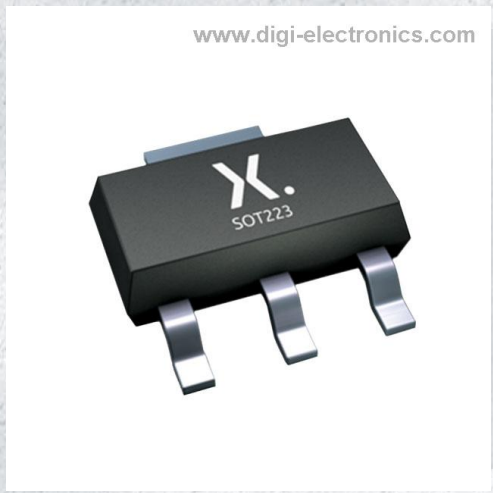
BSP50,115 Datasheet



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DiGi Electronics Part Number	BSP50,115-DG
Manufacturer	Nexperia USA Inc.
Manufacturer Product Number	BSP50,115
Description	TRANS NPN DARL 45V 1A SOT223
Detailed Description	Bipolar (BJT) Transistor NPN - Darlington 45 V 1 A 200MHz 1.25 W Surface Mount SOT-223

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
BSP50,115	Nexperia USA Inc.
Series:	Product Status:
-	Active
Transistor Type:	Current - Collector (Ic) (Max):
NPN - Darlington	1 A
Voltage - Collector Emitter Breakdown (Max):	Vce Saturation (Max) @ Ib, Ic:
45 V	1.3V @ 500µA, 500mA
Current - Collector Cutoff (Max):	DC Current Gain (hFE) (Min) @ Ic, Vce:
50nA	2000 @ 500mA, 10V
Power - Max:	Frequency - Transition:
1.25 W	200MHz
Operating Temperature:	Grade:
150°C (TJ)	Automotive
Qualification:	Mounting Type:
AEC-Q101	Surface Mount
Package / Case:	Supplier Device Package:
TO-261-4, TO-261AA	SOT-223
Base Product Number:	
BSP50	

Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
ROHS3 Compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.29.0075	

BSP50

NPN Darlington transistor

6 June 2018 **Product data sheet**

1. General description

NPN Darlington transistor in an SOT223 plastic package.

PNP complement: BSP60

2. Features and benefits

- High current of 1 A
- Low voltage of 45 V
- Integrated diode and resistor
- AEC-Q101 qualified

3. Applications

- Industrial high gain amplification

4. Quick reference data

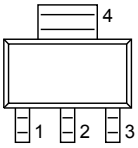
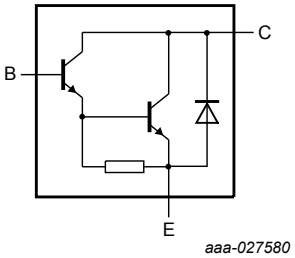
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	-	60	V
V_{CES}	collector-emitter voltage	base short-circuited to emitter		-	-	45	V
I_C	collector current			-	-	1	A
I_{CM}	peak collector current			-	-	2	A
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 150 mA	[1]	1000	-	-	

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

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 SC-73 (SOT223)	
2	C	collector		
3	E	emitter		
4	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BSP50	SC-73	plastic, surface-mounted package with increased heatsink; 4 leads; 4.6 mm pitch; 6.5 mm x 3.5 mm x 1.65 mm body	SOT223

7. Limiting values

Table 4. 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_{CES}	collector-emitter voltage	base short-circuited to emitter		-	45	V
V_{EBO}	emitter-base voltage	open collector		-	5	V
I_C	collector current			-	1	A
I_{CM}	peak collector current			-	2	A
I_{Blim}	limiting base current			-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	1.25	W
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, mounting pad for collector 1 cm^2.

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient		[1]	-	-	96	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	17	K/W

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

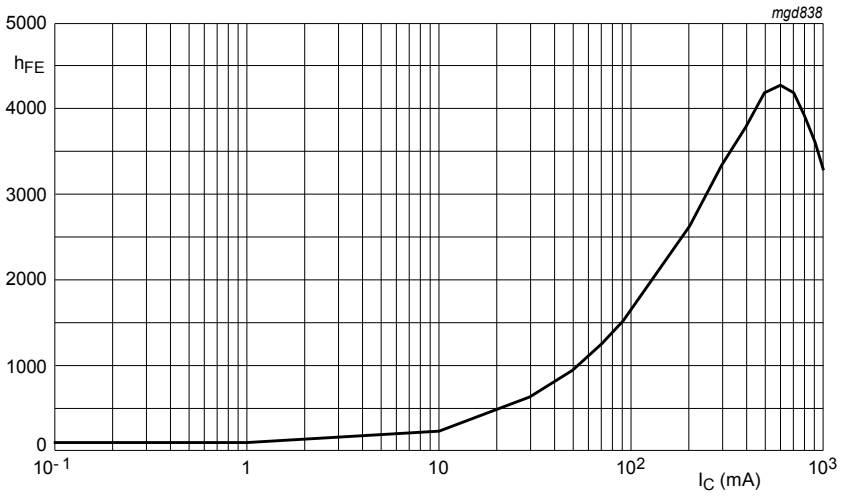
9. Characteristics

Table 6. Characteristics

T_j = 25 °C unless otherwise specified

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 100 µA; I_E = 0 A		60	-	-	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	I_C = 2 mA; V_{BE} = 0 V		45	-	-	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_C = 0 A; I_E = 100 µA		5	-	-	V
I_{CES}	collector-emitter cut-off current	V_{BE} = 0 V; V_{CE} = 45 V		-	-	50	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = 4 V; I_C = 0 A		-	-	50	nA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 150 mA	[1]	1000	-	-	
		V_{CE} = 10 V; I_C = 500 mA	[1]	2000	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 500 mA; I_B = 0.5 mA		-	-	1.3	V
		I_C = 500 mA; I_B = 0.5 mA; T_j = 150 °C		-	-	1.3	V
V_{BEsat}	base-emitter saturation voltage	I_C = 500 mA; I_B = 0.5 mA		-	-	1.9	V
t_{on}	turn-on time	I_C = 500 mA; I_{Bon} = 0.5 mA; I_{Boff} = -0.5 mA		-	500	-	ns
t_{off}	turn-off time			-	1300	-	ns
f_T	transition frequency	V_{CE} = 5 V; I_C = 500 mA; f = 100 MHz		-	200	-	MHz

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



V_{CE} = 10 V

Fig. 1. DC current gain; typical values

10. Test information

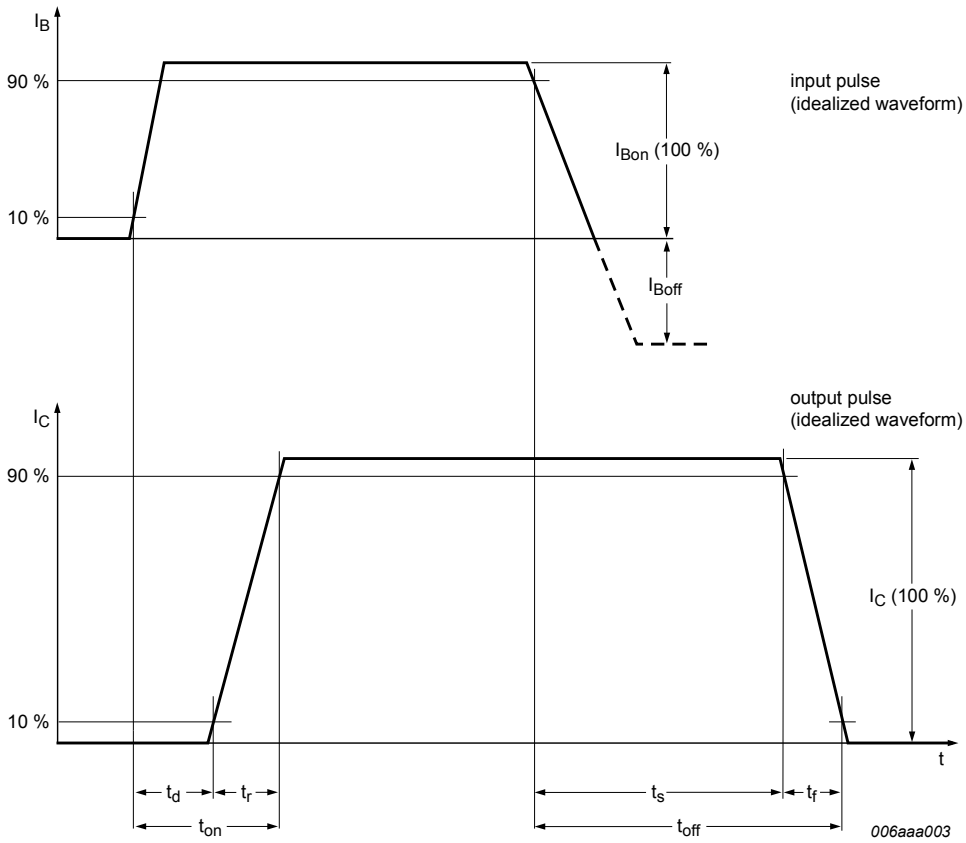
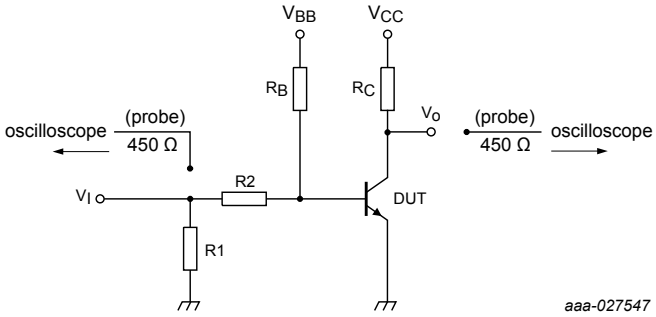


Fig. 2. Transistor switching time definition



V_I = 10 V; T = 200 µs; t_p = 6 µs; t_r = t_f ≤ 3 ns.
R1 = 56 Ω; R2 = 10 kΩ; R_B = 10 kΩ; R_C = 18 Ω.
V_{BB} = -1.8 V; V_{CC} = 10.7 V.
Oscilloscope: input impedance Z_i = 50 Ω.

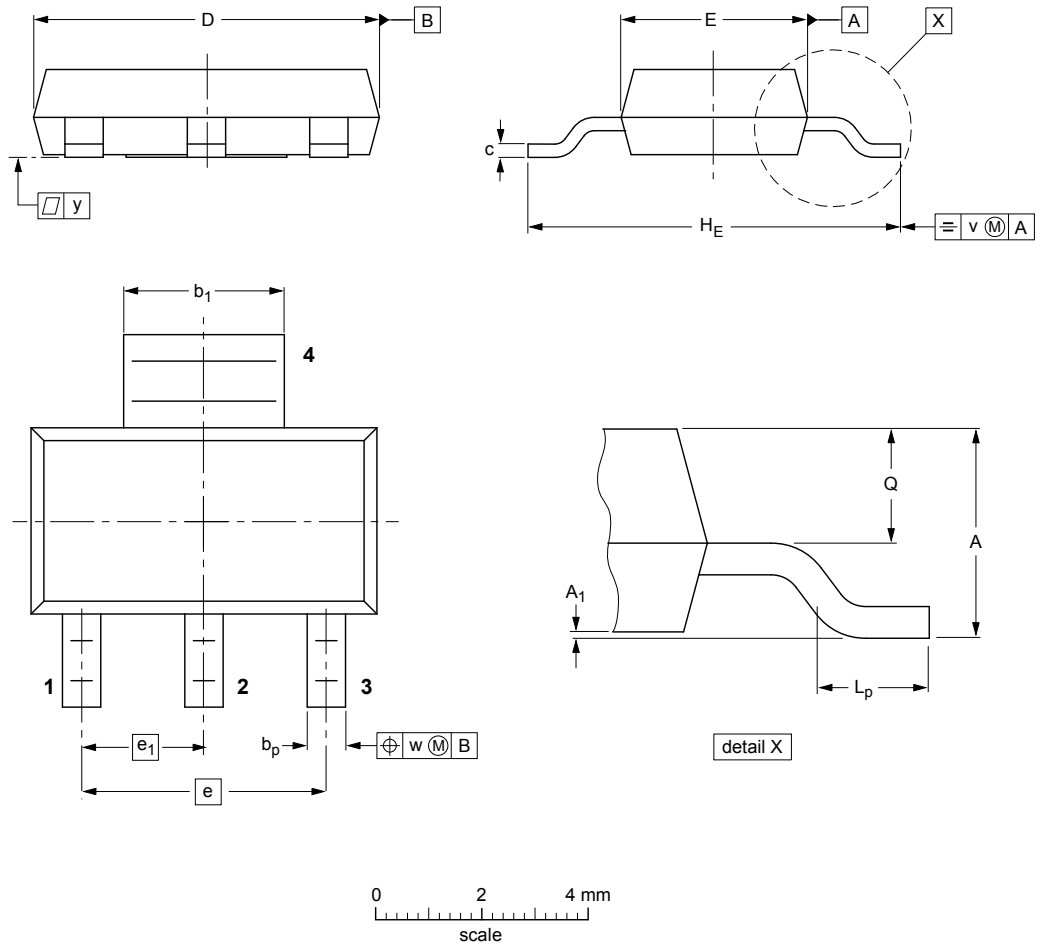
Fig. 3. Test circuit or switching times

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.

11. Package outline

Plastic surface-mounted package with increased heatsink; 4 leads **SOT223**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT223			SC-73			~~04-11-10~~ 06-03-16

Fig. 4. Package outline SC-73 (SOT223)

12. Soldering

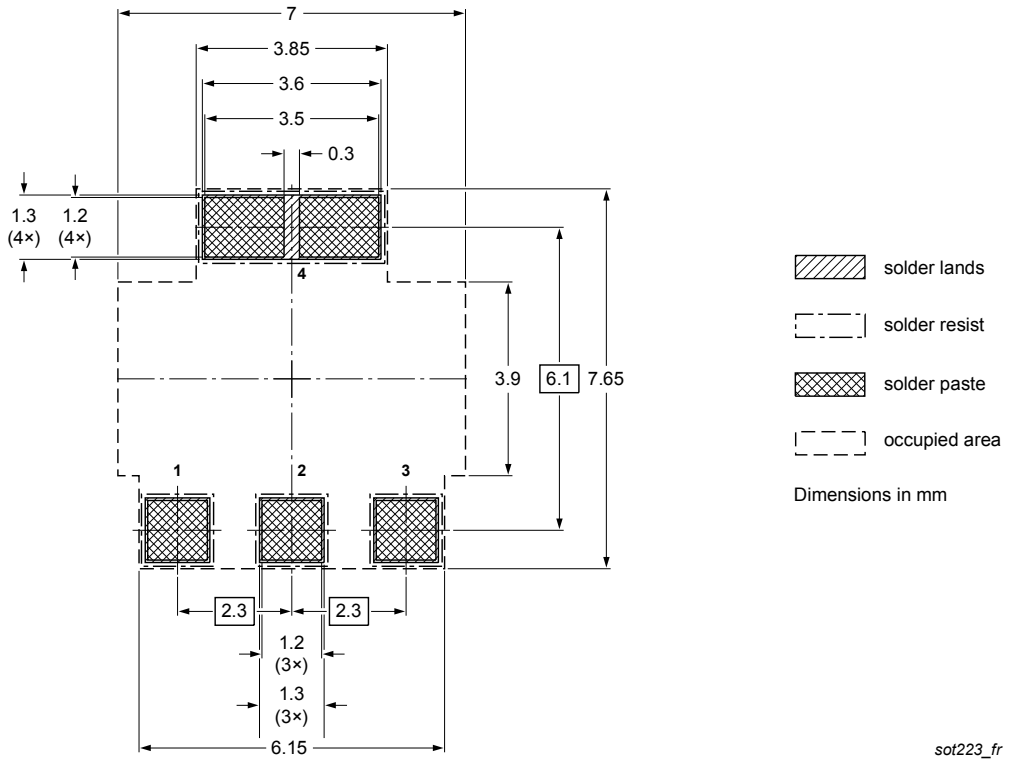


Fig. 5. Reflow soldering footprint for SC-73 (SOT223)

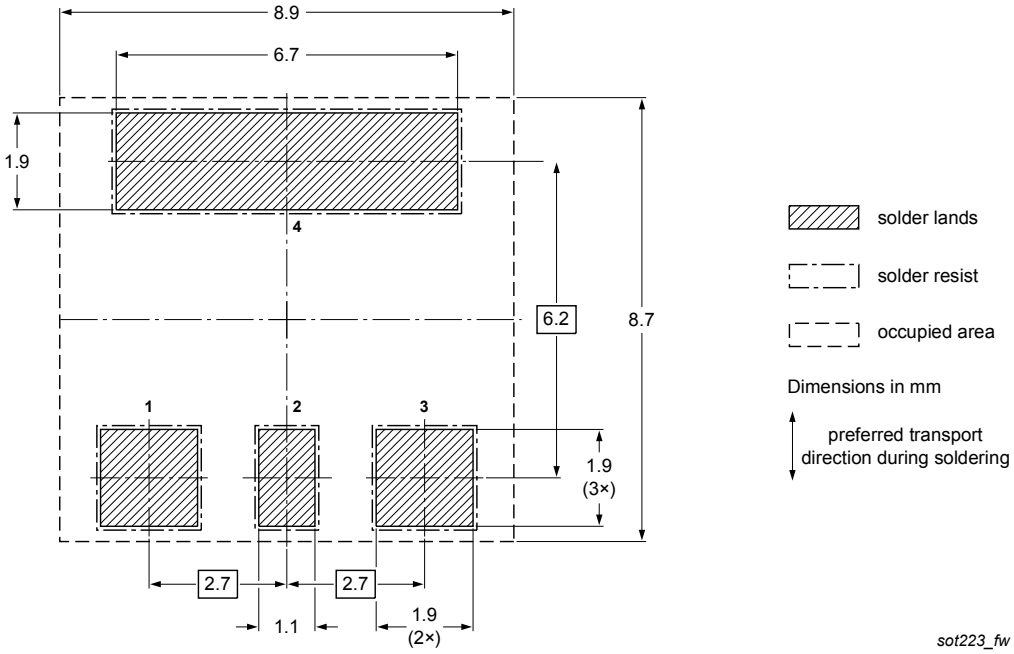


Fig. 6. Wave soldering footprint for SC-73 (SOT223)

13. Revision history

Table 7. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BSP50 v.3	20180606	Product data sheet	-	BSP50_51_52 v.2
Modifications:	• The product is AEC-Q101 qualified. • Familiy data sheet is transformed to single data sheets. • The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate.			
BSP50_51_52 v.2	19990423	Product data sheet	-	BSP50_51_52 v.1
BSP50_51_52 v.1	19970422	Product data sheet	-	-

14. 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".
[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 https://www.nexperia.com.

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Date of release: 6 June 2018

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