



PMST4401-Q

NPN switching transistor

17 January 2024

Product data sheet

1. General description

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

2. Features and benefits

- High current (max. 600 mA)
- Low voltage (max. 40 V)
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- General purpose switching and linear amplification, especially in portable equipment

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CE0}	collector-emitter voltage	open base	-	-	40	V
I_C	collector current		-	-	600	mA
h_{FE}	DC current gain	$V_{CE} = 1 \text{ V}; I_C = 10 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	80	-	-	

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	<p>SC-70 (SOT323)</p>	<p>sym123</p>
2	E	emitter		
3	C	collector		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMST4401-Q	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]
PMST4401-Q	%2X

[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		-	600	mA
I_{CM}	peak collector current		-	600	mA
I_{BM}	peak base current		-	200	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[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	$V_{CB} = 60 \text{ V}; I_E = 0 \text{ A}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	50	nA
		$V_{CB} = 60 \text{ V}; I_E = 0 \text{ A}; T_j = 150 \text{ }^\circ\text{C}$	-	-	10	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = 6 \text{ V}; I_C = 0 \text{ A}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	50	nA
h_{FE}	DC current gain	$V_{CE} = 1 \text{ V}; I_C = 0.1 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	20	-	-	
		$V_{CE} = 1 \text{ V}; I_C = 1 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	40	-	-	
		$V_{CE} = 1 \text{ V}; I_C = 10 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	80	-	-	
		$V_{CE} = 1 \text{ V}; I_C = 150 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	100	-	300	
		$V_{CE} = 2 \text{ V}; I_C = 500 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	40	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 150 \text{ mA}; I_B = 15 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	400	mV
		$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	750	mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 150 \text{ mA}; I_B = 15 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	950	mV
		$I_C = 500 \text{ mA}; I_B = 50 \text{ mA}; \text{pulsed}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	1.2	V
C_c	collector capacitance	$V_{CB} = 5 \text{ V}; I_E = 0 \text{ A}; i_e = 0 \text{ A}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	8	pF
C_e	emitter capacitance	$V_{EB} = 0.5 \text{ V}; I_C = 0 \text{ A}; i_c = 0 \text{ A}; f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	30	pF
f_T	transition frequency	$V_{CE} = 10 \text{ V}; I_C = 20 \text{ mA}; f = 100 \text{ MHz}; T_{amb} = 25 \text{ }^\circ\text{C}$	250	-	-	MHz
Switching times (between 10% and 90% levels)						
t_d	delay time	$I_C = 150 \text{ mA}; I_{Bon} = 15 \text{ mA}; I_{Boff} = -15 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	15	ns
t_r	rise time		-	-	20	ns
t_{on}	turn-on time	$I_C = 150 \text{ mA}; I_{Bon} = 15 \text{ A}; I_{Boff} = -15 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	35	ns
t_s	storage time	$I_C = 150 \text{ mA}; I_{Bon} = 15 \text{ mA}; I_{Boff} = -15 \text{ mA}; T_{amb} = 25 \text{ }^\circ\text{C}$	-	-	200	ns
t_f	fall time		-	-	60	ns
t_{off}	turn-off time		-	-	250	ns

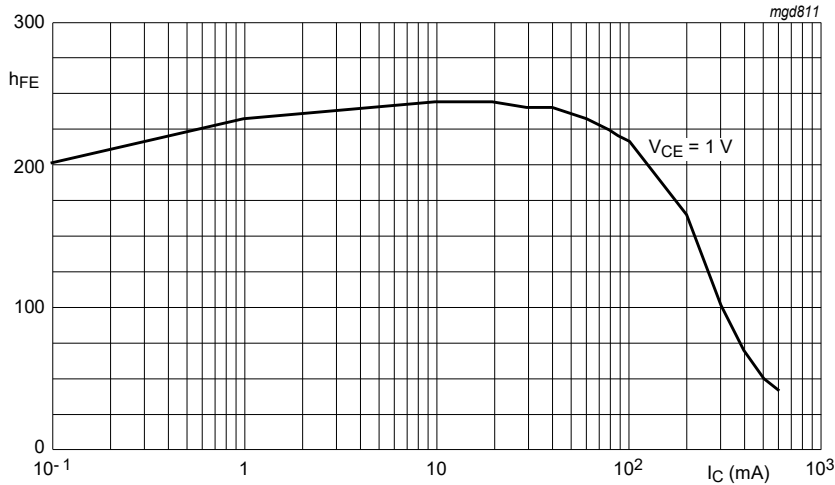


Fig. 1. DC current gain; typical value

11. Test information

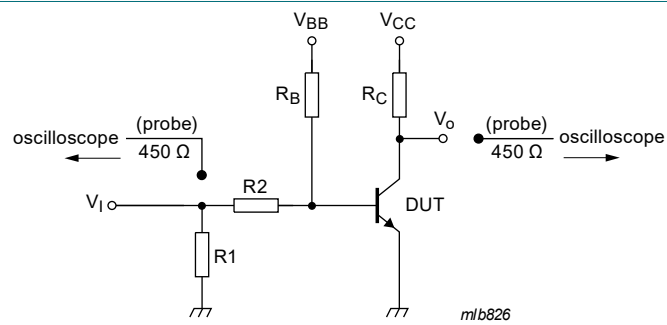


Fig. 2. Test circuit for switching times

$$V_i = 9.5 \text{ V}; T = 500 \text{ } \mu\text{s}; t_p = 10 \text{ } \mu\text{s}; t_r = t_f \leq 3 \text{ ns}$$

$$R_1 = 68 \text{ } \Omega; R_2 = 325 \text{ } \Omega; R_B = 325 \text{ } \Omega; R_C = 160 \text{ } \Omega$$

$$V_{BB} = -3.5 \text{ V}; V_{CC} = 29.5 \text{ V}$$

$$\text{Oscilloscope: input impedance } Z_i = 50 \text{ } \Omega$$

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.

12. Package outline

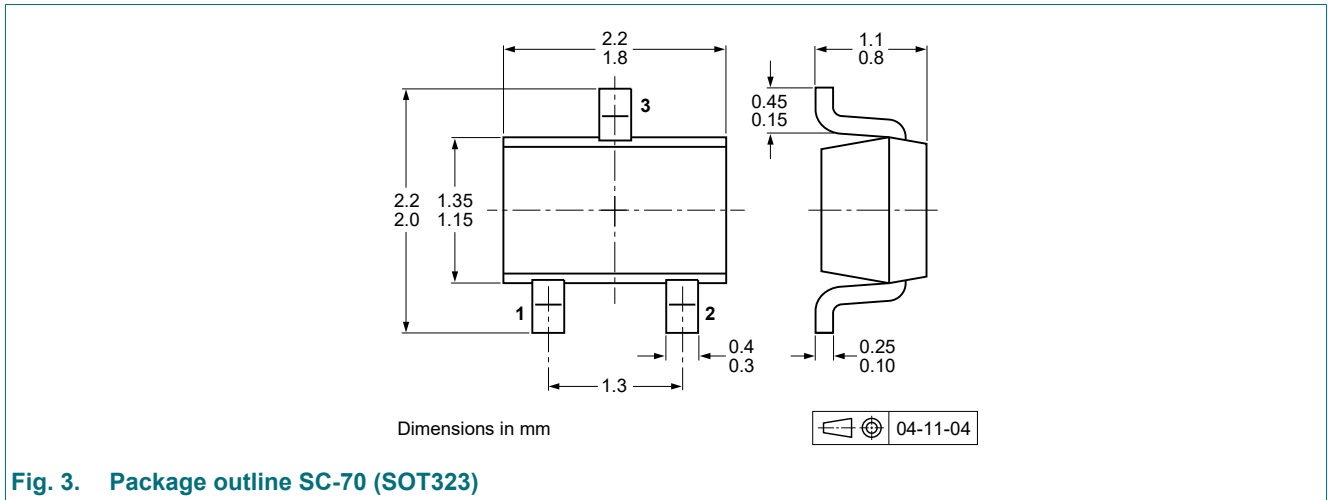


Fig. 3. Package outline SC-70 (SOT323)

13. Soldering

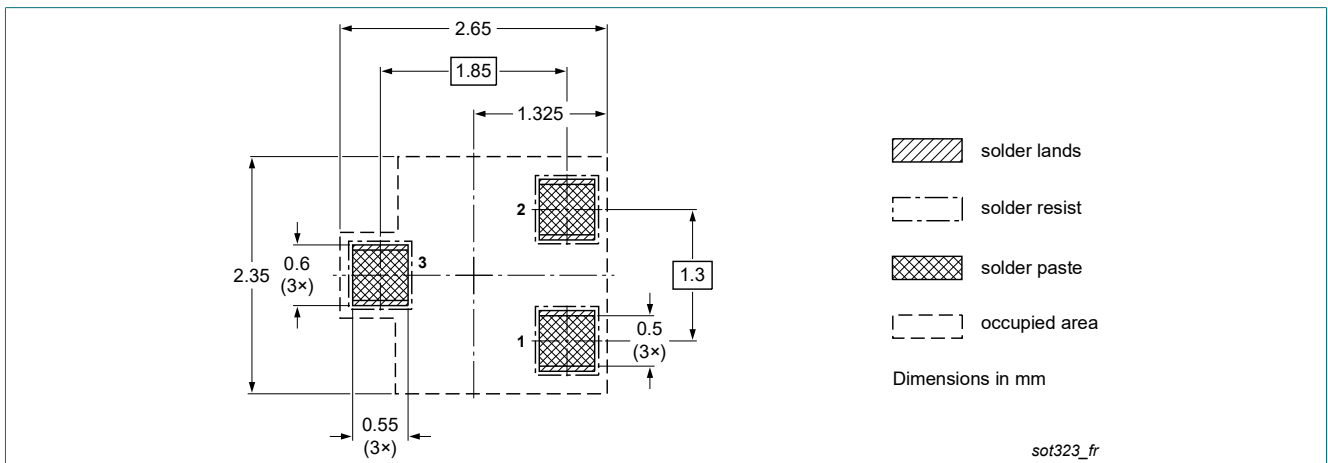


Fig. 4. Reflow soldering footprint for SC-70 (SOT323)

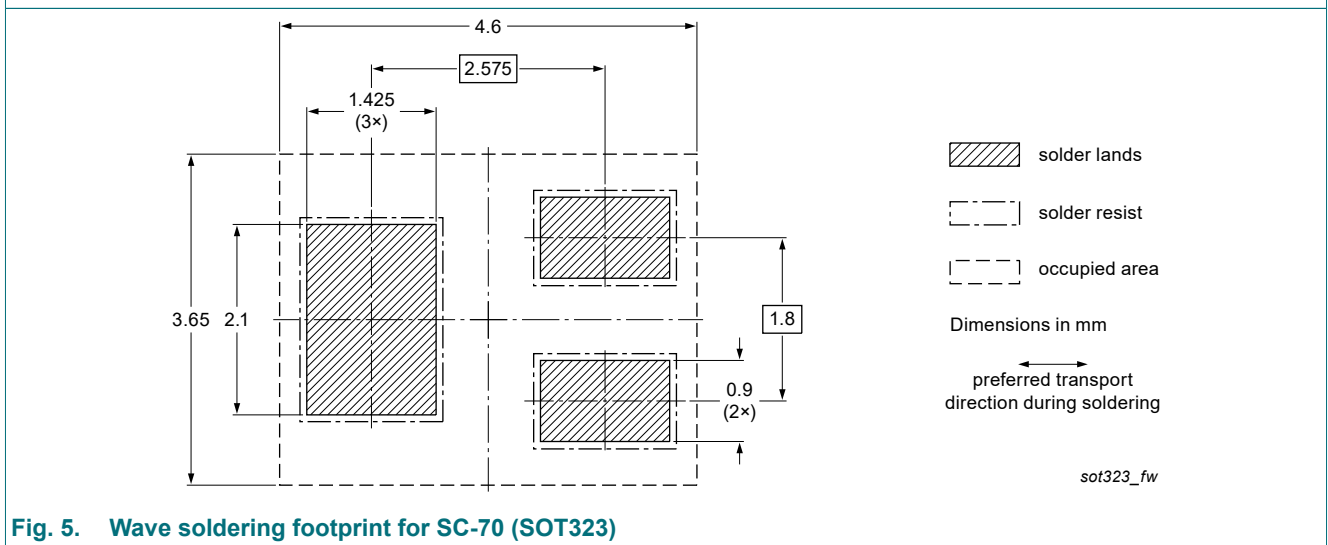


Fig. 5. Wave soldering footprint for SC-70 (SOT323)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PMST4401-Q v.1	20240117	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.

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