

FCC RF Test Report

APPLICANT	:	Huawei Technologies Co.,Ltd.
EQUIPMENT	:	LTE CPE
BRAND NAME	:	HUAWEI
MODEL NAME	:	B311-520
FCC ID	:	QISB311-520
STANDARD	:	47 CFR Part 2, 22(H), 24(E), 27(L)
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)

The product was received on Dec. 05, 2018 and completely tested on Jan. 08, 2019. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Shenzhen) Inc., the test report shall not be reproduced except in full.

File Shih

Approved by: Eric Shih / Manager

(R) TESTING NVLAP LAB CODE 600156-0

Sporton International (Shenzhen) Inc. 1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen City, Guangdong Province 518055, China



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REVISION HISTORY

VERSION	DESCRIPTION	ISSUED DATE
Rev. 01	Initial issue of report	Jan. 18, 2019
Rev. 02	Add the test power of DC-HSDPA for reference.	Jan. 23, 2019
	Rev. 01	Rev. 01 Initial issue of report



Report Section	FCC Rule	Description	Limit	Result	Remark
	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§22.913(a)(5)	Effective Radiated Power	< 7 Watts	PASS	-
3.4	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
	§27.50(d)(4)	Conducted Output Power	< 1 Watts	PASS	-
3.5	§24.232(d)	-	< 13 dB	PASS	-
3.6	§2.1049	Occupied Bandwidth	Reporting Only	PASS	-
3.7	§2.1051 §22.917(a) §24.238(a) §27.53(h)	-	< 43+10log10(P[Watts])	PASS	-
3.8	§2.1051 §22.917(a) §24.238(a) §27.53(h)	Conducted Emission	< 43+10log10(P[Watts])	PASS	-
	§2.1055 §22.355		< 2.5 ppm for Part 22		
3.9	§2.1055 §24.235 §27.54	•	Within Authorized Band	PASS	-
4.4	§2.1053 §22.917(a) §24.238(a) §27.53(h)	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 39.76 dB at 3465.20 MHz



1 General Description

1.1 Applicant

Huawei Technologies Co.,Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.2 Manufacturer

Huawei Technologies Co.,Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Product Feature of Equipment Under Test

Product Feature				
Equipment	LTE CPE			
Brand Name	HUAWEI			
Model Name	B311-520			
FCC ID	QISB311-520			
EUT supports Radios application	WCDMA/LTE			
EOT Supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20/HT40			
IMEI Code	Conducted: 867809040001196			
IMELCODE	RSE: 867809040001204			
HW Version	WL3B311SW06			
SW Version	8.0.1.1(H183SP3C00)			
EUT Stage	Identical Prototype			

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



1.4 Product Specification of Equipment Under Test

Standards-related Product Specification					
	WCDMA:				
- -	Band V:	826.4 MHz ~ 846.6 MHz			
Tx Frequency	Band II:	1852.4 MHz ~ 1907.6 MHz			
	Band IV:	1712.4 MHz ~ 1752.6 MHz			
	WCDMA:				
	Band V:	871.4 MHz ~ 891.6 MHz			
Rx Frequency	Band II:	1932.4 MHz ~ 1987.6 MHz			
	Band IV:	2112.4 MHz ~ 2152.6 MHz			
	WCDMA:				
	Band V:	23.15 dBm			
Maximum Output Power to Antenna	Band II:	23.00 dBm			
	Band IV:	22.55 dBm			
	Internal Antenna				
Antenna Type	1dBi External Antenna				
	3dBi External Antenna				
	Internal Main Antenna:				
	Cellular Band: 0.98 dBi				
	PCS Band:	1.08 dBi			
	AWS Band				
		nal Antenna (#1):			
Antenna Gain	Cellular Ba				
	PCS Band:				
	AWS Band				
		nal Antenna (#2):			
	Cellular Ba				
	PCS Band: 3.0 dBi				
	AWS Band	: 3.0 dBi			
	WCDMA: B				
Type of Modulation	HSPA: QPS	-			
	DC-HSDPA	S 64QAM			

Note:

1. There are Internal PCB Antenna and External PCB Antenna that support TX function, but the Internal Antenna will not work when External Antenna is connected.

2. The maximum ERP/EIRP is calculated with the maximum antenna gain from the Internal and External Antennas.



1.5 Accessories List

	Specification of Accessory						
AC Adapter 1	Brand Name	HONOR	Model Name	HW-120100U01/HW-120100E01/ HW-120100B01/HW-120100A01			
	Power Rating	I/P: 100 - 240 V	ac, 0.5A; O/P: 12	/dc, 1.0A			
AC Adapter 2	Brand Name	Fuhua	Model Name	HW-120100U01/HW-120100E01/ HW-120100B01/HW-120100A01			
	Power Rating	I/P: 100 - 240 V	ac, 0.5A; O/P: 12	/dc, 1.0A			

1.6 Modification of EUT

No modifications are made to the EUT during all test items.

1.7 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Type of Modulation	Maximum ERP/EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22	WCDMA Band V RMC 12.2Kbps	BPSK	0.2512	0.0019 ppm	4M16F9W
Part 24	WCDMA Band II HSUPA	BPSK	0.3981	0.0009 ppm	4M15F9W
Part 27	WCDMA Band IV RMC 12.2Kbps	BPSK	0.3589	0.0008 ppm	4M15F9W



1.8 Testing Location

Sporton International (Shenzhen) Inc. is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0).

Test Site	Sporton International (S	Shenzhen) Inc.					
Test Site Location	1/F, 2/F, Bldg 5, Shiling Guangdong Province 5 TEL: +86-755-8637-95 FAX: +86-755-8637-95	18055, China 89	lage, Xili, Nanshan, Shenzhen City,				
Test Site No.	Sporton Site No. TH01-SZ	FCC designation No. CN5018	FCC Test Firm Registration No. 337463				
	11101-52 CN3010 337403						
Test Site	Sporton International (S	Sporton International (Shenzhen) Inc.					
Test Site Location	No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshar District, Shenzhen City, Guangdong Province 518055, China TEL: +86-755- 3320-2398						
Teet Site No	Sporton Site No.	FCC designation No.	FCC Test Firm Registration No.				
Test Site No.	03CH02-SZ	CN5019	577730				

1.9 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2, 22(H), 24(E), 27(L)
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

- 1. All test items were verified and recorded according to the standards and without any deviation during the test.
- **2.** This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

2.1 Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

- 1. 30 MHz to 10th harmonic for WCDMA Band V.
- 2. 30 MHz to 10th harmonic for WCDMA Band IV.
- 3. 30 MHz to 10th harmonic for WCDMA Band II.

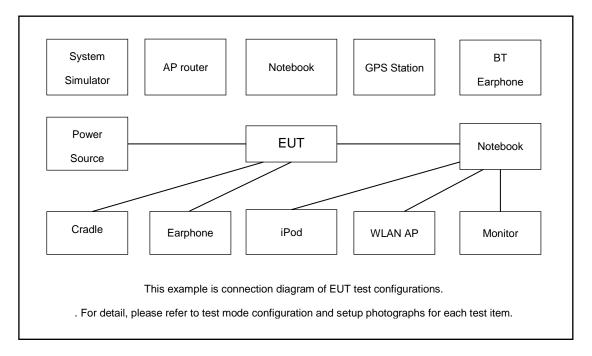
All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

Test Modes					
Band	Radiated TCs	Conducted TCs			
WCDMA Band V	RMC 12.2Kbps Link	RMC 12.2Kbps Link			
WCDMA Band II	RMC 12.2Kbps Link	RMC 12.2Kbps Link			
WCDMA Band IV	RMC 12.2Kbps Link	RMC 12.2Kbps Link			



2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

ltem	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GW INSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.5 dB and a 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.5 + 10 = 14.5 (dB)



2.5 Frequency List of Low/Middle/High Channels

Frequency List						
Band Channel/Frequency(MHz) Lowest Middle Highest						
WCDMA	Channel	4132	4182	4233		
Band V	Frequency	826.4	836.4	846.6		
WCDMA	Channel	9262	9400	9538		
Band II	Frequency	1852.4	1880.0	1907.6		
WCDMA	Channel	1312	1413	1513		
Band IV	Frequency	1712.4	1732.6	1752.6		



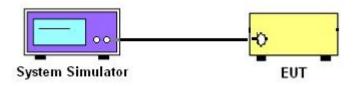
3 Conducted Test Result

3.1 Measuring Instruments

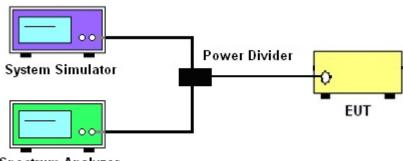
See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 Conducted Output Power

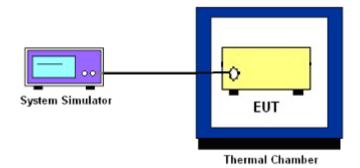


3.2.2 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge and Conducted Spurious Emission



Spectrum Analyzer

3.2.3 Frequency Stability



3.3 Test Result of Conducted Test

Please refer to Appendix A.

Sporton International (Shenzhen) Inc. TEL : 86-755-8637-9589 FAX : 86-755-8637-9595 FCC ID : QISB311-520



3.4 Conducted Output Power and ERP/EIRP

3.4.1 Description of the Conducted Output Power and ERP/EIRP

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

The ERP of mobile transmitters must not exceed 7 Watts for WCDMA Band V.

The EIRP of mobile transmitters must not exceed 2 Watts for WCDMA Band II.

The EIRP of mobile transmitters must not exceed 1 Watts for WCDMA Band IV.

According to KDB 412172 D01 Power Approach,

 $EIRP = P_T + G_T - L_C$, ERP = EIRP - 2.15, where

 P_T = transmitter output power in dBm

 G_T = gain of the transmitting antenna in dBi

 L_{C} = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.4.2 Test Procedures

- 1. The testing follows ANSI C63.26 Section 5.2
- 2. The transmitter output port was connected to the system simulator.
- 3. Set EUT at maximum power through the system simulator.
- 4. Select lowest, middle, and highest channels for each band and different modulation.
- 5. Measure and record the power level from the system simulator.



3.5 Peak-to-Average Ratio

3.5.1 Description of the PAR Measurement

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.5.2 Test Procedures

- 1. The testing follows ANSI C63.26 Section 5.2.3.4 (CCDF).
- 2. The EUT was connected to spectrum and system simulator via a power divider.
- 3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
- 4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
- 5. Record the deviation as Peak to Average Ratio.



3.6 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.6.1 Description of 99% Occupied Bandwidth and 26dB Bandwidth Measurement

The occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

3.6.2 Test Procedures

- 1. The testing follows ANSI C63.26 Section 5.4
- 2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
- The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
- 4. The nominal resolution bandwidth (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.
- 5. Set the detection mode to peak, and the trace mode to max hold.
- 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)
- 7. Determine the "-26 dB down amplitude" as equal to (Reference Value X).
- 8. 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 the "-X dB down amplitude" determined in step 6. 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.
- 9. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.



3.7 Conducted Band Edge

3.7.1 Description of Conducted Band Edge Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P) dB$.

3.7.2 Test Procedures

- 1. The testing follows ANSI C63.26 section 5.7
- 2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
- The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 4. The band edges of low and high channels for the highest RF powers were measured.
- 5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 6. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)



3.8 Conducted Spurious Emission

3.8.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P) dB$.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

3.8.2 Test Procedures

- 1. The testing follows ANSI C63.26 section 5.7
- 2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
- 3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 4. The middle channel for the highest RF power within the transmitting frequency was measured.
- 5. The conducted spurious emission for the whole frequency range was taken.
- 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 7. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)



3.9 Frequency Stability

3.9.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

3.9.2 Test Procedures for Temperature Variation

- 1. The testing follows ANSI C63.26 section 5.6.4
- 2. The EUT was set up in the thermal chamber and connected with the system simulator.
- 3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
- 4. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.9.3 Test Procedures for Voltage Variation

- 1. The testing follows ANSI C63.26 section 5.6.5
- 2. The EUT was placed in a temperature chamber at 20±5°C and connected with the system simulator.
- 3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value for other than hand carried battery equipment.
- 4. For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
- 5. The variation in frequency was measured for the worst case.



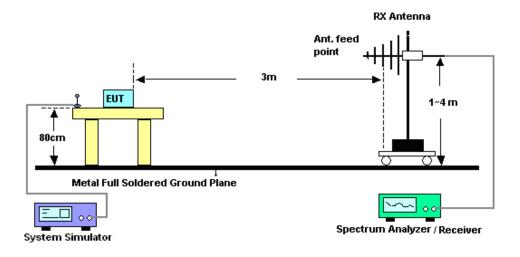
4 Radiated Test Items

4.1 Measuring Instruments

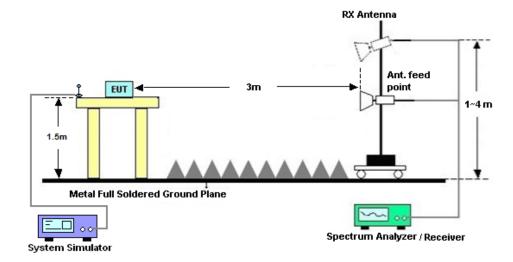
See list of measuring instruments of this test report.

4.2 Test Setup

4.2.1 For radiated test from 30MHz to 1GHz



4.2.2 For radiated test above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

4.4 Field Strength of Spurious Radiation Measurement

4.4.1 Description of Field Strength of Spurious Radiated Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

- 1. The testing follows ANSI C63.26 Section 5.5
- 2. The EUT was placed on a rotatable wooden table 0.8 meters for frequency below 1GHz and 1.5 meter for frequency above 1GHz above the ground.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
- 4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
- 5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
- 6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
- 7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
- 8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
- 9. Taking the record of output power at antenna port.
- 10. Repeat step 7 to step 8 for another polarization.
- 11. EIRP (dBm) = S.G. Power Tx Cable Loss + Tx Antenna Gain
- 12. ERP (dBm) = EIRP 2.15
- 13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 14. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)



5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	Apr. 19, 2018	Jan. 07, 2019~ Jan. 08, 2019	Apr. 18, 2019	Conducted (TH01-SZ)
DC Power Supply	GWINSTEK	AnritsuGPS- 3030D	EM882636	Max 30V	Apr. 19, 2018	Jan. 07, 2019~ Jan. 08, 2019	Apr. 18, 2019	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Dec. 22, 2018	Jan. 07, 2019~ Jan. 08, 2019	Dec. 21, 2019	Conducted (TH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Apr. 19, 2018	Dec. 31, 2018	Apr. 18, 2019	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	May 10, 2018	Dec. 31, 2018	May 09, 2019	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1285	1GHz~18GHz	Dec. 12, 2018	Dec. 31, 2018	Dec. 11, 2019	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Mar. 30, 2018	Dec. 31, 2018	Mar. 29, 2019	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35 -HG	1871923	18GHz~40GHz	Jul. 30, 2018	Dec. 31, 2018	Jul. 29, 2019	Radiation (03CH02-SZ)
LF Amplifier	Burgeon	BPA-530	102211	0.01~3000Mhz	Oct. 20, 2018	Dec. 31, 2018	Oct. 19, 2019	Radiation (03CH02-SZ)
HF Amplifier	Agilent	8449B	3008A01023	1GHz~26.5GHz	Oct. 20, 2018	Dec. 31, 2018	Oct. 19, 2019	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	61601000247 0	N/A	NCR	Dec. 31, 2018	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	Dec. 31, 2018	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	Dec. 31, 2018	NCR	Radiation (03CH02-SZ)

NCR: No Calibration Required



6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.5dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.3dB
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of	3.7dB
Confidence of 95% (U = 2Uc(y))	3.70B



Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)									
Band	WC	MA Ba	nd V	WCDMA Band II			WCDMA Band IV		
Channel	4132	4182	4233	9262	9400	9538	1312	1413	1513
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6	1712.4	1732.6	1752.6
RMC 12.2K	23.15	23.02	23.00	22.80	22.70	23.00	22.39	22.55	22.34
HSDPA Subtest-1	23.15	23.00	23.02	22.82	22.59	22.87	22.30	22.43	22.31
HSDPA Subtest-2	23.08	22.97	22.91	22.78	22.55	22.83	22.24	22.36	22.24
HSDPA Subtest-3	22.43	22.34	22.29	22.15	22.01	22.34	21.70	21.86	21.72
HSDPA Subtest-4	22.45	22.34	22.30	22.13	22.01	22.33	21.70	21.87	21.74
DC-HSDPA Subtest-1	23.14	23.11	23.04	22.53	22.56	22.57	22.36	22.47	22.34
DC-HSDPA Subtest-2	23.10	23.09	23.05	22.51	22.55	22.56	22.33	22.45	22.30
DC-HSDPA Subtest-3	22.52	22.57	22.52	22.02	22.01	22.04	21.80	21.96	21.77
DC-HSDPA Subtest-4	22.56	22.60	22.49	22.01	22.03	22.00	21.79	21.94	21.77
HSUPA Subtest-1	21.94	21.93	22.35	21.81	21.98	22.43	21.00	21.24	21.54
HSUPA Subtest-2	19.96	19.93	19.61	19.72	19.53	19.72	19.12	19.63	19.05
HSUPA Subtest-3	20.89	20.70	20.50	20.51	20.95	20.62	20.06	20.14	19.92
HSUPA Subtest-4	19.86	19.71	20.46	20.25	19.88	19.56	19.35	19.54	19.25
HSUPA Subtest-5	23.14	23.10	23.10	22.50	22.65	22.67	22.30	22.50	22.40



ERP/EIRP

WCDMA Band V (G_T - L_c = 3.0 dB)						
Channel	4132	4182	4233			
Channel	(Low)	(Mid)	(High)			
Frequency	000 4	000 4	946.6			
(MHz)	826.4	836.4	846.6			
Conducted Power (dBm)	23.15	23.02	23.00			
Conducted Power (Watts)	0.2065	0.2004	0.1995			
ERP(dBm)	24.00	23.87	23.85			
ERP(Watts)	0.2512	0.2438	0.2427			

WCDMA Band II (G_T - L_c = 3.0 dB)					
Channel	9262	9400	9538		
Cnannei	(Low)	(Mid)	(High)		
Frequency	1852.4	1880	1907.6		
(MHz)	1052.4	1000	1907.6		
Conducted Power (dBm)	22.80	22.70	23.00		
Conducted Power (Watts)	0.1905	0.1862	0.1995		
EIRP(dBm)	25.80	25.70	26.00		
EIRP(Watts)	0.3802	0.3715	0.3981		

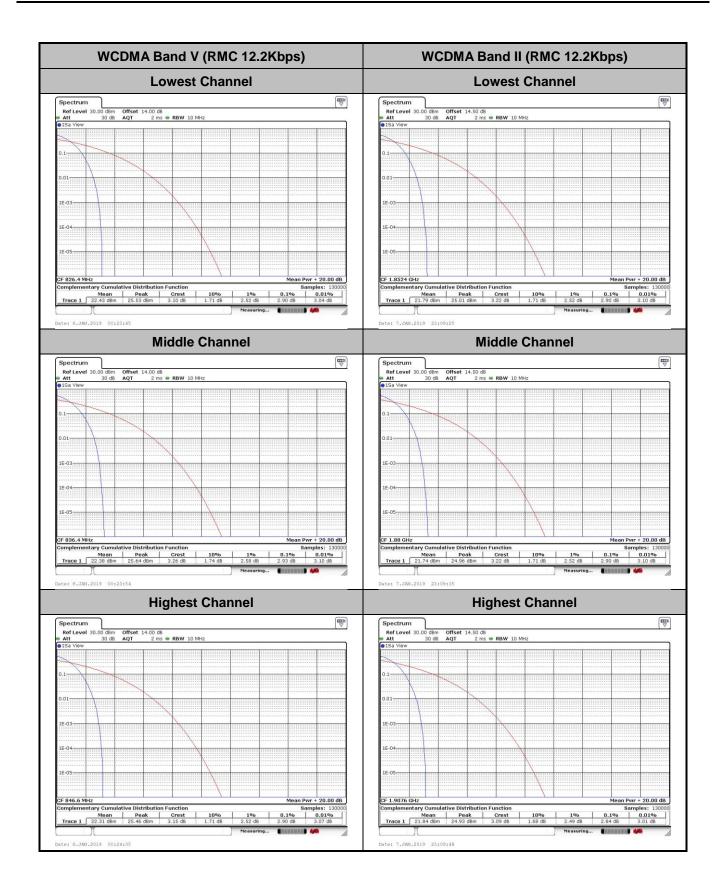
WCDMA Band IV ($G_T - L_c = 3.0 \text{ dB}$)						
Channel	1312	1413	1513			
	(Low)	(Mid)	(High)			
Frequency	1712.4	1732.6	1752.6			
(MHz)	1712.4	1732.0	1752.0			
Conducted Power (dBm)	22.39	22.55	22.34			
Conducted Power (Watts)	0.1734	0.1799	0.1714			
EIRP(dBm)	25.39	25.55	25.34			
EIRP(Watts)	0.3459	0.3589	0.3420			



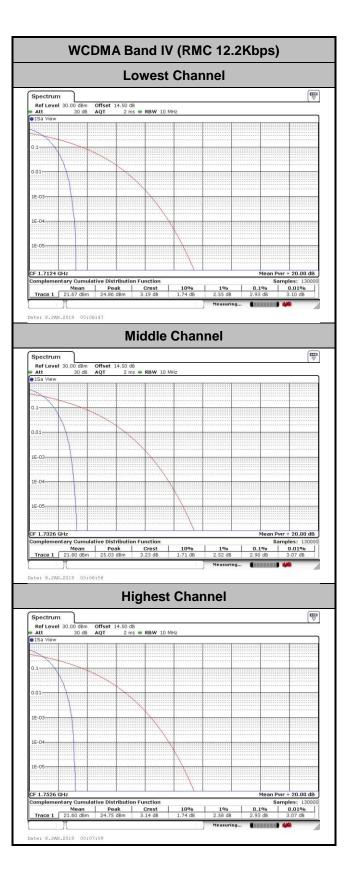
Peak-to-Average Ratio

Mode	WCDMA Band V(dB)	WCDMA Band II(dB)	WCDMA Band IV(dB)	Limit: 13dB
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps	Result
Lowest CH	2.90	2.90	2.93	
Middle CH	2.93	2.90	2.90	PASS
Highest CH	2.90	2.84	2.93	









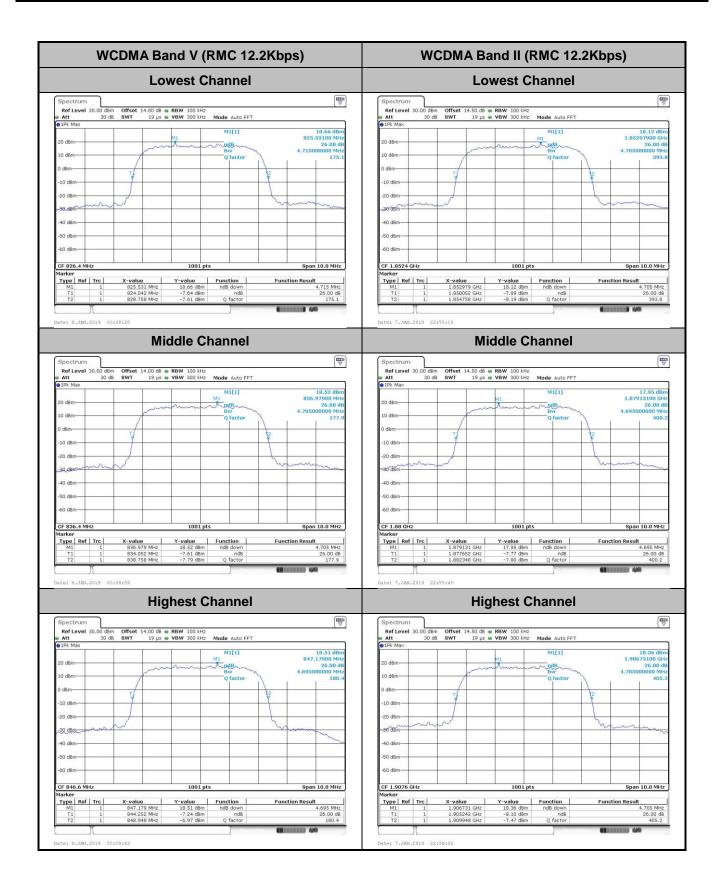
Sporton International (Shenzhen) Inc. TEL : 86-755-8637-9589 FAX : 86-755-8637-9595 FCC ID : QISB311-520



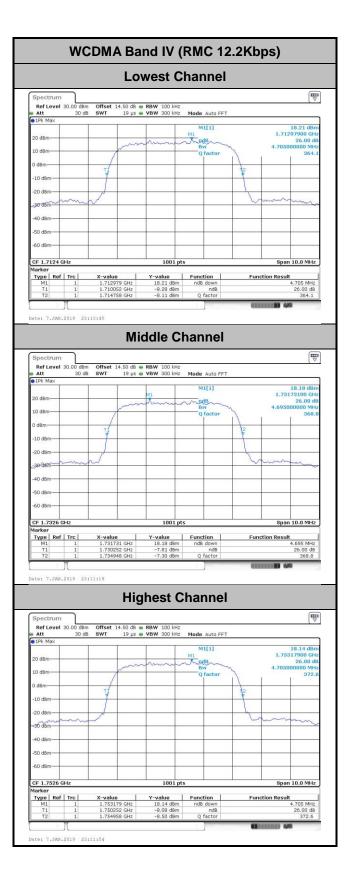
26dB Bandwidth

Mode	WCDMA Band V(MHz)	WCDMA Band II(MHz)	WCDMA Band IV(MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.72	4.71	4.71
Middle CH	4.71	4.70	4.70
Highest CH	4.70	4.71	4.71











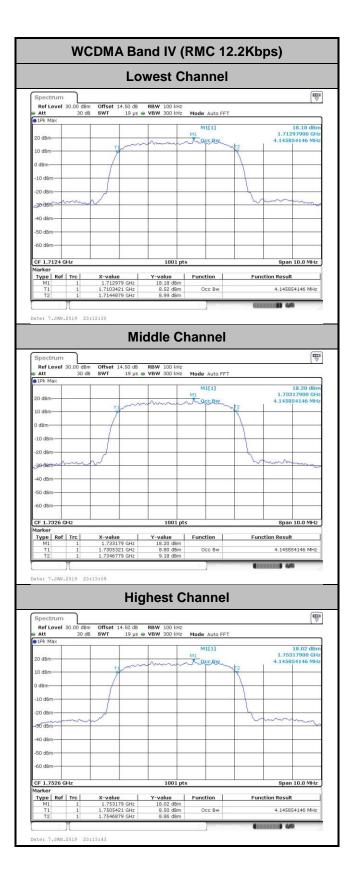
Occupied Bandwidth

Mode	WCDMA Band V(MHz)	WCDMA Band II(MHz)	WCDMA Band IV(MHz)
Mod.	RMC 12.2Kbps	RMC 12.2Kbps	RMC 12.2Kbps
Lowest CH	4.16	4.15	4.15
Middle CH	4.15	4.15	4.15
Highest CH	4.14	4.15	4.15



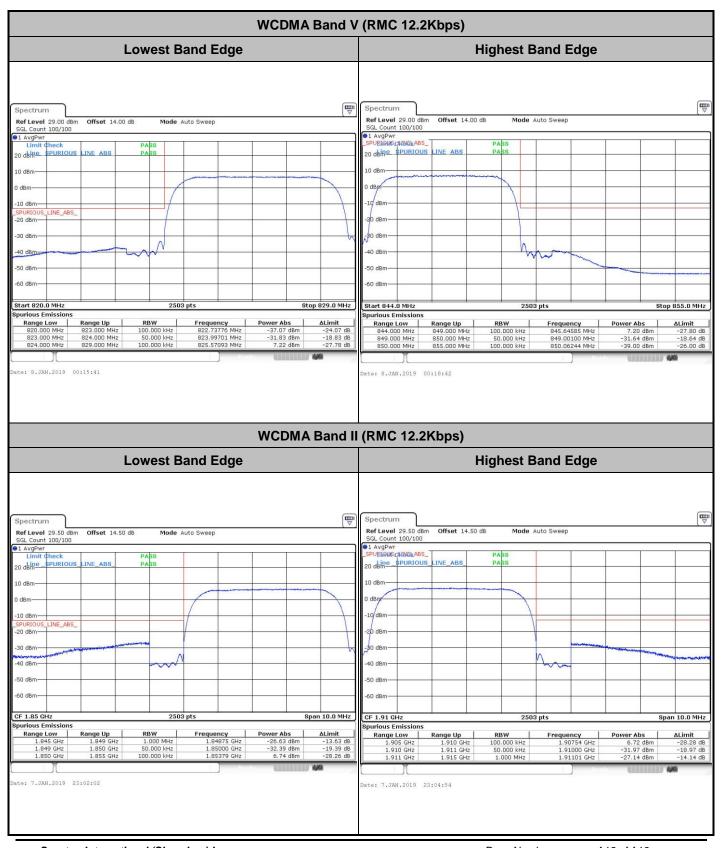




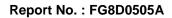




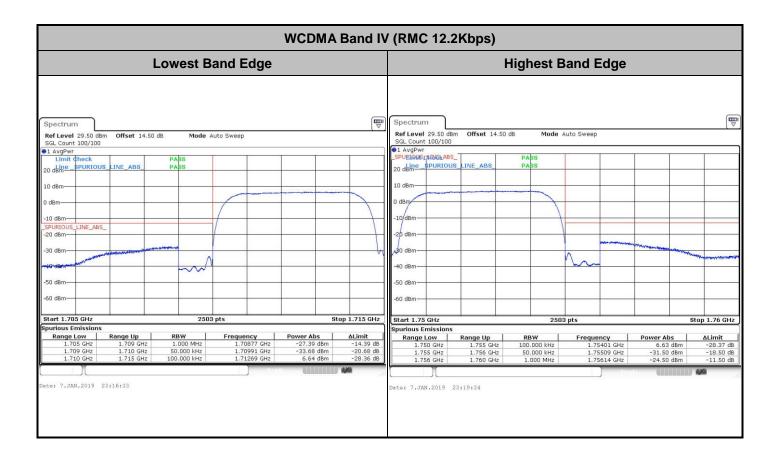
Conducted Band Edge



Sporton International (Shenzhen) Inc. TEL : 86-755-8637-9589 FAX : 86-755-8637-9595 FCC ID : QISB311-520 Page Number : A12 of A18 Report Issued Date : Jan. 23, 2019 Report Version : Rev. 02 Report Template No.: BU5-FG22/24/27 Version 2.0

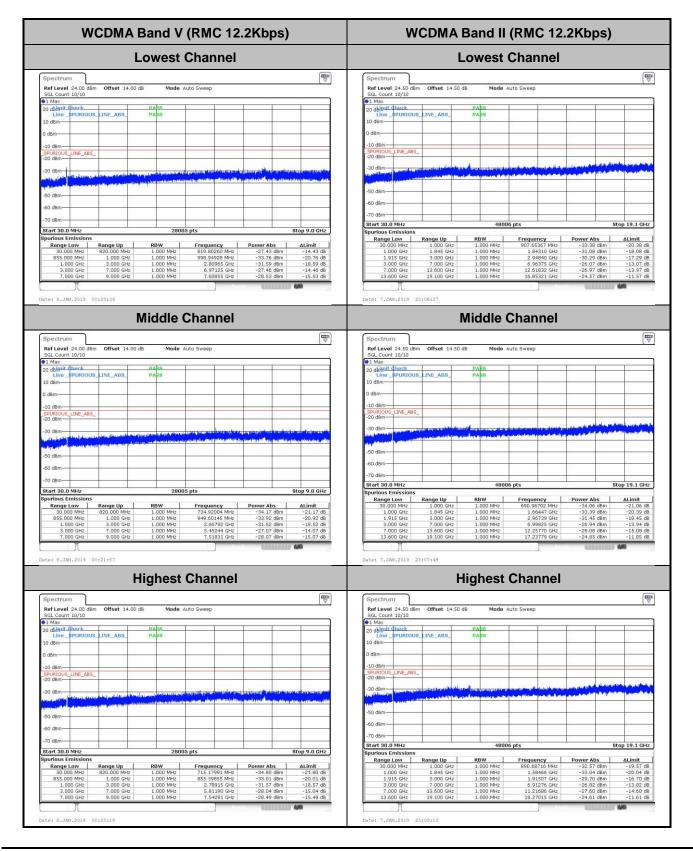








Conducted Spurious Emission



Sporton International (Shenzhen) Inc. TEL : 86-755-8637-9589 FAX : 86-755-8637-9595 FCC ID : QISB311-520 Page Number : A14 of A18 Report Issued Date : Jan. 23, 2019 Report Version : Rev. 02 Report Template No.: BU5-FG22/24/27 Version 2.0



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Spectrum Weil Mode Auto Sweep Sol. Court 10/10 9A bits Mode Auto Sweep 50. Locurt 10/10 9A bits 1 0 Max PA bits 1 0 dbm 1 1 10 dbm 1 1 0 dbm 1 1 10 dbm 1 1 0 dbm 1 1 10 dbm	3.000 GHz 7.000 GHz 13.600 GHz	18.000 GHz	1.000 MHz	16.55769 GHz	-28.13 dBm -24.10 dBm	-15.13 dB -11.10 dB
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13.600 GHz 18.000 GHz 1.000 MHz 16.9463 GHz -24.05 dBm -11.05 dB	3.000 GHz 7.000 GHz 13.600 GHz 13.600 GHz 13.600 GHz 13.600 GHz 13.600 GHz 14 Spectrum Ref Level 30.00 dB SGL Count 10/10 9 Max Limit Check SG	18.000 GHz	1.000 MHz	16.55709 GHz Channel to Sweep	24.10 dbm	-11.10 dB
	3.000 GHz 7.000 GHz 13.600 GHz 13.600 GHz 13.600 GHz 13.600 GHz 13.600 GHz 13.600 GHz 8GL Count 10/10 9 Max Limit Check 20 GHz 10 dBm 10 dBm 20 dBm 20 dBm 20 dBm 30 GHZ 20 dBm 40 dBm 4	18.000 GHz	1.000 MHz	16.55789 GHz Channel Ito Sweep Ito S	24.10 dbm	-11.10 dB



Frequency Stability

Test Conditions	Middle Channel	WCDMA Band V (RMC 12.2Kbps)	Limit 2.5ppm
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0001	
40	Normal Voltage	0.0010	
30	Normal Voltage	0.0019	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0013	
0	Normal Voltage	0.0019	
-10	Normal Voltage	0.0005	PASS
-20	Normal Voltage	0.0014	
-30	Normal Voltage	0.0010	
20	Maximum Voltage	0.0002	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0007	

Note: Normal Voltage = 12 V. ; Battery End Point (BEP) = 10.8 V.; Maximum Voltage = 13.2 V



Test Conditions	Middle Channel	WCDMA Band II (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0007	
40	Normal Voltage	0.0001	
30	Normal Voltage	0.0004	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0009	
0	Normal Voltage	0.0003	
-10	Normal Voltage	0.0002	PASS
-20	Normal Voltage	0.0001	
-30	Normal Voltage	0.0005	
20	Maximum Voltage	0.0001	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0007	

Note:

1. Normal Voltage = 12 V. ; Battery End Point (BEP) = 10.8 V.; Maximum Voltage =13.2 V

2. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.





Test Conditions	Middle Channel	WCDMA Band IV (RMC 12.2Kbps)	Limit Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0002	
40	Normal Voltage	0.0005	
30	Normal Voltage	0.0008	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0007	
0	Normal Voltage	0.0002	
-10	Normal Voltage	0.0001	PASS
-20	Normal Voltage	0.0001	
-30	Normal Voltage	0.0002	
20	Maximum Voltage	0.0008	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0002	

Note:

1. Normal Voltage = 12 V. ; Battery End Point (BEP) = 10.8 V.; Maximum Voltage =13.2 V

2. The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.



Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

	WCDMA Band V(RMC 12.2Kbps) for External Antenna #1												
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)				
	1672.8	-65.11	-13	-52.11	-75.48	-68.36	4.00	9.40	Н				
	2509.2	-65.26	-13	-52.26	-80.24	-68.83	4.88	10.60	Н				
Middle	3345.6	-64.57	-13	-51.57	-81.54	-69.50	5.52	12.60	Н				
Middle	1672.8	-61.33	-13	-48.33	-71.49	-64.58	4.00	9.40	V				
	2509.2	-65.52	-13	-52.52	-80.35	-69.09	4.88	10.60	V				
	3345.6	-64.48	-13	-51.48	-81.45	-69.41	5.52	12.60	V				

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

	WCDMA Band V(RMC 12.2Kbps) for External Antenna #2												
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)				
	1672.8	-66.41	-13	-53.41	-76.78	-69.66	4.00	9.40	Н				
	2509.2	-65.38	-13	-52.38	-80.36	-68.95	4.88	10.60	Н				
Middle	3345.6	-64.29	-13	-51.29	-81.26	-69.22	5.52	12.60	Н				
Middle	1672.8	-61.20	-13	-48.20	-71.36	-64.45	4.00	9.40	V				
	2509.2	-64.91	-13	-51.91	-79.74	-68.48	4.88	10.60	V				
	3345.6	-64.15	-13	-51.15	-81.12	-69.08	5.52	12.60	V				

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

	WCDMA Band V(RMC 12.2Kbps) for Internal Antenna												
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)				
	1672.8	-64.83	-13	-51.83	-75.20	-68.08	4.00	9.40	Н				
	2509.2	-64.21	-13	-51.21	-79.19	-67.78	4.88	10.60	Н				
Middle	3345.6	-64.01	-13	-51.01	-80.98	-68.94	5.52	12.60	Н				
Middle	1672.8	-65.69	-13	-52.69	-75.85	-68.94	4.00	9.40	V				
	2509.2	-64.96	-13	-51.96	-79.79	-68.53	4.88	10.60	V				
	3345.6	-64.03	-13	-51.03	-81.00	-68.96	5.52	12.60	V				

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



	WCDMA Band II(RMC 12.2Kbps) for External Antenna #1												
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)				
	3760	-63.15	-13	-50.15	-81.65	-69.90	5.85	12.60	Н				
	5640	-61.32	-13	-48.32	-83.49	-67.12	7.30	13.10	Н				
Middle	7520	-55.58	-13	-42.58	-83.35	-58.73	8.35	11.50	Н				
Middle	3760	-63.18	-13	-50.18	-81.72	-69.93	5.85	12.60	V				
-	5640	-60.96	-13	-47.96	-83.53	-66.76	7.30	13.10	V				
	7520	-55.99	-13	-42.99	-83.57	-59.14	8.35	11.50	V				

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

	WCDMA Band II(RMC 12.2Kbps) for External Antenna #2											
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)			
	3760	-62.35	-13	-49.35	-80.85	-69.10	5.85	12.60	Н			
	5640	-60.87	-13	-47.87	-83.04	-66.67	7.30	13.10	Н			
Middle	7520	-55.25	-13	-42.25	-83.02	-58.40	8.35	11.50	Н			
Middle	3760	-62.47	-13	-49.47	-81.01	-69.22	5.85	12.60	V			
	5640	-60.38	-13	-47.38	-82.95	-66.18	7.30	13.10	V			
	7520	-55.33	-13	-42.33	-82.91	-58.48	8.35	11.50	V			

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

	WCDMA Band II(RMC 12.2Kbps) for Internal Antenna											
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)			
	3760	-62.84	-13	-49.84	-81.34	-69.59	5.85	12.60	Н			
	5640	-61.24	-13	-48.24	-83.41	-67.04	7.30	13.10	Н			
Middle	7520	-55.45	-13	-42.45	-83.22	-58.60	8.35	11.50	Н			
Middle	3760	-62.67	-13	-49.67	-81.21	-69.42	5.85	12.60	V			
	5640	-60.88	-13	-47.88	-83.45	-66.68	7.30	13.10	V			
	7520	-55.64	-13	-42.64	-83.22	-58.79	8.35	11.50	V			

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



	WCDMA Band IV(RMC 12.2Kbps) for External Antenna #1												
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)				
	3465.2	-52.76	-13	-39.76	-69.88	-59.61	5.65	12.50	Н				
	5197.8	-62.69	-13	-49.69	-84.36	-68.36	7.13	12.80	Н				
Middle	6930.4	-57.45	-13	-44.45	-84.25	-60.85	8.40	11.80	Н				
Middle	3465.2	-59.64	-13	-46.64	-76.79	-66.49	5.65	12.50	V				
	5197.8	-61.79	-13	-48.79	-83.91	-67.46	7.13	12.80	V				
	6930.4	-57.27	-13	-44.27	-84.18	-60.67	8.40	11.80	V				

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

	WCDMA Band IV(RMC 12.2Kbps) for External Antenna #2											
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)			
	3465.2	-54.79	-13	-41.79	-71.91	-61.64	5.65	12.50	Н			
	5197.8	-61.57	-13	-48.57	-83.24	-67.24	7.13	12.80	Н			
Middle	6930.4	-56.39	-13	-43.39	-83.19	-59.79	8.40	11.80	Н			
wilddie	3465.2	-59.62	-13	-46.62	-76.77	-66.47	5.65	12.50	V			
	5197.8	-60.85	-13	-47.85	-82.97	-66.52	7.13	12.80	V			
	6930.4	-56.51	-13	-43.51	-83.42	-59.91	8.40	11.80	V			

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

WCDMA Band IV(RMC 12.2Kbps) for Internal Antenna									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3465.2	-58.89	-13	-45.89	-76.01	-65.74	5.65	12.50	Н
	5197.8	-62.48	-13	-49.48	-84.15	-68.15	7.13	12.80	Н
	6930.4	-57.32	-13	-44.32	-84.12	-60.72	8.40	11.80	Н
	3465.2	-55.71	-13	-42.71	-72.86	-62.56	5.65	12.50	V
	5197.8	-61.99	-13	-48.99	-84.11	-67.66	7.13	12.80	V
	6930.4	-57.23	-13	-44.23	-84.14	-60.63	8.40	11.80	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.