

EMI TEST REPORT

Test Report No. : 24GE0268-HO-1

Applicant : Calsonic Kansei Corporation

Type of Equipment : IMMOBILIZER

Model No. : CSSU58

Test standard : FCC Part 15 Subpart C Section 15.209(2003)

FCC ID : KBRCSSU58

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 : March 18 and 19, 2004

Tested by : 
Mitsuru Fujimura
EMC Head Office Division

Approved by : 
Naoki Sakamoto
Group Leader of EMC Head Office Division

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SECTION 1: Client information

Company Name	: Calsonic Kansei Corporation
Address	: 8 Sakae-cho Sano-shi Tochigi Japan
Telephone Number	: +81-283-21-8407
Facsimile Number	: +81-283-21-8547
Contact Person	: Yoshiaki Ishiduka

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

2.1 Identification of E.U.T.

Type of Equipment	: IMMOBILIZER
Model No.	: CSSU58
Serial No.	: 1
Country of Manufacture	: Japan
Receipt Date of Sample	: March 18, 2004
Condition of EUT	: Production prototype

(Not for Sale : This sample is equivalent to mass-produced items.)

2.2 Product Description

Calsonic Kansei Corporation Model No: CSSU58 is the IMMOBILIZER.
The equipment generates a radio and receives the information from transponder which received it.

Equipment Type	: Transceiver
Radio Frequency	: 125kHz
Type of modulation	: ASK
Antenna Type	: Loop Coil
Antenna Connector Type	: Soldering
CPU	: 8MHz
Power Supply	: DC 5V(Transformed from the DC 12V battery)
Temperature of operation	: -30 deg. C. to +80 deg. C.

FCC 15.31 (e)

This EUT is provided DC12V from the Car Battery, and The test is performed using a full charge battery. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

Type of Equipment and its antenna comply with this requirement since they are built in host device Model No.CSSU58 when they are put up for sale and they are connected by solder.

UL Apex Co., Ltd.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C : 2003
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.209 Radiated emission limits, General requirements.

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Result
1	Electric Field Strength of Fundamental Emission	ANSI C63.4:2001	FCC Section 15.209	Radiated	N/A	27.8dB 0.125MHz 0deg. (AV)	Complied
2	Electric Field Strength of Spurious Emission	ANSI C63.4:2001	FCC Section 15.209	Radiated	N/A	15.2dB 48.1MHz (Vertical)	Complied
3	-26dB Bandwidth	ANSI C63.4:2001	ANSI C63.4 13.1.7	Radiated	N/A	N/A	Complied
4	Conducted Emission	ANSI C63.4:2001	FCC Section 15.207	AC Mains *1)	N/A	N/A	N/A

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

*1) This test is not applicable since the EUT does not have AC power port.

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

3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Result
1	99% Occupied Band Width	RSS210(issue 5) + Amendment	RSS210(issue 5) + Amendment	Radiated	N/A	N/A	N/A

3.4 Confirmation

UL Apex Co., Ltd. hereby confirms that E.U.T., in the configuration tested, complies with the specifications
FCC Part 15 Subpart C : 2003 Section 15.209.

3.5 Uncertainty

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test using Loop antenna is ± 1.8 dB.

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.5 dB.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB.

The data listed in this test report has enough margin.

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3.5 Test Location

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No.1 semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on February 01, 2002. (Registration number: No.1:313583 Industry Canada: No.1: IC4247)

No.2 semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on June 05, 2002. (Registration number: No.2:846015 Industry Canada: No.2: IC4247-2)

*NVLAP Lab. code: 200572-0

Test room	Width x Depth x Height (m)	Size of reference ground plane(m)	Other rooms
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	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 shielded room	3.1 x 5.0 x 2.7m	N/A	-

3.6 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

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

4.1 Operating Modes

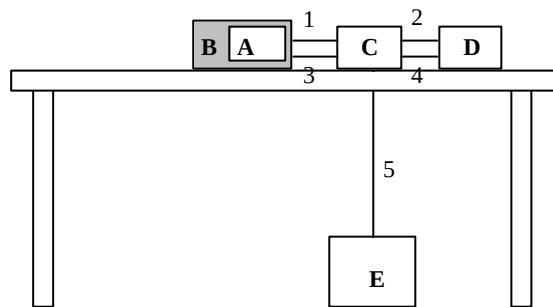
The EUT exercise program used during radiated testing was designed to exercise the various system components in a manner similar to typical use.

The sequence is used : Continuous transmitting mode
*Generates a radio and receives the information from transponder.

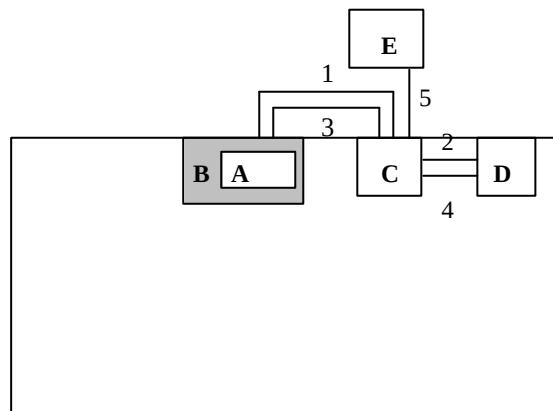
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals

Front View



Top View



* Test data was taken under worse case conditions.

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Description of EUT

No.	Item	Model number	Serial number	Manufacturer	FCC ID
B	CARD SLOT	CSSU58	1	Calsonic Kansei Corporation	KBRCSSU58

Description of Support Equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	FOB	-	5502	Calsonic Kansei Corporation	-
C	BCM	284B1EH100	4221	Calsonic Kansei Corporation	-
D	Checker	-	N/A	Calsonic Kansei Corporation	-
E	Car Battery	50B24L	N/A	YUASA	-

List of cables used

No.	Name	Length (m)	Shield	Remark
1	Signal Cable	1.2	N	-
2	Signal Cable	0.25	N	-
3	DC Power Cable	1.2	N	-
4	DC Power Cable	0.25	N	-
5	DC Power Cable	1.0	N	-

SECTION 5: Radiated emission (Fundamental and Spurious Emission)

5.1 Operating environment

The test was carried out in No.1 semi anechoic chamber.

Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The EUT was set on the center of the tabletop.

Test was made with the antenna was varied in angle to the maximum signal strength, or 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.

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5.3 Test conditions

Frequency range : 9kHz-30MHz and 30MHz-1000MHz
Test distance : 10 and 3m
EUT position : Tabletop
EUT operation mode : Continuous transmitting mode

5.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on No.1 semi anechoic chamber with a ground plane and at a distance of 3 and 10m.

Frequency : From 9kHz to 30MHz at distance 10m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for each antenna angle 0deg. , 45deg. and 90deg. .

Frequency : From 30MHz to 1GHz at distance 3m

The measuring antenna height was varied between 1 to 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.

Measurements were performed with a QP, Peak, and Average detector.

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

	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz	From 150kHz to 490kHz	From 490kHz to 30MHz	From 30MHz to 1GHz
Detector Type	Peak/Average	Quasi Peak	Peak/Average	Quasi Peak	Quasi Peak
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz

- The carrier level (or, noise levels) was (or were) measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined.

With the position, the noise levels of all the frequencies were measured.

5.5 Results

Summary of the test results: Pass

Date: March 18 and 19, 2004

Tested by: Mitsuru Fujimura

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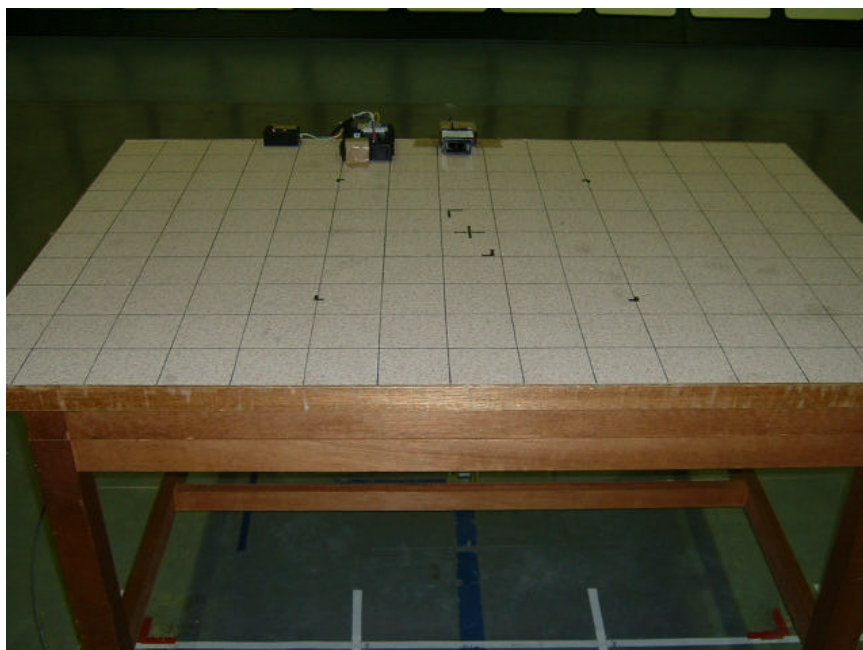
Facsimile : +81 596 24 8124

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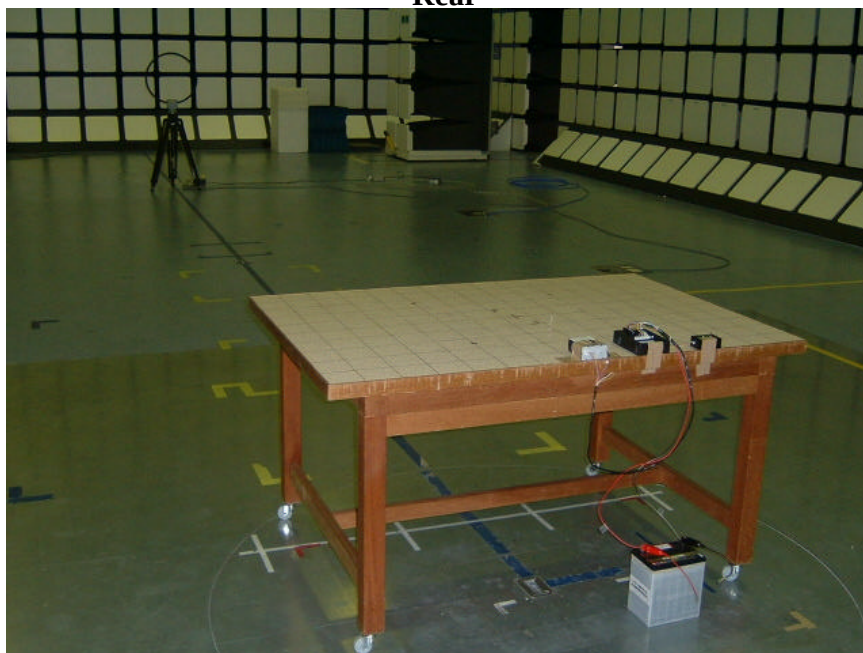
APPENDIX 1: Photographs of test setup

Radiated emission

Front



Rear

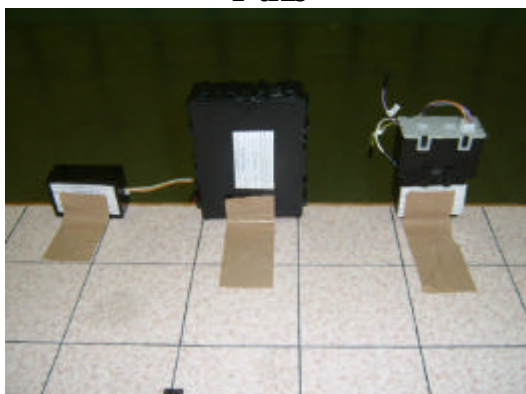


Worst Case Position (Horizontal : X-axis/ Vertical: X-axis)

X-axis



Y-axis



Z-axis



APPENDIX 2: Test Instruments

EMI Test Instrument

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	RE / ME	2003/12/27 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE / ME	2003/11/12 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/Agilent/TSJ	-	ME	2003/12/24 * 12
MCC-07	coaxial cable	-	-	ME	2004/01/26 * 12
MCC-08	coaxial cable	-	-	ME	2004/01/26 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE / ME	2004/03/08 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	ME	2004/01/08 * 12
MCC-01	Coaxial Cable	Suhner/storm/Agilent/TSJ	-	RE	2003/12/19 * 12
MBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/10/15 * 12
MLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/10/15 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12

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

Test Item:

RE: Radiated emission

ME: Radiated Magnetic Field Strength 9kHz – 30MHz (Include 26dB Bandwidth and 99%OBW)

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APPENDIX 3: Data of EMI test

Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)

DATA OF SPURIOUS EMISSIONS(9kHz to 30MHz)

UL Apex Co., Ltd.
Head Office EMC Lab. No.1 Semi Anechoic Chamber

Company	: Calsonic Kansei Corporation	REPORT NO	: 24GE0268-HO
Equipment	: IMMOBILIZER	REGULATION	: Fcc Part15 Subpart C 15.209
Model	: CSSU58	TEST DISTANCE	: 10m
Sample No.	: 1	DATE	: March 18, 2004
Power	: DC 12 V	TEMPERATURE	: 22deg.C
Mode	: Continuous Transmitting mode	HUMIDITY	: 30%
FCC ID	: KBRCSSU58	ENGINEER	: Mitsuru Fujimura
IC No.	: 2111B-CSSU58		

PK DETECT (RBW: 200Hz / 9KHz)

No.	FREQ [MHz]	T/R READING			ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	RESULT			Limit *2 PK [dBuV/m]	MARGIN		
		0deg *1	45deg	90deg				0deg	45deg	90deg		0deg	45deg	90deg
		[dBuV]						[dBuV/m]				[dB]		
Test distance 10meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS														
1	0.016	27.3	28.8	32.5	19.9	5.0	1.6	43.8	45.3	49.0	122.6	78.8	77.3	73.6
2	0.039	37.3	36.1	42.4	19.9	21.3	0.9	36.8	35.6	41.9	114.9	78.1	79.3	73.0
3	0.125	62.3	61.5	60.7	19.9	25.6	0.6	57.2	56.4	55.6	104.8	47.6	48.4	49.2
4	0.250	44.3	44.6	44.3	19.9	26.8	0.3	37.7	38.0	37.7	98.7	61.0	60.7	61.0
5	0.375	43.0	44.2	43.3	19.9	27.1	0.4	36.2	37.4	36.5	95.2	59.0	57.8	58.7

AV DETECT (RBW: 200Hz / 9KHz)

No.	FREQ	T/R READING			ANT Factor	AMP GAIN	CABLE LOSS	RESULT			Limit *2 AV	MARGIN		
		0deg *1	45deg	90deg				0deg	45deg	90deg		0deg	45deg	90deg
		[MHz]	[dBuV]					[dB/m]	[dB]	[dB]		[dBuV/m]	[dBuV/m]	[dB]
Test distance 10meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS														
1	0.016	18.3	18.9	22.3	19.9	5.0	1.6	34.8	35.4	38.8	102.6	67.8	67.2	63.8
2	0.039	27.8	25.6	35.1	19.9	21.3	0.9	27.3	25.1	34.6	94.9	67.6	69.8	60.3
3	0.125	62.1	61.4	60.5	19.9	25.6	0.6	57.0	56.3	55.4	84.8	27.8	28.5	29.4
4	0.250	32.3	32.4	32.3	19.9	26.8	0.3	25.7	25.8	25.7	78.7	53.0	52.9	53.0
5	0.375	31.9	32.0	31.8	19.9	27.1	0.4	25.1	25.2	25.0	75.2	50.1	50.0	50.2

QP DETECT (RBW: 9KHz)

No.	FREQ [MHz]	T/R READING			ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	RESULT			Limit *2 QP [dBuV/m]	MARGIN		
		0deg *1	45deg	90deg				0deg	45deg	90deg		0deg	45deg	90deg
		[dBuV]						[dBuV/m]				[dB]		
Test distance 10meters RESULT=Reading + ANT Factor - Amp Gain + CABLE LOSS														
6	0.500	35.0	35.0	35.2	19.9	27.4	0.5	28.0	28.0	28.2	52.7	24.7	24.7	24.5
7	0.625	34.7	34.6	34.5	19.8	27.4	0.6	27.7	27.6	27.5	50.8	23.1	23.2	23.3
8	0.750	34.0	33.9	34.0	19.8	27.5	0.7	27.0	26.9	27.0	49.2	22.2	22.3	22.2
9	0.875	33.9	33.8	33.8	19.8	27.5	0.7	26.9	26.8	26.8	47.8	20.9	21.0	21.0
10	1.000	33.5	33.5	33.5	19.8	27.5	0.7	26.5	26.5	26.5	46.7	20.2	20.2	20.2
11	1.125	33.4	33.4	33.3	19.8	27.5	0.7	26.4	26.4	26.3	45.7	19.3	19.3	19.4
12	1.250	33.4	33.2	33.3	19.8	27.5	0.6	26.3	26.1	26.2	44.8	18.5	18.7	18.6

*1 It is angle of Received Antenna

*2 The Limit is include below the Distance Factor

Test Distance 10m Distance Factor(Dfac) f = 9kHz - 490kHz : $40\log(300/10) = 59.1$
f = 490kHz - 30MHz : $40\log(30/10) = 19.1$

*Except for the above table : All other spurious emissions were less than 20dB for the limit.

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Radiated Emission (Electric Field Strength of Spurious Emission)

DATA OF RADIATED EMISSION TEST

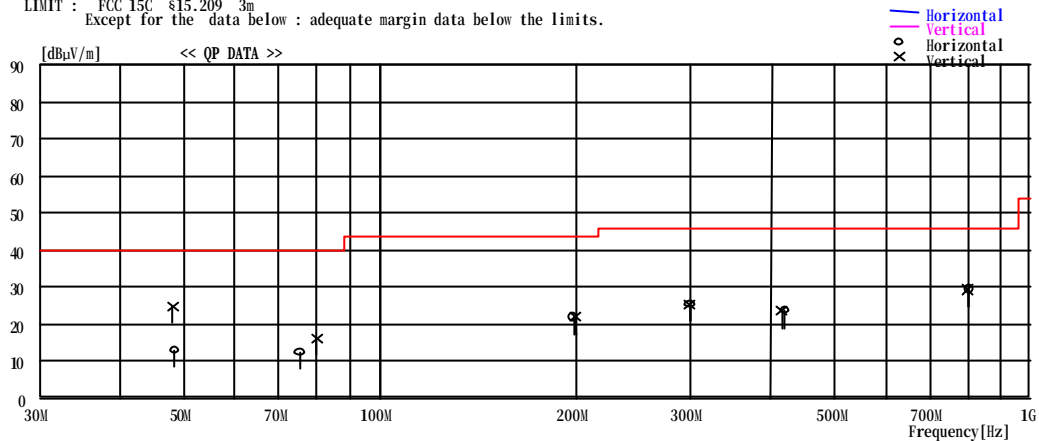
UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber

Applicant : Calsonic Kansei Corp.
Kind of EUT : IMMOBILIZER
Model No. : 1
Serial No. : Production prototype

Report No. : 24GE0268-HO
Power : DC12V
Temp°C/Humi% : 20 / 30
Operator : Mitsuru Fujimura

Mode / Remarks : Continuous Transmitting : X-axis

LIMIT : FCC 15C §15.209 3m
Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING OP [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	48.397	22.4	10.7	7.2	27.4	12.9	40.0	27.1	100	0
2	75.386	25.9	6.5	7.4	27.4	12.4	40.0	27.6	171	0
3	198.817	22.7	16.9	9.3	27.1	21.8	43.5	21.7	100	0
4	300.000	21.6	20.5	10.2	27.0	25.3	46.0	20.7	100	0
5	419.238	22.4	18.2	10.8	27.8	23.6	46.0	22.4	100	0
6	800.806	23.2	21.8	12.7	28.4	29.3	46.0	16.7	100	0
----- Vertical -----										
7	48.096	34.2	10.8	7.2	27.4	24.8	40.0	15.2	100	0
8	80.129	29.6	6.3	7.7	27.4	16.2	40.0	23.8	100	278
9	199.899	22.7	16.9	9.3	27.1	21.8	43.5	21.7	100	0
10	300.000	21.6	20.5	10.2	27.0	25.3	46.0	20.7	100	0
11	415.030	22.3	18.2	10.8	27.8	23.5	46.0	22.5	100	0
12	800.806	23.2	21.8	12.7	28.4	29.3	46.0	16.7	100	0

CHART:WITHOUT FACTOR ANT TYPE : -30MHz LOOP,30-300MHz BICONICAL,300MHz-1000MHz LOGPERIODIC,1000MHz- HORN
CALCULATION : READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - AMP.GAIN Page:

26dB Bandwidth

