BCV46-Q

PNP Darlington transistor

12 May 2022 **Product data sheet**

1. General description

PNP Darlington transistor in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complement: BCV47-Q

2. Features and benefits

- High current
- High current gain
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- For general AF applications and where high amplification is required

4. Quick reference data

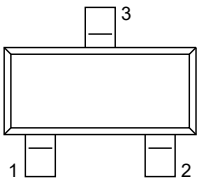
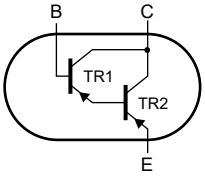
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	-	-80	V
V_{CES}	collector-emitter voltage	base short-circuited to emitter		-	-	-60	V
I_C	collector current			-	-	-500	mA
I_{CM}	peak collector current			-	-	-800	mA
h_{FE}	DC current gain	V_{CE} = -5 V; I_C = -100 mA; T_{amb} = 25 °C	[1]	10000	-	-	

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base		
2	E	emitter		
3	C	collector		

SOT23

aaa-034789

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BCV46-Q	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
BCV46-Q	FE%

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	-80	V
V_{CES}	collector-emitter voltage	base short-circuited to emitter		-	-60	V
V_{EBO}	emitter-base voltage	open collector		-	-10	V
I_C	collector current			-	-500	mA
I_{CM}	peak collector current			-	-800	mA
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms		-	-100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	250	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-65	150	°C
T_{stg}	storage temperature			-65	150	°C

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient		[1]	-	-	500	K/W

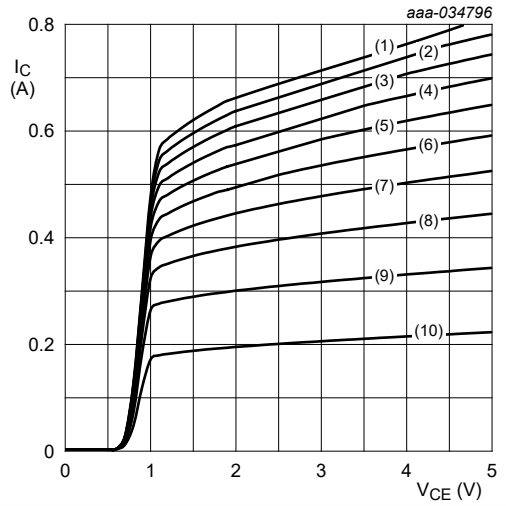
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

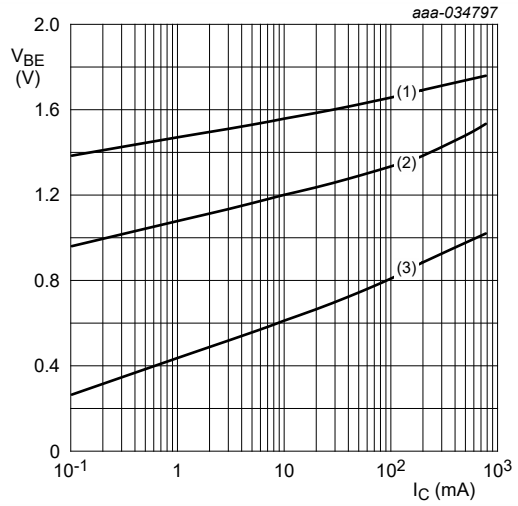
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = -100 µA; I_E = 0 A; T_{amb} = 25 °C		-80	-	-	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = -2 mA; V_{BE} = 0 V; T_{amb} = 25 °C		-60	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 0 A; I_E = -100 µA; T_{amb} = 25 °C		-10	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = -60 V; I_E = 0 A; T_{amb} = 25 °C		-	-	-100	nA
I_{CES}	collector-emitter cut-off current	V_{CE} = -60 V; V_{BE} = 0 V; T_{amb} = 25 °C		-	-	-100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = -10 V; I_C = 0 A; T_{amb} = 25 °C		-	-	-100	nA
h_{FE}	DC current gain	V_{CE} = -5 V; I_C = -1 mA; T_{amb} = 25 °C	[1]	2000	-	-	
		V_{CE} = -5 V; I_C = -10 mA; T_{amb} = 25 °C	[1]	4000	-	-	
		V_{CE} = -5 V; I_C = -100 mA; T_{amb} = 25 °C	[1]	10000	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = -100 mA; I_B = -0.1 mA; T_{amb} = 25 °C		-	-	-1	V
V_{BEsat}	base-emitter saturation voltage			-	-	-1.5	V
V_{BEon}	base-emitter turn-on voltage	I_C = -10 mA; V_{CE} = -5 V; T_{amb} = 25 °C		-	-	-1.4	V
t_d	delay time	I_C = 100 mA; I_{Bon} = 0.1 mA; I_{Boff} = -0.1 mA; V_{CC} = 5 V; T_{amb} = 25 °C		-	225	-	ns
t_r	rise time			-	200	-	ns
t_{on}	turn-on time			-	425	-	ns
t_s	storage time			-	520	-	ns
t_f	fall time			-	810	-	ns
t_{off}	turn-off time			-	1330	-	ns

[1] Pulse test: $t_p \leq 300$ µs; $\delta \leq 0.02$



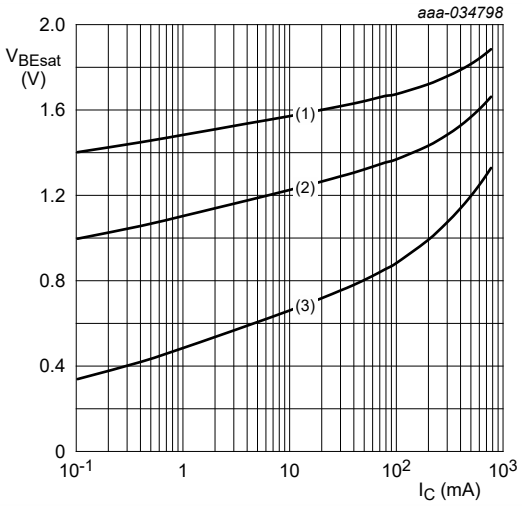
T_{amb} = 25 °C
(1) I_B = 35.0 µA
(2) I_B = 31.5 µA
(3) I_B = 28.0 µA
(4) I_B = 24.5 µA
(5) I_B = 21.0 µA
(6) I_B = 17.5 µA
(7) I_B = 14.0 µA
(8) I_B = 10.5 µA
(9) I_B = 7.0 µA
(10) I_B = 3.5 µA

Fig. 1. Collector current as a function of collector-emitter voltage; typical values



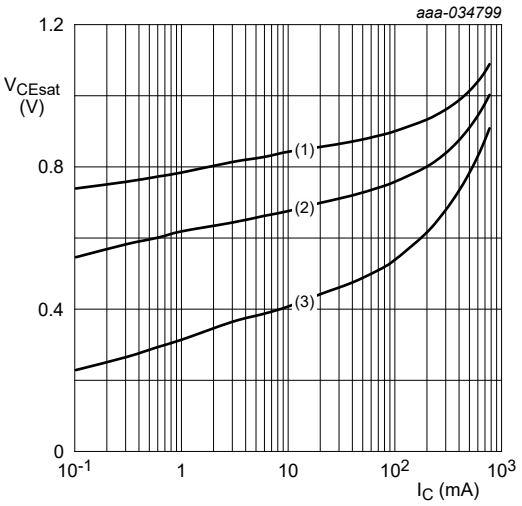
V_{CE} = 5 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 2. Base-emitter voltage as a function of collector current; typical values



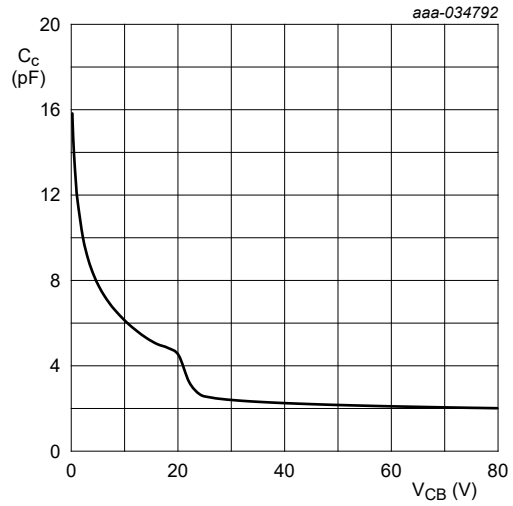
I_C/I_B = 1000
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 3. Base-emitter saturation voltage as a function of collector current; typical values



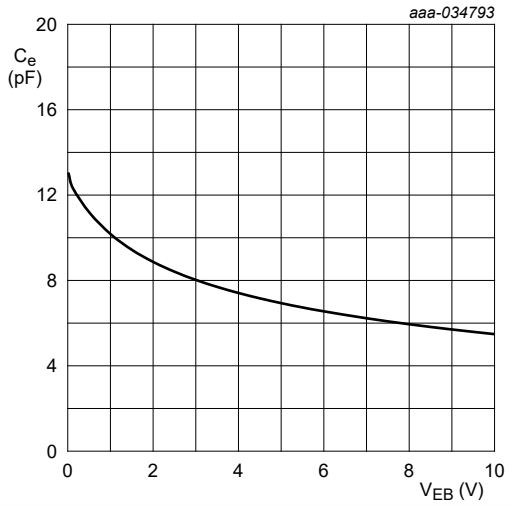
I_C/I_B = 1000
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 4. Collector-emitter saturation voltage as a function of collector current; typical values



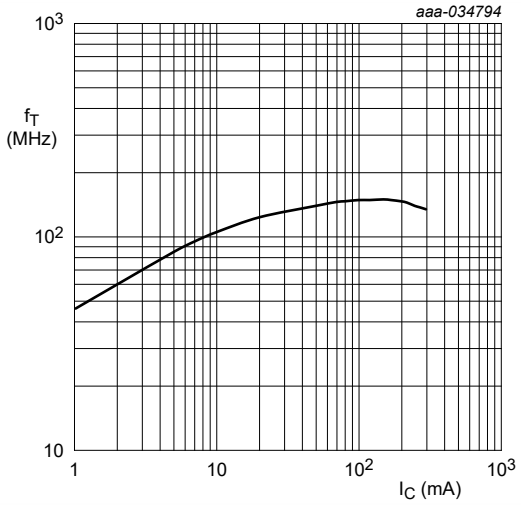
f = 1 MHz; T_{amb} = 25 °C

Fig. 5. Collector capacitance as a function of collector-base voltage; typical values



f = 1 MHz; T_{amb} = 25 °C

Fig. 6. Emitter capacitance as a function of emitter-base voltage; typical values



V_{CE} = 5 V; F = 1000 Hz

Fig. 7. Transition frequency as a function of collector current; typical values

11. Test information

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline

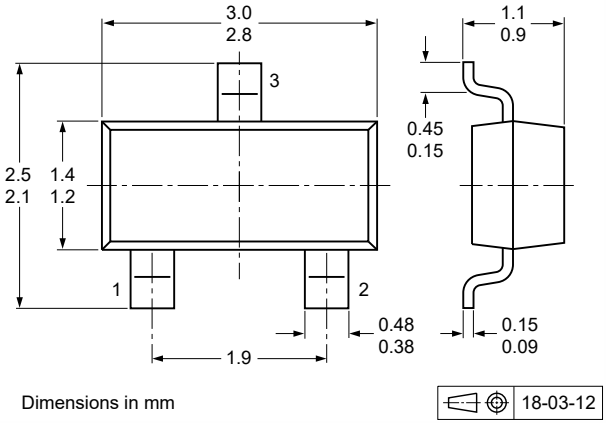


Fig. 8. Package outline SOT23

13. Soldering

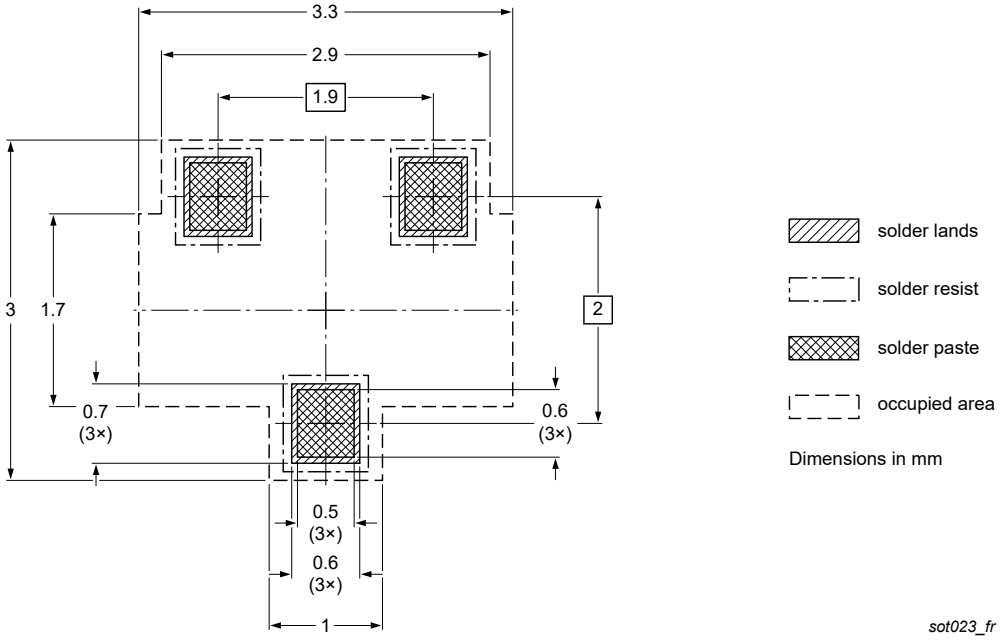


Fig. 9. Reflow soldering footprint for SOT23

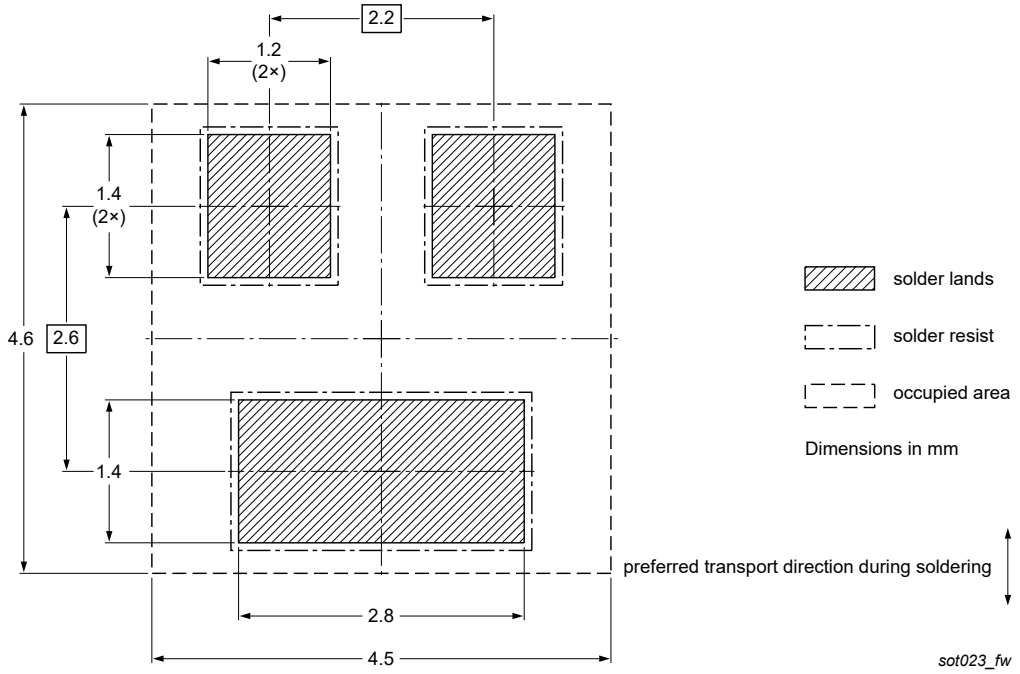


Fig. 10. Wave soldering footprint for SOT23

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BCV46-Q v.1	20220512	Product data sheet	-	-

15. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
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