Application Note

AS5147y

Redundancy Bit

Content Guide

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.

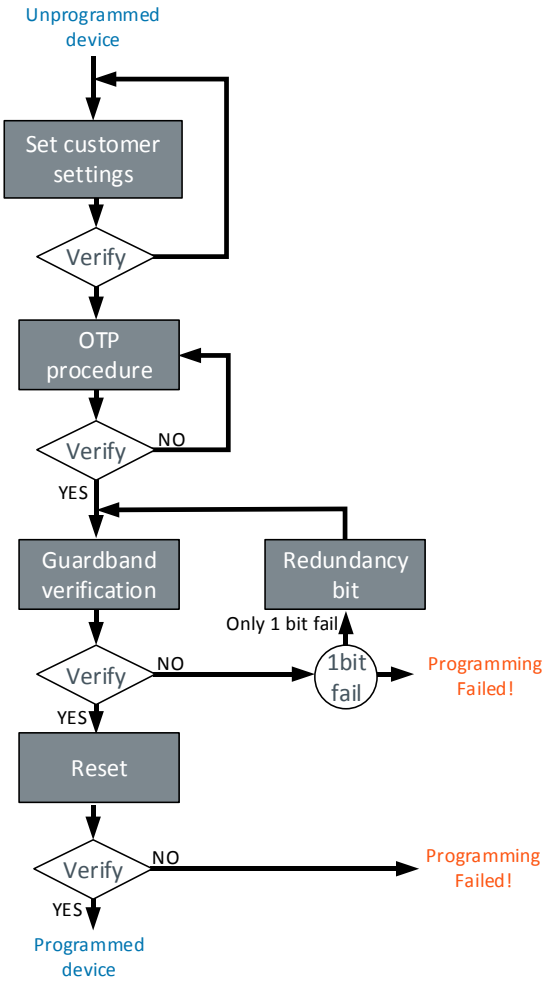

Figure 1: Recommended Programming Flow

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.

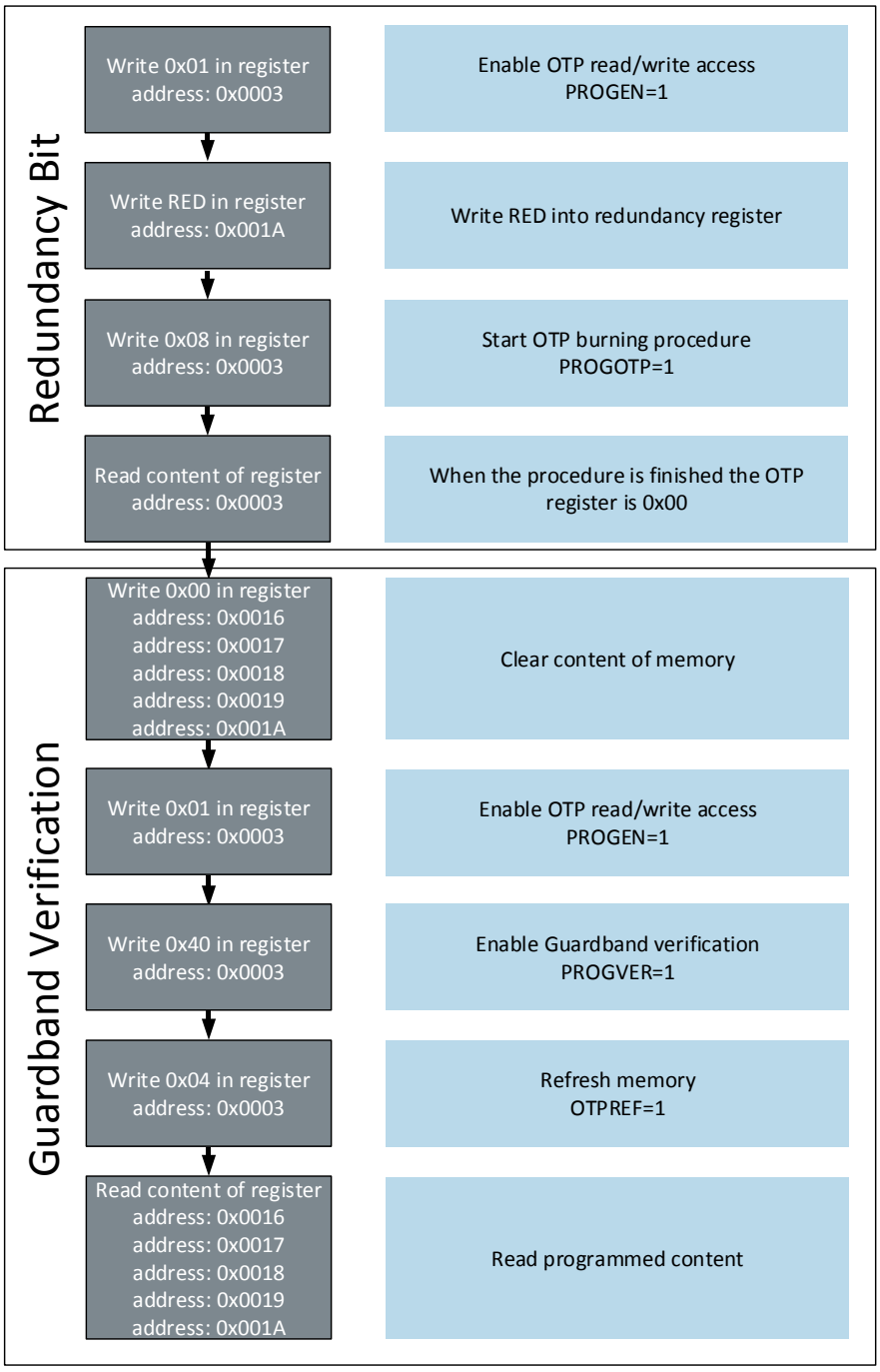

Figure 2: Procedure Flow

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 positon 450 dec (binary: 0000 0001 1100 0010).

After OTP programming following content is in the registers:

Name	Address	Content
ZPOSL	0x0017	0000 0010
ZPOSM	0x0016	0000 0101

At ZPOSM[1] a failure occurred.

Forcing the ZPOSM[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 ZPOSM[1] is still low (see Figure 3).

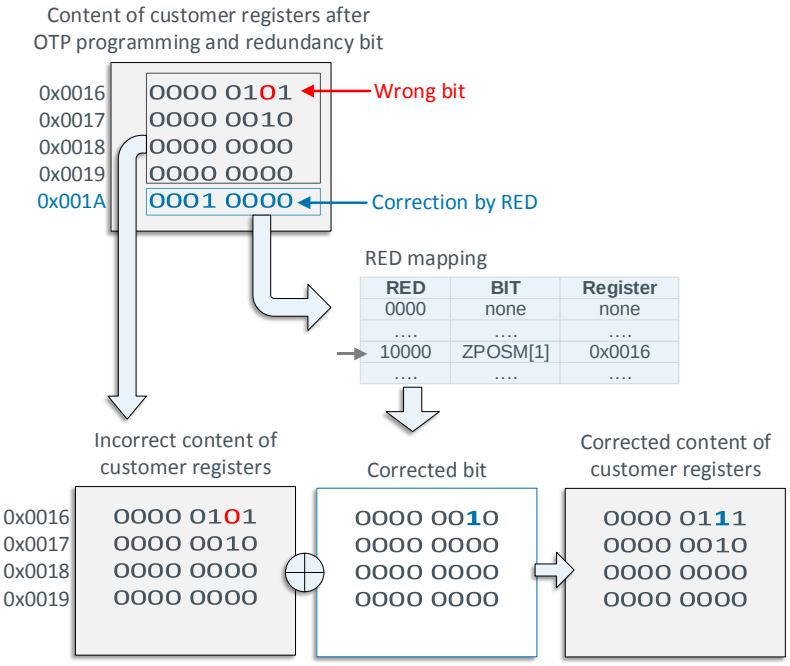

Figure 3: Preparation

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

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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.