NEC

MOS FIELD EFFECT TRANSISTOR

NP86N04CHE, NP86N04DHE, NP86N04EHE

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
NP86N04CHE	TO-220AB
NP86N04DHE	TO-262
NP86N04EHE	TO-263

FEATURES

- Channel temperature 175 degree rated
- Super low on-state resistance
  $R_{DS(on)}$ = 4.5 mΩ MAX. (V_{GS} = 10 V, I_D = 43 A)
- Low C_{iss} : C_{iss} = 6200 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	$I_{D(DC)}$	±86	A
Drain Current (Pulse) Note2	$I_{D(pulse)}$	±344	A
Total Power Dissipation (T_A = 25°C)	P_T	1.8	W
Total Power Dissipation (T_{ch} = 25°C)	P_T	170	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	$R_{th(ch-C)}$	0.88	°C/W
Channel to Ambient	$R_{th(ch-A)}$	83.3	°C/W

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

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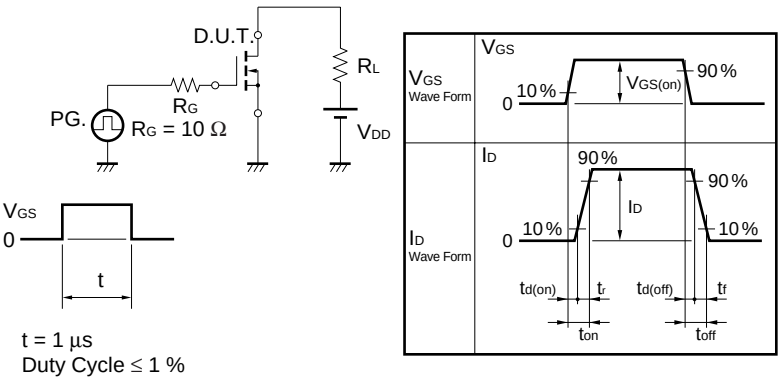
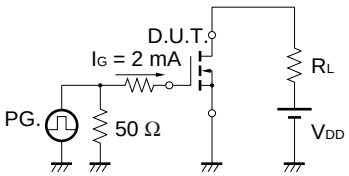
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 43 A		3.5	4.5	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 = 43 A	25	50		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		6200	9300	pF
Output Capacitance	C_{oss}			1200	2520	pF
Reverse Transfer Capacitance	C_{rss}			530	950	pF
Turn-on Delay Time	$t_{d(on)}$	I_D = 43 A, $V_{GS(on)}$ = 10 V, V_{DD} = 20 V,		140	310	ns
Rise Time	t_r	R_G = 10 Ω		2100	5250	ns
Turn-off Delay Time	$t_{d(off)}$			260	520	ns
Fall Time	t_f			340	850	ns
Total Gate Charge	Q_G	I_D = 86 A, V_{DD} = 32 V, V_{GS} = 10 V		100	150	nC
Gate to Source Charge	Q_{GS}			25		nC
Gate to Drain Charge	Q_{GD}			37		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	I_F = 86 A, V_{GS} = 0 V		1.0		V
Reverse Recovery Time	t_{rr}	I_F = 86A, V_{GS} = 0 V, di/dt = 100A/μs		52		ns
Reverse Recovery Charge	Q_{rr}			90		nC

TEST CIRCUIT 1 SWITCHING TIME

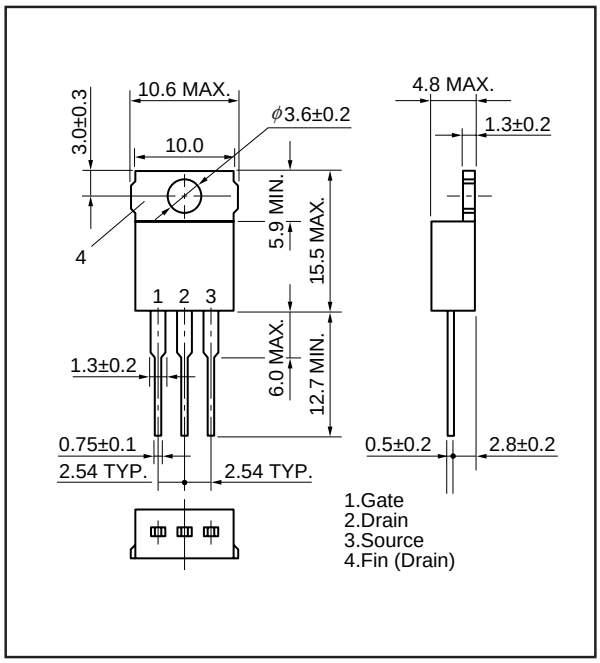


TEST CIRCUIT 2 GATE CHARGE

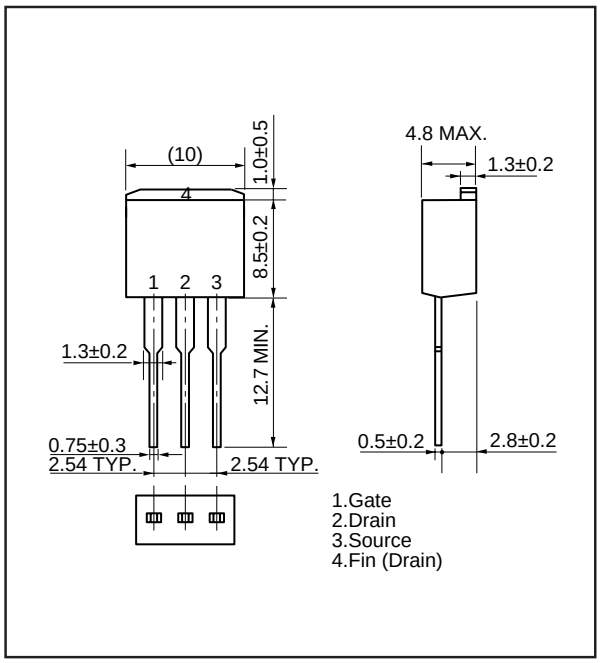


PACKAGE DRAWINGS (Unit: mm)

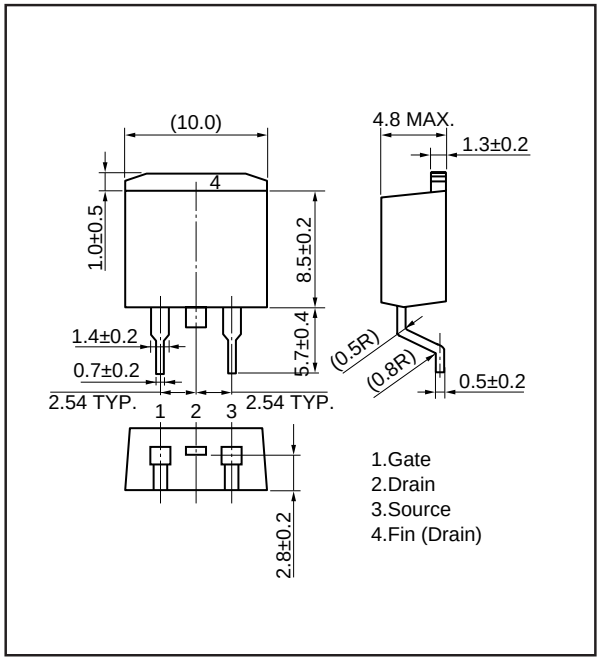
1) TO-220AB (MP-25)



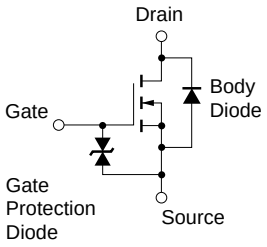
2) TO-262 (MP-25 Fin Cut)



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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