

OMX Media Component

User's Manual **FLAC Decoder Part**

All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by Renesas Electronics Corp. without notice. Please review the latest information published by Renesas Electronics Corp. through various means, including the Renesas Electronics Corp. website (<http://www.renesas.com>).

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.

2. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.

3. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.

4. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from such alteration, modification, copy or otherwise misappropriation of Renesas Electronics product.

5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.

"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots etc.

"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; and safety equipment etc.

Renesas Electronics products are neither intended nor authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems, surgical implantations etc.), or may cause serious property damages (nuclear reactor control systems, military equipment etc.). You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application for which it is not intended. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for which the product is not intended by Renesas Electronics.

6. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.

7. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or systems manufactured by you.

8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.

9. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You should not use Renesas Electronics products or technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. When exporting the Renesas Electronics products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations.

10. It is the responsibility of the buyer or distributor of Renesas Electronics products, who distributes, disposes of, or otherwise places the product with a third party, to notify such third party in advance of the contents and conditions set forth in this document. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties as a result of unauthorized use of Renesas Electronics products.

11. This document may not be reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.

12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

Trademarks

- Linux® is the registered trademark of Linus Torvalds in the United States and other countries.
- ARM® is a registered trademark or trademark of ARM Ltd. in the United States and other countries.
- Windows and Windows Media are registered trademarks of Microsoft Corporation in the United States and other countries.
- Android is a trademark of Google Inc. Use of this trademark is subject to Google permissions.
- All other company names and product names mentioned in this manual are registered trademarks or trademarks of their respective companies.
- The registered trademark symbol (®) and trademark symbol (™) are omitted in this manual.



- Table of Contents -

1. OVERVIEW	3
1.1. Overview of This Document	3
1.2. Overview of FLAC Decoder Media Component and Scope of This Document	3
1.3. Related Documents	4
1.4. Terminology	4
1.5. Role Name and Component Name	4
2. FUNCTIONS	5
2.1. Function Details	5
2.1.1. Decode Function	5
2.1.2. Notification Function of Port Information Change	6
2.2. Port	6
3. I/O DATA FORMAT	7
3.1. Buffer Payload	7
3.2. Data Format of Input Buffer	8
3.3. Data Format of Output Buffer	9
4. API REFERENCE	11
5. INDEXES	12
5.1. Standard Indexes of FLAC Decoder Media Component	12
5.2. Expanded Indexes of FLAC Decoder Media Component	13
5.3. Indexes Specified by OpenMAX IL Macro Functions	13
6. STRUCTURES	14
6.1. OMX_AUDIO_PORTDEFINITIONTYPE	15
6.2. OMX_AUDIO_PARAM_PORTFORMATTYPE	16
6.3. OMXR_MC_AUDIO_PARAM_FLAC TYPE	17
6.4. OMX_AUDIO_PARAM_PCMMODETYPE	20
6.5. OMXR_MC_AUDIO_PARAM_FLACDOWNCHANNELTYPE	23
6.6. Structure Members Used in a Unique Manner	24
6.6.1. Buffer Flag (nFlags)	24
7. EVENTS	25
8. MEMORY SIZE	26

- Figures -

Figure 1-1 Software Configuration of FLAC Decoder Media Component and Scope	3
Figure 3-1 Data Storage Format of Input Buffers	7
Figure 3-2 Data Storage Format of Output Buffer (1 Frame Unit)	7
Figure 3-3 Data Storage Format of Output Buffer (Continuation).....	7
Figure 3-4 Data Format of Input Buffer	8
Figure 3-5 Data Format of Output Buffer	9
Figure 3-6 Data Format of each Output Channel	10

- Tables -

Table 1-1 List of Related Documents	4
Table 1-2 Terminology	4
Table 1-3 Role Name and Component Name.....	4
Table 2-1 Supported Standards and Functions	5
Table 2-4 Ports of FLAC Decoder Media Component	6
Table 5-1 List of Indexes available for FLAC Decoder Media Component	12
Table 5-2 List of Expanded Indexes available for FLAC Decoder Media Component	13
Table 5-3 Indexes Specified by OpenMAX IL Macro Functions	13
Table 6-1 Structures of FLAC Decoder Media Component.....	14
Table 6-2 Structure Members Used in a Unique Manner	24
Table 6-3 Buffer Flag for I/O Port	24
Table 7-1 Events Generation Conditions	25
Table 7-2List of Maskable Information	25
Table 8-1 Main Memory Areas used in MP3 Decoder Media Component	26

1. Overview

1.1. Overview of This Document

This document is the User's Manual for the OMX Media Component and specifications of the FLAC Decoder Media Component are described.

Please read this document with related document [1] and [2].

1.2. Overview of FLAC Decoder Media Component and Scope of This Document

Figure 1-1 shows the software configuration of the FLAC Decoder Media Component and scope. The FLAC Decoder Media Component consists of the OMX Media Component Common Library which provides common functions of OpenMAX IL, the OMX Media Component Audio Common Library which provides common functions of audio processing, and the OMX Media Component FLAC Decoder Library which realizes functions of FLAC Decoder. The OMX Media Component FLAC Decoder Library controls ARM FLAC Decode Software and realizes codec processing.

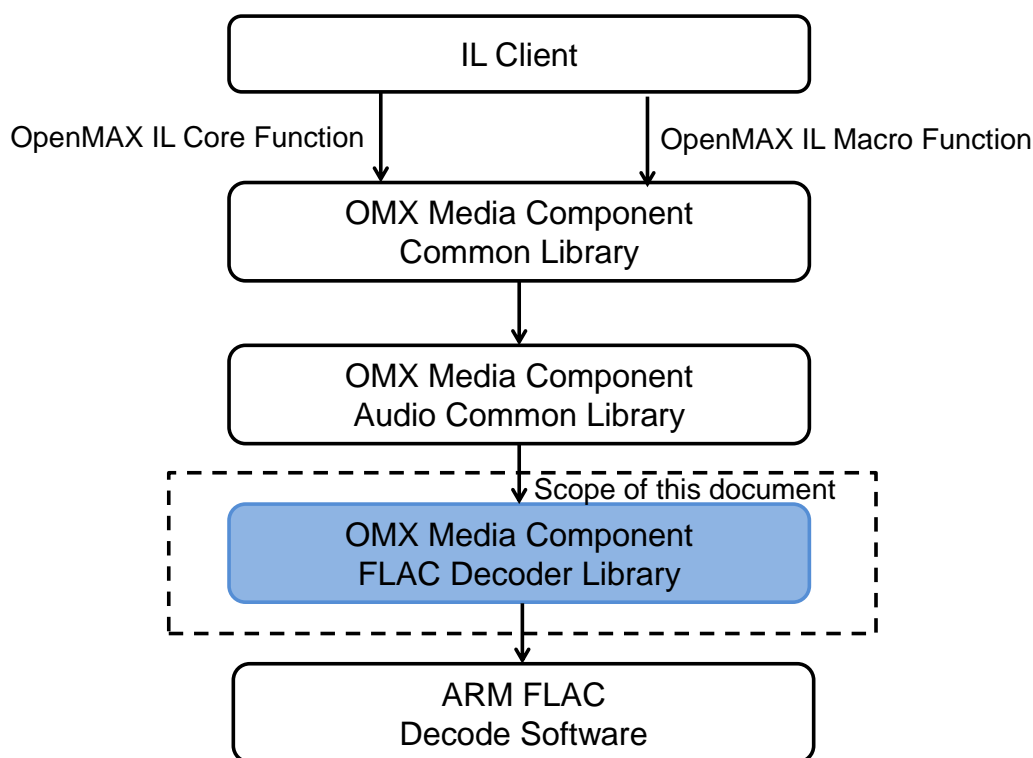


Figure 1-1 Software Configuration of FLAC Decoder Media Component and Scope

1.3. Related Documents

Table 1-1 shows the reference documents and related documents.

Table 1-1 List of Related Documents

No	Document Name	Description
[1]	OMX Media Component User's Manual Common Part	
[2]	OMX Media Component User's Manual Audio Common Part	
[3]	OpenMAX Integration Layer Application Programming Interface Specification Version 1.1.2, September 1, 2008	http://www.khronos.org/registry/omxil/specs/OpenMAX_IL_1_1_2_Specification.pdf

1.4. Terminology

Table 1-2 shows the terminology used in this document.

Table 1-2 Terminology

Term	Abbreviation	Description
Audio Port Base	APB	The base value of the port index of the Audio Media Component. The port index values of the input and output ports are obtained by adding offset values to this base value.
OpenMAX IL	-	Open API specified by the Khronos Group. It standardizes accesses to primitive media processing which is commonly used in graphics, audio, and image libraries.
Component	-	Refers to a component that is defined in OpenMAX IL Specification.
Media Component	MC	A component that performs multimedia processing. It corresponds to the Component that is defined in OpenMAX IL.
IL Client	-	Refers to software that uses functions of OpenMAX IL Core and Component.

1.5. Role Name and Component Name

Table 1-3 shows the role name and component name of FLAC Decoder Media Component.

Table 1-3 Role Name and Component Name

Role Name	Component Name
audio_decoder.flac	OMX.RENESAS.AUDIO.DECODER.FLAC

2. Functions

The FLAC Decoder Media Component is the component that provided functions to decode data compressed by FLAC standard.

The FLAC Decoder Media Component performs decode processing when compressed data is stored in the input buffer and stores resulted linear PCM data to the output buffer.

2.1. Function Details

2.1.1. Decode Function

The supported standards and functions by the FLAC Decoder Media Component are shown as below.

Table 2-1 Supported Standards and Functions

Compliant Standard	FLAC 1.3.0 (26-May-2013)
Input Format	FLAC Frame
Input Channel	1 channel (Monaural) 2 channels (Stereo) 3 channels (3/0) 4 channels (2/2) 5 channels (3/2) 5.1 channels (3/2 + LFE) (Note 1)
Input Sampling Frequency	8 / 11.025 / 12 / 16 / 22.05 / 24 / 32 / 44.1 / 48 / 64 / 88.2 / 96 / 128 / 176.4 / 192 kHz
Bits per sample of input data	4 - 24 bits / sample
Output Format	16 or 32 bit linear PCM (channel interleaved format)
Output Channel	1 channel 2 channels 6 channels (Note 2)
Output Sampling Frequency	Same as input sampling frequency

(Note 1) "/" denotes the number of channels for the front and rear speakers.

(Note 2) Data from 3 to 5.1 channels is outputted as 6 channels.

The un-supported functions for the FLAC Decoder Media Component are shown below.

Meta data is not to be decoded.

MD5 signature is not to be checked.

Down mixing. (Only a L/R channel is outputted when a down channel function is effective)

When block size is fixed, input streams other than 1 - 4608 sample (per 1 frame and 1 channel) is not to be decoded.

When block size is variable, input streams other than 16 - 4608 sample (per 1 frame and 1 channel) is not to be decoded.

2.1.2. Notification Function of Port Information Change

The FLAC Decoder Media Component sends event when the information of “Output Sampling Frequency”, “Output Channel Number”, and “Output Channel Mapping” is changed. Please refer to section 7, for details.

2.2. Port

The FLAC Decoder Media Component has one input port and one output port.

The input port has input buffers to store compressed data, and the output port has output buffers to store PCM data.

Table 2-2 Ports of FLAC Decoder Media Component

Component	Port Index	Type
FLAC decoder Media Component	APB+0	Input Port
	APB+1	Output Port

3. I/O Data Format

3.1. Buffer Payload

Figure 3-1 shows the data storage format of input buffers for FLAC Decoder Media Component. "fn" in the figure denotes the sequence number (frame number) of compressed data. Compressed data is input to FLAC Decoder Media Component in frame units. An arbitrary number of frames can be stored in a single input buffer if data is input in frame units. However, one frame data cannot be split into two or more input buffers.

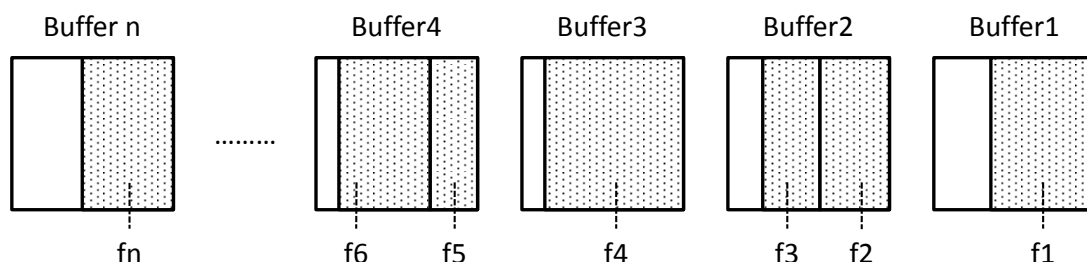


Figure 3-1 Data Storage Format of Input Buffers

Figure 3-2 and Figure 3-3 show the data storage format of output buffers for FLAC Decoder Media Component. PCM data decoded by FLAC Decoder Media Component can be stored in the output buffers in one frame unit or sequentially. However, equal-time linear PCM samples (for all channels) are stored to same buffer.

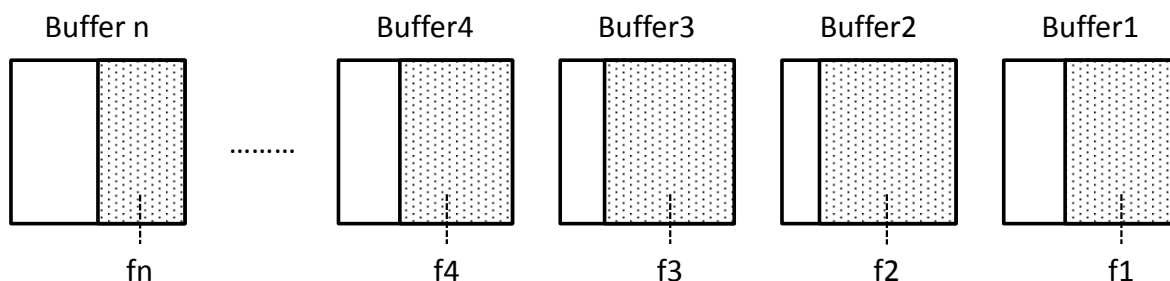


Figure 3-2 Data Storage Format of Output Buffer (1 Frame Unit)

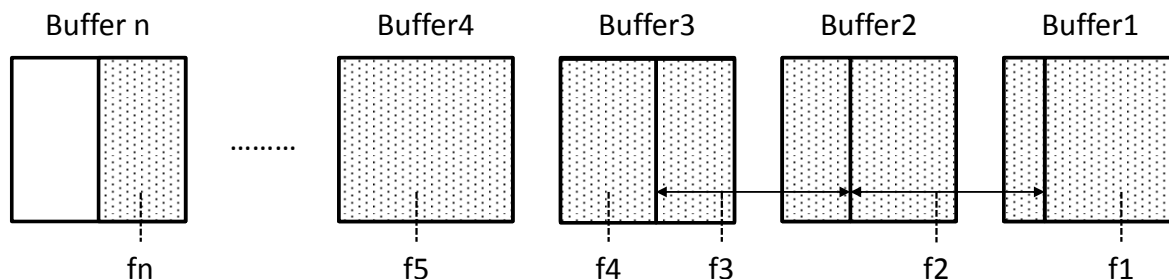


Figure 3-3 Data Storage Format of Output Buffer (Continuation)

3.2. Data Format of Input Buffer

Figure 3-4 shows input buffer format. A stream data is stored to the input buffer and the data size is set to nFilledLen in the OMX_BUFFERHEADERTYPE structure.

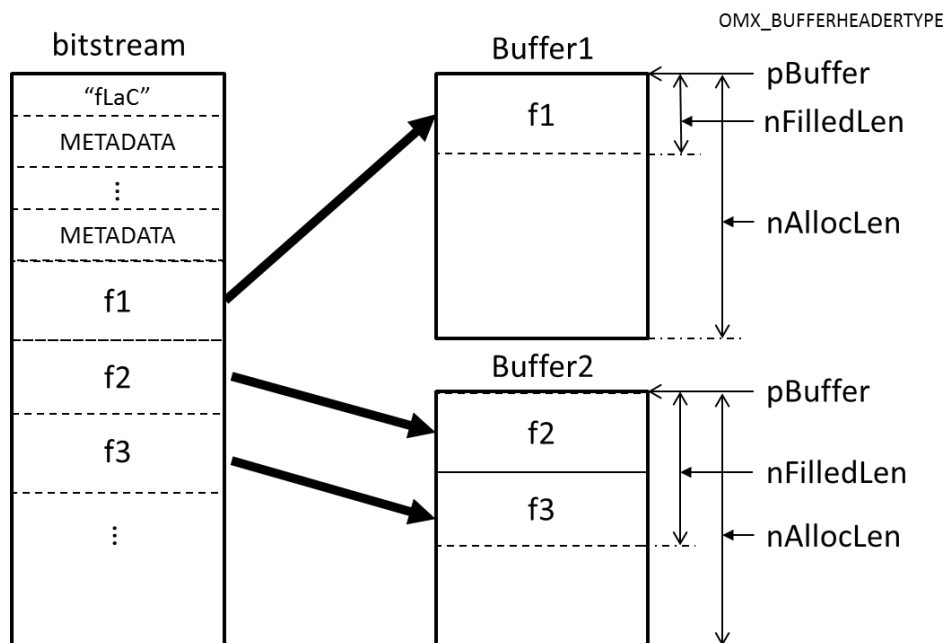


Figure 3-4 Data Format of Input Buffer

3.3. Data Format of Output Buffer

FLAC Decoder Media Component stores the volume of output data specified by `nFilledLen` in the `OMX_BUFFERHEADERTYPE` structure from the address specified by a member of that structure as shown in Figure 3-5.

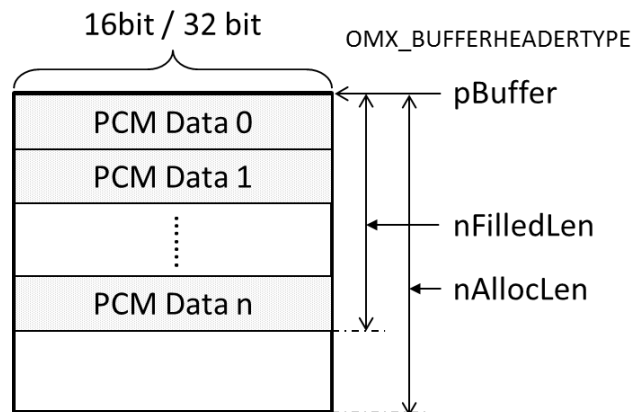


Figure 3-5 Data Format of Output Buffer

In FLAC Decoder Media Component, layout of PCM data is different for each output channel. Figure 3-6 shows formats of each output channel. When data from 3 to 5.1 channels is input, output is 6 channels and silent data is stored for void channel. And, when down channel is effective, output format is 2 channels (Stereo) and value 2 is set to nChannels in the OMX_AUDIO_PARAM_PCMMODETYPE structure.

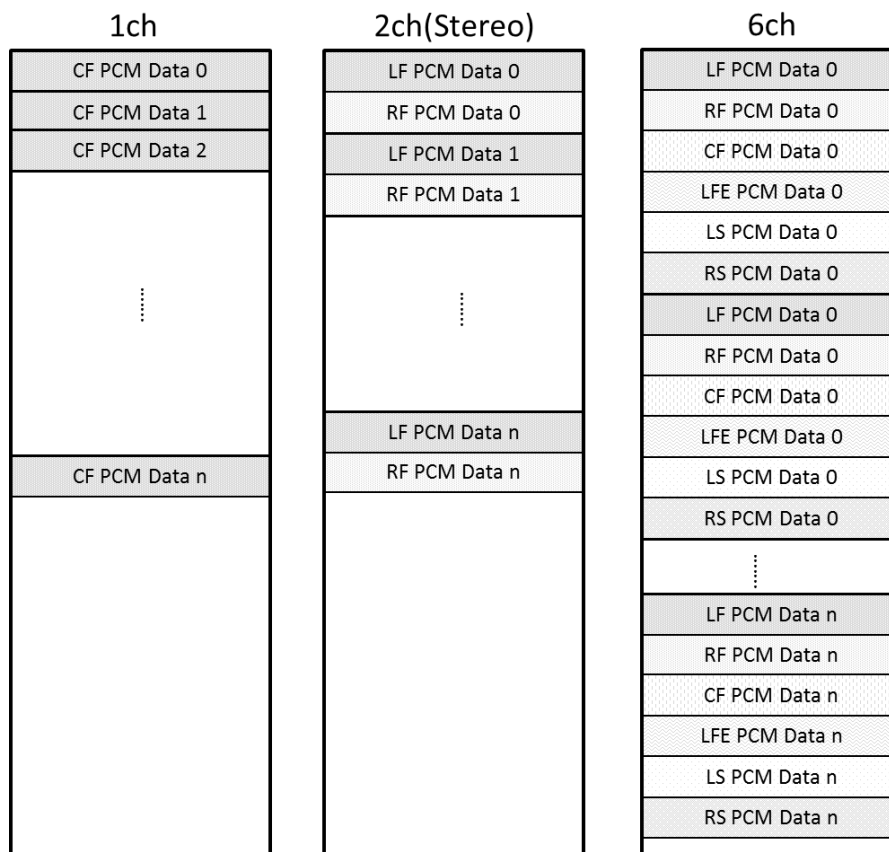


Figure 3-6 Data Format of each Output Channel

4. API Reference

Please refer to the related document [2].

5. Indexes

5.1. Standard Indexes of FLAC Decoder Media Component

Table 5-1 shows the list of standard indexes that are available for FLAC Decoder Media Component.

Table 5-1 List of Indexes available for FLAC Decoder Media Component

Index		Corresponding Structure Name
Description		
OMX_IndexParamAudioInit		OMX_PORT_PARAM_TYPE Structure
	Please refer to the related document [1].	
OMX_IndexParamVideoInit		OMX_PORT_PARAM_TYPE Structure
	Please refer to the related document [1].	
OMX_IndexParamImageInit		OMX_PORT_PARAM_TYPE Structure
	Please refer to the related document [1].	
OMX_IndexParamOtherInit		OMX_PORT_PARAM_TYPE Structure
	Please refer to the related document [1].	
OMX_IndexParamStandardComponentRole		OMX_PARAM_COMPONENTROLETYPE Structure
	Please refer to the related document [1].	
OMX_IndexParamCompBufferSupplier		OMX_PARAM_BUFFERSUPPLIERTYPE Structure
	Please refer to the related document [1].	
OMX_IndexParamPortDefinition		OMX_PORTDEFINITIONTYPE Structure
	Please refer to the related document [1] and [2].	
OMX_IndexParamAudioPortFormat		OMX_AUDIO_PARAM_PORTFORMATTYPE Structure
	Please refer to the related document [2].	
OMX_IndexParamAudioPcm		OMX_AUDIO_PARAM_PCMMODETYPE Structure
	To set or get information regarding PCM.	

5.2. Expanded Indexes of FLAC Decoder Media Component

Table 5-2 shows the list of expanded indexes that are available for FLAC Decoder Media Component.

Table 5-2 List of Expanded Indexes available for FLAC Decoder Media Component

Index (Expanded Index Name)	Corresponding Structure Name
Description	
OMXR_MC_IndexParamAudioOutputUnit (OMX.RENESAS.INDEX.PARAM.AUDIO.OUTPUTUNIT)	OMXR_MC_AUDIO_PARAM_OUTPUTUNITTYPE Structure
Please refer to the related document [2].	
OMXR_MC_IndexParamAudioPortSettingMask (OMX.RENESAS.INDEX.PARAM.AUDIO. PORTSETTINGSEVENTMASK)	OMXR_MC_AUDIO_PARAM_PORTSETTINGSEVENTMASK TYPE Structure
Please refer to the related document [2].	
OMXR_MC_IndexParamAudioFlac (OMX.RENESAS.INDEX.PARAM.AUDIO.FLAC)	OMXR_MC_AUDIO_PARAM_FLAC TYPE Structure
To set or get information regarding FLAC.	
OMXR_MC_IndexParamFlacDownChannel (OMX.RENESAS.INDEX.PARAM.FLAC.DOWNCHANNEL)	OMXR_MC_AUDIO_PARAM_FLACDOWNCHANNELTYPE Structure
To set or get information regarding Down Channel of FLAC.	

5.3. Indexes Specified by OpenMAX IL Macro Functions

Table 5-3 shows indexes which can be specified by OpenMAX IL Macro functions and available port index for FLAC Decoder Media Component.

Table 5-3 Indexes Specified by OpenMAX IL Macro Functions

Index	Get/SetParameter		Get/SetConfig		Port Index	
	Get	Set	Get	Set	APB+0	APB+1
OMX_IndexParamAudioInit	x	x	-	-	-	-
OMX_IndexParamVideoInit	x	x	-	-	-	-
OMX_IndexParamImageInit	x	x	-	-	-	-
OMX_IndexParamOtherInit	x	x	-	-	-	-
OMX_IndexParamStandardComponentRole	x	x	-	-	-	-
OMX_IndexParamCompBufferSupplier	x	x	-	-	x	x
OMX_IndexParamPortDefinition	x	x	-	-	x	x
OMX_IndexParamAudioPortFormat	x	x	-	-	x	x
OMXR_MC_IndexParamAudioFlac	x	x	-	-	x	-
OMX_IndexParamAudioPcm	x	x	-	-	-	x
OMXR_MC_IndexParamAudioOutputUnit	x	x	-	-	-	x
OMXR_MC_IndexParamAudioPortSettingMask	x	x	-	-	-	x
OMXR_MC_IndexParamFlacDownChannel	x	x	-	-	-	x

x : Effective
- : Ineffective

6. Structures

Table 6-1 shows the list of structures of FLAC Decoder Media Component.

Table 6-1 Structures of FLAC Decoder Media Component

Structure Name	Reference
OMX_AUDIO_PORTDEFINITIONTYPE	Section 6.1
OMX_PARAM_COMPONENTROLETYPE	Related Document [1]
OMX_PARAM_BUFFERSUPPLIERTYPE	Related Document [1]
OMX_AUDIO_PARAM_PORTFORMATTYPE	Section 6.2
OMXR_MC_AUDIO_PARAM_FLAC TYPE	Section 6.3
OMX_AUDIO_PARAM_PCMMODETYPE	Section 6.4
OMXR_MC_AUDIO_PARAM_OUTPUT_UNITTYPE	Related Document [2]
OMXR_MC_AUDIO_PARAM_PORTSETTINGSEVENTMASKTYPE	Related Document [2]
OMXR_MC_AUDIO_PARAM_DOWNCHANNELTYPE	Section 6.5

Given below is an explanation of how to interpret the member of the structures described in this section.

- ✓ Description of a member of a structure corresponded to index

[Member]

Member Name	Get	Set
Indicates the member name	Indicates the attribute of the member specified in the OMX_GetParameter () or OMX_GetConfig () function. If "R" is written, the value of this member can be obtained. If "W" is written, please specify a value in this member.	Indicates the attributes of the member specified in the OMX_SetParameter () or OMX_SetConfig () function. If "W" is written, please specify a value in this member. If "-" is written, the value of this member is ignored. Any value specified in this member is not reflected.

6.1. OMX_AUDIO_PORTDEFINITIONTYPE

[Structure] Please refer to section 4.1.5 in the related document [3].

[Function] Please refer to section 4.1.5 in the related document [3].

Member Name	Get	Set
cMIMETYPE	R	-
pNativeRender	R	-
bFlagErrorConcealment	R	-
eEncoding	R	-

[Details]

cMIMETYPE

Configurable value	-
Acquirable value	NULL
Initial value	NULL
Remarks	Not supported.

pNativeRender

Configurable value	-
Acquirable value	NULL
Initial value	NULL
Remarks	Not supported.

bFlagErrorConcealment

Configurable value	-
Acquirable value	OMX_FLASE
Initial value	OMX_FLASE
Remarks	Not supported.

eEncoding

Configurable value	-	
Acquirable value	nPortIndex	Value
	APB+0	OMXR_MC_AUDIO_CodingFLAC
	APB+1	OMX_AUDIO_CodingPCM
Initial value	nPortIndex	Value
	APB+0	OMXR_MC_AUDIO_CodingFLAC
	APB+1	OMX_AUDIO_CodingPCM
Remarks	-	

6.2. OMX_AUDIO_PARAM_PORTFORMATTYPE

[Structure] Please refer to section 4.1.6 in the related document [3].

[Function] Please refer to section 4.1.6 in the related document [3].

Member Name	Get	Set
nSize	W	W
nVersion	R	-
nPortIndex	W	W
nIndex	W	-
eEncoding	R	-

[Details]

nSize

Configurable value	Specify the size (in bytes) of the OMX_AUDIO_PARAM_PORTFORMATTYPE structure.
Acquirable value	-
Initial value	-
Remarks	-

nVersion

Configurable value	-
Acquirable value	Specification version of OpenMAX IL (1.1.2).
Initial value	Specification version of OpenMAX IL (1.1.2).
Remarks	-

nPortIndex

Configurable value	APB+0 APB+1
Acquirable value	-
Initial value	-
Remarks	-

nIndex

Configurable value	nPortIndex	Value
	APB+0	0
	APB+1	0
Acquirable value	-	
Initial value	-	
Remarks	-	

eEncoding

Configurable value	-		
Acquirable value	nPortIndex	nIndex	Value
	APB+0	0	OMXR_MC_AUDIO_CodingFLAC
	APB+1	0	OMX_AUDIO_CodingPCM
Initial value	nPortIndex	nIndex	Value
	APB+0	0	OMXR_MC_AUDIO_CodingFLAC
	APB+1	0	OMX_AUDIO_CodingPCM
Remarks	-		

6.3. OMXR_MC_AUDIO_PARAM_FLACTYPE

[Structure] typedef struct OMXR_MC_AUDIO_PARAM_FLACTYPE {
 OMX_U32 nSize;
 OMX_VERSIONTYPE nVersion;
 OMX_U32 nPortIndex;
 OMX_U32 nMinBlockSize;
 OMX_U32 nMaxBlockSize;
 OMX_U32 nMinFrameSize;
 OMX_U32 nMaxFrameSize;
 OMX_U32 nSampleRate;
 OMX_U32 nChannels;
 OMX_U32 nBitsPerSample;
 } OMXR_MC_AUDIO_PARAM_FLACTYPE;

[Function] FLAC information structure.

[Members]	Member Name	Get	Set
	nSize	W	W
	nVersion	R	-
	nPortIndex	W	W
	nMinBlockSize	R	W
	nMaxBlockSize	R	W
	nMinFrameSize	R	W
	nMaxFrameSize	R	W
	nSampleRate	R	W
	nChannels	R	W
	nBitsPerSample	R	W

[Details]

nSize

Configurable value	Specify the size (in bytes) of the OMXR_MC_AUDIO_PARAM_FLACTYPE structure.
Acquirable value	-
Initial value	-
Remarks	-

nVersion

Configurable value	-
Acquirable value	Specification version of OpenMAX IL (1.1.2).
Initial value	Specification version of OpenMAX IL (1.1.2).
Remarks	-

nPortIndex

Configurable value	APB+0
Acquirable value	-
Initial value	-
Remarks	-

nMinBlockSize

Configurable value	0 - 4608
Acquirable value	Setting value.
Initial value	4096
Remarks	Analyze the FLAC stream and specify the minimum block size. The minimum block size can be obtained from METADATA_BLOCK_STREAMINFO of the FLAC stream.

nMaxBlockSize

Configurable value	0 - 4608
Acquirable value	Setting value.
Initial value	4096
Remarks	Analyze the FLAC stream and specify the maximum block size. The maximum block size can be obtained from METADATA_BLOCK_STREAMINFO of the FLAC stream.

nMinFrameSize

Configurable value	0 - 83968
Acquirable value	Setting value.
Initial value	0
Remarks	Analyze the FLAC stream and specify the minimum frame size. The minimum frame size can be obtained from METADATA_BLOCK_STREAMINFO of the FLAC stream.

nMaxFrameSize

Configurable value	0 - 83968
Acquirable value	Setting value.
Initial value	0
Remarks	Analyze the FLAC stream and specify the maximum frame size. The maximum frame size can be obtained from METADATA_BLOCK_STREAMINFO of the FLAC stream.

nSampleRate

Configurable value	8000, 11025, 12000, 16000, 22050, 24000, 32000, 44100, 48000, 64000, 88200, 96000, 128000, 176400, 192000
Acquirable value	Setting value or decoded result.
Initial value	48000
Remarks	Analyze the FLAC stream and specify the sample rate. The sample rate can be obtained from METADATA_BLOCK_STREAMINFO of the FLAC stream. After decoding, decoded result is stored.

nChannels

Channels															
Configurable value	1 - 6														
Acquirable value	Setting value or decoded result.														
Initial value	2														
Remarks	<table><tr><th>Value</th><th>Description</th></tr><tr><td>1</td><td>1 channel (monaural)</td></tr><tr><td>2</td><td>2 channels (stereo)</td></tr><tr><td>3</td><td>3 channels (3/0)</td></tr><tr><td>4</td><td>4 channels (2/2)</td></tr><tr><td>5</td><td>5 channels (3/2)</td></tr><tr><td>6</td><td>6 channels (3/2+LFE)</td></tr></table>	Value	Description	1	1 channel (monaural)	2	2 channels (stereo)	3	3 channels (3/0)	4	4 channels (2/2)	5	5 channels (3/2)	6	6 channels (3/2+LFE)
	Value	Description													
	1	1 channel (monaural)													
	2	2 channels (stereo)													
	3	3 channels (3/0)													
	4	4 channels (2/2)													
	5	5 channels (3/2)													
	6	6 channels (3/2+LFE)													
	Analyze the FLAC stream and specify the number of channels.														
The number of channels can be obtained from METADATA_BLOCK_STREAMINFO of the FLAC stream.															
After decoding, decoded result is stored.															

nBitsPerSample

Configurable value	4 - 24
Acquirable value	Setting value or decoded result.
Initial value	16
Remarks	Analyze the FLAC stream and specify the bits per sample. The bits per sample can be obtained from METADATA_BLOCK_STREAMINFO of the FLAC stream. After decoding, decoded result is stored.

6.4. OMX_AUDIO_PARAM_PCMMODETYPE

[Structure] Please refer to section 4.1.7 in the related document [3].

[Function] Please refer to section 4.1.7 in the related document [3].

Member Name	Get	Set
nSize	W	W
nVersion	R	-
nPortIndex	W	W
nChannels	R	W
eNumData	R	-
eEndian	R	-
bInterleaved	R	-
nBitPerSample	R	-
nSamplingRate	R	W
ePCMMode	R	-
eChannelMapping	R	W

[Details]

nSize

Configurable value	Specify the size (in bytes) of the OMX_AUDIO_PARAM_PCMMODETYPE structure.
Acquirable value	-
Initial value	-
Remarks	-

nVersion

Configurable value	-
Acquirable value	Specification version of OpenMAX IL (1.1.2).
Initial value	Specification version of OpenMAX IL (1.1.2).
Remarks	-

nPortIndex

Configurable value	APB+1
Acquirable value	-
Initial value	-
Remarks	-

nChannels

Configurable value	1, 2, 6
Acquirable value	Setting value or decoded result.
Initial value	2
Remarks	This value does not affect decoding process. When data from 3 to 5.1 channels is input, this value is set 6.

eNumData

Configurable value	-
Acquirable value	OMX_NumericalDataSigned
Initial value	OMX_NumericalDataSigned
Remarks	Not supported.

eEndian

Configurable value	-
Acquirable value	OMX_EndianLittle
Initial value	OMX_EndianLittle
Remarks	Not supported.

bInterleaved

Configurable value	-
Acquirable value	OMX_TRUE
Initial value	OMX_TRUE
Remarks	Not supported.

nBitPerSample

Configurable value	16, 32
Acquirable value	Setting value.
Initial value	16
Remarks	Specify the number of bits per sample.

nSamplingRate

Configurable value	8000, 11025, 12000, 16000, 22050, 24000, 32000, 44100, 48000, 64000, 88200, 96000, 128000, 176400, 192000
Acquirable value	Setting value or decoded result.
Initial value	48000
Remarks	This value does not affect decoding process.

ePCMMMode

Configurable value	-
Acquirable value	OMX_AUDIO_PCMMModelLinear
Initial value	OMX_AUDIO_PCMMModelLinear
Remarks	Not supported.

eChannelMapping

Configurable value	OMX_AUDIO_ChannelNone OMX_AUDIO_ChannelLF OMX_AUDIO_ChannelRF OMX_AUDIO_ChannelCF OMX_AUDIO_ChannelLFE OMX_AUDIO_ChannelLS OMX_AUDIO_ChannelRS		
Acquirable value	Setting value or decoded result.		
Initial value	eChannelMapping[0]= OMX_AUDIO_ChannelLF eChannelMapping[1]= OMX_AUDIO_ChannelRF		
Remarks	This value does not affect decoding process. The relation among channel of input data, nChannels and eChannelMapping is shown as below. If the Down channel is ON, output channel is 2(stereo).		
	Channel of input data	nChannels	eChannelMapping
	1(monaural)	1	eChannelMapping[0]= OMX_AUDIO_ChannelCF
	2(stereo)	2	eChannelMapping[0]= OMX_AUDIO_ChannelLF

			eChannelMapping[1]= OMX_AUDIO_ChannelRF
	3(3/0)	6	eChannelMapping[0]= OMX_AUDIO_ChannelLF eChannelMapping[1]= OMX_AUDIO_ChannelRF eChannelMapping[2]= OMX_AUDIO_ChannelCF eChannelMapping[3]= OMX_AUDIO_ChannelNone eChannelMapping[4]= OMX_AUDIO_ChannelNone eChannelMapping[5]= OMX_AUDIO_ChannelNone
	4(2/2)	6	eChannelMapping[0]= OMX_AUDIO_ChannelLF eChannelMapping[1]= OMX_AUDIO_ChannelRF eChannelMapping[2]= OMX_AUDIO_ChannelNone eChannelMapping[3]= OMX_AUDIO_ChannelNone eChannelMapping[4]= OMX_AUDIO_ChannelLS eChannelMapping[5]= OMX_AUDIO_ChannelRS
	5(3/2)	6	eChannelMapping[0]= OMX_AUDIO_ChannelLF eChannelMapping[1]= OMX_AUDIO_ChannelRF eChannelMapping[2]= OMX_AUDIO_ChannelCF eChannelMapping[3]= OMX_AUDIO_ChannelNone eChannelMapping[4]= OMX_AUDIO_ChannelLS eChannelMapping[5]= OMX_AUDIO_ChannelRS
	5.1(3/2+LFE)	6	eChannelMapping[0]= OMX_AUDIO_ChannelLF eChannelMapping[1]= OMX_AUDIO_ChannelRF eChannelMapping[2]= OMX_AUDIO_ChannelCF eChannelMapping[3]= OMX_AUDIO_ChannelLFE eChannelMapping[4]= OMX_AUDIO_ChannelLS eChannelMapping[5]= OMX_AUDIO_ChannelRS

6.5. OMXR_MC_AUDIO_PARAM_FLACDOWNCHANNELTYPE

[Structure] typedef struct OMXR_MC_AUDIO_PARAM_FLACDOWNCHANNELTYPE {
 OMX_U32 nSize;
 OMX_VERSIONTYPE nVersion;
 OMX_U32 nPortIndex;
 OMX_BOOL bDownChannel;
 } OMXR_MC_AUDIO_PARAM_FLACDOWNCHANNELTYPE;

[Function] Down channel information structure.

Member Name	Get	Set
nSize	W	W
nVersion	R	-
nPortIndex	W	W
bDownChannel	R	W

[Details]

nSize

Configurable value	Specify the size (in bytes) of the OMXR_MC_AUDIO_PARAM_FLACDOWNCHANNELTYPE structure.
Acquirable value	-
Initial value	-
Remarks	-

nVersion

Configurable value	-
Acquirable value	Specification version of OpenMAX IL (1.1.2).
Initial value	Specification version of OpenMAX IL (1.1.2).
Remarks	-

nPortIndex

Configurable value	APB+1
Acquirable value	-
Initial value	-
Remarks	-

bDownChannel

Configurable value	OMX_TRUE OMX_FALSE
Acquirable value	Setting value.
Initial value	OMX_TRUE
Remarks	If this value is OMX_TRUE, output is 2 channels (stereo). When the input stream is 3 - 5.1 channels, the L/R PCM data is outputted. When the input stream is 1ch, the same PCM data is copied to L/R.

6.6. Structure Members Used in a Unique Manner

Table 6-2 shows structure members used in a unique manner for FLAC Decoder Media Component.

Table 6-2 Structure Members Used in a Unique Manner

Structure Name	Member	Usage
OMX_BUFFERHEADERTYPE (refer to section 5.1.1 in the related document [1])	nOffset	Not supported. Specify 0.
	nTickCount	Any value can be specified to the OMX_BUFFERHEADERTYPE structure which is input by the OMX_EmptyThisbuffer() function. The value specified in this member is copied into a member of the OMX_BUFFERHEADERTYPE structure which is returned by the (*FillBufferDone)() callback function.
	nTimeStamp	Any value can be specified to the OMX_BUFFERHEADERTYPE structure which is input by the OMX_EmptyThisbuffer() function. The value specified in this member is used for calculating the output value of corresponding member of the OMX_BUFFERHEADERTYPE structure which is returned by the (*FillBufferDone)() callback function.
	nFlags	Please refer to section 6.6.1.

6.6.1. Buffer Flag (nFlags)

The buffer flag (nFlags in the OMX_BUFFERHEADERTYPE structure) for FLAC Decoder Media Component is shown as below.

Table 6-3 Buffer Flag for I/O Port

Flag Name (nFlags)	Description for support
OMX_BUFFERFLAG_EOS	This flag can be used as described in the related document [2].
OMX_BUFFERFLAG_STARTTIME	These flags do not affect the processing of Media Component but the flag set to input buffer is transferred to related output buffer.
OMX_BUFFERFLAG_DECODEONLY	
OMX_BUFFERFLAG_DATACORRUPT	This flag is set to output buffer if input stream has an error. If this flag is set, silent data may be stored to output buffer.
OMX_BUFFERFLAG_ENDOFFRAME	These flags do not affect the processing of Media Component but the flag set to input buffer is transferred to related output buffer.
OMX_BUFFERFLAG_SYNCFRAME	
OMX_BUFFERFLAG_EXTRADATA	
OMX_BUFFERFLAG_CODECCONFIG	

7. Events

Table 7-1 shows events having a unique condition for FLAC Decoder Media Component.

Table 7-1 Events Generation Conditions

Event Type	Port	Condition
OMX_EventPortSettingsChanged	APB+0	Event is not generated.
	APB+1	Event is generated when the member nChannels, nSamplingRate, eChannelMapping in the OMX_AUDIO_PARAM_PCMMODETYPE structure are changed internally by decoding.

If OMXR_MC_AUDIO_UnitFull is set in the OMXR_MC_IndexParamAudioOutputUnit index and nChannels, nSamplingRate, eChannelMapping in the OMX_AUDIO_PARAM_PCMMODETYPE structure is changed in FLAC Decoder Media Component, a buffer whose size is less than the size of the buffer may be returned.

For the OMX_EventPortSettingChenged event, it is possible to suppress event generation by masking event. Table 7-2 shows maskable information for FLAC Decoder Media Component.

Table 7-2List of Maskable Information

Information	Masking Value
nSamplingRate	OMXR_MC_AUDIO_EVENTMASK_SAMPLINGRATE
nChannels	OMXR_MC_AUDIO_EVENTMASK_CHANNELS
eChannelMapping	OMXR_MC_AUDIO_EVENTMASK_CHANNELMAPPING

8. Memory Size

Table 8-1 shows size and purpose of main memory areas used in FLAC Decoder Media Component and the value of `nBufferSize`, `nBufferCountActual`, `nBufferCountMin` in the `OMX_PARAM_PORTDEFINITIONTYPE` structure.

Table 8-1 Main Memory Areas used in FLAC Decoder Media Component

Memory Area Name	Memory Size (byte)			Description
Input Buffer (APB + 0)	OMX_PARAM_PORTDEFINITIONTYPE		Value	Buffer to store input stream data. This is the size of memory area allocated by the <code>OMX_AllocateBuffer()</code> function.
	nBufferSize	Minimum Size	83968	
		Default Size	83968	
		Maximum Size	83968	
	nBufferCountActual	Minimum Count (= nBufferCountMin)	1	
		Default Count	4	
		Maximum Count	4	
Output Buffer (APB + 1)	OMX_PARAM_PORTDEFINITIONTYPE		Value	Buffer to store output PCM data. This is the size of memory area allocated by the <code>OMX_AllocateBuffer()</code> function.
	nBufferSize	Minimum Size	110592	
		Default Size	110592	
		Maximum Size	110592	
	nBufferCountActual	Minimum Count (= nBufferCountMin)	1	
		Default Count	8	
		Maximum Count	8	

➤ Additionally, areas for such as context task communication and internal work are need.

Revision History	OMX Media Component User's Manual FLAC Decoder Part
---------------------	--

Rev.	Date	Description	
		Page	Summary
0.01	May. 30, 2014	-	Newly created.
0.02	Jul. 8, 2014	P3	The name of FLAC Decode Middleware is changed to FLAC Decode Software.
0.10	Jul. 18, 2014	-	Correction of errors.
1.00	Oct. 10, 2014	-	Official Release

OMX Media Component User's Manual
FLAC Decoder Part

Publication Date : Oct. 10, 2014 Rev. 1.00

Published by: Renesas Electronics Corporation

© 2014 Renesas Electronics Corporation. All rights reserved.



SALES OFFICES

Renesas Electronics Corporation

<http://www.renesas.com>

Refer to "<http://www.renesas.com/>" for the latest and detailed information.

Renesas Electronics America Inc.

2801 Scott Boulevard Santa Clara, CA 95050-2549, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited

1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH

Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.

Room 1709, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100191, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.

Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, P. R. China 200333
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited

Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.

13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.

80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.

Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.

12F., 234 Teheran-ro, Gangnam-Ku, Seoul, 135-920, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141

OMX Media Component User's Manual



Renesas Electronics Corporation