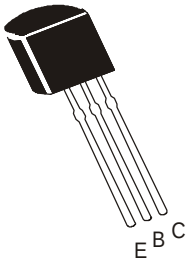
Continental Device India Limited

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

NPN SILICON PLANAR EPITAXIAL SWITCHING TRANSISTORS

2N3903 / 2N3904



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}	60	V
Emitter Base Voltage	V_{EBO}	6.0	V
Collector Current Continuous	I_C	200	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	2N3903	2N3904	UNITS
Collector Emitter Voltage	V_{CEO}	I_C=1mA, I_B=0	>40	>40	V
Collector Base Voltage	V_{CBO}	I_C=10µA. I_E=0	>60	>60	V
Emitter Base Voltage	V_{EBO}	I_E=10µA, I_C=0	>6.0	>6.0	V
Base Cut Off Current	I_{BL}	V_{CE}=30V, V_{EB}=3V	< 50	< 50	nA
Collector Cut Off Current	I_{CEX}	V_{CE}=30V, V_{EB}=3V	< 50	< 50	nA
DC Current Gain	*h_{FE}	I_C=0.1mA, V_{CE}=1V	>20	>40	
		I_C=1mA, V_{CE}=1V	>35	>70	
		I_C=10mA, V_{CE}=1V	50-150	100-300	
		I_C=50mA, V_{CE}=1V	>30	>60	
		I_C=100mA, V_{CE}=1V	>15	>30	
Collector Emitter Saturation Voltage	*$V_{CE\ (sat)}$	I_C=10mA, I_B=1mA	< 0.2	< 0.2	V
		I_C=50mA, I_B=5mA	< 0.3	< 0.3	V
Base Emitter Saturation Voltage	*$V_{BE\ (sat)}$	I_C=10mA, I_B=1mA	0.65 - 0.85	0.65 - 0.85	V
		I_C=50mA, I_B=5mA	< 0.95	< 0.95	V

***Pulse Condition: =300ms, Duty Cycle=2%**

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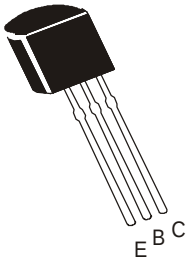

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ELECTRICAL CHARACTERISTICS (T_a=25ºC unless specified otherwise)

SMALL SIGNAL CHARACTERISTICS

DESCRIPTION	SYMBOL	TEST CONDITION	2N3903	2N3904	UNITS
Transistors Frequency	f_T	I_C=10mA, V_{CE}=20V, f=100MHz	>250	>300	MHz
Output Capacitance	C_{ob}	V_{CB}=5V, I_E=0, f=1MHz	< 4.0	<4.0	pF
Input Capacitance	C_{ib}	V_{EB}=0.5V, I_C=0, f=1MHz	< 8.0	< 8.0	pF
		ALL f=1kHz			
Small Signal Current Gain	h_{fe}	I_C=1mA, V_{CE}=10V	50 - 200	100 - 400	
Input Inpedence	h_{ie}	I_C=1mA, V_{CE}=10V	1.0 - 8.0	1.0 -10	kΩ
Voltage Feedback Ratio	h_{re}	I_C=1mA, V_{CE}=10V	0.1 - 5.0	0.5 - 8	x10 $^{-4}$
Out put Adimttance	h_{oe}	I_C=1mA, V_{CE}=10V	1.0 - 40	1.0 - 40	µmhos
Noise Figure	NF	I_C=100µA, V_{CE}=5V, f=1KHz, R_S=1KΩ	< 6.0	< 5.0	dB
SWITCHING Time					
Delay time	t_d	V_{CC}=3V, V_{BE}=0.5V	< 35	< 35	ns
Rise time	t_r	I_C=10mA, I_{B1}=1mA	< 35	< 35	ns
Storage time	t_s	V_{CC}=3V, I_C=10mA	< 175	< 200	ns
Fall time	t_f	I_{B1}=1_{B2}=1mA	< 50	< 50	ns

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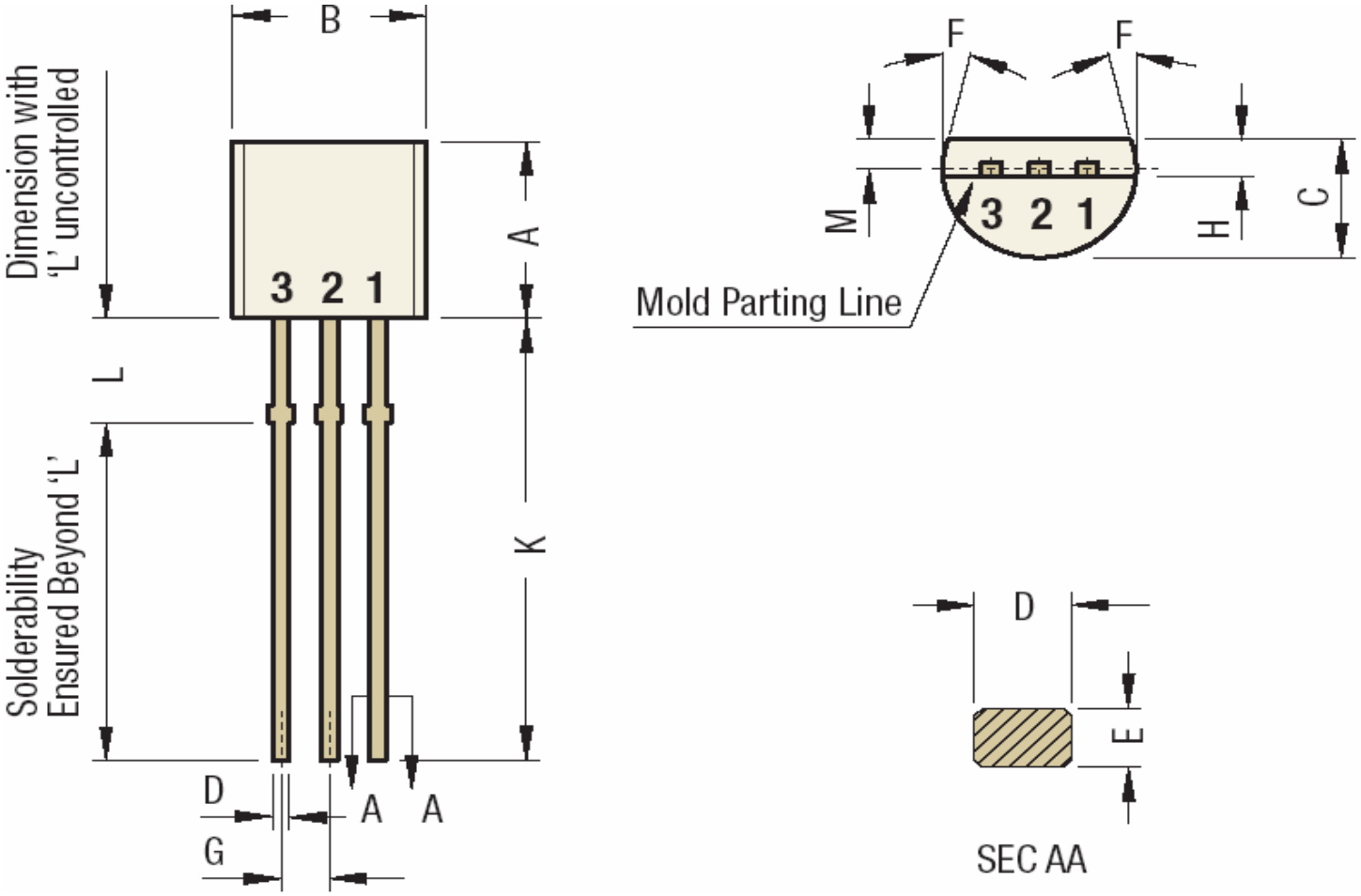
TO-92 Leaded Plastic Package

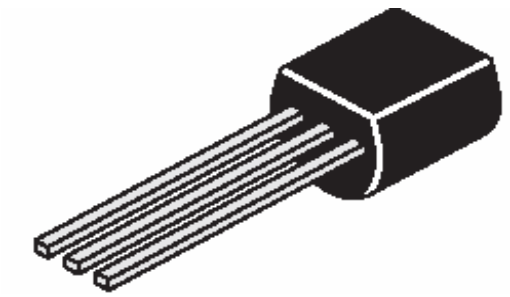


DIM	Min	Max
A	4.32	5.33
B	4.45	5.20
C	3.18	4.19
D	0.40	0.55
E	0.30	0.55
F	5º	

DIM	Min	Max
G	1.14	1.40
H	1.20	1.80
K	12.5	
L	1.982	2.082
M	1.03	1.53

All Dimensions are in mm

Pin 1 Collector
Pin 2 Base
Pin 3 Emitter



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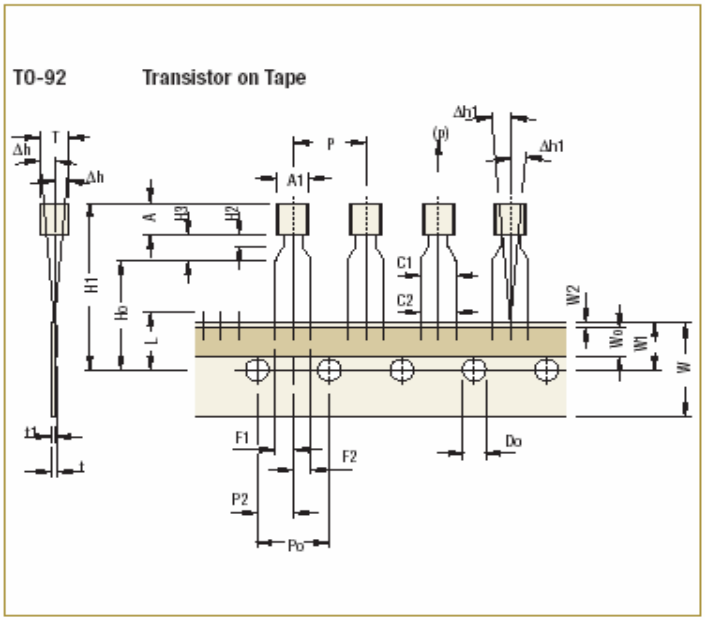
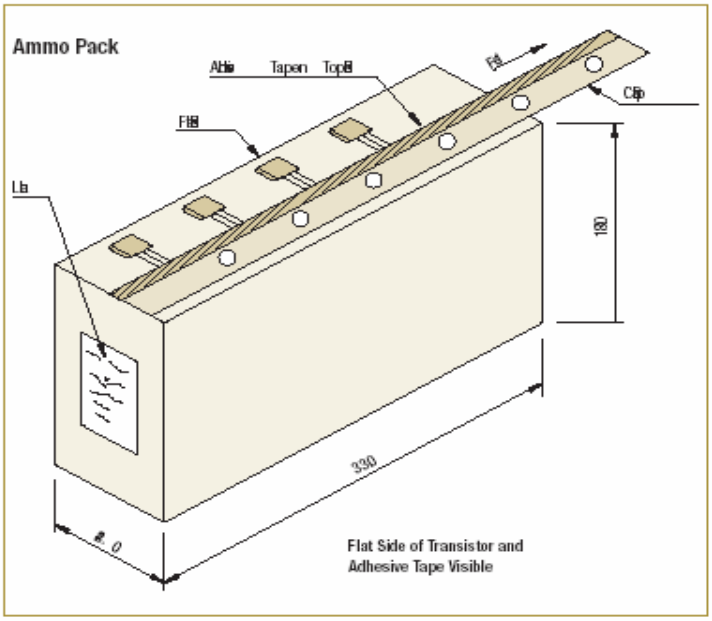
TO-92 Tape and Ammo Packaging





All Dimensions are in mm

Tape Specifications

		TO-92			
Item description	Symbol	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[Cr]	P		12.7		±1.0
Feed hole pitch[§1]	Po		12.7		±0.3
Feed hole center to component centre[§2]	P2		6.35		±0.4
Comp. alignment, Side view[§3]	Dh		0	1.0	
Comp. alignment, Front view[§3]	Dh1		0	1.3	
Tape width[Cr]	W		18		±0.5
Hold down tape width[Cr]	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[Cr]	Do		4		±0.2
Total tape thickness[§4]	t			1.2	
Lead-to-lead distance[Cr]	F1, F2	2.4		2.7	
Stand off	H2	0.45		1.45	
Clinch height	H3			3.0	
Lead parallelismCr	C1-C2			0.22	
Pull-out force	(p)	6N			

Taping Specification

- Maximum alignment deviation between leads not to be greater than 0.20 mm.
- Maximum non-cumulative variation between tape feed holes shall not exceed 1 mm in 20 pitches.
- Hold down tape not to exceed beyond the edge(s) carrier tape and there shall be no exposure of adhesive.
- No more than 3 consecutive missing components is permitted.
- A tape trailer, having at least three feed holes is required after the last component.
- Splices shall not interfere with the sprocket feed holes.

§1 Cumulative pitch error 1.0 mm/20 pitch.
§2 To be measured at bottom of clinch.
§3 At top of body.
§4 t1 = 0.3 – 0.6 mm
Cr Critical Dimension.

All Dimensions are in mm

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Packaging Information

T & A: Tape and Ammo Pack; T & R: Tape and Red; Bulk: Loose in Poly bags; Tube: Tube and Ammo Pack; k: 1.000

Package/Case Type	Packaging Type	Std. Packing	Inner Carton			Outer Carton		
		Qty	Qty	Size L x W x H (cm)	Gross Weight (Kg)	Qty	Size L x W x H (cm)	Gross Weight (Kg)
TO-92	Bulk	1,000	5K	19x19x8	1.10	80K	43x40x35	20.0
	T&A	2,000	2K	32x4.5x20	0.70	40K	43x40x35	15.20

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).

Customer Notes

Disclaimer

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