TEST REPORT

KCTL KCTL Inc.
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
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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 : 2020-08-31

2. Use of Report : Certification

3. Name of Product / Model : Tablet PC / SM-T577U/DS

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

5. FCC ID : A3LSMT577U

6. IC Certificate No. : 649E-SMT577U

7. Date of Test : 2020-07-14 to 2020-09-28

8. Location of Test : ■ Permanent Testing Lab □ On Site Testing (Address: Address of testing location)

9. Test method used : FCC Part 15 Subpart C, 15.225
RSS-210 Issue 10 December 2019
RSS-Gen Issue 5 March 2019

10. Test Result : Refer to the test result in the test report

Affirmation	Tested by Name : Taeyoung Kim (Signature)	Technical Manager Name : Seungyong Kim (Signature)

2020-10-15

KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2020-10-06	Originally issued	-
2020-10-15	Updated	8

Note. The report No. KR20-SRF0254 is superseded by the report No. KR20-SRF0254-A.

General remarks for test reports

Nothing significant to report.

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
Factory	:	Samsung Electronics Vietnam Thai Nguyen Co., Ltd (SEVT)
Address	:	Yen binh Industrial Park, Dong Tien Ward, Pho Yen Town Thai Nguyen Province, Vietnam
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-20080, G-20078, C-20059, T-20056 Industry Canada Registration No. : 8035A KOLAS No.: KT231

2. Device information

Equipment under test	:	Tablet PC
Model	:	SM-T577U/DS
Modulation technique	:	Bluetooth(BDR/EDR)_ GFSK, π/4DQPSK, 8DPSK Bluetooth(BLE)_GFSK WIFI(802.11a/b/g/n/ac/ax)_DSSS, OFDM, OFDMA NFC_ASK LTE_QPSK, 16QAM, 64QAM WCDMA_QPSK GSM_GMSK, 8-PSK
Number of channels	:	Bluetooth(BDR/EDR)_79 ch / Bluetooth(BLE)_40 ch 802.11b/g/n/ac/ax_HT20/VHT20/HE20 : 11 ch UNII-1: 4 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) UNII-2A: 4 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) UNII-2C: 12 ch (20 ㎒), 6 ch (40 ㎒), 3 ch (80 ㎒) UNII-3: 5 ch (20 ㎒), 2 ch (40 ㎒), 1 ch (80 ㎒) NFC: 1 ch
Power source	:	DC 3.85 Ⅴ
Antenna specification	:	LTE/WCDMA_LDS carrier Antenna WIFI/Bluetooth(BDR/EDR/BLE)_LDS carrier Antenna NFC_FPCB Antenna

Antenna gain	:	WIFI/Bluetooth(BDR/EDR/BLE): ANT 1: -2.50 dBi, ANT 2: -2.50 dBi
		UNII-1 ANT 1: -3.20 dBi, ANT 2: -3.70 dBi
		UNII-2A ANT 1: -3.20 dBi, ANT 2: -3.80 dBi
		UNII-2C ANT 1: -6.20 dBi, ANT 2: -6.70 dBi
		UNII-3 ANT 1: -6.50 dBi, ANT 2: -6.40 dBi
Frequency range	:	Bluetooth(BDR/EDR/BLE)_2 402 ㎒ ~ 2 480 ㎒
		2 412 ㎒ ~ 2 462 ㎒ (802.11b/g/n/ac/ax_HT20/VHT20/HE20)
		UNII-1: 5 180 ㎒ ~ 5 240 ㎒ (802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-1: 5 190 ㎒ ~ 5 230 ㎒ (802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-1: 5 210 ㎒ (802.11ac/ax_VHT80/HE80)
		UNII-2A: 5 260 ㎒ ~ 5 320 ㎒ (802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-2A: 5 270 ㎒ ~ 5 310 ㎒ (802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-2A: 5 290 ㎒ (802.11ac/ax_VHT80/HE80)
		UNII-2C: 5 500 ㎒ ~ 5 720 ㎒ (802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-2C: 5 510 ㎒ ~ 5 710 ㎒ (802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-2C: 5 530 ㎒ ~ 5 690 ㎒ (802.11ac/ax_VHT80/HE80)
		UNII-3: 5 745 ㎒ ~ 5 825 ㎒ (802.11a/n/ac/ax_HT20/VHT20/HE20)
		UNII-3: 5 755 ㎒ ~ 5 795 ㎒ (802.11n/ac/ax_HT40/VHT40/HE40)
		UNII-3: 5 775 ㎒ (802.11ac/ax_VHT80/HE80)
		LTE Band 2_1 850.7 ㎒ ~ 1 909.3 ㎒
		LTE Band 4_1 710.7 ㎒ ~ 1 754.3 ㎒
		LTE Band 5_824.7 ㎒ ~ 848.3 ㎒
		LTE Band 7_2 502.5 ㎒ ~ 2 567.5 ㎒
		LTE Band 12_699.7 ㎒ ~ 715.3 ㎒
		LTE Band 13_779.5 ㎒ ~ 784.5 ㎒
		LTE Band 14_790.5 ㎒ ~ 795.5 ㎒
		LTE Band 17_706.5 ㎒ ~ 713.5 ㎒
		LTE Band 25_1 850.7 ㎒ ~ 1 914.3 ㎒
		LTE Band 26_814.7 ㎒ ~ 848.3 ㎒, 814.7 ㎒ ~ 823.3 ㎒
		LTE Band 41_2 498.5 ㎒ ~ 2 687.5 ㎒ (FCC)
		LTE Band 41_2 502.5 ㎒ ~ 2 687.5 ㎒ (IC)
		LTE Band 66_1 710.7 ㎒ ~ 1 779.3 ㎒
		LTE Band 71_665.5 ㎒ ~ 695.5 ㎒
		WCDMA 850_826.4 ㎒ ~ 846.6 ㎒
		WCDMA 1700_1 712.4 ㎒ ~ 1 752.6 ㎒
		WCDMA 1900_1 852.4 ㎒ ~ 1 907.6 ㎒
		NFC_13.56 ㎒
Software version	:	T577U.001
Hardware version	:	REV1.0
Test device serial No.	:	Radiated(R32N601A80M)
Operation temperature	:	-30 ℃ ~ 50 ℃

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source	FCC ID & IC
Travel Adapter	SOLU-M	EP-TA200	R37M12L1A C1HM3	Input : 100-240V, 50-60Hz (0.5A) Output : 9.0V, 1.67A or 5.0V, 2.0A	-
Data Cable	RFTECH	EP-DT725BBE	-	-	-
External Earphone	ALMUS	EHS64AVFBE	-	-	-
Protective Cover	WILLTECH VINA	GH98-45810A	-	-	-
S-Pen	WACOM	CP-913W-00B	-	-	-

2.2. Frequency/channel operations

This device contains the following capabilities:
WiFi (802.11a/b/g/n/ac/ax), Bluetooth (BDR/EDR/BLE), NFC,
LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 7, LTE Band 12, LTE Band 13, LTE Band 14, LTE Band 17, LTE Band 25, LTE Band 26, LTE Band 29 (Downlink only), LTE Band 41 (PC2, PC3), LTE Band 66, LTE Band 71, WCDMA 850, WCDMA 1700, WCDMA 1900

Ch.	Frequency (㎒)
01	13.56

Table 2.2.1. NFC

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.

Requirement of RSS-Gen Section 6.8:

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

- The transmitter has permanently attached FPCB Antenna (Internal antenna) on board.

4. Introduction

This report referenced from the FCC ID : A3LSMT575
Based on their similarity, the FCC Part 15C (equipment class: DXX) reuses the original model's result and do spot-check, following the FCC KDB 484596 D01 v01.
And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

4.1 Difference

The FCC ID: A3LSMT577U shares the same enclosure and circuit board as FCC ID: A3LSMT575. The WIFI/BT/BLE/NFC/WCDMA/LTE antenna and surrounding circuitry and layout are identical between these two units.
As for all bands, they have been verified and the parent model test results under FCC ID : A3LSMT575 shall remain representative of FCC ID : A3LSMT577U.

Note. The Product equality letter includes detailed information about the differences between FCC ID: A3LSMT575 and FCC ID: A3LSMT577U.

4.2 Spot check verification data (Band-edge & Spurious emission)

Test mode	Test item	Measured frequency (㎒)	SM-T575 (dB(㎶/m))	SM-T577U/DS (dB(㎶/m))	Deviation (dB)
			QP	QP	
NFC	Fundamental	13.56	16.75	17.74	-0.99
	Emission	67.71	24.57	11.15	13.42

Notes:
1. For FCC ID: A3LSMT577U has been verified the performance as for NFC identical with the FCC ID: A3LSMT575.
2. Comparison of two models, upper deviation is within 3 ㏈ range and all test results are under FCC technical limits.
3. The test procedure(s) in this report were performed in accordance as following.
   - KDB 484596 D01 v01

4.3 Reference Detail

Reference application that contains the reused reference data in the individual test reports.

Equipment Class	Reference FCC ID	Application Type	Reference Test report Number	Exhibit Type	Variant Test Report Number	Data Re-used
DTS	A3LSMT575	Original	KP20-SRF0209 (802.11b/g/n/ac)	Test report	KR20-SRF0255	All
			KP20-SRF0214 (802.11ax)	Test report	KR20-SRF0256	All
			KP20-SRF0208 (Bluetooth LE)	Test report	KR20-SRF0253	All
DSS	A3LSMT575	Original	KP20-SRF0207 (Bluetooth)	Test report	KR20-SRF0252	All
NII	A3LSMT575	Original	KP20-SRF0210 (802.11a/n/ac)	Test report	KR20-SRF0257	All
			KP20-SRF0215 (802.11ax)	Test report	KR20-SRF0258	All
			KR20-SRF0216 (DFS)	Test report	KR20-SRF0259	All
DXX	A3LSMT575	Original	KP20-SRF0211 (NFC)	Test report	KR20-SRF0254	All
PCB	A3LSMT575	Original	KP20-SRF0212 (2G, 3G)	Test report	KR20-SRF0260	Partial
			KP20-SRF0213 (LTE)	Test report	KR20-SRF0261	Partial

For this application the data reuse is summarized below for each equipment class.

Equipment Class	Reference FCC ID	Application Type	Test Item	Data Re-used
DTS	A3LSMT575	Original	WLAN (802.11b/g/n/ac)	All
			WLAN (802.11ax)	All
			Bluetooth LE	All
DSS	A3LSMT575	Original	Bluetooth	All
NII	A3LSMT575	Original	WLAN (802.11a/n/ac)	All
			WLAN (802.11ax)	All
			WLAN (DFS)	All
DXX	A3LSMT575	Original	NFC	All
PCB	A3LSMT575	Original	2G, 3G	All except for 2G
			LTE	Band 66, Band 12, Band 5, Band 13 LTE 41 (PC 3)

5. Summary of tests

FCC Part section(s)	IC Rule reference	Parameter	Test Condition	Test results
15.225(a)	RSS-210 B.6 (a), I	In-band Fundamental Emission	Radiated	Pass
15.225(b)	RSS-210 B.6 (a), II	In-band Spurious Emission		Pass
15.225(c)	RSS-210 B.6 (a), III	In-band Spurious Emission		Pass
15.225(d) 15.209	RSS-210 B.6 (a), IV RSS-Gen Issue 9 (8.9)	Out-of–band Spurious Emission		Pass
15.225(e)	RSS-210 B.6 (b)	Frequency Stability Tolerance	Conducted	Pass
15.215(c)	-	20 dB Bandwidth		Pass
	RSS-Gen Issue 5 (6.7)	Occupied Bandwidth		Pass
15.207(a)	RSS-Gen Issue 5 (8.8)	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. 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 **Y** orientation
4. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013
5. All the radiated tests have been performed several case.
   (Stand-alone, with accessories (earphone, cover, TA etc.))
   Worst case: stand-alone
6. Radiated(fundamental level and spurious emissions) tests were performed both without reading a passive tag condition[test mode] and with reading a passive tag condition
   - Worst case : Without passive tag

6. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

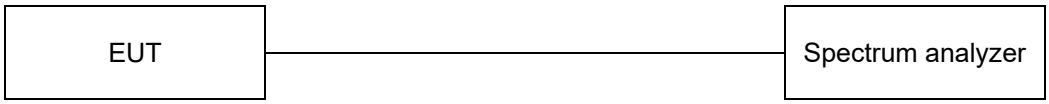
All measurement uncertainty values are shown with a coverage factor of k=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine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

Parameter	Expanded uncertainty (±)	
Radiated spurious emissions	9 ㎑ ~ 30 ㎒:	2.3 dB
	30 ㎒ ~ 300 ㎒	5.4 dB
	300 ㎒ ~ 1 000 ㎒	5.5 dB
Conducted emissions	9 ㎑ ~ 150 ㎑	3.7 dB
	150 ㎑ ~ 30 ㎒	3.3 dB

7. Test results

7.1. 20 dB Bandwidth & 99% Bandwidth

Test setup



Limit

FCC

According to §15.215(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

IC

According to RSS-Gen Issue 5 (6.7) The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.
When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

Test procedure

ANSI C63.10 - Section 6.9.2

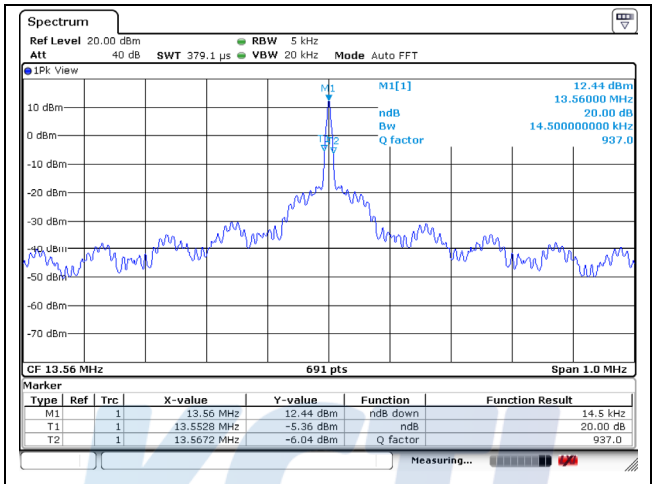
Test settings

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.

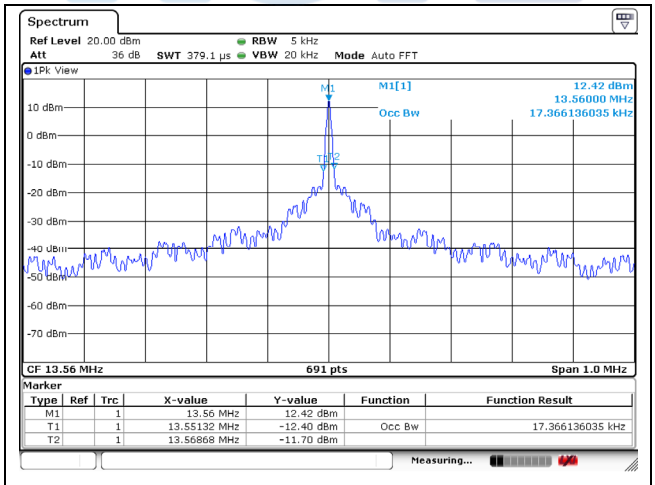
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency.
b) Span: Two times and five times the OBW.
c) RBW = 1 % to 5 % of the OBW and VBW ≥ 3 x RBW
d) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation.
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) Detector: peak
g) Trace mode: max hold.
h) Allow the trace to stabilize.
i) 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.
j) 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).
k) 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.

Test results

Frequency [㎒]	20 ㏈ Bandwidth [㎒]		Limit [㎒]	20 ㏈ Bandwidth [㎒]	Occupied Bandwidth (99 % BW) [㎒]
13.56	Lowest Frequency	13.553	13.110	0.015	0.017
	Highest Frequency	13.567	14.010		



20 ㏈ Bandwidth

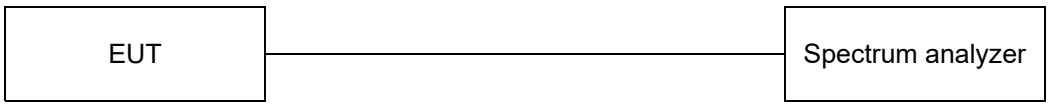


Occupied Bandwidth

Note:
Because the measured signal is CW/CW-like, adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW

7.2. Frequency tolerance

Test setup



Limit

According to 15.225 (e), RSS-210 B.6 The frequency tolerance of the carrier signal shall be maintained within ±0.01 % of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85 % to 115 % of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test procedure

ANSI C63.10-2013 - Section 6.8.1

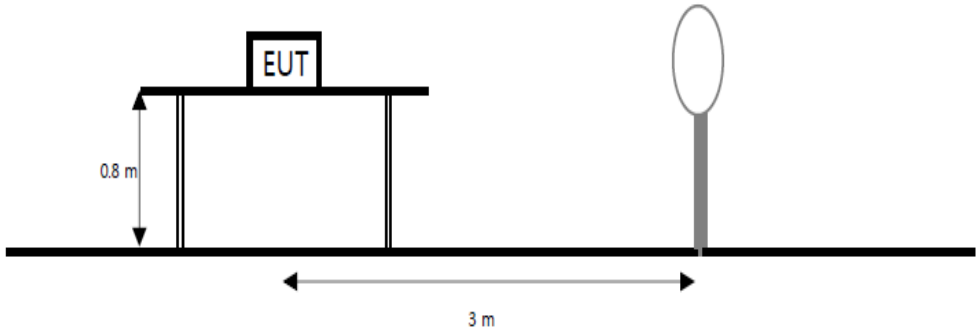
Test results

Voltage	Voltage	TEMP	Maintaining time	Measure frequency	Frequency deviation	Deviation
[%]	[V]	[℃]		[㎐]	[㎐]	[%]
100	3.85	20(Ref.)	Startup	13 560 006	-6.0	0.000 04
			2 minutes	13 560 006	-6.0	0.000 04
			5 minutes	13 560 006	-6.0	0.000 04
			10 minutes	13 560 006	-6.0	0.000 04
		-30	Startup	13 560 008	-8.0	0.000 06
			2 minutes	13 560 008	-8.0	0.000 06
			5 minutes	13 560 008	-8.0	0.000 06
			10 minutes	13 560 008	-8.0	0.000 06
		-20	Startup	13 560 009	-9.0	0.000 07
			2 minutes	13 560 009	-9.0	0.000 07
			5 minutes	13 560 009	-9.0	0.000 07
			10 minutes	13 560 009	-9.0	0.000 07
		-10	Startup	13 560 009	-9.0	0.000 07
			2 minutes	13 560 009	-9.0	0.000 07
			5 minutes	13 560 009	-9.0	0.000 07
			10 minutes	13 560 009	-9.0	0.000 07
		0	Startup	13 560 007	-7.0	0.000 05
			2 minutes	13 560 007	-7.0	0.000 05
			5 minutes	13 560 007	-7.0	0.000 05
			10 minutes	13 560 007	-7.0	0.000 05
		10	Startup	13 560 007	-7.0	0.000 05
			2 minutes	13 560 007	-7.0	0.000 05
			5 minutes	13 560 007	-7.0	0.000 05
			10 minutes	13 560 007	-7.0	0.000 05
		30	Startup	13 560 006	-6.0	0.000 04
			2 minutes	13 560 006	-6.0	0.000 04
			5 minutes	13 560 006	-6.0	0.000 04
			10 minutes	13 560 006	-6.0	0.000 04
		40	Startup	13 560 007	-7.0	0.000 05
			2 minutes	13 560 007	-7.0	0.000 05
			5 minutes	13 560 007	-7.0	0.000 05
			10 minutes	13 560 007	-7.0	0.000 05
		50	Startup	13 560 008	-8.0	0.000 06
			2 minutes	13 560 008	-8.0	0.000 06
			5 minutes	13 560 008	-8.0	0.000 06
			10 minutes	13 560 008	-8.0	0.000 06
85	3.27	20	Startup	13 560 007	-7.0	0.000 05
			2 minutes	13 560 007	-7.0	0.000 05
			5 minutes	13 560 007	-7.0	0.000 05
			10 minutes	13 560 007	-7.0	0.000 05
115	4.43	20	Startup	13 560 007	-7.0	0.000 05
			2 minutes	13 560 007	-7.0	0.000 05
			5 minutes	13 560 007	-7.0	0.000 05
			10 minutes	13 560 007	-7.0	0.000 05

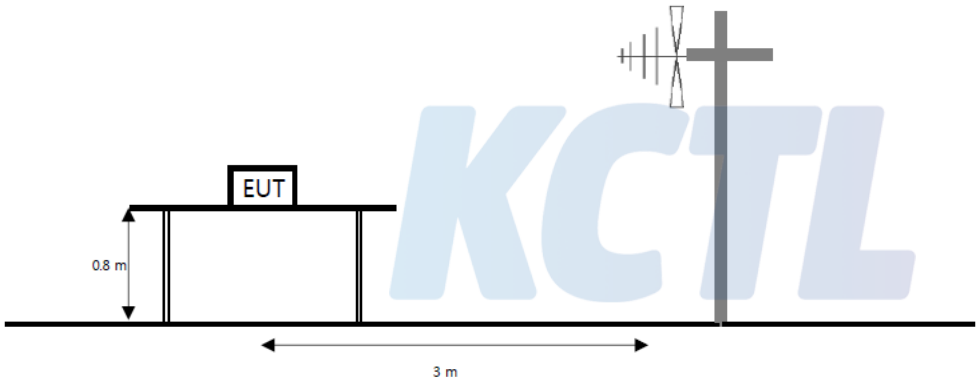
7.3. Radiated spurious emissions

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.



Limit

15.225 (a), RSS-210 B.6 (a), Ⅰ The field strength of any emission within the band 13.553-13.567 ㎒ shall not exceed 15, 848 microvolts/meter at 30 meters.

15.225 (b), RSS-210 B.6 (a), Ⅱ With in the bands 13.410-13.553 ㎒ and 13.567-13.710 ㎒, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

15.225 (c), RSS-210 B.6 (a), Ⅲ With in the bands 13.110-13.410 ㎒ and 13.710-14.010 ㎒, the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

15.225 (d), RSS-210 B.6 (a), Ⅳ RSS-Gen Issue 9 (8.9) The Field Strength of any emissions appearing outside of the 13.110-14.010 ㎒ band shall not exceed the general radiated emission limits in 15.209.

Frequency (㎒)	Field Strength (㎶/m)	Measurement distance (meters)
0.009-0.490	2400/F(㎑)	300
0.490-1.705	24000/F(㎑)	30
1.705-30.0	30(29.54 dB㎶/m)	30
30.0-88.0	100(40 dB㎶/m)	3
88-216	150(43.5 dB㎶/m)	3
216-960	200 (46 dB㎶/m)	3
Above 960	500 (53.98 dB㎶/m)	3

Test procedure
ANSI C63.10-2013 - Section 6.4, 6.5

Test settings

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 x RBW
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

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 ㎒

Notes:

1. *f* <30 ㎒, extrapolation factor of 40 dB/decade of distance. $F_d = 40\log(D_m/Ds)$
   f ≥30 ㎒, extrapolation factor of 20 dB/decade of distance. $F_d = 20\log(D_m/Ds)$
   Where:
   F_d= Distance factor in dB
   D_m= Measurement distance in meters
   D_s= Specification distance in meters
2. Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in § 15.31(f)(2). Extrapolation Factor = 40 log10(30/3) = 40 dB.
3. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or F_d(dB)
4. Result = Reading + Cable loss + Amp gain + Ant. factor - Distance factor
5. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
6. All measurements were recorded using a spectrum analyzer employing a quasi-peak detector.
7. Below 30 ㎒ frequency range, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported and the worse orientations of Face-on and Face-off were set for final test.
8. Face-on = Parallel, Face-off = Perpendicular

Test results for fundamental

15.225 (a) 13.553-13.567 ㎒

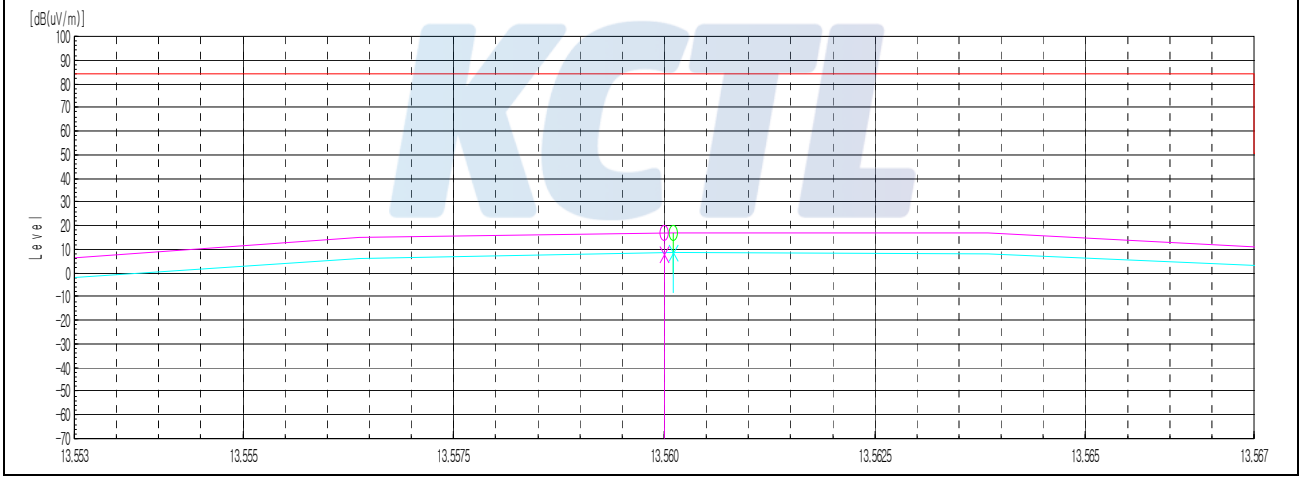
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.56	67.60	20.27	-31.12	40.00	16.75	84.00	67.25

[Face-off]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.56	59.00	20.27	-31.12	40.00	8.15	84.00	75.85

Face-on/Face-off



Test results for in-band & out-band (9 ㎑ to 30 ㎒)

15.225 (b,c) 13.110-14.010 ㎒

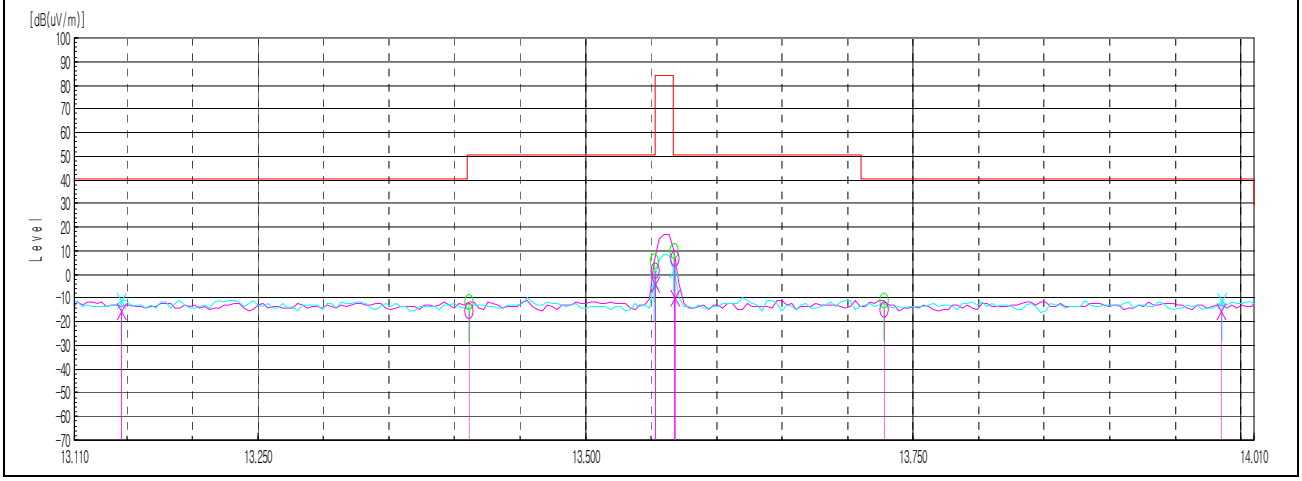
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.41	35.70	20.27	-31.13	40.00	-15.16	50.50	65.66
13.55	52.40	20.27	-31.12	40.00	1.55	50.50	48.95
13.57	57.50	20.27	-31.12	40.00	6.65	50.50	43.85
13.73	36.00	20.27	-31.10	40.00	-14.83	40.50	55.33

[Face-off]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
13.15	35.50	20.26	-31.14	40.00	-15.38	40.50	55.88
13.55	46.70	20.27	-31.12	40.00	-4.15	50.50	54.65
13.57	41.10	20.27	-31.12	40.00	-9.75	50.50	60.25
13.99	35.30	20.28	-31.06	40.00	-15.48	40.50	55.98

Face-on/Face-off



Test results (9 ㎑ to 30 ㎒)

15.225 (d) 0.009-30 ㎒

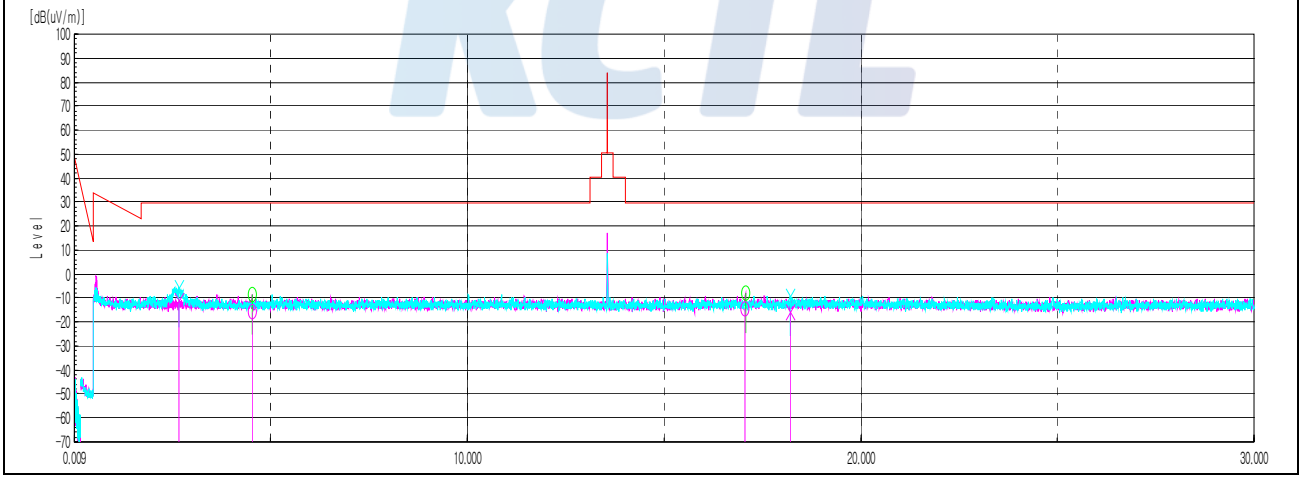
[Face-on]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
4.53	35.70	20.25	-31.77	40.00	-15.82	29.50	45.32
17.07	36.10	20.47	-30.97	40.00	-14.40	29.50	43.90

[Face-off]

Frequency	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data							
2.67	41.10	20.08	-31.93	40.00	-10.75	29.50	40.25
18.21	34.90	20.56	-30.96	40.00	-15.50	29.50	45.00

Face-on/Face-off

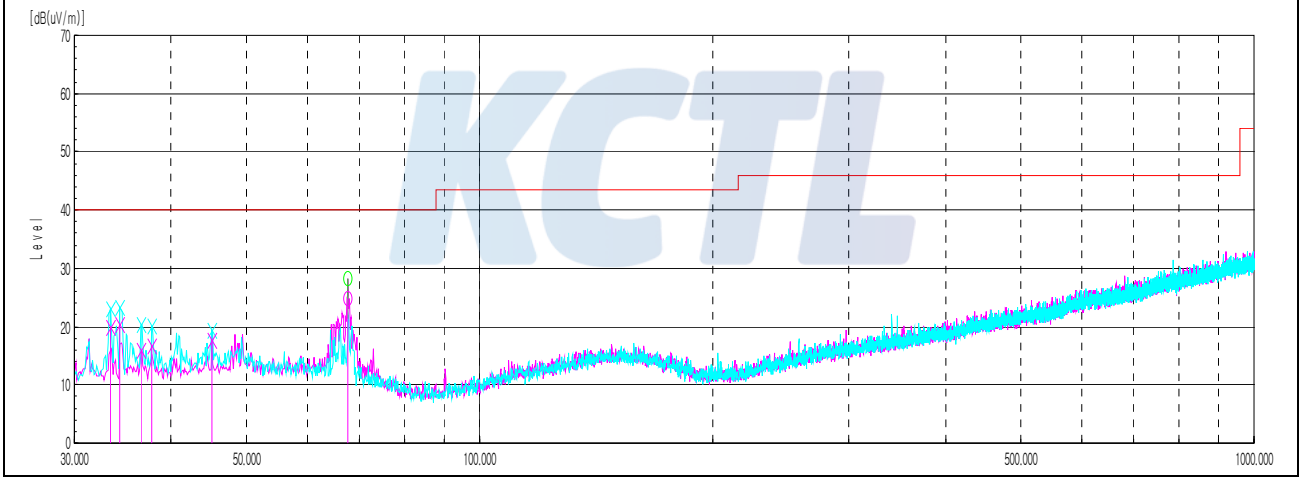


Test results (Below 1 000 ㎒)

15.225 (d) 30-1000 ㎒

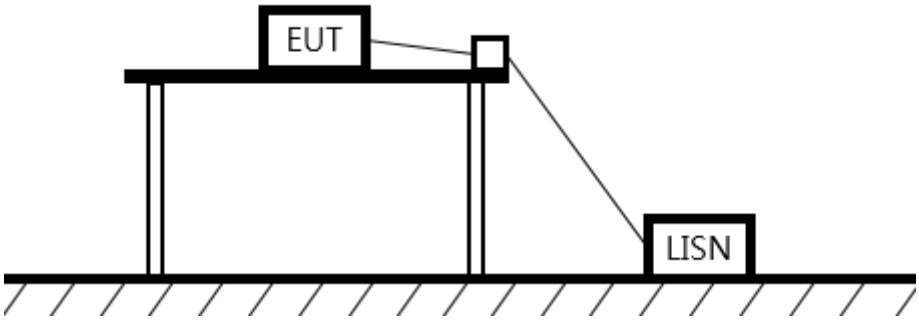
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	Distance Factor	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Quasi peak data								
33.40	V	32.90	17.21	-30.55	-	19.56	40.00	20.44
34.37	V	33.30	17.45	-30.52	-	20.23	40.00	19.77
36.55	V	28.90	17.57	-30.44	-	16.03	40.00	23.97
37.76	V	29.40	17.54	-30.40	-	16.54	40.00	23.46
45.16	V	29.60	18.30	-30.25	-	17.65	40.00	22.35
67.71	H	37.70	16.62	-29.75	-	24.57	40.00	15.43

Horizontal/Vertical



7.4. AC Conducted emission

Test setup



Limit

According to 15.207(a), RSS-Gen (8.8) 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

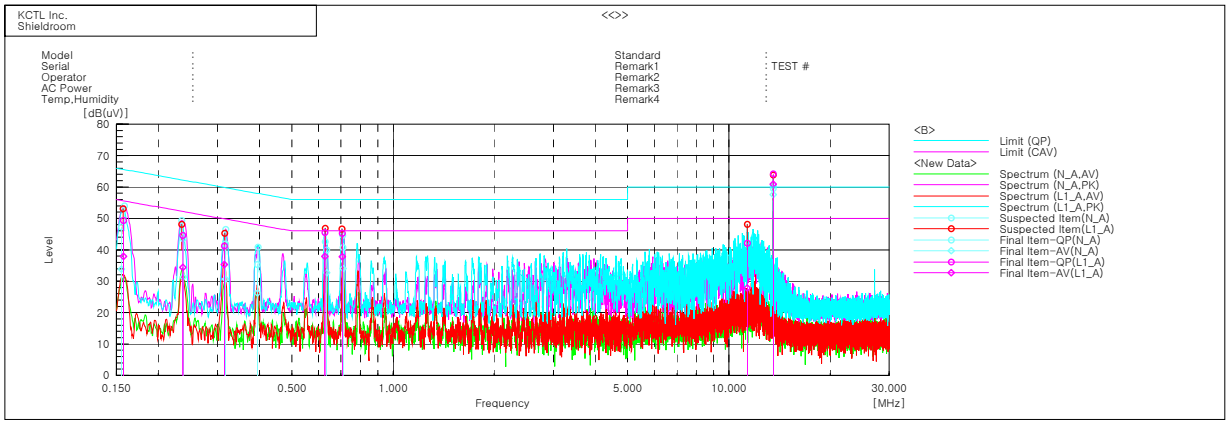
1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 ㎝ in which is located 40 ㎝ away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity ㅡ 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.

Notes:

According to KDB 174176 D01, For a device with a permanent or detachable antenna operating at or below 30 MHz, the FCC will accept measurements performed with a suitable dummy load in lieu of the antenna under the following conditions: (1) perform the AC power-line conducted tests with the antenna connected to determine compliance with Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network which simulates the antenna in the fundamental frequency band.

Test results

<conducted tests with the antenna connected>



Final Result

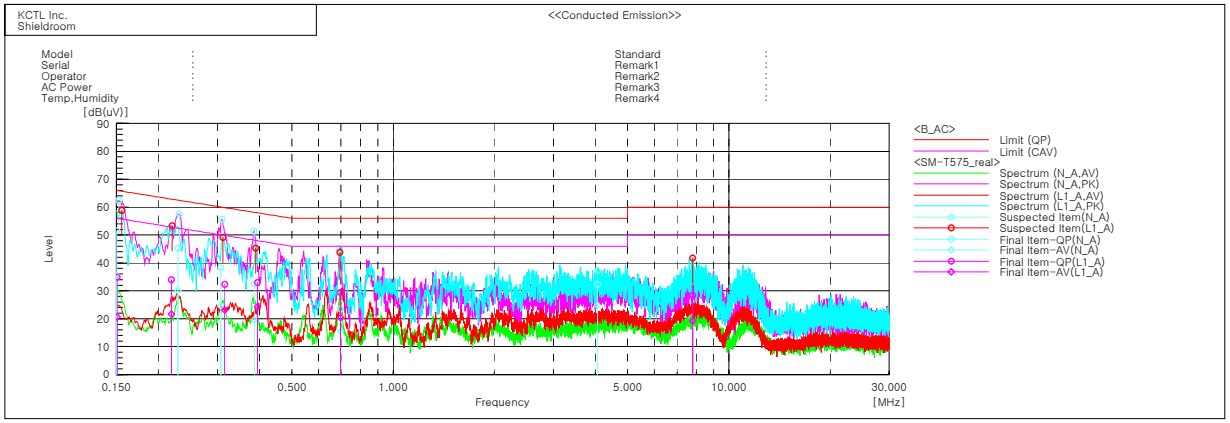
--- N_A Phase ---

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	0.15531	37.2	23.8	10.1	47.3	33.9	65.7	55.7	18.4	21.8
2	0.23699	33.6	21.4	9.9	43.5	31.3	62.2	52.2	18.7	20.9
3	0.31683	31.8	20.7	10.0	41.8	30.7	59.8	49.8	18.0	19.1
4	0.39444	25.1	16.2	10.1	35.2	26.3	58.0	48.0	22.8	21.7
5	0.63382	29.9	22.6	10.1	40.0	32.7	56.0	46.0	16.0	13.3
6	0.70995	30.6	24.0	10.1	40.7	34.1	56.0	46.0	15.3	11.9
7	13.56045	49.0	47.1	10.5	59.5	57.6	60.0	50.0	0.5	-7.6

--- 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	0.15761	39.3	27.9	10.0	49.3	37.9	65.6	55.6	16.3	17.7
2	0.23659	34.8	24.7	9.7	44.5	34.4	62.2	52.2	17.7	17.8
3	0.31459	31.4	25.5	9.8	41.2	35.3	59.8	49.8	18.6	14.5
4	0.62641	35.6	28.0	9.9	45.5	37.9	56.0	46.0	10.5	8.1
5	0.70557	35.4	27.9	9.9	45.3	37.8	56.0	46.0	10.7	8.2
6	11.34134	31.9	17.6	10.2	42.1	27.8	60.0	50.0	17.9	22.2
7	13.55988	53.7	50.4	10.4	64.1	60.8	60.0	50.0	-4.1	-10.8

<Retest with a dummy load>



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	0.15042	41.5	25.5	10.0	51.5	35.5	66.0	56.0	14.5	20.5
2	0.22873	35.3	20.2	10.0	45.3	30.2	62.5	52.5	17.2	22.3
3	0.307	28.4	14.6	10.0	38.4	24.6	60.1	50.1	21.7	25.5
4	0.38557	22.2	9.4	10.2	32.4	19.6	58.2	48.2	25.8	28.6
5	0.69724	13.3	5.4	10.2	23.5	15.6	56.0	46.0	32.5	30.4
6	4.06024	21.9	14.4	10.4	32.3	24.8	56.0	46.0	23.7	21.2

--- 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	0.15055	24.8	10.6	10.0	34.8	20.6	66.0	56.0	31.2	35.4
2	0.21875	24.0	11.6	10.0	34.0	21.6	62.9	52.9	28.9	31.3
3	0.31569	22.4	13.2	10.0	32.4	23.2	59.8	49.8	27.4	26.6
4	0.39436	22.7	14.1	10.2	32.9	24.3	58.0	48.0	25.1	23.7
5	0.69818	19.2	10.1	10.2	29.4	20.3	56.0	46.0	26.6	25.7
6	7.80617	17.7	8.6	10.6	28.3	19.2	60.0	50.0	31.7	30.8

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
EMI TEST RECEIVER	R&S	ESCI7	100732	21.03.04
Bi-Log Antenna	SCHWARZBECK	VULB9168	583	22.04.23
Amplifier	SONOMA INSTRUMENT	310N	284608	21.08.20*
COAXIAL FIXED ATTENUATOR	Agilent	8491B-003	2708A18758	21.04.23
LOOP Antenna	R&S	HFH2-Z2	100355	22.08.21*
Antenna Mast	Innco Systems	MA4640-XP-ET	-	-
Turn Table	Innco Systems	DT2000	79	-
TWO-LINE V - NETWORK	R&S	ENV216	101358	20.10.02
EMI TEST RECEIVER	R&S	ESCI	100001	21.08.20*
Spectrum Analyzer	R&S	FSV30	100806	21.07.29*
Signal Generator	R&S	SMB100A	176206	21.01.21
Vector Signal Generator	R&S	SMBV100A	257566	21.07.13
Temp & Humid Chamber	Myeongseong R&P	CTHC-50P-DT	20150824-3	21.07.28*

* Tests related to this equipment were progressed after the calibration was completed.

End of test report