TEST REPORT

CTK Co., Ltd.
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Report No.: CTK-2019-04513

1. Client

◦ Name : NEOLAB CONVERGENCE

◦ Address : #1501, Mario Tower, 28, Digital-ro 30-gil, Guro-gu, Seoul, Korea 08389

◦ Date of Receipt : 2019-10-25

2. Manufacturer

◦ Name : NEOLAB CONVERGENCE

◦ Address : #1501, Mario Tower, 28, Digital-ro 30-gil, Guro-gu, Seoul, Korea 08389

3. Use of Report : For FCC Certification & Canadian Certification

4. Test Sample / Model: NEO SMARTPEN dimo / NWP-F30

5. Date of Test : 2019-11-06 to 2019-11-11

6. Test Standard(method) used : FCC 47 CFR part 15 subpart C 15.247
RSS-247, RSS-Gen

7. Testing Environment: Temp.: (22 ± 1) ℃, Humidity: (52 ± 3) % R.H.

8. Test Results : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by Bongjun, Jang: (Signature)	Technical Manager Young-taek Lee: (Signature)

2019-11-15

Republic of KOREA **CTK Co., Ltd.**

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REPORT REVISION HISTORY

Date	Revision	Page No
2019-11-15	Issued (CTK-2019-04513)	all

CONTENTS

1. General Product Description

1.1 Client Information

Company	NEOLAB CONVERGENCE
Contact Point	#1501, Mario Tower, 28, Digital-ro 30-gil, Guro-gu, Seoul, Korea 08389
Contact Person	Name : Cho Min-gu E-mail : mgcho@neolab.net Tel : +82-2-2284-9241 Fax : +82-2-3462-2983

1.2 Product Information

FCC ID	2AALG-NWP-F30
IC	21452-NWPF30
Product Description	NEO SMARTPEN dimo
Model name	NWP-F30
Operating Frequency	2 402 MHz - 2 480 MHz
RF Output Power	1.64 dBm (1.459 mW)
Antenna Specification	Antenna type : PCB Pattern antenna Peak Gain : 1.62 dBi
Number of channels	40
Channel Spacing	2 MHz
Type of Modulation	GFSK
Power Source	DC 1.5 V(Battery)
Firmware Version Id Number(FVIN)	REV. 1.0
Test SW Version	WCN_COMBO_TOOL
RF Power setting in Test SW	Initial value

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Notebook	SAMSUNG Electronics	NT951SBE	1A8691AM500016R
AC Adapter	Chicony Power Technology	W18-065N1A	PD-65AWNKR

2. Facility and Accreditations

2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea.

2.2 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	8737A-2
KOREA	NRRA	KR0025

2.3 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

3. Test Specifications

3.1 Standards

Section in FCC	Section in RSS	Requirement(s)	Status (Note 1)	Test Condition
15.247(a)	RSS-247 5.2(a)	6 dB Bandwidth	C	Conducted
15.247(e)	RSS-247 5.2(b)	Transmitter power spectral density	C	
15.247(b)	RSS-247 5.4(d)	Maximum peak conducted output power	C	
15.247(d)	RSS-247 5.5	Unwanted emission	C	
15.209	RSS-Gen 6.13	Transmitter emission	C	Radiated
15.207(a)	RSS-Gen 8.8	AC Conducted Emission	C	Line Conducted
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable				
Note 2: The data in this test report are traceable to the national or international standards.				
Note 3: The sample was tested according to the following specification: FCC Part 15.247, ANSI C63.10-2013, RSS-247 Issue 2, RSS-Gen Issue 5				
Note 4: The tests were performed according to the method of measurements prescribed in KDB No.558074.				

3.2 Mode of operation during the test

The EUT is operated in a manner representative of the typical of the equipments.
During at testing, system components were manipulated within the confines of typical usage to maximize each emission. All modulation modes were tests.
The results are only attached worst cases.

Test Frequency

Lowest channel	Middle channel	Highest channel
2 402 MHz	2 440 MHz	2 480 MHz

Test mode

Modulation	Duty Cycle
GFSK	62.4%

3.3 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.
Coverage factor k = 2, Confidence levels of 95 %

Description	Uncertainty
Conducted RF Output Power	1.5 dB
Occupied Bandwidth	0.1 MHz
Unwanted Emission(conducted)	3.0 dB
Radiated Emissions (f ≤ 1 GHz)	4.0 dB
Radiated Emissions (f > 1 GHz)	5.0 dB

4. Technical Characteristic Test

4.1 6dB Bandwidth

Test Procedures(ANSI C63.10-2013 6.9.2)

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Procedures(ANSI C63.10-2013 6.9.3)

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.
Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

Test Settings :

Center frequency = the highest, middle and the lowest channels

a) RBW = 100 kHz

b) VBW ≥ 3 x RBW

c) Detector = peak

d) Trace mode = Max hold

e) Sweep = auto couple

f) Allow trace to fully stabilize

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Limit :

6 dB Bandwidth	>	500kHz

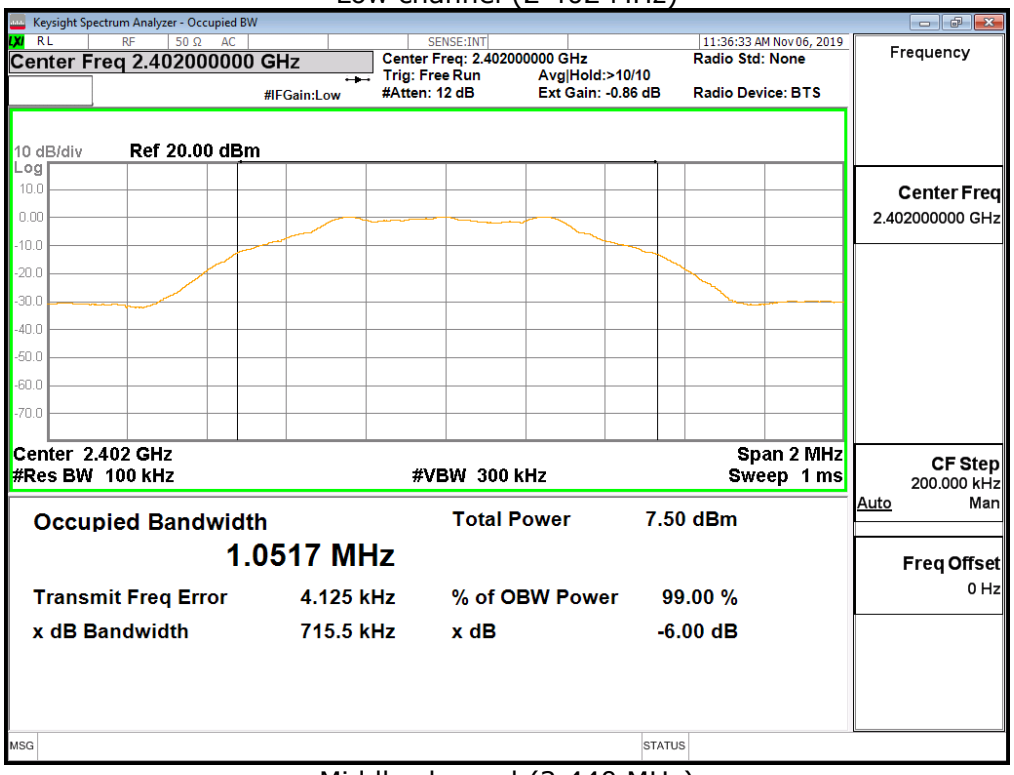
Test Data :

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	99 % Bandwidth [MHz]	Result
Low	2 402	0.716	1.052	Complies
Middle	2 440	0.712	1.052	Complies
High	2 480	0.714	1.052	Complies

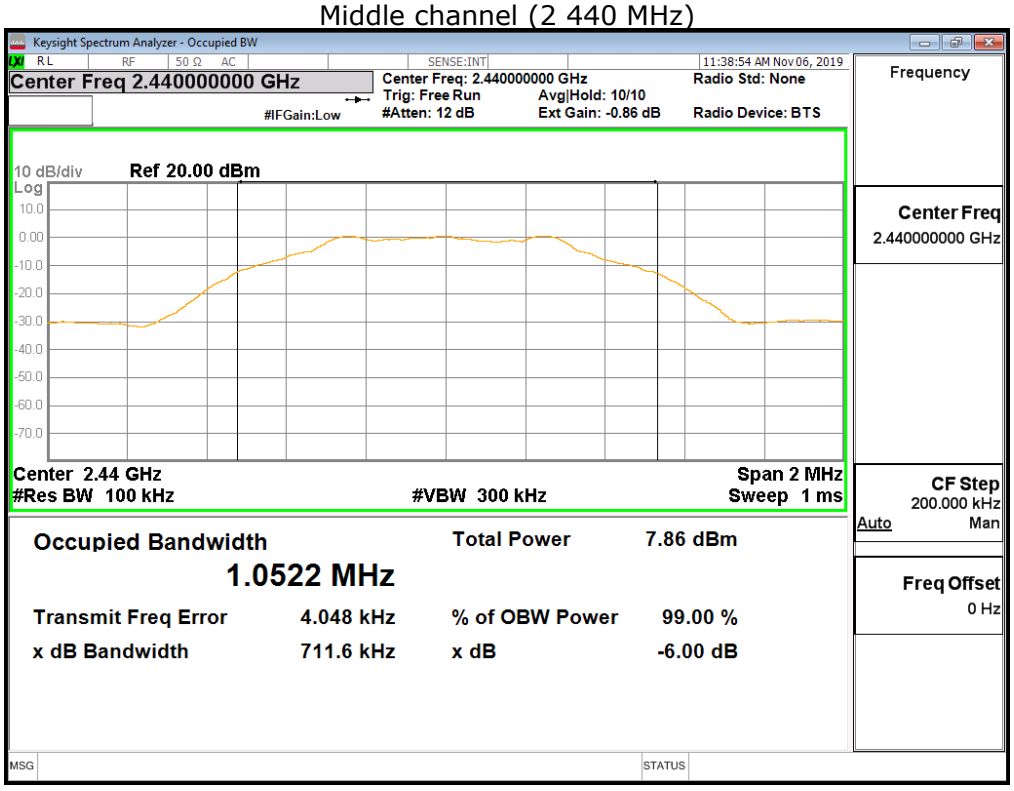
See next pages for actual measured spectrum plots.

6dB Bandwidth & 99% Bandwidth

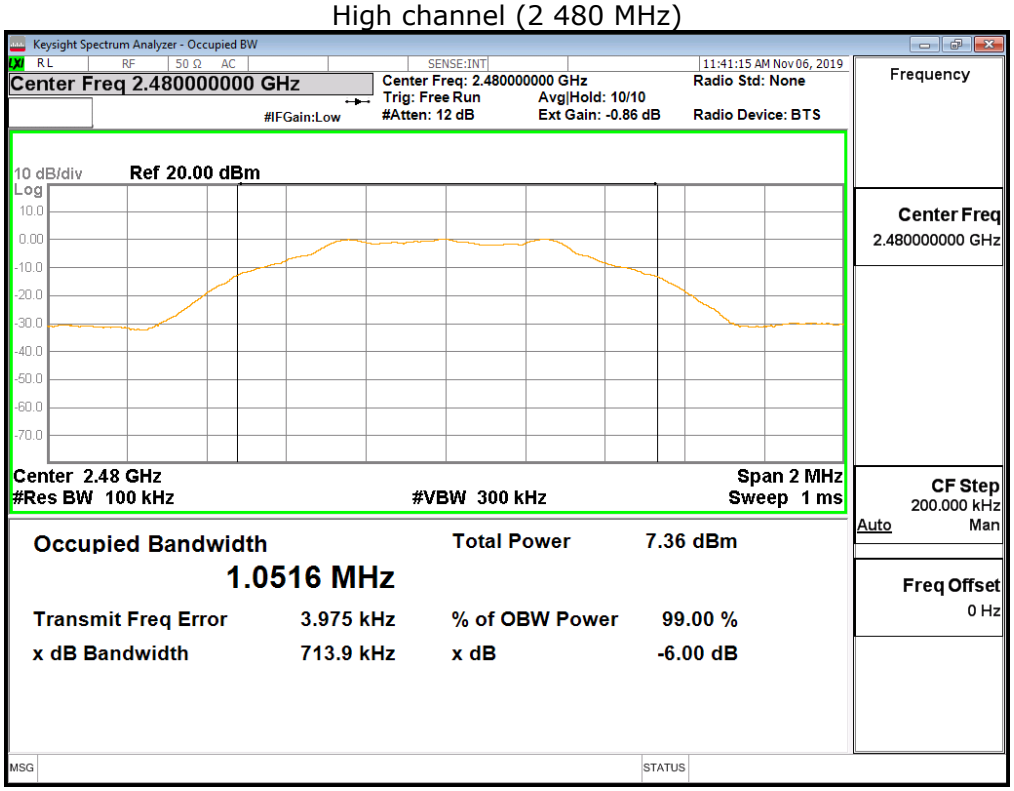
Low channel (2 402 MHz)



Middle channel (2 440 MHz)



High channel (2 480 MHz)



4.2 Maximum peak Conducted Output Power

Test Procedures(ANSI C63.10-2013 11.9.1)

The following procedure can be used when the maximum available RBW of the instrument is less than the DTS bandwidth:

Test Settings:

Center frequency = the highest, middle and the lowest channels

a) RBW ≥ DTS Bandwidth

b) VBW ≥ 3 x RBW

c) span ≥ 3 x RBW

d) Sweep time = auto couple

e) Detector = peak

f) Trace mode= max hold

g) Allow trace to fully stabilize

h) Use peak marker function to determine the peak amplitude level.

Limit :

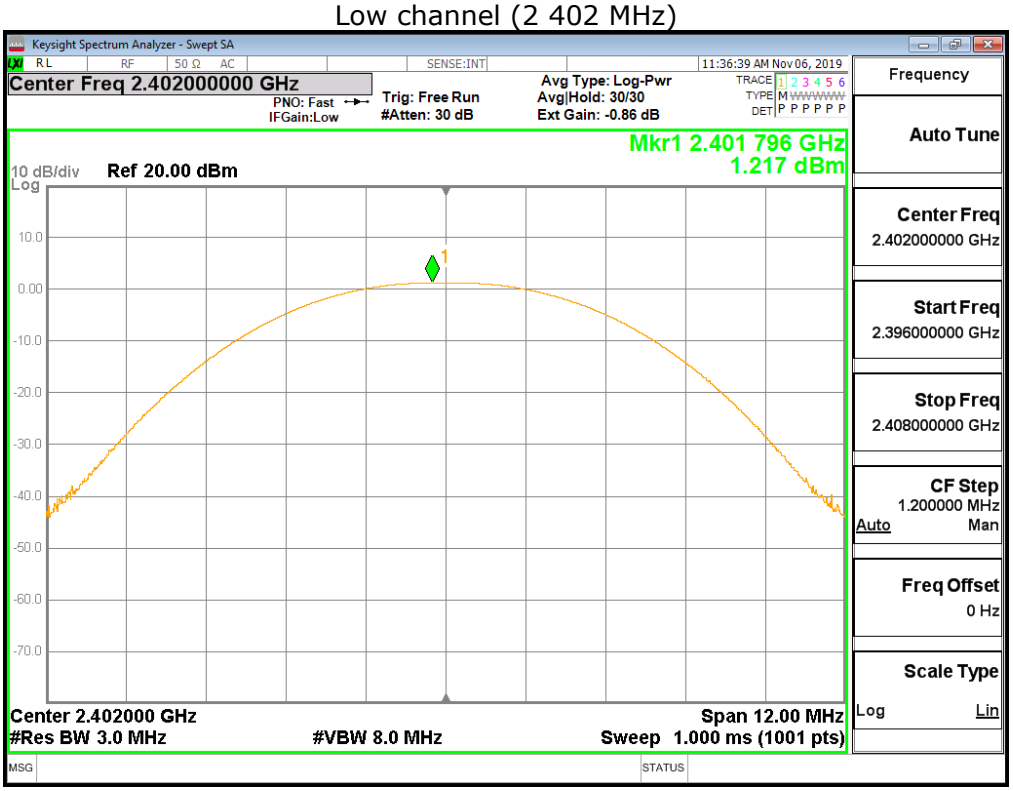
Maximum Output Power < 1 W (30 dBm)

Test Data :

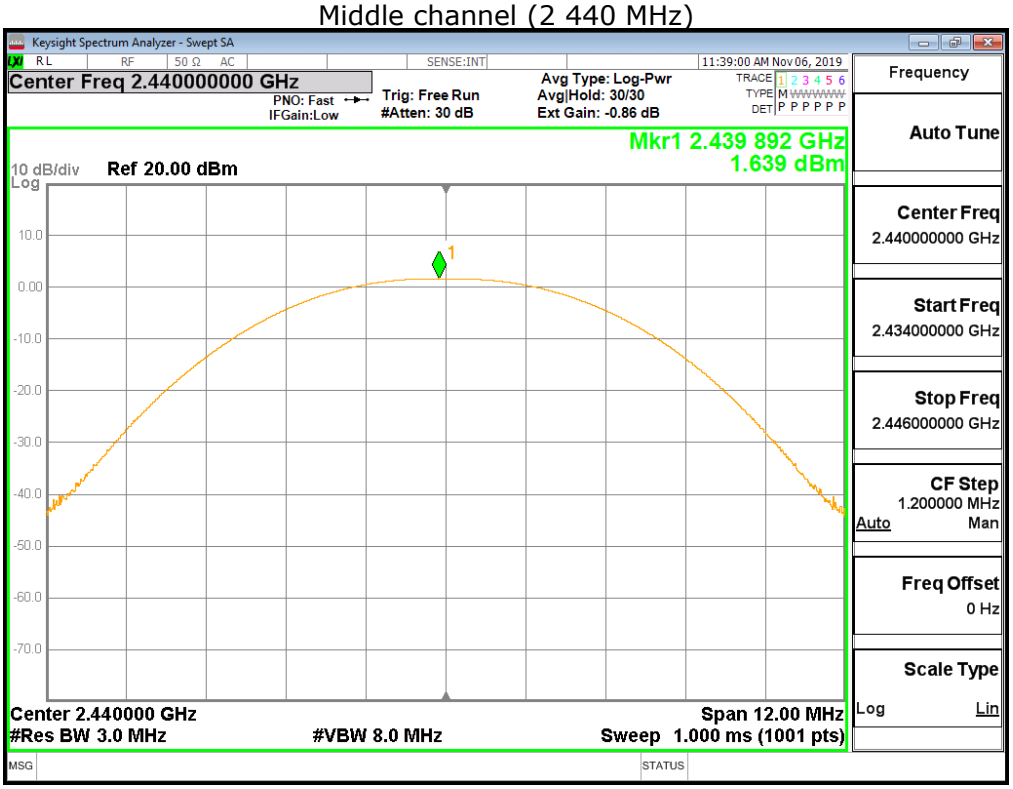
Channel	Frequency [MHz]	Measurement data [dBm]	Limit [dBm]	Result
Low	2 402	1.22	30	Complies
Middle	2 440	1.64	30	Complies
High	2 480	1.14	30	Complies

See next pages for actual measured spectrum plots.

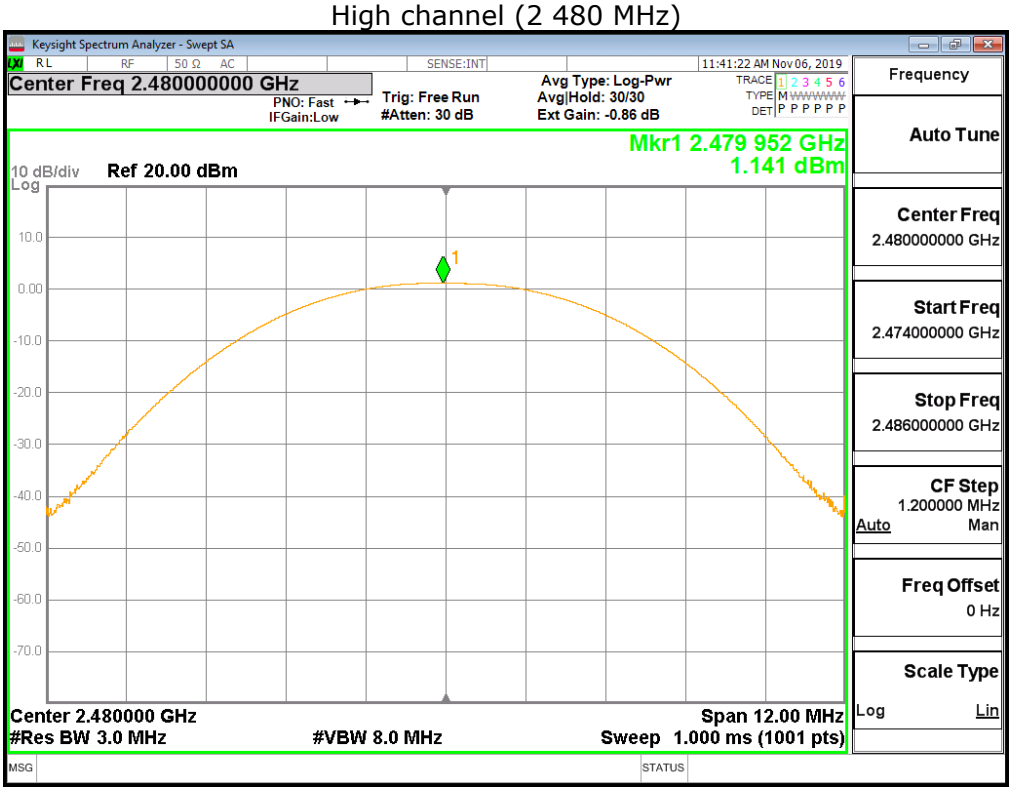
Low channel (2 402 MHz)



Middle channel (2 440 MHz)



High channel (2 480 MHz)



4.3 Power Spectral Density

Test Procedures(ANSI C63.10-2013 11.10.2)

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance.

Test Settings:

Center frequency = the highest, middle and the lowest channels

a) RBW : 3 kHz ≤ RBW ≤ 100 kHz

b) VBW ≥ 3 x RBW

c) span ≥ 1.5 x DTS bandwidth

d) Sweep time = auto couple

e) Detector = peak

f) Trace mode= max hold

g) Allow trace to fully stabilize

h) Use the peak marker function to determine the maximum amplitude level within the RBW.

Limit :

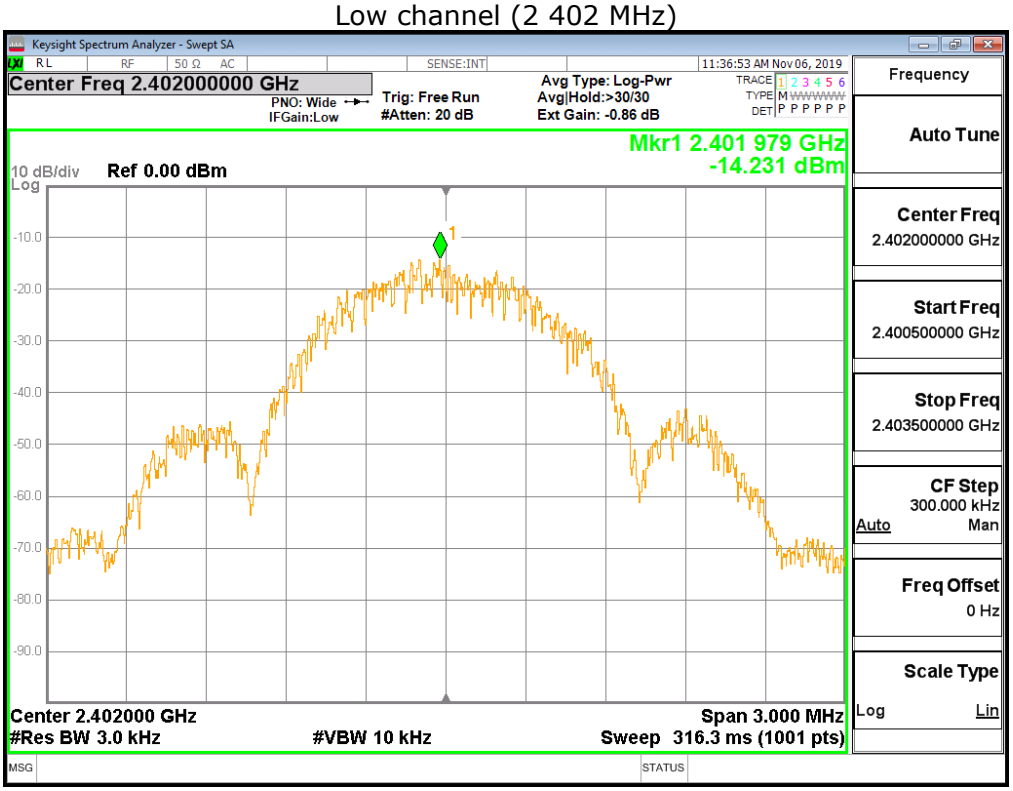
Power Spectral Density < 8 dBm @ 3 kHz BW

Test Data :

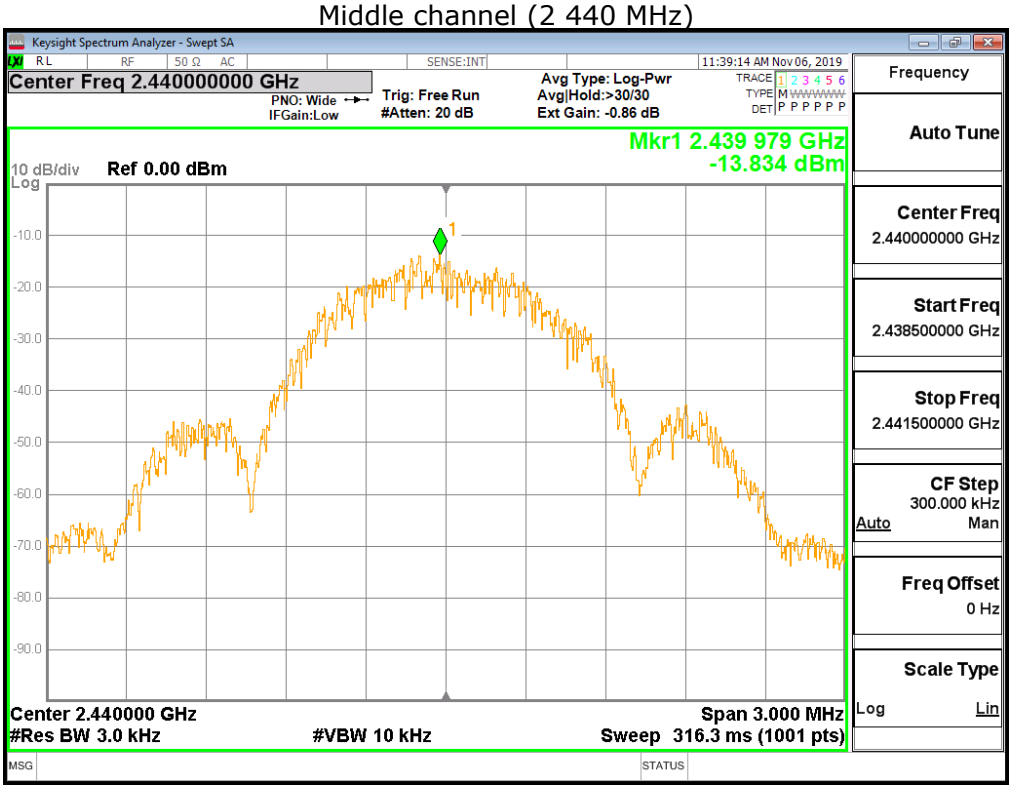
Channel	Frequency [MHz]	Measurement data [dBm]	Limit [dBm]	Result
Low	2 402	-14.23	8	Complies
Middle	2 440	-13.83	8	Complies
High	2 480	-14.39	8	Complies

See next pages for actual measured spectrum plots.

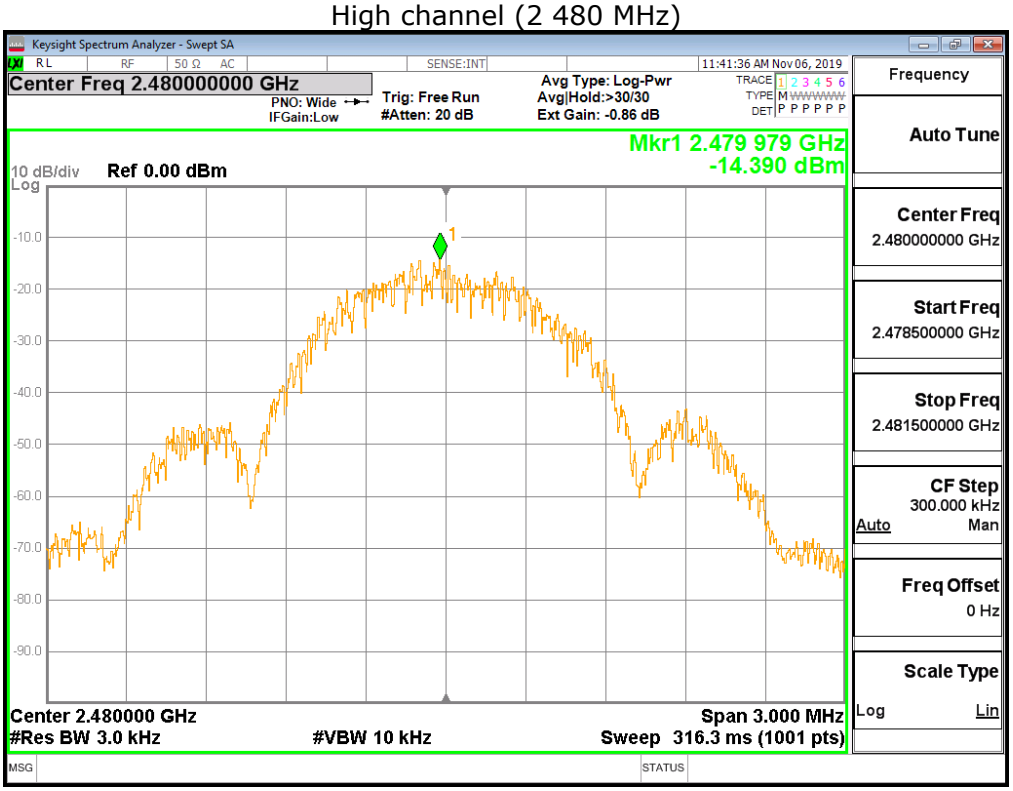
Low channel (2 402 MHz)



Middle channel (2 440 MHz)



High channel (2 480 MHz)



4.4 Band Edge & Conducted Spurious emission

Test Procedures(ANSI C63.10-2013 11.11.3)

The Unwanted emission from the EUT were measured according to the dictates PKPSD measurement procedure in section 11.11 of ANSI C63.10-2013.

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

Test Settings:

Center frequency = the highest, middle and the lowest channels

a) RBW = 100 kHz
b) VBW ≥ 3 x RBW
c) Detector = peak
d) Sweep time = auto couple
e) Trace mode= max hold
f) Allow trace to fully stabilize
g) Use the peak marker function to determine the maximum amplitude level.

Limit :

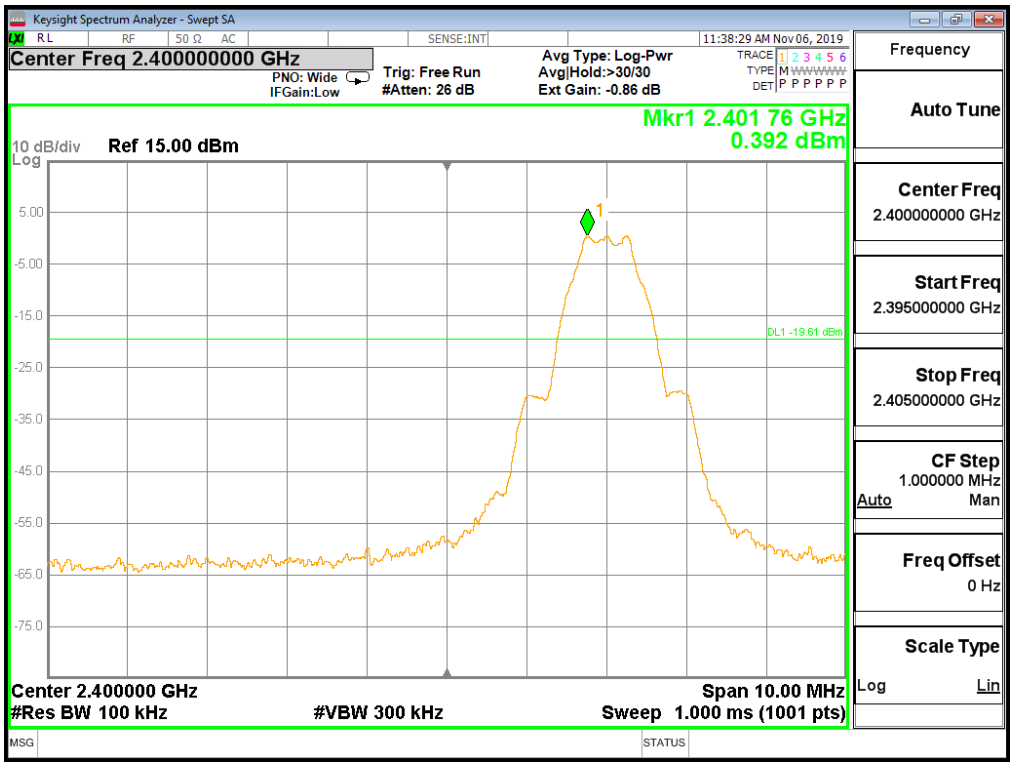
Emission level < 20 dBc

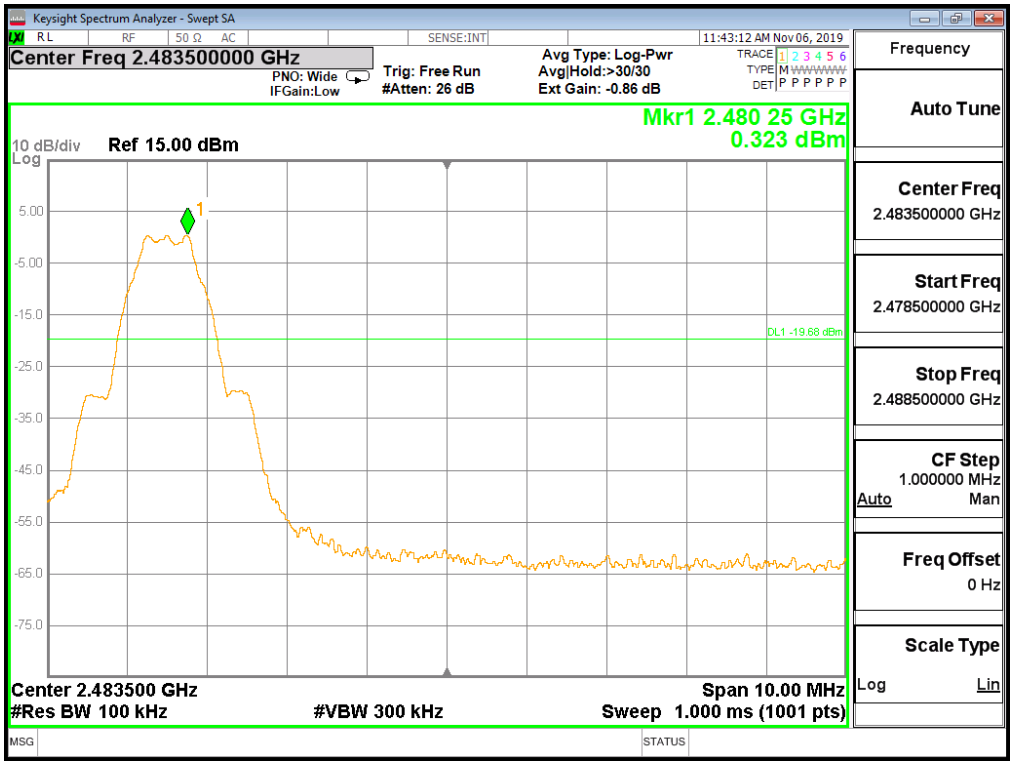
Test results: Complies

- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest in-band spectral density. Therefore the applying equipment meets the requirement.

See next pages for actual measured spectrum plots.

Band-edge


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.400000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.86 dB
11:38:29 AM Nov 06, 2019
Mkr1 2.401 76 GHz
0.392 dBm
10 dB/div
Log
Ref 15.00 dBm
DL1 -19.61 dBm
Center 2.400000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.400000000 GHz
Start Freq
2.395000000 GHz
Stop Freq
2.405000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
MSG
STATUS


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.483500000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 26 dB
Avg Type: Log-Pwr
Avg|Hold:>30/30
Ext Gain: -0.86 dB
11:43:12 AM Nov 06, 2019
Mkr1 2.480 25 GHz
0.323 dBm
10 dB/div
Log
Ref 15.00 dBm
DL1 -19.68 dBm
Center 2.483500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10.00 MHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.483500000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.488500000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
MSG
STATUS

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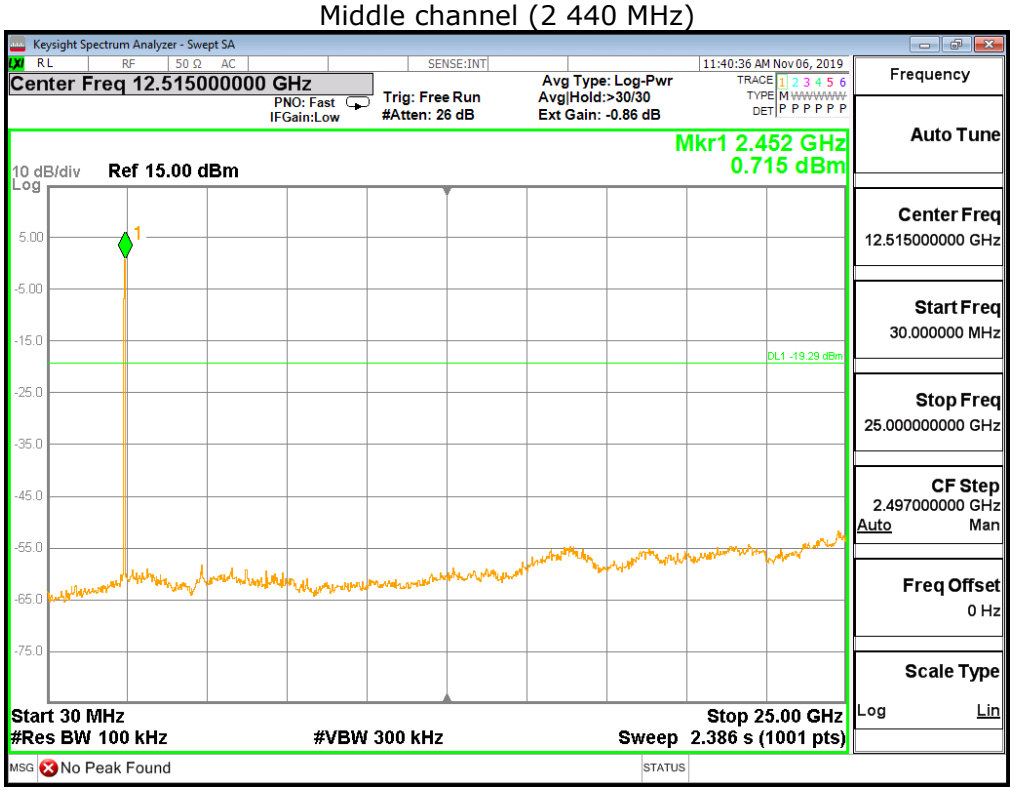
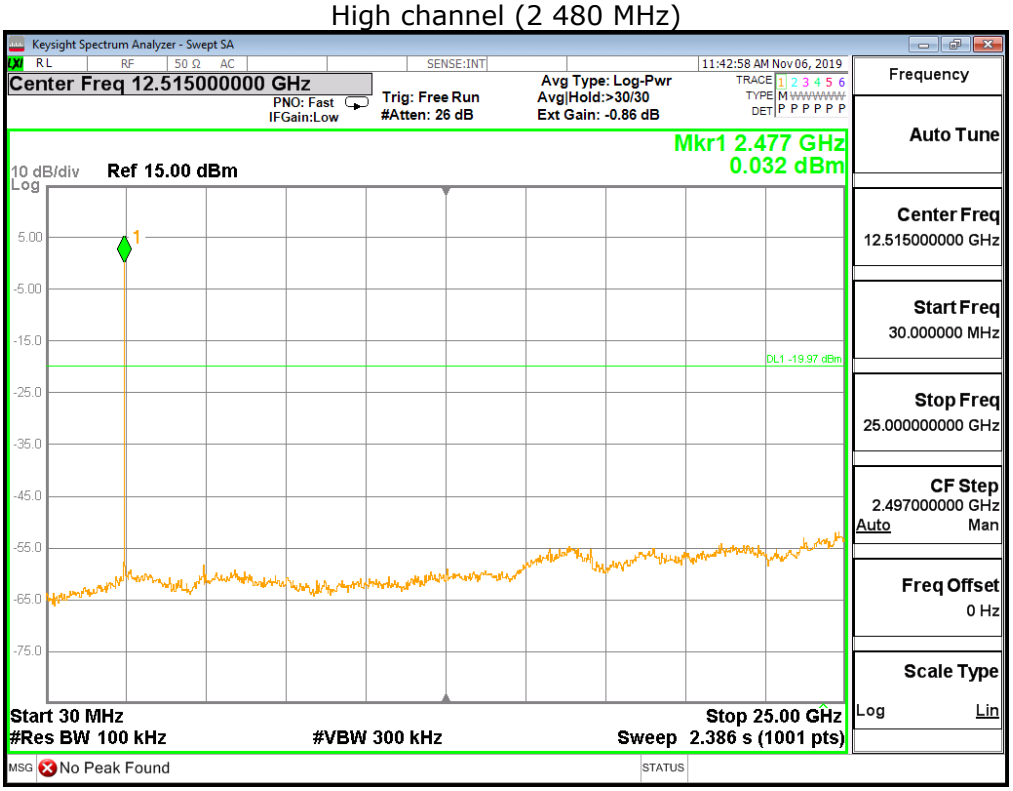
Conducted Spurious emission

Low channel (2 402 MHz)

Middle channel (2 440 MHz)



High channel (2 480 MHz)



4.5 Radiated Emission

Test Location

☒ 10 m SAC (test distance : ☐ 10 m, ☒ 3 m)
☒ 3 m SAC (test distance : 3 m)

Test Procedures

1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
2) In the frequency rage above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

Instrument Settings

Frequency Range = 9 kHz ~ 25 GHz (2.4 GHz 10^{th} harmonic)

a) RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz, 9 kHz for f < 30 MHz

b) VBW ≥ RBW

c) Sweep time = auto couple

Limit :

Unwanted emissions that do not fall within the restricted frequency bands of Table 1 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

FCC Part 15 § 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

Table 1. Restricted Frequency Bands

MHz	MHz	MHz	MHz	MHz	GHz
0.09-0.11	8.37626-8.38675	73-74.6	399.9-410	2690-2900	10.6-12.7
[1]0.495-0.505	8.41425-8.41475	74.8-75.2	608-614	3260-3267	13.25-13.4
2.1735-2.1905	12.29-12.293	108-121.94	960-1240	3332-3339	14.47-14.5
4.125-4.128	12.51975-12.52025	123-138	1300-1427	3345.8-3358	15.35-16.2
4.17725-4.17775	12.57675-12.57725	149.9-150.05	1435-1626.5	3600-4400	17.7-21.4
4.20725-4.20775	13.36-13.41	156.52475-156.52525	1645.5-1646.5	4500-5150	22.01-23.12
6.215-6.218	16.42-16.423	156.7-156.9	1660-1710	5350-5460	23.6-24
6.26775-6.26825	16.69475-16.69525	162.0125-167.17	1718.8-1722.2	7250-7750	31.2-31.8
6.31175-6.31225	16.80425-16.80475	167.72-173.2	2200-2300	8025-8500	36.43-36.5
8.291-8.294	25.5-25.67	240-285	2310-2390	9000-9200	[2]Above 38.6
8.362-8.366	37.5-38.25	322-335.4	2483.5-2500	9300-9500	

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown is Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

FCC Part 15 § 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Except when the requirements applicable to a given device state otherwise, emissions from licence-exempt transmitters shall comply with the field strength limits shown in Table 2 Additionally, the level of any transmitter emission shall not exceed the level of the transmitter's fundamental emission.

Table 2. General Field Strength Limits for Licence-Exempt Transmitters

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705-30	30	-	30
30-88	100**	40	3
88-216	150**	43.5	3
216-960	200**	46	3
Above 960	500	54	3

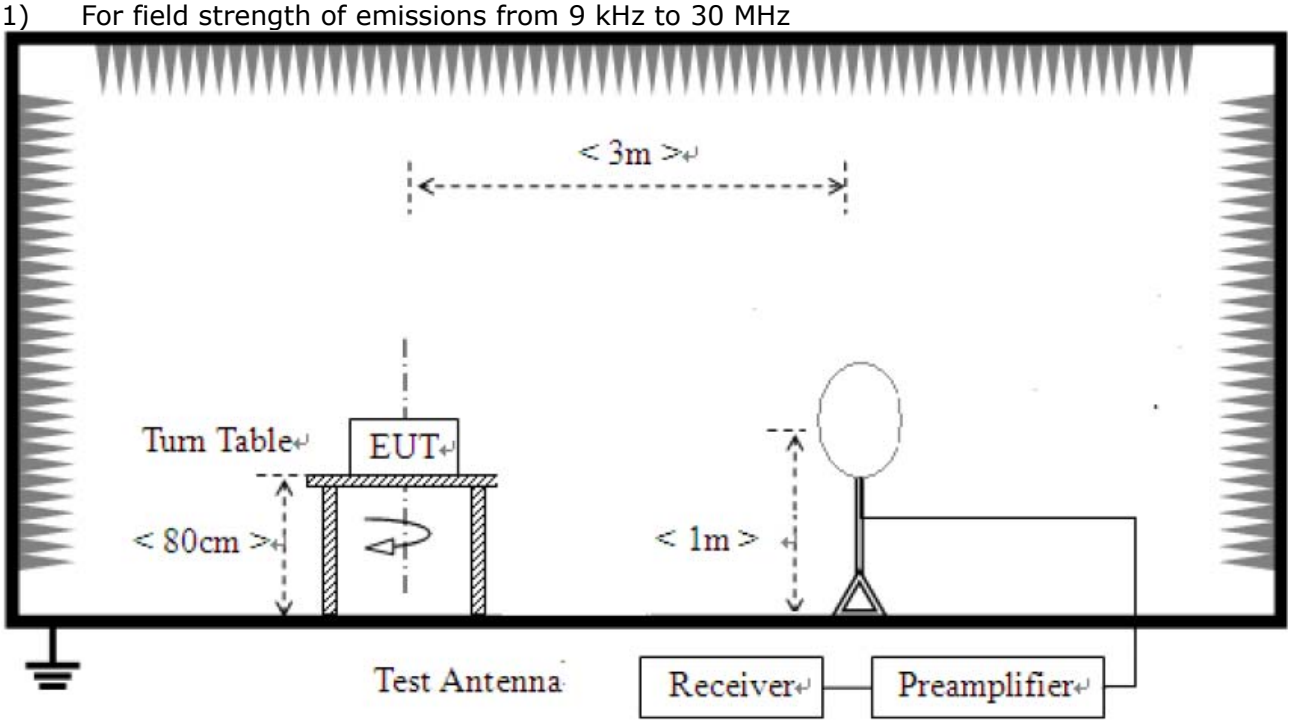
** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Note :

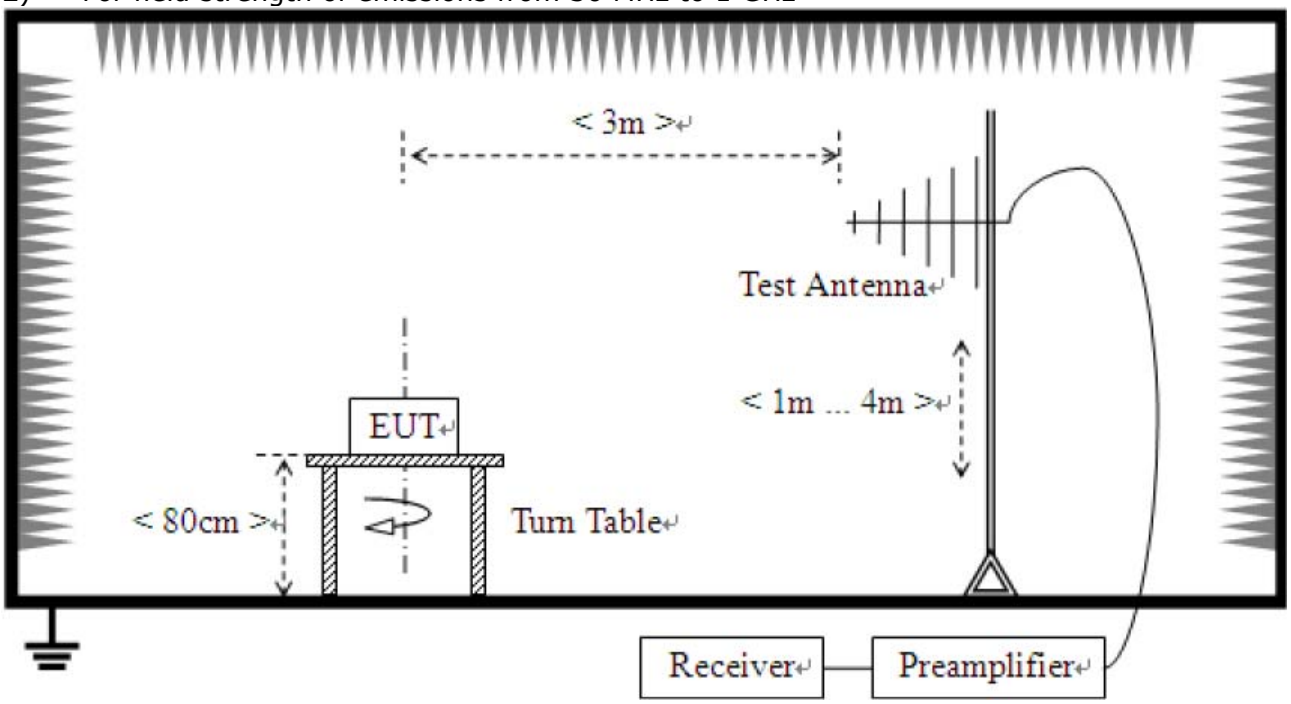
1) For above 1 GHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
2) For above 1 GHz, limit field strength of harmonics : 54 dBuV/m@3m (AV) and 74 dBuV/m@3m (PK)

Test Setup:

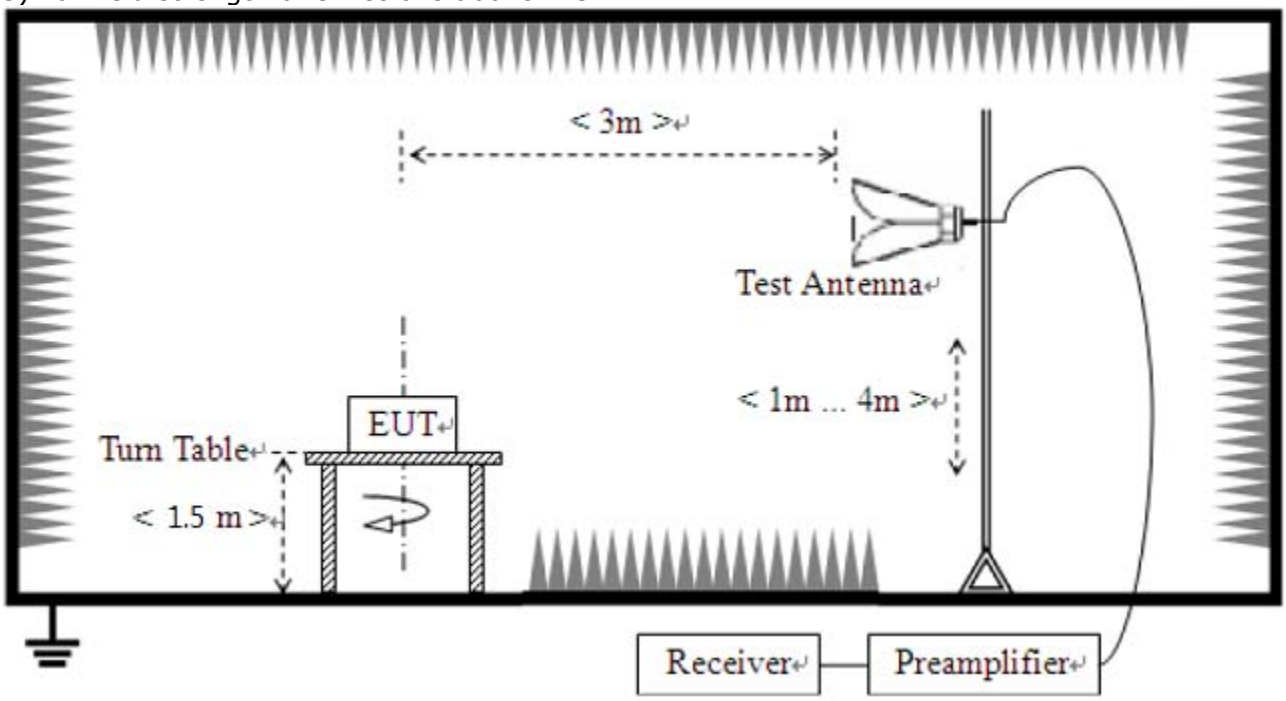
1) For field strength of emissions from 9 kHz to 30 MHz



2) For field strength of emissions from 30 MHz to 1 GHz



3) For field strength of emissions above 1 GHz



Test results

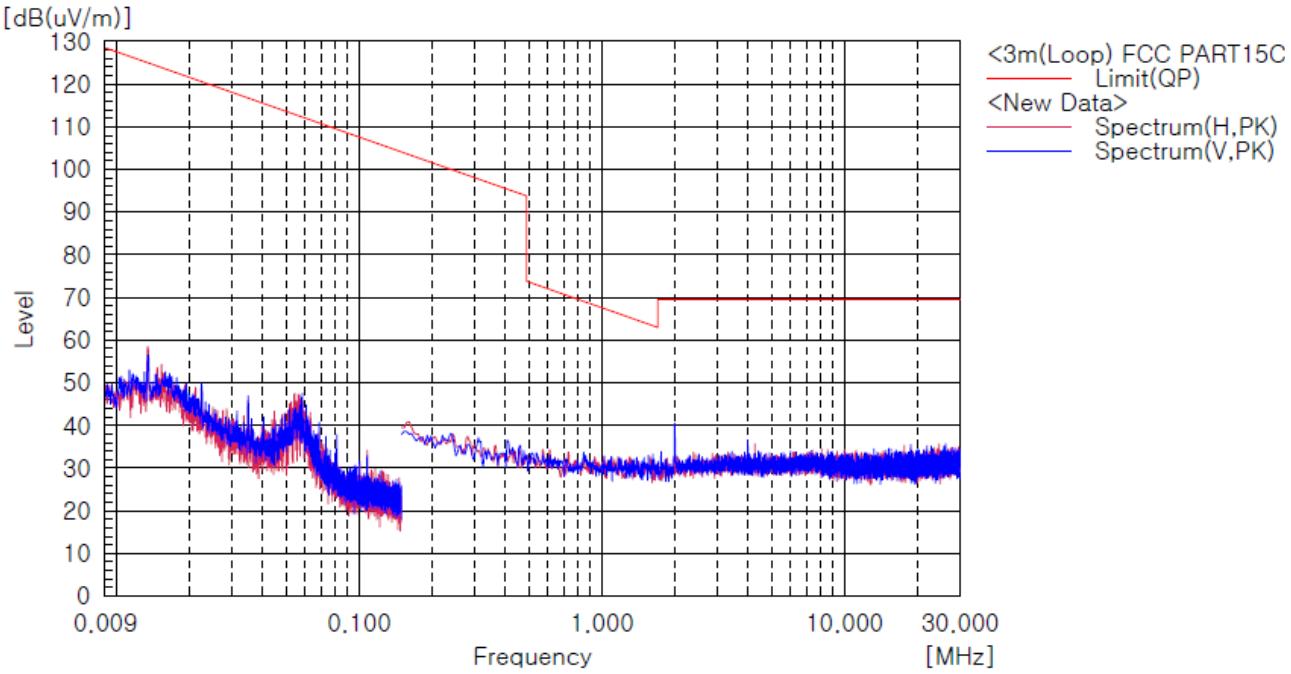
1) 9 kHz to 30 MHz

Test mode : Transmitter mode

The requirements are:
☒ Complies

Test Data

Test Model : NWP-F30
Test Mode : BLE
Tester : JANG, BONG JUN



Frequency [MHz]	(P)	Reading QP [dBuV]	dB [1/m]	Result QP [dBuV/m]	Limit QP [dBuV/m]	Margin QP [dB]
The emissions 9 kHz to 30MHz were 20 dB lower than the limit.						

Note :
1) The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2) The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB)

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Test mode : Receiver mode

The requirements are:
☒ Complies

Frequency [MHz]	(P)	Reading QP [dBuV]	dB [1/m]	Result QP [dBuV/m]	Limit QP [dBuV/m]	Margin QP [dB]
The emissions 9 kHz to 30MHz were 20 dB lower than the limit.						

Note :
1) The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2) The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

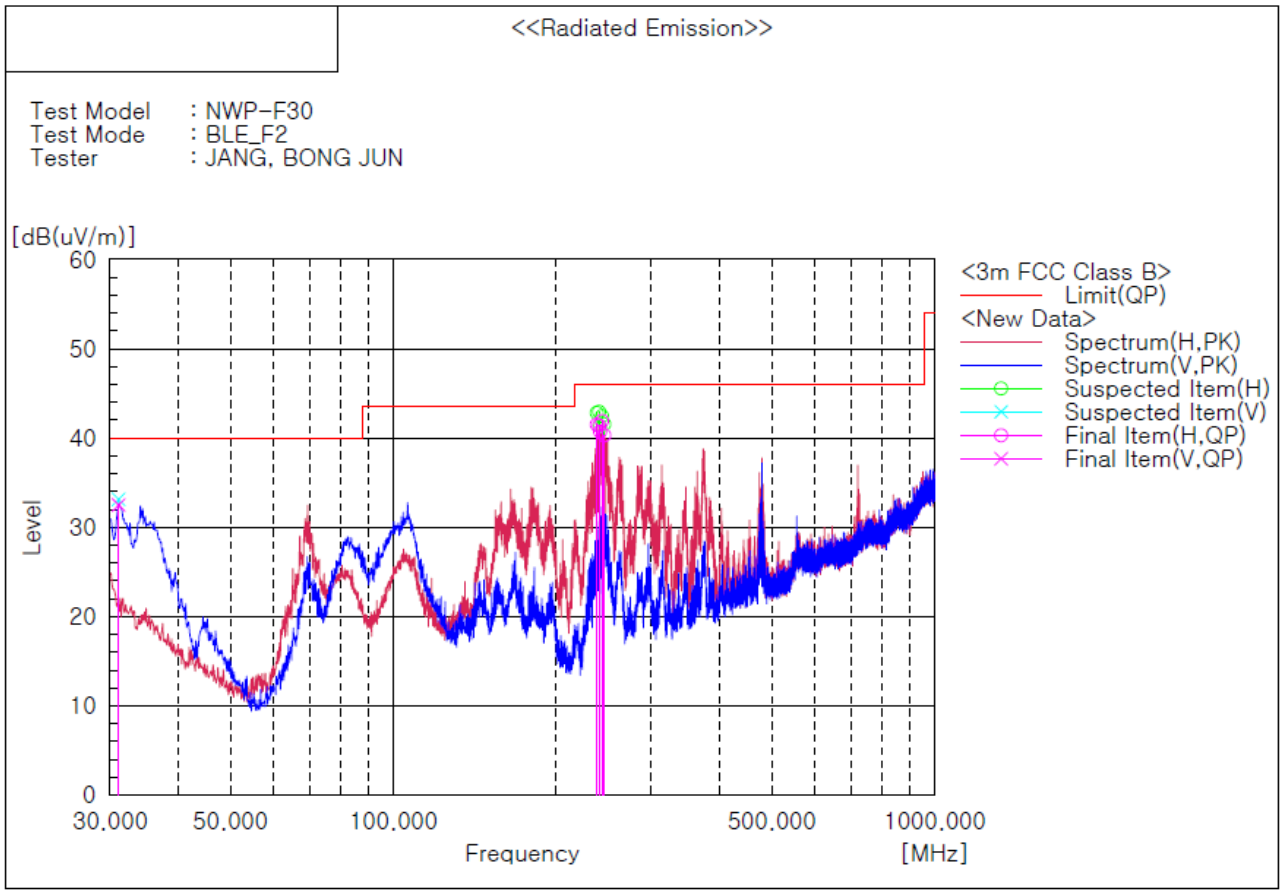
Distance extrapolation factor = 40 log (specific distance / test distance) (dB)

2) 30 MHz to 1 GHz

Test mode : Transmitter mode / Middle channel (Worst case)

The requirements are:
☒ Complies

Test Data



Final Result

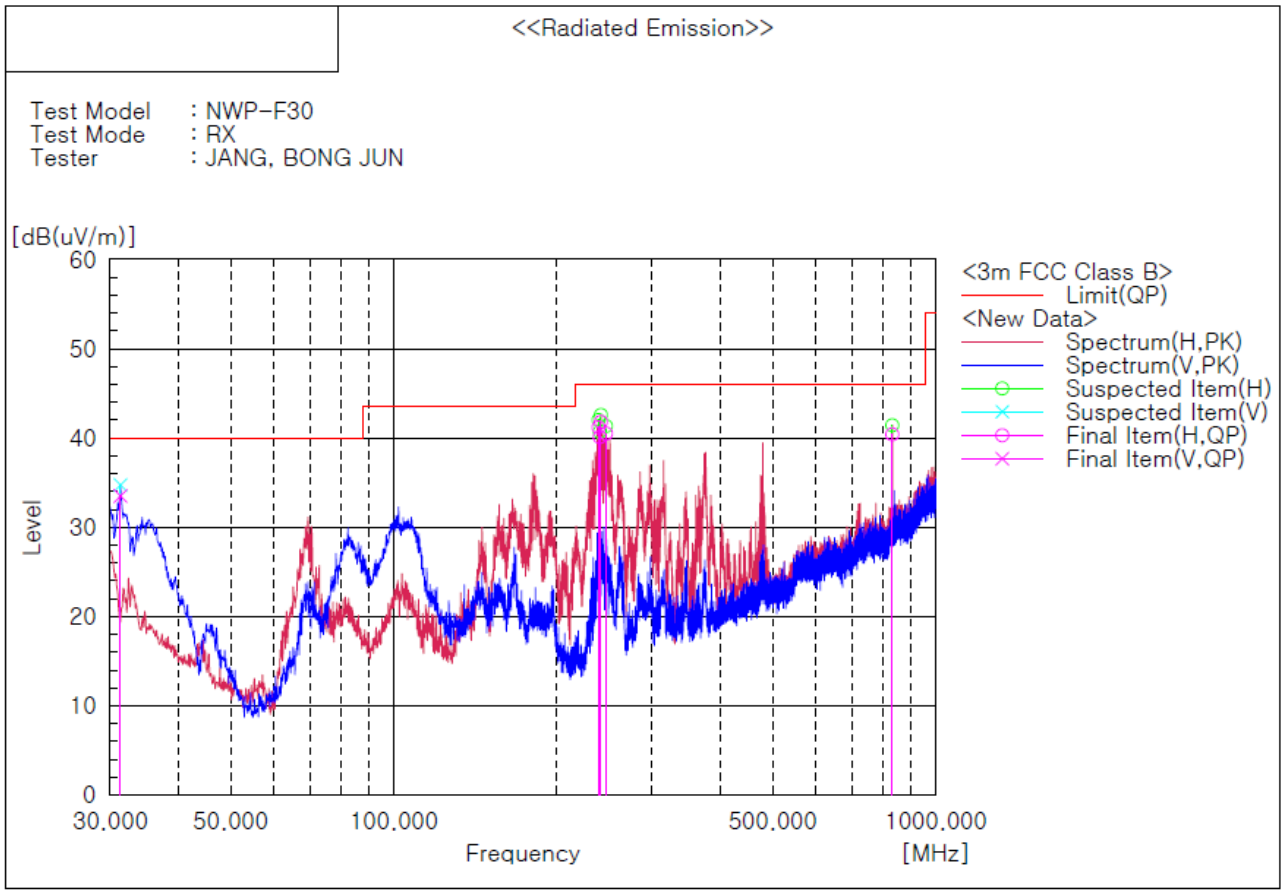
No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	31.091	V	39.2	-6.7	32.5	40.0	7.5	101.0	120.0
2	237.701	H	52.6	-11.1	41.5	46.0	4.5	101.0	77.0
3	240.005	H	52.2	-10.8	41.4	46.0	4.6	101.0	107.0
4	241.096	H	51.3	-10.6	40.7	46.0	5.3	101.0	87.0
5	243.036	H	52.2	-10.3	41.9	46.0	4.1	101.0	107.0
6	245.461	H	50.3	-10.0	40.3	46.0	5.7	101.0	87.0

Remark :
1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Receiver mode

The requirements are:
☒ Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	31.334	V	40.3	-6.8	33.5	40.0	6.5	101.0	124.0
2	238.793	H	52.2	-11.0	41.2	46.0	4.8	101.0	80.0
3	240.005	H	50.9	-10.8	40.1	46.0	5.9	101.0	219.0
4	241.218	H	52.4	-10.6	41.8	46.0	4.2	101.0	67.0
5	246.553	H	50.3	-9.8	40.5	46.0	5.5	101.0	60.0
6	831.826	H	36.3	4.1	40.4	46.0	5.6	306.0	62.0

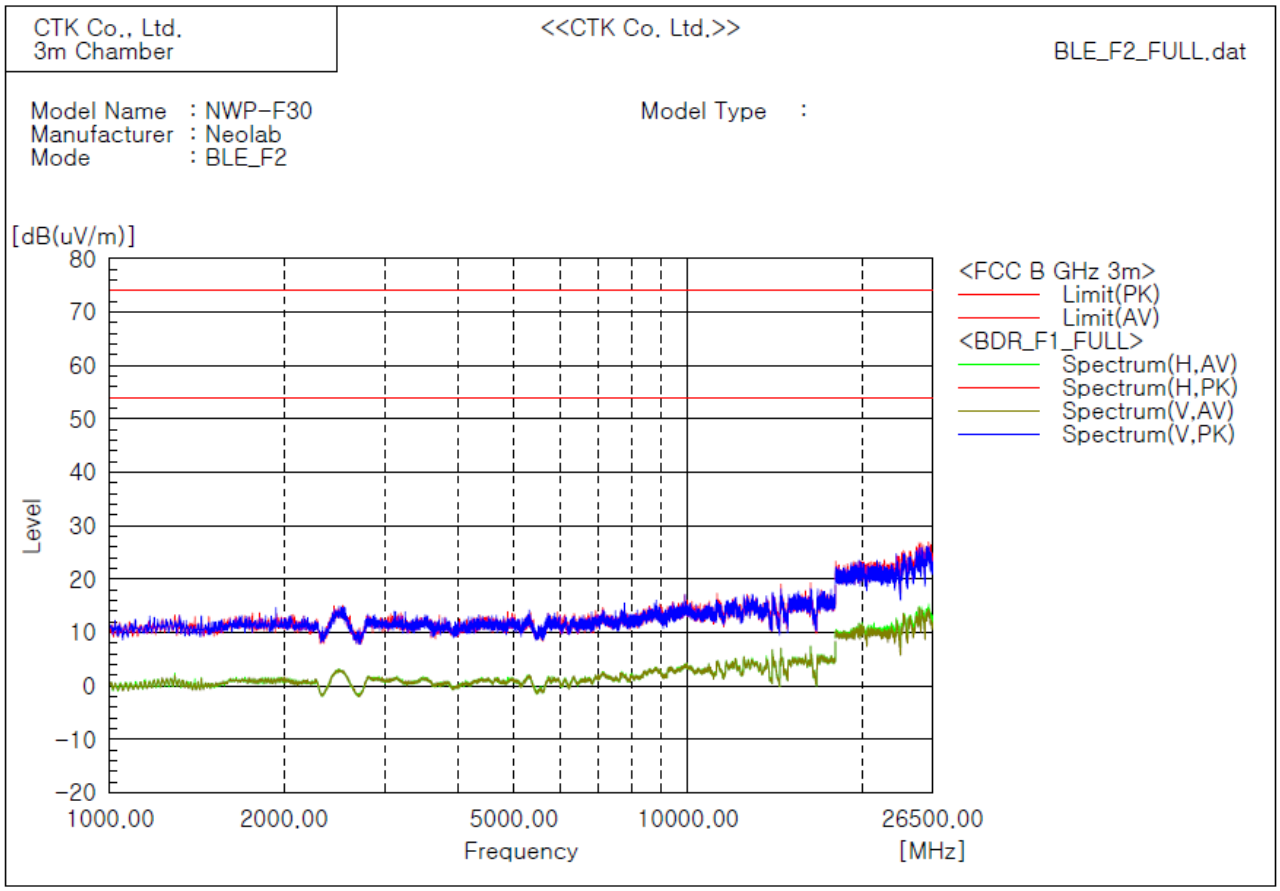
Remark :
1. The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

3) above 1 GHz

Test mode : Transmitter mode / Middle channel (Worst case)

The requirements are:
☒ Complies

Test Data



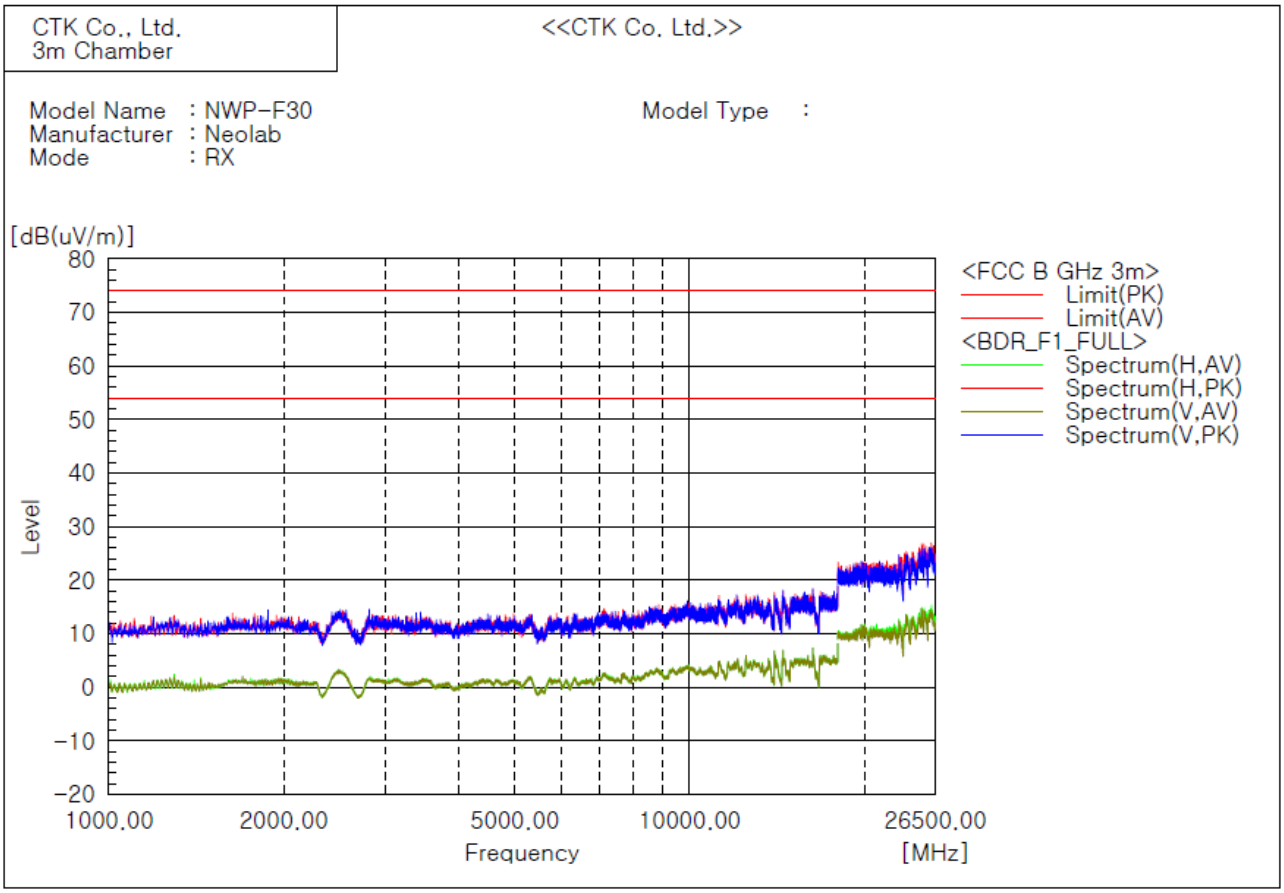
Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
The emissions above 1GHz were 20 dB lower than the limit.							

Note :
1) The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2) The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

Test mode : Receiver mode

The requirements are:
☒ Complies

Test Data

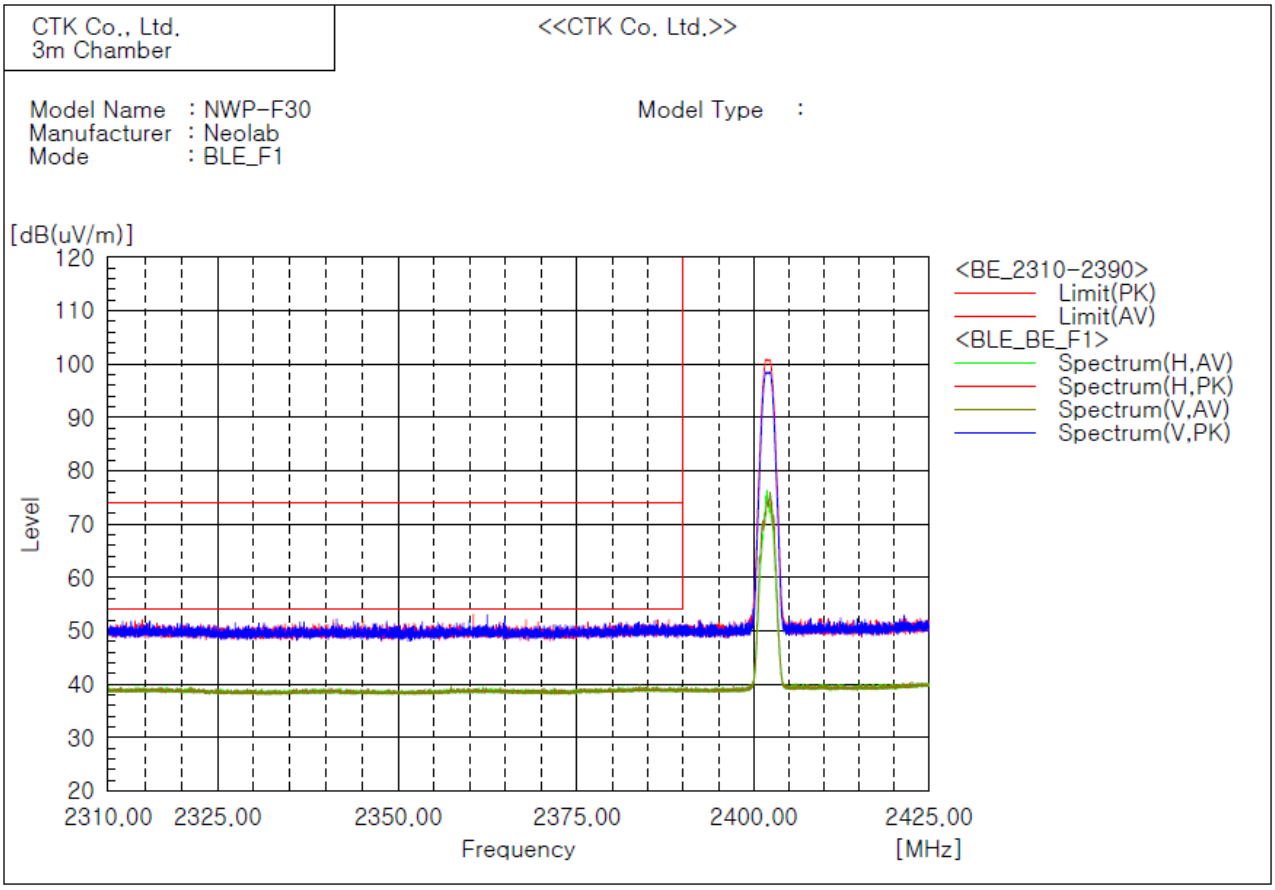


Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
The emissions above 1GHz were 20 dB lower than the limit.							

Note :
1) The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2) The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

4) Restricted band edge test data

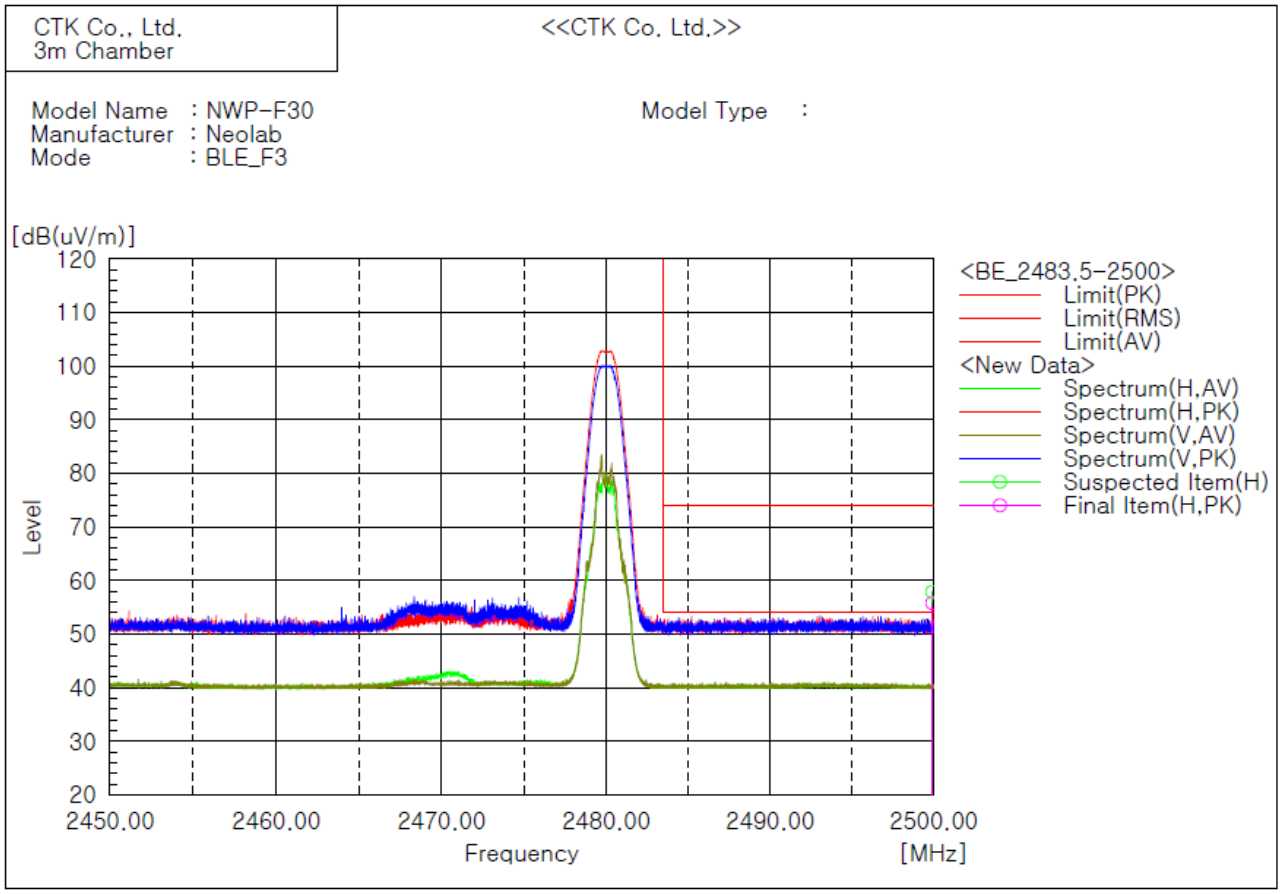
① 2 310 MHz to 2 390 MHz



Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
The emissions above 1GHz were 20 dB lower than the limit.							

Note :
1) The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2) The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

② 2 483.5 MHz to 2 500 MHz



Frequency [MHz]	(P)	Limit AV [dBuV/m]	Limit PK [dBuV/m]	Result AV [dBuV/m]	Result PK [dBuV/m]	Margin AV [dB]	Margin PK [dB]
The emissions above 1GHz were 20 dB lower than the limit.							

Note :
1) The Unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2) The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

4.6 AC Power Line Conducted Emissions

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits.

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.
Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average**
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* The level decreases linearly with the logarithm of the frequency.
** A linear average detector is required.

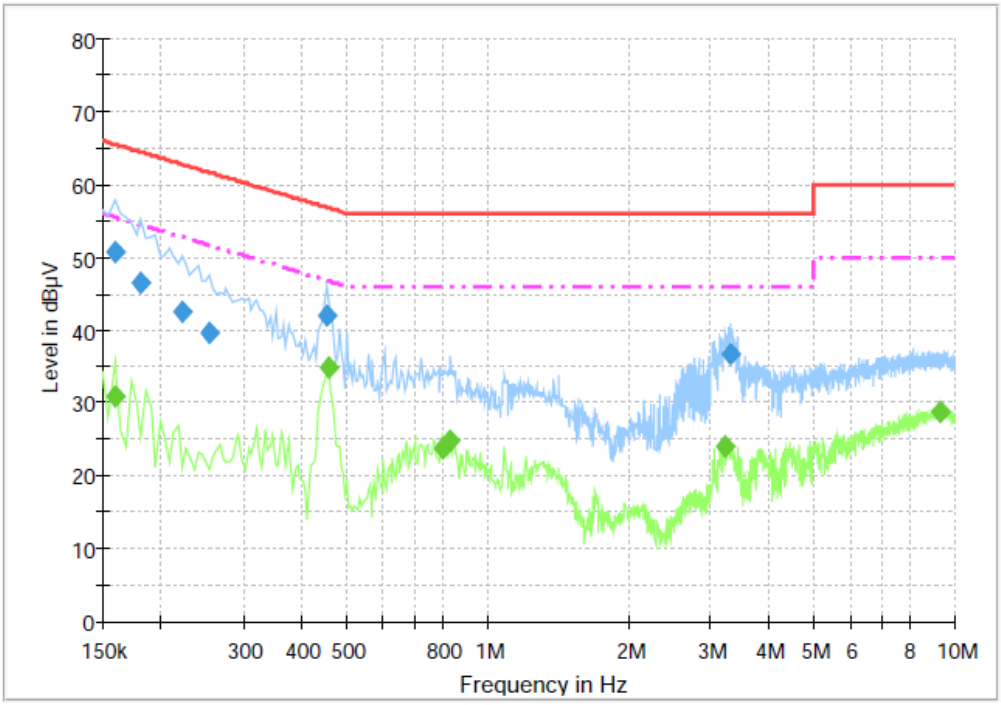
Test Results

The requirements are:
☒ Complies

Test Data

Test mode : Charging Mode
[L1]

3CE_Class B_L1



Final Result 1

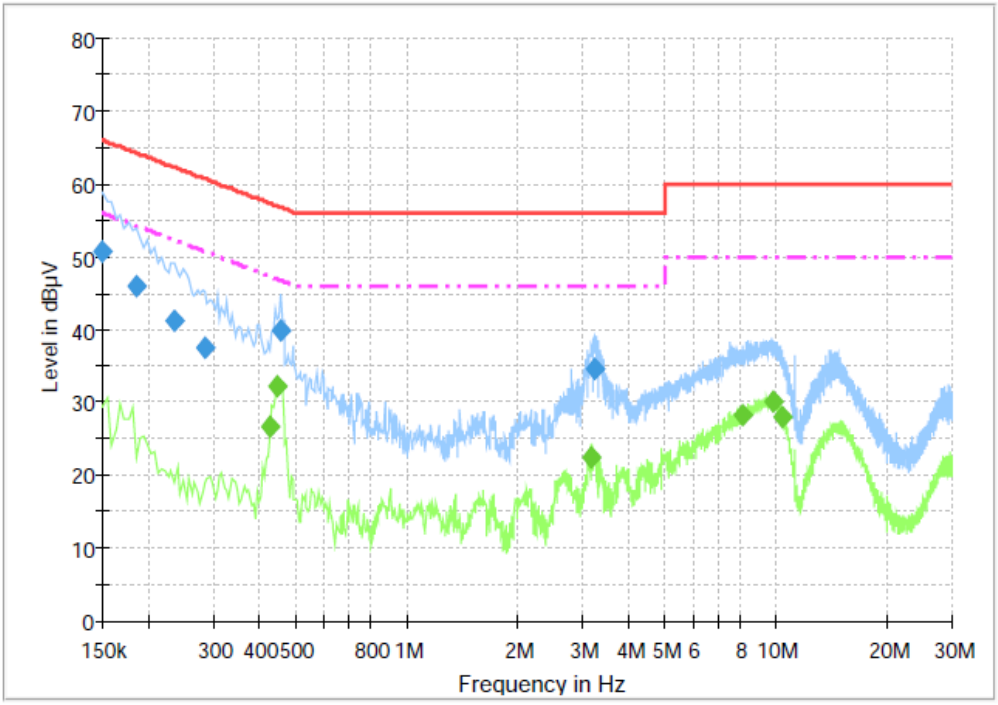
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159000	50.7	1000.0	9.000	On	L1	10.0	14.8	65.5
0.181500	46.5	1000.0	9.000	On	L1	10.0	17.9	64.4
0.222000	42.5	1000.0	9.000	On	L1	9.8	20.3	62.7
0.253500	39.5	1000.0	9.000	On	L1	9.7	22.2	61.6
0.451500	41.9	1000.0	9.000	On	L1	10.0	14.9	56.8
3.318000	36.7	1000.0	9.000	On	L1	9.8	19.3	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159000	31.0	1000.0	9.000	On	L1	10.0	24.5	55.5
0.456000	34.9	1000.0	9.000	On	L1	10.0	11.9	46.8
0.802500	23.7	1000.0	9.000	On	L1	9.9	22.3	46.0
0.834000	24.7	1000.0	9.000	On	L1	9.9	21.3	46.0
3.219000	23.9	1000.0	9.000	On	L1	9.8	22.1	46.0
9.325500	28.7	1000.0	9.000	On	L1	9.9	21.3	50.0

[NEUTRAL]

3CE_Class B_N



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	50.6	1000.0	9.000	On	N	9.8	15.4	66.0
0.186000	45.9	1000.0	9.000	On	N	10.0	18.4	64.2
0.235500	41.2	1000.0	9.000	On	N	9.8	21.0	62.3
0.285000	37.5	1000.0	9.000	On	N	9.8	23.2	60.7
0.456000	39.9	1000.0	9.000	On	N	10.0	16.9	56.8
3.219000	34.5	1000.0	9.000	On	N	9.8	21.5	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.429000	26.7	1000.0	9.000	On	N	10.0	20.6	47.3
0.447000	32.1	1000.0	9.000	On	N	10.0	14.8	46.9
3.178500	22.4	1000.0	9.000	On	N	9.8	23.6	46.0
8.124000	28.2	1000.0	9.000	On	N	9.8	21.8	50.0
9.834000	30.0	1000.0	9.000	On	N	9.9	20.0	50.0
10.423500	28.1	1000.0	9.000	On	N	9.9	21.9	50.0

APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Spectrum Analyzer	Agilent	N9020A	MY48011595	2019-10-16	2020-10-16
2	Signal Generator	Rohde & Schwarz	SMB100A	175528	2019-10-16	2020-10-16
3	EMI Test Receiver	Rohde & Schwarz	ESCI7	100814	2019-10-22	2020-10-22
4	Bilog Antenna	SCHAFFNER	CBL6111C	2551	2019-05-10	2020-05-10
5	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-125	2018-05-02	2020-05-02
6	6dB Attenuator	Rohde & Schwarz	DNF	272.4110.50-2	2019-10-25	2020-10-25
7	AMPLIFIER	SONOMA	310	291721	2019-01-28	2020-01-28
8	EMI Test Receiver	Rohde & Schwarz	ESU40	100336	2019-01-29	2020-01-29
9	Preamplifier	Agilent	8449B	3008A01504	2018-12-17	2019-12-17
10	Horn Antenna	ETS-Lindgren	3116	00062504	2017-12-04	2019-12-04
11	Horn Antenna	ETS-Lindgren	3117	00154525	2019-09-25	2021-09-25
12	Band Reject Filter	Micro Tronics	BRM50702	G233	2019-01-28	2020-01-28
13	LISN	Rohde & Schwarz	ENV216	101760	2019-01-29	2020-01-29

	Cable	Manufacturer	Model No.	Serial No.	Check Date
1	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 104	MY27558/4	2018-12-19
2	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 104	N/A (below 1GHz)	2018-12-19
3	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 104	MY27573/4	2018-12-19
4	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 106	N/A (above 1GHz)	2018-12-19
5	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 102	MY2374/2	2018-12-19
6	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 102	MY4728/2	2018-12-19
7	RF Cable (Radiated)	HUBER+SUHNER	SUCOFLEX 102	MY14858/4	2018-12-19
8	RF Cable (Conducted)	JUNFLON	MWX221	1512S148	2019-10-28
9	Cable	CANARE	AC power line	N/A	2019-01-28
10	Cable	CANARE	3m loop	N/A	2019-01-28