

# TEST REPORT



**DT&C Co., Ltd.**

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1. Report No : DRTFCC2007-0224

2. Customer

- Name (FCC) : BLUEBIRD INC. / Name (IC) : BLUEBIRD INC.
- Address (FCC) : 3F, 115, Irwon-ro, Gangnam-gu, Seoul, South Korea  
Address (IC) : 3F, 115, Irwon-ro, Gangnam-gu Seoul 06355 Korea (Republic Of)

3. Use of Report : FCC & IC Original Grant

4. Product Name / Model Name : Enterprise-Value Full Touch Handheld Computer / VF550  
FCC ID : SS4VF550X / IC : 22515-VF550



5. Test Method Used : KDB971168 D01v03r01, ANSI/TIA-603-E-2016, ANSI C63.26-2015  
Test Specification : §2, §22, §24, §27  
RSS-130 Issue 2, RSS-132 Issue 3, RSS-133 Issue6, RSS-139 Issue 3

6. Date of Test : 2020.06.22 ~ 2020.07.06

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	Reviewed by
	Name : InHee Bae 	Name : JaeJin Lee 

2020 . 07 . 29 .

**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](mailto:report@dtnc.net)

## Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2007-0224	Jul. 29, 2020	Initial issue	InHee Bae	JaeJin Lee

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## 1. GENERAL INFORMATION

**Applicant Name (FCC)** : BLUEBIRD INC.  
**Applicant Name (IC)** : BLUEBIRD INC.  
**Address (FCC)** : 3F, 115, Irwon-ro, Gangnam-gu, Seoul, South Korea  
**Address (IC)** : 3F, 115, Irwon-ro, Gangnam-gu Seoul 06355 Korea (Republic Of)  
**FCC ID** : SS4VF550  
**IC** : 22515-VF550  
**FCC Classification** : PCS Licensed Transmitter (PCB)  
**EUT** : Enterprise-Value Full Touch Handheld Computer  
**Hardware Version** : Rev0.5  
**Software Version** : R1.01  
**Serial Number** : VF550A4LCNETEBA017  
**Model Name** : VF550  
**Add Model Name** : NA  
**Supplying power** : DC 3.85 V  
**Antenna Type** : Internal Antenna

Mode	TX Frequency (MHz)	Modulation	ERP		EIRP	
			Max power (dBm)	Max power (W)	Max power (dBm)	Max power (W)
LTE Band 71	673 ~ 688	QPSK	15.88	0.039	-	-
LTE Band 71	673 ~ 688	16QAM	14.89	0.031	-	-
LTE Band 71	670.5 ~ 690.5	QPSK	15.89	0.039	-	-
LTE Band 71	670.5 ~ 690.5	16QAM	15.21	0.033	-	-
LTE Band 71	668 ~ 693	QPSK	15.86	0.039	-	-
LTE Band 71	668 ~ 693	16QAM	14.92	0.031	-	-
LTE Band 71	665.5 ~ 695.5	QPSK	16.14	0.041	-	-
LTE Band 71	665.5 ~ 695.5	16QAM	14.96	0.031	-	-
LTE Band 12	704 ~ 711	QPSK	17.07	0.051	-	-
LTE Band 12	704 ~ 711	16QAM	15.59	0.036	-	-
LTE Band 12	701.5 ~ 713.5	QPSK	18.04	0.064	-	-
LTE Band 12	701.5 ~ 713.5	16QAM	16.64	0.046	-	-
LTE Band 12	700.5 ~ 714.5	QPSK	17.87	0.061	-	-
LTE Band 12	700.5 ~ 714.5	16QAM	16.74	0.047	-	-
LTE Band 12	699.7 ~ 715.3	QPSK	17.66	0.058	-	-
LTE Band 12	699.7 ~ 715.3	16QAM	16.53	0.045	-	-
LTE Band 13	782 ~ 782	QPSK	19.39	0.087	-	-
LTE Band 13	782 ~ 782	16QAM	18.01	0.063	-	-
LTE Band 13	779.5 ~ 784.5	QPSK	18.85	0.077	-	-
LTE Band 13	779.5 ~ 784.5	16QAM	17.91	0.062	-	-
LTE Band 5	829 ~ 844	QPSK	19.59	0.091	21.74	0.149
LTE Band 5	829 ~ 844	16QAM	18.28	0.067	20.43	0.110
LTE Band 5	826.5 ~ 846.5	QPSK	19.84	0.096	21.99	0.158
LTE Band 5	826.5 ~ 846.5	16QAM	18.60	0.072	20.75	0.119
LTE Band 5	825.5 ~ 847.5	QPSK	19.73	0.094	21.88	0.154
LTE Band 5	825.5 ~ 847.5	16QAM	18.58	0.072	20.73	0.118
LTE Band 5	824.7 ~ 848.3	QPSK	19.61	0.091	21.76	0.150
LTE Band 5	824.7 ~ 848.3	16QAM	18.73	0.075	20.88	0.122

Mode	TX Frequency (MHz)	Modulation	EIRP	
			Max power (dBm)	Max power (W)
LTE Band 66, 4	1720 ~ 1770	QPSK	24.70	0.295
LTE Band 66, 4	1720 ~ 1770	16QAM	23.51	0.224
LTE Band 66, 4	1717.5 ~ 1772.5	QPSK	24.94	0.312
LTE Band 66, 4	1717.5 ~ 1772.5	16QAM	23.58	0.228
LTE Band 66, 4	1715 ~ 1775	QPSK	24.79	0.301
LTE Band 66, 4	1715 ~ 1775	16QAM	23.66	0.232
LTE Band 66, 4	1712.5 ~ 1777.5	QPSK	24.99	0.316
LTE Band 66, 4	1712.5 ~ 1777.5	16QAM	23.68	0.233
LTE Band 66, 4	1711.5 ~ 1778.5	QPSK	24.88	0.308
LTE Band 66, 4	1711.5 ~ 1778.5	16QAM	23.56	0.227
LTE Band 66, 4	1710.7 ~ 1779.3	QPSK	24.85	0.305
LTE Band 66, 4	1710.7 ~ 1779.3	16QAM	23.44	0.221
LTE Band 2	1860 ~ 1900	QPSK	22.68	0.185
LTE Band 2	1860 ~ 1900	16QAM	21.78	0.151
LTE Band 2	1857.5 ~ 1902.5	QPSK	22.58	0.181
LTE Band 2	1857.5 ~ 1902.5	16QAM	21.40	0.138
LTE Band 2	1855 ~ 1905	QPSK	22.39	0.173
LTE Band 2	1855 ~ 1905	16QAM	21.11	0.129
LTE Band 2	1852.5 ~ 1907.5	QPSK	23.39	0.218
LTE Band 2	1852.5 ~ 1907.5	16QAM	22.04	0.160
LTE Band 2	1851.5 ~ 1908.5	QPSK	22.58	0.181
LTE Band 2	1851.5 ~ 1908.5	16QAM	21.34	0.136
LTE Band 2	1850.7 ~ 1909.3	QPSK	23.03	0.201
LTE Band 2	1850.7 ~ 1909.3	16QAM	21.61	0.145

## 2. INTRODUCTION

### 2.1 EUT DESCRIPTION

The Equipment Under Test (EUT) supports WCDMA/LTE/WLAN/Bluetooth/NFC.

### 2.2. EUT CAPABILITIES

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.

### 2.3. TESTING ENVIRONMENT

Ambient Condition	
▪ Temperature	+23 °C ~ +26 °C
▪ Relative Humidity	41 % ~ 45 %

### 2.4 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.

### 2.5. 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 %, $k = 2$ )

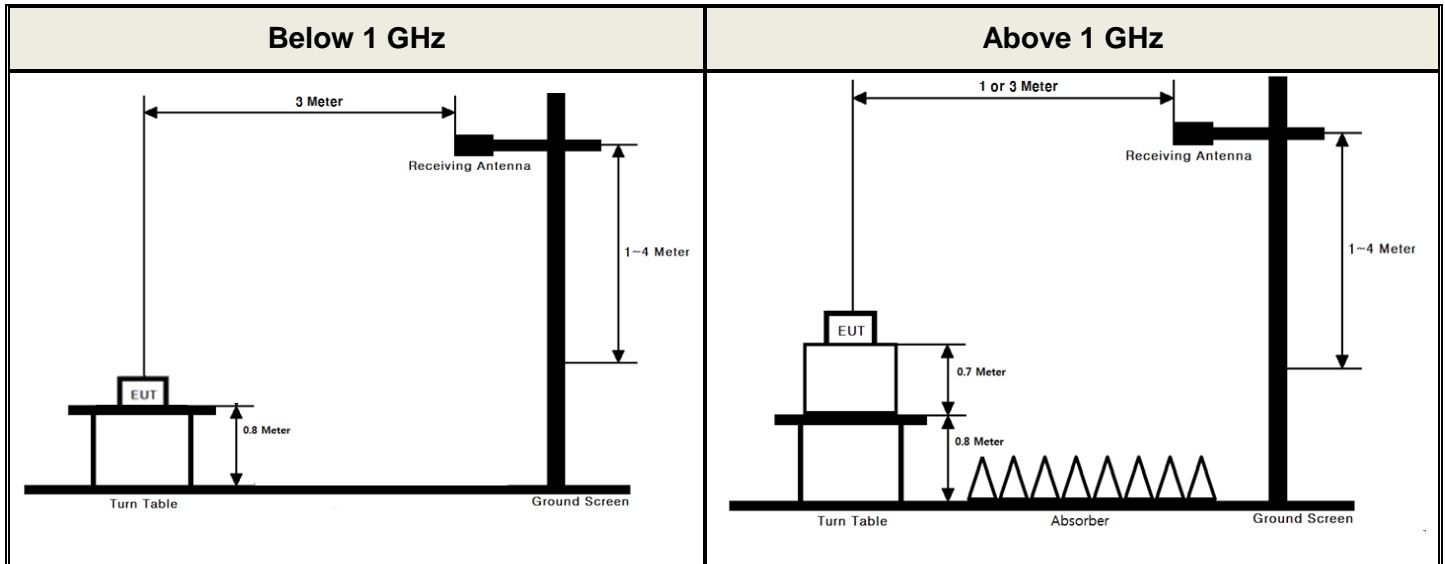
### 2.6. TEST FACILITY

<b>DT&amp;C Co., Ltd.</b>		
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		
<a href="http://www.dtnet.net">www.dtnet.net</a>		
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

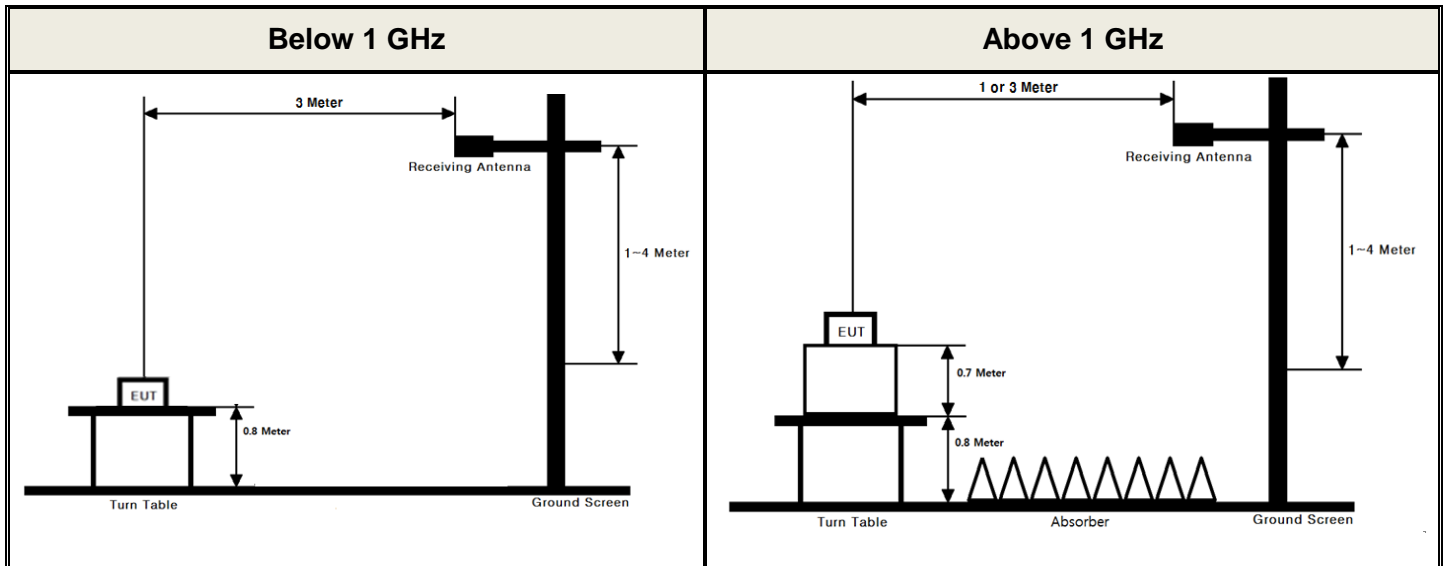
##### Test setting

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 x span / RBW.
5. Sweep time:
  - 1) Set = auto-couple, or
  - 2) Set  $\geq$  [10 x (number of points in sweep) x (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 X RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point  $\geq$  2 X 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	19/12/16	20/12/16	MY48010133
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
Thermohygrometer	BODYCOM	BJ5478	19/12/18	20/12/18	120612-1
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	Schwarzbeck	UHA9105	20/04/10	22/04/10	2262
HORN ANT	ETS	3117	20/04/24	22/04/24	00140394
HORN ANT	A.H.Systems	SAS-574	19/07/03	21/07/03	155
PreAmplifier	H.P	8447D	19/12/16	20/12/16	2944A07774
PreAmplifier	Agilent	8449B	20/06/24	21/06/24	3008A02108
High-pass filter	Wainwright	WHKX12-935-1000-15000-40SS	20/06/24	21/06/24	7
High-pass filter	Wainwright	WHKX10-2838-3300-18000-60SS	20/06/24	21/06/24	2
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

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	RSS-GEN[6.7]	Occupied Bandwidth	N/A		NA Note 2
24.232(d) 27.50(d.5)	RSS-130 [4.6] RSS-132 [5.4] RSS-133 [6.4] RSS-139 [6.5]	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)	RSS-130 [4.7] RSS-132 [5.5] RSS-133 [6.5] RSS-139 [6.6]	Band Edge / Conducted Spurious Emissions	> 43 + 10log <sub>10</sub> (P) dB at Band edge and for all out-of-band emissions		NA Note 2
27.53(c.4)	RSS-130 [4.7.2]	Undesirable missions in 763 ~ 775MHz & 793 ~ 805MHz	< 65 + 10 log <sub>10</sub> (P) dB		NA Note 2
2.1055 22.355 24.235 27.54	RSS-130 [4.5] RSS-132 [5.3] RSS-133 [6.3] RSS-139 [6.4]	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)	RSS-130 [4.6]	Radiated Output Power (B17, 13, 12)	< 3 Watts max. ERP (FCC &IC)		Radiated
22.913(a.5)	RSS-132 [5.4]	Radiated Output Power (B5)	< 7 Watts max. ERP (FCC) < 11.5 Watts max. EIRP (IC)	C	
27.50(d.4)	RSS-139 [6.5]	Radiated Output Power (B4, 66)	< 1 Watts max. EIRP (FCC &IC)	C	
24.232(c)	RSS-133 [6.4]	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)	RSS-130 [4.7] RSS-132 [5.5] RSS-133 [6.5] RSS-139 [6.6]	Undesirable Emissions	> 43 + 10log <sub>10</sub> (P) dB for all out-of-band emissions	C	
27.53(f)	RSS-130 [4.7]	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 / IC: 10224A-2018EC25AF)

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	1/0	H	16.18	-0.63	15.55	0.036
		16QAM	1/0	H	15.36	-0.63	14.73	0.030
	688	QPSK	1/0	H	16.57	-0.69	15.88	0.039
		16QAM	1/0	H	15.58	-0.69	14.89	0.031
15	670.5	QPSK	1/0	H	16.49	-0.60	15.89	0.039
		16QAM	1/0	H	15.81	-0.60.	15.21	0.033
	680.5	QPSK	1/0	H	16.35	-0.71	15.64	0.037
		16QAM	1/0	H	15.05	-0.71	14.34	0.027
	690.5	QPSK	1/0	H	15.66	-0.68	14.98	0.031
		16QAM	1/0	H	14.77	-0.68	14.09	0.026
10	668	QPSK	1/0	H	16.45	-0.59	15.86	0.039
		16QAM	1/0	H	15.51	-0.59	14.92	0.031
	680.5	QPSK	1/0	H	15.98	-0.71	15.27	0.034
		16QAM	1/0	H	15.32	-0.71	14.61	0.029
	693	QPSK	1/0	H	15.47	-0.68	14.79	0.030
		16QAM	1/0	H	14.31	-0.68	13.63	0.023
5	665.5	QPSK	1/0	H	16.72	-0.58	16.14	0.041
		16QAM	1/0	H	15.54	-0.58	14.96	0.031
	680.5	QPSK	1/0	H	15.26	-0.71	14.55	0.029
		16QAM	1/0	H	14.20	-0.71	13.49	0.022
	695.5	QPSK	1/0	H	15.45	-0.67	14.78	0.030
		16QAM	1/0	H	14.04	-0.67	13.37	0.022

**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	H	17.72	-0.65	17.07	0.051
		16QAM	1/25	H	16.24	-0.65	15.59	0.036
	711	QPSK	1/25	H	17.00	-0.63	16.37	0.043
		16QAM	1/25	H	16.02	-0.63	15.39	0.035
5	701.5	QPSK	1/24	H	16.49	-0.66	15.83	0.038
		16QAM	1/24	H	15.46	-0.66	14.80	0.030
	707.5	QPSK	1/24	H	17.27	-0.64	16.63	0.046
		16QAM	1/24	H	15.96	-0.64	15.32	0.034
	713.5	QPSK	1/24	H	18.66	-0.62	18.04	0.064
		16QAM	1/24	H	17.26	-0.62	16.64	0.046
3	700.5	QPSK	1/14	H	17.37	-0.66	16.71	0.047
		16QAM	1/14	H	16.18	-0.66	15.52	0.036
	707.5	QPSK	1/14	H	17.46	-0.64	16.82	0.048
		16QAM	1/14	H	16.40	-0.64	15.76	0.038
	714.5	QPSK	1/14	H	18.49	-0.62	17.87	0.061
		16QAM	1/14	H	17.36	-0.62	16.74	0.047
1.4	699.7	QPSK	1/5	H	17.25	-0.66	16.59	0.046
		16QAM	1/5	H	16.08	-0.66	15.42	0.035
	707.5	QPSK	1/5	H	17.22	-0.64	16.58	0.045
		16QAM	1/5	H	16.17	-0.64	15.53	0.036
	715.3	QPSK	1/5	H	18.28	-0.62	17.66	0.058
		16QAM	1/5	H	17.15	-0.62	16.53	0.045

**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	1/0	H	20.15	-0.67	19.48	0.089
		16QAM	1/0	H	18.85	-0.67	18.18	0.066
	836.5	QPSK	1/0	H	20.33	-0.74	19.59	0.091
		16QAM	1/0	H	18.63	-0.74	17.89	0.062
	844	QPSK	1/0	H	20.26	-0.81	19.45	0.088
		16QAM	1/0	H	19.09	-0.81	18.28	0.067
5	826.5	QPSK	1/0	H	19.78	-0.65	19.13	0.082
		16QAM	1/0	H	18.72	-0.65	18.07	0.064
	836.5	QPSK	1/0	H	19.67	-0.74	18.93	0.078
		16QAM	1/0	H	18.70	-0.74	17.96	0.063
	846.5	QPSK	1/0	H	20.67	-0.83	19.84	0.096
		16QAM	1/0	H	19.43	-0.83	18.60	0.072
3	825.5	QPSK	1/0	H	19.61	-0.64	18.97	0.079
		16QAM	1/0	H	18.44	-0.64	17.80	0.060
	836.5	QPSK	1/0	H	19.89	-0.74	19.15	0.082
		16QAM	1/0	H	18.78	-0.74	18.04	0.064
	847.5	QPSK	1/0	H	20.57	-0.84	19.73	0.094
		16QAM	1/0	H	19.42	-0.84	18.58	0.072
1.4	824.7	QPSK	1/0	H	19.45	-0.63	18.82	0.076
		16QAM	1/0	H	18.16	-0.63	17.53	0.057
	836.5	QPSK	1/0	H	19.72	-0.74	18.98	0.079
		16QAM	1/0	H	18.64	-0.74	17.90	0.062
	848.3	QPSK	1/0	H	20.46	-0.85	19.61	0.091
		16QAM	1/0	H	19.58	-0.85	18.73	0.075

**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	1/0	H	19.84	-0.45	19.39	0.087
		16QAM	1/0	H	18.46	-0.45	18.01	0.063
5	779.5	QPSK	1/12	H	19.30	-0.45	18.85	0.077
		16QAM	1/12	H	18.36	-0.45	17.91	0.062
	784.5	QPSK	1/12	H	18.46	-0.44	18.02	0.063
		16QAM	1/12	H	17.24	-0.44	16.80	0.048



**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	1/0	H	19.19	5.28	24.47	0.280
		16QAM	1/0	H	17.82	5.28	23.10	0.204
	1 745	QPSK	1/0	H	19.32	5.38	24.70	0.295
		16QAM	1/0	H	18.13	5.38	23.51	0.224
	1 770	QPSK	1/0	H	18.96	5.20	24.16	0.261
		16QAM	1/0	H	17.73	5.20	22.93	0.196
15	1 717.5	QPSK	1/0	H	18.93	5.27	24.20	0.263
		16QAM	1/0	H	17.98	5.27	23.25	0.211
	1 745	QPSK	1/0	H	19.56	5.38	24.94	0.312
		16QAM	1/0	H	18.20	5.38	23.58	0.228
	1 772.4	QPSK	1/0	H	17.72	5.18	22.90	0.195
		16QAM	1/0	H	16.27	5.18	21.45	0.140
10	1 715	QPSK	1/0	H	18.71	5.26	23.97	0.249
		16QAM	1/0	H	17.63	5.26	22.89	0.195
	1 745	QPSK	1/0	H	19.41	5.38	24.79	0.301
		16QAM	1/0	H	18.28	5.38	23.66	0.232
	1 774.9	QPSK	1/0	H	17.32	5.15	22.47	0.177
		16QAM	1/0	H	15.98	5.15	21.13	0.130
5	1 712.5	QPSK	1/0	H	18.28	5.25	23.53	0.225
		16QAM	1/0	H	17.48	5.25	22.73	0.187
	1 745	QPSK	1/0	H	19.61	5.38	24.99	0.316
		16QAM	1/0	H	18.30	5.38	23.68	0.233
	1 777.4	QPSK	1/0	H	16.68	5.13	21.81	0.152
		16QAM	1/0	H	15.45	5.13	20.58	0.114
3	1 711.5	QPSK	1/0	H	18.42	5.25	23.67	0.233
		16QAM	1/0	H	17.08	5.25	22.33	0.171
	1 745	QPSK	1/0	H	19.50	5.38	24.88	0.308
		16QAM	1/0	H	18.18	5.38	23.56	0.227
	1 778.4	QPSK	1/0	H	16.61	5.12	21.73	0.149
		16QAM	1/0	H	15.49	5.12	20.61	0.115
1.4	1 710.7	QPSK	1/0	H	18.22	5.24	23.46	0.222
		16QAM	1/0	H	17.00	5.24	22.24	0.167
	1745	QPSK	1/0	H	19.47	5.38	24.85	0.305
		16QAM	1/0	H	18.06	5.38	23.44	0.221
	1 779.2	QPSK	1/0	H	16.61	5.11	21.72	0.149
		16QAM	1/0	H	15.44	5.11	20.55	0.114

**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	V	17.38	4.80	22.18	0.165
		16QAM	1/50	V	15.84	4.80	20.64	0.116
	1 880	QPSK	1/50	V	17.75	4.60	22.35	0.172
		16QAM	1/50	V	17.15	4.60	21.75	0.150
	1 900	QPSK	1/50	V	18.28	4.40	22.68	0.185
		16QAM	1/50	V	17.38	4.40	21.78	0.151
15	1 857.5	QPSK	1/0	V	16.70	4.83	21.53	0.142
		16QAM	1/0	V	15.34	4.83	20.17	0.104
	1 880	QPSK	1/0	V	17.91	4.60	22.51	0.178
		16QAM	1/0	V	16.80	4.60	21.40	0.138
	1 902.5	QPSK	1/0	V	18.17	4.41	22.58	0.181
		16QAM	1/0	V	16.78	4.41	21.19	0.132
10	1 855	QPSK	1/0	V	16.60	4.85	21.45	0.140
		16QAM	1/0	V	15.08	4.85	19.93	0.098
	1 880	QPSK	1/0	V	17.65	4.60	22.25	0.168
		16QAM	1/0	V	16.35	4.60	20.95	0.124
	1 905	QPSK	1/0	V	17.97	4.42	22.39	0.173
		16QAM	1/0	V	16.69	4.42	21.11	0.129
5	1 852.5	QPSK	1/0	V	16.62	4.88	21.50	0.141
		16QAM	1/0	V	15.31	4.88	20.19	0.104
	1 880	QPSK	1/0	V	17.42	4.60	22.02	0.159
		16QAM	1/0	V	16.40	4.60	21.00	0.126
	1 907.5	QPSK	1/0	V	18.96	4.43	23.39	0.218
		16QAM	1/0	V	17.61	4.43	22.04	0.160
3	1 851.5	QPSK	1/0	V	16.28	4.89	21.17	0.131
		16QAM	1/0	V	15.03	4.89	19.92	0.098
	1 880	QPSK	1/0	V	17.27	4.60	21.87	0.154
		16QAM	1/0	V	16.05	4.60	20.65	0.116
	1 908.5	QPSK	1/0	V	18.15	4.43	22.58	0.181
		16QAM	1/0	V	16.91	4.43	21.34	0.136
1.4	1 850.7	QPSK	1/0	V	16.14	4.89	21.03	0.127
		16QAM	1/0	V	14.77	4.89	19.66	0.092
	1 880	QPSK	1/0	V	17.21	4.60	21.81	0.152
		16QAM	1/0	V	15.85	4.60	20.45	0.111
	1 909.3	QPSK	1/0	V	18.59	4.44	23.03	0.201
		16QAM	1/0	V	17.17	4.44	21.61	0.145

## 7.2 UNDESIRABLE EMISSIONS (Radiated)

### - Test Notes

Note 1: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

Note 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 above table.

### 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	Margin	Limit (dBm)
								(dBm)	(dB)	
20	665.5	1/0	QPSK	1 328.21	H	-51.59	0.88	-50.71	37.71	-13.00
				1 992.30	V	-49.76	2.70	-47.06	34.06	
			16QAM	1 328.60	H	-51.69	0.89	-50.80	37.80	
				1 992.26	V	-49.96	2.70	-47.26	34.26	
	695.5	1/0	QPSK	1 358.08	H	-55.18	1.61	-53.57	40.57	
				2 037.28	V	-49.54	2.82	-46.72	33.72	
			16QAM	1 357.95	H	-55.35	1.61	-53.74	40.74	
				2 037.18	V	-49.95	2.82	-47.13	34.13	
5	665.5	1/0	QPSK	1 335.26	H	-56.34	1.07	-55.27	42.27	
				1 990.13	V	-51.38	2.69	-48.69	35.69	
		1/0	16QAM	1 335.27	H	-56.61	1.07	-55.54	42.54	
				1 990.21	V	-51.85	2.69	-49.16	36.16	

### 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	Margin	Limit (dBm)
								(dBm)	(dB)	
10	704	1/25	QPSK	1 408.43	V	-57.15	2.48	-54.67	41.67	-13.00
			16QAM	1 408.03	V	-58.53	2.48	-56.05	43.05	
	711	1/25	QPSK	1 421.87	V	-57.98	2.54	-55.44	42.44	
			16QAM	1 423.06	V	-58.08	2.54	-55.54	42.54	
5	713.5	1/24	QPSK	1 433.50	V	-58.36	2.58	-55.78	42.78	
			16QAM	1 433.18	V	-58.38	2.58	-55.80	42.80	

**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	1/0	QPSK	1 649.16	H	-54.28	4.16	-50.12	37.12	-13.00
				2 473.74	H	-41.72	3.59	-38.13	25.13	
			16QAM	1 649.39	H	-54.42	4.15	-50.27	37.27	
				2 473.83	H	-41.85	3.59	-38.26	25.26	
	836.5	1/0	QPSK	1 664.33	H	-54.36	3.83	-50.53	37.53	
				2 496.20	H	-36.97	3.73	-33.24	20.24	
			16QAM	1 664.30	H	-54.82	3.84	-50.98	37.98	
				2 496.27	H	-37.86	3.73	-34.13	21.13	
	844	1/0	QPSK	1 679.11	H	-55.82	3.51	-52.31	39.31	
				2 518.75	H	-38.24	3.83	-34.41	21.41	
			16QAM	1 679.05	H	-55.76	3.51	-52.25	39.25	
				2 518.81	H	-38.84	3.83	-35.01	22.01	
5	846.5	1/0	QPSK	1 688.78	H	-53.47	3.30	-50.17	37.17	
				2 532.98	H	-36.96	3.88	-33.08	20.08	
			16QAM	1 688.49	H	-54.11	3.30	-50.81	37.81	
				2 533.09	H	-37.59	3.88	-33.71	20.71	

### 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	Margin	Limit (dBm)
								(dBm)	(dB)	
10	782	1/0	QPSK	2 335.66	H	-54.92	3.62	-51.30	38.30	-13.00
			16QAM	2 336.95	H	-55.37	3.62	-51.75	38.75	

### 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	Margin	Limit (dBm/MHz)
								(dBm)	(dB)	
10	782	1/49	QPSK	1 571.90	H	-57.61	6.48	-51.13	11.13	-40.00
			16QAM	1 572.79	H	-57.98	6.48	-51.50	11.50	-40.00

**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	1/0	QPSK	3 422.30	V	-54.69	7.74	-46.95	33.95	-13.00
				5 133.10	H	-49.27	10.30	-38.97	25.97	
			16QAM	3 422.76	V	-54.81	7.75	-47.06	34.06	
				5 133.26	H	-50.04	10.30	-39.74	26.74	
	1 732.5	1/0	QPSK	3 472.54	V	-55.10	7.85	-47.25	34.25	
				5 208.10	H	-48.97	10.38	-38.59	25.59	
			16QAM	3 472.47	V	-54.20	7.84	-46.36	33.36	
				5 208.25	H	-49.19	10.38	-38.81	25.81	
	1 745	1/0	QPSK	3 521.36	V	-55.06	7.99	-47.07	34.07	
				5 283.15	H	-51.99	10.37	-41.62	28.62	
			16QAM	3 521.53	V	-55.34	7.99	-47.35	34.35	
				5 283.66	H	-51.38	10.37	-41.01	28.01	
5	1 745	1/0	QPSK	3 485.91	V	-56.14	7.87	-48.27	35.27	
				5 228.48	H	-48.44	10.34	-38.10	25.10	
			16QAM	3 485.60	V	-55.33	7.87	-47.46	34.46	
				5 228.55	H	-48.08	10.34	-37.74	24.74	

**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	Margin	Limit (dBm)
								(dBm)	(dB)	
20	1 860	1/50	QPSK	3 720.14	V	-52.93	8.34	-44.59	31.59	-13.00
				5 580.27	V	-43.09	10.68	-32.41	19.41	
		1/50	16QAM	3 720.17	V	-52.45	8.34	-44.11	31.11	
				5 580.35	V	-44.52	10.68	-33.84	20.84	
	1 880	1/50	QPSK	3 760.52	V	-54.56	8.42	-46.14	33.14	
				5 640.33	V	-47.07	10.72	-36.35	23.35	
		1/50	16QAM	3 760.83	V	-54.53	8.42	-46.11	33.11	
				5 640.25	V	-47.56	10.72	-36.84	23.84	
	1 900	1/50	QPSK	3 800.07	V	-53.32	8.50	-44.82	31.82	
				5 700.17	V	-46.28	10.60	-35.68	22.68	
		1/50	16QAM	3 800.31	V	-53.03	8.50	-44.53	31.53	
				5 700.14	V	-47.03	10.60	-36.43	23.43	