Module/Package SODEA_SoundDemonstrator

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1 History

Revision	Date	Author, Editor	Reason
1.0	30.11.06	Waldemar Rempel	Initial edition
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Keep the revision numbers of the document consistent to the Version Management system!

For hints on the usage of the history table refer to the SMK document index page, chapter revision numbers.

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3 Terms and Abbreviations

Define all terms which are used in the rest of this document and which don't belong to general language usage but are necessary for understanding this document.

Term	Definition

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4 Overview

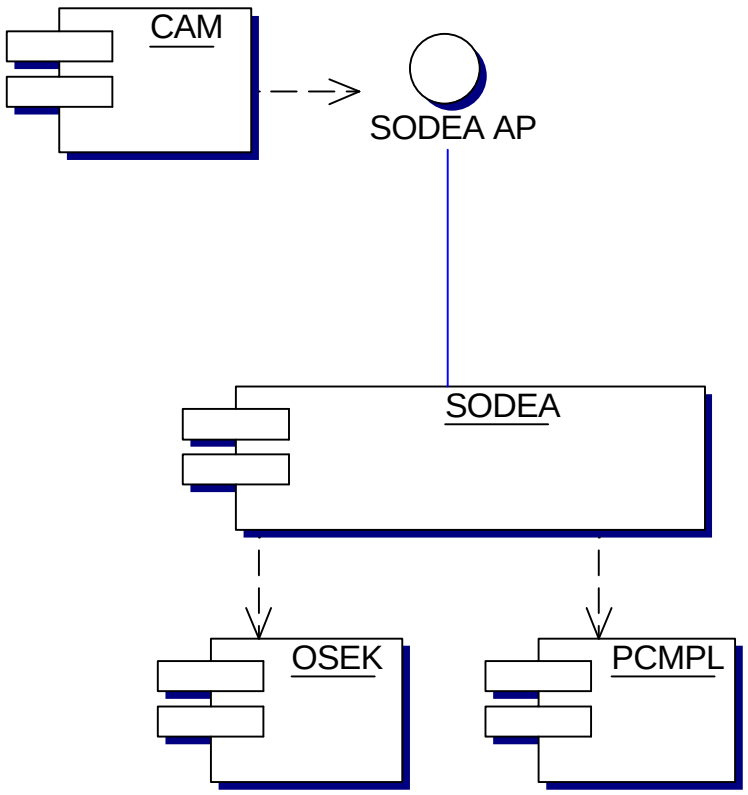
4.1 Performance Specification

SODEA is the main application layer in the software system for the Sound Demonstrator.

4.2 Interdependencies

4.2.1 Module Interdependencies

Components which SODEA depends on.



Used Elements

CAM

Export interface of the SODEA module

SODEA

Sound demonstrator, the main application

OSEK

Operating system

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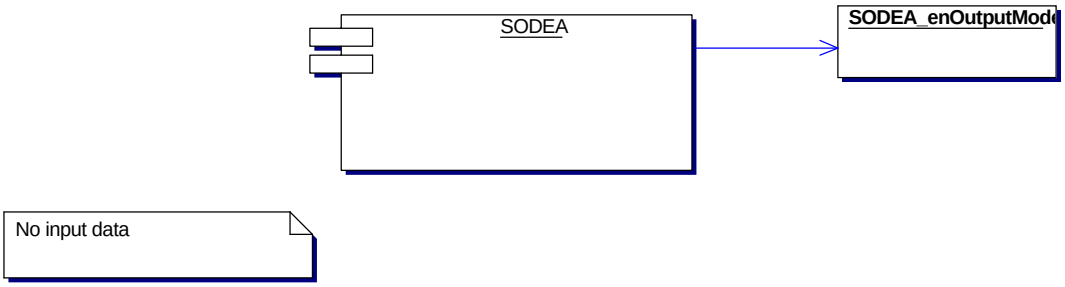
PCMPL

PCM sound player

4.2.2 Input-Output diagram

SODEA supports the hardware layer of PCMPL with the enumerated value of the output stage SODEA_enOutputMode choosen by operator.



Used Elements

SODEA_enOutputMode

Output Mode is used by PCMPL

4.3 Use Cases

4.3.1 The Main Usage Scenario

The main usage scenario of the Package.

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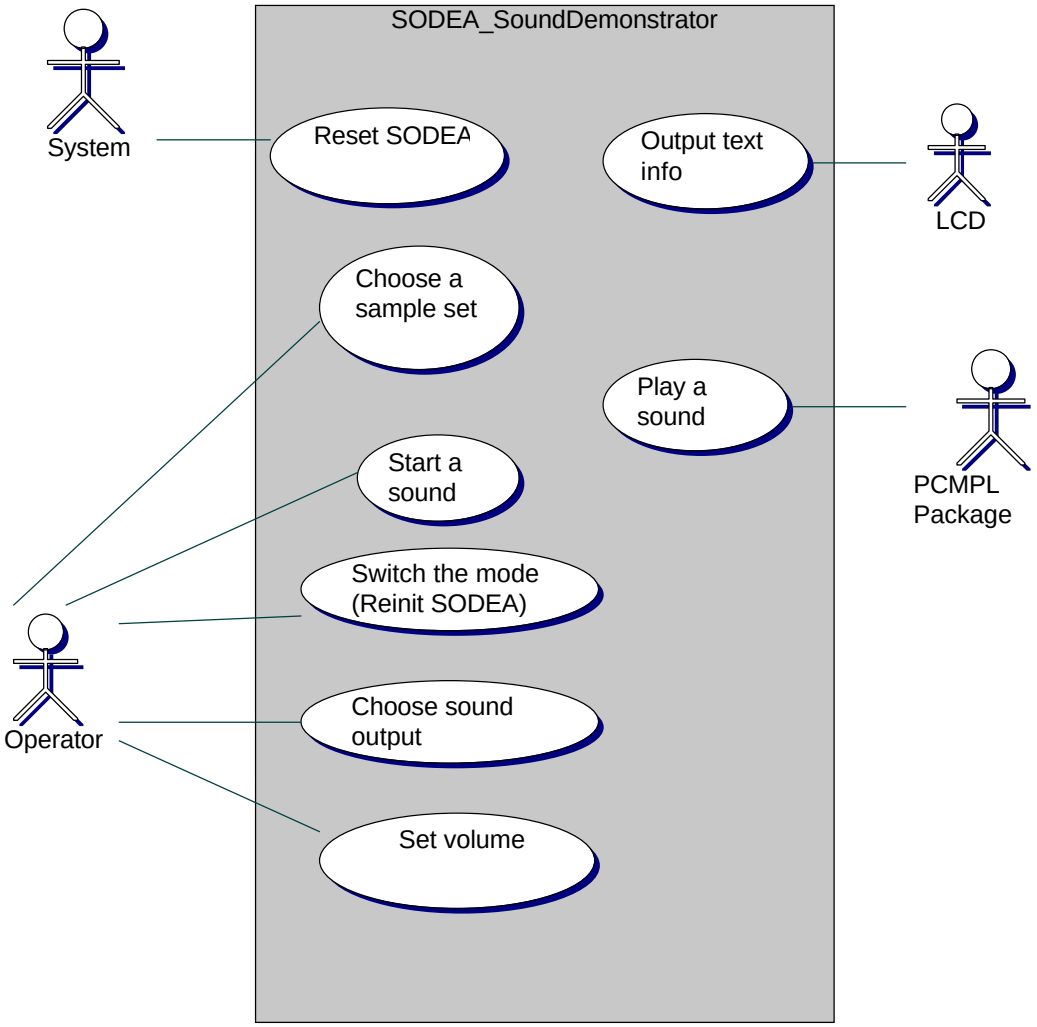

4.4 Resource Consumption

4.4.1 RAM/ROM usage (planned)

Enter the memory requirement (don't forget the memory needed by internal data): first as an estimate, and later with the real values.

RAM/ROM /Stack/EEPROM

Configuration	CODE [Bytes]	DATA [Bytes]	Max. stack	EEPROM

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			(Bytes)	(Bytes)
	not critical	not critical	not critical	0 Bytes

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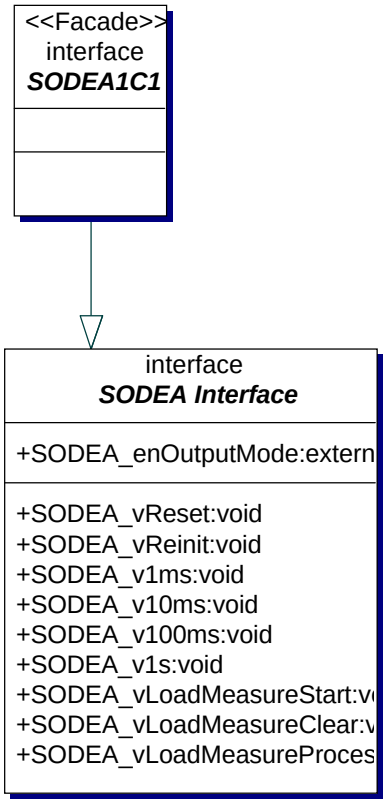
5 Export Interface

5.1 Static View

5.1.1 External Interface

Interface to be used by external components



Classes

SODEA_Interface

This interface class provides all interfaces used by the application.
It implements the interfaces which are visible for the application through SODEA1C1.H

Attribute Description		
Declaration:	public extern SODEA_enOutputMode	SODEA_enOutputMode
Documentation:	Description : sound output mode Access rights : r/w Coding range/coding: see enum definition	

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Method Description		
Declaration:	public void	SODEA_vLoadMeasureStart()
Documentation:	calls SODEA__vLoadMeasureStart	
Return Values:	void	
Declaration:	public void	SODEA_v1s()
Documentation:	Method called from CAM container All activities for 1 s cycle	
Return Values:	void	
Declaration:	public void	SODEA_vLoadMeasureProcess()
Documentation:	calls SODEA__vLoadMeasureProcess calculates the peak load and average load	
Return Values:	void	
Declaration:	public void	SODEA_vLoadMeasureClear()
Documentation:	calls SODEA__vLoadMeasureClear	
Return Values:	void	
Declaration:	public void	SODEA_v100ms()
Documentation:	Method called from CAM container All activities for 100 ms cycle	
Return Values:	void	
Declaration:	public void	SODEA_vReinit()
Documentation:	Sets output hardware according to a new configuration.	
Return Values:	void	
Declaration:	public void	SODEA_vReset()
Documentation:	Method called from reset container (SINI). Sets output hardware to default configuration.	
Return Values:	void	
Declaration:	public void	SODEA_v10ms()
Documentation:	Method called from CAM container All activities for 10 ms cycle	
Return Values:	void	
Declaration:	public void	SODEA_v1ms()
Documentation:	Method called from CAM container All activities for 1 ms cycle	
Return Values:	void	

SODEA1C1

SODEA1C1.H is the interface header which provides the driver's interfaces

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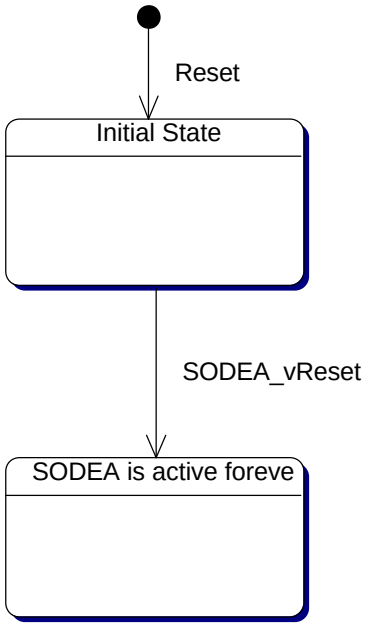
to the application. There are no interface implementations in this class.
SODEA_Interface is used instead.

5.2 Dynamic View

5.2.1 A State Diagram

How to initialize the package.



Used states:

Initial State

SODEA module state after Reset or after power fail.

5.2.2 Task Relations

Task relations for theobservation of the thread safety.

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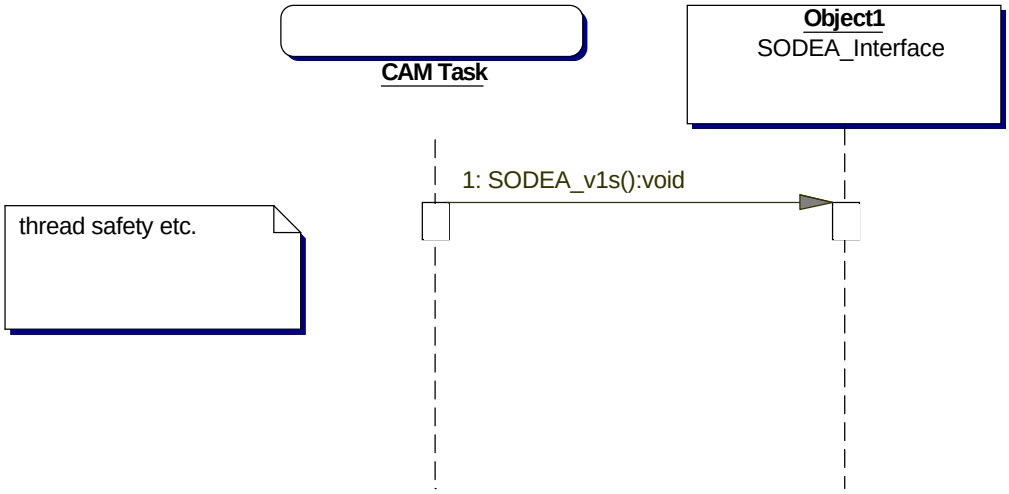

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6 Integration

6.1 Integration Hints

Integration and configuration for JCP platform:

Integration:

The system has to activate SODEA module by calling SODEA_vReset function in the startup container.
No OSEK task is used.
No alarm is used.
No interrupt function is used.
The system has to include the PCMPL_PCMPlayer package with the properly adapted hardware layer.

Configuration:

SODEA1CI.h and SODAE1CE.h files are the configuration headers.
Currently there is no export configuration item available.

You can adapt the HMI by changing of the following import configuration values. For description please refer to SODEA1CI.h.

Configuration attribute	Default value
SODEA__nIniGlobalVolume_Cfg	128
SODEA__nEnterService_Tim	3000
SODEA__nStartUpTimeout_Cfg	3000
SODEA__nMenuTimeout_Cfg	7000
SODEA__nVolumeTimeout_Cfg	1200
SODEA__nBlinkingPer	800
SODEA__nOneKeySound	Off

1. Hardware interface

There are no DIO macros used for handling the ports. The input and outputs are handled directly!
The sound output is the part of the PCMPL hardware layer, which is strongly adapted to the hardware of the Sound Demonstrator.

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7 Internal Design

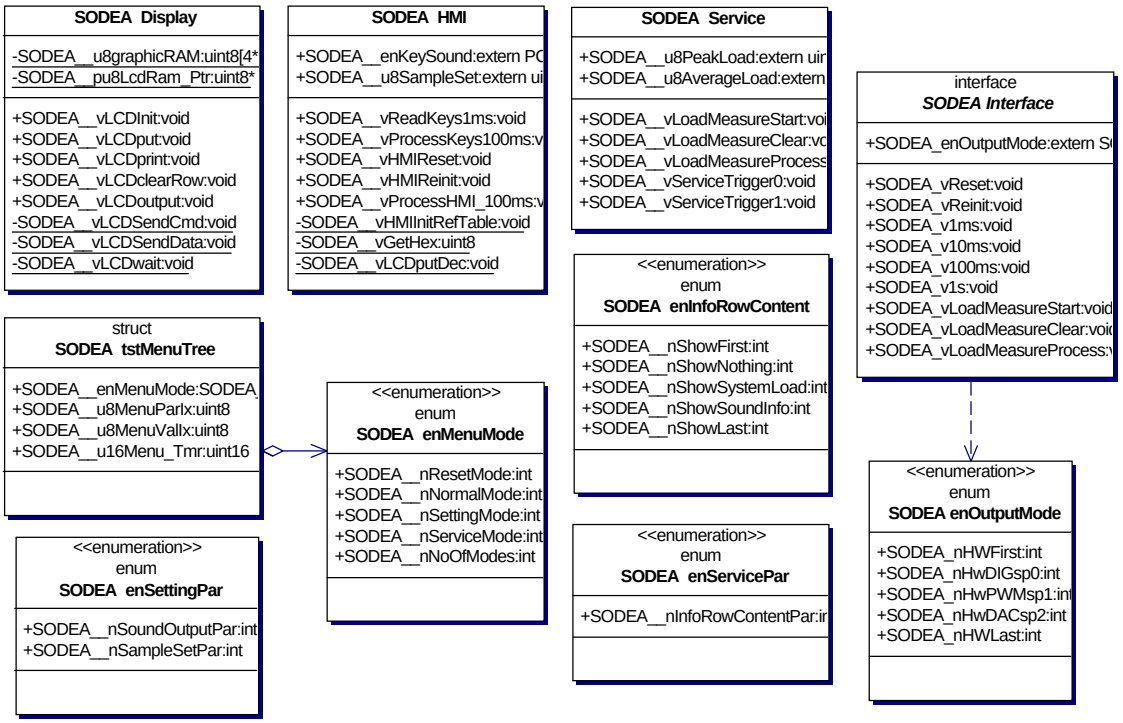
7.1 Static View

7.1.1 Decomposition of the Module

Not applicable

7.1.2 Internal Design

Overview of all used classes.



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Classes

SODEA__Display

Provides all LCD output functions

Attribute Description		
Declaration:	private static uint8*	SODEA__pu8LcdRam_Ptr
Documentation:	pointer to current graphic RAM cell	
Declaration:	private static uint8[4*40]	SODEA__u8graphicRAM
Documentation:	graphic RAM	

Method Description		
Declaration:	private static void	SODEA__vLCDSendCmd(uint8 u8ControllerNo, uint8 u8Cmd)
Documentation:	Sends instruction to LCD module	
Return Values:	void	
Declaration:	public void	SODEA__vLCDoutput()
Documentation:	send the content of graphic RAM to LCD	
Return Values:	void	
Declaration:	private static void	SODEA__vLCDwait(uint16 u16Cycles)
Documentation:	wait u16Appr_us µs (very roughly)	
Return Values:	void	
Declaration:	private static void	SODEA__vLCDSendData(uint8 u8ControllerNo, uint8 u8Data)
Documentation:	Sends data to LCD module	
Return Values:	void	
Declaration:	public void	SODEA__vLCDput(uint8 u8char)
Documentation:	copy a character to graphic RAM. output position is the end of the last output with SODEA__vLCDprint	
Return Values:	void	
Declaration:	public void	SODEA__vLCDInit()
Documentation:	Init Dipsplay Interface	
Return Values:	void	
Declaration:	public void	SODEA__vLCDclearRow(uint8 u8RowNo)
Documentation:	clear row number u8RowNo in the graphic RAM u8RowNo: row to be cleared [0...SODEA__nLCDyMax-1]	
Return Values:	void	

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Method Description		
Declaration:	public void	SODEA__vLCDprint(uint8 u8RowNo, uint8 u8ColNo, uint8* pu8lcdtext)
Documentation:	copy a string to the graphic RAM u8RowNo: row [0...SODEA__nLCDcharsY-1] u8ColNo: column [0...SODEA__nLCDcharsX-1]	
Return Values:	void	

SODEA__HMI

Contains the Human Machine Interface

Attribute Description		
Declaration:	public extern uint8	SODEA__u8SampleSet
Documentation:	Description : sample set number Access rights : r/w	
Declaration:	public extern PCMPL_tenSoundID[]	SODEA__enKeySound
Documentation:	Description : key-sound reference table Access rights : r/w Coding range/coding:	

Method Description		
Declaration:	private static void	SODEA__vHMIInitRefTable()
Documentation:	set key-stream reference of all inactive streams to init	
Return Values:	void	
Declaration:	public void	SODEA__vProcessHMI_100ms()
Documentation:	main activities of the HMI	
Return Values:	void	
Declaration:	private static void	SODEA__vLCDputDec(uint8 u8Value)
Documentation:	copy to graphic RAM max. 3 digits acc. to uint8 decimal value	
Return Values:	void	
Declaration:	private static uint8	SODEA__vGetHex(uint8 u8Input)
Documentation:	returns hex character [0..F] corresponding to the u8Input [0....15] no range check is performed	
Return Values:	uint8	
Declaration:	public void	SODEA__vProcessKeys100ms()
Documentation:	key driver activities every 100 ms process key state	
Return Values:	void	
Declaration:	public void	SODEA__vReadKeys1ms()

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Method Description		
Documentation:	key driver activities every 1 ms read / debounce	
Return Values:	void	
Declaration:	public void	SODEA__vHMIReinit()
Documentation:	reinit of the HMI	
Return Values:	void	
Declaration:	public void	SODEA__vHMIReset()
Documentation:	reset of the HMI	
Return Values:	void	

SODEA__Service

Contains some service functions such as system load measurement

Attribute Description		
Declaration:	public extern uint8	SODEA__u8AverageLoad
Documentation:	peak load and average load values	
Declaration:	public extern uint8	SODEA__u8PeakLoad
Documentation:	peak load and average load values	

Method Description		
Declaration:	public void	SODEA__vServiceTrigger0(bool boLevel)
Documentation:	Service output 0 for time monitoring etc.	
Return Values:	void	
Declaration:	public void	SODEA__vServiceTrigger1(bool boLevel)
Documentation:	Service output 1 for time monitoring etc.	
Return Values:	void	
Declaration:	public void	SODEA__vLoadMeasureProcess()
Documentation:	stops the stop watch timer, calculates the peak load and average load	
Return Values:	void	
Declaration:	public void	SODEA__vLoadMeasureStart()
Documentation:	starts the stop watch timer to measure system load	
Return Values:	void	
Declaration:	public void	SODEA__vLoadMeasureClear()
Documentation:	clears the system load values	

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Method Description	
Return Values:	void

SODEA__enInfoRowContent

Description: enumerated list of values of the service parameter "info row content"
Elements:
SODEA__nShowNothing, : 3. row is empty in normal mode
SODEA__nShowSystemLoad : 3. row shows the system load
SODEA__nShowSoundInfo : 3. row shows the sound info

Attribute Description		
Declaration:	public int	SODEA__nShowSoundInfo
Declaration:	public int	SODEA__nShowLast
Declaration:	public int	SODEA__nShowSystemLoad
Declaration:	public int	SODEA__nShowFirst
Declaration:	public int	SODEA__nShowNothing

SODEA__tstMenuTree

Structure of the menu tree

Attribute Description		
Declaration:	public uint8	SODEA__u8MenuValIx
Documentation:	Description : menu value index Access rights: r/w Values :	
Declaration:	public uint16	SODEA__u16Menu_Tmr
Documentation:	Description : timer for menu control etc. [ms] Access rights: r/w Values :0...65000	
Declaration:	public SODEA__enMenuMode	SODEA__enMenuMode
Documentation:	Description : menu mode Access rights: r/w Values :	
Declaration:	public uint8	SODEA__u8MenuParIx
Documentation:	Description : menu parameter index Access rights: r/w Values :	

SODEA__enMenuMode

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Description: enumerated list of menu tree modes
Elements:
SODEA__nResetMode : the mode set after power on reset
SODEA__nNormalMode : displays the main screen, incremental encoder controls the loadness
SODEA__nSettingMode : can be entered from SODEA__nNormalMode by means of tipping on the incremental encoder;
here the sound output stage can be selected. Exit to SODEA__nNormalMode by
timeout or after tipping on the incremental encoder
SODEA__nServiceMode : mode to make some for customer hidden settings; entered by a key combination during
SODEA__nResetMode

Attribute Description		
Declaration:	public int	SODEA__nServiceMode
Declaration:	public int	SODEA__nNoOfModes
Declaration:	public int	SODEA__nSettingMode
Declaration:	public int	SODEA__nResetMode
Declaration:	public int	SODEA__nNormalMode

SODEA_enOutputMode

Description: Enumerated list of hardware output modes
Elements:
SODEA_nHwDIGsp0: Digital Symmetric Speaker Drive
SODEA_nHwPWMsp1: Analog PWM Speaker Drive
SODEA_nHwDACsp2: Analog DAC Speaker Drive
SODEA_nHWLast = SODEA_nHwDACsp2: last mode

Attribute Description		
Declaration:	public int	SODEA_nHwDACsp2
Declaration:	public int	SODEA_nHWLast
Declaration:	public int	SODEA_nHwPWMsp1
Declaration:	public int	SODEA_nHWFirst
Declaration:	public int	SODEA_nHwDIGsp0

SODEA__enServicePar

Description: enumerated list of service parameters
Elements:
SODEA__nInfoRowContentPar : the Service parameter "info row content"

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Attribute Description		
Declaration:	public int	SODEA__nInfoRowContentPar

SODEA__enSettingPar

description: enumerated list of setting parameters
Elements:
SODEA__nSoundOutputPar : the setting parameter "sound output"
SODEA__nSampleSetPar : the setting parameter "sample set number"

Attribute Description		
Declaration:	public int	SODEA__nSampleSetPar
Declaration:	public int	SODEA__nSoundOutputPar

SODEA_Interface

This interface class provides all interfaces used by the application.
It implements the interfaces which are visible for the application through
SODEA1C1.H

Attribute Description		
Declaration:	public extern SODEA_enOutputMode	SODEA_enOutputMode
Documentation:	Description : sound output mode Access rights : r/w Coding range/coding: see enum definition	

Method Description		
Declaration:	public void	SODEA_vLoadMeasureStart()
Documentation:	calls SODEA__vLoadMeasureStart	
Return Values:	void	
Declaration:	public void	SODEA_v1s()
Documentation:	Method called from CAM container All activities for 1 s cycle	
Return Values:	void	
Declaration:	public void	SODEA_vLoadMeasureProcess()
Documentation:	calls SODEA__vLoadMeasureProcess calculates the peak load and average load	
Return Values:	void	
Declaration:	public void	SODEA_vLoadMeasureClear()

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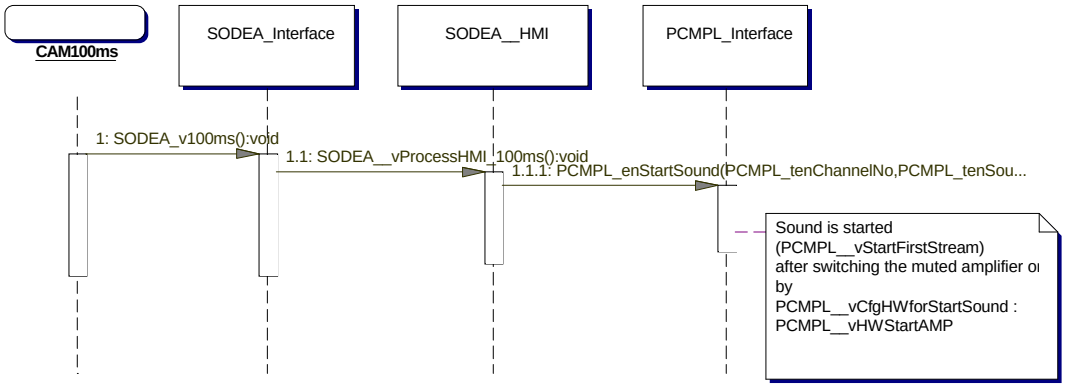
Method Description		
Documentation:	calls SODEA__vLoadMeasureClear	
Return Values:	void	
Declaration:	public void	SODEA_v100ms()
Documentation:	Method called from CAM container All activities for 100 ms cycle	
Return Values:	void	
Declaration:	public void	SODEA_vReinit()
Documentation:	Sets output hardware according to a new configuration.	
Return Values:	void	
Declaration:	public void	SODEA_vReset()
Documentation:	Method called from reset container (SINI). Sets output hardware to default configuration.	
Return Values:	void	
Declaration:	public void	SODEA_v10ms()
Documentation:	Method called from CAM container All activities for 10 ms cycle	
Return Values:	void	
Declaration:	public void	SODEA_v1ms()
Documentation:	Method called from CAM container All activities for 1 ms cycle	
Return Values:	void	

7.2 Dynamic View

7.2.1 Start Sound

Start sound behavior from SODEA's point of view.



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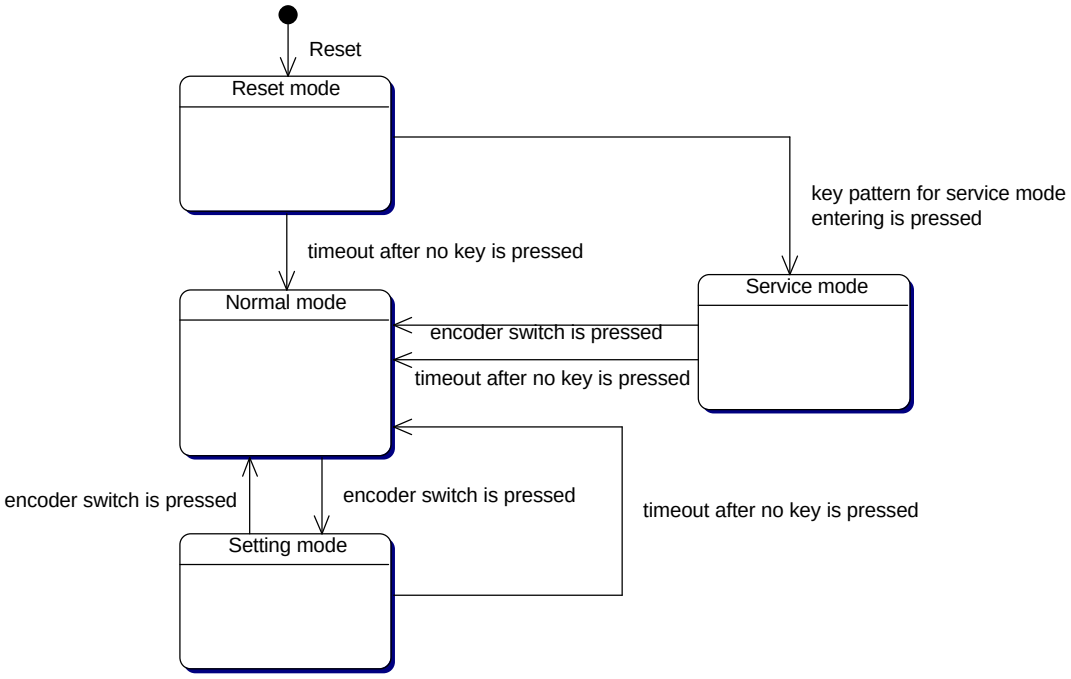
7.2.2 Sample State Diagram

Main state machine for SODEA which is closely bonded to the menu tree of HMI.



Used states:

Reset mode

The Reset mode endures few seconds after power on and shows the start screen with the software version information.

Service mode

Some service settings such as displaying of system load can be choosen in this mode.

Normal mode

In the Normal Mode sound samples can be played.
By entering the normal mode SODEA_vReinit is called in order to set new sound output.

Setting mode

In the Setting Mode user settings such as sound output and sample set can be set

7.2.3 seResetReinit

Sound hardware behavior in SODEA reset context

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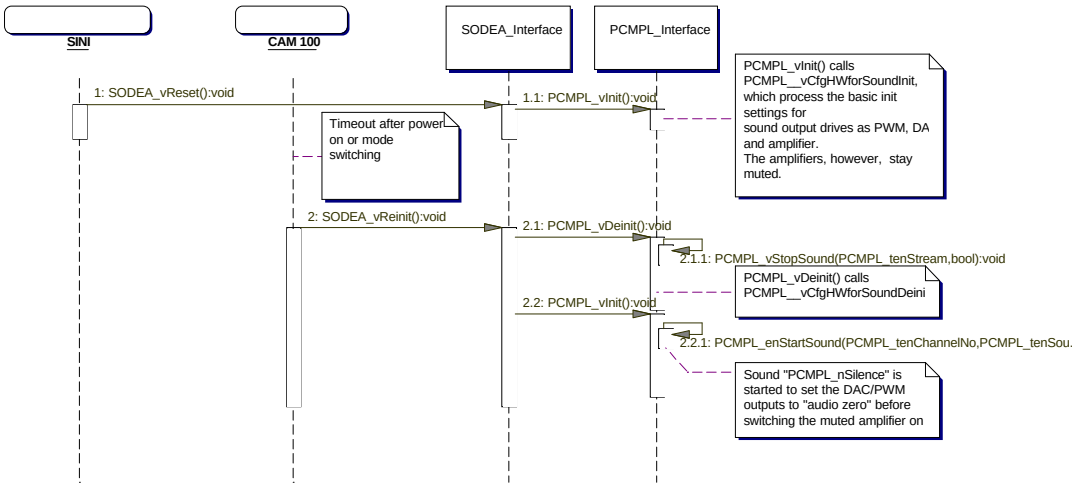

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8 Traceability

Link to the Traceability matrix (one related to architectural requirements, one to the functional requirements)

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9 Open Issues

Collect here all issues which are known, but could not be resolved yet.

Open Issue	Detailed description

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10 References

List all references to requirement documents (e.g. Software Requirements Specification) and other documents (e.g. specific standards) that were used to write this document. Also, provide the version or at least the date of the referred documents.

Name of the Document	Version or Release Date

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