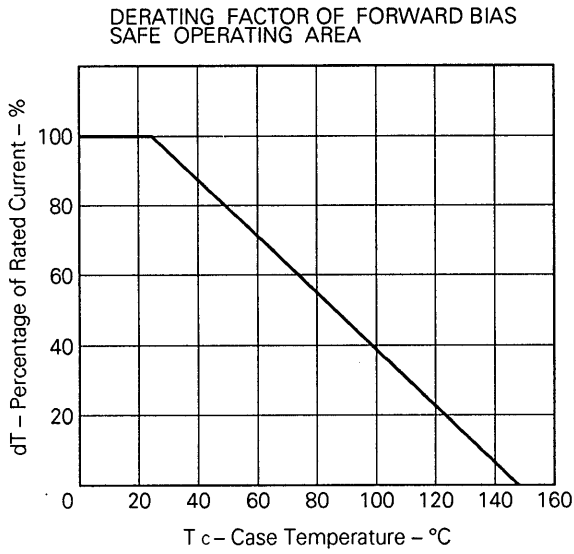
Test Circuit 2 : Switching Time



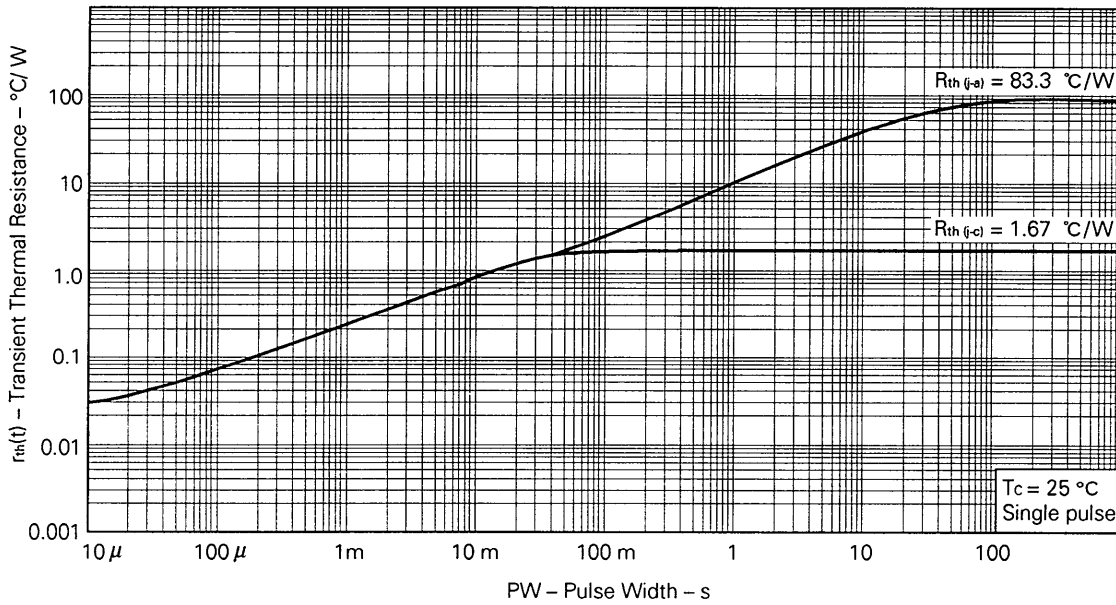
Test Circuit 3 : Gate Charge



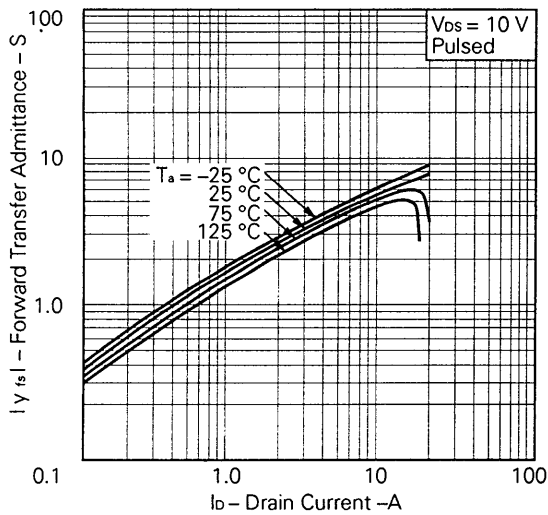
TYPICAL CHARACTERISTICS (T_a = 25 °C)



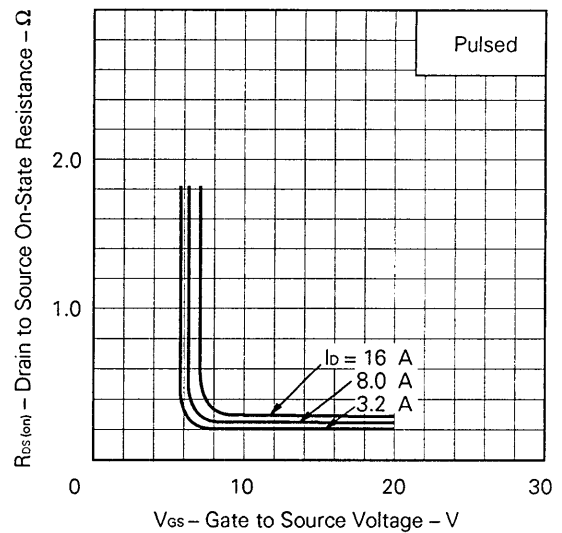
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



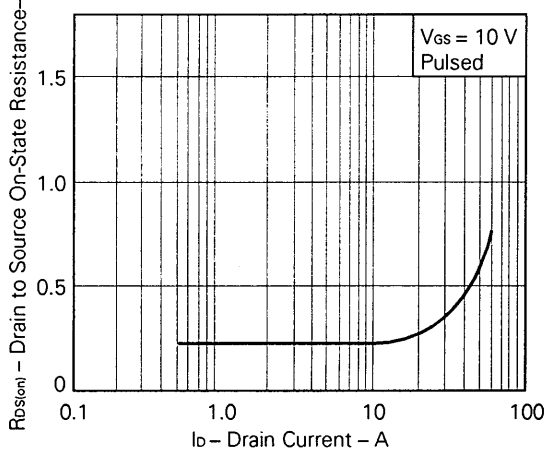
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



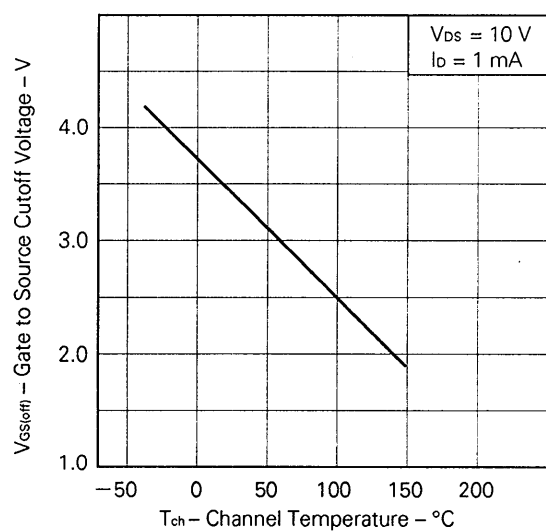
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



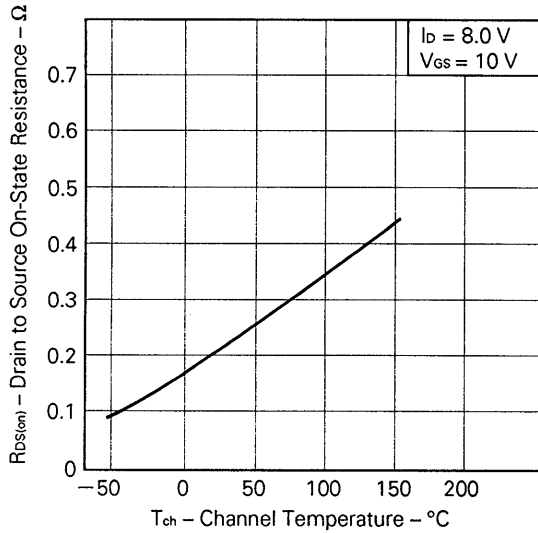
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



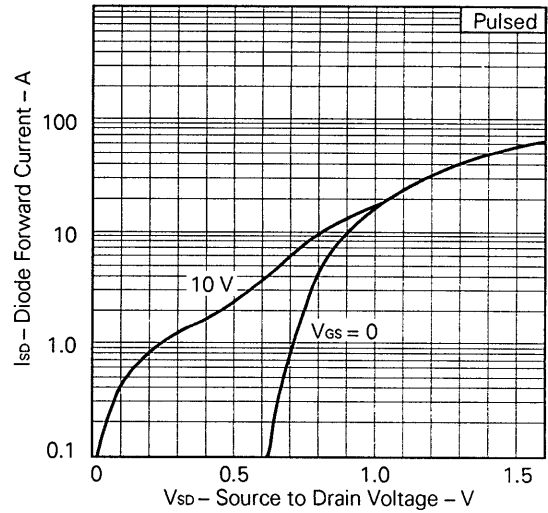
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



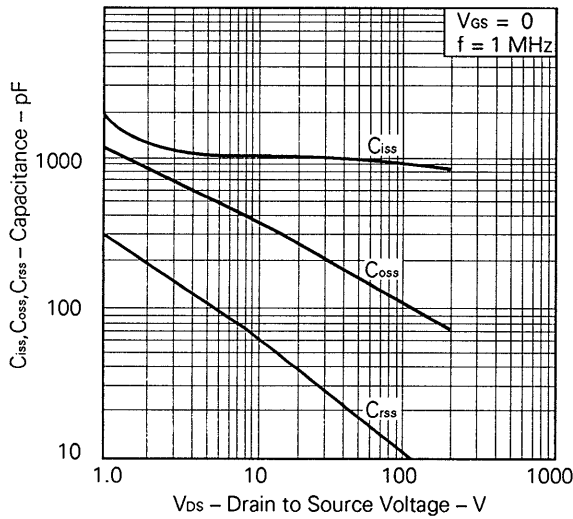
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



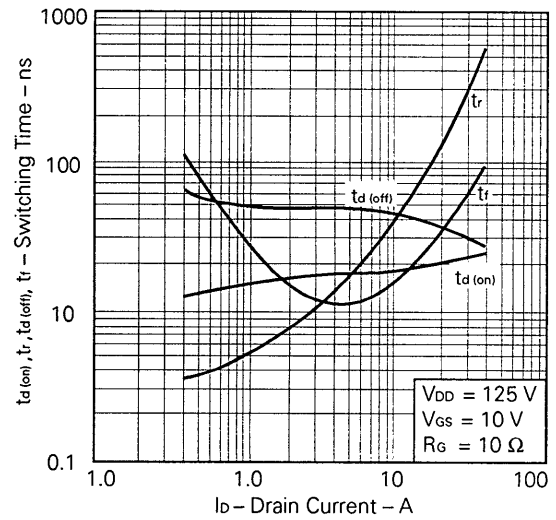
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



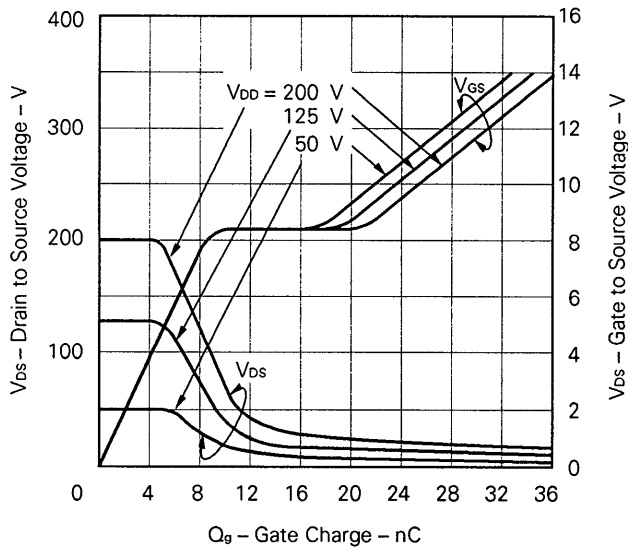
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



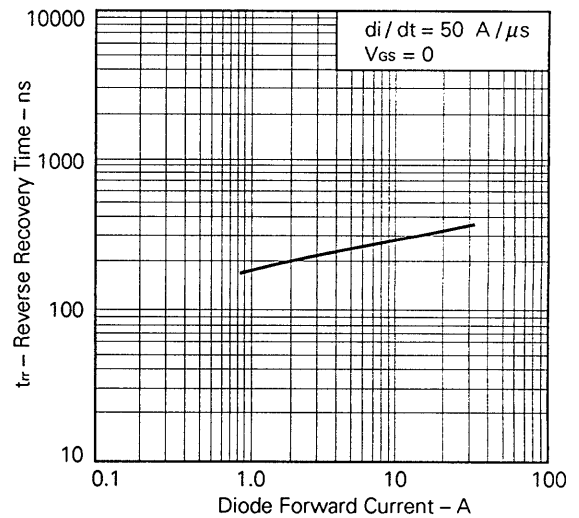
SWITCHING CHARACTERISTICS



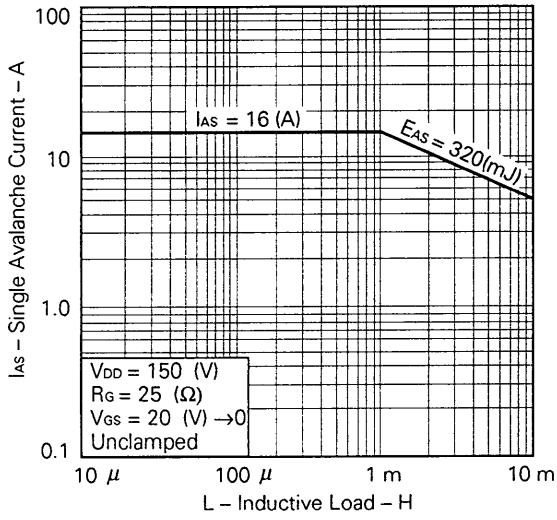
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



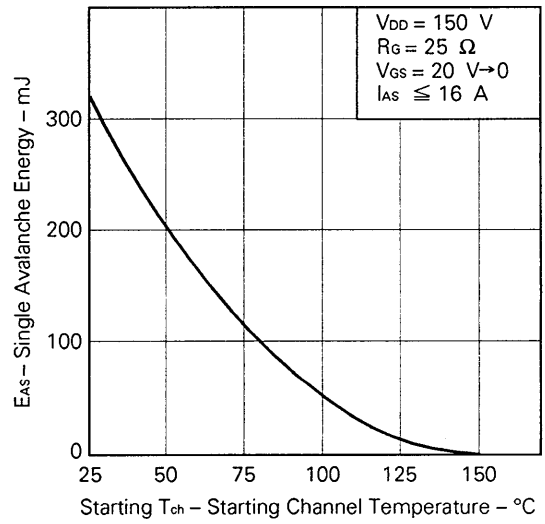
REVERSE RECOVERY TIME vs. REVERSE DRAIN CURRENT



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY vs. STARTING CHANNEL TEMPERATURE



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