FCC RF TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.

FOR

4G Smart Phone

ISSUED TO
Hot Pepper, Inc.

5151 California Ave., Suite 100, Irvine 92617, USA

Tested by: Heng Aiping
Heng Aiping
(Engineer)
Date Aug. 03, 2018

Approved by:
Wei Yanquan
(Chief Engineer)
Date Aug. 03, 2018

Report No.:	BL-SZ1870354-501
EUT Name:	4G Smart Phone
Model Name:	VLE5
Brand Name:	Hot Pepper
Test Standard:	47 CFR Part 2 (10-1-17 Edition)
	47 CFR Part 90 (10-1-17 Edition)
FCC ID:	2APD4-A80C
Test Conclusion:	Pass
Test Date:	Jul. 24, 2018 ~ Jul. 27, 2018
Date of Issue:	Aug. 03, 2018

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Revision History

Version	Issue Date	Revisions Content
Rev. 01	Aug. 03, 2018	Initial Issue

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1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China.
Phone Number	+86 755 6685 0100

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China.
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory is a testing organization accredited by FCC as an accredited testing laboratory. The designation number is CN1196. The laboratory is a testing organization accredited by American Association for Laboratory Accreditation(A2LA) according to ISO/IEC 17025. The accreditation certificate number is 4344.01. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20 °C to 35 °C
Ambient Relative Humidity	30 % to 60 %
Ambient Pressure	98 kPa to 102 kPa

1.4 Announce

(1) The test report reference to the report template version v1.0.

(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.

(3) The test report is invalid if there is any evidence and/or falsification.

(4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.

(5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.

(6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Hot Pepper, Inc.
Address	5151 California Ave., Suite 100, Irvine 92617, USA

2.2 Manufacturer Information

Manufacturer	Hot Pepper, Inc.
Address	5151 California Ave., Suite 100, Irvine 92617, USA

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	4G Smart Phone
Model Name Under Test	VLE5
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	HXF-M 94V-0
Software Version	HPP-VLE5180706
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	Hot Pepper
	Model No.	H2018VL5
	Serial No.	HTT180321000402
	Capacity	2000 mAh
	Rated Voltage	3.8 V
	Limit Charge Voltage	4.4 V
Ancillary Equipment 2	Adapter 1	
	Brand Name	Hot Pepper
	Model No.	TPA_46B050100UU
	Description of Model name differentiation	N/A
	Rated Input	100-240 V~, 1.0 A, 50/60 Hz
	Rated Output	5 V⎓ 1 A
Ancillary Equipment 3	USB Data Cable	
	Length	0.8 m

2.6 Technical Information

All Network and Wireless connectivity for EUT	3G Network CDMA2000 1xRTT BC0/ 1/ 10; CDMA2000 1xEV-DO BC0/ 1/ 10; 4G Network FDD LTE Band 25/ 26; WLAN; Bluetooth
About the Product	The equipment is 4G Smart Phone, intended for used with information technology equipment.

The requirement for the following technical information of the EUT was tested in this report:

Operating Bands	CDMA2000 1xRTT BC10 CDMA2000 1xEV-DO BC10 FDD LTE Band 26	
Modulation Type	1xRTT	O-QPSK, H-PSK, QPSK
	1xEV-DO	QPSK, 8PSK, 16QAM
	LTE	QPSK, 16QAM
TX Frequency Range	CDMA2000 1xRTT BC10: 817.9 MHz ~ 823.1 MHz CDMA2000 1xEV-DO BC10: 817.9 MHz ~ 823.1 MHz FDD LTE Band 26: 814 MHz ~ 824 MHz	
Rx Frequency Range	CDMA2000 1xRTT BC10: 862.9 MHz ~ 868.1 MHz CDMA2000 1xEV-DO BC10: 862.9 MHz ~ 868.1 MHz FDD LTE Band 26: 859 MHz ~ 869 MHz	
Power Class	CDMA2000 1xRTT BC10: 3 CDMA2000 1xEV-DO BC10: 3 FDD LTE Band 26: 3	
Antenna Type	PIFA Antenna	
Antenna Gain	CDMA2000 1xRTT BC10: -3 dBi CDMA2000 1xEV-DO BC10: -3 dBi FDD LTE Band 26: -3 dBi	

EUT 1#	IMEI: 868712020562279 MEID: 86871202056227 SN: 620191
EUT 2#	IMEI: 868872030004876 MEID: 86887203000487

Note 1: The EUT information are declared by manufacturer. For more detailed features description, please refer to the manufacturer's specifications or user's manual.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2 (10-1-17 Edition)	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 90 Subpart S (10-1-17 Edition)	Regulations Governing Licensing and Use of Frequencies in the 806-824, 851-869, 896-901, and 935-940 MHz Bands
3	ANSI/TIA-603-E-2016	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
4	KDB 971168 D01 v03r01	Measurement Guidance for Certification of Licensed Digital Transmitters

3.2 Test Verdict

No.	Test Description	FCC Part No.	Test Result	Test Verdict
1	Conducted RF Output Power	2.1046	Reporting only (ANNEX A.1)	Pass
2	Effective Radiated Power	2.1046 90.635(b)	ANNEX A.1	Pass
3	Peak to Average Radio	2.1046	ANNEX A.2	Pass
4	Occupied Bandwidth	2.1049	ANNEX A.3	Pass
5	Frequency Stability	2.1055 90.213	ANNEX A.4	Pass
6	Spurious Emission at Antenna Terminals	2.1051 90.691	ANNEX A.5	Pass
7	Band Edge	2.1051 90.691	ANNEX A.6	Pass
8	Field Strength of Spurious Radiation	2.1053 90.691	ANNEX A.7	Pass

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

During the measurement, the environmental conditions were within the listed ranges:

Test Voltage of the EUT	NV (Normal Voltage)	3.8 V
	LV (Low Voltage)	3.5 V
	HV (High Voltage)	4.4 V
Test Temperature of the EUT	NT (Normal Temperature)	+25 °C
	LT (Low Temperature)	-15°C
	HT (High Temperature)	+55 °C

4.2 Test Equipment List

Description	Manufacturer	Model	Serial No.	Software /Firmware Version	Cal. Date	Cal. Due
Conducted Test System						
Test Software 1	R&S	CMUgo	N/A	V2.0.1	N/A	N/A
Test Software 2	R&S	CMWRun	N/A	V1.8.9	N/A	N/A
Test Software 3	BALUN	BL410R	N/A	V2.1.1.366	N/A	N/A
Universal Radio Communication Tester	R&S	CMU 200	119280	V5.13	2018.03.16	2019.03.15
Wideband Radio Communication Tester	R&S	CMW 500	127794	V3.5.137	2018.06.15	2019.06.14
Wideband Radio Communication Tester	R&S	CMW 500	120598	V3.5.137	2018.03.05	2019.03.04
Spectrum Analyzer	R&S	FSV-30	103118	2.30.SP1	2018.06.15	2019.06.14
Spectrum Analyzer	Agilent	E4440A	MY45304434	A.11.21	2017.11.02	2018.11.01
Spectrum Analyzer	Agilent	E4440A	MY46181663	A.11.21	2017.11.02	2018.11.01
Temperature Chamber	AHK	SP20	1412	N/A	2018.06.15	2019.06.14
DC Power Supply	ITECH	IT6863A	600014010687210020	N/A	2018.06.14	2019.06.13
Power Sensor	Agilent	E9304A H18	MY41497164	N/A	2017.11.02	2018.11.01
Power Splitter	KMW	DCPD-LDC	1305003215	N/A	N/A	N/A
Attenuator (20 dB)	KMW	ZA-S1-201	110617091	N/A	N/A	N/A
Attenuator (6 dB)	KMW	ZA-S1-61	1305003189	N/A	N/A	N/A

Description	Manufacturer	Model	Serial No.	Software /Firmware Version	Cal. Date	Cal. Due
Radiated Test System						
Test Software	BALUN	BL410_E	N/A	V16.921	N/A	N/A
Test Antenna-Bi-Log (30 MHz-3 GHz)	Schwarzbeck	VULB 9163	9163-624	N/A	2017.07.22	2019.07.21
Test Antenna-Horn(1-18 GHz)	Schwarzbeck	BBHA 9120D	9120D-1600	N/A	2016.07.12	2019.07.11
Test Antenna-Horn(18-40 GHz)	A-INFO	LB-180400KF	J211060273	N/A	2017.01.06	2019.01.05
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	N/A	2017.02.21	2019.02.20
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A	N/A
EMI Receiver	KEYSIGHT	N9038A	MY53220118	A.14.16	2017.11.08	2018.11.07
Spectrum Analyzer	R&S	FSV-30	103118	2.30.SP1	2018.06.15	2019.06.14
Wideband Radio Communication Tester	R&S	CMW 500	121551	V3.2.73	2018.05.07	2019.05.06

4.3 Test Configurations

Test Items	Test Mode	Test Channel		
		LCH	MCH	HCH
Effective Radiated Power	1xRTT BC10	v	v	v
	1XEV-DO BC10	v	v	v
Peak to Average Ratio	1xRTT BC10	v	v	v
	1XEV-DO BC10	v	v	v
Occupied Bandwidth	1xRTT BC10	v	v	v
	1XEV-DO BC10	v	v	v
Frequency Stability	1xRTT BC10	v	v	v
	1XEV-DO BC10	v	v	v
Spurious Emission at Antenna Terminals	1xRTT BC10	v	v	v
	1XEV-DO BC10	v	v	v
Band Edge	1xRTT BC10	v	--	v
	1XEV-DO BC10	v	--	v
Field Strength of Spurious Radiation	1xRTT BC10	v	v	v
	1XEV-DO BC10	v	v	v
Note 1: The mark “v” means that this configuration is chosen for testing.				

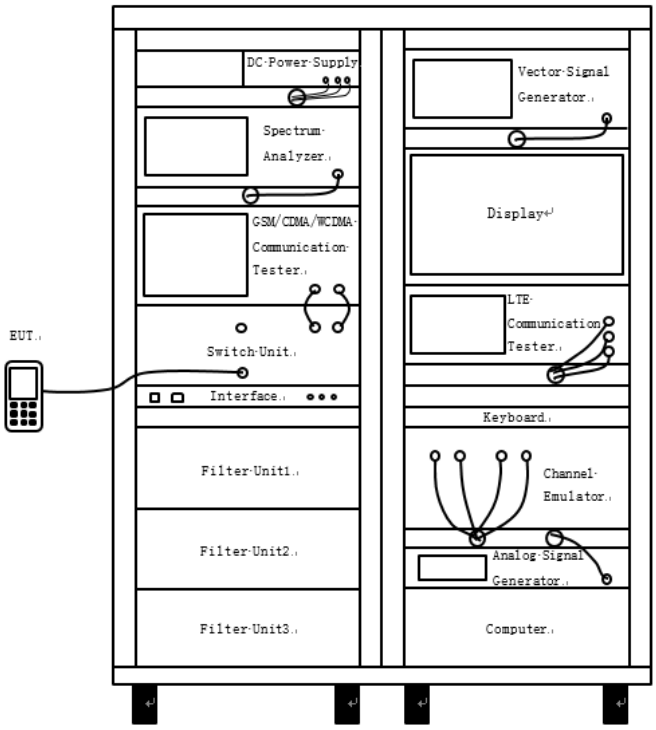
Test Mode	UL Channel	UL Channel No.	UL Frequency (MHz)
CDMA2000 1xRTT BC10 CDMA2000 1xEV-DO BC10	Low Channel	476	817.9
	Middle Channel	580	820.5
	High Channel	684	823.1

LTE Band	Bandwidth (MHz)						Modulation Type		RB#			Test Channel		
	1.4	3	5	10	15	20	QPSK	16-QAM	1	Half	Full	LCH	MCH	HCH
Effective Radiated Power														
26	v	v	v	v	v	n	v	v	v	v	v	v	v	v
Peak to Average Ratio														
26	--	--	--	v	--	n	v	v	v	--	v	--	v	--
Occupied Bandwidth														
26	v	v	v	v	v	n	v	v	--	--	v	v	v	v
Frequency Stability														
26	--	--	--	v	--	n	v	v	--	--	v	--	v	--
Spurious Emission at Antenna Terminals														
26	v	v	v	v	v	n	v	v	v	--	--	v	v	v
Band Edge														
26	v	v	v	v	v	n	v	v	v	--	v	v	--	v
Field Strength of Spurious Radiation														
26	v	v	v	v	--	n	v	--	v	--	--	--	v	--
Note 1: The mark “v” means that this configuration is chosen for testing. Note 2: The mark “n” means that this bandwidth is not supported.														

Test Mode	UL Channel	Channel Bandwidth (MHz)	UL Channel No.	UL Frequency (MHz)
LTE Band 26	Low Range	1.4	26697	814.7
		3	26705	815.5
		5	26715	816.5
		10	---	---
		15	26765	821.5
	Middle Range	1.4/3/5/10	26740	819
	High Range	1.4	26783	823.3
		3	26775	822.5
		5	26765	821.5
		10	---	---
		15	---	---

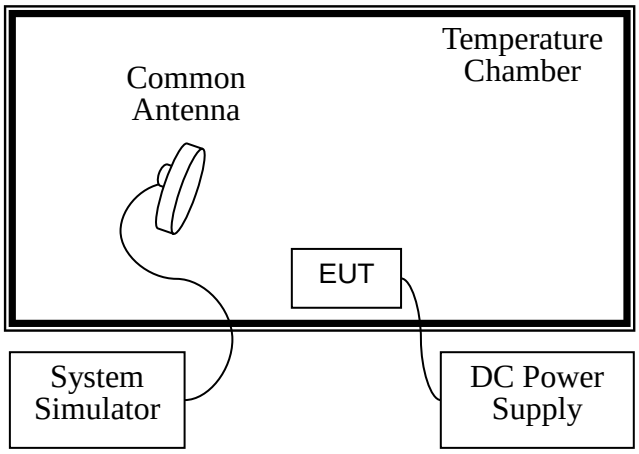
4.4 Test Setup

4.4.1 For Antenna Port Test



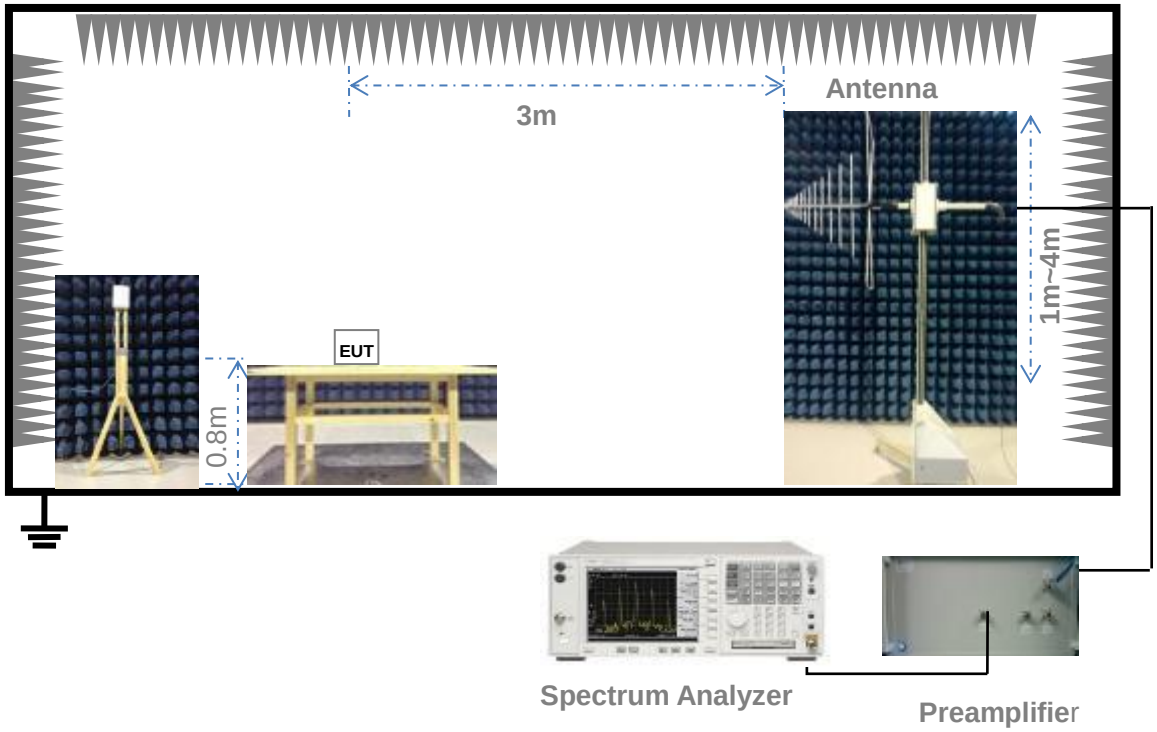
(Diagram 1)

4.4.2 For Frequency Stability Test



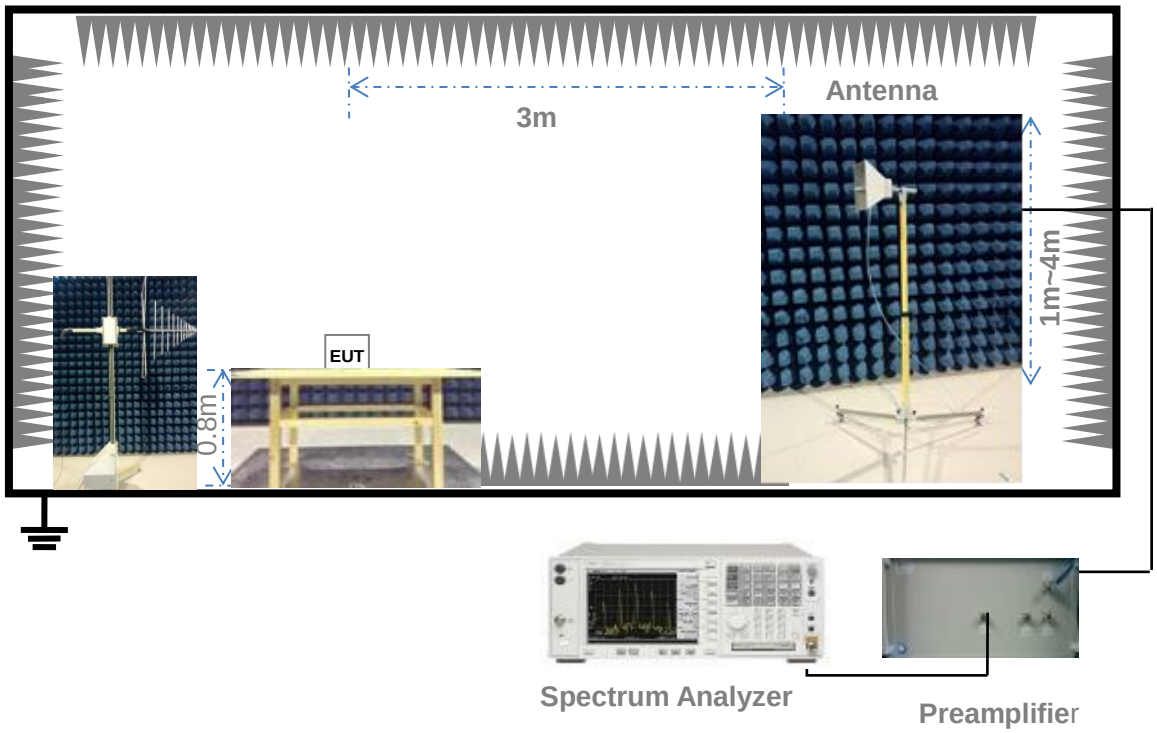
(Diagram 2)

4.4.3 For Radiated Test (30 MHz ~ 1 GHz)



(Diagram 3)

4.4.4 For Radiated Test (Above 1 GHz)



(Diagram 4)

5 TEST ITEMS

5.1 Effective Radiated Power (ERP)

5.1.1 Limit

FCC § 2.1046 & 90.635(b)

According to FCC section 90.635(b), the maximum output power of the transmitter for mobile stations is 100 watts (20dBW).

5.1.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description is used for conducted test, and the section 4.4.3 and 4.4.4 (Diagram 3, 4) test setup description is used for radiated test. The photo of test setup please refer to ANNEX B.

5.1.3 Test Procedure

Description of the Conducted Output Power Measurement

The EUT is coupled to the SS with attenuator through power splitter; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. A system simulator is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The relevant equation for determining the conducted measured value is:

Conducted Output Power Value (dBm) = Measured Value (dBm) + Path Loss (dB)

where:
Conducted Output Power Value = final conducted measured value in the conducted power test, in dBm;
Measured Value = measured conducted power received by spectrum analyzer or power meter, in dBm;
Path Loss = signal attenuation in the connecting cable between the transmitter and spectrum analyzer or power meter, including external cable loss, in dB;

During the test, the data of Path Loss (dB) is added in the spectrum analyzer or power meter, so Measured Value (dBm) is the final values which contains the data of Path Loss (dB).

For example:

In the conducted output power test, when measured value for GSM850 is 24.7 dBm, and path loss is 8.5 dB, then final conducted output power value is:

Conducted Output Power Value (dBm) = 24.7 dBm + 8.5 dB = 33.2 dBm

Description of the Transmitter Radiated Power Measurement

In many cases, the RF output power limits for licensed digital transmission devices is specified in terms of effective radiated power (ERP) or equivalent isotropic radiated power (EIRP). Typically, ERP is specified when the operating frequency is less than or equal to 1 GHz and EIRP is specified when the operating frequency is greater than 1 GHz. Both are determined by adding the transmit antenna gain to the conducted RF output power with the primary difference between the two being that when determining the ERP, the transmit antenna gain is referenced to a dipole antenna (i.e., dBd) whereas when determining the EIRP, the transmit antenna gain is referenced to an isotropic antenna (dBi).

Final measurement calculation as below:

The relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

$ERP/EIRP = P_{Meas} + GT - LC$

where:
ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as P_{Meas}, typically dBW or dBm);
P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
dBd (ERP)=dBi (EIRP) -2.15 dB
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

For example:
In the EIRP test, when P_{Meas} value for GSM1900 is 30.2 dBm, LC is 0.6 dB, and GT is -3.4 dB, then final EIRP value is:
EIRP for GSM1900 = 30.2 dBm - 3.4 dBi - 0.6 dB = 26.2 dBm

The relevant equation for determining the ERP/EIRP from the radiated RF output power is:
ERP/EIRP (dBm) = SA Read Value (dBm) + Correction Factor (dB)

where:
ERP/EIRP = effective or equivalent radiated power, in dBm;
SA Read Value = measured transmitter power received by EMI receiver or spectrum analyzer, in dBm;
Correction Factor = total correction factor including cable loss, in dB;

During the test, the data of Correction Factor (dB) is added in the EMI receiver or spectrum analyzer, so SA Read Value (dBm) is the final values which contains the data of Correction Factor (dB).

For example:

In the ERP test, when SA read value for GSM850 is 21dBm, and correction factor is 8dB, then final ERP value for GSM850 is:

ERP (dBm) = 21dBm + 8dB = 29dBm

5.1.4 Test Result

Please refer to ANNEX A.1.

5.2 Peak to Average Ratio

5.2.1 Limit

FCC § 2.1046

In addition, when the transmitter power is measured in terms of average value, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

5.2.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description is used for this test. The photo of test setup please refer to ANNEX B.

5.2.3 Test Procedure

Here the lowest, middle and highest channels are selected to perform testing to verify the peak-to-average ratio.

According to KDB 971168 D01, there is CCDF procedure for PAPR:

a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;

b) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;

c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Set the measurement interval as follows:

1) for continuous transmissions, set to 1 ms,

2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.

e) Record the maximum PAPR level associated with a probability of 0.1%.

Alternate procedure for PAPR:

Use one of the procedures presented in 4.1 to measure the total peak power and record as P_{Pk}. Use one of the applicable procedures presented 4.2 to measure the total average power and record as P_{Avg}. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

PAPR (dB) = P_{Pk} (dBm) - P_{Avg} (dBm).

5.2.4 Test Result

Please refer to ANNEX A.2.

5.3 Occupied Bandwidth

5.3.1 Limit

FCC § 2.1049

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

Many of the individual rule parts specify a relative OBW in lieu of the 99% OBW. In such cases, the OBW is defined as the width of the signal between two points, one below the carrier center frequency and on above the carrier center frequency, outside of which all emissions are attenuated by at least X dB below the transmitter power, where the value of X is typically specified as 26.

5.3.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description is used for this test. The photo of test setup please refer to ANNEX B.

5.3.3 Test Procedure

The following procedure shall be used for measuring power bandwidth.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the anticipated OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) NOTE—Steps a) through c) may require iteration to adjust within the specified tolerances.

e) For -26 dB OBW, the dynamic range of the spectrum analyzer at the selected RBW shall be at least 10dB below the target “-X dB down” requirement, e.g. -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be 36dB below the reference value.

f) Set the detection mode to peak, and the trace mode to max hold.

g) For 99% OBW, use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.

If the instrument does not have a 99 % power bandwidth function, the trace data points are to be recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99 % power bandwidth is the difference between these two frequencies.

h) For -26 dB OBW, determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

Determine the “-X dB down amplitude” as equal to (reference value -X). Alternatively, this calculation can be performed by the analyzer by using the marker-delta function.

Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below “-X dB down amplitude” determined in step g). If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.

i) The OBW shall be reported by providing plot(s) of the measuring instrument display. The frequency and amplitude axes and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

j) Change variable modulations, coding, or channel bandwidth settings, then repeat above test procedures.

5.3.4 Test Result

Please refer to ANNEX A.3.

5.4 Frequency Stability

5.4.1 Limit

FCC § 2.1055 & 90.213

FCC § 2.1055

The frequency stability shall be measured with variation of ambient temperature as follows:

(1) The temperature is varied from -30°C to +50°C.

(2) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10°C through the range.

The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating and point which shall be specified by the manufacture.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

FCC § 90.213

The frequency stability shall not depart from the reference frequency in excess of ±2.5ppm for mobile stations.

5.4.2 Test Setup

The section 4.4.2 (Diagram 2) test setup description is used for this test. The photo of test setup please refer to ANNEX B.

5.4.3 Test Procedure

1. The EUT is placed in a temperature chamber.

2. The temperature is set to 25°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured.

3. The temperature is increased by not more than 10 degrees, allowed to stabilize and soak, and then repeat the frequency error measurement.

4. Repeat procedure 3 until +50°C and -30°C is reached.

5. Change supply voltage, and repeat measurement until extreme voltage is reached.

5.4.4 Test Result

Please refer to ANNEX A.4.

5.5 Spurious Emission at Antenna Terminals

5.5.1 Limit

FCC § 2.1051 & 90.691

In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

FCC § 90.691

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $Log_{10}(f/6.1)$ decibels or 50 + 10 $Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + $10Log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

5.5.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.5.3 Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. On any frequency outside a licensee’s frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency blocks a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

1. The EUT is coupled to the system simulator and spectrum analyzer; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2. CMW500 is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power.

3. The RF output of the transmitter is connected to the input of the spectrum analyzer through sufficient attenuation.

4. Spurious emissions are tested with 0.001MHz RBW for frequency less than 150kHz, 0.01MHz RBW for frequency less than 30MHz, 0.1MHz RBW for frequency less than 1GHz, and 1MHz RBW for frequency above 1GHz. And sweep point number are at least 401, referring to following formula.

Sweep point number = Span/RBW

VBW=3*RBW

Detector Mode=mean or average power

5. Record the frequencies and levels of spurious emissions.

5.5.4 Test Result

Please refer to ANNEX A.5.

5.6 Band Edge

5.6.1 Limit

FCC § 2.1051 & 90.691

In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

FCC § 90.691

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log_{10}(f/6.1) decibels or 50 + 10 Log_{10}(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log_{10}(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

5.6.2 Test Setup

The section 4.4.1 (Diagram 1) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.6.3 Test Procedure

The EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correct the reading.

1.The EUT is coupled to the system simulator and spectrum analyzer; the RF load attached to EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2. CMW500 is used to establish communication with the EUT, and its parameters are set to force the EUT transmitting at maximum output power.

3. The RF output of the transmitter is connected to the input of the spectrum analyzer through sufficient attenuation.

4. The center of the spectrum analyzer was set to block edge frequency.

5. Band edge are tested with 1%*cBW (RBW), and sweep point number referred to following formula.

Sweep point number = 2*Span/RBW

VBW=3RBW

6. Record the frequencies and levels of spurious emissions.

5.6.4 Test Result

Please refer to ANNEX A.6.

5.7 Field Strength of Spurious Radiation

5.7.1 Limit

FCC § 2.1053 & 90.691

FCC § 90.691

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log_{10}(f/6.1) decibels or 50 + 10 Log_{10}(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log_{10}(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

5.7.2 Test Setup

The section 4.4.3 and 4.4.4 (Diagram 3, 4) test setup description was used for this test. The photo of test setup please refer to ANNEX B.

5.7.3 Test Procedure

1. On a test site, the EUT shall be placed at 80cm height on a turn table, and in the position close to normal use as declared by the applicant.

2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.

3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.

4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the average bandwidth was set to 1 MHz.

5. The transmitter shall be switched on; the measuring receiver shall be tuned to the frequency of the transmitter under test.

6. The test antenna shall be raised and lowered through the specified range of height until the maximum

signal level is detected by the measuring receiver.

7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.

9. The maximum signal level detected by the measuring receiver shall be noted.

10. The EUT was replaced by half-wave dipole (824 ~ 849 MHz) or horn antenna (1 850 ~ 1 910 MHz) connected to a signal generator.

11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.

13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.

14. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

Final measurement calculation as below:

The relevant equation for determining the ERP/EIRP from the radiated RF output power is:

ERP/EIRP (dBm) = SA Read Value (dBm) + Correction Factor (dB)

where:
ERP/EIRP = effective or equivalent radiated power, in dBm;
SA Read Value = measured transmitter power received by EMI receiver or spectrum analyzer, in dBm;
Correction Factor = total correction factor including cable loss, in dB;

During the test, the data of Correction Factor (dB) is added in the EMI receiver or spectrum analyzer, so SA Read Value (dBm) is the final values which contains the data of Correction Factor (dB).

For example:

In the ERP test, when SA read value for GSM850 is 21dBm, and correction factor is 8dB, then final ERP value for GSM850 is:

ERP (dBm) = 21dBm + 8dB = 29dBm

5.7.4 Test Result

Please refer to ANNEX A.7.

ANNEX A TEST RESULTS

A.1 Effective Radiated Power (ERP)

CDMA2000 Mode Test Data

Radio Config.	Service Option	Test Channel	Conducted Output AV Power (dBm)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	ERP (W)	Limit (W)	Verdict
1xRTT BC10									
RC1	SO2 (Loopback)	LCH	24.84	-3	-5.15	19.69	0.09	100	Pass
		MCH	24.61	-3	-5.15	19.46	0.09	100	Pass
		HCH	24.56	-3	-5.15	19.41	0.09	100	Pass
	SO55 (Loopback)	LCH	24.78	-3	-5.15	19.63	0.09	100	Pass
		MCH	24.58	-3	-5.15	19.43	0.09	100	Pass
		HCH	24.50	-3	-5.15	19.35	0.09	100	Pass
RC2	SO9 (Loopback)	LCH	24.51	-3	-5.15	19.36	0.09	100	Pass
		MCH	24.68	-3	-5.15	19.53	0.09	100	Pass
		HCH	24.61	-3	-5.15	19.46	0.09	100	Pass
	SO55 (Loopback)	LCH	24.53	-3	-5.15	19.38	0.09	100	Pass
		MCH	24.68	-3	-5.15	19.53	0.09	100	Pass
		HCH	24.64	-3	-5.15	19.49	0.09	100	Pass
RC3	SO2 (Loopback)	LCH	24.45	-3	-5.15	19.3	0.09	100	Pass
		MCH	24.68	-3	-5.15	19.53	0.09	100	Pass
		HCH	24.69	-3	-5.15	19.54	0.09	100	Pass
	SO55 (Loopback)	LCH	24.55	-3	-5.15	19.4	0.09	100	Pass
		MCH	24.73	-3	-5.15	19.58	0.09	100	Pass
		HCH	24.61	-3	-5.15	19.46	0.09	100	Pass
RC4	SO2 (Loopback)	LCH	24.50	-3	-5.15	19.35	0.09	100	Pass
		MCH	24.60	-3	-5.15	19.45	0.09	100	Pass
		HCH	24.64	-3	-5.15	19.49	0.09	100	Pass
	SO55 (Loopback)	LCH	24.88	-3	-5.15	19.73	0.09	100	Pass
		MCH	24.63	-3	-5.15	19.48	0.09	100	Pass
		HCH	24.61	-3	-5.15	19.46	0.09	100	Pass
RC5	SO9 (Loopback)	LCH	24.89	-3	-5.15	19.74	0.09	100	Pass
		MCH	24.69	-3	-5.15	19.54	0.09	100	Pass
		HCH	24.58	-3	-5.15	19.43	0.09	100	Pass
	SO55 (Loopback)	LCH	24.86	-3	-5.15	19.71	0.09	100	Pass
		MCH	24.70	-3	-5.15	19.55	0.09	100	Pass
		HCH	24.58	-3	-5.15	19.43	0.09	100	Pass

EVDO Revision	Test Channel	Conducted Output AV Power (dBm)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	ERP (W)	Limit (W)	Verdict
1xEV-DO BC10								
EVDO Rel.0	LCH	24.11	-3	-5.15	18.96	0.08	100	Pass
	MCH	24.08	-3	-5.15	18.93	0.08	100	Pass
	HCH	24.11	-3	-5.15	18.96	0.08	100	Pass
EVDO Rev.A	LCH	24.27	-3	-5.15	19.12	0.08	100	Pass
	MCH	24.20	-3	-5.15	19.05	0.08	100	Pass
	HCH	24.23	-3	-5.15	19.08	0.08	100	Pass

Note 1: ERP/EIRP = P_{Meas} + GT − LC

ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as P_{Meas}, typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

ERP = EIRP – 2.15; where ERP and EIRP are expressed in consistent units.

LTE Mode Test Data

Test BW	Test Channel	Test Mode	Test RB (Size#Offset)	Conducted Output AV Power (dBm)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	ERP (W)	Limit (W)	Verdict
LTE BAND26										
1.4 MHz	LCH	QPSK	RB1#0	23.85	-3	-5.15	18.70	0.07	100	Pass
			RB1#3	23.81	-3	-5.15	18.66	0.07	100	Pass
			RB1#5	23.73	-3	-5.15	18.58	0.07	100	Pass
			RB3#0	23.75	-3	-5.15	18.60	0.07	100	Pass
			RB3#2	23.69	-3	-5.15	18.54	0.07	100	Pass
			RB3#3	23.7	-3	-5.15	18.55	0.07	100	Pass
			RB6#0	22.64	-3	-5.15	17.49	0.06	100	Pass
		16-QAM	RB1#0	22.6	-3	-5.15	17.45	0.06	100	Pass
			RB1#3	22.46	-3	-5.15	17.31	0.05	100	Pass
			RB1#5	22.33	-3	-5.15	17.18	0.05	100	Pass
			RB3#0	22.7	-3	-5.15	17.55	0.06	100	Pass
			RB3#2	22.45	-3	-5.15	17.30	0.05	100	Pass
			RB3#3	22.48	-3	-5.15	17.33	0.05	100	Pass
			RB6#0	21.44	-3	-5.15	16.29	0.04	100	Pass
	MCH	QPSK	RB1#0	23.61	-3	-5.15	18.46	0.07	100	Pass
			RB1#3	23.57	-3	-5.15	18.42	0.07	100	Pass
			RB1#5	23.59	-3	-5.15	18.44	0.07	100	Pass
			RB3#0	23.69	-3	-5.15	18.54	0.07	100	Pass
			RB3#2	23.7	-3	-5.15	18.55	0.07	100	Pass
			RB3#3	23.72	-3	-5.15	18.57	0.07	100	Pass
			RB6#0	22.61	-3	-5.15	17.46	0.06	100	Pass
		16-QAM	RB1#0	22.28	-3	-5.15	17.13	0.05	100	Pass
			RB1#3	23.09	-3	-5.15	17.94	0.06	100	Pass
			RB1#5	22.38	-3	-5.15	17.23	0.05	100	Pass
			RB3#0	22.89	-3	-5.15	17.74	0.06	100	Pass
			RB3#2	22.96	-3	-5.15	17.81	0.06	100	Pass
			RB3#3	22.97	-3	-5.15	17.82	0.06	100	Pass
			RB6#0	21.69	-3	-5.15	16.54	0.05	100	Pass
	HCH	QPSK	RB1#0	23.67	-3	-5.15	18.52	0.07	100	Pass
			RB1#3	23.62	-3	-5.15	18.47	0.07	100	Pass
			RB1#5	23.8	-3	-5.15	18.65	0.07	100	Pass
			RB3#0	23.6	-3	-5.15	18.45	0.07	100	Pass
			RB3#2	23.6	-3	-5.15	18.45	0.07	100	Pass
			RB3#3	23.58	-3	-5.15	18.43	0.07	100	Pass
			RB6#0	22.52	-3	-5.15	17.37	0.05	100	Pass
		16-QAM	RB1#0	22.59	-3	-5.15	17.44	0.06	100	Pass
			RB1#3	22.49	-3	-5.15	17.34	0.05	100	Pass

Test BW	Test Channel	Test Mode	Test RB (Size#Offset)	Conducted Output AV Power (dBm)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	ERP (W)	Limit (W)	Verdict
LTE BAND26										
			RB1#5	22.49	-3	-5.15	17.34	0.05	100	Pass
			RB3#0	22.83	-3	-5.15	17.68	0.06	100	Pass
			RB3#2	22.83	-3	-5.15	17.68	0.06	100	Pass
			RB3#3	22.75	-3	-5.15	17.60	0.06	100	Pass
			RB6#0	21.51	-3	-5.15	16.36	0.04	100	Pass
3 MHz	LCH	QPSK	RB1#0	23.98	-3	-5.15	18.83	0.08	100	Pass
			RB1#7	23.76	-3	-5.15	18.61	0.07	100	Pass
			RB1#14	23.73	-3	-5.15	18.58	0.07	100	Pass
			RB8#0	22.71	-3	-5.15	17.56	0.06	100	Pass
			RB8#4	22.76	-3	-5.15	17.61	0.06	100	Pass
			RB8#7	22.74	-3	-5.15	17.59	0.06	100	Pass
			RB15#0	22.65	-3	-5.15	17.50	0.06	100	Pass
		16-QAM	RB1#0	22.86	-3	-5.15	17.71	0.06	100	Pass
			RB1#7	22.58	-3	-5.15	17.43	0.06	100	Pass
			RB1#14	22.67	-3	-5.15	17.52	0.06	100	Pass
			RB8#0	21.69	-3	-5.15	16.54	0.05	100	Pass
			RB8#4	21.58	-3	-5.15	16.43	0.04	100	Pass
			RB8#7	21.82	-3	-5.15	16.67	0.05	100	Pass
			RB15#0	21.73	-3	-5.15	16.58	0.05	100	Pass
	MCH	QPSK	RB1#0	23.61	-3	-5.15	18.46	0.07	100	Pass
			RB1#7	23.55	-3	-5.15	18.40	0.07	100	Pass
			RB1#14	23.67	-3	-5.15	18.52	0.07	100	Pass
			RB8#0	22.7	-3	-5.15	17.55	0.06	100	Pass
			RB8#4	22.71	-3	-5.15	17.56	0.06	100	Pass
			RB8#7	22.69	-3	-5.15	17.54	0.06	100	Pass
			RB15#0	22.66	-3	-5.15	17.51	0.06	100	Pass
		16-QAM	RB1#0	22.31	-3	-5.15	17.16	0.05	100	Pass
			RB1#7	22.23	-3	-5.15	17.08	0.05	100	Pass
			RB1#14	22.17	-3	-5.15	17.02	0.05	100	Pass
			RB8#0	21.74	-3	-5.15	16.59	0.05	100	Pass
			RB8#4	21.74	-3	-5.15	16.59	0.05	100	Pass
			RB8#7	21.75	-3	-5.15	16.60	0.05	100	Pass
			RB15#0	21.67	-3	-5.15	16.52	0.04	100	Pass
	HCH	QPSK	RB1#0	23.71	-3	-5.15	18.56	0.07	100	Pass
			RB1#7	23.71	-3	-5.15	18.56	0.07	100	Pass
			RB1#14	23.79	-3	-5.15	18.64	0.07	100	Pass
			RB8#0	22.65	-3	-5.15	17.50	0.06	100	Pass
			RB8#4	22.69	-3	-5.15	17.54	0.06	100	Pass
			RB8#7	22.55	-3	-5.15	17.40	0.05	100	Pass

Test BW	Test Channel	Test Mode	Test RB (Size#Offset)	Conducted Output AV Power (dBm)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	ERP (W)	Limit (W)	Verdict
LTE BAND26										
			RB15#0	22.57	-3	-5.15	17.42	0.06	100	Pass
		16-QAM	RB1#0	22.63	-3	-5.15	17.48	0.06	100	Pass
			RB1#7	22.55	-3	-5.15	17.40	0.05	100	Pass
			RB1#14	22.39	-3	-5.15	17.24	0.05	100	Pass
			RB8#0	21.52	-3	-5.15	16.37	0.04	100	Pass
			RB8#4	21.55	-3	-5.15	16.40	0.04	100	Pass
			RB8#7	21.49	-3	-5.15	16.34	0.04	100	Pass
			RB15#0	21.54	-3	-5.15	16.39	0.04	100	Pass
5 MHz	LCH	QPSK	RB1#0	23.81	-3	-5.15	18.66	0.07	100	Pass
			RB1#13	23.8	-3	-5.15	18.65	0.07	100	Pass
			RB1#24	23.55	-3	-5.15	18.40	0.07	100	Pass
			RB12#0	22.62	-3	-5.15	17.47	0.06	100	Pass
			RB12#6	22.72	-3	-5.15	17.57	0.06	100	Pass
			RB12#13	22.69	-3	-5.15	17.54	0.06	100	Pass
			RB25#0	22.66	-3	-5.15	17.51	0.06	100	Pass
		16-QAM	RB1#0	22.18	-3	-5.15	17.03	0.05	100	Pass
			RB1#13	22.21	-3	-5.15	17.06	0.05	100	Pass
			RB1#24	22.17	-3	-5.15	17.02	0.05	100	Pass
			RB12#0	21.86	-3	-5.15	16.71	0.05	100	Pass
			RB12#6	21.84	-3	-5.15	16.69	0.05	100	Pass
			RB12#13	21.72	-3	-5.15	16.57	0.05	100	Pass
			RB25#0	21.75	-3	-5.15	16.60	0.05	100	Pass
	MCH	QPSK	RB1#0	23.62	-3	-5.15	18.47	0.07	100	Pass
			RB1#13	23.77	-3	-5.15	18.62	0.07	100	Pass
			RB1#24	23.53	-3	-5.15	18.38	0.07	100	Pass
			RB12#0	22.68	-3	-5.15	17.53	0.06	100	Pass
			RB12#6	22.65	-3	-5.15	17.50	0.06	100	Pass
			RB12#13	22.64	-3	-5.15	17.49	0.06	100	Pass
			RB25#0	22.62	-3	-5.15	17.47	0.06	100	Pass
		16-QAM	RB1#0	22.6	-3	-5.15	17.45	0.06	100	Pass
			RB1#13	22.26	-3	-5.15	17.11	0.05	100	Pass
			RB1#24	22.17	-3	-5.15	17.02	0.05	100	Pass
			RB12#0	21.52	-3	-5.15	16.37	0.04	100	Pass
			RB12#6	21.49	-3	-5.15	16.34	0.04	100	Pass
			RB12#13	21.58	-3	-5.15	16.43	0.04	100	Pass
			RB25#0	21.76	-3	-5.15	16.61	0.05	100	Pass
	HCH	QPSK	RB1#0	23.65	-3	-5.15	18.50	0.07	100	Pass
			RB1#13	23.76	-3	-5.15	18.61	0.07	100	Pass
			RB1#24	23.8	-3	-5.15	18.65	0.07	100	Pass

Test BW	Test Channel	Test Mode	Test RB (Size#Offset)	Conducted Output AV Power (dBm)	Antenna Gain (dBi)	Antenna Gain (dBd)	ERP (dBm)	ERP (W)	Limit (W)	Verdict
LTE BAND26										
			RB12#0	22.62	-3	-5.15	17.47	0.06	100	Pass
			RB12#6	22.58	-3	-5.15	17.43	0.06	100	Pass
			RB12#13	22.57	-3	-5.15	17.42	0.06	100	Pass
			RB25#0	22.67	-3	-5.15	17.52	0.06	100	Pass
		16-QAM	RB1#0	23.01	-3	-5.15	17.86	0.06	100	Pass
			RB1#13	22.35	-3	-5.15	17.20	0.05	100	Pass
			RB1#24	22.36	-3	-5.15	17.21	0.05	100	Pass
			RB12#0	21.64	-3	-5.15	16.49	0.04	100	Pass
			RB12#6	21.61	-3	-5.15	16.46	0.04	100	Pass
			RB12#13	21.54	-3	-5.15	16.39	0.04	100	Pass
			RB25#0	21.56	-3	-5.15	16.41	0.04	100	Pass
10 MHz	MCH	QPSK	RB1#0	23.55	-3	-5.15	18.40	0.07	100	Pass
			RB1#25	23.55	-3	-5.15	18.40	0.07	100	Pass
			RB1#49	23.59	-3	-5.15	18.44	0.07	100	Pass
			RB25#0	22.69	-3	-5.15	17.54	0.06	100	Pass
			RB25#13	22.62	-3	-5.15	17.47	0.06	100	Pass
			RB25#25	22.67	-3	-5.15	17.52	0.06	100	Pass
			RB50#0	22.75	-3	-5.15	17.60	0.06	100	Pass
		16-QAM	RB1#0	22.81	-3	-5.15	17.66	0.06	100	Pass
			RB1#25	22.76	-3	-5.15	17.61	0.06	100	Pass
			RB1#49	22.72	-3	-5.15	17.57	0.06	100	Pass
			RB25#0	21.66	-3	-5.15	16.51	0.04	100	Pass
			RB25#13	21.6	-3	-5.15	16.45	0.04	100	Pass
			RB25#25	21.55	-3	-5.15	16.40	0.04	100	Pass
			RB50#0	21.61	-3	-5.15	16.46	0.04	100	Pass
15 MHz	LCH	QPSK	RB1#0	23.87	-3	-5.15	18.72	0.07	100	Pass
			RB1#38	23.64	-3	-5.15	18.49	0.07	100	Pass
			RB1#74	23.68	-3	-5.15	18.53	0.07	100	Pass
			RB36#0	22.62	-3	-5.15	17.47	0.06	100	Pass
			RB36#19	22.66	-3	-5.15	17.51	0.06	100	Pass
			RB36#39	22.61	-3	-5.15	17.46	0.06	100	Pass
			RB75#0	22.65	-3	-5.15	17.50	0.06	100	Pass
		16-QAM	RB1#0	22.67	-3	-5.15	17.52	0.06	100	Pass
			RB1#38	22.6	-3	-5.15	17.45	0.06	100	Pass
			RB1#74	22.9	-3	-5.15	17.75	0.06	100	Pass
			RB36#0	21.64	-3	-5.15	16.49	0.04	100	Pass
			RB36#19	21.72	-3	-5.15	16.57	0.05	100	Pass
			RB36#39	21.59	-3	-5.15	16.44	0.04	100	Pass
			RB75#0	21.56	-3	-5.15	16.41	0.04	100	Pass

A.2 Peak to Average Ratio

Note 1: Test plots please refer to the document “Annex No.: BL-SZ1870354-501 Data Part 1.pdf”.

CDMA2000 Mode Test Data

Test Band	Test Channel	Peak to Average Ratio (dB)	Limit (dB)	Refer to Plot[Note1]	Verdict
1xRTT BC10	LCH	3.54	13	1.1	Pass
	MCH	2.99	13	1.2	Pass
	HCH	2.87	13	1.3	Pass
1xEV-DO BC10	LCH	4.17	13	2.1	Pass
	MCH	3.57	13	2.2	Pass
	HCH	3.28	13	2.3	Pass

LTE Mode Test Data

Test Band	Test Bandwidth	Test Channel	Test Mode	Test RB (Size#Offset)	Peak to Average Ratio (dB)	Limit (dB)	Refer to Plot[Note1]	Verdict
LTE Band 26	10 MHz	MCH	QPSK	RB1#0	4.23	13	3.1	Pass
				RB50#0	4.58	13	3.2	Pass
			16-QAM	RB1#0	5.13	13	3.3	Pass
				RB50#0	5.54	13	3.4	Pass

A.3 Occupied Bandwidth

Note 1: Test plots please refer to the document “Annex No.: BL-SZ1870354-501 Data Part 2.pdf”.

CDMA2000 Mode Test Data

Test Band	Test Channel	Measured 99% Occupied Bandwidth (MHz)	Measured -26 dB Occupied Bandwidth (MHz)	Refer to Plot[Note1]
1xRTT BC10	LCH	1.279951	1.443083	1.1
	MCH	1.292726	1.577912	1.2
	HCH	1.292887	1.547035	1.3
1xEV-DO BC10	LCH	1.273413	1.439994	2.1
	MCH	1.280766	1.449363	2.2
	HCH	1.286593	1.734802	2.3

LTE Mode Test Data

Test Band	Test Bandwidth	Test Channel	Test Mode	Test RB (Size#Offset)	Measured 99% Occupied Bandwidth (MHz)	Measured -26 dB Occupied Bandwidth (MHz)	Refer to Plot[Note1]
Band 26	1.4 MHz	LCH	QPSK	RB6#0	1.09	1.27	3.1
			16-QAM	RB6#0	1.09	1.3	3.2
		MCH	QPSK	RB6#0	1.09	1.29	3.3
			16-QAM	RB6#0	1.09	1.28	3.4
		HCH	QPSK	RB6#0	1.09	1.27	3.5
			16-QAM	RB6#0	1.09	1.29	3.6
	3 MHz	LCH	QPSK	RB15#0	2.7	2.97	3.7
			16-QAM	RB15#0	2.7	2.98	3.8
		MCH	QPSK	RB15#0	2.7	2.99	3.9
			16-QAM	RB15#0	2.7	2.99	3.10
		HCH	QPSK	RB15#0	2.7	2.99	3.11
			16-QAM	RB15#0	2.7	3	3.12
	5 MHz	LCH	QPSK	RB25#0	4.51	4.99	3.13
			16-QAM	RB25#0	4.49	4.96	3.14
		MCH	QPSK	RB25#0	4.48	5.01	3.15
			16-QAM	RB25#0	4.51	5	3.16
		HCH	QPSK	RB25#0	4.49	4.98	3.17
			16-QAM	RB25#0	4.5	5.04	3.18
	10 MHz	MCH	QPSK	RB50#0	8.94	9.91	3.19
			16-QAM	RB50#0	8.95	9.79	3.20
	15 MHz	LCH	QPSK	RB75#0	13.4	14.66	3.21
			16-QAM	RB75#0	13.4	14.62	3.22

A.4 Frequency Stability

CDMA2000 1xRTT BC10

Test Conditions		Frequency Deviation						Verdict
Power (VDC)	Temperature (°C)	LCH 817.9 MHz		MCH 820.5 MHz		HCH 823.1 MHz		
		Value (Hz)	Limits (Hz)	Value (Hz)	Limits (Hz)	Value (Hz)	Limits (Hz)	
3.8	-15	0.22	±2044.75	2.71	±2051.25	1.45	±2057.75	Pass
	-10	2.56		-2.56		2.27		
	0	-0.22		1.54		5.64		
	10	-1.46		-0.51		-0.03		
	20	0.73		-0.95		1.76		
	30	3.66		1.17		-1.25		
	40	-1.19		2.05		-2.56		
	50	-2.34		-0.44		-0.45		
	55	1.98		2.27		4.56		
3.5	+25	4.32		5.32		3.67		
4.4	+25	5.43		3.65		4.56		

CDMA2000 1xEV-DO BC10

Test Conditions		Frequency Deviation						Verdict
Power (VDC)	Temperature (°C)	LCH 817.9 MHz		MCH 820.5 MHz		HCH 823.1 MHz		
		Value (Hz)	Limits (Hz)	Value (Hz)	Limits (Hz)	Value (Hz)	Limits (Hz)	
3.8	-15	2.42	±2044.75	1.83	±2051.25	-2.2	±2057.75	Pass
	-10	1.54		-0.89		0.59		
	0	4.25		3.08		-0.37		
	10	2.95		-1.46		1.98		
	20	0.66		1.9		-1.03		
	30	4.75		-0.33		0.81		
	40	3.67		2.76		-1.39		
	50	1.46		1.75		2.27		
	55	4.69		3.15		1.83		
3.5	+25	6.57		4.25		-2.27		
4.4	+25	6.43		5.33		-1.64		

LTE Band 26 QPSK 10 MHz

Test Conditions		Frequency Deviation		Verdict
Power (VDC)	Temperature (°C)	MCH 819 MHz		
		Value (Hz)	Limits (Hz)	
3.8	-15	-0.79	±2047.5	Pass
	-10	-1.5		
	0	-1.97		
	10	-1.56		
	20	-1.12		
	30	-1.26		
	40	-1.87		
	50	-2.25		
	55	-1.75		
3.5	+25	-1.85		
4.4	+25	-1.14		

LTE Band 26 16QAM 10 MHz

Test Conditions		Frequency Deviation		Verdict
Power (VDC)	Temperature (°C)	MCH 819 MHz		
		Value (Hz)	Limits (Hz)	
3.8	-15	-2.13	±2047.5	Pass
	-10	-0.9		
	0	-1.43		
	10	-0.74		
	20	-2.45		
	30	-1.44		
	40	-2.16		
	50	-1.73		
	55	-1.29		
3.5	+25	-2.12		
4.4	+25	-1.86		

A.5 Spurious Emission at Antenna Terminals

Note 1: The frequencies of verdict which are marked by "N/A" should be ignored because they are UE carrier frequency.

Note 2: Test plots please refer to the document “Annex No.: BL-SZ1870354-501 Data Part 3.pdf”.

CDMA2000 Mode Test Verdict

Test Band	Test Channel	Refer to Plot[Note2]	Verdict
1xRTT BC10	LCH	1.1	Pass
	MCH	1.2	Pass
	HCH	1.3	Pass
1xEV-DO BC10	LCH	2.1	Pass
	MCH	2.2	Pass
	HCH	2.3	Pass

LTE Mode Test Verdict

Test Band	Test Bandwidth	Test Channel	Test Mode	Test RB (Size#Offset)	Refer to Plot[Note2]	Verdict
Band 26	1.4 MHz	LCH	QPSK	RB1#0	3.1	Pass
			16-QAM	RB1#0	3.2	Pass
		MCH	QPSK	RB1#0	3.3	Pass
			16-QAM	RB1#0	3.4	Pass
		HCH	QPSK	RB1#0	3.5	Pass
			16-QAM	RB1#0	3.6	Pass
	3 MHz	LCH	QPSK	RB1#0	3.7	Pass
			16-QAM	RB1#0	3.8	Pass
		MCH	QPSK	RB1#0	3.9	Pass
			16-QAM	RB1#0	3.10	Pass
		HCH	QPSK	RB1#0	3.11	Pass
			16-QAM	RB1#0	3.12	Pass
	5 MHz	LCH	QPSK	RB1#0	3.13	Pass
			16-QAM	RB1#0	3.14	Pass
		MCH	QPSK	RB1#0	3.15	Pass
			16-QAM	RB1#0	3.16	Pass
		HCH	QPSK	RB1#0	3.17	Pass
			16-QAM	RB1#0	3.18	Pass
	10 MHz	MCH	QPSK	RB1#0	3.19	Pass
			16-QAM	RB1#0	3.20	Pass
	15 MHz	LCH	QPSK	RB1#0	3.21	Pass
			16-QAM	RB1#0	3.22	Pass

A.6 Band Edge

Note 1: Test plots please refer to the document “Annex No.: BL-SZ1870354-501 Data Part 4.pdf”.

CDMA2000 Mode Test Verdict

Test Band	Test Channel	Refer to Plot[Note1]	Verdict
1xRTT BC10	LCH	1.1	Pass
	HCH	1.2	Pass
1xEV-DO BC10	LCH	2.1	Pass
	HCH	2.2	Pass

LTE Mode Test Verdict

Test Band	Test Bandwidth	Test Channel	Test Mode	Test RB (Size#Offset)	Refer to Plot[Note1]		Verdict
					In-band	Out-of-band	
Band 26	1.4 MHz	LCH	QPSK	RB1#0	3.1	4.1	Pass
				RB6#0	3.2	4.2	Pass
			16-QAM	RB1#0	3.3	4.3	Pass
				RB6#0	3.4	4.4	Pass
		HCH	QPSK	RB1#5	3.5	4.5	Pass
				RB6#0	3.6	4.6	Pass
			16-QAM	RB1#5	3.7	4.7	Pass
				RB6#0	3.8	4.8	Pass
	3 MHz	LCH	QPSK	RB1#0	3.9	4.9	Pass
				RB15#0	3.10	4.10	Pass
			16-QAM	RB1#0	3.11	4.11	Pass
				RB15#0	3.12	4.12	Pass
		HCH	QPSK	RB1#14	3.13	4.13	Pass
				RB15#0	3.14	4.14	Pass
			16-QAM	RB1#14	3.15	4.15	Pass
				RB15#0	3.16	4.16	Pass
	5 MHz	LCH	QPSK	RB1#0	3.17	4.17	Pass
				RB25#0	3.18	4.18	Pass
			16-QAM	RB1#0	3.19	4.19	Pass
				RB25#0	3.20	4.20	Pass
		HCH	QPSK	RB1#24	3.21	4.21	Pass
				RB25#0	3.22	4.22	Pass
			16-QAM	RB1#24	3.23	4.23	Pass
				RB25#0	3.24	4.24	Pass
	10 MHz	MCH	QPSK	RB1#0	3.25	4.25	Pass
				RB50#0	3.26	4.26	Pass
			16-QAM	RB1#0	3.27	4.27	Pass

Test Band	Test Bandwidth	Test Channel	Test Mode	Test RB (Size#Offset)	Refer to Plot[Note1]		Verdict
					In-band	Out-of-band	
				RB50#0	3.28	4.28	Pass
		MCH	QPSK	RB1#49	3.29	4.29	Pass
				RB50#0	3.30	4.30	Pass
			16-QAM	RB1#49	3.31	4.31	Pass
				RB50#0	3.32	4.32	Pass
	15 MHz	LCH	QPSK	RB1#0	3.33	4.33	Pass
				RB75#0	3.34	4.34	Pass
			16-QAM	RB1#0	3.35	4.35	Pass
				RB75#0	3.36	4.36	Pass

A.7 Field Strength of Spurious Radiation

Note 1: The frequencies of verdict which are marked by "N/A" should be ignored because they are UE carrier frequency.

Note 2: Test plots please refer to the document “Annex No.: BL-SZ1870354-501 Data Part 5.pdf”.

CDMA2000 Mode Test Verdict

Test Band	Test Channel	Refer to Plot[Note2]	Verdict
1xRTT BC10	LCH	1.1	Pass
	MCH	1.2	Pass
	HCH	1.3	Pass
1xEV-DO BC10	LCH	2.1	Pass
	MCH	2.2	Pass
	HCH	2.3	Pass

LTE Mode Test Verdict

Test Band	Test Bandwidth	Test Channel	Test Mode	Test RB (Size#Offset)	Refer to Plot[Note2]	Verdict
Band 26	1.4 MHz	MCH	QPSK	RB1#0	3.1	Pass
	3 MHz	MCH	QPSK	RB1#0	3.2	Pass
	5 MHz	MCH	QPSK	RB1#0	3.3	Pass
	10 MHz	MCH	QPSK	RB1#0	3.4	Pass

ANNEX B TEST SETUP PHOTOS

Please refer to the document “BL-SZ1870354-AR.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer to the document “BL- SZ1870354-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer to the document “BL- SZ1870354-AI.PDF”.

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