RF Test Report

Report No.	:	FCCBVCO-WAY-P21050095-1R1
Customer	:	Samsung Electronics. Co., Ltd.
Address	:	129, Samsung-ro Yeontong-gu, Suwon-si, Gyeonggi-do, Korea
Use of Report	:	Certification
Model Name	:	NP935QDC
FCC ID	:	Contains FCC ID : A3LH111U935QDC, A3LAX210D
Date of Test	:	2021.07.26 to 2021.08.07
Test Method Used	:	FCC 47 CFR Part 22(H), 24(E), 27(C), 90(R)
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 : David Jang (Signature)

Technical Manager
Name : Jongha Choi (Signature)

2021. 08. 31

BV CPS ADT Korea Ltd.

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

RELEASE CONTROL RECORD

REPORT NO.	REASON FOR CHANGE	DATE ISSUED
FCCBVCO-WAY-P21050095-1	Original release	2021.08.20
FCCBVCO-WAY-P21050095-1R1	Modify Antenna Gain, Add LTE band information	2021.08.31

Table of Contents

1 Summary of Test Results

The EUT has been tested according to the following specifications

Applied Standard : FCC Part 22(H), Part 24(E), Part 27(C), Part 90(R)				
FCC Part Section(s)	**Test Description**	**Limit**	**Test Result**	**Reference**
2.1049	Occupied Bandwidth	N/A	NT Note3)	Section 3.1
22.917(a) 24.238(a) 27.53(c)(g)(h) 27.53(I)(2) 27.53(n)(2)	Out of Band Emissions	> 43 + 10log10(P[Watts]) at Band Edge and for all out-of-band emissions	NT Note3)	Section 3.2 Section 3.3
90.543(e)		> 65 + 10log10(P[Watts]) at Band Edge and for all out-of-band emissions	NA Note4)	Section 3.2 Section 3.3
27.53(m)		Undesirable emissions must meet the limits detailed in 27.53(m)	NT Note3)	Section 3.2 Section 3.3
27.53(a)		Undesirable emissions must meet the limits detailed in 27.53(a)	NT Note3)	Section 3.2 Section 3.3
24.232(d) 27.50(d)(5)	Peak-Average Ratio	< 13 dB	NT Note3)	Section 3.4
2.1055 22.355 24.235 27.54 90.213 Note4)	Frequency Stability	< 2.5 ppm (Part 22) and fundamental emissions stat within authorized frequency block	NT Note3)	Section 3.7
22.913(a)(5)	Effective Radiated Power / Equivalent Isotropic Radiated Power	< 7 Watts maximum ERP	PASS	Section 3.5
90.635(b)		< 100 Watts maximum ERP	NA Note4)	Section 3.5
27.50(b)(10) 27.50(c)(10)		< 3 Watts maximum ERP	PASS	Section 3.5
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power	< 2 Watts maximum ERP	PASS	Section 3.5
27.50(d)(4)		< 1 Watts maximum ERP	PASS	Section 3.5
27.50(a)(3)		< 0.25 Watts maximum ERP	PASS	Section 3.5
2.1053 22.917(a) 24.238(a) 27.53(c)(g)(h)	Undesirable Emissions	> 43 + 10log10(P[Watts]) for all out-of-band emissions	PASS	Section 3.6
27.53(f)		< -70 dBW/MHz (for wideband signals) < -80 dBW/MHz (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 – 1610 MHz	PASS	Section 3.6
27.53(a)		> 70 + 10log10(P[Watts])	PASS	Section 3.6
27.53(m)		Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Section 3.6

NOTES

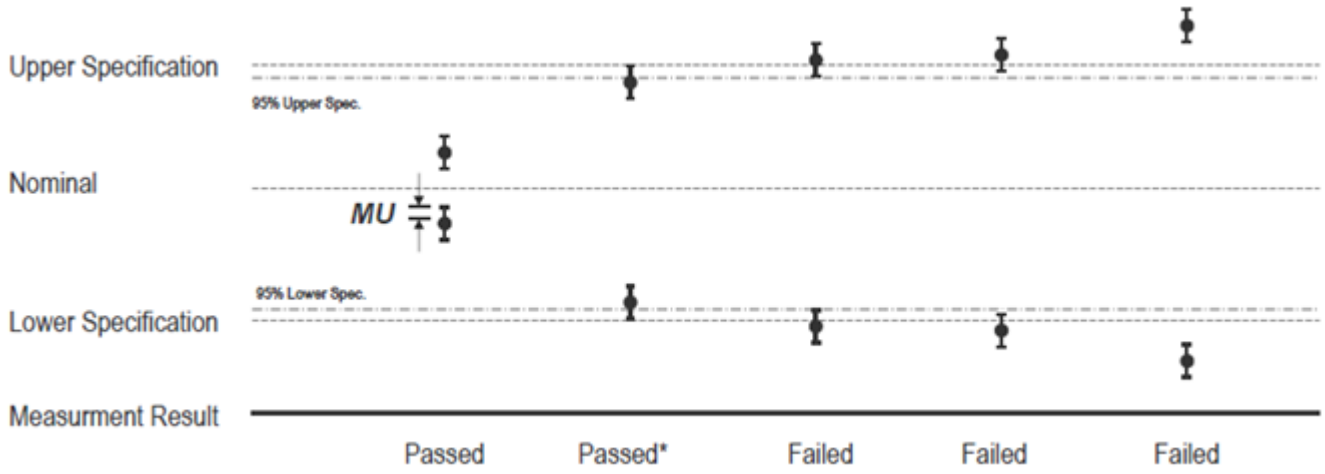
1) The general test methods used to test on this devices are ANSI C63.26-2015, ANSI/TIA-603-E-2016, and KDB 971168 D01 v03r01.

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

3) Due to request of manufacturer, these test items were not tested. Please refer to the original test report(Report number : 4789899747-E2V3) issued by UL Korea, Ltd.

4) This device do not support frequency band for FCC Rule Part 90(R).

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)
Conducted Emissions at main ports	150 kHz – 30 MHz	2.99 dB
Radiated Spurious Emissions	9 kHz – 30 MHz	1.92 dB
	30 MHz – 1 GHz	4.00 dB
	1 GHz – 6 GHz	6.36 dB
	1 GHz – 18 GHz	5.68 dB
	18 GHz – 40 GHz	5.24 dB

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

Product	Laptop	
Brand	Samsung Electronics. Co., Ltd.	
Model	NP935QDC	
Identification No. of EUT	1J9T91ZR700065M	
Series Model	N/A	
Model Difference	N/A	
Power Supply	Battery: DC 15.44 V / Adaptor: DC 20 V(Output), AC 100 ~ 240 V(Input)	
Modulation Type	Refer 2.3 Description of Test Mode	
Operating Frequency Band	WCDMA B5 /LTE B5 /NR n5	824 MHz ~ 849 MHz
	WCDMA B4 /LTE B4 /LTE B66 /NR n66	1 710 MHz ~ 1 780 MHz
	WCDMA B2 /LTE B2 /LTE B25 /NR n2	1 850 ~ 1 915 MHz
	LTE B12 /LTE B17	699 ~ 716 MHz
	LTE B7	2 500 ~ 2 570 MHz
	LTE B13	777 ~ 787 MHz
	LTE B14	788 ~ 798 MHz
	LTE B41 / NR n41	2 496 ~ 2 690 MHz
	LTE B71 / NR n71	663 ~ 698 MHz
	NR n77	3 300 ~ 4 200 MHz
Maximum Power (E.R.P/E.I.R.P)	25.85 dBm	
	384.59 mW	
Antenna Type	ANT 1(Main), ANT 2(Aux) , ANT 3(MIMO2), ANT 4(MIMO1) : FPCB	
Antenna Connector	U.FL Connector	
H/W Version	REV 1.0	
S/W Version	0	

NOTES

1) The above equipment has been tested by **Bureau Veritas Consumer Products Services ADT Korea**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

2) The following antennas were provided to the EUT

Antenna	Type	Connector	Peak Gain (dBi)	
ANT 1 (Main)	FPCB	U.FL Connector	WCDMA B2, LTE B25/2, NR n2	0.38
			WCDMA B4, LTE B66/4, NR n66	-0.41
			LTE B7	-0.24
			LTE B41, NR n41	-0.24
ANT 2 (Aux)	FPCB	U.FL Connector	WCDMA B5, LTE B5, NR n5	-0.6
			LTE B12/17	-1.25
			LTE B13	-0.84
			LTE B14	-1.11
			LTE B71, NR n71	-1.91
ANT 3 (MIMO2)	FPCB	U.FL Connector	NR n77	1.71
ANT 4 (MIMO1)	FPCB	U.FL Connector	Only Receive	N/A

3) **List of Accessories**

Accessories	Brand	Model	Manufacturer	Specification
Adapter	Samsung Electronics. Co., Ltd.	EP-TA865	Samsung Electronics. Co., Ltd.	Input : AC 100 ~ 240 V 50 ~ 60 Hz Output : DC 5 ~ 20 V

2.2 Description of Support Units

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
-	-	-	-	-	-	-

2.3 Description of Test Mode

2.3.1 Test Mode Applicability and Tested Channel Details

Worst case of E.R.P/E.I.R.P was found by Max power of Original Test report.(4789899747-E2V3)
Worst case of Undesirable Emissions wase found by worst margin of Original Test report. (4789899747-E2V3)
The fundamental emission was investigated in three orthogonal orientation X, Y and Z to determine worst case orientation for each band.
Following channel(s) was(were) selected for the final test as listed below :

WCDMA Mode

Band	Test Items	Modulation	BW	Tested Frequency		axis
B2	E.R.P / E.I.R.P	RMC	5	9262	1 825.4 MHz	Z
	Undesirable Emissions	HSDPA	5	9262	1 852.4 MHz	Z
B4	E.R.P / E.I.R.P	RMC	5	1413	1 732.6 MHz	Z
	Undesirable Emissions	HSDPA	5	1513	1 752.6 MHz	Z
B5	E.R.P / E.I.R.P	RMC	5	4233	846.6 MHz	X
	Undesirable Emissions	HSDPA	5	4233	846.6 MHz	X

LTE Mode

Band	Test Items	Modulation	BW	RB Allocation / RB offset	Tested Frequency		Axis
B2	E.R.P / E.I.R.P	QPSK	5	1 / 24	26065	1 852.5 MHz	Z
	Undesirable Emissions	QPSK	5	1 / 0	26665	1 912.5 MHz	Z
B4	E.R.P / E.I.R.P	QPSK	20	1 / 49	132072	1 720.0 MHz	Z
	Undesirable Emissions	QPSK	20	1 / 49	132572	1 770.0 MHz	Z
B5	E.R.P / E.I.R.P	QPSK	5	1 / 12	20425	826.5 MHz	X
	Undesirable Emissions	QPSK	5	1 / 0	20625	846.5 MHz	X
B7	E.R.P / E.I.R.P	QPSK	5	1 / 24	21425	2 567.5 MHz	X
	Undesirable Emissions	QPSK	5	1 / 0	21425	2 567.5 MHz	X
B12	E.R.P / E.I.R.P	QPSK	5	1 / 12	23095	707.5 MHz	X
	Undesirable Emissions	QPSK	5	1 / 24	23155	713.5 MHz	X
B13	E.R.P / E.I.R.P	QPSK	5	1 / 24	23205	779.5 MHz	X
	Undesirable Emissions	QPSK	5	1 / 12	23230	782.0 MHz	X
B14	E.R.P / E.I.R.P	QPSK	5	1 / 12	23330	793.0 MHz	X
	Undesirable Emissions	QPSK	5	1 / 12	23305	790.5 MHz	X
B17	E.R.P / E.I.R.P	QPSK	5	1 / 12	23095	707.5 MHz	X
	Undesirable Emissions	QPSK	5	1 / 24	23155	713.5 MHz	X
B25	E.R.P / E.I.R.P	QPSK	5	1 / 24	26065	1 852.5 MHz	Z
	Undesirable Emissions	QPSK	5	1 / 0	26665	1 912.5 MHz	Z
B41 (PC2)	E.R.P / E.I.R.P	QPSK	20	1 / 99	41490	2 680.0 MHz	X
	Undesirable Emissions	QPSK	20	1 / 49	41490	2 680.0 MHz	X
B66	E.R.P / E.I.R.P	QPSK	20	1 / 49	132072	1 720.0 MHz	Z
	Undesirable Emissions	QPSK	20	1 / 49	132572	1 770.0 MHz	Z
B71	E.R.P / E.I.R.P	QPSK	20	1 / 49	133372	688.0 MHz	X
	Undesirable Emissions	QPSK	20	1 / 49	133372	688.0 MHz	X

NR Mode

Band	Test Items	Modulation	BW	RB Allocation / RB offset	Tested Frequency		Axis
n2 (Anchor n12)	E.R.P / E.I.R.P	DFT-s-OFDM _π/2 BPSK	20	50 / 28	380000	1 900.0 MHz	Z
	Undesirable Emissions	DFT-s-OFDM _QPSK	20	1 / 53	380000	1 900.0 MHz	Z
n5 (Anchor n5)	E.R.P / E.I.R.P	DFT-s-OFDM _QPSK	15	1 / 77	166300	831.5 MHz	X
	Undesirable Emissions	DFT-s-OFDM _QPSK	15	1 / 1	168300	841.5 MHz	X
n41#0 (Anchor n4)	E.R.P / E.I.R.P	DFT-s-OFDM _QPSK	100	1 / 137	528000	2 640.0 MHz	X
	Undesirable Emissions	DFT-s-OFDM _QPSK	100	1 / 137	528000	2 640.0 MHz	X
n41#1 (Anchor n12)	E.R.P / E.I.R.P	DFT-s-OFDM _QPSK	30	1 / 39	534996	2 674.98 MHz	X
	Undesirable Emissions	DFT-s-OFDM _QPSK	30	1 / 39	534996	2 674.98 MHz	X
n66 (Anchor n12)	E.R.P / E.I.R.P	DFT-s-OFDM _QPSK	20	1 / 53	354000	1 770.0 MHz	Z
	Undesirable Emissions	DFT-s-OFDM _QPSK	20	1 / 53	354000	1 770.0 MHz	Z
n71 (Anchor n2)	E.R.P / E.I.R.P	DFT-s-OFDM _QPSK	15	1 / 77	138100	690.5 MHz	X
	Undesirable Emissions	DFT-s-OFDM _QPSK	15	1 / 77	138100	690.5 MHz	X
n77 (Anchor n12) (3 450 ~ 3 550 MHz)	E.R.P / E.I.R.P	DFT-s-OFDM _QPSK	100	1 / 137	633332	3499.98 MHz	Z
	Undesirable Emissions	DFT-s-OFDM _QPSK	100	1 / 137	633332	3499.98 MHz	Z
n77 (Anchor n12) (3 700 ~ 3 980 MHz)	E.R.P / E.I.R.P	DFT-s-OFDM _QPSK	60	81 / 41	663332	3949.98 MHz	Z
	Undesirable Emissions	DFT-s-OFDM _QPSK	60	1 / 81	663332	3949.98 MHz	Z

Test Condition

Test Item	Environmental Conditions	Test Voltage	Tested by
E.R.P / E.I.R.P	(25 ± 3) ℃, (50 ± 5) %R.H.	AC 120 V, 60 Hz	David Jang
Undesirable Emissions	(25 ± 3) ℃, (50 ± 5) %R.H.	AC 120 V, 60 Hz	David Jang

2.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards.

FCC CFR 47 Part 2
FCC CFR 47 Part 22/24/27
ANSI TIA-603-E, 2016
ANSI C63.26, 2015
KDB 971168 D01 v03r01

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

2.5 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	Model	Serial Number	Manufacturer	Description	Cal Date	Cal Due
Loop Antenna	HFH2-Z2E	349806	R&S	Active Loop Antenna, 30 MHz	2021-02-18	2023-02-18
Bi-log Antenna	VULB 9163	1199	Schwarzbeck	Trilog Antenna, 3 GHz (with 6 dB ATT.)	2019-08-26	2021-08-26
Horn Antenna	HF907	102772	R&S	Horn Antenna, 18 GHz	2020-12-09	2021-12-09
Horn Antenna	BBHA9170	00955	Schwarzbeck	15 - 40 GHz, 10 W (cont.) 25 W (peak)	2020-12-09	2021-12-09
VUBA 9117 Biconical VHF-UHF Broadband Antenna	VUBA 9117	403	Schwarzbeck	30 MHz ~ 1 GHz	2020-01-09	2022-01-09
Horn Antenna	HF907	102772	R&S	1 GHz ~ 18 GHz	2020-12-09	2021-12-09
Horn Antenna	QSH-SL-18-26-S-20	19926	Steatite Antenna	18 GHz ~ 26 GHz	2020-12-09	2021-12-09
Horn Antenna	QSH-SL-26-40-K-20	18320	Steatite Antenna	26 GHz ~ 40 GHz	2020-12-09	2021-12-09
Amplifier	SCU08F2	8400016	R&S	Signal Conditioning Unit, 8 GHz	2020-12-09	2021-12-09
Amplifier	SCU-18F	180111	R&S	Signal Conditioning Unit, 18 GHz	2020-12-09	2021-12-09
Amplifier	JS44-18004000-33-8P	2142086	L3 Narda-MITEQ	Amplifier, 40 GHz	2021-01-05	2022-01-05
Signal analyzer	FSW50	101403	R&S	DC Coupled : 2 Hz to 50 GHz AC Coupled : 10 MHz to 50 GHz	2020-12-09	2021-12-09
Attenuator	PE7087-10	1712-2	Pasternack	10 dB Atten / 2 W / DC to 26 GHz	2021-06-04	2022-06-04
High Pass Filter	WT-A1696-HS	WT190313-6-2	Wt Microwave	1.2 GHz to 11.5 GHz / 5 W	2021-01-04	2022-01-04
High Pass Filter	WT-A1706-HS	WT190313-6-3	Wt Microwave	2.3 GHz to 18 GHz / 5 W	2021-01-04	2022-01-04
High Pass Filter	HPM17543	028	Micro-Tronics	3 GHz High Pass Filter	2021-06-04	2022-06-04
High Pass Filter	WT-A1698-HS	WT190313-6-4	Wt Microwave	3.5 GHz to 18 GHz / 5 W	2021-01-04	2022-01-04
High Pass Filter	HPS17542	027	Micro-Tronics	6 GHz High Pass Filter	2021-06-04	2022-06-04
High Pass Filter	HPM50107-02	G010	Micro-Tronics	8 GHz High Pass Filter	2021-06-28	2022-06-28
EMI Receiver	ESR	102529	R&S	DC ~ 7 GHz	2020-12-08	2021-12-08

Signal Generator	SMB100A	MY41006053	R&S	100 kHz ~ 40 GHz	2021-06-04	2022-06-04
Signalling Tester	MT8821C	6262170397	Anritsu	5 G Call Equipment-LTE Combi nd Equipment	2020-08-21	2021-08-21
Signalling Tester	MT8000A	6262134986	Anritsu	5 G Call Equipment	2020-08-24	2021-08-24
Wide Band Radio Co mmunication Tester	CMW500	133256	R&S	70 MHz ~ 3 300 MHz	2020-12-07	2021-12-07
Radio Communication Analyzer	MT8821C	6262025356	Anritsu	30 MHz ~ 2.7 GHz	2020-10-27	2021-10-27

3 Test Results

3.1 Occupied Bandwidth

3.1.1 Regulation

§2.1049 : The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

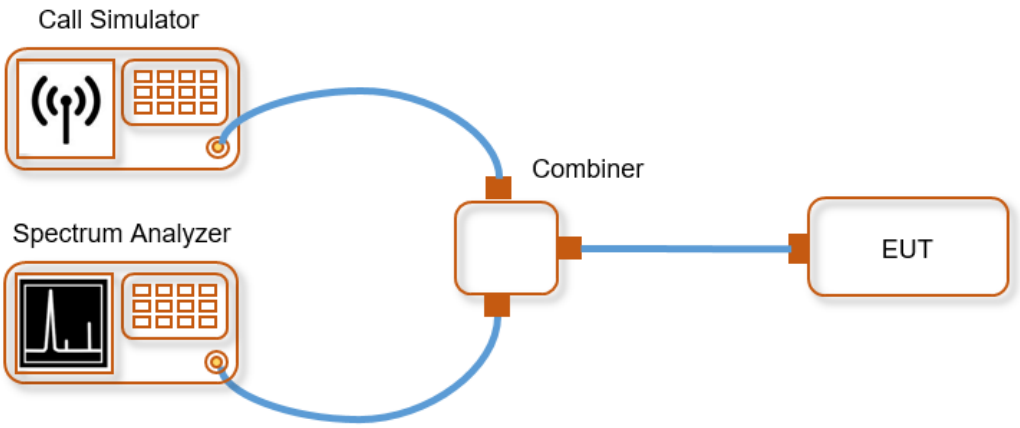
3.1.2 Test Procedure

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental.
2. RBW : 1 – 5 % of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector : Peak
5. Trace : Max hold
6. Sweep : Auto
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5 % of the 99 % occupied bandwidth observed in Step 7

3.1.3 Deviation from Test Standard

No deviation.

3.1.4 Test Setup



3.1.5 Test Result

- Not Tested.

Note) Due to request of manufacturer, these test items were not tested. Please refer to the original test report(Report number : 4789899747-E2V3) issued by UL Korea, Ltd.

3.2 Spurious Emissions at Antenna Terminal

3.2.1 Regulation

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section

The minimum permissible attenuation level of any spurious emission is 43 + 10 $\log_{10}$(P[Watts]), where P is the transmitter power in Watts.

3.2.2 Test Procedure

1. Start frequency was set to 30 Mhz and stop frequency was set to at least 10 * the fundamental frequency (Separated into at least two plots per channel)
2. Detector : RMS
3. Trace : Average
4. Sweep time : auto
5. The trace was allowed to stabilize
6. Please refer to the notes below for RBW and VBW settings.

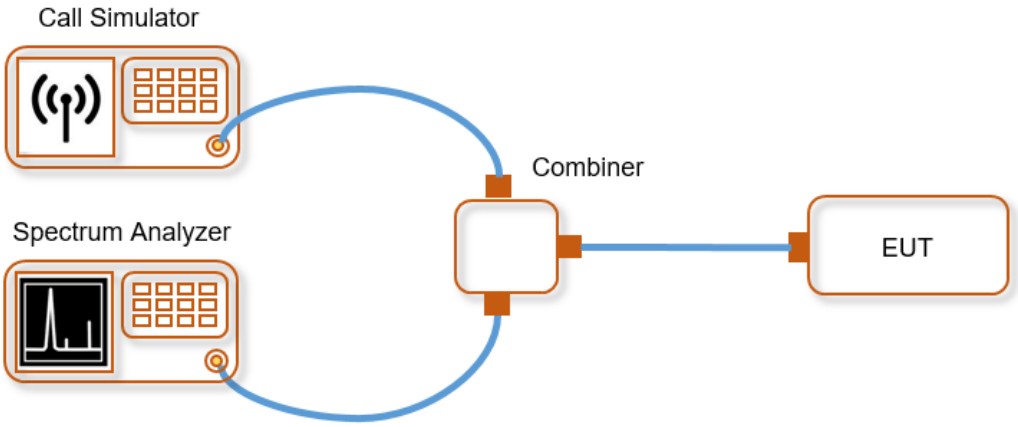
NOTES

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 Mhz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

3.2.3 Deviation from Test Standard

No deviation.

3.2.4 Test Setup



3.2.5 Test Result

- Not Tested.

Note) Due to request of manufacturer, these test items were not tested. Please refer to the original test report(Report number : 4789899747-E2V3) issued by UL Korea, Ltd.

3.3 Band Edge Emissions at Antenna Terminal

3.3.1 Regulation

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

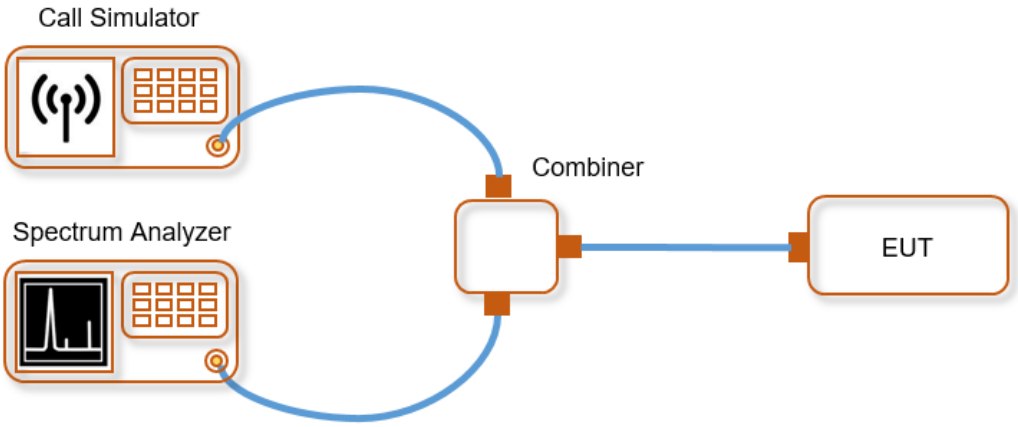
3.3.2 Test Procedure

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 ≥ 1 % of the emission bandwidth
4. VBW ≥ 3 x RBW
5. Detector : RMS
6. Sweep point ≥ 2 x Span/RBW
7. Trace : Average
8. Sweep time : Auto
9. The trace was allowed to stabilize.

3.3.3 Deviation from Test Standard

No deviation.

3.3.4 Test Setup



3.3.5 Test Result

- Not Tested.

Note) Due to request of manufacturer, these test items were not tested. Please refer to the original test report(Report number : 4789899747-E2V3) issued by UL Korea, Ltd.

3.4 Peak-Average Ratio

3.4.1 Regulation

A Peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

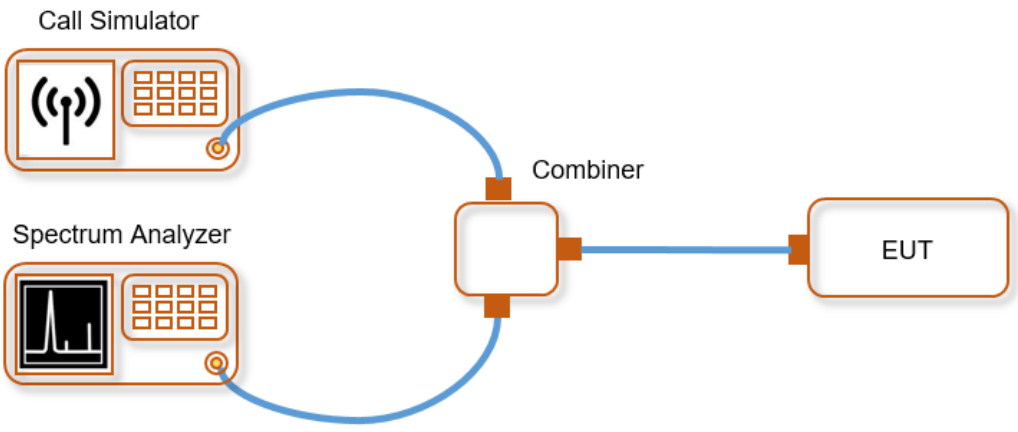
3.4.2 Test Procedure

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency : carrier center frequency
3. Measurement BW ≥ OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal anzlyzed. For continuous signals (> 98 % duty cycle), the measurement interval was set to 1 ms.

3.4.3 Deviation from Test Standard

No deviation.

3.4.4 Test Setup



3.4.5 Test Result

- Not Tested.

Note) Due to request of manufacturer, these test items were not tested. Please refer to the original test report(Report number : 4789899747-E2V3) issued by UL Korea, Ltd.

3.5 Radiated Power (ERP/EIRP)

3.5.1 Regulation

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1 GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1 GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurement are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

3.5.2 Test Procedure

1. Radiated power measurment are performed using the signal analyzer's " channel power " measurement capability for signals with continuous operation.
2. RBW : 1 – 5 % of the expected OBW, not to exceed 1 MHz
3. VBW ≥ 3 x RBW
4. Span : 1.5 times of the OBW
5. Sweep point : ≥ 2 x span / RBW
6. Detector : RMS
7. Trigger is set to "free run" for signals with continuous with the sweep times set to "Auto".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace : Averaging(RMS) over 100 sweeps
10. The trace was allowed to stabilize

NOTES

1) The receiving atenna scans in order to determine the level of the maximized emission.

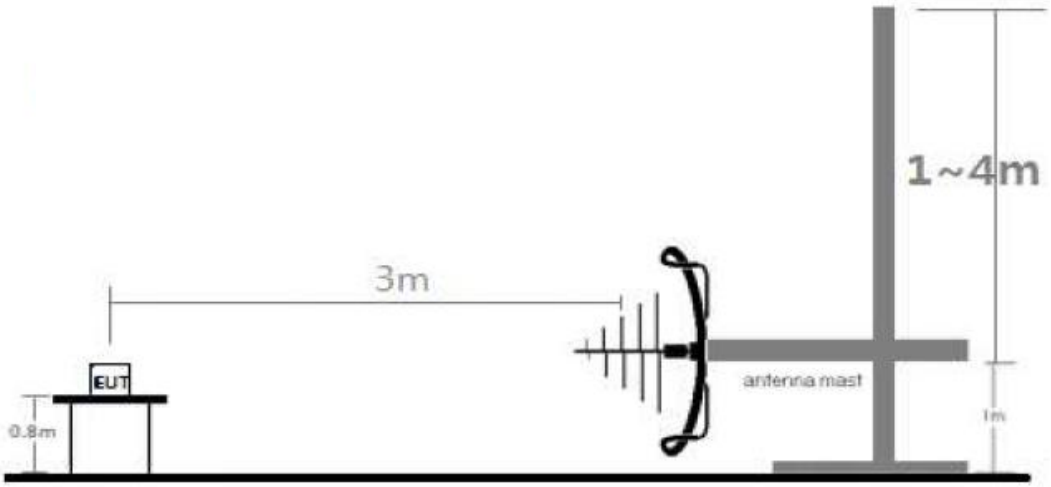
2) A half wave dipole is then substituted in place of the EUT. For emission above 1GHz, a Horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The power is calulated by the following formula:
E.I.R.P(dBm) = S.G Level(dBm) – Tx cable loss (dB) + Tx antenna gain(dBi)
E.I.R.P(dBm) = E.R.P(dBm) + 2.15

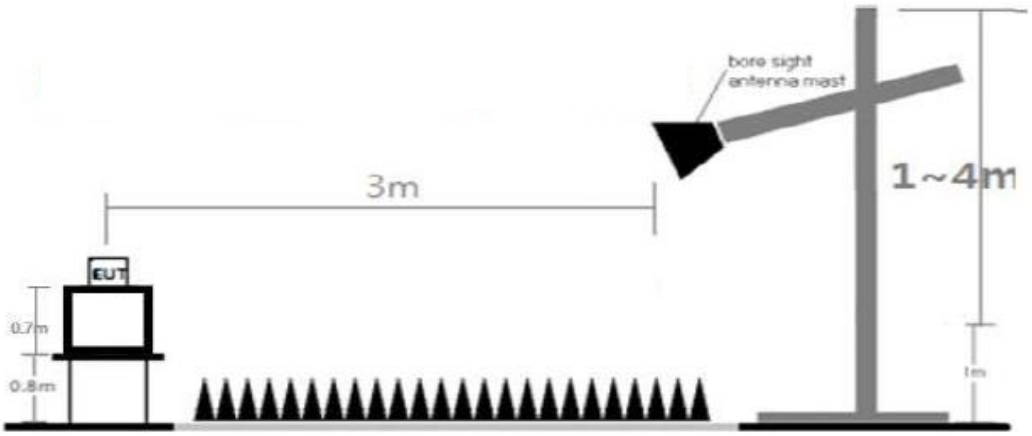
3.5.3 Deviation from Test Standard

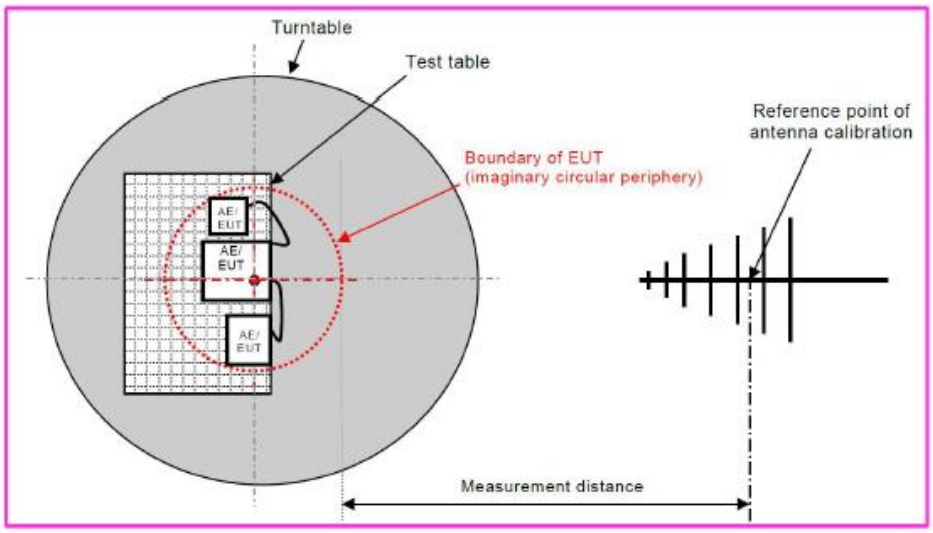
No deviation.

3.5.4 Test Setup



[Radiated power(ERP/EIRP) Test Setup Below 1 GHz]





[Radiated power(ERP/EIRP) Test Setup Above 1 GHz]

3.5.5 Test Result of Radiated Power (ERP/EIRP)

ERP / EIRP	Band	Frequency	S.G Level	Tx Ant Gain	Tx Cable Loss	Result		Limit [W]
		[MHz]	[dBm]	[dBi]	[dB]	[dBm]	[mW]	[W]
E.R.P	WCDMA B5	846.60	22.85	-0.57	-0.58	19.55	90.16	7.00
	LTE B5	826.50	24.74	-0.41	-0.58	21.60	144.54	7.00
	LTE B12/17	707.50	22.85	-0.29	-0.54	19.87	97.05	3.00
	LTE B13	779.50	23.29	-0.22	-0.56	20.36	108.64	3.00
	LTE B14	793.00	24.09	-0.21	-0.57	21.16	130.62	3.00
	LTE B71	688.00	21.68	-0.42	-0.54	18.57	71.94	3.00
	NR n5	831.50	22.80	-0.45	-0.58	19.62	91.62	7.00
	NR n71	690.50	22.33	-0.40	-0.54	19.24	83.95	3.00
E.I.R.P	WCDMA B2	1 852.40	14.18	9.34	-0.84	22.68	185.35	2.00
	WCDMA B4	1 732.60	15.16	8.88	-0.82	23.22	209.89	1.00
	LTE B25/2	1 852.50	15.92	9.34	-0.84	24.42	276.69	2.00
	LTE B66/4	1 720.00	14.35	8.84	-0.81	22.38	172.98	1.00
	LTE B7	2 567.50	13.63	10.77	-0.99	23.41	219.28	2.00
	LTE B41(PC2)	2 680.00	15.99	10.88	-1.02	25.85	384.59	2.00
	NR n2	1 900.00	14.51	9.52	-0.86	23.17	207.49	2.00
	NR n41#0	2 640.00	11.77	10.84	-1.01	21.60	144.54	2.00
	NR n41#1	2 674.98	12.51	10.87	-1.02	22.36	172.19	2.00
	NR n66	1 770.00	13.29	9.03	-0.82	21.50	141.25	1.00
	NR n77 (3450-3550 MHz) (Anchor n12)	3 499.98	8.08	12.40	-1.14	19.34	85.90	1.00
	NR n77 (Anchor n12) (3700-3980 MHz)	3 949.98	9.03	12.58	-1.17	20.44	110.66	1.00

NOTES

1) LTE Band 2

LTE Band 2(Frequency range: 1 850 ~ 1 910 MHz is covered by LTE Band 25 ((Frequency range: 1 850 ~ 1 915 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

2) LTE Band 4

LTE Band 4 (Frequency range: 1 710 ~ 1 755 MHz) is covered by LTE Band 66 (Frequency range: 1 710 ~ 1 780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

3) LTE Band 17

LTE Band 17 (Frequency range: 704 ~ 716 MHz) is covered by LTE Band 12 (Frequency range: 699 ~ 716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

4) LTE Band 41(PC3)

LTE Band 41(PC3, Frequency range: 2 496 ~ 2 690 MHz) is covered by LTE Band 41(PC2) (Frequency range: 2 496 ~ 2 690 MHz) due to same frequency range, same channel bandwidth and maximum tune-up limit is higher than LTE Band41(PC3).

3.6 Radiated Spurious Emissions Measurements

3.6.1 Regulation

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1 GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurement on signals operting above 1 GHz are performed using vertically and horizontally polarized broadband horn antennas.

3.6.2 Test Procedure

1. RBW : 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
2. VBW ≥ 3 x RBW
3. Span : 1.5 times of the OBW
4. Sweep points ≥ 2 x span / RBW
5. Detector : RMS
6. Trace mode : Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

NOTES

1) The receiving atenna scans in order to determine the level of the maximized emission.

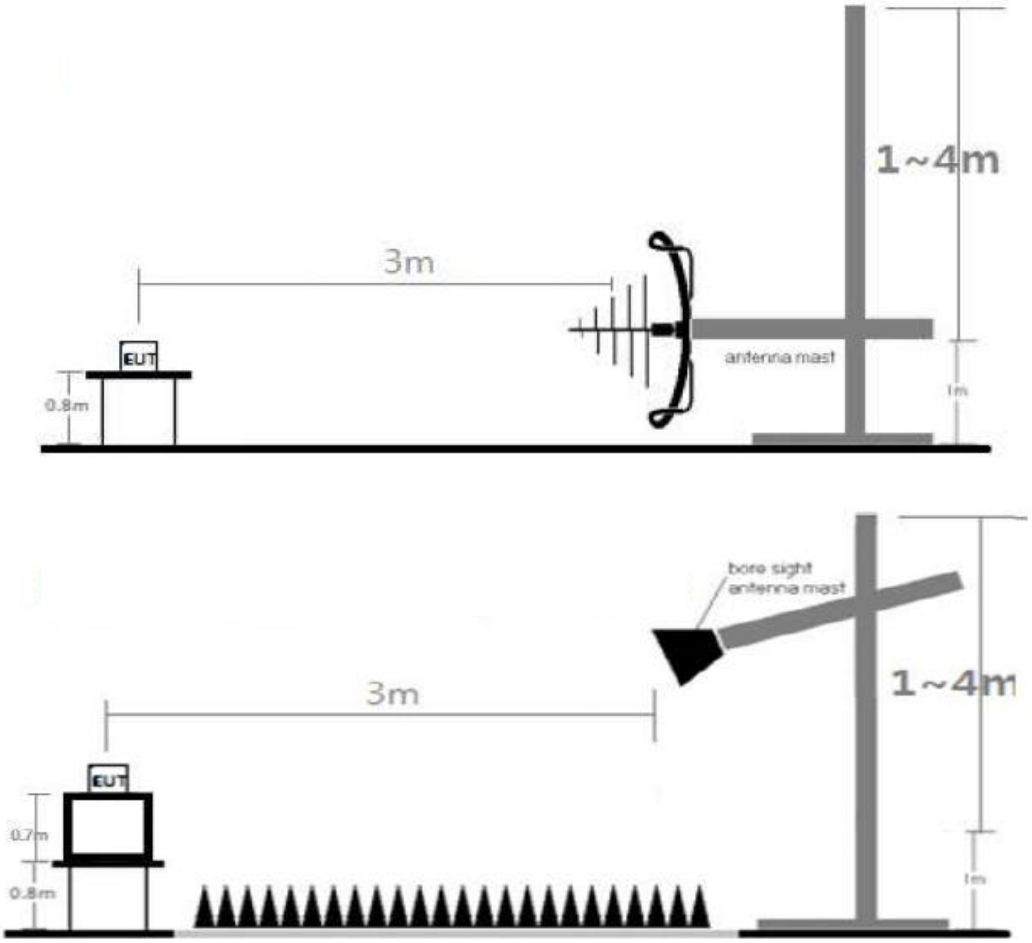
2) A half wave dipole is then substituted in place of the EUT. For emission above 1GHz, a Horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

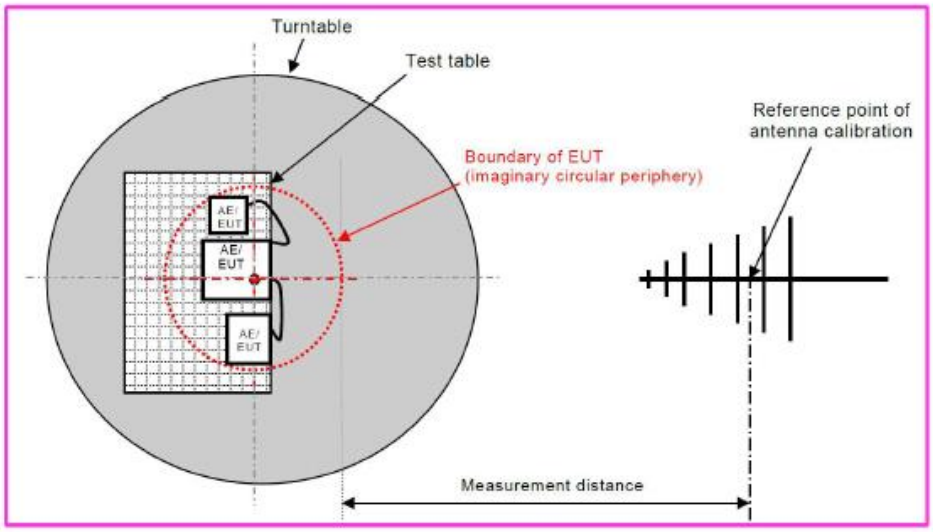
The power is calulated by the following formula:
E.I.R.P(dBm) = S.G Level(dBm) – Tx cable loss (dB) + Tx antenna gain(dBi)
E.I.R.P(dBm) = E.R.P(dBm) + 2.15

3.6.3 Deviation from Test Standard

No deviation.

3.6.4 Test Setup





[Radiated Spurious Emissions Test Setup]

3.6.5 Test Result of Radiated Spurious Emissions

[WCDMA B5]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
217.94	28.57	1.16	-71.28	-0.31	H	-72.58	-13
619.32	36.04	-1.11	-62.08	-0.52	H	-65.86	-13
1 030.30	31.76	5.46	-68.31	-0.64	H	-63.49	-13
1 121.67	29.36	5.96	-71.20	-0.66	H	-65.90	-13
1 695.00	28.54	8.74	-75.06	-0.81	V	-67.13	-13
2 544.20	40.95	10.74	-63.46	-0.98	V	-53.70	-13

[WCDMA B4]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
49.98	23.58	-32.21	-42.78	-0.16	V	-77.30	-13
169.63	17.98	-2.90	-75.84	-0.28	V	-81.17	-13
17 825.25	48.11	6.31	-58.45	-2.83	H	-54.97	-13
18 335.90	45.07	18.40	-68.54	-2.83	V	-52.97	-13

[WCDMA B2]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
49.98	22.93	-32.21	-43.43	-0.16	V	-77.95	-13
169.58	17.69	-2.91	-79.00	-0.28	H	-84.34	-13
1 836.50	35.67	9.28	-68.39	-0.84	H	-59.95	-13
1 913.60	35.47	9.57	-68.92	-0.86	H	-60.21	-13
3 705.25	39.97	12.48	-66.32	-1.15	V	-54.99	-13
5 576.25	48.08	13.15	-58.42	-1.43	V	-46.70	-13
18 273.50	45.06	18.40	-68.47	-2.83	V	-52.90	-13

NOTES

1) Result of below 1 GHz frequency is E.R.P value and Result of Above 1 GHz frequency is E.I.R.P value.

[LTE B5]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
617.43	22.93	-1.13	-75.20	-0.52	H	-79.00	-13
1 019.02	34.10	5.40	-65.91	-0.63	H	-61.14	-13
1 110.20	30.63	5.90	-69.87	-0.66	H	-64.63	-13
1 692.56	44.20	8.73	-59.22	-0.81	H	-51.30	-13
2 529.88	53.76	10.73	-50.62	-0.98	V	-40.87	-13

[LTE B7]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
49.98	24.46	-32.21	-41.90	-0.16	V	-76.42	-25
169.15	17.21	-2.96	-76.54	-0.28	V	-81.93	-25
16 750.50	47.26	14.65	-61.42	-2.74	V	-49.51	-25
26 636.85	47.97	17.95	-64.90	-3.56	V	-50.51	-25

[LTE B12]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
193.88	26.39	0.05	-72.69	-0.30	H	-75.09	-13
897.62	42.93	-0.98	-53.21	-0.60	V	-56.94	-13
1 431.24	52.07	7.63	-50.15	-0.74	H	-43.26	-13
2 130.80	49.14	10.11	-55.50	-0.90	H	-46.29	-13

[LTE B13]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
375.27	30.00	-0.60	-67.48	-0.42	H	-70.65	-13
406.89	30.21	-0.57	-66.86	-0.43	H	-70.01	-13
980.60	33.11	-1.73	-62.59	-0.62	H	-67.09	-13
1 563.88	49.05	8.24	-53.80	-0.78	H	-46.34	-40
2 345.76	58.31	10.45	-46.13	-0.94	V	-36.62	-13

NOTES

1) Result of below 1 GHz frequency is E.R.P value and Result of Above 1 GHz frequency is E.I.R.P value.

[LTE B14]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
988.12	33.81	-1.80	-60.55	-0.63	V	-65.13	-13
1 581.04	50.81	8.31	-52.13	-0.78	H	-44.60	-40
2 371.28	58.95	10.49	-45.44	-0.95	H	-35.90	-13

[LTE B25]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
49.98	24.36	-32.21	-42.00	-0.16	V	-76.52	-13
169.24	18.01	-2.95	-75.75	-0.28	V	-81.13	-13
1 229.40	36.48	6.54	-64.79	-0.69	V	-58.94	-13
5 663.50	39.50	13.20	-66.98	-1.44	V	-55.22	-13
19 438.64	44.31	18.95	-69.12	-2.93	V	-53.10	-13

[LTE B41(PC2)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
49.98	23.76	-32.21	-42.60	-0.16	V	-77.12	-25
562.53	19.60	-1.19	-75.20	-0.50	V	-79.04	-25
8 039.95	38.53	11.18	-66.33	-1.74	V	-56.89	-25
10 578.18	36.43	10.37	-68.93	-1.93	H	-60.49	-25
24 643.35	46.02	20.70	-69.28	-3.11	V	-51.69	-25

[LTE B66]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
49.98	24.81	-32.21	-41.55	-0.16	V	-76.07	-13
169.63	17.94	-2.90	-75.88	-0.28	V	-81.21	-13
1 708.00	35.06	8.79	-68.43	-0.81	H	-60.45	-13
5 309.25	43.44	12.79	-63.05	-1.40	V	-51.66	-13
18 249.00	44.85	18.40	-68.79	-2.84	H	-53.23	-13

NOTES

1) Result of below 1 GHz frequency is E.R.P value and Result of Above 1 GHz frequency is E.I.R.P value.

[LTE B71]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
582.66	38.31	-1.25	-59.77	-0.51	H	-63.68	-13
757.89	29.64	-0.24	-68.25	-0.56	H	-71.20	-13
1 343.44	48.03	7.15	-53.91	-0.72	V	-47.48	-13
2 014.88	58.13	9.92	-46.61	-0.88	V	-37.57	-13
3 358.20	34.72	12.06	-71.22	-1.13	H	-60.29	-13

[NR n2(Anchor 12)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
434.93	43.49	-1.24	-53.93	-0.44	H	-57.76	-13
979.29	45.55	-1.72	-50.19	-0.62	H	-54.68	-13
3 781.25	45.56	12.51	-60.74	-1.16	V	-49.39	-13
5 652.25	56.36	13.19	-50.41	-1.44	H	-38.66	-13
18 692.20	44.95	18.48	-68.51	-2.82	V	-52.85	-13

[NR n5(Anchor 2)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
206.10	36.56	0.92	-63.19	-0.30	H	-64.72	-13
629.56	34.60	-1.00	-63.48	-0.53	H	-67.16	-13
1 110.41	29.66	5.90	-70.91	-0.66	V	-65.67	-13
1 683.44	46.61	8.70	-56.78	-0.80	H	-48.88	-13
2 524.88	51.83	10.72	-52.53	-0.98	V	-42.79	-13

[NR n41#0(Anchor 4)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
42.61	29.44	-35.38	-35.18	-0.15	V	-72.86	-25
62.50	20.83	-26.40	-51.66	-0.17	V	-80.38	-25
124.96	16.26	-10.41	-68.89	-0.24	V	-81.69	-25
859.59	34.95	-0.68	-63.12	-0.59	H	-66.54	-25
17 783.25	48.29	6.91	-57.09	-2.82	V	-53.00	-25
26 509.50	47.25	17.90	-65.65	-3.55	H	-51.30	-25

NOTES

1) Result of below 1 GHz frequency is E.R.P value and Result of Above 1 GHz frequency is E.I.R.P value.

[NR n41#1(Anchor 12)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
318.82	30.64	-0.24	-67.99	-0.38	H	-70.76	-25
391.08	33.13	-0.47	-64.05	-0.42	H	-67.09	-25
1 968.88	45.60	9.78	-59.03	-0.87	V	-50.12	-25
3 384.63	50.19	12.12	-55.86	-1.13	V	-44.87	-25
17 816.58	46.09	6.43	-60.49	-2.83	H	-56.89	-25
26 796.60	47.79	18.02	-65.11	-3.56	H	-50.65	-25

[NR n66(Anchor 12)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
42.76	28.56	-35.32	-36.09	-0.15	V	-73.71	-13
49.98	22.48	-32.21	-43.88	-0.16	V	-78.40	-13
62.50	21.23	-26.40	-51.26	-0.17	V	-79.98	-13
94.75	23.85	-16.66	-59.46	-0.21	H	-78.48	-13
314.60	40.71	-0.16	-58.01	-0.38	H	-60.70	-13
392.63	36.35	-0.46	-60.78	-0.43	H	-63.82	-13
582.17	32.02	-1.25	-66.05	-0.51	H	-69.96	-13
844.85	33.24	-0.56	-64.81	-0.58	H	-68.10	-13
1 061.20	56.56	5.63	-43.67	-0.65	H	-38.69	-13
2 474.90	61.19	10.66	-43.14	-0.97	V	-33.45	-13
5 302.50	40.17	12.78	-66.32	-1.40	V	-54.94	-13
8 838.75	40.58	11.69	-63.91	-1.76	H	-53.98	-13
18 899.90	45.17	18.56	-67.91	-2.81	V	-52.16	-13

[NR n71(Anchor 2)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
484.11	31.18	-1.19	-66.32	-0.46	H	-70.12	-13
910.86	39.81	-1.10	-58.00	-0.60	H	-61.85	-13
1 394.48	48.12	7.43	-53.90	-0.73	H	-47.20	-13
2 092.32	48.04	10.05	-56.63	-0.90	V	-47.48	-13

NOTES

1) Result of below 1 GHz frequency is E.R.P value and Result of Above 1 GHz frequency is E.I.R.P value.

[NR n77(Anchor 12)_ (3 450 ~ 3 550 MHz)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
912.07	37.92	-1.11	-59.86	-0.60	H	-63.72	-13
7 000.20	38.98	12.10	-66.37	-1.63	V	-55.90	-13
17 799.00	48.18	6.69	-58.46	-2.82	H	-54.59	-13
39 139.80	55.86	20.77	-60.24	-4.44	V	-43.91	-13

[NR n77(Anchor 2)_ (3 700 ~ 3 980 MHz)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
844.85	33.86	-0.56	-64.19	-0.58	H	-67.48	-13
11 850.60	41.23	12.19	-63.99	-2.08	H	-53.88	-13
39 145.30	56.01	20.77	-60.10	-4.44	V	-43.77	-13

NOTES

1) Result of below 1 GHz frequency is E.R.P value and Result of Above 1 GHz frequency is E.I.R.P value.

3.6.6 Test Result of Simultaneous Radiated Spurious Emissions

[NR n41#0(Anchor 4)_100 MHz_1/137_2 640 MHz + BT(BDR_2 480 MHz)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
49.98	23.01	-32.21	-43.35	-0.16	V	-77.87	-25
251.69	20.57	1.74	-78.68	-0.34	H	-79.43	-25
2 319.25	50.54	10.41	-53.93	-0.94	H	-44.46	-25
2 369.13	48.97	10.49	-55.45	-0.95	V	-45.91	-25
7 921.05	36.57	11.08	-68.28	-1.73	H	-58.93	-25

NOTES

1) Result of below 1 GHz frequency is E.R.P value and Result of Above 1 GHz frequency is E.I.R.P value.

[NR n41#0(Anchor 4)_100 MHz_1/137_2 640 MHz + Wi-Fi(11b_1Mbps_Ant 2(Aux)_2 437 MHz)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
49.98	22.90	-32.21	-43.46	-0.16	V	-77.98	-25
251.45	19.70	1.75	-80.39	-0.34	H	-81.13	-25
2 131.38	40.67	10.11	-63.97	-0.90	H	-54.76	-25
2 233.38	51.21	10.27	-53.33	-0.92	H	-43.98	-25
2 283.13	41.74	10.35	-62.74	-0.93	H	-53.32	-25
2 741.25	36.18	10.94	-68.67	-1.04	V	-58.77	-25
2 842.25	41.02	11.04	-64.05	-1.07	V	-54.08	-25
7 920.33	35.30	11.08	-69.55	-1.73	V	-60.20	-25
39 107.90	55.58	20.78	-60.46	-4.43	V	-44.11	-25

[NR n41#0(Anchor 4)_100 MHz_1/137_2 640 MHz + Wi-Fi(11b_1Mbps_Ant 1(Main)_2 437 MHz)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
49.98	23.26	-32.21	-43.10	-0.16	V	-77.62	-25
251.74	21.38	1.74	-78.70	-0.34	H	-79.45	-25
2 233.88	47.36	10.27	-57.18	-0.92	V	-47.83	-25
2 282.63	36.29	10.35	-68.21	-0.93	V	-58.79	-25
2 743.00	37.61	10.94	-67.24	-1.04	V	-57.34	-25
2 844.88	42.74	11.04	-62.33	-1.07	V	-52.36	-25
5 741.70	36.76	13.25	-69.99	-1.44	H	-58.18	-25
23 762.90	44.92	20.41	-70.25	-3.03	V	-52.87	-25
39 116.70	55.52	20.78	-60.37	-4.43	H	-44.02	-25

[NR n41#0(Anchor 4)_100 MHz_1/137_2 640 MHz + Wi-Fi(11ax_HE20_52/37_HE0_MIMO_2 412 MHz)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
49.98	22.71	-32.21	-43.65	-0.16	V	-78.17	-25
251.26	19.52	1.76	-79.76	-0.34	V	-80.49	-25
2 167.38	40.04	10.17	-64.56	-0.91	H	-55.30	-25
2 219.75	35.69	10.25	-68.86	-0.92	H	-59.53	-25
7 216.35	40.71	11.62	-64.30	-1.66	V	-54.34	-25
39 129.79	55.61	20.77	-60.25	-4.44	H	-43.92	-25

NOTES

1) Result of below 1 GHz frequency is E.R.P value and Result of Above 1 GHz frequency is E.I.R.P value.

[NR n41#0(Anchor 4)_100 MHz_1/137_2 640 MHz + Wi-Fi(11n_HT20__HT0_Ant 2(Aux)_5 180 MHz)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
49.98	22.82	-32.21	-43.54	-0.16	V	-78.06	-25
251.65	20.70	1.74	-79.38	-0.34	H	-80.13	-25
1 403.50	32.24	7.48	-70.06	-0.73	V	-63.31	-25
6 486.00	35.21	12.82	-70.67	-1.55	V	-59.40	-25
17 853.00	48.84	5.91	-56.32	-2.83	V	-53.24	-25
39 114.50	55.50	20.78	-60.39	-4.43	H	-44.04	-25

[NR n41#0(Anchor 4)_100 MHz_1/137_2 640 MHz + Wi-Fi(11a_6Mbps_Ant 1(Main)_5 260 MHz)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
41.69	24.92	-35.77	-39.49	-0.15	V	-77.56	-25
49.98	23.53	-32.21	-42.83	-0.16	V	-77.35	-25
251.40	19.01	1.75	-81.08	-0.34	H	-81.82	-25
1 176.50	30.96	6.25	-69.99	-0.68	V	-64.42	-25
7 921.80	37.32	11.08	-67.53	-1.73	V	-58.18	-25
13 403.40	41.74	13.02	-65.49	-2.24	V	-54.71	-25
39 114.30	55.71	20.78	-60.18	-4.43	H	-43.83	-25

[NR n41#0(Anchor 4)_100 MHz_1/137_2 640 MHz + Wi-Fi(11n_HT20_HT8_MIMO_5 180 MHz)]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
43.77	22.09	-34.88	-42.81	-0.15	V	-79.99	-25
251.55	21.30	1.75	-78.79	-0.34	H	-79.53	-25
437.50	22.63	-1.30	-71.70	-0.44	V	-75.59	-25
1 247.25	31.15	6.64	-70.23	-0.69	V	-64.28	-25
7 920.60	37.22	11.08	-67.63	-1.73	V	-58.28	-25
17 862.60	48.75	5.77	-57.70	-2.83	H	-54.76	-25
38 081.60	53.63	20.62	-63.66	-4.46	V	-47.50	-25

NOTES

1) Result of below 1 GHz frequency is E.R.P value and Result of Above 1 GHz frequency is E.I.R.P value.

[NR n41#0(Anchor 4)_100 MHz_1/137_2 640 MHz + Wi-Fi(11n_HT20_HT0_Ant 2(Aux)_5 180 MHz) + BT(BDR_2 480 MHz]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
44.16	25.86	-34.71	-39.13	-0.15	V	-76.14	-25
49.98	23.02	-32.21	-43.34	-0.16	V	-77.86	-25
251.50	20.42	1.75	-79.67	-0.34	H	-80.41	-25
437.50	23.01	-1.30	-71.32	-0.44	V	-75.21	-25
2 319.50	56.27	10.41	-48.20	-0.94	V	-38.73	-25
2 368.50	48.90	10.49	-55.52	-0.95	V	-45.98	-25
5 120.15	62.14	12.49	-44.33	-1.38	V	-33.22	-25
7 920.60	38.78	11.08	-66.54	-1.73	H	-57.19	-25
39 204.70	55.50	20.76	-60.75	-4.44	V	-44.43	-25

[NR n41#0(Anchor 4)_100 MHz_1/137_2 640 MHz + Wi-Fi(11a_6Mbps_Ant 1(Main)_5 260 MHz) + BT(BDR_2 480 MHz]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
30.73	14.58	-42.16	-42.21	-0.14	V	-86.66	-25
49.98	22.87	-32.21	-43.49	-0.16	V	-78.01	-25
251.60	20.91	1.75	-79.18	-0.34	H	-79.92	-25
562.53	24.38	-1.19	-70.42	-0.50	V	-74.26	-25
2 319.00	53.69	10.41	-50.78	-0.94	V	-41.31	-25
2 369.13	43.88	10.49	-60.54	-0.95	V	-51.00	-25
5 071.60	43.79	12.41	-62.52	-1.38	H	-51.49	-25
5 120.25	60.21	12.49	-46.26	-1.38	V	-35.15	-25
7 921.20	42.71	11.08	-62.14	-1.73	V	-52.79	-25
39 149.70	55.60	20.77	-60.52	-4.44	V	-44.19	-25

[NR n41#0(Anchor 4)_100 MHz_1/137_2 640 MHz + Wi-Fi(11n_HT20_HT8_MIMO_5 180 MHz) + BT(BDR_2 480 MHz]

Frequency [MHz]	Measured Level [dBµV/m]	Tx Ant. Gain [dBi]	S.G Level [dBm]	Tx Cable Loss [dB]	Pol. (H/V)	Result [dBm]	Limit [dBm]
31.41	24.53	-41.74	-32.80	-0.14	V	-76.83	-25
251.11	20.61	1.76	-79.48	-0.34	H	-80.21	-25
500.01	22.94	-1.00	-71.83	-0.47	V	-75.45	-25
2 319.38	55.96	10.41	-48.51	-0.94	V	-39.04	-25
2 369.00	47.40	10.49	-57.02	-0.95	V	-47.48	-25
5 071.05	47.15	12.41	-59.16	-1.38	H	-48.13	-25
7 920.60	42.99	11.08	-61.86	-1.73	V	-52.51	-25
39 121.10	55.83	20.78	-60.06	-4.43	H	-43.71	-25

NOTES

1) Result of below 1 GHz frequency is E.R.P value and Result of Above 1 GHz frequency is E.I.R.P value.

3.7 Frequency Stability / Temperature Variation

3.7.1 Regulation

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. The freuquency stability of the transmitter is measured by :

a) **Temperature** : The temperature is varied from -30 ˚C to +50 ˚C in 10 ˚C increments using an environmental chamber

b) **Primary Supply Voltage** : The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment. Primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 22, the frequency stability of the transmitter shall be maintained within ±0.00025 % (±2.5 ppm) of the center frequency. For Part 24, Part 27, the freuqunecy stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

3.7.2 Test Procedure

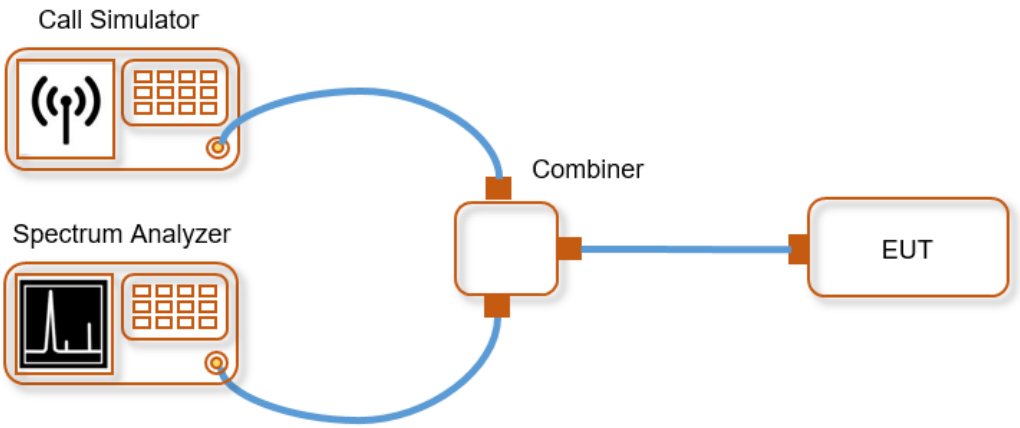
1. The carrier frequency of the transmitter is measured at room temperature (20 ˚C to provide a reference).
2. The equipment is tuned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10 ˚C intervals ranging from -30 ˚C to +50 ˚C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

3.7.3 Deviation from Test Standard

No deviation.

3.7.4 Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.



3.7.5 Test Result

- Not Tested.

Note) Due to request of manufacturer, these test items were not tested. Please refer to the original test report(Report number : 4789899747-E2V3) issued by UL Korea, Ltd.

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 -