BAW56SRA

Quad high-speed switching diodes

14 September 2018 **Product data sheet**

1. General description

Quad high-speed switching diodes with common anode configurations encapsulated in a leadless ultra small DFN1412-6 (SOT1268) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

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

3. Applications

- High-speed switching
- General-purpose switching

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
I_F	forward current	single diode loaded; T_{amb} = 25 °C	[1]	-	-	375	mA
I_R	reverse current	V_R = 80 V; pulsed; T_j = 25 °C		-	-	0.5	µA
V_F	forward voltage	I_F = 150 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_j = 25 °C		-	-	1.25	V
V_R	reverse voltage	T_j = 25 °C		-	-	90	V
t_{rr}	reverse recovery time	I_F = 10 mA; I_R = 10 mA; R_L = 100 Ω; $I_{R(meas)}$ = 1 mA; T_{amb} = 25 °C		-	-	4	ns

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

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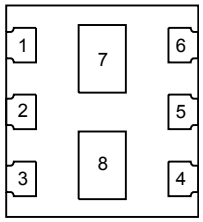
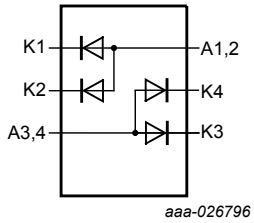
5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 Transparent top view DFN1412-6 (SOT1268)	
2	K2	cathode (diode 2)		
3	A3,4	com. anode (diodes 3, 4)		
4	K3	cathode (diode 3)		
5	K4	cathode (diode 4)		
6	A1,2	com. anode (diodes 1, 2)		
7	A1,2	com. anode (diodes 1, 2)		
8	A3,4	com. anode (diodes 3, 4)		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAW56SRA	DFN1412-6	plastic, thermal enhanced ultra thin small outline package; no leads; 6 terminals; 1.4 mm x 1.2 mm x 0.47 mm body	SOT1268

7. Marking

Table 4. Marking codes

Type number	Marking code
BAW56SRA	A2

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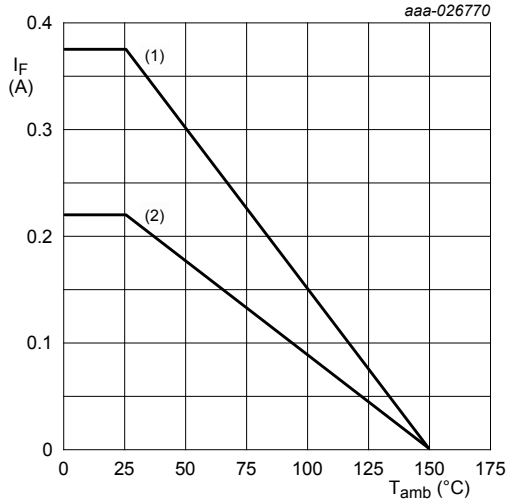
8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
Per diode						
V_R	reverse voltage	T_j = 25 °C		-	90	V
I_F	forward current	single diode loaded; T_{amb} = 25 °C	[1]	-	375	mA
		double diodes loaded; T_{amb} = 25 °C	[1]	-	220	mA
I_{FSM}	non-repetitive peak forward current	t_p = 100 µs; $T_{j(init)}$ = 25 °C; square wave		-	4	A
		t_p = 1 ms; $T_{j(init)}$ = 25 °C; square wave		-	1.5	A
		t_p = 1 s; $T_{j(init)}$ = 25 °C; square wave		-	0.5	A
I_{FRM}	repetitive peak forward current	$t_p \leq$ 0.5 ms; $\delta \leq$ 0.25		-	1	A
Per device; one diode loaded						
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[1]	-	410	mW
			[2]	-	610	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	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] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated mounting pad for cathode 1cm^2.



(1) single diode loaded
(2) double diode loaded

Fig. 1. Forward current as a function of ambient temperature; derating curve

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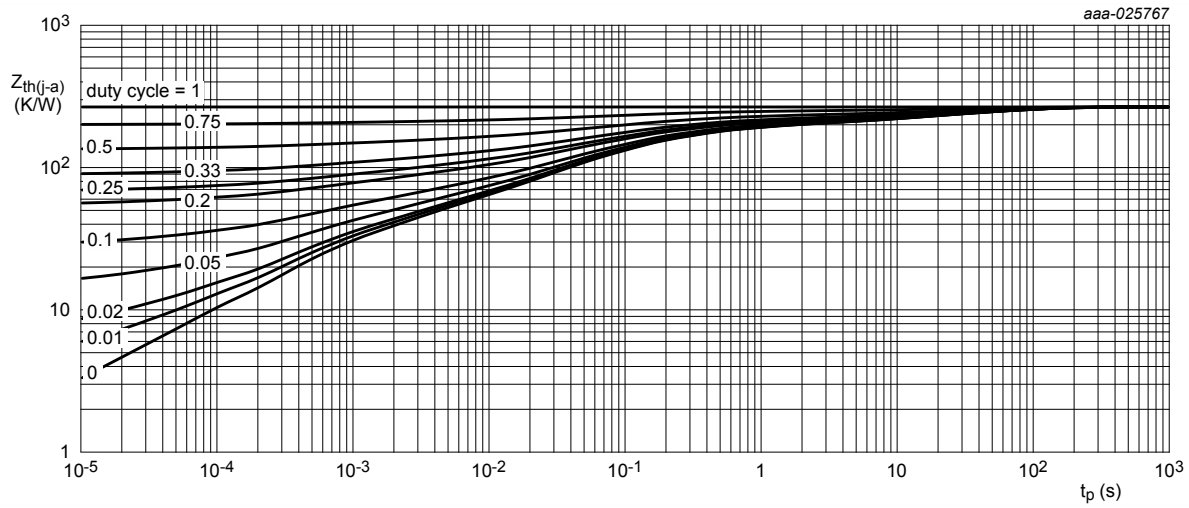
9. Thermal characteristics

Table 6. Thermal characteristics

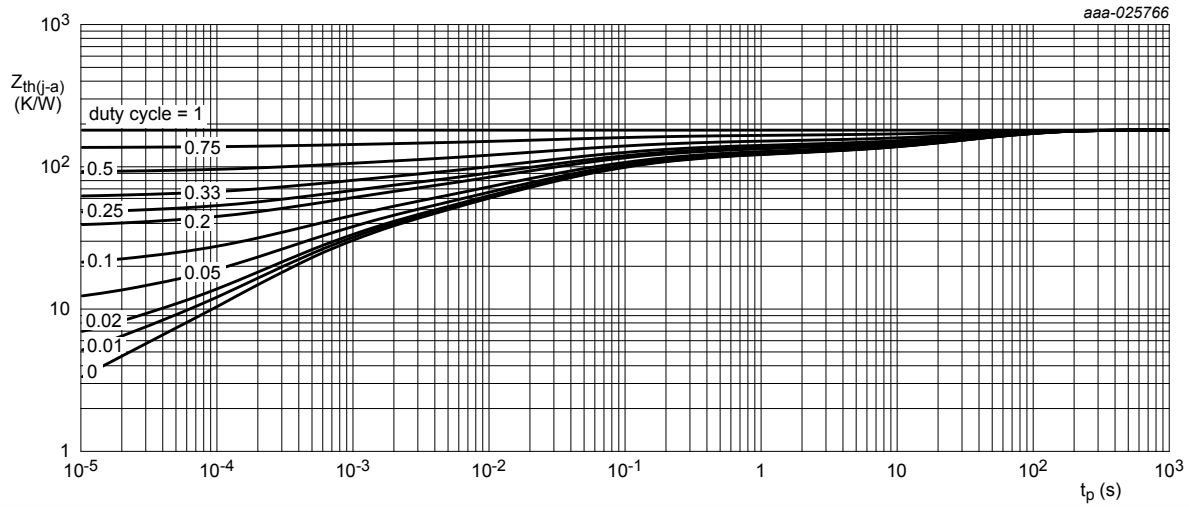
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	305	K/W
			[2]	-	-	205	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[3]	-	-	40	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated mounting pad for cathode 1cm^2.
[3] Soldering point of anode tab.



FR4 PCB, standard footprint

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



FR4 PCB, mounting pad for cathode 1 cm²

Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

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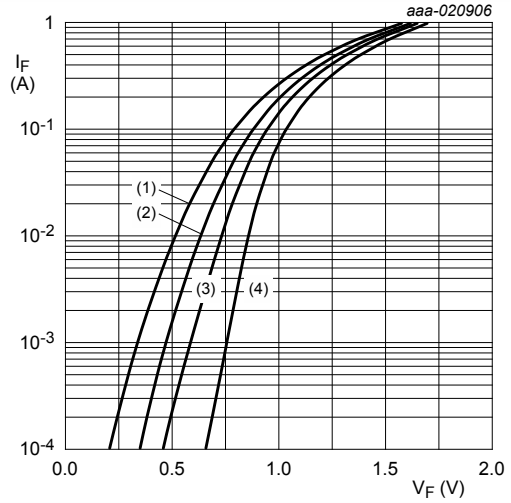
10. Characteristics

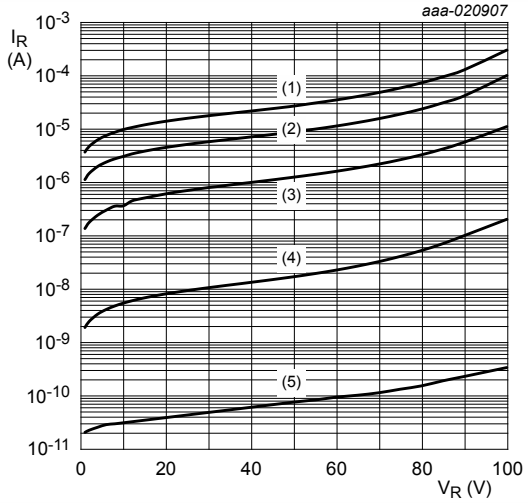
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
V_F	forward voltage	I_F = 1 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_j = 25 °C		-	-	715	mV
		I_F = 10 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_j = 25 °C		-	-	855	mV
		I_F = 50 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_j = 25 °C		-	-	1	V
		I_F = 150 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02; T_j = 25 °C		-	-	1.25	V
I_R	reverse current	V_R = 25 V; pulsed; T_j = 25 °C		-	-	30	nA
		V_R = 80 V; pulsed; T_j = 25 °C		-	-	0.5	µA
		V_R = 25 V; pulsed; T_j = 150 °C		-	-	30	µA
		V_R = 80 V; pulsed; T_j = 150 °C		-	-	150	µA
C_d	diode capacitance	V_R = 0 V; f = 1 MHz; T_j = 25 °C		-	-	2	pF
t_{rr}	reverse recovery time	I_F = 10 mA; I_R = 10 mA; R_L = 100 Ω; $I_{R(meas)}$ = 1 mA; T_{amb} = 25 °C		-	-	4	ns
V_{FRM}	peak forward recovery voltage	I_F = 10 mA; t_r = 20 ns		-	-	1.75	V



(1) T_j = 150 °C
(2) T_j = 85 °C
(3) T_j = 25 °C
(4) T_j = −40 °C

Fig. 4. Forward current as a function of forward voltage; typical values



(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

Fig. 5. Reverse current as a function of reverse voltage; typical values

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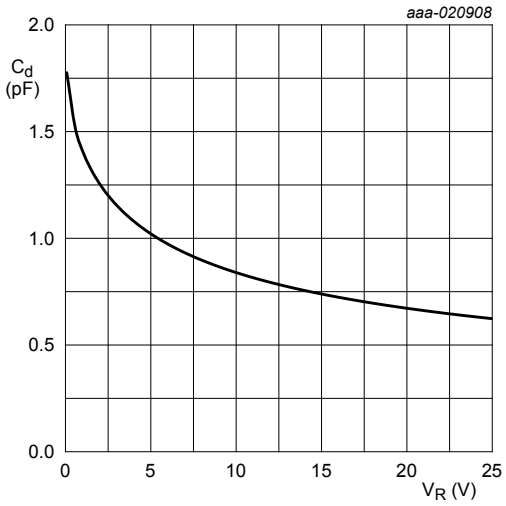
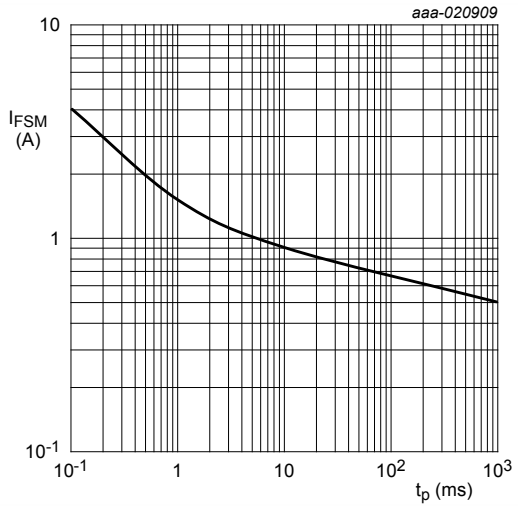


f = 1MHz; T_{amb} = 25 °C

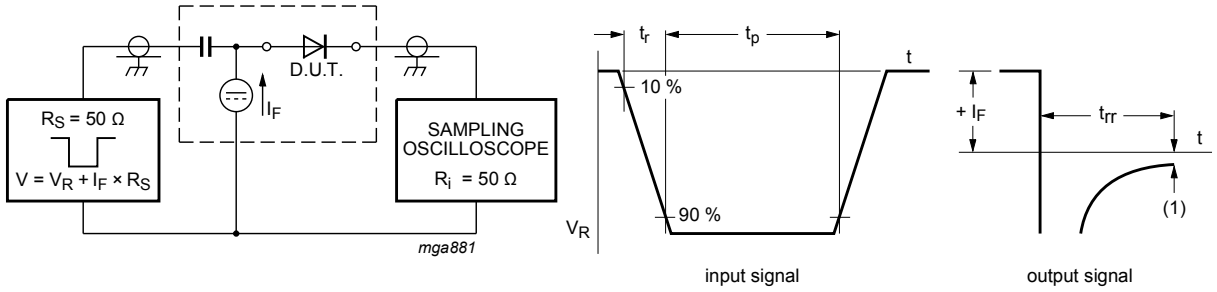
Fig. 6. Diode capacitance as a function of reverse voltage; typical values



Based on square wave currents.
T_{amb} = 25 °C

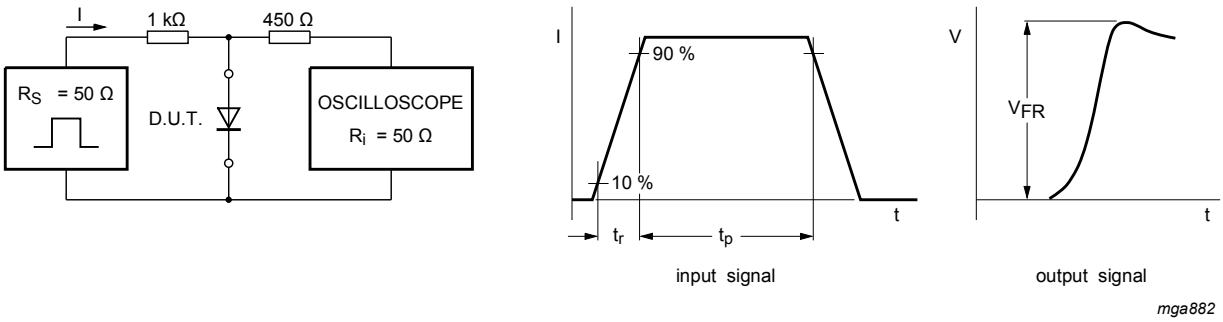
Fig. 7. Non-repetitive forward current as a function of pulse duration; maximum values

11. 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. 8. Reverse recovery time test circuit and waveforms



Input signal: forward pulse rise time t_r = 20 ns; forward current pulse duration t_p ≥ 100 ns; duty cycle δ ≤ 0.005

Fig. 9. Forward recovery voltage test circuit and waveforms

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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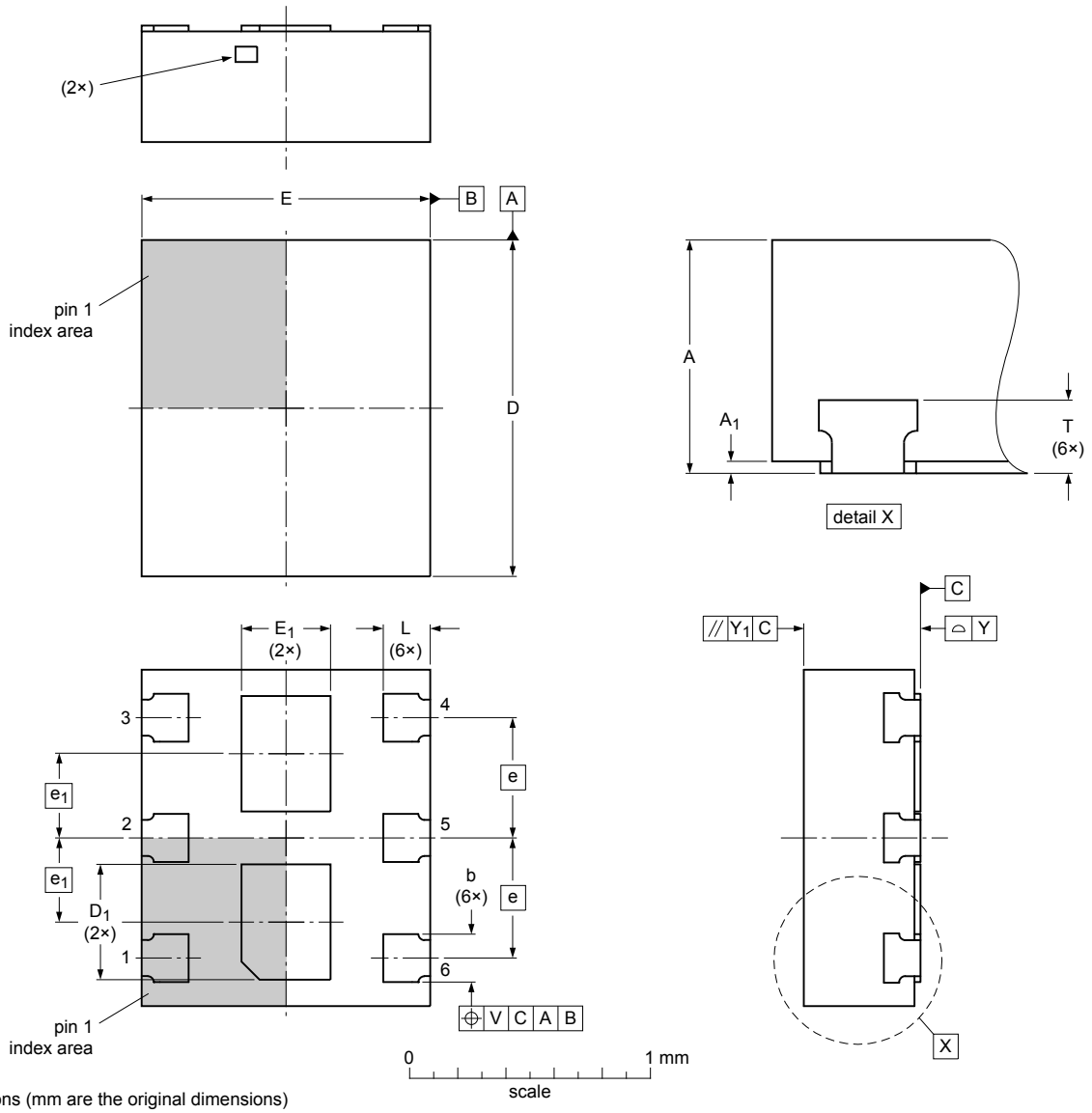
12. Package outline

DFN1412-6: plastic thermal enhanced ultra thin small outline package; no leads; 6 terminals; body: 1.4 x 1.2 x 0.47 mm **SOT1268**



Dimensions (mm are the original dimensions)

Unit[1]		A	A_1	b	D	D_1	E	E_1	e	e_1	L	T	V	Y	Y_1
mm	min	0.44	0.00	0.15	1.35	0.43	1.15	0.32			0.145	0.10			
	nom	0.47		0.20	1.40	0.48	1.20	0.37	0.5	0.35	0.195	0.16	0.1	0.05	0.05
	max	0.50	0.04	0.25	1.45	0.53	1.25	0.42			0.245	0.22			

Note
1. Dimension A is including plating thickness.

sot1268_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1268		- - -				~~18-08-23~~ 18-09-11

Fig. 10. Package outline DFN1412-6 (SOT1268)

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13. Soldering

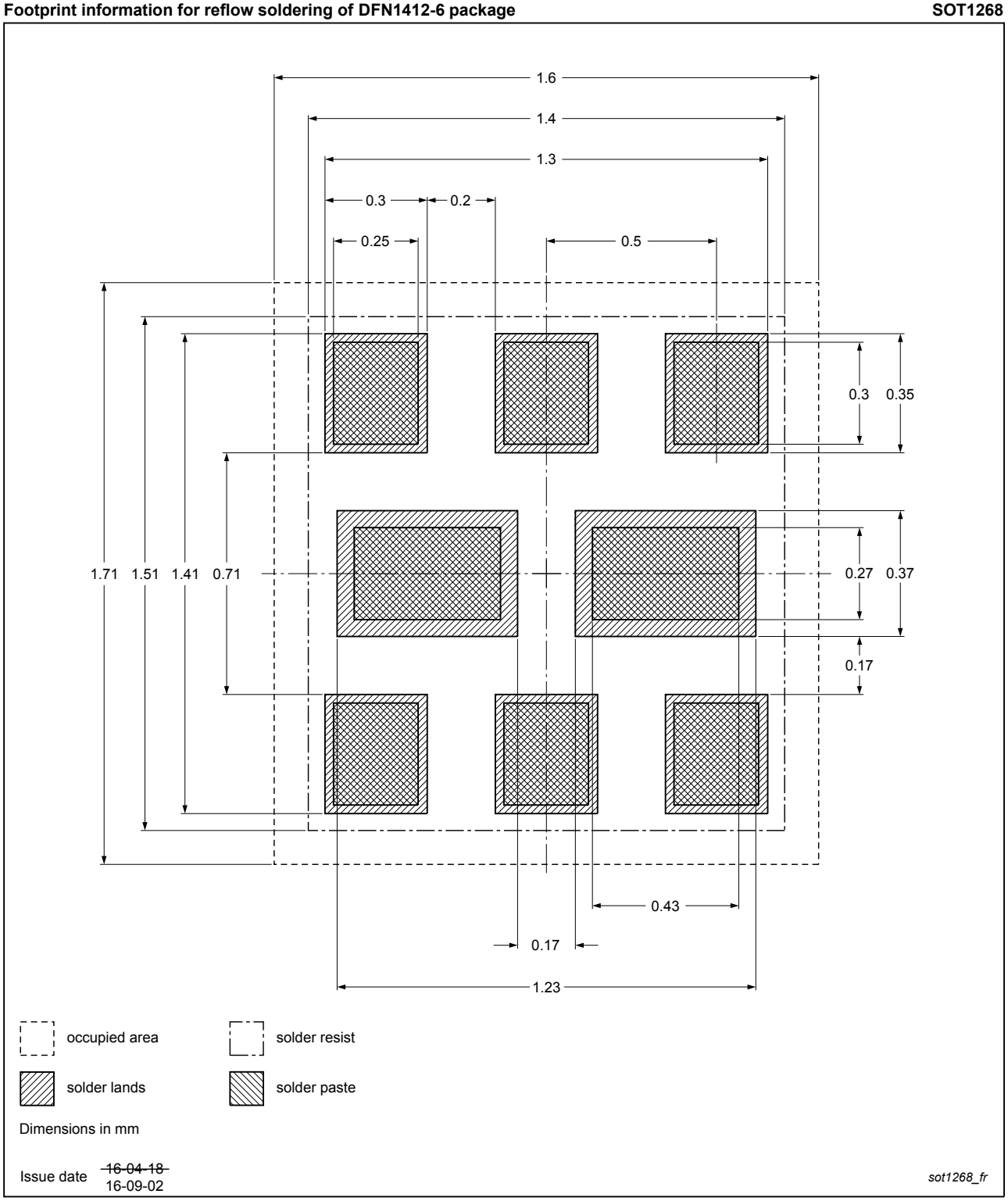

Fig. 11. Reflow soldering footprint for DFN1412-6 (SOT1268)

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14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAW56SRA v.2	20180914	Product data sheet	-	BAW56SRA v.1
	• Package outline drawing updated: Unit T added			
BAW56SRA v.1	20170626	Product data sheet	-	-

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15. Legal information

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".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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Date of release: 14 September 2018

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