NEC

MOS Field Effect Power Transistor

NP24N06HLB,NP24N06ILB

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

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

FEATURES

- Channel temperature 175 degree rated
- Super Low On-State Resistance
  $R_{DS(on)1}$ =70mΩ Max. (V_{GS}=10V,I_D=12A)
  $R_{DS(on)2}$ =90mΩ Max. (V_{GS}= 5V,I_D=5A)
- Low C_{iss} C_{iss} = 860pF Typ.
- Built-in Gate Protection Diode

ORDERING INFORMATION

PART NUMBER	PACKAGE
NP24N06HLB	TO-251
NP24N06ILB	TO-252

ABSOLUTE MAXIMUM RATINGS(Ta=25°C)

Drain to Source Voltage	V_{DSS}	60	V
Gate to Source Voltage	V_{GSS}	± 20	V
Drain Current(DC)	$I_{D(DC)}$	± 24	A
Drain Current(pulse)*	$I_{D(pulse)}$	± 40	A
Total Power Dissipation(T_a=25°C)	P_T	1.2	W
Total Power Dissipation(T_{ch}=25°C)	P_T	51	W
Single Avalanche Current	I_{AS}	24	A
Single Avalanche Energy	E_{AS}	T.B.D.	mJ
Channel Temperature	T_{ch}	175	°C
Storage Temperature	T_{stg}	- 55 ~ + 175	°C

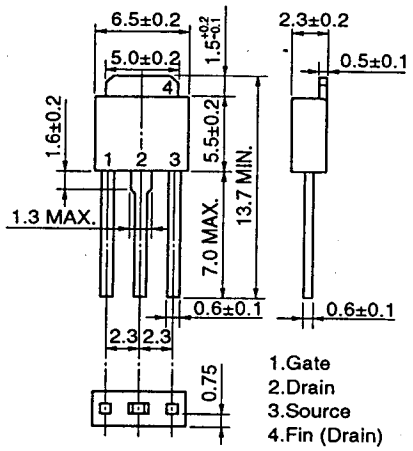
* PW≤10μs,Duty Cycle≤1%

**Starting T_{ch}=25°C,R_G=25Ω,T_{GS}20V→0

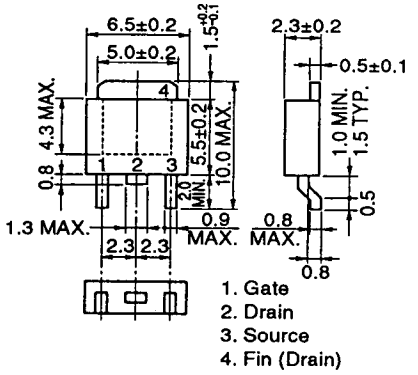
THERMAL RESISTANCE

Channel to Case	Rth(ch-c)	2.94	°C/W
Channel to Ambient	Rth(ch-a)	125	°C/W

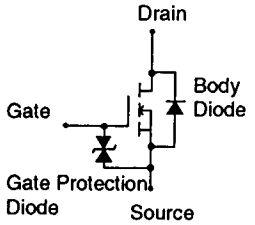
PACKAGE DIMENSIONS (in millimeter)



TO-251 (MP-3)



TO-252 (MP-3Z)



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

This information in this document is being issued in advance of the production cycle for the device. The parameter for the device may change before final production or NEC Corporation, at its own discretion, may withdraw the device prior to its production.

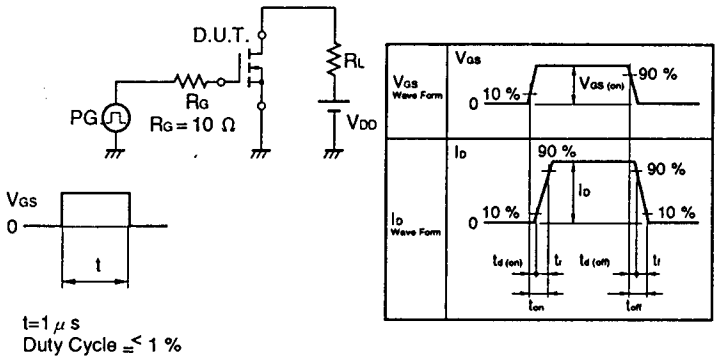
Document No. D13458EJ1V0PM00
Date Published April, 1998

General-Purpose Device Department
Semiconductor Solution Engineering Division
NEC Corporation

ELECTRICAL CHARACTERISTICS(Ta=25°C)

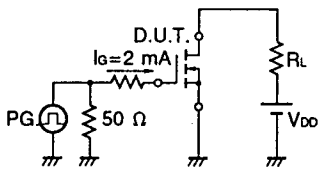
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS}=10V, I_D= 12A		52	70	mΩ
	$R_{DS(on)2}$	V_{GS}= 5V, I_D= 5A		63	90	mΩ
	$R_{DS(on)3}$	V_{GS}= 4V, I_D= 5A		68	95	mΩ
Gate to Source Cutoff Voltage	$V_{GS(off)}$	V_{DS}=10V, I_D=1mA	1.0	1.6	2.0	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS}=10V, I_D=5A	7.0	12		S
Drain Leakage Current	I_{DSS}	V_{DS}=60V, V_{GS}=0			10	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0			±10	μA
Input Capacitance	C_{iss}	V_{DS}=10V		860	1900	pF
Output Capacitance	C_{oss}	V_{GS}=0		440	660	pF
Reverse Transfer Capacitance	C_{rss}	f=1MHz		110	200	pF
Turn-On Delay Time	$t_{d(on)}$	I_D=5A		15	33	nS
Rise Time	t_r	$V_{GS(on)}$=10V		90	230	nS
Turn-Off Delay Time	$t_{d(off)}$	V_{DD}=30V		75	150	nS
Fall Time	t_f	R_G=10Ω		35	90	nS
Total Gate Charge	Q_G	I_D=10A		24	36	nC
Gate to Source Charge	Q_{GS}	V_{DD}=48V		2.6		nC
Gate to Drain Charge	Q_{GD}	V_{GS}=10V		6.0		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F=10A, V_{GS}=0		1.0		V
Reverse Recovery Time	t_{rr}	I_F=10A, V_{GS}=0		85		ns
Reverse Recovery Charge	Q_{rr}	di/dt=50A/μs		220		nC

Test Circuit 1 Switching Time



t=1 μs
Duty Cycle ≦ 1 %

Test Circuit 2 Gate Charge



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.

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: Aircrafts, 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.

Anti-radioactive design is not implemented in this product.