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MOS FIELD EFFECT POWER TRANSISTOR
2SK1502

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SK1502 is N-channel MOS Field Effect Transistor designed for high voltage switching applications.

FEATURES

- Low On-state Resistance
 $R_{DS(on)} = 2.0 \Omega$ ($V_{GS} = 10 V, I_D = 4 A$)
- Low C_{iss} $C_{iss} = 1550 pF$ TYP.
- Built-in G-S Gate Protection Diode
- High Avalanche Capability Ratings

QUALITY GRADE

Standard

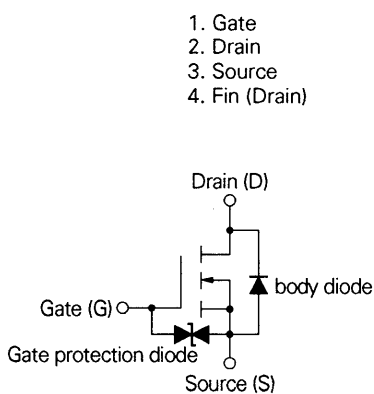
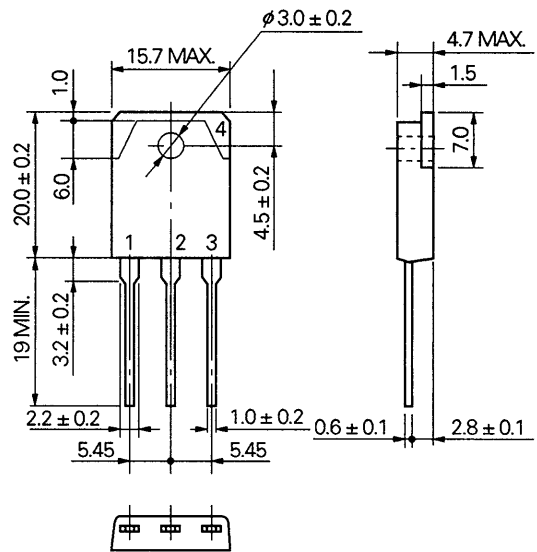
Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

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

Drain to Source Voltage	V_{DSS}	900	V
Gate to Source Voltage	V_{GSS}	± 30	V
Drain Current (DC)	$I_{D(DC)}$	± 7.0	A
Drain Current (pulse)	$I_{D(pulse)^*}$	± 14	A
Total Power Dissipation ($T_c = 25^\circ C$)	P_T	120	W
Channel Temperature	T_{ch}	150	$^\circ C$
Storage Temperature	T_{stg}	-55 to +150	$^\circ C$

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

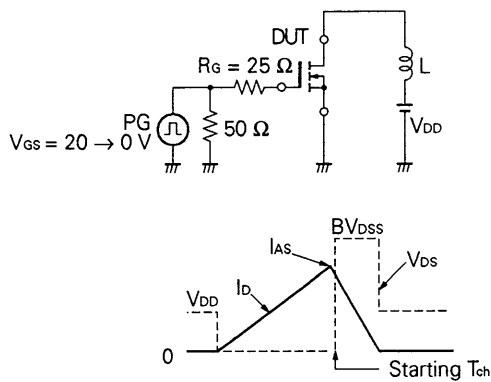
PACKAGE DIMENSIONS
in millimeters



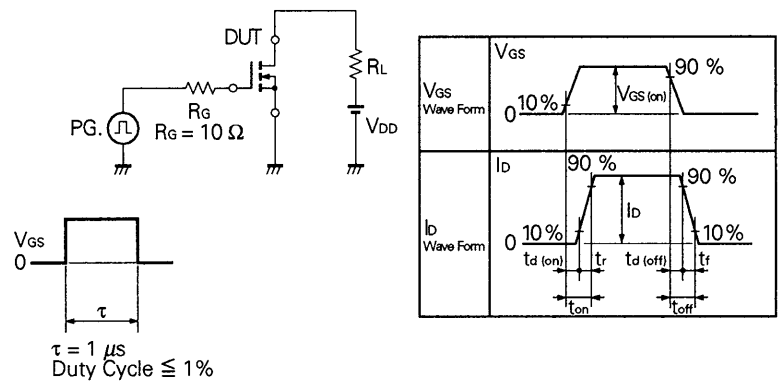
ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-state Resistance	R _{DS(on)}		1.7	2.0	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}	2.0	5.8		S	V _{DS} = 20 V, I _D = 4 A
Drain Leakage Current	I _{DSS}			100	μA	V _{DS} = 900 V, V _{GS} = 0
Gate to Source Leakage Current	I _{GSS}			±10	μA	V _{GS} = ±30 V, V _{DS} = 0
Input Capacitance	C _{iss}		1 550		pF	V _{DS} = 10 V V _{GS} = 0 f = 1 MHz
Output Capacitance	C _{oss}		225		pF	
Reverse Transfer Capacitance	C _{rss}		75		pF	
Turn-On Delay Time	t _{d(on)}		25		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		30		ns	
Turn-Off Delay Time	t _{d(off)}		155		ns	
Fall Time	t _f		35		ns	
Total Gate Charge	Q _G		80		nC	V _{GS} = 10 V I _D = 7 A V _{DD} = 450 V
Gate to Source Charge	Q _{GS}		5		nC	
Gate to Drain Charge	Q _{GD}		35		nC	
Diode Forward Voltage	V _{F(S-D)}		0.9		V	I _F = 7 A, V _{GS} = 0
Reverse Recovery Time	t _{rr}		620		ns	I _F = 7 A, V _{GS} = 0 di/dt = 50 A/μs
Reverse Recovery Charge	Q _{rr}		4.2		μC	
Single Avalanche Current	I _{AS}	7.0			A	V _{DD} = 150 V, L = 100 μH R _G = 25 Ω, V _{GS} = 20 V → 0 Unclamped Starting T _{ch} = 25 °C
Channel to Case Thermal Resistance	R _{th(ch-c)}			1.04	°C/W	Channel to Case

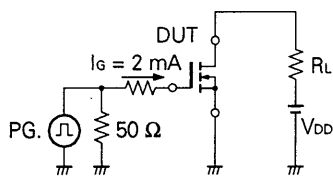
Test Circuit 1: Avalanche Capability



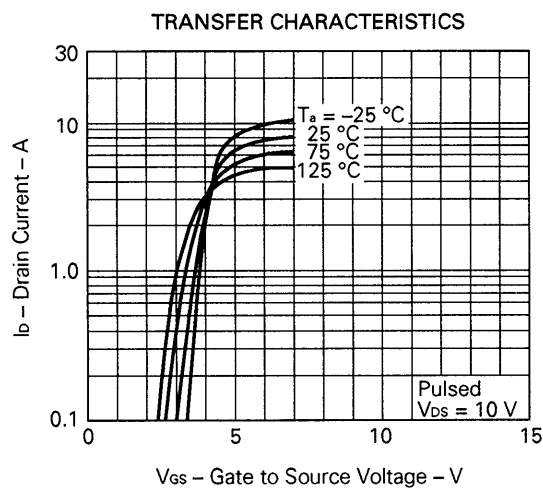
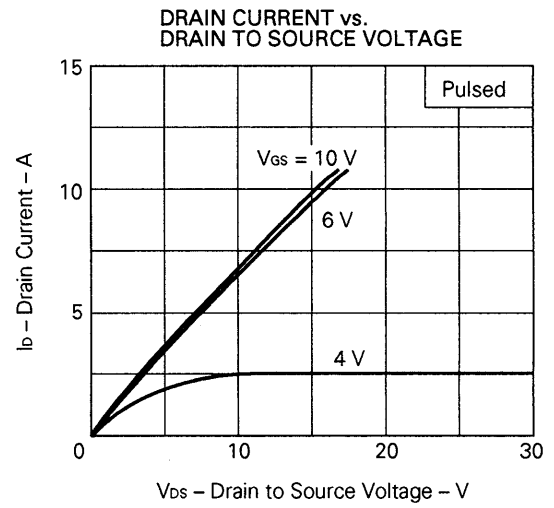
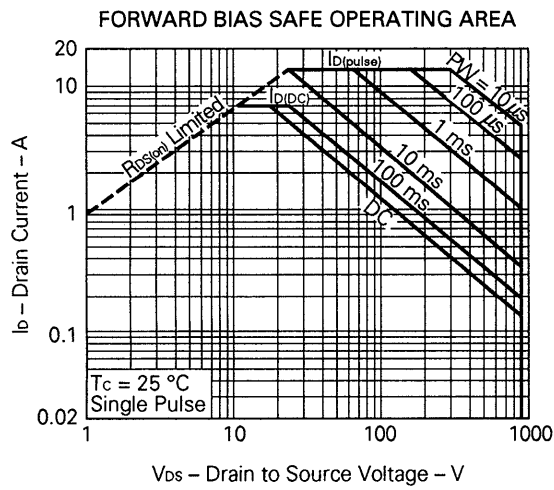
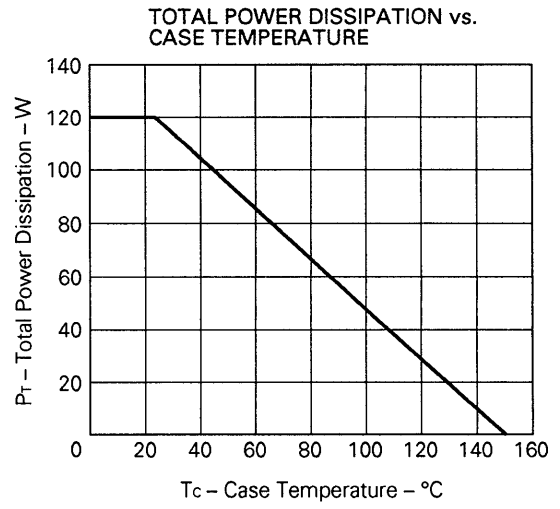
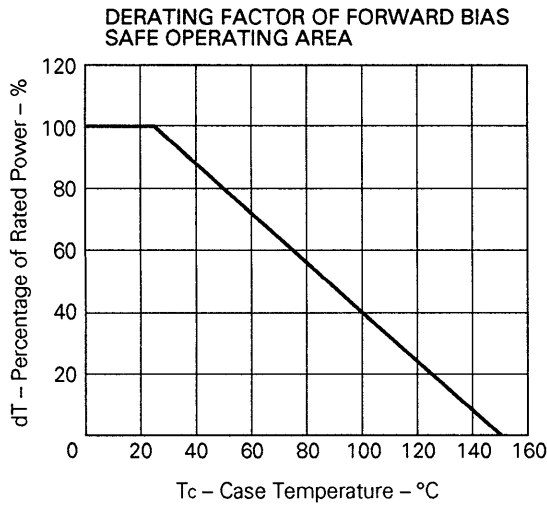
Test Circuit 2: Switching Time

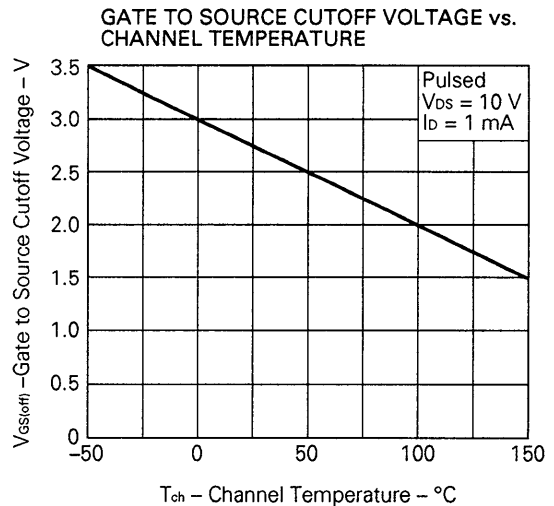
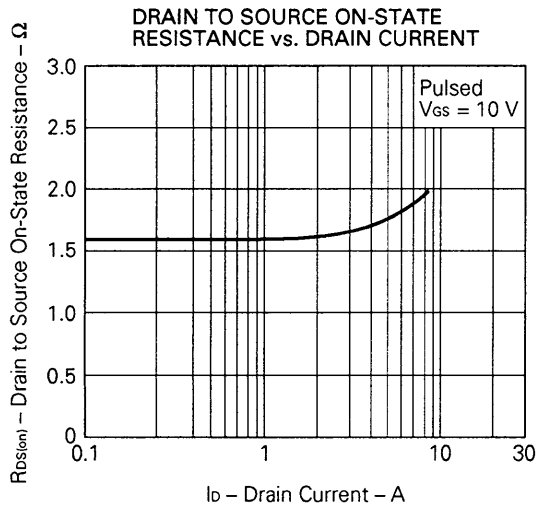
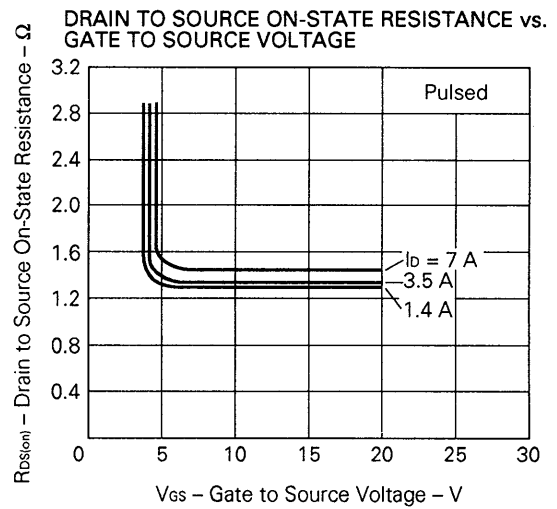
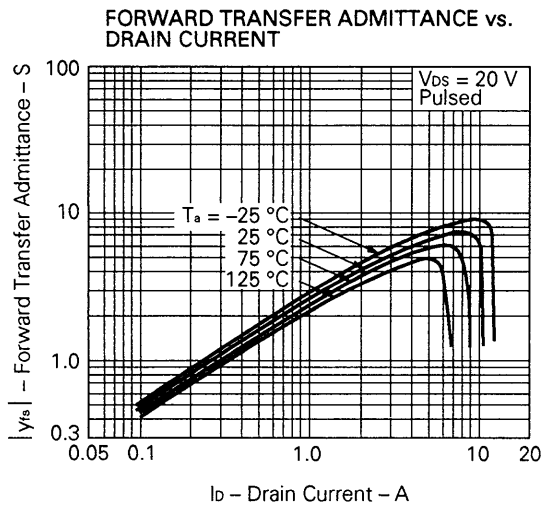
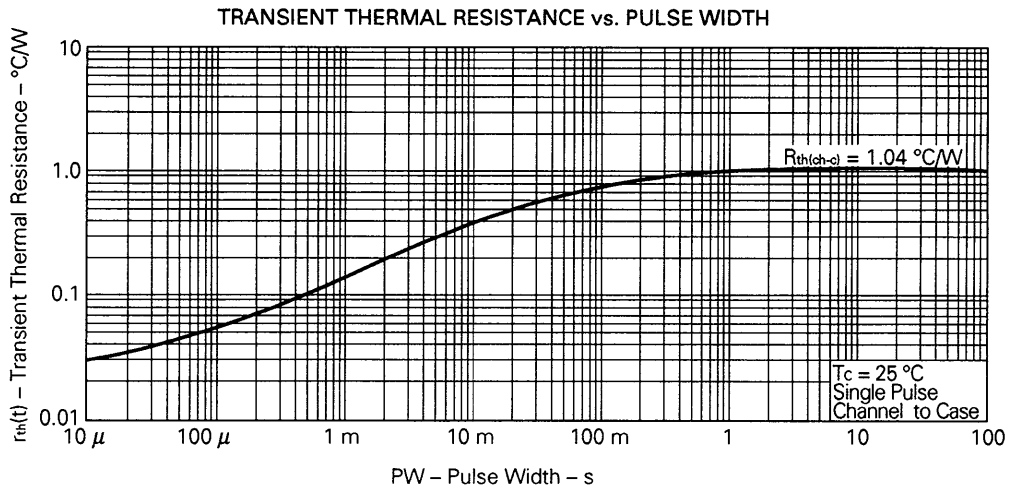


Test Circuit 3: Gate Charge

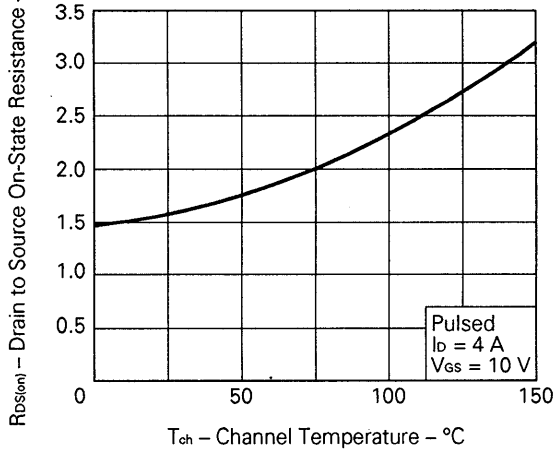


TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

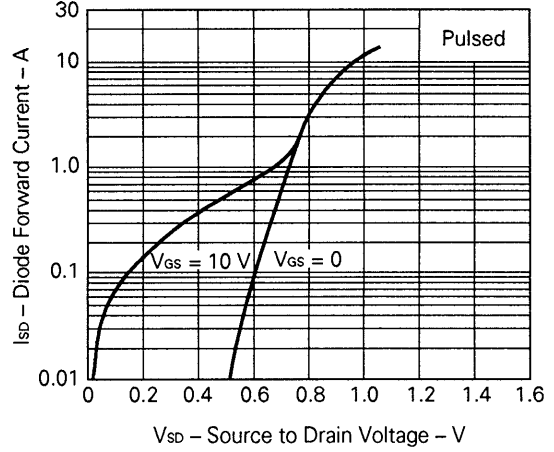




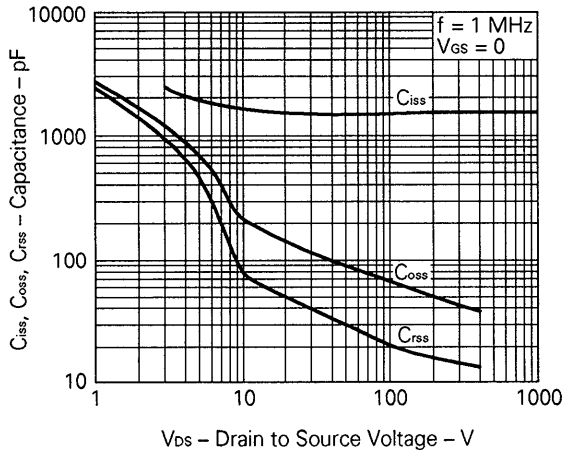
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



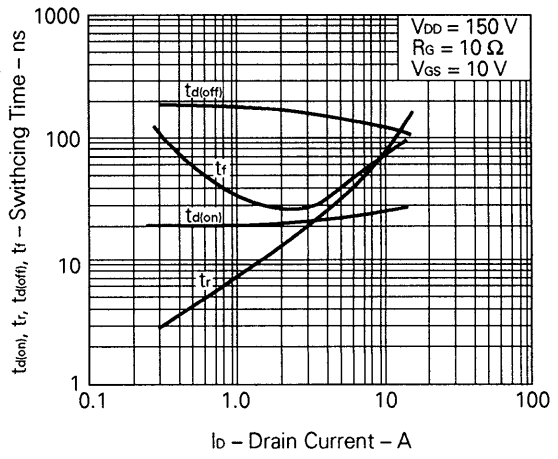
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



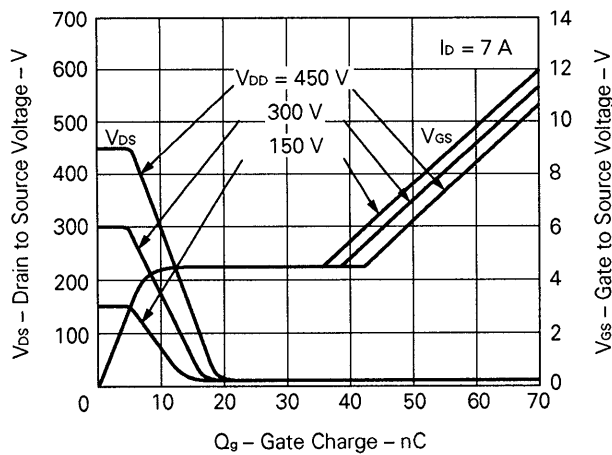
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



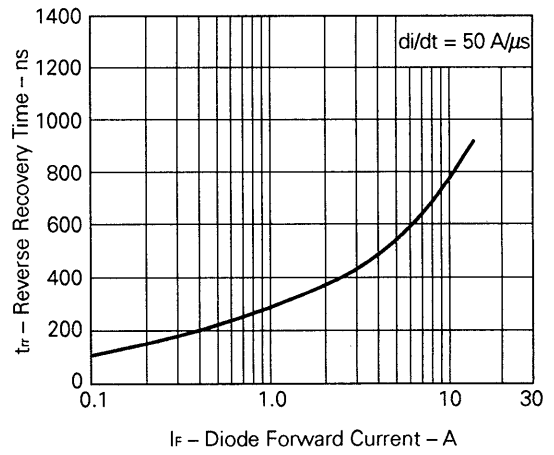
SWITCHING CHARACTERISTICS



DYNAMIC INPUT 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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