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EMI Test Report

On Model Name: ATSC Digital Terrestrial Receiver

Model Number: HA110C

Brand Name : Skyworth

FCC ID Number: WNA080902

Prepared for Shenzhen Skyworth Digital Technology Co.,Ltd.

According to FCC Part 15 Class B

Test Report #: SHE-0807-10043-FCCID

Prepared by: Jawen Yin

Reviewed by: Ivan Wen

QC Manager: Paul Chen

Test Report Released by: Paul J. Chen
Paul Chen

2008, September 20
Date

Test Location

Tests performed at ECMG Worldwide Certification Solutions(Shanghai) in a Certified ANSI Semi-Anechoic Chamber and Shielded Room.

*Test Site Location: Building 2, No. 1298, Lianxi Road, Pu Dong
New Area, Shanghai P.R.C 201204, China*

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Fax: 86-021-51909333

FCC Registration Number: 172634

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Opinions and Interpretations

This test report relates to the above mentioned equipment under test (EUT). Without the permission of ECMG Worldwide Certification Solution Inc. Test Lab this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark on this or similar products. The manufacturer has sole responsibility of continued compliance of the device.

Statement of Measurement Uncertainty

The data and results referenced in the document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities that can account for a nominal measurement error. Furthermore, component and process variability of devices similar to that tested may result in additional deviation.

Administrative Data

Test Sample : ATSC Digital Terrestrial Receiver
Model Number : HA110C
Model Tested : HA110C
Date Tested : 2008, Aug. 25
Applicant : SHENZHEN SKYWORTH DIGITAL TECHNOLOGY CO.,LTD.
Unit A14/F.Skyworth Bldg.,Gaoxin Ave.1s., Nanshan District, Shenzhen,China
Telephone : 86-755-26010039
Fax : 86-755-26010028

EUT Description

SHENZHEN SKYWORTH DIGITAL TECHNOLOGY CO.,LTD model tested HA110C (referred to as the EUT in this report) is a ATSC Digital Terrestrial Receiver.

Test Summary

The Electromagnetic Compatibility requirements on model HA110C for this test are stated below. All results listed in this report relate exclusively to this above-mentioned model as the Equipment Under Test. This report confers no approval or endorsement upon any other component, host or subsystem used in the test set-up.

Emission Tests				
Specifications	Description	Test Results	Test Point	Remark
<i>Part 15.107 ANSI C63.4 2003</i>	<i>Conducted Emission</i>	<i>Passed</i>	<i>AC Input Port</i>	<i>Attachment 1</i>
<i>Part 15.109 ANSI C63.4 2003</i>	<i>Radiated Emission</i>	<i>Passed</i>	<i>Enclosure</i>	<i>Attachment 2</i>
<i>Part 15.111(a) ANSI C63.4 2003</i>	<i>Antenna Power Conduction</i>	<i>Passed</i>	<i>RF input</i>	<i>Attachment 3</i>
<i>Part 15.115(b) ANSI C63.4 2003</i>	<i>Output and spurious conducted level</i>	<i>Passed</i>	<i>RF Output</i>	<i>Attachment 4</i>
<i>Part 15.115(d) ANSI C63.4 2003</i>	<i>Incorporate circuitry to automatically prevent emanations</i>	<i>Passed</i>	<i>RF Input</i>	<i>Attachment 5</i>

Test Mode Justification

This device complies with Part 15 of the FCC rules. Operations is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Equipment Modification

Any modifications installed previous to testing by SHENZHEN SKYWORTH DIGITAL TECHNOLOGY CO.,LTD. will be incorporated in each production model sold or leased in United States.

There were no modifications installed by ECMG Worldwide Certification Solution Inc. (China) test personnel.

EUT Sample Photos



Front View



Back View



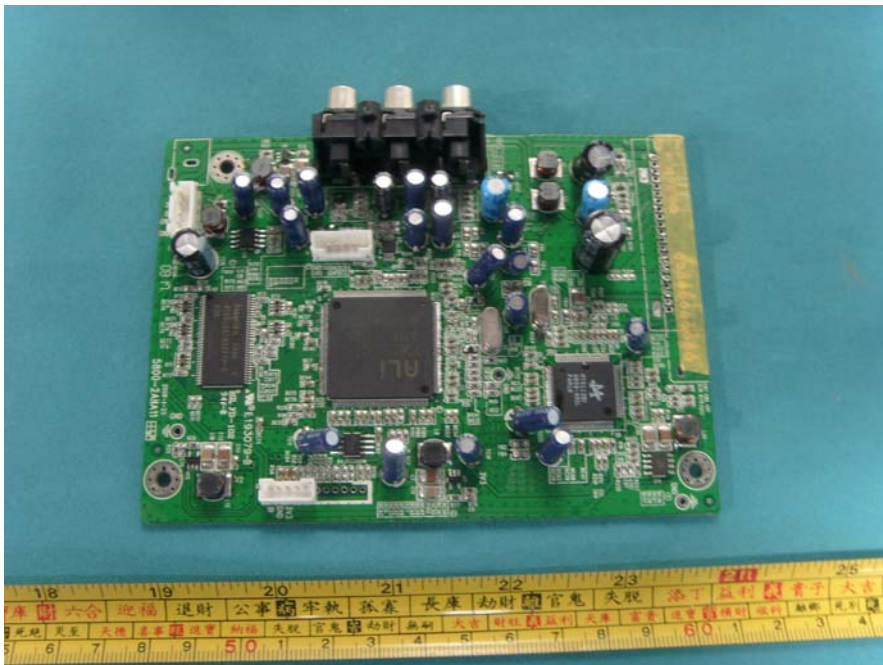
Bottom View



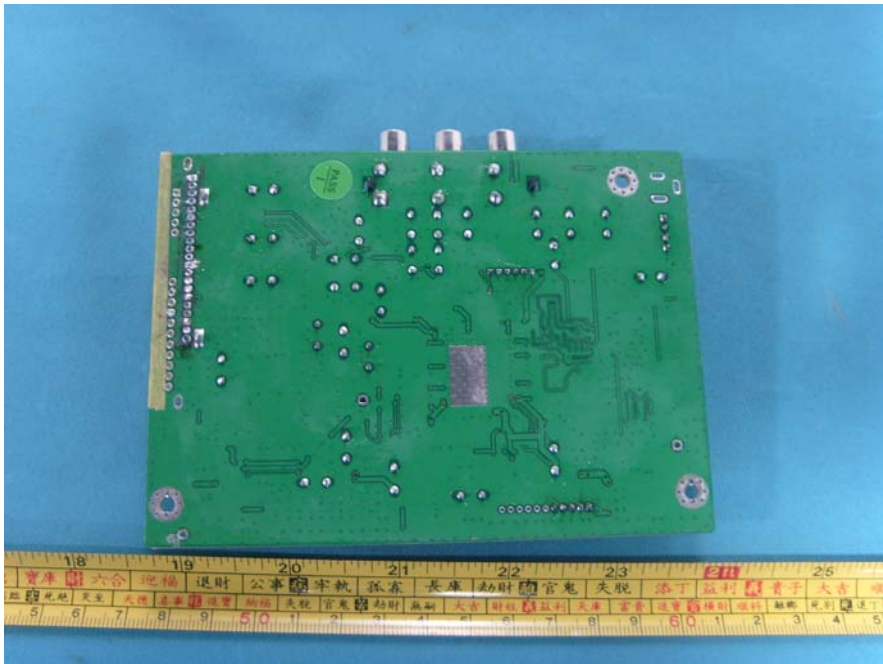
Remote Control



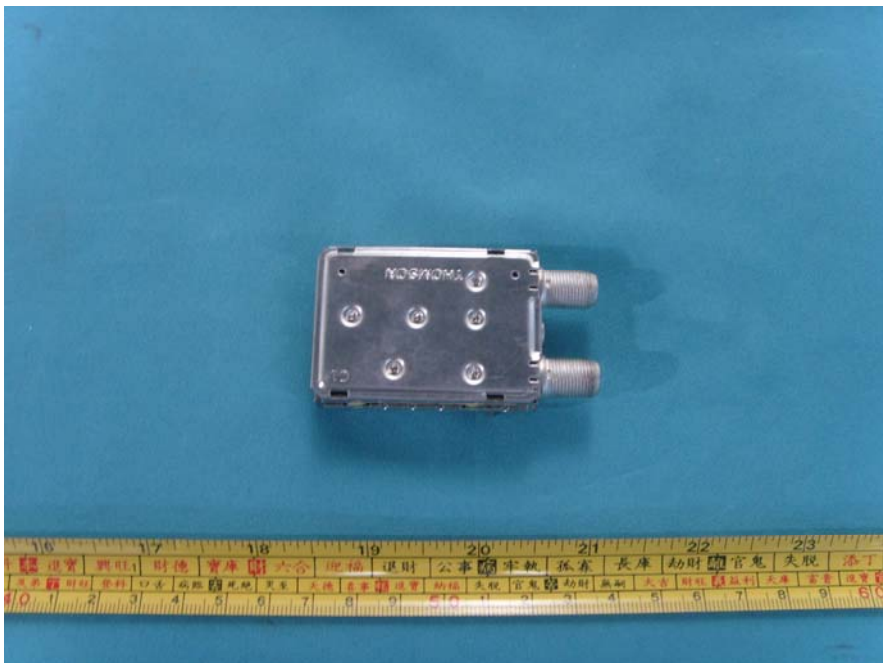
Inside View



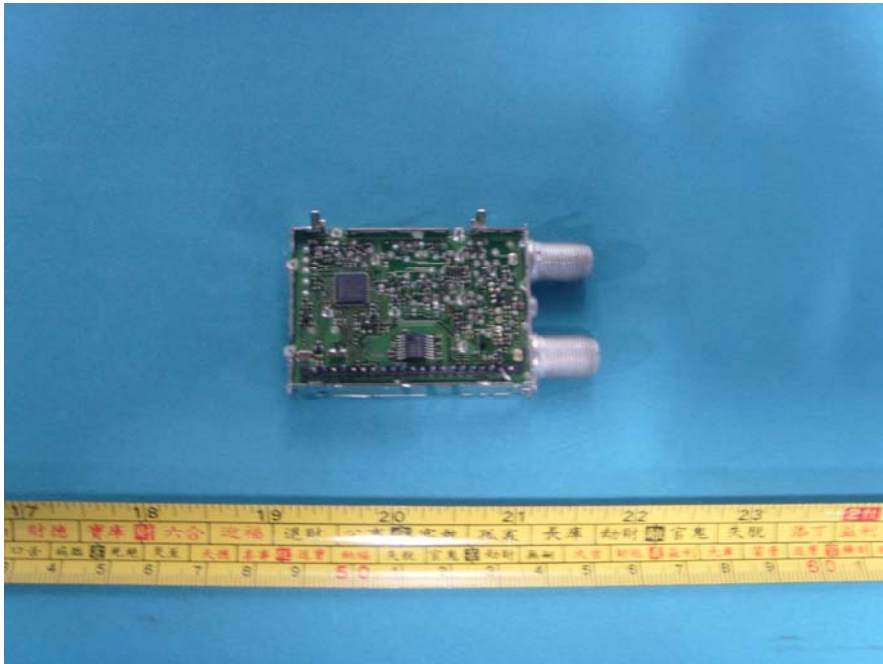
Main board Front View



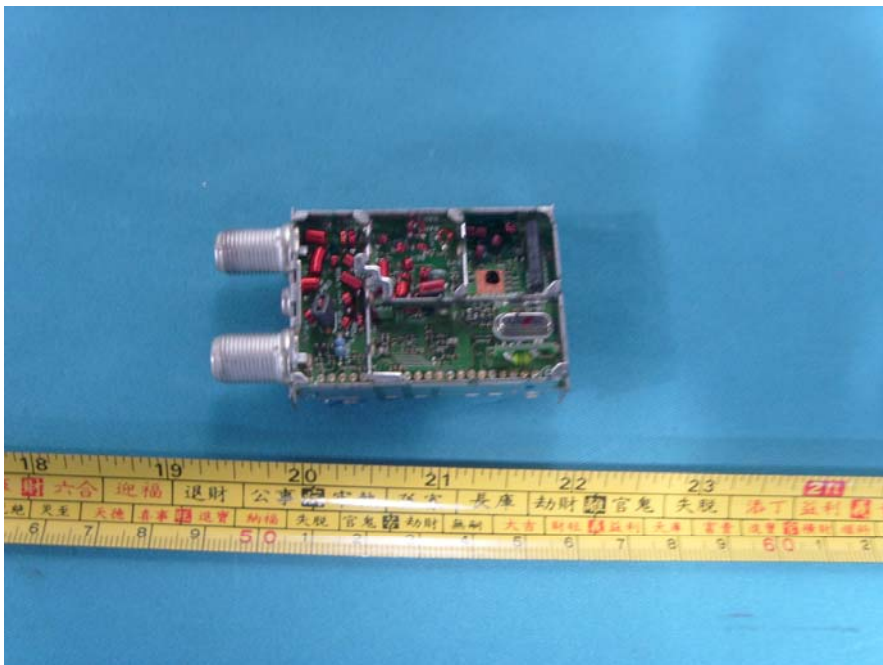
Main board Rear View



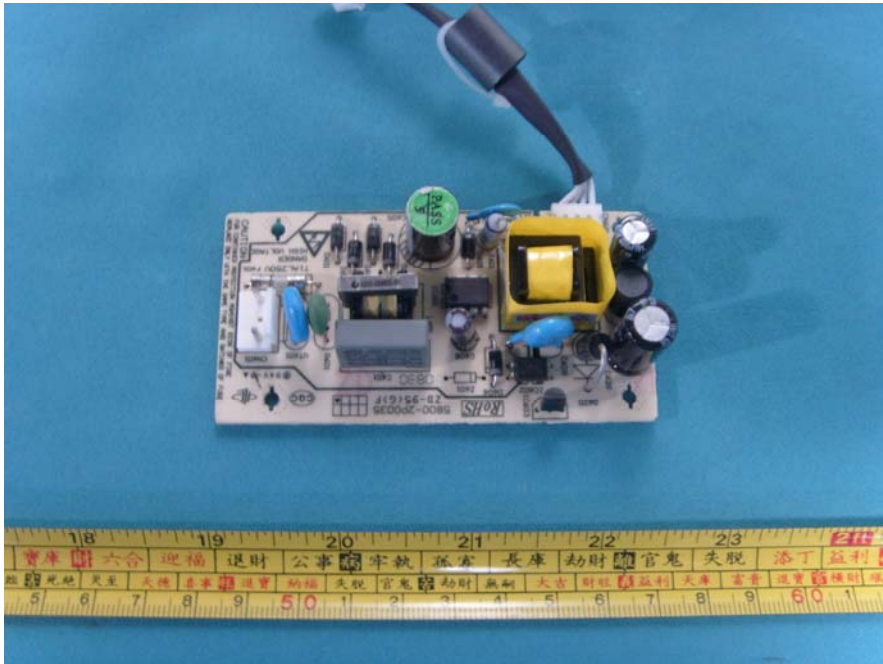
Tuner View



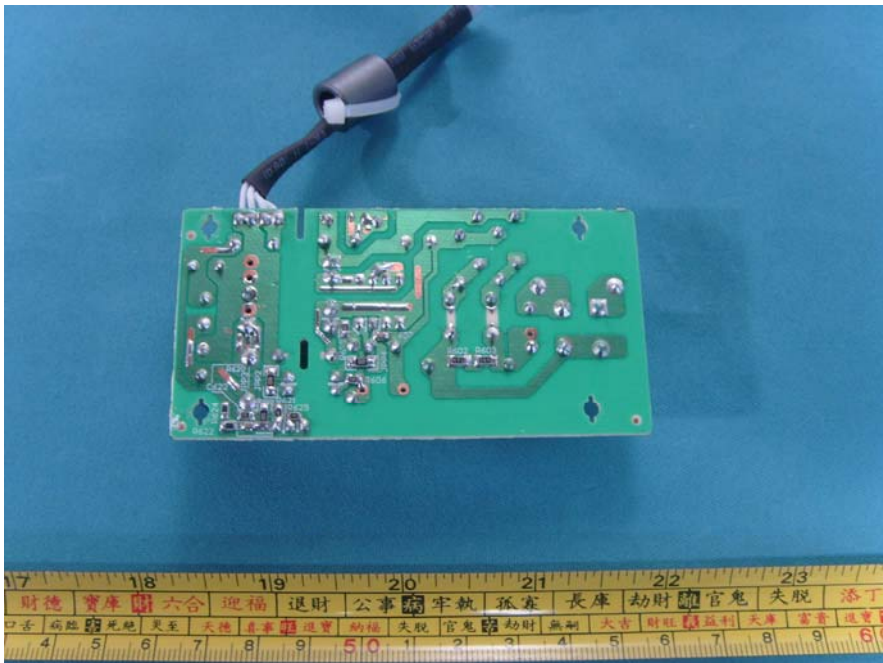
Turn uncovered View#1



Turn uncovered View#2



Power board Front View

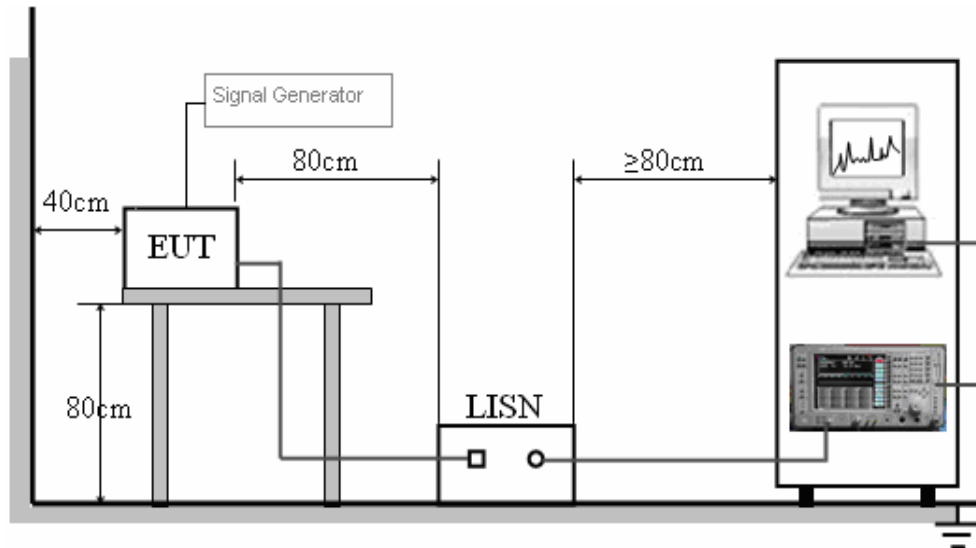


Power board Rear View

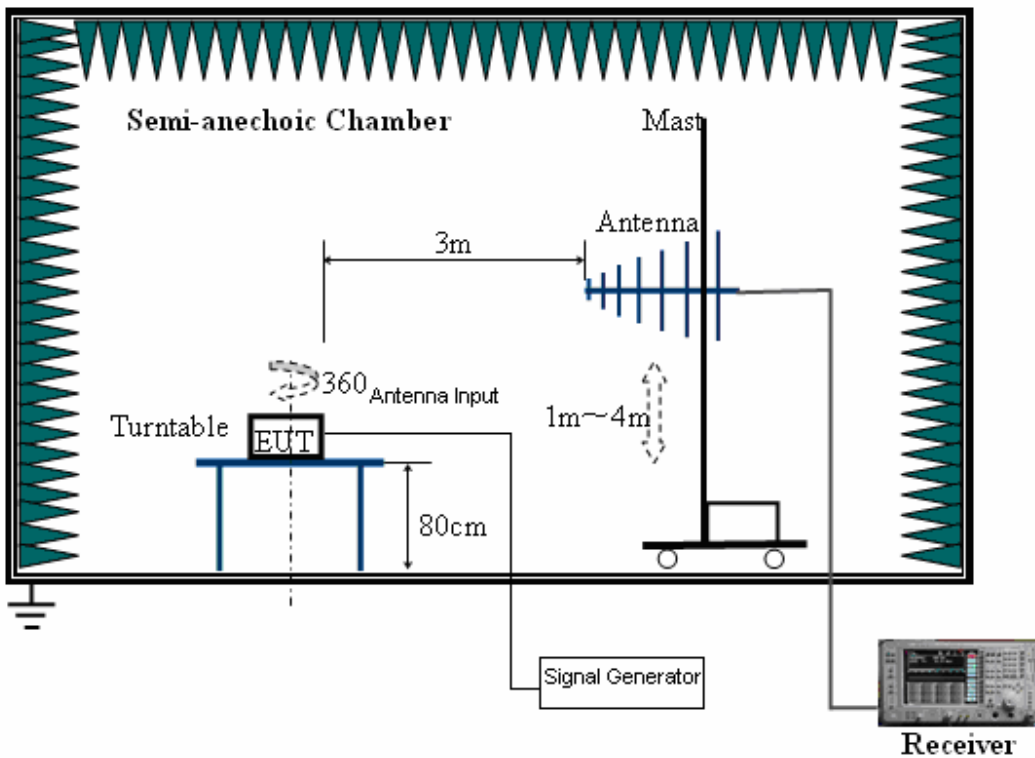
Test System Details

EUT					
Model Number:	HA110C				
Model Tested:	HA110C				
Description:	ATSC Digital Terrestrial Receiver				
Manufacture:	SHENZHEN SKYWORTH DIGITAL TECHNOLOGY CO.,LTD.				
Support Equipment					
Description	Model Number	Serial Number	Manufacturer		
Monitor	KV-HZ29M81	N/A	SONY		
Cable Description					
Description	From	To	Length (Meters)	Shielded (Y/N)	Ferrite (Y/N)
AC Power Cord	EUT	Plug	1.5	N	N
AV Cable	EUT	Monitor	1.1	N	N

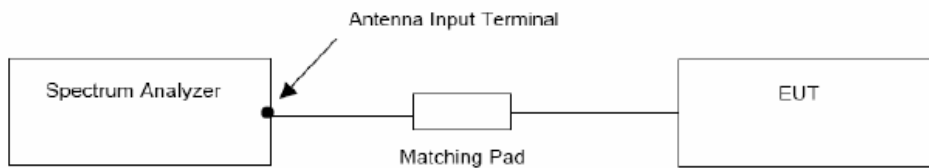
Configuration of Tested System



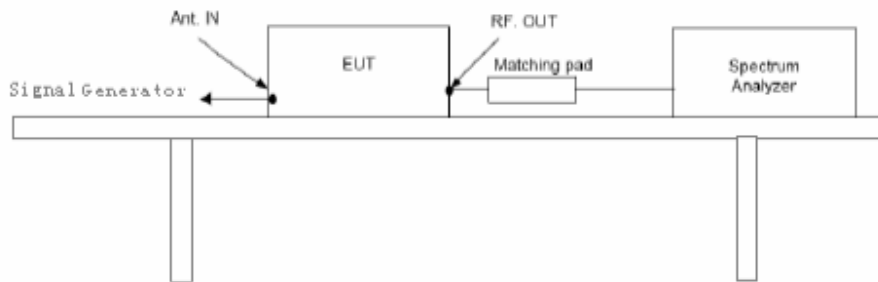
Conducted Emission Measurement Set up



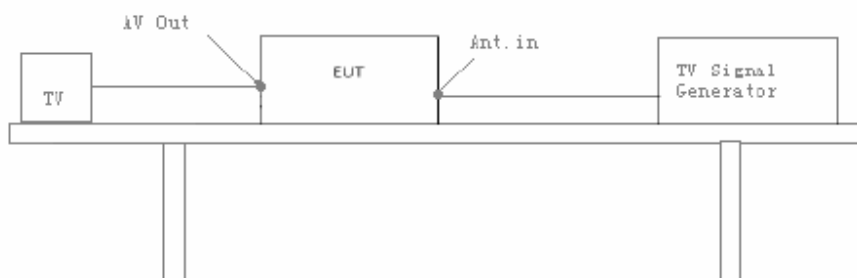
Radiated Emission Measurement Set up



Antenna Power Conduction Measurement Set up



RF Output and Spurious Level Measurement Set up



Incorporate circuitry to automatically prevent emanations Test Set up

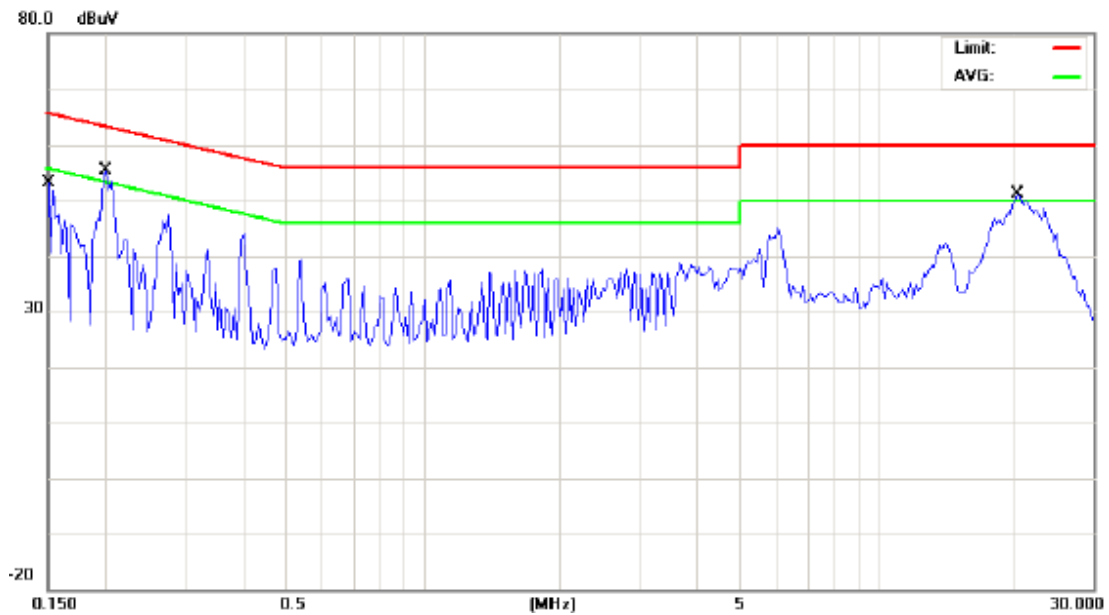
Attachment 1 - Conducted Emission Measurement

CLIENT:	SHENZHEN SKYWORTH DIGITAL TECHNOLOGY CO.,LTD.	TEST STANDERD:	FCC Part 15, Class B
MODEL NUMBERS:	HA110C	PRODUCT:	ATSC Digital Terrestrial Receiver
EUT MODEL:	HA110C	EUT DESIGNATION:	TV Interface Device
TEMPERATURE:	23°C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	Through AC Power Cord
TESTED BY:	Jawen Yin	DATE OF TEST:	2008, Aug. 25
TEST REFERENCE:	ANSI C63.4: 2003, CISPR 16-1:2002		
TEST PROCEDURE:	<p>The EUT was set up according to the guideline of ANSI C63.4: 2003 for conducted emissions test. The measurement was using a AMN on each line and an EMI receiver peak scan was made at the frequency measurement range. The six highest significant peaks were then marked, and these signals were then quasi-peaked and averaged. The frequency range investigated was from 150KHz to 30MHz</p> <p>The EUT was placed on an on-conductive table at least 80 above the ground plan. A grounded vertical reference plane was positioned in a distance of 40cm from the EUT. The distance from the EUT to other metal surfaces was at least 0.8m. The EUT was only earthen by its power cord through the line impedance stabilizing network. The power cord has been bundled to a length of 1.0m.. The test receiver with Quasi Peak detector complies with CISPR 16.</p>		
TESTED RANGE:	150kHz to 30MHz		
TEST VOLTAGE:	120VAC / 60Hz		
RESULTS:	<p>The EUT meets the requirements of test reference for Conducted Emissions.</p> <p>The test results relate only to the equipment under test provided by client.</p>		
Changes or Modifications:	There were no modifications installed by ECMG Worldwide Certification Solution Inc. (China) test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7} \times$ Center Freq., Amp ± 2.6 dB		

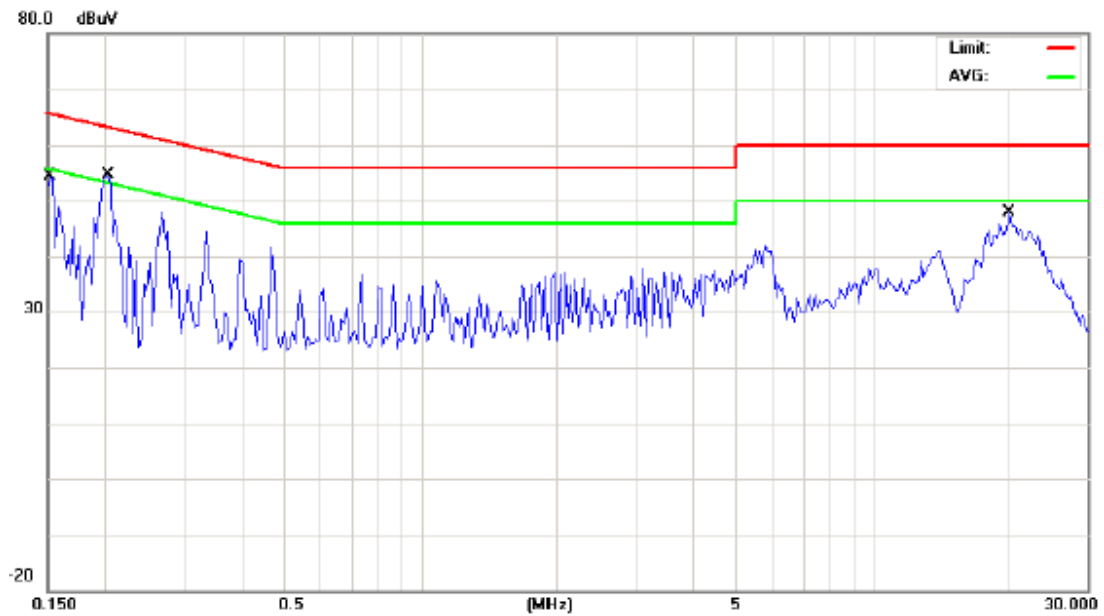
15.107 Conducted limit:

Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

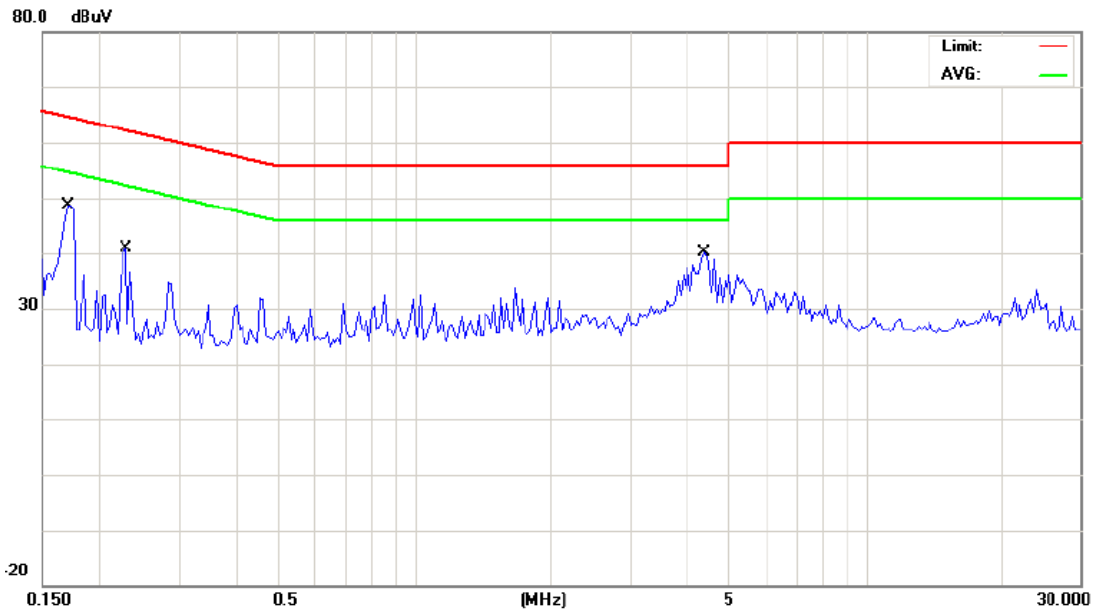
<i>Frequency of Emission (MHz)</i>	<i>Conducted Limit(dBuV)</i>	
	<i>Quasi-Peak</i>	<i>Average</i>
<i>0.15-0.5</i>	<i>66 to 56*</i>	<i>56 to 46*</i>
<i>0.5-5</i>	<i>56</i>	<i>46</i>
<i>5-30</i>	<i>60</i>	<i>50</i>



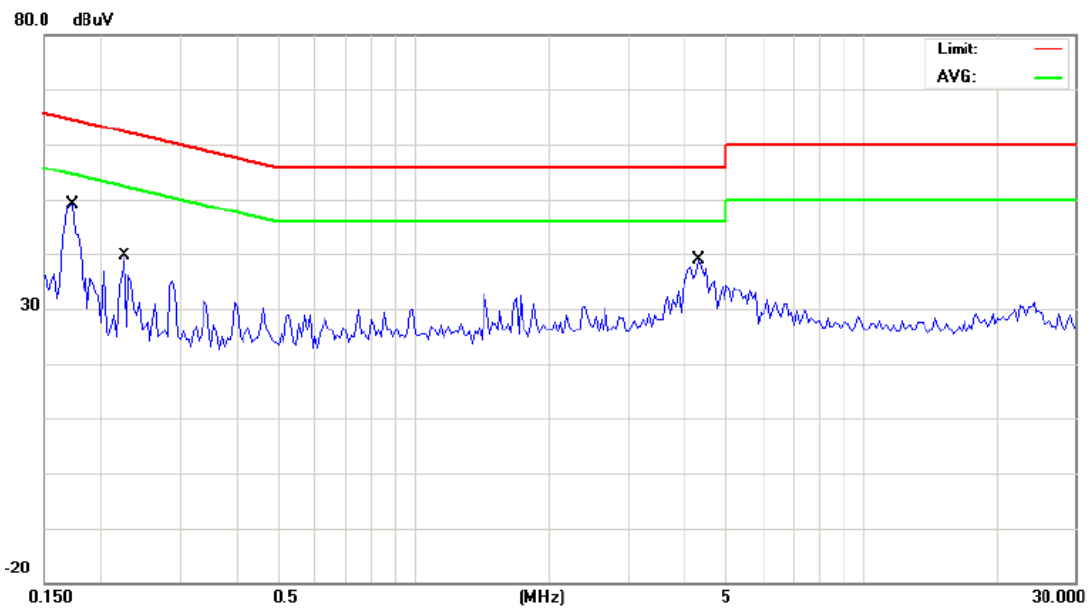
Line L Conducted Emission Graph(AV Output)



Line N Conducted Emission Graph(AV Output)



Line L Conducted Emission Graph(RF Output)



Line N Conducted Emission Graph(RF Output)


Test Data:

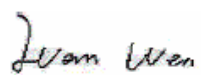
Line	Frequency (MHz)	Corrected QP Level (dBuV)	Limits QP (dBuV)	Margin QP (dB)	Corrected AV Level (dBuV)	Limits AV (dBuV)	Margin AV (dB)
AV Output Mode							
L	0.173	47.89	64.81	-16.92	35.21	54.81	-19.60
L	0.226	37.97	62.59	-24.62	23.18	52.59	-29.41
L	4.336	38.20	56.0	-17.80	29.80	46.00	-16.20
N	0.173	47.35	64.81	-17.46	35.20	54.81	-19.61
N	0.226	37.97	62.59	-24.62	23.18	52.59	-29.41
N	4.336	38.20	56.0	-17.80	29.80	46.00	-16.20
RF Output Mode							
L	0.173	47.89	64.81	-16.92	35.20	54.81	-19.61
L	0.226	37.97	62.59	-24.62	23.15	52.59	-29.44
L	4.336	38.20	56.0	-17.80	29.80	46.00	-16.20
N	0.173	47.35	64.81	-17.46	35.20	54.81	-19.61
N	0.226	37.97	62.59	-24.62	23.18	52.59	-29.41
N	4.336	38.20	56.0	-17.80	29.60	46.00	-16.40
Note: All readings are using a bandwidth of 9 kHz, with a 30 ms sweep time. A video filter was not used.							

Test Equipment List :

<i>Test Equipment</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Serial No.</i>	<i>Last Cal.</i>	<i>Cal. Due Date</i>
<i>Test Receiver</i>	<i>HP</i>	<i>85462A</i>	<i>3704A00349</i>	<i>11/29/08</i>	<i>11/28/09</i>
<i>LISN</i>	<i>R&S</i>	<i>ESH3-Z5</i>	<i>A110503</i>	<i>11/29/08</i>	<i>11/28/09</i>
<i>Signal Generator</i>	<i>R&S</i>	<i>SMY01</i>	<i>SB4033</i>	<i>11/29/08</i>	<i>11/28/09</i>

Note: All testing were performed using internationally recognized standards. All test instruments were calibrated and traceable to the National Institute of Standards and Technology (NIST).

SIGNED BY: 
ENGINEER

REVIEWED BY: 
SENIOR ENGINEER



Conducted Emission Test Set-up Photo

Attachment 2 – Radiated Emission Measurement

CLIENT:	SHENZHEN SKYWORTH DIGITAL TECHNOLOGY CO.,LTD.	TEST STANDERD:	FCC Part 15, Class B
MODEL NUMBERS:	HA110C	PRODUCT:	ATSC Digital Terrestrial Receiver
EUT MODEL:	HA110C	EUT DESIGNATION:	TV Interface Device
TEMPERATURE:	23°C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	None
TESTED BY:	Jawen Yin	DATE OF TEST:	2008, Aug. 25
TEST REFERENCE:	ANSI C63.4: 2003, CISPR 16-1: 2002		
TEST PROCEDURE:	<p>The EUT was set up according to the guidelines of ANSI C63.4: 2003 for radiated emissions test.</p> <p>An EMI receiver peak scan was made at the frequency measurement range (pre-scan) in an Anechoic chamber. Signal discrimination was then performed and the significant peaks marked. These peaks were then quasi-peaked in the frequency range of 30 MHz to 1GHz and Average in the frequency range of 1GHz to 5GHz at an Anechoic chamber.</p> <p>The following data lists the significant emission frequencies, measured levels, correction factors (including cable and antenna correction factors), and the corrected readings against the limits. Explanation of the Correction Factor are given as follows:</p> <p>FS= RA + AF + CF - AG</p> <p>Where: FS = Field Strength</p> <p>RA = Receiver Amplitude</p> <p>AF = Antenna Factor</p> <p>CF = Cable Attenuation Factor</p> <p>AG = Amplifier Gain</p>		
TESTED RANGE:	30MHz to 5000MHz		
TEST VOLTAGE:	120VAC / 60Hz		
RESULTS:	<p>The EUT meets the requirements of test reference for Radiated Emissions.</p> <p>The test results relate only to the equipment under test provided by client.</p>		
CHANGES OR MODIFICATIONS:	There were no modifications installed by ECMG Worldwide Certification Solution Inc. (China) test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		

15.209 Limits of Radiated Emission :

The field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Field Strength ($\text{dB}\mu\text{V}/\text{m}$)
30 - 88	100	40.0
88 -216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

Low Channel(198.31MHz):

Frequency [MHz]	Antenna Polarization [V/H]	Corrected Reading [$\text{dB}\mu\text{V}/\text{m}$]	Margin [dB]	3 Meters Limits [$\text{dB}\mu\text{V}/\text{m}$]
100.3200	H	21.88	-21.62	43.5
175.5100	H	24.04	-19.46	43.5
199.7500	H	25.06	-18.44	43.5
50.0000	V	37.01	-2.99	40.0
129.4200	V	29.24	-14.26	43.5
199.7500	V	31.90	-11.60	43.5

1. All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.
2. Quasi-peaked in the frequency range of 30 MHz to 1GHz and Average in the frequency range of 1GHz to 5GHz
3. All other frequency are more than 20dB below the limit.

Mid Channel(560.31):

Frequency [MHz]	Antenna Polarization [V/H]	Corrected Reading [dB μ V/m]	Margin [dB]	3 Meters Limits [dB μ V/m]
100.3200	H	21.80	-21.70	43.5
175.5100	H	24.01	-19.49	43.5
199.7500	H	25.01	-18.49	43.5
50.0000	V	37.00	-3.00	40.0
129.4200	V	29.24	-14.26	43.5
199.7500	V	31.85	-11.65	43.5
<p>1. All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.</p> <p>2. Quasi-peaked in the frequency range of 30 MHz to 1GHz and Average in the frequency range of 1GHz to 5GHz</p> <p>3. All other frequency are more than 20dB below the limit.</p>				

High Channel (848.31MHz):

Frequency [MHz]	Antenna Polarization [V/H]	Corrected Reading [dB μ V/m]	Margin [dB]	3 Meters Limits [dB μ V/m]
100.3200	H	21.80	-21.70	43.5
175.5100	H	24.00	-19.50	43.5
199.7500	H	25.00	-18.50	43.5
50.0000	V	37.09	-2.91	40.0
129.4200	V	29.24	-14.26	43.5
199.7500	V	32.40	-11.10	43.5
<p>1. All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.</p> <p>2. Quasi-peaked in the frequency range of 30 MHz to 1GHz and Average in the frequency range of 1GHz to 5GHz</p> <p>3. All other frequency are more than 20dB below the limit.</p>				

RF Output(channel 3):

Frequency [MHz]	Antenna Polarization [V/H]	Corrected Reading [dB μ V/m]	Margin [dB]	3 Meters Limits [dB μ V/m]
100.3200	H	21.70	-21.80	43.5
175.5100	H	23.5	-20.00	43.5
199.7500	H	24.08	-19.42	43.5
50.0000	V	35.79	-4.21	40.0
129.4200	V	29.24	-14.26	43.5
199.7500	V	31.90	-11.6	43.5
<p>3. All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.</p> <p>4. Quasi-peaked in the frequency range of 30 MHz to 1GHz and Average in the frequency range of 1GHz to 5GHz</p> <p>3. All other frequency are more than 20dB below the limit.</p>				


RF Output(channel 4):

Frequency [MHz]	Antenna Polarization [V/H]	Corrected Reading [dB μ V/m]	Margin [dB]	3 Meters Limits [dB μ V/m]
100.3200	H	21.88	-21.62	43.5
175.5100	H	24.01	-19.49	43.5
199.7500	H	25.06	-17.90	43.5
50.0000	V	36.89	-3.11	40.0
129.4200	V	29.24	-14.26	43.5
199.7500	V	31.00	-12.5	43.5
<p>5. All readings are quasi-peak unless stated otherwise, using a QPA bandwidth of 120kHz, with a 30 ms sweep time. A video filter was not used.</p> <p>6. Quasi-peaked in the frequency range of 30 MHz to 1GHz and Average in the frequency range of 1GHz to 5GHz</p> <p>3. All other frequency are more than 20dB below the limit.</p>				

Test Equipment List :

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Test Receiver	HP	85462A	3704A00349	11/29/08	11/28/09
Bilog Antenna	Sunol	JB5	A110503	11/29/08	11/28/09
Horn Antenna	Xibao	Xibao	040507	11/29/08	11/28/09
Signal Generator	R&S	SMY01	SB4033	11/29/08	11/28/09
3m SEMI-ANECHOIC CHAMBER	ETS	9X6X6	---	11/29/08	11/28/09

Note: All testing were performed using internationally recognized standards. All test instruments were calibrated and traceable to the National Institute of Standards and Technology (NIST).

SIGNED BY: 
ENGINEER

REVIEWED BY: 
SENIOR ENGINEER



Radiated Emission Test Set-up(Below 1GHz)



Radiated Emission Test Set-up(Above 1GHz)

Attachment 3 – Antenna-Conducted Power Measurement

CLIENT:	SHENZHEN SKYWORTH DIGITAL TECHNOLOGY CO.,LTD.	TEST STANDERD:	FCC Part 15, Class B
MODEL NUMBERS:	HA110C	PRODUCT:	ATSC Digital Terrestrial Receiver
EUT MODEL:	HA110C	EUT DESIGNATION:	TV Interface Device
TEMPERATURE:	23°C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	None
TESTED BY:	Jawen Yin	DATE OF TEST:	2008, Aug. 25
TEST REFERENCE:	ANSI C63.4: 2003, CISPR 16-1: 2002		
TEST PROCEDURE:	<p>The EUT was set up according to the guidelines of ANSI C63.4: 2003 for antenna-conducted power.</p> <ol style="list-style-type: none"> The EUT antenna terminals connected to the EMI receiver , If the antenna impedance matches the impedance of the measuring instrument , Otherwise , use a balun or impedance-matching network to connect the measuring instrument to the antenna terminals of the EUT. Activate the EUT and the measuring instrument and Tune the EUT to one of the numbers of frequencies specified in 12.1.1 of ANSI C63.4 Measure both the frequency and voltage present at the antenna input terminals over the frequency range specified in the individual equipment requirement. Repeat this measurement with the EUT tuned to another frequency until the number of frequency has been successively measured, Power available from the antenna terminals is the ratio of V^2/R..Where V is the loss-corrected voltage measured at the antenna terminals, and R is the impedance of the measuring instrument. For frequencies below or equal to 1000 MHz, a quasi-peak detector shall be used for these measurements. If the peak detected signals are below the limit, then no further investigation of the quasi-peak readings is required. 		
TESTED RANGE:	30MHz to 1000MHz		
TEST VOLTAGE:	120VAC / 60Hz		
RESULTS:	<p>The EUT meets the requirements of test reference for antenna power conduction.</p> <p>The test results relate only to the equipment under test provided by client.</p>		
CHANGES OR MODIFICATIONS:	There were no modifications installed by ECMG Worldwide Certification Solution Inc. (China) test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		

Antenna Power Conduction Limit:

15.109 (f)

For a receiver which employs terminals for the connection of an external receiving antenna, the receiver shall be tested to demonstrate compliance with the provisions of this Section with an antenna connected to the antenna terminals unless the antenna conducted power is measured as specified in Section 15.111(a). If a permanently attached receiving antenna is used, the receiver shall be tested to demonstrate compliance with the provisions of this Section.

Section 15.111 (a)

In addition to the radiated emission limits, receivers that operate (tune) in the frequency range 30 to 960 MHz and CB receivers that provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the provisions of Section 15.109 with the antenna terminals shielded and terminated with a resistive termination equal to the impedance specified for the antenna, provided these receivers also comply with the following: with the receiver antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in Section 15.33 shall not exceed 2.0 nanowatts.

<i>Frequency(MHz)</i>	<i>QP-Limit (nW)</i>	<i>QP-Limit (dBuV)</i>
<i>30 to 1000</i>	<i>2</i>	<i>51.7</i>

Remark : The impedance used in test instrument is 50 Ω

Test Data:

Source		limits (dBuV)	Emission Level (dBuV)	Margin (dB)	
channel	Frequency(MHz)				
11	Fundamental	198.31	51.7	33.2	-17.5
	Harmonics	396.62	51.7	30.8	-20.9
	Harmonics	594.93	51.7	29.6	-22.1
	Harmonics	793.24	51.7	28.4	-23.3
	Harmonics	991.55	51.7	28.5	-23.2
15	Fundamental	476.31	51.7	33.3	-18.4
	Harmonics	952.62	51.7	30.2	-21.5
29	Fundamental	560.31	51.7	31.8	-19.9
77	Fundamental	848.31	51.7	31.0	-20.7


Note :

- 1) A quasi-peak detector shall be used for these measurements, All readings are using a bandwidth of 120kHz. If the peak detected signals are below the limit, then no further investigation of the quasi-peak readings is required.
- 2) Emission level = Reading level + Cable loss.
- 3) Cable loss = Cable loss+Matching Network.

Test Equipment List:

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due Date
Test Receiver	HP	85462A	3704A00349	11/29/2008	11/28/2009
Signal Generator	R&S	SMY01	SB4033	11/29/2008	11/28/2009
Match Network	12N50-75B	Anritsu	A0304264	11/29/2008	11/28/2009

Note: All testing were performed using internationally recognized standards. All test instruments were calibrated and traceable to the National Institute of Standards and Technology (NIST).

SIGNED BY: 
ENGINEER

REVIEWED BY: 
SENIOR ENGINEER



Antenna Power Conduction Test Set Up Photo

Attachment 4 – Output and Spurious level Measurement

CLIENT:	SHENZHEN SKYWORTH DIGITAL TECHNOLOGY CO.,LTD.	TEST STANDERD:	FCC Part 15, Class B
MODEL NUMBERS:	HA110C	PRODUCT:	ATSC Digital Terrestrial Receiver
EUT MODEL:	HA110C	EUT DESIGNATION:	TV Interface Device
TEMPERATURE:	23°C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	None
TESTED BY:	Jawen Yin	DATE OF TEST:	2008, Aug. 25
TEST REFERENCE:	ANSI C63.4: 2003, CISPR 16-1: 2002		
TEST PROCEDURE:	<p>The EUT was set up according to the guidelines of ANSI C63.4: 2003 for out put and spurious level measurement .</p> <p>a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external signal generator.</p> <p>b) A spectrum analyzer or other instrument providing a spectral display is recommended for exploratory measurements. Video filtering is not used during these tests. For measurements in the range 30 to 1000 MHz, set the bandwidth of the measuring instrument to 100 kHz and the detector function to the peak mode. The frequency range may be scanned in segments or in its entirety, adjusting the sweep speed control so that the display is calibrated.</p> <p>c) Configure the EUT as specified in 6.2 and 12.2.2. Remove the termination connected to the end of the EUT output cable, and connect the output cable to the measuring instrument, using an impedance-matching device or balun, as appropriate.</p> <p>d) Energize the EUT, and set it to one of its output channels.</p> <p>e) If the EUT</p> <p>1) Operates only from internal video signals, it shall be tested with these in normal operation. A VCR shall be tested in the record and play modes using a standard TV signal as the modulating signal. Measure the signal level at the visual and aural carrier frequencies. Also measure any emissions in the range from 30 MHz to 4.6 MHz below the visual carrier frequency, and any emissions in the range from 7.4 MHz above the visual carrier frequency to 1 GHz.</p> <p>2) Also operates from externally generated video signal(s), it shall be tested with modulation as follows:</p> <p>i) With the internal signals described in step e), item I)</p> <p>ii) External VITS signal at 1 V peak to peak</p> <p>iii) External VITS signal at 5 V peak to peak.</p> <p>Measure the signal level at the visual and aural carrier frequencies. Also measure any emissions in the range from 30 MHz to 4.6 MHz below the visual carrier frequency, and any emissions in the range from 7.4 MHz above the visual carrier frequency to 1 GHz.</p>		

	f) Repeat step e1), step e2), or step e3), as appropriate, for any other available output channel(s) on the EUT.
TESTED RANGE:	30MHz to 1000MHz
TEST VOLTAGE:	120VAC / 60Hz
RESULTS:	The EUT meets the requirements of test reference for RF output and spurious level . The test results relate only to the equipment under test provided by client.
CHANGES OR MODIFICATIONS:	There were no modifications installed by ECMG Worldwide Certification Solution Inc. (China) test personnel.
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB

Section 15.115(b) Output signal Limit :

(1) At any RF output terminal, the maximum measured RMS voltage, in microvolts, corresponding to the peak envelope power of the modulated signal during maximum amplitude peaks across a resistance (R in ohms) matching the rated output impedance of the TV interface device, shall not exceed the following:

(i) For a cable system terminal device or a TV interface device used with a master antenna, 692.8 times the square root of (R) for the video signal and 155 times the square root of (R) for the audio signal.
[At 75 ohms, this is 6000/1342 μ V; at 300 ohms, this is 12,000/2685 μ V. There is a 13 dB difference³⁸ between video and audio levels.]

(ii) For all other TV interface devices, 346.4 times the square root of (R) for the video signal and 77.5 times the square root of (R) for the audio signal.
[At 75 ohms, this is 3000/671 μ V; at 300 ohms, this is 6000/1342 μ V.]

(2) At any RF output terminal, the maximum measured RMS voltage, in microvolts, corresponding to the peak envelope power of the modulated signal during maximum amplitude peaks across a resistance (R in ohms) matching the rated output impedance of the TV interface device, of any emission appearing on frequencies removed by more than 4.6 MHz below or 7.4 MHz above the video carrier frequency on which the TV interface device is operated shall not exceed the following:

(i) For a cable system terminal device or a TV interface device used with a master antenna, 692.8 times the square root of (R).

(ii) For all other TV interface devices, 10.95 times the square root of (R).
[At 75 ohms, this is 95 μ V; at 300 ohms, this is 190 μ V; this represents a 30 dB attenuation.]

Level of the Carrier:

Source		Reading Level (dBuV)	Factor (dBuV)	limits (dBuV)	Emission Level (dBuV)	Margin (dB)	
channel	Carrier Frequency(MHz)						
3	Video	61.25	55.56	4.8	69.54	60.36	-9.18
	Audio	65.75	43.68	4.8	56.53	48.48	-8.05
4	Video	69.25	55.35	4.8	69.54	60.15	-9.29
	Audio	71.75	43.32	4.8	56.53	48.12	-8.41

1) The impedance of RF Output terminal is 75 ohm. (dBuV=20lguV)
2) Emission level =Reading Level +Factor
3) Factor =Cable loss + Matching Network


Level of the spurious :

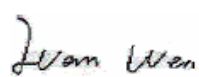
Source		Reading Level (dBuV)	limits (dBuV)	Factor (dB)	Emission Level (dBuV)	Margin (dB)	
channel	Frequency(MHz)						
3	Spurious	51.66	7.7	39.55	4.8	12.5	-27.05
	Spurious	86.254	8.2	39.55	4.8	13.0	-26.55
	Spurious	136.432	10.0	39.55	4.8	14.8	-24.75
	Spurious	248.568	6.6	39.55	4.8	11.4	-28.15
	Spurious	259.484	13.4	39.55	4.8	18.2	-21.35
	Spurious	375.126	7.3	39.55	4.8	12.1	-27.45
4	Spurious	247.788	9.3	39.55	4.8	14.1	-25.45
	Spurious	362.438	8.8	39.55	4.8	13.6	-25.95
	Spurious	432.445	6.4	39.55	4.8	11.2	-28.35
	Spurious	652.556	12.0	39.55	4.8	16.8	-22.75
	Spurious	754.486	6.3	39.55	4.8	11.1	-28.45
<p>1) The impedance of RF Output terminal is 75 ohm. (dBuV=20lguV) 2) Emission level =Reading Level +Factor 3) Factor =Cable loss + Matching Network</p>							

Test Equipment list:

Test Equipment	Model No.	Manufacturer	Serial No.	Last Cal.	Cal. Interval
EMI test receiver	ESCS30	R&S	830245/009	01/22/2008	01/21/2009
Match Network	12N50-75B	Anritsu	A0304264	01/22/2008	01/21/2009
Signal Generator	SMY01	R&S	SB4033	11/29/2008	11/28/2009
3m SEMI-ANECHOIC CHAMBER	ETS	9X6X6	---	01/18/2008	01/18/2011

Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.

SIGNED BY: 
ENGINEER

REVIEWED BY: 
SENIOR ENGINEER



Output and Spurious level test set up photo


Attachment 5 - Incorporate circuitry to automatically prevent emanations


CLIENT:	SHENZHEN SKYWORTH DIGITAL TECHNOLOGY CO.,LTD.	TEST STANDERD:	FCC Part 15, Class B
MODEL NUMBERS:	HA110C	PRODUCT:	ATSC Digital Terrestrial Receiver
EUT MODEL:	HA110C	EUT DESIGNATION:	TV Interface Device
TEMPERATURE:	23°C	HUMIDITY:	47%RH
ATM PRESSURE:	101.0kPa	GROUNDING:	Through AC Power Cord
TESTED BY:	Jawen Yin	DATE OF TEST:	2008 ,Aug. 25
TEST REFERENCE:	Part 15.115(d)		
TEST PROCEDURE:	<p>The EUT was set up according to 15.115(d)</p> <p>A TV interface device, including a cable system terminal device, shall incorporate circuitry to automatically prevent emanations from the device from exceeding the technical specifications in this Part.</p> <p>These circuits shall be adequate to accomplish their functions when the TV interface device is presented, if applicable, with video input signal levels in the range of one to five volts;</p>		
TESTED RANGE:	With video input signal levels in the range of one to five Volts.		
TEST VOLTAGE:	120VAC / 60Hz		
RESULTS:	<p>The EUT meets the requirements of 15.115(d),These circuits could accomplish their function when input a video input signal levels from one to five volts.</p> <p>The test results relate only to the equipment under test provided by client.</p>		
CHANGES OR MODIFICATIONS:	There were no modifications installed by ECMG Worldwide Certification Solution Inc. (China) test personnel.		
M. UNCERTAINTY:	Freq. $\pm 2 \times 10^{-7}$ x Center Freq., Amp ± 2.6 dB		

Test Equipment list:

Test Equipment	Model No.	Manufacturer	Serial No.	Last Cal.	Cal. Interval
Match Network	12N50-75B	Anritsu	A0304264	01/22/2008	01/21/2009
TV Signal Generator	PM5518	Philips	A9012042	01/22/2007	01/21/2008
Signal Generator	SMY01	R&S	SB4033	01/22/2008	01/21/2009

Note: All testing were performed using internationally recognized standards. All test instruments were calibrated.

SIGNED BY: 
ENGINEER

REVIEWED BY: 
SENIOR ENGINEER



Test set up photo