

MMBD4148

High-speed switching diode

Rev. 01 — 4 June 2009 **Product data sheet**

1. Product profile

1.1 General description

High-speed switching diode, encapsulated in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

1.2 Features

- High switching speed: $t_{rr} \leq 4$ ns
- Low leakage current
- Repetitive peak reverse voltage: $V_{RRM} \leq 75$ V
- Low capacitance
- Reverse voltage: $V_R \leq 75$ V
- Small SMD plastic package

1.3 Applications

- High-speed switching
- General-purpose switching

1.4 Quick reference data

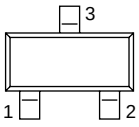
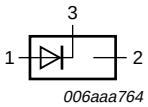
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_R	reverse voltage			-	-	75	V
I_R	reverse current	V_R = 75 V		-	-	0.5	µA
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 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	anode		
2	not connected		
3	cathode		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
MMBD4148	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
MMBD4148	A6*

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

5. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	75	V
V_R	reverse voltage			-	75	V
I_F	forward current		[1]	-	215	mA
I_{FRM}	repetitive peak forward current	$t_p \leq 0.5$ µs; $\delta \leq 0.25$		-	500	mA
I_{FSM}	non-repetitive peak forward current	square wave	[2]			
		t_p = 1 µs		-	4	A
		t_p = 1 ms		-	1	A
		t_p = 1 s		-	0.5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	250	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] T_j = 25 °C prior to surge.

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6. 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]	-	-	500	K/W
$R_{th(j-t)}$	thermal resistance from junction to tie-point			-	-	330	K/W

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

7. Characteristics

Table 7. Characteristics

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

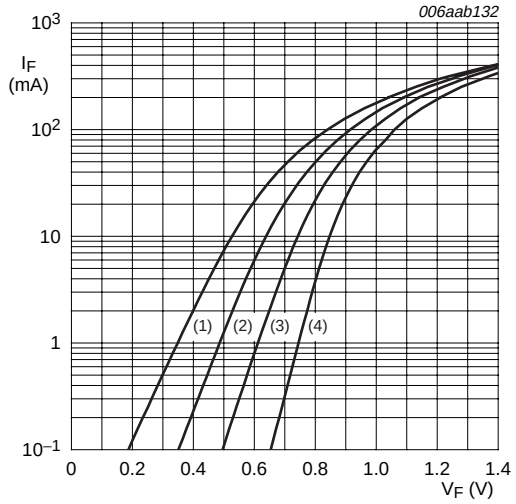
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage		[1]				
		I_F = 1 mA		-	-	715	mV
		I_F = 10 mA		-	-	855	mV
		I_F = 50 mA		-	-	1	V
		I_F = 150 mA		-	-	1.25	V
I_R	reverse current	V_R = 25 V		-	-	30	nA
		V_R = 75 V		-	-	0.5	µA
		V_R = 25 V; T_j = 150 °C		-	-	30	µA
		V_R = 75 V; T_j = 150 °C		-	-	50	µA
C_d	diode capacitance	f = 1 MHz; V_R = 0 V		-	-	1.5	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.

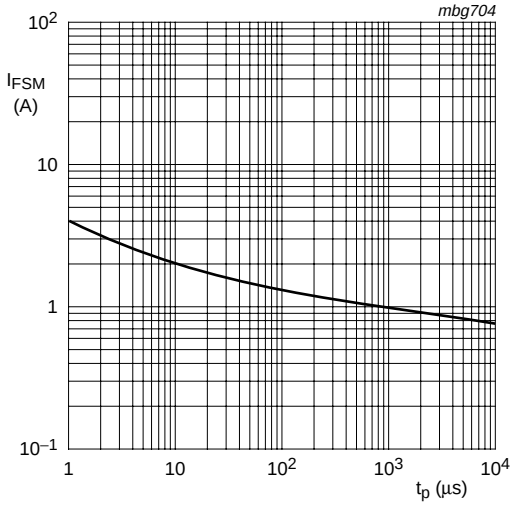
[3] When switched from I_F = 10 mA; t_r = 20 ns.

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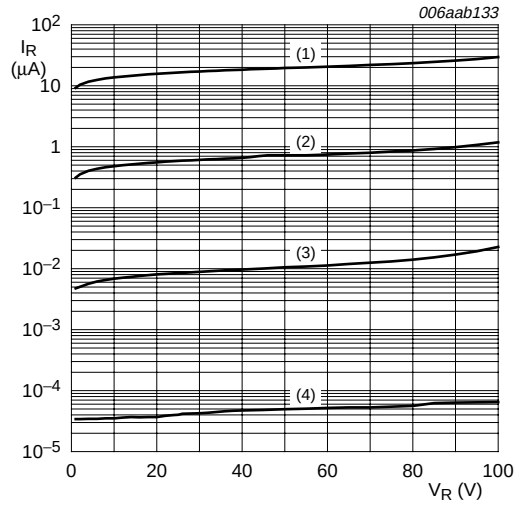
(1) T_{amb} = 150 °C
(2) T_{amb} = 85 °C
(3) T_{amb} = 25 °C
(4) T_{amb} = −40 °C

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



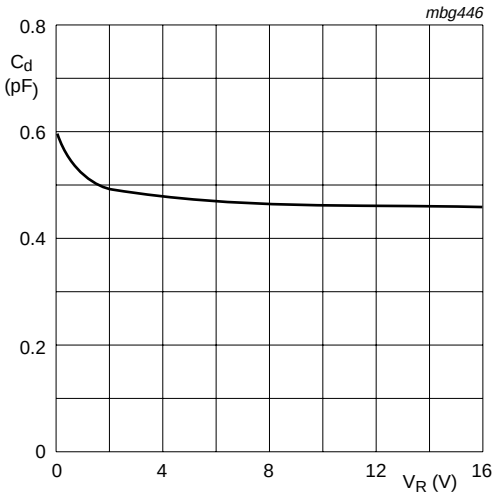
Based on square wave currents.
T_j = 25 °C; prior to surge

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

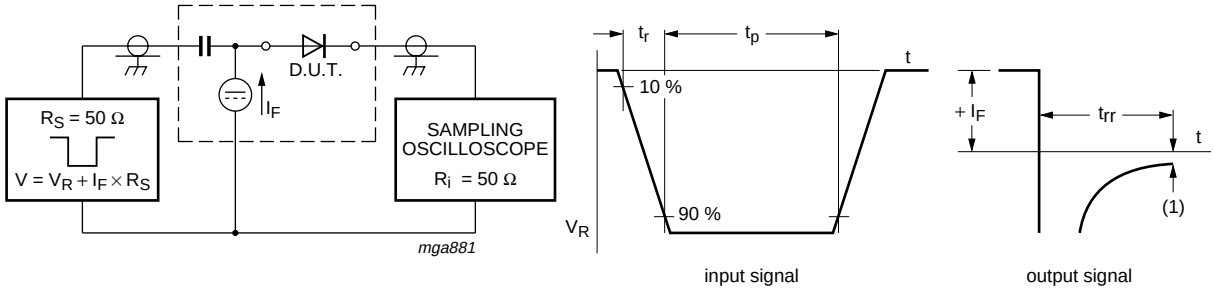


f = 1 MHz; T_{amb} = 25 °C

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

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8. Test information

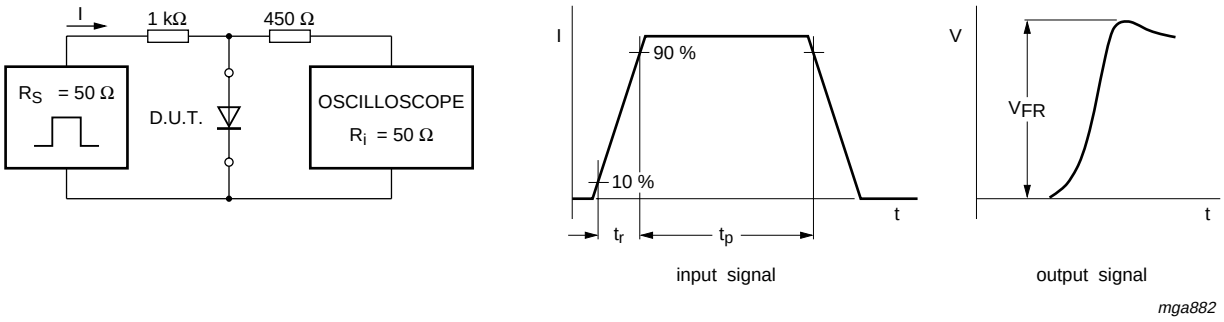


(1) I_R = 1 mA

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 δ ≤ 0.005

Fig 6. Forward recovery voltage test circuit and waveforms

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9. Package outline

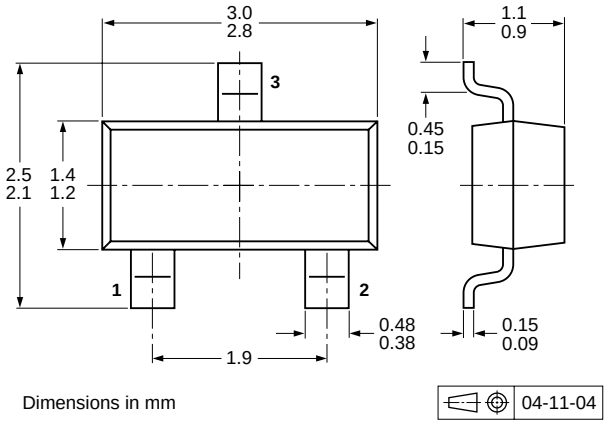


Fig 7. Package outline MMBD4148 (SOT23/TO-236AB)

10. Packing information

Please refer to packing information on www.nexperia.com.

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11. Soldering

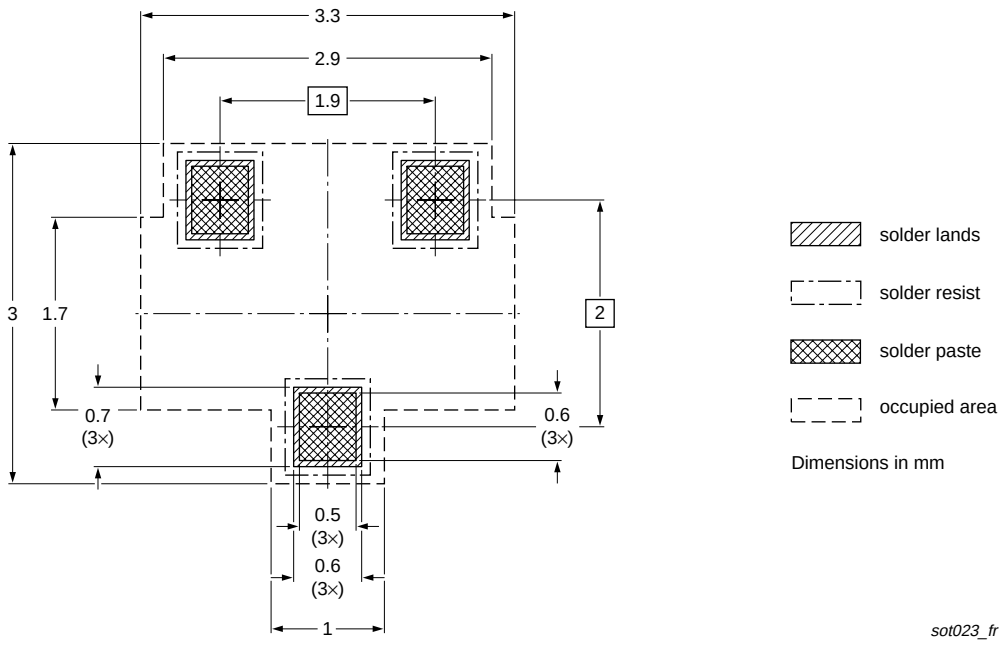


Fig 8. Reflow soldering footprint MMBD4148 (SOT23/TO-236AB)

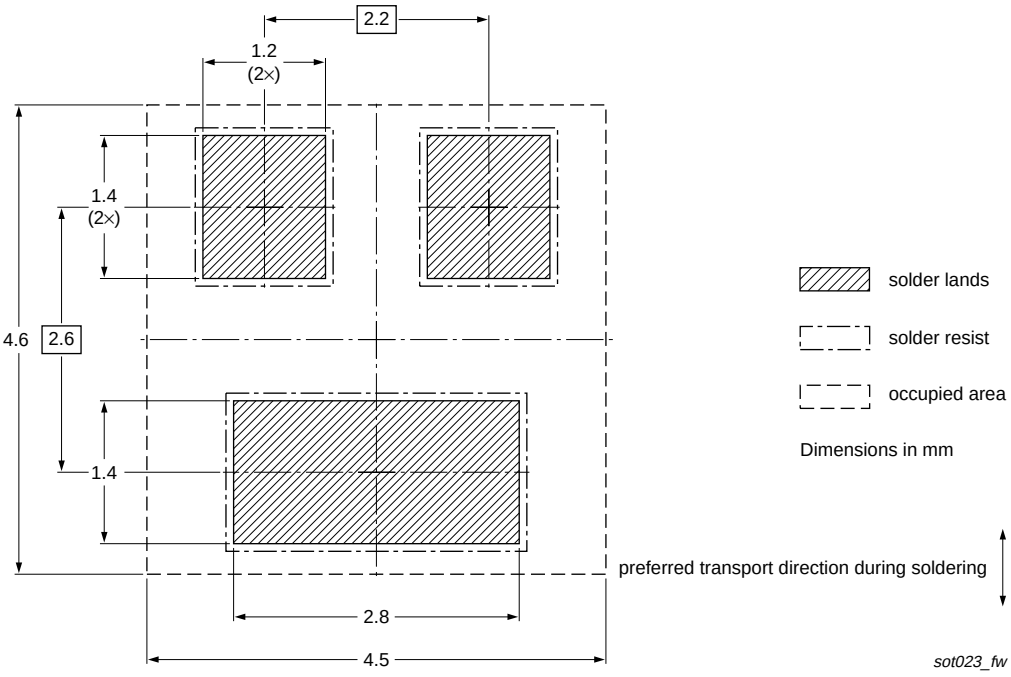


Fig 9. Wave soldering footprint MMBD4148 (SOT23/TO-236AB)

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12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
MMBD4148_1	20090604	Product data sheet	-	-

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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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14. Contents

1	**Product profile**	**1**
1.1	General description	1
1.2	Features	1
1.3	Applications	1
1.4	Quick reference data	1
2	**Pinning information**	**1**
3	**Ordering information**	**2**
4	**Marking**	**2**
5	**Limiting values**	**2**
6	**Thermal characteristics**	**3**
7	**Characteristics**	**3**
8	**Test information**	**5**
9	**Package outline**	**6**
10	**Packing information**	**6**
11	**Soldering**	**7**
12	**Revision history**	**8**
13	**Legal information**	**9**
13.1	Data sheet status	9
13.2	Definitions	9
13.3	Disclaimers	9
13.4	Trademarks	9
14	**Contents**	**10**

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