ECMG Worldwide Certification Solutions
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EMI Test Report

On Model Name: DTV Converter Box

Model Number: DT 700

Brand Name : Arena

FCC ID Number: WKJ2008073101

Prepared for ARENA ELECTRONICS LIMITED

According to FCC Part 15 Class B

Test Report #:	SHE-0807-10046-FCCID
Prepared by:	Eddy Chen
Reviewed by:	Ivan Wen
QC Manager:	Paul Chen

Test Report Released by: Paul J. Chen 2008, Aug. 28

Paul Chen 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*
Tel:	*86-021-51909320/51909321*
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	*: DTV Converter Box*
Model Number	*: DT 700*
Model Tested	*: DT 700*
Date Tested	*: 2008, Aug. 24*
Applicant	*: ARENA ELECTRONICS LIMITED*
	Room 806, 8/F, Alliance Building, 130-136 Connaught Road Central, Hk.
Telephone	*: 86-755-26990000-7871*
Fax	*: 86-755-26733777*
Manufacturer	*: ARENA ELECTRONICS LIMITED*
	Room 806, 8/F, Alliance Building, 130-136 Connaught Road Central, Hk.

EUT Description

ARENA ELECTRONICS LIMITED model tested DT 700 (referred to as the EUT in this report) is a DTV Converter Box.

Test Summary

The Electromagnetic Compatibility requirements on model DT 700 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***
Part 15. 107 ANSI C63.4 2003	*Conducted Emission*	*Passed*	*AC Input Port*	*Attachment 1*
Part 15.109 ANSI C63.4 2003	*Radiated Emission*	*Passed*	*Enclosure*	*Attachment 2*
Part 15.111(a) ANSI C63.4 2003	*Antenna Power Conduction*	*Passed*	*RF input*	*Attachment 3*
Part 15.115(b) ANSI C63.4 2003	*Output and spurious conducted level*	*Passed*	*RF Output*	*Attachment 4*
Part 15.115(d) ANSI C63.4 2003	*Incorporate circuitry to automatically prevent emanations*	*Passed*	*RF Input*	*Attachment 5*

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 ARENA ELECTRONICS LIMITED 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 – DT 700

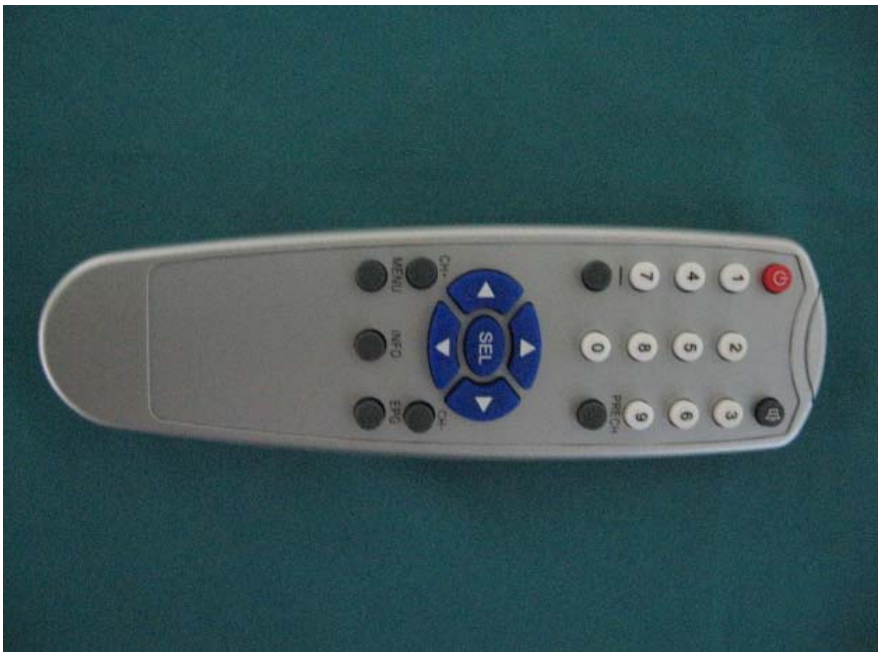
Front View

Back View

Top View

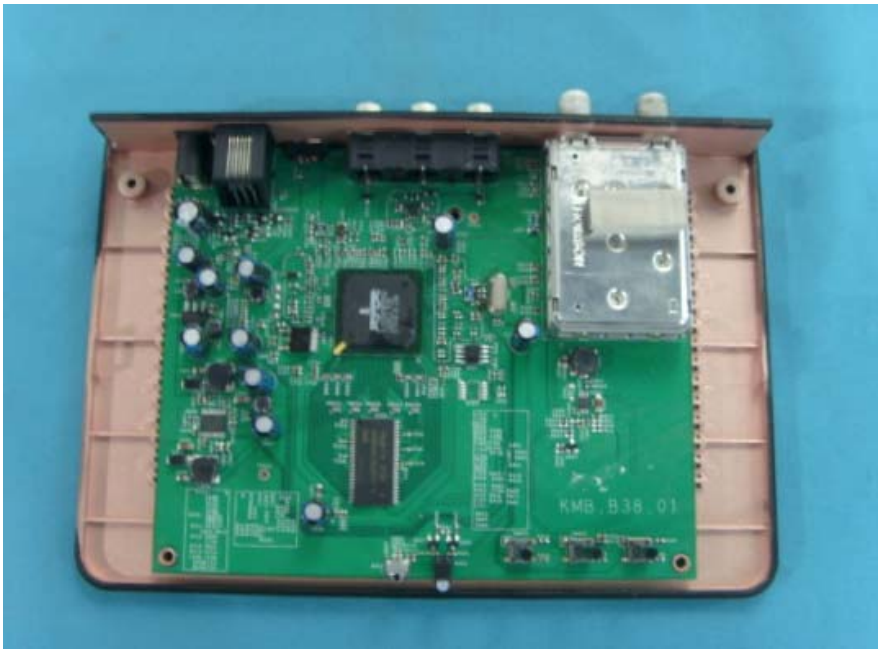
Bottom View

Power Adapter

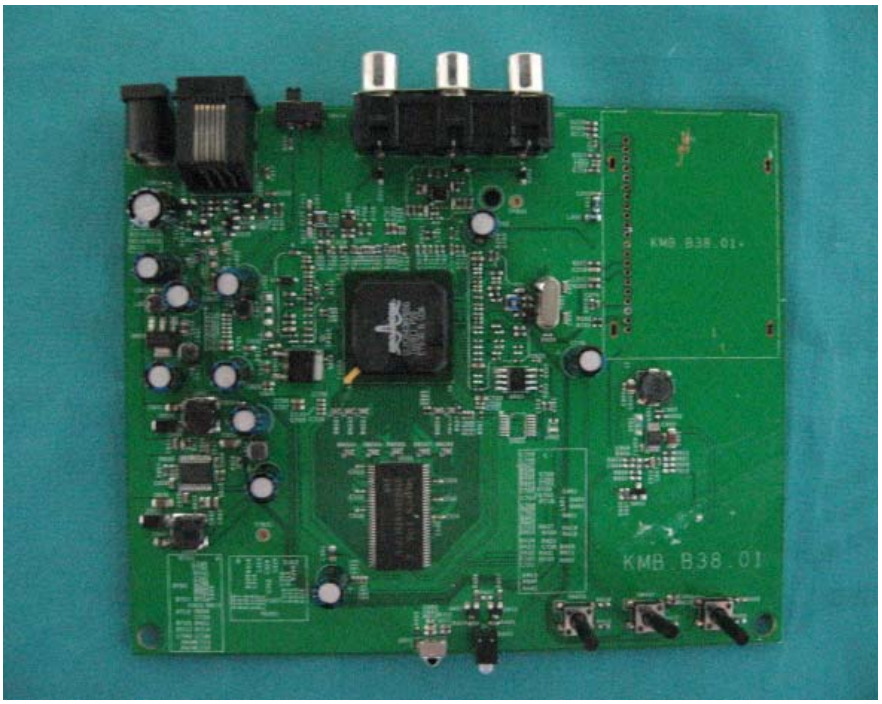


Remote Control

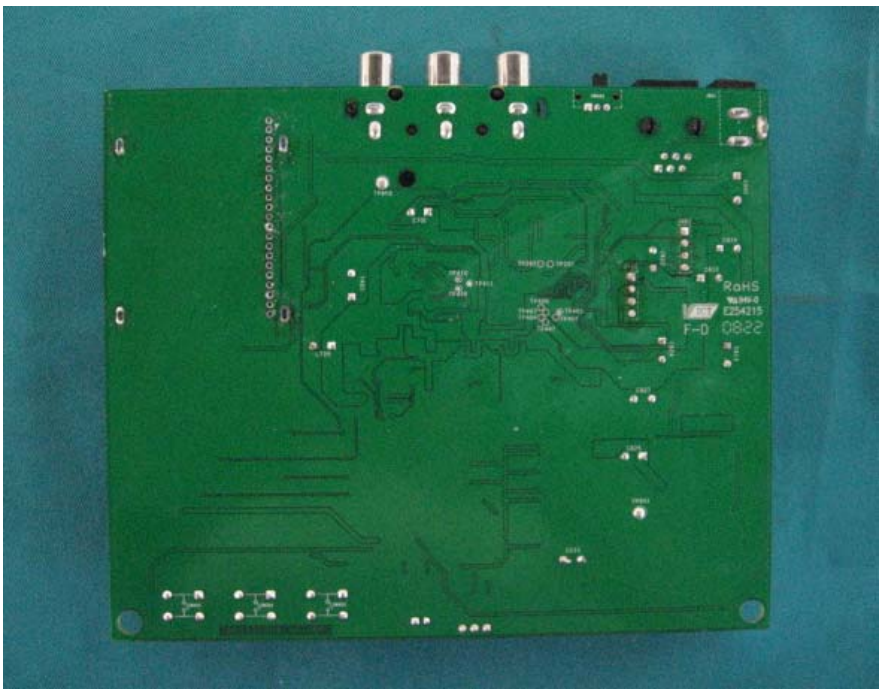
Inside View #1



Inside View #2

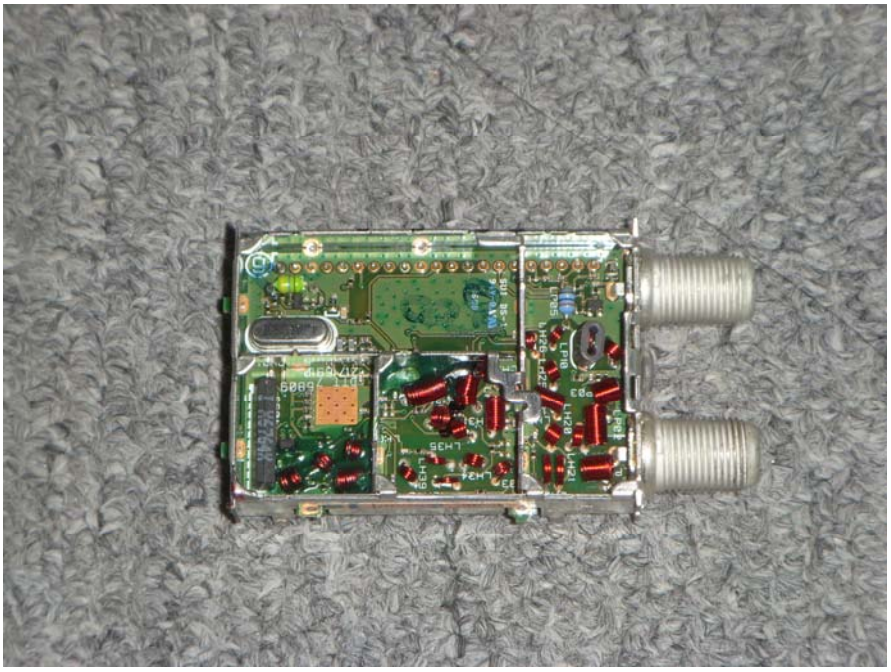


Main board View #1



Main board View #2

Tunner View



Turn uncovered View#1

Turn uncovered View#2

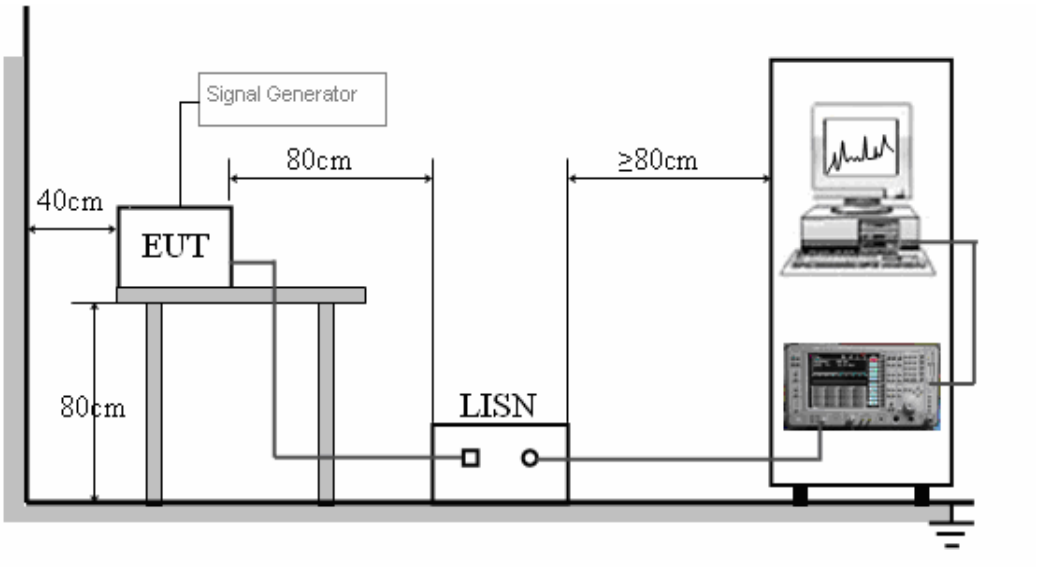
Test System Details

EUT	
Model Number:	DT 700
Model Tested:	DT 700
Description:	DTV Converter Box
Manufacture:	ARENA ELECTRONICS LIMITED

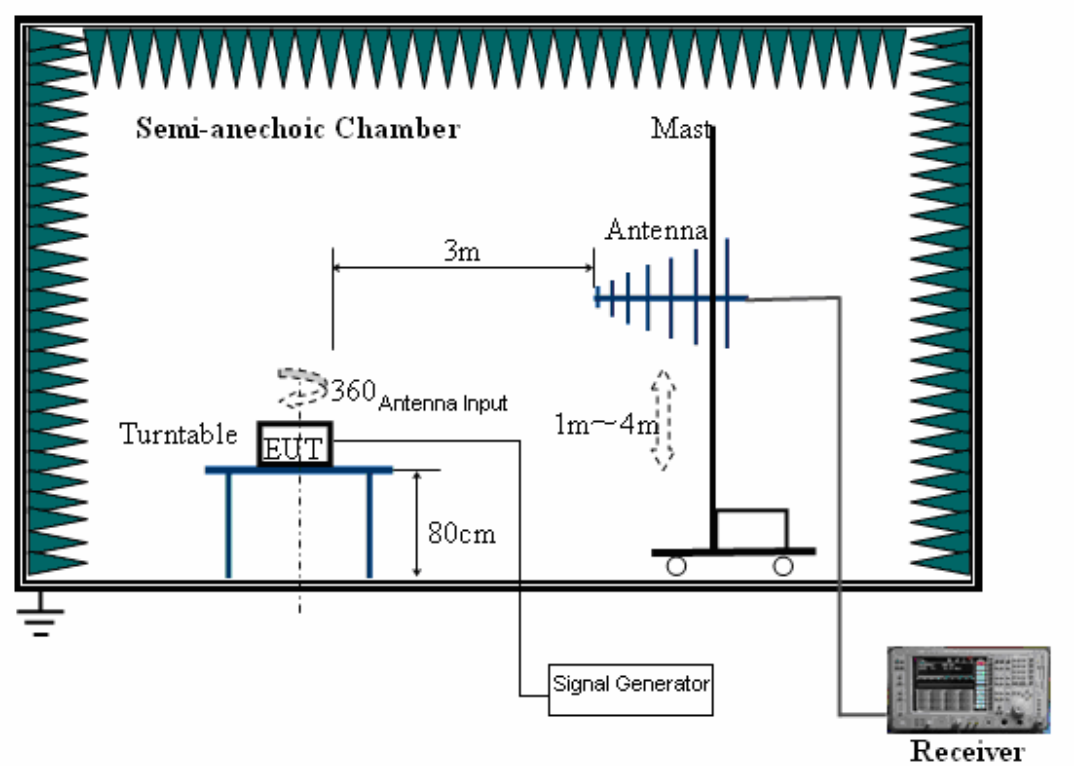
Support Equipment			
Description	**Model Number**	**Serial Number**	**Manufacturer**
Monitor	KV-HZ29M81	N/A	SONY

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

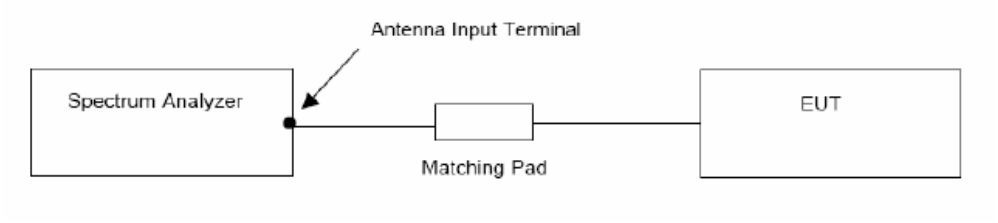
Configuration of Tested System



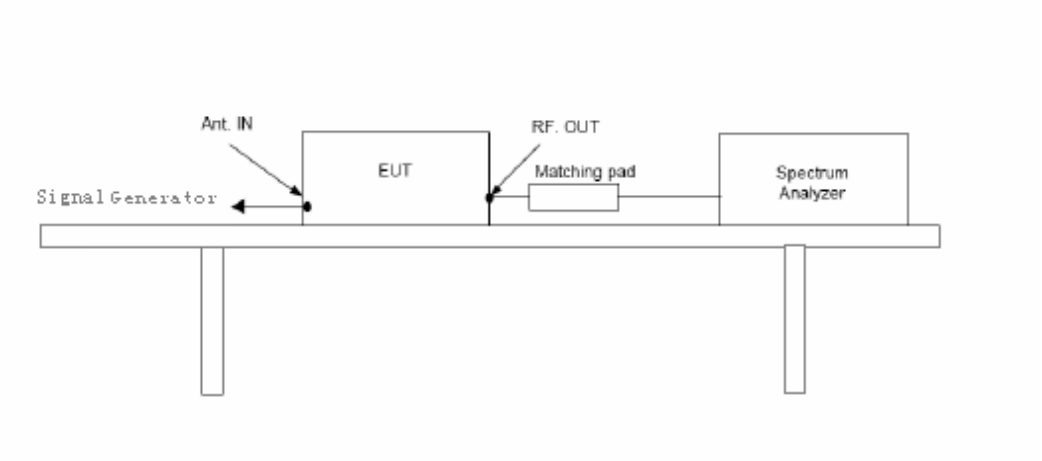
Conducted Emission Measurement Set up



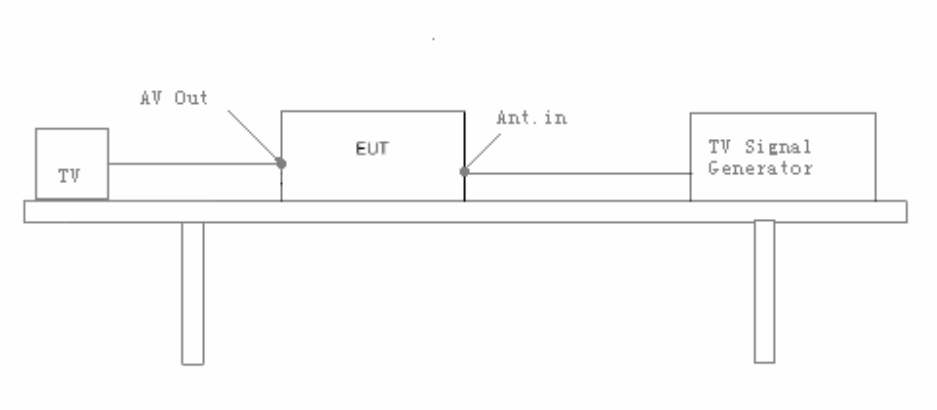
Radiated Emission Measurement Set up



Antenna Power Conduction Measurement Set up



Output and Spurious Level Test Setup



Incorporate circuitry to automatically prevent emanations Test Setup

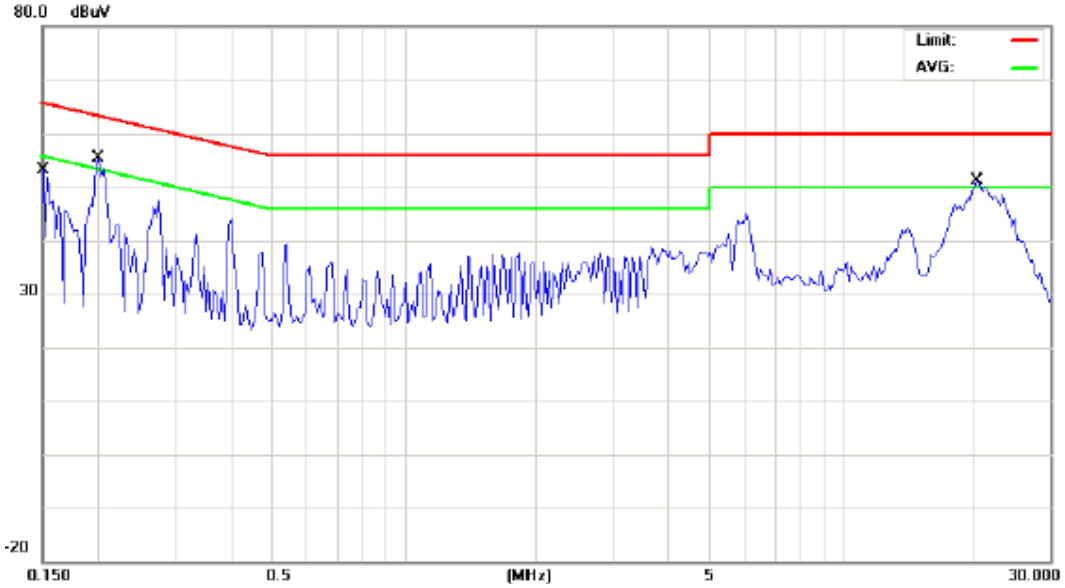
ATTACHMENT 1 – CONDUCTED EMISSION MEASUREMENT

CLIENT:	ARENA ELECTRONICS LIMITED	**TEST STANDERD:**	FCC Part 15, Class B
MODEL NUMBERS:	DT 700	**PRODUCT:**	DTV Converter Box
EUT MODEL:	DT 700	**EUT DESIGNATION:**	TV Interface Device
TEMPERATURE:	23°C	**HUMIDITY:**	47%RH
ATM PRESSURE:	101.0kPa	**GROUNDING:**	None
TESTED BY:	Eddy Chen	**DATE OF TEST:**	2008, Aug. 24
TEST REFERENCE:	ANSI C63.4: 2003, CISPR 16-1:2002		
TEST PROCEDURE:	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. 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.		
TESTED RANGE:	150kHz to 30MHz		
TEST VOLTAGE:	120VAC / 60Hz		
RESULTS:	The EUT meets the requirements of test reference for Conducted Emissions. 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. ± 2x10-7 x Center Freq., Amp ± 2.6 dB		

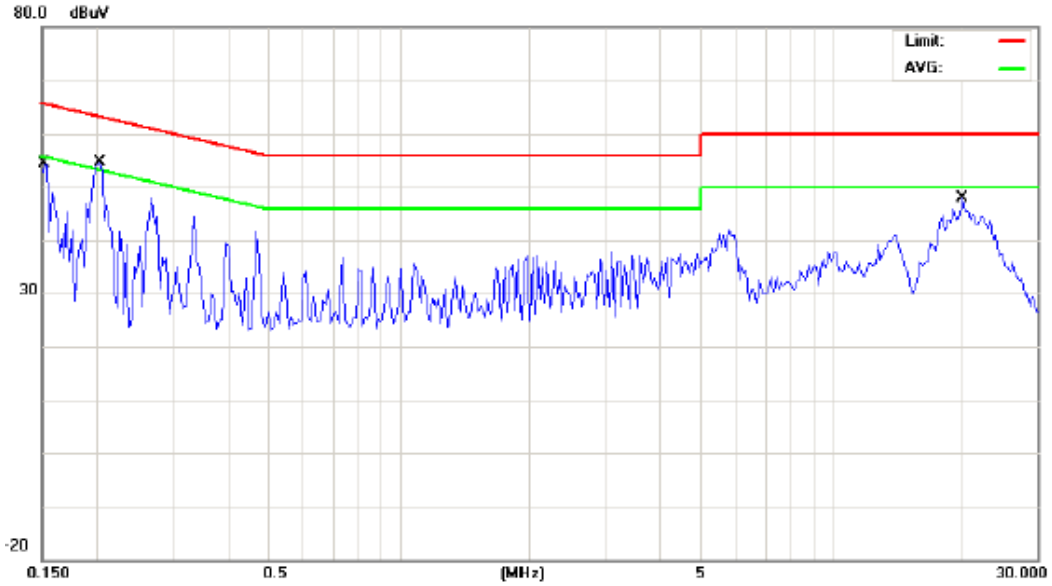
15.107 Conducted limit:

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 μH/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.

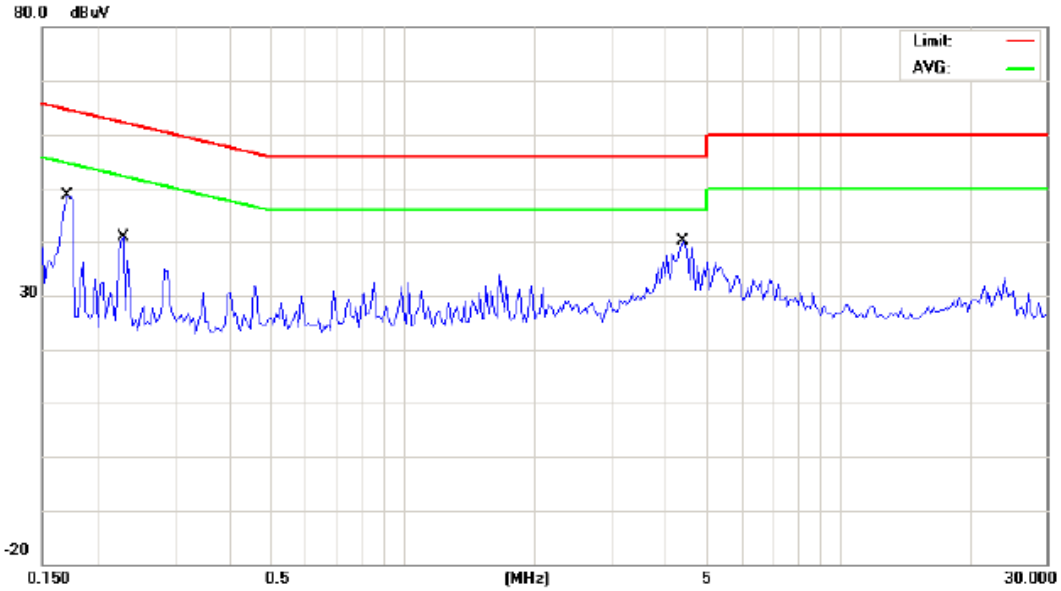
Frequency of Emission (MHz)	*Conducted Limit(dBuV)*	
	Quasi-Peak	*Average*
0.15-0.5	*66 to 56**	*56 to 46**
0.5-5	*56*	*46*
5-30	*60*	*50*



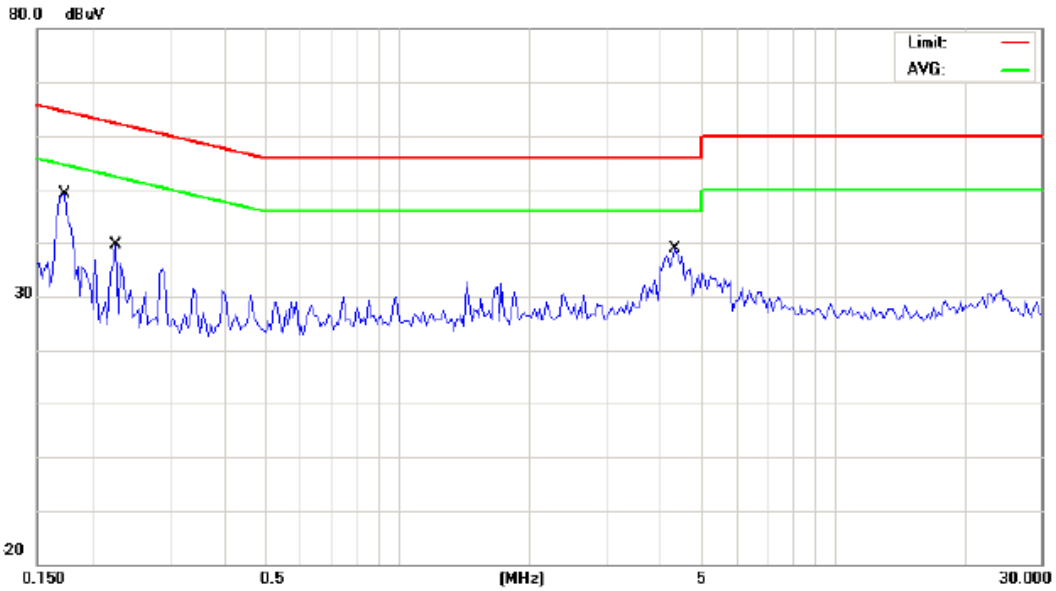
Line L Conducted Emission Graph(AV Output)



Line N Conducted Emission Graph(AV Output)



Line L Conducted Emission Graph(RF Output)



Line N Conducted Emission Graph(RF Output)

Test Data:

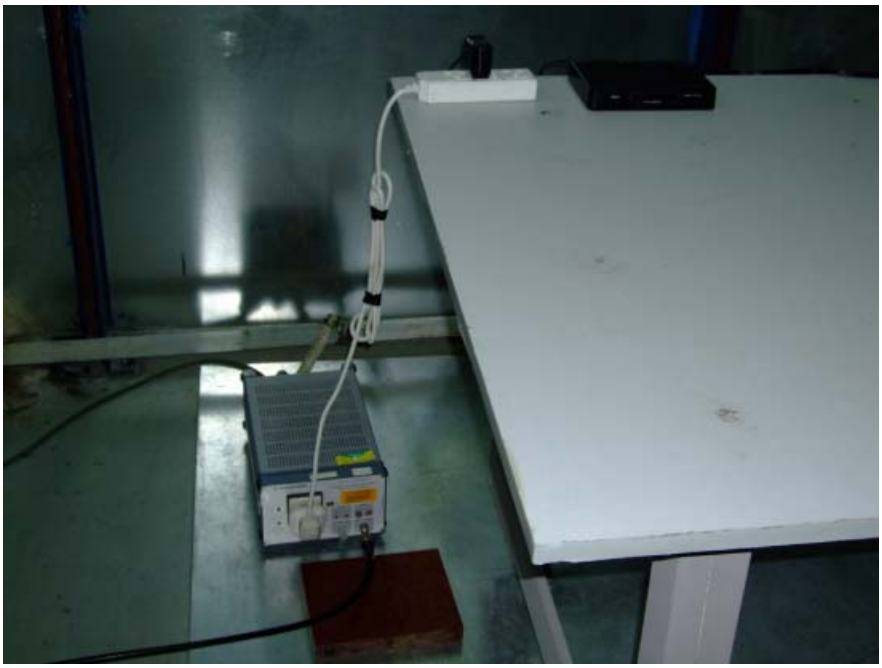
Line	Frequency (MHz)	Corrected QP Level (dBuV)	Limits QP (dBuV)	Margin QP (dB)	Corrected AV Level (dBuV)	Limits AV (dBuV)	Margin AV (dB)
AV Output Mode							
L	0.155	50.62	65.83	-15.21	40.55	55.83	-15.28
L	0.203	53.89	63.56	-9.67	43.18	53.56	-10.38
L	20.432	50.43	60.00	-9.57	39.76	50.00	-10.24
N	0.155	54.02	65.78	-11.76	42.56	55.78	-13.22
N	0.202	54.20	63.44	-9.24	44.25	53.44	-9.19
N	20.172	47.16	60.00	-12.84	36.60	50.00	-13.42
RF output Mode							
L	0.1730	47.35	64.81	-17.46	37.04	54.81	-17.77
L	0.2290	40.04	62.48	-22.44	29.04	52.48	-23.44
L	4.3950	39.05	56.00	-16.95	27.84	46.00	-18.16
N	0.1730	47.89	64.81	-16.92	37.35	54.81	-17.46
N	0.2260	37.97	62.59	-24.62	26.95	52.59	-25.64
N	4.3360	38.20	56.00	-17.80	27.72	46.00	-18.28
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 :

Test Equipment	*Manufacturer*	*Model*	*Serial No.*	*Last Cal.*	*Cal. Due Date*
Test Receiver	*HP*	*85462A*	*3704A00349*	*11/29/08*	*11/28/09*
LISN	*R&S*	*ESH3-Z5*	*A110503*	*11/29/08*	*11/28/09*
Signal Generator	*R&S*	*SMY01*	*844249/018*	*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: _____ ***REVIEWED BY:*** _____

ENGINEER ***SENIOR ENGINEER***



Conducted Emission Test Set-up Photo

ATTACHMENT 2 – RADIATED EMISSION MEASUREMENT

CLIENT:	ARENA ELECTRONICS LIMITED	**TEST STANDERD:**	FCC Part 15, Class B
MODEL NUMBERS:	DT 700	**PRODUCT:**	DTV Converter Box
EUT MODEL:	DT 700	**EUT DESIGNATION:**	TV Interface Device
TEMPERATURE:	23°C	**HUMIDITY:**	47%RH
ATM PRESSURE:	101.0kPa	**GROUNDING:**	None
TESTED BY:	Eddy Chen	**DATE OF TEST:**	2008, Aug. 24
TEST REFERENCE:	ANSI C63.4: 2003, CISPR 16-1: 2002		
TEST PROCEDURE:	The EUT was set up according to the guidelines of ANSI C63.4: 2003 for radiated emissions test. 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. 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: FS= RA + AF + CF - AG Where: FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Attenuation Factor AG = Amplifier Gain		
TESTED RANGE:	30MHz to 5000MHz		
TEST VOLTAGE:	120VAC / 60Hz		
RESULTS:	The EUT meets the requirements of test reference for Radiated Emissions. 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. ± 2x10-7 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 (μV/m)*	*Field Strength (dBμV/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 [dBμV/m]*	*Margin [dB]*	*3 Meters Limits [dBμV/m]*
106.488	*V*	*28.2*	*-13.3*	*43.5*
225.192	*V*	*28.9*	*-17.1*	*46.0*
536.448	*V*	*26.4*	*-19.6*	*46.0*
238.098	*H*	*16.6*	*-29.4*	*46.0*
291.517	*H*	*30.7*	*-15.3*	*46.0*
337.498	*H*	*23.7*	*-22.3*	*46.0*

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 [dBμV/m]*	*Margin [dB]*	*3 Meters Limits [dBμV/m]*
106.476	*V*	*27.8*	*-13.7*	*43.5*
225.192	*V*	*28.8*	*-17.2*	*46.0*
536.450	*V*	*27.5*	*-18.5*	*46.0*
238.102	*H*	*18.4*	*-27.6*	*46.0*
291.516	*H*	*30.7*	*-15.3*	*46.0*
337.496	*H*	*23.6*	*-22.4*	*46.0*

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.

High Channel (848.31MHz):

Frequency [MHz]	*Antenna Polarization [V/H]*	*Corrected Reading [dBμV/m]*	*Margin [dB]*	*3 Meters Limits [dBμV/m]*
112.366	*V*	*26.5*	*-17.0*	*43.5*
225.192	*V*	*28.7*	*-17.3*	*46.0*
536.450	*V*	*26.4*	*-19.6*	*46.0*
238.115	*H*	*18.5*	*-27.5*	*46.0*
291.516	*H*	*30.8*	*-15.2*	*46.0*
337.495	*H*	*23.7*	*-22.3*	*46.0*

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.

RF Output(channel 3):

Frequency [MHz]	*Antenna Polarization [V/H]*	*Corrected Reading [dBμV/m]*	*Margin [dB]*	*3 Meters Limits [dBμV/m]*
37.125	*H*	*25.1*	*-14.9*	*40*
61.830	*H*	*32.0*	*-8.0*	*40*
158.927	*H*	*25.6*	*-17.9*	*43.5*
35.101	*V*	*32.7*	*-7.3*	*40*
149.830	*V*	*26.5*	*-17.0*	*43.5*
198.440	*V*	*28.1*	*-15.4*	*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.

RF Output(channel 4):

Frequency [MHz]	*Antenna Polarization [V/H]*	*Corrected Reading [dBμV/m]*	*Margin [dB]*	*3 Meters Limits [dBμV/m]*
46.010	*H*	*18.7*	*-21.3*	*40.0*
150.830	*H*	*26.7*	*-16.8*	*43.5*
188.324	*H*	*17.1*	*-26.4*	*43.5*
46.025	*V*	*16.3*	*-23.7*	*40.0*
98.643	*V*	*17.8*	*-26.4*	*43.5*
189.015	*V*	*15.0*	*-28.5*	*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.

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: Eddy _____ ***REVIEWED BY:*** Duan Wen _____

ENGINEER ***SENIOR ENGINEER***

Radiated Emission Test Set-up(Below 1GHz)

Radiated Emission Test Set-up(Above 1GHz)

ATTACHMENT 3 – ANTENNA-CONDUCTED POWER MEASUREMENT

CLIENT:	ARENA ELECTRONICS LIMITED	**TEST STANDERD:**	FCC Part 15, Class B
MODEL NUMBERS:	DT 700	**PRODUCT:**	DTV Converter Box
EUT MODEL:	DT 700	**EUT DESIGNATION:**	TV Interface Device
TEMPERATURE:	23°C	**HUMIDITY:**	47%RH
ATM PRESSURE:	101.0kPa	**GROUNDING:**	Through AC Power Cord
TESTED BY:	Eddy Chen	**DATE OF TEST:**	2008, Aug. 24
TEST REFERENCE:	ANSI C63.4: 2003, CISPR 16-1: 2002		
TEST PROCEDURE:	The EUT was set up according to the guidelines of ANSI C63.4: 2003 for antenna-conducted power. a. 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. b. 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 c. Measure both the frequency and voltage present at the antenna input terminals over the frequency range specified in the individual equipment requirement. d. Repeat this measurement with the EUT tuned to another frequency until the number of frequency has been successively measured, e. 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. f. 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:	The EUT meets the requirements of test reference for antenna power conduction.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. ± 2x10-7 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.

Frequency(MHz)	*QP-Limit (nW)*	*QP-Limit (dBuV)*
30 to 1000	*2*	*51.7*

Remark : The impedance used in test instrument is 50 Ω

Test Data:

Source			limits (dBuV)	Factor (dB)	Emission Level (dBuV)	Reading level (dBuV)	Margin (dB)
channel	Frequency(MHz)						
11	Fundamental	198.31	51.7	4.8	34.0	29.2	-17.5
	Harmonics	396.62	51.7	4.8	30.6	25.8	-20.9
	Harmonics	594.93	51.7	4.8	29.4	24.6	-22.1
	Harmonics	793.24	51.7	4.8	28.2	23.4	-23.3
	Harmonics	991.55	51.7	4.8	28.3	23.5	-23.2
15	Fundamental	476.31	51.7	4.8	33.1	28.3	-18.4
	Harmonics	952.62	51.7	4.8	30.0	25.2	-21.5
29	Fundamental	560.31	51.7	4.8	31.6	26.8	-19.9
77	Fundamental	848.31	51.7	4.8	30.8	26.0	-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 + Factor.

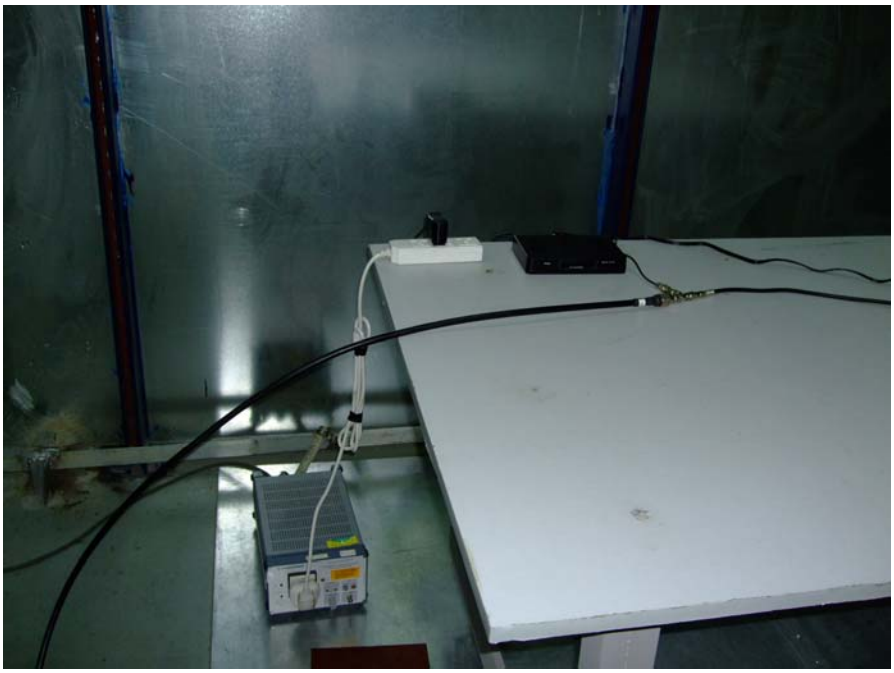
3) Factor = Cable loss+Matching Network.

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: _____ *REVIEWED BY:* _____

ENGINEER *SENIOR ENGINEER*



Antenna Power Conduction Test Set Up Photo

ATTACHMENT 4 – OUTPUT AND SPURIOUS LEVEL MEASUREMENT

CLIENT:	ARENA ELECTRONICS LIMITED	**TEST STANDERD:**	FCC Part 15, Class B
MODEL NUMBERS:	DT 700	**PRODUCT:**	DTV Converter Box
EUT MODEL:	DT 700	**EUT DESIGNATION:**	TV Interface Device
TEMPERATURE:	23°C	**HUMIDITY:**	47%RH
ATM PRESSURE:	101.0kPa	**GROUNDING:**	None
TESTED BY:	Eddy Chen	**DATE OF TEST:**	2008, Aug. 24
TEST REFERENCE:	ANSI C63.4: 2003		
TEST PROCEDURE:	The EUT was set up according to the guidelines of ANSI C63.4: 2003 for out put and spurious level measurement . **a)** Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external signal generator. **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. **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. **d)** Energize the EUT, and set it to one of its output channels. **e)** If the EUT 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. 2) Also operates from externally generated video signal(s), it shall be tested with modulation as follows: i) With the internal signals described in step e), item l) ii) External VITS signal at 1 V peak to peak iii) External VITS signal at 5 V peak to peak. 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. **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. ± 2x10-7 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 uV; at 300 ohms, this is 12,000/2685 uV. 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 uV; at 300 ohms, this is 6000/1342 uV.]

(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 uV; at 300 ohms, this is 190 uV; this represents a 30 dB attenuation.]

Level of the Carrier:

Source			*Reading Level (dBuV)*	*Factor (dB)*	*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	*65.74*	*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)*	*Factor (dB)*	*limits (dBuV)*	*Emission Level (dBuV)*	*Margin (dB)*
channel	*Frequency(MHz)*						
3	*Spurious*	*51.66*	*7.7*	*4.8*	*39.55*	*12.5*	*-27.05*
	Spurious	*86.254*	*8.2*	*4.8*	*39.55*	*13.0*	*-26.55*
	Spurious	*136.432*	*10.0*	*4.8*	*39.55*	*14.8*	*-24.75*
	Spurious	*248.568*	*6.6*	*4.8*	*39.55*	*11.4*	*-28.15*
	Spurious	*259.484*	*13.4*	*4.8*	*39.55*	*18.2*	*-21.35*
	Spurious	*375.126*	*7.3*	*4.8*	*39.55*	*12.1*	*-27.45*
4	*Spurious*	*247.788*	*9.3*	*4.8*	*39.55*	*14.1*	*-25.45*
	Spurious	*362.438*	*8.8*	*4.8*	*39.55*	*13.6*	*-25.95*
	Spurious	*432.445*	*6.4*	*4.8*	*39.55*	*11.2*	*-28.35*
	Spurious	*652.556*	*12.0*	*4.8*	*39.55*	*16.8*	*-22.75*
	Spurious	*754.486*	*6.3*	*4.8*	*39.55*	*11.1*	*-28.45*

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

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 Setup Photo

ATTACHMENT 5 – INCORPORATE CIRCUITRY TO AUTOMATICALLY PREVENT EMANATIONS

CLIENT:	ARENA ELECTRONICS LIMITED	**TEST STANDERD:**	FCC Part 15, Class B
MODEL NUMBERS:	DT 700	**PRODUCT:**	DTV Converter Box
EUT MODEL:	DT 700	**EUT DESIGNATION:**	TV Interface Device
TEMPERATURE:	23°C	**HUMIDITY:**	47%RH
ATM PRESSURE:	101.0kPa	**GROUNDING:**	Through AC Power Cord
TESTED BY:	Eddy Chen	**DATE OF TEST:**	2008 ,Aug. 24
TEST REFERENCE:	Part 15.115(d)		
TEST PROCEDURE:	The EUT was set up according to 15.115(d) 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. 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;		
TESTED RANGE:	With video input signal levels in the range of one to five Volts.		
TEST VOLTAGE:	120VAC / 60Hz		
RESULTS:	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. 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. ± 2x10-7 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