



# Report on EMC Test of Outdoor BTS with Dual-density TRX

**M/N: BTS3006C**

Report No: SYBH (E) 097092007EB



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## Notice 2

Modification Information:

For original equipment, following table is not applicable.

Table 1 Modification Information

Modification Information	1	
	2	
	3	<i>Not Applicable</i>
	4	
	5	
	6	
	7	



**REPORT ON** **EMC Test of Outdoor BTS with Dual-density TRX**  
**M/N: BTS3006C**

**REGULATION** **FCC CFR47 Part 15 Class B**  
**ICES-003 Class B**

**START OF TEST** **Sep.10, 2007**  
**END OF TEST** **Sep.20, 2007**

**Final Judgement:** **Pass**

**Approver** 2007-10-13 张兴海   
**Date** **Name** **Signature**

**Reviewer** 2007-10-13 余辉   
**Date** **Name** **Signature**

**Operator** 2007-10-11 张金涛   
**Date** **Name** **Signature**

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## 1 Status

### 1.1 Product Information

CLIENT: Huawei Technologies Co., Ltd.  
ADDRESS: Bantian Longgang District Shenzhen, P.R. China  
MANUFACTURING DESCRIPTION Outdoor BTS with Dual-density TRX  
MANUFACTURERS MODEL NUMBER BTS3006C

### 1.2 Applied Standard

APPLIED STANDARD FCC CFR47 Part 15: Subpart B  
ICES-003: 2004

TEST METHODS ANSI C63.4: 2003  
CAN/CSA-CEI/IEC CISPR 22:02  
CISPR 22: 2003

### 1.3 Test Site

Site 1:  
RELIABILITY LABORATORY OF HUAWEI TECHNOLOGIES CO., LTD

### 1.4 Test environment condition

Ambient temperature	20~25°C
Relative humidity	45~55%
Atmospheric pressure	101kPa



## 2 Summary of Results

Table 2 below shows a brief summary of the results obtained.

Table 2 Summary of results

<b>EUT Classification:</b> Other than Telecommunication Centre Equipment				
<b>Test Items</b>	<b>Configuration</b>	<b>Limits</b>	<b>Result</b>	<b>Site</b>
<u>Radiated Emissions</u> Enclosure Port	TC1~TC4	Class B	Pass	Site1
<u>Conducted Emissions</u> AC Power Port	TC2&TC4	Class B	Pass	Site1
<u>Conducted Emissions</u> DC Power Port	TC1&TC3	Class B	Pass	Site1
Note: 1, Measurement taken is within the measurement uncertainty of measurement system.				



### 3 Equipment Specification

#### 3.1 General Description

The BTS3006C has large power and large capacity. It is small and easy to install. Especially, it uses the direct air cooling technology, which saves the cost on the heat exchanger, power consumption, and maintenance.

It has strong environment adaptability and can work under the temperature of -40 to +55°C. It supports the outdoor application with IP55 protection level.

It supports -48 V DC power inputs or AC power inputs and supports the SDH. The optical cable can directly connect to the BTS.

The BTS3006C can form a network with indoor double-transceiver BTSs and outdoor BTSs, thus proving a fast, economical and effective network construction.

The BTS3006C has the following benefits in terms of coverage:

- High receive sensitivity, The static sensitivity of the TCH/FS channel is -112.5 dBm (a typical value in the normal temperature)
- Omni-directional coverage and directional coverage
- Configuration of up to two cells in a single cabinet
- Power detection and reporting of the Double-Transceiver Unit (DDRM)
- Radio Frequency (RF) hopping and baseband frequency hopping
- Transmit diversity and 4-way receive diversity
- Dynamic and static power control
- Detection and reporting of the power of transceivers

#### 3.2 Technical Data

##### 3.2.1 Main Equipment Technical Data

Input Rated Voltage	== -48V;40A; ~200-240V;50/60Hz;13A ~110/220V;50/60Hz;2W+PE;13A
Rated Power	Max 1800W
Dimensions	470 (depth) ×600 (width) ×700 (height)(mm³)
Weight	145kg
Transmitt Frequency:	850M : 869 MHz to 894 MHz 1900M: 1930 MHz to 1990 MHz
Receive Frequency:	850M: 824 MHz to 849 MHz 1900M: 1850 MHz to 1910 MHz
Maximum Output Power:	46.7dBm



Figure 1. EUT Appearance



### 3.3 Sub-Assembly Identity

Table 3 Sub-Assembly Identity of 850MHz

Board				
Model Name	Qty.	Hardware Version	Serial Number	Description
DMCM	1	VER.B	030BMY1063000021	Main Control Module for DDRM BTS
DDRM	3	VER.B	210231469810701000012 210231469810707000018 210231469810711000027	Double transceiver Digital and Radio frequency Module
DDPM	3	VER.B	210231468910701000019 210231468910701000027 210231468910701000036	Dual Duplexer Module for DDRM BTS
DDCM	1	/	210231492810711000078	Double Combining Module for DDRM BTS
DPSM	1	/	0374631063000045	Power Supply Module for DDRM BTS
DSEM	1	/	0287081062800074	DC SPD and EMI Module

Table 4 Sub-Assembly Identity of 1900MHz

Board				
Model Name	Qty.	Hardware Version	Serial Number	Description
DMCM	1	VER.B	030BMY1063000028	Main Control Module for DDRM BTS
DDRM	3	VER.B	210231493810701000012 210231493810701000024 210231493810709000036	Double transceiver Digital and Radio frequency Module
DDPM	3	VER.B	210231493910705000039 210231493910705000025 210231493910706000041	Dual Duplexer Module for DDRM BTS
DDCM	1	/	210231493610709000039	Double Combining Module for DDRM BTS
DPSM	1	/	0374631063000036	Power Supply Module for DDRM BTS
DSEM	1	/	0287081062800081	DC SPD and EMI Module



#### 4 System Configuration during EMC Test

The Equipment under Test (EUT) was functioning correctly during all tests. The EUT was installed within the test site and was configured to simulate a typical user installation.

##### 4.1 Cables Used during Test

Table 5 Cable Used during Test

Port	Connector	Type of Cable
DC Mains	OT10-6	Unshielded
AC Mains	OT	Unshielded
E1-75ohm	SMB75-female	Shielded coaxial
RF Cable	N50-female	Coaxial cable
Earth	OT6-6	Unshielded

##### 4.2 Associated Equipment Used during Test

Table 6 Associated Equipment Used during Test

Name	Model	Manufacturer	S/N	Cal Date	Cal Interval (month)
Digital Communication Tester	CMU300	R&S	3604071145	2007-05-26	12
30dB Attenuator	DTS100	Huaxiang Shanghai	04031818	2007-08-12	12
100W Load	TF100-3	Huaxiang Shanghai	04101445 04101402	2007-08-12	12
Personal Computer	PIII1G/128M/ 30G/15"	LEGEND	NA	NA	NA

##### 4.3 Test Configurations for Emission Test

###### 4.3.1 Test Configuration.

The BTS3006C system was connected to ancillary in order to simulate normal operating conditions (with reference to the guidance given in the standard for this type of equipment). There were four test configurations, TC1, TC2, TC3, TC4 were shown in the diagrams below:

- TC1: 850MHz, DC POWER;
- TC2: 850MHz, AC POWER;
- TC3: 1900MHz, DC POWER;
- TC4: 1900MHz, AC POWER;

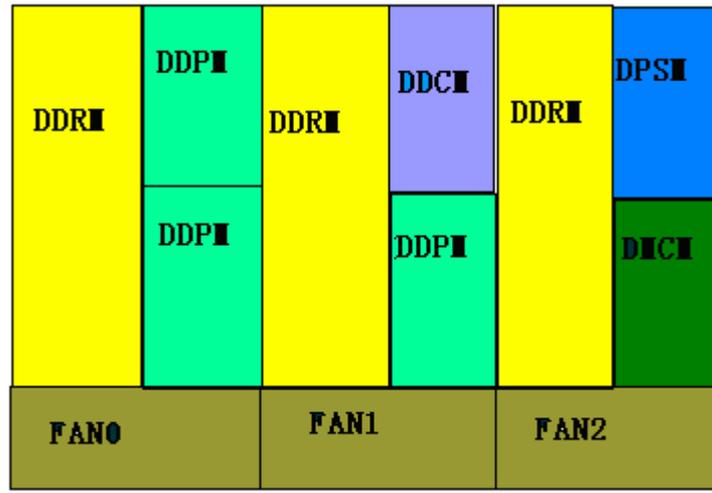


Figure 2.: Test Configuration TC1,TC3

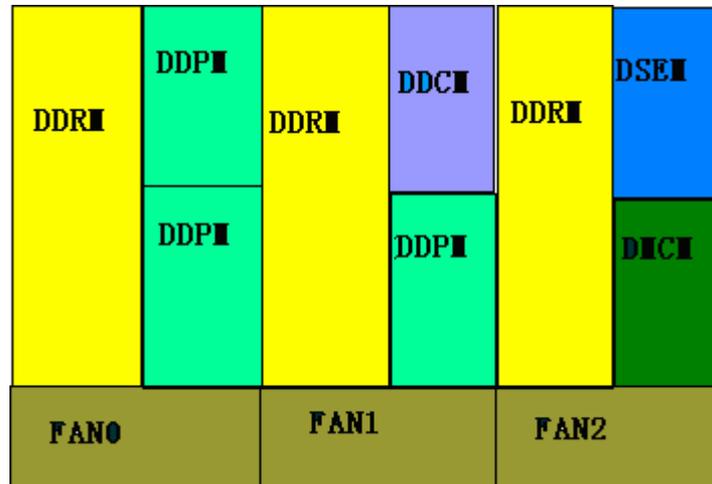


Figure 3. Test Configuration TC2,TC4

#### 4.4 Test conditions and test connections

##### 4.4.1 Test Conditions

During emission test , 6 transmitters was set to transmit with full power 46.7dBm using GMSK modulation, The 6 carriers was set to uniform distribution in the TX band. RF input and output ports was terminated with 50ohm load, remained E1 was configured to self loop.

Every transmitter transmit with full power of 46.7dBm (one carriers are active.) .The 6 carrier frequencies are set to uniform distribution in the TX band, the frequency number is:

The Carrier No. of 850MHz

Carrier No.	Channel No.
1	128
2	160
3	189
4	210
5	221
6	251



The Carrier No. of 1900MHz

Carrier No.	Channel No.
1	512
2	587
3	661
4	737
5	780
6	810

#### 4.4.2 Test Connections

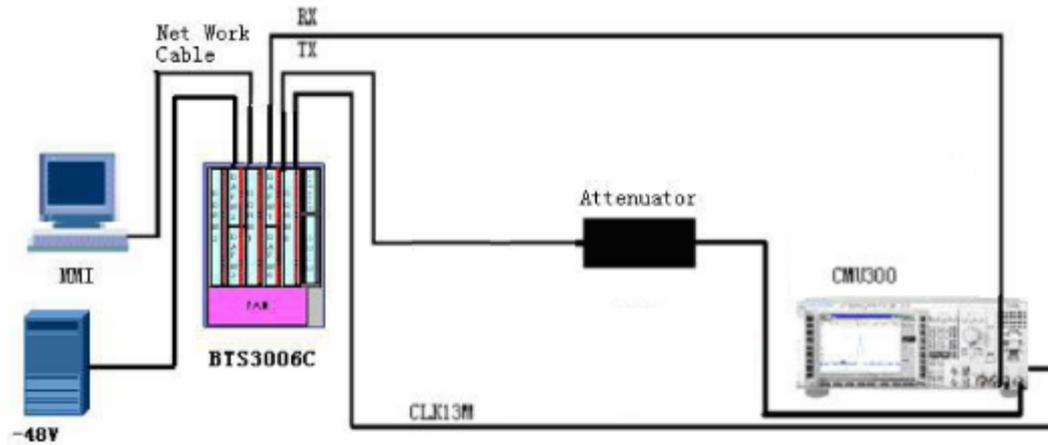


Figure 4. Test connection

## 5 Enclosure Port

### 5.1 Radiated Disturbance 30MHz to 26GHz

#### 5.1.1 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4. The test distance was 3m. The set-up and test methods were according to ANSI 63.4 and CAN/CSA-CEI/IEC CISPR 22

A preliminary scan and a final scan of the emissions were made from 30 MHz to 1GHz by using test script of software; the emissions were measured using a Quasi-Peak detector. And above 1GHz, the emissions were measured using an AV detector.

The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0° to 360°, The receive antenna has two polarizations V and H.

#### 5.1.2 Test Results

The EUT has met the requirements of FCC Part15 and ICES-003 for Radiated Emission of enclosure port.

The test data see section 9.1 of this report.

Table 7 Test Limits for FCC Part 15

Frequency range	30~ 26000MHz
Measuring distance	3m
Limits(Class B)	30MHz~88MHz 40 dB $\mu$ V/m 88MHz~216MHz 43.5 dB $\mu$ V/m 216MHz~960MHz 46 d dB $\mu$ V/m Above 960MHz 53.9 dB $\mu$ V/m

Table 8 Test Limits for ICES-003

Frequency range	30~ 1000MHz
Measuring distance	3m
Limits(Class B)	30MHz~230MHz 40 dB $\mu$ V/m 230MHz~1GHz 47 dB $\mu$ V/m



## 6 AC & DC Power Ports Tests

### 6.1 Conducted Disturbance

#### 6.1.1 Test Procedure

The EUT was configured as described in section 4 for this test. The mains cable of the EUT being measured shall be connected to LISN, The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8 m from the LISN.

All telecommunication and signal ports must be correctly terminated using either appropriate associated equipment or a representative termination during the measurement of the conducted disturbances at the mains.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

#### 6.1.2 Test Results

The EUT has met the requirements of FCC Part15 /ICES 003 for Conducted Disturbance of AC&DC Power Port

The test data see section 9.2 of this report.

Table 9 Test Limits

Frequency range	150kHz ~ 30MHz	
Classification	Class B	
Limit	Voltage limits	
	QP	AV
0.15MHz~0.5MHz	66~56 dB $\mu$ V	56~46 dB $\mu$ V
0.5MHz~5MHz	56 dB $\mu$ V	46 dB $\mu$ V
5MHz~30MHz	60 dB $\mu$ V	50 dB $\mu$ V



## 7 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Table 10 System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dB $\mu$ V/m)	U=4.6dB; k=2
CE	Disturbance Voltage (dB $\mu$ V)	U=3.3dB; k=2



**8 Main Test Instruments**

Table 11 Main Test Equipments

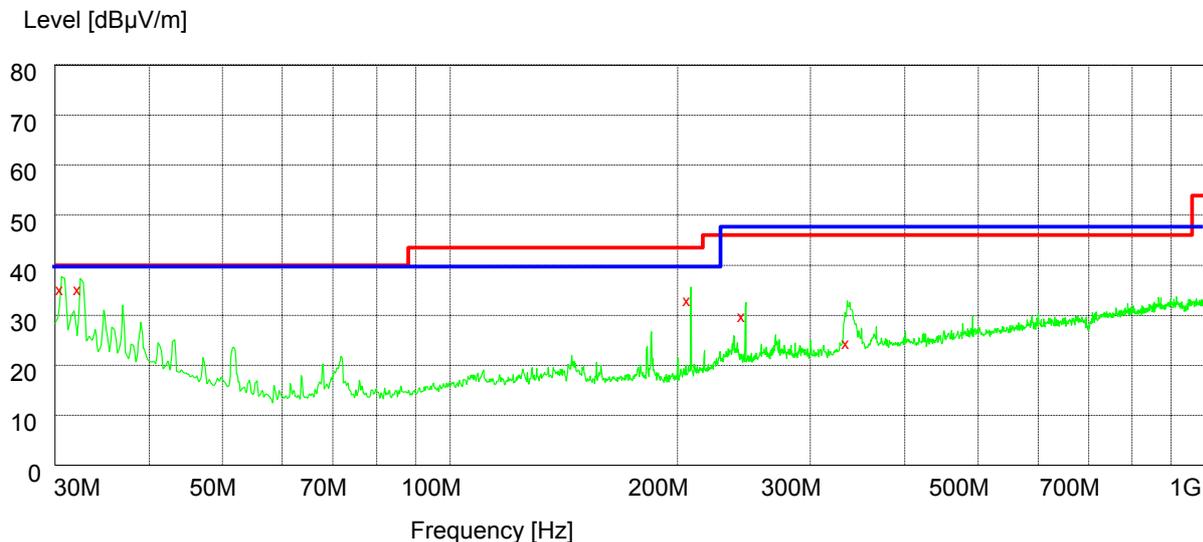
Test item	Test Instrument	Model	Manufacturer	Cal-Date	Cal Interval (month)
RE	EMI Test receiver	ESMI	R&S	April.23, 2007	12
	Broadband Antenna	CBL 6112B	SCHAFFNER	Sep.27, 2006	12
	Horn Antenna	HF906	R&S	Feb.23, 2007	12
CE	EMI Test receiver	ESCS30	R&S	May.30, 2007	12
	Artificial Mains Network	ENV4200	R&S	May.21, 2007	12
Software Information					
Test Item	Software Name	Manufacturer		Version	
RE/CE	ES-K1	R&S		1.7.1	



## 9 Graph and Data of Emission Test

### 9.1 Radiated Disturbance

#### 9.1.1 Radiated Disturbance

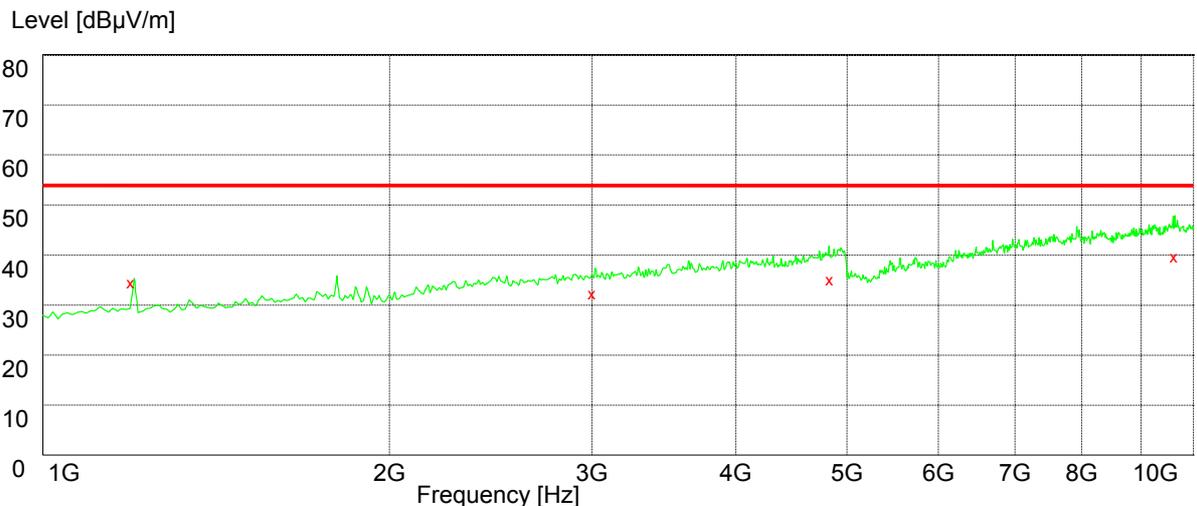


Note: This is worst case of TC1~TC4.

#### MEASUREMENT RESULT: QP Detector

Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit FCC	Margin (dB)	Height (cm)	Azimuth (deg)	Polarization
30.720000	35.30	-3.5	40.0	4.7	100.0	274.00	VERTICAL
32.460000	35.20	-4.3	40.0	4.8	100.0	208.00	VERTICAL
207.96000	33.10	-11.3	43.5	10.4	100.0	95.00	VERTICAL
245.70000	30.00	-9.2	46.0	16.0	100.0	177.00	VERTICAL
337.68000	24.50	-6.7	46.0	21.5	196.0	176.00	HORIZONTAL
Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit ICES 003	Margin (dB)	Height (cm)	Azimuth (deg)	Polarization
30.720000	35.30	-3.5	40.0	4.7	100.0	274.00	VERTICAL
32.460000	35.20	-4.3	40.0	4.8	100.0	208.00	VERTICAL
207.96000	33.10	-11.3	40.0	6.9	100.0	95.00	VERTICAL
245.70000	30.00	-9.2	47.0	15.0	100.0	177.00	VERTICAL
337.68000	24.50	-6.7	47.0	20.5	196.0	176.00	HORIZONTAL

### 9.1.2 Radiated Disturbance of 850MHz (1GHz-10GHz)

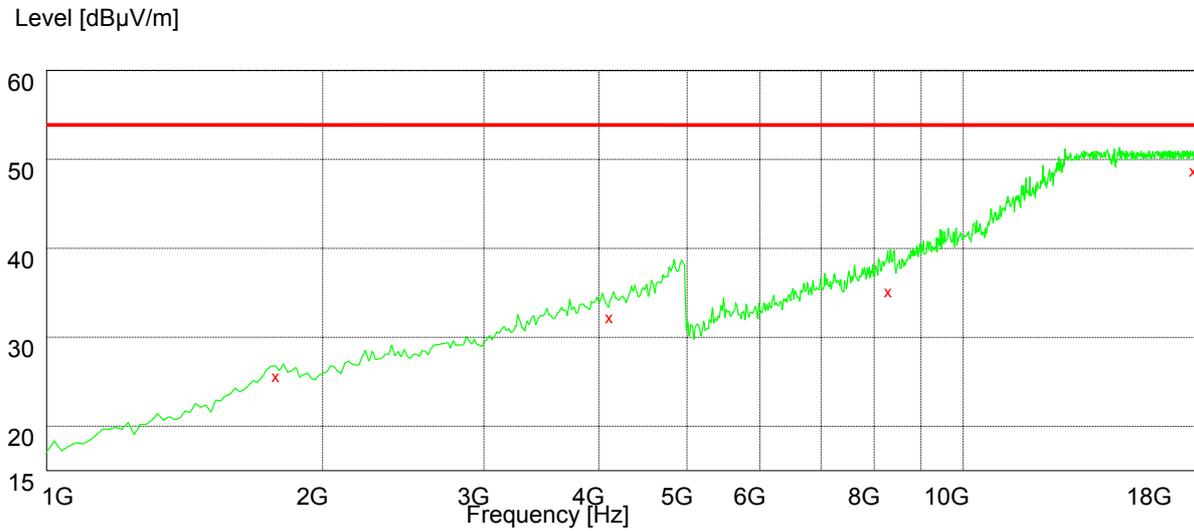


Note: This is worse case between TC1 and TC2.

#### MEASUREMENT RESULT: AV Detector

Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit FCC (dBµV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarizations
1200.0000	34.60	-4.7	53.9	19.3	135.0	226.00	VERTICAL
3022.0000	32.40	4.9	53.9	21.5	265.0	150.00	VERTICAL
4867.0000	35.20	10.7	53.9	18.7	100.0	241.00	HORIZONTAL
9683.5000	39.90	20.2	53.9	14.0	227.0	360.00	HORIZONTAL

### 9.1.3 Radiated Disturbance of 1900MHz (1GHz-18GHz)

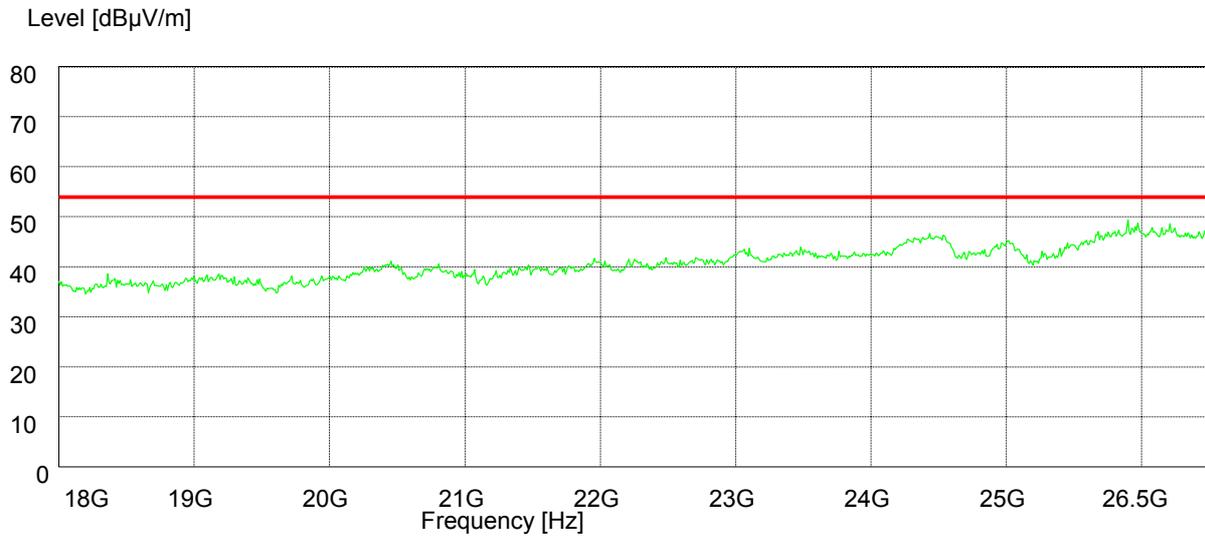


Note: This is worse case between TC3 and TC4.

#### MEASUREMENT RESULT: AV Detector

Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit FCC (dBµV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarizations
1795.5000	25.70	-0.4	53.9	28.2	100.0	190.00	VERTICAL
4147.5000	32.30	8.6	53.9	21.6	117.0	6.00	HORIZONTAL
8358.5000	35.30	17.5	53.9	18.6	150.0	0.00	VERTICAL
17998.000	48.80	36.4	53.9	5.1	200.0	93.00	HORIZONTAL

### 9.1.4 Radiated Disturbance of 1900MHz (18GHz-26GHz)

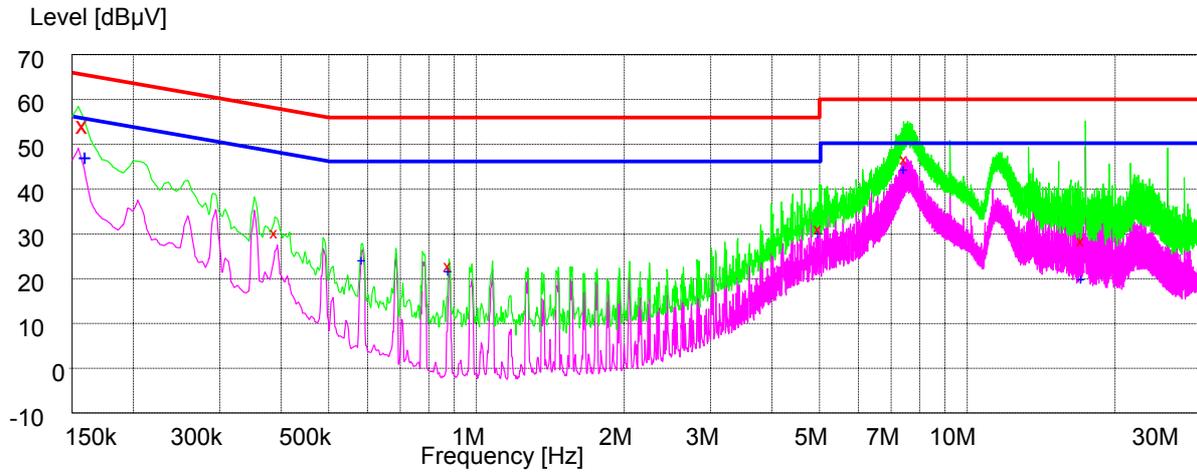


Note: This is worse case between TC3 and TC4.



## 9.2 Conducted Disturbance

### 9.2.1 AC Power Port Test Data



Note: This is worse case between TC2 and TC4.

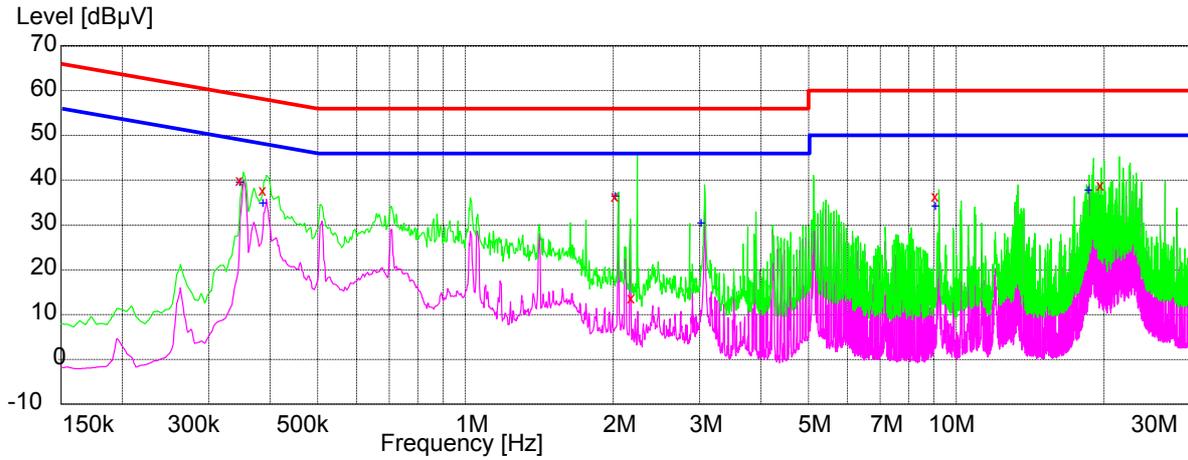
#### MEASUREMENT RESULT: QP Detector

Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.150000	55.30	11.0	66	10.7	L3	GND
0.393000	30.60	10.1	58	27.4	N	GND
0.888000	23.20	9.9	56	32.8	L3	GND
5.037000	31.40	10.1	60	28.6	L3	GND
7.539000	47.10	10.4	60	12.9	L3	GND
17.277000	28.70	12.0	60	31.3	N	GND

#### MEASUREMENT RESULT: AV Detector

Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.154500	47.80	10.9	56	8.0	L3	GND
0.591000	24.40	10.0	46	21.6	L3	GND
0.888000	22.00	9.9	46	24.0	L3	GND
5.046000	30.30	10.1	50	19.7	L3	GND
7.525500	44.50	10.4	50	5.5	L3	GND
17.268000	20.20	12.0	50	29.8	N	GND

### 9.2.2 DC power port test data



Note: This is worse case between TC1 and TC3.

#### MEASUREMENT RESULT: QP Detector

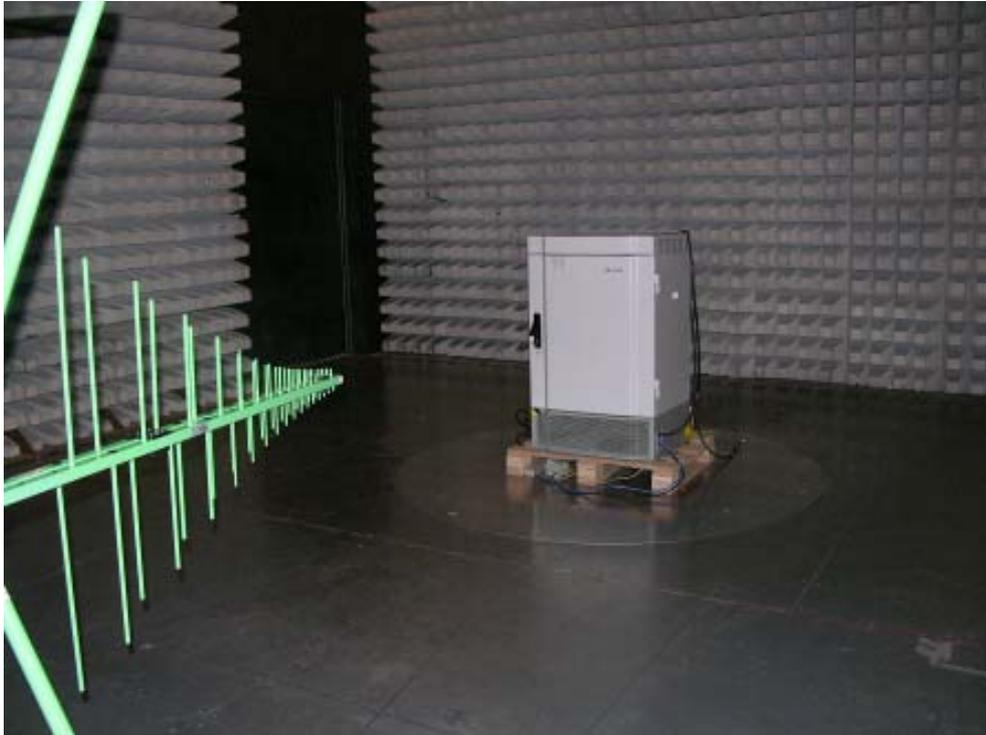
Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.352500	40.50	10.2	59	18.4	N	GND
0.393000	38.10	10.1	58	19.9	N	GND
2.049000	36.90	10.1	56	19.1	L3	GND
2.211000	14.10	10.1	56	41.9	L3	GND
9.217500	36.80	10.7	60	23.2	N	GND
19.999500	39.30	13.1	60	20.7	N	GND

#### MEASUREMENT RESULT: AV Detector

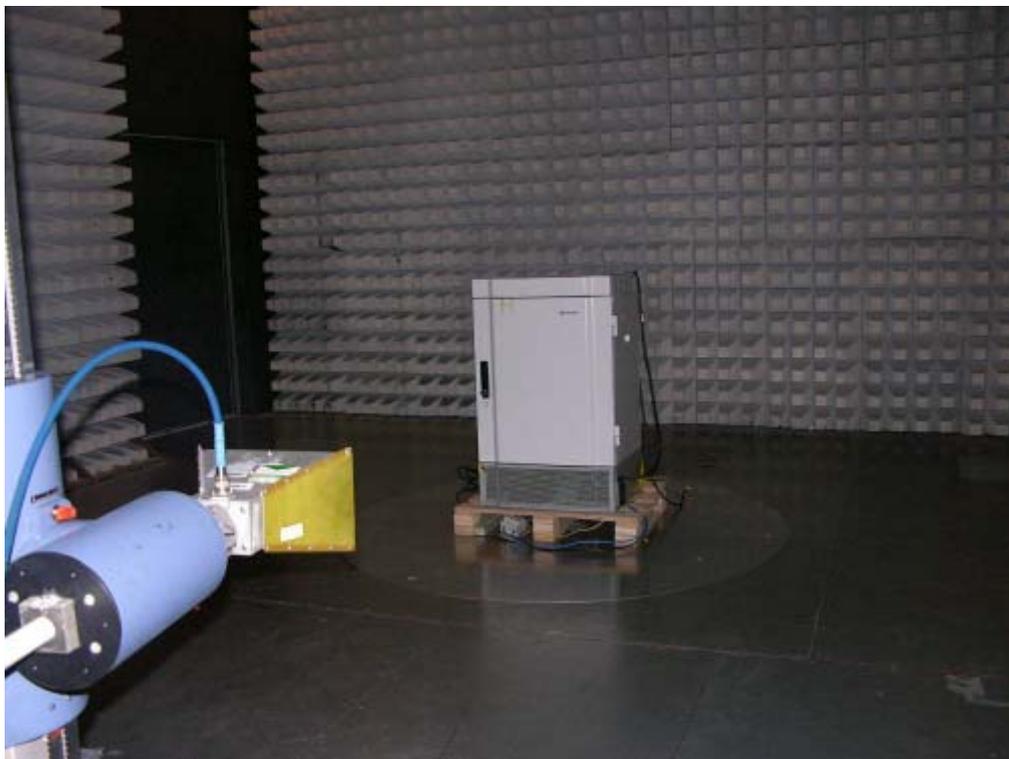
Frequency (MHz)	Level (dBµV)	Transd (dB)	Limit (dBµV)	Margin (dB)	Line	PE
0.352500	40.00	10.2	49	8.9	N	GND
0.393000	35.20	10.1	48	12.8	N	GND
2.049000	36.80	10.1	46	9.2	L3	GND
3.070500	30.90	10.1	46	15.1	N	GND
9.217500	34.60	10.7	50	15.4	N	GND
18.888000	38.20	12.6	50	11.8	N	GND

## 10 Photographs of Test Set-ups

### 10.1 Radiated Emissions



Radiated Disturbance below 1GHz



Radiated Disturbance above 1GHz



## 10.2 Conducted Emissions



Conducted Emissions for AC Power Port

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**END**