

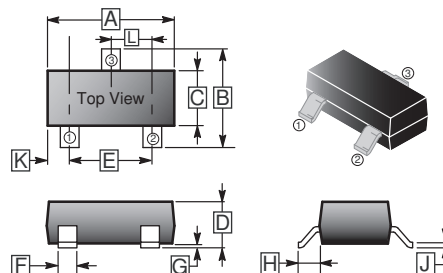
RoHS Compliant Product

A suffix of "-C" specifies halogen & lead-free

## FEATURES

- Ideally suited for automatic insertion
- For Switching and AF Amplifier Applications

## SOT-23



## CLASSIFICATION OF $h_{FE}$

Product-Rank	BC846AS	BC846BS	-
	BC847AS	BC847BS	BC847CS
	BC848AS	BC848BS	BC848CS
Range	110~220	200~450	420~800

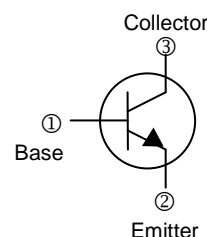
## MARKING

Product-Rank	BC846AS	BC846BS	-
Marking	1A	1B	-
Product-Rank	BC847AS	BC847BS	BC847CS
Marking	1E	1F	1G
Product-Rank	BC848AS	BC848BS	BC848CS
Marking	1J	1K	1L

REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.80	3.04	G	0.09	0.18
B	2.10	2.55	H	0.45	0.60
C	1.20	1.40	J	0.08	0.177
D	0.89	1.15	K	0.6 REF.	
E	1.78	2.04	L	0.89	1.02
F	0.30	0.50			

## PACKAGE INFORMATION

Package	MPQ	Leader Size
SOT-23	3K	7' inch



## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted )

PARAMETER	SYMBOL	RATINGS	UNIT
Collector to Base Voltage	$V_{CBO}$	BC846	80
		BC847	50
		BC848	30
Collector to Emitter Voltage	$V_{CEO}$	BC846	65
		BC847	45
		BC848	30
Emitter to Base Voltage	$V_{EBO}$	BC846	6
		BC847	6
		BC848	5
Collector Current - Continuous	$I_C$	0.1	A
Total Device Dissipation	$P_D$	FR-5 Board, $T_A=25^\circ\text{C}$ <sup>1</sup>	225
		Derate Above $25^\circ\text{C}$	1.8
Thermal Resistance, Junction to Ambient <sup>1</sup>	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Total Device Dissipation	$P_D$	FR-5 Board, $T_A=25^\circ\text{C}$ <sup>2</sup>	300
		Derate Above $25^\circ\text{C}$	2.4
Thermal Resistance, Junction to Ambient <sup>2</sup>	$R_{\theta JA}$	417	$^\circ\text{C/W}$
Junction, Storage Temperature	$T_J, T_{STG}$	-55 ~ 150	$^\circ\text{C}$

Note:

1. FR-5 = 1.0 x 0.75 x 0.062 in
2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Collector to Base Breakdown Voltage	BC846	$V_{CBO}$	80	-	-	V	$I_C = 10\mu\text{A}$
	BC847		50				
	BC848		30				
Collector–Emitter Breakdown Voltage	BC846	$V_{(BR)CES}$	80	-	-	V	$I_C = 10\mu\text{A}, V_{EB} = 0$
	BC847		50				
	BC848		30				
Collector to Emitter Breakdown Voltage	BC846	$V_{CEO}$	65	-	-	V	$I_C = 10\text{ mA}$
	BC847		45				
	BC848		30				
Emitter to Base Breakdown Voltage	BC846	$V_{EBO}$	6	-	-	V	$I_E = 1\mu\text{A}$
	BC847		6				
	BC848		5				
Collector Cutoff Current		$I_{CBO}$	-	-	15	nA	$V_{CB} = 30\text{ V}$
			-	-	5	$\mu\text{A}$	$V_{CB} = 30\text{ V}, T_A = 150^\circ\text{C}$

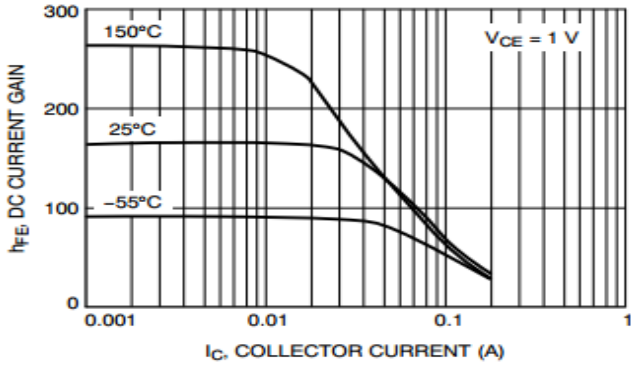
**ON CHARACTERISTICS**

Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	-	-	0.25	V	$I_C = 10\text{mA}, I_B = 0.5\text{ mA}$
		-	-	0.6		$I_C = 100\text{mA}, I_B = 5\text{ mA}$
Base to Emitter Saturation Voltage	$V_{BE(sat)}$	-	0.7	-	V	$I_C = 10\text{mA}, I_B = 0.5\text{ mA}$
		-	0.9	-		$I_C = 100\text{mA}, I_B = 5\text{ mA}$
Base to Emitter Voltage	$V_{BE(on)}$	580	660	700	mV	$V_{CE} = 5\text{ V}, I_C = 2\text{ mA}$
		-	-	770		$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$
DC Current Gain	BC846AS,BC847AS,BC848AS	$h_{FE}$	110	180	220	$V_{CE} = 5\text{V}, I_C = 2\text{mA}$
	BC846BS,BC847BS,BC848BS		200	290	450	
	BC847CS,BC848CS		420	520	800	

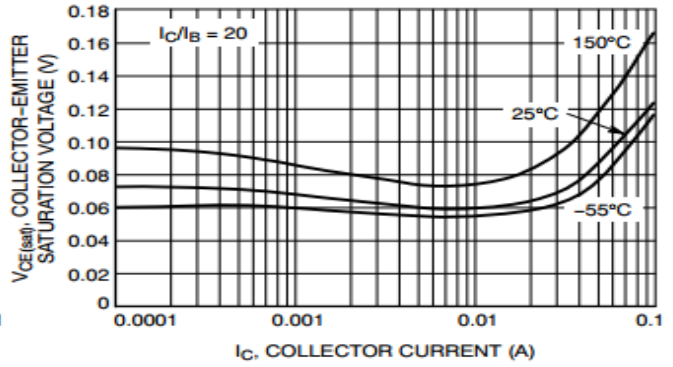
**SMALL–SIGNAL CHARACTERISTICS**

Transition Frequency	$f_T$	100	-	-	MHz	$V_{CE} = 5\text{ V}, I_C = 10\text{ mA}, f = 100\text{MHz}$
Collector Output Capacitance	$C_{Ob}$	-	-	4.5	pF	$V_{CB} = 10\text{ V}, f=1\text{MHz}$
Noise Figure	NF	-	-	10	dB	$V_{CE}= 5\text{ V}, I_C= 0.2\text{ mA}, f= 1\text{KHz}, R_S= 2\text{K}\Omega, \text{BW}= 200\text{Hz}$

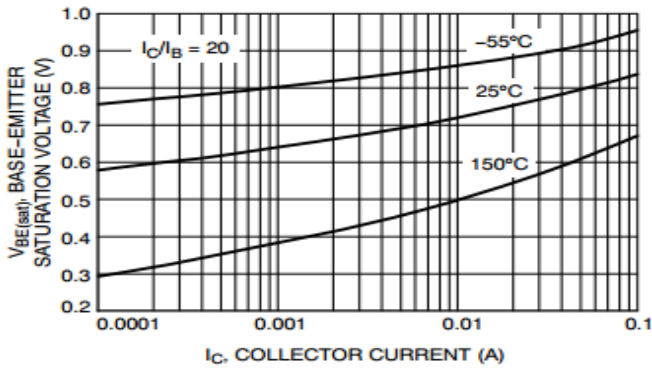
**CHARACTERISTIC CURVES (BC846AS, BC847AS, BC848AS)**



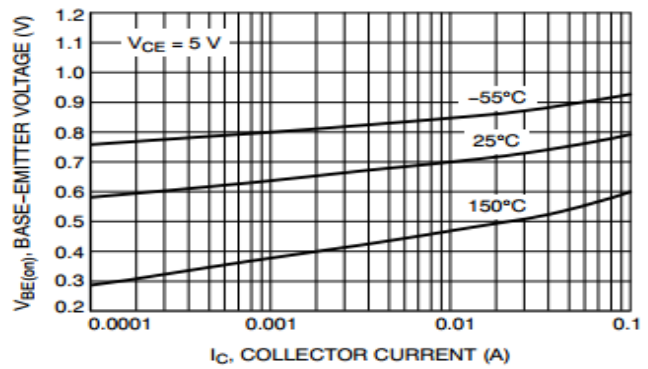
**Figure 1. DC Current Gain vs. Collector Current**



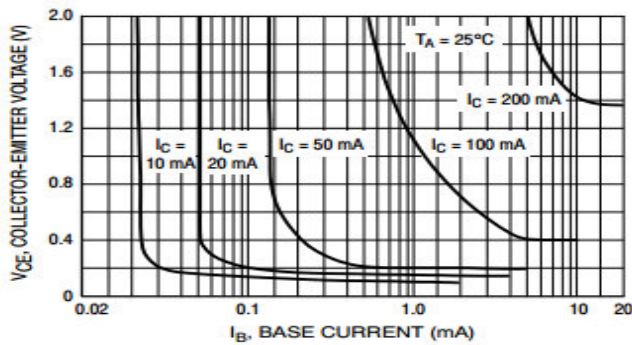
**Figure 2. Collector Emitter Saturation Voltage vs. Collector Current**



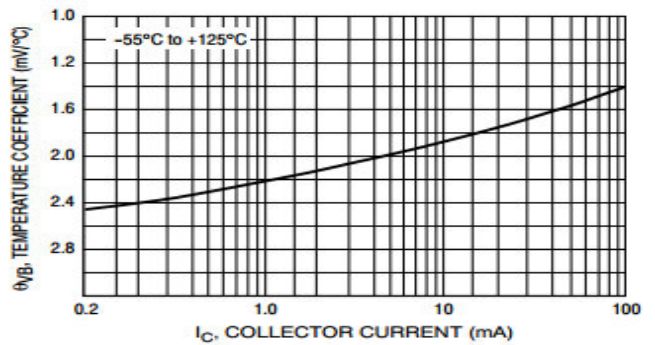
**Figure 3. Base Emitter Saturation Voltage vs. Collector Current**



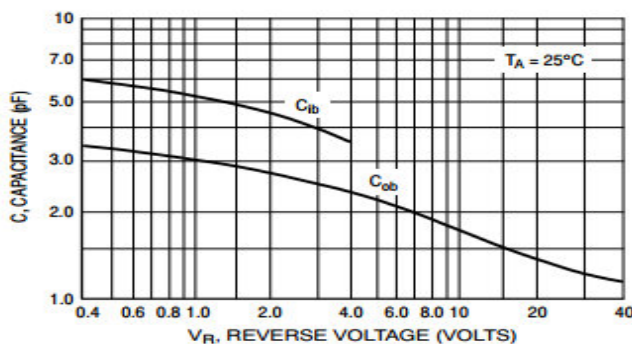
**Figure 4. Base Emitter Voltage vs. Collector Current**



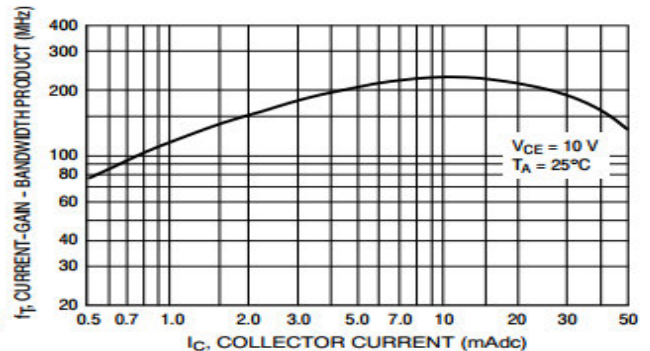
**Figure 5. Collector Saturation Region**



**Figure 6. Base-Emitter Temperature Coefficient**

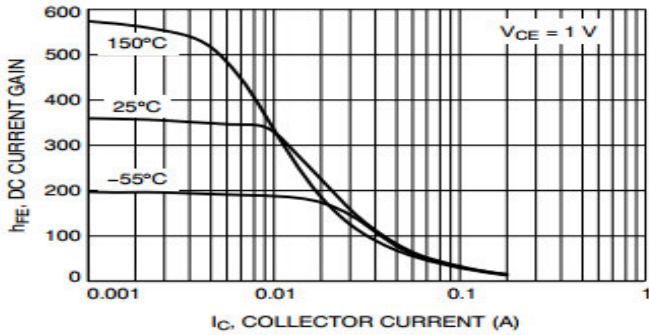


**Figure 7. Capacitances**

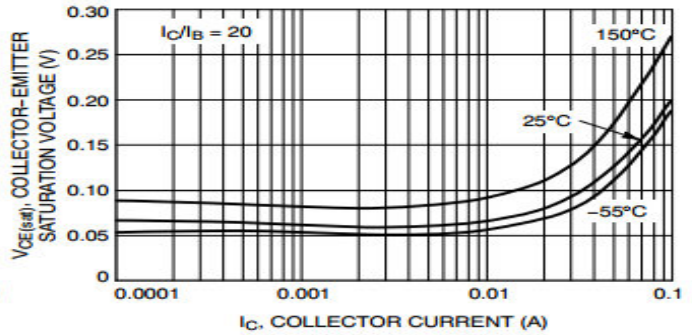


**Figure 8. Current-Gain - Bandwidth Product**

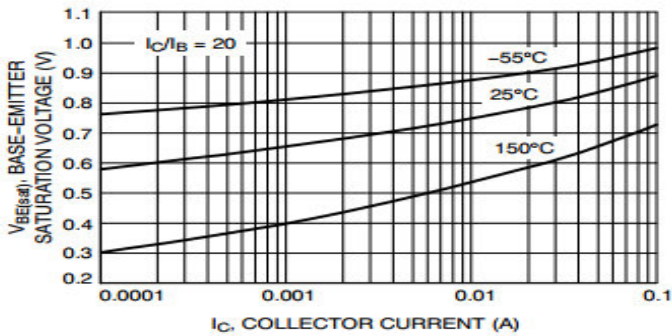
**CHARACTERISTIC CURVES (BC846BS)**



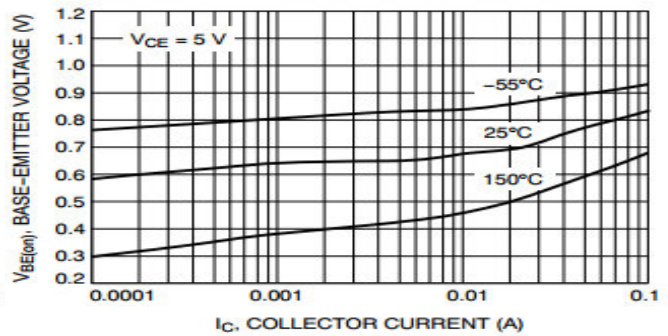
**Figure 9. DC Current Gain vs. Collector Current**



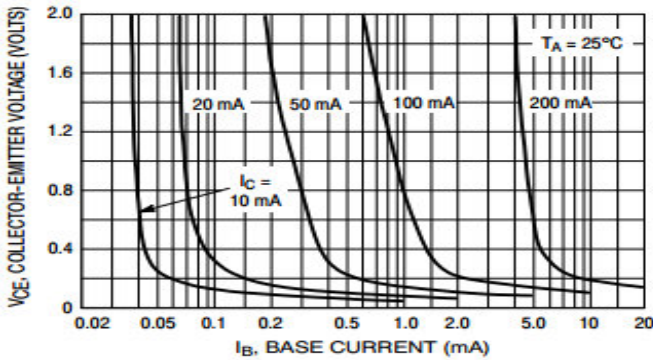
**Figure 10. Collector Emitter Saturation Voltage vs. Collector Current**



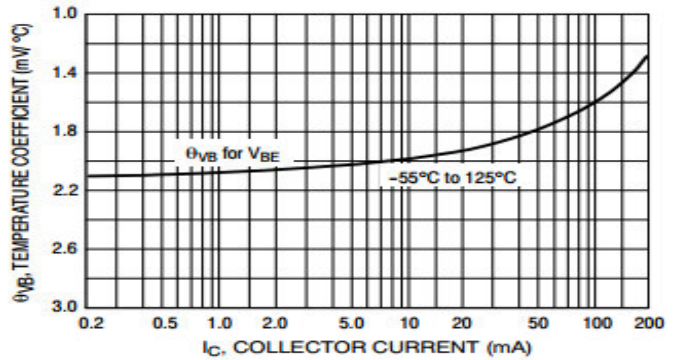
**Figure 11. Base Emitter Saturation Voltage vs. Collector Current**



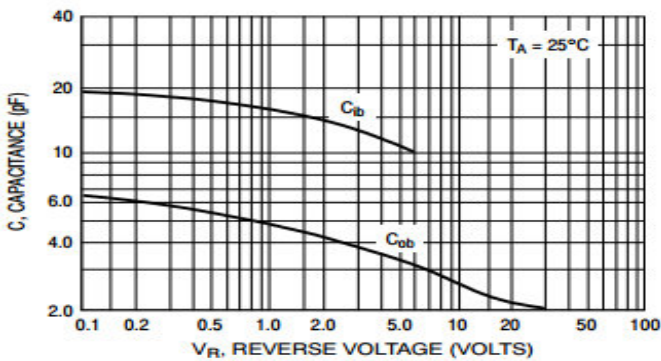
**Figure 12. Base Emitter Voltage vs. Collector Current**



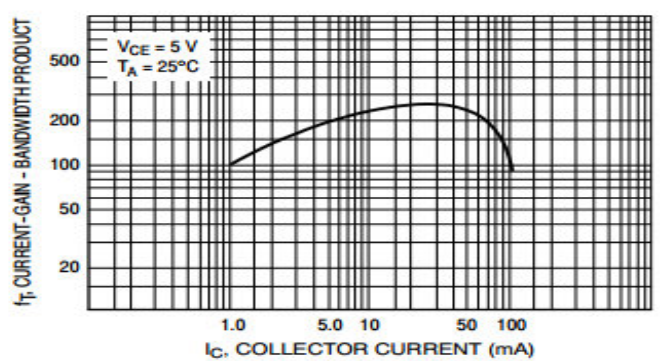
**Figure 13. Collector Saturation Region**



**Figure 14. Base-Emitter Temperature Coefficient**

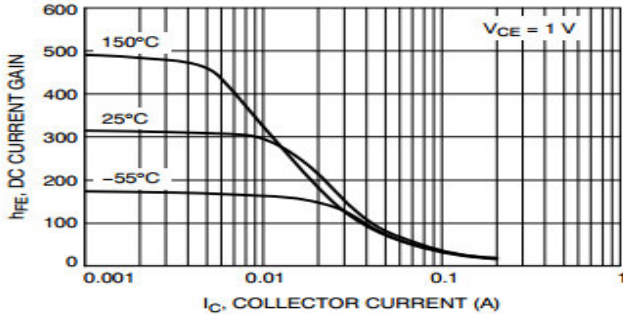


**Figure 15. Capacitance**

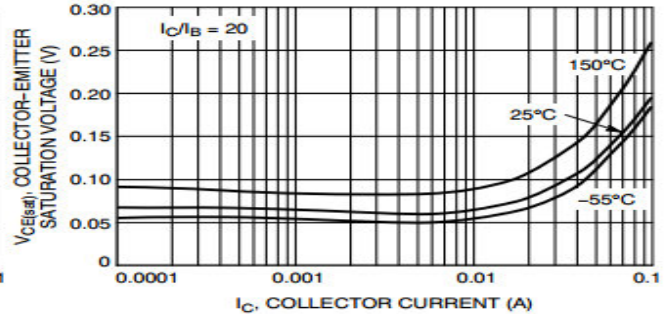


**Figure 16. Current-Gain - Bandwidth Product**

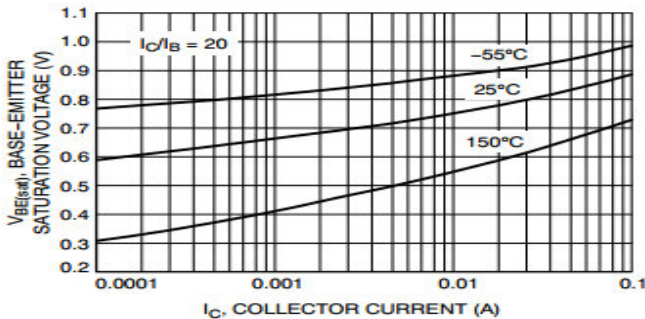
**CHARACTERISTIC CURVES (BC847BS, BC848BS)**



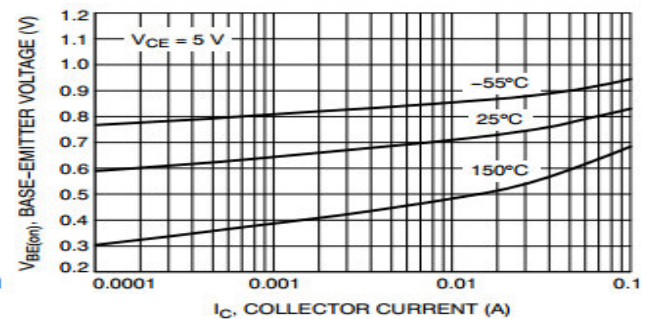
**Figure 17. DC Current Gain vs. Collector Current**



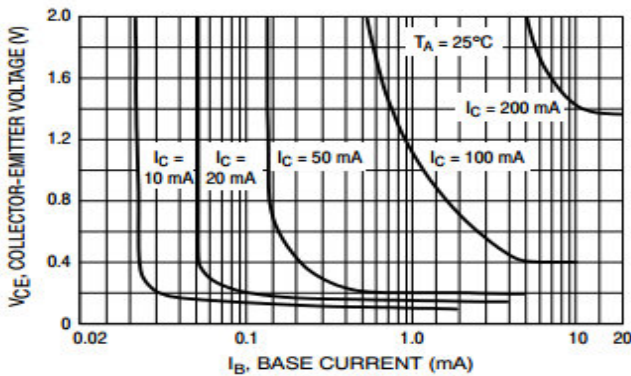
**Figure 18. Collector Emitter Saturation Voltage vs. Collector Current**



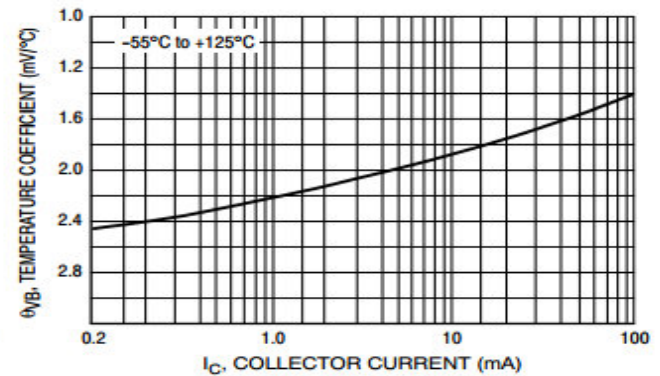
**Figure 19. Base Emitter Saturation Voltage vs. Collector Current**



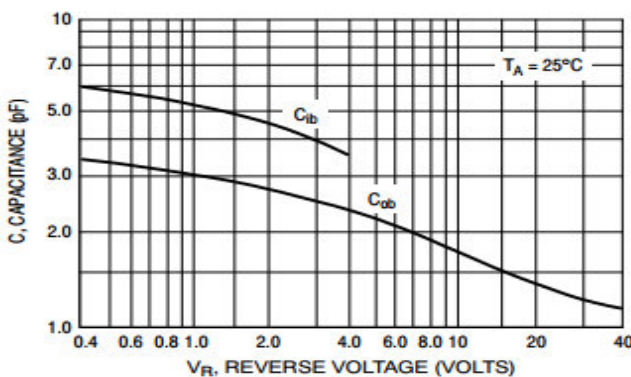
**Figure 20. Base Emitter Voltage vs. Collector Current**



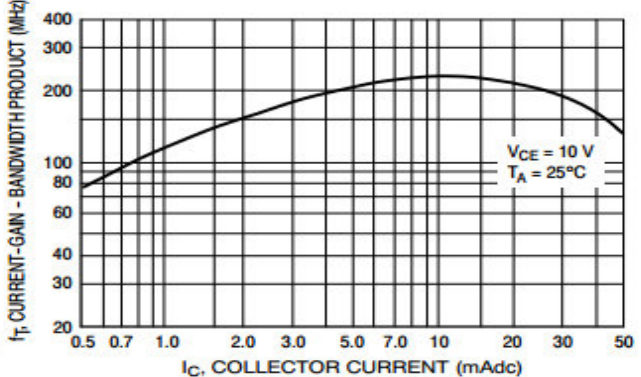
**Figure 21. Collector Saturation Region**



**Figure 22. Base-Emitter Temperature Coefficient**

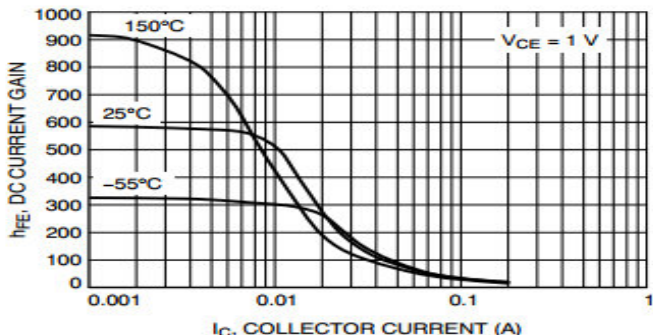


**Figure 23. Capacitances**

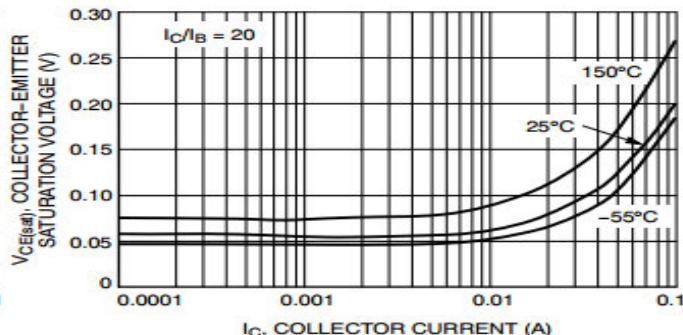


**Figure 24. Current-Gain - Bandwidth Product**

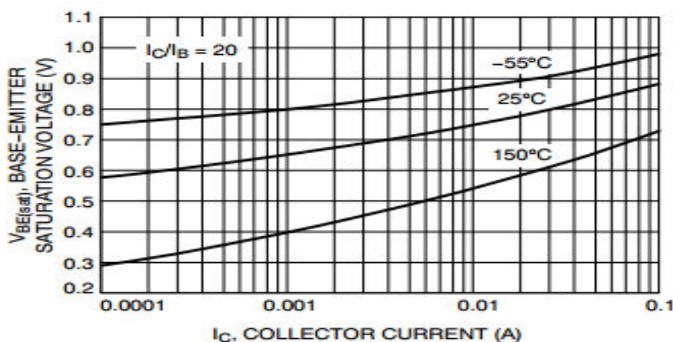
**CHARACTERISTIC CURVES (BC847CS, BC848CS)**



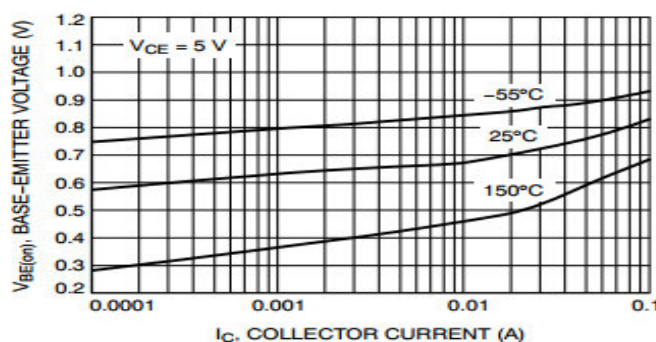
**Figure 25. DC Current Gain vs. Collector Current**



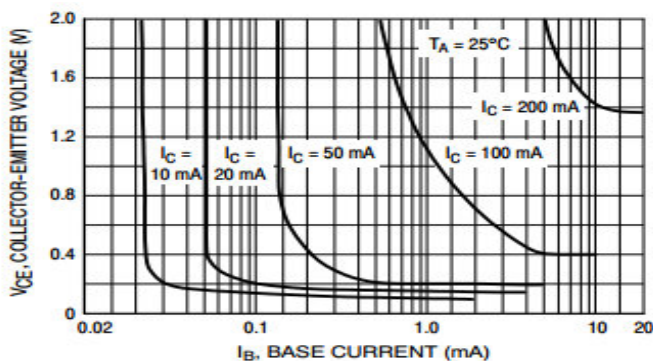
**Figure 26. Collector Emitter Saturation Voltage vs. Collector Current**



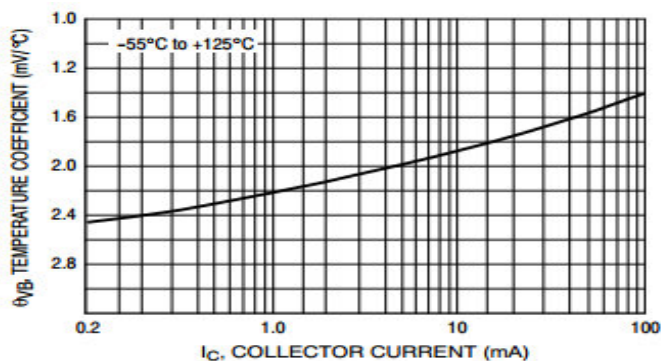
**Figure 27. Base Emitter Saturation Voltage vs. Collector Current**



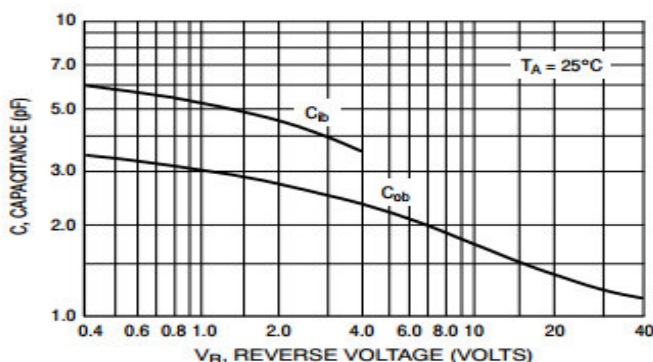
**Figure 28. Base Emitter Voltage vs. Collector Current**



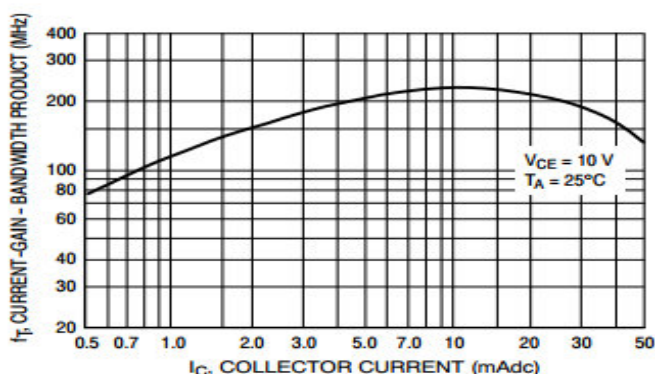
**Figure 29. Collector Saturation Region**



**Figure 30. Base-Emitter Temperature Coefficient**

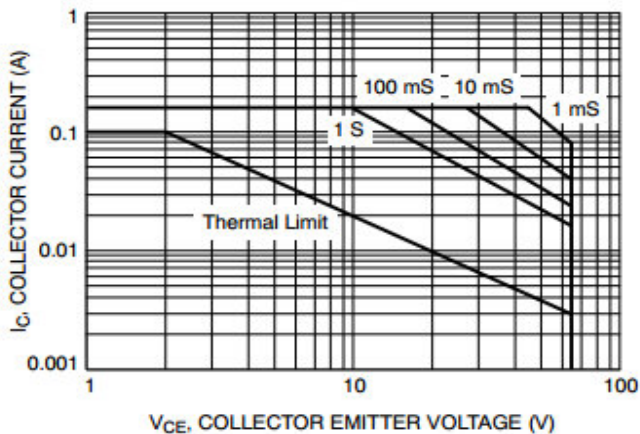


**Figure 31. Capacitances**

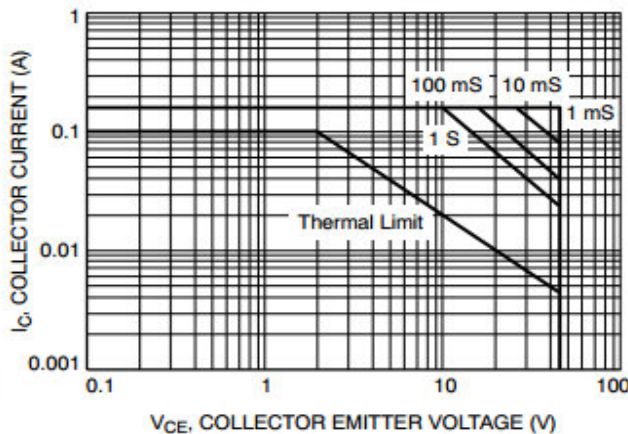


**Figure 32. Current-Gain - Bandwidth Product**

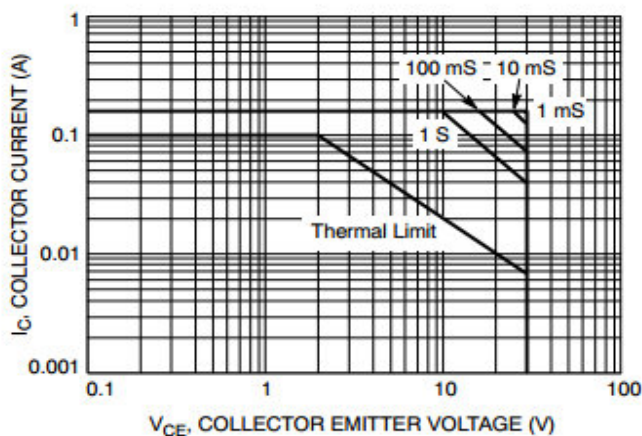
**CHARACTERISTIC CURVES**



**Figure 33. Safe Operating Area for BC846AS, BC846BS**



**Figure 34. Safe Operating Area for BC847AS, BC847BS, BC847CS**



**Figure 35. Safe Operating Area for BC848AS, BC848BS, BC848CS**