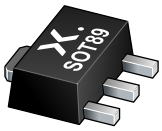

2PD2150

20 V, 3 A NPN low V_{CEsat} (BISS) transistor

Rev. 02 — 2 January 2007 Product data sheet

1. Product profile

1.1 General description

NPN low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a medium power SOT89 (SC-62/TO-243) flat lead Surface-Mounted Device (SMD) plastic package.

PNP complement: 2PB1424.

1.2 Features

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- High efficiency due to less heat generation
- Smaller required Printed-Circuit Board (PCB) area than for conventional transistors

1.3 Applications

- DC-to-DC conversion
- MOSFET gate driving
- Motor control
- Charging circuits
- Power switches (e.g. motors, fans)
- Thin Film Transistor (TFT) backlight inverter

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	20	V
I_C	collector current			-	-	3	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	-	5	A
V_{CEsat}	collector-emitter saturation voltage	$I_C = 2$ A; $I_B = 0.1$ A	[1]	-	0.2	0.5	V

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

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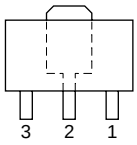
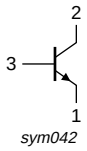
2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	emitter		
2	collector		
3	base		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
2PD2150	SC-62	plastic surface-mounted package; collector pad for good heat transfer; 3 leads	SOT89

4. Marking

Table 4. Marking codes

Type number	Marking code
2PD2150	M2

5. Limiting values

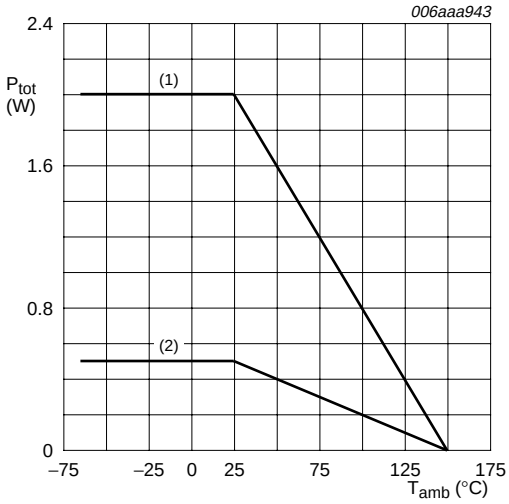
Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CBO}	collector-base voltage	open emitter		-	40	V
V_{CEO}	collector-emitter voltage	open base		-	20	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current			-	3	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	0.5	W
			[2]	-	2	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 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.



(1) Ceramic PCB, Al_2O_3, standard footprint

(2) FR4 PCB, standard footprint

Fig 1. Power derating curves

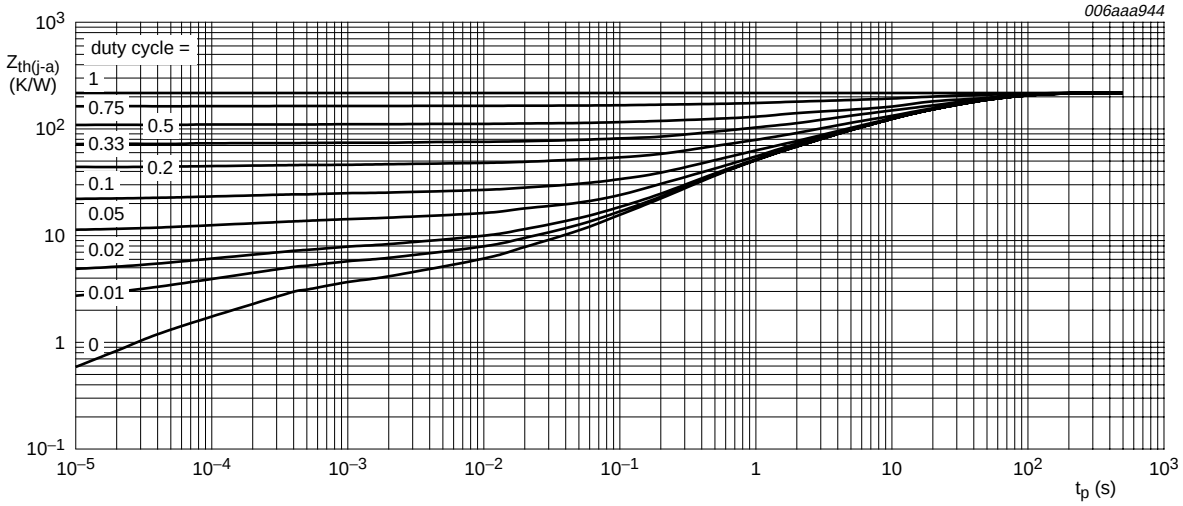
6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	250	K/W
			[2]	-	-	62	K/W

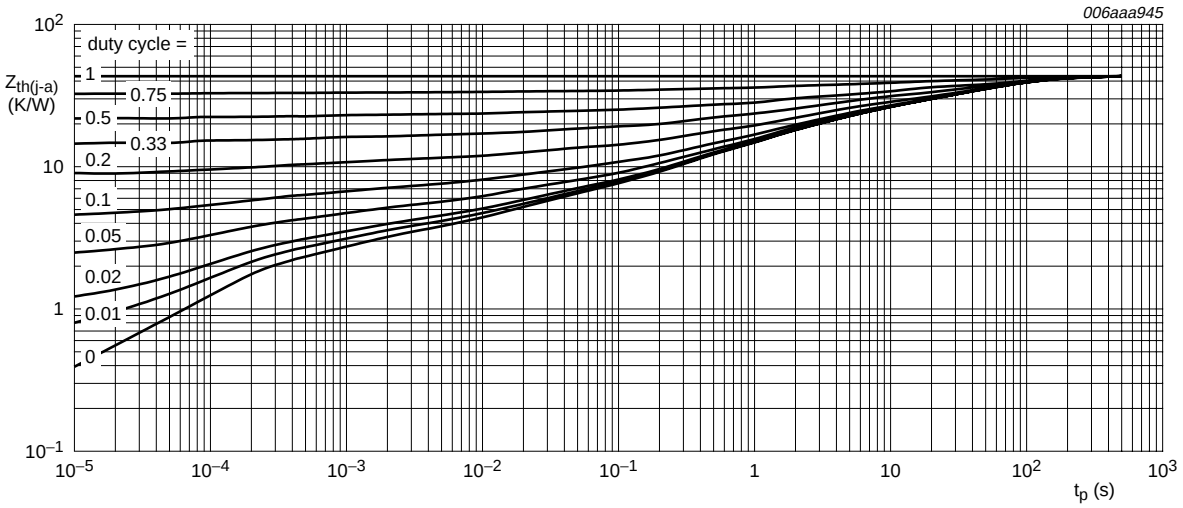
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.



FR4 PCB, standard footprint

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



Ceramic PCB, Al_2O_3, standard footprint

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

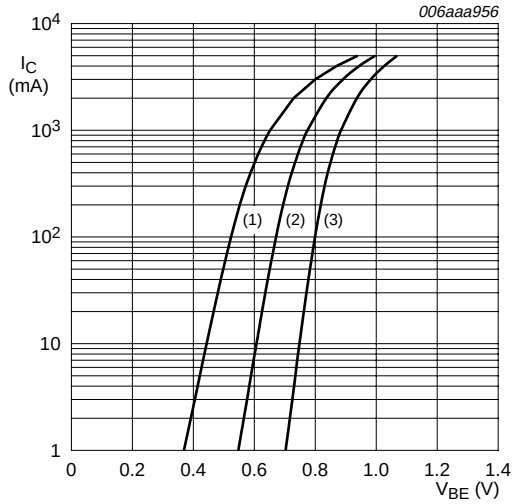
7. Characteristics

Table 7. Characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 30 V; I_E = 0 A		-	-	0.1	µA
I_{EBO}	emitter-base cut-off current	V_{EB} = 5 V; I_C = 0 A		-	-	0.1	µA
h_{FE}	DC current gain	V_{CE} = 2 V; I_C = 0.1 A		180	-	390	
V_{CEsat}	collector-emitter saturation voltage	I_C = 2 A; I_B = 0.1 A	[1]	-	0.2	0.5	V
f_T	transition frequency	V_{CE} = 2 V; I_E = –0.5 A; f = 100 MHz		-	220	-	MHz
C_{ib}	common-base input capacitance	V_{EB} = 5 V; I_E = i_e = 0 A; f = 1 MHz		-	180	-	pF
C_{ob}	common-base output capacitance	V_{CB} = 10 V; I_E = i_e = 0 A; f = 1 MHz		-	20	-	pF

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



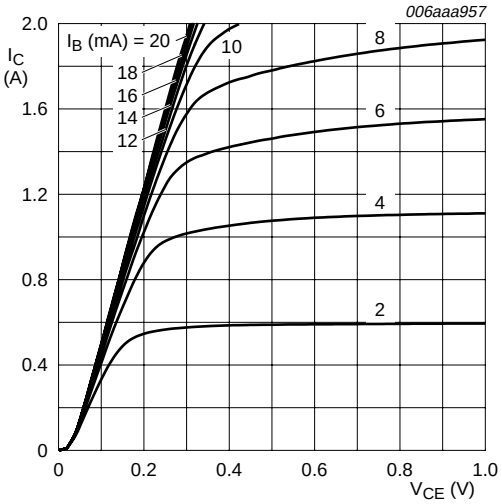
V_{CE} = 2 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

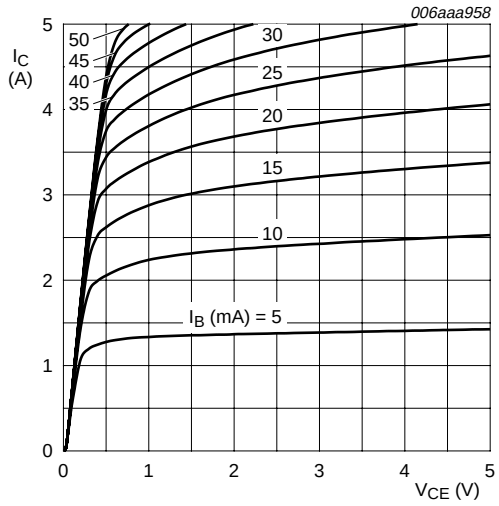
(3) T_{amb} = –40 °C

Fig 4. Collector current as a function of base-emitter voltage; typical values



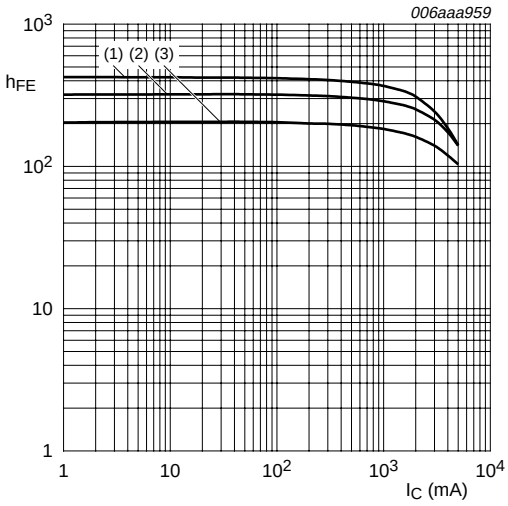
T_{amb} = 25 °C

Fig 5. Collector current as a function of collector-emitter voltage; typical values



T_{amb} = 25 °C

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



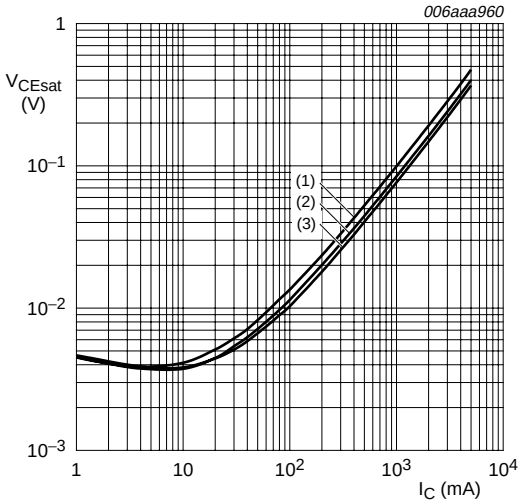
V_{CE} = 2 V

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = –40 °C

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



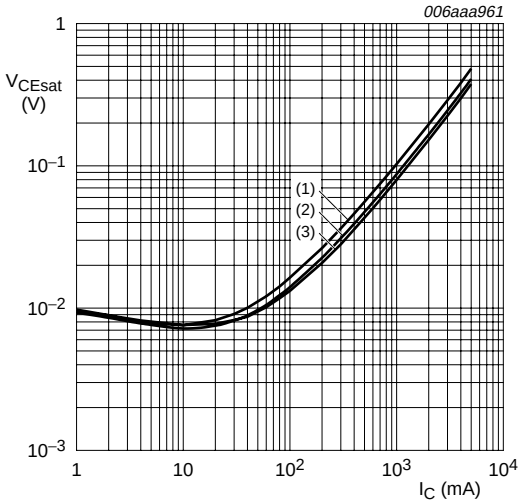
I_C/I_B = 10

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = –40 °C

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



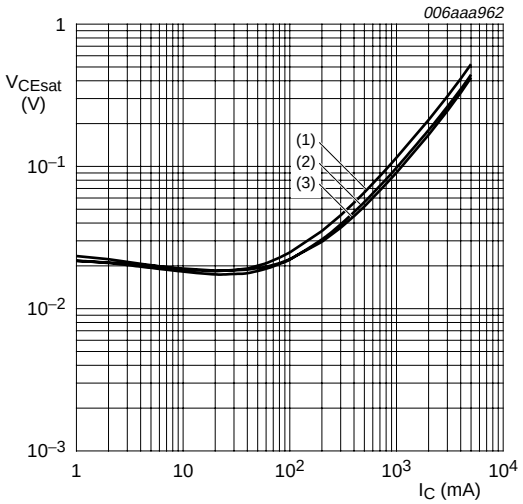
I_C/I_B = 20

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = –40 °C

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



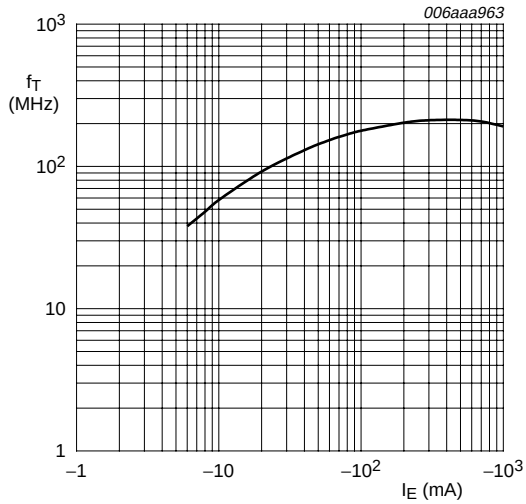
I_C/I_B = 50

(1) T_{amb} = 100 °C

(2) T_{amb} = 25 °C

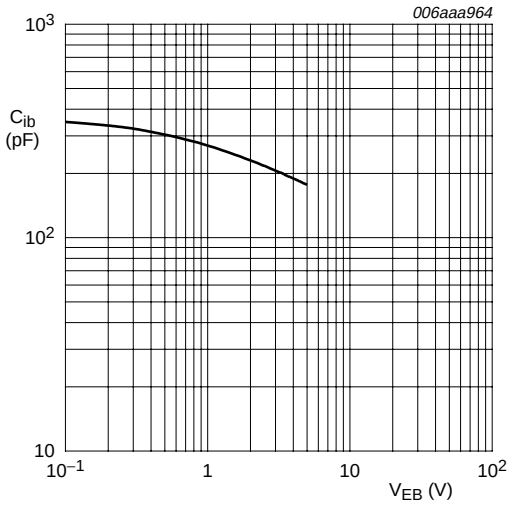
(3) T_{amb} = –40 °C

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



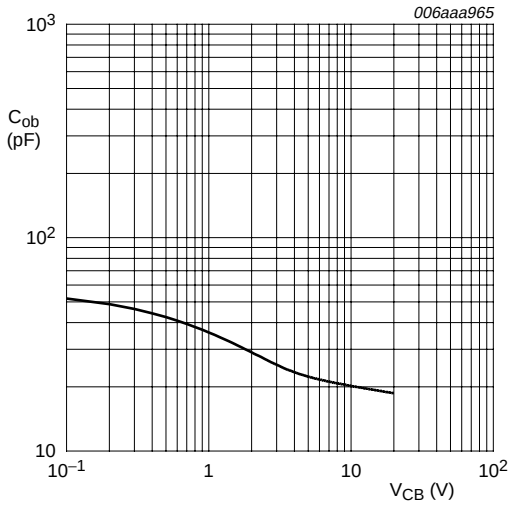
T_{amb} = 25 °C; V_{CE} = 2 V

Fig 11. Transition frequency as a function of emitter current; typical values



T_{amb} = 25 °C; f = 1 MHz; $I_E = i_e$ = 0 A

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



T_{amb} = 25 °C; f = 1 MHz; $I_E = i_e$ = 0 A

Fig 13. Common-base output capacitance as a function of collector-base voltage; typical values

8. Package outline

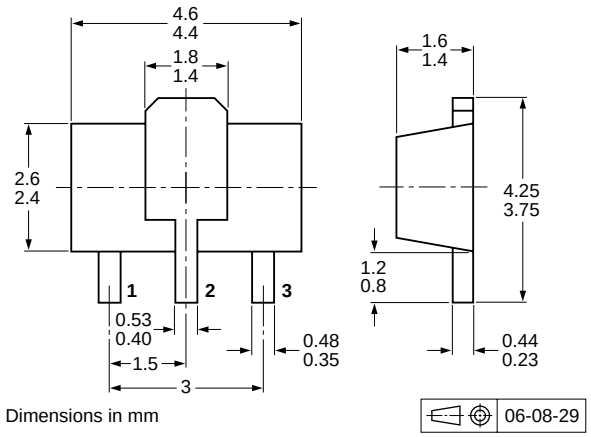
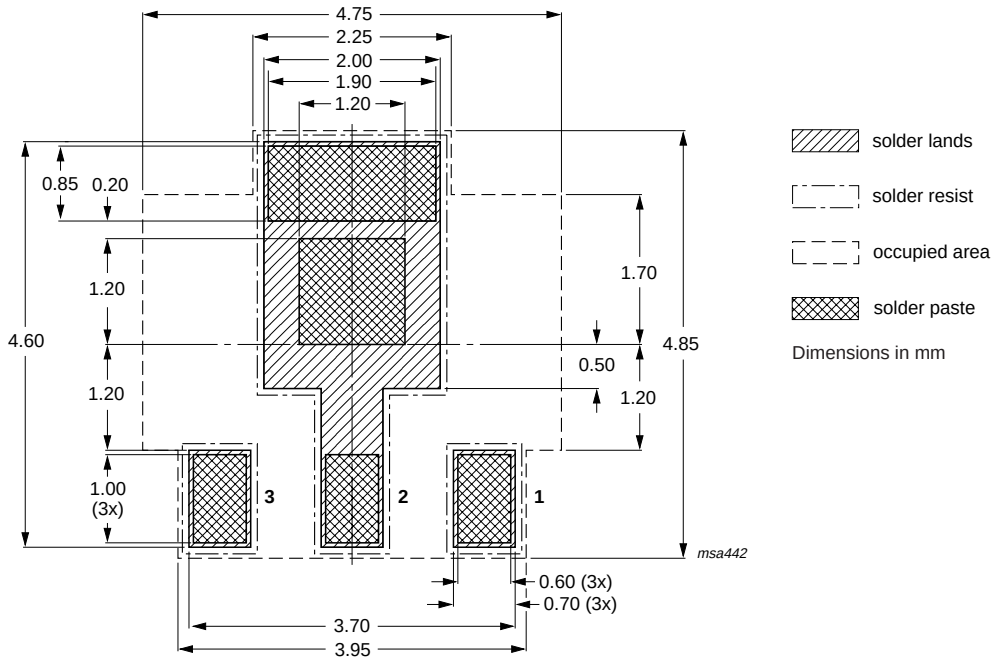


Fig 14. Package outline SOT89 (SC-62/TO-243)

9. Packing information

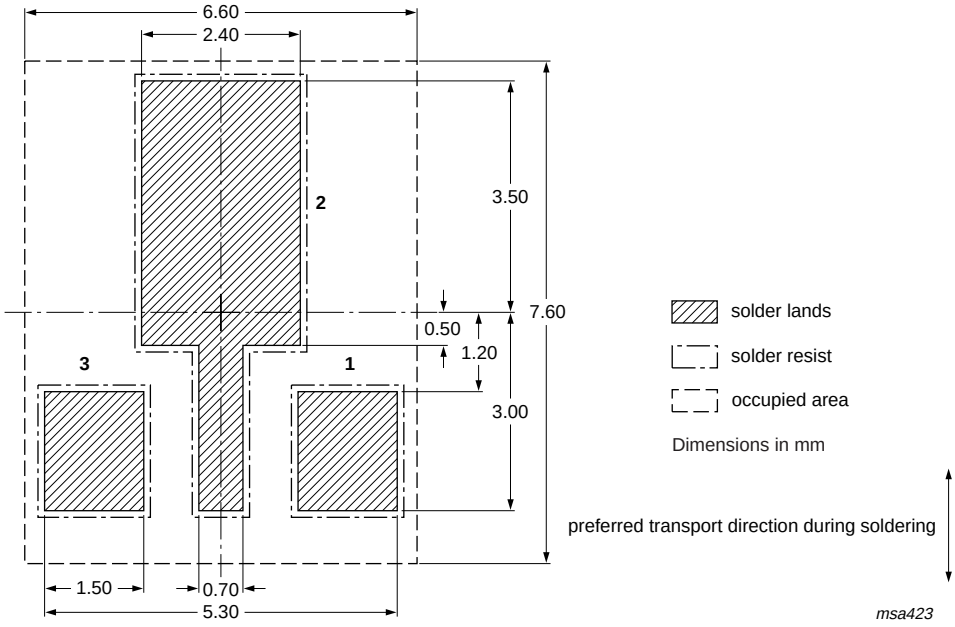
Please refer to packing information on www.nexperia.com.

10. Soldering



SOT89 standard mounting conditions for reflow soldering

Fig 15. Reflow soldering footprint SOT89 (SC-62/TO-243)



Not recommended for wave soldering

Fig 16. Wave soldering footprint SOT89 (SC-62/TO-243)

11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
2PD2150_2	20070102	Product data sheet	-	2PD2150_1
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Table 1 “Quick reference data”: I_C collector current added • Table 1 “Quick reference data”: I_{CM} peak collector current maximum value adapted • Table 1 “Quick reference data”: V_{CEsat} collector-emitter saturation voltage added • Table 5 “Limiting values”: V_{CEO} collector-emitter voltage maximum value adapted • Table 5 “Limiting values”: I_C collector current maximum value adapted • Table 5 “Limiting values”: I_{CM} peak collector current maximum value adapted • Table 5 “Limiting values”: P_{tot} total power dissipation for ceramic PCB condition added • Figure 1 “Power derating curves”: adapted • Table 6 “Thermal characteristics”: adapted • Table 6 “Thermal characteristics”: $R_{th(j-a)}$ thermal resistance from junction to ambient for ceramic PCB condition added • Figure 2: t_p pulse time redefined to pulse duration • Figure 3: added • Table 7 “Characteristics”: V_{CEsat} collector-emitter saturation voltage typical value added • Table 7 “Characteristics”: f_T transition frequency conditions slightly changed • Table 7 “Characteristics”: C_{ib} common-base input capacitance added • Table 7 “Characteristics”: C_{ob} common-base output capacitance added • Figure 4, 6, 10, 11, 12, 13 and 16: added • Figure 5, 7, 8 and 9: adapted • Section 12 “Legal information”: updated		
2PD2150_1	20050422	Product data sheet	-	-

12. Legal information

12.1 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.

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13. Contents

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