

Test procedureANSI C63.10-2013 Section 12.7.7.2, 12.7.5, 12.7.6
KDB 789033 D02 v02r01 – Section G**Test settings****Peak field strength measurements**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW \geq (3 \times RBW)
4. Detector = peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow sweeps to continue until the trace stabilizes

Table. RBW as a function of frequency

Frequency	RBW
9 kHz to 150 kHz	200 Hz to 300 Hz
0.15 MHz to 30 MHz	9 kHz to 10 kHz
30 MHz to 1 000 MHz	100 kHz to 120 kHz
> 1 000 MHz	1 MHz

Average field strength measurements**Trace averaging with continuous EUT transmission at full power**

If the EUT can be configured or modified to transmit continuously ($D \geq 98\%$), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

1. RBW = 1 MHz (unless otherwise specified).
2. VBW \geq (3 \times RBW).
3. Detector = RMS (power averaging), if $[\text{span} / (\# \text{ of points in sweep})] \leq (\text{RBW} / 2)$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
4. Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.

Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT ($D \geq 98\%$) cannot be achieved and the duty cycle is constant (duty cycle variations are less than $\pm 2\%$), then the following procedure shall be used:

1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. RBW = 1 MHz (unless otherwise specified).
4. VBW \geq [3 \times RBW].
5. Detector = RMS (power averaging), if $[\text{span} / (\# \text{ of points in sweep})] \leq (\text{RBW} / 2)$. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.

6. Averaging type = power (i.e., rms):
 - 1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
 - 2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.
7. Sweep time = auto.
8. Perform a trace average of at least 100 traces.
9. A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
 - 1) If power averaging (rms) mode was used in step f), then the applicable correction factor is $[10 \log (1 / D)]$, where D is the duty cycle.
 - 2) If linear voltage averaging mode was used in step f), then the applicable correction factor is $[20 \log (1 / D)]$, where D is the duty cycle.
 - 3) If a specific emission is demonstrated to be continuous ($D \geq 98\%$) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Notes:

1. $f < 30$ MHz, extrapolation factor of 40 dB/decade of distance. $F_d = 40 \log(D_m/D_s)$
 $f \geq 30$ MHz, extrapolation factor of 20 dB/decade of distance. $F_d = 20 \log(D_m/D_s)$
Where:
 - F_d = Distance factor in dB
 - D_m = Measurement distance in meters
 - D_s = Specification distance in meters
2. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d (dB)
3. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
4. Average test would be performed if the peak result were greater than the average limit.
5. ¹⁾ means restricted band.
6. According to part 15.31(f)(2), an extrapolation factor of 40 dB/decade is applied because measured distance of radiated emission is 3 m.
7. Below 30 MHz frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 dB of the limit, then the following statement shall be made: "No spurious emissions were detected within 20 dB of the limit."
8. For above 1 GHz pre-scan to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.

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.:
KR21-SRF0136
Page (53) of (127)

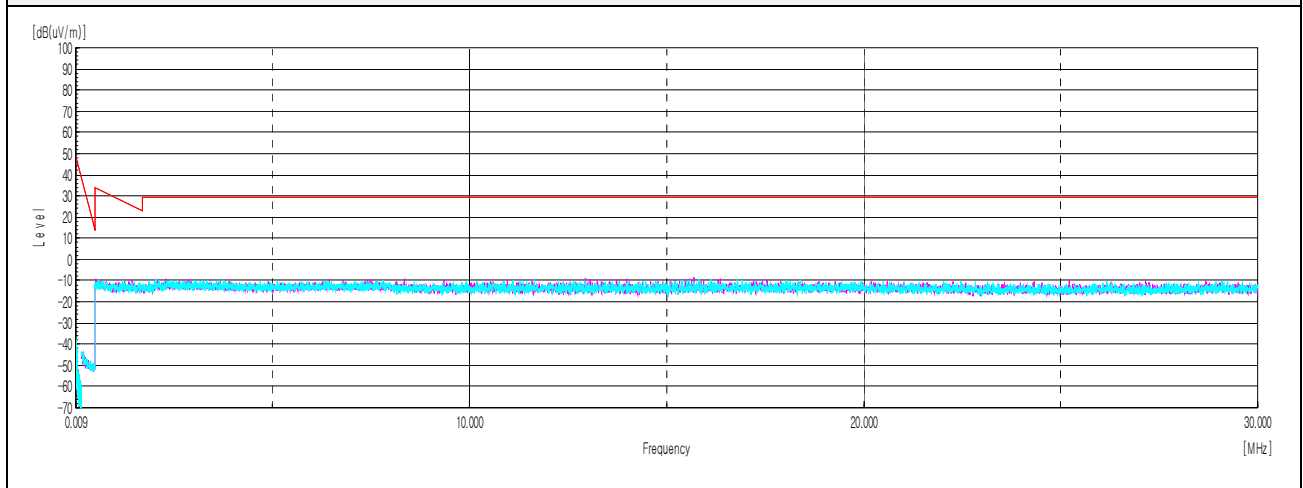


Test results (Below 30 MHz) – Worst case: 802.11a / UNII-2C 5 700 MHz

Frequency	Pol.	Reading	Ant. Factor	Amp. +Cable	Distance Factor	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]

No spurious emissions were detected within 20 dB of the limit.

Horizontal/Vertical



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

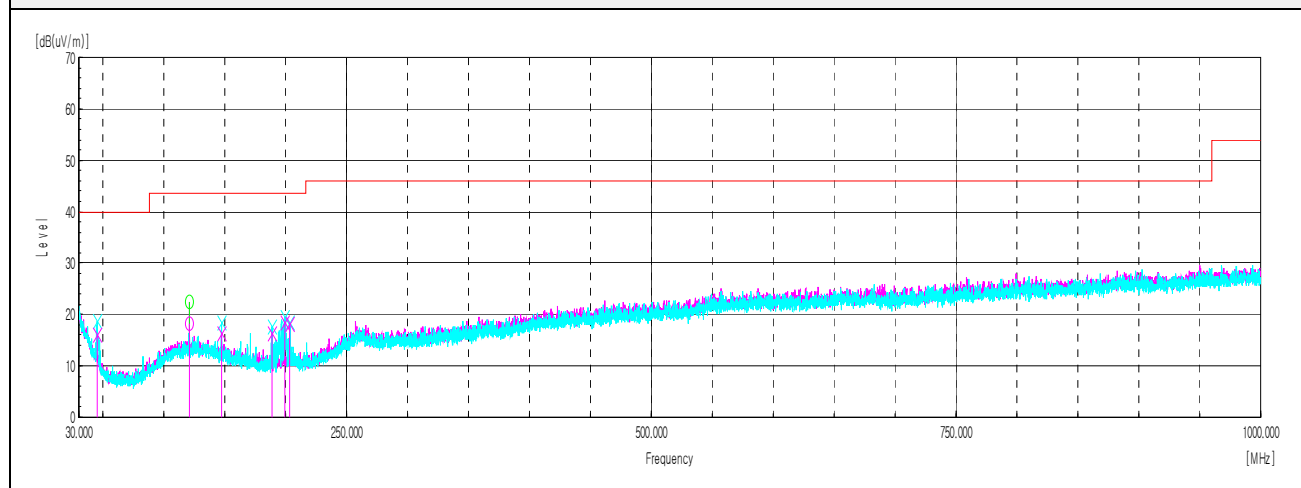
Report No.:
KR21-SRF0136
Page (54) of (127)



Test results (Below 1 000 MHz) – Worst case: 802.11a / UNII-2C 5 700 MHz

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data								
45.16	V	29.90	18.30	-30.10	-	18.10	40.00	21.90
120.70 ¹⁾	H	28.60	17.17	-28.76	-	17.01	43.50	26.49
146.89	V	27.80	19.10	-28.35	-	18.55	43.50	24.95
188.60	V	28.80	16.24	-27.86	-	17.18	43.50	26.32
199.27	V	30.40	15.50	-27.70	-	18.20	43.50	25.30
203.02	V	30.10	15.56	-27.68	-	17.98	43.50	25.52

Horizontal/Vertical



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.:
KR21-SRF0136
Page (55) of (127)

**Test results (Above 1 000 MHz)****802.11a UNII-1****Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 149.77 ¹⁾	V	50.14	34.17	-26.27	-	58.04	74.00	15.96
10 360.41	H	62.43	37.56	-49.97	-	50.02	68.20	18.18
16 294.41	V	56.81	40.95	-47.14	-	50.62	68.20	17.58
Average Data								
5 149.77 ¹⁾	V	41.25	34.17	-26.27	0.14	49.29	54.00	4.71

Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 400.30	H	64.23	37.60	-50.01	-	51.82	68.20	16.38
15 707.91 ¹⁾	V	55.78	39.92	-46.11	-	49.59	74.00	24.41
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 035.47 ¹⁾	H	72.39	28.81	-49.00	-	52.20	74.00	21.80
10 484.75	H	61.59	37.68	-50.08	-	49.19	68.20	19.01
16 224.69	V	57.14	40.87	-46.88	-	51.13	68.20	17.07
Average Data								
1 035.47 ¹⁾	H	65.13	28.81	-49.00	0.14	45.08	54.00	8.92

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

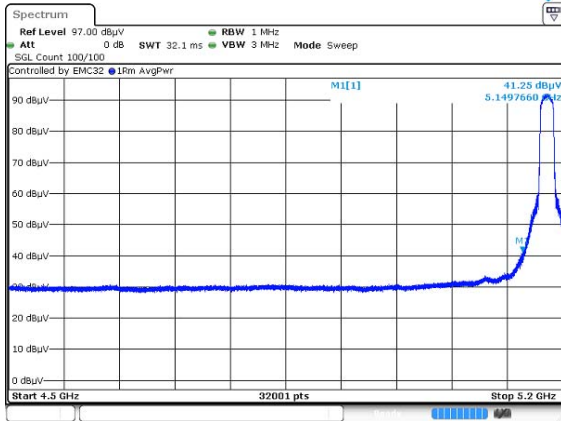
Report No.:
KR21-SRF0136
Page (56) of (127)



802.11a UNII-1

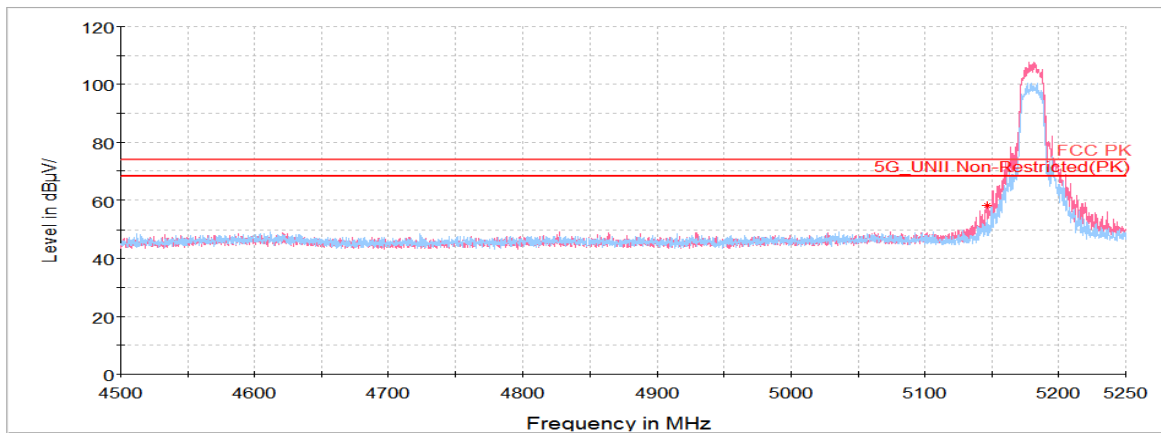
Lowest Channel (5 180 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



KCTL Inc.

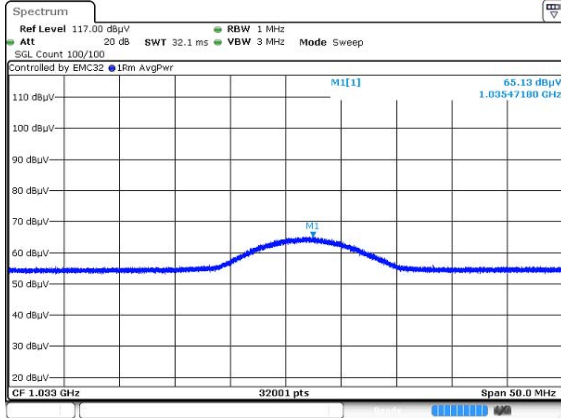
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (57) of (127)



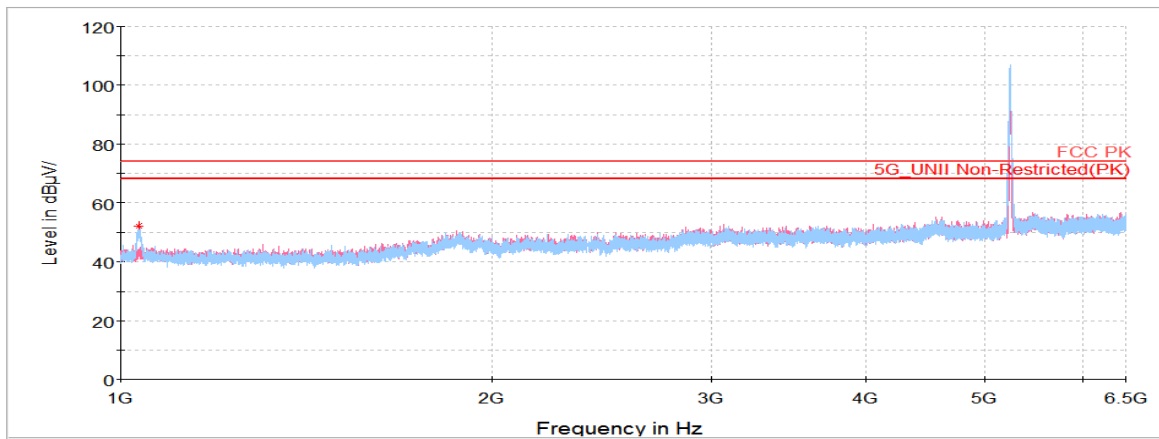
Highest Channel (5 240 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



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.:
KR21-SRF0136
Page (58) of (127)

**802.11n HT20 UNII-1****Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 149.96 ¹⁾	V	54.73	34.17	-26.27	-	62.63	74.00	11.37
10 357.89	H	63.34	37.56	-49.97	-	50.93	68.20	17.27
15 567.75 ¹⁾	V	54.87	39.97	-46.14	-	48.70	74.00	25.30
Average Data								
5 149.96 ¹⁾	V	40.76	34.17	-26.27	0.15	48.81	54.00	5.19

Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 402.81	H	65.97	37.60	-50.01	-	53.56	68.20	14.64
15 596.50 ¹⁾	H	54.46	39.96	-46.13	-	48.29	74.00	25.71
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 034.81 ¹⁾	H	72.23	28.81	-49.00	-	52.04	74.00	21.96
10 478.64	H	63.91	37.68	-50.07	-	51.52	68.20	16.68
15 712.22 ¹⁾	V	54.76	39.92	-46.11	-	48.57	74.00	25.43
Average Data								
1 034.81	H	64.75	28.81	-49.00	0.15	44.71	54.00	9.29

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

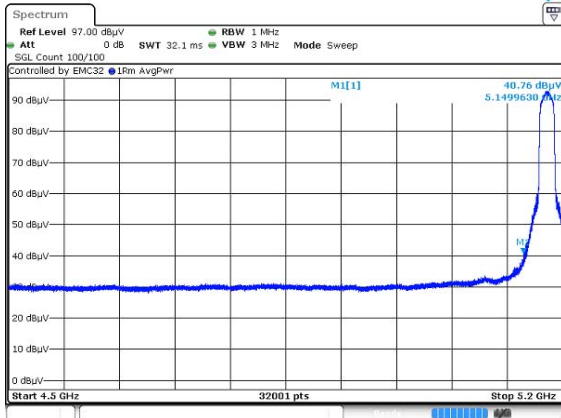
Report No.:
KR21-SRF0136
Page (59) of (127)



802.11n HT20 UNII-1

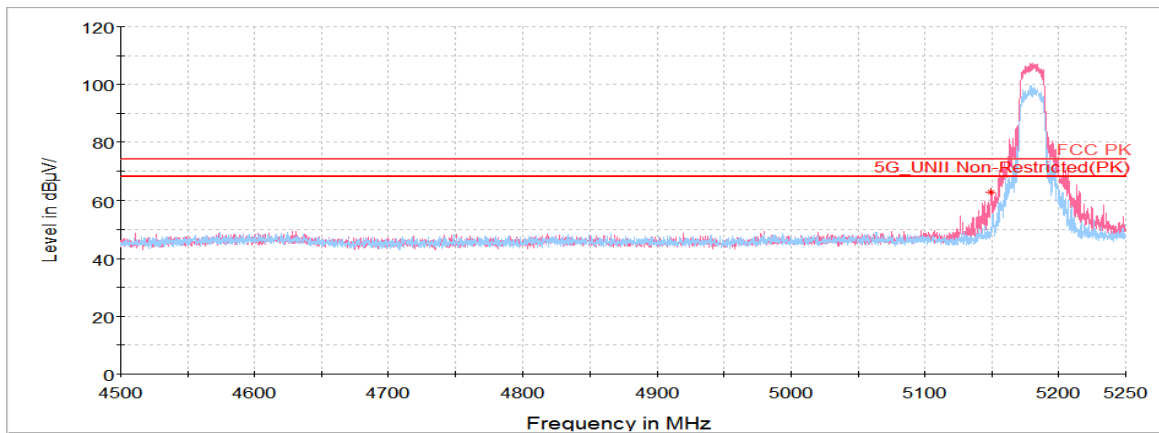
Lowest Channel (5 180 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



KCTL Inc.

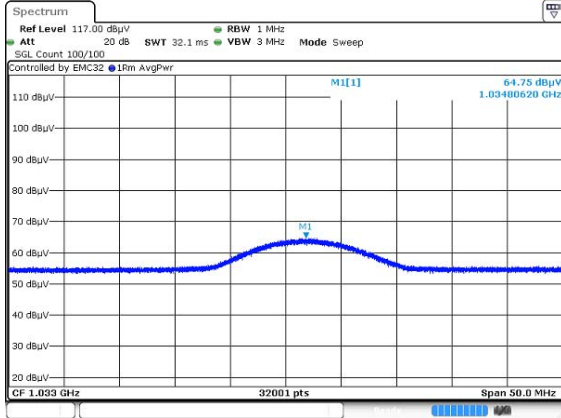
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (60) of (127)



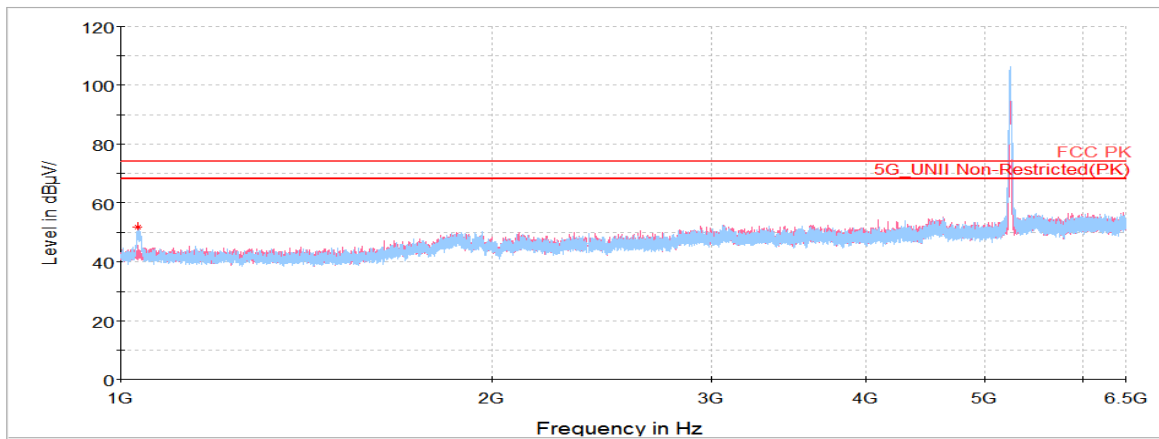
Highest Channel (5 240 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



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.:
KR21-SRF0136
Page (61) of (127)

**802.11n HT40 UNII-1****Lowest Channel (5 190 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 149.50 ¹⁾	V	54.63	34.17	-26.27	-	62.53	74.00	11.47
10 385.20	H	60.34	37.59	-49.99	-	47.94	68.20	20.26
15 569.91 ¹⁾	V	54.74	39.97	-46.14	-	48.57	74.00	25.43
Average Data								
5 149.50 ¹⁾	V	42.81	34.17	-26.27	0.29	51.00	54.00	3.00

Highest Channel (5 230 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 024.92 ¹⁾	H	70.05	28.80	-49.00	-	49.85	74.00	24.15
10 458.16	H	61.03	37.66	-50.05	-	48.64	68.20	19.56
15 667.30 ¹⁾	V	55.49	39.93	-46.12	-	49.30	74.00	24.70
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

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

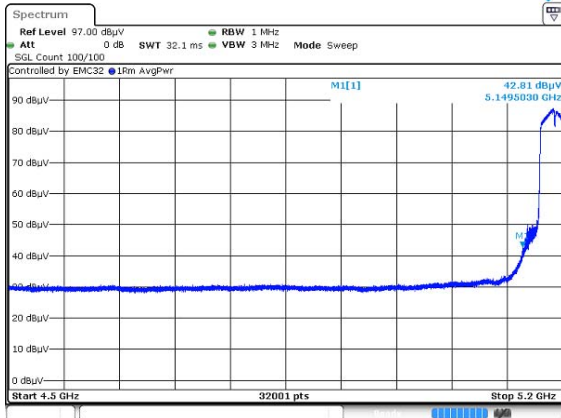
Report No.:
KR21-SRF0136
Page (62) of (127)



802.11n HT40 UNII-1

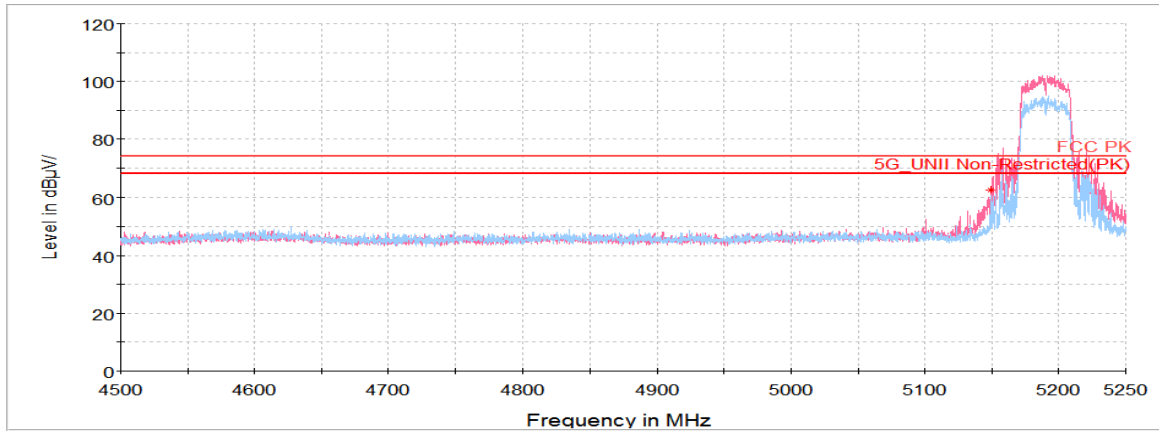
Lowest Channel (5 190 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



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.:
KR21-SRF0136
Page (63) of (127)

**802.11ac VHT20 UNII-1****Lowest Channel (5 180 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 149.02 ¹⁾	V	51.50	34.17	-26.28	-	59.39	74.00	14.61
10 355.02	H	60.98	37.56	-49.97	-	48.57	68.20	19.63
15 522.11 ¹⁾	V	54.46	39.99	-46.15	-	48.30	74.00	25.70
Average Data								
5 149.02 ¹⁾	V	38.88	34.17	-26.28	0.15	46.92	54.00	7.08

Middle Channel (5 200 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 399.94	H	64.17	37.60	-50.01	-	51.76	68.20	16.44
15 597.58 ¹⁾	V	55.05	39.96	-46.13	-	48.88	74.00	25.12
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 240 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 035.63 ¹⁾	H	72.22	28.81	-49.00	-	52.03	74.00	21.97
10 479.00	H	64.27	37.68	-50.07	-	51.88	68.20	16.32
15 721.56 ¹⁾	V	54.67	39.91	-46.11	-	48.47	74.00	25.53
Average Data								
1 035.63 ¹⁾	H	64.95	28.81	-49.00	0.15	44.91	54.00	9.09

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

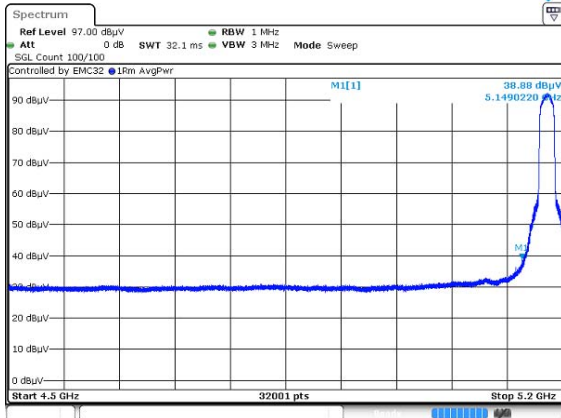
Report No.:
KR21-SRF0136
Page (64) of (127)



802.11ac VHT20 UNII-1

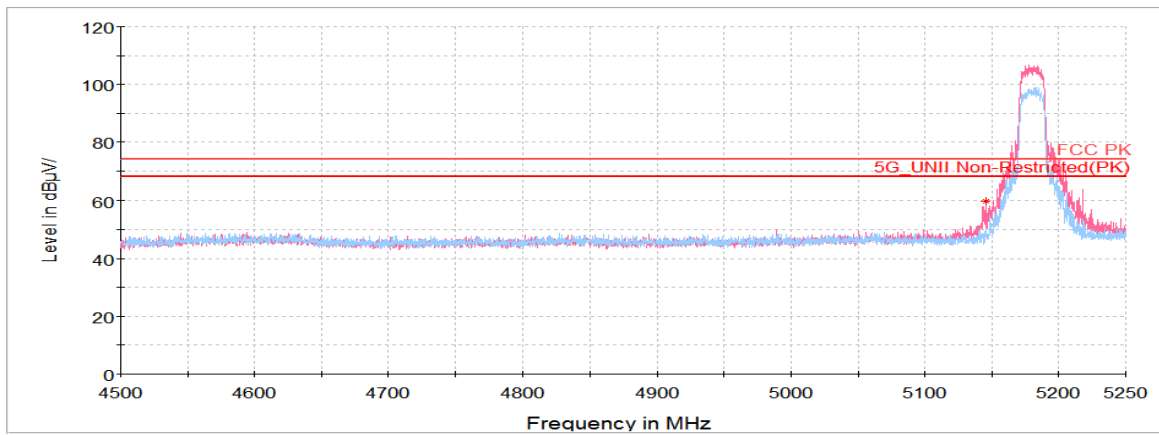
Lowest Channel (5 180 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



KCTL Inc.

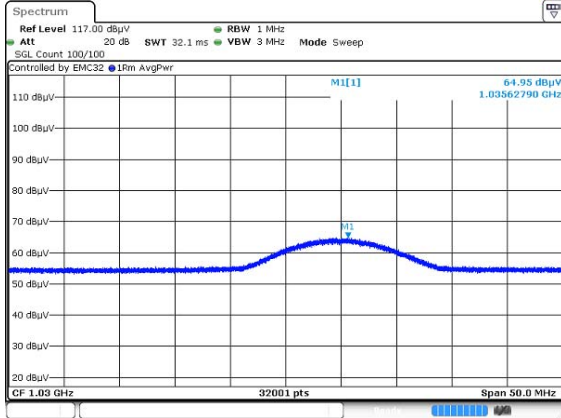
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (65) of (127)



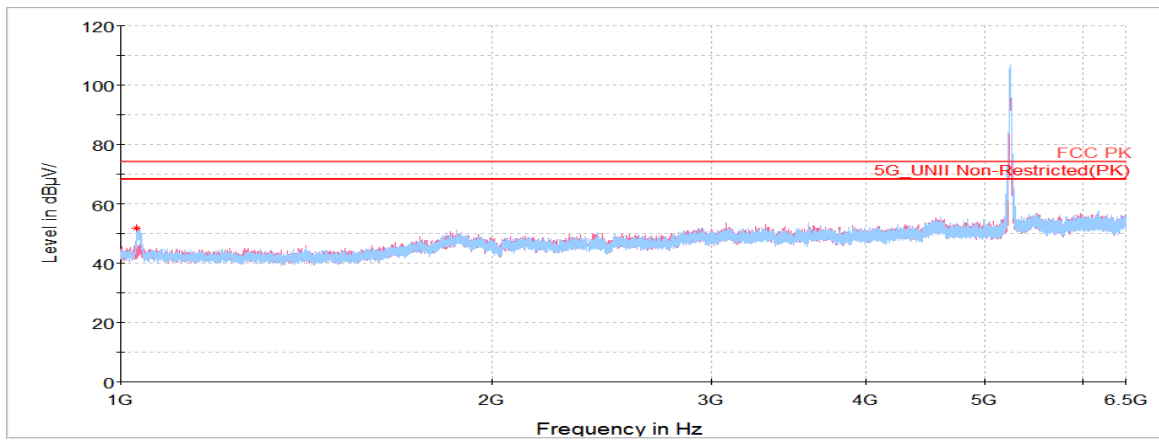
Highest Channel (5 240 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



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.:
KR21-SRF0136
Page (66) of (127)

**802.11ac VHT40 UNII-1****Lowest Channel (5 190 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 149.88 ¹⁾	V	51.67	34.17	-26.27	-	59.57	74.00	14.43
10 391.31	H	61.21	37.59	-50.00	-	48.80	68.20	19.40
15 570.98 ¹⁾	H	55.20	39.97	-46.14	-	49.03	74.00	24.97
Average Data								
5 149.88 ¹⁾	V	42.20	34.17	-26.27	0.29	50.39	54.00	3.61

Highest Channel (5 230 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
10 462.83	H	60.45	37.66	-50.06	-	48.05	68.20	20.15
15 709.34 ¹⁾	H	55.05	39.92	-46.11	-	48.86	74.00	25.14
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

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

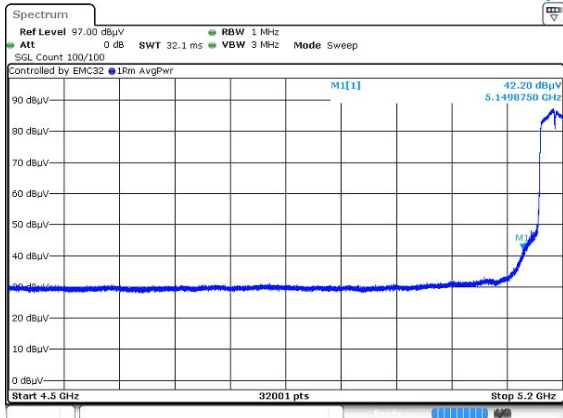
Report No.:
KR21-SRF0136
Page (67) of (127)



802.11ac VHT40 UNII-1

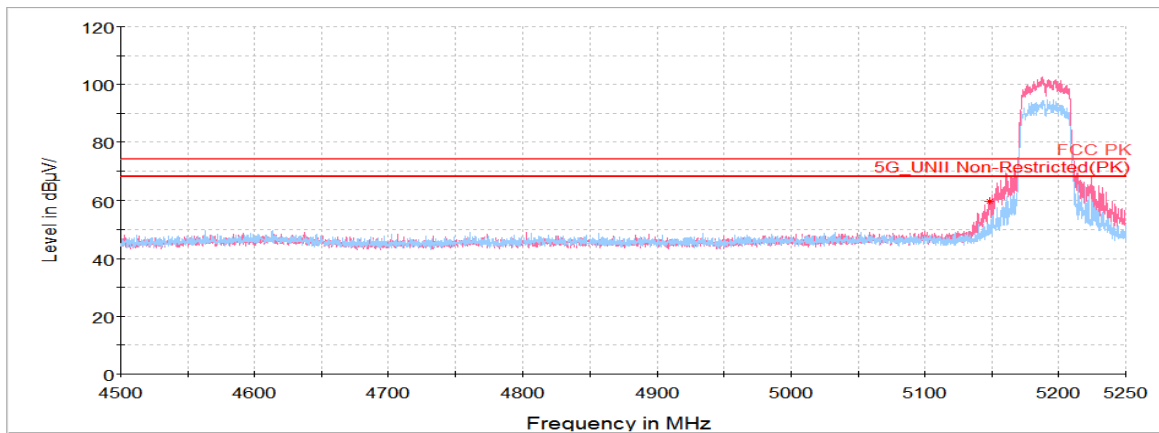
Lowest Channel (5 190 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



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

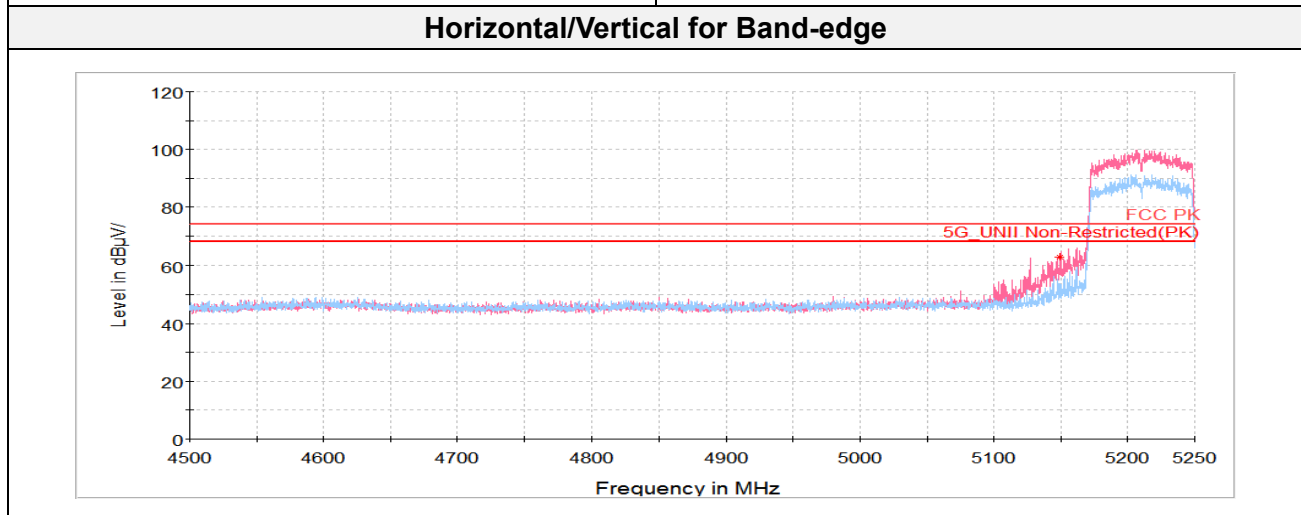
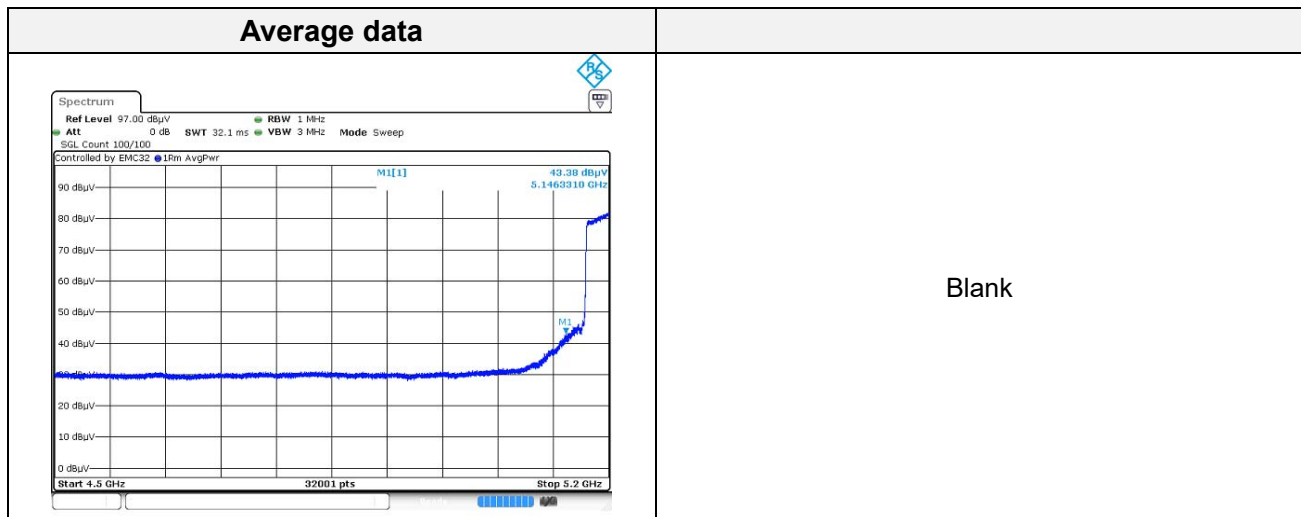
Report No.:
KR21-SRF0136
Page (68) of (127)



802.11ac VHT80 UNII-1

Lowest Channel (5 210 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
5 146.33 ¹⁾	V	54.90	34.16	-26.31	-	62.75	74.00	11.25
10 440.55	V	58.03	37.64	-50.04	-	45.63	68.20	22.57
15 629.56 ¹⁾	H	54.07	39.95	-46.13	-	47.89	74.00	26.11
Average Data								
5 146.33 ¹⁾	V	43.38	34.16	-26.31	0.56	51.79	54.00	2.21

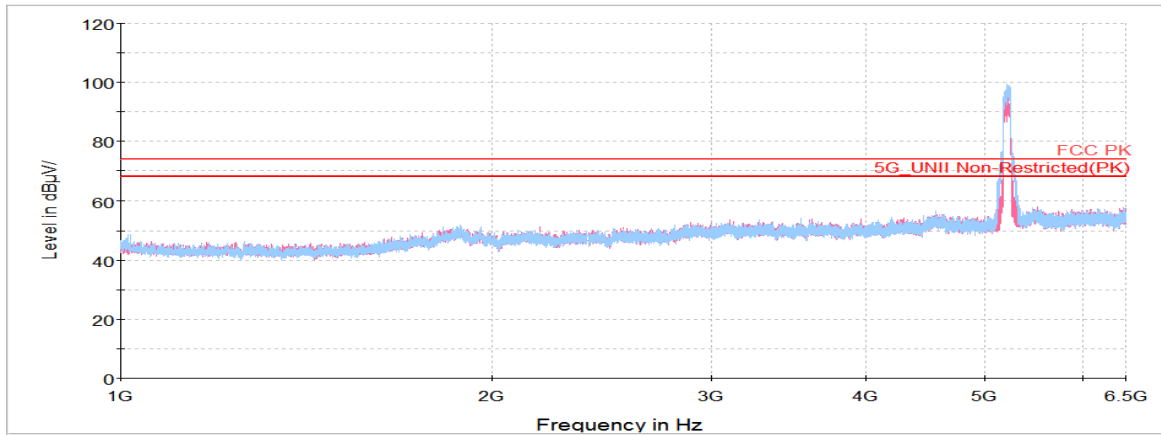


Plot of Harmonics and Spurious Emissions

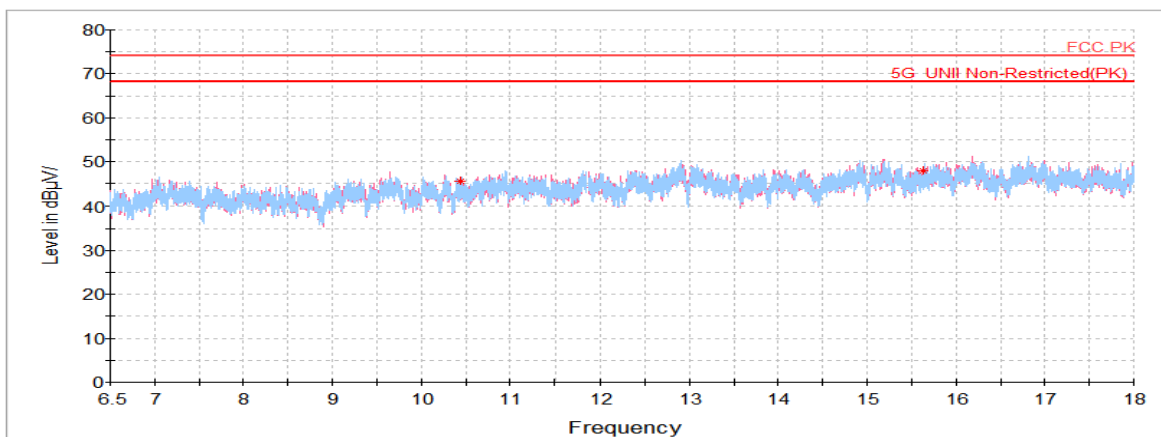
In order to simplify the report, attached plots were only the lowest margin condition

802.11ac VHT80_UNII-1_Lowest Channel (5 210 MHz)

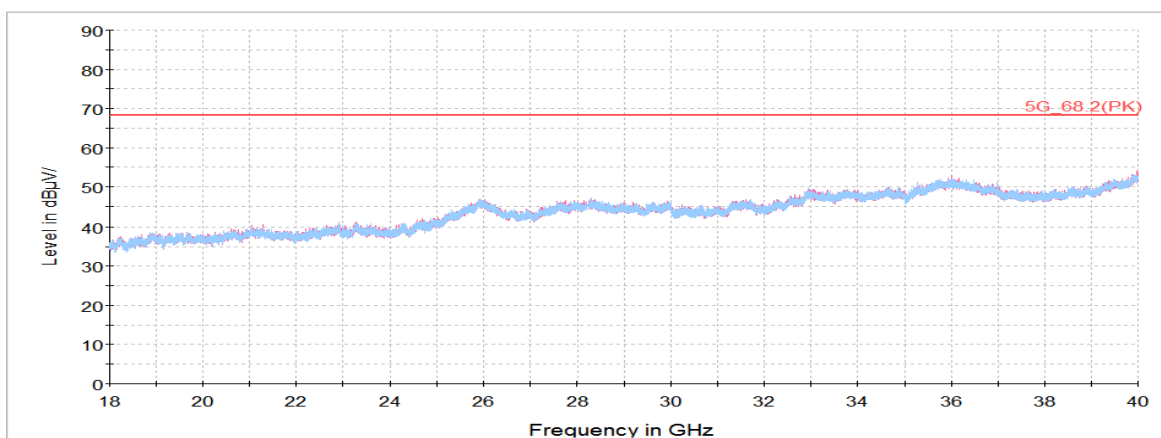
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz



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.:
KR21-SRF0136
Page (70) of (127)

**802.11a UNII-2A****Lowest Channel (5 260 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 055.04 ¹⁾	H	73.15	28.81	-49.00	-	52.96	74.00	21.04
10 516.73	H	64.06	37.72	-50.04	-	51.74	68.20	16.46
15 679.52 ¹⁾	H	55.85	39.93	-46.12	-	49.66	74.00	24.34
Average Data								
1 055.04 ¹⁾	H	64.64	28.81	-49.00	0.14	44.59	54.00	9.41

Middle Channel (5 280 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 074.60 ¹⁾	H	74.62	28.81	-49.00	-	54.43	74.00	19.57
10 564.89	H	63.88	37.76	-49.90	-	51.74	68.20	16.46
15 904.13 ¹⁾	V	56.95	39.84	-46.07	-	50.72	74.00	23.28
Average Data								
1 074.60 ¹⁾	H	64.44	28.81	-49.00	0.14	44.39	54.00	9.61

Highest Channel (5 320 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 115.19 ¹⁾	H	71.56	28.82	-48.98	-	51.40	74.00	22.60
5 350.40 ¹⁾	V	51.93	34.53	-26.11	-	60.35	74.00	13.65
10 640.70 ¹⁾	H	64.50	37.84	-49.69	-	52.65	74.00	21.35
16 207.44	H	56.79	40.85	-46.81	-	50.83	68.20	17.37
Average Data								
1 115.19 ¹⁾	H	64.05	28.82	-48.98	0.14	44.03	54.00	9.97
5 350.40 ¹⁾	V	41.71	34.53	-26.11	0.14	50.27	54.00	3.73
10 640.70 ¹⁾	H	55.66	37.84	-49.69	0.14	43.95	54.00	10.05

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

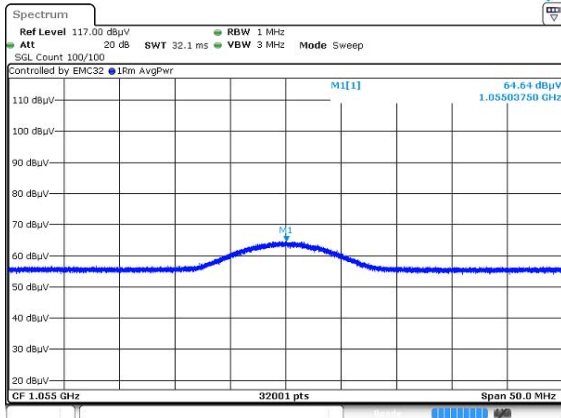
Report No.:
KR21-SRF0136
Page (71) of (127)



802.11a UNII-2A

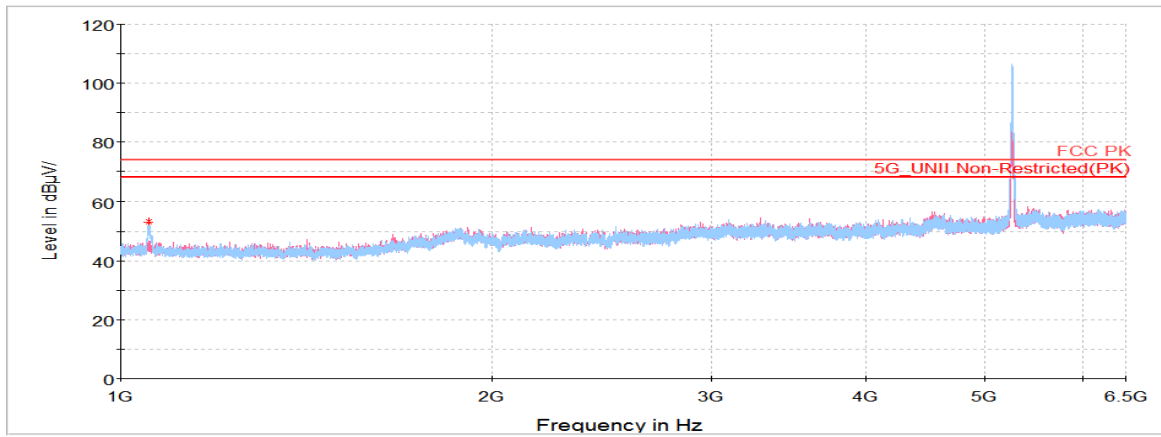
Lowest Channel (5 260 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



KCTL Inc.

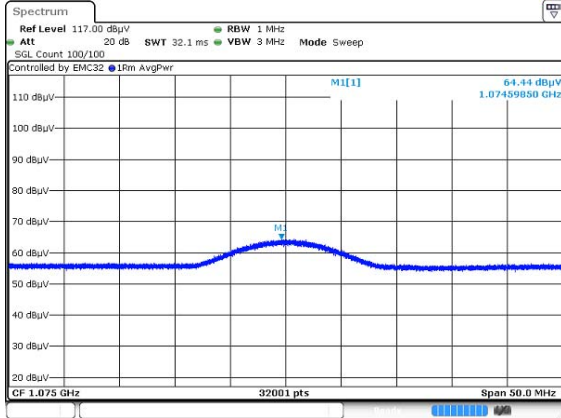
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (72) of (127)



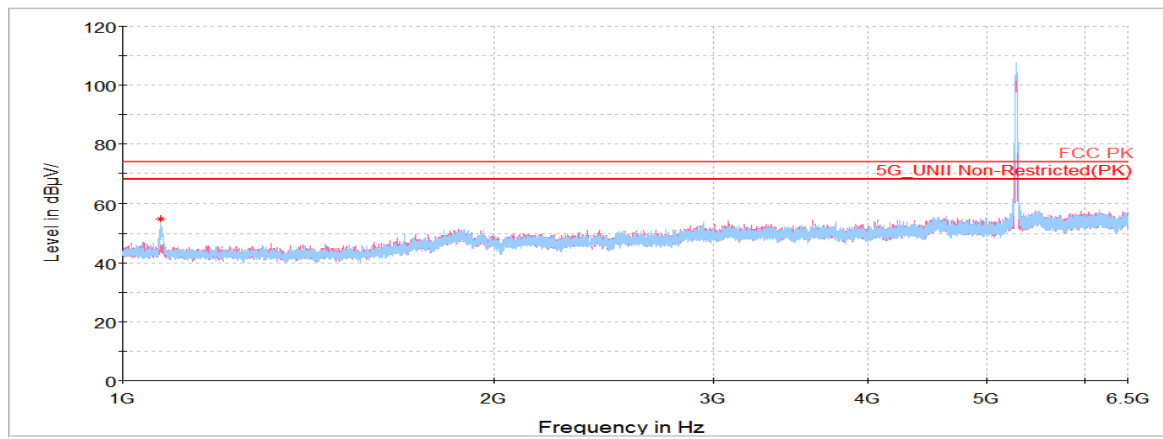
Middle Channel (5 280 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



KCTL Inc.

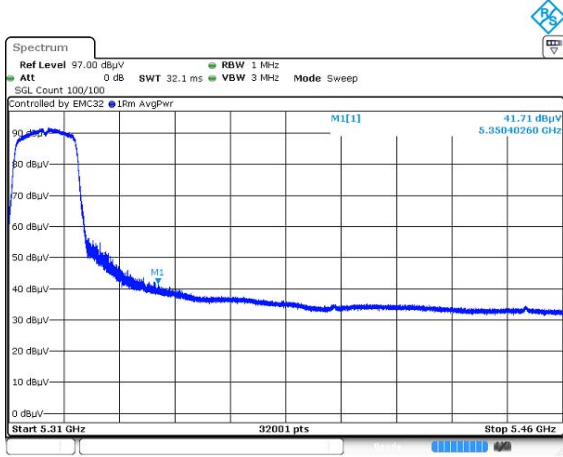
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (73) of (127)



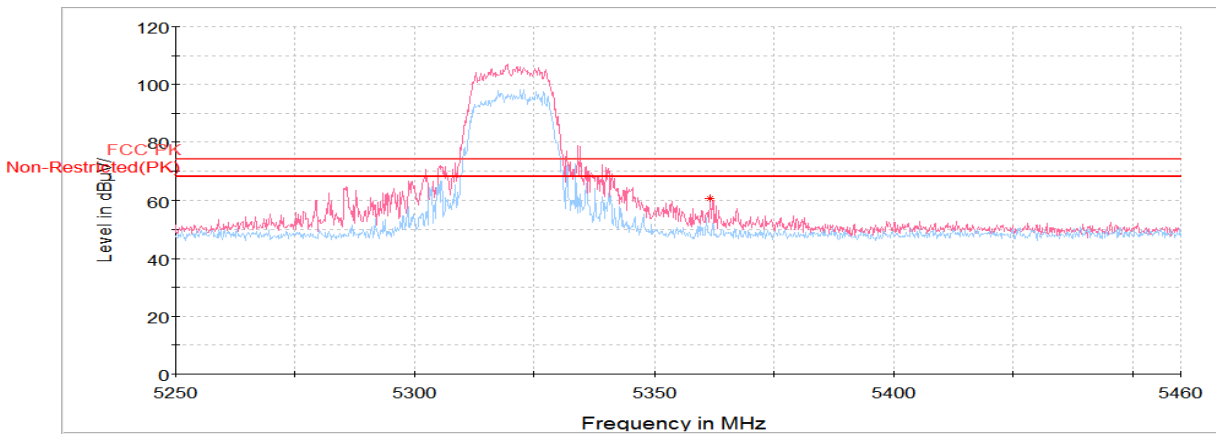
Highest Channel (5 320 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



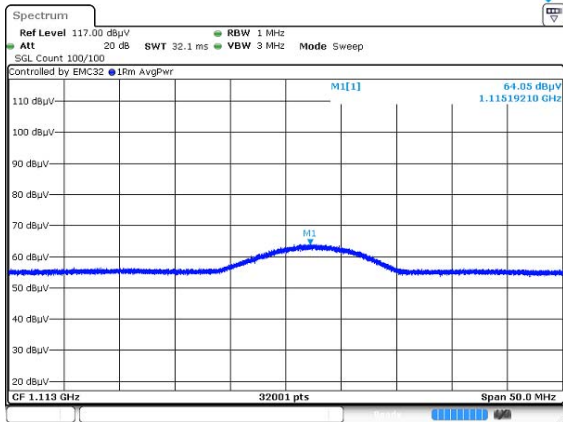
KCTL Inc.

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

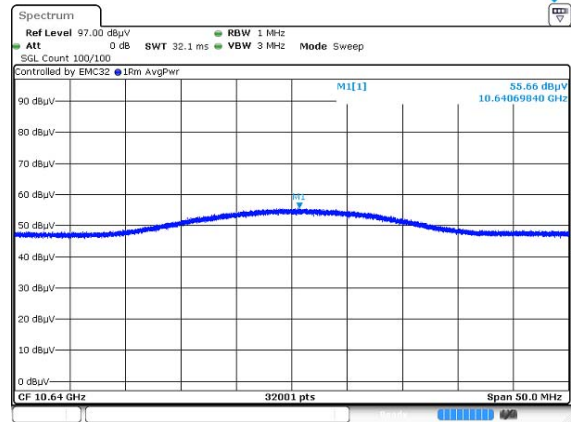
Report No.:
KR21-SRF0136
Page (74) of (127)



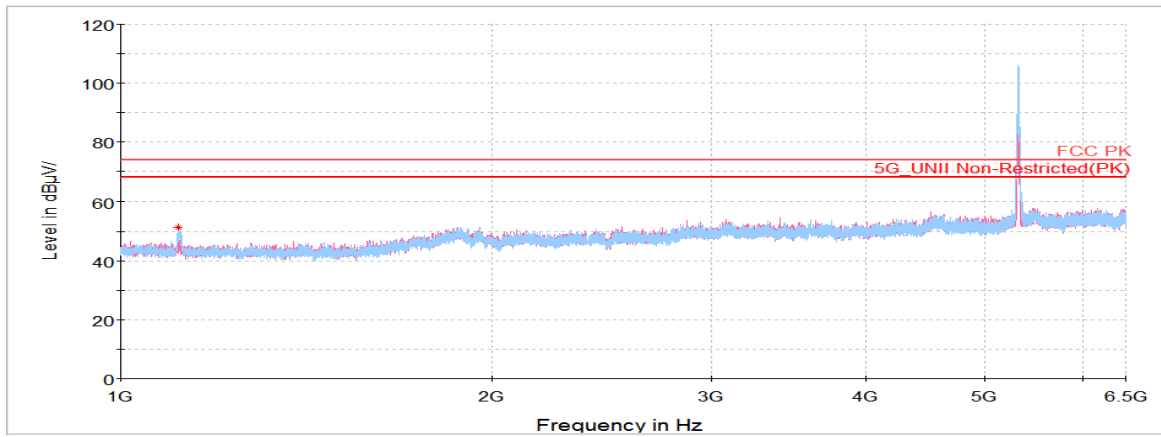
Average data



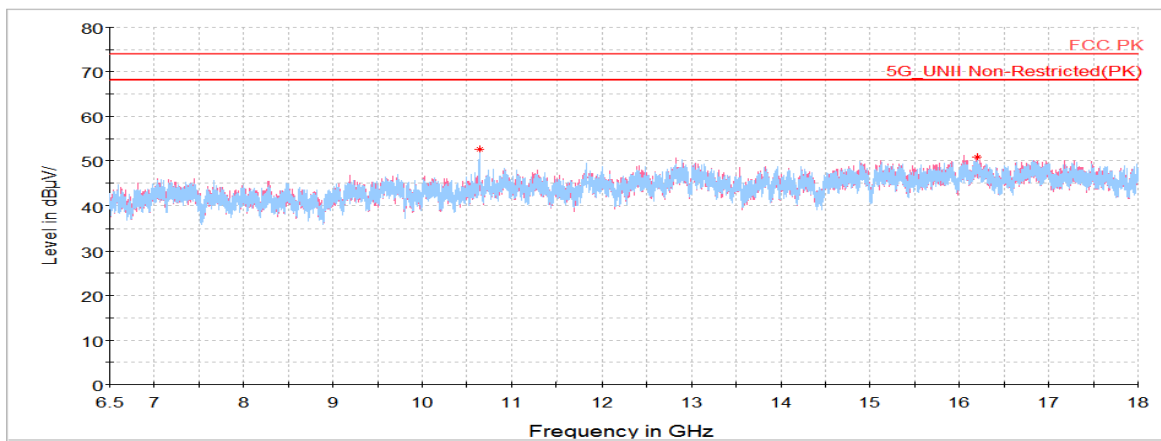
Average data



Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



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.:
KR21-SRF0136
Page (75) of (127)

KCTL**802.11n HT20 UNII-2A**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 055.55 ¹⁾	H	72.99	28.81	-49.00	-	52.80	74.00	21.20
10 515.66	H	63.24	37.72	-50.04	-	50.92	68.20	17.28
15 779.78 ¹⁾	V	54.48	39.89	-46.10	-	48.27	74.00	25.73
Average Data								
1 055.55 ¹⁾	H	65.35	28.81	-49.00	0.15	45.31	54.00	8.69

Middle Channel (5 280 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 075.67 ¹⁾	H	71.60	28.82	-49.00	-	51.42	74.00	22.58
10 554.11	H	64.79	37.75	-49.93	-	52.61	68.20	15.59
15 840.52 ¹⁾	H	57.18	39.86	-46.08	-	50.96	74.00	23.04
Average Data								
1 075.67 ¹⁾	H	65.65	28.82	-49.00	0.15	45.62	54.00	8.38

Highest Channel (5 320 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 115.26 ¹⁾	H	71.48	28.82	-48.98	-	51.32	74.00	22.68
5 350.29 ¹⁾	V	55.06	34.53	-26.11	-	63.48	74.00	10.52
10 639.63 ¹⁾	H	65.01	37.84	-49.69	-	53.16	74.00	20.84
15 994.33 ¹⁾	V	54.67	39.80	-46.05	-	48.42	74.00	25.58
Average Data								
1 115.26 ¹⁾	H	63.39	28.82	-48.98	0.15	43.38	54.00	10.62
5 350.29 ¹⁾	V	42.56	34.53	-26.11	0.15	51.13	54.00	2.87
10 639.63 ¹⁾	H	58.71	37.84	-49.69	0.15	47.01	54.00	6.99

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

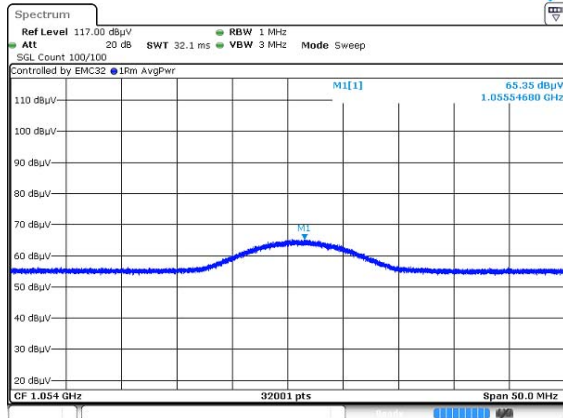
Report No.:
KR21-SRF0136
Page (76) of (127)



802.11n HT20 UNII-2A

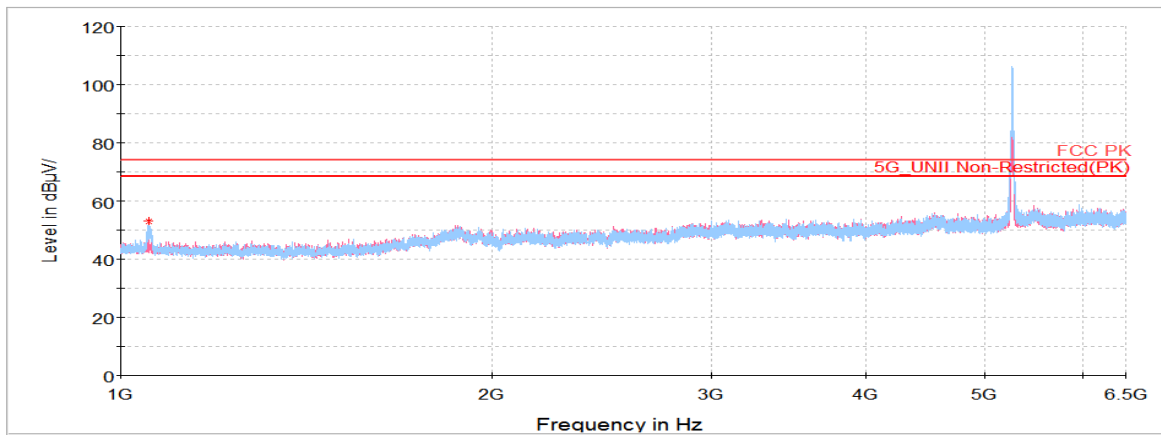
Lowest Channel (5 260 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



KCTL Inc.

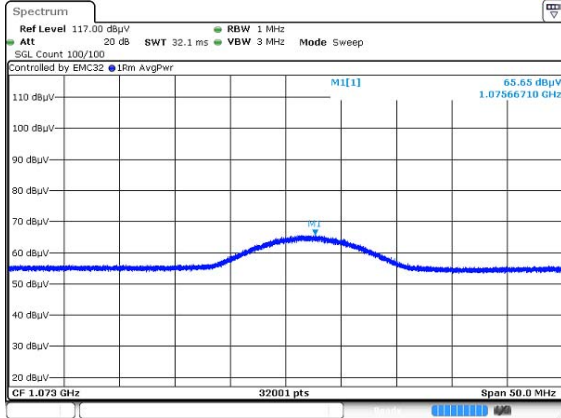
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (77) of (127)



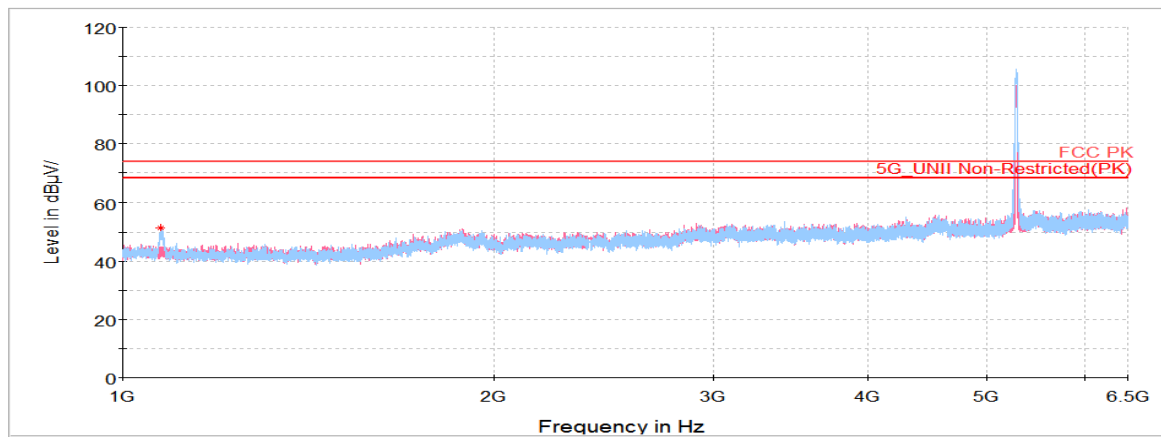
Middle Channel (5 280 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



KCTL Inc.

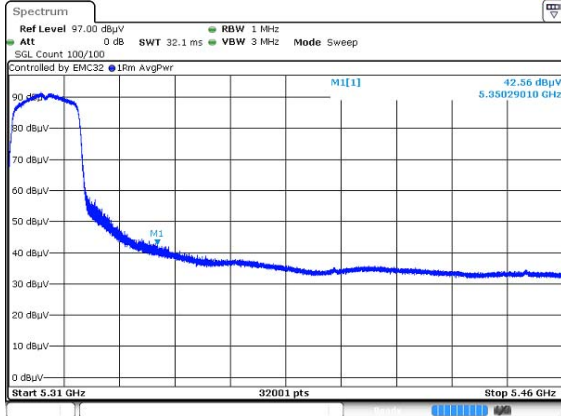
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (78) of (127)



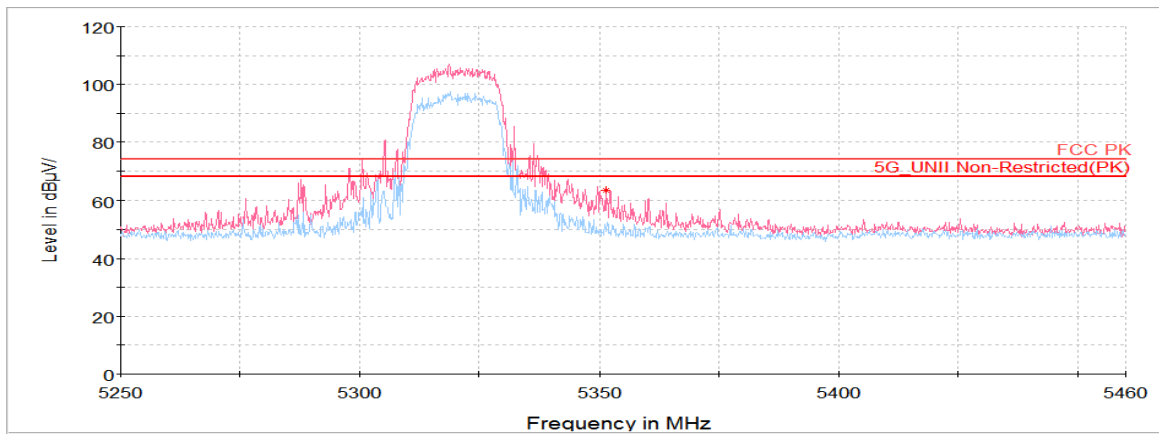
Highest Channel (5 320 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



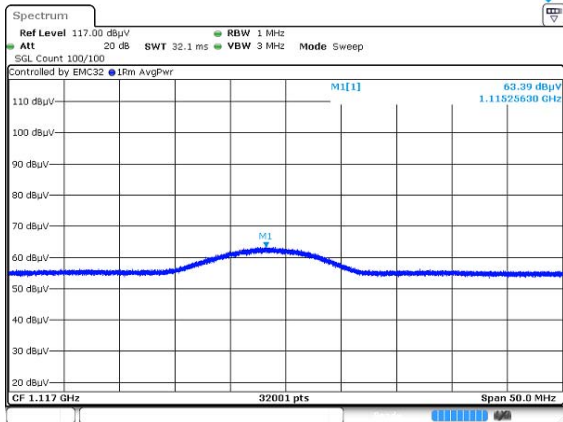
KCTL Inc.

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

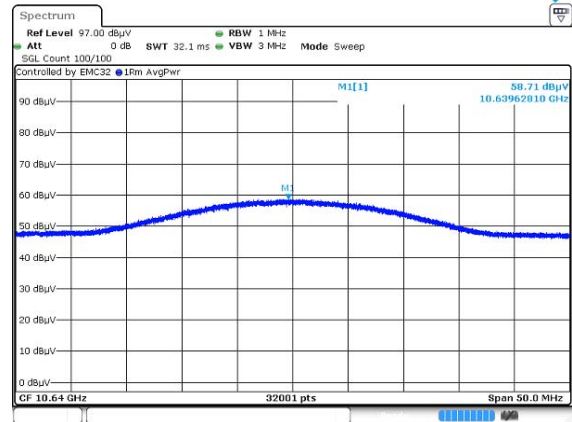
Report No.:
KR21-SRF0136
Page (79) of (127)



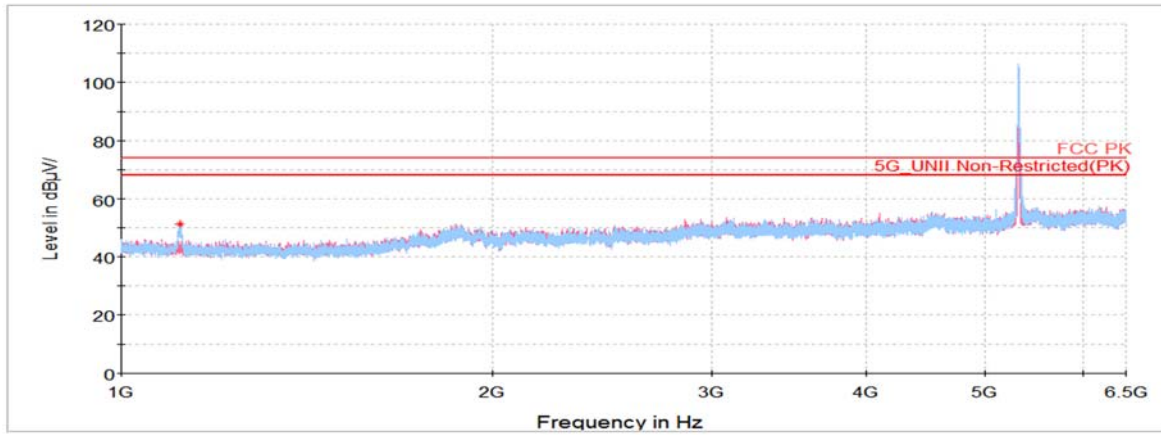
Average data



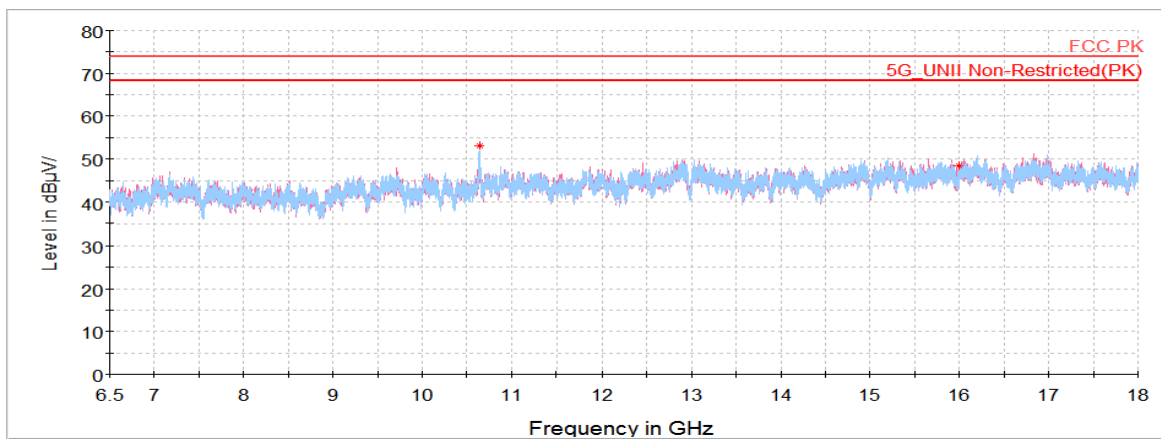
Average data



Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



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.:
KR21-SRF0136
Page (80) of (127)

**802.11n HT40 UNII-2A****Lowest Channel (5 270 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 071.16 ¹⁾	H	68.07	28.81	-49.00	-	47.88	74.00	26.12
10 544.05	H	60.23	37.74	-49.96	-	48.01	68.20	20.19
15 799.55 ¹⁾	H	54.73	39.88	-46.09	-	48.52	74.00	25.48
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 310 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 104.33 ¹⁾	H	68.21	28.82	-48.99	-	48.04	74.00	25.96
5 350.03 ¹⁾	V	57.94	34.53	-26.11	-	66.36	74.00	7.64
10 635.33 ¹⁾	H	62.32	37.84	-49.70	-	50.46	74.00	23.54
15 936.11 ¹⁾	H	54.77	39.83	-46.06	-	48.54	74.00	25.46
Average Data								
5 350.03 ¹⁾	V	42.99	34.53	-26.11	0.29	51.70	54.00	2.30

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

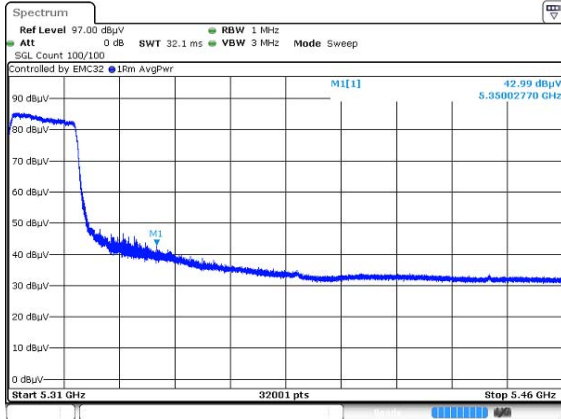
Report No.:
KR21-SRF0136
Page (81) of (127)



802.11n HT40 UNII-2A

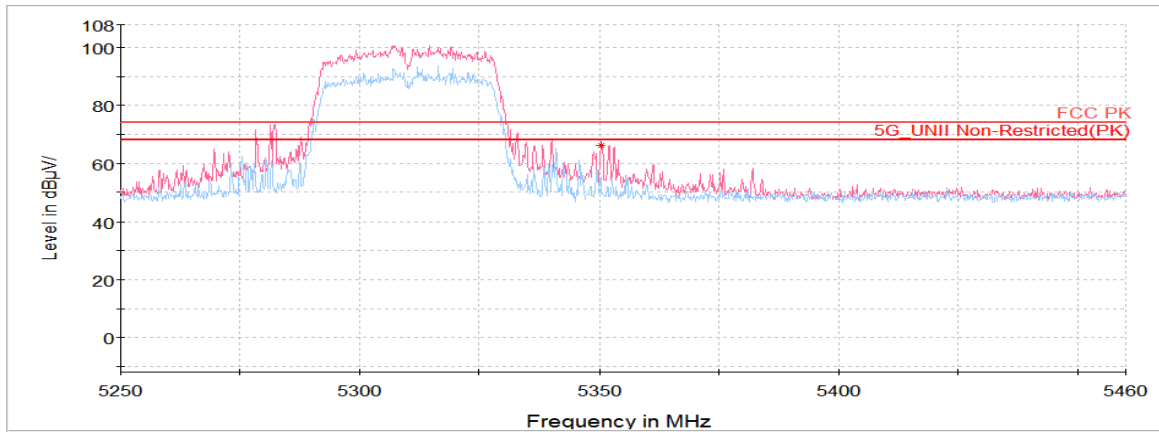
Highest Channel (5 310 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



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.:
KR21-SRF0136
Page (82) of (127)

**802.11ac VHT20 UNII-2A****Lowest Channel (5 260 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 055.06 ¹⁾	H	71.77	28.81	-49.00	-	51.58	74.00	22.42
10 517.09	H	61.89	37.72	-50.04	-	49.57	68.20	18.63
15 780.50 ¹⁾	H	55.59	39.89	-46.10	-	49.38	74.00	24.62
Average Data								
1 055.06 ¹⁾	H	64.88	28.81	-49.00	0.15	44.84	54.00	9.16

Middle Channel (5 280 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 074.51 ¹⁾	H	71.47	28.81	-49.00	-	51.28	74.00	22.72
10 556.27	H	63.46	37.76	-49.93	-	51.29	68.20	16.91
15 839.08 ¹⁾	H	56.09	39.86	-46.08	-	49.87	74.00	24.13
Average Data								
1 074.51 ¹⁾	H	65.68	28.81	-49.00	0.15	45.64	54.00	8.36

Highest Channel (5 320 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 119.45 ¹⁾	H	71.04	28.82	-48.98	-	50.88	74.00	23.12
5 350.96 ¹⁾	V	51.88	34.53	-26.10	-	60.31	74.00	13.69
10 641.02 ¹⁾	H	66.05	37.84	-49.69	-	54.20	74.00	19.80
16 018.05 ¹⁾	H	54.86	40.62	-46.12	-	49.36	74.00	24.64
Average Data								
5 350.96 ¹⁾	V	41.22	34.53	-26.10	0.15	49.80	54.00	4.20
10 641.02 ¹⁾	H	58.79	37.84	-49.69	0.15	47.09	54.00	6.91

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

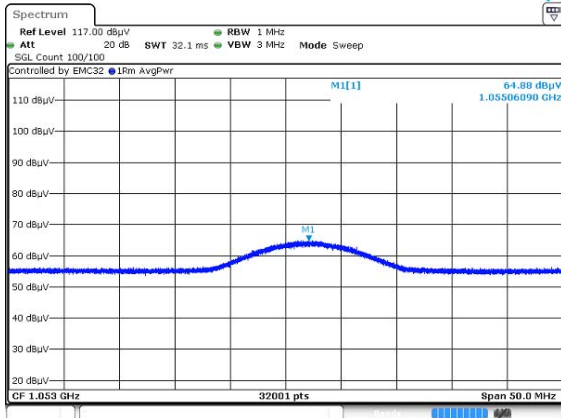
Report No.:
KR21-SRF0136
Page (83) of (127)



802.11ac VHT20 UNII-2A

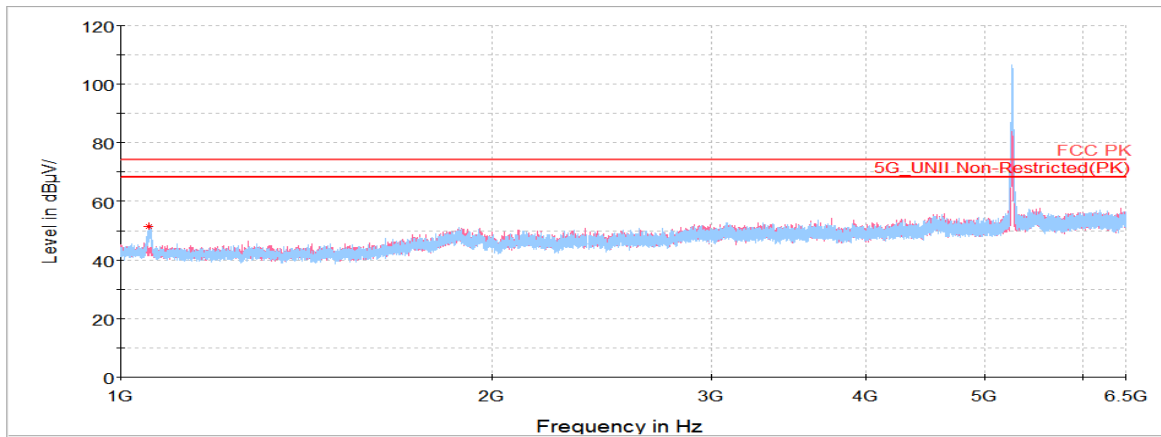
Lowest Channel (5 260 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



KCTL Inc.

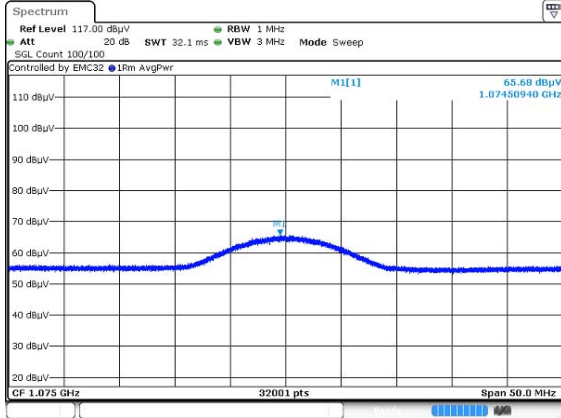
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (84) of (127)



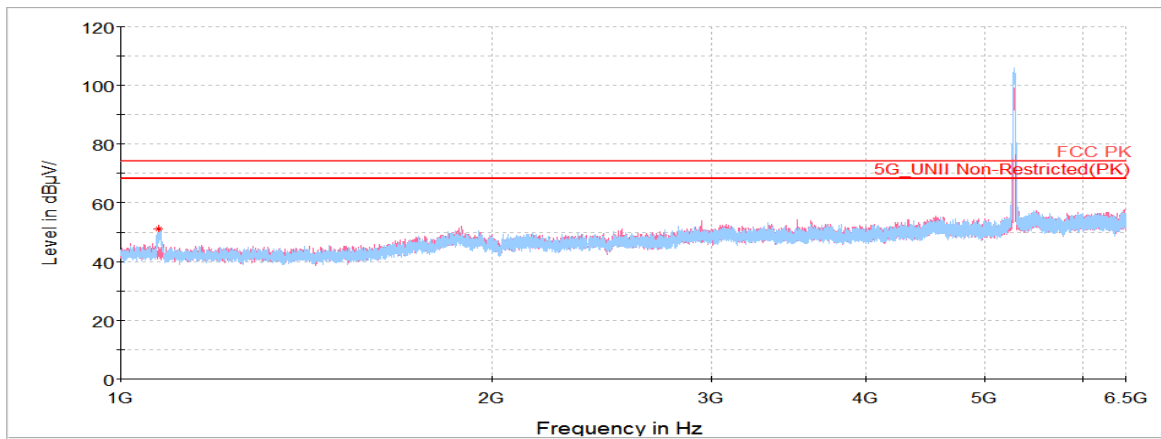
Middle Channel (5 280 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



KCTL Inc.

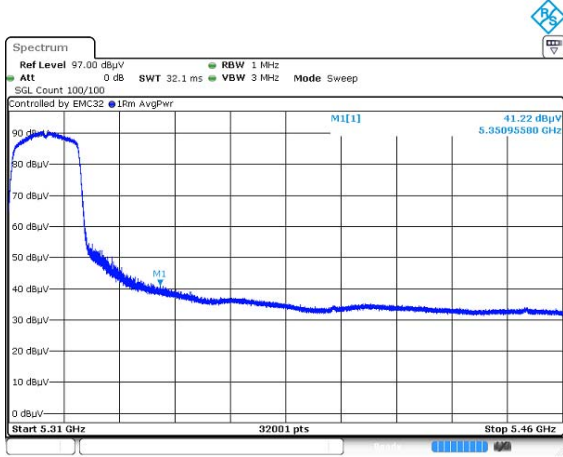
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (85) of (127)



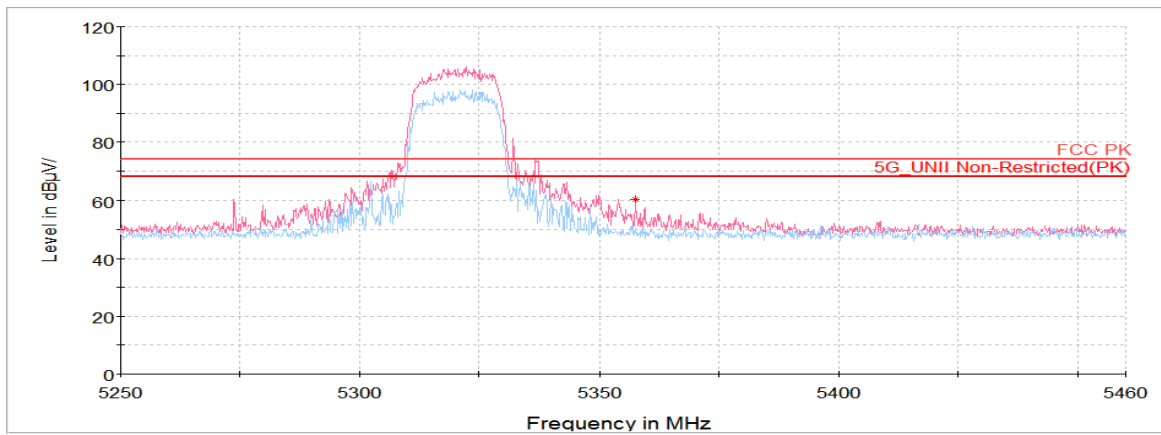
Highest Channel (5 320 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



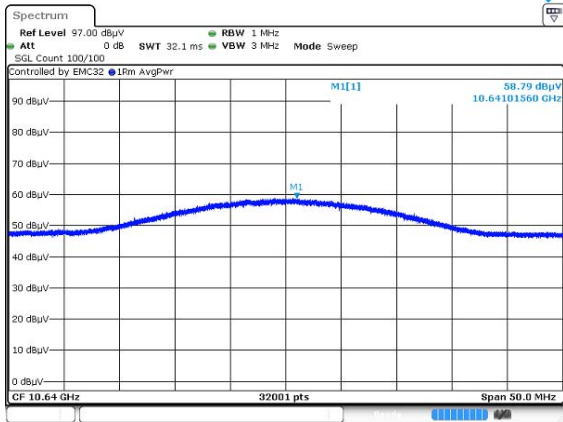
KCTL Inc.

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.:
KR21-SRF0136
Page (86) of (127)

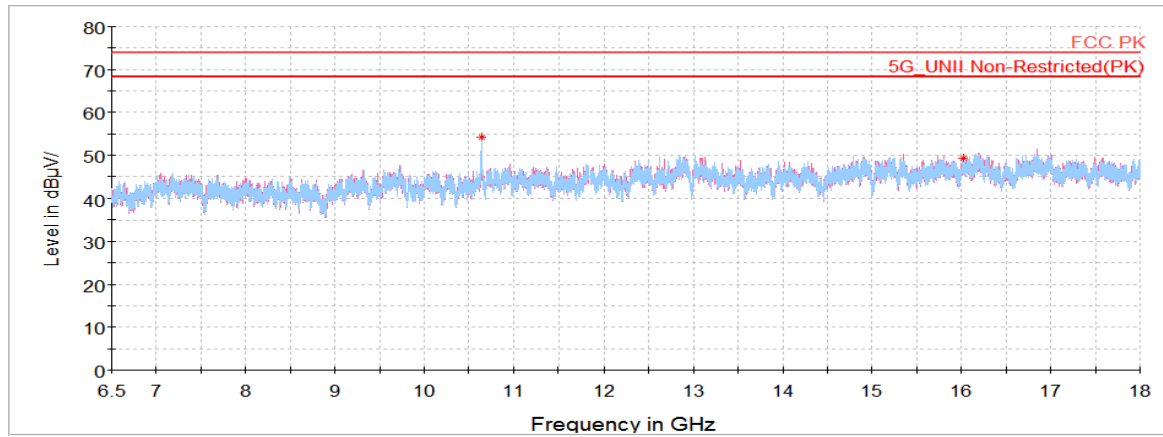


Average data



Blank

Horizontal/Vertical for 6.5 GHz ~ 18 GHz



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.:
KR21-SRF0136
Page (87) of (127)

**802.11ac VHT40 UNII-2A****Lowest Channel (5 270 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 061.53 ¹⁾	H	67.79	28.81	-49.00	-	47.60	74.00	26.40
10 540.81	V	56.55	37.74	-49.97	-	44.32	68.20	23.88
15 806.73 ¹⁾	V	55.60	39.88	-46.09	-	49.39	74.00	24.61
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 310 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 110.00 ¹⁾	H	67.45	28.82	-48.99	-	47.28	74.00	26.72
5 353.90 ¹⁾	V	51.54	34.54	-26.08	-	60.00	74.00	14.00
10 624.19 ¹⁾	H	61.25	37.82	-49.73	-	49.34	74.00	24.66
15 934.67 ¹⁾	H	54.66	39.83	-46.06	-	48.43	74.00	25.57
Average Data								
5 353.90 ¹⁾	V	39.45	34.54	-26.08	0.29	48.20	54.00	5.80

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

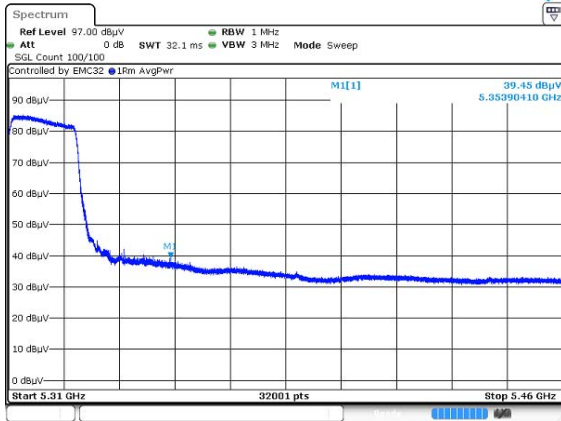
Report No.:
KR21-SRF0136
Page (88) of (127)



802.11ac VHT40 UNII-2A

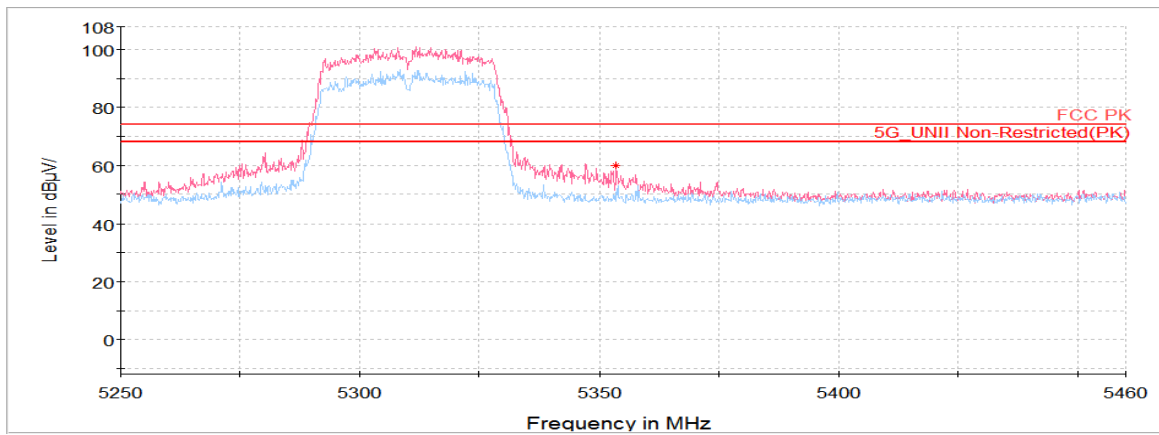
Highest Channel (5 310 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



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

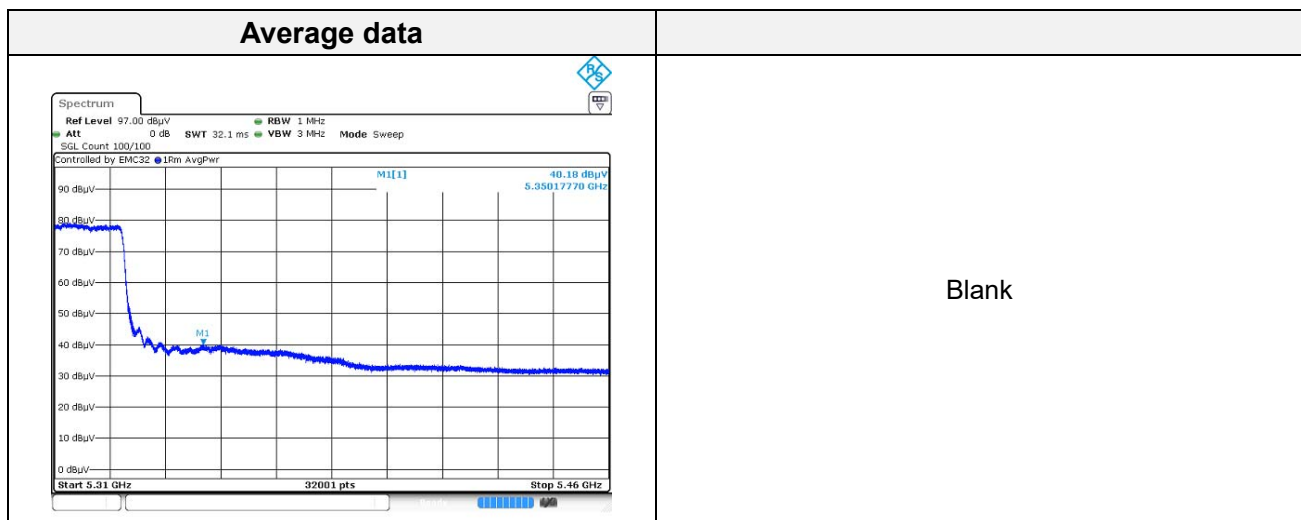
Report No.:
KR21-SRF0136
Page (89) of (127)



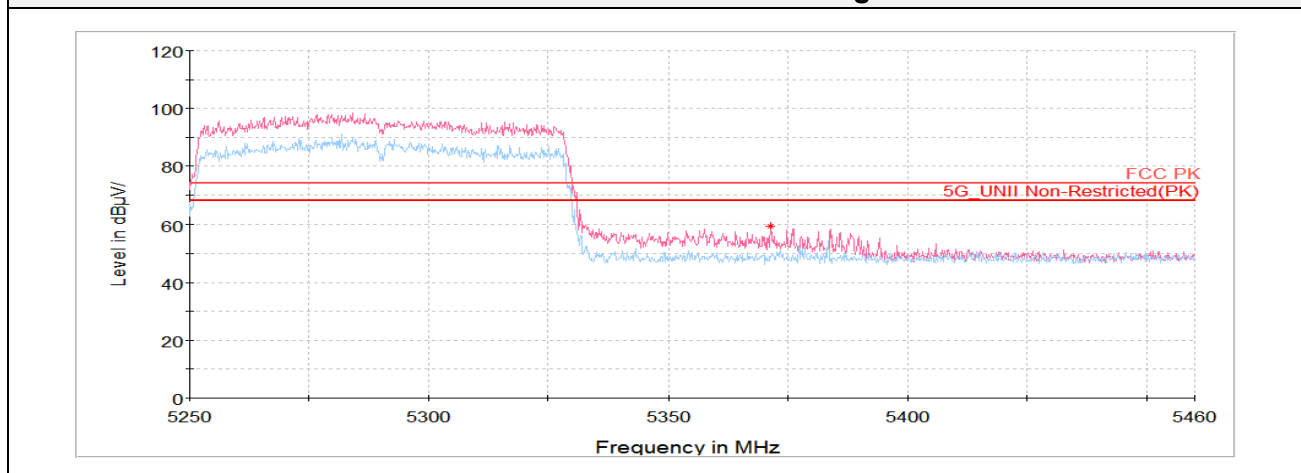
802.11ac VHT80 UNII-2A

Lowest Channel (5 290 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
5 350.18 ¹⁾	V	51.58	34.53	-26.11	-	60.00	74.00	14.00
10 589.69	H	58.39	37.79	-49.83	-	46.35	68.20	21.85
15 902.33 ¹⁾	V	54.53	39.84	-46.07	-	48.30	74.00	25.70
Average Data								
5 350.18 ¹⁾	V	40.18	34.53	-26.11	0.56	49.16	54.00	4.84



Horizontal/Vertical for Band-edge

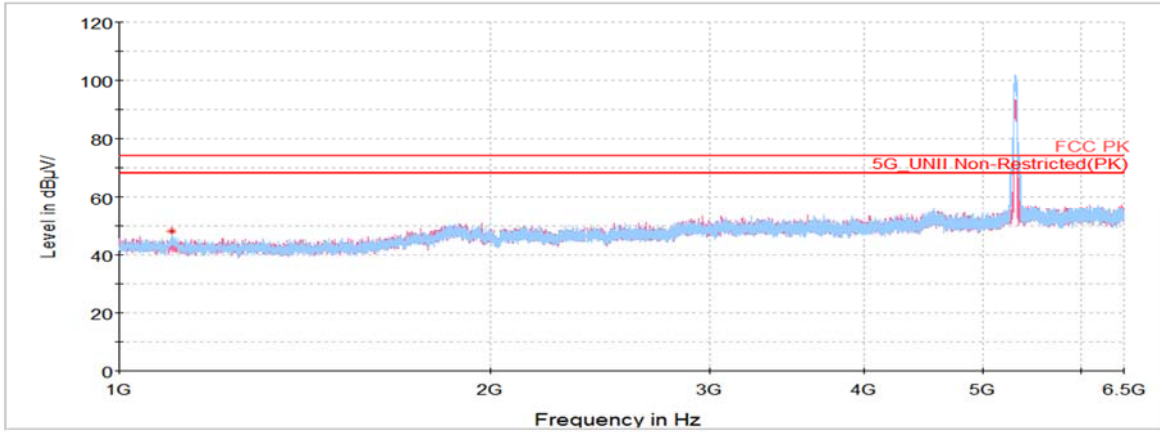


Plot of Harmonics and Spurious Emissions

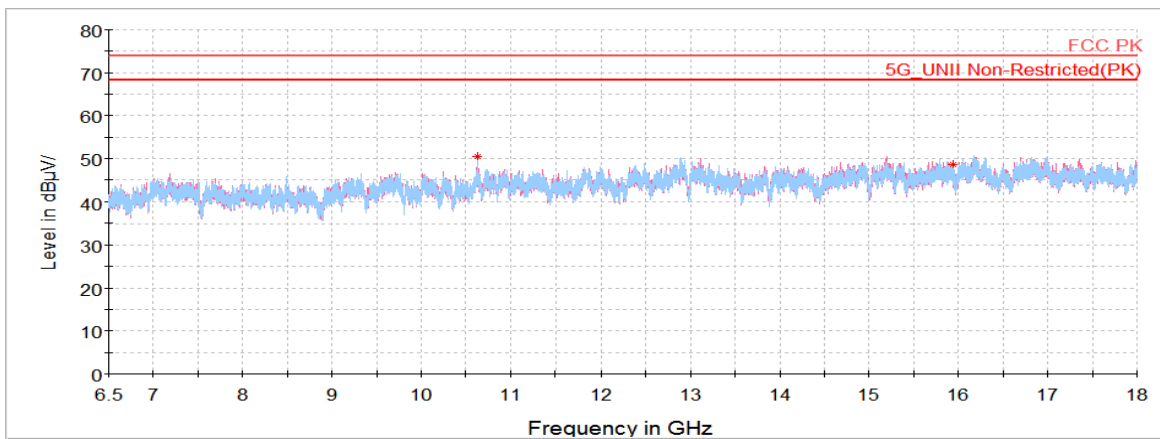
In order to simplify the report, attached plots were only the lowest margin condition

802.11n HT40_UNII-2A_Highest Channel (5 310 MHz)

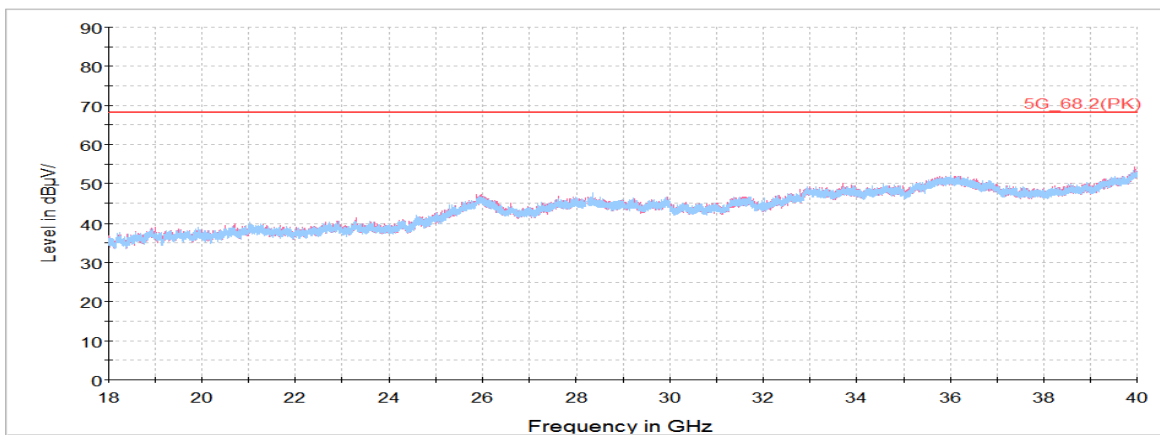
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz



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.:
KR21-SRF0136
Page (91) of (127)

**802.11a UNII-2C****Lowest Channel (5 500 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 292.88	H	70.17	28.86	-48.57	-	50.46	68.20	17.74
5 459.15 ¹⁾	V	50.55	34.73	-25.09	-	60.19	74.00	13.81
11 085.63 ¹⁾	H	59.30	38.22	-48.96	-	48.56	74.00	25.44
16 501.77	V	60.04	41.00	-47.89	-	53.15	68.20	15.05
Average Data								
5 459.15 ¹⁾	V	39.37	34.73	-25.09	0.14	49.15	54.00	4.85

Middle Channel (5 600 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 393.58 ¹⁾	H	71.73	28.88	-48.55	-	52.06	74.00	21.94
11 216.08 ¹⁾	V	57.53	38.24	-49.43	-	46.34	74.00	27.66
16 798.25	H	60.47	41.24	-47.74	-	53.97	68.20	14.23
Average Data								
1 393.58 ¹⁾	H	64.24	28.88	-48.55	0.14	44.71	54.00	9.29

Highest Channel (5 700 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 494.31	H	70.02	28.90	-48.16	-	50.76	74.00	23.24
5 726.56	V	52.35	35.03	-26.42	-	60.96	68.20	7.24
11 394.69	H	59.25	38.28	-50.07	-	47.46	74.00	26.54
17 003.81	H	57.22	40.70	-47.64	-	50.28	68.20	17.92
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

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

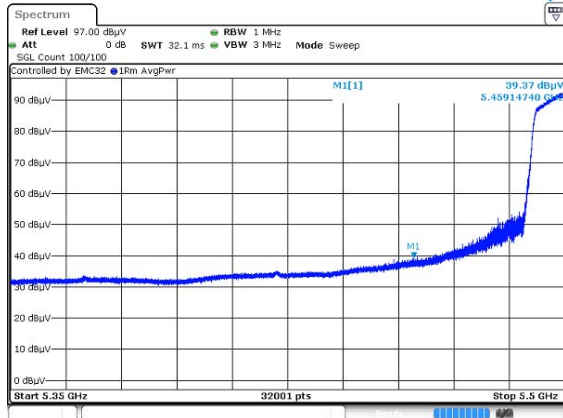
Report No.:
KR21-SRF0136
Page (92) of (127)



802.11a UNII-2C

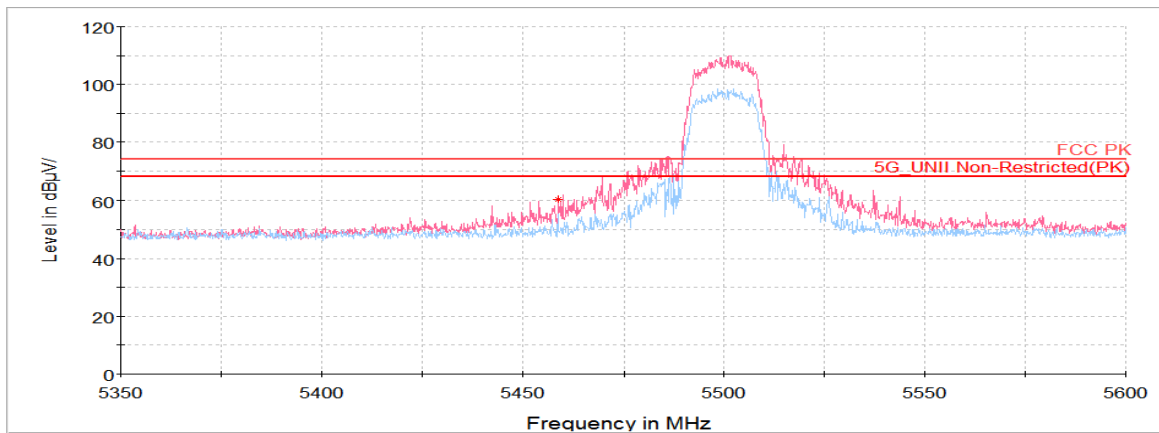
Lowest Channel (5 500 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



KCTL Inc.

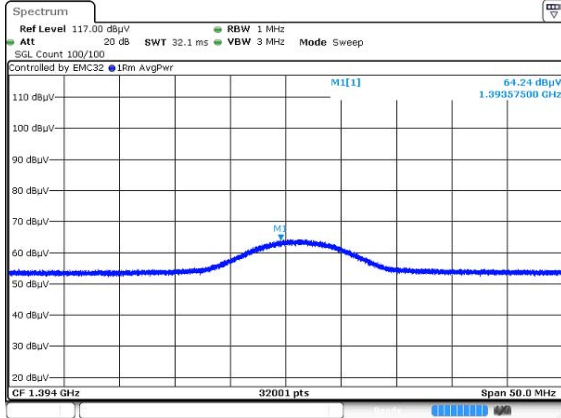
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (93) of (127)



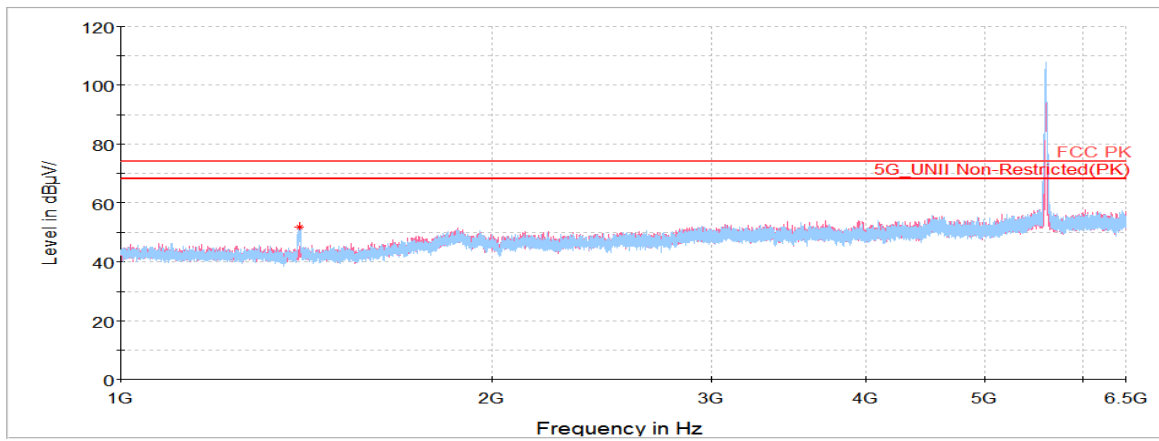
Middle Channel (5 600 MHz)

Average data



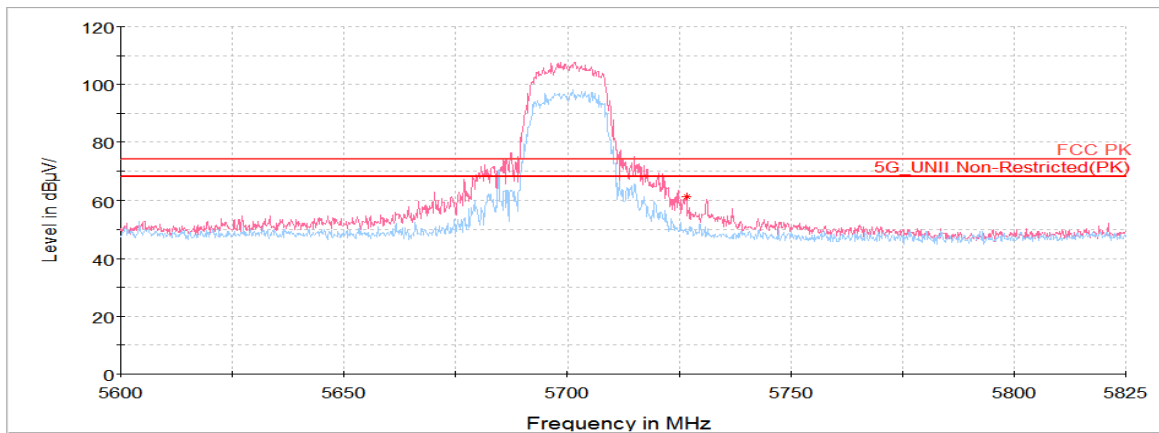
Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Highest Channel (5 700 MHz)

Horizontal/Vertical for Band-edge (5 700 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

Report No.:
KR21-SRF0136
Page (94) of (127)

**802.11n HT20 UNII-2C****Lowest Channel (5 500 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 293.39	H	69.60	28.86	-48.57	-	49.89	68.20	18.31
5 459.31 ¹⁾	V	52.60	34.73	-25.09	-	62.24	74.00	11.76
11 010.88 ¹⁾	H	60.60	38.20	-48.70	-	50.10	74.00	23.90
16 495.30	H	61.75	41.19	-47.88	-	55.06	68.20	13.14
Average Data								
5 459.31 ¹⁾	V	39.91	34.73	-25.09	0.15	49.70	54.00	4.30

Middle Channel (5 600 MHz)

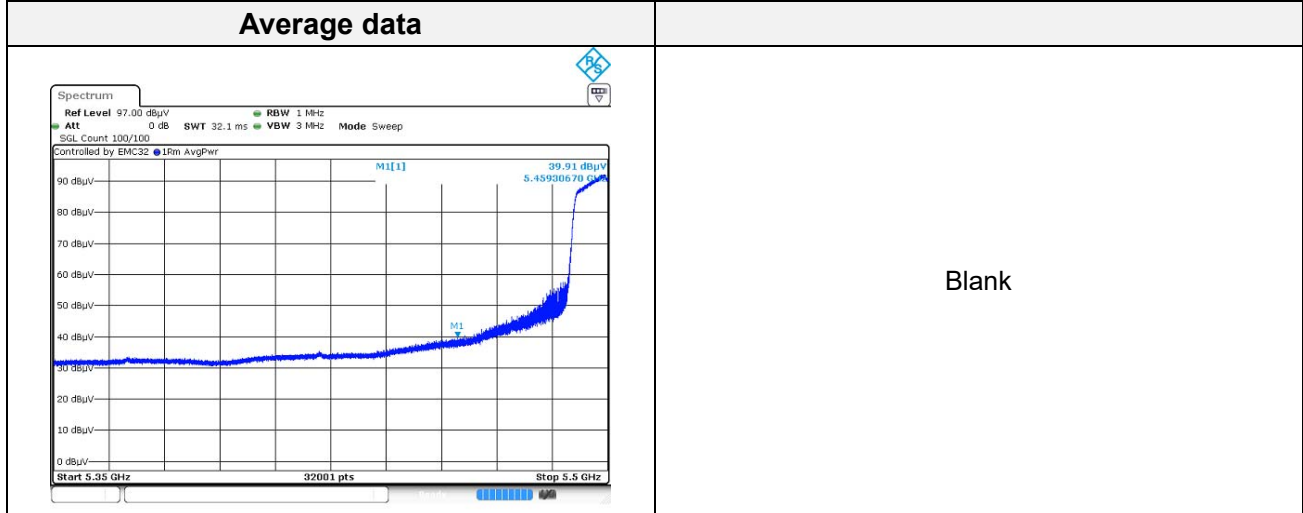
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 396.52 ¹⁾	H	69.06	28.88	-48.55	-	49.39	74.00	24.61
11 215.00 ¹⁾	V	58.63	38.24	-49.43	-	47.44	74.00	26.56
16 787.83	V	58.89	41.23	-47.74	-	52.38	68.20	15.82
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 700 MHz)

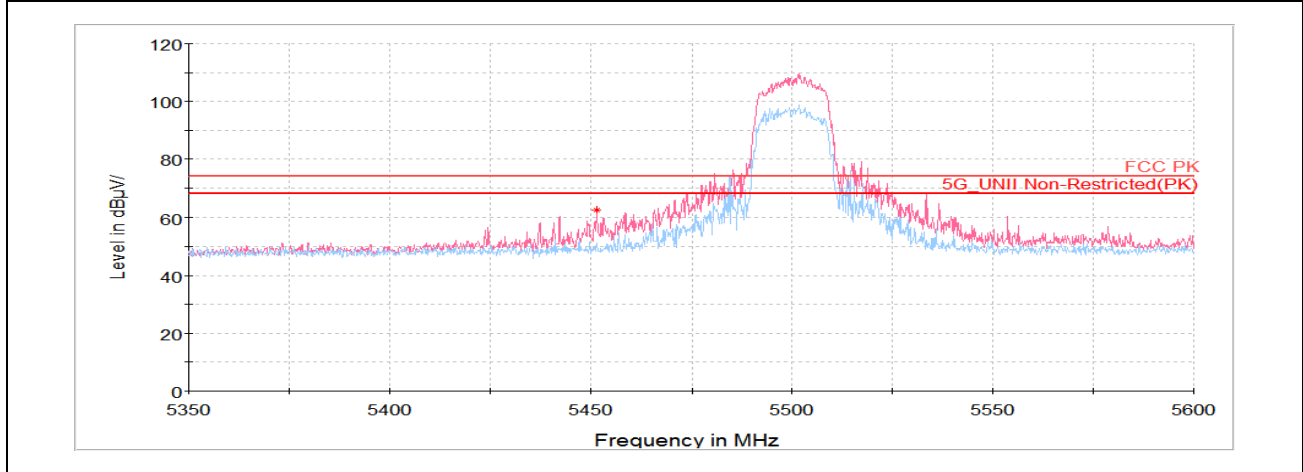
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 490.19 ¹⁾	H	70.18	28.90	-48.17	-	50.91	74.00	23.09
5 726.73	V	51.32	35.03	-26.42	-	59.93	68.20	8.27
11 397.20 ¹⁾	H	58.79	38.28	-50.08	-	46.99	74.00	27.01
17 101.20	H	54.93	40.64	-47.70	-	47.87	68.20	20.33
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11n HT20 UNII-2C

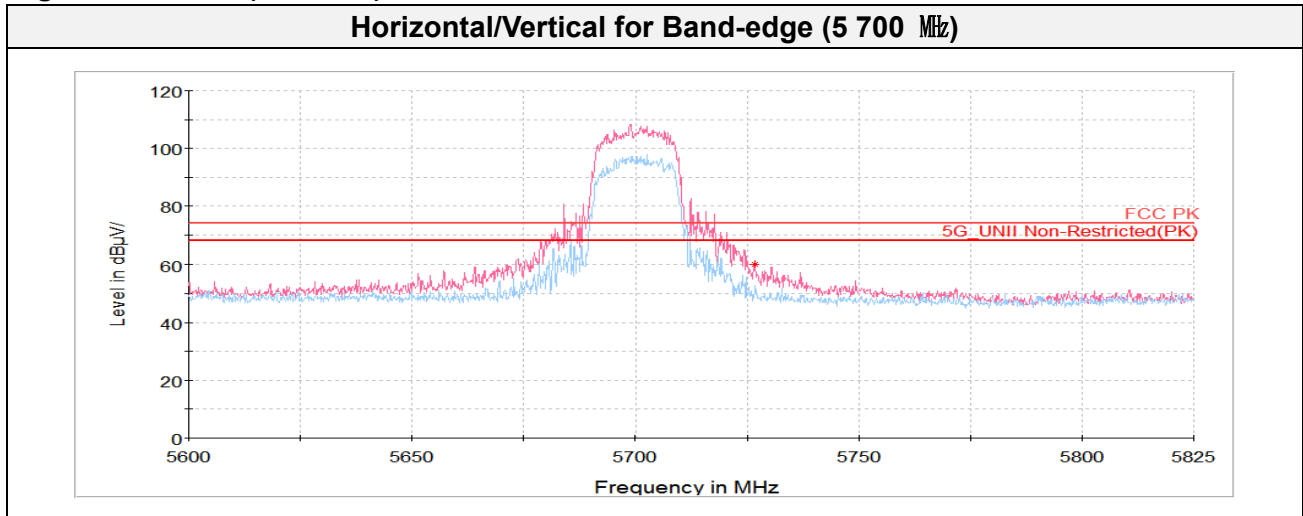
Lowest Channel (5 500 MHz)



Horizontal/Vertical for Band-edge



Highest Channel (5 700 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

Report No.:
KR21-SRF0136
Page (96) of (127)

**802.11n HT40 UNII-2C****Lowest Channel (5 510 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 455.50 ¹⁾	V	55.59	34.72	-25.13	-	65.18	74.00	8.82
11 020.58 ¹⁾	H	56.98	38.20	-48.73	-	46.45	74.00	27.55
16 548.84	V	54.16	41.04	-47.87	-	47.33	68.20	20.87
Average Data								
5 455.50 ¹⁾	V	39.17	34.72	-25.13	0.29	49.05	54.00	4.95

Middle Channel (5 590 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
11 182.66 ¹⁾	V	57.11	38.24	-49.31	-	46.04	74.00	27.96
16 761.23	V	56.57	41.21	-47.76	-	50.02	68.20	18.18
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 670 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 464.58 ¹⁾	H	66.81	28.89	-48.28	-	47.42	74.00	26.58
5 728.28	V	45.55	35.03	-26.41	-	54.17	68.20	14.03
11 342.94 ¹⁾	V	56.54	38.27	-49.88	-	44.93	74.00	29.07
17 169.48	V	55.10	40.60	-47.74	-	47.96	68.20	20.24
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

KCTL Inc.

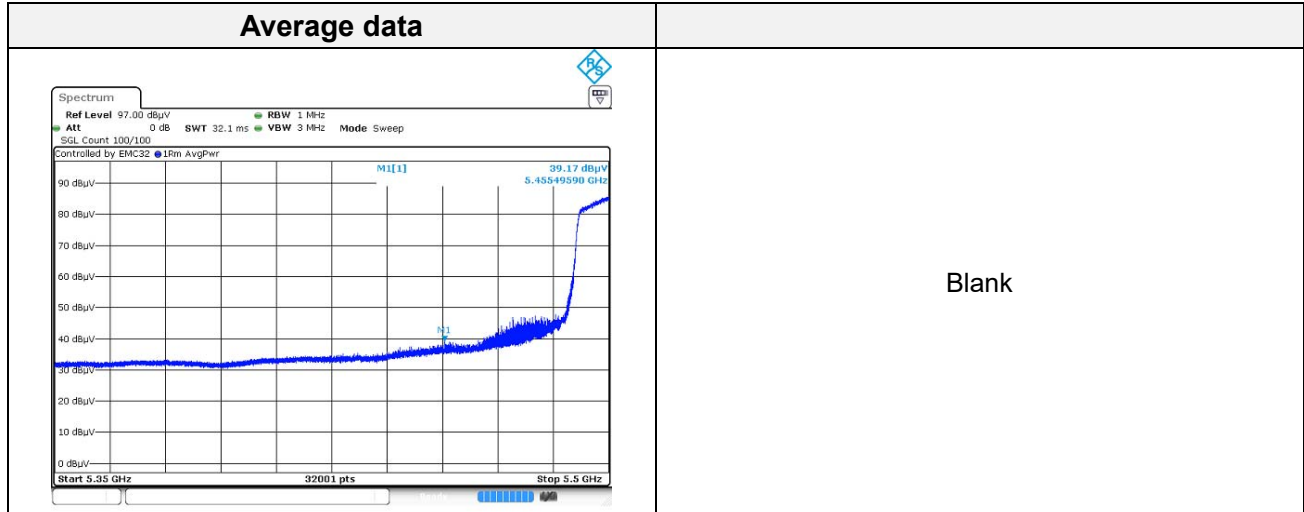
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (97) of (127)

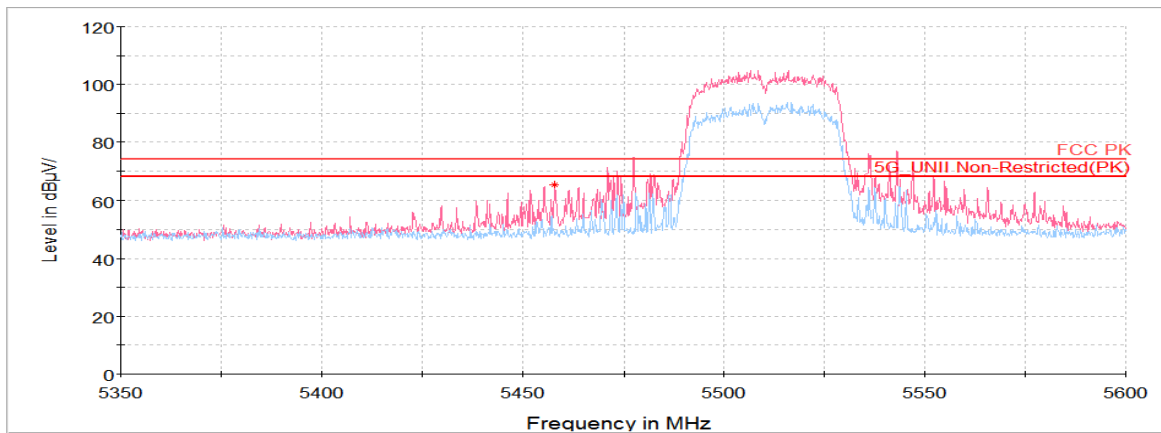


802.11n HT40 UNII-2C

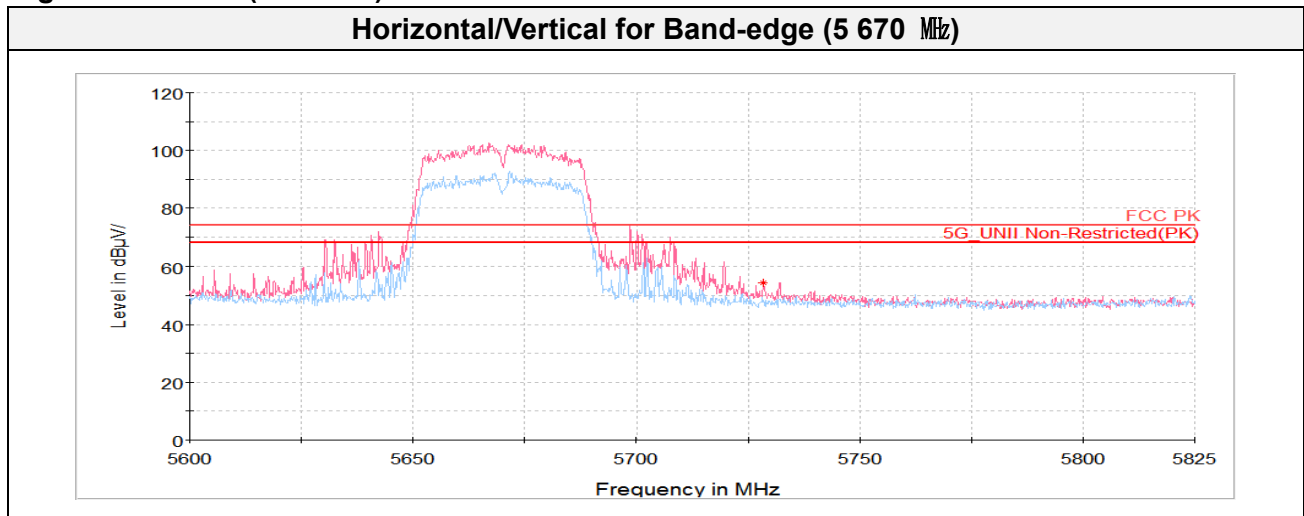
Lowest Channel (5 510 MHz)



Horizontal/Vertical for Band-edge



Highest Channel (5 670 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

Report No.:
KR21-SRF0136
Page (98) of (127)

**802.11ac VHT20 UNII-2C****Lowest Channel (5 500 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 297.00	H	70.70	28.86	-48.55	-	51.01	68.20	17.19
5 459.83 ¹⁾	V	53.07	34.73	-25.08	-	62.72	74.00	11.28
11 004.41 ¹⁾	H	58.60	38.20	-48.67	-	48.13	74.00	25.87
16 498.53	H	59.62	41.20	-47.89	-	52.93	68.20	15.27
Average Data								
5 459.83 ¹⁾	V	40.23	34.73	-25.08	0.15	50.03	54.00	3.97

Middle Channel (5 600 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 392.22 ¹⁾	H	69.47	28.88	-48.55	-	49.80	74.00	24.20
11 211.41 ¹⁾	H	58.81	38.24	-49.41	-	47.64	74.00	26.36
16 797.53	H	60.26	41.24	-47.74	-	53.76	68.20	14.44
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 700 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 495.68 ¹⁾	H	72.31	28.90	-48.15	-	53.06	74.00	20.94
5 726.73	V	56.62	35.03	-26.42	-	65.23	68.20	2.97
11 383.55 ¹⁾	V	57.62	38.28	-50.03	-	45.87	74.00	28.13
17 098.69	H	56.72	40.64	-47.70	-	49.66	68.20	18.54
Average Data								
1 495.68 ¹⁾	H	62.88	28.90	-48.15	0.15	43.78	54.00	10.22

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

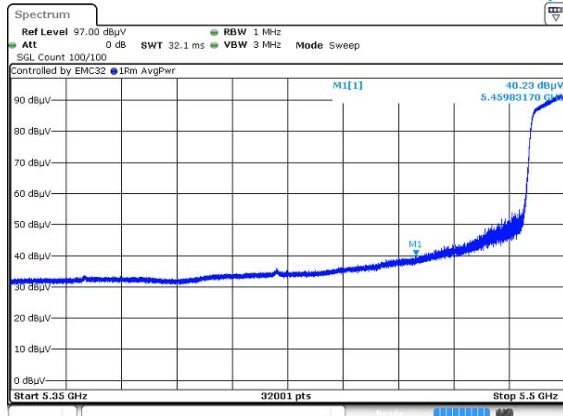
Report No.:
KR21-SRF0136
Page (99) of (127)



802.11ac VHT20 UNII-2C

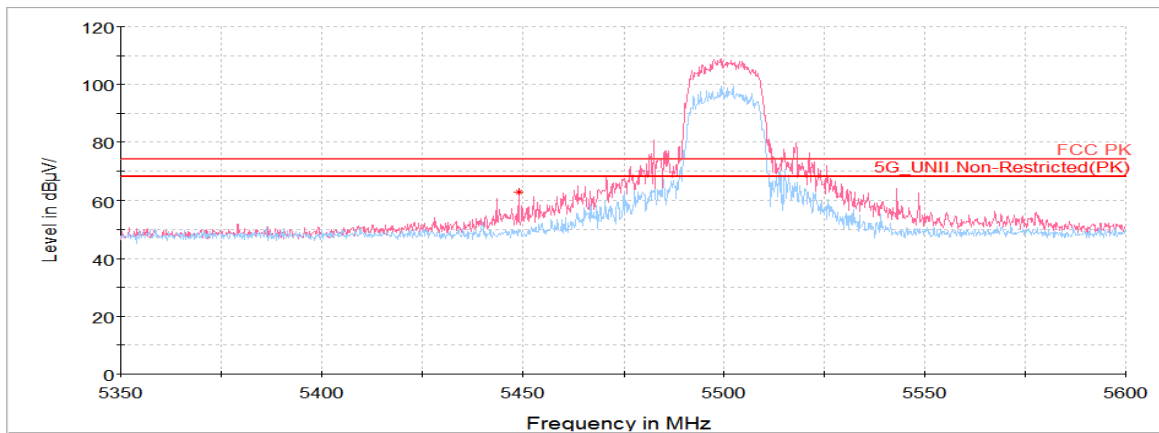
Lowest Channel (5 500 MHz)

Average data



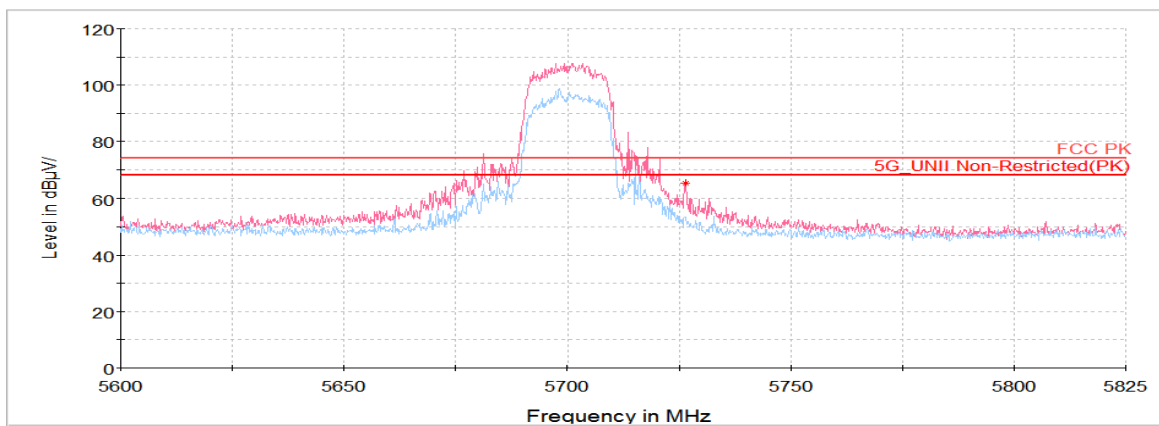
Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 700 MHz)

Horizontal/Vertical for Band-edge (5 700 MHz)



KCTL Inc.

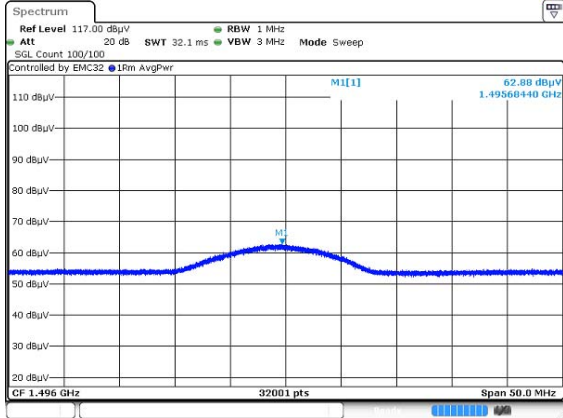
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (100) of (127)



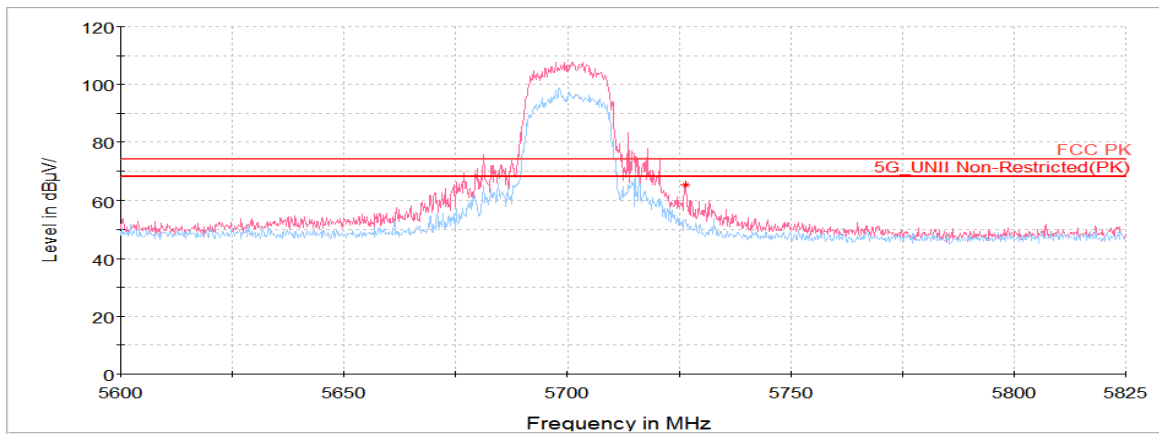
Highest Channel (5 700 MHz)

Average data

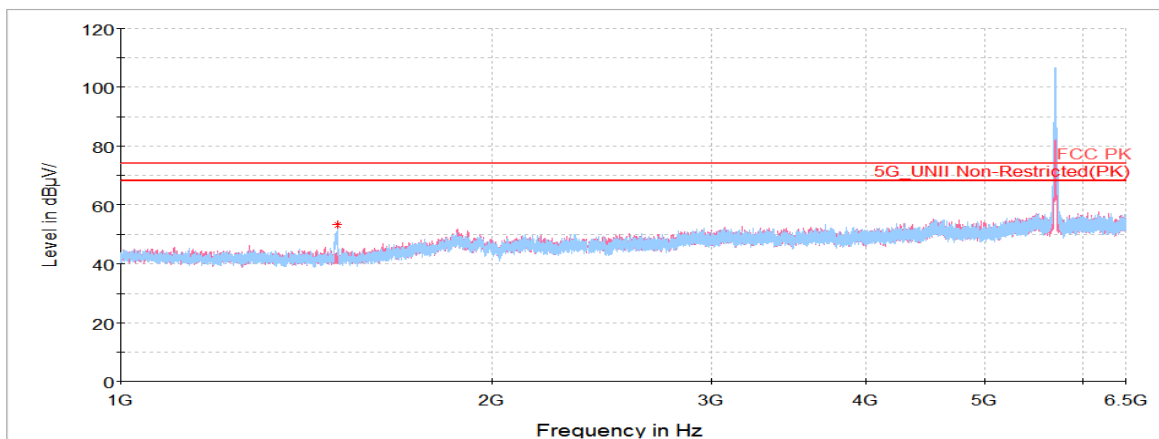


Blank

Horizontal/Vertical for Band-edge (5 700 MHz)



Horizontal/Vertical for 1 GHz ~ 6.5 GHz



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.:
KR21-SRF0136
Page (101) of (127)

**802.11ac VHT40 UNII-2C****Lowest Channel (5 510 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 459.81 ¹⁾	V	51.17	34.73	-25.08	-	60.82	74.00	13.18
11 021.66 ¹⁾	H	56.79	38.20	-48.74	-	46.25	74.00	27.75
16 535.55	V	54.58	41.03	-47.87	-	47.74	68.20	20.46
Average Data								
5 459.81 ¹⁾	V	37.95	34.73	-25.08	0.29	47.89	54.00	6.11

Middle Channel (5 590 MHz)

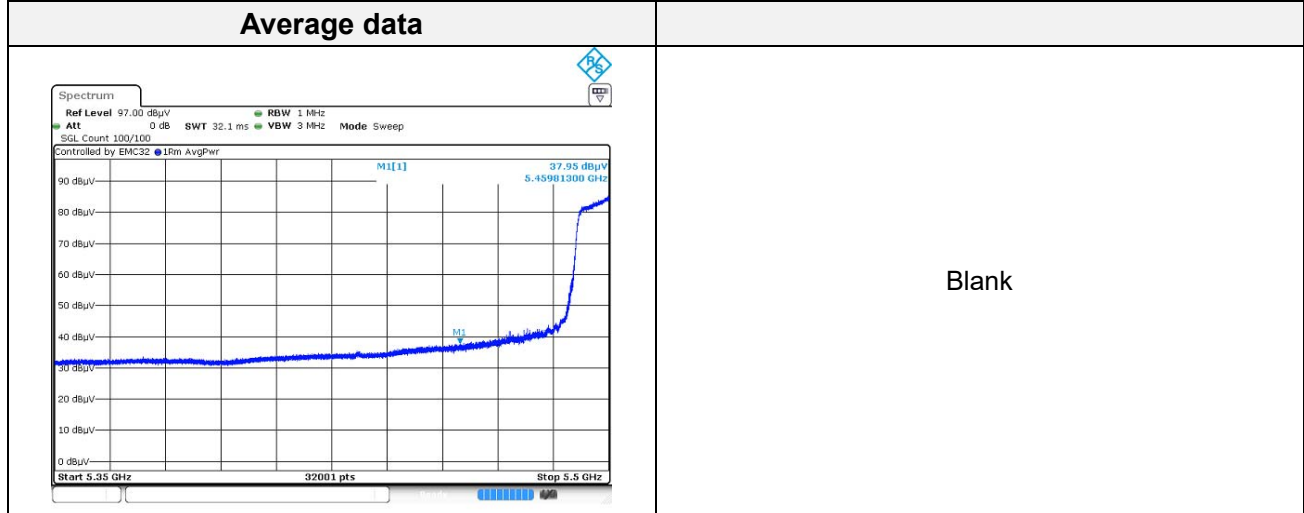
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
11 207.09 ¹⁾	V	57.61	38.24	-49.40	-	46.45	74.00	27.55
16 779.20	V	55.45	41.22	-47.75	-	48.92	68.20	19.28
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 670 MHz)

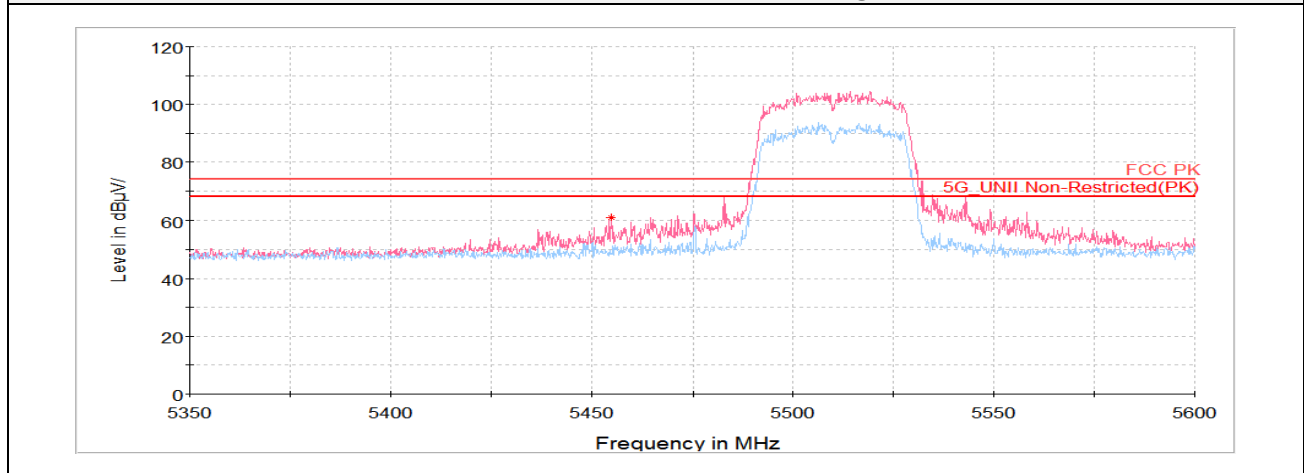
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 470.25 ¹⁾	H	67.08	28.89	-48.26	-	47.71	74.00	26.29
5 732.41	V	42.85	35.03	-26.40	-	51.48	68.20	16.72
11 327.84 ¹⁾	V	58.05	38.27	-49.83	-	46.49	74.00	27.51
17 004.89	H	56.43	40.70	-47.64	-	49.49	68.20	18.71
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11ac VHT40 UNII-2C

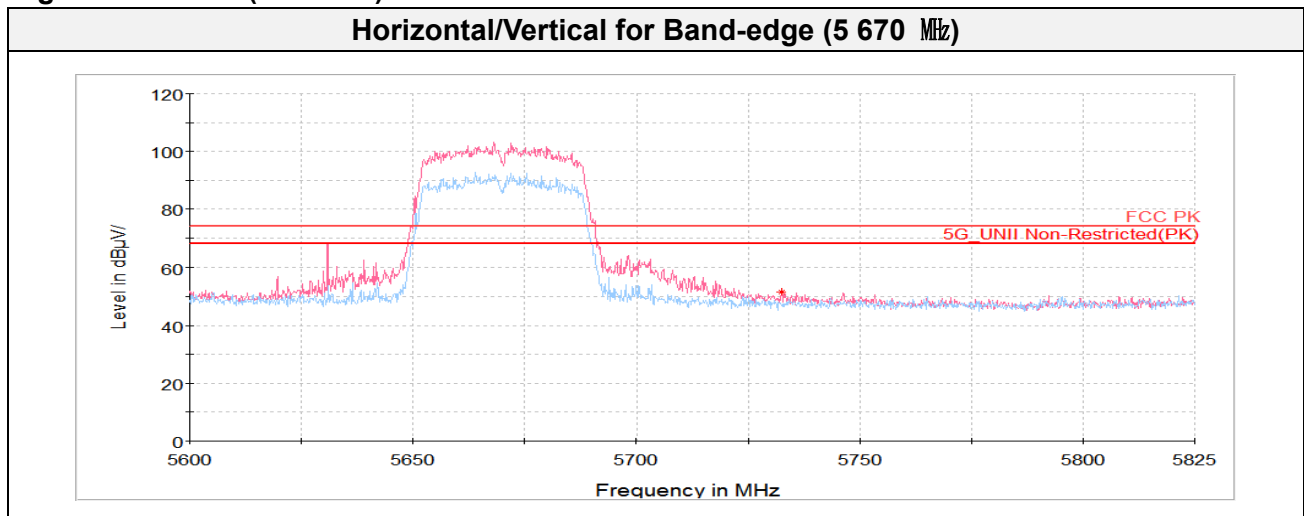
Lowest Channel (5 510 MHz)



Horizontal/Vertical for Band-edge



Highest Channel (5 670 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

Report No.:
KR21-SRF0136
Page (103) of (127)

**802.11ac VHT80 UNII-2C****Lowest Channel (5 530 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 456.88 ¹⁾	V	49.88	34.72	-25.11	-	59.49	74.00	14.51
11 089.94 ¹⁾	H	58.04	38.22	-48.98	-	47.28	74.00	26.72
16 511.47	V	55.10	41.01	-47.89	-	48.22	68.20	19.98
Average Data								
5 456.88 ¹⁾	V	39.90	34.72	-25.11	0.56	50.07	54.00	3.93

Highest Channel (5 610 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 731.03	V	45.34	35.03	-26.40	-	53.97	68.20	14.23
11 215.36 ¹⁾	H	58.23	38.24	-49.43	-	47.04	74.00	26.96
16 831.31	V	56.75	41.27	-47.72	-	50.30	68.20	17.90
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

KCTL Inc.

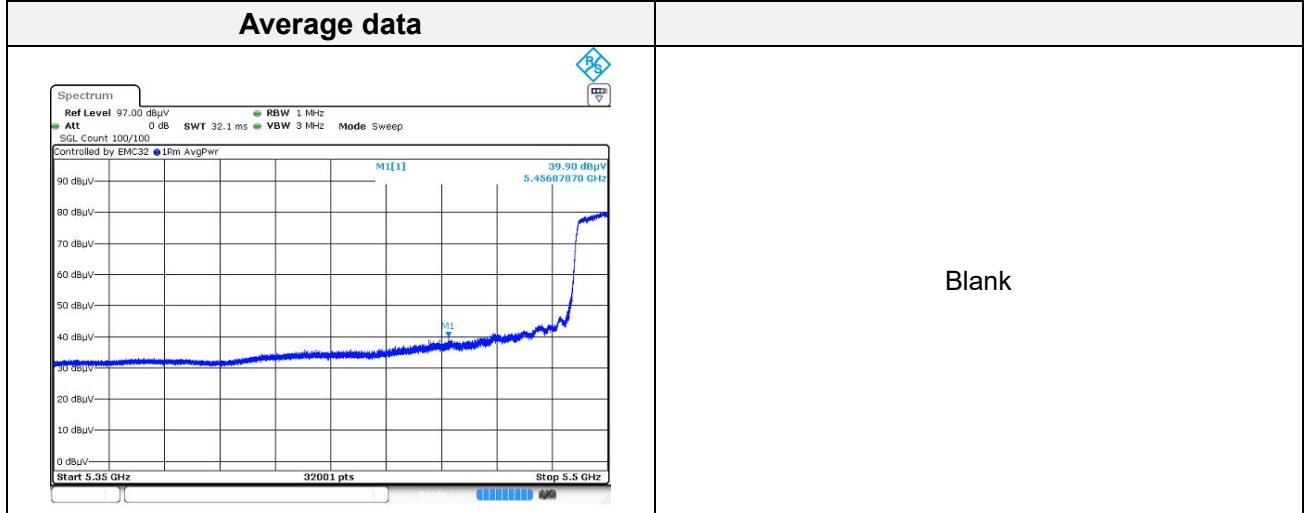
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (104) of (127)

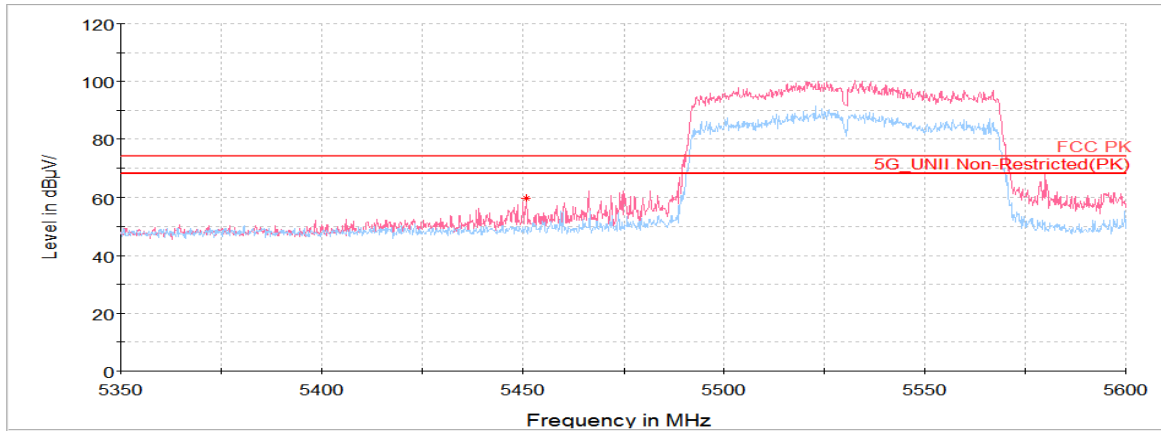


802.11ac VHT80 UNII-2C

Lowest Channel (5 530 MHz)

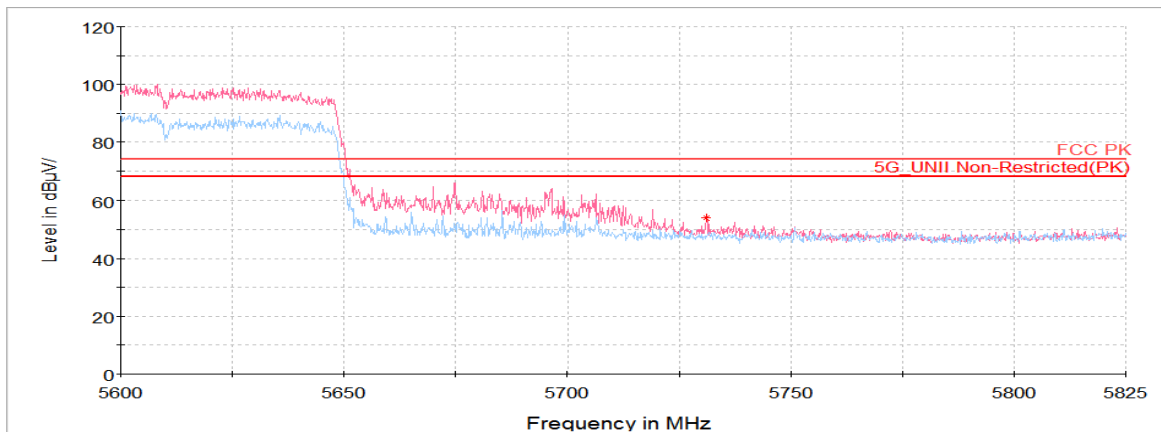


Horizontal/Vertical for Band-edge



Highest Channel (5 610 MHz)

Horizontal/Vertical for Band-edge (5 610 MHz)

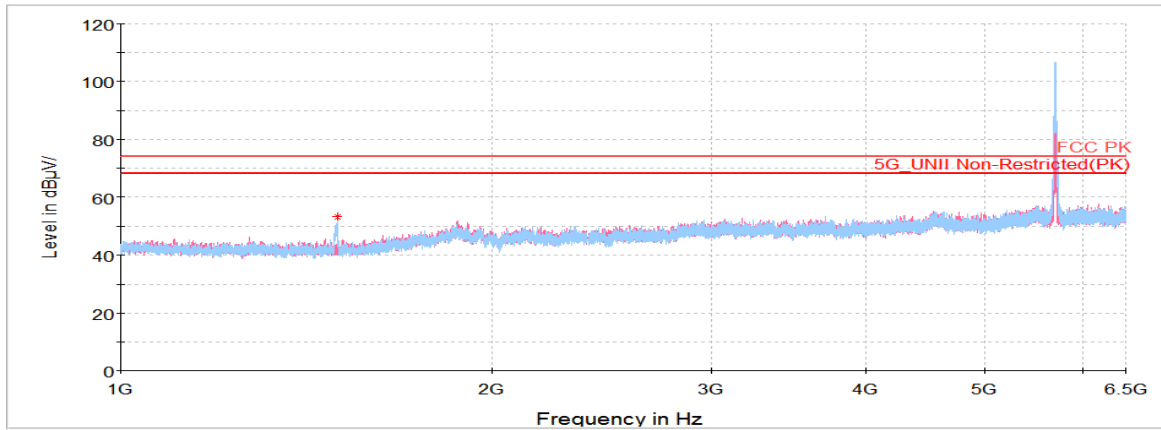


Plot of Harmonics and Spurious Emissions

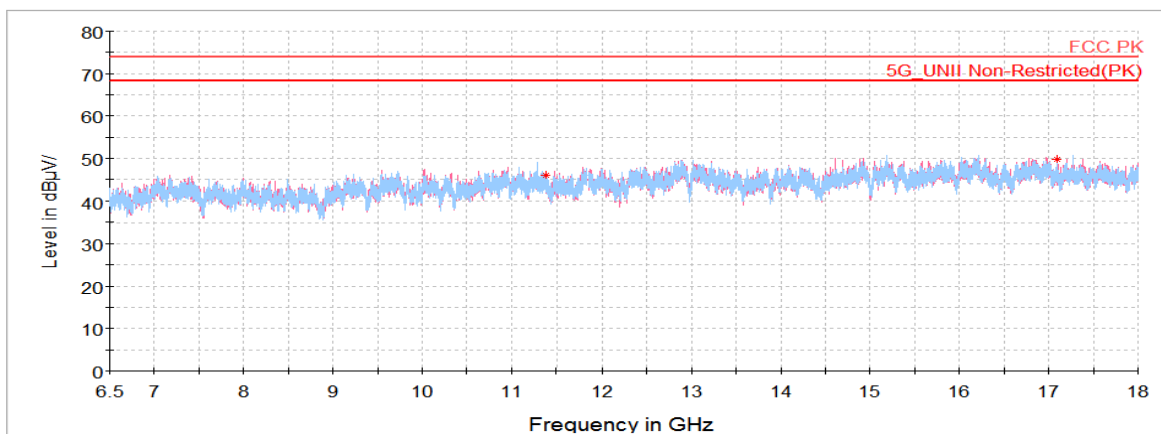
In order to simplify the report, attached plots were only the lowest margin condition

802.11ac VHT20_UNII-2C_Highest Channel (5 700 MHz)

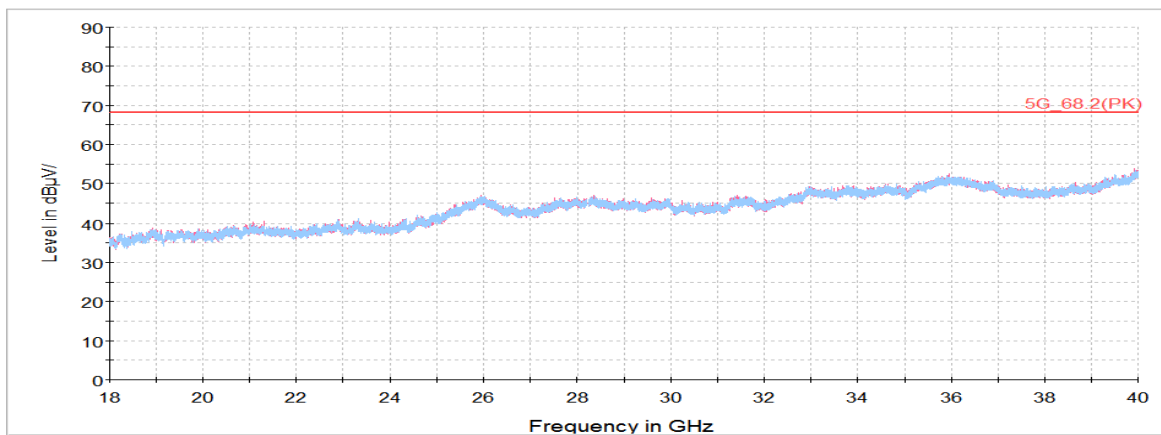
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz



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.:
KR21-SRF0136
Page (106) of (127)

**Straddle Channel****802.11a (5 720 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 513.22 ¹⁾	H	70.09	28.96	-48.13	-	50.92	74.00	23.08
11 482.02 ¹⁾	V	57.50	38.30	-50.38	-	45.42	74.00	28.58
17 165.53	H	55.85	40.60	-47.74	-	48.71	68.20	19.49
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11n HT20 (5 720 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 514.77 ¹⁾	H	69.86	28.97	-48.13	-	50.70	74.00	23.30
11 476.63 ¹⁾	H	57.42	38.30	-50.36	-	45.36	74.00	28.64
17 159.78	H	55.40	40.60	-47.74	-	48.26	68.20	19.94
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11n HT40 (5 710 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
11 395.41 ¹⁾	H	57.42	38.28	-50.07	-	45.63	74.00	28.37
17 163.02	V	55.02	40.60	-47.74	-	47.88	68.20	20.32
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11ac VHT20 (5 720 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 514.59 ¹⁾	H	69.68	28.97	-48.13	-	50.52	74.00	23.48
11 481.30 ¹⁾	V	58.13	38.30	-50.38	-	46.05	74.00	27.95
17 146.13	V	55.04	40.61	-47.73	-	47.92	68.20	20.28
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

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.:
KR21-SRF0136
Page (107) of (127)

**802.11ac VHT40 (5 710 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB($\mu V/m$))	(dB($\mu V/m$))	(dB)
Peak data								
11 483.09 ¹⁾	V	59.13	38.30	-50.38	-	47.05	74.00	26.95
17 182.06	V	56.71	40.59	-47.75	-	49.55	68.20	18.65
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11ac VHT80 (5 690 MHz)

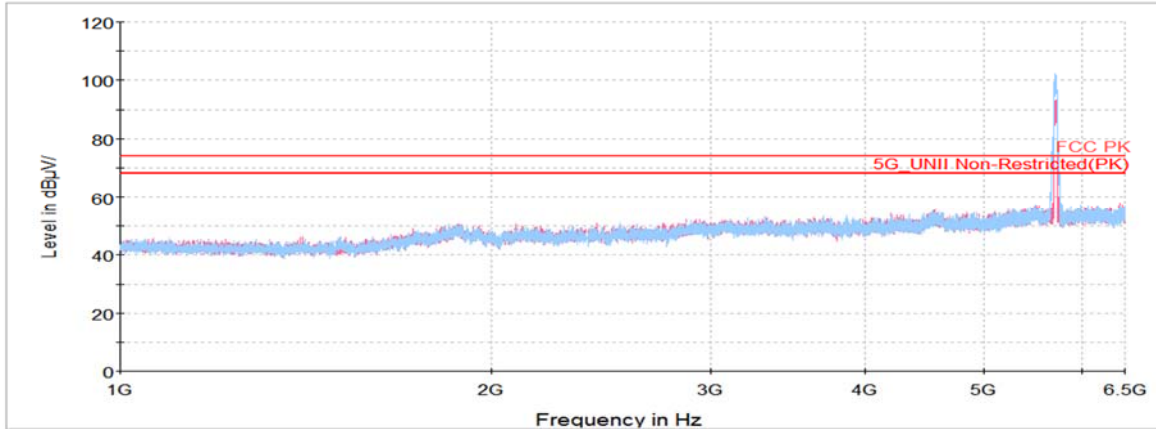
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB($\mu V/m$))	(dB($\mu V/m$))	(dB)
Peak data								
11 381.03 ¹⁾	H	58.00	38.28	-50.02	-	46.26	74.00	27.74
17 076.41	H	54.90	40.65	-47.68	-	47.87	68.20	20.33
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Plot of Harmonics and Spurious Emissions

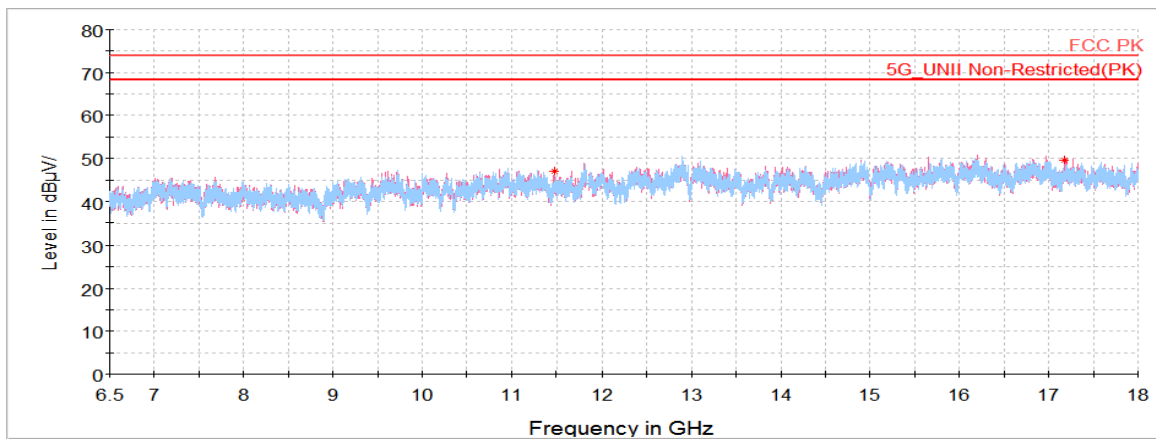
In order to simplify the report, attached plots were only the lowest margin condition

802.11ac VHT40_ Straddle Channel (5 710 MHz)

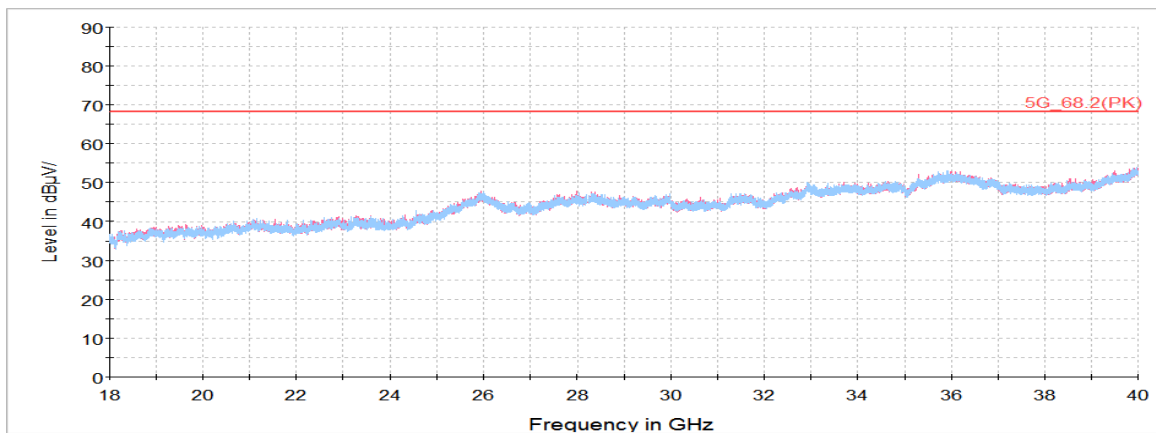
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz



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.:
KR21-SRF0136
Page (109) of (127)

**802.11a UNII-3****Lowest Channel (5 745 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 540.22 ¹⁾	H	70.90	29.09	-48.14	-	51.85	74.00	22.15
5 724.67	V	59.19	35.02	-26.43	-	67.78	121.45	53.68
11 291.91 ¹⁾	V	59.22	38.26	-49.70	-	47.78	74.00	26.22
17 215.13	V	57.02	40.57	-47.77	-	49.82	68.20	18.38
Average Data								
1 540.22 ¹⁾	H	63.85	29.09	-48.14	0.14	44.94	54.00	9.06

Middle Channel (5 785 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
11 821.63 ¹⁾	V	60.40	38.56	-49.38	-	49.58	74.00	24.42
17 356.36	H	56.88	40.49	-47.86	-	49.51	68.20	18.69
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 825 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 620.41 ¹⁾	H	70.33	29.48	-47.75	-	52.06	74.00	21.94
5 864.23	V	44.24	35.16	-25.20	-	54.20	108.21	54.01
11 821.63 ¹⁾	V	59.20	38.56	-49.38	-	48.38	74.00	25.62
17 491.13	H	57.07	40.41	-47.95	-	49.53	68.20	18.67
Average Data								
1 620.41 ¹⁾	H	64.29	29.48	-47.75	0.14	46.16	54.00	7.84

KCTL Inc.

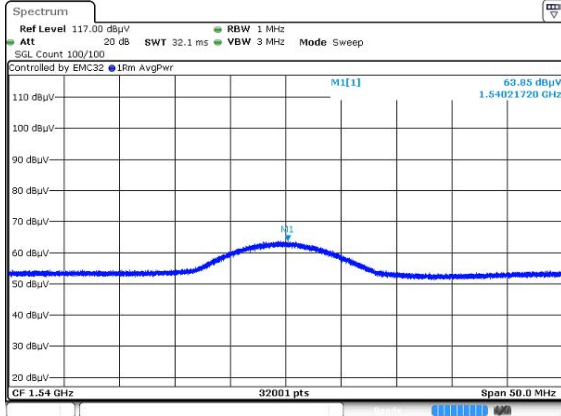
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (110) of (127)



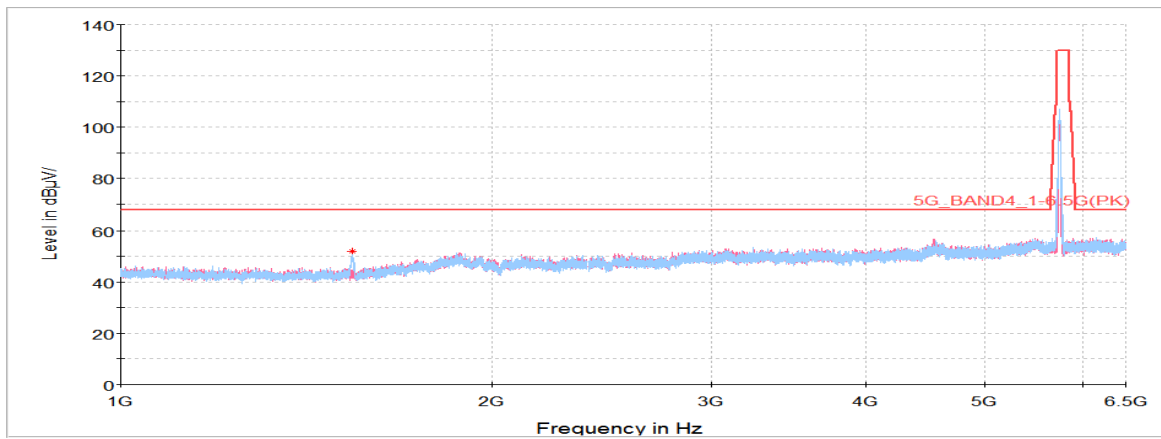
Lowest Channel (5 745 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



KCTL Inc.

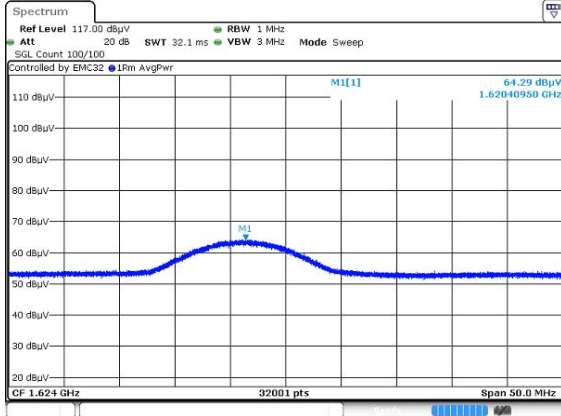
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (111) of (127)



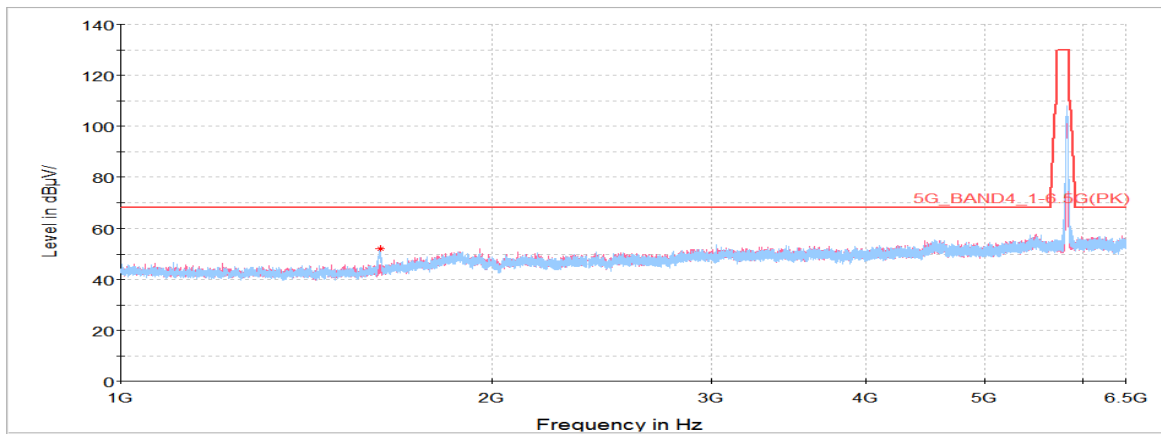
Highest Channel (5 825 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



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.:
KR21-SRF0136
Page (112) of (127)

**802.11n HT20 UNII-3****Lowest Channel (5 745 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 539.69 ¹⁾	H	70.20	29.09	-48.14	-	51.15	74.00	22.85
5 724.84	V	63.20	35.02	-26.43	-	71.79	121.84	50.05
11 358.03 ¹⁾	V	59.54	38.27	-49.94	-	47.87	74.00	26.13
16 201.69	V	57.15	40.84	-46.79	-	51.20	68.20	17.00
Average Data								
1 539.69	H	63.58	29.09	-48.14	0.15	44.68	54.00	9.32

Middle Channel (5 785 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
11 654.52 ¹⁾	H	57.99	38.42	-49.93	-	46.48	74.00	27.52
17 357.08	H	56.76	40.49	-47.86	-	49.39	68.20	18.81
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 825 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 620.55 ¹⁾	H	70.96	29.48	-47.75	-	52.69	74.00	21.31
5 853.06	V	55.07	35.15	-25.36	-	64.86	115.22	50.36
11 658.11 ¹⁾	H	58.07	38.43	-49.92	-	46.58	74.00	27.42
17 571.63	H	56.73	40.81	-48.02	-	49.52	68.20	18.68
Average Data								
1 620.55 ¹⁾	H	64.03	29.48	-47.75	0.15	45.91	54.00	8.09

KCTL Inc.

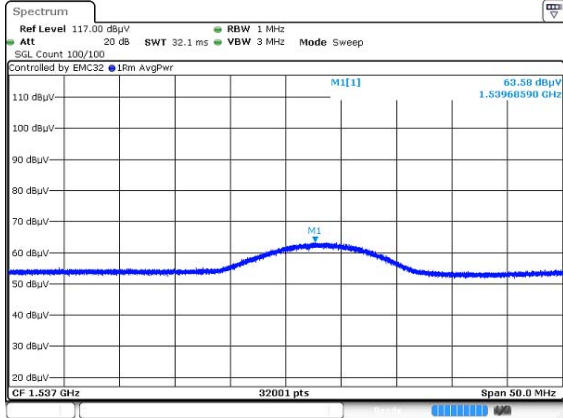
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (113) of (127)



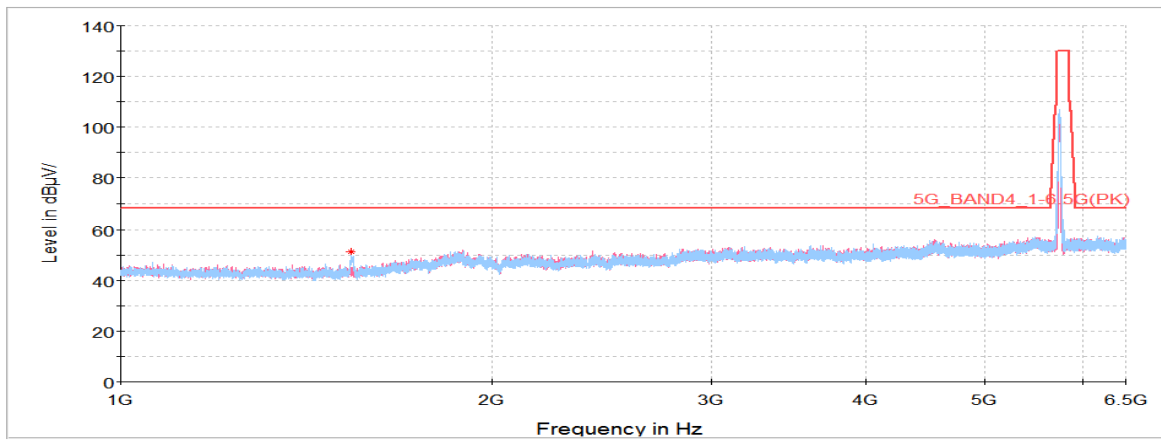
Lowest Channel (5 745 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



KCTL Inc.

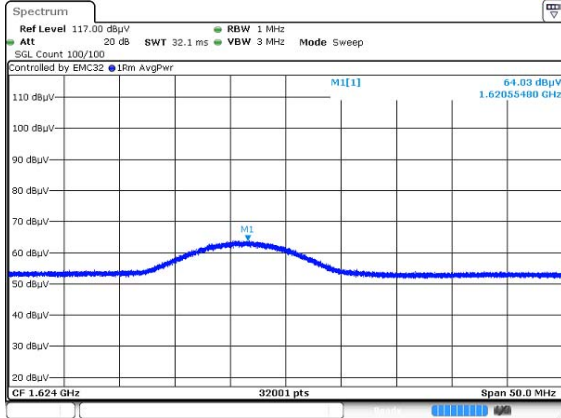
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (114) of (127)



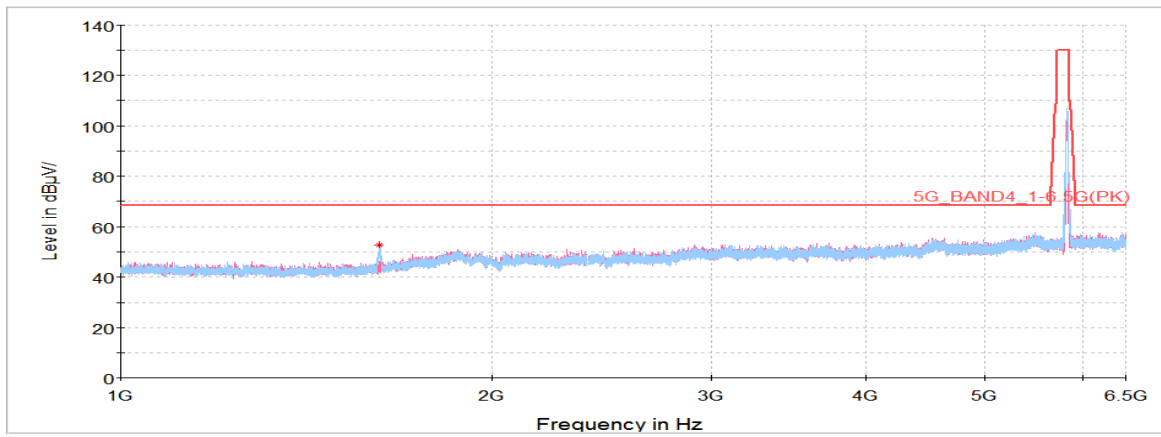
Highest Channel (5 825 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



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.:
KR21-SRF0136
Page (115) of (127)

**802.11n HT40 UNII-3****Lowest Channel (5 755 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 722.09	V	69.63	35.02	-26.44	-	78.21	115.57	37.37
11 515.44 ¹⁾	H	58.19	38.31	-50.39	-	46.11	74.00	27.89
16 820.17	V	57.27	41.26	-47.73	-	50.80	68.20	17.40
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 795 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 860.80	V	45.78	35.16	-25.25	-	55.69	109.18	53.49
11 499.98 ¹⁾	V	58.44	38.30	-50.44	-	46.30	74.00	27.70
17 193.92	H	57.38	40.58	-47.76	-	50.20	68.20	18.00
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

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.:
KR21-SRF0136
Page (116) of (127)

**802.11ac VHT20 UNII-3****Lowest Channel (5 745 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 540.56 ¹⁾	H	70.27	29.09	-48.14	-	51.22	74.00	22.78
5 723.64	V	62.04	35.02	-26.43	-	70.63	119.10	48.47
11 541.67 ¹⁾	V	58.43	38.33	-50.31	-	46.45	74.00	27.55
16 200.25	V	56.47	40.84	-46.79	-	50.52	68.20	17.68
Average Data								
1 540.56 ¹⁾	H	63.62	29.09	-48.14	0.15	44.72	54.00	9.28

Middle Channel (5 785 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 578.36 ¹⁾	H	67.44	29.28	-48.14	-	48.58	74.00	25.42
11 571.14 ¹⁾	V	57.64	38.36	-50.21	-	45.79	74.00	28.21
17 351.69	V	55.98	40.49	-47.86	-	48.61	68.20	19.59
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 825 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
1 619.00 ¹⁾	H	70.53	29.47	-47.78	-	52.22	74.00	21.78
5 853.92	V	48.74	35.15	-25.35	-	58.54	113.26	54.72
11 650.92 ¹⁾	V	57.69	38.42	-49.94	-	46.17	74.00	27.83
17 484.66	H	55.69	40.41	-47.94	-	48.16	68.20	20.04
Average Data								
1 619.00 ¹⁾	H	64.22	29.47	-47.78	0.15	46.06	54.00	7.94

KCTL Inc.

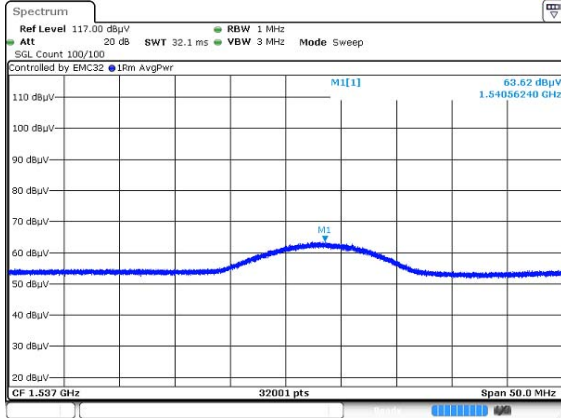
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (117) of (127)



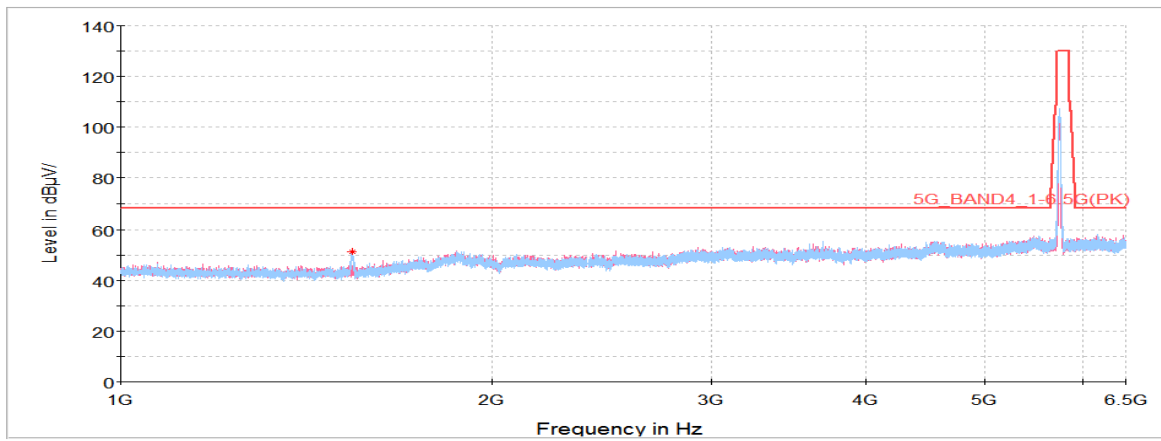
Lowest Channel (5 745 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



KCTL Inc.

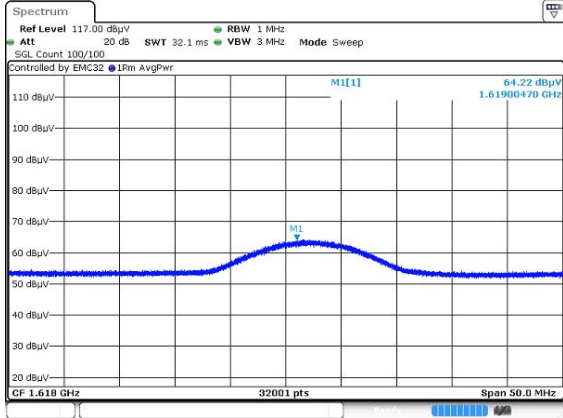
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (118) of (127)



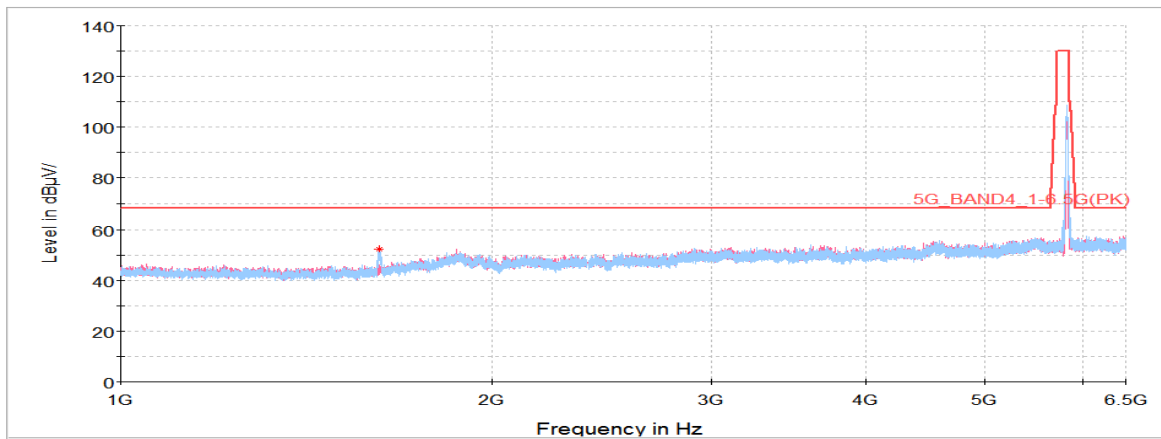
Highest Channel (5 825 MHz)

Average data



Blank

Horizontal/Vertical for 1 GHz ~ 6.5 GHz



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.:
KR21-SRF0136
Page (119) of (127)

**802.11ac VHT40 UNII-3****Lowest Channel (5 755 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 718.31	V	60.64	35.02	-26.45	-	69.21	110.33	41.12
11 514.36 ¹⁾	V	57.33	38.31	-50.40	-	45.24	74.00	28.76
17 250.70	H	56.28	40.55	-47.79	-	49.04	68.20	19.16
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Highest Channel (5 795 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 859.77	V	43.46	35.16	-25.27	-	53.35	109.47	56.12
11 577.97 ¹⁾	H	57.68	38.36	-50.18	-	45.86	74.00	28.14
17 384.39	V	55.97	40.47	-47.88	-	48.56	68.20	19.64
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

802.11ac VHT80 UNII-3**Lowest Channel (5 775 MHz)**

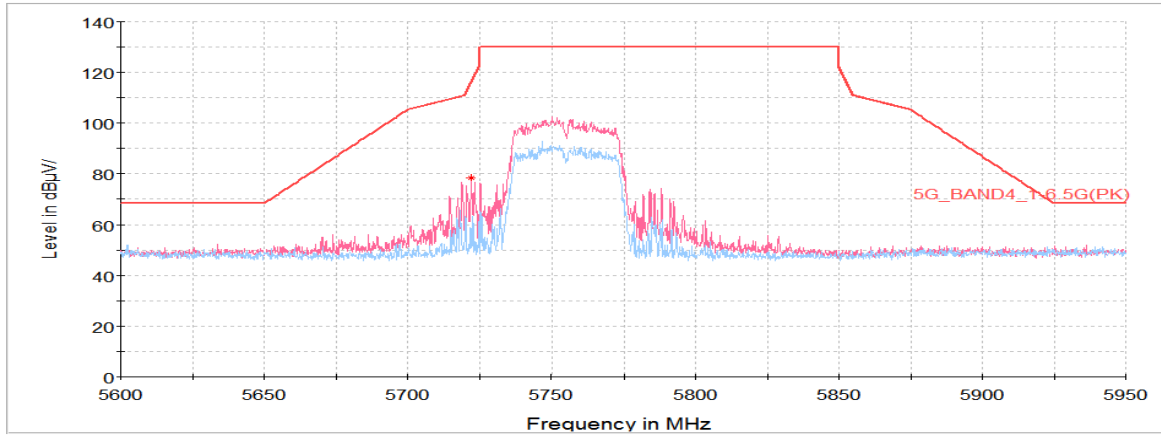
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
5 723.64	V	58.17	35.02	-26.43	-	66.76	119.10	52.34
5 869.39	V	52.90	35.17	-25.12	-	62.95	106.77	43.83
11 537.72 ¹⁾	V	57.23	38.33	-50.32	-	45.24	74.00	28.76
17 359.23	V	55.84	40.48	-47.86	-	48.46	68.20	19.74
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Plot of Band-edge, Harmonics and Spurious Emissions

In order to simplify the report, attached plots were only the lowest margin condition

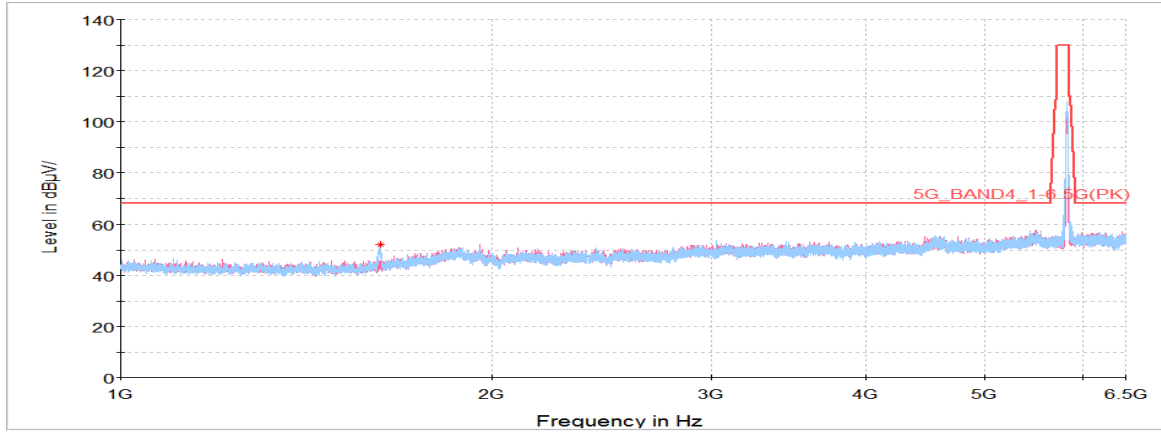
802.11n HT40_UNII-3_Lowest Channel (5 755 MHz)

Horizontal/Vertical for Band-edge

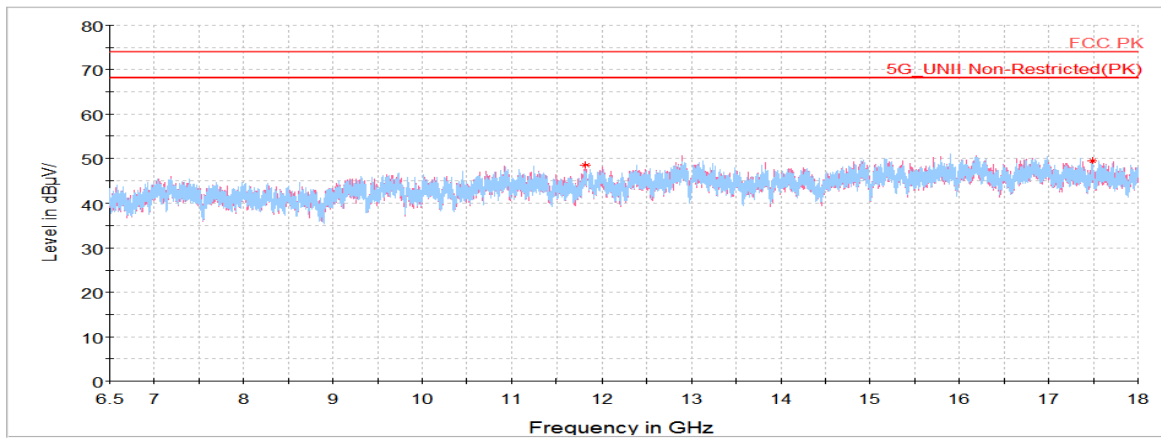


802.11a_UNII-3_Highest Channel (5 825 MHz)

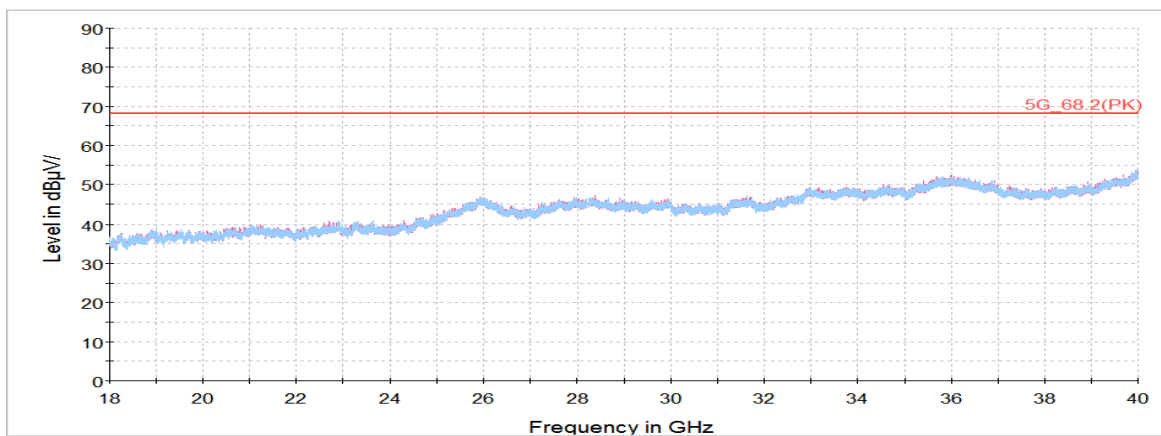
Horizontal/Vertical for 1 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz



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.:
KR21-SRF0136
Page (122) of (127)

**Spurious Emission for Simultaneous Tx Condition**

Case	WLAN 5 GHz	Bluetooth
Mode	802.11ac VHT20	EDR
Channel	64	39
Frequency	5 320	2 441
Data Rate	MCS0	3DH-1

Notes.

The lowest margin condition among the channels and modes were selected for test.

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
4 882.03 ¹⁾	H	66.81	33.83	-53.14	-	47.50	74.00	26.50
7 332.31 ¹⁾	V	59.24	35.30	-50.51	-	44.03	74.00	29.97
10 638.64 ¹⁾	V	64.76	37.84	-49.69	-	52.91	74.00	21.09
15 959.11 ¹⁾	V	54.33	39.82	-46.06	-	48.09	74.00	25.91
Average Data								
10 638.64 ¹⁾	V	57.40	37.84	-49.69	0.15	45.70	54.00	8.30

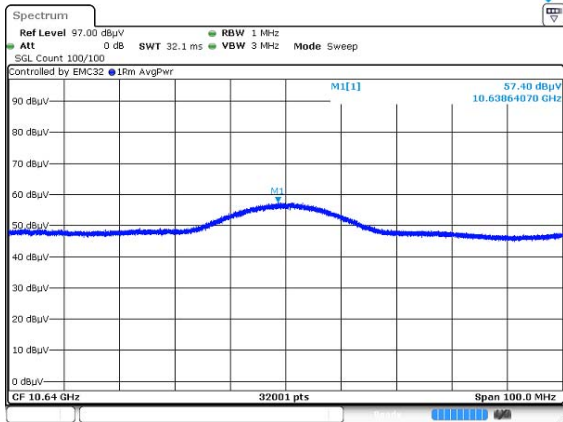
KCTL Inc.

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.:
KR21-SRF0136
Page (123) of (127)

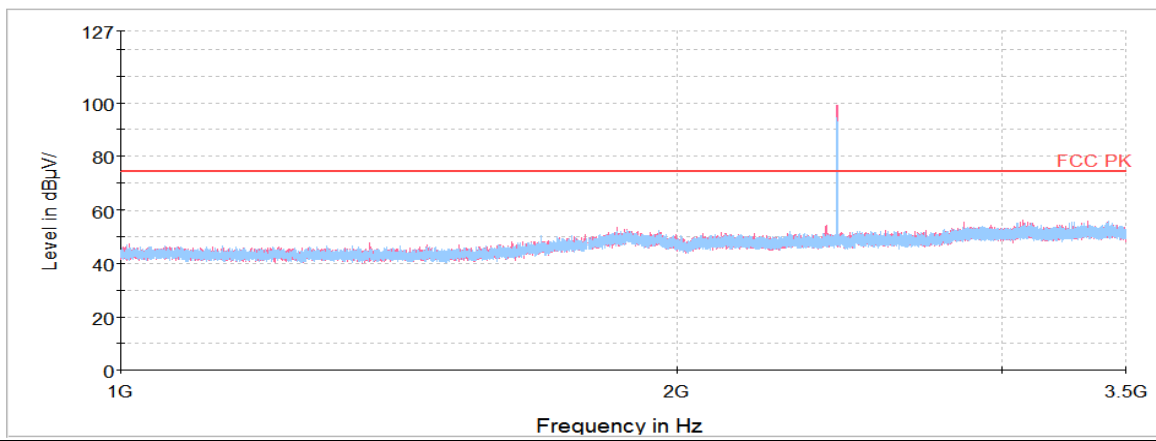


Average data

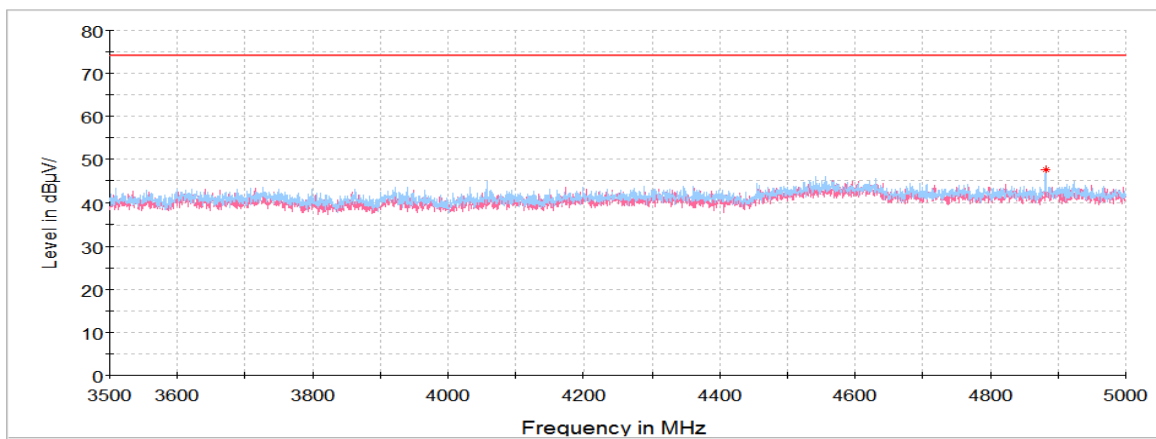


Blank

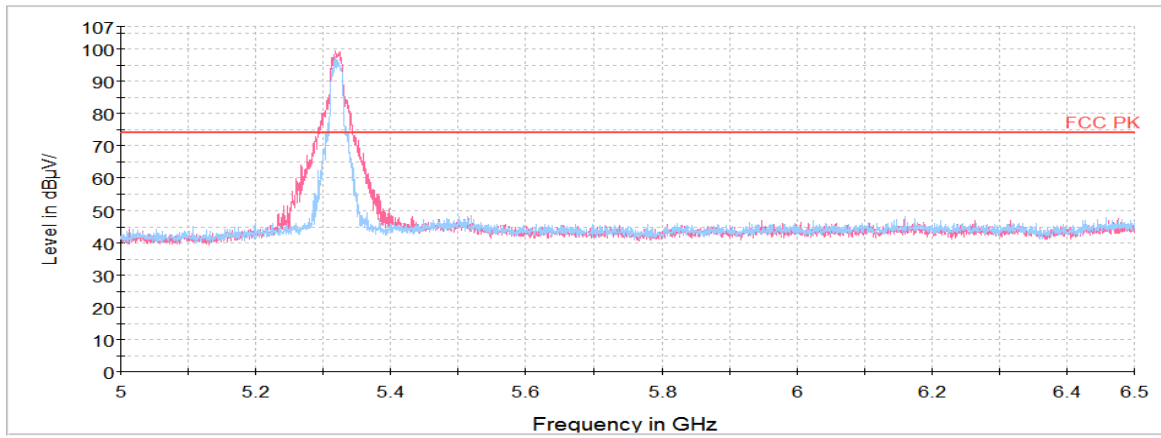
Horizontal/Vertical for 1 GHz ~ 3.5 GHz



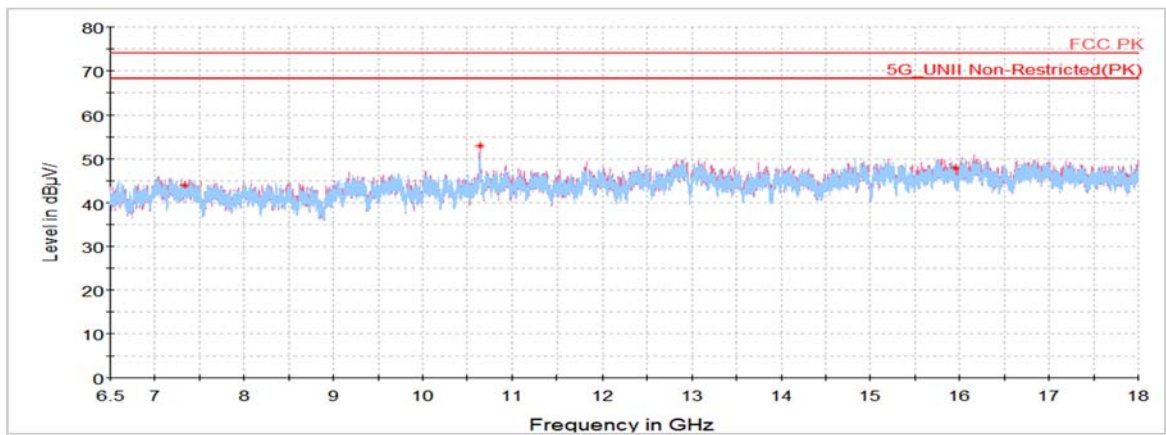
Horizontal/Vertical for 3.5 GHz ~ 5 GHz



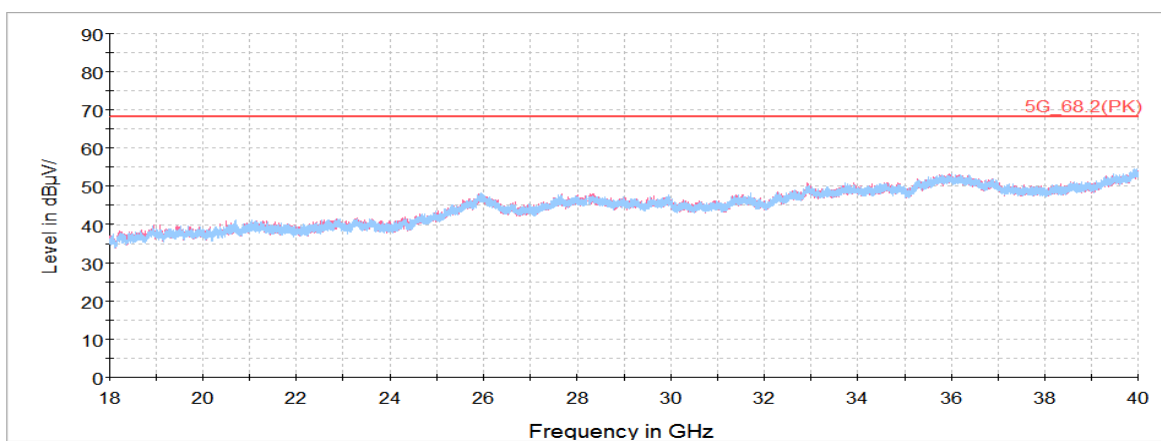
Horizontal/Vertical for 5 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz

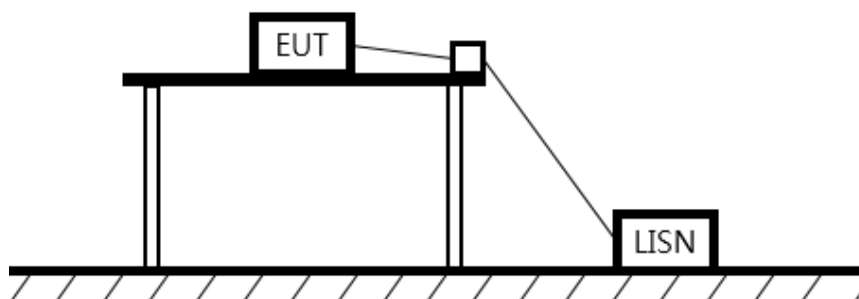


Horizontal/Vertical for 18 GHz ~ 40 GHz



7.7. AC Conducted emission

Test setup



Limit

§15.407

According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall be on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted limit (dB μ V/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Measurement procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50 Ω /50 μ H LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 kHz or to quasi-peak and average within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

KCTL Inc.

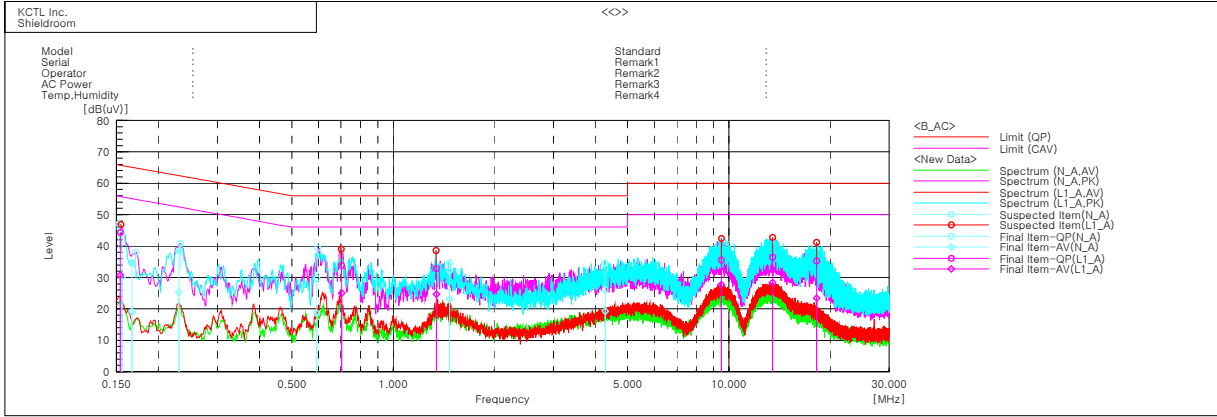
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR21-SRF0136
Page (126) of (127)



Test results

Worst case: 802.11a / UNII-2C 5 700 MHz



Final Result

--- N_A Phase ---										
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.156	33.8	20.1	10.0	43.8	30.1	65.7	55.7	21.9	25.6
2	0.16701	24.4	9.0	10.2	34.6	19.2	65.1	55.1	30.5	35.9
3	0.23043	28.7	15.4	9.8	38.5	25.2	62.4	52.4	23.9	27.2
4	0.59261	19.8	8.7	10.0	29.8	18.7	56.0	46.0	26.2	27.3
5	1.47381	22.3	13.3	9.9	32.2	23.2	56.0	46.0	23.8	22.8
6	4.28045	16.3	9.3	9.9	26.2	19.2	56.0	46.0	29.8	26.8

--- L1_A Phase ---										
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.15408	34.3	20.8	10.0	44.3	30.8	65.8	55.8	21.5	25.0
2	0.70228	24.0	15.1	9.9	33.9	25.0	56.0	46.0	22.1	21.0
3	1.34646	22.9	14.8	9.9	32.8	24.7	56.0	46.0	23.2	21.3
4	9.50122	25.4	17.6	10.1	35.5	27.7	60.0	50.0	24.5	22.3
5	13.50092	26.1	18.1	10.4	36.5	28.5	60.0	50.0	23.5	21.5
6	18.23549	24.7	12.9	10.6	35.3	23.5	60.0	50.0	24.7	26.5

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.:
KR21-SRF0136
Page (127) of (127)



8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV30	100807	21.07.29
Attenuator	Weinschel ENGINEERING	56-10	51395	22.01.22
Signal Generator	R&S	SMB100A	176206	22.01.20
Vector Signal Generator	R&S	SMBV100A	257566	21.07.13
DC Power Supply	Agilent	E3632A	MY40008800	21.07.28
Spectrum Analyzer	R&S	FSV40	100989	21.12.31
EMI TEST RECEIVER	R&S	ESCI3	101408	21.08.20
Bi-Log Antenna	SCHWARZBECK	VULB9168	583	22.04.23
Amplifier	SONOMA INSTRUMENT	310N	284608	21.08.20
COAXIAL FIXED ATTENUATOR	Agilent	8491B-003	2708A18758	22.04.23
Horn antenna	ETS.lindgren	3117	00155787	21.10.28
Horn antenna	ETS.lindgren	3116	00086632	22.01.29
Attenuator	API Inmet	40AH2W-10	12	22.05.11*
Broadband PreAmplifier	SCHWARZBECK	BBV9718	216	21.07.28
AMPLIFIER	L-3 Narda-MITEQ	AMF-7D-01001800 -22-10P	2003683	21.08.28
AMPLIFIER	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000996	22.01.21
LOOP Antenna	R&S	HFH2-Z2	100355	22.08.21
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	-
High pass Filter	WT	WT-A1698-HS	WT160411001	22.05.10
TWO-LINE V - NETWORK	R&S	ENV216	101358	21.09.29
EMI TEST RECEIVER	R&S	ESCI	100001	21.08.20

* Tests related to this equipment were progressed after the calibration was completed.

End of test report