# **TEST REPORT**

 Reference No.
 WTN16S0448791E

 FCC ID
 2AFOYL554UCNN

Applicant ..... : Le Shi Zhi Xin Electronic Technology (Tian jin) Limited

Address ...... 201-427 2F B1 District, Anime building,No.126 Anime Middle Road,

Eco-city Tianjin, China

Manufacturer ...... TPV Technology(Qingdao) Co.,Ltd

City, Shandong Province, China(PRC)

Product Name.....: LED TV

Model No. ..... : L554UCNN

Brand.....LeEco

**Standards**.....: FCC CFR47 Part 15 Section 15.249: 2015

Date of Receipt sample .... : Apr. 25, 2016

Date of Test ..... : Apr. 26 – Jun. 25, 2016

Date of Issue...... : Jun. 25, 2016

Test Result.....: Pass

#### Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

#### Prepared By:

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Tested by:

Zero Zhou / Test Engineer

Philo Zhong 7 Manager

Approved.

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# 2 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
	15.249(a)	
Radiated Emission	15.209	PASS
	15.205(a)	
Periodic Operation	15.35(c)	PASS
	15.249	
Outside of Band Emission	15.205	PASS
	15.209	
20dB Bandwidth	15:215(c)	PASS
Antenna Requirement	15.203	PASS

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## 4 General Information

## 4.1 General Description of E.U.T.

Product Name: LED TV

Model No.: L554UCNN

Model Description: N/A

Operation Frequency: IEEE 802.11b/g/n(HT20):2412MHz ~ 2462MHz

IEEE 802.11n(HT40):2422MHz~2452MHz

IEEE 802.11a/ n(HT20/40)/ac(HT20/40/80): 5150MHz to 5250MHz IEEE 802.11a/ n(HT20/40)/ac(HT20/40/80): 5725MHz to 5850MHz

BT: 2402-2480MHz SRD: 2403-2480MHz

Type of modulation: IEEE 802.11b DSSS(CCK/QPSK/BPSK)

IEEE 802.11g OFDM(BPSK/QPSK/16QAM/64QAM)
IEEE 802.11n OFDM(BPSK/QPSK/16QAM/64QAM)
IEEE for 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM)
IEEE for 802.11n: OFDM(BPSK/QPSK/16QAM/64QAM)

IEEE for 802.11ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)

BT: GFSK,PI/4-DQPSK,8DPSK

SRD: GFSK

The Lowest Oscillator: 32.768KHz

Antenna installation: internal permanent antenna

Antenna Gain: ANT 0

2.4GHz WIFI:3.2 dBi 5.2GHz WIFI:4.1 dBi 5.8GHz WIFI:4.0 dBi

ANT 1

2.4GHz WIFI:3.2 dBi5.2GHz WIFI:3.3 dBi5.8GHz WIFI:3.4 dBi

ANT 2

2.4GHz BT:3.2 dBi

ANT 3

2.4GHz SRD:3.0 dBi

#### 4.2 Details of E.U.T.

Technical Data : AC 120V~60Hz, 170W

#### 4.3 Channel List

Channel	Frequency	Channel	Frequency	Channel Frequency		Channel	Frequency
No.	(MHz)	No.	(MHz)	No. (MHz)		No.	(MHz)
1	2403	2	2408	3	2413	4	2418

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
5	2423	6	2428	7	7 2433		2440
9	2445	10	2450	11	2455	12	2460
13	2465	14	2470	15	2475	16	2480

#### 4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

## IC – Registration No.: 7760A-1

Waltek Services (Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration 7760A-1, Oct. 15, 2015.

### FCC Test Site 1# Registration No.: 880581

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, April 29, 2014.

### FCC Test Site 2# Registration No.: 328995

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory 'has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 328995, December 3, 2014

### 4.4.1 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Transmitting duty cycle is normal.

The software is installed in operation system, named "RFTestTool.apk", Version 1,date 20160518.

Test mode	channel
Transmitting	2403MHz
Transmitting	2440MHz
Transmitting	2480MHz

# 5 Equipment Used during Test

## 5.1 Equipments List

Cond	ucted Emissions at M	ains Terminals Dis	sturbance Volta	ge(1#)		
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMI Test Receiver	R&S	ESCI	100947	2015.09.14	2016.09.13
2	LISN	R&S	ENV216	100115	2015.09.14	2016.09.13
3	Cable	Тор	TYPE16(3.5M)	-	2015.09.14	2016.09.13
Cond	ucted Emissions at M	ains Terminals Dis	sturbance Volta	ge(2#)		
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMI Test Receiver	R&S	ESCI	101155	2015.09.14	2016.09.13
2	LISN	SCHWARZBECK	NSLK 8128	8128-289	2015.09.14	2016.09.13
3	Limiter	York	MTS-IMP-136	261115-001- 0024	2015.09.14	2016.09.13
4	Cable	Laplace	RF300	-	2015.09.14	2016.09.13
3m Se	emi-anechoic Chambe	er for Radiation(1#	)			
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Spectrum Analyzer	R&S	FSP	100091	2015.09.14	2016.09.13
2	Amplifier	Agilent	8447D	2944A10178	2015.09.14	2016.09.13
3	Active Loop Antenna	Beijing Dazhi	ZN30900A	0703	2015.09.14	2016.09.13
4	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	2015.09.14	2016.09.13
5	Coaxial Cable (below 1GHz)	Тор	TYPE16(13M)	-	2015.09.14	2016.09.13
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	2015.09.14	2016.09.13
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2015.09.14	2016.09.13
8	Coaxial Cable (above 1GHz)	Тор	1GHz-25GHz	EW02014-7	2015.09.14	2016.09.13
3m Se	emi-anechoic Chambe	er for Radiation(2#	)			
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	2016.03.23	2017.03.22
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2016.03.23	2017.03.22
3	Amplifier	ANRITSU	MH648A	M43381	2016.03.23	2017.03.22
4	Cable	HUBER+SUHNER	CBL2	525178	2016.03.23	2017.03.22

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## 5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
	± 5.03 dB
Radiated Spurious	(Bilog antenna 30M~1000MHz)
Emissions test	± 5.47 dB
	(Horn antenna 1000M~25000MHz)

## 5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

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## 6 Conducted Emission

Test Requirement: FCC CFR 47 Part 15 Section 15.207

Test Method: ANSI C63.10:2009

Test Result: PASS

Frequency Range: 150kHz to 30MHz

Class/Severity: Class B

Limit:  $66-56 \text{ dB}_{\mu}\text{V} \text{ between } 0.15\text{MHz } \& 0.5\text{MHz}$ 

56 dB $\mu$ V between 0.5MHz & 5MHz 60 dB $\mu$ V between 5MHz & 30MHz

Detector: Peak for pre-scan (9kHz Resolution Bandwidth)

## 6.1 E.U.T. Operation

Operating Environment:

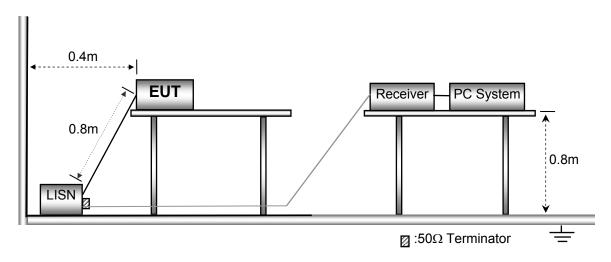
Temperature: 25.5 °C
Humidity: 51 % RH
Atmospheric Pressure: 101.2kPa

**EUT Operation:** 

The test was performed in transmitting mode, the test data were shown in the report.

### 6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2009.



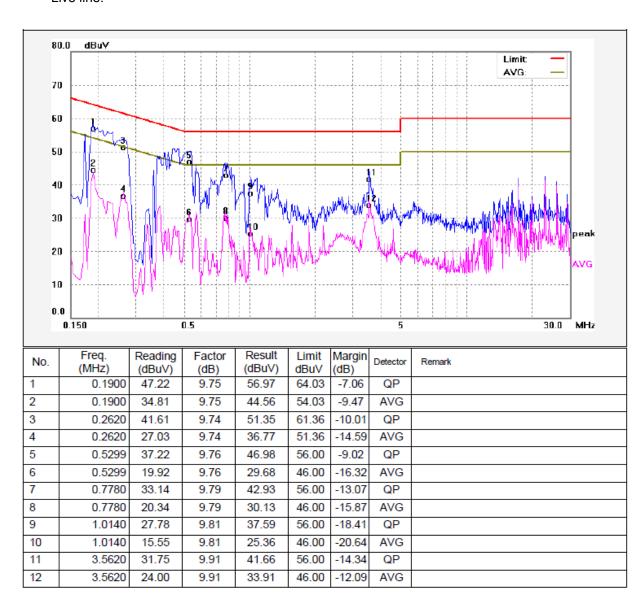
## 6.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

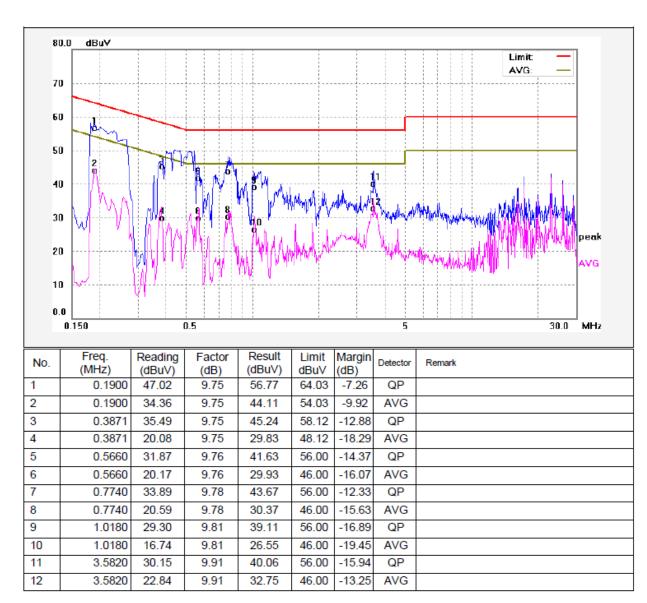
Waltek Services (Shenzhen) Co.,Ltd. http://www.waltek.com.cn

## 6.4 Conducted Emission Test Result

Live line:



#### Neutral line:



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## 7 Radiation Emission Test

Test Requirement: FCC Part15 Paragraph 15.249

Test Method: ANSI 63.10: 2009

Measurement Distance: 3m

Test Result: PASS

15.249(a)Limit:

Fundamental frequency	Field strength	of fundamental	Field strength of harmonics		
	mV/m dBuV/m		uV/m	dBuV/m	
902-928 MHz	50	94	500	54	
2400-2483.5 MHz	50	94	500	54	
5725-5875 MHz	50	94	500	54	
24.0-24.25 GHz	250	108	2500	68	

#### 15.209 Limit:

15.209 Limit:						
_	Field Strei	ngth	Field Strength Limit at 3m Measurement Distance			
Frequency (MHz)	uV/m	Distance (m)	uV/m	dBuV/m		
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	20log <sup>(2400/F(kHz))</sup> + 80		
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	20log <sup>(24000/F(kHz))</sup> + 40		
1.705 ~ 30	30	30	100 * 30	20log <sup>(30)</sup> + 40		
30 ~ 88	100	3	100	20log <sup>(100)</sup>		
88 ~ 216	150	3	150	20log <sup>(150)</sup>		
216 ~ 960	200	3	200	20log <sup>(200)</sup>		
Above 960	500	3	500	20log <sup>(500)</sup>		

Note: RF Voltage(dBuV)=20 log<sub>10</sub> RF Voltage(uV)

## 7.1 EUT Operation

Operating Environment:

Temperature: 23.5 °C
Humidity: 51.1 % RH
Atmospheric Pressure: 101.2kPa

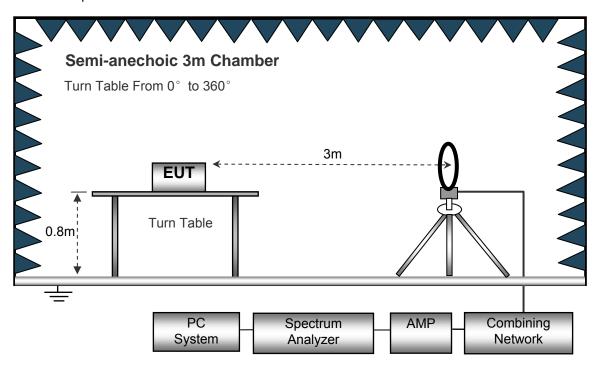
**EUT Operation:** 

The test was performed in transmitting mode, the test data were shown in the report.

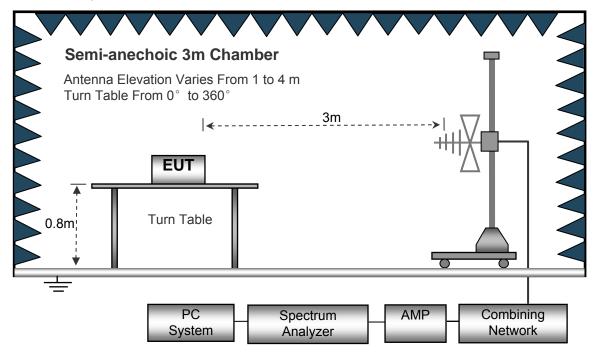
### 7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI 63.10: 2009.

The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30MHz to 1GHz.



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Anechoic 3m Chamber

Antenna Elevation Varies From 1 to 4 m
Turn Table From 0° to 360°

Turn Table Absorbers

PC Spectrum AMP Combining

Analyzer

Network

The test setup for emission measurement above 1 GHz.

System

## 7.3 Spectrum Analyzer Setup

Below 30MHz		
	Sweep Speed	. Auto
	IF Bandwidth	.10kHz
	Video Bandwidth	.10kHz
	Resolution Bandwidth	.10kHz
30MHz ~ 1GH	z	
	Sweep Speed	. Auto
	Detector	.PK
	Resolution Bandwidth	.100kHz
	Video Bandwidth	.300kHz
Above 1GHz		
	Sweep Speed	. Auto
	Detector	.PK
	Resolution Bandwidth	.1MHz
	Video Bandwidth	.3MHz
	Detector	.Ave.
	Resolution Bandwidth	.1MHz
	Video Bandwidth	.10Hz

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#### 7.4 Test Procedure

1. The EUT is placed on a turntable, which is above ground plane.

- 2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions. The spectrum was investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
- 4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 6. Repeat above procedures until the measurements for all frequencies are complete.
- 7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

### 7.5 Test Result

Test Frequency: 32.768kHz~30MHz

Frequency (MHz)	Measurement results		Detector	Correct factor	Extrapolation factor	Measurement results (calculated)	Limits	Margin
(1711 12)	dΒμV	@3m	PK/QP	dB/m	dB	dBµV/m @30m	dBµV/m @30m	dB
26.581	26.00		QP	19.90	40.00	5.90	29.54	-23.64

Test Frequency: 30MHz ~ 18GHz

Test Mode: Low channel(2403MHz)

Frequency	Receiver	Detector	Turn	RX Antenna		Corrected		FCC Part	
	Reading		table			Factor	Corrected	15.249/209	9/205
			Angle	Height	Polar		Amplitude	Limit	Margin
(MHz)	(dBµV)	(PK/QP)	Degree	(m)	(H/V)	(dB/m)	(dBµV/m)	(dBµV/m)	(dB)
302.18	42.36	QP	163	1.1	V	-11.40	30.96	40.00	-9.04
*2403.00	72.05	PK	269	1.7	Н	-13.08	58.97	114.00	-55.03
*2403.00	70.11	PK	327	1.4	V	-13.08	57.03	114.00	-56.97
4806.00	44.28	PK	7	1.0	Н	0.09	44.37	74.00	-29.63
4806.00	42.39	PK	265	1.0	٧	0.09	42.48	74.00	-31.52
7209.00	48.66	PK	196	1.6	Н	3.01	51.67	74.00	-22.33
7209.00	46.27	PK	263	1.4	>	3.01	49.28	74.00	-24.72

<sup>\*</sup> Fundamental Frequency

Frequency	PK	Turn table	RX Antenna		Duty AV cycle		FCC Part 15.249/209/205	
		Angle	Height	Polar	Factor		Limit	Margin
(MHz)	(dBµV/m)	Degree	(m)	(H/V)	(dB)	(dBµV/m)	(dBµV/m)	(dB)
*2403.00	58.97	269	1.7	Н	-37.00	21.97	94.00	-72.03
*2403.00	57.03	327	1.4	V	-37.00	20.03	94.00	-73.97
4806.00	44.37	7	1.0	Н	-37.00	7.37	54.00	-46.63
4806.00	42.48	265	1.0	V	-37.00	5.48	54.00	-48.52
7209.00	51.67	196	1.6	Н	-37.00	14.67	54.00	-39.33
7209.00	49.28	263	1.4	V	-37.00	12.28	54.00	-41.72

<sup>\*</sup> Fundamental Frequency

Test Mode: Middle channel(2440MHz)

Frequency	Receiver	Detector	Turn	Turn RX Antenna		Corrected	FCC Part			
	Reading		table			Factor	actor Corrected		15.249/209/205	
			Angle	Height	Polar		Amplitude	Limit	Margin	
(MHz)	(dBµV)	(PK/QP)	Degree	(m)	(H/V)	(dB/m)	(dBµV/m)	(dBµV/m)	(dB)	
302.18	42.66	QP	270	1.9	٧	-11.40	31.26	40.00	-8.74	
*2440.00	72.59	PK	172	1.9	Н	-13.08	59.51	114.00	-54.49	
*2440.00	69.47	PK	133	1.9	V	-13.08	56.39	114.00	-57.61	
4880.00	44.00	PK	180	1.4	Н	0.09	44.09	74.00	-29.91	
4880.00	42.31	PK	47	1.5	V	0.09	42.40	74.00	-31.60	
7320.00	48.15	PK	254	2.0	Н	3.01	51.16	74.00	-22.84	
7320.00	45.39	PK	169	1.3	V	3.01	48.40	74.00	-25.60	

<sup>\*</sup> Fundamental Frequency

Frequency	PK	Turn table	RX Antenna		Duty AV cycle		FCC Part 15.249/209/205		
		Angle	Height	Polar	Factor		Limit	Margin	
(MHz)	(dBµV/m)	Degree	(m)	(H/V)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
*2440.00	59.51	172	1.9	Н	-37.00	22.51	94.00	-71.49	
*2440.00	56.39	133	1.9	V	-37.00	19.39	94.00	-74.61	
4880.00	44.09	180	1.4	Н	-37.00	7.09	54.00	-46.91	
4880.00	42.40	47	1.5	V	-37.00	5.40	54.00	-48.60	
7320.00	51.16	254	2.0	Н	-37.00	14.16	54.00	-39.84	
7320.00	48.40	169	1.3	V	-37.00	11.40	54.00	-42.60	

<sup>\*</sup> Fundamental Frequency

Test Mode: High channel(2480MHz)

Frequency	Receiver	Detector	Turn RX Antenna		Corrected	FCC Part				
	Reading		table		Г	Factor	Corrected	15.249/209	15.249/209/205	
			Angle	Height	Polar		Amplitude	Limit	Margin	
(MHz)	(dBµV)	(PK/QP)	Degree	(m)	(H/V)	(dB/m)	(dBµV/m)	(dBµV/m)	(dB)	
302.18	42.13	QP	87	1.7	V	-11.40	30.73	40.00	-9.27	
*2480.00	72.65	PK	343	1.5	Н	-13.08	59.57	114.00	-54.43	
*2480.00	68.12	PK	58	1.5	V	-13.08	55.04	114.00	-58.96	
4960.00	44.87	PK	337	1.8	Н	0.09	44.96	74.00	-29.04	
4960.00	42.76	PK	45	1.2	V	0.09	42.85	74.00	-31.15	
7440.00	48.67	PK	59	1.9	Н	3.01	51.68	74.00	-22.32	
7440.00	46.12	PK	191	1.4	V	3.01	49.13	74.00	-24.87	

<sup>\*</sup> Fundamental Frequency

Frequency	PK	Turn table	RX Antenna		Duty cycle	,		FCC Part 15.249/209/205	
		Angle	Height	Polar	Factor		Limit	Margin	
(MHz)	(dBµV/m)	Degree	(m)	(H/V)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	
*2480.00	59.57	343	1.5	Н	-37.00	22.57	94.00	-71.43	
*2480.00	55.04	58	1.5	V	-37.00	18.04	94.00	-75.96	
4960.00	44.96	337	1.8	Н	-37.00	7.96	54.00	-46.04	
4960.00	42.85	45	1.2	V	-37.00	5.85	54.00	-48.15	
7440.00	51.68	59	1.9	Н	-37.00	14.68	54.00	-39.32	
7440.00	49.13	191	1.4	V	-37.00	12.13	54.00	-41.87	

<sup>\*</sup> Fundamental Frequency

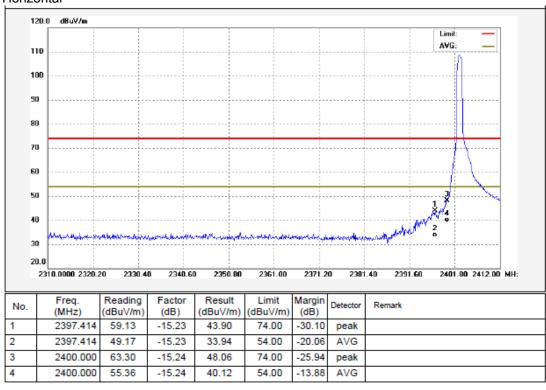
Test Frequency :From 18GHz to 25GHz

The measurements were more than 20 dB below the limit and not reported.

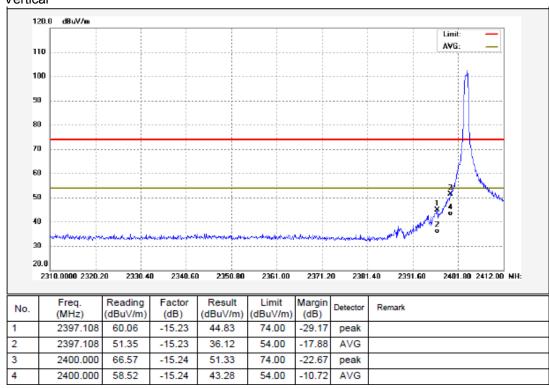
# Outside of Band Emissions

### Left band- 2403MHz transmitting

#### Horizontal

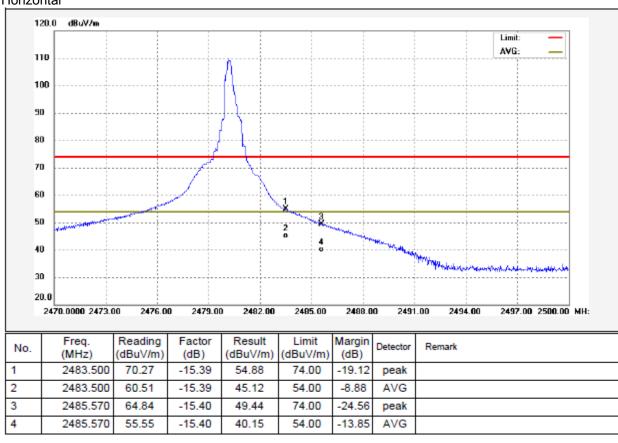


#### Vertical

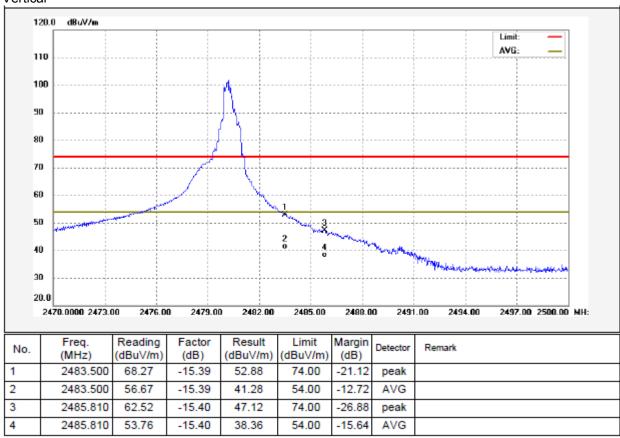


### Right band-2480MHz transmitting

#### Horizontal



#### Vertical



## 8 Periodic Operation

The duty cycle was determined by the following equation:

To calculate the actual field intensity, the duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion

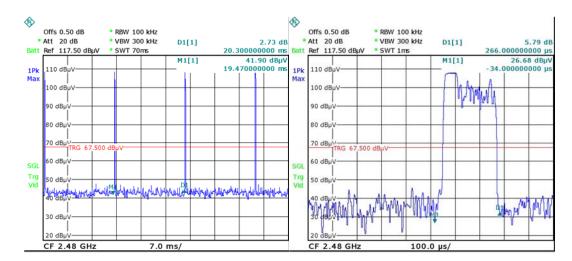
Duty Cycle(%)=Total On interval in a complete pulse train/ Length of a complete pulse train \* % Duty Cycle Correction Factor(dB)=20 \* Log<sub>10</sub>(Duty Cycle(%))

Total transmission time(ms)	0.266
Length of a complete transmission period(ms)	20.30
Duty Cycle(%)	1.3
Duty Cycle Correction Factor(dB)	-37

Refer to the duty cycle plot (as below), This device meets the FCC requirement.

Length of a complete pulse train:

Remark: FCC part15.35(c) required that a complete pulse train is more than 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.



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## 9 20 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.215(c)

Test Method: ANSI C63.10:2009

Test Mode: Transmitting

#### 9.1 Test Procedure

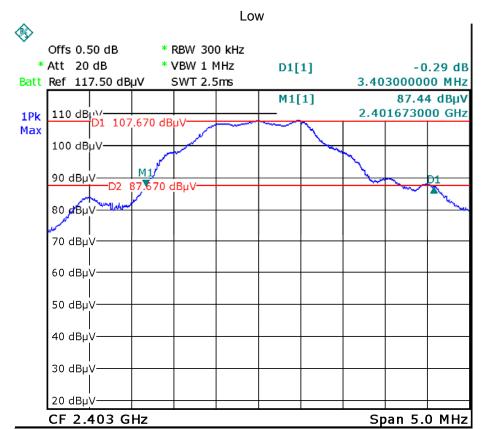
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

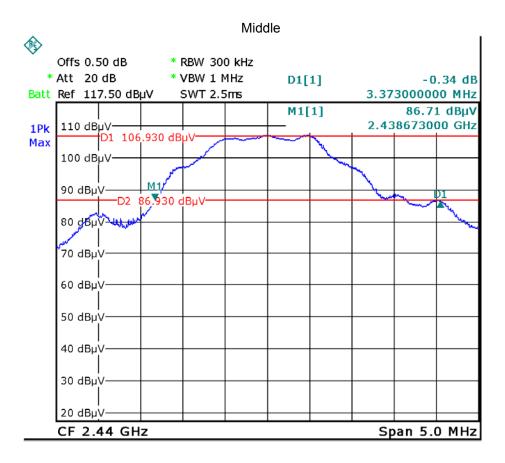
2. Set the spectrum analyzer: RBW = 30kHz, VBW = 100kHz

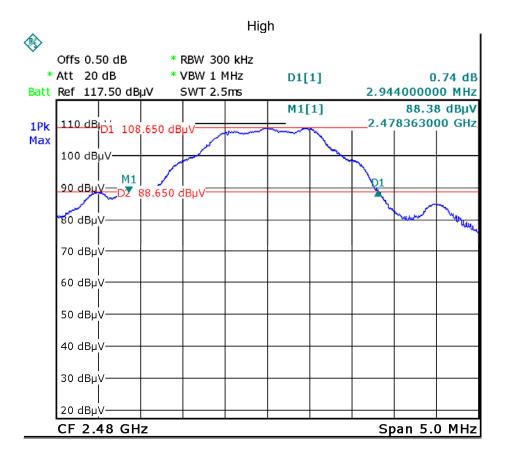
### 9.2 Test Result

Test Channel	Bandwidth
2403MHz	2401.7MHz
2440MHz	2438.7MHz
2480MHz	2478.4MHz

## Test plots







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# 10 Antenna Requirement

According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. This product has a RF connector to connect internal integrated antenna fulfill the requirement of this section.

====End of Report=====