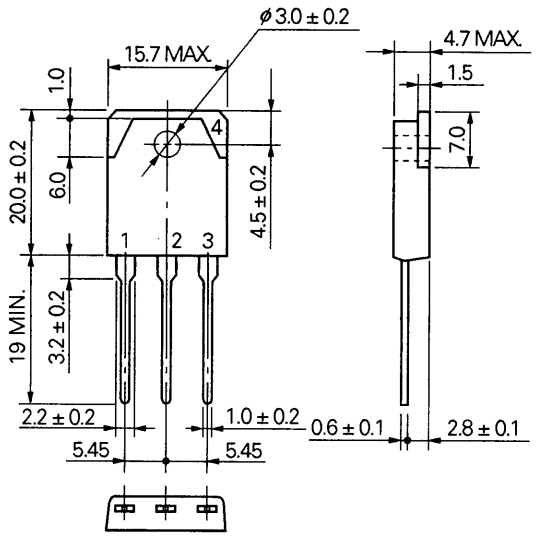
NEC

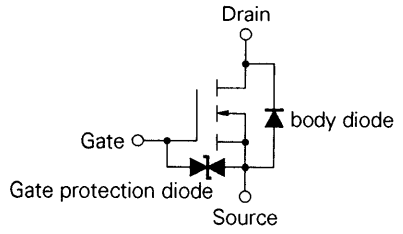
N-CHANNEL MOS FIELD EFFECT POWER TRANSISTOR

2SK1491

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

PACKAGE DIMENSIONS
(in millimeters)





1. Gate
2. Drain
3. Source
4. Fin (Drain)

DESCRIPTION

The 2SK1491 is N-channel MOS Field Effect Transistor designed for high voltage switching applications

FEATURES

- Low On-state Resistance
  $R_{DS(on)} \leqq 0.15\ \Omega$ MAX. (V_{GS} = 10 V, I_D = 13 A)
- Low C_{iss} C_{iss} = 1 950 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 MAX.	°C
Maximum Power Dissipation			
Total Power Dissipation (T_a = 25 °C)		120	W
Maximum Voltages and Currents (T_a = 25 °C)			
V_{DSS}	Drain to Source Voltage	250	V
V_{GSS}	Gate to Source Voltage	±30	V
$I_{D(DC)}$	Drain Current (DC)	±25	A
$I_{D(pulse)}$*	Drain Current (pulse)	±100	A
Maximum Avalanche Capability Ratings**			
I_{AS}	Single Avalanche Current	37.5	A
E_{AS}	Single Avalanche Energy	1 250	mJ

* PW ≦ 10 μs, Duty Cycle ≦ 1 %

** Starting T_{ch} = 25 °C, R_G = 25 Ω, V_{GS} = 20 V → 0

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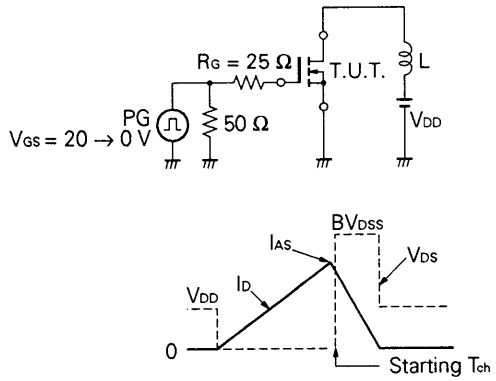
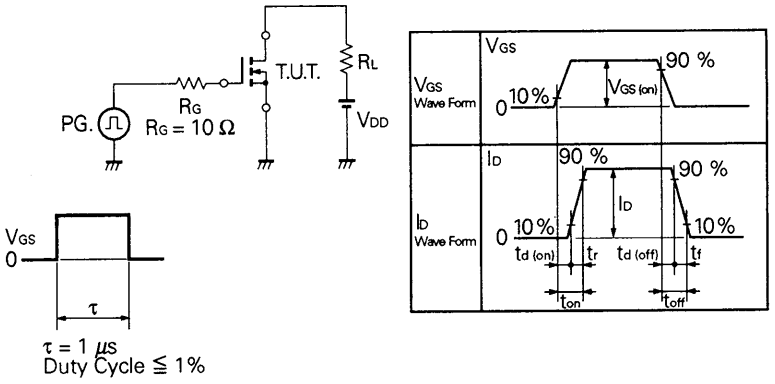
ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-state Resistance	$R_{DS(on)}$		0.12	0.15	Ω	V_{GS} = 10 V, I_D = 13 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	$\|y_{fs}\|$	7.0			S	V_{DS} = 10 V, I_D = 13 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}		1 950		pF	V_{DS} = 10 V V_{GS} = 0 f = 1 MHz
Output Capacitance	C_{oss}		980		pF	
Reverse Transfer Capacitance	C_{rss}		410		pF	
Turn-On Delay Time	$t_{d(on)}$		35		ns	V_{GS} = 10 V V_{DD} = 150 V I_D = 13 A, R_G = 10 Ω R_L = 11.5 Ω
Rise Time	t_r		110		ns	
Turn-Off Delay Time	$t_{d(off)}$		110		ns	
Fall Time	t_f		50		ns	
Total Gate Charge	Q_G		55		nC	V_{GS} = 10 V I_D = 25 A V_{DD} = 200 V
Gate to Source Charge	Q_{GS}		12		nC	
Gate to Drain Charge	Q_{GD}		32		nC	
Diode Forward Voltage	$V_{F(S-D)}$		1.0		V	I_F = 25 A, V_{GS} = 0
Reverse Recovery Time	t_{rr}		340		ns	I_F = 25 A, V_{GS} = 0 di/dt = 50 A/μs
Reverse Recovery Charge	Q_{rr}		2.3		μC	

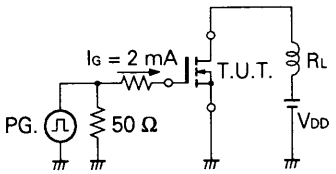
Test Circuit 1: Avalanche Capability



Test Circuit 2: Switching Time

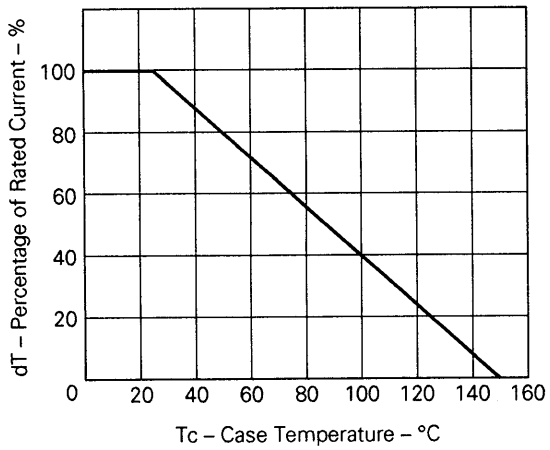


Test Circuit 3: Gate Charge

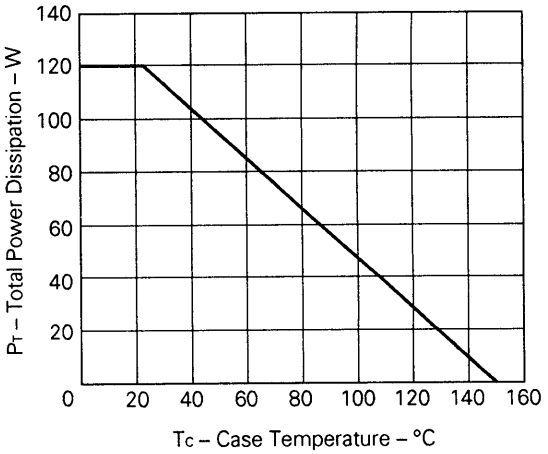


TYPICAL CHARACTERISTICS (T_a = 25 °C)

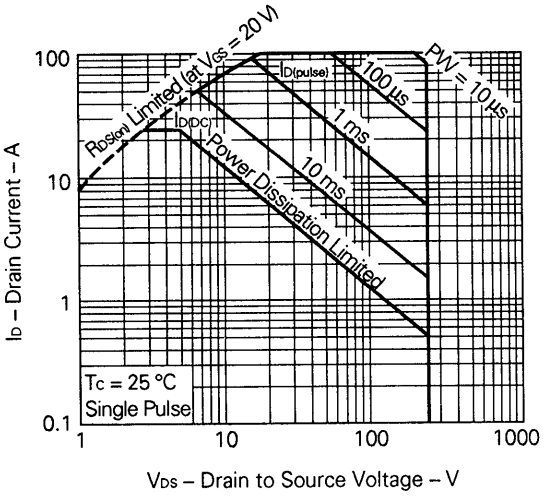
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



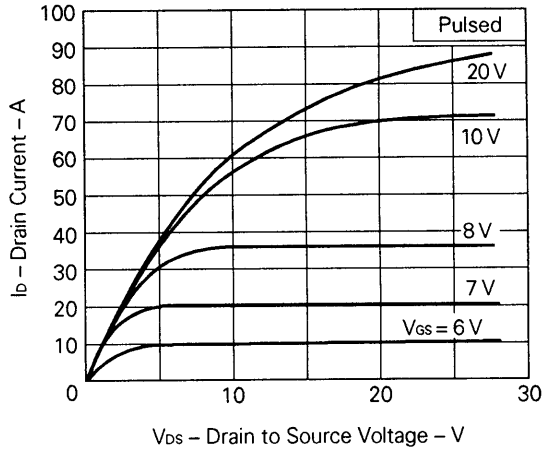
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



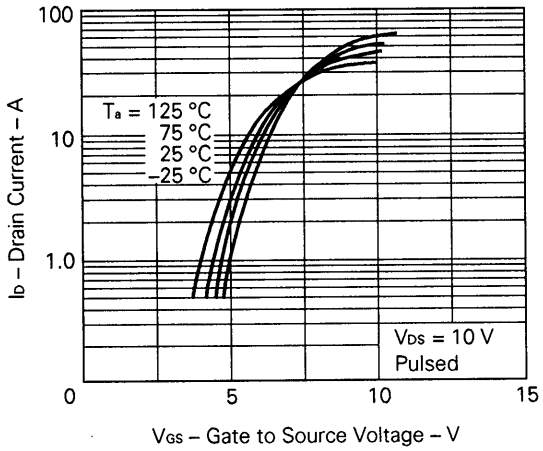
FORWARD BIAS SAFE OPERATING AREA



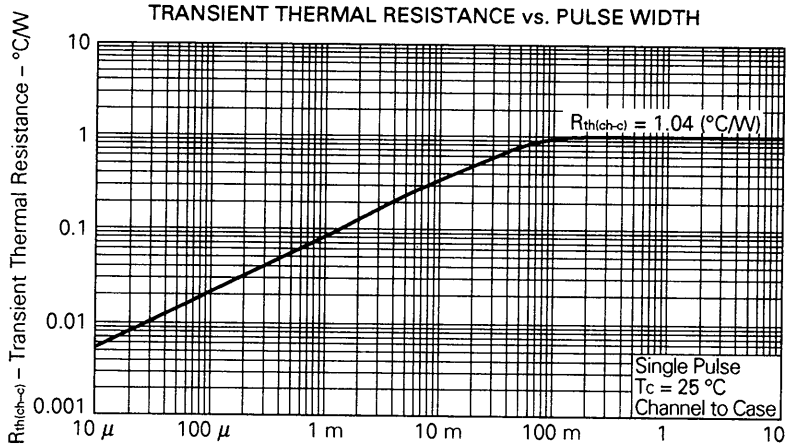
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



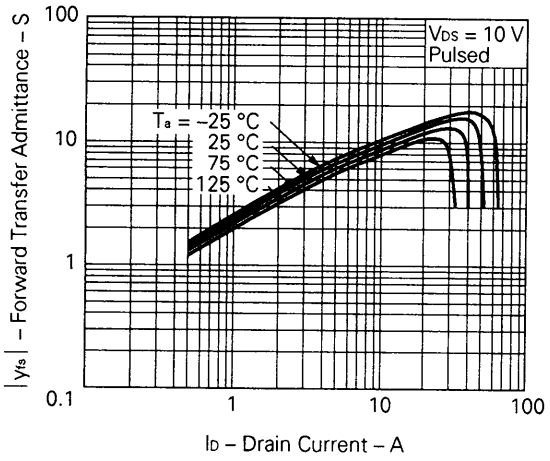
TRANSFER CHARACTERISTICS



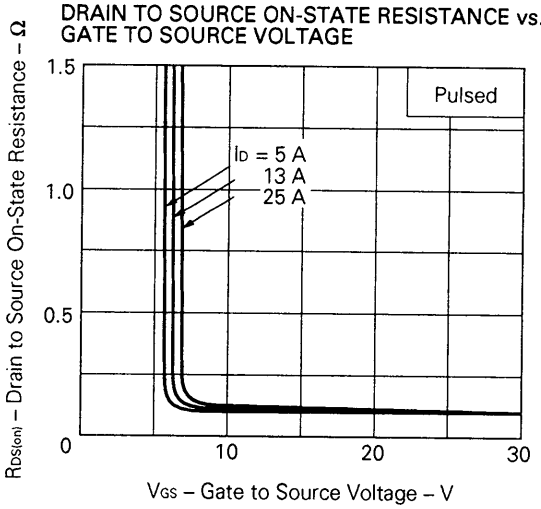
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



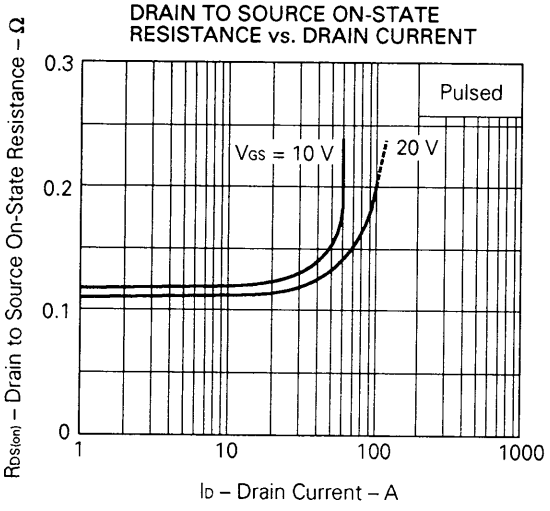
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



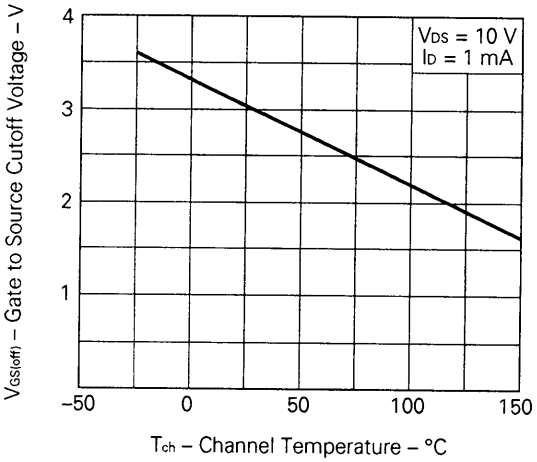
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



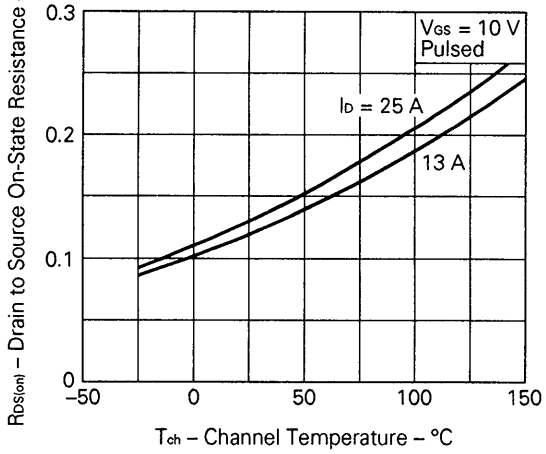
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



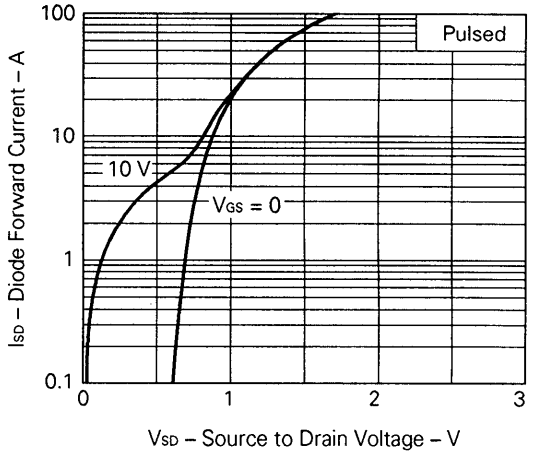
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



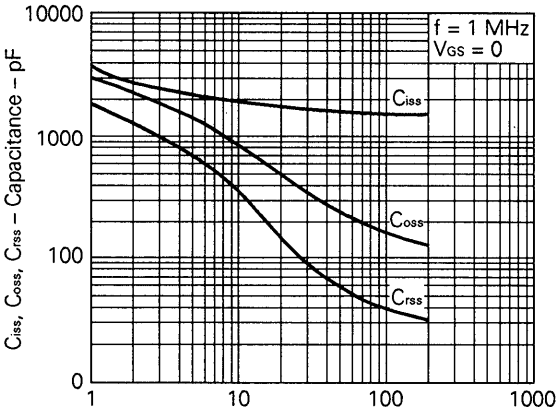
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



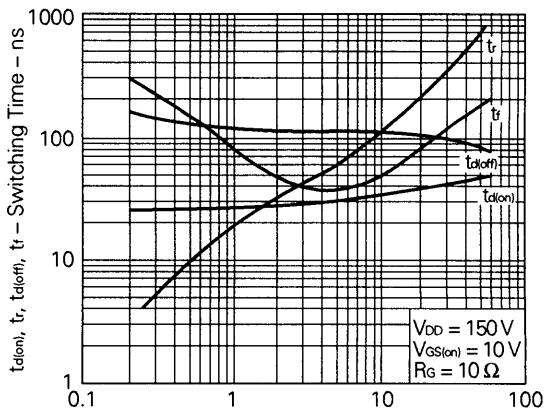
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



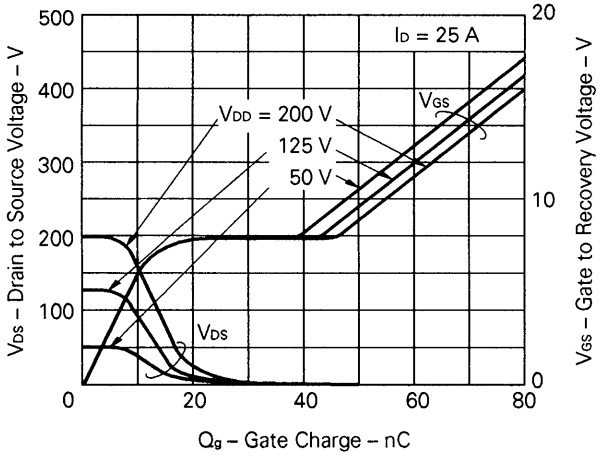
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



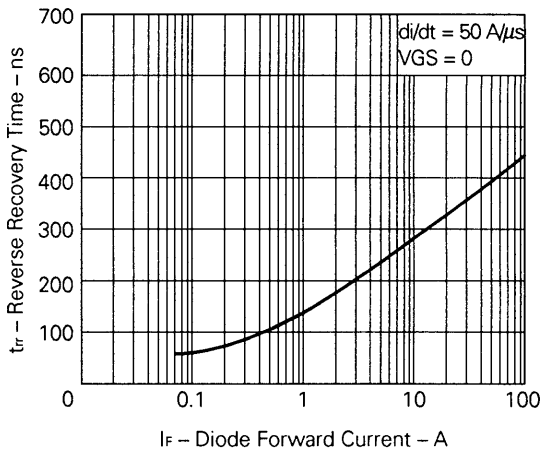
SWITCHING CHARACTERISTICS



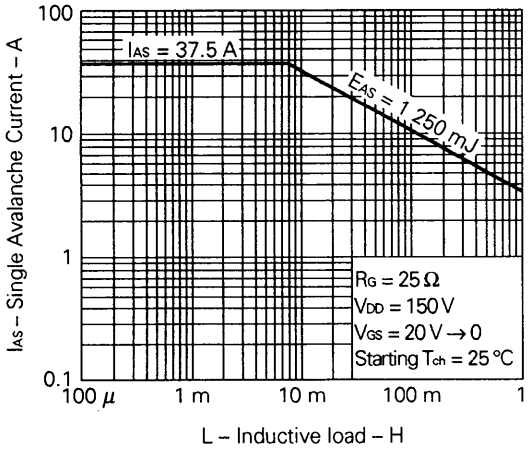
DYNAMIC INPUT CHARACTERISTICS



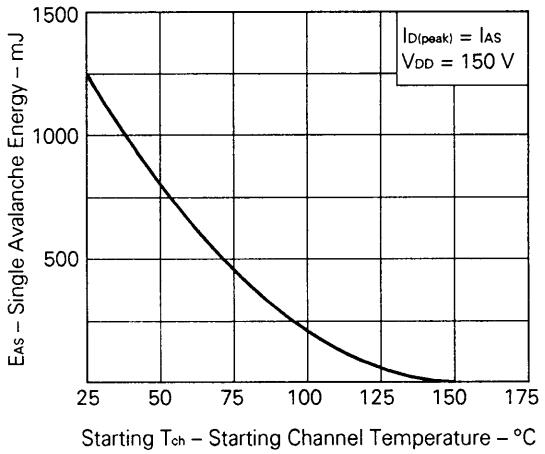
REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



SINGLE AVALANCHE CURRENT vs.
INDUCTIVE LOAD



SINGLE AVALANCHE ENERGY vs.
STARTING CHANNEL TEMPERATURE



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

[MEMO]

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