NEC

P-CHANNEL MOS FIELD EFFECT POWER TRANSISTOR

2SJ330

SWITCHING
P-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SJ330 is P-channel MOS Field Effect Transistor designed for solenoid, motor and lamp driver.

FEATURES

- Low On-state Resistance
  $R_{DS(on)}$ = 40 mΩ TYP. (V_{GS} = −10 V, I_D = −10 A)
  $R_{DS(on)}$ = 70 mΩ TYP. (V_{GS} = −4 V, I_D = −8 A)
- Low C_{iss} C_{iss} = 2 570 pF TYP.
- Built-in G-S Gate Protection Diodes

QUALITY GRADE

Standard

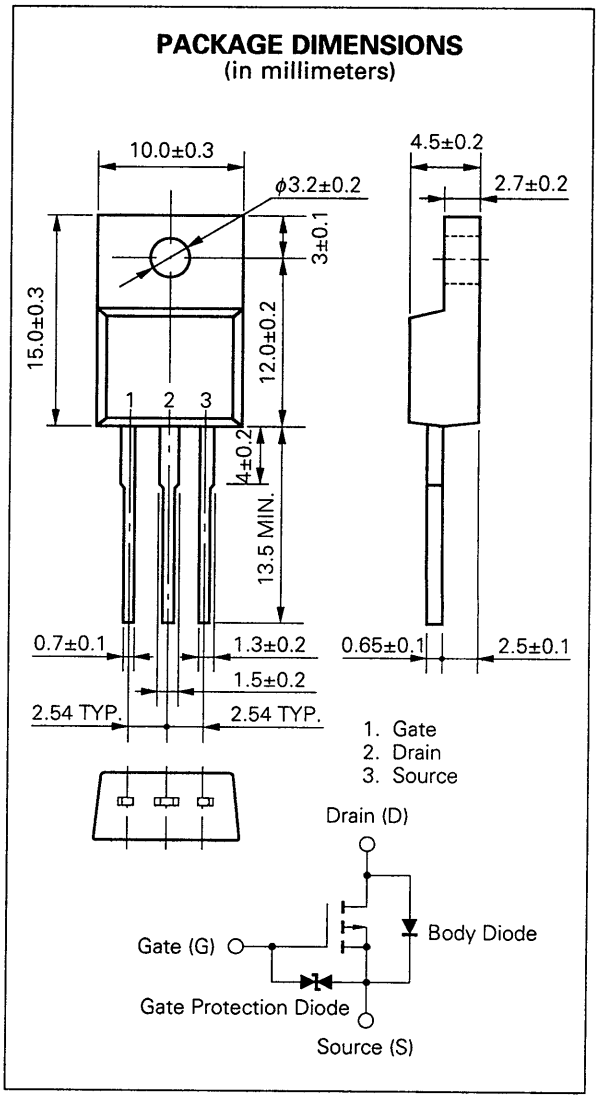
Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

Drain to Source Voltage	V_{DSS}	−60	V
Gate to Source Voltage	$V_{GSS(AC)}$	∓20	V
Gate to Source Voltage	$V_{GSS(DC)}$	−20, +10	V
Drain Current (DC)	$I_{D(DC)}$	∓20	A
Drain Current (pulse)	$I_{D(pulse)}$*	∓80	A
Total Power Dissipation (T_C = 25 °C)	P_{T1}	35	W
Total Power Dissipation (T_a = 25 °C)	P_{T2}	2.0	W
Channel Temperature	T_{ch}	150 °C MAX.	
Storage Temperature	T_{stg}	−55 to +150 °C	

* PW ≦ 10 μs, Duty Cycle ≦ 1 %

PACKAGE DIMENSIONS
(in millimeters)



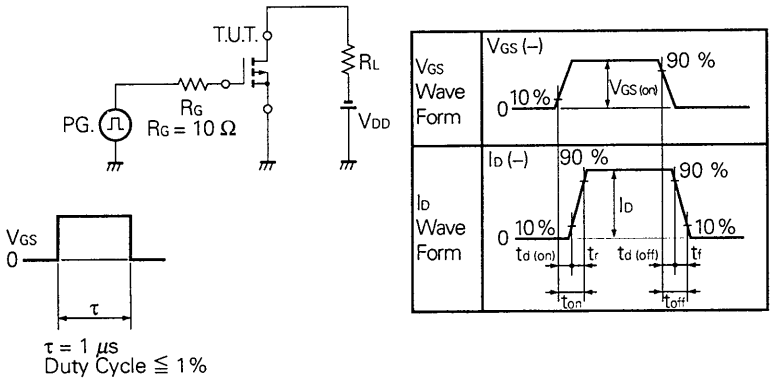
Document No. TC-2465
(O.D. No. TC-7970)
Date Published November 1993 M
Printed in Japan

© NEC Corporation 1993

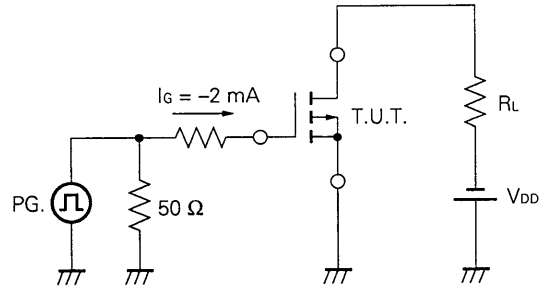
ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source On-state Resistance	$R_{DS(on)}$		0.04	0.05	Ω	V_{GS} = −10 V, I_D = −10 A
Drain to Source On-state Resistance	$R_{DS(on)}$		0.07	0.09	Ω	V_{GS} = −4 V, I_D = −8 A
Gate to Source Cutoff Voltage	$V_{GS(off)}$	−1.0	−1.6	−2.0	V	V_{DS} = −10 V, I_D = −1 mA
Forward Transfer Admittance	$\|y_{fs}\|$	10			S	V_{DS} = −10 V, I_D = −10 A
Drain Leakage Current	I_{DSS}			−10	μA	V_{DS} = −60 V, V_{GS} = 0
Gate to Source Leakage Current	I_{GSS}			∓10	μA	V_{GS} = ∓16 V, V_{DS} = 0
Input Capacitance	C_{iss}		2 570		pF	V_{DS} = −10 V V_{GS} = 0 f = 1 MHz
Output Capacitance	C_{oss}		1 460		pF	
Reverse Transfer Capacitance	C_{rss}		640		pF	
Turn-On Delay Time	$t_{d(on)}$		50		ns	$V_{GS(on)}$ = −10 V V_{DD} = −30 V I_D = −10 A, R_G = 10 Ω R_L = 3.0 Ω
Rise Time	t_r		200		ns	
Turn-Off Delay Time	$t_{d(off)}$		340		ns	
Fall Time	t_f		230		ns	
Total Gate Charge	Q_G		90		nC	V_{GS} = −10 V I_D = −20 A V_{DD} = −48 V
Gate to Source Charge	Q_{GS}		7		nC	
Gate to Drain Charge	Q_{GD}		36		nC	
Diode Forward Voltage	V_{SD}		0.9		V	I_F = 20 A, V_{GS} = 0
Reverse Recovery Time	t_{rr}		100		ns	I_F = 20 A, V_{GS} = 0 di/dt = 50 A/μs
Reverse Recovery Charge	Q_{rr}		490		nC	

Test Circuit 1: Switching Time

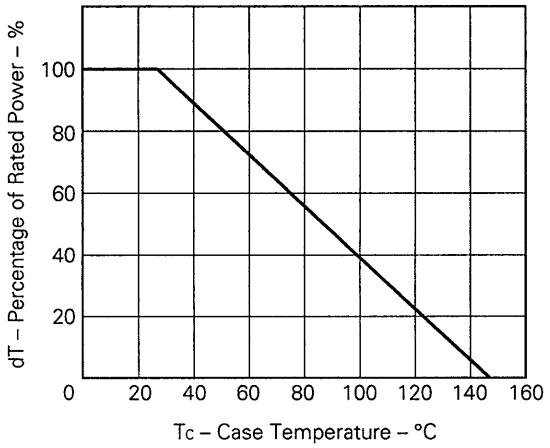


Test Circuit 2: Gate Charge

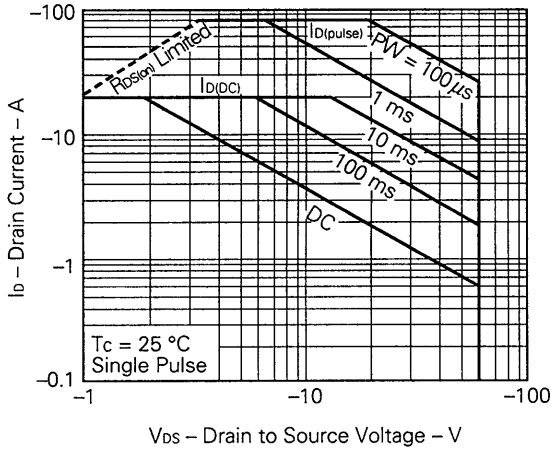


TYPICAL CHARACTERISTICS (T_a = 25 °C)

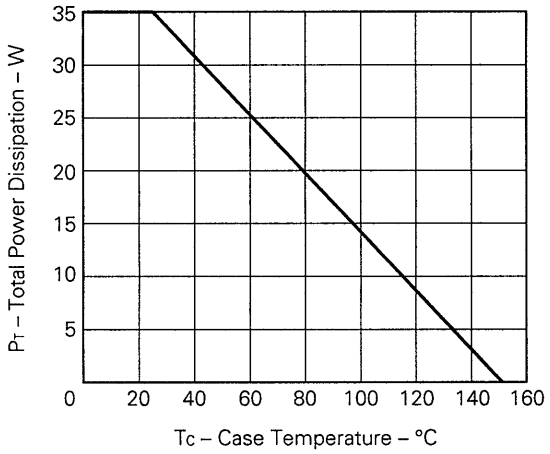
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



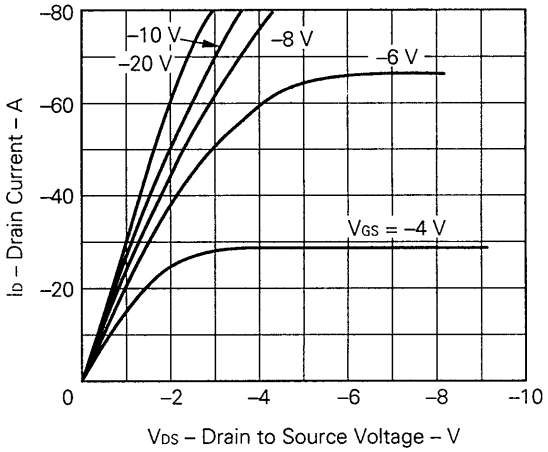
FORWARD BIAS SAFE OPERATING AREA



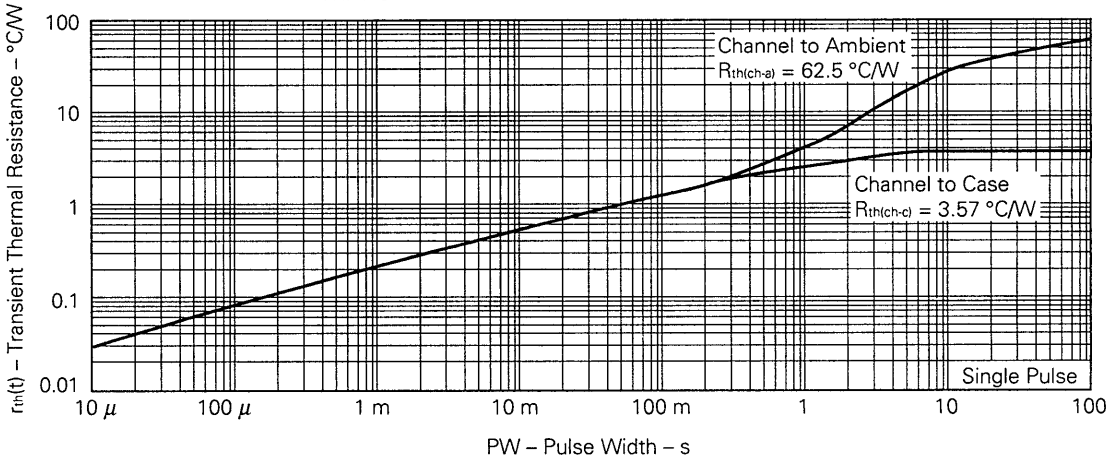
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



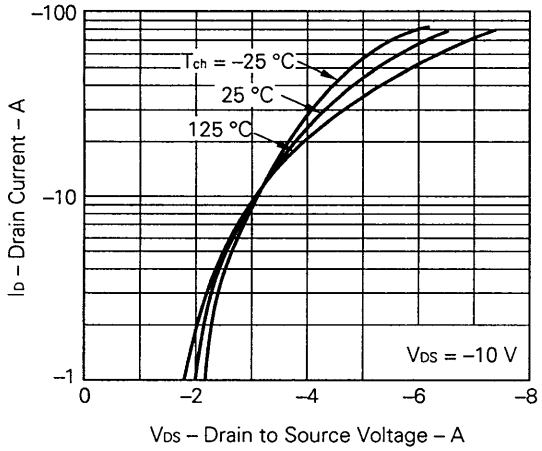
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



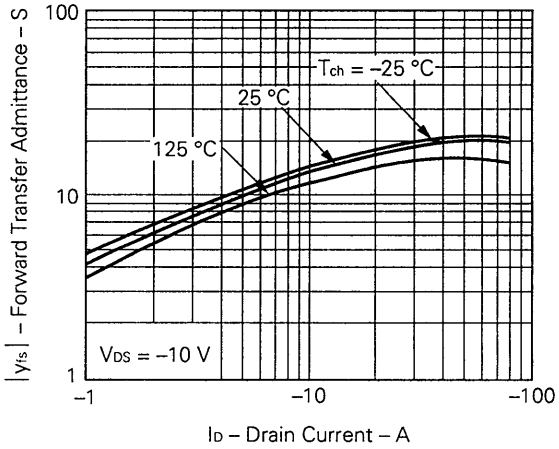
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



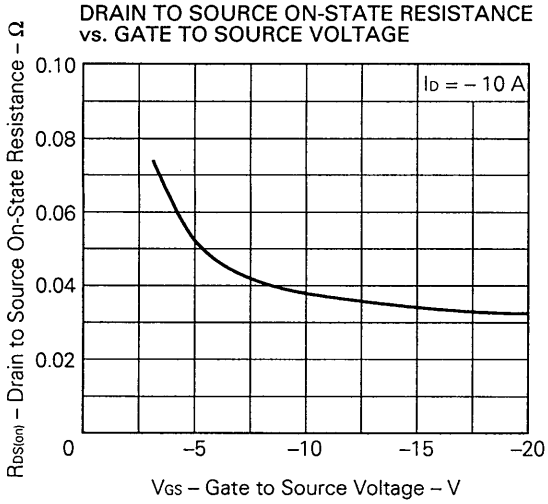
TRANSFER CHARACTERISTICS



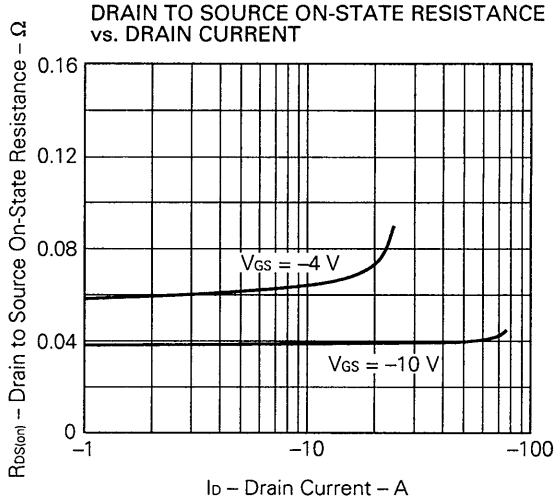
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



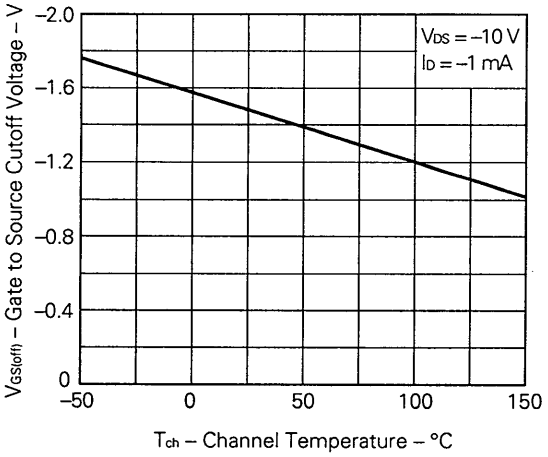
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



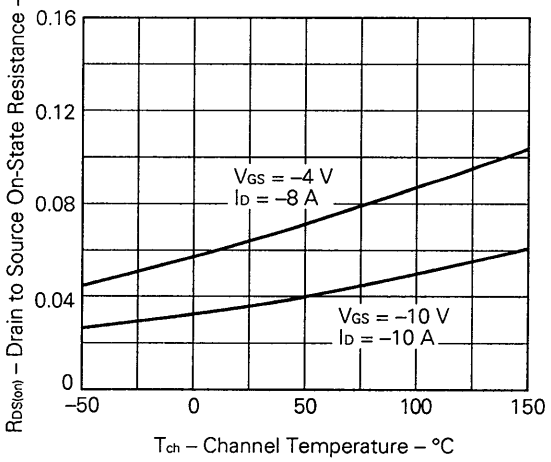
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



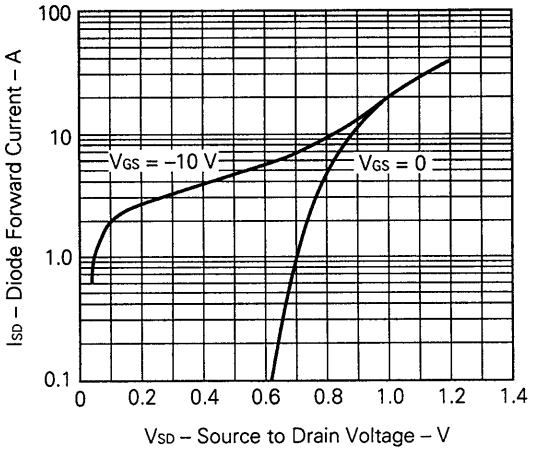
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



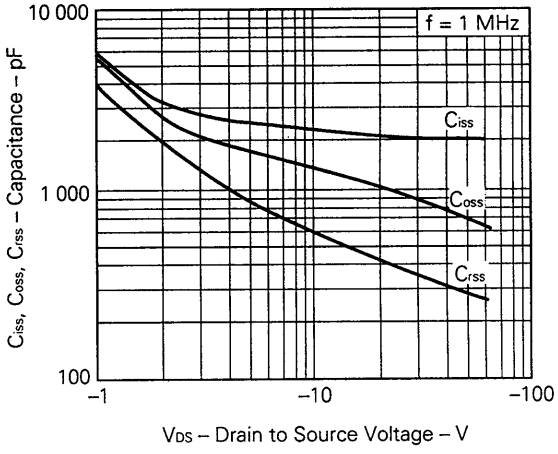
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



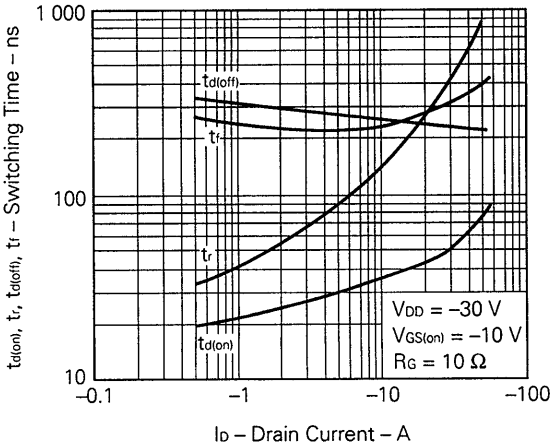
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



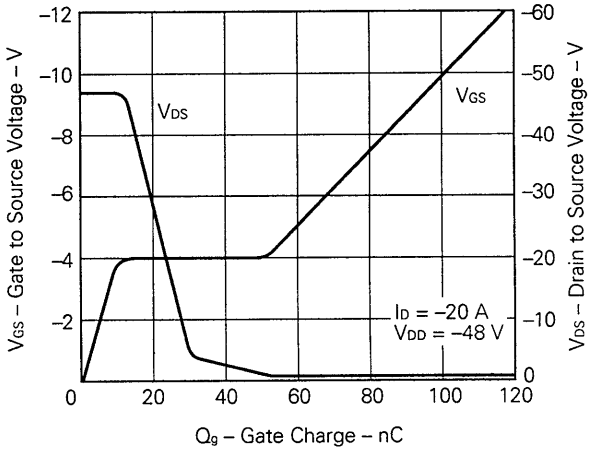
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



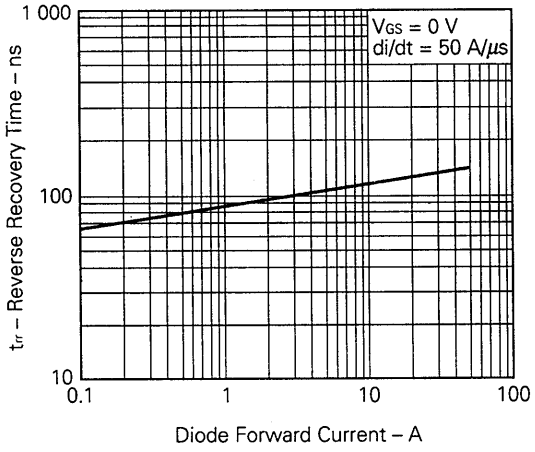
SWITCHING CHARACTERISTICS



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



REVERSE RECOVERY TIME vs. REVERSE DRAIN 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

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of NEC Corporation.NEC Corporation assumes no responsibility for any errors which may appear in this document.
NEC Corporation does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from use of a device described herein or any other liability arising from use of such device. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC Corporation or others.
The devices listed in this document are not suitable for use in aerospace equipment, submarine cables, nuclear reactor control systems and life support systems. If customers intend to use NEC devices for above applications or they intend to use "Standard" quality grade NEC devices for applications not intended by NEC, please contact our sales people in advance.
Application examples recommended by NEC Corporation.
Standard: Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tools, Industrial robots, Audio and Visual equipment, Other consumer products, etc.
Special: Automotive and Transportation equipment, Traffic control systems, Antidisaster systems, Anticrime systems, etc.

M4 92.6