



Continental Device India Pvt. Limited  
An IATF 16949, ISO9001 and ISO 14001 Certified Company

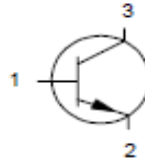


## NPN SILICON PLANAR EPITAXIAL TRANSISTORS

**CMBT2222**  
**CMBT2222A**



SOT-23



**SOT-23**  
**Formed SMD Package**  
**RoHS compliant**

### Device marking

**CMBT2222 =1B**

**CMBT2222A =1P**

### PIN CONFIGURATION

- 1 - Base
- 2 - Emitter
- 3 - Collector

### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

Parameter		Symbol	Min/ Max	CMBT 2222	CMBT 2222A	Unit
Collector-base voltage (open emitter)		$V_{CBO}$	Max	60	75	V
Collector emitter voltage (open base)		$V_{CEO}$	Max	30	40	V
Emitter base voltage (open collector)		$V_{EBO}$	Max	5	6	V
Collector current (dc.)		$I_C$	Max	600		mA
Total power dissipation up to $T_{amb} = 25\text{ }^{\circ}\text{C}$		$P_{tot}$	Max	250		mW
DC Current Gain	$I_C = 150\text{mA}, V_{CE} = 10\text{ V}$	$h_{FE}$	Min	100		
	$I_C = 150\text{mA}, V_{CE} = 10\text{ V}$	$h_{FE}$	Max	300		
	$I_C = 500\text{ mA}, V_{CE} = 10\text{ V}$	$h_{FE}$	Min	30	40	
Transition Frequency at $f = 100\text{ MHz}$	$I_C = 20\text{ mA}, V_{CE} = 20\text{ V}$	$f_T$	Min	250	300	MHz
Storage Temperature Range		$T_{stg}$	Min	-55		$^{\circ}\text{C}$
		$T_{stg}$	Max	150		$^{\circ}\text{C}$
Junction Temperature		$T_j$	Max	150		$^{\circ}\text{C}$
THERMAL RESISTANCE						
From junction to ambient		$R_{\theta ja}$		500		K/W

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Rev1\_04032020EM



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# **ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min/ Max	CMBT 2222	CMBT 2222A	Unit
Collector Cut Off Current	I <sub>CBO</sub>	IE = 0 , VCB = 50 V	Max	0.01	-	μA
	I <sub>CBO</sub>	IE = 0 , VCB = 60 V	Max	-	0.01	μA
	I <sub>CBO</sub>	IE = 0 , VCB = 50 V	Max	10	-	μA
	I <sub>CBO</sub>	IE = 0 , VCB = 60 V	Max	-	10	μA
	I <sub>CEX</sub>	V <sub>EB</sub> = 3 V, V <sub>CE</sub> = 60V	Max	-	10	nA
Base current with reverse biased Emitter Junction	I <sub>BEX</sub>	V <sub>FB</sub> =3V, V <sub>CE</sub> = 60V	Max	-	20	nA
Emitter Cut Off Current	I <sub>EBO</sub>	I <sub>C</sub> = 0, V <sub>EB</sub> = 3V	Max	-	10	nA
Saturation Voltages	V <sub>CESat</sub>	I <sub>C</sub> = 150mA , I <sub>B</sub> = 15mA	Max	400	300	mV
	V <sub>BESat</sub>		Min	-	0.6	
	V <sub>BESat</sub>		Max	1.3	1.2	V
	V <sub>CESat</sub>	I <sub>C</sub> = 500mA , I <sub>B</sub> = 50mA	Max	1.6	1	V
	V <sub>BESat</sub>		Max	2.6	2	V
Breakdown Voltages	V <sub>BR(CEO)</sub>	I <sub>C</sub> = 1μA, I <sub>B</sub> = 0	Min	30	40	V
	V <sub>BR(CBO)</sub>	I <sub>C</sub> = 100μA, I <sub>E</sub> = 0	Min	60	75	V
	V <sub>BR(EBO)</sub>	I <sub>C</sub> = 0, I <sub>E</sub> = 10μA	Min	5	6	V
DC Current Gain	h <sub>FE</sub>	I <sub>C</sub> = 0.1 mA, V <sub>CE</sub> = 10 V	Min	30		
		I <sub>C</sub> = 0.1 mA, V <sub>CE</sub> = 10 V	Min	50		
		I <sub>C</sub> = 0.1 mA, V <sub>CE</sub> = 10 V	Min	75		
		I <sub>C</sub> = 0.1 mA, V <sub>CE</sub> = 10V, T <sub>amb</sub> = -55°C	Min	35		
		I <sub>C</sub> = 0.1 mA, V <sub>CE</sub> = 10 V	Min	100		
		I <sub>C</sub> = 0.1 mA, V <sub>CE</sub> = 10 V	Max	300		
		I <sub>C</sub> = 0.1 mA, V <sub>CE</sub> = 1 V	Min	50		
		I <sub>C</sub> = 0.1 mA, V <sub>CE</sub> = 10 V	Min	30	40	
Transition Frequency at f = 100 MHz	f <sub>T</sub>	I <sub>C</sub> = 20 mA, V <sub>CE</sub> = 20 V	Min	250	300	MHz
Output Capacitance at f =1 MHz	C <sub>o</sub>	I <sub>E</sub> = 0 , V <sub>CB</sub> = 10 V	Max	8		pF
Input Capacitance at f = 1 MHz	C <sub>in</sub>	I <sub>C</sub> = 0, V <sub>EB</sub> = 0.5V	Max	30	25	pF
Noise figure at Rs = 1 KΩ	NF	I <sub>C</sub> = 100 mA, V <sub>CE</sub> =10 V, f = 1KHz	Max	4		dB
SWITCHING TIME (BETWEEN 10% AND 90% LEVELS)						
Turn On Time switched to	Delay	t <sub>d</sub>	I <sub>C</sub> = 150 mA	Max	10	ns
	Rise	t <sub>r</sub>		Max	25	ns
Turn Off Time switched from	Storage	t <sub>stg</sub>		Max	225	ns
	Fall	t <sub>f</sub>		Max	60	ns
Small Signal Current Gain	h <sub>FE</sub>	I <sub>C</sub> = 1 mA, V <sub>CE</sub> =10 V, f = 1KHz	Min	50		
			Max	300		
		I <sub>C</sub> = 10 mA, V <sub>CE</sub> =10 V, f = 1KHz	Min	75		
			Max	375		

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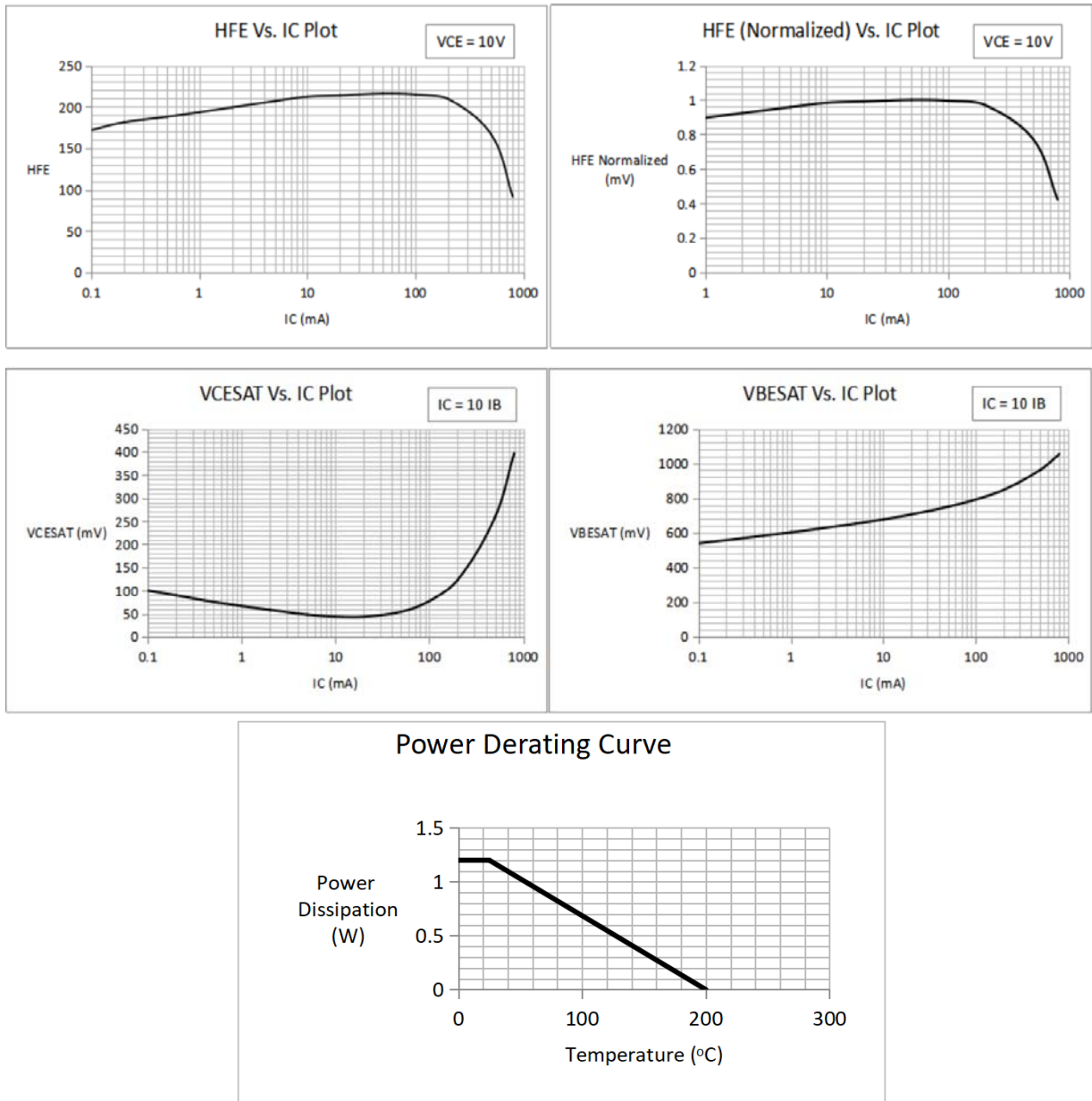


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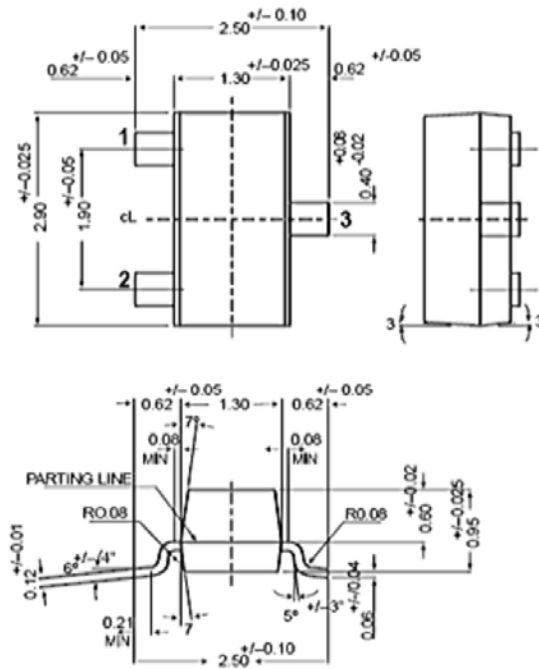
## Typical Characteristic curves



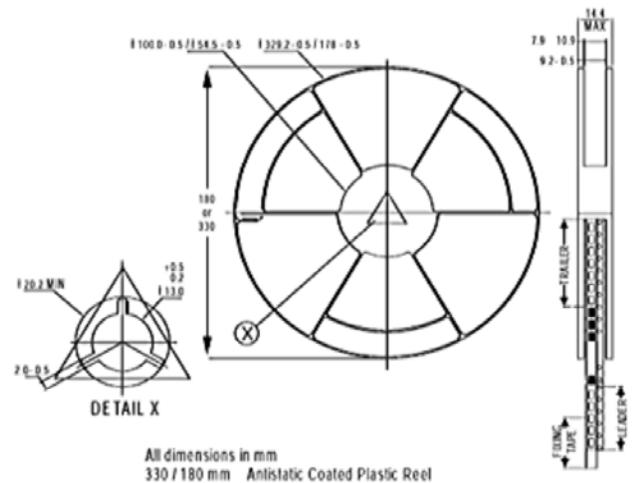
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## Package Details

**SOT-23 Formed SMD Package**

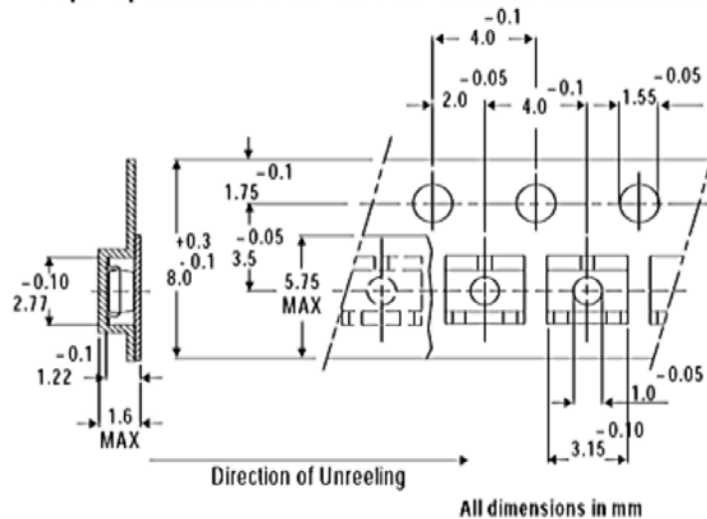


**SOT-23 Package Reel Information**  
**Reel specifications for Packing (13"/7" reels)**



- | NOTES:         |  |
|----------------|--|
| No. of Devices | <div> <div>8mm Tape</div> <div>Size of Reel</div> <div>330 mm (13")</div> <div>10,000 Pcs</div> </div> <div> <div>8mm Tape</div> <div>Size of Reel</div> <div>180 mm (7")</div> <div>3,000 Pcs</div> </div>  |
| 1.             | The bandolier of 330 mm reel contains at least 10,000 devices.   |
| 2.             | The bandolier of 180 mm reel contains at least 3,000 devices.  |
| 3.             | No more than 0.5% missing devices / reel. 50 empty compartments for 330 mm reel. 15 empty compartments for 180 mm reel.  |
| 4.             | Three consecutive empty places might be found provided this gap is followed by 6 consecutive devices.  |
| 5.             | The carrier tape (leader) starts with at least 75 empty positions (equivalent to 330 mm). In order to fix the carrier tape a self adhesive tape of 20 to 50 mm is applied. At the end of the bandolier at least 40 empty positions (equivalent to 160 mm) are there. |

### Tape Specification for SOT-23 Surface Mount Device





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## **Recommended Product Storage Environment for Discrete Semiconductor Devices**

This storage environment assumes that the Diodes and transistors are packed properly inside the original packing supplied by CDIL.

- Temperature 5 °C to 30 °C
- Humidity between 40 to 70 %RH
- Air should be clean.
- Avoid harmful gas or dust.
- Avoid outdoor exposure or storage in areas subject to rain or water spraying .
- Avoid storage in areas subject to corrosive gas or dust. Product shall not be stored in areas exposed to direct sunlight.
- Avoid rapid change of temperature.
- Avoid condensation.
- Mechanical stress such as vibration and impact shall be avoided.
- The product shall not be placed directly on the floor.
- The product shall be stored on a plane area. They should not be turned upside down. They should not be placed against the wall.

### **Shelf Life of CDIL Products**

The shelf life of products is the period from product manufacture to shipment to customers. The product can be unconditionally shipped within this period. The period is defined as 2 years.

If products are stored longer than the shelf life of 2 years the products shall be subjected to quality check as per CDIL quality procedure.

The products are further warranted for another one year after the date of shipment subject to the above conditions in CDIL original packing.

### **Floor Life of CDIL Products and MSL Level**

When the products are opened from the original packing, the floor life will start.

For this, the following JEDEC table may be referred:

JEDEC MSL Level		
Level	Time	Condition
1	Unlimited	≤30 °C / 85% RH
2	1 Year	≤30 °C / 60% RH
2a	4 Weeks	≤30 °C / 60% RH
3	168 Hours	≤30 °C / 60% RH
4	72 Hours	≤30 °C / 60% RH
5	48 Hours	≤30 °C / 60% RH
5a	24 Hours	≤30 °C / 60% RH
6	Time on Label(TOL)	≤30 °C / 60% RH



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## Customer Notes

### 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).

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



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