THE DATASHEET OF

BCM56DSX

www.win-source.net 0086-755-83957316



BCM56DS

80 V, 1 A NPN/NPN matched double transistors

10 April 2018 Product data sheet

1. General description

NPN/NPN matched double transistors in a small SOT457 (SC-74) Surface-Mounted Device (SMD) plastic package.

PNP/PNP complement: BCM53DS

2. Features and benefits

- High collector current capability I_C and I_{CM}
- Reduces component count
- Reduces pick and place costs
- Current gain matching 5%
- Application-optimized pinout
- AEC-Q101 qualified

3. Applications

- Current mirror
- Differential amplifier
- Linear voltage regulators
- MOSFET drivers
- High-side switches
- Power management
- Amplifiers

4. Quick reference data

Table 1. Quick reference data

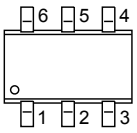
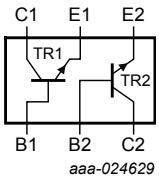
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
V_{CEO}	collector-emitter voltage	open base		-	-	80	V
I_C	collector current			-	-	1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	2	A
h_{FE}	DC current gain	V_{CE} = 2 V; I_C = 150 mA; T_{amb} = 25 °C	[1]	63	-	250	
Per device							
h_{FE1}/h_{FE2}	DC current gain matching	V_{CE} = 5 V; I_C = 2 mA; T_{amb} = 25 °C		0.95	1	1.05	

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{BE1}-V_{BE2}$	base-emitter voltage matching		[2]	-	-	2	mV

[1] Pulse test: $t_p \leq 300\ \mu s$; $\delta \leq 0.02$
[2] The smaller of the two values is subtracted from the larger value.

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B1	base TR1	 TSOP6 (SOT457)	 aaa-024629
2	B2	base TR2		
3	C2	collector TR2		
4	E2	emitter TR2		
5	E1	emitter TR1		
6	C1	collector TR1		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BCM56DS	TSOP6	plastic, surface-mounted package (SC-74)	SOT457

7. Marking

Table 4. Marking codes

Type number	Marking code
BCM56DS	3D

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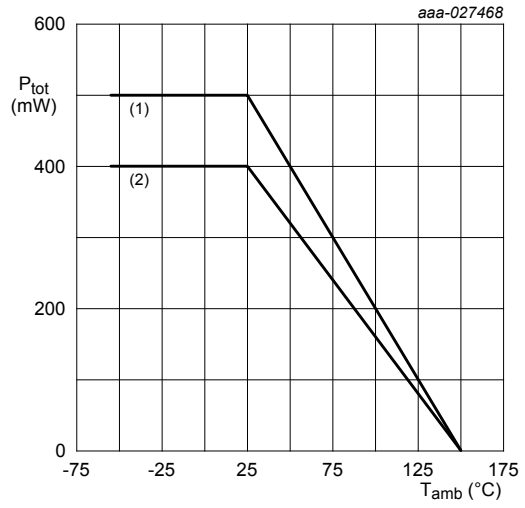
8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC60134).

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor						
V_{CBO}	collector-base voltage	open emitter		-	100	V
V_{CEO}	collector-emitter voltage	open base		-	80	V
V_{EBO}	emitter-base voltage	open collector		-	5	V
I_C	collector current			-	1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	2	A
I_{Blim}	limiting base current			-	0.2	A
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms		-	0.3	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	270	mW
			[2]	-	320	mW
Per device						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	400	mW
			[2]	-	500	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	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 FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated; mounting pad for collector 1 cm^2.



(1) = FR4 PCB, single sided copper, 1 cm^2
(2) = FR4 PCB, single sided copper, standard footprint

Fig. 1. Per device: Power derating curves

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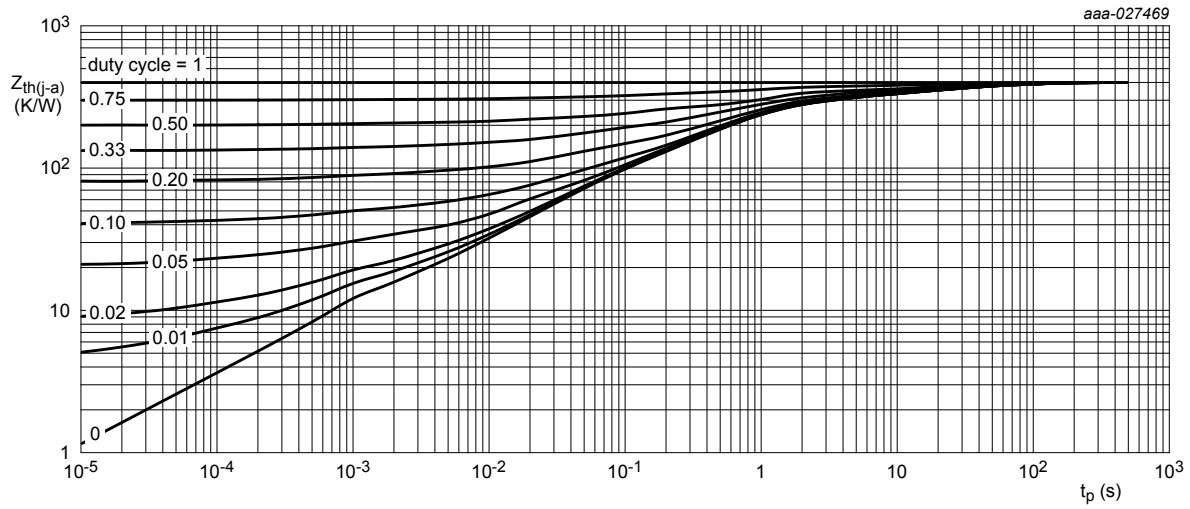
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9. Thermal characteristics

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]	-	-	463	K/W
			[2]	-	-	391	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	150	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	313	K/W
			[2]	-	-	250	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 1 cm^2.

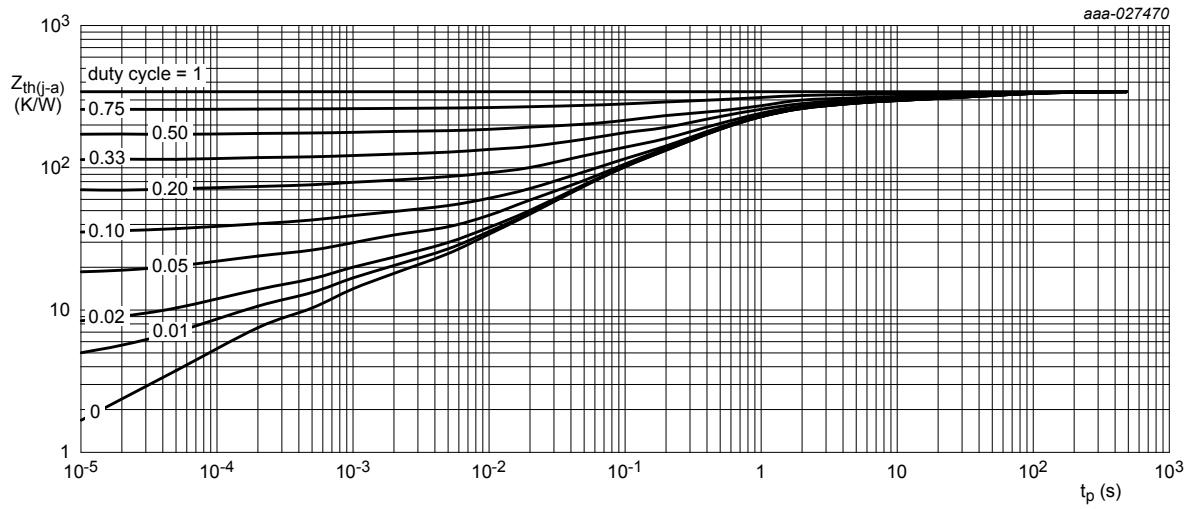


FR4 PCB, single sided copper, tin-plated and standard footprint

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

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FR4 PCB, single sided 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

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10. Characteristics

Table 7. Characteristics

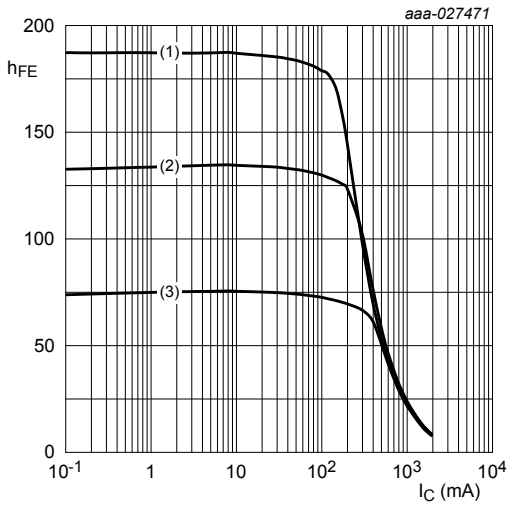
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 100 µA; I_E = 0 A		100	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 2 mA; I_B = 0 A		80	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 0 A; I_E = 100 µA		5	-	-	V
I_{CBO}	collector-base cut-off current	V_{CB} = 30 V; I_E = 0 A; T_{amb} = 25 °C		-	-	100	nA
		V_{CB} = 30 V; I_E = 0 A; T_j = 150 °C		-	-	10	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A; T_{amb} = 25 °C		-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 5 V; I_C = 2 mA; T_{amb} = 25 °C		63	-	-	
		V_{CE} = 2 V; I_C = 150 mA; T_{amb} = 25 °C	[1]	63	-	250	
		V_{CE} = 2 V; I_C = 500 mA; T_{amb} = 25 °C	[1]	40	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 500 mA; I_B = 50 mA; T_{amb} = 25 °C	[1]	-	-	500	mV
V_{BE}	base-emitter voltage	V_{CE} = 2 V; I_C = 500 mA; T_{amb} = 25 °C	[1]	-	-	1	V
C_c	collector capacitance	V_{CB} = 10 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	4.5	-	pF
f_T	transition frequency	V_{CE} = 5 V; I_C = 50 mA; f = 100 MHz; T_{amb} = 25 °C		100	155	-	MHz
Per device							
h_{FE1}/h_{FE2}	DC current gain matching	V_{CE} = 5 V; I_C = 2 mA; T_{amb} = 25 °C		0.95	1	1.05	
$V_{BE1}-V_{BE2}$	base-emitter voltage matching		[2]	-	-	2	mV

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

[2] The smaller of the two values is subtracted from the larger value.

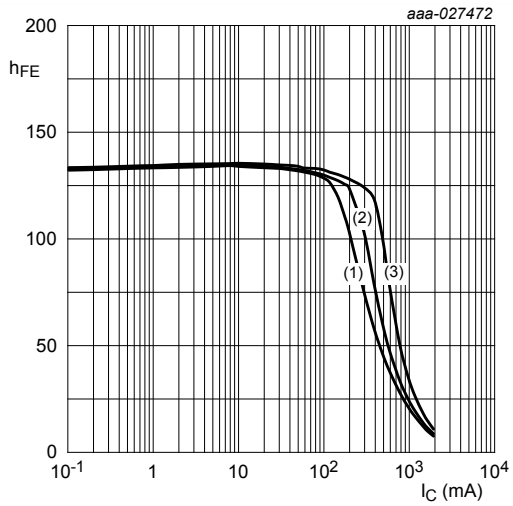
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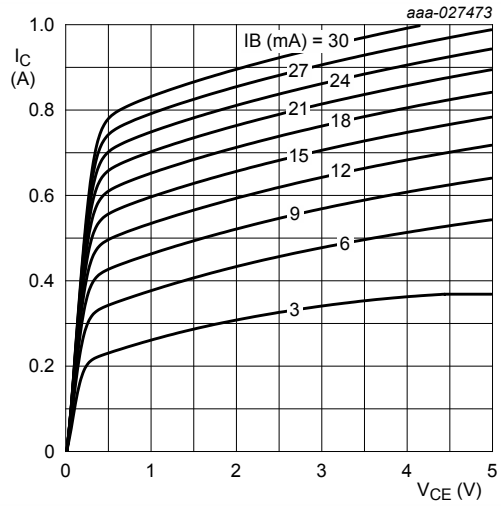
V_{CE} = 2 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

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



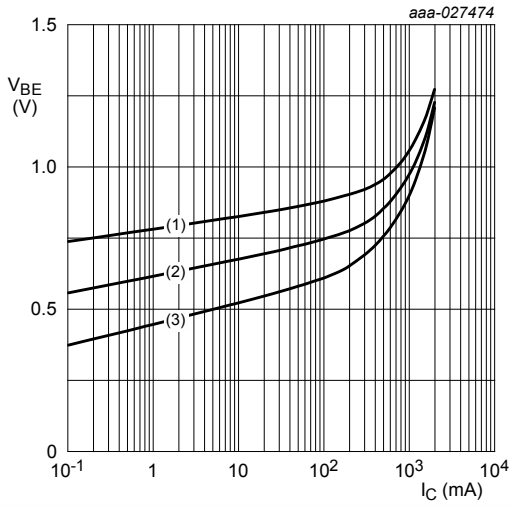
T_{amb} = 25 °C
(1) V_{CE} = 1 V
(2) V_{CE} = 2 V
(3) V_{CE} = 5 V

Fig. 5. DC current gain as a function of collector current; typical values



T_{amb} = 25 °C

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

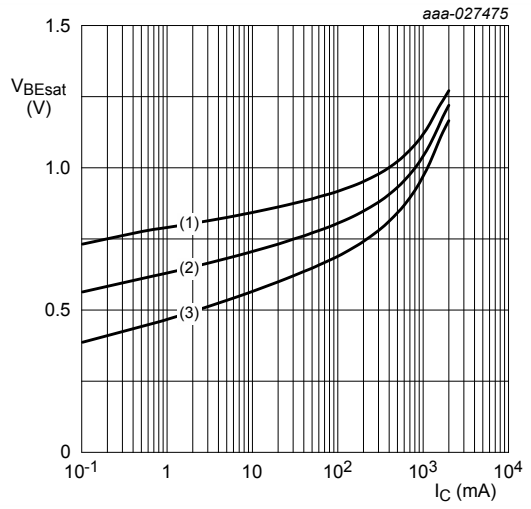


V_{CE} = 2 V
T_{amb} = -55 °C
T_{amb} = 25 °C
T_{amb} = 100 °C

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

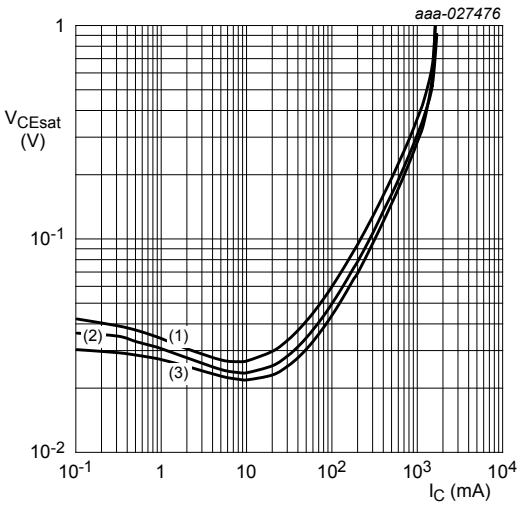
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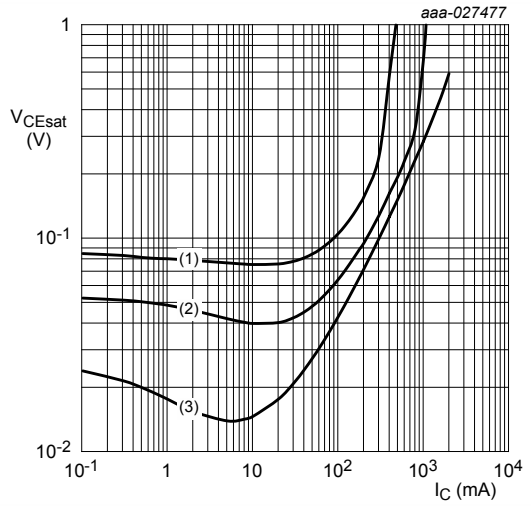
I_C/I_B = 10
(1) T_{amb} = -55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 100 °C

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



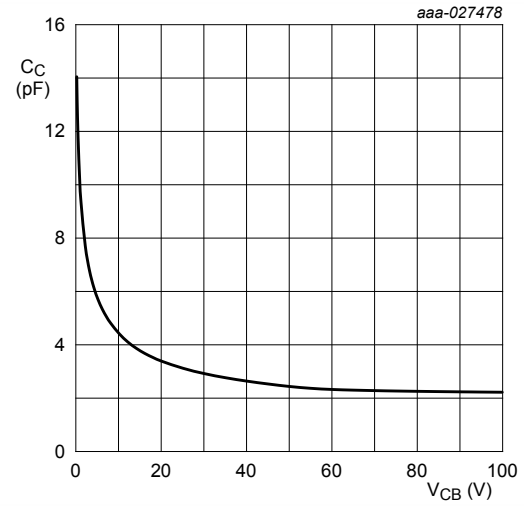
I_C/I_B = 10
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 9. Collector-emitter saturation voltage as a function of collector current; typical values



T_{amb} = 25 °C
(1) I_C/I_B = 50
(2) I_C/I_B = 20
(3) I_C/I_B = 5

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

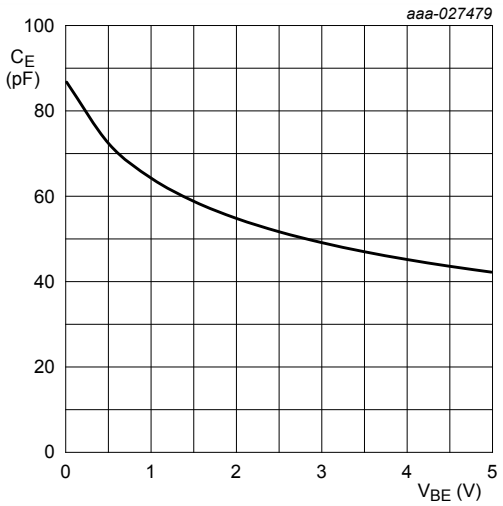


f = 1 MHz
T_{amb} = 25 °C

Fig. 11. Collector capacitance as a function of collector-base voltage; typical values

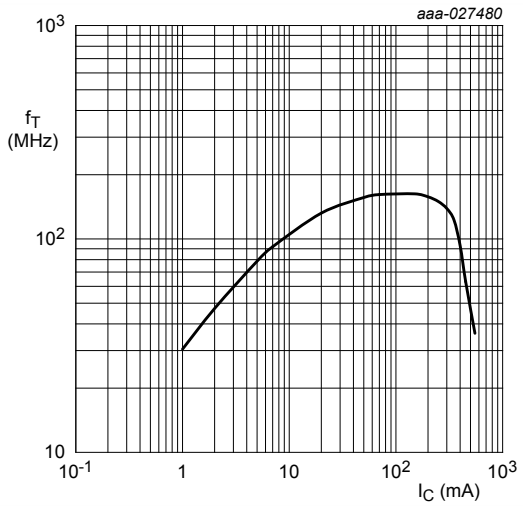
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f = 1 MHz
T_{amb} = 25 °C

Fig. 12. Emitter capacitance as a function of emitter-base voltage; typical values



V_{CE} = 5 V
f = 100 MHz
T_{amb} = 25 °C

Fig. 13. 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

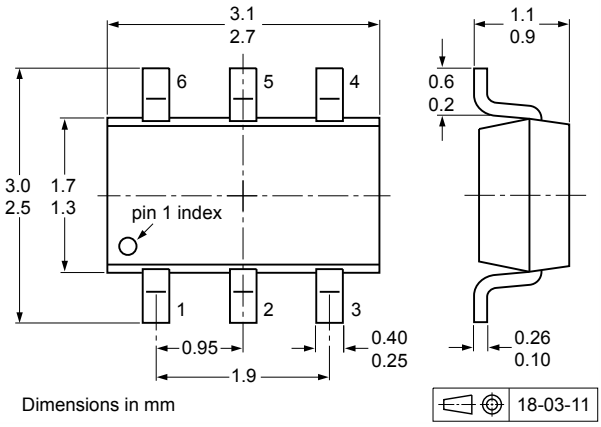


Fig. 14. Package outline TSOP6 (SOT457)

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13. Soldering

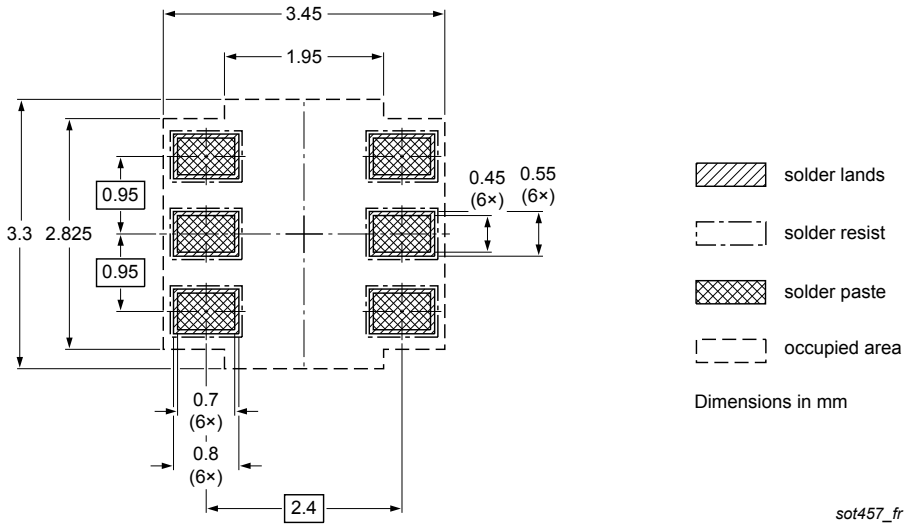


Fig. 15. Reflow soldering footprint for TSOP6 (SOT457)

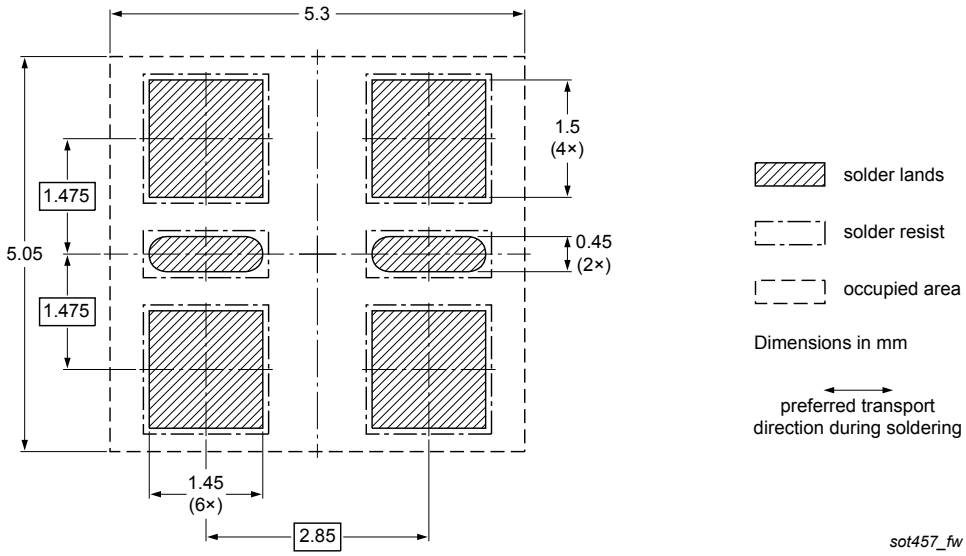


Fig. 16. Wave soldering footprint for TSOP6 (SOT457)

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14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BCM56DS v.1	20180410	Product data sheet	-	-

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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: 10 April 2018

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