
i.MX25 SDK

Windows Embedded CE 6.0

Multimedia Framework

User's Guide

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About This Book

This guide explains how to install, build, and execute Windows Embedded CE 6.0 OS images for the 3-Stack board, using the Freescale i.MX25 3-Stack Windows CE Multimedia Framework Software Development Kit (SDK).

Audience

This document is intended for software, hardware, and system engineers who are planning to use the product and for anyone who wants to understand more about the product.

Organization

This document contains the following chapters.

- Chapter 1 Explains how to install/uninstall the SDK.
- Chapter 2 Explains how to build Windows CE OS images using the BSP.
- Chapter 3 Explains how to test the multimedia components that you install.

Conventions

This document uses the following conventions:

<i>Courier</i>	Is used to identify commands, explicit command parameters, code examples, expressions, data types, and directives.
<i>Italic</i>	Is used for emphasis, to identify new terms, and for replaceable command parameters.

References

The following documents were referenced to build this document.

1. i.MX25 PDK 1.7 Hardware User's Guide
2. i.MX Advanced Toolkit Standard Version User's Guide
3. i.MX25 PDK 1.7 Windows Embedded CE 6.0 User's Guide

Chapter 1

Installation

The Freescale Multimedia Framework Software Development Kit (SDK) is a collection of binary, code, and support files that you can use to create Windows CE OS images for the i.MX25 3-Stack board. The SDK is distributed as a single archive EXE (.exe) file.

There are two steps to perform for the installation: first, install the i.MX25 3-Stack Board Support Package (BSP), and then install the SDK into the Windows CE source code tree and the Platform Builder development environment.

1.1 Installing the BSP

To install the BSP, use these steps:

1. Confirm that the BSP version is PDK 1.7 version or above.
2. Follow the steps in Chapter 1 of the *i.MX25 PDK 1.7 Windows Embedded CE 6.0 User's Guide*.

1.2 Installing the SDK

To install the SDK, use these steps:

NOTE

Before installing the SDK, save any modified files and close the sample workspace, because the Installer will modify the file of the sample workspace project.

1. Run the installation execution package.

The Setup Wizard screen is displayed (Figure 1-1).



Figure 1-1 Setup Screen

2. Click **Next**.

The Choose Components screen is displayed (Figure 1-2).

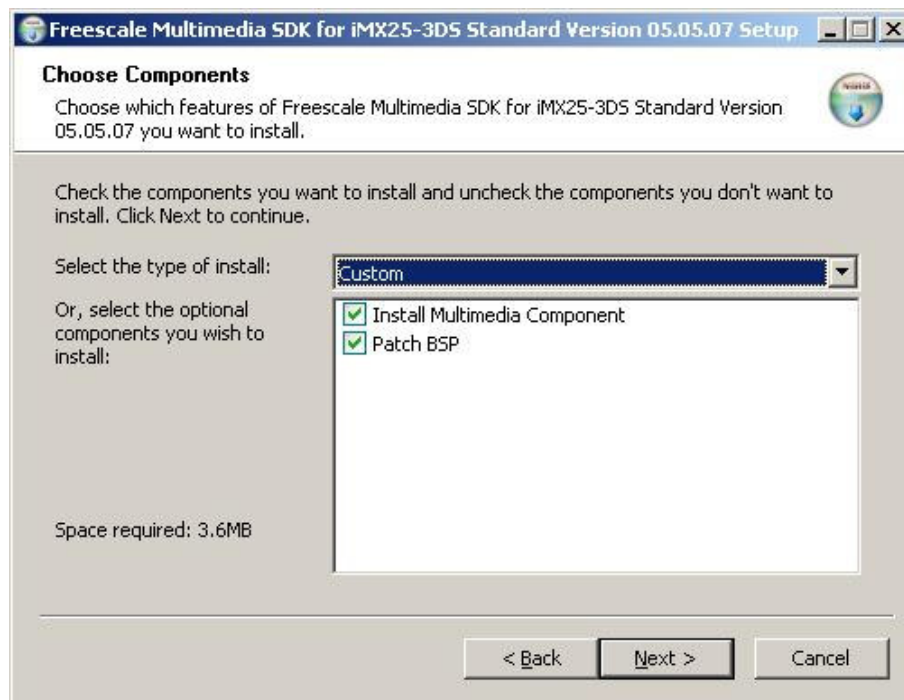


Figure 1-2 Choose Components

3. Click Next.

The installation location screen is displayed.

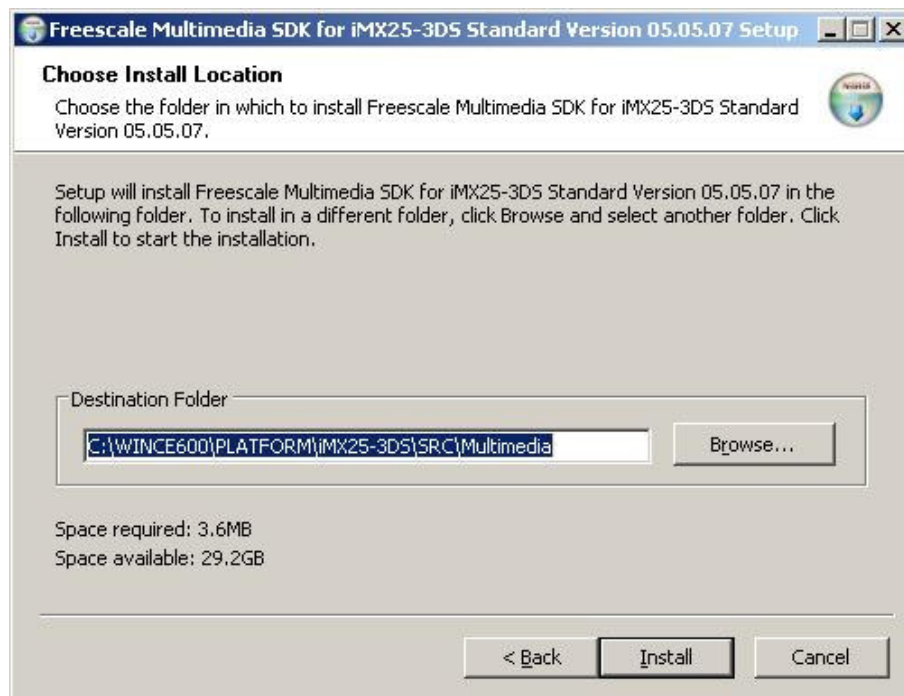


Figure 1-3 Selecting the Installation Location

4. Under Destination Folder, set the path of the destination folder for the SDK installation. By default, the multimedia framework SDK will be installed in the following path:

`$(_WINCEROOT)\Platform\<platform_name>\src\Multimedia`

where:

- `$(_WINCEROOT)` is the path of your Windows CE root folder – “Wince600”
 - `<platform_name>` is the name of the 3-stack platform BSP directory – “iMX25-3DS-PDK1_7” for i.MX25 3-stack Windows Embedded CE 6.0 BSP
5. Continue with the installation wizard until the installation is complete.
 6. In the final installation window (Figure 1-4) you can select whether to do a clean build for the Windows CE OS Image automatically.
 - If **Make Run-time Image (Nk.bin)** is selected, the entire image build procedure, which includes the CSP build, BSP build, and SYSGEN, will be implemented automatically.
 - During the automatic build, all of the FSL developed multimedia components are included in the OS Image by default.



Figure 1-4 Setup Complete Screen

1.2.1 Checking the Installation

This section explains how to ensure that the multimedia framework SDK was installed successfully. The installer copies the Multimedia SDK folder into the BSP code tree:

- For Windows Embedded CE 6.0, the folder is copied to
`\WINCE600\platform\<platform>\src`

1.2.1.1 Check the SDK folder in the BSP code tree

The SDK code tree architecture is shown in Figure 1-5. The table that follows describes the folder contents.

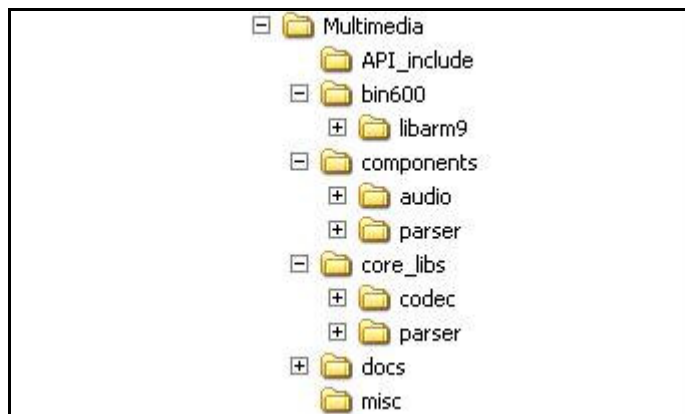


Figure 1-5 Multimedia SDK Code Tree Screen

Folder	Contents
API_include	This folder contains the global header files of multimedia DirectShow DMO and Filters.
components	This folder, with its audio, parser, and image subfolders, contains the DirectShow DMO and Filters source code of multimedia components.
core_libs	This folder contains header files and library binaries of multimedia components.
Docs	This folder contains API document, Datasheet and release notes of all of the components.
Misc	This folder contains the *.reg and *.bib file required by platform builder.
bin600	These folders contain DLL and EXE binaries, which are built by the components' source code.

1.2.1.2 Check the BSP modification performed by the installer

The SDK installer modifies the BSP to support the Freescale multimedia components.

To check the BSP modifications, use these steps:

1. In the **bsp_cfg.h** file under `$(_WINCEROOT) \platform \<platform> \src \inc \`, check that the line **BSP_VID_MEM_CACHE_WRITETHROUGH** has been defined as **TRUE**, as follows:

```
#define BSP_VID_MEM_CACHE_WRITETHROUGH TRUE
```

2. In the **platform.reg** file under `$(_WINCEROOT) \platform \<platform> \files \`, check the following line was added:

```
#include "$(_TARGETPLATROOT) \src \Multimedia \misc \fslmm_mx25.reg"
```

3. In the **platform.bib** file under `$(_WINCEROOT) \platform \<platform> \files \`, check that the following line was added:

```
#include "$(_TARGETPLATROOT) \src \Multimedia \misc \fslmm_mx25.bib"
```

4. In the **directx.bib** file under `$(_WINCEROOT) \public \directx \oak \files \`, check that the following line as below has been commented as follows:

```
;wmadmod.dll      $( _FLATRELEASEDIR ) \wmadmod.dll      NK      SH
```

1.2.1.3 Check the workspace modified by the installer

The SDK installer modifies the Platform Builder's workspace to support the Freescale multimedia components.

To check the workspace, use these steps:

1. In Platform Builder IDE, select menu **Project -> iMX25-3DS-Mobility-PDK1_7 Properties -> Configuration Properties -> Environment**, check the variables were added, as indicated
 - Added – variable **TGTARM** has been set to **arm9**
 - Added – variable **BSP_WATERMARK** has been set to **1**
2. In **Catalog Items** View, check that the following DirectShow system components of the OS Build were added or removed, as indicated:
 - Added - all components in **Core OS > CEBASE > Graphics and Multimedia Technologies -> Media -> DirectShow**
 - Added - the component **Core OS > CEBASE > Graphics and Multimedia Technologies > Media > Media Formats > MPEG-1 Parser/Splitter**
 - Added - the component **Core OS > CEBASE > Graphics and Multimedia Technologies > Media > Media Formats > AVI Filter**
 - Added - the component **Core OS > CEBASE > Graphics and Multimedia Technologies > Media > Audio Codecs and Renderers > Wave/AIFF/au/snd File Parser**

1.2.2 Removing an Existing Installed SDK

This section explains how to remove an installation of the SDK from the Windows CE source code tree and Platform Builder development environment.

NOTE

Before uninstalling the SDK, save any modified files that you want to keep to a protected location, because uninstalling the SDK will remove all files that were populated by the Installer.

To remove an SDK installation, use these steps:

1. Close Platform Builder.
2. Click **Start > Settings > Control Panel > Add or remove Programs**.
The Add or Remove Programs dialog is displayed.
3. Remove the SDK.
4. Manually remove the remaining SDK files and directories.

```
$(_WINCEROOT)\Platform\<platform_name>\src\Multimedia
```

Chapter 2

Building OS Images

After completing the SDK installation, you can use the sample workspace to build a Windows CE OS Image based on the installed SDK. You may add or remove image build components.

2.1 Working with Multimedia Components

The multimedia components are located in the Windows Catalog. You import the catalog, and can then add the components to the OS Image build.

2.1.1 Importing the Windows Embedded CE 6.0 Catalog

For Windows Embedded CE 6.0, the multimedia catalog is automatically imported when the sample workspace is opened.

To view the catalog, use these steps:

1. Click **View > Other Windows > Catalog Items View**.

The Catalog Items View dialog is displayed (Figure 2-1).

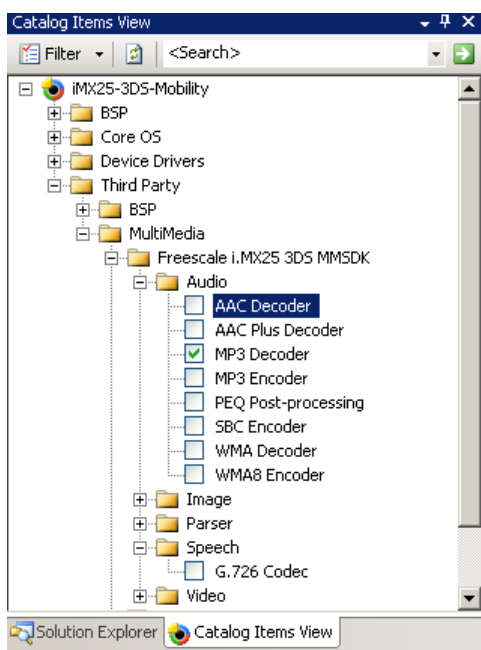


Figure 2-1 Multimedia SDK Catalog View

2. To view the multimedia components, open **Third Party > Multimedia > Freescale i.MX25 3DS MMSDK**.

If can not find these components in catalog items view, it need exit and restart the Platform Builder to make multimedia catalog imported completely.

2.1.2 Add/Remove components from Catalog

To add/remove components from the catalog, use these steps:

1. Click **View > Other Windows > Catalog Items View**.
2. To view the multimedia components, open **Third Party > Multimedia > Freescale i.MX25 3DS MMSDK**.
3. To add/remove a multimedia component, just select/unselect the associated check box.

2.2 Building OS Images

This section explains how to build Windows CE OS image included multimedia components in the sample workspace.

2.2.1 Building an Image in Platform Builder

For instructions for building OS images using Platform Builder, see the *i.MX25 PDK 1.7 Windows Embedded CE 6.0 User's Guide*.

2.2.2 Building an Image using the Command Line

The SDK installation provides the `fsl_mmfwk_build.bat` script, which builds the OS image. You can run this script during the last installation step or in the command line after installation.

To run the script in the command line, follow these steps:

1. Open the command console on your PC.
2. Go to the `$(_WINCEROOT)\platform\<platform>\src\Multimedia\` directory.
3. Run `fsl_mmfwk_build.bat`.

2.3 Building Multimedia Components in a Workspace

This section explains how to build/rebuild installed multimedia components after the SDK upgrading or the modification on multimedia components' source code.

2.3.1 Building all components simultaneously

To build all of the installed components at once, use these steps:

1. Go to the Solution Explorer View, and then open the **Multimedia** project in the folder **Platform > iMX25-3DS-PDK1_7 > SRC**.
2. Right-click on the **Multimedia** project, and then select **Rebuild**.

This builds all DLL and EXE binaries in the `bin600` directories under the Multimedia folder in the BSP code tree.

2.3.2 Building individual components

To build individual components, use these steps:

1. In the project window, open the individual component subproject in the **Multimedia** project
2. Right-click an individual component's sub-project, and then select **Rebuild**

This builds the DLL and EXE binaries in the `bin600` directories under the Multimedia folder in the BSP code tree.

Chapter 3

Using the Test Procedures

This chapter explains how to test the Freescale multimedia components in the Windows CE OS. The image was built as described in chapter 2.

3.1 Audio Decoder Test

To perform this test, use the Windows CE Media Player to playback the audio files.

3.2 MP3 Encoder Test

The test application for an MP3 audio encoder is built into the Windows CE OS image, when the MP3 encoder component is added from the Catalog during the image build procedure. The test application supports the WAV file input.

To execute the test bench, run the following at the command line:

fsl_mp3_enc_dmo_test.exe <input file> <output file> <Encoder Configuration>

The <Encoder Configuration> parameters are optional, and described as follows:

[-b<bps>] [-s<samplerate>]

Arguments	Description
-b <bps>	Bit rate for the encoded mp3 bit stream (default 128000), bit/second in Unit. Accepted values: 32000, 40000, 48000, 56000, 64000, 80000, 96000, 112000, 128000, 160000, 192000, 224000, 256000, 320000
-s <samplerate>	Sample rate for the encoded mp3 bit stream (default 44100), sample/second in Unit Accepted values: 32000, 44100, 48000

Refer to the following command line for information.

fsl_mp3_enc_dmo_test.exe pcm.wav output.mp3 -b 128000 -s 44100

NOTE

The current test application supports the WAV file input. The sample rate of an input WAV should be the same as "**-s <sampleRate>**". If the two rates are not identical, the test application stop the encode procedure and exits.

3.3 G.711 Encoder/Decoder Test

G.711 encoder test application is built into the Windows CE OS image when the G.711 codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

fsl_g711_enc_test.exe <Options> <InFile> <OutFile>

The following table describes the arguments:

Argument	Description
-Options	<ul style="list-style-type: none">• A A-law• M Mu-law• A2M convert A-law to Mu-law• M2A convert Mu-law to A-law
InFile	Name of the input file
OutFile	Name of the output file

G.711 decoder test application is built into the Windows CE OS image when the G.711 codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

fsl_g711_dec_test.exe <Options> <InFile> <OutFile>

The following table describes the arguments:

Argument	Description
-Options	<ul style="list-style-type: none">• A A-law• M Mu-law
InFile	Name of the input file
OutFile	Name of the output file

3.4 G.723.1 Encoder/Decoder Test

G.723.1 encoder test application is built into the Windows CE OS image when the G.723.1 codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

fsl_g723_enc_test.exe [-Options] <InFile> <OutFile>

The following table describes the arguments:

Argument	Description
-Options	<ul style="list-style-type: none">• -DTX for DTX test vector• -Noh Enable/Disable Hp Filter• -rate # bit-rate (in kbit/s): 63 for 6.3 kbit/s and 53 for 5.3 kbit/s• -?/-help print help message
InFile	Name of the input file
OutFile	Name of the output file

G.723.1 decoder test application is built into the Windows CE OS image when the G.723.1 codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

fsl_g723_dec_test.exe [-Options] <InFile> <OutFile>

The following table describes the arguments:

Argument	Description
-Options	<ul style="list-style-type: none">• -Nop Enable/Disable Hp Filter• -?/-help print help message• -f <file> Use file as CRC file
InFile	Name of the input file
OutFile	Name of the output file

3.5 G.726 Encoder/Decoder Test

G.726 encoder test application is built into the Windows CE OS image when the G.726 codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

fsl_g726_enc_test.exe [-Options] <InFile> <OutFile>

The following table describes the arguments:

Argument	Description
-Options	<div>-law <a u l> The letters A or a for G.711 A-law, letter u for G.711 m-law, or letter l for linear. Default is A-law.</div> <div>-rate # the bit-rate (in kbit/s): 40, 32, 24 or 16. Default is 32kbit/s.</div> <div>-homing <InitFile> The file contains initialization (homing) sequence to drive the Encoder to a known initial state. Default is no init file and the Codec is in reset state.</div> <div>-?/-help print help message</div>
InFile	Name of the input file
OutFile	Name of the output file

G.726 decoder test application is built into the Windows CE OS image when the G.726 codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

fsl_g726_dec_test.exe [-Options] <InFile> <OutFile>

The following table describes the arguments:

Argument	Description
-Options	<div>-law <a u l> The letters A or a for G.711 A-law, letter u for G.711 m-law, or letter l for linear. Default is A-law.</div> <div>-rate # the bit-rate (in kbit/s): 40, 32, 24 or 16. Default is 32kbit/s.</div> <div>-homing <InitFile> The file contains initialization (homing) sequence to drive the Encoder to a known initial state. Default is no init file and the Codec is in reset state.</div> <div>-?/-help print help message</div>
InFile	Name of the input file
OutFile	Name of the output file

3.6 G.729 Encoder/Decoder Test

G.729 encoder test application is built into the Windows CE OS image when the G.729 codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

fsl_g729ab_enc_test.exe <InFile> <OutFile> <VAD_flag>

The following table describes the arguments:

Argument	Description
InFile	Name of the input file
OutFile	Name of the output file
VAd_flag	0: disable VAD, 1: enable VAD.

G.729 decoder test application is built into the Windows CE OS image when the G.729 codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

fsl_g729ab_dec_test.exe <InFile> <OutFile>

The following table describes the arguments:

Argument	Description
InFile	Name of the input file
OutFile	Name of the output file

3.7 NB_AMR Encoder/Decoder Test

NB_AMR encoder test application is built into the Windows CE OS image when the NB_AMR codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

fsl_nb_amr_enc_test.exe [-dtx|dtx2] [-bitstreamformat] [-numframetoencode] <amr_mode>
<speech_file> <bitstream_file>

The following table describes the arguments:

Argument	Description
-dtx	enables DTX or DTX2 mode
-bitstreamformat	File format, etsi, if1, if2 or mms, default is etsi
-numframetoencode	Number of frame to encode should be between 1 and 255
amr_mode	Specify the bit rate, it should be MR122, MR102, MR795, MR74, MR67, MR59, MR 515, MR475 or -modefile = mode_file (this will read AMR modes from text file)
speech_file	Name of the input file
bitstream_file	Name of the output file

Refer to the following command line for information.

**fsl_nb_amr_enc_test.exe -dtx1 -if2 -numframe=1 MR122 \release\input\dtx1\DTX1.INP
\release\output\if2\DTX1_MR122.COD**

**fsl_nb_amr_enc_test.exe -dtx1 -if2 -numframe=1 -modefile=\release\input\dtx1\allmodes.txt
\release\input\dtx1\SPEECH.INP \release\output\if2\SPEECH_VAD1.COD**

NB_AMR decoder test application is built into the Windows CE OS image when the NB_AMR codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

**fsl_nb_amr_dec_test.exe [-bitstreamformat] [-numframetodecode] <encoded_file>
<output_file>**

The following table describes the arguments:

Argument	Description
-bitstreamformat	Specify input file format, etsi, if1, if2 or mms, default is etsi
-numframetodecode	Number of frame to decode per time, default value is 1
encoded_file	Name of the input file
output_file	Name of the output file

Refer to the following command line for information.

**fsl_nb_amr_dec_test.exe -if2 -numframe=1
\release\input\if2_ref_vectors\no_dtx\t_mode\T21.COD \release\output\if2\T21.OUT**

3.8 WB_AMR Encoder/Decoder Test

WB_AMR encoder test application is built into the Windows CE OS image when the WB_AMR codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

fsl_wb_amr_enc_test.exe [-dtx] [-bitstreamformat] < mode> <speech_file> <bitstream_file>

The following table describes the arguments:

Argument	Description
-dtx	-dtx if DTX is ON, default is OFF
-bitstreamformat	include: -itu -mime -if1 -if2, default is -itu
mode	Specify the bit rate, it should be 0,1,2,3,4,5,6,7,8. "mode : (0) (1) (2) (3) (4) (5) (6) (7) (8) "

	"bitrate: 6.60 8.85 12.65 14.25 15.85 18.25 19.85 23.05 23.85kbit/s "
speech_file	Name of the input file
bitstream_file	Name of the output file

Refer to the following command line for information.

**fsl_wb_amr_enc_test 0 release/wb_amr/input/T_inp/T00.inp
release/wb_amr/output/T00_660.cod**

**fsl_wb_amr_enc_test -dtx 0 release/wb_amr/input/DTX_test_vectors/T_inp/Dtx3.inp
release/wb_amr/output/Dtx3_660.cod**

WB_AMR decoder test application is built into the Windows CE OS image when the WB_AMR codec component is added from Catalog during the image build procedure.

To execute the test bench, run the following at the command line:

fsl_wb_amr_dec_test.exe [-bitstreamformat] <encoded_file> <output_file>

The following table describes the arguments:

Argument	Description
-bitstreamformat	specify output file format include: -itu -mime -if1 -if2, default is -itu
encoded_file	Name of the input file
output_file	Name of the output file

**fsl_wb_amr_dec_test.exe release/wb_amr/input/T_660/T00_660.cod
release/wb_amr/output/T00_660.out**

Appendix A

Patches and Fixes

Upon installation, Freescale patches are automatically installed. However, you may also install the patches manually, if you prefer to confirm that they are installed.

A.1 WinCE Kernel Debugger Configuration

When use WinCE debugger, some multimedia components might generate exceptions on their system check initialization but are safe to continue since the exceptions are handled directly by the multimedia components. This might disturb your debug environment with processing these exceptions.

The following steps specify how to configure your debugger so that these exceptions are handled automatically without user input needed:

1. From the Debug menu, click **Exception...**

The **Exceptions dialog box** opens.

2. In the **Exceptions** list, use the list control to select the individual exception or category of exceptions whose handling you want to change. The **Exceptions dialog box** then displays the exception number, description and action for that exception. Select **Add new**:

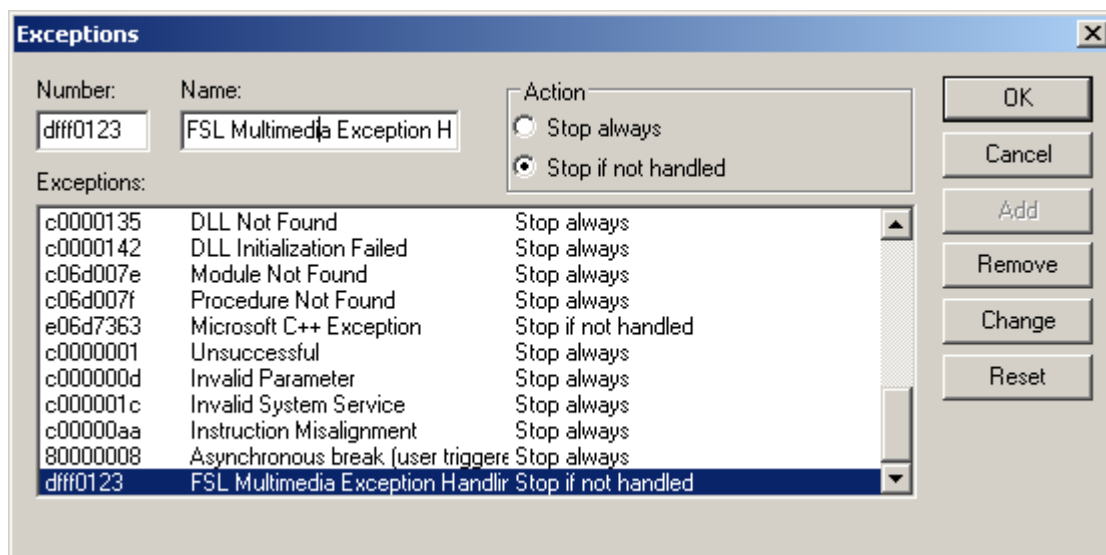


Figure 3-1 Watermark exception configuration window

-
- In field **Number**, input *DFFF0123*;
 - In field **Name**, input *FSL Multimedia Exception Handling*;
 - In field **Action Select**, select *Stop if Not Handled*;
 - Click **Add**

3. Click **OK**.