



EMI TEST REPORT

Test Report No. : 24JE0129-HO

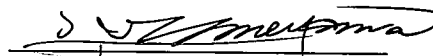
Applicant : Sony Corporation
Type of Equipment : Car FM Stereo Transmitter
Model No. : DCC-FMT1
Test standard : FCC Part 15 Subpart C
Section 15.239 : 2003
FCC ID : AK8DCCFMT1
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation. We hereby certify that the data contain a true representation of the EMC profile.
4. The test results in this report are traceable to the national or international standards.

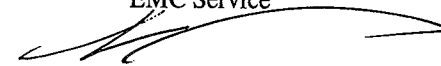
Date of test:

June 3, 2004

Tested by:


Hiroka Umeyama
EMC Service

Approved by :


Naoki Sakamoto
Group Leader of
EMC Service

UL Apex Co., Ltd.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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SECTION 1: Client information

Company Name : Sony Corporation
Brand name : SONY
Address : Shinagawa INTERCITY C Tower, 2-15-3 Konan Minato-ku, Tokyo,
108-6201 Japan
Telephone Number : +81-03-5769-5640
Facsimile Number : +81-03-5769-5962
Contact Person : Kikuo Murata

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Car FM Stereo Transmitter
Model No. : DCC-FMT1
Serial No. : 00000006
Rating : DC12/24V (Test was taken under worse case DC12V)
The carrier level for DC 12V is 3 dB higher than the one for DC 24V.
Country of Manufacture : China
Receipt Date of Sample : May 27, 2004
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Model No: DCC-FMT1(referred to as the EUT in this report) is the Car FM Stereo Transmitter.

Equipment Type : Transmitter
Frequency of operation : 88.1-107.9MHz
(1ch: 88.1, 2ch: 88.3, 3ch: 88.5, 4ch: 88.7, 5ch: 88.9, 6ch: 106.9,
8ch: 107.1, 9ch: 107.3, 10ch: 107.5, 11ch: 107.7, 12ch: 107.9)
Type of modulation : FM
Bandwidth & Channel spacing : 200kHz & 0.2MHz
Power control : No
Mode of operation : Simplex
Antenna Type : Integral (Cable)
Method of Frequency Generation : LC
Operating voltage (inner) : DC 12/24 V

FCC 15.31 (e)

This EUT provides stable voltage(DC5V) to the radio part constantly. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

The antenna is not removable from EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C : 2003
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.239 Operation in the band 88-108MHz : 2003

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Results
1	200kHz Band Width	FCC Part 2 Section 2.1049	Section 15.239(a)	N/A	126.8kHz 106.7MHz Vertical	Complied
2	Emissions from the Intentional radiators	FCC Part 2 Section 2.1046	Section 15.239(b)	N/A	0.1dB 106.700MHz 107.900MHz AV	Complied
3	Spurious Emissions	FCC Part 2 Section 2.1053	Section 15.239 (c)	N/A	6.8dB 106.800MHz and 108.000MHz QP	Complied
4	A custom built telemetry Intentional radiator	-	Section 15.239(d)	N/A *1)	N/A	N/A
5	20dB Bandwidth	ANSI C63.4:2003	Section 15.215(c)	N/A	N/A	Complied

*1) This test is not applicable since this EUT is not the ordered and produced equipment for the remote measurement used in the educational organization.

Note: UL Apex's EMI Work Procedures No. QPM05

*These tests were performed without any deviations from test procedure except for additions or exclusions.

3.3 Confirmation

UL Apex Co., Ltd. hereby confirms that E.U.T. , in the configuration tested, complies with the specifications FCC Part15 Subpart C 2003 Section 15.239.

3.4 Uncertainty

Radiated emission

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is $\pm 4.5\text{dB}(3\text{m})/\pm 4.7\text{dB}(10\text{m})$.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is $\pm 5.2\text{dB}(3\text{m})/\pm 3.8\text{dB}(10\text{m})$.

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is $\pm 6.6\text{dB}$.

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

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3.5 Test Location

UL Apex Co., Ltd. Head Office EMC Lab. *NVLAP Lab. code: 200572-0

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	Listed date (for NVLAP)	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	February 01, 2002	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	June 05, 2002	846015	IC4247-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 shielded room	-	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.4 measurement room	-	-	-	3.1 x 5.0 x 2.7m	N/A	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1 and No.2 semi-anechoic and No.3 measurement room.

3.6 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

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SECTION 4: Operation of E.U.T. during testing

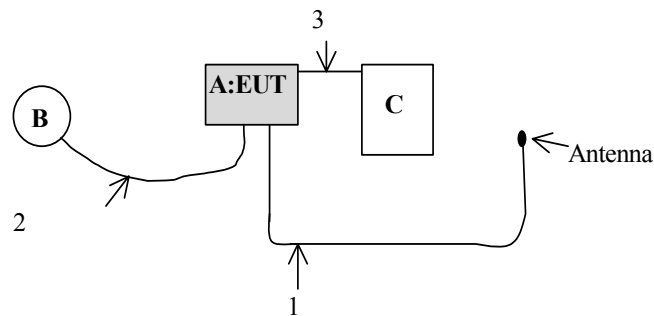
4.1 Operating Modes

The EUT was operating in a manner similar to typical use during the tests.

The mode is used : Transmitting mode (88.1/106.7/107.9 MHz)
Audio Signal 1kHz

Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals



* Cabling was taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	Car FM Stereo Transmitter	DCC-FMT1	00000006	SONY	EUT
B	Portable CD Player	XP-EV515	8	SONY	-
C	Car battery	40B19L	A030402	YUASA	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	Antenna Cable	3.0	N	Polyvinyl Chloride
2	Connecting Cable	1.2	N	Polyvinyl Chloride
3	DC Cable	1.0	N	Polyvinyl Chloride

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SECTION 5: 200kHz Band Width and 20 dB Band Width

5.1 Operating environment

Test place : No.2 semi anechoic chamber
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a platform of nominal size, 0.5m by 1.0m, raised 80cm above the conducting ground plane.

The EUT was set on the center of the tabletop.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

A drawing of the set up is shown in the photos of APPENDIX 1.

5.3 Test conditions

Test distance : 3m
EUT position : Tabletop
EUT operation mode : Transmitting

5.4 Test procedure

The 200kHz Band Width and 20dB Band Width was measured with a spectrum analyzer.

5.5 Results

Summary of the test results: Pass

Date: June 3, 2004

Tested by: Hiroka Umeyama

SECTION 6: Emissions from the Intentional radiator and Spurious Emissions

6.1 Operating environment

Test place : No.2 semi anechoic chamber
Temperature : See data
Humidity : See data

6.2 Test configuration

EUT was placed on a platform of nominal size, 0.5m by 1.0m, raised 80cm above the conducting ground plane.

The EUT was set on the center of the tabletop.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

A drawing of the set up is shown in the photos of APPENDIX 1.

6.3 Test conditions

Frequency range : 30MHz-1080MHz
Test distance : 3m
EUT position : Tabletop
EUT operation mode : Transmitting

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on No.2 semi anechoic chamber with a ground plane and at a distance of 3m.

The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

The radiated emission measurements were made with the following detector function of the test receiver.

	Emissions from intentional radiator	Spurious Emissions (below 1GHz)	Spurious Emissions (above 1GHz)
Detector Type	Average/Peak	Quasi-Peak	Average/Peak
IF Bandwidth	120kHz	120kHz	PK: RBW:1MHz/VBW: 1MHz AV: RBW:1MHz/VBW:10Hz

6.5 Results

Summary of the test results: Pass

Date: June 3, 2004

Tested by: Hiroka Umeyama

UL Apex Co., Ltd.

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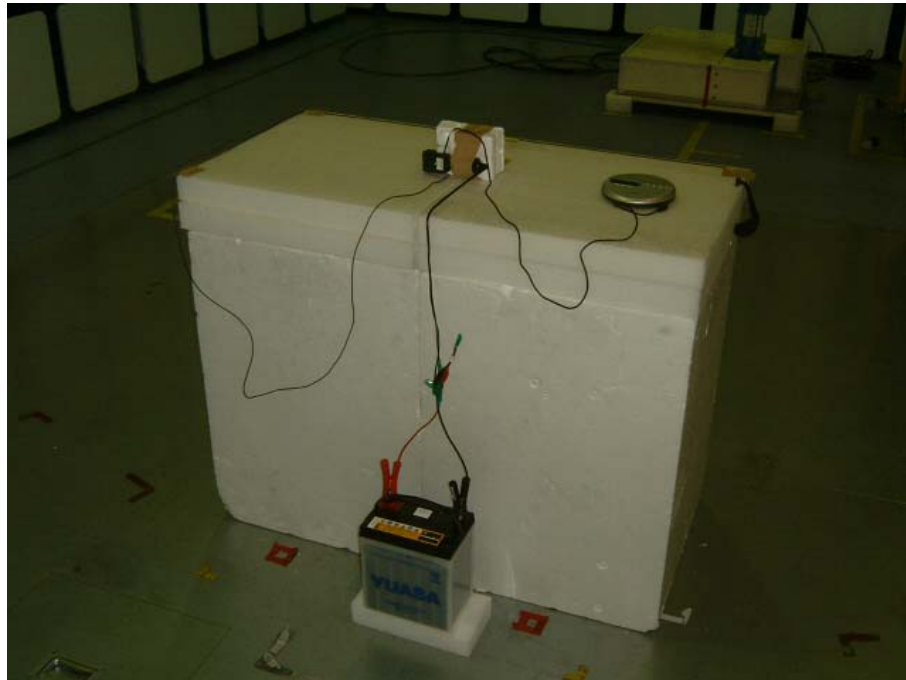
APPENDIX 1: Photographs of test setup

Spurious Emissions

Front



Rear



Worst Case Position (Z-axis:Horizontal / Z-axis:Vertical)

X-axis



Y-axis



Z-axis



APPENDIX 2:Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2004/04/12 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/10/15 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/10/15 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2004/02/03 * 12
MRENT-09	Spectrum Analyzer	Advantest	R3273	RE	2004/02/18 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2004/02/24 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MPA-02	Pre Amplifier	Agilent	87405A	RE	2004/04/16 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE	2003/11/12 * 12

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test Item:

RE: Radiated emission

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APPENDIX 3: Data of EMI test

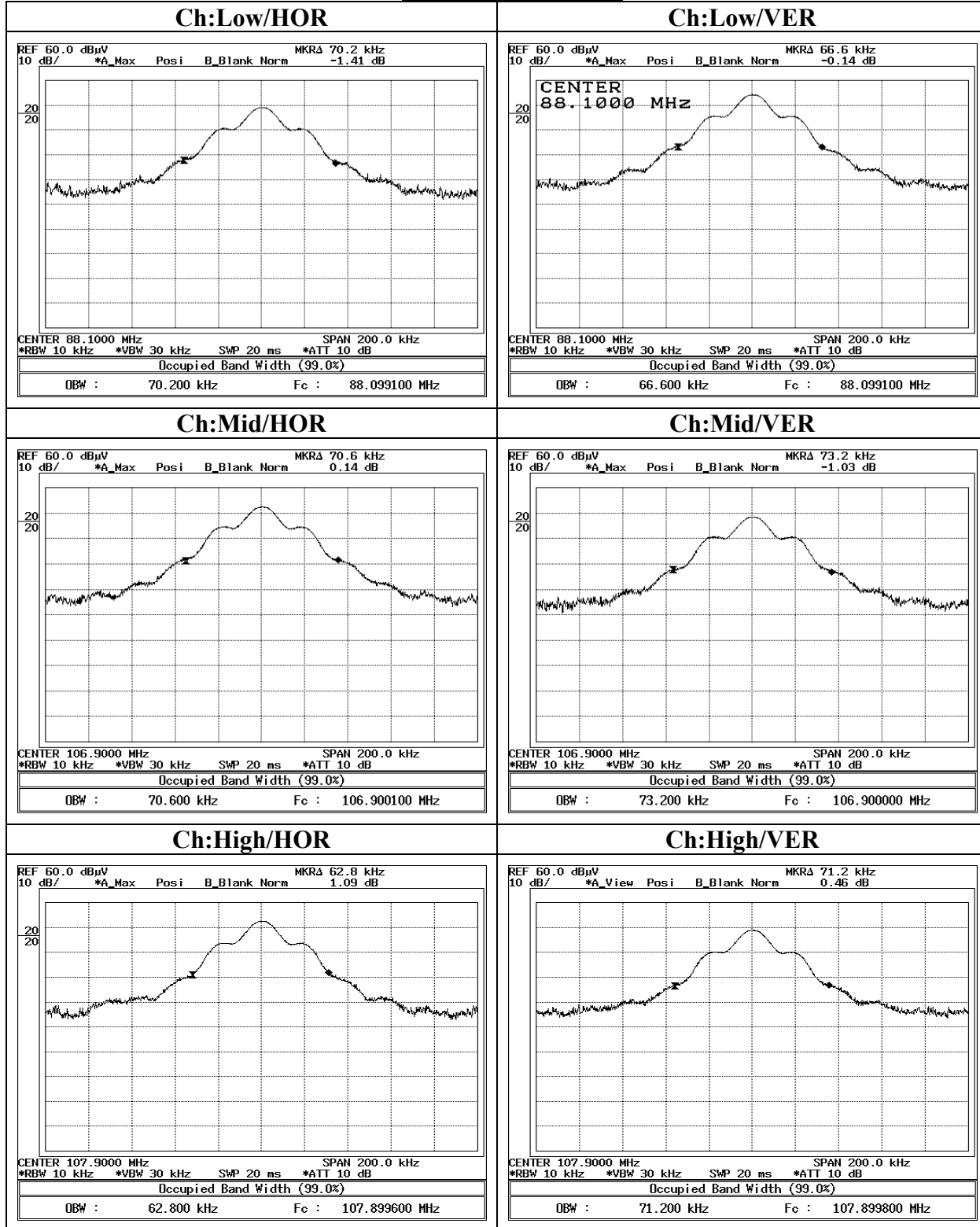
200kHz Band Width

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY	: Sony Corporation	REGULATION	: Fcc Part15 Subpart C Section 15.239(a)
EQUIPMENT	: Car FM Stereo Transmitter	PROCEDURE	: Fcc Part2 Section 2.1049
MODEL	: DOC-FMT1	TEST DISTANCE	: 3 m
S/ N	: 00000006	DATE	: 06/03/2004
POWER	: DC12V	TEMPERATURE	: 28 deg.C
MODE	: Transmitting (88.1/106.7/107.9MHz)	HUMIDITY	: 37 %
	: Audio Signal 1kHz	ENGINEER	: Hiroka Umeyama

No.	FREQ [MHz]	RESULT		LIMIT [kHz]	MARGIN	
		HOR [kHz]	VER		HOR [kHz]	VER [kHz]
1	88.1	70.2	66.6	200.0	129.8	133.4
2	106.7	70.6	73.2	200.0	129.4	126.8
3	107.9	62.8	71.2	200.0	137.2	128.8

200kHz Band Width



20dB Band Width

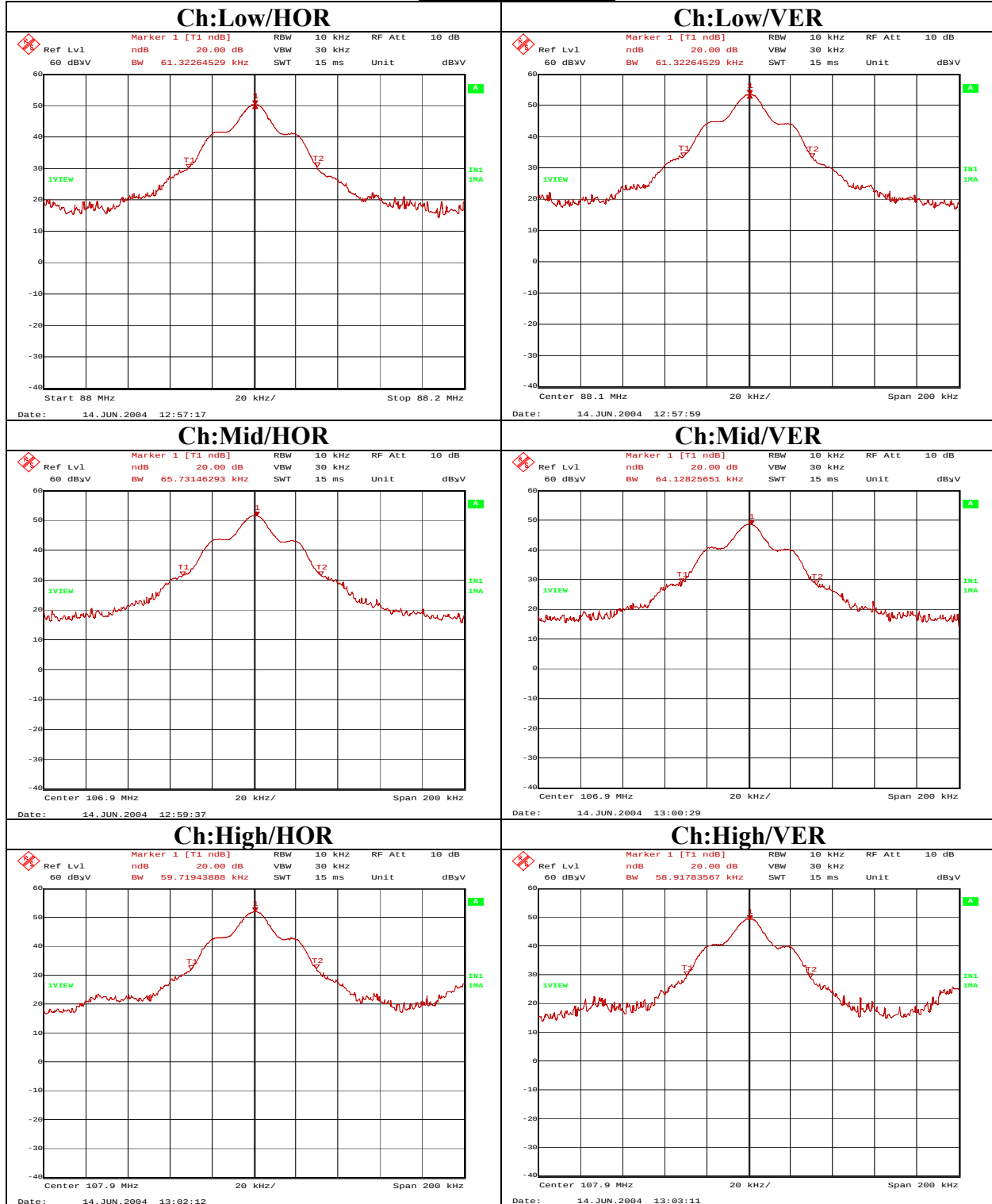
UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : Sony Corporation
EQUIPMENT : Car FM Stereo Transmitter
MODEL : DOC-FMT1
S/ N : 00000006
POWER : DC12V
MODE : Transmitting (88.1/106.7/107.9MHz)
: Audio Signal 1kHz

REGULATION : Fcc Part15 Subpart C
PROCEDURE : FCC Part 15 Section 15.215 (c)
TEST DISTANCE : 3 m
DATE : 06/03/2004
TEMPERATURE : 28 deg.C
HUMIDITY : 37 %
ENGINEER : Hiroka Umeyama

No.	FREQ [MHz]	RESULT		LIMIT [kHz]	MARGIN	
		HOR [kHz]	VER [kHz]		HOR [kHz]	VER [kHz]
1	88.1	61.3	61.3	-	-	-
2	106.7	65.7	64.1	-	-	-
3	107.9	59.7	58.9	-	-	-

20dB Band Width



Emissions from the Intentional radiators

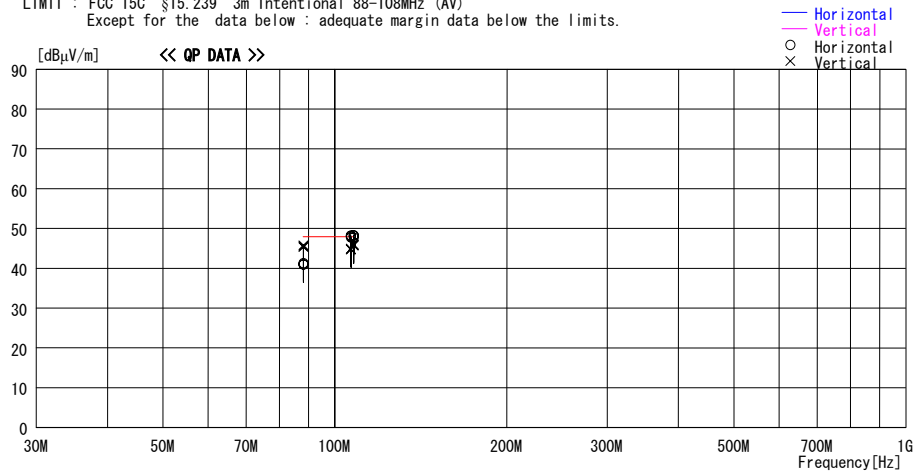
DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2004/06/03 10:42:27

Applicant : Sony Corporation
Kind of EUT : Car FM Stereo Transmitter
Model No. : DCC-FMT1
Serial No. : 00000006
Report No. : 24JE0129-HO
Power : DC12V
Temp°C/Humi% : 27 / 60%
Operator : Hiroka Umeyama

Mode / Remarks : Transmitting 88.1/106.7/107.9MHz MAX-Axis Emissions From Intentional Radiator

LIMIT : FCC 15C §15.239 3m Intentional 88-108MHz (AV)
Except for the data below : adequate margin data below the limits.



Frequency	Reading	DET	Antenna Factor	Loss & Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBμV]		[dB/m]	[dB]	[dBμV/m]	[Deg]	[cm]		[dBμV/m]	[dB]
88.100	49.3	AV	7.5	-15.8	41.0	200	213	Hori.	47.9	6.9
88.100	53.8	AV	7.5	-15.8	45.5	153	100	Vert.	47.9	2.4
106.700	52.3	AV	11.2	-15.7	47.8	0	270	Hori.	47.9	0.1
106.700	49.3	AV	11.2	-15.7	44.8	145	100	Vert.	47.9	3.1
107.900	50.0	AV	11.4	-15.6	45.8	67	100	Vert.	47.9	2.1
107.900	52.0	AV	11.4	-15.6	47.8	0	290	Hori.	47.9	0.1

CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

DATA OF RADIATED EMISSION TEST

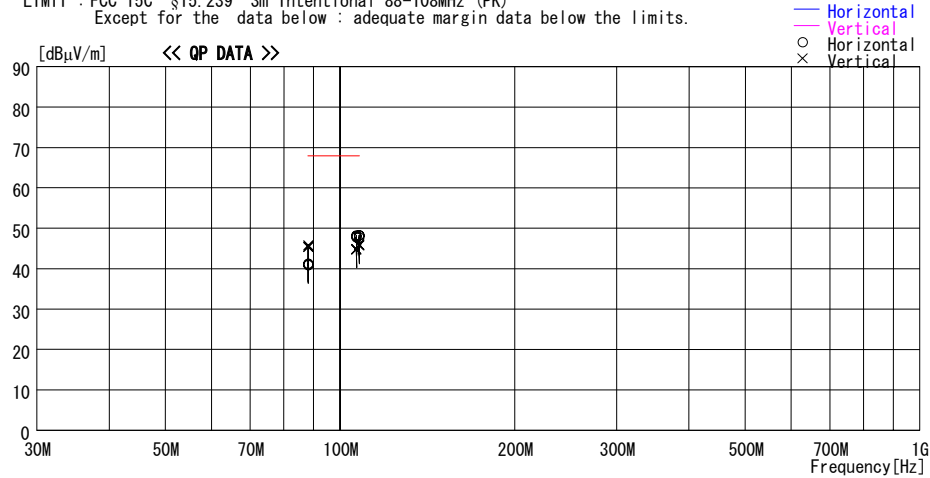
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/06/03 10:42:27

Applicant : Sony Corporation
Kind of EUT : Car FM Stereo Transmitter
Model No. : DCC-FMT1
Serial No. : 00000006

Report No. : 24JE0129-HO
Power : DC12V
Temp°C/Humi% : 27 / 60%
Operator : Hiroka Umeyama

Mode / Remarks: Transmitting 88.1/106.7/107.9MHz MAX-Axis Emissions From Intentional Radiator

LIMIT : FCC 15C §15.239 3m Intentional 88-108MHz (PK)
Except for the data below : adequate margin data below the limits.



Frequency	Reading	DET	Antenna Factor	Loss & Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBμV]		[dB/m]	[dB]	[dBμV/m]	[Deg]	[cm]		[dBμV/m]	[dB]
88.100	49.6	PK	7.5	-15.8	41.3	200	213	Hori.	67.9	26.6
88.100	54.1	PK	7.5	-15.8	45.8	153	100	Vert.	67.9	22.1
106.700	52.7	PK	11.2	-15.7	48.2	0	270	Hori.	67.9	19.7
106.700	49.4	PK	11.2	-15.7	44.9	145	100	Vert.	67.9	23.0
107.900	50.2	PK	11.4	-15.6	46.0	67	100	Vert.	67.9	21.9
107.900	52.5	PK	11.4	-15.6	48.3	0	290	Hori.	67.9	19.6

CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

Spurious Emissions

DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/06/03 15:43:34

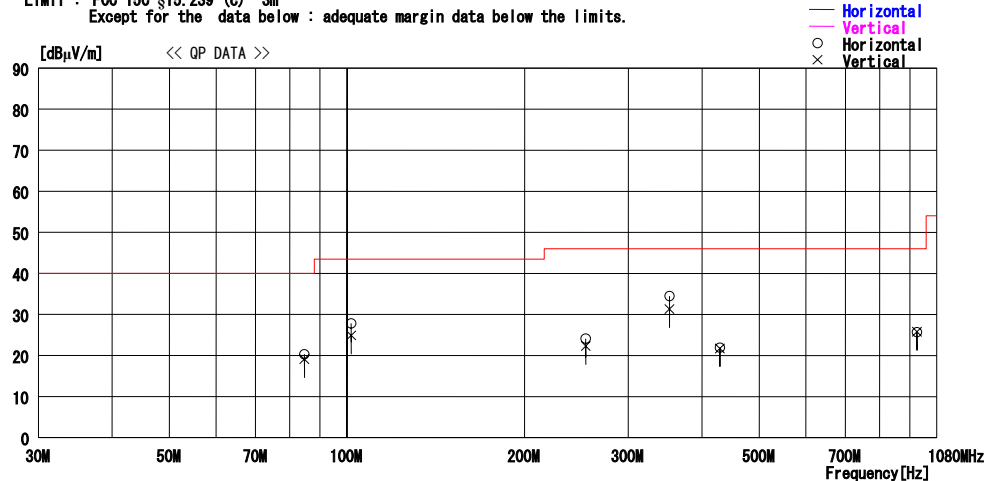
Applicant : Sony Corporation
Kind of EUT : Car FM Stereo Transmitter
Model No. : DCC-FMT1
Serial No. : 00000006

Report No. : 24JE0129-HO
Power : DC12V
Temp°C/Humi% : 27 / 45%
Operator : Hiroka Umeyama

Mode / Remarks : Transmitting 88.1MHz MAX-Axis

LIMIT : FCC 15C §15.239 (c) 3m

Except for the data below : adequate margin data below the limits.



Frequency	Reading	DET	Antenna Factor	Loss & Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBμV]		[dB/m]	[dB]	[dBμV/m]	[Deg]	[cm]		[dBμV/m]	[dB]
84.710	29.3	QP	7.0	-16.0	20.3	0	300	Hori.	40.0	19.7
84.710	28.1	QP	7.0	-16.0	19.1	0	100	Vert.	40.0	20.9
101.660	33.1	QP	10.5	-15.8	27.8	0	300	Hori.	43.5	15.7
101.660	30.2	QP	10.5	-15.8	24.9	359	100	Vert.	43.5	18.6
254.140	19.5	QP	17.7	-14.9	22.3	226	100	Vert.	46.0	23.7
254.140	21.3	QP	17.7	-14.9	24.1	216	300	Hori.	46.0	21.9
352.380	29.1	QP	16.4	-14.2	31.3	80	100	Vert.	46.0	14.7
352.380	32.3	QP	16.4	-14.2	34.5	114	100	Hori.	46.0	11.5
428.800	17.2	QP	18.3	-13.6	21.9	0	100	Hori.	46.0	24.1
428.802	17.0	QP	18.3	-13.6	21.7	0	100	Vert.	46.0	24.3
925.811	15.6	QP	21.8	-11.6	25.8	0	100	Vert.	46.0	20.2
925.811	15.5	QP	21.8	-11.6	25.7	0	100	Hori.	46.0	20.3

CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

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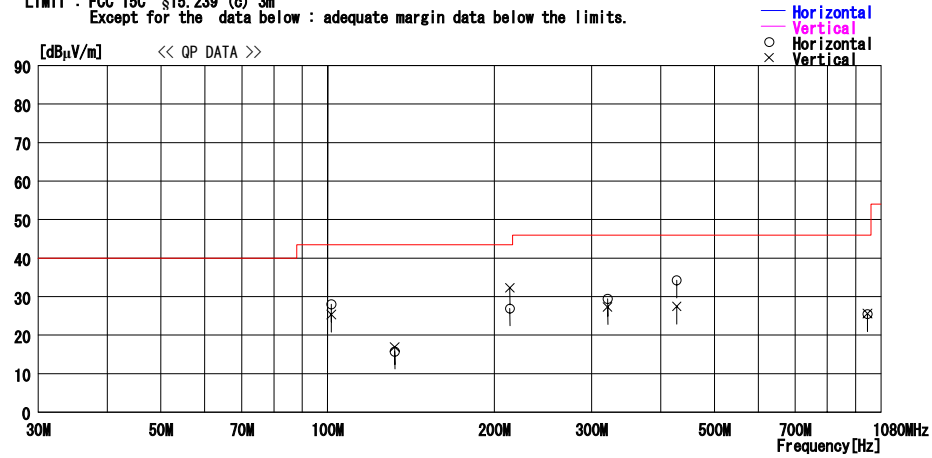
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/06/03 13:15:32

Applicant : Sony Corporation
Kind of EUT : Car FM Stereo Transmitter
Model No. : DCC-FMT1
Serial No. : 00000006

Report No. : 24JE0129-HO
Power : DC12V
Temp°C/Humi% : 27 / 45%
Operator : Hiroka Uneyama

Mode / Remarks : Transmitting 106.7MHz MAX-Axis

LIMIT : FCC 15C §15.239 (c) 3m
Except for the data below : adequate margin data below the limits.



Frequency	Reading	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBμV]		Factor	Gain	[dBμV/m]	[Deg]	[cm]		[dBμV/m]	[dB]
101.650	30.6	QP	10.5	-15.8	25.3	294	100	Vert.	43.5	18.2
101.650	33.3	QP	10.5	-15.8	28.0	0	340	Hori.	43.5	15.5
132.340	18.7	QP	13.7	-15.5	16.9	0	100	Vert.	43.5	26.6
132.340	17.5	QP	13.7	-15.5	15.7	1	300	Hori.	43.5	27.8
213.400	25.1	QP	17.0	-15.2	26.9	313	300	Hori.	43.5	16.6
213.400	30.5	QP	17.0	-15.2	32.3	220	100	Vert.	43.5	11.2
320.680	28.9	QP	15.0	-14.5	29.4	200	100	Hori.	46.0	16.6
320.680	26.8	QP	15.0	-14.5	27.3	80	100	Vert.	46.0	18.7
427.580	29.5	QP	18.3	-13.6	34.2	340	100	Hori.	46.0	11.8
427.580	22.7	QP	18.3	-13.6	27.4	0	100	Vert.	46.0	18.6
945.500	14.9	QP	22.2	-11.6	25.5	0	100	Hori.	46.0	20.5
945.500	15.0	QP	22.2	-11.6	25.6	0	100	Vert.	46.0	20.4

CHART:WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

Spurious Emissions(Band Edge)

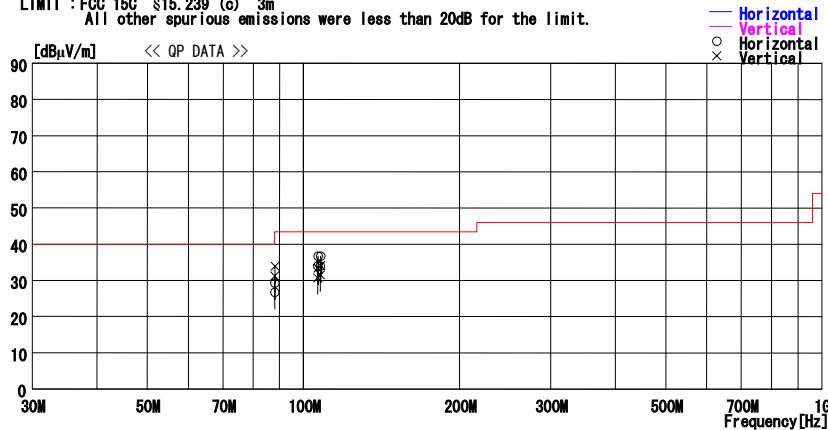
DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/06/03 10:42:27

Applicant : Sony Corporation
Kind of EUT : Car FM Stereo Transmitter
Model No. : DCC-FMT1
Serial No. : 00000006
Report No. : 24JE0129-HO
Power : DC12V
Temp°C/Humi% : 27 / 45%
Operator : Hiroka Umeyama

Mode / Remarks: Transmitting 88.1/106.7/107.9MHz MAX-Axis Band Edge

LIMIT : FCC 15C §15.239 (c) 3m
All other spurious emissions were less than 20dB for the limit.



Frequency	Reading	DET	Antenna		Level	Angle	Height	Polar.	Limit	Margin
			Factor	Loss& Gain						
[MHz]	[dBμV]		[dB/m]	[dB]	[dBμV/m]	[Deg]	[cm]		[dBμV/m]	[dB]
88.000	35.0	QP	7.5	-15.8	26.7	200	213	Hori.	40.0	13.3
88.000	39.5	QP	7.5	-15.8	31.2	153	100	Vert.	40.0	8.8
88.200	37.6	QP	7.5	-15.8	29.3	200	213	Hori.	43.5	14.2
88.200	42.2	QP	7.5	-15.8	33.9	153	100	Vert.	43.5	9.6
106.600	35.2	QP	11.2	-15.7	30.7	145	100	Vert.	43.5	12.8
106.600	38.5	QP	11.2	-15.7	34.0	0	270	Hori.	43.5	9.5
106.800	37.9	QP	11.2	-15.7	33.4	145	100	Vert.	43.5	10.1
106.800	41.2	QP	11.2	-15.7	36.7	0	270	Hori.	43.5	6.8
107.800	38.2	QP	11.4	-15.6	34.0	0	290	Hori.	43.5	9.5
107.800	35.7	QP	11.4	-15.6	31.5	67	100	Vert.	43.5	12.0
108.000	40.9	QP	11.4	-15.6	36.7	0	290	Hori.	43.5	6.8
108.000	38.3	QP	11.4	-15.6	34.1	67	100	Vert.	43.5	9.4

CHART: WITH FACTOR ANT TYPE: -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)