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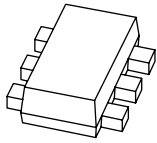Should be replaced with:
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PBSS5160V

60 V, 1 A PNP low V_{CEsat} (BISS) transistor

1. Product profile

1.1 General description

PNP low V_{CEsat} Breakthrough in Small Signals (BISS) transistor in a SOT666 plastic package.

NPN complement: PBSS4160V.

1.2 Features

- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High efficiency leading to less heat generation
- Reduces printed-circuit board area required
- Cost effective replacement for medium power transistors BCP52 and BCX52

1.3 Applications

- Major application segments
  - ◆ Automotive
  - ◆ Telecom infrastructure
  - ◆ Industrial
- Power management
  - ◆ DC-to-DC conversion
  - ◆ Supply line switching
- Peripheral driver
  - ◆ Driver in low supply voltage applications (e.g. lamps and LEDs)
  - ◆ Inductive load driver (e.g. relays, buzzers and motors)

1.4 Quick reference data

Table 1.   Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	−60	V
I_C	collector current (DC)	[1]	-	-	−1	A
I_{CM}	peak collector current		-	-	−2	A
R_{CEsat}	equivalent on-resistance	$I_C = -1$ A; $I_B = -100$ mA	-	220	330	mΩ

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

2. Pinning information

Table 2.   Pinning

Pin	Description	Simplified outline	Symbol
1, 2, 5, 6	collector		
3	base		
4	emitter		

sym030

3. Ordering information

Table 3.   Ordering information

Type number	Package		
	Name	**Description**	**Version**
PBSS5160V	-	plastic surface mounted package; 6 leads	SOT666

4. Marking

Table 4.   Marking codes

| Type number	Marking code
PBSS5160V	51

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		-	−80	V
V$_{CEO}$	collector-emitter voltage	open base		-	−60	V
V$_{EBO}$	emitter-base voltage	open collector		-	−5	V
I$_C$	collector current (DC)		[1]	-	−0.9	A
			[2]	-	−1	A
I$_{CM}$	peak collector current	t = 1 ms or limited by T$_{j(max)}$		-	−2	A
I$_B$	base current (DC)			-	−300	mA
I$_{BM}$	peak base current	t$_p$ ≤ 300 μs; δ ≤ 0.02		-	−1	A
P$_{tot}$	total power dissipation	T$_{amb}$ ≤ 25 °C	[1]	-	300	mW
			[2]	-	500	mW
T$_j$	junction temperature			-	150	°C
T$_{amb}$	ambient temperature			−65	+150	°C
T$_{stg}$	storage temperature			−65	+150	°C

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

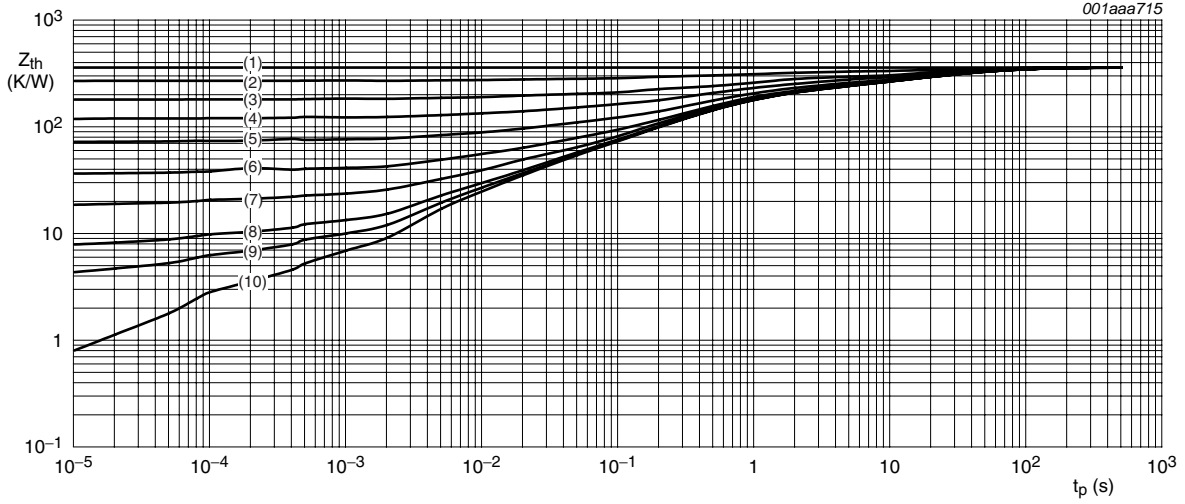[2] Device mounted on a FR4 PCB, single-sided copper, tin-plated, 1 cm^2 collector mounting pad.

(1) FR4 PCB; 1 cm^2 collector mounting pad

(2) FR4 PCB; standard footprint

Fig 1. Power derating curves
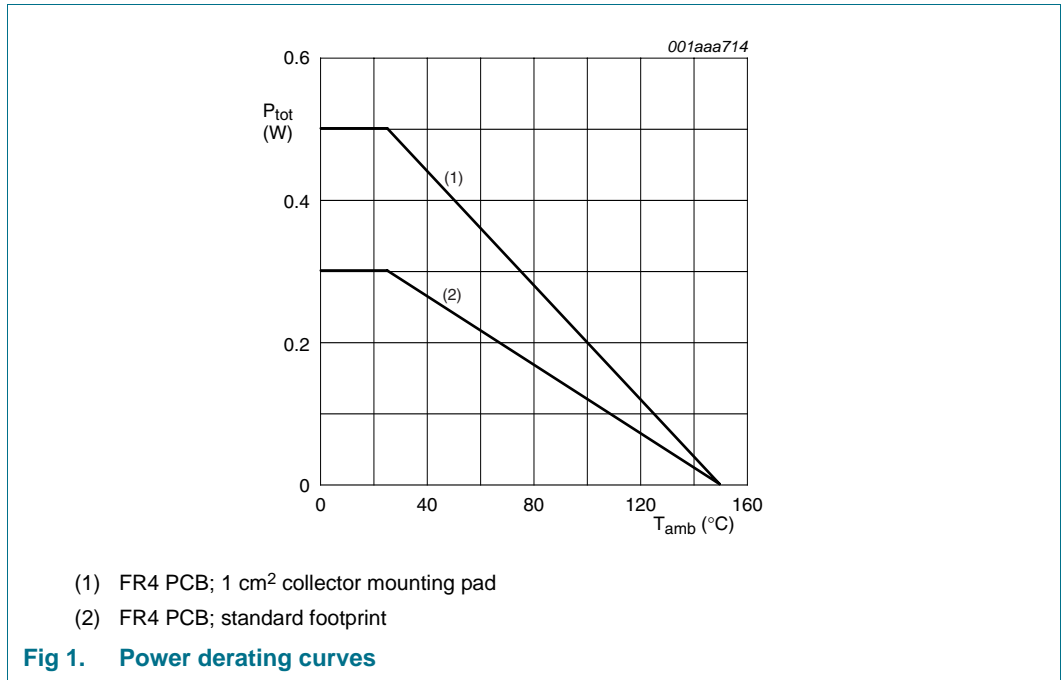
6. Thermal characteristics

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]	-	-	415	K/W
			[2]	-	-	250	K/W

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

[2] Device mounted on a FR4 PCB, single-sided copper, tin-plated, 1 cm^2 collector mounting pad.

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Mounted on FR4 PCB; standard footprint

(1)   δ = 1
(2)   δ = 0.75
(3)   δ = 0.5
(4)   δ = 0.33
(5)   δ = 0.2
(6)   δ = 0.1
(7)   δ = 0.05
(8)   δ = 0.02
(9)   δ = 0.01
(10) δ = 0

Fig 2.   Transient thermal impedance as a function of pulse time; 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	$V_{CB} = -60$ V; $I_E = 0$ A		-	-	−100	nA
		$V_{CB} = -60$ V; $I_E = 0$ A; $T_j = 150$ °C		-	-	−50	μA
I_{CES}	collector-emitter cut-off current	$V_{CE} = -60$ V; $V_{BE} = 0$ V		-	-	−100	nA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5$ V; $I_C = 0$ A		-	-	−100	nA
h_{FE}	DC current gain	$V_{CE} = -5$ V; $I_C = -1$ mA		200	350	-	
		$V_{CE} = -5$ V; $I_C = -500$ mA	[1]	150	250	-	
		$V_{CE} = -5$ V; $I_C = -1$ A	[1]	100	160	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -100$ mA; $I_B = -1$ mA		-	−110	−160	mV
		$I_C = -500$ mA; $I_B = -50$ mA		-	−120	−175	mV
		$I_C = -1$ A; $I_B = -100$ mA	[1]	-	−220	−330	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = -1$ A; $I_B = -50$ mA		-	−0.95	−1.1	V
R_{CEsat}	equivalent on-resistance	$I_C = -1$ A; $I_B = -100$ mA	[1]	-	220	330	mΩ
V_{BEon}	base-emitter turn-on voltage	$I_C = -1$ A; $V_{CE} = -5$ V		-	−0.82	−0.9	V
t_d	delay time	$V_{CC} = -10$ V; $I_C = -0.5$ A; $I_{Bon} = -0.025$ A; $I_{Boff} = 0.025$ A		-	11	-	ns
t_r	rise time			-	30	-	ns
t_{on}	turn-on time			-	41	-	ns
t_s	storage time			-	205	-	ns
t_f	fall time			-	55	-	ns
t_{off}	turn-off time			-	260	-	ns
f_T	transition frequency	$I_C = -50$ mA; $V_{CE} = -10$ V; $f = 100$ MHz		150	220	-	MHz
C_c	collector capacitance	$I_E = i_e = 0$ A; $V_{CB} = -10$ V; $f = 1$ MHz		-	9	15	pF

[1] Pulse test: $t_p \le 300$ μs; $\delta \le 0.02$.
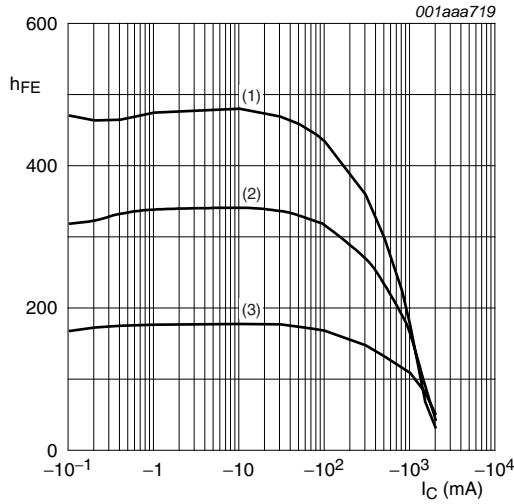
$V_{CE} = -5$ V

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

Fig 3. **DC current gain as a function of collector current; typical values**
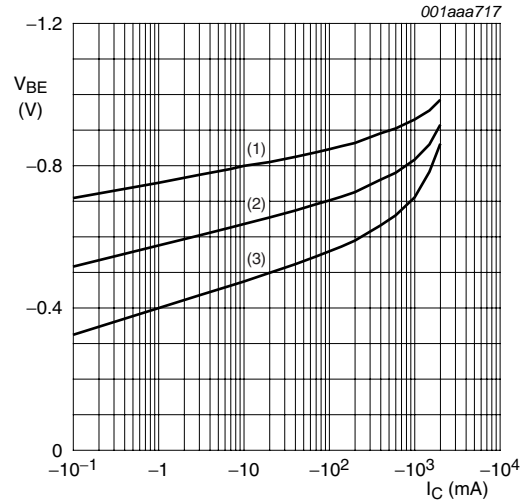
$V_{CE} = -5$ V

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

Fig 4. **Base-emitter voltage as a function of collector current; typical values**
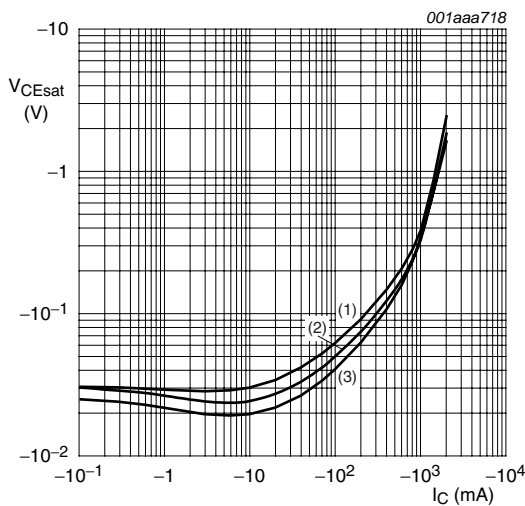
$I_C/I_B = 20$

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

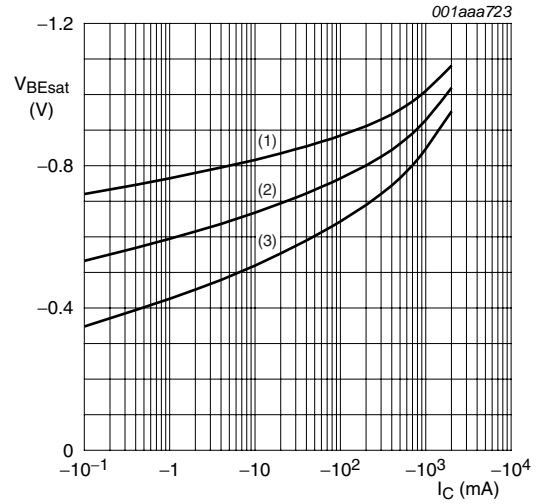**Fig 5.** **Collector-emitter saturation voltage as a function of collector current; typical values**
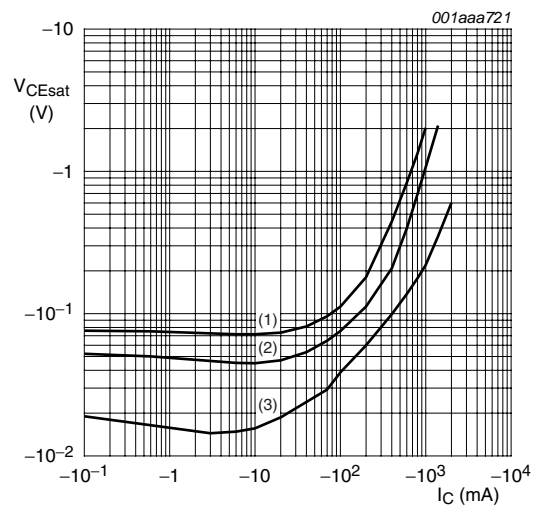
$T_{amb} = 25$ °C

(1) $I_C/I_B = 100$
(2) $I_C/I_B = 50$
(3) $I_C/I_B = 10$

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

Fig 7. Base-emitter saturation voltage as a function of collector current; typical values
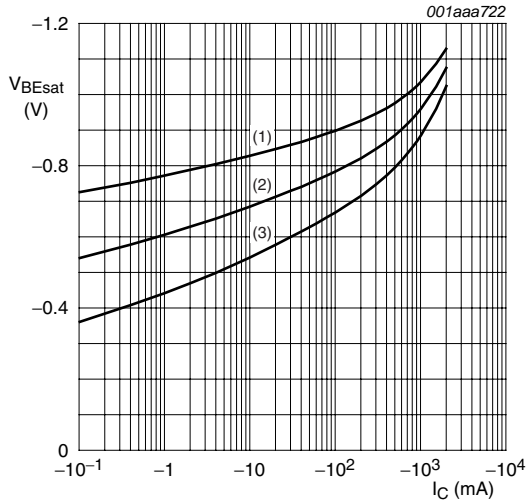
I$_C$/I$_B$ = 10

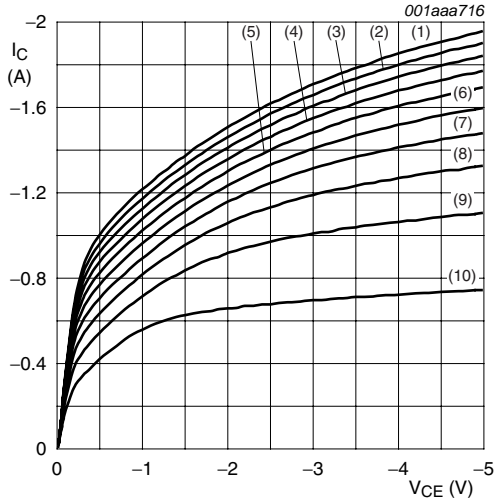(1) T$_{amb}$ = −55 °C

(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$_B$ = 20

(1) T$_{amb}$ = −55 °C

(2) T$_{amb}$ = 25 °C

(3) T$_{amb}$ = 100 °C

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$T_{amb} = 25\ °C$

(1) $I_B = -40\ mA$

(2) $I_B = -36\ mA$

(3) $I_B = -32\ mA$

(4) $I_B = -28\ mA$

(5) $I_B = -24\ mA$

(6) $I_B = -20\ mA$

(7) $I_B = -16\ mA$

(8) $I_B = -12\ mA$

(9) $I_B = -8\ mA$

(10) $I_B = -4\ mA$

Fig 9. **Collector current as a function of collector-emitter voltage; typical values**
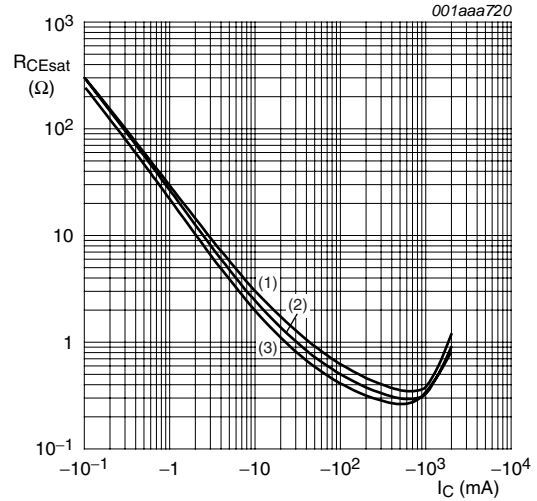
$I_C/I_B = 20$

(1) $T_{amb} = 100\ °C$
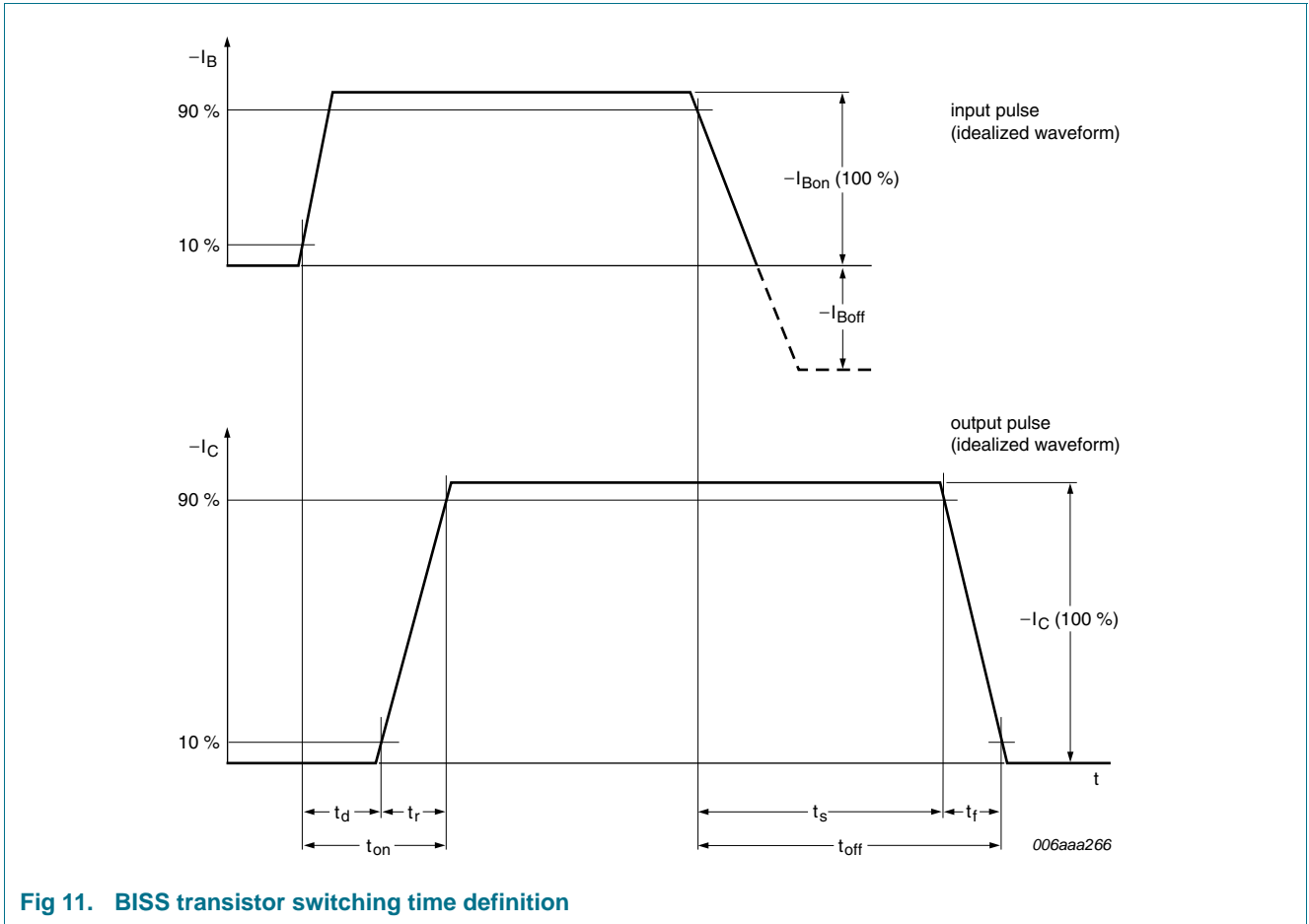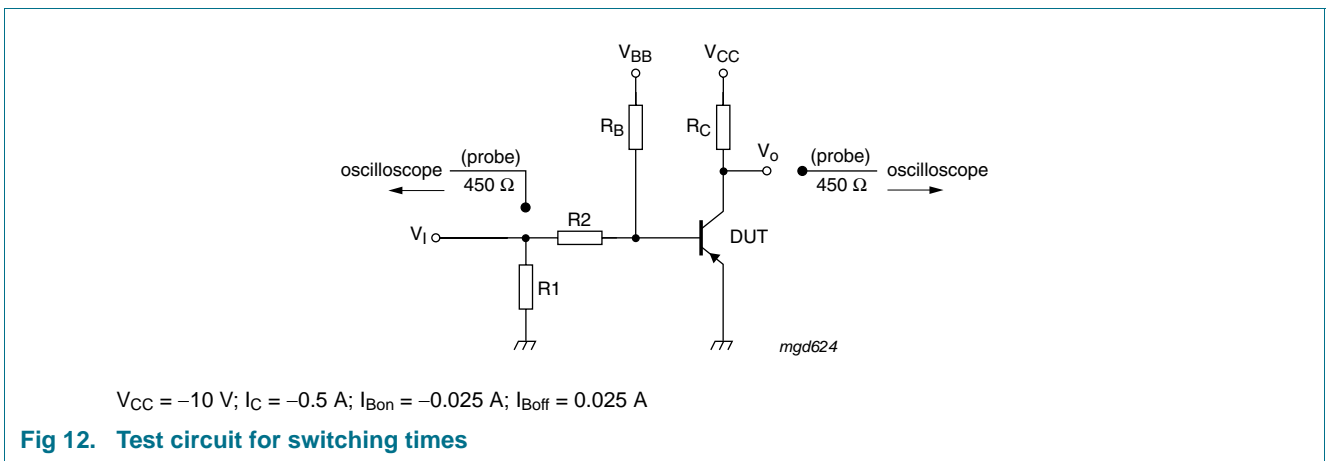
(2) $T_{amb} = 25\ °C$

(3) $T_{amb} = -55\ °C$

Fig 10. **Equivalent on-resistance as a function of collector current; typical values**

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Fig 11.   BISS transistor switching time definition

V$_{CC}$ = −10 V; I$_C$ = −0.5 A; I$_{Bon}$ = −0.025 A; I$_{Boff}$ = 0.025 A

Fig 12.   Test circuit for switching times

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8. Package outline

Plastic surface-mounted package; 6 leads　　　　　　　　　　　　　　**SOT666**

DIMENSIONS (mm are the original dimensions)

UNIT	A	b$_p$	c	D	E	e	e$_1$	H$_E$	L$_p$	w	y
mm	0.6 0.5	0.27 0.17	0.18 0.08	1.7 1.5	1.3 1.1	1.0	0.5	1.7 1.5	0.3 0.1	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT666						~~04-11-08~~ 06-03-16

Fig 13. Package outline SOT666

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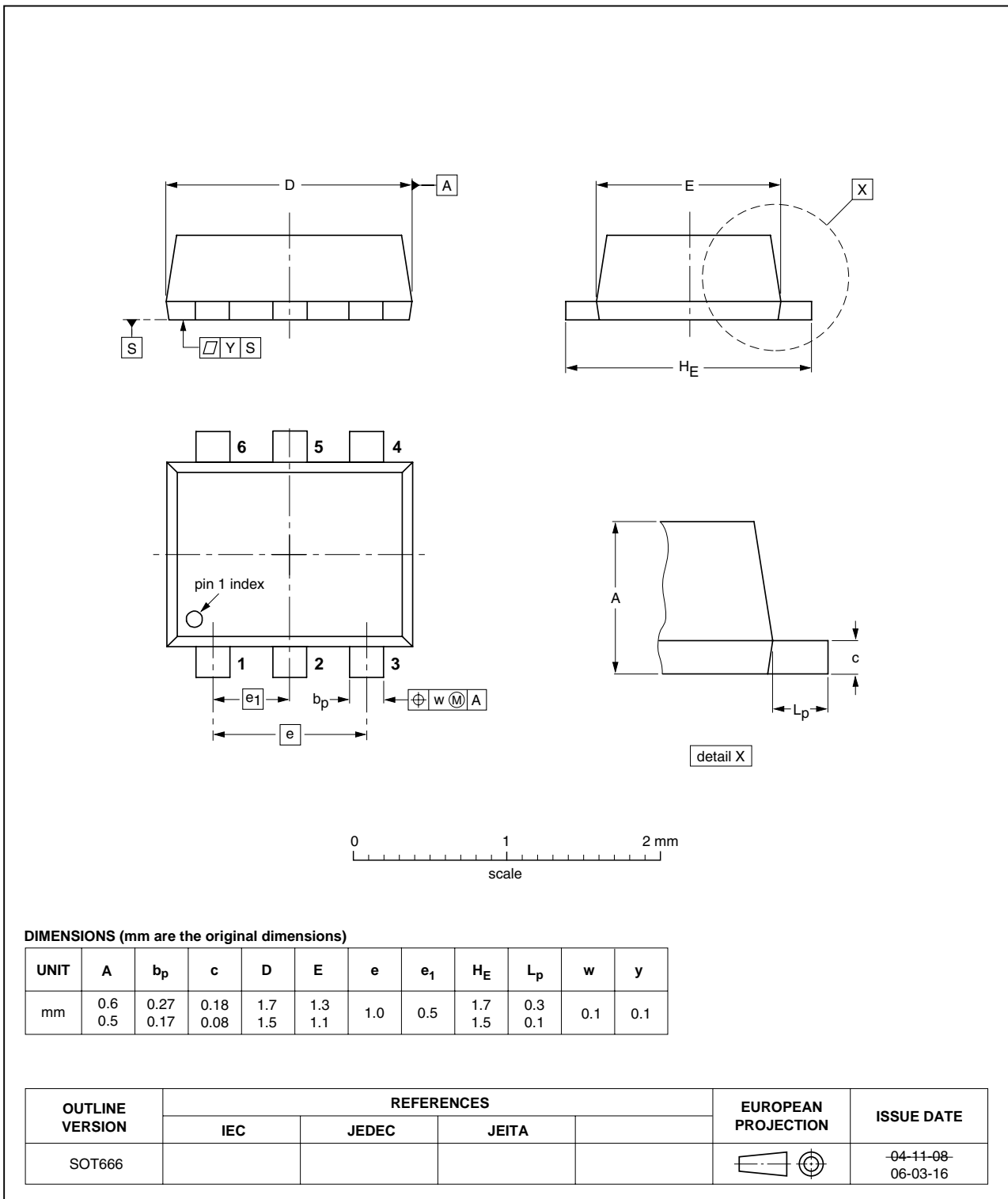
9. Packing information

Table 8.   Packing methods
The indicated -xxx are the last three digits of the 12NC ordering code.[1]

Type number	Package	Description	Packing quantity
			3000
PBSS5160V	SOT666	4 mm pitch, 8 mm tape and reel	-115

[1]   For further information and the availability of packing methods, see Section 12.

10. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS5160V_3	20091214	Product data sheet	-	PBSS5160V_2
Modifications:	• This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content.			
	• Figure 13 "Package outline SOT666": updated			
PBSS5160V_2	20050404	Product data sheet	-	PBSS5160V_1
PBSS5160V_1	20040420	Objective data sheet	-	-

11. Legal information

11.1 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".

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