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**ADSP FRAMEWORK: ADMA DRIVER**

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# Overview

This section provides an overview of software architecture.

User Application

ADSP Interface

Kernel Space

User Space

ADSP Driver

ARM

Audio HW

**ADSP Framework**

TDM class

Renderer class

Equalizer class

Capture class

TDM Plugin

ADSP

Plugin

Equalizer Plugin\*

Capture Plugin

Renderer Plugin

This document’s target is in side of red square

\* Not connect to hardware modules

DAC/

ADC

ADMAC

FIFO

SCU

PDMA

SSI

SSIU

Figure 1‑1 ****The software architecture****

# Function list

The following is list of functions:

Table 2‑1 Function list

|  |  |  |
| --- | --- | --- |
| **Type** | **Function Name** | **Outline** |
| API | xa\_dmac\_get\_register\_addr | This API is to get DMAC channel N register’s address |
| xa\_dmac\_check\_stage | This API is to check the current stage of DMAC module |
| xa\_dmac\_check\_and\_clear\_interrupt | This API is to check and clear interrupt of DMAC channel N |
| xa\_dmac\_start | This API is to start DMAC channel N |
| xa\_dmac\_stop | This API is to stop DMAC channel N |
| xa\_dmac\_check\_valid\_channel | This API is to check availability of DMAC module and choose an available one |
| xa\_dmac\_setting\_use\_descriptor | This API is to set DMAC module using descriptor memory |
| xa\_dmac\_setting\_nouse\_descriptor | This API is to set DMAC module not using descriptor memory |
| xa\_dmac\_resetup | This API is to re-setup DMAC module |
| Internal function | xa\_dmac\_set\_stage\_number | This function is to set stage number |
| xa\_dmac\_reset\_descriptor | This function is to reset descriptor |
| xa\_dmac\_start\_descriptor | This function is to start descriptor |
| xa\_dmac\_enable\_ch | This function is to enable a channel |
| xa\_dmac\_disable\_ch | This function is to disable a channel |
| xa\_dmac\_enable\_module | This function is to enable DMAC module |
| xa\_dmac\_clear\_channel | This function is to clear value set in DMAC channel N register |
| xa\_dmac\_descriptor\_setup | This function is to set up DMAC descriptor |
| xa\_dmac\_stage\_config | This function is to set DMAC stage |
| xa\_dmac\_pre\_config | This function is to set DMAC parameters |
| xa\_dmac\_post\_config | This function is to post-set DMAC parameters |

# Detail information

This section describes detail information of data types, macro definitions, implemented APIs and internal function units, global variable.

## Data type definition

### DMAC\_CHN

The data type DMAC\_CHN is a type-defined enumeration that lists all supported ADMAC channels.

Table 3‑1 DMAC\_CHN type information

|  |  |  |
| --- | --- | --- |
| **Member name** | **Value** | **Outline** |
| ADMAC\_CH00 | 0 | ADMAC channel 0 |
| ADMAC\_CH01 | 1 | ADMAC channel 1 |
| ADMAC\_CH02 | 2 | ADMAC channel 2 |
| ADMAC\_CH03 | 3 | ADMAC channel 3 |
| ADMAC\_CH04 | 4 | ADMAC channel 4 |
| ADMAC\_CH05 | 5 | ADMAC channel 5 |
| ADMAC\_CH06 | 6 | ADMAC channel 6 |
| ADMAC\_CH07 | 7 | ADMAC channel 7 |
| ADMAC\_CH08 | 8 | ADMAC channel 8 |
| ADMAC\_CH09 | 9 | ADMAC channel 9 |
| ADMAC\_CH10 | 10 | ADMAC channel 10 |
| ADMAC\_CH11 | 11 | ADMAC channel 11 |
| ADMAC\_CH12 | 12 | ADMAC channel 12 |
| ADMAC\_CH13 | 13 | ADMAC channel 13 |
| ADMAC\_CH14 | 14 | ADMAC channel 14 |
| ADMAC\_CH15 | 15 | ADMAC channel 15 |
| ADMAC\_CH16 | 16 | ADMAC channel 16 |
| ADMAC\_CH17 | 17 | ADMAC channel 17 |
| ADMAC\_CH18 | 18 | ADMAC channel 18 |
| ADMAC\_CH19 | 19 | ADMAC channel 19 |
| ADMAC\_CH20 | 20 | ADMAC channel 20 |
| ADMAC\_CH21 | 21 | ADMAC channel 21 |
| ADMAC\_CH22 | 22 | ADMAC channel 22 |
| ADMAC\_CH23 | 23 | ADMAC channel 23 |
| ADMAC\_CH24 | 24 | ADMAC channel 24 |
| ADMAC\_CH25 | 25 | ADMAC channel 25 |
| ADMAC\_CH26 | 26 | ADMAC channel 26 |
| ADMAC\_CH27 | 27 | ADMAC channel 27 |
| ADMAC\_CH28 | 28 | ADMAC channel 28 |
| ADMAC\_CH29 | 29 | ADMAC channel 29 |
| ADMAC\_CH30 | 30 | ADMAC channel 30 |
| ADMAC\_CH31 | 31 | ADMAC channel 31 |
| ADMAC\_CHMAX | 32 | Total number of ADMAC channels |

### DMAC\_ERROR\_CODE

The data type DMAC\_ERROR\_CODE is a type-defined enumeration that lists all error codes for ADMAC.

Table 3‑2 DMAC\_ERROR\_CODE type information

|  |  |
| --- | --- |
| **Member name** | **Value** |
| DMAC\_ERROR\_NONE | 0 |
| DMAC\_ERROR\_BUSY | -1 |
| DMAC\_ERROR\_INVALID | -2 |
| DMAC\_ERROR\_OUT\_RANGE | -3 |

### DMAC\_SRC\_DST

The data type DMAC\_SRC\_DST is a type-defined enumeration that shows connections between ADMAC and other devices.

Table 3‑3 DMAC\_SRC\_DST type information

|  |  |
| --- | --- |
| **Member name** | **Value** |
| DMAC\_SSI00 | DMAC\_SSI\_MODULE\_MIN |
| DMAC\_SSI01 | 1 |
| DMAC\_SSI02 | 2 |
| DMAC\_SSI03 | 3 |
| DMAC\_SSI04 | 4 |
| DMAC\_SSI05 | 5 |
| DMAC\_SSI06 | 6 |
| DMAC\_SSI07 | 7 |
| DMAC\_SSI10 | 10 |
| DMAC\_SSI11 | 11 |
| DMAC\_SSI12 | 12 |
| DMAC\_SSI13 | 13 |
| DMAC\_SSI14 | 14 |
| DMAC\_SSI15 | 15 |
| DMAC\_SSI16 | 16 |
| DMAC\_SSI17 | 17 |
| DMAC\_SSI20 | 20 |
| DMAC\_SSI21 | 21 |
| DMAC\_SSI22 | 22 |
| DMAC\_SSI23 | 23 |
| DMAC\_SSI24 | 24 |
| DMAC\_SSI25 | 25 |
| DMAC\_SSI26 | 26 |
| DMAC\_SSI27 | 27 |
| DMAC\_SSI30 | 30 |
| DMAC\_SSI31 | 31 |
| DMAC\_SSI32 | 32 |
| DMAC\_SSI33 | 33 |
| DMAC\_SSI34 | 34 |
| DMAC\_SSI35 | 35 |
| DMAC\_SSI36 | 36 |
| DMAC\_SSI37 | 37 |
| DMAC\_SSI40 | 40 |
| DMAC\_SSI41 | 41 |
| DMAC\_SSI42 | 42 |
| DMAC\_SSI43 | 43 |
| DMAC\_SSI44 | 44 |
| DMAC\_SSI45 | 45 |
| DMAC\_SSI46 | 46 |
| DMAC\_SSI47 | 47 |
| DMAC\_SSI5 | 50 |
| DMAC\_SSI6 | 60 |
| DMAC\_SSI7 | 70 |
| DMAC\_SSI8 | 80 |
| DMAC\_SSI90 | 90 |
| DMAC\_SSI91 | 91 |
| DMAC\_SSI92 | 92 |
| DMAC\_SSI93 | 93 |
| DMAC\_SSI94 | 94 |
| DMAC\_SSI95 | 95 |
| DMAC\_SSI96 | 96 |
| DMAC\_SSI97 | DMAC\_SSI\_MODULE\_MAX |
| DMAC\_DTCPPP0 | 98 |
| DMAC\_DTCPPP1 | 99 |
| DMAC\_DTCPCP0 | 100 |
| DMAC\_DTCPCP1 | 101 |
| DMAC\_SCU\_SRCI0 | DMAC\_SCU\_SRC\_INPUT\_MODULE\_MIN |
| DMAC\_SCU\_SRCI1 | 111 |
| DMAC\_SCU\_SRCI2 | 112 |
| DMAC\_SCU\_SRCI3 | 113 |
| DMAC\_SCU\_SRCI4 | 114 |
| DMAC\_SCU\_SRCI5 | 115 |
| DMAC\_SCU\_SRCI6 | 116 |
| DMAC\_SCU\_SRCI7 | 117 |
| DMAC\_SCU\_SRCI8 | 118 |
| DMAC\_SCU\_SRCI9 | DMAC\_SCU\_SRC\_INPUT\_MODULE\_MAX |
| DMAC\_SCU\_SRCO0 | DMAC\_SCU\_SRC\_OUTPUT\_MODULE\_MIN |
| DMAC\_SCU\_SRCO1 | 121 |
| DMAC\_SCU\_SRCO2 | 122 |
| DMAC\_SCU\_SRCO3 | 123 |
| DMAC\_SCU\_SRCO4 | 124 |
| DMAC\_SCU\_SRCO5 | 125 |
| DMAC\_SCU\_SRCO6 | 126 |
| DMAC\_SCU\_SRCO7 | 127 |
| DMAC\_SCU\_SRCO8 | 128 |
| DMAC\_SCU\_SRCO9 | DMAC\_SCU\_SRC\_OUTPUT\_MODULE\_MAX |
| DMAC\_SCU\_CMD0 | DMAC\_SCU\_CMD\_MODULE\_MIN |
| DMAC\_SCU\_CMD1 | DMAC\_SCU\_CMD\_MODULE\_MAX |
| DMAC\_MLM0 | 132 |
| DMAC\_MLM1 | 133 |
| DMAC\_MLM2 | 134 |
| DMAC\_MLM3 | 135 |
| DMAC\_MLM4 | 136 |
| DMAC\_MLM5 | 137 |
| DMAC\_MLM6 | 138 |
| DMAC\_MLM7 | 139 |
| DMAC\_NONCONTROL | 140 |
| DMAC\_MAX | 141 |

### DMAC\_MODE

The data type DMAC\_MODE is a type-defined enumeration of ADMAC operation mode.

Table 3‑4 DMAC\_MODE type information

|  |  |  |
| --- | --- | --- |
| **Member name** | **Value** | **Outline** |
| ADMAC\_NORMAL\_MODE | 1 | ADMAC normal mode |
| ADMAC\_REPEAT\_MODE | 2 | ADMAC repeating mode |

### DMAC\_PARAMS

The data type DMAC\_PARAMS is a type-defined structure that possesses necessary parameters for DMAC module.

Table 3‑5 DMAC\_PARAMS type information

|  |  |  |
| --- | --- | --- |
| **Member name** | **Data type** | **Outline** |
| dst | WORD32 | Destination address |
| src | WORD32 | Source address |
| connect\_flag | WORD32 | Transmission type flag |
| transmem | pVOID | Transmission memory address |
| trans\_num | WORD32 | Transfer number |
| stg\_num | WORD32 | Stage number |
| stg\_size | WORD32 | Stage memory size |
| buf\_size | WORD32 | Ring buffer size |
| trans\_mode | WORD32 | Indicator of transfer/receive mode |
| mode | DMAC\_MODE | Operation mode |
| dma\_ch | UWORD32 | ADMAC channel |
| src\_reqst | UWORD32 | Source request |
| trans\_size | UWORD32 | Transfer size |

### DMAC\_MODULE\_INFO

The data type DMAC\_MODULE\_INFO is a type-defined structure of ADMAC device infomation.

Table 3‑6 DMAC\_MODULE\_INFO type information

|  |  |  |
| --- | --- | --- |
| **Member name** | **Data type** | **Outline** |
| module\_address | UWORD32 | Destination address |
| trans | UWORD32 | Source address |
| recei | UWORD32 | Transmission memory address |

## Macro definition

|  |  |  |
| --- | --- | --- |
| **Macros** | **Value** | **Outline** |
| DMAC\_SSI\_MODULE\_MIN | 0 | SSI module min index |
| DMAC\_SSI\_MODULE\_MAX | 97 | SSI module max index |
| DMAC\_SCU\_SRC\_INPUT\_MODULE\_MIN | 110 | SCU input module min index |
| DMAC\_SCU\_SRC\_INPUT\_MODULE\_MAX | 119 | SCU input module max index |
| DMAC\_SCU\_SRC\_OUTPUT\_MODULE\_MIN | 120 | SCU output module min index |
| DMAC\_SCU\_SRC\_OUTPUT\_MODULE\_MAX | 129 | SCU output module max index |
| DMAC\_SCU\_CMD\_MODULE\_MIN | 130 | CMD module min index |
| DMAC\_SCU\_CMD\_MODULE\_MAX | 131 | CMD module max index |
| XF\_RCAR\_DMAOR\_L | XF\_RCAR\_REG\_DMAOR\_L | DMA operation register (for lower-numbered channels) |
| XF\_RCAR\_DMAOR\_U | XF\_RCAR\_REG\_DMAOR\_U | DMA channel clear register (for lower-numbered channels) |
| XF\_DMACHCLR\_L | XF\_RCAR\_REG\_DMACHCLR\_L | DMA channel clear register (for lower-numbered channels) |
| XF\_DMACHCLR\_U | XF\_RCAR\_REG\_DMACHCLR\_U | DMA channel clear register (for higher-numbered channels) |
| XF\_RCAR\_DMARS\_0 | XF\_RCAR\_REG\_DMARS\_0 | Channel 0 DMA Extended Resource Selectors Register |
| XF\_RCAR\_DMADPBASE\_0 | XF\_RCAR\_REG\_DMADPBASE\_0 | Channel 0 DMA Descriptor Base Address Register |
| XF\_RCAR\_DMACHCRB\_0 | XF\_RCAR\_REG\_DMACHCRB\_0 | Channel 0 DMA channel control register B |
| XF\_RCAR\_DMACHCR\_0 | XF\_RCAR\_REG\_DMACHCR\_0 | Channel 0 DMA Channel Control Register |
| XF\_RCAR\_DMATCR\_0 | XF\_RCAR\_REG\_DMATCR\_0 | Channel 0 DMA Transfer Count Register |
| XF\_RCAR\_DMABUFCR\_0 | XF\_RCAR\_REG\_DMABUFCR\_0 | Channel 0 DMA Buffer Control register |
| XF\_RCAR\_DMASAR\_0 | XF\_RCAR\_REG\_DMASAR\_0 | Channel 0 Source Address register |
| XF\_RCAR\_DMADAR\_0 | XF\_RCAR\_REG\_DMADAR\_0 | Channel 0 Destination Address register |
| DMAC\_TRANSMIT\_REQ | 1 | source request is source |
| DMAC\_RECEIVE\_REQ | 2 | source request is destination |

## Register definition

Below is the table listing all items that are macros representing register addresses located in repository s492d/include/sys/xt-shmem/board-rcar/xf-registers.h

|  |  |
| --- | --- |
| **Register** | **Outline** |
| XF\_RCAR\_REG\_DMAOR\_L | DMA operation register (for lower-numbered channels) |
| XF\_RCAR\_REG\_DMAOR\_U | DMA channel clear register (for lower-numbered channels) |
| XF\_RCAR\_REG\_DMACHCLR\_L | DMA channel clear register (for lower-numbered channels) |
| XF\_RCAR\_REG\_DMACHCLR\_U | DMA channel clear register (for higher-numbered channels) |
| XF\_RCAR\_REG\_DMARS\_0 | Channel 0 DMA Extended Resource Selectors Register |
| XF\_RCAR\_REG\_DMADPBASE\_0 | Channel 0 DMA Descriptor Base Address Register |
| XF\_RCAR\_REG\_DMACHCRB\_0 | Channel 0 DMA channel control register B |
| XF\_RCAR\_REG\_DMACHCR\_0 | Channel 0 DMA Channel Control Register |
| XF\_RCAR\_REG\_DMATCR\_0 | Channel 0 DMA Transfer Count Register |
| XF\_RCAR\_REG\_DMABUFCR\_0 | Channel 0 DMA Buffer Control register |
| XF\_RCAR\_REG\_DMASAR\_0 | Channel 0 Source Address register |
| XF\_RCAR\_REG\_DMADAR\_0 | Channel 0 Destination Address register |

## Global variable definition

Below is the array of struct DMAC\_MODULE\_INFO-datatype admac\_set\_value holds 141 (DMAC\_MAX) elements representing settings for ADMAC data transfer

|  |  |  |  |
| --- | --- | --- | --- |
| static DMAC\_MODULE\_INFO admac\_set\_value[DMAC\_MAX] | | | |
| Array’s index | module\_address | trans | recei |
| DMAC\_SSI00 | 0xEC100000 | 0x15 | 0x16 |
| DMAC\_SSI01 | 0xEC100400 | 0x35 | 0x36 |
| DMAC\_SSI02 | 0xEC100800 | 0x37 | 0x38 |
| DMAC\_SSI03 | 0xEC100C00 | 0x47 | 0x48 |
| DMAC\_SSI04 | 0xEC10A000 | 0x3F | 0x40 |
| DMAC\_SSI05 | 0xEC10A400 | 0x43 | 0x44 |
| DMAC\_SSI06 | 0xEC10A800 | 0x4F | 0x50 |
| DMAC\_SSI07 | 0xEC10AC00 | 0x53 | 0x54 |
| DMAC\_SSI10 | 0xEC101000 | 0x49 | 0x4A |
| DMAC\_SSI11 | 0xEC101400 | 0x4B | 0x4C |
| DMAC\_SSI12 | 0xEC101800 | 0x57 | 0x58 |
| DMAC\_SSI13 | 0xEC101C00 | 0x59 | 0x5A |
| DMAC\_SSI14 | 0xEC10B000 | 0x5F | 0x60 |
| DMAC\_SSI15 | 0xEC10B400 | 0xC3 | 0xC4 |
| DMAC\_SSI16 | 0xEC10B800 | 0xC7 | 0xC8 |
| DMAC\_SSI17 | 0xEC10BC00 | 0xCB | 0xCC |
| DMAC\_SSI20 | 0xEC102000 | 0x63 | 0x64 |
| DMAC\_SSI21 | 0xEC102400 | 0x67 | 0x68 |
| DMAC\_SSI22 | 0xEC102800 | 0x6B | 0x6C |
| DMAC\_SSI23 | 0xEC102C00 | 0x6D | 0x6E |
| DMAC\_SSI24 | 0xEC10C000 | 0xCF | 0xCE |
| DMAC\_SSI25 | 0xEC10C400 | 0xEB | 0xEC |
| DMAC\_SSI26 | 0xEC10C800 | 0xED | 0xEE |
| DMAC\_SSI27 | 0xEC10CC00 | 0xEF | 0xF0 |
| DMAC\_SSI30 | 0xEC103000 | 0x6F | 0x70 |
| DMAC\_SSI31 | 0xEC103400 | 0x21 | 0x22 |
| DMAC\_SSI32 | 0xEC103800 | 0x23 | 0x24 |
| DMAC\_SSI33 | 0xEC103C00 | 0x25 | 0x26 |
| DMAC\_SSI34 | 0xEC10D000 | 0x27 | 0x28 |
| DMAC\_SSI35 | 0xEC10D400 | 0x29 | 0x2A |
| DMAC\_SSI36 | 0xEC10D800 | 0x2B | 0x2C |
| DMAC\_SSI37 | 0xEC10DC00 | 0x2D | 0x2E |
| DMAC\_SSI40 | 0xEC104000 | 0x71 | 0x72 |
| DMAC\_SSI41 | 0xEC104400 | 0x17 | 0x18 |
| DMAC\_SSI42 | 0xEC104800 | 0x19 | 0x1A |
| DMAC\_SSI43 | 0xEC104C00 | 0x1B | 0x1C |
| DMAC\_SSI44 | 0xEC10E000 | 0x1D | 0x1E |
| DMAC\_SSI45 | 0xEC10E400 | 0x1F | 0x20 |
| DMAC\_SSI46 | 0xEC10E800 | 0x31 | 0x32 |
| DMAC\_SSI47 | 0xEC10EC00 | 0x33 | 0x34 |
| DMAC\_SSI5 | 0xEC105000 | 0x73 | 0x74 |
| DMAC\_SSI6 | 0xEC106000 | 0x75 | 0x76 |
| DMAC\_SSI7 | 0xEC107000 | 0x79 | 0x7A |
| DMAC\_SSI8 | 0xEC108000 | 0x7B | 0x7C |
| DMAC\_SSI90 | 0xEC109000 | 0x7D | 0x7E |
| DMAC\_SSI91 | 0xEC109400 | 0x7F | 0x80 |
| DMAC\_SSI92 | 0xEC109800 | 0x81 | 0x82 |
| DMAC\_SSI93 | 0xEC109C00 | 0x83 | 0x84 |
| DMAC\_SSI94 | 0xEC10F000 | 0xA3 | 0xA4 |
| DMAC\_SSI95 | 0xEC10F400 | 0xA5 | 0xA6 |
| DMAC\_SSI96 | 0xEC10F800 | 0xA7 | 0xA8 |
| DMAC\_SSI97 | 0xEC10FC00 | 0xA9 | 0xAA |
| DMAC\_DTCPPP0 | 0xEC120000 | 0xBF | 0xC0 |
| DMAC\_DTCPPP1 | 0xEC120400 | 0xD5 | 0xD6 |
| DMAC\_DTCPCP0 | 0xEC124000 | 0xD7 | 0xD8 |
| DMAC\_DTCPCP1 | 0xEC124400 | 0xD9 | 0xDA |
| DMAC\_SCU\_SRCI0 | 0xEC000000 | 0x85 | 0xff |
| DMAC\_SCU\_SRCI1 | 0xEC000400 | 0x87 | 0xff |
| DMAC\_SCU\_SRCI2 | 0xEC000800 | 0x89 | 0xff |
| DMAC\_SCU\_SRCI3 | 0xEC000C00 | 0x8B | 0xff |
| DMAC\_SCU\_SRCI4 | 0xEC001000 | 0x8D | 0xff |
| DMAC\_SCU\_SRCI5 | 0xEC001400 | 0x8F | 0xff |
| DMAC\_SCU\_SRCI6 | 0xEC001800 | 0x91 | 0xff |
| DMAC\_SCU\_SRCI7 | 0xEC001C00 | 0x93 | 0xff |
| DMAC\_SCU\_SRCI8 | 0xEC002000 | 0x95 | 0xff |
| DMAC\_SCU\_SRCI9 | 0xEC002400 | 0x97 | 0xff |
| DMAC\_SCU\_SRCO0 | 0xEC004000 | 0xff | 0x9A |
| DMAC\_SCU\_SRCO1 | 0xEC004400 | 0xff | 0x9C |
| DMAC\_SCU\_SRCO2 | 0xEC004800 | 0xff | 0x9E |
| DMAC\_SCU\_SRCO3 | 0xEC004C00 | 0xff | 0xA0 |
| DMAC\_SCU\_SRCO4 | 0xEC005000 | 0xff | 0xB0 |
| DMAC\_SCU\_SRCO5 | 0xEC005400 | 0xff | 0xB2 |
| DMAC\_SCU\_SRCO6 | 0xEC005800 | 0xff | 0xB4 |
| DMAC\_SCU\_SRCO7 | 0xEC005C00 | 0xff | 0xB6 |
| DMAC\_SCU\_SRCO8 | 0xEC006000 | 0xff | 0xB8 |
| DMAC\_SCU\_SRCO9 | 0xEC006400 | 0xff | 0xBA |
| DMAC\_SCU\_CMD0 | 0xEC008000 | 0xff | 0xBC |
| DMAC\_SCU\_CMD1 | 0xEC008400 | 0xff | 0xBE |
| DMAC\_MLM0 | 0xEC020000 | 0xDB | 0xDC |
| DMAC\_MLM1 | 0xEC020400 | 0xE3 | 0xE4 |
| DMAC\_MLM2 | 0xEC020800 | 0xE5 | 0xE6 |
| DMAC\_MLM3 | 0xEC020C00 | 0xE7 | 0xE8 |
| DMAC\_MLM4 | 0xEC021000 | 0xF3 | 0xF4 |
| DMAC\_MLM5 | 0xEC021400 | 0xF5 | 0xF6 |
| DMAC\_MLM6 | 0xEC021800 | 0xF7 | 0xF8 |
| DMAC\_MLM7 | 0xEC021C00 | 0xF9 | 0xFA |

## Function definition

### xa\_dmac\_get\_register\_addr

DD\_PLG\_TDM\_03\_001

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | inline UWORD32 xa\_dmac\_get\_register\_addr(UWORD32 reg\_addr0, DMAC\_CHN n) | | | |
| **Function** | This function is to get DMAC channel N register’s address. | | | |
| **Arguments** | Type | Name | I/O | Description |
| UWORD32 | reg\_addr0 | I | Pointer to register of channel 0 |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] |
| **Return value** | The value of register channel N | | | |
| **Description** | * xa\_dmac\_get\_register\_addr command processing:   - Get DMAC channel N register’s address | | | |

[Covers: FD\_PLG\_TDM\_005, FD\_PLG\_TDM\_017]

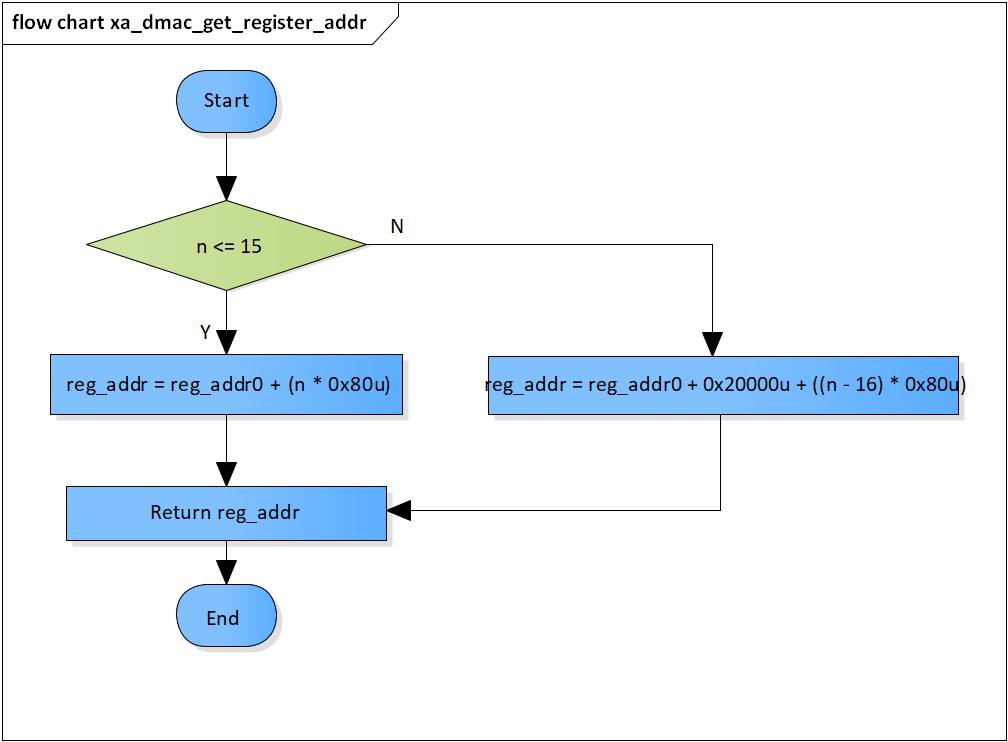


Figure 3‑1 xa\_dmac\_get\_register\_addr flowchart

### xa\_dmac\_set\_stage\_number

DD\_PLG\_TDM\_03\_002

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | static VOID xa\_dmac\_set\_stage\_number(UWORD32 n, UWORD32 stg\_num) | | | |
| **Function** | This function is to set stage number. | | | |
| **Arguments** | Type | Name | I/O | Description |
| UWORD32 | n | I | Channel number  Valid range: [0: 31] |
| UWORD32 | stg\_num | I | Stage number  Valid values: greater than zero |
| **Return value** | None | | | |
| **Description** | * xa\_dmac\_set\_stage\_number command processing:   - Set stage for DMA channel N | | | |

[Covers: FD\_PLG\_TDM\_005]

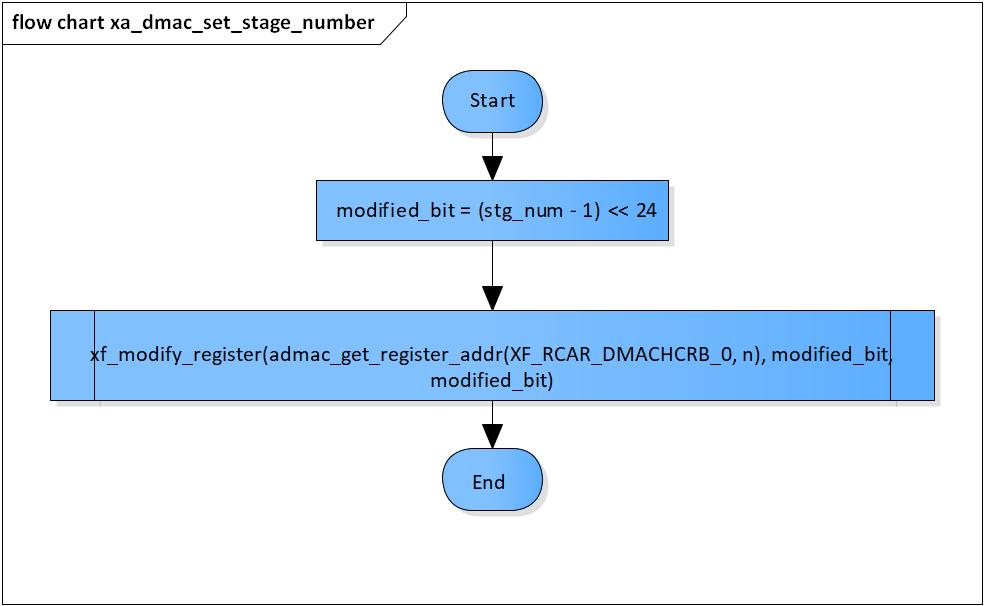


Figure 3‑2 xa\_dmac\_set\_stage\_number flowchart

### xa\_dmac\_reset\_descriptor

DD\_PLG\_TDM\_03\_003

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Syntax** | static DMAC\_ERROR\_CODE xa\_dmac\_reset\_descriptor(DMAC\_CHN n) | | | | |
| **Function** | This function is to reset descriptor of DMA channel N. | | | | |
| **Arguments** | Type | Name | I/O | Description | |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] | |
| **Return value** | DMAC\_ERROR\_NONE | | | | Always success |
| **Description** | * xa\_dmac\_reset\_descriptor command processing:   - Reset descriptor of DMA channel N | | | | |

[Covers: FD\_PLG\_TDM\_005]

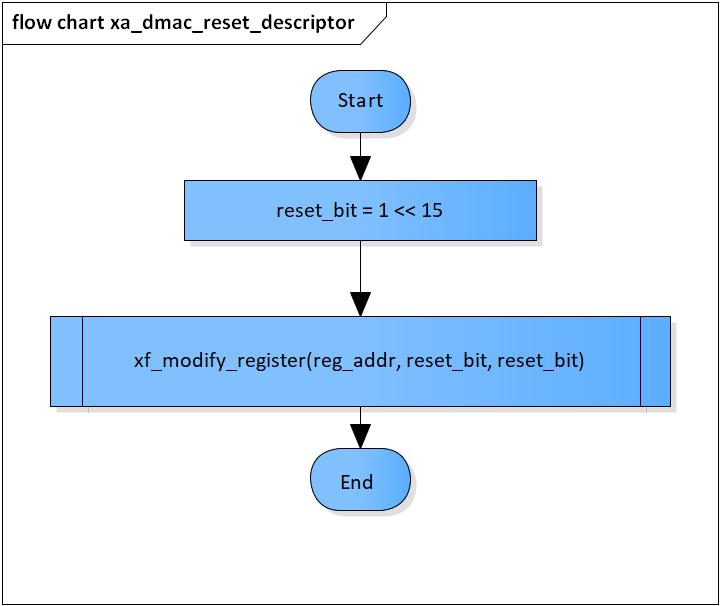
****

Figure 3‑3 xa\_dmac\_reset\_descriptor flowchart

### xa\_dmac\_start\_descriptor

DD\_PLG\_TDM\_03\_004

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Syntax** | static DMAC\_ERROR\_CODE xa\_dmac\_start\_descriptor(DMAC\_CHN n) | | | | |
| **Function** | This function is to start descriptor of DMA channel N. | | | | |
| **Arguments** | Type | Name | I/O | Description | |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] | |
| **Return value** | DMAC\_ERROR\_NONE | | | | Normal end |
| **Description** | * xa\_dmac\_start\_descriptor command processing:   - Start descriptor of DMA channel N | | | | |

[Covers: FD\_PLG\_TDM\_005]

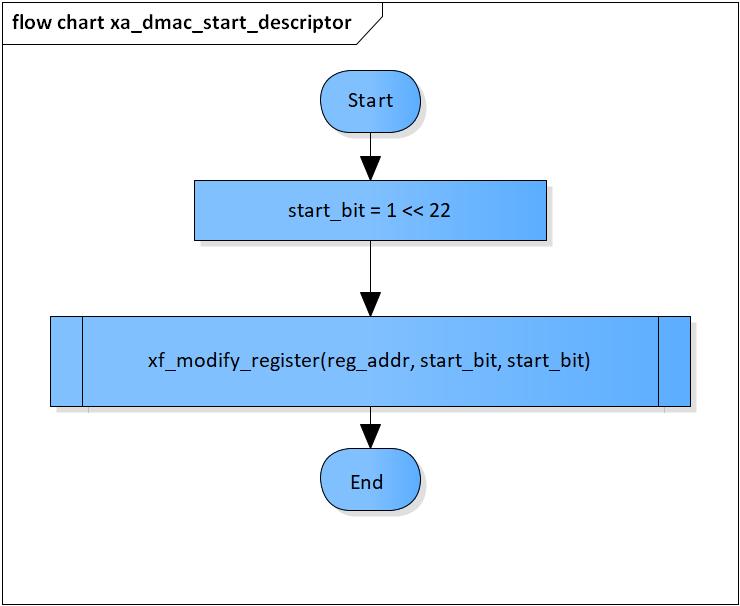


Figure 3‑4 xa\_dmac\_start\_descriptor flowchart

### xa\_dmac\_enable\_ch

DD\_PLG\_TDM\_03\_005

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Syntax** | static inline DMAC\_ERROR\_CODE xa\_dmac\_enable\_ch(DMAC\_CHN n) | | | | |
| **Function** | This function is to enable DMA channel N. | | | | |
| **Arguments** | Type | Name | I/O | Description | |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] | |
| **Return value** | DMAC\_ERROR\_BUSY | | | | Current ADMAC is running |
| DMAC\_ERROR\_NONE | | | | Normal end |
| **Description** | * xa\_dmac\_enable\_ch command processing:   - Enable DMA channel N | | | | |

[Covers: FD\_PLG\_TDM\_005, FD\_PLG\_TDM\_017]

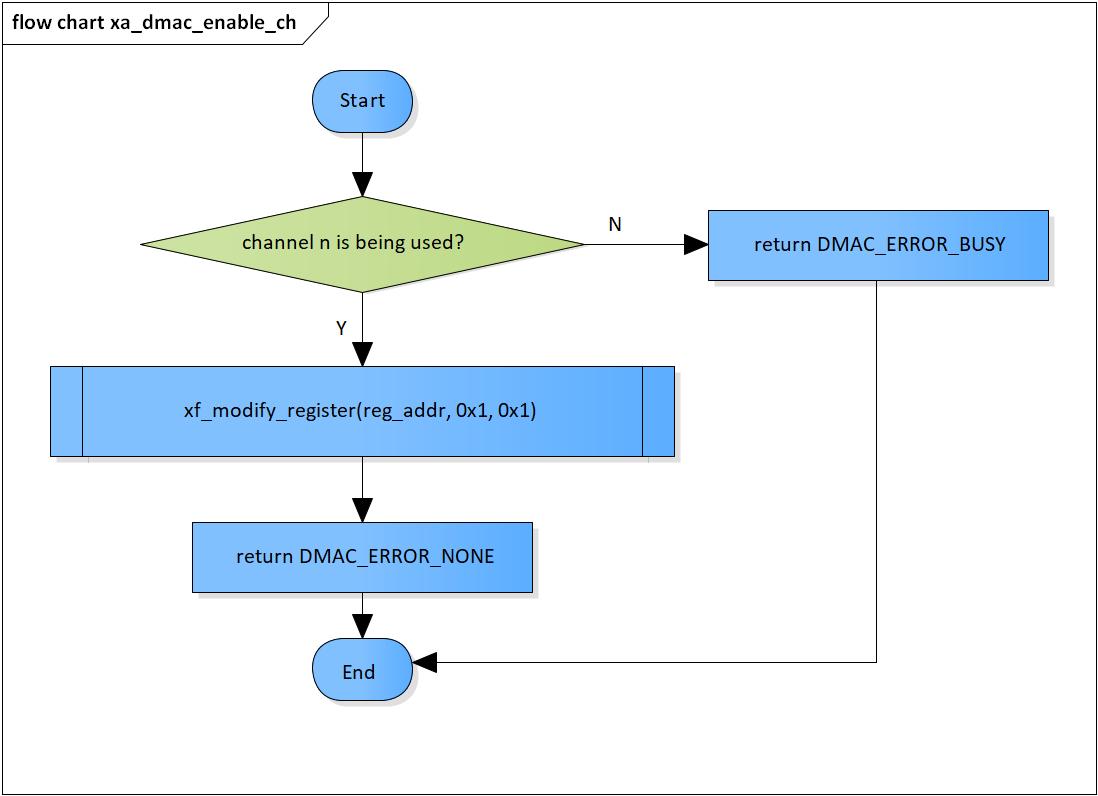


Figure 3‑5 xa\_dmac\_enable\_ch flowchart

### xa\_dmac\_disable\_ch

DD\_PLG\_TDM\_03\_006

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Syntax** | static inline DMAC\_ERROR\_CODE xa\_dmac\_disable\_ch(DMAC\_CHN n) | | | | |
| **Function** | This function is to disable DMA channel N. | | | | |
| **Arguments** | Type | Name | I/O | Description | |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] | |
| **Return value** | DMAC\_ERROR\_OUT\_RANGE | | | | DMAC module is invalid |
| DMAC\_ERROR\_NONE | | | | Normal end |
| **Description** | * xa\_dmac\_disable\_ch command processing:   - Disable DMA channel N | | | | |

[Covers: FD\_PLG\_TDM\_005, FD\_PLG\_TDM\_017]

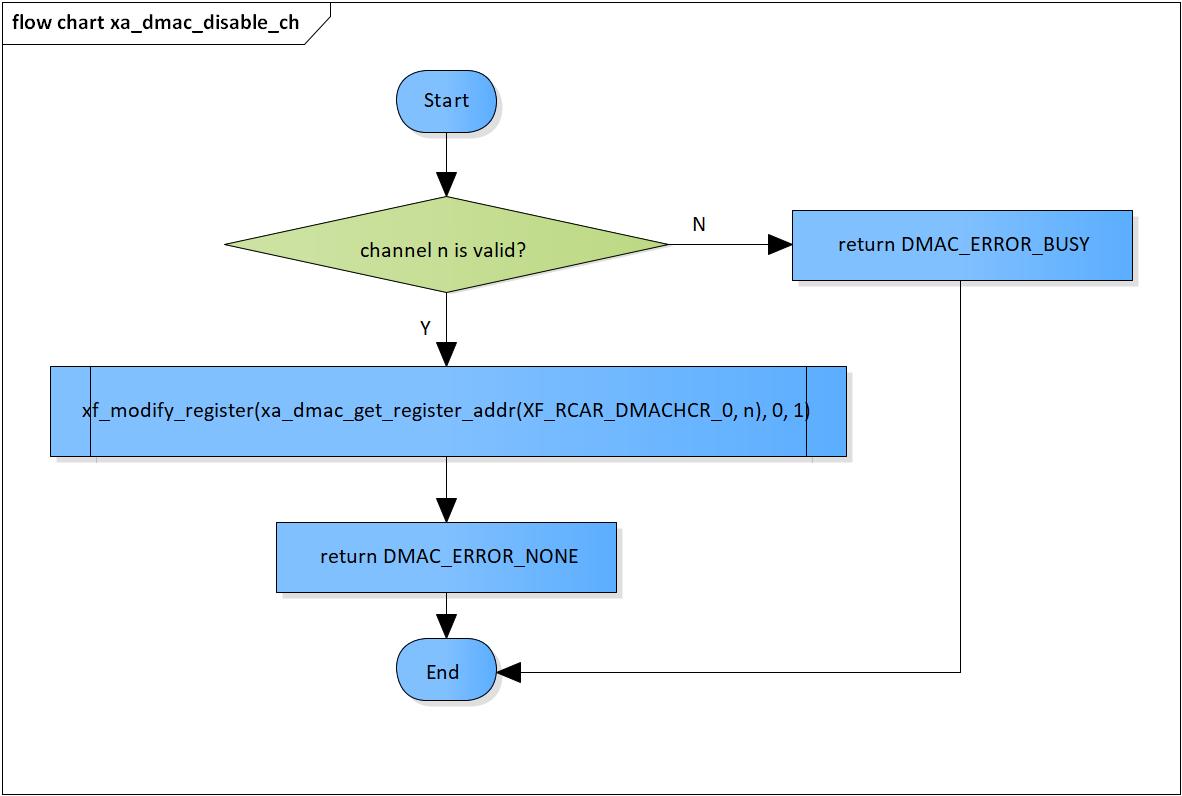


Figure 3‑6 xa\_dmac\_disable\_ch flowchart

### xa\_dmac\_enable\_module

DD\_PLG\_TDM\_03\_007

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | static inline VOID xa\_dmac\_enable\_module(DMAC\_CHN n) | | | |
| **Function** | This function is to enable DMAC module. | | | |
| **Arguments** | Type | Name | I/O | Description |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] |
| **Return value** | None | | | |
| **Description** | * xa\_dmac\_enable\_module command processing:   - Set ‘1’ to DE bit of register XF\_RCAR\_DMAOR\_L or XF\_RCAR\_DMAOR\_U depending channel number to enable DMAC module | | | |

[Covers: FD\_PLG\_TDM\_005, FD\_PLG\_TDM\_017]

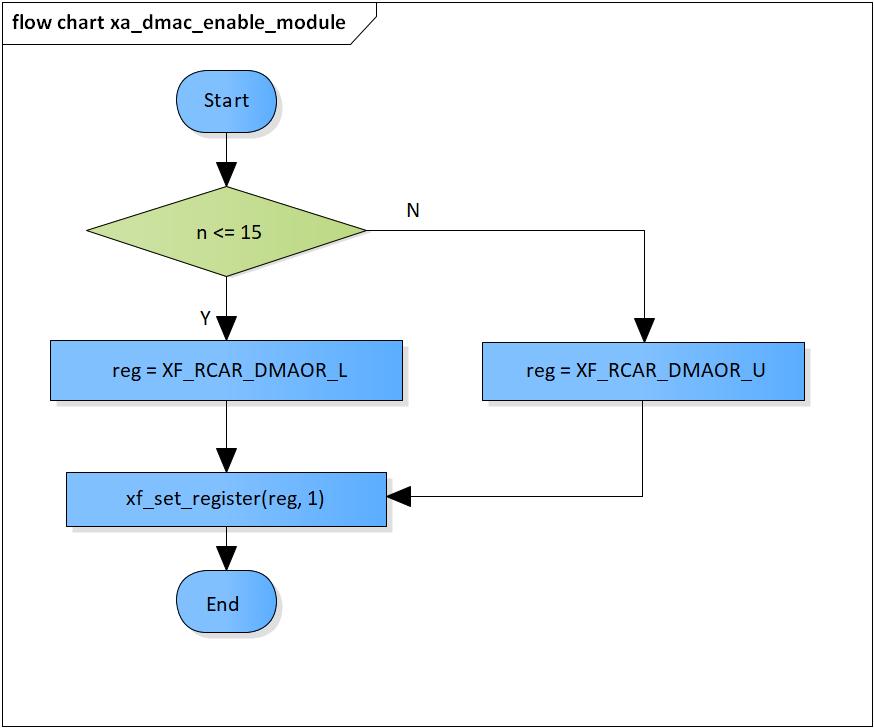


Figure 3‑7 xa\_dmac\_enable\_module flowchart

### xa\_dmac\_clear\_channel

DD\_PLG\_TDM\_03\_008

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | static inline void xa\_dmac\_clear\_channel(DMAC\_CHN n) | | | |
| **Function** | This function is to clear value set in DMAC channel N registers. | | | |
| **Arguments** | Type | Name | I/O | Description |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] |
| **Return value** | None | | | |
| **Description** | * xa\_dmac\_clear\_channel command processing:   - Clear value set in DMAC channel N registers | | | |

[Covers: FD\_PLG\_TDM\_005, FD\_PLG\_TDM\_017]

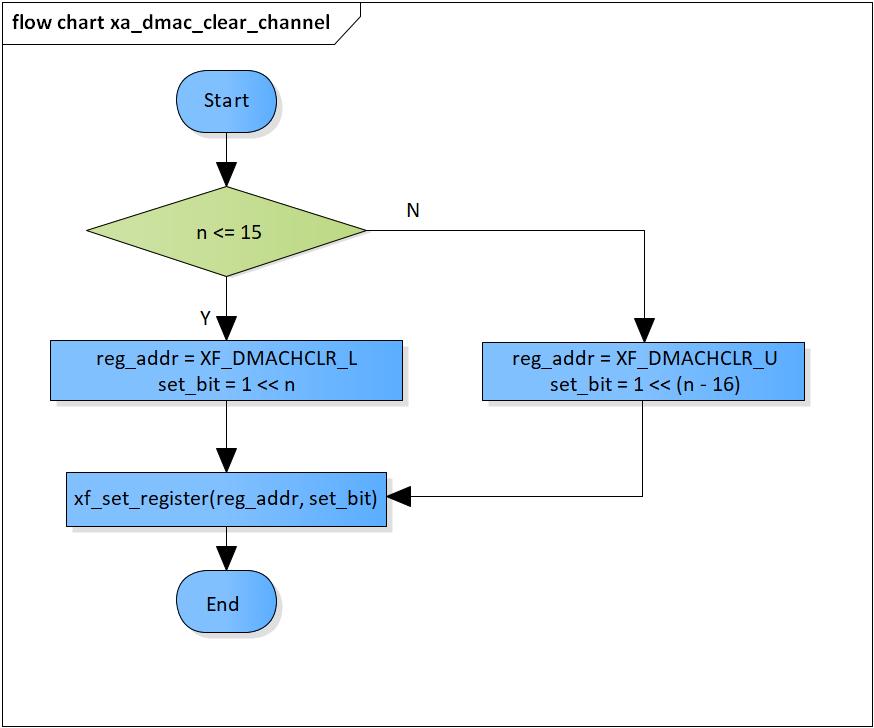


Figure 3‑8 xa\_dmac\_clear\_channel flowchart

### xa\_dmac\_check\_stage

DD\_PLG\_TDM\_03\_009

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | inline WORD32 xa\_dmac\_check\_stage(DMAC\_CHN n) | | | |
| **Function** | This function is to check the current stage of DMAC module. | | | |
| **Arguments** | Type | Name | I/O | Description |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] |
| **Return value** | The stage of ADMAC module | | | |
| **Description** | * xa\_dmac\_check\_stage command processing:   - Check the current stage of DMAC module | | | |

[Covers: FD\_PLG\_TDM\_017]

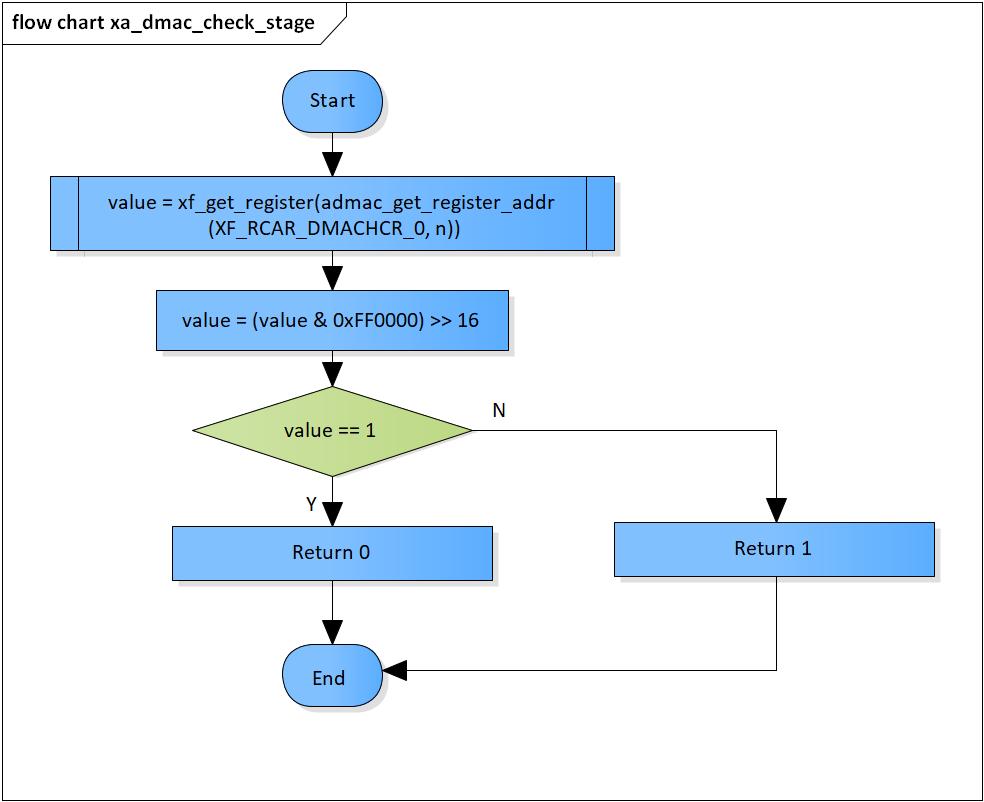


Figure 3‑9 xa\_dmac\_check\_stage flowchart

### xa\_dmac\_check\_and\_clear\_interrupt

DD\_PLG\_TDM\_03\_010

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | inline WORD32 admac\_check\_and\_clear\_interrupt(DMAC\_CHN n) | | | |
| **Function** | This function is to check and clear interrupt of DMAC channel N. | | | |
| **Arguments** | Type | Name | I/O | Description |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] |
| **Return value** | The interrupt\_flag | | | |
| **Description** | * xa\_dmac\_check\_and\_clear\_interrupt command processing:   - Check and clear the interrupt of DMAC channel N | | | |

[Covers: FD\_PLG\_TDM\_017]

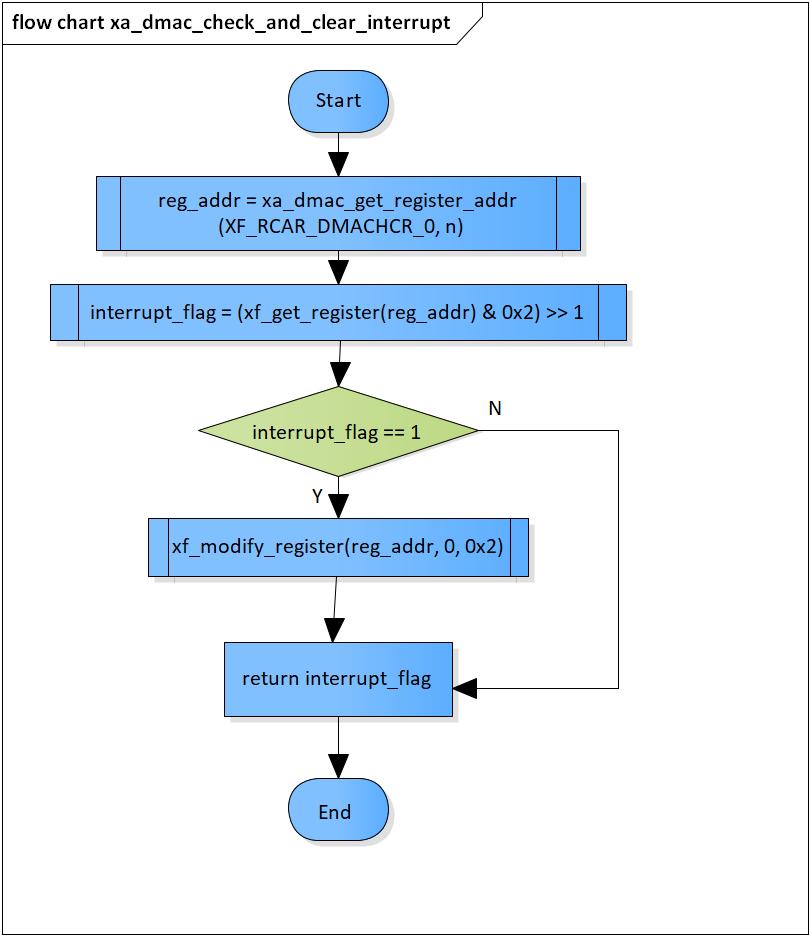


Figure 3‑10 xa\_dmac\_check\_and\_clear\_interrupt flowchart

### xa\_dmac\_start

DD\_PLG\_TDM\_03\_011

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | inline DMAC\_ERROR\_CODE xa\_dmac\_start(DMAC\_CHN n) | | | |
| **Function** | This function is to start DMAC channel N. | | | |
| **Arguments** | Type | Name | I/O | Description |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] |
| **Return value** | DMAC\_ERROR\_BUSY | | Cannot enable ADMAC transfer on the current ADMAC channel | |
| DMAC\_ERROR\_NONE | | Normal end | |
| **Description** | * xa\_dmac\_start command processing:   - Start the DMAC channel N | | | |

[Covers: FD\_PLG\_TDM\_005, FD\_PLG\_TDM\_017]

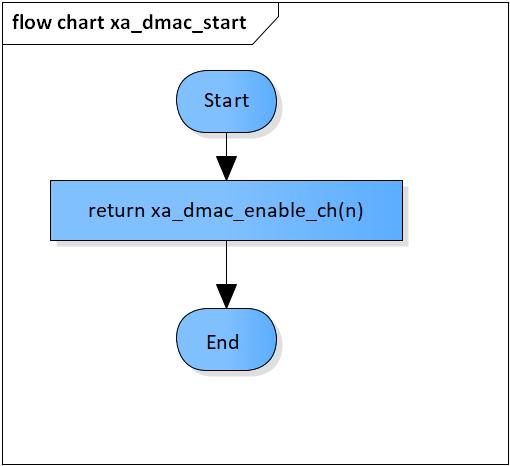


Figure 3‑11 xa\_dmac\_start flowchart

### xa\_dmac\_stop

DD\_PLG\_TDM\_03\_012

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | DMAC\_ERROR\_CODE xa\_dmac\_stop(DMAC\_CHN n) | | | |
| **Function** | This function is to stop DMAC channel N. | | | |
| **Arguments** | Type | Name | I/O | Description |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] |
| **Return value** | DMAC\_ERROR\_INVALID | | Cannot disable ADMAC transfer on the current ADMAC channel | |
| DMAC\_ERROR\_NONE | | Normal end | |
| **Description** | * xa\_dmac\_stop command processing:   - Stop the DMAC channel N and clear value set on all of its registers | | | |

[Covers: FD\_PLG\_TDM\_017]

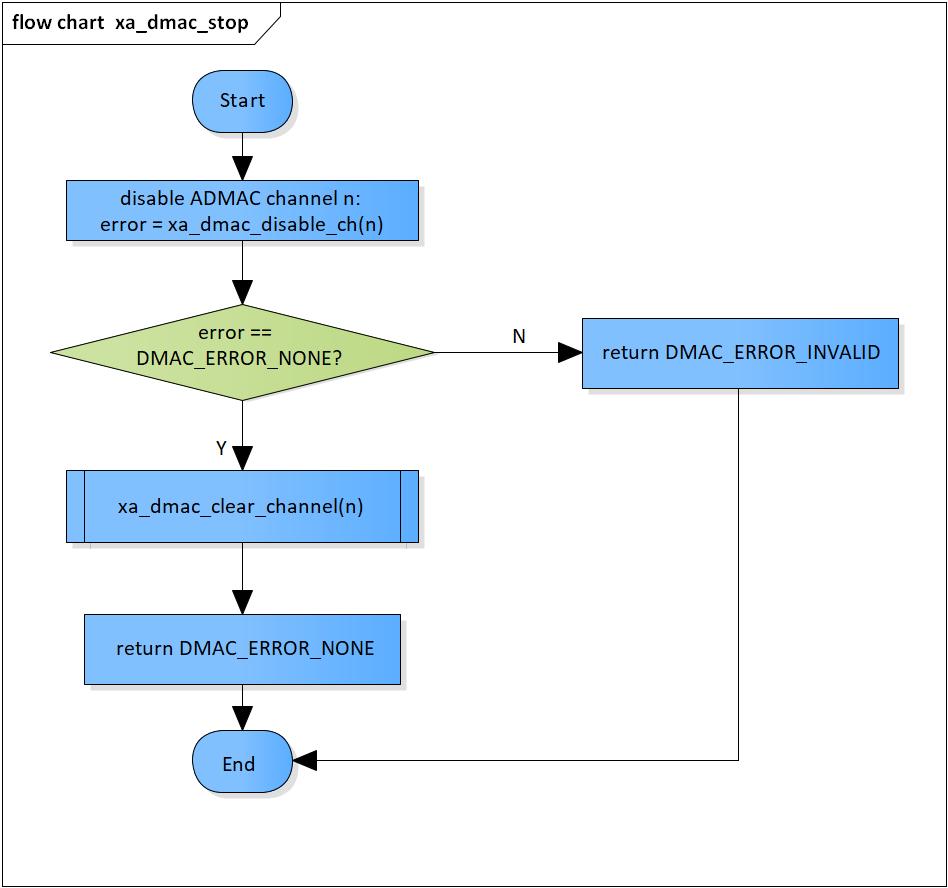


Figure 3‑12 xa\_dmac\_stop flowchart

### xa\_dmac\_descriptor\_setup

DD\_PLG\_TDM\_03\_013

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | static VOID xa\_dmac\_descriptor\_setup(DMAC\_CHN n, const pVOID descript\_mem) | | | |
| **Function** | This function is to set DMAC channel N’s descriptor. | | | |
| **Arguments** | Type | Name | I/O | Description |
| DMAC\_CHN | n | I | Channel number  Valid range: [0: 31] |
| const pVOID | descript\_mem | I | Pointer to descriptor memory |
| **Return value** | None | | | |
| **Description** | * xa\_dmac\_descriptor\_setup command processing:   - Set DMAC channel N’s descriptor | | | |

[Covers: FD\_PLG\_TDM\_005]

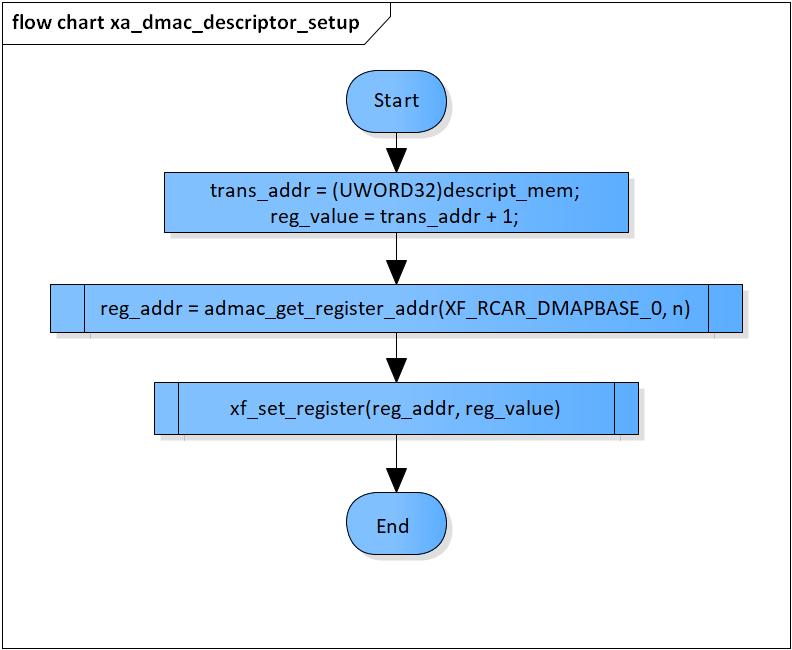


Figure 3‑13 xa\_dmac\_descriptor\_setup flowchart

### xa\_dmac\_stage\_config

DD\_PLG\_TDM\_03\_014

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | static VOID xa\_dmac\_stage\_config(const pVOID src, const pVOID dst, const pVOID stage\_mem, UWORD32 trans\_num) | | | |
| **Function** | This function is to set DMAC stage. | | | |
| **Arguments** | Type | Name | I/O | Description |
| const pVOID | src | I | Source address |
| const pVOID | dst | I | Destination address |
| const pVOID | stage\_mem | I | Stage memory |
| UWORD32 | trans\_num | I | Transmission number in a time |
| **Return value** | None | | | |
| **Description** | * xa\_dmac\_stage\_config command processing:   - Set DMAC stage | | | |

[Covers: FD\_PLG\_TDM\_005]

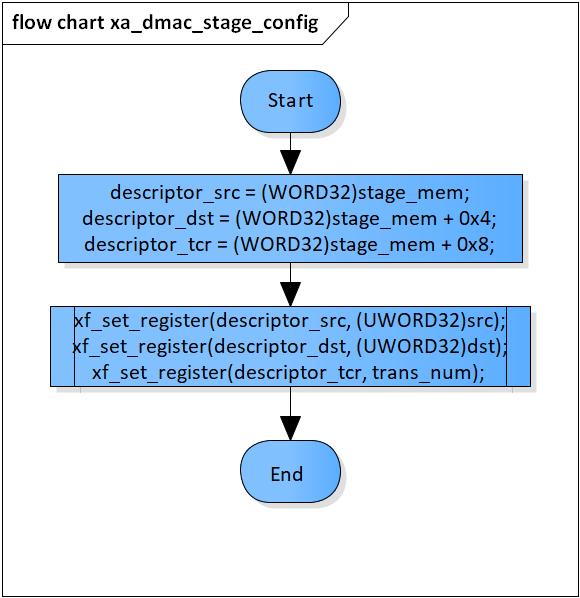


Figure 3‑14 xa\_dmac\_stage\_config flowchart

### xa\_dmac\_pre\_config

DD\_PLG\_TDM\_03\_015

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | static inline DMAC\_ERROR\_CODE admac\_pre\_config(DMAC\_CHN dma\_channel, UWORD32 src\_reqst, UWORD32 reqst\_flag, const void \*descript\_mem, UWORD32 stg\_num, DMAC\_MODE mode, UWORD32 transfer\_size) | | | |
| **Function** | This function is to set DMAC parameters. | | | |
| **Arguments** | Type | Name | I/O | Description |
| DMAC\_CHN | dma\_channel | I | DMAC channel  Valid range: [0: 31] |
| UWORD32 | src\_reqst | I | Source request |
| UWORD32 | reqst\_flag | I | Source or destination is requested  Valid values: 1/2 |
| const pVOID | descript\_mem | I | Descriptor memory address |
| UWORD32 | stg\_num | I | Stage number  Valid values: greater than zero |
| DMAC\_MODE | mode | I | Operating mode  Valid values: 1/2 |
| UWORD32 | transfer\_size | I | Transmission unit  Valid values: 4 |
| **Return value** | DMAC\_ERROR\_INVALID | | Stage number is invalid  Transfer size is invalid | |
| DMAC\_ERROR\_NONE | | Normal end | |
| **Description** | * xa\_dmac\_pre\_config command processing:   - Set DMAC parameters | | | |

[Covers: FD\_PLG\_TDM\_005]

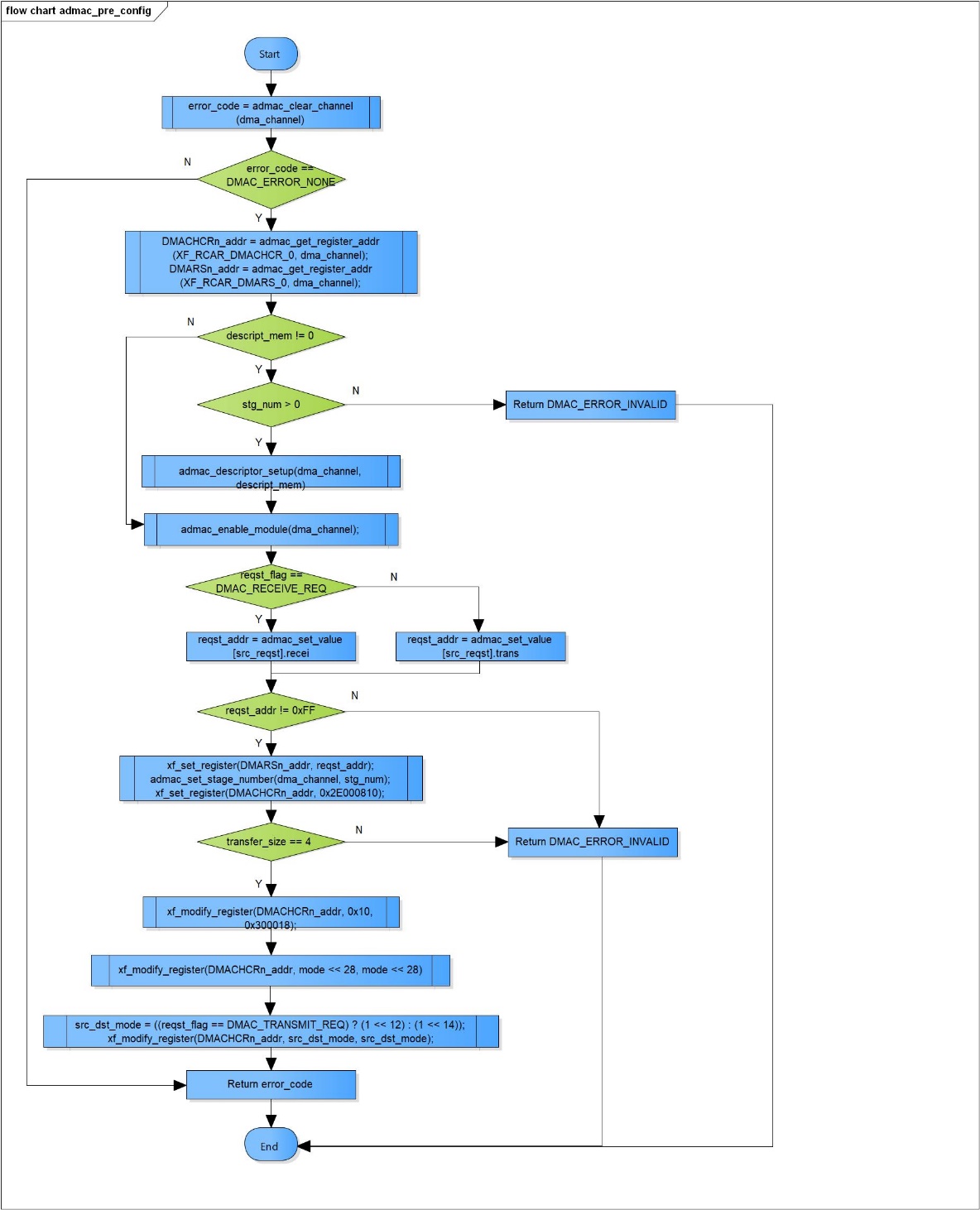
****

Figure 3‑15 xa\_dmac\_pre\_config flowchart

### xa\_dmac\_post\_config

DD\_PLG\_TDM\_03\_016

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | static DMAC\_ERROR\_CODE xa\_dmac\_post\_config(DMAC\_CHN n) | | | |
| **Function** | This function is to post set DMAC parameters for DMAC channel N | | | |
| **Arguments** | Type | Name | I/O | Description |
| DMAC\_CHN | n | I | Channel number  Valid values: [0: 31] |
| **Return value** | DMAC\_ERROR\_NONE | | Normal end | |
| **Description** | * xa\_dmac\_post\_config command processing:   - Reset the descriptor and then start it | | | |

[Covers: FD\_PLG\_TDM\_005]

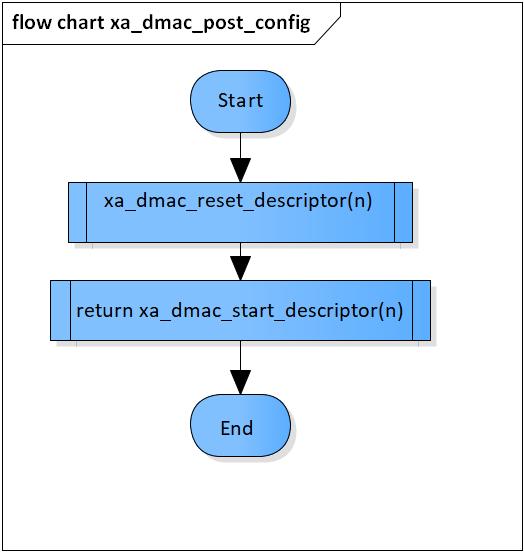


Figure 3‑16 xa\_dmac\_post\_config flowchart

### xa\_dmac\_check\_valid\_channel

DD\_PLG\_TDM\_03\_017

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | DMAC\_ERROR\_CODE xa\_dmac\_check\_valid\_channel(pVOID pch) | | | |
| **Function** | This function is to check availability of DMACs and choose an available one for operation. | | | |
| **Arguments** | Type | Name | I/O | Description |
| pVOID | pch | I/O | Pointer to channel of DMAC  Valid values: [0: 31] |
| **Return value** | DMAC\_ERROR\_OUT\_RANGE | | DMAC module is invalid | |
| DMAC\_ERROR\_BUSY | | No available DMAC module | |
| DMAC\_ERROR\_NONE | | Normal end | |
| **Description** | * xa\_dmac\_check\_valid\_channel command processing:   - Check availability of DMACs  - Choose an available one for operation | | | |

[Covers: FD\_PLG\_TDM\_005]

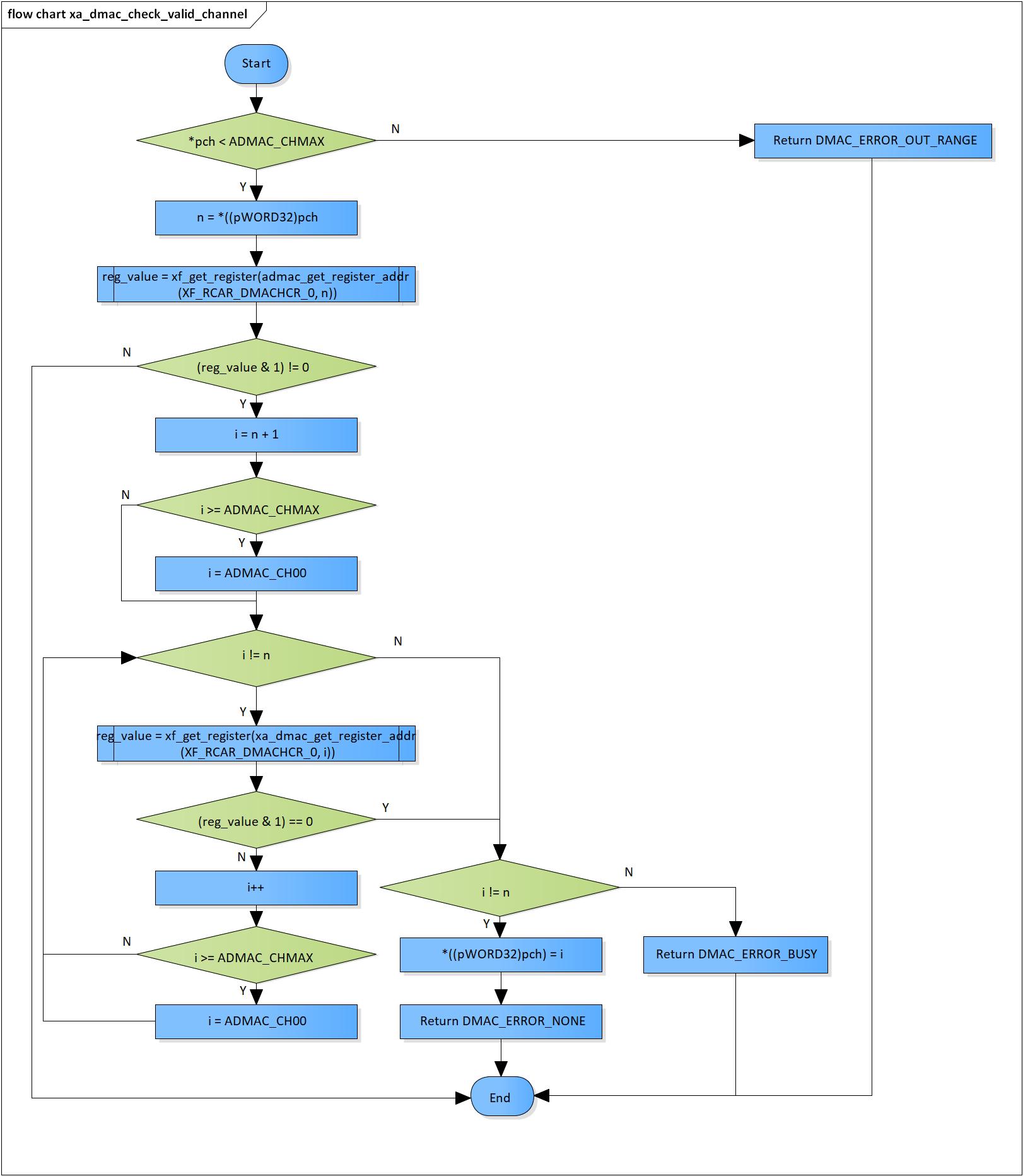


Figure 3‑17 xa\_dmac\_check\_valid\_channel flowchart

### xa\_dmac\_setting\_use\_descriptor

DD\_PLG\_TDM\_03\_018

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Syntax** | DMAC\_ERROR\_CODE xa\_dmac\_setting\_use\_descriptor(const DMAC\_PARAMS \*dmac\_set) | | | | |
| **Function** | This function is to set DMAC module using descriptor memory. | | | | |
| **Arguments** | Type | Name | I/O | | Description |
| const DMAC\_PARAMS \* | dmac\_set | I | | Pointer to DMAC parameter structure |
| **Return value** | DMAC\_ERROR\_INVALID | | | Stage number is invalid  Request address is invalid  Transfer size is invalid | |
| DMAC\_ERROR\_NONE | | | Normal end | |
| **Description** | * xa\_dmac\_setting\_use\_descriptor command processing:   - Pre set up DMAC module  - Set up all stages based on transmission mode  - Post set up DMAC module | | | | |

[Covers: FD\_PLG\_TDM\_005]

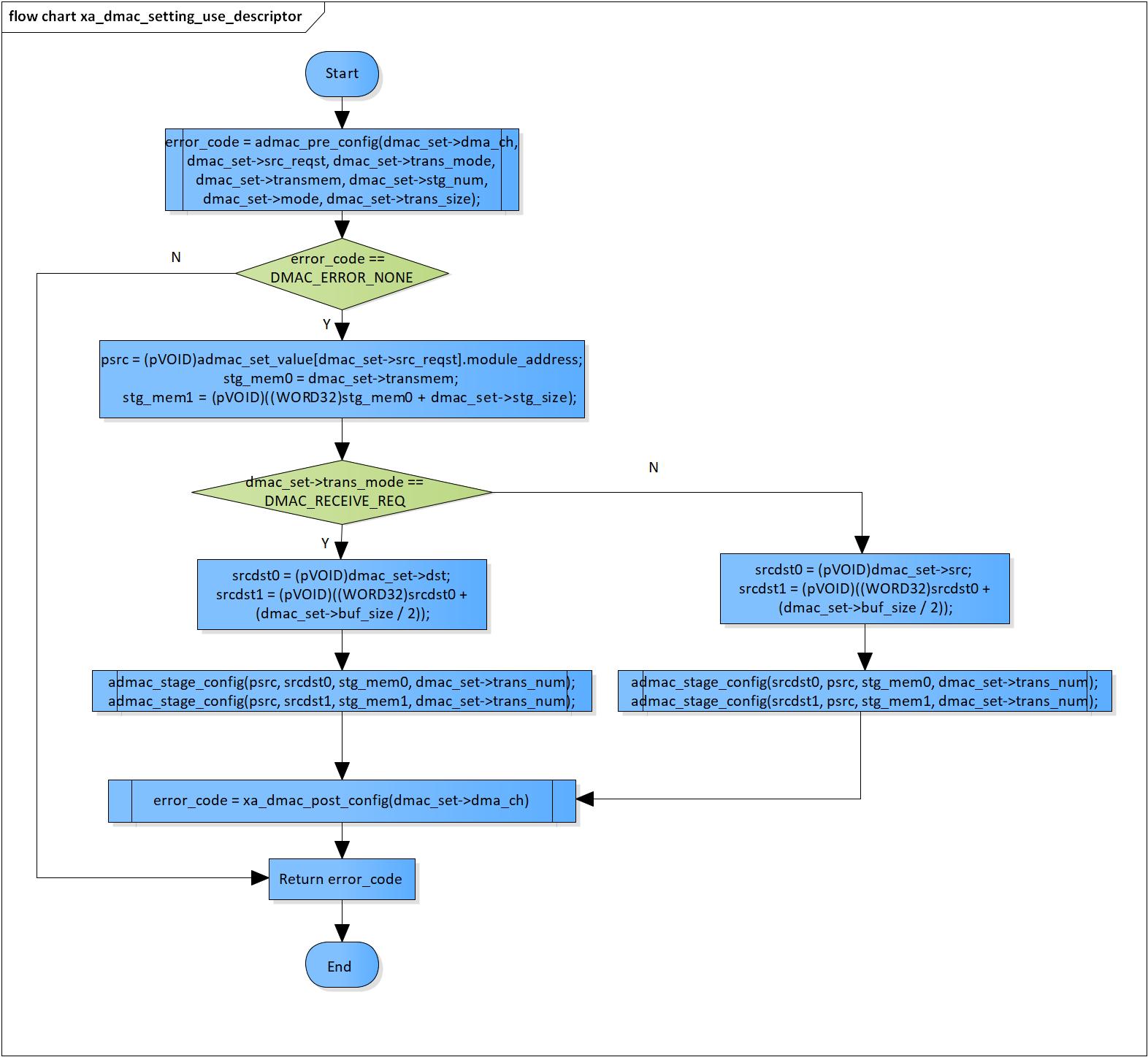


Figure 3‑18 xa\_dmac\_setting\_use\_descriptor flowchart

### xa\_dmac\_setting\_nouse\_descriptor

DD\_PLG\_TDM\_03\_019

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | DMAC\_ERROR\_CODE xa\_dmac\_setting\_nouse\_descriptor(const DMAC\_PARAMS \*dmac\_set) | | | |
| **Function** | This function is to set DMAC module without using descriptor memory. | | | |
| **Arguments** | Type | Name | I/O | Description |
| const DMAC\_PARAMS \* | dmac\_set | I | Pointer to DMAC parameter structure |
| **Return value** | DMAC\_ERROR\_INVALID | | Transfer size is invalid  Source request address is invalid  Cannot disable ADMAC transfer on the current ADMAC channel | |
| DMAC\_ERROR\_NONE | | Normal end | |
| **Description** | * xa\_dmac\_setting\_nouse\_descriptor command processing:   - Set registers necessary for ADAMC execution without descriptor memory involvement | | | |

[Covers: FD\_PLG\_TDM\_005]

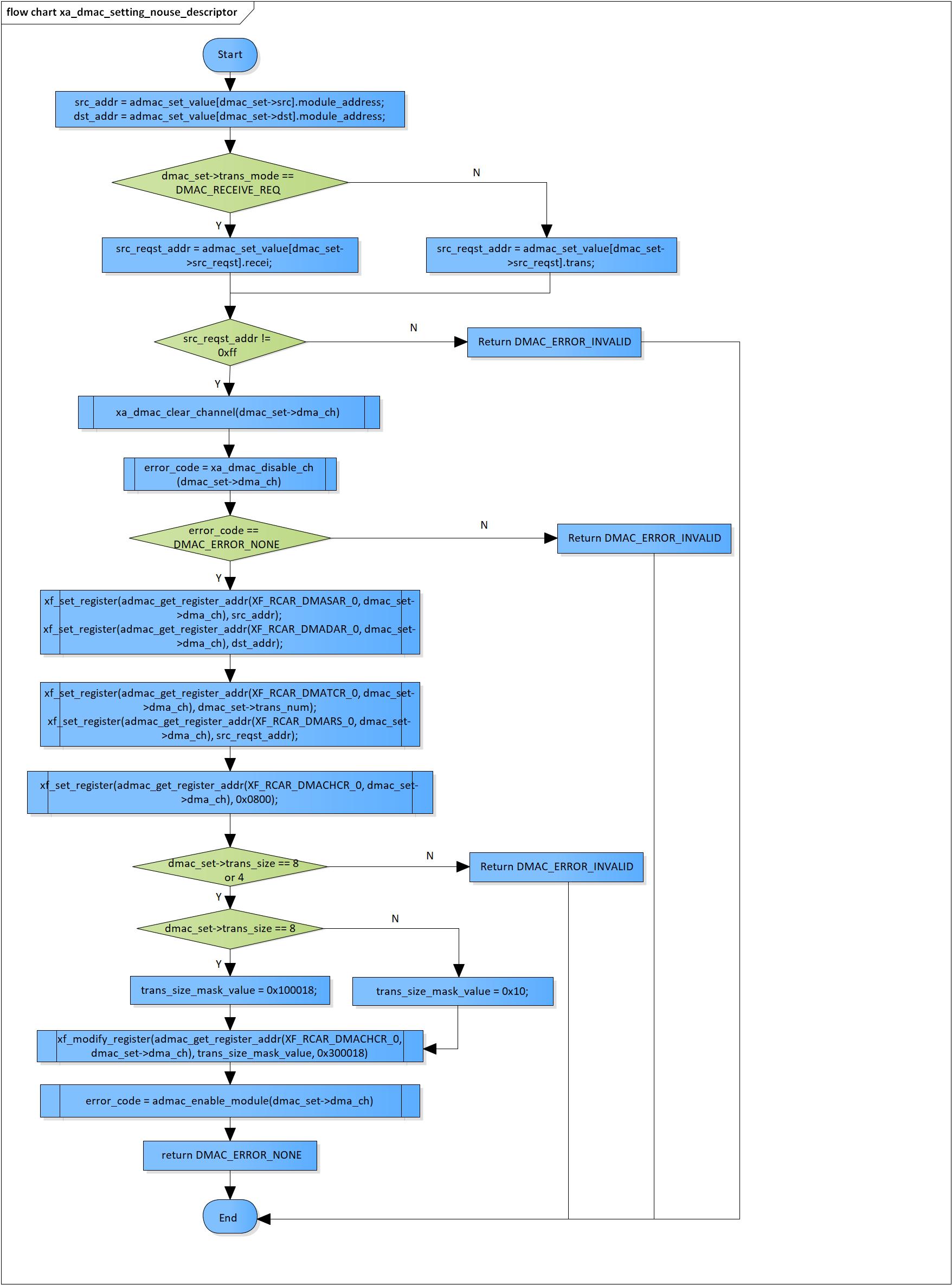


Figure 3‑19 xa\_dmac\_setting\_nouse\_descriptor flowchart

### xa\_dmac\_resetup

DD\_PLG\_TDM\_03\_020

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Syntax** | inline DMAC\_ERROR\_CODE admac\_resetup(DMAC\_PARAMS dmac\_set)s | | | |
| **Function** | This function is to re-setup DMAC module. | | | |
| **Arguments** | Type | Name | I/O | Description |
| DMAC\_PARAMS | dmac\_set | I | DMAC parameter structure |
| **Return value** | DMAC\_ERROR\_INVALID | | Cannot disable transfer on the current DMAC module  Cannot enable transfer on the current DMAC module | |
| DMAC\_ERROR\_NONE | | Normal end | |
| **Description** | * xa\_dmac\_resetup command processing:   - Re-setup DMAC module | | | |

[Covers: FD\_PLG\_TDM\_017]

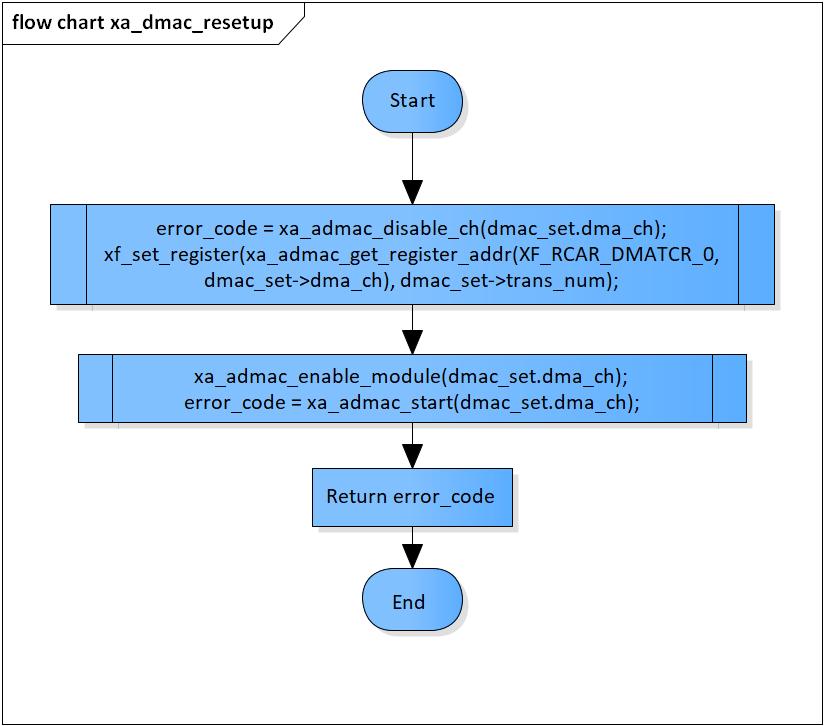


Figure 3‑20 xa\_dmac\_resetup flowchart

# Revision history

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Version** | **Date** | **Page** | **Content** | **Approved** | **Changed** |
| 1.0.0 | Nov 14 2018 | - | First Edition issued | Vu Phan | Nguyen Dang |
| 1.1.0 | Dec 10 2018 | - | Add traceability ID | Vu Phan | Nguyen Dang |
| 1.2.0 | Jan 03, 2019 | - | Add range for input parameters | Vu Phan | Tien Tran |