



TEST REPORT

KCTL Inc.

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Report No.:
KR18-SRF0048-B

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1. Client

- Name : Qualcomm Atheros, Inc.
- Address : 1700 Technology Drive, San Jose, CA 95110
- Date of Receipt : 2018-04-03

2. Use of Report : -

3. Product Name : Single Stream 802.11a/b/g/n/ac + BT 4.1 M.2 1216 Type Card

- Model Number : QCNFA425
- Manufacturer and Country of Origin : Qualcomm Atheros, Inc. / USA

4. Host Product Name : Notebook PC

- Host Model Number : NP550XTA
- Manufacturer : Samsung Electronic Co., Ltd.

5. FCC ID : PPD-QCNFA425

6. Date of Test : 2018-04-03 to 2018-04-13

7. Test Standards : FCC Part 15 Subpart C, 15.247

8. Test Results : Refer to the test result in the test report

Affirmation	Tested by	Technical Manager
	 Name : Jaehyong Lee (Signature)	 Name : Changmin Kim (Signature)

2018-04-26

KCTL Inc.

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2018-04-23	Originally issued	-
2018-04-26	Additional Bluetooth Information	6 ~ 7
	Change Antenna gain table	7
	Change RF power setting in test software	7
	Additional note ₁₎	8
	Change a mention for Below 30 MHz test	19
	Change b mode higher band edge antenna polarization	53 ~ 58
2018-04-26	Revised antenna gain	7

Note: Test report KR18-SRF0048-B issued on 2018-04-26 supercedes previously issued test report KR18-SRF0048-A on 2018-04-26.

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1. Client information

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Telephone number: +1 858 658 3208
Contact person: Mark Ortlieb / mortlieb@qti.qualcomm.com

Manufacturer: Qualcomm Atheros, Inc.
Address: 1700 Technology Drive, San Jose, CA 95110

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2. Laboratory information

Address

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FCC Site Designation No: KR0040, FCC Site Registration No: 687132

VCCI Registration No. : R-3327, G-198, C-3706, T-1849

Industry Canada Registration No. : 8035A

KOLAS NO.: KT231

SITE MAP



3. Description of E.U.T.

3.1 Basic description

Product Name	Single Stream 802.11a/b/g/n/ac + BT 4.1 M.2 1216 Type Card
Product Model Number	QCNFA425
Product Manufacturer	Qualcomm Atheros, Inc.
Host Product Name	Notebook PC
Host Model Number	NP550XTA
Host Manufacturer	Samsung Electronic Co., Ltd.
Serial Number	0W7N91ZK200021Z

3.2 General description

Frequency Range	2 402 MHz ~ 2 480 MHz (Bluetooth, Bluetooth Low Energy) 2 412 MHz ~ 2 462 MHz (802.11b/g/n/ac_HT20/VHT20) 2 422 MHz ~ 2 452 MHz (802.11n/ac_HT40/VHT40) 5 180 MHz ~ 5 240 MHz (802.11a/n/ac_HT20/VHT20) 5 190 MHz ~ 5 230 MHz (802.11n/ac_HT40/VHT40) 5 210 MHz (802.11ac_VHT80) 5 260 MHz ~ 5 320 MHz (802.11a/n/ac_HT20/VHT20) 5 270 MHz ~ 5 310 MHz (802.11n/ac_HT40/VHT40) 5 290 MHz (802.11ac_VHT80) 5 260 MHz ~ 5 320 MHz (802.11a/n/ac_HT20/VHT20) 5 270 MHz ~ 5 310 MHz (802.11n/ac_HT40/VHT40) 5 290 MHz (802.11ac_VHT80) 5 500 MHz ~ 5 720 MHz (802.11a/n/ac_HT20/VHT20) 5 510 MHz ~ 5 710 MHz (802.11n/ac_HT40/VHT40) 5 530 MHz ~ 5 690 MHz (802.11ac_VHT80) 5 745 MHz ~ 5 825 MHz (802.11a/n/ac_HT20/VHT20) 5 755 MHz ~ 5 795 MHz (802.11n/ac_HT40/VHT40) 5 775 MHz (802.11ac_VHT80)
Type of Modulation	Bluetooth: GFSK, $\pi/4$ DQPSK, 8DPSK WiFi: DSSS, OFDM

The number of channels	2.4 GHz: 79 ch (Bluetooth) 40 ch (Bluetooth Low Energy) 11 ch (802.11b/g/n/ac_HT20/VHT20) 7 ch (802.11n/ac_HT40/VHT40) 5.0 GHz: 5 150 MHz Band: 4 ch (802.11a/n/ac_HT20/VHT20) 2 ch (802.11n/ac_HT40/VHT40) 1 ch (802.11ac_VHT80) 5 250 MHz Band: 4 ch (802.11a/n/ac_HT20/VHT20) 2 ch (802.11n/ac_HT40/VHT40) 1 ch (802.11ac_VHT80) 5 470 MHz Band: 12 ch (802.11a/n/ac_HT20/VHT20) 6 ch (802.11n/ac_HT40/VHT40) 3 ch (802.11ac_VHT80) 5 725 MHz Band: 5 ch (802.11a/n/ac_HT20/VHT20) 2 ch (802.11n/ac_HT40/VHT40) 1 ch (802.11ac_VHT80)
Type of Antenna	PIFA Antenna
Antenna Gain	Main Antenna 2.4 GHz: -0.32 dBi 5 GHz: -4.16 dBi (U-NII-1 & U-NII-2A), -3.58 dBi (U-NII-2C), -3.34 dBi (U-NII-3)
Power supply	AC 120 V
Test SW Version	QCA Radio Control Toolkit Version3.0.55.0

Note : The above EUT information was declared by the manufacturer.

Note : Main antenna operate as both of transmitter and receiver antenna but Aux antenna operate as only receiver antenna.

3.3 RF power setting in TEST SW

Mode	Lowest Channel	Middle Channel	Highest Channel
802.11b	14	14	14.5
802.11g	10	10	10
802.11n HT20	9.5	9.5	10
802.11n HT40	7.5	7.5	8
802.11ac VHT20	9.5	9.5	10
802.11ac VHT40	7.5	7.5	8

3.4 Average output power

Method AVGPM (Measurement using an RF average-reading power meter)

- a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.
 - 1) The EUT is configured to transmit continuously, or to transmit with a constant duty factor.
 - 2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
 - 3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
- b) If the transmitter does not transmit continuously, measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.
- c) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- d) Adjust the measurement in dBm by adding $10\log(1/x)$, where x is the duty cycle to the measurement result.

- Average output power

Mode	Channel	Frequency [MHz]	Average power [dBm]
802.11b	Lowest	2 412	15.37
	Middle	2 437	15.30
	Highest	2 462	15.08
802.11g	Lowest	2 412	11.23
	Middle	2 437	11.04
	Highest	2 462	10.53
802.11n HT20	Lowest	2 412	10.31
	Middle	2 437	10.25
	Highest	2 462	10.18
802.11n HT40	Lowest	2 422	8.67
	Middle	2 437	8.64
	Highest	2 452	8.77
802.11ac VHT20	Lowest	2 412	10.36
	Middle	2 437	10.25
	Highest	2 462	10.14
802.11ac VHT40	Lowest	2 422	8.62
	Middle	2 437	8.56
	Highest	2 452	8.69

Note₁) : The above average output power were retested results.

Note₂) : The worst-case data rates were:

802.11 b mode: 1 Mbps

802.11 g mode: 6 Mbps

802.11 n/ac_HT20/VHT20 mode: MCS0

802.11 n/ac_HT40/VHT40 mode: MCS0

3.5 Test frequency

	802.11b/g/n/ac_HT20/VHT20
Lowest frequency	2 412 MHz
Middle frequency	2 437 MHz
Highest frequency	2 462 MHz
	802.11n/ac_HT40/VHT40
Lowest frequency	2 422 MHz
Middle frequency	2 437 MHz
Highest frequency	2 452 MHz

3.6 Normal and extreme test conditions

- Ambient Conditions

	Temperature [°C]	Relative humidity [%]
Requirement for tests	15 to 35	20 to 75
Ambient Conditions	23	51

-Test Conditions

Test Condition	Temperature [°C]	Voltage [V]
NTNV	23	AC 120.00

Note₁₎ : N:Normal T:Temperature V:Voltage

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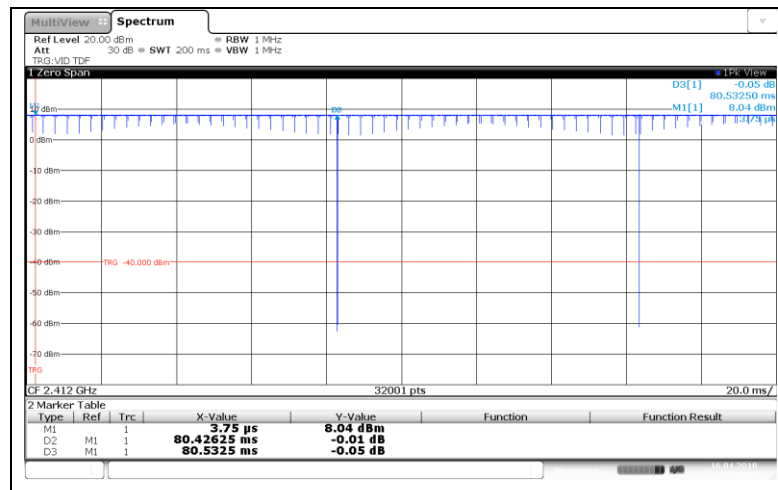
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3.7 Duty Cycle Correction Factor

- 802.11b

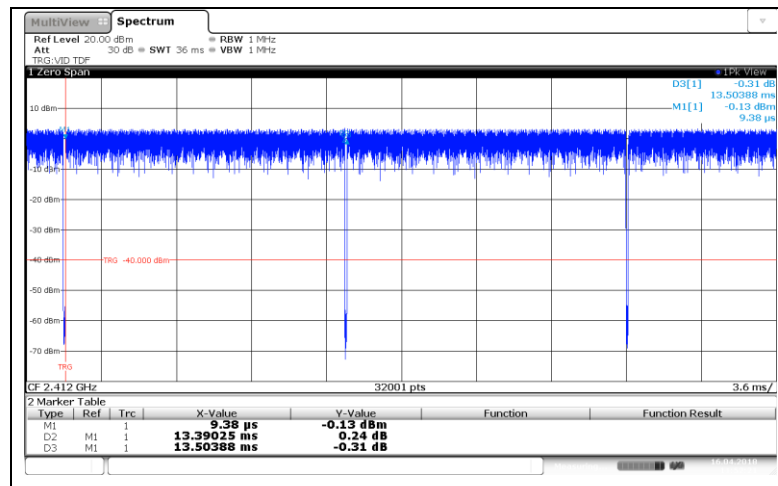


Note₁) : Period : 80.53 ms, On time : 80.43 ms

Note₂) : Duty Cycle : 99.87 %

Note₃) : It is a continuous transmission (duty cycle > 98 %)

- 802.11g



Note₁) : Period : 13.50 ms, On time : 13.39 ms

Note₂) : Duty Cycle : 99.16 %

Note₃) : It is a continuous transmission (duty cycle > 98 %)

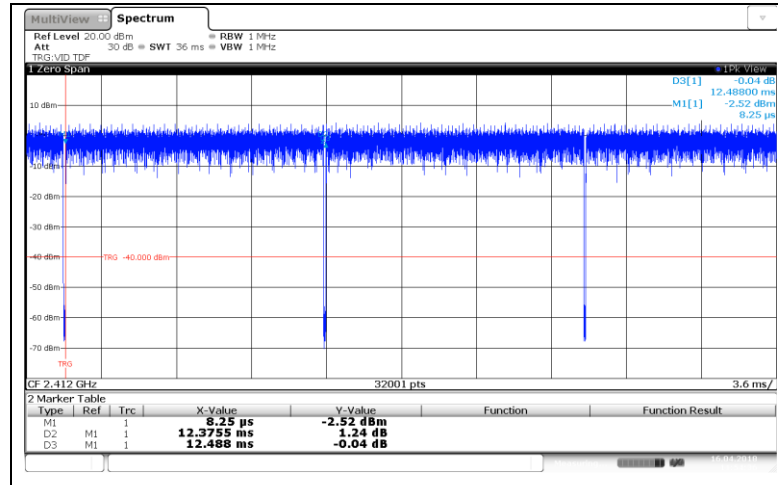
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- 802.11n HT20

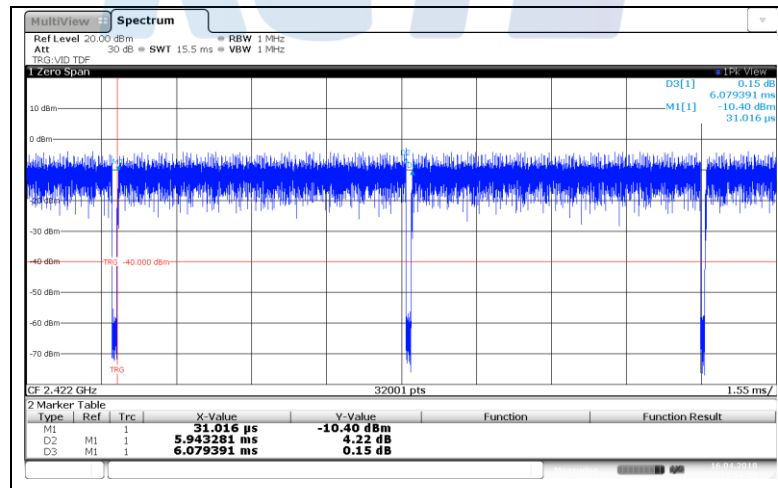


Note₁ : Period : 12.49 ms, On time : 12.38 ms

Note₂ : Duty Cycle : 99.10 %

Note₃ : It is a continuous transmission (duty cycle > 98 %)

- 802.11n HT40



Note₁ : Period : 6.08 ms, On time : 5.94 ms

Note₂ : Duty Cycle : 97.76 %

Note₃ : It is a continuous transmission (duty cycle <= 98 %)

Note₄ : Duty Cycle Correction Factor : $10 \log(1 / x) = 10 \log(1 / (5.94 / 6.08)) = 0.10 \text{ dB}$

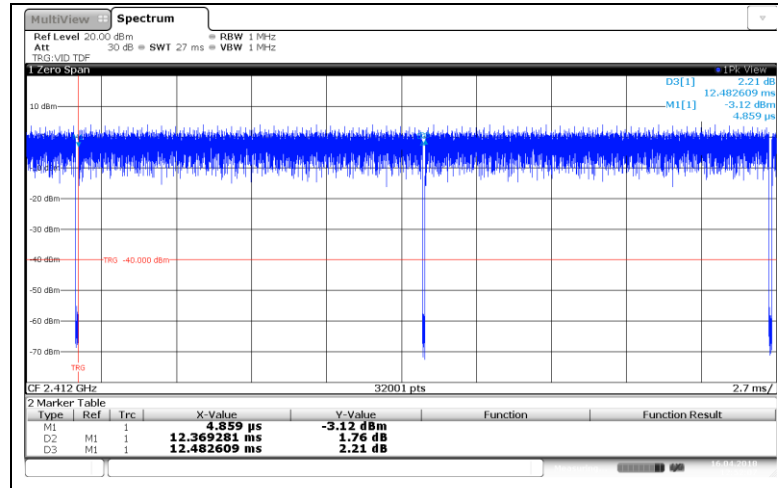
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- 802.11ac VHT20

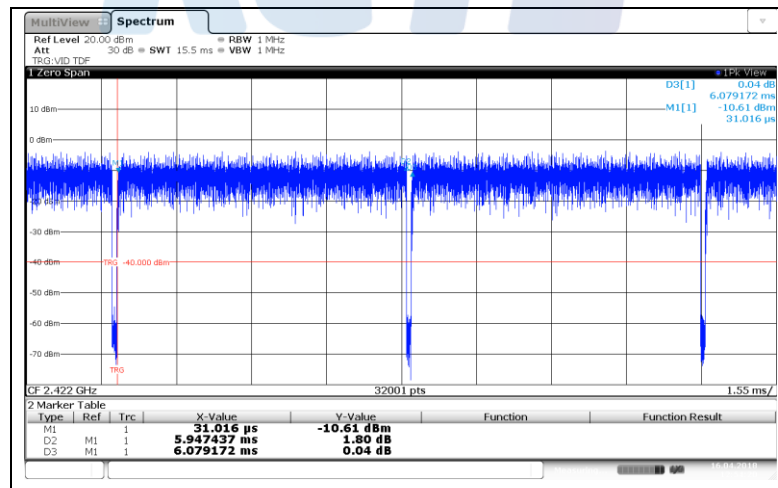


Note₁ : Period : 12.48 ms, On time : 12.37 ms

Note₂ : Duty Cycle : 99.09 %

Note₃ : It is a continuous transmission (duty cycle > 98 %)

- 802.11ac VHT40



Note₁ : Period : 6.08 ms, On time : 5.95 ms

Note₂ : Duty Cycle : 97.83 %

Note₃ : It is a continuous transmission (duty cycle $\leq$ 98 %)

Note₄ : Duty Cycle Correction Factor : $10 \log(1 / x) = 10 \log(1 / (5.95 / 6.08)) = 0.10 \text{ dB}$

4. Summary of test results

4.1 Standards & results

FCC Rule Reference	Parameter	Report Section	Test Result
15.203, 15.247(b)(4)	Antenna Requirement	5.1	C
15.247(d),15.205(a),15.209(a)	Spurious Emission, Band Edge and Restricted bands	5.2	C
Note ₁₎ : C = Complies, NC = Not complies, NT = Not tested, NA = Not applicable			

Note: Measurement methods used to test this device are ANSI C63.10:2013 and KDB558074 D01 v04

4.2 Uncertainty

Measurement Item	Expanded Uncertainty $U = kU_c (k = 2)$	
Radiated Spurious Emissions	30 MHz ~ 300 MHz:	+4.94 dB, -5.06 dB
		+4.93 dB, -5.05 dB
	300 MHz ~ 1 000 MHz:	+4.97 dB, -5.08 dB
		+4.84 dB, -4.96 dB
	1 GHz ~ 25 GHz:	+6.03 dB, -6.05 dB

5. Test results

5.1 Antenna Requirement

5.1.1 Regulation

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 with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.1.2 Result

- Complied

The transmitter has permanently attached internal antenna on EUT.

5.2 Spurious Emission, Band Edge, and Restricted bands

5.2.1 Regulation

According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

According to §15.209(a), Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (μV/m)	Measurement distance (m)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §15.231 and 15.241.

According to § 15.205(a) and (b), only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 - 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 - 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 - 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 - 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 - 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 - 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 - 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 - 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 - 2 500	17.7 - 21.4
8.376 25 - 8.386 75	156.7 - 156.9	2 690 - 2 900	22.01 - 23.12
8.414 25 - 8.414 75	162.012 5 - 167.17	3 260 - 3 267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3 332 - 3 339	31.2 - 31.8
12.519 75 - 12.520 25	240 - 285	3 345.8 - 3 358	36.43 - 36.5
12.576 75 - 12.577 25	322 - 335.4	3 600 - 4 400	Above 38.6
13.36 - 13.41			

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

5.2.2 Measurement Procedure

5.2.2.1 Band-edge Compliance of RF Conducted Emissions

5.2.2.1.1 Reference Level Measurement

Establish a reference level by using the following procedure:

- 1) Set instrument center frequency to DTS channel center frequency.
- 2) Set the span to ≥ 1.5 times the DTS bandwidth.
- 3) Set the RBW = 100 kHz.
- 4) Set the VBW $\geq 3 \times$ RBW.
- 5) Detector = peak.
- 6) Sweep time = auto couple.
- 7) Trace mode = max hold.
- 8) Allow trace to fully stabilize.
- 9) Use the peak marker function to determine the maximum PSD level.

5.2.2.1.2 Emissions Level Measurement

- 1) Set the center frequency and span to encompass frequency range to be measured.
- 2) Set the RBW = 100 kHz.
- 3) Set the VBW $\geq 3 \times$ RBW.
- 4) Detector = peak.
- 5) Ensure that the number of measurement points $\geq$ span/RBW
- 6) Sweep time = auto couple.
- 7) Trace mode = max hold.
- 8) Allow trace to fully stabilize.
- 9) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

5.2.2.2 Conducted Spurious Emissions

Set the spectrum analyzer as follows:

- 1) Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic.

Typically, several plots are required to cover this entire span.

- 2) RBW = 100 kHz
- 3) VBW ≥ RBW
- 4) Sweep = auto
- 5) Detector function = peak
- 6) Trace = max hold
- 7) Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
- 8) Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

5.2.2.3 Radiated Spurious Emissions

- 1) The preliminary and final radiated measurements were performed to determine the frequency producing the maximum emissions in at a 10m semi-anechoic chamber. The EUT was tested at a distance 3 meters.
- 2) The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.
- 3) The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, and from 30 to 1 000 MHz using the Bi-Log antenna, and from 1 000 MHz to 26 500 MHz using the horn antenna.
- 4) Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.
- 5) The 0.8m height is for below 1 G testing, and 1.5m is for above 1G testing.

Note

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Average detection (AV) at frequency above 1 GHz. (Detector = RMS, Averaging type = power)
 In case of duty cycle less than 98%, a duty cycle correction factor has to be added to the measurement result.

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RADIATED EMISSION TEST SITES FOR MEASUREMENTS FROM 9 kHz TO 30 MHz

According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

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5.2.3 Test Result

Test Condition: Refer to the clause 3.6 Normal and extreme test conditions

- Complied

- Conducted Spurious Emissions was shown in figure 3.
Note: We took the insertion loss of the cable into consideration within the measuring instrument.
- Measured value of the Field strength of spurious Emissions (Radiated)
- All radiated testing was performed with normal notebook pc position.
- The Worst-case rates:
 802.11b mode : 1 Mbps
 802.11g mode : 6 Mbps
 802.11n_HT20/HT40 : MCS0
 802.11ac_VHT20/VHT40 : MCS0

- Below 1 GHz data (worst-case)

802.11b Lowest Channel (2 412 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 MHz										
Not detected										
Quasi-Peak DATA. Emissions below 1 GHz										
46.98	120	V	42.20	1.40	-30.59	15.45	-13.74	28.46	40.00	11.54
165.56	120	V	23.10	2.82	-36.40	15.85	-17.73	5.37	43.50	38.13
233.22	120	H	38.70	3.38	-34.52	17.23	-13.91	24.79	46.00	21.21
375.93	120	V	32.70	4.40	-35.57	21.10	-10.07	22.63	46.00	23.37
431.82	120	V	33.40	4.75	-35.75	22.21	-8.79	24.61	46.00	21.39

Note1. Factor = Cable loss + Amp gain + Antenna factor

Result = Reading + Factor

Note2. Emission below 30 MHz : No emissions were detected above the noise floor which was at least 20 dB below The specification limits.

- Above 1 GHz data

- 802.11b

Lowest Channel (2 412 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
2 022.97	1 000	H	67.15	3.44	-62.77	27.84	-31.49	-	35.66	74.00	38.34
2 388.01 ¹⁾	1 000	V	60.37	3.70	-34.34	28.54	-2.10	-	58.27	74.00	15.73
3 490.08	1 000	H	66.63	4.45	-61.65	31.02	-26.18	-	40.44	74.00	33.56
4 649.58 ¹⁾	1 000	V	74.75	5.23	-63.28	32.72	-25.33	-	49.43	74.00	24.57
4 824.03 ²⁾	1 000	V	74.44	5.35	-62.95	32.81	-24.79	-	49.66	74.00	24.34
6 000.34	1 000	V	72.86	6.10	-62.77	34.40	-22.27	-	50.59	74.00	23.41
24 118.67	1 000	V	43.95	12.80	-48.57	45.10	9.33	-	53.28	74.00	20.72
Average DATA. Emissions above 1 GHz											
2 385.09 ¹⁾	1 000	V	50.46	3.70	-34.34	28.54	-2.10	-	48.36	54.00	5.64
4 649.58 ¹⁾	1 000	V	65.62	5.23	-63.28	32.72	-25.33	-	40.29	54.00	13.71
4 824.03 ²⁾	1 000	V	73.57	5.35	-62.95	32.81	-24.79	-	48.78	54.00	5.22

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

Middle Channel (2 437 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
1 690.55 ¹⁾	1 000	V	71.74	3.13	-63.20	26.56	-33.51	-	38.23	74.00	35.77
2 184.14	1 000	V	70.43	3.56	-62.76	28.15	-31.05	-	39.38	74.00	34.62
4 662.72 ¹⁾	1 000	V	74.67	5.24	-63.33	32.73	-25.36	-	49.31	74.00	24.69
4 873.88 ²⁾	1 000	V	74.75	5.39	-62.58	32.84	-24.35	-	50.40	74.00	23.60
5 999.89	1 000	V	73.20	6.10	-62.77	34.40	-22.27	-	50.93	74.00	23.07
24 377.92	1 000	H	43.67	12.80	-48.23	45.10	9.67	-	53.33	74.00	20.67
Average DATA. Emissions above 1 GHz											
1 690.55 ¹⁾	1 000	V	53.30	3.13	-63.20	26.56	-33.51	-	19.79	54.00	34.21
4 662.72 ¹⁾	1 000	V	64.29	5.24	-63.33	32.73	-25.36	-	38.93	54.00	15.07
4 873.88 ²⁾	1 000	V	72.17	5.39	-62.58	32.84	-24.35	-	47.82	54.00	6.18

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

Highest Channel (2 462 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
2 137.11	1 000	V	67.97	3.52	-62.69	28.06	-31.11	-	36.85	74.00	37.15
2 176.48	1 000	V	69.58	3.55	-62.75	28.14	-31.06	-	38.52	74.00	35.48
2 491.26 ¹⁾	1 000	V	56.91	3.77	-34.84	28.72	-2.35	-	54.56	74.00	19.44
4 663.63 ¹⁾	1 000	V	74.10	5.24	-63.33	32.73	-25.36	-	48.74	74.00	25.26
4 923.72 ²⁾	1 000	V	75.86	5.42	-62.22	32.86	-23.94	-	51.93	74.00	22.07
5 999.89	1 000	V	73.35	6.10	-62.77	34.40	-22.27	-	51.08	74.00	22.92
24 626.02	1 000	H	43.34	12.80	-47.91	45.10	9.99	-	53.33	74.00	20.67
Average DATA. Emissions above 1 GHz											
2 491.26 ¹⁾	1 000	V	48.65	3.77	-34.84	28.72	-2.35	-	46.30	54.00	7.70
4 663.63 ¹⁾	1 000	V	64.06	5.24	-63.33	32.73	-25.36	-	38.70	54.00	15.30
4 923.72 ²⁾	1 000	V	73.28	5.42	-62.22	32.86	-23.94	-	49.34	54.00	4.66

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

- 802.11g

Lowest Channel (2 412 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
1 681.95	1 000	V	76.30	3.12	-63.22	26.53	-33.57	-	42.72	74.00	31.28
2 156.17	1 000	V	72.59	3.54	-62.73	28.10	-31.09	-	41.51	74.00	32.49
2 389.95 ¹⁾	1 000	V	66.97	3.70	-34.34	28.54	-2.10	-	64.87	74.00	9.13
4 649.58 ¹⁾	1 000	V	74.02	5.23	-63.28	32.72	-25.33	-	48.70	74.00	25.30
4 823.58 ²⁾	1 000	V	66.50	5.35	-62.95	32.81	-24.79	-	41.72	74.00	32.28
5 999.89	1 000	V	73.77	6.10	-62.77	34.40	-22.27	-	51.50	74.00	22.50
24 120.80	1 000	H	43.36	12.80	-48.57	45.10	9.33	-	52.69	74.00	21.31
Average DATA. Emissions above 1 GHz											
2 389.95 ¹⁾	1 000	V	52.21	3.70	-34.34	28.54	-2.10	-	50.11	54.00	3.89
4 649.58 ¹⁾	1 000	V	63.67	5.23	-63.28	32.72	-25.33	-	38.34	54.00	15.66
4 823.58 ²⁾	1 000	V	57.48	5.35	-62.95	32.81	-24.79	-	32.69	54.00	21.31

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

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**Middle Channel (2 437 MHz)**

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
2 265.16 ¹⁾	1 000	V	78.23	3.61	-62.83	28.30	-30.92	-	47.31	74.00	26.69
2 566.25	1 000	V	78.72	3.83	-62.96	28.88	-30.25	-	48.47	74.00	25.53
4 651.39 ¹⁾	1 000	V	74.56	5.23	-63.29	32.73	-25.33	-	49.23	74.00	24.77
4 866.63 ²⁾	1 000	V	69.42	5.38	-62.63	32.83	-24.42	-	45.01	74.00	28.99
6 000.34	1 000	V	73.26	6.10	-62.77	34.40	-22.27	-	51.00	74.00	23.00
24 370.22	1 000	V	43.70	12.80	-48.24	45.10	9.66	-	53.35	74.00	20.65
Average DATA. Emissions above 1 GHz											
2 265.16 ¹⁾	1 000	V	60.66	3.61	-62.83	28.30	-30.92	-	29.74	54.00	24.26
4 651.39 ¹⁾	1 000	V	64.92	5.23	-63.29	32.73	-25.33	-	39.59	54.00	14.41
4 866.63 ²⁾	1 000	V	61.69	5.38	-62.63	32.83	-24.42	-	37.27	54.00	16.73

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

Highest Channel (2 462 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
2 188.98	1 000	V	73.86	3.56	-62.76	28.16	-31.04	-	42.81	74.00	31.19
2 484.21 ¹⁾	1 000	V	62.22	3.77	-34.84	28.72	-2.35	-	59.87	74.00	14.13
3 210.94	1 000	V	69.88	4.27	-62.04	30.27	-27.50	-	42.38	74.00	31.62
4 656.38 ¹⁾	1 000	V	74.03	5.24	-63.31	32.73	-25.34	-	48.69	74.00	25.31
4 924.17 ²⁾	1 000	V	66.63	5.42	-62.21	32.86	-23.93	-	42.70	74.00	31.30
5 999.89	1 000	V	73.88	6.10	-62.77	34.40	-22.27	-	51.61	74.00	22.39
24 617.52	1 000	V	44.21	12.80	-47.92	45.10	9.98	-	54.19	74.00	19.81
Average DATA. Emissions above 1 GHz											
2 483.54 ¹⁾	1 000	V	52.01	3.77	-34.84	28.72	-2.35	-	49.66	54.00	4.34
4 656.38 ¹⁾	1 000	V	64.98	5.24	-63.31	32.73	-25.34	-	39.64	54.00	14.36
4 924.17 ²⁾	1 000	V	59.90	5.42	-62.21	32.86	-23.93	-	35.97	54.00	18.03

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

- 802.11n HT20

Lowest Channel (2 412 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
2 183.83	1 000	V	76.12	3.56	-62.76	28.15	-31.05	-	45.07	74.00	28.93
2 389.87 ¹⁾	1 000	V	64.76	3.70	-34.34	28.54	-2.10	-	62.66	74.00	11.34
2 800.00 ¹⁾	1 000	V	76.42	4.00	-63.20	29.32	-29.88	-	46.53	74.00	27.47
4 661.81 ¹⁾	1 000	V	74.03	5.24	-63.31	32.73	-25.34	-	48.69	74.00	25.31
4 823.13 ²⁾	1 000	V	66.63	5.35	-62.09	32.81	-23.93	-	42.70	74.00	31.30
5 999.89	1 000	V	73.88	6.10	-62.77	34.40	-22.27	-	51.61	74.00	22.39
24 116.81	1 000	H	43.98	12.80	-48.58	45.10	9.32	-	53.30	74.00	20.70
Average DATA. Emissions above 1 GHz											
2 389.97 ¹⁾	1 000	V	52.50	3.70	-34.34	28.54	-2.10	-	50.40	54.00	3.60
2 800.00 ¹⁾	1 000	V	56.01	4.00	-63.20	29.32	-29.88	-	26.13	54.00	27.87
4 661.81 ¹⁾	1 000	V	64.52	5.24	-63.31	32.73	-25.34	-	39.18	54.00	14.82
4 823.13 ²⁾	1 000	V	56.52	5.35	-62.09	32.81	-23.93	-	32.59	54.00	21.41

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

Middle Channel (2 437 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
1 748.83	1 000	V	74.92	3.19	-63.19	26.80	-33.20	-	41.72	74.00	32.28
2 199.38	1 000	V	74.44	3.57	-62.78	28.18	-31.03	-	43.41	74.00	30.59
4 654.11 ¹⁾	1 000	V	75.11	5.23	-63.30	32.73	-25.34	-	49.77	74.00	24.23
4 872.06 ²⁾	1 000	V	68.01	5.38	-62.59	32.84	-24.37	-	43.65	74.00	30.35
5 999.89	1 000	V	74.41	6.10	-62.77	34.40	-22.27	-	52.14	74.00	21.86
24 365.17	1 000	H	44.02	12.80	-48.25	45.10	9.65	-	53.67	74.00	20.33
Average DATA. Emissions above 1 GHz											
4 654.11 ¹⁾	1 000	V	64.51	5.23	-63.30	32.73	-25.34	-	39.17	54.00	14.83
4 872.06 ²⁾	1 000	V	57.18	5.38	-62.59	32.84	-24.37	-	32.81	54.00	21.19

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

Highest Channel (2 462 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
1 721.25 ¹⁾	1 000	V	74.92	3.16	-63.19	26.69	-33.34	-	41.58	74.00	32.42
2 157.58	1 000	V	73.98	3.54	-62.73	28.10	-31.09	-	42.89	74.00	31.11
2 484.23 ¹⁾	1 000	V	62.05	3.77	-34.84	28.72	-2.35	-	59.70	74.00	14.30
4 650.48 ¹⁾	1 000	V	74.64	5.23	-63.29	32.73	-25.33	-	49.31	74.00	24.69
4 921.45 ²⁾	1 000	V	66.84	5.42	-62.23	32.86	-23.95	-	42.89	74.00	31.11
5 999.89	1 000	V	73.71	6.10	-62.77	34.40	-22.27	-	51.45	74.00	22.55
24 630.27	1 000	H	43.27	12.80	-47.90	45.10	10.00	-	53.26	74.00	20.74
Average DATA. Emissions above 1 GHz											
1 721.25 ¹⁾	1 000	V	59.40	3.16	-63.19	26.69	-33.34	-	26.06	54.00	27.94
2 483.69 ¹⁾	1 000	V	53.01	3.77	-34.84	28.72	-2.35	-	50.66	54.00	3.34
4 650.48 ¹⁾	1 000	V	64.55	5.23	-63.29	32.73	-25.33	-	39.22	54.00	14.78
4 921.45 ²⁾	1 000	V	57.98	5.42	-62.23	32.86	-23.95	-	34.03	54.00	19.97

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

- 802.11n HT40

Lowest Channel (2 422 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
1 710.00 ¹⁾	1 000	V	75.74	3.15	-63.19	26.64	-33.40	-	42.34	74.00	31.66
2 167.27	1 000	V	75.85	3.55	-62.74	28.12	-31.07	-	44.78	74.00	29.22
2 386.87 ¹⁾	1 000	V	62.55	3.70	-34.34	28.54	-2.10	-	60.45	74.00	13.55
4 655.02 ¹⁾	1 000	V	74.33	5.23	-63.30	32.73	-25.34	-	48.99	74.00	25.01
4 845.78 ²⁾	1 000	V	66.54	5.37	-62.79	32.82	-24.60	-	41.95	74.00	32.05
5 999.89	1 000	V	73.27	6.10	-62.77	34.40	-22.27	-	51.01	74.00	22.99
24 218.02	1 000	V	44.80	12.80	-48.44	45.10	9.46	-	54.25	74.00	19.75
Average DATA. Emissions above 1 GHz											
1 710.00 ¹⁾	1 000	V	58.72	3.15	-63.19	26.64	-33.40	0.10	25.42	54.00	28.58
2 389.80 ¹⁾	1 000	V	50.59	3.70	-34.34	28.54	-2.10	0.10	48.59	54.00	5.41
4 655.02 ¹⁾	1 000	V	65.48	5.23	-63.30	32.73	-25.34	0.10	40.24	54.00	13.76
4 845.78 ²⁾	1 000	V	55.86	5.37	-62.79	32.82	-24.60	0.10	31.36	54.00	22.64

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor + DCCF

¹⁾ Restricted band

²⁾ Harmonic

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**Middle Channel (2 437 MHz)**

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
1 713.98	1 000	V	75.65	3.15	-63.19	26.66	-33.38	-	42.27	74.00	31.73
2 184.06	1 000	V	74.82	3.56	-62.76	28.15	-31.05	-	43.77	74.00	30.23
4 660.45 ¹⁾	1 000	V	75.00	5.24	-63.32	32.73	-25.35	-	49.65	74.00	24.35
4 873.88 ²⁾	1 000	V	66.89	5.39	-62.58	32.84	-24.35	-	42.53	74.00	31.47
5 999.89	1 000	V	73.62	6.10	-62.77	34.40	-22.27	-	51.35	74.00	22.65
24 366.50	1 000	V	44.50	12.80	-48.25	45.10	9.65	-	54.15	74.00	19.85
Average DATA. Emissions above 1 GHz											
4 660.45 ¹⁾	1 000	V	65.40	5.24	-63.32	32.73	-25.35	0.10	40.15	54.00	13.85
4 873.88 ²⁾	1 000	V	54.47	5.39	-62.58	32.84	-24.35	0.10	30.22	54.00	23.78

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor + DCCF

¹⁾ Restricted band

²⁾ Harmonic

Highest Channel (2 452 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
2 185.94	1 000	V	74.74	3.56	-62.76	28.15	-31.05	-	43.69	74.00	30.31
2 484.07 ¹⁾	1 000	V	56.66	3.77	-34.84	28.72	-2.35	-	54.31	74.00	19.69
2 797.73 ¹⁾	1 000	V	76.07	3.99	-63.19	29.32	-29.88	-	46.20	74.00	27.80
4 654.56 ¹⁾	1 000	V	75.19	5.23	-63.30	32.73	-25.34	-	49.85	74.00	24.15
4 898.80 ²⁾	1 000	V	68.33	5.40	-62.39	32.85	-24.14	-	44.19	74.00	29.81
5 999.89	1 000	V	72.65	6.10	-62.77	34.40	-22.27	-	50.38	74.00	23.62
24 525.08	1 000	V	43.29	12.80	-48.04	45.10	9.86	-	53.15	74.00	20.85
Average DATA. Emissions above 1 GHz											
2 483.57 ¹⁾	1 000	V	49.60	3.77	-34.84	28.72	-2.35	0.10	47.35	54.00	6.65
2 797.73 ¹⁾	1 000	V	57.84	3.99	-63.19	29.32	-29.88	0.10	28.06	54.00	25.94
4 654.56 ¹⁾	1 000	V	65.30	5.23	-63.30	32.73	-25.34	0.10	40.06	54.00	13.94
4 898.80 ²⁾	1 000	V	55.03	5.40	-62.39	32.85	-24.14	0.10	30.99	54.00	23.01

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor + DCCF

¹⁾ Restricted band

²⁾ Harmonic

- 802.11ac VHT20

Lowest Channel (2 412 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
2 172.03	1 000	V	74.29	3.55	-62.75	28.13	-31.07	-	43.23	74.00	30.77
2 389.30 ¹⁾	1 000	V	64.25	3.70	-34.34	28.54	-2.10	-	62.15	74.00	11.85
3 298.98	1 000	V	69.68	4.33	-62.02	30.51	-27.18	-	42.50	74.00	31.50
4 649.13 ¹⁾	1 000	V	73.81	5.23	-63.28	32.72	-25.33	-	48.48	74.00	25.52
4 829.02 ²⁾	1 000	V	64.48	5.35	-62.90	32.81	-24.74	-	39.74	74.00	34.26
6 000.34	1 000	V	72.79	6.10	-62.77	34.40	-22.27	-	50.52	74.00	23.48
24 124.25	1 000	H	44.35	12.80	-48.57	45.10	9.33	-	53.69	74.00	20.31
Average DATA. Emissions above 1 GHz											
2 389.90 ¹⁾	1 000	V	52.65	3.70	-34.34	28.54	-2.10	-	50.55	54.00	3.45
4 649.13 ¹⁾	1 000	V	65.30	5.23	-63.28	32.72	-25.33	-	39.97	54.00	14.03
4 829.02 ²⁾	1 000	V	55.71	5.35	-62.90	32.81	-24.74	-	30.97	54.00	23.03

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

Middle Channel (2 437 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
2 948.44	1 000	V	67.76	4.10	-62.17	29.60	-28.47	-	39.29	74.00	34.71
3 479.69	1 000	V	66.81	4.45	-61.68	31.00	-26.23	-	40.58	74.00	33.42
4 649.13 ¹⁾	1 000	V	74.64	5.23	-63.28	32.72	-25.33	-	49.31	74.00	24.69
4 871.61 ²⁾	1 000	V	68.47	5.38	-62.59	32.84	-24.37	-	44.10	74.00	29.90
5 999.89	1 000	V	72.73	6.10	-62.77	34.40	-22.27	-	50.46	74.00	23.54
24 367.83	1 000	H	43.92	12.80	-48.25	45.10	9.65	-	53.57	74.00	20.43
Average DATA. Emissions above 1 GHz											
4 649.13 ¹⁾	1 000	V	65.13	5.23	-63.28	32.72	-25.33	-	39.80	54.00	14.20
4 871.61 ²⁾	1 000	V	57.77	5.38	-62.59	32.84	-24.37	-	33.40	54.00	20.60

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

Highest Channel (2 462 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
2 161.25	1 000	V	73.85	3.54	-62.73	28.11	-31.08	-	42.77	74.00	31.23
2 484.37 ¹⁾	1 000	V	61.17	3.77	-34.84	28.72	-2.35	-	58.82	74.00	15.18
3 025.70	1 000	V	70.13	4.15	-62.11	29.77	-28.19	-	41.94	74.00	32.06
4 660.45 ¹⁾	1 000	V	74.70	5.24	-63.32	32.73	-25.35	-	49.35	74.00	25.26
4 923.27 ²⁾	1 000	V	66.41	5.42	-62.22	32.86	-23.94	-	42.47	74.00	22.07
5 999.89	1 000	V	73.80	6.10	-62.77	34.40	-22.27	-	51.53	74.00	22.92
24 621.77	1 000	H	43.74	12.80	-47.92	45.10	9.98	-	53.72	74.00	20.28
Average DATA. Emissions above 1 GHz											
2 483.61 ¹⁾	1 000	V	52.78	3.77	-34.84	28.72	-2.35	-	50.43	54.00	3.57
4 660.45 ¹⁾	1 000	V	65.15	5.24	-63.32	32.73	-25.35	-	39.80	54.00	14.20
4 923.27 ²⁾	1 000	V	56.15	5.42	-62.22	32.86	-23.94	-	32.21	54.00	21.79

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor

¹⁾ Restricted band

²⁾ Harmonic

- 802.11ac VHT40

Lowest Channel (2 422 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
1 711.09	1 000	V	74.78	3.15	-63.18	26.64	-33.39	-	41.39	74.00	32.61
2 148.75	1 000	V	77.00	3.53	-62.71	28.08	-31.10	-	45.90	74.00	28.10
2 388.17 ¹⁾	1 000	V	58.44	3.70	-34.34	28.54	-2.10	-	56.34	74.00	17.66
4 649.13 ¹⁾	1 000	V	73.97	5.23	-63.28	32.72	-25.33	-	48.65	74.00	25.35
4 843.52 ²⁾	1 000	V	65.20	5.36	-62.80	32.82	-24.62	-	40.58	74.00	33.42
5 999.89	1 000	V	73.31	6.10	-62.77	34.40	-22.27	-	51.04	74.00	22.96
24 225.19	1 000	V	43.50	12.80	-48.44	45.10	9.46	-	52.97	74.00	21.03
Average DATA. Emissions above 1 GHz											
2 389.48 ¹⁾	1 000	V	50.33	3.70	-34.34	28.54	-2.10	0.10	48.33	54.00	5.67
4 649.13 ¹⁾	1 000	V	65.22	5.23	-63.28	32.72	-25.33	0.10	39.99	54.00	14.01
4 843.52 ²⁾	1 000	V	55.18	5.36	-62.80	32.82	-24.62	0.10	30.66	54.00	23.34

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor + DCCF

¹⁾ Restricted band

²⁾ Harmonic

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**Middle Channel (2 437 MHz)**

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
1 681.88 ¹⁾	1 000	V	77.64	3.12	-63.22	26.53	-33.57	-	44.07	74.00	29.93
2 181.17	1 000	V	78.59	3.56	-62.75	28.14	-31.05	-	47.54	74.00	26.46
4 652.75 ¹⁾	1 000	V	74.79	5.23	-63.29	32.73	-25.33	-	49.46	74.00	24.54
4 869.34 ²⁾	1 000	V	64.63	5.38	-62.60	32.83	-24.39	-	40.24	74.00	33.76
5 999.89	1 000	V	72.99	6.10	-62.77	34.40	-22.27	-	50.72	74.00	23.28
24 368.89	1 000	V	45.34	12.80	-48.25	45.10	9.65	-	54.99	74.00	19.01
Average DATA. Emissions above 1 GHz											
1 681.88 ¹⁾	1 000	V	59.98	3.12	-63.22	26.53	-33.57	0.10	26.50	54.00	27.50
4 652.75 ¹⁾	1 000	V	65.42	5.23	-63.29	32.73	-25.33	0.10	40.18	54.00	13.82
4 869.34 ²⁾	1 000	V	55.19	5.38	-62.60	32.83	-24.39	0.10	30.89	54.00	23.11

Note. Factor = Cable loss + Amp. Gain + Antenna factor

Result = Reading + Factor + DCCF

¹⁾ Restricted band

²⁾ Harmonic

Highest Channel (2 452 MHz)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. [V/H]	Reading [dB(μV)]	Cable Loss [dB]	Amp Gain [dB]	Antenna Factor [dB]	Factor [dB]	DCCF [dB]	Result dB(μV/m)	Limit dB(μV/m)	Margin [dB]
Peak DATA. Emissions above 1 GHz											
2 168.67	1 000	V	72.61	3.55	-62.74	28.12	-31.07	-	41.54	74.00	32.46
2 484.24 ¹⁾	1 000	V	56.68	3.77	-34.84	28.72	-2.35	-	54.33	74.00	19.67
3 451.72	1 000	V	67.55	4.43	-61.70	30.92	-26.35	-	41.20	74.00	32.80
4 649.58 ¹⁾	1 000	V	74.32	5.23	-63.28	32.72	-25.33	-	48.99	74.00	25.01
4 903.33 ²⁾	1 000	V	64.24	5.41	-62.36	32.85	-24.10	-	40.14	74.00	33.86
6 000.34	1 000	H	73.12	6.10	-62.77	34.40	-22.27	-	50.85	74.00	23.15
24 623.63	1 000	V	43.18	12.80	-47.91	45.10	9.99	-	53.17	74.00	20.83
Average DATA. Emissions above 1 GHz											
2 483.51 ¹⁾	1 000	V	49.89	3.77	-34.84	28.72	-2.35	0.10	47.64	54.00	6.36
4 649.58 ¹⁾	1 000	V	65.68	5.23	-63.28	32.72	-25.33	0.10	40.45	54.00	13.55
4 903.33 ²⁾	1 000	V	54.84	5.41	-62.36	32.85	-24.10	0.10	30.84	54.00	23.16

Note. Note. Factor = Cable loss + Amp. Gain + Antenna factor

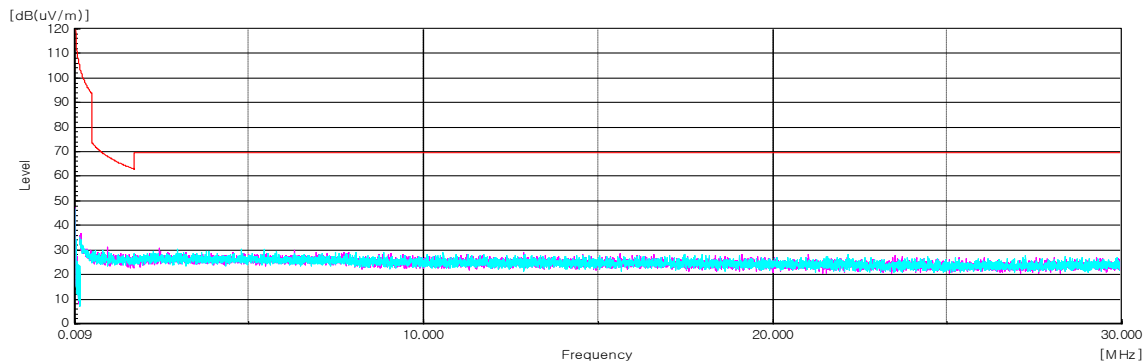
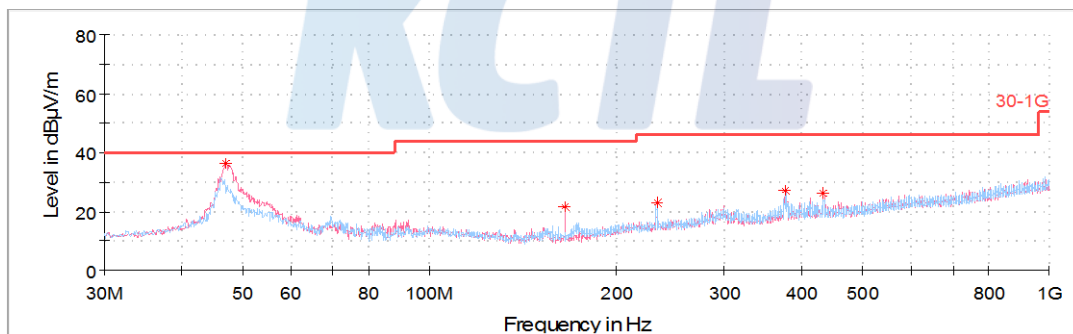
Result = Reading + Factor + DCCF

¹⁾ Restricted band

²⁾ Harmonic

5.2.4.1 Test Plot

Figure 1. Plot of the Spurious Emissions (Radiated)

- 9 kHz ~ 30 MHz data**- 30 MHz ~ 1 GHz data**

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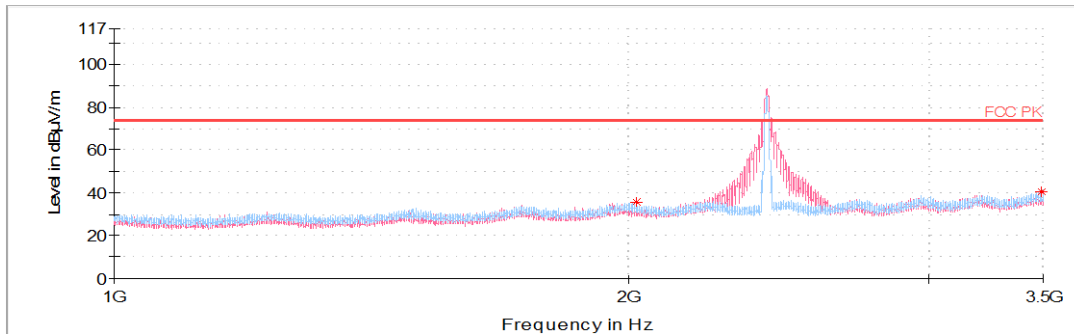
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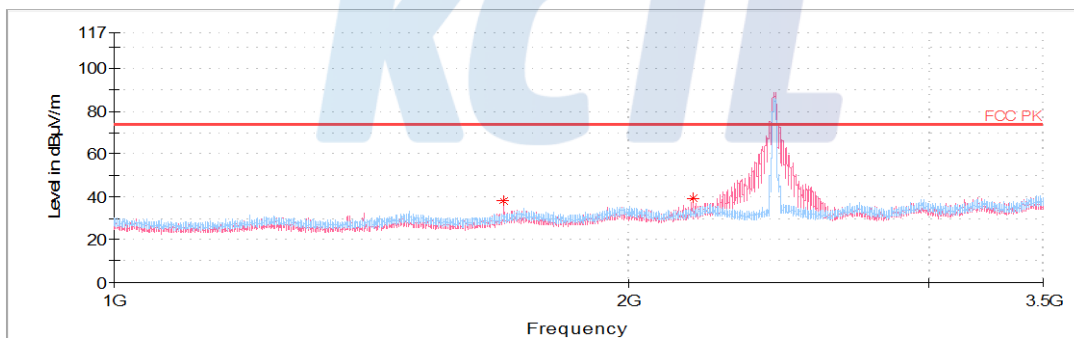
- 1 GHz ~ 3.5 GHz data

- 802.11b

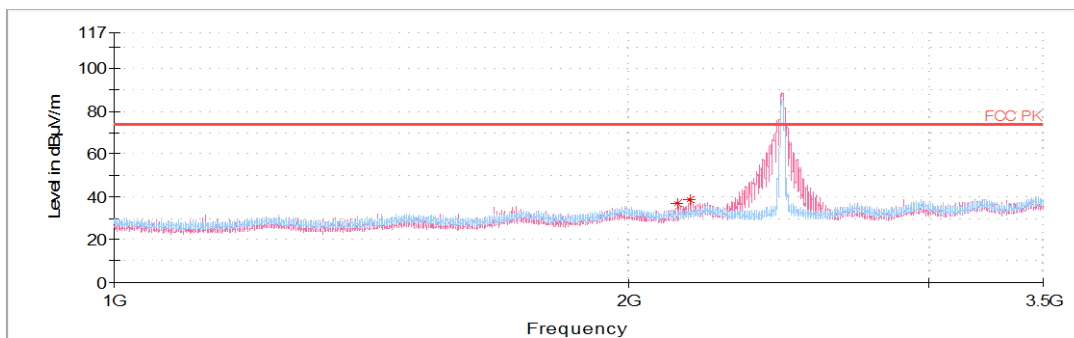
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

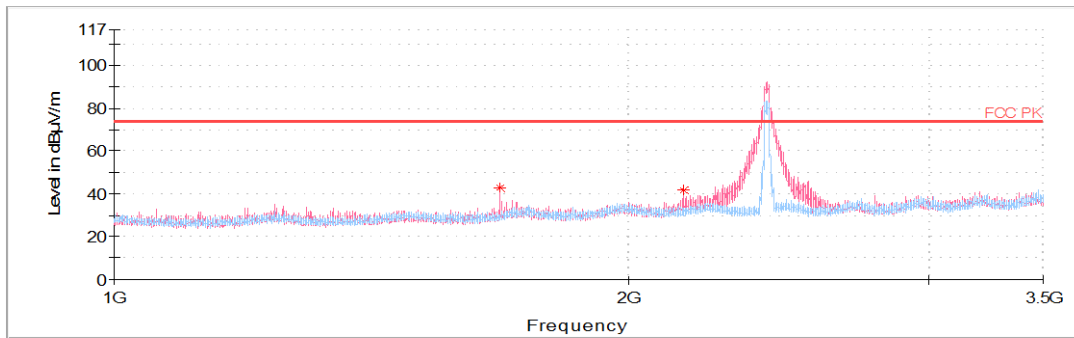
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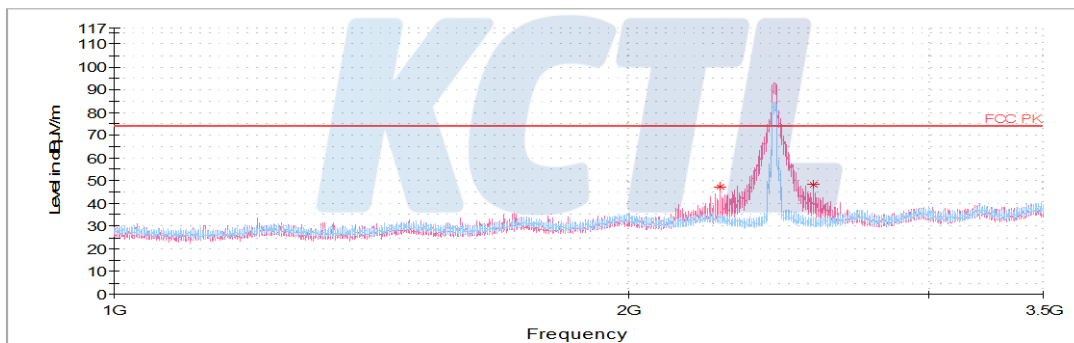
KCTL

- 802.11g

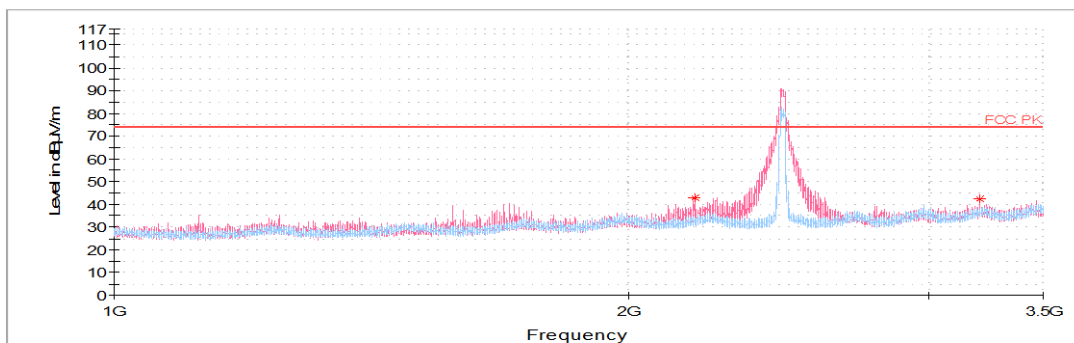
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

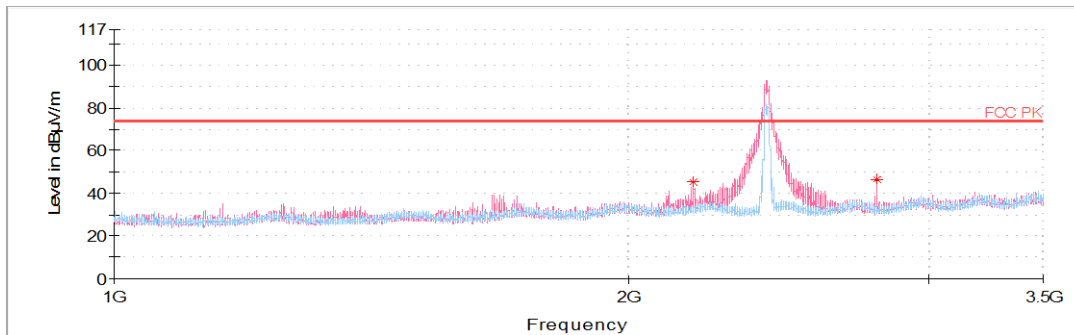
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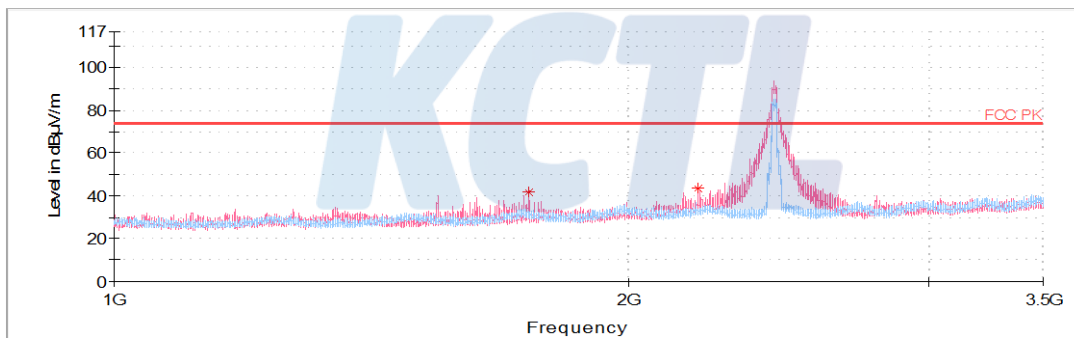
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- 802.11n HT20

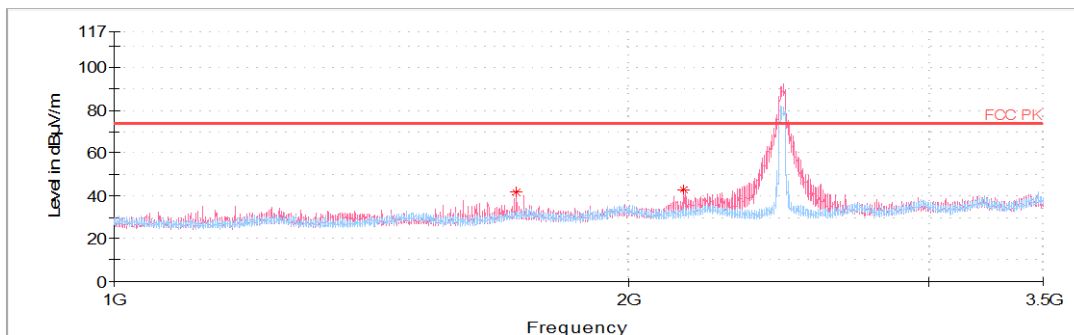
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

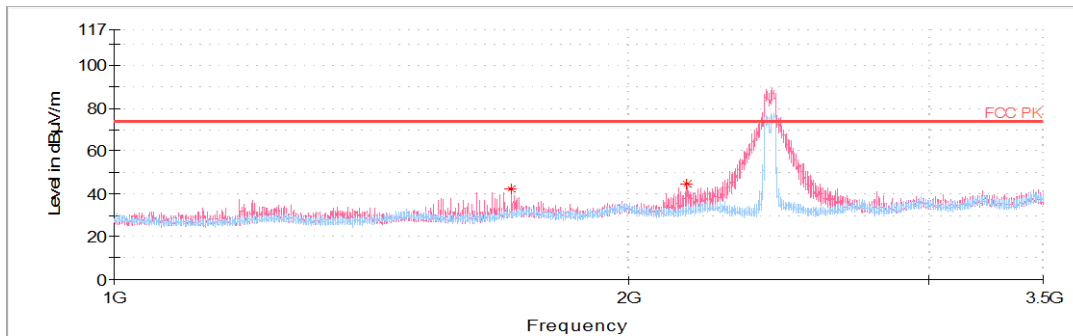
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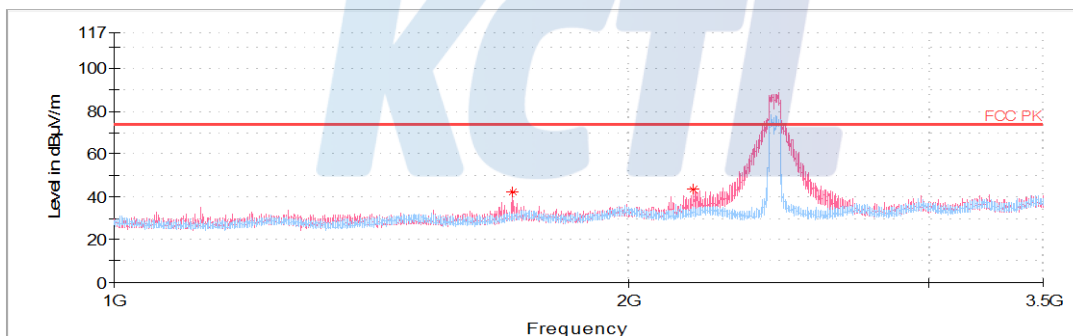
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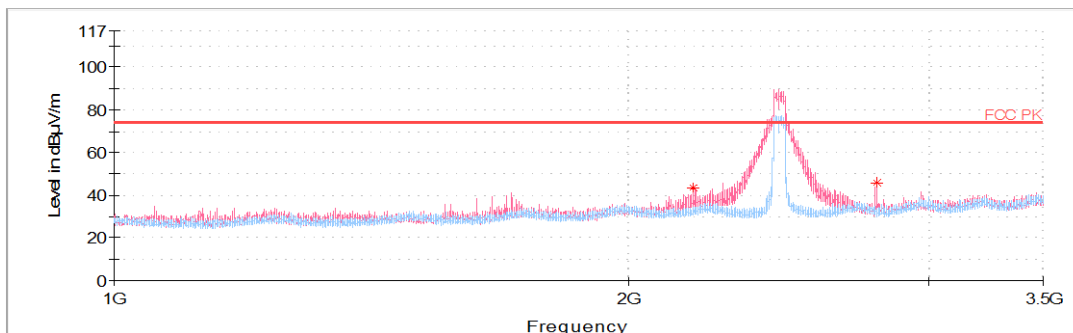
Lowest Channel (2 422 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 452 MHz)



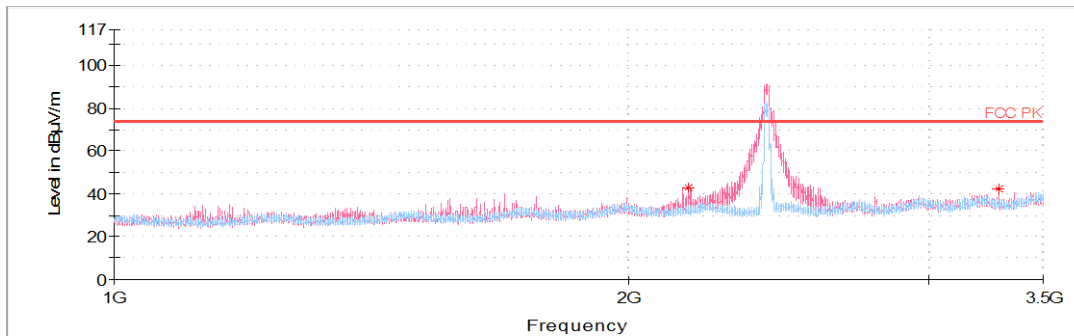
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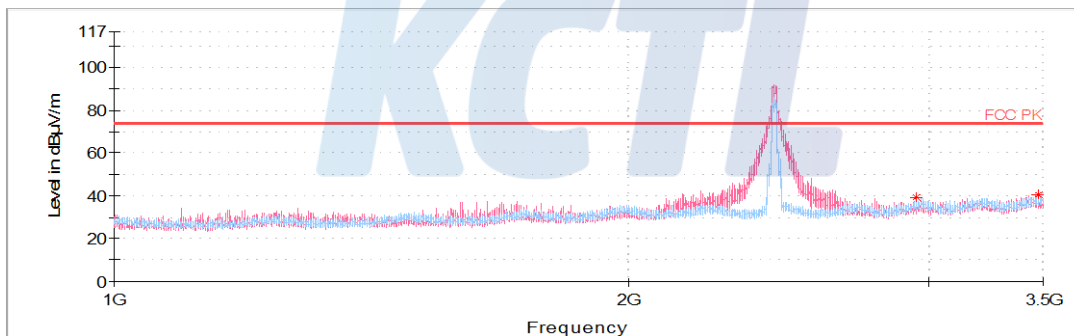
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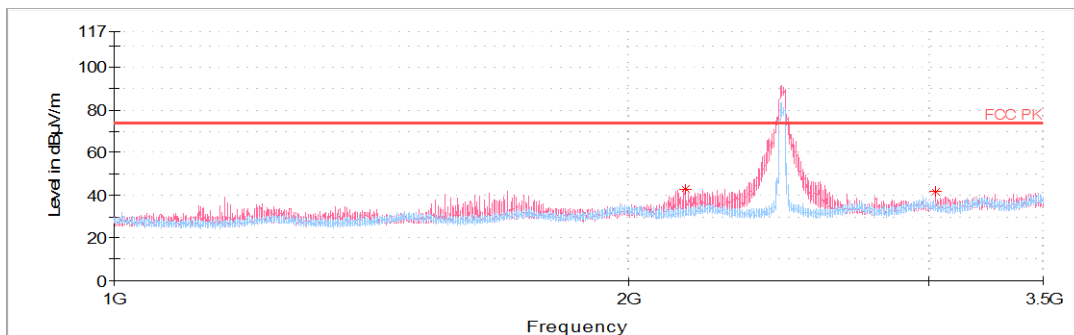
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



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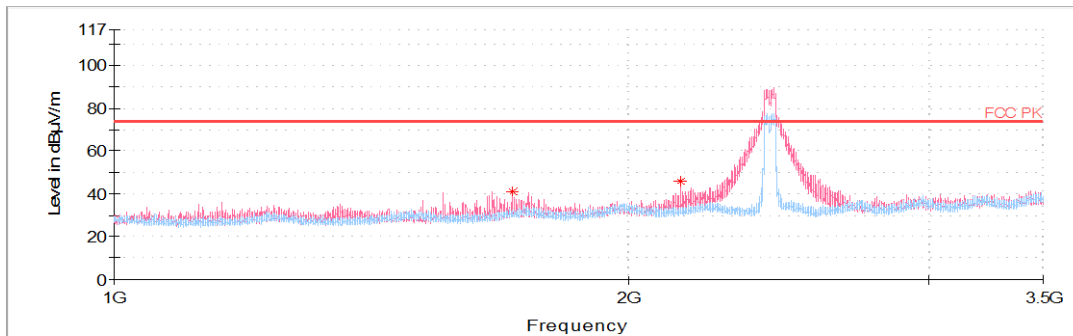
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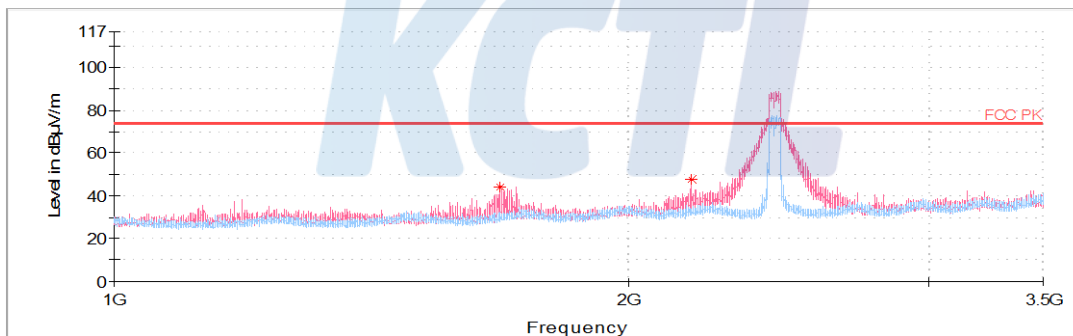
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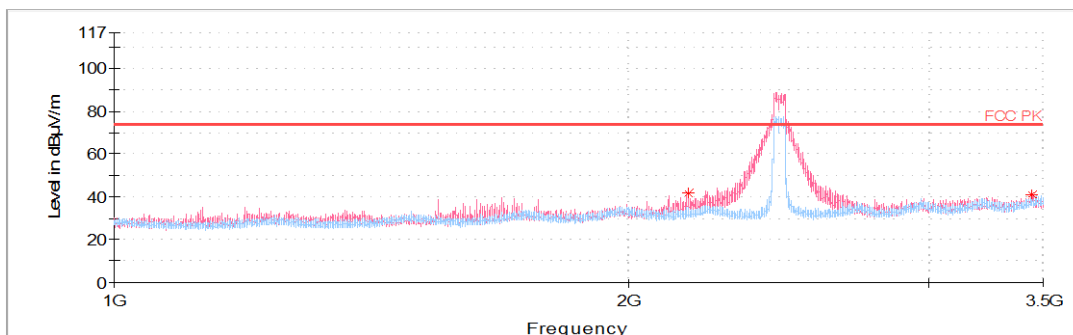
Lowest Channel (2 422 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 452 MHz)



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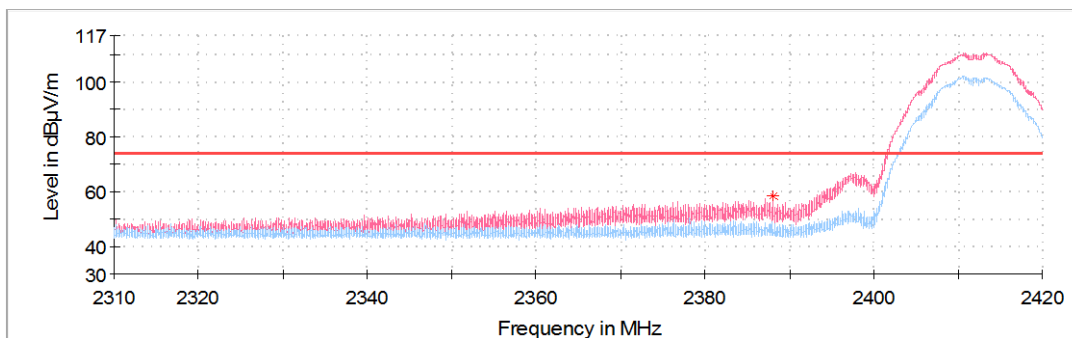
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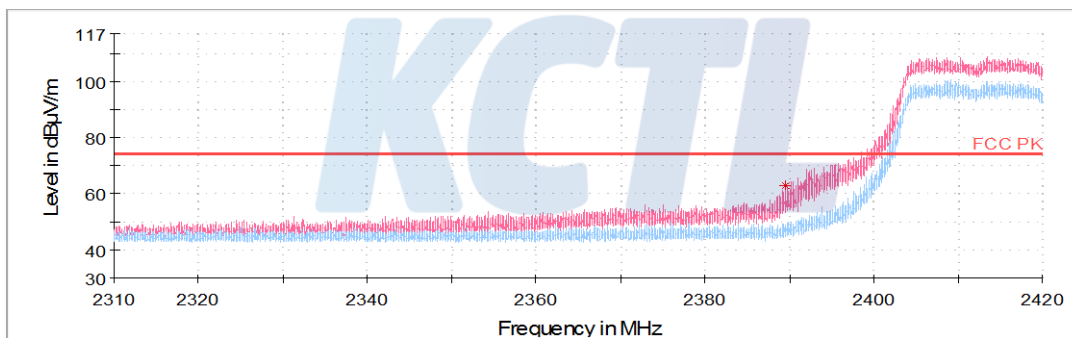
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- Restricted Bandedge data(Lowest Channel)

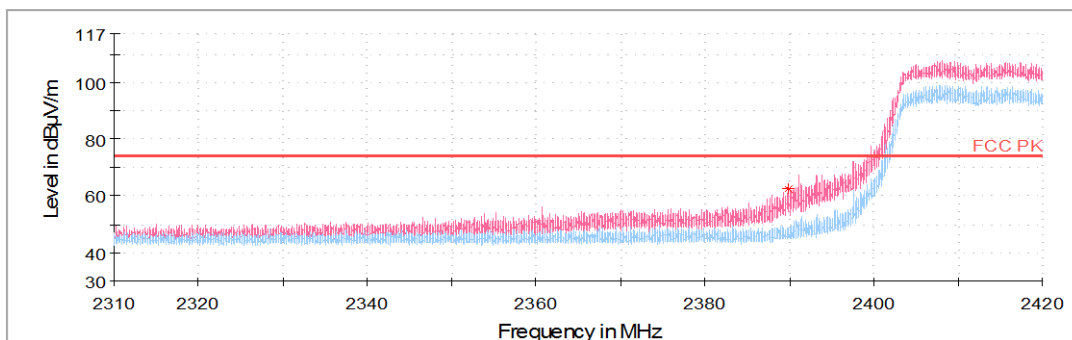
- 802.11b



- 802.11g



- 802.11n HT20



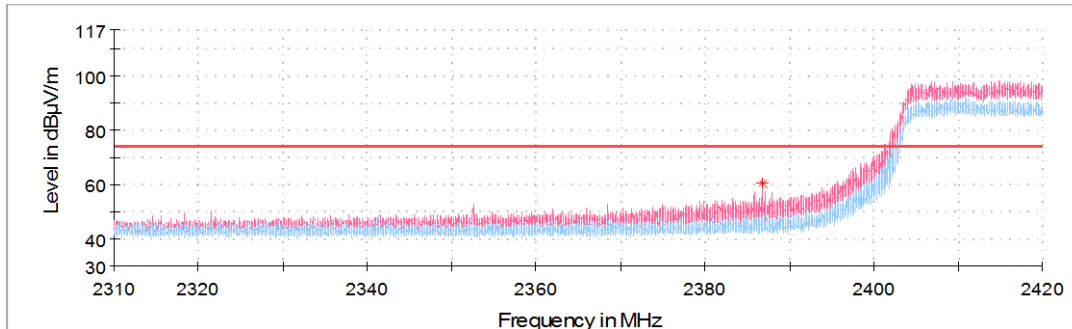
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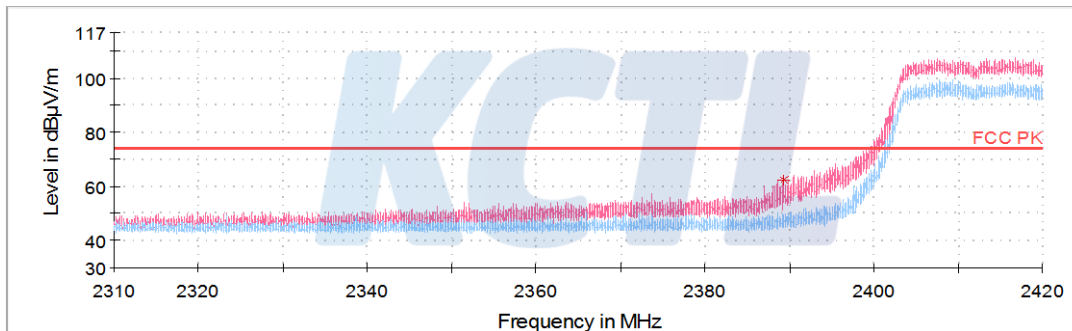
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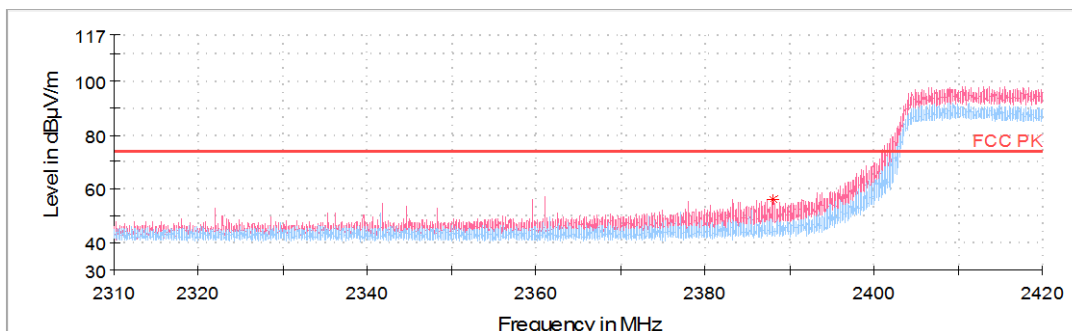
- 802.11n HT40



- 802.11ac VHT20



- 802.11ac VHT40



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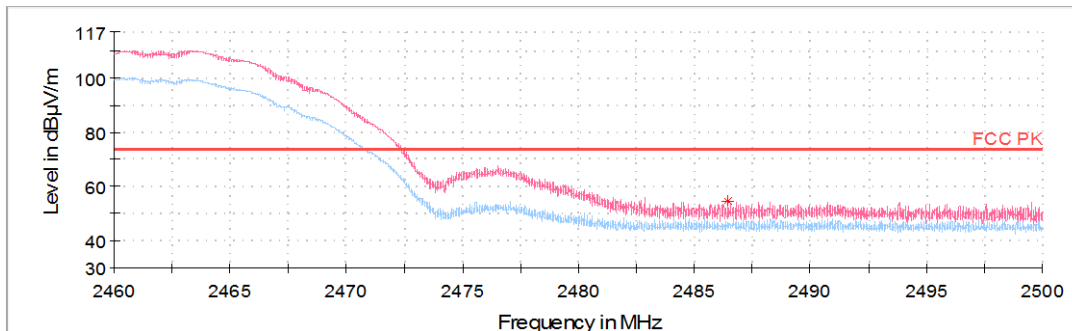
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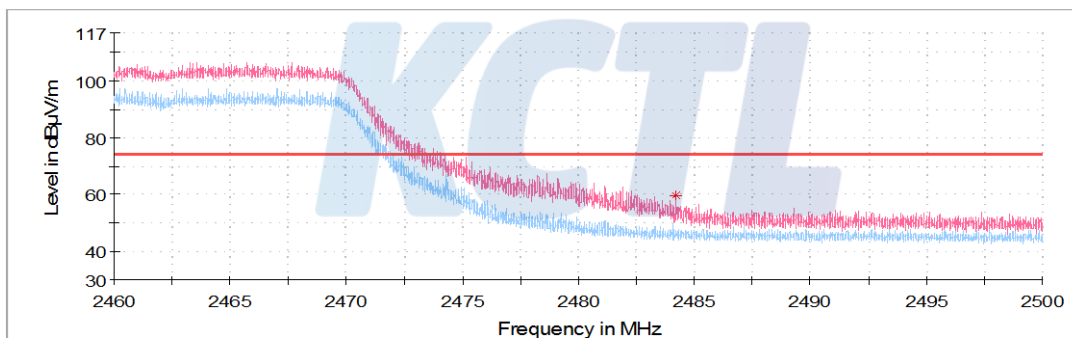
KCTL

- Restricted Bandedge data(Highest Channel)

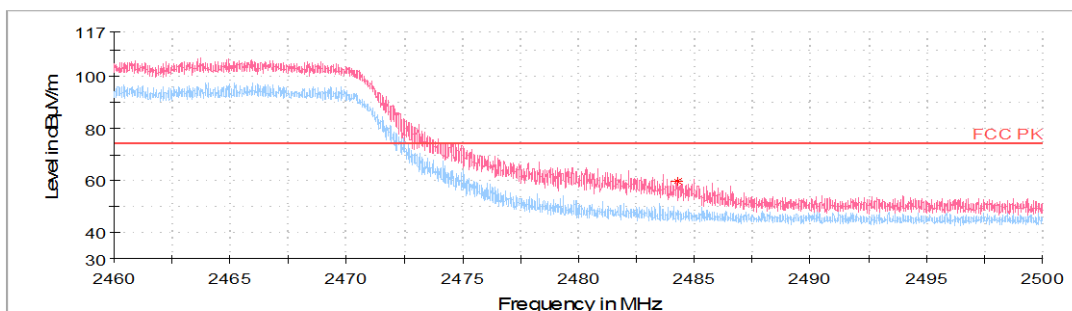
- 802.11b



- 802.11g



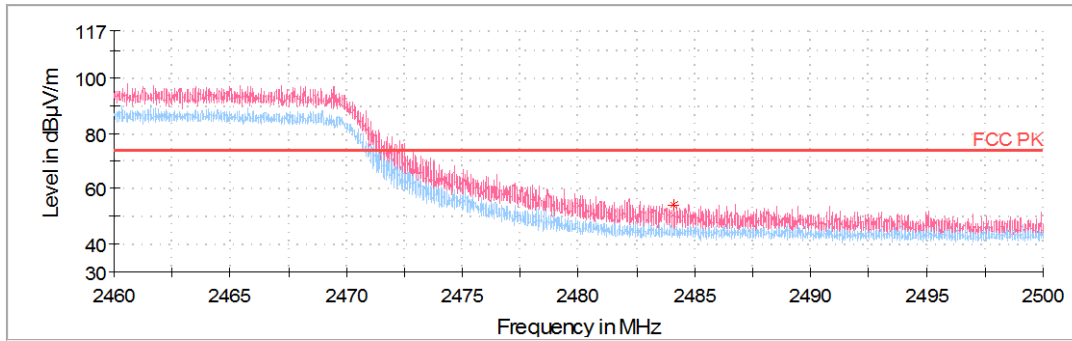
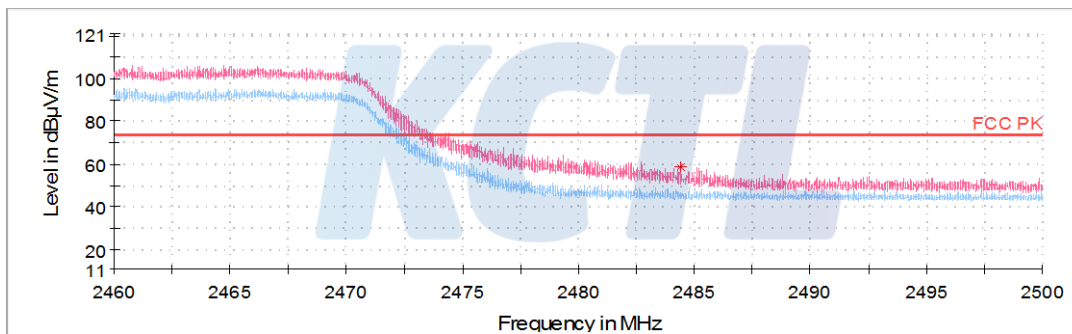
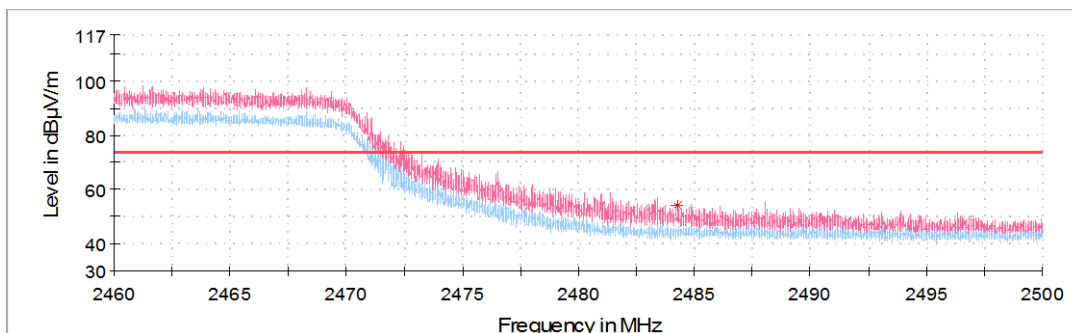
- 802.11n HT20



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KCTL Inc.

65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

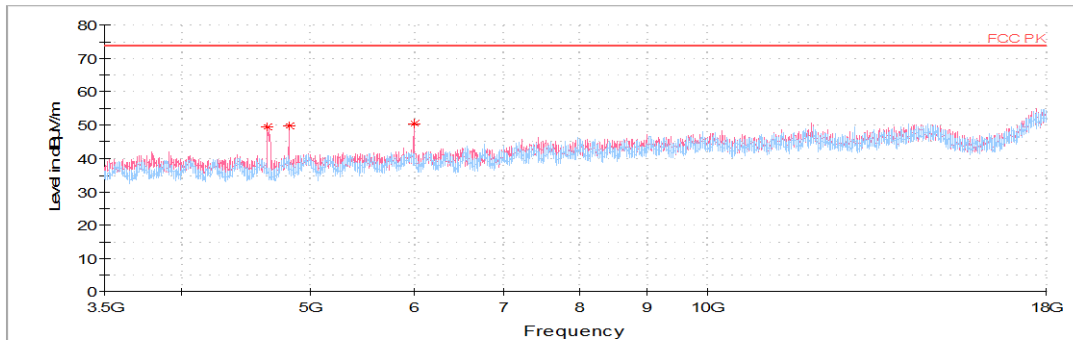
Report No.:
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KCTL

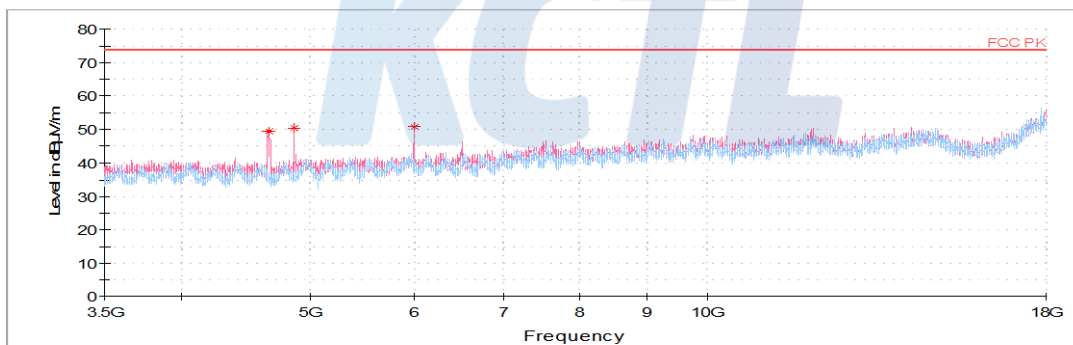
- 3.5 GHz ~ 18 GHz data

- 802.11b

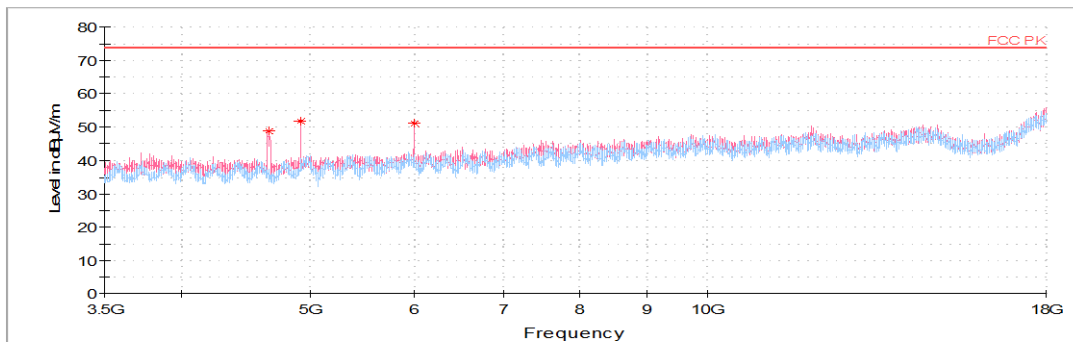
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

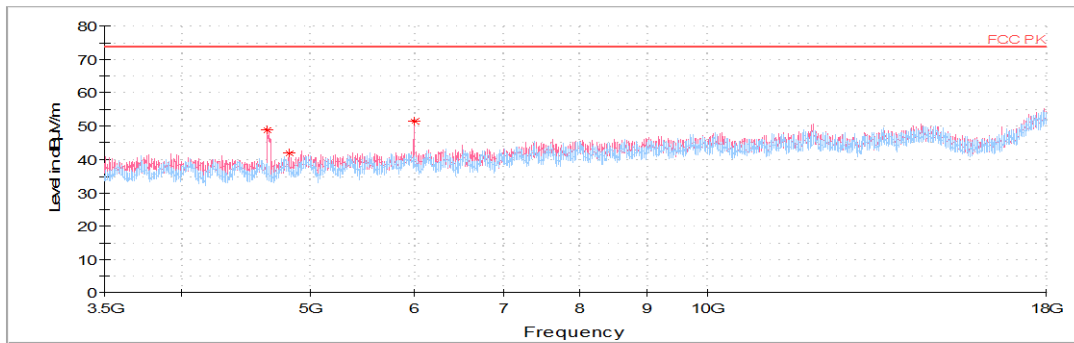
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
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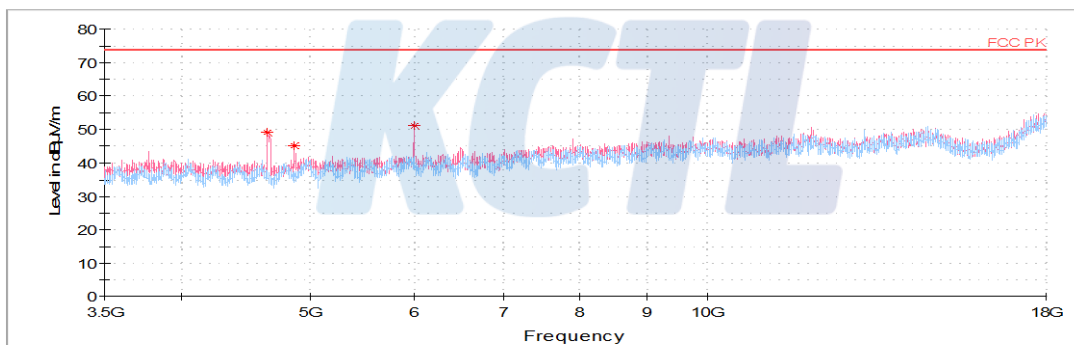
KCTL

- 802.11g

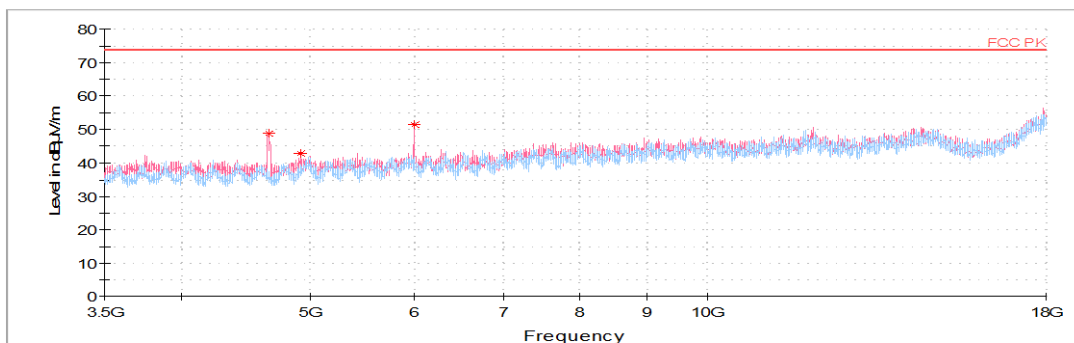
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

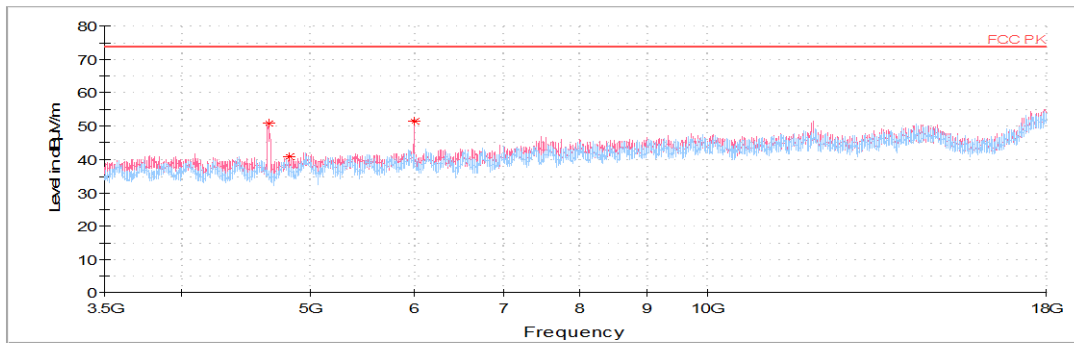
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
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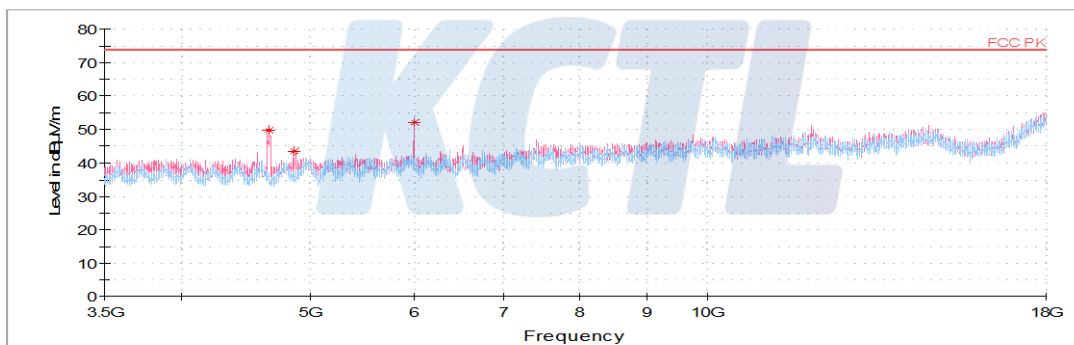
KCTL

- 802.11n HT20

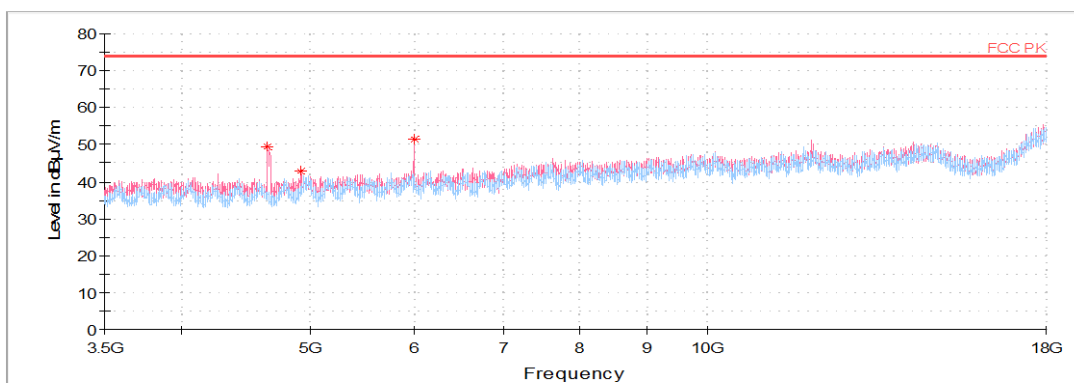
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

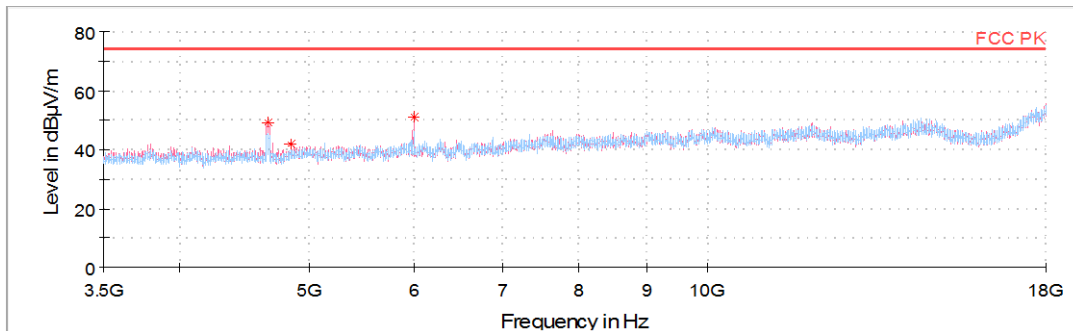
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
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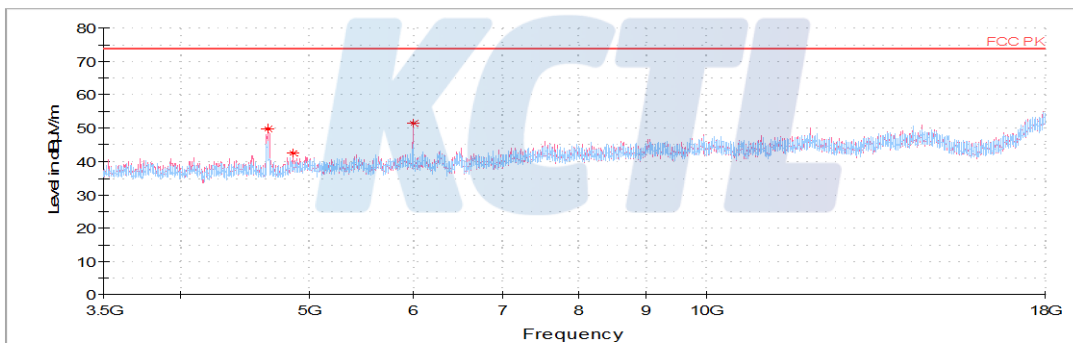
KCTL

- 802.11n HT40

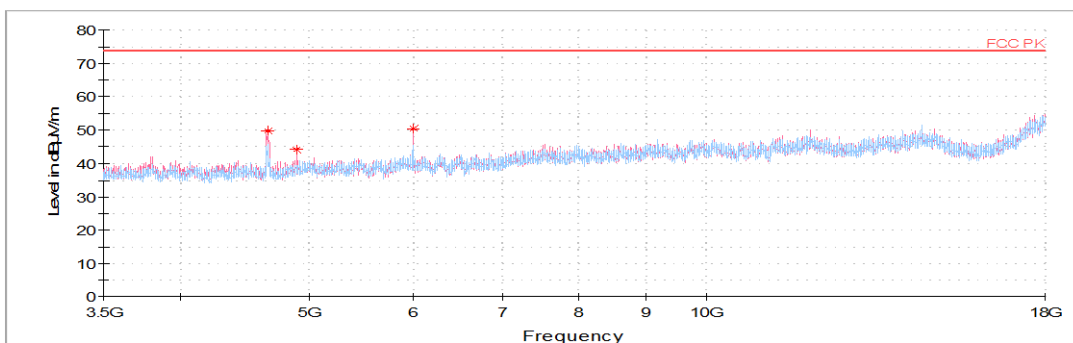
Lowest Channel (2 422 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 452 MHz)



KCTL Inc.

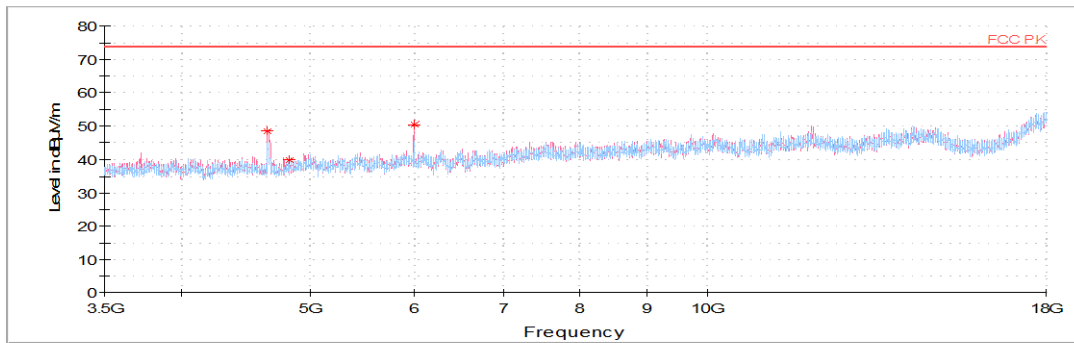
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

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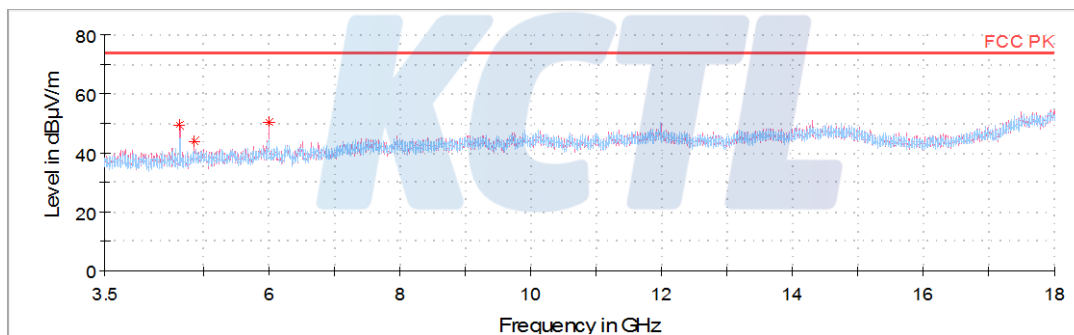
KCTL

- 802.11ac VHT20

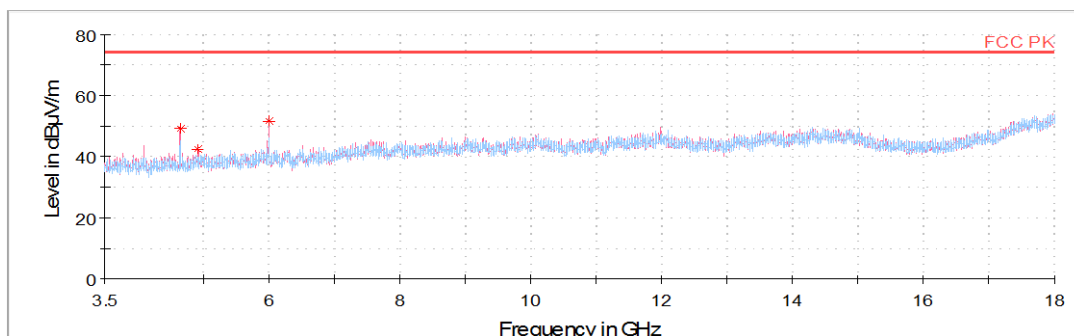
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

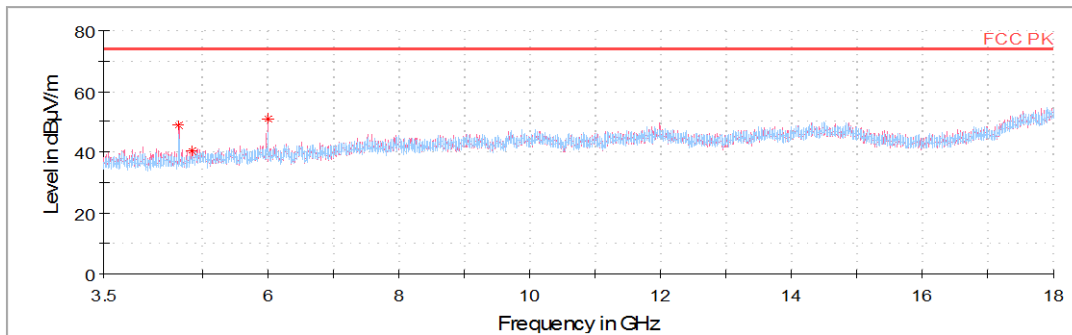
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Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
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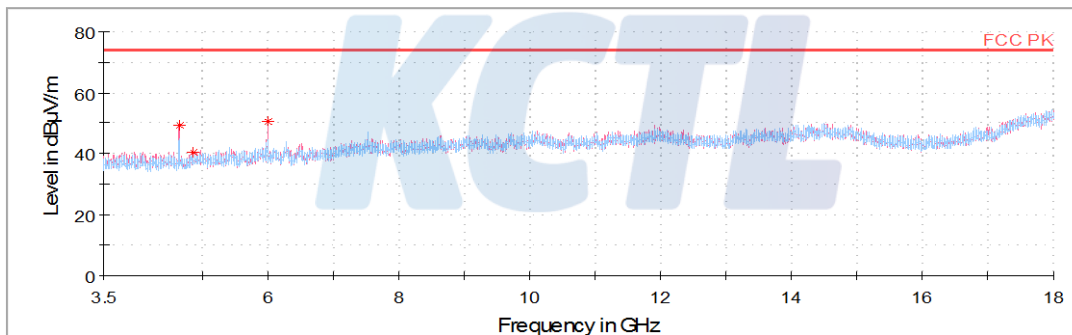
KCTL

- 802.11ac VHT40

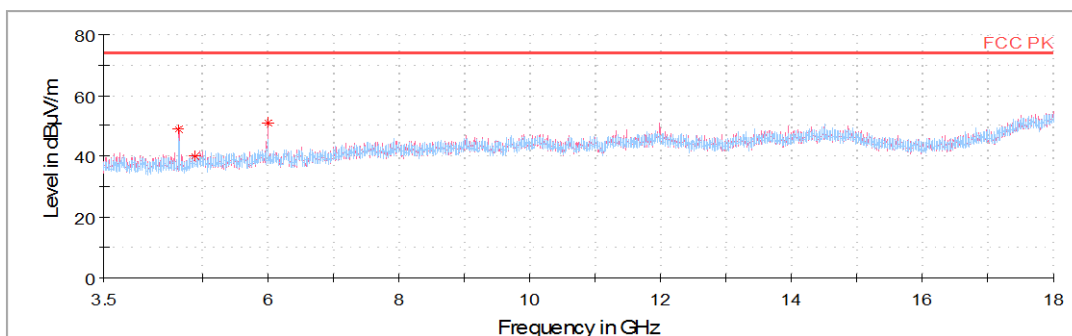
Lowest Channel (2 422 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 452 MHz)



KCTL Inc.

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Suwon-si, Gyeonggi-do, 16677, Korea
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www.kctl.co.kr

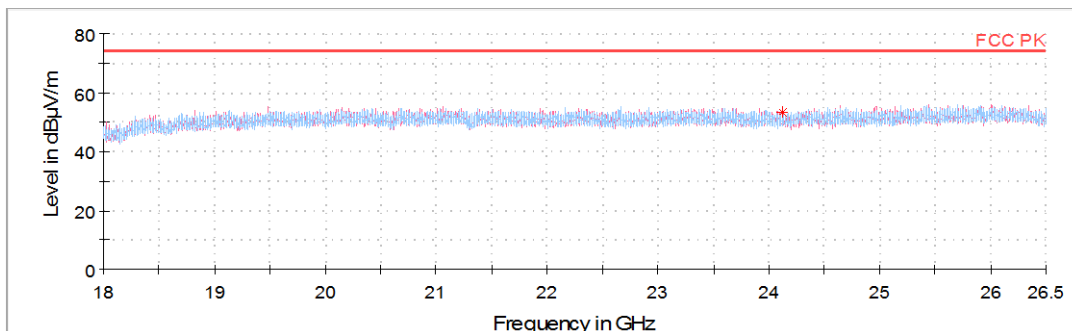
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KCTL

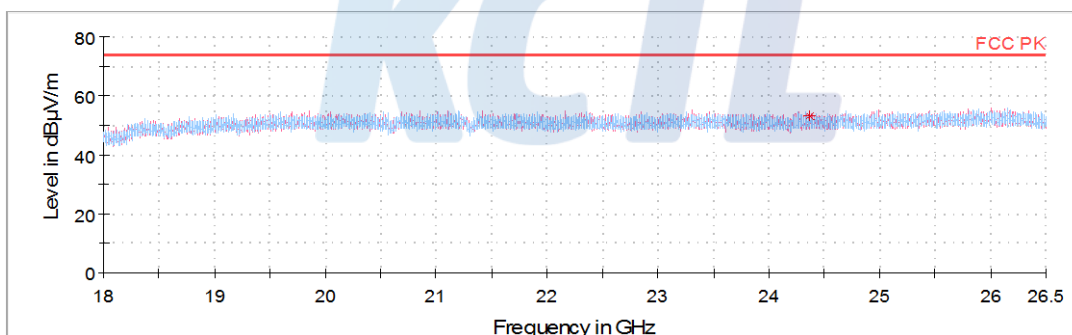
- 18 GHz ~ 26.5 GHz data

- 802.11b

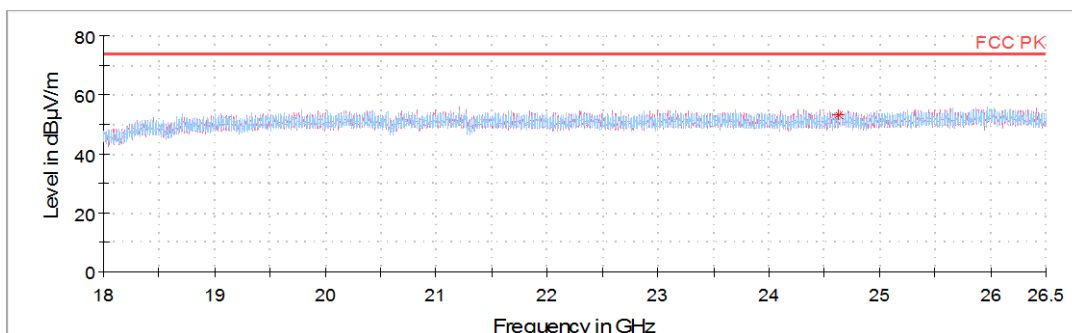
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

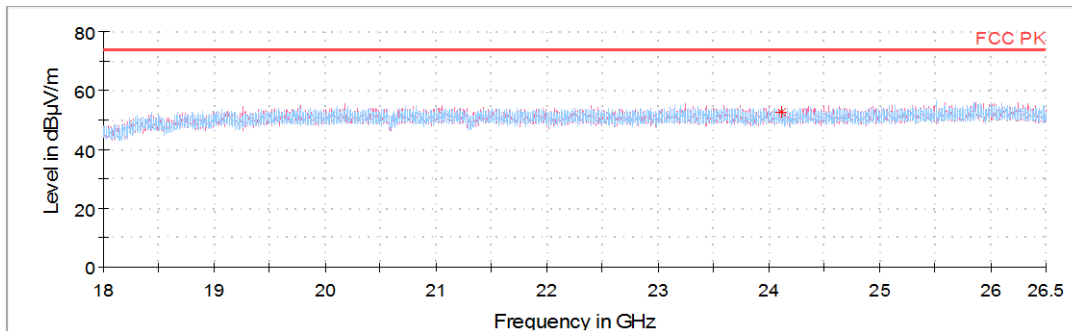
65, Sinwon-ro, Yeongtong-gu,
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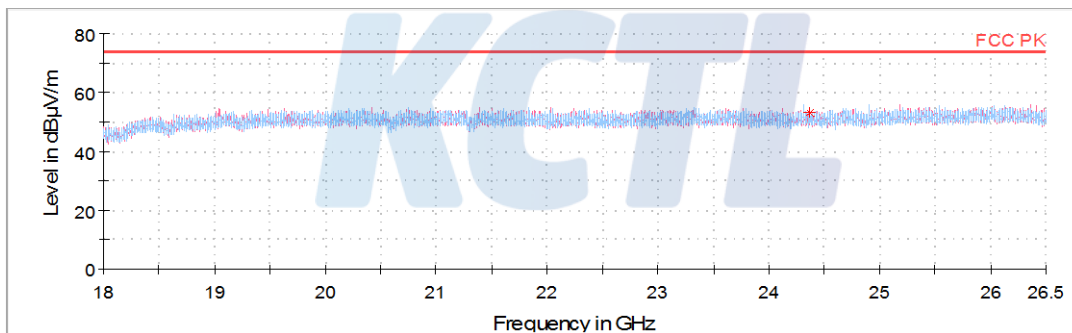
KCTL

- 802.11g

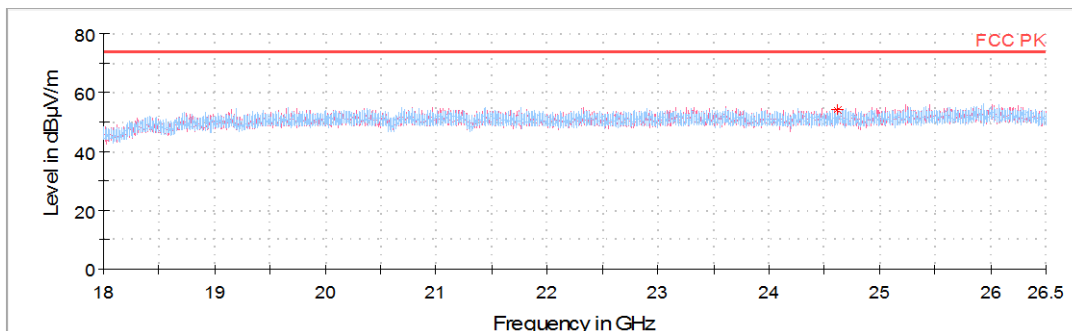
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

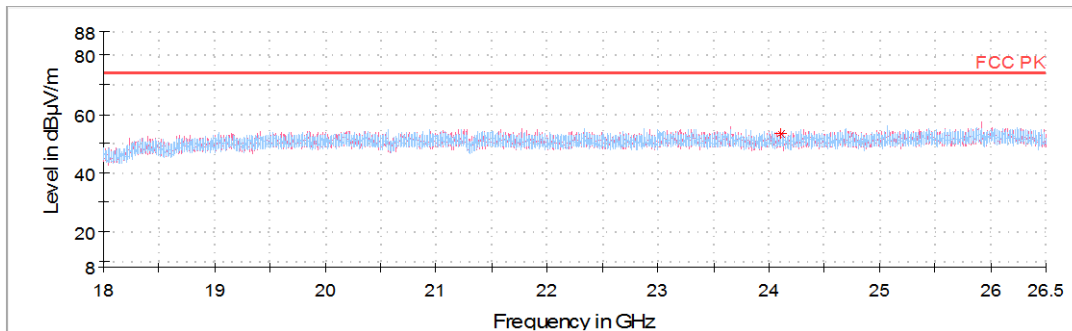
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
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KR18-SRF0048-B
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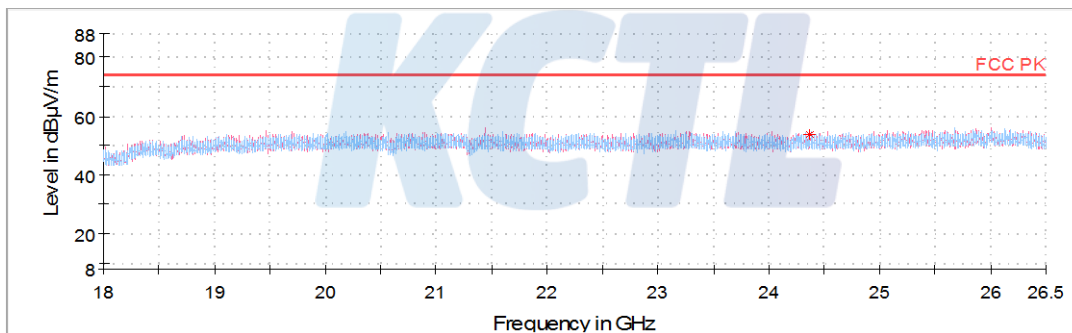
KCTL

- 802.11n HT20

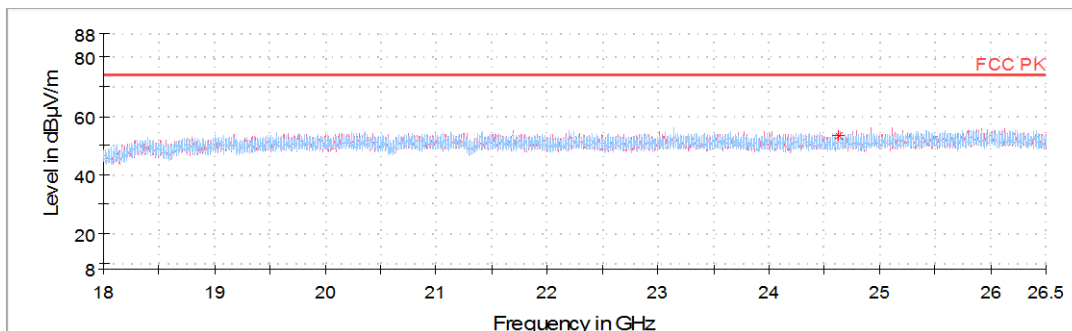
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

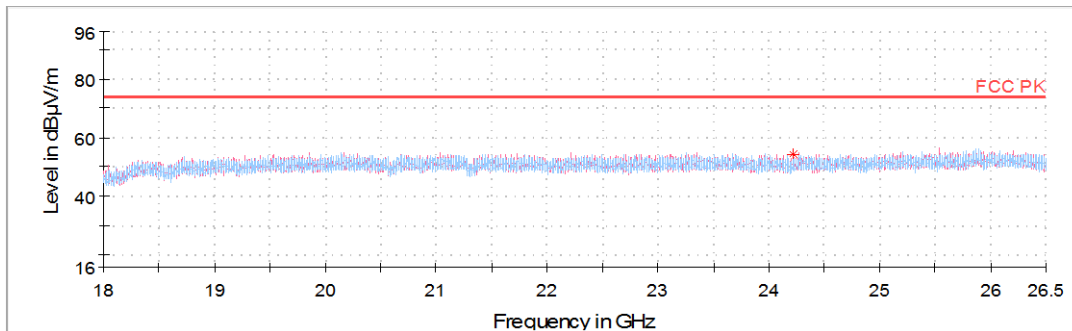
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

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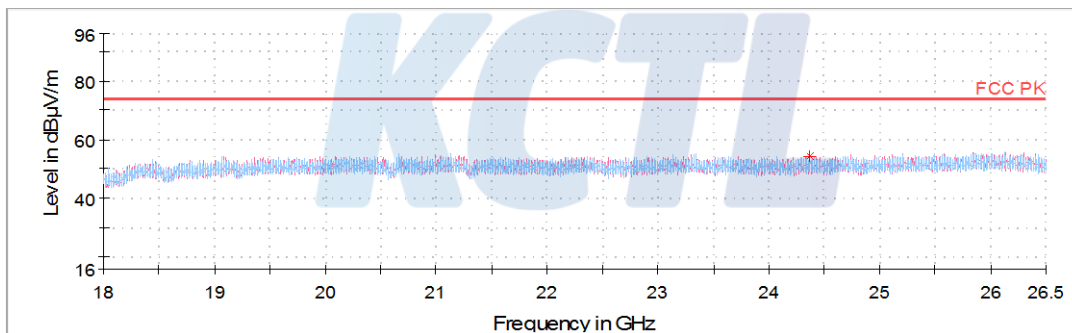


- 802.11n HT40

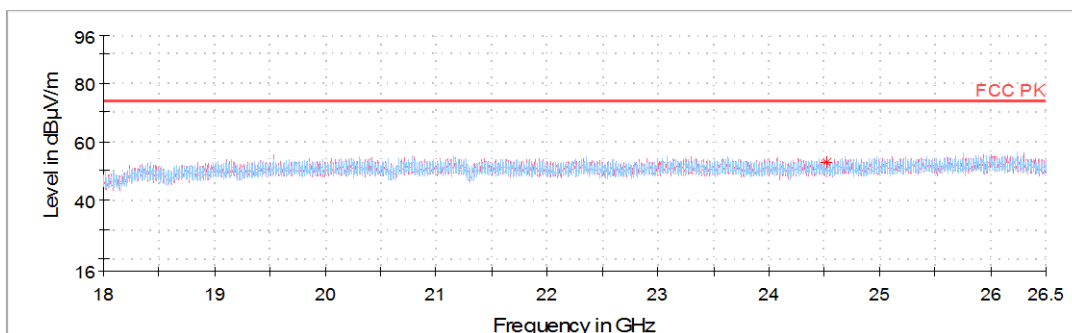
Lowest Channel (2 422 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

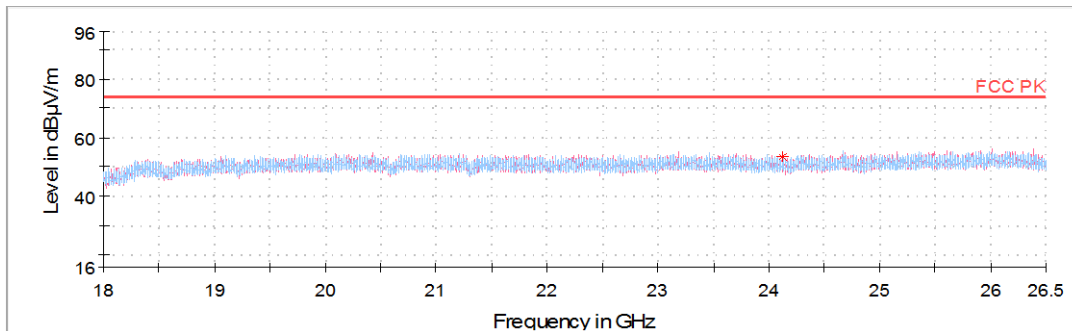
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
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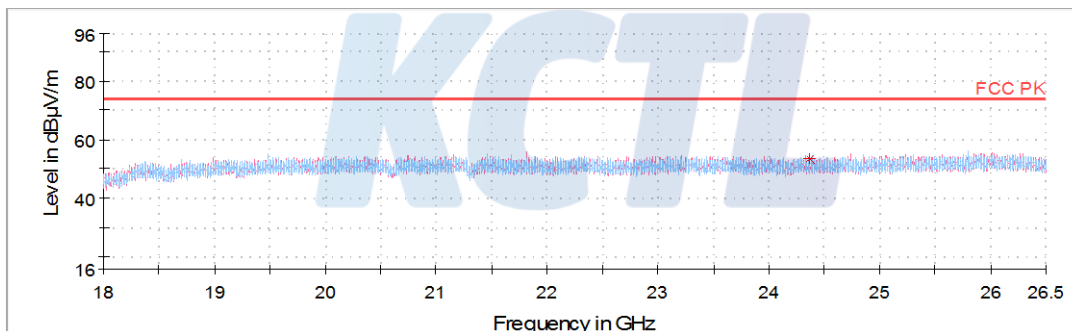
KCTL

- 802.11ac VHT20

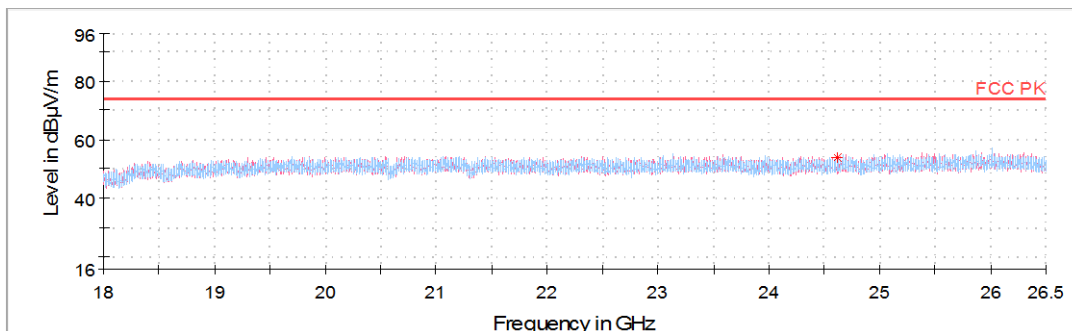
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 462 MHz)



KCTL Inc.

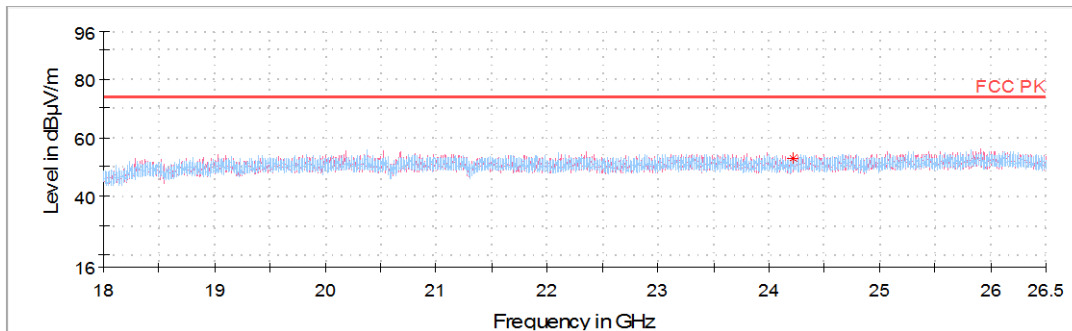
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
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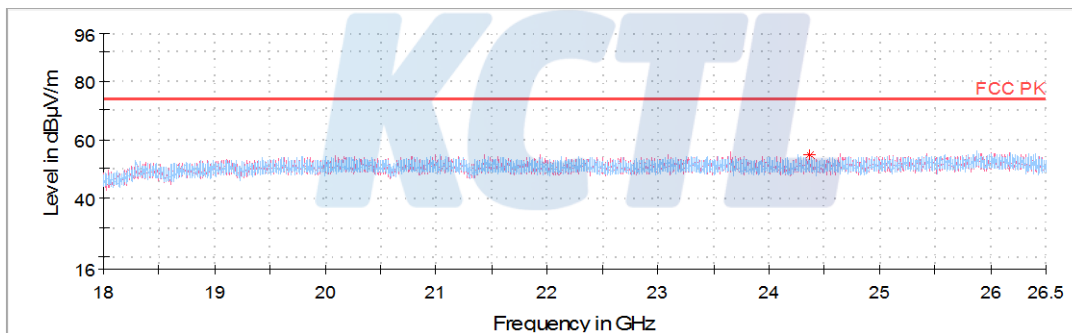


- 802.11ac VHT40

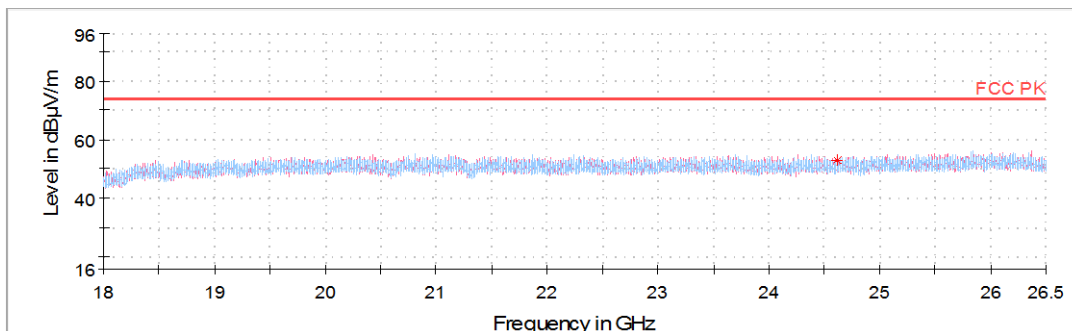
Lowest Channel (2 422 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 452 MHz)



5.2.4.2 Test Plot

Figure 2. Plot of the average data emissions

- Restricted Bandedge data(Lowest Channel)

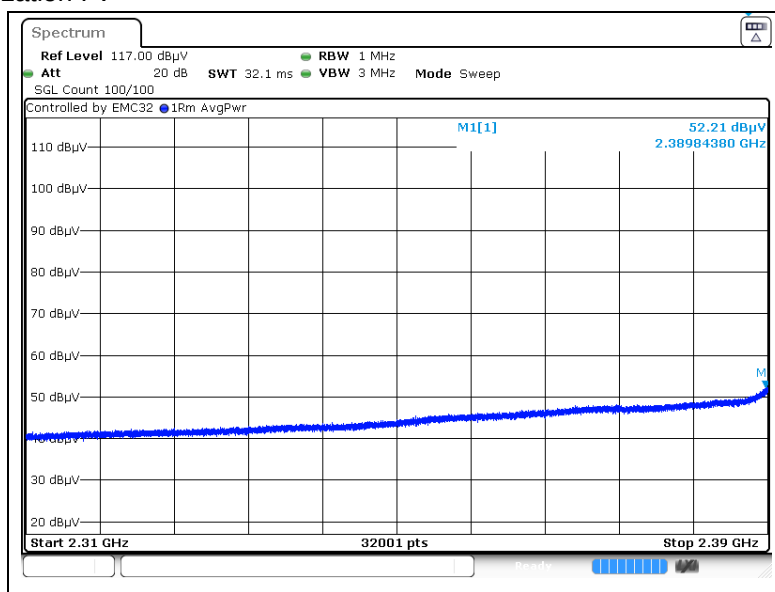
- 802.11b

Worst Antenna polarization : V



- 802.11g

Worst Antenna polarization : V



KCTL Inc.

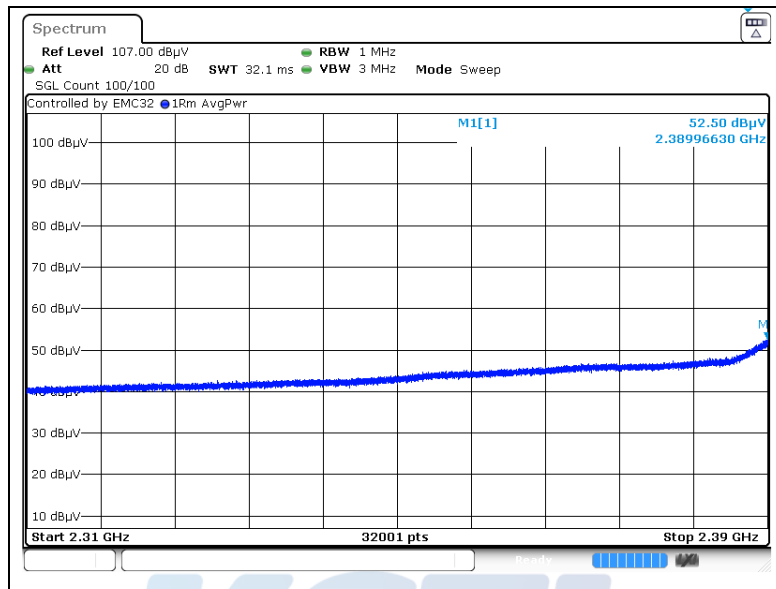
65, Sinwon-ro, Yeongtong-gu,
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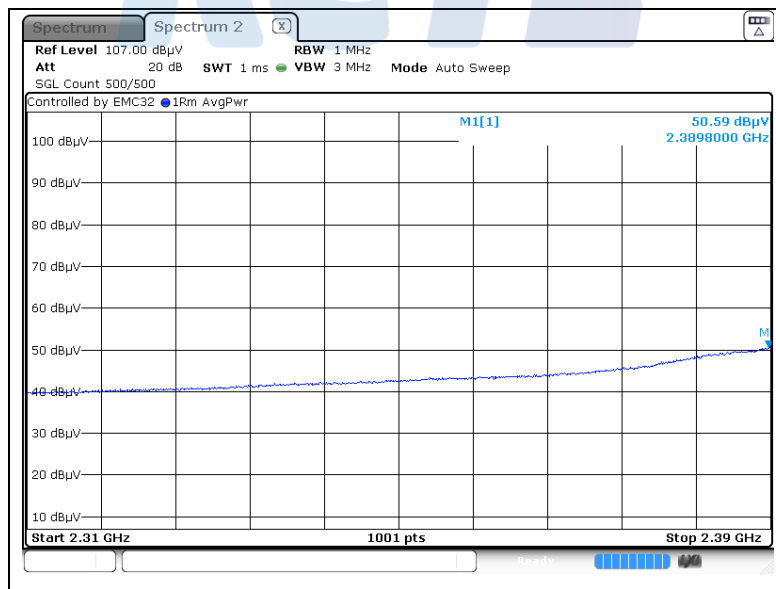
- 802.11n HT20

Worst Antenna polarization : V



- 802.11n HT40

Worst Antenna polarization : V



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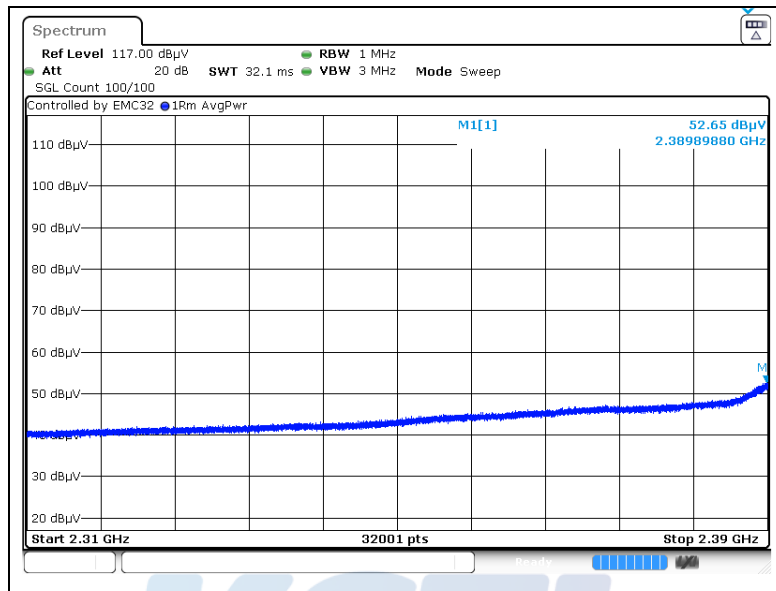
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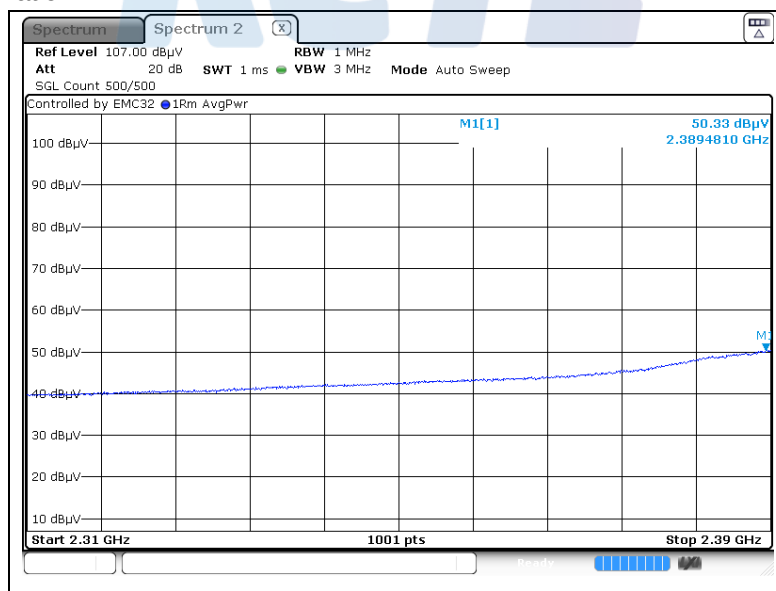
- 802.11ac VHT20

Worst Antenna polarization : V



- 802.11ac VHT40

Worst Antenna polarization : V



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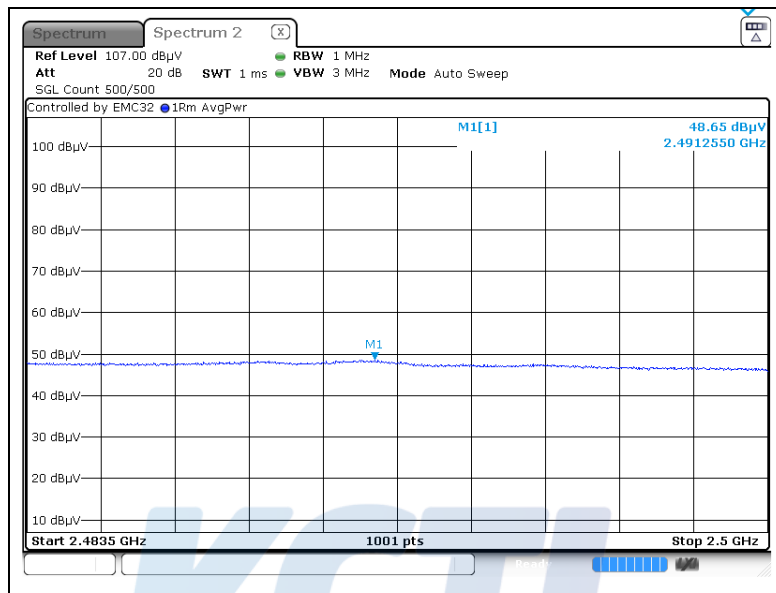
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- Restricted Bandedge data(Highest Channel)

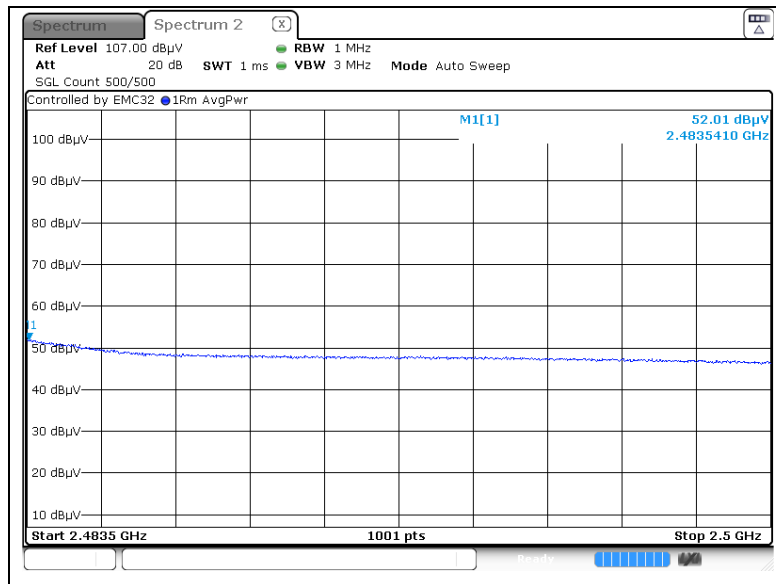
- 802.11b

Worst Antenna polarization : V



- 802.11g

Worst Antenna polarization : V



KCTL Inc.

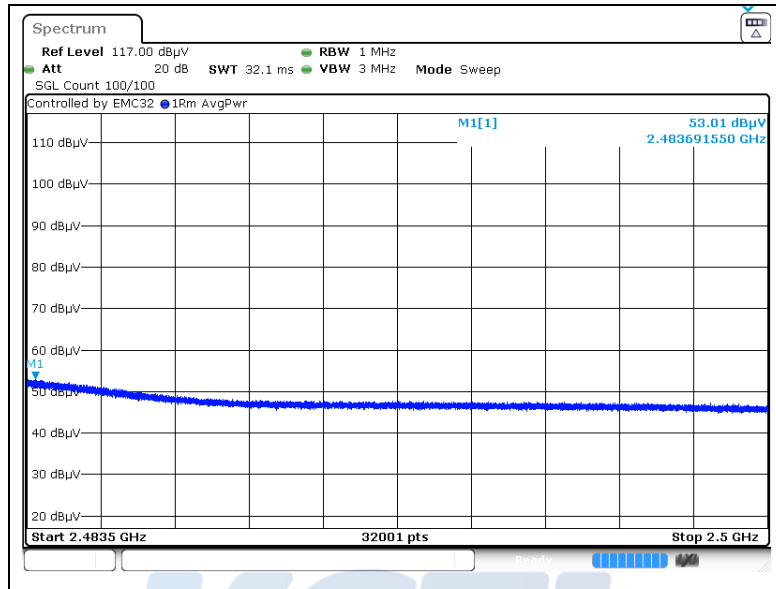
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
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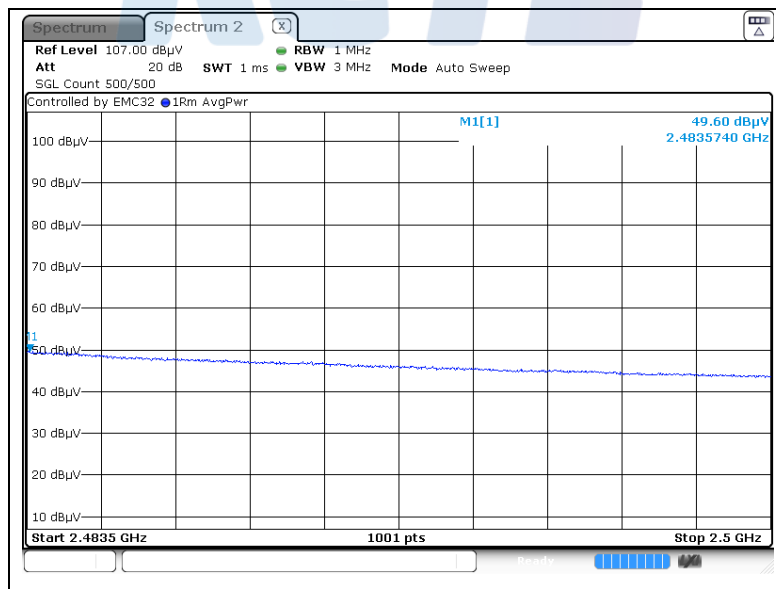
- 802.11n HT20

Worst Antenna polarization : V



- 802.11n HT40

Worst Antenna polarization : V



KCTL Inc.

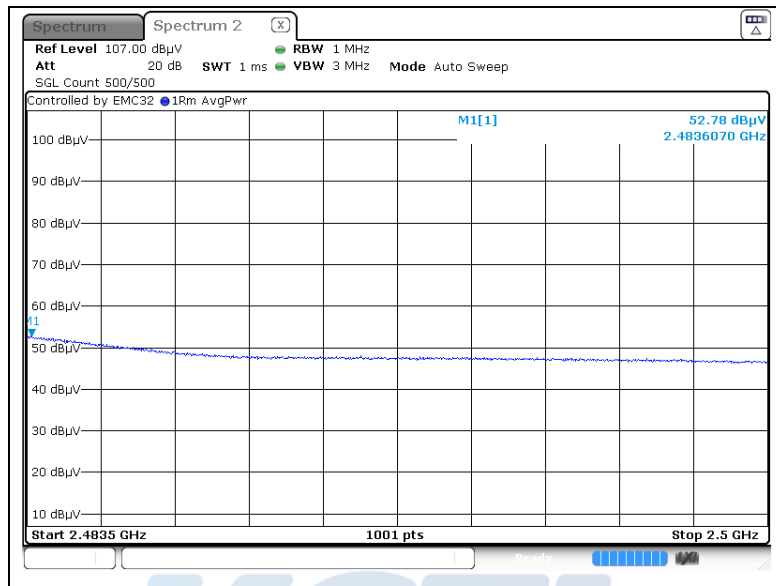
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
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- 802.11ac VHT20

Worst Antenna polarization : V



- 802.11ac VHT40

Worst Antenna polarization : V



6. Test equipment used for test

	Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
■	Spectrum Analyzer	R & S	FSV40	100989	19.01.05
■	Spectrum Analyzer	R & S	FSW50	101013	18.06.22
■	Wideband Power Sensor	R & S	NRP-Z81	102398	19.01.31
■	ATTENUATOR	R & S	DNF Dämpfungsglied 10 dB in N-50 Ohm	31212	18.05.15
■	EMI TEST RECEIVER	R & S	ESCI	100732	18.08.24
■	Bi-Log Antenna	SCHWARZBECK	VULB 9163	552	18.05.10
■	Amplifier	SONOMA INSTRUMENT	310N	186280	19.04.05
■	Amplifier	SONOMA INSTRUMENT	310N	284608	18.08.24
■	ATTENUATOR	Weinschel ENGINEERING	1	AE7348	18.05.15
■	Horn antenna	ETS.lindgren	3116	00086635	18.04.25
■	Horn antenna	ETS.lindgren	3115	62589	18.11.21
■	AMPLIFIER	L-3 Narda-MITEQ	AMF-7D- 01001800-22- 10P	2003683	18.06.12
■	AMPLIFIER	L-3 Narda-MITEQ	JS44- 18004000-33- 8P	2000997	18.08.09
■	LOOP Antenna	R & S	HFH2-Z2	100355	20.01.31
■	Antenna Mast	Innco Systems	MA4640-XP-ET	-	-
■	Turn Table	Innco Systems	DT2000	79	-
■	Antenna Mast	Innco Systems	MA4000-EP	303	-
■	Turn Table	Innco Systems	DT2000	79	-
■	Highpass Filter	WT	WT-A1698-HS	WT160411001	18.05.15
■	Vector Signal Generator	R & S	SMBV100A	257566	19.01.05
■	Signal Generator	R & S	SMR40	100007	18.05.15
■	Cable Assembly	RadiAll	2301761768000 PJ	17.30.38	-
■	Cable Assembly	gigalane	RG-400	-	-
■	Cable Assembly	HUER+SUHNER	SUCOFLEX 104	MY4342/4	-