EMI TEST REPORT

Test Report No. : 25FE0190-HO-1

Applicant	:	**Mitsubishi Electric Corporation Himeji Works**
Type of Equipment	:	**The Immobilizer System**
Model No.	:	**IMB111-03**
Test standard	:	**FCC Part 15 Subpart C Section 15.209: 2004**
FCC ID	:	**BGBX1T265IMB11103**
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:

February 15, 2005

Tested by:

Norihisa Hashimoto
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
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

CONTENTS **PAGE**

SECTION 1: Client information

Company Name : Mitsubishi Electric Corporation Himeji Works
Address : 840, Chiyoda-machi, Himeji, Hyogo, 670-8677 JAPAN
Telephone Number : +81-792-98-8896
Facsimile Number : +81-792-98-9262
Contact Person : Yoshiharu Goto

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

2.1 Identification of E.U.T.

Type of Equipment : The Immobilizer System
Model No. : IMB111-03
Serial No. : 1
Country of Manufacture : Japan
Receipt Date of Sample : February 14, 2005
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Model No: IMB111-03 (referred to as the EUT in this report) is the Immobilizer System.

Clock frequency	CPU: 4MHz
Feature of EUT	1) Normal EUT : When the correct key is inserted to the key-cylinder and the power supply is turned ON, the LED of the engine control unit is turned on for about 3 seconds and turned off afterward. If the incorrect key is inserted to the key-cylinder or the any key is not inserted to the key-cylinder, the LED is blinking 2) Continuous transmitting EUT for testing. When the power supply is turned ON, the transmitting is started and continues untill the power supply is turned OFF.

Equipment Type	Transceiver	Receiver
Frequency of Operation	134.45kHz	134.45kHz
Bandwidth & Channel spacing	N/A	-
Type of Modulation	Unmodulated	-
Antenna Type	Inductive loop	
Antenna Connector Type	-	
Antenna Gain	-	
Mode of Operation	Simplex	-
Method of frequency generation	Crystal	
ITU code	N0N	-
Power Supply (Inner)	DC 5.0V from Car Batery DC12V	

FCC 15.31 (e)
This test was performed with the New Battery (DC 12V) and the constant voltage was supplied to this EUT during the tests. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C : 2004
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.209 Radiated emission limits, general requirements : 2004

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin *0)	Result
1	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003	FCC Section 15.209	Radiated	N/A	48.6dB 0.135kHz 0 deg. AV	Complied
2	Electric Field Strength of Spurious Emission	ANSI C63.4:2003	FCC Section 15.209	Radiated	N/A	10.8dB 160.522MHz, Horizontal, QP	Complied
3	-26dB bandwidth	ANSI C63.4:2003	ANSI C63.4 13.1.7	Radiated	N/A	N/A	N/A
4	Conducted Emission	ANSI C63.4:2003	FCC Section 15.207	AC Mains *1)	N/A	N/A	N/A

Note: UL Apex's EMI Work procedures No. QPM05
*0) The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.
*1) This test is not applicable since the EUT does not have AC power port.
Uncertainty:
Spurious Emission (Radiated)
The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ±4.5dB(3m)/ ±4.7dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ±5.2dB(3m)/ ±3.8dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ±6.6dB.
Other test except Conducted Emission and Spurious Emission (Radiated)
The measurement uncertainty (with a 95% confidence level) for this test is ±3.0dB.
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	Results
1	99% Occupied bandwidth	RSS-210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004 + Amendment4: 2004	RSS-210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004 + Amendment4: 2004	Radiated	N/A	N/A	N/A

3.4 Test Location

UL Apex Co., Ltd. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	Listed date (for FCC)	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 shielded room.

3.5 Test set up, Test instruments and Data of EMI

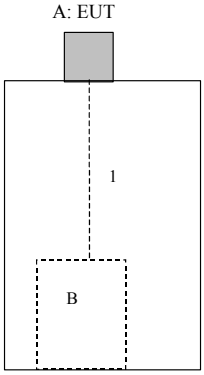
Refer to APPENDIX 1 to 3.

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

4.1 Operating Modes

The mode is used : Transmitting mode

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	The Immobilizer System	IMB111-03	1	Mitsubishi Himeji	BGBX1T265IMB11103
B	Car Battery	40B19L	A030402	YUASA	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	DC Cable	1.0	N	Polyvinyl chloride

SECTION 5: Radiated emission (Fundamental and Spurious Emission)

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 3m.

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 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.

Measurements were performed with a QP, PK, and AV 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	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz

- The carrier level and noise levels were confirmed at each position of X and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

* Part 15 Section 15.31 (f)(2) (9kHz-30MHz)
[Limit at 10m]=[Limit at 300m]-40 x log (10[m]/300[m])
[Limit at 10m]=[Limit at 30m]-40 x log (10[m]/30[m])

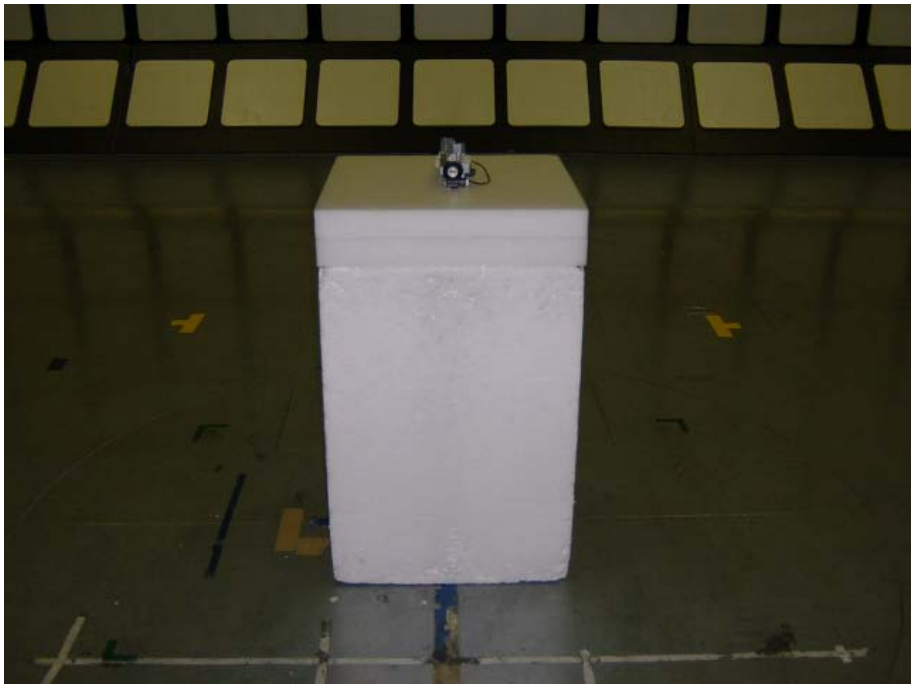
Test data : APPENDIX 3
Test result : Pass

Date: February 15, 2005 Test engineer: Norihisa Hashimoto

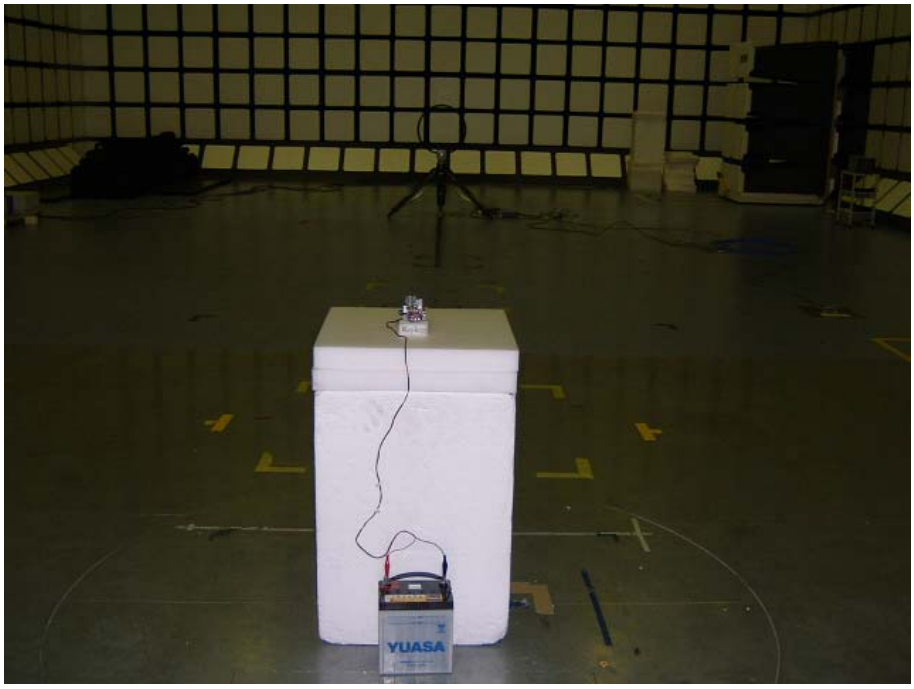
APPENDIX 1: Photographs of test setup

Radiated Emission

Front



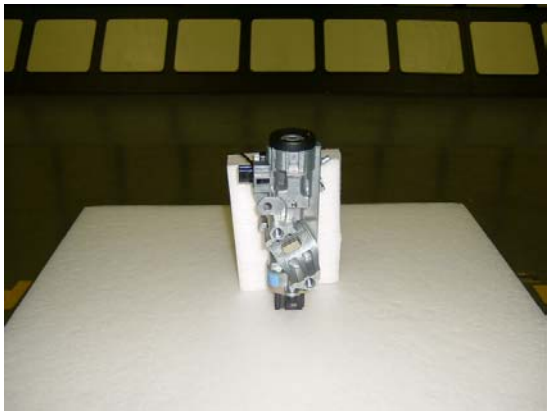
Rear



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

X-axis

Z-axis



APPENDIX 2:Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	RE	2004/11/13 * 12
MCC-01	Coaxial Cable 0.1-3000Mz	Suhner/storm/ Agilent/TSJ	-	RE	2004/12/19 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/ Agilent/TSJ	-	RE	2004/12/24 * 12
MCC-30	coaxial cable	ULApex	-	RE	2004/06/12 * 12
MBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2004/10/14 * 12
MLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2004/10/14 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	RE	2004/12/10 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE	2004/12/16 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2004/05/25 * 12
MRENT-11	Spectrum Analyzer	Advantest	R3273	RE	2005/01/22 * 12
APRCV03	Test Receiver	MEB	SMV41	RE	2004/10/12 * 12

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

Test Item:

RE: Radiated Spurious Emission

APPENDIX 3: Data of EMI test

Radiated Spurious Emission

2005/02/15 00:37:38

DATA OF MAGNETIC RADIATED EMISSION TEST

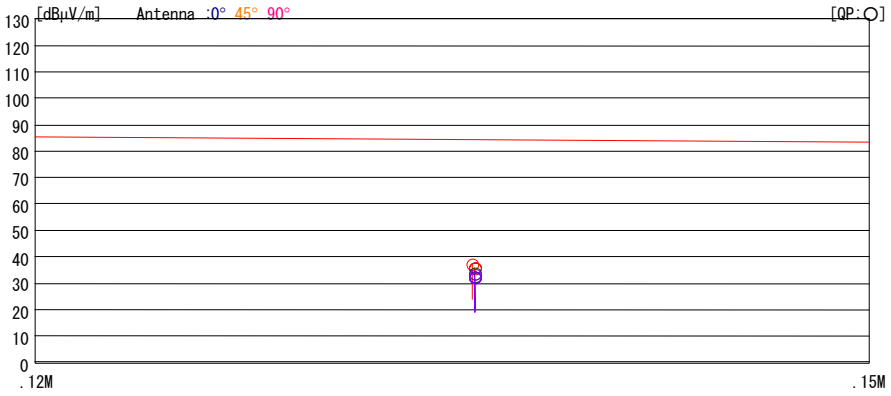
UL Apex Co.,LTD. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2005/02/15 00:37:28

Applicant : Mitsubishi Electric Corporation
Kind of EUT : Immobilizer System
Model No. : IMB111-03
Serial No. : 1

Report No. : 25FE0190-HO
Power : DC12V
Temp./ Humi. : 23deg.C / 27%
Operator : Norihisa Hashimoto

Mode / Remarks: Carrier (0/45/90)

LIMIT : FCC15C §15.209(a) 10m
Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB]	LOSS [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA	TABLE [DEG]	
1	0.135	43.7	19.7	-26.4	37.0	84.1	47.1	0°	0	PK
2	0.135	42.6	19.7	-26.4	35.9	84.1	48.2	0°	0	QP
3	0.135	42.2	19.7	-26.4	35.5	84.1	48.6	0°	0	AV
4	0.135	39.1	19.7	-26.4	32.4	84.1	51.7	45°	141	QP
5	0.135	40.5	19.7	-26.4	33.8	84.1	50.3	45°	141	PK
6	0.135	39.0	19.7	-26.4	32.3	84.1	51.8	45°	141	AV
7	0.135	38.6	19.7	-26.4	31.9	84.1	52.2	90°	62	AV
8	0.135	40.1	19.7	-26.4	33.4	84.1	50.7	90°	62	PK
9	0.135	38.7	19.7	-26.4	32.0	84.1	52.1	90°	62	QP

CHART : WITH FACTOR ANT TYPE : LOOP
CALCULATION : READING + ANT FACTOR + LOSS(CABLE + ATTEN.-AMP.)

Page:

DATA OF MAGNETIC RADIATED EMISSION TEST

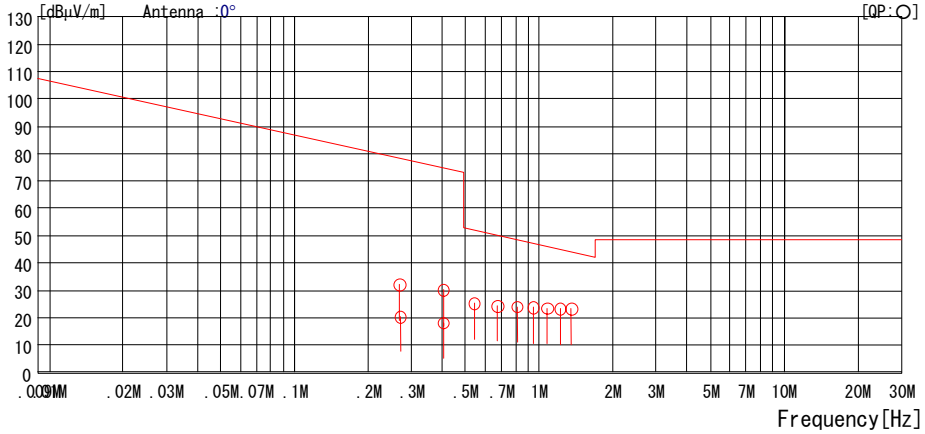
UL Apex Co.,LTD. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2005/02/15 00:06:11

Applicant : Mitsubishi Electric Corporation
Kind of EUT : Immobilizer System
Model No. : IMB111-03
Serial No. : 1

Report No. : 25FE0190-HO
Power : DC12V
Temp./ Humi. : 23deg.C / 27%
Operator : Norihisa Hashimoto

Mode / Remarks: Max-axis (X)

LIMIT : FCC15C §15.209(a) 10m
Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB]	LOSS [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA	TABLE [DEG]	
1	0.270	39.2	19.7	-26.7	32.2	78.1	45.9	0°	0	PK
2	0.270	27.5	19.7	-26.7	20.5	78.1	57.6	0°	0	AV
3	0.404	37.6	19.7	-27.2	30.1	74.6	44.5	0°	0	PK
4	0.404	25.6	19.7	-27.2	18.1	74.6	56.5	0°	0	AV
5	0.539	32.7	19.7	-27.2	25.2	52.0	26.8	0°	0	QP
6	0.674	32.1	19.6	-27.3	24.4	50.1	25.7	0°	0	QP
7	0.809	31.8	19.6	-27.4	24.0	48.5	24.5	0°	0	QP
8	0.944	31.6	19.6	-27.5	23.7	47.2	23.5	0°	0	QP
9	1.078	31.4	19.6	-27.5	23.5	46.0	22.5	0°	0	QP
10	1.213	31.2	19.6	-27.5	23.3	45.0	21.7	0°	0	QP
11	1.348	31.1	19.6	-27.4	23.3	44.1	20.8	0°	0	QP

CHART : WITH FACTOR ANT TYPE : LOOP
CALCULATION : READING + ANT FACTOR + LOSS(CABLE + ATTEN.-AMP.)

Page:

DATA OF RADIATED EMISSION TEST

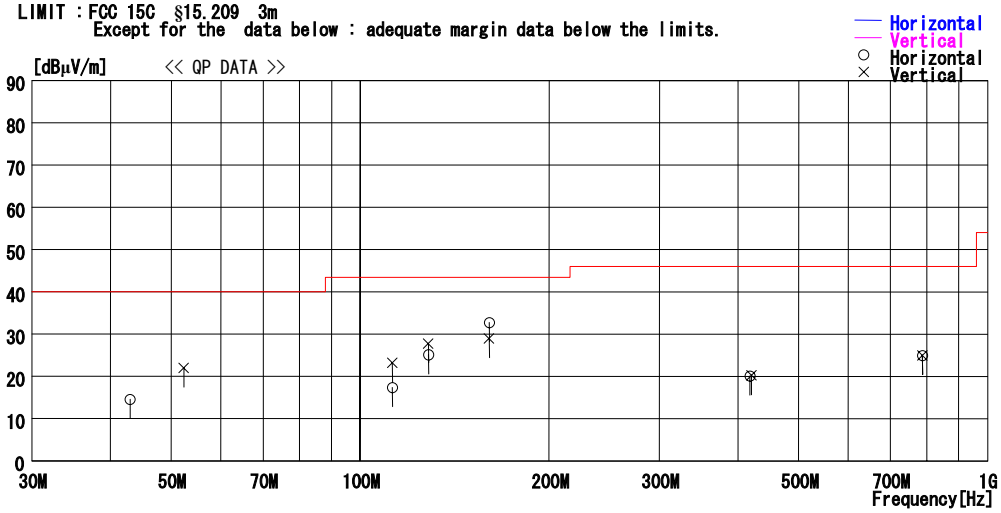
UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2005/02/15 02:10:40

Applicant : Mitsubishi Electric Corporation
Kind of EUT : Immobilizer System
Model No. : IMB111-03
Serial No. : 1

Report No. : 25FE0190-HO
Power : DC12.0V
Temp℃/Humi% : 23 / 27
Operator : Norihisa Hashimoto

Mode / Remarks: Tx134.45KHz / Max-Axis(X)

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



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
——— Horizontal ———										
1	42.957	22.8	12.6	7.2	28.0	14.6	40.0	25.4	183	352
2	112.507	24.7	12.0	8.4	27.7	17.4	43.5	26.1	249	96
3	128.431	30.8	13.6	8.4	27.7	25.1	43.5	18.4	255	257
4	160.522	36.0	15.7	8.8	27.8	32.7	43.5	10.8	193	100
5	418.277	19.2	18.1	10.8	28.0	20.1	46.0	25.9	100	8
6	787.181	19.7	21.1	12.7	28.6	24.9	46.0	21.1	153	89
——— Vertical ———										
7	52.352	32.8	9.7	7.3	27.8	22.0	40.0	18.0	100	354
8	112.510	30.5	12.0	8.4	27.7	23.2	43.5	20.3	100	195
9	128.429	33.5	13.6	8.4	27.7	27.8	43.5	15.7	100	157
10	160.525	32.3	15.7	8.8	27.8	29.0	43.5	14.5	100	203
11	420.657	19.3	18.1	10.9	28.1	20.2	46.0	25.8	250	155
12	787.164	19.8	21.1	12.7	28.6	25.0	46.0	21.0	103	351

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)

99%Occupied bandwidth

-26dB bandwidth