

Summary



Vclips VC302B Video Clips for Testing and Optimization of Video Compression

Decoder Series – VC302B, D-Space AVC 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-302-B D-Space-AVC-EP

Decoder Test Set	VC-302-B D-Space-AVC-EP
Purpose	Test H.264/AVC decoders with typical and extreme values of each bitstream parameter.
Content	Synthetic sequence with Space shuttle, Earth and Moon. Most CIF/ and QCIF clips are 175 frames, clips with larger frame sizes are shorter.
Standard	ISO/IEC 14496-10:2003(E) ISO title: Information technology – Coding of audio-visual objects: Part 10: Advanced Video Coding 2003-12-01
Number of clips	76 sequences, numbered V30201 to V30276, with the following sizes: <ul style="list-style-type: none"> • 16x16 (1 stream) • 48x448 (1 stream) • 448x48 (1 stream) • 176x144 (57 streams) • 352x288 (8 streams) • 720x576 (2 streams) • 1280x720 (1 stream) • 1280x736 (1 stream) • 1920x1088 (2 streams) • 4096x2304 (2 streams) plus ten YUV source files (one per input size)
Total disk size	3 MBytes (.264 files) + 197 MBytes (trace files) + 203 MBytes (.yuv files)
Video format	Compressed ".264" video files as per AVC Visual standard
How supplied	1 computer CD
Software supplied	YUV sequence viewer ".264" to YUV decoder in folder: \Software
Documentation	PDF of this manual in folder: \Documentation

1. Introduction

This set of video sequences is designed to test an H.264/AVC Extended Profile decoder with a wide variety of bitstream parameters. This includes the syntax elements in the Sequence Parameter and Picture Parameter Sets, as well as higher-level encoder controls such as the number of B-pictures or the frequency of Intra frames.

Syntax element tests are done by individually enabling all the different permissible bit-field options within the header in the clips specified. Some clips are also provided with multiple combinations and with all permissible bit-fields enabled.

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 settings used for each sequence.

In addition, on the CD there are provided:

- ❑ 'Trace' information for the headers and first few frames of each clip (see below);
- ❑ a spreadsheet which lists all the clips and shows which Header fields are enabled and the values used (Microsoft Excel[®] format);
- ❑ the original YUV source video used to encode the video sequences.

2.1. 'Trace' information provided

The 'Trace' files provide a plain-text parsing/decoding of the headers and first few frames of each clip.

Two Trace files are provided for each clip:

- ❑ Parse bitstream
- ❑ Interpret

Both of these file types have the file extension '.vpt', although they only contain standard ASCII text data and can be viewed with any text viewer.

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

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
0000 1010 ---- ---- ---- ---- ---- ---- (0x00000007,7) : LEVEL_IDC
1---- ---- ---- ---- ---- ---- ---- (0x00000008,7) : SEQ_PARAMETER_SET_ID
0011 0---- ---- ---- ---- ---- ---- (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
```

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:

V302nn_*_D-Space_AVC_EP_xxx_parse_bitstream.vpt

(where 'nn' is the last 2 digits of the clip number and 'xxx' is a short clip name)

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 = 10 : Level 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 = 5 : MaxFrameNum = 512 (bitstream values:
length=5 bits, log2_max_frame_num_minus4=0x6)
(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)
```

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 = Sequence Parameter Set);
- ❑ the 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:

V302nn_*_D-Space_AVC_EP_xxx_interpret.vpt

(where 'nn' is the last 2 digits of the clip number and 'xxx' is a short clip name)

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:

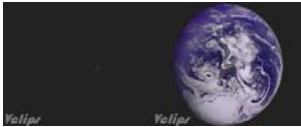
```
decode264 <input file> <output file>
```

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

4.1. General clip set details

CLIP SET DETAILS		Begin End	Title
			Space
1.	Number(s)	V30201 to V30276	
	Filename(s)	V30201_*_D-Space_AVC_EP_*.264 to V30276_*_D-Space_AVC_EP_*.264	
1.	Title	Space	
	Description	Synthetic sequence with Space shuttle, Earth and Moon	
2.	Main purposes/tests	Check different options in Header are correctly decoded	
3.	Size(s), horizontal x vertical	<ul style="list-style-type: none"> • 16x16 (1 stream) • 112x896 (1 stream) • 896x112 (1 stream) • 176x144 (3 streams) • 352x288 (57 streams) • 720x576 (2 streams) • 1280x720 (1 stream) • 1920x1088 (1 stream) • 4096x2304 (1 stream) 	
4.	Video format	H264 ISO/IEC 14496-10 (source material YUV 4:2:0 Planar, 8 bits per sample)	
5.	Number of frames	175 (some encoded clips are shorter)	
6.	Source frame rate	25 fps	
7.	Clip duration (seconds : frames)	7 : 00	
8.	File size on disc (MB)	103 MBytes (.264 files) 629 MBytes (.yuv files)	
9.	Original video format	720x576 DV, interlaced	
10.	Keywords	KW-vehicles, KW-cross_movement, KW-dark, KW-text KW-high_contrast, KW-bright_colours, KW-monochromatic_area	

	FEATURES	Qty/amount	Notes
11.	GLOBAL MOTION		
12.	Fast pan	-	
13.	Pan	-	
14.	Tracking pan	-	
15.	Zoom in	-	
16.	Zoom out	-	
17.	Scroll	-	
18.	Rotate	-	
19.	Hand-held camera	-	
20.	OBJECT MOTION		
21.	Movement out of picture	-	
22.	Movement into picture	Some	
23.	Movement across picture	Lots, mainly upwards	
24.	Diagonal movement	-	
25.	Subjects behind foreground objects	-	
26.	Low movement	-	
27.	COLOURS & CONTRAST		
28.	Light picture	Areas	
29.	Dark picture	Areas	
30.	Bright colours	Areas	
31.	Dull colours	-	
32.	Fine detail pattern	Some	
33.	High contrast areas	Several	
34.	Large monochromatic area	Some	Black background
35.	SCENE CONTENT		
36.	Out-of-focus	-	
37.	Fine lines/moiré patterns	-	
38.	Reflections	-	
39.	Scene change	-	

40.	SCENE SUBJECTS		
41.	People	-	
42.	Faces	-	
43.	Vehicles	Space shuttle	
44.	Buildings	-	
45.	Trees	-	
46.	Text	-	
47.	Talking head	-	
48.	Water	-	
49.	Leaves	-	
50.	Sky	-	
51.	Clouds	-	
52.	Round objects	Earth, Moon	
53.	LIGHT CONDITIONS		
54.	Bright sunlight	-	
55.	Shaded areas	-	
56.	Bright daylight	Some	
57.	Dull daylight	-	
58.	Twilight	-	
59.	Night	-	
60.	Backlighting	-	
61.	Substantial brightness change	-	

4.2. Summary of clips

V30201	Extended Profile stream
V30202	CIF sized stream with a reserved profile (type 89), but specifying conformance to Extended Profile in constraint flags
V30203	Bitstream with <code>sequence_parameter_set_id</code> equal to 31
V30204	Bitstream with <code>log2_max_frame_num_minus4</code> set to 0
V30205	Bitstream with <code>log2_max_frame_num_minus4</code> set to 12
V30206	Bitstream with <code>pic_order_cnt_type</code> set to 1
V30207	Bitstream with <code>pic_order_cnt_type</code> set to 2
V30208	Bitstream with <code>log2_max_pic_order_cnt_lsb_minus4</code> set to 0
V30209	Bitstream with <code>log2_max_pic_order_cnt_lsb_minus4</code> set to 12
V30210	Bitstream with <code>num_ref_frames_in_pic_order_cnt_cycle</code> equal to 255
V30211	Bitstream with <code>num_ref_frames_in_pic_order_cnt_cycle</code> equal to 0
V30212	Bitstream with <code>delta_pic_order_always_zero</code> equal to 1
V30213	Bitstream with <code>num_ref_frames</code> equal to 1
V30214	Bitstream with <code>num_ref_frames</code> equal to 4
V30215	Bitstream with <code>gaps_in_frame_num_value_allowed_flag</code> equal to 1
V30216	Bitstream with <code>pic_width_in_mbs_minus1</code> and <code>pic_height_in_map_units_minus1</code> both equal to 0 (i.e. 1 macroblock per picture)
V30217	Bitstream with <code>pic_width_in_mbs_minus1</code> equal to 27 and <code>pic_height_in_map_units_minus1</code> equal to 2
V30218	Bitstream with <code>pic_width_in_mbs_minus1</code> equal to 2 and <code>pic_height_in_map_units_minus1</code> equal to 27
V30219	Frame coded CIF-sized image
V30220	Field coding, Level 2.1
V30221	Field/Frame coding, Level 2.1
V30222	MBAFF coding, Level 2.1
V30223	Bitstream using nominal frame cropping
V30224	Bitstream using extreme frame cropping
V30225	Bitstream with <code>pic_parameter_set_id</code> equal to 255
V30226	Bitstream with <code>pic_order_present_flag</code> equal to 1
V30227	Bitstream with <code>num_ref_idx_l0</code> equal to 31
V30228	Bitstream with <code>num_ref_idx_l1</code> equal to 31
V30229	Bitstream using <code>weighted_pred_flag</code> equal to 1
V30230	Bitstream using <code>weighted_bipred_idc</code> equal to 1
V30231	Stream with initial luma quantisation parameter equal to 0
V30232	Stream with initial luma quantisation parameter equal to 51
V30233	Stream with initial SP luma quantisation parameter equal to 0
V30234	Stream with initial SP luma quantisation parameter equal to 51

V30235	Bitstream with <code>chroma_qp_index_offset</code> equal to -12
V30236	Bitstream with <code>chroma_qp_index_offset</code> equal to 12
V30237	Bitstream with <code>deblocking_filter_control_present_flag</code> equal to 1
V30238	Bitstream using constrained Intra prediction
V30239	Bitstream using the <code>redundant_pic_cnt</code> syntax element
V30240	Bitstream using data partitioning
V30241	Bitstream with no VUI parameters
V30242	Extreme values in Extended Sample Aspect Ratio
V30243	Useless values in Extended Sample Aspect Ratio
V30244	Square aspect ratio
V30245	"Overscan appropriate" specified
V30246	Video signal type information, low values
V30247	Video signal type information, high values
V30248	Video signal type information, with colour description
V30249	Video signal type information, with colour description
V30250	Chroma sampling location information present, location type = 0
V30251	Chroma sampling location information present, location type = 5
V30252	Extremely low frame rate
V30253	Extremely high frame rate
V30254	Frame rate not fixed
V30255	Bitstream restrictions, default values
V30256	Bitstream restrictions, most permissive values
V30257	Intra frames
V30258	Bitstream using only 16x16 Inter-prediction
V30259	Bitstream using only 16x8 Inter-prediction
V30260	Bitstream using only 8x16 Inter-prediction
V30261	Bitstream using only 8x8 Inter-prediction
V30262	Bitstream using only 8x4 Inter-prediction
V30263	Bitstream using only 4x8 Inter-prediction
V30264	Bitstream using only 4x4 Inter-prediction
V30265	Multiple parameters test
V30266	Simple stream, compliant with all three profiles
V30267	Low delay, error tolerant CIF stream
V30268	High quality CIF stream
V30269	Low delay, error tolerant 625SD stream
V30270	High quality 625SD stream
V30271	Low delay, error tolerant 720p-sized stream
V30272	High quality 1280x736 sized stream
V30273	Low delay, error tolerant 1080HD-sized stream
V30274	High quality 1080HD sized stream

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V30275	Low delay, error tolerant 4096x2304 sized stream
V30276	High quality 4096x2304 sized stream