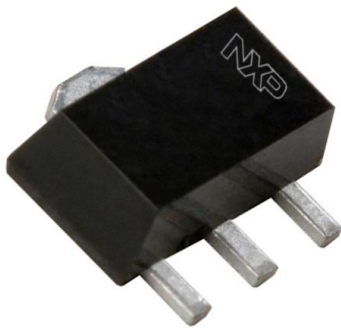


BCX51-16,115 Datasheet

www.digi-electronics.com



<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	BCX51-16,115-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	BCX51-16,115
Description	TRANS PNP 45V 1A SOT89
Detailed Description	Bipolar (BJT) Transistor PNP 45 V 1 A 145MHz 1.3 W Surface Mount SOT-89



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.

Purchase and inquiry

Manufacturer Product Number:

BCX51-16,115

Series:

-

Transistor Type:

PNP

Voltage - Collector Emitter Breakdown (Max):

45 V

Current - Collector Cutoff (Max):

100nA (ICBO)

Power - Max:

1.3 W

Operating Temperature:

150°C (TJ)

Qualification:

AEC-Q100

Package / Case:

TO-243AA

Base Product Number:

BCX51

Manufacturer:

Nexperia USA Inc.

Product Status:

Active

Current - Collector (Ic) (Max):

1 A

Vce Saturation (Max) @ Ib, Ic:

500mV @ 50mA, 500mA

DC Current Gain (hFE) (Min) @ Ic, Vce:

100 @ 150mA, 2V

Frequency - Transition:

145MHz

Grade:

Automotive

Mounting Type:

Surface Mount

Supplier Device Package:

SOT-89

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0075

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

BCP51; BCX51; BC51PA

45 V, 1 A PNP medium power transistors

Rev. 9 — 13 October 2011

Product data sheet

1. Product profile

1.1 General description

PNP medium power transistor series in Surface-Mounted Device (SMD) plastic packages.

Table 1. Product overview

Type number ^[1]	Package			NPN complement
	Nexperia	JEITA	JEDEC	
BCP51	SOT223	SC-73	-	BCP54
BCX51	SOT89	SC-62	TO-243	BCX54
BC51PA	SOT1061	-	-	BC54PA

[1] Valid for all available selection groups.

1.2 Features and benefits

- High current
- Three current gain selections
- High power dissipation capability
- Exposed heatsink for excellent thermal and electrical conductivity (SOT89, SOT1061)
- Leadless very small SMD plastic package with medium power capability (SOT1061)
- AEC-Q101 qualified

1.3 Applications

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

1.4 Quick reference data

Table 2. Quick reference data

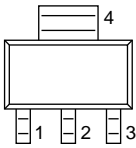
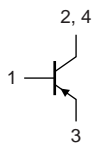
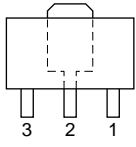
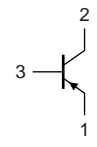
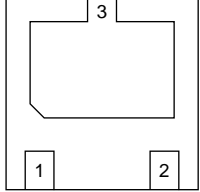
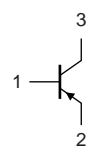
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CE0}	collector-emitter voltage	open base	-	-	-45	V
I_C	collector current		-	-	-1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	-2	A

Table 2. Quick reference data ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
h_{FE}	DC current gain	$V_{CE} = -2\text{ V};$ $I_C = -150\text{ mA}$	63	-	250	
	h_{FE} selection -10	$V_{CE} = -2\text{ V};$ $I_C = -150\text{ mA}$	63	-	160	
	h_{FE} selection -16	$V_{CE} = -2\text{ V};$ $I_C = -150\text{ mA}$	100	-	250	

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
SOT223			
1	base		 sym028
2	collector		
3	emitter		
4	collector		
SOT89			
1	emitter		 006aaa231
2	collector		
3	base		
SOT1061			
1	base	 Transparent top view	 sym013
2	emitter		
3	collector		

3. Ordering information

Table 4. Ordering information

Type number ^[1]	Package		
	Name	Description	Version
BCP51	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223
BCX51	SC-62	plastic surface-mounted package; collector pad for good heat transfer; 3 leads	SOT89
BC51PA	HUSON3	plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body 2 × 2 × 0.65 mm	SOT1061

[1] Valid for all available selection groups.

4. Marking

Table 5. Marking codes

Type number	Marking code
BCP51	BCP51
BCP51-10	BCP51/10
BCP51-16	BCP51/16
BCX51	AA
BCX51-10	AC
BCX51-16	AD
BC51PA	BP
BC51-10PA	BQ
BC51-16PA	BR

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	-	-45	V			
V_{CEO}	collector-emitter voltage	open base	-	-45	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						
			BCP51	[1]	-	0.65	W	
				[2]	-	1.00	W	
				[3]	-	1.35	W	
			BCX51	[1]	-	0.50	W	
				[2]	-	0.95	W	
				[3]	-	1.35	W	
			BC51PA	[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

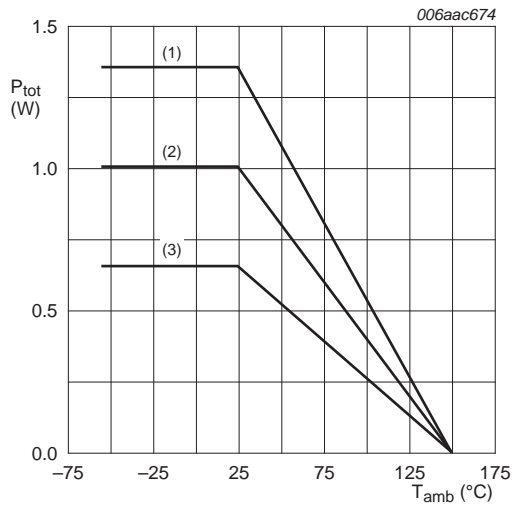
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

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

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

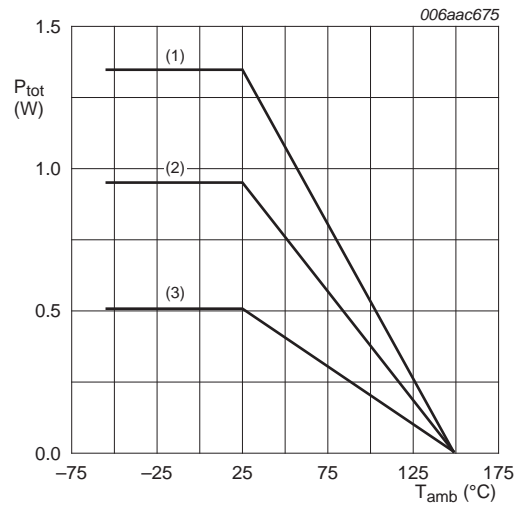
[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.

[5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated, mounting pad for collector 1 cm².



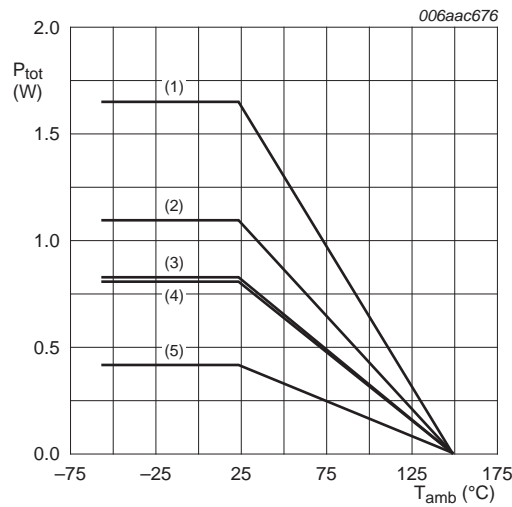
- (1) FR4 PCB, mounting pad for collector 6 cm²
- (2) FR4 PCB, mounting pad for collector 1 cm²
- (3) FR4 PCB, standard footprint

Fig 1. Power derating curves SOT223



- (1) FR4 PCB, mounting pad for collector 6 cm²
- (2) FR4 PCB, mounting pad for collector 1 cm²
- (3) FR4 PCB, standard footprint

Fig 2. Power derating curves SOT89



- (1) FR4 PCB, 4-layer copper, mounting pad for collector 1 cm²
- (2) FR4 PCB, single-sided copper, mounting pad for collector 6 cm²
- (3) FR4 PCB, single-sided copper, mounting pad for collector 1 cm²
- (4) FR4 PCB, 4-layer copper, standard footprint
- (5) FR4 PCB, single-sided copper, standard footprint

Fig 3. Power derating curves SOT1061

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						
			BCP51	[1]	-	-	192	K/W
				[2]	-	-	125	K/W
				[3]	-	-	93	K/W
			BCX51	[1]	-	-	250	K/W
				[2]	-	-	132	K/W
				[3]	-	-	93	K/W
			BC51PA	[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						
			BCP51	-	-	16	K/W	
			BCX51	-	-	16	K/W	
BC51PA			-	-	20	K/W		

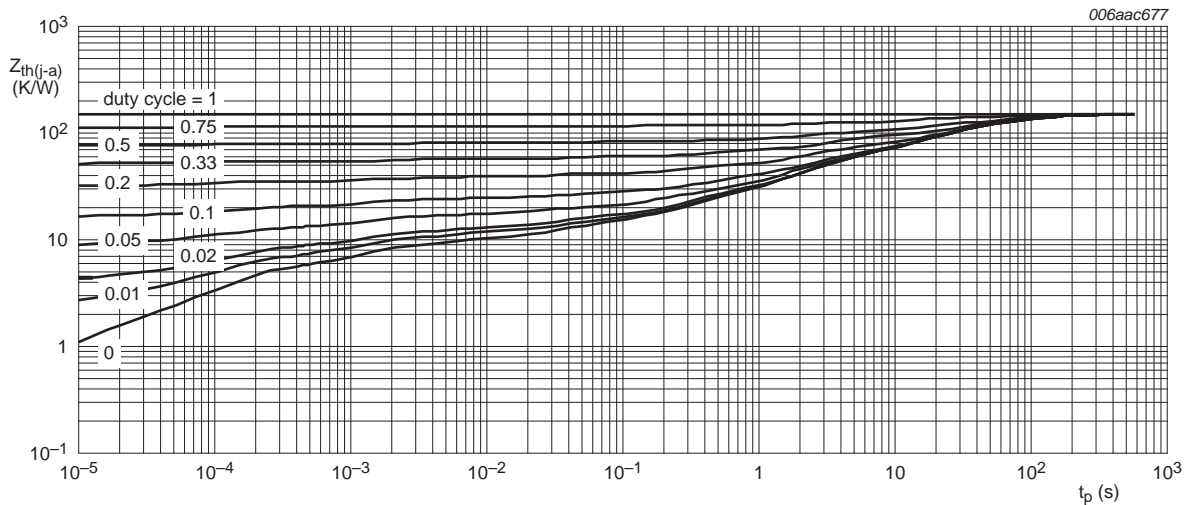
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

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

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².

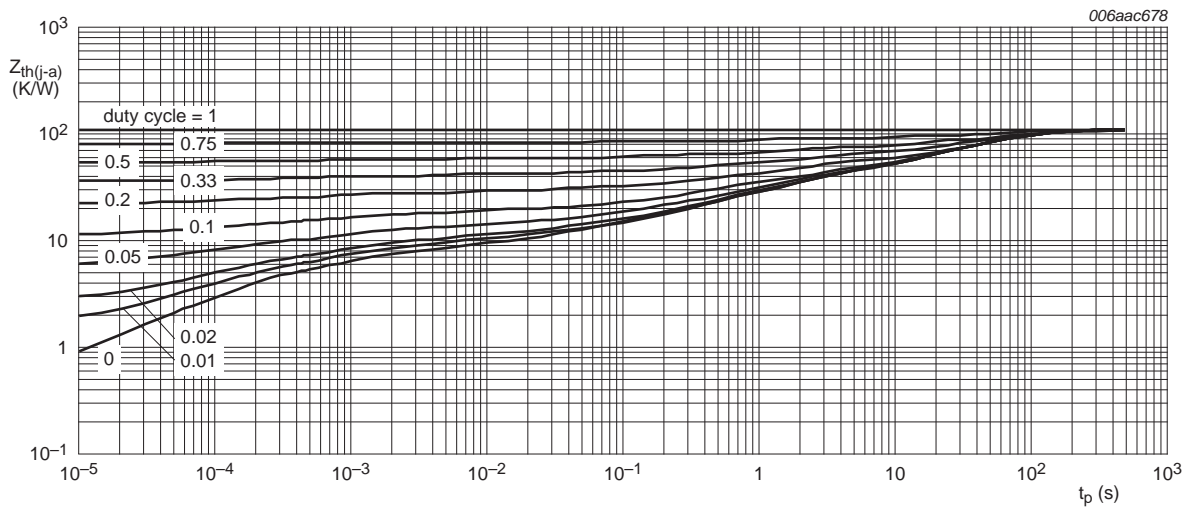
[4] Device mounted on an FR4 PCB, 4-layer copper, tin-plated and standard footprint.

[5] Device mounted on an FR4 PCB, 4-layer copper, tin-plated, mounting pad for collector 1 cm².



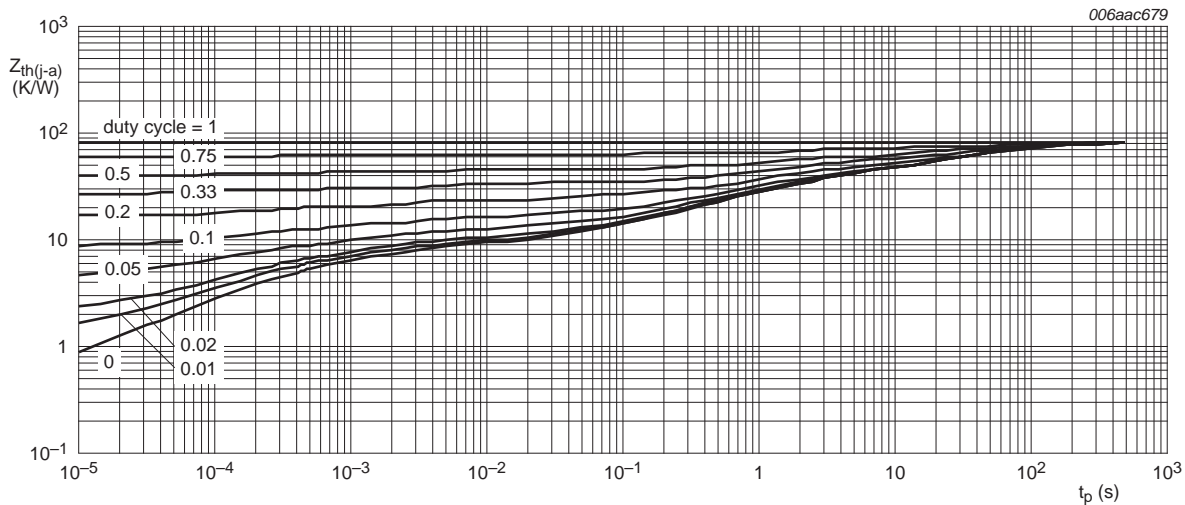
FR4 PCB, standard footprint

Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT223; typical values



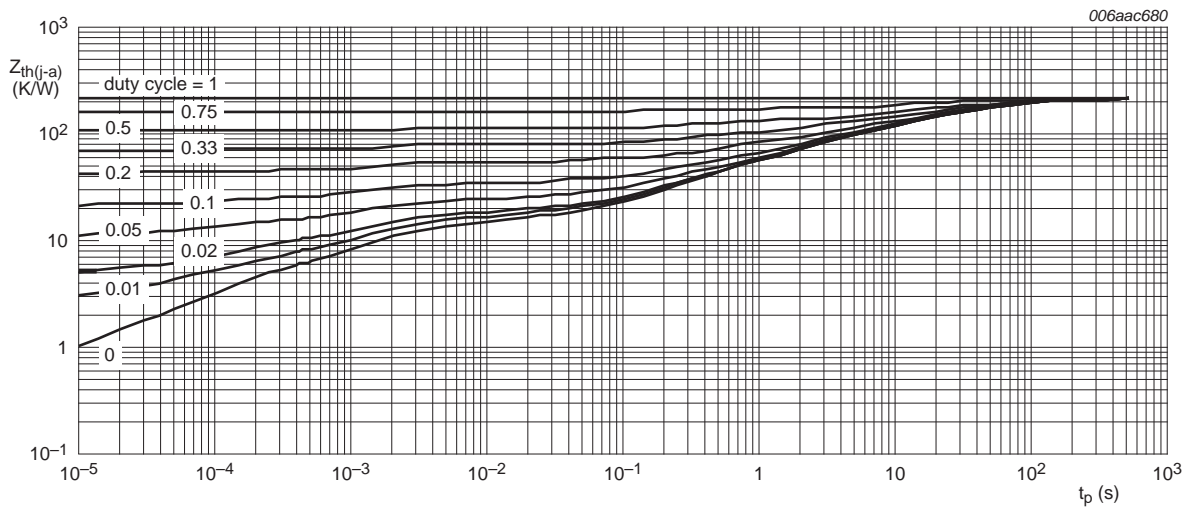
FR4 PCB, mounting pad for collector 1 cm²

Fig 5. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT223; typical values



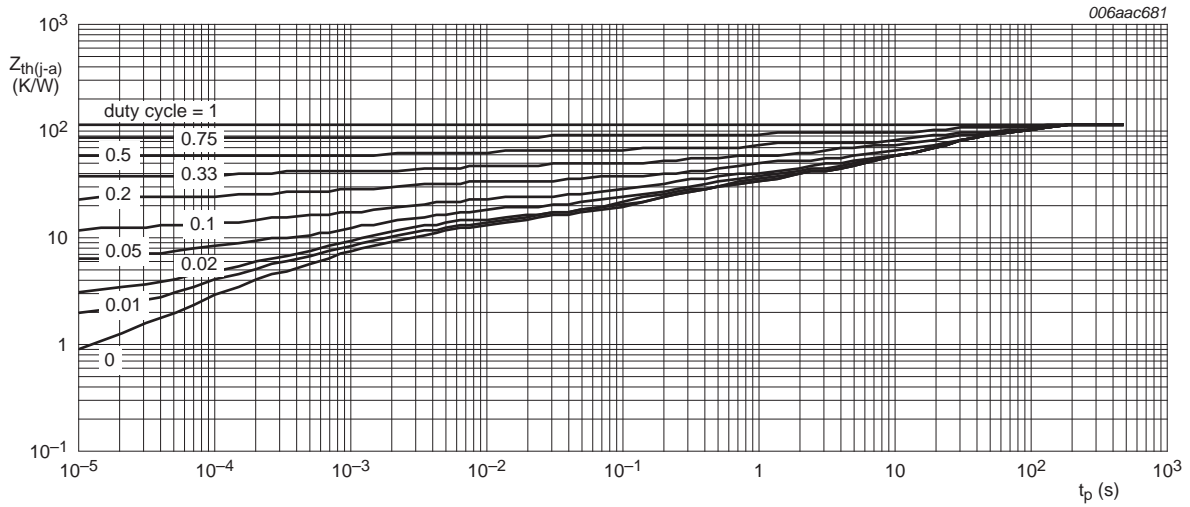
FR4 PCB, mounting pad for collector 6 cm²

Fig 6. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT223; typical values



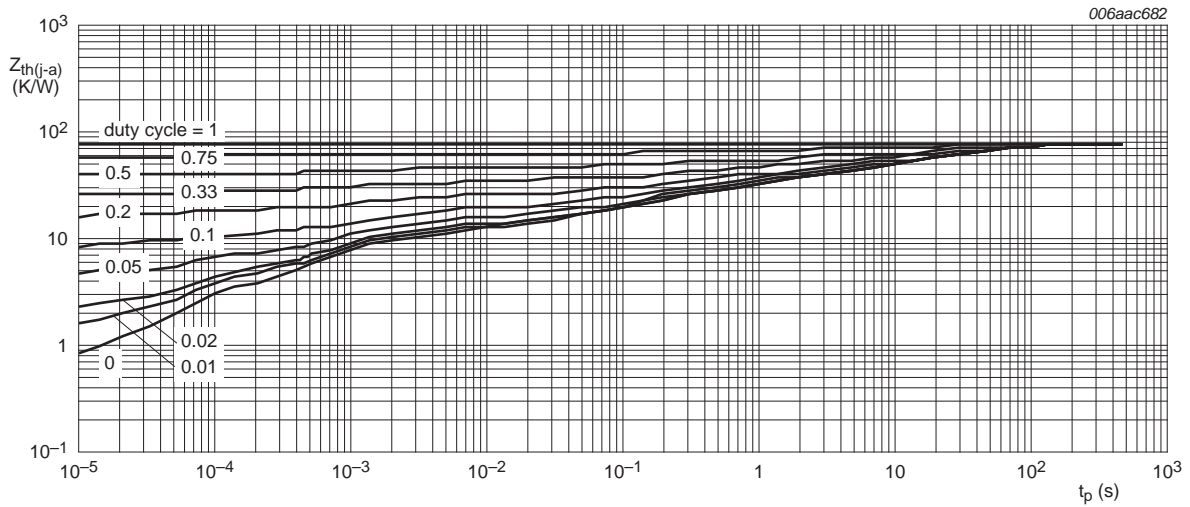
FR4 PCB, standard footprint

Fig 7. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT89; typical values



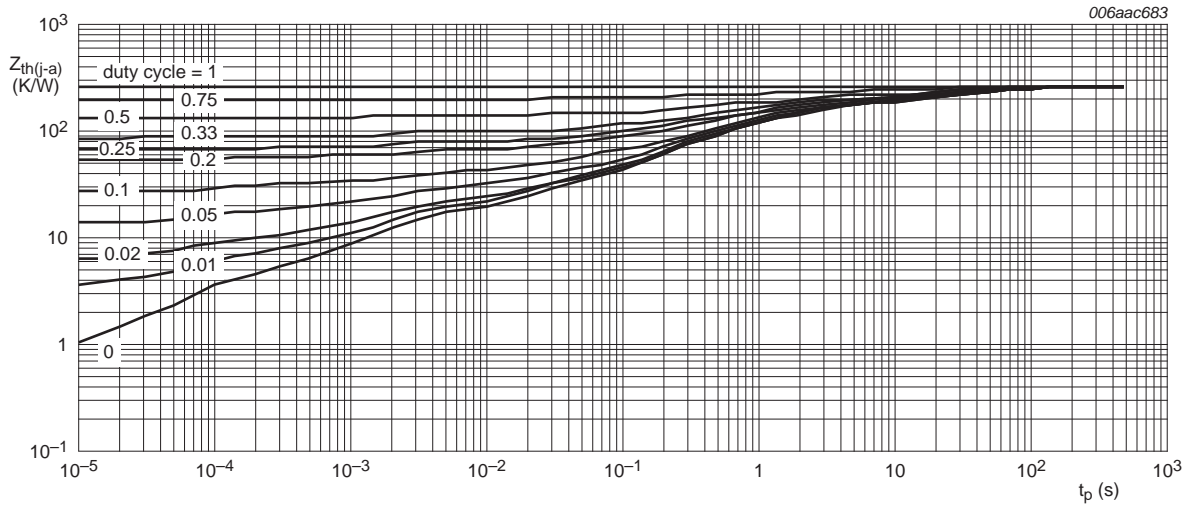
FR4 PCB, mounting pad for collector 1 cm²

Fig 8. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT89; typical values



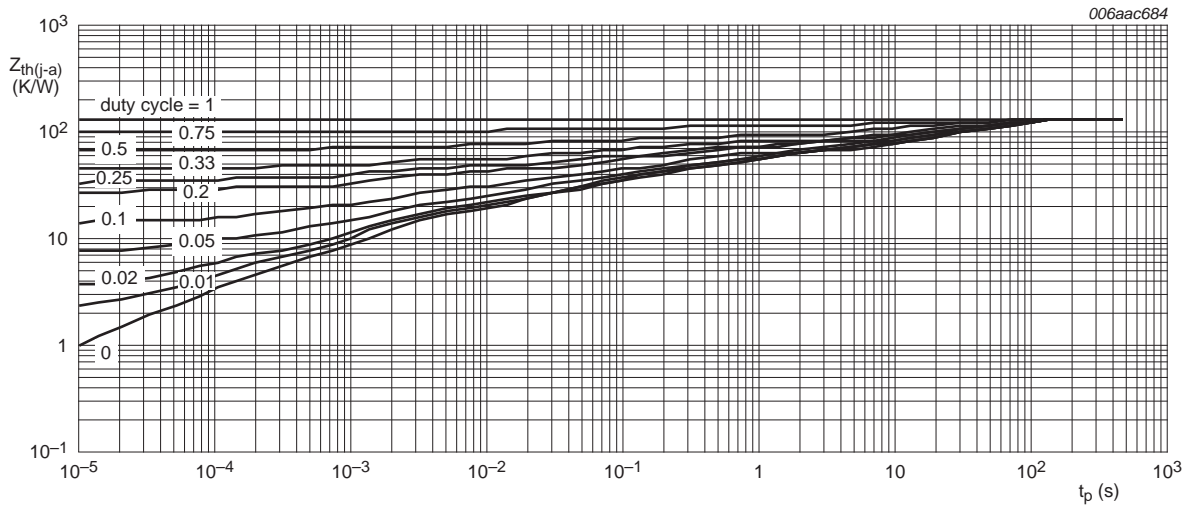
FR4 PCB, mounting pad for collector 6 cm²

Fig 9. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT89; typical values



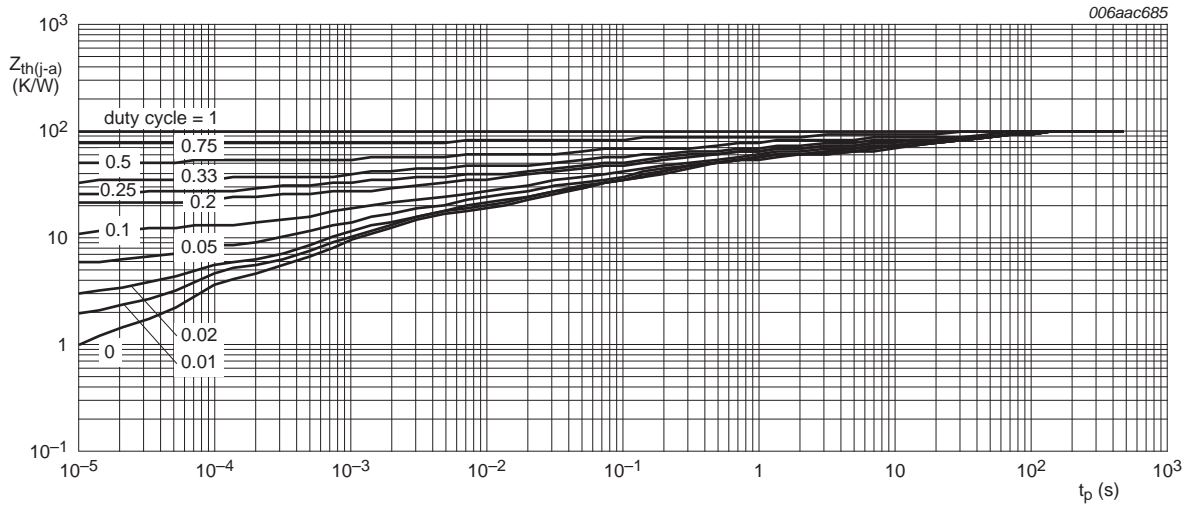
FR4 PCB, single-sided copper, standard footprint

Fig 10. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT1061; typical values



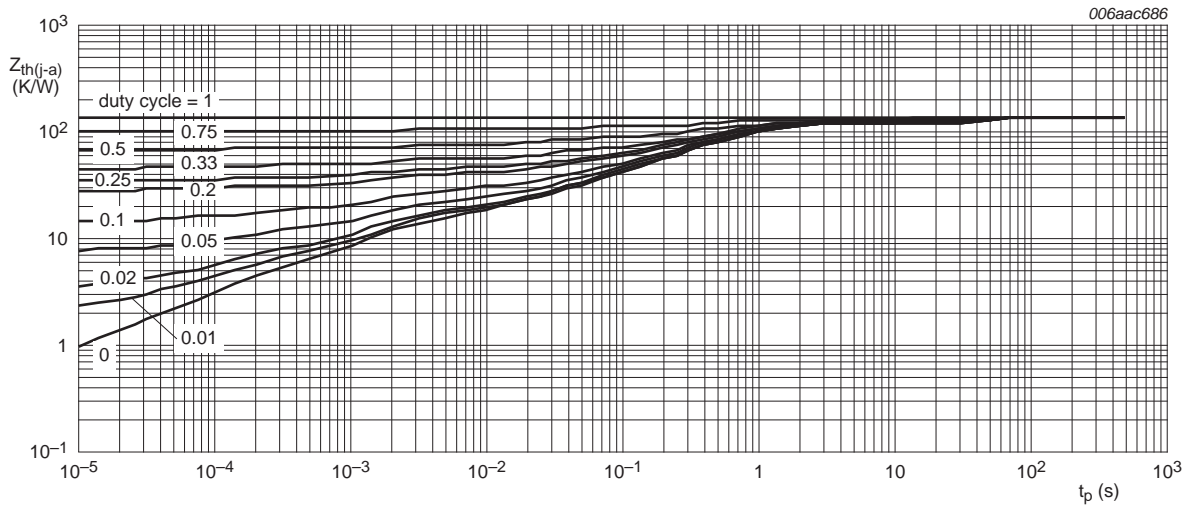
FR4 PCB, single-sided copper, mounting pad for collector 1 cm²

Fig 11. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT1061; typical values



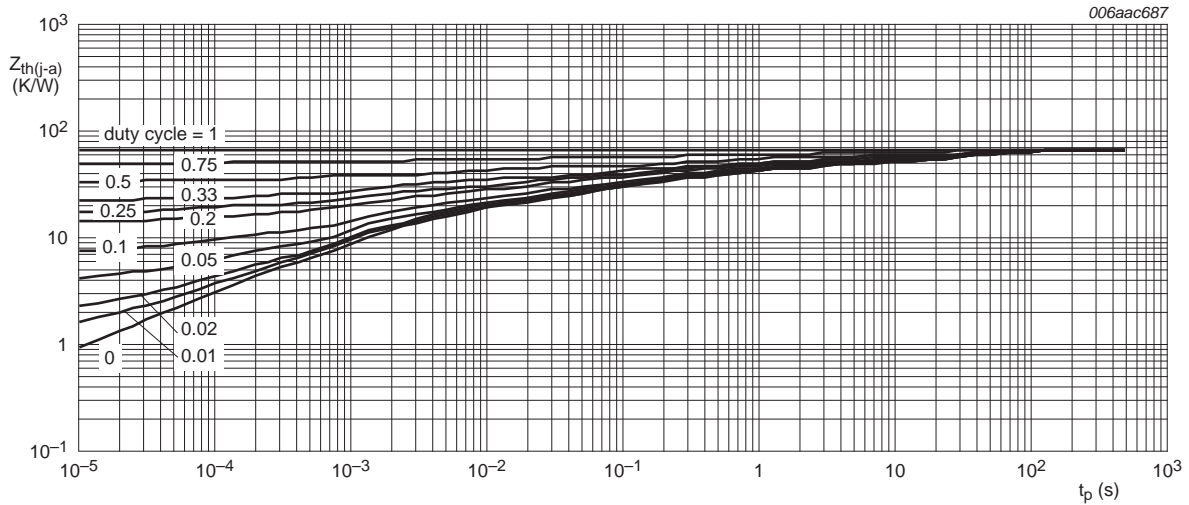
FR4 PCB, single-sided copper, mounting pad for collector 6 cm²

Fig 12. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT1061; typical values



FR4 PCB, 4-layer copper, standard footprint

Fig 13. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT1061; typical values



FR4 PCB, 4-layer copper, mounting pad for collector 1 cm²

Fig 14. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT1061; typical values

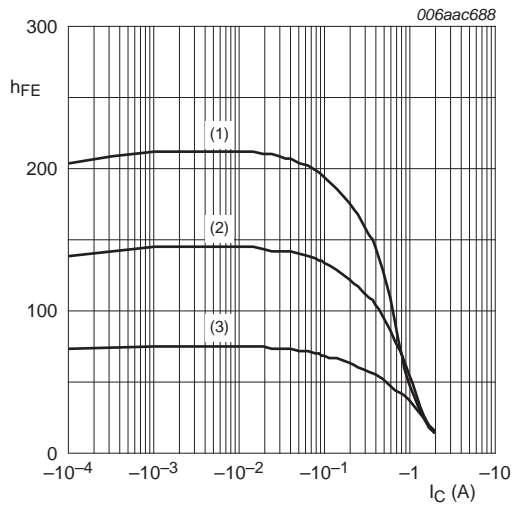
7. Characteristics

Table 8. Characteristics

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

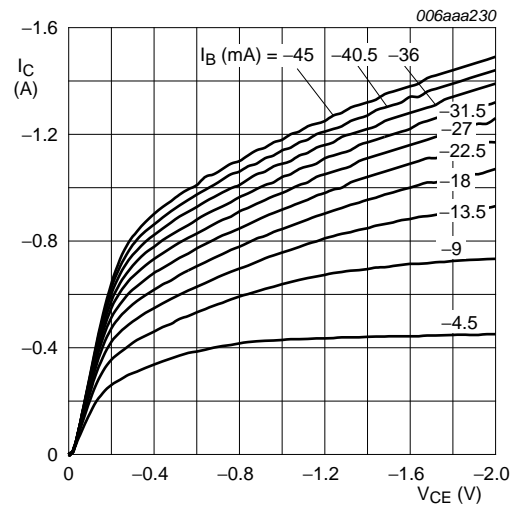
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -30\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA
		$V_{CB} = -30\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$	-	-	-10	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	-	-	-100	nA
h_{FE}	DC current gain	$V_{CE} = -2\text{ V}$				
		$I_C = -5\text{ mA}$	63	-	-	
		$I_C = -150\text{ mA}$	63	-	250	
		$I_C = -500\text{ mA}$	[1] 40	-	-	
	DC current gain	$V_{CE} = -2\text{ V}$				
	h_{FE} selection -10	$I_C = -150\text{ mA}$	63	-	160	
	h_{FE} selection -16	$I_C = -150\text{ mA}$	100	-	250	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	[1] -	-	-0.5	V
V_{BE}	base-emitter voltage	$V_{CE} = -2\text{ V}; I_C = -500\text{ mA}$	[1] -	-	-1	V
C_C	collector capacitance	$V_{CB} = -10\text{ V}; I_E = I_C = 0\text{ A}; f = 1\text{ MHz}$	-	15	-	pF
f_T	transition frequency	$V_{CE} = -5\text{ V}; I_C = -50\text{ mA}; f = 100\text{ MHz}$	-	145	-	MHz

[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}$; $\delta = 0.02$.



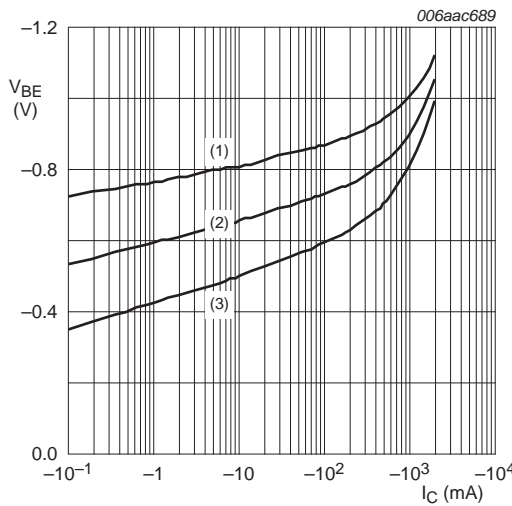
$V_{CE} = -2\text{ V}$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -55\text{ °C}$

Fig 15. DC current gain as a function of collector current; typical values



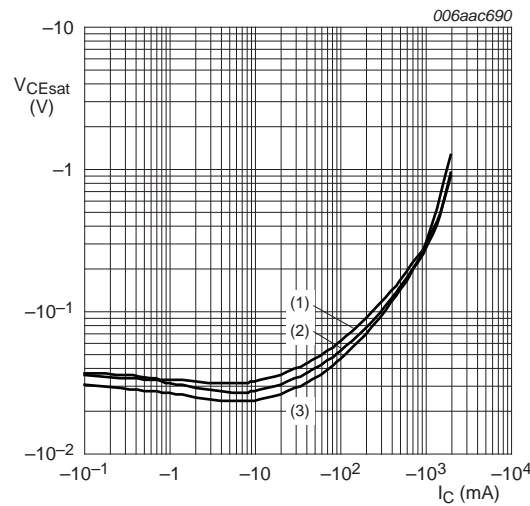
$T_{amb} = 25\text{ °C}$

Fig 16. Collector current as a function of collector-emitter voltage; typical values



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

Fig 17. Base-emitter voltage as a function of collector current; typical values



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

Fig 18. Collector-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

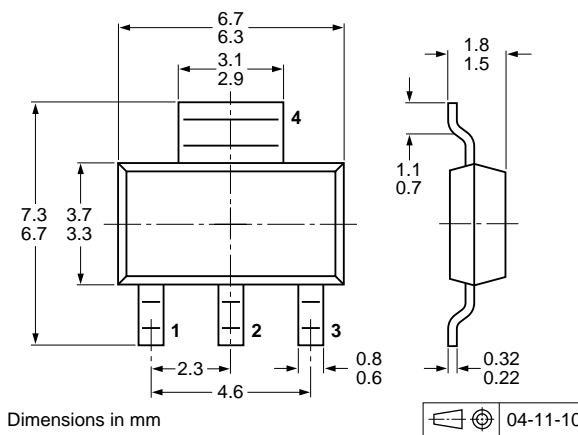


Fig 19. Package outline SOT223 (SC-73)

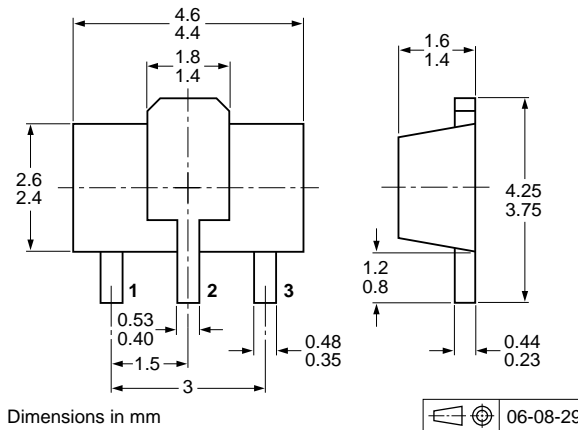


Fig 20. Package outline SOT89 (SC-62/TO-243)

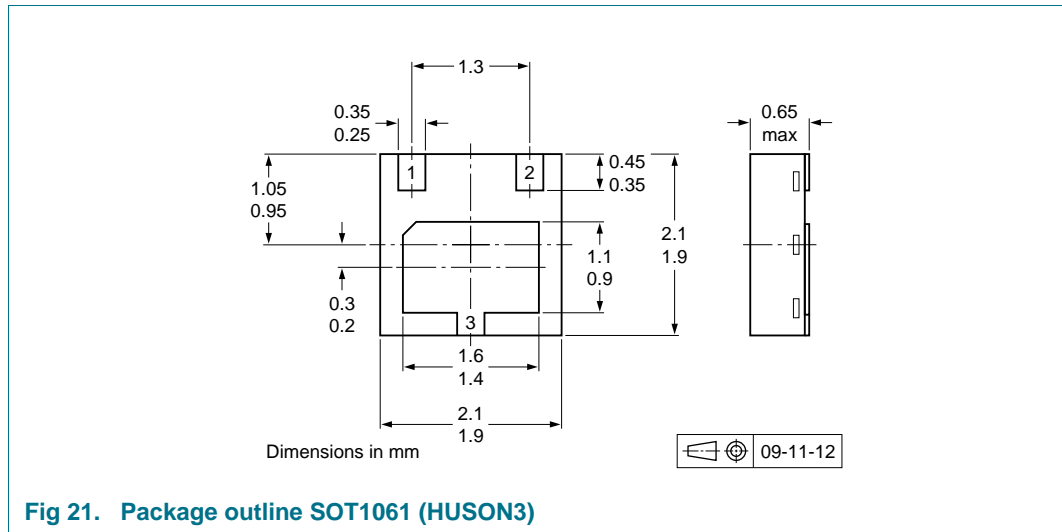


Fig 21. Package outline SOT1061 (HUSON3)

10. Packing information

Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number ^[2]	Package	Description	Packing quantity		
			1000	3000	4000
BCP51	SOT223	8 mm pitch, 12 mm tape and reel	-115	-	-135
BCX51	SOT89	8 mm pitch, 12 mm tape and reel; T1 ^[3]	-115	-	-135
		8 mm pitch, 12 mm tape and reel; T3 ^[4]	-146	-	-
BC51PA	SOT1061	4 mm pitch, 8 mm tape and reel	-	-115	-

[1] For further information and the availability of packing methods, see [Section 14](#).

[2] Valid for all available selection groups.

[3] T1: normal taping

[4] T3: 90° rotated taping

11. Soldering

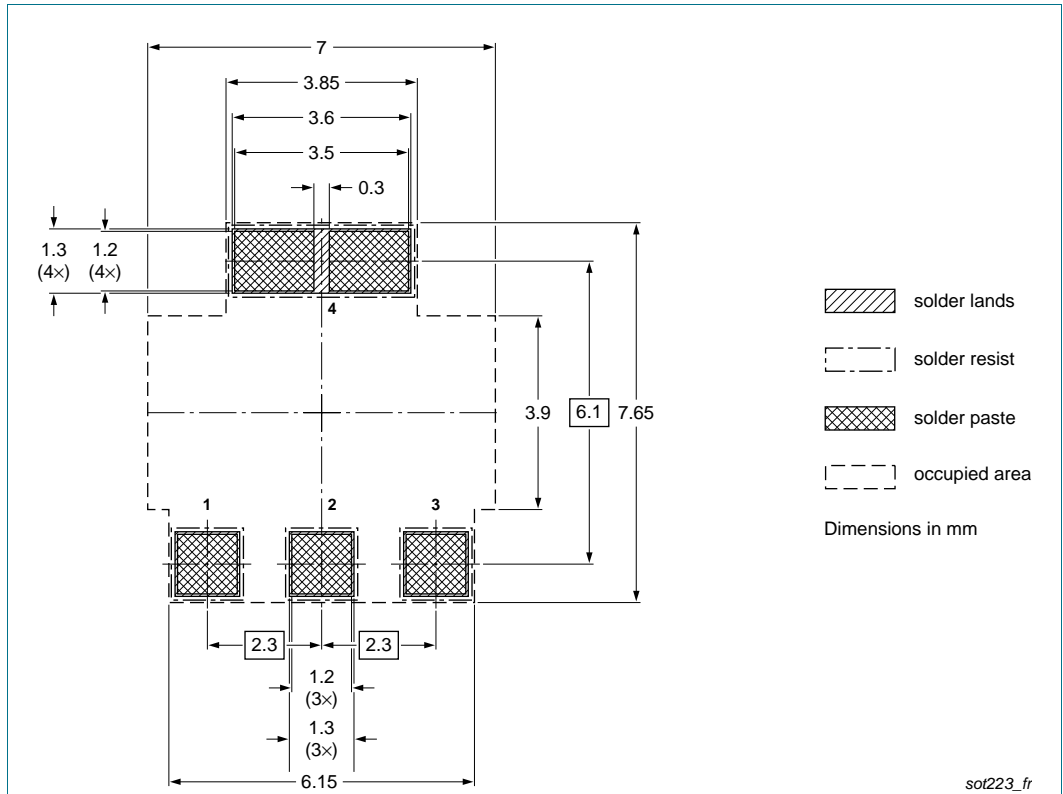


Fig 22. Reflow soldering footprint SOT223 (SC-73)

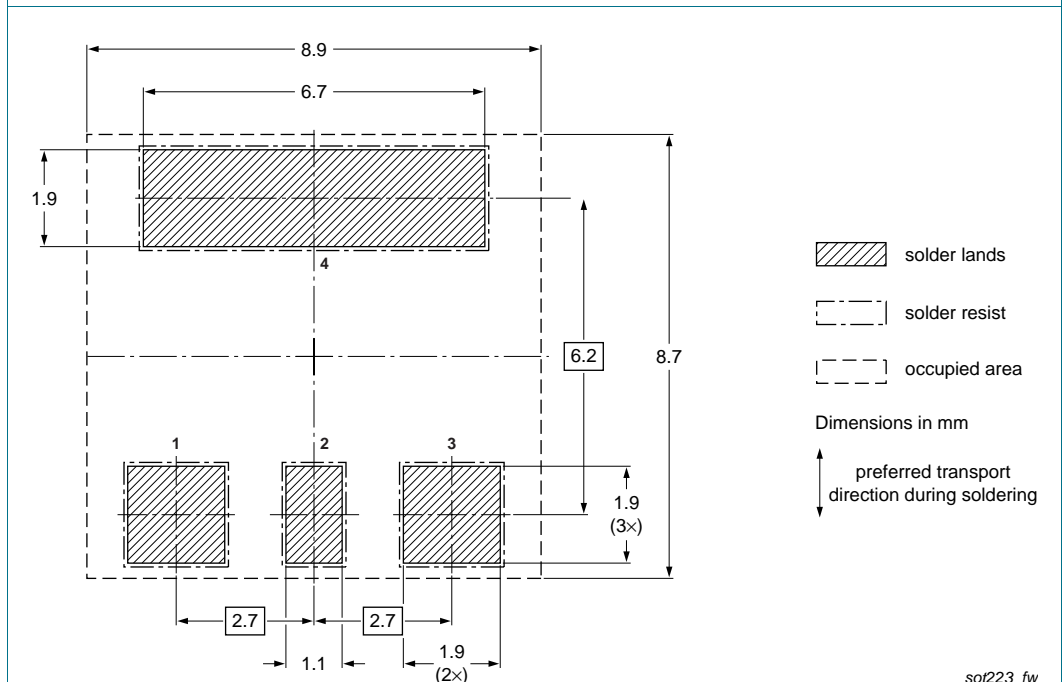
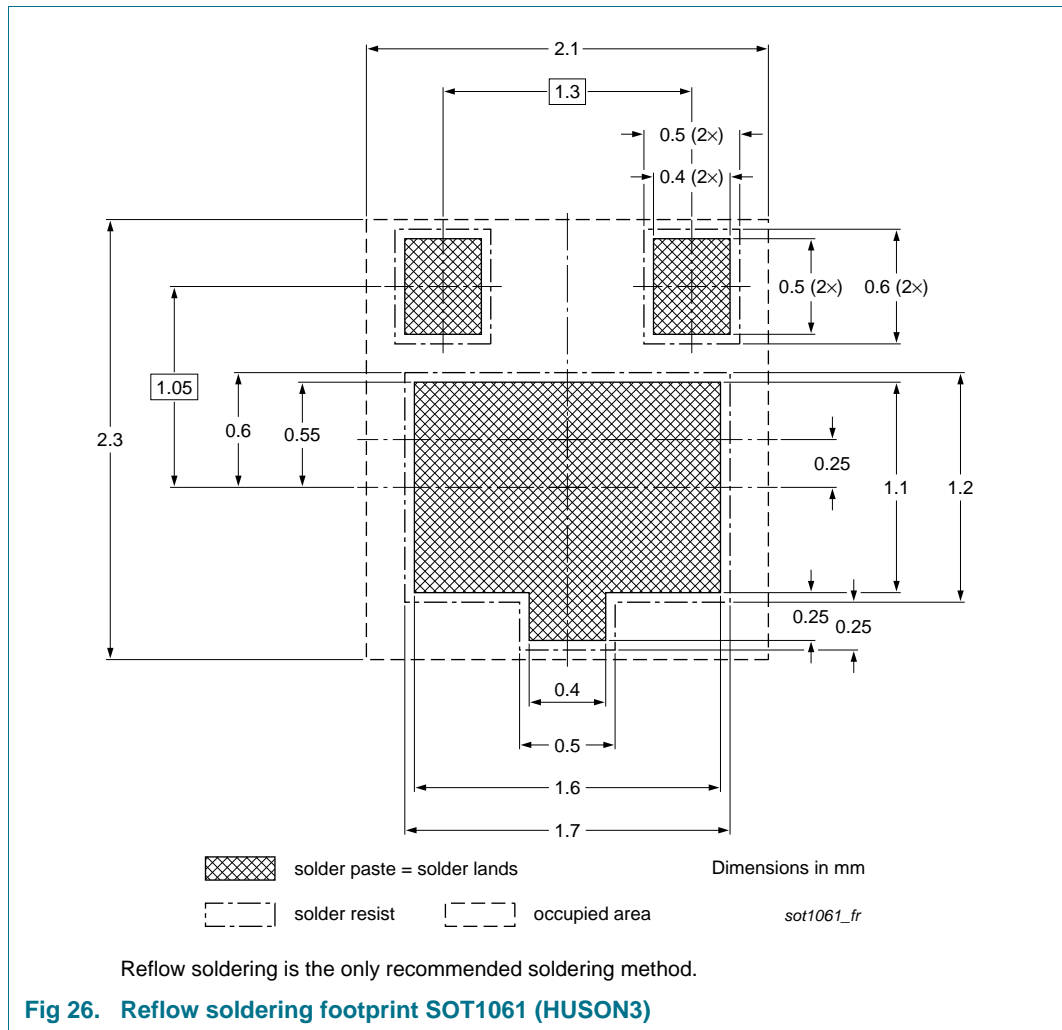


Fig 23. Wave soldering footprint SOT223 (SC-73)



12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BCP51_BCX51_BC51PA v.9	20111013	Product data sheet	-	BC636_BCP51_BCX51 v.8
Modifications:	<ul style="list-style-type: none"> Deleted type number BC636 Added Type number BC51PA Section 1 "Product profile": updated Table 6 and 7: updated according to latest measurements Figure 1 to 9, 15, 17, 18 and 21: updated Figure 10 to 14: added Section 8 "Test information": added Section 11 "Soldering": added Section 13 "Legal information": updated 			
BC636_BCP51_BCX51 v.8	20080222	Product data sheet	-	BC636_BCP51_BCX51 v.7
BC636_BCP51_BCX51 v.7	20070629	Product data sheet	-	BC636_BCP51_BCX51 v.6
BC636_BCP51_BCX51 v.6	20060329	Product data sheet	-	BC636_638_640 v.5 BCP51_52_53 v.5 BCX51_52_53 v.4
BC636_638_640 v.5	20041011	Product specification	-	BC636_638_640 v.4
BCP51_52_53 v.5	20030206	Product specification	-	BCP51_52_53 v.4
BCX51_52_53 v.4	20011010	Product specification	-	BCX51_52_53 v.3

13. Legal information

13.1 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nexperia.com>.

13.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Nexperia does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between Nexperia and its customer, unless Nexperia and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Nexperia product is deemed to offer functions and qualities beyond those described in the Product data sheet.

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For more information, please visit: <http://www.nexperia.com>

For sales office addresses, please send an email to: salesaddresses@nexperia.com

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