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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

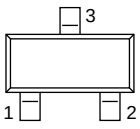
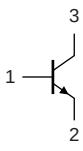
### 1.4 Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CEO}$ | collector-emitter voltage | open base | - | - | 50 | V |
| $I_C$ | collector current | | - | - | 150 | mA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 6 V; $I_C$ = 2 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[1] |
|---|---|
| NXP3875Y | *JE |
| NXP3875G | *JF |

[1] * = placeholder for manufacturing site code.

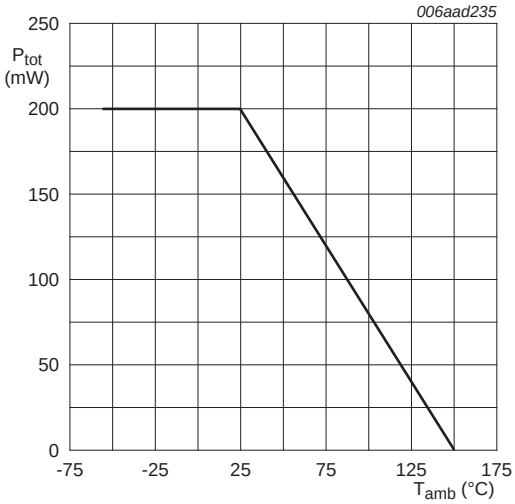
## 5. Limiting values

**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 | [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

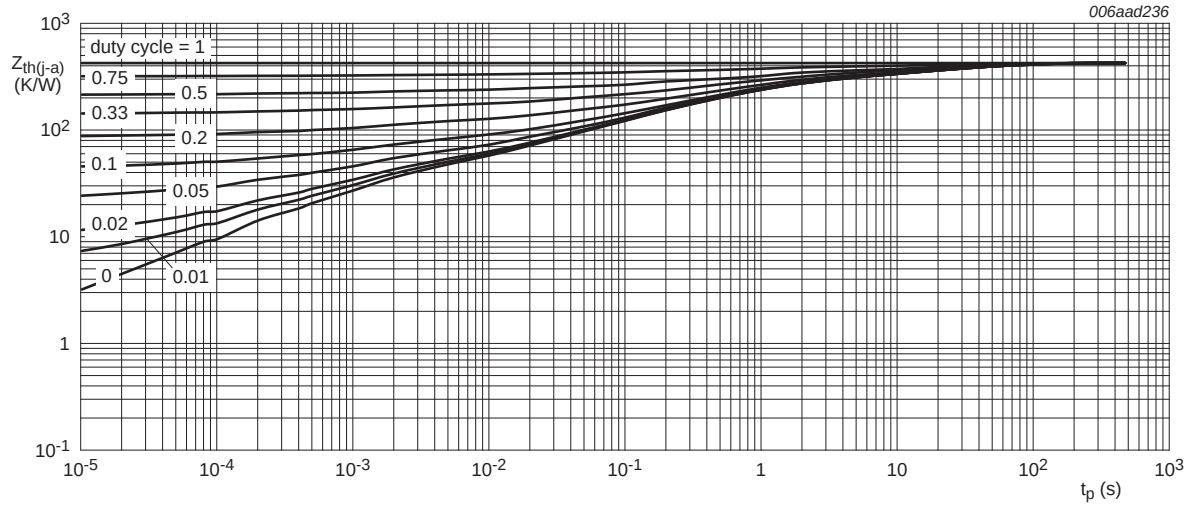
**Fig 1. Power derating curve**

## 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.




FR4 PCB, standard footprint

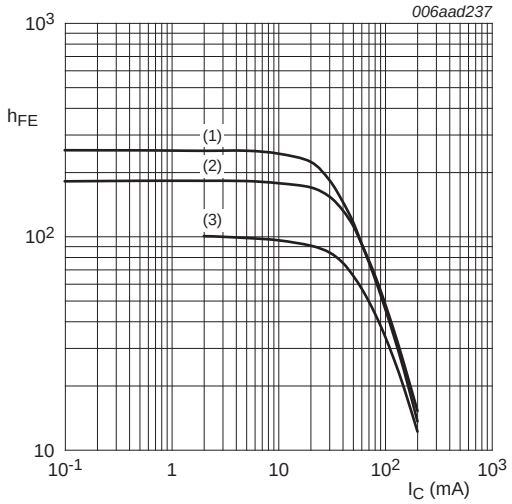
**Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values**

## 7. 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 | $V_{CB}$ = 60 V; $I_E$ = 0 A | - | - | 100 | nA |
| | | $V_{CB}$ = 60 V; $I_E$ = 0 A; $T_j$ = 150 °C | - | - | 5 | µA |
| $I_{EBO}$ | emitter-base cut-off current | $V_{EB}$ = 5 V; $I_C$ = 0 A | - | - | 100 | nA |
| $h_{FE}$ | DC current gain | $V_{CE}$ = 6 V; $I_C$ = 2 mA | | | | |
| | NXP3875Y | | 120 | - | 240 | |
| | NXP3875G | | 200 | - | 400 | |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 100 mA; $I_B$ = 10 mA | - | - | 250 | mV |
| $V_{BEsat}$ | base-emitter saturation voltage | $I_C$ = 100 mA; $I_B$ = 10 mA | - | - | 1 | V |
| $f_T$ | transition frequency | $V_{CE}$ = 10 V; $I_C$ = 1 mA; f = 100 MHz | 80 | - | - | MHz |
| $C_c$ | collector capacitance | $V_{CB}$ = 10 V; $I_E$ = $i_e$ = 0 A; f = 1 MHz | - | - | 3.5 | pF |
| NF | noise figure | $I_C$ = 0.1 mA; $V_{CE}$ = 6 V; $R_S$ = 10 kΩ; f = 1 kHz; | - | - | 10 | dB |



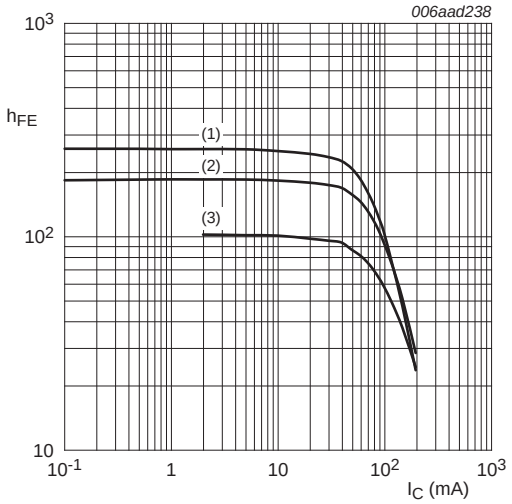

$V_{CE}$ = 1 V

(1) $T_{amb}$ = 100 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = −55 °C

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



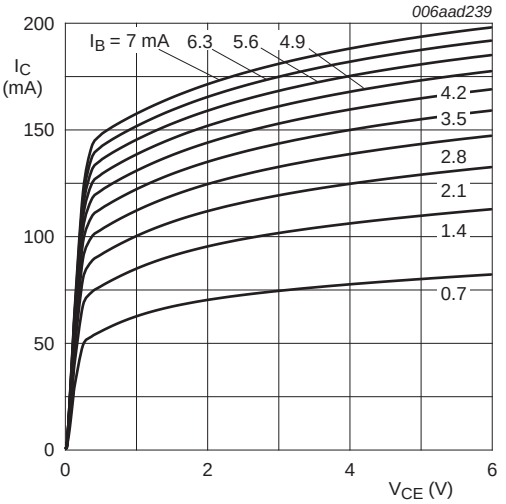

$V_{CE}$ = 6 V

(1) $T_{amb}$ = 100 °C

(2) $T_{amb}$ = 25 °C

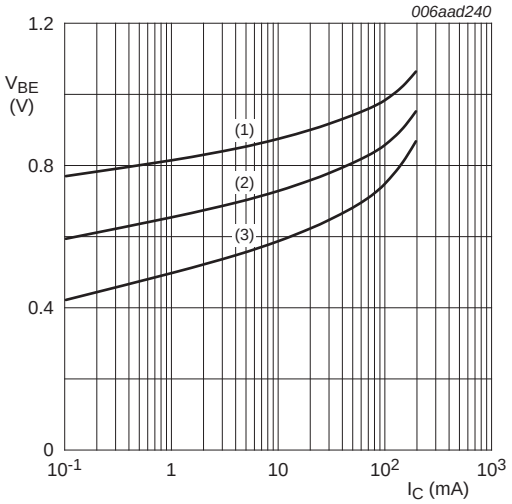
(3) $T_{amb}$ = −55 °C

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




$T_{amb}$ = 25 °C

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



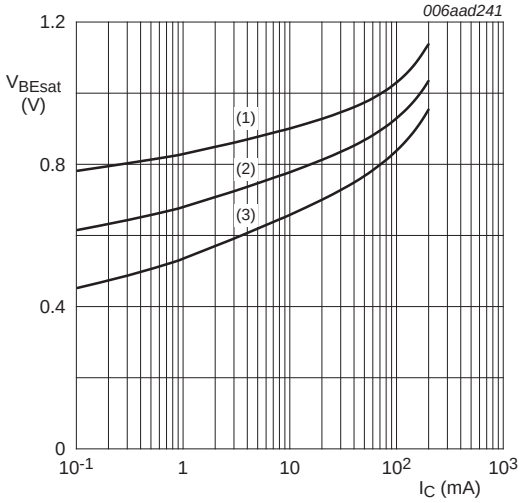

$V_{CE}$ = 6 V

(1) $T_{amb}$ = −55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

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



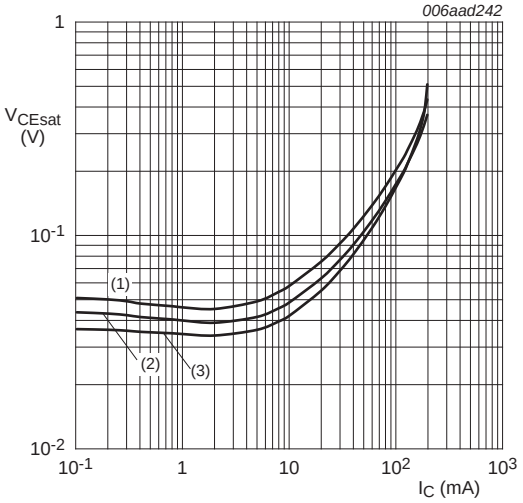

$I_C/I_B = 10$

(1) $T_{amb} = -55$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = 100$ °C

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



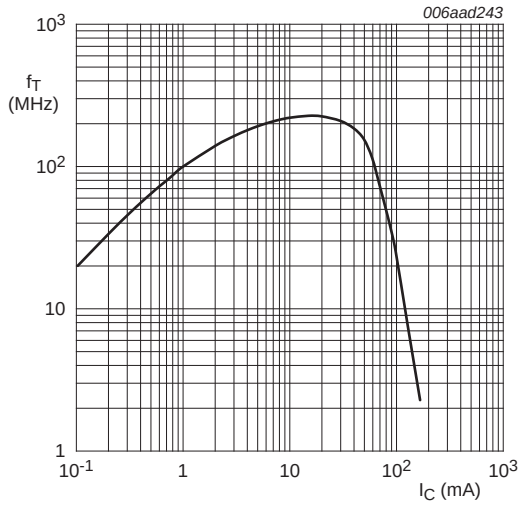

$I_C/I_B = 10$

(1) $T_{amb} = 100$ °C

(2) $T_{amb} = 25$ °C

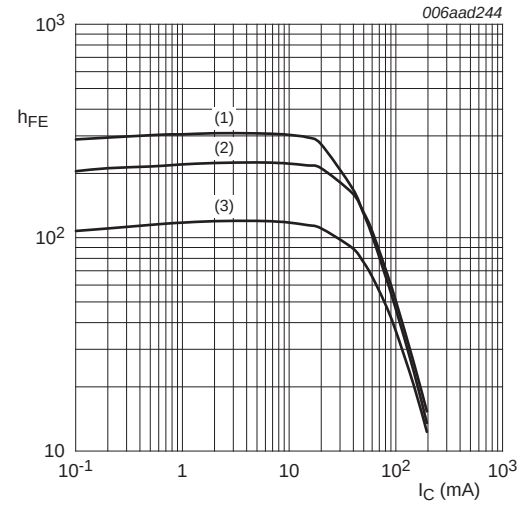
(3) $T_{amb} = -55$ °C

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




$V_{CE} = 10$ V; $T_{amb} = 25$ °C

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



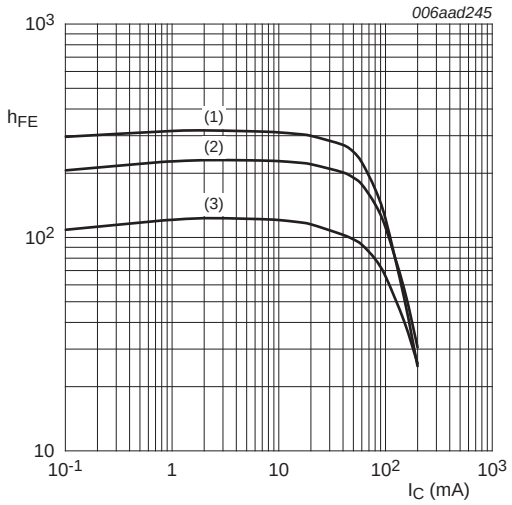

$V_{CE} = 1$ V

(1) $T_{amb} = 100$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = -55$ °C

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



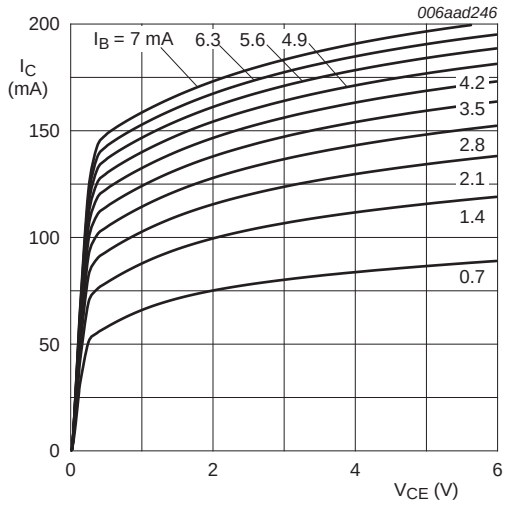

$V_{CE}$ = 6 V

(1) $T_{amb}$ = 100 °C

(2) $T_{amb}$ = 25 °C

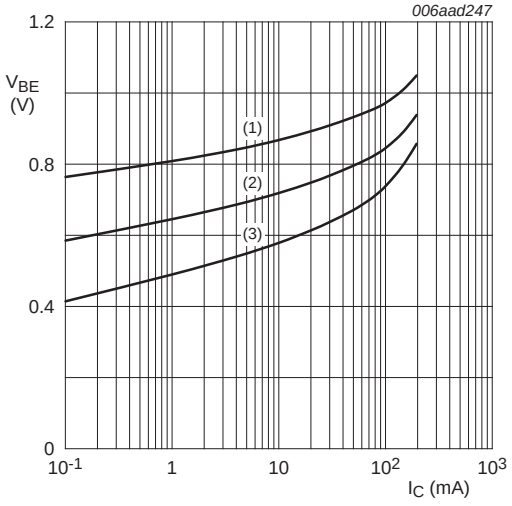
(3) $T_{amb}$ = −55 °C

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




$T_{amb}$ = 25 °C

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



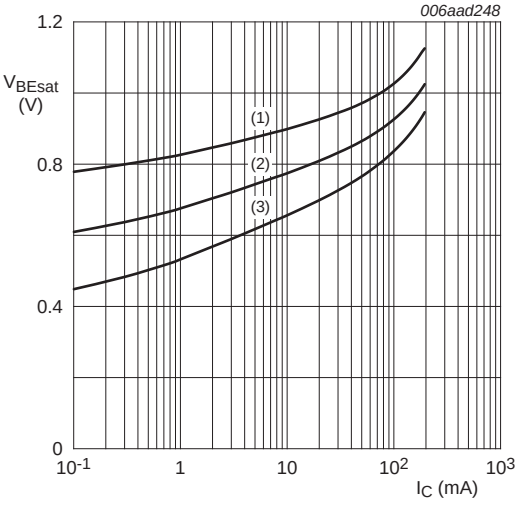

$V_{CE}$ = 6 V

(1) $T_{amb}$ = −55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

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



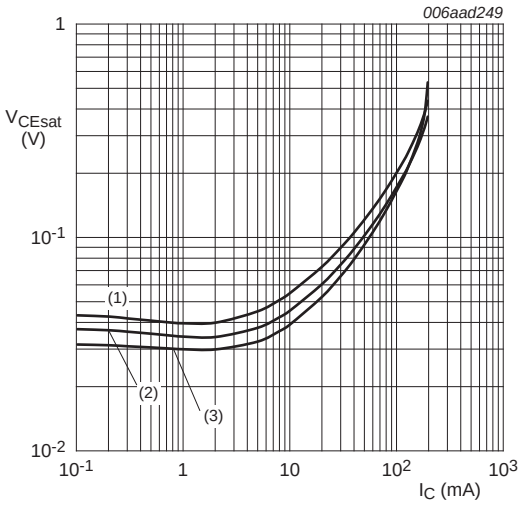

$I_C/I_B$ = 10

(1) $T_{amb}$ = −55 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = 100 °C

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



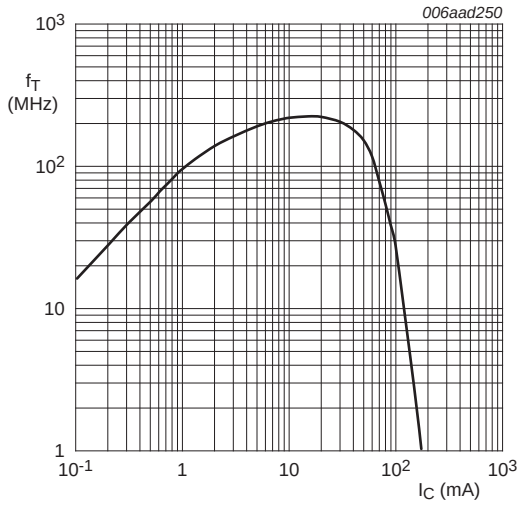

$I_C/I_B$ = 10

(1) $T_{amb}$ = 100 °C

(2) $T_{amb}$ = 25 °C

(3) $T_{amb}$ = − 55 °C

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




$V_{CE}$ = 10 V; $T_{amb}$ = 25 °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

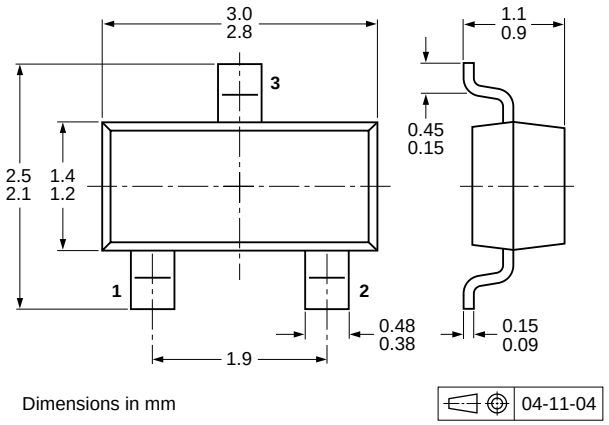



**Fig 17. Package outline SOT23 (TO-236AB)**

## 10. 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 | |
|---|---|---|---|---|
| | | | 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

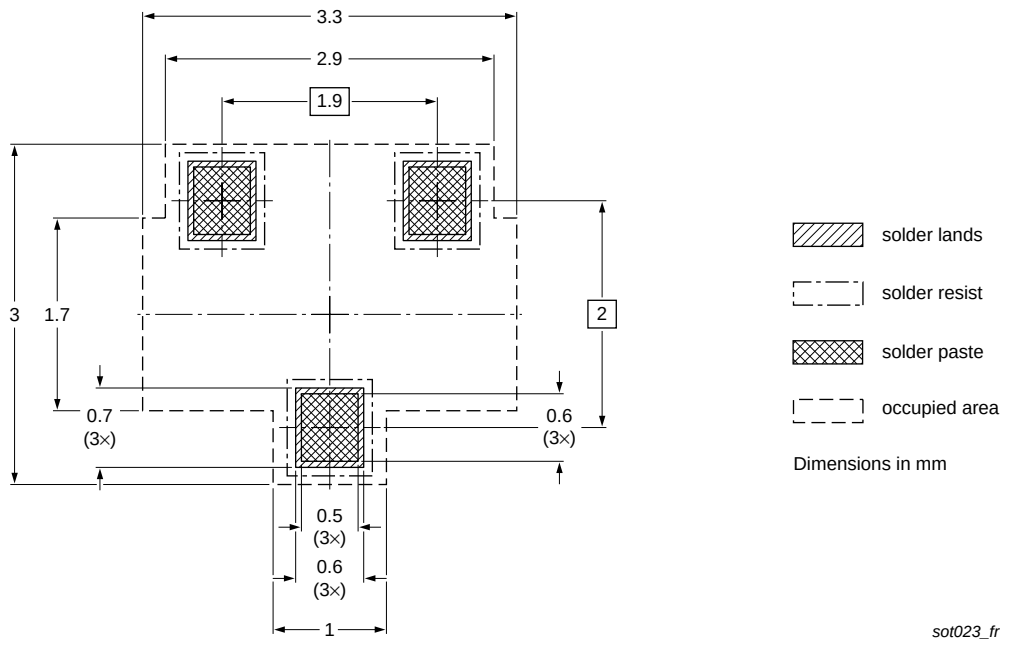



**Fig 18. Reflow soldering footprint SOT23 (TO-236AB)**

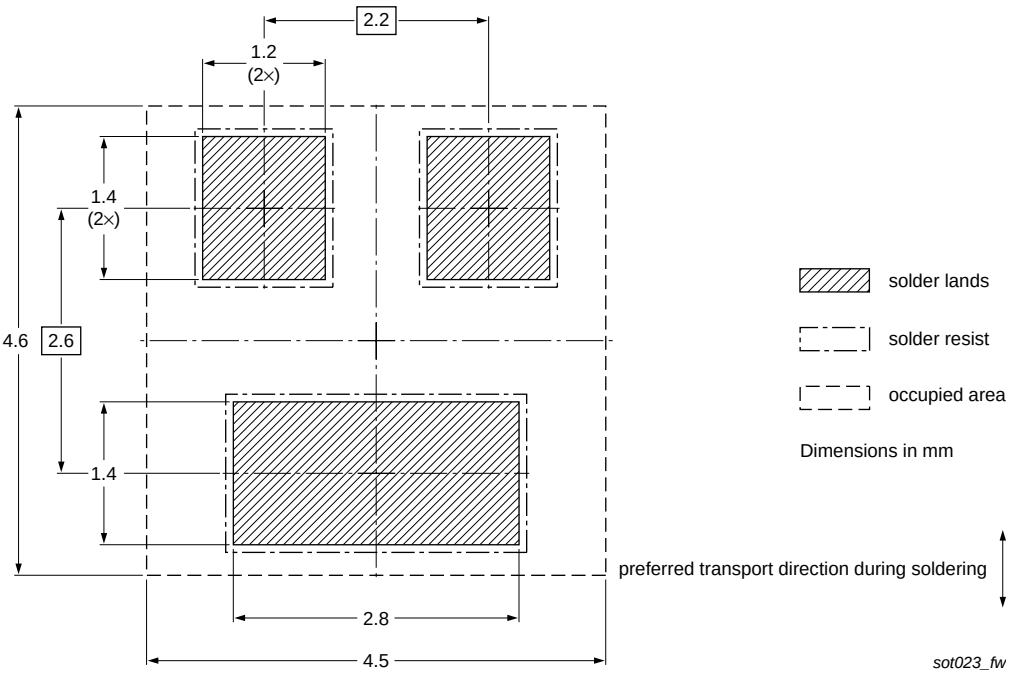



**Fig 19. Wave soldering footprint SOT23 (TO-236AB)**

## 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[1][2] | Product status[3] | Definition |
|---|---|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
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**Date of release: 12 December 2012**
**Document identifier: NXP3875Y_NXP3875G**

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