



# PGMH10

NPN/NPN resistor-equipped transistors;  
R1 = 2.2 k $\Omega$ , R2 = 47 k $\Omega$

4 November 2015

Product data sheet

## 1. General description

NPN/NPN Resistor-Equipped Transistors (RET) in a leadless ultra small DFN1010B-6 (SOT1216) Surface-Mounted Device (SMD) plastic package.

NPN/PNP complement: PQMD10.

## 2. Features and benefits

- 100 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Low package height of 0.37 mm
- Reduces component count
- Reduces pick and place costs
- AEC-Q101 qualified

## 3. Applications

- Low current peripheral driver
- Control of IC inputs
- Replaces general-purpose transistors in digital applications
- Mobile applications

## 4. Quick reference data

Table 1. Quick reference data

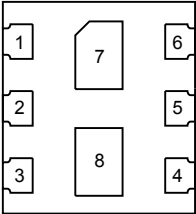
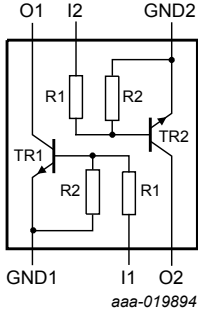
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per transistor</b>							
V <sub>CEO</sub>	collector-emitter voltage	open base		-	-	50	V
I <sub>O</sub>	output current			-	-	100	mA
<b>Per transistor</b>							
R1	bias resistor 1	T <sub>amb</sub> = 25 °C	[1]	1.54	2.2	2.86	k $\Omega$
R2/R1	bias resistor ratio		[1]	17	21	26	

[1] See section "Test information" for resistor calculation and test conditions.

NPN/NPN resistor-equipped transistors; R1 = 2.2 kΩ, R2 = 47 kΩ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	GND1	GND (emitter) TR1	 <p>Transparent top view <b>DFN1010B-6 (SOT1216)</b></p>	 <p>aaa-019894</p>
2	I1	input ( base) TR1		
3	O2	output (collector) TR2		
4	GND2	GND (emitter) TR2		
5	I2	input ( base) TR2		
6	O1	output (collector) TR1		
7	O1	output (collector) TR1		
8	O2	output (collector) TR2		

6. Ordering information

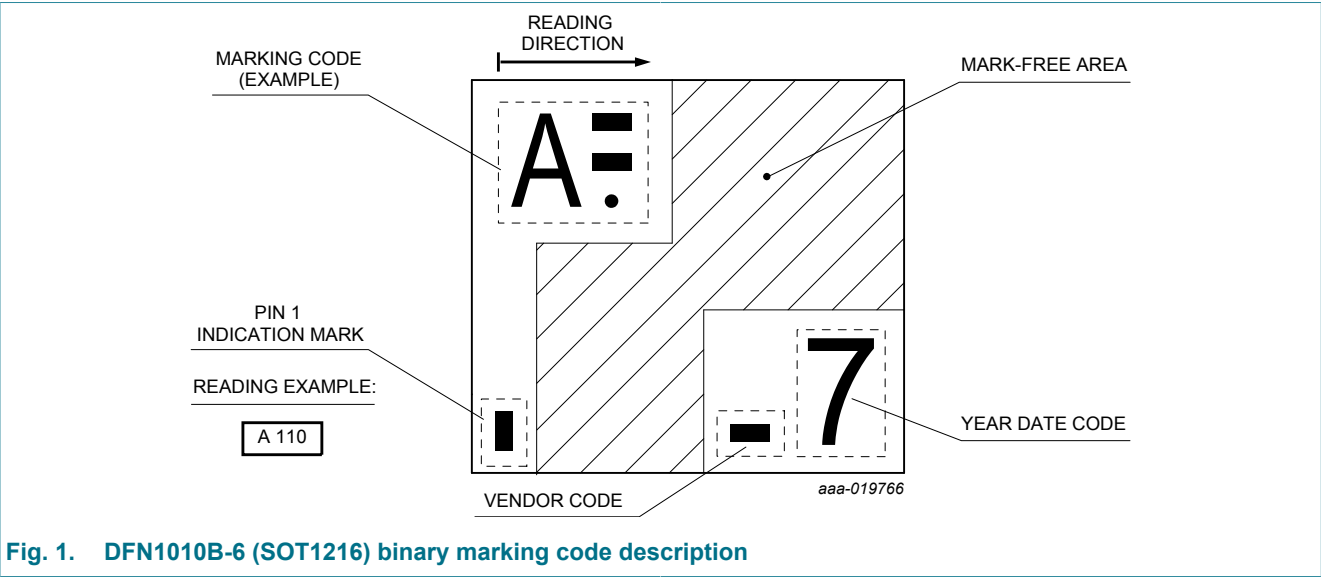
Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PQMH10	DFN1010B-6	DFN1010B-6: plastic thermal enhanced ultra thin small outline package; no leads; 6 terminals	SOT1216

7. Marking

Table 4. Marking codes

Type number	Marking code
PQMH10	A 011

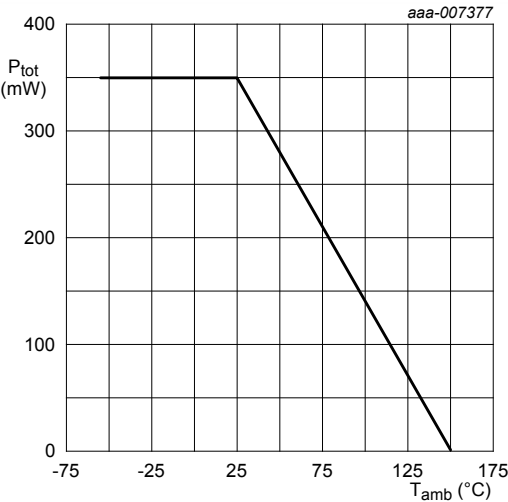


8. Limiting values

Table 5. Limiting values  
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
Per transistor						
V <sub>CBO</sub>	collector-base voltage	open emitter		-	50	V
V <sub>CEO</sub>	collector-emitter voltage	open base		-	50	V
V <sub>EBO</sub>	emitter-base voltage	open collector		-	5	V
V <sub>I</sub>	input voltage	positive		-	12	V
		negative		-	-5	V
I <sub>O</sub>	output current			-	100	mA
I <sub>CM</sub>	peak collector current			-	100	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1]	-	230	mW
Per device						
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1]	-	350	mW
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-55	150	°C
T <sub>stg</sub>	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

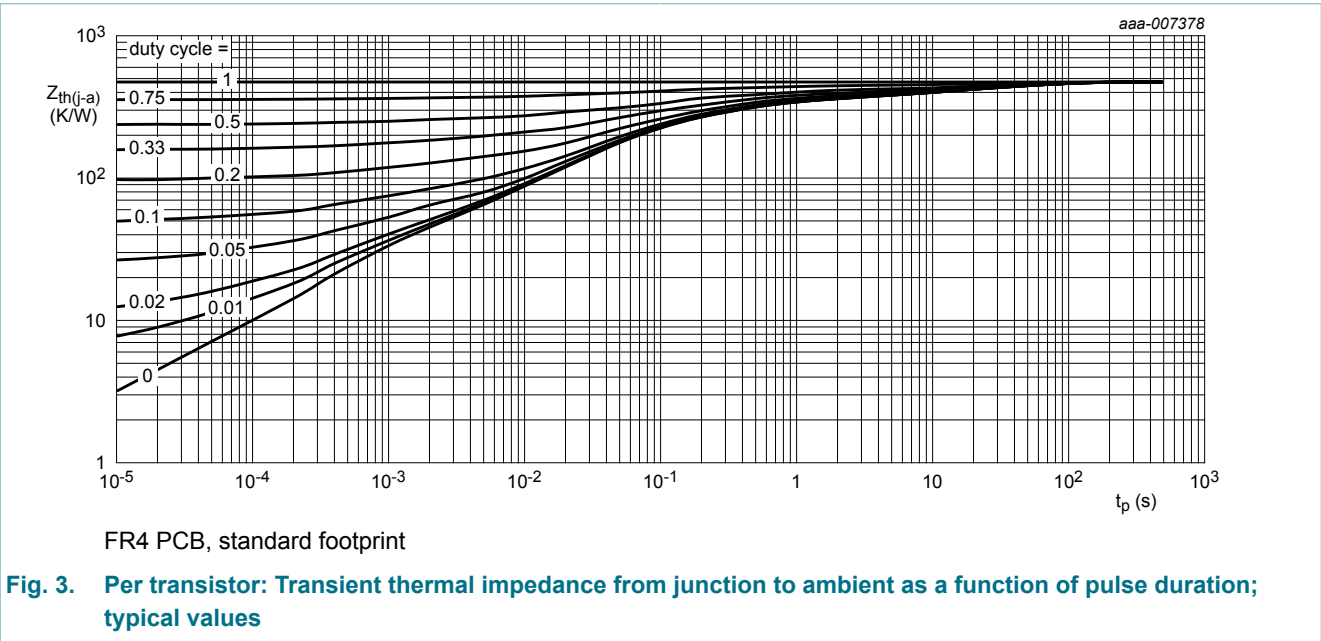
Fig. 2. Per device: Power derating curve

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per transistor							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	543	K/W
Per device							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	357	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
<b>Per transistor</b>							
$I_{CBO}$	collector-base cut-off current (emitter open)	$V_{CB} = 50\text{ V}$ ; $I_E = 0\text{ A}$ ; $T_{amb} = 25\text{ °C}$		-	-	100	nA
$I_{CEO}$	collector-emitter cut-off current (base open)	$V_{CE} = 30\text{ V}$ ; $I_B = 0\text{ A}$ ; $T_{amb} = 25\text{ °C}$		-	-	1	μA
		$V_{CE} = 30\text{ V}$ ; $I_B = 0\text{ A}$ ; $T_{amb} = 150\text{ °C}$		-	-	5	μA
$I_{EBO}$	emitter-base cut-off current (collector open)	$V_{EB} = 5\text{ V}$ ; $I_C = 0\text{ A}$ ; $T_{amb} = 25\text{ °C}$		-	-	180	μA
$h_{FE}$	DC current gain	$V_{CE} = 5\text{ V}$ ; $I_C = 10\text{ mA}$ ; $T_{amb} = 25\text{ °C}$		100	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 5\text{ mA}$ ; $I_B = 0.25\text{ mA}$ ; $T_{amb} = 25\text{ °C}$		-	-	100	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = 5\text{ V}$ ; $I_C = 100\text{ μA}$ ; $T_{amb} = 25\text{ °C}$		-	0.6	0.5	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = 0.3\text{ V}$ ; $I_C = 5\text{ mA}$ ; $T_{amb} = 25\text{ °C}$		1.1	0.75	-	V
R1	bias resistor 1	$T_{amb} = 25\text{ °C}$	[1]	1.54	2.2	2.86	kΩ
R2/R1	bias resistor ratio		[1]	17	21	26	
$C_C$	collector capacitance	$V_{CB} = 10\text{ V}$ ; $I_E = 0\text{ A}$ ; $f = 1\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$		-	-	2.5	pF
$f_T$	transition frequency	$V_{CE} = 5\text{ V}$ ; $I_C = 10\text{ mA}$ ; $f = 100\text{ MHz}$ ; $T_{amb} = 25\text{ °C}$	[2]	-	230	-	MHz

[1] See section "Test information" for resistor calculation and test conditions.

[2] Characteristics of built-in transistor

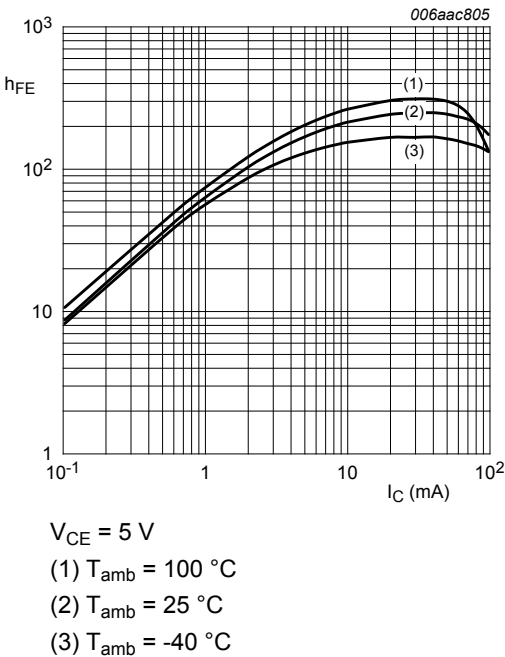


Fig. 4. DC current gain as a function of collector current; typical values

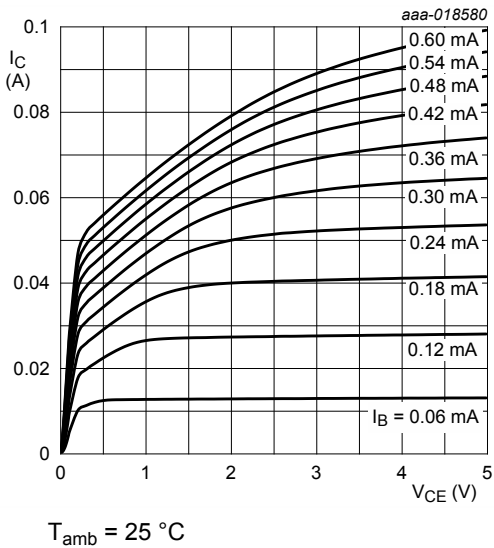


Fig. 5. Collector current as a function of collector-emitter voltage; typical values

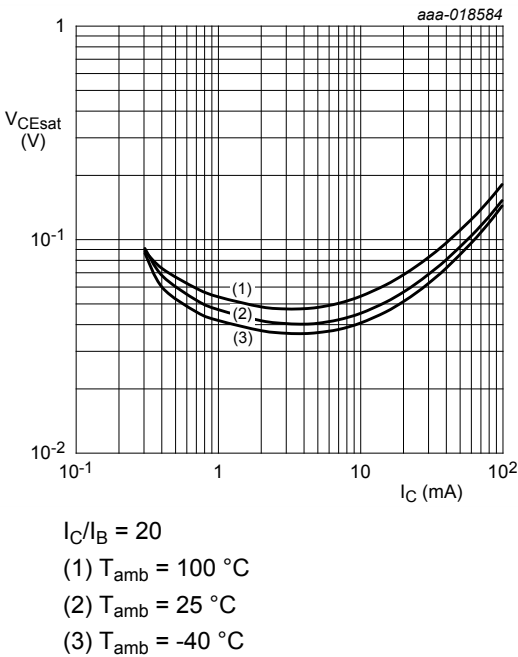


Fig. 6. Collector-emitter saturation voltage as a function of collector current; typical values

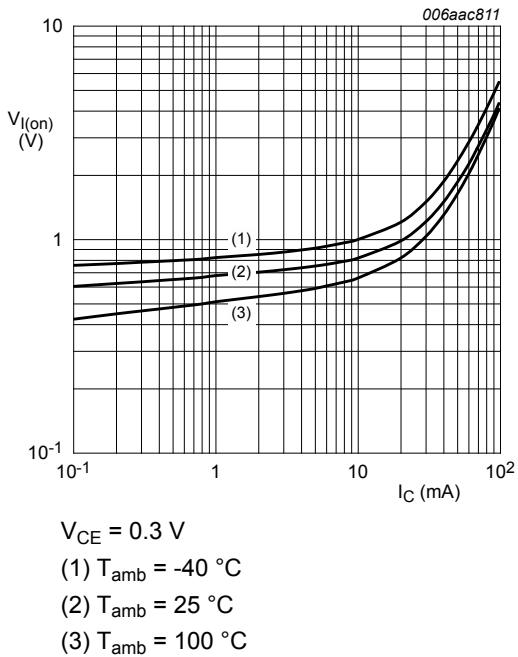
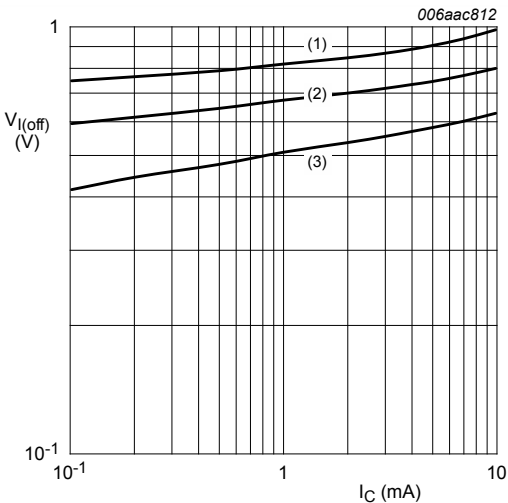
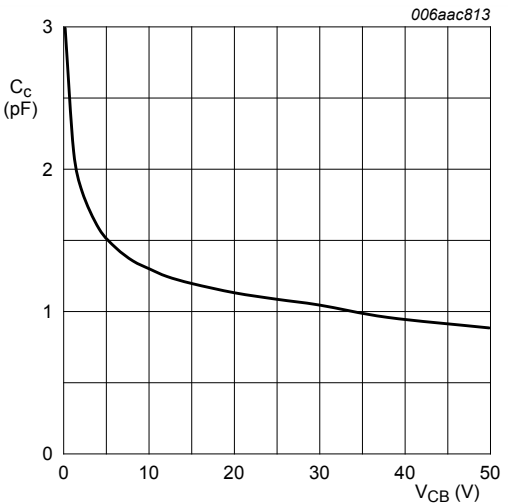


Fig. 7. On-state input voltage as a function of collector current; typical values



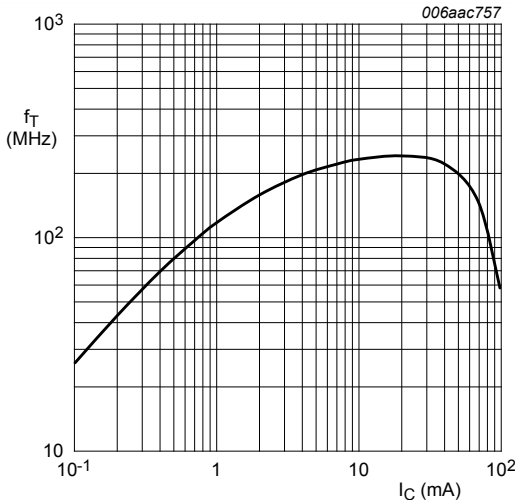
$V_{CE} = 5\text{ V}$   
(1)  $T_{amb} = -40^\circ\text{C}$   
(2)  $T_{amb} = 25^\circ\text{C}$   
(3)  $T_{amb} = 100^\circ\text{C}$

Fig. 8. Off-state input voltage as a function of collector current; typical values



$f = 1\text{ MHz}$ ;  $T_{amb} = 25^\circ\text{C}$

Fig. 9. Collector capacitance as a function of collector-base voltage; typical values



$V_{CE} = 5\text{ V}$ ;  $T_{amb} = 25^\circ\text{C}$

Fig. 10. Transition frequency as a function of collector current; typical values of built-in transistor

## 11. Test information

### 11.1 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.



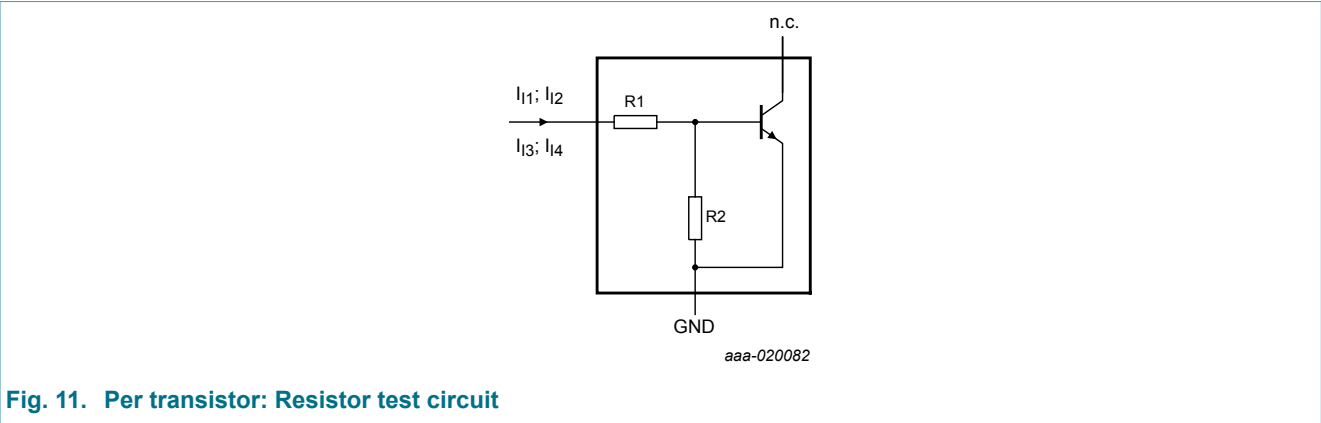
11.2 Resistor calculation

- Calculation of bias resistor 1 (R1)

$$R1 = \frac{V(I12) - V(I11)}{I12 - I11}$$

- Calculation of bias resistor ratio (R2/R1)

$$\frac{R2}{R1} = \frac{V(I14) - V(I13)}{R1 \cdot (I14 - I13)} - 1$$

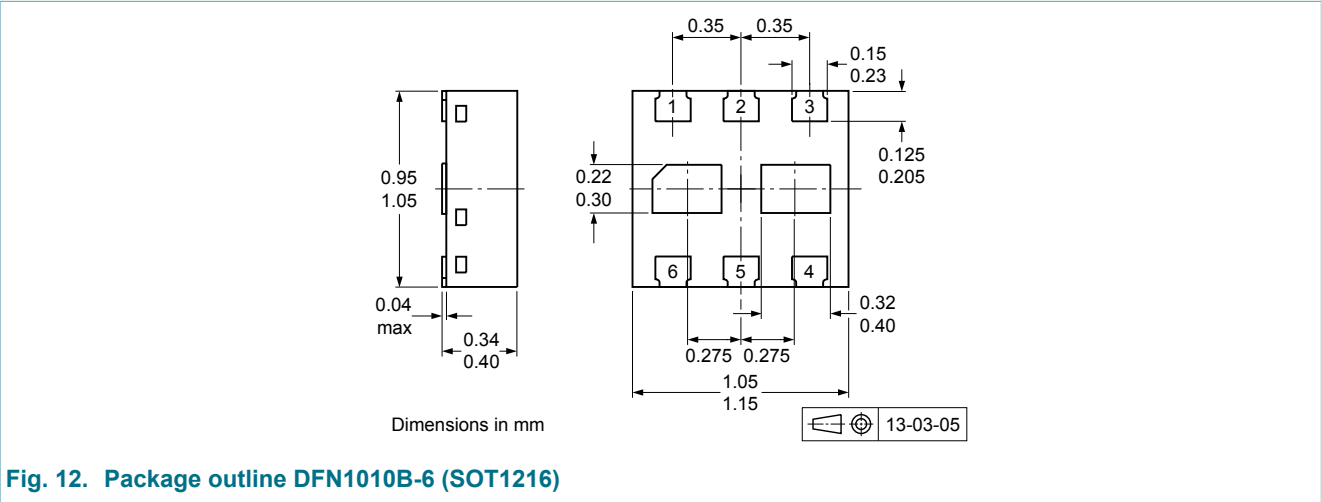


11.3 Resistor test conditions

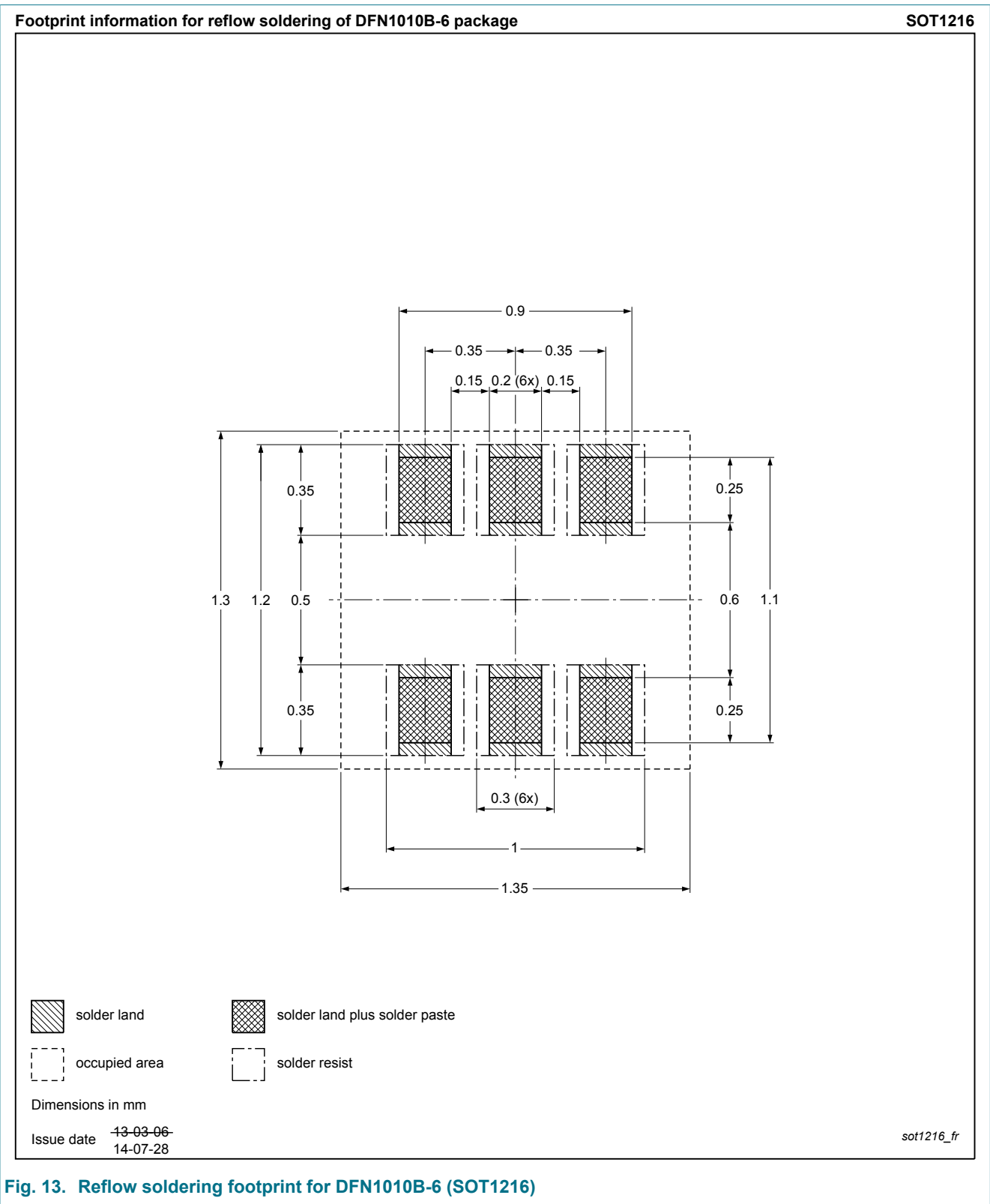
Table 8. Resistor test conditions

R1 (kΩ)	R2 (kΩ)	Test conditions				
		I11	I12	I13	I14	
2.2	47	90 μA	140 μA	-55 μA	-105 μA	

12. Package outline



13. Soldering



14. Revision history

Table 9. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PQMH10 v.1	20151104	Product data sheet	-	-

## 15. Legal information

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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.
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Date of release: 04 November 2015



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**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
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