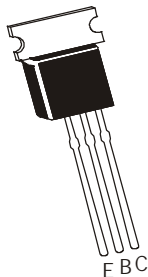


## NPN SILICON PLANAR SWITCHING TRANSISTOR

TN2222A



TO-237

Plastic Package

For use as a Medium Power Amplifier

### ABSOLUTE MAXIMUM RATINGS

DESCRIPTION	SYMBOL	VALUE	UNIT
Collector Emitter Voltage	$V_{CEO}$	40	V
Collector Base Voltage	$V_{CBO}$	75	V
Emitter Base Voltage	$V_{EBO}$	6.0	V
Collector Current Continuous	$I_C$	800	mA
Power Dissipation @ $T_a=25^\circ\text{C}$	$P_D$	0.75	W
Power Dissipation @ $T_c=25^\circ\text{C}$		2.2	W
@ $T_a=25^\circ\text{C}$ PCB Land Area for Collector Lead >1 sq inch		1.2	W
@ $T_a=25^\circ\text{C}$ with heat sink		1.5	W
Operating And Storage Junction Temperature Range	$T_j, T_{stg}$	- 55 to +150	$^\circ\text{C}$

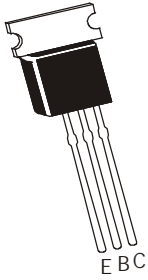
### THERMAL RESISTANCE

Junction to Case	$R_{th(j-c)}$	57	$^\circ\text{C/W}$
Junction to Ambient in free air	$R_{th(j-a)}$	167	$^\circ\text{C/W}$
Thermal Resistance >with PCB land area for collector lead >1 sq inch	$R_{th(j-a)}$	104	$^\circ\text{C/W}$
Thermal Resistance Junction to Ambient with heat sink	$R_{th(j-a)}$	83	$^\circ\text{C/W}$

### ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$ unless specified otherwise )

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	MAX	UNIT
Collector Emitter Voltage	$*V_{CEO}$	$I_C=10\text{mA}, I_B=0$	40		V
Collector Base Voltage	$V_{CBO}$	$I_C=10\mu\text{A}, I_E=0$	75		V
Emitter Base Voltage	$V_{EBO}$	$I_E=10\mu\text{A}, I_C=0$	6		V
Collector Cut Off Current	$I_{CEX}$	$V_{CE}=60\text{V}, V_{EB(off)}=3\text{V}$		10	nA
Collector Cut Off Current	$I_{CBO}$	$V_{CB}=60\text{V}, I_E=0$		10	nA
		$V_{CB}=60\text{V}, I_E=0, T_a=150^\circ\text{C}$		10	$\mu\text{A}$
Emitter Cut Off Current	$I_{EBO}$	$V_{EB}=3\text{V}, I_C=0$		10	nA
Base Cut Off Current	$I_{BL}$	$V_{CE}=60\text{V}, V_{EB(off)}=3\text{V}$		20	nA
DC Current Gain	$h_{FE}$	$I_C=0.1\text{mA}, V_{CE}=10\text{V}$	35	300	
		$I_C=1\text{mA}, V_{CE}=10\text{V}$	50		
		$I_C=10\text{mA}, V_{CE}=10\text{V}$	75		
		$I_C=150\text{mA}, V_{CE}=10\text{V}$	100		
		$I_C=150\text{mA}, V_{CE}=1\text{V}$	50		
		$I_C=500\text{mA}, V_{CE}=10\text{V}$	40		

\*Pulse Test: Pulse Width  $\leq 300\text{ms}$ , Duty Cycle  $\leq 2\%$

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

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	MAX	UNIT
Collector Emitter Saturation Voltage	$*V_{CE(sat)}$	$I_C=150\text{mA}$ , $I_B=15\text{mA}$		0.3	V
		$I_C=500\text{mA}$ , $I_B=50\text{mA}$		1.0	V
Base Emitter Saturation Voltage	$*V_{BE(sat)}$	$I_C=150\text{mA}$ , $I_B=15\text{mA}$	0.6	1.2	V
		$I_C=500\text{mA}$ , $I_B=50\text{mA}$		2.0	V

## SMALL SIGNAL CHARACTERISTICS

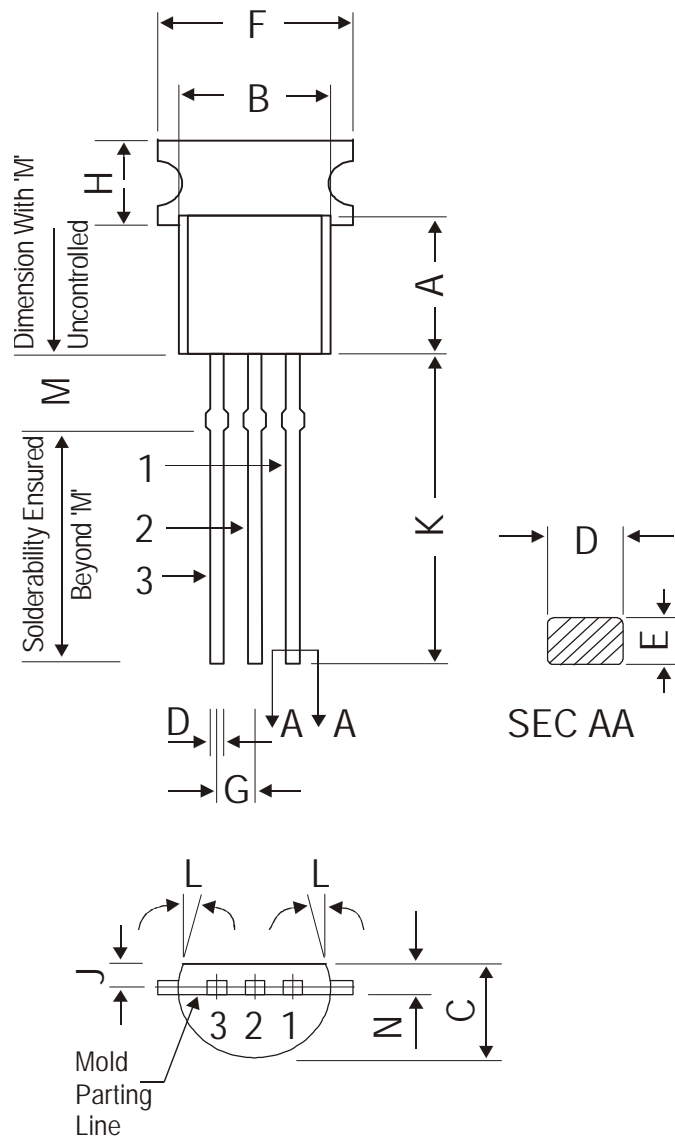
DESCRIPTION	SYMBOL	TEST CONDITION	MIN	MAX	UNIT
Output Capacitance	$C_{obo}$	$V_{CB}=10\text{V}$ , $I_E=0$ , $f=100\text{KHz}$		8.0	pF
Input Capacitance	$C_{ibo}$	$V_{EB}=0.5\text{V}$ , $I_C=0$ , $f=100\text{KHz}$		25	pF
Small Signal Current Gain	$h_{fe}$	$I_C=1\text{mA}$ , $V_{CE}=10\text{V}$ , $f=1\text{KHz}$	50	300	
		$I_C=10\text{mA}$ , $V_{CE}=10\text{V}$ , $f=1\text{KHz}$	75	375	
Collector Base Time Constant	$rb'C_C$	$I_E=20\text{mA}$ , $V_{CE}=20\text{V}$ , $f=31.8\text{MHz}$		150	pS
Noise Figure	NF	$I_C=100\mu\text{A}$ , $V_{CE}=10\text{V}$ , $R_S=1\text{K}\Omega$ , $f=1\text{KHz}$ , $Bw=1\text{KHz}$		4.0	dB
Real Part of Common Emitter High Frequency Input Impedance	$\text{Re}(h_{ie})$	$I_C=20\text{mA}$ , $V_{CE}=20\text{V}$ , $f=300\text{MHz}$		60	$\Omega$

## SWITCHING TIME

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	MAX	UNIT
Delay Time	$t_d$	$I_C=150\text{mA}$ , $I_{B1}=15\text{mA}$ , $V_{CC}=30\text{V}$ , $V_{BE(off)}=0.5\text{V}$		10	ns
Rise Time	$t_r$			25	ns
Storage Time	$t_s$	$I_C=150\text{mA}$ , $I_{B1}=I_{B2}=15\text{mA}$ , $V_{CC}=30\text{V}$		225	ns
Fall Time	$t_f$			60	ns

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

## TO-237 Plastic Package

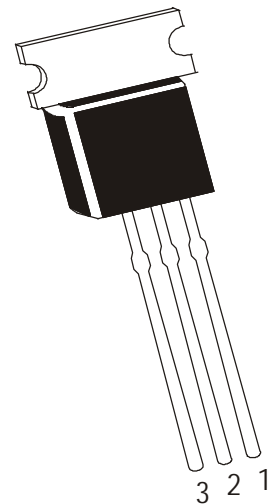


DIM	MIN.	MAX.
A	4.32	5.33
B	4.45	5.20
C	3.18	4.19
D	0.41	0.55
E	0.35	0.50
F	—	5.40
G	1.14	1.40
H	—	2.54
J	1.03	1.20
K	12.70	—
L	5 DEG	
M	1.982	2.082
N	1.20	1.40

All dimensions are in mm

## PIN CONFIGURATION

1. COLLECTOR
2. BASE
3. EMITTER

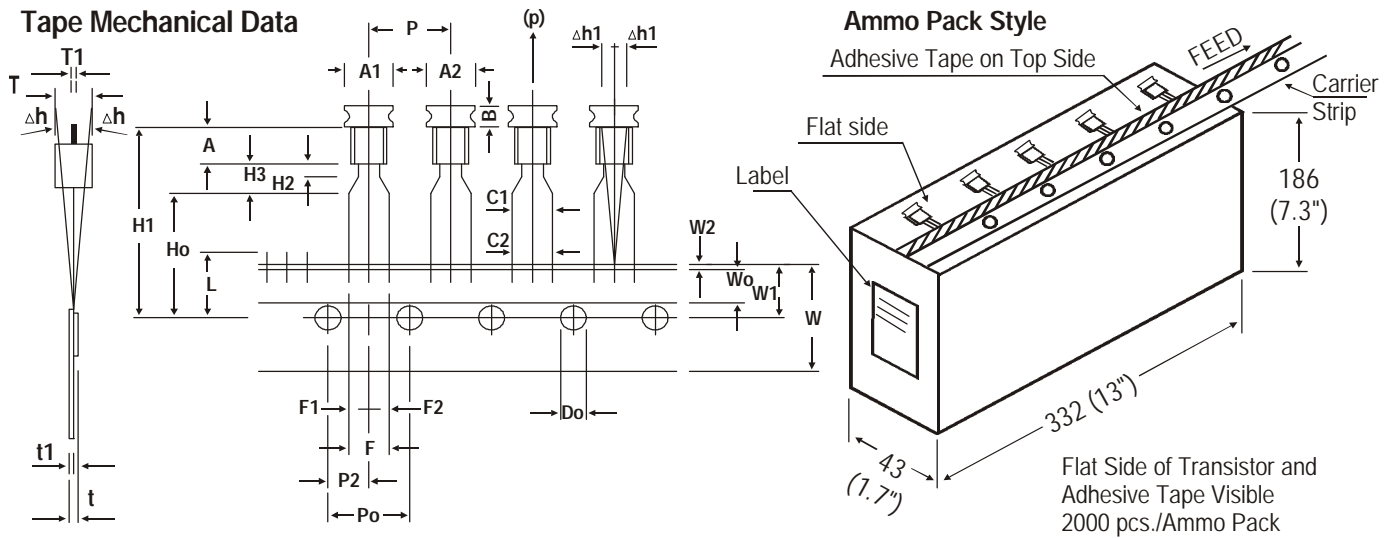


The TO-237 Package, Tape and Ammo Pack Drawings are correct as on the date of issue/revision of this Data Sheet.  
The currently valid dimensions and information, may please be confirmed from the TO-237 Drawing in the Package and Packing Section of the Product Catalogue.

## Packing Details

PACKAGE	STANDARD PACK		INNER CARTON BOX		OUTER CARTON BOX		
	Details	Net Weight/Qty	Size	Qty	Size	Qty	Gr Wt
TO-237 Bulk	1K/polybag	240 gm/1K pcs	3" x 7.5" x 7.5"	5K	17" x 15" x 13.5"	80K	26.2 kgs
TO-237 T&A	2K/ammo box	725 gm/2K pcs	12.5" x 8" x 1.8"	2K	17" x 15" x 13.5"	32K	13.8 kgs

## TO-237 Tape and Ammo Pack



All dimensions are in mm

ITEM	SYMBOL	SPECIFICATION			
		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		± 1.0
*1 FEED HOLE PITCH	Po		12.7		± 0.3
*2 FEED HOLE CENTRE TO COMPONENT CENTRE	P2		6.35		± 0.4
DISTANCE BETWEEN OUTER LEADS	F		5.08		+ 0.6 - 0.2
*3 COMPONENT ALIGNMENT SIDE VIEW	Δh		0	1.0	
*4 COMPONENT ALIGNMENT FRONT VIEW	Δh1		0	1.3	
TAPE WIDTH	W		18		± 0.5
HOLD-DOWN TAPE WIDTH	Wo		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
*5 TOTAL TAPE THICKNESS	t			1.2	
LEAD - TO - LEAD DISTANCE	F1, F2		2.54		+ 0.4 - 0.1
STAND OFF	H2	0.45		1.45	
CLINCH HEIGHT	H3			3.0	
LEAD PARALLELISM	C1 - C2			0.22	
PULL - OUT FORCE	(p)	6N			
HEAT SINK WIDTH	A2			5.40	
HEAT SINK HEIGHT	B			2.54	
HEAT SINK THICKNESS	T1			0.45	

## NOTES

- Maximum alignment deviation between leads will not be greater than 0.2mm.
- Maximum non-cumulative variation between tape feed holes shall not exceed 1 mm in 20 pitches.
- Holddown tape will not exceed beyond the edge(s) of carrier tape and there shall be no exposure of adhesive.
- There will be no more than three (3) consecutive missing components in a tape.
- A tape trailer, having at least three feed holes are provided after the last component in a tape.
- Splices should not interfere with the sprocket feed holes.

## REMARKS

- \*1 Cumulative pitch error 1.0 mm/20 pitch
- \*2 To be measured at bottom of clinch
- \*3 At top of body
- \*4 At top of body
- \*5 t1 0.3 – 0.6 mm

### **Disclaimer**

The product information and the selection guides facilitate selection of the CDIL's Discrete Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review our Data Sheet(s) so as to confirm that the Device(s) meet functionality parameters for your application. The information furnished in the Data Sheet and on the CDIL Web Site/CD are believed to be accurate and reliable. CDIL however, does not assume responsibility for inaccuracies or incomplete information. Furthermore, CDIL does not assume liability whatsoever, arising out of the application or use of any CDIL product; neither does it convey any license under its patent rights nor rights of others. These products are not designed for use in life saving/support appliances or systems. CDIL customers selling these products (either as individual Discrete Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems or applications do so at their own risk and CDIL will not be responsible for any damages resulting from such sale(s).

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