THE DATASHEET OF

PMST3904,115

PMST3904

NPN switching transistor

30 September 2025 Product data sheet

1. General description

NPN switching transistor in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

PNP complement: PMST3906

2. Features and benefits

- Collector current capability I_C = 200 mA
- Collector-emitter voltage V_{CEO} =40 V
- AEC-Q101 qualified

3. Applications

- General amplification and switching

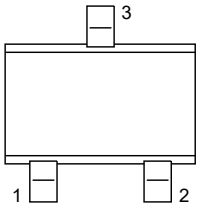
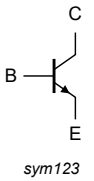
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base		-	-	40	V
I_C	collector current			-	-	200	mA
h_{FE}	DC current gain	V_{CE} = 1 V; I_C = 10 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		100	-	300	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base		
2	E	emitter		
3	C	collector		

SC-70 (SOT323)

sym123

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMST3904	SC-70	plastic, surface-mounted package; 3 leads; 1.3 mm pitch; 2 mm x 1.25 mm x 0.95 mm body	SOT323

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
PMST3904	%1A

[1] % = placeholder for manufacturing site code

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		-	60	V
V_{CEO}	collector-emitter voltage	open base		-	40	V
V_{EBO}	emitter-base voltage	open collector		-	6	V
I_C	collector current			-	200	mA
I_{CM}	peak collector current			-	200	mA
I_{BM}	peak base current			-	100	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	200	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 an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

9. Thermal characteristics

Table 6. Thermal characteristics

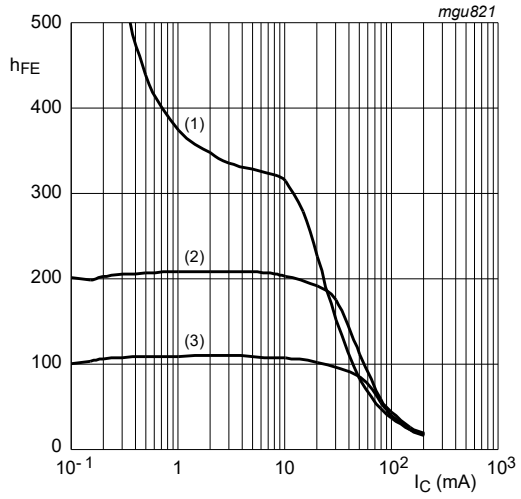
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	625	K/W

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

10. Characteristics

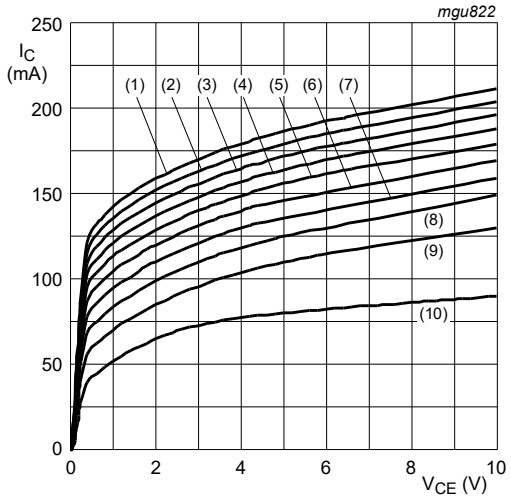
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 30 V; I_E = 0 A; T_{amb} = 25 °C		-	-	50	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = 6 V; I_C = 0 A; T_{amb} = 25 °C		-	-	50	nA
h_{FE}	DC current gain	V_{CE} = 1 V; I_C = 0.1 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		60	-	-	
		V_{CE} = 1 V; I_C = 1 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		80	-	-	
		V_{CE} = 1 V; I_C = 10 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		100	-	300	
		V_{CE} = 1 V; I_C = 50 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		60	-	-	
		V_{CE} = 1 V; I_C = 100 mA; pulsed; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_{amb} = 25 °C		30	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 1 mA; T_{amb} = 25 °C		-	-	200	mV
		I_C = 50 mA; I_B = 5 mA; T_{amb} = 25 °C		-	-	300	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 10 mA; I_B = 1 mA; T_{amb} = 25 °C		650	-	850	mV
		I_C = 50 mA; I_B = 5 mA; T_{amb} = 25 °C		-	-	950	mV
C_c	collector capacitance	V_{CB} = 5 V; I_E = 0 A; i_e = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	4	pF
C_e	emitter capacitance	V_{EB} = 0.5 V; I_C = 0 A; i_c = 0 A; f = 1 MHz; T_{amb} = 25 °C		-	-	8	pF
f_T	transition frequency	V_{CE} = 10 V; I_C = 20 mA; f = 100 MHz; T_{amb} = 25 °C		300	-	-	MHz
NF	noise figure	V_{CE} = 5 V; I_C = 100 µA; R_S = 1 kΩ; f = 10 Hz to 15.7 kHz; T_{amb} = 25 °C		-	-	5	dB
Switching times (between 10% and 90% levels)							
t_d	delay time	I_C = 10 mA; I_{Bon} = 1 mA; I_{Boff} = -1 mA; T_{amb} = 25 °C		-	-	35	ns
t_r	rise time			-	-	35	ns
t_s	storage time			-	-	200	ns
t_f	fall time			-	-	50	ns



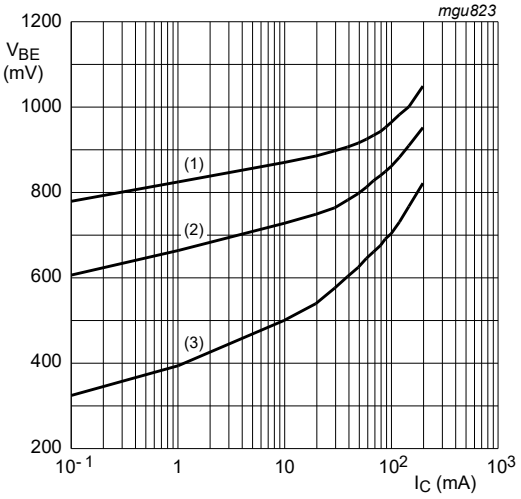
V_{CE} = 1 V
(1) T_{amb} = 150 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = −55 °C

Fig. 1. DC current gain as a function of collector current; typical values



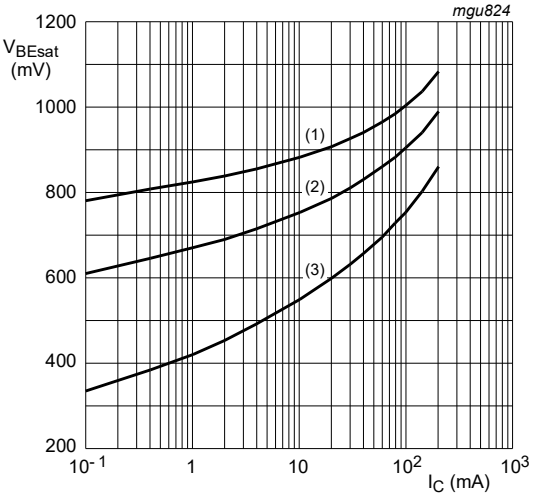
T_{amb} = 25 °C
(1) I_B = 5.0 mA
(2) I_B = 4.5 mA
(3) I_B = 4.0 mA
(4) I_B = 3.5 mA
(5) I_B = 3.0 mA
(6) I_B = 2.5 mA
(7) I_B = 2.0 mA
(8) I_B = 1.5 mA
(9) I_B = 1.0 mA
(10) I_B = 0.5 mA

Fig. 2. Collector current as a function of collector-emitter voltage; typical values



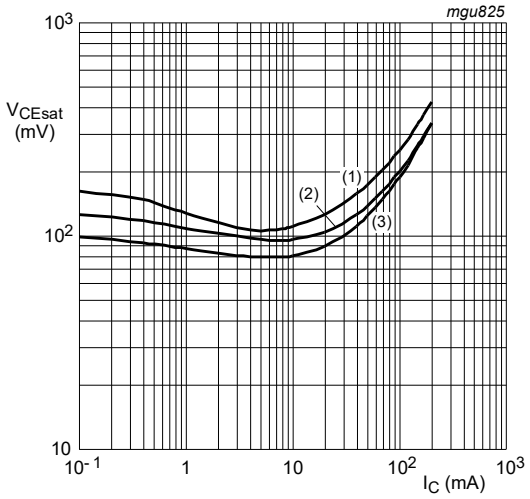
V_{CE} = 1 V
(1) T_{amb} = −55 °C
(2) T_{amb} = 25 °C
(3) T_{amb} = 150 °C

Fig. 3. Base-emitter 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} = 150 °C

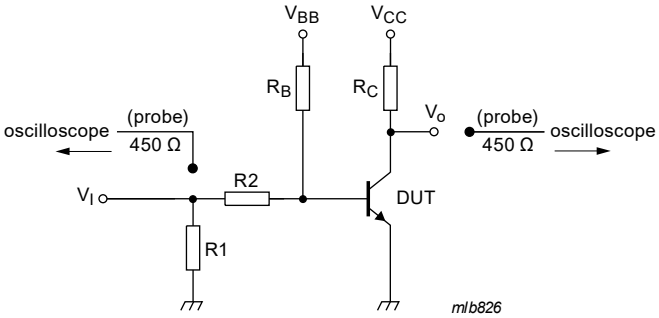
Fig. 4. Base-emitter saturation voltage as a function of collector current; typical values



I_C/I_B = 10
(1) T_{amb} = 150 °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

11. Test information



V_I = 5 V; t = 600 µs; t_p = 10 µs; t_r = t_f ≤ 3ns
R1 = 56 Ω; R2 = 2.5 kΩ; R_B = 3.9 kΩ; R_C = 270 Ω
V_{BB} = -1.9 V; V_{CC} = 3 V
Oscilloscope: input impedance Z_i = 50 Ω

Fig. 6. Test circuit for switching times

12. Package outline

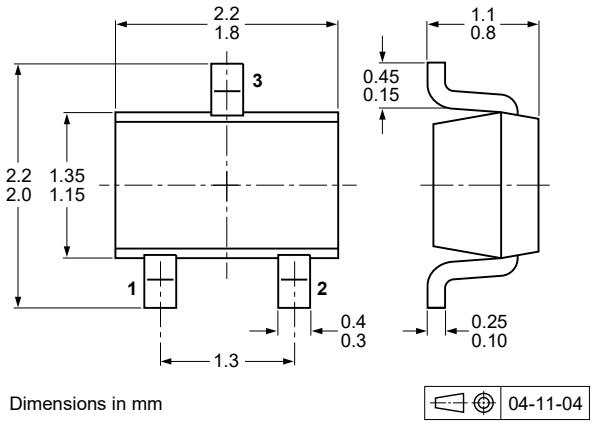


Fig. 7. Package outline SC-70 (SOT323)

13. Soldering

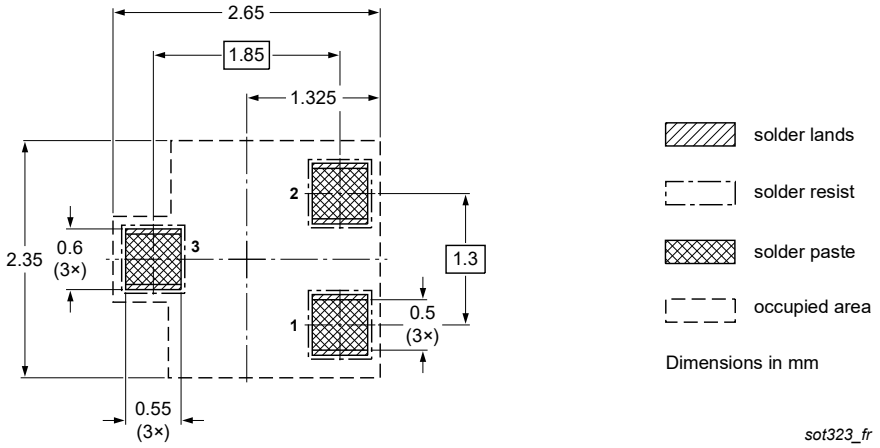


Fig. 8. Reflow soldering footprint for SC-70 (SOT323)

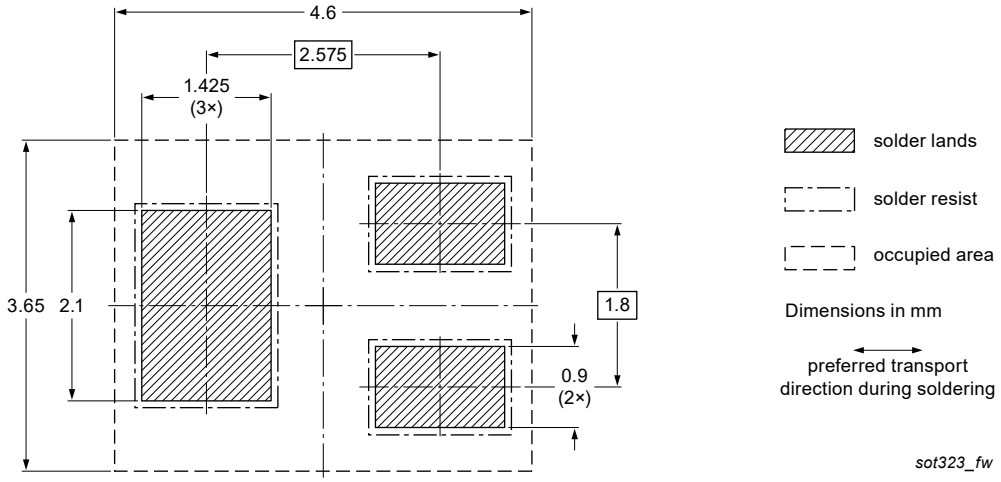


Fig. 9. Wave soldering footprint for SC-70 (SOT323)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMST3904 v.4	20250930	Product data sheet	-	PMST3904 v.3
Modifications:	• Product(s) changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).			
PMST3904 v.3	20240228	Product data sheet	-	PMST3904 v.2
PMST3904 v.2	20040421	Product data sheet	-	PMST3904 v.1
PMST3904 v.1	19990422	Product data sheet	-	-

15. 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".
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Date of release: 30 September 2025

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