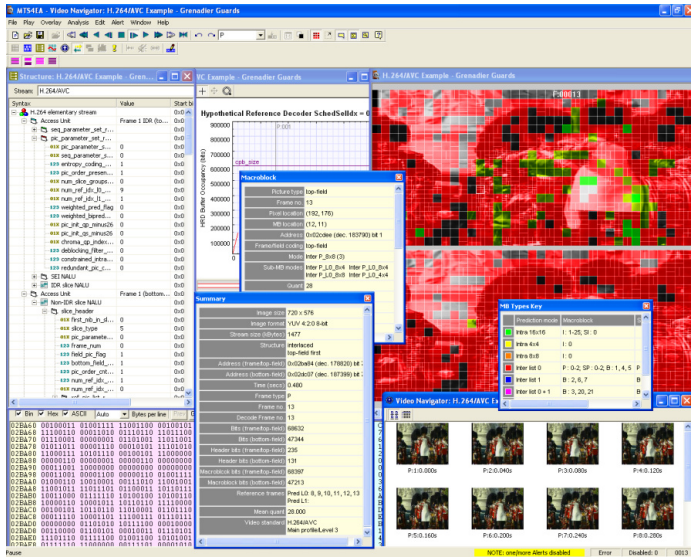


HEVC / AVC Video and Compressed Audio Analyzer

MTS4EAV7 Datasheet



- Video differencing and fidelity analysis
- Bitstream editor for making changes, reanalyzing the stream, then saving
- Exports data for detailed graphical analysis (requires Microsoft Excel®)
- Comprehensive batch mode for automated regression testing with log reports
- YUV decoded video output for baseband video analysis
- Audio compression analysis
- AV delay measurement
- Built-in help and tutorials
- Closed Caption syntax and compliance analysis with ability to render captions over video, save captions to standard file format (SRT, SCC MCC), and debug capabilities

The MTS4EAV7 HEVC / AVC Video and Compressed Audio Analyzer is a powerful PC-based software package for deferred time analysis of encoded video and audio elementary streams. Supported video standards include HEVC (H.265), AVC / H.264, VC-1, MPEG-2, MPEG-4 part 2, and H.263. Supported audio standards include MPEG-2 audio, AAC, and AC-3. Also included are closed caption analysis capabilities. The MTS4EAV7 analyzer is available for standalone or networked PCs, and for Tektronix MTS4000 MPEG Test Systems.

Key features

- Video, audio, and caption decode and analysis
- Verification of the stream's compliance with the encoding standard
- Extraction of elementary streams from containers
- Comprehensive stream navigation and tracking to follow all aspects of the decoding process
- Multiple displays and overlays of Coding Unit (CU), Prediction Unit (PU), Transform Unit (TU), Macroblocks (MB)
- Easy selection of specified CU/MB and navigation using Zoom in and out for analysis
- Synchronized video, audio, and data views for instant cross reference
- Wide range of frame and Coding Tree Unit (CTU), Coding Unit (CU), Prediction Unit (PU), Transform Unit (TU), macroblock statistics, syntax traces – bitstream, interpret, alerts, frame, macroblock, transform, pixel level, fidelity traces
- Buffer analysis with graphical plots – spatial bits/MB, MV histogram, quantization, DCT frequency, MB coded frequency, intra-coding frequency

Intended users and applications

- Equipment manufacturers
 - Video codec software and hardware developers
 - Semiconductor device designers and manufacturers
 - Mobile video infrastructure and mobile device developers
- Video content transmission and distribution
 - CODEC and equipment evaluation and comparison in cable, satellite, terrestrial, and IP applications
 - Network operators and network equipment providers
 - Application and service providers and streaming media applications
 - Broadcasters for checking AV delay

Elementary stream analysis

Video compression standards are complex and involve many elements which are vitally important to the efficiency and interoperability of compressed video in different applications. The MTS4EAV7 analyzer provides verification of the compliance of the stream against the compression standard, detailed analysis and statistics of the video and audio streams, tools for editing and debugging the stream, fidelity comparison against the original uncompressed stream, and checking for any video and audio delay.

Analysis of intermediate HEVC/H.265 and H.264/AVC transform values is included, as well as ARIB TR-B14 compliance verification. It enables equipment and systems developers to test and bring new designs rapidly to market, and video users to test compliance, interoperability, and performance of compression products.

Standards supported

Video

- HEVC (H.265) Main and Main 10 profiles, all levels
- H.264/AVC/MPEG-4 Part 10 – Baseline, Extended, Main, High, High 10, High 4:2:2, and High 4:4:4 profiles all levels 1 to 5:1
- H.264/AVC Intra profiles, High10, High422, High444, and CALVC at levels 1 to 5.1
- H.264/AVC Scalable Video Coding (SVC) Extensions – Baseline, High, and High Intra profiles at levels 1 to 5.1
- MPEG-2 – Main Profile at Main, High, and High 1440 levels, 4:2:2 Profile at Main and High levels
- VC-1 – All profiles at all levels
- MPEG-4 Part 2 – Simple Profile at levels 0 to 5 and Advanced Simple Profile at levels 0 to 5
- H.263 Baseline
- Uncompressed YUV, RGB, or Grayscale Color Models, 8 to 16 bit Sample Depth, various Chroma Subsampling Formats

Audio

- MPEG-1 Part 3 Layers I and II
- MPEG-2 Part 3 Layers I and II
- MPEG-2 Part 7 (AAC) Main (Excludes LC and SSR)
- MPEG-4 Part 3 (HE-AAC) AAC Main, AAC LC (Low Complexity, AAC LTP (Long-term Prediction), SBR (Spectral Band Replication))
- Dolby Digital (AC-3) Baseline Standard, Annex D: Extended/Alternate Bit Stream (Playback and Waveform only)

System layer

- MPEG-2 Transport/Program Streams
- MP4 Parts 1, 12, and 15
- ASF
- 3GPP
- DVD VOB
- QuickTime MOV

Closed caption

- CEA 608
- CEA 708
- SCTE 20/21

System requirements

- Windows 7, 64-bit operating system
- Processor Speed > 2.5 GHz
- 4 GB or greater RAM
- 250 GB hard disk space

MTS4EAV7 example screens

Video View: H.264/AVC Example - Grenadier Guards
F:00004

Video Summary

Image size	720 x 576
Image format	YUV 4:2:0 8-bit
Stream size (kBytes)	1477
Structure	Interlaced top-field first
Address (frame/top-field)	0x00c908 (dec: 51464) bit 7
Address (bottom-field)	0x00e73f (dec: 59199) bit 7
Time (secs)	0.240
Frame type	P
Frame no.	4
Decode Frame no.	4
Bits (frame/top-field)	61880
Bits (bottom-field)	43176
Header bits (frame/top-field)	255
Header bits (bottom-field)	129
Macroblock bits (frame/top-field)	61625
Macroblock bits (bottom-field)	43047
Reference frames	Pred L0: 1, 2, 3, 4 Pred L1:
Meath quant	28.000
Video standard	H.264/AVC Main profile/Level 3

Frame summary

Video Navigator: mp2_3

I: 1:0.000s B: 2:0.040s B: 3:0.080s P: 4:0.120s

Video Navigator

CTU and CU Tooltips

CTU Size (Unit)

Frame no.	5
Picture number	10 (dec: 384)
CTU number	128.84
CU number	130
Address	0x001200 (dec: 12000) bit 3
Number of CU	4
Size	64
Type	P

CU Size (Unit)

Frame no.	5
Picture number	10 (dec: 384)
CU number	130
Address	0x001200 (dec: 12000) bit 3
Number of CU	4
Size	64
Type	P

CTU and CU Tooltips

CU Types Overlay

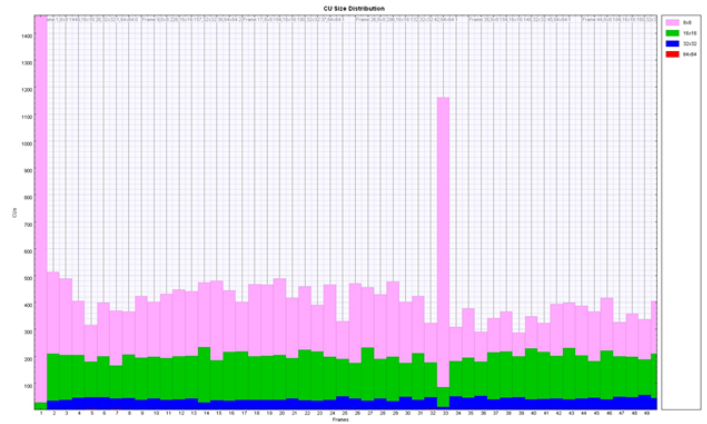
CU type: Intra, Inter

CU Types Overlay

PU Types Overlay

PU key: Intra 2Nx2N, Intra 2NxN, Intra 2Nx1, Intra Nx2N, Intra NxN, Intra 2Nx1U, Intra 2Nx1D, Intra Nx2N, Intra Nx1U, Intra Nx1D

PU Types Overlay



CU Size distribution graph

Motion vectors

Video View: H.264/AVC Example - Bus Junction
F:00039

Motion vectors

Decode Warning 33001: modulo_time_base is zero

Warning Video Object Plane
 WARNING: modulo_time_base is zero after vop_time_increment is reset at position 0x6186 (dec. 24966), bit 3

Summary

Image size	352 x 288
Image format	YUV 4:2:0 8-bit
Stream size (kBytes)	976
Address	0x006182 (dec. 24962) bit 7
Time (secs)	1.040
VOP type	P-VOP
VOP no.	14

Skip this Warning only in future
 Skip ALL Warning alerts in future

Close Goto

Real-time compliance testing and error alerts

Video View: mp2_3

Macroblock

Picture type	top-field
Frame no.	5
Pixel location	(288, 176)
MB location	(18, 11)
Address	0x018f99 (dec. 102297) bit 3

Frame/field coding top-field

Mode	field-based bi M.C., coded, w. qu
Quant	16
Bits	53
Slice	11
CBP	1 (000001)
Forward MV	< -2.5, 1.5>
Backward MV	< 0.5, -3.5>

MB Types Key

- Prediction mode
- Intra coded
- Forwards predictive
- Backwards predictive
- Bi-directional

Macroblock overlays and statistics



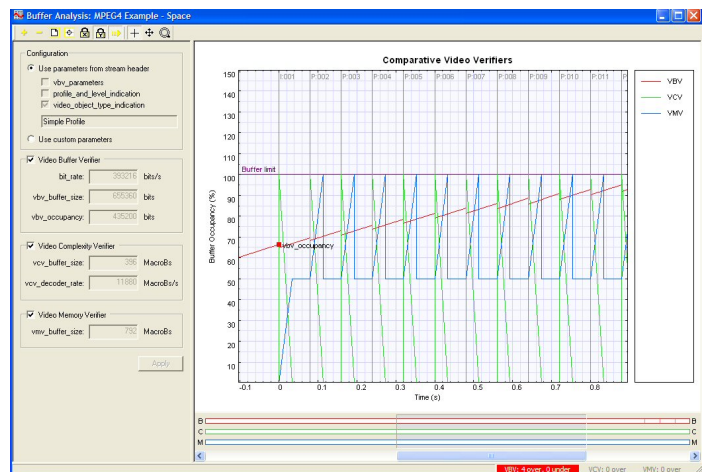
Frame statistics

Structure: H.264/AVC Example - Grenadier Guards (video)

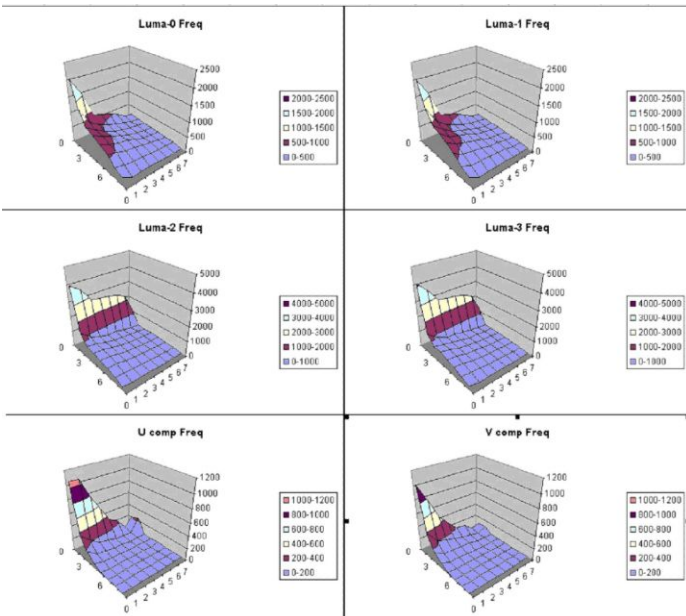
Stream: H.264/AVC

Syntax	Value	Start bit	Size (bits)
H.264 elementary stream		0x000000,7	12097552
Access Unit	Frame 1 IDR (to...	0x000000,7	149592
seq_parameter_set_r...		0x000005,7	234
pic_parameter_set_r...		0x00002a,7	24
01X pic_parameter_s...	0	0x00002a,7	1
01X seq_parameter_s...	0	0x00002a,6	1
123 entropy_coding_...	1	0x00002a,5	1
123 pic_order_presen...	1	0x00002a,4	1
01X num_slice_groups...	0	0x00002a,3	1
01X num_ref_idx_0...	9	0x00002a,2	7
01X num_ref_idx_1_...	1	0x00002b,3	3
123 weighted_pred_flag	0	0x00002b,0	1
123 weighted_bipred...	0	0x00002c,7	2
01X pic_init_qp_minus26	0	0x00002c,5	1
01X pic_init_qs_minus26	0	0x00002c,4	1
01X chroma_qp_index...	0	0x00002c,3	1
123 deblocking_filter_...	0	0x00002c,2	1
123 constrained_intra...	0	0x00002c,1	1
123 redundant_pic_c...	0	0x00002c,0	1
sei_rbsp		0x000033,7	144
sei_message		0x000033,7	72
-101 last_payload...	0x0	0x000033,7	8
-101 last_payload...	0x7	0x000034,7	8
buffering_per...		0x000035,7	49
-101 bit_equal_to_...	'1'	0x00003b,6	1
001 bit_equal_to_...	'0'	0x00003b,5	1

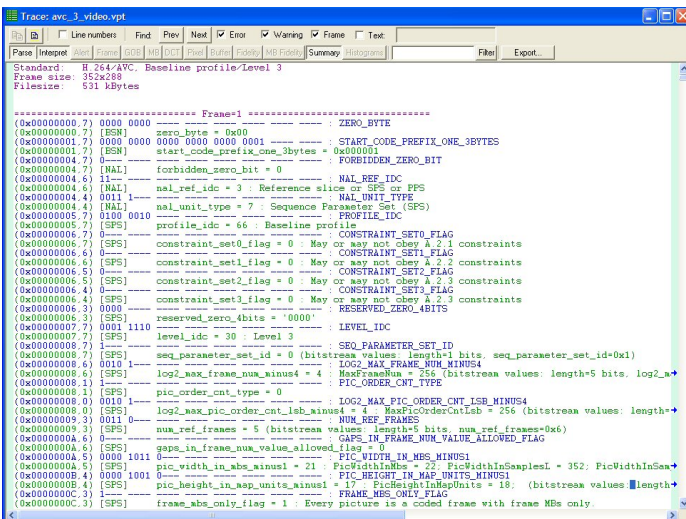
File structure



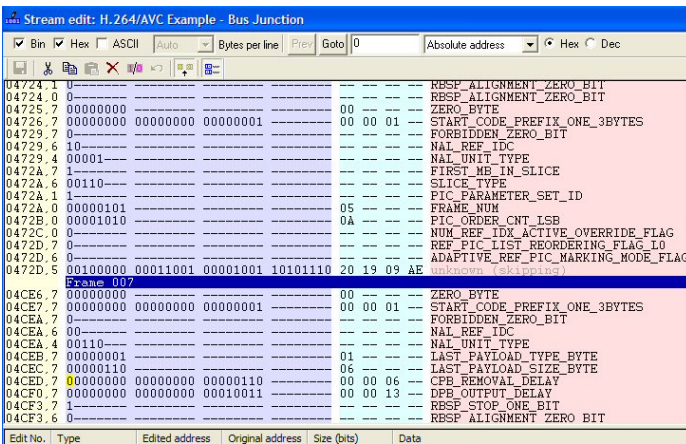
Buffer analysis



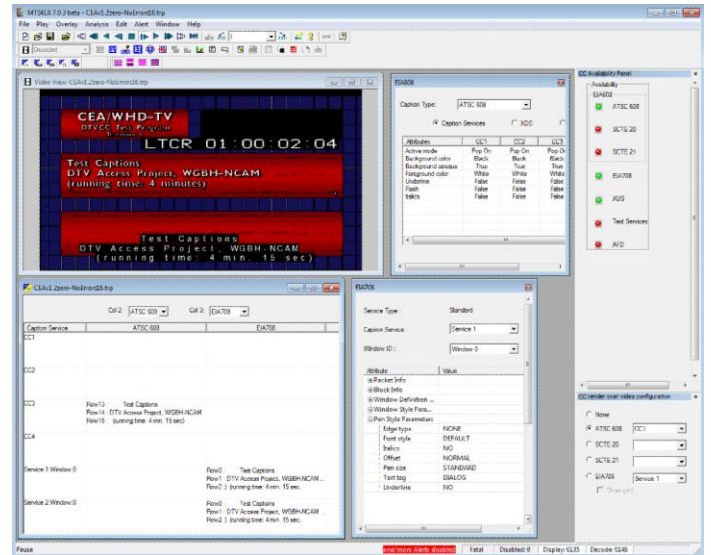
Graphical analysis



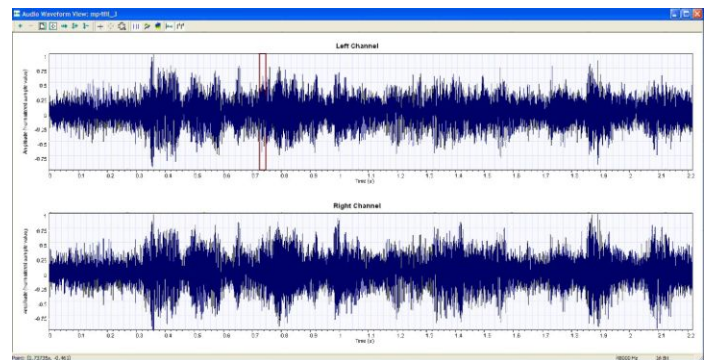
Trace views



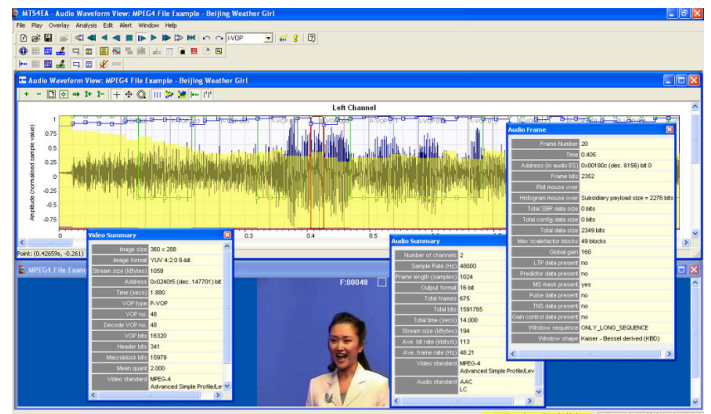
Stream HexView and edit



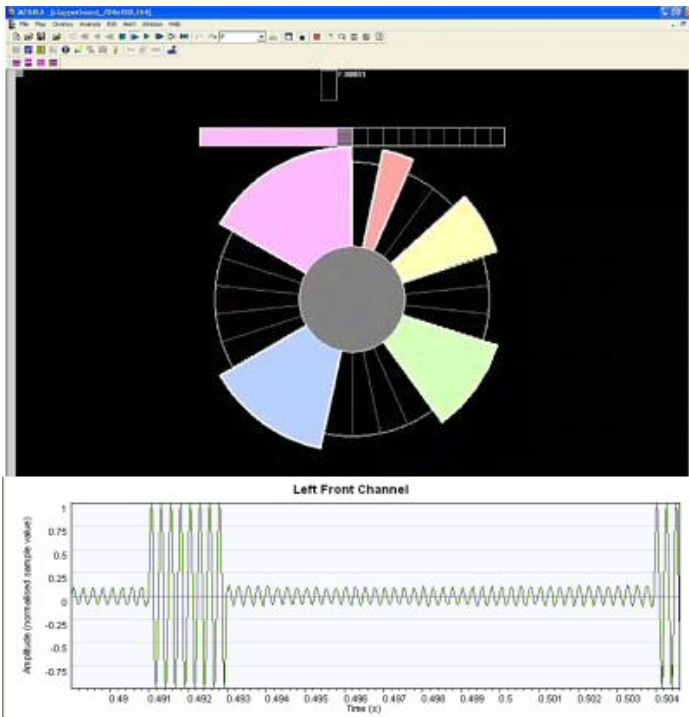
Closed Caption analysis (CEA 608 shown).



Audio channels



Audio compression analysis



Audio video delay measurement

Ordering information

Models

MTS4EAV7	Base software includes support for AVC / H.264 baseline, main, extended and high (plus Intra) profiles codec, MPEG-4 advanced simple profile (Level 0 to 5), MPEG-2 main and 4:2:2 profiles at high level, and VC1 all profiles, all levels; audio decode and analysis (including MPEG-2 Layer 1 and 2, AAC, HE AAC, and AC-3), and A/V delay measurement; Closed Caption analysis; Floating license ¹ (includes one license). Optional software includes H.265/HEVC support. For an additional floating license, order Option FLT.
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Standard accessories

071-3228-XX	MTS4EAV7 User Manual
063-4517-XX	MTS4EAV7 Software Install CD-ROM
Not orderable	USB dongle

MTS4EAV7 product options

Opt. HEVC	Add HEVC / H.265 codec support, main profile, all levels
Opt. FLT	Add one additional floating license (all floating licenses include the same capabilities); for multiple licenses, order multiple Option FLT
Opt. LUD	Add MTS4EAV7 to a preexisting MPEG analyzer dongle (single user license only; cannot be ordered with Option FLT)

MTS4EAUP upgrade options

Software upgrade kit for MTS4EAV7, MTS4EAB, and MTS4EAF Version 4 or higher as well as MTS4000 Option ESE and Option ESB.

Opt. HEVC	Add HEVC / H.265 codec support, main profile, all levels. Base software must be V7. If not, then must order Option V7 as well.
Opt. V7	Upgrade MTS4EA V4 or higher to MTS4EAV7 base software; also upgrade a single user license to floating license (except for MTS4000 Opt. ESE). If more than one floating license needed, then must order MTS4EAUP Option FLT to add extra licenses. Only available for MTS4EA V4 or higher.
Opt. FLT	Add one additional floating license to MTS4EAV7 (all floating licenses include the same capabilities). For multiple licenses, order multiple Opt. FLT. Floating license is not available on MTS4000 Option ESE or Option ESB.



Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

¹ For single-license installations, the software can be installed in floating-license mode or node-locked mode.

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