



FCC RADIO TEST REPORT

FCC ID : B94HNI29CPK
Equipment : Notebook Computer
Brand Name : HP
Model Name : HSN-I29C
Applicant : HP Inc.
1501 Page Mill Road, Palo Alto CA 94304 USA
Standard : 47 CFR Part 2, 22(H), 24(E), 27(L)

The product was received on Mar. 20, 2019 and testing was started from Mar. 28, 2019 and completed on Apr. 16, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Jones Tsai

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FG912412-01A	01	Initial issue of report	Apr. 25, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Pass	-
	§22.913 (a)(2)	Effective Radiated Power		
	§24.232 (c)	Equivalent Isotropic Radiated Power		
	§27.50 (d)(4)	Equivalent Isotropic Radiated Power		
4.4	§2.1053 §22.917 (a) §24.238 (a) §27.53 (h)	Field Strength of Spurious Radiation	Pass	Under limit 33.02 dB at 5135.000 MHz

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Yimin Ho



1 General Description

1.1 Product Feature of Equipment Under Test

WCDMA/LTE

Product Specification subjective to this standard	
Integrated WWAN Module	Brand Name: Fibocom Model Name: L860-GL
Antenna Type	WWAN: <Ant 1.>: PIFA Antenna <Ant 2.>: PIFA Antenna

1.2 Modification of EUT

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

1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. TH05-HY
Test Engineer	George Chen
Temperature	24~25°C
Relative Humidity	50~52%

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No. 03CH15-HY
Test Engineer	Watt Tseng, Karl Hou, and BigShow Wang
Temperature	23~24°C
Relative Humidity	55~56%

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No. TW1190 and TW0007



1.4 Applicable Standards

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

- ♦ ANSI C63.26-2015
- ♦ ANSI / TIA-603-E
- ♦ 47 CFR Part 2, 22(H), 24(E), 27(L)
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

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.

For radiated measurement, pre-scanned in Notebook type and three orthogonal panels, X, Y, Z. The worst cases (Notebook type) were recorded in this report.

Radiated emissions were investigated as following frequency range:

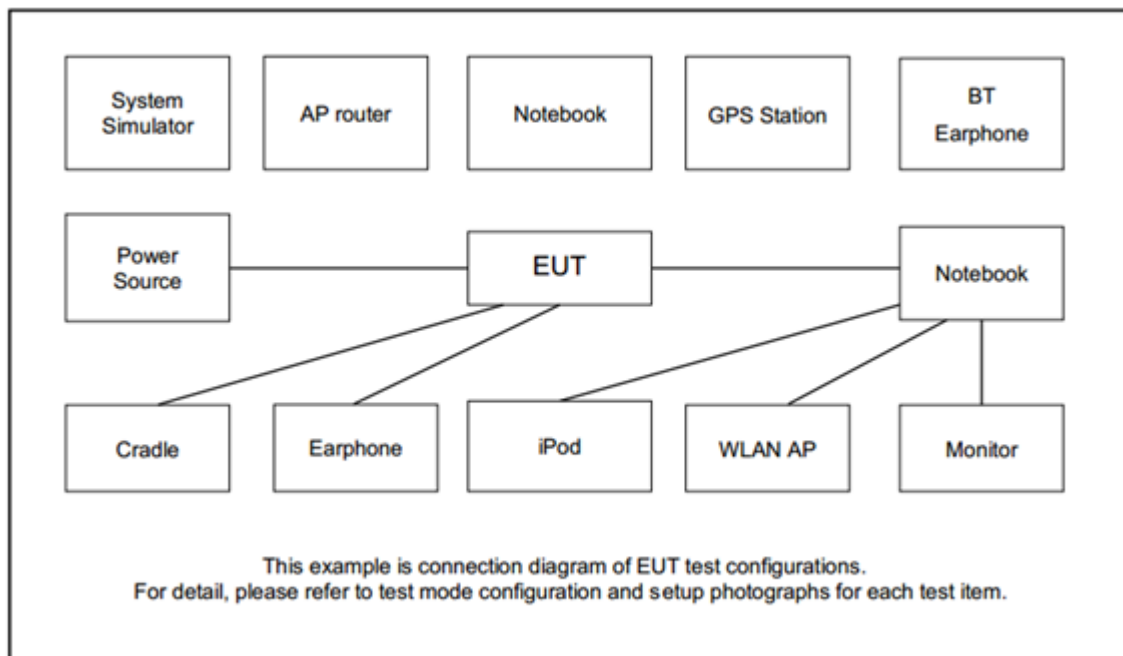
1. 30 MHz to 9000 MHz for WCDMA Band V.
2. 30 MHz to 18000 MHz for WCDMA Band IV.
3. 30 MHz to 19100 MHz for WCDMA Band II.

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

Item	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.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

2.4 Frequency List of Low/Middle/High Channels

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

3 Conducted Test Result

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.1.1 Test Setup

3.1.2 Conducted Output Power



3.1.3 Test Result of Conducted Test

Please refer to Appendix A.



3.2 Conducted Output Power and ERP/EIRP

3.2.1 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

3.2.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.

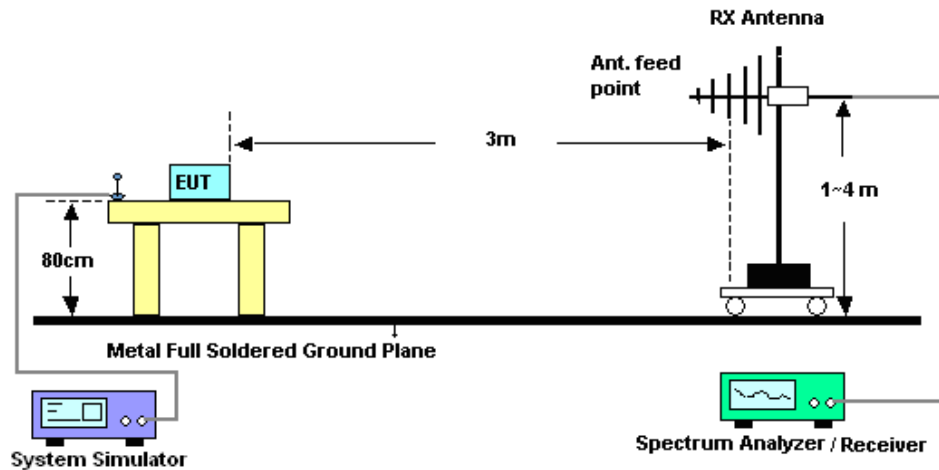
4 Radiated Test Items

4.1 Measuring Instruments

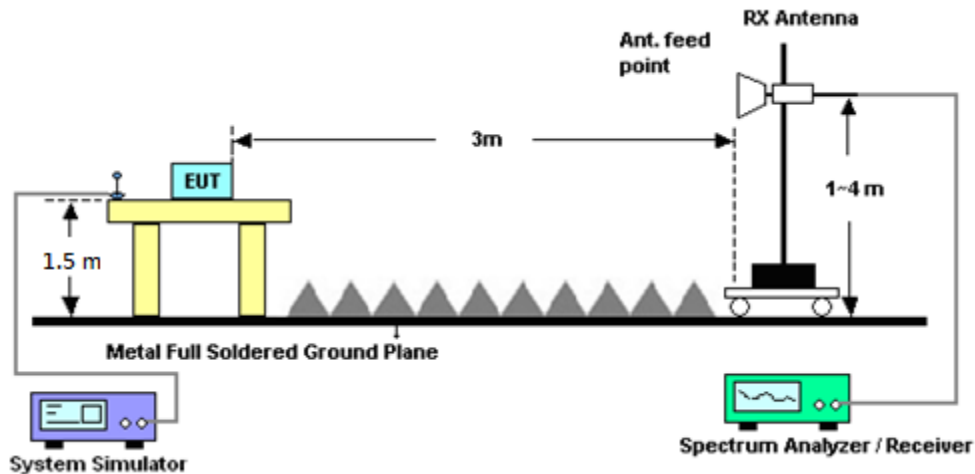
See list of measuring instruments of this test report.

4.2 Test Setup

For radiated test from 30MHz to 1GHz



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

The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI / TIA-603-E Section 2.2.12.

1. 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.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. 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.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
11. $ERP \text{ (dBm)} = EIRP - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. The limit line is derived from $43 + 10\log(P)$ 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
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 06, 2018	Apr. 13, 2019~ Apr. 16, 2019	Dec. 05, 2019	Radiation (03CH15-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 07, 2019	Apr. 13, 2019~ Apr. 16, 2019	Jan. 06, 2020	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz ~ 40GHz	May 08, 2018	Apr. 13, 2019~ Apr. 16, 2019	May 07, 2019	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 28, 2018	Apr. 13, 2019~ Apr. 16, 2019	Dec. 27, 2019	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL6111D&0800N1D01N-06	41912&05	30MHz to 1GHz	Feb. 12, 2019	Apr. 13, 2019~ Apr. 16, 2019	Feb. 11, 2020	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1620	1G~18GHz	Oct. 17, 2018	Apr. 13, 2019~ Apr. 16, 2019	Oct. 16, 2019	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 23, 2018	Apr. 13, 2019~ Apr. 16, 2019	Aug. 22, 2019	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55-303	17100018000550006	1GHz~18GHz	Jul. 10, 2018	Apr. 13, 2019~ Apr. 16, 2019	Jul. 09, 2019	Radiation (03CH15-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	Apr. 25, 2018	Apr. 13, 2019~ Apr. 16, 2019	Apr. 24, 2019	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Apr. 13, 2019~ Apr. 16, 2019	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Apr. 13, 2019~ Apr. 16, 2019	N/A	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz- 40GHz	Nov. 20, 2018	Apr. 13, 2019~ Apr. 16, 2019	Nov. 19, 2019	Radiation (03CH15-HY)
Signal Generator	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	May 22, 2018	Apr. 13, 2019~ Apr. 16, 2019	May 21, 2019	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1G~18GHz	Sep. 07, 2018	Apr. 13, 2019~ Apr. 16, 2019	Sep. 06, 2019	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24	RK-000451	N/A	N/A	Apr. 13, 2019~ Apr. 16, 2019	N/A	Radiation (03CH15-HY)
Base Station	Anritsu	MT8820C	6201107509	-	Mar. 02, 2018	Mar. 28, 2019	Mar. 01, 2020	Conducted (TH05-HY)

6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.37
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.67
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.03
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Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

Conducted Power (*Unit: dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4182	4233	9262	9400	9538
Frequency	826.4	836.4	846.6	1852.4	1880	1907.6
RMC 12.2K	23.56	23.91	24.39	23.78	24.28	23.97
HSDPA Subtest-1	23.48	23.90	24.37	23.65	24.00	23.85
HSDPA Subtest-2	22.49	22.92	23.36	22.59	22.95	22.76
HSDPA Subtest-3	21.99	22.44	22.83	22.05	22.42	22.25
HSDPA Subtest-4	21.74	22.16	22.52	21.80	22.28	21.98
HSUPA Subtest-1	22.46	22.89	23.29	22.56	23.00	22.74
HSUPA Subtest-2	20.33	20.68	21.06	20.28	20.67	20.42
HSUPA Subtest-3	20.99	21.38	21.74	21.04	21.47	21.18
HSUPA Subtest-4	20.54	20.94	21.30	20.55	20.97	20.62
HSUPA Subtest-5	22.50	22.90	23.30	22.50	23.00	22.60

Conducted Power (*Unit: dBm)			
Band	WCDMA Band IV		
Channel	1312	1413	1513
Frequency	1712.4	1732.6	1752.6
RMC 12.2K	23.92	23.95	24.02
HSDPA Subtest-1	23.95	23.86	24.00
HSDPA Subtest-2	22.91	22.79	23.00
HSDPA Subtest-3	22.42	22.33	22.50
HSDPA Subtest-4	22.14	22.02	22.30
HSUPA Subtest-1	22.76	22.82	22.77
HSUPA Subtest-2	20.66	20.75	20.84
HSUPA Subtest-3	21.35	21.53	21.64
HSUPA Subtest-4	20.88	20.87	20.82
HSUPA Subtest-5	22.85	22.77	22.76

**Appendix B. Test Results of ERP/EIRP and Radiated Test****ERP/EIRP**

Channel	Mode	Conducted		ERP	
		Power (dBm)	Power (Watts)	ERP(dBm)	ERP(W)
Lowest	WCDMA Band V	23.56	0.2270	17.80	0.0603
Middle	RMC 12.2Kbps	23.91	0.2460	18.15	0.0653
Highest	GT - LC = -3.61 dB	24.39	0.2748	18.63	0.0729
Limit	ERP < 7W	Result		PASS	

Channel	Mode	Conducted		EIRP	
		Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest	WCDMA Band II	23.78	0.2388	18.61	0.0726
Middle	RMC 12.2Kbps	24.28	0.2679	19.11	0.0815
Highest	GT - LC = -5.17 dB	23.97	0.2495	18.80	0.0759
Limit	EIRP < 2W	Result		PASS	

Channel	Mode	Conducted		EIRP	
		Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest	WCDMA Band IV	23.92	0.2466	19.23	0.0838
Middle	RMC 12.2Kbps	23.95	0.2483	19.26	0.0843
Highest	GT - LC = -4.69 dB	24.02	0.2523	19.33	0.0857
Limit	EIRP < 1W	Result		PASS	

**Radiated Spurious Emission****WCDMA 850**

WCDMA 850									
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)
Lowest	1653	-63.44	-13	-50.44	-75.58	-69.31	0.70	8.71	H
	2479	-59.67	-13	-46.67	-75.63	-67.34	0.95	10.77	H
	3306	-58.25	-13	-45.25	-76.37	-66.77	1.20	11.87	H
									H
									H
									H
	1653	-63.37	-13	-50.37	-74.39	-69.24	0.70	8.71	V
	2479	-59.78	-13	-46.78	-75.73	-67.45	0.95	10.77	V
	3306	-58.49	-13	-45.49	-76.42	-67.01	1.20	11.87	V
									V
									V
									V
Middle	1672	-63.36	-13	-50.36	-74.57	-69.29	0.71	8.79	H
	2509	-59.55	-13	-46.55	-75.52	-67.25	0.95	10.81	H
	3345	-58.08	-13	-45.08	-76.1	-66.68	1.21	11.96	H
									H
									H
									H
	1672	-63.73	-13	-50.73	-74.85	-69.66	0.71	8.79	V
	2509	-59.81	-13	-46.81	-75.8	-67.51	0.95	10.81	V
	3345	-58.35	-13	-45.35	-76.07	-66.95	1.21	11.96	V
									V
									V
									V



Highest	1694	-63.55	-13	-50.55	-74.89	-69.56	0.72	8.88	H
	2540	-59.65	-13	-46.65	-75.67	-67.37	0.96	10.83	H
	3386	-58.46	-13	-45.46	-76.37	-67.14	1.22	12.05	H
									H
									H
									H
									H
	1694	-63.49	-13	-50.49	-74.76	-69.50	0.72	8.88	V
	2540	-59.31	-13	-46.31	-75.61	-67.03	0.96	10.83	V
	3386	-58.92	-13	-45.92	-76.41	-67.60	1.22	12.05	V
									V
									V
									V
									V

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

**WCDMA 1700**

WCDMA 1700									
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)
Lowest	3420	-55.31	-13	-42.31	-74.07	-66.20	1.23	12.12	H
	5135	-49.98	-13	-36.98	-73.83	-60.88	1.97	12.86	H
	6850	-51.28	-13	-38.28	-76.35	-60.26	2.34	11.32	H
									H
									H
									H
									H
	3420	-52.52	-13	-39.52	-70.98	-63.41	1.23	12.12	V
	5135	-46.02	-13	-33.02	-69.61	-56.92	1.97	12.86	V
	6850	-51.45	-13	-38.45	-76.41	-60.43	2.34	11.32	V
									V
									V
									V
									V
Middle	3469	-56.86	-13	-43.86	-76.19	-67.85	1.24	12.23	H
	5198	-51.20	-13	-38.20	-75.23	-62.16	1.97	12.94	H
	6927	-50.48	-13	-37.48	-76.26	-59.69	2.36	11.57	H
									H
									H
									H
									H
	3469	-54.67	-13	-41.67	-73.75	-65.66	1.24	12.23	V
	5198	-49.21	-13	-36.21	-72.8	-60.17	1.97	12.94	V
	6927	-50.53	-13	-37.53	-76.42	-59.74	2.36	11.57	V
									V
									V
									V
									V



Highest	3504	-55.39	-13	-42.39	-75.09	-66.44	1.25	12.30	H
	5261	-51.28	-13	-38.28	-75.28	-62.31	1.98	13.01	H
	7011	-49.08	-13	-36.08	-75.59	-58.50	2.37	11.79	H
									H
									H
									H
									H
	3504	-54.45	-13	-41.45	-73.99	-65.50	1.25	12.30	V
	5261	-49.83	-13	-36.83	-73.55	-60.86	1.98	13.01	V
	7011	-48.59	-13	-35.59	-75.4	-58.01	2.37	11.79	V
									V
									V
									V
									V

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

**WCDMA 1900**

WCDMA 1900									
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)
Lowest	3705	-54.97	-13	-41.97	-75.53	-66.00	1.43	12.46	H
	5557	-52.88	-13	-39.88	-76.85	-64.16	2.01	13.29	H
	7410	-48.95	-13	-35.95	-76.86	-58.13	2.21	11.39	H
									H
									H
									H
									H
	3705	-55.37	-13	-42.37	-75.63	-66.40	1.43	12.46	V
	5557	-52.66	-13	-39.66	-76.84	-63.94	2.01	13.29	V
	7410	-49.15	-13	-36.15	-76.64	-58.33	2.21	11.39	V
									V
									V
									V
									V
Middle	3760	-54.61	-13	-41.61	-75.28	-65.64	1.48	12.51	H
	5640	-52.82	-13	-39.82	-76.82	-64.09	2.00	13.27	H
	7520	-48.91	-13	-35.91	-76.73	-58.02	2.18	11.30	H
									H
									H
									H
									H
	3760	-55.09	-13	-42.09	-75.51	-66.12	1.48	12.51	V
	5640	-52.54	-13	-39.54	-76.83	-63.81	2.00	13.27	V
	7520	-48.68	-13	-35.68	-76.66	-57.79	2.18	11.30	V
									V
									V
									V
									V



Highest	3815	-55.56	-13	-42.56	-76.34	-66.58	1.53	12.55	H
	5723	-53.59	-13	-40.59	-77.67	-64.85	1.99	13.26	H
	7630	-48.78	-13	-35.78	-76.1	-57.79	2.26	11.27	H
									H
									H
									H
									H
	3815	-55.58	-13	-42.58	-76.19	-66.60	1.53	12.55	V
	5723	-53.26	-13	-40.26	-77.6	-64.52	1.99	13.26	V
	7630	-48.31	-13	-35.31	-75.85	-57.32	2.26	11.27	V
									V
									V
									V
									V

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