NEC

DATA SHEET

MOS FIELD EFFECT TRANSISTOR

2SK2511

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SK2511 is N-Channel MOS Field Effect Transistor designed for high current switching applications.

FEATURES

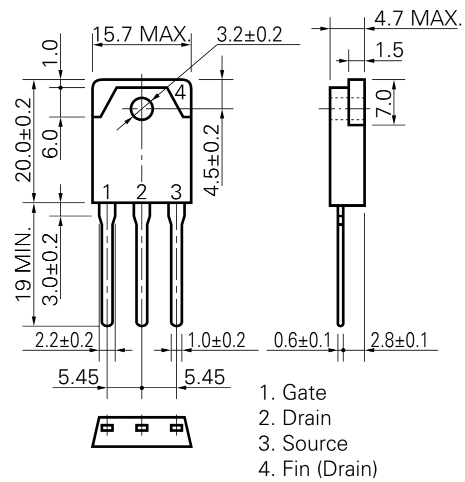
- Super Low On-Resistance
  $R_{DS(on)1}$ = 27 mΩ (V_{GS} = 10 V, I_D = 20 A)
  $R_{DS(on)2}$ = 40 mΩ (V_{GS} = 4 V, I_D = 20 A)
- Low C_{iss} C_{iss} = 1 210 pF TYP.
- Built-in G-S Protection Diode

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

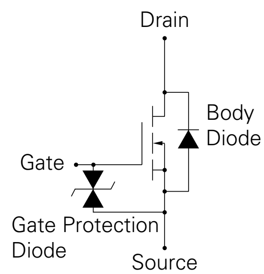
Drain to Source Voltage	V_{DSS}	60	V
Gate to Source Voltage	V_{GSS}	±20	V
Drain Current (DC)	$I_{D(DC)}$	±40	A
Drain Current (pulse)*	$I_{D(pulse)}$	±160	A
Total Power Dissipation (T_c = 25 °C)	P_{T1}	80	W
Total Power Dissipation (T_A = 25 °C)	P_{T2}	3.0	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

* PW ≤ 10 μs, Duty Cycle ≤ 1 %

PACKAGE DIMENSIONS
(in millimeter)



MP-88



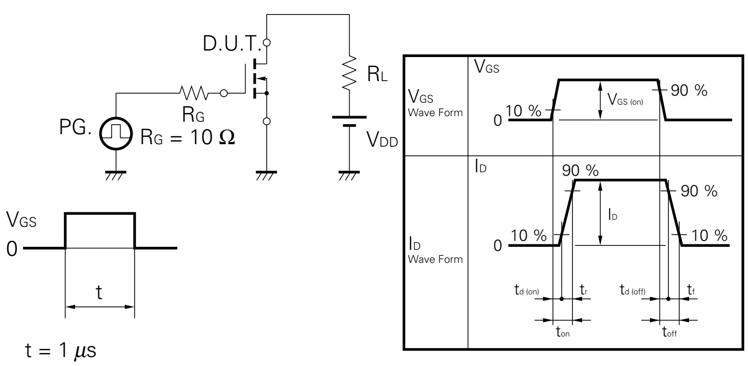
The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device is actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

Document No. D10295EJ1V0DS00 (1st edition)
Date Published August 1995 P
Printed in Japan

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

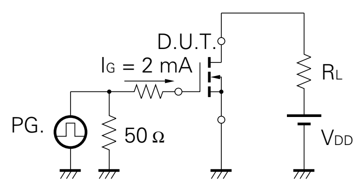
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-Resistance	$R_{DS\,(on)1}$		22	27	mΩ	V_{GS} = 10 V, I_D = 20 A
Drain to Source On-Resistance	$R_{DS\,(on)2}$		32	40	mΩ	V_{GS} = 4 V, I_D = 20 A
Gate to Source Cutoff Voltage	$V_{GS\,(off)}$	1.0	1.5	2.0	V	V_{DS} = 10 V, I_D = 1 mA
Forward Transfer Admittance	$\lvert y_{fs} \rvert$	10			S	V_{DS} = 10 V, I_D = 20 A
Drain Leakage Current	I_{DSS}			10	μA	V_{DS} = V_{DSS}, V_{GS} = 0
Gate to Source Leakage Current	I_{GSS}			±10	μA	V_{GS} = ±20 V, V_{DS} = 0
Input Capacitance	C_{iss}		1 210		pF	V_{DS} = 10 V
Output Capacitance	C_{oss}		610		pF	V_{GS} = 0
Reverse Transfer Capacitance	C_{rss}		270		pF	f = 1 MHz
Turn-On Delay Time	$t_{d\,(on)}$		32		ns	I_D = 20 A
Rise Time	t_r		300		ns	V_{GS} = 10 V
Turn-Off Delay Time	$t_{d\,(off)}$		160		ns	V_{DD} = 30 V
Fall Time	t_f		220		ns	R_G = 10 Ω
Total Gate Charge	Q_G		50		nC	I_D = 40 A
Gate to Source Charge	Q_{GS}		4.5		nC	V_{DD} = 48 V
Gate to Drain Charge	Q_{GD}		21		nC	V_{GS} = 10 V
Body Diode Forward Voltage	$V_{F\,(S\text{-}D)}$		1.0		V	I_F = 40 A, V_{GS} = 0
Reverse Recovery Time	t_{rr}		70		ns	I_F = 40 A, V_{GS} = 0
Reverse Recovery Charge	Q_{rr}		140		nC	di/dt = 100 A/μs

Test Circuit 1 Switching Time



t = 1 μs
Duty Cycle ≤ 1 %

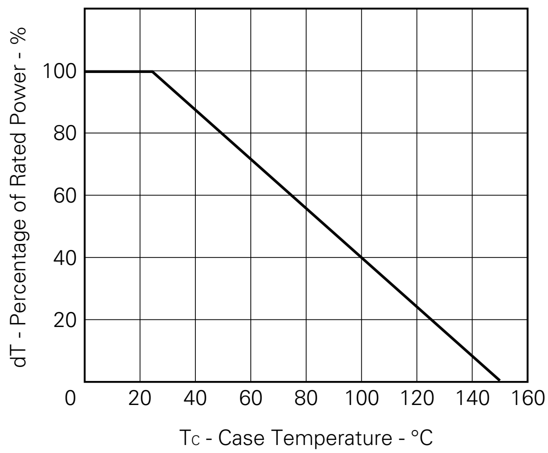
Test Circuit 2 Gate Charge



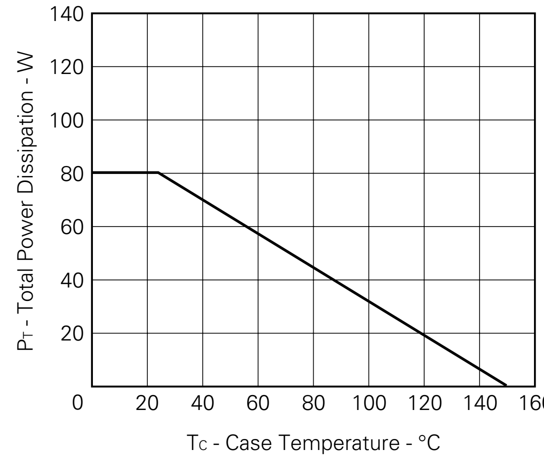
The application circuits and their parameters are for references only and are not intended for use in actual design-in's.

TYPICAL CHARACTERISTICS (T_A = 25 °C)

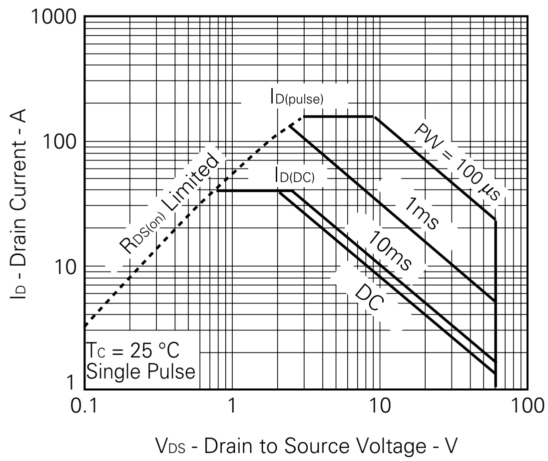
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



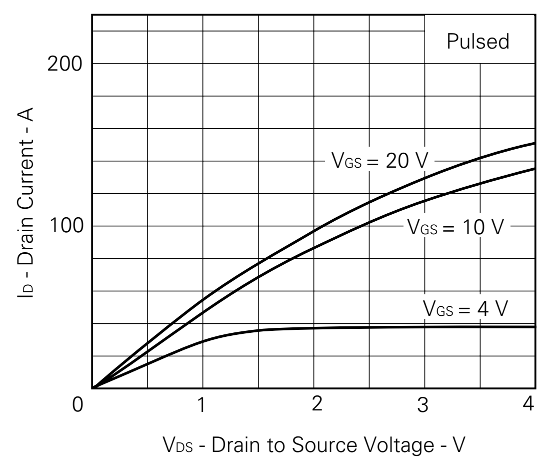
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



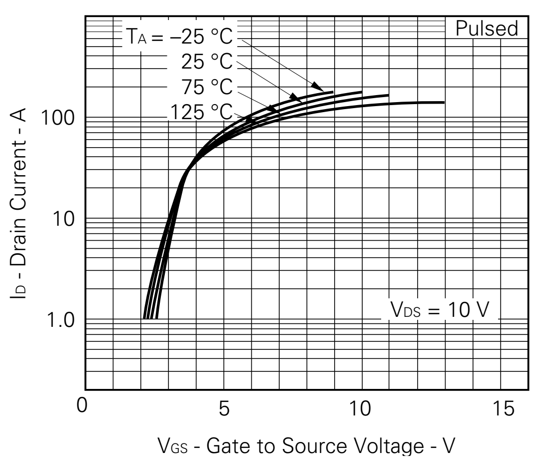
FORWARD BIAS SAFE OPERATING AREA



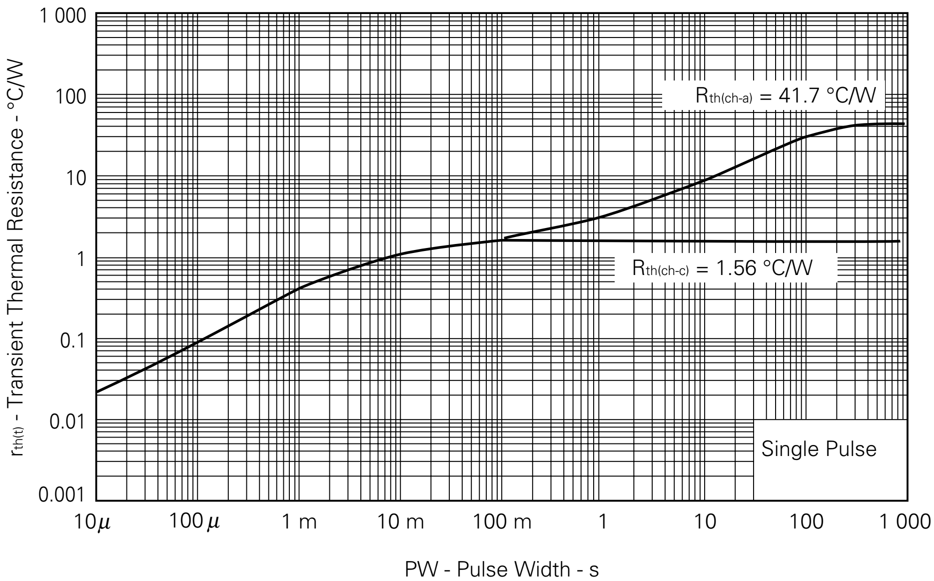
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



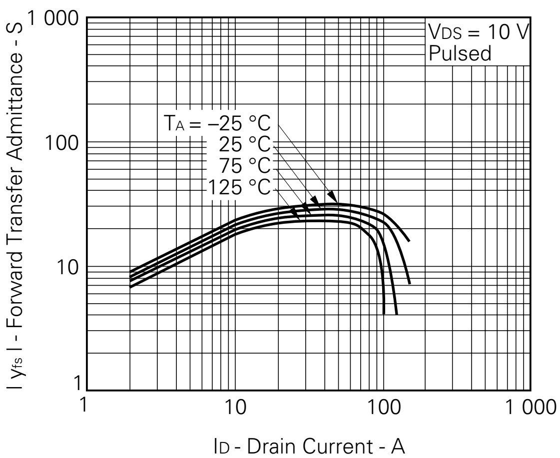
FORWARD TRANSFER CHARACTERISTICS



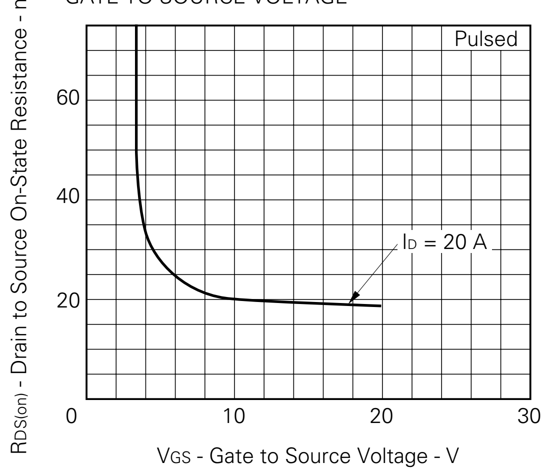
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



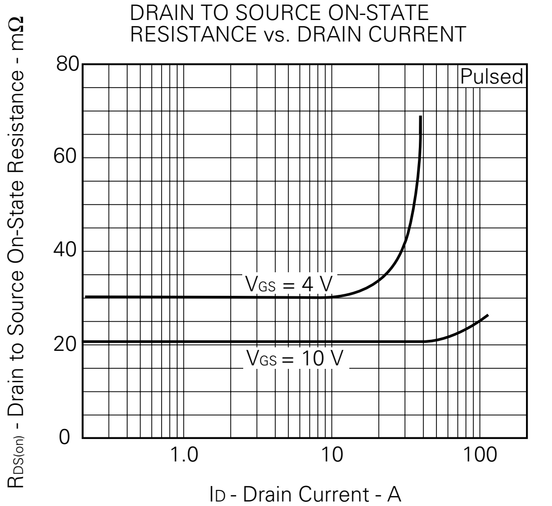
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



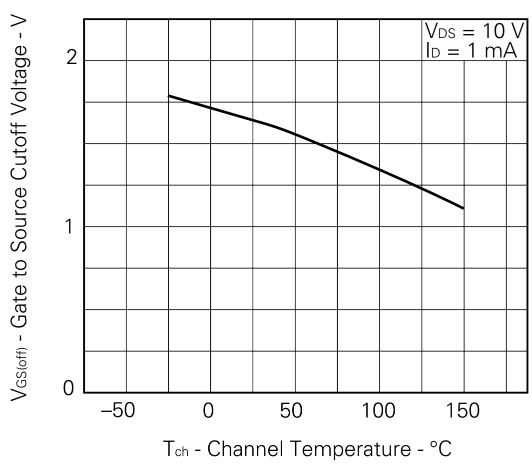
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



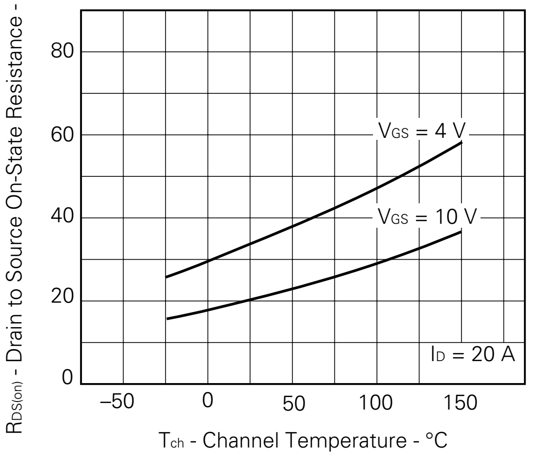
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



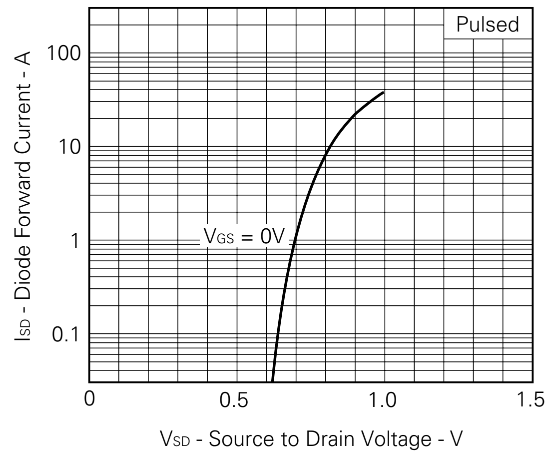
GATE TO SOURCE CUTOFF VOLTAGE vs.
CHANNEL TEMPERATURE



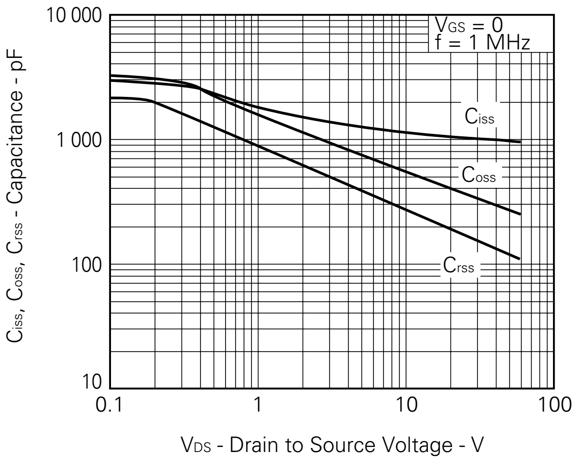
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



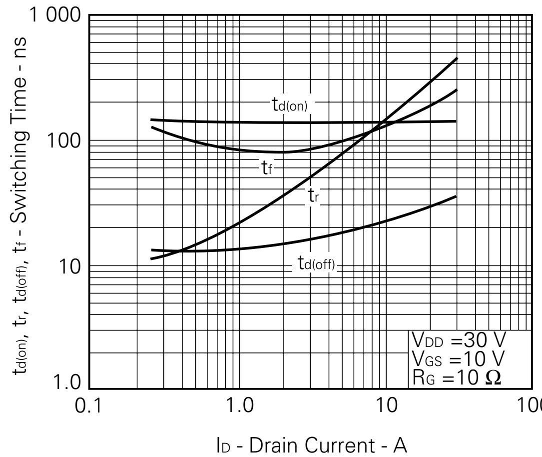
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



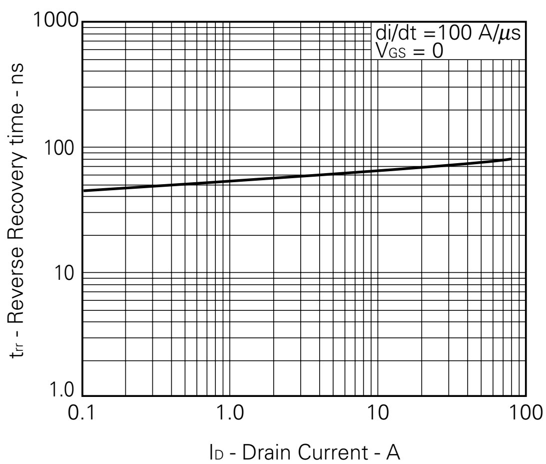
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



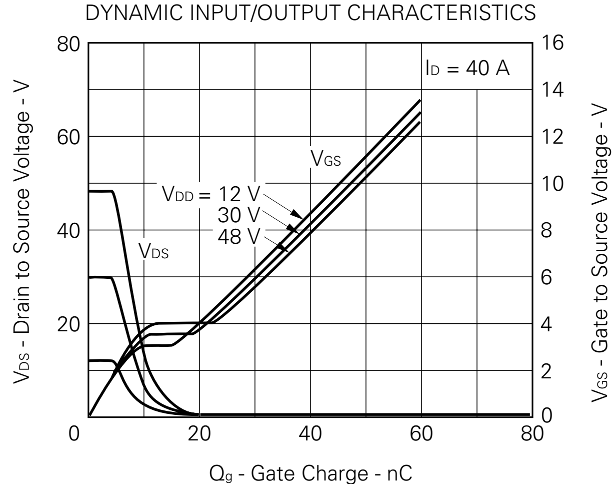
SWITCHING CHARACTERISTICS



REVERSE RECOVERY TIME vs. DRAIN CURRENT



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system.	TEI-1202
Quality grade on NEC semiconductor devices.	IEI-1209
Semiconductor device mounting technology manual.	IEI-1207
Semiconductor device package manual.	IEI-1213
Guide to quality assurance for semiconductor devices.	MEI-1202
Semiconductor selection guide.	MF-1134
Power MOS FET features and application switching power supply.	TEA-1034
Application circuits using Power MOS FET.	TEA-1035
Safe operating area of Power MOS FET.	TEA-1037

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