

## High voltage fast-switching PNP power transistor

Datasheet — production data

#### **Features**

- High voltage capability
- Fast switching speed

### **Applications**

- Lighting
- Switch mode power supply

### **Description**

This device is a high voltage fast-switching PNP power transistor. It is manufactured using high voltage multi epitaxial planar technology for high switching speeds and medium voltage capability. It uses a cellular emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA. The device is designed for use in lighting applications and low cost switch-mode power supplies.

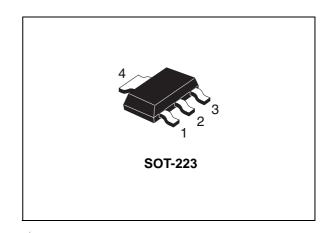


Figure 1. Internal schematic diagram

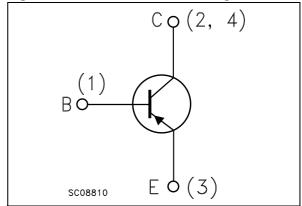


Table 1. Device summary

Part number	Marking	Package	Packaging
STN9360	N9360	SOT-223	Tape and reel

Electrical ratings STN9360

# 1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-emitter voltage (V <sub>BE</sub> = 0)	-600	V
V <sub>CEO</sub>	Collector-emitter voltage (I <sub>B</sub> = 0)	-600	V
V <sub>EBO</sub>	Emitter-base voltage ( $I_C = 0$ )	-7	V
I <sub>C</sub>	Collector current	-0.5	Α
I <sub>CM</sub>	Collector peak current (t <sub>P</sub> < 5 ms)	-1	Α
I <sub>B</sub>	Base current	-0.25	Α
I <sub>BM</sub>	Base peak current (t <sub>P</sub> < 5 ms)	-0.5	Α
P <sub>TOT</sub>	Total dissipation at T <sub>a</sub> = 25 °C	1.6	W
T <sub>STG</sub>	Storage temperature	-65 to 150	°C
TJ	Max. operating junction temperature	150	°C

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R <sub>thJA</sub>	Thermal resistance junction-ambient (1) max	78	°C/W

<sup>1.</sup> Device mounted on PCB area of 1 cm<sup>2</sup>.

## 2 Electrical characteristics

 $T_{case}$  = 25 °C unless otherwise specified.

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
I <sub>CES</sub>	Collector cut-off current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = -600 V			-10	μΑ
I <sub>EBO</sub>	Emitter cut-off current (I <sub>C</sub> = 0)	V <sub>EB</sub> = -7 V			-1	μΑ
V <sub>CE(sus)</sub> (1)	Collector-emitter sustaining voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = -10 mA	-600			V
V <sub>CE(sat)</sub> (1)	Collector-emitter saturation voltage	$I_C = -100 \text{ mA}$ $I_B = -10 \text{ mA}$			-0.5	٧
V <sub>BE(sat)</sub> (1)	Base-emitter saturation voltage	$I_C = -100 \text{ mA}$ $I_B = -10 \text{ mA}$			-1	٧
h <sub>FE</sub>	DC current gain	$\begin{split} I_{C} = -1 \text{ mA} & V_{CE} = -5 \text{ V} \\ I_{C} = -10 \text{ mA} & V_{CE} = -5 \text{ V} \\ I_{C} = -20 \text{ mA} & V_{CE} = -5 \text{ V} \end{split}$	170 120	200		
	Resistive load					
t <sub>r</sub>	Rise time	V <sub>CC</sub> =-200 V, I <sub>C</sub> =-0.1 A		45		ns
t <sub>s</sub>	Storage time	I <sub>B1</sub> =-10 mA, I <sub>B2</sub> =20 mA		3.15		μs
t <sub>f</sub>	Fall time	T <sub>p</sub> =30 <i>μ</i> s		160		ns

<sup>1.</sup> Pulse test: pulse duration  $\leq$  300  $\mu$ s, duty cycle  $\leq$  2 %.

**Electrical characteristics** STN9360

#### **Electrical characteristics (curves)** 2.1

Figure 2. Safe operating area

Figure 3. **Derating curve** 

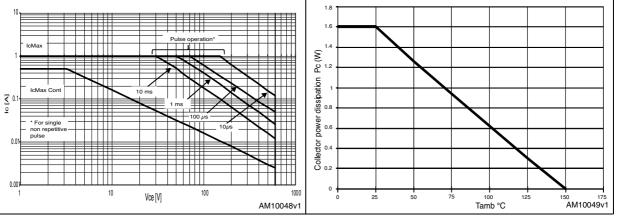
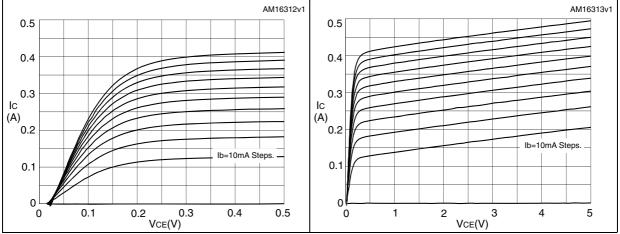


Figure 4. Output curves up to  $V_{CE}$ = 0.5 V

Figure 5. Output curves up to V<sub>CE</sub>= 5 V



DC current gain  $(V_{CE} = 1 V)$ Figure 6.

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Figure 7. DC current gain  $(V_{CE} = 5 V)$ 

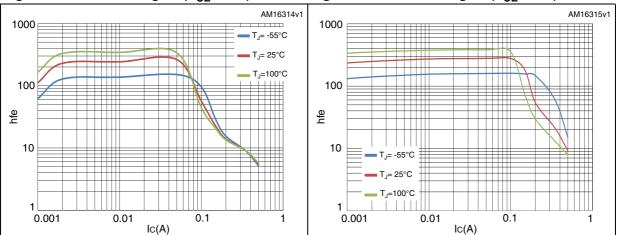


Figure 8. Collector-emitter saturation voltage Figure 9. Base-emitter saturation voltage

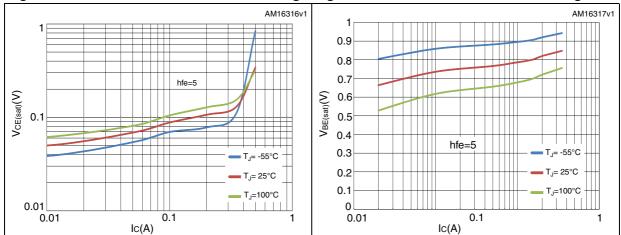


Figure 10. Base-emitter on voltage

Figure 11. Capacitance variation

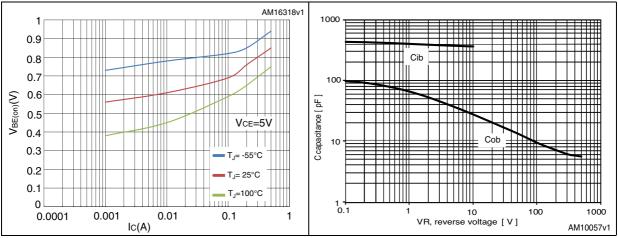
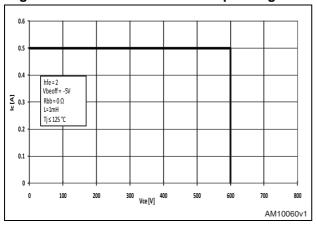


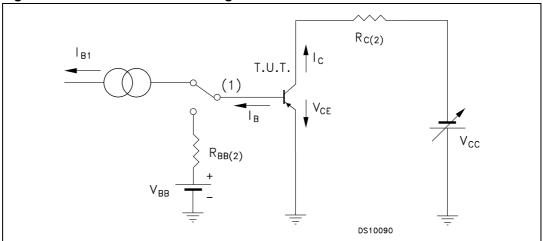
Figure 12. Reverse biased safe operating area



Electrical characteristics STN9360

### 2.2 Test circuits

Figure 13. Resistive load switching test circuit



- 1. Fast electronic switching
- 2. Non-inductive resistor

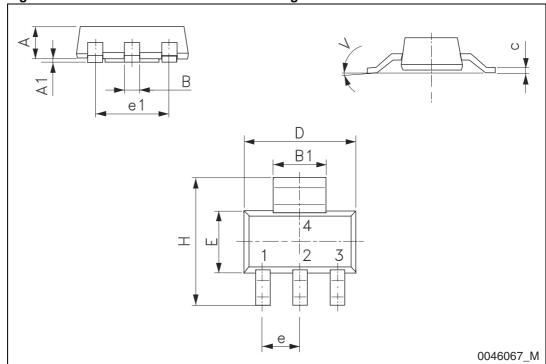
## 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: <a href="https://www.st.com">www.st.com</a>. ECOPACK<sup>®</sup> is an ST trademark.

Table 5. SOT-223 mechanical data

Dim.		mm	
Diiii.	Min.	Тур.	Max.
А			1.80
A1	0.02		0.1
В	0.60	0.70	0.85
B1	2.90	3.00	3.15
С	0.24	0.26	0.35
D	6.30	6.50	6.70
е		2.30	
e1		4.60	
E	3.30	3.50	3.70
Н	6.70	7.00	7.30
V			10°

Figure 14. SOT-223 mechanical data drawing



STN9360 Revision history

# 4 Revision history

Table 6. Document revision history

Date	Revision	Changes	
21-May-2012	1	Initial release.	
06-Dec-2012	2	Document status promoted from preliminary data to datasheet.	

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