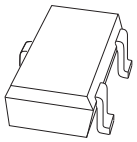


PMSTA3904

40 V, 200 mA NPN switching transistor

Rev. 01 — 21 April 2008 Product data sheet

1. Product profile

1.1 General description

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

PNP complement: PMST3906.

1.2 Features

- Single NPN switching transistor
- Integrated extraction electrode for fast switching
- AEC-Q101 qualified

1.3 Applications

- General-purpose switching and amplification

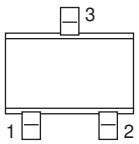
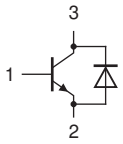
1.4 Quick reference data

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	100	195	300	

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	base		
2	emitter		
3	collector		

006aab209

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PMSTA3904	SC-70	plastic surface-mounted package; 3 leads	SOT323

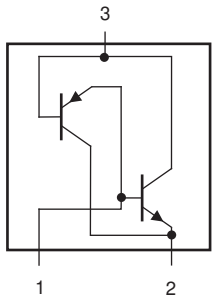
4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PMSTA3904	*1Y

[1] * = -: made in Hong Kong
* = p: made in Hong Kong
* = t: made in Malaysia
* = W: made in China

5. Functional diagram



006aab244

Fig 1. Functional diagram PMSTA3904

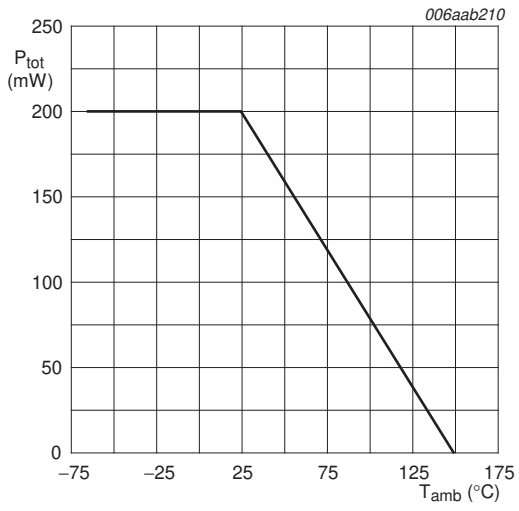
6. Limiting values

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_{CR}	reverse collector current	open base		-	20	mA
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms		-	200	mA
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms		-	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.



FR4 PCB, standard footprint

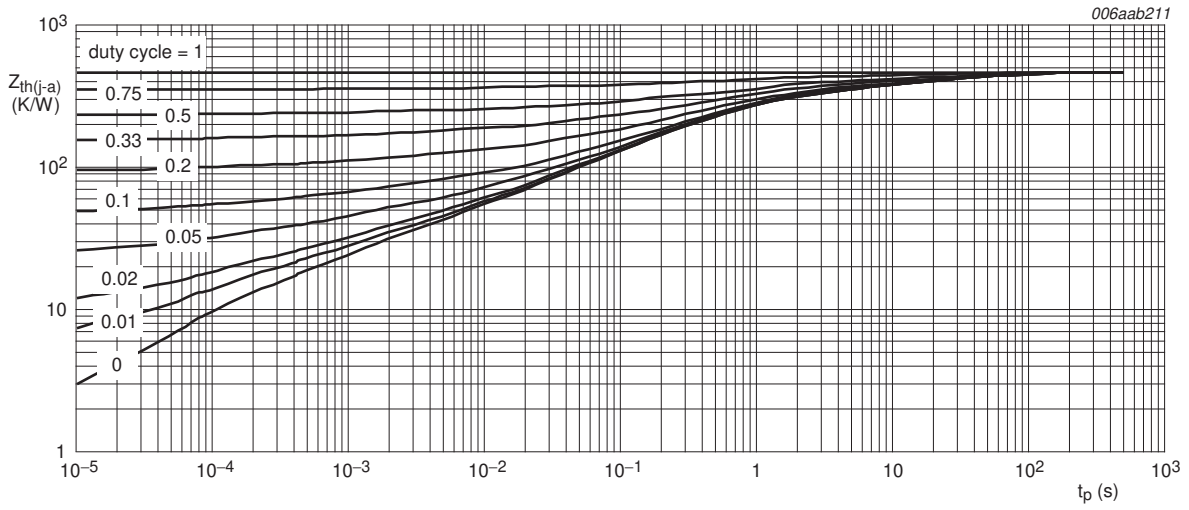
Fig 2. Power derating curve for SOT323 (SC-70)

7. 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
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	175	K/W

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



FR4 PCB, standard footprint

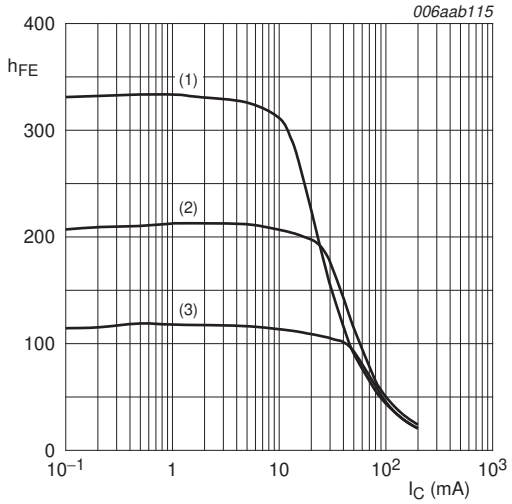
Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT323 (SC-70)

8. 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} = 30 V; I_E = 0 A	-	-	50	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = 6 V; I_C = 0 A	-	-	50	nA
h_{FE}	DC current gain	V_{CE} = 1 V				
		I_C = 0.1 mA	60	195	-	
		I_C = 1 mA	80	195	-	
		I_C = 10 mA	100	195	300	
		I_C = 50 mA	60	105	-	
		I_C = 100 mA	30	50	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 10 mA; I_B = 1 mA	-	75	200	mV
		I_C = 50 mA; I_B = 5 mA	-	120	300	mV
V_{ECO}	emitter-collector voltage	I_{CR} = 1 mA; I_B = 0 A	-	660	-	mV
V_{BEsat}	base-emitter saturation voltage	I_C = 10 mA; I_B = 1 mA	650	750	850	mV
		I_C = 50 mA; I_B = 5 mA	-	850	950	mV
f_T	transition frequency	V_{CE} = 20 V; I_C = 10 mA; f = 100 MHz	300	-	-	MHz
C_c	collector capacitance	V_{CB} = 5 V; $I_E = i_e$ = 0 A; f = 1 MHz	-	-	4	pF
C_e	emitter capacitance	V_{BE} = 0.5 V; $I_C = i_c$ = 0 A; f = 1 MHz	-	-	8	pF
NF	noise figure	V_{CE} = 5 V; I_C = 100 µA; R_S = 1 kΩ; f = 10 Hz to 15.7 kHz	-	-	5	dB
t_d	delay time	V_{CC} = 3 V; I_C = 10 mA; I_{Bon} = 1 mA; I_{Boff} = −1 mA	-	-	35	ns
t_r	rise time		-	-	35	ns
t_{on}	turn-on time		-	-	70	ns
t_s	storage time		-	-	200	ns
t_f	fall time		-	-	50	ns
t_{off}	turn-off time		-	-	250	ns



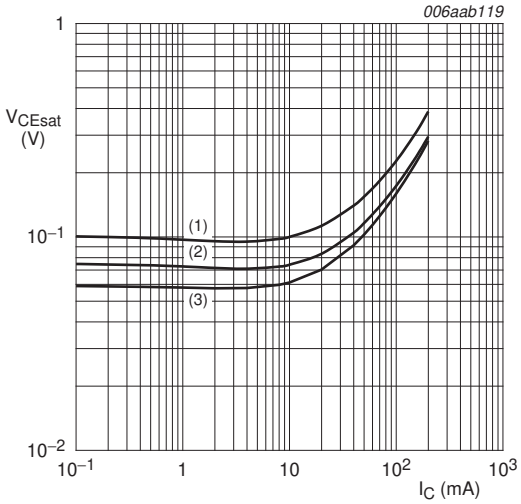
V_{CE} = 1 V

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = −55 °C

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



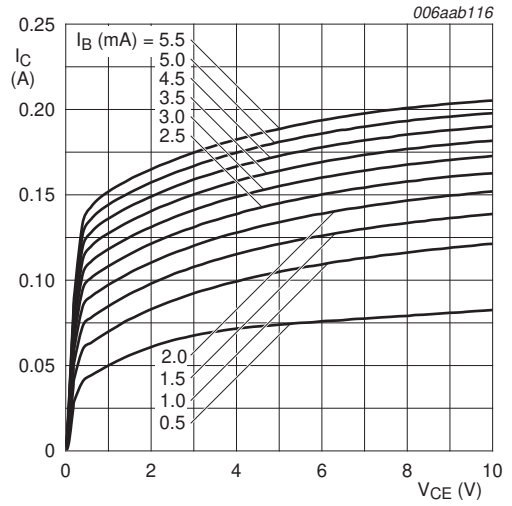
I_C/I_B = 10

(1) T_{amb} = 150 °C

(2) T_{amb} = 25 °C

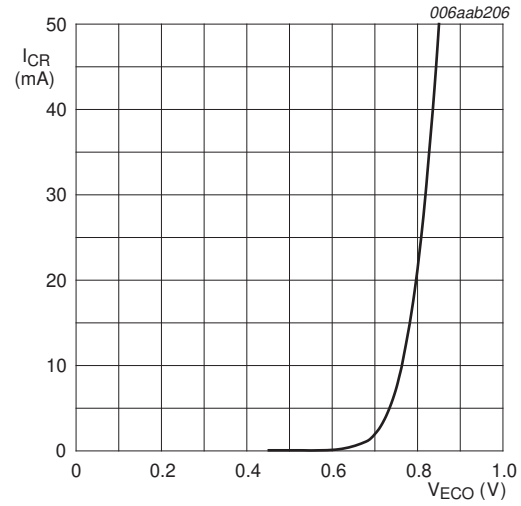
(3) T_{amb} = −55 °C

Fig 5. Collector-emitter saturation voltage as a function of collector current; typical values



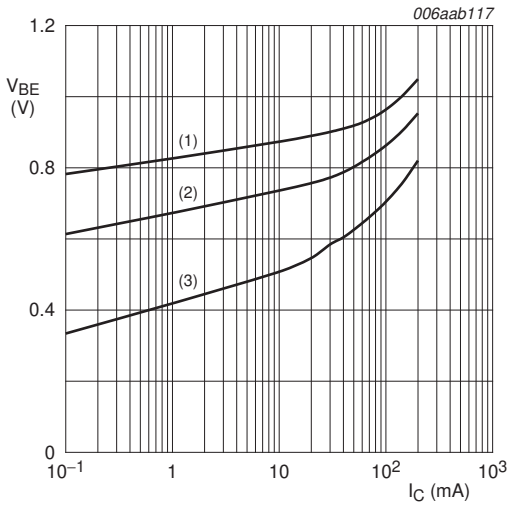
T_{amb} = 25 °C

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



I_B = 0 A; T_{amb} = 25 °C

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



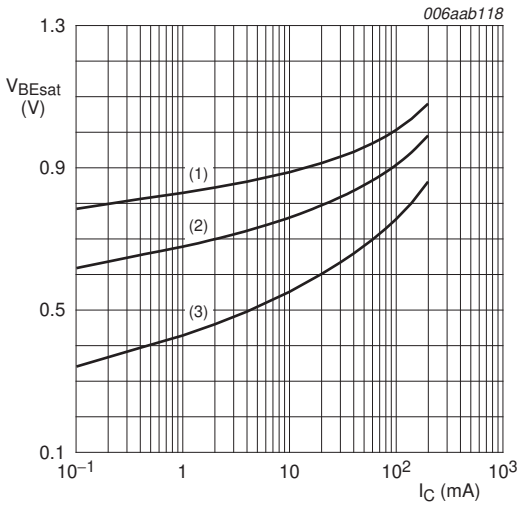
V_{CE} = 1 V

(1) T_{amb} = −55 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 150 °C

Fig 8. 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 9. Base-emitter saturation voltage as a function of collector current; typical values

9. Test information

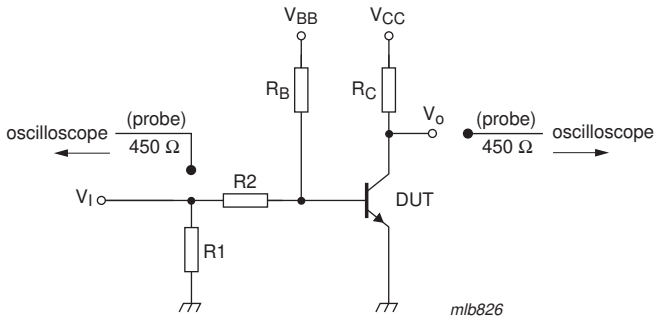


Fig 10. Test circuit for switching times

9.1 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.

10. Package outline

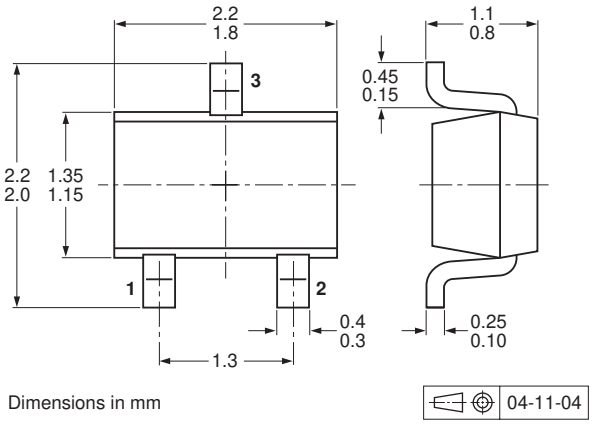


Fig 11. Package outline SOT323 (SC-70)

11. 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	10000
PMSTA3904	SOT323	4 mm pitch, 8 mm tape and reel	-115	-135

[1] For further information and the availability of packing methods, see Section 15.

12. Soldering

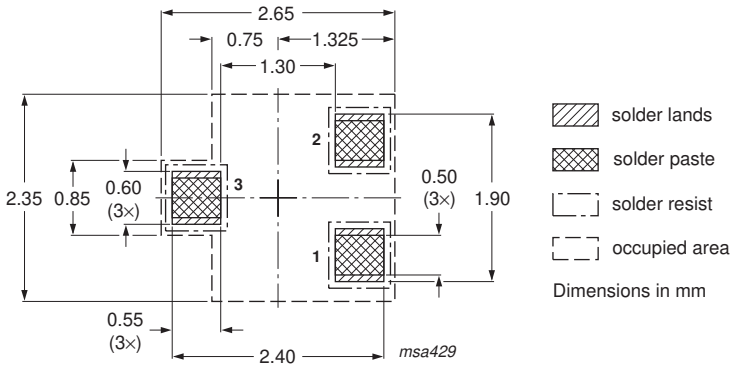


Fig 12. Reflow soldering footprint SOT323 (SC-70)

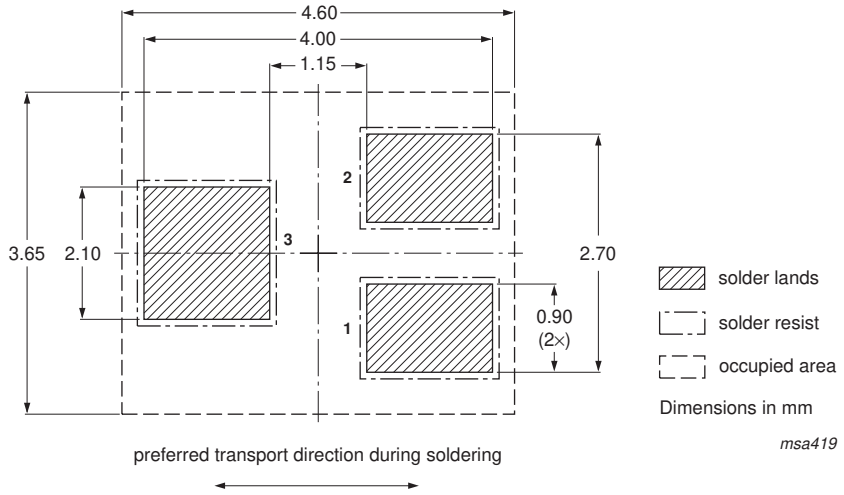


Fig 13. Wave soldering footprint SOT323 (SC-70)

13. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PMSTA3904_1	20080421	Product data sheet	-	-

14. Legal information

14.1 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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16. Contents

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