

TEST REPORT



DT&C Co., Ltd.

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Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2011-0355

2. Customer

• Name : BLUEBIRD INC.

• Address : 3F, 115, Irwon-ro, Gangnam-gu, Seoul, South Korea

3. Use of Report : FCC Original Grant

4. Product Name / Model Name : Hybrid Full-Touch Handheld Computer / HF550

FCC ID : SS4HF550

5. FCC Regulation(s): Part 2, 22, 24, 27

Test Method Used : KDB971168 D01v03r01, ANSI/TIA-603-E-2016, ANSI C63.26-2015

6. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

7. Testing Environment : Refer to appended test report.

8. Test Result : Refer to the attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Affirmation	Tested by	 (Signature)	Reviewed by	 (Signature)
	Name : InHee Bae		Name : JaeJin Lee	

2020 . 11 . 19 .

DT&C Co., Ltd.

Not abided by KS Q ISO / IEC 17025 and KOLAS accreditation.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2011-0355	Nov. 19, 2020	Initial issue	InHee Bae	JaeJin Lee

Table of Contents

1. GENERAL INFORMATION	4
2. INTRODUCTION	7
2.1 EUT DESCRIPTION	7
2.2. TESTING ENVIRONMENT	7
2.3. MEASURING INSTRUMENT CALIBRATION	7
2.4. MEASUREMENT UNCERTAINTY	7
2.5. TEST FACILITY	7
3. DESCRIPTION OF TESTS	8
3.1 ERP & EIRP (Effective Radiated Power & Equivalent Isotropic Radiated Power)	8
3.2 UNDESIRABLE EMISSIONS	9
4. LIST OF TEST EQUIPMENT	10
5. SUMMARY OF TEST RESULTS	11
6. SAMPLE CALCULATION	12
7. TEST DATA	13
7.1 ERP & EIRP	13
7.1.1 LTE Band 71	13
7.1.2 LTE Band 12	14
7.1.3 LTE Band 5	15
7.1.4 LTE Band 13	16
7.1.5 LTE Band 66(4)	17
7.1.6 LTE Band 2	18
7.2 UNDESIRABLE EMISSIONS (Radiated)	19
7.2.1 LTE Band 71	19
7.2.2 LTE Band 12	19
7.2.3 LTE Band 5	20
7.2.4 LTE Band 13	21
7.2.5 LTE Band 66(4)	22
7.2.6 LTE Band 2	23

1. GENERAL INFORMATION

Applicant Name (FCC) : BLUEBIRD INC.

Address (FCC) : 3F, 115, Irwon-ro, Gangnam-gu, Seoul, South Korea

FCC ID : SS4HF550

FCC Classification : PCS Licensed Transmitter held to ear(PCE)

EUT : Hybrid Full-Touch Handheld Computer

Hardware Version : Rev0.5

Software Version : R1.01

Serial Number : HF550A4LAASTIBA003

Model Name : HF550

Add Model Name : NA

Supplying power : DC 3.85 V

Antenna Type : Internal Antenna

Mode	TX Frequency (MHz)	Modulation	ERP	
			Max power (dBm)	Max power (W)
LTE Band 71	673 ~ 688	QPSK	16.16	0.041
LTE Band 71	673 ~ 688	16QAM	14.97	0.031
LTE Band 71	670.5 ~ 690.5	QPSK	15.91	0.039
LTE Band 71	670.5 ~ 690.5	16QAM	14.77	0.030
LTE Band 71	668 ~ 693	QPSK	15.36	0.034
LTE Band 71	668 ~ 693	16QAM	14.51	0.028
LTE Band 71	665.5 ~ 695.5	QPSK	15.35	0.034
LTE Band 71	665.5 ~ 695.5	16QAM	14.40	0.028
LTE Band 12	704 ~ 711	QPSK	17.70	0.059
LTE Band 12	704 ~ 711	16QAM	16.59	0.046
LTE Band 12	701.5 ~ 713.5	QPSK	17.42	0.055
LTE Band 12	701.5 ~ 713.5	16QAM	16.46	0.044
LTE Band 12	700.5 ~ 714.5	QPSK	17.33	0.054
LTE Band 12	700.5 ~ 714.5	16QAM	16.21	0.042
LTE Band 12	699.7 ~ 715.3	QPSK	17.30	0.054
LTE Band 12	699.7 ~ 715.3	16QAM	16.19	0.042
LTE Band 13	782 ~ 782	QPSK	18.07	0.064
LTE Band 13	782 ~ 782	16QAM	16.79	0.048
LTE Band 13	779.5 ~ 784.5	QPSK	18.35	0.068
LTE Band 13	779.5 ~ 784.5	16QAM	17.22	0.053
LTE Band 5	829 ~ 844	QPSK	21.00	0.126
LTE Band 5	829 ~ 844	16QAM	19.84	0.096
LTE Band 5	826.5 ~ 846.5	QPSK	21.16	0.131
LTE Band 5	826.5 ~ 846.5	16QAM	20.03	0.101
LTE Band 5	825.5 ~ 847.5	QPSK	21.00	0.126
LTE Band 5	825.5 ~ 847.5	16QAM	19.97	0.099
LTE Band 5	824.7 ~ 848.3	QPSK	20.88	0.122
LTE Band 5	824.7 ~ 848.3	16QAM	19.96	0.099

Mode	TX Frequency (MHz)	Modulation	EIRP	
			Max power (dBm)	Max power (W)
LTE Band 66, 4	1 720 ~ 1770	QPSK	21.96	0.157
LTE Band 66, 4	1 720 ~ 1770	16QAM	20.91	0.123
LTE Band 66, 4	1 717.5 ~ 1772.5	QPSK	21.86	0.153
LTE Band 66, 4	1 717.5 ~ 1772.5	16QAM	20.89	0.123
LTE Band 66, 4	1 715 ~ 1775	QPSK	22.20	0.166
LTE Band 66, 4	1 715 ~ 1775	16QAM	21.02	0.126
LTE Band 66, 4	1 712.5 ~ 1777.5	QPSK	22.12	0.163
LTE Band 66, 4	1 712.5 ~ 1777.5	16QAM	20.98	0.125
LTE Band 66, 4	1 711.5 ~ 1778.5	QPSK	22.01	0.159
LTE Band 66, 4	1 711.5 ~ 1778.5	16QAM	20.87	0.122
LTE Band 66, 4	1 710.7 ~ 1779.3	QPSK	21.90	0.155
LTE Band 66, 4	1 710.7 ~ 1779.3	16QAM	20.76	0.119
LTE Band 2	1 860 ~ 1900	QPSK	24.63	0.290
LTE Band 2	1 860 ~ 1900	16QAM	23.44	0.221
LTE Band 2	1 857.5 ~ 1902.5	QPSK	24.59	0.288
LTE Band 2	1 857.5 ~ 1902.5	16QAM	23.68	0.233
LTE Band 2	1 855 ~ 1905	QPSK	24.84	0.305
LTE Band 2	1 855 ~ 1905	16QAM	23.71	0.235
LTE Band 2	1 852.5 ~ 1907.5	QPSK	24.54	0.284
LTE Band 2	1 852.5 ~ 1907.5	16QAM	23.63	0.231
LTE Band 2	1 851.5 ~ 1908.5	QPSK	24.46	0.279
LTE Band 2	1 851.5 ~ 1908.5	16QAM	23.33	0.215
LTE Band 2	1 850.7 ~ 1909.3	QPSK	24.36	0.273
LTE Band 2	1 850.7 ~ 1909.3	16QAM	23.28	0.213

2. INTRODUCTION

2.1 EUT DESCRIPTION

This EUT contains the following capabilities:

WCDMA850/1700/1900, Multi-band LTE, 802.11b/g/n WLAN(2.4GHz), 802.11a/n/ac WLAN(5GHz), Bluetooth(BDR, EDR, LE), NFC.

2.2. TESTING ENVIRONMENT

Ambient Condition	
▪ Temperature	+21 °C ~ +24 °C
▪ Relative Humidity	41 % ~ 46 %

2.3. MEASURING 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 equipment, which is traceable to recognized national standards.

2.4. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95 % level of confidence.

Parameter	Measurement uncertainty
Radiated Disturbance (Below 1 GHz)	4.9 dB (The confidence level is about 95 %, $k = 2$)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.1 dB (The confidence level is about 95 %, $k = 2$)
Radiated Disturbance (Above 18 GHz)	5.3 dB (The confidence level is about 95 %, $k = 2$)

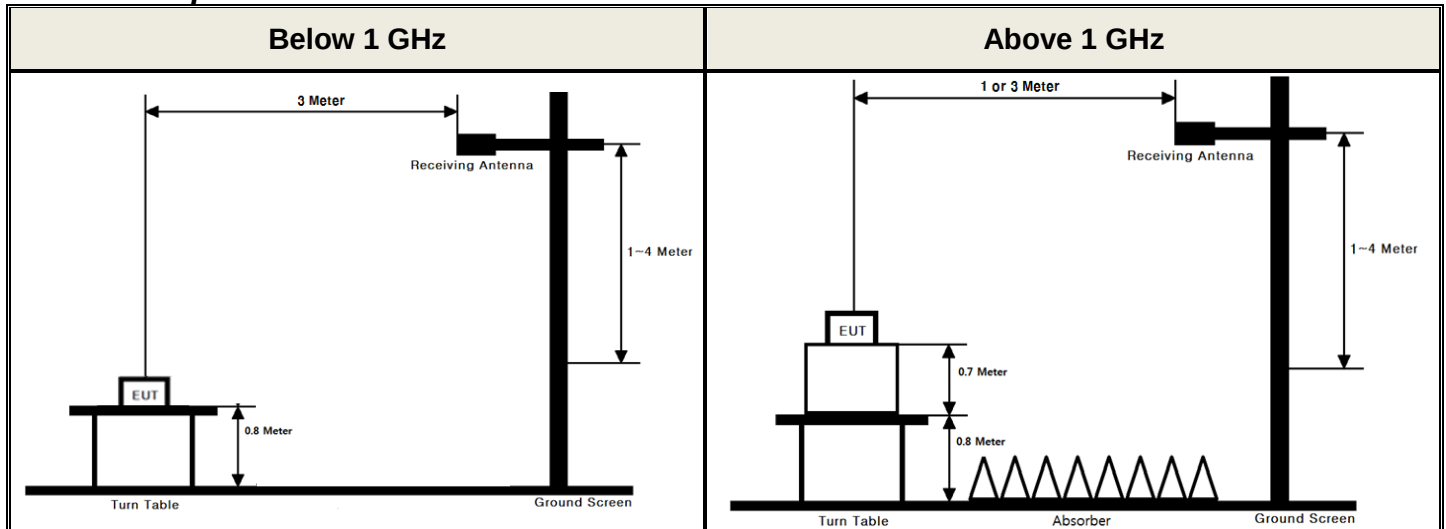
2.5. TEST FACILITY

DT&C Co., Ltd.		
The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042.		
The test site comply with the requirements of § 2.948 according to ANSI 63.4-2014.		
- FCC & IC MRA Designation No. : KR0034		
- ISED #: 5740A		
www.dtnet.net		
Telephone	:	+ 82-31-321-2664
FAX	:	+ 82-31-321-1664

3. DESCRIPTION OF TESTS

3.1 ERP & EIRP (Effective Radiated Power & Equivalent Isotropic Radiated Power)

Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8 or 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

Test Procedure

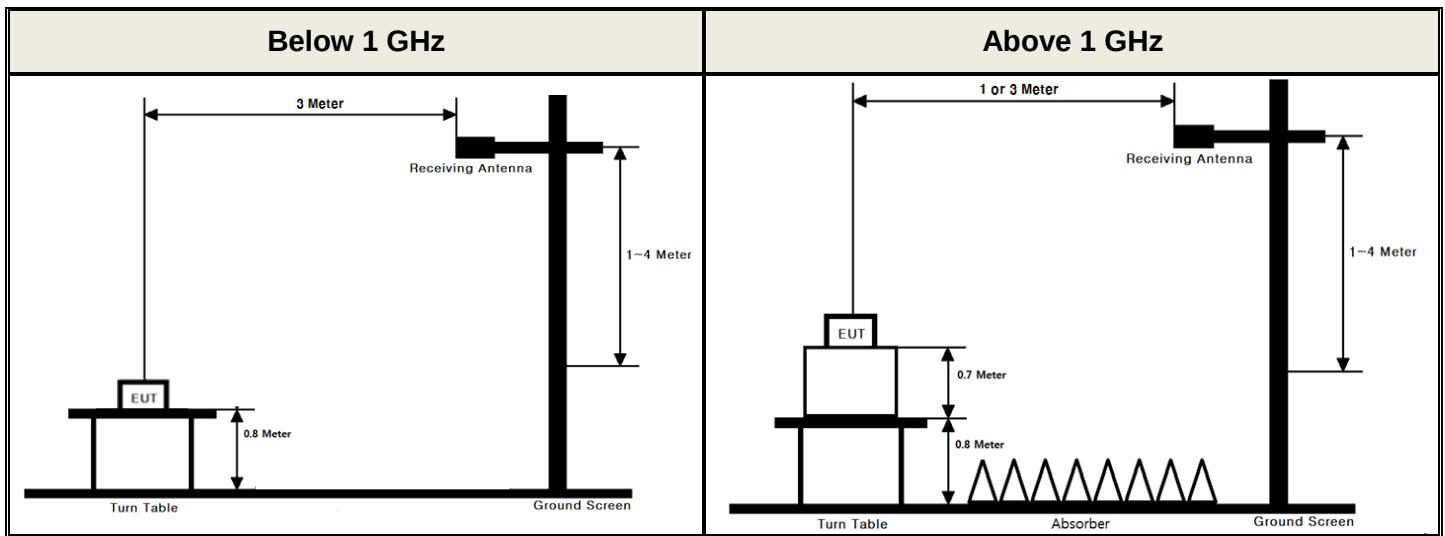
- **ANSI/TIA-603-E-2016 - Section 2.2.17**
- **KDB971168 D01v03 - Section 5.2.2**
- **ANSI C63.26-2015 – Section 5.2.4.4.1**

Test setting

1. Set span to 2 x to 3 x the OBW.
2. Set RBW = 1 % to 5 % of the OBW.
3. Set VBW $\geq$ 3 x RBW.
4. Set number of points in sweep $\geq$ 2 $\times$ span / RBW.
5. Sweep time:
 - 1) Set = auto-couple, or
 - 2) Set $\geq$ $[10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6. Detector = power averaging (rms).
7. If the EUT can be configured to transmit continuously, then set the trigger to free run.
8. If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
9. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.

3.2 UNDESIRABLE EMISSIONS

Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8 or 1.5 meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1 GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

Test Procedure

- **ANSI/TIA-603-E-2016 - Section 2.2.12**
- **KDB971168 D01v03 - Section 5.8**
- **ANSI C63.26-2015 – Section 5.5**

Test setting

1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW $\geq 3 \times$ RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point $\geq 2 \times$ span / RBW
5. The trace was allowed to stabilize

The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer. For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.

For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration. This measurement was performed with the EUT oriented in 3 orthogonal axis.

4. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal. Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	20/02/26	21/02/26	MY46471251
DC power supply	SM techno	SDP30-5D	20/06/24	21/06/24	305DNF079
Multimeter	FLUKE	17B+	19/12/16	20/12/16	36390701WS
Radio Communication Analyzer	Anritus	MT8820C	20/06/24	21/06/24	6201127429
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-2
Signal Generator	Rohde Schwarz	SMBV100A	19/12/16	20/12/16	255571
Signal Generator	ANRITSU	MG3695C	19/12/16	20/12/16	173501
Loop Antenna	ETS-Lindgren	6502	19/09/18	21/09/18	00226186
Bilog Antenna	Schwarzbeck	VULB 9160	19/04/23	21/04/23	9160-3362
Dipole Antenna	A.H.Systems Inc.	FCC-4	19/03/26	21/03/26	710A
Dipole Antenna	Schwarzbeck	UHA9105	20/04/10	22/04/10	2262
HORN ANT	ETS	3117	20/04/24	21/04/24	00140394
HORN ANT	ETS	3117	20/03/26	21/03/26	00152145
HORN ANT	A.H.Systems	SAS-574	20/06/24	21/06/24	154
HORN ANT	A.H.Systems	SAS-574	20/06/24	21/06/24	155
PreAmplifier	H.P	8447D	19/12/16	20/12/16	2944A07774
PreAmplifier	Agilent	8449B	20/06/24	21/06/24	3008A02108
Amplifier	EMPOWER	BBS3Q7ELU	20/06/24	21/06/24	1020
PreAmplifier	RFBAY.Inc	MPA-40-40	19/12/16	20/12/16	21151801
High-pass filter	Wainwright	WHKX12-935-1000-15000-40SS	20/06/24	21/06/24	7
High-pass filter	Wainwright	WHKX12-2580-3000-18000-80SS	20/06/24	21/06/24	3
Cable	DTNC	Cable	20/01/16	21/01/16	M-01
Cable	DTNC	Cable	20/01/16	21/01/16	M-02
Cable	Junkosha	MWX315	20/01/16	21/01/16	M-05
Cable	Junkosha	MWX221	20/01/16	21/01/16	M-06
Test Software	tsj	Radiated Emission Measurement	NA	NA	Version 2.00.0177

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.

Note2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.

5. SUMMARY OF TEST RESULTS

FCC Part	Section(s)	Test Description	Test Limit	Test Condition	Status Note 1
2.1046	-	Conducted Output Power	N/A	Conducted	NA Note 2
2.1049	-	Occupied Bandwidth	N/A		NA Note 2
24.232(d) 27.50(d.5)	-	Peak to Average Ratio	< 13 dB		NA Note 2
2.1051 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	-	Band Edge / Conducted Spurious Emissions	> 43 + 10log ₁₀ (P) dB at Band edge and for all out-of-band emissions		NA Note 2
27.53(c.4)	-	Undesirable missions in 763 ~ 775MHz & 793 ~ 805MHz	< 65 + 10 log ₁₀ (P) dB		NA Note 2
2.1055 22.355 24.235 27.54	-	Frequency Stability	< 2.5 ppm (Part 22) Fundamental emissions must stay within Authorized frequency block (Part 24, 27)		NA Note 2
27.50(b.10) 27.50(c.10)	-	Radiated Output Power (B71, 13, 12)	< 3 Watts max. ERP (FCC &IC)	Radiated	C
22.913(a.5)	-	Radiated Output Power (B5)	< 7 Watts max. ERP (FCC) < 11.5 Watts max. EIRP (IC)		C
27.50(d.4)	-	Radiated Output Power (B66, 4)	< 1 Watts max. EIRP (FCC &IC)		C
24.232(c)	-	Radiated Output Power(B2)	< 2 Watts max. EIRP (FCC &IC)		C
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	-	Undesirable Emissions	> 43 + 10log ₁₀ (P) dB for all out-of-band emissions		C
27.53(f)	-	Undesirable Emissions in 1559 ~ 1610MHz	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions of less than 700 Hz bandwidth)		C

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: These test items were not performed because this device uses the granted module.

(FCC ID: XMR201808EC25AF)

Please refer to the test report of the granted module

6. SAMPLE CALCULATION

A. For substitution method

- 1) The EUT was placed on a turntable with 0.8 meter height for frequency below 1 GHz and 1.5 meter height for frequency above 1 GHz respectively above ground.
- 2) The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
- 3) During the test, the turn table is rotated until the maximum signal is found.
- 4) Record the field strength meter's level. (ex. Spectrum reading level is -8.5 dBm)
- 5) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 6) Increase the signal generator output till the field strength meter's level is equal to the item (4).
(ex. Signal generator level is -18.04 dBm)
- 7) The gain of the cable and amplifier between the signal generator and terminals of substituted antenna is 46.92 dB at test frequency.
- 8) Record the level at substituted antenna terminal. (ex. 28.88 dBm)
- 9) The result is calculated as below;

$$\text{EIRP(dBm)} = \text{LEVLE@ANTENNA TERMINAL} + \text{TX Antenna Gain (dBi)}$$

$$\text{ERP(dBm)} = \text{LEVLE@ANTENNA TERMINAL} + \text{TX Antenna Gain (dBd)}$$

$$\text{Where, TX Antenna Gain (dBd)} = \text{TX Antenna Gain (dBi)} - 2.15 \text{ dB}$$

7. TEST DATA

7.1 ERP & EIRP

- Test Notes

- 1) This is device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the below table.

7.1.1 LTE Band 71

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
20	673	QPSK	1/50	H	16.06	-0.60	15.46	0.035
		16QAM	1/50	H	15.03	-0.60	14.43	0.028
	688	QPSK	1/0	H	16.79	-0.63	16.16	0.041
		16QAM	1/0	H	15.60	-0.63	14.97	0.031
15	670.5	QPSK	1/36	H	15.79	-0.59	15.20	0.033
		16QAM	1/36	H	14.66	-0.59	14.07	0.026
	680.5	QPSK	1/36	H	15.67	-0.61	15.06	0.032
		16QAM	1/36	H	14.56	-0.61	13.95	0.025
	690.5	QPSK	1/36	H	16.55	-0.64	15.91	0.039
		16QAM	1/36	H	15.41	-0.64	14.77	0.030
10	668	QPSK	1/49	H	15.43	-0.59	14.84	0.030
		16QAM	1/49	H	14.22	-0.59	13.63	0.023
	680.5	QPSK	1/25	H	15.65	-0.61	15.04	0.032
		16QAM	1/25	H	14.61	-0.61	14.00	0.025
	693	QPSK	1/25	H	16.01	-0.65	15.36	0.034
		16QAM	1/25	H	15.16	-0.65	14.51	0.028
5	665.5	QPSK	1/12	H	15.64	-0.58	15.06	0.032
		16QAM	1/12	H	14.58	-0.58	14.00	0.025
	680.5	QPSK	1/12	H	15.60	-0.61	14.99	0.032
		16QAM	1/12	H	14.53	-0.61	13.92	0.025
	695.5	QPSK	1/12	H	16.00	-0.65	15.35	0.034
		16QAM	1/12	H	15.05	-0.65	14.40	0.028

7.1.2 LTE Band 12

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
10	704	QPSK	1/25	V	18.35	-0.65	17.70	0.059
		16QAM	1/25	V	17.24	-0.65	16.59	0.046
	711	QPSK	1/0	V	18.12	-0.63	17.49	0.056
		16QAM	1/0	V	17.17	-0.63	16.54	0.045
5	701.5	QPSK	1/12	V	17.91	-0.66	17.25	0.053
		16QAM	1/12	V	16.80	-0.66	16.14	0.041
	707.5	QPSK	1/0	V	18.06	-0.64	17.42	0.055
		16QAM	1/0	V	17.10	-0.64	16.46	0.044
	713.5	QPSK	1/0	V	16.76	-0.62	16.14	0.041
		16QAM	1/0	V	15.86	-0.62	15.24	0.033
3	700.5	QPSK	1/0	V	17.70	-0.66	17.04	0.051
		16QAM	1/0	V	16.58	-0.66	15.92	0.039
	707.5	QPSK	1/0	V	17.97	-0.64	17.33	0.054
		16QAM	1/0	V	16.85	-0.64	16.21	0.042
	714.5	QPSK	1/0	V	17.27	-0.62	16.65	0.046
		16QAM	1/0	V	16.41	-0.62	15.79	0.038
1.4	699.7	QPSK	1/0	V	17.60	-0.66	16.94	0.049
		16QAM	1/0	V	16.48	-0.66	15.82	0.038
	707.5	QPSK	1/0	V	17.94	-0.64	17.30	0.054
		16QAM	1/0	V	16.83	-0.64	16.19	0.042
	715.3	QPSK	1/0	V	17.16	-0.62	16.54	0.045
		16QAM	1/0	V	16.43	-0.62	15.81	0.038

7.1.3 LTE Band 5

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
10	829	QPSK	1/25	H	21.67	-0.67	21.00	0.126
		16QAM	1/25	H	20.51	-0.67	19.84	0.096
	836.5	QPSK	1/25	H	21.62	-0.74	20.88	0.122
		16QAM	1/25	H	20.53	-0.74	19.79	0.095
	844	QPSK	1/0	H	21.55	-0.81	20.74	0.119
		16QAM	1/0	H	20.40	-0.81	19.59	0.091
5	826.5	QPSK	1/12	H	21.50	-0.65	20.85	0.122
		16QAM	1/12	H	20.38	-0.65	19.73	0.094
	836.5	QPSK	1/12	H	21.90	-0.74	21.16	0.131
		16QAM	1/12	H	20.77	-0.74	20.03	0.101
	846.5	QPSK	1/12	H	19.81	-0.83	18.98	0.079
		16QAM	1/12	H	18.93	-0.83	18.10	0.065
3	825.5	QPSK	1/7	H	21.29	-0.64	20.65	0.116
		16QAM	1/7	H	20.17	-0.64	19.53	0.090
	836.5	QPSK	1/7	H	21.74	-0.74	21.00	0.126
		16QAM	1/7	H	20.71	-0.74	19.97	0.099
	847.5	QPSK	1/7	H	20.33	-0.84	19.49	0.089
		16QAM	1/7	H	19.26	-0.84	18.42	0.070
1.4	824.7	QPSK	1/2	H	21.13	-0.63	20.50	0.112
		16QAM	1/2	H	20.00	-0.63	19.37	0.086
	836.5	QPSK	1/2	H	21.62	-0.74	20.88	0.122
		16QAM	1/2	H	20.70	-0.74	19.96	0.099
	848.3	QPSK	1/2	H	20.53	-0.85	19.68	0.093
		16QAM	1/2	H	19.66	-0.85	18.81	0.076

7.1.4 LTE Band 13

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBd)	ERP (dBm)	ERP (W)
10	782	QPSK	1/25	H	18.52	-0.45	18.07	0.064
		16QAM	1/25	H	17.24	-0.45	16.79	0.048
5	779.5	QPSK	1/12	H	18.07	-0.45	17.62	0.058
		16QAM	1/12	H	16.93	-0.45	16.48	0.044
	784.5	QPSK	1/12	H	18.79	-0.44	18.35	0.068
		16QAM	1/12	H	17.66	-0.44	17.22	0.053

7.1.5 LTE Band 66(4)

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm)	EIRP (W)
20	1 720	QPSK	1/50	V	13.75	5.28	19.03	0.080
		16QAM	1/50	V	12.92	5.28	18.20	0.066
	1 745	QPSK	1/50	V	16.38	5.38	21.76	0.150
		16QAM	1/50	V	15.53	5.38	20.91	0.123
	1 770	QPSK	1/50	V	16.76	5.20	21.96	0.157
		16QAM	1/50	V	15.61	5.20	20.81	0.121
15	1 717.5	QPSK	1/36	V	13.50	5.27	18.77	0.075
		16QAM	1/36	V	12.39	5.27	17.66	0.058
	1 745	QPSK	1/36	V	16.48	5.38	21.86	0.153
		16QAM	1/36	V	15.51	5.38	20.89	0.123
	1 772.5	QPSK	1/36	V	16.65	5.18	21.83	0.152
		16QAM	1/36	V	15.52	5.18	20.70	0.117
10	1 715	QPSK	1/25	V	13.27	5.26	18.53	0.071
		16QAM	1/25	V	12.38	5.26	17.64	0.058
	1 745	QPSK	1/25	V	16.82	5.38	22.20	0.166
		16QAM	1/25	V	15.64	5.38	21.02	0.126
	1 775	QPSK	1/25	V	16.65	5.15	21.80	0.151
		16QAM	1/25	V	15.48	5.15	20.63	0.116
5	1 712.5	QPSK	1/12	V	13.09	5.25	18.34	0.068
		16QAM	1/12	V	12.04	5.25	17.29	0.054
	1 745	QPSK	1/12	V	16.74	5.38	22.12	0.163
		16QAM	1/12	V	15.60	5.38	20.98	0.125
	1 777.5	QPSK	1/12	V	16.50	5.13	21.63	0.146
		16QAM	1/12	V	15.53	5.13	20.66	0.116
3	1 711.5	QPSK	1/0	V	13.04	5.25	18.29	0.067
		16QAM	1/0	V	12.07	5.25	17.32	0.054
	1 745	QPSK	1/7	V	16.63	5.38	22.01	0.159
		16QAM	1/7	V	15.49	5.38	20.87	0.122
	1 778.5	QPSK	1/7	V	16.51	5.12	21.63	0.146
		16QAM	1/7	V	15.56	5.12	20.68	0.117
1.4	1 710.7	QPSK	1/2	V	12.91	5.24	18.15	0.065
		16QAM	1/2	V	11.78	5.24	17.02	0.050
	1745	QPSK	1/2	V	16.52	5.38	21.90	0.155
		16QAM	1/2	V	15.38	5.38	20.76	0.119
	1 779.3	QPSK	1/2	V	16.39	5.11	21.50	0.141
		16QAM	1/2	V	15.34	5.11	20.45	0.111

7.1.6 LTE Band 2

Channel Bandwidth (MHz)	Test Frequency (MHz)	Test Mode	RB Size/ Offset	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain (dBi)	EIRP (dBm)	EIRP (W)
20	1 860	QPSK	1/50	H	18.00	4.80	22.80	0.191
		16QAM	1/50	H	16.94	4.80	21.74	0.149
	1 880	QPSK	1/50	H	18.20	4.60	22.80	0.191
		16QAM	1/50	H	17.19	4.60	21.79	0.151
	1 900	QPSK	1/50	H	20.23	4.40	24.63	0.290
		16QAM	1/50	H	19.04	4.40	23.44	0.221
15	1 857.5	QPSK	1/36	H	18.09	4.83	22.92	0.196
		16QAM	1/36	H	17.04	4.83	21.87	0.154
	1 880	QPSK	1/36	H	18.41	4.60	23.01	0.200
		16QAM	1/36	H	17.37	4.60	21.97	0.157
	1 902.5	QPSK	1/36	H	20.18	4.41	24.59	0.288
		16QAM	1/36	H	19.27	4.41	23.68	0.233
10	1 855	QPSK	1/25	H	18.27	4.85	23.12	0.205
		16QAM	1/25	H	17.34	4.85	22.19	0.166
	1 880	QPSK	1/25	H	18.77	4.60	23.37	0.217
		16QAM	1/25	H	17.69	4.60	22.29	0.169
	1 905	QPSK	1/25	H	20.42	4.42	24.84	0.305
		16QAM	1/25	H	19.29	4.42	23.71	0.235
5	1 852.5	QPSK	1/12	H	18.11	4.88	22.99	0.199
		16QAM	1/12	H	17.10	4.88	21.98	0.158
	1 880	QPSK	1/12	H	18.41	4.60	23.01	0.200
		16QAM	1/12	H	17.28	4.60	21.88	0.154
	1 907.5	QPSK	1/12	H	20.11	4.43	24.54	0.284
		16QAM	1/12	H	19.20	4.43	23.63	0.231
3	1 851.5	QPSK	1/7	H	18.06	4.89	22.95	0.197
		16QAM	1/7	H	16.98	4.89	21.87	0.154
	1 880	QPSK	1/7	H	18.22	4.60	22.82	0.191
		16QAM	1/7	H	17.30	4.60	21.90	0.155
	1 908.5	QPSK	1/7	H	20.03	4.43	24.46	0.279
		16QAM	1/7	H	18.90	4.43	23.33	0.215
1.4	1 850.7	QPSK	1/2	H	17.94	4.89	22.83	0.192
		16QAM	1/2	H	16.81	4.89	21.70	0.148
	1 880	QPSK	1/2	H	18.08	4.60	22.68	0.185
		16QAM	1/2	H	16.85	4.60	21.45	0.140
	1 909.3	QPSK	1/2	H	19.92	4.44	24.36	0.273
		16QAM	1/2	H	18.84	4.44	23.28	0.213

7.2 UNDESIRABLE EMISSIONS (Radiated)

- Test Notes

- 1) This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported.
- 2) The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter.
No other spurious and harmonic emissions were reported greater than listed emissions.
- 3) Limit Calculation for Band 2/5/12/13/66(4)/71 = $43 + 10\log_{10}(P[\text{Watts}])$
- 4) Limit Calculation for 1 559 MHz ~ 1 610 MHz in Band 13 = -70 dBW/MHz (equivalent isotropically radiated power for wideband signals)

7.2.1 LTE Band 71

B.W (MHz)	Test Freq. (MHz)	RB Size/Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result (dBm)	Margin (dB)	Limit (dBm)
20	673	1/50	QPSK	1 346.29	V	-52.55	1.35	-51.20	38.20	28.46
			16QAM	1 346.26	V	-52.31	1.35	-50.96	37.96	27.43
	688	1/0	QPSK	1 358.36	V	-51.44	1.62	-49.82	36.82	29.16
			16QAM	1 358.06	V	-51.62	1.61	-50.01	37.01	27.43

7.2.2 LTE Band 12

B.W (MHz)	Test Freq. (MHz)	RB Size/Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result (dBm)	Margin (dB)	Limit (dBm)
10	704	1/25	QPSK	1 408.01	V	-56.53	2.48	-54.05	41.05	30.70
			16QAM	1 407.95	V	-57.29	2.48	-54.81	41.81	29.59
	711	1/0	QPSK	1 413.19	V	-56.50	2.50	-54.00	41.00	30.49
			16QAM	1 412.97	V	-57.22	2.50	-54.72	41.72	29.54

7.2.3 LTE Band 5

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result	Margin	Limit (dBm)
								(dBm)	(dB)	
10	829	1/25	QPSK	1 657.87	H	-57.15	3.98	-53.17	40.17	34.00
				3 312.08	V	-54.34	5.30	-49.04	36.04	
			16QAM	1 658.32	H	-57.10	3.97	-53.13	40.13	32.84
				3 321.39	V	-53.13	5.34	-47.79	34.79	
	836.5	1/25	QPSK	1 673.28	H	-56.35	3.64	-52.71	39.71	33.88
				2 509.69	H	-49.95	3.79	-46.16	33.16	
			16QAM	1 673.23	H	-56.59	3.64	-52.95	39.95	32.79
				2 509.68	H	-51.49	3.79	-47.70	34.70	
	844	1/0	QPSK	1 679.01	H	-55.94	3.51	-52.43	39.43	33.74
				2 529.30	H	-53.66	3.87	-49.79	36.79	
			16QAM	1 679.23	H	-55.69	3.51	-52.18	39.18	32.59
				2 518.52	H	-54.23	3.82	-50.41	37.41	
5	836.5	1/12	QPSK	1 672.82	H	-56.10	3.65	-52.45	39.45	34.16
				2 509.33	H	-49.63	3.79	-45.84	32.84	

7.2.4 LTE Band 13

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBd)	Result (dBm)	Margin (dBc)	Limit (dBm)
10	782	1/25	QPSK	2 346.39	V	-49.42	3.64	-45.78	32.78	31.07
			16QAM	2 346.14	V	-49.76	3.64	-46.12	33.12	29.79
5	784.5	1/12	QPSK	2 353.64	V	-50.73	3.66	-47.07	34.07	31.35

UNDESIRABLE EMISSIONS IN 1 559 MHz ~ 1 610 MHz (LTE Band 13)

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result (dBm)	Margin (dB)	Limit (dBm/MHz)
10	782	1/25	QPSK	1 563.96	V	-57.47	6.41	51.06	11.06	-40.00
			16QAM	1 563.94	V	-57.50	6.41	51.09	11.09	
5	784.5	1/12	QPSK	1 569.14	V	-57.24	6.45	50.79	10.79	
			16QAM	1 568.38	V	-57.22	6.45	50.77	10.77	

7.2.5 LTE Band 66(4)

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result	Margin	Limit (dBm)
								(dBm)	(dB)	
20	1 720	1/50	QPSK	3 437.85	V	-53.98	7.78	-46.20	33.20	32.03
			16QAM	3 440.27	V	-54.74	7.78	-46.96	33.96	31.20
	1 745	1/50	QPSK	3 465.02	V	-53.77	7.83	-45.94	32.94	34.76
			16QAM	3 485.94	V	-55.01	7.87	-47.14	34.14	33.91
	1 770	1/50	QPSK	3 560.90	V	-54.45	8.10	-46.35	33.35	34.96
			16QAM	3 515.29	V	-55.00	7.96	-47.04	34.04	33.81
10	1 745	1/25	QPSK	3 477.59	V	-54.21	7.86	-46.35	33.35	35.20

7.2.6 LTE Band 2

B.W (MHz)	Test Freq. (MHz)	RB Size/ Offset	Test Mode	Freq.(MHz)	Ant Pol (H/V)	Level(dBm) @ Ant Terminal	TX Ant Gain(dBi)	Result (dBm)	Margin (dB)	Limit (dBm)
20	1 860	1/50	QPSK	3 706.50	V	-54.16	8.31	-45.85	32.85	35.80
				5 603.38	V	-52.67	10.79	-41.88	28.88	
		1/50	16QAM	3 696.27	V	-54.32	8.30	-46.02	33.02	34.74
				5 589.57	V	-52.95	10.74	-42.21	29.21	
	1 880	1/50	QPSK	3 772.40	V	-54.06	8.44	-45.62	32.62	35.80
				5 640.19	V	-52.35	10.72	-41.63	28.63	
		1/50	16QAM	3 769.09	V	-54.47	8.44	-46.03	33.03	34.79
				5 653.93	V	-52.19	10.69	-41.50	28.50	
	1 900	1/50	QPSK	3 799.96	V	-53.72	8.50	-45.22	32.22	37.63
				5 700.00	V	-51.32	10.60	-40.72	27.72	
		1/50	16QAM	3 810.55	V	-54.54	8.50	-46.04	33.04	36.44
				5 700.29	V	-52.62	10.60	-42.02	29.02	
10	1 905	1/25	QPSK	3 810.33	V	-52.82	8.50	-44.32	31.32	37.84
				5 715.57	V	-51.57	10.60	-40.97	27.97	