

Test Report of FCC Part 15 C for FCC Certificate

On Behalf of

SoundRacer AB

Product description: Car FM Transmitter

Model No.: SR010x

FCC ID: XJK-SR010x

Prepared for: SoundRacer AB

Avagen 24, 412 51, GOTEborg, Sweden

Prepared by: Bontek Compliance Testing Laboratory Ltd.

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Applicant: **SoundRacer AB**
Address of Applicant: Avagen 24, 412 51 GOTEborg, Sweden
Manufacturer: **SoundRacer AB**
Address of Manufacturer: Avagen 24, 412 51 GOTEborg, Sweden

EUT Description: Car FM Transmitter
Trade Name: SoundRacer
Model No.: SR010x
Rated Voltage Input: 12/24Vdc
Frequency Range 88.1~107.9MHz
Channel Separation 20kHz
Product Class: Low Power Communication Device Transmitter
Measurement Procedure: ANSI C63.4-2003

EUT Cable: Audio input cable, 0.5m long, unshielded
Test Accessories: MP3 player:
Trade Mark: OPPO / Model No.: X29M / Serial No.: K24453

Remark: * The test data gathered are from the production sample provided by the manufacturer.

1.2 Related Submittal(s) / Grant (s)

This submittal(s) is a test report based on the Electromagnetic Interference (EMI) tests performed on the EUT. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 - 2003.

The following Declaration of Conformity report of EUT is prepared in accordance with FCC Rules and Regulations Part 15 Subpart C Section 15.239

The objective of the manufacturer is to demonstrate compliance with the described above standards.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 - 2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

All measurement required was performed at laboratory of Bontek Compliance Testing Laboratory Ltd at 1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China.

The test facility is recognized, certified, or accredited by the following organizations:

FCC – Registration No.: 338263

Bontek Compliance Testing Laboratory Ltd EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 338263, March 24, 2008.

IC Registration No.: 126111

The 3m alternate test site of Bontek Compliance Testing Laboratory Ltd EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 126111 on March, 2008.

2. SYSTEM TEST CONFIGURATION

The tests documented in this report were performed in accordance with ANSI C63.4-2003 and FCC CFR 47 Part 15 Subpart C Section 15.239.

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

2.3 General Test Procedures

Conducted Emissions: The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

Radiated Emissions: The EUT is placed on as turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

2.4 List of Measuring Equipments Used

Items	Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
1	EMI Test Receiver	R&S	ESCI	100687	2009-2-22	1 Year
2	EMI Test Receiver	R&S	ESPI	100097	2009-2-22	1 Year
3	Amplifier	HP	8447D	1937A024 92	2009-2-22	1 Year
4	TRILOG Broadband Test- Antenna	SCHWARZBECK	VULB9163	9163-324	2009-2-22	1 Year
5	3 phase Artificial Mains (L.I.S.N)	SCHWARZBECK	NSLK 8128	8128247	2009-3-31	1 Year
6	Horn Antenna	SCHWARZBECK	BBHA9120A	D69250	2009-2-27	1 Year
7	High Field Biconical Antenna	ELECTRO- METRICS	EM-6913	166	2009-9-04	1 Year
8	Log Periodic Antenna	ELECTRO- METRICS	EM-6950	811	2009-9-04	1 Year
9	Remote Active Vertical Antenna	ELECTRO- METRICS	EM-6892	304	2009-9-04	1 Year
10	Power Clamp	SCHWARZBECK	MDS-21	3812	2009-2-22	1 Year

3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
15.207	Disturbance Voltage at The Mains Terminals	N/A, without AC power supply
15.239	Radiation Emission	Pass
15.239	Occupied Bandwidth	Pass

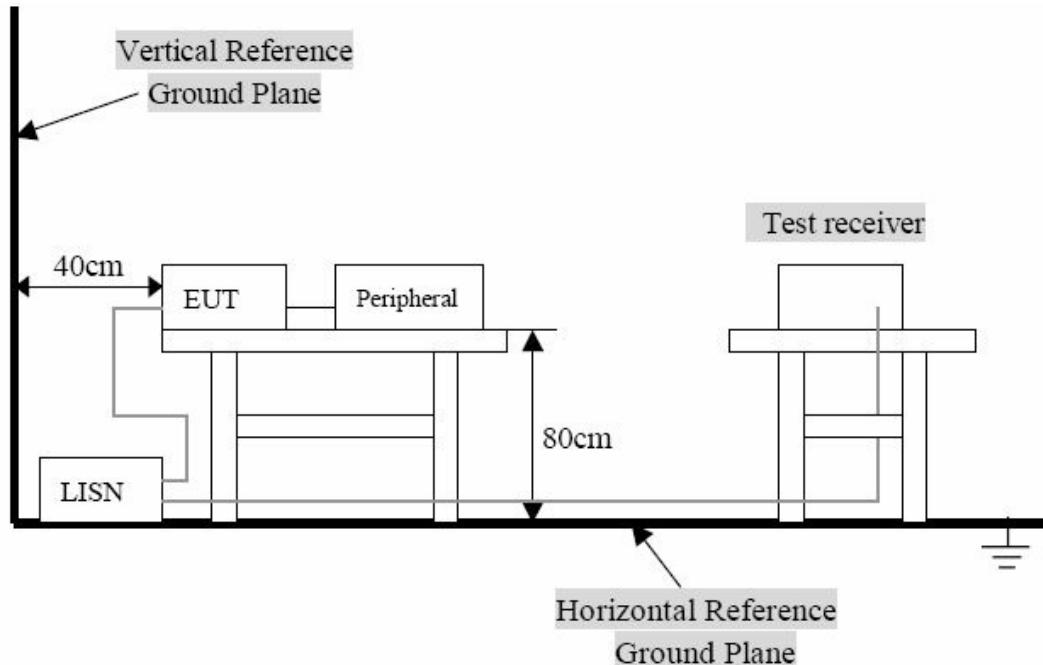
4. TEST OF CONDUCTED EMISSION

4.1 Applicable Standard

Section 15.207: For a Low-power Radio-frequency Device is designed to be connected to the 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 below limits table.

Frequency Range (MHz)	Limits (dBuV)	
	Quasi-Peak	Average
0.150~0.500	66~56	56~46
0.500~5.000	56	46
5.000~30.00	60	50

4.2 Test Setup Diagram



Remark:

1. The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC 15.207 limits.
2. The EUT is excluded from investigation of Disturbance Voltage at The Mains Terminals, for it is powered by DC 12V from car battery. According to the Section 15.207(d), measurement to demonstrate compliance with the limits of Disturbance Voltage at The Mains Terminals are not required to the devices which only employed battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

5- RADIATED EMISSIONS

5.1 Limit of Radiated Emissions (FCC 47 CFR 15.209 Class B):

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dB μ V/m)
30 ~ 88	3	40
88~216	3	43.5
216 ~ 960	3	46
960 ~ 1000	3	54

Note: (1) The tighter limit shall apply at the edge between two frequency bands.

(2) The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

5.2 Test Equipment Used

Items	Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
1	EMI Test Receiver	R&S	ESCI	100687	2009-2-22	1 Year
2	EMI Test Receiver	R&S	ESPI7	100097	2009-2-22	1 Year
3	Amplifier	HP	8447D	1937A024 92	2009-2-22	1 Year
4	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2009-2-22	1 Year

5.3 EUT Setup

Radiated Measurement Setup

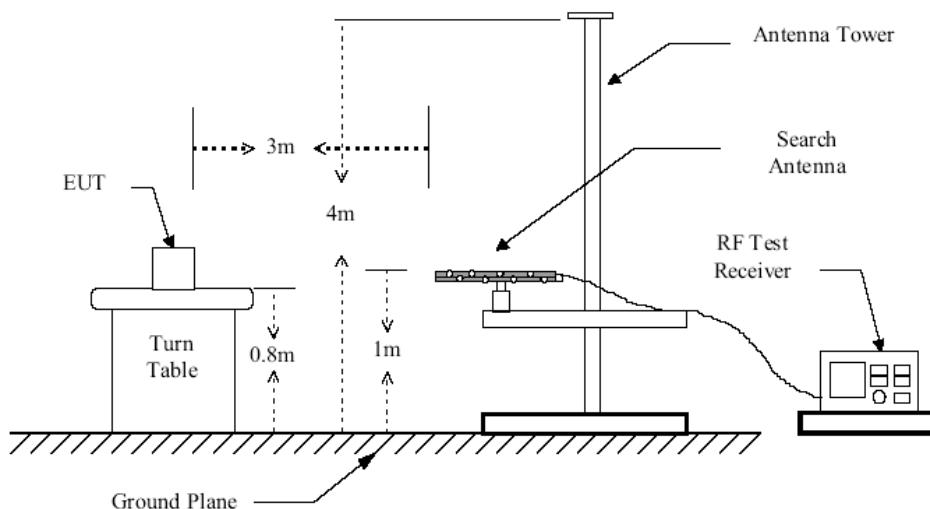


Figure 1 : Frequencies measured below 1 GHz configuration

5.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

- 1). Configure the EUT according to ANSI C63.4:2003.
- 2). The EUT was placed on the top of the turntable 0.8 meter above ground.
- 3). The receiving antenna was placed 3 meters far away from the turntable.
- 4). The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 5). For Spurious Emissions test, The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization. For each suspected emission, the antenna tower was scanned (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 6). For Field Strength of Fundamental Emissions test, Positioned the loop antenna with its plane vertical at the specified distance of 3 meters between its center and the EUT. The center of the loop antenna is set with 1m above the grounded plane. Then rotated about its vertical axis for finding out the maximum emission level of the EUT.

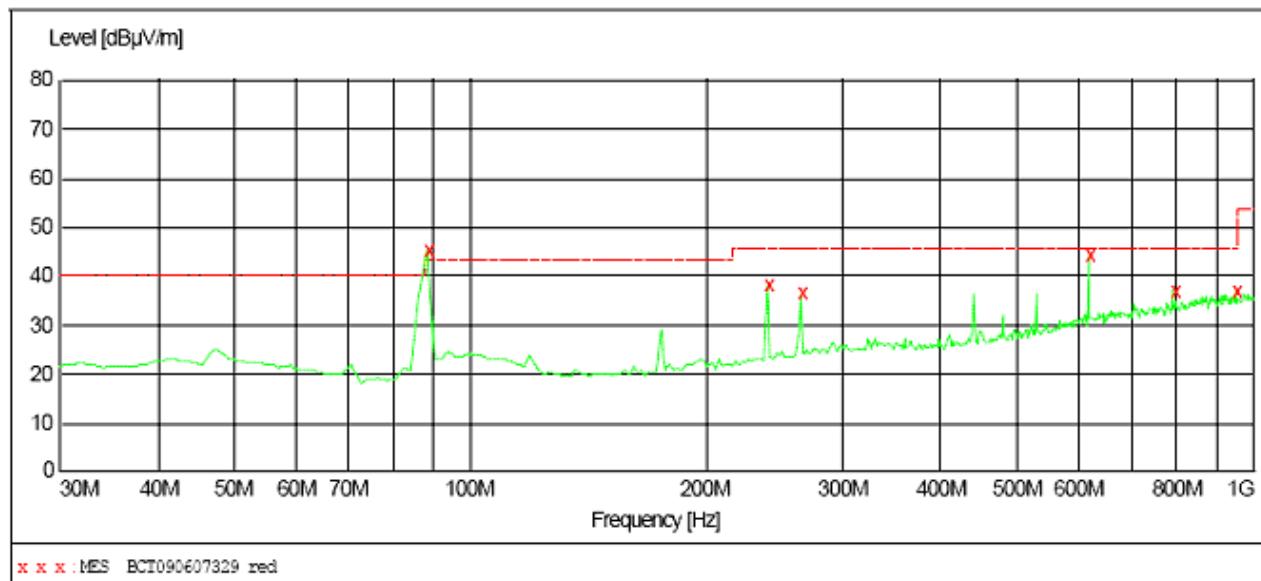
5.5 Test Result

Temperature (°C) : 22~23	EUT: Car FM Transmitter
Humidity (%RH): 50~54	M/N: SR010X
Barometric Pressure (mbar): 950~1000	Operation Condition: Normal Operating

Note: The notebook is playing typical MP3 song and the MP3 player is adjusted to maximum volume.

Harmonics & Spurious Emission (Low Channel: 88.1MHz)

Antenna Polarization: Vertical

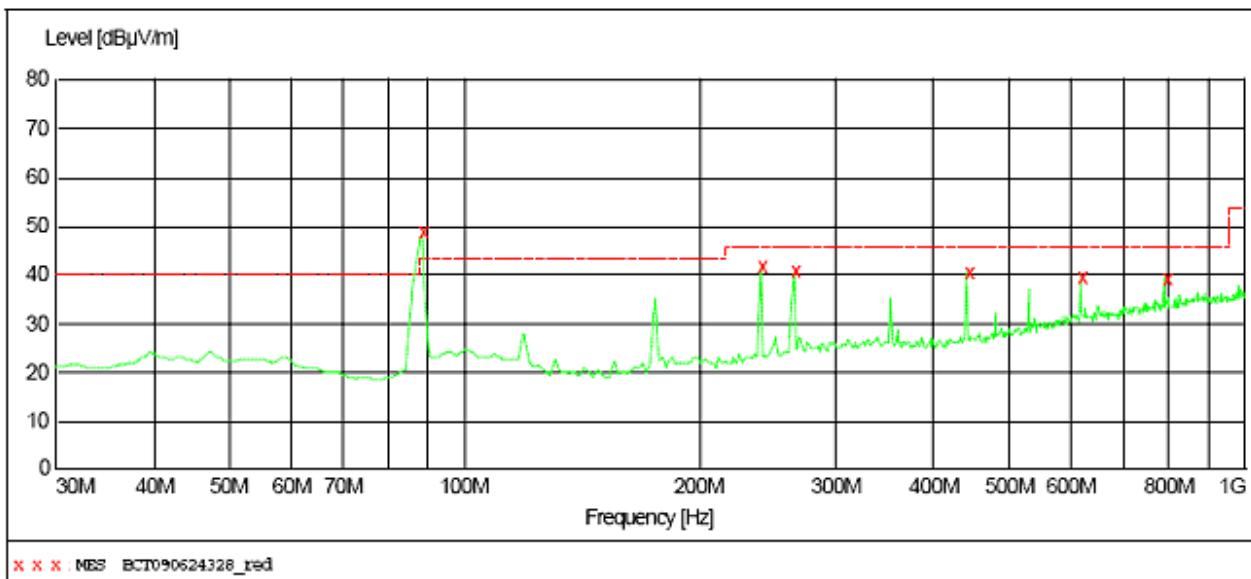


MEASUREMENT RESULT: "BCT090624329_red"

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Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
88.100000	45.50	16.4	43.5	-2.0	QP	100.0	0.00	VERTICAL
239.520000	38.30	18.2	46.0	7.7	QP	100.0	0.00	VERTICAL
264.740000	36.60	18.8	46.0	9.4	QP	100.0	0.00	VERTICAL
617.820000	44.20	25.5	46.0	1.8	QP	100.0	0.00	VERTICAL
794.360000	37.20	27.9	46.0	8.8	QP	100.0	0.00	VERTICAL
949.560000	37.00	29.7	46.0	9.0	QP	100.0	0.00	VERTICAL

Antenna Polarization: Horizontal



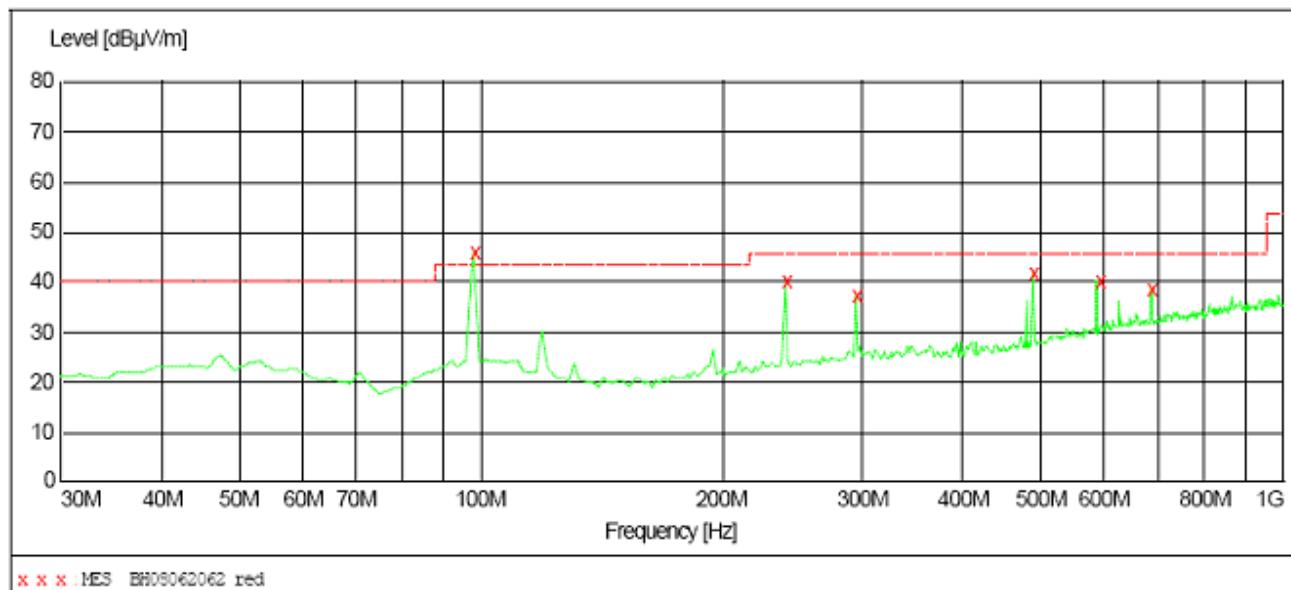
MEASUREMENT RESULT: "BCT090624328_red"

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Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
88.100000	48.70	16.4	43.5	-5.2	QP	100.0	0.00	HORIZONTAL
239.520000	41.70	18.2	46.0	4.3	QP	100.0	0.00	HORIZONTAL
264.740000	40.60	18.8	46.0	5.4	QP	100.0	0.00	HORIZONTAL
441.280000	40.50	21.3	46.0	5.5	QP	100.0	0.00	HORIZONTAL
617.820000	39.70	25.5	46.0	6.3	QP	100.0	0.00	HORIZONTAL
794.360000	39.30	27.9	46.0	6.7	QP	100.0	0.00	HORIZONTAL

Harmonics & Spurious Emission (Middle Channel: 98MHz)

Antenna Polarization: Vertical

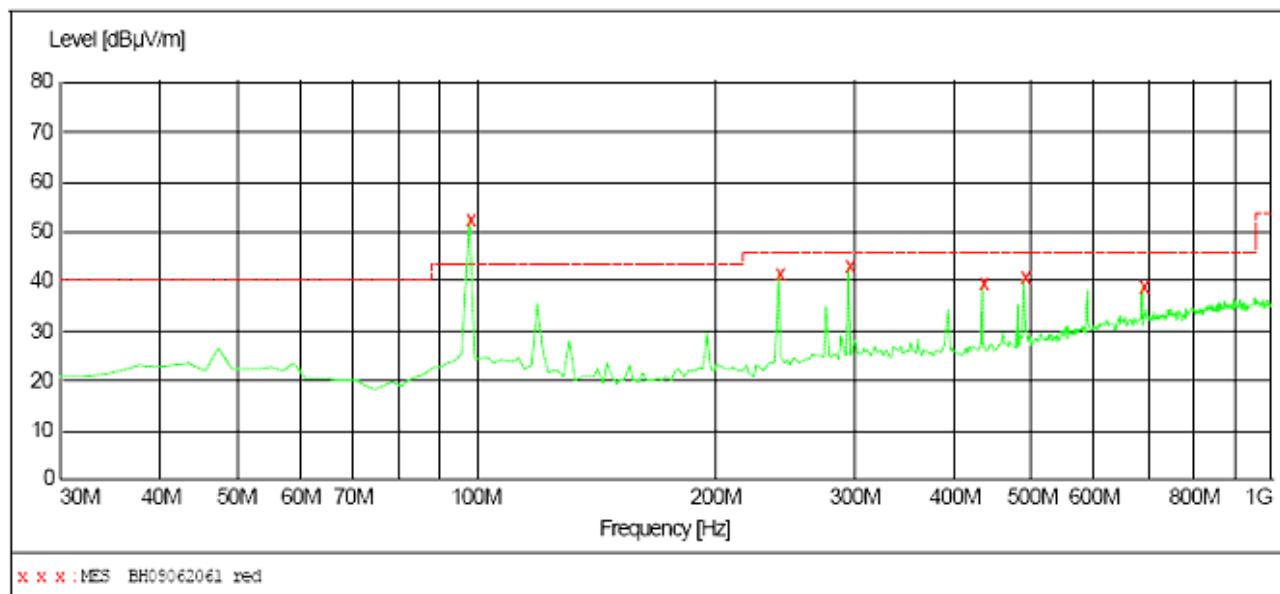


MEASUREMENT RESULT: "BH09062062_red"

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Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det. QP	Height cm	Azimuth deg	Polarization
97.900000	46.30	18.2	43.5	-2.8	QP	100.0	0.00	VERTICAL
239.520000	39.80	18.2	46.0	6.2	QP	100.0	0.00	VERTICAL
293.840000	37.50	20.0	46.0	8.5	QP	100.0	0.00	VERTICAL
489.780000	41.80	22.4	46.0	4.2	QP	100.0	0.00	VERTICAL
588.720000	40.20	25.0	46.0	5.8	QP	100.0	0.00	VERTICAL
685.720000	38.60	26.5	46.0	7.4	QP	100.0	0.00	VERTICAL

Antenna Polarization: Horizontal



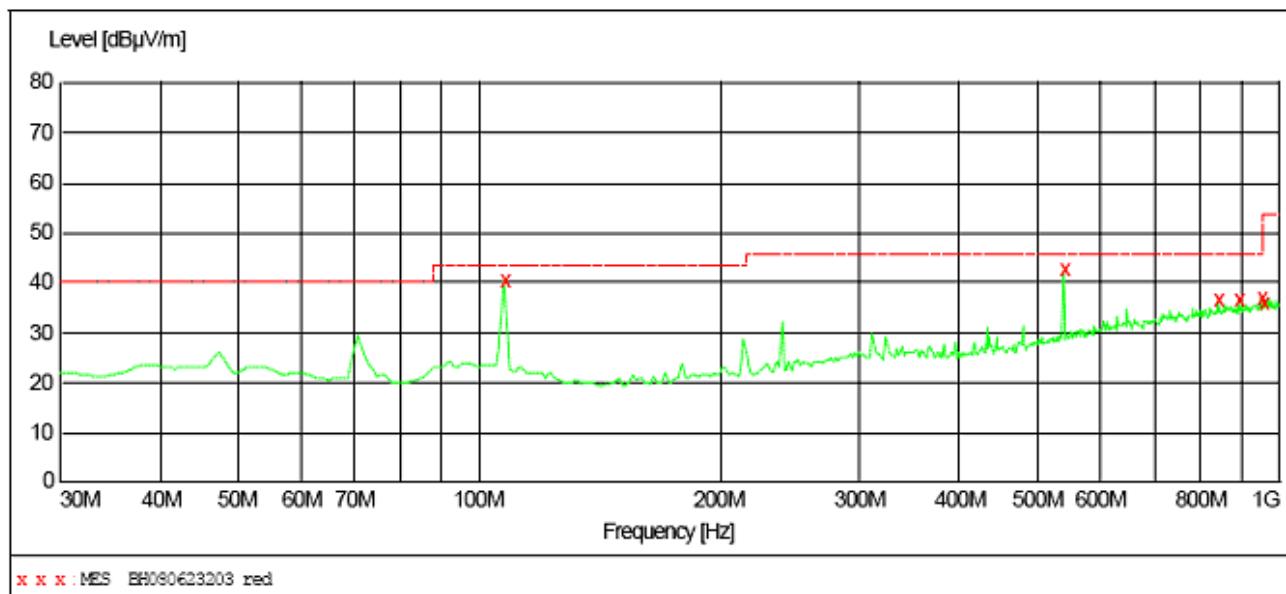
MEASUREMENT RESULT: "BH09062061_red"

6/20/2009 19:14

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
97.900000	52.70	18.2	43.5	-9.2	QP	100.0	0.00	HORIZONTAL
239.520000	41.40	18.2	46.0	4.6	QP	100.0	0.00	HORIZONTAL
293.840000	42.90	20.0	46.0	3.1	QP	300.0	0.00	HORIZONTAL
431.580000	39.50	21.3	46.0	6.5	QP	100.0	0.00	HORIZONTAL
489.780000	40.60	22.4	46.0	5.4	QP	200.0	0.00	HORIZONTAL
687.660000	38.90	26.5	46.0	7.1	QP	100.0	0.00	HORIZONTAL

Harmonics & Spurious Emission (High Channel: 107.9MHz)

Antenna Polarization: Vertical

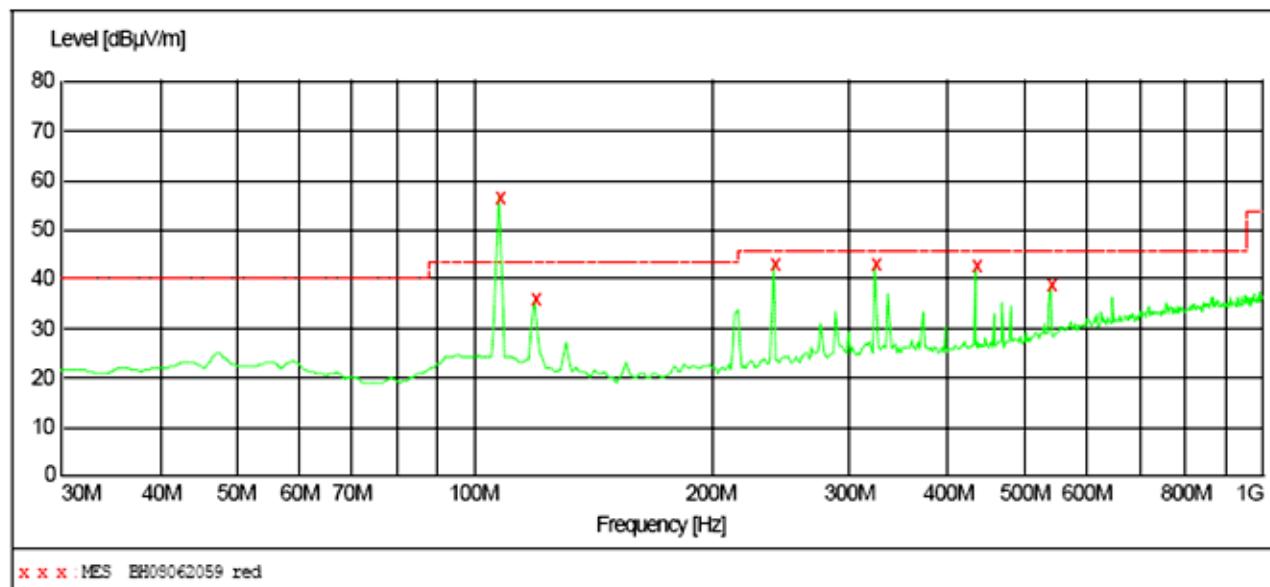


MEASUREMENT RESULT: "BH090623203_red"

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Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
107.900000	40.40	17.8	43.5	3.1	QP	100.0	0.00	VERTICAL
540.220000	42.50	23.8	46.0	3.5	QP	100.0	0.00	VERTICAL
838.980000	36.60	28.5	46.0	9.4	QP	100.0	0.00	VERTICAL
893.300000	36.60	29.2	46.0	9.4	QP	100.0	0.00	VERTICAL
951.500000	37.10	29.7	46.0	8.9	QP	100.0	0.00	VERTICAL
955.380000	36.00	29.7	46.0	10.0	QP	100.0	0.00	VERTICAL

Antenna Polarization: Horizontal



MEASUREMENT RESULT: "BH09062059_red"

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Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
107.900000	56.80	17.8	43.5	-13.3	QP	100.0	0.00	HORIZONTAL
119.240000	35.70	16.1	43.5	7.8	QP	300.0	0.00	HORIZONTAL
239.520000	43.20	18.2	46.0	2.8	QP	100.0	0.00	HORIZONTAL
322.940000	43.00	20.4	46.0	3.0	QP	200.0	0.00	HORIZONTAL
431.580000	42.50	21.3	46.0	3.5	QP	100.0	0.00	HORIZONTAL
540.220000	38.80	23.8	46.0	7.2	QP	100.0	0.00	HORIZONTAL

Fundamental Emission Test Data

Antenna polarization: Horizontal

Frequency (MHz)	Read Level (dBuV)	Correction Factor (dBuV/m)	FS (dBuV/m)	Limit (dB μ V/m)	Margin (dB)	Detector Mode
Low Channel: 88.1MHz						
88.1	37.4	16.4	53.8	68.0	-14.2	PEAK
88.1	13.7	16.4	30.1	48.0	-17.9	AVERAGE
Middle Channel: 98.0MHz						
98.0	29.0	18.2	47.2	68.0	-20.8	PEAK
98.0	11.0	18.2	29.2	48.0	-18.8	AVERAGE
High Channel: 107.9MHz						
107.9	39.3	17.8	57.1	68.0	-10.9	PEAK
107.9	6.3	17.8	24.1	48.0	-23.9	AVERAGE

Antenna polarization: Vertical

Frequency (MHz)	Read Level (dBuV)	Correction Factor (dBuV/m)	FS (dBuV/m)	Limit (dB μ V/m)	Margin (dB)	Detector Mode
Low Channel: 88.1MHz						
88.1	28.3	16.4	44.7	68.0	-23.3	PEAK
88.1	7.9	16.4	24.3	48.0	-23.7	AVERAGE
Middle Channel: 98.0MHz						
98.0	28.1	18.2	46.3	68.0	-21.7	PEAK
98.0	8.5	18.2	26.7	48.0	-21.3	AVERAGE
High Channel: 107.9MHz						
107.9	22.7	17.8	40.5	68.0	-27.5	PEAK
107.9	3.6	17.8	21.4	48.0	-26.6	AVERAGE

6- OCCUPIED BANDWIDTH

6.1 Requirement of Occupied Bandwidth

Emission from the intentional radiator shall be confined within a band 200kHz wide centered on the operation frequency. The 200kHz band shall lie wholly within the frequency range of 88~108MHz.

6.2 Test Procedure

- 1). The EUT was placed on the top of the turntable 0.8 meter above ground.
- 2). The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 3). Power on the EUT and all the supporting units.
- 4). The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 5). For each suspected emission, the antenna tower was scanned (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading of both horizontal and vertical polarization.
- 6). Set EMI test receiver with Max hold. Mark peak, -20dB.

6.3 Test Equipment Used

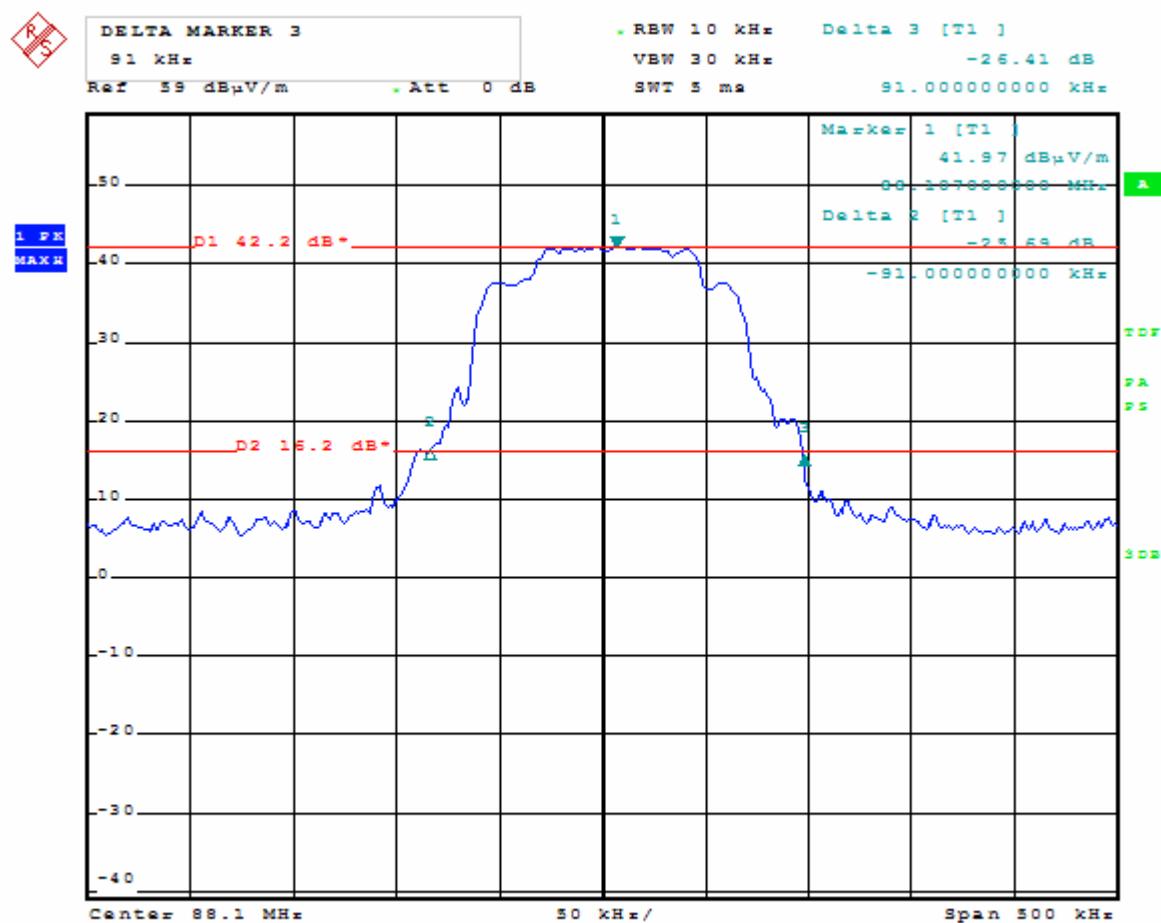
Items	Equipment	Manufacturer	Model No.	Serial No.	Last Cal	Calibration Period
1	EMI Test Receiver	R&S	ESCI	100687	2009-2-22	1 Year
2	EMI Test Receiver	R&S	ESPI7	100097	2009-2-22	1 Year
3	Amplifier	HP	8447D	1937A024 92	2009-2-22	1 Year
4	TRILOG Broadband Test- Antenna	SCHWARZBECK	VULB9163	9163-324	2009-2-22	1 Year

6.4 Emissions within Band Edges Test Result

Temperature (°C) : 22~23	EUT: Car FM Transmitter
Humidity (%RH) : 50~54	M/N: SR010X
Barometric Pressure (mbar) : 950~1000	Operation Condition: Normal Operating

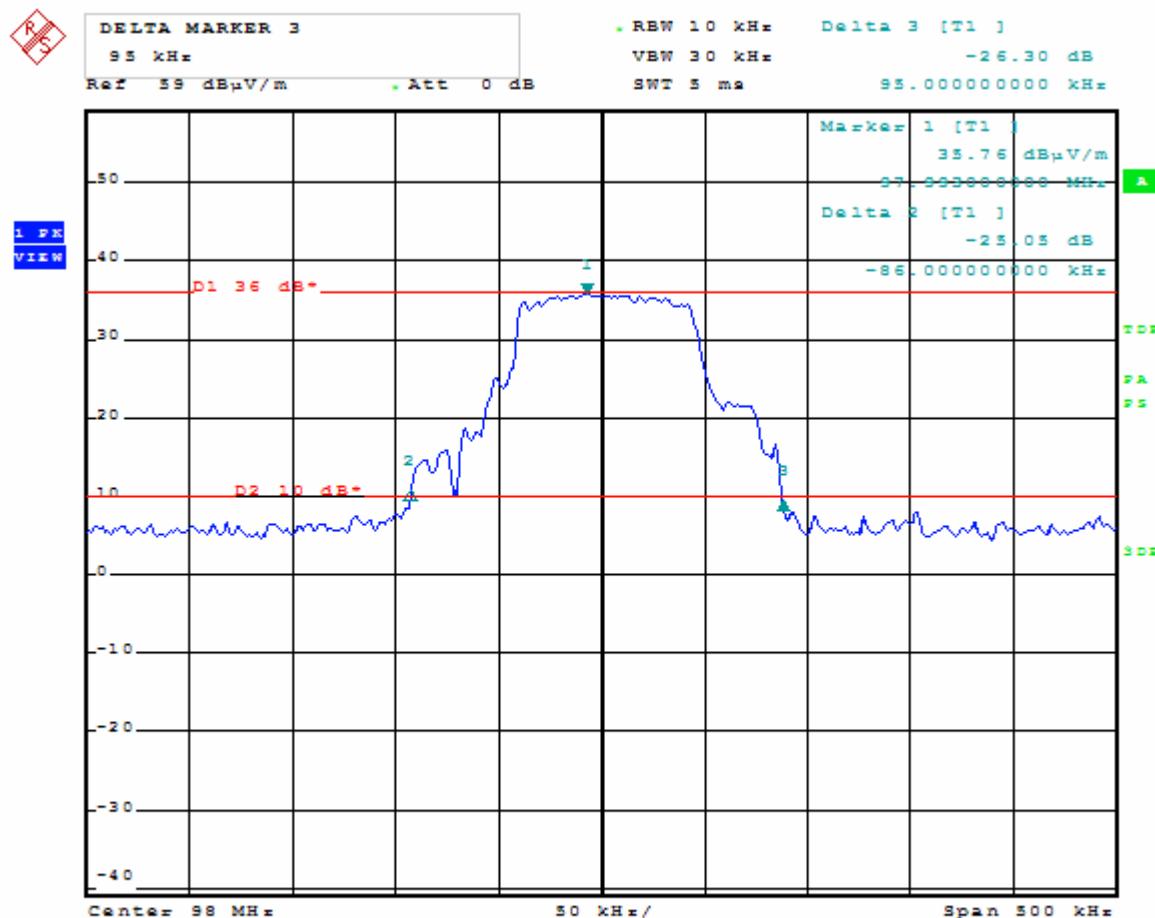
Note: The notebook is playing typical MP3 song and the MP3 player is adjusted to maximum volume.

Low Channel: 88.1MHz



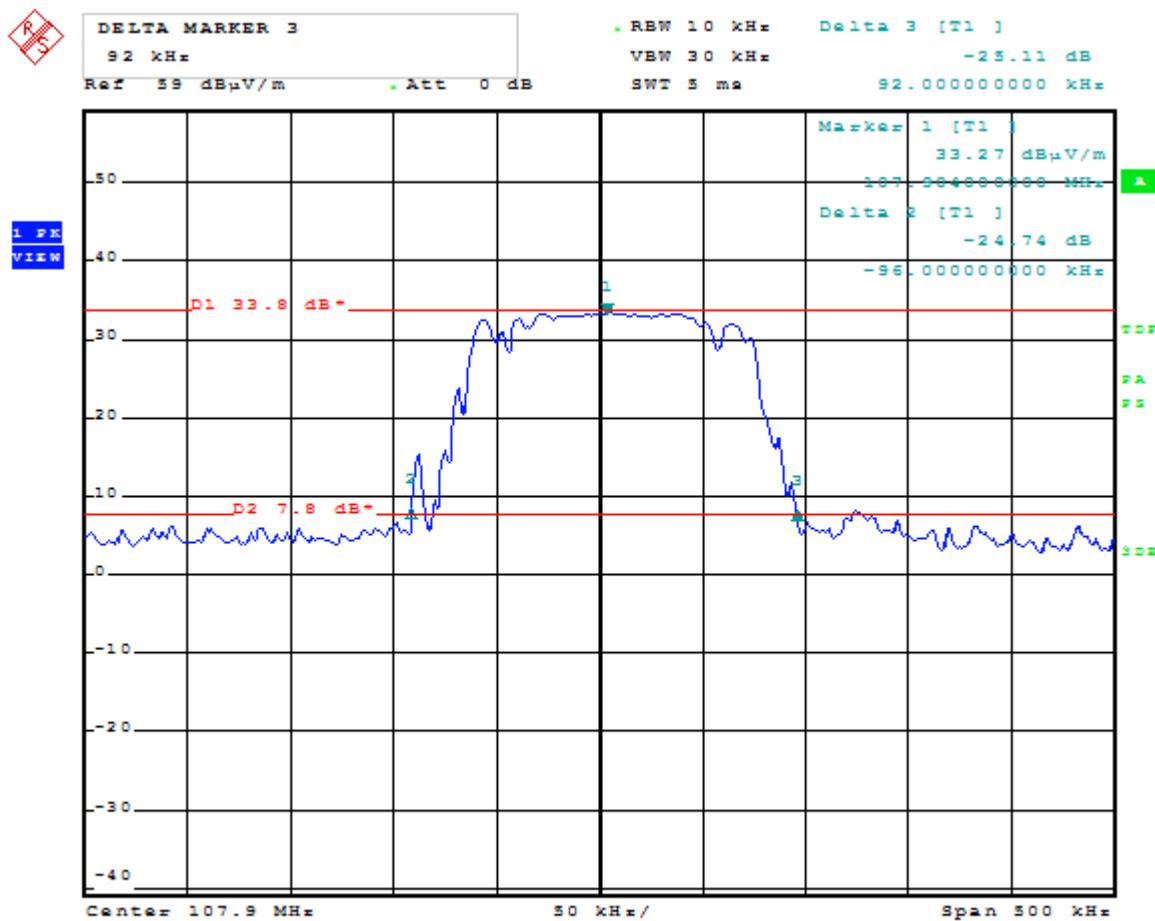
Date: 23.JUN.2009 21:03:37

Middle Channel: 98MHz



Date: 23.JUN.2009 21:21:55

High Channel: 107.9MHz



Date: 23.JUN.2009 21:19:05

7. ANTENNA REQUIREMENT

7.1 Standard Applicable

Section 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.

7.2 Antenna Connected Construction

The antenna connector is designed with permanent attachment and no consideration of replacement.