TECHNICAL EVALUATION REPORT

BRAND AND MODEL

Device and remote control photos

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Edition Month, Day, Year.

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REVISION HISTORY

Revision	Date	Modifications and changes
Original	Month, Day, Year	• Original Document
Rev. X	Month, Day, Year	• Changes in this version respect to the previous.

BACKGROUND

The following procedures are intended to verify the performance of the **STB Brand and Model**, identified in these procedures as the Device Under Test (DUT).

The **STB Brand and Model** is intended for the reception of DTMB Digital Terrestrial Television in 6MHz bandwidth, according to the specifications GB 20600-2006. It is designed for NTSC-M (*SMPTE 170M-2004*) as stated by the Resolution No. 430/2014: “Minimum Mandatory Technical and Operational Specifications for Digital Television Set-Top Boxes” from the Ministry of Communications, May 22nd, 2014. [http://www.lacetel.cu/television-digital/verificacion.html]

General STB (Brand and Model) specifications

BRAND:	
MODEL:	
Distinctive features:	
Dimensions:	**Length: Width: Height:**
TUNER:	
DEM:	
SoC:	
FLASH:	
RAM:	
Audio Line Drive:	
Remote Control:	
Hardware Version:	
Firmware Version:	
Images:	
Front View	
Right Side View	
Left Side View	
Rear View	
Remote Control	
External Power Supply	

0. DTMB TESTS

a) DTMB demodulation –

The DUT shall be capable of properly demodulate the RF signal according to GB 20600-2006Standard.

Test procedure:

1. Feed the DUT´s input with DTMB RF signal whose strength is adjusted to the moderate level[1] (−53dBm).
2. Set the DTMB modulator frequency at 587 MHz (Channel 33)
3. Set the modulation parameters according to the 7 main DTMB modes in 6MHz RF channel bandwidth.
4. Adjust the encoder´s video throughput parameter to the maximum bitrate allowed for each mode.

Table 0.a.1: DTMB Main Modes.

Mode	Number of Carriers	FEC	Modulation	Frame header	Interleaver length	Throughput (Mbps)	Test
1	3780	0.4	16QAM	PN945	720	7.220	
2	1	0.8	4QAM	PN595	720	7.797	
3	3780	0.6	16QAM	PN945	720	10.829	
4	1	0.8	16QAM	PN595	720	15.593	
5	3780	0.8	16QAM	PN420	720	16.244	
6	**3780**	**0.6**	**64QAM**	**PN420**	**720**	**18.274**	
7	1	0.8	32QAM	PN595	720	19.492	

b) Frequency Offset –

The receiver shall be capable of tuning transmissions with a channel offset of at least ± 1/6 MHz.

[1] According to Report ITU-R BT.2035-2 Guidelines and techniques for the evaluation of digital terrestrial television broadcasting systems, including assessment of their coverage areas. (Question ITU-R 31/6). (2003-2004-2008).

Test procedure:

1. Configure modulator's output to DTMB Mode 6 (see Table 0.a.I) with Variable GIC and 6 MHz RF channel bandwidth, according to Exp 337 Regulation of Digital TV Broadcasting Service, Chapter 3: Technical Requirements.
2. Adjust the DTMB modulator's output signal at six relevant frequencies: 177 MHz (Channel 7), 195 MHz (Channel 10), 213 MHz (Channel 13), 473 MHz (Channel 14), 587 MHz (Channel 33) and 695 MHz (Channel 51).
3. Adjust RF output level to -53dBm (moderate level) for each tested channel.
4. Increment channel's frequency offset in both directions of at least 1/6 MHz.

Table 0.b.1: DTMB - DUT´s frequency offset windows.

Lowest Offset	Center Frequency	Top Offset
	177 MHz	
	195 MHz	
	213 MHz	
	473 MHz	
	587 MHz	
	695 MHz	

c) Minimum input signal level –

The DUT should work properly with RF input signal levels in mode 6 of at least -86dBm for VHF band and -84dBm for UHF bands, without exceeding the TOV, according to Exp 337 Regulation of Digital TV Broadcasting Service, Chapter 3: Technical Requirements.

Test procedure:

1. Set the modulation parameters according to DTMB Mode 6 (see Table 0.a. 1) with variable GIC and 6 MHz RF channel bandwidth.

2. The test shall be done for all channels from 7 to 13 and 14 to 51, if all of them accomplish the requested specification, then the obtained values at six relevant frequencies will be registered: 177 MHz (Channel 7), 195 MHz (Channel 10), 213 MHz (Channel 13), 473 (Channel 14), 587 MHz (Channel 33) and 695 MHz (Channel 51). If there were some fails in any channels, then the specific frequencies and values would be registered as well.
3. The signal level at the DUT's RF input is set to -86dBm for channels 7, 10 and 13 and to -84dBm for the remaining channels.
4. Verify whether the signal is received properly without exceeding the TOV.

Table 0.c.1: Minimum DTMB-Receiver's input signal level.

Frequency	Minimum Level	Test
177MHz		
195MHz		
213MHz		
473MHz		
587MHz		
695MHz		

I. GENERAL SPECIFICATIONS

a) Frequency bands –

Input frequency bands at least from 174 to 216 MHz and from 470 to 698 MHz.

Test procedure:

1. Configure modulator's output according to Mode 6 (see Table 0.a.I) with variable GIC and 6MHz RF channel bandwidth in accordance with Exp 337 Regulation of Digital TV Broadcasting Service, Chapter 3: Technical Requirements.
2. Adjust the output RF signal level to -53dBm (moderate level) for each channel tested.
3. Configure modulator's output in the center frequency of every channel listed below:
   a. VHF band: 177, 183, 189…201, 207, 213 MHz (total of 7 channels).
   b. UHF band: 473, 479, 485…683, 689, 695 MHz (total of 38 channels).
4. Configure the DUT to receive and display a program transmitted within each RF channel.

b) Intermediate Frequency (IF) –

Intermediate Frequency (IF) in one of the alternatives of direct base band conversion (Zero or Quasi-Zero) or, otherwise, 44 MHz.

Test procedure:

1. Configure modulator's output according to DTMB Mode 6 (see Table 0.a.I) with variable GIC and 6MHz RF channel bandwidth in accordance with Exp 337 Regulation of Digital TV Broadcasting Service, Chapter 3: Technical Requirements.
2. Adjust RF signal level to -53dBm (moderate level).

3. Tune the DUT according to the frequency configured in the DTMB modulator
4. Verify the signal spectrum at the output of the tuner stage.

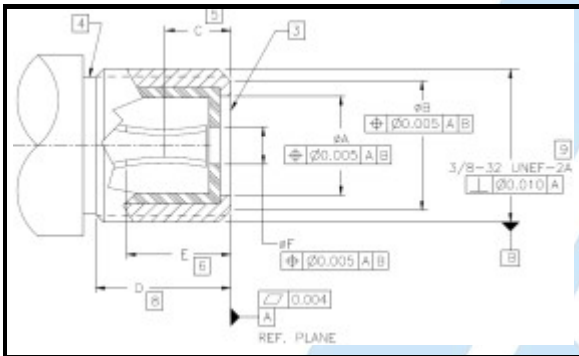
c) RF connector type –

*Any input or output RF connector **must be** female "F" type (ANSII/SCTE 02 2006).*

Test procedure:

1. Visual inspection and elementary comparison with specifications.
2. Practical connection of Male "F" type connector, taken as reference.

Table I.c.1: Specifications for "F" Port, Female.



DESCRIPTION	DIM (mm)	Recommended	
		Min	Max
Ref plane opening diameter	A	4.32	6.10
Ref plane outer diameter	B	7.10	8.00
Positive contact point depth[1]	C	-	5.08
Full thread depth[2]	D	8.26	-
Mating male center conductor clearance[3]	E	9.65	-
Center conductor guide inner diameter	F	-	1.73

Notes:

Dimension to point of positive contact of male center conductor.
When the indoor female f connector is used in a panel or bulkhead mounted application, dimension d is the length of thread extending beyond the mounting hardware.
Minimum clearance required for maximum length male center conductor.

d) Adaptable aspect ratio –

The DUT shall provide means for selecting display configuration which can be Standard 4:3 or Widescreen 16:9 format.

Test procedure:

1. Selected files are consecutively transmitted with different aspect ratios as indicated:
   a) Aspect_ratio_4-3.ts, 4:3 Aspect Ratio.
   b) Aspect_ratio_16-9.ts, 16:9 Aspect Ratio.

2. The DUT is connected to TV sets with 4:3 and 16:9 aspect ratios. The image on screen is observed when changing the DUT´s output Aspect Ratio (Figure I.d.1).

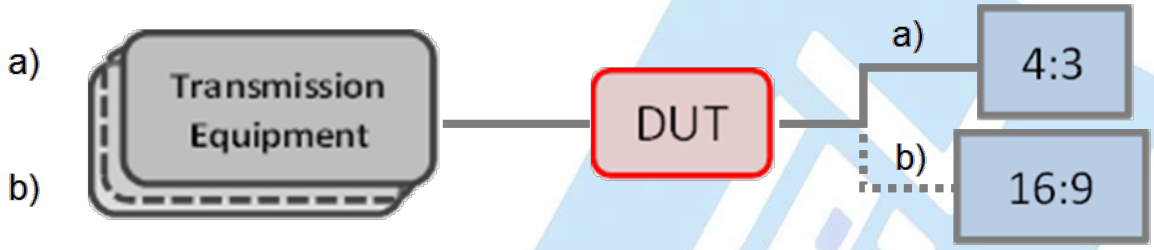


Figure I.d.1: Equipment set-up for Aspect Ratio tests

Table II: Aspect Ratio configuration versus TV displayed images.

TxFormat	STB	TV	Result	Sample
4:3	4:3	4:3		
	16:9			
	4:3	16:9		
	16:9			
16:9	4:3	4:3		
	16:9			
	4:3	16:9		
	16:9			

e) DVB subtitles (ETSI EN 300 743) –

The DUT must support DVB subtitles (ETSI EN 300 743).

Test procedure:

1. Selected transport streams with DVB subtitle are transmitted:
   a) **CC-H.264.ts**, with Standard Definition picture format.
   b) **HD_screenDVBx4.ts,** with High Definition picture format.
2. By visual inspection is evaluated if the DUT includes provisions to decode and display subtitles conforming to ETSI EN 300 743.

f) Electronic Program Guide (EPG) –

The DUT shall be capable of receiving and processing the EPG data stream according to the specifications of the Standard GB. 20600-2006, GY/T 231-2008 (Supporting 7-day information).

Test procedure:

1. Tune the DUT to receive television broadcasting service.
2. Check by visual inspection the ability of the DUT to receive and show properly the EPG information for 7 days.

g) Data broadcasting (GDIJ027-2011) –

The DUT shall support Data broadcast processing, according to GY/T201-2004 and GD/J027-2011 (4.4.1.1.2.1, 4.4.1.1.5, 4.1.6, 4.4.2.2.6, Annex E, Annex G.28 – G.36, Annex H [ISO/IEC 13818-1 and ISO/IEC 13818-1) with Latin character format, with "single byte" coding in Spanish-ci language.

Note: *The application shall search the Data Broadcasting "BAT/SDT"* ***first*** *on PID=0x0011, according with hereinbefore mentioned standards. If it is not present, then use as* ***second option*** *the PID=0x1000. It must be done in said* ***specific order****.*

Test procedure:

1. Tune the DUT to receive television broadcasting service (carrying Data Broadcasting "BAT/SDT" on PID=0x1000) and evaluate by visual inspection if the DUT properly receives and process the Data Broadcasting Service.
2. Feed the DUT's RF input with a signal containing the data of **Data_Broadcast_PID_0x0011.ts** (a TS file with PID offset of 0x0011, in accordance with GDIJ027-2011 Standard) and check by visual inspection the correct reception and processing of the Data Broadcast Service.
3. Feed the DUT´s RF input with a signal containing the data of **Data_Broadcast_PID_0x1000.ts** (a TS file with PID offset of 0x1000, in accordance

with GDIJ027-2011 Standard) and check by visual inspection the correct reception and processing of the Data Broadcast Service.

4. Feed the DUT´s RF input with a signal containing the data of **Data_Broadcast_BOTH_PID.ts** (a TS file with PID offset of 0x1000 and 0x0011, in accordance with GDIJ027-2011 Standard) and check by visual inspection the correct reception and processing of the Data Broadcast Service.

h) Firmware updating capacity (OTA) –

*OTA (Over The Air) firmware update **must be inhibited** Signed and stamped **Certificate must be provided** from manufacturer to the trading company, assuring that the equipment cannot be software upgraded by means of any air broadcasted signal, neither in current software version nor any future updates; as well as assuming responsibility and liability.*

i) Service Interface –

*Service interface for **ISP** (In-System Programmability) with purpose of firmware update (not necessarily external).*

Notes:

- *ISP **must** be present independently from any available USB upgrade option.*
- *All the software and hardware **ISP accessories and tools**, as well as **firmware update** with different version number **must be provided**.*

Test procedure:

1. Verify, by visual inspection and update execution the functionality of service interfaces.
2. Identify if there are options for firmware update on GUI.
3. Use the corresponding PC software (provided by Manufacturer) and specific cable to get access to the DUT's ISP function.
4. Update the DUT's firmware (write to DUT's flash).

j) Menus and information –

*All menus and **any other** screen information from the DUT must be in Spanish language.*

Test procedure:

1. Check all items in the user interface and buttons in the remote control.

k) Signal meter function –

Signal strength and quality (signal metering function) must be available, in order to be useful for antenna tuning purposes and to know the signal margin.

Tips:

- *The showed Level in % shall linearly follow recommended levels of ITU-R BT.2035-2 Report (showing **50% at -53dBm with 1.5% Slope**).*
- *The use of bar type indicators is suggested as the better way for said purpose.*

Test procedure:

1. Find and select, if available, a remote control key and/or a menu function to access the signal strength and quality metering functions.
2. Check the concordance between the signal level at the DUT´s RF input and the strength showed by the metering function.
3. Check if the correlation dBm vs % shown by DUT lineally follows the levels recommended by ITU-R BT.2035-2 Report.

Table I.k.I: ITU-R BT.2035-2 and Test results

UIT-R BT.2035-2		DUT		
Level Range	**Classification**	**Classification**	**Test Result (dBm)**	**Shown (%)**
≤ -68	Weak			
-68 to -53	Moderate			
-52 to -28	Strong			
≥ -28	Very Strong			

l) Restore factory default option –

The DUT's graphical interface must allow the user restore the factory default parameters.

Test procedure:

1. Customize DUT's configuration parameters, taking note of values modified.
2. Restore factory default parameters through menu option available for this purpose and check if modified parameters returned to their default values.

m) Time and Date –

Date and time automatically update according to the Specification ETSI EN 300 468.

Tips:

- *The options of selecting both the Time Zone and Daylight Saving Time - DTS, must be present.*
- *Special care must be taken about the correspondence of actual day and time with the day and time used for EPG and, if present, PVR options.*

Test procedure:

1. Connect the DUT to the mains AC line and turn it on without RF input signal.
2. If the DUT includes time settings, set the automatic option.
3. Feed the DUT's RF input with a signal containing **Time&Date_stream_1.ts,** this file contains the following time information:
   - UTC time: 24/09/2015 at 19:07
   - Time to change: 10/10/2015 at 04:00:00
   - Local offset: -07:07
   - Next offset: -08:00

   The corresponding information to display is 24/09/2015 at 12:00. Check by visual inspection the correct reception and processing of this information.
4. Feed the DUT's RF input with a signal containing **Time&Date_stream_2.ts,** this file contains the following time information:
   - UTC time: 30/12/2015 at 13:17
   - Time to change: 10/10/2015 at 05:00:00
   - Local offset: -07:00
   - Next offset: -08:02

   The corresponding information to display is 30/12/2015 at 05:15. Check by visual inspection the correct reception and processing of this information.
5. Set the manual option and test all possible configurations.

n) Channel numbering –

Channel numbering display in format XX.1, XX.2… where XX is the received RF channel number and "1, 2 …" is the multiplexer program order.

Test procedure:

1. Tune the DUT to receive the television broadcast service.
2. Check whether the channel number is displayed as XX.1, XX.2, and so on, where XX is the tuned channel number and "1, 2 …" is the multiplexer program order.

o) Environmental –

The DUT must be tropicalized (adapted to customer needs) complying with the Standard IEC 60068-1, "Environmental essays Generalities and Guides" and other related parameters.

This verification should be performed by specialized laboratories in environmental tests in Cuba.

p) Composite Video Baseband Signal (CVBS) –

If Video Baseband Signal is present, any of CVBS or YPbPr, outputs must accomplish NTSC-M (SMPTE 170M-2004) standard and allow connection to RCA male connector(s) on TV set.

Test procedure:

1. Check if Video baseband signal output is present and accessories allows connection to RCA male connector(s) on TV set.
2. Connect the test system as Figure I.p.1. The **Data stream generator** outputs a transport stream with 100 percent flat White signal (**1-100% White.ts**)

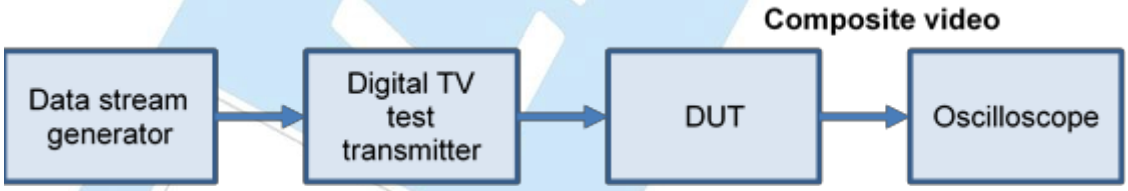


Figure I.p. 1: Measurement diagram

3. As shown in Figure I.p.2, use the oscilloscope to measure the amplitudes of CVBS at the output port of the DUT and record them:
   - Reference white level
   - Burst amplitude (p-p)
   - Level of sync pulse
   - Peak-to-peak amplitude between white level and sync level of video output.

The peak-to-peak amplitude of the luminance plus sync, measured from sync pulse to white level, shall be 140 IRE units = 1.0 V p-p and the amplitudes of the component parts of the signal shall be as given in Table I.p.1.

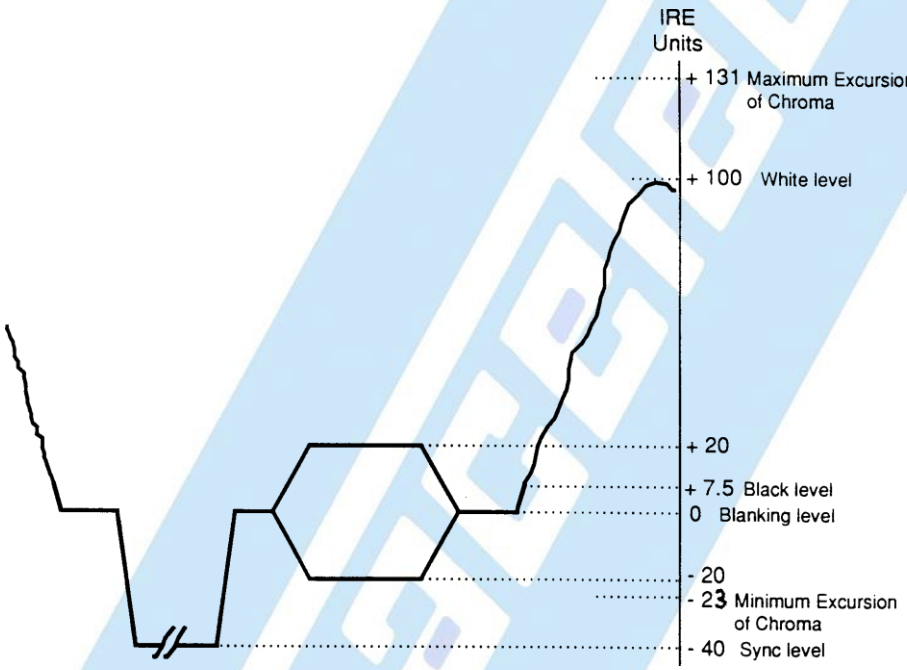


Figure I.p.2: Video output waveform

4. Check the number of burst cycles and record it (9 ± 1 cycles admitted).

   The start of burst shall be defined by the zero crossing (positive or negative slope) that precedes the first half cycle of subcarrier that is 50% or greater of the burst amplitude. The end of burst shall be defined by the zero crossing (positive or negative slope) that follows the last half cycle of subcarrier that is 50% or greater of the burst amplitude (see Figure I.p.3). Considered separately, the variations in level of each half envelope of the burst shall not exceed 0.5 IRE unit.

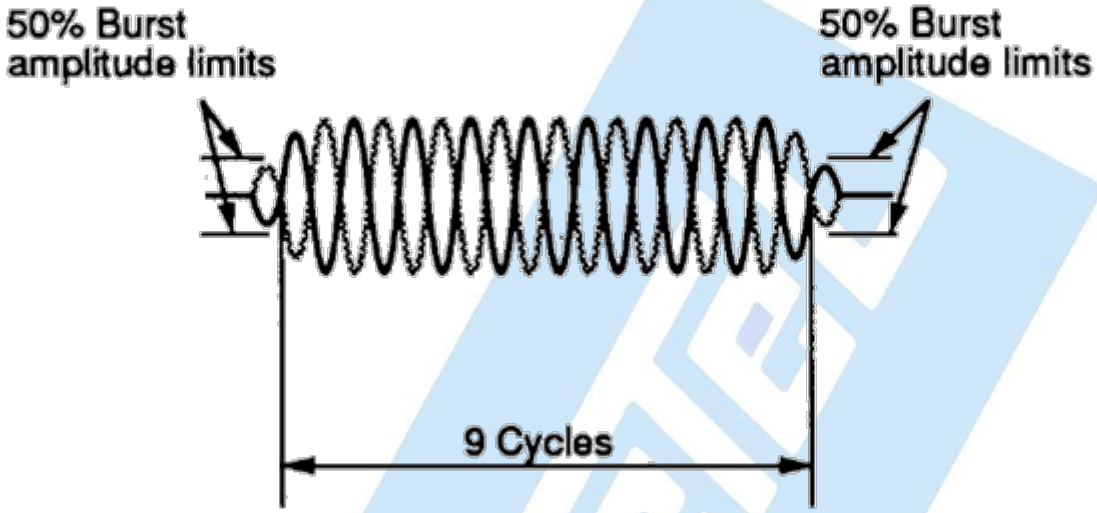


Figure I.p.3: Color burst

Table I.p.1: SMPTE 170M-2004 and Test Results

Specification	Standard Value		Measured Value	Difference	Recommended Tolerance		Result
	(IRE)	(V)	(V)	(V)	(IRE)	(V)	
White level	100	+0.714			± 1	±0.00714	
Burst amplitude (p-p)	40	0.286			± 1	±0.00714	
Sync level	-40	-0.286			± 1	±0.00714	

q) Audio Output –

If Audio baseband output is present, it must guarantee a mono/stereo signal with selection of mono right and mono left options (right and left channels) and allow connection to RCA male connectors on TV set.

Test procedure:

1. Check if Audio baseband signal outputs are present and accessory allows connection to RCA male connector(s) on TV set.
2. Play a stereo file with different audio on each channel (Stero_Mono.ts) and select with Remote Control key **Audio**, the options Mono, Stereo, Right and Left.

Table I.q.I: Audio output test results.

Option	Expected Results	Test
Mono	Both channels are mixed and sound is emitted equally over the two outputs.	
Stereo	Each channel sound is emitted by the corresponding output.	
Right	Right channel was emitted by the two outputs.	
Left	Left channel was emitted by the two outputs.	

r) RF out –

If RF output is present, it must be on channels 3 and 4 selectable (preferably by Menu, without external switch) and according to NTSC-M (SMPTE 170M-2004) standard.

s) Video Baseband frequency tolerance –

The frequency tolerance for NTSC-M (SMPTE 170M-2004) standard must be so that color subcarrier 3.579545 MHz deviation never surpasses ± 100 Hz.

Test procedure:

1. Set to verify the Burst subcarrier frequency deviation (+/-100 Hz admitted by current regulation).

II. ADDITIONAL MANDATORY SPECS, FEATURES AND RECOMMENDATIONS FOR STANDARD DEFINITION (SDTV) STB

a) Image formats –

*Supports Image formats (**all included**):*

1. *720 x 480i (interlaced) video at 59.94 fields per seconds.*
2. *720 x 480p (progressive) video at 29.97 frames per seconds (fps).*

Test procedure:

1. Play transport streams coded with the formats 720x480i-59.94 fields per seconds and 720x480p-29.97 frames per seconds (fps). The samples are listed in Table II.a.I.
2. Check if DUT properly displays video for each tested resolution.

Table II.a.1: SD Image format test files.

No	Test Stream	Format	Fields /sec	Frames /sec
1	**720x480i_2997_MPEG2(MP@ML)_MP2.ts**	720x480i	59.94	29.97
2	**720x480p_2997_MPEG2(MP@ML)_M**	720x480p	29.97	29.97

b) Video compression standards –

*Supports video compression standards (**all included**):*

1. *ISO/IEC 13818-2 (H.262 or MPEG-II Part 2) Main Profile at Main Level: (**MP**@**ML**).*
2. *ISO/IEC 14496-10 (**H.264**/AVC or MPEG-4 Part 10) Main Profile at Level 3: (**MP**@**L3**).*
3. *IEEE Std. 1857™-2013 (**AVS**1-P2) Main Group (Jizhun Profile) at Level 4.0.0.08.30.*

Test procedure:

1. Send to DUT through its RF input a DTMB signal carrying data of streams with the herein before mentioned compression standards.
2. Check if the DUT is capable of properly reproduce each tested stream.

c) Audio compression standards –

The DUT must support ISO/IEC 13818-3 Layer 2 (MPEG-2 Part 3 Layer 2) audio compression standard.

Test procedure:

1. Send to DUT's RF input a DTMB signal carrying the data of the file *720x576i-MPEG2-MPEG.ts*, according to the audio standard under test.
2. Check if the DUT supports playing of the herein before mentioned audio compression standard.

III. ADDITIONAL MANDATORY SPECS AND FEATURES FOR HIGH DEFINITION (HDTV) STB

The DUT must be fully **downward compatible** with SD STB and accomplish all previous requirements besides following specs and features.

a) Image formats –

*Support for **Image formats** (**all included**) specified in previous II, a) clause **and**:*

1. *1280x720**p** (progressive) video at 29.97 frames per seconds (fps),*
2. *1920x1080**i** (interlaced) video at 59.94 fields per seconds.*

Test procedure:

1. Play transport streams coded with the formats 1280x720p-29.97 frames per second and 1920x1080i-59.94 fields per second. The samples are listed in Table III.a.1.
2. Check if DUT properly displays video for each tested resolution.

Table III.a.2: HD Image format test files.

No	File	Format	Fields /sec	Frames /sec
1	1280x720p_5994_MPEG 2(MP@HL)_MP2.ts	1280x720p	29.97	29.97
2	1920x1080i_2997_MPEG 2(MP@HL)_MP2.ts	1920x1080i	59.94	29.97

b) Video compression standards –

*Support for **video compression** standards (**all included**):*

*1) ISO/IEC 13818-2 (H.262 or **MPEG-2** Part 2) Main Profile at **High Level (MP@HL).***

*2) ISO/IEC 14496-10 (**H.264**/AVC or MPEG-4 Part 10) High Profile at Level 4.0 (**HP@L4.0**).*

*3) IEEE Std. 1857™-2013 (**AVS+** or AVS1-**P16**) Broadcasting Group at Level 6.0.0.08.60.*

Test procedure:

1. Send to DUT through its RF input a DTMB signal carrying data of streams with the herein before mentioned compression standards.
2. Check if the DUT is capable of properly reproduce each tested stream.

c) Support for audio compression standard ISO/IEC 14496-3 (MPEG-4 Part 3 Subpart 4 AAC) –

The DUT must be capable of decode and reproduce audio coded using Advanced Audio Coding (AAC) Standard.

Test procedure:

1. Send to DUT's RF input a DTMB signal carrying information of the file *720x480p-MPEG2-AAC.ts* according to the audio standard under test.
2. Check if the DUT supports playing the herein before mentioned audio compression standard.

d) HDMI output port –

*Supports **HDMI output** interface (version 1.2 or higher).*

Test procedure:

1. Check if there is an HDMI port present in the DUT.
2. Set lab equipment and DUT to transmit/receive a TS file with HD 1080p video.
3. Feed the HDMI output signal to TV set in order to check if it works properly.

IV. ADDITIONAL FEATURES –

a) USB Port Features –

Table IV.I: USB Port Main Features

Feature	Supported	Test
HDD Up to 1TB		
Disk with 3 partitions		
NTFS, FAT32 File System		
PVR (FAT32)		
PVR (NTFS)		
Time Shift		
Subtitle .srt		

b) Supported Video Codecs –

Table IV.II: Tested Video Files

No	File	Source
	720x480	
1	01-11011_AVI_DivX_720x_480_2997_Auto_MP3_4800--GV-UVC.avi	Ultra Video Converter
2	04-11012_AVI_Xvid_720x_480_2997_Auto_MP3_4800--GV-UVC.avi	Ultra Video Converter
3	sony_animal-aviH264BR2k0-AC3.avi	Xilisoft Video ConverterUltimate
4	44-11081_FLV_FLV_720x_480_2397_Auto_MP3_4410--GV-UVC.flv	Ultra Video Converter
5	sony_animal-mkvbr4k0-Xilisoft.mkv	Xilisoft Video ConverterUltimate
6	86-16032_Xbox360_MPEG4_AAC_16-9--MS-UVC.mp4	Ultra Video Converter
7	20-11051_MPEG2_MPEG2__720x_480_2997_04-3_MP2___4800-- GV-UVC.mpg	Ultra Video Converter
8	NTSC-DVD_MPEG-1_720x480_29.970_fps_MP2-MPEG-1_Layer2.mpg	Pazera
9	NTSC-DVD_MPEG-1_720x480_29.970_fps_AC3-Dolby_AC3.mpg	Pazera
10	NTSC-DVD_MPEG-2_720x480_29.970_fps_AC3-Dolby_AC3.mpg	Pazera
11	MPEG-1_720x576_25_fps_mp3.mpg	Xilisoft Video Converter Ultimate
12	14-11041_MPEG1_MPEG1__720x_480_2397_04-3_MP2___4800-- GV-UVC.mpg	Ultra Video Converter
13	sony_animal-720x480_rmvb-Xilisoft.rmvb	Xilisoft Video Converter Ultimate
14	78-12034_DVD_MPEG2_720x_480_2997_16-9_MP2_4800--Disc-UVC.VOB	Ultra Video Converter

1280x720		
15	AVI_DivX_1280x720p_5994fps_mp3.avi	Xilisoft Video Converter Ultimate

16	AVI_MPEG1_1280x720p_5994fps_mp3.avi	Xilisoft Video Converter Ultimate
17	AVI_MPEG2_1280x720p_5994fps_mp3.avi	Xilisoft Video ConverterUltimate
18	AVI_XViD_1280x720p_5994fps_ac3.avi	Xilisoft Video ConverterUltimate
19	AVI_XViD_1280x720p_5994fps_mp2.avi	Xilisoft Video ConverterUltimate
20	FLV_1280x720p_2997fps_mp3.flv	Xilisoft Video ConverterUltimate
21	MKV_H264_1280x720p_5994fps_mp3.mkv	Xilisoft Video ConverterUltimate
22	MP4_AVC_1280x720p_5994fps_aac.mp4	Xilisoft Video ConverterUltimate
23	MPG_MPEG2_1280x720p_2997fps_mp2.mpg	Xilisoft Video ConverterUltimate
24	RMVB_RV_1280x720p_30fps_rma.rmvb	Xilisoft Video ConverterUltimate
25	VOB_MPEG2_1280x720p_2997fps_mp2.vob	Xilisoft Video ConverterUltimate
1920x1080		
26	AVI_DivX_1920x1080i_30fps_mp3.avi	Xilisoft Video ConverterUltimate
27	AVI_XViD_1920x1080i_30fps_ac3.avi	Xilisoft Video ConverterUltimate
28	AVI_XViD_1920x1080i_30fps_mp2.avi	Xilisoft Video ConverterUltimate
29	MKV_H264_1920x1080i_30fps_mp3.mkv	Xilisoft Video ConverterUltimate
30	MP4_AVC_1920x1080i_30fps_AAC.mp4	Xilisoft Video ConverterUltimate
31	MPG_MPEG2_1920x1080i_30fps_mp2.mpg	Xilisoft Video ConverterUltimate
32	RMVB_RV_1920x1080i_30fps_RA.rmvb	Xilisoft Video ConverterUltimate

Table III.III: Supported Video Codecs

File Number	Resolution	FPS	Codecs		Container (Extension)	Supported		
			Video	Audio		Yes	No	Remarks
1	720x480	29.97	MPEG4 (DivX)	MP3	AVI			
2	720x480	29.97	MPEG4 (XviD)	MP3				
3	720x480	29.97	AVC	AC3				
4	720x480	23.976	SorensonSpark	MP3	FLV			
5	720x480	29.97	AVC	MP2	MKV			
6	720x480	29.97	MPEG4	AAC	MP4			
7	720x480	29.97	MPEG2	MP2	MPG			

File Number	Resolution	FPS	Codecs		Container (Extension)	Supported		
			Video	Audio		Yes	No	Remarks
8	720x480	29.97	MPEG1	MP2				
9	720x480	29.97	MPEG1	AC3				
10	720x480	29.97	MPEG2	AC3				
11	720x576	25	MPEG1	MP3				
12	720x480	23.976	MPEG1	MP2				
13	720x480	29.97	Real Video	Cook	RMVB			
14	720x480	29.97	MPEG2	MP2	VOB			
15	1280x720	59.94	DivX	MP3				
16	1280x720	59.94	MPEG-1	MP3				
17	1280x720	59.94	MPEG-2	MP3	AVI			
18	1280x720	59.94	XviD	AC3				
19	1280x720	59.94	XviD	MP2				
20	1280x720	29.97		MP3	FLV			
21	1280x720	59.94	H.264	MP3	MKV			
22	1280x720	59.94	AVC	AAC	MP4			
23	1280x720	29.97	MPEG-2	MP2	MPG			
24	1280x720	30	Real Video	RMA	RMVB			
25	1280x720	29.97	MPEG-2	MP2	VOB			
26	1920x1080	30	DivX	MP3				
27	1920x1080	30	XviD	AC3	AVI			
28	1920x1080	30	XviD	MP2				
29	1920x1080	30	H.264	MP3	MKV			
30	1920x1080	30	AVC	AAC	MP4			
31	1920x1080	30	MPEG-2	MP2	MPG			
32	1920x1080	30	Real Video	RA	RMVB			

V. ADDITIONAL REMARKS

VI. HARDWARE, DOCUMENTATION, SOFTWARE AND TOOLS PROVIDED

TableVI.I: HARDWARE

DESCRIPTION		PROVIDED
STB Solution	Two STB samples	
	Two USB-load loader & debug Box	
	Two Debug Card	
	USB cable and Serial port connecting cables	
Silicon Tuner	Two Evaluation boards (including all cables and accessories)	
RF Modulator	Two Evaluation boards (including all cables and accessories)	
Demodulator	Two Evaluation boards (including all cables and accessories)	
SoC	Two Evaluation boards (including all cables and accessories)	

Continue in next page.

TableVI.II: DOCUMENTATION

DESCRIPTION		PROVIDED
STB Solution	User Manual	
	Service Manual	
	Reference Schematics	
	Environmental Test Report	
Silicon Tuner	Detailed Datasheets	
	Software Programming Guide	
	Evaluation Board User Guide	
	Evaluation Board Bill Of Materials	
	Evaluation Board Reference Schematics	
	Evaluation Board Gerber files	
	Layout Guide	
	PCB Footprint	
	Standard Reflow Profile	
	Silicon Tuner performance Test Report	
RF Modulator (Chs 3/4)	Detailed Datasheets	
	Software Programming Guide	
	Evaluation Board User Guide	
	Evaluation Board Bill Of Materials	
	Evaluation Board Reference Schematics	
	Evaluation Board Gerber files	
	Layout Guide	
	PCB Footprint	
	Standard Reflow Profile	
	RF Modulator performance Test Report	
Demodulator	Detailed Datasheets	
	Software Programming Guide	
	Evaluation Board User Guide	
	Evaluation Board Bill Of Materials	
	Evaluation Board Reference Schematics	
	Evaluation Board Gerber files	
	PCB Footprint	
	Layout Guide	
	Standard Reflow Profile	
	Demodulator performance Test Report	
SoC	Detailed Datasheets	
	Software Programming Guide	
	Evaluation Board User Guide	
	Evaluation Board Bill Of Materials	
	Evaluation Board Reference Schematics	

DESCRIPTION		PROVIDED
	Evaluation Board Gerber files	
	PCB Footprint	
	Layout Guide	
	Standard Reflow Profile	
	SoC performance Test Report	

TableVI.III: SOFTWARE & TOOLS

DESCRIPTION		RELEASE			PROVIDED
STB Solution	Current firmware version (bin file)				
	Source code of application	**Layer**	**Module**	**Providing Mode**	
		Application	Basic function & task	Source Code	
			Information service	Library	
			Menu & OSD	Library	
			Software Upgrading	Bootloader	
			Games	Source Code	
		Multimedia	Multimedia player	Source Code + Library	
		Middleware	Audio & Video function	Library	
			closed captioning	Library	
			Database	Source Code	
			Demux	Library	
			EPG	Library	
			Fonts & Menu analyses	Source Code	
			File system	Source Code	
			File browsing	Library	
		Driver	Driver for the master IC	Source Code + Library	
			Front panel & remote control	Source Code + Library	
			Flash	Source Code	
			Tuner	Source Code	
			Demodulator	Source Code	
		Op. System	Op. System	Library	
	Debug Tool				
Silicon	All function for Si-Tuner Operation				

DESCRIPTION		RELEASE	PROVIDED
Tuner	All function for API PC based Tuner GUI demo		
RF Modulator (Chs 3/4)	All function for RF Mod Operation All function for API PC based RF Modulator GUI demo		
Demodulator	All function for Demod Operation All function for API PC based Demodulator GUI demo		
SoC	USB-load tool Flash programming tool SDK environment		
	All function for API		
	Reference TS for Video compression standards		
	Source code of basic application (including peripherals and other elements' drivers)		

REFERENCES	
http://www.lacetel.cu/	"Minimum Technical and Operational Specifications for Digital Television Set-Top Boxes", issued by Ministry of Communications on May 22, 2014
Draft	Exp 337, Reglamento Servicio de Radiodifusión de TV Digital Terrestre, Versión de 1ro de Abril de 2014
REPORT ITU-R BT.2035-2.	Guidelines and techniques for the evaluation of digital terrestrial television broadcasting systems including assessment of their coverage areas. (Question ITU-R 31/6). (2003-2004-2008).
GB 20600. 2006.	Framing Structure, Channel Coding and ModulationFor Digital Television Terrestrial Broadcasting System. Published: 2006-08-18.
STB SDM240B (Mayo 2012).	Relationship between the RF signal strength and SDM240B STB displayed parameters. ***LACETEL***, May 2012.
Laboratory Test Results for DTMB Receiver in 6MHz Bandwidth.	Compilation of the results obtained strictly according to the guidelines of ITU－R BT.2035-2, aimed at providing an updated characterization of the commercially available DTMB receivers. ***LACETEL***, September 2013.
DTMB: Terrestrial Digital Transmission Standard.	DTMB/DTMB-A standards promotional brochure. International Fair and Convention INFORMATICA 2013. DTVNEL, March 2013.
Evaluation of DTMB STB Selected Quality Parameters.	Evaluation of Set-Top Box quality parameters for DTMB digital television signal broadcasting standard ***LACETEL***, September 2012.