

Summary



Vclips VC312B Video Clips for Testing and Optimization of Video Compression

Decoder Series – VC312B, D-Space AVC Err EP

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General Safety Summary

Use this product only as specified.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other product manuals for warnings and cautions related to their operation.

Summary: VC-312-B D-Space-AVC-Err-EP

Decoder Test Set	VC-312-B D-Space-AVC-Err-EP
Purpose	Test AVC (H264) Extended Profile decoders with many different errors that can occur in SPS, PPS and slice data within an Annex-B bitstream
Content	Single scene – Earth, space shuttle and moon moving up into picture, 175 frames
Standard	ISO/IEC 14496-10:2003(E) Information technology - Coding of audio-visual objects - Part 10: Advanced video coding
Number of clips	37 sequences, numbered V31201 to V31237: <ul style="list-style-type: none"> • QCIF: 176x144 28 • CIF: 352x288 6 • 912x96 1 • 96x912 1 • 368x288 1 plus CIF-size YUV source video (number V31200)
Total disk size	24 Mbytes (for compressed video files)
Video format	Compressed ".264" video files as per H.264 Annex-B file format
How supplied	1 computer DVD
Software supplied	YUV sequence viewer ".264" to YUV decoder in folder: \Software on disk 1
Documentation	PDF of this manual in folder: \Documentation on disk 1

1. Introduction

This set of video sequences is designed to test the response of an AVC Extended Profile decoder to errors:

- ❑ which commonly occur within a compressed bitstream (based upon [Vqual's](#) experience with customer bitstreams);
- ❑ caused when other individual fields of the parameter sets or slices are set incorrectly.

This is done by:

- ❑ setting individual bitstream fields to non-permissible values (i.e. not permitted in AVC Extended Profile at the given Level);
- ❑ setting bitstream fields to a non-permitted combination of values;
- ❑ introducing bit-errors at various points, to check decoder recovery from and resilience to errors.

A single video scene is provided: all the variations are done on this single video scene.

2. Information supplied

The following pages list:

- ❑ the basic details of the video sequence (source data, contents of the scene);
- ❑ the error settings used for each sequence with the error location.

In addition, on the DVD there are provided:

- ❑ 'Trace' information of the relevant part of each clip showing where the error is (see below);
- ❑ the original YUV source video used to encode the video sequences.

2.1. 'Trace' information provided

The 'Trace' files provide a parsing/decoding of the bitstream of each clip, into the bitstream fields as listed in the AVC standard.

Two Trace files are provided for each clip:

- ❑ Parse bitstream
- ❑ Interpret

Both of these file types are provided in HTML format.

(These Trace files were generated using the [MTS4EA](#) video compression analysis tool, available from [Tektronix](#), then converted to HTML)

To quickly find the error location in these files, select a link from the comment index at the top of the page

Note that in most of these HTML files, only the first 7 frames are listed, as this is all that is necessary to understand the error.

2.1.1 Parse bitstream Trace file

The Parse bitstream Trace file lists all the bits of the bitstream, divided into the individual bitstream fields:

```

0000 0000 ---- ---- ---- ---- ---- ---- (0x00000000,7) : ZERO_BYTE
0000 0000 0000 0000 0000 0001 ---- ---- (0x00000001,7) : START_CODE_PREFIX_ONE_3BYTES
0---- ---- ---- ---- ---- ---- ---- (0x00000004,7) : FORBIDDEN_ZERO_BIT
11-- ---- ---- ---- ---- ---- ---- (0x00000004,6) : NAL_REF_IDC
0011 1--- ---- ---- ---- ---- ---- ---- (0x00000004,4) : NAL_UNIT_TYPE
0101 1000 ---- ---- ---- ---- ---- ---- (0x00000005,7) : PROFILE_IDC
0--- ---- ---- ---- ---- ---- ---- ---- (0x00000006,7) : CONSTRAINT_SET0_FLAG
0--- ---- ---- ---- ---- ---- ---- ---- (0x00000006,6) : CONSTRAINT_SET1_FLAG
0--- ---- ---- ---- ---- ---- ---- ---- (0x00000006,5) : CONSTRAINT_SET2_FLAG
0000 0--- ---- ---- ---- ---- ---- ---- (0x00000006,4) : RESERVED_ZERO_5BITS
0001 0101 ---- ---- ---- ---- ---- ---- (0x00000007,7) : LEVEL_IDC
1--- ---- ---- ---- ---- ---- ---- ---- (0x00000008,7) : SEQ_PARAMETER_SET_ID
0010 1--- ---- ---- ---- ---- ---- ---- (0x00000008,6) : LOG2_MAX_FRAME_NUM_MINUS4
1--- ---- ---- ---- ---- ---- ---- ---- (0x00000008,1) : PIC_ORDER_CNT_TYPE
0010 1--- ---- ---- ---- ---- ---- ---- (0x00000008,0) : LOG2_MAX_PIC_ORDER_CNT_LSB_MINUS4
0011 0--- ---- ---- ---- ---- ---- ---- (0x00000009,3) : NUM_REF_FRAMES

```

The above information is split into three sections:

- ❑ the section of '0's and '1's on the left gives the bits in the bitstream, in the order they occur;
- ❑ the data in brackets (0x00000004,7) is the hex address byte address in the bitstream and the starting bit position in the bitstream, where 7 is the most-significant bit (occurring first in the byte) and 0 is the least-significant bit (occurring last in the byte);
- ❑ the name given is the standard name for the bitstream field.

Each of the Parse bitstream Trace files has a name of the form:

V312nn_D_Space_AVC_EP_<err_name>_parse_bitstream.html

(where 'nn' is the last 2 digits of the clip number and <err_name> is the error name as listed in the table below in section **Error! Reference source not found.**)

Within each Trace file, the error is highlighted and a comment has been inserted. To find the error, use the comment index at the top of the trace file.

The Parse bitstream files are located in the folder: \Parse bitstream on the disk.

2.1.2 Interpret Trace file

The Interpret Trace file reads the values in the bitstream fields and interprets them i.e. explains what the value given means:

```
(0x00000000,7) [BSN]      zero_byte = 0x00
(0x00000001,7) [BSN]      start_code_prefix_one_3bytes = 0x000001
(0x00000004,7) [NAL]      forbidden_zero_bit = 0
(0x00000004,6) [NAL]      nal_ref_idc = 3 : Reference slice or SPS or PPS
(0x00000004,4) [NAL]      nal_unit_type = 7 : Sequence Parameter Set (SPS)
(0x00000005,7) [SPS]      profile_idc = 88 : Extended profile
(0x00000006,7) [SPS]      constraint_set0_flag = 0 : May or may not obey A.2.1 constraints
(0x00000006,6) [SPS]      constraint_set1_flag = 0 : May or may not obey A.2.2 constraints
(0x00000006,5) [SPS]      constraint_set2_flag = 0 : May or may not obey A.2.3 constraints
(0x00000006,4) [SPS]      reserved_zero_5bits = '00000'
(0x00000007,7) [SPS]      level_idc = 21 : Level 2.1
(0x00000008,7) [SPS]      seq_parameter_set_id = 0 (bitstream values: length=1 bits,
seq_parameter_set_id=0x1)
(0x00000008,6) [SPS]      log2_max_frame_num_minus4 = 4 : MaxFrameNum = 256 (bitstream values:
length=5 bits, log2_max_frame_num_minus4=0x5)
(0x00000008,1) [SPS]      pic_order_cnt_type = 0
(0x00000008,0) [SPS]      log2_max_pic_order_cnt_lsb_minus4 = 4 : MaxPicOrderCntLsb = 256
(bitstream values: length=5 bits, log2_max_pic_order_cnt_lsb_minus4=0x5)
(0x00000009,3) [SPS]      num_ref_frames = 5 (bitstream values: length=5 bits, num_ref_frames=0x6)
```

The above information is split into three sections:

- ❑ section on the left in brackets (0x00000004,7) is the hex address byte address in the bitstream and the starting bit position in the bitstream, where 7 is the most-significant bit (occurring first in the byte) and 0 is the least-significant bit (occurring last in the byte);
- ❑ the title (such as [SPS]) is the general syntax level of the bitstream element (e.g. SPS = SequenceParameterSet);
- ❑ section on the right gives the interpreted value of the bitstream data, i.e. what the bitstream data means.

Each of the Interpret Trace files has a name:

V312nn_D_Space_AVC_EP_<err_name>_interpret.vpt

(where 'nn' is the last 2 digits of the clip number and <err_name> is the error name as listed in the table below in section **Error! Reference source not found.**).

Within each Trace file, the error is highlighted and a comment has been inserted. To find the error, use the comment index at the top of the trace file.

The Interpret files are located in the folder: \Interpret
on the disk.

3. Software supplied

The following software is supplied:

- ❑ ".264" to YUV decoder;
- ❑ YUV sequence viewer.

3.1. YUV sequence viewer

This program is called: `YUVSequenceViewer.exe`
and is located on disk 1 in the folder: `\Software`

To run it, double-click on it – it does not need to be installed.

Once it has been run once, it associates files with an extension of `.yuv` so that after this double-clicking on a file with this extension will automatically open the YUV file in the sequence viewer.

YUVSequenceViewer tries to work out the size of the video frames from the filename (if it is given in the filename): if there are no clues from the filename then the user must enter the size of the frames.

On the 'Tool' menu there is an option to subtract two YUV sequences, to look for differences between two files. A zero difference results in a constant grey image. To make these differences more visible, select the menu 'View' then 'Options' then enter a number into the 'Subtraction scale' box: the larger the number, the more the differences are multiplied.

3.2. ".264" to YUV decoder

This program is called: `decode264.exe`
and is located on disk 1 in the folder: `\Software`

It is a command-line only tool (to be called from within a DOS/Command Prompt box).


The syntax for use is:

```
decode264 <input file> <output file>
```

Where the file names include spaces, the filenames must be included within quotes, e.g.

```
decode264 "input 1" "C:\Temp\output 1"
```

4. Clip Set Details

CLIP SET DETAILS		Begin End	Title
			Space
1.	Number(s)	V31201 to V31237	
2.	Filename(s)	V31201_B_D_Space_AVC_EP_*.264 to V31237_B_D_Space_AVC_EP_*.264	
3.	Title	Space	
4.	Description	Synthetic sequence with Space shuttle, Earth and Moon	
5.	Main purposes/tests	Check decoder response to different errors in the SPS, PPS and Slice NAL units	
6.	Size(s), horizontal x vertical	28 QCIF sequences (176x144), 6 CIF sequences (352x288), and one sequence at each of the following dimensions: 912x96, 96x912 and 368x288	
7.	Video format	H264 ISO/IEC 14496-10 (source material YUV 4:2:0 Planar, 8 bits per pixel)	
8.	Number of frames	175	
9.	Source frame rate	25 fps	
10.	Clip duration (seconds)	7	
11.	File size on disc (MB)	Total for all files: 12MB	
12.	Original video format	720x576 DV, interlaced	

13.	Keywords	KW-vehicles, KW-cross_movement, KW-dark, KW-text KW-high_contrast, KW-bright_colours, KW-monochromatic_area
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	FEATURES	Qty/amount	Notes
14.	GLOBAL MOTION		
15.	Fast pan	-	
16.	Pan	-	
17.	Tracking pan	-	
18.	Zoom in	-	
19.	Zoom out	-	
20.	Scroll	-	
21.	Rotate	-	
22.	Hand-held camera	-	

23.	OBJECT MOTION		
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24.	Movement out of picture	-	
25.	Movement into picture	Some	
26.	Movement across picture	Lots, mainly upwards	
27.	Diagonal movement	-	
28.	Subjects behind foreground objects	-	
29.	Low movement	-	

30.	COLOURS & CONTRAST		
31.	Light picture	Areas	
32.	Dark picture	Areas	
33.	Bright colours	Areas	
34.	Dull colours	-	
35.	Fine detail pattern	Some	
36.	High contrast areas	Several	
37.	Large monochromatic area	Some	Black background

38.	SCENE CONTENT		
39.	Out-of-focus	-	
40.	Fine lines/moiré patterns	-	
41.	Reflections	-	
42.	Scene change	-	

43.	SCENE SUBJECTS		
44.	People	-	
45.	Faces	-	
46.	Vehicles	Space shuttle	
47.	Buildings	-	
48.	Trees	-	
49.	Text	-	
50.	Talking head	-	
51.	Water	-	
52.	Leaves	-	
53.	Sky	-	
54.	Clouds	-	
55.	Round objects	Earth, Moon	

56.	LIGHT CONDITIONS		
57.	Bright sunlight	-	

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58.	Shaded areas	-	
59.	Bright daylight	Some	
60.	Dull daylight	-	
61.	Twilight	-	
62.	Night	-	
63.	Backlighting	-	
64.	Substantial brightness change	-	