600 V, 0.1 A PNP high-voltage low VCEsat (BISS) transistor

18 August 2014 Product data sheet

1. General description

PNP high-voltage low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a medium power SOT223 (SC-73) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- High voltage
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C
- High collector current gain h_{FE} at high I_C
- AEC-Q101 qualified

3. Applications

- Electronic ballast for fluorescent lighting
- LED driver for LED chain module
- LCD backlighting
- HID front lighting
- Automotive motor management
- Hook switch for wired telecom
- Switch Mode Power Supply (SMPS)

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V _{CEO}	collector-emitter voltage	open base	-	-	-600	V
I _C	collector current		-	-	-0.1	Α
h _{FE}	DC current gain	V_{CE} = -10 V; I_{C} = -10 mA; T_{amb} = 25 °C	70	130	-	



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5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	В	base	4	2, 4
2	С	collector		1—
3	Е	emitter		. M
4	С	collector	⊟1 ⊟2 ⊟3 SC-73 (SOT223)	3 sym028

6. Ordering information

Table 3. Ordering information

Type number	Package					
	Name	Description	Version			
PBHV3160Z	SC-73	plastic surface-mounted package with increased heatsink; 4 leads	SOT223			

7. Marking

Table 4. Marking codes

Type number	Marking code
PBHV3160Z	HV316Z

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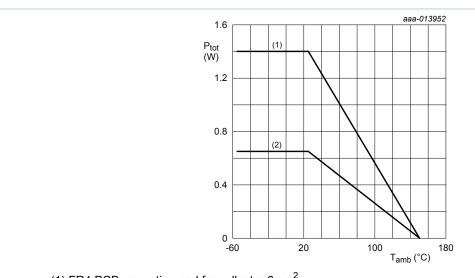
8. Limiting values

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		-	-600	V
V _{CEO}	collector-emitter voltage	open base		-	-600	V
V _{CESM}	collector-emitter peak voltage	V _{BE} = 0 V		-	-600	V
V _{EBO}	emitter-base voltage	open collector		-	-6	V
I _C	collector current			-	-0.1	Α
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]	-	0.65	W
			<u>[2]</u>	-	1.4	W
Tj	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 6 cm².



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

Fig. 1. Power derating curves

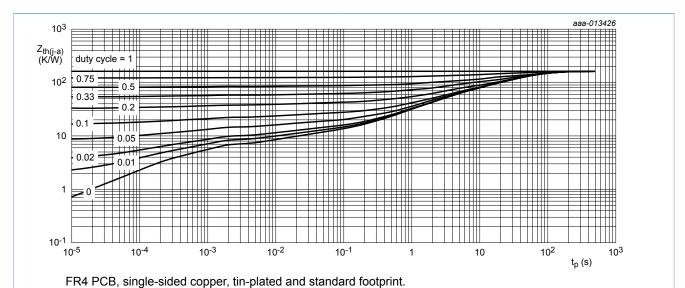
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Thermal characteristics

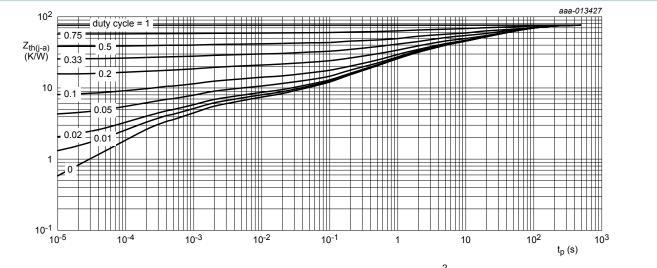
Table 6. **Thermal characteristics**

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
R _{th(j-a)}	thermal resistance from junction to ambient	in free air	[1]	-	-	190	K/W
			[2]	-	-	89	K/W
R _{th(j-sp)}	thermal resistance from junction to solder point			-	-	20	K/W

- Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 6 cm².



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



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

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

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10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
I _{CBO}	collector-base cut-off	V_{CB} = -400 V; I_E = 0 A; T_{amb} = 25 °C	-	-	-100	nA
	current	V_{CB} = -400 V; I_{E} = 0 A; T_{j} = 150 °C	-	-	-10	μA
I _{CES}	collector-emitter cut-off current	$V_{CE} = -400 \text{ V}; V_{BE} = 0 \text{ V}; T_{amb} = 25 \text{ °C}$	-	-	-100	nA
I _{EBO}	emitter-base cut-off current	$V_{EB} = -5 \text{ V}; I_{C} = 0 \text{ A}; T_{amb} = 25 \text{ °C}$	-	-	-100	nA
h _{FE}	DC current gain	V_{CE} = -10 V; I_{C} = -10 mA; T_{amb} = 25 °C	70	130	-	
V _{CEsat}	collector-emitter saturation voltage	I_C = -30 mA; I_B = -6 mA; T_{amb} = 25 °C	-	-150	-250	mV
V _{BEsat}	base-emitter saturation voltage	I_C = -50 mA; I_B = -5 mA; pulsed; $t_p \le 300 \ \mu s; \ \delta \le 0.02; \ T_{amb} = 25 \ ^{\circ}C$	-	-	-950	mV
f _T	transition frequency	V_{CE} = -10 V; I_{C} = -5 mA; f = 100 MHz	-	38	-	MHz
C _c	collector capacitance	V_{CB} = -20 V; I_{E} = 0 A; i_{e} = 0 A; f = 1 MHz; T_{amb} = 25 °C	-	6	-	pF
C _e	emitter capacitance	V_{EB} = -0.5 V; I_{C} = 0 A; i_{c} = 0 A; f_{c} = 1 MHz; f_{amb} = 25 °C	-	76	-	pF

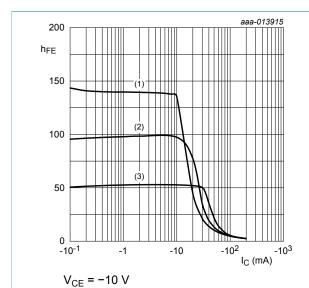
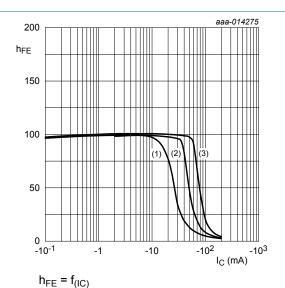


Fig. 4. DC current gain as a function of collector current; typical values

(1) $T_{amb} = 100 \, ^{\circ}C$

(2) T_{amb} = 25 °C

(3) $T_{amb} = -55 \, ^{\circ}C$



 $T_{amb} = 25 \,^{\circ}\text{C}$ $(1) \, V_{CE} = -10 \,^{\circ}\text{V}$ $(2) \, V_{CE} = -25 \,^{\circ}\text{V}$ $(3) \, V_{CE} = -50 \,^{\circ}\text{V}$

Fig. 5. DC current gain as a function of collector current; typical values

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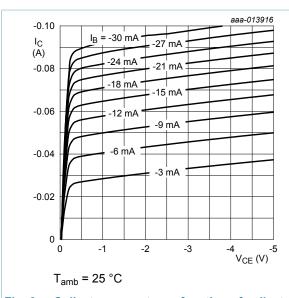
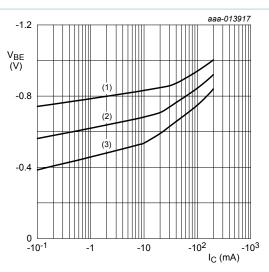


Fig. 6. Collector current as a function of collectoremitter voltage; typical values



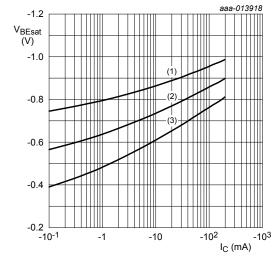
$$V_{CE} = -10 \text{ V}$$

(1)
$$T_{amb} = -55 \, ^{\circ}C$$

(2)
$$T_{amb} = 25 \, ^{\circ}C$$

(3)
$$T_{amb}$$
 = 100 °C

Fig. 7. Base-emitter voltage as a function of collector current; typical values



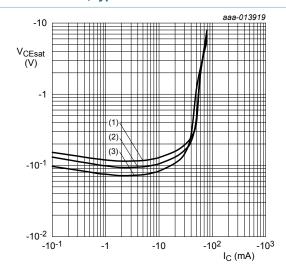
$$I_C/I_B = 5$$

(1)
$$T_{amb} = -55 \, ^{\circ}C$$

(2)
$$T_{amb}$$
 = 25 °C

(3)
$$T_{amb} = 100 \, ^{\circ}C$$

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



$$I_C/I_B = 5$$

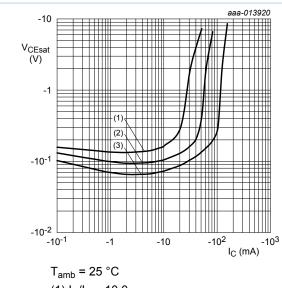
(1)
$$T_{amb} = 100 \, ^{\circ}C$$

(2)
$$T_{amb}$$
 = 25 °C

(3)
$$T_{amb} = -55 \, ^{\circ}C$$

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

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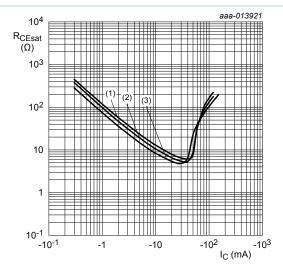


(1)
$$I_C/I_B = 10.0$$

(2)
$$I_C/I_B = 5.0$$

(3)
$$I_C/I_B = 2.5$$

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



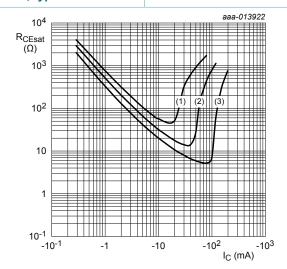
$$I_C/I_B = 5$$

(1)
$$T_{amb} = 100 \, ^{\circ}C$$

$$(2) T_{amb} = 25 °C$$

(3)
$$T_{amb} = -55 \, ^{\circ}C$$

Fig. 11. Collector-emitter saturation resistance as a function of collector current; typical values



$$T_{amb} = 25 \, ^{\circ}C$$

(1)
$$I_C/I_B = 10.0$$

(2)
$$I_C/I_B = 5.0$$

(3)
$$I_C/I_B = 2.5$$

Fig. 12. Collector-emitter saturation resistance as a function of collector current; typical values

11. Test information

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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.

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12. Package outline

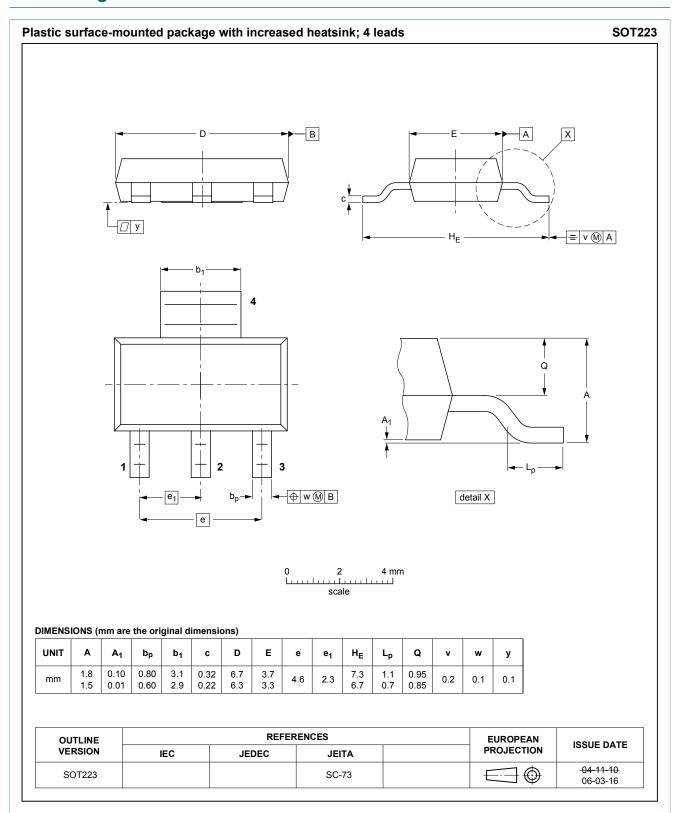


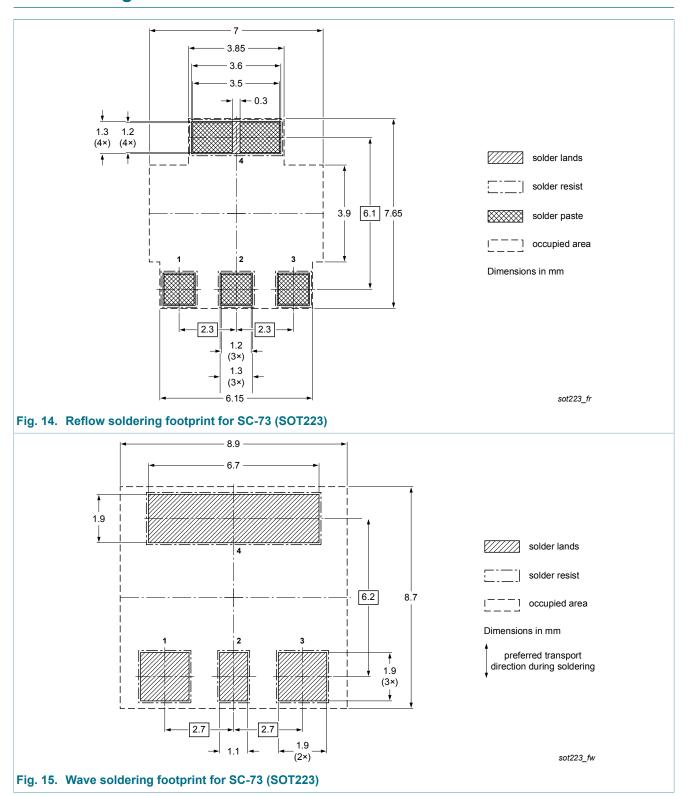
Fig. 13. Package outline SC-73 (SOT223)

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13. Soldering



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14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV3160Z v.1	20140818	Product data sheet	-	-

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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