TEST REPORT

KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 443-390, Korea TEL: 82 70 5008 1021 FAX: 82 505 299 8311	Report No.: KCTL15-FR0033 Page(1) / (18) Pages	KCTL http://www.kctl.co.kr

1. Applicant

Name: Cuattro, LLC

Address: 3760, Rockymoutain Drv., Loveland, Co. USA, 80538

2. Sample Description:

FCC ID: 2AFCFSLATE6

Type of equipment: Slate

Basic Model: Slate6

3. Date of Test: September 24 ~ September 26, 2015

4. Test method used: FCC Part 15 Subpart C 15.247

5. Test Results

Test Item: Refer to page 8

Result: Refer to page 9 ~ page 17

Measurement Uncertainty: Refer to page 8

This result shown in this report refer only to the sample(s) tested unless otherwise stated.

Affirmation	Tested by Name: SEO, SU HYUN	Technical Manager Name: SON, MIN GI

2015. 09. 07

KCTL Inc. Testing Laboratory

[Contents]

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1. Client information

Applicant:	Cuattro, LLC
Address:	3760, Rockymoutain Drv., Loveland, Co. USA, 80538
Telephone number:	+1 970-775-2247(ext 6003)
Contact person:	Kim Jong-Chul / jkim@cuattro.com

Manufacturer:	ISOL
Address:	402, Star Tower, 37, 62, Sagimakgol-ro, Jungwon-gu, Seongnam-si, Gyeonggi-do, Republic of Korea

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2. Laboratory information

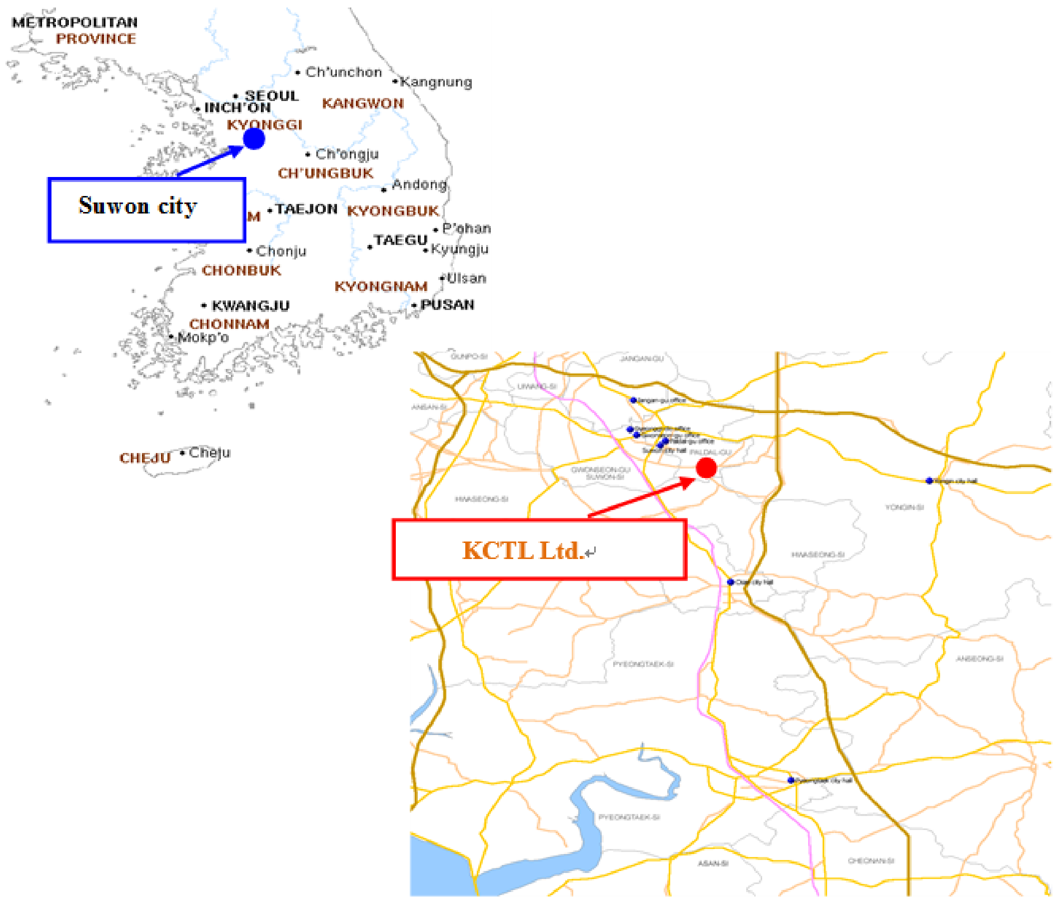
Address

KCTL Ltd.
65 Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea (443-390)
Telephone Number: +82-70-5008-1016   Facsimile Number: +82-505-299-8311

Certificate

KOLAS No.: 231
FCC Site Designation No: KR0040
FCC Site Registration No: 687132
VCCI Site Registration No.: R-3327, G-198, C-3706, T-1849
IC Site Registration No.:8035A-2

SITE MAP



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3. Description of E.U.T.

3.1 Basic description

Applicant:	Cuattro, LLC
Address of Applicant	3760, Rockymoutain Drv., Loveland, Co. USA, 80538
Manufacturer	ISOL
Address of Manufacturer	402, Star Tower, 37, 62, Sagimakgol-ro, Jungwon-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
Type of equipment	Slate
Basic Model	Slate6
Serial number	N/A

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3.2 General description

Frequency Range	2 402 ㎒ ~ 2 480 ㎒ (Bluetooth LE), 2 412 ㎒ ~ 2 462 ㎒ (802.11b/g/n_HT20), 2 422 ㎒ ~ 2 452 ㎒ (802.11n_HT40), 5 180 ㎒ ~ 5 240 ㎒ (802.11a/n/ac_HT20/VHT20) 5 190 ㎒ ~ 5 230 ㎒ (802.11n/ac_HT40/VHT40) 5 210 ㎒ (802.11ac_VHT80) 5 260 ㎒ ~ 5 320 ㎒ (802.11a/n/ac_HT20/VHT20) 5 270 ㎒ ~ 5 310 ㎒ (802.11n/ac_HT40/VHT40) 5 290 ㎒ (802.11ac_VHT80) 5 500 ㎒ ~ 5 700 ㎒ (802.11a/n/ac_HT20/VHT20) 5 510 ㎒ ~ 5 670 ㎒ (802.11n/ac_HT40/VHT40) 5 530 ㎒ (802.11ac_VHT80) 5 745 ㎒ ~ 5 825 ㎒ (802.11a/n/ac_HT20/VHT20) 5 755 ㎒ ~ 5 795 ㎒ (802.11n/ac_HT40/VHT40) 5 775 ㎒ (802.11ac_VHT80)
Type of Modulation	GFSK (Bluetooth LE), CCK (802.11b) OFDM (802.11a/g/n_HT/VHT20/HT/VHT40/VHT80)
Number of Channels	2.0 ㎓: 40 ch (Bluetooth LE), 11 ch (802.11b/g/n HT20), 7 ch (802.11n HT40), 5.0 ㎓: 5 150 ㎒ Band: 4 ch (802.11a/n/ac_HT20/VHT20) 2 ch (802.11n/ac_HT40/VHT40) 1 ch (802.11ac_VHT80) 5 250 ㎒ Band: 4 ch (802.11a/n/ac_HT20/VHT20) 2 ch (802.11n/ac_HT40/VHT40) 1 ch (802.11ac_VHT80) 5 470 ㎒ Band: 8 ch (11a/n/ac_HT20/VHT20) 4 ch (802.11n/ac_HT40/VHT40) 1 ch (802.11ac_VHT80) 5 725 ㎒ 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	2.4 ㎓: 3 dBi (Bluetooth, WiFi), 5.0 ㎓: 5 dBi (5 150 Band, 5 250 Bnad, 5 470 Band, 5 725 Band)
Transmit Power	26.78 dBm
Power supply	DC 19 V* (AC Adaptor : ADP-65JH AB)
Product SW/HW version	UNOEQ 3.7 / Slate6 1.0
Radio SW/HW version	N/A
Test SW Version	RF Test Tool
RF power setting in TEST SW	The Value 16.5

* Declared by the applicant.

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3.3 Available channel list and frequency

- 802.11b/g/n_HT20

Channel	Frequency	Channel	Frequency
1	2 412 MHz	7	2 442 MHz
2	2 417 MHz	8	2 447 MHz
3	2 422 MHz	9	2 452 MHz
4	2 427 MHz	10	2 457 MHz
5	2 432 MHz	11	2 462 MHz
6	2 437 MHz		

- 802.11n_HT40

Channel	Frequency	Channel	Frequency
3	2 422 MHz	7	2 442 MHz
4	2 427 MHz	8	2 447 MHz
5	2 432 MHz	9	2 452 MHz
6	2 437 MHz		

3.4 Test channel and frequency

	Channel	Frequency	Channel	Frequency
Bandwidth	802.11b/g/n_HT20		802.11n_HT40	
Low frequency	1	2 412 MHz	3	2 422 MHz
Middle frequency	7	2 437 MHz	7	2 437 MHz
High frequency	13	2 462 MHz	11	2 452 MHz

3.5 Test Voltage

Mode	Voltage
Norminal voltage	DC 19 V

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4. Summary of test results

4.1 Standards & results

FCC Rule Reference	IC Rule Reference	Parameter	Report Section	Test Result
15.203, 15.247(b)(4)	-	Antenna Requirement	5.1	C
15.247(b)(3)	RSS-210, A8.4(2)	Maximum Peak Output Power	5.2	N/A[1)]
15.247(e)	RSS-210, A8.2(b)	Peak Power Spectral Density	5.3	N/A[1)]
15.247(a)(2)	RSS-210, A8.2(a)	6 dB Channel Bandwidth	5.4	N/A[1)]
-	RSS-GEN, 6.6	Occupied Bandwidth	5.4	N/A[1)]
15.247(d), 15.205(a), 15.209(a)	RSS-210, A8.5 RSS-GEN, 8.9, 10	Spurious Emission, Band Edge, and Restricted bands	5.5	C
15.207(a)	RSS-GEN, 8.8	Conducted Emissions	5.6	N/A[1)]

Note: C = complies
NC = Not complies
NT = Not tested
NA = Not Applicable

* N/A[1)] Refer to the RF module test report.38067RRF.002A1, FCC ID: PD97260H

* The general test methods used to test this device is ANSI C63.4:2014

4.2 Uncertainty

Measurement Item	Expanded Uncertainty U = KUc (K = 2)	
Conducted RF power	± 1.30 dB	
Conducted Spurious Emissions	± 1.52 dB	
Radiated Spurious Emissions	30 ㎒ ~ 300 ㎒:	+ 4.94 dB, - 5.06 dB
		+ 4.93 dB, - 5.05 dB
	300 ㎒ ~ 1 000 ㎒:	+ 4.97 dB, - 5.08 dB
		+ 4.84 dB, - 4.96 dB
	1 ㎓ ~ 25 ㎓:	+ 6.03 dB, - 6.05 dB
Conducted Emissions	9 ㎑ ~ 150 ㎑:	± 3.75 dB
	150 ㎑ ~ 30 ㎒:	± 3.36 dB

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5. Test results

5.1 Spurious Emission, Band Edge, and Restricted bands

5.1.1 Regulation

According to §15.247(d), in any 100 ㎑ 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 ㏈ below that in the 100 ㎑ 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 ㏈ instead of 20 ㏈. 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 notexceed the field strength levels specified in the following table:

Frequency (㎒)	Field strength (㎶/m)	Measurement distance (m)
0.009 - 0.490	2 400/F(㎑)	300
0.490 - 1.705	24 000/F(㎑)	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 ㎒, 76–88 ㎒, 174–216 ㎒ or 470–806 ㎒. However, operation within these frequency bands is permItted under other sections of this part, e.g., §§15.231 and 15.241.

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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.

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5.1.2 Measurement Procedure

5.1.2.1 Band-edge Compliance of RF Conducted Emissions

5.1.2.1.1 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 ㎑.
4) Set the VBW ≥ 3 x 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.

5.1.2.1.2 Emissions Level Measurement

1) Set the center frequency and span to encompass frequency range to be measured.
2) Set the RBW = 100 ㎑.
3) Set the VBW ≥ 3 x RBW.
4) Detector = peak.
5) Ensure that the number of measurement points ≥ 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.

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5.1.2.2 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 ㎑
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.

5.1.2.3 Radiated Spurious Emissions

1) The preliminary and final rdiated measurements were performed to determine the frequency producing the maximum emissions in at a 10m 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 ㎑ to 30 ㎒ using the loop antenna, and from 30 to 1 000 ㎒ using the TRILOG broadband antenna, and from 1 000 ㎒ to 26 500 ㎒ 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.

Note

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 ㎑ for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1 ㎓.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 ㎒ for Peak detection and frequency above 1 ㎓.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 ㎒ and the video bandwidth is 1 ㎑(≥1/T) for Average detection (AV) at frequency above 1 ㎓. **(**where T = pulse width)

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5.5.3 Test Result

- Complied

1. Band edge & Conducted Spurious Emissions was shown in figure 3.
   Note: We took the insertion loss of the cable into consideration within the measuring instrument.
2. Measured value of the Field strength of spurious Emissions (Radiated)
3. It tested x,y and z – 3 axis each, mentioned only worst case data at this report.

*** Below 1 ㎓ data (worst-case: 802.11g)**

Low channel (2 437 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Quasi-Peak DATA. Emissions below 30 ㎒							
Below 30.00	Not Detected	-	-	-	-	-	-
Quasi-Peak DATA. Emissions below 1 ㎓							
46.13	120	V	40.2	-16.4	23.8	40.0	16.2
125.06	120	H	52.0	-20.4	31.6	43.5	11.9
721.00	120	V	38.4	-6.5	31.9	46.0	14.1
Above 800.00	Not Detected	-	-	-	-	-	-

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*** Above 1 ㎓ data**

802.11b_Low channel (2 412 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

802.11b_Middle channel (2 437 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

802.11b_High channel (2 462 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

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802.11g_Low channel (2 412 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

802.11g_Middle channel (2 437 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

802.11g_High channel (2 462 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

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802.11n HT20_Low channel (2 412 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

802.11n HT20_ Middle channel (2 437 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

802.11n HT20_ High channel (2 462 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB (㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

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802.11n HT40_Low channel (2 422 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

802.11n HT40_ Middle channel (2 437 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB(㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

802.11n HT40_ High channel (2 452 ㎒)

Frequency [㎒]	Receiver Bandwidth [㎑]	Pol. [V/H]	Reading [dB(㎶)]	Factor [dB]	Result [dB (㎶/m)]	Limit [dB(㎶/m)]	Margin [dB]
Peak DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-
Average DATA. Emissions above 1 ㎓							
-	Not Detected	-	-	-	-	-	-

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6. Test equipment used for test

	Description	Manufacturer	Model No.	Serial No.	Next Cal Date.
■	Spectrum Analyzer	R&S	FSV40	100989	16.01.26
■	Amplifier	SONOMA INSTRUMENT	310	293004	15.09.25
■	Loop Antenna	R&S	HFH2-Z2	861971003	17.03.03
■	Bi-Log Antenna	Schwarzbeck	VULB9163	552	16.05.14
■	Horn Antenna	ETS-LINDGREN	3116	86632	15.10.20
■	Horn Antenna	ETS-LINDGREN	3117	155787	16.02.05
■	Attenuator	HP	8491A	MY52460424	16.07.13
■	Broadband Preamplifier	SCHWARZBECK	BBV9718	9718-223	16.04.13
■	Broadband Preamplifier	SCHWARZBECK	BBV9721	2	16.05.19
■	Highpass Filter	Wainwright Instruments GmbH	WHKX3.0/ 18G-12SS	44	16.02.02
■	Highpass Filter	Wainwright Instruments GmbH	WHKX6.5/ 18G-8SS	2	16.02.24
■	EMI Test Receiver	R&S	ESR7	101078	15.10.04
■	Turn Table	Innco Systems	DT2000S-1t	79	-
■	Antenna Mast	Innco Systems	MA4000-EP	303	-

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