

# MOS FIELD EFFECT TRANSISTOR

## NP82N055CLE, NP82N055DLE, NP82N055ELE

### 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  
 $R_{DS(on)1} = 8.4 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 41 \text{ A)}$   
 $R_{DS(on)2} = 11 \text{ m}\Omega \text{ MAX. (} V_{GS} = 5 \text{ V, } I_D = 41 \text{ A)}$
- Low  $C_{iss}$  :  $C_{iss} = 4750 \text{ pF (TYP.)}$
- Built-in gate protection diode

#### ORDERING INFORMATION

PART NUMBER	PACKAGE
NP82N055CLE	TO-220AB
NP82N055DLE	TO-262
NP82N055ELE	TO-263

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

Drain to Source Voltage	$V_{DSS}$	55	V
Gate to Source Voltage	$V_{GSS}$	$\pm 20$	V
Drain Current (DC) <sup>Note1</sup>	$I_{D(DC)}$	$\pm 82$	A
Drain Current (Pulse) <sup>Note2</sup>	$I_{D(pulse)}$	$\pm 328$	A
Total Power Dissipation ( $T_A = 25^\circ\text{C}$ )	$P_T$	1.8	W
Total Power Dissipation ( $T_{ch} = 25^\circ\text{C}$ )	$P_T$	110	W
Single Avalanche Current	$I_{AS}$	T.B.D.	A
Single Avalanche Energy <sup>Note3</sup>	$E_{AS}$	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

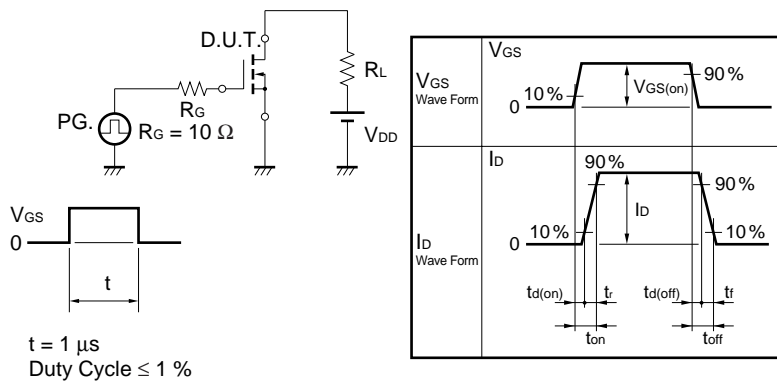
Channel to Case	$R_{th(ch-c)}$	1.36	$^\circ\text{C/W}$
Channel to Ambient	$R_{th(ch-a)}$	83.3	$^\circ\text{C/W}$

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.

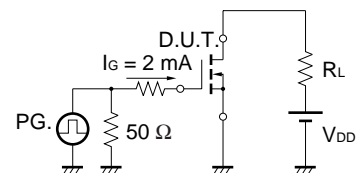
ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

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> = 41 A		6.7	8.4	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 5 V, I <sub>D</sub> = 41 A		7.9	11	mΩ
	R <sub>DS(on)3</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 41 A		8.2	12	mΩ
Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 250 μA	1.5	2.0	2.5	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 41 A	25	50		S
Drain Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 55 V, V <sub>GS</sub> = 0			10	μA
Gate to Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0			±10	μA
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0, f = 1 MHz		4750	7130	pF
Output Capacitance	C <sub>oss</sub>			840	1260	pF
Reverse Transfer Capacitance	C <sub>rss</sub>			340	610	pF
Turn-on Delay Time	t <sub>d(on)</sub>	I <sub>D</sub> = 41 A, V <sub>GS(on)</sub> = 10 V, V <sub>DD</sub> = 28 V, R <sub>G</sub> = 10 Ω		100	220	ns
Rise Time	t <sub>r</sub>			550	1380	ns
Turn-off Delay Time	t <sub>d(off)</sub>			200	400	ns
Fall Time	t <sub>f</sub>			330	830	ns
Total Gate Charge 1	Q <sub>G1</sub>	I <sub>D</sub> = 82 A, V <sub>DD</sub> = 44 V, V <sub>GS</sub> = 10 V		72	110	nC
Total Gate Charge 2	Q <sub>G2</sub>	I <sub>D</sub> = 82 A, V <sub>DD</sub> = 44 V, V <sub>GS</sub> = 5 V		51	77	nC
Gate to Source Charge	Q <sub>GS</sub>			11		nC
Gate to Drain Charge	Q <sub>GD</sub>			20		nC
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 82 A, V <sub>GS</sub> = 0		1.0		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 82 A, V <sub>GS</sub> = 0, di/dt = 100A/μs		48		ns
Reverse Recovery Charge	Q <sub>rr</sub>			100		nC

TEST CIRCUIT 1 SWITCHING TIME

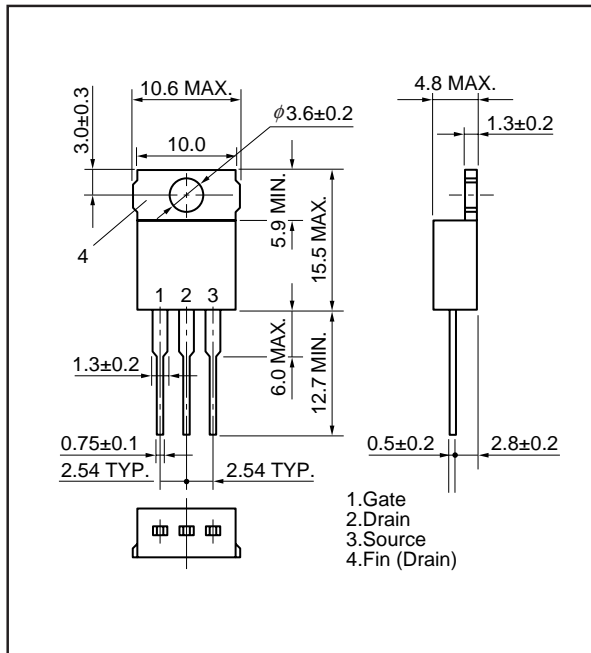


TEST CIRCUIT 2 GATE CHARGE

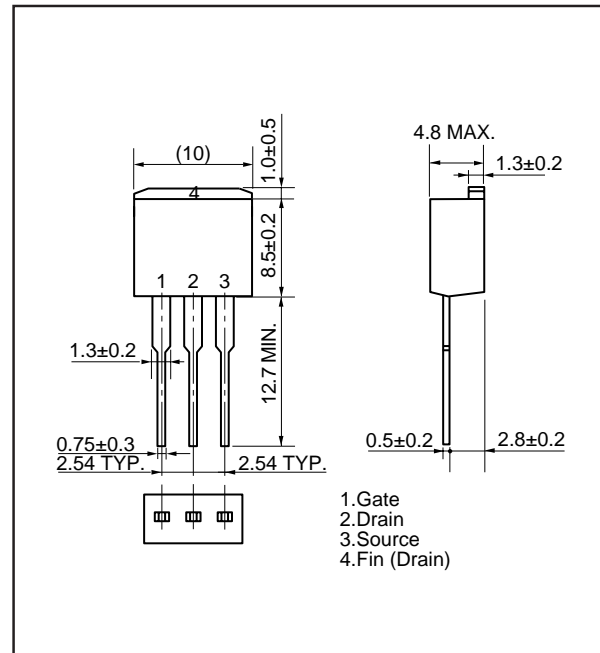


PACKAGE DRAWINGS (Unit: mm)

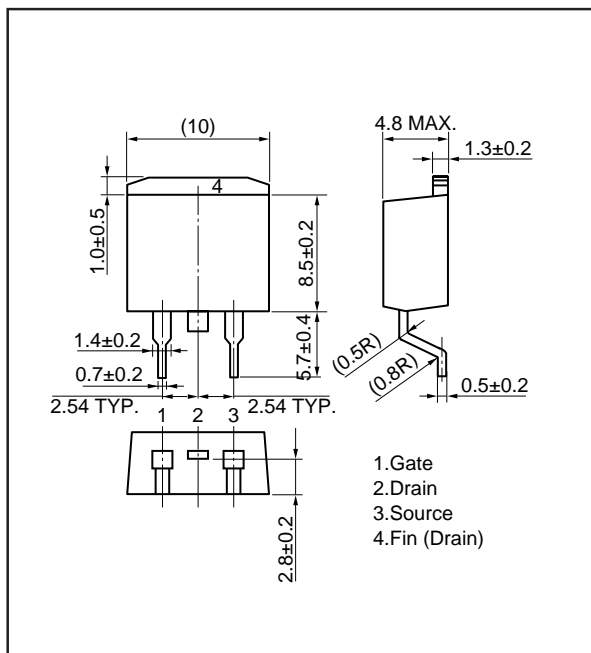
1) TO-220AB (MP-25)



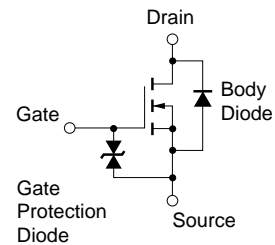
2) TO-262 (MP-25 Fin Cut)



3) TO-263 (JEDEC TYPE: MP-25ZJ)



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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