

BC817-16-Q1/BC817-25-Q1/BC817-40-Q1**List**

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Formosa MS

BC817-16-Q1/BC817-25-Q1/BC817-40-Q1

General Purpose Transistors NPN Silicon

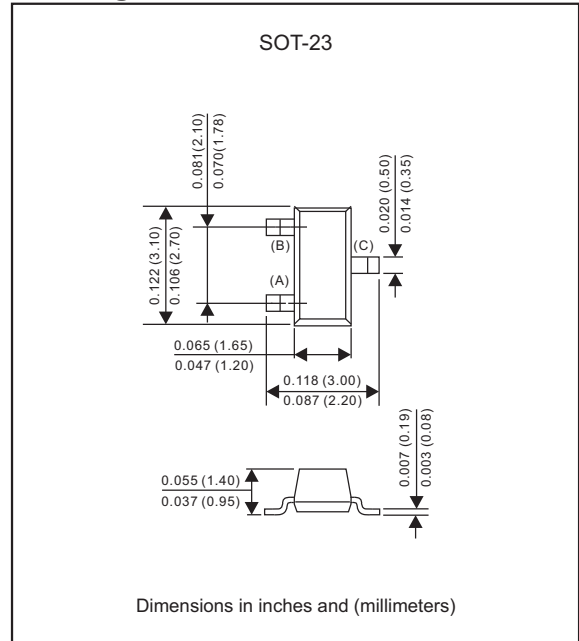
Features

- High collector-emitter breakdown voltage.
($BV_{CEO} = 45V @ I_C = 10mA$)
- Small load switch transistor with high gain and low saturation voltage, is designed for general purpose amplifier and switching applications at collector current.
- Capable of 225mW power dissipation.
- We declare that the material of product compliance with RoHS requirements.
- Qualified to AEC-Q101 standards for high reliability.
- Suffix "-H" indicates Halogen-free part, ex. BC817-16-Q1-H.

Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.008 gram

Package outline



Maximum ratings (AT $T_A = 25^\circ C$ unless otherwise noted)

PARAMETER	Symbol	MIN.	TYP.	MAX.	UNIT
Collector-base voltage	V_{CBO}			50	V
Collector-emitter voltage	V_{CEO}			45	V
Emitter-base voltage	V_{EBO}			5.0	V
Collector current — continuous	I_C			500	mA
Total device dissipation FR-5 board (1)	P_D			225	mW
				1.8	mW/ $^\circ C$
Thermal resistance	$R_{\theta JA}$			556	$^\circ C/W$
Total device dissipation alumina substrate(2)	P_D			300	mW
				2.4	mW/ $^\circ C$
Thermal resistance	$R_{\theta JA}$			417	$^\circ C/W$
Operation junction temperature range	T_J	-55		+150	$^\circ C$
Storage temperature range	T_{STG}	-55		+150	$^\circ C$

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.

Formosa MS

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Electrical characteristics (AT $T_A=25^{\circ}\text{C}$ unless otherwise noted)

Off characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Collector-emitter breakdown voltage	$I_C = 10\text{mA}$, $I_B = 0$	$V_{(BR)CEO}$	45			V
Collector-emitter breakdown voltage	$I_C = 10\mu\text{A}$, $V_{BE} = 0$	$V_{(BR)CES}$	50			V
Emitter-base breakdown voltage	$I_E = 1.0\mu\text{A}$, $I_C = 0$	$V_{(BR)EBO}$	5.0			V
Collector cutoff current	$V_{CB} = 20\text{Vdc}$	I_{CBO}			100	nA
	$V_{CB} = 20\text{Vdc}$, $T_A=150^{\circ}\text{C}$	I_{CBO}			5.0	μA

On characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
DC current gain	BC817-16-Q1 $I_C = 100\text{mA}$, $V_{CE} = 1.0\text{V}$	h_{FE}	100		250	-
	BC817-25-Q1 $I_C = 100\text{mA}$, $V_{CE} = 1.0\text{V}$		160		400	
	BC817-40-Q1 $I_C = 100\text{mA}$, $V_{CE} = 1.0\text{V}$		250		600	
	$I_C = 500\text{mA}$, $V_{CE} = 1.0\text{V}$		40			
Collector-emitter saturation voltage	$I_C = 500\text{mA}$, $I_B = 50\text{mA}$	$V_{CE(sat)}$			0.7	V
Base-emitter saturation voltage	$I_C = 500\text{mA}$, $V_{CE} = 1.0\text{V}$	$V_{BE(on)}$			1.2	V

Small-signal characteristics

PARAMETER	CONDITIONS	Symbol	MIN.	TYP.	MAX.	UNIT
Current-gain-bandwidth product	$I_C = 10\text{mA}$, $V_{CE} = 5\text{V}$, $f = 100\text{MHz}$	f_T	100			MHz
Output capacitance	$V_{CB} = 10\text{V}$, $f = 1.0\text{MHz}$	C_{obo}		10		pF

Rating and characteristic curves (BC817-16-Q1)

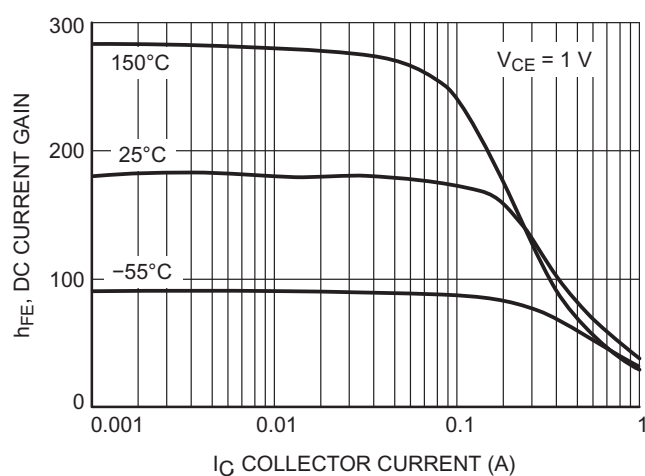


Figure 1. DC Current Gain vs. Collector Current

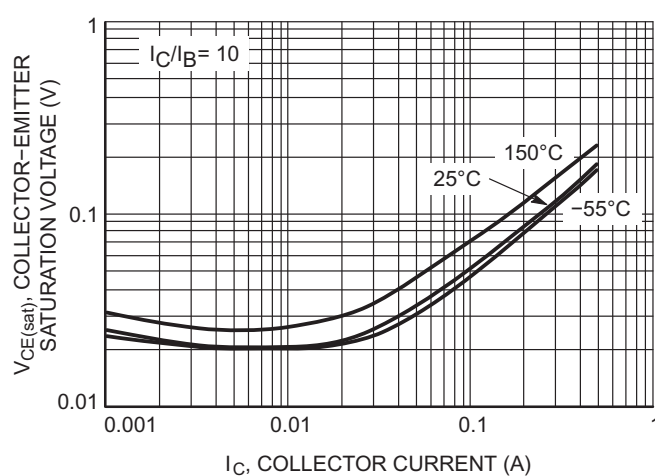


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

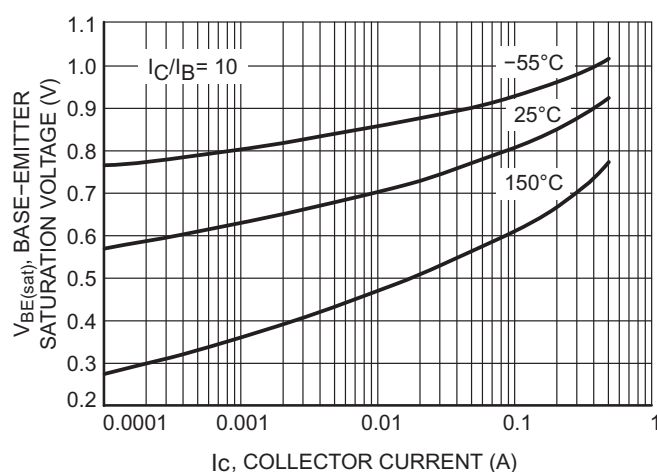


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

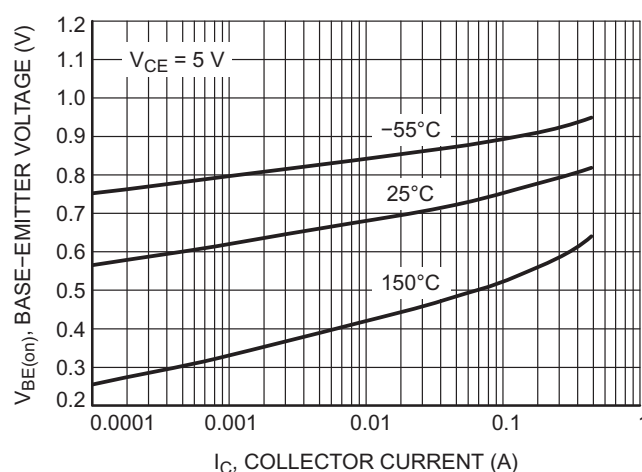


Figure 4. Base Emitter Voltage vs. Collector Current

Rating and characteristic curves (BC817-16-Q1)

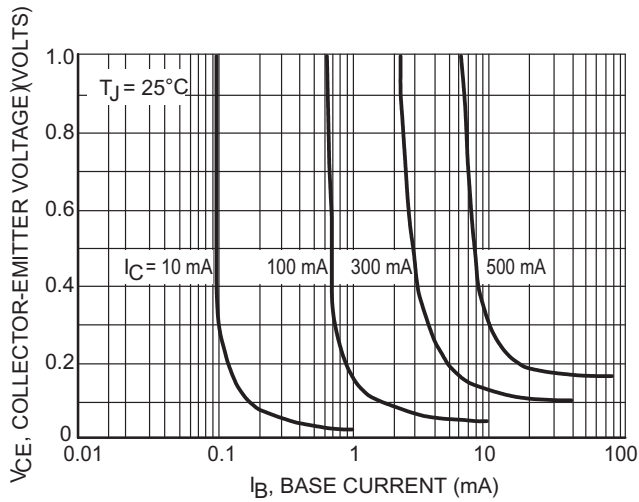


Figure 5. Saturation Region

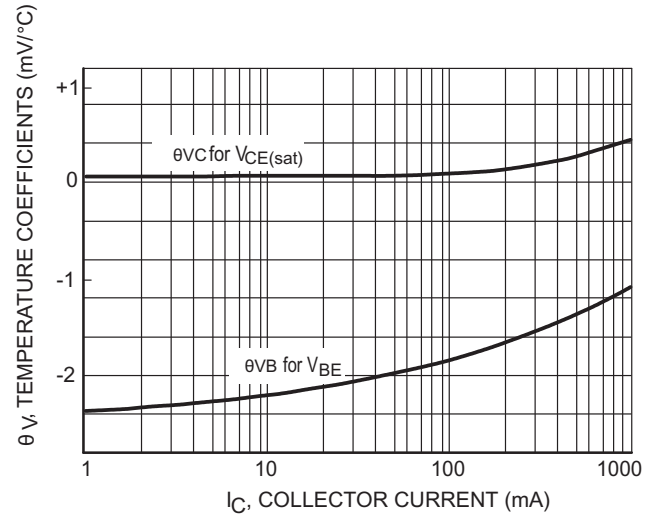


Figure 6. Temperature Coefficients

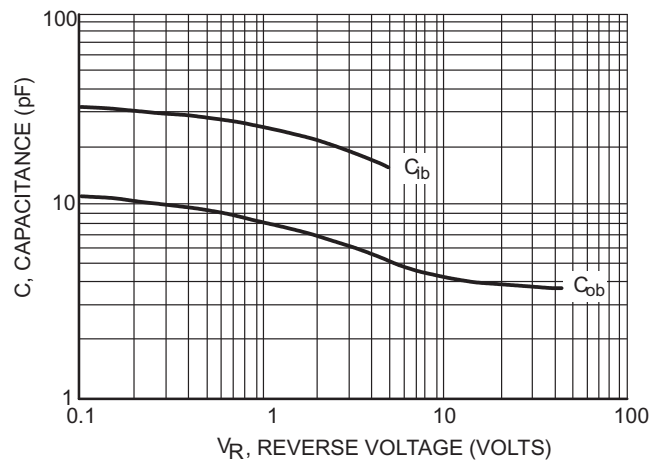


Figure 7. Capacitances

Rating and characteristic curves (BC817-25-Q1)

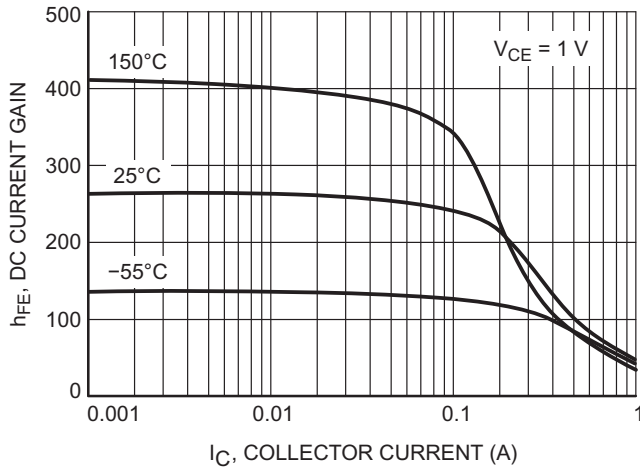


Figure 8. DC Current Gain vs. Collector Current

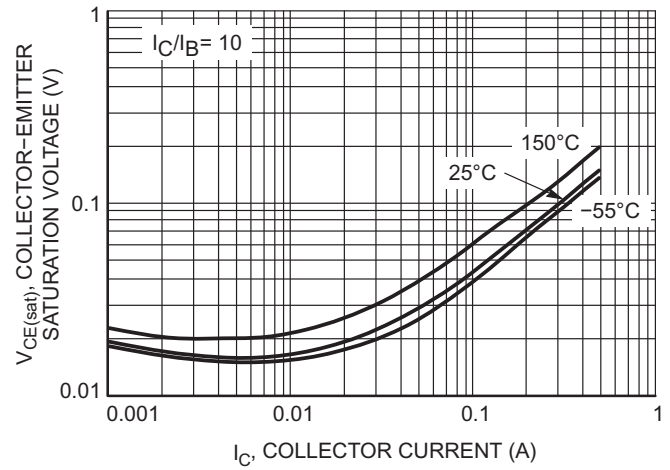


Figure 9. Collector Emitter Saturation Voltage vs. Collector Current

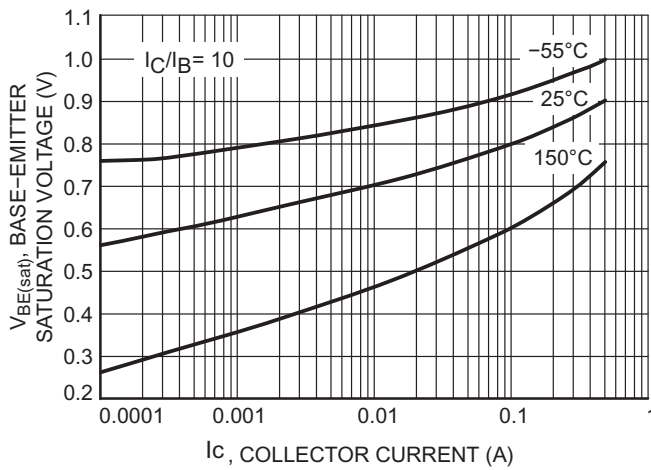


Figure 10. Base Emitter Saturation Voltage vs. Collector Current

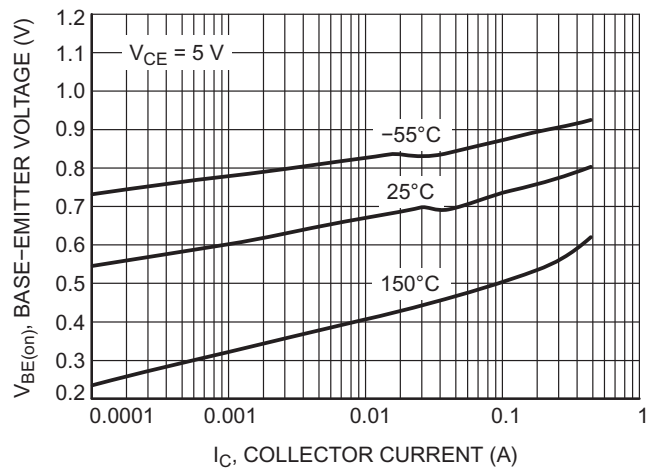


Figure 11. Base Emitter Voltage vs. Collector Current

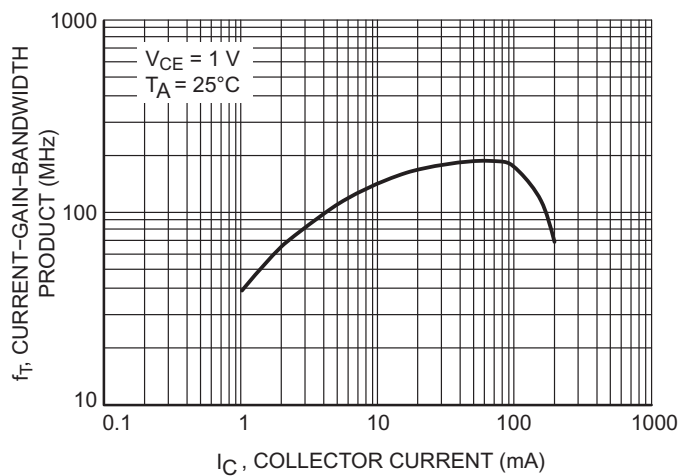


Figure 12. Current Gain Bandwidth Product vs. Collector Current

Rating and characteristic curves (BC817-25-Q1)

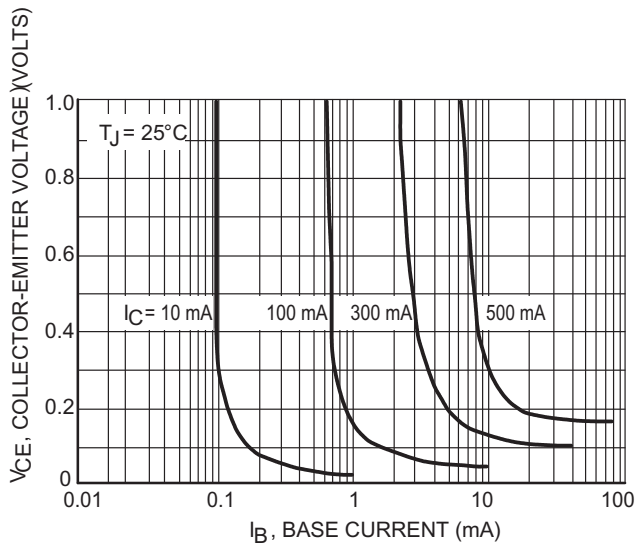


Figure 13. Saturation Region

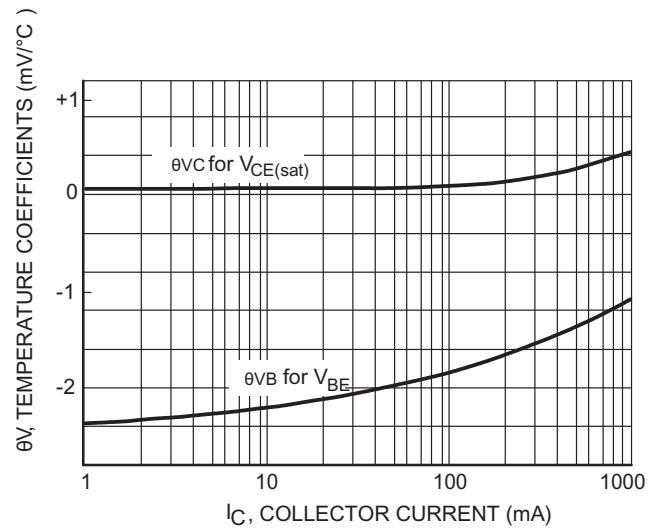


Figure 14. Temperature Coefficients

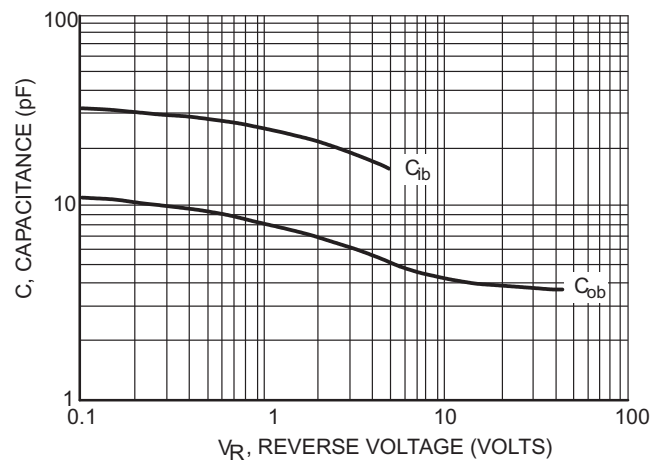


Figure 15. Capacitances

Rating and characteristic curves (BC817-40-Q1)

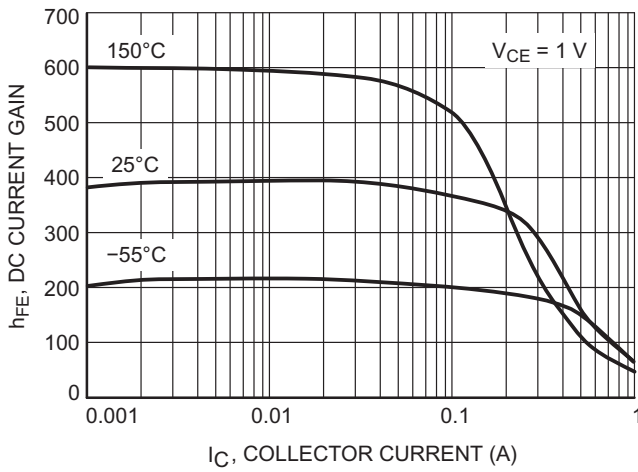


Figure 16. DC Current Gain vs. Collector Current

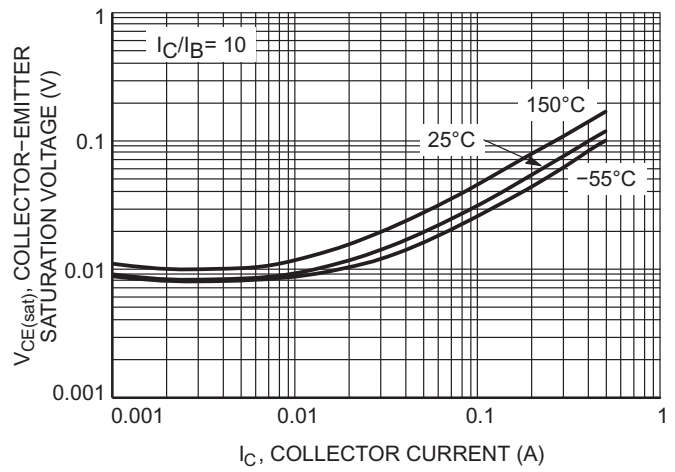


Figure 17. Collector Emitter Saturation Voltage vs. Collector Current

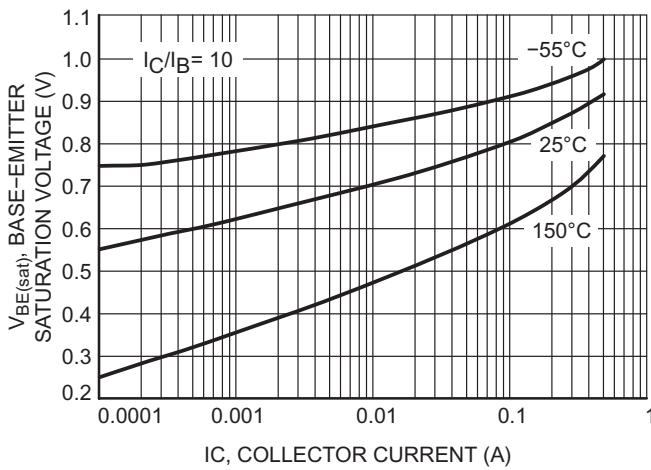


Figure 18. Base Emitter Saturation Voltage vs. Collector Current

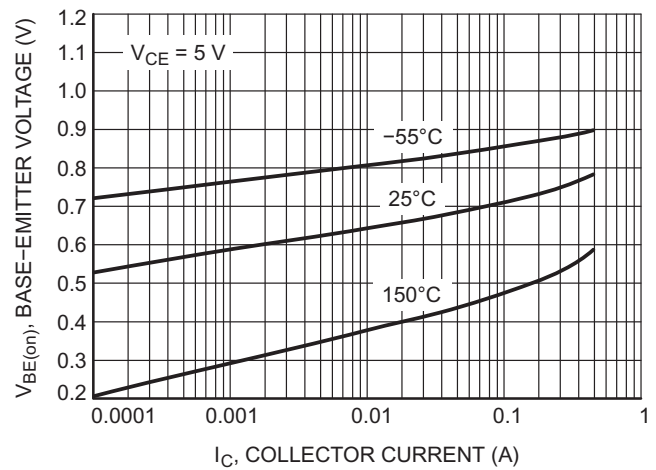


Figure 19. Base Emitter Voltage vs. Collector Current

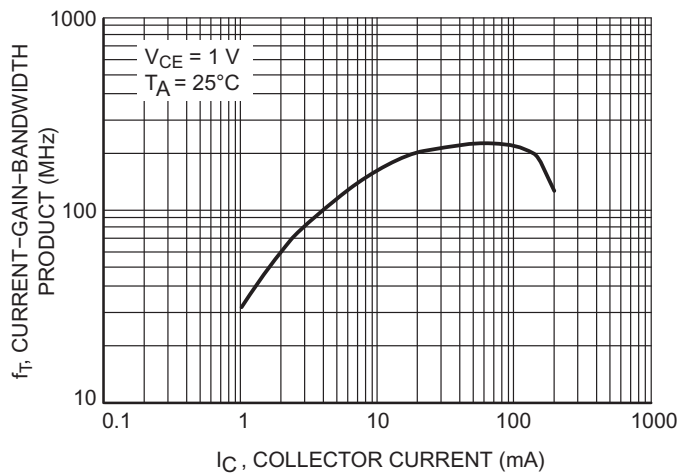


Figure 20. Current Gain Bandwidth Product vs. Collector Current

Rating and characteristic curves (BC817-40-Q1)

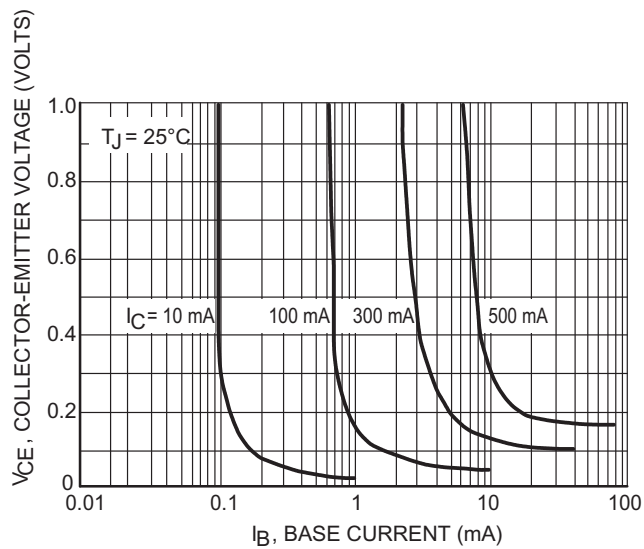


Figure 21. Saturation Region

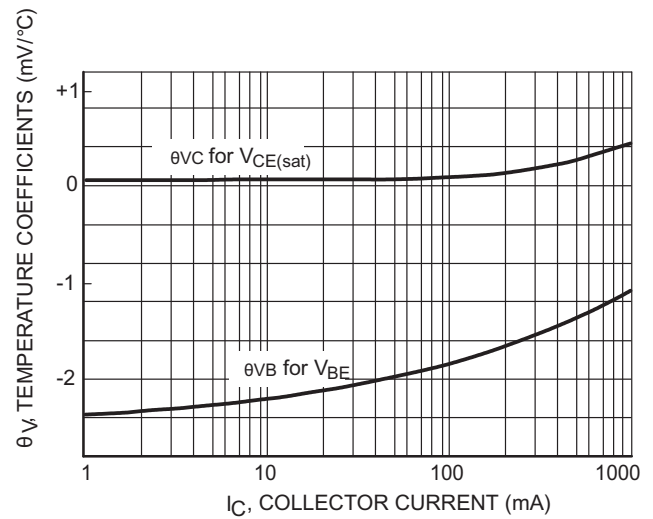


Figure 22. Temperature Coefficients

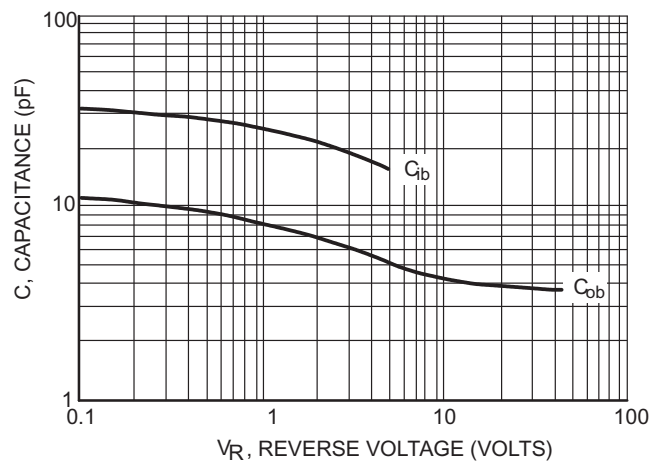


Figure 23. Capacitances

Rating and characteristic curves (BC817-16-Q1 / BC817-25-Q1 / BC817-40-Q1)

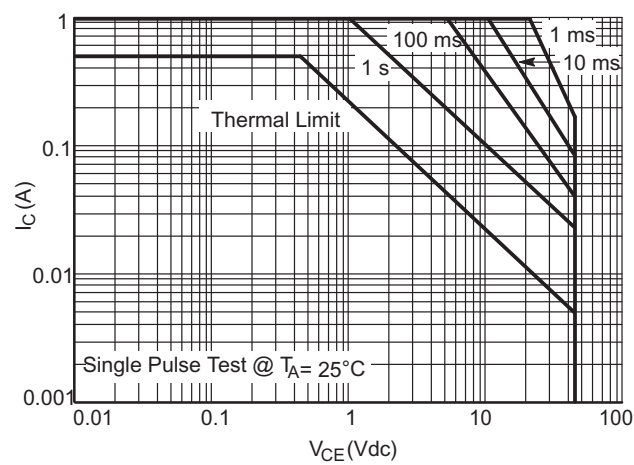
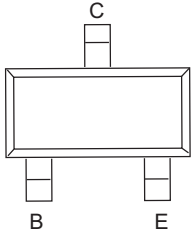
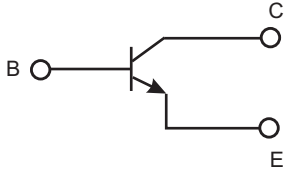


Figure 24. Safe Operating Area

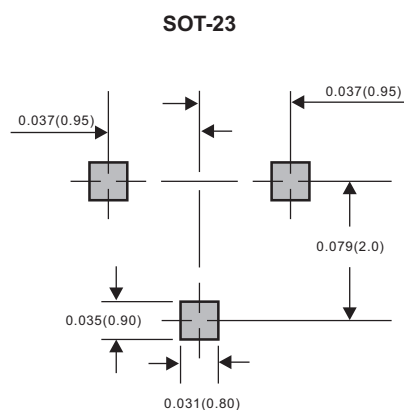
Pinning information

Pin	Simplified outline	Symbol
PinB Base PinC Collector PinE Emitter		

Marking

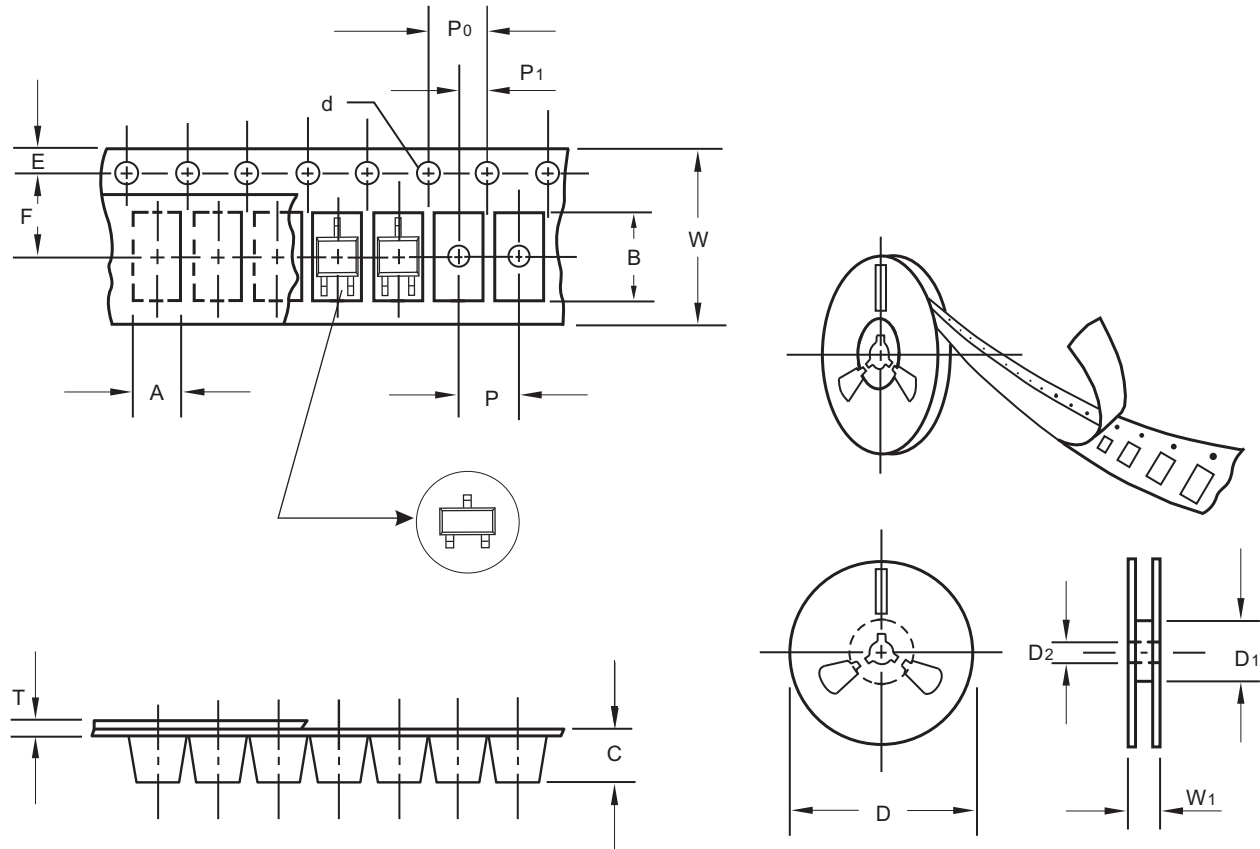
Type number	Marking code
BC817-16-Q1	6A
BC817-25-Q1	6B
BC817-40-Q1	6C

Suggested solder pad layout



Dimensions in inches and (millimeters)

Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	54.40
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	12.0

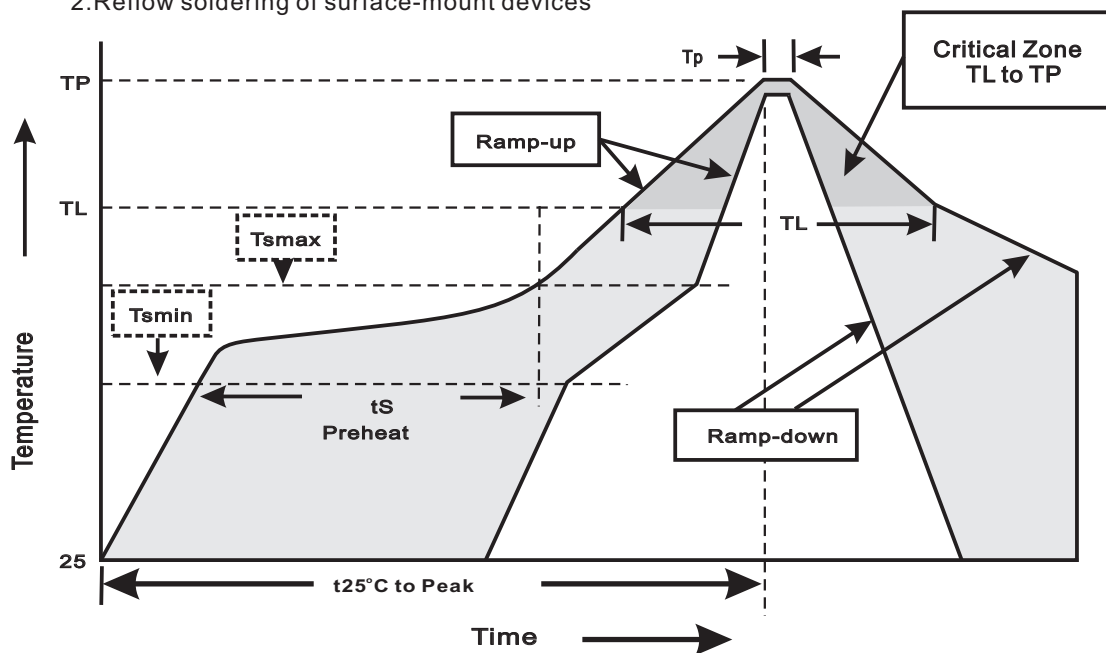
Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-23	7"	3,000	4.0	30,000	183*183*123	178	382*262*387	240,000	11.6

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T_L to T_P)	$<3^{\circ}\text{C}/\text{sec}$
Preheat -Temperature Min(T_{smin}) -Temperature Max(T_{smax}) -Time(min to max)(t_s)	150°C 200°C 60~120sec
T_{smax} to T_L -Ramp-upRate	$<3^{\circ}\text{C}/\text{sec}$
Time maintained above: -Temperature(T_L) -Time(t_L)	217°C 60~260sec
Peak Temperature(T_P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t_P)	10~30sec
Ramp-down Rate	$<6^{\circ}\text{C}/\text{sec}$
Time 25°C to Peak Temperature	$<6\text{minutes}$

High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125°C+168hrs@85°C /85%RH+3xIR@260°C+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. Intermittent Operating Life	Ta=25?, ΔTj≥100? On/Off=2min Test Duration:1000hrs	MIL-STD-750E METHOD 1037
3. High Temperature Reverse Bias	VCE=80%BVCeo (Tj=150°C)Test Duration:1000hrs	JESD22-A108
4. High Temperature Storage Life	Ta=125°C Test Duration: 1000hrs	JESD22 A-103
5. Temperature Cycle	-55°C (15min) to 150°C (15min)Test Cycles: 1000cycles	JESD22 A-104
6. Autoclave	P=2atm Ta=121°C RH=100% Test Duration:96hrs	JESD22 A-102
7. Solderability	245±5°C for 5sec	J-STD-002
8. Moisture Resistance	Ta=85°C/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
9. Resistance To Solder Heat	260±5°C for 10sec	JESD22 B-106
10. High Temperature High Humidity Reverse Bias	Ta=85°C, 85%RH, VCE=80%BVCeo Test Duration:1000hrs	JESD22-A101