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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

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PEMB11; PUMB11

PNP/PNP resistor-equipped transistors;
R1 = 10 k Ω , R2 = 10 k Ω

Rev. 3 — 30 November 2011

Product data sheet

1. Product profile

1.1 General description

PNP/PNP Resistor-Equipped Transistors (RET) in Surface-Mounted Device (SMD) plastic packages.

Table 1. Product overview

Type number	Package		NPN/PNP complement	NPN/NPN complement	Package configuration
	NXP	JEITA			
PEMB11	SOT666	-	PEMD3	PEMH11	ultra small and flat lead
PUMB11	SOT363	SC-88	PUMD3	PUMH11	very small

1.2 Features and benefits

- 100 mA output current capability
- Built-in bias resistors
- Simplifies circuit design
- Reduces component count
- Reduces pick and place costs
- AEC-Q101 qualified

1.3 Applications

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

1.4 Quick reference data

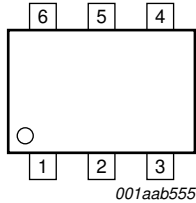
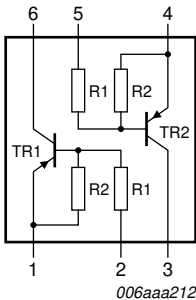
Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
V _{CEO}	collector-emitter voltage	open base	-	-	-50	V
I _O	output current		-	-	-100	mA
R1	bias resistor 1 (input)		7	10	13	k Ω
R2/R1	bias resistor ratio		0.8	1.0	1.2	



2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	GND (emitter) TR1		
2	input (base) TR1		
3	output (collector) TR2		
4	GND (emitter) TR2		
5	input (base) TR2		
6	output (collector) TR1		

3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
PEMB11	-	plastic surface-mounted package; 6 leads	SOT666
PUMB11	SC-88	plastic surface-mounted package; 6 leads	SOT363

4. Marking

Table 5. Marking codes

Type number	Marking code ^[1]
PEMB11	B1
PUMB11	B*1

[1] * = placeholder for manufacturing site code.

5. Limiting values

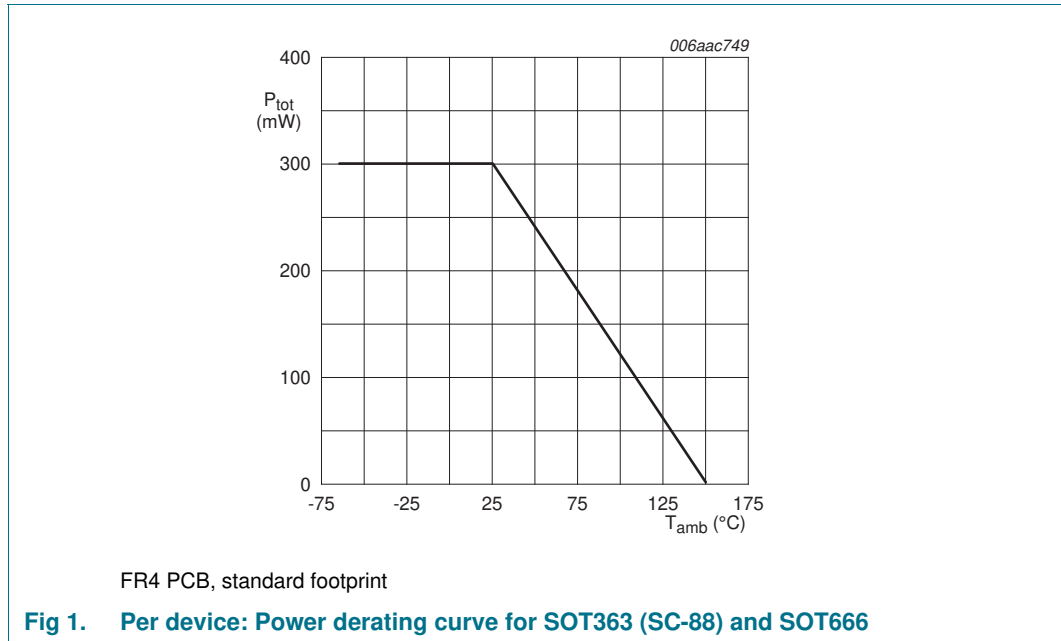
Table 6. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit	
Per transistor						
V _{CBO}	collector-base voltage	open emitter	-	-50	V	
V _{CEO}	collector-emitter voltage	open base	-	-50	V	
V _{EBO}	emitter-base voltage	open collector	-	-10	V	
V _I	input voltage					
	positive		-	+10	V	
	negative		-	-40	V	
I _O	output current		-	-100	mA	
I _{CM}	peak collector current		-	-100	mA	
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]			
	PEMB11 (SOT666)		[2]	-	200	mW
	PUMB11 (SOT363)		-	-	200	mW
Per device						
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[1]			
	PEMB11 (SOT666)		[2]	-	300	mW
	PUMB11 (SOT363)		-	-	300	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.

[2] Reflow soldering is the only recommended soldering method.



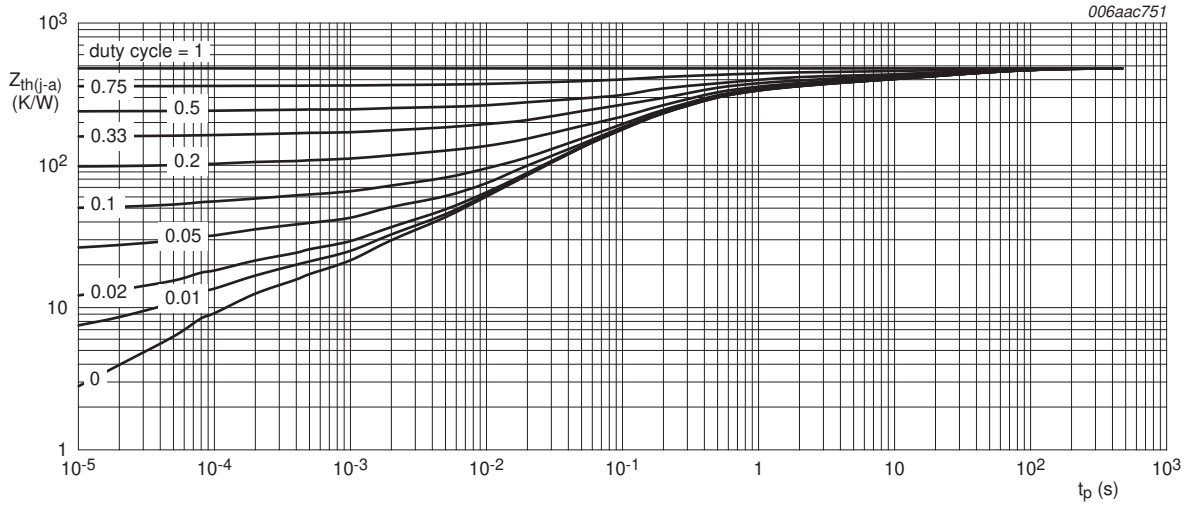
6. Thermal characteristics

Table 7. 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]			
	PEMB11 (SOT666)		[2]	-	625	K/W
	PUMB11 (SOT363)		-	-	625	K/W
Per device						
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]			
	PEMB11 (SOT666)		[2]	-	417	K/W
	PUMB11 (SOT363)		-	-	417	K/W

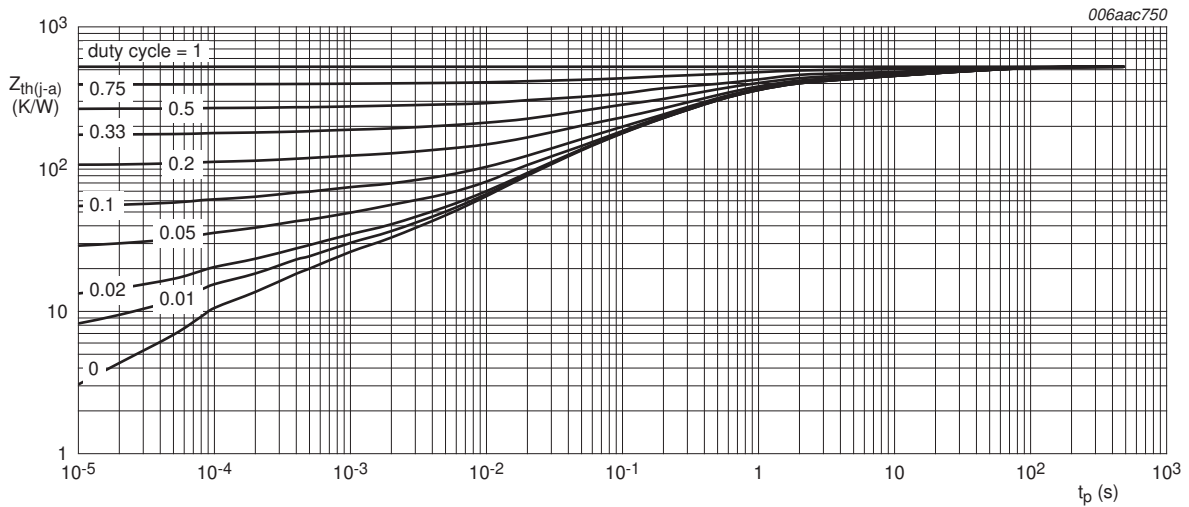
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Reflow soldering is the only recommended soldering method.



FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration for PEMB11 (SOT666); typical values



FR4 PCB, standard footprint

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for PUMB11 (SOT363); typical values

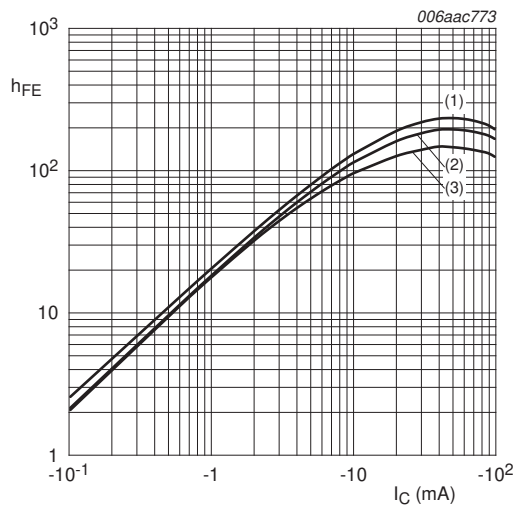
7. Characteristics

Table 8. Characteristics

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

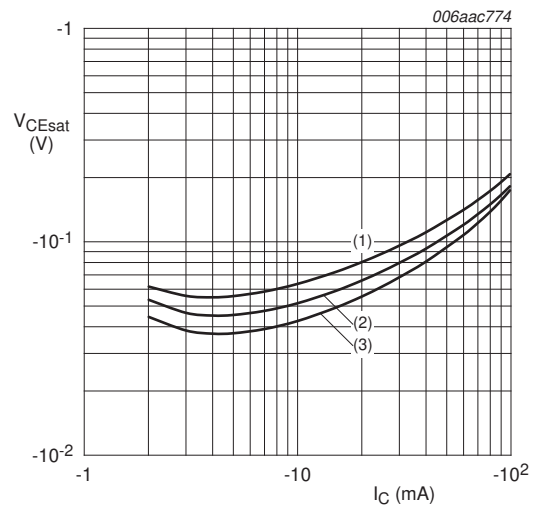
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per transistor						
I_{CBO}	collector-base cut-off current	$V_{CB} = -50\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = -30\text{ V}; I_B = 0\text{ A}$	-	-	-1	μA
		$V_{CE} = -30\text{ V}; I_B = 0\text{ A}; T_j = 150\text{ °C}$	-	-	-5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V}; I_C = 0\text{ A}$	-	-	-400	μA
h_{FE}	DC current gain	$V_{CE} = -5\text{ V}; I_C = -5\text{ mA}$	-30	-	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -10\text{ mA}; I_B = -0.5\text{ mA}$	-	-	-150	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5\text{ V}; I_C = -100\text{ μA}$	-	-1.1	-0.8	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3\text{ V}; I_C = -10\text{ mA}$	-2.5	-1.8	-	V
R1	bias resistor 1 (input)		7	10	13	kΩ
R2/R1	bias resistor ratio		0.8	1.0	1.2	
C_c	collector capacitance	$V_{CB} = -10\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$	-	-	3	pF
f_T	transition frequency	$V_{CB} = -5\text{ V}; I_C = -10\text{ mA}; f = 100\text{ MHz}$	[1]	-	180	MHz

[1] Characteristics of built-in transistor.



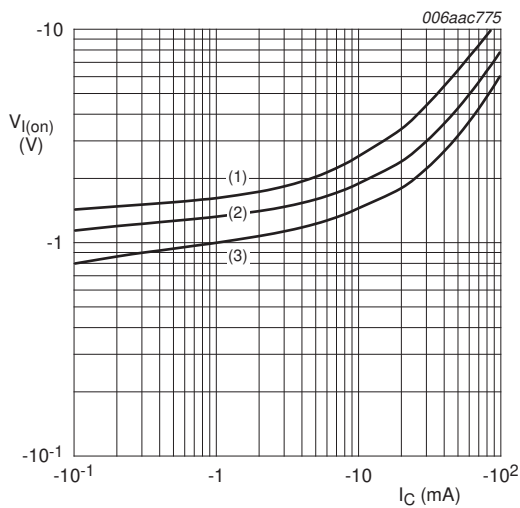
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -40\text{ °C}$

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



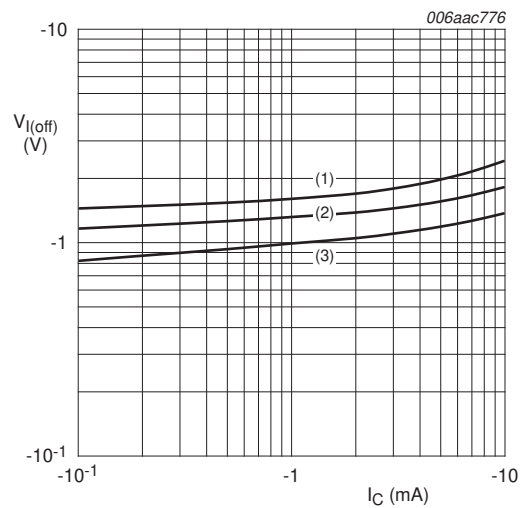
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = -40\text{ °C}$

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



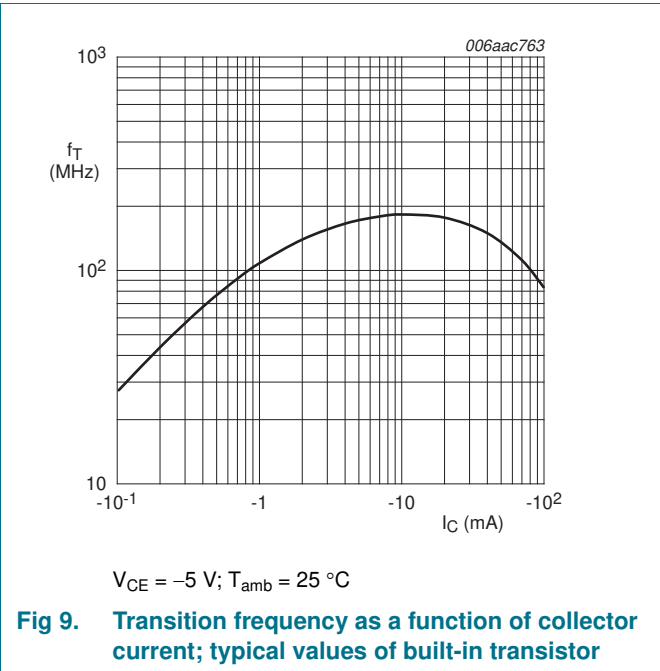
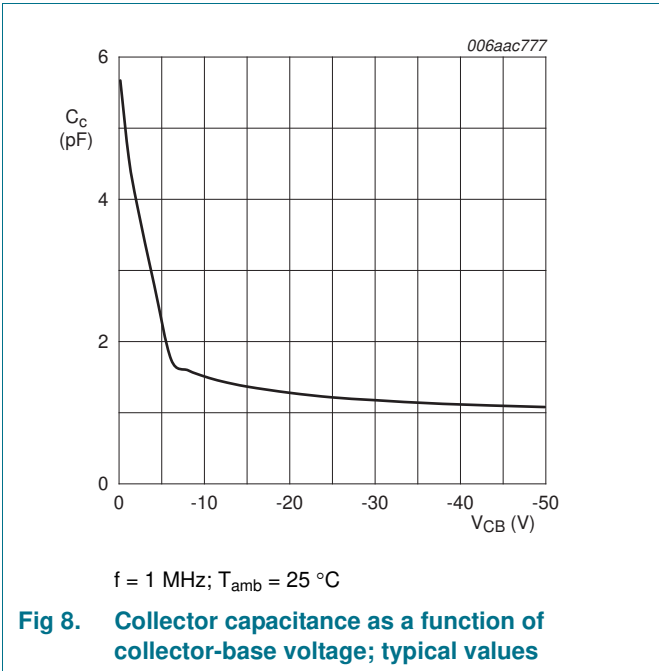
$V_{CE} = -0.3\text{ V}$
 (1) $T_{amb} = -40\text{ °C}$
 (2) $T_{amb} = 25\text{ °C}$
 (3) $T_{amb} = 100\text{ °C}$

Fig 6. On-state input voltage as a function of collector current; typical values



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

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

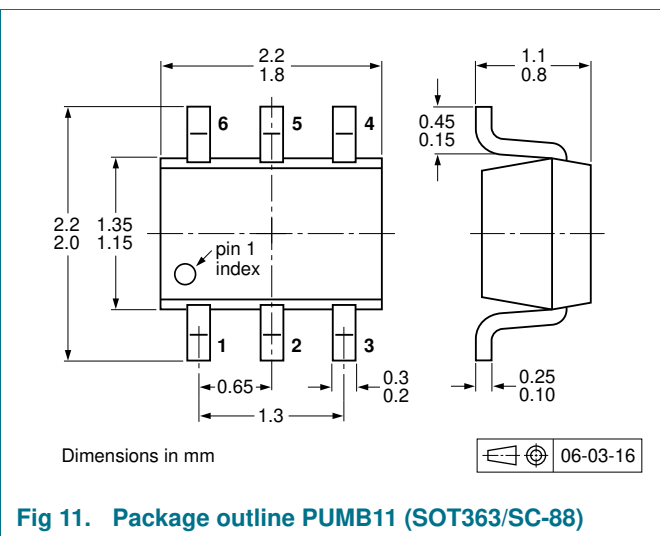
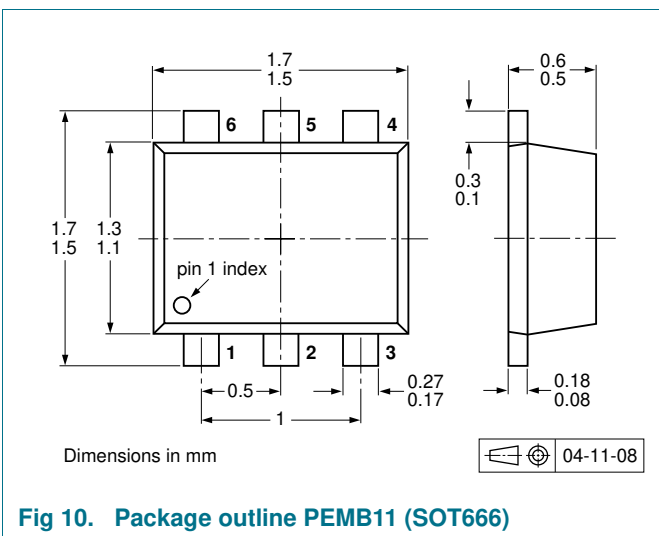


8. Test information

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 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

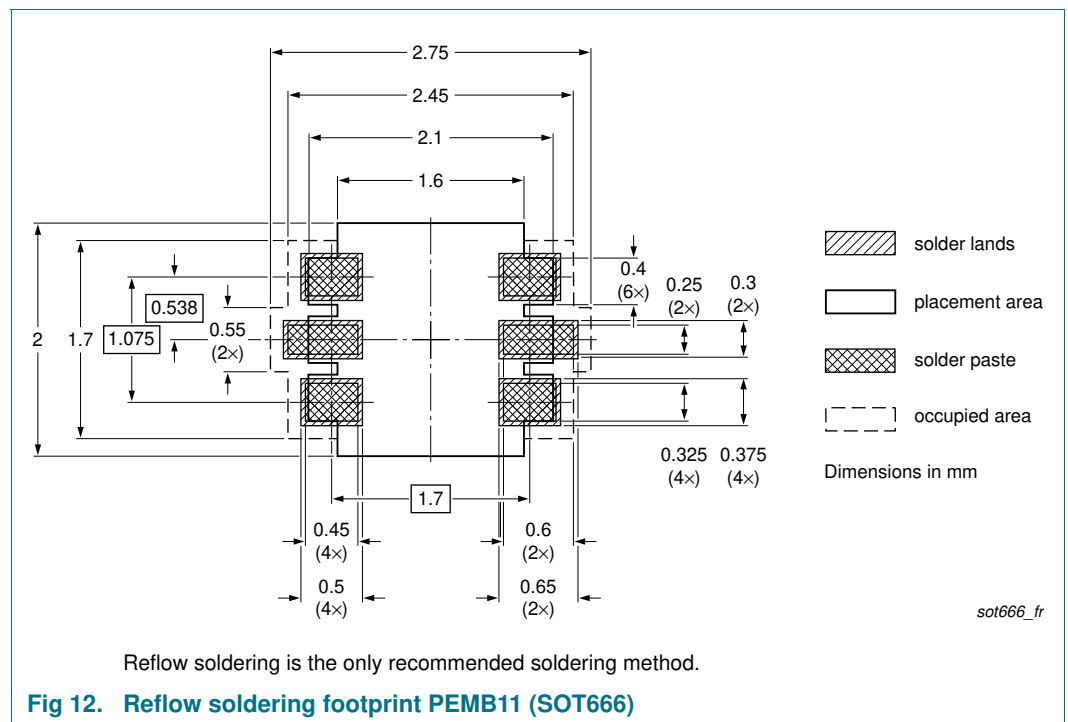
Type number	Package	Description	Packing quantity			
			3000	4000	8000	10000
PEMB11	SOT666	2 mm pitch, 8 mm tape and reel	-	-	-315	-
		4 mm pitch, 8 mm tape and reel	-	-115	-	-
PUMB11	SOT363	4 mm pitch, 8 mm tape and reel; T1 ^[2]	-115	-	-	-135
		4 mm pitch, 8 mm tape and reel; T2 ^[3]	-125	-	-	-165

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

[2] T1: normal taping

[3] T2: reverse taping

11. Soldering



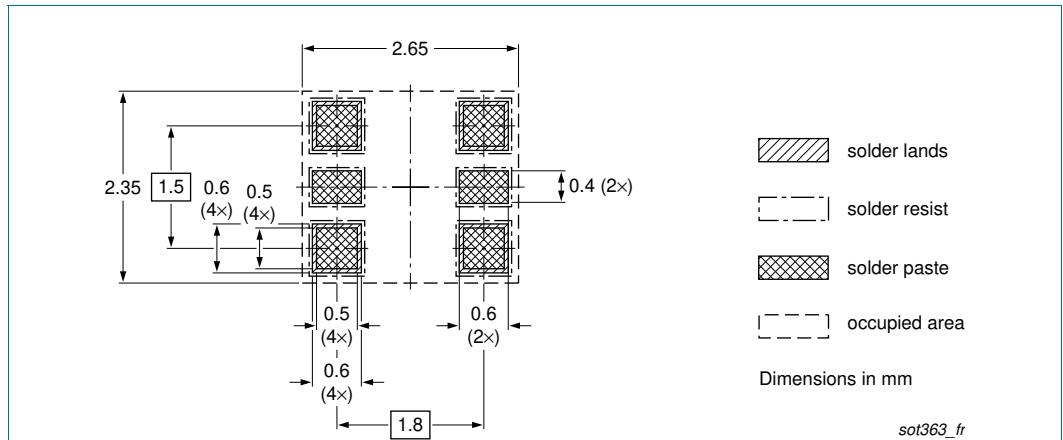


Fig 13. Reflow soldering footprint PUMB11 (SOT363/SC-88)

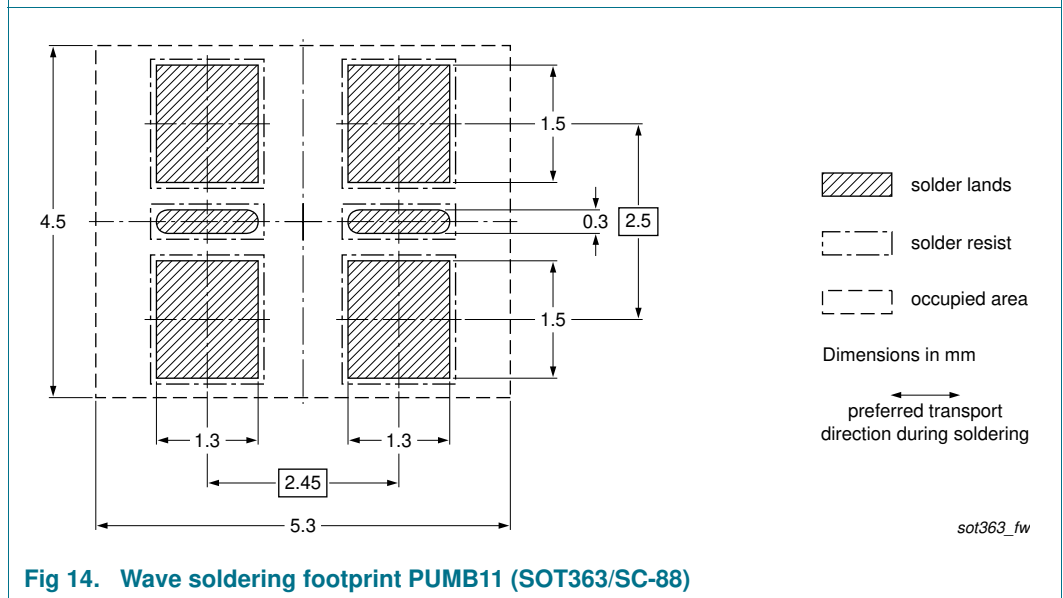


Fig 14. Wave soldering footprint PUMB11 (SOT363/SC-88)

12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PEMB11_PUMB11 v.3	20111130	Product data sheet	-	PEMB11_PUMB11 v.2
Modifications:	<ul style="list-style-type: none"> • The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Section 1 “Product profile”: updated • Section 4 “Marking”: updated • Table 7 “Thermal characteristics”: updated according to the latest measurements • Table 8 “Characteristics”: I_{CEO} updated according to the latest measurements, V_{i(on)} and V_{i(off)} changed respectively to V_{I(on)} and V_{I(off)}, f_T added • Figure 1 to 9: added • Section 8 “Test information”: added • Figure 11 and 10: replaced by minimized package outline drawings • Section 10 “Packing information”: added • Section 11 “Soldering”: added • Section 13 “Legal information”: updated 			
PEMB11_PUMB11 v.2	20031003	Product data sheet	-	PEMB11 v.1 PUMB11 v.1
PEMB11 v.1	20010913	Preliminary specification	-	-
PUMB11 v.1	20000808	Product specification	-	-

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.
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".

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15. Contents

1 Product profile 1

1.1 General description 1

1.2 Features and benefits 1

1.3 Applications 1

1.4 Quick reference data 1

2 Pinning information 2

3 Ordering information 2

4 Marking 2

5 Limiting values 3

6 Thermal characteristics 4

7 Characteristics 6

8 Test information 8

8.1 Quality information 8

9 Package outline 8

10 Packing information 9

11 Soldering 9

12 Revision history 11

13 Legal information 12

13.1 Data sheet status 12

13.2 Definitions 12

13.3 Disclaimers 12

13.4 Trademarks 13

14 Contact information 13

15 Contents 14

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