

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE FCC Class II Permissive Change

Applicant Name: LG Electronics MobileComm U.S.A., Inc.	Date of Issue: August 09, 2013
Address: 1000 Sylvan Avenue, Englewood Cliffs NJ 07632	Test Site/Location: HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, Korea
	Report No.: HCTR1308FR07-1
	HCT FRN: 0005866421

FCC ID	: ZNFVS980
APPLICANT	: LG Electronics MobileComm U.S.A., Inc.

FCC Model(s):	LG-VS980
EUT Type:	GSM/WCDMA/CDMA/LTE Phone Bluetooth, WLAN and NFC
Frequency Range:	2402 MHz - 2480 MHz (Bluetooth)
Modulation type	GFSK(Normal), $\pi/4$ DQPSK and 8DPSK(EDR)
FCC Classification:	FCC Part 15 Spread Spectrum Transmitter
FCC Rule Part(s):	Part 15 subpart C 15.247

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998, 21 U.S. C.853(a)



Report prepared by
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Approved by
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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1308FR07	August 01, 2013	- First Approval Report
HCTR1308FR07-1	August 09, 2013	- Deletion the Duty Cycle Correction Factor for Peak Field Strength

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1. GENERAL INFORMATION

Applicant: LG Electronics MobileComm U.S.A., Inc.
Address: 1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID: ZNFVS980
EUT Type: GSM/WCDMA/CDMA/LTE Phone Bluetooth, WLAN and NFC
Model name(s): LG-VS980
Date(s) of Tests: July 11, 2013 ~ July 19, 2013
Place of Tests: HCT Co., Ltd.
 105-1, Jangam-ri , Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, KOREA.
 (IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

EUT Type	GSM/WCDMA/CDMA/LTE Phone Bluetooth, WLAN and NFC
FCC Model Name	LG-VS980
Power Supply	DC 3.8 V
Battery type	Li-ion Battery(Standard)
Frequency Range	2402 MHz - 2480 MHz (Bluetooth)
BT Operating Mode	Normal, EDR, AFH
Modulation Type	GFSK(Normal), $\pi/4$ DQPSK and 8DPSK(EDR)
Modulation Technique	FHSS
Number of Channels	79Channels, Minimum 20 Channels(AFH)
Antenna Specification	Antenna type: FPCB Antenna Peak Gain : -1.05 dBi

※ 15.247 Requirements for Bluetooth transmitter

- This Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following:
 - 1) This system is hopping pseudo-randomly.
 - 2) Each frequency is used equally on the average by each transmitter.
 - 3) The receiver input bandwidths that match the hopping channel bandwidths of their corresponding transmitters
 - 4) The receiver shifts frequencies in synchronization with the transmitted signals.
- 15.247(g): The system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this Section 15.247 should the transmitter be presented with a continuous data (or information) stream.
- 15.247(h): The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

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3. TEST METHODOLOGY

The measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.4-2003) and FCC Public Notice DA 00-705 dated March 30, 2000 entitled “Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems” were used in the measurement of the **LG Electronics MobileComm U.S.A., Inc. GSM/WCDMA/CDMA/LTE Phone Bluetooth, WLAN and NFC FCC ID: ZNFVS980**

3.1 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.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version :2003) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version: 2003). To record the final measurements, the analyzer detector function was set to CISPR quasi-peak mode and the bandwidth of the spectrum analyzer was set to 120 kHz for frequencies below 1 GHz or 1 MHz for frequencies above 1 GHz. For average measurements above 1 GHz, the analyzer was set to peak detector with a reduced VBW setting(RBW = 1 MHz, VBW = 1/T Hz, where T = Pulse width).

Conducted Antenna Terminal

See Section from 8.1 to 8.6.1.(DA 00-705)

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3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

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.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated June 21, 2011 (Registration Number: 90661)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

"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 this section."

* The antennas of this E.U.T are permanently attached.

*The E.U.T Complies with the requirement of §15.203

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7. SUMMARY OF TEST RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
Radiated Spurious Emissions	§15.247(d), 15.205, 15.209	cf. Section 8.6.2	RADIATED	PASS
Radiated Restricted Band Edge	§15.247(d), 15.205, 15.209	cf. Section 8.6.3		PASS

8. FCC PART 15.247 REQUIREMENTS

8.1 SPURIOUS EMISSIONS

8.1.1 RADIATED SPURIOUS EMISSIONS

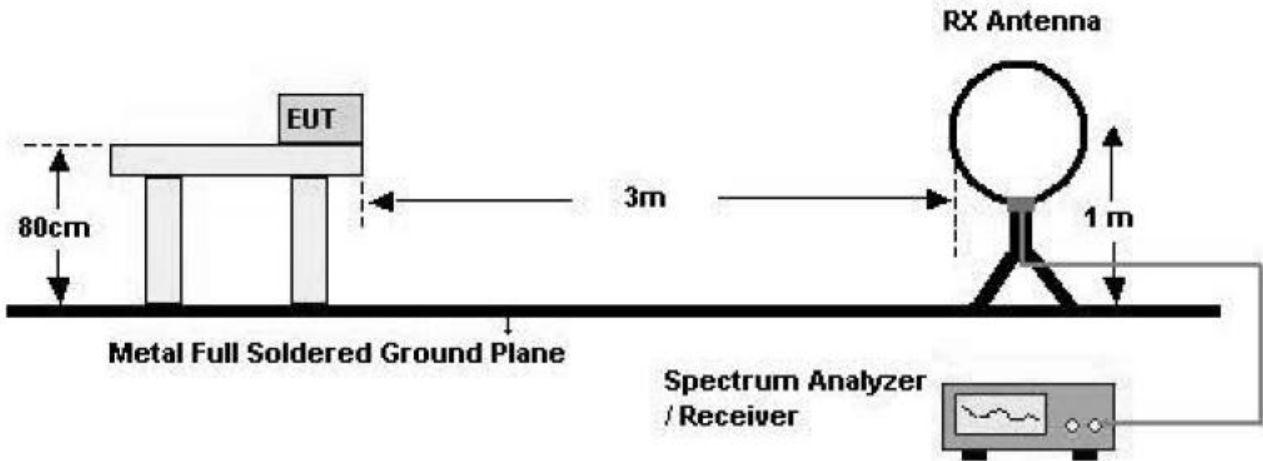
LIMIT : §15.247(d), §15.205, §15.209

1. 20dBc in any 100kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

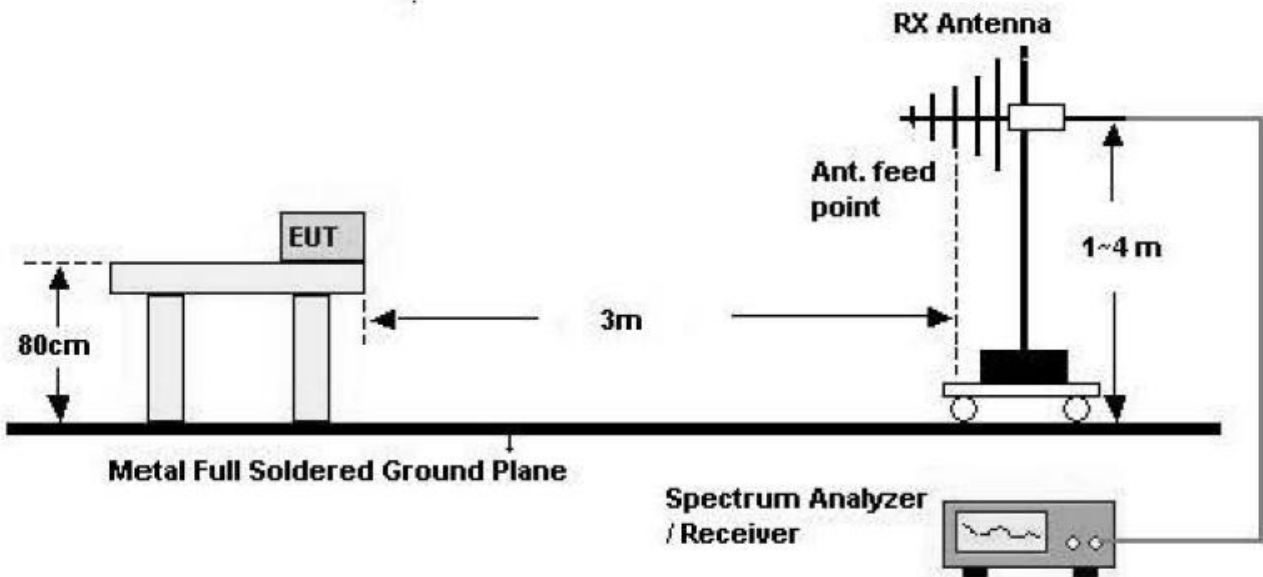
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

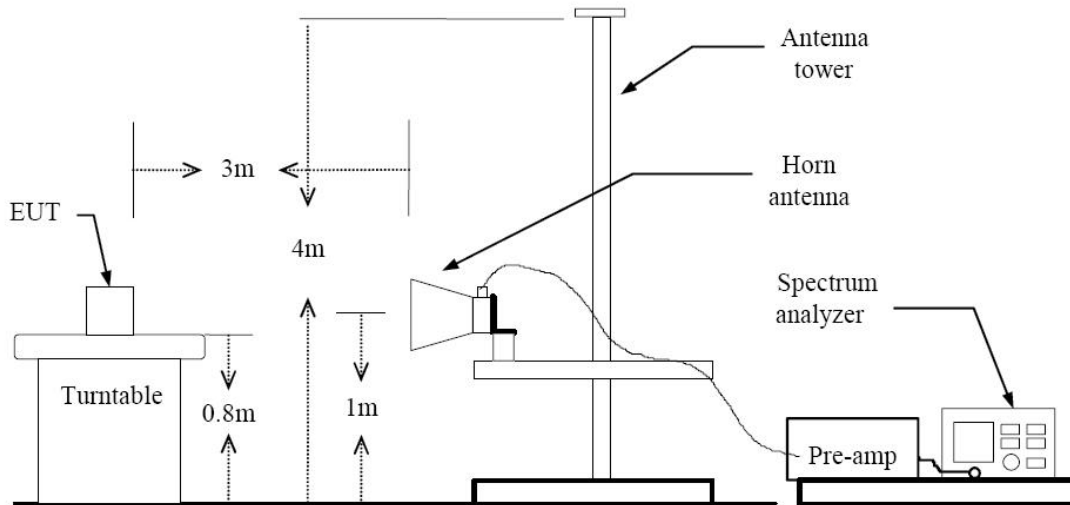
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. Spectrum Setting
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds.

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TEST RESULTS

9 kHz – 30MHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor = 40 log (specific distance / test distance) (dB)
4. Limit line = specific Limits (dBuV) + Distance extrapolation factor
5. This test is performed with hopping off.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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TEST RESULTS

Below 1 GHz

Operation Mode: Normal Mode

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V	dB /m	dB	(H/V)	dB μ V/m	dB μ V/m	dB
No Critical peaks found							

Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.
3. This test is performed with hopping off.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Above 1 GHz

Stand alone

Operation Mode: CH Low(GFSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4804	49.91	-0.84	V	49.07	74	24.93	PK
4804	36.68	-0.84	V	35.84	54	18.16	AV
7206	49.36	9.15	V	58.51	74	15.49	PK
7206	35.75	9.15	V	44.90	54	9.10	AV
4804	50.30	-0.84	H	49.46	74	24.54	PK
4804	36.64	-0.84	H	35.80	54	18.20	AV
7206	49.59	9.15	H	58.74	74	15.26	PK
7206	35.61	9.15	H	44.76	54	9.24	AV

Operation Mode: CH Low(8DPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4804	50.02	-0.84	V	49.18	74	24.82	PK
4804	36.67	-0.84	V	35.83	54	18.17	AV
7206	49.53	9.15	V	58.68	74	15.32	PK
7206	35.64	9.15	V	44.79	54	9.21	AV
4804	50.18	-0.84	H	49.34	74	24.66	PK
4804	36.66	-0.84	H	35.82	54	18.18	AV
7206	49.34	9.15	H	58.49	74	15.51	PK
7206	35.60	9.15	H	44.75	54	9.25	AV

Operation Mode: CH Low($\pi/4$ DQPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4804	49.95	-0.84	V	49.11	74	24.89	PK
4804	36.62	-0.84	V	35.78	54	18.22	AV
7206	49.28	9.15	V	58.43	74	15.57	PK
7206	35.70	9.15	V	44.85	54	9.15	AV
4804	50.12	-0.84	H	49.28	74	24.72	PK
4804	36.65	-0.84	H	35.81	54	18.19	AV
7206	49.68	9.15	H	58.83	74	15.17	PK
7206	35.63	9.15	H	44.78	54	9.22	AV

※ A:F: ANTENNA FACTOR
C:L: CABLE LOSS
AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds.
We performed using a reduced video BW method was done with the analyzer in linear mode.
6. We have done Normal Mode and EDR Mode test.
7. This test is performed with hopping off.
8. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Operation Mode: CH Mid(GFSK)

Frequency [MHz]	Reading dBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4882	49.32	-0.37	V	48.95	74	25.05	PK
4882	35.64	-0.37	V	35.27	54	18.73	AV
7323	48.78	8.72	V	57.50	74	16.51	PK
7323	35.38	8.72	V	44.10	54	9.91	AV
4882	49.40	-0.37	H	49.03	74	24.97	PK
4882	35.80	-0.37	H	35.43	54	18.57	AV
7323	48.90	8.72	H	57.62	74	16.39	PK
7323	35.26	8.72	H	43.98	54	10.03	AV

Operation Mode: CH Mid(8DPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4882	49.52	-0.37	V	49.15	74	24.85	PK
4882	35.65	-0.37	V	35.28	54	18.72	AV
7323	48.78	8.72	V	57.50	74	16.51	PK
7323	35.34	8.72	V	44.06	54	9.94	AV
4882	49.49	-0.37	H	49.12	74	24.88	PK
4882	35.75	-0.37	H	35.38	54	18.62	AV
7323	48.99	8.72	H	57.71	74	16.30	PK
7323	35.31	8.72	H	44.03	54	9.97	AV

Operation Mode: CH Mid($\pi/4$ DQPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4882	49.28	-0.37	V	48.91	74	25.09	PK
4882	35.63	-0.37	V	35.26	54	18.74	AV
7323	48.92	8.72	V	57.64	74	16.37	PK
7323	35.31	8.72	V	44.03	54	9.97	AV
4882	49.35	-0.37	H	48.98	74	25.02	PK
4882	35.74	-0.37	H	35.37	54	18.63	AV
7323	48.93	8.72	H	57.65	74	16.36	PK
7323	35.25	8.72	H	43.97	54	10.04	AV

※ A:F: ANTENNA FACTOR
C:L: CABLE LOSS
AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds.
We performed using a reduced video BW method was done with the analyzer in linear mode.
6. We have done Normal Mode and EDR Mode test.
7. This test is performed with hopping off.
8. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

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Operation Mode: CH High(GFSK)

Frequency [MHz]	Reading dBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4960	48.59	0.50	V	49.09	74	24.91	PK
4960	35.07	0.50	V	35.57	54	18.43	AV
7440	49.22	8.95	V	58.17	74	15.83	PK
7440	36.20	8.95	V	45.15	54	8.85	AV
4960	48.76	0.50	H	49.26	74	24.74	PK
4960	34.91	0.50	H	35.41	54	18.59	AV
7440	49.92	8.95	H	58.87	74	15.13	PK
7440	36.26	8.95	H	45.21	54	8.79	AV

Operation Mode: CH High(8DPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4960	48.48	0.50	V	48.98	74	25.02	PK
4960	34.98	0.50	V	35.48	54	18.52	AV
7440	49.31	8.95	V	58.26	74	15.74	PK
7440	36.08	8.95	V	45.03	54	8.97	AV
4960	48.62	0.50	H	49.12	74	24.88	PK
4960	34.89	0.50	H	35.39	54	18.61	AV
7440	49.95	8.95	H	58.90	74	15.10	PK
7440	36.34	8.95	H	45.29	54	8.71	AV

Operation Mode: CH High ($\pi/4$ DQPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4960	48.48	0.50	V	48.98	74	25.02	PK
4960	35.00	0.50	V	35.50	54	18.50	AV
7440	49.30	8.95	V	58.25	74	15.75	PK
7440	36.12	8.95	V	45.07	54	8.93	AV
4960	48.56	0.50	H	49.06	74	24.94	PK
4960	34.92	0.50	H	35.42	54	18.58	AV
7440	49.84	8.95	H	58.79	74	15.21	PK
7440	36.26	8.95	H	45.21	54	8.79	AV

※ A:F: ANTENNA FACTOR
C:L: CABLE LOSS
AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds.
We performed using a reduced video BW method was done with the analyzer in linear mode.
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With Wireless Charger

Operation Mode: CH Low(GFSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4804	49.74	-0.84	V	48.90	74	25.10	PK
4804	36.62	-0.84	V	35.78	54	18.22	AV
7206	49.35	9.15	V	58.50	74	15.50	PK
7206	35.74	9.15	V	44.89	54	9.11	AV
4804	50.01	-0.84	H	49.17	74	24.83	PK
4804	36.60	-0.84	H	35.76	54	18.24	AV
7206	49.58	9.15	H	58.73	74	15.27	PK
7206	35.59	9.15	H	44.74	54	9.26	AV

Operation Mode: CH Low(8DPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4804	49.87	-0.84	V	49.03	74	24.97	PK
4804	36.65	-0.84	V	35.81	54	18.19	AV
7206	49.48	9.15	V	58.63	74	15.37	PK
7206	35.55	9.15	V	44.70	54	9.30	AV
4804	50.10	-0.84	H	49.26	74	24.74	PK
4804	36.65	-0.84	H	35.81	54	18.19	AV
7206	49.48	9.15	H	58.63	74	15.37	PK
7206	35.49	9.15	H	44.64	54	9.36	AV

Operation Mode: CH Low($\pi/4$ DQPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4804	49.88	-0.84	V	49.04	74	24.96	PK
4804	36.59	-0.84	V	35.75	54	18.25	AV
7206	49.20	9.15	V	58.35	74	15.65	PK
7206	35.55	9.15	V	44.70	54	9.30	AV
4804	50.09	-0.84	H	49.25	74	24.75	PK
4804	36.59	-0.84	H	35.75	54	18.25	AV
7206	49.54	9.15	H	58.69	74	15.31	PK
7206	35.59	9.15	H	44.74	54	9.26	AV

※ A:F: ANTENNA FACTOR
C:L: CABLE LOSS
AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds.
We performed using a reduced video BW method was done with the analyzer in linear mode.
6. We have done Normal Mode and EDR Mode test.
7. This test is performed with hopping off.
8. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode: CH Mid(GFSK)

Frequency [MHz]	Reading dBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4882	49.32	-0.37	V	48.95	74	25.05	PK
4882	35.60	-0.37	V	35.23	54	18.77	AV
7323	48.63	8.72	V	57.35	74	16.66	PK
7323	35.25	8.72	V	43.97	54	10.04	AV
4882	49.28	-0.37	H	48.91	74	25.09	PK
4882	35.75	-0.37	H	35.38	54	18.62	AV
7323	48.71	8.72	H	57.43	74	16.58	PK
7323	35.18	8.72	H	43.90	54	10.11	AV

Operation Mode: CH Mid(8DPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4882	49.44	-0.37	V	49.07	74	24.93	PK
4882	35.64	-0.37	V	35.27	54	18.73	AV
7323	48.64	8.72	V	57.36	74	16.65	PK
7323	35.28	8.72	V	44.00	54	10.01	AV
4882	49.36	-0.37	H	48.99	74	25.01	PK
4882	35.71	-0.37	H	35.34	54	18.66	AV
7323	48.74	8.72	H	57.46	74	16.55	PK
7323	35.28	8.72	H	44.00	54	10.01	AV

Operation Mode: CH Mid($\pi/4$ DQPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4882	49.21	-0.37	V	48.84	74	25.16	PK
4882	35.60	-0.37	V	35.23	54	18.77	AV
7323	48.90	8.72	V	57.62	74	16.39	PK
7323	35.28	8.72	V	44.00	54	10.01	AV
4882	49.34	-0.37	H	48.97	74	25.03	PK
4882	35.68	-0.37	H	35.31	54	18.69	AV
7323	49.87	8.72	H	58.59	74	15.42	PK
7323	35.21	8.72	H	43.93	54	10.08	AV

※ A:F: ANTENNA FACTOR
C:L: CABLE LOSS
AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds.
We performed using a reduced video BW method was done with the analyzer in linear mode.
6. We have done Normal Mode and EDR Mode test.
7. This test is performed with hopping off.
8. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

Operation Mode: CH High(GFSK)

Frequency [MHz]	Reading dBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4960	48.35	0.50	V	48.85	74	25.15	PK
4960	34.98	0.50	V	35.48	54	18.52	AV
7440	49.20	8.95	V	58.15	74	15.85	PK
7440	36.12	8.95	V	45.07	54	8.93	AV
4960	48.65	0.50	H	49.15	74	24.85	PK
4960	34.84	0.50	H	35.34	54	18.66	AV
7440	49.84	8.95	H	58.79	74	15.21	PK
7440	36.20	8.95	H	45.15	54	8.85	AV

Operation Mode: CH High(8DPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4960	48.45	0.50	V	48.95	74	25.05	PK
4960	34.95	0.50	V	35.45	54	18.55	AV
7440	49.21	8.95	V	58.16	74	15.84	PK
7440	35.99	8.95	V	44.94	54	9.06	AV
4960	48.48	0.50	H	48.98	74	25.02	PK
4960	34.84	0.50	H	35.34	54	18.66	AV
7440	49.74	8.95	H	58.69	74	15.31	PK
7440	36.28	8.95	H	45.23	54	8.77	AV

Operation Mode: CH High ($\pi/4$ DQPSK)

Frequency [MHz]	Reading DBuV	※A.F+CL-AMP GAIN [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4960	48.28	0.50	V	48.78	74	25.22	PK
4960	34.95	0.50	V	35.45	54	18.55	AV
7440	49.27	8.95	V	58.22	74	15.78	PK
7440	36.10	8.95	V	45.05	54	8.95	AV
4960	48.54	0.50	H	49.04	74	24.96	PK
4960	34.88	0.50	H	35.38	54	18.62	AV
7440	49.75	8.95	H	58.70	74	15.30	PK
7440	36.20	8.95	H	45.15	54	8.85	AV

※ A:F: ANTENNA FACTOR
C:L: CABLE LOSS
AMP GAIN: AMPLIFIER GAIN

Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Total = Reading Value + Antenna Factor + Cable Loss - Amp Gain
5. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds.
We performed using a reduced video BW method was done with the analyzer in linear mode.
6. We have done Normal Mode and EDR Mode test.
7. This test is performed with hopping off.
8. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

8.1.2 RADIATED RESTRICTED BAND EDGES

Test Requirements and limit, §15.247(d), §15.205, §15.209

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Stand alone

Operation Mode	Normal(GFSK)
Operating Frequency	2402 MHz
Channel No	CH 0

Frequency [MHz]	Reading dBuV	※A.F+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	25.19	33.90	H	59.09	74	14.91	PK
2390.0	11.69	33.90	H	45.59	54	8.41	AV
2390.0	24.82	33.90	V	58.72	74	15.28	PK
2390.0	11.81	33.90	V	45.71	54	8.29	AV

Operation Mode	EDR(8DPSK)
Operating Frequency	2402 MHz
Channel No	CH 0

Frequency [MHz]	Reading dBuV	※A.F+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	24.50	33.90	H	58.40	74	15.60	PK
2390.0	11.71	33.90	H	45.61	54	8.39	AV
2390.0	24.94	33.90	V	58.84	74	15.16	PK
2390.0	11.71	33.90	V	45.61	54	8.39	AV



Operation Mode EDR($\pi/4$ DQPSK)
 Operating Frequency 2402 MHz
 Channel No CH 0

Frequency [MHz]	Reading dBuV	※A.F+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	24.63	33.90	H	58.53	74	15.47	PK
2390.0	11.70	33.90	H	45.60	54	8.40	AV
2390.0	25.90	33.90	V	59.80	74	14.20	PK
2390.0	11.68	33.90	V	45.58	54	8.42	AV

※ A.F: ANTENNA FACTOR
 C.L: CABLE LOSS

Notes:

- 1.. Frequency range of measurement = 2310 MHz ~ 2390 MHz
2. Total = Fundamental Reading Value + Antenna Factor + Cable Loss
3. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds.
 We performed using a reduced video BW method was done with the analyzer in linear mode.
4. We have done Normal Mode and EDR Mode.
5. This test is performed with hopping off.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna



Operation Mode Normal(GFSK)
 Operating Frequency 2480 MHz
 Channel No CH 78

Frequency [MHz]	Reading dBuV	* A.F.+CL [dB]	Ant. Pol. [H/V]	Duty Cycle Correction [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2483.5	34.99	33.99	H	0	68.98	74	5.02	PK
2483.5	32.02	33.99	H	-24.76	41.25	54	12.75	AV
2483.5	32.03	33.99	V	0	66.02	74	7.98	PK
2483.5	28.83	33.99	V	-24.76	38.06	54	15.94	AV

Operation Mode EDR(8DPSK)
 Operating Frequency 2480 MHz
 Channel No CH 78

Frequency [MHz]	Reading dBuV	* A.F.+CL [dB]	Ant. Pol. [H/V]	Duty Cycle Correction [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2483.5	33.91	33.99	H	0	67.90	74	6.10	PK
2483.5	29.37	33.99	H	-24.76	38.60	54	15.40	AV
2483.5	30.45	33.99	V	0	64.44	74	9.56	PK
2483.5	25.42	33.99	V	-24.76	34.65	54	19.35	AV

Operation Mode	EDR($\pi/4$ DQPSK)
Operating Frequency	2480 MHz
Channel No	CH 78

Frequency [MHz]	*Fund. Reading dBuV	※ A.F.+CL [dB]	Ant. Pol. [H/V]	Duty Cycle Correction [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2483.5	33.79	33.99	H	0	67.78	74	6.22	PK
2483.5	29.32	33.99	H	-24.76	38.55	54	15.45	AV
2483.5	30.47	33.99	V	0	64.46	74	9.54	PK
2483.5	25.69	33.99	V	-24.76	34.92	54	19.08	AV

※ A:F: ANTENNA FACTOR
C:L: CABLE LOSS
AMP GAIN: AMPLIFIER GAIN

Notes:

- Frequency range of measurement = 2483.5 MHz ~ 2500 MHz
- Total = Fundamental Reading Value + Antenna Factor + Cable Loss – Delta Value + Duty Cycle Correction Factor
- Spectrum setting:
 - Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds.
We performed using a reduced video BW method was done with the analyzer in linear mode.
- FYI : Duty Cycle Correction Factor (79 channel hopping)
 - Time to cycle through all channels= $\Delta t = \tau$ [ms] x 79 channels = 228.468 ms, where τ = pulse width
 - $100 \text{ ms} / \Delta t$ [ms] = $H \rightarrow$ Round up to next highest integer, $H' = 1$
 - Worst Case Dwell Time = τ [ms] x $H' = 2.892$ ms
 - Duty Cycle Correction = $20\log(\text{Worst Case Dwell Time} / 100\text{ms})$ dB = -30.776 dB
- Duty Cycle Correction Factor(AFH mode – minimum channel number case - 20 channels)
 - Time to cycle through all channels= $\Delta t = \tau$ [ms] x 20 channels = 57.84 ms, where τ = pulse width
 - $100 \text{ ms} / \Delta t$ [ms] = $H \rightarrow$ Round up to next highest integer, $H' = 2$
 - Worst Case Dwell Time = τ [ms] x $H' = 5.784$ ms
 - Duty Cycle Correction(AFH) = $20\log(\text{Worst Case Dwell Time} / 100\text{ms})$ dB = -24.7554 dB
 - We applied DCCF in the test result which hopping channel number is 20.
- We have done Normal Mode, EDR Mode.
- This test is performed with hopping off.
- We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

FCC PT.15.247 TEST REPORT	FCC Class II Permissive Change REPORT		www.hct.co.kr
Test Report No. HCTR1308FR07-1	Date of Issue: August 09, 2013	EUT Type: GSM/WCDMA/CDMA/LTE Phone Bluetooth, WLAN and NFC	FCC ID: ZNFVS980

With Wireless Charger

Operation Mode Normal(GFSK)
 Operating Frequency 2402 MHz
 Channel No CH 0

Frequency [MHz]	Reading dBuV	※A.F+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	24.78	33.90	H	58.68	74	15.32	PK
2390.0	11.42	33.90	H	45.32	54	8.68	AV
2390.0	24.65	33.90	V	58.55	74	15.45	PK
2390.0	11.40	33.90	V	45.30	54	8.70	AV

Operation Mode EDR(8DPSK)
 Operating Frequency 2402 MHz
 Channel No CH 0

Frequency [MHz]	Reading dBuV	※A.F+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	24.48	33.90	H	58.38	74	15.62	PK
2390.0	11.65	33.90	H	45.55	54	8.45	AV
2390.0	24.52	33.90	V	58.42	74	15.58	PK
2390.0	11.69	33.90	V	45.59	54	8.41	AV

Operation Mode EDR($\pi/4$ DQPSK)
 Operating Frequency 2402 MHz
 Channel No CH 0

Frequency [MHz]	Reading dBuV	※A.F+CL [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2390.0	24.58	33.90	H	58.48	74	15.52	PK
2390.0	11.63	33.90	H	45.53	54	8.47	AV
2390.0	24.55	33.90	V	58.45	74	15.55	PK
2390.0	11.65	33.90	V	45.55	54	8.45	AV

※ A.F: ANTENNA FACTOR
 C.L: CABLE LOSS

Notes:

- 1.. Frequency range of measurement = 2310 MHz ~ 2390 MHz
2. Total = Fundamental Reading Value + Antenna Factor + Cable Loss
3. Spectrum setting:
 - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds.
 We performed using a reduced video BW method was done with the analyzer in linear mode.
4. We have done Normal Mode and EDR Mode.
5. This test is performed with hopping off.
6. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna



Operation Mode Normal(GFSK)
 Operating Frequency 2480 MHz
 Channel No CH 78

Frequency [MHz]	Reading dBuV	* A.F.+CL [dB]	Ant. Pol. [H/V]	Duty Cycle Correction [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2483.5	34.60	33.99	H	0	68.59	74	5.41	PK
2483.5	31.87	33.99	H	-24.76	41.10	54	12.90	AV
2483.5	30.86	33.99	V	0	64.85	74	9.15	PK
2483.5	26.60	33.99	V	-24.76	35.83	54	18.17	AV

Operation Mode EDR(8DPSK)
 Operating Frequency 2480 MHz
 Channel No CH 78

Frequency [MHz]	Reading dBuV	* A.F.+CL [dB]	Ant. Pol. [H/V]	Duty Cycle Correction [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2483.5	33.65	33.99	H	0	67.64	74	6.36	PK
2483.5	29.25	33.99	H	-24.76	38.48	54	15.52	AV
2483.5	32.59	33.99	V	0	66.58	74	7.42	PK
2483.5	28.87	33.99	V	-24.76	38.10	54	15.90	AV

Operation Mode EDR(π /4DQPSK)
 Operating Frequency 2480 MHz
 Channel No CH 78

Frequency [MHz]	*Fund. Reading dBuV	※ A.F.+CL [dB]	Ant. Pol. [H/V]	Duty Cycle Correction [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2483.5	33.45	33.99	H	0	67.44	74	6.56	PK
2483.5	29.01	33.99	H	-24.76	38.24	54	15.76	AV
2483.5	32.87	33.99	V	0	66.86	74	7.14	PK
2483.5	28.65	33.99	V	-24.76	37.88	54	16.12	AV

※ A:F: ANTENNA FACTOR
 C:L: CABLE LOSS
 AMP GAIN: AMPLIFIER GAIN

Notes:

- Frequency range of measurement = 2483.5 MHz ~ 2500 MHz
- Total = Fundamental Reading Value + Antenna Factor + Cable Loss – Delta Value + Duty Cycle Correction Factor
- Spectrum setting:
 - Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
 - AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 kHz $\geq 1/\tau$ Hz, where τ = pulse width in seconds.
 We performed using a reduced video BW method was done with the analyzer in linear mode.
- FYI : Duty Cycle Correction Factor (79 channel hopping)
 - Time to cycle through all channels= $\Delta t = \tau$ [ms] x 79 channels = 228.468 ms, where τ = pulse width
 - $100 \text{ ms} / \Delta t$ [ms] = $H \rightarrow$ Round up to next highest integer, $H' = 1$
 - Worst Case Dwell Time = τ [ms] x $H' = 2.892$ ms
 - Duty Cycle Correction = $20\log(\text{Worst Case Dwell Time} / 100\text{ms})$ dB = -30.776 dB
- Duty Cycle Correction Factor(AFH mode – minimum channel number case - 20 channels)
 - Time to cycle through all channels= $\Delta t = \tau$ [ms] x 20 channels = 57.84 ms, where τ = pulse width
 - $100 \text{ ms} / \Delta t$ [ms] = $H \rightarrow$ Round up to next highest integer, $H' = 2$
 - Worst Case Dwell Time = τ [ms] x $H' = 5.784$ ms
 - Duty Cycle Correction(AFH) = $20\log(\text{Worst Case Dwell Time} / 100\text{ms})$ dB = -24.7554 dB
 - We applied DCCF in the test result which hopping channel number is 20.
- We have done Normal Mode, EDR Mode.
- This test is performed with hopping off.
- We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

9. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Calibration Interval	Calibration Due	Serial No.
Rohde & Schwarz	ENV216/ LISN	Annual	02/06/2014	100073
Schwarzbeck	VULB 9160/ TRILOG Antenna	Biennial	12/17/2014	3150
Rohde & Schwarz	ESI 40 / EMI TEST RECEIVER	Annual	04/16/2014	831564103
Agilent	E4440A/ Spectrum Analyzer	Annual	04/25/2014	US45303008
Agilent	N9020A/ SIGNAL ANALYZER	Annual	05/14/2014	MY51110063
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	SCU-18/ Signal Conditioning Unit	Annual	09/11/2013	10094
MITEQ	AMF-6B-180265-35-10P / POWER AMP	Annual	04/16/2014	667624
CERNEX	CBL26405040 / POWER AMP	Annual	04/16/2014	19660
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	10/17/2013	937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	Biennial	10/30/2014	BBHA9170124
Rohde & Schwarz	FSP / Spectrum Analyzer	Annual	02/08/2014	839117/011
Agilent	E4416A /Power Meter	Annual	11/07/2013	GB41291412
Agilent	E9327A /POWER SENSOR	Annual	04/16/2014	MY4442009
Wainwright Instrument	WHF3.0/18G-10EF / High Pass Filter	Annual	02/08/2014	F6
Wainwright Instrument	WHNX6.0/26.5G-6SS / High Pass Filter	Annual	04/16/2014	1
Wainwright Instrument	WHNX7.0/18G-8SS / High Pass Filter	Annual	04/16/2014	29
Wainwright Instrument	WRCJ2400/2483.5-2370/2520-60/14SS / Band Reject Filter	Annual	03/19/2014	1
Hewlett Packard	11636B/Power Divider	Annual	11/07/2013	11377
Agilent	87300B/Directional Coupler	Annual	12/24/2013	3116A03621
Hewlett Packard	11667B / Power Splitter	Annual	05/29/2014	05001
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	11/07/2013	3110117
ITECH	IT6720 / DC POWER SUPPLY	Annual	11/07/2013	010002156287001199
TESCOM	TC-3000C / BLUETOOTH TESTER	Annual	04/24/2014	3000C000276
Rohde & Schwarz	CBT / BLUETOOTH TESTER	Annual	04/25/2014	100422
EMCO	6502.LOOP ANTENNA	Biennial	01/11/2014	9009-2536
CERNEX	CBLU1183540 / POWER AMP	Annual	07/24/2014	21691
Agilent	8493C / Attenuator(10 dB)	Annual	07/24/2014	76649
WEINSCHL	2-3 / Attenuator(3 dB)	Annual	11/07/2013	BR0617

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