

MOS FIELD EFFECT POWER TRANSISTOR

2SK2135

SWITCHING

N-CHANNEL POWER MOS FET

INDUSTRIAL USE

DESCRIPTION

The 2SK2135 is N-channel Power MOS Field Effect Transistor designed for high voltage switching applications.

FEATURES

- Low On-state Resistance
 $R_{DS(on)} = 0.18 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 7.0 \text{ A)}$
- 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 ($T_a = 25^\circ\text{C}$)

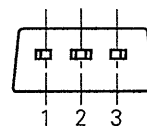
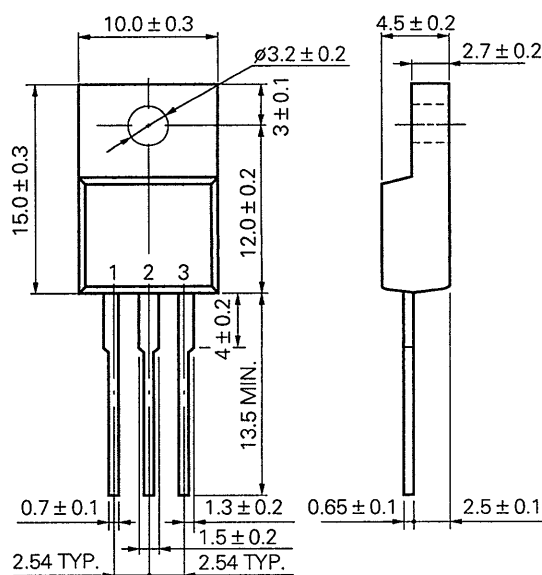
Drain to Source Voltage	V_{DSS}	200	V
Gate to Source Voltage	V_{GSS}	± 30	V
Drain Current (DC)	$I_{D(DC)}$	± 14	A
Drain Current (pulse)	$I_{D(pulse)}^*$	± 56	A
Single Avalanche Current	I_{AS}^{**}	14	A
Single Avalanche Energy	E_{AS}^{**}	392	mJ
Total Power Dissipation ($T_c = 25^\circ\text{C}$)	P_{T1}	35	W
Total Power Dissipation ($T_a = 25^\circ\text{C}$)	P_{T2}	2.0	W
Storage Temperature	T_{stg}	$-55 \text{ to } +150$	$^\circ\text{C}$
Channel Temperature	T_{ch}	150	$^\circ\text{C}$

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

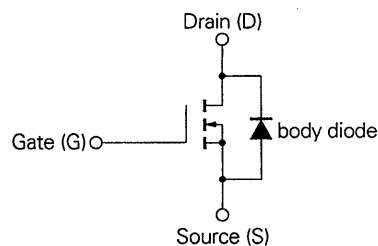
** Starting $T_{ch} = 25^\circ\text{C}$, $R_G = 25 \Omega$, $V_{GS} = 20 \text{ V} \rightarrow 0$

PACKAGE DIMENSIONS

(in millimeters)



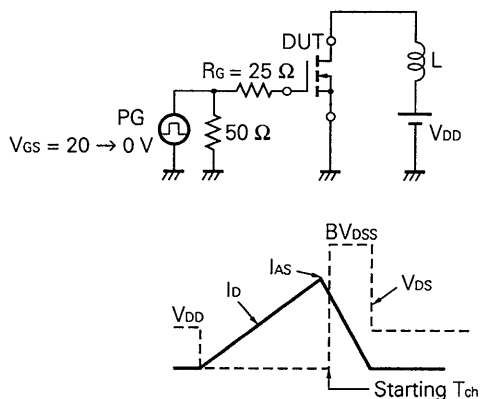
1. Gate
2. Drain
3. Source



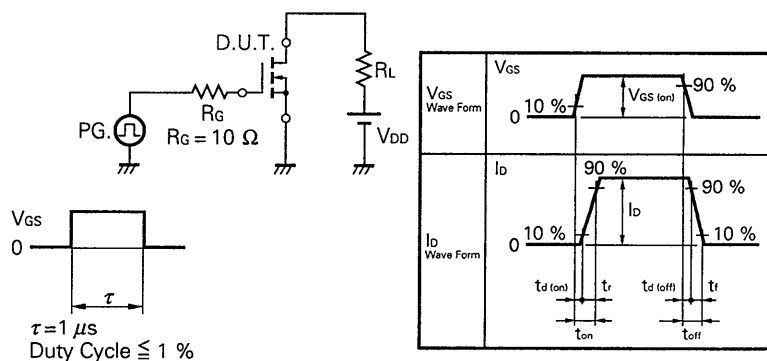
ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-state Resistance	$R_{DS(on)}$			0.18	Ω	$V_{GS} = 10\text{ V}, I_D = 7\text{ A}$
Gate to Source Cutoff Voltage	$V_{GS(off)}$	2.0		4.0	V	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$
Forward Transfer Admittance	$ y_{fs} $	4.0			S	$V_{DS} = 10\text{ V}, I_D = 7\text{ A}$
Drain Leakage Current	I_{DSS}			100	μA	$V_{DS} = 200\text{ V}, V_{GS} = 0$
Gate to Source Leakage Current	I_{GSS}			± 100	nA	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0$
Input Capacitance	C_{iss}		1 100		pF	$V_{DS} = 10\text{ V}$ $V_{GS} = 0$ $f = 1\text{ MHz}$
Output Capacitance	C_{oss}		540		pF	
Reverse Transfer Capacitance	C_{rss}		190		pF	
Turn-On Delay Time	$t_d(on)$		20		ns	$V_{GS} = 10\text{ V}$ $V_{DD} = 100\text{ V}$ $I_D = 7\text{ A}, R_G = 10\ \Omega$ $R_L = 14.3\ \Omega$
Rise Time	t_r		50		ns	
Turn-Off Delay Time	$t_d(off)$		65		ns	
Fall Time	t_f		25		ns	
Total Gate Charge	Q_G		30		nC	$V_{GS} = 10\text{ V}$ $I_D = 14\text{ A}$ $V_{DD} = 160\text{ V}$
Gate to Source Charge	Q_{GS}		7.0		nC	
Gate to Drain Charge	Q_{GD}		15		nC	
Diode Forward Voltage	$V_{F(S-D)}$		1.0		V	$I_F = 14\text{ A}, V_{GS} = 0$
Reverse Recovery Time	t_{rr}		170		ns	$I_F = 14\text{ A}$ $di/dt = 50\text{ A}/\mu\text{s}$
Reverse Recovery Charge	Q_{rr}		0.6		μC	

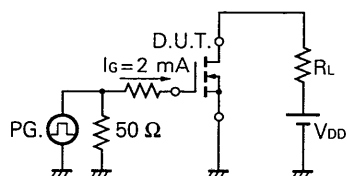
Test Circuit 1 : Avalanche Capability



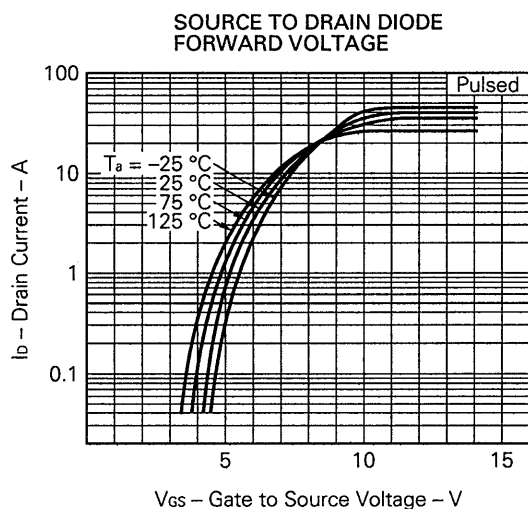
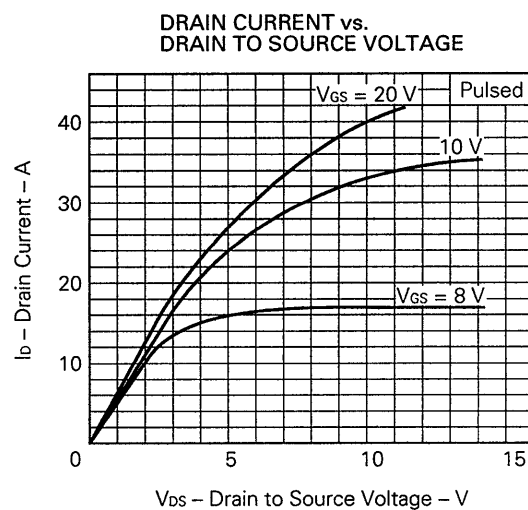
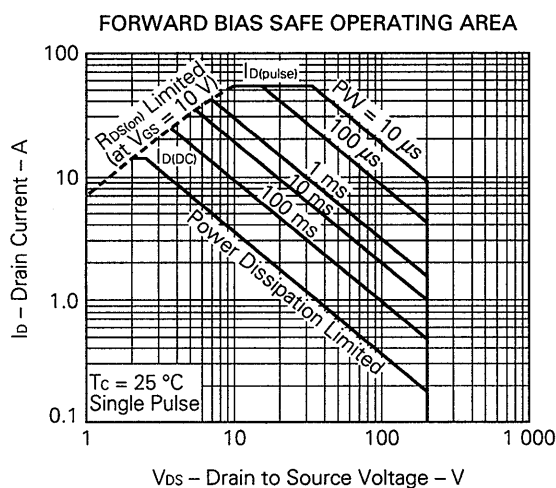
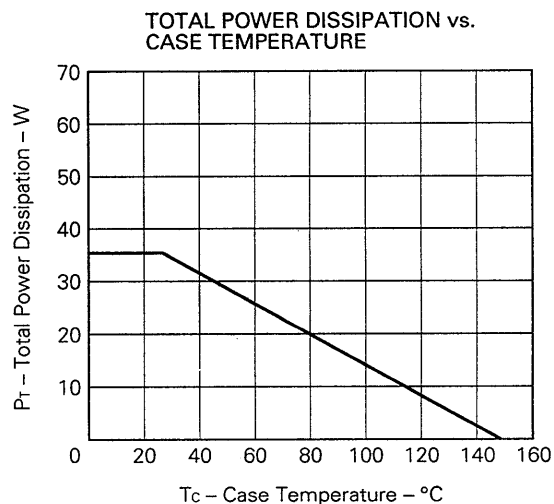
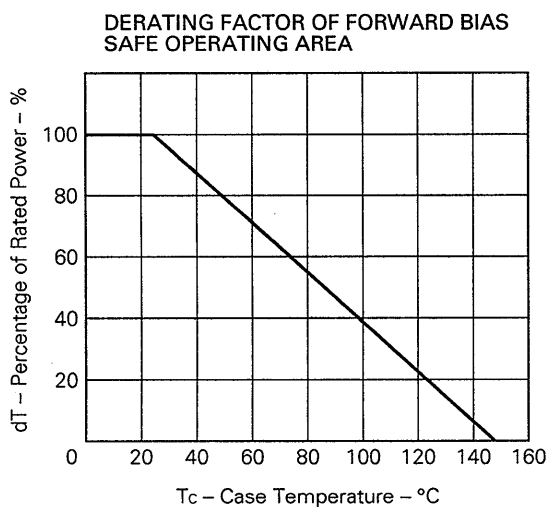
Test Circuit 2 : Switching Time

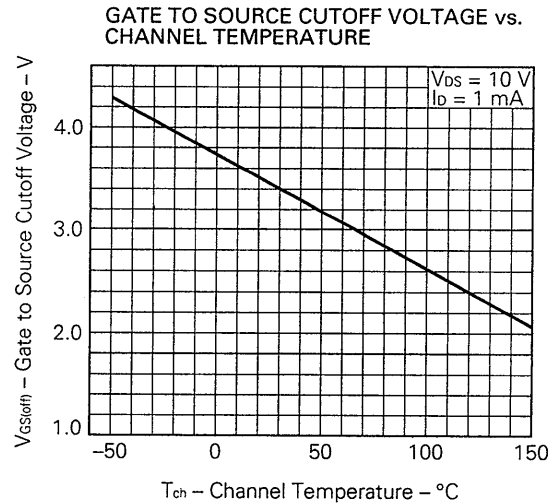
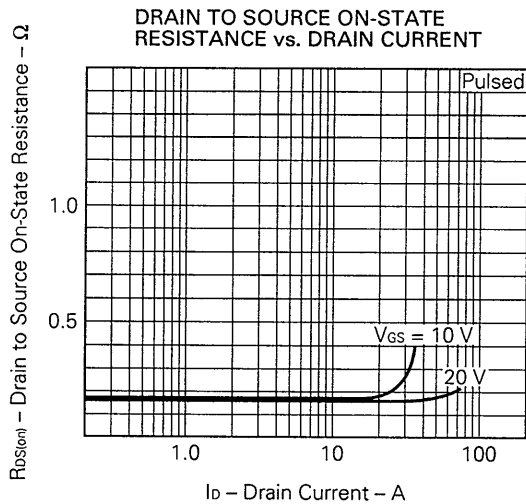
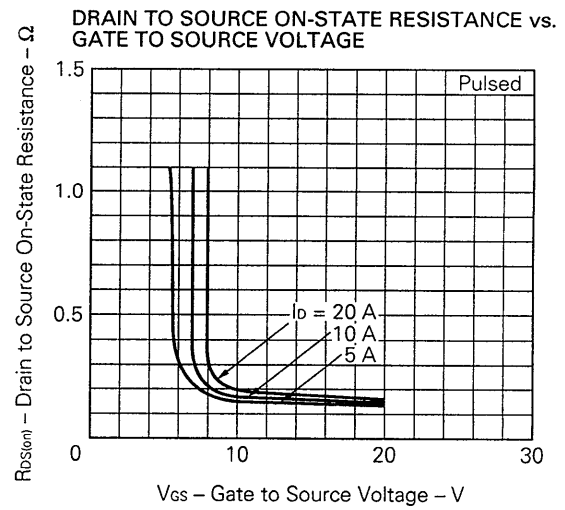
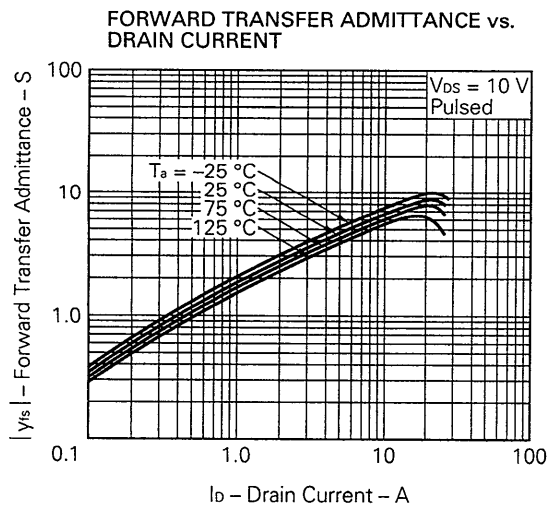
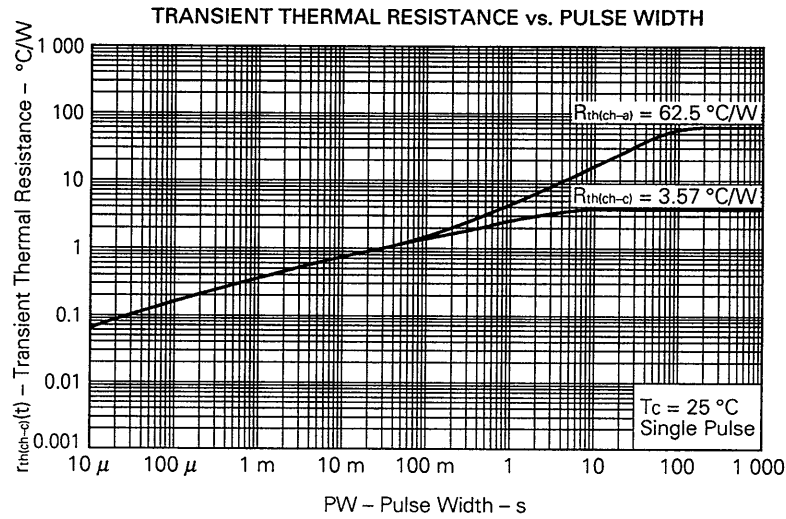


Test Circuit 3 : Gate Charge

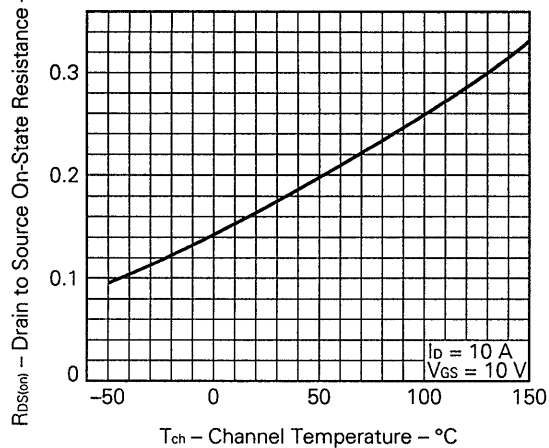


TYPICAL CHARACTERISTICS ($T_a = 25\text{ }^{\circ}\text{C}$)

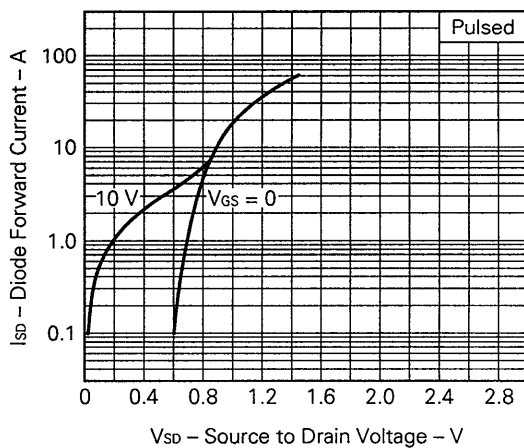




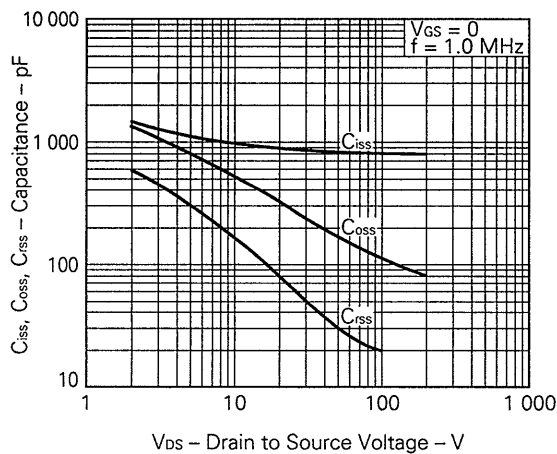
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



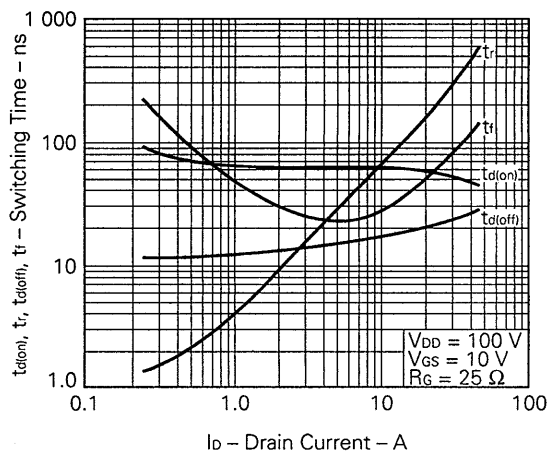
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



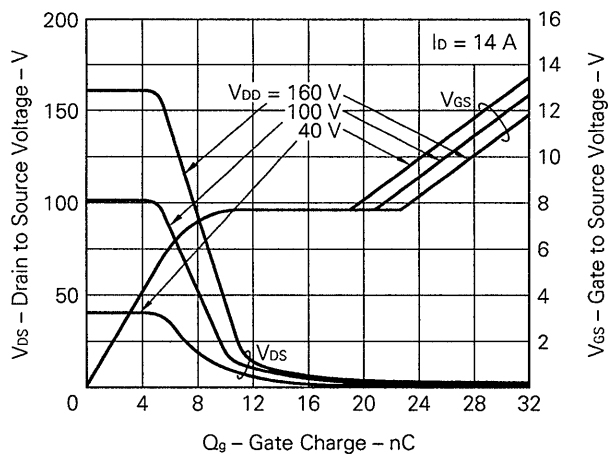
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



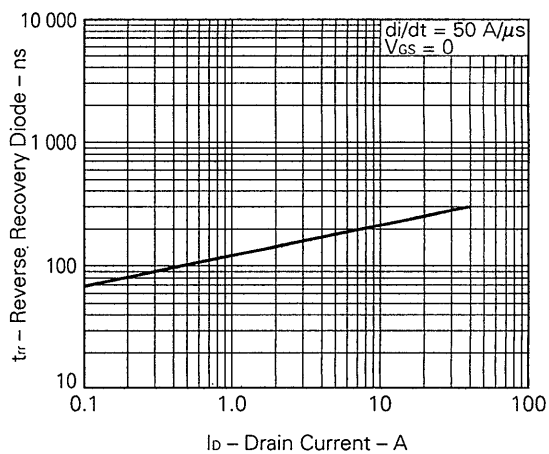
SWITCHING CHARACTERISTICS

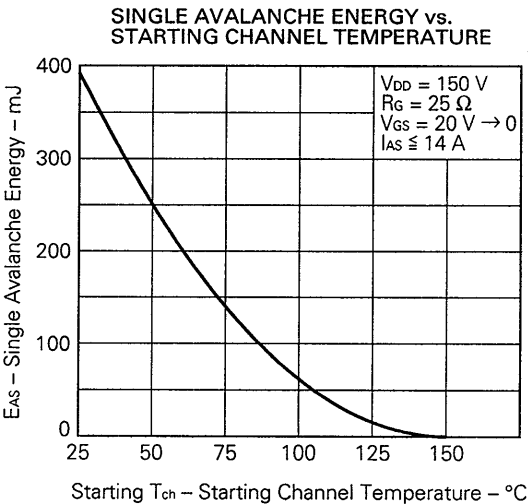
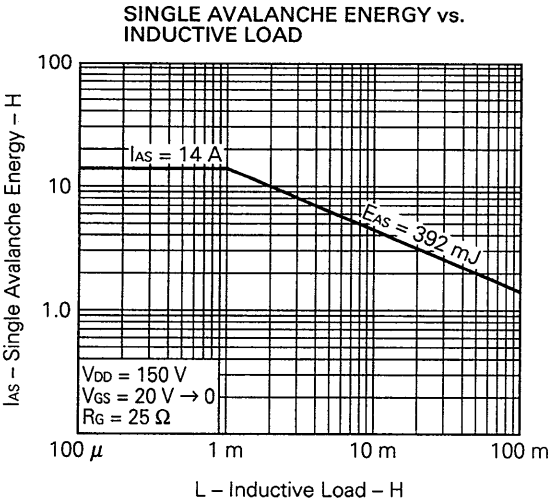


DYNAMIC INPUT/OUTPUT CHARACTERISTICS



REVERSE RECOVERY TIME vs. DRAIN CURRENT





[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.