BC55PA series

60 V, 1 A NPN medium power transistors

Rev. 9 — 1 July 2022 Product data sheet

1. General description

NPN medium power transistor in an ultra thin SOT1061 leadless small Surface-Mounted Device (SMD) plastic package.

Table 1. Product overview

Type number	Package		NPN complement
	Nexperia	JEITA	
BC55PA	SOT1061	-	BC52PA
BC55-10PA			BC52-10PA
BC55-16PA			BC52-16PA

2. Features and benefits

- High current
- Three current gain selections
- High power dissipation capability
- Exposed heatsink for excellent thermal and electrical conductivity
- Leadless very small SMD plastic package with medium power capability
- AEC-Q101 qualified

3. Applications

- Linear voltage regulators
- Power management
- Low-side switches
- MOSFET drivers
- Battery-driven devices
- Amplifiers

4. Quick reference data

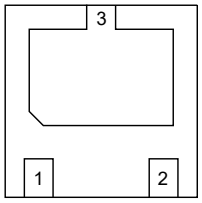
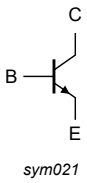
Table 2. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	60	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						
	BC55PA	V_{CE} = 2 V; I_C = 150 mA T_{amb} = 25 °C	[1]	63	-	250	
	BC55-10PA		[1]	63	-	160	
	BC55-16PA		[1]	100	-	250	

[1] pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$

5. Pinning information

Table 3. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 Transparent top view	 sym021
2	E	emitter		
3	C	collector		

6. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BC55PA	HUSON3	plastic surface-mounted package; exposed die pad for good heat transfer; 3 leads	SOT1061
BC55-10PA			
BC55-16PA			

7. Marking

Table 5. Marking

Type number	Marking code
BC55PA	AW
BC55-10PA	BH
BC55-16PA	BJ

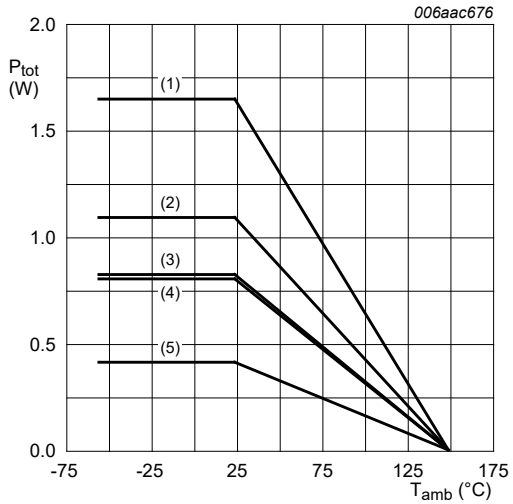
8. Limiting values

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		-	60	V
V_{CEO}	collector-emitter voltage	open base		-	60	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_B	base current			-	0.3	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]	-	0.42	W
			[2]	-	0.83	W
			[3]	-	1.10	W
			[4]	-	0.81	W
			[5]	-	1.65	W
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 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.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 6 cm^2.
[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.
[5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated, mounting pad for collector 1 cm^2.



(1) FR4 PCB, 4-layer copper, mounting pad for collector 1 cm^2
(2) FR4 PCB, single-sided copper, mounting pad for collector 6 cm^2
(3) FR4 PCB, single-sided copper, mounting pad for collector 1 cm^2
(4) FR4 PCB, 4-layer copper, standard footprint
(5) FR4 PCB, single-sided copper, standard footprint

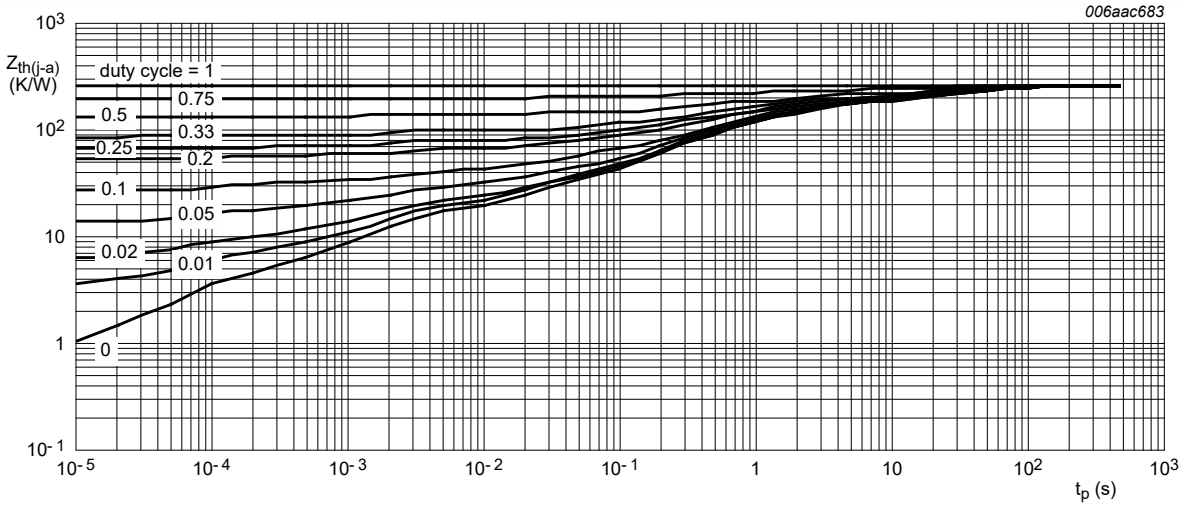
Fig. 1. Power derating curves SOT89

9. Thermal characteristics

Table 7. Thermal characteristics

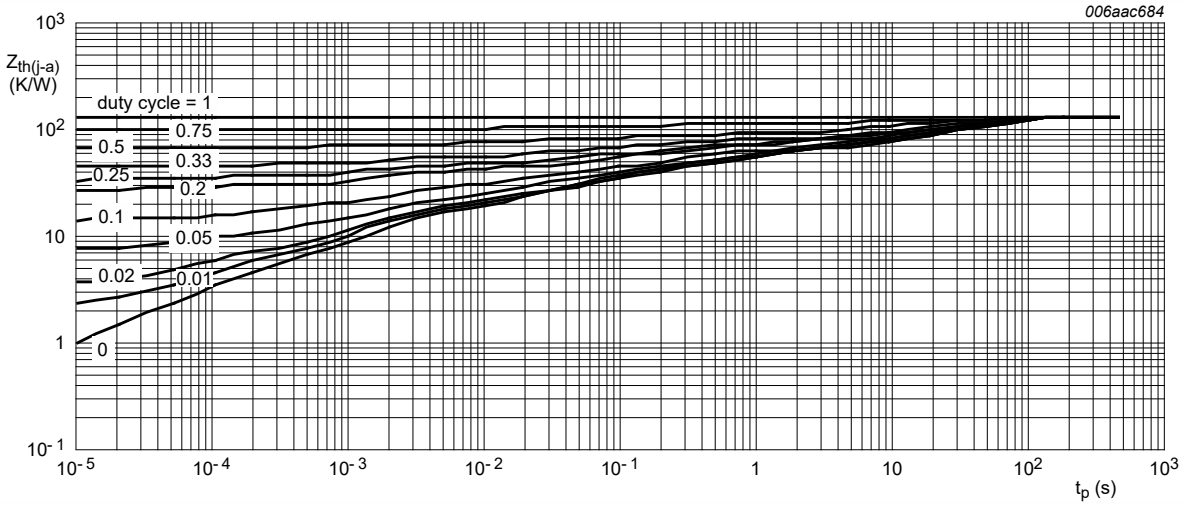
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	298	K/W
			[2]	-	-	151	K/W
			[3]	-	-	114	K/W
			[4]	-	-	154	K/W
			[5]	-	-	76	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	20	K/W

[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; monting pad for collector 1 cm^2.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated; monting pad for collector 6 cm^2.
[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.
[5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated, mounting pad for collector 1 cm^2.



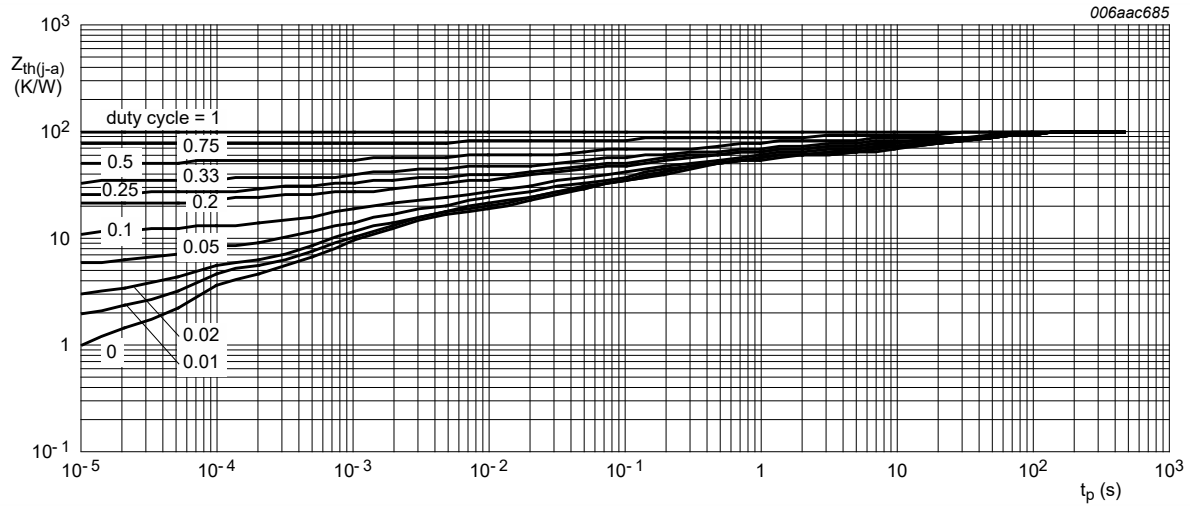
FR4 PCB, single-sided, tin-plated and standard footprint

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



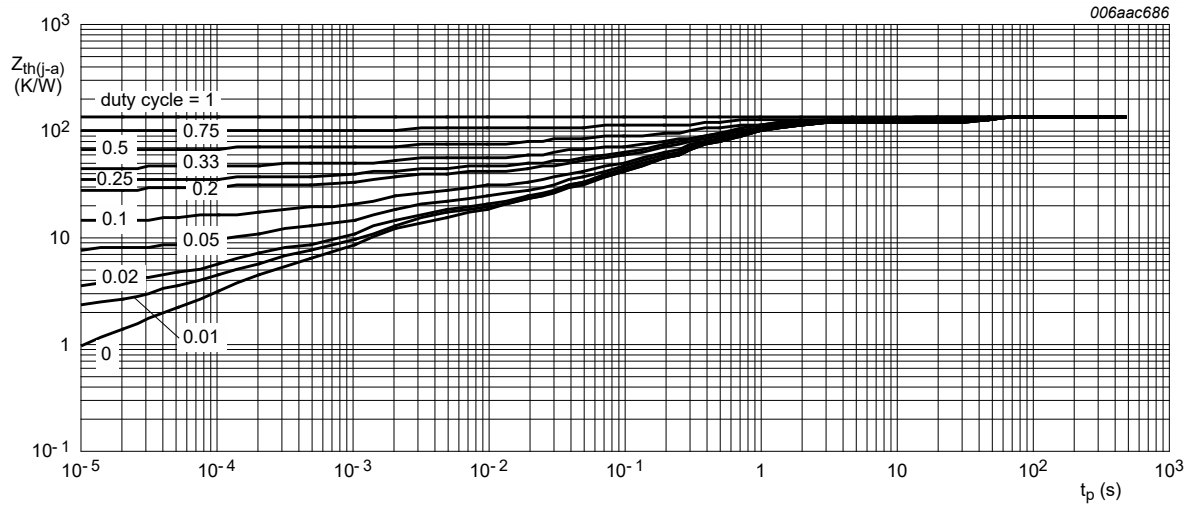
FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 1 cm^2

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



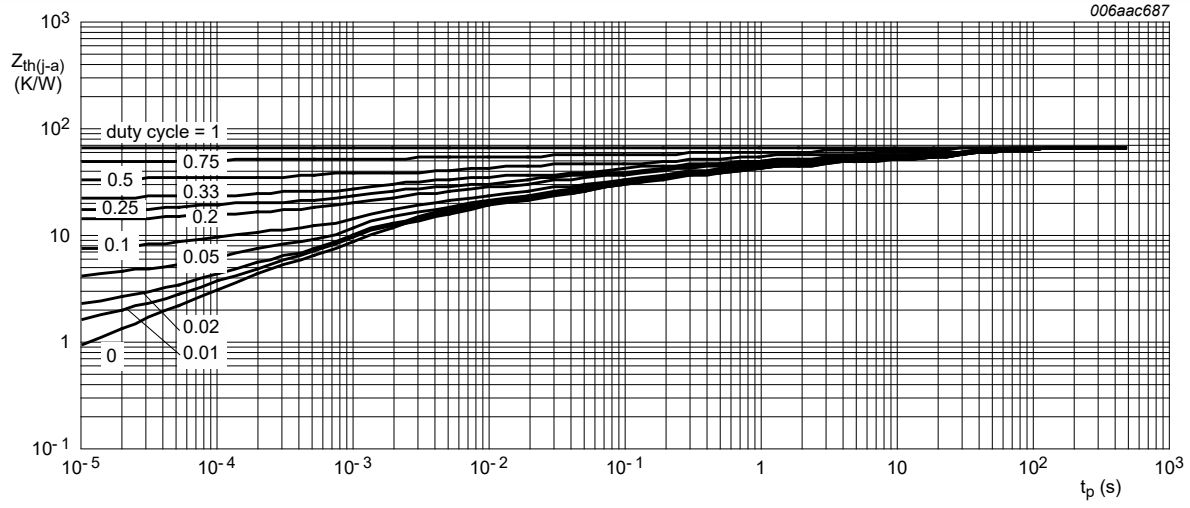
FR4 PCB, single-sided copper, tin-plated; mounting pad for collector 6 cm^2

Fig. 4. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, 4-layer copper, standard footprint

Fig. 5. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, 4-layer copper, mounting pad for collector 1 cm^2.

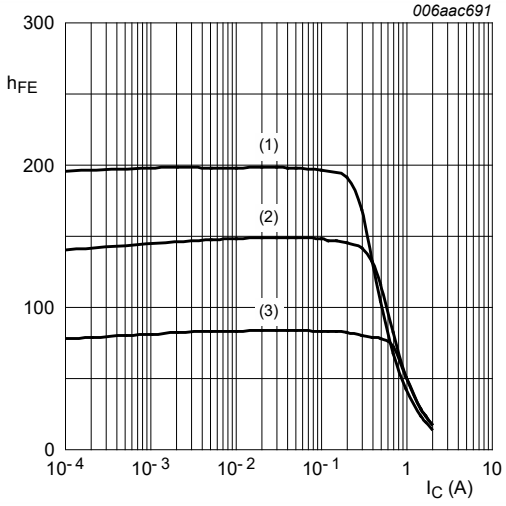
Fig. 6. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

Table 8. Characteristics

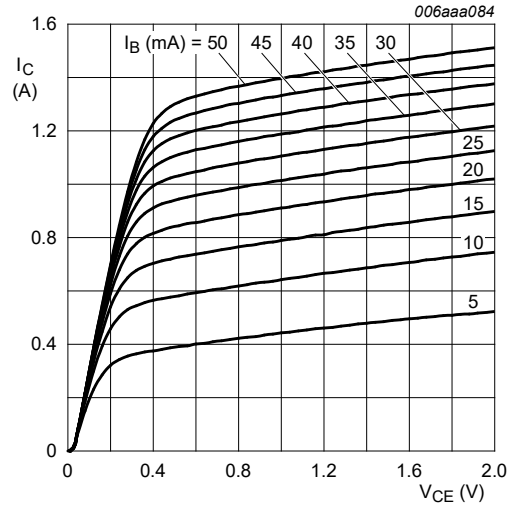
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 100 µA; I_E = 0 ; T_{amb} = 25 °C		60	-	-	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 2 µA; I_B = 0 A; T_{amb} = 25 °C		60	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 0 A; I_E = 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						
	BC55PA	V_{CE} = 2 V; I_C = 5 mA; T_{amb} = 25 °C	[1]	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	-	-	
	BC55-10PA	V_{CE} = 2 V; I_C = 5 mA; T_{amb} = 25 °C	[1]	63	-	-	
		V_{CE} = 2 V; I_C = 150 mA; T_{amb} = 25 °C	[1]	63	-	160	
		V_{CE} = 2 V; I_C = 500 mA; T_{amb} = 25 °C	[1]	40	-	-	
	BC55-16PA	V_{CE} = 2 V; I_C = 5 mA; T_{amb} = 25 °C	[1]	63	-	-	
		V_{CE} = 2 V; I_C = 150 mA; T_{amb} = 25 °C	[1]	100	-	250	
		V_{CE} = 2 V; I_C = 500 mA; T_{amb} = 25 °C	[1]	40	-	-	
h_{FE}	DC current gain	V_{CE} = 2 V; I_C = 5 mA; T_{amb} = 25 °C	[1]	63	-	-	
h_{FE}	DC current gain	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]	-	-	0.5	V
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 = i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	6	-	pF
f_T	transition frequency	V_{CE} = 5 V; I_C = 50 mA; f = 100 MHz; T_{amb} = 25 °C		100	180	-	MHz

[1] pulsed; $t_p \leq 300$ µs; $\delta \leq 0.02$



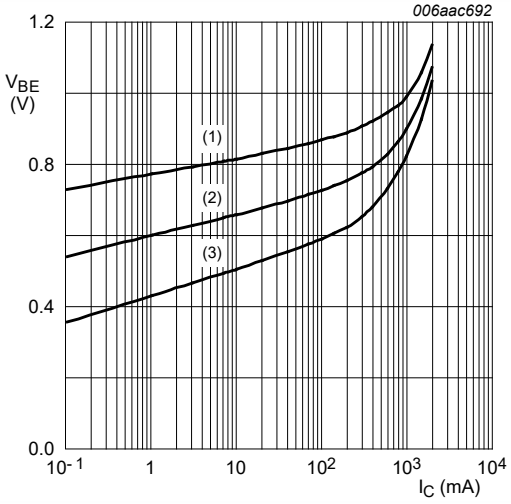
V_{CE} = 2 V
(1) T_{amb} = 100 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = -55 °C

Fig. 7. DC current gain as a function of collector current; typical values



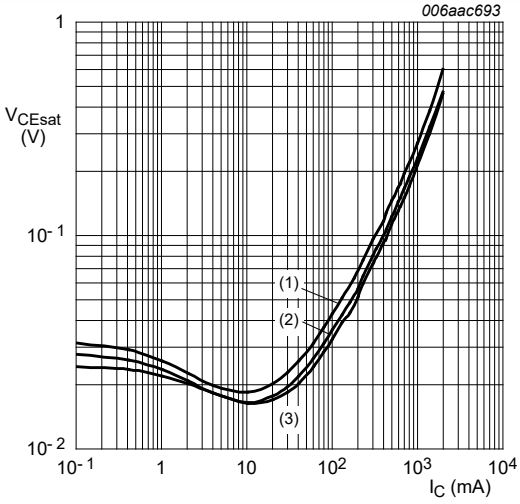
T_{amb} = 25 °C

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



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

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



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

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

11. Test information

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

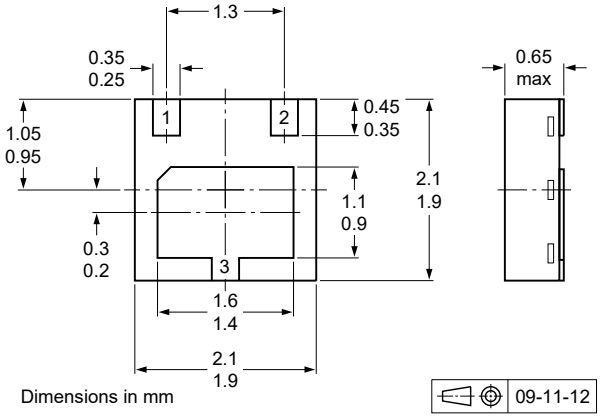


Fig. 11. Package outline SOT1061

13. Soldering

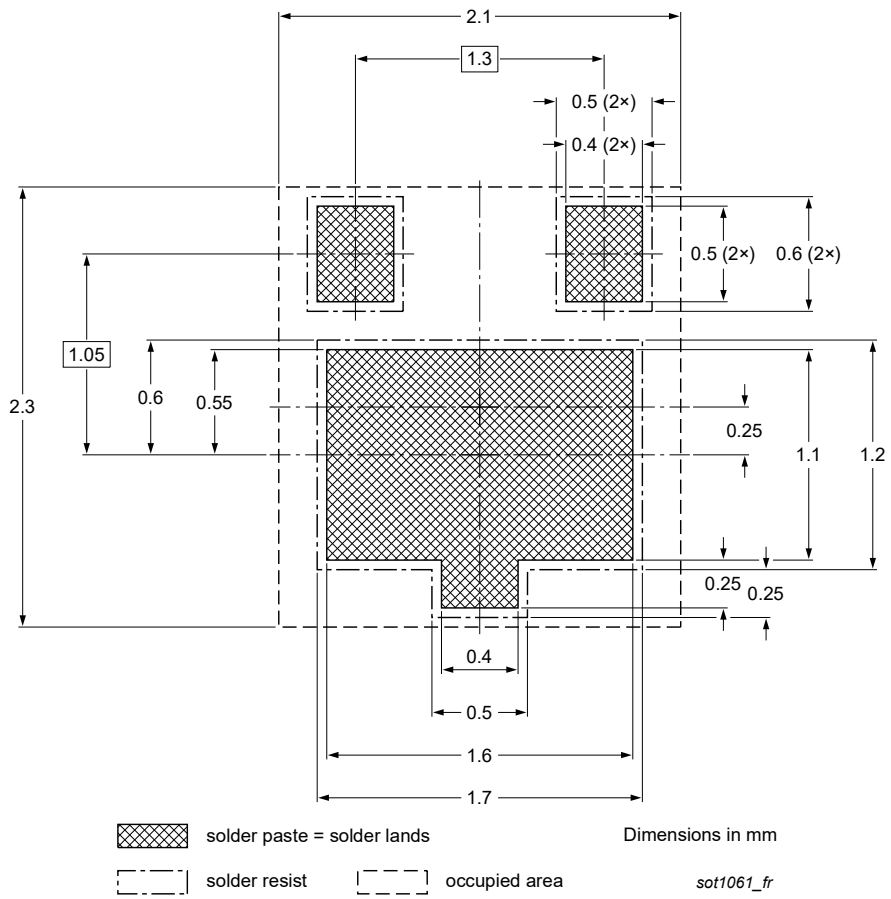


Fig. 12. Reflow soldering footprint for SOT1061

14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BC55PA_SER v.9	20220701	Product data sheet	-	BCP55_BCX55_BC55PA v.8
Modifications:	• Series data sheet describing several packages reduced to series data sheets per package. • Package information removed.			
BCP55_BCX55_BC55PA v.8	20111024	Product data sheet	-	BC637_BCP55_BCX55 v.7
BC637_BCP55_BCX55 v.7	20070625	Product data sheet	-	BC637_BCP55_BCX55 v.6
BC637_BCP55_BCX55 v.6	20050218	Product data sheet	CPCN200405029	BC635_637_639 v.4 BCP54_55_56 v.5 BCX54_55_56 v.4
BC635_637_639 v.4	20011010	Product Specification	-	BC635_637_639 v.3
BCP54_55_56 v.5	20030206	Product Specification	-	BCX54_55_56 v.4
BCX54_55_56 v.4	20011010	Product Specification	-	BCX54_55_56 v.3

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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