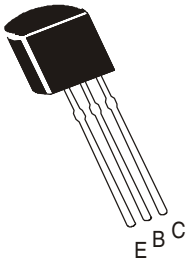
Continental Device India Limited

An ISO/TS 16949, ISO 9001 and ISO 14001 Certified Company

PNP SILICON PLANAR EPITAXIAL SWITCHING TRANSISTORS

2N4402 / 2N4403



TO-92
Plastic Package
For Lead Free Parts, Device Part # will be Prefixed with "T"

General Purpose Switching And Amplifier Applications

ABSOLUTE MAXIMUM RATINGS (T_a=25ºC)

DESCRIPTION	SYMBOL	VALUE	UNITS
Collector Emitter Voltage	V_{CEO}	40	V
Collector Base Voltage	V_{CBO}	40	V
Emitter Base Voltage	V_{EBO}	5.0	V
Collector Current Continuous	I_C	600	mA
Power Dissipation at T_a=25ºC	P_D	625	mW
Derate Above 25ºC		5.0	mW/ºC
Power Dissipation at T_c=25ºC	P_D	1.5	W
Derate Above 25ºC		12	mW/ºC
Operating And Storage Junction Temperature Range	T_j, T_{stg}	-55 to +150	ºC

THERMAL RESISTANCE

Junction to Case	$R_{th\ (j-c)}$	83.3	ºC/W
Junction to Ambient in free air	$R_{th\ (j-a)}$	200	ºC/W

ELECTRICAL CHARACTERISTICS (T_a=25ºC unless specified otherwise)

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	MAX	UNITS
Collector Emitter Voltage	V_{CEO}	I_C=1mA, I_B=0	40		V
Collector Base Voltage	V_{CBO}	I_C=100µA. I_E=0	40		V
Emitter Base Voltage	V_{EBO}	I_E=100µA, I_C=0	5.0		V
Base Cut Off Current	I_{BEV}	V_{CE}=35V, V_{EB}=0.4V		100	nA
Collector Cut Off Current	I_{CEX}	V_{CE}=35V, V_{EB}=0.4V		100	nA
DC Current Gain	*h_{FE}		**2N4402**	**2N4403**	
		I_C=0.1mA, V_{CE}=1V	-	>30	
		I_C=1mA, V_{CE}=1V	>30	>60	
		I_C=10mA, V_{CE}=1V	>50	>100	
		I_C=150mA, V_{CE}=2V	50 - 150	100 - 300	
		I_C=500mA, V_{CE}=2V	>20	>20	

***Pulse Test: Pulse Width ≤ 300µs, Duty Cycle ≤ 2%**

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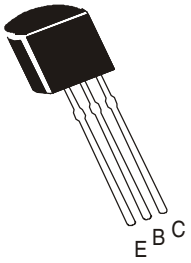

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ELECTRICAL CHARACTERISTICS (T_a=25ºC unless specified otherwise)

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	MAX	UNITS
Collector Emitter Saturation Voltage	*$V_{CE\ (sat)}$	I_C=150mA, I_B=15mA		0.40	V
		I_C=500mA, I_B=50mA		0.75	V
Base Emitter Saturation Voltage	*$V_{BE\ (sat)}$	I_C=150mA, I_B=15mA	0.75	0.95	V
		I_C=500mA, I_B=50mA		1.30	V

SMALL SIGNAL CHARACTERISTICS

DESCRIPTION	SYMBOL	TEST CONDITION	2N4402	2N4403	UNITS
Transition Frequency	f_T	I_C=20mA, V_{CE}=10V, f=100MHz	>150	>200	MHz
Collector Base Capacitance	C_{cb}	V_{CB}=10V, I_E=0, f=140KHz	< 8.5		pF
Emitter Base Capacitance	C_{eb}	V_{EB}=0.5V, I_C=0, f=140KHz	<30		pF
Input Inpedence	h_{ie}	I_C=1mA, V_{CE}=10V, f=1KHz	750 - 7.5K	1.5K - 15K	Ω
Voltage Feedback Ratio	h_{re}	I_C=1mA, V_{CE}=10V, f=1KHz	0.1 - 8.0		x10 $^{-4}$
Small Signal Current Gain	h_{fe}	I_C=1mA, V_{CE}=10V, f=1KHz	30 - 250	60 - 500	
Out put Admittance	h_{oe}	I_C=1mA, V_{CE}=10V, f=1KHz	1.0 - 100		µmhos
SWITCHING Time					
Delay time	t_d	V_{CC}=30, V_{EB}=2V	< 15		ns
Rise time	t_r	I_C=150mA, I_{B1}=15mA	< 20		ns
Storage time	t_s	V_{CC}=30V, I_C=150mA	< 225		ns
Fall time	t_f	I_{B1}=1_{B2}=15mA	< 30		ns

***Pulse Test: Pulse Width ≤ 300µs, Duty Cycle ≤ 2%**

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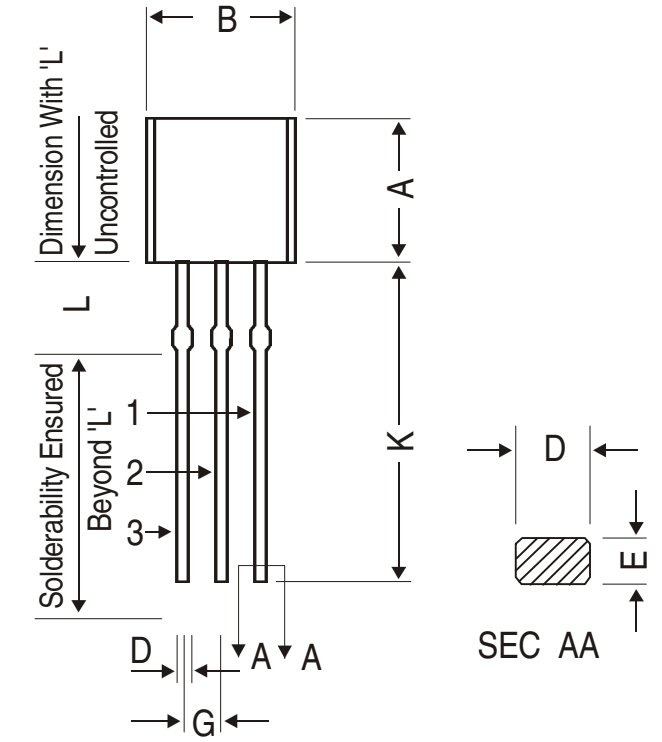
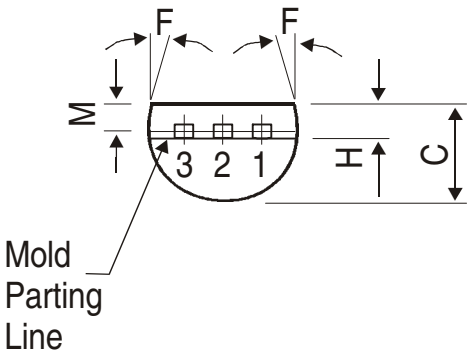
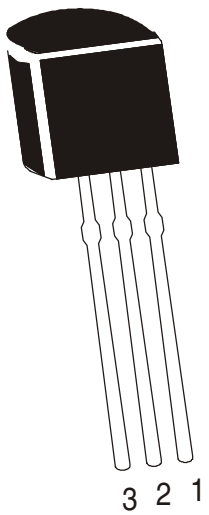
TO-92 Plastic Package



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 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

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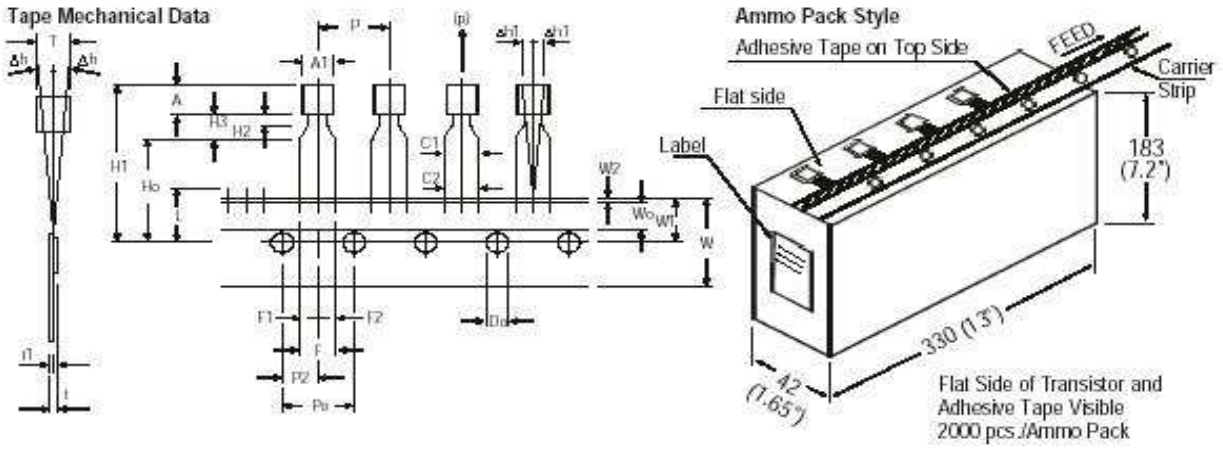
TO-92 Tape and Ammo Pack



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

Component Disposal Instructions

1. CDIL Semiconductor Devices are RoHS compliant, customers are requested to please dispose as per prevailing Environmental Legislation of their Country.

2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

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Disclaimer

The product information and the selection guides facilitate selection of the CDIL's 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 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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