RF Test Report

Report No.	:	FCCBVSV-WAY-P23080048-1
Customer	:	balsangcorporation Co.,Ltd
Address	:	#201, Mcity, 10, Myconmok-ro 92da-gil, Jungnang-gu Seoul, Republic of Korea
Use of Report	:	Certification
Model Name	:	BSF100
FCC ID	:	2AVQ3-BSF100
Date of Test	:	2023-08-04 to 2023-10-12
Test Method Used	:	FCC 47 CFR PART 15 Subpart C (Section §15.231) ANSI C63.10-2013
Testing Environment	:	Refer to the Test Condition

Test Result : ☒ **Pass** ☐ **Fail**

ISSUED BY: BV CPS ADT Korea Ltd., EMC/RF Laboratory

ADDRESS: Innoplex No.2 106, Sinwon-ro 306, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea 16675

TEST LOCATION: HeungAn-daero 49, DongAn-gu, Anyang-si, Gyeonggi-do, Korea, 14119

Tested by

Name : Kwangmin Jung (Signature)

Technical Manager

Name: Jungwoo Kim (Signature)

2023. 11. 09

BV CPS ADT Korea Ltd.

RELEASE CONTROL RECORD

REPORT NO.	REASON FOR CHANGE	DATE ISSUED
FCCBVSV-WAY-P23080048-1	Original release	2023.11.09

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1 Summary of Test Results

The EUT has been tested according to the following specifications

Applied Standard : FCC Part 15, Subpart C 15.231					
FCC Part Section(s)	**Test Description**	**Limit**	**Test Condition**	**Test Result**	**Reference**
15.231(c)	20 dB Bandwidth	70 ~ 900 MHz: No wider than 0.25% of the center frequency Above 900 MHz: No wider than 0.5% of the center frequency	Conduted	PASS	Section 3.2
15.231(a)	Dwell Time	FCC 15.231(a)		PASS	Section 3.3
15.231(b)	Field Strength of the Fundamental Signal	FCC 15.231(b)	Radiated	PASS	Section 3.4
15.231(b) 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in Restricted bands must meet the radiated limits detailed in 15.209		PASS	Section 3.5
15.203	Antenna Requirement	FCC 15.203	-	PASS	Section 3.1

NOTES

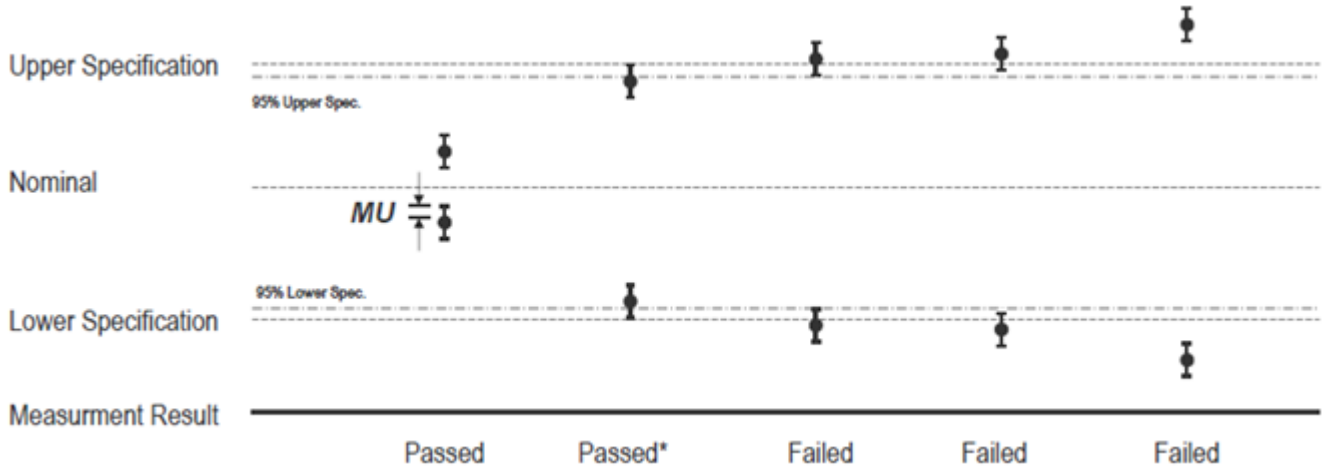
1) The general test methods used to test on this devices are ANSI C63.10.

2) Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

3) This Devices which only employ battery power for operation.

4) The Radiation test is conducted with an RF sample se to 100% duty.

1.1 Decision Rules for Statement of Conformity



QUA-52 Decision Rule(QA Document) was applied.

Step 1) : Reference Check, Daily Check, Peripheral device Check

Step 2) : Re-test Procedure (Repeat the test maximum 3 times, Different Test Engineer)

1) If the original test results are subject to retesting and the judgement is unclear, the retest is carried out.
2) If the result of the first retest is the same as the initial test, the judgement is made based on the value.
3) If the result of the first retest differ from the results of the initial test, the second re-test is carried out.
4) After completion of the second retest, the average of the three test results is determined as the final result. However, if the deviation of the three test values is more than 5 % of the reference value, the technical manager should review the reproducibility of the test from the beginning.

1.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2

Measurement Items	Frequency Range	Expanded Uncertainty U = *k*Uc (*k* = 2)
Radiated Spurious Emissions	9 kHz – 30 MHz	2.00
	30 MHz – 1 GHz	4.22
	1 GHz – 6 GHz	5.40
Measurement Items		**Expanded Uncertainty U = *k*Uc (*k* = 2)**
Conducted	Occupied channel bandwidth	2.88

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of *k* = 2.

2 General Information

2.1 General Description of EUT

Equipment Class	Security/Remote Control Transmitter (DSC)
Product name	Wireless fish bite detector
FCC ID	2AVQ3-BSF100
Model	BSF100
Additional model name	-
Power Supply	DC 3 V
Modulation Type	ASK
Transfer Rate	-
Operating Frequency	315 MHz
Antenna Type	Spring Antenna
Antenna Gain	2 dBi
H/W Version	1.3
S/W Version	1.6

NOTE 1: For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

NOTE 2: For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

2.2 Tested sample and Tested companion device information

Type	Model	Note
Test sample (Conducted)	BSF100	Identification
Test sample (Radiated)	BSF100	Identification

2.3 Description of Test Mode

The EUT has been tested with all modes of operating conditions to determine the worst case emission characteristics.

Test Mode		Worst case data rate	Tested Frequency (MHz)
TM 1	ASK	NA	315

2.4 INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

2.5 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.6 General Description of Applied Standards

Generally the tests were performed according to the specifications of the standard, it must comply with the requirements of the following standards.

FCC CFR 47 Part 15, Subpart C (§15.231)
ANSI C63.10-2013

All test items in this test report have been performed and recorded as per the above standards.

2.7 Test Equipment

Test Equipment is traceable to the National Institute of Standards and Technology (NIST). Measurement antenna used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
True-RMS Digital Multimeter	Fluke	177	43240434	2024-05-25
MXG Vector Signal Generator	Keysight Technologies	N5182B	MY53051310	2023-11-22
Signal Generator	R&S	SMB100A	MY41006053	2024-05-25
DC Power Supply	Keysight Technologies	E3632A	MY62246260	2024-05-25
Active Loop Antenna	R&S	HFH2-Z2E	100881	2025-02-03
Trilog Antenna (with 6 dB ATT.)	Schwarzbeck	VULB 9163	1100	2025-02-08
Horn Antenna	R&S	HF907	102773	2023-12-22
Signal Conditioning Unit	R&S	SCU-18F	180112	2023-11-21
Signal Conditioning Unit	R&S	SCU08F2	08400015	2023-11-21
EMI Test Receiver	R&S	ESW8	101170	2023-11-21
EMI Test Receiver	R&S	ESW44	101812	2023-11-22
Spectrum Analyzer	R&S	FSW50	101403	2023-11-22
Signal Analyzer	R&S	FSV30	103631	2023-11-22
Humidity Barometer TEMP Meter	LUTRON	MHB-382SD	AJ.38459	2023-11-29
Humidity Barometer TEMP Meter	LUTRON	MHB-382SD	AJ.38482	2023-11-22
Attenuator	Aeroflex	40AH2W-10	1	2023-11-22
Open Switch and Control Unit	R&S	OSP120	102245	-
EMC 32(RSE)	R&S	EMC 32	Version 10.35.10	-

3 Test Results

3.1 Antenna Requirement

Except from §15.203 of the FCC Rules/Regulations:

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 the section.

- The antenna(s) of the EUT is Permanently attached. (Spring Antenna)

Result
The EUT complies with the requirement of §15.203

3.2 20 dB Bandwidth

3.2.1 Regulation

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

3.2.2 Test Procedure

3.2.2.1 Occupied bandwidth—relative measurement procedure

The occupied bandwidth is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). Typical ratios, expressed in dB, are −6 dB, −20 dB, and −26 dB, corresponding to 6 dB BW, 20 dB BW, and 26 dB BW, respectively. In this subclause, the ratio is designated by "−xx dB." The reference value is either the level of the unmodulated carrier or the highest level of the spectral envelope of the modulated signal, as stated by the applicable requirement. Some requirements might specify a specific maximum or minimum value for the "−xx dB" bandwidth; other requirements might specify that the "−xx dB" bandwidth be entirely contained within the authorized or designated frequency band.(See 47 CFR 15.215(c) and 7.2.6 of RSS-Gen Issue 3.)

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five 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 video bandwidth (VBW) shall be approximately three times 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) Steps a) through c) might require iteration to adjust within the specified tolerances.

e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max hold.

g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

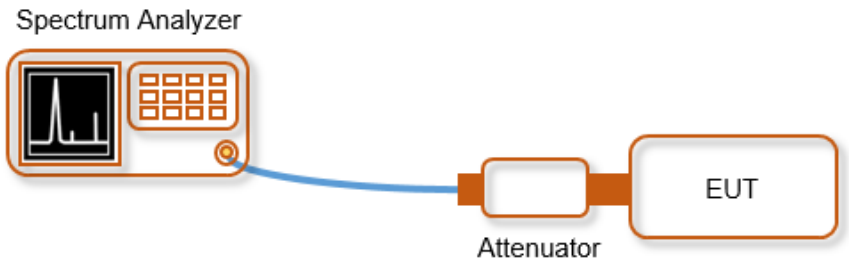
i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set

a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "−xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) 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).

3.2.3 Test Setup



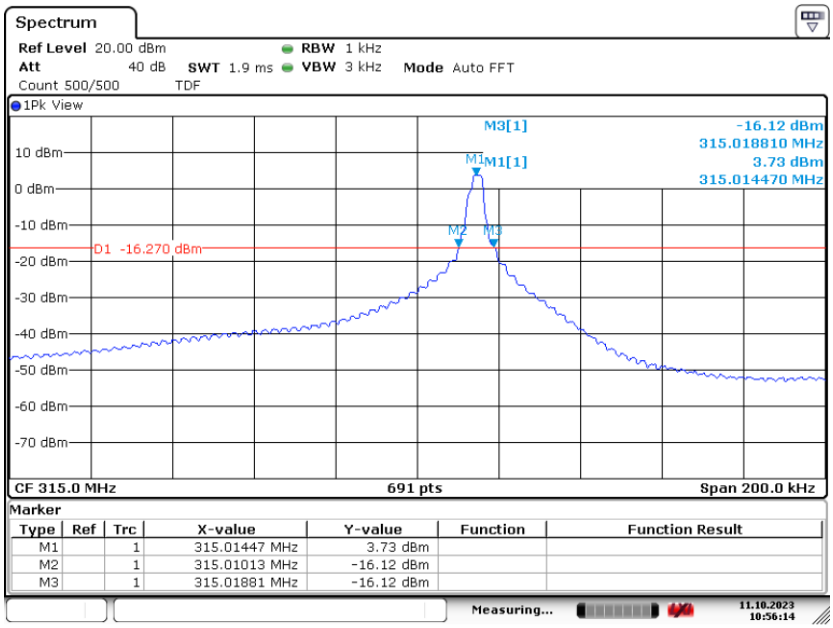
3.2.4 Test Result

[Test Data of 20 dB Bandwidth]

Test Mode	Tested Frequency [MHz]	20dB Bandwidth [kHz]	Limit [kHz]
TM 1	315	8.68	< 787.5

NOTE 1: Limit = No wider than 0.25% of the center frequency
= 315MHz × 0.0025 = 0.787 5 MHz = 787.5 kHz

[Test Plot of 20 dB Bandwidth]

315 MHz


3.3 Dwell Time

3.3.1 Regulation

The provisions of this section are restricted to periodic operation within the band 40.66–40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

1) **A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.**
2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.
4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition
5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

3.3.2 Test Procedure

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 ms). 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:

$$\delta(dB)=20\log(\Delta)$$

where

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:

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.

NOTE—If the bandwidth of the pulse is greater than the RBW of the spectrum analyzer, then a similar measurement may be performed using a wideband digital storage oscilloscope (DSO).

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 ms 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 ms, 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 ms, 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 ms.
   2) Find the 100 ms 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 ms (tON/100 ms).

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

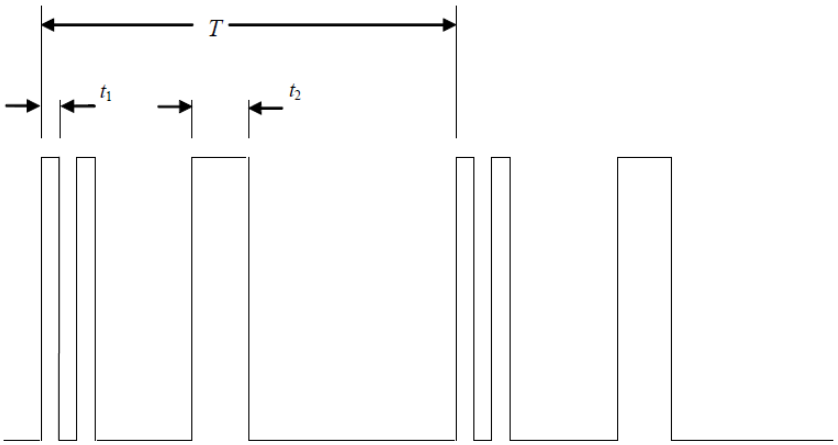


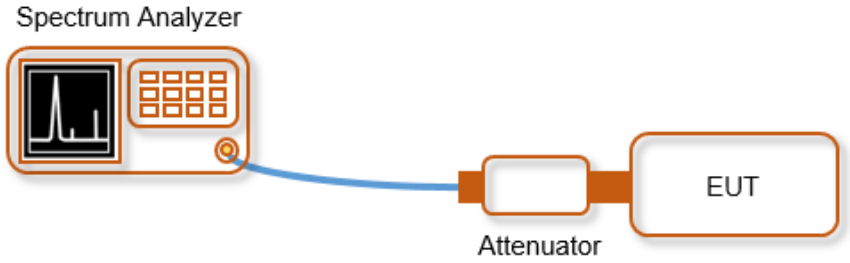
Figure shows an example of a ZERO SPAN spectrum analyzer display of a representative pulse train. The center frequency is set to the maximum of the emission, and the triggering is set to capture a single sweep over 100 ms. The pulse train is composed of two different duration pulses, t1 and t2. Using the delta-marker function, the times t1 and t2 are measured and recorded. The total number of times that the two pulses occur over the period (i.e., time interval T) is counted. The duty cycle correction factor is calculated from the sum of the individual ON times, per Equation:

$$\delta(\mathrm{dB}) = 20\log\left[\sum\left(nt_1 + mt_2 + \ldots + \xi t_x\right)/T\right]$$

Where

n is the number of pulses of duration t_1
m is the number of pulses of duration t_2
ξ is the number of pulses of duration t_x
T is the period of the pulse train, or 100 ms if the pulse train length is greater than 100 ms

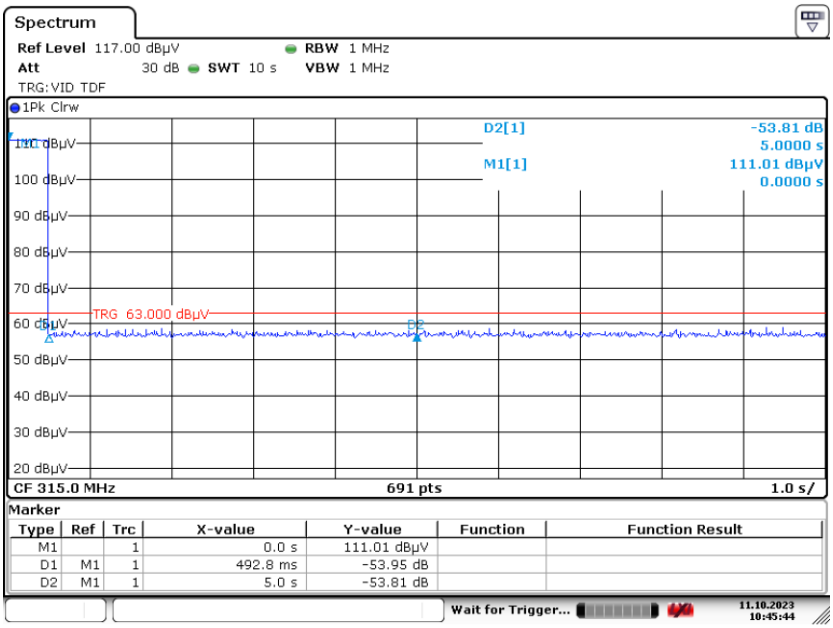
3.3.3 Test Setup



3.3.4 Test Result

Test Mode	Tested Frequency [MHz]	On Time [ms]
TM 1	315	492.8

[Test Plot of Dwell time]

315 MHz


3.4 Field Strength of the Fundamental Signal

3.4.1 Regulation

In addition to the provisions of § 15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66–40.70	2,250	225
70–130	1,250	125
130–174	[1] 1,250 to 3,750	[1] 125 to 375
174–260	3,750	375
260–470	[1] 3,750 to 12,500	[1] 375 to 1,250
Above 470	12,500	1,250

1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.
2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in § 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of § 15.205 shall be demonstrated using the measurement instrumentation specified in that section.
3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in § 15.209, whichever limit permits a higher field strength.

3.4.2 Test Procedure

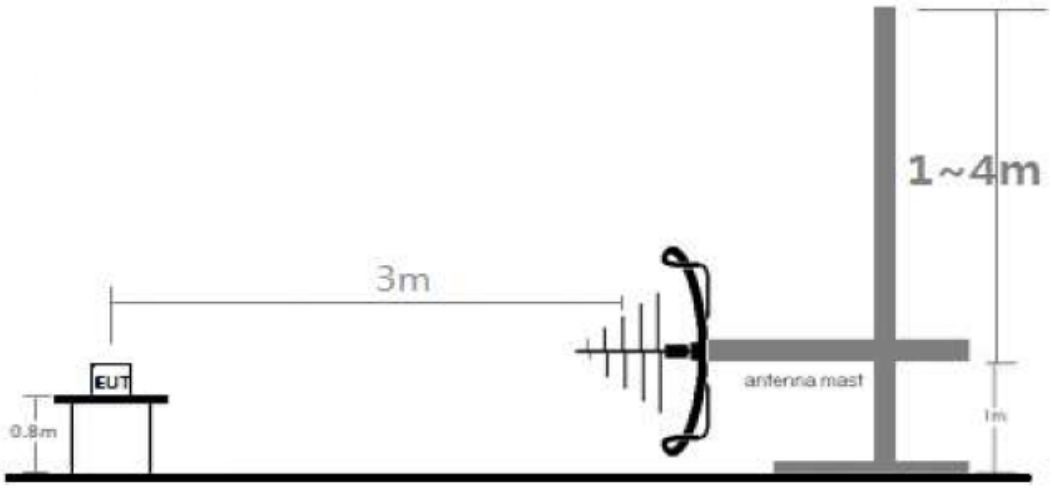
Spurious Radiated Emissions

1. The preliminary radiated measurement were performed to determine the frequency producing the maximum emissions in an semi-anechoic chamber at a distance of 3 meters.
2. The EUT was placed on the top of the 0.8-meter height, 1 x 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360º.
3. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, and from 30 to 1000 MHz using the Bi-Log antenna, and from 1000 MHz to 26500 MHz using the horn antenna.
4. To obtain the final measurement data, the EUT was arranged on a turntable situated on a 4 x 4 meter in an semi-anechoic chamber. The EUT was tested at a distance 3 meters.
5. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector fuction with specified bandwidth.
6. The 0.8 m height is for below 1 GHz testing, and 1.5 m is for above 1GHz testing.

- Sample Calculation

- Field Strength Level [dBμV/m] = S/A Reading Value [dBμV] + T.F [dB/m] + DCCF [dB]
- Total Factor [dB/m] = T.F [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB] + Amplifier Gain [dB]
- Margin [dB] = Field Strength Level [dBμV/m] – Limit [dBμV/m]

3.4.3 Test Setup



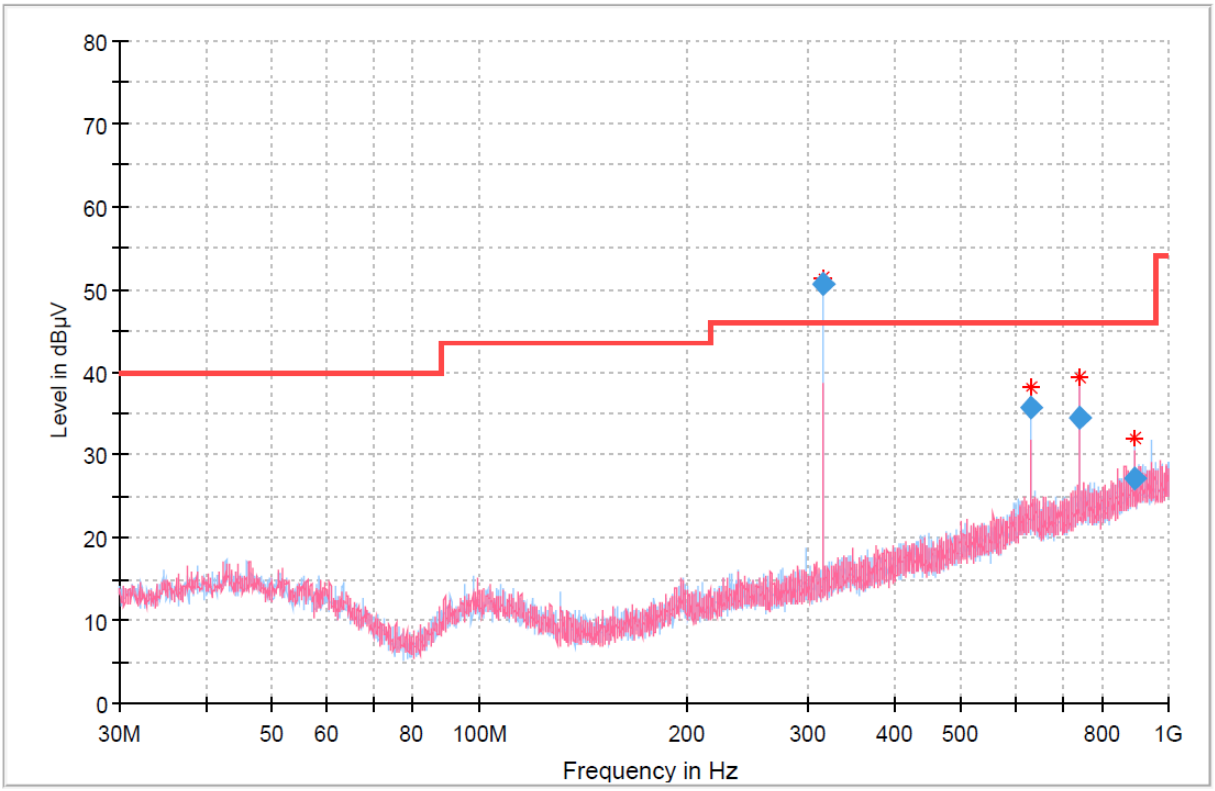
[Radiated Emission Test Setup Below 1 GHz]

3.4.4 Test Result

Remarks

1. Field Result (dBµV/m) = S/A Reading Value(dBµV) + Total Factor(dB/m) + DCCF(dB)
2. Total Factor(dB/m) = T.F (dB/m) = Antenna Factor(dB/m) + Cable Loss(dB) – Pre-Amplifier Gain(dB)
3. Margin(dB) = Field Strength (dBµV/m) – Limit (dBµV/m)
4. Measurement Distance = 3 m
5. The intent is to test at 100 % duty cycle.
6. DCCF = Duty Cycle Correction Factor.
7. No other spurious and harmonic emissions were found greater than listed emissions on above table
8. If the measured peak value satisfies the AVG Limit, the AVG value was not written.

Worst case – RSE (30 MHz ~ 1 GHz) – X axis



Tested Frequency [MHz]	Frequency [MHz]	Reading Value [dBuV]	Pol [H/V]	EUT Axis	Detector Mode	T.F [dB]	DCCF [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
315	315.0345 0	69.52	H	X	QuasiPeak	0.00	-18.90	50.62	95.62	45.00

3.5 Spurious Emission and Restricted Bands

3.5.1 Regulation

In addition to the provisions of § 15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66–40.70	2,250	225
70–130	1,250	125
130–174	[1] 1,250 to 3,750	[1] 125 to 375
174–260	3,750	375
260–470	[1] 3,750 to 12,500	[1] 375 to 1,250
Above 470	12,500	1,250

1) The above field strength limits are specified at a distance of 3 meters. The tighter limits apply at the band edges.
2) Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector. The specific method of measurement employed shall be specified in the application for equipment authorization. If average emission measurements are employed, the provisions in § 15.35 for averaging pulsed emissions and for limiting peak emissions apply. Further, compliance with the provisions of § 15.205 shall be demonstrated using the measurement instrumentation specified in that section.
3) The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in § 15.209, whichever limit permits a higher field strength.

§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 (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	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 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permItted under other sections of this part, e.g., §§15.231 and 15.241.

3.5.2 Test Procedure

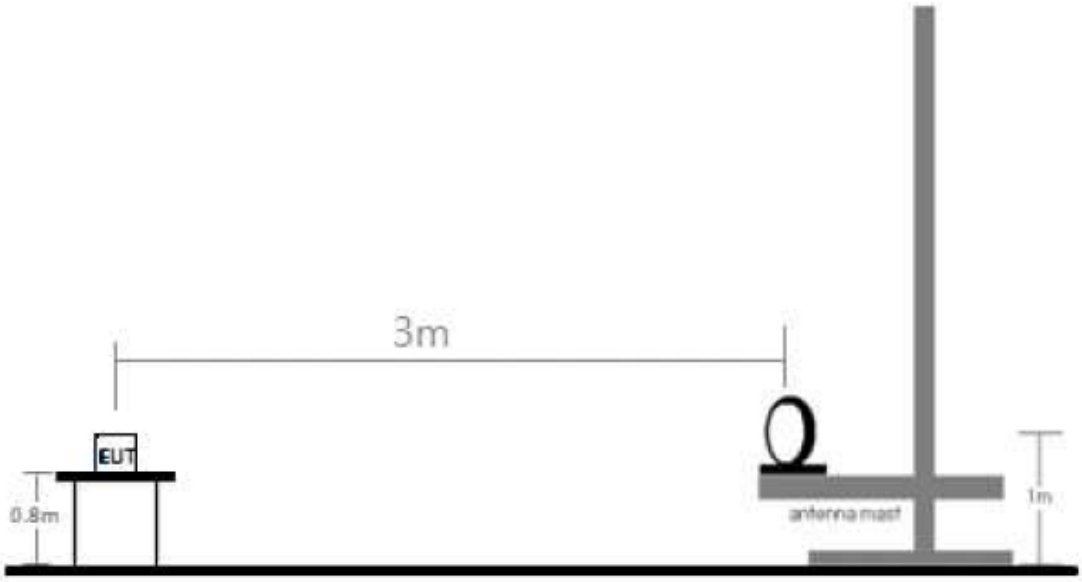
Spurious Radiated Emissions

7. The preliminary radiated measurement were performed to determine the frequency producing the maximum emissions in an semi-anechoic chamber at a distance of 3 meters.
8. The EUT was placed on the top of the 0.8-meter height, 1 x 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360º.
9. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, and from 30 to 1000 MHz using the Bi-Log antenna, and from 1000 MHz to 26500 MHz using the horn antenna.
10. To obtain the final measurement data, the EUT was arranged on a turntable situated on a 4 x 4 meter in an semi-anechoic chamber. The EUT was tested at a distance 3 meters.
11. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector fuction with specified bandwidth.
12. The 0.8 m height is for below 1 GHz testing, and 1.5 m is for above 1GHz testing.

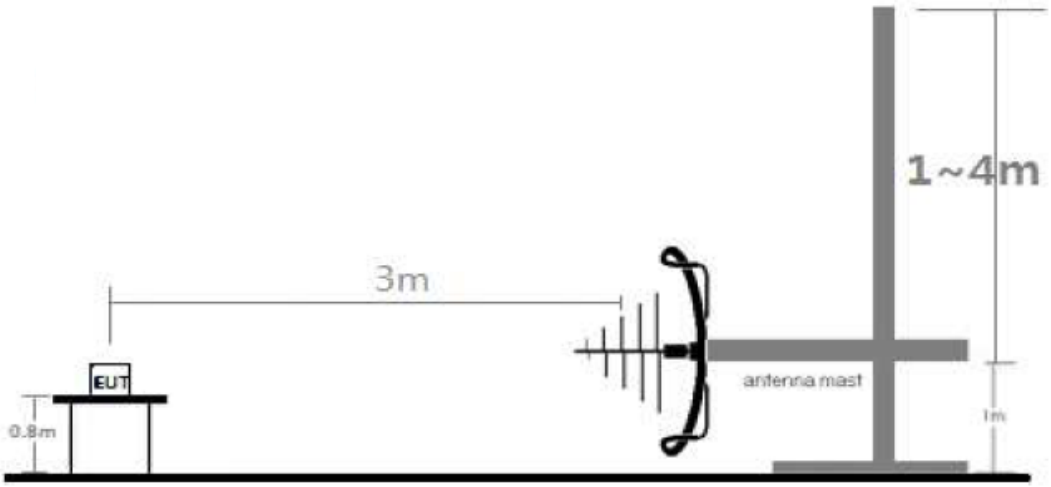
- Sample Calculation

- Field Strength Level [dBμV/m] = S/A Reading Value [dBμV] + T.F [dB/m] + DCCF [dB]
- Total Factor [dB/m] = T.F [dB/m] = Antenna Factor [dB/m] + Cable Loss [dB] + Amplifier Gain [dB]
- Margin [dB] = Field Strength Level [dBμV/m] – Limit [dBμV/m]

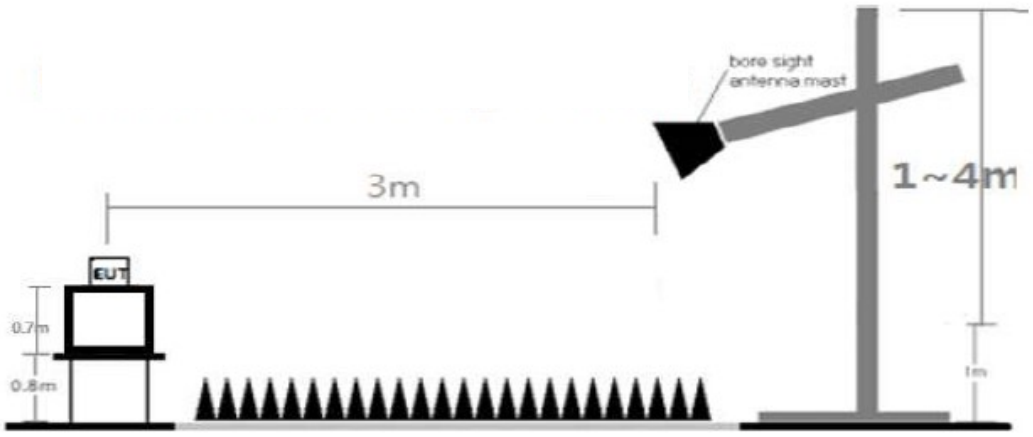
3.5.3 Test Setup

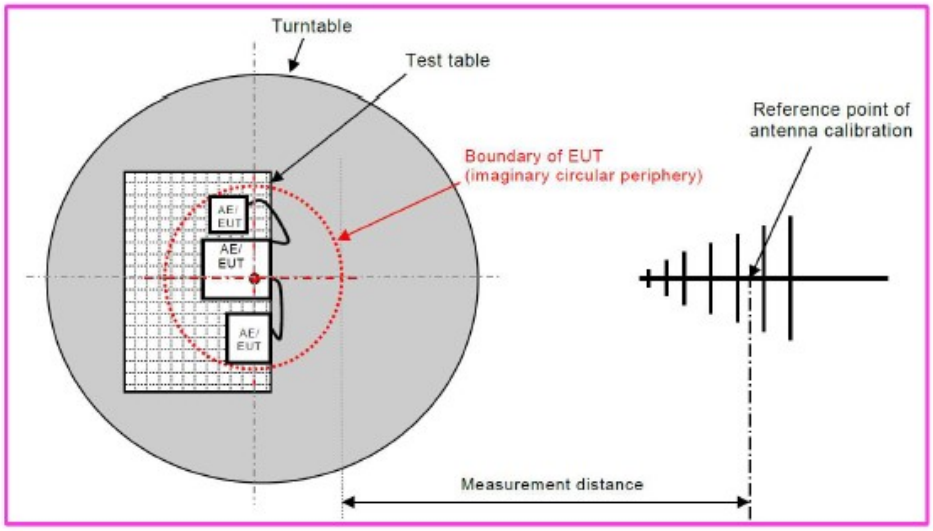


[Radiated Emission Test Setup Below 30 MHz]



[Radiated Emission Test Setup Below 1 GHz]





[Radiated Emission Test Setup Above 1 GHz]

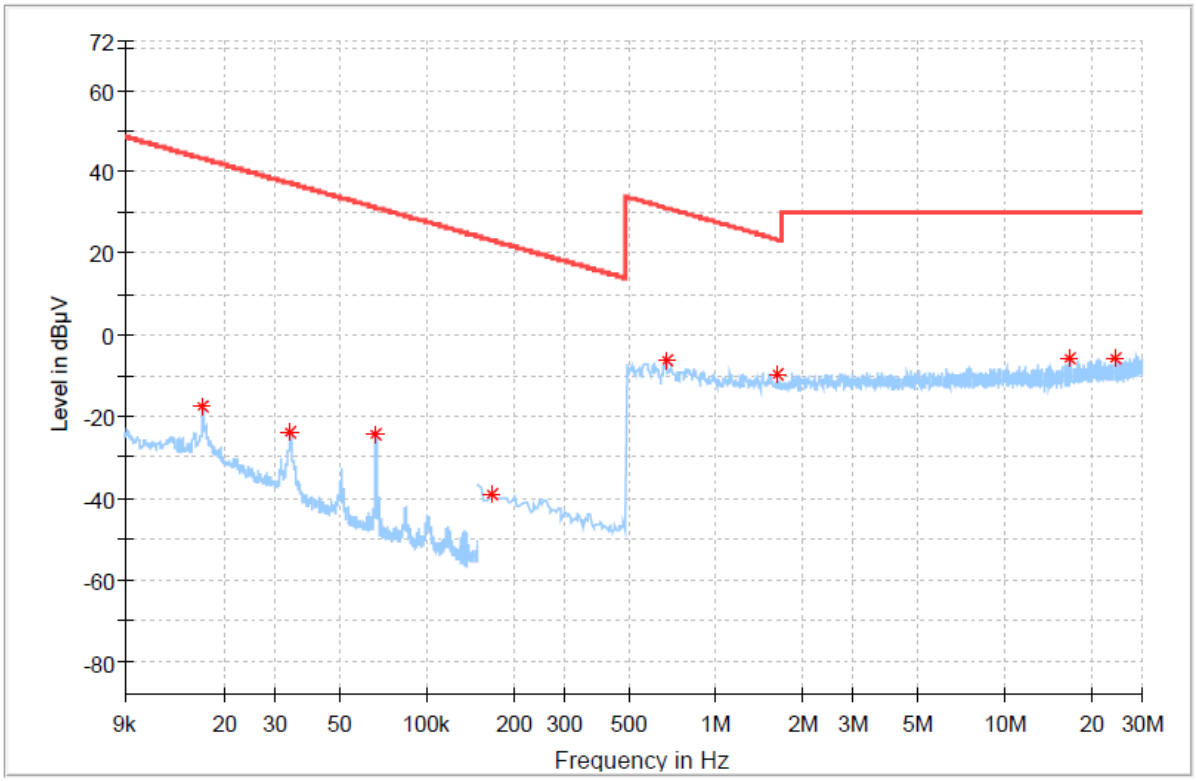
3.5.4 Test Result of Radiated Spurious Emission

Remarks

1. Field Result (dBμV/m) = S/A Reading Value(dBμV) + Total Factor(dB/m) + DCCF(dB)
2. Total Factor(dB/m) = T.F (dB/m) = Antenna Factor(dB/m) + Cable Loss(dB) – Pre-Amplifier Gain(dB)
3. Margin(dB) = Field Strength (dBμV/m) – Limit (dBμV/m)
4. Measurement Distance = 3 m
5. The intent is to test at 100 % duty cycle.
6. DCCF = Duty Cycle Correction Factor.
7. No other spurious and harmonic emissions were found greater than listed emissions on above table
8. If the measured peak value satisfies the AVG Limit, the AVG value was not written.

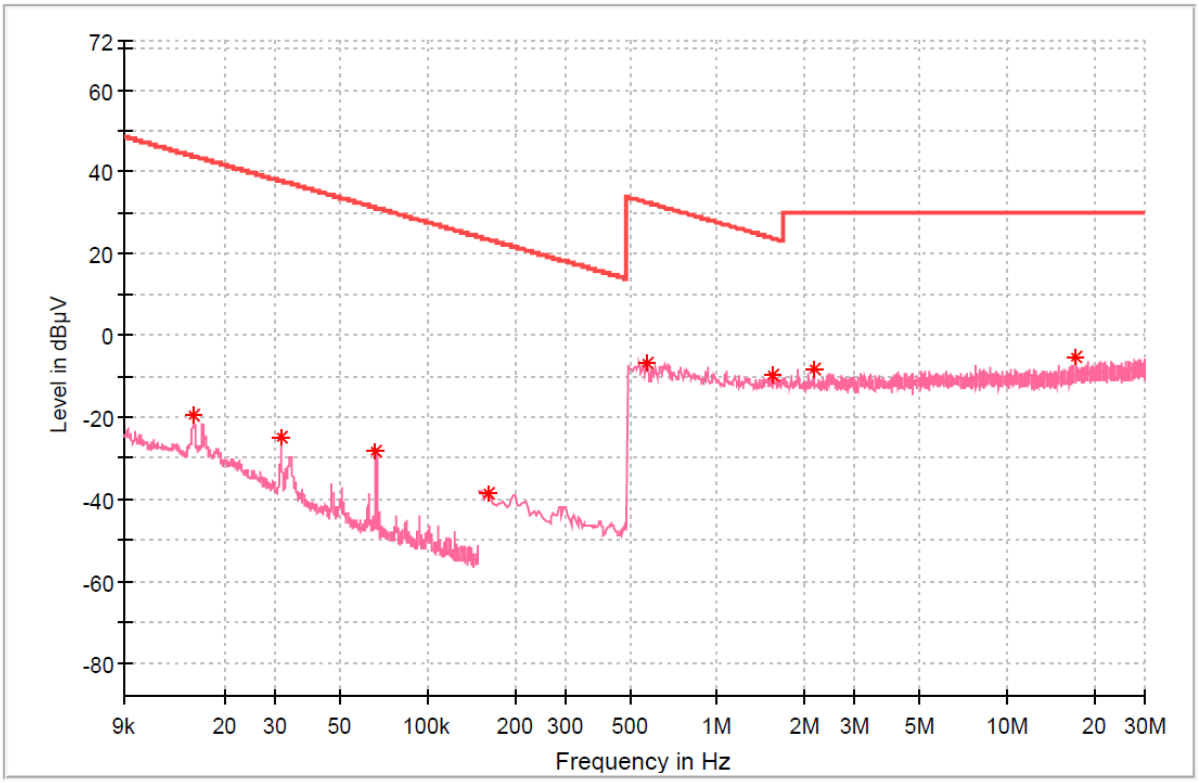
3.4.4.1 Radiated Emissions (Below 1 GHz)

Worst case – RSE (9 kHz ~ 30 MHz) Horizontal



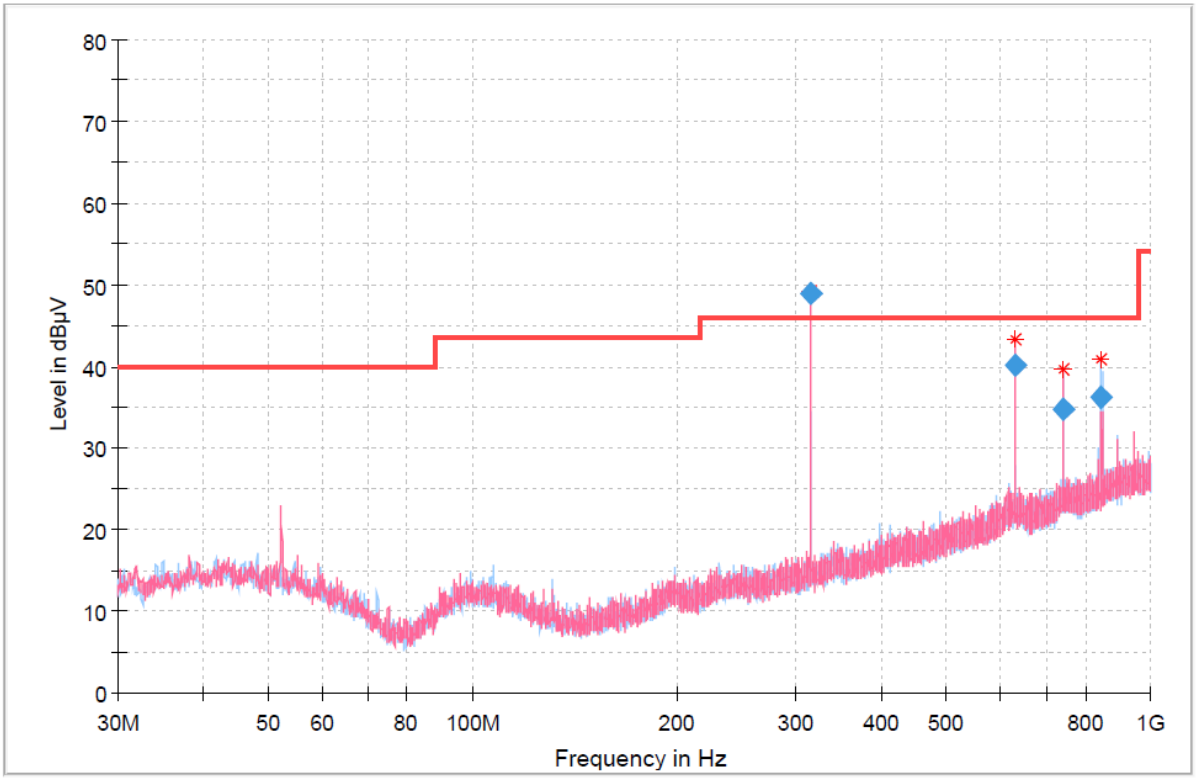
Tested Frequency [MHz]	Frequency [MHz]	Reading Value [dBuV]	Pol [H/V]	EUT Axis	Detector Mode	T.F [dB]	DCCF [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
315	0.066 7	35.59	H	X	Peak	0.00	-59.90	-24.31	31.12	55.43
	1.638 8	9.97	H	X	Peak	0.00	-19.60	-9.63	23.31	32.94

Worst case – RSE (9 kHz ~ 30 MHz) Vertical



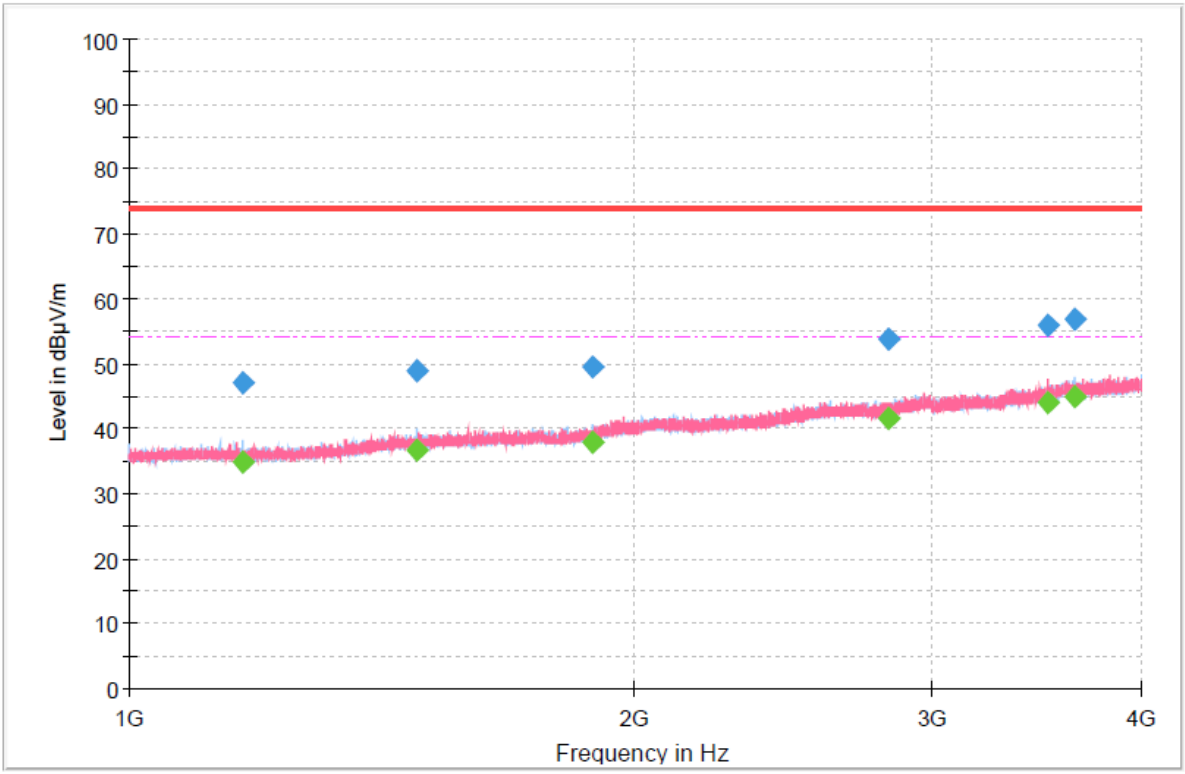
Tested Frequency [MHz]	Frequency [MHz]	Reading Value [dBuV]	Pol [H/V]	EUT Axis	Detector Mode	T.F [dB]	DCCF [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
315	0.066 7	31.74	V	X	Peak	0.00	-59.90	-28.16	31.12	59.28
	1.567 9	9.76	V	X	Peak	0.00	-19.60	-9.84	23.70	33.54

Worst case – RSE (30 MHz ~ 1 GHz) – Y axis



Tested Frequency [MHz]	Frequency [MHz]	Reading Value [dBuV]	Pol [H/V]	EUT Axis	Detector Mode	T.F [dB]	DCCF [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
315	630.090 5	51.11	V	Y	QuasiPeak	0.00	-11.00	40.11	46.00	5.89
	742.562 0	44.58	V	Z	QuasiPeak	0.00	-9.90	34.68	46.00	11.32
	891.069 0	35.65	H	X	QuasiPeak	0.00	-8.50	27.15	46.00	18.85

Worst case – RSE (Above 1 GHz)



Tested Frequency [MHz]	Frequency [MHz]	Reading Value [dBuV]	Pol [H/V]	EUT Axis	Detector Mode	T.F [dB]	DCCF [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
315	1168.75	48.25	H	X	Peak	0.00	-1.00	47.25	54.00	6.75
	1484.31	48.39	H	X	Peak	0.00	0.40	48.79	54.00	5.21
	1887.53	47.54	H	X	Peak	0.00	1.90	49.44	54.00	4.56
	2832.06	48.61	V	X	Peak	0.00	5.20	53.81	54.00	0.19
	3524.88	35.38	H	X	Average	0.00	8.80	44.18	54.00	9.82
	3650.13	35.43	H	X	Average	0.00	9.40	44.83	54.00	9.17

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services Korea. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

Test Firm Name : BV CPS ADT Korea Ltd.

Address : Innoplex No.2 106, Sinwon-ro 306, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675 KOREA

FCC

Designation Number : KR0158
Test Firm Registration Number : 666061

ISED

Designation Number : KR0158
Test Firm Registration Number : 25944

If you have any comments, please feel free to contact us at the following:

Email: Meyer.Shin@bureauveritas.com
Web Site: www.bureauveritas.co.kr/cps/eaw

The address and road map of all our labs can be found in our web site also.

- End of report -