

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-C	TEST DISTANCE	3m		
S/N	1001	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 (453.5125MHz)	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	48.3	41.7	-52.7	-59.0	-20.0	32.7	39.0	Operating
2	502.88	36.2	38.5	-66.3	-62.5	-20.0	46.3	42.5	Operating
3	907.03	75.4	76.6	-24.7	-22.7	-20.0	4.7	2.7	Operating
4	1240.57	31.2	32.7	-71.9	-66.8	-20.0	51.9	46.8	Operating
5	1360.54	75.7	76.0	-27.4	-23.5	-20.0	7.4	3.5	Operating
6	1814.05	72.5	69.6	-30.6	-29.9	-20.0	10.6	9.9	Operating
7	2267.56	81.0	72.2	-22.1	-27.3	-20.0	2.1	7.3	Operating
8	2721.08	74.3	65.6	-28.8	-33.9	-20.0	8.8	13.9	Operating
9	2894.59	50.8	49.8	-52.3	-49.7	-20.0	32.3	29.7	Operating
10	3174.59	81.2	75.2	-21.9	-24.3	-20.0	1.9	4.3	Operating
11	3308.10	48.8	47.8	-54.3	-51.7	-20.0	34.3	31.7	Operating
12	3628.14	64.0	61.3	-39.1	-38.2	-20.0	19.1	18.2	Operating
13	3721.62	63.5	61.6	-39.6	-38.0	-20.0	19.6	18.0	Operating
14	4081.61	76.4	69.9	-26.7	-29.6	-20.0	6.7	9.6	Operating
15	4535.13	65.8	64.2	-37.3	-35.3	-20.0	17.3	15.3	Operating
16	4988.60	63.0	61.5	-40.1	-38.0	-20.0	20.1	18.0	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 = 40.1dBm

- Attenuation limits = $50 + 10\log(\text{Carrier Power}) = 60.1\text{dB}(-20.0\text{dBm})$

- Attenuation = Carrier Power - Spurious Power > 60.1dB(-20.0dBm)

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

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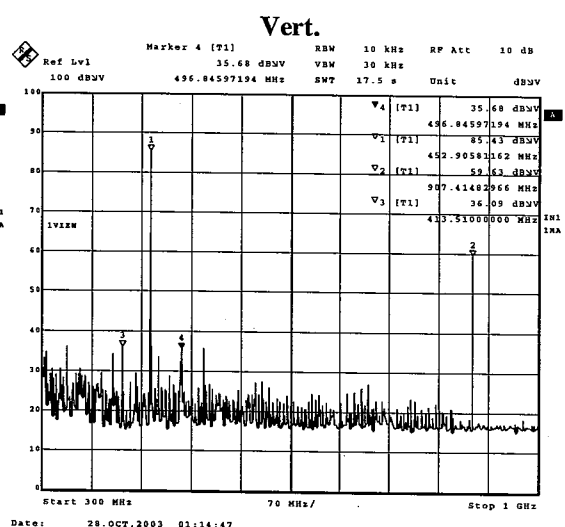
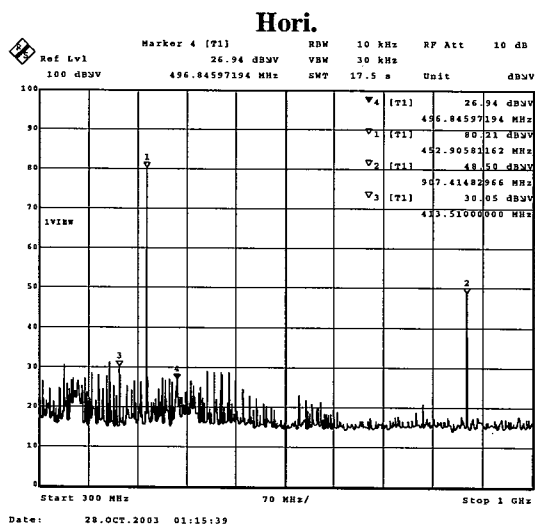
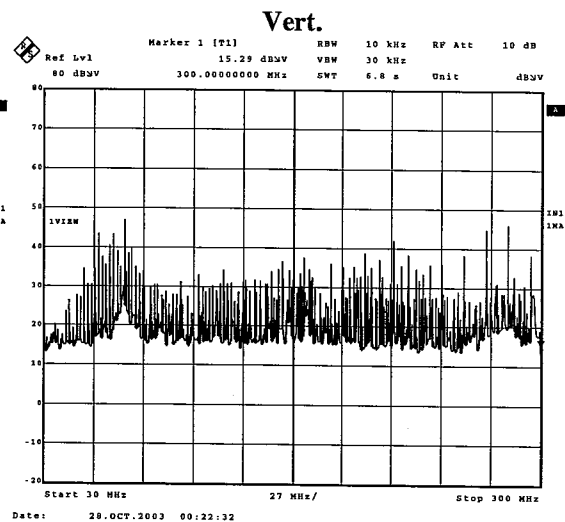
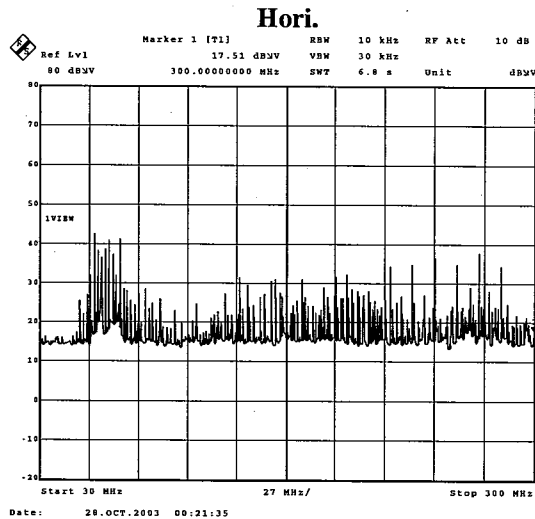
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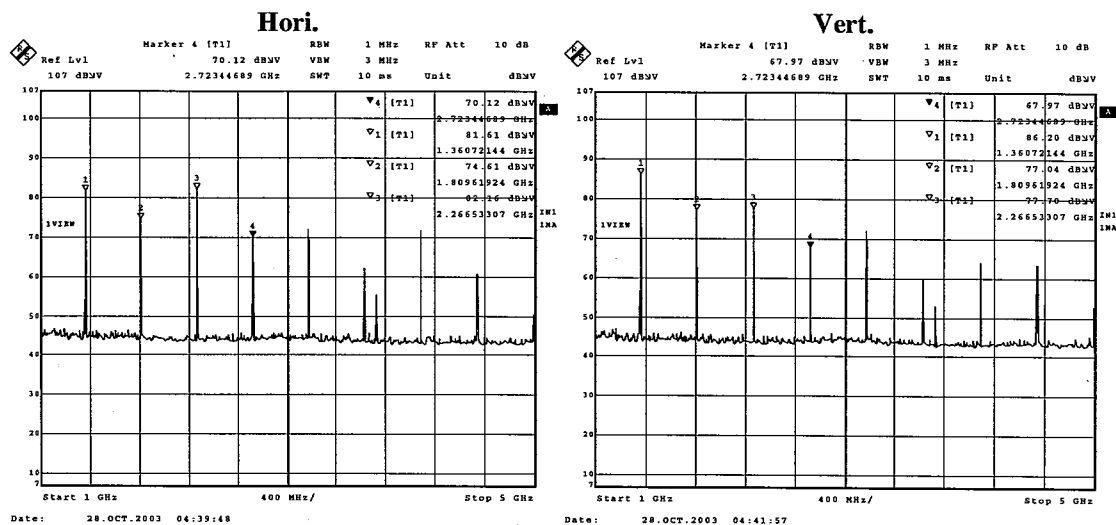
Facsimile : +81 596 24 8124

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



HX68-C + HX69-C (Transmitting)
Spurious Emission(Radiated) (Above 1GHz-)



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

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COMPANY	NEC System Integration & Construction, Ltd.	REPORT NO	24BE0140-HO
EQUIPMENT	Radio Equipment	REGULATION	FCC 2.1053
MODEL	HX68-C + HX69-C	TEST DISTANCE	3m
S/N	1001, 1003	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 (453.5125MHz)	HUMIDITY	41% 50% 41%
POSITION	-	CALIBRATION	OK
TX ANTENNA HIGH	1.0m		
EUT 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	413.52	48.5	42.9	-52.5	-57.8	-20.0	32.5	37.8	Operating
2	502.88	36.1	38.3	-66.4	-62.7	-20.0	46.4	42.7	Operating
3	907.03	72.6	73.4	-27.5	-25.9	-20.0	7.5	5.9	Operating
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15	4535.13	66.1	65.9	-37.0	-33.6	-20.0	17.0	13.6	Operating
16	4988.60	61.0	62.2	-42.1	-37.3	-20.0	22.1	17.3	Operating

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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 = 32.5dBm

- Attenuation limits = $50 + 10\log(\text{Carrier Power}) = 52.5\text{dB}(-20.0\text{dBm})$

- Attenuation = Carrier Power - Spurious Power > 52.5dB(-20.0dBm)

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

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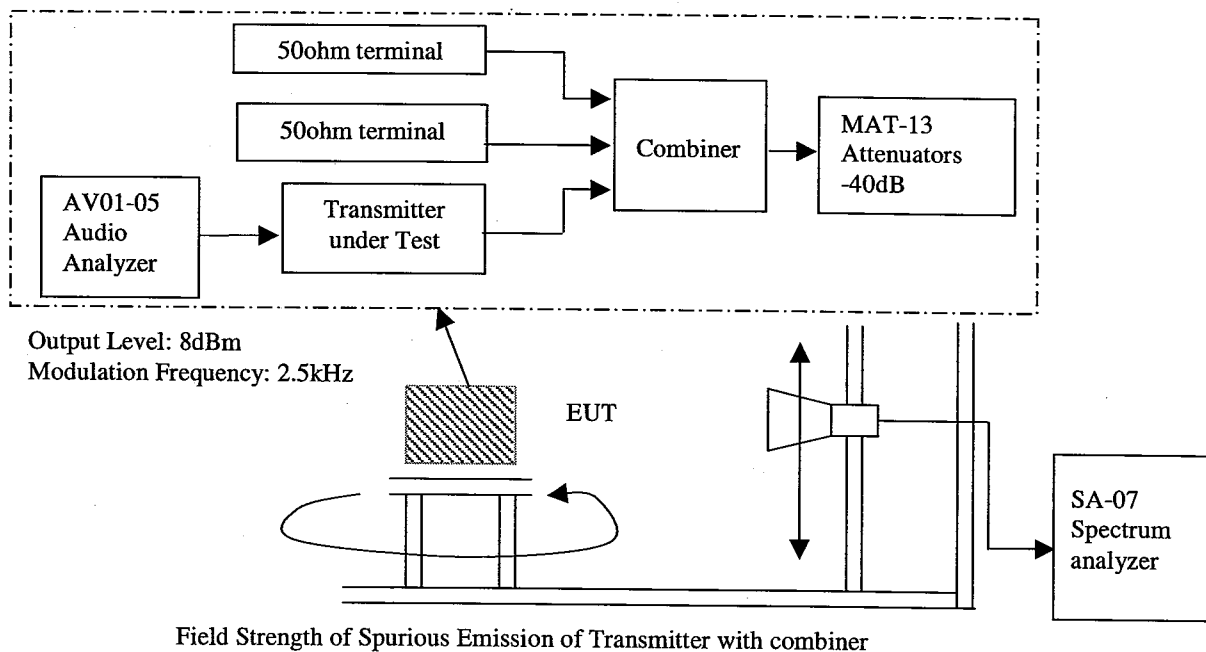
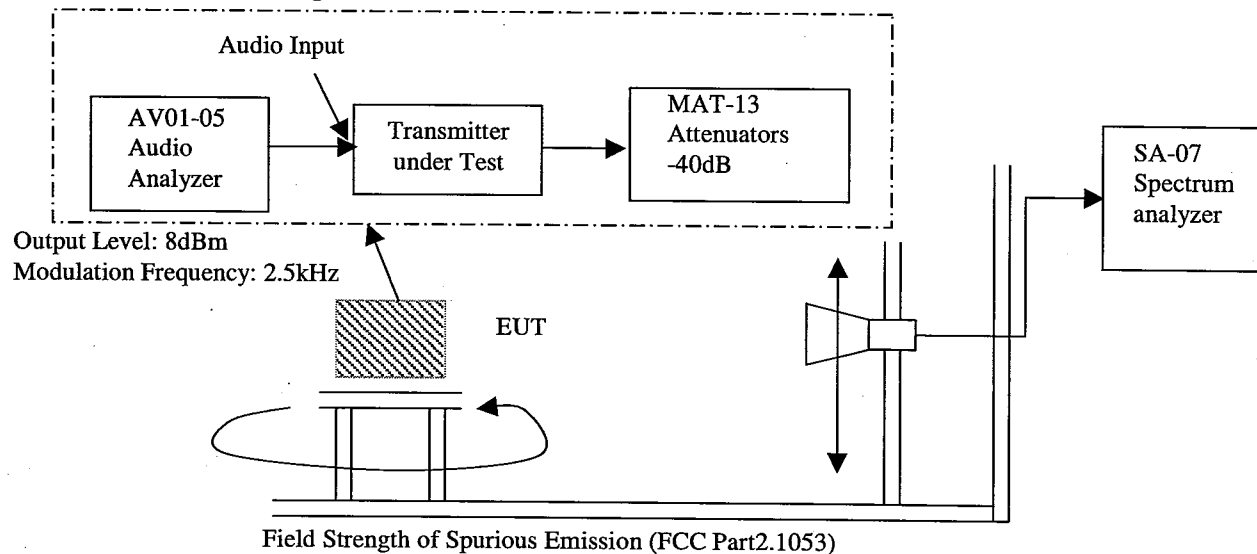
Facsimile : +81 596 24 8124

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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



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SECTION 10: Frequency Stability

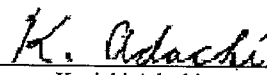
10.1 Test Procedure : FCC 2.1055, FCC 90.213

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 (Base)	REGULATION	: Fcc Part 90 Section 90.213
MODEL	: HX68-C	TEST METHOD	: Fcc Part 2 Section 2.1055(a)(1)and(b),(d)(1)
S/N	: 1001	TEST DISTANCE	: -
FCC ID	: RJGHX68C	DATE	: 10/02/2003
IC Number	: -	TEMPERATURE	: 22deg.C
POWER	: DC 13.8V	HUMIDITY	: 41%
MODE	: Tx : 453.5125MHz		


Engineer : Kenichi Adachi

Temp.	Volt.	Frequency Reading	Frequency Error	Limit 1.5ppm	Margin
[deg.C]	[V]	[MHz]	[kHz]	[kHz]	[kHz]
-30.0	13.8	453.512592	-0.02	0.68	0.66
-20.0	13.8	453.512443	0.13	0.68	0.55
-10.0	13.8	453.512456	0.12	0.68	0.56
0.0	13.8	453.512504	0.07	0.68	0.61
10.0	13.8	453.512611	-0.03	0.68	0.65
20.0	13.8	453.512577	0.00	0.68	0.68
30.0	13.8	453.512493	0.08	0.68	0.60
40.0	13.8	453.512353	0.22	0.68	0.46
50.0	13.8	453.512278	0.30	0.68	0.38
55.0	13.8	453.512320	0.26	0.68	0.42

Temp.	Volt.	Frequency Reading	Frequency Error	Limit 1.5ppm	Margin
[deg.C]	[V]	[MHz]	[kHz]	[kHz]	[kHz]
20.0	15.87	453.512623	-0.05	0.68	0.63
20.0	11.73	453.512624	-0.05	0.68	0.63

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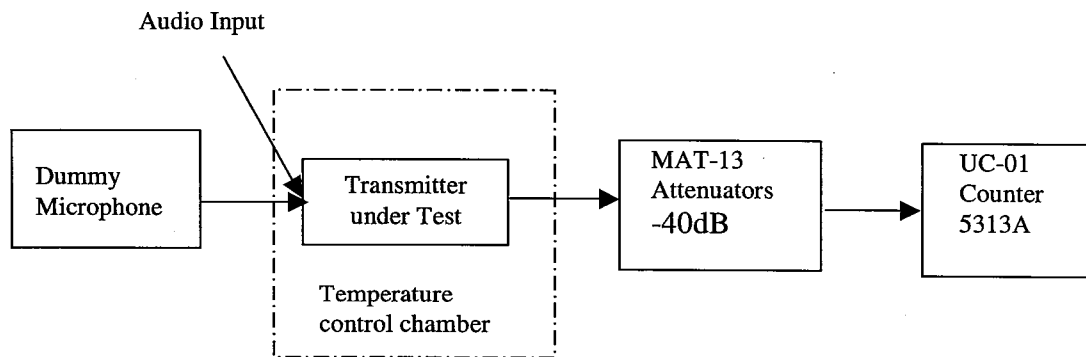
Facsimile : +81 596 24 8124

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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)

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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

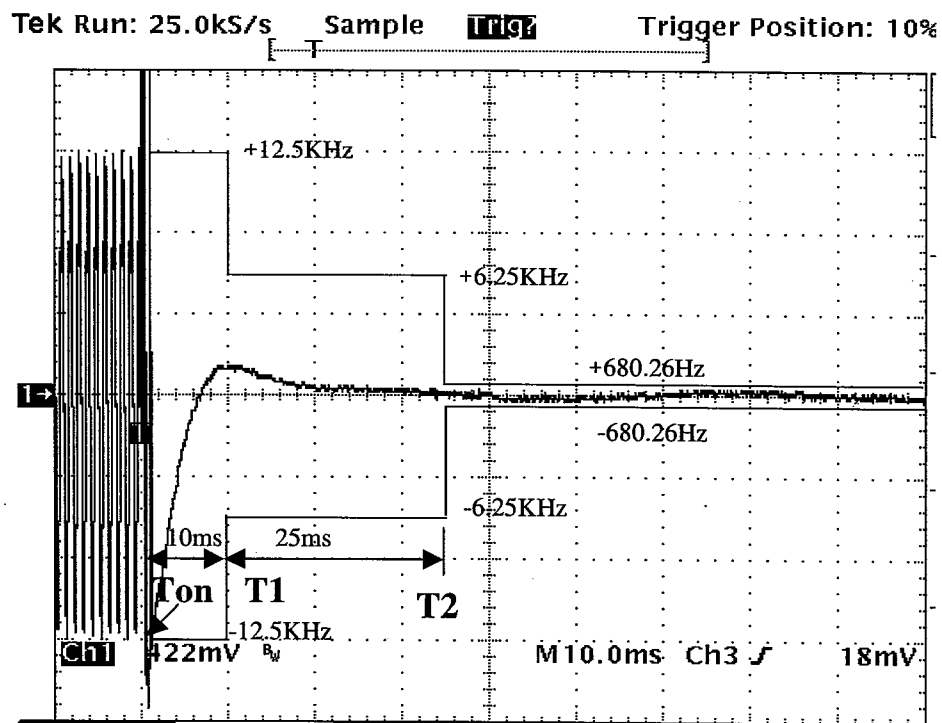
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Head Office EMC Lab. No.3 measurement room

COMPANY	: NEC System Integration & Construction, Ltd.	REPORT NO	: 24BE0140-HO
EQUIPMENT	: Radio Equipment	REGULATION	: FCC Part 90 Section 90.214
MODEL	: HX68-C	TEST METHOD	: TIA-603-B2.2.19
S/N	: 1001	TEST DISTANCE	: -
POWER	: DC 13.8V	DATE	: 10/22/2003
MODE	: Tx (453.5125MHz)	TEMPERATURE	: 23deg.C
		HUMIDITY	: 46%

(a) Switch On Condition

Input SG level : -23dBm



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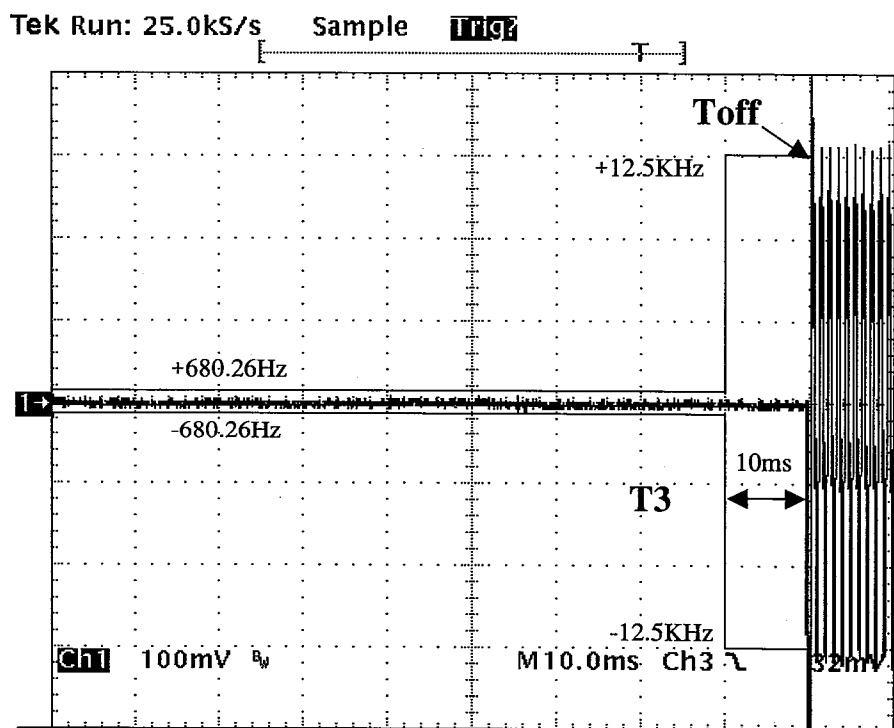
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(b) Switch Off Condition
Input SG level : -23dBm



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

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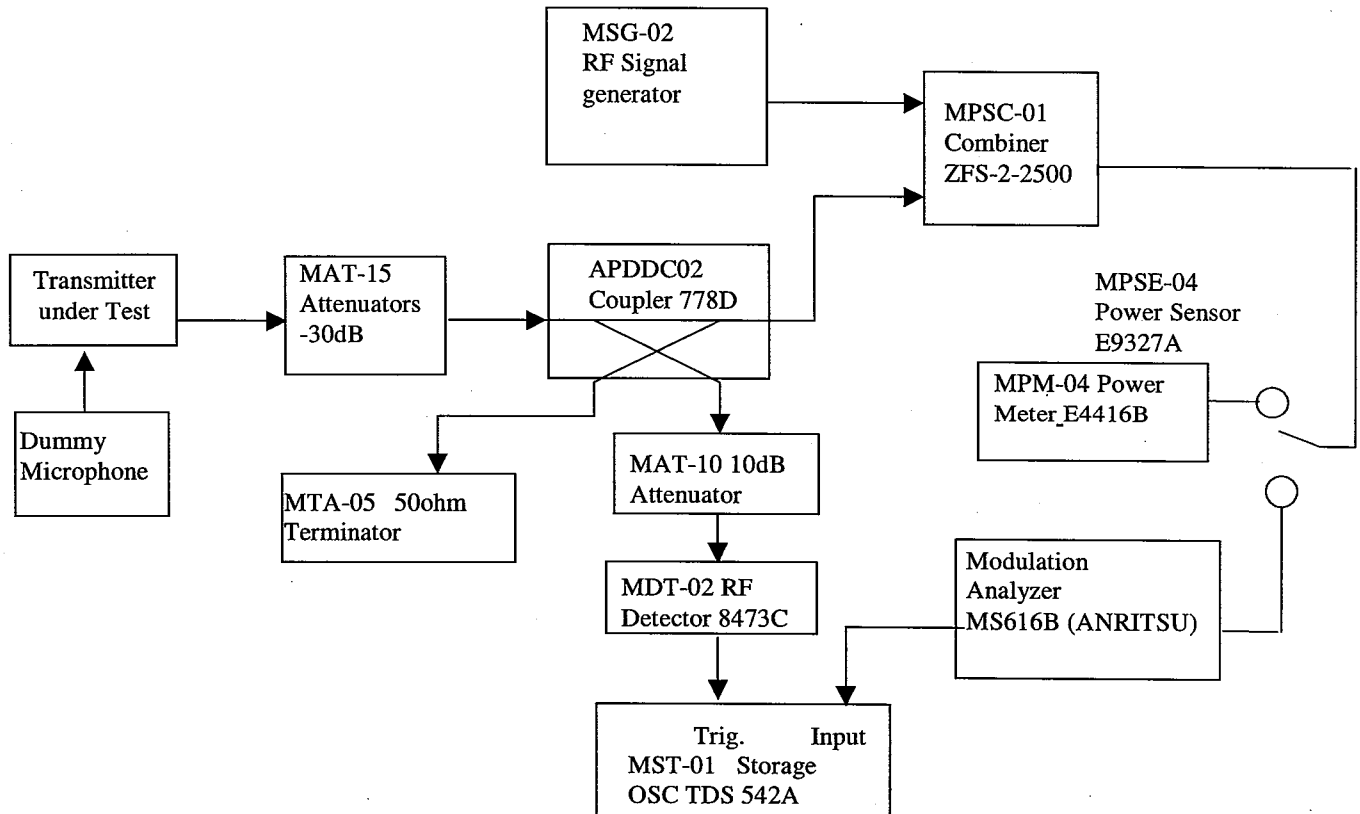
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11.5 Measurement Block Diagram



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

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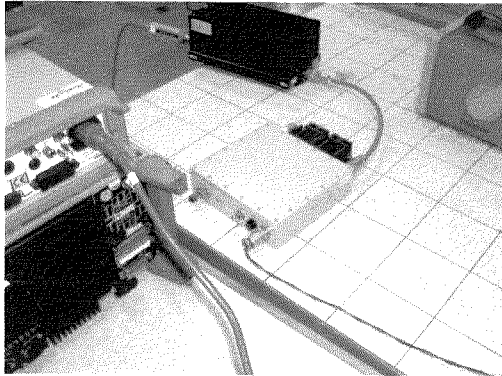
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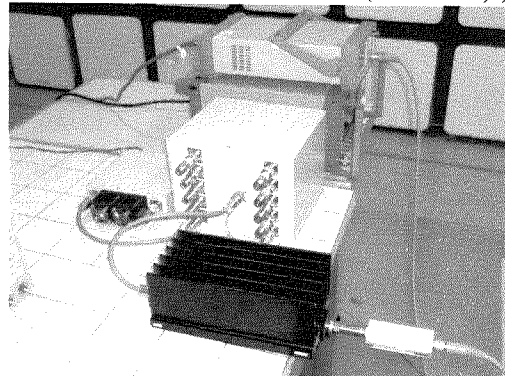
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APPENDIX 1: Photographs of test setup

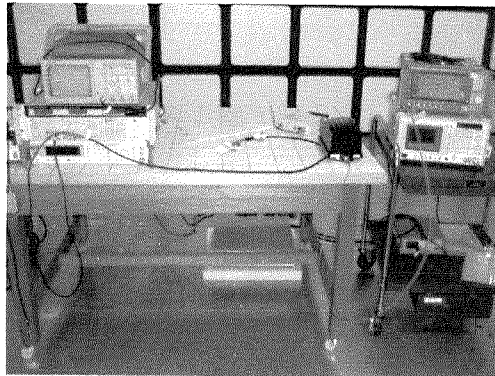
RF Power(None Combiner(HX69-C))



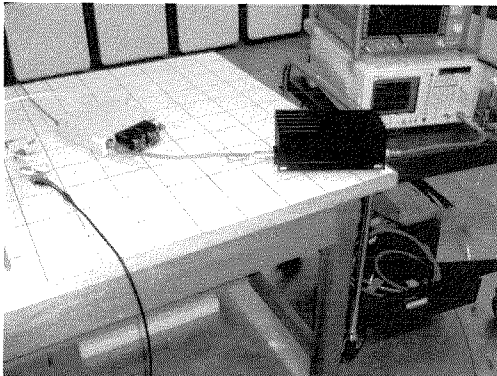
RF Power(With Combiner(HX69-C))



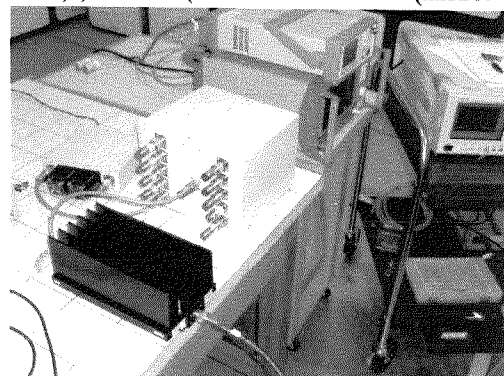
Modulation Characteristics



Emission Bandwidth(None Combiner(HX69-C))



(With Combiner(HX69-C))



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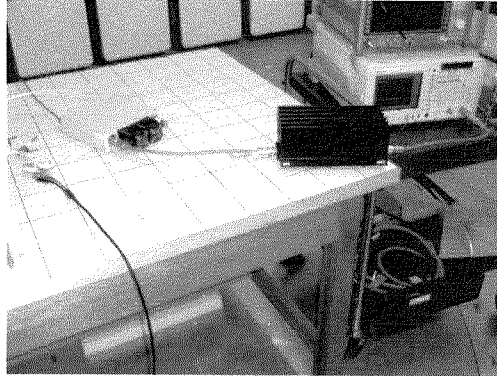
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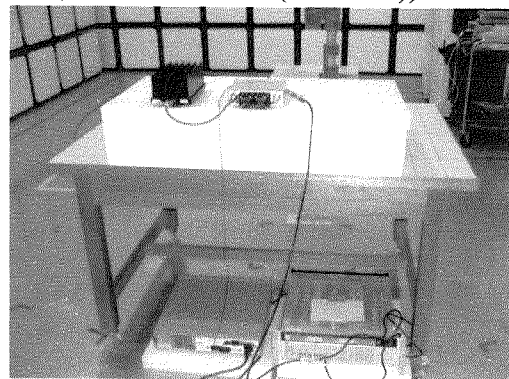
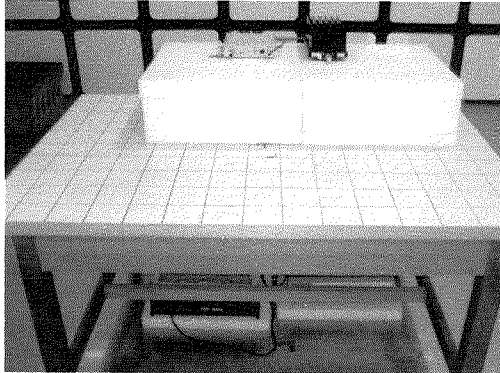
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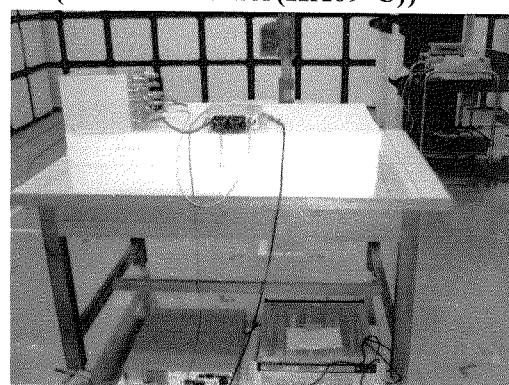
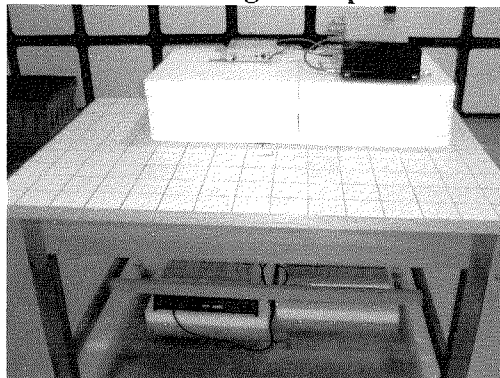
Spurious Emission at Antenna Terminals



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



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



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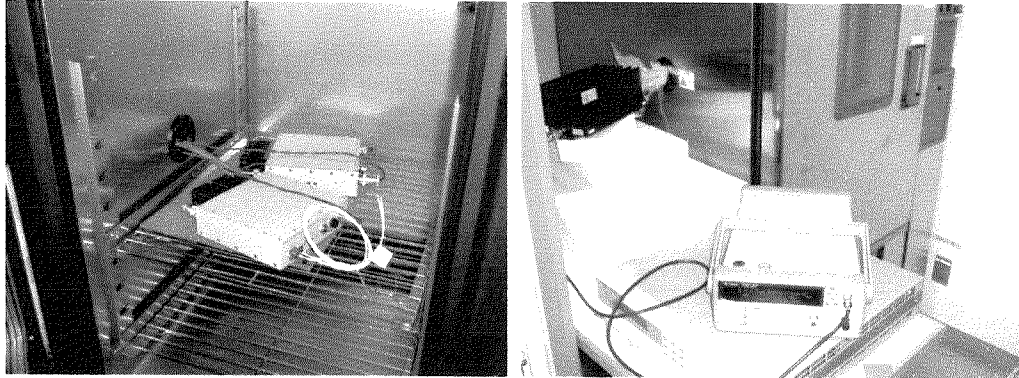
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Frequency Stability



Transient Frequency Behavior



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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 Espec	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

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