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MOS FIELD EFFECT POWER TRANSISTORS 2SK2136, 2SK2136-Z

SWITCHING N-CHANNEL POWER MOS FET INDUSTRIAL USE

DESCRIPTION

The 2SK2136, 2SK2136-Z are N-channel Power MOS Field Effect Transistors designed for high voltage switching applications.

FEATURES

- Low On-state Resistance
 $R_{D(on)} = 0.18 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 10 \text{ A)}$
- Low C_{iss} $C_{iss} = 1100 \text{ pF TYP.}$
- 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.

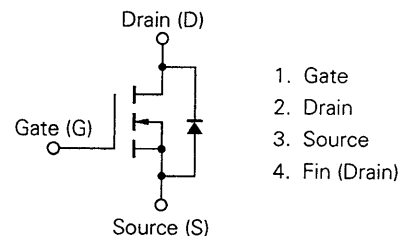
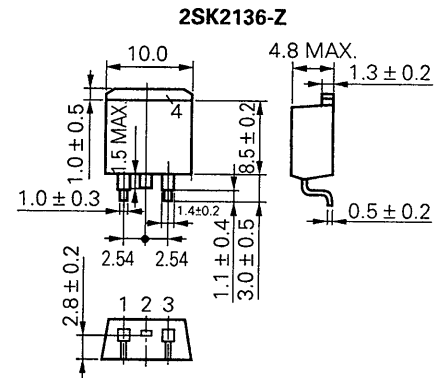
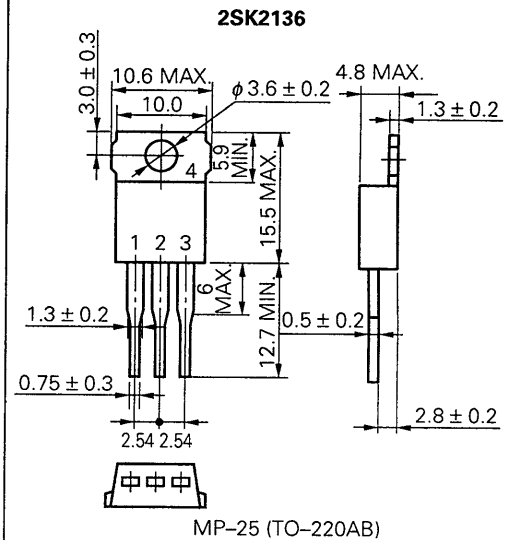
ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

Drain to Source Voltage	V_{DSS}	200	V
Gate to Source Voltage	V_{GSS}	± 30	V
Drain Current (DC)	$I_{D(DS)}$	± 20	A
Drain Current (pulse)	$I_{D(pulse)^*}$	± 80	A
Total Power Dissipation ($T_c = 25^\circ\text{C}$)	P_{T1}	75	W
Total Power Dissipation ($T_a = 25^\circ\text{C}$)	P_{T2}	1.5	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$
Single Avalanche Current	I_{AS}^{**}	20	A
Single Avalanche Energy	E_{AS}^{**}	80	mJ

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

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

PACKAGE DIMENSIONS (Unit: mm)

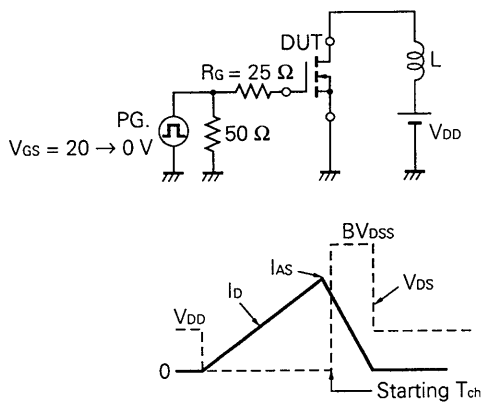


(Diode in the figure is the parasitic diode)

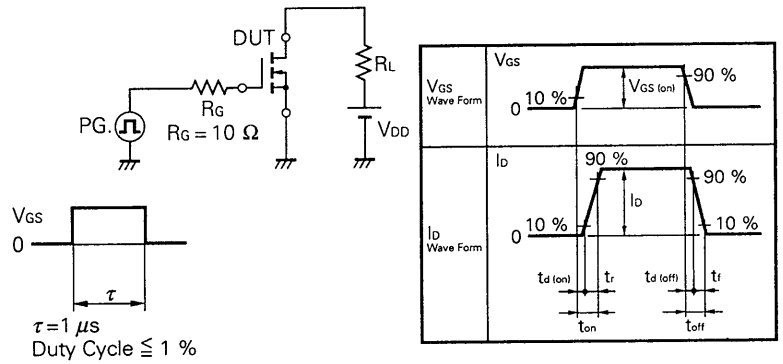
ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-state Resistance	R _{DS(on)}			0.18	Ω	V _{GS} = 10 V, I _D = 10 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 _{fs}	4.0			S	V _{DS} = 10 V, I _D = 10 A
Drain Leakage Current	I _{DSS}			100	μA	V _{DS} = 200 V, V _{GS} = 0
Gate to Source Leakage Current	I _{GSS}			±100	nA	V _{GS} = ±30 V, V _{DS} = 0
Input Capacitance	C _{iss}		1 100		pF	V _{DS} = 10 V
Output Capacitance	C _{oss}		540		pF	V _{GS} = 0
Reverse Transfer Capacitance	C _{rss}		190		pF	f = 1 MHz
Turn-On Delay Time	t _{d(on)}		20		ns	V _{GS} = 10 V
Rise Time	t _r		85		ns	V _{DD} = 100 V
Turn-Off Delay Time	t _{d(off)}		60		ns	I _D = 10 A, R _G = 10 Ω
Fall Time	t _f		25		ns	R _L = 10 Ω
Total Gate Charge	Q _G		30		nC	V _{GS} = 10 V
Gate to Source Charge	Q _{GS}		7.0		nC	I _D = 20 A
Gate to Drain Charge	Q _{GD}		15		nC	V _{DD} = 160 V
Diode Forward Voltage	V _{F(S-D)}		1.0		V	I _F = 20 A, V _{GS} = 0
Reverse Recovery Time	t _{rr}		210		ns	I _F = 20 A
Reverse Recovery Charge	Q _{rr}		1.0		μC	di/dt = 50 A/μs

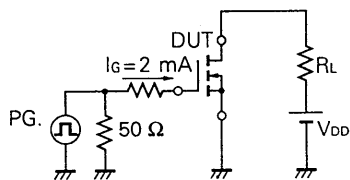
Test Circuit 1 : Avalanche Capability



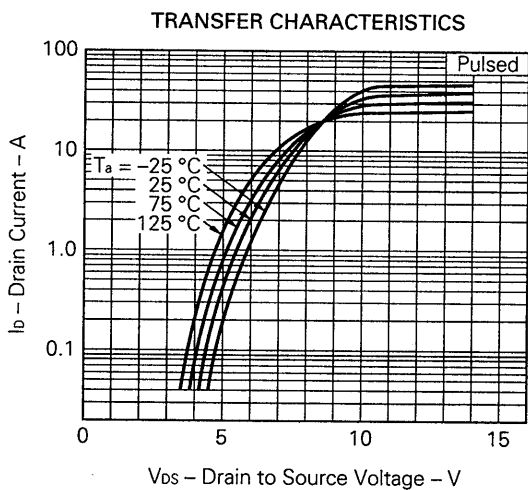
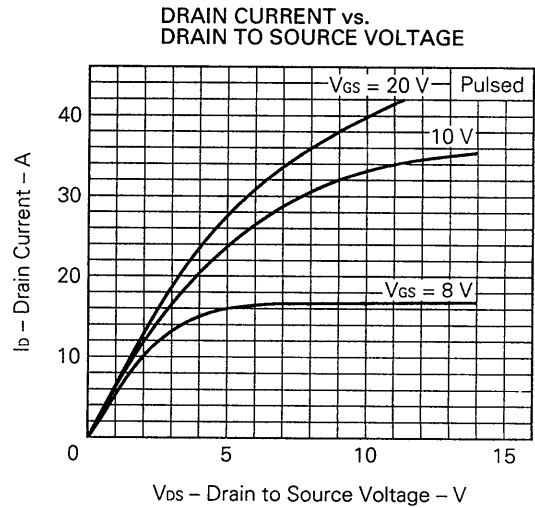
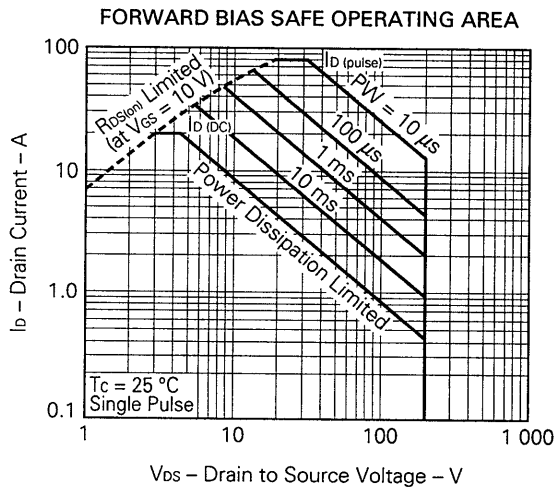
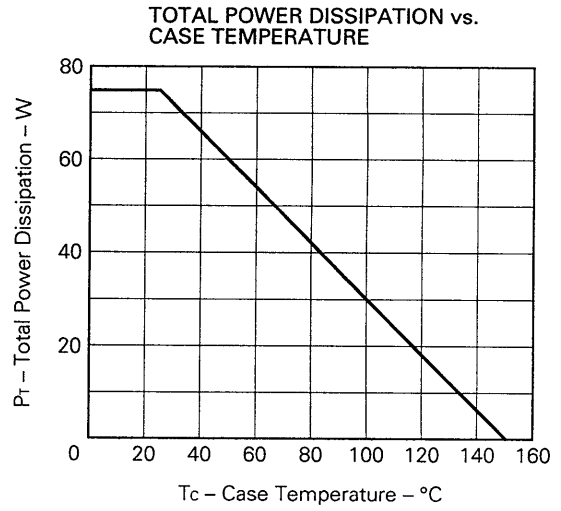
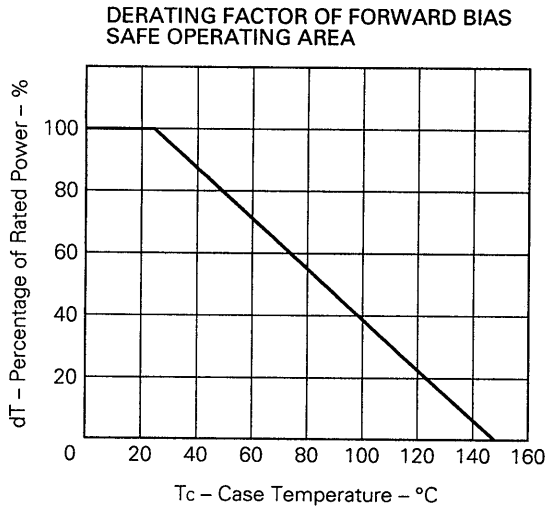
Test Circuit 2 : Switching Time



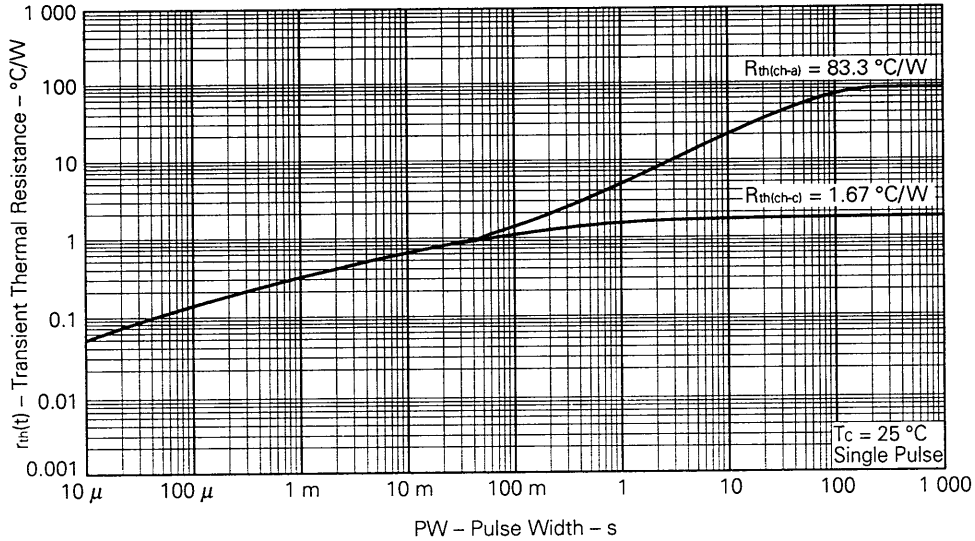
Test Circuit 3 : Gate Charge



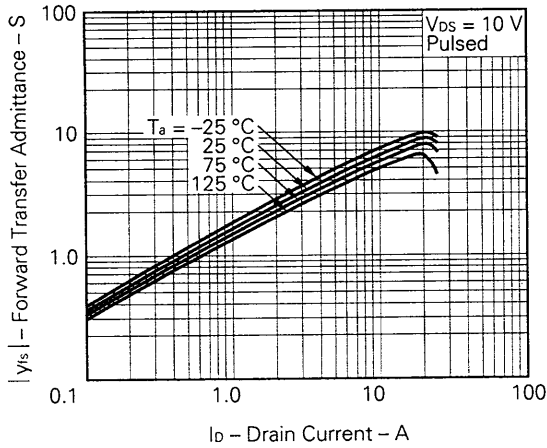
TYPICAL CHARACTERISTICS ($T_a = 25\text{ }^\circ\text{C}$)



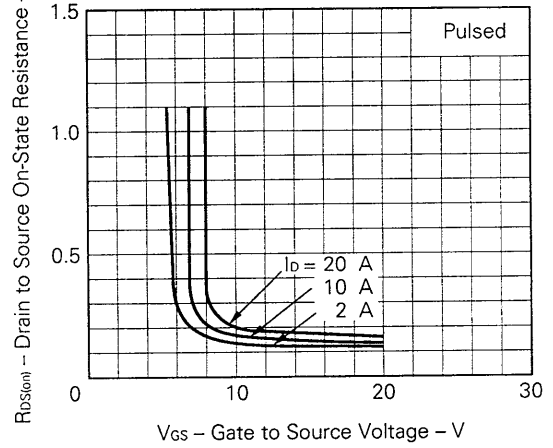
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



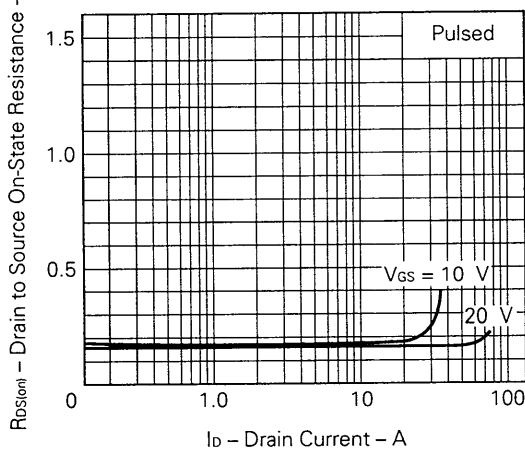
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



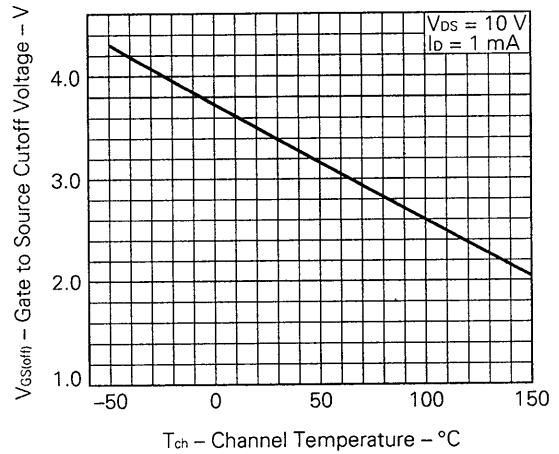
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



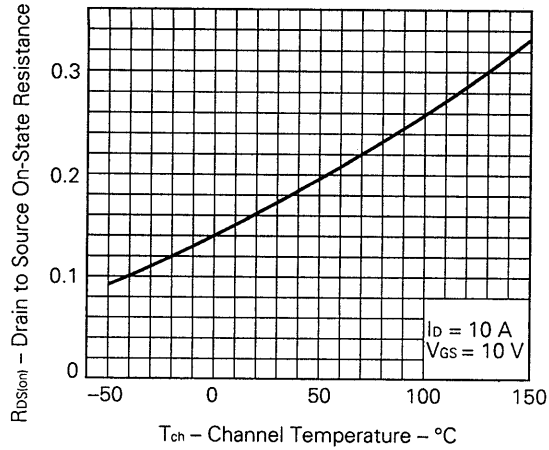
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



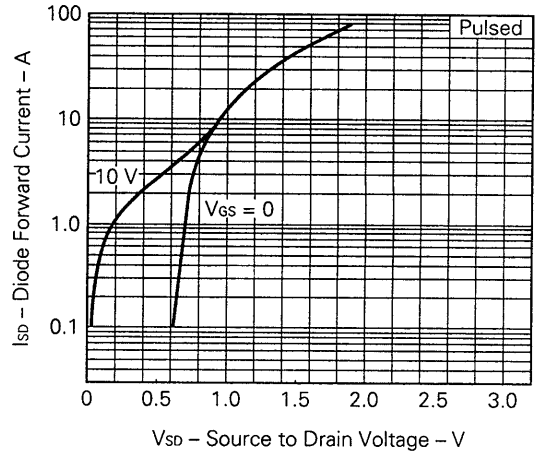
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



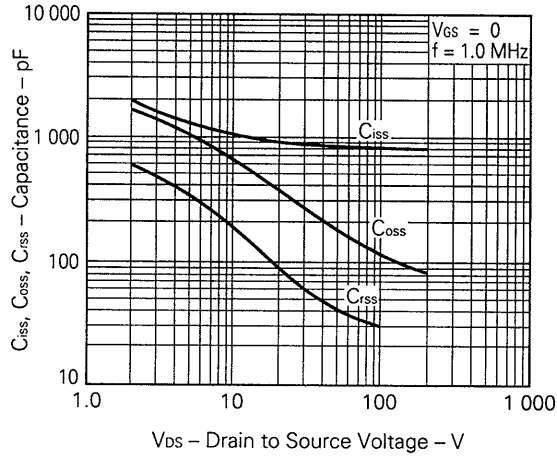
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



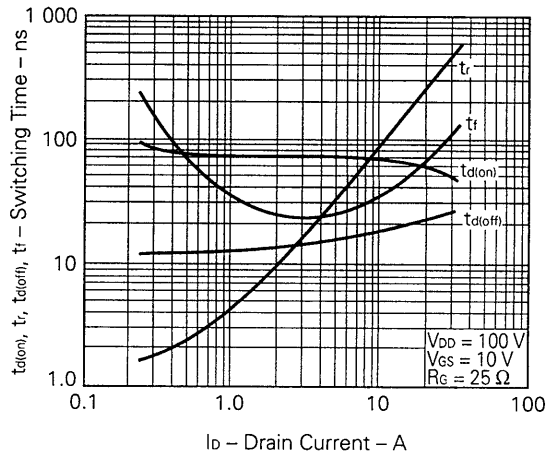
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



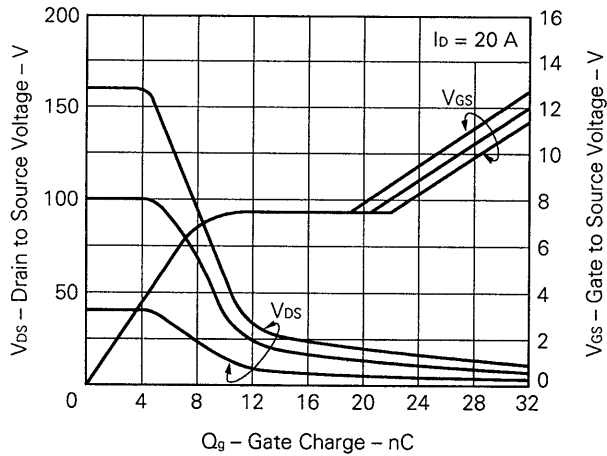
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



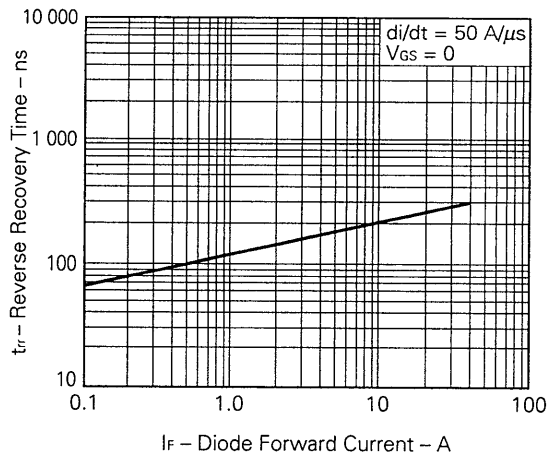
SWITCHING CHARACTERISTICS



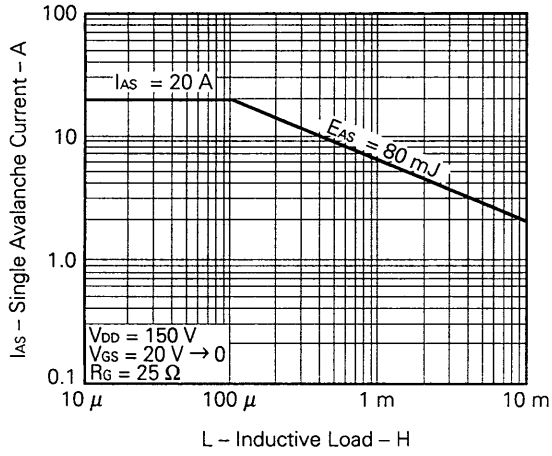
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



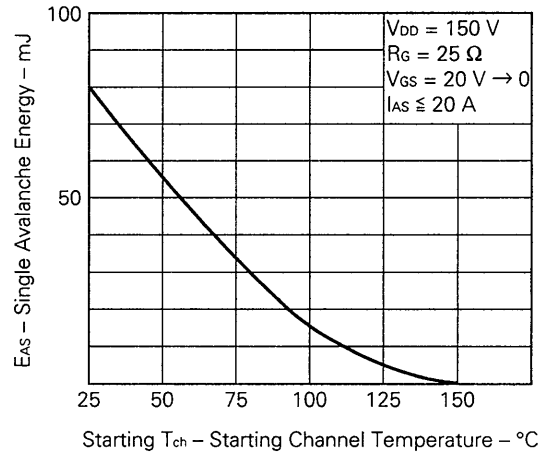
REVERSE RECOVERY TIME vs. REVERSE DRAIN CURRENT



SINGLE AVALANCHE CURRENT vs. INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY vs. STARTING CHANNEL TEMPERATURE



[MEMO]

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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Special: Automotive and Transportation equipment, Traffic control systems, Antidisaster systems, Anticrime systems, etc.