

# MOS FIELD EFFECT TRANSISTOR

## NP55N06CLD, NP55N06DLD, NP55N06ELD

### 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  
 $R_{DS(on)1} = 17 \text{ m}\Omega$  (MAX.) ( $V_{GS} = 10 \text{ V}$ ,  $I_D = 28 \text{ A}$ )  
 $R_{DS(on)2} = 23 \text{ m}\Omega$  (MAX.) ( $V_{GS} = 5 \text{ V}$ ,  $I_D = 28 \text{ A}$ )
- Low  $C_{iss}$  :  $C_{iss} = 1920 \text{ pF}$  (TYP.)
- Built-in Gate protection diode

#### ORDERING INFORMATION

PART NUMBER	PACKAGE
NP55N06CLD	TO-220AB
NP55N06DLD	TO-262
NP55N06ELD	TO-263

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

Drain to Source Voltage	$V_{DSS}$	60	V
Gate to Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current (DC)	$I_{D(DC)}$	$\pm 55$	A
Drain Current (Pulse) <sup>Note1</sup>	$I_{D(pulse)}$	$\pm 165$	A
Total Power Dissipation ( $T_A = 25 \text{ }^\circ\text{C}$ )	$P_T$	1.8	W
Total Power Dissipation ( $T_{ch} = 25 \text{ }^\circ\text{C}$ )	$P_T$	77	W
Single Avalanche Current	$I_{AS}$	TBD	A
Single Avalanche Energy <sup>Note2</sup>	$E_{AS}$	TBD	mJ
Channel Temperature	$T_{ch}$	175	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to + 175	$^\circ\text{C}$

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

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

#### THERMAL RESISTANCE

Channel to Case	$R_{th(ch-C)}$	1.95	$^\circ\text{C/W}$
Channel to Ambient	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

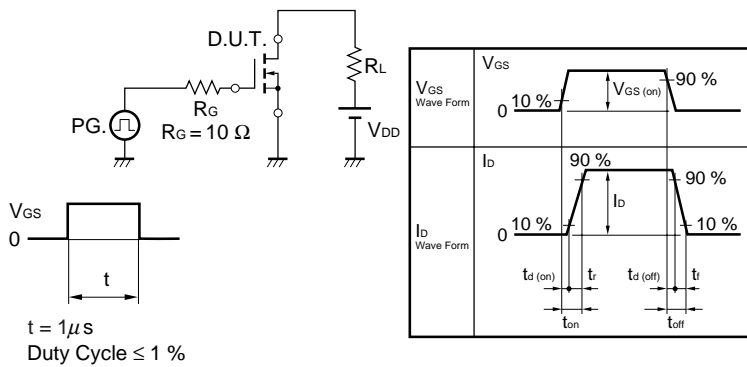
The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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.

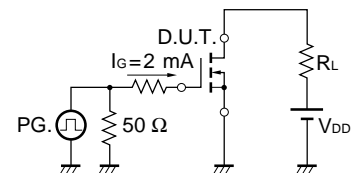
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 28 A		13	17	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 5 V, I <sub>D</sub> = 28 A		17	23	mΩ
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = 4 V, I <sub>D</sub> = 28 A		20	27	mΩ
Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 250 μA	1.0	1.5	2.0	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 28 A	13	42		S
Drain Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V			10	μA
Gate to Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V			±10	μA
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1 MHz		1920	2880	pF
Output Capacitance	C <sub>oss</sub>			380	570	pF
Reverse Transfer Capacitance	C <sub>rss</sub>			140	250	pF
Turn-on Delay Time	t <sub>d(on)</sub>	I <sub>D</sub> = 28 A, V <sub>GS(on)</sub> = 10 V, V <sub>DD</sub> = 30 V, R <sub>G</sub> = 10 Ω		35	80	ns
Rise Time	t <sub>r</sub>			440	1100	ns
Turn-off Delay Time	t <sub>d(off)</sub>			110	220	ns
Fall Time	t <sub>f</sub>			230	500	ns
Total Gate Charge 1	Q <sub>G1</sub>	I <sub>D</sub> = 55 A, V <sub>DD</sub> = 48 V, V <sub>GS</sub> = 10 V		44	66	nC
Total Gate Charge 2	Q <sub>G2</sub>	I <sub>D</sub> = 55 A, V <sub>DD</sub> = 48 V, V <sub>GS</sub> = 5 V		25	38	nC
Gate to Source Charge	Q <sub>GS</sub>			8		nC
Gate to Drain Charge	Q <sub>GD</sub>			13		nC
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 55 A, V <sub>GS</sub> = 0 V		1.0		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 55 A, V <sub>GS</sub> = 0 V, di/dt = 100 A/μs		60		ns
Reverse Recovery Charge	Q <sub>rr</sub>			100		nC

**TEST CIRCUIT 1 SWITCHING TIME**

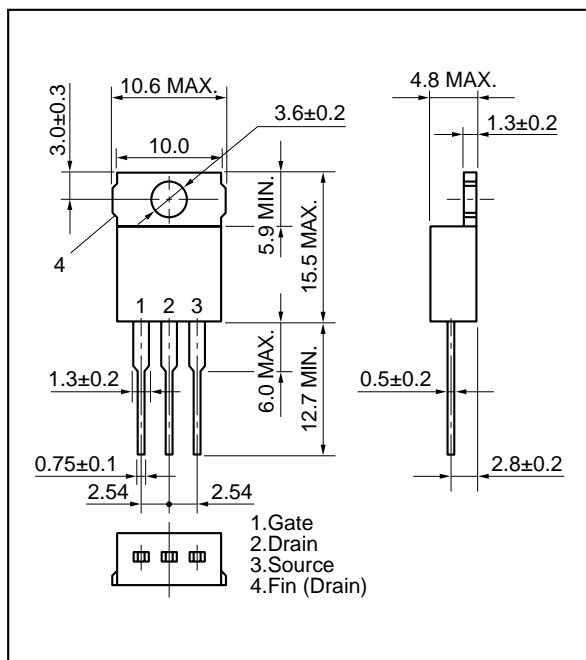


**TEST CIRCUIT 2 GATE CHARGE**

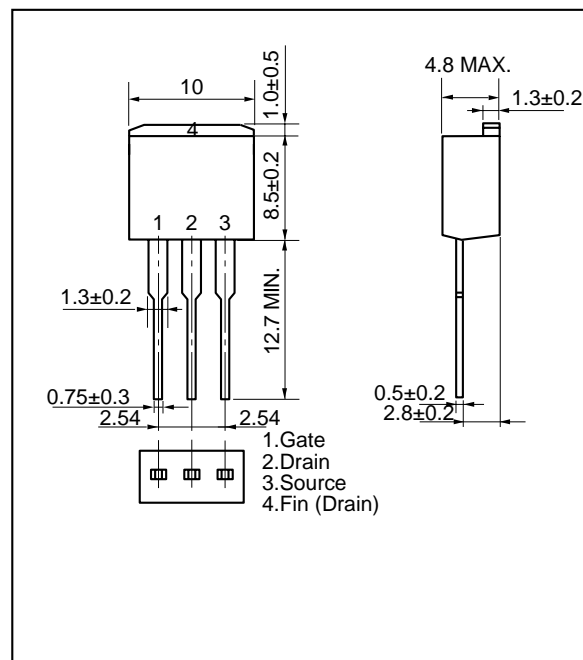


PACKAGE DRAWINGS (Unit : mm)

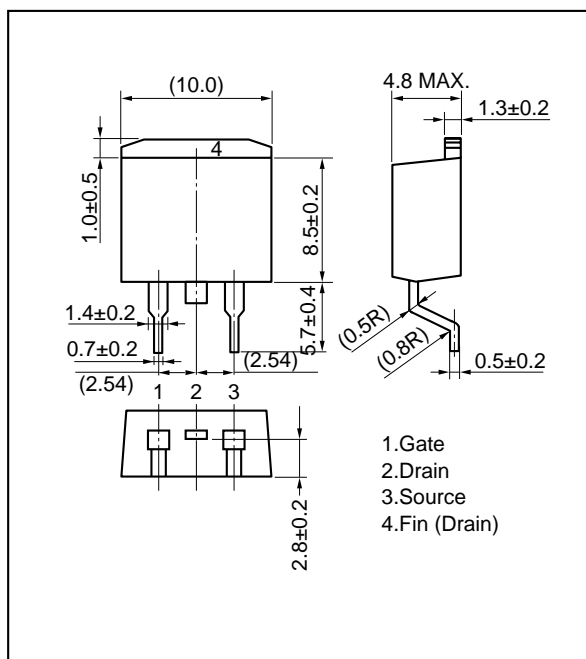
1. TO-220AB (MP-25)



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



3. TO-263 (JEDEC type : MP-25ZJ)



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Anti-radioactive design is not implemented in this product.