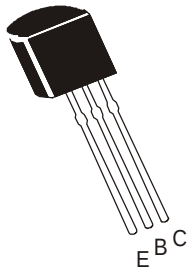
NPN SILICON PLANAR EPITAXIAL TRANSISTORS

CN652 / CN653

TO-92
Plastic Package



Use in Wide Variety of Industrial and Consumer Applications Including Lamp and Solenoid Drivers and Audio Amplifier

Complementary CP752 and CP753

ABSOLUTE MAXIMUM RATINGS (T_a=25ºC)

DESCRIPTION	SYMBOL	CN652	CN653	UNIT
Collector Base Voltage	V_{CBO}	100	120	V
Collector Emitter Voltage	V_{CEO}	80	100	V
Emitter Base Voltage	V_{EBO}	5		V
Peak Pulse Current	*I_{CM}	6		A
Collector Current Continuous	I_C	2		A
Power Dissipation @ T_a=25ºC Derate Above 25ºC	P_D	0.9 7.2		W mW/ºC
Power Dissipation @ T_a=25ºC	**P_D	1.1		W
Power Dissipation @ T_c=25ºC	P_D	2.2		W
Operating and Storage Junction Temperature Range	T_j, T_{stg}	- 65 to +150		ºC

Thermal Resistance

Junction to Ambient	$R_{th\ (j\text{-}a)\ 1}$	138.8	ºC/W
Junction to Ambient	$R_{th\ (j\text{-}a)\ 2+}$	113.6	ºC/W
Junction to Case	$R_{th\ (j\text{-}c)}$	56.8	ºC/W

*** Consult safe operating area graph for conditions.**
****Transistors mounted on printed circuit board. Lead Length 4mm, mounting pad for collector lead min 10mm x 10 mm, copper**
2+ Device mounted on P.C.B with copper equal to 1sq.inch. Minimum

ELECTRICAL CHARACTERISTICS (T_a=25ºC unless specified otherwise)

DESCRIPTION	SYMBOL	TEST CONDITION		MIN	MAX	UNIT
Collector Base Voltage	V_{CBO}	I_C=100µA, I_E=0	CN652	100		V
			CN653	120		V
Collector Emitter Voltage	V_{CEO}	I_C=1mA, I_B=0	CN652	80		V
			CN653	100		V
Emitter Base Voltage	V_{EBO}	I_E=100µA, I_C=0		5.0		V
Collector Cut Off Current	I_{CBO}	V_{CB}=80V, I_E=0	CN652		100	nA
		V_{CB}=80V, I_E=0, T_a=100ºC			10	µA
		V_{CB}=100V, I_E=0	CN653		100	nA
		V_{CB}=100V, I_E=0,T_a=100ºC			10	µA
Emitter Cut Off Current	I_{EBO}	V_{EB}=4V, I_C=0			100	nA

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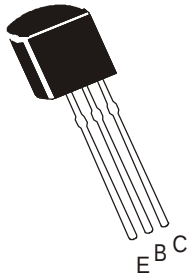

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ELECTRICAL CHARACTERISTICS (T_a=25ºC unless specified otherwise)

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	MAX	UNIT
Collector Emitter Saturation Voltage	*** $V_{CE\ (sat)}$	I_C=1A, I_B=100mA		0.3	V
		I_C=2A, I_B=200mA		0.5	V
Base Emitter Saturation Voltage	*** $V_{BE\ (sat)}$	I_C=1A, I_B=100mA		1.25	V
Base Emitter on Voltage	*** $V_{BE\ (on)}$	I_C=1A, V_{CE}=2V		1.0	V
DC Current Gain	*** h_{FE}	I_C=50mA,V_{CE}=2V	70		
		I_C=500mA,V_{CE}=2V	100	300	
		I_C=1A, V_{CE}=2V	55		
		I_C=2A, V_{CE}=2V	25		
Transition Frequency	f_T	I_C=100mA, V_{CE}=5V, f=100MHz	140		MHz
Output Capacitance	C_{obo}	V_{CB}=10V, I_E=0, f=1MHz		30	pF

SWITCHING TIMES

DESCRIPTION	SYMBOL	TEST CONDITION	TYP	UNIT
Turn On Time	t_{on}	I_C=500mA, I_{B1}=I_{B2}=50mA, V_{CC}=10V	80	ns
Turn Off Time	t_{off}		1200	ns

***** Measured under Pulse conditions. Pulse Width=300µs. Duty Cycle≤2%**

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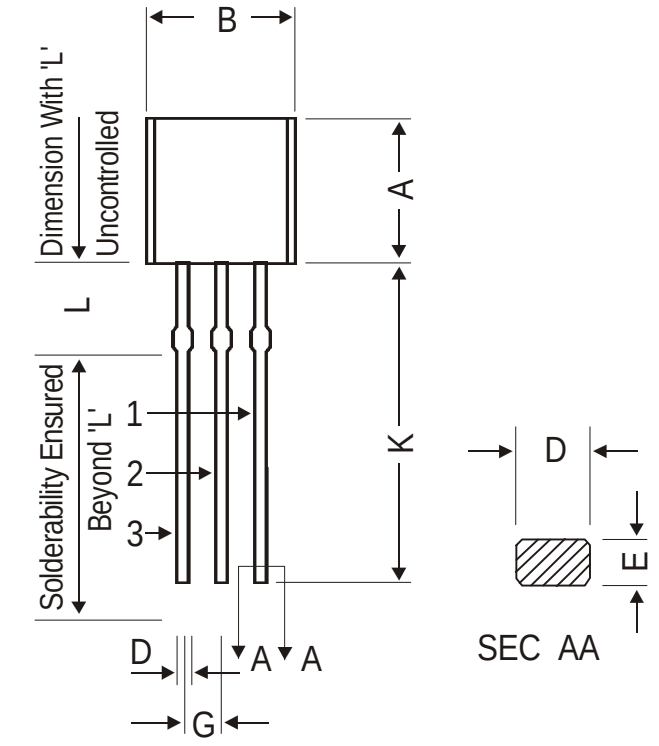
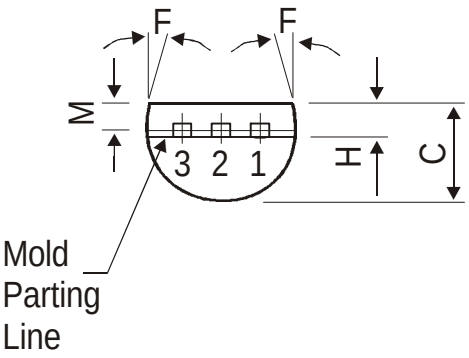
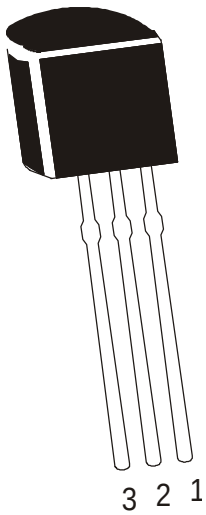


DIM	MIN.	MAX.
A	4.32	5.33
B	4.45	5.20
C	3.18	4.19
D	0.41	0.55
E	0.35	0.50
F	5 DEG	
G	1.14	1.40
H	1.20	1.40
K	12.70	—
L	1.982	2.082
M	1.03	1.20

All dimensions are in mm





PIN CONFIGURATION
1. COLLECTOR
2. BASE
3. EMITTER

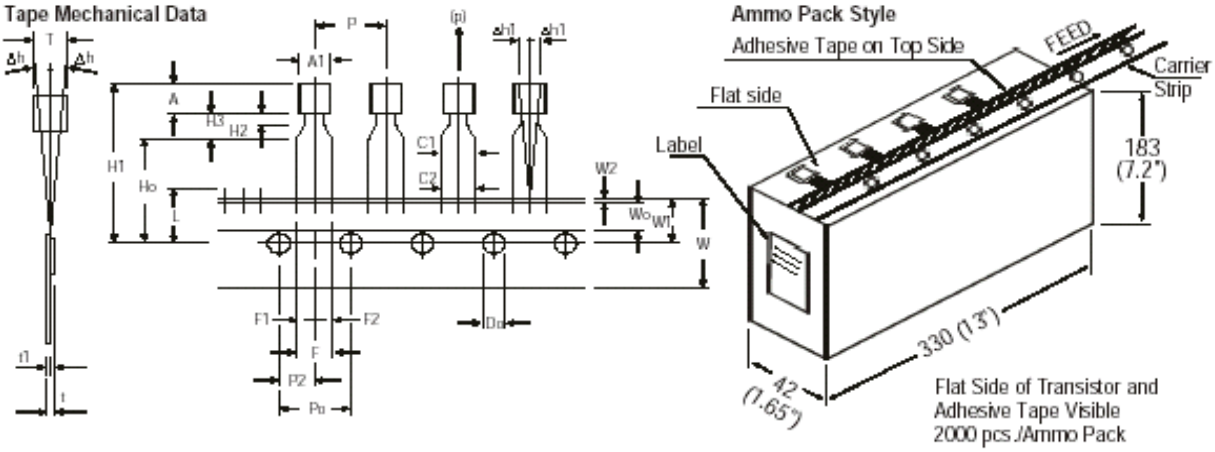
The TO-92 Package, Tape and Ammo Pack Drawings are correct as on the date of issue/revision of this Data Sheet.

The currently valid dimensions and information, may please be confirmed from the TO-92 Drawing in the Packages 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-92 Bulk	1K/polybag	200 gm/1K pcs	3" x 7.5" x 7.5"	5K	17" x 15" x 13.5"	80K	23 kgs
TO-92 T&A	2K/ammo box	645 gm/2K pcs	12.5" x 8" x 1.8"	2K	17" x 15" x 13.5"	32K	12.5 kgs

TO-92 Tape and Ammo Pack



All dimensions are in mm

ITEM	SYMBOL	SPECIFICATION			
		MIN.	NOM.	MAX.	TOL.
BODY WIDTH	A1	4.45		5.20	
BODY HEIGHT	A	4.32		5.33	
BODY THICKNESS	T	3.18		4.19	
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	0.0		0.7	
LEAD WIRE CLINCH HEIGHT	Ho		16		± 0.5
COMPONENT HEIGHT	H1			24.0	
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	2.40		2.70	- 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			

NOTES

1. Maximum alignment deviation between leads will not to be greater than 0.2mm.
2. Maximum non-cumulative variation between tape feed holes shall not exceed 1 mm in 20 pitches.
3. Holddown tape will not exceed beyond the edge(s) of carrier tape and there shall be no exposure of adhesive.
4. There will be no more than three (3) consecutive missing components in a tape.
5. A tape trailer, having at least three feed holes are provided after the last component in a tape.
6. 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

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Disclaimer

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