

**SOT-23 Formed SMD Package**

**CMBT3903  
CMBT3904**

*SILICON EPITAXIAL TRANSISTORS*

*N-P-N transistors*

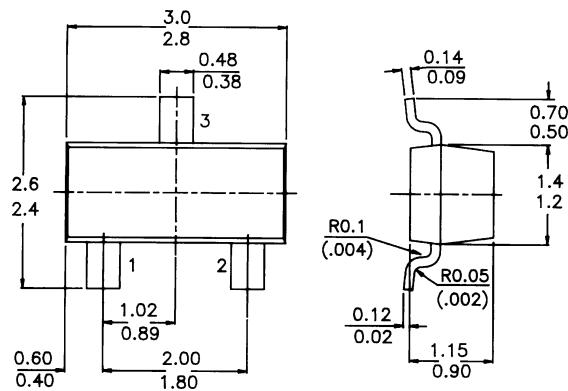
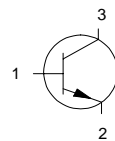
**Marking**

CMBT3903 = 1Y  
CMBT3904 = 1A

**PACKAGE OUTLINE DETAILS**  
ALL DIMENSIONS IN *mm*

**Pin configuration**

- 1 = BASE
- 2 = EMITTER
- 3 = COLLECTOR



**ABSOLUTE MAXIMUM RATINGS**

Collector-base voltage (open emitter)	$V_{CB0}$	max.	60 V
Collector-emitter voltage (open base)	$V_{CE0}$	max.	40 V
Emitter-base voltage (open collector)	$V_{EB0}$	max.	6 V
Collector current (DC)	$I_C$	max.	200 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$	$P_{tot}$	max.	250 mW
DC current gain	CMBT3903	>	50
$I_C = 10\text{ mA}; V_{CE} = 1\text{ V}$	$h_{FE}$	<	150
	CMBT3904	>	100
$I_C = 10\text{ mA}; V_{CE} = 1\text{ V}$	$h_{FE}$	<	300
Transition frequency at $f = 35\text{ MHz}$	$f_T$	>	300 MHz
$I_C = 10\text{ mA}; V_{CE} = 20\text{ V}$			

**CMBT3903**  
**CMBT3904**

**RATINGS** (at  $T_A = 25^\circ\text{C}$  unless otherwise specified)

*Limiting values*

Collector–base voltage (open emitter)	$V_{CB0}$	max.	60 V
Collector–emitter voltage (open base)	$V_{CE0}$	max.	40 V
Emitter–base voltage (open collector)	$V_{EB0}$	max.	6 V
Collector current (d.c.)	$I_C$	max.	200 mA
Total power dissipation up to $T_{amb} = 25^\circ\text{C}$	$P_{tot}$	max.	250 mW
Storage temperature $^\circ\text{C}$	$T_{stg}$		–55 to +150
Junction temperature	$T_j$	max.	150 $^\circ\text{C}$

**THERMAL RESISTANCE**

$$T_j = P (R_{th\ j-t} + R_{th\ t-s} + R_{th\ s-a}) + T_{amb}$$

*Thermal resistance*

from junction to ambient

$$R_{th\ j-a} = 500\ \text{K/W}$$

**CHARACTERISTICS**

$T_{amb} = 25^\circ\text{C}$  unless otherwise specified

*Collector–emitter breakdown voltage*

$$I_C = 1\ \text{mA}; I_B = 0$$

$$V_{(BR)CEO}\ \text{min.} = 40\ \text{V}$$

*Collector–base breakdown voltage*

$$I_C = 10\ \mu\text{A}; I_E = 0$$

$$V_{(BR)CBO}\ \text{min.} = 60\ \text{V}$$

*Emitter–base breakdown voltage*

$$I_E = 10\ \mu\text{A}; I_C = 0$$

$$V_{(BR)EBO}\ \text{min.} = 6\ \text{V}$$

*Collector cut-off current*

$$V_{CE} = 30\ \text{V}; V_{EB} = 3\ \text{V}$$

$$I_{CEX}\ \text{max.} = 50\ \text{nA}$$

*Output capacitance at  $f = 1\ \text{MHz}$*

$$I_E = 0; V_{CB} = 5\ \text{V}$$

$$C_c\ \text{max.} = 4\ \text{pF}$$

*Input capacitance at  $f = 1\ \text{MHz}$*

$$I_C = 0; V_{BE} = 0,5\ \text{V}$$

$$C_e\ \text{max.} = 8\ \text{pF}$$

*Base current*

with reverse biased emitter junction

$$V_{EB} = 3\ \text{V}; V_{CE} = 30\ \text{V}$$

$$I_{BEX}\ \text{max.} = 50\ \text{nA}$$

*Saturation voltages*

$$I_C = 10\ \text{mA}; I_B = 1\ \text{mA}$$

$$V_{CEsat}\ \text{max.} = 0.2\ \text{V}$$

$$I_C = 50\ \text{mA}; I_B = 5\ \text{mA}$$

$$V_{CEsat}\ \text{max.} = 0.3\ \text{V}$$

$$I_C = 10\ \text{mA}; I_B = 1\ \text{mA}$$

$$V_{BEsat}\ \text{min.} = 0.65\ \text{V}$$

$$\text{max.} = 0.85\ \text{V}$$

$$I_C = 50\ \text{mA}; I_B = 5\ \text{mA}$$

$$V_{BEsat}\ \text{max.} = 0.95\ \text{V}$$

**CMBT3903  
CMBT3904**

			<b>CMBT3903</b>	<b>CMBT3904</b>	
<i>D.C. current gain *</i>					
$I_C = 0,1 \text{ mA}; V_{CE} = 1 \text{ V}$	$h_{FE}$	>	20	40	
$I_C = 1 \text{ mA}; V_{CE} = 1 \text{ V}$	$h_{FE}$	>	35	70	
$I_C = 10 \text{ mA}; V_{CE} = 1 \text{ V}$	$h_{FE}$	>	50	100	
		<	150	300	
$I_C = 50 \text{ mA}; V_{CE} = 1 \text{ V}$	$h_{FE}$	>	30	60	
$I_C = 100 \text{ mA}; V_{CE} = 1 \text{ V}$	$h_{FE}$	>	15	30	
<i>Transition frequency at <math>f = 100 \text{ MHz}</math></i>					
$I_C = 10 \text{ mA}; V_{CE} = 20 \text{ V}$	$f_T$	min.	250	300	MHz
<i>Noise figure at <math>R_S = 1 \text{ k}\Omega</math></i>					
$I_C = 100 \mu\text{A}; V_{CE} = 5 \text{ V}$ $f = 10 \text{ Hz to } 15,7 \text{ kHz}$	$F$	max.	6	5	dB
<i>Small Signal Current Gain</i>					
$V_{CE} = 10\text{V}; I_C = 1 \text{ mA}; f = 1 \text{ KHz}$	$h_{fe}$	min.	50	100	
			max.	200	400

**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 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).

CDIL strives for continuous improvement and reserves the right to change the specifications of its products without prior notice.



CDIL is a registered Trademark of  
**Continental Device India Limited**

C-120 Naraina Industrial Area, New Delhi 110 028, India.  
Telephone + 91-11-2579 6150, 5141 1112 Fax + 91-11-2579 5290, 5141 1119  
email@cdil.com www.cdilsemi.com