NEC

MOS FIELD EFFECT TRANSISTOR
2SK2984

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

This product is N-Channel MOS Field Effect Transistor designed for high current switching application.

FEATURES

- Low on-resistance
  $R_{DS(on)1}$ = 10 mΩ (MAX.) (V_{GS} = 10 V, I_D = 20 A)
  $R_{DS(on)2}$ = 15 mΩ (MAX.) (V_{GS} = 4.5 V, I_D = 20 A)
- Low C_{iss} C_{iss} = 2850 pF TYP.
- Built-in gate protection diode

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK2984	TO-220AB
2SK2984-S	TO-262
2SK2984-ZJ	TO-263

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Drain to Source Voltage Note1	V_{DSS}	30	V
Gate to Source Voltage Note2	V_{GSS}	±20	V
Drain Current (DC)	$I_{D(DC)}$	±40	A
Drain Current (pulse) Note3	$I_{D(pulse)}$	±160	A
Total Power Dissipation (T_A = 25°C)	P_T	1.5	W
Total Power Dissipation (T_c = 25°C)	P_T	60	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Notes.1 V_{GS} = 0 V
2 V_{DS} = 0 V
3 PW ≤ 10 μs, Duty Cycle ≤ 1 %

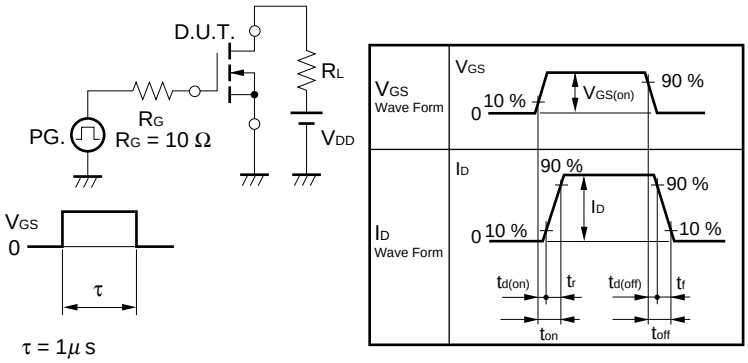
.

Document No. D12356EJ1V0DS00 (1st edition)
Date Published October 1998 NS CP (K)
Printed in Japan

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

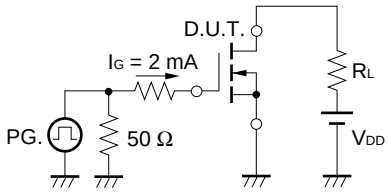
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 20 A		6.5	10	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.5 V, I_D = 20 A		8.5	13	mΩ
Gate to Source Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	1.0	1.5	2.0	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 20 A	18	36		S
Drain Leakage Current	I_{DSS}	V_{DS} = 30 V, V_{GS} = 0 V			10	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±20 V, V_{DS} = 0 V			±10	μA
Input Capacitance	C_{iss}	V_{DS} = 10 V V_{GS} = 0 V f = 1 MHz		2600		pF
Output Capacitance	C_{oss}			1150		pF
Reverse Transfer Capacitance	C_{rss}			500		pF
Turn-on Delay Time	$t_{d(on)}$	I_D = 20 A $V_{GS(on)}$ = 10 V V_{DD} = 15 V R_G = 10 Ω		70		ns
Rise Time	t_r			1100		ns
Turn-off Delay Time	$t_{d(off)}$			210		ns
Fall Time	t_f			310		ns
Total Gate Charge	Q_G	I_D = 40 A V_{DD} = 24 V V_{GS} = 10 V		65		nC
Gate to Source Charge	Q_{GS}			9.5		nC
Gate to Drain Charge	Q_{GD}			12.5		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 40 A, V_{GS} = 0 V		0.8		V
Reverse Recovery Time	t_{rr}	I_F = 40 A, V_{GS} = 0 V di/dt = 100 A /μS		50		ns
Reverse Recovery Charge	Q_{rr}			100		nC

TEST CIRCUIT 1 SWITCHING TIME



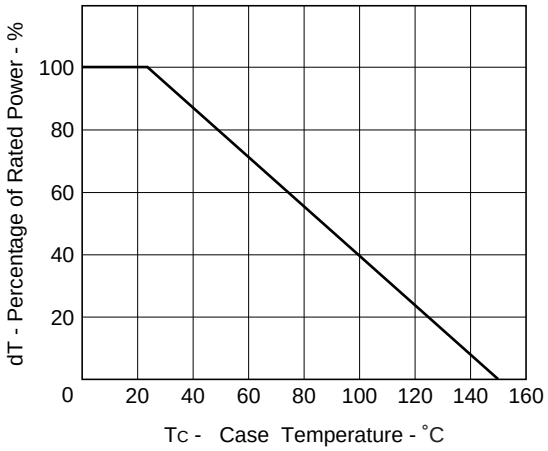
τ = 1μs
Duty Cycle ≤ 1 %

TEST CIRCUIT 2 GATE CHARGE

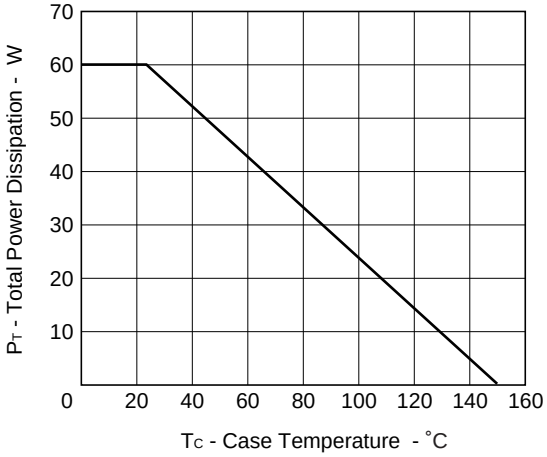


TYPICAL CHARACTERISTICS (T_A = 25 °C)

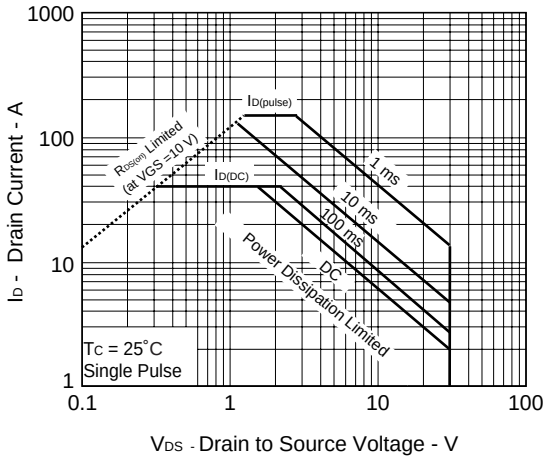
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



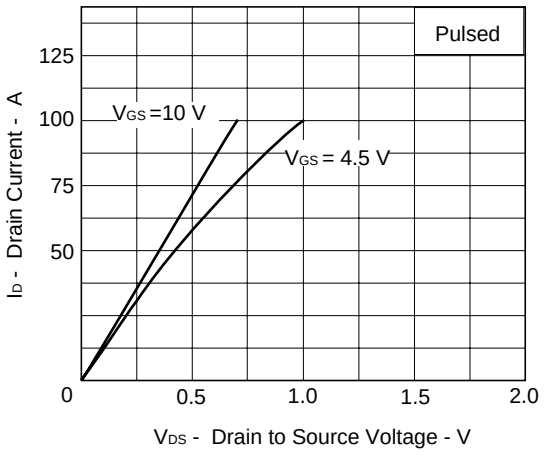
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



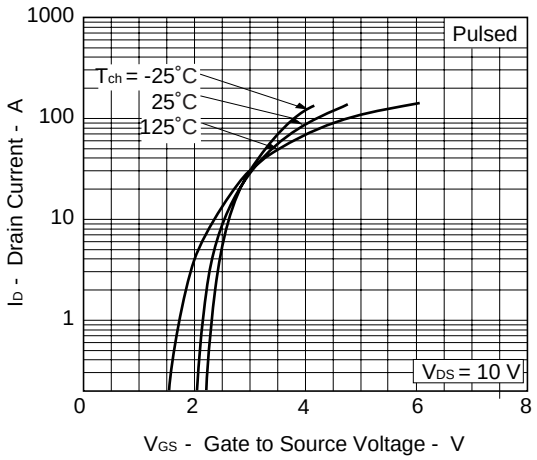
FORWARD BIAS SAFE OPERATING AREA



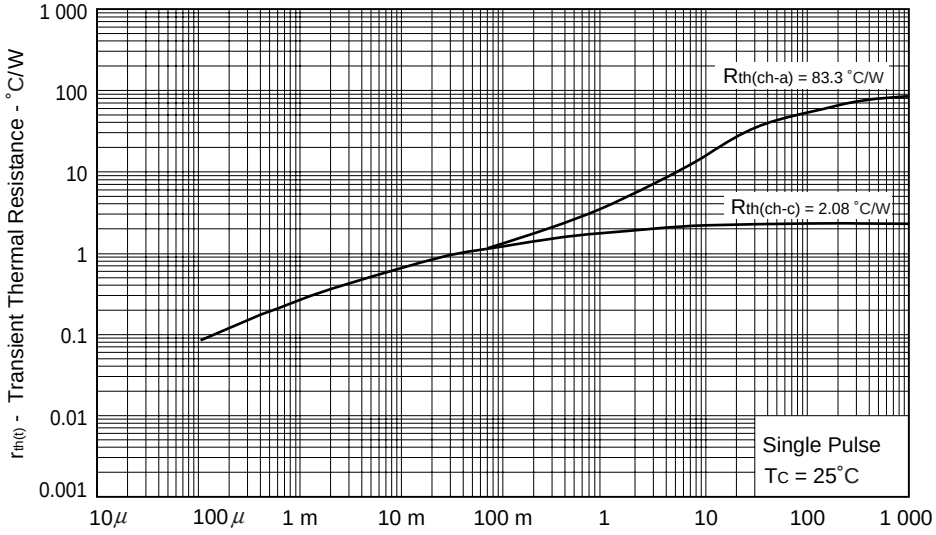
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



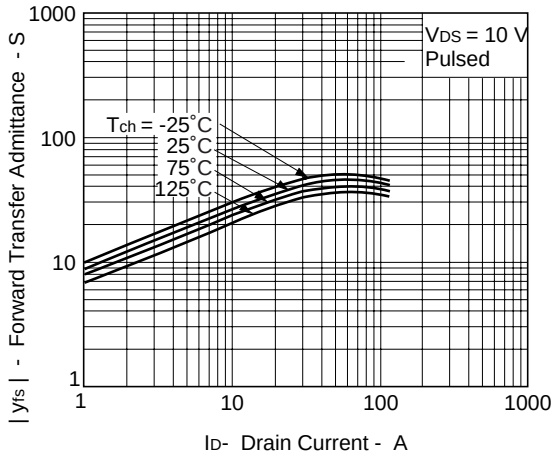
FORWARD TRANSFER CHARACTERISTICS



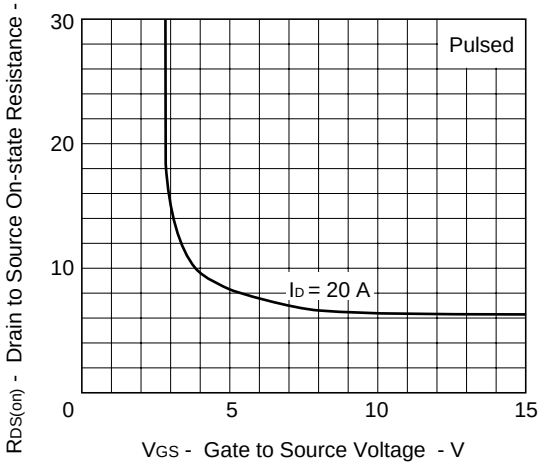
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



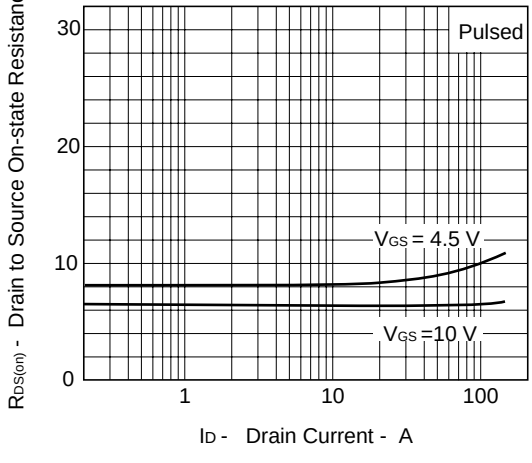
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



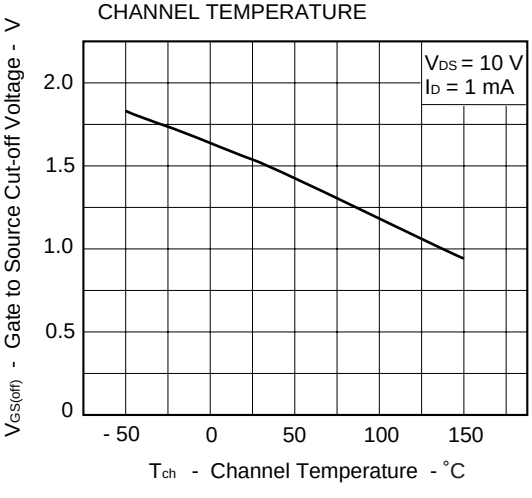
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



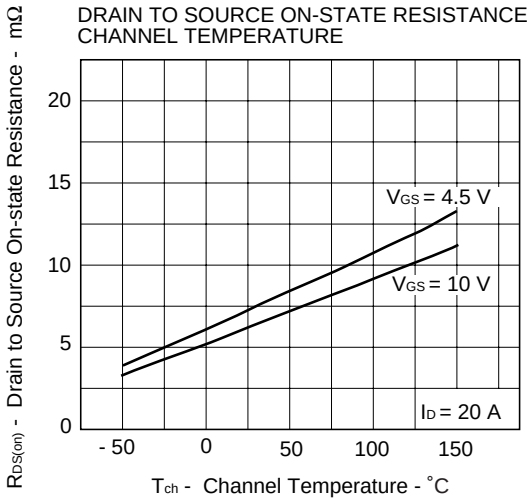
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



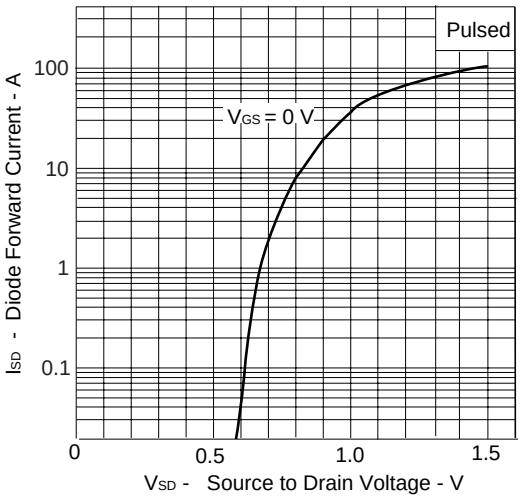
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



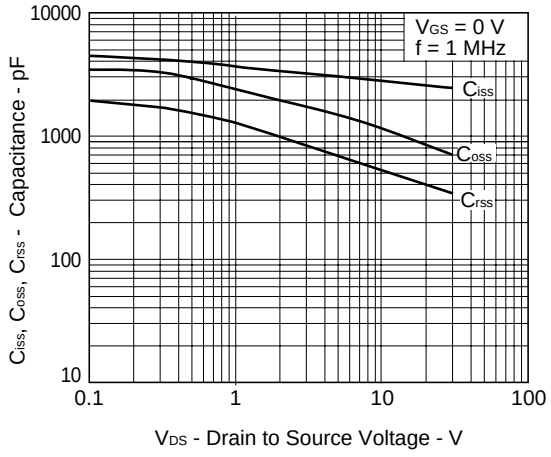
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



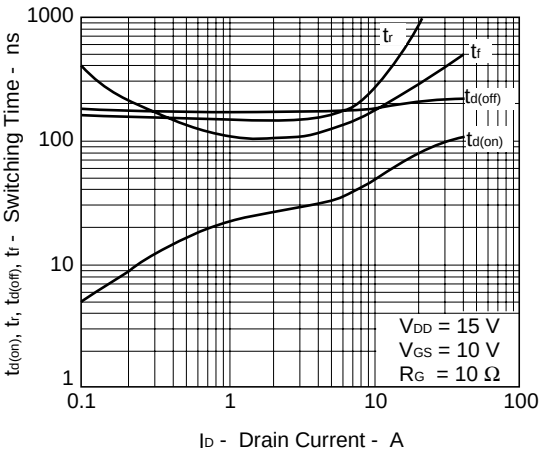
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



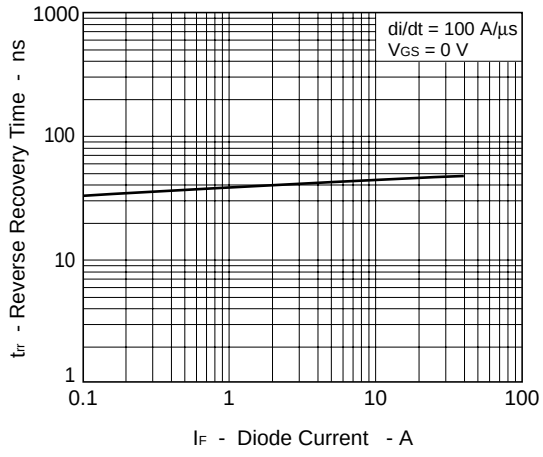
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



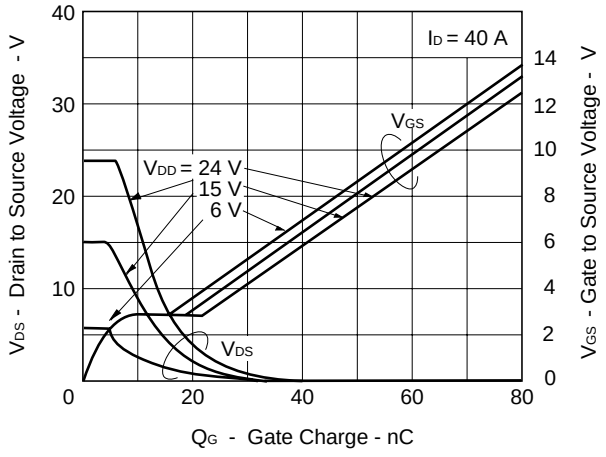
SWITCHING CHARACTERISTICS



REVERSE RECOVERY TIME vs. DRAIN CURRENT

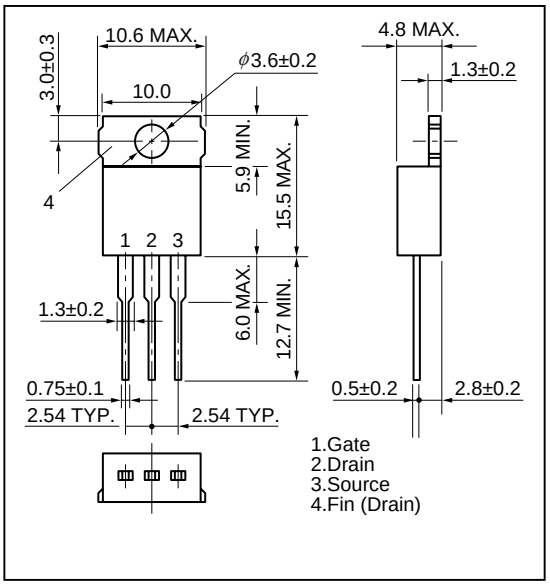


DYNAMIC INPUT/OUTPUT CHARACTERISTICS

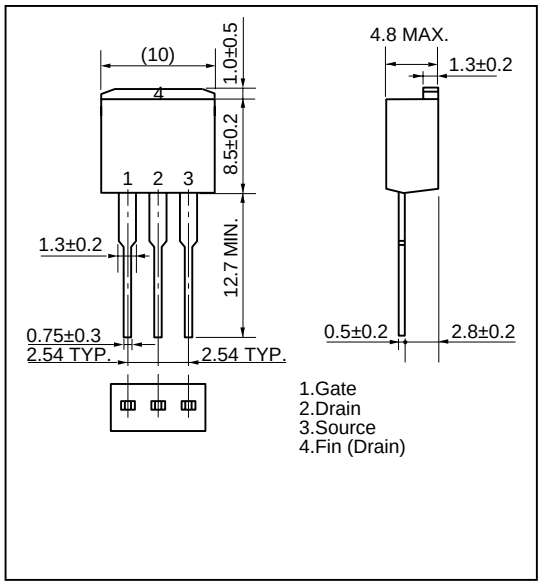


PACKAGE DRAWINGS (Unit : mm)

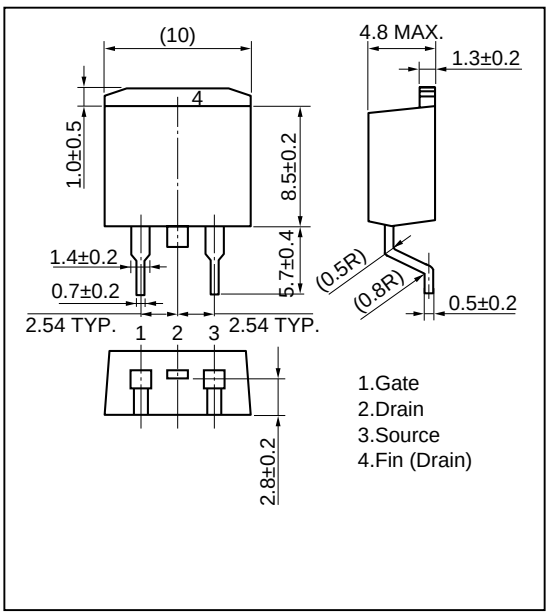
1)TO-220AB (MP-25)



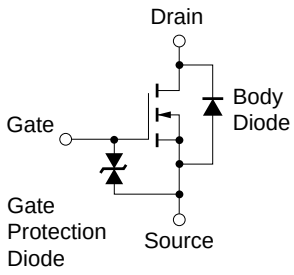
2)TO-262 (TO-220 Fin Cut:MP-25S)



3)TO-263 (JEDEC TYPE:MP-25ZJ)



EQUIVALENT CIRCUIT



Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

[MEMO]