



BC847BS-Q

45 V, 100 mA NPN/NPN general-purpose transistor

17 June 2021

Product data sheet

1. General description

NPN/NPN general-purpose transistor pair in a very small SOT363 (SC-88) Surface-Mounted Device (SMD) plastic package.

PNP/PNP complement: BC857BS-Q

2. Features and benefits

- Low collector capacitance
- Low collector-emitter saturation voltage
- Closely matched current gain
- Reduces number of components and board space
- No mutual interference between the transistors
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- General-purpose switching and amplification

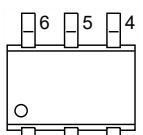
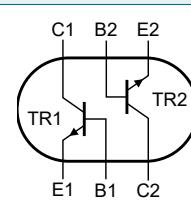
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
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; $T_{amb} = 25$ °C		200	-	450	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E1	emitter TR1	 TSSOP6 (SOT363)	 <i>sym020</i>
2	B1	base TR1		
3	C2	collector TR2		
4	E2	emitter TR2		
5	B2	base TR2		
6	C1	collector TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BC847BS-Q	TSSOP6	plastic, surface-mounted package; 6 leads; 0.65 mm pitch; 2.1 mm x 1.25 mm x 0.95 mm body	SOT363

7. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
BC847BS-Q	1F%

[1] % = placeholder for manufacturing site code

8. Limiting values

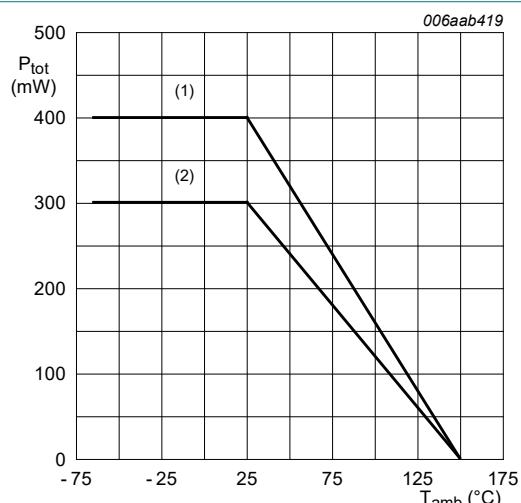
Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor						
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		-	5	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			-	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	220	mW
			[2]	-	250	mW
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	300	mW
			[2]	-	400	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 PCB, single-sided, 35 µm copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided, 35 µm copper, tin-plated, mounting pad for collector 1 cm².



(1) FR4 PCB, single-sided, 35 µm copper, tin-plated, mounting pad for collector 1 cm²

(2) FR4 PCB, single-sided, 35 µm copper, tin-plated and standard footprint

Fig. 1. Per device: Power derating curves SOT363 (SC-88)

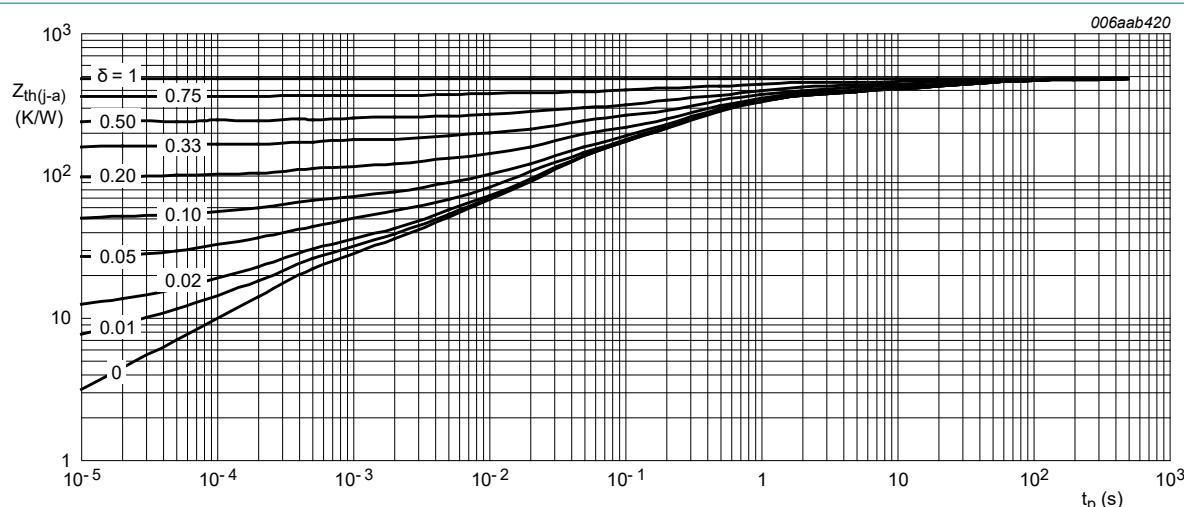
9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	568	K/W
			[2]	-	-	500	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	416	K/W
			[2]	-	-	313	K/W

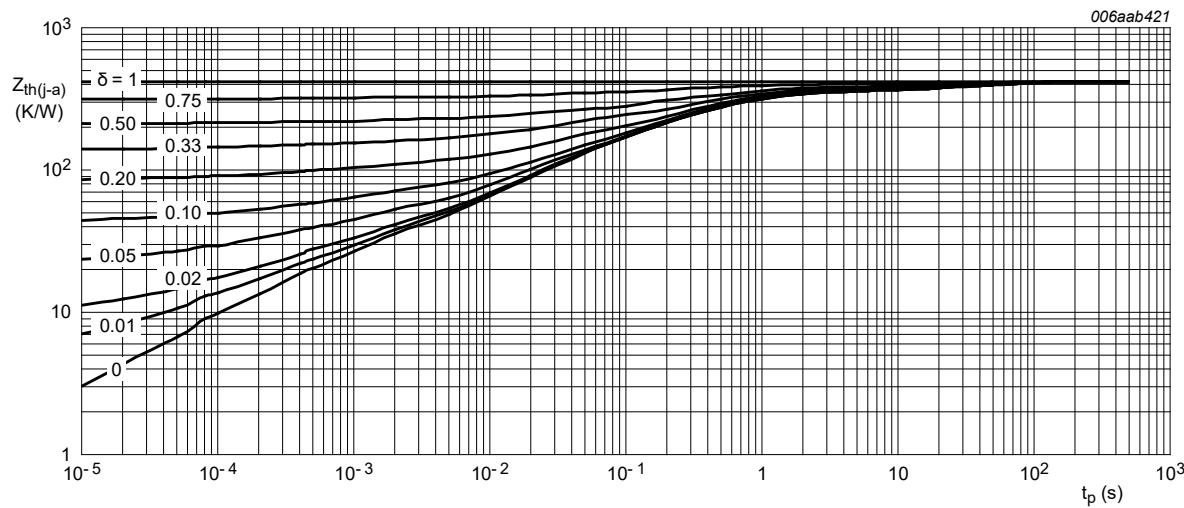
[1] Device mounted on an FR4 PCB, single-sided, 35 μ m copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided, 35 μ m copper, tin-plated, mounting pad for collector 1 cm^2 .



FR4 PCB, single-sided, 35 μ m copper, tin-plated and standard footprint

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



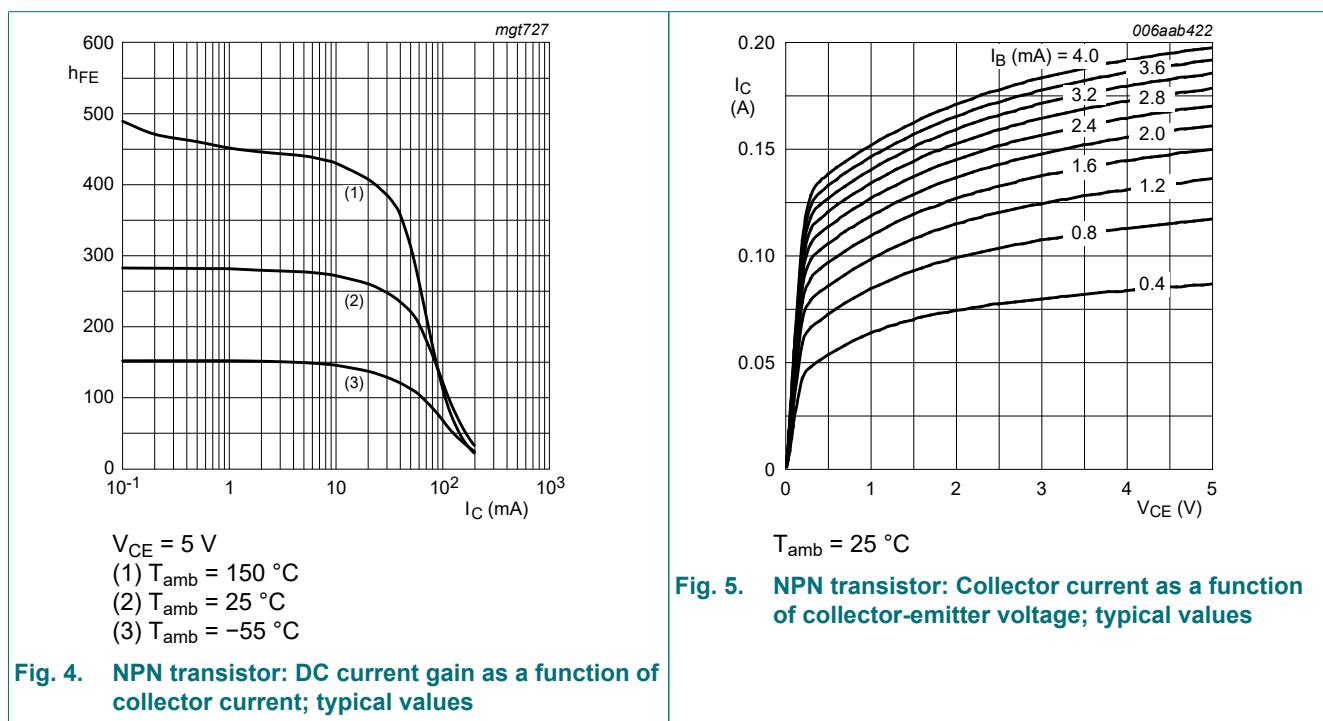
FR4 PCB, single-sided, 35 μ m copper, tin-plated, mounting pad for collector 1 cm^2

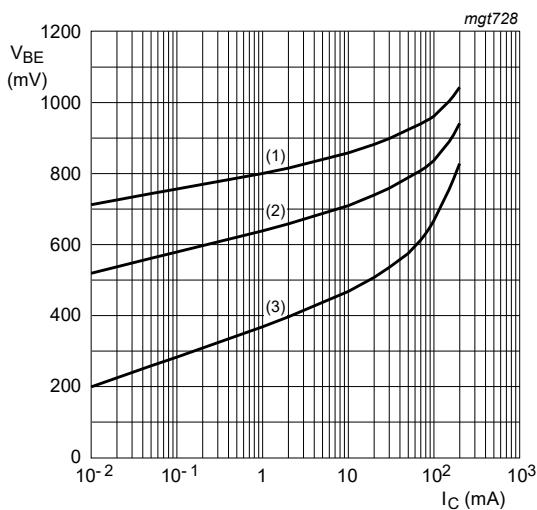
Fig. 3. Per transistor: Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 7. Characteristics

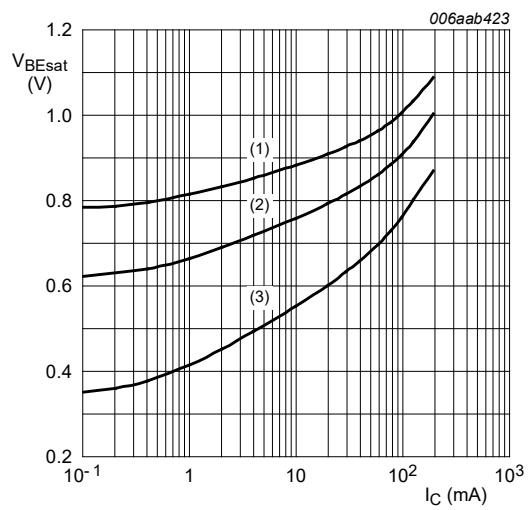
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100 \mu A; I_E = 0 A; T_{amb} = 25^\circ C$		50	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 2 mA; I_B = 0 A; T_{amb} = 25^\circ C$		45	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_C = 0 A; I_E = 100 \mu A; T_{amb} = 25^\circ C$		5	-	-	V
I_{CBO}	collector-base cut-off current	$V_{CB} = 30 V; I_E = 0 A; T_{amb} = 25^\circ C$		-	-	15	nA
		$V_{CB} = 30 V; I_E = 0 A; T_j = 150^\circ C$		-	-	5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 5 V; I_C = 0 A; T_{amb} = 25^\circ C$		-	-	100	nA
h_{FE}	DC current gain	$V_{CE} = 5 V; I_C = 2 mA; T_{amb} = 25^\circ C$		200	-	450	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 10 mA; I_B = 0.5 mA; T_{amb} = 25^\circ C$		-	-	100	mV
		$I_C = 100 mA; I_B = 5 mA; \text{pulsed}; t_p \leq 300 \mu s; \delta \leq 0.02; T_{amb} = 25^\circ C$		-	-	300	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 10 mA; I_B = 0.5 mA; T_{amb} = 25^\circ C$		-	755	-	mV
V_{BE}	base-emitter voltage	$V_{CE} = 5 V; I_C = 2 mA; T_{amb} = 25^\circ C$		580	655	700	mV
C_c	collector capacitance	$V_{CB} = 10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25^\circ C$		-	-	1.5	pF
C_e	emitter capacitance	$V_{EB} = 0.5 V; I_C = 0 A; i_c = 0 A; f = 1 MHz; T_{amb} = 25^\circ C$		-	11	-	pF
f_T	transition frequency	$V_{CE} = 5 V; I_C = 10 mA; f = 100 MHz; T_{amb} = 25^\circ C$		100	-	-	MHz





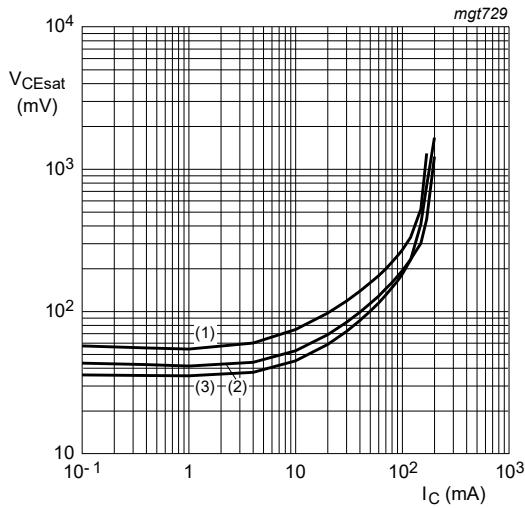
$V_{CE} = 5 \text{ V}$
 (1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 150 \text{ }^{\circ}\text{C}$

Fig. 6. Base-emitter voltage as a function of collector current; typical values



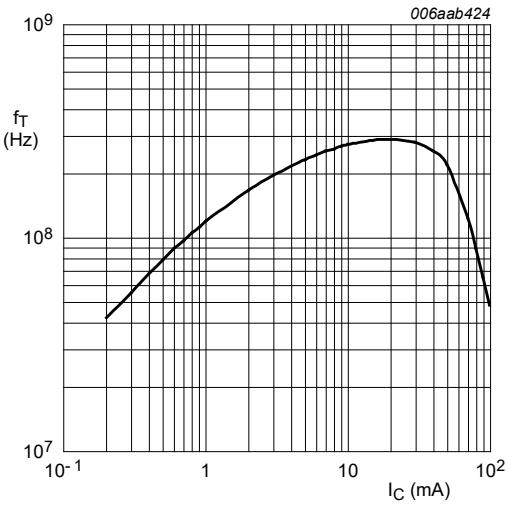
$I_C/I_B = 20$
 (1) $T_{amb} = -55 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = 150 \text{ }^{\circ}\text{C}$

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



$I_C/I_B = 20$
 (1) $T_{amb} = 150 \text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25 \text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -55 \text{ }^{\circ}\text{C}$

Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values



$T_{amb} = 25 \text{ }^{\circ}\text{C};$
 $V_{CE} = 5 \text{ V};$
 $f = 100 \text{ MHz}$

Fig. 9. 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

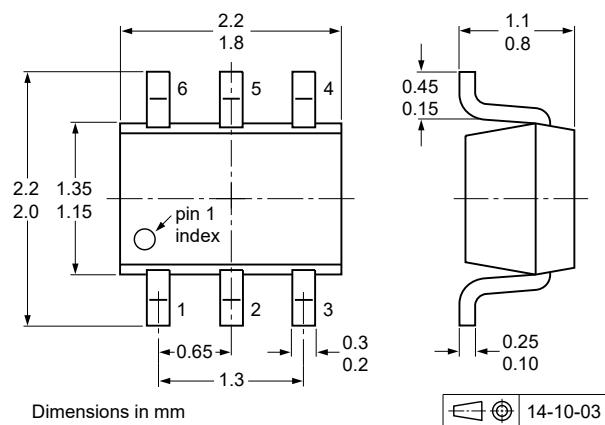


Fig. 10. Package outline TSSOP6 (SOT363)

13. Soldering

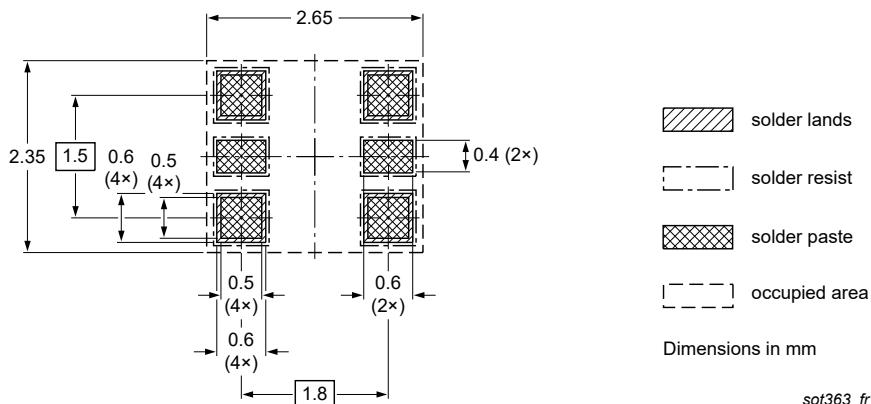


Fig. 11. Reflow soldering footprint for TSSOP6 (SOT363)

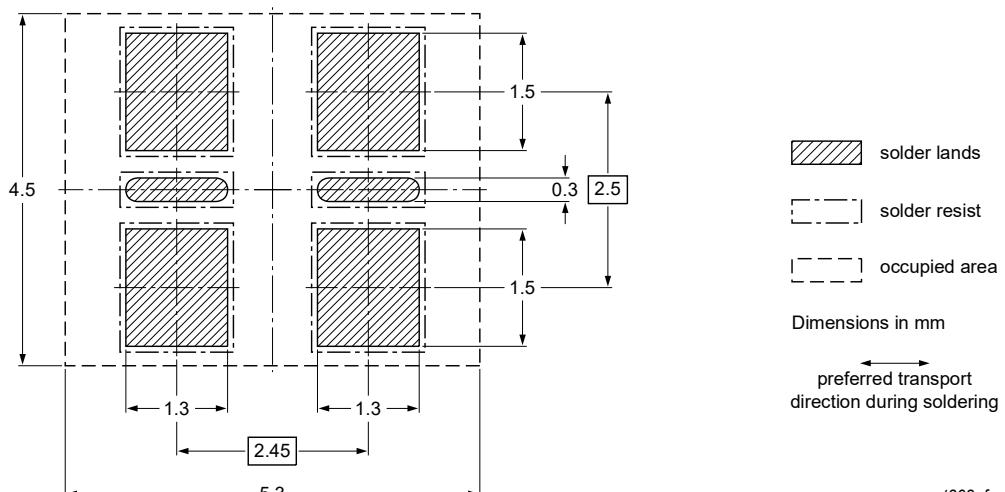


Fig. 12. Wave soldering footprint for TSSOP6 (SOT363)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC847BS-Q v.1	20210617	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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