NEC

MOS FIELD EFFECT TRANSISTOR

NP84N04CHE, NP84N04DHE, NP84N04EHE

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

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

ORDERING INFORMATION

PART NUMBER	PACKAGE
NP84N04CHE	TO-220AB
NP84N04DHE	TO-262
NP84N04EHE	TO-263

FEATURES

- Channel temperature 175 degree rated
- Super low on-state resistance
  $R_{DS(on)}$ = 5.0 mΩ MAX. (V_{GS} = 10 V, I_D = 42 A)
- Low C_{iss} : C_{iss} = 4700 pF (TYP.)
- Built-in gate protection diode

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage	V_{DSS}	40	V
Gate to Source Voltage	V_{GSS}	±20	V
Drain Current (DC) Note1	$I_{D(DC)}$	±84	A
Drain Current (Pulse) Note2	$I_{D(pulse)}$	±336	A
Total Power Dissipation (T_A = 25°C)	P_T	1.8	W
Total Power Dissipation (T_{ch} = 25°C)	P_T	150	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	°C
Storage Temperature	T_{stg}	–55 to +175	°C

Notes 1. Package Limit = ± 75 A

2. PW ≤ 10 μs, Duty cycle ≤ 1 %

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

THERMAL RESISTANCE

Channel to Case	R_{th}(ch-C)	1.00	°C/W
Channel to Ambient	R_{th}(ch-A)	83.3	°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.

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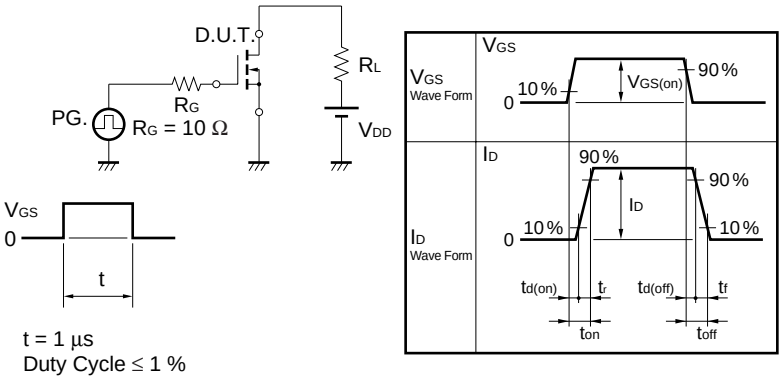
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

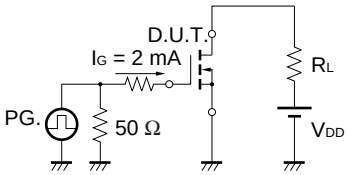
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 42 A		3.9	5.0	mΩ
Gate to Source Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 250 μA	2.0	3.0	4.0	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 42 A	20	40		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		4700	7050	pF
Output Capacitance	C_{oss}			900	1350	pF
Reverse Transfer Capacitance	C_{rss}			400	720	pF
Turn-on Delay Time	$t_{d(on)}$	I_D = 42 A, $V_{GS(on)}$ = 10 V, V_{DD} = 20 V,		110	240	ns
Rise Time	t_r	R_G = 10 Ω		1620	4050	ns
Turn-off Delay Time	$t_{d(off)}$			200	400	ns
Fall Time	t_f			260	650	ns
Total Gate Charge	Q_G	I_D = 84 A, V_{DD} = 32 V, V_{GS} = 10 V		80	120	nC
Gate to Source Charge	Q_{GS}			20		nC
Gate to Drain Charge	Q_{GD}			28		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 84 A, V_{GS} = 0 V		1.0		V
Reverse Recovery Time	t_{rr}	I_F = 84A, V_{GS} = 0 V, di/dt = 100A/μs		40		ns
Reverse Recovery Charge	Q_{rr}			70		nC

TEST CIRCUIT 1 SWITCHING TIME



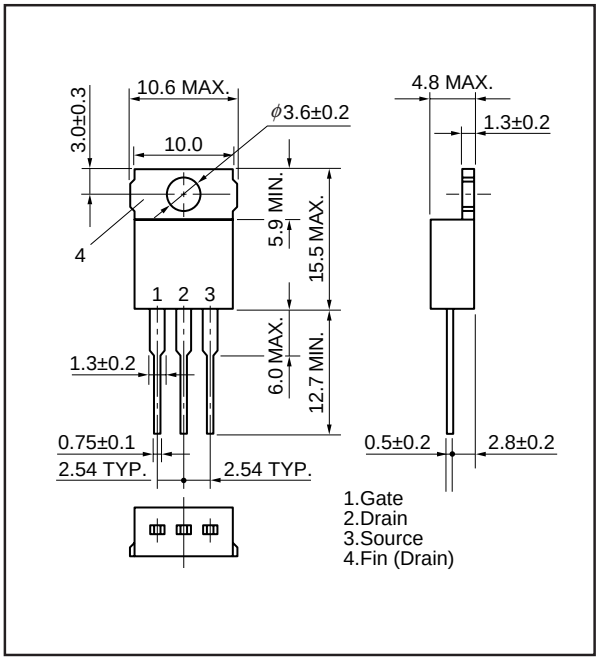
t = 1 μs
Duty Cycle ≤ 1 %

TEST CIRCUIT 2 GATE CHARGE

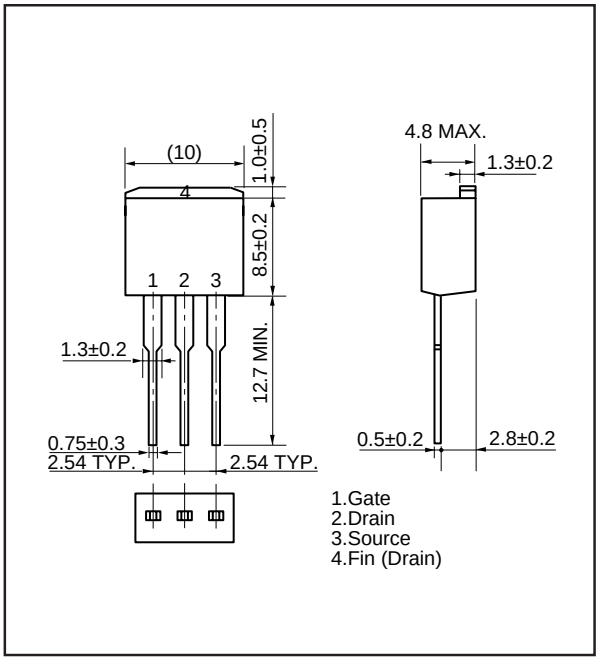


PACKAGE DRAWINGS (Unit: mm)

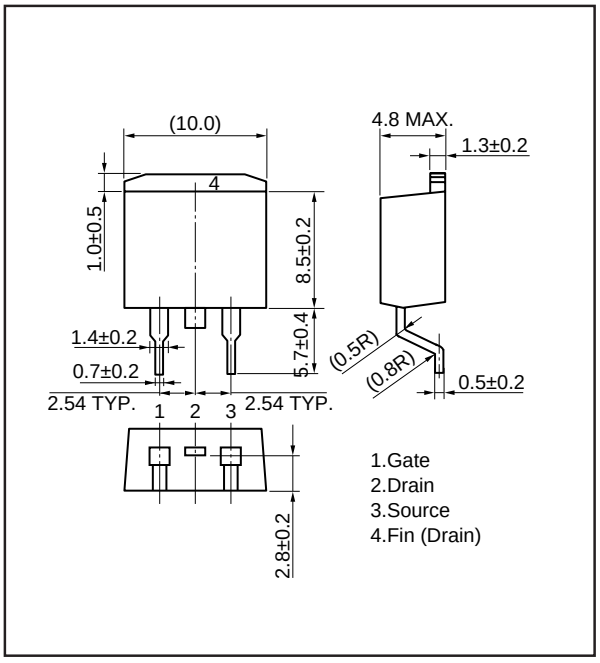
1) TO-220AB (MP-25)



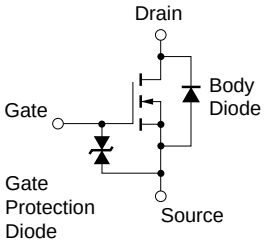
2) TO-262 (MP-25 Fin Cut)



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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