



FCC Test Report

Report No.: TAOL17JU0237LTSSB-1

FCC ID: 2AMETWFESP01

Product: LED lamp

Model: A E26 WiZ60 TW, A E26 WiZ60 TR, BR30 WiZ75 TR, BR30 WiZ75 TW

Received Date: Jun.12, 2017

Test Date: Jun.12 to Jul.05, 2017

Issued Date: Jul.05, 2017

Applicant: TAO LIGHT CO., LTD

Address: Building A11 & A6, No. 999 North Huancheng Road, Nanqiao Town, Feng Xian District, Shanghai, China

Issued By: BUREAU VERITAS ADT (Shanghai) Corporation

Lab Address: 2F, Building C, No.1618, Yishan Rd., 201103, Shanghai, China

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Release Control Record

Issue No.	Description	Date Issued
TAOL17JU0237LTSSB-1	Original release	Jul.05, 2017

1 Certificate of Conformity

Product: LED lamp

Brand: --

Model: A E26 WiZ60 TW, A E26 WiZ60 TR, BR30 WiZ75 TR, BR30 WiZ75 TW

Applicant: TAO LIGHT CO., LTD

Test Date: Jun.12 to Jul.05, 2017

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

The above equipment has been tested by **BUREAU VERITAS ADT (Shanghai) Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Bing YE, **Date:** Jul.05, 2017

Bing YE
Testing Engineer

Approved by : Joy ZHU, **Date:** Jul.05, 2017

Joy ZHU
Testing Manager

2 Summary of Test Results

The EUT has been tested according to the following specifications:

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit.
15.205 / 15.209 / 15.247(d)	Radiated Emissions Measurement	PASS	Meet the requirement of limit.
15.247(d)	Emissions in non-restricted frequency bands	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

2.1 Test Instruments

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Hybrid antenna(25MHz-1.5GHz)	Schwarzbeck	VULB9168	E1A1012	Sep.01, 15	Aug.31, 17
Horn Antenna(1GHz -18GHz)	Schwarzbeck	BBHA9120D	E1A1017	Sep.01, 15	Aug.31, 17
Pre-Amplifier(100kHz-1.3GHz)	Agilent	8447D	E1A2001	Sep.28, 16	Sep.27, 17
Pre-Amplifier(1GHz-26.5GHz)	Agilent	8449B	E1A2002	Mar. 27, 17	Mar. 26, 19
EMI test receiver	R&S	ESR7	E1R1005	Nov.29, 16	Nov.28, 17
Spectrum Analyzer	Keysight	N9030B	E1S1003	Jun. 13, 17	Jun. 12, 18
EMI test receiver	R&S	ESCS30	E1R1001	Mar.27, 17	Mar.26, 18
LISN	R&S	ENV216	E1L1011	Aug.01, 16	Jul.31, 18
Humidity&Temp Tester	Baolima	WS508	E1H1011	Oct. 26, 16	Oct. 25, 17
Test Software	ADT	ADT_Radiated_V7.5.14	N/A	N/A	N/A
Test Software	Keysight	V1.01.10	N/A	N/A	N/A

2.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Frequency	Expanded Uncertainty ($k=2$) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.83 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.36 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.47 dB
	6GHz ~ 18GHz	3.75 dB
	18GHz ~ 40GHz	3.30 dB

2.3 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	LED lamp
Brand	--
Test Model	A E26 WiZ60 TW, A E26 WiZ60 TR, BR30 WiZ75 TR, BR30 WiZ75 TW
Model Difference	A E26 WiZ60 TW/TR: 11.5W; BR30 WiZ75 TR/TW: 13.8W
Power Rating	100-130Vac, 50/60Hz
Modulation Type	CCK, DQPSK, DBPSK
Modulation Technology	DSSS
Operating Frequency	2.412 ~ 2.462GHz
Number of Channel	11
Antenna Type	PCB antenna
Antenna Connector	--
Antenna Gain	2dBi

Note:

1. The EUT incorporated a MIMO function. Physically, the EUT provides one completed transmitter and one receivers.

Modulation Mode	TX /RX Function
802.11b	1TX / 1RX

3.2 Description of Test Modes

11 channels are provided for 802.11b:

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz	-	-

3.2.1 Test Mode Applicability:

EUT Configure Mode	Applicable to				Description
	RE ≥ 1G	RE < 1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G**: Radiated Emission above 1GHz

RE≤1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

Radiated Emission Test (Above 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0

Radiated Emission Test (Below 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1	DSSS	DBPSK	1.0

Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1	DSSS	DBPSK	1.0

Antenna Port Conducted Measurement

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

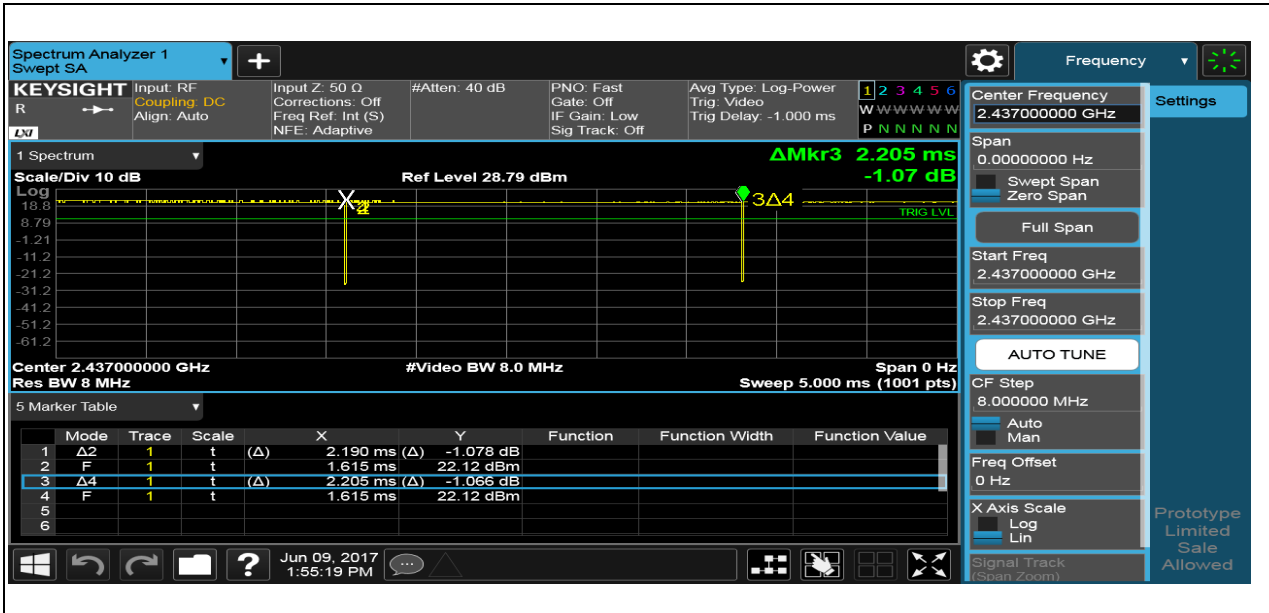
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0

3.2.2 Test Condition:

Applicable to	Normal Environmental Conditions	Normal Input Power
RE ≥ 1G	25deg. C, 60%RH	120Vac, 60Hz
RE < 1G	25deg. C, 60%RH	120Vac, 60Hz
PLC	25deg. C, 60%RH	120Vac, 60Hz
APCM	25deg. C, 60%RH	120Vac, 60Hz

3.3 Duty Cycle of Test Signal

Modulation	Test Freq (MHz)	Duty Cycle (%)
802.11 b	2412	99.32



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standard:

FCC Part 15, Subpart C (15.247)

KDB 558074 D01 DTS Meas Guidance v04

ANSI C63.10:2013

All relaxed test items have been performed and recorded as per the above standard.

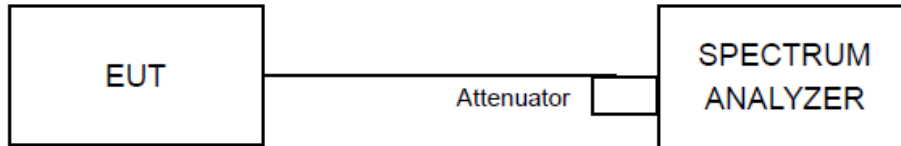
4 Test Procedure and Results

4.1 6dB Bandwidth Measurement

4.1.1 Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz

4.1.2 Test Setup



4.1.3 Test Procedures

The EUT was tested according to DTS test procedure of "KDB558074 D01 DTS Meas Guidance" for compliance to FCC 47CFR 15.247 requirements (clause 8.2).

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., $RBW = 100 \text{ kHz}$, $VBW \geq 3 \text{ RBW}$, peak detector with maximum hold) is implemented by the instrumentation function.

4.1.4 Deviation of Test Standard

No deviation.

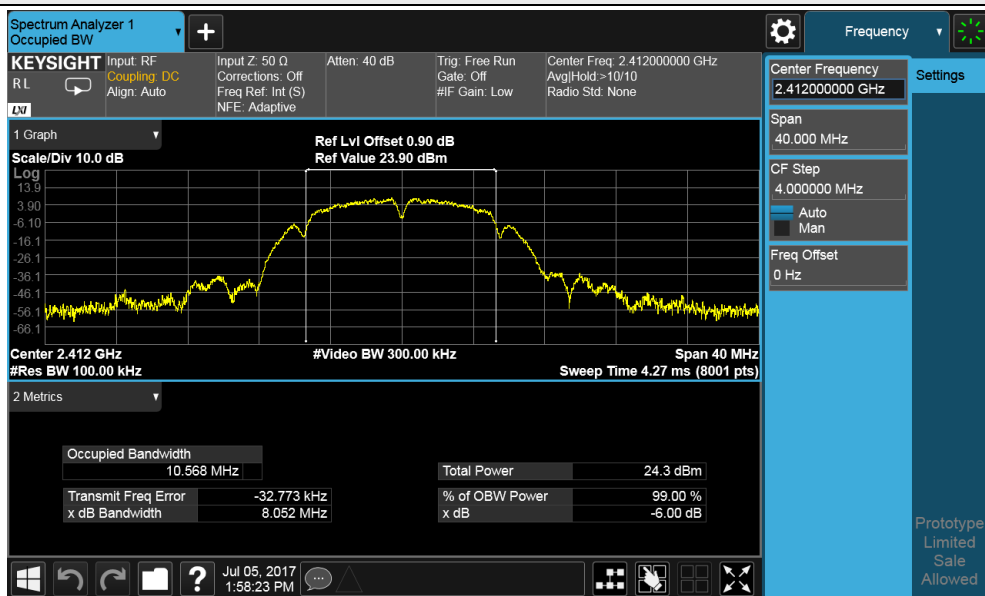
4.1.5 Test Results

802.11b

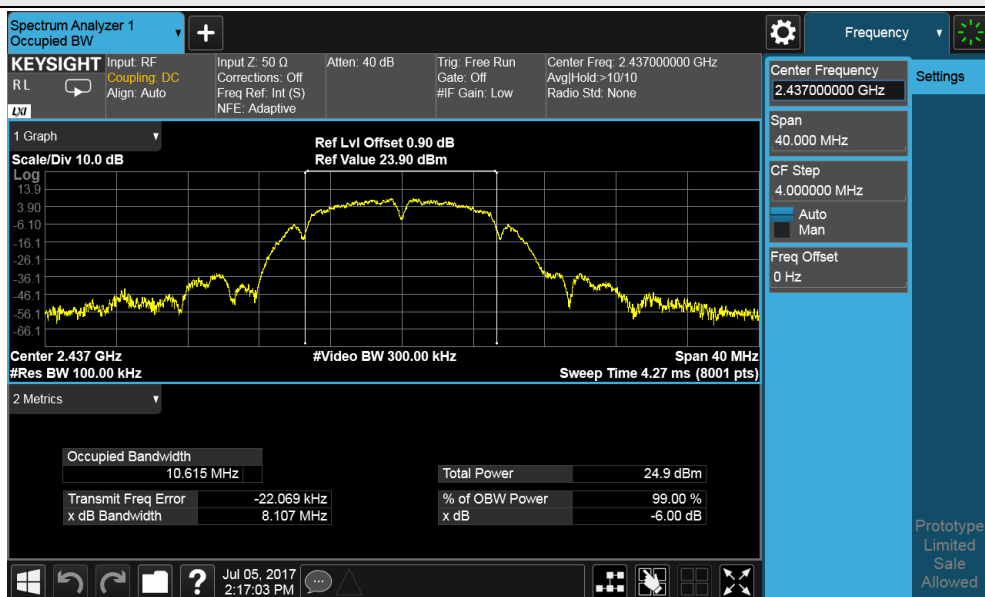
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	10.568	8.052	0.5	Pass
6	2437	10.615	8.107	0.5	Pass
11	2462	10.629	8.109	0.5	Pass

Spectrum Plot

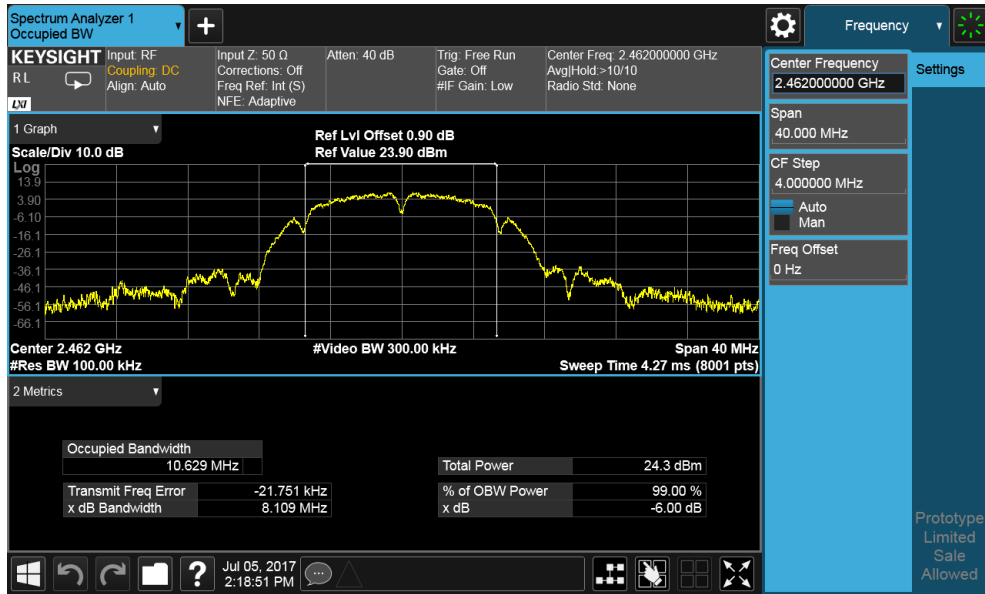
802.11b(2412MHz)



802.11b(2437MHz)



802.11b(2462MHz)

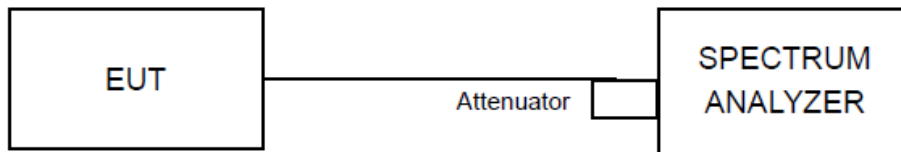


4.2 Conducted Output Power Measurement

4.2.1 Limit

For systems using digital modulation in the 2400 – 2483.5 MHz bands: 1 Watt (30 dBm)

4.2.2 Test Setup



4.2.3 Test Procedures

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” for compliance to FCC 47CFR 15.247 requirements (clause 9.2.2.4).

- Measure the duty cycle, x , of the transmitter output signal as described in Section 6.0.
- Set span to at least 1.5 OBW.
- Set RBW = 1 % to 5 % of the OBW, not to exceed 1 MHz.
- Set VBW $\geq$ 3 RBW.
- Number of points in sweep $\geq$ 2 span / RBW. (This gives bin-to-bin spacing $\leq$ RBW/2, so that narrowband signals are not lost between frequency bins.)
- Sweep time = auto.
- Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- Do not use sweep triggering. Allow the sweep to “free run”.
- Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
- Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- Add $10 \log (1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on- and off-times of the transmission). For example, add $10 \log (1/0.25) = 6$ dB if the duty cycle is 25 %.

4.2.4 Deviation of Test Standard

No deviation.

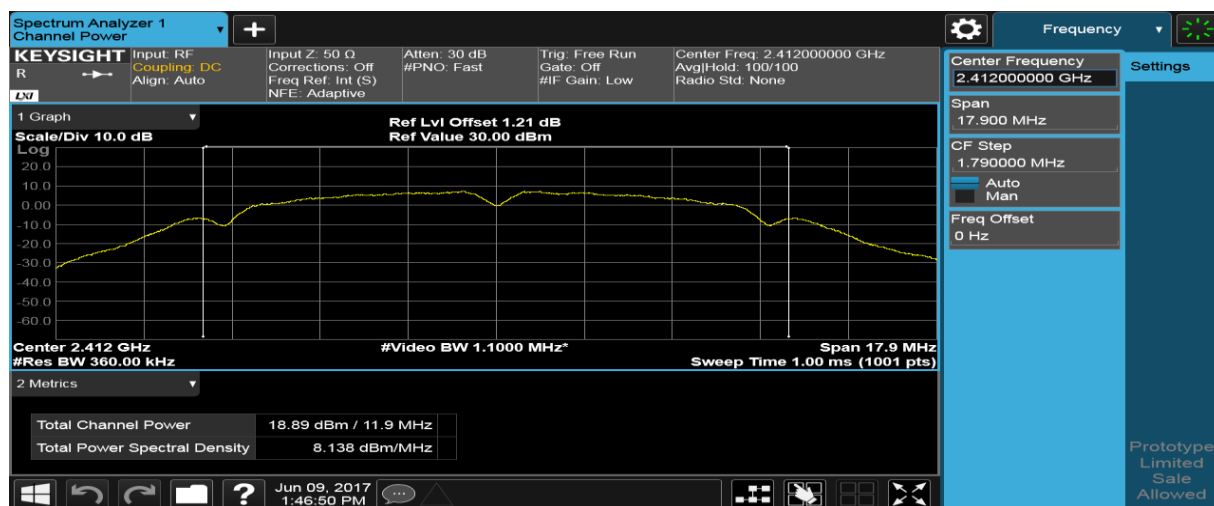
4.2.5 Test Results

802.11b

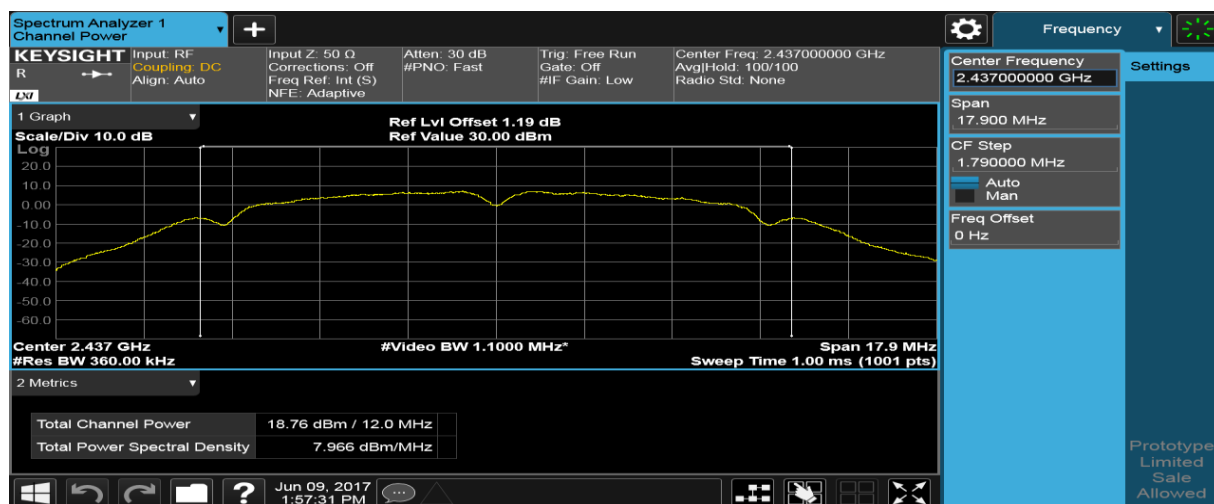
Channel	Frequency (MHz)	Duty Cycle Factor (dB)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	0.03	18.89	30	Pass
6	2437	0.03	18.76	30	Pass
11	2462	0.03	18.10	30	Pass

Spectrum Plot

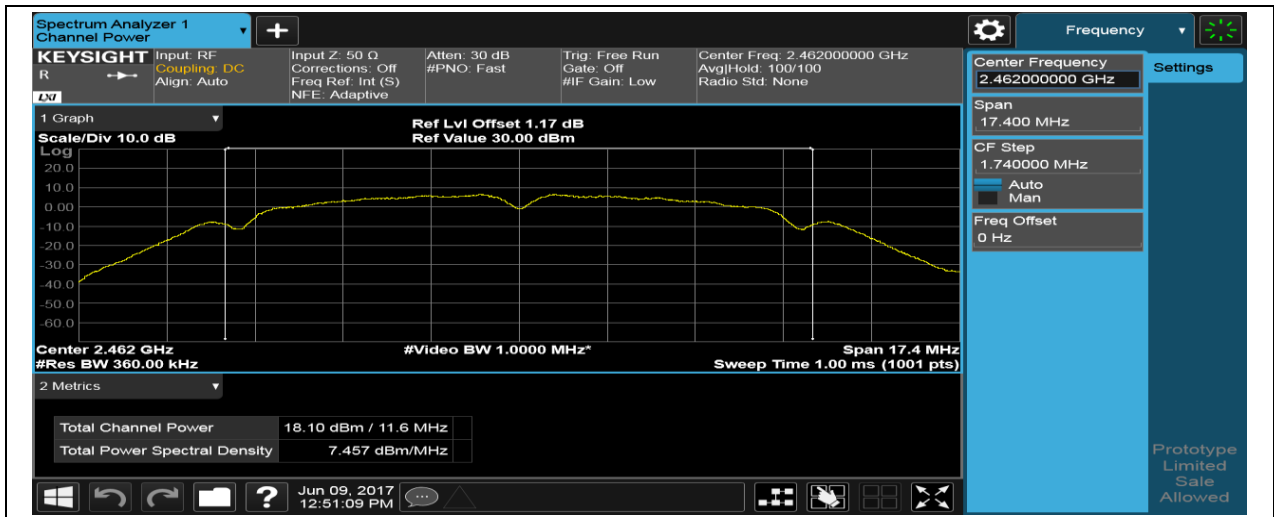
802.11b(2412MHz)



802.11b(2437MHz)



802.11b(2462MHz)

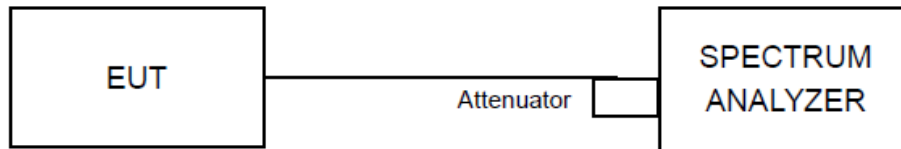


4.3 Power Spectral Density Measurement

4.3.1 Limit

The Maximum of Power Spectral Density Measurement is 8 dBm.

4.3.2 Test Setup



4.3.3 Test Procedures

The power output per FCC § 15.247(e) was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 10.5) for compliance to FCC 47CFR 15.247 requirements.

- a) Measure the duty cycle (x) of the transmitter output signal.
- b) Set instrument center frequency to DTS channel center frequency.
- c) Set span to at least 1.5 OBW.
- d) Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- e) Set VBW $\geq 3 \text{ RBW}$.
- f) Detector = power averaging (RMS) or sample detector (when RMS not available).
- g) Ensure that the number of measurement points in the sweep $\geq 2 \text{ span/RBW}$.
- h) Sweep time = auto couple.
- i) Do not use sweep triggering. Allow sweep to “free run”.
- j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
- k) Use the peak marker function to determine the maximum amplitude level.
- l) Add $10 \log (1/x)$, where x is the duty cycle measured in step (a), to the measured PSD to compute the average PSD during the actual transmission time.
- m) If resultant value exceeds the limit, then reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

4.3.4 Deviation of Test Standard

No deviation.

4.3.5 Test Results

802.11b

Channel	Frequency (MHz)	Duty Cycle Factor (dB)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
1	2412	0.03	-11.13	8	Pass
6	2437	0.03	-11.73	8	Pass
11	2462	0.03	-12.69	8	Pass

Spectrum Plot

802.11b(2412MHz)



802.11b(2437MHz)



802.11b(2462MHz)

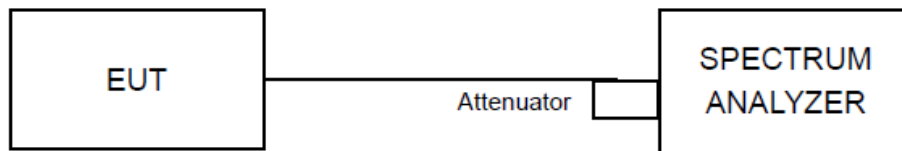


4.4 Emissions in non-restricted frequency bands

4.4.1 Limit

Below 30 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

4.4.2 Test Setup



4.4.3 Test Procedures

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 11.0) for compliance to FCC 47CFR 15.247 requirements.

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.4.4 Deviation of Test Standard

No deviation.

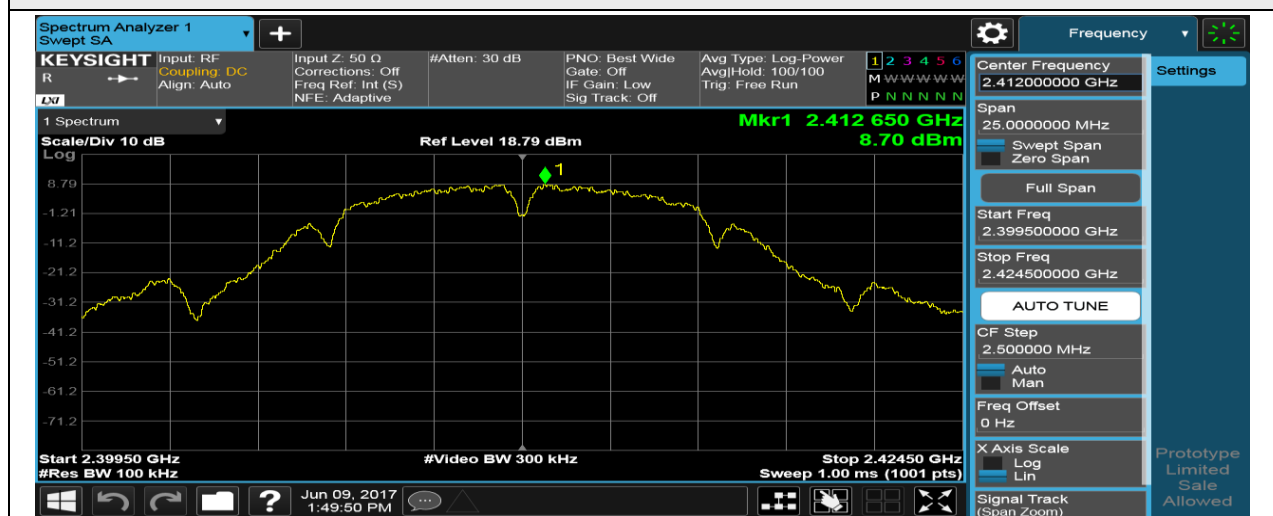
4.4.5 Test Results

802.11b

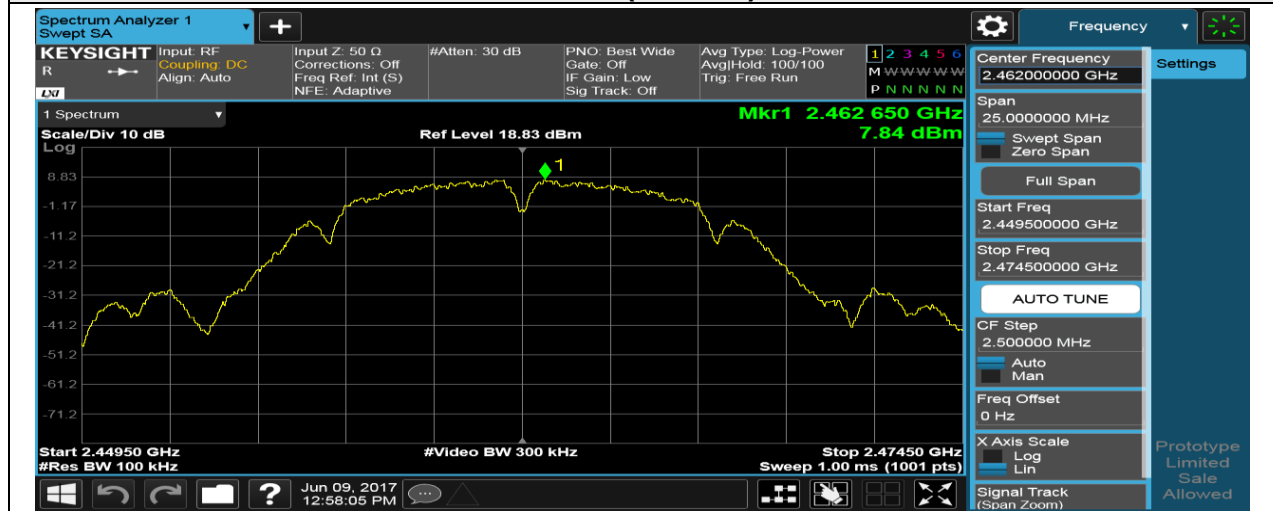
Channel	Frequency (MHz)	Pass / Fail
1	2412	Pass
11	2462	Pass

Spectrum Plot

802.11b(2412MHz)

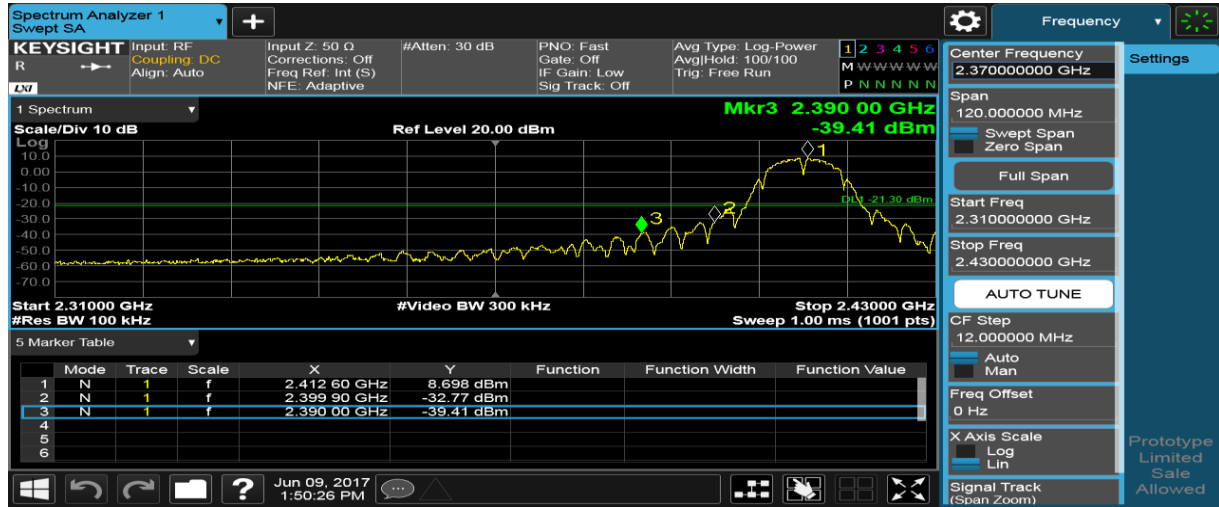


802.11b(2462MHz)

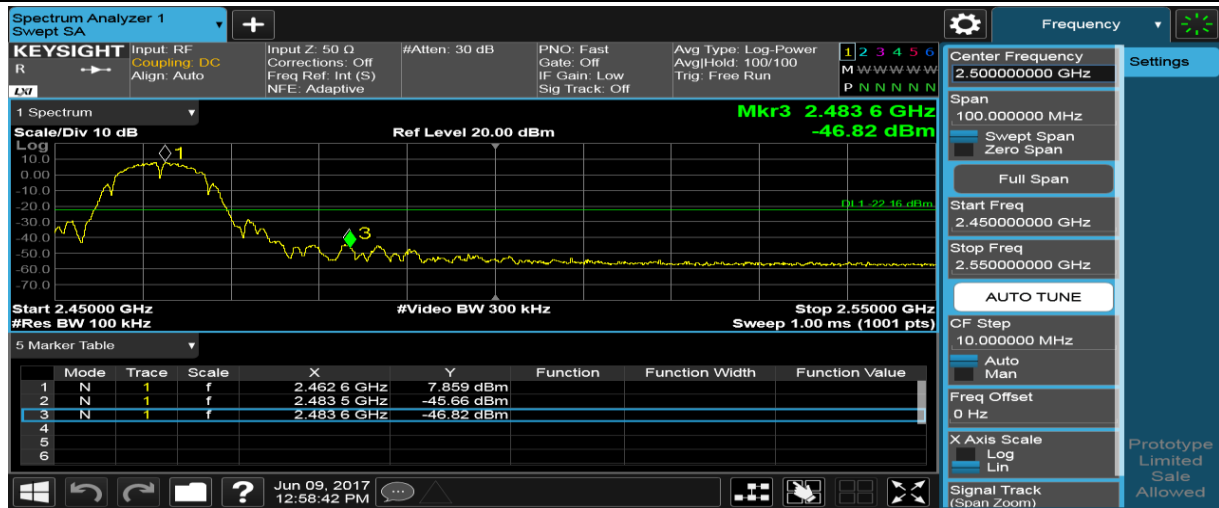


Spectrum Plot

802.11b(2412MHz) Band Edge

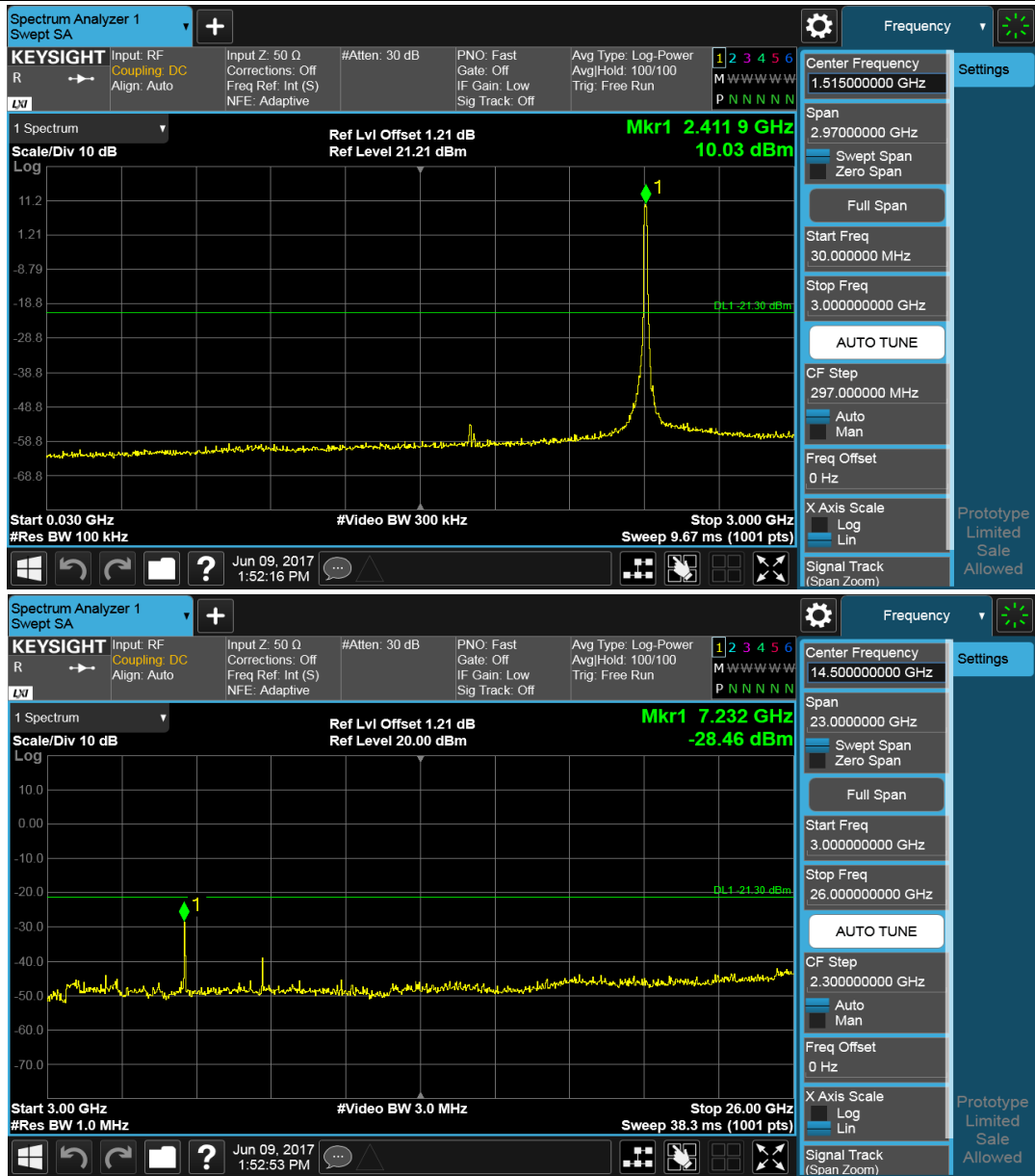


802.11b(2462MHz) Band Edge

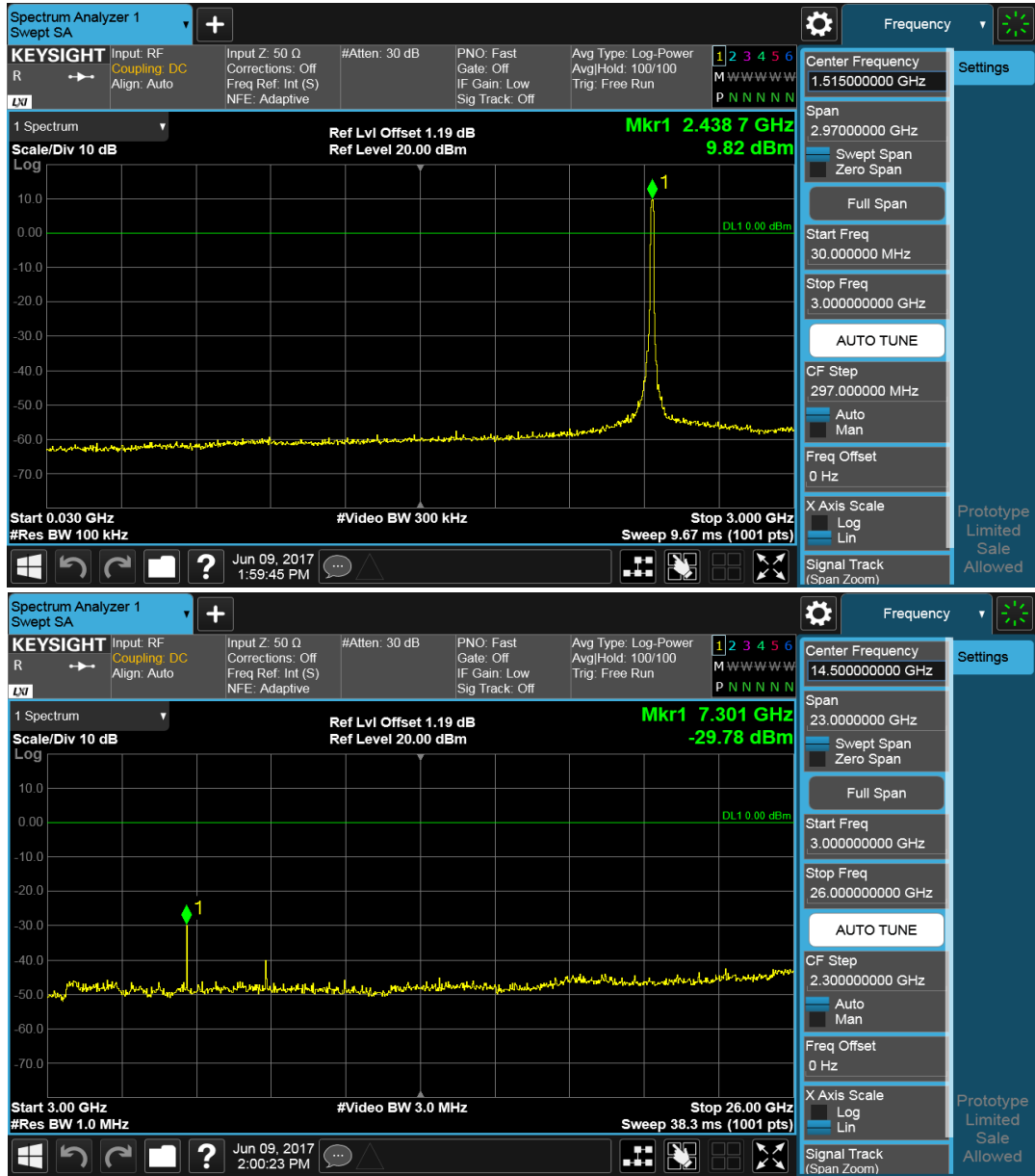


Spectrum Plot

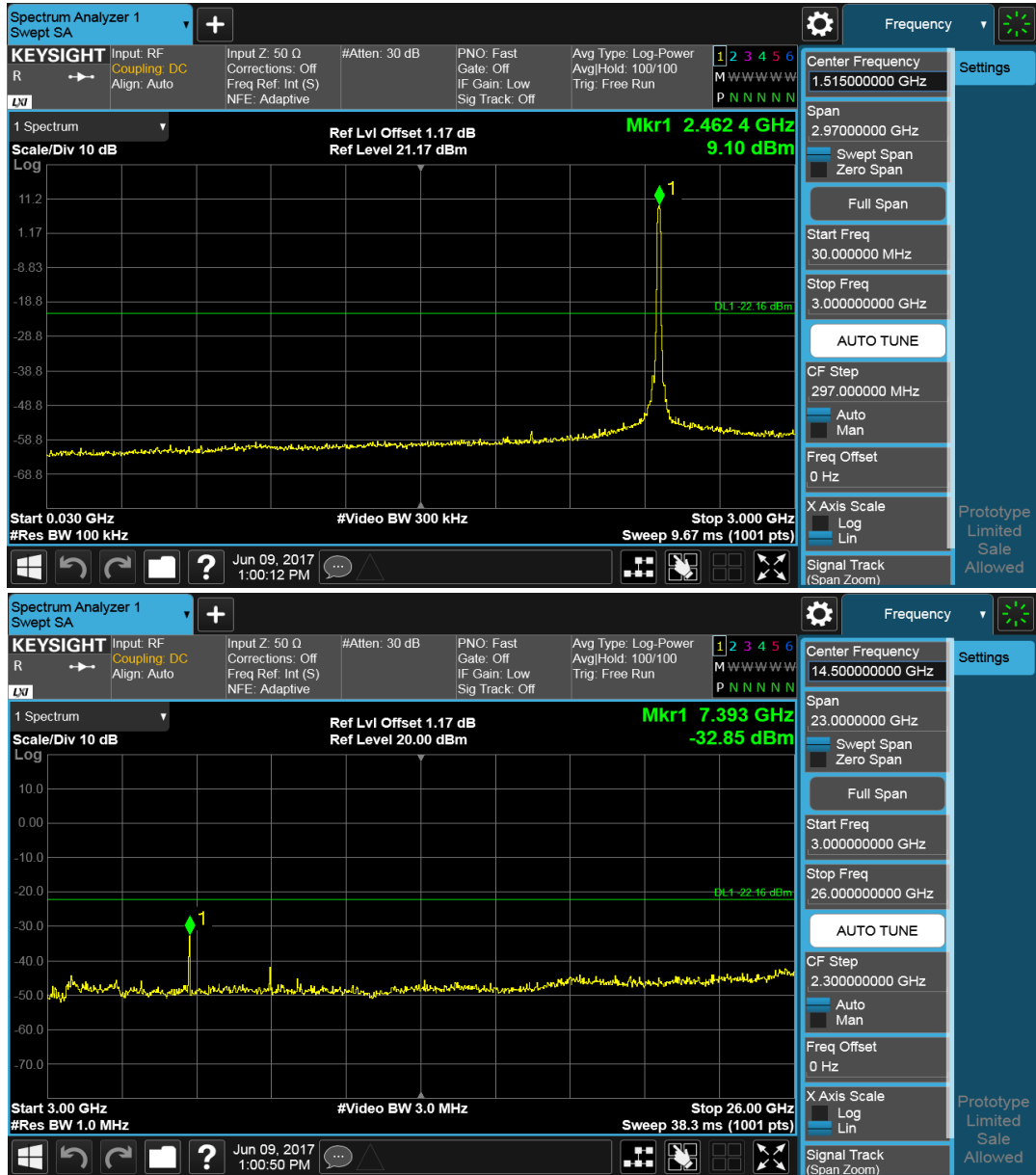
802.11b(2412MHz) Out-of-Band Emissions



802.11b(2437MHz) Out-of-Band Emissions



802.11b(2462MHz) Out-of-Band Emissions



4.5 Radiated Emission Measurement

4.5.1 Limits

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, 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.

4.5.2 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degree to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Both X and Y axes of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotate table was turned from 0 degree to 360 degree to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

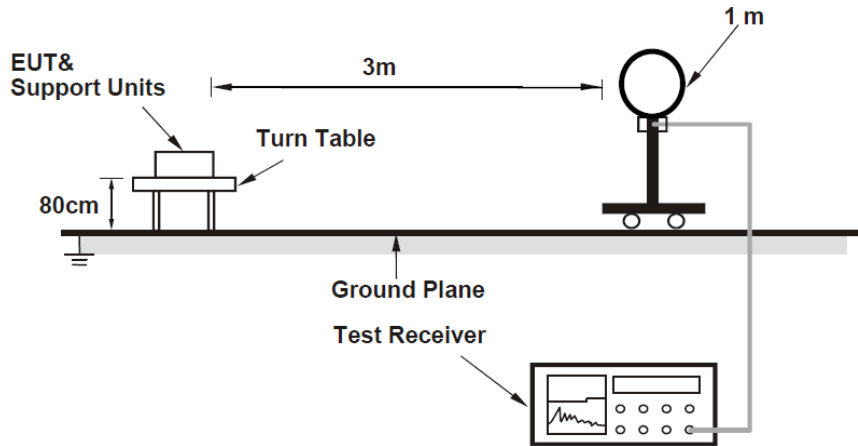
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for RMS Average (Duty cycle < 98 %) for Peak detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle $\geq$ 98 %) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.5.3 Deviation from Test Standard

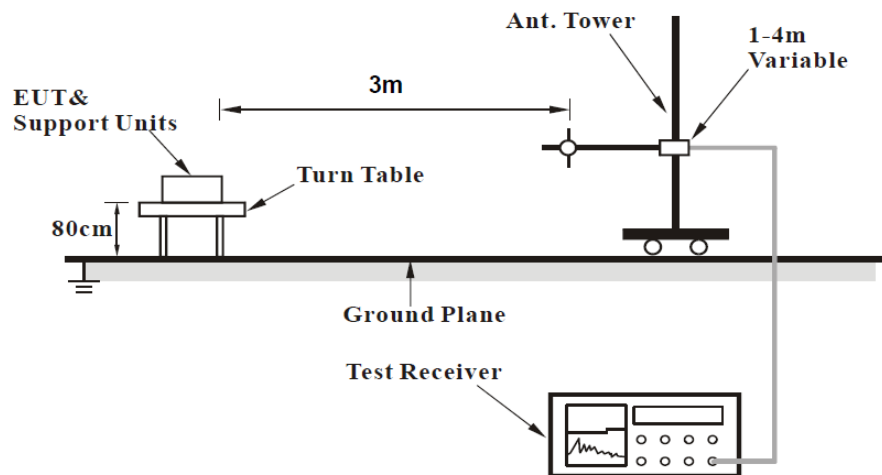
No deviation.

4.5.4 Test Setup

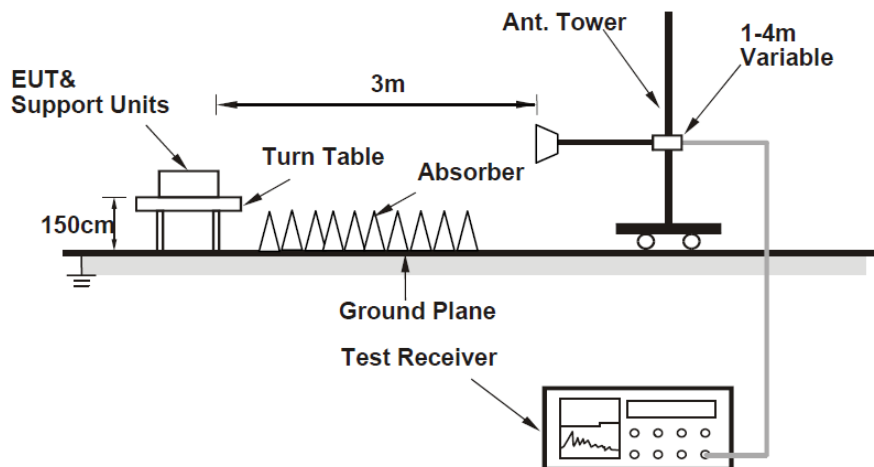
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.5.5 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.5.6 Test Results

Radiated Emissions Range 9kHz~30MHz

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Radiated Emissions Range 30MHz~1GHz

For model A E26 WiZ60 TR

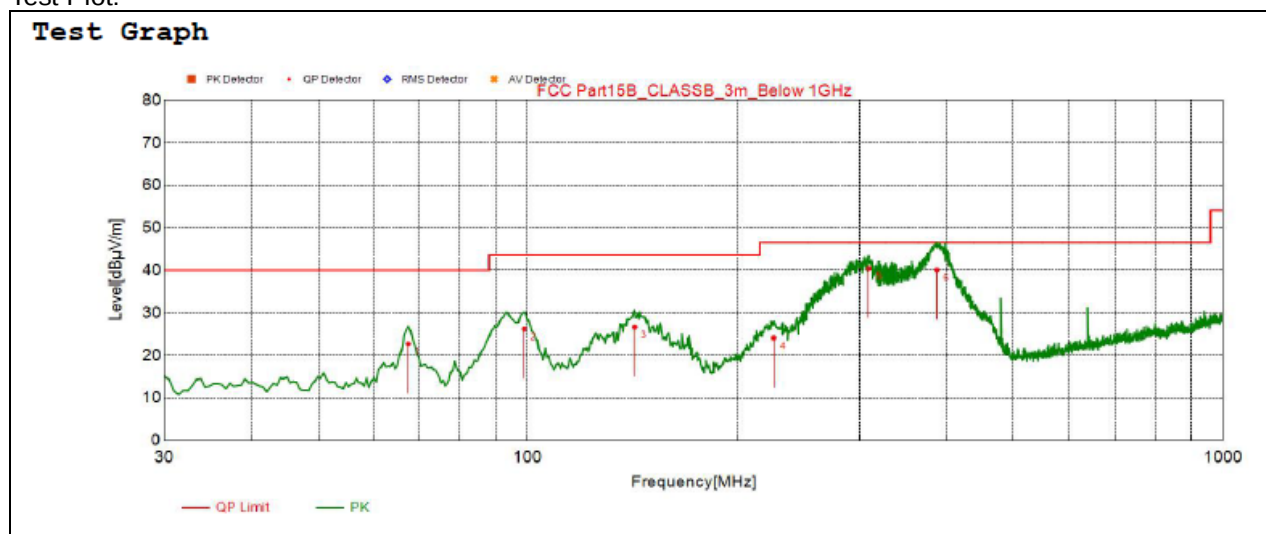
Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Horizontal

Spurious Emission Level					
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)
1	67.34	22.74	40	-17.26	-16.14
2	98.87	26.15	43.5	-17.35	-18.11
3	142.52	26.60	43.5	-16.90	-14.35
4	225.94	24.06	46.5	-22.44	-16.35
5	309.66	40.46	46.5	-6.04	-13.09
6	387.80	40.08	46.5	-6.42	-11.36

REMARKS:

- Emission Level(dBuV/m) = Spectrum reading (dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value

Test Plot:



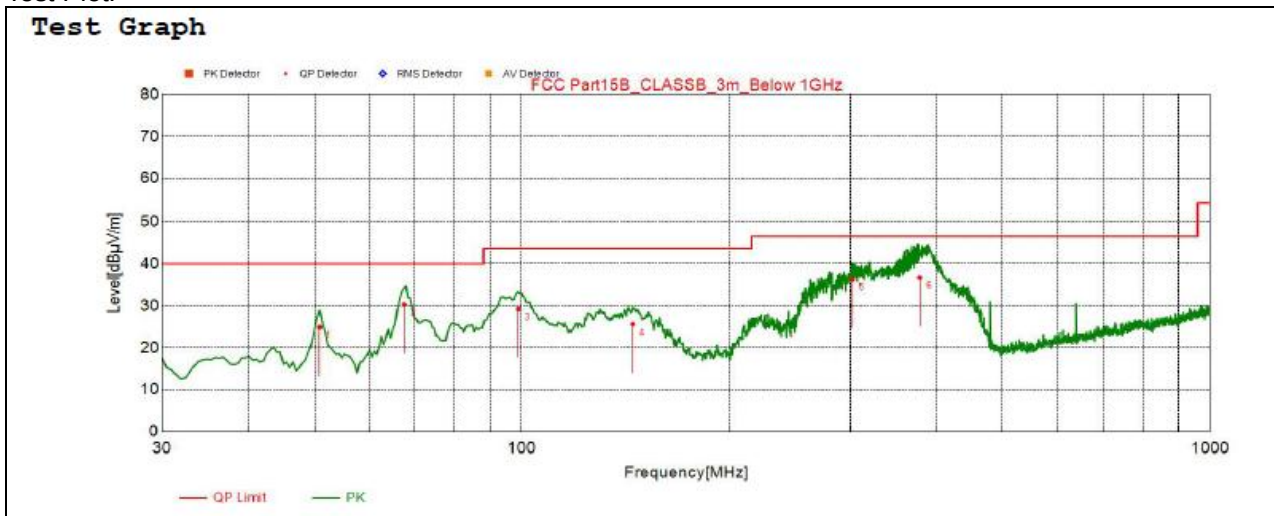
Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Vertical

Spurious Emission Level					
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)
1	50.85	24.81	40	-15.19	-15
2	67.461	30.27	40	-9.73	-16.16
3	98.87	29.22	43.5	-14.28	-18.11
4	144.94	25.54	43.5	-17.96	-14.24
5	302.08	36.21	46.5	-10.29	-13.33
6	378.45	36.65	46.5	-9.85	-11.48

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Test Plot:



For model A E26 WiZ60 TW

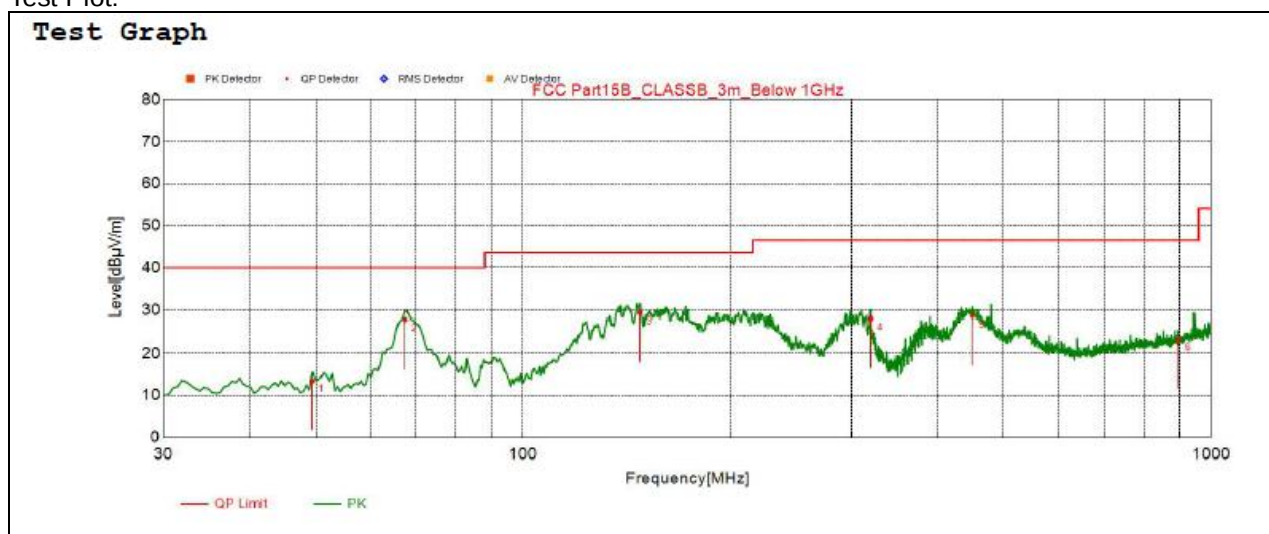
Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Horizontal

Spurious Emission Level					
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)
1	49.4	13.45	40	-26.55	-15.44
2	67.345	27.81	40	-12.19	-16.72
3	147.85	29.45	43.5	-14.05	-15.07
4	320.03	28.02	46.5	-18.48	-14.19
5	450.01	28.64	46.5	-17.86	-11.42
6	896.69	23.27	46.5	-23.23	-3.57

REMARKS:

1. Emission Level(dBuV/m) = Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Test Plot:



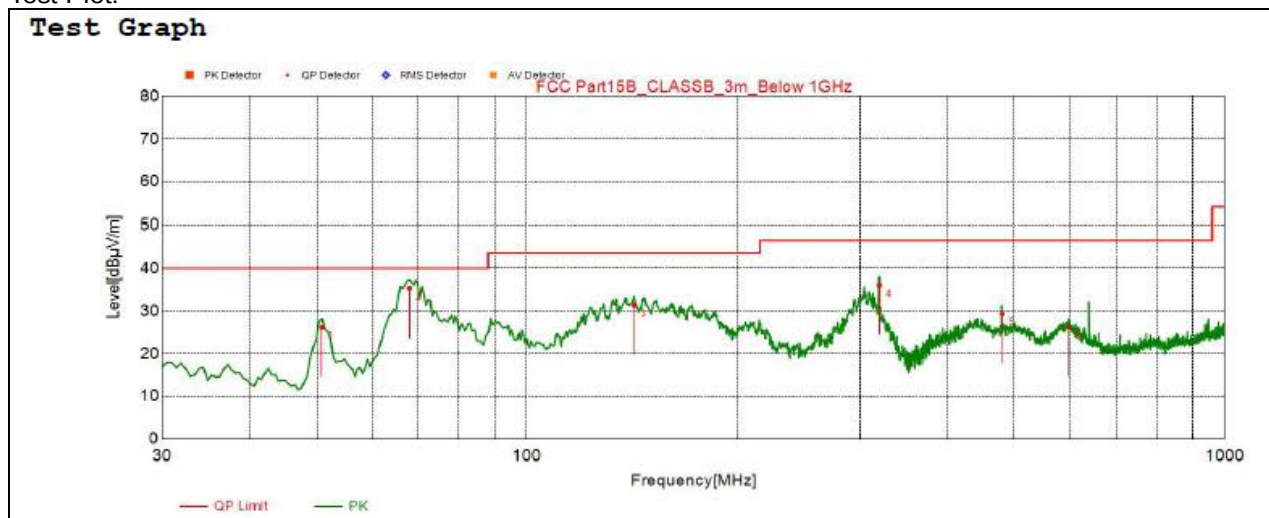
Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Vertical

Spurious Emission Level					
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)
1	50.855	26.11	40	-13.89	-15.5
2	67.830	35.26	40	-4.74	-16.81
3	98.87	31.31	43.5	-12.19	-15.26
4	144.94	35.97	46.5	-10.53	-14.19
5	302.08	29.31	46.5	-17.19	-10.91
6	378.45	26.12	46.5	-20.38	-8.38

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Test Plot:



For model BR30 WiZ75 TR

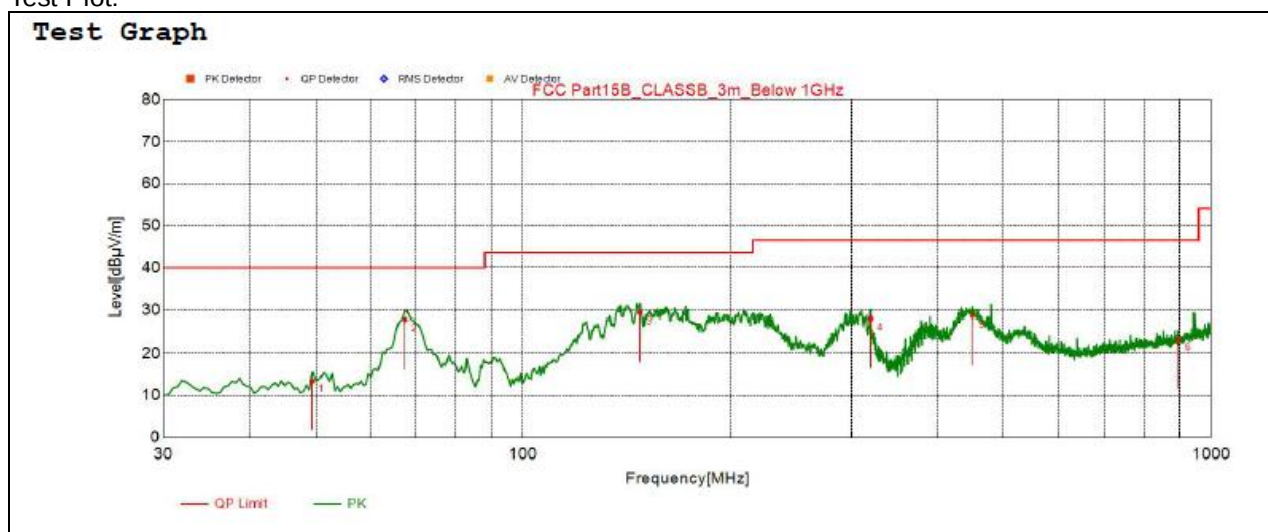
Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Horizontal

Spurious Emission Level					
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)
1	51.34	19.68	40	-20.32	-15.52
2	67.83	22.34	40	-17.66	-16.81
3	166.77	31.96	43.5	-11.54	-14.98
4	310.81	28.86	46.5	-17.64	-14.45
5	378.23	29.22	46.5	-17.28	-13.03
6	860.32	22.69	46.5	-23.81	-3.77

REMARKS:

1. Emission Level(dBuV/m) = Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Test Plot:



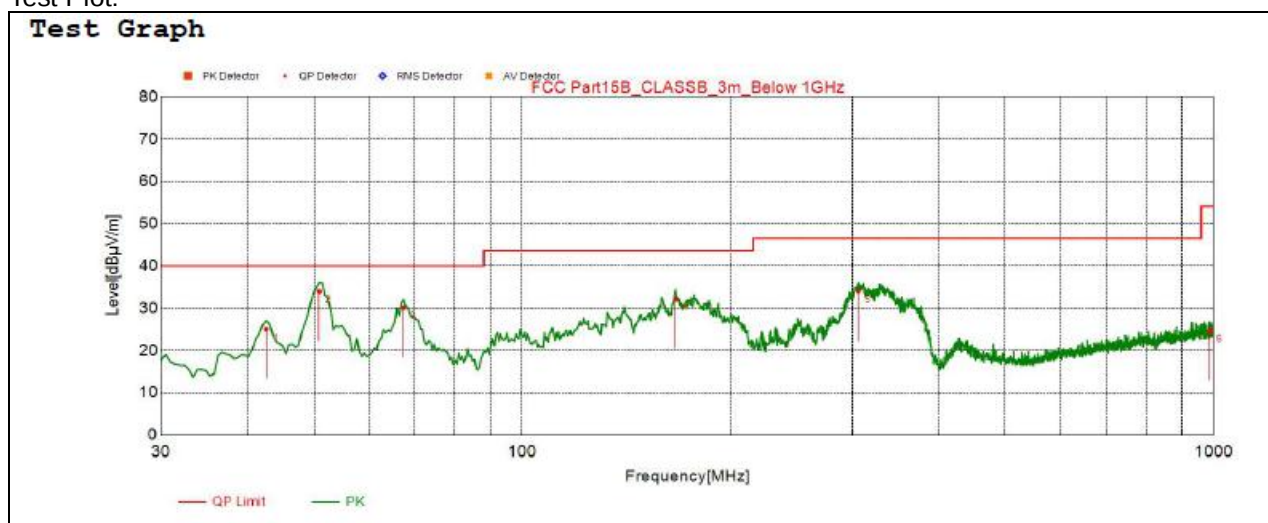
Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Vertical

Spurious Emission Level					
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)
1	42.61	24.96	40	-15.04	-15.27
2	50.855	33.91	40	-6.09	-15.5
3	67.345	30.10	40	-9.90	-16.72
4	166.77	32.22	43.5	-11.28	-14.98
5	306.45	33.95	46.5	-12.55	-14.58
6	988.84	24.64	54	-29.36	-1.31

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Test Plot:



For model BR30 WiZ75 TW

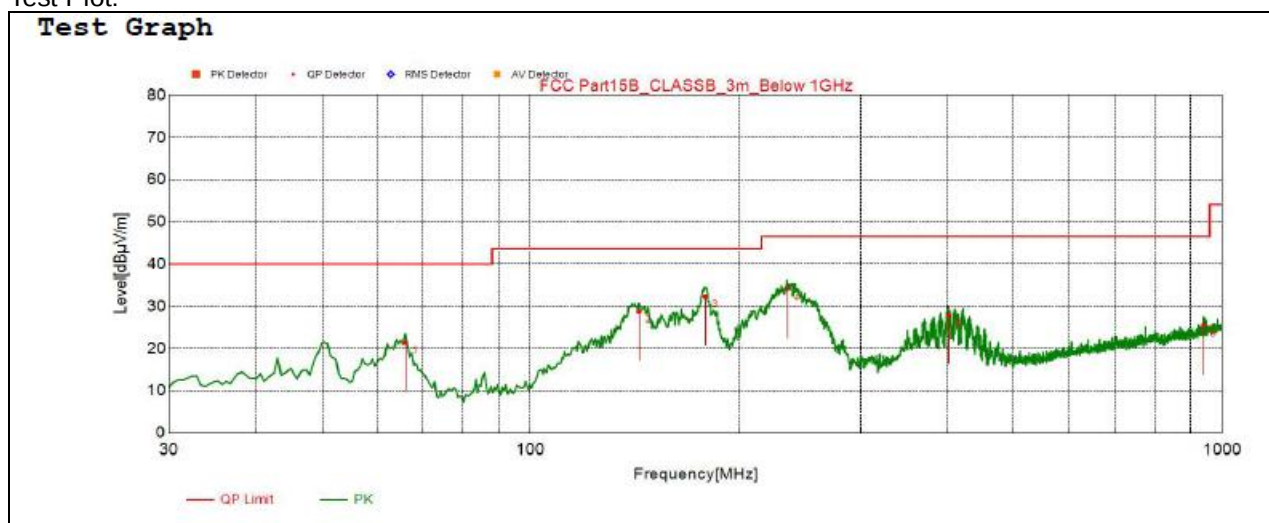
Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Horizontal

Spurious Emission Level					
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)
1	65.89	21.47	40	-18.53	-16.43
2	143.49	28.74	43.5	-14.76	-15.22
3	178.89	32.35	43.5	-11.15	-16.11
4	235.15	34.05	46.5	-12.45	-17.02
5	402.48	27.83	46.5	-18.67	-12.66
6	940.83	25.49	46.5	-21.01	-2.17

REMARKS:

1. Emission Level(dBuV/m) = Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Test Plot:



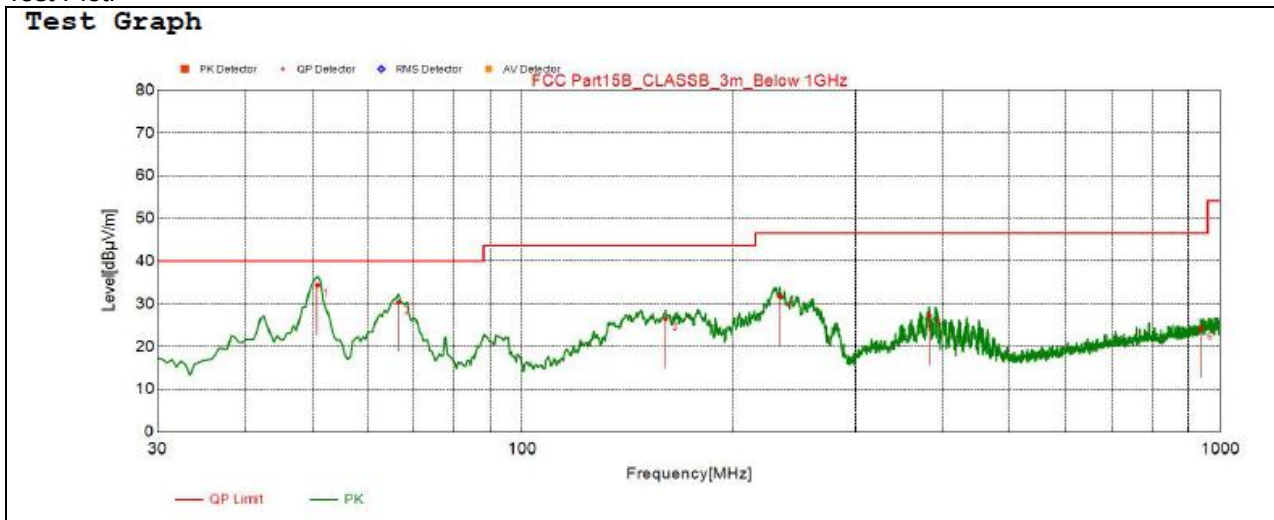
Channel	TX Channel 1	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Vertical

Spurious Emission Level					
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)
1	50.85	34.26	40	-5.74	-15.5
2	66.37	30.34	40	-9.66	-16.52
3	160.46	26.41	43.5	-17.09	-15.13
4	234.18	31.77	46.5	-14.73	-17.11
5	383.08	27.19	46.5	-19.31	-12.96
6	938.89	24.36	46.5	-22.14	-2.22

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Test Plot:



Radiated Emission Range 1GHz~10th Harmonic

802.11b

Channel	TX Channel 1	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	4824.00	54.56	74	-19.44	1.54	H	PK
2	4824.00	51.64	54	-2.36	1.54	H	AV
3	4824.00	54.36	74	-19.64	1.54	V	PK
4	4824.00	49.32	54	-4.68	1.54	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Channel	TX Channel 6	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	4874.00	53.37	74	-20.63	1.61	H	PK
2	4874.00	47.15	54	-6.85	1.61	H	AV
3	4874.00	52.33	74	-21.67	1.61	V	PK
4	4874.00	45.15	54	-8.85	1.61	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Channel	TX Channel 11	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	4924.00	54.18	74	-19.82	1.69	H	PK
2	4924.00	51.75	54	-2.25	1.69	H	AV
3	4924.00	53.86	74	-20.14	1.69	V	PK
4	4924.00	51.25	54	-2.75	1.69	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.6 Conducted Emission Measurement

4.6.1 Limits

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.6.2 Test Procedures

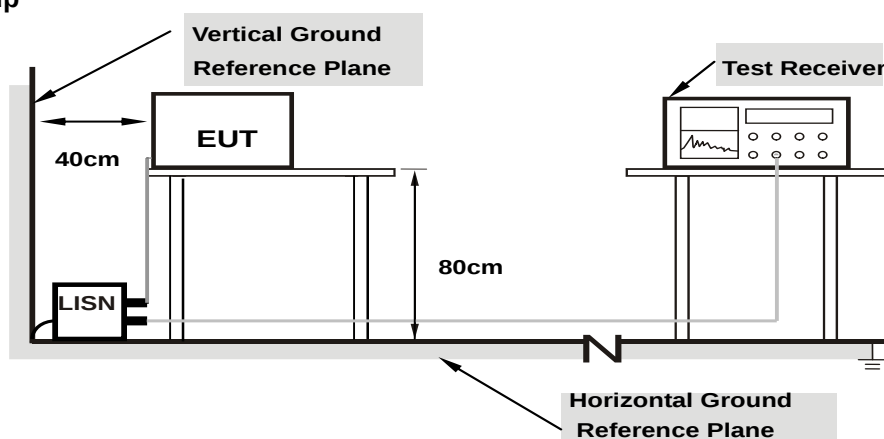
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.6.3 Deviation from Test Standard

No deviation.

4.6.4 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.6.5 EUT Operating Conditions

Same as 4.1.6.

4.6.6 Test Results

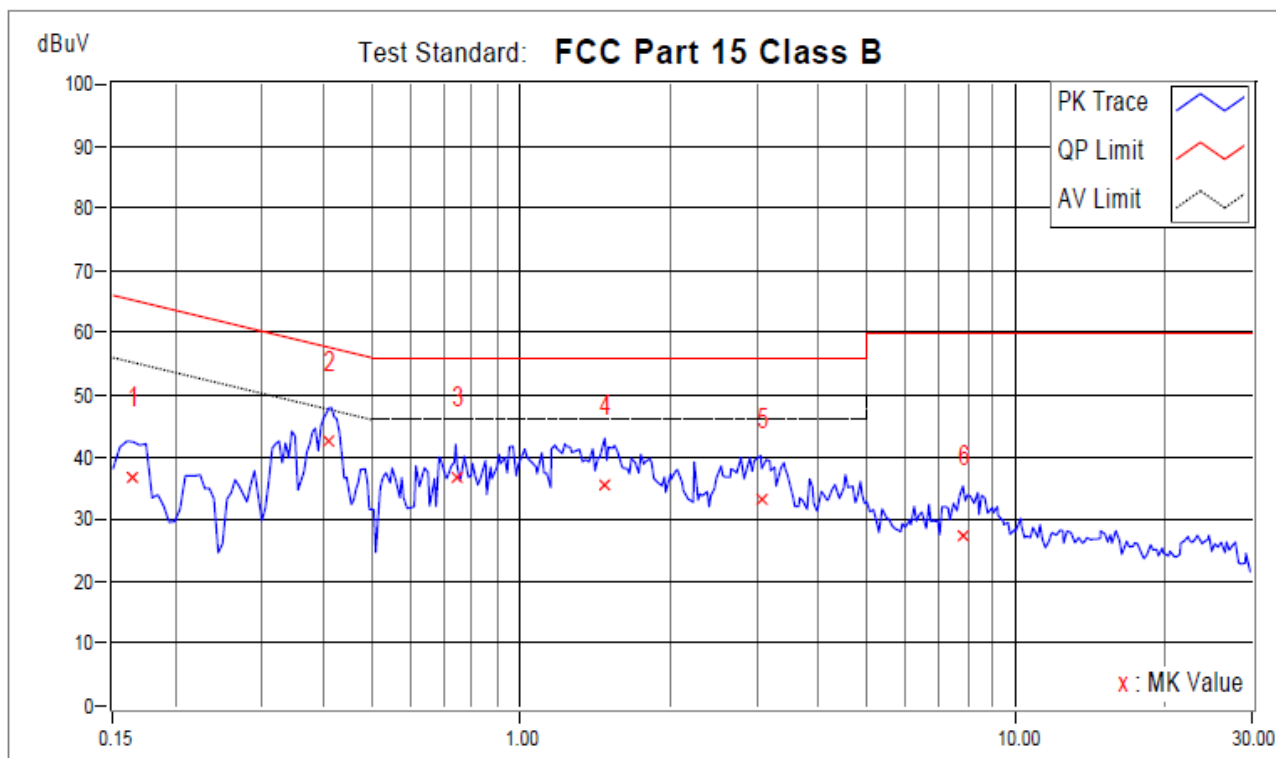
For model A E26 WiZ60 TR

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16500	10.05	26.85	14.16	36.90	24.21	65.21	55.21	-28.31	-31.00
2	0.41000	10.05	32.42	13.75	42.47	23.80	57.65	47.65	-15.18	-23.85
3	0.74000	10.11	26.43	16.42	36.54	26.53	56.00	46.00	-19.46	-19.47
4	1.48000	10.12	25.26	11.77	35.38	21.89	56.00	46.00	-20.62	-24.11
5	3.06000	10.14	22.92	12.71	33.06	22.85	56.00	46.00	-22.94	-23.15
6	7.84500	10.26	17.17	7.36	27.43	17.62	60.00	50.00	-32.57	-32.38

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

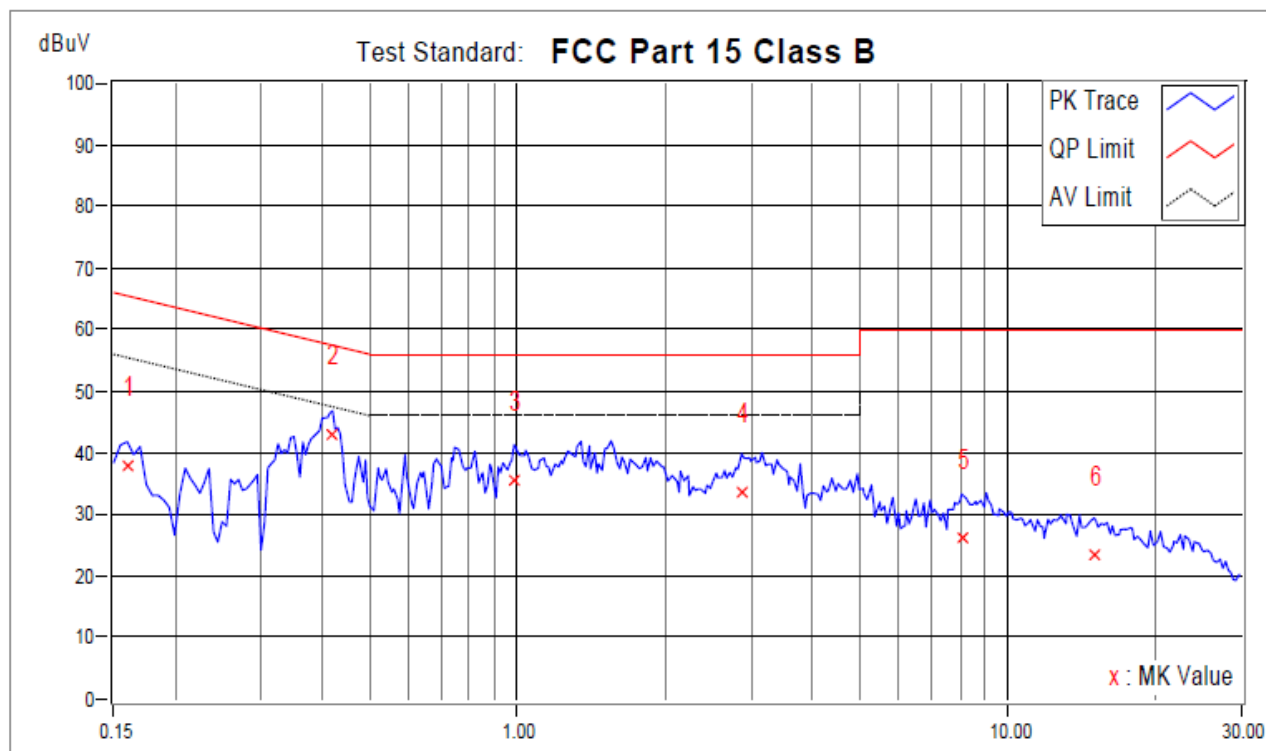


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16000	9.97	27.84	18.72	37.81	28.69	65.46	55.46	-27.65	-26.77
2	0.42000	10.03	32.82	23.61	42.85	33.64	57.45	47.45	-14.60	-13.81
3	0.98500	10.06	25.31	13.27	35.37	23.33	56.00	46.00	-20.63	-22.67
4	2.87000	10.12	23.43	12.70	33.55	22.82	56.00	46.00	-22.45	-23.18
5	8.07500	10.10	16.08	6.63	26.18	16.73	60.00	50.00	-33.82	-33.27
6	15.03500	10.21	13.05	5.24	23.26	15.45	60.00	50.00	-36.74	-34.55

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



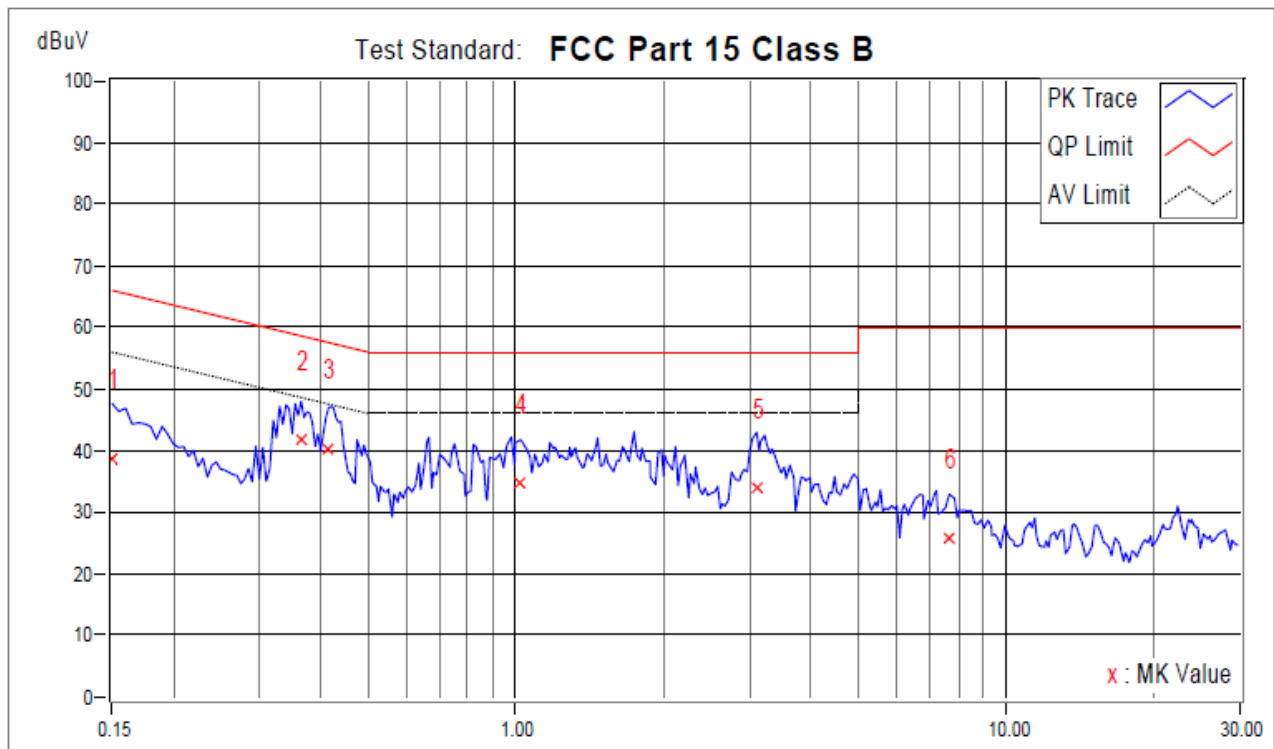
For model A E26 WIZ60 TW

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	----------	-------------------	--------------------------------

No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
		(dB)								
1	0.15000	10.06	28.77	6.64	38.83	16.70	66.00	56.00	-27.17	-39.30
2	0.36500	10.04	31.72	19.86	41.76	29.90	58.61	48.61	-16.86	-18.72
3	0.41500	10.05	30.22	15.18	40.27	25.23	57.55	47.55	-17.28	-22.32
4	1.02500	10.14	24.60	12.38	34.74	22.52	56.00	46.00	-21.26	-23.48
5	3.10500	10.14	24.03	11.87	34.17	22.01	56.00	46.00	-21.83	-23.99
6	7.68000	10.26	15.37	5.68	25.63	15.94	60.00	50.00	-34.37	-34.06

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

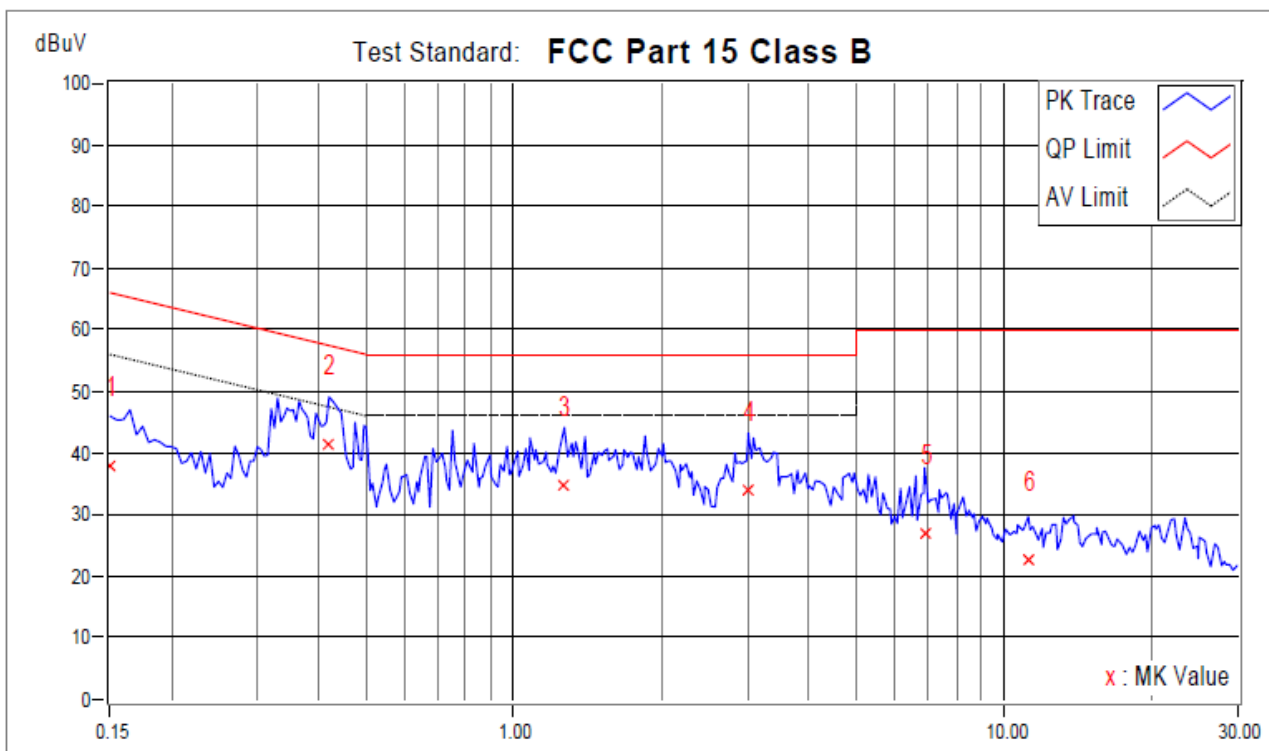


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	-----------------------------------

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.96	27.92	7.41	37.88	17.37	66.00	56.00	-28.12	-38.63
2	0.42000	10.03	31.38	17.21	41.41	27.24	57.45	47.45	-16.04	-20.21
3	1.26500	10.07	24.55	11.26	34.62	21.33	56.00	46.00	-21.38	-24.67
4	3.01500	10.12	23.98	12.54	34.10	22.66	56.00	46.00	-21.90	-23.34
5	6.90500	10.07	16.90	6.42	26.97	16.49	60.00	50.00	-33.03	-33.51
6	11.24000	10.16	12.35	3.57	22.51	13.73	60.00	50.00	-37.49	-36.27

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



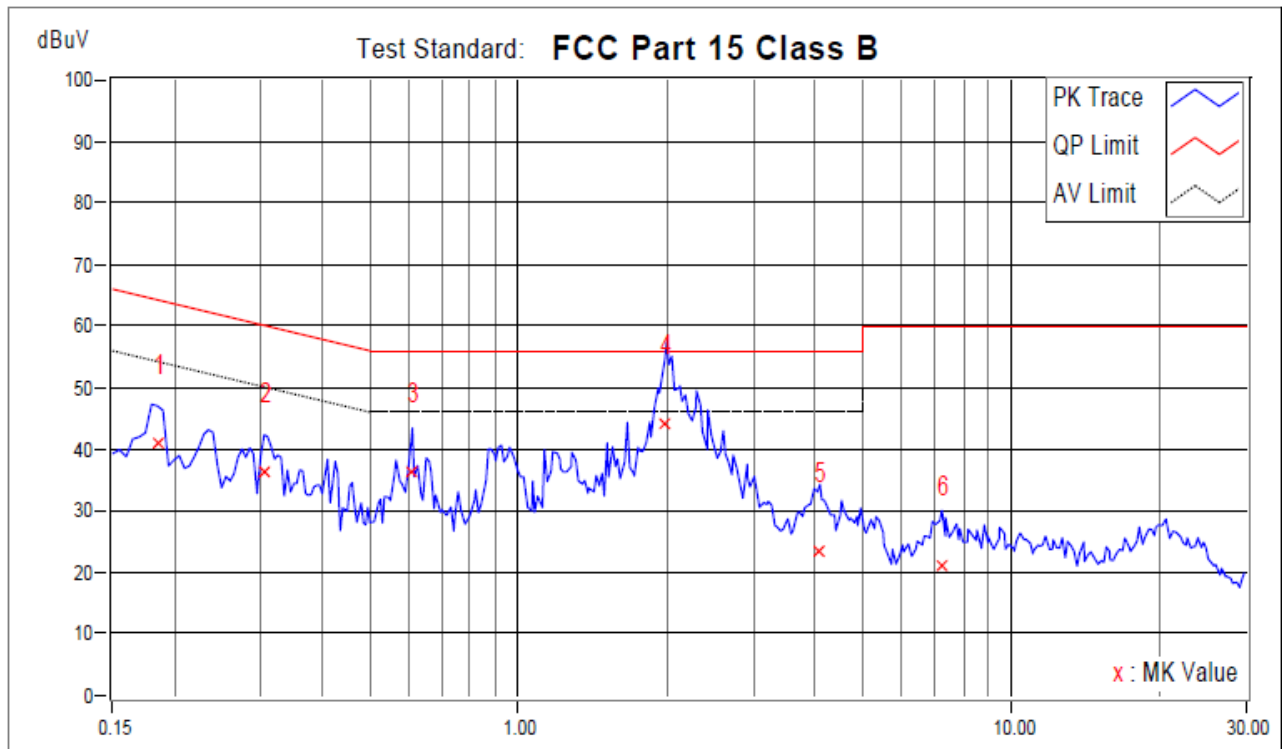
For model BR30 WiZ75 TR

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	----------	-------------------	--------------------------------

No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)								
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18500	10.00	30.87	11.77	40.87	21.77	64.26	54.26	-23.39	-32.49
2	0.30500	10.02	26.26	14.78	36.28	24.80	60.11	50.11	-23.83	-25.31
3	0.61000	10.06	26.09	15.53	36.15	25.59	56.00	46.00	-19.85	-20.41
4	1.98500	10.11	33.88	23.02	43.99	33.13	56.00	46.00	-12.01	-12.87
5	4.10000	10.13	13.47	4.29	23.60	14.42	56.00	46.00	-32.40	-31.58
6	7.25000	10.08	11.15	3.63	21.23	13.71	60.00	50.00	-38.77	-36.29

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

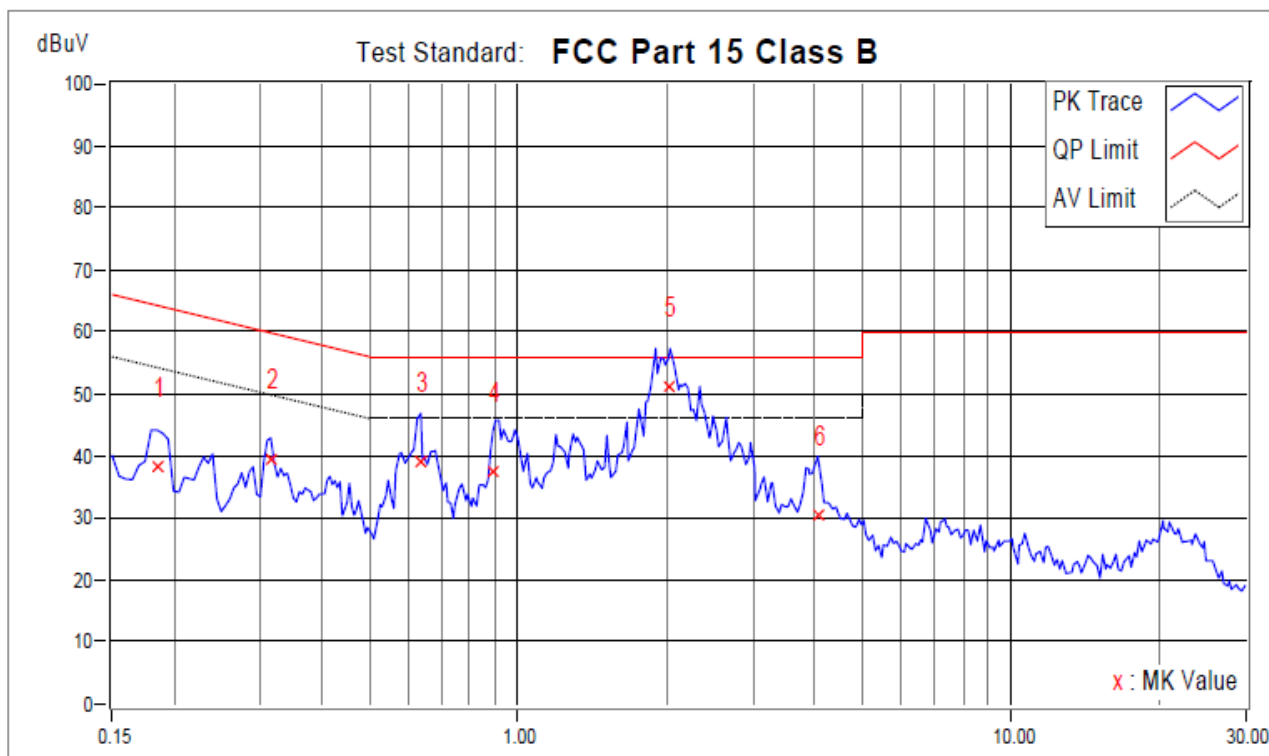


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18500	10.03	28.17	10.60	38.20	20.63	64.26	54.26	-26.06	-33.63
2	0.31500	10.03	29.53	18.82	39.56	28.85	59.84	49.84	-20.28	-20.99
3	0.63500	10.09	29.02	16.58	39.11	26.67	56.00	46.00	-16.89	-19.33
4	0.89000	10.13	27.55	14.88	37.68	25.01	56.00	46.00	-18.32	-20.99
5	2.03500	10.10	41.20	28.52	51.30	38.62	56.00	46.00	-4.70	-7.38
6	4.06500	10.18	20.15	6.12	30.33	16.30	56.00	46.00	-25.67	-29.70

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



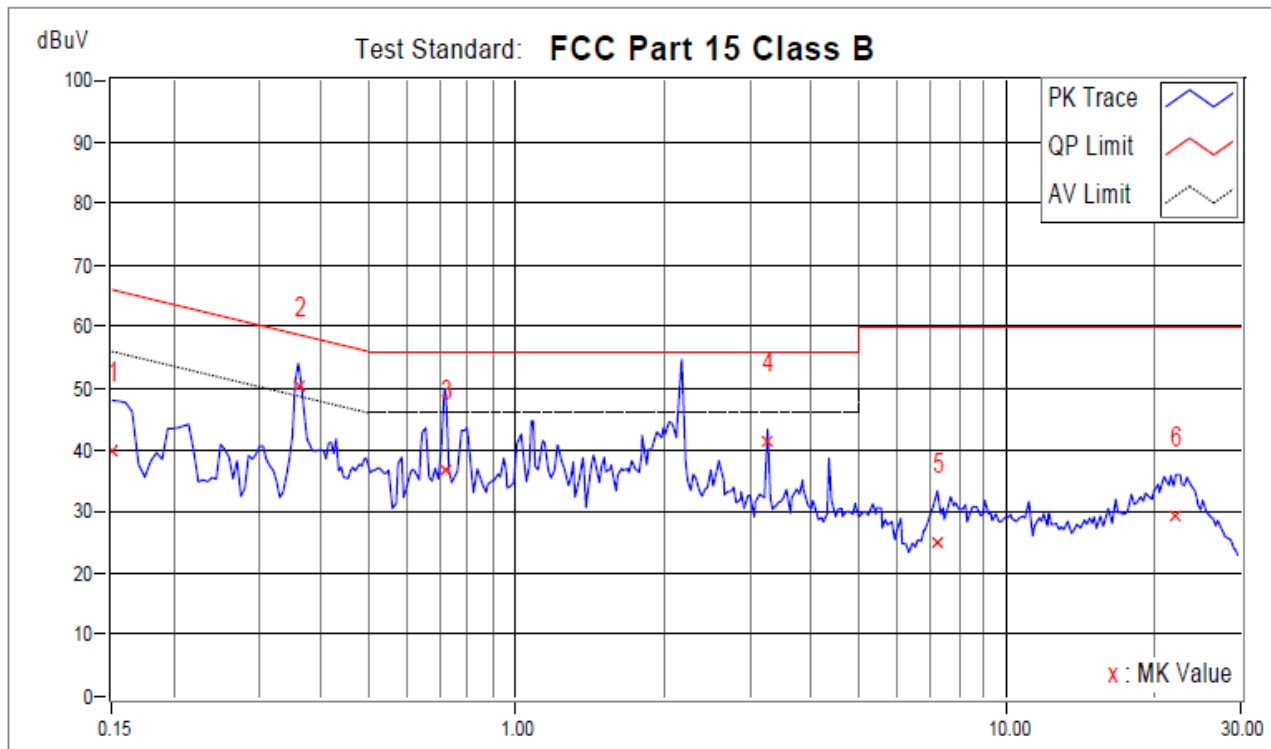
For model BR30 WiZ75 TW

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.06	29.97	12.26	40.03	22.32	66.00	56.00	-25.97	-33.68
2	0.36000	10.04	40.34	29.06	50.38	39.10	58.73	48.73	-8.35	-9.63
3	0.71500	10.11	26.73	14.77	36.84	24.88	56.00	46.00	-19.16	-21.12
4	3.26500	10.15	31.30	21.08	41.45	31.23	56.00	46.00	-14.55	-14.77
5	7.24500	10.27	14.81	5.84	25.08	16.11	60.00	50.00	-34.92	-33.89
6	22.19500	10.15	19.01	11.44	29.16	21.59	60.00	50.00	-30.84	-28.41

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

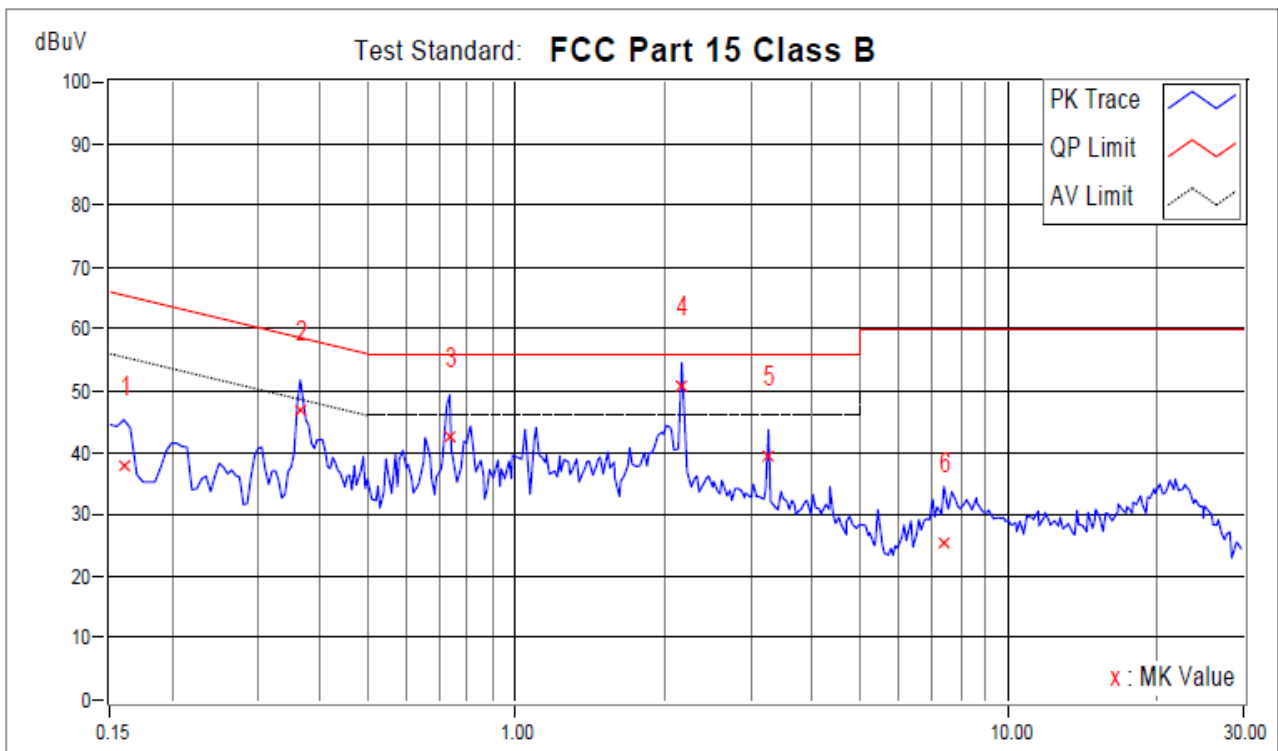


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16000	9.97	27.94	9.48	37.91	19.45	65.46	55.46	-27.55	-36.01
2	0.36500	10.03	36.96	27.64	46.99	37.67	58.61	48.61	-11.63	-10.95
3	0.73500	10.07	32.38	23.08	42.45	33.15	56.00	46.00	-13.55	-12.85
4	2.17500	10.11	40.69	30.63	50.80	40.74	56.00	46.00	-5.20	-5.26
5	3.26500	10.12	29.38	20.45	39.50	30.57	56.00	46.00	-16.50	-15.43
6	7.41500	10.08	15.31	7.17	25.39	17.25	60.00	50.00	-34.61	-32.75

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

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