

MOS FIELD EFFECT TRANSISTOR

NP88N04CHE, NP88N04DHE, NP88N04EHE

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
 $R_{DS(on)} = 4.0 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 44 \text{ A)}$
- Low C_{iss} : $C_{iss} = 7300 \text{ pF TYP.}$
- Built-in gate protection diode

ORDERING INFORMATION

PART NUMBER	PACKAGE
NP88N04CHE	TO-220AB
NP88N04DHE	TO-262
NP88N04EHE	TO-263

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Drain to Source Voltage	V_{DSS}	40	V
Gate to Source Voltage	V_{GSS}	± 20	V
Drain Current (DC) ^{Note1}	$I_{D(DC)}$	± 88	A
Drain Current (Pulse) ^{Note2}	$I_{D(pulse)}$	± 352	A
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_T	1.8	W
Total Power Dissipation ($T_{ch} = 25^\circ\text{C}$)	P_T	185	W
Single Avalanche Current	I_{AS}	T.B.D.	A
Single Avalanche Energy ^{Note3}	E_{AS}	T.B.D.	mJ
Channel Temperature	T_{ch}	175	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +175	$^\circ\text{C}$

Notes 1. Package Limit = $\pm 75 \text{ A}$

2. $PW \leq 10 \mu\text{s}$, Duty cycle $\leq 1 \%$

3. Starting $T_{ch} = 25^\circ\text{C}$, $R_G = 25 \Omega$, $V_{GS} = 20 \text{ V} \rightarrow 0 \text{ V}$

THERMAL RESISTANCE

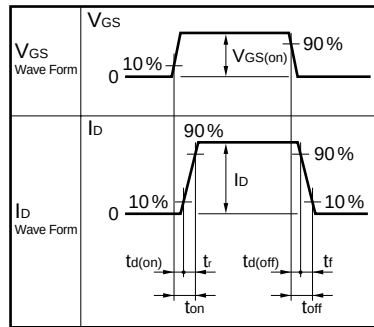
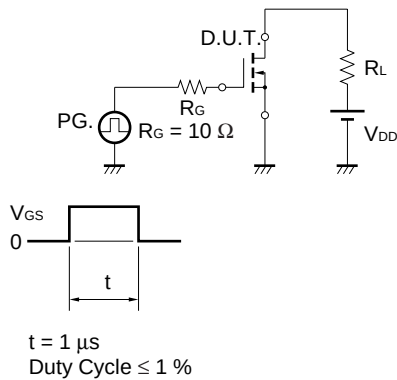
Channel to Case	$R_{th(ch-C)}$	0.81	$^\circ\text{C/W}$
Channel to Ambient	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

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.
 Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

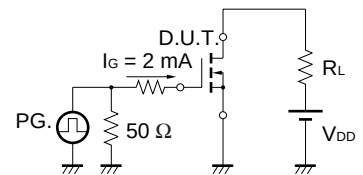
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 44 A		3.2	4.0	mΩ
Gate to Source Cut-off Voltage	V _{GS(off)}	V _{DS} = 10 V, I _D = 250 μA	2.0	3.0	4.0	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 44 A	30	60		S
Drain Leakage Current	I _{DSS}	V _{DS} = 40 V, V _{GS} = 0 V			10	μA
Gate to Source Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±10	μA
Input Capacitance	C _{iss}	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz		7300	11000	pF
Output Capacitance	C _{oss}			1400	2100	pF
Reverse Transfer Capacitance	C _{rss}			620	1120	pF
Turn-on Delay Time	t _{d(on)}	I _D = 44 A, V _{GS(on)} = 10 V, V _{DD} = 20 V, R _G = 10 Ω		162	360	ns
Rise Time	t _r			2470	6180	ns
Turn-off Delay Time	t _{d(off)}			300	600	ns
Fall Time	t _f			400	1000	ns
Total Gate Charge	Q _G	I _D = 88 A, V _{DD} = 32 V, V _{GS} = 10 V		120	180	nC
Gate to Source Charge	Q _{GS}			30		nC
Gate to Drain Charge	Q _{GD}			43		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 88 A, V _{GS} = 0 V		1.0		V
Reverse Recovery Time	t _{rr}	I _F = 88 A, V _{GS} = 0 V, di/dt = 100 A/μs		60		ns
Reverse Recovery Charge	Q _{rr}			100		nC

TEST CIRCUIT 1 SWITCHING TIME

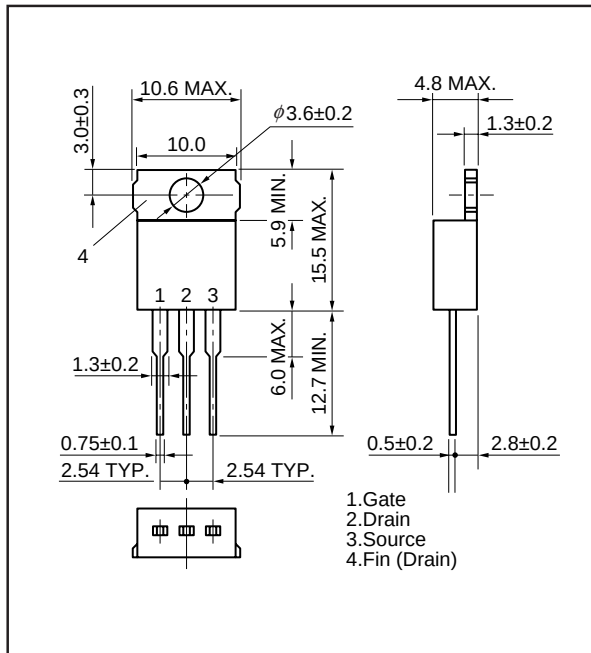


TEST CIRCUIT 2 GATE CHARGE

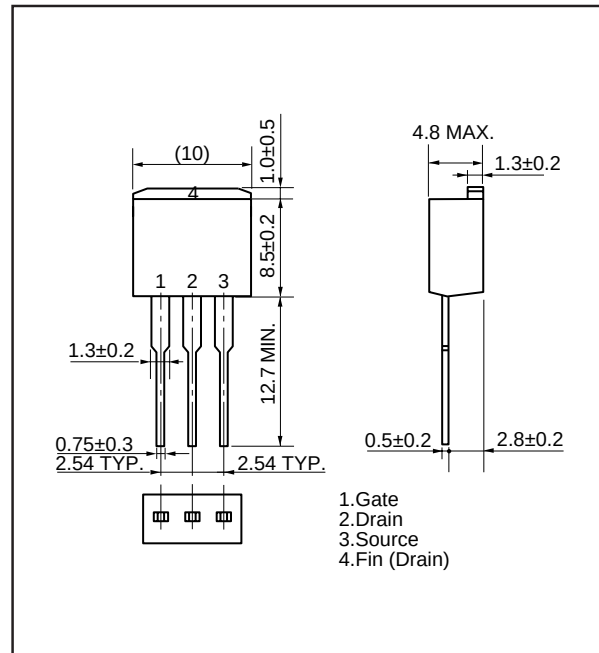


PACKAGE DRAWINGS (Unit: mm)

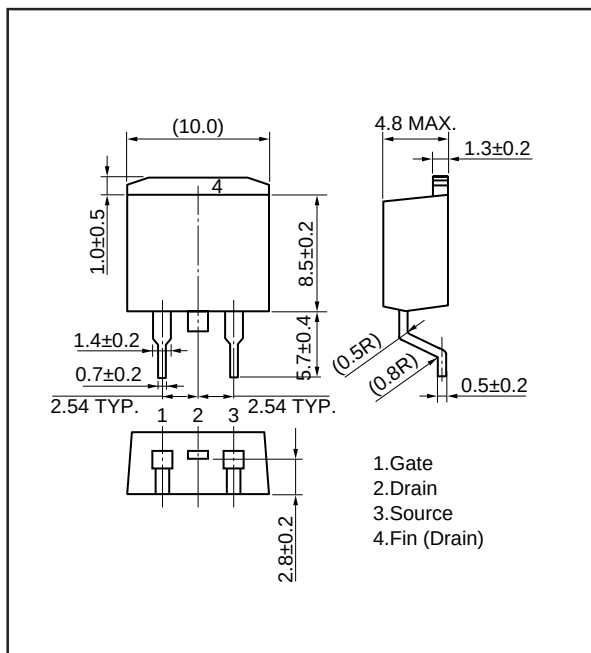
1) TO-220AB (MP-25)



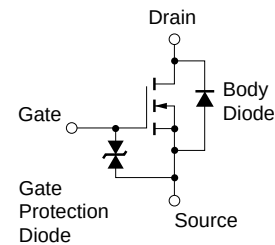
2) TO-262 (MP-25 Fin Cut)



3) TO-263 (MP-25ZJ)



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.

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