

SS24FL

High temperature 40 V, 2 A low VF Schottky barrier rectifier

2 August 2024 Product data sheet

1. General description

Planar Schottky barrier rectifier with an integrated guard ring for stress protection, encapsulated in a SOD123FL small and flat lead Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Average forward current: $I_{F(AV)} \leq 2$ A
- Reverse voltage: $V_R \leq 40$ V
- Low forward voltage
- High power capability due to clip-bond technology
- Small and flat lead SMD plastic package
- High temperature: $T_j \leq 175$ °C

3. Applications

- Low voltage rectification
- High efficiency DC-to-DC conversion
- Switch Mode Power Supply (SMPS)
- Reverse polarity protection
- Low power consumption applications
- High temperature applications

4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; square wave; $T_{sp} \leq$ 165 °C		-	-	2	A
V_R	reverse voltage	T_j = 25 °C		-	-	40	V
V_F	forward voltage	I_F = 2 A; T_j = 25 °C		-	430	490	mV
I_R	reverse current	V_R = 40 V; T_j = 25 °C		-	25	100	µA

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 Transparent top view **SOD123FL**	 *sym001*
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
SS24FL	SOD123FL	plastic, surface mounted package; 2 terminals; 3 mm x 1.9 mm x 1 mm body	SOD123FL

7. Marking

Table 4. Marking codes

Type number	Marking code
SS24FL	PM

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_R	reverse voltage	T_j = 25 °C		-	40	V
$I_{F(AV)}$	average forward current	δ = 0.5; f = 20 kHz; square wave; T_{sp} ≤ 165 °C		-	2	A
I_{FSM}	non-repetitive peak forward current	t_p = 8.3 ms; half sine wave; $T_{j(init)}$ = 25 °C		-	50	A
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[1]	-	0.68	W
			[2]	-	1.15	W
T_j	junction temperature			-	175	°C
T_{amb}	ambient temperature			-55	175	°C
T_{stg}	storage temperature			-65	175	°C

[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 1 cm^2.

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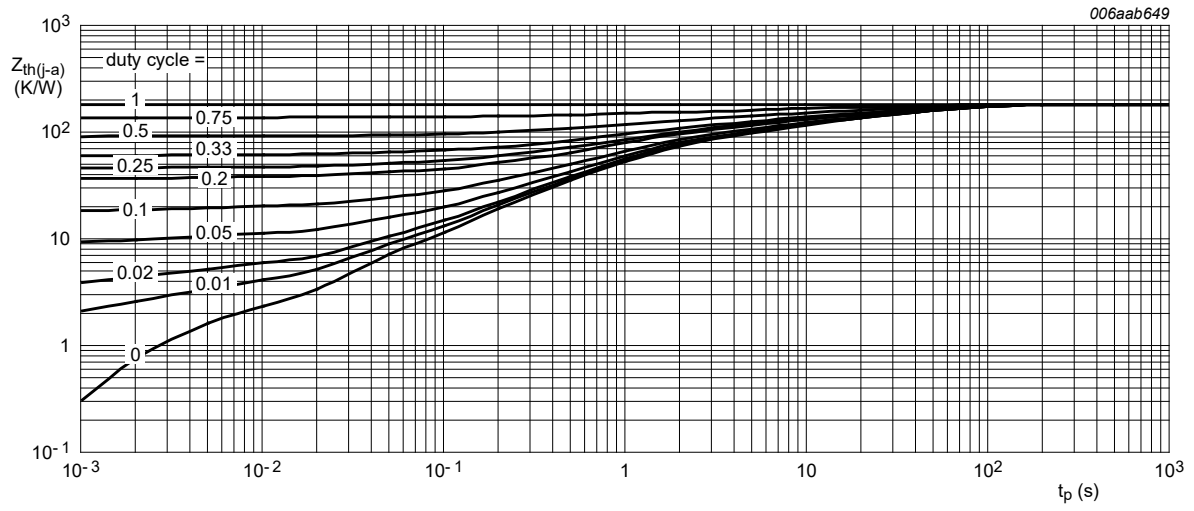
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9. Thermal characteristics

Table 6. Thermal characteristics

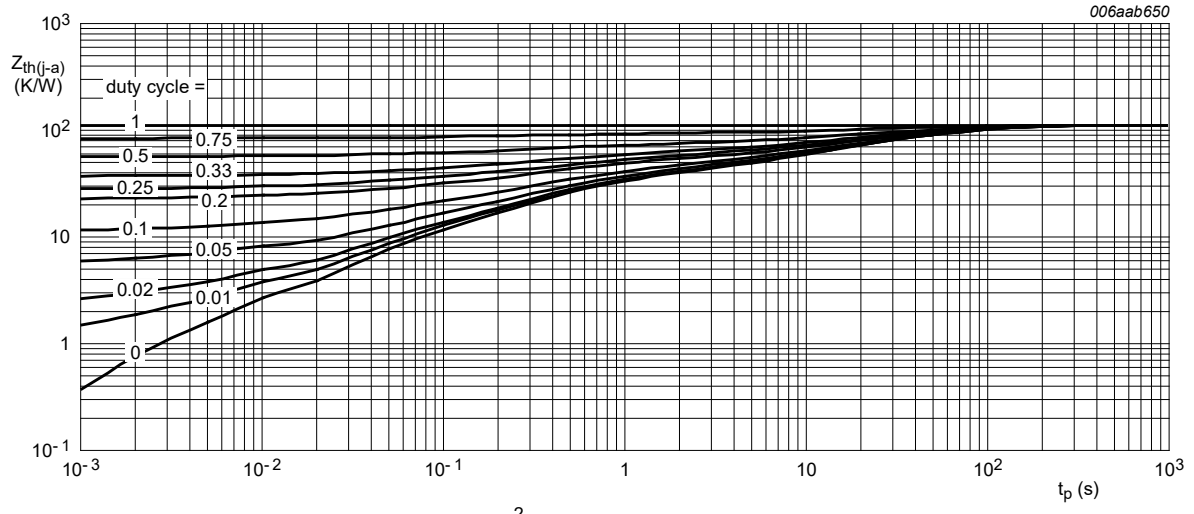
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	220	K/W
			[1] [3]	-	-	130	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	18	K/W

[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses P_R are a significant part of the total power losses.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.
[4] Soldering point of cathode tab.



FR4 PCB, standard footprint

Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values



FR4 PCB, mounting pad for cathode 1 cm^2

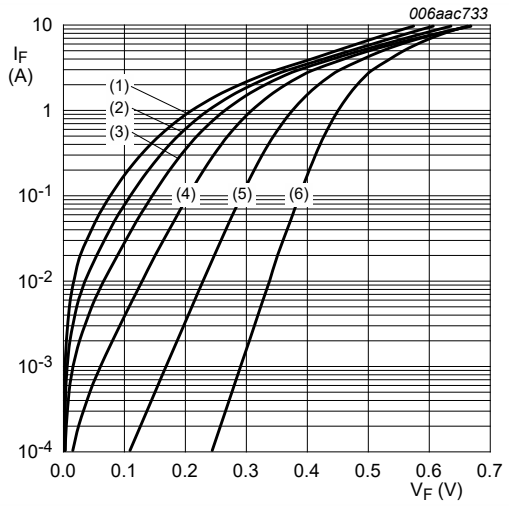
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

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10. Characteristics

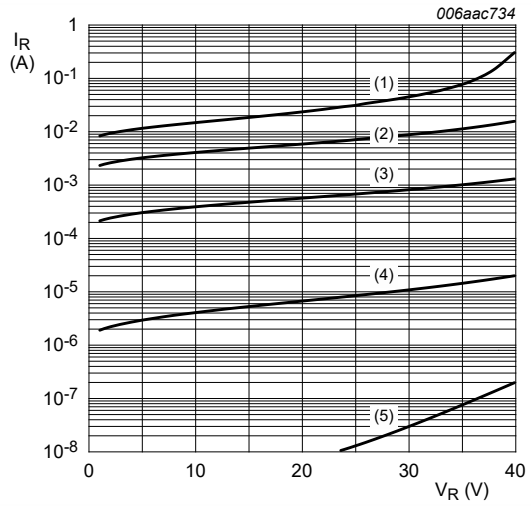
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 0.1 A; T_j = 25 °C		-	295	330	mV
		I_F = 1 A; T_j = 25 °C		-	380	440	mV
		I_F = 2 A; T_j = 25 °C		-	430	490	mV
		I_F = 2 A; T_j = 125 °C		-	330	380	mV
I_R	reverse current	V_R = 10 V; T_j = 25 °C		-	5	-	µA
		V_R = 40 V; T_j = 25 °C		-	25	100	µA
		V_R = 10 V; T_j = 125 °C		-	4	-	mA
		V_R = 40 V; T_j = 125 °C		-	15	-	mA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	228	-	pF
		V_R = 4 V; f = 1 MHz; T_j = 25 °C		-	124	-	pF
		V_R = 10 V; f = 1 MHz; T_j = 25 °C		-	79	-	pF



(1) T_j = 175 °C
(2) T_j = 150 °C
(3) T_j = 125 °C
(4) T_j = 85 °C
(5) T_j = 25 °C
(6) T_j = −40 °C

Fig. 3. Forward current as a function of forward voltage; typical values

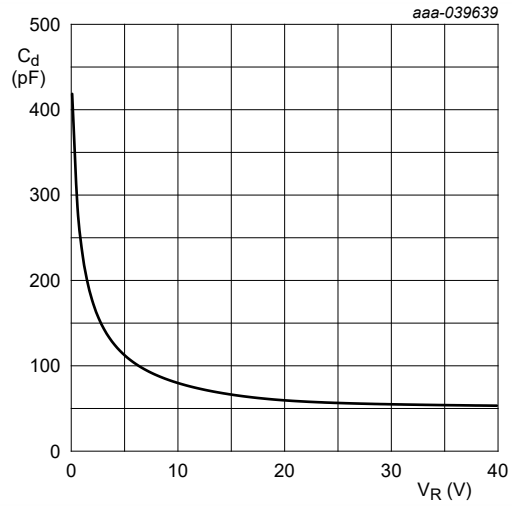


(1) T_j = 150 °C
(2) T_j = 125 °C
(3) T_j = 85 °C
(4) T_j = 25 °C
(5) T_j = −40 °C

Fig. 4. Reverse current as a function of reverse voltage; typical values

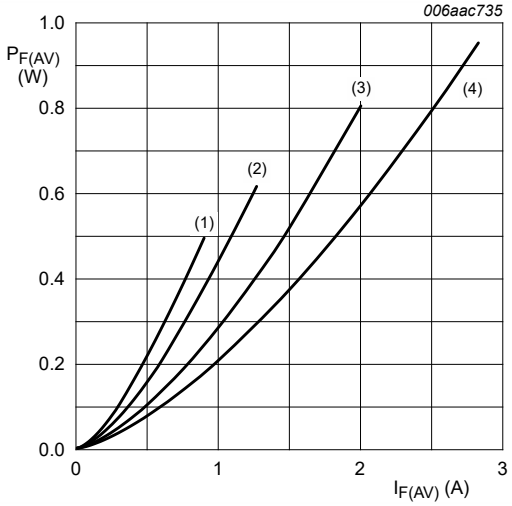
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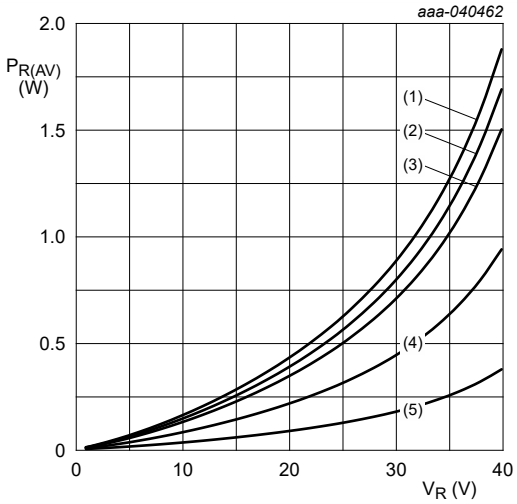
f = 1 MHz; T_{amb} = 25 °C

Fig. 5. Diode capacitance as a function of reverse voltage; typical values



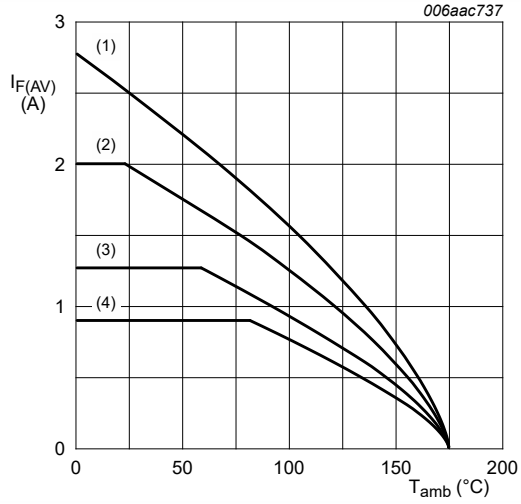
T_j = 175 °C
(1) δ = 0.1
(2) δ = 0.2
(3) δ = 0.5
(4) δ = 1.0

Fig. 6. Average forward power dissipation as a function of average forward current; typical values



T_j = 150 °C
(1) δ = 1
(2) δ = 0.9
(3) δ = 0.8
(4) δ = 0.5
(5) δ = 0.2

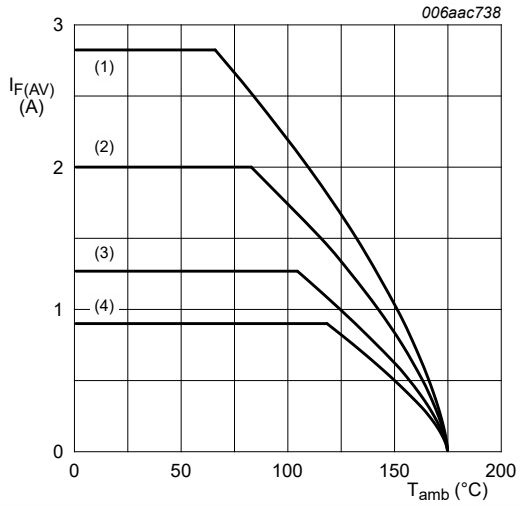
Fig. 7. Average reverse power dissipation as a function of reverse voltage; typical values



FR4 PCB, standard footprint
T_j = 175 °C
(1) δ = 1.0 (DC)
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

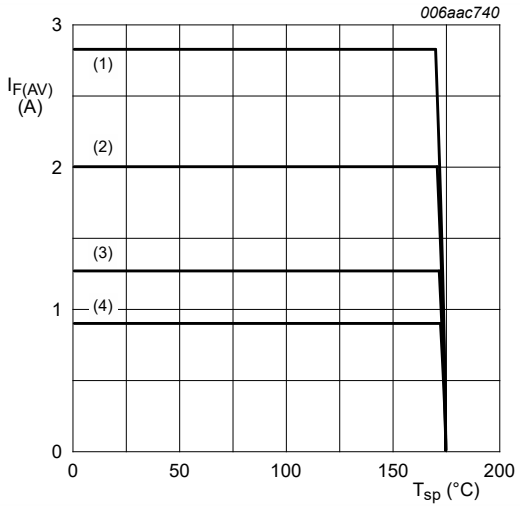
Fig. 8. Average forward current as a function of ambient temperature; typical values

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FR4 PCB, mounting pad for cathode 1 cm^2
T_j = 175 °C
(1) δ = 1.0 (DC)
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

Fig. 9. Average forward current as a function of ambient temperature; typical values



T_j = 175 °C
(1) δ = 1.0 (DC)
(2) δ = 0.5; f = 20 kHz
(3) δ = 0.2; f = 20 kHz
(4) δ = 0.1; f = 20 kHz

Fig. 10. Average forward current as a function of solder point temperature; typical values

11. Test information

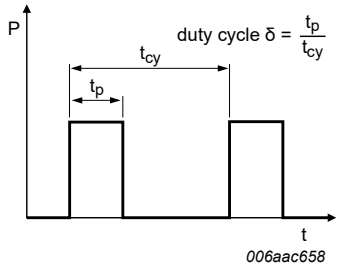


Fig. 11. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations:

$I_{F(AV)} = I_M \times \delta$ with I_M defined as peak current

$I_{RMS} = I_{F(AV)}$ at DC

$I_{RMS} = I_M \times \sqrt{\delta}$ with I_{RMS} defined as RMS current

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12. Package outline

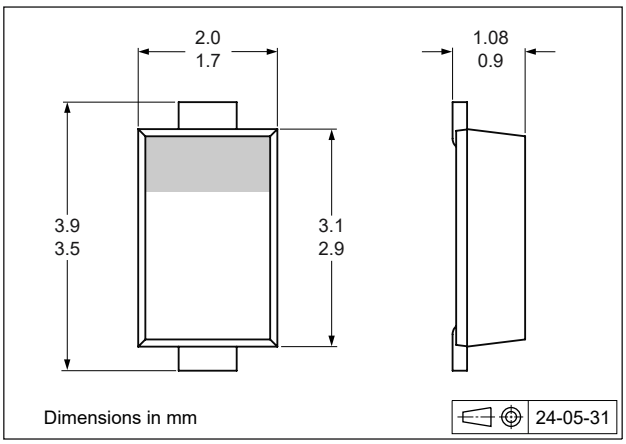


Fig. 12. Package outline SOD123FL

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13. Soldering

Footprint information for reflow soldering of SOD123FL package **SOD123FL**

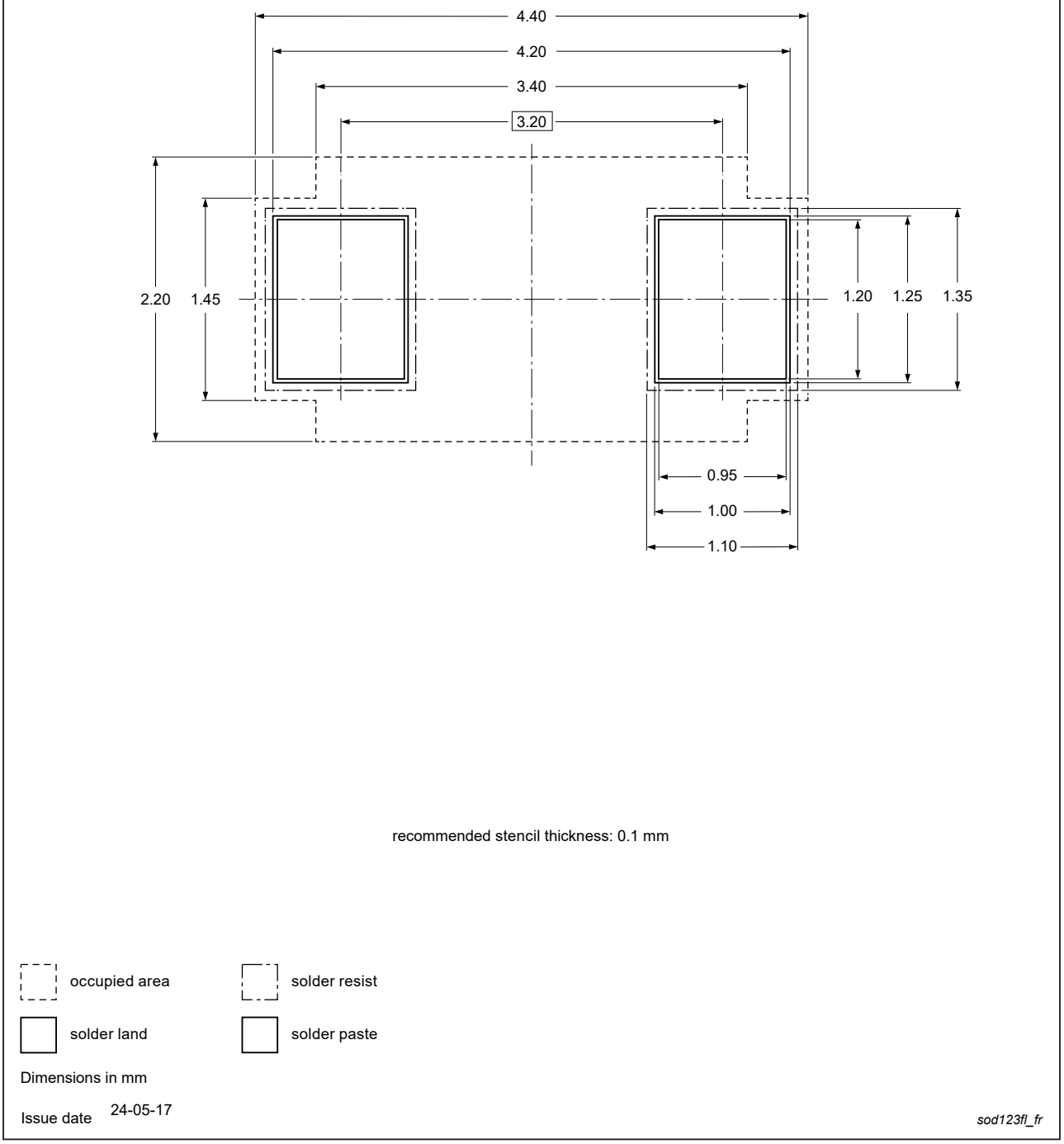


Fig. 13. Reflow soldering footprint for SOD123FL

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14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
SS24FL v.1	20240802	Product data sheet	-	-

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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.
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