

# Product Document



**Application Note**

# AS5147y

## Redundancy Bit



**Content Guide**

1 General Description ..... 3

2 OTP Programming ..... 3

3 Redundancy Bit..... 4

3.1 Verification ..... 5

3.2 Register Mapping ..... 5

3.3 Example ..... 6

4 Contact Information..... 7

5 Copyrights & Disclaimer..... 8

6 Revision Information ..... 9

## 1 General Description

This application note describes the use of redundancy bits.

The redundancy bits are part of the programming flow. It allows a single-bit correction of the OTP memory. If one bit is not well burned after programming, it is possible to force the bit high with the redundancy bits.

## 2 OTP Programming

The One Time Programming of the device is used to save permanently the customer settings in device. For detailed description on OTP see datasheet.

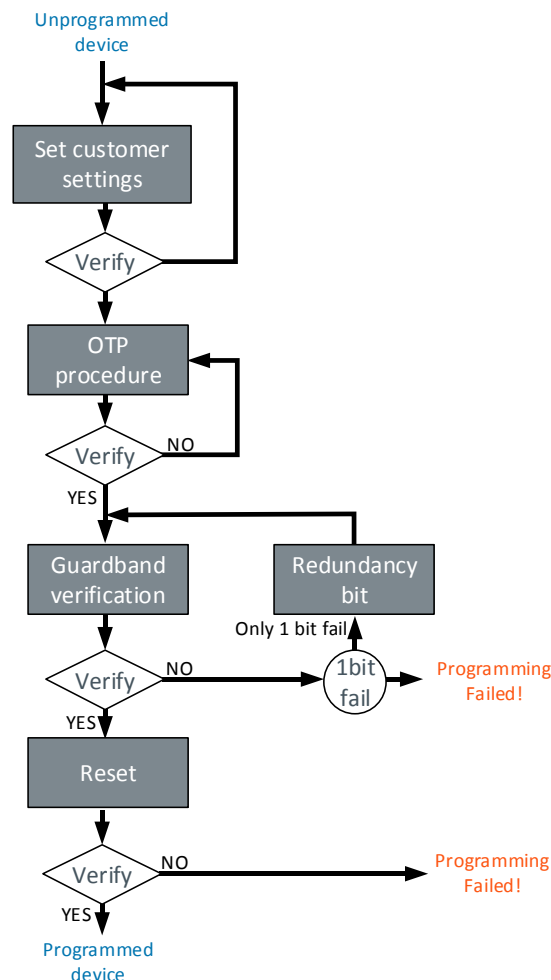


Figure 1: Recommended Programming Flow

The programming flow is shown in Figure 1. First step is the configuration of customer relevant settings in SPI register 0x0016 – 0x0019. When the settings are written, the device gets programmed. After programming a guard band verification is recommended. If all verifications passed, the device is programmed successfully.

If one bit is not programmed correctly, the redundancy bit should be used as backup and force the relevant bit in the customer settings high.

Note: The redundancy bit procedure can only force a low bit to high. It is not possible to change a high bit to low.

### 3 Redundancy Bit

If one bit is not programmed correctly, the redundancy bit procedure can force one bit in the customer settings high.

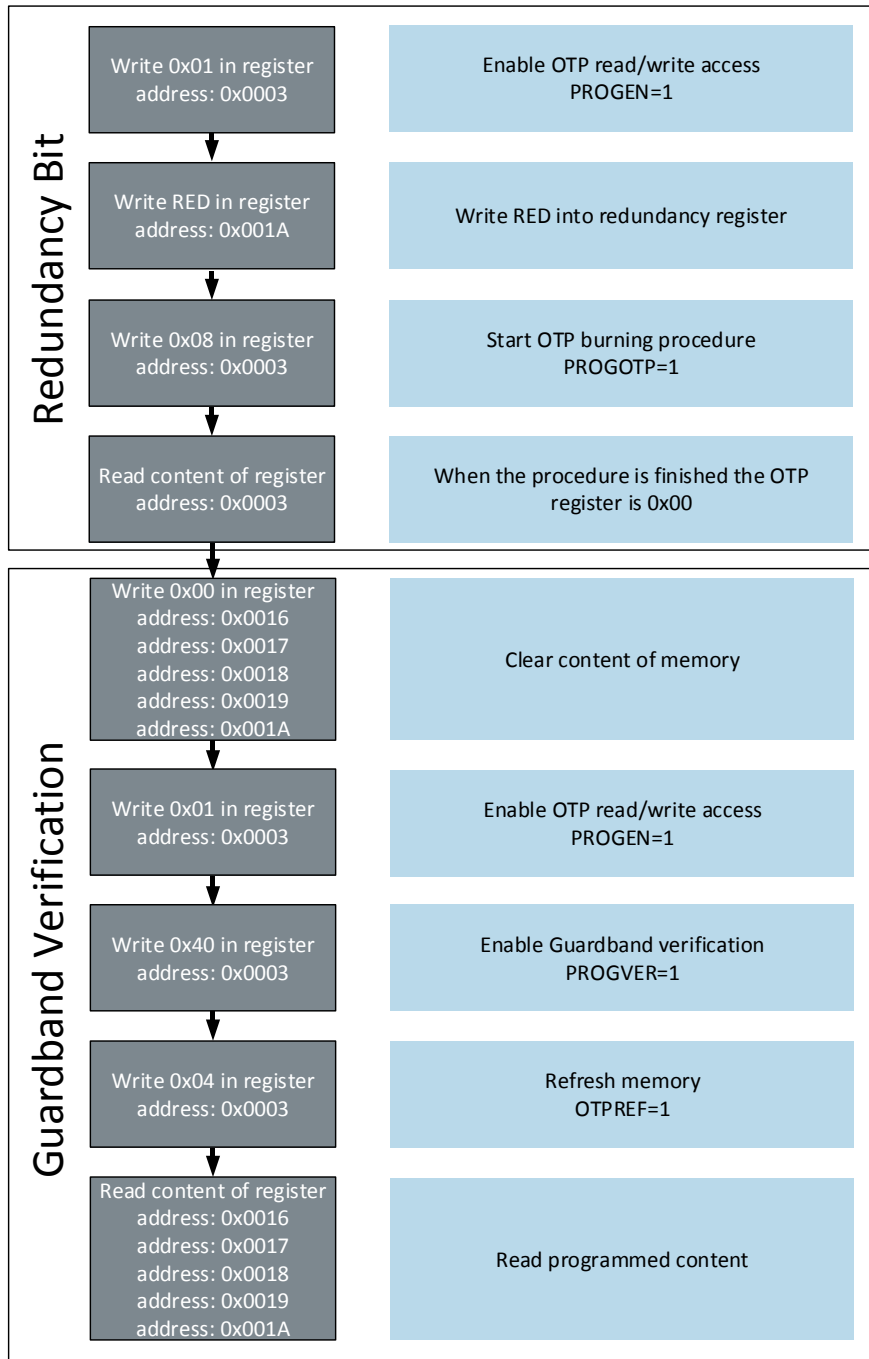


Figure 2: Procedure Flow

- 1) In the first step the OTP programming is enabled.
- 2) Write the redundancy bit to redundancy register
- 3) Start burning procedure
- 4) Do guard band Verification
- 5) Verify content of register

### 3.1 Verification

After the redundancy bit is programmed, a read out of the customer registers shows that the bad programmed bit is still not correct. The information which bit is “corrected” is stored in the RED register (0x001A). How to decode the information is shown in chapter Register Mapping.

### 3.2 Register Mapping

Table 1: RED - register mapping

RED content					register		Name	
Dec	LSB					Address		BIT
	4	3	2	1	0			
0	0	0	0	0	0	none		
1	0	0	0	0	1	0x0017	0 ZPOSL 0	
2	0	0	0	1	0		1 ZPOSL 1	
3	0	0	0	1	1		2 ZPOSL 2	
4	0	0	1	0	0		3 ZPOSL 3	
5	0	0	1	0	1		4 ZPOSL 4	
6	0	0	1	1	0		5 ZPOSL 5	
7	0	0	1	1	1	0x0016	0 ZPOSM 0	
8	0	1	0	0	0		1 ZPOSM 1	
9	0	1	0	0	1		2 ZPOSM 2	
10	0	1	0	1	0		3 ZPOSM 3	
11	0	1	0	1	1		4 ZPOSM 4	
12	0	1	1	0	0		5 ZPOSM 5	
13	0	1	1	0	1		6 ZPOSM 6	
14	0	1	1	1	0		7 ZPOSM 7	
15	0	1	1	1	1	0x0019	0 UVWPP 0	
16	1	0	0	0	0		1 UVWPP 1	
17	1	0	0	0	1		2 UVWPP 2	
18	1	0	0	1	0		3 HYS 0	
19	1	0	0	1	1		4 HYS 1	
20	1	0	1	0	0		5 ABIRES 0	
21	1	0	1	0	1		6 ABIRES 1	
22	1	0	1	1	0		7 ABIRES 2	
23	1	0	1	1	1	0x0018	0 IWIDTH	
24	1	1	0	0	0		1 NOISESET	
25	1	1	0	0	1		2 DIR	
26	1	1	0	1	0		3 UVW_ABI	
27	1	1	0	1	1		4 DAECDIS	
28	1	1	1	0	0		5 ABIBin *	
29	1	1	1	0	1		6 Dataselect	
30	1	1	1	1	0		7 PWMon	

\* ... The ABIBin is applicable for AS5047y.

### 3.3 Example

Assumption:

The zero position is at position 450 dec (binary: 0000 0001 1100 0010).

After OTP programming following content is in the registers:

Name	Address	Content
ZPSL	0x0017	0000 0010
ZPSM	0x0016	0000 0101

At ZPSM[1] a failure occurred.

Forcing the ZPSM[1] bit to high following content must be written into redundancy register:

Name	Address	Content
RED	0x001A	0001 0000

After setting redundancy bit, the guard band verification is executed again.

When the register are read out the ZPSM[1] is still low (see Figure 3).

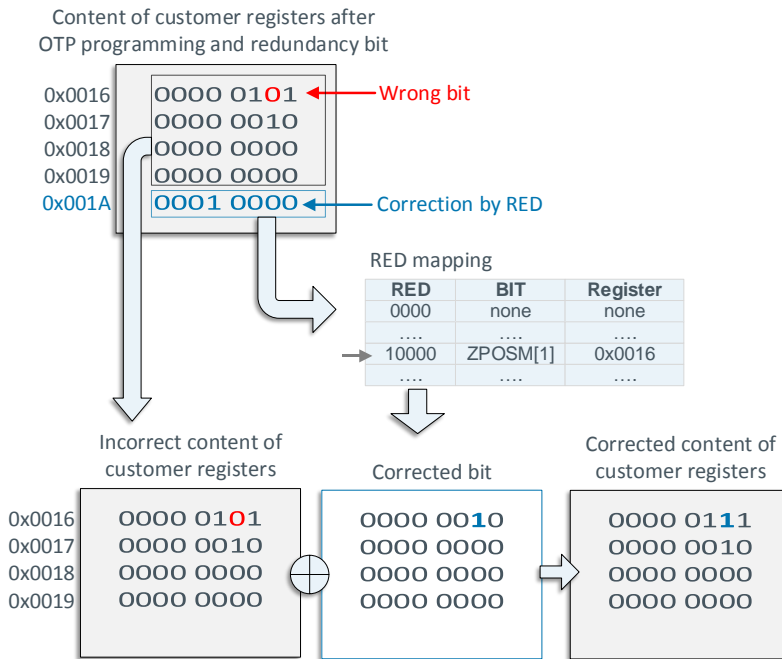


Figure 3: Preparation

For verification the content of RED register is decoded and then correlated with the incorrect content of customer registers.

## 4 Contact Information

**Buy our products or get free samples online at:**

[www.ams.com/ICdirect](http://www.ams.com/ICdirect)

**Technical Support is available at:**

[www.ams.com/Technical-Support](http://www.ams.com/Technical-Support)

**Provide feedback about this document at:**

[www.ams.com/Document-Feedback](http://www.ams.com/Document-Feedback)

**For further information and requests, e-mail us at:**

[ams\\_sales@ams.com](mailto:ams_sales@ams.com)

**For sales offices, distributors and representatives, please visit:**

[www.ams.com/contact](http://www.ams.com/contact)

### Headquarters

ams AG

Tobelbaderstrasse 30

8141 Premstaetten

Austria, Europe

Tel: +43 (0) 3136 500 0

Website: [www.ams.com](http://www.ams.com)



## 5 Copyrights & Disclaimer

Copyright ams AG, Tobelbader Strasse 30, 8141 Premstaetten, Austria-Europe. Trademarks Registered. All rights reserved. The material herein may not be reproduced, adapted, merged, translated, stored, or used without the prior written consent of the copyright owner.

Information in this document is believed to be accurate and reliable. However, ams AG does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Applications that are described herein are for illustrative purposes only. ams AG makes no representation or warranty that such applications will be appropriate for the specified use without further testing or modification. ams AG takes no responsibility for the design, operation and testing of the applications and end-products as well as assistance with the applications or end-product designs when using ams AG products. ams AG is not liable for the suitability and fit of ams AG products in applications and end-products planned.

ams AG shall not be liable to recipient or any third party for any damages, including but not limited to personal injury, property damage, loss of profits, loss of use, interruption of business or indirect, special, incidental or consequential damages, of any kind, in connection with or arising out of the furnishing, performance or use of the technical data or applications described herein. No obligation or liability to recipient or any third party shall arise or flow out of ams AG rendering of technical or other services.

ams AG reserves the right to change information in this document at any time and without notice.

## 6 Revision Information

Changes from previous version to current revision 1-00 (2016-Mar-23)	Page
Initial version 1-00	

**Note:** Page numbers for the previous version may differ from page numbers in the current revision.  
Correction of typographical errors is not explicitly mentioned.