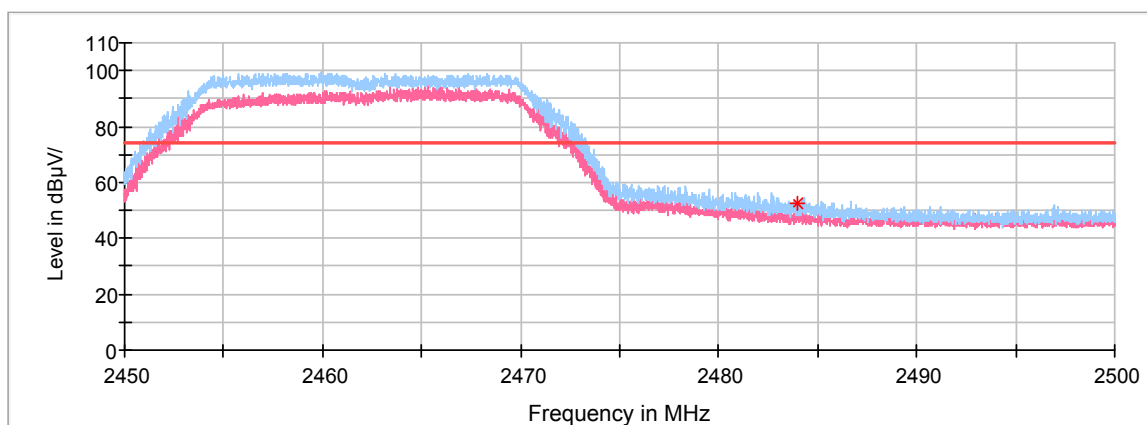
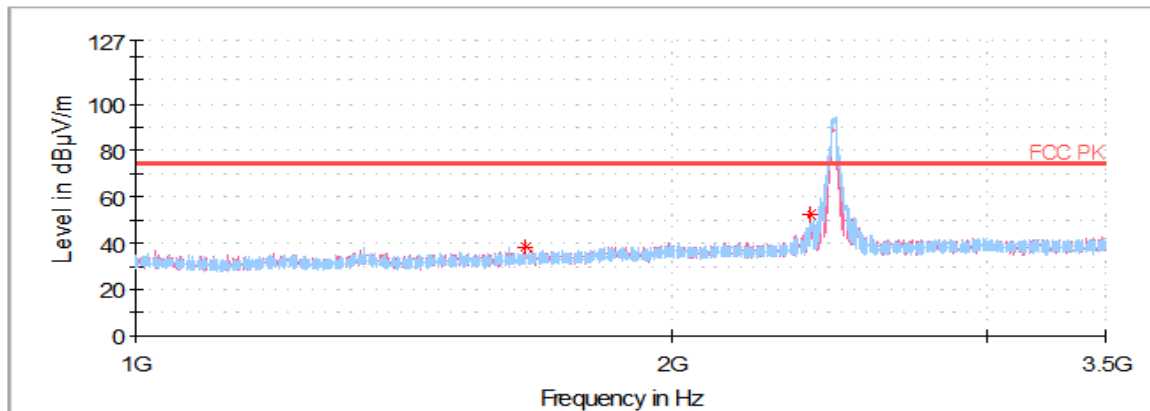
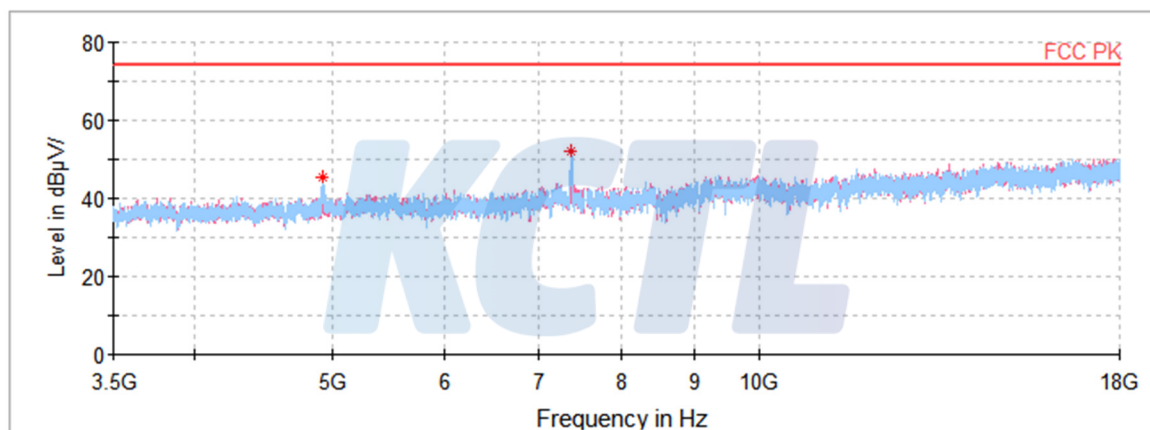
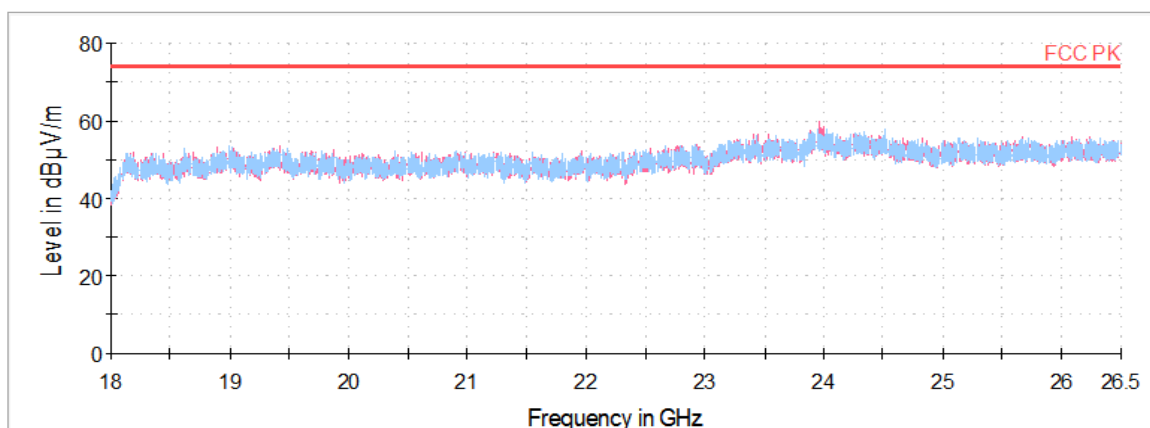


Highest Channel

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
2 483.96 ¹⁾	H	79.70	32.09	-59.17	-	52.62	74.00	21.38
4 929.61 ¹⁾	V	68.03	33.86	-56.49	-	45.40	74.00	28.60
7 383.73 ¹⁾	V	70.73	35.50	-54.33	-	51.90	74.00	22.10
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

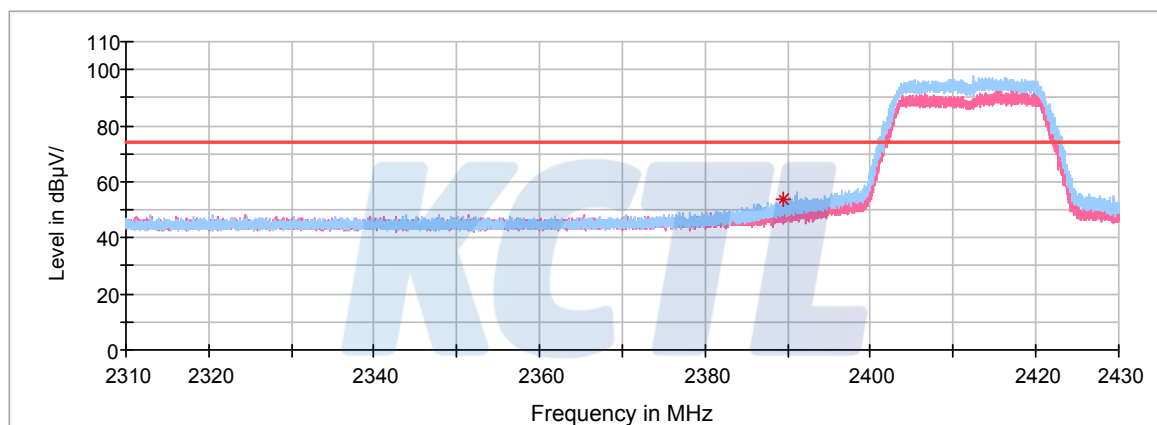
Average data	Average data
Blank	Blank

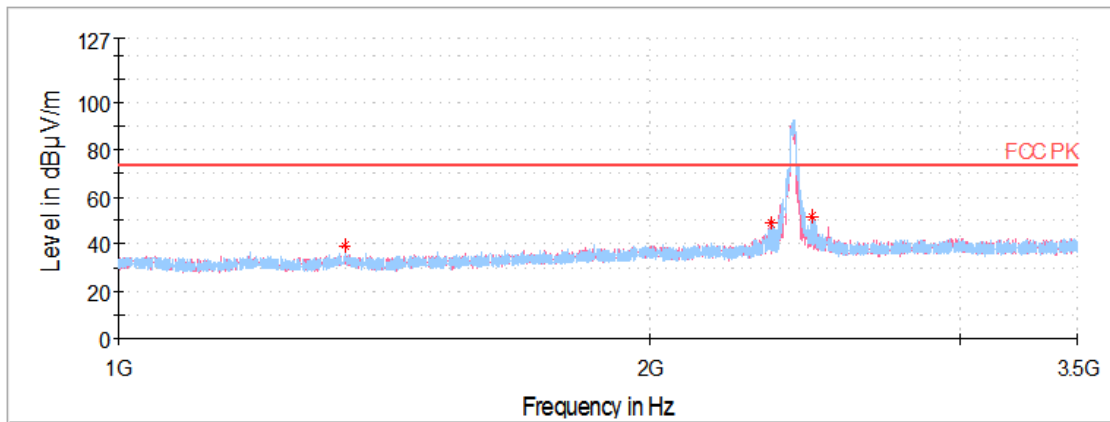
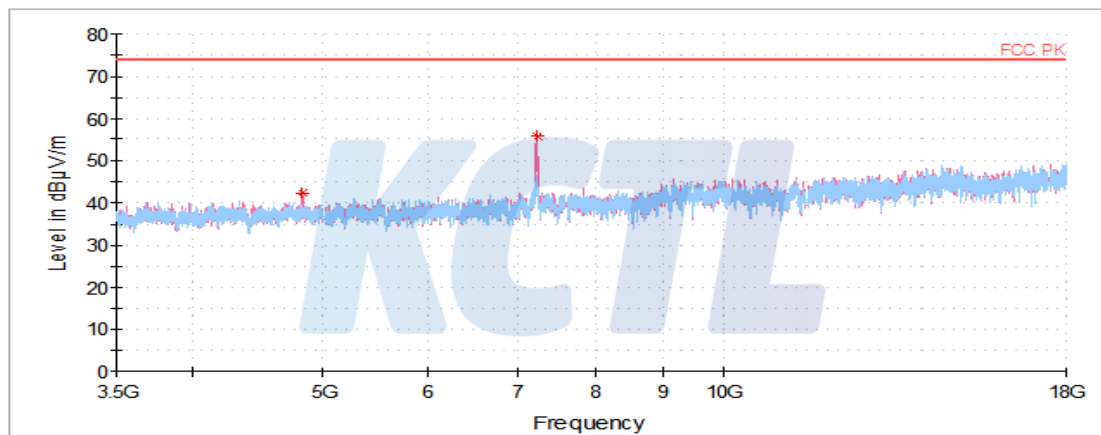
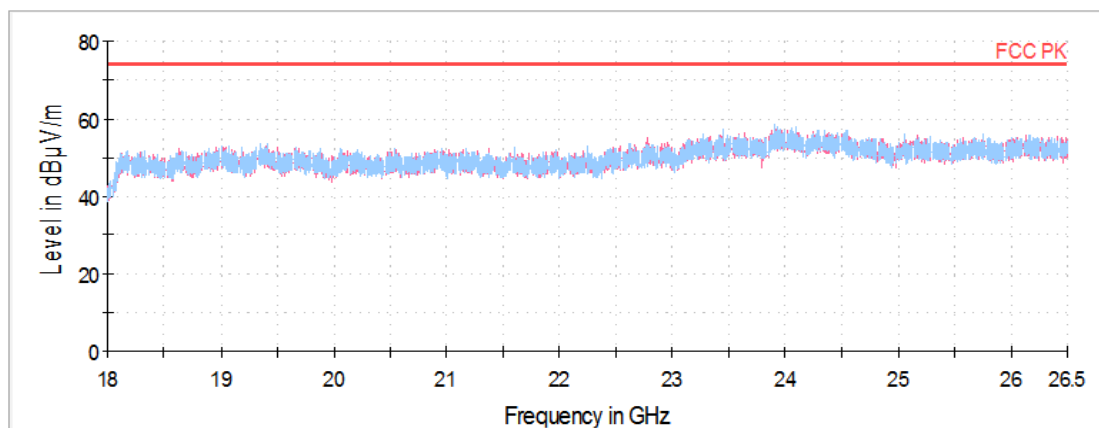
Horizontal/Vertical for Band-edge

Horizontal/Vertical for 1 GHz ~ 3.5 GHz**Horizontal/Vertical for 3.5 GHz ~ 18 GHz****Horizontal/Vertical for 18 GHz ~ 26.5 GHz**

802.11n HT20**Lowest Channel**

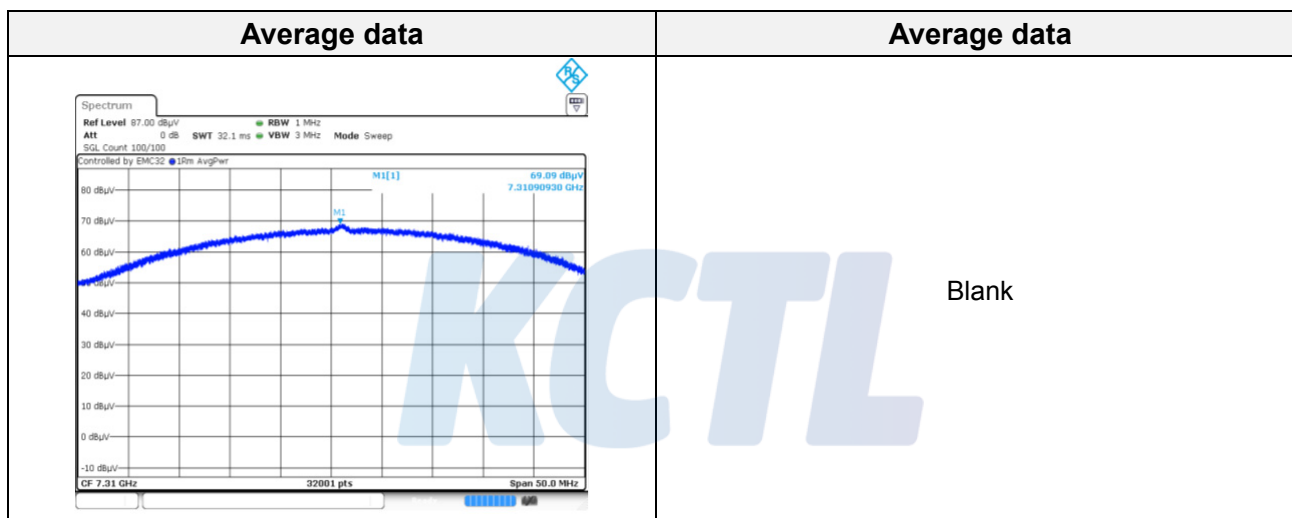
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
2 389.43 ¹⁾	H	81.02	32.01	-59.45	-	53.58	74.00	20.42
4 830.38 ¹⁾	V	65.12	33.80	-56.54	-	42.38	74.00	31.62
7 236.05	V	74.67	35.50	-54.26	-	55.91	74.00	18.09
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

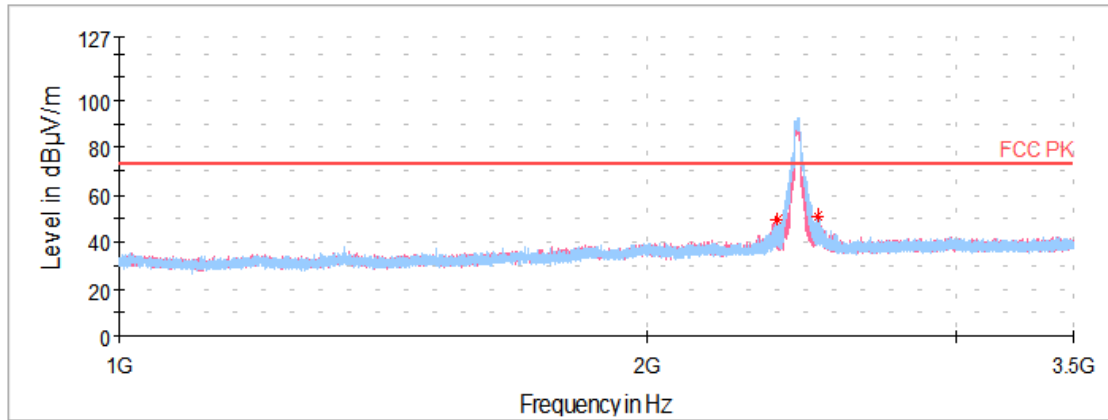
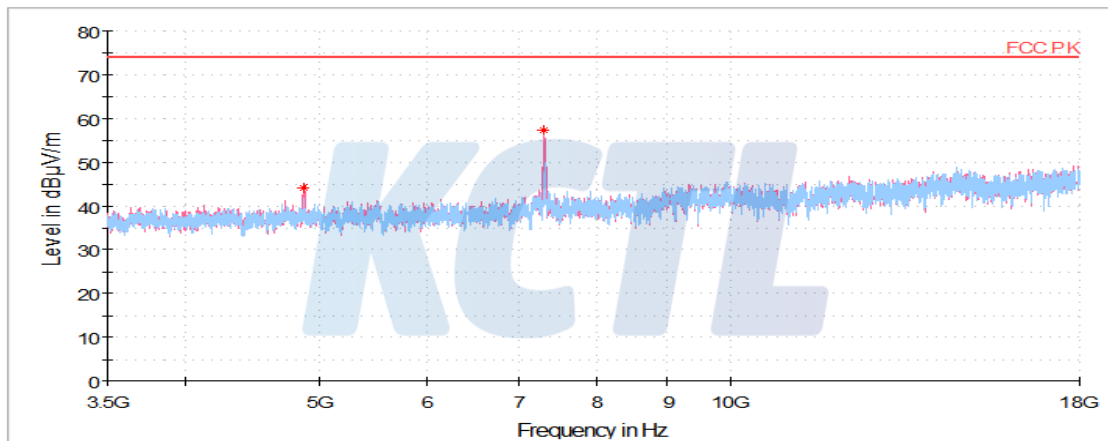
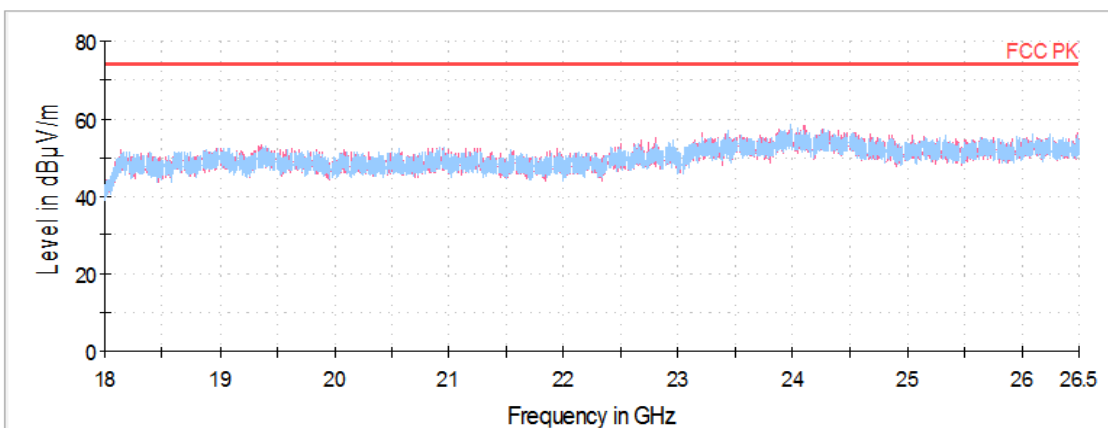
Horizontal/Vertical for Band-edge

Horizontal/Vertical for 1 GHz ~ 3.5 GHz**Horizontal/Vertical for 3.5 GHz ~ 18 GHz****Horizontal/Vertical for 18 GHz ~ 26.5 GHz**

Middle Channel

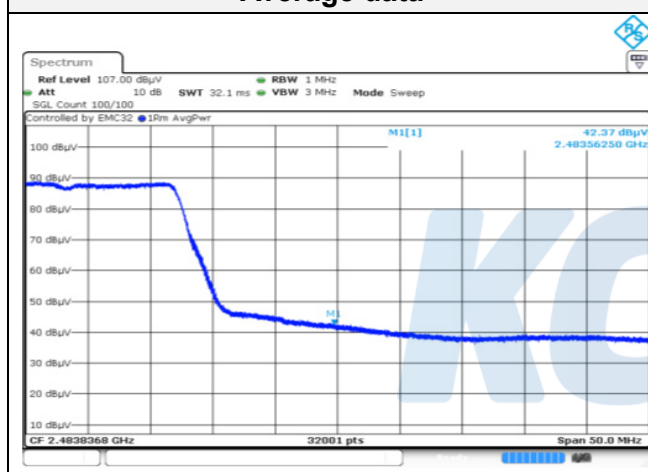
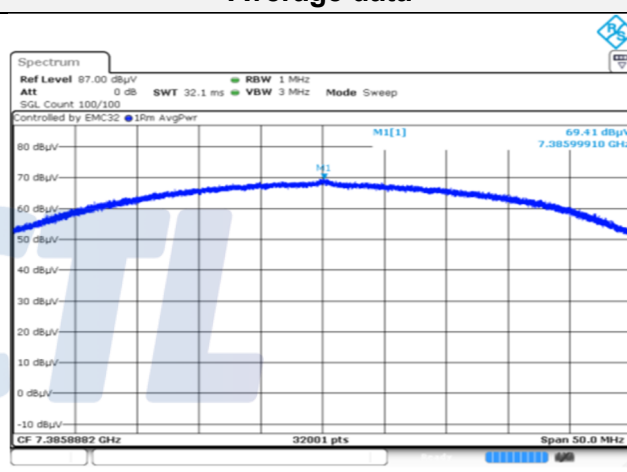
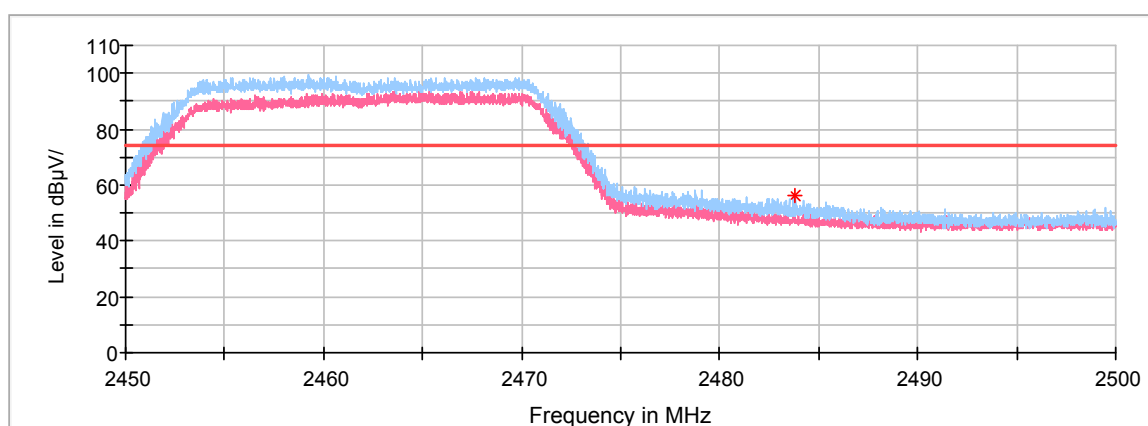
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
2 375.00 ¹⁾	H	76.77	32.00	-59.48	-	49.29	74.00	24.71
2 504.14	H	78.34	32.11	-59.11	-	51.34	74.00	22.66
4 870.25 ¹⁾	V	67.01	33.82	-56.64	-	44.19	74.00	29.81
7 310.91 ¹⁾	V	76.19	35.50	-54.30	-	57.39	74.00	16.61
Average Data								
7 310.91 ¹⁾	V	69.09	35.50	-54.30	0.34	50.63	54.00	3.37

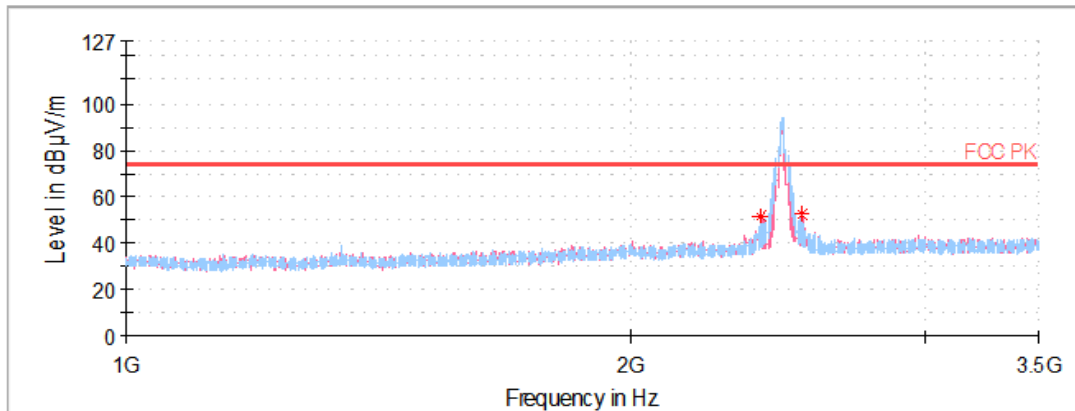
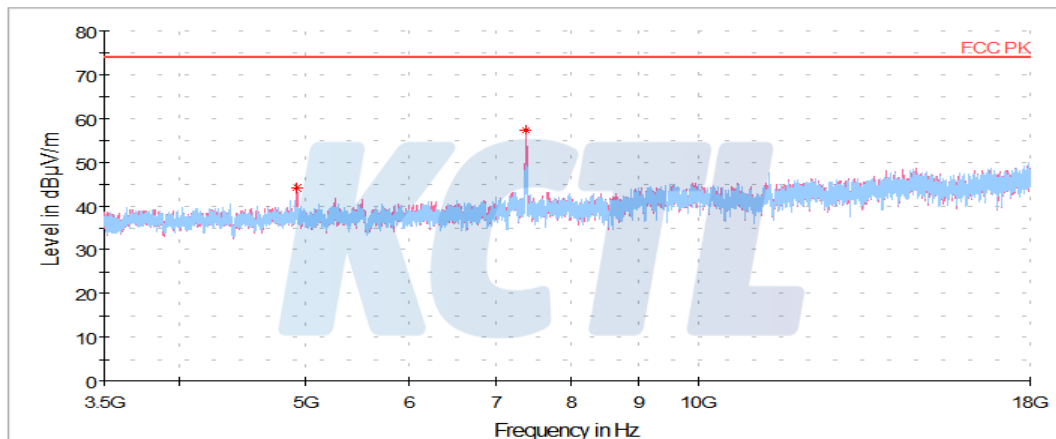


Horizontal/Vertical for 1 GHz ~ 3.5 GHz**Horizontal/Vertical for 3.5 GHz ~ 18 GHz****Horizontal/Vertical for 18 GHz ~ 26.5 GHz**

Highest Channel

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μ V))	(dB)	(dB)	(dB)	(dB(μ V/m))	(dB(μ V/m))	(dB)
Peak data								
2 483.56 ¹⁾	H	53.95	32.09	-29.88	-	56.16	74.00	17.84
4 923.27 ¹⁾	V	66.92	33.85	-56.54	-	44.23	74.00	29.77
7 386.00 ¹⁾	V	76.18	35.50	-54.33	-	57.35	74.00	16.65
Average Data								
2 483.56 ¹⁾	H	42.37	32.09	-29.88	0.34	44.92	54.00	9.08
7 386.00 ¹⁾	V	69.41	35.50	-54.33	0.34	50.92	54.00	3.08

Average data**Average data****Horizontal/Vertical for Band-edge**

Horizontal/Vertical for 1 GHz ~ 3.5 GHz**Horizontal/Vertical for 3.5 GHz ~ 18 GHz****Horizontal/Vertical for 18 GHz ~ 26.5 GHz**

KCTL Inc.

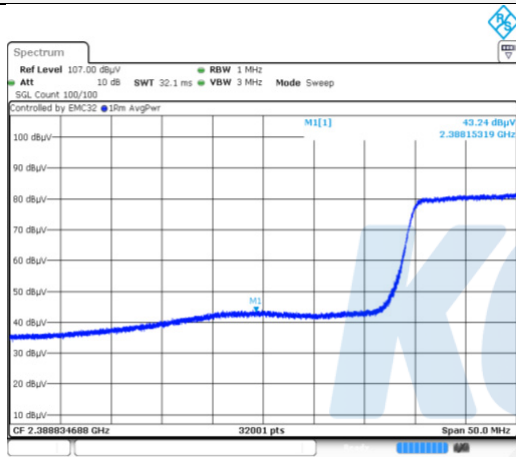
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR19-SRF0069

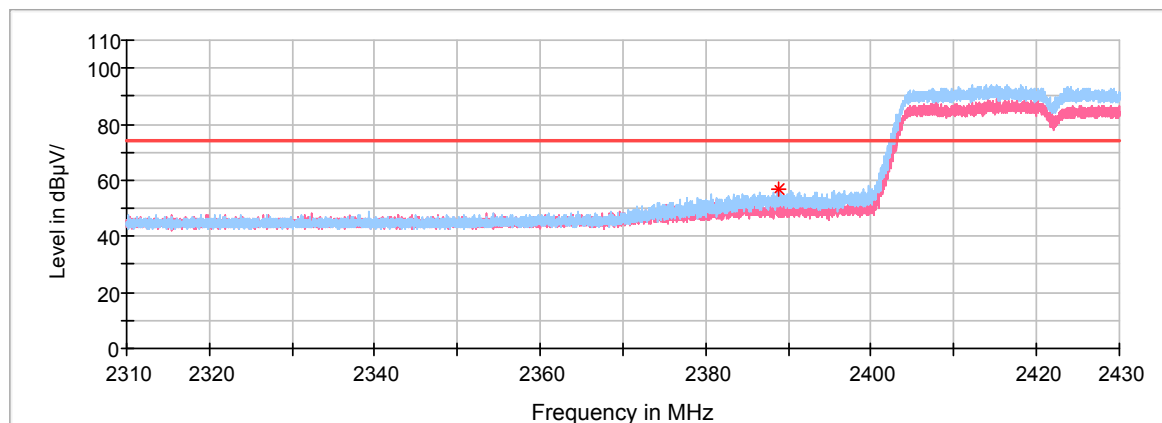
Page (48) of (63)

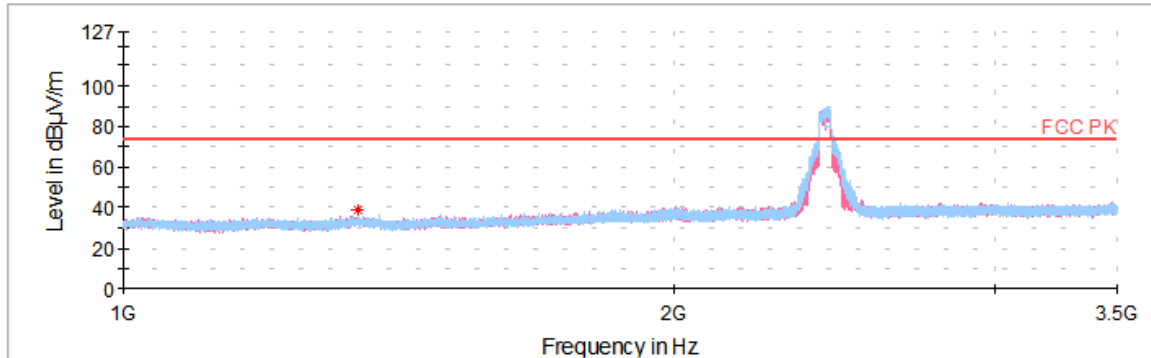
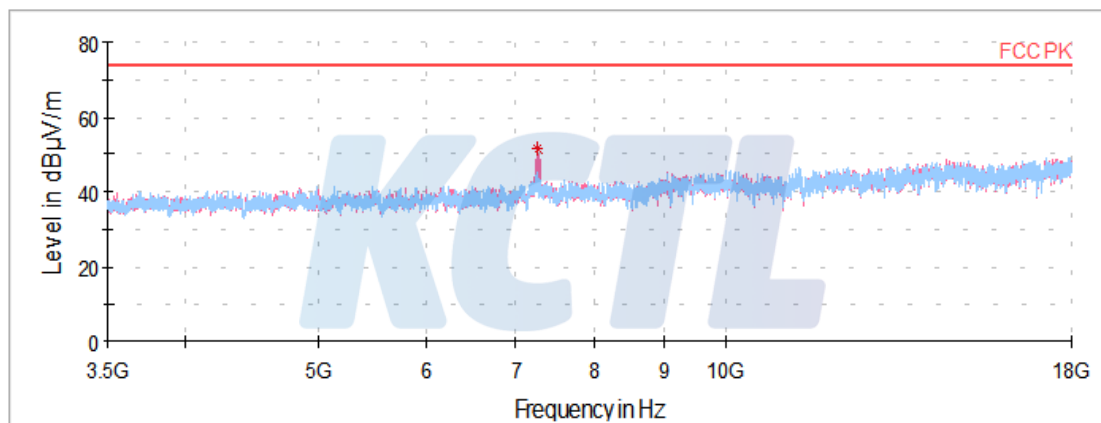
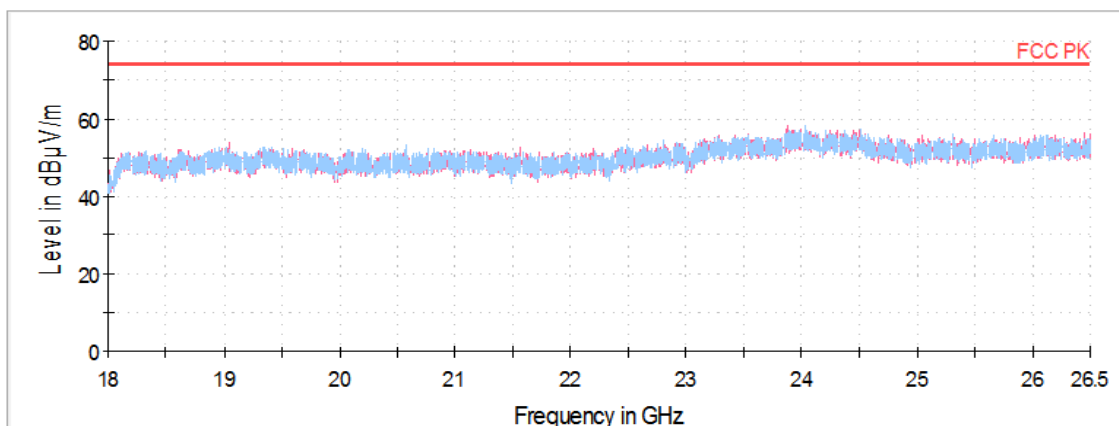
KCTL**802.11n HT40****Lowest Channel**

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
2 388.15 ¹⁾	H	54.77	32.01	-29.79	-	56.99	74.00	17.01
7 265.47 ¹⁾	V	70.12	35.50	-54.27	-	51.35	74.00	22.65
Average Data								
2 388.15 ¹⁾	H	43.24	32.01	-29.79	0.86	46.32	54.00	7.68

Average data**Average data**

Blank

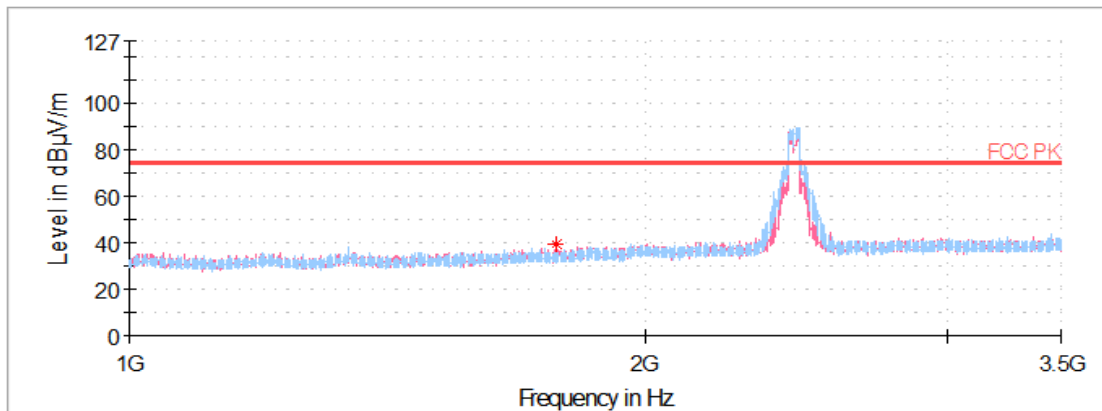
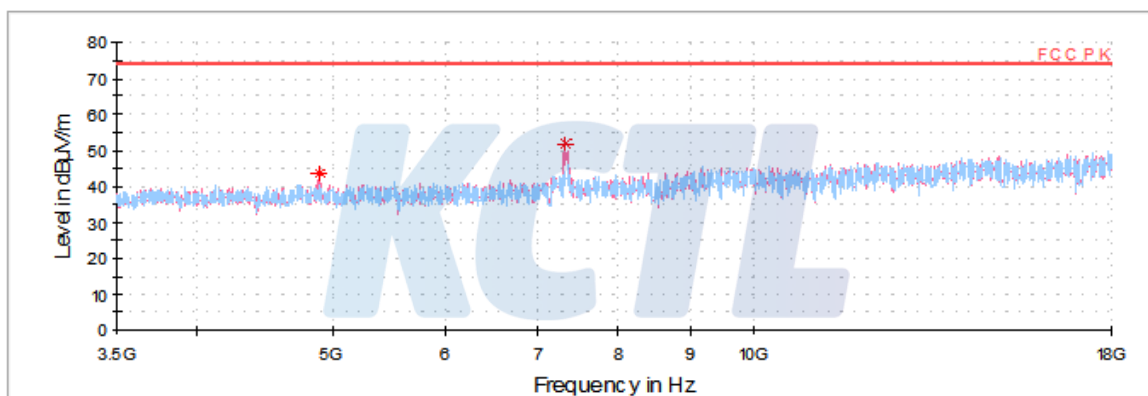
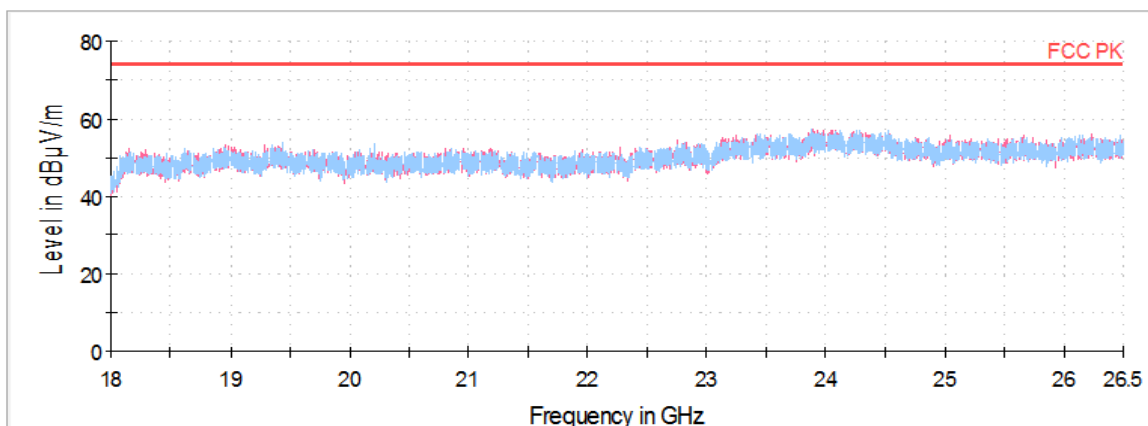
Horizontal/Vertical for Band-edge

Horizontal/Vertical for 1 GHz ~ 3.5 GHz**Horizontal/Vertical for 3.5 GHz ~ 18 GHz****Horizontal/Vertical for 18 GHz ~ 26.5 GHz**

Middle Channel

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB($\mu V/m$))	(dB($\mu V/m$))	(dB)
Peak data								
4 890.64 ¹⁾	V	66.72	33.83	-57.20	-	43.35	74.00	30.65
7 329.81 ¹⁾	V	70.84	35.50	-54.68	-	51.66	74.00	22.34
Average Data								
No spurious emissions were detected within 20 dB of the limit.								



Horizontal/Vertical for 1 GHz ~ 3.5 GHz**Horizontal/Vertical for 3.5 GHz ~ 18 GHz****Horizontal/Vertical for 18 GHz ~ 26.5 GHz**

KCTL Inc.

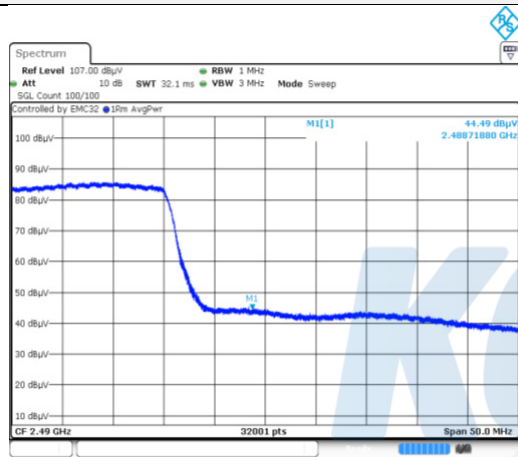
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR19-SRF0069

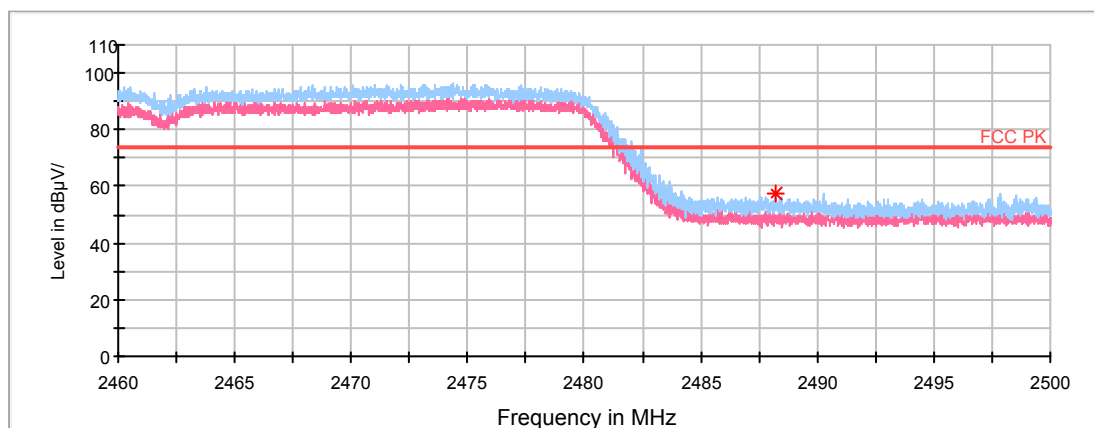
Page (52) of (63)

KCTL**Highest Channel**

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
2 488.72 ¹⁾	H	55.53	32.09	-29.89	-	57.73	74.00	16.27
4 931.88 ¹⁾	V	65.41	33.86	-56.48	-	42.79	74.00	31.21
7 386.45 ¹⁾	V	70.55	35.50	-54.33	-	51.72	74.00	22.28
Average Data								
2 488.72 ¹⁾	H	44.49	32.09	-29.89	0.86	47.55	54.00	6.45

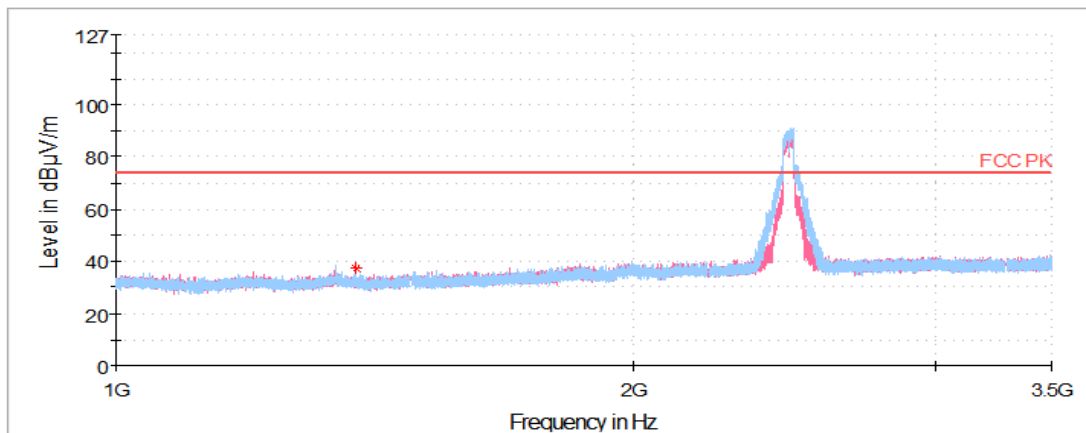
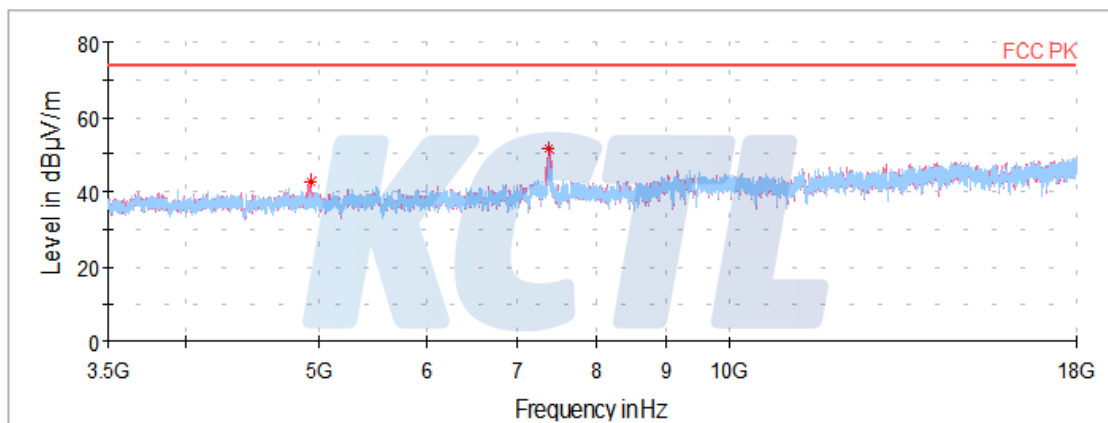
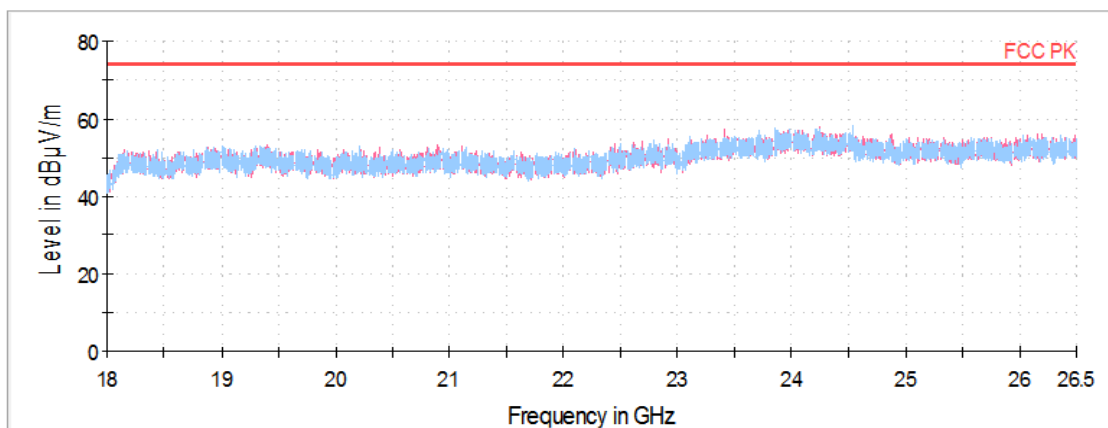
Average data**Average data**

Blank

Horizontal/Vertical for Band-edge

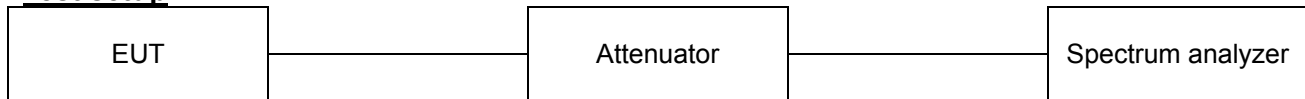
This test report shall not be reproduced, except in full, without the written approval

KCTL-TIR001-003/2

Horizontal/Vertical for 1 GHz ~ 3.5 GHz**Horizontal/Vertical for 3.5 GHz ~ 18 GHz****Horizontal/Vertical for 18 GHz ~ 26.5 GHz**

7.5. Conducted Spurious Emission

Test setup



Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operation, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation specified in §15.209(a) is not required. In addition, radiated emission limits specified in §15.209(a) (see §15.205(c)).

Limit : 20 dBc

Test procedure

ANSI C63.10 - Section 11.11.3
558074 D01 v04 – Section 11.3

Test settings

Set the spectrum analyzer as follows:

- 1) Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic.
Typically, several plots are required to cover this entire span.
- 2) RBW = 100 kHz
- 3) VBW ≥ RBW
- 4) Sweep = auto
- 5) Detector function = peak
- 6) Trace = max hold
- 7) Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
- 8) Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

KCTL Inc.

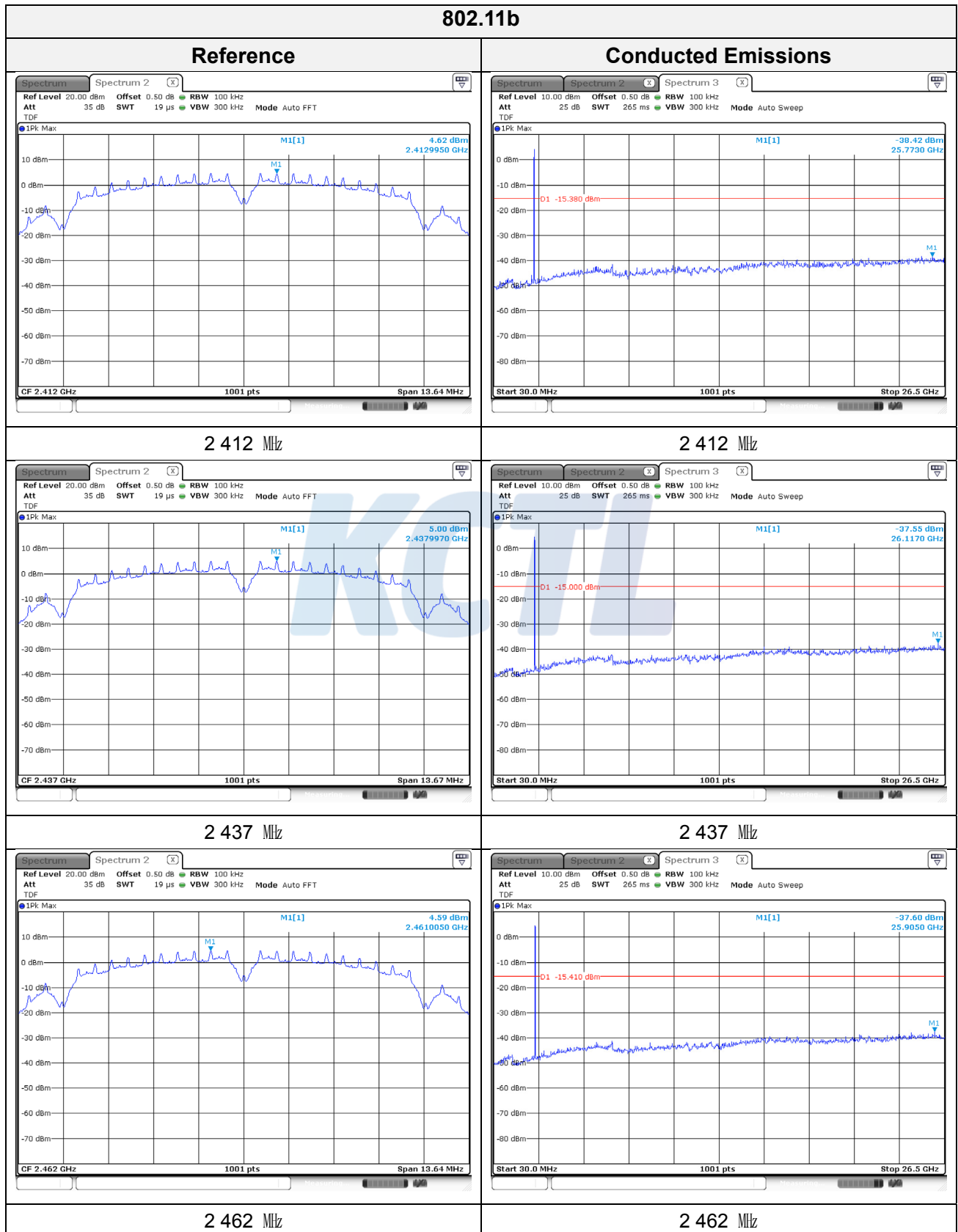
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR19-SRF0069

Page (55) of (63)

KCTL

Test results



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

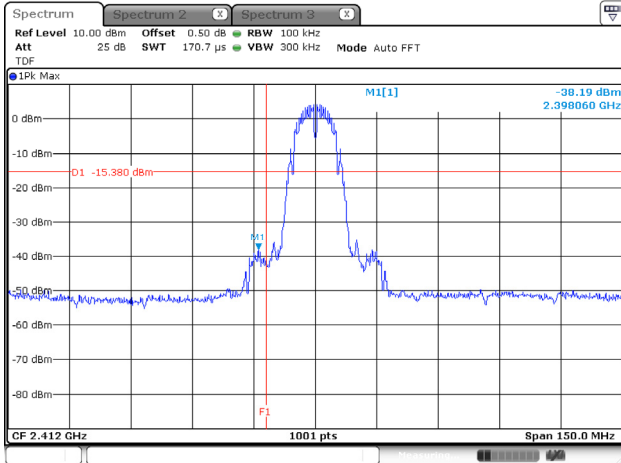
Report No.:
KR19-SRF0069

Page (56) of (63)

KCTL

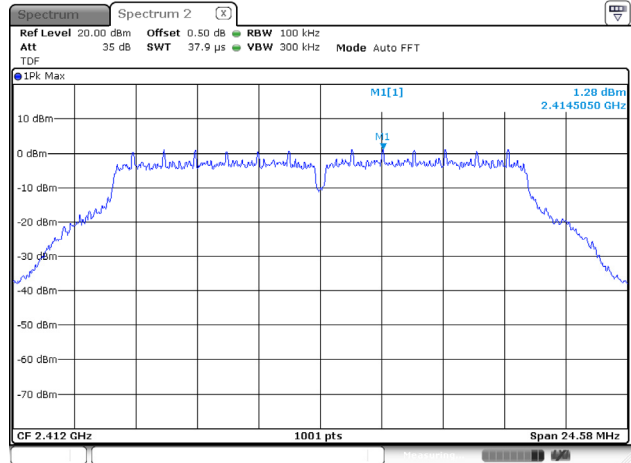
802.11b

Band edge



802.11g

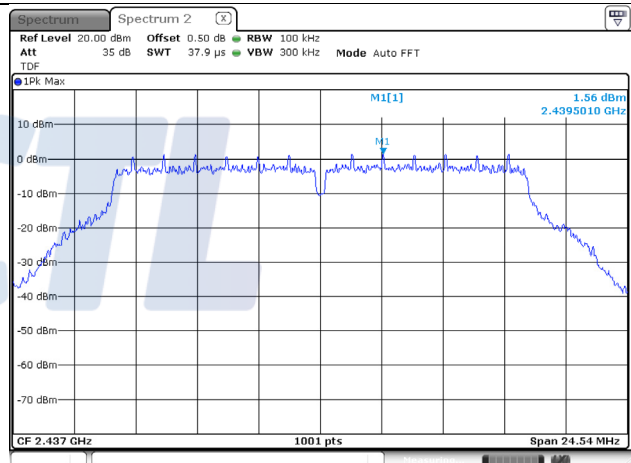
Reference



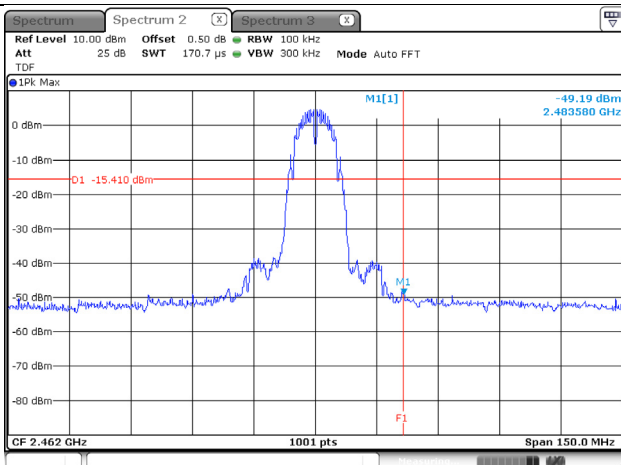
2 412 MHz

Blank

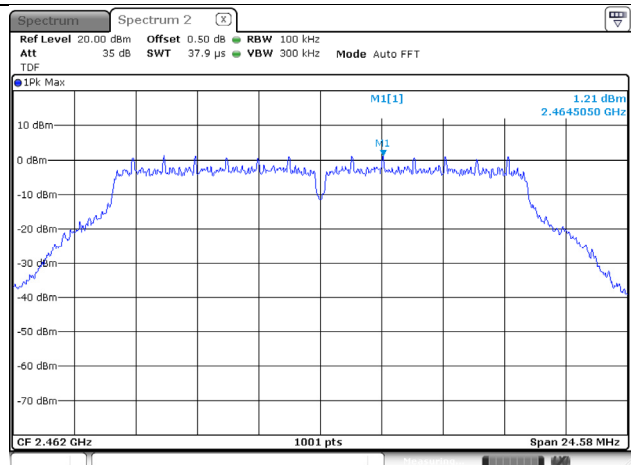
2 412 MHz



2 437 MHz



2 437 MHz



2 462 MHz

2 462 MHz

KCTL Inc.

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

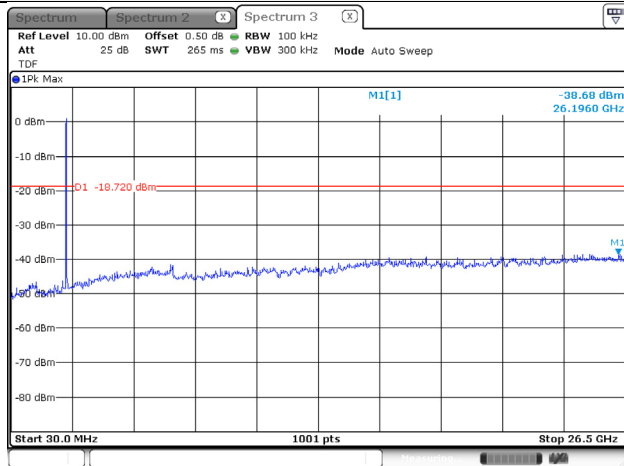
Report No.:
KR19-SRF0069

Page (57) of (63)

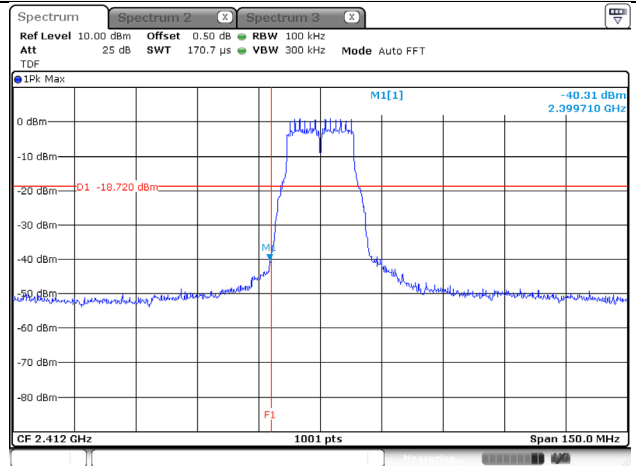
KCTL

802.11g

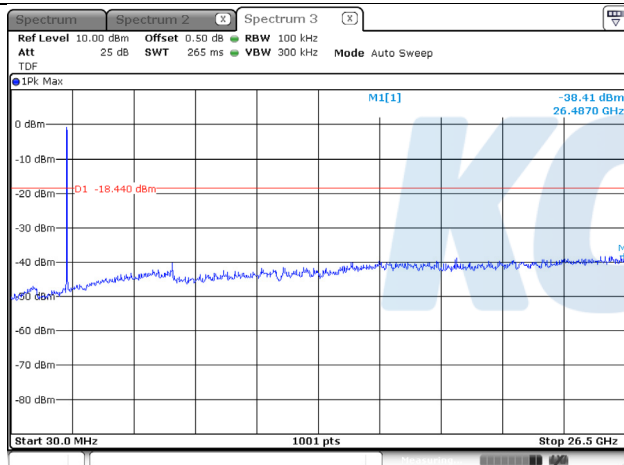
Conducted Emissions



Band edge



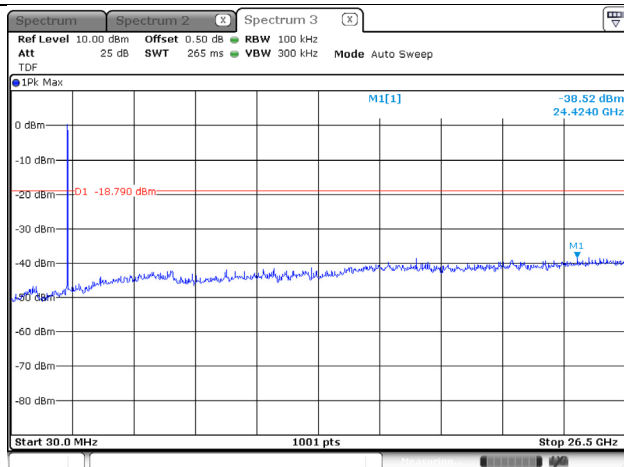
2 412 MHz



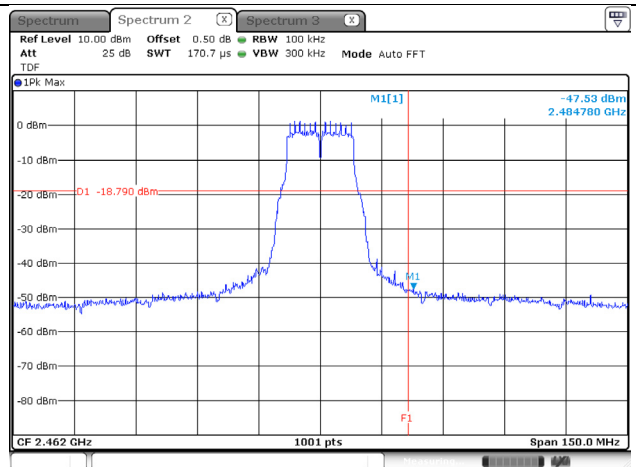
2 412 MHz

Blank

2 437 MHz



2 437 MHz



2 462 MHz

2 462 MHz

KCTL Inc.

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

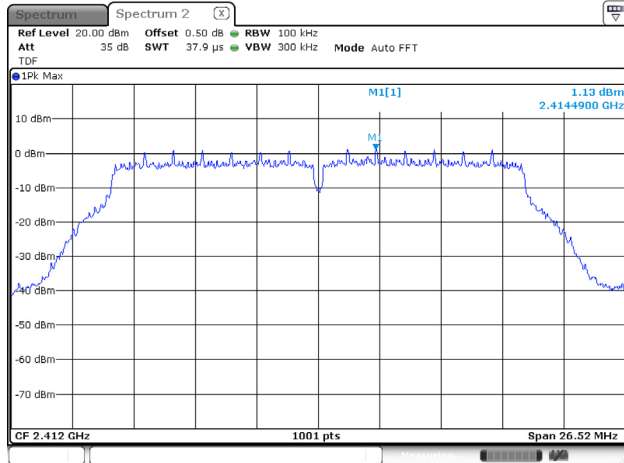
Report No.:
KR19-SRF0069

Page (58) of (63)

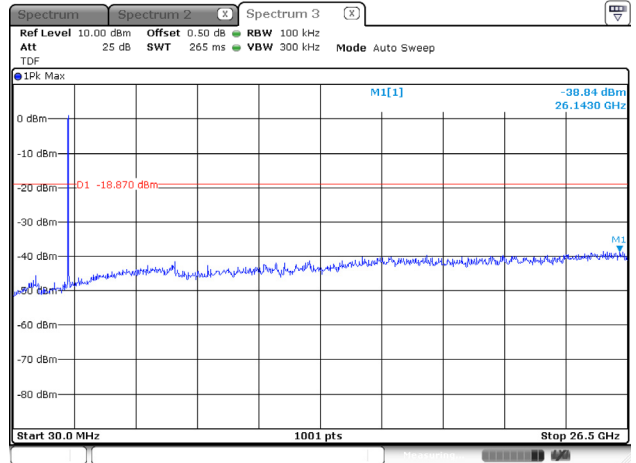
KCTL

802.11n HT20

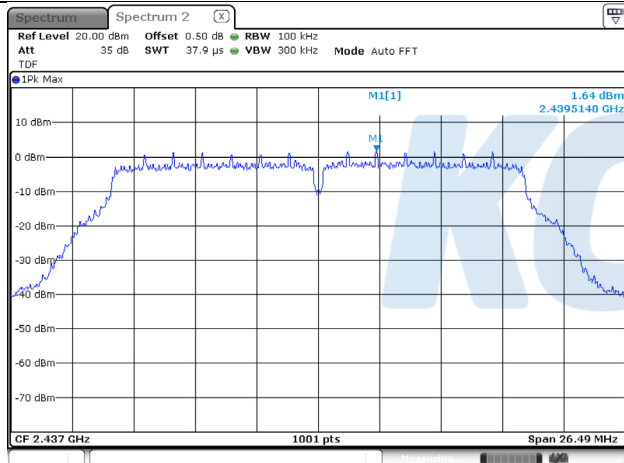
Reference



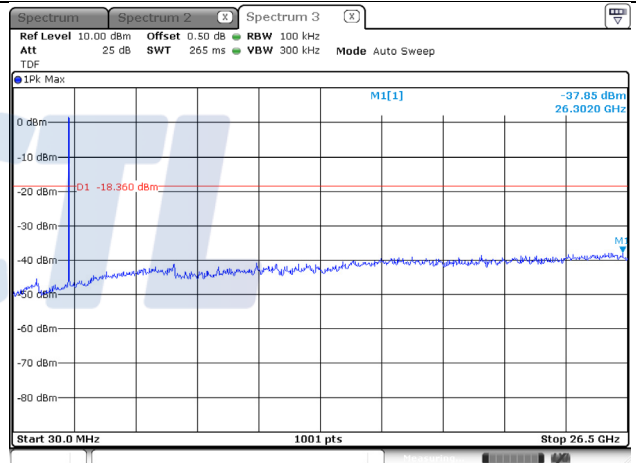
Conducted Emissions



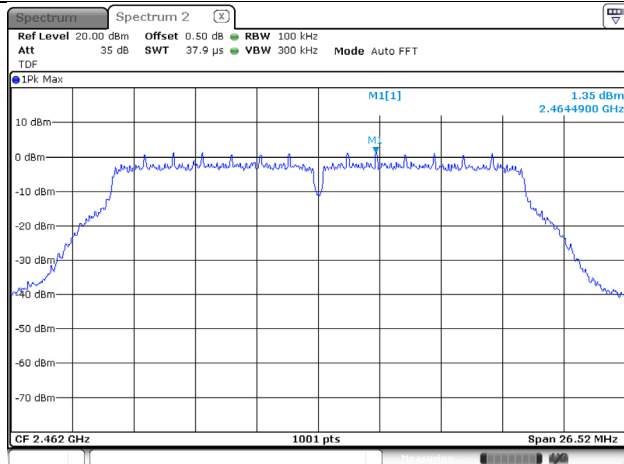
2 412 MHz



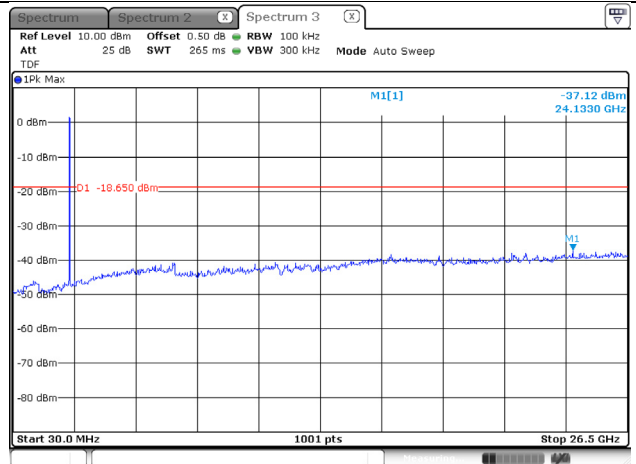
2 412 MHz



2 437 MHz



2 437 MHz



2 462 MHz

2 462 MHz

KCTL Inc.

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

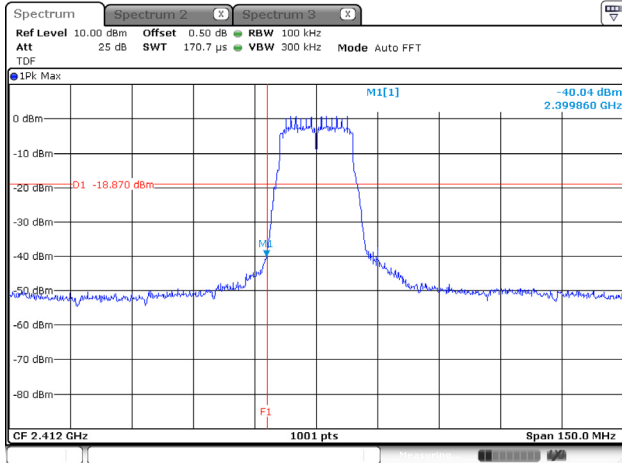
Report No.:
KR19-SRF0069

Page (59) of (63)

KCTL

802.11n HT20

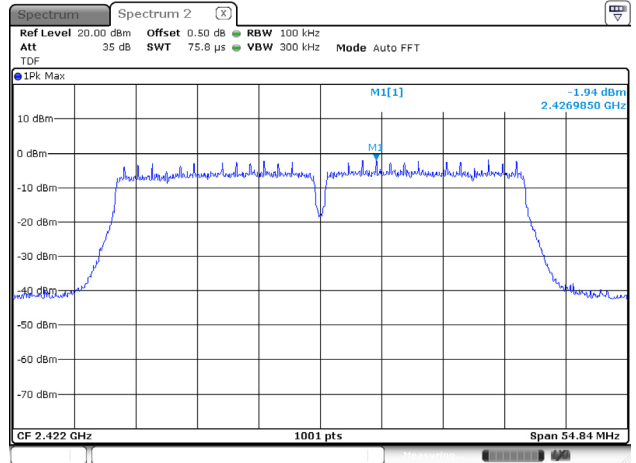
Band edge



2 412 MHz

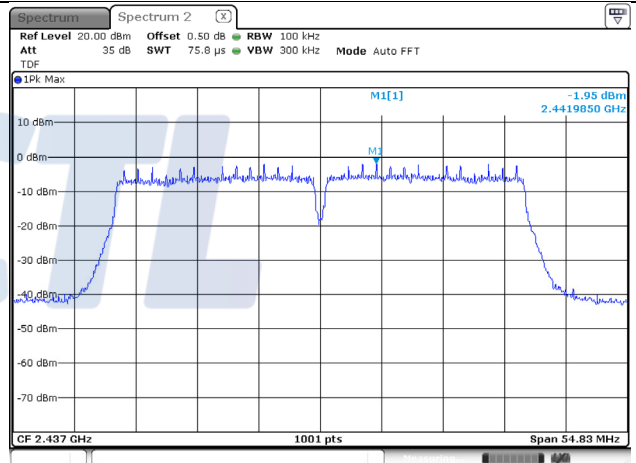
802.11n HT40

Reference



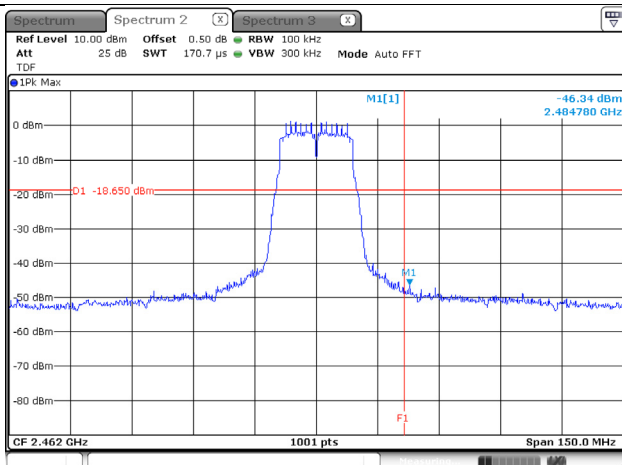
2 422 MHz

Blank

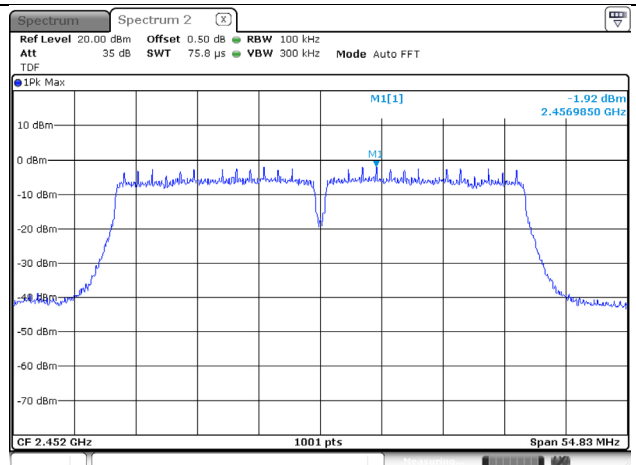


2 437 MHz

2 437 MHz



2 462 MHz



2 452 MHz

KCTL Inc.

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

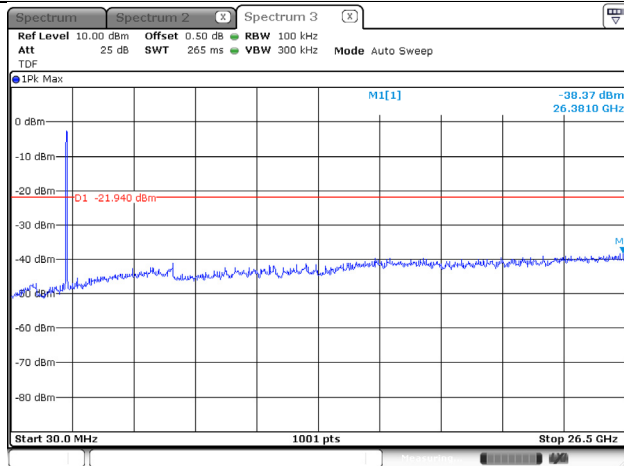
Report No.:
KR19-SRF0069

Page (60) of (63)

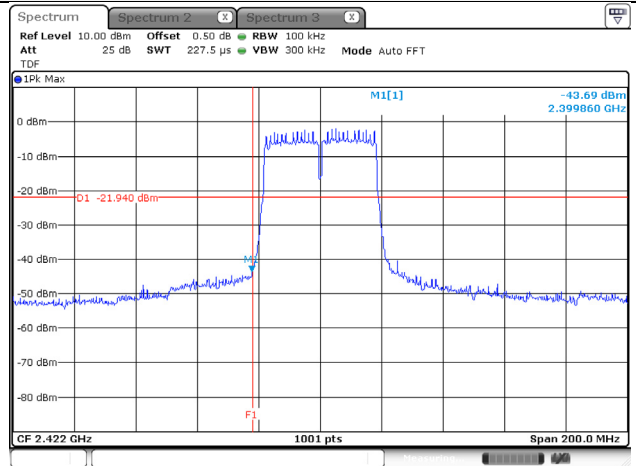
KCTL

802.11n HT40

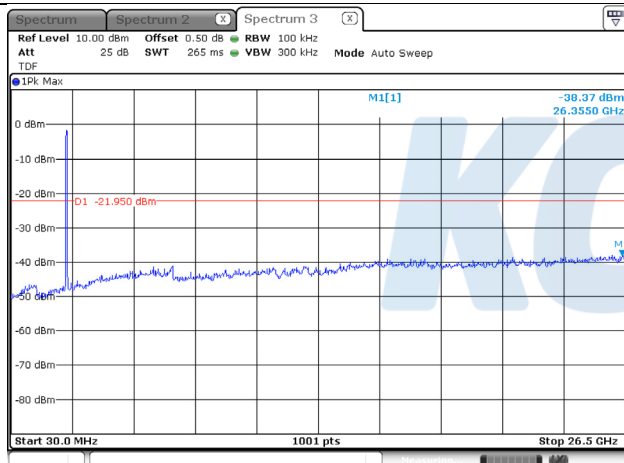
Conducted Emissions



Band edge



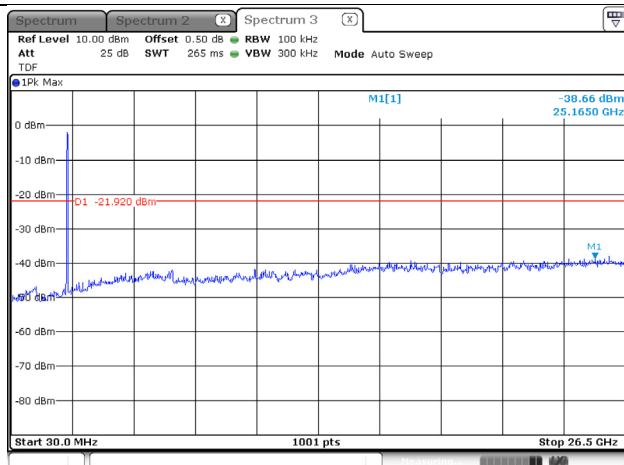
2 422 MHz



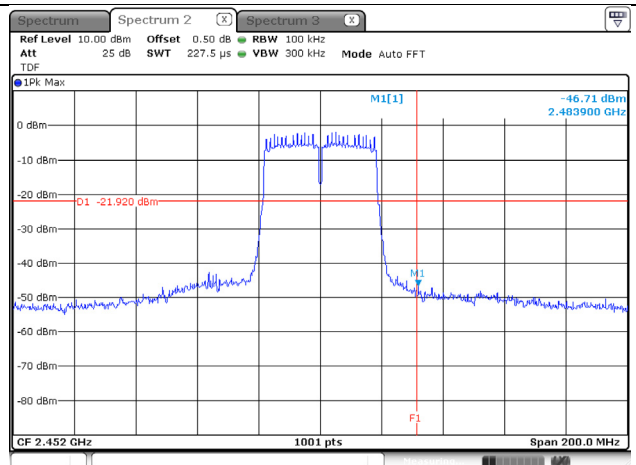
2 422 MHz

Blank

2 437 MHz



2 437 MHz

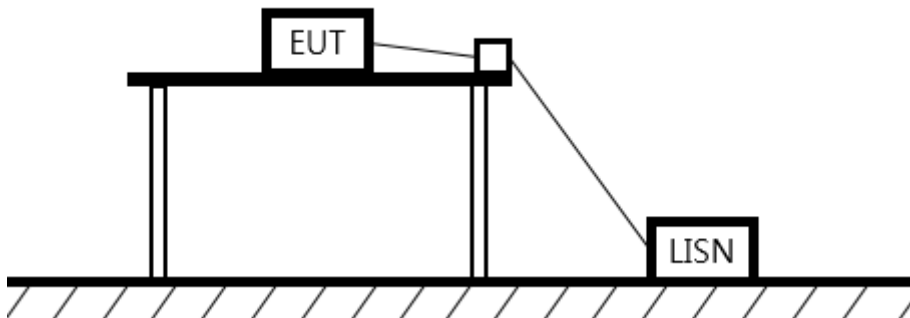


2 452 MHz

2 452 MHz

7.6. AC Conducted emission

Test setup



Limit

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 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.

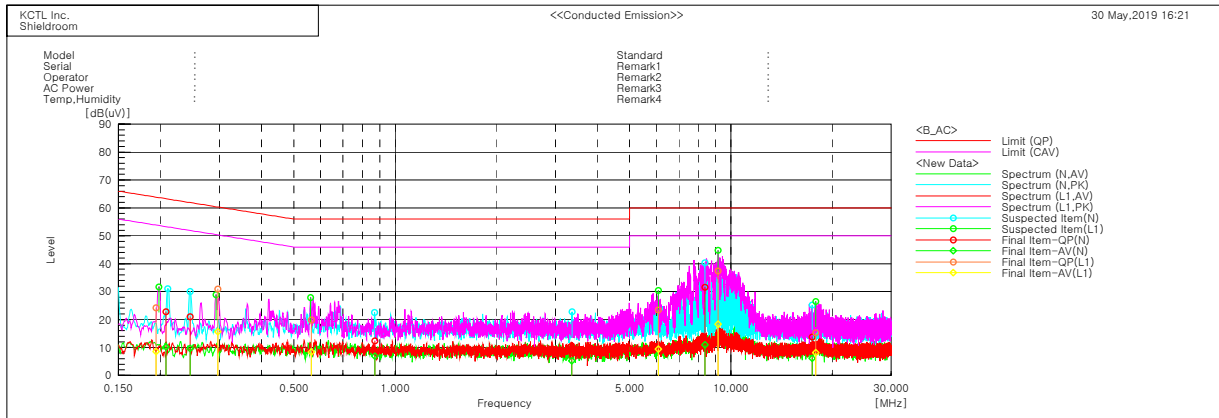
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR19-SRF0069

Page (62) of (63)



Test results



Final Result

--- N Phase ---										
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.20768	13.0	0.4	9.8	22.8	10.2	63.3	53.3	40.5	43.1
2	0.24517	11.4	0.1	9.6	21.0	9.7	61.9	51.9	40.9	42.2
3	0.87084	2.5	-2.9	9.8	12.3	6.9	56.0	46.0	43.7	39.1
4	3.36093	0.9	-4.4	9.7	10.6	5.3	56.0	46.0	45.4	40.7
5	8.36383	21.7	1.1	9.8	31.5	10.9	60.0	50.0	28.5	39.1
6	17.45959	3.7	-3.9	10.0	13.7	6.1	60.0	50.0	46.3	43.9

--- L1 Phase ---										
No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]
1	0.19406	14.2	-1.5	10.0	24.2	8.5	63.9	53.9	39.7	45.4
2	0.29683	21.2	5.9	9.8	31.0	15.7	60.3	50.3	23.3	34.6
3	0.56265	10.0	-1.5	9.9	19.9	8.4	56.0	46.0	36.1	37.6
4	6.07778	13.6	-0.4	9.8	23.4	9.4	60.0	50.0	36.6	40.6
5	9.16326	27.6	8.4	9.9	37.5	18.3	60.0	50.0	22.5	31.7
6	17.88655	5.1	-2.0	10.2	15.3	8.2	60.0	50.0	44.7	41.8

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV30	101437	19.08.01
Spectrum Analyzer	R&S	FSV40	100988	20.01.04
Wideband Power Sensor	R&S	NRP-Z81	102398	20.01.25
Attenuator	API Inmet	40AH2W-10	12	20.05.15
Attenuator	HP	8491A	29738	20.01.04
Vector Signal Generator	R&S	SMBV100A	257566	20.01.04
Signal Generator	R&S	SMR40	100007	20.05.13
EMI TEST RECEIVER	R&S	ESCI7	100732	19.08.23
EMI TEST RECEIVER	R&S	ESCI3	100001	19.08.23
High pass Filter	WT	WT-A1698-HS	WT160411001	20.05.14
TWO-LINE V - NETWORK	R&S	ENV216	101584	20.04.05
Bi-Log Antenna	SCHWARZBECK	VULB 9168	583	20.05.21
COAXIAL FIXED ATTENUATOR	Agilent	8491B-003	2708A18758	20.05.04
Horn antenna	ETS.lindgren	3116	00086635	20.05.09
Horn antenna	ETS.lindgren	3117	161225	20.05.22
Amplifier	SONOMA INSTRUMENT	310N	284608	19.08.23
Amplifier	L-3 Narda-MITEQ	AMF-7D-01001800-22-10P	2031196	20.02.21
Amplifier	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000997	19.08.02
Loop Antenna	R&S	HFH2-Z2	100355	20.08.24
Antenna Mast	Innco Systems	MA4640-XP-ET	-	-
Antenna Mast	Innco Systems	MA4000-EP	303	-
Turn Table	Innco Systems	DT2000	79	-
Turn Table	Innco Systems	DT2000	79	-
Cable Assembly	RadiAll	2301761768000PJ	1724.659	-
Cable Assembly	gigalane	RG-400	-	-

End of test report