NEC

MOS FIELD EFFECT TRANSISTOR
V5311

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The V5311 is N-Channel MOS FET device that features a low on-state resistance and excellent switching characteristics, designed for high voltage applications such as switching power supply, lamp driver.

ORDERING INFORMATION

PART NUMBER	PACKAGE
	TO-220AB
	TO-262
	TO-263(MP-25ZK)

FEATURES

- Gate voltage rating ±30 V
- Low on-state resistance
  $R_{DS(on)}$ = 0.55 Ω MAX. (V_{GS} = 10 V, I_D = 5 A)
- Low gate charge
- Surface mount device available

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	400	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±30	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)}$	±10	A
Drain Current (Pulse) **Note**	$I_{D(pulse)}$	±40	A
Total Power Dissipation (T_A = 25°C)	P_{T1}	1.5	W
Total Power Dissipation (T_C = 25°C)	P_{T2}	150	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to +150	°C

Note PW ≤ 10 μs, Duty Cycle ≤ 1%

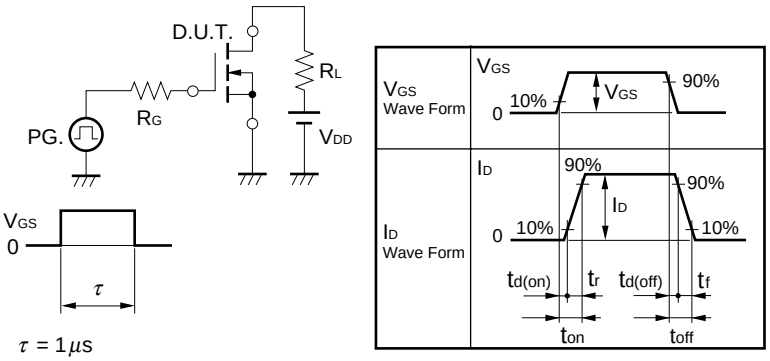
Document No. D16077EJ1V0PM00 (1st edition)
Date Published March 2002 NS CP(K)
Printed in Japan

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 400 V, V_{GS} = 0 V			100	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±30 V, V_{DS} = 0 V			±100	nA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	2.5		3.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 5 A		T.B.D.		S
Drain to Source On-state Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 5 A		0.44	0.55	Ω
Input Capacitance	C_{iss}	V_{DS} = 10 V		1450		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		210		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		4.0		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 150 V , I_D = 5 A		T.B.D.		ns
Rise Time	t_r	V_{GS} = 10 V		T.B.D.		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		T.B.D.		ns
Fall Time	t_f			T.B.D.		ns
Total Gate Charge	Q_G	V_{DD} = 320 V		T.B.D.		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 10 V		T.B.D.		nC
Gate to Drain Charge	Q_{GD}	I_D = 10 A		T.B.D.		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 10 A, V_{GS} = 0 V		T.B.D.		V
Reverse Recovery Time	t_{rr}	I_F = 10 A, V_{GS} = 0 V		T.B.D.		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/ μs		T.B.D.		nC

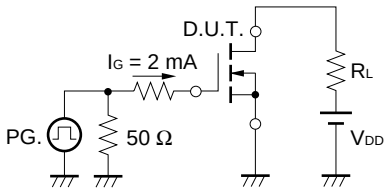
Remark T.B.D. (To be determined.)

TEST CIRCUIT 1 SWITCHING TIME



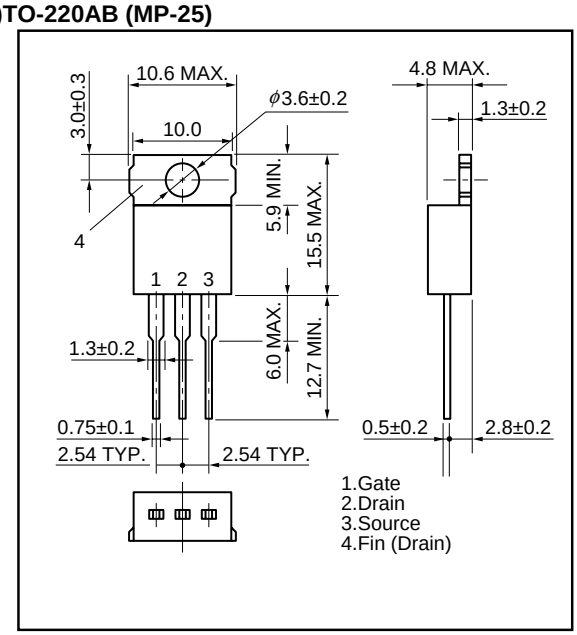
τ = 1 μs
Duty Cycle ≤ 1%

TEST CIRCUIT 2 GATE CHARGE

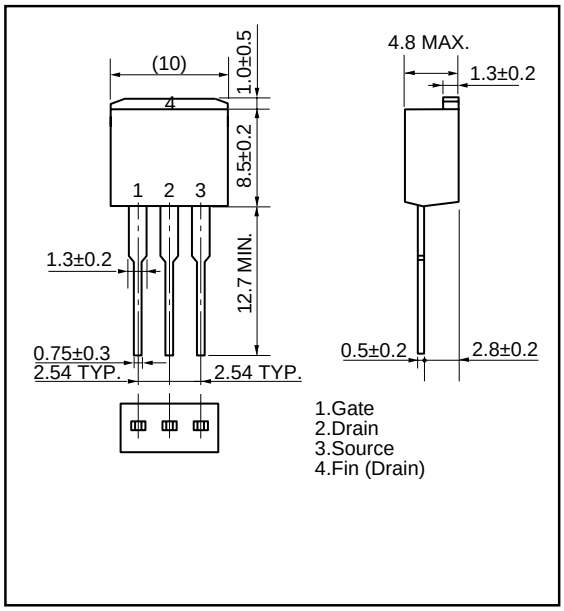


PACKAGE DRAWINGS (Unit: mm)

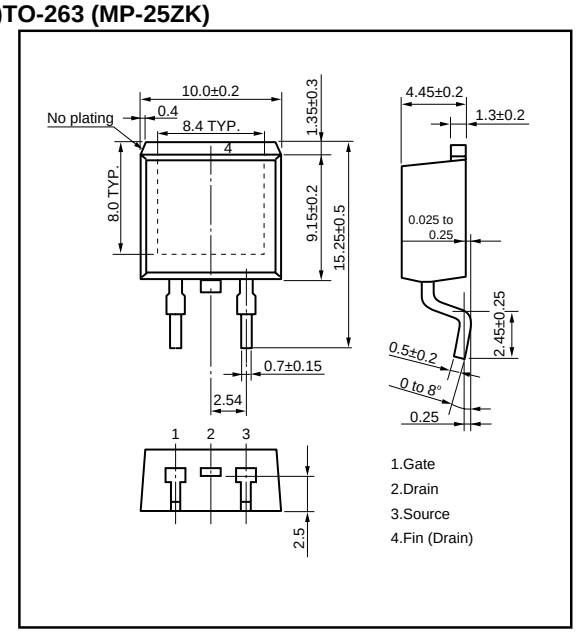
1)TO-220AB (MP-25)



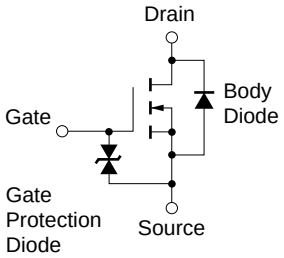
2)TO-262



3)TO-263 (MP-25ZK)



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.

- **The information contained in this document is being issued in advance of the production cycle for the device. The parameters for the device may change before final production or NEC Corporation, at its own discretion, may withdraw the device prior to its production.**
- 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.
- Descriptions of circuits, software, and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software, and information in the design of the customer's equipment shall be done under the full responsibility of the customer. NEC Corporation assumes no responsibility for any losses incurred by the customer or third parties arising from the use of these circuits, software, and information.
- While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.
- NEC devices are classified into the following three quality grades:
  "Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.
  - Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots
  - Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
  - Specific: Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

  The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.