TEST REPORT

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KCTL

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2019-01-25

2. Use of Report : -

3. Name of Product and Model : Mobile Phone / SM-A105F/DS

4. Manufacturer and Country of Origin : Samsung Electronics Co., Ltd. / Korea

5. FCC ID : A3LSMA105F

6. Date of Test : 2019-01-29 to 2019-02-15

7. Test Standards : FCC Part 15 Subpart C, 15.249

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

Affirmation	Tested by Name : Euijung Kim (Signature)	Technical Manager Name : Bongok Ko (Signature)

2019-02-22

KCTL Inc.

Report revision history

Date	Revision	Page No
2019-02-15	Initial report	-
2019-02-19	Updated measurement equipment	29
2019-02-22	Updated a note	6, 18

CONTENTS

1. General information

Client	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Manufacturer	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Laboratory	:	KCTL Inc.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132
		VCCI Registration No. : R-3327, G-198, C-3706, T-1849
		Industry Canada Registration No. : 8035A-2
		KOLAS No.: KT231

2. Device information

Equipment under test	:	Mobile Phone
Model	:	SM-A105F/DS
Derivative model	:	SM-A105F, SM-A105G/DS, SM-A105G
Frequency range	:	Bluetooth(BDR/EDR/BLE), ANT+_2 402 ㎒ ~ 2 480 ㎒
		WIFI(802.11b/g/n20)_2 412 ㎒ ~ 2 472 ㎒
		LTE Band 5_824.7 ㎒ ~ 844 ㎒
		LTE Band 2_1 850.7 ㎒ ~ 1 900 ㎒
		LTE Band 41_2 498.5 ㎒ ~ 2 680 ㎒
		GSM 850_824.2 ㎒ ~ 848.8 ㎒
		GSM 1900_1850.2 ㎒ ~ 1909.8 ㎒
		WCDMA 850_826.4 ㎒ ~ 846.6 ㎒
		WCDMA 1900_1 852.4 ㎒ ~ 1 907.6 ㎒
Modulation technique	:	Bluetooth(BDR/EDR)_ GFSK, π/4DQPSK, 8DPSK
		Bluetooth(BLE), ANT+_GFSK
		WIFI(802.11b/g/n20)_DSSS, OFDM
		LTE_QPSK, 16QAM
		GSM_GMSK, 8-PSK
		WCDMA_QPSK
Number of channels	:	Bluetooth(BDR/EDR)_79ch
		Bluetooth(BLE)_40ch
		ANT+_79ch
		WIFI(802.11b/g/n20)_13ch

Power source	:	DC 3.85 V
Antenna specification	:	LDS Antenna
Software version	:	A105F.001
Hardware version	:	REV1.0
Test device serial No.	:	Conducted_R38M109JC6H, R38M109J4XW Radiated_R38M10PXDTJ, R38M109JB1B
Operation temperature	:	-30 ℃ ~ 50 ℃

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
Earphone information	ALMUS	EHS61ASFWE	-	-
Travel Adapter	Samsung Electronics Co., Ltd.	ETA0U84IWE	R37K9RC6DD3RC3	AC 100-240V 50-60 Hz, 0.15A
Micro USB Data Cable	Samsung Electronics Co., Ltd.	ECB-DU68WE	-	-

2.2. Information about derivative model

The difference between basic model and derivative models is:

-SM-A105F, SM-A105G: It does not support Dual-Sim card, support Single-Sim card and changed from Dual SIM tray to Single SIM tray.
-SM-A105G/DS: LTE B28 is enabled.

2.3. Frequency/channel operations

This device contains the following capabilities: Bluetooth(BDR/EDR/BLE), ANT+, WIFI(802.11b/g/n20), LTE Band 5, LTE Band 2, LTE Band 41, GSM 850, GSM 1900, WCDMA 850, WCDMA 1900

Ch.	Frequency (㎒)
00	2 402
.	.
39	2 441
.	.
78	2 480

Table 2.3.1. ANT+ mode

3. Antenna requirement

Requirement of FCC part section 15.203:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

- The transmitter has permanently attached LDS Antenna (internal antenna) on board.

4. Summary of tests

FCC Part section(s)	Parameter	Test results
-	Occupied bandwidth	Pass
15.249(a)(e)	Field strength of fundamental, Field strength of harmonics	Pass
15.35(c)	Duty Cycle Calculation	Pass
15.205(a), 15.209(a), 15.249(d)(e)	Spurious emission	Pass
	Band-edge, restricted band	Pass
15.207(a)	Conducted Emissions	Pass

Notes:

1. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2. According to exploratory test no any obvious emission were detected from 9 ㎑ to 30 ㎒. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
3. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that Y orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in X orientation
4. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013

5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.
All measurement uncertainty values are shown with a coverage factor of *k*=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty(±dB)	
Conducted RF power	1.76 dB	
Conducted spurious emissions	4.03 dB	
Radiated spurious emissions	9 kHz ~ 30 MHz:	2.28 dB
	30 MHz ~ 300 MHz	4.98 dB
	300 MHz ~ 1 000 MHz	5.14 dB
	1 GHz ~ 6 GHz	6.70 dB
	Above 6 GHz	6.60 dB
Conducted emissions	9 kHz ~ 150 kHz	3.66 dB
	150 kHz ~ 30 MHz	3.26 dB

6. Measurement results explanation example

The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.
With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	10.03	9000	12.38
100	10.44	10000	12.30
200	10.50	11000	12.68
300	10.64	12000	12.95
400	10.71	13000	13.14
500	10.75	14000	13.21
600	10.74	15000	13.21
700	10.79	16000	13.41
800	10.87	17000	13.36
900	10.94	18000	13.45
1000	10.90	19000	13.51
2000	11.18	20000	13.49
3000	11.44	21000	13.52
4000	11.73	22000	13.68
5000	11.99	23000	13.72
6000	12.15	24000	13.71
7000	12.21	25000	13.76
8000	12.41	26000	13.94

Note.
Offset(㏈) = RF cable loss(㏈)

7 Test results

7.1. Occupied Bandwidth

Test setup

EUT	Attenuator	Spectrum analyzer

Limit

According to §2.1049(h) Transmitters employing digital modulation techniques—when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

Test procedure

ANSI C63.10-2013 - Section 6.9.3

Test settings

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.

The following procedure shall be used for measuring 99% power bandwidth:

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Step a) through step c) might require iteration to adjust within the specified range.
e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

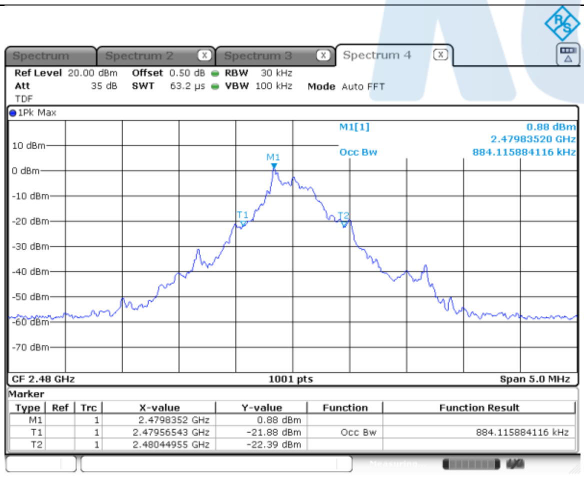
Test results

Test mode	Frequency(㎒)	99 % bandwidth(㎒)
ANT+	2 402	0.884
	2 441	0.884
	2 480	0.884

ANT+

2 402 ㎒

2 441 ㎒



2 480 ㎒

Blank

-

7.2. Duty Cycle Calculation

Test setup

EUT	Attenuator	Spectrum analyzer

Limit

According to §15.35(c), Unless otherwise specified, e.g., §§15.255(b), and 15.256(l)(5), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to Supplier's Declaration of Conformity.

Test procedure

ANSI C63.10-2013 - Section 7.5

Test settings

Unless otherwise specified, when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 s (100 ㎳). In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval.64 The following procedure is an example of how the average value may be determined. The average field strength may be found by measuring the peak pulse amplitude (in log equivalent units) and determining the duty cycle correction factor (in dB) associated with the pulse modulation as shown in Equation (10):

δ (dB) = 20log(Δ) (δ is the duty cycle correction factor (dB), Δ is the duty cycle (dimensionless))

This correction factor may then be subtracted from the peak pulse amplitude (in dB) to find the average emission. This correction may be applied to all emissions that demonstrate the same pulse timing characteristics as the fundamental emission (e.g., the fundamental and harmonic emissions). In cases where the pulse train is truly random or pseudo random, some regulatory agencies may accept a declaration by the manufacturer of the worst-case value of tON. The duty cycle correction is determined as follows:

a) Adjust and configure any EUT switches, controls, or input data streams to ensure that the EUT is transmitting or encoded to obtain the “worst-case” pulse ON time.
b) Couple the final radio frequency output signal to the input of a spectrum analyzer. This may be performed by a radiated, direct connection (i.e., conducted) or by a “near-field” coupling method. The signal received shall be of sufficient level to trigger adequately the spectrum analyzer sweep display.
c) Adjust the center frequency of the spectrum analyzer to the center of the RF signal.
d) Set the spectrum analyzer for ZERO SPAN.
e) Adjust the SWEEP TIME to obtain at least a 100 ㎳ period of time on the horizontal display axis of the spectrum analyzer.
f) If the pulse train is periodic (i.e., consists of a series of pulses that repeat in a characteristic pattern over a constant time period), and the period (T) is less than or equal to 100 ㎳, then:

1) Set the TRIGGER on the spectrum analyzer to capture at least one period of the pulse train, including any blanking intervals.
2) Determine the total maximum pulse “ON time” (tON) over one period of the pulse train. An example of a periodic pulse train and the associated period is shown in Figure 14. If the pulse train contains pulses of different widths, then tON is determined by summing the duration of all of the pulses within the pulse train [i.e., tON = Σ(t1 + t2 + …tn)].
3) The duty cycle is then determined by dividing the total maximum “ON time” by the period of the pulse train (tON/T).

g) If the pulse train is nonperiodic or is periodic with a period that exceeds 100 ㎳, or as an alternative to step f), then:
1) Set the TRIGGER on the spectrum analyzer to capture the greatest amount of pulse “ON time” over 100 ㎳.
2) Find the 100 ㎳ period that contains the maximum “on time”; this may require summing the duration of multiple pulses as described in step f2).
3) Determine the duty cycle by dividing the total maximum “ON time” by 100 ㎳ (tON/100 ㎳).

h) Determine the duty cycle correction factor by applying Equation (10) to the duty cycle determined in the preceding steps.

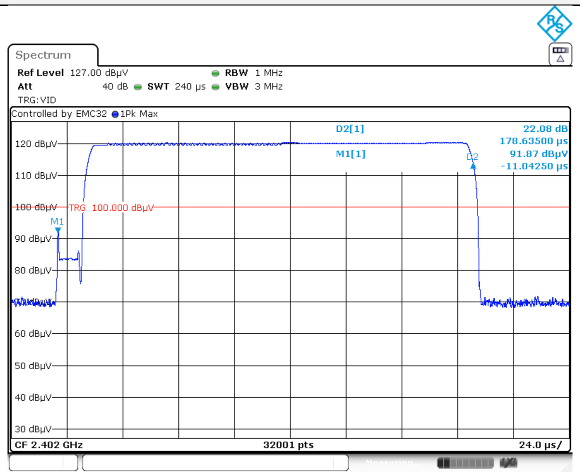
Test results

Frequency(㎒)	Operating Mode	On time(㎳)	DCCF (㏈)
2 402	ANT+	0.929	-42.92

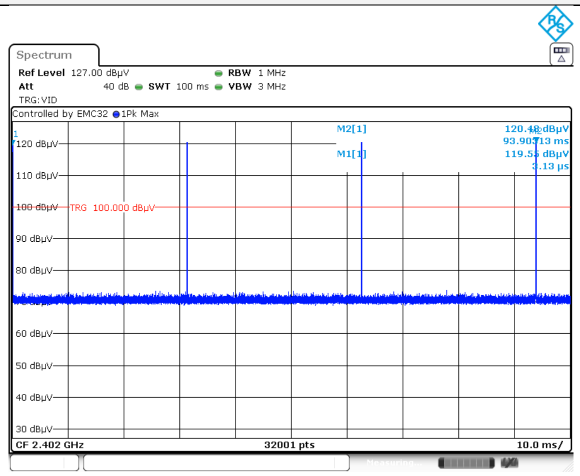
Notes:

DCCF = 20log10 (number of pulses in 100 ㎳ x (on time / 100 ㎳))
= 20log10 (4 x (0.929 ㎳/100 ㎳)) = -42.92 ㏈

ANT+



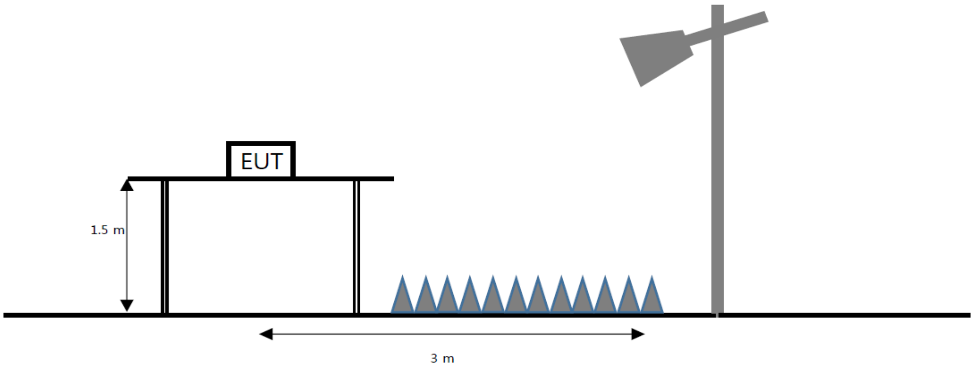
2 402 ㎒ (On time)



2 402 ㎒ (Number of pulses in 100 ㎳)

7.3. Field Strength of Fundamental

Test setup



Limit

According to §15.249(a)(e), Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

Test procedure

ANSI C63.10-2013

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 ≥ (3×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

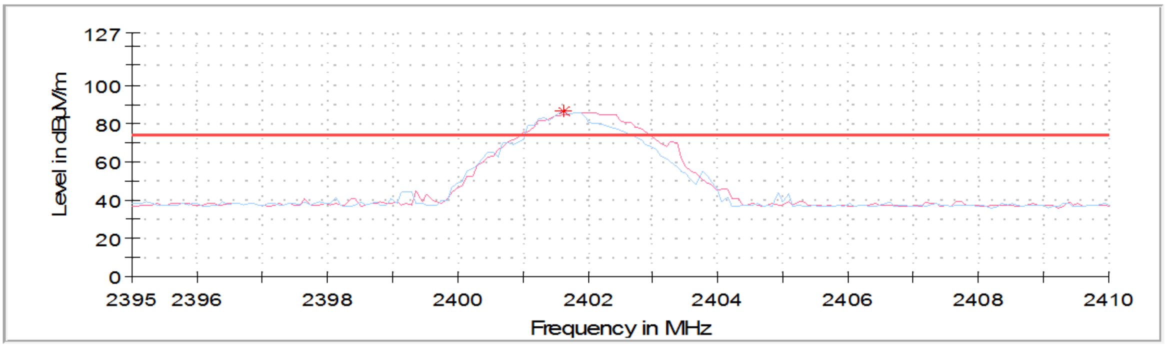
Average field strength measurements

Average field strength data is determined by applying the duty cycle correction factor (DCCF) found in Section 7.3 to the measured peak field strength values.

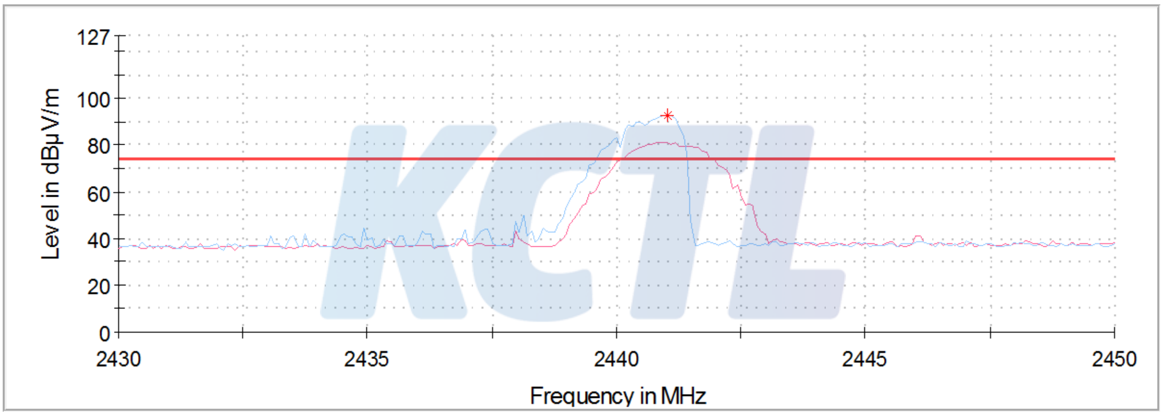
Test results

Frequency	Pol.	Reading	Cable Loss	Amp Gain	Antenna Factor	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data									
2401.64	H	113.39	3.71	-59.67	28.56	-	85.99	113.98	27.99
2441.02	H	120.03	3.74	-59.63	28.64	-	92.78	113.98	21.20
2479.84	H	118.69	3.77	-59.57	28.71	-	91.59	113.98	22.39
Average Data									
2401.64	H	113.39	3.71	-59.67	28.56	-42.92	43.07	93.98	50.91
2441.02	H	120.03	3.74	-59.63	28.64	-42.92	49.86	93.98	44.12
2479.84	H	118.69	3.77	-59.57	28.71	-42.92	48.67	93.98	45.31

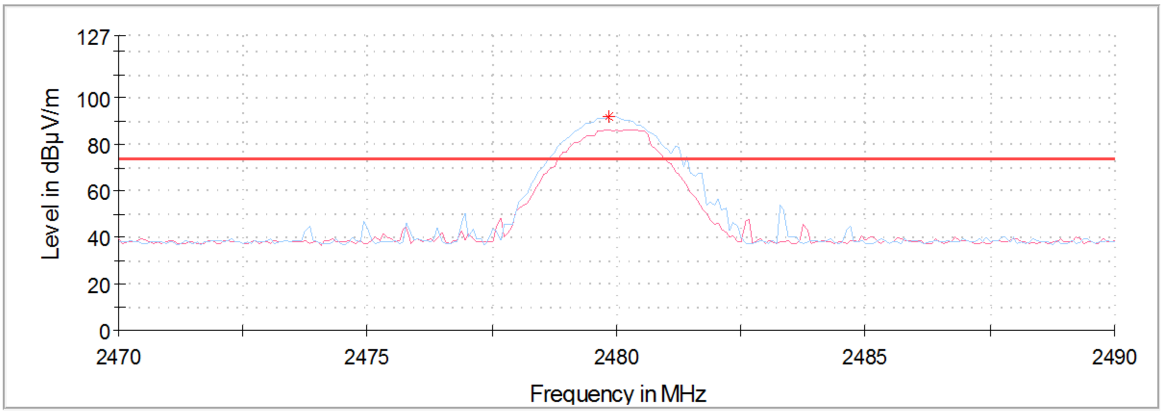
Horizontal/Vertical for 2 402 ㎒



Horizontal/Vertical for 2 441 ㎒



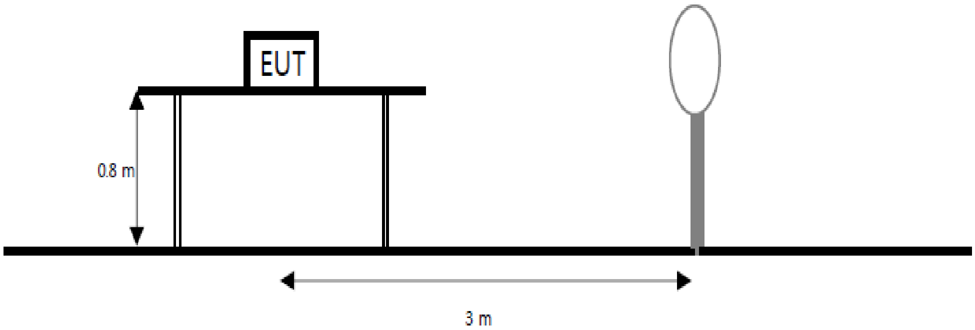
Horizontal/Vertical for 2 480 ㎒



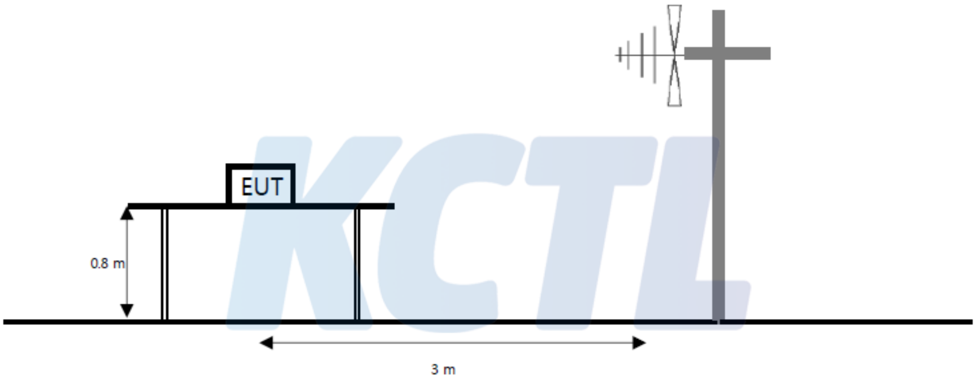
7.4. Radiated spurious emissions & band edge

Test setup

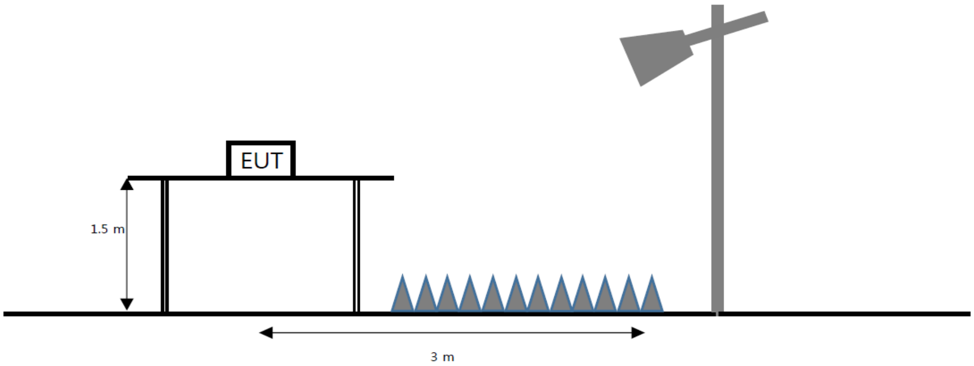
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.



Limit

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

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

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 ㎒, 76–88 ㎒, 174–216 ㎒ or 470–806 ㎒. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section15.231 and 15.241.

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

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

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in section 15.209. At frequencies equal to or less than 1 000 ㎒, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 ㎒, 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.

Test procedure
ANSI C63.10-2013

Test settings
Peak field strength measurements

8. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
9. RBW = as specified in table
10. VBW ≥ (3×RBW)
11. Detector = peak
12. Sweep time = auto
13. Trace mode = max hold
14. Allow sweeps to continue until the trace stabilizes

Table. RBW as a function of frequency

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

Average field strength measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1 ㎒
3. VBW = 1/T ≥ 1 ㎐
4. Averaging type was set to RMS to ensure that video filtering was applied in the power domain
5. Detector = peak
6. Sweep time = auto
7. Trace mode = max hold
8. Trace was allowed to run for at least 50 times(1/duty cycle) traces

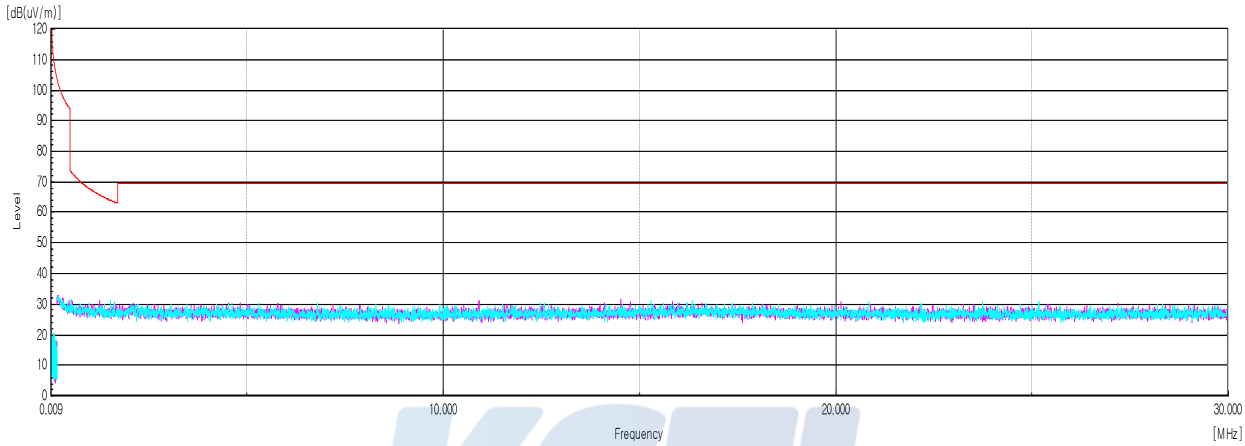
Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 ㎒ for Peak detection and frequency above 1 ㎓. The resolution bandwidth of test receiver/spectrum analyzer is 1 ㎒ and the video bandwidth is 1 ㎑(≥1/T) for Average detection (AV) at frequency above 1 ㎓. (where T = pulse width)
2. *f* <30 ㎒, extrapolation factor of 40 ㏈/decade of distance. $F_d = 40\log(D_m/Ds)$
   f ≥30 ㎒, extrapolation factor of 20 ㏈/decade of distance. $F_d = 20\log(D_m/Ds)$
   Where:
   F_d= Distance factor in ㏈
   D_m= Measurement distance in meters
   D_s= Specification distance in meters
3. Factors(㏈) = Antenna factor(㏈/m) + Cable loss(㏈) + or Amp. gain(㏈) + or F_d(㏈)
4. The worst-case emissions are reported however emissions whose levels were not within 20 ㏈ of respective limits were not reported.
5. Average test would be performed if the peak result were greater than the average limit.
6. 1) mean is restricted band.
7. 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.

Test results (Below 30 ㎒) – Worst case: ANT+ Middle frequency

Frequency	Pol.	Reading	Cable Loss	Amp Gain	Antenna Factor	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
No spurious emissions were detected within 20 ㏈ of the limit.									

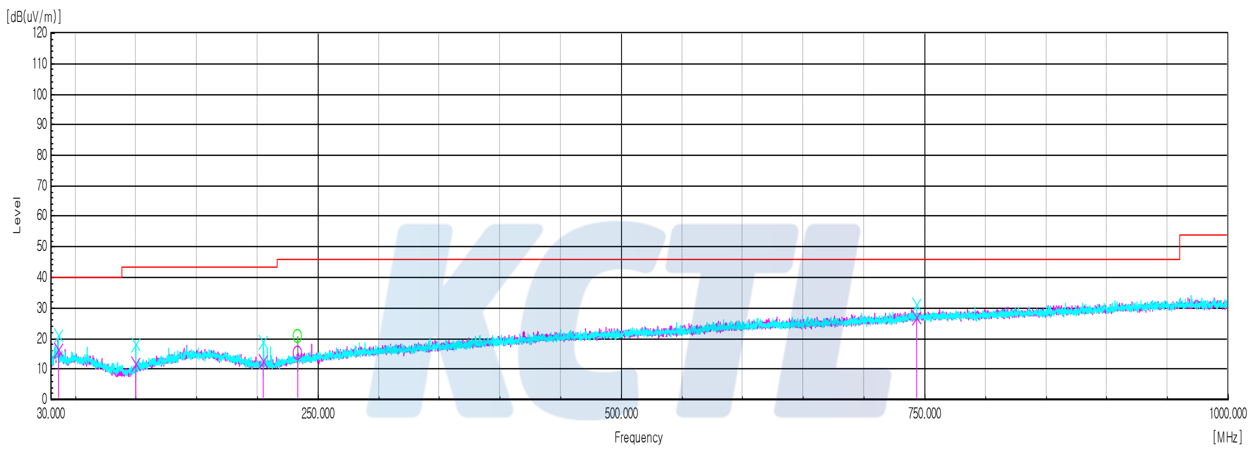
Horizontal/Vertical



Test results (Below 1 000 ㎒) – Worst case: ANT+ Middle frequency

Frequency	Pol.	Reading	Cable Loss	Amp Gain	Antenna Factor	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data									
35.82	V	29.70	1.19	-26.87	12.58	-	16.60	40.00	23.40
99.96	V	26.10	2.14	-25.14	8.60	-	11.70	43.50	31.80
205.09	V	25.10	3.16	-25.65	10.09	-	12.70	43.50	30.80
233.22	H	25.80	3.38	-25.24	11.16	-	15.10	46.00	30.90
743.07	V	22.80	6.37	-24.02	21.75	-	26.90	46.00	19.10

Horizontal/Vertical



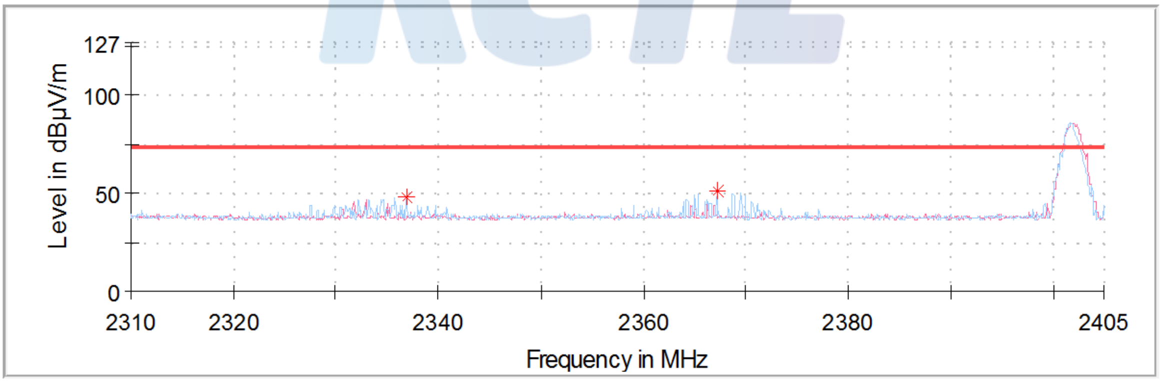
Test results (Above 1 000 ㎒)

ANT+

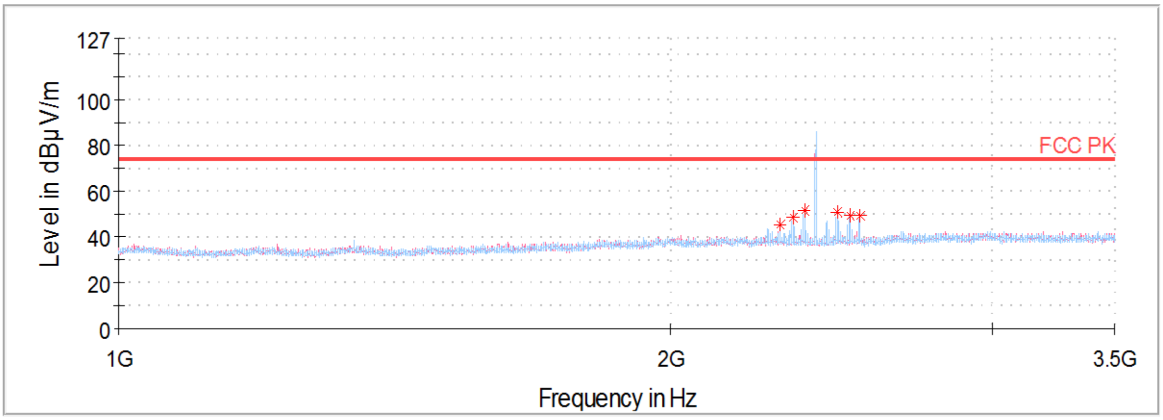
Low Channel

Frequency	Pol.	Reading	Cable Loss	Amp Gain	Antenna Factor	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data									
2 296.33[1)]	H	73.23	3.64	-59.70	28.36	-	45.53	74.00	28.47
2 336.88[1)]	H	76.07	3.67	-59.70	28.44	-	48.48	74.00	25.52
2 367.19[1)]	H	78.89	3.69	-59.69	28.50	-	51.39	74.00	22.61
2 507.66	H	76.40	3.79	-59.55	28.76	-	49.41	74.00	24.59
2 539.92	H	75.83	3.81	-59.56	28.83	-	48.91	74.00	25.09
4 804.55[1)]	H	61.40	5.34	-60.83	32.80	-	38.71	74.00	35.29
7 206.11	V	60.28	6.71	-61.37	35.91		41.53	74.00	32.47
Average Data									
No spurious emissions were detected within 20 ㏈ of the limit.									

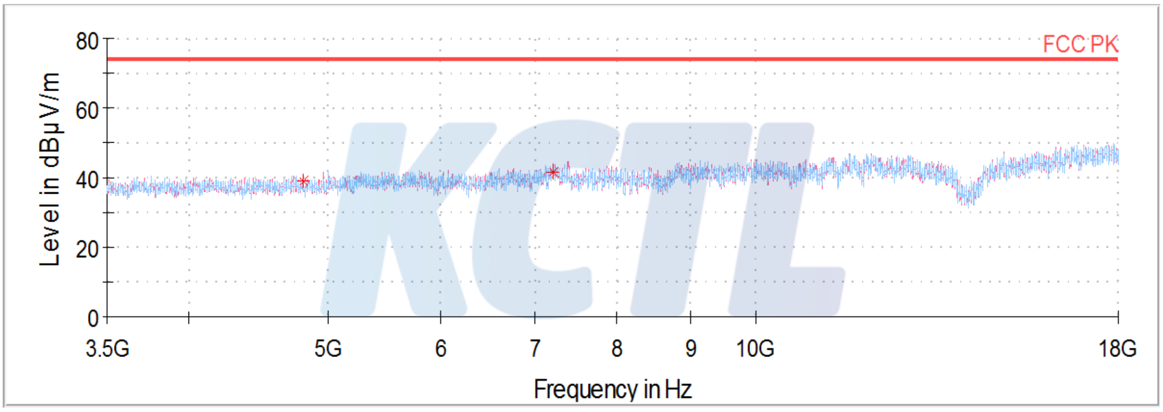
Horizontal/Vertical for Band-edge



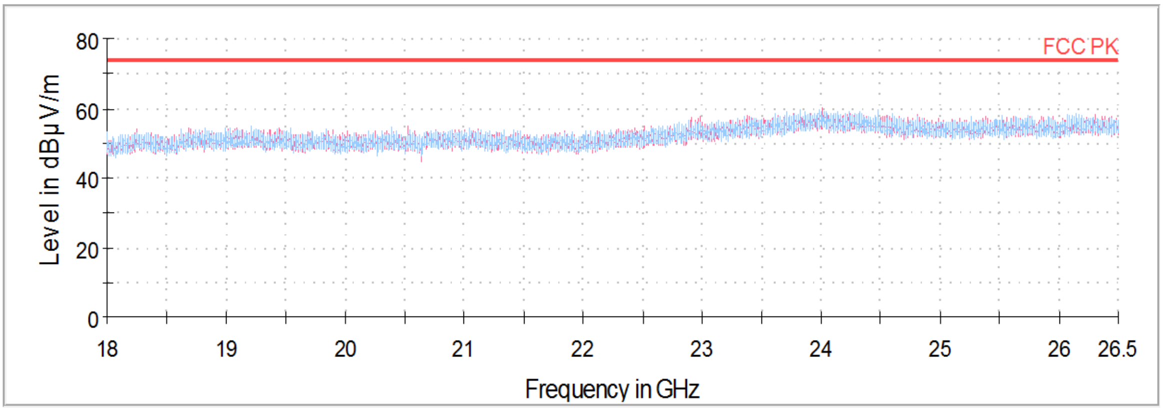
Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓



Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓



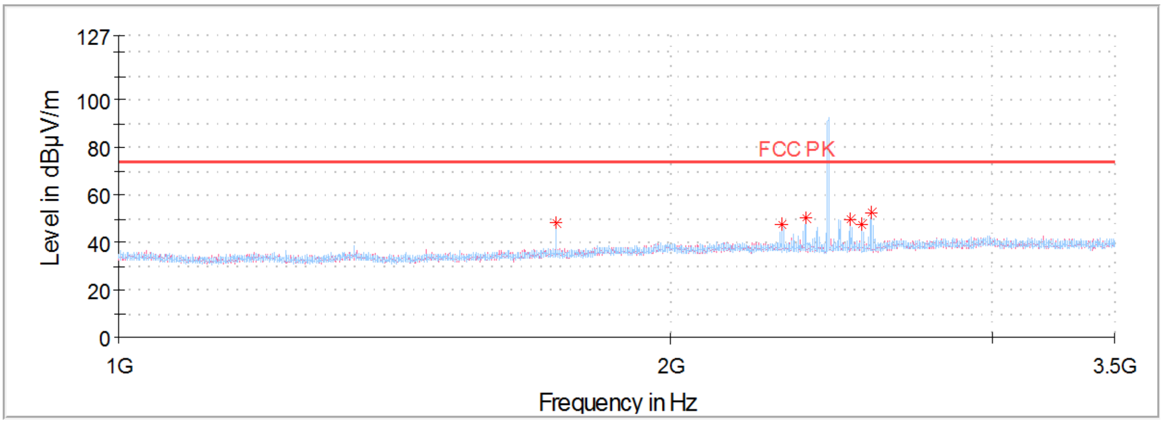
Horizontal/Vertical for 18 ㎓ ~ 26.5 ㎓



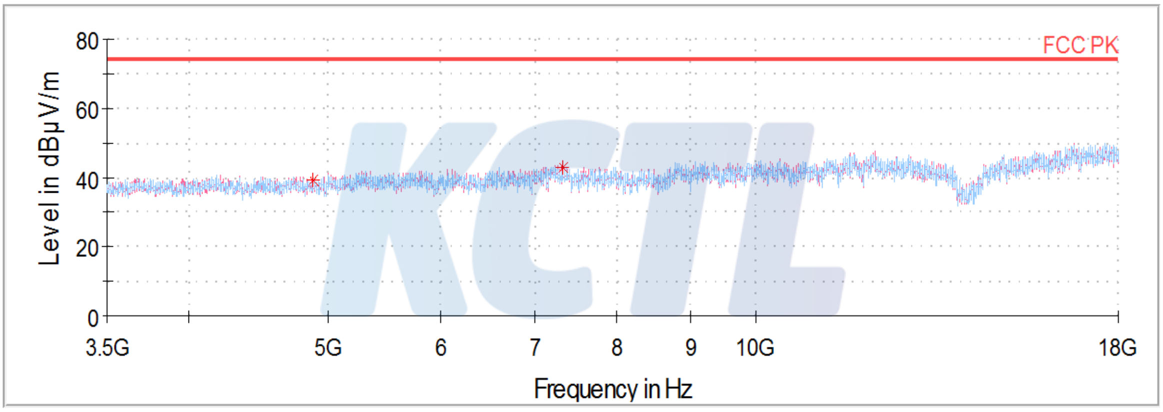
Middle Channel

Frequency	Pol.	Reading	Cable Loss	Amp Gain	Antenna Factor	DCCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data									
1 732.97	H	78.82	3.17	-60.25	26.73	-	48.46	74.00	25.54
2 301.95	H	75.38	3.64	-59.71	28.37	-	47.68	74.00	26.32
2 373.91[1)]	H	77.99	3.69	-59.68	28.51	-	50.51	74.00	23.49
2 507.89	H	76.92	3.79	-59.55	28.76	-	49.92	74.00	24.08
2 544.45	H	74.57	3.81	-59.55	28.83	-	47.67	74.00	26.33
2 575.63	H	79.03	3.84	-59.56	28.89	-	52.20	74.00	21.80
4 882.94[1)]	V	62.11	5.39	-61.07	32.84	-	39.27	74.00	34.73
7 323.92[1)]	H	61.70	6.76	-61.58	36.02	-	42.90	74.00	31.10
Average Data									
No spurious emissions were detected within 20 ㏈ of the limit.									

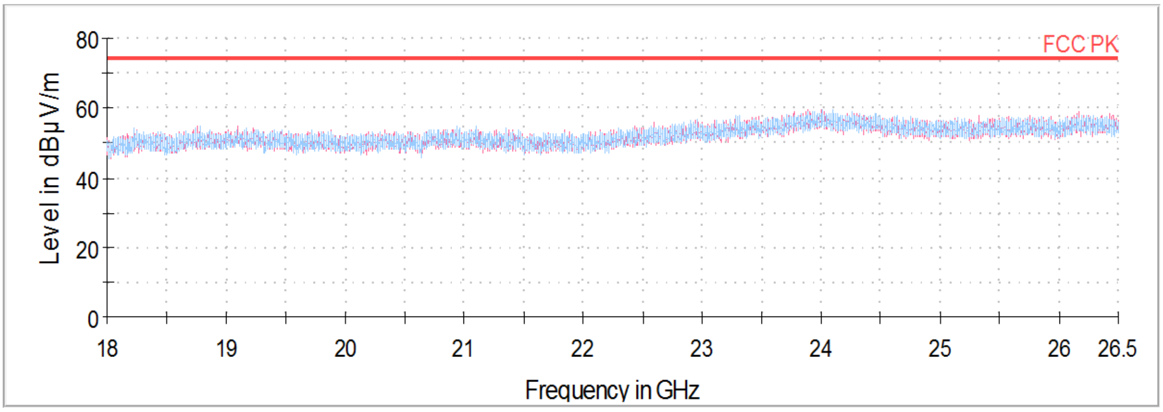
Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓



Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓



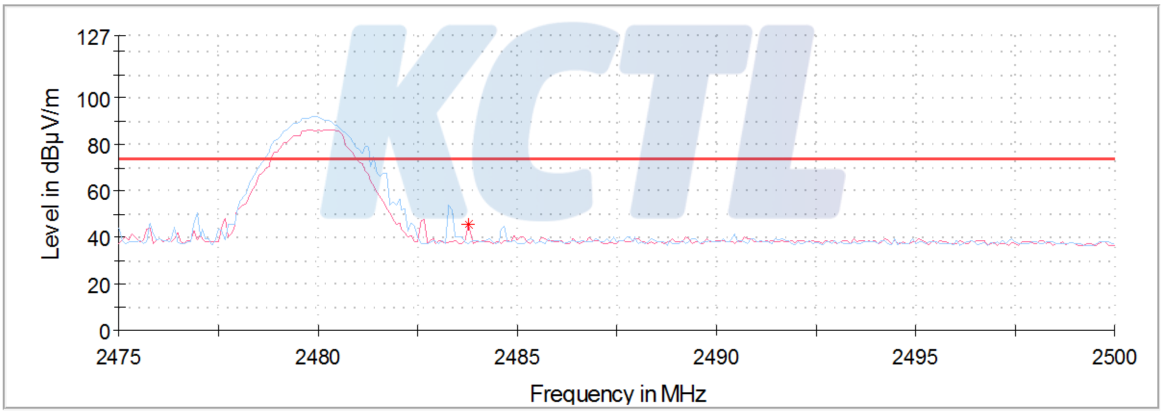
Horizontal/Vertical for 18 ㎓ ~ 26.5 ㎓



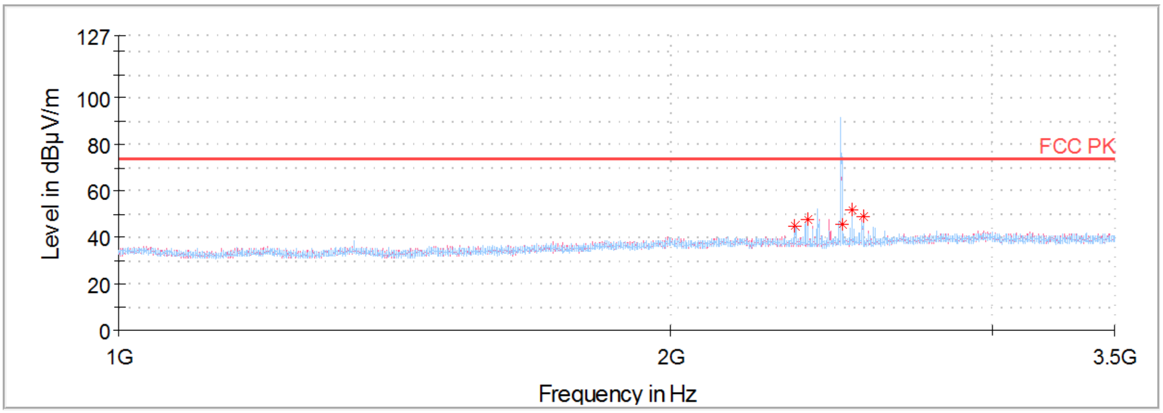
High Channel

Frequency	Pol.	Reading	Cable Loss	Amp Gain	Antenna Factor	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data									
2 342.50[1)]	H	72.67	3.67	-59.70	28.45	-	45.09	74.00	28.91
2 376.64[1)]	H	74.77	3.69	-59.68	28.52	-	47.30	74.00	26.70
2 483.75[1)]	V	72.31	3.77	-59.57	28.72	-	45.23	74.00	28.77
2 514.77	H	78.80	3.79	-59.55	28.78	-	51.82	74.00	22.18
2 549.45	V	75.75	3.82	-59.55	28.84	-	48.86	74.00	25.14
4 960.42[1)]	V	60.52	5.45	-60.72	32.88	-	38.13	74.00	35.87
7 439.92[1)]	V	57.66	6.81	-61.80	36.14	-	38.81	74.00	35.19
Average Data									
No spurious emissions were detected within 20 dB of the limit.									

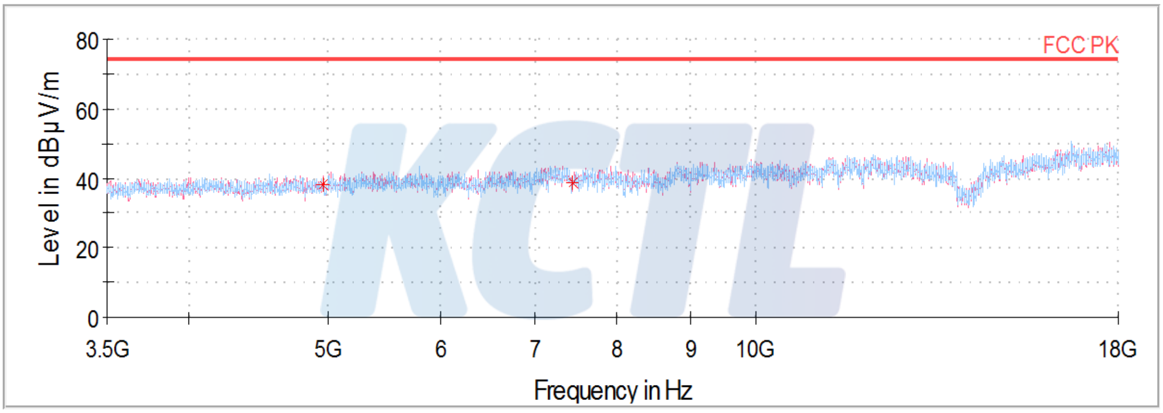
Horizontal/Vertical for Band-edge



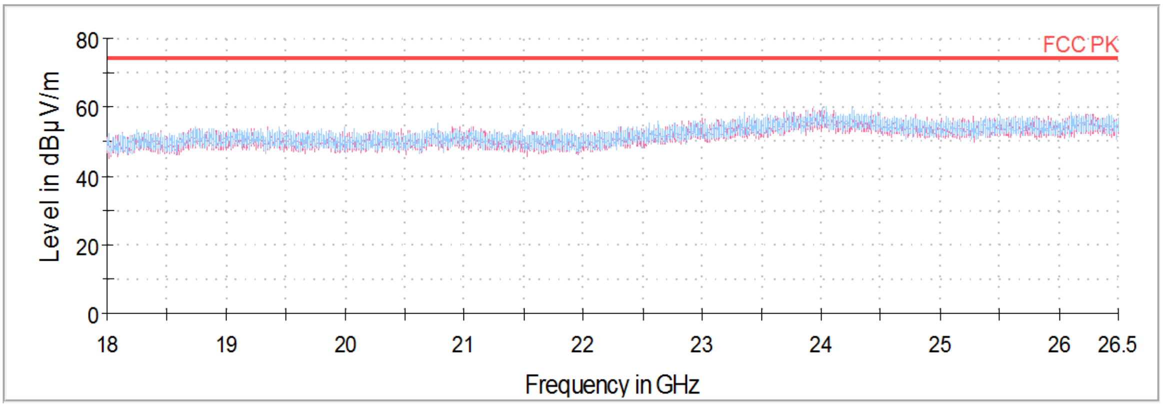
Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓



Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓

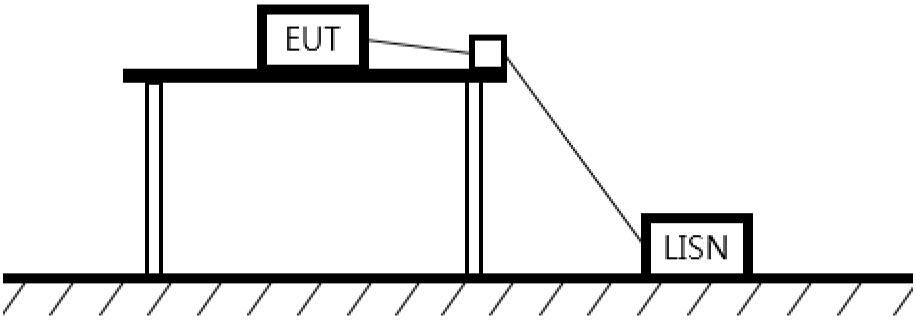


Horizontal/Vertical for 18 ㎓ ~ 26.5 ㎓



7.5. AC Conducted emission

Test setup



Limit

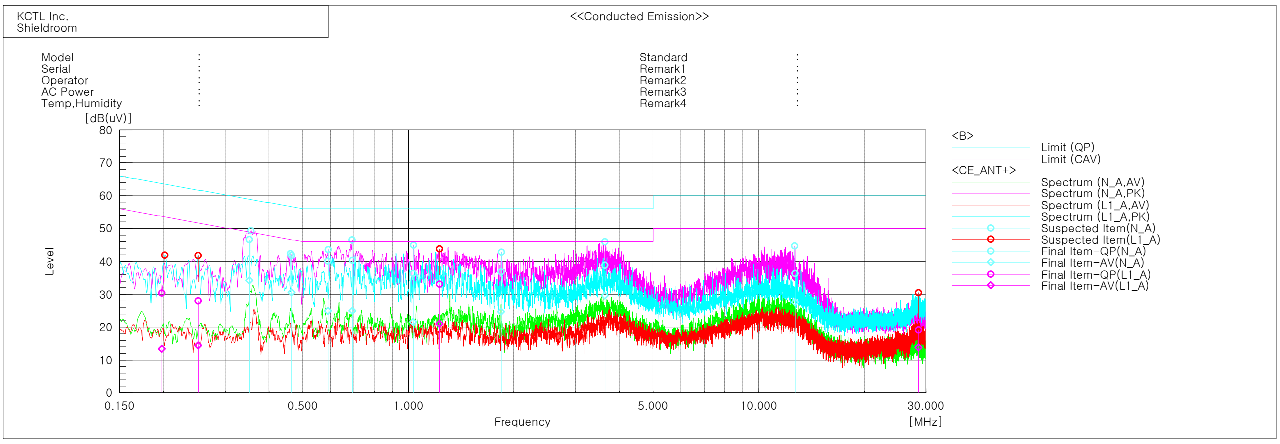
According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50uH/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 (㎒)	Conducted limit (dB㎶/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 ㎝ in which is located 40 ㎝ 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 50Ω/50μH 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 ㎒ to 30 ㎒.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 ㎑ or to quasi-peak and average within a bandwidth of 9 ㎑. The EUT was in transmitting mode during the measurements.

Test results



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	0.35161	36.9	24.4	9.8	46.7	34.2	58.9	48.9	12.2	14.7
2	0.46474	31.8	20.7	9.9	41.7	30.6	56.6	46.6	14.9	16.0
3	0.59012	30.2	15.0	9.9	40.1	24.9	56.0	46.0	15.9	21.1
4	0.69257	30.5	15.0	9.8	40.3	24.8	56.0	46.0	15.7	21.2
5	1.03174	26.5	11.7	9.8	36.3	21.5	56.0	46.0	19.7	24.5
6	1.83966	27.1	15.0	9.7	36.8	24.7	56.0	46.0	19.2	21.3
7	3.63772	29.0	19.7	9.8	38.8	29.5	56.0	46.0	17.2	16.5
8	12.68117	25.7	16.9	10.6	36.3	27.5	60.0	50.0	23.7	22.5

--- 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	0.19815	20.5	3.6	9.8	30.3	13.4	63.7	53.7	33.4	40.3
2	0.25171	18.3	4.8	9.6	27.9	14.4	61.7	51.7	33.8	37.3
3	1.22656	23.4	11.2	9.7	33.1	20.9	56.0	46.0	22.9	25.1
4	28.57712	8.0	2.7	11.1	19.1	13.8	60.0	50.0	40.9	36.2

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R & S	FSV30	101437	19.08.01
Wideband Power Sensor	R & S	NRP-Z81	102398	20.01.25
ATTENUATOR	R & S	DNF Dämpfungsglied 10 dB in N-50 Ohm	31212	19.05.14
EMI TEST RECEIVER	R & S	ESCI	100732	19.08.23
Bi-Log Antenna	SCHWARZBECK	VULB 9168	583	20.05.04
Amplifier	SONOMA INSTRUMENT	310N	284608	19.08.23
COAXIAL FIXED ATTENUATOR	Agilent	8491B-003	2708A18758	20.05.04
Horn antenna	ETS.lindgren	3116	00086635	19.05.10
Horn antenna	ETS.lindgren	3117	161225	19.05.18
AMPLIFIER	L-3 Narda-MITEQ	AMF-7D-01001800 -22-10P	2003683	19.05.15
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	-	-
Turn Table	Innco Systems	DT2000	79	-
Antenna Mast	Innco Systems	MA4000-EP	303	-
Turn Table	Innco Systems	DT2000	79	-
Highpass Filter	WT	WT-A1698-HS	WT160411001	19.05.14
TWO-LINE V - NETWORK	R&S	ENV216	101584	19.04.05
EMI TEST RECEIVER	R & S	ESCI	101408	19.08.23
Vector Signal Generator	R & S	SMBV100A	257566	20.01.04
Signal Generator	R & S	SMR40	100007	19.05.15
Cable Assembly	RadiAll	2301761768000PJ	1724.659	-
Cable Assembly	gigalane	RG-400	-	-
Cable Assembly	HUER+SUHNER	SUCOFLEX 104	MY4342/4	-

End of test report