

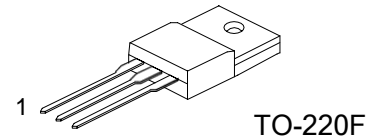
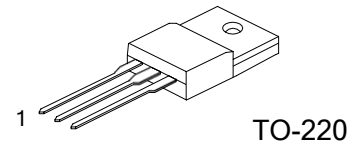
# 10A 800V N-CHANNEL POWER MOSFET

## Description:

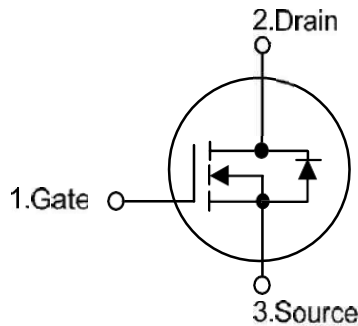
The KWNJ10N80 uses advanced proprietary, planar stripe, DMOS technology to provide excellent RDS(ON), low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

## Features:

- \*  $V_{DS} = 800V$
- \*  $I_D = 10A$
- \*  $R_{DS(ON)} = 0.8\Omega @ V_{GS} = 10V$ .
- \* Ultra Low Gate Charge ( Typical 45nC )
- \* Low Reverse Transfer Capacitance (  $CRSS = \text{Typical } 15pF$  )
- \* Fast switching capability
- \* Avalanche energy specified
- \* Improved dv/dt capability, high ruggedness



## SYMBOL



## ORDERING INFORMATION

Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
KWNJ10N80	TO-220	G	D	S	Tape Box
KWNJ10N80-BL	TO-220	G	D	S	Bulk
KWNJ10N80F	TO-220F	G	D	S	Tube

Note: Pin Assignment: G: Gate D: Drain S: Source

**ABSOLUTE MAXIMUM RATINGS** ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	800	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Continuous Drain Current ( $T_C = 25^\circ\text{C}$ )		$I_D$	10	A
Pulsed Drain Current (Note 2)		$I_{DM}$	40	A
Avalanche Current (Note 2)		$I_{AR}$	10	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	920	mJ
	Repetitive (Note 2)	$E_{AR}$	24	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.0	V/ns
Power Dissipation	TO-220	$P_D$	156	W
	TO-220F		63	
Linear Derating Factor above $T_C = 25^\circ\text{C}$	TO-220		1.25	W/ $^\circ\text{C}$
	TO-220F		0.504	
Junction Temperature			$T_J$	150
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

- Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.  
 2. Repetitive Rating: Pulse width limited by maximum junction temperature.  
 3.  $L=17.3\text{mH}$ ,  $I_{AS}=10\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$   
 4.  $I_{SD} \leq 10\text{ A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$ .

**THERMAL DATA**

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220F	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-220			
Junction to Case	TO-220	$\theta_{JC}$	0.8	$^\circ\text{C}/\text{W}$
	TO-220F		1.98	

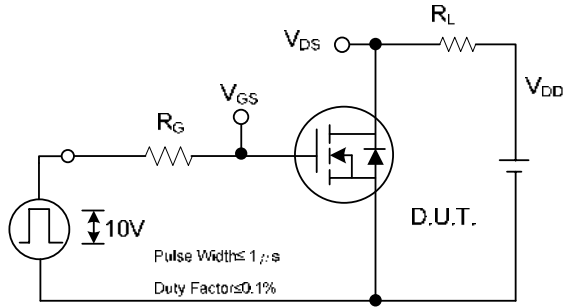
**ELECTRICAL CHARACTERISTICS** ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0\text{ V}, I_D=250\ \mu\text{A}$	800			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=800\text{V}, V_{GS}=0\text{ V}$			10	$\mu\text{A}$
		$V_{DS}=640\text{V}, T_C=125^{\circ}\text{C}$			100	
Gate-Body Leakage Current	$I_{GSS}$	$V_{DS}=0\text{ V}, V_{GS}=\pm 30\text{ V}$			$\pm 100$	nA
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\ \mu\text{A}$ , Referenced to $25^{\circ}\text{C}$		0.98		$\text{V}/^{\circ}\text{C}$
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\ \mu\text{A}$	3.0		5.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=5.0\text{A}$		0.7	0.8	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=25\text{V}, V_{GS}=0\text{V},$ $f=1\text{MHz}$		2150	2800	$\text{pF}$
Output Capacitance	$C_{OSS}$			180	230	
Reverse Transfer Capacitance	$C_{RSS}$			15	20	
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=400\text{V}, I_D=10.0\text{A},$ $R_G=25\ \Omega$ (Note 1,2)		50	110	ns
Turn-ON Rise Time	$t_R$			130	270	
Turn-OFF Delay Time	$t_{D(OFF)}$			90	190	
Turn-OFF Fall-Time	$t_F$			80	170	
Total Gate Charge	$Q_G$	$V_{DS}=640\text{V}, V_{GS}=10\text{V},$ $I_D=10.0\text{A}$ (Note 1,2)		45	58	nC
Gate Source Charge	$Q_{GS}$			13.5		
Gate Drain Charge	$Q_{GD}$			17		
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=10.0\text{ A}, V_{GS}=0\text{V}$			1.4	V
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				10.0	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				40.0	
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0\text{V}, dI_F/dt=100\text{ A}/\mu\text{s},$		730		ns
Reverse Recovery Charge	$Q_{RR}$	$I_S=10.0\text{A}$ (Note 1)		10.9		nC

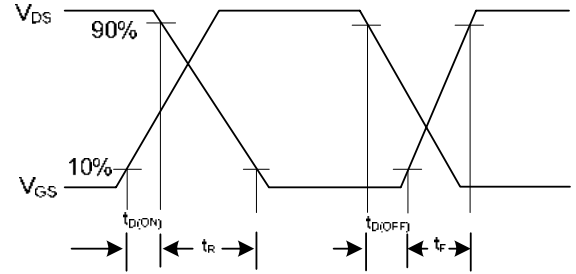
Notes: 1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

2. Independent of operating temperature.

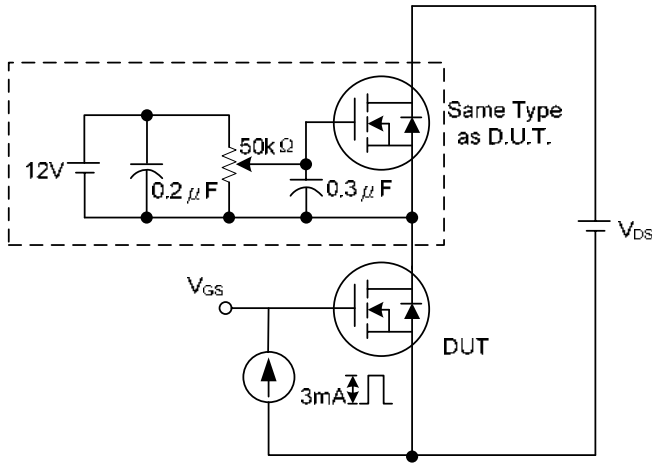
**TEST CIRCUIT**



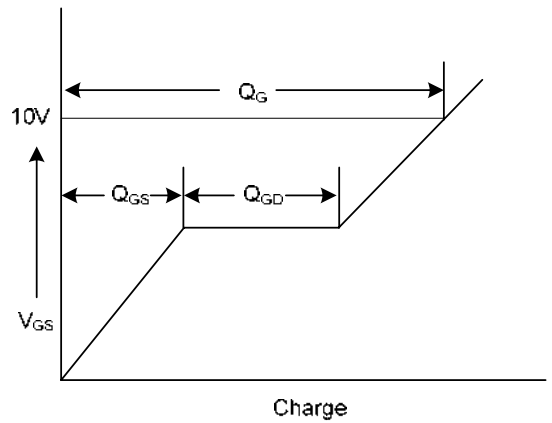
**Switching Test Circuit**



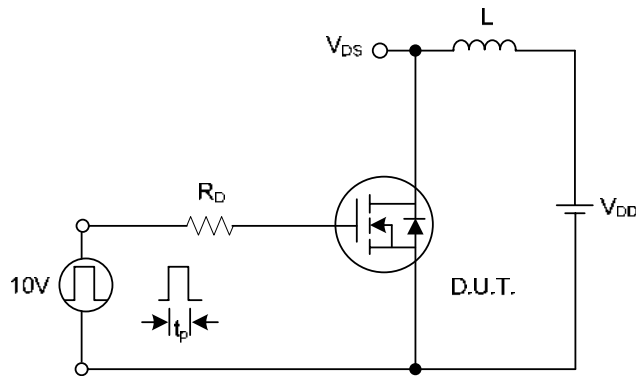
**Switching Waveforms**



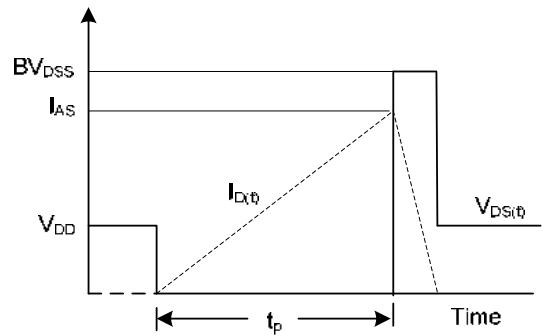
**Gate Charge Test Circuit**



**Gate Charge Waveform**

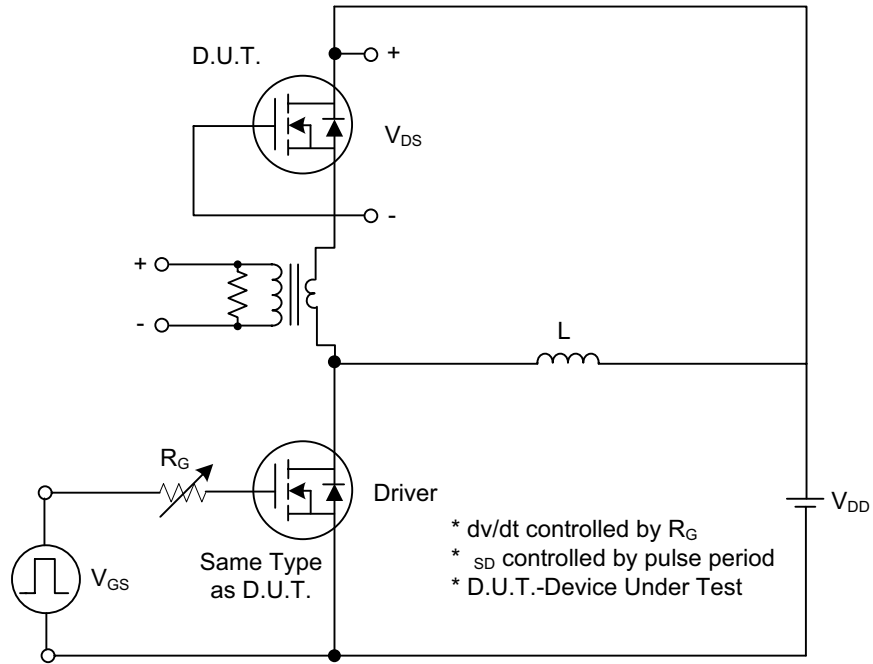


**Unclamped Inductive Switching Test Circuit**

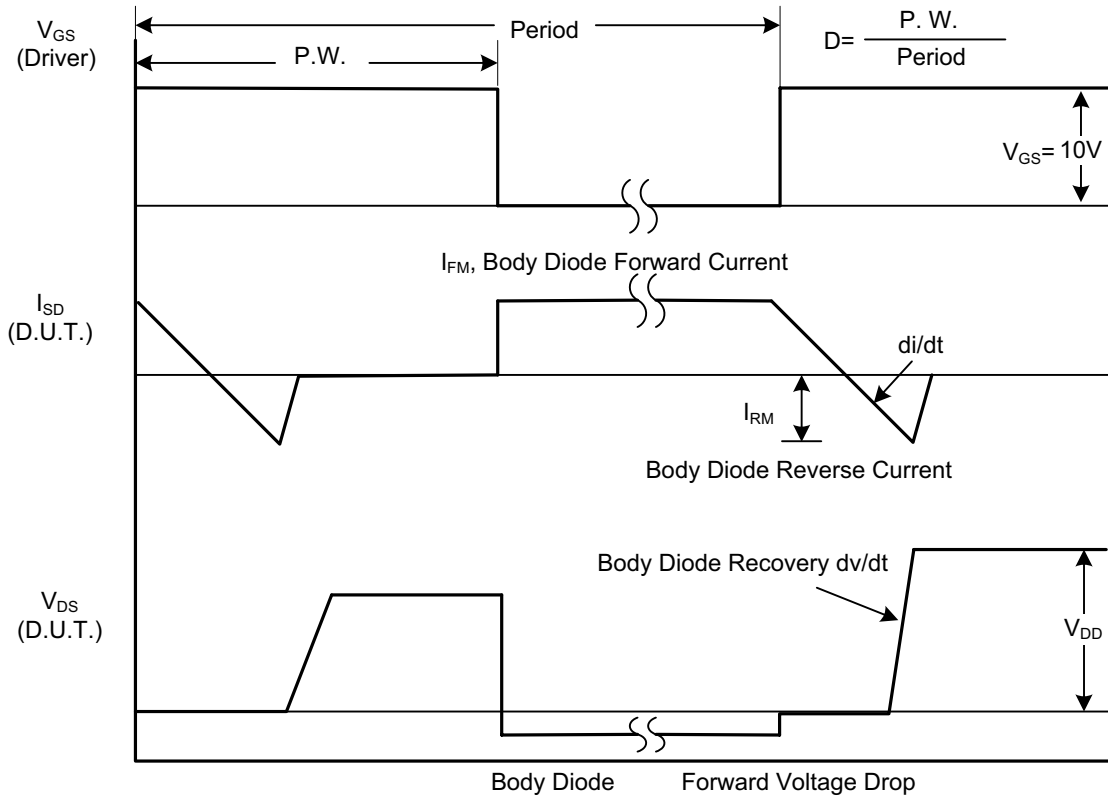


**Unclamped Inductive Switching Waveforms**

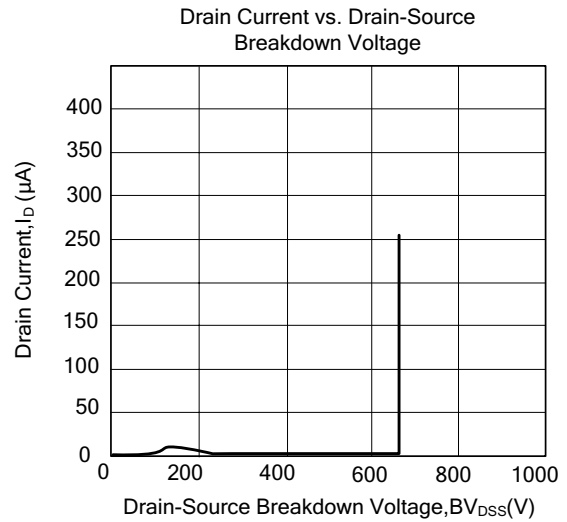
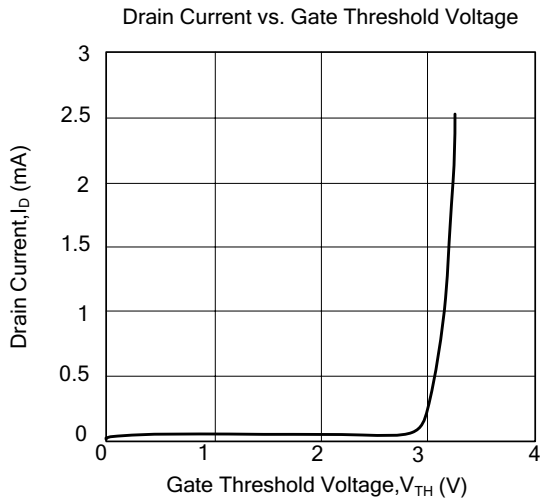
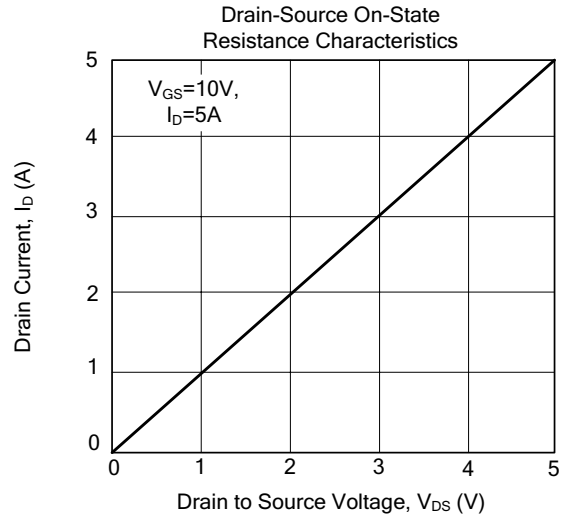
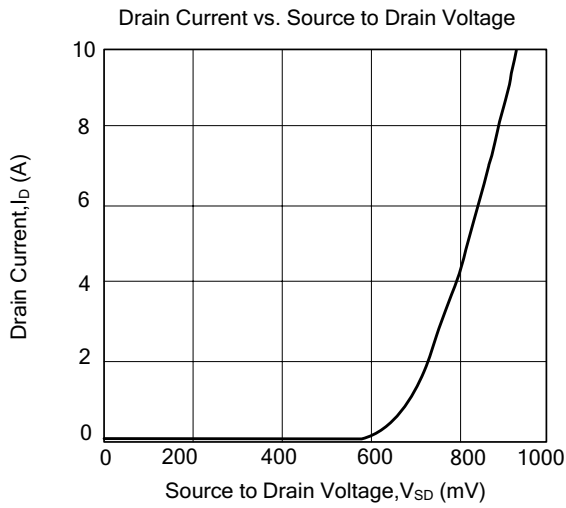
**TEST CIRCUIT(Cont.)**



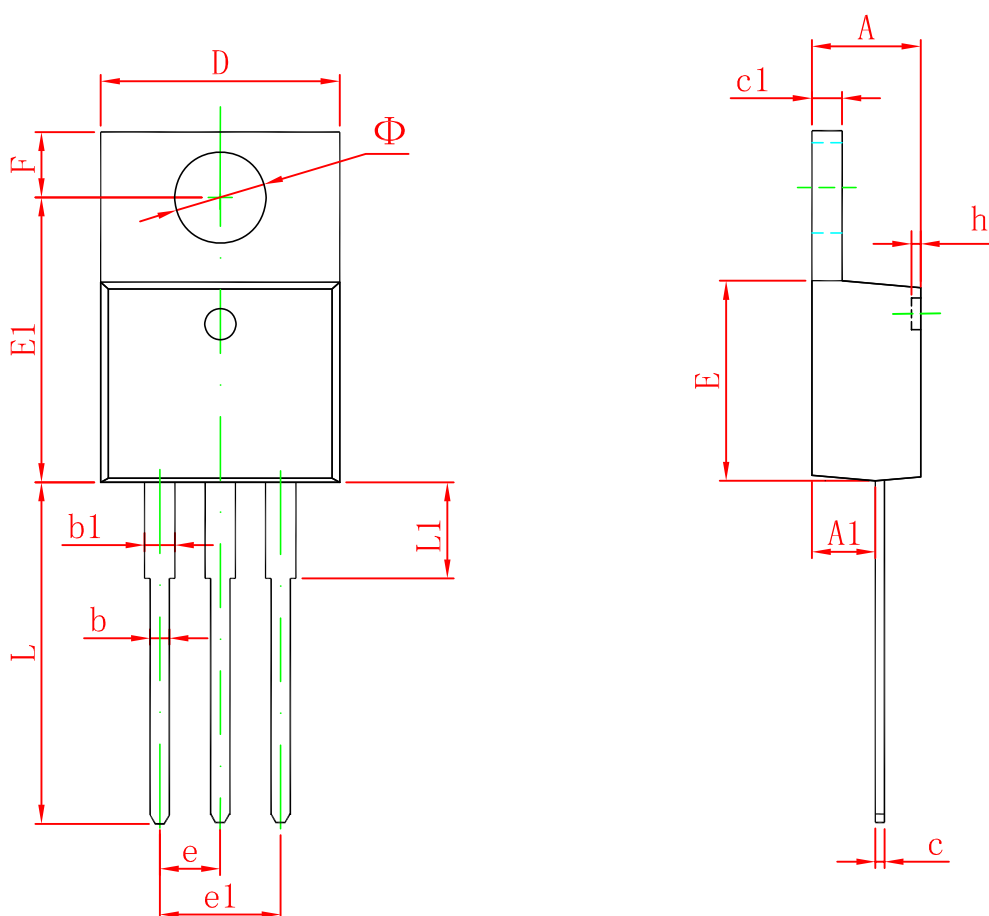
**Peak Diode Recovery dv/dt Test Circuit**



**TYPICAL CHARACTERISTICS**

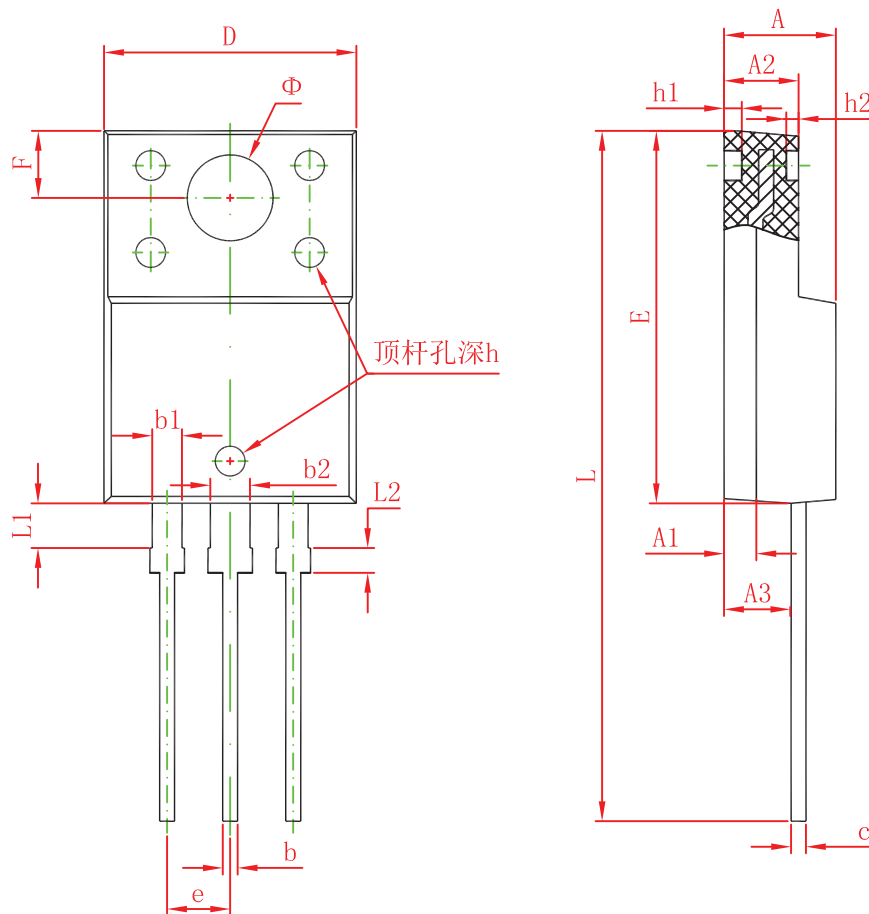


TO-220-3L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540 TYP		0.100 TYP	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
h	0.000	0.300	0.000	0.012
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
Φ	3.735	3.935	0.147	0.155

TO-220F Package Outline Dimensions

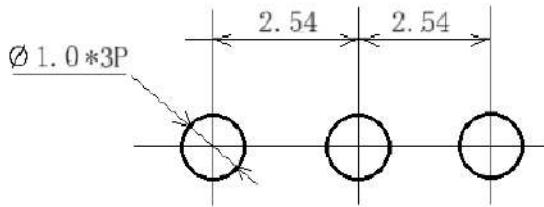


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	1.300 REF.		0.051 REF.	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540 TYP.		0.100 TYP.	
F	2.700 REF.		0.106 REF.	
$\Phi$	3.500 REF.		0.138 REF.	
h	0.000	0.300	0.000	0.012
h1	0.800 REF.		0.031 REF.	
h2	0.500 REF.		0.020 REF.	
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	0.900	1.100	0.035	0.043



## Packaging Specifications of Tube Pack for TO-220AB and ITO-220AB

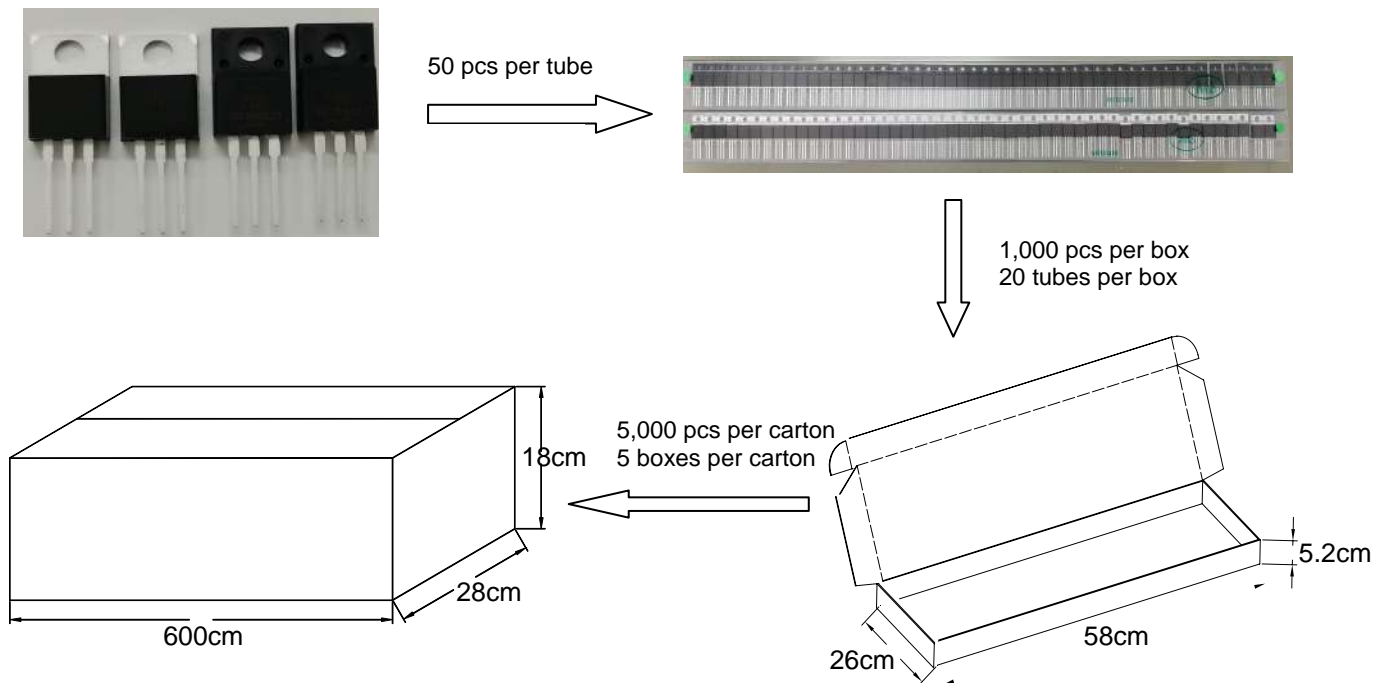
TO-220AB&ITO-220AB Suggested Pad Layout



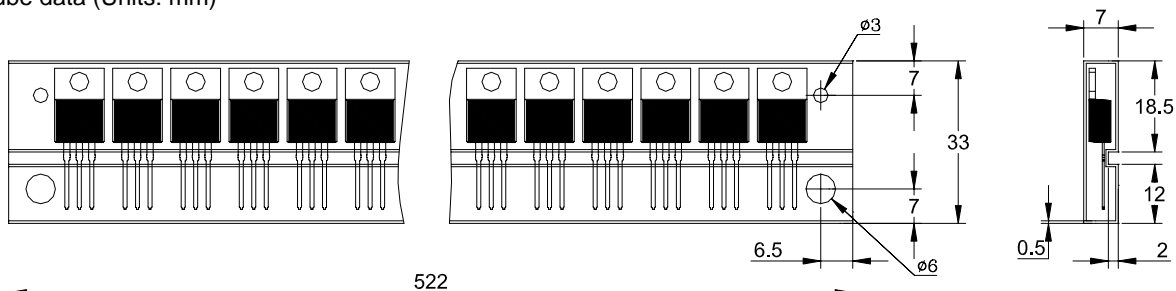
**Note:**

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.

1. The method of packaging and dimension are shown as below figure. (Dimension in mm)



2. Tube data (Units: mm)



### Storage

1. It is recommended to store the products in the following conditions:

Humidity: 75% R.H. Max.

Temperature :  $0^{\circ}\text{C} \sim 35^{\circ}\text{C}$  ( $32^{\circ}\text{F} \sim 95^{\circ}\text{F}$ )

2. Shelf life : 12 month at  $< 0^{\circ}\text{C} \sim 35^{\circ}\text{C}$  ( $32^{\circ}\text{F} \sim 95^{\circ}\text{F}$ ) and  $< 75\%$  R.H.