

MOS FIELD EFFECT TRANSISTOR

NP22N055HHE, NP22N055IHE

SWITCHING

N-CHANNEL POWER MOS FET

INDUSTRIAL USE

DESCRIPTION

These products are N-channel MOS Field Effect Transistors designed for high current switching applications.

FEATURES

- Channel temperature 175 degree rated
- Super low on-state resistance
- ★ $R_{DS(on)} = 39 \text{ m}\Omega$ MAX. ($V_{GS} = 10 \text{ V}$, $I_D = 11 \text{ A}$)
- ★ • Low C_{iss} : $C_{iss} = 590 \text{ pF}$ TYP.
- Built-in gate protection diode

ORDERING INFORMATION

PART NUMBER	PACKAGE
NP22N055HHE	TO-251(MP-3)
NP22N055IHE	TO-252(MP-3Z)

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

Drain to Source Voltage	V_{DSS}	55	V
Gate to Source Voltage	V_{GSS}	± 20	V
Drain Current (DC)	$I_{D(DC)}$	± 22	A
Drain Current (Pulse) ^{Note1}	$I_{D(pulse)}$	± 88	A
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_T	1.2	W
★ Total Power Dissipation ($T_c = 25^\circ\text{C}$)	P_T	45	W
★ Single Avalanche Current ^{Note2}	I_{AS}	13 / 5	A
★ Single Avalanche Energy ^{Note2}	E_{AS}	16 / 25	mJ
Channel Temperature	T_{ch}	175	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +175	$^\circ\text{C}$

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

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

THERMAL RESISTANCE

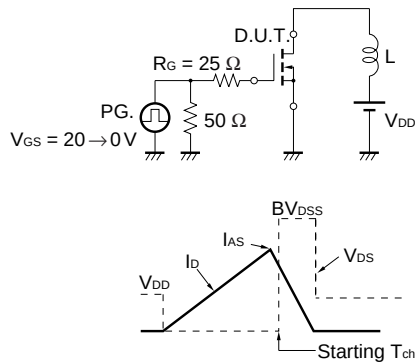
★ Channel to Case	$R_{th(ch-C)}$	3.33	$^\circ\text{C/W}$
Channel to Ambient	$R_{th(ch-A)}$	125	$^\circ\text{C/W}$

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

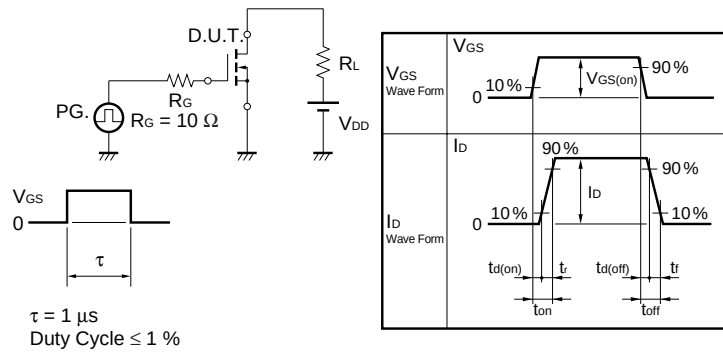
★ ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 11 A		30	39	mΩ
Gate to Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2.0	3.0	4.0	V
Forward Transfer Admittance	y _{fs}	V _{DS} = 10 V, I _D = 11 A	4	8		S
Drain Leakage Current	I _{DSS}	V _{DS} = 55 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		590	890	pF
Output Capacitance	C _{oss}			110	170	pF
Reverse Transfer Capacitance	C _{rss}			52	94	pF
Turn-on Delay Time	t _{d(on)}	I _D = 11 A, V _{GS(on)} = 10 V, V _{DD} = 28 V, R _G = 10 Ω		20	50	ns
Rise Time	t _r			200	500	ns
Turn-off Delay Time	t _{d(off)}			37	74	ns
Fall Time	t _f			36	90	ns
Total Gate Charge	Q _G	I _D = 11 A, V _{DD} = 44 V, V _{GS} = 10 V		12	18	nC
Gate to Source Charge	Q _{GS}			3		nC
Gate to Drain Charge	Q _{GD}			5		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 22 A, V _{GS} = 0 V		1.0		V
Reverse Recovery Time	t _{rr}	I _F = 22 A, V _{GS} = 0 V, di/dt = 100A/μs		35		ns
Reverse Recovery Charge	Q _{rr}			42		nC

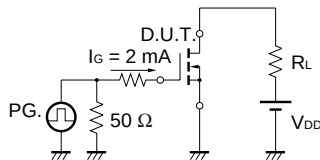
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

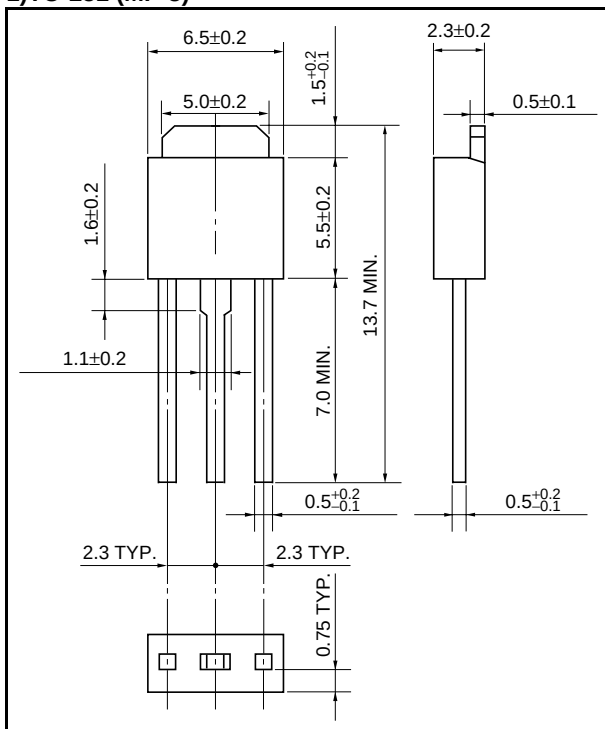


TEST CIRCUIT 3 GATE CHARGE

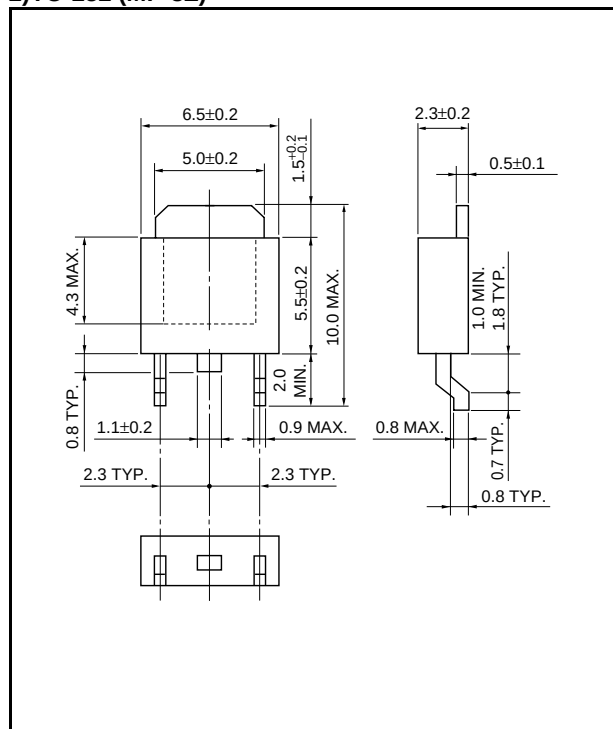


★ PACKAGE DRAWINGS (Unit: mm)

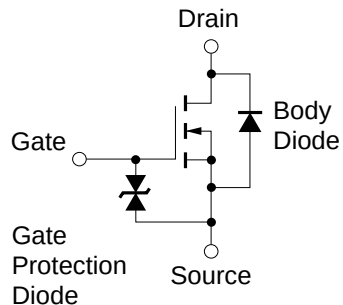
1) TO-251 (MP-3)



2) TO-252 (MP-3Z)



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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