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Kind regards,

Team Nexperia



# NXP3875Y; NXP3875G

50 V, 150 mA NPN general-purpose transistors

Rev. 1 — 12 December 2012

Product data sheet

## 1. Product profile

### 1.1 General description

NPN general-purpose transistors in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

### 1.2 Features and benefits

- General-purpose transistors
- Small SMD plastic packages
- Two different current gain selections
- AEC-Q101 qualified

### 1.3 Applications

- General-purpose switching and amplification

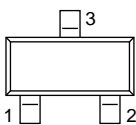
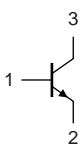
### 1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CE0}$	collector-emitter voltage	open base	-	-	50	V
$I_C$	collector current		-	-	150	mA
$h_{FE}$	DC current gain	$V_{CE} = 6\text{ V}; I_C = 2\text{ mA}$				
	NXP3875Y		120	-	240	
	NXP3875G		200	-	400	

## 2. Pinning information

Table 2. Pinning

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

*sym021*



### 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
NXP3875Y	TO-236AB	plastic surface-mounted package; 3 leads	SOT23
NXP3875G			

### 4. Marking

Table 4. Marking codes

Type number	Marking code <sup>[1]</sup>
NXP3875Y	*JE
NXP3875G	*JF

[1] \* = placeholder for manufacturing site code.

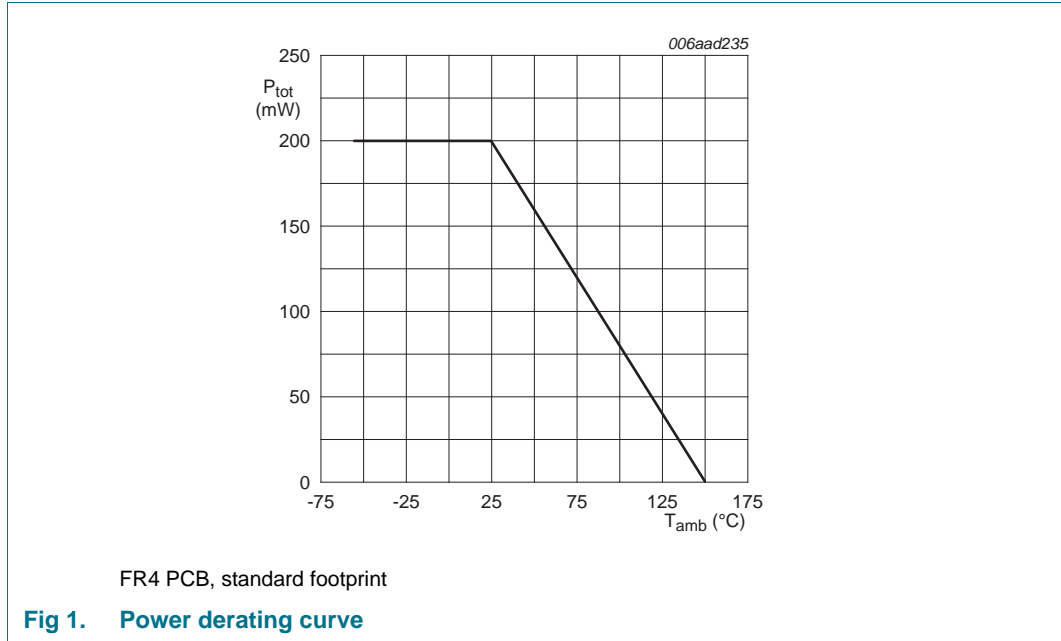
### 5. Limiting values

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	-	50	V
$V_{EBO}$	emitter-base voltage	open collector	-	5	V
$I_C$	collector current		-	150	mA
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	200	mA
$I_B$	base current			30	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	<sup>[1]</sup> -	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.

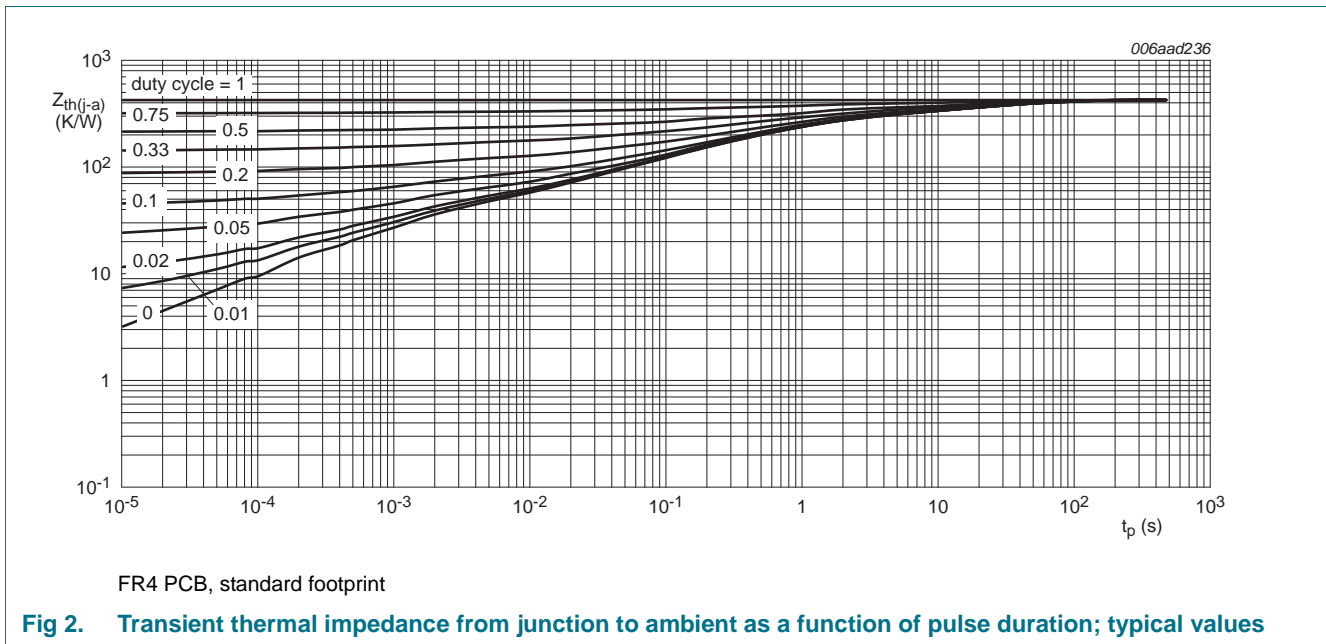


## 6. Thermal characteristics

**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.

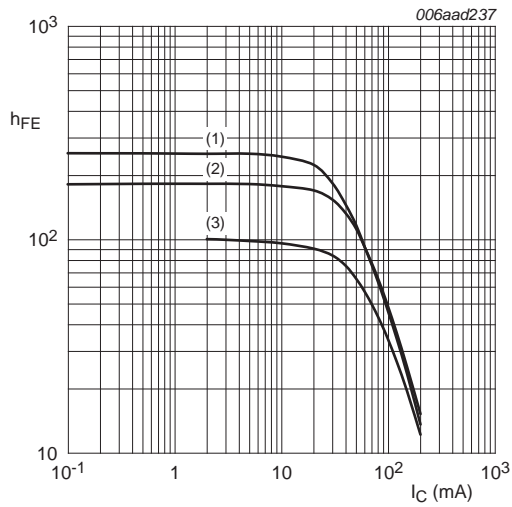


## 7. Characteristics

**Table 7. Characteristics**

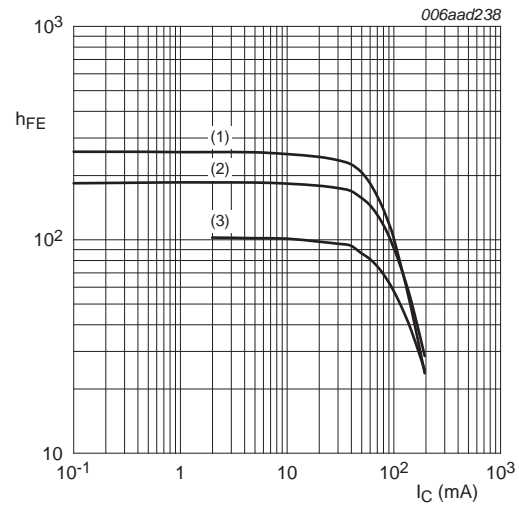
$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 60\text{ V}; I_E = 0\text{ A}$	-	-	100	nA
		$V_{CB} = 60\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	5	$\mu\text{A}$
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = 5\text{ V}; I_C = 0\text{ A}$	-	-	100	nA
$h_{FE}$	DC current gain	$V_{CE} = 6\text{ V}; I_C = 2\text{ mA}$				
			NXP3875Y	120	-	240
	NXP3875G	200	-	400		
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 100\text{ mA}; I_B = 10\text{ mA}$	-	-	250	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 100\text{ mA}; I_B = 10\text{ mA}$	-	-	1	V
$f_T$	transition frequency	$V_{CE} = 10\text{ V}; I_C = 1\text{ mA}; f = 100\text{ MHz}$	80	-	-	MHz
$C_c$	collector capacitance	$V_{CB} = 10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$	-	-	3.5	pF
NF	noise figure	$I_C = 0.1\text{ mA}; V_{CE} = 6\text{ V}; R_S = 10\text{ k}\Omega; f = 1\text{ kHz};$	-	-	10	dB



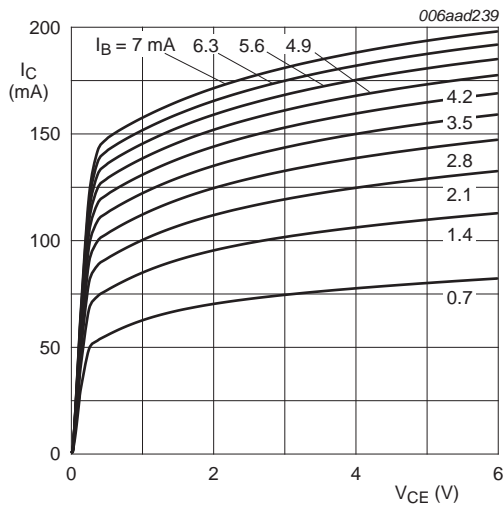
$V_{CE} = 1 \text{ V}$   
 (1)  $T_{amb} = 100 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -55 \text{ }^\circ\text{C}$

**Fig 3. NXP3875Y: DC current gain as a function of collector current; typical values**



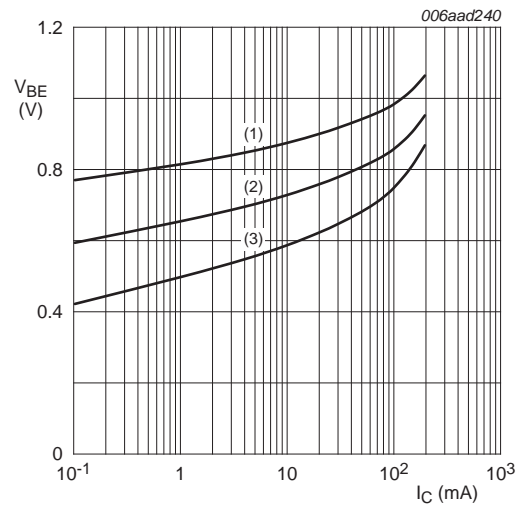
$V_{CE} = 6 \text{ V}$   
 (1)  $T_{amb} = 100 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -55 \text{ }^\circ\text{C}$

**Fig 4. NXP3875Y: DC current gain as a function of collector current; typical values**



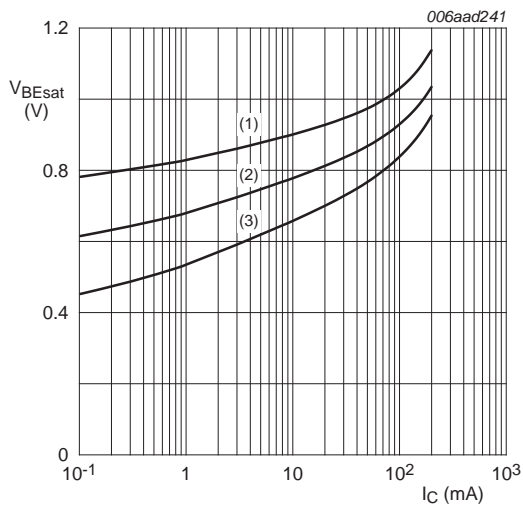
$T_{amb} = 25 \text{ }^\circ\text{C}$

**Fig 5. NXP3875Y: Collector current as a function of collector-emitter voltage; typical values**



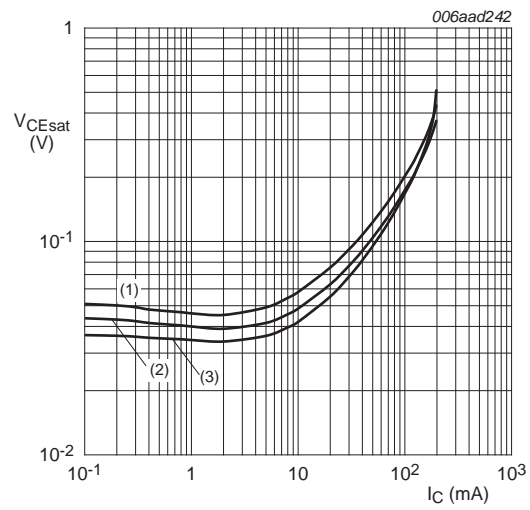
$V_{CE} = 6 \text{ V}$   
 (1)  $T_{amb} = -55 \text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25 \text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 100 \text{ }^\circ\text{C}$

**Fig 6. NXP3875Y: Base-emitter voltage as a function of collector current; typical values**



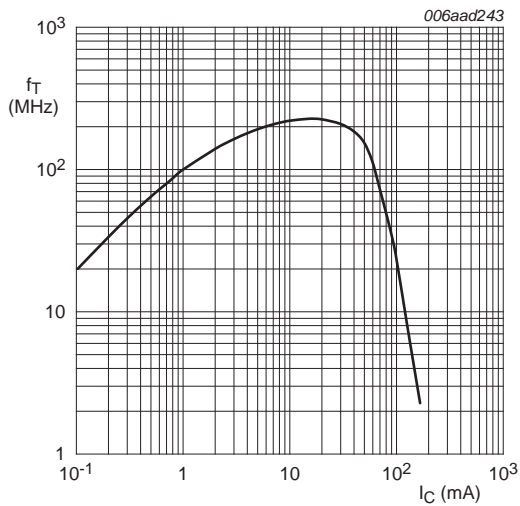
- $I_C/I_B = 10$
- (1)  $T_{amb} = -55\text{ °C}$
  - (2)  $T_{amb} = 25\text{ °C}$
  - (3)  $T_{amb} = 100\text{ °C}$

**Fig 7. NXP3875Y: Base-emitter saturation voltage as a function of collector current; typical values**



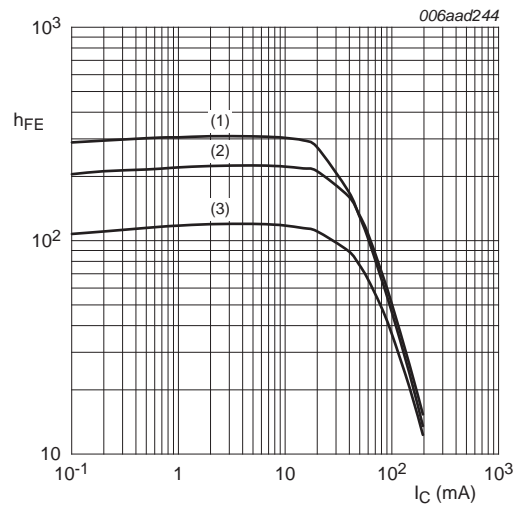
- $I_C/I_B = 10$
- (1)  $T_{amb} = 100\text{ °C}$
  - (2)  $T_{amb} = 25\text{ °C}$
  - (3)  $T_{amb} = -55\text{ °C}$

**Fig 8. NXP3875Y: Collector-emitter saturation voltage as a function of collector current; typical values**



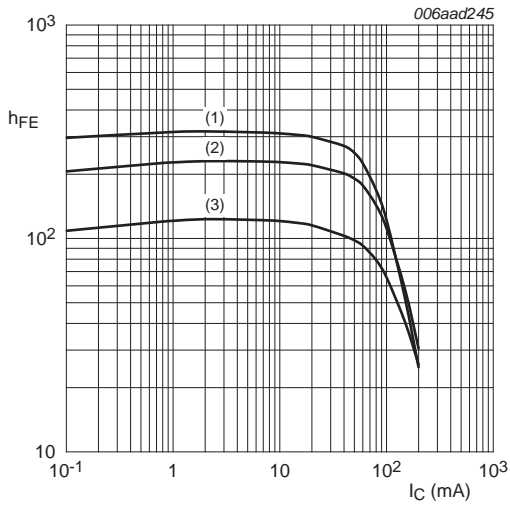
$V_{CE} = 10\text{ V}; T_{amb} = 25\text{ °C}$

**Fig 9. NXP3875Y: Transition frequency as a function of collector current; typical values**



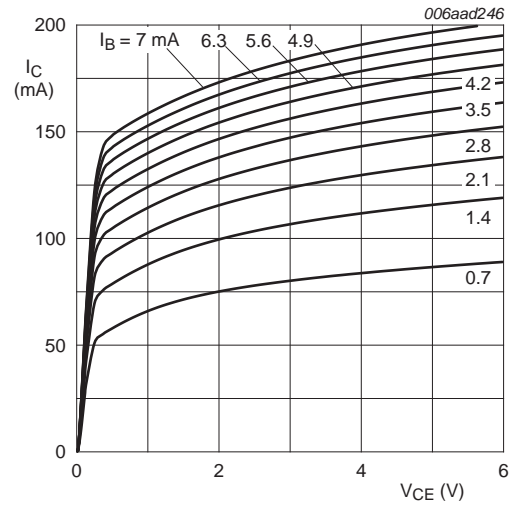
- $V_{CE} = 1\text{ V}$
- (1)  $T_{amb} = 100\text{ °C}$
  - (2)  $T_{amb} = 25\text{ °C}$
  - (3)  $T_{amb} = -55\text{ °C}$

**Fig 10. NXP3875G: DC current gain as a function of collector current; typical values**



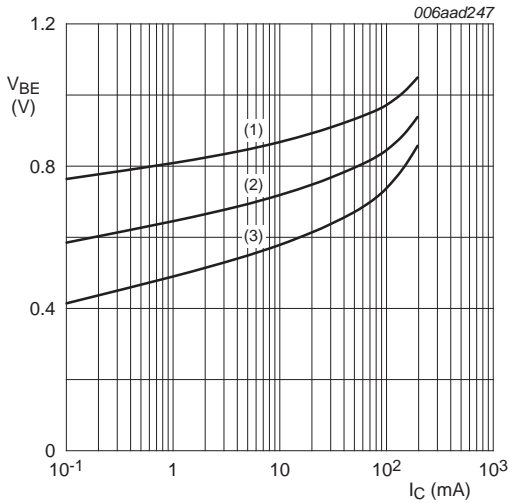
$V_{CE} = 6\text{ V}$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

**Fig 11. NXP3875G: DC current gain as a function of collector current; typical values**



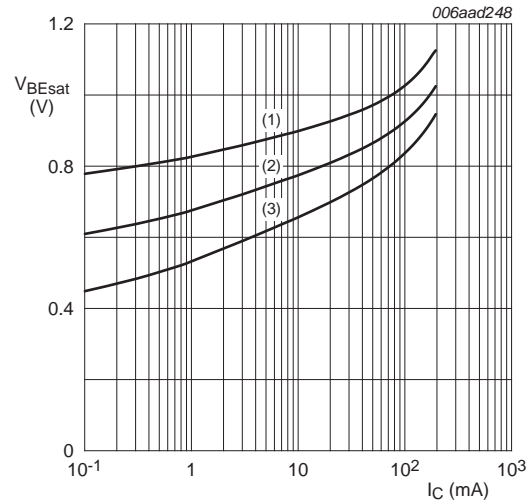
$T_{amb} = 25\text{ °C}$

**Fig 12. NXP3875G: Collector current as a function of collector-emitter voltage; typical values**



$V_{CE} = 6\text{ V}$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

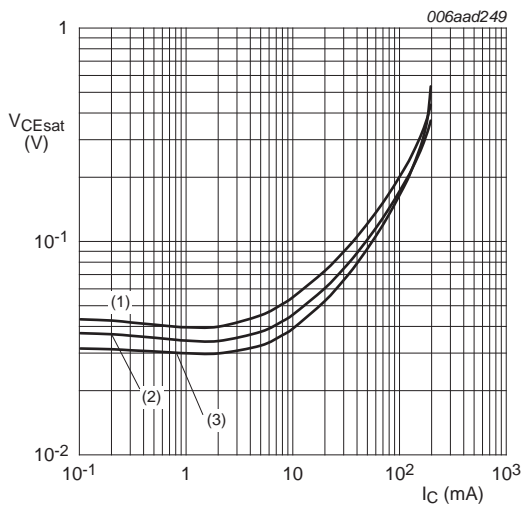
**Fig 13. NXP3875G: Base-emitter voltage as a function of collector current; typical values**



$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

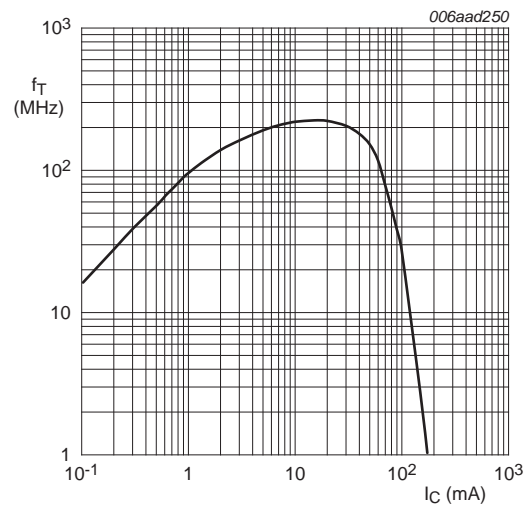
**Fig 14. NXP3875G: Base-emitter saturation voltage as a function of collector current; typical values**





- $I_C/I_B = 10$
- (1)  $T_{amb} = 100\text{ °C}$
  - (2)  $T_{amb} = 25\text{ °C}$
  - (3)  $T_{amb} = -55\text{ °C}$

**Fig 15. NXP3875G: Collector-emitter saturation voltage as a function of collector current; typical values**



$V_{CE} = 10\text{ V}; T_{amb} = 25\text{ °C}$

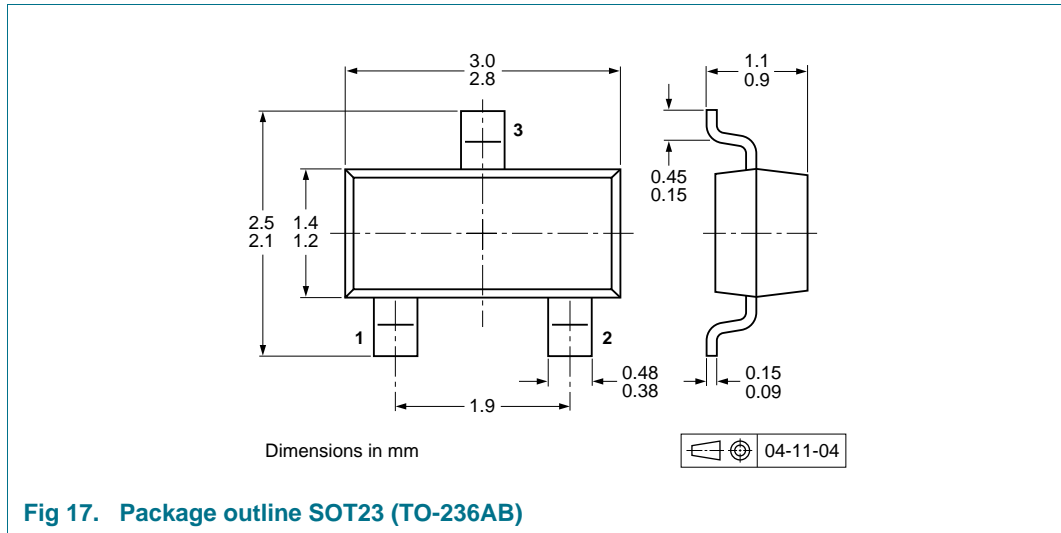
**Fig 16. NXP3875G: Transition frequency as a function of collector current; typical values**

## 8. Test information

### 8.1 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.

## 9. Package outline



## 10. Packing information

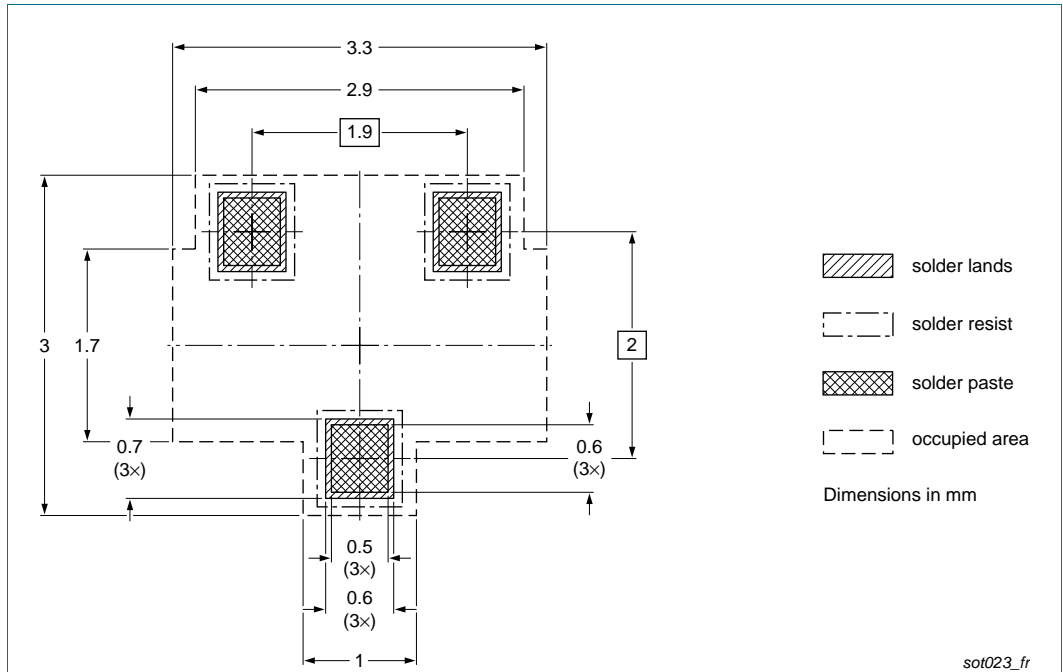
**Table 8. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

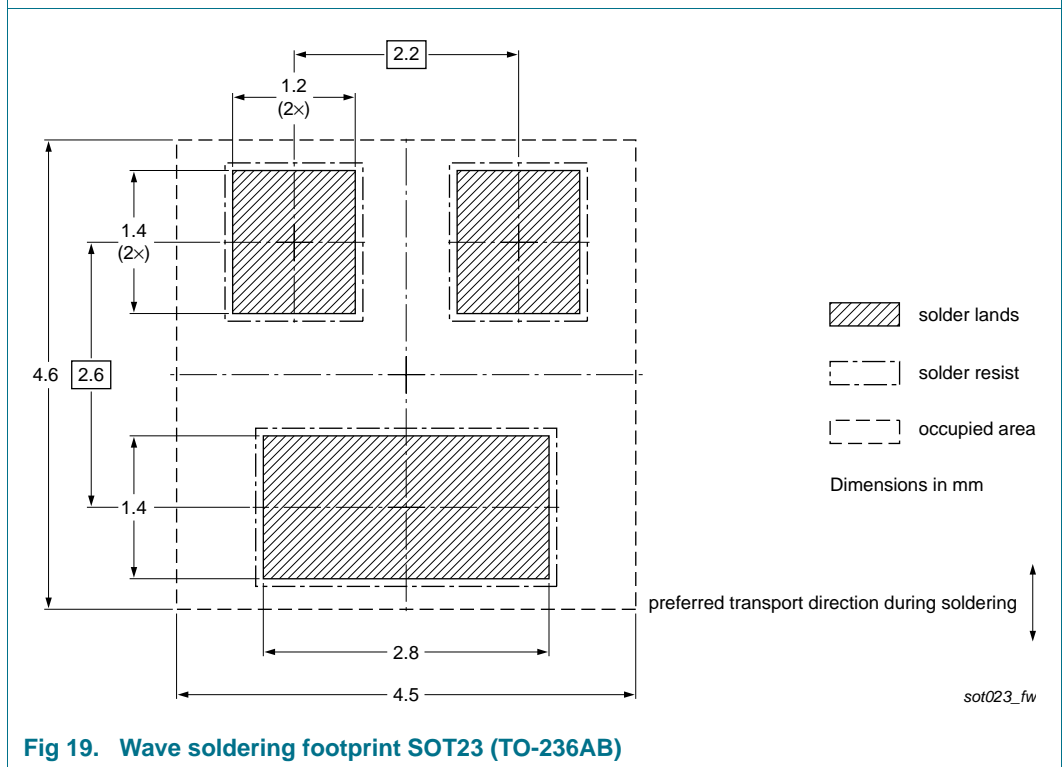
Type number	Package	Description	Packing quantity	
			1000	4000
NXP3875Y	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
NXP3875G				

[1] For further information and the availability of packing methods, see [Section 14](#).

## 11. Soldering



**Fig 18. Reflow soldering footprint SOT23 (TO-236AB)**



**Fig 19. Wave soldering footprint SOT23 (TO-236AB)**

## 12. Revision history

**Table 9.** Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
NXP3875Y_NXP3875G v.1	20121212	Product data sheet	-	-

## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.

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