

DATA OF SPURIOUS EMISSIONS TEST (30MHz-5GHz)

UL Apex Co., Ltd.

Head Office EMC Lab. Semi Anechoic Chamber : No.2

COMPANY	NEC System Integration & Construction, Ltd.	REPORT NO	24BE0140-HO	
EQUIPMENT	Radio Equipment	REGULATION	FCC 2.1053	
MODEL	HX68-V	TEST DISTANCE	3m	
S/N	1002	DATE	10/19/2003	10/20/2003 10/27/2003
POWER	DC 13.8V	TEMPERATURE	23 deg.C	23 deg.C 23 deg.C
MODE	Tx (458.5125MHz)	HUMIDITY	41%	50% 41%
POSITION	-	CALIBRATION	OK	
TX ANTENNA HIGH 1.0m				
EUT ANTENNA HIGH 1.0m				

Engineer

K. Adachi
Kenichi Adachi

No.	FREQUENCY [MHz]	Electric Field Strength (After Factor Calculation) [dBuV/m]		RESULT [dBm] (dBm)		LIMIT [dBm] (ERP)	MARGIN [dBm]		Mode
		HOR	VER	HOR	VER		HOR	VER	
1	413.51	44.4	36.6	-56.6	-64.1	-20.0	36.6	44.1	Operating
2	498.00	39.2	24.8	-63.3	-76.3	-20.0	43.3	56.3	Operating
3	917.03	69.7	67.4	-30.7	-31.9	-20.0	10.7	11.9	Operating
4	1375.53	71.0	74.5	-32.1	-25.0	-20.0	12.1	5.0	Operating
5	1634.03	41.2	41.2	-61.9	-58.3	-20.0	41.9	38.3	Operating
6	1834.04	78.0	76.2	-25.1	-23.3	-20.0	5.1	3.3	Operating
7	2292.55	78.7	74.5	-24.4	-25.0	-20.0	4.4	5.0	Operating
8	2751.06	76.6	74.4	-26.5	-25.1	-20.0	6.5	5.1	Operating
9	2859.55	52.1	49.5	-51.0	-50.0	-20.0	31.0	30.0	Operating
10	3209.57	79.4	74.0	-23.7	-25.5	-20.0	3.7	5.5	Operating
11	3268.14	51.2	49.9	-51.9	-49.6	-20.0	31.9	29.6	Operating
12	3668.08	67.7	62.8	-35.4	-36.7	-20.0	15.4	16.7	Operating
13	3676.62	57.8	56.2	-45.3	-43.4	-20.0	25.3	23.4	Operating
14	4085.09	49.4	49.2	-53.7	-50.3	-20.0	33.7	30.3	Operating
15	4126.59	69.4	63.9	-33.8	-35.6	-20.0	13.8	15.6	Operating
16	4585.13	62.3	65.3	-40.8	-34.2	-20.0	20.8	14.2	Operating

Rx-ANTENNA : Biconical Antenna(30-300MHz), Logperiodic Antenna(300-1000MHz), Horn Antenna(1-12.75GHz)

Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Antenna(1-12.75GHz)

All other emissions were at least 20dB below the specification limit.

*Audio Input : 8dBm , 2.5kHz

- for the calibration data on the substitution measurement.

Carrier Power = 39.1dBm

- Attenuation limits = 50 + 10log(Carrier Power) = 59.1dB(-20.0dBm)

- Attenuation = Carrier Power - Spurious Power > 59.1dB(-20.0dBm)

- Below 1GHz : SA PK(RBW:10kHz / VBW:30kHz) Above 1GHz : S/A PK(RBW/VBW:1MHz)

UL Apex Co., Ltd.

Head Office EMC Lab.

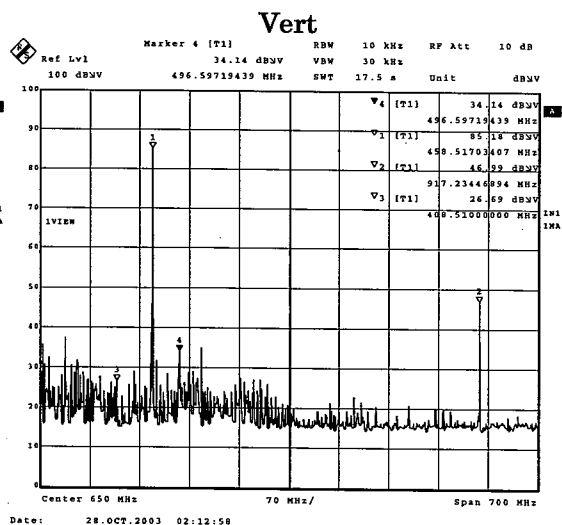
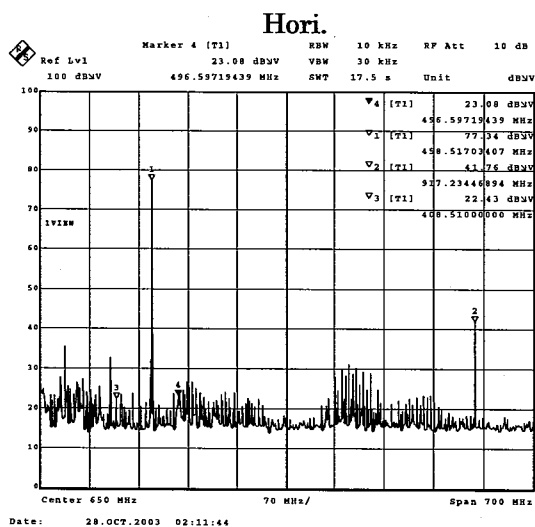
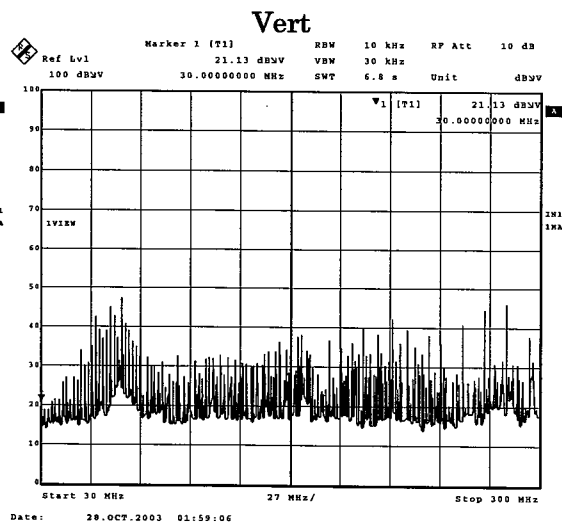
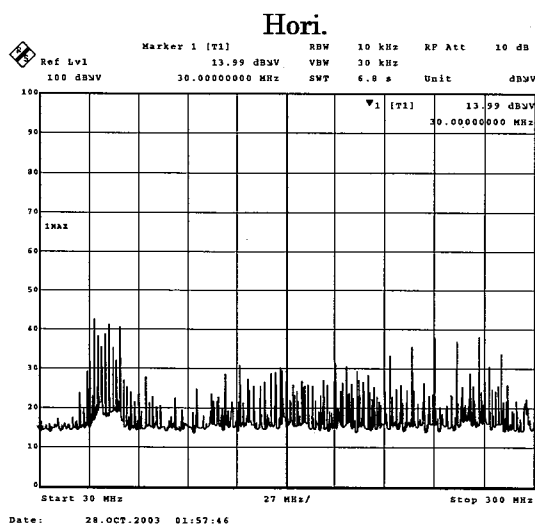
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

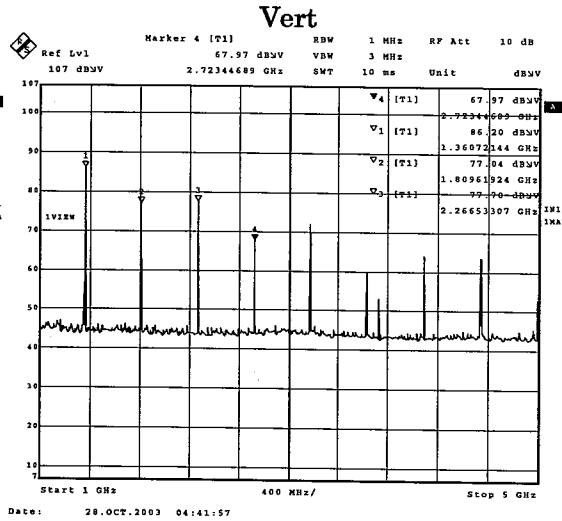
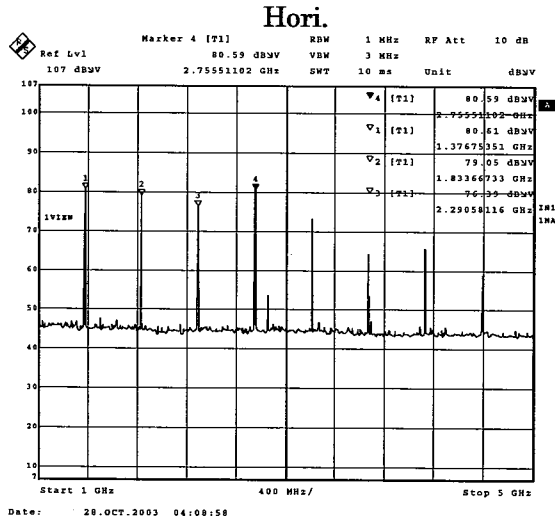
Facsimile : +81 596 24 8124

MF060b(10.04.03)

HX68-V + HX69-V (Transmitting)
Spuripous Emission(Radiated))(Below 1GHz)



HX68-V + HX69-V (Transmitting)
Spuripous Emission(Radiated)(Above 1GHz)



DATA OF SPURIOUS EMISSIONS TEST (30MHz-5GHz)

UL Apex Co., Ltd.

Head Office EMC Lab. Semi Anechoic Chamber : No.2

COMPANY	NEC System Integration & Construction, Ltd.	REPORT NO	24BE0140-HO
EQUIPMENT	Radio Equipment	REGULATION	FCC 2.1053
MODEL	HX68-V + HX69-V	TEST DISTANCE	3m
S/N	1002, 1004	DATE	10/19/2003 10/20/2003
POWER	DC 13.8V	TEMPERATURE	23 deg.C 23 deg.C
MODE	Tx (458.5125MHz)	HUMIDITY	41% 50%
POSITION	-	CALIBRATION	OK
TX ANTENNA HIGH 1.0m			

Engineer

: Kenichi Adachi

No.	FREQUENCY [MHz]	Electric Field Strength (After Factor Calculation) [dBuV/m]		RESULT [dBm] (dBm)		LIMIT [dBm] (ERP)	MARGIN [dBm]		Mode
		HOR	VER	HOR	VER		HOR	VER	
1	413.51	38.9	37.4	-62.1	-63.3	-20.0	42.1	43.3	Operating
2	498.00	35.5	24.9	-67.0	-76.2	-20.0	47.0	56.2	Operating
3	917.03	66.6	63.0	-33.8	-36.3	-20.0	13.8	16.3	Operating
4	1375.53	69.3	72.6	-33.8	-26.9	-20.0	13.8	6.9	Operating
5	1634.03	41.2	41.2	-61.9	-58.3	-20.0	41.9	38.3	Operating
6	1834.04	75.0	78.2	-28.1	-21.3	-20.0	8.1	1.3	Operating
7	2292.55	78.8	74.7	-24.3	-24.8	-20.0	4.3	4.8	Operating
8	2751.06	79.4	73.6	-23.7	-25.9	-20.0	3.7	5.9	Operating
9	2859.55	51.5	50.1	-51.6	-49.4	-20.0	31.6	29.4	Operating
10	3209.57	78.9	72.7	-24.2	-26.8	-20.0	4.2	6.8	Operating
11	3268.14	51.6	48.9	-51.6	-50.6	-20.0	31.6	30.6	Operating
12	3668.08	63.3	63.7	-39.8	-35.8	-20.0	19.8	15.8	Operating
13	3676.62	58.0	56.6	-45.2	-42.9	-20.0	25.2	22.9	Operating
14	4085.09	49.4	49.2	-53.7	-50.3	-20.0	33.7	30.3	Operating
15	4126.59	70.0	67.8	-33.1	-31.7	-20.0	13.1	11.7	Operating
16	4585.13	63.8	64.6	-39.3	-34.9	-20.0	19.3	14.9	Operating

Rx-ANTENNA : Biconical Antenna(30-300MHz), Logperiodic Antenna(300-1000MHz), Horn Antenna(1-12.75GHz)

Tx-ANTENNA : Dipole Antenna(30-1000MHz), Horn Antenna(1-12.75GHz)

All other emissions were at least 20dB below the specification limit.

*Audio Input : 8dBm, 2.5kHz

- for the calibration data on the substitution measurement.

Carrier Power = 32.6dBm

- Attenuation limits = 50 + 10log(Carrier Power) = 52.6dB(-20.0dBm)

- Attenuation = Carrier Power - Spurious Power > 52.6dB(-20.0dBm)

- Below 1GHz : SA PK(RBW:10kHz / VBW:30kHz) Above 1GHz : S/A PK(RBW/VBW:1MHz)

UL Apex Co., Ltd.

Head Office EMC Lab.

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

Telephone : +81 596 24 8116

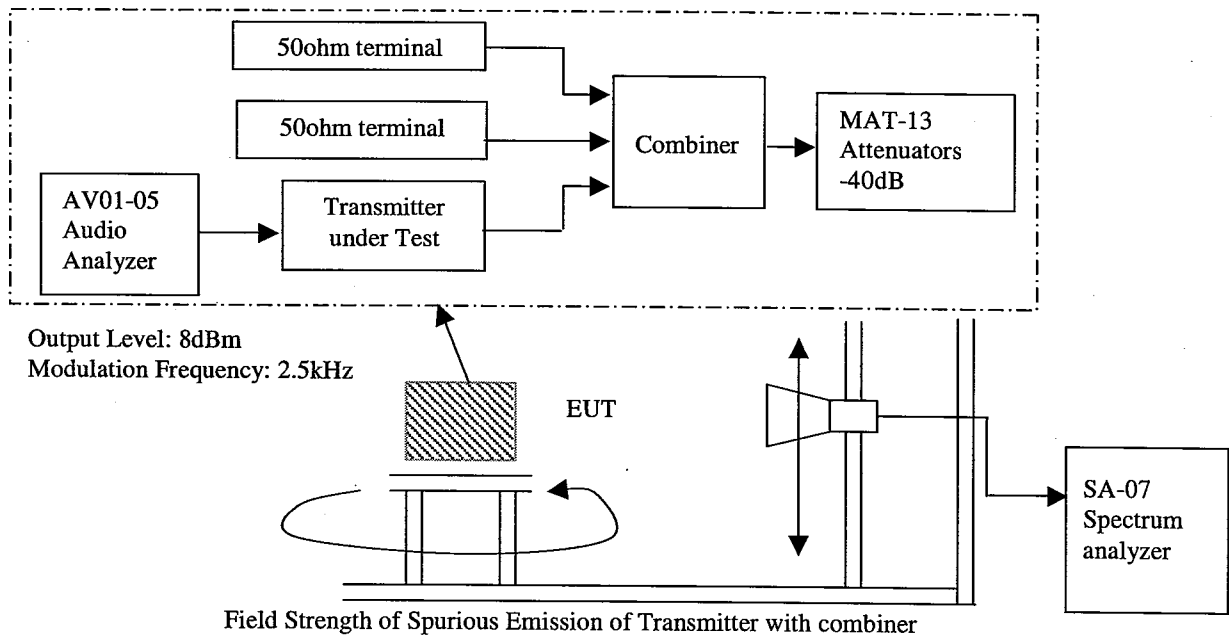
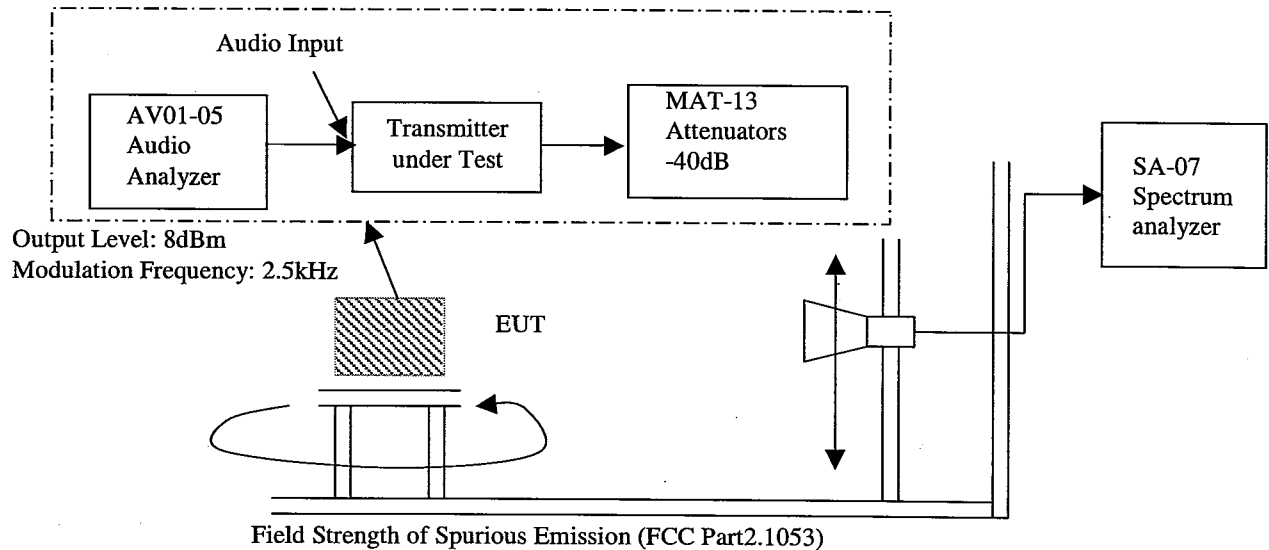
Facsimile : +81 596 24 8124

MF060b(10.04.03)

9.3 Test Result : Pass

9.4 Test Instrument : MAEC-02, SA-07, MTR-02, MCC-12, MPA-02, MAT-07, MBA-03, MLA-03, MCC-07, MCC-08, MCC-25, MPA-01, MCC-24, MHA-06, AV01-05, MDPS-01

9.5 Measurement Block Diagram



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

MF060b(10.04.03)

SECTION 10: Frequency Stability

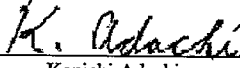
10.1 Test Procedure : FCC 2.1055, FCC 90.213

10.2 Test Data

DATA OF FREQUENCY STABILITY

UL Apex Co., Ltd.
Head Office EMC Lab. No.3 Measurement Room

COMPANY	: NEC System Integration & Construction, Ltd.	REPORT NO	: 24BE0140-HO
EQUIPMENT	: Radio Equipment (Mobile)	REGULATION	: Fcc Part 90 Section 90.213
MODEL	: HX68-V	TEST METHOD	: Fcc Part 2 Section 2.1055(a)(1)and(b),(d)
S/N	: 1002	TEST DISTANCE	: -
FCC ID	: RJGHX68V	DATE	: 10/02/2003
IC Number	: -	TEMPERATURE	: 22deg.C
POWER	: DC 13.8V	HUMIDITY	: 41%
MODE	: Tx : 458.5125MHz		

Engineer :  Kenichi Adachi

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [kHz]	Limit 2.5ppm [kHz]	Margin [kHz]
-30.0	13.8	458.512475	0.13	1.15	1.02
-20.0	13.8	458.512474	0.13	1.15	1.02
-10.0	13.8	458.512486	0.12	1.15	1.03
0.0	13.8	458.512554	0.05	1.15	1.10
10.0	13.8	458.512640	-0.04	1.15	1.11
20.0	13.8	458.512604	0.00	1.15	1.15
30.0	13.8	458.512473	0.13	1.15	1.02
40.0	13.8	458.512298	0.31	1.15	0.84
50.0	13.8	458.512208	0.40	1.15	0.75
55.0	13.8	458.512241	0.36	1.15	0.78

Temp. [deg.C]	Volt. [V]	Frequency Reading [MHz]	Frequency Error [kHz]	Limit 1.5ppm [kHz]	Margin [kHz]
20.0	15.87	458.512620	-0.02	1.15	1.13
20.0	11.73	458.512617	-0.01	1.15	1.13

UL Apex Co., Ltd.

Head Office EMC Lab.

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

Telephone : +81 596 24 8116

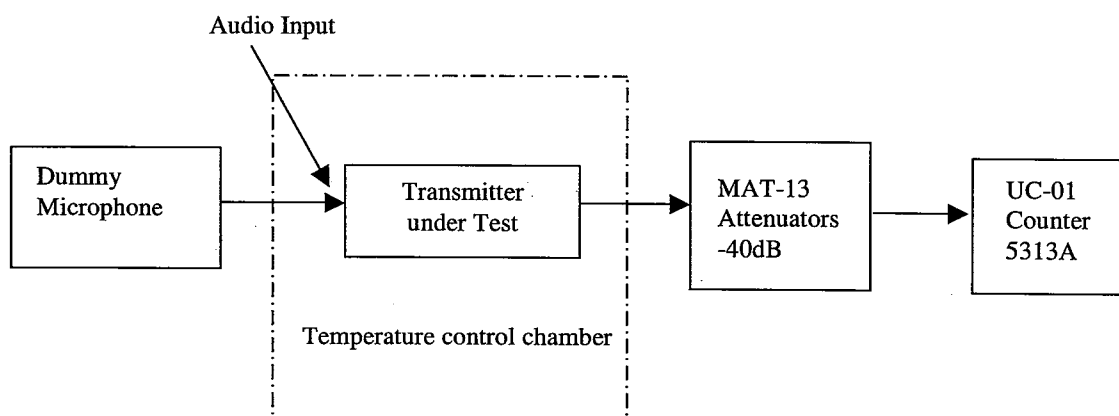
Facsimile : +81 596 24 8124

MF060b(10.04.03)

10.3 Test Result : Pass

10.4 Test Instrument : MCH-01 , UC-01 , MCC-07 , MCC-08 , MAT-13 , MDPS-01

10.5 Measurement Block Diagram



Frequency Stability(FCC Part 2.1055, Part 90.213)

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

MF060b(10.04.03)

SECTION 11: Transient Frequency Behavior

11.1 Test Procedure : TIA-603-B 2.2.19, FCC 90.214

Measurement techniques have been in accordance with TIA/EIA 603-B 2.2.19 and the FCC requirements.

11.2 Test Data

UL Apex Co., Ltd.

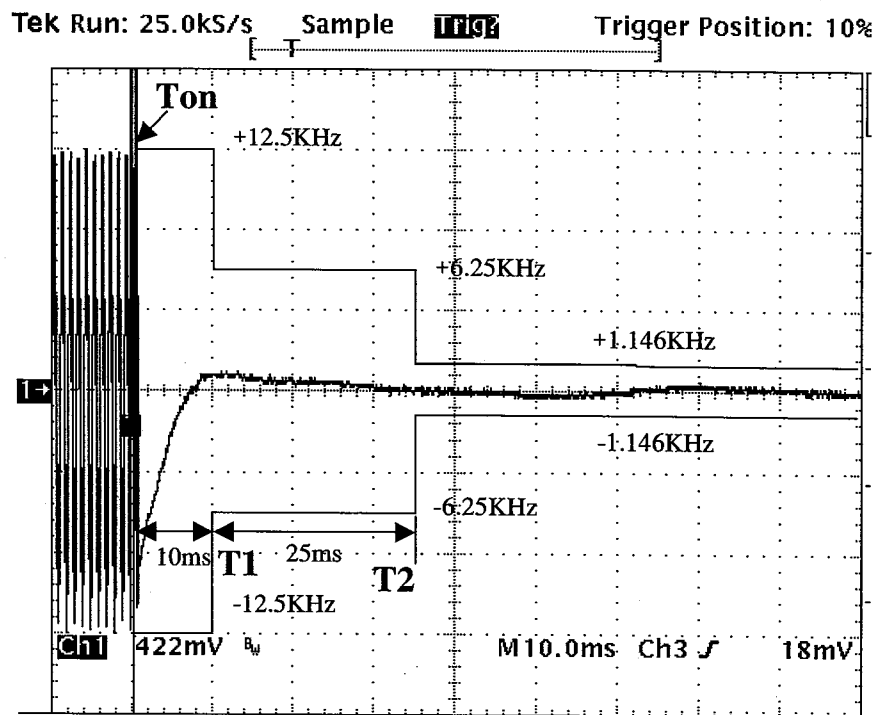
Head Office EMC Lab. Semi Anechoic chamber : No. 2

COMPANY : NEC System Integration & Construction, Ltd.
EQUIPMENT : Radio Equipment
MODEL : HX68-V
S/N : 1002
POWER : DC 13.8V
MODE : Tx : 453.5125MHz

REPORT NO : 24BE0140-HO
REGULATION : FCC Part 90 Section 90.214
TEST METHOD : TIA-603-B2.2.19
TEST DISTANCE : -
DATE : 10/22/2003
TEMPERATURE : 23deg.C
HUMIDITY : 46%

(a) Switch On Condition

Input level : -23dBm



UL Apex Co., Ltd.

Head Office EMC Lab.

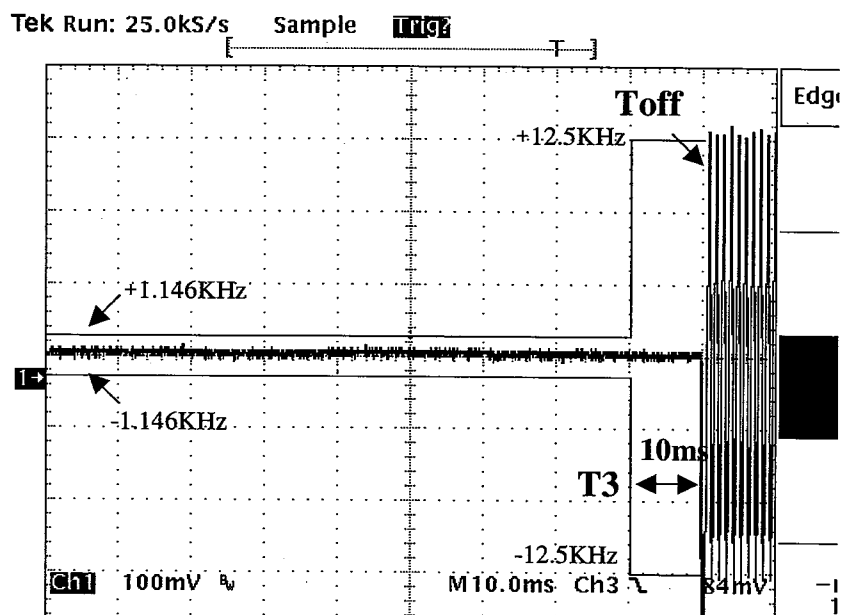
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

(b) Switch Off Condition
Input level : -23dBm



11.3 Test Result : Pass

11.4 Test Instrument : MS616B(ANRITSU), MCC-22, MPSC-01, APDDC02, MSG-02, MDT-02, MTA-04, MTA-05, MAT-15, MAT-10, MCC-04, MST-01, MDPS-01, MPM-04, MPSE-04

UL Apex Co., Ltd.

Head Office EMC Lab.

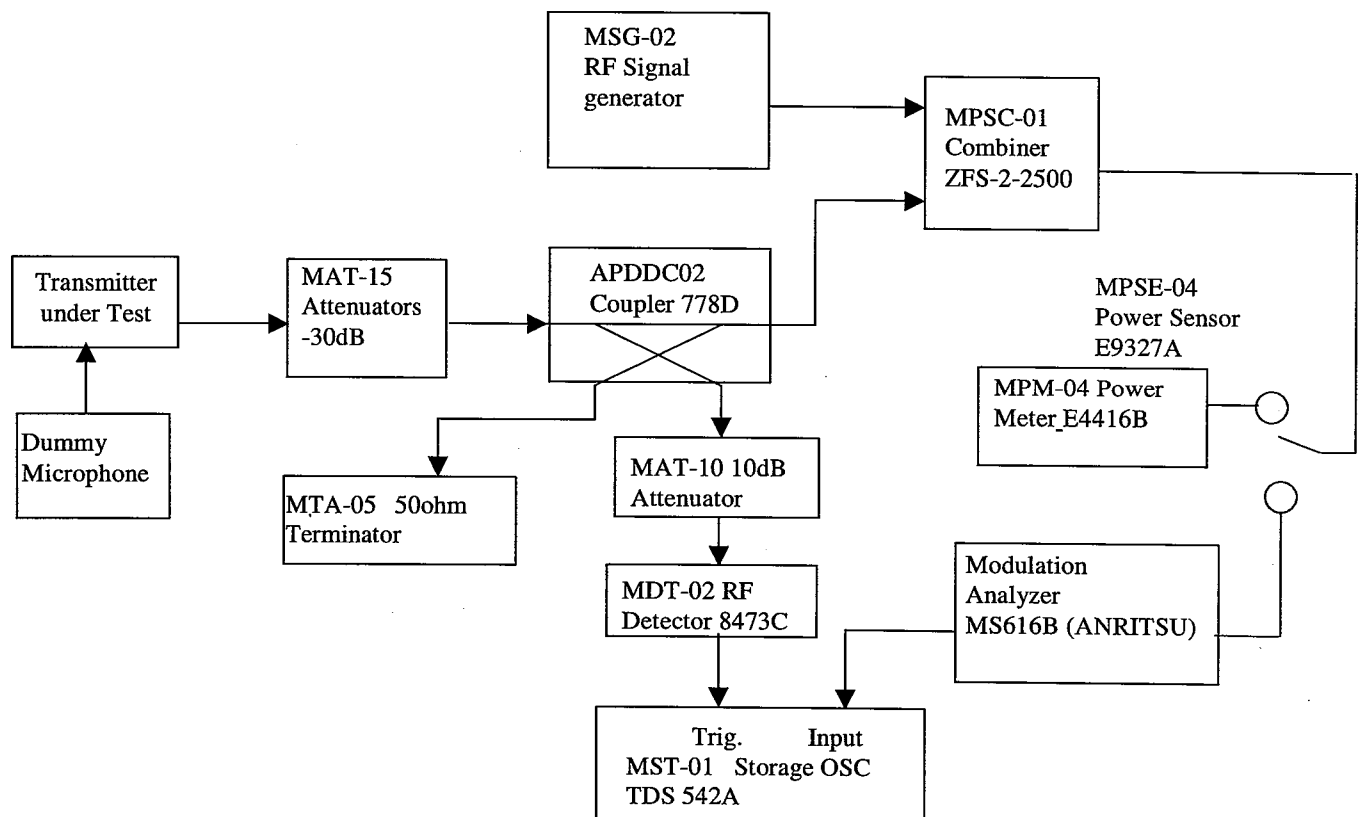
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

11.5 Measurement Block Diagram



Transient Frequency Behavior (TIA-603-B 2.2.19, FCC Part 90.214)

UL Apex Co., Ltd.

Head Office EMC Lab.

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

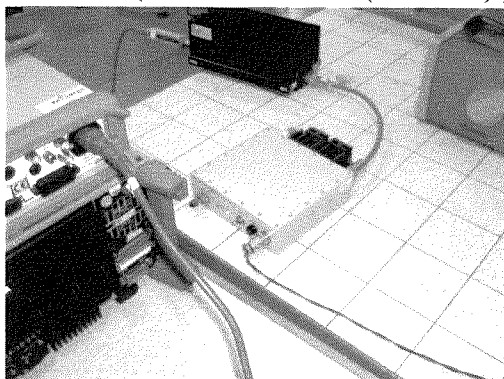
Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

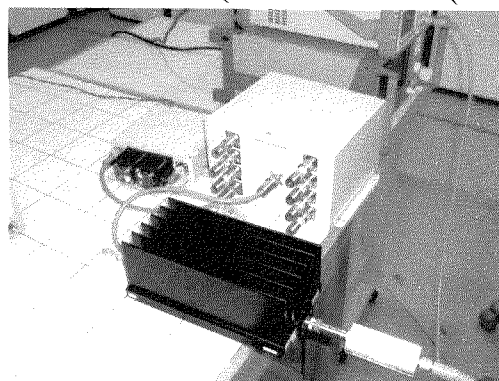
MF060b(10.04.03)

APPENDIX 1: Photographs of test setup

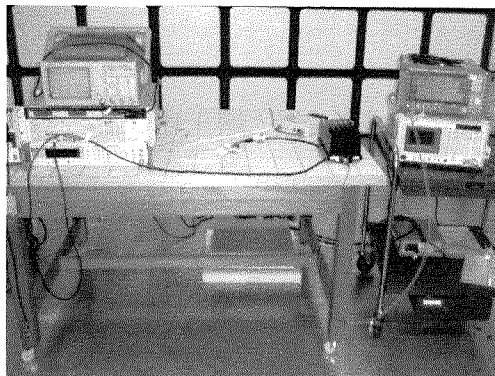
RF Power(None Combiner(HX69-V))



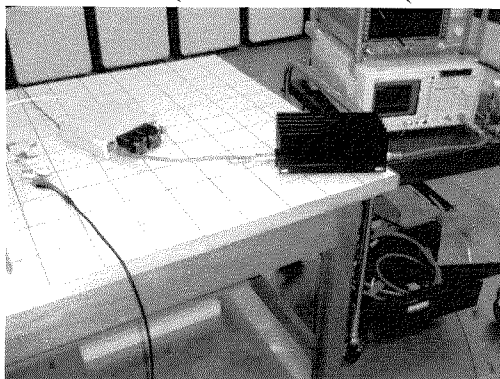
RF Power(With Combiner(HX69-V))



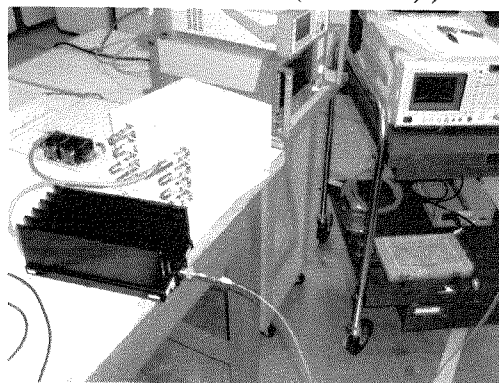
Modulation Characteristics



Emission Bandwidth(None Combiner(HX69-V))



(With Combiner(HX69-V))



UL Apex Co., Ltd.

Head Office EMC Lab.

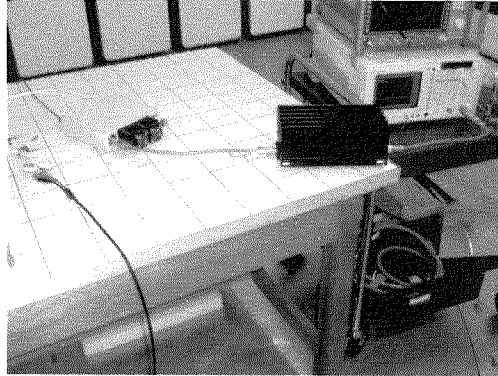
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

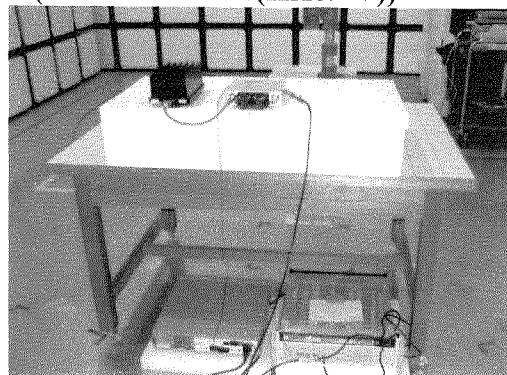
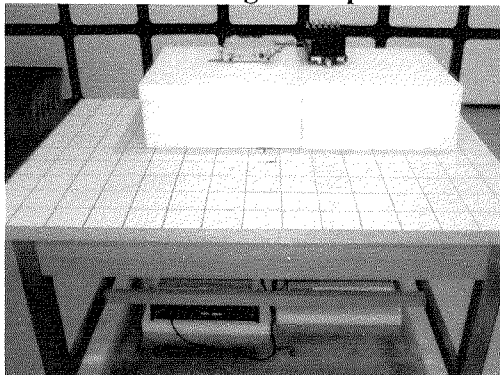
Facsimile : +81 596 24 8124

MF060b(10.04.03)

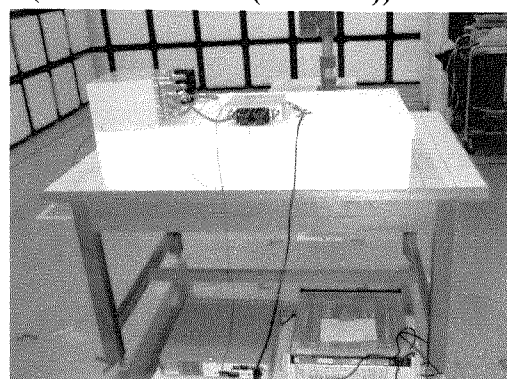
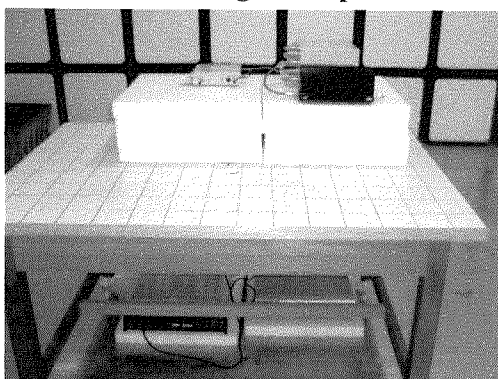
Spurious Emission at Antenna Terminals



Field Strength of Spurious Emission(None Combiner(HX69-V))



Field Strength of Spurious Emission(With Combiner(HX69-V))



UL Apex Co., Ltd.

Head Office EMC Lab.

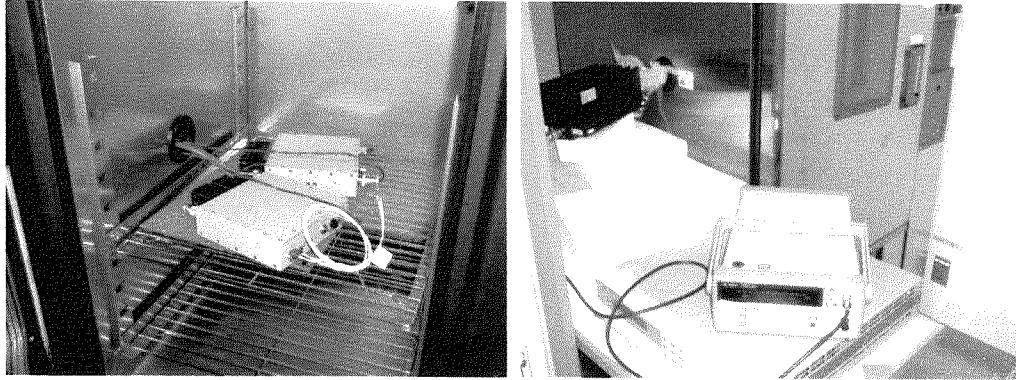
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b(10.04.03)

Frequency Stability



Transient Frequency Behavior



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

MF060b(10.04.03)

APPENDIX 2: Test Instruments

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	1, 2	2003/04/11 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	1, 2	2003/01/31 * 12
SA-07	Spectrum Analyzer	Advantest	R3273	1, 2	2002/12/10 * 12
MCC-10	Coaxial cable	Storm	90-195-394	1, 2	2003/03/26 * 12
MAT-13	Attenuator (40dB)	Weinschel Corp	53-40-33	1, 2	2002/12/24 * 12
MAT-15	Attenuator (30dB)	Agilent	US40010300	1	2002/12/24*12
MPSE-04	Power sensor	Agilent	E9327A	1	2003/03/18 * 12
MPM-04	Power Meter	Agilent	E4416A	1	2003/03/13 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	2	2003/05/08 * 12
MPA-02	Pre Amplifier	Agilent	87405A	2	2003/04/17 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	2	2002/12/24 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	2	2003/04/28 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	2	2003/04/28 * 12
MCC-25	Microwave Cable	Suhner	SUCOFLEX104	2	2003/06/30 * 12
MPA-01	Pre Amplifier	Agilent	8449B	2	2003/02/08 * 12
MCC-24	Microwave Cable	Storm	-	2	2003/04/30 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	2	2003/01/11 * 12
MCC-07	coaxial cable	-	-	1, 2	2003/02/06 * 12
MCC-08	coaxial cable	-	-	1, 2	2003/02/07 * 12
MTA-04	Termination	MCL	NTRM-50	1, 2	2003/03/26 * 12
MTA-05	Termination	MCL	NTRM-50	1, 2	2003/03/26 * 12
MCH-01	Temp.&Humid. Chamber	Tabai Spec	PL-2KP	1	2002/12/18 * 12
UC-01	Universal Counter	Agilent	53131A	1	2002/10/24 * 12
MSG-02	Signal Generator	Rohde & Schwarz	SML03	1	2003/08/26 * 12
MCC-22	Microwave Cable	Storm	-	1	2004/04/29 * 12
MAT-10	Attenuator (10dB)	Weinschel Corp	2	1	2002/12/24 * 12
APDDC02	Dual Directional Coupler	Hewlett Packard	778D	1	Pre Check
MDT-02	Detector	Agilent	8473C	1	Pre Check
MPSC-01	Power splitters/Combiners	Mini-Circuit	ZFSC-2-2500	1	2003/08/27 * 12
MST-01	Digitizing Oscilloscope	Sony Tektronix	TDS420A	1	2003/02/24 * 12
AV01-05	Audio Analyzer	Rohde & Schwarz	UPA	1, 2	2003/08/13 * 12
MDPS-01	DC Power Supply	Agilent	6642A	1, 2	Pre Check
-	Radio communication monitor	Rohde & Schwarz	CMS54	1	2003/08/21 * 12
-	Modulation Analyzer	ANRITSU	MS616B	1	Pre Check

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

1. Conducted emission at Antenna Terminals
2. Radiated emission

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

MF060b(10.04.03)