



FCC Test Report

Report Number	UCSFR-1302-001R3			
Applicant	Company Name	MAPTech Co., Ltd.		
	Address	Yeonsung University Venture Center #402, 111, Anyang-ro, Manan-gu, Anyang-si, Gyeonggi-do, Korea (430-731)		
Product	Product Name	Wireless Charger Base Station		
	Model Name	MWC-T510T		
	Variant model	-		
	Manufacturer	MAPTech Co., Ltd.		
	Serial No.	-	Country of origin	Korea
Other	Receipt Date	2012.09.26	Receipt Number	UCS-R-2012-557
	Issued Date	2013.04.18	Tested Date	2013.04.11 ~ 2013.04.17
Standard	FCC CFR 47 Part 15 Subpart C			
Tested by	Y. R. Jo (sign) 			
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Revision History

Rev.	Issue Date	Revisions	Revised By
-	2013.02.05	Initial Issue	Y. R. Jo
R1	2013.03.11	Corrected Test Methodology	Y. R. Jo
R2	2013.04.15	added test data.	Y. R. Jo
R3	2013.05.10	Add a description of the test Mode	Y. R. Jo

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1. APPLICANT AND MANUFACTURER INFORMATION

Applicant Name : MAPTech Co., Ltd.

Address : Yeonsung University Venture Center #402, 111, Anyang-ro, Manan-gu, Anyang-si, Gyeonggi-do, Korea (430-731)

Manufacturer : MAPTech Co., Ltd.

Address: Yeonsung University Venture Center #402, 111, Anyang-ro, Manan-gu, Anyang-si, Gyeonggi-do, Korea (430-731)

2. TEST RESULT CERTIFICATION

2.1 Applicable standards

Standard	Clause	Test Item	Result	Remarks
FCC CFR 47 Part 15 Subpart C	15.203	Antenna Requirement	Pass	-
	15.209	Radiated Spurious Emissions	Pass	-
	15.207	AC Power Line Conducted Emissions	Pass	-

3. LABORATORY INFORMATION

3.1 General

UCS Co., Ltd. established 1999 as the International agreed upon laboratory(CBTL, KOLAS) for Standard.

Internally, UCS Co., Ltd. is the designated test laboratory from Radio Research Laboratory of Korea Communications Commission and Korea Food & Drug Administration.

Based on its extensive experience and expertise, UCS Co., Ltd. is the Global test laboratory that has best professionalism in this field.

3.2 Test Site

- UCS Co., Ltd. (Universal Certification Solution)

3.3 Location

UCS Co., Ltd.

- #702, Anyang Megavalley799, Gwanyang2-dong, Dongan-gu, Anyang-si, Gyeonggi-do, 431-767, Korea

ER Center

- #476-4, Hwalcho-dong, Hwaseong-si, Gyeonggi-do, 445-150, Korea

4. EUT INFORMATION

Equipment Class	DCD – Part 15 Low Power Transmitter Below 1705 kHz
Product name	Wireless Charger Base Station
Power source	Input : DC 19.0 V, 1 A Adaptor : AC 100 - 240 V, 50/60 Hz, 0.6 A Max
Local Oscillator or X-Tal	-
Operating Frequency range	(112 ~ 205) kHz
Antenna Type	Integral loop antenna
Type of Modulation	CW(Continuous wave)
Device type of Wireless Power Consortium protocol ^{Note 1}	A1 Device
RF Output power	68.42 dBuV/m (PEAK) (measured @ 3 m)
External Ports	DC INPUT
Charging power range	0 ~5 W
Operating Temperature Range	(0 ~ 40) °C
Dimensions(W×L×T)	((72.1 ± 0.2) × (120.1 ± 0.2) × (15 ± 0.07)) mm
Weight	(105.0 ± 5) g

Note 1: This device can charge only one client device at a time with the specific location of the EUT. So this device is a A1 device of the Wireless Power Consortium protocol.

* See the site below for more information on Wireless Power Consortium.

Site contact : <http://www.wirelesspowerconsortium.com/>

- Power Transmitter design A1 uses the Operating Frequency and duty cycle of the Power Signal in order to control the amount of power that is transferred. For this purpose, the Operating Frequency range of the half-bridge inverter is $f_{op}=110\ldots205$ kHz with a duty cycle of 50%; and its duty cycle range is 10...50% at an Operating Frequency of 205 kHz. A higher Operating Frequency or lower duty cycle result in the transfer of a lower amount of power. In order to achieve a sufficiently accurate adjustment of the amount of power that is transferred, a type A1 Power Transmitter shall control the Operating Frequency with a resolution of
 - $0.01 \times f_{op} - 0.7$ kHz, for f_{op} in the 110...175 kHz range;
 - $0.015 \times f_{op} - 1.58$ kHz, for f_{op} in the 110...175 kHz range;
 or better. In addition, a type A1 Power Transmitter shall control the duty cycle of the Power Signal with a resolution of 0.1% or better.

5. TEST METHODOLOGY

5.1 Setup of equipment under test

5.1.1 Description of support units

Equipment	Manufacturer	Model	S/N
Receiver unit	MAPTech Co., Ltd.	MWC-R524T	-
AC/DC adapter	SIMSUKIAN	SK02G-1900100U	-
Resistance Load jig	MAPTech Co., Ltd.	-	-
Mobile Phone	SAMSUNG ELECTRONICS CO., LTD.	SHV-E250S (FCC ID : A3LSHVE250S)	

5.1.2 Test Mode

- This device has been tested below conditions:

Test Mode	Operating Mode	Charging	Note
Mode 1	112 kHz	1000 mA	Low Frequency, Max. Load
	158 kHz	800 mA	Middle Frequency, Medium Load
	205 kHz	500 mA	High Frequency, Min. Load
Mode 2	112 kHz	1000 mA	Low Frequency, Max. Load
	158 kHz	800 mA	Middle Frequency, Medium Load
	205 kHz	500 mA	High Frequency, Min. Load
Mode 3	GSM 1900	< 1 % Battery status	
		50 % Battery status	
	WCDMA	< 1 % Battery status	
		50 % Battery status	
Mode 4	GSM 1900	< 1 % Battery status	
		50 % Battery status	
	WCDMA	< 1 % Battery status	
		50 % Battery status	

Note

Mode 1

- Put the receiver on the EUT(transmitter), for maintain the state of charge at all times, we made a 'JIG Board' for 'Load' and tested it after mounted on top of the receiver.
- Frequency change : If changed the location as frequency (112 kHz ~ 205 kHz) will change. And also 'Current' value was changed followed it.
- 'JIG' for 'Load' : Made it using connect the resister, for a maintain the state of charge at all times. (Resistance Specifications: Using 10W and 10Ω cement resistor)

Mode 2

- Tilt in the test mode and Test conducted in the same way as Mode 1.

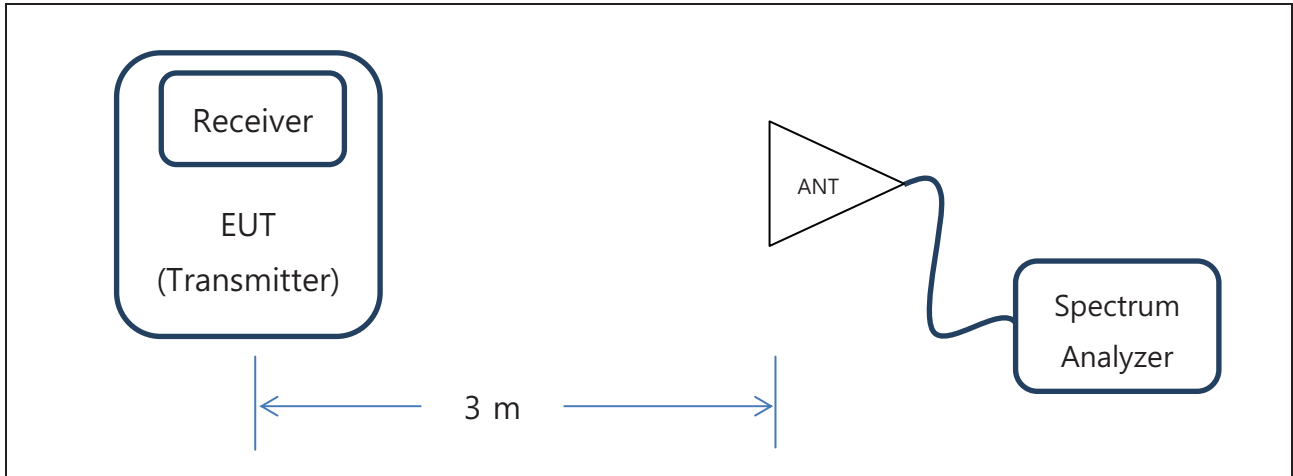
Mode 3

- Less than 1% and 50% when using the mobile phones in use in the field, in the state of charge was measured.
- We've got the above test results by activating call connecting with call test equipment.
- activating call connecting can cause higher battery consumption rate than airplane and stand by mode.
- Test was commenced with activating call connecting which place the most activating and the worst running condition.

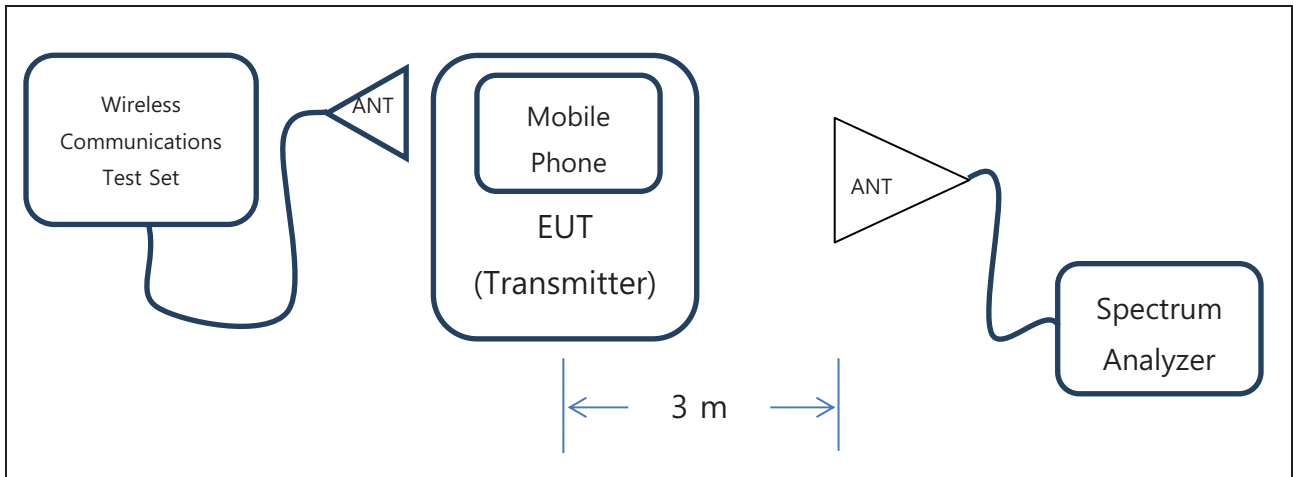
Mode 4

- Tilt in the test mode and Test conducted in the same way as Mode 3.

5.2 Connection Diagram of Test System



[Mode 1 and Mode 2 of Test Configuration]



[Mode 3 and Mode 4 of Test Configuration]



6. TEST DATA

6.1 Antenna requirement

6.1.1 Regulation

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31 (d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

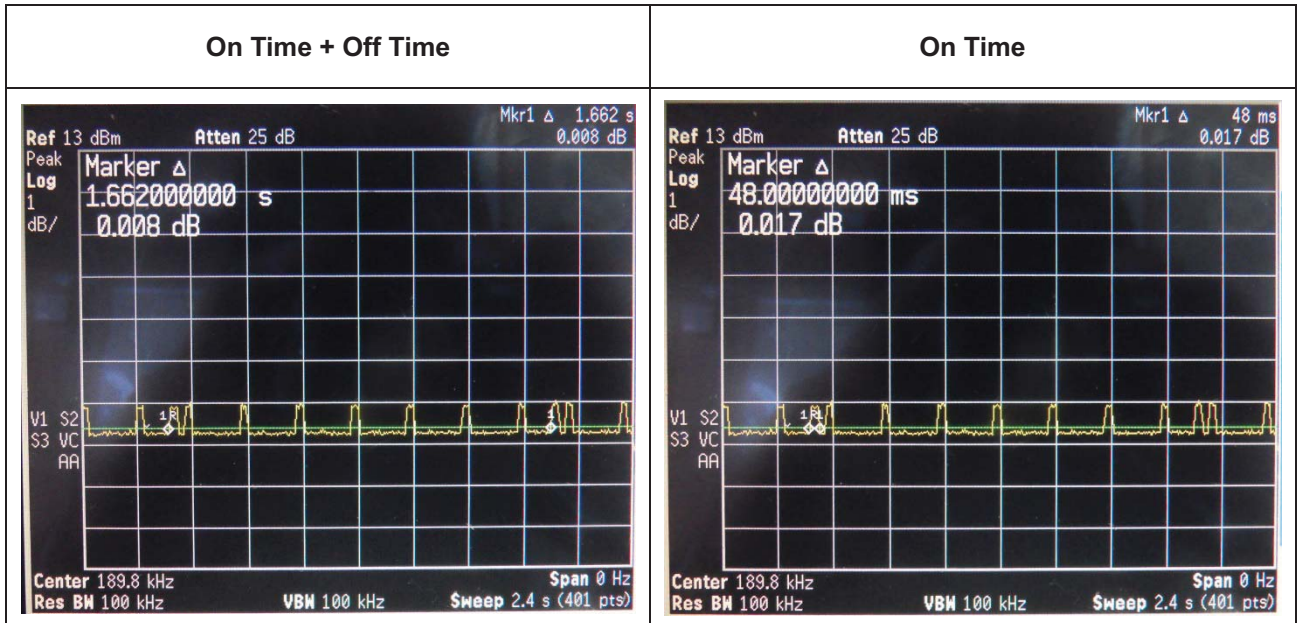
6.1.2 Result

The EUT has an integral loop coil antenna, and meets the requirements of this section.



6.2 Duty Cycle

6.2.1 Plot of the Duty Cycle



6.2.2 Test Results

- Duty Cycle = On Time / On Time + Off Time
- On Time : $48.00 \text{ ms} \times 8 = 384 \text{ ms}$
- On Time + Off Time : 1662 ms
- Duty Cycle : $384 \text{ ms} / 1662 \text{ ms} = 0.23$

6.2 Radiated emissions

6.2.1 Regulation

FCC CFR 47 Part 15-15.209

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength limit (μV/m)	Field strength limit (dBμV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F (kHz) = 266.7 – 4.9	48.5 – 13.8	300
0.490 – 1.705	24000/F (kHz) = 49.0 – 14.1	33.8 – 23.0	30
1.705 – 30.	30	29.5	30
30 – 88	100	40.0	3
88 – 216	150	43.5	3
216 – 960	200	46.0	3
Above 960	500	54.0	3

* The emission limits shown in the above table are based in measurement instrumentation employing a CISPR quasi-peak detector. For the frequency bands (9 – 90) kHz, (110 – 490) kHz and above 1000 MHz, the radiated emission limits are based on measurements employing an average detector.

* The lower limit shall apply at the transition frequencies.

6.2.2 Measurement Procedure

Radiated Emissions Test, 9 kHz to 30 MHz (Magnetic Field Test)

1. The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions at a distance of 1 meter or 3 meters according to Section 15.31(f)(2).
2. The EUT was placed on the top of the 0.8 meter height, (1 × 1.5) meter non-metallic table.
3. Emissions from the EUT are maximized by adjusting the orientation of the Loop antenna and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions if applicable.
4. To obtain the final measurement data, each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

Radiated Emissions Test, above 30 MHz

1. The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions in an anechoic chamber at a distance of 3 meters.
2. The EUT was placed on the top of the 0.8 meter height, (1 × 1.5) meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.
3. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 30 MHz to 1000 MHz using the TRILOG broadband antenna.
4. To obtain the final measurement data, the EUT was arranged on a turntable situated on a (4 × 4) meter at the Open Area Test Site. The EUT was tested at a distance 3 meters.
5. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.
6. The EUT is situated in three orthogonal planes (if appropriate)
7. The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT.

6.2.3 Test Results

1. Mode 1

1) Operating at Max. Load

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
130.54	Peak	57.88	10.45	0.09	80	-11.58	28.39	39.97	
	Average	55.00				-14.46	18.39	32.85	
151.36	Peak	46.48	10.44	0.09	80	-22.99	25.86	48.85	
	Average	44.79				-24.68	15.86	40.54	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
660.10	Quasi-peak	34.19	10.24	0.27	40	4.70	36.36	31.66	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

2) Operating at Medium Load

2) Operating at Medium Band

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]	
166.32	Peak	55.80	10.43	0.09	80	-13.68	24.43	38.11	
	Average	55.43				-14.05	14.43	28.48	
-	-	-	-	-	-	-	-	-	
	-	-				-	-	-	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
494.8	Quasi-peak	37.83	10.30	0.24	40	8.37	48.50	40.13	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
			No Spurious Radiated Emissions Found						

NOTE 1 : The tests were performed at the 3 m distance.

NOTE 2 : Results (dBuV/m) = Reading + Antenna Factor + Cable Loss- Distance Extrapolation Factor

Margin (dB) = Limit – Results

NOTE 3 : Distance Extrapolation Factor

For 300 m : $40\log(300 \text{ m} / 3 \text{ m}) = 80 \text{ dB}$, for frequency band : 0.009 MHz to 0.490 MHz

For 30 m : $40\log(300 \text{ m} / 3 \text{ m}) = 40 \text{ dB}$, for frequency band : 0.490 MHz to 30 MHz

3) Operating at Min. Load

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
183.32	Peak	55.70	10.62	0.19	80	-13.58	23.09	36.67	
	Average	55.49				-13.79	13.09	26.88	
-	-	-	-	-	-	-	-	-	
	-	-				-	-	-	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
548.32	Quasi-peak	38.06	10.28	0.25	40	8.59	43.77	35.18	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

NOTE 1 : The tests were performed at the 3 m distance.

NOTE 2 : Results (dBuV/m) = Reading + Antenna Factor + Cable Loss - Distance Extrapolation Factor
Margin (dB) = Limit – Results

NOTE 3 : Distance Extrapolation Factor

For 300 m : $40\log(300 \text{ m} / 3 \text{ m}) = 80 \text{ dB}$, for frequency band : 0.009 MHz to 0.490 MHz

For 30 m : $40\log(300 \text{ m} / 3 \text{ m}) = 40 \text{ dB}$, for frequency band : 0.490 MHz to 30 MHz

2. Mode 2

1) Operating at Max. Load

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
128.0	Peak	76.40	10.67	0.09	80	7.16	28.75	21.59	
	Average	76.17				6.93	18.75	11.92	
384.2	Peak	62.93	10.35	0.09	80	-6.63	16.25	22.88	
	Average	62.18				-7.38	6.25	13.64	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
733.0	Quasi-peak	51.78	10.21	0.31	40	22.30	32.74	10.44	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

2) Operating at Medium Load

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
141.3	Peak	81.25	10.66	0.17	80	12.08	26.99	14.91	
	Average	80.90				11.73	16.99	5.26	
423.9	Peak	62.02	10.33	0.22	80	-7.43	15.66	23.09	
	Average	60.68				-8.77	5.66	14.43	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
718.0	Quasi-peak	52.22	10.21	0.31	40	22.74	33.43	10.69	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

NOTE 1 : The tests were performed at the 3 m distance.

NOTE 2 : Results (dBuV/m) = Reading + Antenna Factor + Cable Loss - Distance Extrapolation Factor
Margin (dB) = Limit - Results

NOTE 3 : Distance Extrapolation Factor

For 300 m : $40\log(300 \text{ m} / 3 \text{ m}) = 80 \text{ dB}$, for frequency band : 0.009 MHz to 0.490 MHz

For 30 m : $40\log(300 \text{ m} / 3 \text{ m}) = 40 \text{ dB}$, for frequency band : 0.490 MHz to 30 MHz

3) Operating at Min. Load

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
187.0	Peak	76.85	10.61	0.19	80	7.65	22.83	15.18	
	Average	76.31				7.11	12.83	5.72	
292.8	Peak	49.64	10.51	0.20	80	-19.65	18.20	37.85	
	Average	41.93				-27.36	8.20	35.56	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
560.0	Quasi-peak	58.33	10.28	0.25	40	28.86	42.86	14.00	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

NOTE 1 : The tests were performed at the 3 m distance.

NOTE 2 : Results (dBuV/m) = Reading + Antenna Factor + Cable Loss - Distance Extrapolation Factor
Margin (dB) = Limit – Results

NOTE 3 : Distance Extrapolation Factor

For 300 m : $40\log(300 \text{ m} / 3 \text{ m}) = 80 \text{ dB}$, for frequency band : 0.009 MHz to 0.490 MHz

For 30 m : $40\log(300 \text{ m} / 3 \text{ m}) = 40 \text{ dB}$, for frequency band : 0.490 MHz to 30 MHz

3. Mode 3

1) Operating at GSM 1900, < 1 % Battery status

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
140.1	Peak	61.55	10.66	0.17	80	-7.62	27.13	24.75	
	Average	61.41				-7.76	17.13	24.89	
420.3	Peak	41.48	10.33	0.22	80	-27.97	15.71	43.68	
	Average	40.92				-28.53	5.71	34.24	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
639.0	Quasi-peak	30.49	10.24	0.30	40	1.03	37.56	36.53	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

2) Operating at GSM 1900, 50 % Battery status

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
158.1	Peak	54.04	10.64	0.18	80	-15.14	25.18	40.32	
	Average	53.10				-16.08	15.18	31.26	
473.2	Peak	34.91	10.31	0.23	80	-34.55	15.07	49.62	
	Average	32.09				-37.37	5.07	42.44	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
517.0	Quasi-peak	33.64	10.29	0.24	40	4.17	46.42	42.25	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

NOTE 1 : The tests were performed at the 3 m distance.

NOTE 2 : Results (dBuV/m) = Reading + Antenna Factor + Cable Loss - Distance Extrapolation Factor
Margin (dB) = Limit - Results

NOTE 3 : Distance Extrapolation Factor

For 300 m : $40\log(300 \text{ m} / 3 \text{ m}) = 80 \text{ dB}$, for frequency band : 0.009 MHz to 0.490 MHz

For 30 m : $40\log(300 \text{ m} / 3 \text{ m}) = 40 \text{ dB}$, for frequency band : 0.490 MHz to 30 MHz

3) Operating at WCDMA, < 1 % Battery status

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
140.1	Peak	56.16	10.66	0.17	80	-13.01	27.13	40.14	
	Average	56.01				-13.16	17.13	30.29	
420.3	Peak	35.79	10.33	0.22	80	-33.66	15.71	49.37	
	Average	34.34				-35.11	5.71	40.82	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
526.0	Quasi-peak	32.22	10.29	0.25	40	2.76	45.63	42.87	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

4) Operating at WCDMA, 50 % Battery status

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
158.1	Peak	53.69	10.64	0.18	80	-15.49	25.18	40.67	
	Average	52.42				-16.76	15.18	31.94	
473.2	Peak	34.95	10.31	0.23	80	-34.51	15.07	49.58	
	Average	31.08				-38.38	5.07	43.45	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
517.0	Quasi-peak	38.35	10.29	0.24	40	8.88	46.42	37.54	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

NOTE 1 : The tests were performed at the 3 m distance.

NOTE 2 : Results (dBuV/m) = Reading + Antenna Factor + Cable Loss - Distance Extrapolation Factor
Margin (dB) = Limit - Results

NOTE 3 : Distance Extrapolation Factor

For 300 m : $40\log(300 \text{ m} / 3 \text{ m}) = 80 \text{ dB}$, for frequency band : 0.009 MHz to 0.490 MHz

For 30 m : $40\log(300 \text{ m} / 3 \text{ m}) = 40 \text{ dB}$, for frequency band : 0.490 MHz to 30 MHz

4. Mode 4

1) Operating at GSM 1900, < 1 % Battery status

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
182.2	Peak	52.48	10.62	0.19	80	-16.71	23.17	39.88	
	Average	51.65				-17.54	13.17	30.71	
419.1	Peak	36.59	10.33	0.22	80	-32.86	15.73	48.59	
	Average	34.79				-34.66	5.73	40.39	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
545.0	Quasi-peak	32.99	10.28	0.25	40	3.52	44.04	40.52	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

2) Operating at GSM 1900, 50 % Battery status

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
176.1	Peak	52.34	10.62	0.19	80	-16.85	23.63	40.48	
	Average	51.22				-17.97	13.63	31.60	
473.2	Peak	31.37	10.31	0.23	80	-38.09	15.07	53.16	
	Average	22.83				-46.63	5.07	51.70	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
529.0	Quasi-peak	34.56	10.29	0.25	40	5.1	45.37	40.27	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

NOTE 1 : The tests were performed at the 3 m distance.

NOTE 2 : Results (dBuV/m) = Reading + Antenna Factor + Cable Loss - Distance Extrapolation Factor
Margin (dB) = Limit - Results

NOTE 3 : Distance Extrapolation Factor

For 300 m : $40\log(300 \text{ m} / 3 \text{ m}) = 80 \text{ dB}$, for frequency band : 0.009 MHz to 0.490 MHz

For 30 m : $40\log(300 \text{ m} / 3 \text{ m}) = 40 \text{ dB}$, for frequency band : 0.490 MHz to 30 MHz

3) Operating at WCDMA, < 1 % Battery status

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
182.2	Peak	52.48	10.62	0.19	80	-16.71	23.17	39.88	
	Average	51.64				-17.55	13.17	30.72	
375.8	Peak	36.61	10.35	0.22	80	-32.82	16.39	49.21	
	Average	33.69				-35.74	6.39	42.13	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
545.0	Quasi-peak	35.31	10.28	0.25	40	5.84	44.04	38.2	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

4) Operating at WCDMA, 50 % Battery status

Field strength below 30 MHz									
Frequency [kHz]	Detector	Reading [dBuV/m]	Antenna Factor [dB]	Cable Loss [dB]	Distance Extrapolation Factor [dB]	Results [dBuV/m]	Limit[dBuV/m]	Margin [dB]	
176.1	Peak	52.31	10.62	0.19	80	-16.88	23.63	40.51	
	Average	51.15				-18.04	13.63	31.67	
473.2	Peak	30.11	10.31	0.23	80	-39.35	15.72	55.07	
	Average	23.36				-46.10	5.72	51.82	
Frequency within 90 kHz ~ 110 kHz and above 490 kHz									
529.0	Quasi-peak	34.5	10.29	0.25	40	5.04	45.37	40.33	
Field strength above 30 MHz									
Frequency [kHz]	POL [V/H]	ANT [m]	Reading [dBuV]	Antenna Factor [dB]	Cable Loss [dB]	AMP [dB]	Results [dBuV/m]	Limit [dBuV/m]	Margin [dB]
		No Spurious Radiated Emissions Found							

NOTE 1 : The tests were performed at the 3 m distance.

NOTE 2 : Results (dBuV/m) = Reading + Antenna Factor + Cable Loss - Distance Extrapolation Factor
Margin (dB) = Limit - Results

NOTE 3 : Distance Extrapolation Factor

For 300 m : $40\log(300 \text{ m} / 3 \text{ m}) = 80 \text{ dB}$, for frequency band : 0.009 MHz to 0.490 MHz

For 30 m : $40\log(300 \text{ m} / 3 \text{ m}) = 40 \text{ dB}$, for frequency band : 0.490 MHz to 30 MHz

6.3 AC POWER LINE CONDUCTED EMISSIONS

6.3.1 Regulation

FCC 47CFR15 – 15.207(a)

According to §15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency

6.3.2 Test Procedure

1. The EUT was placed on a wooden table of size, 1m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5 m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50 Ω /50 μ H LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz
5. The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASI-PEAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

6.3.3 Test Results

1. Mode 1

1) Operating at Max. Load

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.16	Quasi-Peak	H (AC +120 V)	52.37	0.03	0.04	52.44	65.46	13.02
0.22	Quasi-Peak	H (AC +120 V)	46.73	0.03	0.04	46.80	62.82	16.02
0.34	Quasi-Peak	H (AC +120 V)	43.28	0.03	0.05	43.36	59.20	15.84
0.37	Quasi-Peak	N (AC 0 V)	45.26	0.03	0.05	45.34	58.50	13.16
0.45	Quasi-Peak	H (AC +120 V)	41.45	0.03	0.06	41.54	56.88	15.34
0.75	Quasi-Peak	N (AC 0 V)	39.73	0.04	0.08	39.85	56.00	16.15
1.64	Quasi-Peak	N (AC 0 V)	39.51	0.05	0.13	39.69	56.00	16.31
1.94	Quasi-Peak	H (AC +120 V)	39.73	0.06	0.14	39.93	56.00	16.07
3.13	Quasi-Peak	N (AC 0 V)	40.25	0.08	0.19	40.52	56.00	15.48
5.83	Quasi-Peak	H (AC +120 V)	40.07	0.11	0.31	40.49	60.00	19.51
9.11	Quasi-Peak	H (AC +120 V)	39.72	0.17	0.39	40.28	60.00	19.72
9.40	Quasi-Peak	N (AC 0 V)	40.31	0.17	0.39	40.86	60.00	19.14

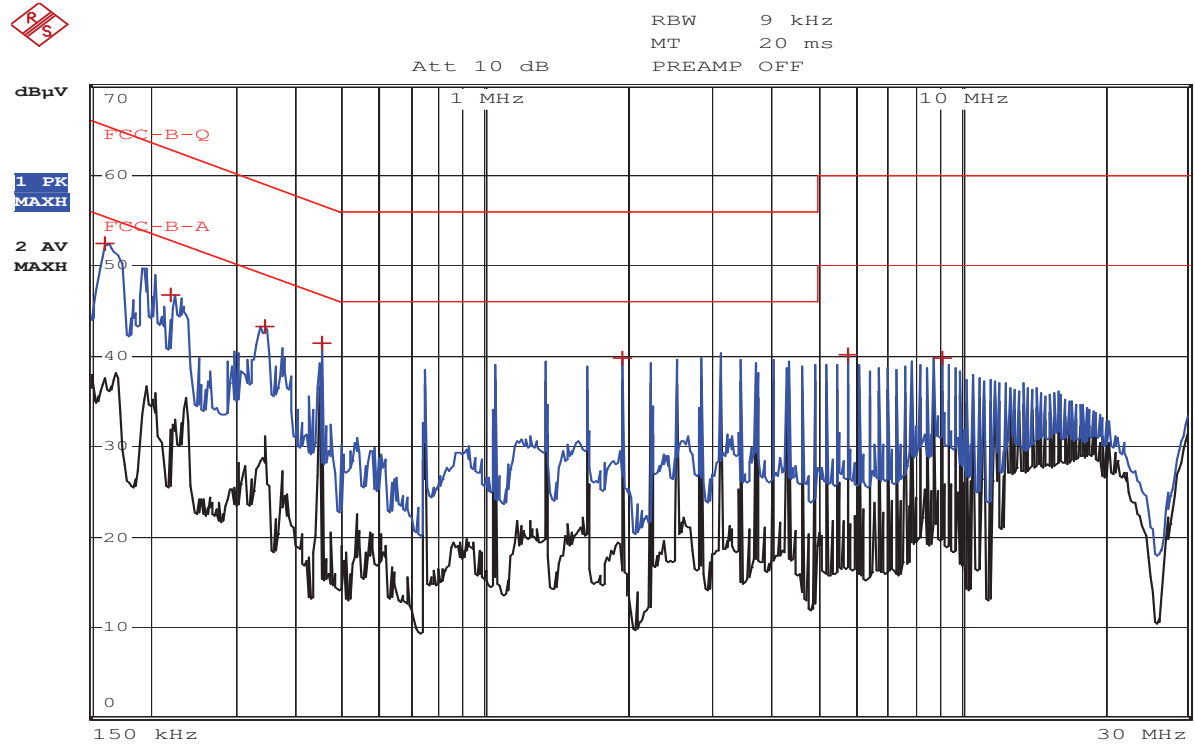
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

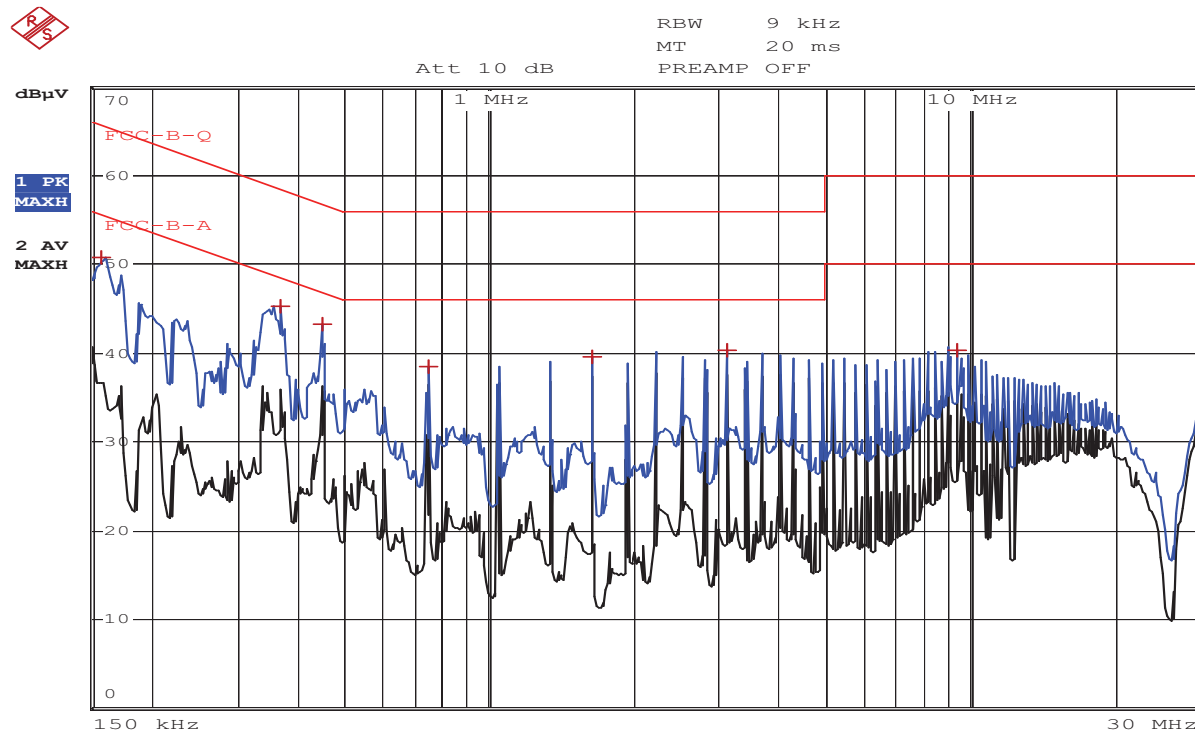


Figure 1: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE



2) Operating at Medium Load

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.15	Quasi-Peak	N (AC 0 V)	49.92	0.03	0.04	49.99	66.00	16.01
0.16	Quasi-Peak	H (AC +120 V)	51.83	0.03	0.04	51.90	65.46	13.56
0.19	Quasi-Peak	H (AC +120 V)	49.96	0.03	0.04	50.03	64.04	14.01
0.34	Quasi-Peak	N (AC 0 V)	46.49	0.03	0.05	46.57	59.20	12.63
0.45	Quasi-Peak	N (AC 0 V)	47.34	0.03	0.06	47.43	56.88	9.45
0.73	Quasi-Peak	H (AC +120 V)	38.78	0.04	0.07	38.89	56.00	17.11
1.61	Quasi-Peak	H (AC +120 V)	39.54	0.05	0.12	39.72	56.00	16.28
2.25	Quasi-Peak	N (AC 0 V)	46.58	0.06	0.15	46.80	56.00	9.21
3.75	Quasi-Peak	N (AC 0 V)	47.61	0.08	0.22	47.92	56.00	8.09
6.02	Quasi-Peak	H (AC +120 V)	39.33	0.12	0.32	39.76	60.00	20.24
9.46	Quasi-Peak	N (AC 0 V)	46.61	0.17	0.39	47.17	60.00	12.83
29.72	Quasi-Peak	N (AC 0 V)	40.54	0.47	0.68	41.69	60.00	18.31
29.89	Quasi-Peak	H (AC +120 V)	34.75	0.51	0.68	35.94	60.00	24.06

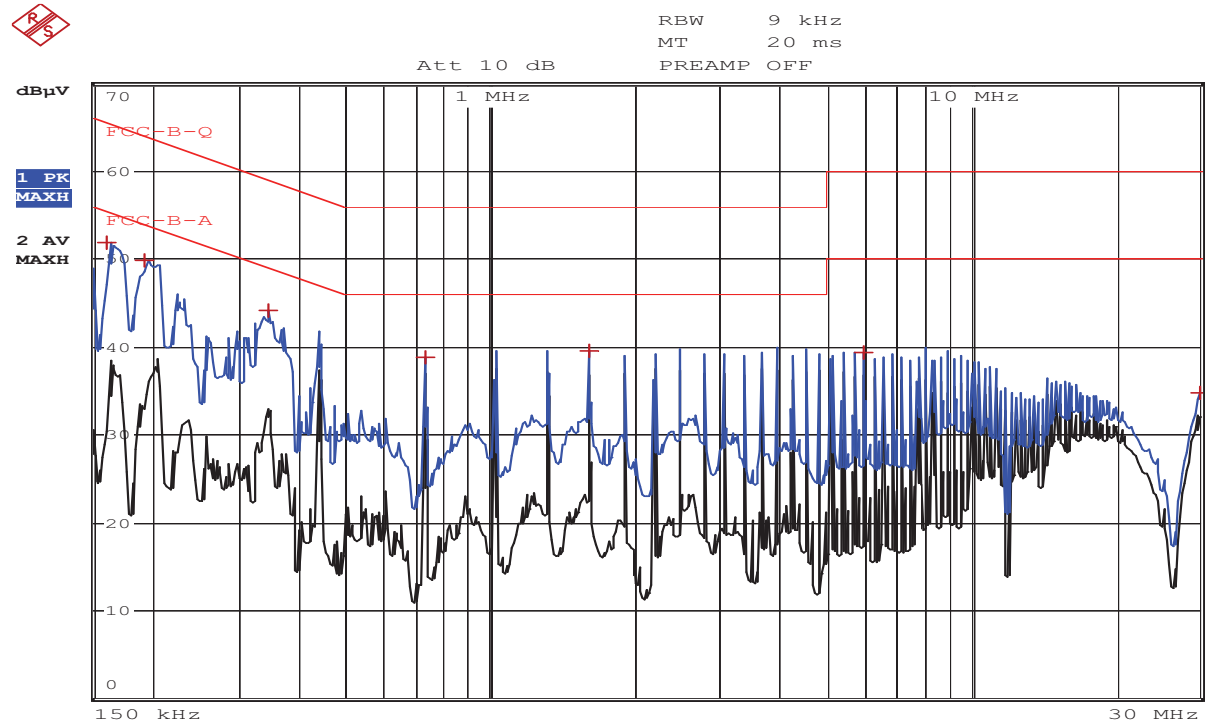
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

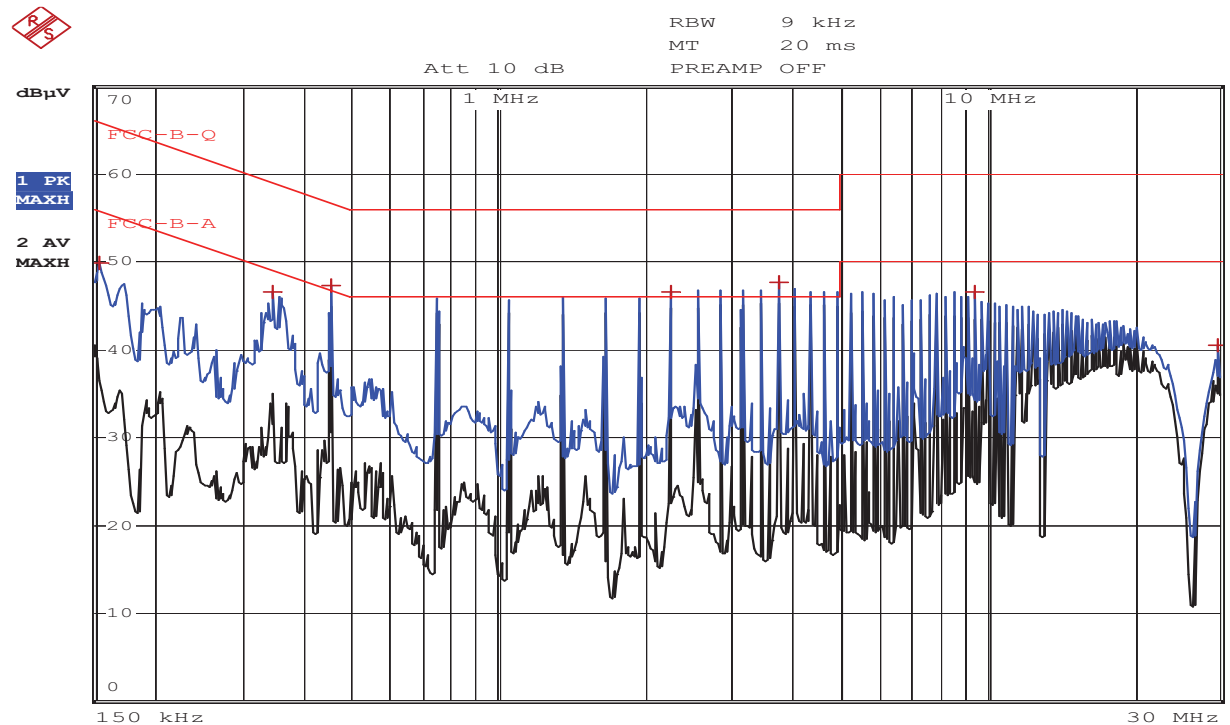


Figure 2: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE



3) Operating at Min. Load

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dB μ V)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dB μ V)	Limit (dB μ V)	Margin (dB)
0.16	Quasi-Peak	H (AC +120 V)	53.79	0.03	0.04	53.86	65.46	11.60
0.21	Quasi-Peak	H (AC +120 V)	50.37	0.03	0.04	50.44	63.21	12.76
0.34	Quasi-Peak	N (AC 0 V)	47.00	0.03	0.05	47.08	59.20	12.12
0.49	Quasi-Peak	N (AC 0 V)	41.80	0.03	0.06	41.89	56.17	14.28
0.82	Quasi-Peak	N (AC 0 V)	39.98	0.04	0.08	40.10	56.00	15.90
1.16	Quasi-Peak	H (AC +120 V)	37.91	0.04	0.11	38.06	56.00	17.94
2.71	Quasi-Peak	H (AC +120 V)	38.38	0.07	0.17	38.62	56.00	17.38
2.79	Quasi-Peak	N (AC 0 V)	39.68	0.07	0.18	39.93	56.00	16.07
7.67	Quasi-Peak	H (AC +120 V)	37.49	0.14	0.36	37.99	60.00	22.01
9.71	Quasi-Peak	N (AC 0 V)	40.58	0.18	0.40	41.15	60.00	18.85
10.57	Quasi-Peak	H (AC +120 V)	37.62	0.19	0.41	38.22	60.00	21.78
19.31	Quasi-Peak	N (AC 0 V)	35.29	0.29	0.55	36.13	60.00	23.87

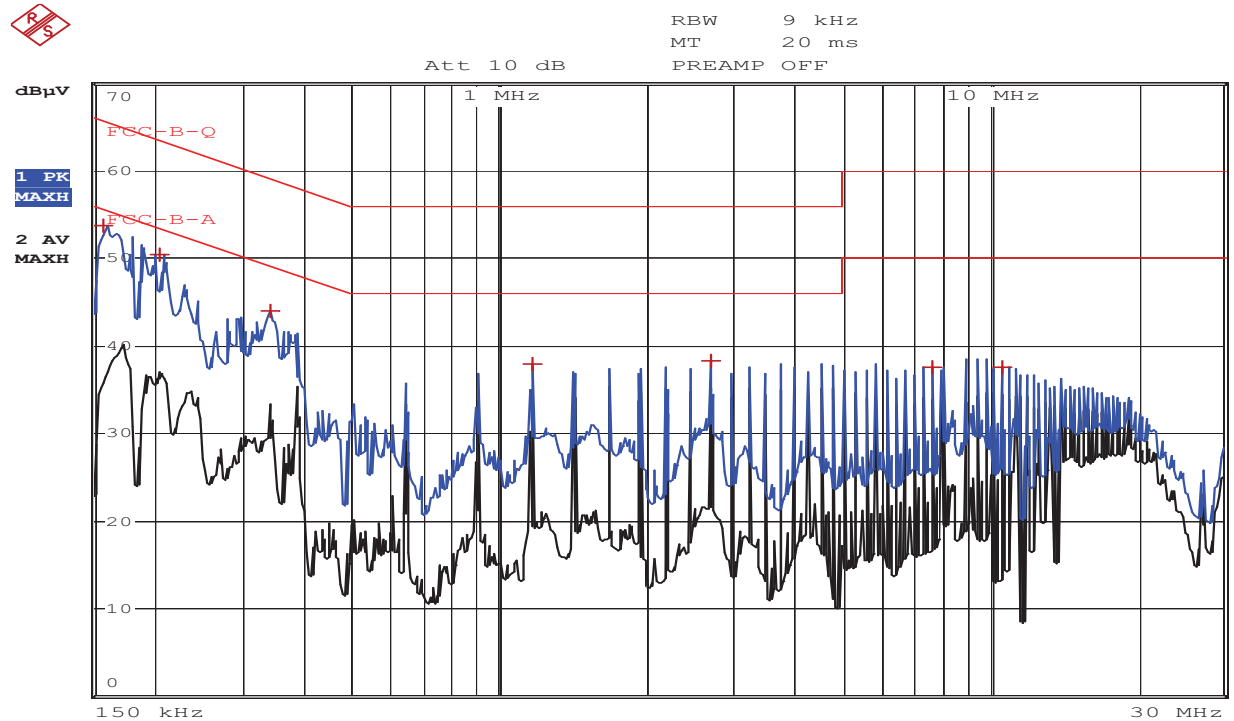
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

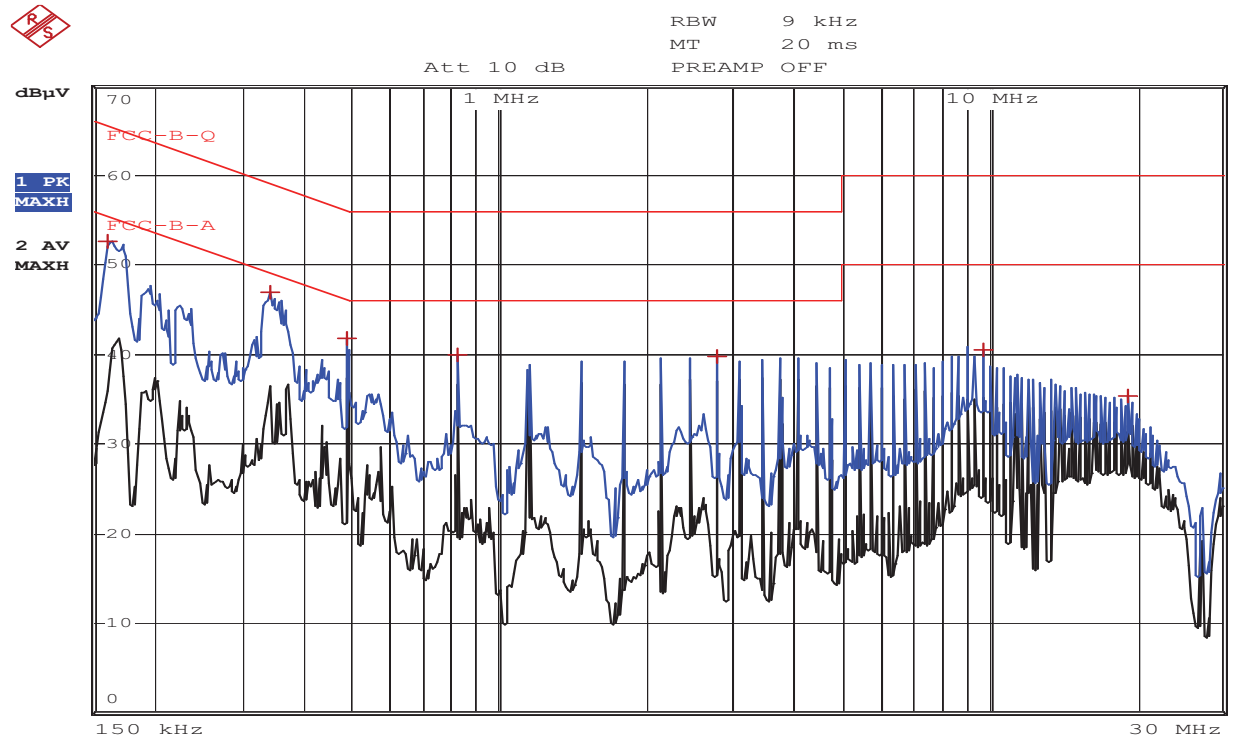


Figure 3: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE



**2. Mode 2****1) Operating at Max. Load**

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.17	Quasi-Peak	H (AC +120 V)	51.73	0.03	0.04	51.80	64.96	13.16
0.19	Quasi-Peak	H (AC +120 V)	50.00	0.03	0.04	50.07	64.04	13.97
0.36	Quasi-Peak	N (AC 0 V)	45.01	0.03	0.05	45.09	58.73	13.64
0.39	Quasi-Peak	H (AC +120 V)	43.61	0.04	0.05	43.70	58.06	14.36
0.65	Quasi-Peak	H (AC +120 V)	38.69	0.04	0.07	38.80	56.00	17.20
0.92	Quasi-Peak	N (AC 0 V)	38.62	0.04	0.09	38.75	56.00	17.25
1.17	Quasi-Peak	H (AC +120 V)	39.58	0.04	0.11	39.73	56.00	16.27
1.44	Quasi-Peak	N (AC 0 V)	38.96	0.05	0.12	39.13	56.00	16.87
3.5	Quasi-Peak	H (AC +120 V)	39.12	0.08	0.21	39.41	56.00	16.59
4.32	Quasi-Peak	N (AC 0 V)	39.26	0.09	0.25	39.60	56.00	16.40
9.48	Quasi-Peak	H (AC +120 V)	38.68	0.17	0.39	39.24	60.00	20.76
9.82	Quasi-Peak	N (AC 0 V)	39.95	0.18	0.40	40.52	60.00	19.48
29.86	Quasi-Peak	N (AC 0 V)	34.44	0.48	0.68	35.60	60.00	24.40

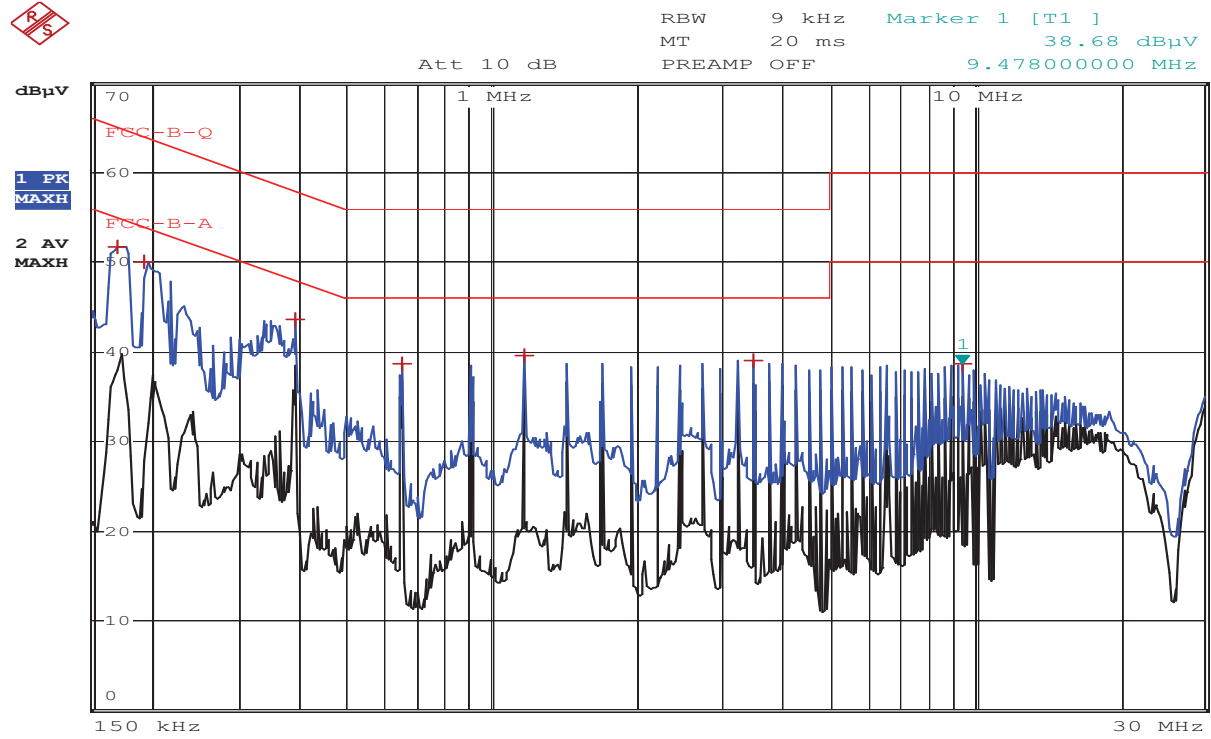
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

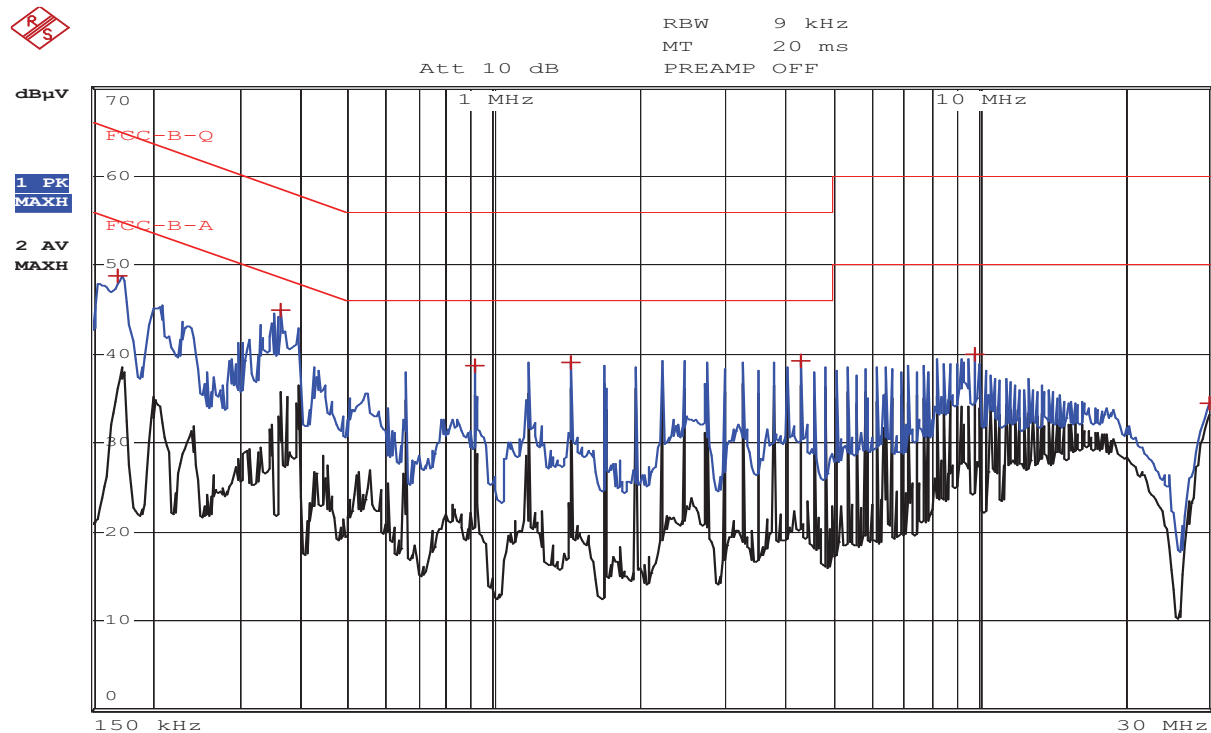


Figure 4: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE





2) Operating at Medium Load

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.16	Quasi-Peak	H (AC +120 V)	51.18	0.03	0.04	51.25	65.46	14.21
0.17	Quasi-Peak	N (AC 0 V)	53.71	0.03	0.04	53.78	64.96	11.18
0.18	Quasi-Peak	H (AC +120 V)	51.02	0.03	0.04	51.09	64.49	13.40
0.22	Quasi-Peak	H (AC +120 V)	46.23	0.03	0.04	46.30	62.82	16.52
0.34	Quasi-Peak	H (AC +120 V)	43.26	0.03	0.05	43.34	59.20	15.86
0.51	Quasi-Peak	N (AC 0 V)	48.63	0.03	0.06	48.72	56.00	7.28
0.54	Quasi-Peak	H (AC +120 V)	40.83	0.04	0.06	40.93	56.00	15.07
0.85	Quasi-Peak	N (AC 0 V)	48.17	0.04	0.09	48.30	56.00	7.71
1.53	Quasi-Peak	N (AC 0 V)	47.74	0.05	0.12	47.91	56.00	8.09
1.62	Quasi-Peak	H (AC +120 V)	41.34	0.05	0.12	41.52	56.00	14.48
2.55	Quasi-Peak	N (AC 0 V)	48.59	0.07	0.17	48.82	56.00	7.18
4.13	Quasi-Peak	H (AC +120 V)	41.43	0.09	0.24	41.76	56.00	14.24
4.25	Quasi-Peak	N (AC 0 V)	48.39	0.09	0.25	48.73	56.00	7.27
17.76	Quasi-Peak	N (AC 0 V)	48.61	0.27	0.54	49.42	60.00	10.58
29.83	Quasi-Peak	H (AC +120 V)	33.47	0.51	0.68	34.66	60.00	25.34

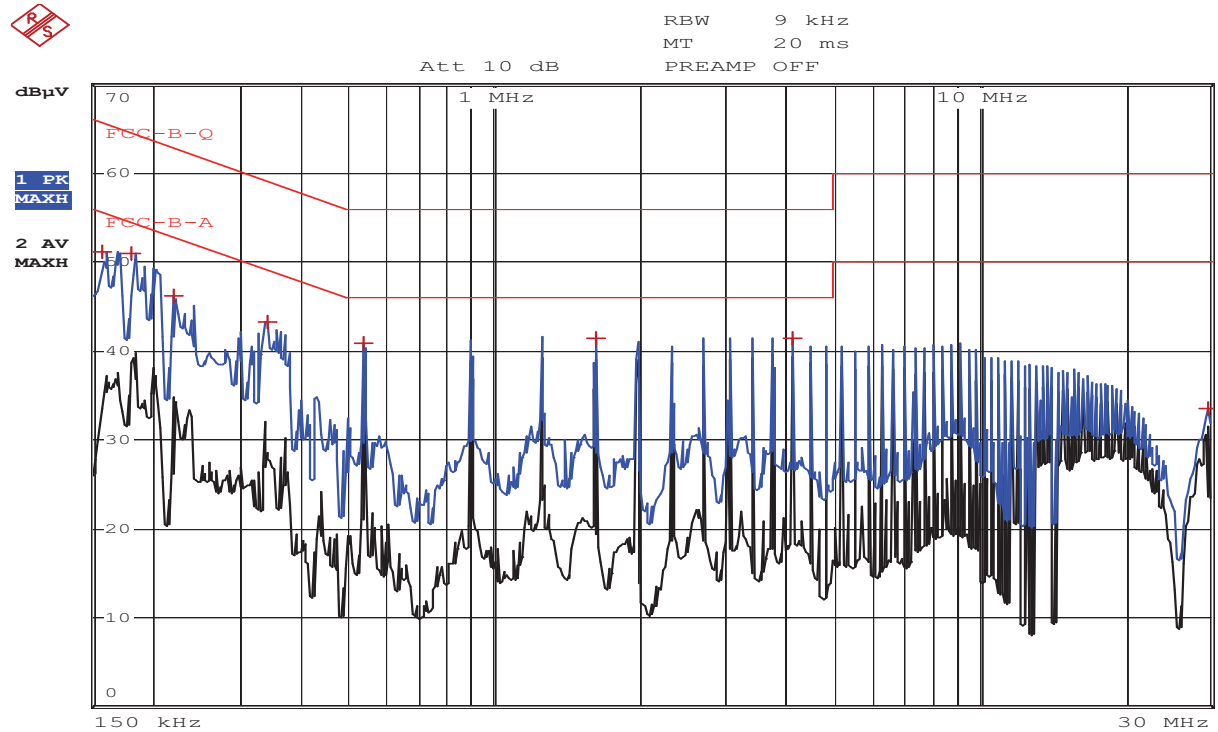
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

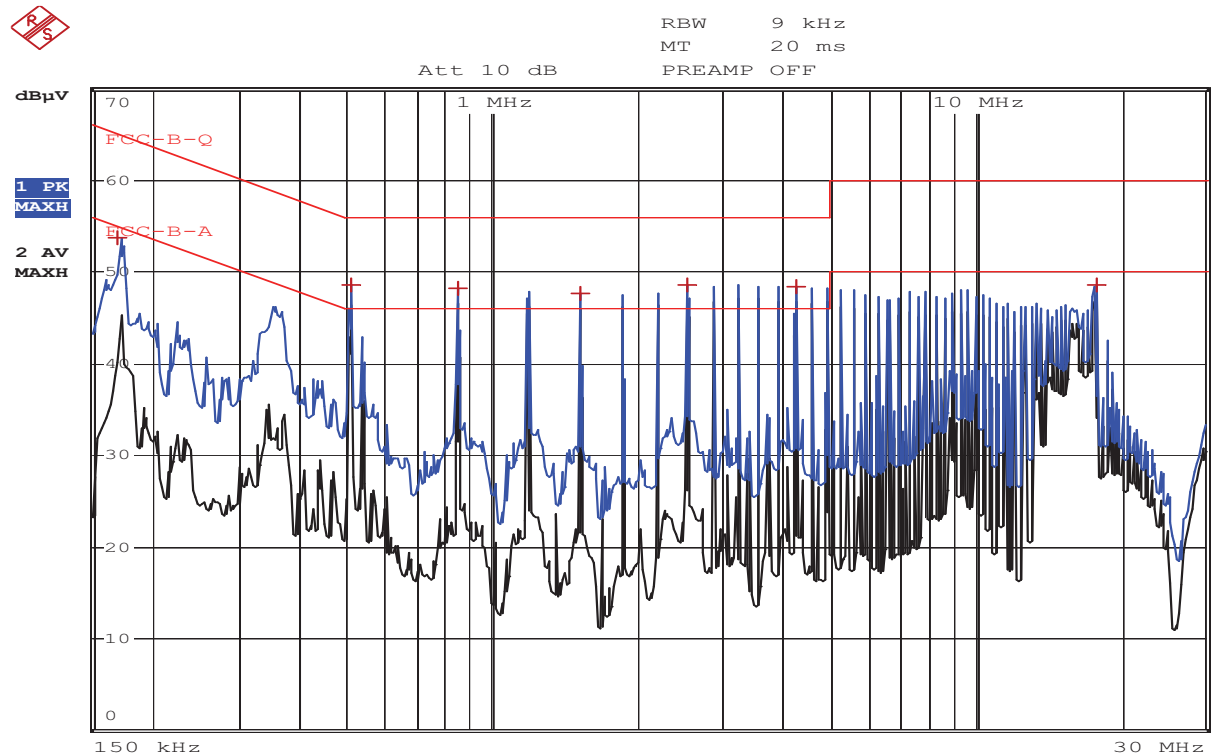


Figure 5: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE





3) Operating at Min. Load

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.15	Quasi-Peak	H (AC +120 V)	55.11	0.03	0.04	55.18	66.00	10.82
0.17	Quasi-Peak	H (AC +120 V)	53.57	0.03	0.04	53.64	64.96	11.32
0.21	Quasi-Peak	H (AC +120 V)	50.16	0.03	0.04	50.23	63.21	12.97
0.35	Quasi-Peak	N (AC 0 V)	47.76	0.03	0.05	47.84	58.96	11.12
0.81	Quasi-Peak	N (AC 0 V)	38.37	0.04	0.08	38.49	56.00	17.51
1.51	Quasi-Peak	H (AC +120 V)	36.90	0.05	0.12	37.07	56.00	18.93
2.67	Quasi-Peak	N (AC 0 V)	37.81	0.07	0.17	38.05	56.00	17.95
9.43	Quasi-Peak	H (AC +120 V)	36.64	0.17	0.39	37.20	60.00	22.80
9.87	Quasi-Peak	N (AC 0 V)	38.79	0.18	0.40	39.37	60.00	20.63
29.79	Quasi-Peak	H (AC +120 V)	29.91	0.51	0.68	31.09	60.00	28.91

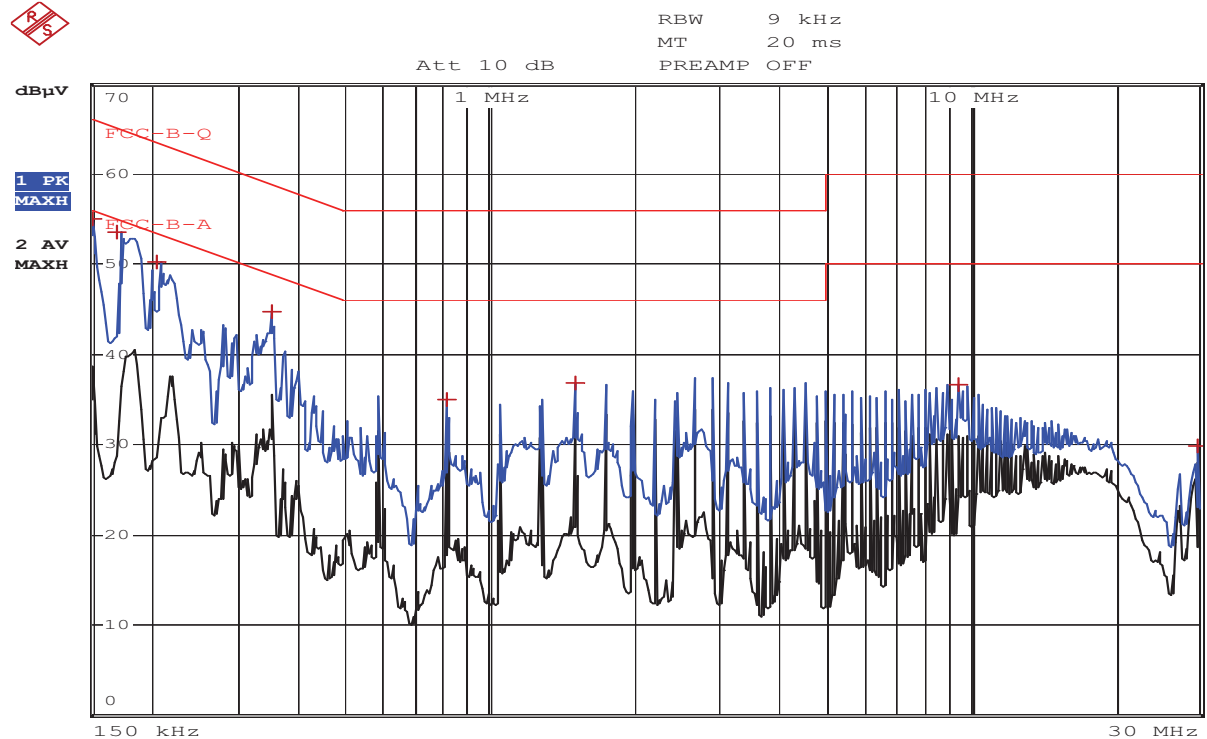
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

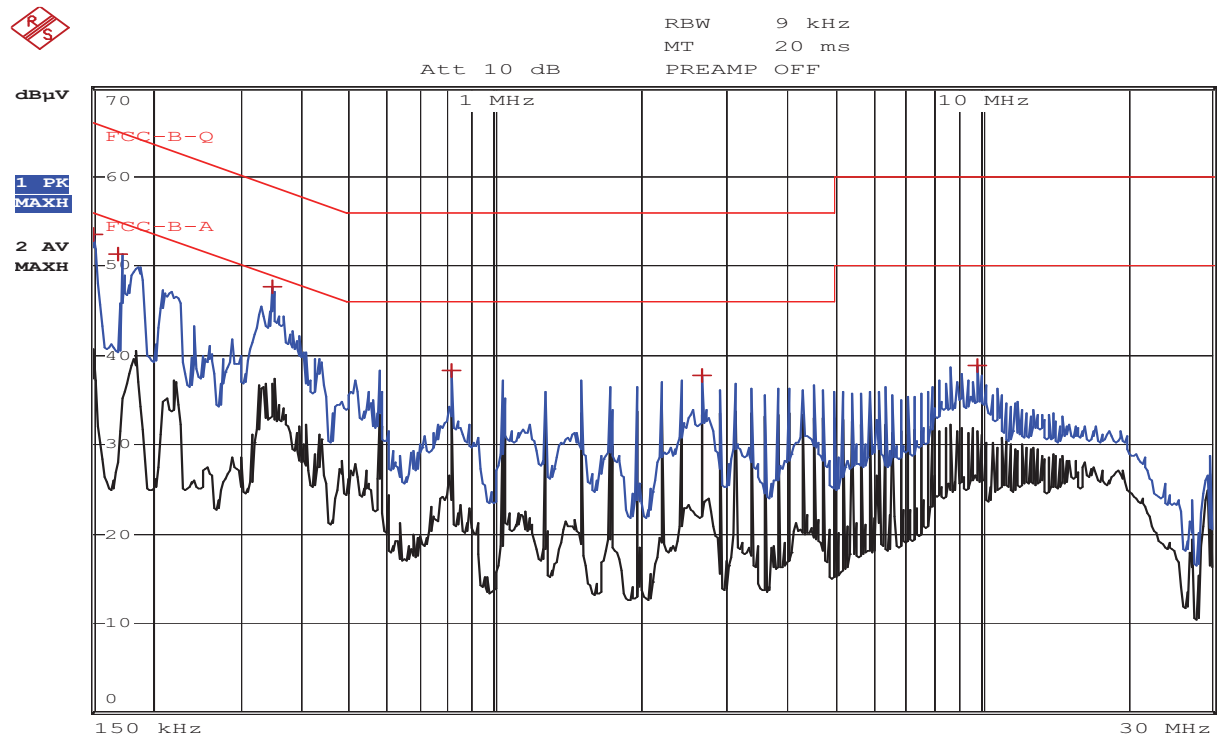


Figure 6: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE



3. Mode 3

1) Operating at GSM 1900, < 1 % Battery status

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.16	Quasi-Peak	H (AC +120 V)	56.65	0.03	0.04	56.72	65.46	8.74
0.2	Quasi-Peak	H (AC +120 V)	51.07	0.03	0.04	51.14	63.61	12.47
0.21	Quasi-Peak	N (AC 0 V)	47.79	0.03	0.04	47.86	63.21	15.34
0.43	Quasi-Peak	H (AC +120 V)	44.24	0.04	0.06	44.33	57.25	12.92
0.44	Quasi-Peak	N (AC 0 V)	44.93	0.03	0.06	45.02	57.06	12.05
0.72	Quasi-Peak	H (AC +120 V)	41.96	0.04	0.07	42.07	56.00	13.93
1.02	Quasi-Peak	N (AC 0 V)	42.52	0.04	0.10	42.66	56.00	13.34
1.59	Quasi-Peak	H (AC +120 V)	42.81	0.05	0.12	42.99	56.00	13.01
2.74	Quasi-Peak	H (AC +120 V)	43.31	0.07	0.17	43.55	56.00	12.45
2.76	Quasi-Peak	N (AC 0 V)	43.68	0.07	0.18	43.93	56.00	12.07
8.82	Quasi-Peak	H (AC +120 V)	43.60	0.16	0.38	44.14	60.00	15.86
10.59	Quasi-Peak	N (AC 0 V)	43.12	0.19	0.41	43.72	60.00	16.28
29.83	Quasi-Peak	H (AC +120 V)	37.38	0.51	0.68	38.57	60.00	21.43
29.93	Quasi-Peak	N (AC 0 V)	37.37	0.48	0.68	38.53	60.00	21.47

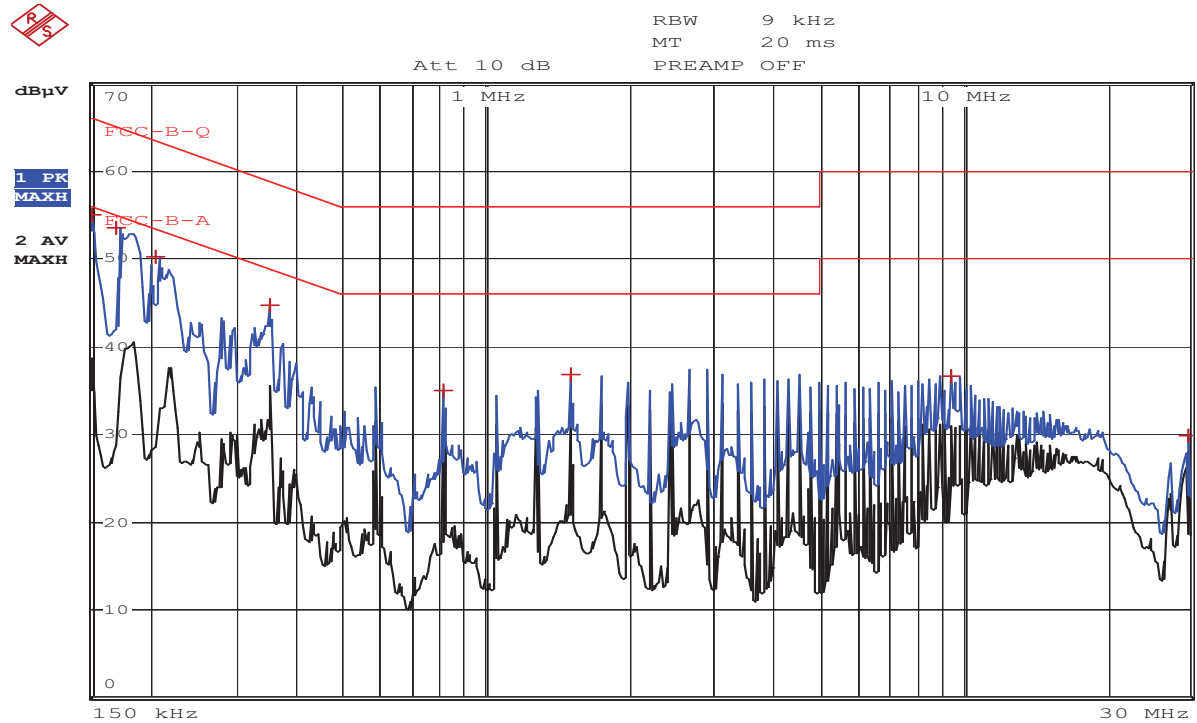
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

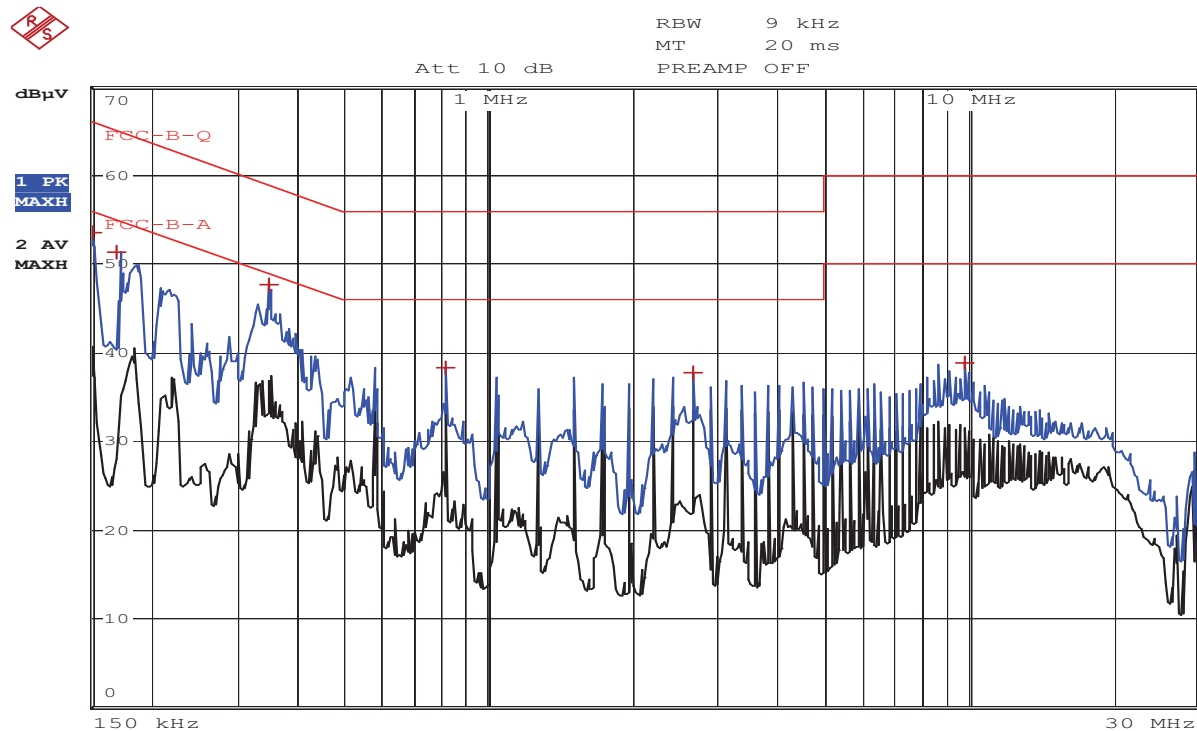


Figure 7: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE



2) Operating at GSM 1900, 50 % Battery status

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.17	Quasi-Peak	H (AC +120 V)	53.00	0.03	0.04	53.07	64.96	11.89
0.19	Quasi-Peak	H (AC +120 V)	50.22	0.03	0.04	50.29	64.04	13.75
0.34	Quasi-Peak	N (AC 0 V)	46.76	0.03	0.05	46.84	59.20	12.36
0.5	Quasi-Peak	N (AC 0 V)	44.46	0.03	0.06	44.55	56.00	11.45
0.83	Quasi-Peak	N (AC 0 V)	44.34	0.04	0.08	44.46	56.00	11.54
1.16	Quasi-Peak	H (AC +120 V)	43.14	0.04	0.11	43.29	56.00	12.71
1.82	Quasi-Peak	H (AC +120 V)	41.94	0.06	0.13	42.13	56.00	13.87
2.15	Quasi-Peak	N (AC 0 V)	44.10	0.06	0.15	44.31	56.00	11.69
2.81	Quasi-Peak	H (AC +120 V)	42.76	0.07	0.18	43.01	56.00	12.99
3.14	Quasi-Peak	N (AC 0 V)	44.34	0.08	0.19	44.61	56.00	11.39
5.13	Quasi-Peak	H (AC +120 V)	42.92	0.10	0.28	43.31	60.00	16.69
9.43	Quasi-Peak	H (AC +120 V)	42.93	0.17	0.39	43.49	60.00	16.51
29.8	Quasi-Peak	N (AC 0 V)	34.82	0.48	0.68	35.97	60.00	24.03

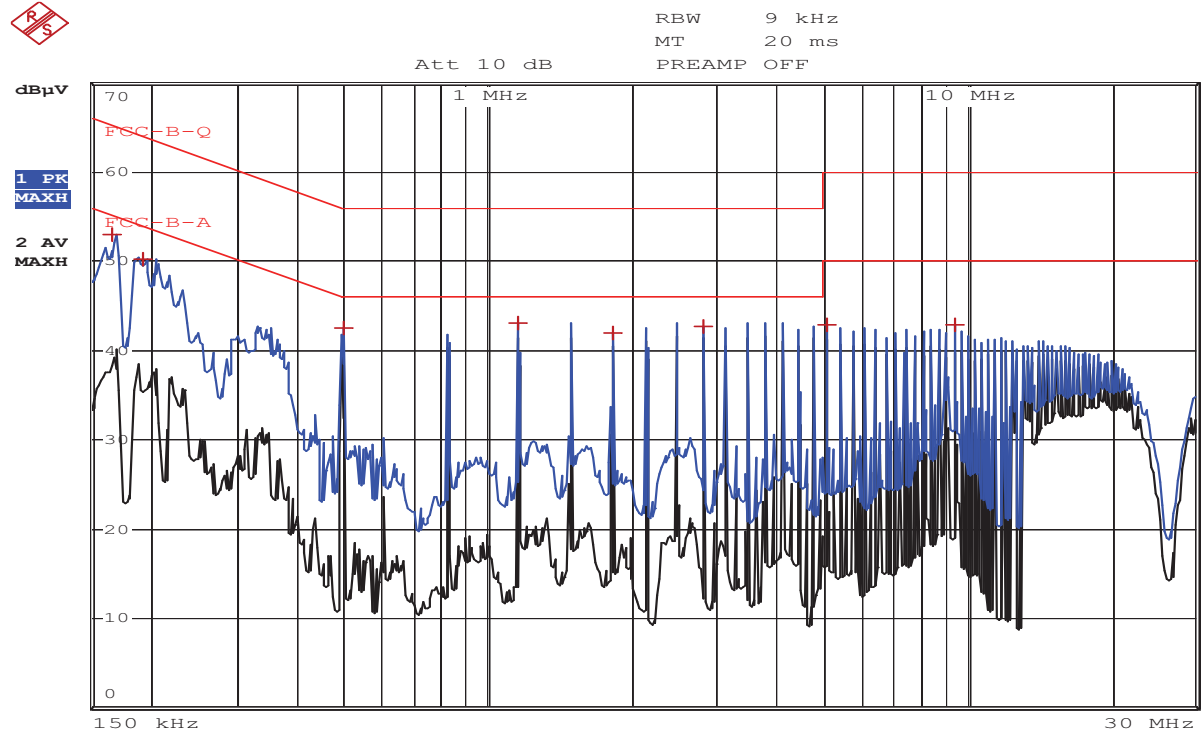
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

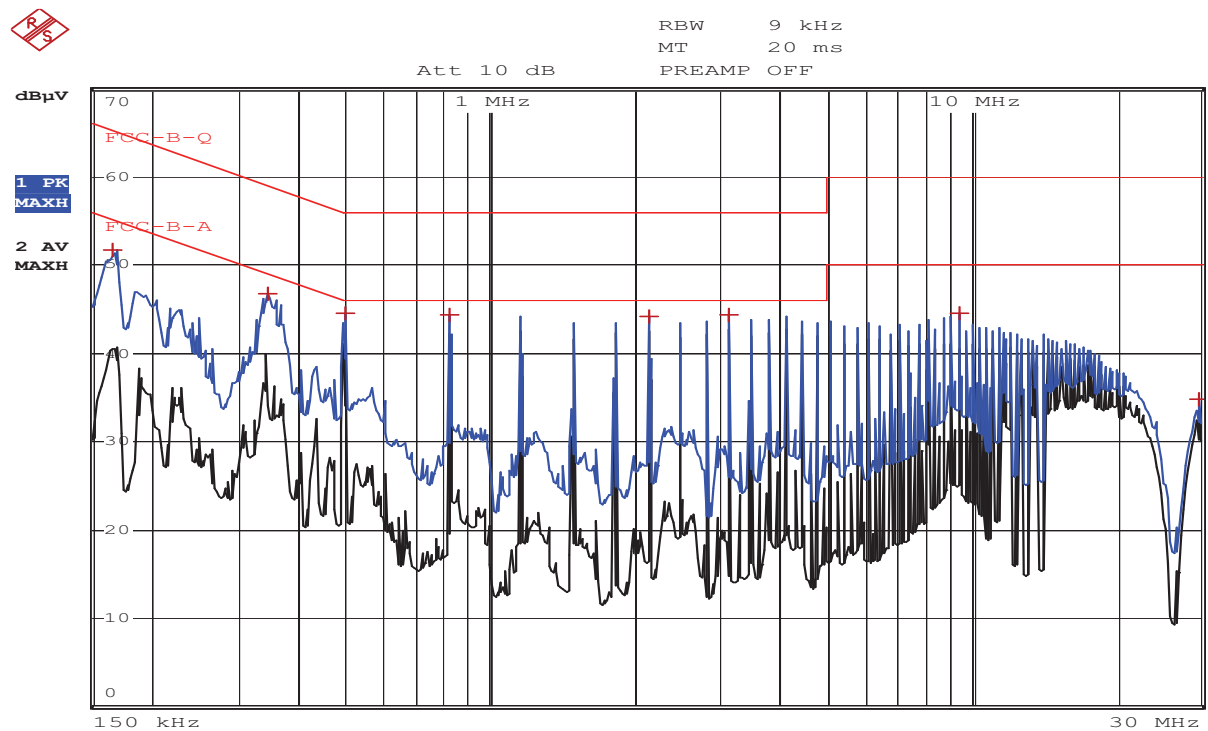


Figure 8: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE



3) Operating at WCDMA, < 1 % Battery status

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.15	Quasi-Peak	H (AC +120 V)	54.49	0.03	0.04	54.56	66.00	11.44
0.19	Quasi-Peak	H (AC +120 V)	50.68	0.03	0.04	50.75	64.04	13.29
0.23	Quasi-Peak	H (AC +120 V)	44.58	0.03	0.04	44.65	62.45	17.80
0.32	Quasi-Peak	N (AC 0 V)	45.59	0.03	0.05	45.67	59.71	14.04
0.4	Quasi-Peak	H (AC +120 V)	45.78	0.04	0.05	45.87	57.85	11.98
0.67	Quasi-Peak	N (AC 0 V)	41.88	0.04	0.07	41.99	56.00	14.01
1.75	Quasi-Peak	H (AC +120 V)	41.46	0.06	0.13	41.65	56.00	14.36
2.56	Quasi-Peak	N (AC 0 V)	42.07	0.07	0.17	42.30	56.00	13.70
8.71	Quasi-Peak	H (AC +120 V)	42.62	0.16	0.38	43.16	60.00	16.84
9.83	Quasi-Peak	N (AC 0 V)	42.98	0.18	0.40	43.55	60.00	16.45
29.84	Quasi-Peak	H (AC +120 V)	36.77	0.51	0.68	37.96	60.00	22.04
29.934	Quasi-Peak	N (AC 0 V)	37.63	0.48	0.68	38.79	60.00	21.21

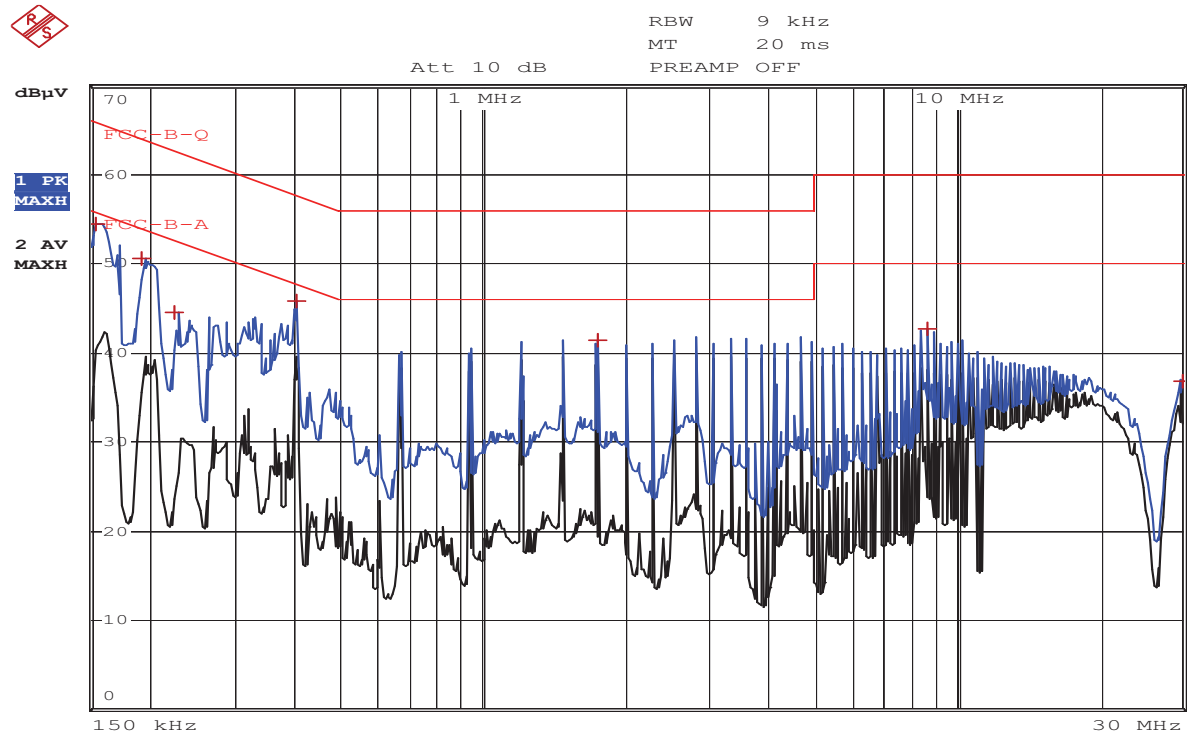
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

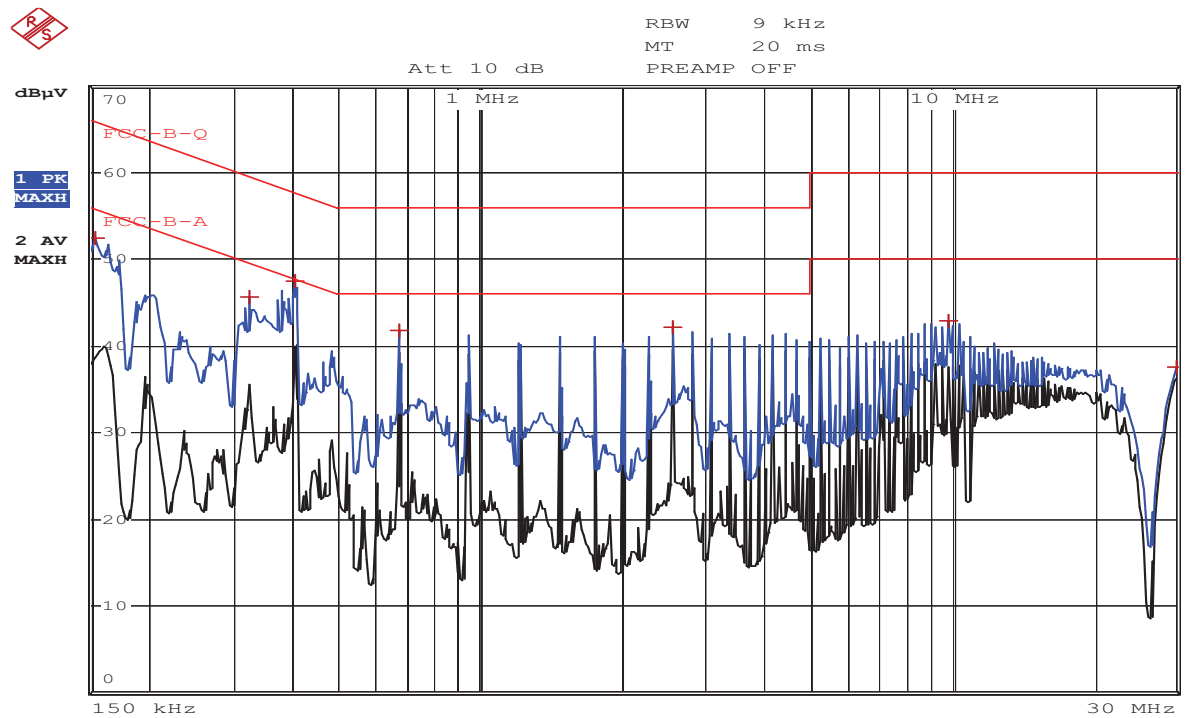


Figure 9: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE





4) Operating at WCDMA, 50 % Battery status

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dB μ V)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dB μ V)	Limit (dB μ V)	Margin (dB)
0.15	Quasi-Peak	H (AC +120 V)	53.36	0.03	0.04	53.43	66.00	12.57
0.17	Quasi-Peak	H (AC +120 V)	53.03	0.03	0.04	53.10	64.96	11.86
0.39	Quasi-Peak	N (AC 0 V)	45.76	0.03	0.05	45.84	58.06	12.22
0.51	Quasi-Peak	H (AC +120 V)	43.27	0.04	0.06	43.37	56.00	12.63
0.85	Quasi-Peak	H (AC +120 V)	43.01	0.04	0.09	43.14	56.00	12.87
1.52	Quasi-Peak	N (AC 0 V)	43.22	0.05	0.12	43.39	56.00	12.61
2.53	Quasi-Peak	N (AC 0 V)	43.48	0.07	0.16	43.71	56.00	12.29
2.55	Quasi-Peak	H (AC +120 V)	43.66	0.07	0.17	43.89	56.00	12.11
4.22	Quasi-Peak	N (AC 0 V)	43.49	0.09	0.24	43.82	56.00	12.18
5.95	Quasi-Peak	H (AC +120 V)	42.81	0.11	0.31	43.24	60.00	16.76
8.33	Quasi-Peak	H (AC +120 V)	43.04	0.15	0.37	43.56	60.00	16.44
9.62	Quasi-Peak	N (AC 0 V)	43.22	0.17	0.39	43.79	60.00	16.21
29.7	Quasi-Peak	N (AC 0 V)	34.54	0.47	0.68	35.69	60.00	24.31
29.93	Quasi-Peak	H (AC +120 V)	35.33	0.51	0.68	36.52	60.00	23.48

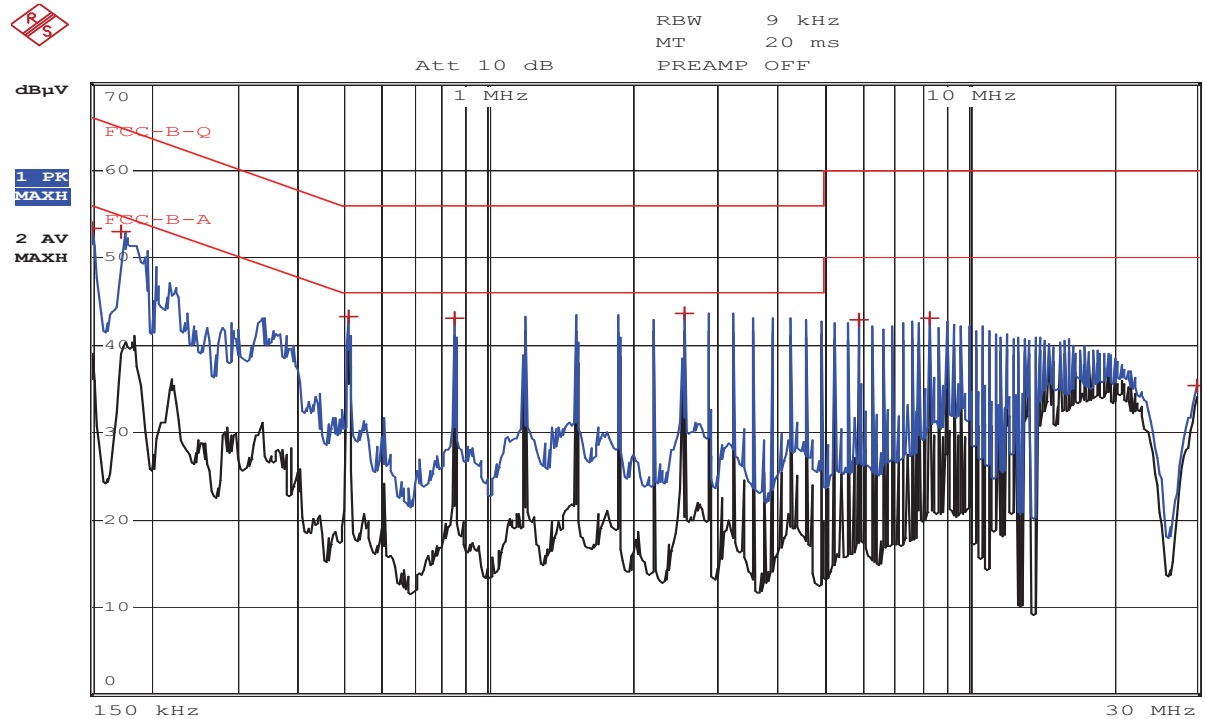
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

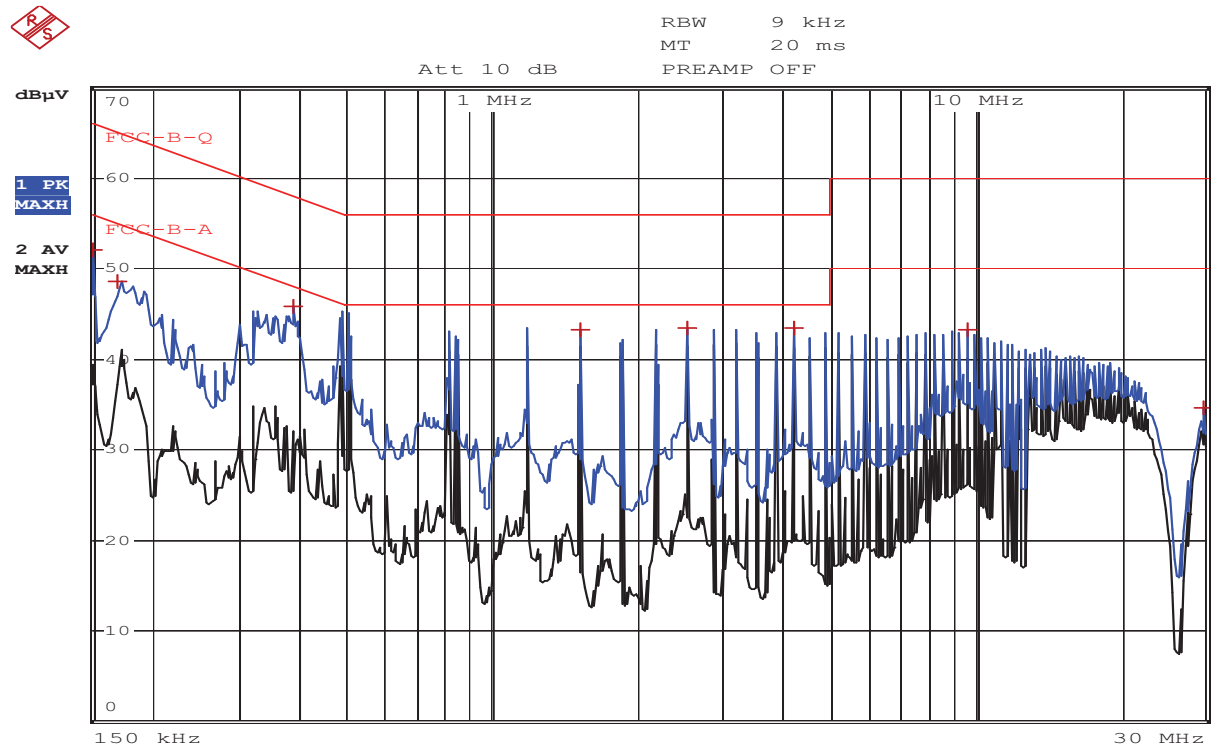


Figure 10: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE



4. Mode 4

1) Operating at GSM 1900, < 1 % Battery status

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dB μ V)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dB μ V)	Limit (dB μ V)	Margin (dB)
0.16	Quasi-Peak	H (AC +120 V)	56.41	0.03	0.04	56.48	65.46	8.98
0.17	Quasi-Peak	N (AC 0 V)	53.81	0.03	0.04	53.88	64.96	11.08
0.19	Quasi-Peak	H (AC +120 V)	50.65	0.03	0.04	50.72	64.04	13.32
0.37	Quasi-Peak	N (AC 0 V)	45.79	0.03	0.05	45.87	58.50	12.63
0.5	Quasi-Peak	N (AC 0 V)	45.78	0.03	0.06	45.87	56.00	10.13
0.83	Quasi-Peak	N (AC 0 V)	44.66	0.04	0.08	44.78	56.00	11.22
1.5	Quasi-Peak	H (AC +120 V)	44.53	0.05	0.12	44.70	56.00	11.30
2.5	Quasi-Peak	N (AC 0 V)	44.37	0.07	0.16	44.60	56.00	11.40
2.83	Quasi-Peak	H (AC +120 V)	44.87	0.07	0.18	45.12	56.00	10.88
9.48	Quasi-Peak	N (AC 0 V)	44.34	0.17	0.39	44.90	60.00	15.10
10.15	Quasi-Peak	H (AC +120 V)	43.94	0.18	0.40	44.53	60.00	15.47
29.96	Quasi-Peak	N (AC 0 V)	37.73	0.48	0.68	38.89	60.00	21.11
29.99	Quasi-Peak	H (AC +120 V)	38.16	0.51	0.68	39.35	60.00	20.65

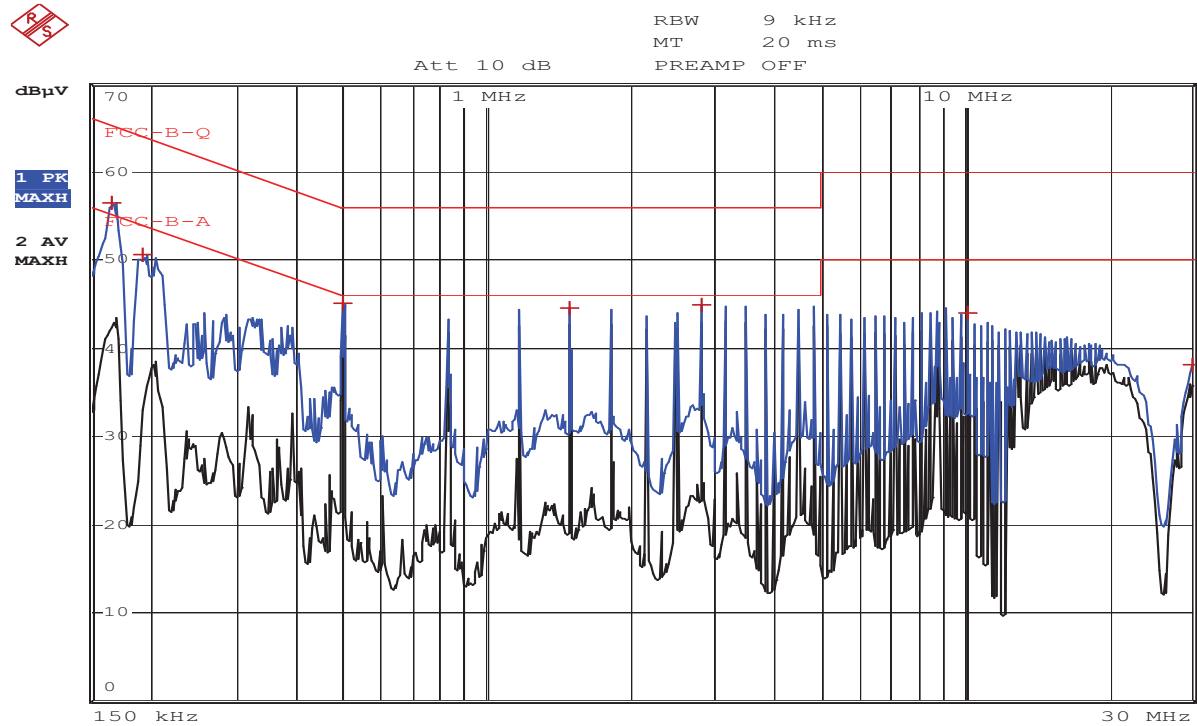
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

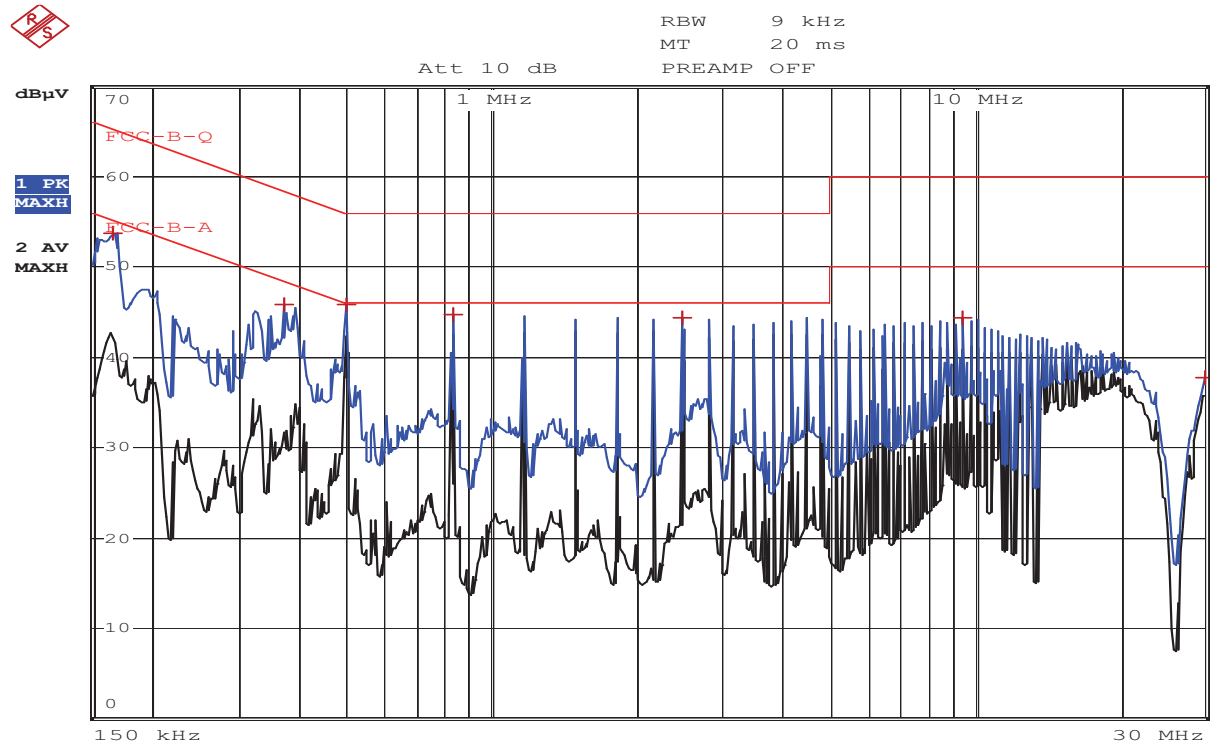


Figure 11: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE





2) Operating at GSM 1900, 50 % Battery status

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.15	Quasi-Peak	H (AC +120 V)	55.40	0.03	0.04	55.47	66.00	10.53
0.18	Quasi-Peak	N (AC 0 V)	51.51	0.03	0.04	51.58	64.49	12.91
0.19	Quasi-Peak	H (AC +120 V)	53.55	0.03	0.04	53.62	64.04	10.42
0.51	Quasi-Peak	H (AC +120 V)	44.57	0.04	0.06	44.67	56.00	11.33
0.52	Quasi-Peak	N (AC 0 V)	46.70	0.03	0.06	46.79	56.00	9.21
0.86	Quasi-Peak	N (AC 0 V)	45.39	0.04	0.09	45.52	56.00	10.48
1.2	Quasi-Peak	H (AC +120 V)	45.45	0.04	0.11	45.60	56.00	10.40
1.55	Quasi-Peak	N (AC 0 V)	45.13	0.05	0.12	45.30	56.00	10.70
2.58	Quasi-Peak	N (AC 0 V)	46.23	0.07	0.17	46.46	56.00	9.54
2.91	Quasi-Peak	H (AC +120 V)	45.69	0.07	0.18	45.94	56.00	10.06
9.78	Quasi-Peak	H (AC +120 V)	45.07	0.18	0.40	45.64	60.00	14.36
9.81	Quasi-Peak	N (AC 0 V)	46.23	0.18	0.40	46.80	60.00	13.20
26.78	Quasi-Peak	H (AC +120 V)	38.96	0.45	0.65	40.06	60.00	19.94

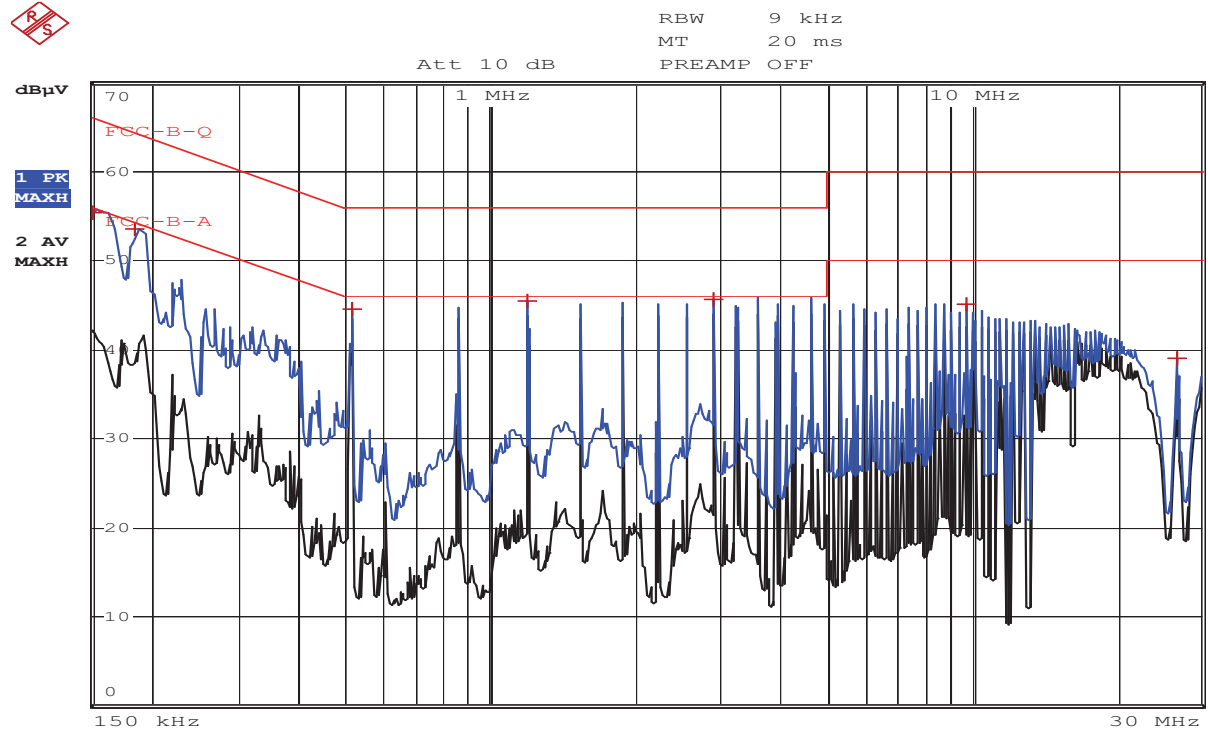
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

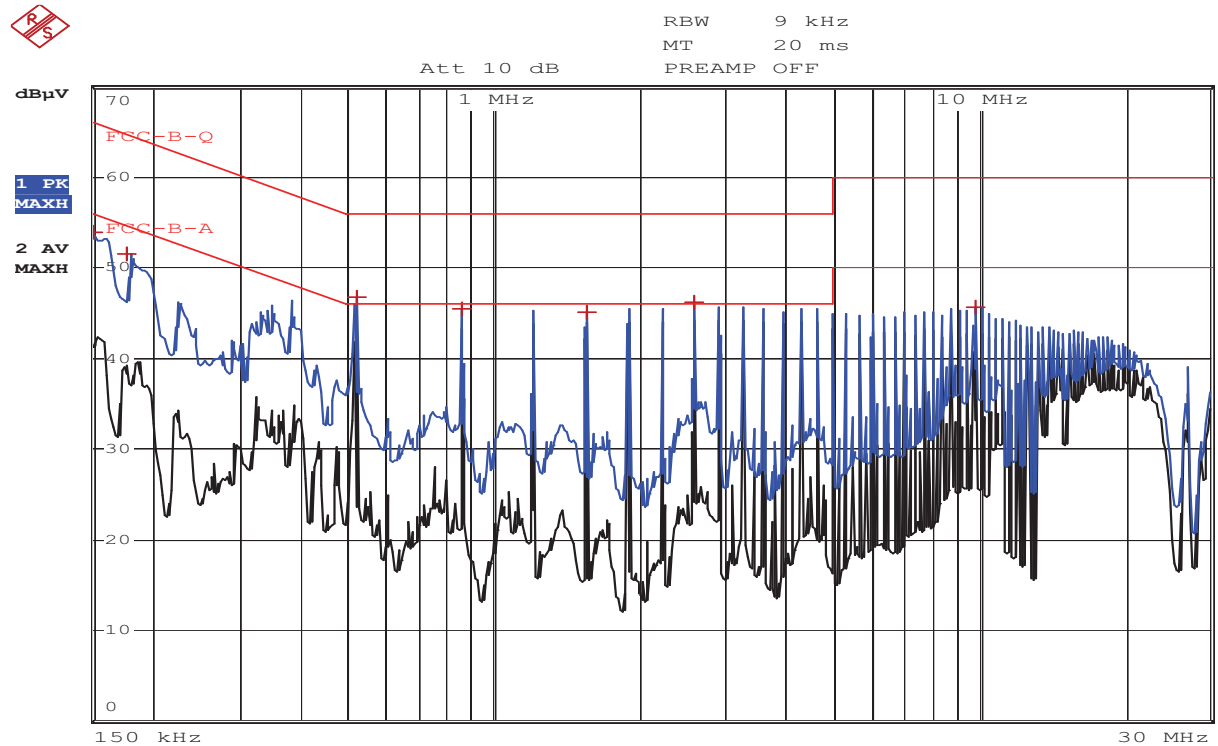


Figure 12: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE





3) Operating at WCDMA, < 1 % Battery status

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.15	Quasi-Peak	N (AC 0 V)	51.98	0.03	0.04	52.05	66.00	13.95
0.17	Quasi-Peak	H (AC +120 V)	52.91	0.03	0.04	52.98	64.96	11.98
0.53	Quasi-Peak	N (AC 0 V)	45.97	0.03	0.06	46.06	56.00	9.94
0.88	Quasi-Peak	H (AC +120 V)	45.44	0.04	0.09	45.57	56.00	10.43
1.23	Quasi-Peak	H (AC +120 V)	45.78	0.04	0.11	45.93	56.00	10.07
1.58	Quasi-Peak	H (AC +120 V)	45.31	0.05	0.12	45.48	56.00	10.52
3.68	Quasi-Peak	N (AC 0 V)	45.70	0.08	0.22	46.00	56.00	10.00
4.74	Quasi-Peak	H (AC +120 V)	45.97	0.10	0.27	46.33	56.00	9.67
10.71	Quasi-Peak	N (AC 0 V)	45.29	0.19	0.42	45.89	60.00	14.11
26.69	Quasi-Peak	N (AC 0 V)	37.96	0.42	0.65	39.03	60.00	20.97
26.73	Quasi-Peak	H (AC +120 V)	40.50	0.44	0.65	41.60	60.00	18.40

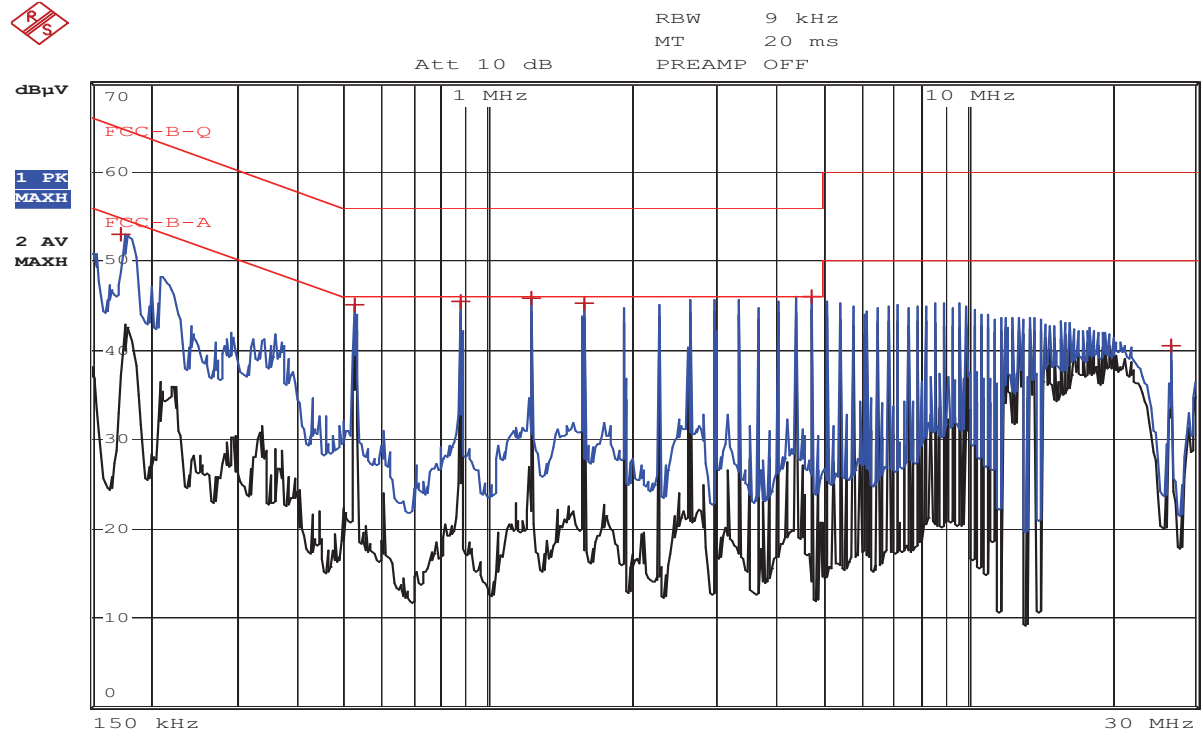
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

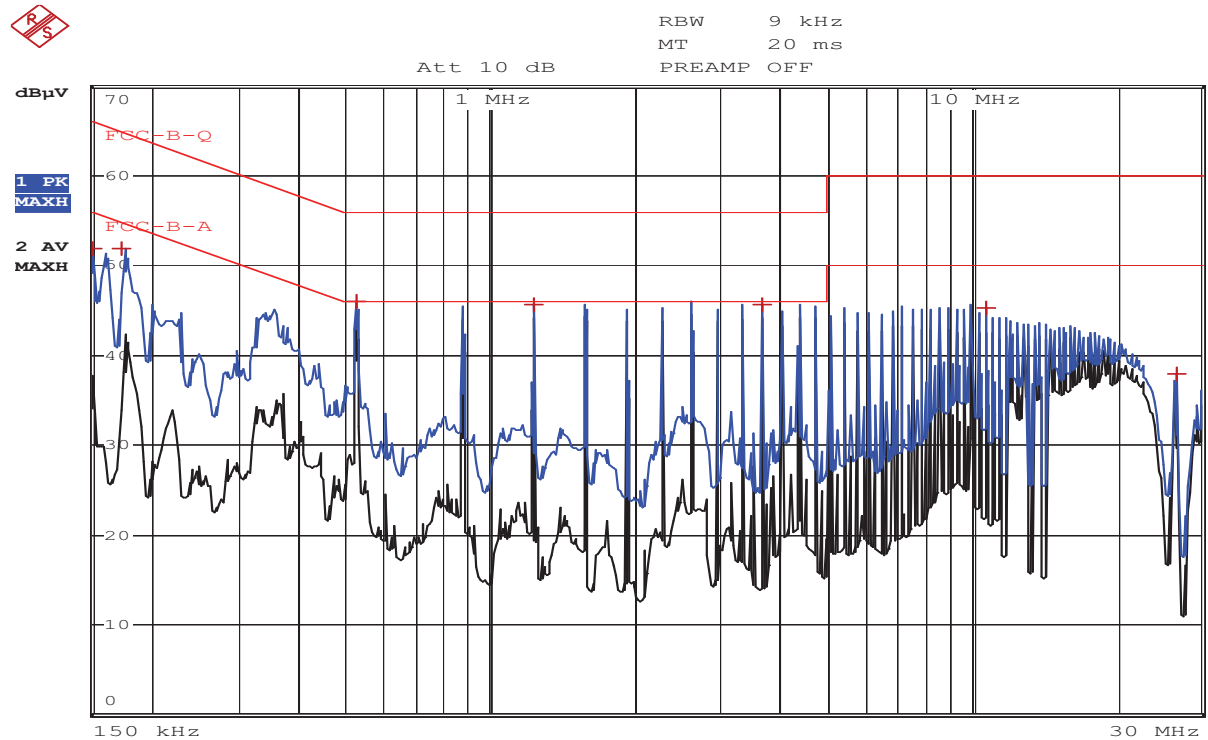


Figure 13: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE



4) Operating at WCDMA, 50 % Battery status

Measured values of the AC Power Line Conducted Emissions								
Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.17	Quasi-Peak	H (AC +120 V)	57.85	0.03	0.04	57.92	64.96	7.04
0.2	Quasi-Peak	H (AC +120 V)	49.96	0.03	0.04	50.03	63.61	13.58
0.26	Quasi-Peak	H (AC +120 V)	45.98	0.03	0.04	46.06	61.43	15.38
0.38	Quasi-Peak	N (AC 0 V)	46.82	0.03	0.05	46.90	58.28	11.38
0.49	Quasi-Peak	H (AC +120 V)	44.42	0.04	0.06	44.52	56.17	11.65
0.81	Quasi-Peak	H (AC +120 V)	43.67	0.04	0.08	43.79	56.00	12.21
0.82	Quasi-Peak	N (AC 0 V)	43.65	0.04	0.08	43.77	56.00	12.23
1.47	Quasi-Peak	N (AC 0 V)	44.43	0.05	0.12	44.60	56.00	11.40
2.77	Quasi-Peak	H (AC +120 V)	44.50	0.07	0.18	44.75	56.00	11.25
2.78	Quasi-Peak	N (AC 0 V)	44.88	0.07	0.18	45.13	56.00	10.87
4.74	Quasi-Peak	N (AC 0 V)	44.16	0.10	0.27	44.52	56.00	11.48
10.27	Quasi-Peak	H (AC +120 V)	44.06	0.18	0.41	44.65	60.00	15.35
10.29	Quasi-Peak	N (AC 0 V)	44.00	0.18	0.41	44.59	60.00	15.41
29.73	Quasi-Peak	H (AC +120 V)	37.48	0.50	0.68	38.66	60.00	21.34

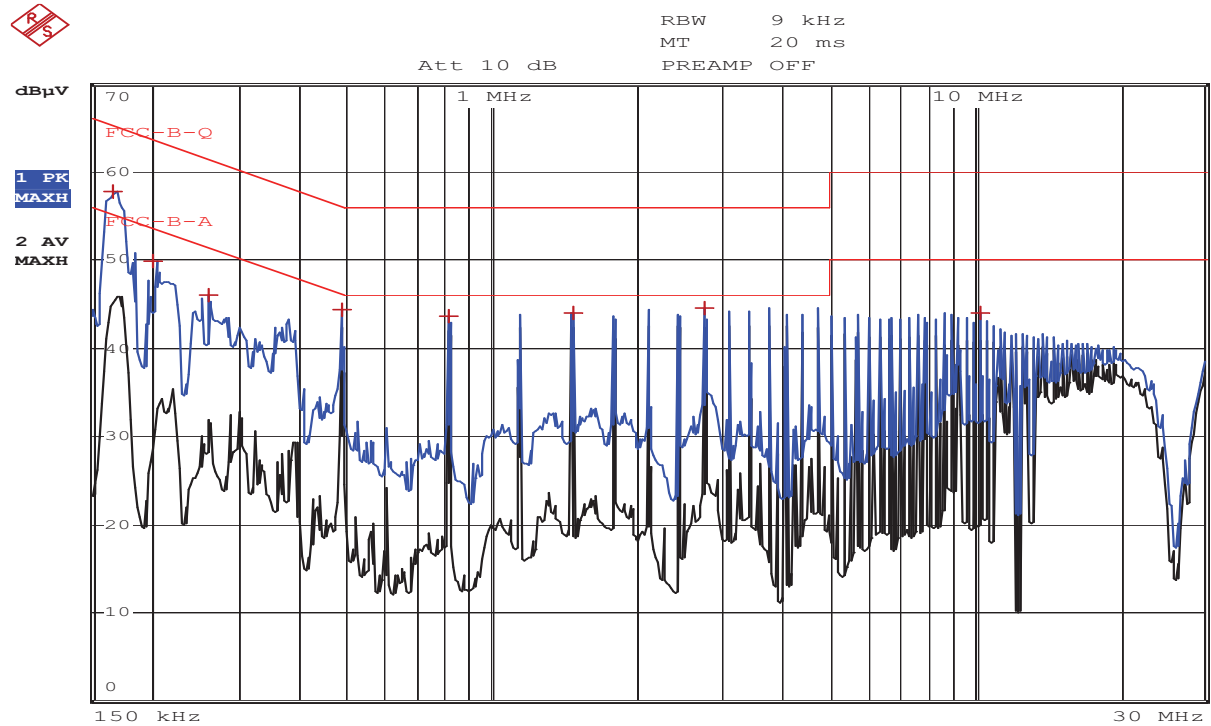
1. Margin (dB) = Limit – Emission Level

2. Emission Level = Measured Value + CF + CL

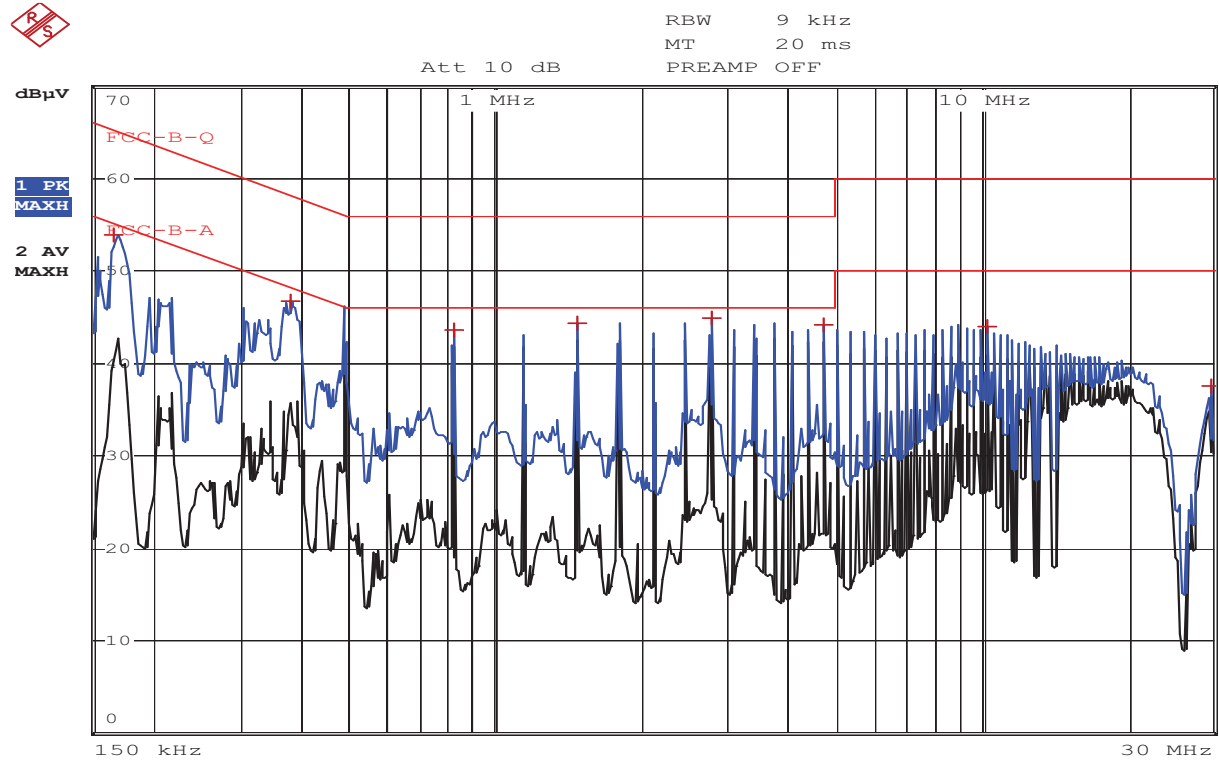


Figure 14: Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE



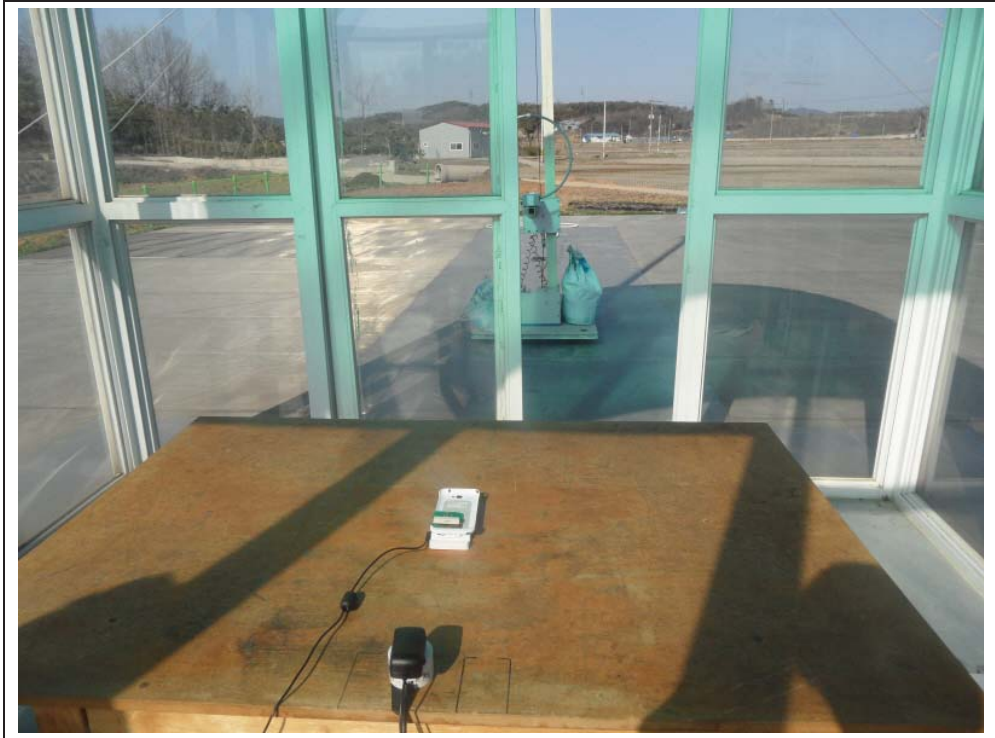
7. TEST EQUIPMENT USED FOR TEST

Used equipment	Description	Manufacturer	Model Name	Serial Number	Specifications	Next Cal. Data
☐	MICROWAVE FREQUENCY COUNTER	ANRITSU	MF2414B	6200003197	10 Hz ~ 26.5GHz	2013-09-26
☐	EPM-P SERIES POWER METER	Agilent	E4416A	GB38272722	1CH,(100~240)Vac	2013-09-28
☐	Power Sensor	Agilent	8481A	US41030240	MAX.23dBm, AVG, 18GHz	2013-09-28
☐	Modulation Analyzer	HP	8901B	3028A02980	150kHz ~1.3GHz	2013-10-04
☐	Audio Analyzer	HP	8903B	3729A17164	20Hz~100 kHz	2013-09-26
☐	Attenuator	Weinschel	41-6-12	21644	6dB, 10W	2013-10-04
☐	Attenuator	Weinschel	41-10-12	13218	10dB, 10W	2013-10-04
☐	Dual Directional Coupler	HP	778D	15923	20dB Coupler	2013-09-26
☐	Dual Directional Coupler	AGILENT	11691D	1212A01281	18GHz, 20dB	2014-02-21
☐	BT SIMULATOR	TESCOM CO. LTD	TC-3000A	3000A4C0158	(100~240)Vac 50/60Hz, 40W	2013-09-27
☐	Power Divider	H.P	11636B	07317	DC-26.5GHz	2013-09-28
☐	Power Divider	H.P	11636B	07412	DC-26.5GHz	2013-09-28
☒	Test receiver	ROHDE&SCHWARZ	ESPI3	101171	9kHz ~3GHz	2013-08-10
☒	BI-LOG ANT	SCHWARZBECK	VULB9163	398	30MHz ~1 GHz	2014-09-12
☒	Loop Antenna	EMCO	6502	9801-3191	9kHz ~30MHz	2014-02-02
☐	Horn antenna	Schwarzbeck	BBHA 9120D	769	1GHz ~ 18GHz	2013-12-06
☐	Horn antenna	Schwarzbeck	BBHA 9120D	768	1GHz ~ 18GHz	2013-12-06
☒	Spectrum Analyzer	ROHDE&SCHWARZ	FSPI3	100640	9kHz ~ 13.6GHz	2014-01-07
☐	Amplifier	TESTEK	TK-PA1	110013	1 GHz~ 6GHz	2013-09-26
☒	LISN	Schwarzbeck	NSLK 8127	8127518	30 MHz	2013-09-28
☐	DC Power Supply	ODA Tech	OPE-505S	oda-01-0923-03430	1CH, 50V, 5A	-
☒	Slidacs	Daekwang	-	-	5KVA, OUTPUT: AC: (0~300) V	-
☐	DC Power Supply	Maynuo	M8811	080010960011103046	30V, 5A	2013-08-25
☒	Digital Multimeter	FLUKE	8842A	5126272	1000 V, 2 A	2013-08-07
☐	Continuous operation tester	-	-	-	MAX 9990h	2013-03-12
☐	Vibration Tester	Gana	GNV-500	-	(0~60)Hz/50kg	2013-09-27
☐	HUMIDITY CHAMBER	BUM JIN Eng.	-	-	(-40~120)°C, 95%R.H.	2013-09-13
☐	Drop Tester	JUNG JIN Eng.	-	-	(0~120)cm	-
☒	Wireless Communications Test Set	Agilent	E5515C	GB4223D736	INPUT MAX. 5 W	2013-11-12

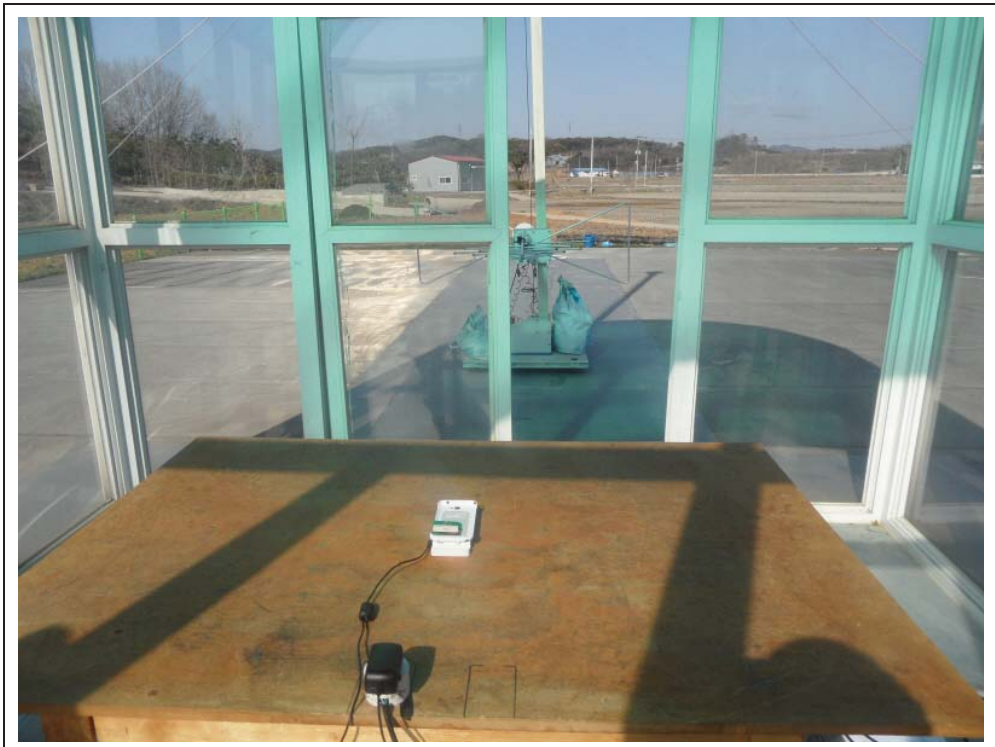
8. SETUP PHOTOS

8.1. Radiation emission test setup

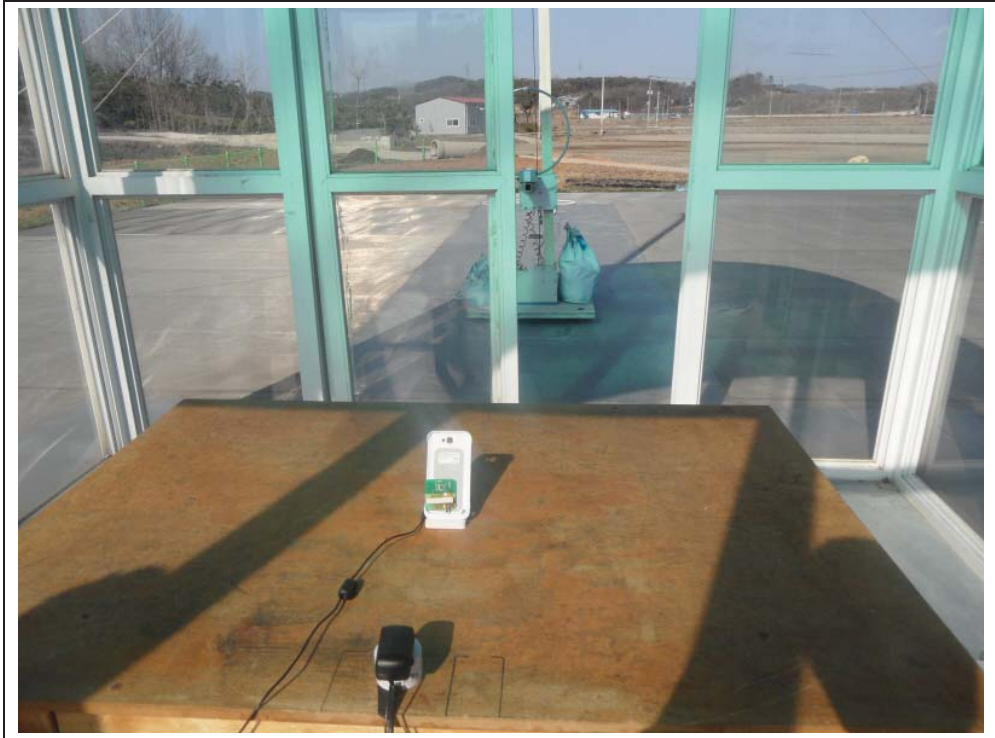
8.1.1. Mode 1(below 30 MHz)



Mode 1(above 30 MHz)



8.1.2. Mode 2 (below 30 MHz)



Mode 2 (above 30 MHz)



8.1.3. Mode 3 (below 30 MHz)



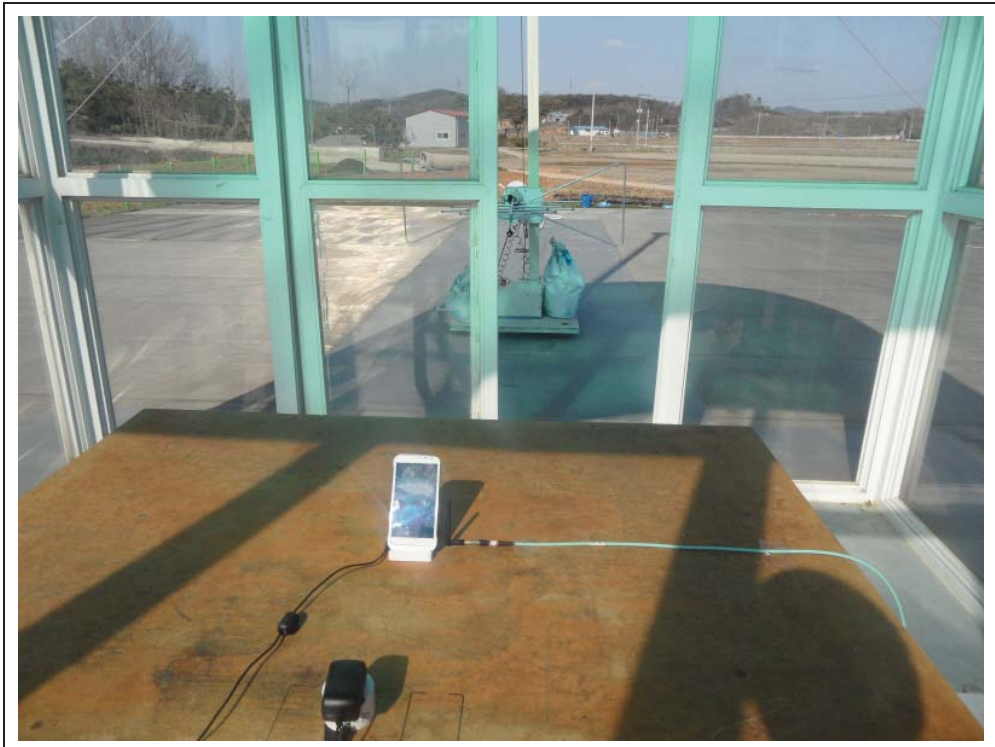
Mode 3 (above 30 MHz)



8.1.4. Mode 4 (below 30 MHz)



Mode 4 (above 30 MHz)





8.2Conducted Emissions

8.2.1. Mode 1





8.2.2. Mode 2



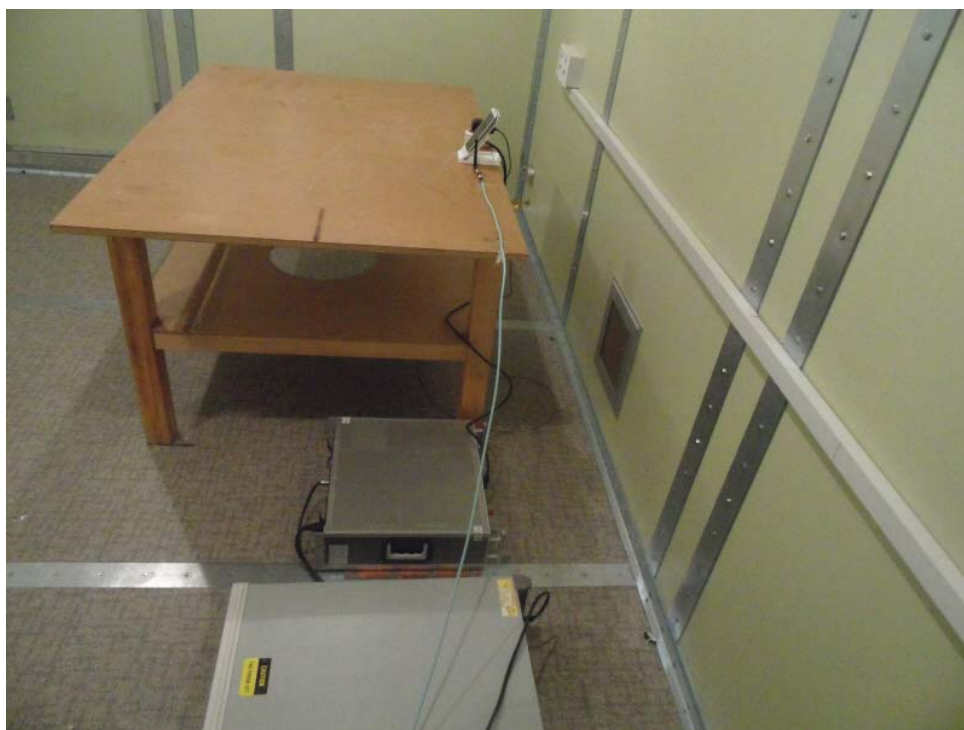


8.2.3. Mode 3





8.2.4. Mode 4





9. EUT Photographs

9.1 Front view



9.2 Back view

