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Kind regards,

Team Nexperia

BAV756S; BAW56 series

High-speed switching diodes

Rev. 6 — 18 March 2015 Product data sheet

1. Product profile

1.1 General description

High-speed switching diodes, encapsulated in small Surface-Mounted Device (SMD) plastic packages.

Table 1. Product overview

Type number	Package			Package configuration	Configuration
	NXP	JEITA	JEDEC		
BAV756S	SOT363	SC-88	-	very small	quadruple common anode/common cathode
BAW56	SOT23	-	TO-236AB	small	dual common anode
BAW56M	SOT883	SC-101	-	leadless ultra small	dual common anode
BAW56S	SOT363	SC-88	-	very small	quadruple common anode/common anode
BAW56T	SOT416	SC-75	-	ultra small	dual common anode
BAW56W	SOT323	SC-70	-	very small	dual common anode

1.2 Features and benefits

- High switching speed: $t_{rr} \leq 4$ ns
- Low leakage current
- Small SMD plastic packages
- Low capacitance: $C_d \leq 2$ pF
- Reverse voltage: $V_R \leq 90$ V
- AEC-Q101 qualified

1.3 Applications

- High-speed switching
- General-purpose switching

1.4 Quick reference data

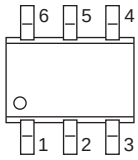
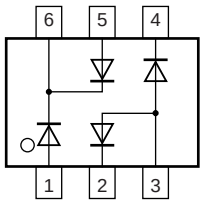
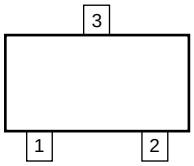
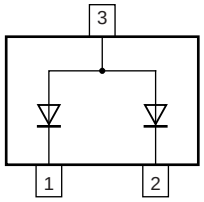
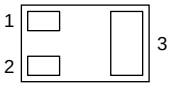
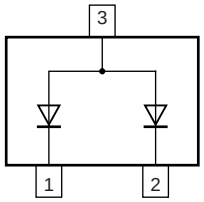
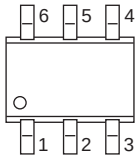
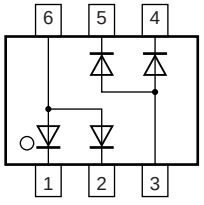
Table 2. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
I_R	reverse current	V_R = 80 V	-	-	0.5	µA
V_R	reverse voltage		-	-	90	V
t_{rr}	reverse recovery time	[1]	-	-	4	ns

[1] When switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA.

2. Pinning information

Table 3. Pinning

Pin	Description	Simplified outline	Symbol
BAV756S			
1	anode (diode 1)		 006aab103
2	cathode (diode 2)		
3	common anode (diode 2 and diode 3)		
4	cathode (diode 3)		
5	anode (diode 4)		
6	common cathode (diode 1 and diode 4)		
BAW56; BAW56T; BAW56W			
1	cathode (diode 1)	 006aaa144	 006aab099
2	cathode (diode 2)		
3	common anode		
BAW56M			
1	cathode (diode 1)	 Transparent top view	 006aab099
2	cathode (diode 2)		
3	common anode		
BAW56S			
1	cathode (diode 1)		 006aab102
2	cathode (diode 2)		
3	common anode (diode 3 and diode 4)		
4	cathode (diode 3)		
5	cathode (diode 4)		
6	common anode (diode 1 and diode 2)		

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3. Ordering information

Table 4. Ordering information

Type number	Package		
	Name	Description	Version
BAV756S	SC-88	plastic surface-mounted package; 6 leads	SOT363
BAW56	-	plastic surface-mounted package; 3 leads	SOT23
BAW56M	SC-101	leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm	SOT883
BAW56S	SC-88	plastic surface-mounted package; 6 leads	SOT363
BAW56T	SC-75	plastic surface-mounted package; 3 leads	SOT416
BAW56W	SC-70	plastic surface-mounted package; 3 leads	SOT323

4. Marking

Table 5. Marking codes

Type number	Marking code[1]
BAV756S	A7*
BAW56	A1*
BAW56M	S5
BAW56S	A1*
BAW56T	A1
BAW56W	A1*

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

5. Limiting values

Table 6. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
Per diode					
V_{RRM}	repetitive peak reverse voltage		-	90	V
V_R	reverse voltage		-	90	V
I_F	forward current				
	BAV756S	T_s = 60 °C	-	250	mA
	BAW56	$T_{amb} \leq$ 25 °C	-	215	mA
	BAW56M	$T_{amb} \leq$ 25 °C	-	150	mA
	BAW56S	T_s = 60 °C	-	250	mA
	BAW56T	T_s = 90 °C	-	150	mA
	BAW56W	$T_{amb} \leq$ 25 °C	-	150	mA

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Table 6. Limiting values *...continued*

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

Symbol	Parameter	Conditions	Min	Max	Unit
I_{FRM}	repetitive peak forward current		-	500	mA
I_{FSM}	non-repetitive peak forward current	square wave [1]			
		t_p = 1 μs	-	4	A
		t_p = 1 ms	-	1	A
		t_p = 1 s	-	0.5	A
P_{tot}	total power dissipation	[2]			
	BAV756S	T_s = 60 °C	-	350	mW
	BAW56	$T_{amb} \leq$ 25 °C	-	250	mW
	BAW56M	$T_{amb} \leq$ 25 °C [3]	-	250	mW
	BAW56S	T_s = 60 °C	-	350	mW
	BAW56T	T_s = 90 °C [4]	-	170	mW
	BAW56W	$T_{amb} \leq$ 25 °C	-	200	mW
Per device					
I_F	forward current				
	BAV756S	T_s = 60 °C	-	100	mA
	BAW56	$T_{amb} \leq$ 25 °C	-	125	mA
	BAW56M	$T_{amb} \leq$ 25 °C	-	75	mA
	BAW56S	T_s = 60 °C	-	100	mA
	BAW56T	T_s = 90 °C	-	75	mA
	BAW56W	$T_{amb} \leq$ 25 °C	-	130	mA
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		−65	+150	°C
T_{stg}	storage temperature		−65	+150	°C

[1] T_j = 25 °C prior to surge.

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

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

[4] Single diode loaded.

6. Thermal characteristics

Table 7. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air [1]				
	BAW56		-	-	500	K/W
	BAW56M	[2]	-	-	500	K/W
	BAW56W		-	-	625	K/W

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Table 7. Thermal characteristics *…continued*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point					
	BAV756S		-	-	255	K/W
	BAW56		-	-	360	K/W
	BAW56S		-	-	255	K/W
	BAW56T		-	-	350	K/W
	BAW56W		-	-	300	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.

7. Characteristics

Table 8. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
V_F	forward voltage	[1]				
		I_F = 1 mA	-	-	715	mV
		I_F = 10 mA	-	-	855	mV
		I_F = 50 mA	-	-	1	V
		I_F = 150 mA	-	-	1.25	V
I_R	reverse current	V_R = 25 V	-	-	30	nA
		V_R = 80 V	-	-	0.5	μA
		V_R = 25 V; T_j = 150 °C	-	-	30	μA
		V_R = 80 V; T_j = 150 °C	-	-	150	μA
C_d	diode capacitance	V_R = 0 V; f = 1 MHz	-	-	2	pF
t_{rr}	reverse recovery time	[2]	-	-	4	ns
V_{FR}	forward recovery voltage	[3]	-	-	1.75	V

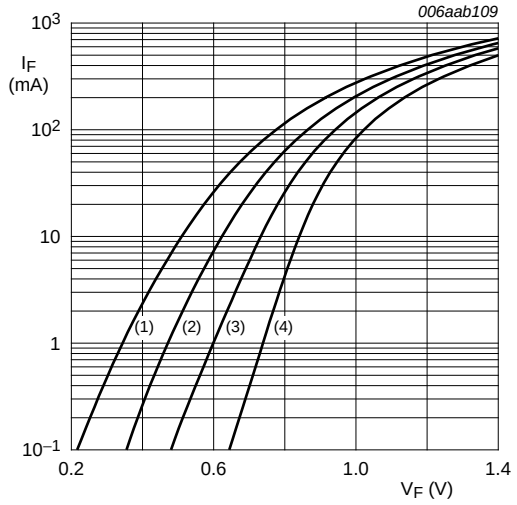
[1] Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.02$.

[2] When switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA.

[3] When switched from I_F = 10 mA; t_r = 20 ns.

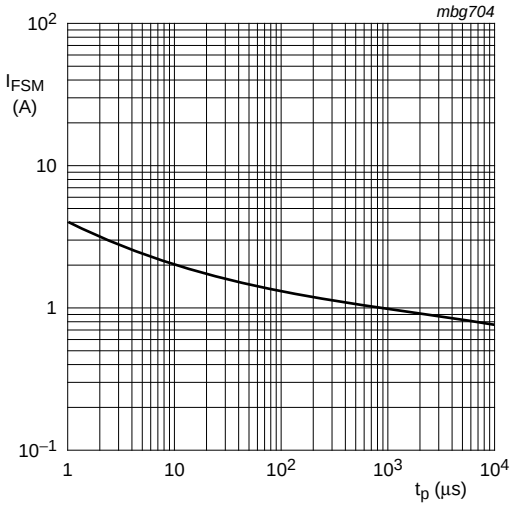
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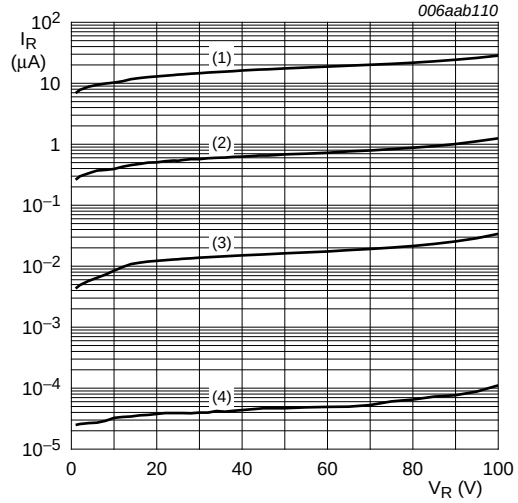
(1) T_{amb} = 150 °C
(2) T_{amb} = 85 °C
(3) T_{amb} = 25 °C
(4) T_{amb} = −40 °C

Fig 1. Forward current as a function of forward voltage; typical values



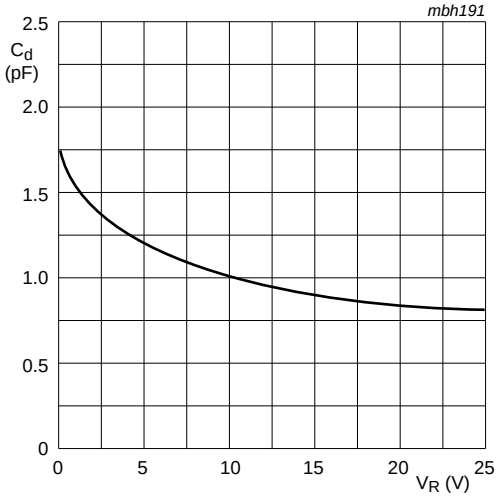
Based on square wave currents.
T_j = 25 °C; prior to surge

Fig 2. Non-repetitive peak forward current as a function of pulse duration; maximum values



(1) T_{amb} = 150 °C
(2) T_{amb} = 85 °C
(3) T_{amb} = 25 °C
(4) T_{amb} = −40 °C

Fig 3. Reverse current as a function of reverse voltage; typical values



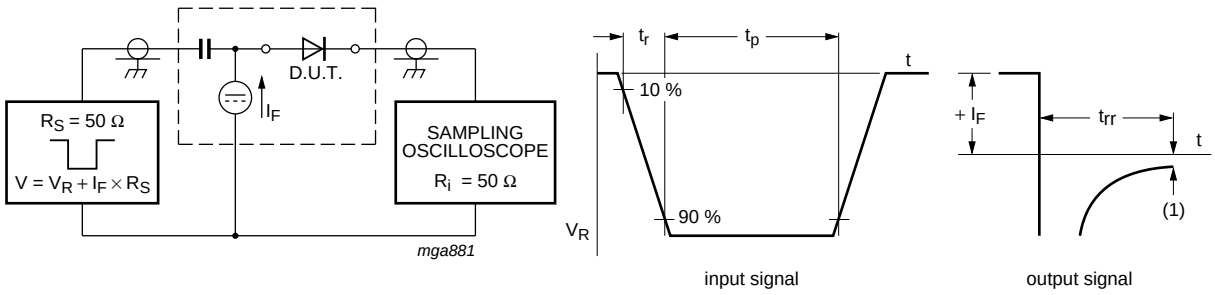
f = 1 MHz; T_{amb} = 25 °C

Fig 4. Diode capacitance as a function of reverse voltage; typical values

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8. Test information

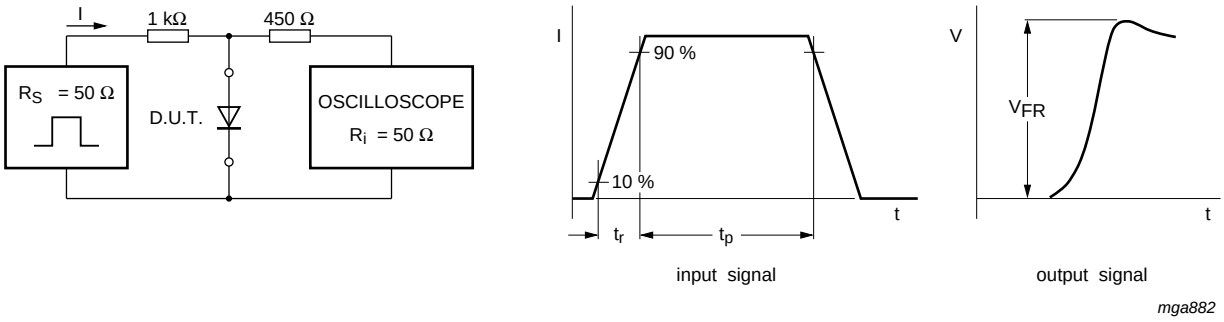


(1) I_R = 1 mA

Input signal: reverse pulse rise time t_r = 0.6 ns; reverse voltage pulse duration t_p = 100 ns; duty cycle δ = 0.05

Oscilloscope: rise time t_r = 0.35 ns

Fig 5. Reverse recovery time test circuit and waveforms



Input signal: forward pulse rise time t_r = 20 ns; forward current pulse duration $t_p \geq$ 100 ns; duty cycle $\delta \leq$ 0.005

Fig 6. Forward recovery voltage test circuit and waveforms

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.

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9. Package outline

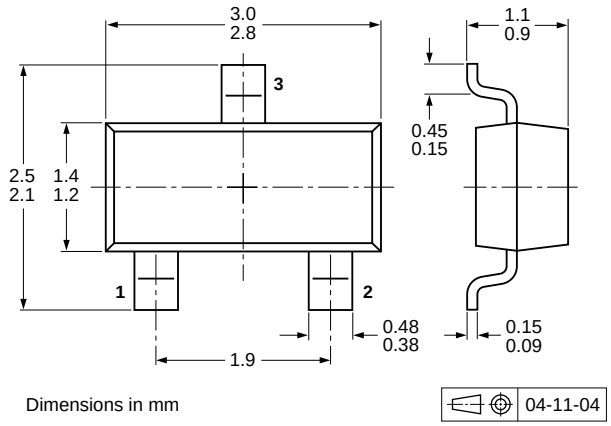


Fig 7. Package outline BAW56 (SOT23/TO-236AB)

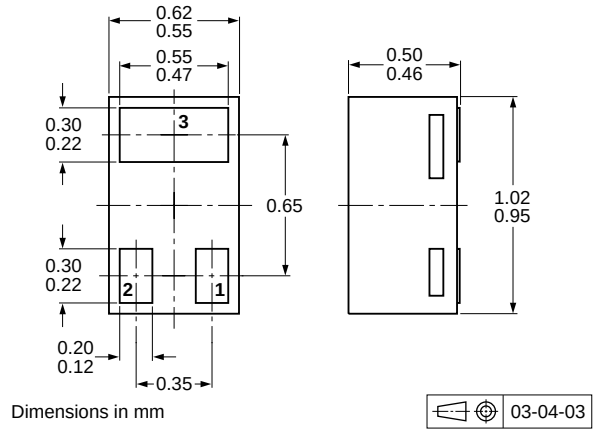


Fig 8. Package outline BAW56M (SOT883/SC-101)

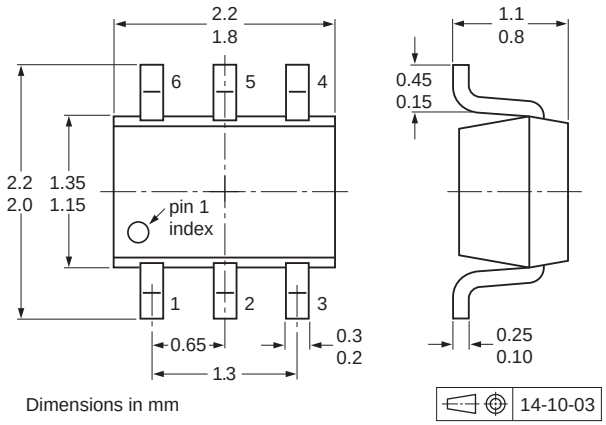


Fig 9. Package outline BAV756S and BAW56S (SOT363/SC-88)

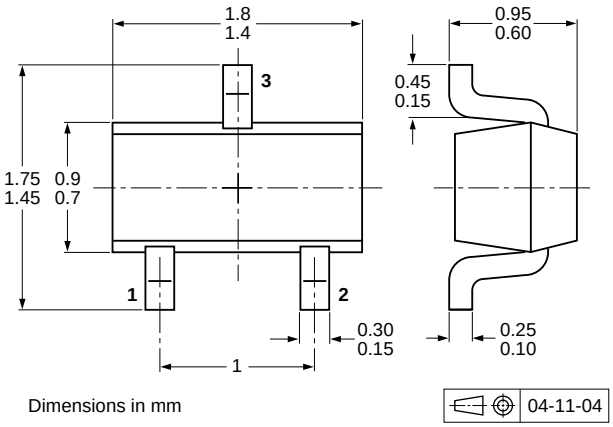


Fig 10. Package outline BAW56T (SOT416/SC-75)

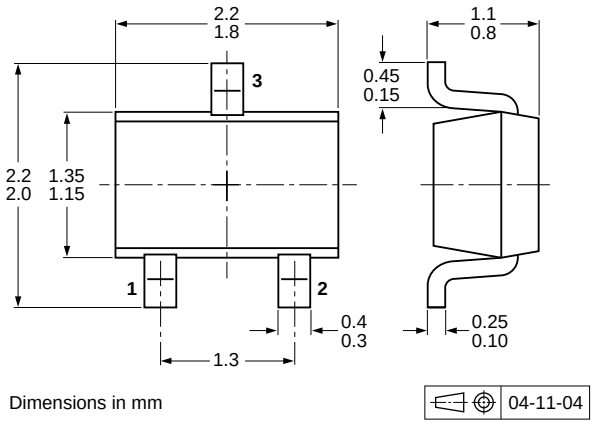


Fig 11. Package outline BAW56W (SOT323/SC-70)

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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	10000
BAV756S	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
BAW56	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
BAW56M	SOT883	2 mm pitch, 8 mm tape and reel	-	-315
BAW56S	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
BAW56T	SOT416	4 mm pitch, 8 mm tape and reel	-115	-135
BAW56W	SOT323	4 mm pitch, 8 mm tape and reel	-115	-135

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

[2] T1: normal taping

[3] T2: reverse taping

11. Soldering

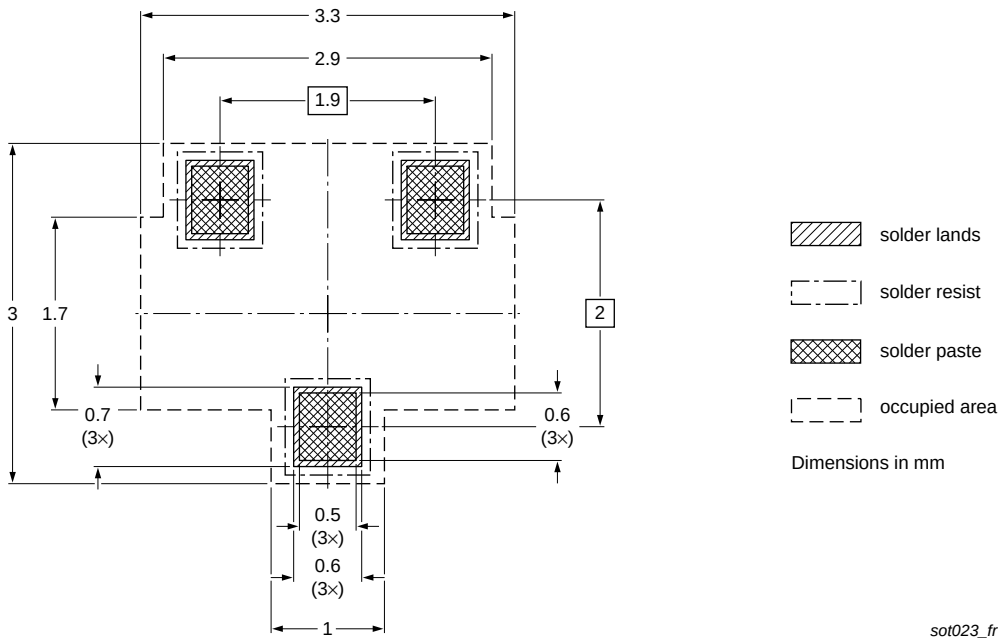


Fig 12. Reflow soldering footprint BAW56 (SOT23/TO-236AB)

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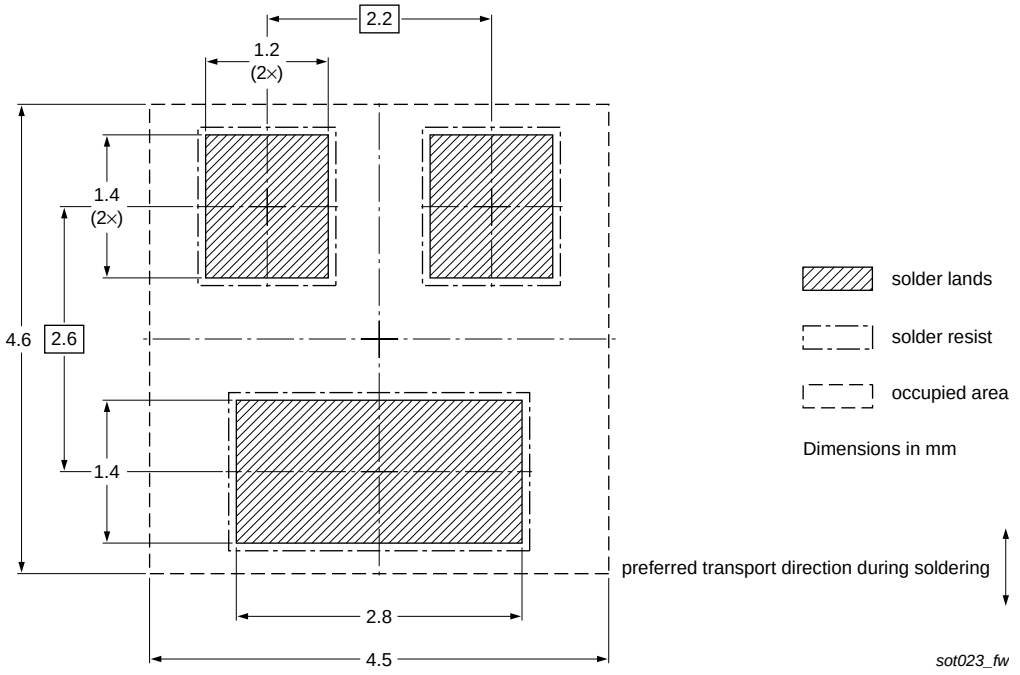
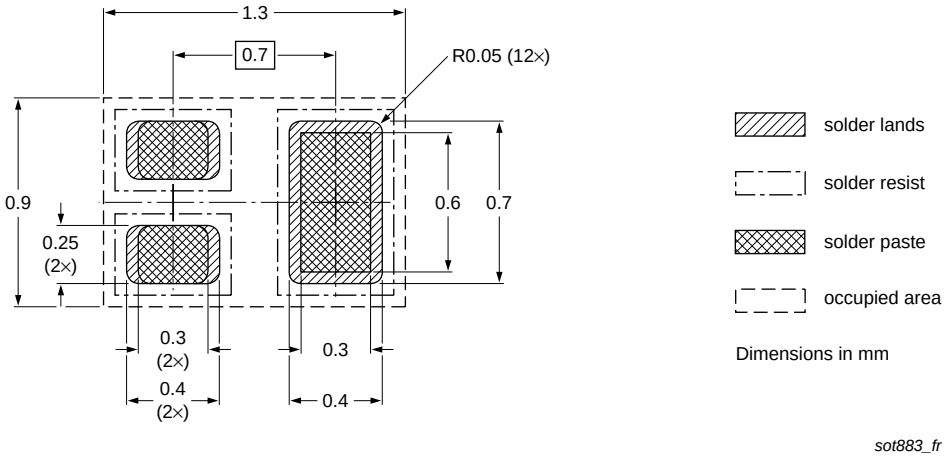


Fig 13. Wave soldering footprint BAW56 (SOT23/TO-236AB)



Reflow soldering is the only recommended soldering method.

Fig 14. Reflow soldering footprint BAW56M (SOT883/SC-101)

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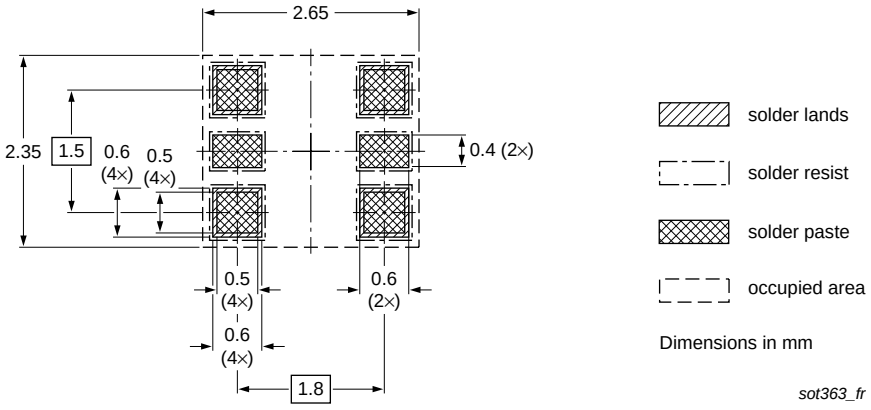


Fig 15. Reflow soldering footprint BAV756S and BAW56S (SOT363/SC-88)

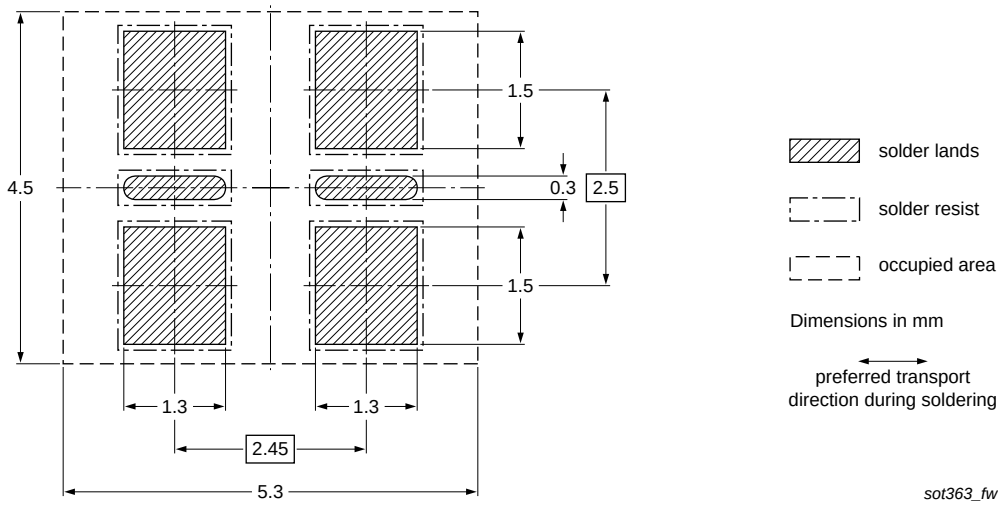


Fig 16. Wave soldering footprint BAV756S and BAW56S (SOT363/SC-88)

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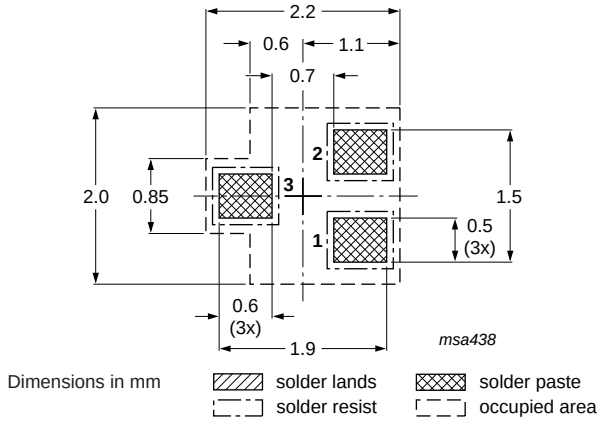


Fig 17. Reflow soldering footprint BAW56T (SOT416/SC-75)

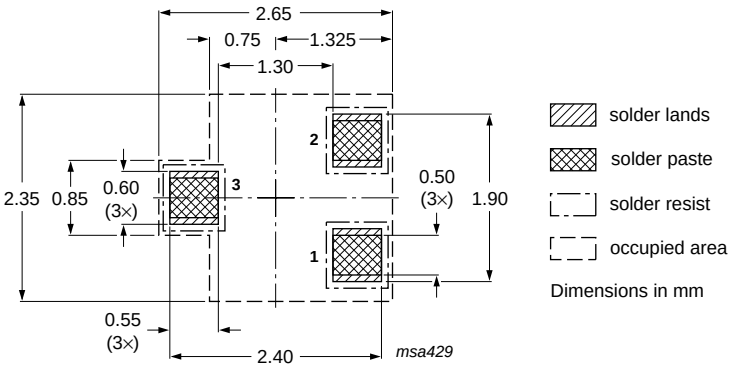


Fig 18. Reflow soldering footprint BAW56W (SOT323/SC-70)

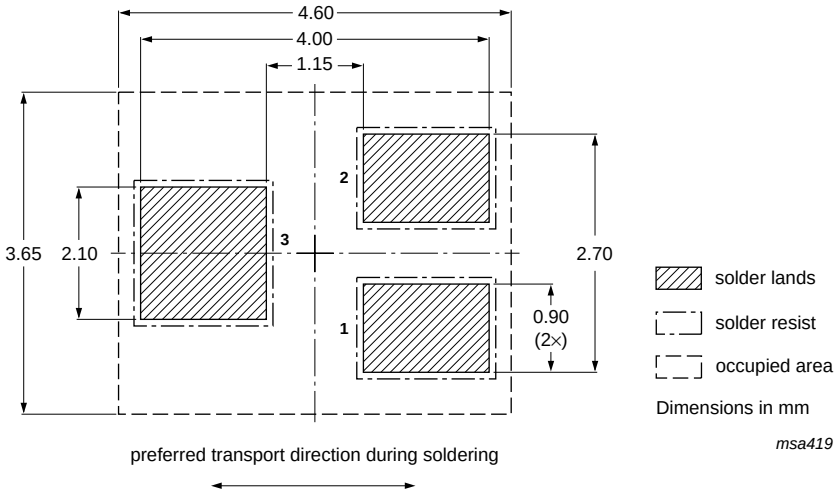


Fig 19. Wave soldering footprint BAW56W (SOT323/SC-70)

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12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BAV756S_BAW56_SER v.6	20150318	Product data sheet	-	BAV756S_BAW56_SER_5
Modifications:	• The format of this data sheet 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.			
BAV756S_BAW56_SER_5	20071126	Product data sheet	-	BAV756S_2 BAW56_4 BAW56S_2 BAW56T_2 BAW56W_4
BAV756S_2	19971021	Product specification	-	BAV756S_1
BAW56_4	20030325	Product specification	-	BAW56_3
BAW56S_2	19971021	Product specification	-	BAW56S_1
BAW56T_2	19971219	Product specification	-	-
BAW56W_4	19990511	Product specification	-	BAW56W_3

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