



FCC RF Test Report

APPLICANT : Lenovo (Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT : Portable Tablet Computer
BRAND NAME : Lenovo
MODEL NAME : Lenovo TB-8505XS
FCC ID : O57TB8505X
STANDARD : 47 CFR Part 2, 22(H), 24(E)
CLASSIFICATION : PCS Licensed Transmitter (PCB)
TEST DATE(S) : May 20, 2022 ~Jun. 01, 2022

We, Sporton International Inc. (Kunshan), 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 Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia



Sporton International Inc. (Kunshan)

**No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China**



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG981204-21A	Rev. 01	Initial issue of report	Jul. 22, 2022



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.4	§2.1046	Conducted Output Power	Reporting Only	PASS	-
	§22.913(a)(5)	Effective Radiated Power	< 7 Watts	PASS	-
	§24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts	PASS	-
4.4	§2.1053; §22.917(a); §24.238(a);	Field Strength of Spurious Radiation	< 43+10log10(P[Watts])	PASS	Under limit 19.19 dB at 2508.00 MHz

Note:

This is a variant report for Lenovo TB-8505XS. The change note could be referred to the Class II Permissive Change letter which is exhibit separately. Based on the similarity between current and previous project, only the related test cases of conducted power and RSE from original test report (Sporton Report Number FG981204-19A) were verified for the differences.

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.



1 General Description

1.1 Applicant

Lenovo (Shanghai) Electronics Technology Co., Ltd.

Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone

1.2 Manufacturer

Lenovo PC HK Limited

23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Portable Tablet Computer
Brand Name	Lenovo
Model Name	Lenovo TB-8505XS
IMEI Code	Conducted/Radiation: 863763043818128/86376304381812878
FCC ID	O57TB8505X
HW Version	Lenovo TB-8505XS
SW Version	TB-8505XS_RF01_220408
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	
Tx Frequency	GSM/GPRS/EDGE: 850: 824 MHz ~ 849 MHz 1900: 1850MHz ~ 1910MHz WCDMA: Band V: 824 MHz ~ 849 MHz Band II: 1850 MHz ~ 1910 MHz
Rx Frequency	GSM/GPRS/EDGE: 850: 869 MHz ~ 894 MHz 1900: 1930 MHz ~ 1990 MHz WCDMA: Band V: 869 MHz ~ 894 MHz Band II: 1930 MHz ~ 1990 MHz
Maximum Output Power to Antenna	GSM/GPRS/EDGE: 850: 32.75 dBm 1900: 29.11 dBm WCDMA: Band V: 23.31 dBm Band II: 23.21 dBm
Antenna Type	LDS Antenna
Antenna Gain	Cellular Band: -3.0 dBi PCS Band: -1.4 dBi
Type of Modulation	GSM: GMSK GPRS: GMSK EDGE: GMSK / 8PSK WCDMA : BPSK HSDPA/DC-HSDPA : QPSK HSUPA : QPSK HSPA+ : 16QAM (16QAM uplink is not supported) DC-HSDPA : 64QAM

1.5 Modification of EUT

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



1.6 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	TH01-KS 03CH04-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH04-KS	AUDIX	E3	6.2009-8-24a

1.8 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)
- ANSI C63.26-2015
- 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.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission. (Y-Plane)

Radiated emissions were investigated as following frequency range:

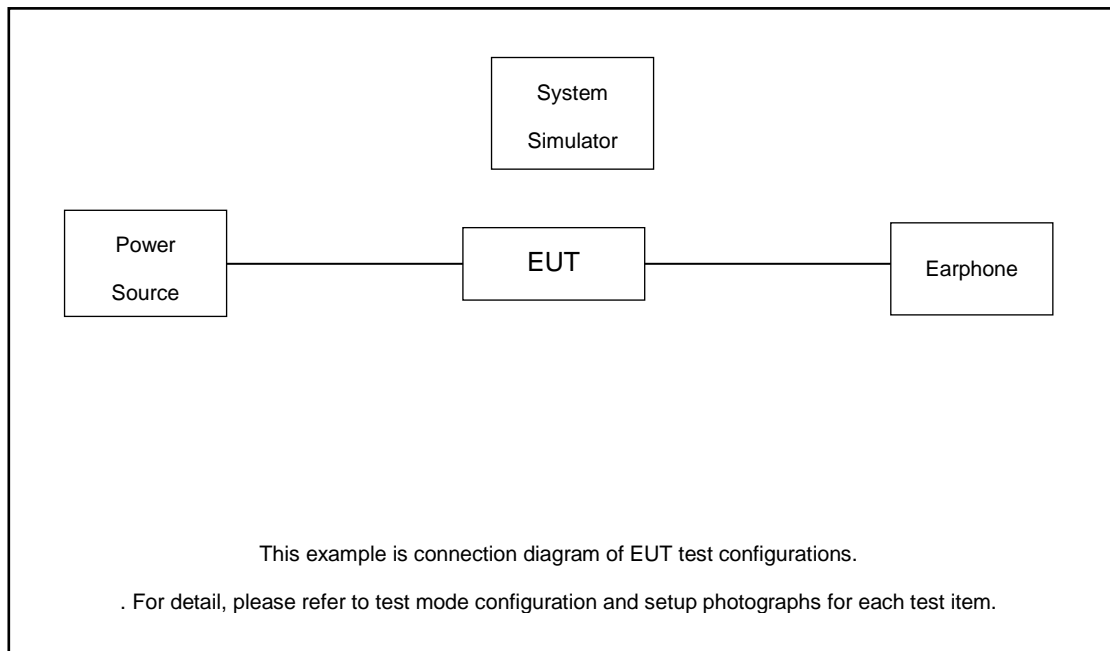
1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V.
2. 30 MHz to 19100 MHz for GSM1900 and WCDMA Band II.

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
GSM 850	<ul style="list-style-type: none"> ■ GPRS 1 Tx slots Link ■ EDGE 1 Tx slots Link 	<ul style="list-style-type: none"> ■ GPRS 1 Tx slots Link ■ EDGE 1 Tx slots Link
GSM 1900	<ul style="list-style-type: none"> ■ GPRS 1 Tx slots Link ■ EDGE 1 Tx slots Link 	<ul style="list-style-type: none"> ■ GPRS 1 Tx slots Link ■ EDGE 1 Tx slots Link
WCDMA Band V	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link 	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link
WCDMA Band II	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link 	<ul style="list-style-type: none"> ■ RMC 12.2Kbps Link

2.2 Connection Diagram of Test System



The EUT has been configuration operated in a manner tended to maximize its emission characteristics in a typical application.

2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	LTE Base Station	Anritsu	MT8820/8821	N/A	N/A	Unshielded,1.8m

2.4 Frequency List of Low/Middle/High Channels

Frequency List				
Band	Channel/Frequency(MHz)	Lowest	Middle	Highest
GSM850	Channel	128	189	251
	Frequency	824.2	836.4	848.8
WCDMA Band V	Channel	4132	4182	4233
	Frequency	826.4	836.4	846.6
GSM1900	Channel	512	661	810
	Frequency	1850.2	1880.0	1909.8
WCDMA Band II	Channel	9262	9400	9538
	Frequency	1852.4	1880.0	1907.6

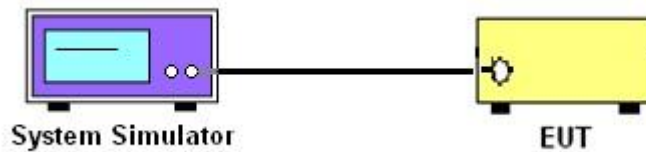
3 Conducted Test Result

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.2 Test Setup

3.2.1 Conducted Output Power



3.3 Test Result of Conducted Test

Please refer to Appendix A.



3.4 Conducted Output Power

3.4.1 Description of the Conducted Output Power

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.

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.

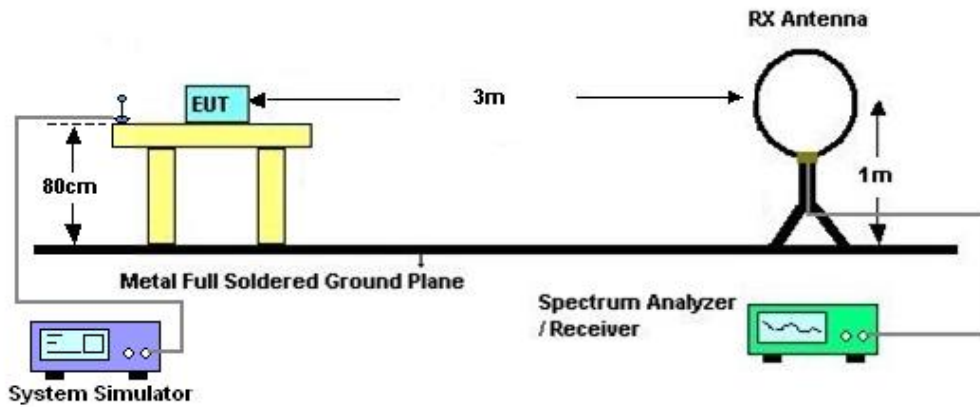
4 Radiated Test Items

4.1 Measuring Instruments

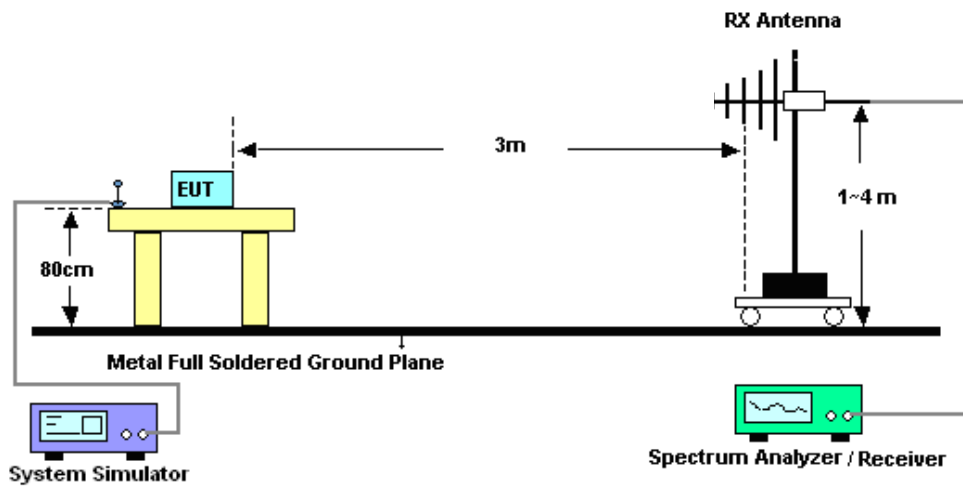
See list of measuring instruments of this test report.

4.2 Test Setup

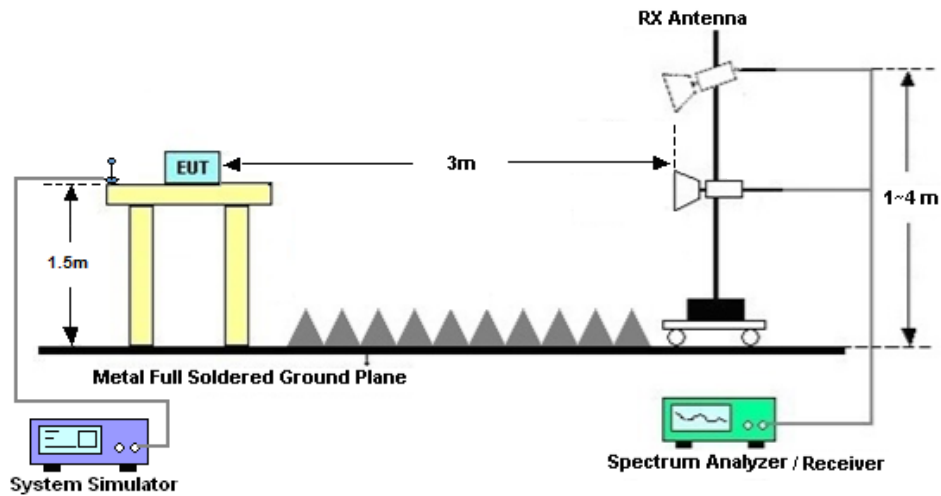
4.2.1 For radiated test below 30MHz



4.2.2 For radiated test from 30MHz to 1GHz



4.2.3 For radiated test above 1GHz



4.3 Test Result of Radiated Test

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

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. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12. $ERP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from $43 + 10\log(P)$ 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
EXA Spectrum Analyzer	Keysight	N9010B	MY57541079	10Hz-44G,MAX 30dB	Oct. 14, 2021	May 20, 2022	Oct. 13, 2022	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May 29, 2022	May 20, 2022	May 28, 2023	Radiation (03CH04-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 30, 2021	May 20, 2022	Oct. 29, 2022	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	May 20, 2022	Jan. 04, 2023	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 05, 2022	May 20, 2022	Jan. 04, 2023	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-00 101800-30-1 0P	2025788	1Ghz-18Ghz	Jul. 30, 2021	May 20, 2022	Jul. 29, 2022	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Oct. 13, 2021	May 20, 2022	Oct. 12, 2022	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40G GA	060728	18~40GHz	Jan. 05, 2022	May 20, 2022	Jan. 04, 2023	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	May 20, 2022	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	May 20, 2022	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	May 20, 2022	NCR	Radiation (03CH04-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 14, 2021	Jun. 01, 2022	Oct. 13, 2022	Conducted (TH01-KS)
Power divider	STI	STI08-0055	-	0.5~40GHz	Aug. 26, 2021	Jun. 01, 2022	Aug. 25, 2022	Conducted (TH01-KS)

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))	3.3dB
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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))	2.8dB
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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))	2.8dB
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----- THE END -----



Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

GSM850	Burst Average Power (dBm)		
TX Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8
GSM 1 Tx slot	32.74	32.75	32.71
GPRS 1 Tx slot	32.73	32.67	32.65
GPRS 2 Tx slots	31.98	31.87	31.80
GPRS 3 Tx slots	30.26	30.12	30.06
GPRS 4 Tx slots	29.11	29.01	28.88
EDGE 1 Tx slot	26.73	26.75	26.82
EDGE 2 Tx slots	25.47	25.51	25.65
EDGE 3 Tx slots	23.27	23.35	23.42
EDGE 4 Tx slots	22.04	22.03	22.11

GSM1900	Burst Average Power (dBm)		
TX Channel	512	661	810
Frequency (MHz)	1850.2	1880	1909.8
GSM 1 Tx slot	28.99	29.11	29.03
GPRS 1 Tx slot	28.95	29.00	28.95
GPRS 2 Tx slots	28.20	28.26	28.22
GPRS 3 Tx slots	26.45	26.53	26.52
GPRS 4 Tx slots	25.38	25.41	25.42
EDGE 1 Tx slot	25.61	25.60	25.56
EDGE 2 Tx slots	24.66	24.54	24.62
EDGE 3 Tx slots	22.71	22.65	22.63
EDGE 4 Tx slots	21.67	21.65	21.59



Band		WCDMA II			WCDMA V		
TX Channel		9262	9400	9538	4132	4182	4233
Rx Channel		9662	9800	9938	4357	4407	4458
Frequency (MHz)		1852.4	1880	1907.6	826.4	836.4	846.6
3GPP Rel 99	AMR 12.2Kbps	23.02	23.10	22.83	23.29	23.28	23.10
3GPP Rel 99	RMC 12.2Kbps	23.07	23.21	22.92	23.26	23.31	23.29
3GPP Rel 6	HSDPA Subtest-1	22.03	22.13	21.97	22.38	22.28	22.05
3GPP Rel 6	HSDPA Subtest-2	21.95	22.22	21.93	22.42	22.47	22.15
3GPP Rel 6	HSDPA Subtest-3	21.47	21.77	21.30	21.90	21.83	21.54
3GPP Rel 6	HSDPA Subtest-4	21.45	21.62	21.40	21.74	21.72	21.73
3GPP Rel 8	DC-HSDPA Subtest-1	22.09	22.15	21.81	22.31	22.34	22.16
3GPP Rel 8	DC-HSDPA Subtest-2	21.83	22.03	21.85	22.08	22.38	22.11
3GPP Rel 8	DC-HSDPA Subtest-3	21.46	21.66	21.36	21.74	21.83	21.46
3GPP Rel 8	DC-HSDPA Subtest-4	21.50	21.31	21.17	21.82	21.58	21.53
3GPP Rel 6	HSUPA Subtest-1	22.00	22.11	21.90	22.46	22.35	22.23
3GPP Rel 6	HSUPA Subtest-2	20.14	20.16	19.83	20.33	20.31	20.20
3GPP Rel 6	HSUPA Subtest-3	20.88	21.20	20.74	21.27	21.29	21.14
3GPP Rel 6	HSUPA Subtest-4	20.17	20.22	19.86	20.44	20.33	20.17
3GPP Rel 6	HSUPA Subtest-5	22.09	22.14	21.82	22.21	22.35	22.02



Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

Test Engineer :	Chris Chen	Temperature :	22~23°C
		Relative Humidity :	41~42%

GSM850 (GSM)								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1672	-49.04	-13	-36.04	-56.01	1.58	10.70	H
	2508	-34.01	-13	-21.01	-42.26	2.102	12.50	H
	3344	-57.63	-13	-44.63	-66.52	2.856	13.90	H
	1672	-50.85	-13	-37.85	-57.82	1.58	10.70	V
	2508	-32.19	-13	-19.19	-40.44	2.10	12.50	V
	3344	-58.87	-13	-45.87	-67.76	2.86	13.90	V

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

GSM850 (EDGE 1 Tx slots)								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1672	-48.21	-13	-35.21	-55.18	1.58	10.70	H
	2512	-53.07	-13	-40.07	-61.32	2.102	12.50	H
	3344	-56.92	-13	-43.92	-65.81	2.856	13.90	H
	1672	-51.89	-13	-38.89	-58.86	1.58	10.70	V
	2512	-49.81	-13	-36.81	-58.06	2.10	12.50	V
	3344	-58.03	-13	-45.03	-66.92	2.86	13.90	V

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

GSM1900 (GSM)								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3765	-47.06	-13	-34.06	-59.32	2.64	14.90	H
	5640	-42.15	-13	-29.15	-54.01	2.94	14.80	H
	7515	-52.58	-13	-39.58	-62.35	3.39	13.16	H
	3765	-46.05	-13	-33.05	-58.31	2.64	14.90	V
	5640	-45.12	-13	-32.12	-56.98	2.94	14.80	V
	7515	-52.73	-13	-39.73	-62.50	3.39	13.16	V

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



GSM1900 (EDGE 1 Tx slots)								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3765	-46.30	-13	-33.30	-58.56	2.64	14.90	H
	5640	-43.34	-13	-30.34	-55.20	2.94	14.80	H
	7515	-52.63	-13	-39.63	-62.40	3.39	13.16	H
	3765	-51.71	-13	-38.71	-63.97	2.64	14.90	V
	5640	-44.95	-13	-31.95	-56.81	2.94	14.80	V
	7515	-52.90	-13	-39.90	-62.67	3.39	13.16	V

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

WCDMA Band V (RMC 12.2Kbps)								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1672	-55.23	-13	-42.23	-62.20	1.58	10.70	H
	2512	-53.51	-13	-40.51	-61.76	2.102	12.50	H
	3344	-59.94	-13	-46.94	-68.83	2.856	13.90	H
	1672	-55.31	-13	-42.31	-62.28	1.58	10.70	V
	2512	-54.11	-13	-41.11	-62.36	2.10	12.50	V
	3344	-59.81	-13	-46.81	-68.70	2.86	13.90	V

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

WCDMA Band II (RMC 12.2Kbps)								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	3765	-49.60	-13	-36.60	-61.86	2.64	14.90	H
	5640	-54.35	-13	-41.35	-66.21	2.94	14.80	H
	7515	-52.47	-13	-39.47	-62.24	3.39	13.16	H
	3765	-52.57	-13	-39.57	-64.83	2.64	14.90	V
	5640	-54.56	-13	-41.56	-66.42	2.94	14.80	V
	7515	-52.33	-13	-39.33	-62.10	3.39	13.16	V

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