

# OMX Media Component

User's Manual    ALAC Decoder Part

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## 1. Overview

### 1.1. Overview of This Document

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

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

### 1.2. Overview of ALAC Decoder Media Component and Scope of This Document

Figure 1-1 shows the software configuration of the ALAC Decoder Media Component and scope. The ALAC 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 ALAC Decoder Library which realizes functions of ALAC Decoder. The OMX Media Component ALAC Decoder Library controls ARM ALAC Decode Software and realizes codec processing.

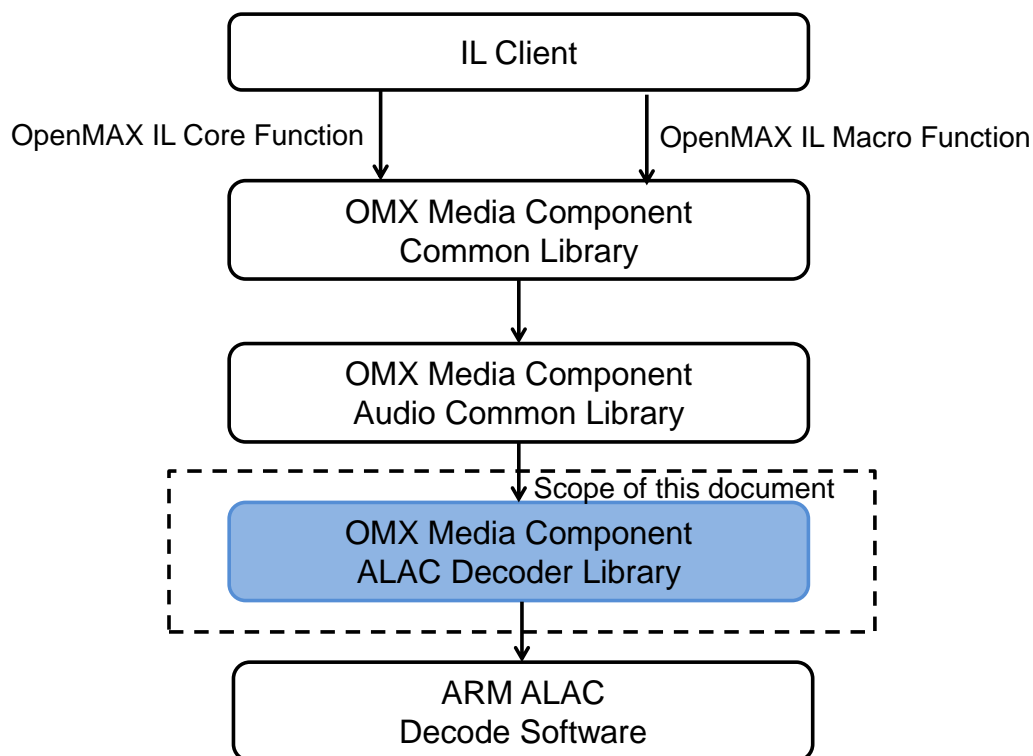


Figure 1-1 Software Configuration of ALAC Decoder Media Component and Scope

### 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	<a href="http://www.khronos.org/registry/omxil/specs/OpenMAX_IL_1_1_2_Specification.pdf">http://www.khronos.org/registry/omxil/specs/OpenMAX_IL_1_1_2_Specification.pdf</a>

### 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 ALAC Decoder Media Component.

**Table 1-3 Role Name and Component Name**

Role Name	Component Name
audio_decoder.alac	OMX.RENESAS.AUDIO.DECODER.ALAC

## 2. Functions

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

The ALAC 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 ALAC Decoder Media Component are shown as below.

**Table 2-1 Supported Standards and Functions**

Compliant Standard	Apple Lossless Audio Codec - Rev.4
Input Format	ALAC frame data which coded the linear PCM data in an ALAC data file (RAW format)
Input Channel	1 channel (Monaural) 2 channels (Stereo)
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	16/ 20/ 24/ 32 bits / sample
Output Format	16 or 32 bit linear PCM (channel interleaved format)
Output Channel	Same as input channel
Output Sampling Frequency	Same as input sampling frequency

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

- CAF/MPEG-4 container is not analyzed.
- CCE(Coupling Channel Element) is not decoded.(Error)
- PCE(Program Configuration Element) is not decoded.(Error)
- DSE(Data Stream Element) is not decoded. (Skip)
- FIL(Filler data) is not decoded.(Skip)
- The frame length per packet of data is except the standard value.  
the standard value:4096 sample frame
- The tuning parameter value is except the standard value.  
the standard value:pb=40/mb=10/kb=14/maxRun=255



## 2.1.2. Notification Function of Port Information Change

The ALAC 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 ALAC 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 ALAC Decoder Media Component**

Component	Port Index	Type
ALAC 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 ALAC Decoder Media Component. "fn" in the figure denotes the sequence number (frame number) of compressed data. Compressed data is input to ALAC 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.

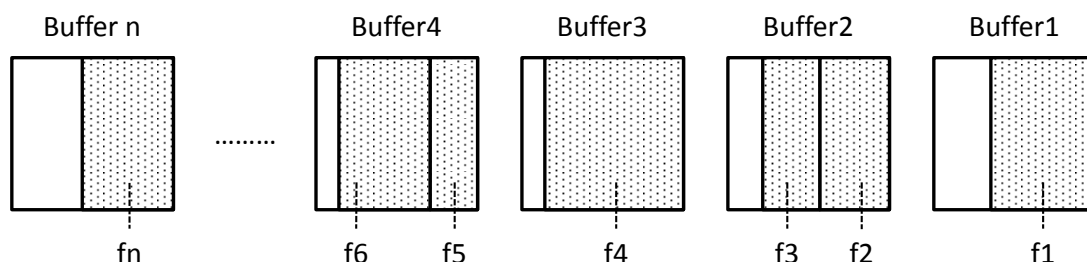


Figure 3-1 Data Storage Format of Input Buffers

Figure 3-2 and Figure 3-3 show the data storage format of output buffers for ALAC Decoder Media Component. PCM data decoded by ALAC 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.

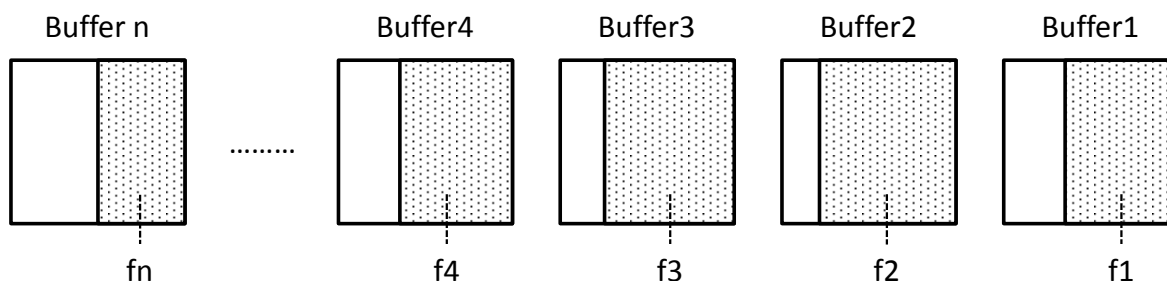


Figure 3-2 Data Storage Format of Output Buffer (1 Frame Unit)

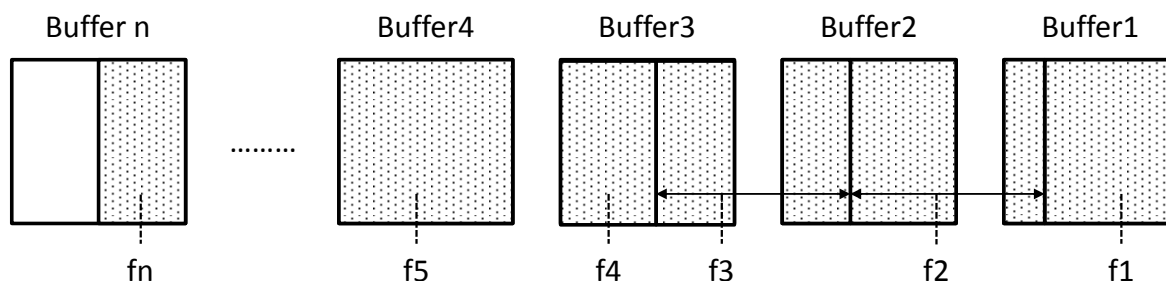


Figure 3-3 Data Storage Format of Output Buffer (Continuation)

### 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.

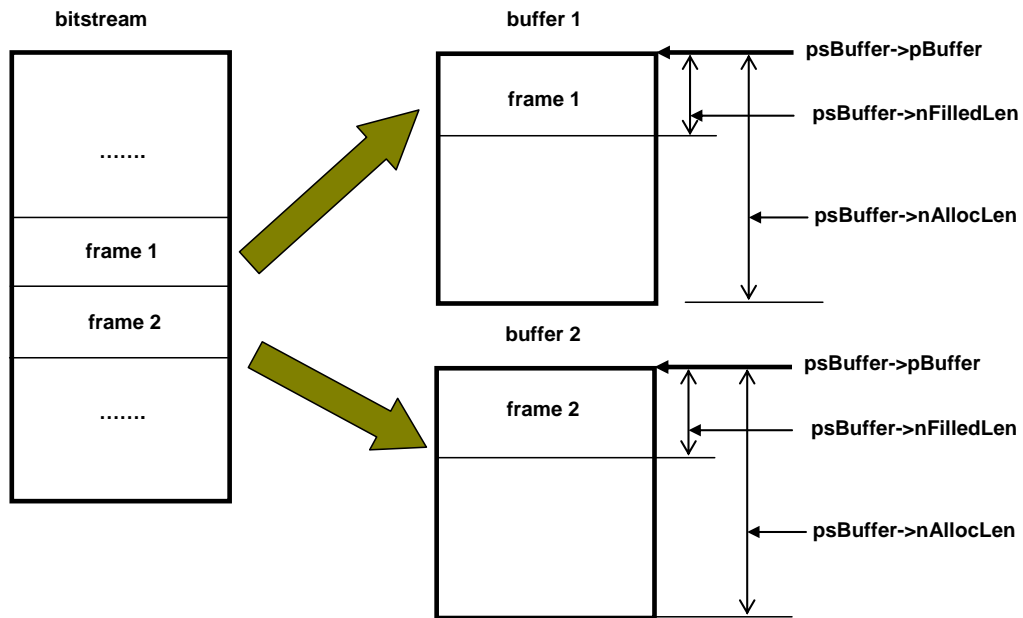


Figure 3-4 Data Format of Input Buffer

### 3.3. Data Format of Output Buffer

ALAC 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.

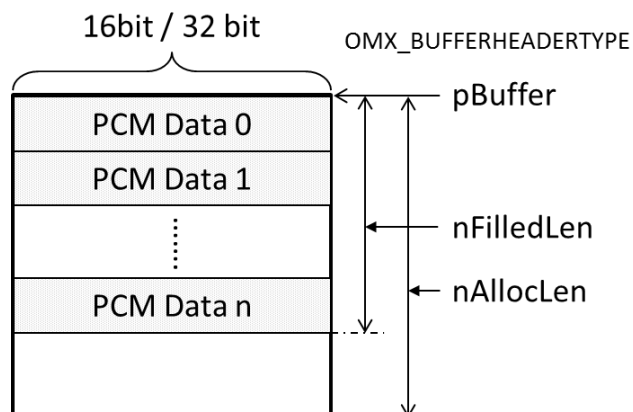


Figure 3-5 Data Format of Output Buffer

In ALAC Decoder Media Component, layout of PCM data is different for each output channel. Figure 3-6 shows formats of each output channel.

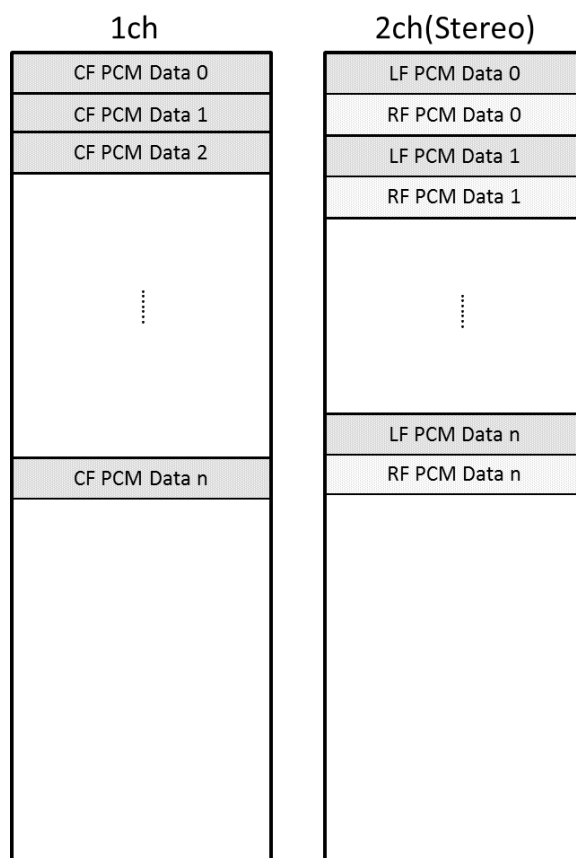


Figure 3-6 Data Format of each Output Channel

## 4. API Reference

Please refer to the related document [2].

## 5. Indexes

### 5.1. Standard Indexes of ALAC Decoder Media Component

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

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

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

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

Index (Expanded Index Name)	Corresponding Structure Name
<b>Description</b>	
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_IndexParamAudioAlac (OMX.RENESAS.INDEX.PARAM.AUDIO.ALAC)	OMXR_MC_AUDIO_PARAM_ALACTYPE Structure
To set or get information regarding ALAC.	

## 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 ALAC 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_IndexParamAudioAlac	x	x	-	-	x	-
OMX_IndexParamAudioPcm	x	x	-	-	-	x
OMXR_MC_IndexParamAudioOutputUnit	x	x	-	-	-	x
OMXR_MC_IndexParamAudioPortSettingMask	x	x	-	-	-	x

x : Effective  
- : Ineffective



## 6. Structures

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

**Table 6-1 Structures of ALAC 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_ALACTYPE	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]

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

<b>Configurable value</b>	-
<b>Acquirable value</b>	NULL
<b>Initial value</b>	NULL
<b>Remarks</b>	Not supported.

pNativeRender

<b>Configurable value</b>	-
<b>Acquirable value</b>	NULL
<b>Initial value</b>	NULL
<b>Remarks</b>	Not supported.

bFlagErrorConcealment

<b>Configurable value</b>	-
<b>Acquirable value</b>	OMX_FLASE
<b>Initial value</b>	OMX_FLASE
<b>Remarks</b>	Not supported.

eEncoding

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

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

nVersion

<b>Configurable value</b>	-
<b>Acquirable value</b>	Specification version of OpenMAX IL (1.1.2).
<b>Initial value</b>	Specification version of OpenMAX IL (1.1.2).
<b>Remarks</b>	-

nPortIndex

<b>Configurable value</b>	APB+0 APB+1
<b>Acquirable value</b>	-
<b>Initial value</b>	-
<b>Remarks</b>	-

nIndex

Configurable value	nPortIndex	Value
	APB+0	0
	APB+1	0
<b>Acquirable value</b>	-	
<b>Initial value</b>	-	
<b>Remarks</b>	-	

eEncoding

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



nBitsPerSample

<b>Configurable value</b>	16, 20, 24, 32
<b>Acquirable value</b>	Setting value
<b>Initial value</b>	16
<b>Remarks</b>	Analyze the ALAC stream and specify the bits per sample.

## 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

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

nVersion

<b>Configurable value</b>	-
<b>Acquirable value</b>	Specification version of OpenMAX IL (1.1.2).
<b>Initial value</b>	Specification version of OpenMAX IL (1.1.2).
<b>Remarks</b>	-

nPortIndex

<b>Configurable value</b>	APB+1
<b>Acquirable value</b>	-
<b>Initial value</b>	-
<b>Remarks</b>	-

nChannels

<b>Configurable value</b>	1, 2
<b>Acquirable value</b>	Setting value or decoded result.
<b>Initial value</b>	2
<b>Remarks</b>	This value does not affect decoding process.

eNumData

<b>Configurable value</b>	-
<b>Acquirable value</b>	OMX_NumericalDataSigned
<b>Initial value</b>	OMX_NumericalDataSigned
<b>Remarks</b>	Not supported.

#### eEndian

<b>Configurable value</b>	-
<b>Acquirable value</b>	OMX_EndianLittle
<b>Initial value</b>	OMX_EndianLittle
<b>Remarks</b>	Not supported.

#### bInterleaved

<b>Configurable value</b>	-
<b>Acquirable value</b>	OMX_TRUE
<b>Initial value</b>	OMX_TRUE
<b>Remarks</b>	Not supported.

#### nBitPerSample

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

#### nSamplingRate

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

#### ePCMMMode

<b>Configurable value</b>	-
<b>Acquirable value</b>	OMX_AUDIO_PCMMModelLinear
<b>Initial value</b>	OMX_AUDIO_PCMMModelLinear
<b>Remarks</b>	Not supported.

#### eChannelMapping

<b>Configurable value</b>	OMX_AUDIO_ChannelNone OMX_AUDIO_ChannelLF OMX_AUDIO_ChannelRF OMX_AUDIO_ChannelCF		
<b>Acquirable value</b>	Setting value or Decoded result.		
<b>Initial value</b>	eChannelMapping[0]= OMX_AUDIO_ChannelLF eChannelMapping[1]= OMX_AUDIO_ChannelRF		
<b>Remarks</b>	This value does not affect decoding process. The relation among channel of input data, nChannels and eChannelMapping is shown as below.		
	<b>Channel of input data</b>	<b>nChannels</b>	<b>eChannelMapping</b>
	1 (monaural)	1	eChannelMapping[0]= OMX_AUDIO_ChannelCF
	2 (stereo)	2	eChannelMapping[0]= OMX_AUDIO_ChannelLF eChannelMapping[1]= OMX_AUDIO_ChannelRF

## 6.5. Structure Members Used in a Unique Manner

Table 6-2 shows structure members used in a unique manner for ALAC 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 6.5.1.

### 6.5.1. Buffer Flag (nFlags)

The buffer flag (nFlags in the OMX\_BUFFERHEADERTYPE structure) for ALAC 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 ALAC 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 ALAC 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 ALAC 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 ALAC Decoder Media Component and the value of nBufferSize, nBufferCountActual, nBufferCountMin in the OMX\_PARAM\_PORTDEFINITIONTYPE structure.<sup>(\*)</sup>

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

Memory Area Name	Memory Size (byte)			Description
Input Buffer (APB + 0)	<b>OMX_PARAM_PORTDEFINITIONTYPE</b>		<b>Value</b>	Buffer to store input stream data. This is the size of memory area allocated by the OMX_AllocateBuffer() function.
	nBufferSize	Minimum Size <sup>(*)</sup>	8192	
		Default Size	32776	
		Maximum Size	32776	
	nBufferCountActual	Minimum Count (= nBufferCountMin)	1	
		Default Count	4	
		Maximum Count	4	
Output Buffer (APB + 1)	<b>OMX_PARAM_PORTDEFINITIONTYPE</b>		<b>Value</b>	Buffer to store output PCM data. This is the size of memory area allocated by the OMX_AllocateBuffer() function.
	nBufferSize	Minimum Size	32768	
		Default Size	32768	
		Maximum Size	32768	
	nBufferCountActual	Minimum Count (= nBufferCountMin)	1	
		Default Count	8	
		Maximum Count	8	

<sup>(\*)</sup> Additionally, areas for such as context task communication and internal work are need.

<sup>(\*)</sup> Analyze the header and specify the value more than the maximum size of the stream.

Revision History	OMX Media Component User's Manual ALAC Decoder Part
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Rev.	Date	Description	
		Page	Summary
0.01	Jun. 20, 2014	-	Newly created.
0.02	Jul. 8, 2014	P3	The name of ALAC Decode Middleware is changed to ALAC Decode Software.
0.10	Jul. 18, 2014	-	Correction of errors.
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