Report No: GZ11111478-1

TEST REPORT

Applicant Name & Address	:	Universal Electronics Inc Address 902-908, 9/F, One harbourfront, 18 Tak Fung Street, Hunghom, Kowloon, Hong Kong.
Manufacturing Site	:	Gemstar TECHNOLOGY(CHINA)CO.,LTD. Gemstar Industrial Park, Shi Guang Road, Zhong Cun Town Panyu Guangdong Province, China

Sample Description

Product	:	Remote controller unit
FCC ID	:	MG3-2119
Model No.	:	APAC UES HuaWei DC750
Electrical Rating	:	3V DC
Frequency	:	2.4G transmitter

Date Received	:	28 November 2011
Date Test Conducted	:	30 November 2011 – 07 December 2011
Test standards	:	**FCC Part 15: 2010**
Test Result	:	Pass
Conclusion	:	The submitted samples complied with the above rules/standards.
Remark	:	None.

**********End of Page**********

Prepared and Checked By:

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Approved By:

Signature
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16 Feb.,2012 Date

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CONTENT

1. General Description

1.1 Product Description

The Equipment Under Test (EUT) is a transmitter, model: APAC UES HuaWei DC750. It is powered by 3V DC. The main function of EUT is working as a TV controller.

Antenna Type: internal, PCB antenna.

For electronic filing, the brief circuit description is saved with filename: Technical Description. pdf.

1.2 Related Submittal (s) / Grants

The FCC application of corresponding TV receiver for this transmitter is the responsible of the TV manufacturer.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). Radiated emission measurement was performed in semi-anechoic chamber room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

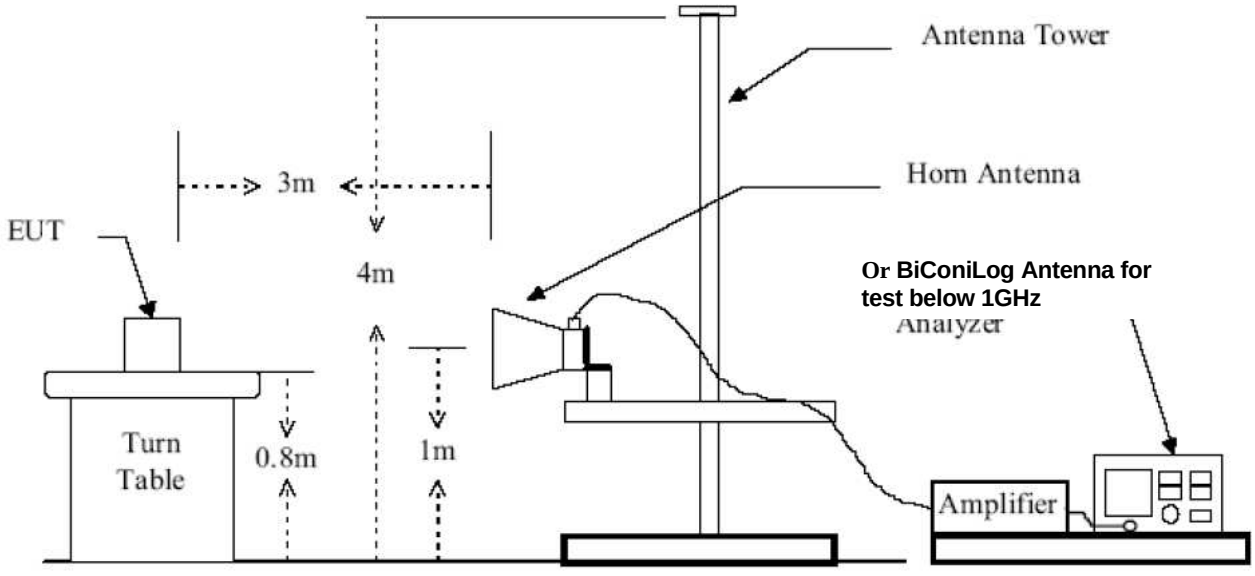
1.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data is Shenzhen EMTEK Co., Ltd. and located at Bldg. 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China. This test facility and site measurement data have been fully placed on file with the FCC, Registration Number: 709623

Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
EE-043	Bilog Antenna	Schwarzbeck	VULB9163	142	29-May-11	29-May-12
EE-089	EMI Test Receiver	Rohde & Schwarz	ESU26	1302.6005.26	29-May-11	29-May-12
EE-068.	Horn Antenna	Schwarzbeck	BBHA 9120	D143	29-May-11	29-May-12
EE-040.	Pre-Amplifier	HP	8447D	2944A07999	29-May-11	29-May-12
EE-174	Semi-Anechoic Chamber	TDK	9*6*6	3m	29-May-11	29-May-12

Test setup figure



Test setup figure

1.5 Measurement Uncertainty

Uncertainty: 3.3 dB in the frequency range of 30MHz-1GHz, 2.9dB in the frequency of above 1GHz at a level of confidence of 95%.
When determining the test conclusion, the Measurement Uncertainty of test has been considered.

2. System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2003).

The EUT was powered by 3V DC(2 x AAA size batteries) in the testing.

Type of modulation: O-QPSK modulation, and only the worst data was reported in this report.

For maximizing emissions, the unit was placed in the center of the turntable, and the turntable was rotated through 360°, the antenna hei ght was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Chapter 3.

2.2 EUT Exercising Software

There was no special software to exercise the device.

2.3 Special Accessories

No special accessories used.

2.4 Equipment Modification

Any modifications installed previous to testing by Universal Electronics Inc will be incorporated in each production model sold/leased in the United States. No modifications were installed by Intertek Testing Services Shenzhen Ltd. Guangzhou Branch.

2.5 Support Equipment List and Description

No support equipment used.

3. Summary of Test Results

FCC Rules	Description of Test	Result
15.203	Antenna Requirement	Pass
15.207	Disturbance Voltage at the Mains Terminals	N/A
15.249	Radiated Emission	Pass
15.249	Band Edges Measurement	Pass

Remark: 1. The symbol “N/A” in above table means Not Applicable.
2. When determining the test results, measurement uncertainty of tests has been considered.

3.1 Antenna Requirement

The EUT Antenna Type: internal, PCB antenna.

3.2 Conducted Emission

The EUT is battery operating device, the conducted emission is unnecessary.

3.3 Radiated Emission

Data is included worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.3.1 Radiated Emission Limits

According to FCC 15.249, operating within the bands 2400-2483.5 MHz, the field strength of emissions from intentional radiators operated within this frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
2400 - 2483.5	50	500

3.3.2 Test Setup

Reference 1.4

3.3.3 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV
→ FS = RA + Correct Factor + AV

Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in –dB
Correct Factor = AF + CF – AG + PD

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
AV = -10 dB

Correct Factor = 7.4 + 1.6 – 29.0 + 0 = -20 dB

FS = 62 + (-20) + (-10) = 32 dBµV/m

Level in µV/m = Common Antilogarithm [(32 dBµV/m)/20] = 39.8 µV/m

3.3.4 Radiated Emission Test Data

Date of test: 07 December 2011
Worst case operating mode: EUT on Transmitting

Table 2-1

Radiated Emissions
Pursuant to FCC 15.249: Emissions Requirement

(2425MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Correct Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2425.667	106.1	-8.7	97.4	114.0	-16.6
Horizontal	4850.346	70.6	-4.4	66.2	74.0	-7.8
Horizontal	7273.026	56.6	2.5	59.1	74.0	-14.9
Vertical	2425.667	100.9	-8.7	92.2	114.0	-21.8
Vertical	4849.346	61.7	-4.4	57.3	74.0	-16.7
Vertical	7170.295	54.6	2.2	56.8	74.0	-17.2

Polarization	Frequency (MHz)	Reading (dBµV)	Correct Factor (dB)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2425.667	106.1	-8.7	19.7	77.7	94.0	-16.3
Horizontal	4850.346	70.6	-4.4	19.7	46.5	54.0	-7.5
Horizontal	7273.026	56.6	2.5	19.7	39.4	54.0	-14.6
Vertical	2425.667	100.9	-8.7	19.7	72.5	94.0	-21.5
Vertical	4849.346	61.7	-4.4	19.7	37.6	54.0	-16.4
Vertical	7170.295	54.6	2.2	19.7	37.1	54.0	-16.9

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

Date of test: 07 December 2011
Worst case operating mode: EUT on Transmitting

Table 2-2

Radiated Emissions
Pursuant to FCC 15.249: Emissions Requirement

(2450MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Correct Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2449.910	103.6	-8.6	95.0	114.0	-19.0
Horizontal	4898.833	66.3	-4.3	62.0	74.0	-12.0
Horizontal	7351.756	55.0	2.5	57.5	74.0	-16.5
Vertical	2449.910	100.9	-8.7	92.2	114.0	-21.8
Vertical	4899.833	60.9	-4.3	56.6	74.0	-17.4
Vertical	7865.385	54.1	3.2	57.3	74.0	-16.7

Polarization	Frequency (MHz)	Reading (dBµV)	Correct Factor (dB)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2449.910	103.6	-8.6	19.7	75.3	94.0	-18.7
Horizontal	4898.833	66.3	-4.3	19.7	42.3	54.0	-11.7
Horizontal	7351.756	55.0	2.5	19.7	37.8	54.0	-16.2
Vertical	2449.910	100.9	-8.7	19.7	72.5	94.0	-21.5
Vertical	4899.833	60.9	-4.3	19.7	36.9	54.0	-17.1
Vertical	7865.385	54.1	3.2	19.7	37.6	54.0	-16.4

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

Date of test: 07 December 2011
Worst case operating mode: EUT on Transmitting

Table 2-3

Radiated Emissions
Pursuant to FCC 15.249: Emissions Requirement

(2475MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Correct Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2475.800	104.2	-8.6	95.6	114.0	-18.4
Horizontal	4948.900	67.2	-4.3	62.9	74.0	-11.1
Horizontal	8900.600	53.0	6.0	59.0	74.0	-15.0
Vertical	2475.000	99.9	-8.6	91.3	114.0	-22.7
Vertical	4950.000	59.6	-4.3	55.3	74.0	-18.7
Vertical	9990.000	53.5	10.7	64.2	74.0	-9.8

Polarization	Frequency (MHz)	Reading (dBµV)	Correct Factor (dB)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2475.800	104.2	-8.6	19.7	75.9	94.0	-18.1
Horizontal	4948.900	67.2	-4.3	19.7	43.2	54.0	-10.8
Horizontal	8900.600	53.0	6.0	19.7	39.3	54.0	-14.7
Vertical	2475.000	99.9	-8.6	19.7	71.6	94.0	-22.4
Vertical	4950.000	59.6	-4.3	19.7	35.6	54.0	-18.4
Vertical	9990.000	53.5	10.7	19.7	44.5	54.0	-9.5

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

3.3.5 Test Result

The data on the above test result table lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

According 15.249, the worst case radiated emission at 4850.346 MHz
Judgement: Passed by 7.5 dB

3.4 Band Edges Measurement

3.4.1 Limited of the band edges measurement

Sec15.249:
(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 Section 15.209, whichever is the lesser attenuation.

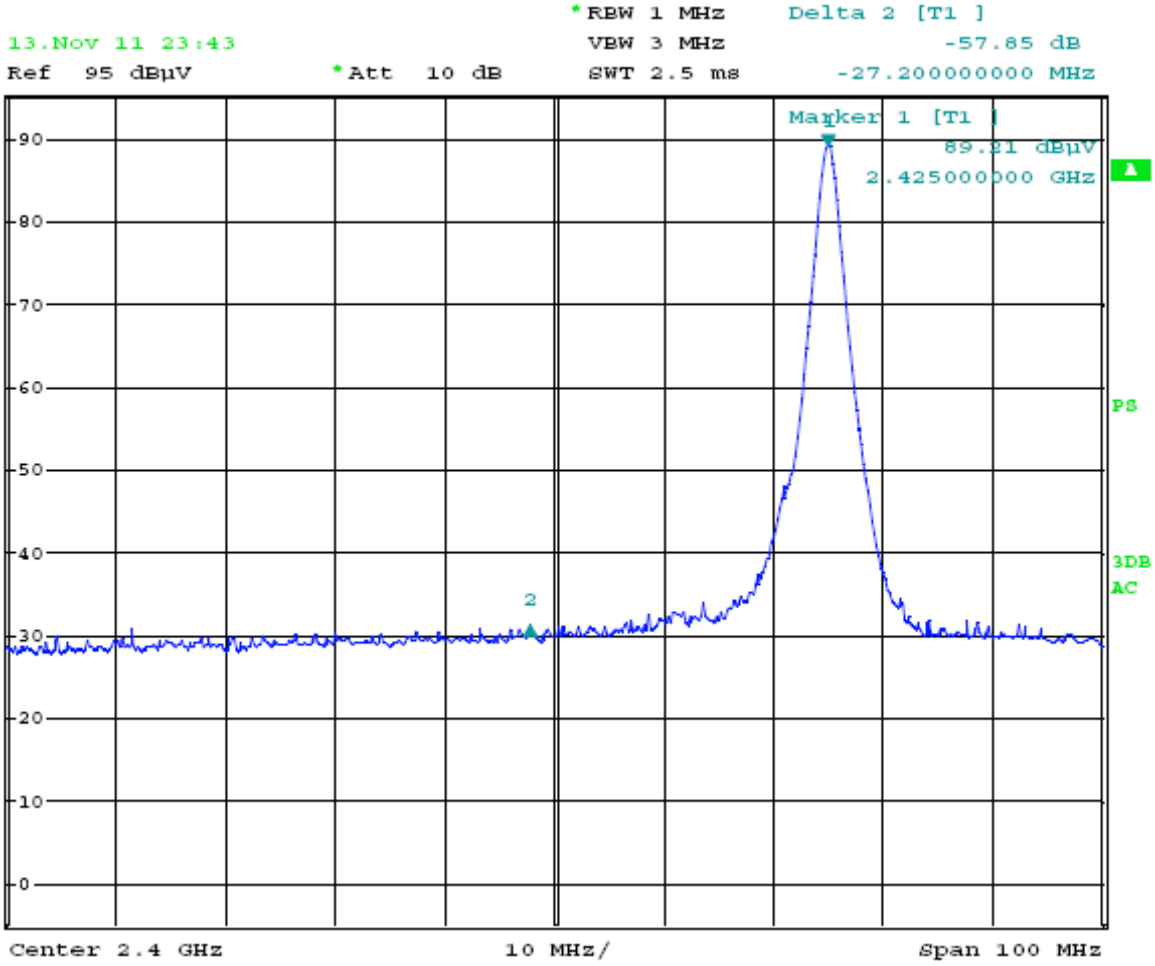
(e) As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

3.4.2 Test Setup

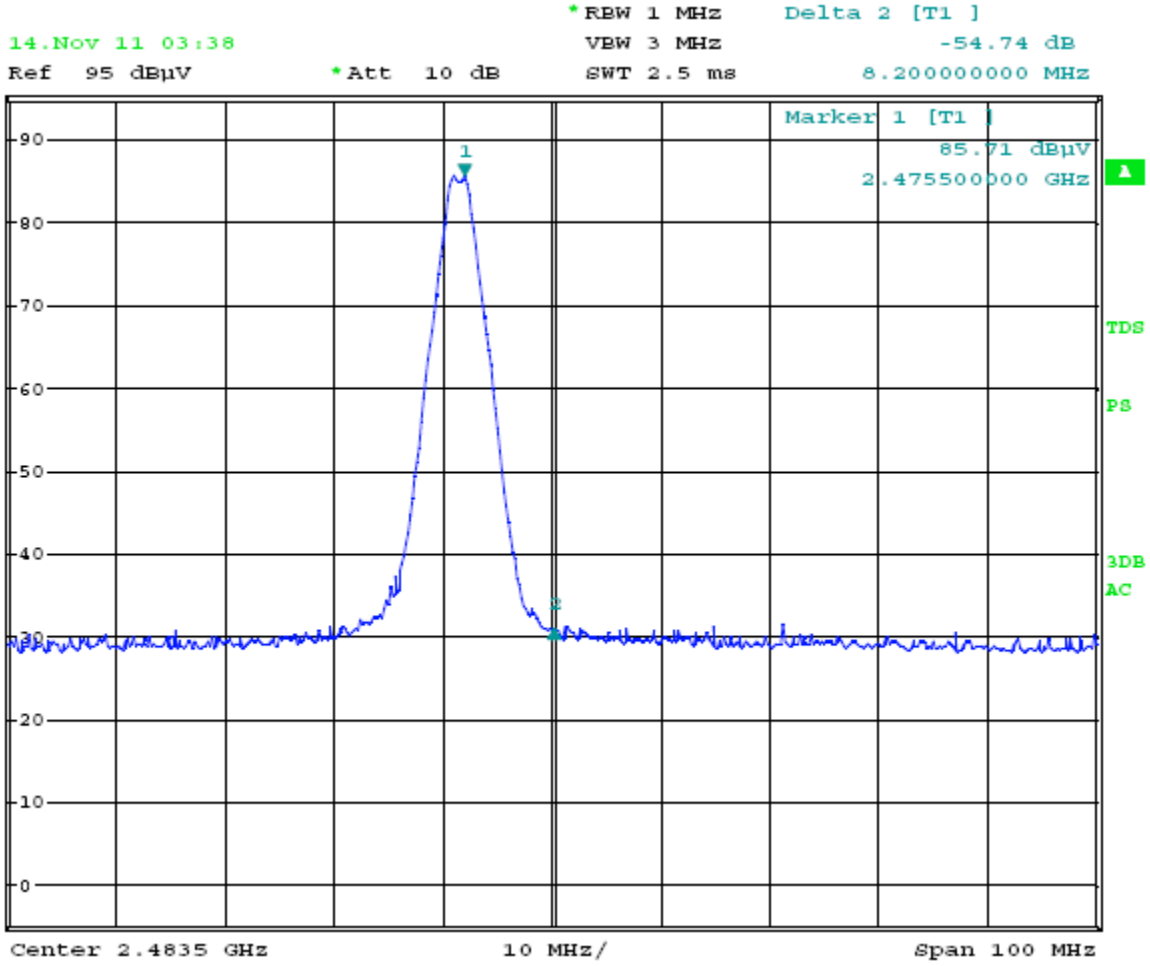
Reference 1.4

3.4.3 Test Plot

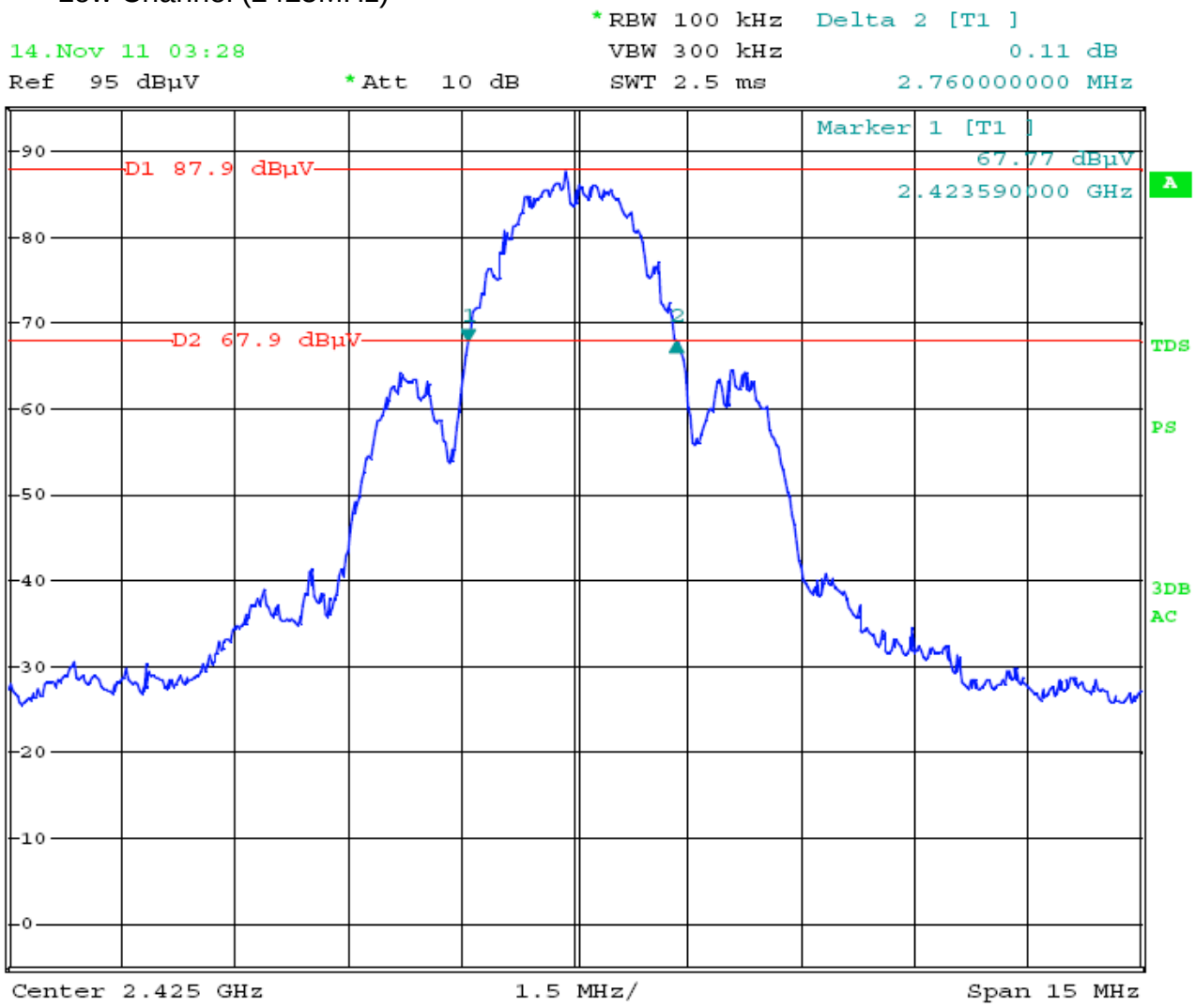
Frequency Bands
Operating mode: Transmitting
Low Channel (2425MHz)



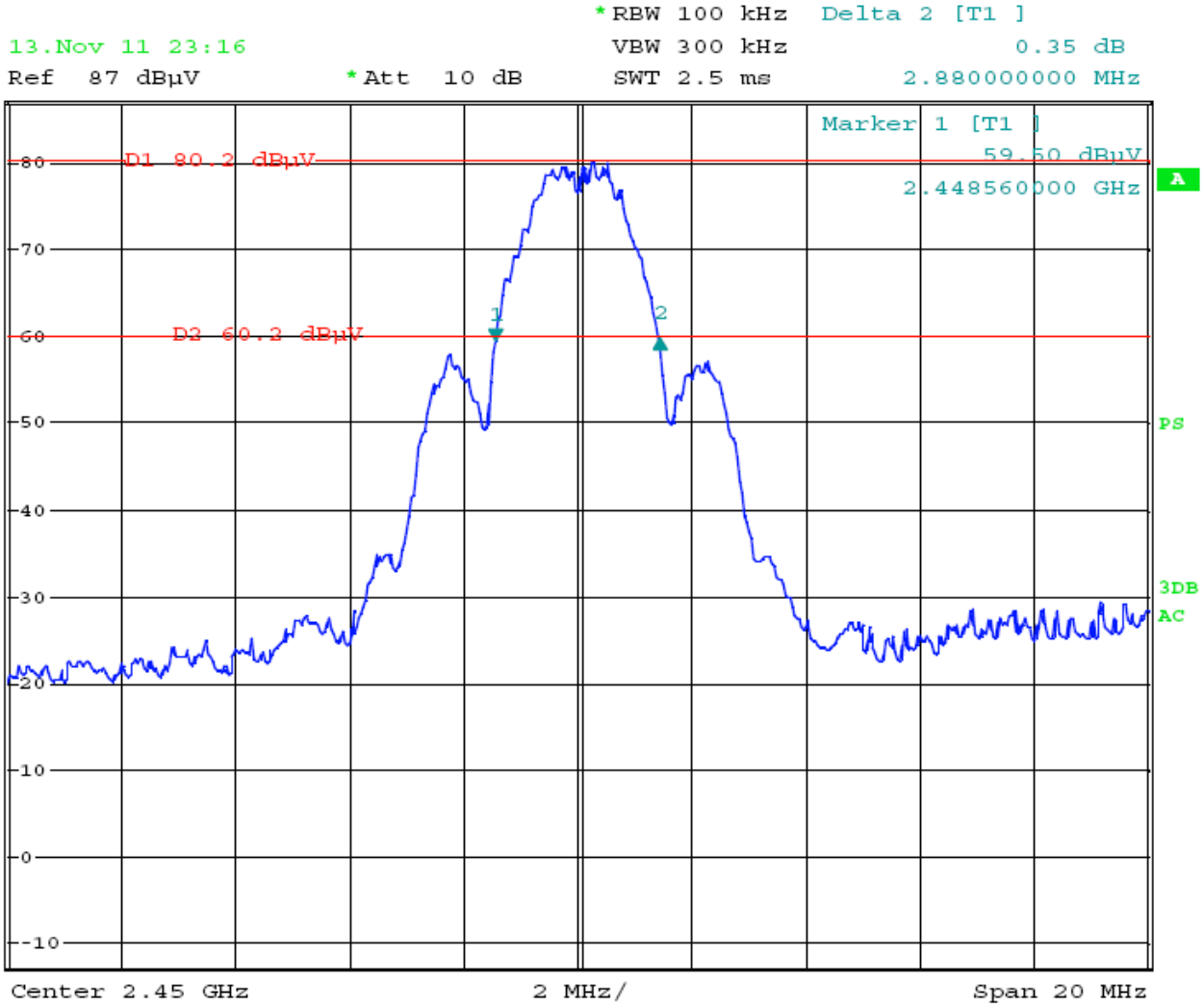
High Channel (2475MHz)



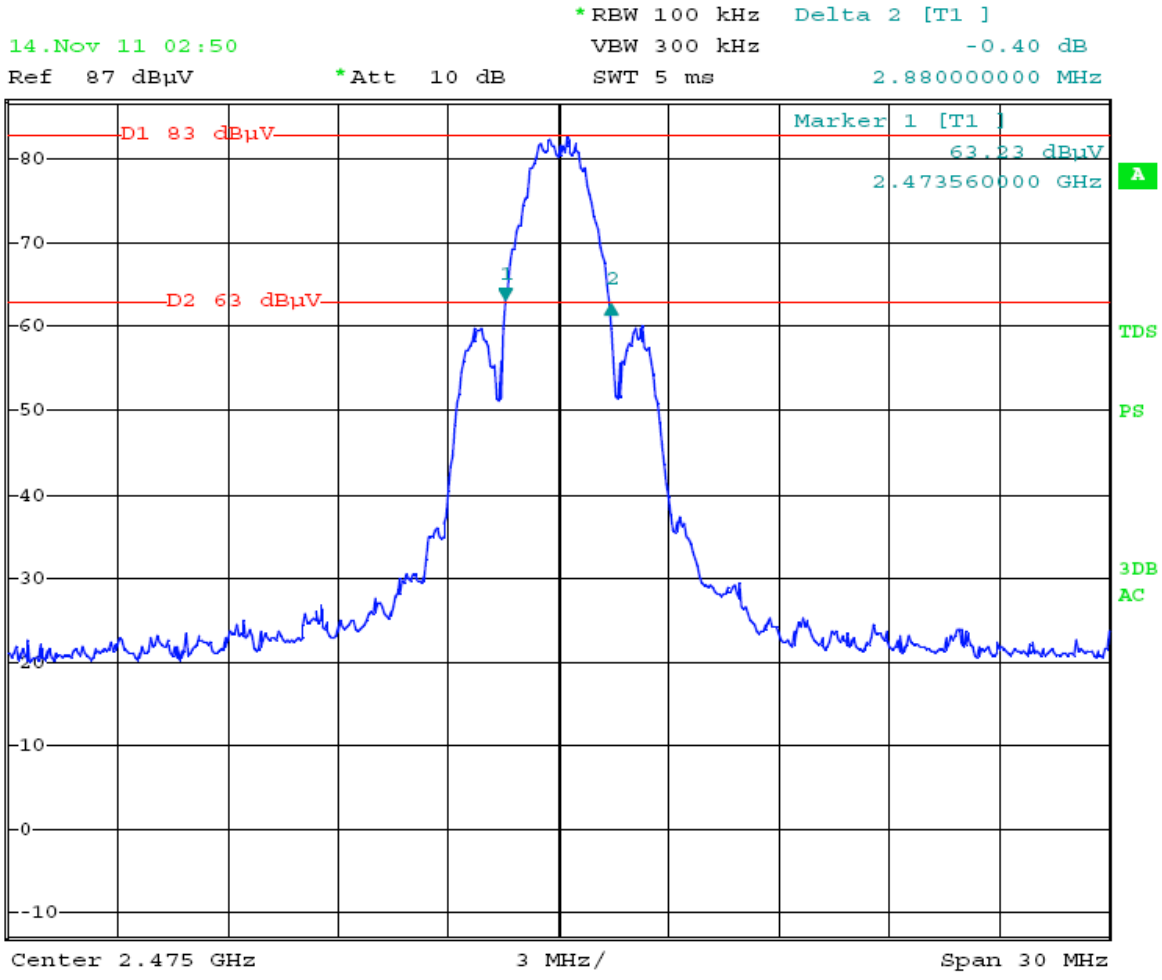
Modulation Bandwidth
Operating mode: Transmitting
Low Channel (2425MHz)



Middle Channel (2450MHz)



High Channel (2475MHz)



3.4.4 Test Result

From the plots of band-edge, Emission radiated outside of the specified frequency bands are attenuated by 57.85 dB for lower frequency and 54.74dB for upper frequency, it fulfill the requirement of 15.249(d)

From the plots of Modulation Bandwidth, 20dB bandwidth of the emission is within the frequency band designated in the rule section: 2.4GHz-2.4835GHz, it fulfil the requirement of 15.215(c).

3.4.5 Transmitter Duty Cycle Calculation FCC Rule 15.35(b, c)

Averaging factor in dB = 20 log (duty cycle)

The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured is 100 milliseconds, or the repetition cycle, whichever is a shorter time frame. The worst case (highest percentage on) duty cycle is used for the calculation. The duty cycle is measured by placing the spectrum analyzer in zero scan (receiver mode) and linear mode at maximum bandwidth (3 MHz at 3 dB down) and viewing the resulting time domain signal output from the analyzer on a Tektronix oscilloscope. The oscilloscope is used because of its superior time base and triggering facilities.

A plot of the worst-case duty cycle as detected in this manner is shown below.

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 9.2949ms
Effective period of the cycle = 0.9615ms

DC =0.9615/9.2949=0.1034 or 10.34%

Therefore, the averaging factor is found by 20lg0.1034=-19.7dB

4. Appendix III - Document List

Exhibit type	File Description	Filename
Average factor	Average factor	Average factor.pdf
Bandwidth Plot	Bandwidth Plot	Bandwidth Plot.pdf
Block diagram	Block diagram	Block diagram.pdf
Certification agreement	Certification agreement	Certification agreement.pdf
Circuit diagram	Circuit diagram	Circuit diagram.pdf
External photos	External photos	External photos.pdf
Form-731	Form-731	Form-731.doc
Internal photos	Internal photos	Internal photos.pdf
Label and Label location	Label and Label location	Label and Label location.pdf
Letter of agency	Letter of agency	Letter of agency.pdf
Permanent Confidential	Permanent Confidential	Permanent Confidential.pdf
Technical Description	Technical Description	Technical Description.pdf
Test Setup Photos	Test Setup Photos	Test Setup Photos.pdf
User manual	User manual	User manual.pdf

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