TEST REPORT
Part 15 Subpart C 15.247

Equipment under test	APM-PRO
Model name	APM-PRO
FCC ID	XYCAPMPRO
Applicant	Aram Huvis Co., LTD.
Manufacturer	Aram Huvis Co., LTD.
Date of test(s)	2017.11.09 ~ 2017.11.21
Date of issue	2018.01.03

Issued to
Aram Huvis Co., LTD.
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Test and report completed by :	Report approval by :
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Revision history

Revision	Date of issue	Test report No.	Description
-	2018.01.03	KES-RF-18T0002	Initial

TABLE OF CONTENTS

1. General information

Applicant:	Aram Huvis Co., LTD.
Applicant address:	Jung-Ja Dong-Rm401-402, Seoul National University Hospital's Health Care Innovation Park, 172, Dolma-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, South Korea
Test site:	KES Co., Ltd.
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Test Facility	FCC Accreditation Designation No.: KR0100, Registration No.: 444148
FCC rule part(s):	15.247
FCC ID:	XYCAPMPRO
Test device serial No.:	☒ Production ☐ Pre-production ☐ Engineering

1.1. EUT description

Equipment under test	APM-PRO
Frequency range	2 402 ㎒ ~ 2 480 ㎒ (BDR/EDR) 2 402 ㎒ ~ 2 480 ㎒ (LE) 2 412 ㎒ ~ 2 462 ㎒ (11b/g/n_HT20) UNII-1 5 180 ㎒ ~ 5 240 ㎒ (11a/n_HT20) UNII-3 5 745 ㎒ ~ 5 825 ㎒ (11a/n_HT20)
Model:	APM-PRO
Modulation technique	WIFI : DSSS, OFDM BT : GFSK, π/4DQPSK, 8DPSK
Number of channels	2 402 ㎒ ~ 2 480 ㎒ (BDR/EDR) : 79 ch 2 402 ㎒ ~ 2 480 ㎒ (LE) : 40 ch 2 412 ㎒ ~ 2 462 ㎒ (11b/g/n_HT20) : 11 ch 5 180 ㎒ ~ 5 240 ㎒ (11a/n_HT20) : 4 ch 5 745 ㎒ ~ 5 825 ㎒ (11a/n_HT20) : 5 ch
Antenna specification	2.4 ㎓ Antenna type : Chip antenna, Peak gain : 3.44 dBi 5 ㎓ Antenna type : Chip antenna, Peak gain(UNII-1) : -1.97 dBi, Peak gain(UNII-3) : -1.95 dBi
Power source	DC 3.7 V (Internal Rechargeable Battery)

1.2. Test configuration

The **Aram Huvis Co., LTD. APM-PRO FCC ID: XYCAPMPRO** was tested per the guidance of KDB 558074 D01 v04. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

1.3. Device modifications

N/A

1.4. Frequency/channel operations

Ch.	Frequency (㎒)	Rate(Mbps)
01	2 402	1
. .	. .	. .
20	2 442	1
. .	. .	. .
39	2 480	1

1.5. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
Smart Cradle	Aram Huvis Co., LTD.	APM-PRO	APM-C-A-AGJE2500106	DC 5 V

1.6. Software and Firmware description

The software and firmware installed in the EUT is version 1.01-02.

1.7. Measurement results explanation example

For all conducted test items

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator 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.

Offset(㏈) = RF cable loss(㏈) + attenuator factor(㏈).
= 1.05 + 10 = 11.05 (㏈)

1.8. Measurement Uncertainty

Test Item		Uncertainty
Uncertainty for Conduction emission test		2.62 ㏈
Uncertainty for Radiation emission test (include Fundamental emission)	9㎑ - 30㎒	4.54 ㏈
	30㎒ - 1㎓	4.36 ㏈
	Above 1㎓	5.00 ㏈
Note. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.		

2. Summary of tests

Reference	Parameter	Test results
15.247(a)(2)	6 ㏈ bandwidth	Pass
15.247(b)(3)	Output power	Pass
15.247(e)	Power spectral density	Pass
15.205 15.209	Radiated restricted band and emission	Pass
15.247(d)	Conducted spurious emission and band edge	Pass
15.207(a)	AC conducted emissions	Pass

3. Test results

3.1. 6 ㏈ bandwidth

Test procedure

KDB 558074 D01 v04 – Section 8.1 or 8.2
Used test method is section 8.1.

Test setup

EUT	Attenuator	Spectrum analyzer

Section 8.1

1. RBW = 100 ㎑.
2. VBW ≥ 3 × RBW.
3. Detector = peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize
7. 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 ㏈ relative to the maximum level measured in the fundamental emission.

Section 8.2

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 ㏈, if the functionality described above (i.e., RBW = 100 ㎑, VBW ≥ 3 × RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 ㏈.

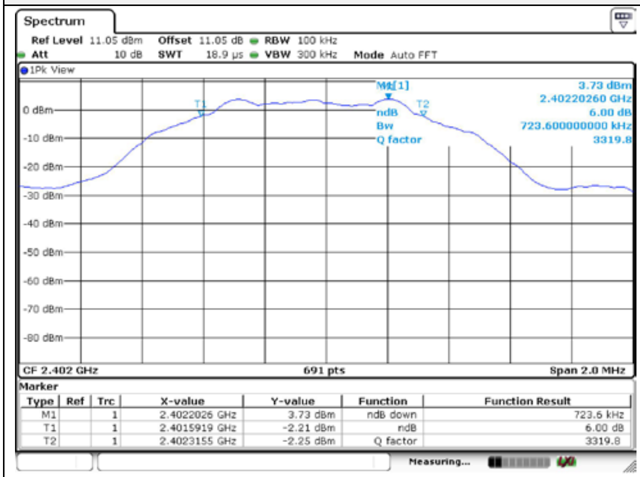
Limit

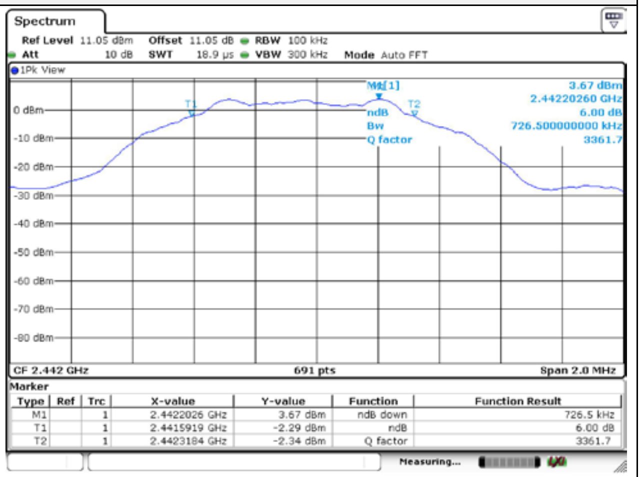
According to §15.247(a)(2), systems using digital modulation techniques may operate 902 ~ 928 ㎒, 2 400 ~ 2 483.5 ㎒, and 5 725 ~ 5 850 ㎒ bands. The minimum 6 ㏈ bandwidth shall be at least 500 ㎑.

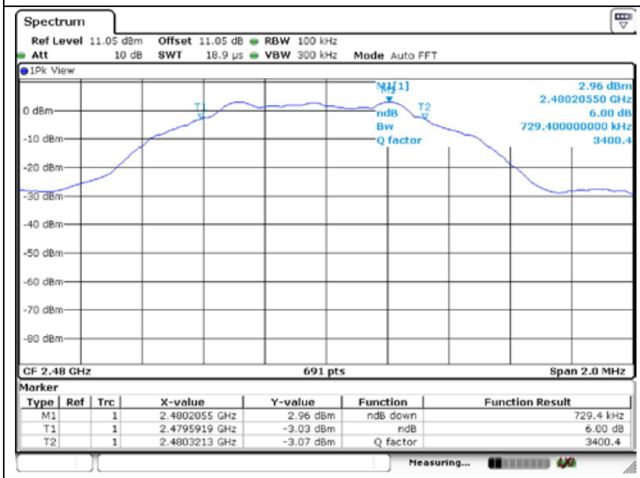
Test results

Frequency(㎒)	6 ㏈ bandwidth(㎒)	Limit(㎒)
2 402	0.724	0.5
2 442	0.727	
2 480	0.729	

LE







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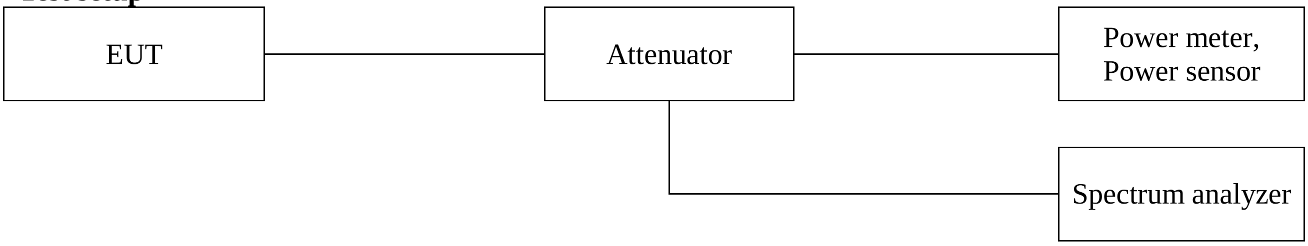
3.2. Output power

Test procedure

KDB 558074 D01 v04 – section 9.1.1 or 9.1.3 and 9.2.3.2
Used test method is section 9.1.1 and 9.2.3.2

Test setup



Section 9.1.1

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is gr eater than the DTS bandwidth.

1. Set the RBW ≥ DTS bandwidth.
2. Set VBW ≥ 3 × RBW.
3. Set span ≥ 3 × RBW
4. Sweep time = auto couple
5. Detector = peak
6. Trace mode = max hold
7. Allow trace to fully stabilize
8. Use peak marker function to determine the peak amplitude level

Section 9.1.3

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS ba ndwidth and shall utilize a fast-responding diode detector.

Section 9.2.3.2

Alternatively, measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since this measurement is made only during the ON time of the transmitter, no duty cycle corection is required.

Limit

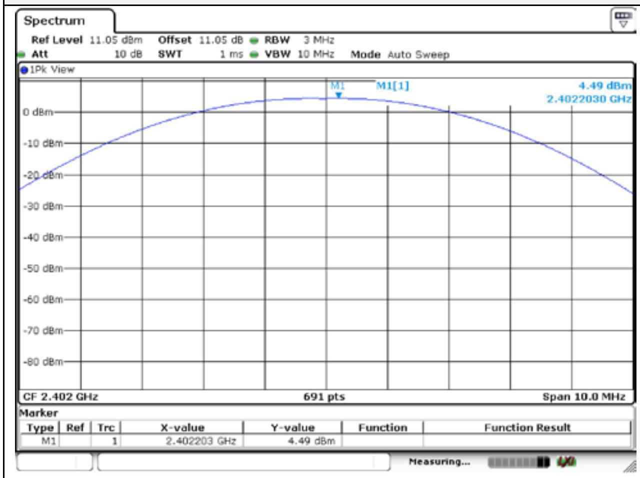
According to §15.247(b)(3), For systems using digital modulation in the 902~928 ㎒, 2 400~2 483.5 ㎒, and 5 725~5 850 ㎒ bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted out-put power. Maximum Conducted Out-put Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

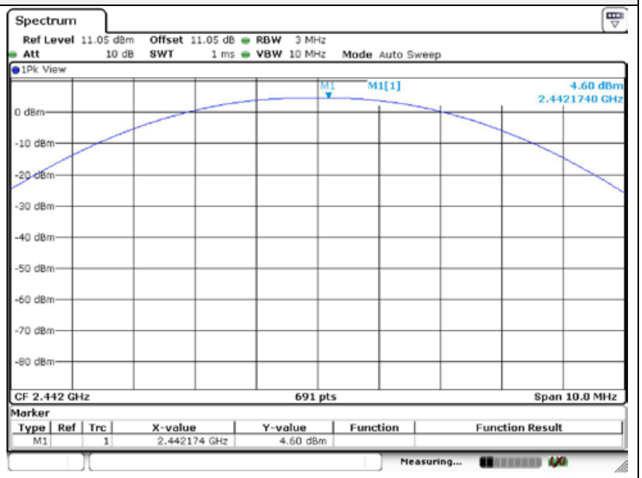
According to §15.247(b)(4), The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmit-ting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

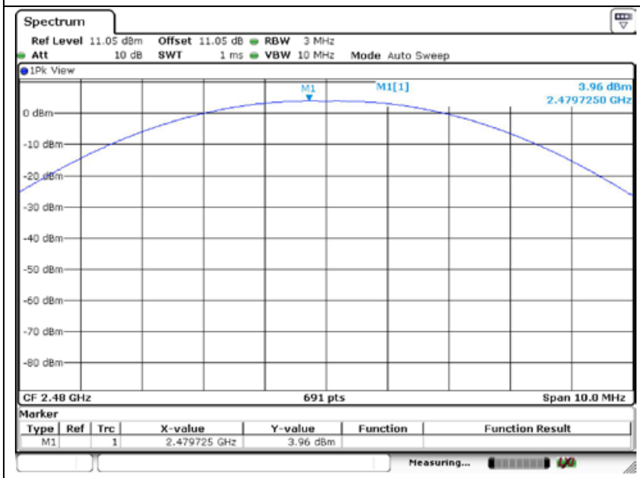
Test results

Frequency(㎒)	Peak output power(dBm)	Average output power(dBm)	Limit(dBm)
2 402	4.49	2.06	30
2 442	4.60	1.95	
2 480	3.96	2.23	

LE







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3.3. Power spectral density

Test procedure

KDB 558074 D01 v04– section 10.2

Test setup

Section 10.2

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW : 3 ㎑ ≤ RBW ≤ 100 ㎑
4. Set the VBW ≥ 3 × RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW(no less than 3 ㎑) and repeat.

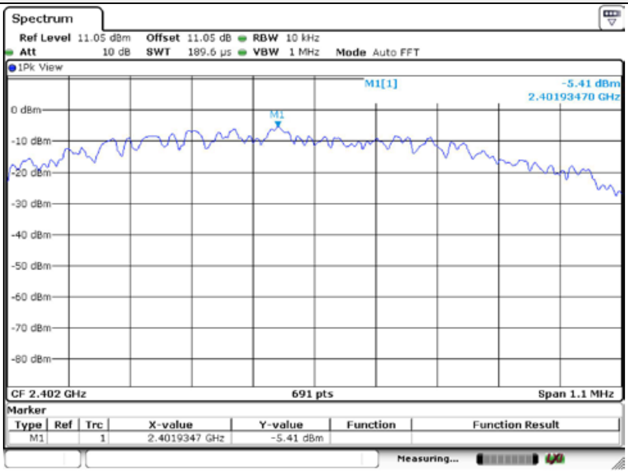
Limit

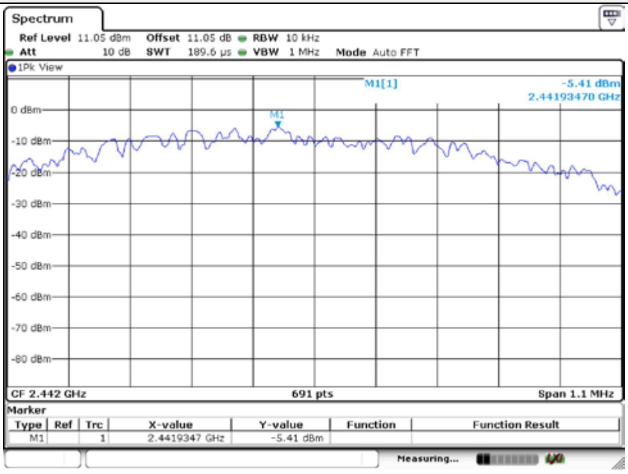
According to §15.247(e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 ㏈m in any 3 ㎑ band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

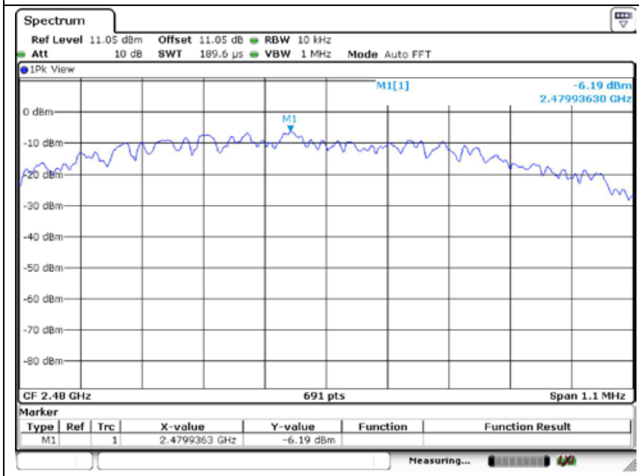
Test results

Frequency(㎒)	PSD (dBm)	Limit(dBm)
2 402	-5.41	8
2 442	-5.41	
2 480	-6.19	

LE







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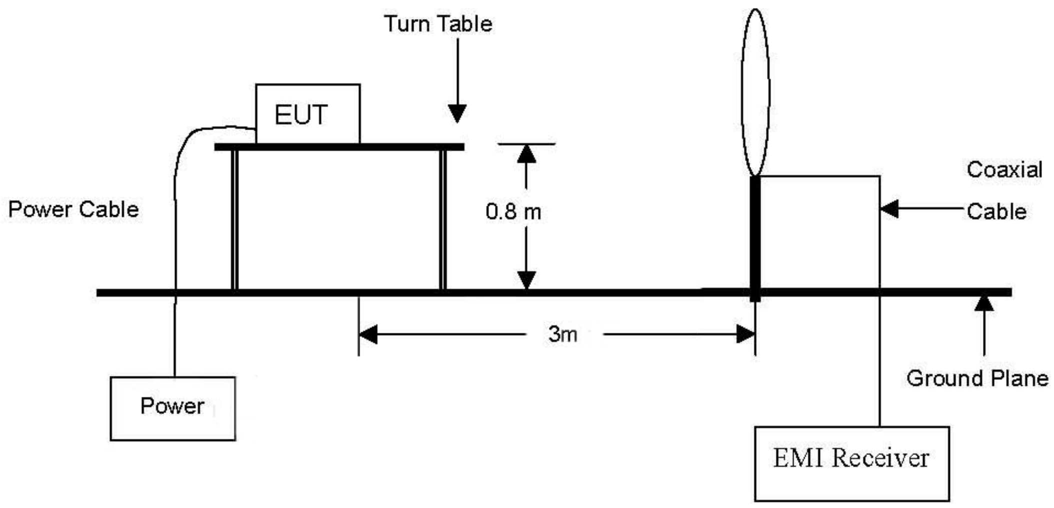
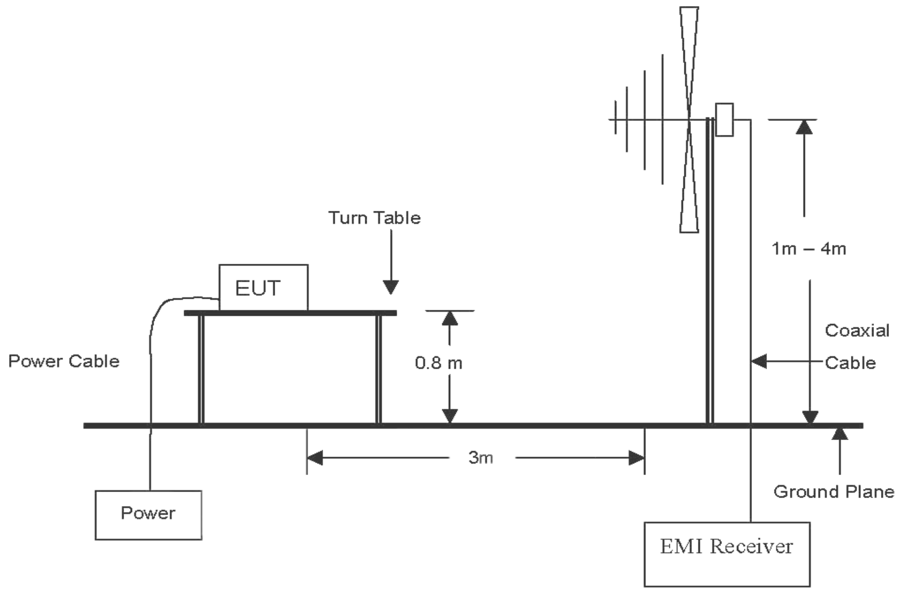
3.4. Radiated restricted band and emissions

Test setup

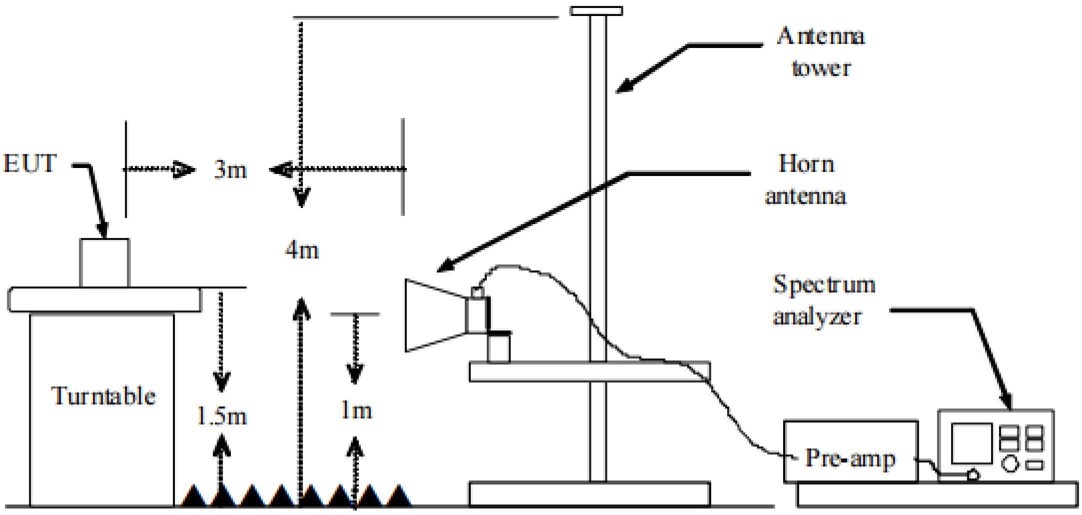
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions.



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.



Test procedure below 30 ㎒

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
3. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
4. The test-receiver system was set to average or quasi peak detect function and Specified Bandwidth with Maximum hold mode.

Test procedure above 30 ㎒

1. Spectrum analyzer settings for *f* < 1 ㎓:
   ① Span = wide enough to fully capture the emission being measured
   ② RBW = 100 ㎑
   ③ VBW ≥ RBW
   ④ Detector = quasi peak
   ⑤ Sweep time = auto
   ⑥ Trace = max hold
2. Spectrum analyzer settings for *f* ≥1 ㎓: Peak
   ① Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
   ② RBW = 1 ㎒
   ③ VBW ≥ 3 ㎒
   ④ Detector = peak
   ⑤ Sweep time = auto
   ⑥ Trace = max hold
   ⑦ Trace was allowed to stabilize

3. Spectrum analyzer settings for $f \geq 1$ ㎓: Average
   ① Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
   ② RBW = 1 ㎒
   ③ VBW ≥ 3 × RBW
   ④ Detector = RMS, if span/(# of points in sweep) ≤ (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.
   ⑤ 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 in order to use linear voltage averaging. Log or ㏈ averaging shall not be used.
   ⑥ Sweep = auto
   ⑦ Trace = max hold
   ⑧ Perform a trace average of at least 100 traces.
   ⑨ A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

      1) If power averaging (RMS) mode was used in step ⑤, then the applicable correction factor is 10 log(1/x), where x is the duty cycle.
      2) If linear voltage averaging mode was used in step ⑤, then the applicable correction factor is 20 log(1/x), where x is the duty cycle.
      3) If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

Note.

1. f <30 ㎒, extrapolation factor of 40 ㏈/decade of distance. $F_d = 40\log(D_m/Ds)$
   $f \geq 30$ ㎒, 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. CF(Correction factors(㏈)) = Antenna factor(㏈/m) + Cable loss(㏈) + or Amp. gain(㏈) + or F_d(㏈)
4. Field strength(㏈㎶/m) = Level(㏈㎶) + CF (㏈) + or DCF(㏈)
5. Margin(㏈) = Limit(㏈㎶/m) - Field strength(㏈㎶/m)
6. Emissions below 18 ㎓ were measured at a 3 meter test distance while emissions above 18 ㎓ were measured at a 1 meter test distance with the application of a distance correction factor.
7. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z, it was determined that **X orientation** was worst-case orientation; therefore, all final radiated testing was performed with the EUT in **X orientation**.
8. The worst-case emissions are reported however emissions whose levels were not within 20 ㏈ of respective limits were not reported.
9. According to exploratory test no any obvious emission were detected from 9㎑ to 30㎒. Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test 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.

Limit

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

Frequency (㎒)	Distance (Meters)	Radiated (㎶/m)
0.009 ~ 0.490	300	2400/F(㎑)
0.490 ~ 1.705	30	24000/F(㎑)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88 ~ 216	3	150**
216 ~ 960	3	200**
Above 960	3	500

**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., Sections 15.231 and 15.241.

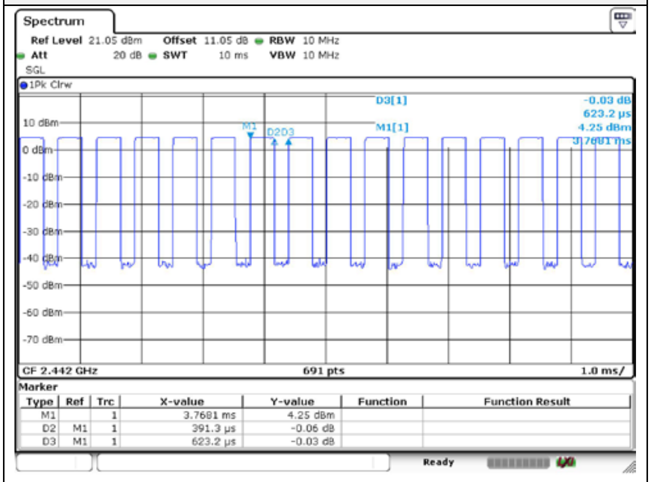
Duty cycle

Regarding to KDB 558074 D01_v04, 6.0, the maximum duty cycles of all modes were investigated and set the spectrum analyzer as below.
Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100.

T_{on} time (㎳)	Period (㎳)	Duty cycle (Linear)	Duty cycle (%)	Minimum VBW (㎑)	Duty cycle correction factor (㏈)
0.391 3	0.623 2	0.627 8	62.78	2.56	2.02

Duty cycle (Linear) = T_{on} time/Period
Minimum VBW(㎑) = $1/T_{on}$, where T is on time in second
DCF(Duty cycle correction factor (㏈)) = 10log(1/duty cycle)

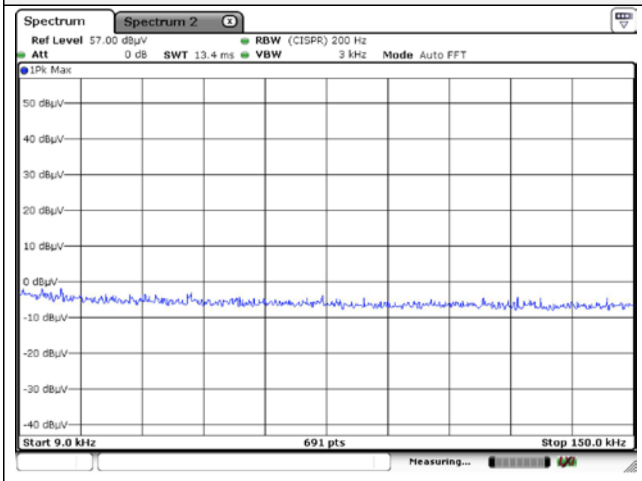
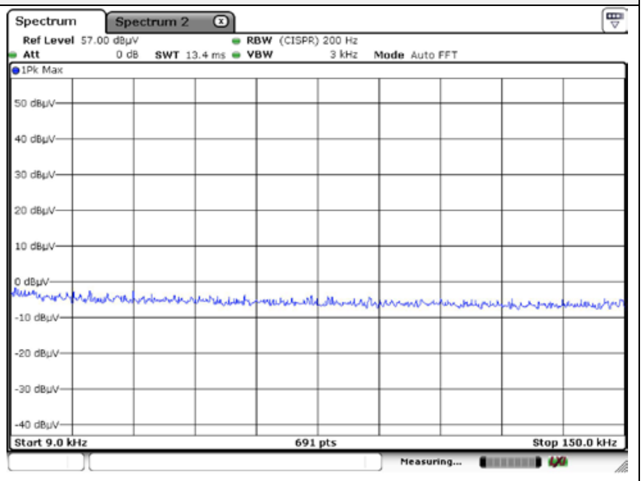
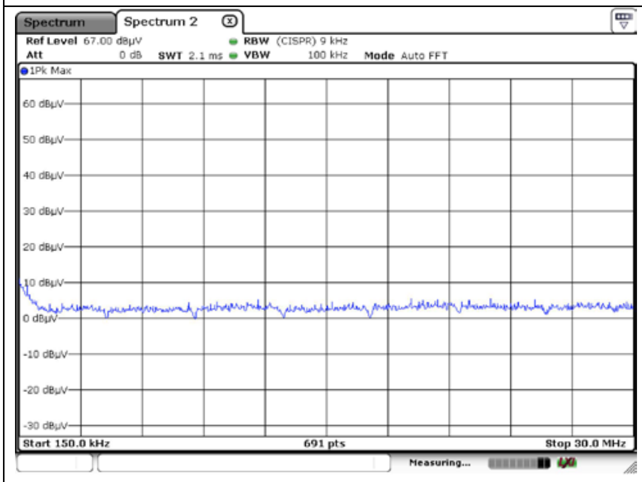
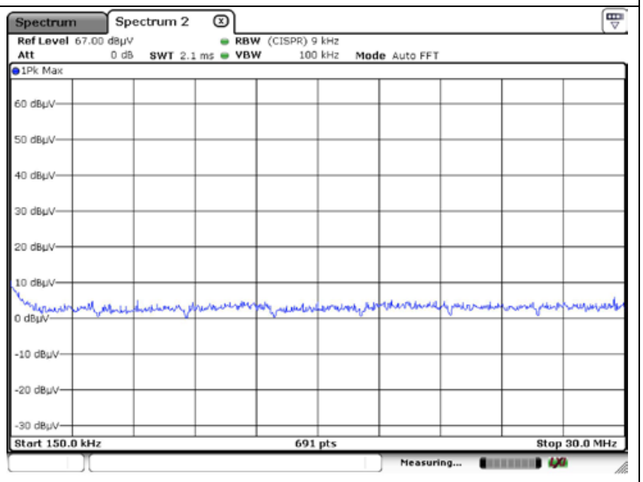
Middle channel



Test results (Below 30 ㎒)

Mode:	BLE
Distance of measurement:	3 meter
Channel:	20 (Worst case)

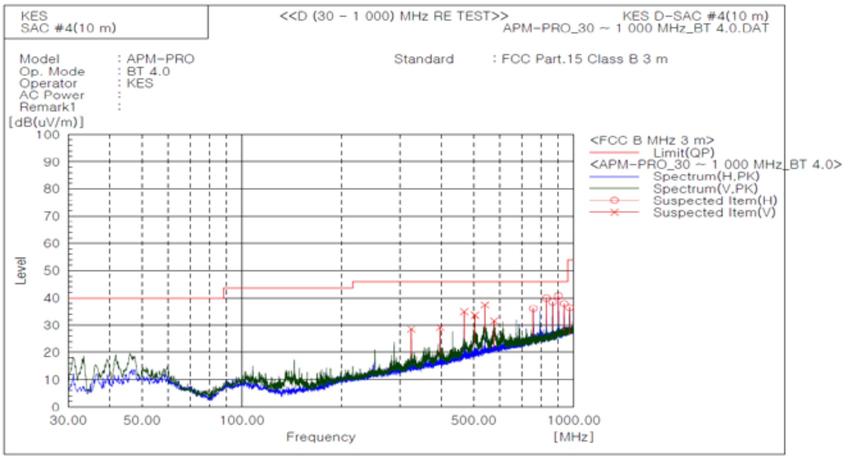
Frequency (㎒)	Level (dB㎶)	Ant. Pol. (H/V)	CF (dB)	F_d (dB)	Field strength (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
No spurious emissions were detected within 20 ㏈ of the limit							

Horizontal	Vertical
	
	

Test results (Below 1 000 ㎒) – Worst case

Mode:	BLE
Distance of measurement:	3 meter
Channel:	20 (Worst case)

Horizontal // Vertical



No.	Frequency [MHz]	(P)	Reading [dB(uV)]	c.f [dB(1/m)]	Result PK [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Remark
1	756.045	H	49.4	-13.3	36.1	46.0	9.9	
2	828.068	H	52.1	-12.1	40.0	46.0	6.0	
3	864.079	H	49.9	-11.3	38.6	46.0	7.4	
4	899.969	H	51.4	-10.6	40.8	46.0	5.2	
5	935.980	H	47.9	-10.0	37.9	46.0	8.1	
6	971.991	H	45.8	-9.4	36.4	54.0	17.6	
7	324.031	V	52.1	-23.6	28.5	46.0	17.5	
8	395.933	V	50.1	-21.0	29.1	46.0	16.9	
9	467.955	V	53.7	-18.8	34.9	46.0	11.1	
10	503.966	V	51.4	-17.7	33.7	46.0	12.3	
11	539.978	V	54.2	-16.7	37.5	46.0	8.5	
12	575.989	V	47.4	-15.8	31.6	46.0	14.4	

Test results (Above 1 000 ㎒)

Mode: BLE

Distance of measurement: 3 meter

Channel: 00

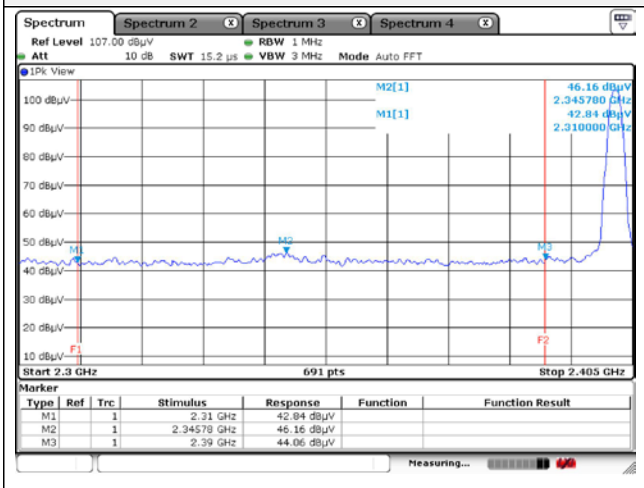
- **Spurious**

Frequency (㎒)	Level (dB㎶)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
2 347.30	47.72	Peak	H	-0.30	-	47.42	74.00	26.58
1 835.00	48.39	Peak	V	-2.71	-	45.68	74.00	28.32
2 162.10	46.81	Peak	V	-0.65	-	46.16	74.00	27.84
2 353.10	50.86	Peak	V	-0.29	-	50.57	74.00	23.43

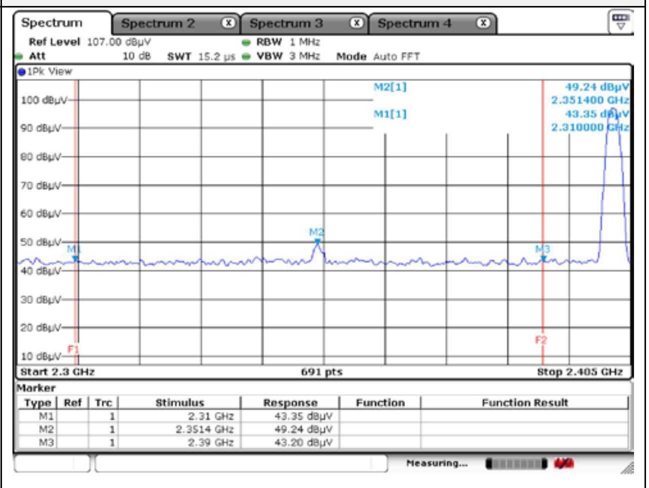
- **Band edge**

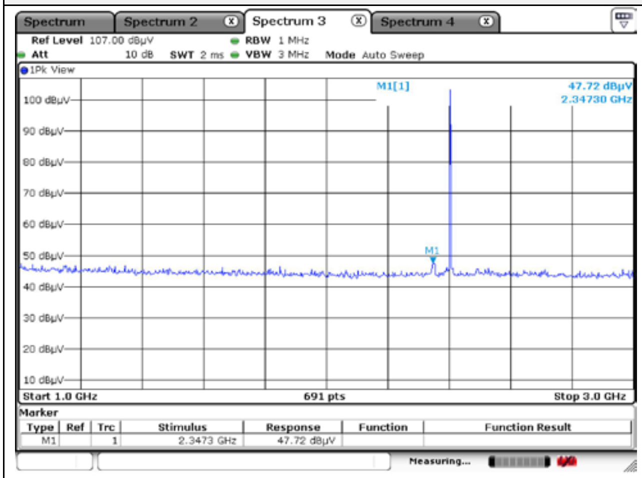
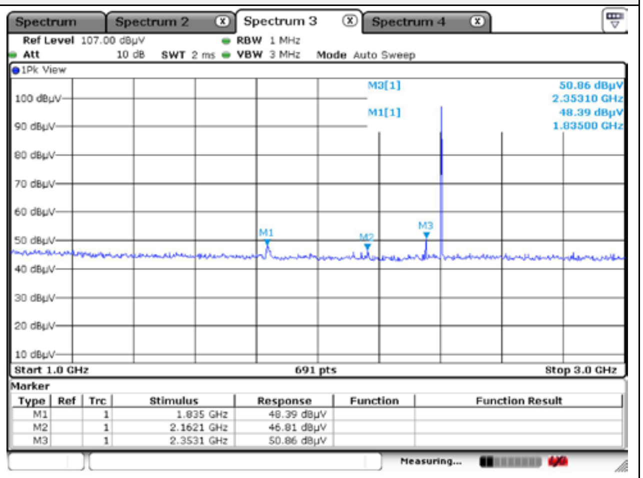
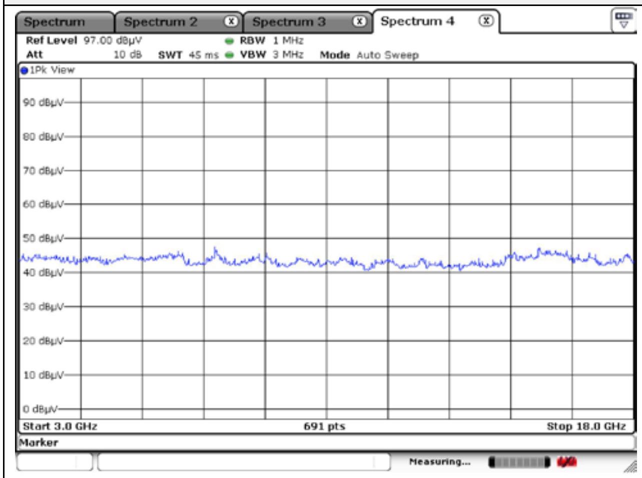
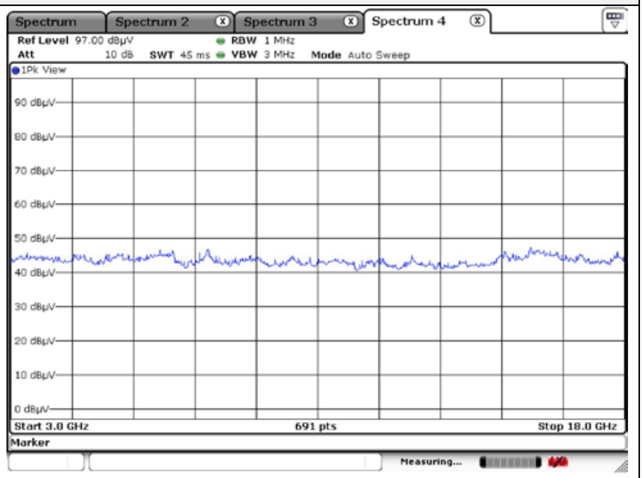
Frequency (㎒)	Level (dB㎶)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
2 345.78	46.16	Peak	H	-0.30	-	45.86	74.00	28.14
2 351.40	49.24	Peak	V	-0.29	-	48.95	74.00	25.05

Restricted band // Horizontal // Peak



Restricted band // Vertical // Peak



Horizontal // Peak for 1 ㎓ to 3 ㎓	**Vertical // Peak for 1 ㎓ to 3 ㎓**
	
Horizontal // Peak for 3 ㎓ to 18 ㎓	**Vertical // Peak for 3 ㎓ to 18 ㎓**
	

Note.
1. No spurious emission were detected above 3 ㎓.
2. Average test would be performed if the peak result were greater than the average limit.

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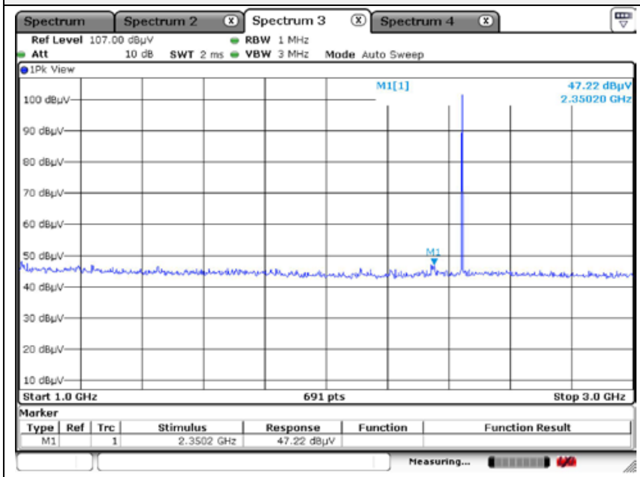
www.kes.co.kr

Mode:	BLE
Distance of measurement:	3 meter
Channel:	20

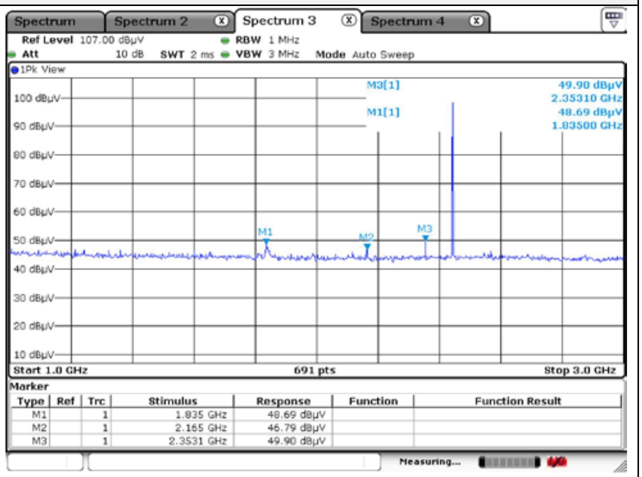
- **Spurious**

Frequency (㎒)	**Level (dB㎶)**	**Detect mode**	**Ant. Pol. (H/V)**	**CF (dB)**	**DCF (dB)**	**Field strength (dB㎶/m)**	**Limit (dB㎶/m)**	**Margin (dB)**
2 350.20	47.22	Peak	H	-0.30	-	46.92	74.00	27.08
1 835.00	48.69	Peak	V	-2.71	-	45.98	74.00	28.02
2 165.00	46.79	Peak	V	-0.64	-	46.15	74.00	27.85
2 353.10	49.90	Peak	V	-0.29	-	49.61	74.00	24.39

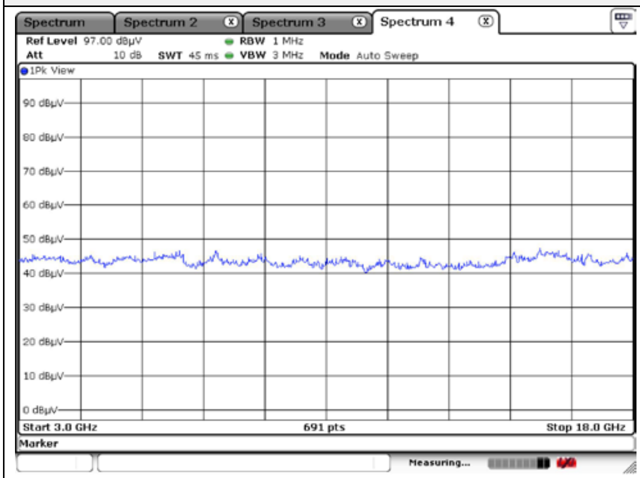
Horizontal // Peak for 1 ㎓ to 3 ㎓



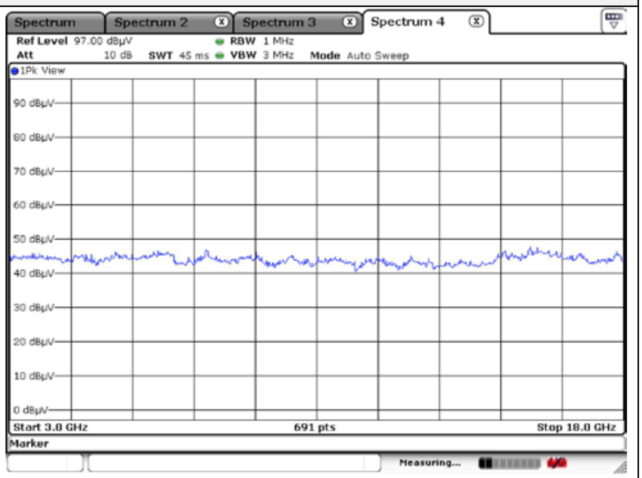
Vertical // Peak for 1 ㎓ to 3 ㎓



Horizontal // Peak for 3 ㎓ to 18 ㎓



Vertical // Peak for 3 ㎓ to 18 ㎓



Note.
1. No spurious emission were detected above 3 ㎓.
2. Average test would be performed if the peak result were greater than the average limit.

Mode:	BLE
Distance of measurement:	3 meter
Channel:	39

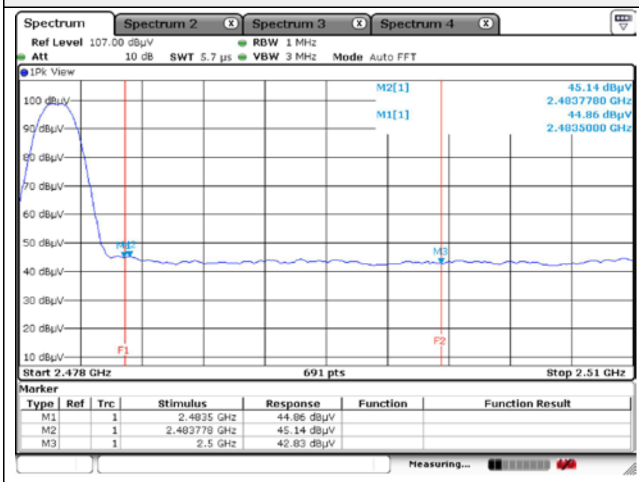
- **Spurious**

Frequency (㎒)	**Level (dB㎶)**	**Detect mode**	**Ant. Pol. (H/V)**	**CF (dB)**	**DCF (dB)**	**Field strength (dB㎶/m)**	**Limit (dB㎶/m)**	**Margin (dB)**
2 353.10	48.00	Peak	H	-0.29	-	47.71	74.00	26.29
1 835.00	48.42	Peak	V	-2.71	-	45.71	74.00	28.29
2 162.10	47.53	Peak	V	-0.65	-	46.88	74.00	27.12
2 353.10	50.34	Peak	V	-0.29	-	50.05	74.00	23.95

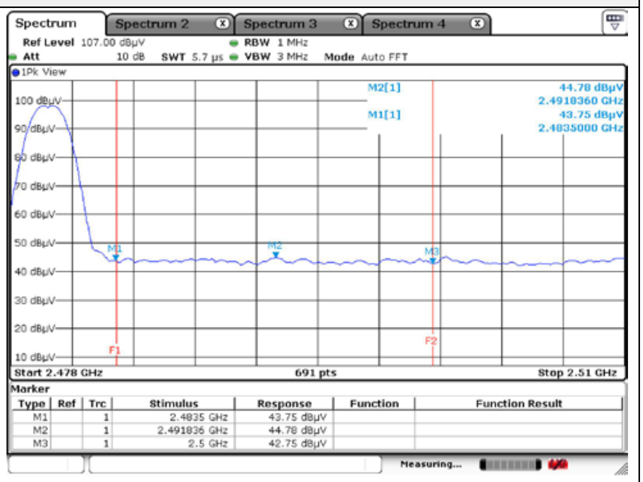
- **Band edge**

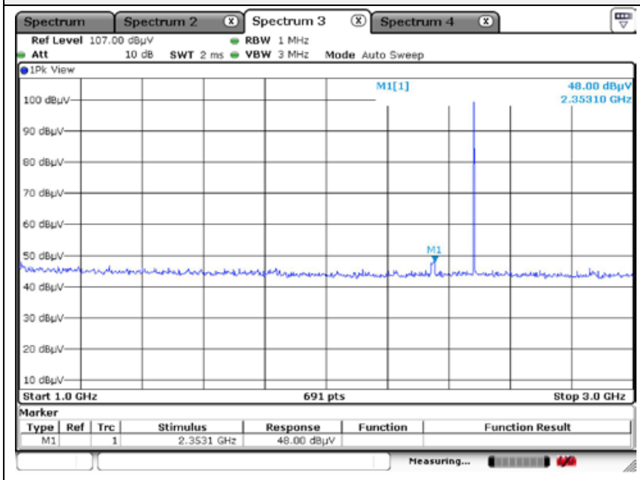
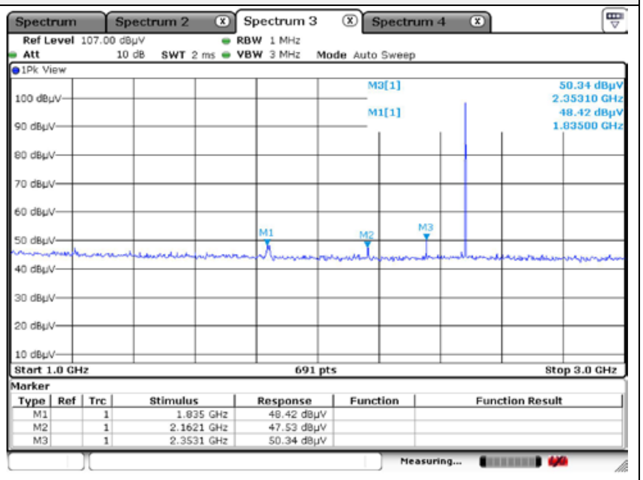
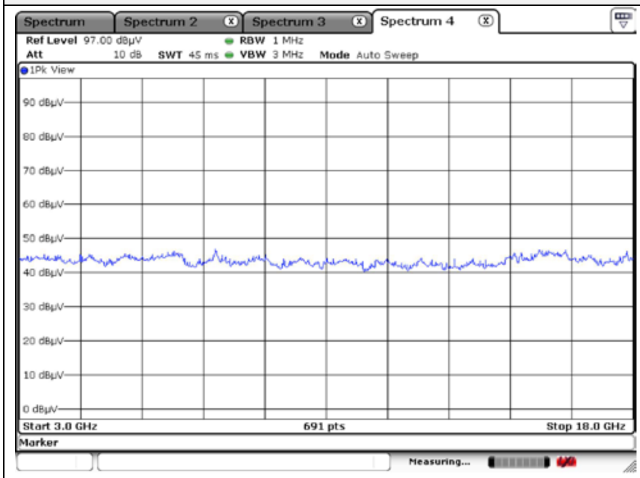
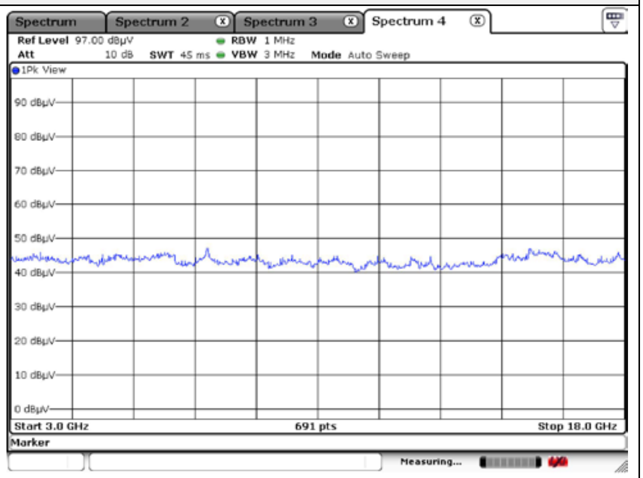
Frequency (㎒)	**Level (dB㎶)**	**Detect mode**	**Ant. Pol. (H/V)**	**CF (dB)**	**DCF (dB)**	**Field strength (dB㎶/m)**	**Limit (dB㎶/m)**	**Margin (dB)**
2 483.78	45.14	Peak	H	-0.05	-	45.09	74.00	28.91
2 491.84	44.78	Peak	V	-0.03	-	44.75	74.00	29.25

Restricted band // Horizontal // Peak



Restricted band // Vertical // Peak

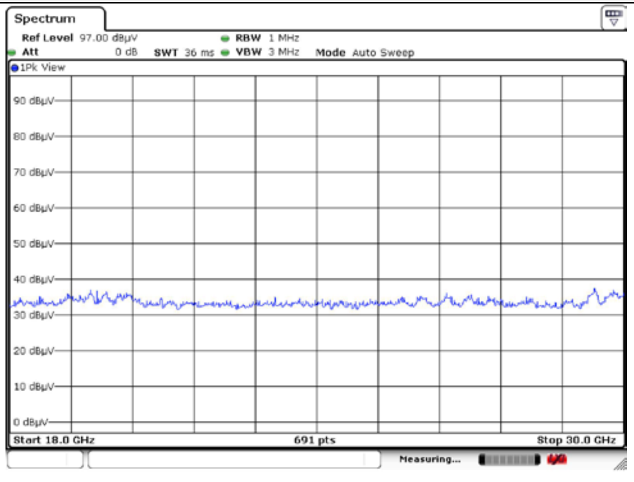
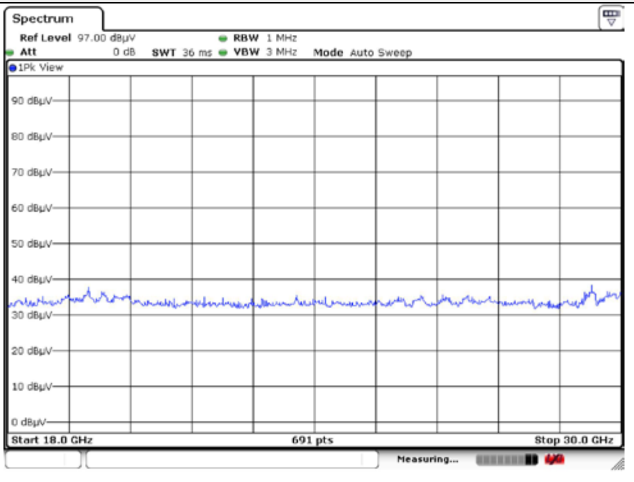


Horizontal // Peak for 1 ㎓ to 3 ㎓	Vertical // Peak for 1 ㎓ to 3 ㎓
	
Horizontal // Peak for 3 ㎓ to 18 ㎓	**Vertical // Peak for 3 ㎓ to 18 ㎓**
	

Note.
1. No spurious emission were detected above 3 ㎓.
2. Average test would be performed if the peak result were greater than the average limit.

Test results (18 ㎓ to 30 ㎓) – Worst case

Mode:	BLE
Distance of measurement:	3 meter
Channel:	20 (Worst case)

Horizontal	Vertical
	

Note.
1. No spurious emission were detected above 18 ㎓.

3.5 Conducted spurious emissions & band edge

Test setup

EUT	→	Attenuator	→	Spectrum analyzer

Test procedure

<u>Band edge</u>

KDB 558074 D01 v04 – Section 11.3

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW = 100 ㎑
4. VBW = 300 ㎑
5. Detector = Peak
6. Trace mode = max hold
7. Sweep time = auto
8. The trace was allowed to stabilize

<u>Out of band emissions</u>

KDB 558074 D01 v04 – Section 11.3

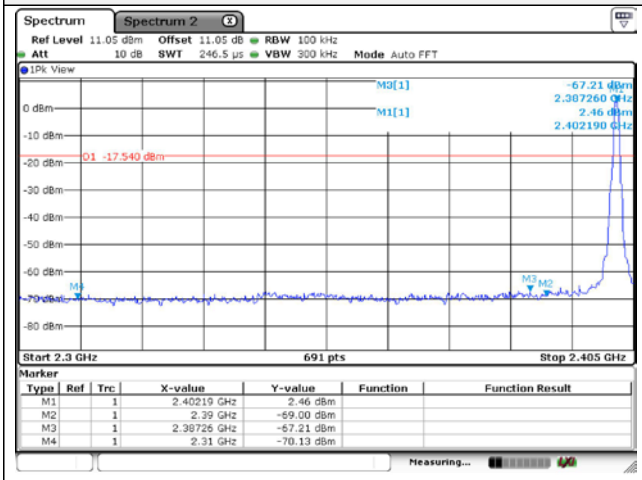
1. Start frequency was set to 30 ㎒ and stop frequency was set to 25 ㎓ for 2.4 ㎓ frequencies and 40 ㎓ for 5 ㎓ frequencies
2. RBW = 100 ㎑
3. VBW = 300 ㎑
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

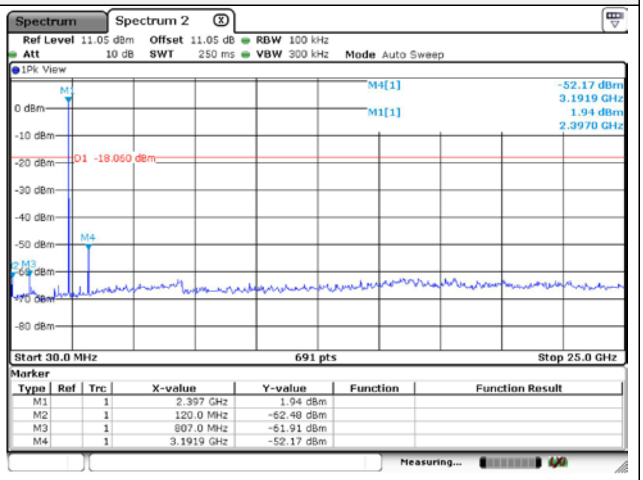
Limit

According to 15.247(d), in any 100 ㎑ bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 ㏈ below that in the 100 ㎑ bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval , as permitted under paragraph(b)(3) of this section , the attenuation required under this paragraph shall be 30 ㏈ instead of 20 ㏈. Attenuation below the general limits specified in section 15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section 15.205(a), must also comply the radiated emission limits specified in section 15.209(a) (see section 15.205(c))

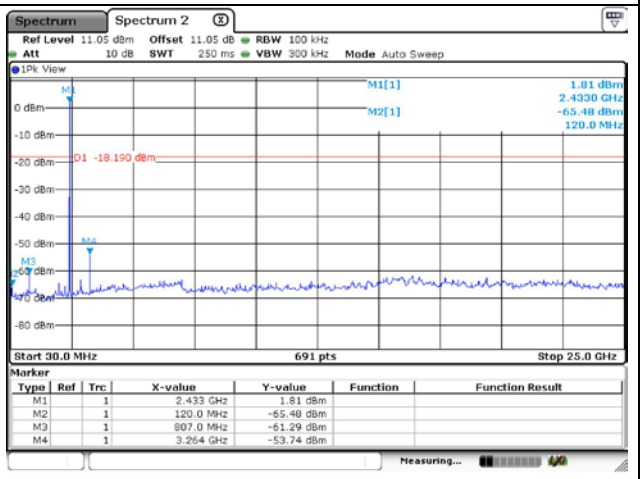
Test results

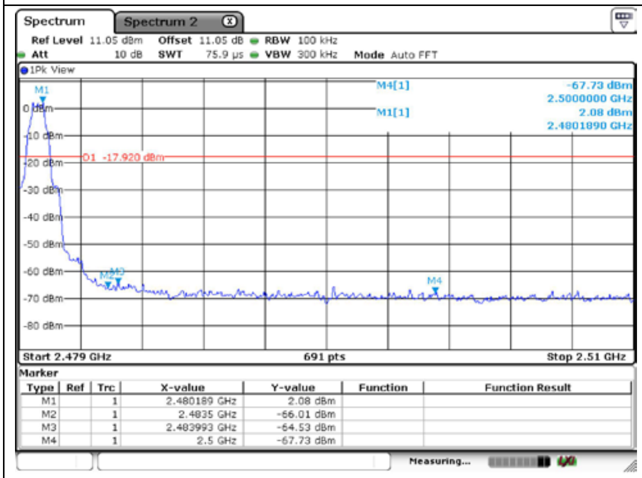
LE

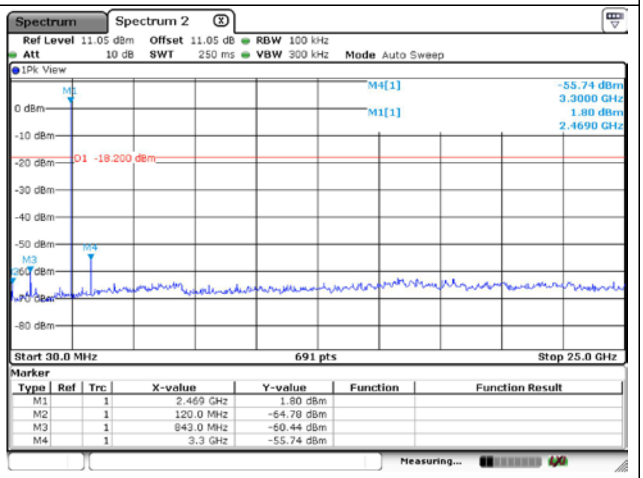




Blank

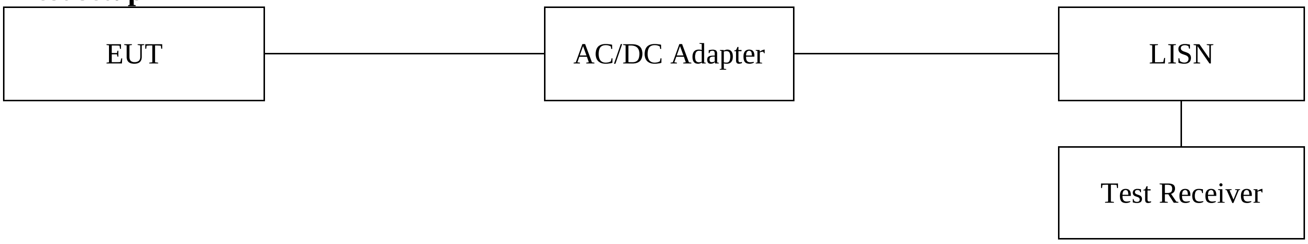






3.6. AC conducted emissions

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.

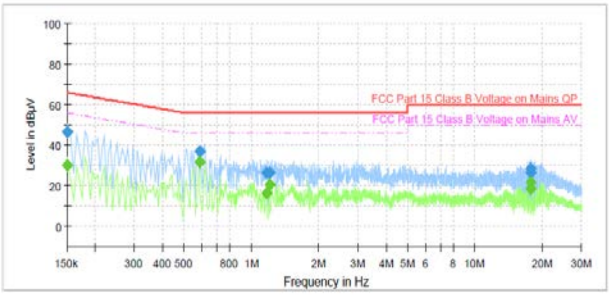
Frequency of Emission (㎒)	Conducted limit (dBμV/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Note:

1. All AC line conducted spurious emission are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and the appropriate frequencies. All data rates and modes were investigated for conducted spurious emission. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.
3. Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

Test results

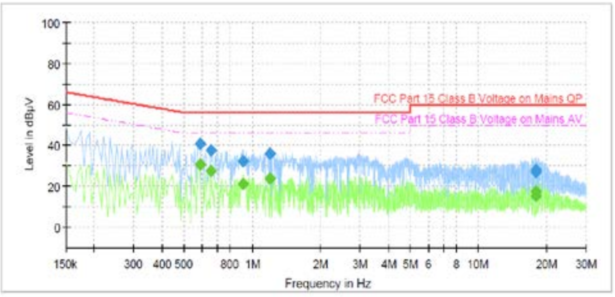
Hot Line



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.150000	---	29.98	56.00	26.02	1000.0	9.000	N	19.4
0.150000	46.51	---	66.00	19.49	1000.0	9.000	N	19.4
0.585000	---	31.57	46.00	14.43	1000.0	9.000	N	19.6
0.585000	37.23	---	56.00	18.77	1000.0	9.000	N	19.6
1.175000	---	16.65	46.00	29.35	1000.0	9.000	N	19.8
1.175000	26.51	---	56.00	29.49	1000.0	9.000	N	19.8
1.205000	---	20.43	46.00	25.57	1000.0	9.000	N	19.8
1.205000	26.67	---	56.00	29.33	1000.0	9.000	N	19.8
17.750000	---	21.82	50.00	28.18	1000.0	9.000	N	20.1
17.750000	28.79	---	60.00	31.21	1000.0	9.000	N	20.1
17.785000	---	18.82	50.00	31.18	1000.0	9.000	N	20.1
17.785000	26.67	---	60.00	33.33	1000.0	9.000	N	20.1

Neutral Line



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.585000	---	30.96	46.00	15.04	1000.0	9.000	L1	19.6
0.585000	40.86	---	56.00	15.14	1000.0	9.000	L1	19.6
0.655000	---	27.61	46.00	18.39	1000.0	9.000	L1	19.6
0.655000	37.84	---	56.00	18.16	1000.0	9.000	L1	19.6
0.905000	---	21.16	46.00	24.84	1000.0	9.000	L1	19.8
0.905000	32.28	---	56.00	23.72	1000.0	9.000	L1	19.8
1.195000	---	23.60	46.00	22.40	1000.0	9.000	L1	19.8
1.195000	35.97	---	56.00	20.03	1000.0	9.000	L1	19.8
17.940000	---	15.35	50.00	34.65	1000.0	9.000	L1	20.2
17.940000	27.04	---	60.00	32.96	1000.0	9.000	L1	20.2
17.975000	---	17.44	50.00	32.56	1000.0	9.000	L1	20.2
17.975000	28.34	---	60.00	31.66	1000.0	9.000	L1	20.2

Appendix A. Measurement equipment

Equipment	Manufacturer	Model	Serial No.	Calibration interval	Calibration date	Calibration due.
Spectrum Analyzer	R&S	FSV30	101389	1 year	2017.01.23	2018.01.23
Spectrum Analyzer	R&S	FSV40	101002	1 year	2017.07.04	2018.07.04
8360B Series Swept Signal Generator	HP	83630B	3844A00786	1 year	2017.01.23	2018.01.23
Power Meter	Anritsu	ML2495A	1438001	1 year	2017.01.23	2018.01.23
Pulse Power Sensor	Anritsu	MA2411B	1339205	1 year	2017.01.23	2018.01.23
Attenuator	Agilent	8493C	51401	1 year	2017.07.04	2018.07.04
Loop Antenna	Schwarzbeck	FMZB1513	225	2 years	2018.05.10	2019.05.10
Trilog-broadband antenna	SCHWARZBECK	VULB 9163	9168-714	2 years	2017.11.28	2018.11.28
Horn Antenna	A.H	SAS-571	414	2 years	2018.02.15	2019.02.15
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA 9170550	2 years	2018.02.15	2019.02.15
High Pass Filter	Wainwright Instrument Gmbh	WHJS3000-10TT	1	1 year	2017.07.03	2018.07.03
Low Pass Filter	Wainwright Instrument Gmbh	WLK1.0/18 G-10TT	1	1 year	2017.07.03	2018.07.03
Preamplifier	R&S	SCU01	100603	1 year	2017.11.27	2018.11.27
Preamplifier	AGILENT	8449B	3008A01742	1 year	2018.01.11	2019.01.11
EMI Test Receiver	R&S	ESR3	101781	1 year	2017.04.27	2018.04.27
EMI Test Receiver	R&S	ESU26	100552	1 year	2017.04.19	2018.04.19
Pulse Limiter	R&S	ESH3-Z2	101915	1 year	2016.12.13	2017.12.13
					2017.11.27	2018.11.27
LISN	R&S	ENV216	101787	1 year	2017.01.11	2018.01.11
					2018.01.05	2019.01.15

Peripheral devices

Device	Manufacturer	Model No.	Serial No.
-	-	-	-