

BC847 series

45 V, 100 mA NPN general-purpose transistors

Rev. 12 — 24 October 2019

Product data sheet

1. Product profile

1.1. General description

NPN general-purpose transistors in a small SOT23 (TO-236AB), very small SOT323 (SC-70) or ultra small SOT883 (DFN1006-3) Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number[1]	Package			PNP complement
	Nexperia	JEITA	JEDEC	
BC847	SOT23	-	TO-236AB	BC857
BC847A				BC857A
BC847B				BC857B
BC847C				BC857C
BC847W	SOT323	SC-70	-	BC857W
BC847AW				BC857AW
BC847BW				BC857BW
BC847CW				BC857CW
BC847AM	SOT883	SC-101	-	BC857AM
BC847BM				BC857BM
BC847CM				BC857CM

[1] Valid for all available selection groups.

1.2. Features and benefits

- General-purpose transistors
- SMD plastic packages
- Three different gain selections
- AEC-Q101 qualified

1.3. Applications

- General-purpose switching and amplification

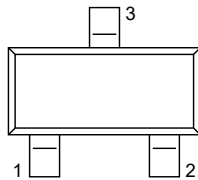
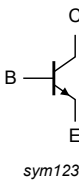
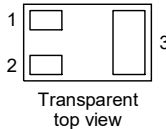
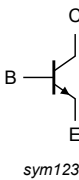
1.4. Quick reference data

Table 2. Quick reference data
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CEO}	collector-emitter voltage	open base	-	-	45	V
I _C	collector current		-	-	100	mA
h _{FE}	DC current gain	V _{CE} = 5 V; I _C = 2 mA	110	-	800	
	h _{FE} group A		110	180	220	
	h _{FE} group B		200	290	450	
	h _{FE} group C		420	520	800	

2. Pinning information

Table 3. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
SOT23; SOT323				
1	B	base		
2	E	emitter		
3	C	collector		
SOT883				
1	B	base		
2	E	emitter		
3	C	collector		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC847	TO-236AB	plastic surface-mounted package; 3 leads	SOT23
BC847A			
BC847B			
BC847C			
BC847W	SC-70		SOT323
BC847AW			
BC847BW			
BC847CW			
BC847AM	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.5 mm	SOT 883
BC847BM			
BC847CM			

4. Marking

Table 5. Marking codes

Type number		Marking code
BC847	[1]	1H%
BC847A	[1]	1E%
BC847B	[1]	1F%
BC847C	[1]	1G%
BC847W	[1]	1H%
BC847AW	[1]	1E%
BC847BW	[1]	1F%
BC847CW	[1]	1G%
BC847AM		D4
BC847BM		D5
BC847CM		D6

[1] % = placeholder for manufacturing site code

5. 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		-	50	V
V_{CEO}	collector-emitter voltage	open base		-	45	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current			-	100	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	200	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				
	SOT23		[1]	-	250	mW
	SOT323		[1]	-	200	mW
	SOT883		[2]	-	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.

[2] Device mounted on an PCB with 60 µm copper strip line, standard footprint.

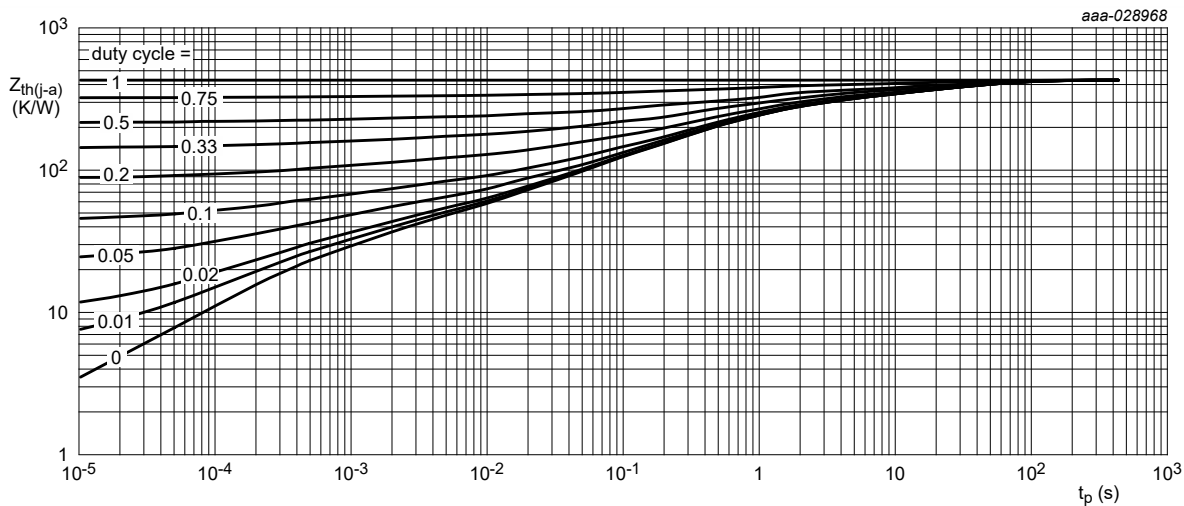
6. Thermal characteristics

Table 7. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air					
	SOT23		[1]	-	-	500	K/W
	SOT323		[1]	-	-	625	K/W
	SOT883		[2]	-	-	500	K/W

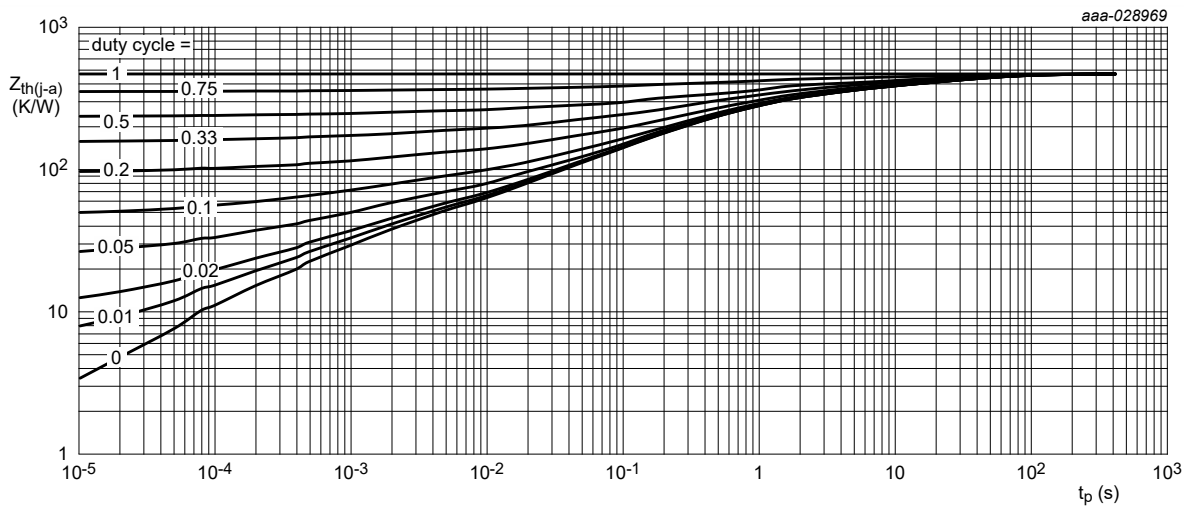
[1] Device mounted on an FR4 PCB; single-sided copper; tin-plated and standard footprint.

[2] Device mounted on an PCB with 60 µm copper strip line, standard footprint.



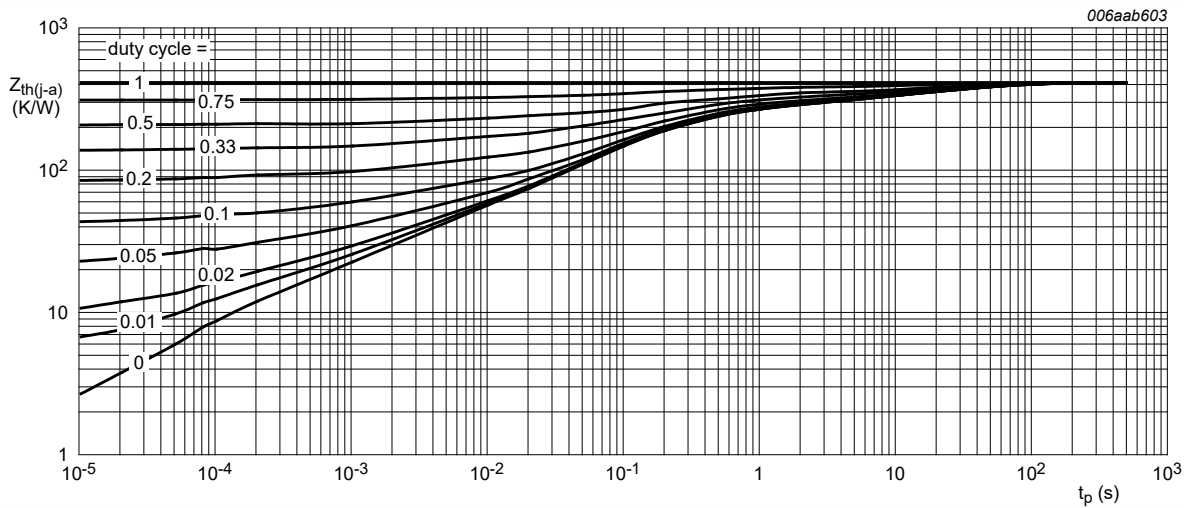
FR4 PCB; single-sided copper; tin-plated and standard footprint

Fig. 1. SOT23: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB; single-sided copper; tin-plated and standard footprint

Fig. 2. SOT323: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB; single-sided copper; tin-plated and standard footprint

Fig. 3. SOT883: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

7. Characteristics

Table 8. Characteristics

$T_{amb} = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\text{ }\mu\text{A}$; $I_E = 0\text{ A}$	50	-	-	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$I_C = 2\text{ mA}$; $V_{BE} = 0\text{ A}$	45	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_C = 0\text{ A}$; $I_E = 100\text{ }\mu\text{A}$	6	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = 30\text{ V}$; $I_E = 0\text{ A}$	-	-	15	nA
		$V_{CB} = 30\text{ V}$; $I_E = 0\text{ A}$; $T_j = 150\text{ °C}$	-	-	5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5\text{ V}$; $I_C = 0\text{ A}$	-	-	100	nA
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}$; $I_C = 10\text{ }\mu\text{A}$				
	h_{FE} group A		-	170	-	
	h_{FE} group B		-	280	-	
	h_{FE} group C		-	420	-	
	DC current gain	$V_{CE} = 5\text{ V}$; $I_C = 2\text{ mA}$	110	-	800	
	h_{FE} group A		110	180	220	
	h_{FE} group B		200	290	450	
	h_{FE} group C		420	520	800	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10\text{ mA}$; $I_B = 0.5\text{ mA}$	-	90	200	mV
		$I_C = 100\text{ mA}$; $I_B = 5\text{ mA}$	[1] -	200	400	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10\text{ mA}$; $I_B = 0.5\text{ mA}$	[2] -	700	-	mV
		$I_C = 100\text{ mA}$; $I_B = 5\text{ mA}$	[2] -	900	-	mV
V_{BE}	base-emitter voltage	$V_{CE} = 5\text{ V}$; $I_C = 2\text{ mA}$	[2] 580	660	700	mV
		$V_{CE} = 5\text{ V}$; $I_C = 10\text{ mA}$	-	-	770	mV
f_T	transition frequency	$V_{CE} = 5\text{ V}$; $I_C = 10\text{ mA}$; $f = 100\text{ MHz}$	100	-	-	MHz
C_c	collector capacitance	$V_{CB} = 10\text{ V}$; $I_E = i_e = 0\text{ A}$; $f = 1\text{ MHz}$	-	-	1.5	pF
C_e	emitter capacitance	$V_{EB} = 0.5\text{ V}$; $I_C = i_c = 0\text{ A}$; $f = 1\text{ MHz}$	-	11	-	pF
NF	noise figure	$I_C = 200\text{ }\mu\text{A}$; $V_{CE} = 5\text{ V}$; $R_S = 2\text{ k}\Omega$; $f = 1\text{ kHz}$; $B = 200\text{ Hz}$	-	2	10	dB

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

[2] V_{BE} decreases by approximately 2 mV/K with increasing temperature

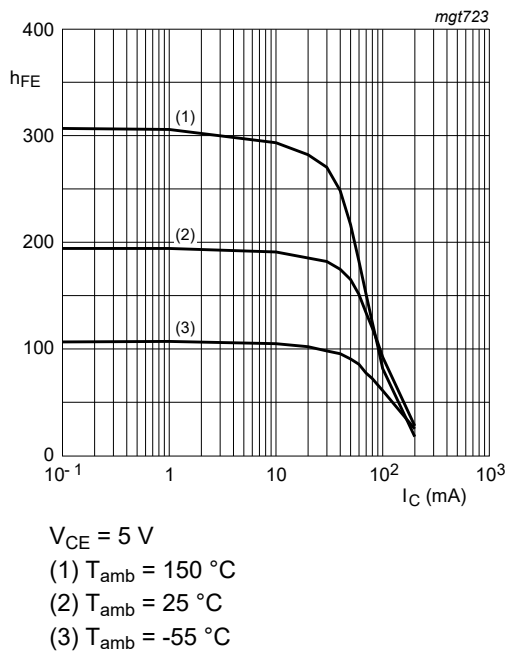


Fig. 4. Group A: DC current gain as a function of collector current; typical values

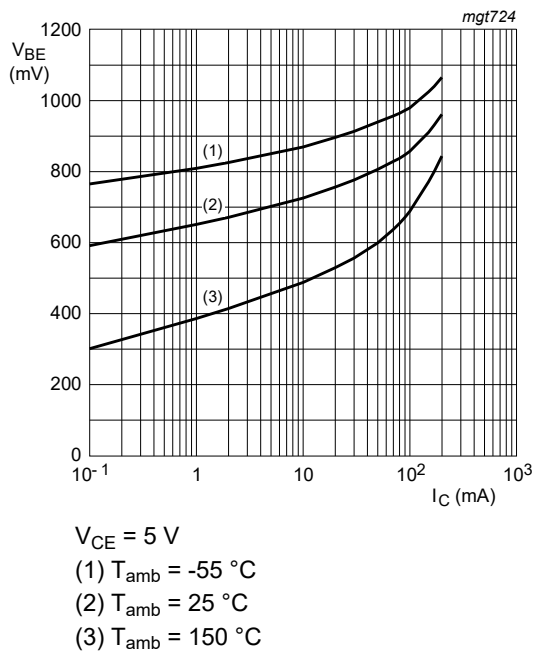


Fig. 5. Group A: Base-emitter voltage as a function of collector current; typical values

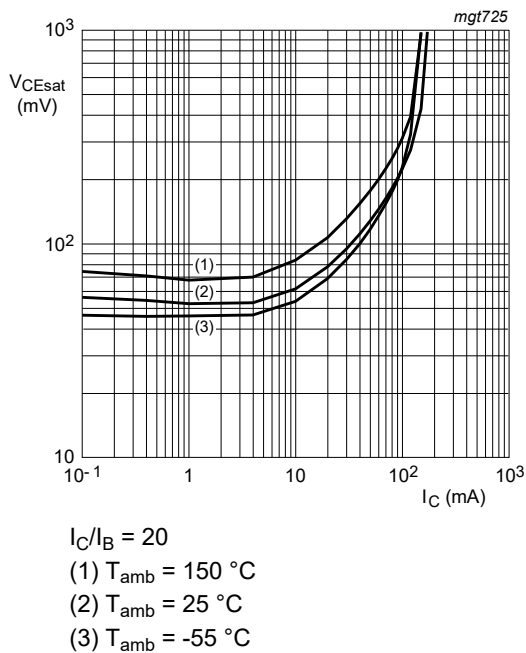


Fig. 6. Group A: Collector-emitter saturation voltage as a function of collector current; typical values

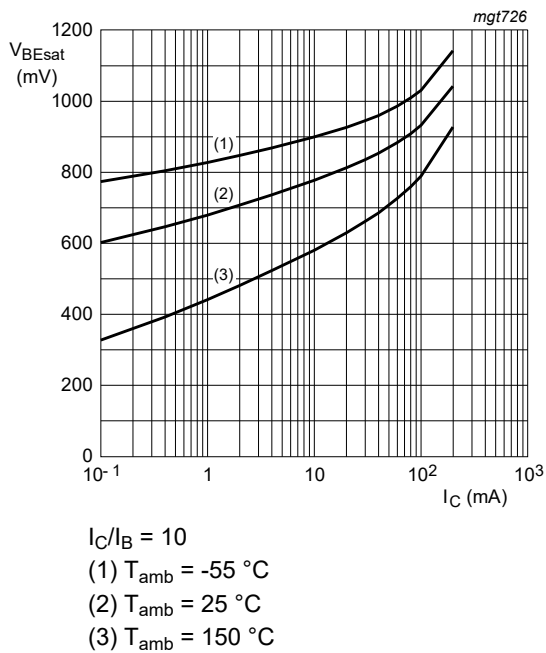


Fig. 7. Group A: Base-emitter saturation voltage as a function of collector current; typical values

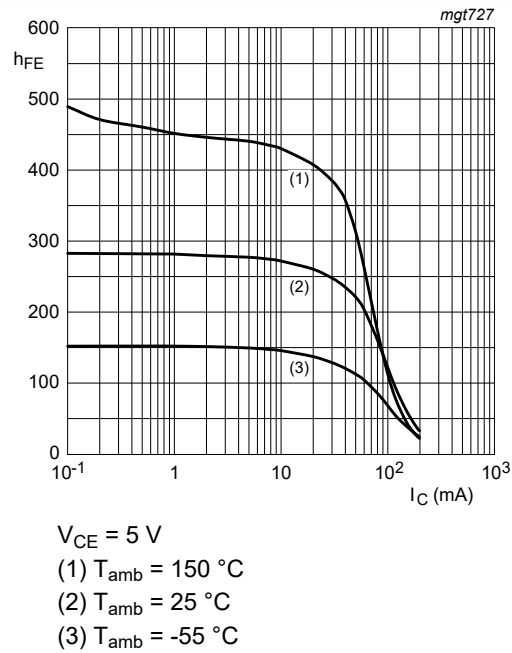


Fig. 8. Group B: DC current gain as a function of collector current; typical values

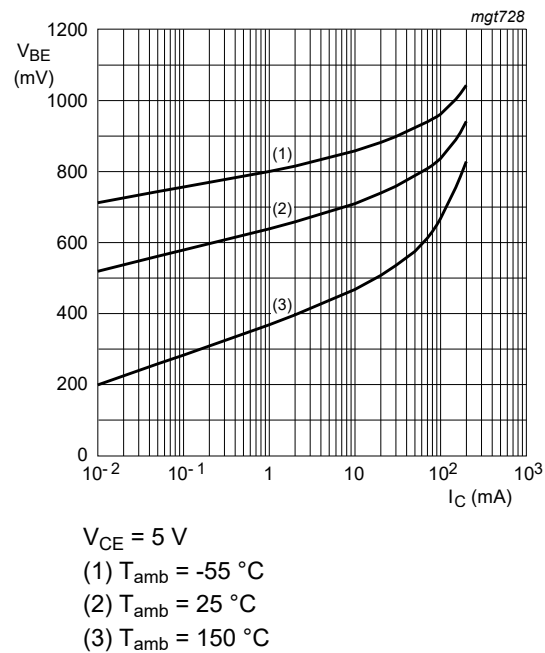


Fig. 9. Group B: Base-emitter voltage as a function of collector current; typical values

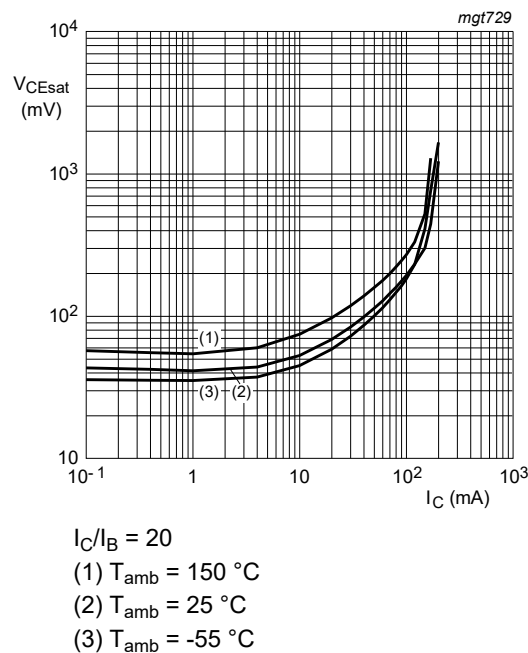


Fig. 10. Group B: Collector-emitter saturation voltage as a function of collector current; typical values

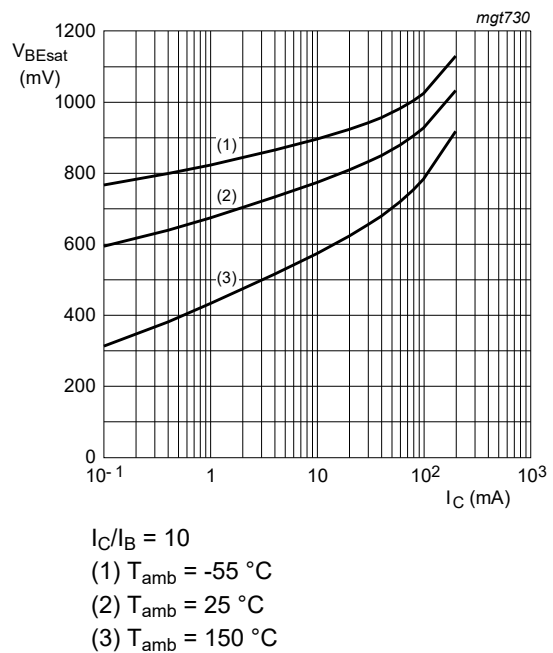


Fig. 11. Group B: Base-emitter saturation voltage as a function of collector current; typical values

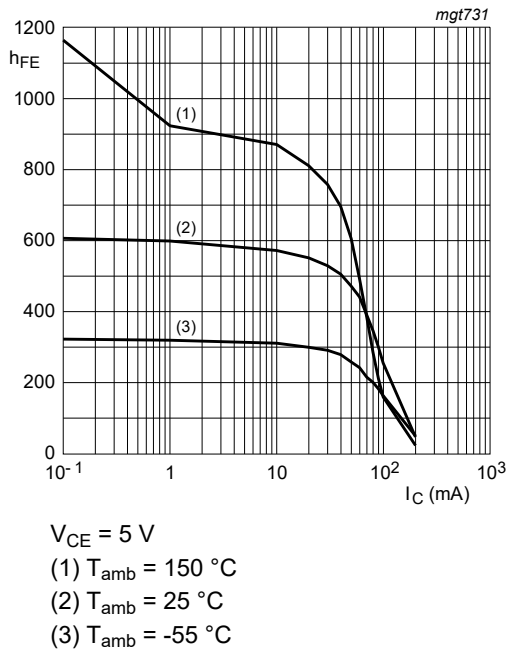


Fig. 12. Group C: DC current gain as a function of collector current; typical values

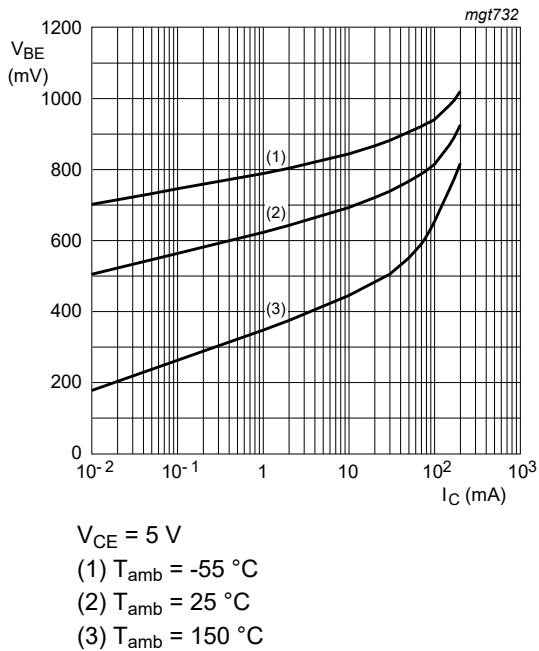


Fig. 13. Group C: Base-emitter voltage as a function of collector current; typical values

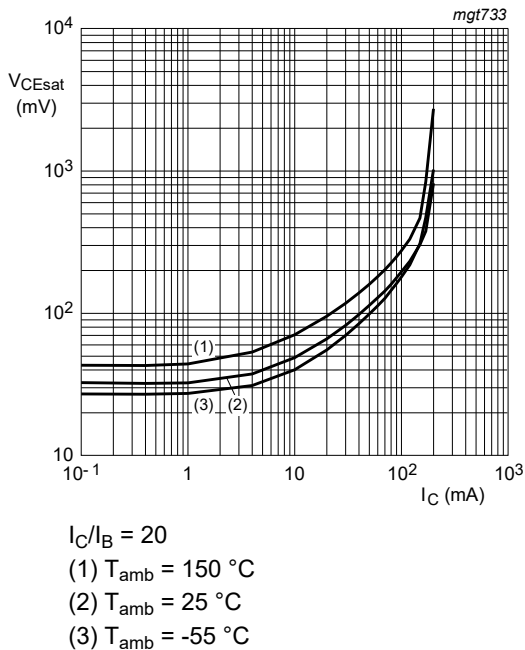


Fig. 14. Group C: Collector-emitter saturation voltage as a function of collector current; typical values

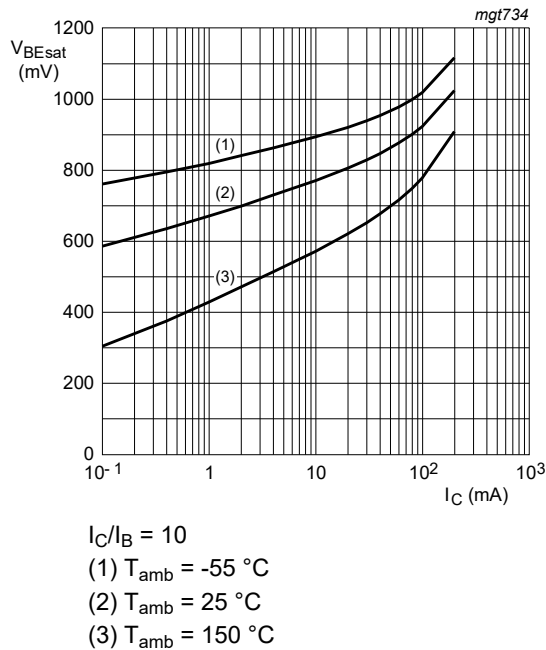


Fig. 15. Group C: Base-emitter saturation voltage as a function of collector current; typical values

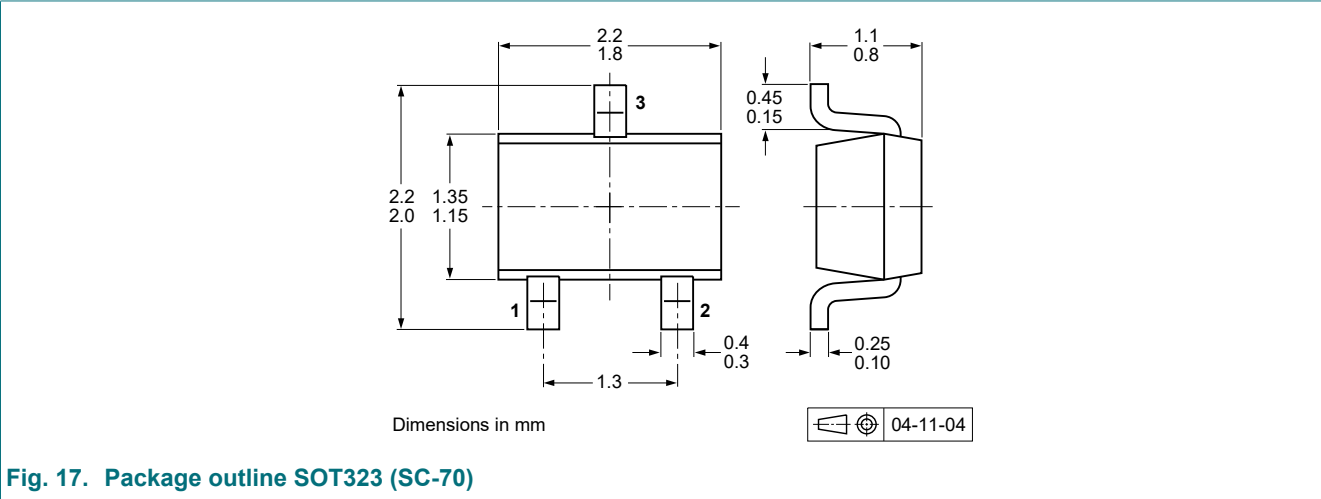
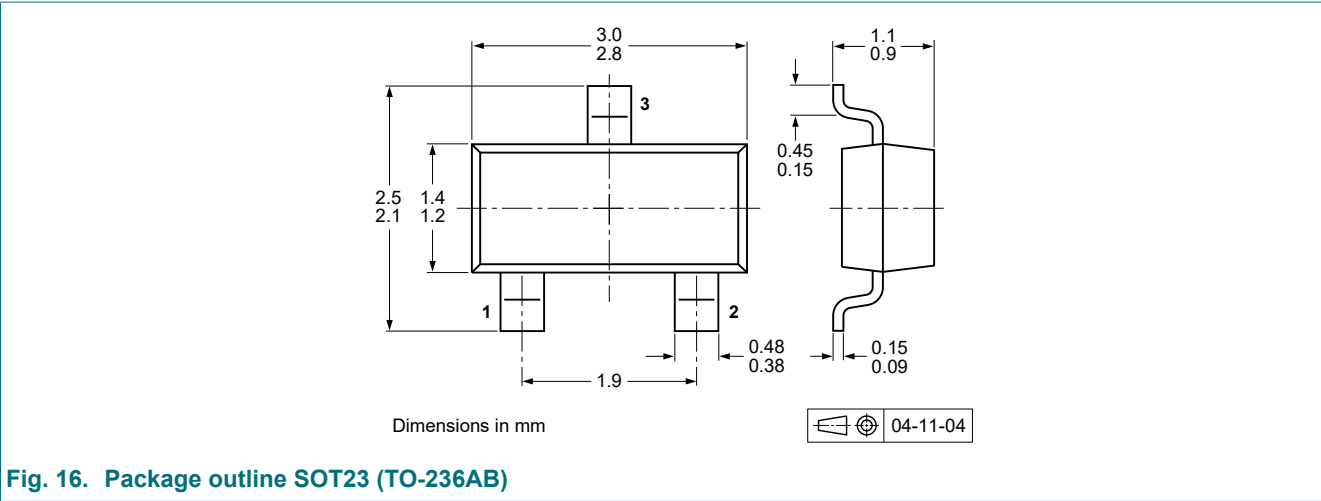
8. Test information

8.1. 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.

9. Package outline

Table 9. Package outline



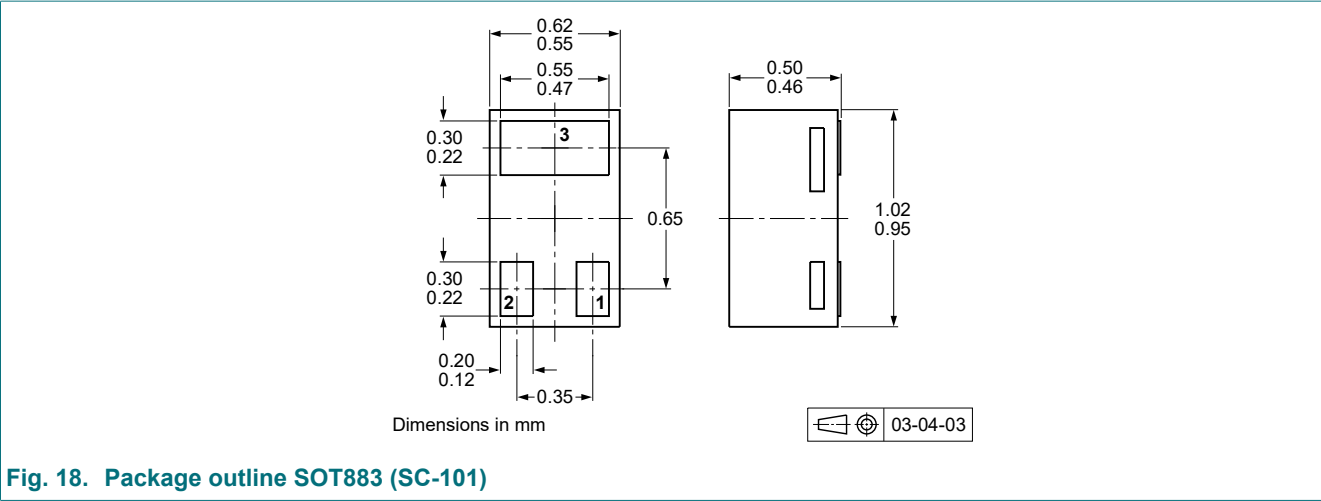
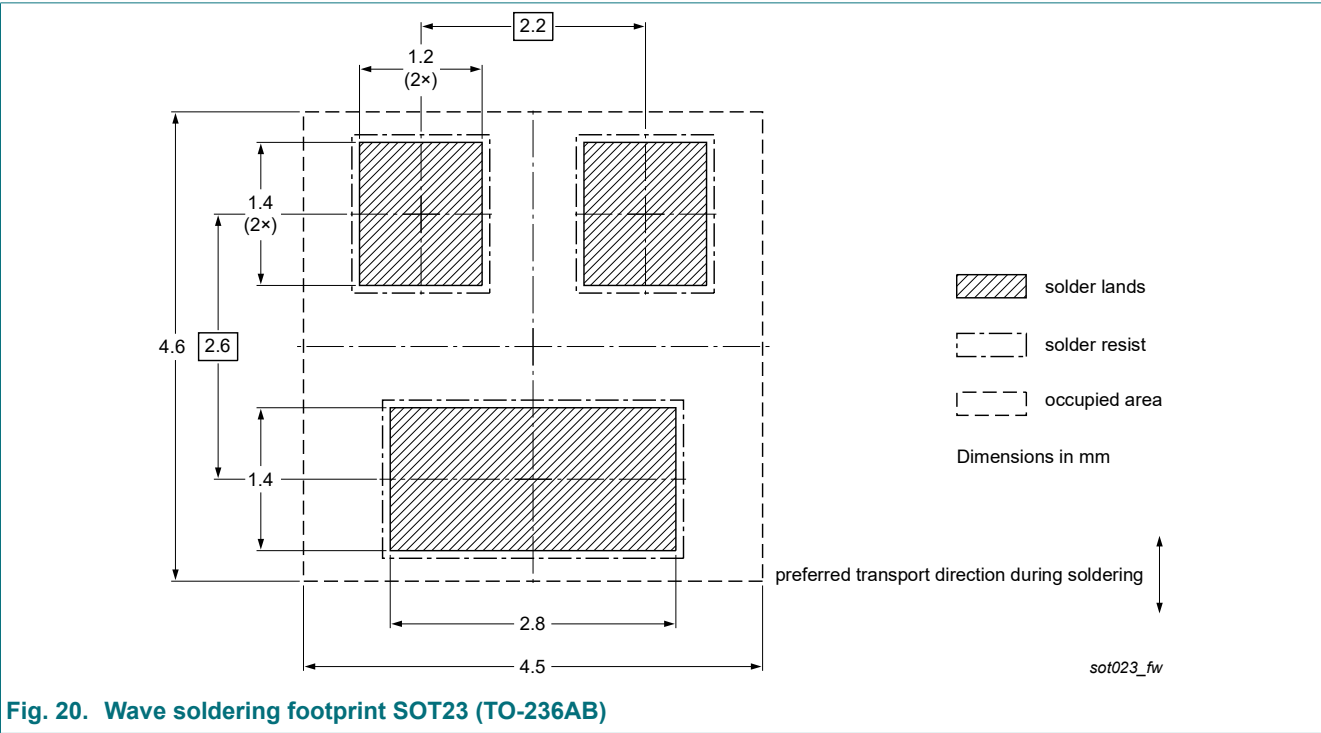
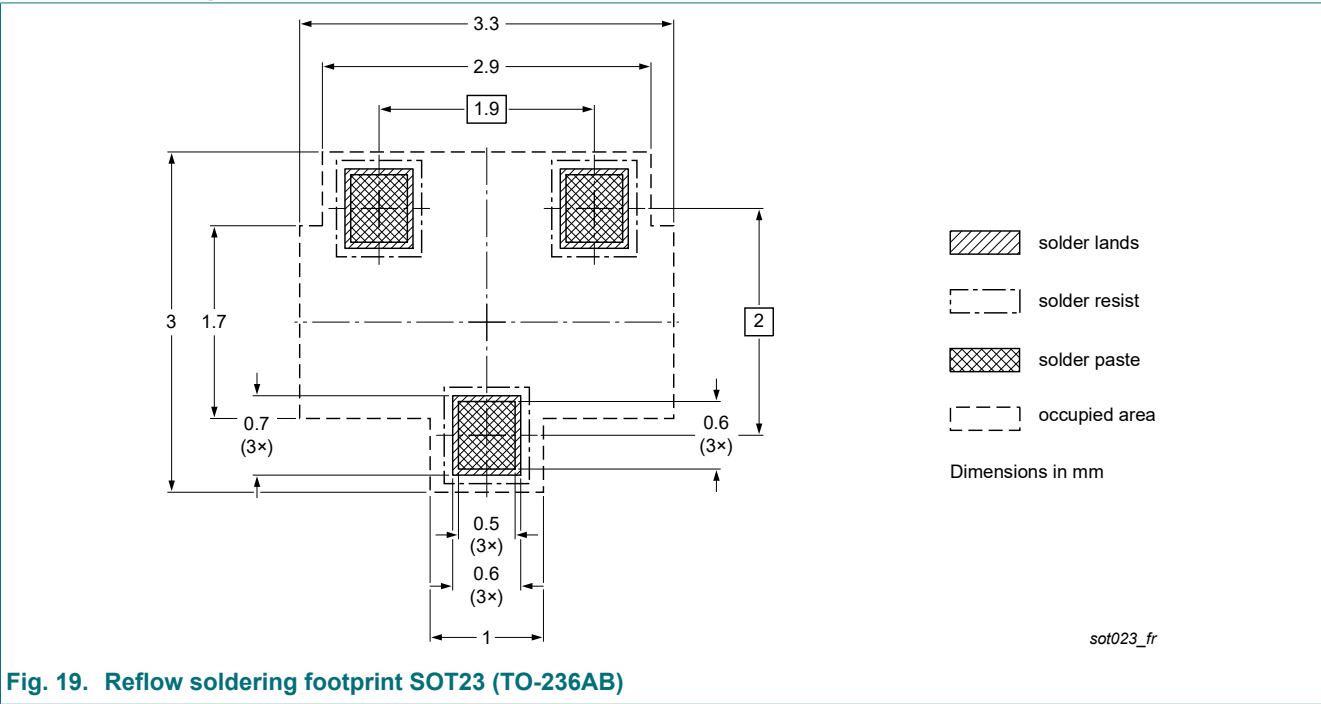
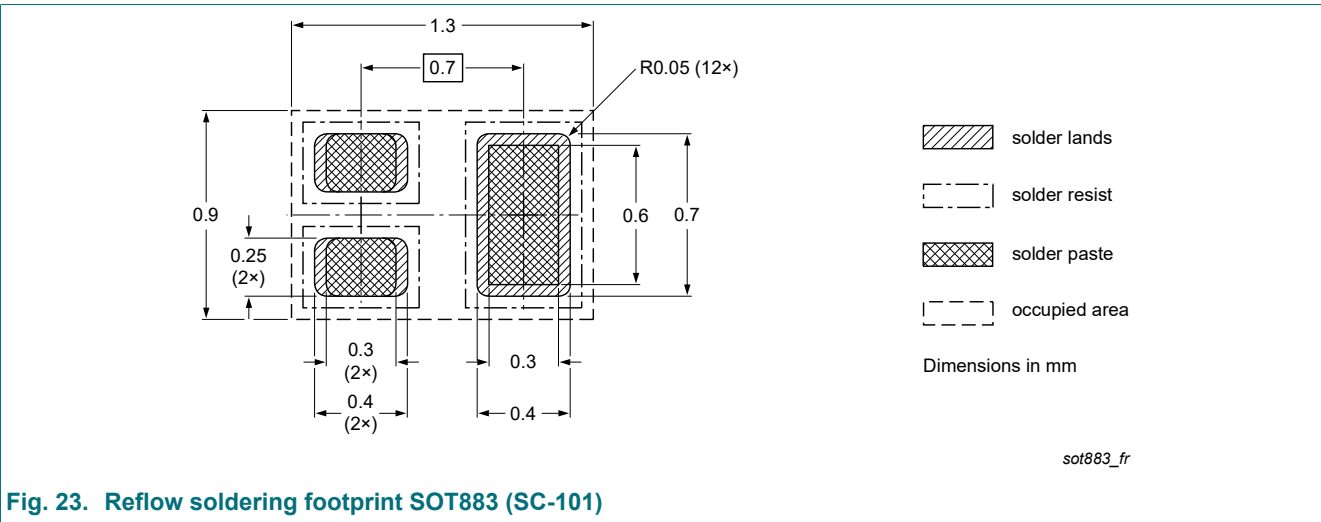
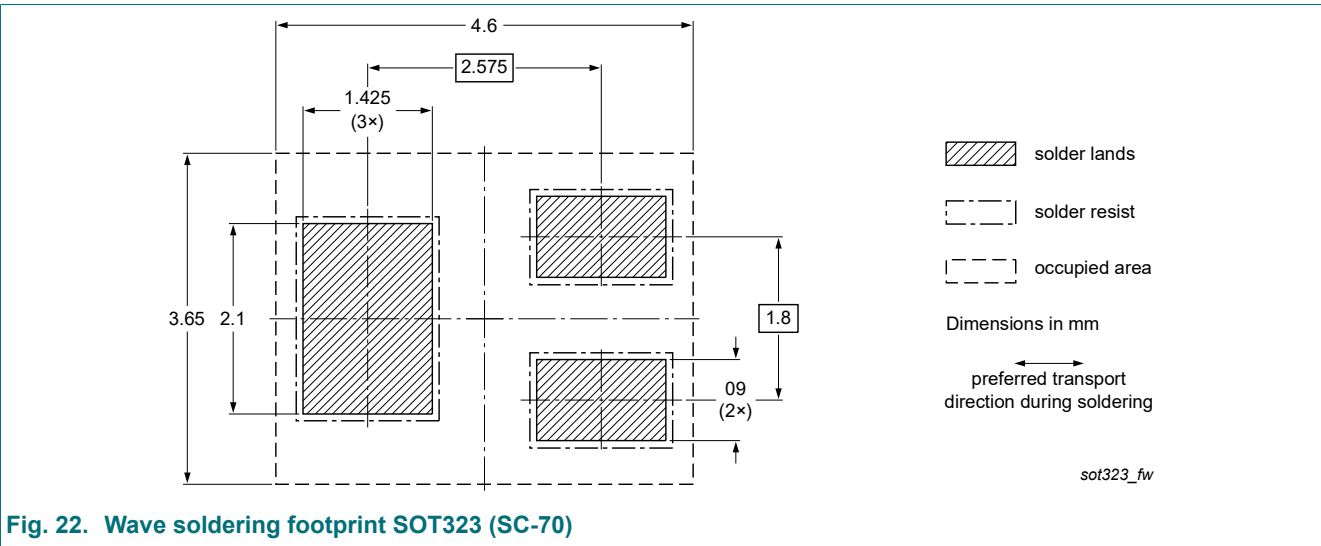
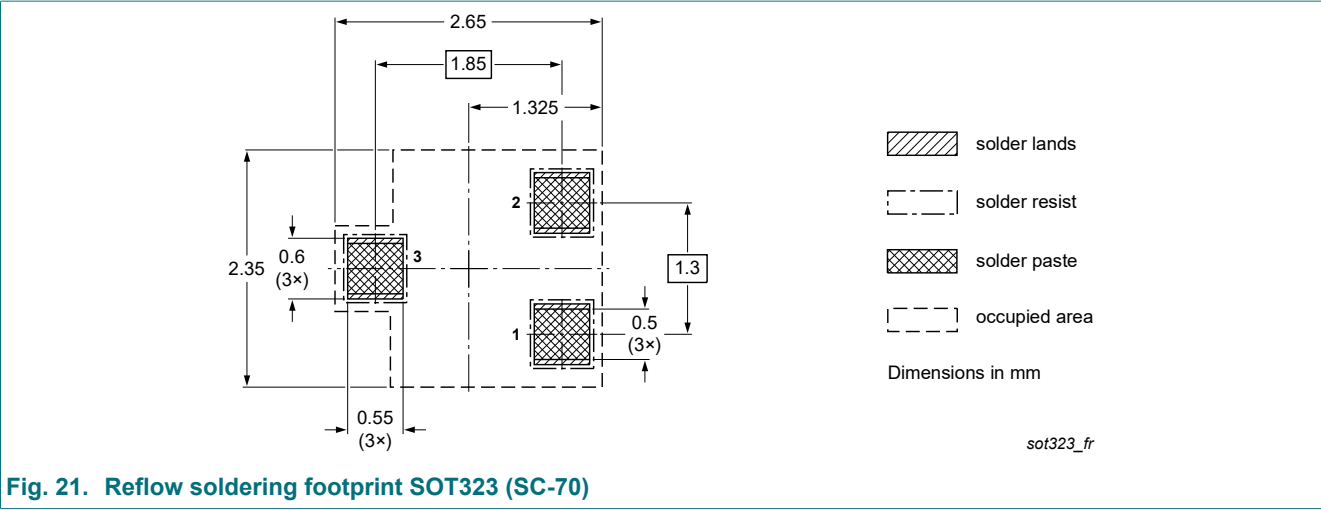


Fig. 18. Package outline SOT883 (SC-101)

10. Soldering

Table 10. Soldering





11. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BC847_SER v.12	20191024	Product data sheet	-	BC847_SER v.11
Modifications:	• Table 1: Header NPN complement corrected to PNP complement			
BC847_SER v.11	20181205	Product data sheet	-	BC847_SER v.10
BC847_SER v.10	20180302	Product data sheet	-	BC847_SER v.9
BC847_SER v.9	20140923	Product data sheet	-	BC847_SER v.8
BC847_SER v.8	20120820	Product data sheet	-	BC847_BC547_SER v.7
BC847_BC547_SER v.7	20081210	Product data sheet	-	BC847_BC547_SER v.6
BC847_BC547_SER v.6	20050519	Product data sheet	-	-

12. 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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