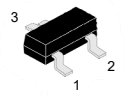
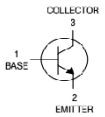
NPN SILICON PLANAR EPITAXIAL TRANSISTORS

CMBT5088
CMBT5089



SOT-23



SOT-23
Plastic Package
RoHS compliant

Marking code :

CMBT5088 = **1Q**
CMBT5089 = **1R**

FEATURES:

These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

ABSOLUTE MAXIMUM RATINGS (T_a = 25 ℃ Unless otherwise specified)

PARAMETER	SYMBOL	VALUE		UNIT
		CMBT 5088	CMBT 5089	
Collector–Base voltage (Open Emitter)	V_{CBO}	35	30	V
Collector–Emitter voltage (Open Base)	V_{CEO}	30	25	V
Collector current	I_C	50		mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot} [1]	225		m/W
Junction temperature	T_J	150		°C
Storage temperature	T_{stg}	–55 to +150		°C
THERMAL RESISTANCE				
from junction to ambient	$R_{th\ j-a}$	417		K/W

NOTE:

1.FR-5 Board = 1.0 × 0.75 × 0.062 in.

ELECTRICAL CHARACTERISTICS at (T_a= 25 ℃ Unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	Min/Max	VALUE		UNIT
				CMBT 5088	CMBT 5089	
Collector cut–off current	I_{CBO}	I_E = 0; V_{CB} = 20 V	Max	50	--	nA
		I_E = 0; V_{CB} = 15 V	Max	--	50	
Emitter cut–off current	I_{EBO}	I_C = 0; V_{EB} = 3 V	Max	50	--	nA
		I_C = 0; V_{EB} = 4.5 V	Max	--	100	
Saturation voltages	V_{CEsat}	I_C = 10 mA; I_B = 1 mA	Max	500		mV
	V_{BEsat}		Max	800		
Collector capacitance Emitter guarded at f = 100 KHz	C_{cb}	I_E = 0; V_{CB} = 5 V	Max	4.0		pF
Emitter capacitance Emitter guarded at f = 100 KHz	C_{eb}	I_C = 0; V_{EB} = 5 V	Max	10		pF
D.C. current gain	h_{FE}	I_C = 100 µA; V_{CE} = 5 V		300 ~ 900	400 ~ 1200	
		I_C = 1.0 mA; V_{CE} = 5 V	Min	350	450	
		I_C = 10 mA; V_{CE} = 5 V	Min	300	400	
Small–signal current gain	h_{fe}	I_C = 1 mA; V_{CE} = 10 V; f = 1 kHz		350-1400	450-1800	
Transition frequency at f = 20 MHz	f_T	I_C = 500 µA; V_{CE} = 5 V	Min	50		MHz
Noise figure at R_S = 10 kΩ	N_F	I_C = 100 µA; V_{CE} = 5 V f = 10 Hz to 15.7 Hz	Max	3.0	2.0	dB

Note: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

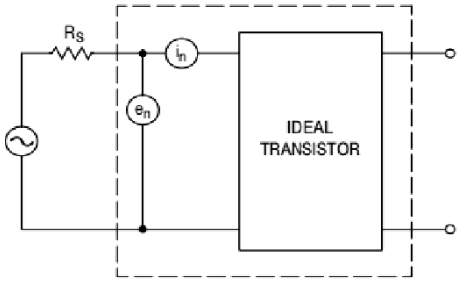


Figure 1. Transistor Noise Model

TYPICAL ELECITRICAL CHARACTERISTIC CURVES

Figure 2. DC Current Gain

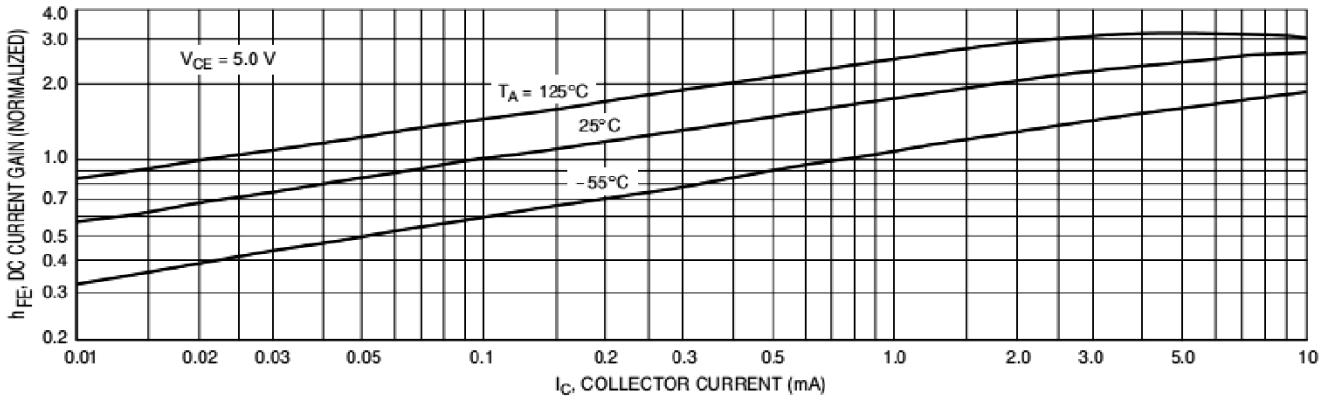


Figure 3. “On” Voltages

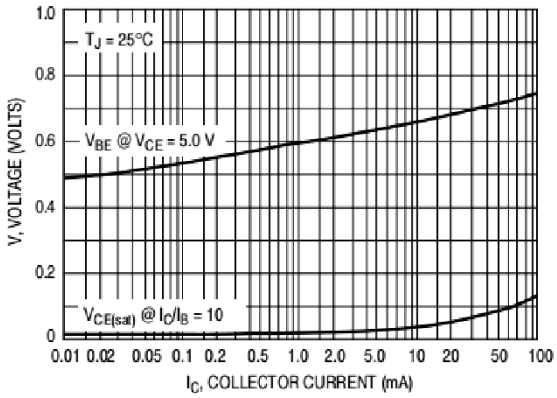


Figure 4. Temperature Coefficients

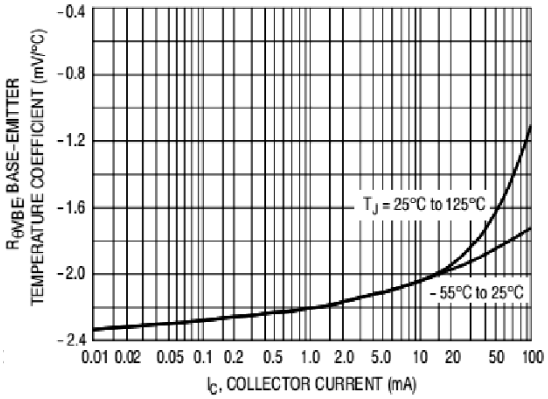


Figure 5. Capacitance

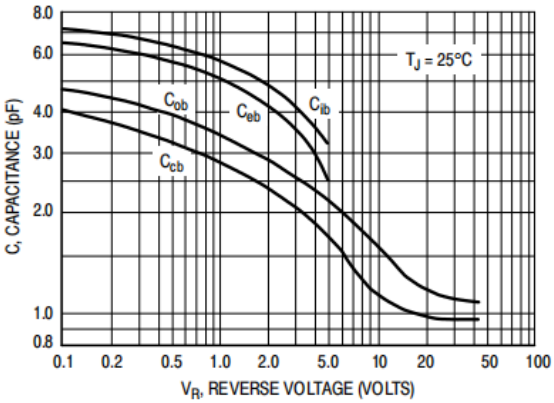
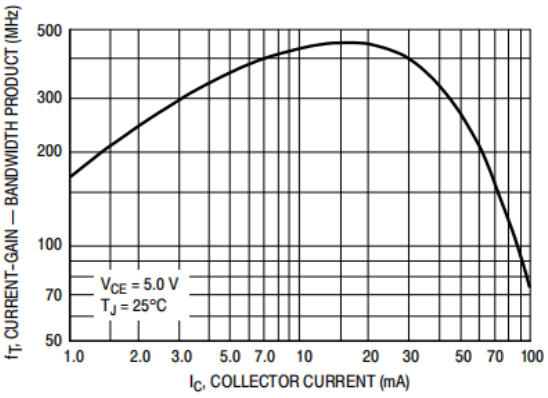
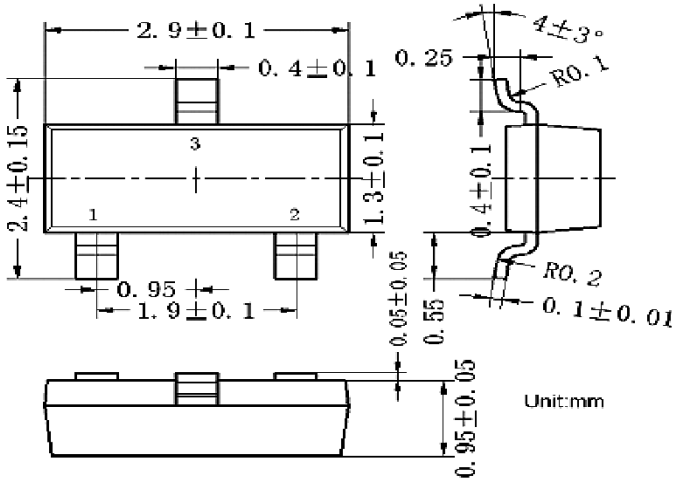


Figure 6. Current−Gain — Bandwidth Product



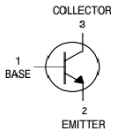
PACKAGE DETAILS

SOT-23 Package

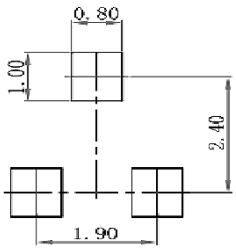


PIN CONFIGURATION

1. BASE
2. EMITTER
3. COLLECTOR



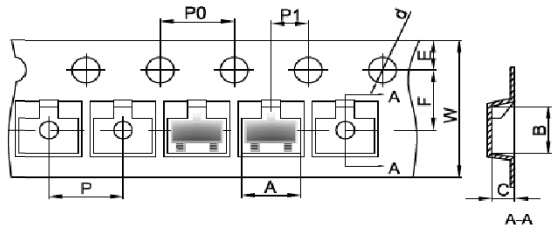
SOT-23 Suggested Pad Layout



Unit : mm

SOT-23 Tape and Reel

SOT-23 Embossed Carrier Tape

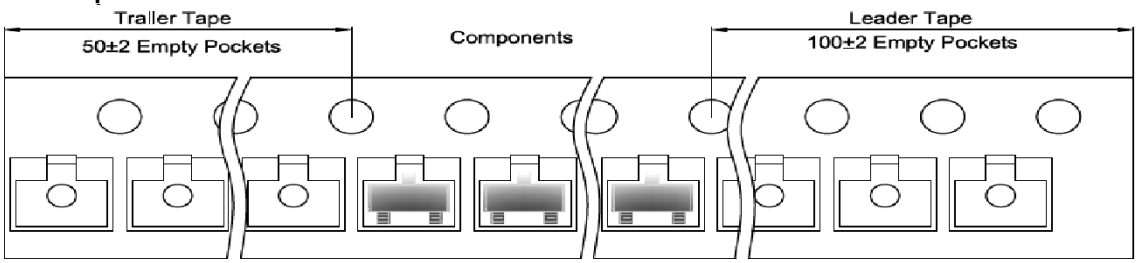


Packaging Description:

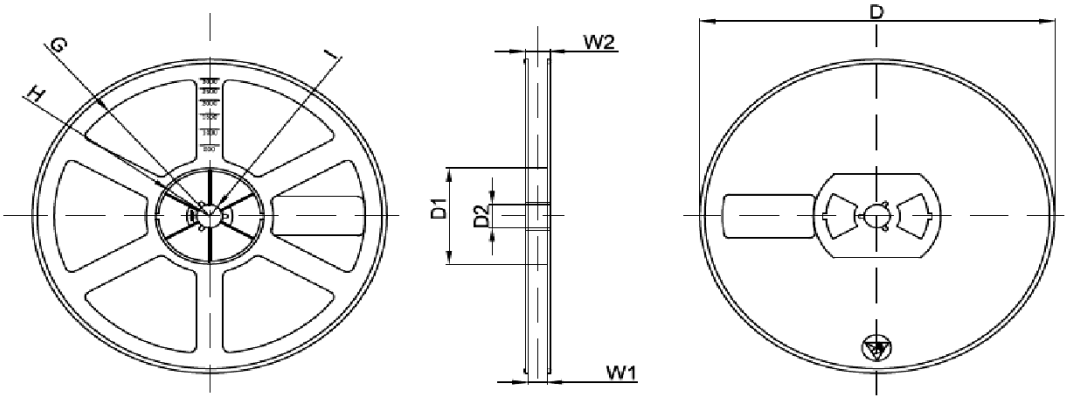
SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 17.8cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00

SOT-23 Tape Leader and Trailer



SOT-23 Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Ø178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 Inch	45,000 pcs	203×203×195	180,000 pcs	438×438×220	

Recommended Reflow Solder Profiles

The recommended reflow solder profiles for Pb and Pb-free devices are shown below.

Figure 1 shows the recommended solder profile for devices that have Pb-free terminal plating, and where a Pb-free solder is used.

Figure 2 shows the recommended solder profile for devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with a leaded solder.

Figure 1

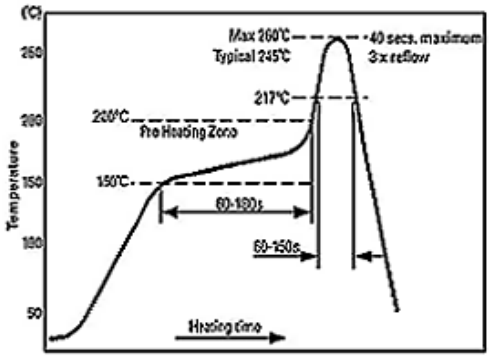
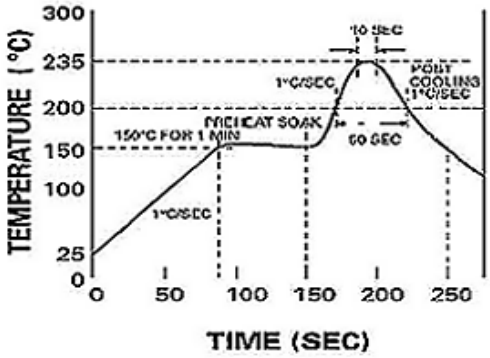


Figure 2

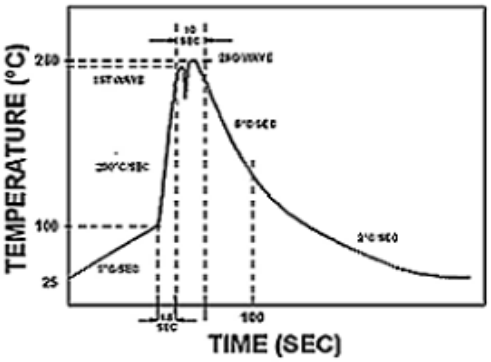


Reflow profiles in tabular form

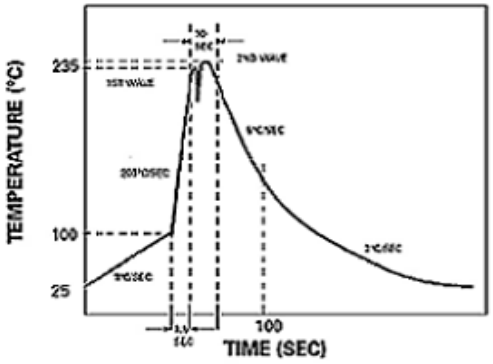
Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~3°C/second	~3°C/second
Preheat – Temperature Range – Time	 150-170°C 60-180 seconds	 150-200°C 60-180 seconds
Time maintained above: – Temperature – Time	 200°C 30-50 seconds	 217°C 60-150 seconds
Peak Temperature	235°C	260°C max.
Time within +0 -5°C of actual Peak	10 seconds	40 seconds
Ramp-Down Rate	3°C/second max.	6°C/second max.

Recommended Wave Solder Profiles

The Recommended solder Profile For Devices with Pb-free terminal plating where a Pb-free solder is used



The Recommended solder Profile For Devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with leaded solder



Wave Profiles in Tabular Form

Profile Feature	Sn-Pb System	Pb-Free System
Average Ramp-Up Rate	~200°C/second	~200°C/second
Heating rate during preheat	Typical 1-2, Max 4°C/sec	Typical 1-2, Max 4°C/Sec
Final preheat Temperature	Within 125°C of Solder Temp	Within 125°C of Solder Temp
Peak Temperature	235°C	260°C max.
Time within +0 -5°C of actual Peak	10 seconds	10 seconds
Ramp-Down Rate	5°C/second max.	5°C/second max

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

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).
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