



MBR140SF

40 V, 1 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: $I_{F(AV)} \leq 1 \text{ A}$
- Reverse voltage: $V_R \leq 40 \text{ V}$
- Low forward voltage
- High power capability due to clip-bond technology
- Small and flat lead SMD plastic package

3. Applications

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

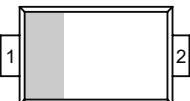
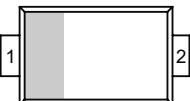
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $f = 20 \text{ kHz}$; square wave; $T_{sp} \leq 140 \text{ }^\circ\text{C}$	-	-	1	A
V_R	reverse voltage	$T_j = 25 \text{ }^\circ\text{C}$	-	-	40	V
V_F	forward voltage	$I_F = 1 \text{ A}$; $T_j = 25 \text{ }^\circ\text{C}$	-	430	490	mV
I_R	reverse current	$V_R = 40 \text{ V}$; $T_j = 25 \text{ }^\circ\text{C}$	-	10	50	μA

5. Pinning information

Table 2. Pinning information

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

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
MBR140SF	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
MBR140SF	PA

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	$T_j = 25 \text{ }^\circ\text{C}$		-	40	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $f = 20 \text{ kHz}$; square wave; $T_{sp} \leq 140 \text{ }^\circ\text{C}$		-	1	A
I_{FSM}	non-repetitive peak forward current	$t_p = 8.3 \text{ ms}$; half sine wave; $T_{j(init)} = 25 \text{ }^\circ\text{C}$		-	40	A
P_{tot}	total power dissipation	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[1]	-	0.57	W
			[2]	-	0.95	W
T_j	junction temperature			-	150	$^\circ\text{C}$
T_{amb}	ambient temperature			-55	150	$^\circ\text{C}$
T_{stg}	storage temperature			-65	150	$^\circ\text{C}$

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

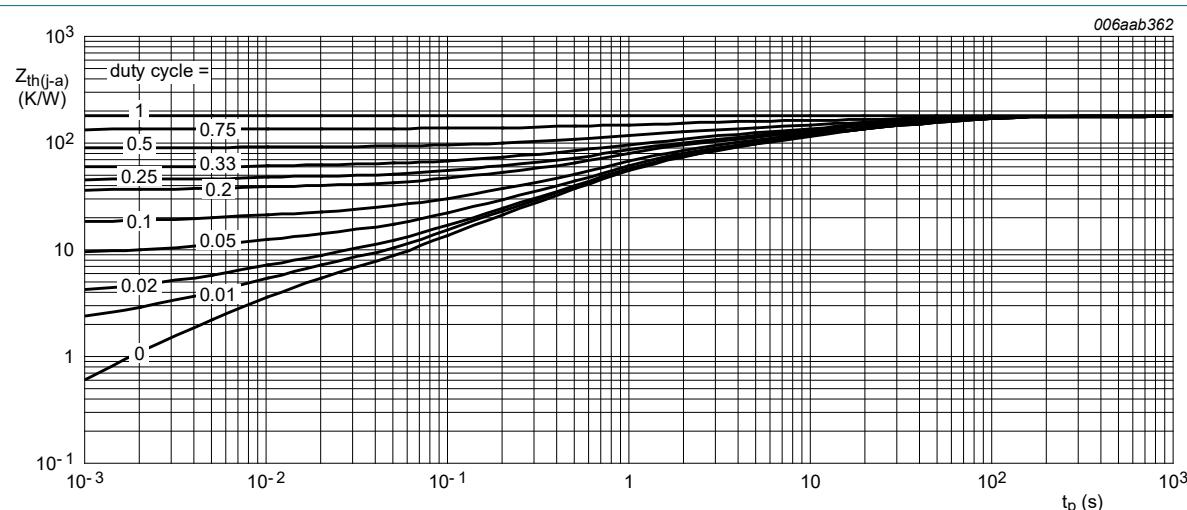
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2 .

9. Thermal characteristics

Table 6. Thermal characteristics

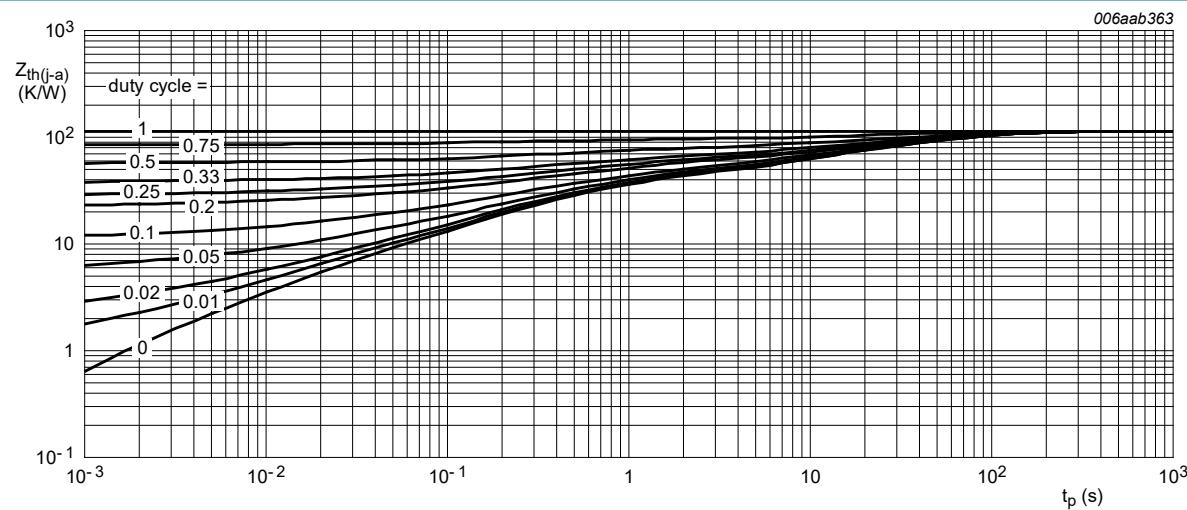
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] [2]	-	-	220	K/W
			[3] [2]	-	-	130	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	18	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
 [2] 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.
 [3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².
 [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 cm²

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

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_F	forward voltage	$I_F = 0.1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	310	360	mV
		$I_F = 1 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$	-	430	490	mV
I_R	reverse current	$V_R = 10 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	3	13	μA
		$V_R = 40 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	10	50	μA
C_d	diode capacitance	$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	114	-	pF
		$V_R = 4 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	63	-	pF
		$V_R = 10 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	41	-	pF

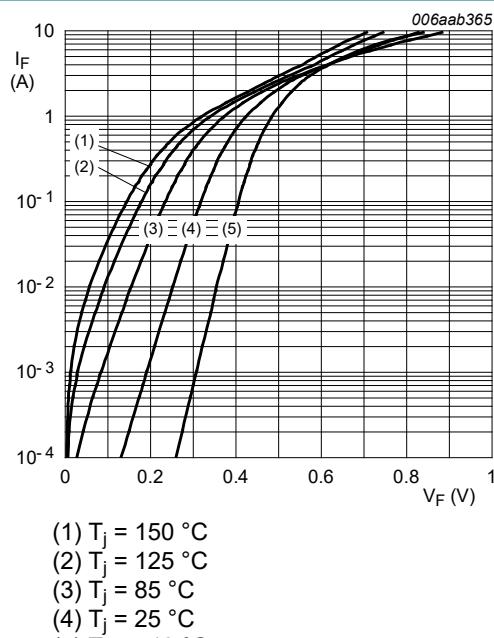


Fig. 3. Forward current as a function of forward voltage; typical values

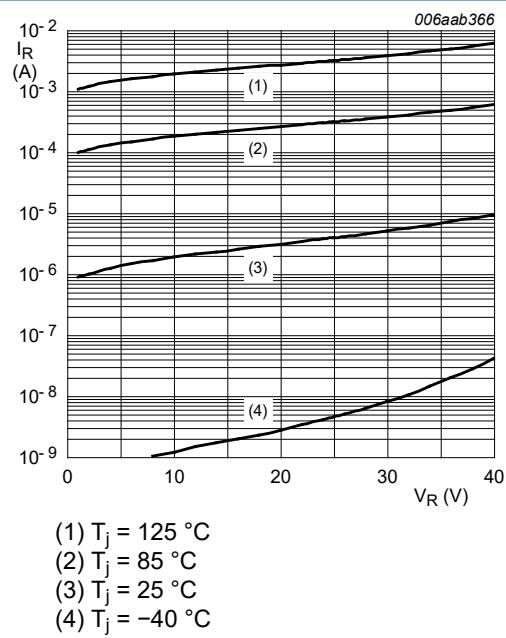
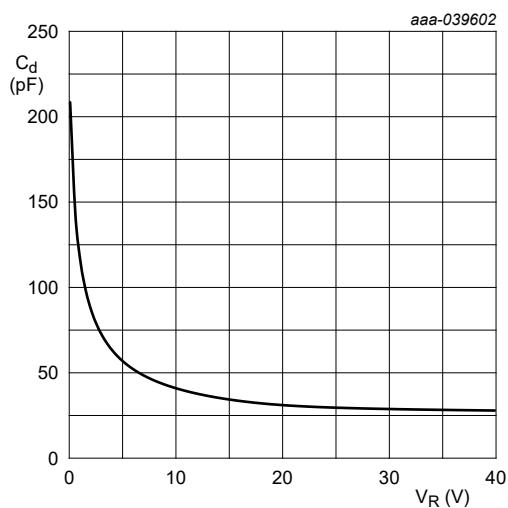
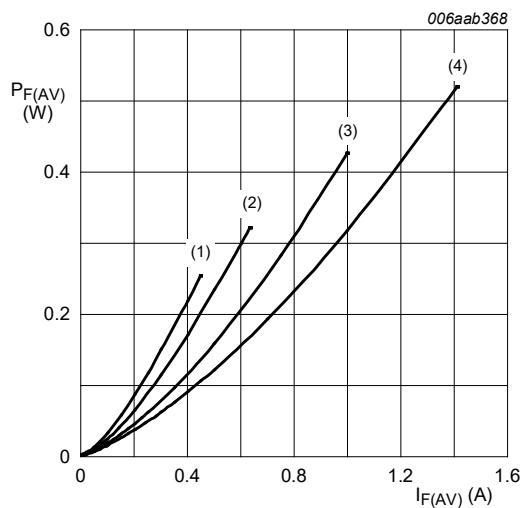


Fig. 4. Reverse current as a function of reverse voltage; typical values



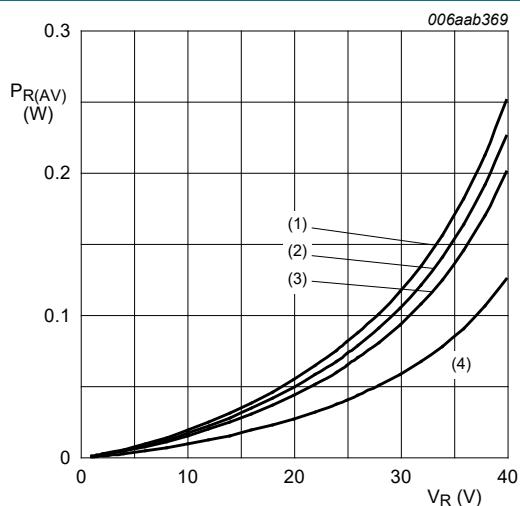
$f = 1$ MHz; $T_{amb} = 25$ °C

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



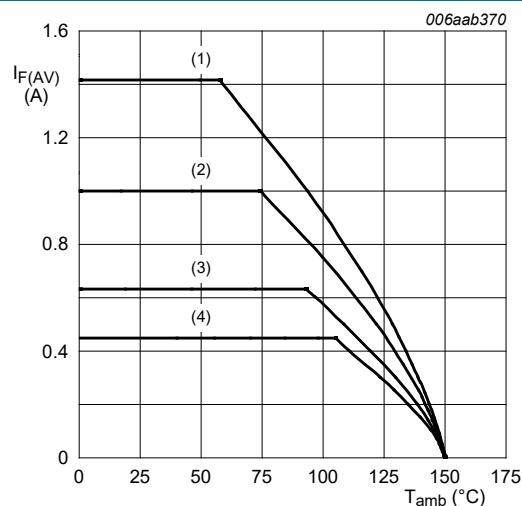
$T_j = 150$ °C
 (1) $\delta = 0.1$
 (2) $\delta = 0.2$
 (3) $\delta = 0.5$
 (4) $\delta = 1$

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



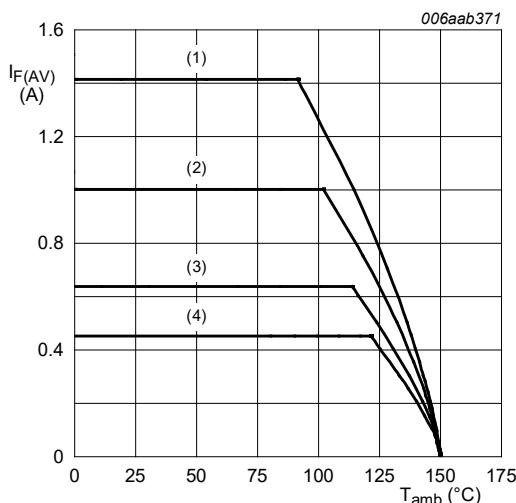
$T_j = 125$ °C
 (1) $\delta = 1$
 (2) $\delta = 0.9$
 (3) $\delta = 0.8$
 (4) $\delta = 0.5$

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



FR4 PCB, standard footprint
 $T_j = 150$ °C
 (1) $\delta = 1$; DC
 (2) $\delta = 0.5$; $f = 20$ kHz
 (3) $\delta = 0.2$; $f = 20$ kHz
 (4) $\delta = 0.1$; $f = 20$ kHz

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



FR4 PCB, mounting pad for cathode 1 cm^2

$T_j = 150 \text{ }^\circ\text{C}$

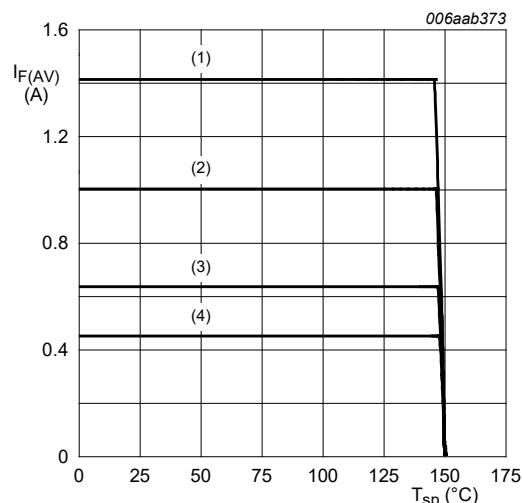
(1) $\delta = 1$; DC

(2) $\delta = 0.5$; $f = 20 \text{ kHz}$

(3) $\delta = 0.2$; $f = 20 \text{ kHz}$

(4) $\delta = 0.1$; $f = 20 \text{ kHz}$

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



$T_j = 150 \text{ }^\circ\text{C}$

(1) $\delta = 1$; DC

(2) $\delta = 0.5$; $f = 20 \text{ kHz}$

(3) $\delta = 0.2$; $f = 20 \text{ kHz}$

(4) $\delta = 0.1$; $f = 20 \text{ kHz}$

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

11. Test information

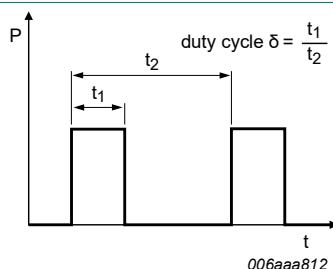


Fig. 11. Duty cycle definition

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

12. Package outline

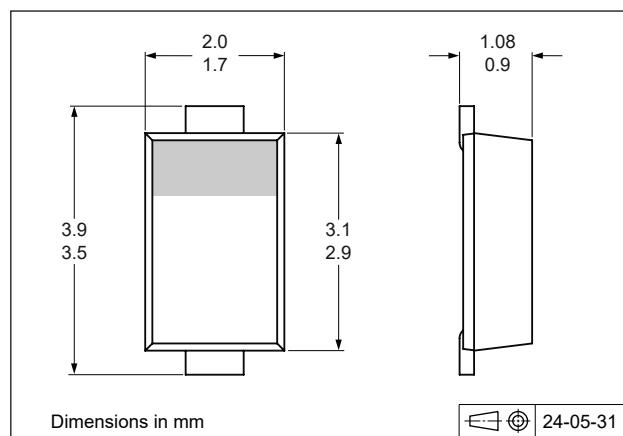
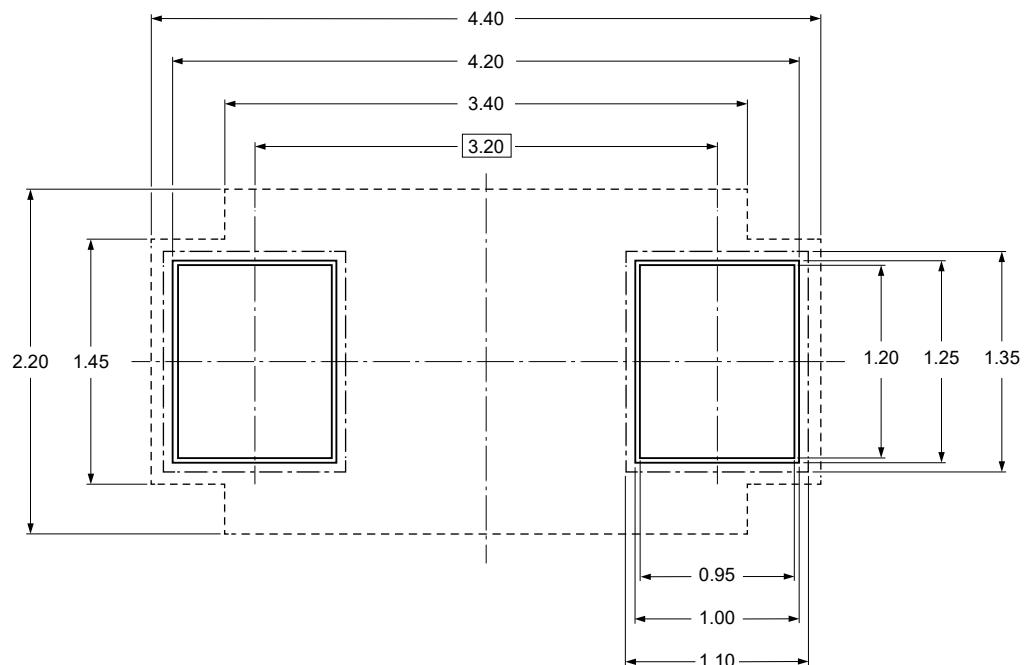


Fig. 12. Package outline SOD123FL

13. Soldering

Footprint information for reflow soldering of SOD123FL package

SOD123FL



recommended stencil thickness: 0.1 mm

 occupied area solder resist solder land solder paste

Dimensions in mm

Issue date 24-05-17

sod123fl_fr

Fig. 13. Reflow soldering footprint for SOD123FL

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
MBR140SF v.1	20240802	Product data sheet	-	-

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.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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