



# BC807W-Q series

45 V, 500 mA PNP general-purpose transistors

Rev. 1 — 8 June 2021

Product data sheet

## 1. General description

PNP general-purpose transistors in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package			NPN complement
	Nexperia	JEDEC	JEITA	
BC807W-Q	SOT323	-	SC-70	BC817W-Q
BC807-16W-Q				BC817-16W-Q
BC807-25W-Q				BC817-25W-Q
BC807-40W-Q				BC817-40W-Q

## 2. Features and benefits

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

## 3. Applications

- General-purpose switching and amplification

## 4. Quick reference data

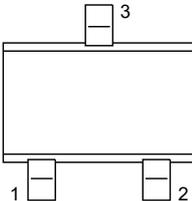
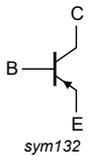
Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{CE0}$	collector-emitter voltage	open base; $T_{amb} = 25\text{ °C}$	-	-	-45	V	
$I_C$	collector current	$T_{amb} = 25\text{ °C}$	-	-	-500	mA	
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1\text{ ms}$ ; $T_{amb} = 25\text{ °C}$	-	-	-1	A	
$h_{FE}$	DC current gain						
	BC807W-Q	$V_{CE} = -1\text{ V}$ ; $I_C = -100\text{ mA}$ $T_{amb} = 25\text{ °C}$	[1]	100	-	600	
	BC807-16W-Q		[1]	100	-	250	
	BC807-25W-Q		[1]	160	-	400	
	BC807-40W-Q		[1]	250	-	600	

[1] pulsed;  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$

## 5. Pinning information

Table 3. Pinning

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

## 6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC807W-Q	SC-70	Plastic surface-mounted package; 3 leads	SOT323
BC807-16W-Q			
BC807-25W-Q			
BC807-40W-Q			

## 7. Marking

Table 5. Marking

Type number	Marking code[1]
BC807W-Q	5D%
BC807-16W-Q	5A%
BC807-25W-Q	5B%
BC807-40W-Q	5C%

[1] % = placeholder for manufacturing site code

## 8. Limiting values

**Table 6. Limiting values**

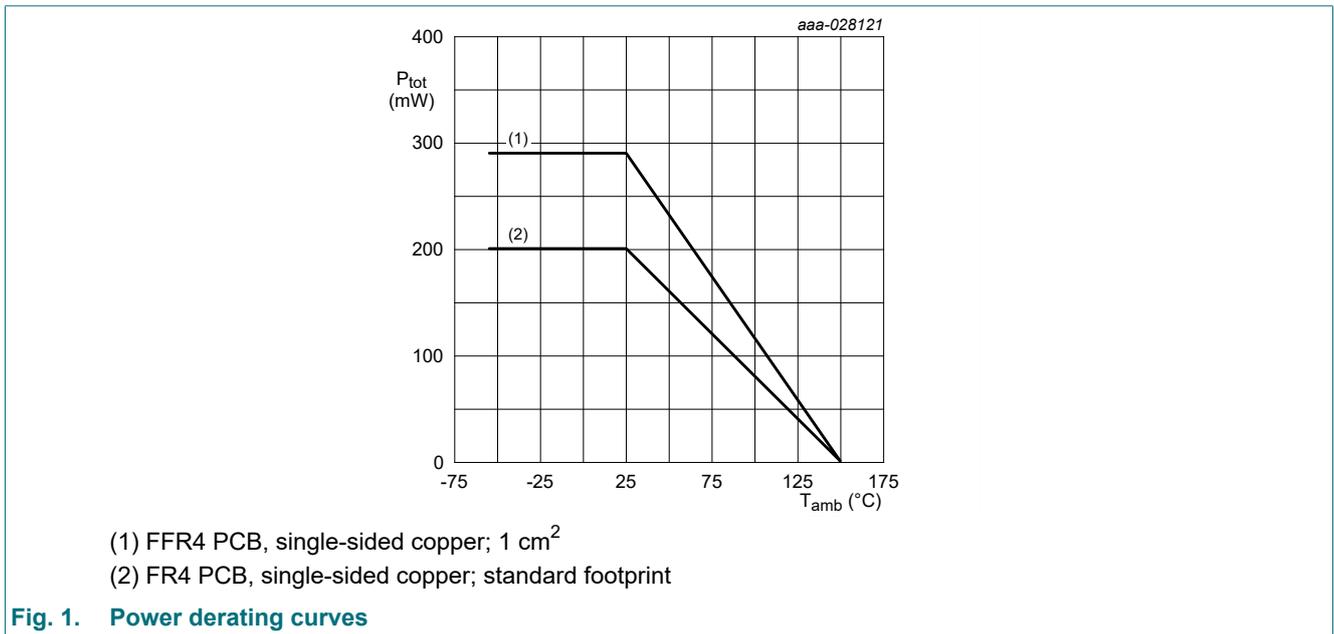
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter; $T_{amb} = 25\text{ °C}$	-	-50	V
$V_{CEO}$	collector-emitter voltage	open base; $T_{amb} = 25\text{ °C}$	-	-45	V
$V_{EBO}$	emitter-base voltage	open collector; $T_{amb} = 25\text{ °C}$	-	-5	V
$I_C$	collector current	$T_{amb} = 25\text{ °C}$	-	-500	mA
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1\text{ ms}$ ; $T_{amb} = 25\text{ °C}$	-	-1	A
$I_{BM}$	peak base current	single pulse; $t_p \leq 1\text{ ms}$ ; $T_{amb} = 25\text{ °C}$	-	-200	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1] [2]	200	mW
			[3] [2]	290	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.

[2] Valid for all available selection groups.

[3] Device mounted on an FR4 PCB; single-sided copper, tin-plated; mounting pad for collector 1 cm<sup>2</sup>.



**Fig. 1. Power derating curves**

## 9. Thermal characteristics

Table 7. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W
			[2]	-	-	431	K/W
			[3]	-	-	431	K/W

[1] Device mounted on an FR4 PCB; single-sided copper; tin-plated and standard footprint.

[2] Valid for all available selection groups.

[3] Device mounted on an FR4 PCB; single-sided copper, tin-plated; mounting pad for collector 1 cm<sup>2</sup>.

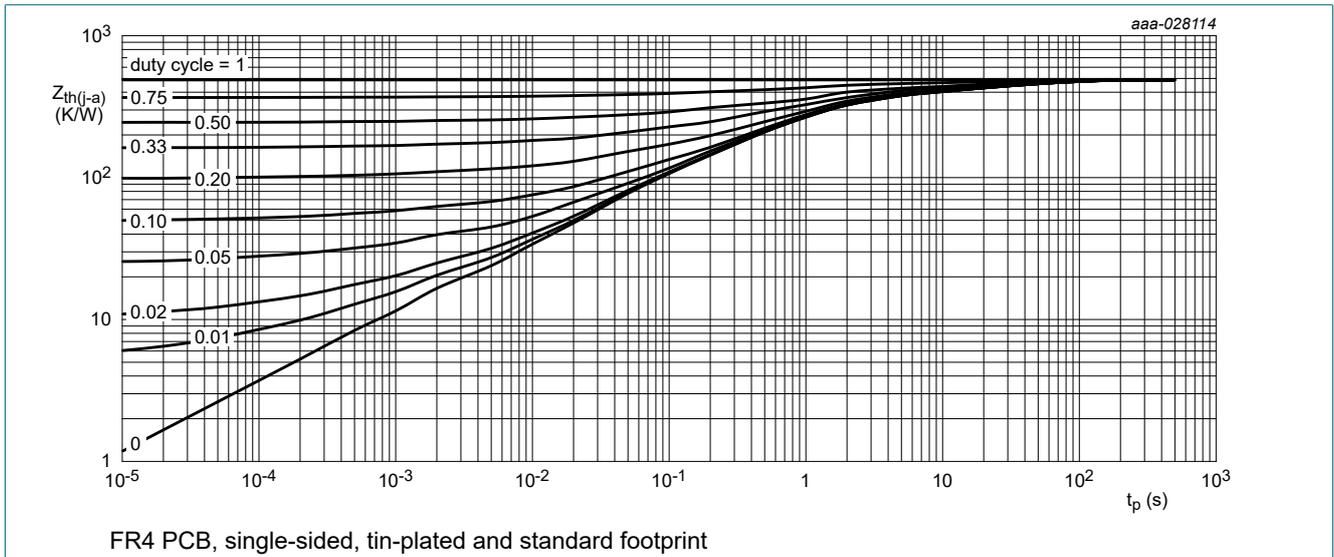


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

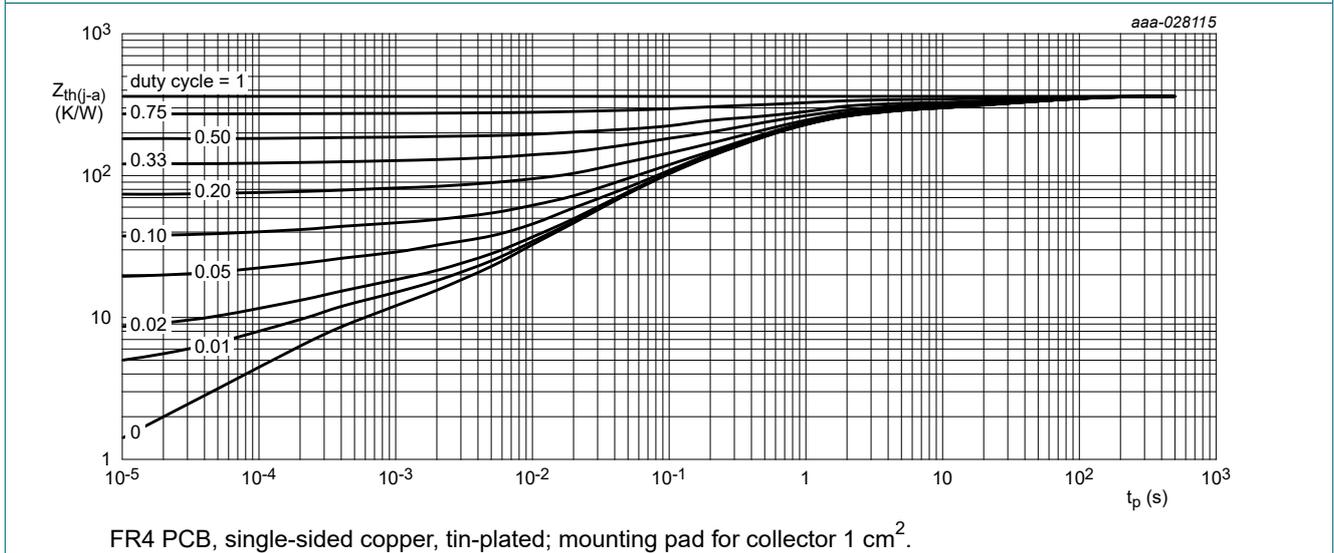


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

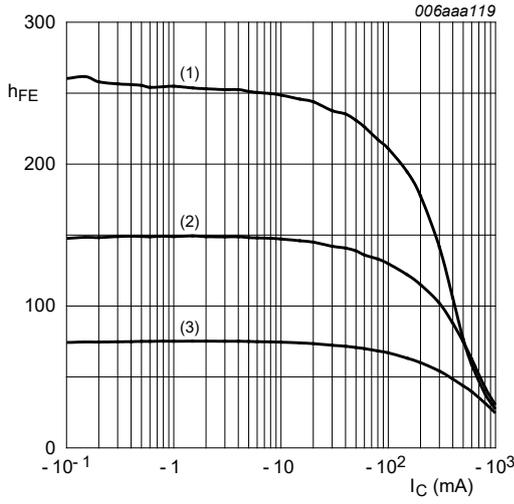
## 10. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = -100 \mu\text{A}$ ; $I_E = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = -10 \text{ mA}$ ; $I_E = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-45	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = -100 \mu\text{A}$ ; $I_C = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-5	-	-	V
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -20 \text{ V}$ ; $I_E = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-100	nA
		$V_{CB} = -20 \text{ V}$ ; $I_E = 0 \text{ A}$ ; $T_j = 150 \text{ }^\circ\text{C}$	-	-	-5	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -5 \text{ V}$ ; $I_C = 0 \text{ A}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	-100	nA
$h_{FE}$	DC current gain					
	BC807W-Q	$V_{CE} = -1 \text{ V}$ ; $I_C = -100 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	100	-	600
	BC807-16W-Q		[1]	100	-	250
	BC807-25W-Q		[1]	160	-	400
BC807-40W-Q	[1]		250	-	600	
$h_{FE}$	DC current gain	$V_{CE} = -1 \text{ V}$ ; $I_C = -500 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	40	-	-
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -500 \text{ mA}$ ; $I_B = -50 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1]	-	-	-700 mV
$V_{BE}$	base-emitter voltage	$V_{CE} = -1 \text{ V}$ ; $I_C = -500 \text{ mA}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	[1] [2]	-	-	-1.2 V
$f_T$	transition frequency	$V_{CE} = -5 \text{ V}$ ; $I_C = -10 \text{ mA}$ ; $f = 100 \text{ MHz}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		80	-	- MHz
$C_c$	collector capacitance	$V_{CB} = -10 \text{ V}$ ; $I_E = I_C = 0 \text{ A}$ ; $f = 1 \text{ MHz}$ ; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$		-	5	- pF

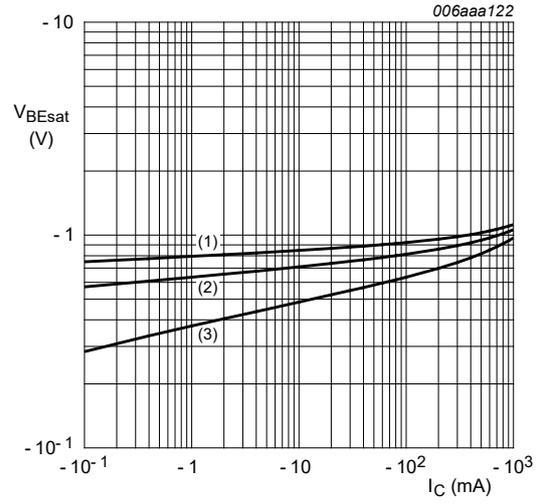
[1] pulsed;  $t_p \leq 300 \mu\text{s}$ ;  $\delta \leq 0.02$

[2]  $V_{BE}$  decreases by about 2 mV/K with increasing temperature.



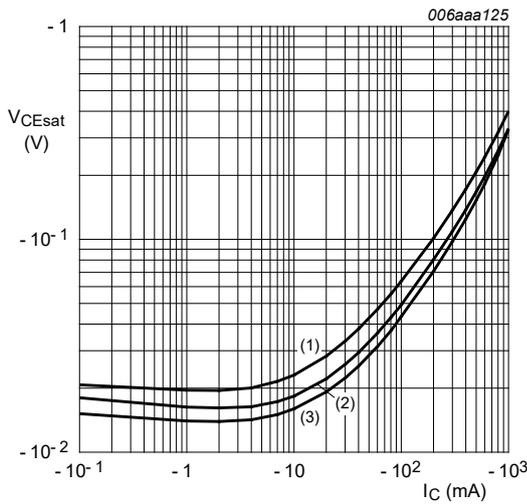
$V_{CE} = -1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

**Fig. 4. BC807-16W-Q: DC current gain as a function of collector current; typical values**



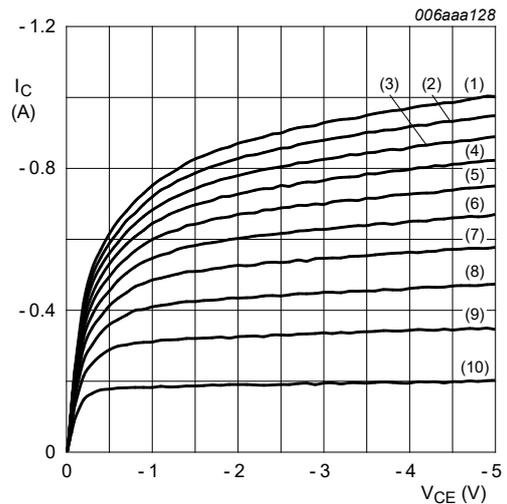
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

**Fig. 5. BC807-16W-Q: Base-emitter saturation voltage as a function of collector current; typical values**



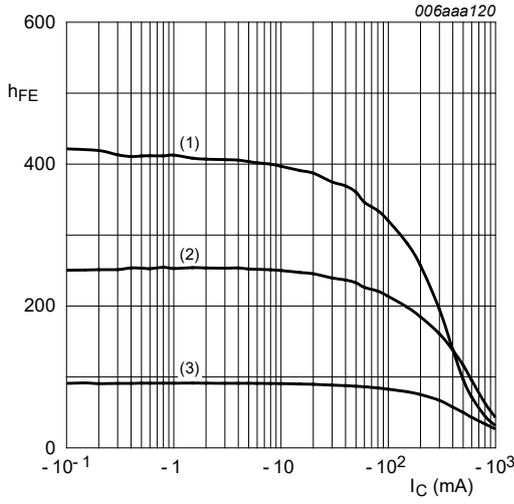
$I_C/I_B = 10$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

**Fig. 6. BC807-16W-Q: Collector-emitter saturation voltage as a function of collector current; typical values**



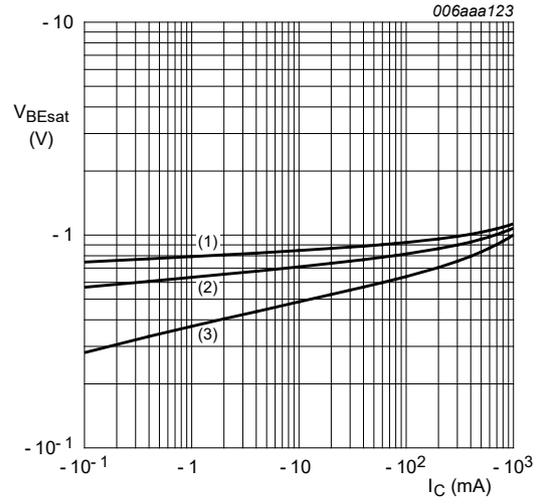
$T_{amb} = 25\text{ °C}$   
 (1)  $I_B = -16.0\text{ mA}$   
 (2)  $I_B = -14.4\text{ mA}$   
 (3)  $I_B = -12.8\text{ mA}$   
 (4)  $I_B = -11.2\text{ mA}$   
 (5)  $I_B = -9.6\text{ mA}$   
 (6)  $I_B = -8.0\text{ mA}$   
 (7)  $I_B = -6.4\text{ mA}$   
 (8)  $I_B = -4.8\text{ mA}$   
 (9)  $I_B = -3.2\text{ mA}$   
 (10)  $I_B = -1.6\text{ mA}$

**Fig. 7. BC807-16W-Q: Collector current as a function of collector-emitter voltage; typical values**



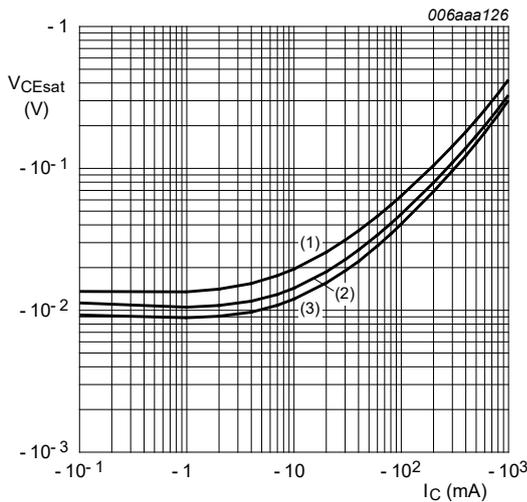
$V_{CE} = -1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

Fig. 8. BC807-25W-Q: DC current gain as a function of collector current; typical values



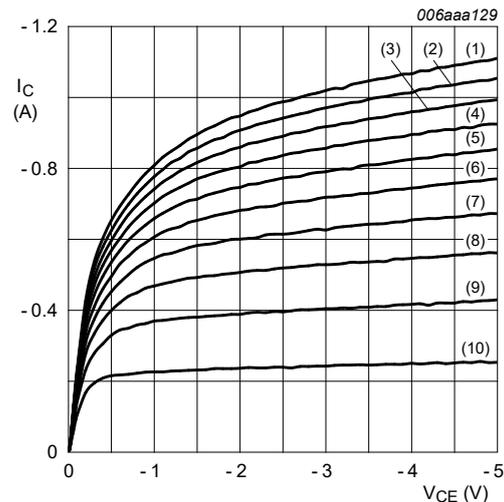
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

Fig. 9. BC807-25W-Q: Base-emitter saturation voltage as a function of collector current; typical values



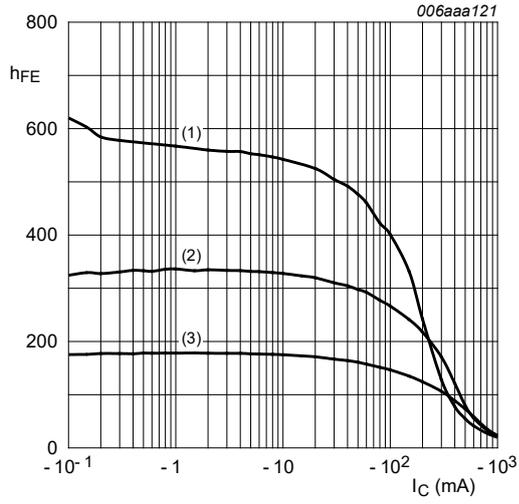
$I_C/I_B = 10$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

Fig. 10. BC807W-25-Q: Collector-emitter saturation voltage as a function of collector current; typical values



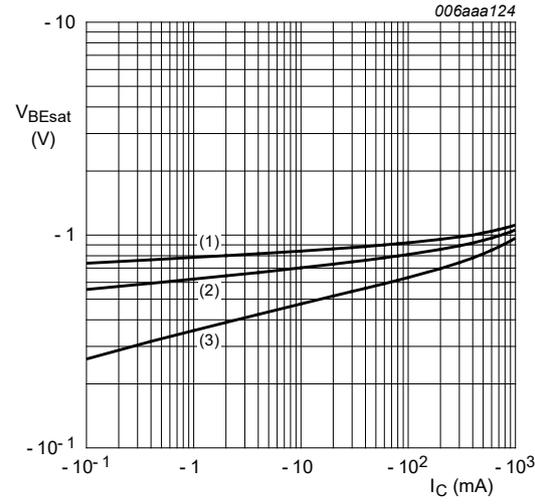
$T_{amb} = 25\text{ °C}$   
 (1)  $I_B = -13.0\text{ mA}$   
 (2)  $I_B = -11.7\text{ mA}$   
 (3)  $I_B = -10.4\text{ mA}$   
 (4)  $I_B = -9.1\text{ mA}$   
 (5)  $I_B = -7.8\text{ mA}$   
 (6)  $I_B = -6.5\text{ mA}$   
 (7)  $I_B = -5.2\text{ mA}$   
 (8)  $I_B = -3.9\text{ mA}$   
 (9)  $I_B = -2.6\text{ mA}$   
 (10)  $I_B = -1.3\text{ mA}$

Fig. 11. BC807W-25-Q: Collector current as a function of collector-emitter voltage; typical values



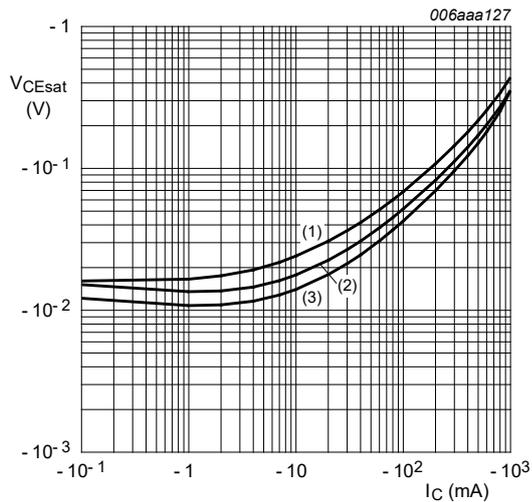
$V_{CE} = -1\text{ V}$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

**Fig. 12. BC807-40W-Q: DC current gain as a function of collector current; typical values**



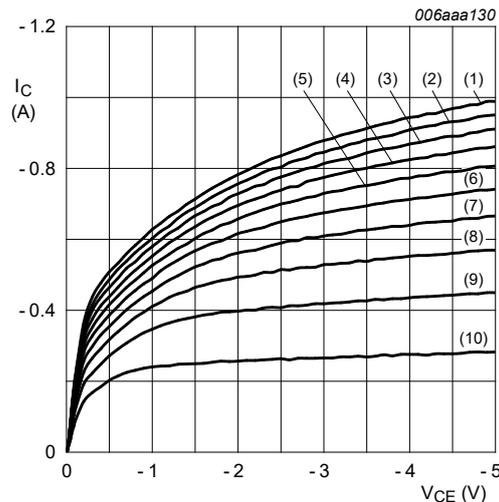
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 150\text{ °C}$

**Fig. 13. BC807-40W-Q: Base-emitter saturation voltage as a function of collector current; typical values**



$I_C/I_B = 10$   
 (1)  $T_{amb} = 150\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

**Fig. 14. BC807-40W-Q: Collector-emitter saturation voltage as a function of collector current; typical values**



$T_{amb} = 25\text{ °C}$   
 (1)  $I_B = -12.0\text{ mA}$   
 (2)  $I_B = -10.8\text{ mA}$   
 (3)  $I_B = -9.6\text{ mA}$   
 (4)  $I_B = -8.4\text{ mA}$   
 (5)  $I_B = -7.2\text{ mA}$   
 (6)  $I_B = -6.0\text{ mA}$   
 (7)  $I_B = -4.8\text{ mA}$   
 (8)  $I_B = -3.6\text{ mA}$   
 (9)  $I_B = -2.4\text{ mA}$   
 (10)  $I_B = -1.2\text{ mA}$

**Fig. 15. BC807-40W-Q: Collector current as a function of collector-emitter voltage; typical values**

## 11. Test information

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### 11.1. 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

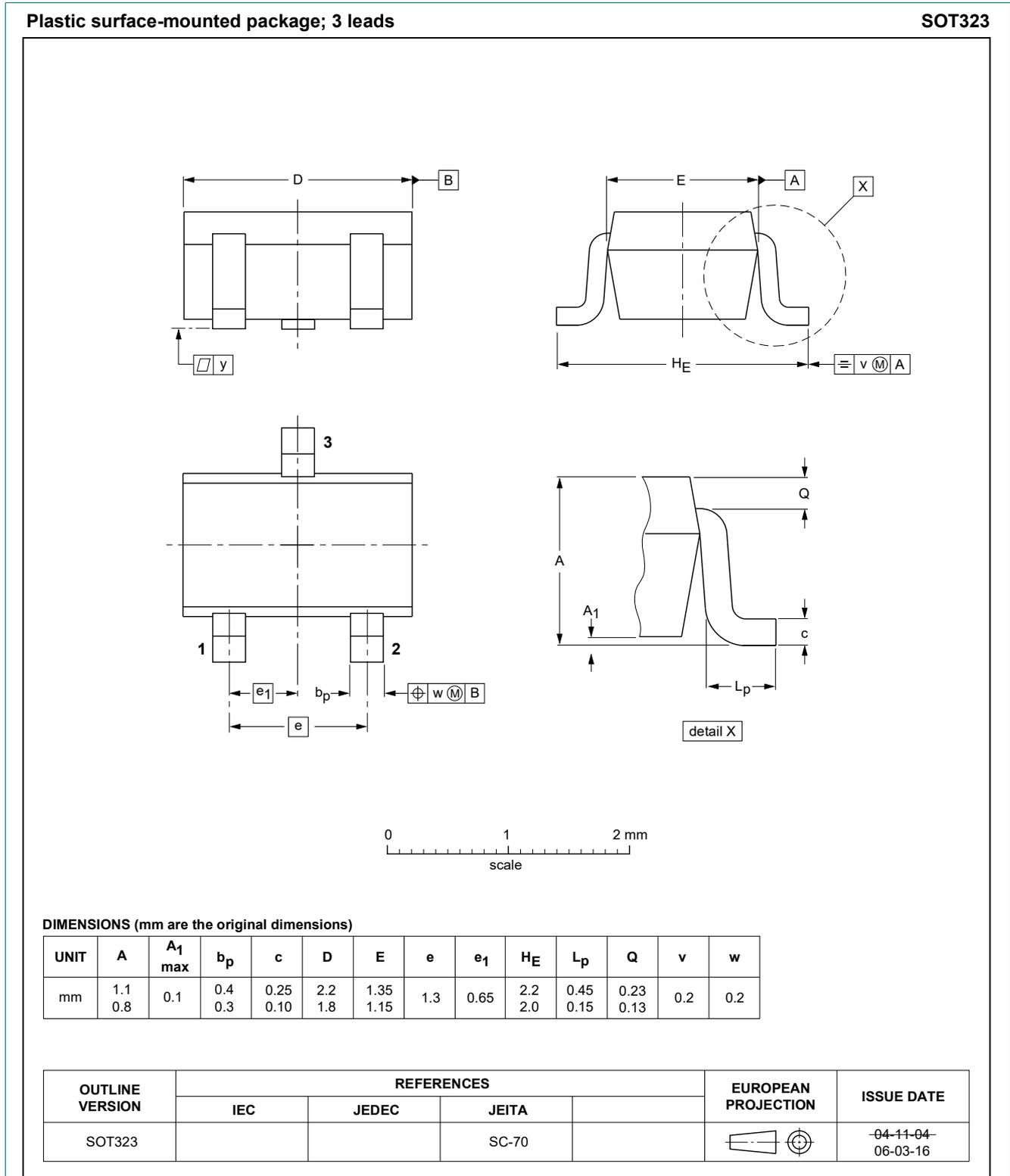


Fig. 16. Package outline SOT323 (SC-70)

### 13. Soldering

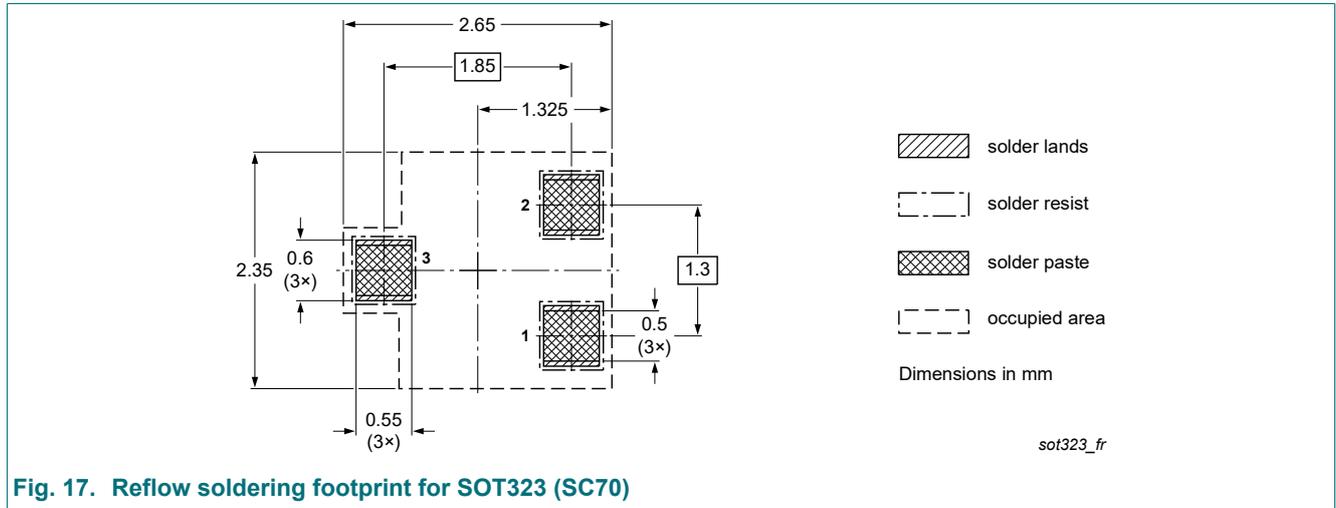


Fig. 17. Reflow soldering footprint for SOT323 (SC70)

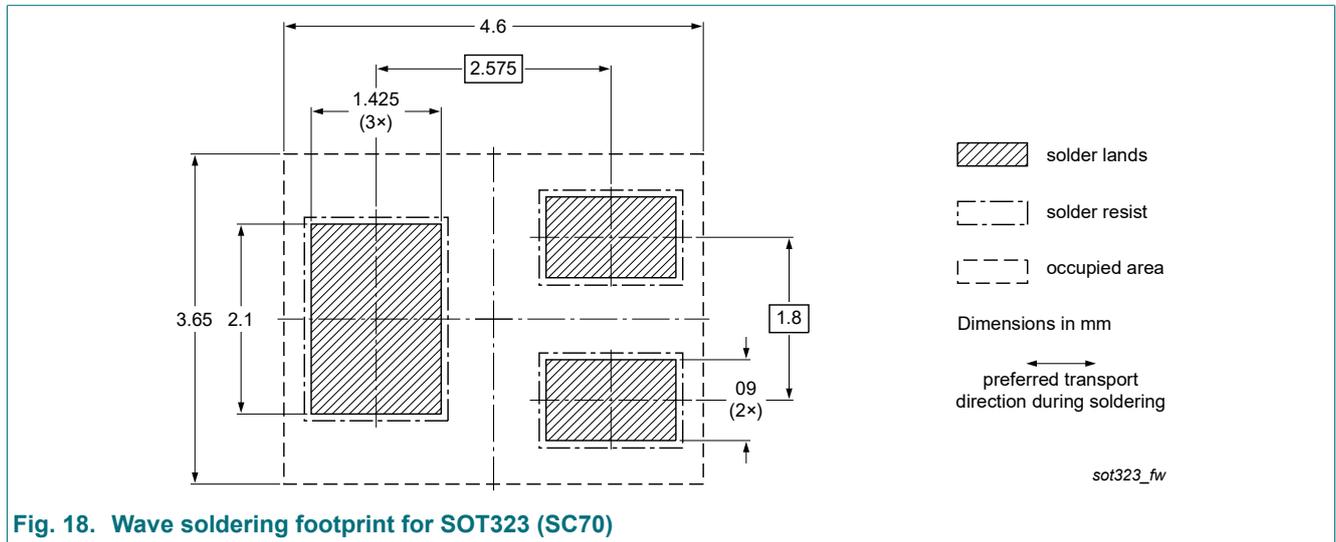


Fig. 18. Wave soldering footprint for SOT323 (SC70)

## 14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC807W-Q_SER v.1	20210608	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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 8 June 2021

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