

### NP40N06CLC, NP40N06DLC, NP40N06ELC

#### N-CHANNEL MOS FIELD EFFECT TRANSISTOR FOR SWITCHING

#### DESCRIPTION

This product is N-channel MOS Field Effect Transistor designed for high voltage switching application.

#### FEATURES

- Channel temperature 175degree rated
- Low On-state resistance  
 $R_{DS(on)1} = 0.027 \Omega \text{ MAX. at } V_{GS} = 10V, I_D = 18A$   
 $R_{DS(on)2} = 0.04 \Omega \text{ MAX. at } V_{GS} = 4V, I_D = 18A$
- Low Ciss Ciss= 1000pF
- High avalanche Capability Ratings
- TO-220AB, TO-262AA, TO-220SMD Package

#### ORDERING INFORMATION

PART NUMBER*	PACKAGE
NP40N06CLC	TO-220AB
NP40N06DLC	TO-262AA
NP40N06ELC	TO-220SMD

\*:Tentative Type Number

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

Drain to source Voltage	$V_{DS}$	60	V
Gate to Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current(DC)	$I_{D(DC)}$	$\pm 40$	A
Drain Current(pulse)	$I_{D(pulse)}$	$\pm 160^*$	A
Total Power Dissipation	$P_{T1}$	84**	W
Total Power Dissipation	$P_{T2}$	1.5***	W
Single Avalanche Current	$I_{AS}$	40****	A
Single Avalanche Energy	$E_{AS}$	T.B.D****	mJ
Channel Temperature	$T_{ch}$	175	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +175	$^\circ\text{C}$

\* $PW \leq 10 \mu s$ , Duty Cycle  $\leq 1\%$

\*\* $T_c = 25^\circ\text{C}$ , \*\*\* $T_a = 25^\circ\text{C}$

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

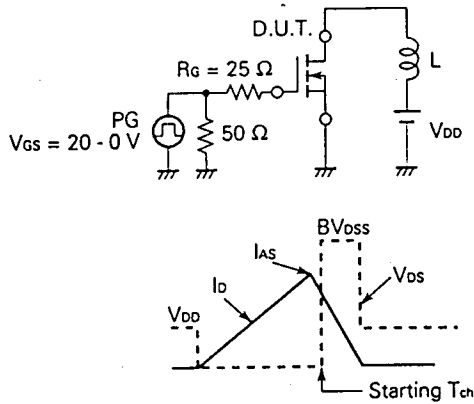
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## THERMAL RESISTANCE

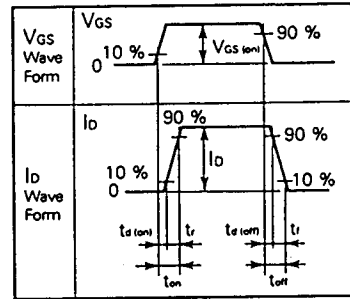
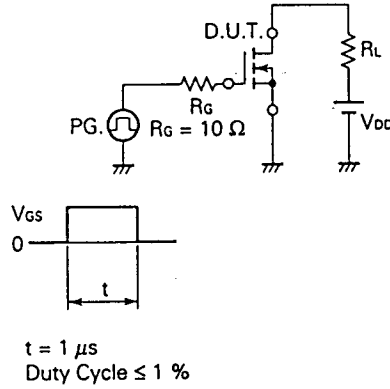
Channel to Case  $R_{th(ch-c)}$  1.79°C/WChannel to Ambient  $R_{th(ch-a)}$  100°C/WELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Cut-off Current	$I_{DSS}$			10	$\mu\text{A}$	$V_{DS} = 60\text{V}$ , $V_{GS} = 0$
Gate Leakage Current	$I_{GSS}$			$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0$
Gate Cut-off Voltage	$V_{GS(off)}$	1.0	1.5	2.0	V	$V_{DS} = 10\text{V}$ , $I_D = 1\text{mA}$
Forward Transfer Admittance	$ y_{fs} $	10	23		S	$V_{DS} = 10\text{V}$ , $I_D = 18\text{A}$
Drain to Source On-State Resistance	$R_{DS(on)1}$		0.02	0.027	$\Omega$	$V_{GS} = 10\text{V}$ , $I_D = 18\text{A}$
Drain to Source On-State Resistance	$R_{DS(on)2}$		0.033	0.04	$\Omega$	$V_{GS} = 4\text{V}$ , $I_D = 18\text{A}$
Input Capacitance	$C_{iss}$		1000	1500	pF	$V_{DS} = 25\text{V}$ $V_{GS} = 0$ $f = 1\text{MHz}$
Output Capacitance	$C_{oss}$		400	600	pF	
Reverse Transfer Capacitance	$C_{rss}$		150	270	pF	
Turn-on Delay Time	$t_{d(on)}$		35	T.B.D.	ns	$V_{DD} = 30\text{V}$ , $I_D = 18\text{A}$ $V_{GS(on)} = 10\text{V}$ , $R_G = 10\Omega$ $R_L = 1.67\Omega$
Rise Time	$t_r$		280	T.B.D.	ns	
Turn-off Delay Time	$t_{d(off)}$		160	T.B.D.	ns	
Fall Time	$t_f$		170	T.B.D.	ns	
Total Gate Charge	$Q_G$		50	T.B.D.	nC	$V_{DS} = 48\text{V}$ $V_{GS} = 10\text{V}$ $I_D = 35\text{A}$
Gate to Source Charge	$Q_{GS}$		4.5		nC	
Gate to Drain Charge	$Q_{GD}$		22		nC	
Diode Forward Voltage	$V_{F(S-D)}$		1.0		V	$I_F = 35\text{A}$ , $V_{GS} = 0$
Reverse Recovery Time	$t_{rr}$		70.		ns	$I_F = 35\text{A}$ , $V_{GS} = 0$ $di/dt = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge	$Q_{rr}$		130		nC	

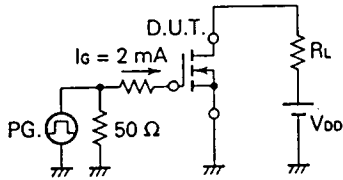
Test Circuit 1 Avalanche Capability



Test Circuit 2 Switching Time



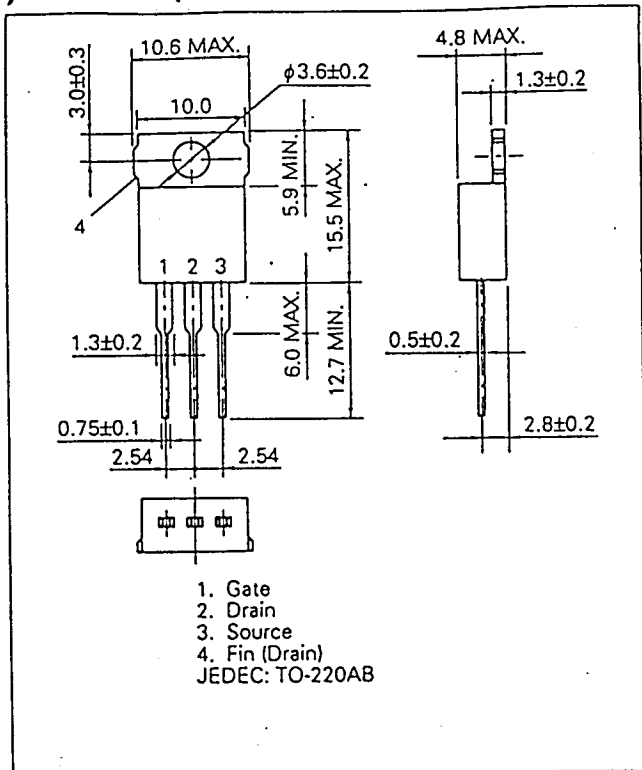
Test Circuit 3 Gate Charge



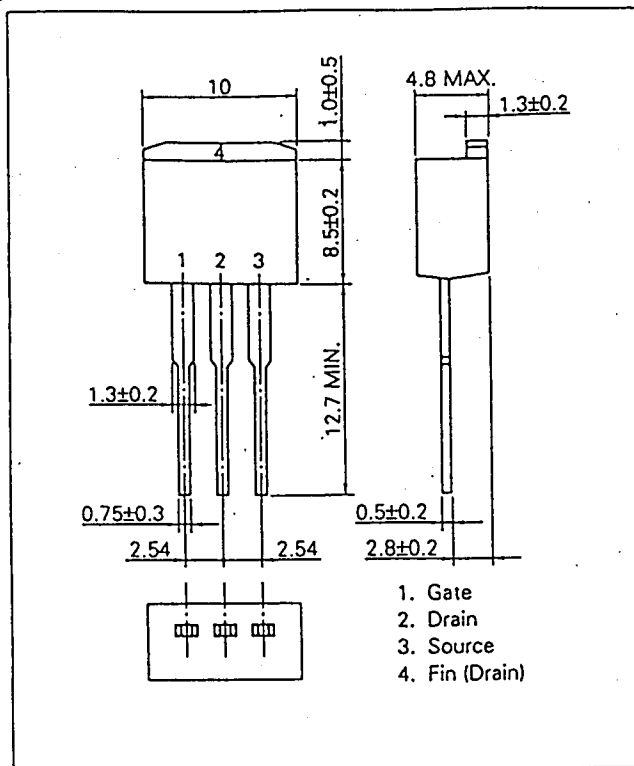
The application circuits and their parameters are for references only and are not intended for use in actual design-in's.

Package Dimensions(in millimeter)

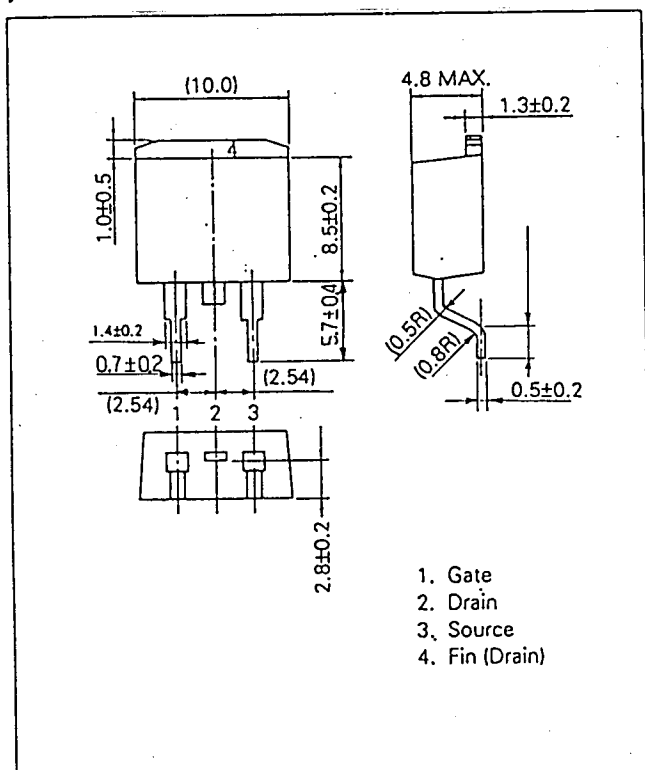
1) TO-220AB(MP-25)



2) TO-262AA(TO-220 Fin Cut:MP-25 Fin Cut)



3) TO-220SMD(JEDEC type:MP-25ZJ)



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Anti-radioactive design is not implemented in this product.