NEC

MOS FIELD EFFECT POWER TRANSISTOR
2SK1853

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SK1853 is N-channel MOS Field Effect Transistor designed for solenoid, motor and lamp driver.

FEATURES

- Low On-state Resistance
  $R_{DS(on)} \leqq 80$ mΩ (V_{GS} = 10 V, I_D = 8.0 A)
  $R_{DS(on)} \leqq 0.1$ Ω (V_{GS} = 4 V, I_D = 8.0 A)
- Low C_{iss} C_{iss} = 2 200 pF TYP.
- Built-in G-S Gate Protection Diode

QUALITY GRADE

Standard

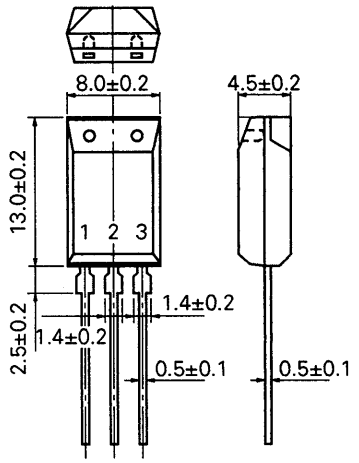
Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

ABSOLUTE MAXIMUM RATINGS (T_a = 25°C)

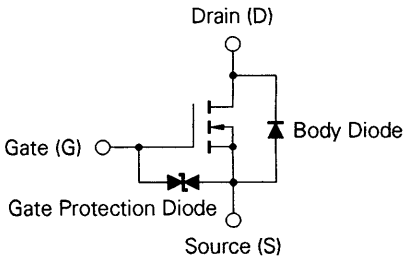
Drain to Source Voltage	V_{DSS}	100	V
Gate to Source Voltage	$V_{GSS(AC)}$	±20	V
Gate to Source Voltage	$V_{GSS(DC)}$	+20, −10	V
Drain Current (DC)	$I_{D(DC)}$	±15	A
Drain Current (pulse)	$I_{D(pulse)}$*	±60	A
Total Power Dissipation (T_a = 25 °C)	P_T	1.8	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	−55 to +150	°C

* PW ≦ 10 μs, Duty Cycle ≦ 1 %

PACKAGE DIMENSIONS
(in millimeters)



1. Gate
2. Drain
3. Source



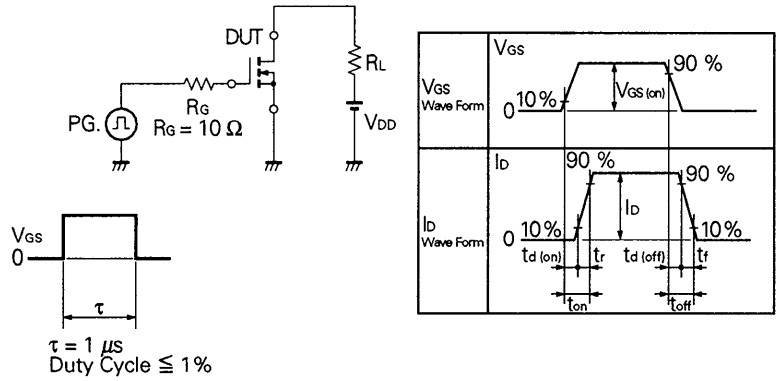
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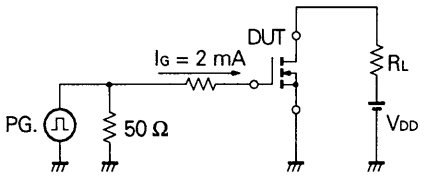
ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-state Resistance	$R_{DS(on)}$		0.07	0.08	Ω	V_{GS} = 10 V, I_D = 8 A
Drain to Source On-state Resistance	$R_{DS(on)}$		0.08	0.10	Ω	V_{GS} = 4 V, I_D = 8 A
Gate to Source Cutoff Voltage	$V_{GS(off)}$	1.0		2.5	V	V_{DS} = 10 V, I_D = 1 mA
Forward Transfer Admittance	$\|y_{fs}\|$	11			S	V_{DS} = 10 V, I_D = 8 A
Drain Leakage Current	I_{DSS}			10	μA	V_{DS} = 100 V, V_{GS} = 0
Gate to Source Leakage Current	I_{GSS}			±10	μA	V_{GS} = ±20 V, V_{DS} = 0
Input Capacitance	C_{iss}		2 200		pF	V_{DS} = 10 V V_{GS} = 0 f = 1 MHz
Output Capacitance	C_{oss}		550		pF	
Reverse Transfer Capacitance	C_{rss}		90		pF	
Turn-On Delay Time	$t_{d(on)}$		25		ns	$V_{GS(on)}$ = 10 V V_{DD} = 50 V I_D = 8 A, R_G = 10 Ω R_L = 6.25 Ω
Rise Time	t_r		85		ns	
Turn-Off Delay Time	$t_{d(off)}$		220		ns	
Fall Time	t_f		90		ns	
Total Gate Charge	Q_G		50		nC	V_{GS} = 10 V I_D = 15 A V_{DD} = 80 V
Gate to Source Charge	Q_{GS}		10		nC	
Gate to Drain Charge	Q_{GD}		10		nC	
Diode Forward Voltage	$V_{F(S-D)}$		1.0		V	V_{GS} = 0, I_D = 15 A
Reverse Recovery Time	t_{rr}		150		ns	I_F = 15 A, V_{GS} = 0 di/dt = 50 A/μs
Reverse Recovery Charge	Q_{rr}		300		nC	

Test Circuit 1: Switching Time

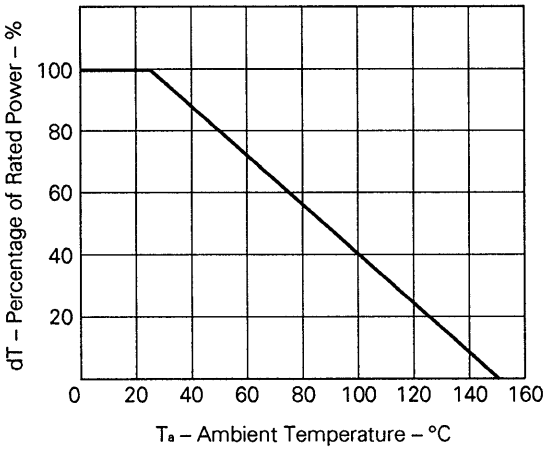


Test Circuit 2: Gate Charge

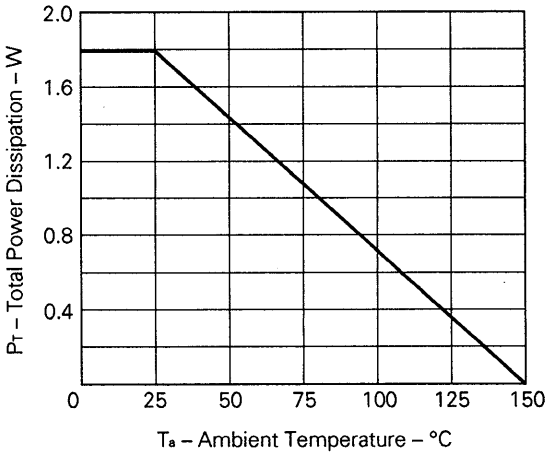


TYPICAL CHARACTERISTICS (T_a = 25 °C)

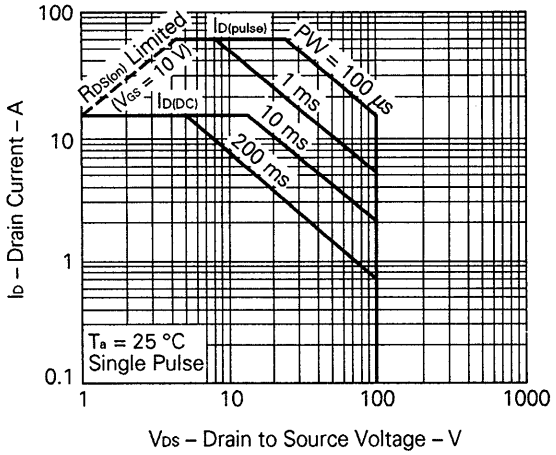
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



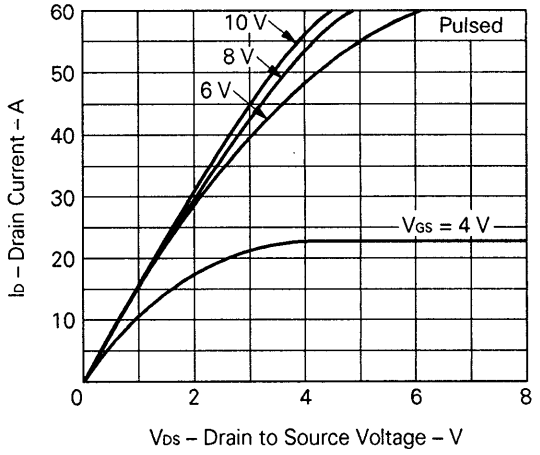
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



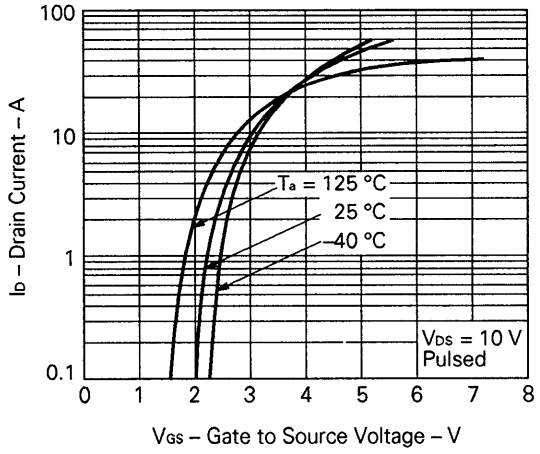
FORWARD BIAS SAFE OPERATING AREA



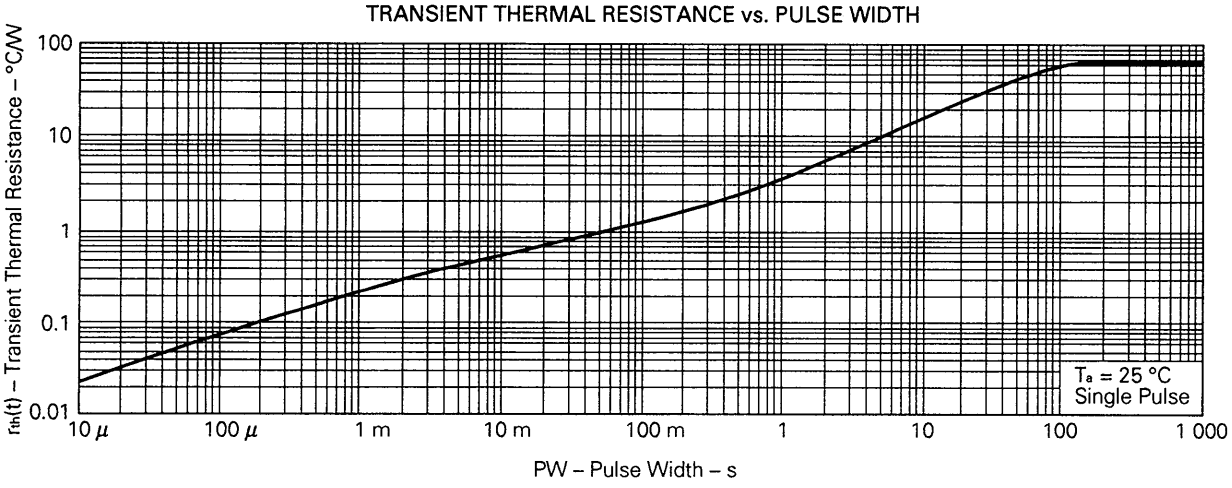
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



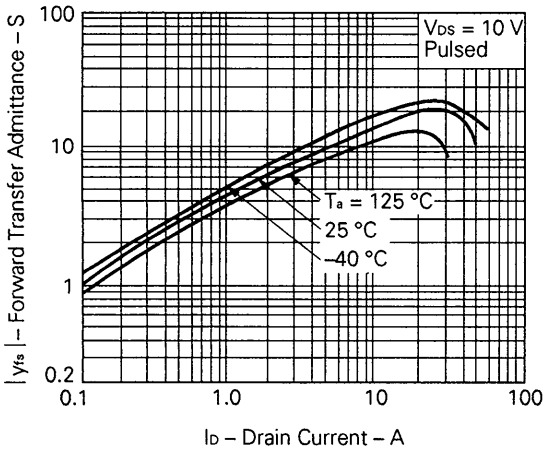
TRANSFER CHARACTERISTICS



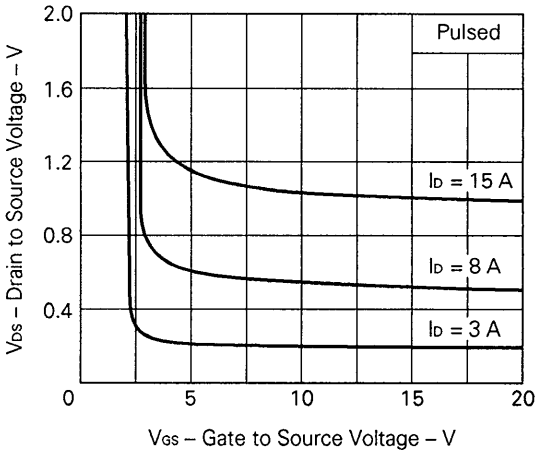
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



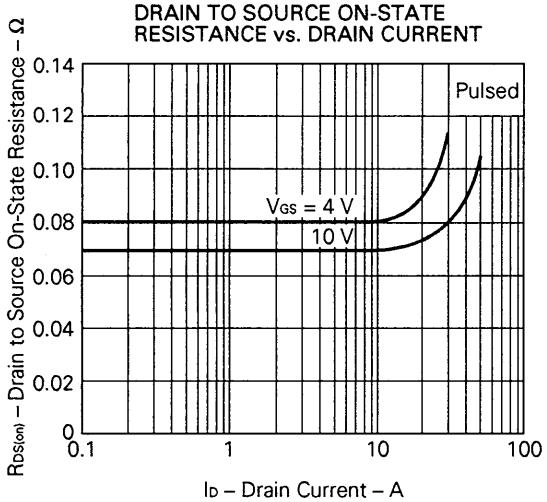
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



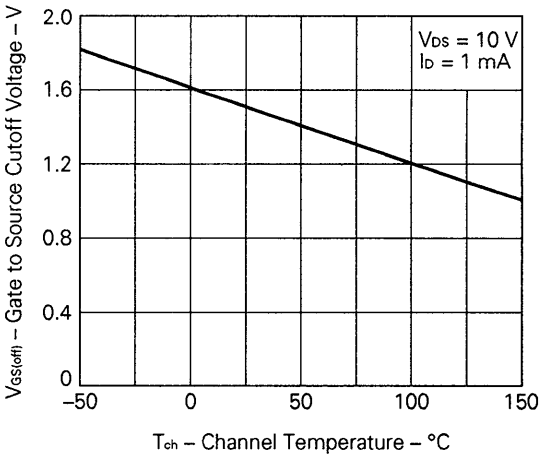
DRAIN TO SOURCE VOLTAGE vs. GATE TO SOURCE VOLTAGE



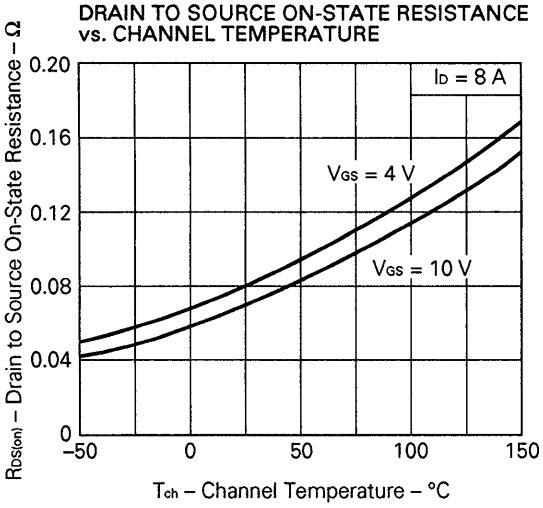
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



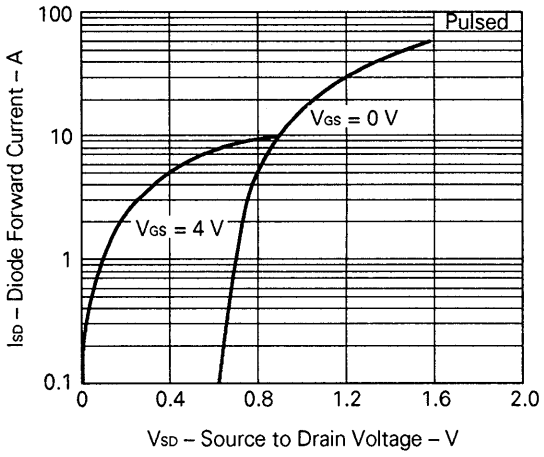
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



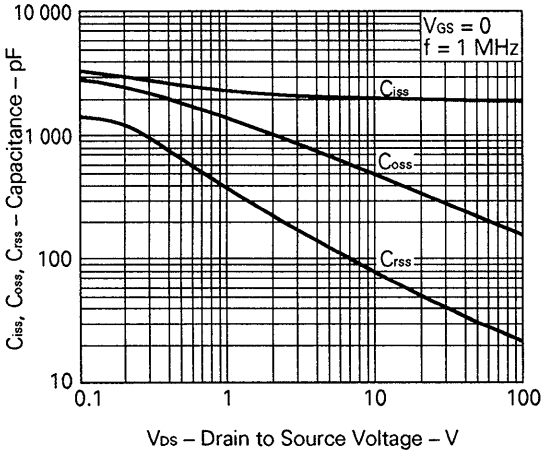
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



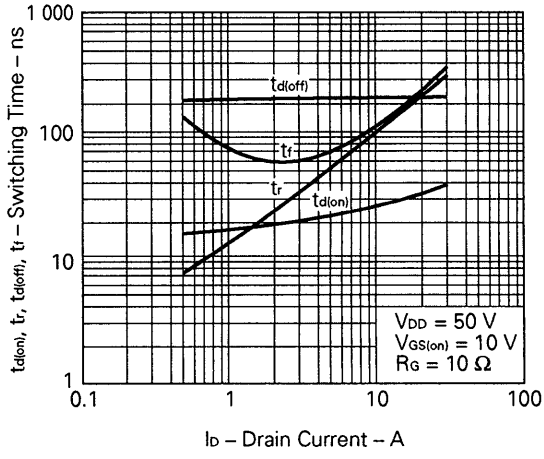
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



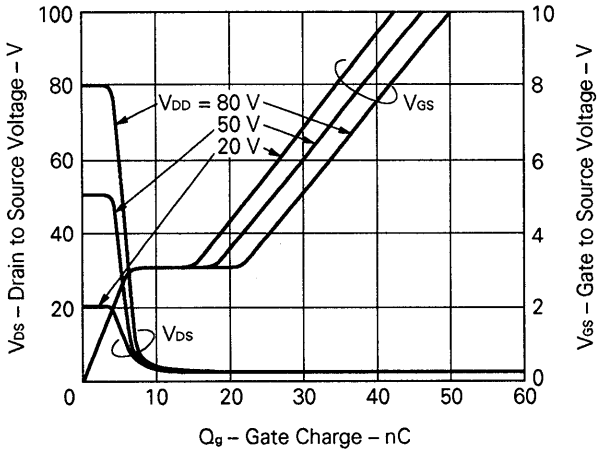
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



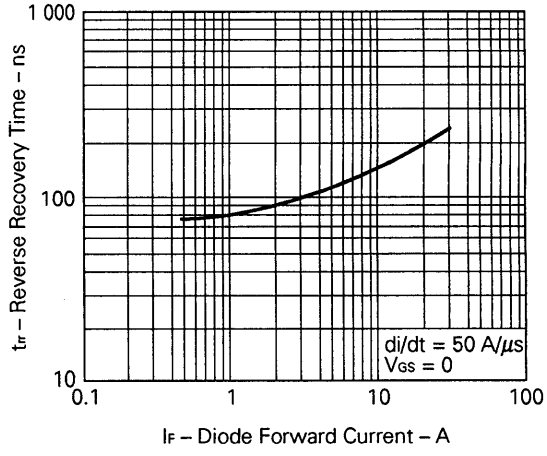
SWITCHING CHARACTERISTICS



DYNAMIC INPUT CHARACTERISTICS



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



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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