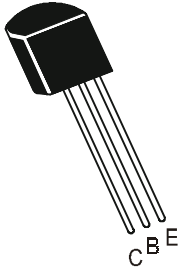


**NPN SILICON PLANAR SWITCHING TRANSISTORS**

**P2N2222**  
**P2N2222A**  
**EBC**  
**TO-92**



**Complementary Silicon Transistors For Switching And Linear Applications**  
**DC Amplifier & Driver For Industrial Applications.**

**ABSOLUTE MAXIMUM RATINGS(Ta=25deg C unless otherwise specified)**

DESCRIPTION	SYMBOL	2222	2222A	UNIT
Collector -Emitter Voltage	VCEO	30	40	V
Collector -Base Voltage	VCBO	60	75	V
Emitter -Base Voltage	VEBO	5.0	6.0	V
Collector Current Continuous	IC		600	mA
Power Dissipation @Ta=25 degC	PD		625	mW
Derate Above 25deg C			5	mW/deg C
@ Tc=25 degC	PD		1.5	W
Derate Above 25deg C			12	mW/deg C
Operating And Storage Junction Temperature Range	Tj, Tstg		-55 to +150	deg C
<b>THERMAL RESISTANCE</b>				
Junction to Case	Rth(j-c)		83.3	deg C/W
Junction to Ambient	Rth(j-a)		200	deg C/W

**ELECTRICAL CHARACTERISTICS (Ta=25 deg C Unless Otherwise Specified)**

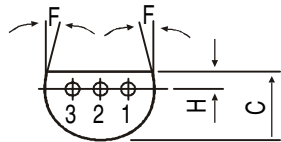
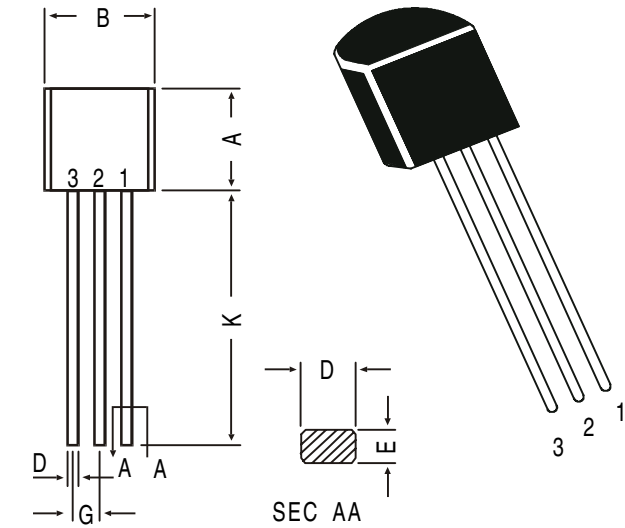
DESCRIPTION	SYMBOL	TEST CONDITION	2222	2222A	UNIT
Collector -Emitter Voltage	VCEO	IC=10mA, IB=0	>30	>40	V
Collector -Base Voltage	VCBO	IC=10uA, IE=0	>60	>75	V
Emitter-Base Voltage	VEBO	IE=10uA, IC=0	>5.0	>6.0	V
Collector-Cut off Current	ICBO	VCB=50V, IE=0	<10	-	nA
		VCB=60V, IE=0	-	<10	nA
		Ta=150 deg C			
		VCB=50V, IE=0	<10	-	uA
		VCB=60V, IE=0	-	<10	uA
	ICEX	VCE=60V, VBE=3V	-	<10	nA
	ICEO	VCE=10V, IB=0	<10	<10	nA
Emitter-Cut off Current	IEBO	VEB=3V, IC=0	-	<10	nA
Base-Cut off Current	IBEX	VCE=60V, VBE=3V	-	<20	nA
Collector Emitter Saturation Voltage	VCE(Sat)*	IC=150mA, IB=15mA	<0.4	<0.3	V
		IC=500mA, IB=50mA	<1.6	<1.0	V
Base Emitter Saturation Voltage	VBE(Sat) *	IC=150mA, IB=15mA	<1.3	0.6-1.2	V
		IC=500mA, IB=50mA	<2.6	<2.0	V

ELECTRICAL CHARACTERISTICS (Ta=25 deg C Unless Otherwise Specified)			P2N2222, P2N2222A		
DESCRIPTION	SYMBOL	TEST CONDITION	2222	2222A	UNIT
DC Current Gain	hFE	IC=0.1mA, VCE=10V	>35	>35	
		IC=1mA, VCE=10V	>50	>50	
		IC=10mA, VCE=10V	>75	>75	
		IC=10mA, VCE=10V	-	>35	
		Ta=55 deg C			
		IC=150mA, VCE=10V	100-300	100-300	
		IC=150mA, VCE=1V	>50	>50	
		IC=500mA, VCE=10V	>30	>40	
<b>DYNAMIC CHARACTERISTICS</b>					
Small Signal Current Gain	hfe	ALL f=1kHz			
		IC=1mA, VCE=10V	-	50-300	
Input Impedence	hie	IC=10mA, VCE=10V	-	75-375	
		IC=1mA, VCE=10V	-	2.0-8.0	kohms
Voltage Feedback Ratio	hre	IC=10mA, VCE=10V	-	0.25-1.25	
		IC=1mA, VCE=10V	-	8.0 x 10 <sup>-4</sup>	
Out put Adimttance	hoe	IC=10mA, VCE=10V	-	4.0	
		IC=1mA, VCE=10V	-	5.0-35	umhos
Collector Base Time Constant	rb'Cc	IC=10mA, VCE=10V	-	25-200	
		IE=20mA, VCB=20V	-	<150	ps
Noise Figure	NF	f=31.8MHz			
		IC=100uA, VCE=10V	-	<4.0	dB
		Rs=1kohms, f=1kHz			
<b>DYNAMIC CHARACTERISTICS</b>					
Transistors Frequency	ft	IC=20mA, VCE=20V	>250	>300	MHz
Out-Put Capacitance	Cob	f=100MHz			
		VCB=10V, IE=0	<8.0	<8.0	pF
Input Capacitance	Cib	f=1MHz			
		VEB=0.5V, IC=0	<30	<25	pF
		f=1MHz			
<b>SWITCHING Time</b>					
Delay time	td	IC=150mA, IB1=15mA		<10	ns
Rise time	tr	VCC=30V, VBE=0.5V	-	<25	ns
Storage time	ts	IC=150mA, IB1=		<225	ns
Fall time	tf	IB2=15mA, VCC=30V	-	<60	ns

\*Pulse Condition: Length =300us, Duty Cycle=2%

# TO-92 Plastic Package

## TO-92 Transistors on Tape and Ammo Pack

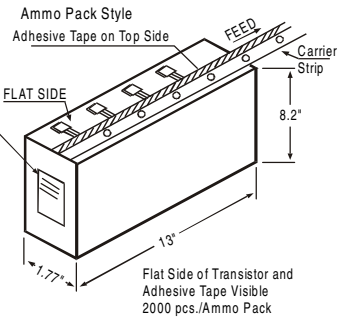
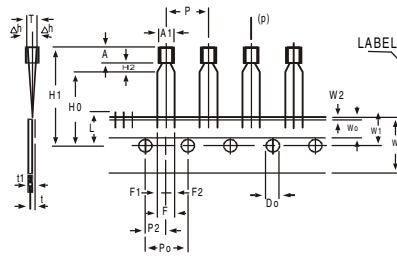


- PIN CONFIGURATION**
1. EMITTER
  2. BASE
  3. COLLECTOR

All dimensions in mm.

DIM	MIN.	MAX.
A	4.32	5.33
B	4.45	5.20
C	3.18	4.19
D	0.41	0.55
E	0.35	0.50
F	5 DEG	
G	1.14	1.40
H	1.14	1.53
K	12.70	—

### MECHANICAL DATA



All dimensions in mm unless specified otherwise

ITEM	SYMBOL	SPECIFICATION				REMARKS
		MIN.	NOM.	MAX.	TOL.	
BODY WIDTH	A1	4.0		4.8		
BODY HEIGHT	A	4.8		5.2		
BODY THICKNESS	T	3.9		4.2		
PITCH OF COMPONENT	P		12.7		±1	
FEED HOLE PITCH	Po		12.7		±0.3	
FEED HOLE CENTRE TO COMPONENT CENTRE	P2		6.35		±0.4	
DISTANCE BETWEEN OUTER LEADS	F		5.08		+0.6 -0.2	
COMPONENT ALIGNMENT	Δh		0	1		AT TOP OF BODY
TAPE WIDTH	W		18		±0.5	
HOLD-DOWN TAPE WIDTH	W0		6		±0.2	
HOLE POSITION	W1		9		+0.7 -0.5	
HOLD-DOWN TAPE POSITION	W2		0.5		±0.2	
LEAD WIRE CLINCH HEIGHT	Ho		16		±0.5	
COMPONENT HEIGHT	H1			23.25		
LENGTH OF SNIPPED LEADS	L			11.0		
FEED HOLE DIAMETER	Do		4		±0.2	
TOTAL TAPE THICKNESS	t			1.2		±0.3 - 0.6
LEAD - TO - LEAD DISTANCE F1,	F2		2.54		+0.4 -0.1	
CLINCH HEIGHT	H2			3		
PULL - OUT FORCE	(P)		6N			

### NOTES

1. MAXIMUM ALIGNMENT DEVIATION BETWEEN LEADS NOT TO BE GREATER THAN 0.2 mm.
2. MAXIMUM NON-CUMULATIVE VARIATION BETWEEN TAPE FEED HOLES SHALL NOT EXCEED 1 mm IN 20 PITCHES.
3. HOLDDOWN TAPE NOT TO EXCEED BEYOND THE EDGE(S) OF CARRIER TAPE AND THERE SHALL BE NO EXPOSURE OF ADHESIVE.
4. NO MORE THAN 3 CONSECUTIVE MISSING COMPONENTS ARE PERMITTED.
5. A TAPE TRAILER, HAVING AT LEAST THREE FEED HOLES ARE REQUIRED AFTER THE LAST COMPONENT.
6. SPLICES SHALL NOT INTERFERE WITH THE SPROCKET FEED HOLES.

## Packing Detail

PACKAGE	STANDARD PACK		INNER CARTON BOX		OUTER CARTON BOX		
	Details	Net Weight/Qty	Size	Qty	Size	Qty	Gr Wt
TO-92 Bulk	1K/polybag	200 gm/1K pcs	3" x 7.5" x 7.5"	5.0K	17" x 15" x 13.5"	80.0K	23 kgs
TO-92 T&A	2K/ammo box	645 gm/2K pcs	12.5" x 8" x 1.8"	2.0K	17" x 15" x 13.5"	32.0K	12.5 kgs