



GSM 9000 INDOOR BTS EMC FCC TEST REPORT

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PUBLICATION HISTORY

This document is modified for every change in the regulatory documentation of FCC mark file.

TCF Version	Date	Content of evolution	Comments	Author
01.01/EN	31/Oct/2007	Creation	N/A	William Li

CONTENTS

PUBLICATION HISTORY	2
1. INTRODUCTION	4
1.1 Object	4
1.2 Scope of The Document.....	4
2. RELATED DOCUMENTS	5
2.1 Reference documents.....	5
2.2 Applicables documents.....	5
3. GENERAL INFORMATION.....	6
4. TEST EQUIPMENT AND ANCILLARIES	7
4.1 Test equipment.....	7
4.2 Test Software.....	7
4.3 Ancillaries.....	7
5. TEST CONFIGURATION	8
5.1 Modules configuration under Test.....	8
5.2 bts configuration under Test	8
5.3 bts software	9
6. EMC TEST RESULT	9
7. CONCLUSION	10
8. ABBREVIATIONS.....	11
9. DEFINITIONS.....	12

1. INTRODUCTION

1.1 OBJECT

This document presents the measurement results of tests performed on Nortel Networks New ROHS GSM 9000 Indoor BTS cabinet with MOBI DDM GSM850 and PCS1900. It is also used for MOBI DDM 850 qualification, which complied with FCC Part 15 § 15.107 15.109 & ICES003, Part 22 § 22.917 & RS132 and Part 24 § 24.238 & RS133.

1.2 SCOPE OF THE DOCUMENT

This document presents the EMC tests result for MOBI DDM 850 & 1900 in ROHS GSM 9000 indoor BTS 850 MHz & 1900 MHz for radio configurations: full & dual band on GSM 9000 Indoor BTS.

The main items introduced during this qualification are:
MOBI DDM GSM850 and PCS1900 in ROHS GSM 9000 indoor BTS cabinet.

The following GSM 9000 Indoor BTS configurations shall be covered:

- Standard single band RF configurations:
 - Up to S333 configuration with a single cabinet configuration
 - Support of extension cabinets (up to 2 cabinets with 2 S333/333)
- Standard dual band RF configurations:
 - Up to S333_333 configuration with a single cabinet configuration
 - Support of extension cabinets (up to 2 cabinets with 2 S333_333/333_333)
- Synchronization options:
 - GPS synchronization
 - Synchronization from S8000/S12000
- Modules covered:
 - 850 MHz HPRM 60w GMSK/ 45w EGPRS
 - 1900 MHz RM 30w GMSK/ 30w EGPRS
 - All PGSM, DCS coupling devices configurations including:
 - DDM_H2 and mixed configuration with VSWR
 - ICAM & RICAM configurations
 - E1 PCM interface without secondary protection
- Energy:
 - DC power for Indoor cabinet only: - 48V i.e.: -40.5Vdc to -57Vdc
- Options for Indoor cabinet:
 - Alarm protection module (S8000/S12000 ALPRO)

2. RELATED DOCUMENTS

2.1 REFERENCE DOCUMENTS

- [R1] PE/BTS/DPL/022599 V01/EN GSM BTS 9000 Indoor 900MHz Project Qualification Plan)
- [R2] PE/BTS/DD/022497 V01/EN Electrical Installation of buildings. Part 5: Selection and erection of electrical equipment. Chap 54: Earthing arrangements and protective conductor (1980/A1:1982)
- [R3] PE/BTS/DPL/S9K_EM-EMI-TP01 Insulation Co-ordination for Electrical Equipment within Low-Voltage Systems (2000)

2.2 APPLICABLES DOCUMENTS

- [A1] EN55022:1998 & CISPR 22 Information technology equipment ,Radio disturbance characteristics, Limits and methods of measurement
- [A2] EN301 502 V8.1.2 Technical Specification Group Radio Access Networks; Base station conformance testing
- [A3] 3GPP TS 05.05 V8.16.0 Technical Specification Group GSM/EDGE Radio Access Network; Radio transmission and reception (Release 1999)
- [A4] 3GPP TS 11.21 V8.9.0 3rd Generation Partnership Project; Technical Specification Group GSM/EDGE Radio Access Network; Base Station System (BSS) equipment specification; Radio aspects (Release 1999)
- [A5] FCC Part 15 Radio frequency devices
- [A6] FCC Part 22 Public mobile services
- [A7] FCC Part 24 Personal communications services

3. GENERAL INFORMATION

The measurements reported in this document have been performed in Nortel Networks premises at the following address:

Guangdong Nortel Telecommunications Equipment Co. Ltd.

Rongli Industrial Park, Liuheng Road

Ronggui, Shunde

Foshan

Guangdong, 528306, P.R.C.

This report contains results for testing in accordance with EN 55022:1998 & CISPR22:1997 EN 301 502 and FCC Part 15.107, 15.109, 22.917, 24.238, ICES003, RS132 and RS133.

The test definitions, methods and requirements follow the applicable version (as indicated earlier, reference documents section) of EN 55022:1998 & CISPR22:1997, EN301 502, ICES003 and RS 132 & 133.

Nortel Networks retains all results, plots and printouts for the tests performed and also calibration details of the test equipment used.

The test results in this report relate the equipment under test only.

4. TEST EQUIPMENT AND ANCILLARIES

4.1 TEST EQUIPMENT

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Current Clamp meter	Fluke	318	85250015	2007-06-27	2008-06-27
Multi-meter	Fluke	112	92040151	2007-11-15	2008-11-15
Power Meter	Hewlett&Packard	E4419A	US38260709	2007-10-16	2008-10-16
Power Sensor	Agilent	E4412A	MY41498625	2006-12-25	2007-12-25

Note: EMC test equipments refer to report [E0710WT8888-2636]

4.2 TEST SOFTWARE

Software	Version
TIL_alarm	v01f 205
TIL_COAM	v15e402

4.3 ANCILLARIES

Item	Quantity	Description
PC	1	
RF Cable	1	Huber+Suhner SUCOFLEX 104PEA
Attenuator	8	30dB @ 150W
Attenuator	8	12dB @ 5W
Terminal	8	Huber+Suhner Load @ 50 Ohm
Ethernet Cable	1	About 10m

5. TEST CONFIGURATION

Dual band Indoor is the worst case for module integration due to GSM850 /PCS co-siting in the same BTS. The critical RF performances are checked in Dual band INDOOR.

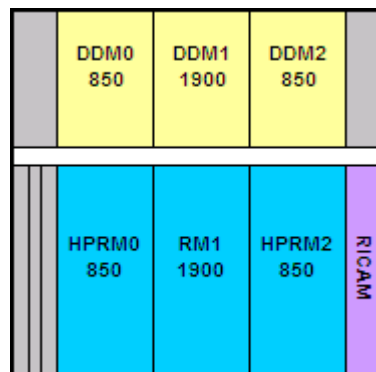
The radio compliance in Dual band Indoor 9000 BTS ensures Dual Band Indoor 9000 BTS radio compliance.

5.1 MODULES CONFIGURATION UNDER TEST

Designation	PEC Code	Serial number
BTS 9000 INDOOR	NTLE01AA 01	NNTM7890RQNB
DDM0	NTN063HA D1	MANT01X00001
DDM1	NTN063BA 04	FICT030025H3
DDM2	NTN063HA D1	MANT01X00008
RM0	NTN050JA 01	NNTM78901Q6E
RM1	NTN050PM 14	NNTM78901QDJ
RM2	NTN050JA 01	NNTM78901Q62
RICAM	NTN024AA 04	NNTMGWF3006D
ALPRO	NTQ811CA 01	NNTM7890WE2Y
SICS	NTN071GM V1	NNTMLA123456

5.2 BTS CONFIGURATION UNDER TEST

Configuration indoor dualband 850/1900MHz BTS is as following.



Tests are realized with all RM at full power at "B, M, T" GSM & PCS frequency.

HPRM850			RM2 1900			HPRM 850		
TDMA 0	TDMA 1	TDMA 2	TDMA 0	TDMA 1	TDMA 2	TDMA 0	TDMA 1	TDMA 2
ARFCN B(128)	ARFCN M(189)	ARFCN T(251)	ARFCN B(512)	ARFCN T(810)		ARFCN R(128)	ARFCN M(189)	ARFCN T(251)
Max POWER	Max POWER	Max POWER	Max POWER	Max POWER		Max POWER	Max POWER	Max POWER
DDM0_M		DDM0_D	DDM1_M	DDM1_D		DDM0_M		DDM0_D

5.3 BTS SOFTWARE

BTS Load software version : v15e402

6. EMC TEST RESULT

Refer to the Report [E0710WT8888-2636].

7. CONCLUSION

The following table presents the test result for the FCC mark qualification for Nortel Networks MOBI DDM 850 qualification in New ROHS GSM 9000 indoor BTS cabinet with MOBI DDM GSM850, PCS1900.

Emission Test				
Test Item	Test Requirement	Standard	Criteria	Result
Conducted Emission at DC port	150 kHz to 30 MHz	EN 55022: 1998 & CISPR 22: 1997; FCC Part 15.107 & ICES 003	Class B	PASS
Conducted Emission at Telecommunication Port	150 kHz to 30 MHz	EN 55022: 1998 & CISPR 22: 1997	Class B	PASS
Radiated Emission	30MHz to 18GHz	FCC Part 15.109 & ICES 003	Class B	PASS
Radiated Emission Spurious	30MHz to 20GHz	FCC Part 22.917 & RS 132; FCC Part 24.238 & RS 133 For 60W, limit is 71.77 dB μ V/m@10m		PASS
Radiated emissions spurious	30MHz to 20GHz	FCC Part 24 & 24.238 & RS133 For 60W, limit is 71.77 dB μ V/m@10m		PASS
Enclosure Radiated Emission	30 MHz to 6 GHz	EN 55022: 1998 & CISPR 22: 1997	Class B	PASS
Enclosure Radiated Spurious Emissions	30 MHz to 4 GHz	EN 301 502		PASS

Immunity Tests			
Test Item	Test Requirement	Standard	Result
Radiated Immunity	80Mhz to 2Ghz (10V/M)	EN 301 489-8 Clause 8	PASS
Conducted Immunity	DC Port (10Vrms) Abis Port (10Vrms) RF Port (10Vrms)	EN 301 489-8 Clause 8	PASS
Electrical Fast Transient	DC Port (+/- 2KV) Abis Port (+/-1KV) RF Port (+/-1KV)	EN 301 489-8 Clause 8	PASS
Surge	Abis Port (+/- 1KV)	EN 301 489-8 Clause 8	PASS
ElectroStatic Discharge	Air (+/- 8KV) Contact (+/- 4KV)	EN 301 489-8 Clause 8	PASS

8. ABBREVIATIONS

AC	Alternative Current
AC/DC	Alternative Current to Direct Current converter
AE	Auxiliary Equipment
AM	Amplitude Modulation
AV	Average
BER	Bit Error Rate
CW	Continuous Waves
dBm	Decibel milli-watt
DC	Direct Current
EFT/B	Electrical Fast Transient / Burst
EM	Electro-Magnetic
EMC	Electro-Magnetic Compatibility
EMI	Electro-Magnetic Interference
EN	European Norm
ERM	Electromagnetic compatibility and Radio spectrum Matters
ESD	Electro-Static Discharge
ETS	ETSI Standard
EUT	Equipment under Test
GRP	Ground Reference Plane
HCP	Horizontal Coupling Plane
IT	Information Technology
PE	Protective Earth
N/A	Not Applicable
NTP	Network Termination Point
RF	Radio Frequency
RFI	Radio Frequency Interference
TDMA	Time Division Multiple Access
VCP	Vertical Coupling Plane

9. DEFINITIONS

BTS9000: Nortel product line which includes GSM 9000 indoor BTS:

B: Bottom ARFCN. Downlink (BTS Tx) and Uplink (BTS Rx) frequencies are given as following:

PCS1900: $F_{B \text{ downlink}} = 1930.2\text{MHz};$ $F_{B \text{ uplink}} = 1850.2\text{MHz}$

GSM850: $F_{B \text{ downlink}} = 869.2\text{MHz};$ $F_{B \text{ uplink}} = 824.2\text{MHz}$

M: Middle ARFCN. Downlink (BTS Tx) and Uplink (BTS Rx) frequencies are given as following:

PCS1900: $F_{M \text{ downlink}} = 1960\text{MHz};$ $F_{M \text{ uplink}} = 1880\text{MHz}$

GSM850: $F_{M \text{ downlink}} = 881.4\text{MHz};$ $F_{M \text{ uplink}} = 836.4\text{MHz}$

T: Top ARFCN. Downlink (BTS Tx) and Uplink (BTS Rx) frequencies are given as following:

PCS1900: $F_{T \text{ downlink}} = 1989.8\text{MHz};$ $F_{T \text{ uplink}} = 1909.8\text{MHz}$

GSM850: $F_{T \text{ downlink}} = 893.8\text{MHz};$ $F_{T \text{ uplink}} = 848.8\text{MHz}$

☞ End of DOCUMENT ☞

No.	E0710WT8888-2636
Total page	60

TEST REPORT

(No part of the report can be duplicated without permission)

Product Name : GSM 9000 Indoor BTS

Type and Specification : ROHS NEW GSM 9000 Indoor BTS with MOBI
DDM850 and New SICS

Test Category : Entrusted Test

Manufacturer : Guangdong Nortel Telecommunications Equipment
Co.,Ltd

Applicant: Guangdong Nortel Telecommunications Equipment
Co.,Ltd



China Electronic Product Reliability And
Environmental Testing Research Institute

China CEPREI Laboratory

Items For Attention

1. It would be invalid test report without specific stamp for test institute or the authority.
2. It would be invalid duplicated report without specific stamp for test institute or the authority.
3. It would be invalid test report without all the signatures of compilation, reviewer and approver.
4. It would be invalid test report, if there is any scrawl in the test report without official authorization.
5. Any disputes about the report must be submitted for test institute within 15 days from the day when the report is received, otherwise that would be invalid out of expiry.
6. Generally, the responsible is only for the samples in entrusted test.

Remark: Possible test case verdicts:

Test item does meet the requirement.....P (Pass)

Test item does not meet the requirement.....F (Fail)

Test case does not apply to the test object.....N (N/A)

Address: No.110, Dongguanzhuang Road, Tianhe District,
Guangzhou City, Guangdong Province, 510610, P.R. China

Tel: 0086-20-87237150, 87237006, 87237178,87237552

Fax: 0086-20-87236171, 87237609

E-mail: info@ceprei.biz, qic@ceprei.biz, market@ceprei.biz

TEST REPORT

Product	GSM 9000 Indoor BTS			Model / Type	ROHS NEW GSM 9000 Indoor BTS with MOBI DDM850 and New SICS
Factory	Guangdong Nortel Telecommunications Equipment Co.,Ltd			Trade/Mark	Nortel
Address of Factory	Rongli Industrial Park ,Liheng Road ,Ronggui Shunde Foshan Guangdong 528306 P.R.China.				
Manufacturer	Guangdong Nortel Telecommunications Equipment Co.,Ltd				
Address of manufacturer	Rongli Industrial Park ,Liheng Road ,Ronggui Shunde Foshan Guangdong 528306 P.R.China.				
Applicant	Guangdong Nortel Telecommunications Equipment Co.,Ltd				
Address of Applicant	Rongli Industrial Park ,Liheng Road ,Ronggui Shunde Foshan Guangdong 528306 P.R.China.				
Sampling Method	Sampling by the factory			Production Date	/
Number of Specimen	1	Testing Duration	2007.10.11-2007.10.17	Ambient Condition	15~35℃, 45~75%RH, 86~106kPa
Test Standards: EN301 489-1 V1.7.1; EN301 489-8 V1.2.1; FCC PART 15 § 15.109 EN301 502 V8.1.2; TS 101 087 V8.10.0 FCC PART 22 § 22.917 EN55022:1998+A1:2000+A2:2003 FCC PART 24 § 24.238					
Test Instruments and Equipments: See Equipments List of This Report.					
Conclusion: EUT complied with the requirements of the test standards.					
Testing Technician: <u>刘鑫</u> (Liu xin) Responsible Engineer: <u>陈辉</u> (Chen Hui)					
Remark:					

China CEPREI Laboratory

China Electronic Product Reliability And Environmental Testing Research Institute

No.110, Dongguan Zhuang Road, Tianhe District, Guangzhou City, Guangdong Province, 510610, P.R. China

EMC Standards Compliance List / Test Summary:

The following standards have been applied to ensure the product conforms to Emission and Immunity requirements of the Reference: PE/BTS/DPL/S9K/850-1900MHz/EMC-EMI-TP01.

EMC Test plan for GSM 9000 Indoor BTS Introduction:

Electromagnetic Emissions		
Test Item	Clause Standard	Result
Conducted Emission at DC port	EN55022	PASS
Conducted Emission at Telecommunication Port	EN55022	PASS
Radiated Emissions	EN55022(30MHz-6GHz)	PASS
Radiated emissions spurious	TS 101.087 V8.10.0	PASS
Radiated Emissions	FCC PART 15(30MHz-18GHz)	PASS
Radiated emissions spurious	FCC PART 22 § 22.917 & RS.132	PASS
Radiated emissions spurious	FCC PART 24 § 24.238 & RS.133	PASS

Electromagnetic Immunity				
Test Item	Performance Criteria	Standard	Test Level	Result
Electrostatic Discharge Immunity	See clause 8 of EN301 489-8 (on this document § 6.2.1)	EN301 489-1 V1.7.1; EN301 489-8 V1.2.1	Contact discharge: ±2kV, ±4kV, ±8kV Air discharge: ±2kV, ±4kV, ±8kV, ±15kV	PASS
Electrical Fast Transient/Burst Immunity	See clause 8 of EN301 489-8 (on this document § 6.2.1)	EN301 489-1 V1.7.1; EN301 489-8 V1.2.1	DC Port: ±2kV ABIS Port: ±1kV RF Port: ±1kV	PASS
Surge immunity	See clause 8 of EN301 489-8 (on this document § 6.2.2)	EN301 489-1 V1.7.1; EN301 489-8 V1.2.1	ABIS Port: 10/700 Tr/Th μs 1 kV line to earth(ground)	PASS
Radio-frequency Conducted Disturbance Immunity	See clause 8 of EN301 489-8 (on this document § 6.2.2)	EN301 489-1 V1.7.1; EN301 489-8 V1.2.1	0.15-80 MHz 10V (unmodulated, r.m.s) 80% AM (1kHz)	PASS
Radio-frequency Electromagnetic Fields Immunity	See clause 8 of EN301 489-8 (on this document § 6.2.2)	EN301 489-1 V1.7.1; EN301 489-8 V1.2.1	80-2000 MHz 10V/m (unmodulated, r.m.s) 80 % AM (1kHz)	PASS

Test conditions during Immunity tests

- a) TIL Alarm checking before, during & after test
- b) Radio performance checking before, during & after test
- c) Abis BER checking during test
- d) 850Mhz & 1900MHz radio loop RXQUAL checking with the RX level equal to -84dBm and GMSK TCH 13K modulation during test

TABLE OF CONTENTS

Items For Attention.....	2
EMC Standards Compliance List / Test Summary:	3
TABLE OF CONTENTS	5
Section 1 General Information	7
1.1 Introduction.....	7
1.2 EUT General and Technical Descriptions	7
1.3 Emissions testing configuration	8
1.4 Immunities testing configuration	9
Section 2 Electromagnetic Emissions	11
2.1 Conducted Emission at DC Terminals	11
2.1.1 Conducted Emission Test Information.....	11
2.1.2 Measurement Equipments Used for Conducted Emission	11
2.1.3 Test Data.....	11
2.1.4 Test curves.....	13
2.1.5 Test Setup.....	15
2.2 Conducted Emission at Telecommunication Terminals.....	16
2.2.1 Conducted Emission Test Information.....	16
2.2.2 Measurement Equipments Used for Conducted Emission	16
2.2.3 Test Data.....	16
2.2.4 Test curves.....	17
2.2.5 Test Setup.....	18
2.3 Radiated Emission (30-1000MHz).....	19
2.3.1 Radiated Emission Test Information.....	19
2.3.2 Measurement Equipments Used for Radiated emission	19
2.3.3 Test Data.....	19
2.3.4 Test Curves.....	20
2.3.5 Test Setup.....	21
2.4 Radiated Emission (1GHz-6GHz).....	22
2.4.1 Radiated Emission Test Information.....	22
2.4.2 Measurement Equipments Used for Radiated emission	22
2.4.3 Test Data.....	22
2.4.4 Test Curves.....	23
2.4.5 Test Setup.....	24
2.5 Radiated Emission spurious (30-4000MHz)	25
2.5.1 Radiated Emission Test Information.....	25
2.5.2 Measurement Equipments Used for Radiated emission	25
2.5.3 Test Data.....	25
2.5.4 Test Curves.....	26
2.5.5 Test Setup.....	28
2.6 Radiated Emission (30-1000MHz).....	29
2.6.1 Radiated Emission Test Information.....	29
2.6.2 Measurement Equipments Used for Radiated emission	29
2.6.3 Test Data.....	29
2.6.4 Test Curves.....	30
2.6.5 Test Setup.....	31
2.7 Radiated Emission (1GHz-18GHz).....	32
2.7.1 Radiated Emission Test Information.....	32

2.7.2 Measurement Equipments Used for Radiated emission	32
2.7.3 Test Data.....	32
2.7.4 Test Curves.....	33
2.7.5 Test Setup.....	34
2.8 Radiated Emission spurious (30MHz-20GHz)	35
2.8.1 Radiated Emission Test Information.....	35
2.8.2 Measurement Equipments Used for Radiated emission	35
2.8.3 Limits for radiated emissions from FCC Part 22,and RSS132	35
2.8.4 Test Data.....	36
2.8.5 Test Curves.....	37
2.9 Radiated Emission spurious (30MHz-20GHz)	40
2.9.1 Radiated Emission Test Information.....	40
2.9.2 Measurement Equipments Used for Radiated emission	40
2.9.3 Limits for radiated emissions from FCC Part 24,and RSS133	40
2.9.4 Test Data.....	41
2.9.5 Test Curves.....	42
Section 3 Electromagnetic Immunity.....	45
3.1 Electrostatic Discharge Immunity	45
3.1.1 Electrostatic Discharge Immunity Test Information	45
3.1.2 Measurement Equipment Used for Electrostatic Discharge Immunity	45
3.1.3 Electrostatic Discharge points selection.....	45
3.1.4 Test Data.....	46
3.1.5 Test Setup.....	47
3.2 Electrical Fast Transient/Burst Immunity	49
3.2.1 Electrical Fast Transient/Burst Immunity test information	49
3.2.2 Measurement Equipment Used for Electrical Fast Transient/Burst Immunity test.....	49
3.2.3 Test Data.....	49
3.2.4 Test Setup.....	50
3.3 Surge immunity	52
3.3.1 Surge immunity test information.....	52
3.3.2 Measurement Equipment Used for Surge immunity test.....	52
3.3.3 Test Data.....	52
3.3.4 Test Setup.....	53
3.4 Immunity from conducted voltages.....	55
3.4.1 Immunity from conducted voltages test information	55
3.4.2 Measurement Equipment Used for Immunity from conducted voltages	55
3.4.3 Test Data.....	55
3.4.4 Test Setup.....	56
3.5 Radio-frequency Electromagnetic Fields Immunity.....	58
3.5.1 Radio-frequency Electromagnetic Fields Immunity test information.....	58
3.5.2 Measurement Equipment Used for Radio-frequency Electromagnetic Fields Immunity test.....	58
3.5.3 Test Data.....	58
3.5.4 Test Setup.....	59

Section 1 General Information

1.1 Introduction

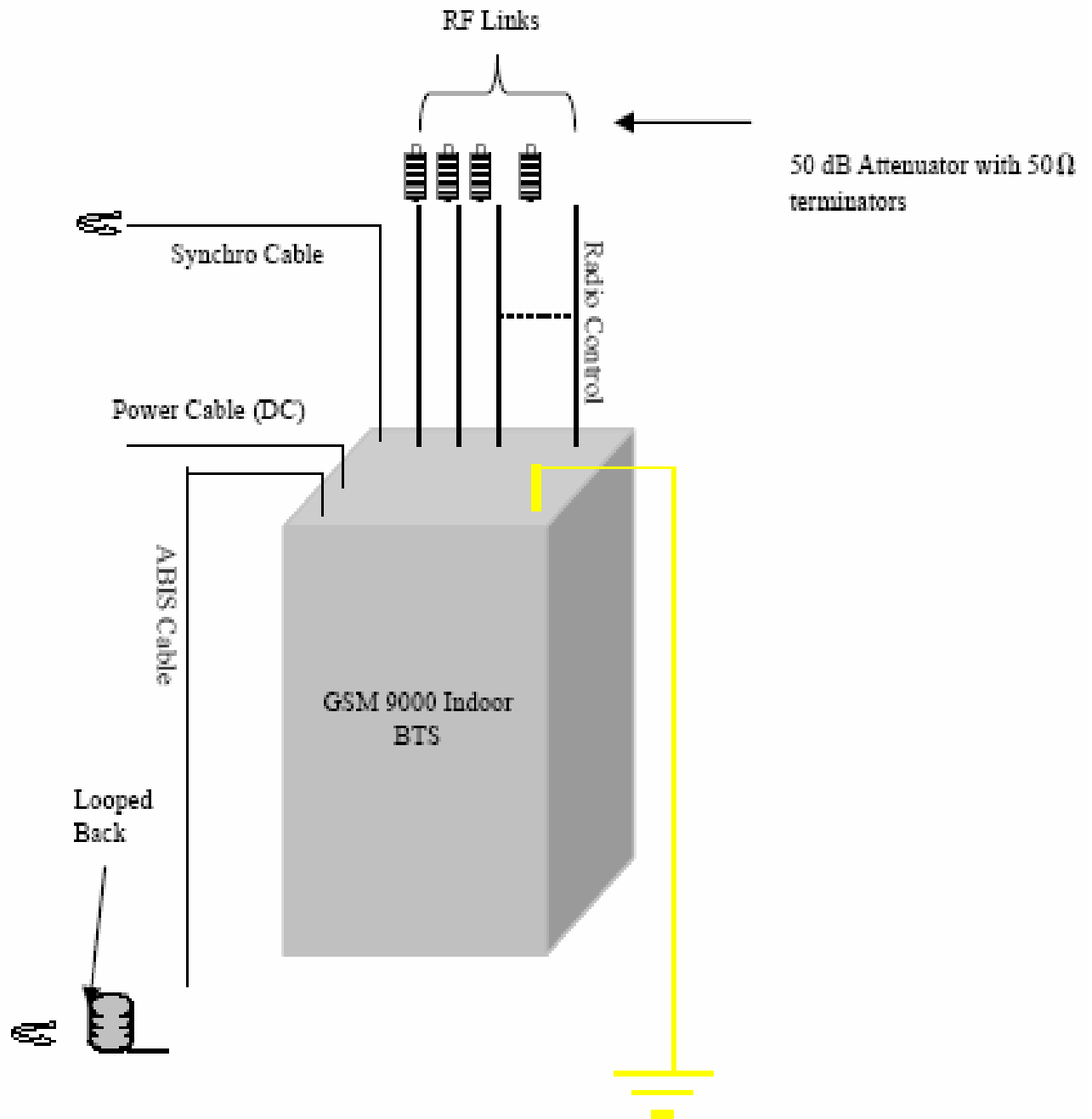
This report documents the emission and Immunity test results for the GSM 9000 Indoor BTS 850 MHz & 1900 MHz for radio configurations: full & dual band.

1.2 EUT General and Technical Descriptions

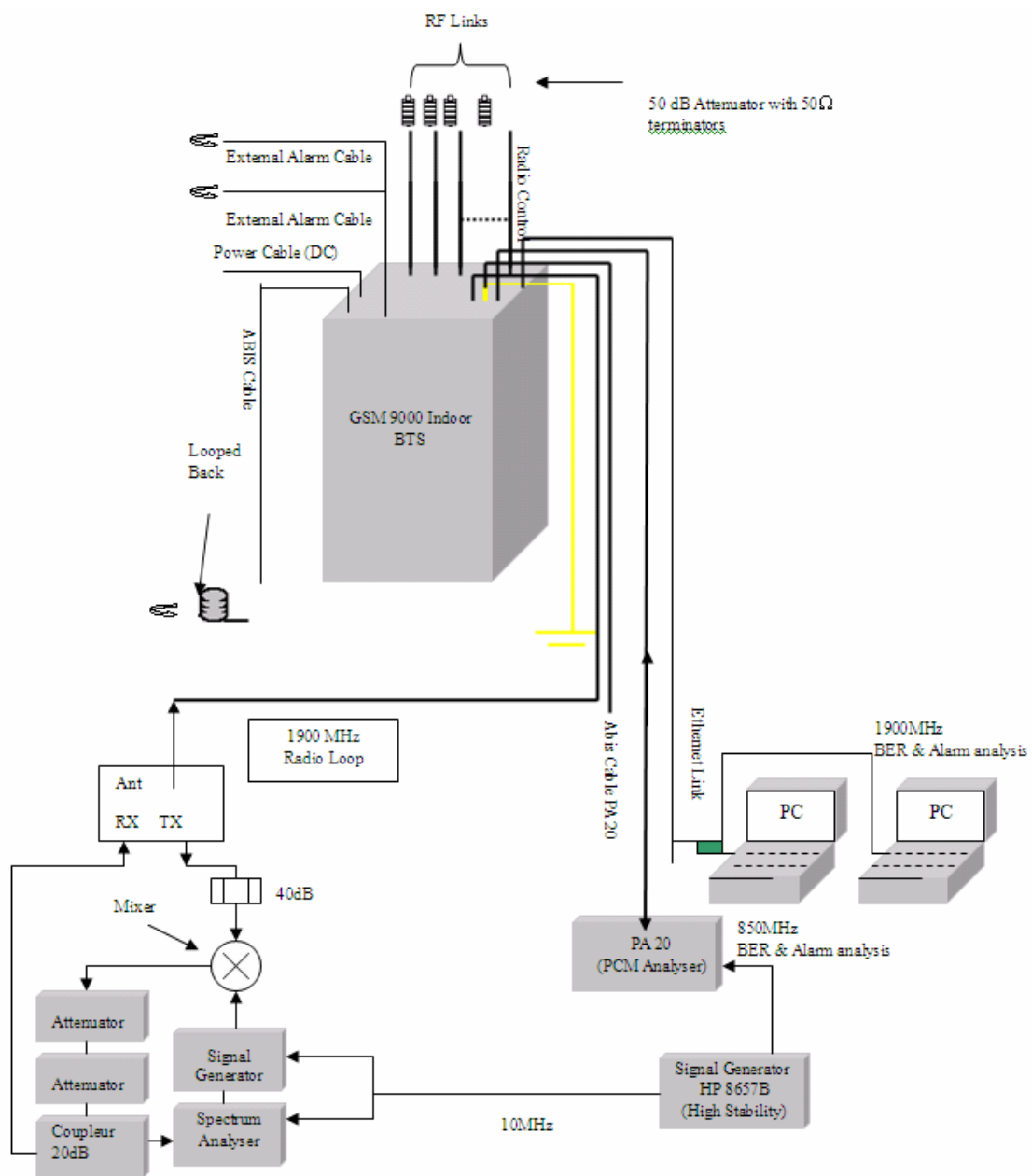
EUT Name:	GSM 9000 Indoor BTS
EUT Model:	ROHS NEW GSM 9000 Indoor BTS with MOBI DDM850 and New SICS
EUT Trademark:	Nortel
Input Voltage:	DC-48V
Power Cable Description:	DC cable: un-shielded.
Other Cables Description:	ABIS cable: shielded.
Function(s) Description:	GSM base station.

1.3 Emissions testing configuration

Figure N°1: Emissions testing configuration



1.4 Immunities testing configuration



1.5 EUT Photographs



/

Section 2 Electromagnetic Emissions

2.1 Conducted Emission at DC Terminals

2.1.1 Conducted Emission Test Information

Temperature:	25 °C	Humidity:	65% RH
ATM Pressure:	103 k Pa	Grounding:	Grounding
Test Voltage:	-48VDC	Tested Range:	150kHz to 30MHz
Tested by:	Liu Xin	Date of test:	2007-10-12
Test Reference:	EN 301 489-1 clause 8.3		
Results:	PASS		

2.1.2 Measurement Equipments Used for Conducted Emission

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Test Receiver	R&S	ESCS 30	640101042	2007-06-08	2008-06-08
LISN	R&S	ESH3-Z5	640101042-02	2007-06-08	2008-06-08
Anechoic Chamber	Lindgren	FACT-4	640101037	2007-06-08	2008-06-08

2.1.3 Test Data

0V terminal, with "0V/ground" strap							
No.	Frequency (MHz)	Corrected QP Level (dBµV)	Limits QP (dBµV)	Margin QP (dB)	Corrected AVE Level (dBµV)	Limits AVE (dBµV)	Margin AVE (dB)
1	0.425	32.3	57.4	-25.1	29.7	47.4	-17.7
2	0.565	30.0	56.0	-26.0	29.2	46.0	-16.8
3	1.360	36.5	56.0	-19.5	35.7	46.0	-10.3
4.	2.585	41.4	56.0	-14.6	39.6	46.0	-6.4
5	8.035	39.5	60.0	-20.5	33.4	50.0	-16.6
6	20.99	34.8	60.0	-25.2	25.8	50.0	-24.2
0V terminal, without "0V/ground" strap							
No.	Frequency (MHz)	Corrected QP Level (dBµV)	Limits QP (dBµV)	Margin QP (dB)	Corrected AVE Level (dBµV)	Limits AVE (dBµV)	Margin AVE (dB)
1	0.300	41.9	60.3	-18.4	38.4	50.3	-11.9
2	0.565	30.3	56.0	-25.7	29.4	46.0	-16.6
3	1.365	36.1	56.0	-19.9	35.3	46.0	-10.7
4.	2.590	41.2	56.0	-14.9	39.3	46.0	-6.7
5	3.955	31.3	56.0	-24.7	24.4	46.0	-21.6
6	8.045	38.6	60.0	-21.4	35.2	50.0	-14.8

Note: The Corrected QP Level and Corrected AVE Level included The Cable attenuation.

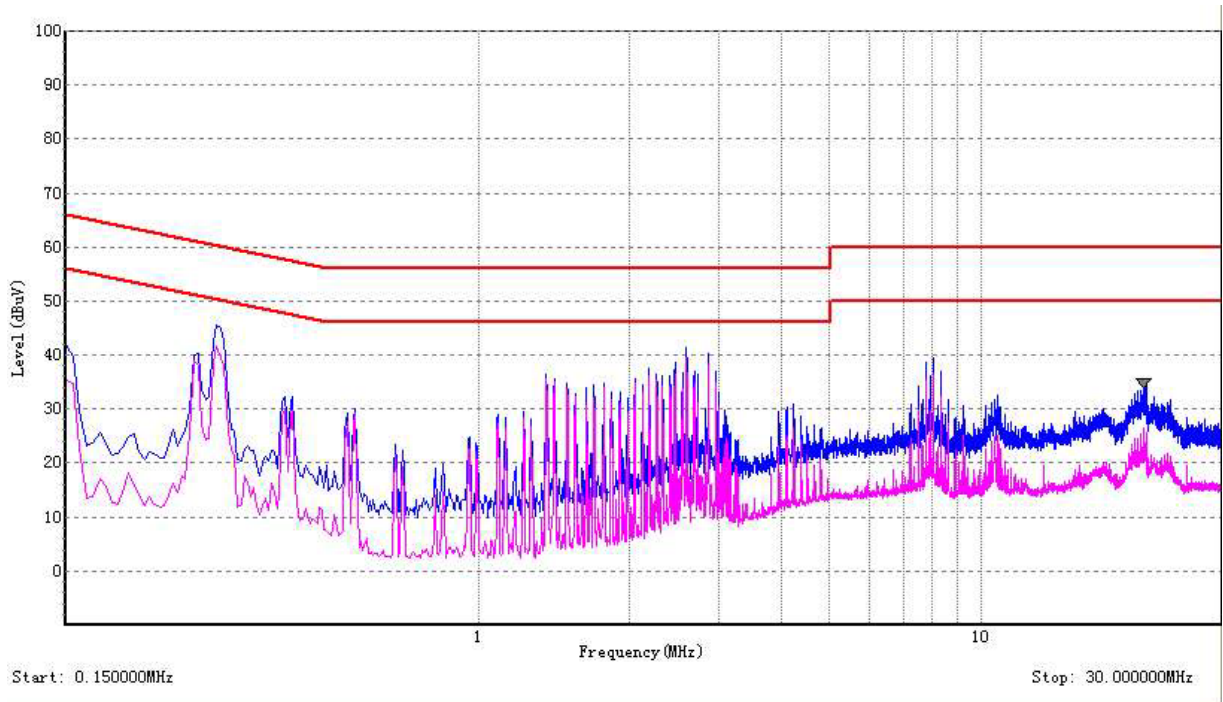
All RM runs at full Power at "BMT" GSM850Mhz & 1900Mhz frequencies.

-48V terminal, with "0V/ground" strap							
No.	Frequency (MHz)	Corrected QP Level (dBμV)	Limits QP (dBμV)	Margin QP (dB)	Corrected AVE Level (dBμV)	Limits AVE (dBμV)	Margin AVE (dB)
1	0.300	42.0	60.3	-18.3	38.3	50.3	-12.0
2	0.545	29.6	56.0	-26.4	28.0	46.0	-18.0
3	1.360	35.9	56.0	-20.1	35.4	46.0	-10.6
4	2.855	42.3	56.0	-13.7	41.3	46.0	-4.7
5	8.570	46.4	60.0	-13.6	43.1	50.0	-6.9
6	20.95	33.8	60.0	-26.2	22.7	50.0	-27.3
-48V terminal, without "0V/ground" strap							
No.	Frequency (MHz)	Corrected QP Level (dBμV)	Limits QP (dBμV)	Margin QP (dB)	Corrected AVE Level (dBμV)	Limits AVE (dBμV)	Margin AVE (dB)
1	0.300	42.2	60.3	-18.1	38.5	50.3	-11.8
2	0.545	29.6	56.0	-26.4	28.3	46.0	-17.7
3	1.360	36.0	56.0	-20.0	35.5	46.0	-10.5
4	2.855	42.4	56.0	-13.6	41.3	46.0	-4.7
5	8.570	46.0	60.0	-14.0	43.0	50.0	-7.0
6	20.41	34.8	60.0	-25.2	25.5	50.0	-24.5

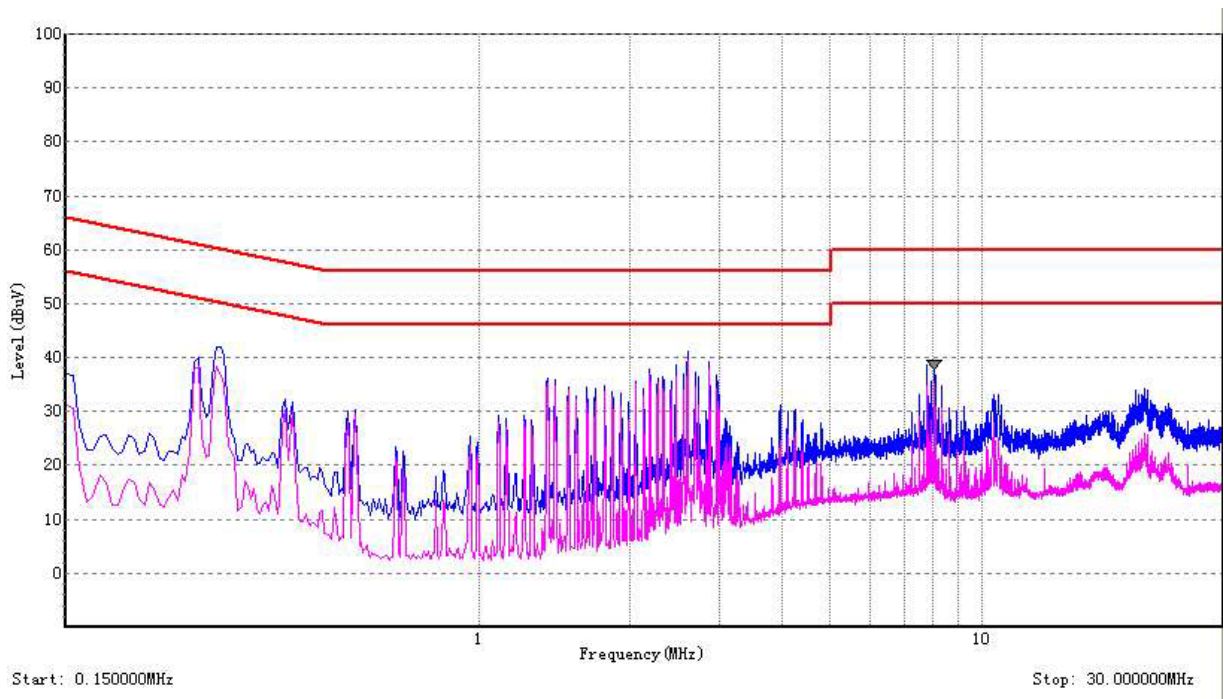
Note: The Corrected QP Level and Corrected AVE Level included The Cable attenuation.

All RM runs at full Power at "BMT" GSM850Mhz & 1900Mhz frequencies.

2.1.4 Test curves

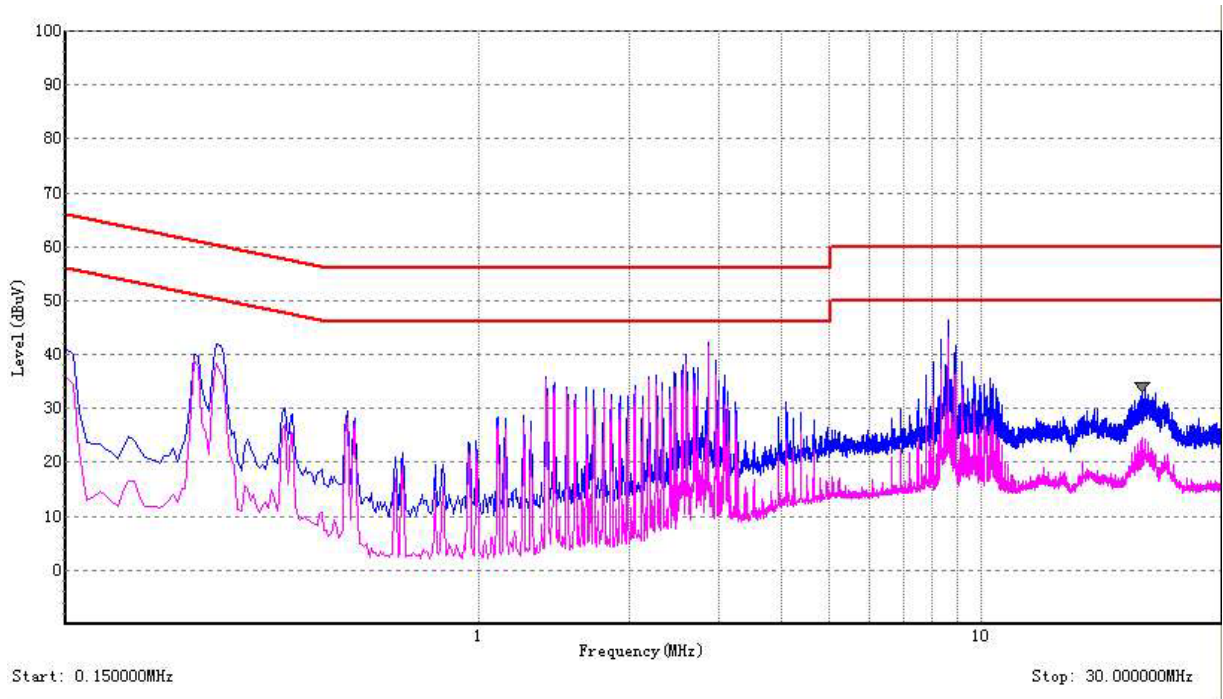


DC port conducted Emission Graph (0V terminal, with "0V/ground" strap)

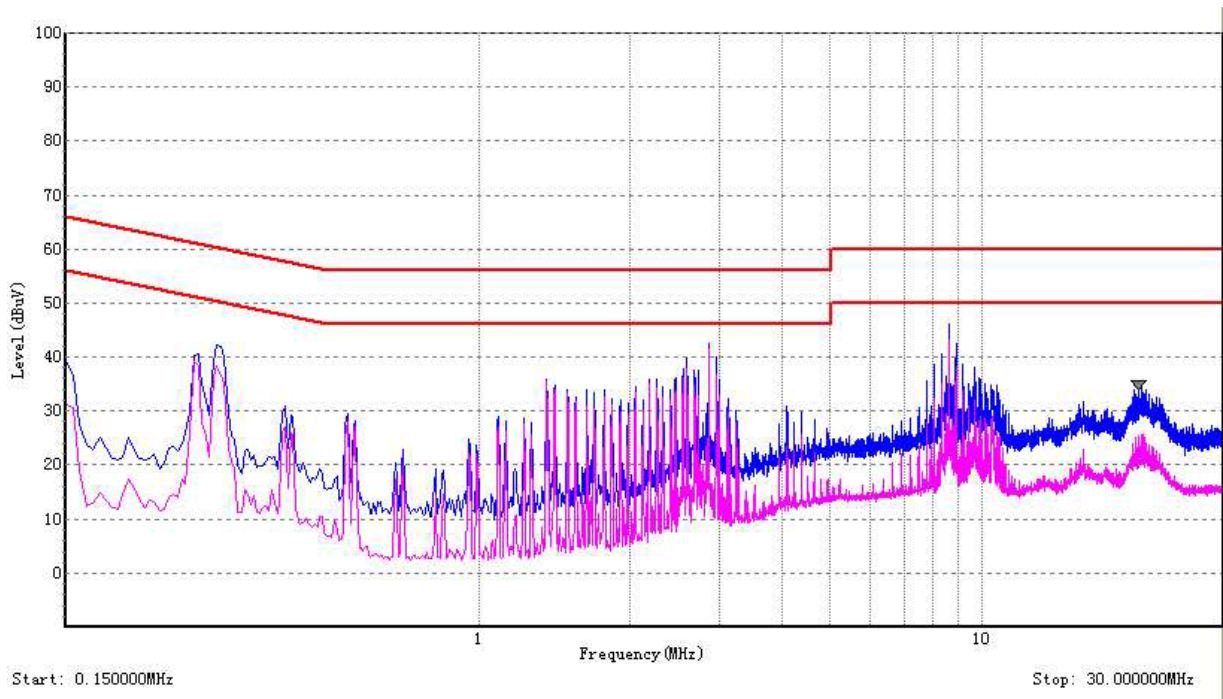


DC port conducted Emission Graph (0V terminal, without "0V/ground" strap)

Note: The curves included The Cable attenuation.



DC port conducted Emission Graph (-48V terminal, with "0V/ground" strap)



DC port conducted Emission Graph (-48V terminal, without "0V/ground" strap)

Note: The curves included The Cable attenuation.

2.1.5 Test Setup



DC port Conducted Emission Test Set-up

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2.2 Conducted Emission at Telecommunication Terminals

2.2.1 Conducted Emission Test Information

Temperature:	25 °C	Humidity:	65% RH
ATM Pressure:	103 k Pa	Grounding:	Grounding
Test Voltage:	-48VDC	Tested Range:	150kHz to 30MHz
Tested by:	Liu xin	Date of test:	2007-10-15
Test Reference:	EN 301 489-1 clause 8.7		
Results:	PASS		

2.2.2 Measurement Equipments Used for Conducted Emission

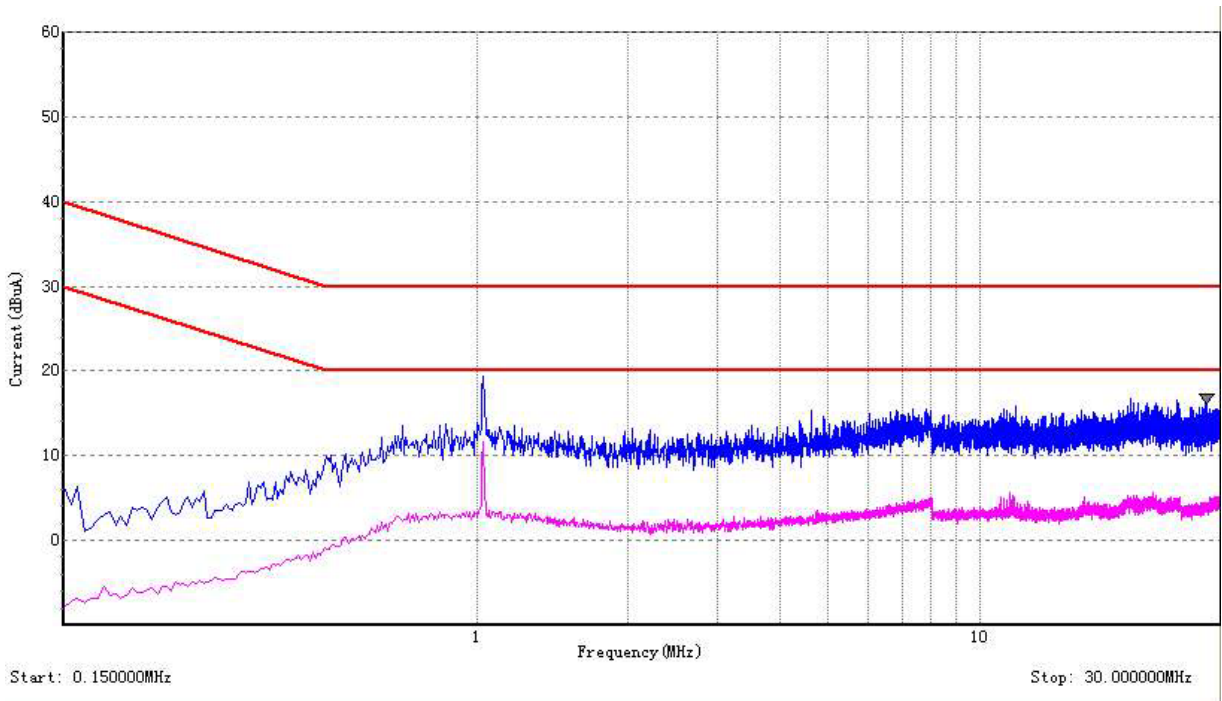
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Test Receiver	R&S	ESCS 30	640101042	2007-06-08	2008-06-08
ISN	R&S	ENY41	640101042-04	2007-06-08	2008-06-08
Current Probe	R&S	EZ-17	640201028-13	2007-06-08	2008-06-08
Anechoic Chamber	Lindgren	FACT-4	640101037	2007-06-08	2008-06-08

2.2.3 Test Data

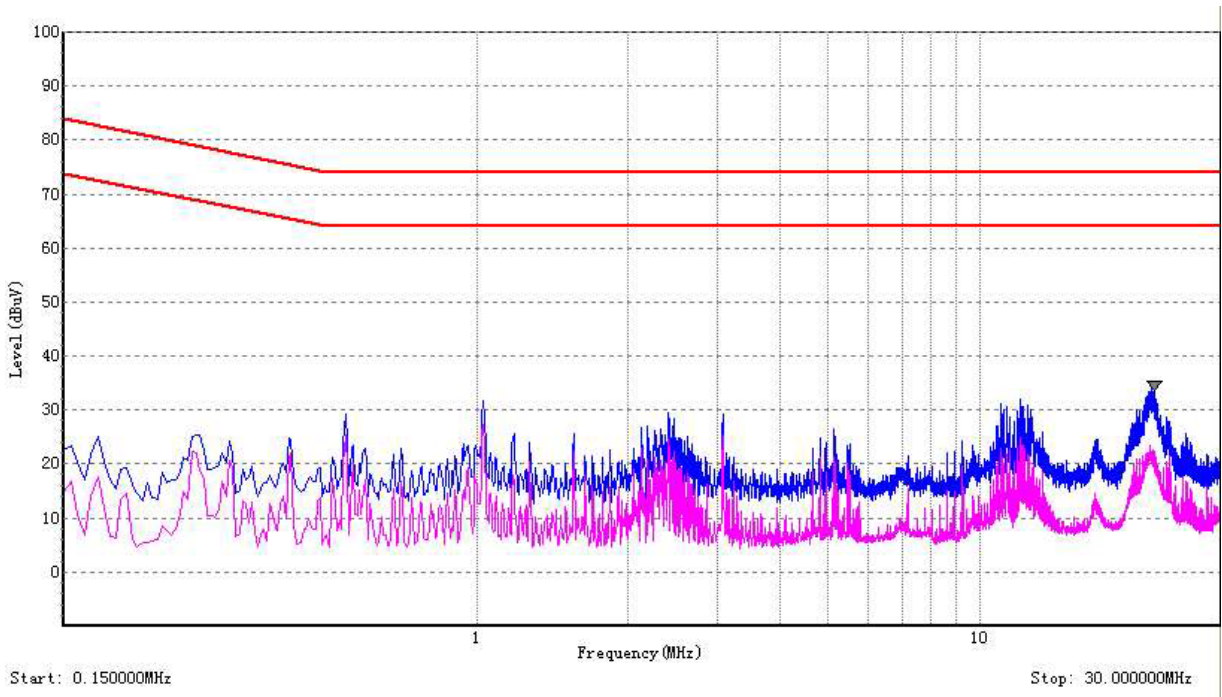
Telecommunication Terminals Conducted Current (Pmax, PCM0, 1,2,3 Loop Back)							
No.	Frequency (MHz)	Corrected QP Level (dBμA)	Limits QP (dBμA)	Margin QP (dB)	Corrected AVE Level (dBμA)	Limits AVE (dBμA)	Margin AVE (dB)
1	1.025	19.3	30.0	-10.7	11.7	20.0	-8.3
2	4.600	15.3	30.0	-14.7	2.6	20.0	-17.4
3	7.315	15.4	30.0	-14.6	3.9	20.0	-16.1
4.	28.22	16.7	30.0	-13.3	3.7	20.0	-16.3
Telecommunication Terminals Conducted Voltage (Pmax, PCM0, 1,2,3 Loop Back)							
No.	Frequency (MHz)	Corrected QP Level (dBμV)	Limits QP (dBμV)	Margin QP (dB)	Corrected AVE Level (dBμV)	Limits AVE (dBμV)	Margin AVE (dB)
1	0.545	29.2	74.00	-44.8	25.5	64.0	-38.5
2	1.025	31.7	74.00	-42.3	27.2	64.0	-36.8
3	2.395	29.7	74.00	-44.3	24.5	64.0	-39.5
4	5.120	26.5	74.00	-47.5	21.3	64.0	-42.7
5	11.99	32.0	74.00	-42.0	24.9	64.0	-39.1
6	22.15	34.5	74.00	-39.5	21.3	64.0	-42.7

Note: The Corrected QP Level and Corrected AVE Level included The Cable attenuation.

2.2.4 Test curves



Telecommunication Terminals Conducted Current (Pmax, PCM0, 1,2,3 Loop Back)



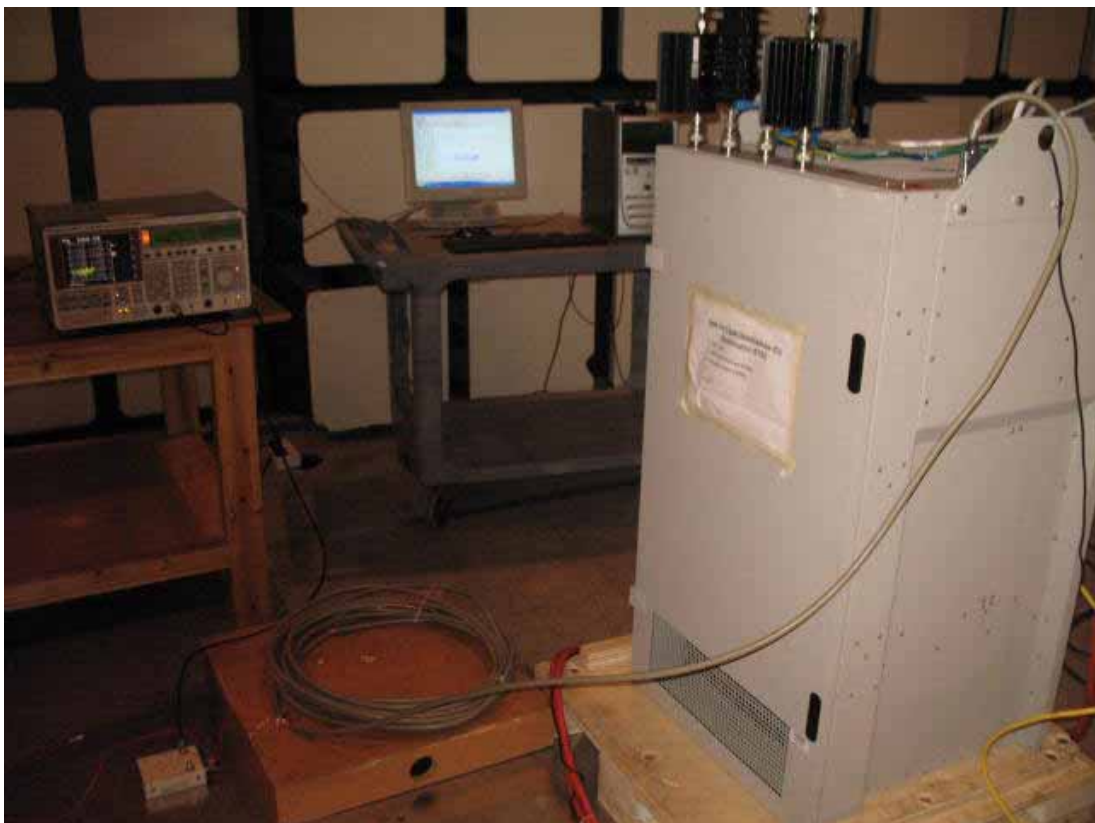
Telecommunication Terminals Conducted Voltage (Pmax, PCM0, 1,2,3 Loop Back)

Note: The curves included The Cable attenuation.

2.2.5 Test Setup



Conducted Emission at telecomm port Test Set-up



Conducted Emission at telecomm port Test Set-up

2.3 Radiated Emission (30-1000MHz)

2.3.1 Radiated Emission Test Information

Temperature:	25 °C	Humidity:	65% RH
ATM Pressure:	103 k Pa	Grounding:	Grounding
Test Voltage:	-48VDC	Tested Range:	30MHz to 1000MHz
Tested by:	Liu Xin	Date of test:	2007-10-11
Test Reference:	EN55022		
Results:	PASS		

2.3.2 Measurement Equipments Used for Radiated emission

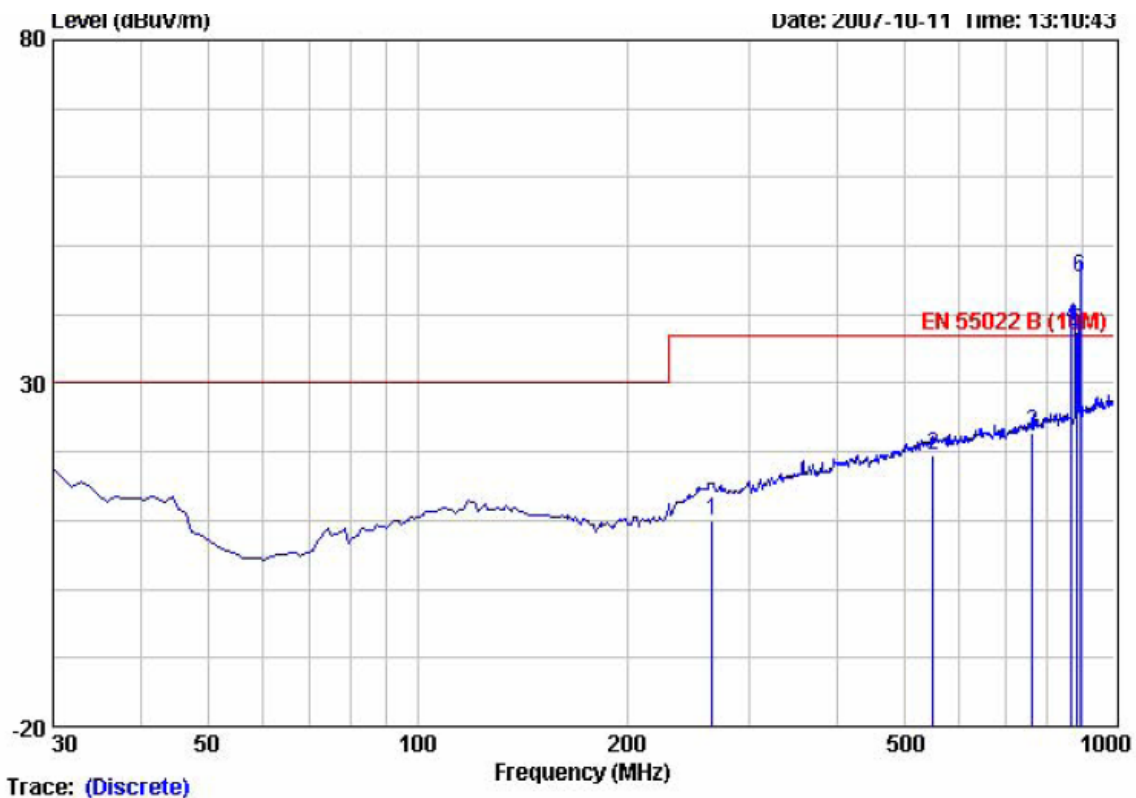
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	2007-06-08	2008-06-08
Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2007-06-08	2008-06-08
0.1-1300 MHz Pre-Amplifier	HP	8447D OPT 010	2944A06252	2007-06-08	2008-06-08
10m Semi- Anechoic Chamber	ETS	N/A	N/A	2007-06-08	2008-06-08

2.3.3 Test Data

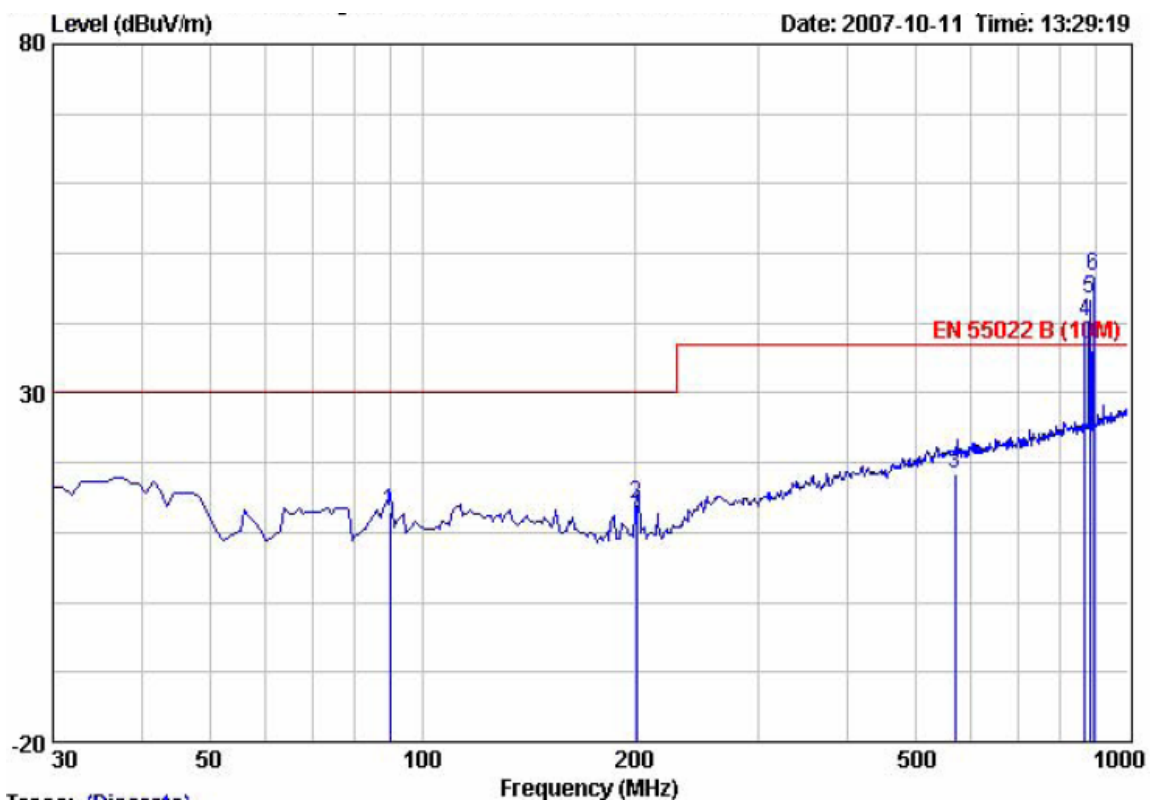
Horizontal (30-1000MHz)				
No.	Frequency (MHz)	Corrected QP Level dB (µV/m)	10 Meter Limits dB (µV/m)	Margin (dB)
1	264.7	10.0	37.0	-27.0
2	549.9	19.4	37.0	-17.6
3	763.3	22.8	37.0	-14.2
Vertical (30-1000MHz)				
No.	Frequency (MHz)	Corrected QP Level dB (µV/m)	10 Meter Limits dB (µV/m)	Margin (dB)
1	90.1	12.9	30.0	-17.1
2	201.1	14.0	30.0	-16.0
3	569.3	18.5	37.0	-18.5

Note: The Corrected QP Level included The Cable attenuation and The Antenna Factor.
 Test was performed at 10m semi-anechoic chamber.

2.3.4 Test Curves



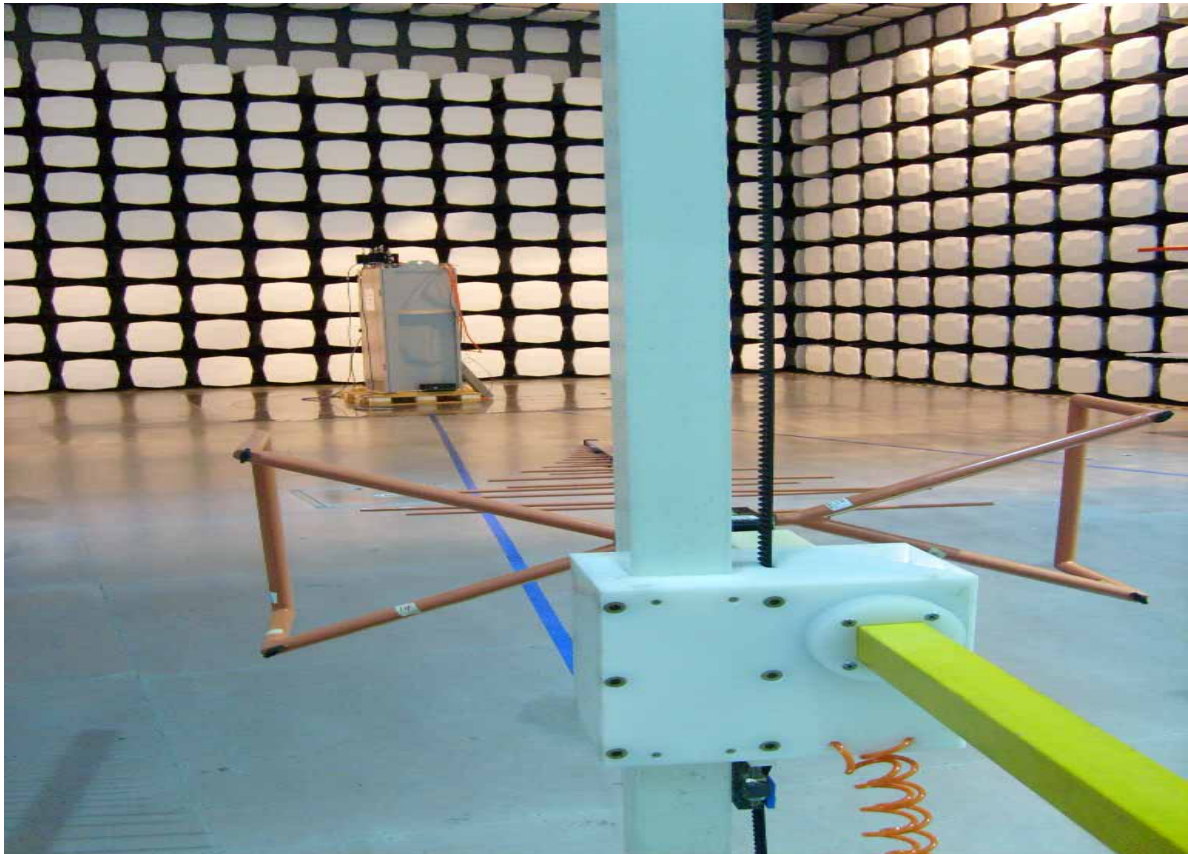
Horizontal Radiated Emission Plot (Peak, Max Hold Mode)



Vertical Radiated Emission Plot (Peak, Max Hold Mode)

Note: The Curves included The Cable attenuation and The Antenna Factor.
GSM frequencies were excluded.

2.3.5 Test Setup



Radiated Emission Test Set-Up 30-1000MHz

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2.4 Radiated Emission (1GHz-6GHz)

2.4.1 Radiated Emission Test Information

Temperature:	25 °C	Humidity:	65% RH
ATM Pressure:	103 k Pa	Grounding:	Grounding
Test Voltage:	-48VDC	Tested Range:	1GHz to 6GHz
Tested by:	Liu Xin	Date of test:	2007-10-11
Test Reference:	EN55022		
Results:	PASS		

2.4.2 Measurement Equipments Used for Radiated emission

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	2007-06-08	2008-06-08
Horn Antenna	R & S	HF906	100095	2007-06-08	2008-06-08
1-26.5GHz Pre-Amplifier	Agilent	8449B	3008A01649	2007-06-08	2008-06-08
10m Semi- Anechoic Chamber	ETS	N/A	N/A	2007-06-08	2008-06-08

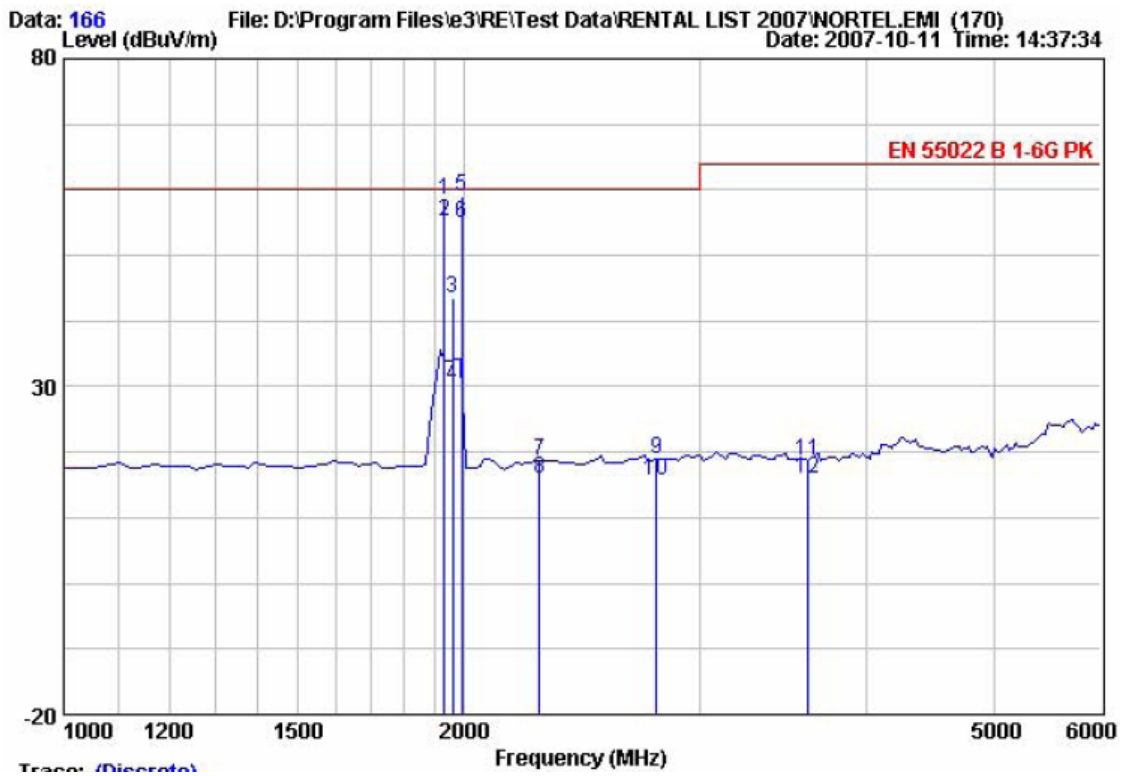
2.4.3 Test Data

Horizontal (1-6GHz)							
No.	Frequency (MHz)	Corrected PK Level (dBµV/m)	Limits PK (dBµV/m)	Margin PK (dB)	Corrected AVE Level (dBµV/m)	Limits AVE (dBµV/m)	Margin AVE (dB)
1	2275.0	18.7	60.0	-41.3	16.0	40.0	-24.0
2	2785.0	18.9	60.0	-41.1	15.7	40.0	-24.3
3	3618.0	18.7	64.0	-45.3	16.1	44.0	-27.9
Vertical (1-6GHz)							
No.	Frequency (MHz)	Corrected PK Level (dBµV/m)	Limits PK (dBµV/m)	Margin PK (dB)	Corrected AVE Level (dBµV/m)	Limits AVE (dBµV/m)	Margin AVE (dB)
1	1731.0	29.0	60.0	-31.0	24.5	40.0	-15.5
2	2938.0	19.5	60.0	-40.5	15.2	40.0	-24.8
3	4247.0	23.0	64.0	-41.0	15.5	44.0	-28.5

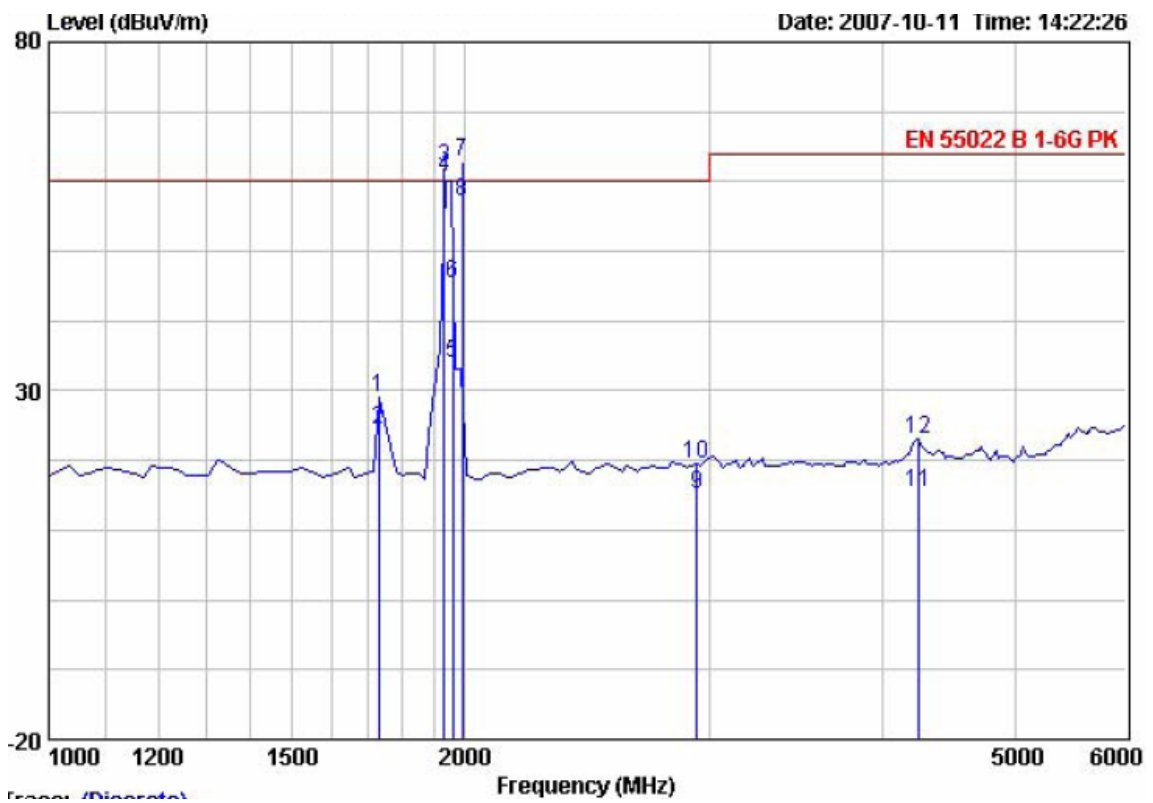
Note: The Corrected QP Level and Corrected AVE Level included The Cable attenuation.

Test was performed at 10m semi-anechoic chamber.

2.4.4 Test Curves



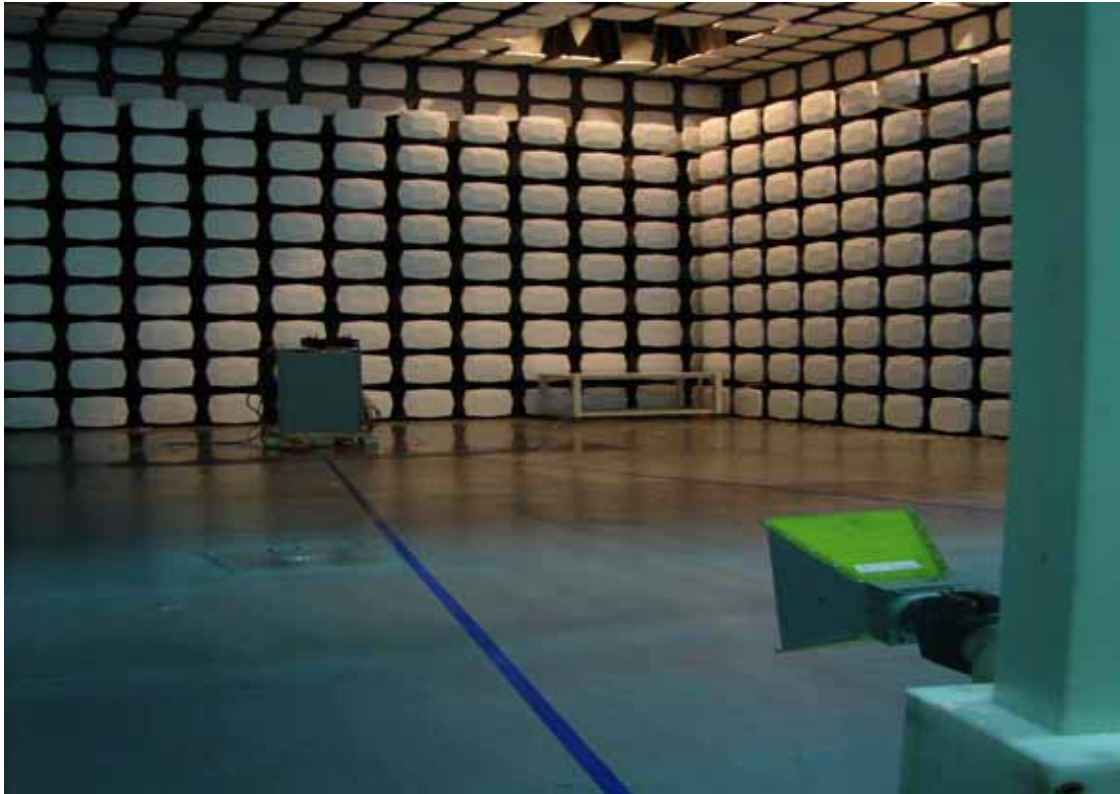
Horizontal Radiated Emission Plot (Peak, Max Hold Mode)



Vertical Radiated Emission Plot (Peak, Max Hold Mode)

Note: The Curves included The Cable attenuation and The Antenna Factor.
GSM frequencies were excluded.

2.4.5 Test Setup



Radiated spurious Emission Test Set-Up 1G-6GHz

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2.5 Radiated Emission spurious (30-4000MHz)

2.5.1 Radiated Emission Test Information

Temperature:	25 °C	Humidity:	65% RH
ATM Pressure:	103 k Pa	Grounding:	Grounding
Test Voltage:	-48VDC	Tested Range:	30MHz to 4000MHz
Tested by:	Liu xin	Date of test:	2007-10-11
Test Reference:	ETSI TS 101 087 V8.10.0 clause 8, except clause 8.4		
Results:	PASS		

2.5.2 Measurement Equipments Used for Radiated emission

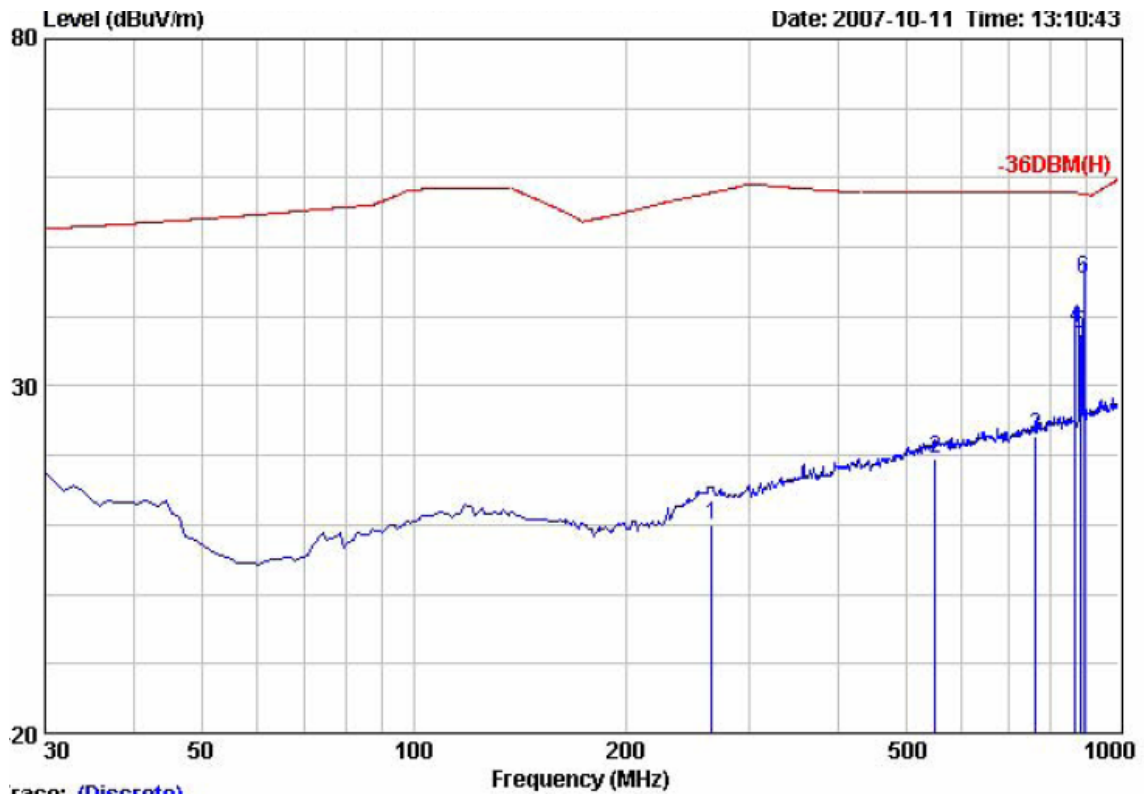
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
Horn Antenna	R & S	HF906	100095	2007-06-08	2008-06-08
EMI Test Receiver	R & S	ESIB26	100249	2007-06-08	2008-06-08
Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2007-06-08	2008-06-08
0.1-1300 MHz Pre-Amplifier	HP	8447D OPT 010	2944A06252	2007-06-08	2008-06-08
1-26.5 GHz Pre-Amplifier	Agilent	8449B	3008A01649	2007-06-08	2008-06-08
10m Semi-Anechoic Chamber	ETS	N/A	N/A	2007-06-08	2008-06-08

2.5.3 Test Data

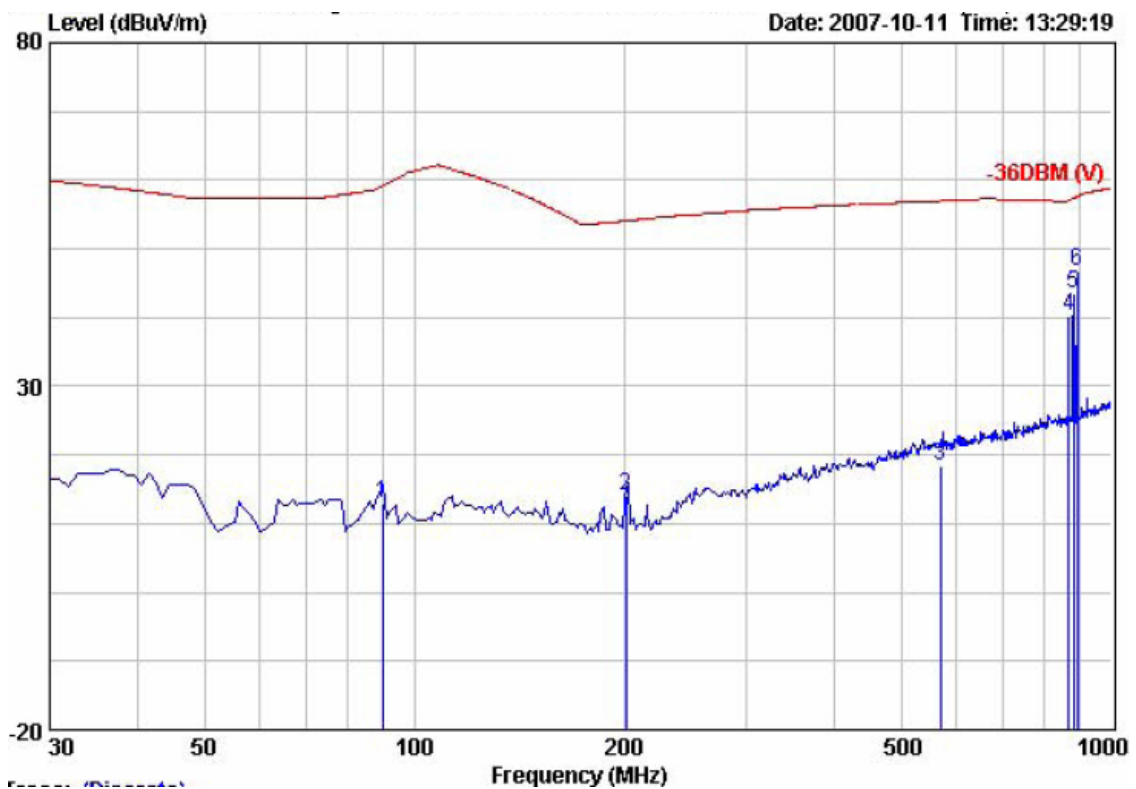
Horizontal (30-4000MHz)				
No.	Frequency (MHz)	ERP Level (dBm)	Limits (dBm)	Margin (dB)
1	264.7	-83.8	-36.0	-47.8
2	549.9	-74.5	-36.0	-38.5
3	763.3	-71.1	-36.0	-35.1
4	2275.0	-74.6	-30.0	-44.6
5	2785.0	-76.8	-30.0	-46.8
6	3618.0	-78.6	-30.0	-48.6
Vertical (30-4000MHz)				
No.	Frequency (MHz)	ERP Level (dBm)	Limits (dBm)	Margin (dB)
1	90.1	-82.4	-36.0	-46.4
2	201.1	-76.1	-36.0	-40.1
3	569.3	-74.5	-36.0	-38.5
4	1731.0	-63.0	-30.0	-33.0
5	2394.0	-73.4	-30.0	-43.4
6	2938.0	-76.9	-30.0	-46.9

Note: Test was performed at 10m semi-anechoic chamber. Radiation spurious component were detected by the test antenna and measuring receiver. At each frequency at which a component is detected, the BSS was rotated and the height of the test antenna adjusted to obtain maximum response, and the effective radiated power of that component determined by a substitution measurement. The measurement was repeated with the test antenna in the orthogonal polarization plane.

2.5.4 Test Curves

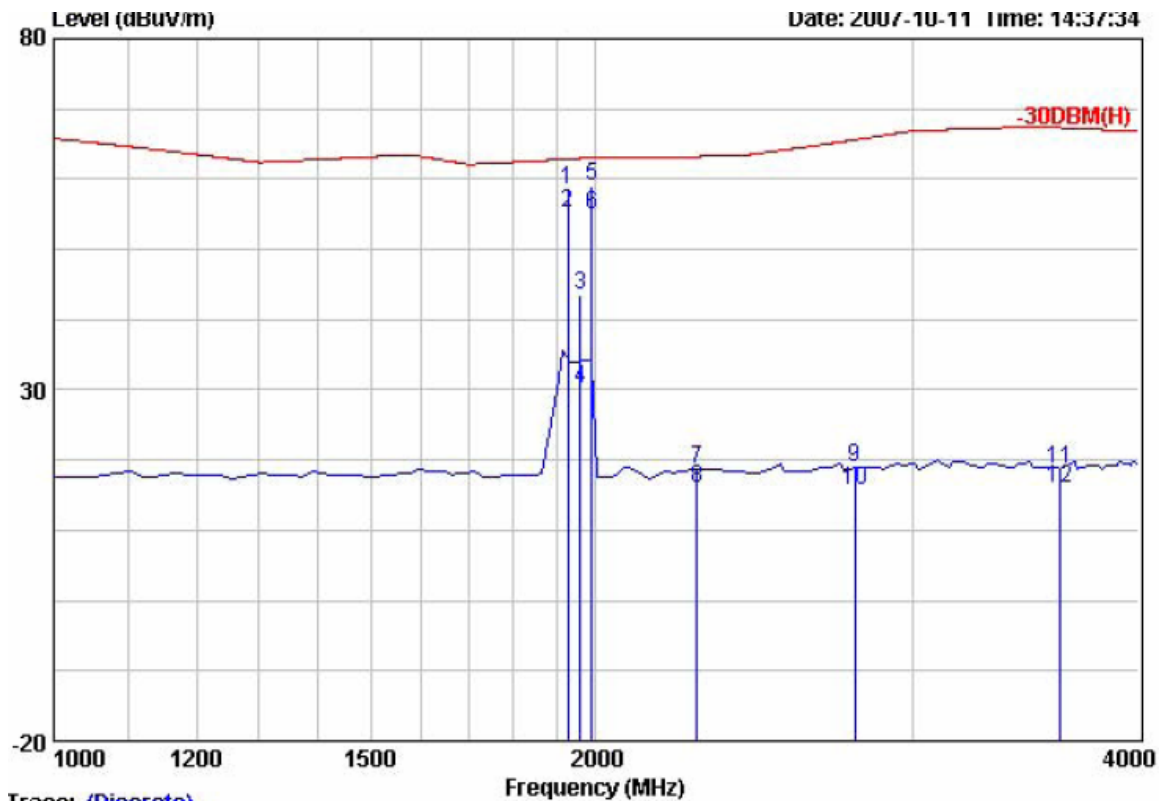


Horizontal Radiated Emission Plot (Peak, Max Hold Mode)(30M-1GHz)

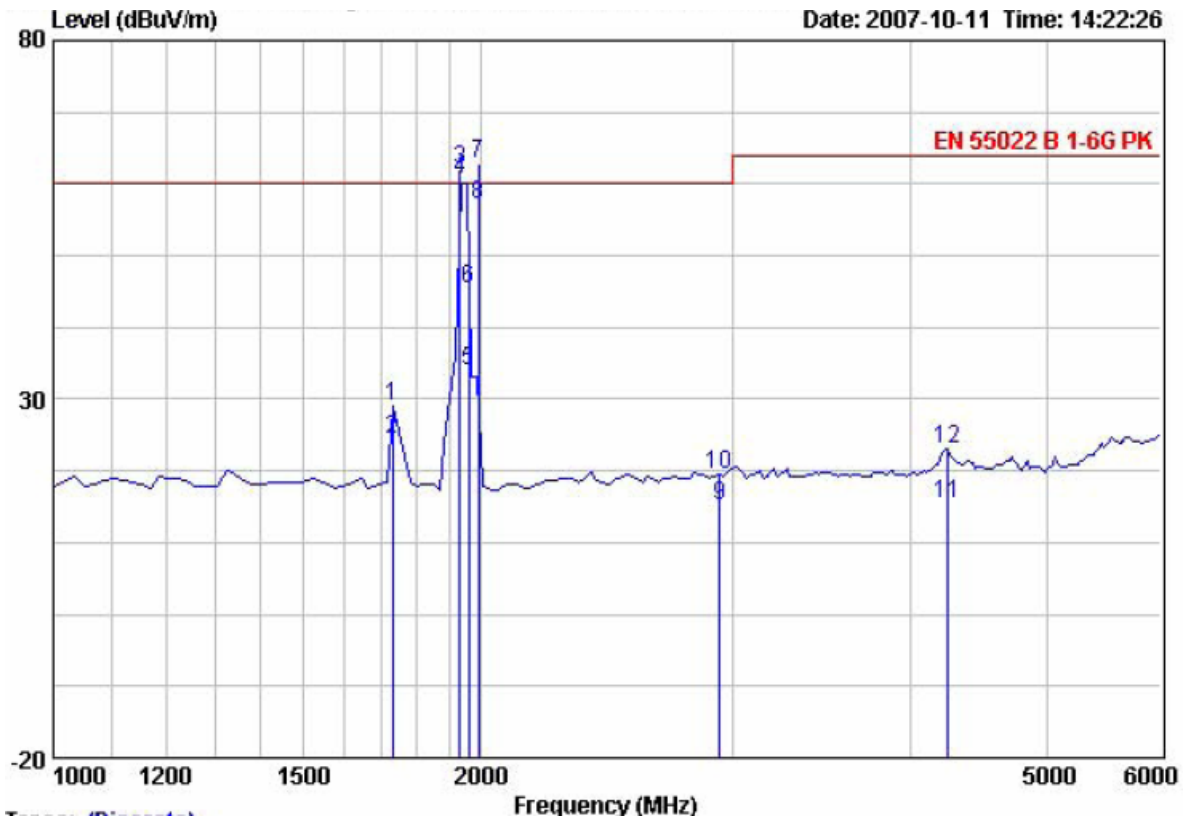


Vertical Radiated Emission Plot (Peak, Max Hold Mode) (30M-1GHz)

Note: The Curves included The Cable attenuation and The Antenna Factor.
GSM frequencies were excluded.



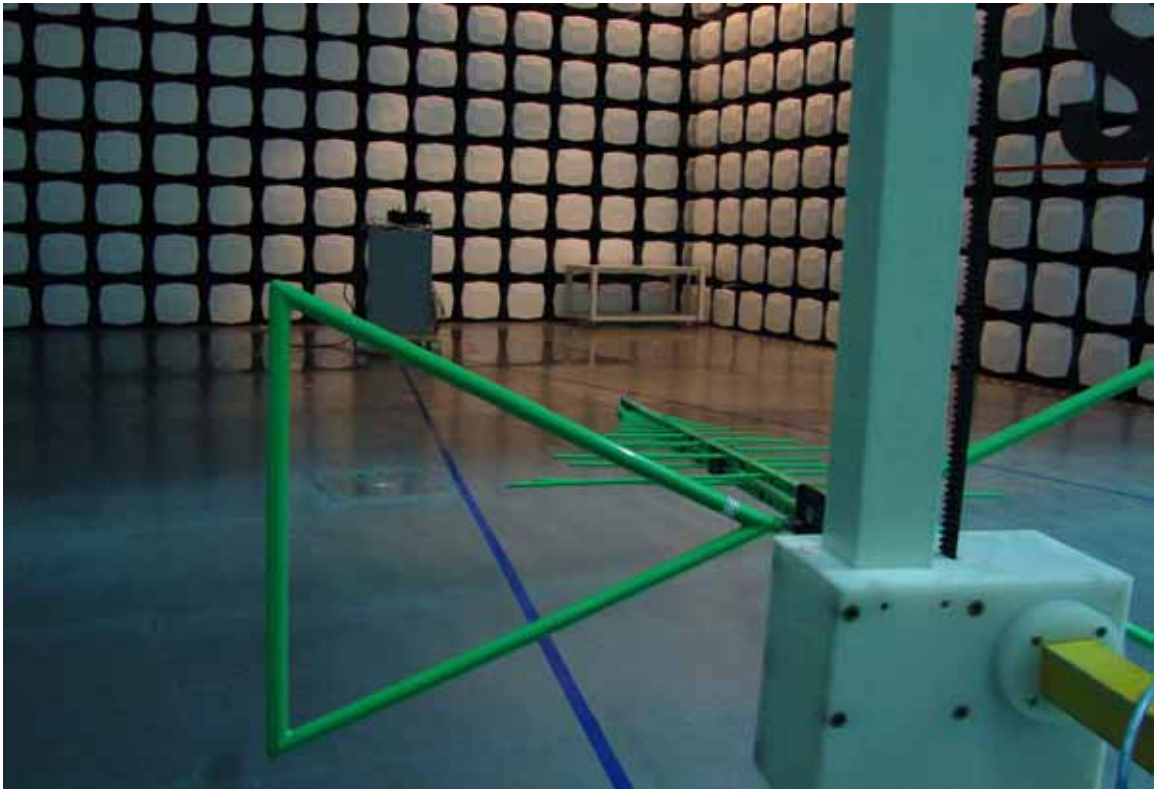
Horizontal Radiated Emission Plot (Peak, Max Hold Mode)(1G-6GHz)



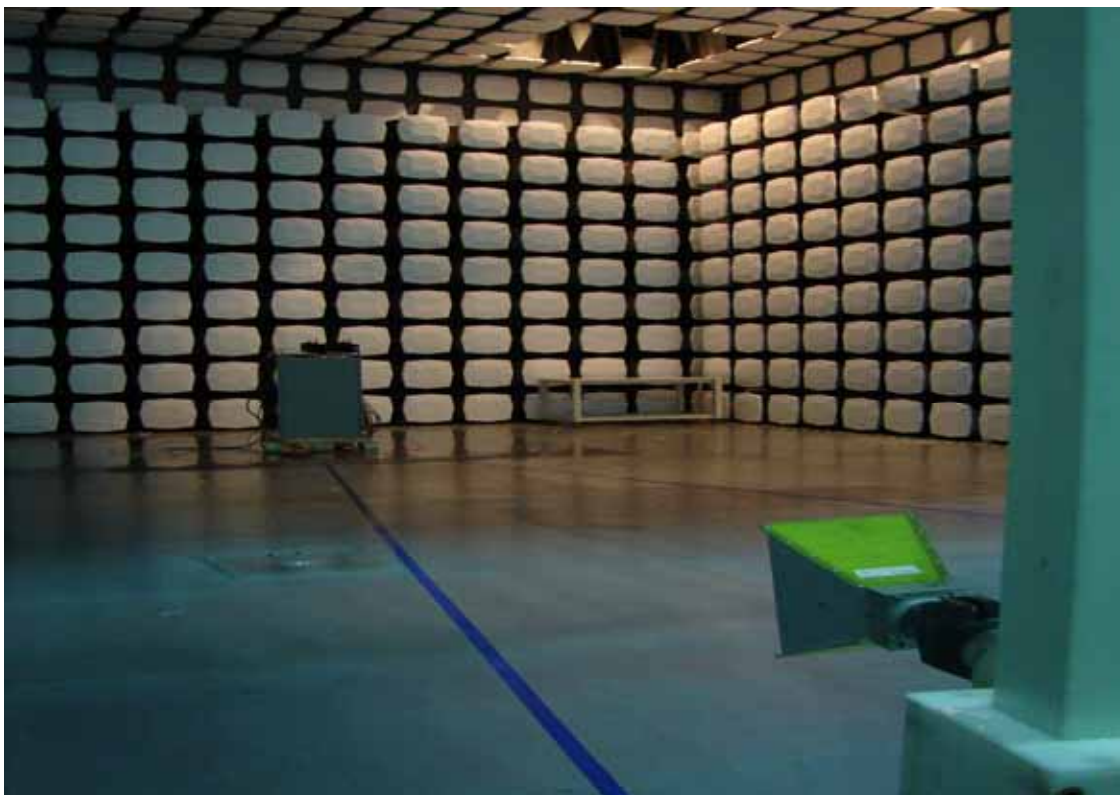
Vertical Radiated Emission Plot (Peak, Max Hold Mode) (1G-6GHz)

Note: The Curves included The Cable attenuation and The Antenna Factor.
 GSM frequencies were excluded.

2.5.5 Test Setup



Radiated spurious Emission Test Set-Up 30-1000MHz



Radiated spurious Emission Test Set-Up 1-4GHz

2.6 Radiated Emission (30-1000MHz)

2.6.1 Radiated Emission Test Information

Temperature:	25 °C	Humidity:	65% RH
ATM Pressure:	103 k Pa	Grounding:	Grounding
Test Voltage:	-48VDC	Tested Range:	30MHz to 1000MHz
Tested by:	Liu Xin	Date of test:	2007-10-11
Test Reference:	FCC PART 15		
Results:	PASS		

2.6.2 Measurement Equipments Used for Radiated emission

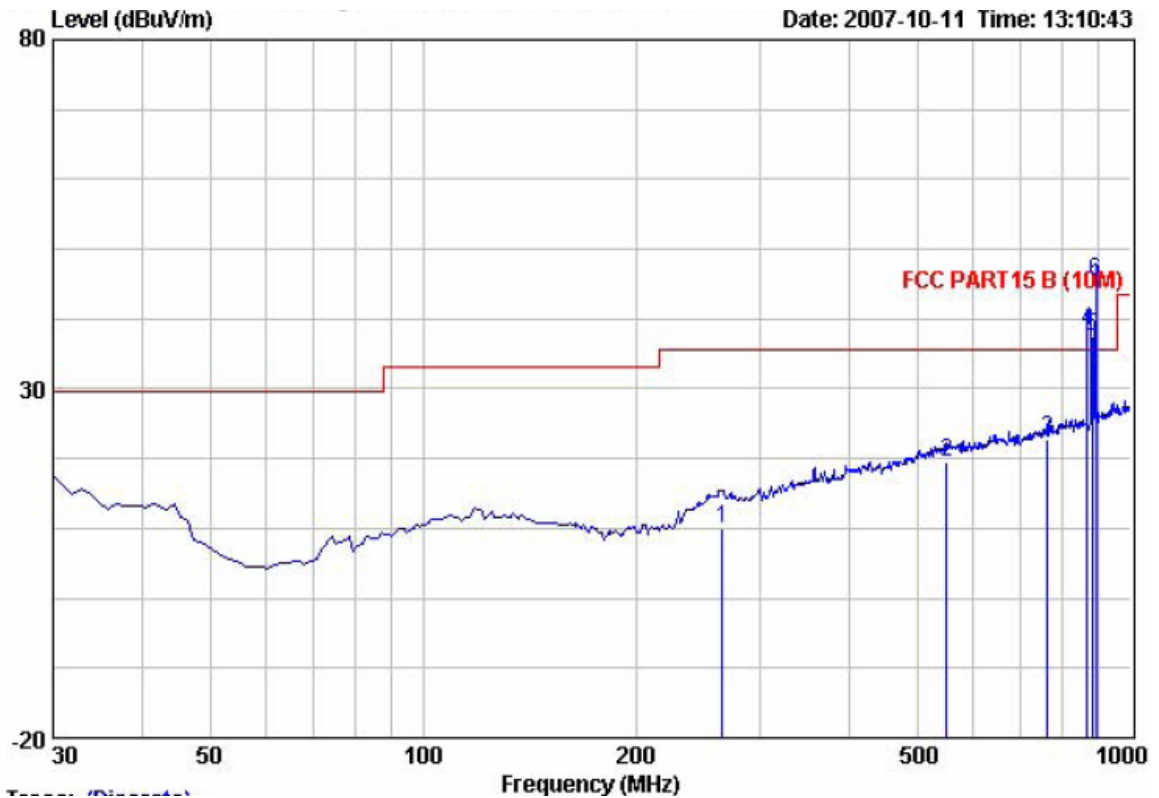
Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	2007-06-08	2008-06-08
Bi-log Type Antenna	Schaffner -Chase	CBL6112B	2966	2007-06-08	2008-06-08
0.1-1300 MHz Pre-Amplifier	HP	8447D OPT 010	2944A06252	2007-06-08	2008-06-08
10m Semi- Anechoic Chamber	ETS	N/A	N/A	2007-06-08	2008-06-08

2.6.3 Test Data

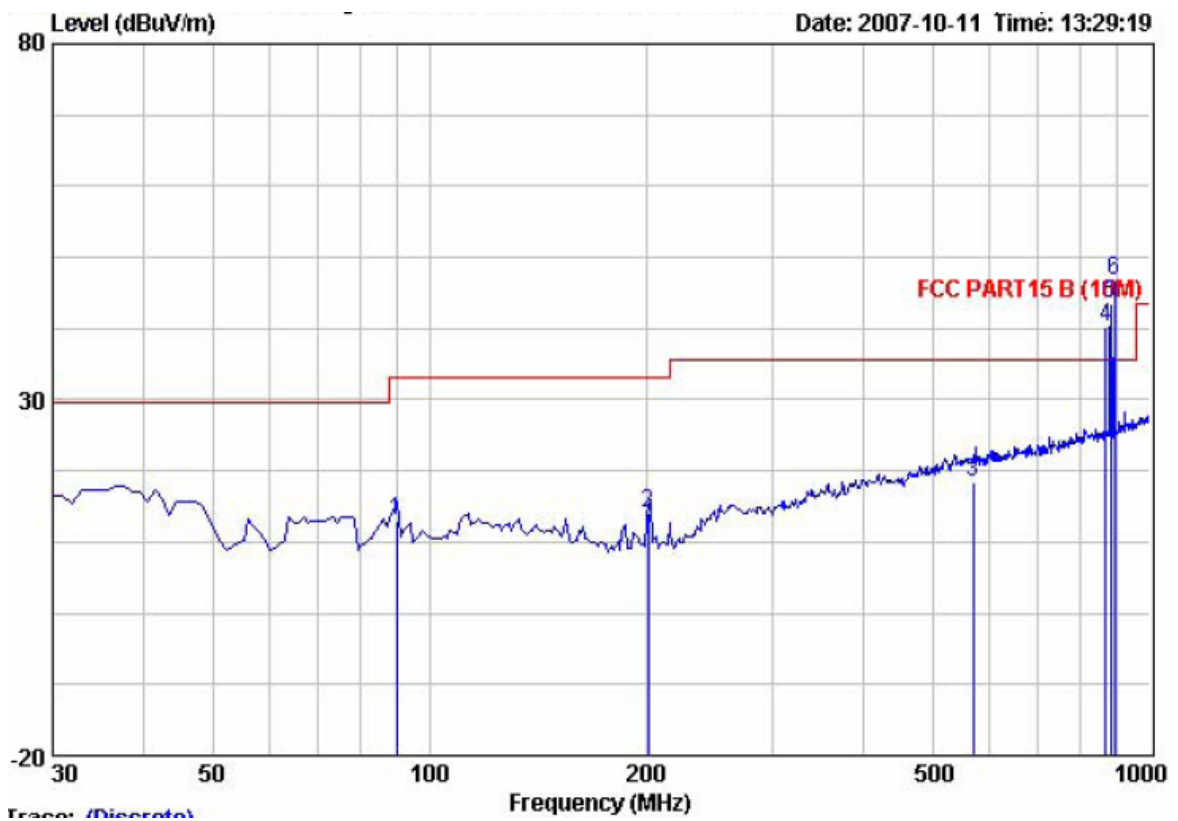
Horizontal (30-1000MHz)				
No.	Frequency (MHz)	Corrected QP Level dB (µV/m)	10 Meter Limits dB (µV/m)	Margin (dB)
1	264.7	10.0	35.6	-25.6
2	549.9	19.4	35.6	-16.2
3	763.3	22.8	35.6	-12.8
Vertical (30-1000MHz)				
No.	Frequency (MHz)	Corrected QP Level dB (µV/m)	10 Meter Limits dB (µV/m)	Margin (dB)
1	90.1	12.9	33.1	-20.2
2	201.1	14.0	33.1	-19.1
3	569.3	18.5	35.6	-17.1

Note: The Corrected QP Level included The Cable attenuation and The Antenna Factor.
 Test was performed at 10m semi-anechoic chamber.

2.6.4 Test Curves



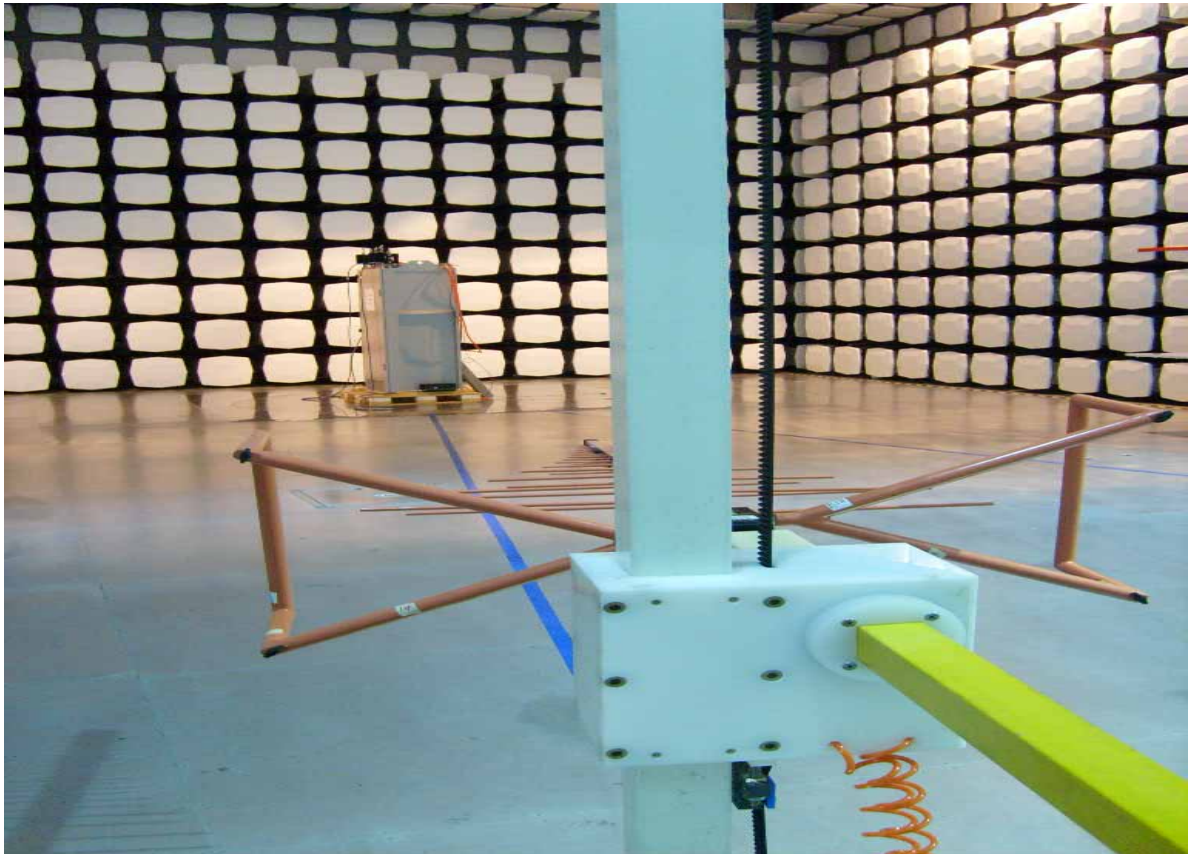
Horizontal Radiated Emission Plot (Peak, Max Hold Mode)



Vertical Radiated Emission Plot (Peak, Max Hold Mode)

Note: The Curves included The Cable attenuation and The Antenna Factor.
GSM frequencies were excluded.

2.6.5 Test Setup



Radiated Emission Test Set-Up 30-1000MHz

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2.7 Radiated Emission (1GHz-18GHz)

2.7.1 Radiated Emission Test Information

Temperature:	25 °C	Humidity:	65% RH
ATM Pressure:	103 k Pa	Grounding:	Grounding
Test Voltage:	-48VDC	Tested Range:	1GHz to 18GHz
Tested by:	Liu Xin	Date of test:	2007-10-11
Test Reference:	FCC PART 15		
Results:	PASS		

2.7.2 Measurement Equipments Used for Radiated emission

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	2007-06-08	2008-06-08
Horn Antenna	R & S	HF906	100095	2007-06-08	2008-06-08
1-26.5GHz Pre-Amplifier	Agilent	8449B	3008A01649	2007-06-08	2008-06-08
10m Semi- Anechoic Chamber	ETS	N/A	N/A	2007-06-08	2008-06-08

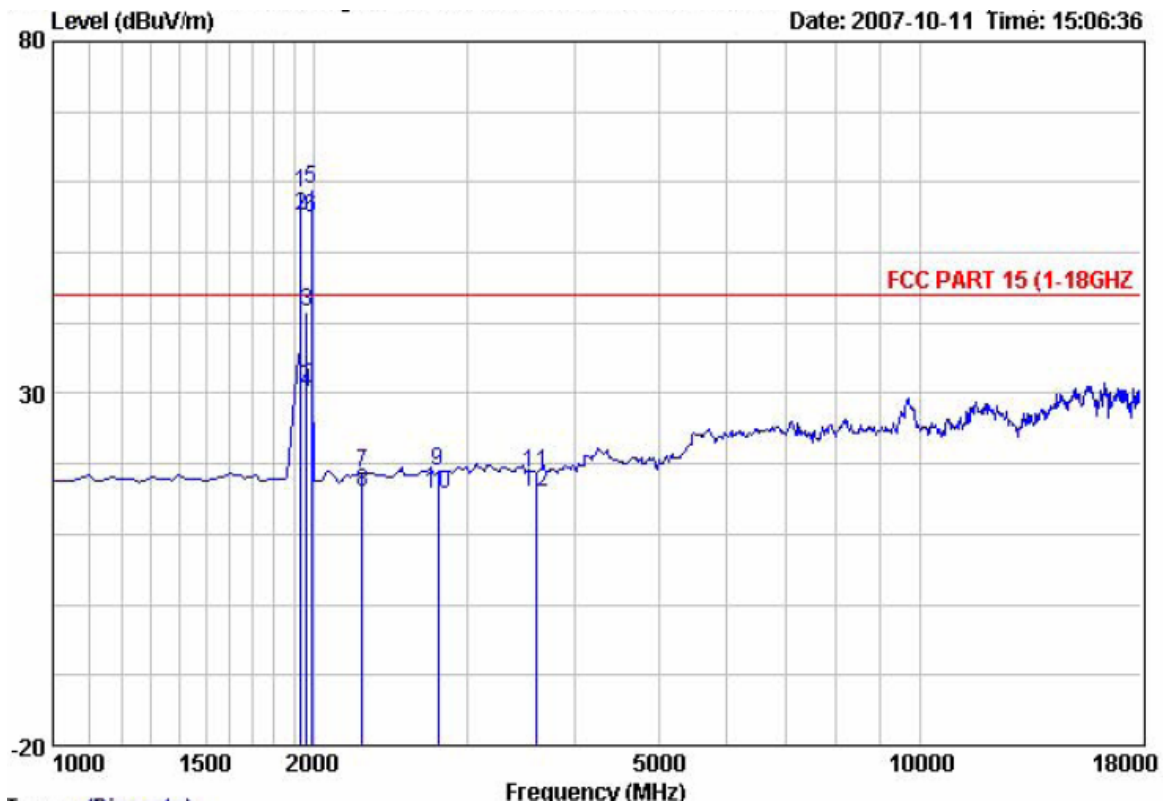
2.7.3 Test Data

Horizontal (1-18GHz)							
No.	Frequency (MHz)	Corrected PK Level (dBµV/m)	Limits PK (dBµV/m)	Margin PK (dB)	Corrected AVE Level (dBµV/m)	Limits AVE (dBµV/m)	Margin AVE (dB)
1	2275.0	18.7	60.0	-41.3	16.0	40.0	-24.0
2	2785.0	18.9	60.0	-41.1	15.7	40.0	-24.3
3	3618.0	18.7	64.0	-45.3	16.1	44.0	-27.9
Vertical (1-18GHz)							
No.	Frequency (MHz)	Corrected PK Level (dBµV/m)	Limits PK (dBµV/m)	Margin PK (dB)	Corrected AVE Level (dBµV/m)	Limits AVE (dBµV/m)	Margin AVE (dB)
1	1731.0	29.0	60.0	-31.0	24.5	40.0	-15.5
2	2938.0	19.5	60.0	-40.5	15.2	40.0	-24.8
3	4247.0	23.0	64.0	-41.0	15.5	44.0	-28.5

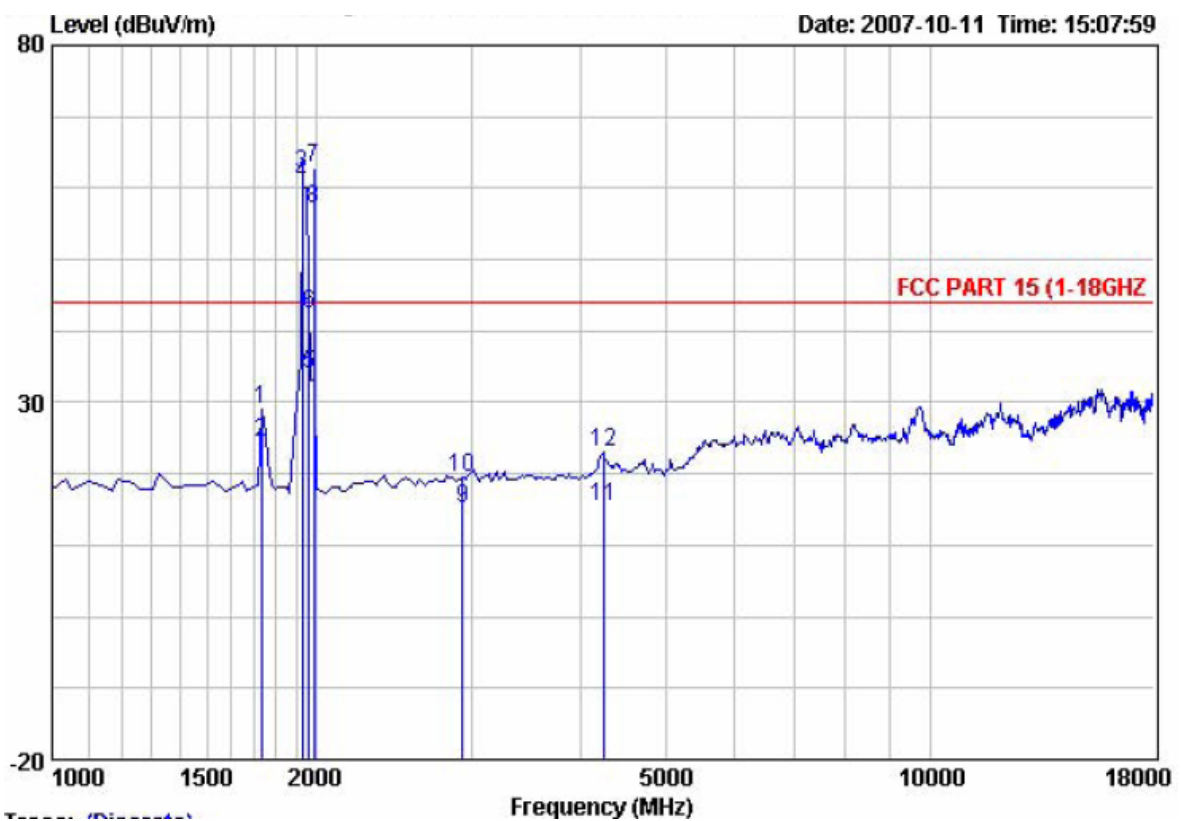
Note: The Corrected QP Level and Corrected AVE Level included The Cable attenuation.

Test was performed at 10m semi-anechoic chamber.

2.7.4 Test Curves



Horizontal Radiated Emission Plot (Peak, Max Hold Mode)



Vertical Radiated Emission Plot (Peak, Max Hold Mode)

Note: The Curves included The Cable attenuation and The Antenna Factor.
GSM frequencies were excluded.

2.7.5 Test Setup



Radiated spurious Emission Test Set-Up 1G-18GHz

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2.8 Radiated Emission spurious (30MHz-20GHz)

2.8.1 Radiated Emission Test Information

Temperature:	25 °C	Humidity:	65% RH
ATM Pressure:	103 k Pa	Grounding:	Grounding
Test Voltage:	-48VDC	Tested Range:	30MHz to 20GHz
Tested by:	Liu Xin	Date of test:	2007-10-11
Test Reference:	FCC PART 22 § 22.917	Test method:	ANSI/TIA/EIA-603-B:2002
Results:	PASS		

2.8.2 Measurement Equipments Used for Radiated emission

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	2007-06-08	2008-06-08
Horn Antenna	R & S	HF906	100095	2007-06-08	2008-06-08
0.1-1300 MHz Pre-Amplifier	HP	8447D OPT 010	2944A06252	2007-06-08	2008-06-08
1-26.5GHz Pre-Amplifier	Agilent	8449B	3008A01649	2007-06-08	2008-06-08
10m Semi- Anechoic Chamber	ETS	N/A	N/A	2007-06-08	2008-06-08

2.8.3 Limits for radiated emissions from FCC Part 22 § 22.917, and RSS132

5.2.4 Limits for radiated emissions from FCC Part 22, and RSS132.

Spurious emissions limit: -13dBm

Frequency range	Minimum requirement (e.r.p.)/Reference Bandwidth
30 MHz ≤ f < 20 GHz	The spurious emissions must be attenuated by at least 43 + 10 Log(P) P = Transmitter rated Power in Watts

Measurements were made according to the procedures outline in ANSI/TIA-603-C-2004
The emissions were investigated up to the tenth harmonic of the fundamental emission (20 GHz).
The measured level of the emissions was recorded and compared to the limit.
The reference level for spurious radiation was taken with reference to an ideal dipole antenna excited by the rated output power according to the following relationship :

$$E(V/m) = \frac{1}{R(m)} * \sqrt{30 * P_t}$$

Where,

E = Field Strength in Volts/meter,
R = Measurement distance in meters (10m),
P_t = Transmitter Rated Power in Watts (60 Watts),

Therefore :

$$E(V/m) = \frac{1}{10} * \sqrt{30 * 60}$$

$$E = 4.24 V/m = 132,55 \text{ dB}\mu\text{V/m}$$

The power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10*Log (P)

Therefore, the spurious emissions must be attenuated by at least 43 + 10*Log (60) = 60.78 dB.

Consequently, the field strength limit at 10 meters must be lower than:

$$E = 132,55 \text{ dB}\mu\text{V/m} - 60.78 \text{ dB} = 71,77 \text{ dB}\mu\text{V/m}$$

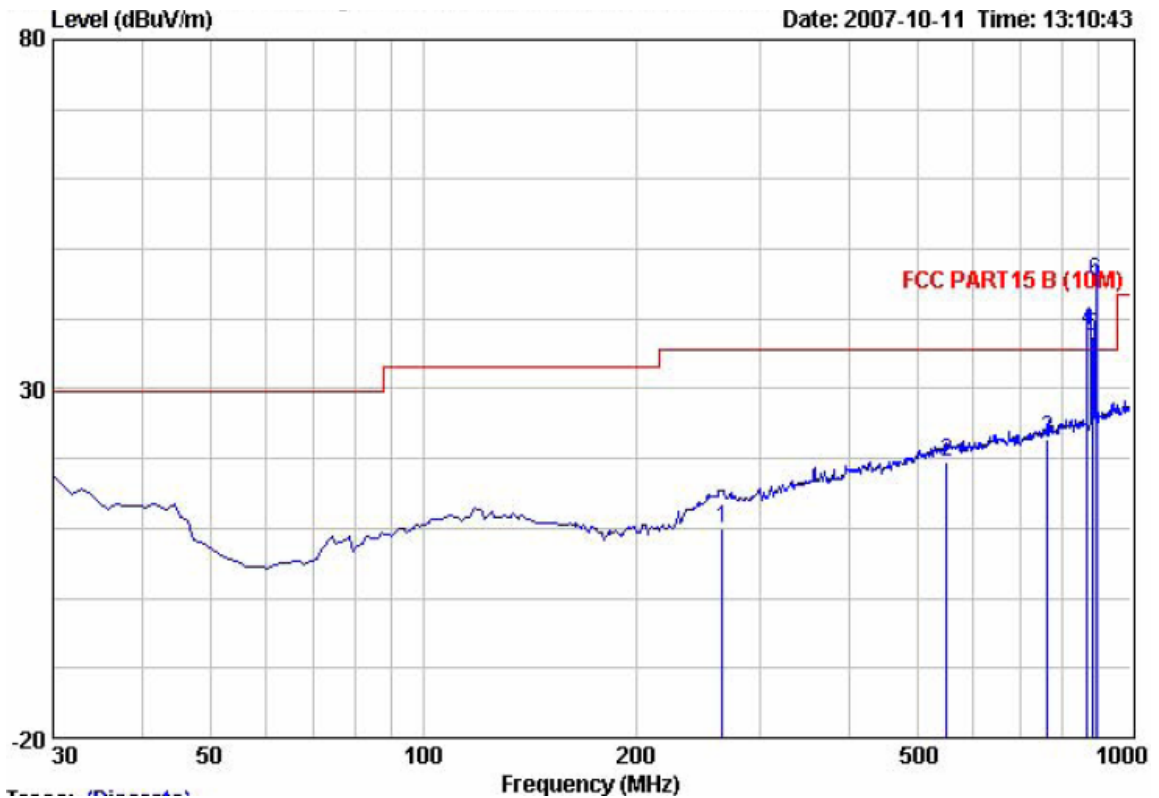
Limit Level = 71.77 dBμV/m

2.8.4 Test Data

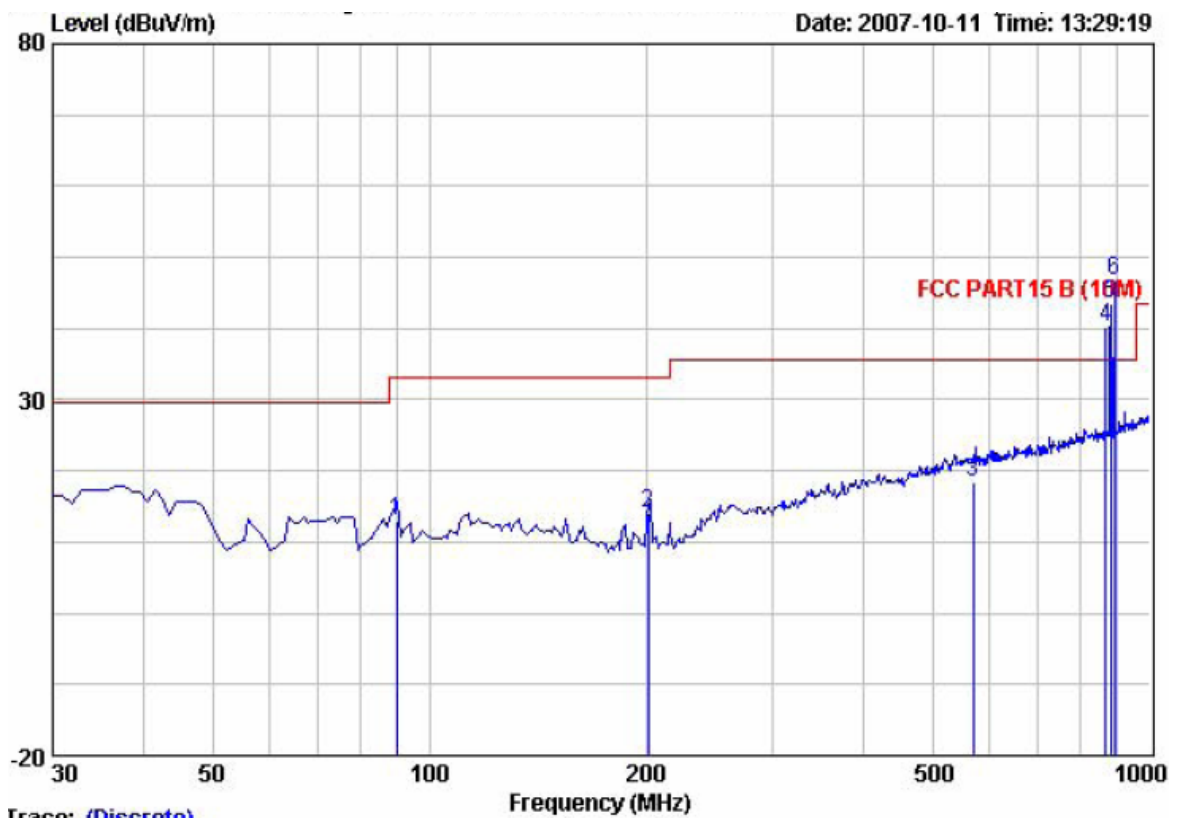
Horizontal				
Channels Investigated	Frequency (MHz)	Corrected QP Level dB (μV/m)	10 Meter Limits dB (μV/m)	Margin (dB)
Low channel	869.3	38.4	71.77	-33.37
Mid channel	881.5	37.6	71.77	-34.17
High channel	893.9	45.4	71.77	-26.37
Vertical				
No.	Frequency (MHz)	Corrected QP Level dB (μV/m)	10 Meter Limits dB (μV/m)	Margin (dB)
Low channel	869.3	40.2	71.77	-31.57
Mid channel	881.5	43.6	71.77	-28.17
High channel	893.9	46.8	71.77	-24.97

Note: The Corrected QP Level included The Cable attenuation and The Antenna Factor.
 Test was performed at 10m semi-anechoic chamber.

2.8.5 Test Curves

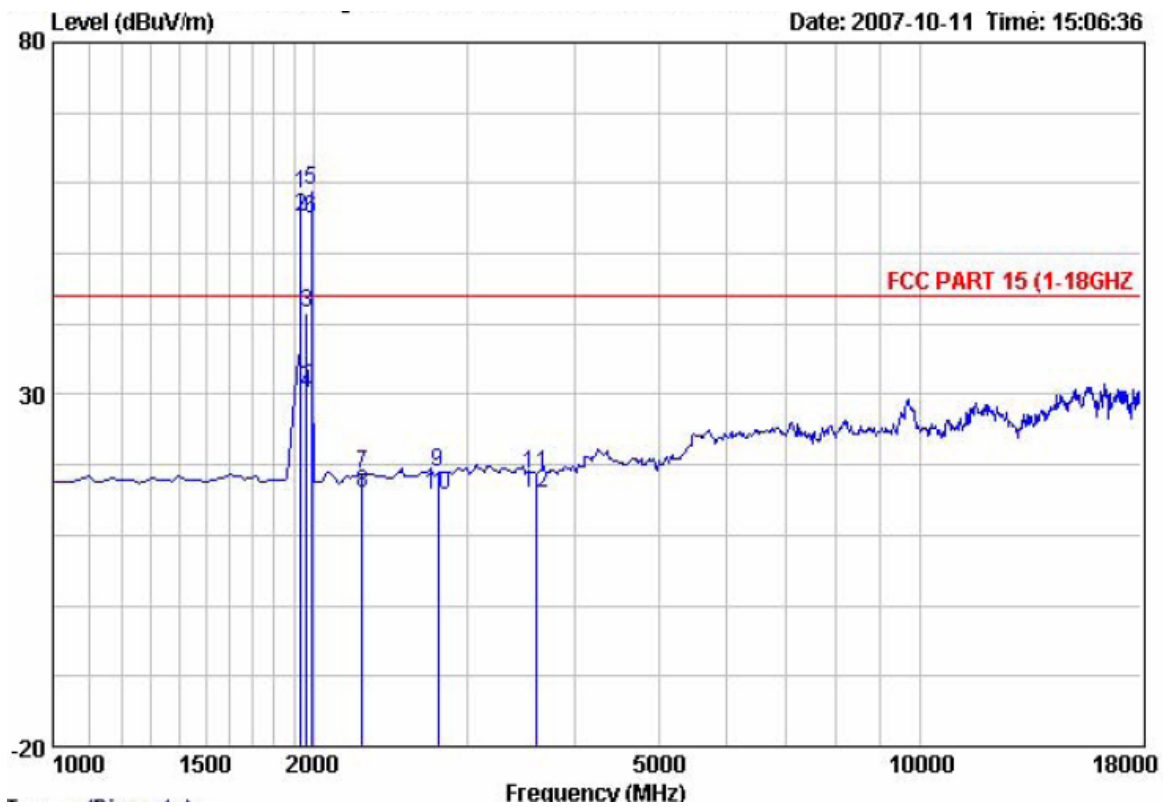


Horizontal Radiated Emission Plot (Peak, Max Hold Mode)30M-1GHz

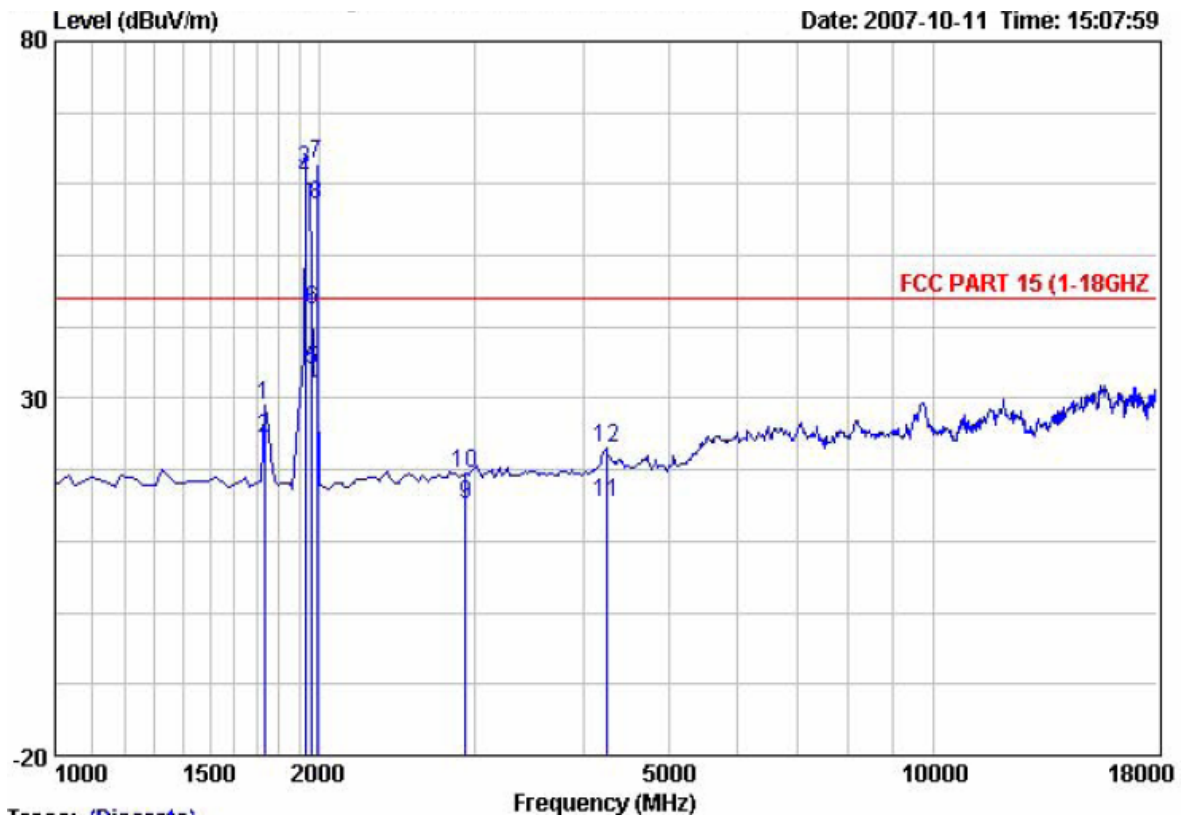


Vertical Radiated Emission Plot (Peak, Max Hold Mode) 30M-1GHz

Note: The Curves included The Cable attenuation and The Antenna Factor.
GSM frequencies were excluded.

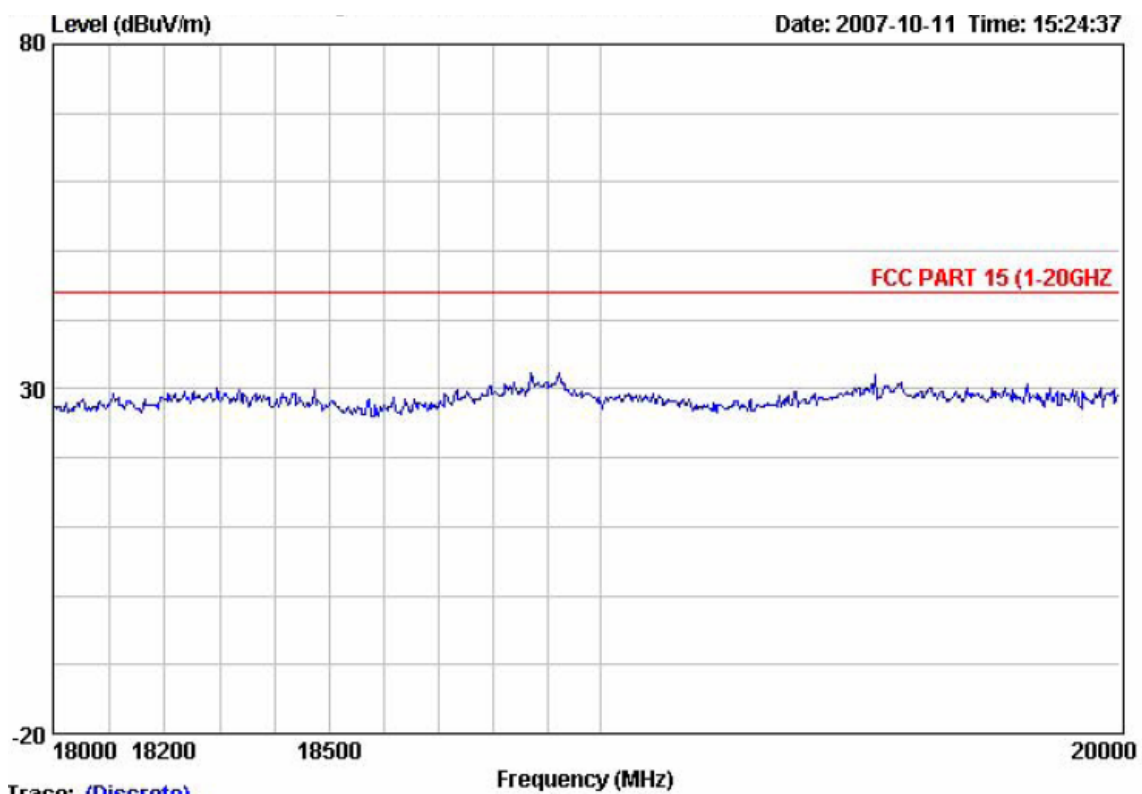


Horizontal Radiated Emission Plot (Peak, Max Hold Mode)1-18GHz

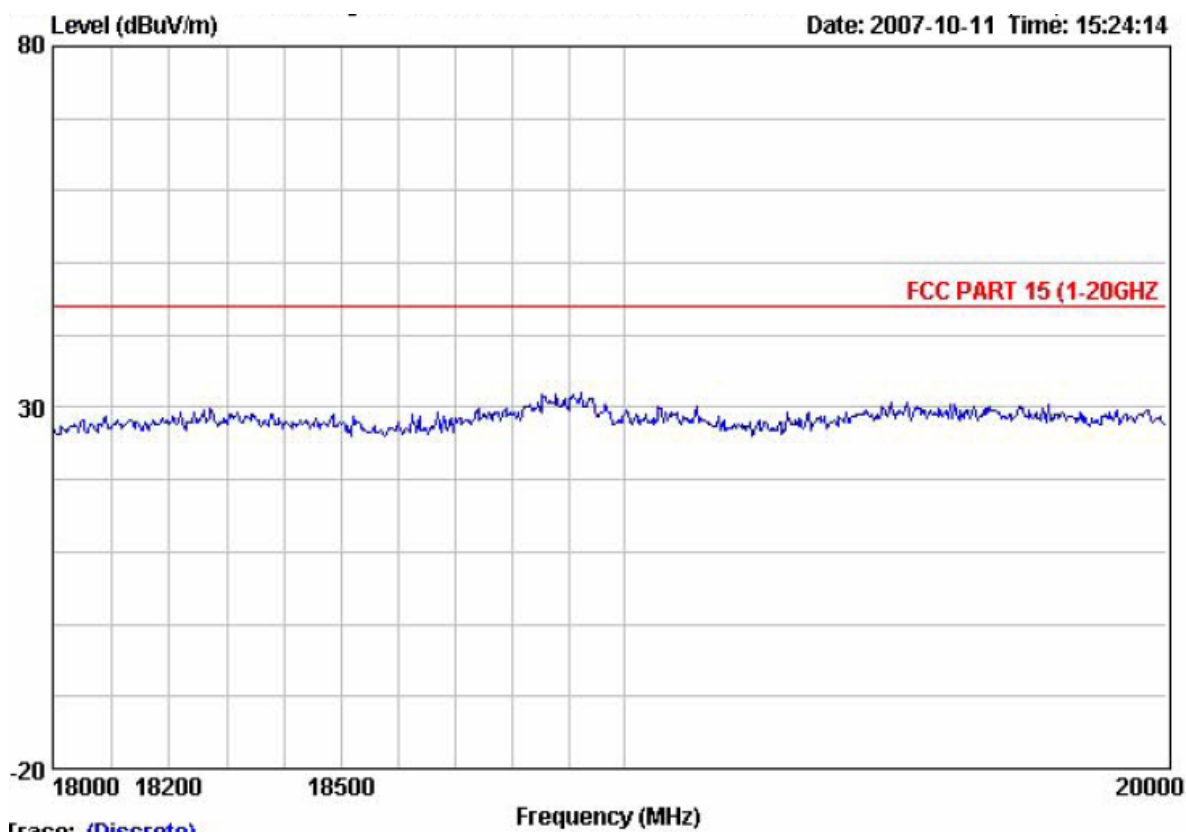


Vertical Radiated Emission Plot (Peak, Max Hold Mode) 1-18GHz

Note: The Curves included The Cable attenuation and The Antenna Factor.
GSM frequencies were excluded.



Horizontal Radiated Emission Plot (Peak, Max Hold Mode)18-20GHz



Vertical Radiated Emission Plot (Peak, Max Hold Mode) 18-20GHz

Note: The Curves included The Cable attenuation and The Antenna Factor.
GSM frequencies were excluded.

2.9 Radiated Emission spurious (30MHz-20GHz)

2.9.1 Radiated Emission Test Information

Temperature:	25 °C	Humidity:	65% RH
ATM Pressure:	103 k Pa	Grounding:	Grounding
Test Voltage:	-48VDC	Tested Range:	30MHz to 20GHz
Tested by:	Liu Xin	Date of test:	2007-10-11
Test Reference:	FCC PART 24 § 24.238	Test method:	ANSI/TIA/EIA-603-B:2002
Results:	PASS		

2.9.2 Measurement Equipments Used for Radiated emission

Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	2007-06-08	2008-06-08
Horn Antenna	R & S	HF906	100095	2007-06-08	2008-06-08
0.1-1300 MHz Pre-Amplifier	HP	8447D OPT 010	2944A06252	2007-06-08	2008-06-08
1-26.5GHz Pre-Amplifier	Agilent	8449B	3008A01649	2007-06-08	2008-06-08
10m Semi- Anechoic Chamber	ETS	N/A	N/A	2007-06-08	2008-06-08

2.9.3 Limits for radiated emissions from FCC Part 24 § 24.238, and RSS133

Spurious emissions limit: -13dBm

Frequency range	Minimum requirement (e.r.p.)/Reference Bandwidth
30 MHz ≤ f < 20 GHz	The spurious emissions must be attenuated by at least 43 + 10 Log(P) P = Transmitter rated Power in Watts

Measurements were made according to the procedures outline in ANSI/TIA-603-C-2004
The emissions were investigated up to the tenth harmonic of the fundamental emission (20 GHz).
The measured level of the emissions was recorded and compared to the limit.
The reference level for spurious radiation was taken with reference to an ideal dipole antenna excited by the rated output power according to the following relationship :

$$E(V / m) = \frac{1}{R(m)} * \sqrt{30 * P_t}$$

Where,

E = Field Strength in Volts/meter,
R = Measurement distance in meters (10m),
P_t = Transmitter Rated Power in Watts (60 Watts),

Therefore :

$$E(V / m) = \frac{1}{10} * \sqrt{30 * 60}$$

$$E = 4.24 V/m = 132,55 \text{ dB}\mu\text{V/m}$$

The power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10*Log (P)

Therefore, the spurious emissions must be attenuated by at least 43 + 10*Log (60) = 60.78 dB.

Consequently, the field strength limit at 10 meters must be lower than:
E = 132,55 dBμV/m – 60.78 dB = 71,77 dBμV/m

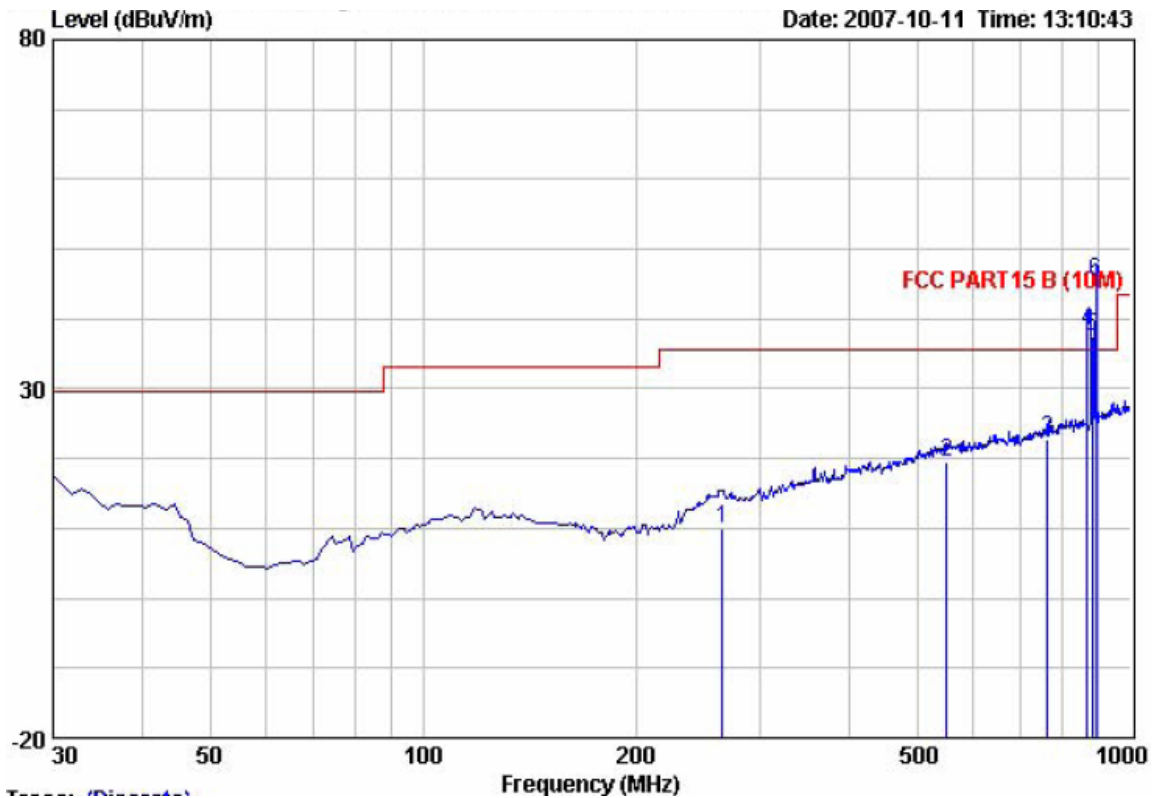
Limit Level = 71.77 dBμV/m

2.9.4 Test Data

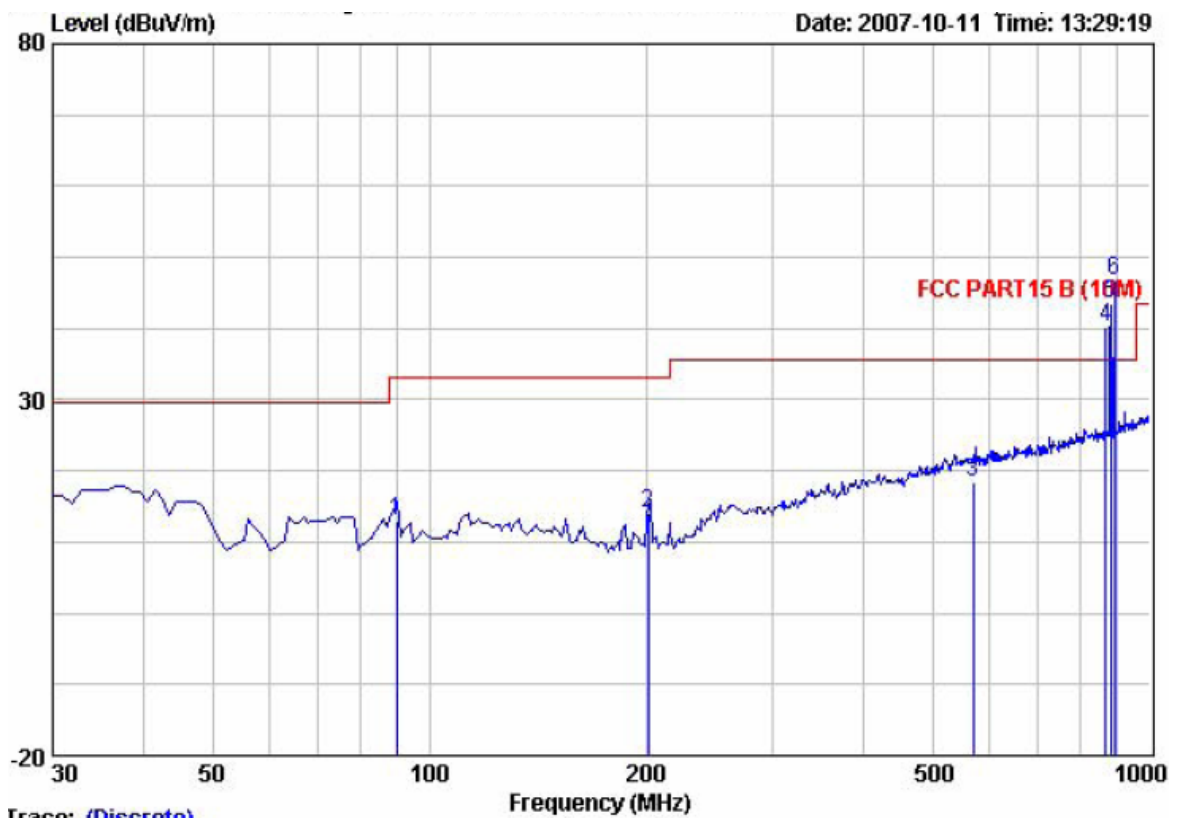
Horizontal				
Channels Investigated	Frequency (MHz)	Corrected QP Level dB (μV/m)	10 Meter Limits dB (μV/m)	Margin (dB)
Low channel	1930.2	58.4	71.77	-13.37
Mid channel	1960.0	41.5	71.77	-30.27
High channel	1989.8	59.0	71.77	-12.77
Vertical				
No.	Frequency (MHz)	Corrected QP Level dB (μV/m)	10 Meter Limits dB (μV/m)	Margin (dB)
Low channel	1930.2	62.1	71.77	-9.67
Mid channel	1960.0	42.5	71.77	-29.27
High channel	1989.8	62.9	71.77	-8.87

Note: The Corrected QP Level included The Cable attenuation and The Antenna Factor.
 Test was performed at 10m semi-anechoic chamber.

2.9.5 Test Curves

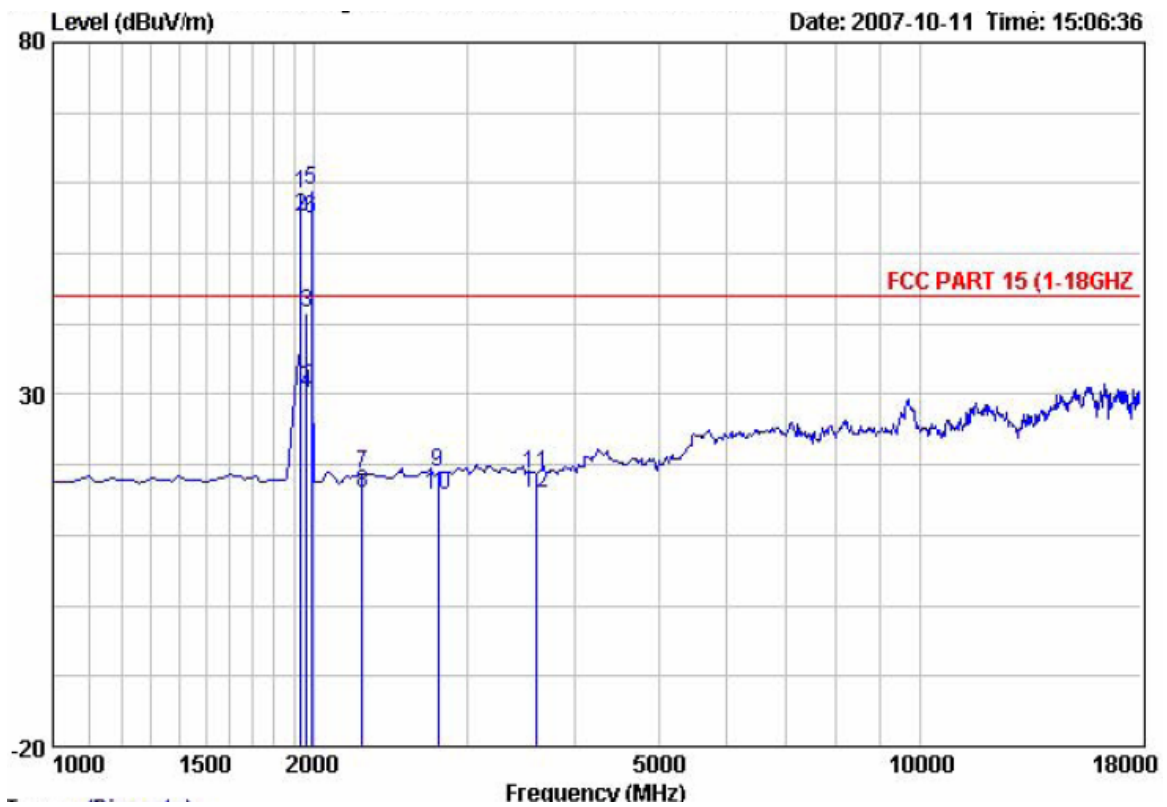


Horizontal Radiated Emission Plot (Peak, Max Hold Mode)30M-1GHz

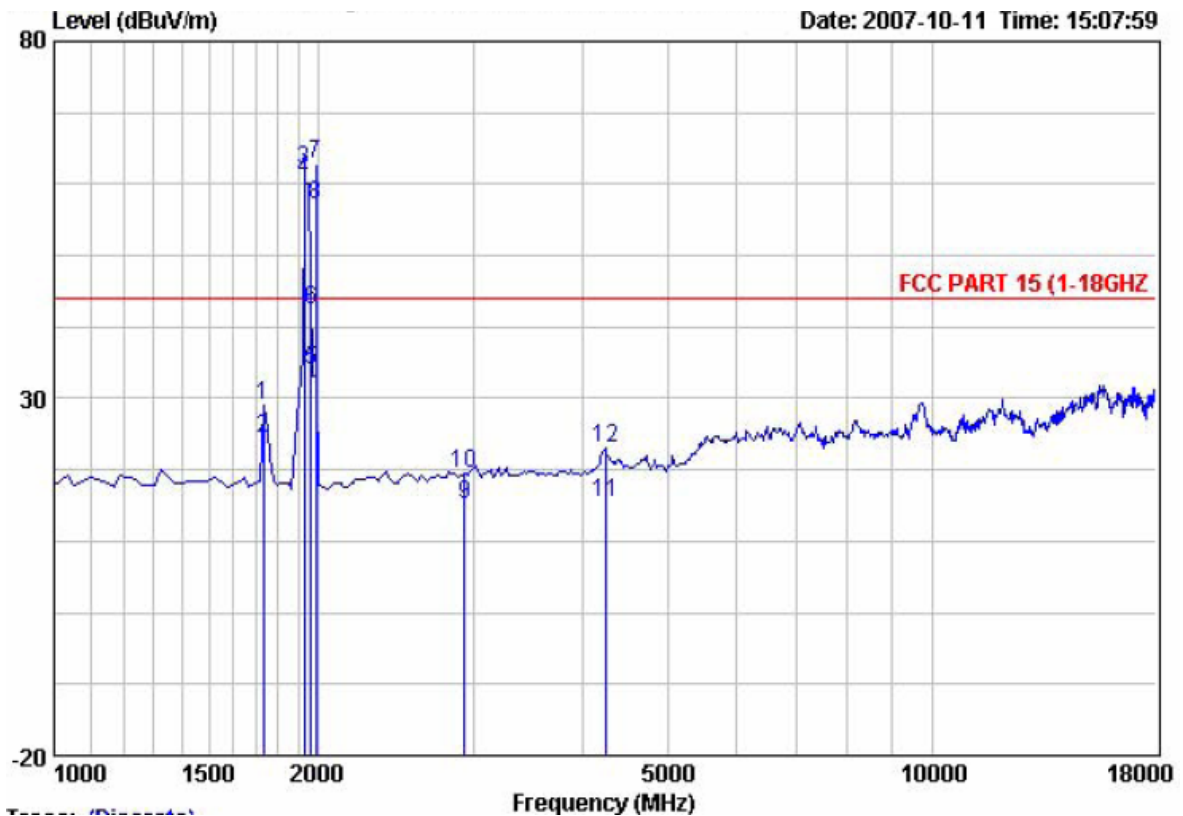


Vertical Radiated Emission Plot (Peak, Max Hold Mode) 30M-1GHz

Note: The Curves included The Cable attenuation and The Antenna Factor.
GSM frequencies were excluded.

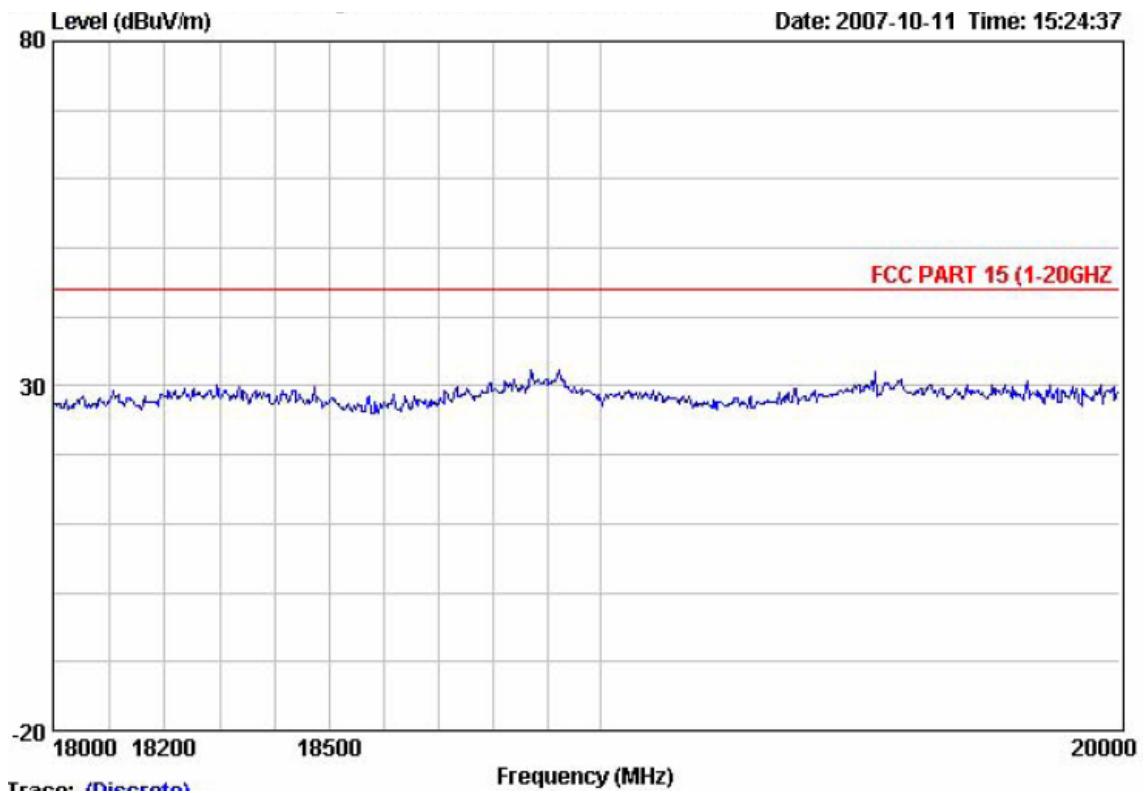


Horizontal Radiated Emission Plot (Peak, Max Hold Mode)1-18GHz

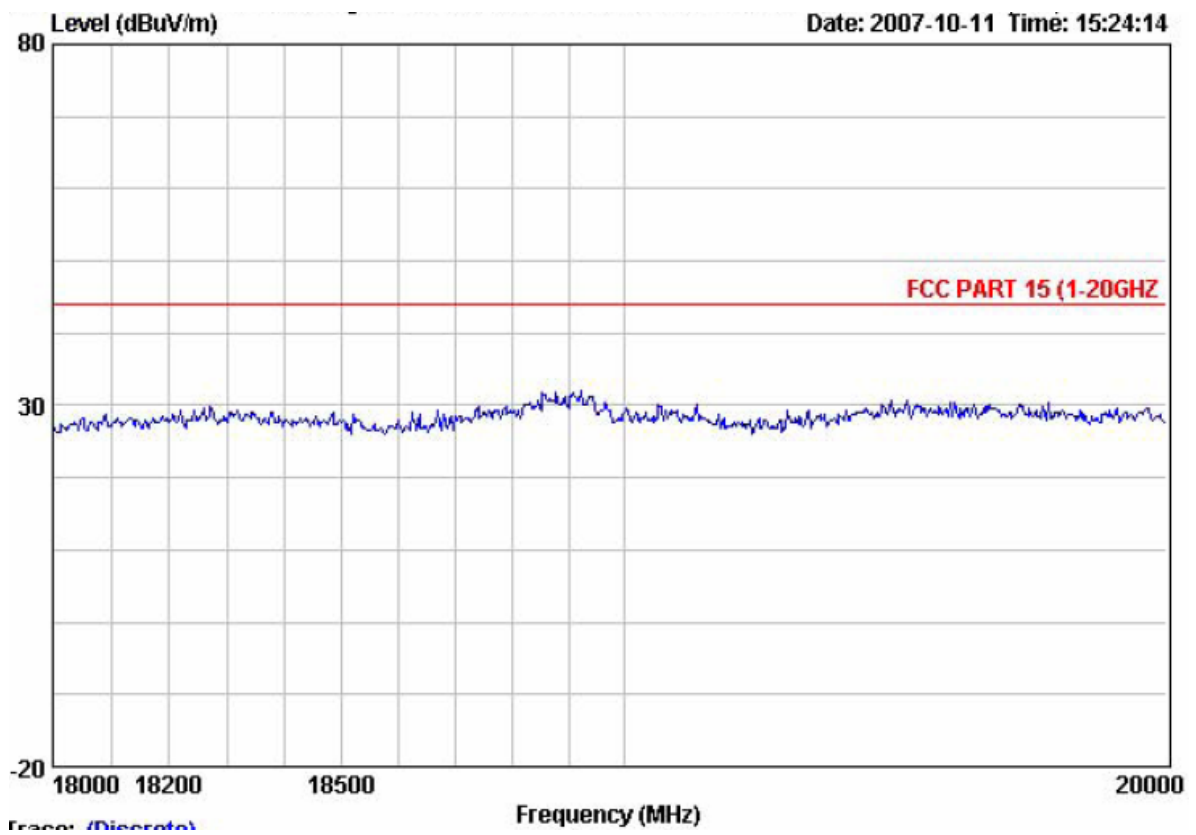


Vertical Radiated Emission Plot (Peak, Max Hold Mode) 1-18GHz

Note: The Curves included The Cable attenuation and The Antenna Factor.
GSM frequencies were excluded.



Horizontal Radiated Emission Plot (Peak, Max Hold Mode) 18-20GHz



Vertical Radiated Emission Plot (Peak, Max Hold Mode) 18-20GHz

Note: The Curves included The Cable attenuation and The Antenna Factor.
GSM frequencies were excluded.