FCC PART 15.249

MEASUREMENT AND TEST REPORT

For

NOVA DVR WIRELESS REMOTE

MODEL: 55518TX

Test Report Number:

BATT201107101R-1

ISSUED FOR

Teknatool International Limited

7D Dallan Place, Albany, Auckland 0632, New Zealand

ISSUED BY:

SHENZHEN BATT TESTING TECHNOLOGY CO.,LTD.

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Issued Date: July 22, 2011

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TABLE OF CONTENTS

TEST CERTIFICATION

Product:	NOVA DVR WIRELESS REMOTE
Model:	55518TX
Brand:	NOVA
Tested:	July 11~18, 2011
Applicant:	**Teknatool International Limited** 7D Dallan Place, Albany, Auckland 0632, New Zealand
Manufacturer:	**Shenzhen Yefo Electronics Technology Co.,Ltd** 809-813,Nuobo Plaza,QianJin 1RD.,Baoan District,ShenZhen

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR PART 15 SUBPART C	NO NON-COMPLIANCE NOTED
DEVIATION FROM APPLICABLE STANDARD	
None	

We hereby certify that:

The above equipment was tested by SHENZHEN BATT TESTING TECHNOLOGY CO.,LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.205 ,15.207, 15.209, 15.249.

The test results of this report relate only to the tested sample EUT identified in this report.

Tested by:

simon mo

Simon Mo
Test Engineer

Reviewed by:

Mike Yong

Mike Yong
EMC Engineer

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	NOVA DVR WIRELESS REMOTE
Trade Name	NOVA
Model Number	55518TX
Model Discrepancy	N/A
Serial Number	N/A
Power Supply	DC 3.2V Powered by LITHIUM Battery
Frequency Range	2440 MHz
Transmit Power	PK: 92.79 dBµV/m@3m ; AV: 90.98 dBµV/m@3m
Modulation Technique	GFSK
Number of Channels	1 channel
Antenna Specification	Printed PCB antenna with 0dBi gain

Note: *1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*

2. This submittal(s) (test report) is intended for FCC ID: ZSG-55518TX filing to comply with Section 15.205 ,15.207, 15.209 and 15.249 of the FCC Part 15, Subpart C Rules.

Objective

This Type approval report is prepared on behalf of *Teknatool International Limited* *in* accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurements were performed at ShenZhen Emtek Co.,Ltd .
The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by ShenZhen Emtek Co.,Ltd to collect test data is located in Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China.

Test site at ShenZhen Emtek Co.,Ltd has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on March 18, 2008 and October 28, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 709623 and 406365. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.
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SYSTEM TEST CONFIGURATION

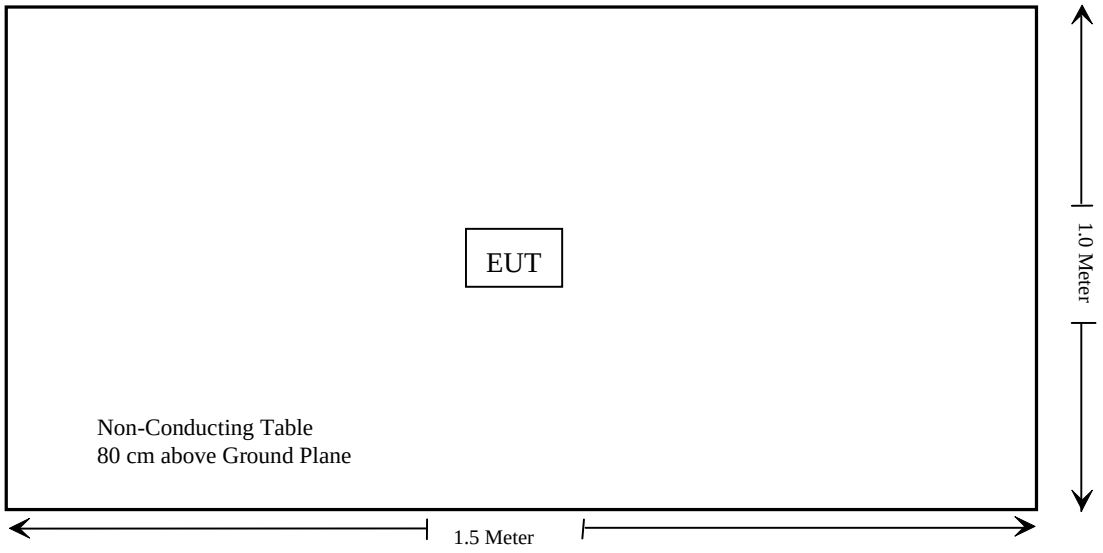
Justification

The system was configured for testing in a engineering mode which was provided by the manufacturer.

Equipment Modifications

No modifications were made to the EUT tested.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	N/A
§15.205(a), §15.209(a), 15.249(a), §15.249(c), §15.35	Radiated Emissions	Compliance
§15.249(d)	Out of Band Emissions	Compliance
§15.215(c)	20dB Bandwidth	Compliance

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Antenna Connector Construction

The EUT has a printed antenna on PCB, the antenna gain is 0 dBi, which in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.

Result: Compliant.

Please refer to the EUT photos.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

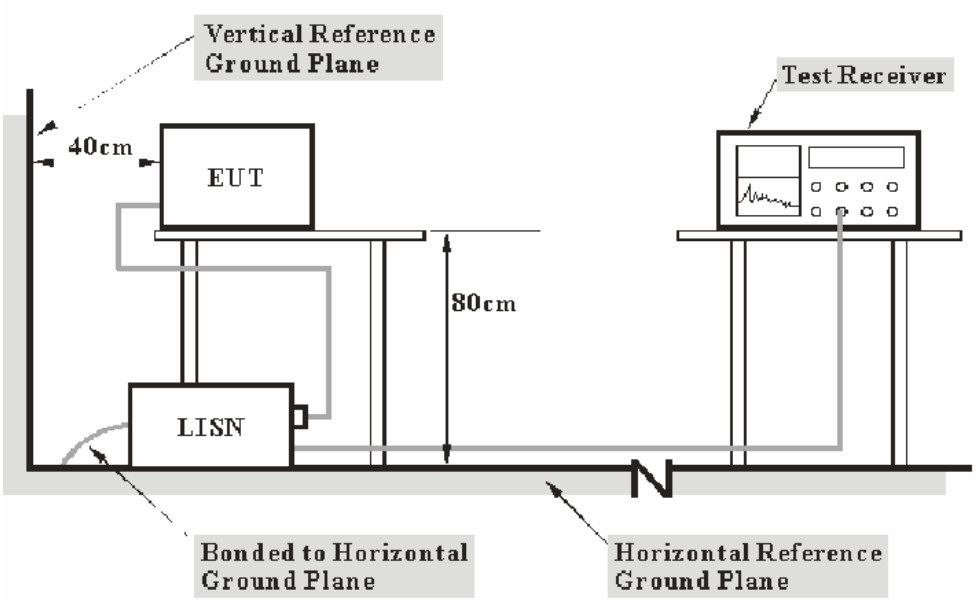
FCC §15.207

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at ShenZhen Emtek Co.,Ltd is ±2.4 dB.

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	***IF B/W***
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	834549/006	2010-09-07	2011-09-06
Rohde &Schwarz	L.I.S.N.	ENV216	834548/112	2010-09-07	2011-09-06
Rohde & Schwarz	EMI Test Receiver	ESCS30	828985/018	2010-09-07	2011-09-06

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to International system of unit (SI).

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Results

Not applicable (The device only employ battery power for operation.)

FCC§15.205, §15.209& §15.249- RADIATED EMISSIONS

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at ShenZhen Emtek Co.,Ltd is ±4.0 dB.

Test Equipment Setup

The spectrum analyzer or receiver is set as:

30 MHz ~1000 MHz:

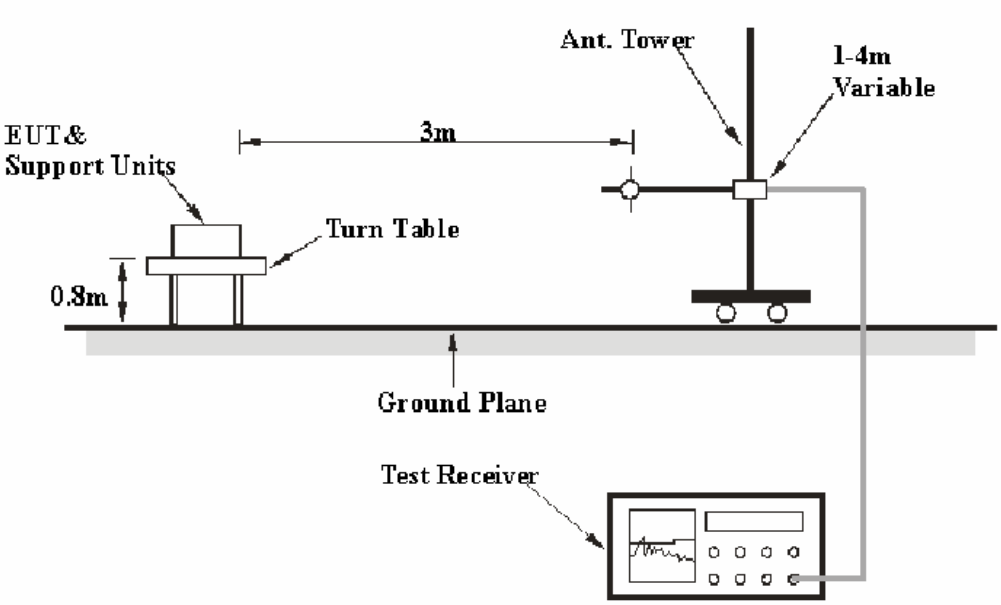
RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

Average: RBW = 1MHz / VBW = 10 Hz / Sweep = Auto

EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209 and FCC 15.249 limits.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSP30	839511/010	2010-09-26	2011-09-25
Rohde & Schwarz	EMI Test Receiver	ESCI	100005	2011-03-08	2012-03-07
HP	Amplifier	8447D	2944A07999	2010-10-02	2011-10-02
HP	Amplifier	8449B	2624A00116	2011-03-03	2012-03-02
Schwardzbeck	Horn Antenna	BBHA 9120	D143	2010-09-04	2011-09-03
Schwardzbeck	Bilog Antenna	VULB9163	142	2011-04-12	2012-04-12
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2011-03-11	2012-03-10

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to International system of unit (SI).

Test Procedure

For the radiated emissions test, maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 & 15.249, with the worst margin reading of:

3.02 dB at **2440 MHz** in the **Vertical** polarization

Test Data

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	50 %
ATM Pressure:	100.2 kPa

The testing was performed by Simon Mo on 2011-07-17.

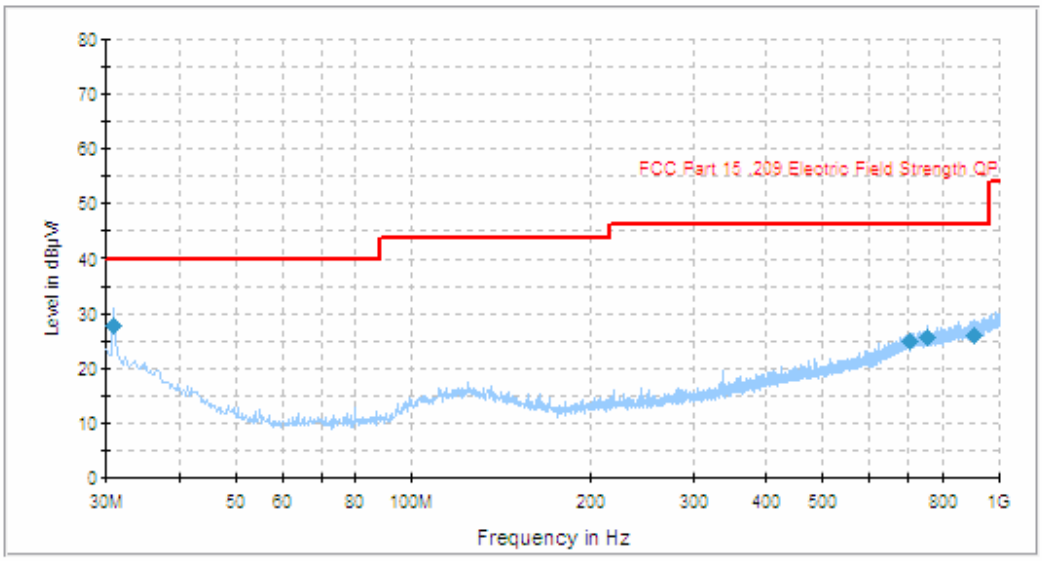
Test Mode: Transmitting

Test Result: Compliance

Please refer to the following table.

30-1000 MHz

Auto test (FCC Part 15.209)



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity	Turntable Position (deg)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
30.914000	27.7	172.0	V	116.0	-6.0	40.0	12.3
904.647250	26.1	371.0	V	77.0	-0.7	46.0	19.9
755.447000	25.5	216.0	V	63.0	-2.4	46.0	20.5
702.453000	25.3	356.0	V	230.0	-3.0	46.0	20.7

Note: The data which below 20dB to limit was not recorded.

Above 1 GHz

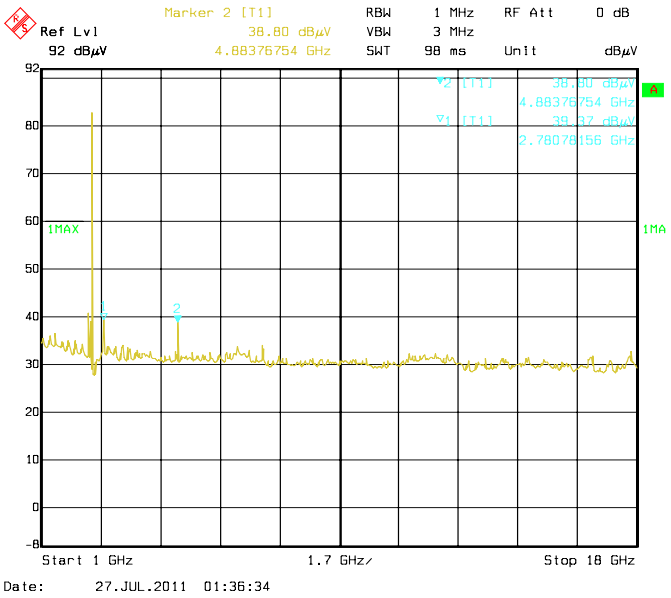
Freq. (MHz)	Reading (dBµV)	Detector QP/PK/Ave.	Direction Degree	Height (m)	Ant. Polar H/V	Ant. Loss (dB)	Cable loss (dB)	Amp. Gain (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.249/15.209		
										Limit (dBµV/m)	Margin (dB)	Comment
Channel (2440 MHz)												
2440	86.15	PK	145	1.50	V	30.4	3.08	26.84	92.79	114	21.21	Fundamental
2440	84.34	Ave	145	1.50	V	30.4	3.08	26.84	90.98	94	3.02	Fundamental
2440	81.98	PK	85	1.50	H	30.3	3.08	26.84	88.52	114	25.48	Fundamental
2440	80.04	Ave	85	1.50	H	30.3	3.08	26.84	86.58	94	7.42	Fundamental
4880	37.84	PK	258	1.50	V	35.1	4.36	26.78	50.52	74	23.48	Harmonic
4880	37.01	Ave	258	1.50	V	35.1	4.36	26.78	49.69	54	4.31	Harmonic
4880	35.12	PK	144	1.50	H	35.3	4.36	26.78	48.00	74	26.00	Harmonic
4880	34.24	Ave	144	1.50	H	35.3	4.36	26.78	47.12	54	6.88	Harmonic

Restricted Band

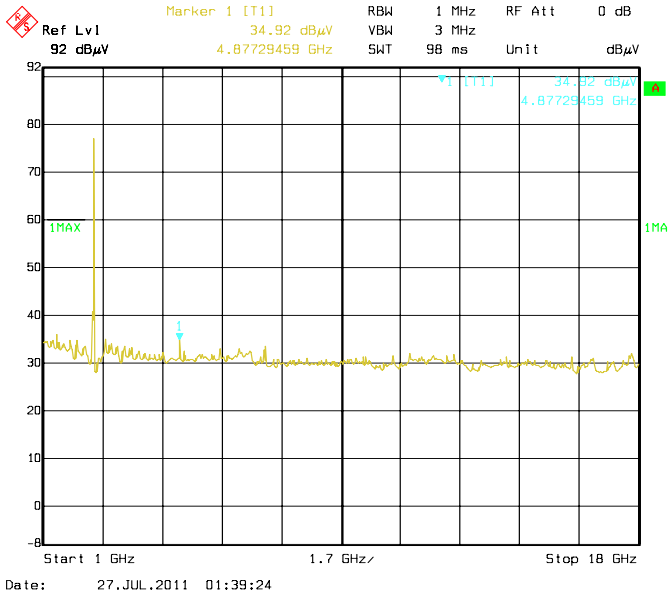
Freq. (MHz)	Reading (dBµV)	Detector QP/PK/Ave.	Direction Degree	Height (m)	Ant. Polar H/V	Ant. Loss (dB)	Cable loss (dB)	Amp. Gain (dB)	Corrected Amplitude (dBµV/m)	FCC Part 15.249/ 15.205		
										Limit (dBµV/m)	Margin (dB)	Comment
2374.61	39.35	PK	80	1.50	V	30.2	2.98	26.83	45.70	74	28.30	Spurious
2374.61	29.02	Ave.	80	1.50	V	30.2	2.98	26.83	35.37	54	18.63	Spurious
2374.61	39.74	PK	360	1.50	H	30.1	2.98	26.83	45.99	74	28.01	Spurious
2374.61	29.19	Ave.	187	1.50	H	30.1	2.98	26.83	35.44	54	18.56	Spurious
2492.66	38.39	PK	139	1.50	V	30.6	3.11	26.86	45.24	74	28.76	Spurious
2492.66	27.59	Ave.	139	1.50	V	30.6	3.11	26.86	34.44	54	19.56	Spurious
2492.66	38.92	PK	245	1.50	H	30.6	3.11	26.86	45.77	74	28.23	Spurious
2492.66	28.31	Ave.	245	1.50	H	30.6	3.11	26.86	35.16	54	18.84	Spurious

Please refer to the following plots of pre-scan:

Horizontal: 1~18 GHz



Vertical: 1~18 GHz



***Note**: The data above 18 GHz which was too low so not recorded.*

§15.249(d) – OUT OF BAND EMISSIONS

Applicable Standard

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at ShenZhen Emtek Co.,Ltd is ±4.0 dB.

Test Equipment Setup

The spectrum analyzer or receiver is set as:

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

Test Procedure

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission at the band edge. The receiving antenna should be changed the polarization both of horizontal and vertical.

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100005	2011-03-08	2012-03-07
HP	Amplifier	8449B	2624A00116	2011-03-03	2012-03-02
Schwardzbeck	Horn Antenna	BBHA 9120	D143	2010-09-04	2011-09-03

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to International system of unit (SI).

Test Data

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	50 %
ATM Pressure:	100.2 kPa

The testing was performed by Simon Mo on 2011-07-17.

Test Mode: Transmitting

Test Result: Compliance

Please refer to the following table.

Freq. (MHz)	Reading (dBµV)	Detector QP/PK/Ave.	Direction Degree	Height (m)	Ant. Polar H/V	Ant. Loss (dB)	Cable loss (dB)	Amp. Gain (dB)	Corrected Amplitude (dBµV/m)	FCC 15.249/15.209	
										Limit (dBµV/m)	Margin (dB)
Out of left side band											
2399.80	39.55	PK	134	1.50	V	30.2	3.03	26.84	45.94	74	28.06
2399.80	29.54	AV	134	1.50	V	30.2	3.03	26.84	35.93	54	18.07
2399.95	39.11	PK	185	1.50	H	30.1	3.03	26.84	45.40	74	28.60
2399.95	28.18	AV	185	1.50	H	30.1	3.03	26.84	34.47	54	19.53
Out of right side band											
2495.65	39.45	PK	136	1.50	V	30.6	3.11	26.86	46.30	74	27.70
2495.65	28.46	AV	136	1.50	V	30.6	3.11	26.86	35.31	54	18.69
2493.22	38.88	PK	246	1.50	H	30.6	3.11	26.86	45.73	74	28.27
2493.22	27.46	AV	246	1.50	H	30.6	3.11	26.86	34.31	54	19.69

FCC§15.215(c) – 20dB BANDWIDTH

Applicable Standard

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100005	2011-03-08	2012-03-07
HP	Amplifier	8449B	2624A00116	2011-03-03	2012-03-02
Schwardzbeck	Horn Antenna	BBHA 9120	D143	2010-09-04	2011-09-03

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to International system of unit (SI).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

3. Measure the frequency difference of two frequencies that indicated 20dB bandwidth.

4. Repeat above procedures until all frequencies measured were complete.

Test Data

Environmental Conditions

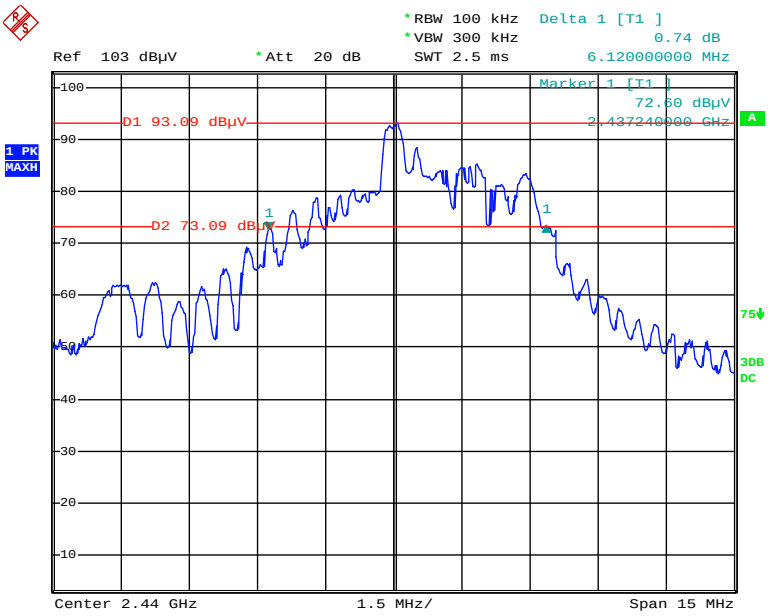
Temperature:	26 °C
Relative Humidity:	50 %
ATM Pressure:	100.2 kPa

**The testing was performed by Simon Mo on 2011-07-18.*

Test Mode: Transmitting

Pleas refer to the plot and tabular data sheet attached.

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)
1	2440	6.120



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