



TEST REPORT

REGULATION :

FCC Part 2, 22, 74, 90, 90.210,
RSS-119 Issue 9

Applicant	Testing Laboratory
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Equipment type Trademark Model(s) Serial No. FCC ID IC CN and UPN Measurement Method Deviation from standard(s) Test Result Report Number Report issue date	UHF DIGITAL TRANSCEIVER KENWOOD NX-800H-K2 / TK-5820-K2 None K44378703 282F-378703 ANSI/TIA-603-C-2004 / RSS-119 Issue 9(2007), RSS-Gen Issue 2(2007) No deviation Complied JK08080002A September 05, 2008

This equipment has been shown to be capable of compliance with the applicable standard(s) as indicated in the test report.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

This test report shall not be reproduced partially, or in full, without the prior written approval of Intertek Japan K. K. The results and statements contained in this report pertain only to the equipment evaluated.

The test report JK08080002 was superseded by this test report.

Approved by

Junichi Okada

[Site Manager]

Tested by

Kazuo Masuda

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SECTION 1. GENERAL INFORMATION

Description of Test Item	
Kind of EUT	: UHF DIGITAL TRANSCEIVER
Condition of EUT	: Prototype
Type	: Mobile type
Trademark	: KENWOOD

Test Performed	
EUT Received	: June 24, 2008
Test started	: August 04, 2008
Test completed	: August 29, 2008
Temperature	: 21 to 25 degree C
Humidity	: 48 to 69 %
Atmospheric	: 101.0 to 102.5 kPa
Voltage	: DC 13.6 V +/- 20 %
Current	: 13.0 A Maximum
Frequency	: None

Test Tracability	
Tracability to national standards of test result is achieved by means of calibration tractability to national or international standards.	

Abbreviations	
EUT = Equipment Under Test	Cal Exp. = Calibration Expire
D.R.G. Antenna = Double Rigid Guide Antenna	RBW = Resolution Band Width
AVG = Average	VBW = Video Band Width

In Accordance with FCC Rules and Regulations, Volume II, Part 2 and 90**Sub-part 2.1033**

(c)(1) Applicant and Manufacture Information	
APPLICANT	
Company	: Kenwood Corporation
Address	: 1-16-2, Hakusan, Midori-ku, Yokohama-shi, Kanagawa, 226-8525 Japan
Contact Person	: Tamaki Shimamura Manager, Communications Equipment Division
MANUFACTURER	
Company	: Kenwood Corporation
Address	: 1-16-2, Hakusan, Midori-ku, Yokohama-shi, Kanagawa, 226-8525 Japan
(c)(2) FCC ID	
FCC ID	: K44378703
Model number	: NX-800H-K2 / TK-5820-K2
Serial number	: None
(c)(3) Instruction Manual(S)	
Instruction manual(s)	: Please refer to attached Exhibits F
(c)(4) Type of Emission	
Emission Designation	: 16K0F3E(Wide) / 11K0F3E(Narrow) 14K4F1D(Wide) 8K30F1E(Narrow) / 8K30F1D(Narrow) / 8K30F7W(Narrow) 8K10F1E(Narrow) / 8K10F1D(Narrow) 4K00F1E(Very Narrow) / 4K00F1D(Very Narrow) / 4K00F7W(Very Narrow) 4K00F2D(Very Narrow)
(c)(5) Frequency range	
Frequency Range	: 406.1 to 470 MHz (CFR) / 406.1 to 430 MHz and 450 to 470 MHz (RSS)
(c)(6) Power Rating	
Output Power	: 10 to 45 W
Type	: Continuously Variable
(c)(7) Maximum Power Rating	
Output Power	: 45 W
Other Information	
Number of Channel	: 250
Maximum Deviation	: 5 kHz / 2.5 kHz
Frequency Stability	: 1 ppm
Antenna Impedance	: 50 Ω Norminal
Note	

SECTION 2. TEST AND MEASUREMENT DATA

All test and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J and Industry Canada as the following individual parts:

FCC Rule	Test Item	Tested
Part 21	Domestic Public Fixed radio Services	N.A.
Part 22	Non Cellular	YES
Part 22	Public Mobile Services	N.A.
Part 22	Subpart H - Cellular Radiotelephone Service	N.A.
Part 22	Alternative technologies and auxiliary service	N.A.
Part 23	International Fixed Public Radiocommunication service	N.A.
Part 24	Personal Communications Services	N.A.
Part 74	Experimental Radio Auxiliary , Special Broadcast and Other Program Distributional Services	YES
Part 80	Stations in the Maritime Services	N.A.
Part 80	Subpart E - general Technical Standards	N.A.
Part 80	Subpart F - Equipment Authorization for Compulsory Ships	N.A.
Part 80	Subpart K - Private Coast Stations and Marine Utility Stations	N.A.
Part 80	Subpart S - Compulsory radiotelephone Installations for Small Passenger Boats	N.A.
Part 80	Subpart T - Radiotelephone Installation Required for Vessels on the Great Lakes	N.A.
Part 80	Subpart U - Radiotelephone Installations Required by the Bridge-to-Bridge Act	N.A.
Part 80	Subpart V - Emergency Position Indicating Radiobeacons (EPIRB'S)	N.A.
Part 80	Subpart W - Global Maritime Distress and Safety System (GMDSS)	N.A.
Part 80	Subpart X - Voluntary Radio Installations	N.A.
Part 87	Aviation Services	N.A.
Part 90	Private Land Mobile radio Services	YES
Part 94	Private Operational - Fixed Microwave Service	N.A.
Part 95	Subpart A - General Mobile radio Service	N.A.
Part 95	Subpart C - Radio Control (R/C) radio Service	N.A.
Part 95	Subpart D - Citizens Band (CB) Radio Service	N.A.
Part 95	Subpart E -Family radio Service	N.A.
Part 95	Subpart F -Interactive Video and Data Service (IVDS)	N.A.
Part 97	Amateur Radio Service	N.A.
Part 101	Fixed Microwave Service	N.A.

IC Rule	Test Item	Tested
RSS-119	Land Mobile and Fixed Radio Transmitters and Receivers	YES
RSS-Gen	General Requirements and Information for the Certification of Radiocommunication Equipment	YES

SECTION 3. INFORMATION ABOUT EUT AND SUPPORT EQUIPMENT(S)**List of System Configuration**

Symbol	Item	Model No.	Serial No.	Manufacture	Notes
A	UHF DIGITAL TRANSCEIVER	NX-800H-K2 TK-5820-K2	None	Kenwood Corporation	EUT

Port(s)/Connector(s)

Port Name	Connector Type	Connector Pin	Notes
Microphone	Modular Jack	8 pin	
Speaker	Jack	2 pin	
ACC	D-Sub	25 pin	
Antenna	M	2 pin	

Support Equipment(s)

Symbol	Item	Model No.	Serial No.	Manufacture	FCC ID
B	CONTROL HEAD REMOTE KIT	KRK-10	None	KENWOOD	N/A
C	VOICE GUIDE & STORAGE UNIT	VGS-1	None	KENWOOD	N/A
D	SECURE CRYPTOGRAPHIC MODULE	KWD-AE20	None	KENWOOD	N/A
E	KEYPAD MICROPHONE	KMC-36	None	KENWOOD	N/A
F	EXTERNAL SPEAKER	KES-3	None	KENWOOD	N/A
G	IGNITION SENSE Cable	KCT-46	None	KENWOOD	N/A
H	Dummy Load	CT-150NP	None	TAMAGAWA	N/A
I	DC Power Supply	PS-3020	None	Daiwa	N/A

Used Cable(s)

No.	Name	Length (m)	Shield	Connector
1	KEYPAD MICROPHONE Cable	0.50	No	Plastic
2	CONTROL HEAD REMOTE KIT Cable	7.00	Yes	-
3	EXTERNAL SPEAKER Cable	3.00	No	Plastic
4	Antenna Cable	0.90	Yes	Metal
5	IGNITION SENSE Sub Cable	0.12	No	Metal
6	IGNITION SENSE Cable	3.20	No	Metal
7	ACC Cable	1.70	Yes	Metal
8	DC Sub Cable for EUT	0.25	No	Plastic
9	DC Cable for EUT	3.00	No	Plastic
10	Power Cable for DC Power Supply	1.70	No	-

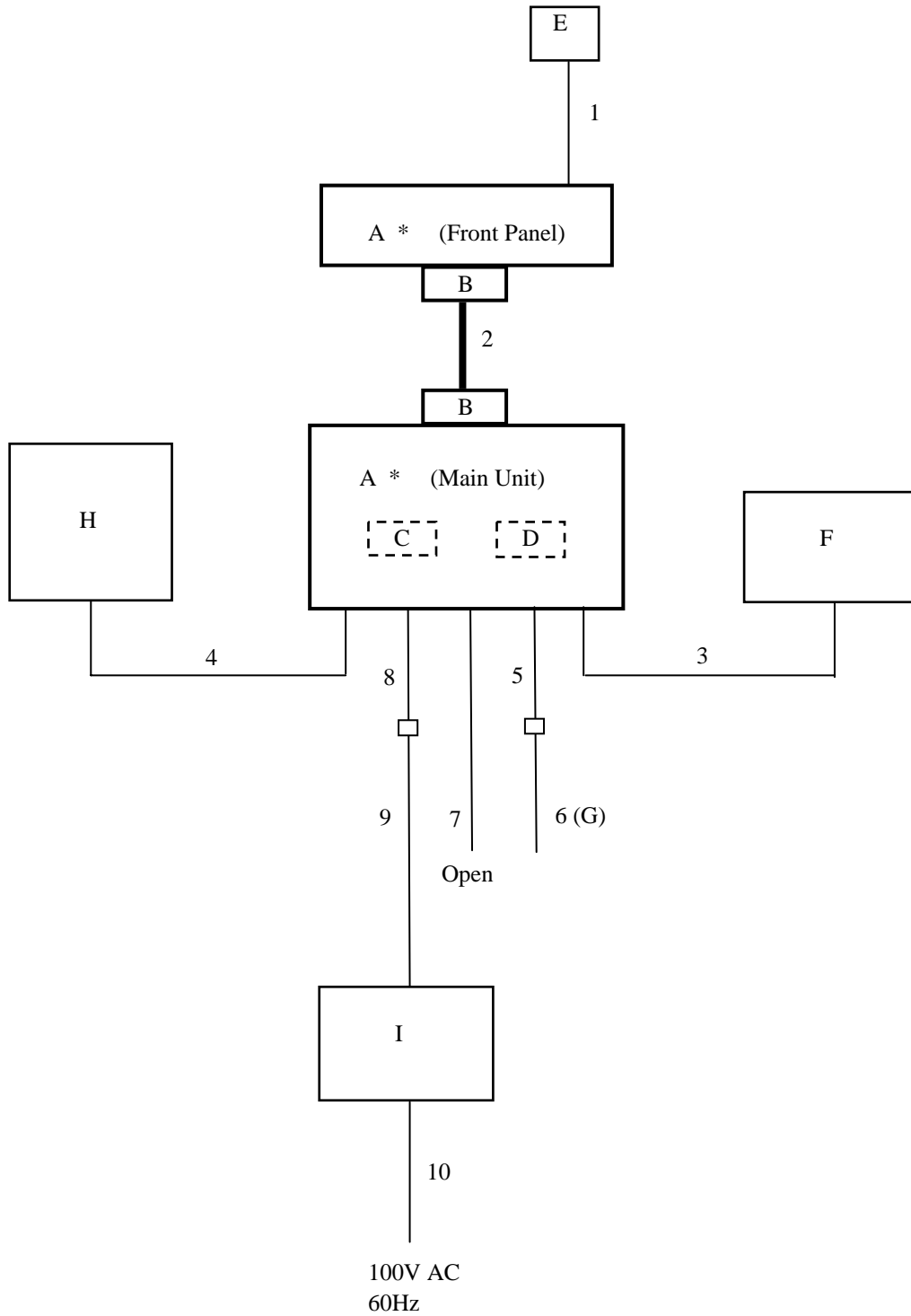
Note: No.5 IGNITION SENSE Sub Cable is fixed.

Details of Configuration and Connection

Example: Case of Section 5.3 and 5.10 Radiation Test

* : EUT

□ : Joint Connector



SECTION 4. MEASUREMENT RESULT

FCC Part2	Part22	Part74	Part90	Rule RSS-119	TEST ITEM	RESULTS
2.1046 (a)	-	74.461	-	5.4	Carrier Output Power (Conducted)	PASS
2.1051	-	-	90.210	5.8	Unwanted Emissions (Transmitter Conducted)	PASS
2.1053 (a)	-	-	90.210	5.8	Field Strength of Spurious Radiation	PASS
2.1049 (c) (1)	22.359, 357 (a) (1)	74.462	90.210	5.8	Emission Masks (Occupied Bandwidth)	PASS
-	-	-	90.214	5.9	Transient Frequency Behavior	PASS
2.1047 (a)	-	-	90.242 (b) (8)	-	Audio Low Pass Filter (Voice Input)	PASS
2.1047 (a)	-	-	-	-	Audio Frequency Response	PASS
2.1047 (b)	-	-	-	-	Modulation Limiting	PASS
2.1055 (a) (1)	22.355	74.464	90.213 (a)	5.3	Frequency Stability (Temperature Variation)	PASS
2.1055 (d) (1)	22.355	74.464	90.213 (a)	5.3	Frequency Stability (Voltage Variation)	PASS
-	-	-	-	5.11	Receiver Spurious Emissions	PASS

Limitation on Results

The test result of this report is effective equipment under test itself and under the test configuration described on the report. This test report does not assure that whether the test result taken in other testing laboratory is compatible or reproducible to the test result on this report or not.

SECTION 5. TEST DATA

5.1 Carrier Output Power (Conducted)

REGULATIONS : 47 CFR 2.1046 (a) / RSS-119 Section 5.4

TEST METHOD/GUIDE : ANSI/TIA-603-C Section 2.2.1.2 / RSS-119 Section 4.1

Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 The EUT was conducted to a resistive coaxial attenuator of normal load impedance.
 $\text{RF Power (dBm)} = \text{Power Meter reading (dBm)} + \text{Attenuator Loss (dB)} + \text{Cable Loss (dB)}$
 $\text{RF Power (W)} = 10^{(\text{RF Power (dBm)}/10)}/1000$
- 3 Modulate the transmitter with a 2.5 kHz sine wave at an input Level of 16 dB greater than that necessary to produce 50 % of rated system deviation.

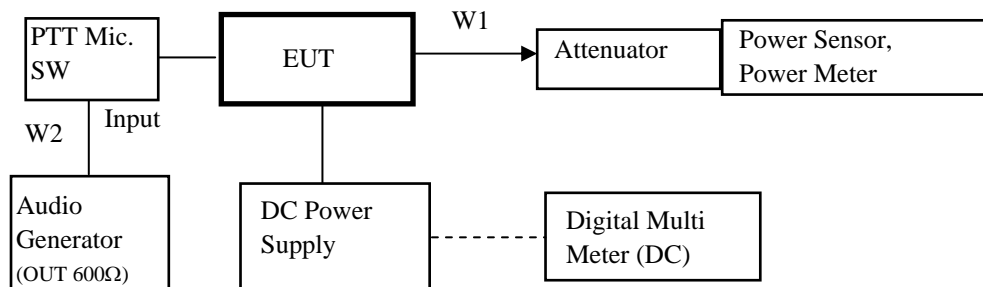
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Power Meter	Hewlett Packard	E4418B	GB38410265	May 09, 08	May 31, 09
2	Power Sensor	Hewlett Packard	8482A	US37292237	May 12, 08	May 31, 09
3	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 08	Jun. 30, 09
4	Attenuator (10dB)	TME	CFA-05NPJ-10	262856	Aug. 16, 07	Aug. 31, 08
5	Audio Generator	Anritsu	MG443B	M70150	Jul. 25, 08	Jul. 31, 09
6	Digital Multi Meter	Sanwa	CD721	3215593	Dec. 10, 07	Dec. 31, 08
7	DC Power Supply	Daiwa	PS-3020	None	None	None

Measuring Cables

No.	Cable	Manufacturer	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C02	Aug. 31, 07	Aug. 31, 08
W2	Balance Cable	Nicoon	3D-2V	KSR00092	Oct. 16, 07	Oct. 31, 08

Measuring Equipment Configuration



→ : RF Output

Uncertainty

Measurement uncertainty is +/- 0.5dB (k = 2)

Test Results

Measured for the worst case

No.	Frequency (MHz)	Band	Setting	RF Power (W)
1	406.10	Low (CFR/RSS)	High Power	45.0
2	429.95	Middle (RSS)	High Power	45.0
3	438.05	Middle (CFR)	High Power	45.0
4	469.95	High (CFR/RSS)	High Power	45.0
5	406.10	Low (CFR/RSS)	Low Power	10.0
6	429.95	Middle (RSS)	Low Power	10.0
7	438.05	Middle (CFR)	Low Power	10.0
8	469.95	High (CFR/RSS)	Low Power	10.0

5.2 Unwanted Emissions (Transmitter Conducted)

REGULATIONS	: 47 CFR 2.1051, 90.210 / RSS-119 Section 5.8
TEST METHOD/GUIDE	: ANSI/TIA-603-C Section 2.2.13.2 / RSS-119 Section 4.2, RSS-Gen Section 4.9

Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Modulate the transmitter with a 2.5 kHz sine wave at an input Level of 16 dB greater than that necessary to produce 50 % of rated system deviation.
- 3 Adjust the spectrum analyzer for the following setting:
 - a) RBW : 10 kHz (< 1 GHz), 1 MHz (> 1 GHz).
 - b) VBW : 30 kHz (< 1 GHz), 3 MHz (> 1 GHz).
 - c) Sweep Speed : 50 msec.
 - d) Detector mode : Average
- 4 The emissions were measured for the worst case as follows:
 - a) : within a band of frequencies defined by the carrier frequency plus and minus one channel.
 - b) : from the lowest frequency generated in the EUT and to at least the 10th harmonic of the carrier frequency, or 40 GHz, whichever is lower.

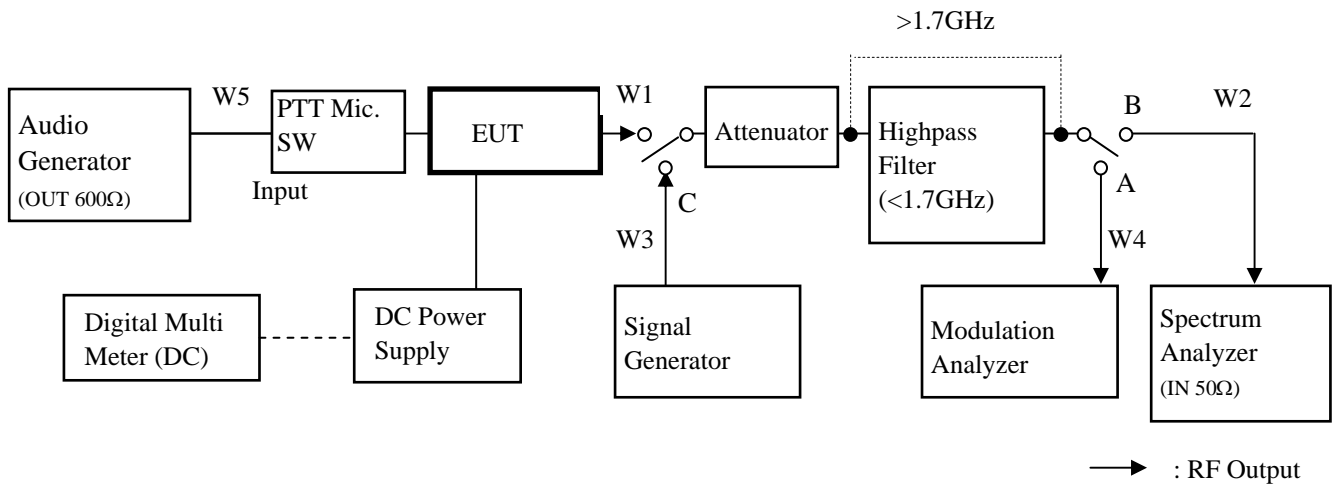
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Audio Generator	Anritsu	MG443B	M70150	Jul. 25, 08	Jul. 31, 09
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 08	Jun. 30, 09
3	Attenuator (10dB)	TME	CFA-05NPJ-10	262856	Aug. 16, 07	Aug. 31, 08
4	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	Jun. 17, 08	Jun. 30, 09
5	Signal Generator	Rohde&Schwarz	SMP02	845275/007	Feb. 04, 08	Feb. 28, 09
6	Spectrum Analyzer	Agilent	E4407B	MY45102460	Jan 09, 08	Jan. 31, 09
7	Highpass Filter	Anritsu	MP526D	6200220657	Aug. 16, 07	Aug. 31, 08
8	DC Power Supply	Daiwa	PS-3020	None	None	None
9	Digital Multi Meter	Sanwa	CD721	3051002	Dec 10, 07	Dec. 31, 08

Measuring Cables

No.	Cable	Manufacturer	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C02	Aug. 31, 07	Aug. 31, 08
W2	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00093	Aug. 31, 07	Aug. 31, 08
W3	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C03	Aug. 31, 07	Aug. 31, 08
W4	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	Aug. 31, 07	Aug. 31, 08
W5	Balance Cable	Nicoon	3D-2V	KSR00092	Oct. 16, 07	Oct. 31, 08

Measuring Equipment Configuration



Uncertainty

Measurement uncertainty is +/- 1.5 dB (k = 2)

Test Results

Measured for the worst case

State : High Power / Authorized Bandwidth 6 kHz

No.	Band	Frequency (MHz)	Correct Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)
1	Low (CFR/RSS)	812.20	-49.89	-96.42	-65.0	31.4
2	Middle (RSS)	859.90	-48.49	-95.02	-65.0	30.0
3	Middle (CFR)	876.10	-47.84	-94.37	-65.0	29.4
4	High (CFR/RSS)	939.90	-47.05	-93.58	-65.0	28.6

There is the margin of 20dB over except for the above points.

State : Low Power / Authorized Bandwidth 6 kHz

No.	Band	Frequency (MHz)	Correct Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)
1	Low (CFR/RSS)	812.20	-52.38	-92.38	-65.0	27.4
2	Middle (RSS)	1289.85	-38.36	-78.36	-65.0	13.4
3	Middle (CFR)	876.10	-54.02	-94.02	-65.0	29.0
4	High (CFR/RSS)	939.90	-50.95	-90.95	-65.0	26.0

There is the margin of 20dB over except for the above points.

Mask E Limit (dBc) = whichever is the lesser attenuation ; $-(55+10\log(P))$ or -65

Correct Level (dBm) = Substitute SG Level (dBm)

Emission Level (dBc) = Correct Level (dBm) - $10\log(P*1000)$

P = Carrier Level (W)

" - " = Measurement Limit

5.3 Field Strength of Spurious Radiation

REGULATIONS	: 47 CFR 2.1053 (a), 90.210 / RSS-119 Section 5.8
TEST METHOD/GUIDE	: ANSI/TIA-603-C Section 2.2.12.2 / RSS-119 Section 4.2, RSS-Gen Section 4.9

Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Adjust the spectrum analyzer for the following setting:
 - a) RBW : 10 kHz (< 1 GHz), 1 MHz (> 1 GHz).
 - b) VBW : 300 kHz (< 1 GHz), 3 MHz (> 1 GHz).
 - c) Sweep Speed : 50ms.
 - d) Detector mode : Positive Peak
- 3 The transmitter was placed on a wooden turntable, and it was transmitting into non-radiating load which was also placed on the turntable.
- 4 The measurement antenna was placed at a distance of 3 meters from the EUT.
 During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.
 The test was performed by placing the EUT on 3-orthogonal axis.
- 5 The frequency range up to tenth harmonic of the fundamental frequency was investigated.
- 6 Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable.
 The absolute levels of the spurious emissions were measured by the substitution.
- 7 Spurious emissions in dB = 10 Log (TX power in Watts/0.001) – the absolute level

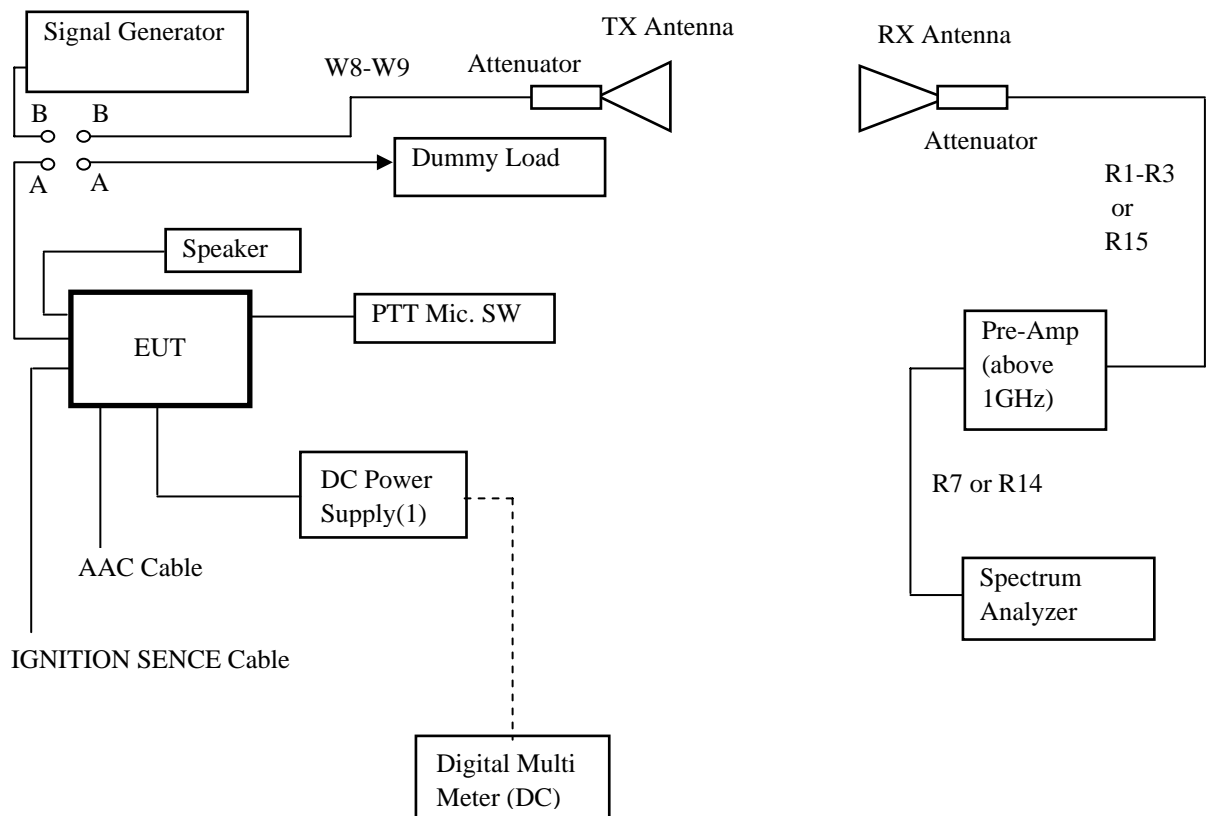
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Dipole Antenna(TX)	Schwarzbeck	VHA9103	C01082007	May 15, 08	May 31, 09
2	Dipole Antenna(TX)	Schwarzbeck	UHA9105	AM0082002	May 16, 08	May 31, 09
3	D.R.G Antenna(TX)	Schwarzbeck	3115	5045	Jun. 18, 08	Jun. 30, 09
4	Tri-log Antenna(RX)	Schwarzbeck	VULB9168	106	Dec. 03, 07	Dec. 31, 08
5	D.R.G Antenna(RX)	Schwarzbeck	3115	5044	Jun. 18, 08	Jun. 30, 09
6	Pre-Amplifier	Hewlett Packard	83051A	3332A00329	Oct. 11, 07	Oct. 31, 08
7	Step Attenuator	Hewlett Packard	8494B	2726A14513	Nov. 30, 07	Nov. 30, 08
8	Attenuator(6dB)	Anritsu	MP721B	M57593	Nov. 30, 07	Nov. 30, 08
9	Attenuator(3dB)	Narda	4768-3	79	Oct. 11, 07	Oct. 31, 08
10	Attenuator(10dB)	HUBER+SUHNER	6810.17B	KSR0044	Sep. 10, 07	Sep. 30, 08
11	Spectrum Analyzer	Agilent	E4407B	MY45102460	Jan. 09, 08	Jan. 31, 09
13	Signal Generator	Rohde&Schwarz	SMP02	845275/007	Feb. 04, 08	Feb. 28, 09
14	Dummy Load	TME	CT-150NP	1138693	Aug. 31, 07	Aug. 31, 08
15	Digital Multi Meter	Sanwa	CD721	3051002	Dec. 10, 07	Dec. 31, 08
16	DC Power Supply	Daiwa	PS-3020	None	None	None

Measuring Cables

No.	Cable	Manufacturer	Model No.	Serial No.	Cal Date	Cal Exp.
W8	Coaxial Cable	Suhner	SUCOFLEX100	KSR00046	Aug. 16, 07	Aug. 31, 08
W9	Coaxial Cable	Radiall	R286401332	KSR00048	Aug. 16, 07	Aug. 31, 08
R1	Coaxial Cable	Intertek Japan	5D-2W	None	Nov. 30, 07	Nov. 30, 08
R2	Coaxial Cable	Intertek Japan	10D-2W	None	Nov. 30, 07	Nov. 30, 08
R3	Coaxial Cable	Intertek Japan	5D-2W	None	Nov. 30, 07	Nov. 30, 08
R7	Coaxial Cable	Intertek Japan	5D-2W	None	Nov. 30, 07	Nov. 30, 08
R14	Coaxial Cable	Suhner	SUCOFLEX102	712/2	Oct. 11, 07	Oct. 31, 08
R15	Coaxial Cable	Insulated Wire	KSP-1501-1969- KPS	03292004	Oct. 11, 07	Oct. 31, 08

Measuring Equipment Configuration



Uncertainty

Measurement uncertainty is +/- 4.8dB (k = 2)

Test Results

Test carried out for all the frequency band of section 5.1
 Measured for the worst case

State : High Power / Authorized Bandwidth 6 kHz / 438.05 MHz

No	Frequency (MHz)	Pol	Reading Level (dBm)	SG Out Level (dBm)	Loss (dB)	Antenna Gain (dBi)	Correct Level (dBm)	Emission Level (dBc)	Limit Level (dBc)	Margin (dB)
1	876.10	Hor.	-69.43	-41.30	12.43	2.15	-51.6	-98.1	-65.0	33.1
		Ver.	-66.69	-35.80	12.43	2.15	-46.1	-92.6	-65.0	27.6
2	1314.15	Hor.	-51.50	-37.70	13.00	7.25	-43.4	-90.0	-65.0	25.0
		Ver.	-48.06	-35.40	13.00	7.25	-41.1	-87.7	-65.0	22.7
3	1752.20	Hor.	-54.91	-41.40	13.50	8.59	-46.3	-92.8	-65.0	27.8
		Ver.	-55.86	-42.10	13.50	8.59	-47.0	-93.5	-65.0	28.5
4	2190.25	Hor.	-61.47	-49.30	13.93	9.64	-53.6	-100.1	-65.0	35.1
		Ver.	-60.61	-48.40	13.93	9.64	-52.7	-99.2	-65.0	34.2
5	2628.30	Hor.	-66.77	-61.70	14.35	9.95	-66.1	-112.6	-65.0	47.6
		Ver.	-65.36	-56.40	14.35	9.95	-60.8	-107.3	-65.0	42.3
6	3066.35	Hor.	-64.17	-51.30	12.96	9.75	-54.5	-101.0	-65.0	36.0
		Ver.	-65.24	-51.10	12.96	9.75	-54.3	-100.8	-65.0	35.8
7	3504.40	Hor.	-64.00	-50.20	13.25	10.22	-53.2	-99.8	-65.0	34.8
		Ver.	-60.86	-38.90	13.25	10.22	-41.9	-88.5	-65.0	23.5
8	3942.45	Hor.	-67.79	-58.50	13.42	9.80	-62.1	-108.7	-65.0	43.7
		Ver.	-66.58	-48.50	13.42	9.80	-52.1	-98.7	-65.0	33.7
9	4380.50	Hor.	-	-	13.63	11.15	-	-	-65.0	-
		Ver.	-	-	13.63	11.15	-	-	-65.0	-

There is the margin of 20dB over except for the above points.

Mask E Limit (dBc) = whichever is the lesser attenuation ; $-(55+10\log(P))$ or -65

Correct Level (dBm) = Substitute SG Level (dBm) + ANT Gain (dBi) - Loss (Cable, Attenuator) (dB)

Emission Level (dBc) = Correct Level (dBm) - $10\log(P*1000)$

P = Carrier Level (W)

" - " = Measurement Limit

State : Low Power / Authorized Bandwidth 6 kHz / 438.05 MHz

No	Frequency (MHz)	Pol	Reading	SG Out	Loss (dB)	Antenna	Correct	Emission	Limit	Margin (dB)
			Level (dBm)	Level (dBm)		Gain (dBi)	Level (dBm)	Level (dBc)	Level (dBc)	
1	876.10	Hor.	-74.87	-50.40	12.43	2.15	-60.7	-100.7	-65.0	35.7
		Ver.	-66.25	-35.20	12.43	2.15	-45.5	-85.5	-65.0	20.5
2	1314.15	Hor.	-48.17	-33.80	13.00	7.25	-39.5	-79.5	-65.0	14.5
		Ver.	-49.72	-36.80	13.00	7.25	-42.5	-82.5	-65.0	17.5
3	1752.20	Hor.	-54.35	-40.30	13.50	8.59	-45.2	-85.2	-65.0	20.2
		Ver.	-56.67	-42.50	13.50	8.59	-47.4	-87.4	-65.0	22.4
4	2190.25	Hor.	-62.26	-50.20	13.93	9.64	-54.5	-94.5	-65.0	29.5
		Ver.	-61.58	-49.00	13.93	9.64	-53.3	-93.3	-65.0	28.3
5	2628.30	Hor.	-65.15	-54.10	14.35	9.95	-58.5	-98.5	-65.0	33.5
		Ver.	-63.41	-50.80	14.35	9.95	-55.2	-95.2	-65.0	30.2
6	3066.35	Hor.	-66.80	-61.80	12.96	9.75	-65.0	-105.0	-65.0	40.0
		Ver.	-67.16	-53.90	12.96	9.75	-57.1	-97.1	-65.0	32.1
7	3504.40	Hor.	-67.87	-62.60	13.25	10.22	-65.6	-105.6	-65.0	40.6
		Ver.	-65.86	-50.30	13.25	10.22	-53.3	-93.3	-65.0	28.3
8	3942.45	Hor.	-67.75	-62.70	13.42	9.80	-66.3	-106.3	-65.0	41.3
		Ver.	-68.00	-54.30	13.42	9.80	-57.9	-97.9	-65.0	32.9
9	4380.50	Hor.	-	-	13.63	11.15	-	-	-65.0	-
		Ver.	-	-	13.63	11.15	-	-	-65.0	-

There is the margin of 20dB over except for the above points.

Mask E Limit (dBc) = whichever is the lesser attenuation ; $-(55+10\log(P))$ or -65

Correct Level (dBm) = Substitute SG Level (dBm) + ANT Gain (dBi) - Loss (Cable, Attenuator) (dB)

Emission Level (dBc) = Correct Level (dBm) - $10\log(P*1000)$

P = Carrier Level (W)

" - " = Measurement Limit

5.4 Emission Masks (Occupied Bandwidth)

REGULATIONS : 47 CFR 2.1049 (c) (1), 22.359, 357 (a) (1) , 74.462 , 90.210 / RSS-119 Section 5.8

TEST METHOD/GUIDE : ANSI/TIA-603-C Section 2.2.11.2 / RSS-119 Section 4.2.1, 4.2.2

Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 For EUT supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for +/- 2.5 kHz or +/- 1.25 kHz deviation (or 50 % modulation).
- 3 With level constant, the signal level was increased 16 dB.
For EUT supporting digital modulation, the digital modulation mode was operated to its maximum extent.
- 4 Adjust the spectrum analyzer for the following setting:
 - a) RBW : 100 Hz (Non modulation and Authorized Band 11.25 kHz), 300Hz (Authorized Band 20 kHz).
 - b) VBW : 100Hz (Non modulation and Authorized Band 11.25 kHz), 300 Hz (Authorized Band 20 kHz).
 - c) RBW and VBW : 30 kHz (Non Modulation of Authorized Band 6 kHz).
 - d) Sweep Speed : 8 sec.
 - e) Sampling Time : 10 times
- 5 The occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

Measuring Equipments

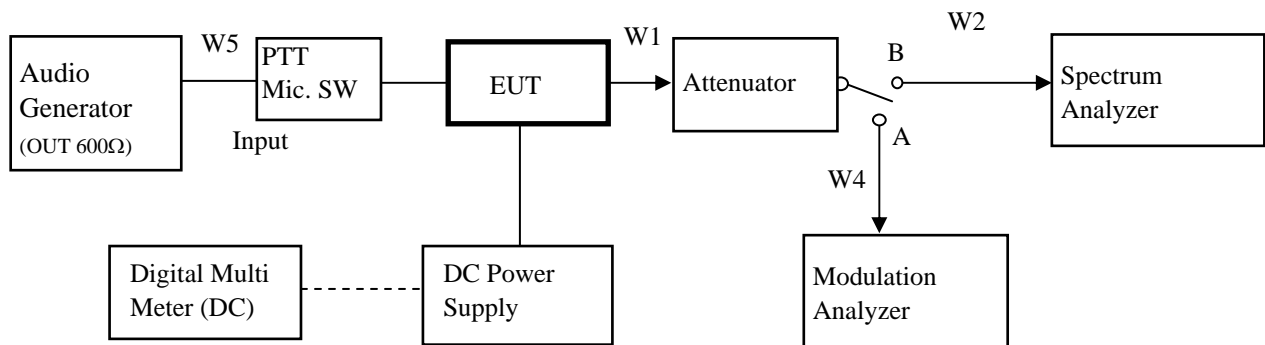
No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Audio Generator	Anritsu	MG443B	M70150	Jul. 25, 08	Jul. 31, 09
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 08	Jun. 30, 09
3	Attenuator (10dB)	TME	CFA-05NPJ-10	262856	Aug. 16, 07	Aug. 31, 08
4	Modulation Analyzer	Hewlett Packard	8901B	2806A01669	Jun. 17, 08	Jun. 30, 09
5	Spectrum Analyzer	Agilent	E4407B	MY45102460	Jan. 09, 08	Jan. 31, 09
6	Modem Evaluation Kit	Consumer Microcircuits	EV9000	None	None	None
7	DC Power Supply (1)	Daiwa	PS-3020	None	None	None
8	DC Power Supply (2)	Kenwood	PW18-1.8Q	None	None	None
9	Digital Multi Meter	Sanwa	CD721	3051002	Dec. 10, 07	Dec. 31, 08

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C02	Aug. 31, 07	Aug. 31, 08
W2	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00093	Aug. 31, 07	Aug. 31, 08
W4	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C03	Aug. 31, 07	Aug. 31, 08
W5	Balance Cable	Nicoon	3D-2V	KSR00092	Oct. 16, 07	Oct. 31, 08

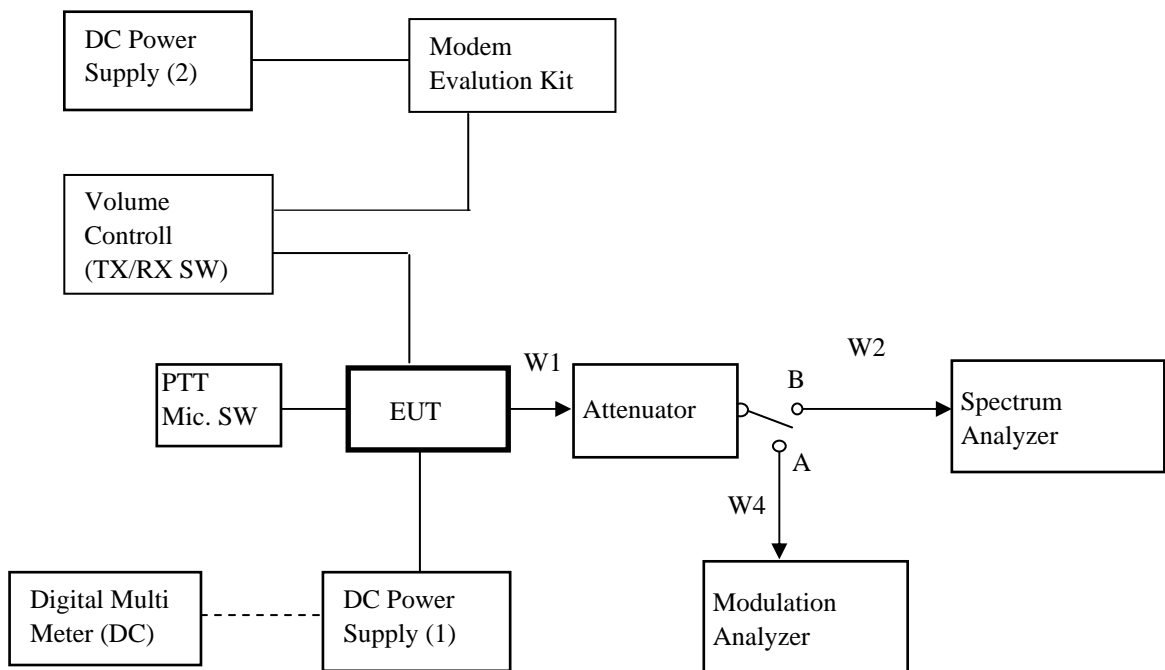
Measuring Equipment Configuration

<FM Modulation Case>



Note: Configuration of other Modulation(C4FM and CWID) test is composed without the Audio Generator.

<GMSK and 4Level FSK Modulation Case>



→ : RF Output

Uncertainty

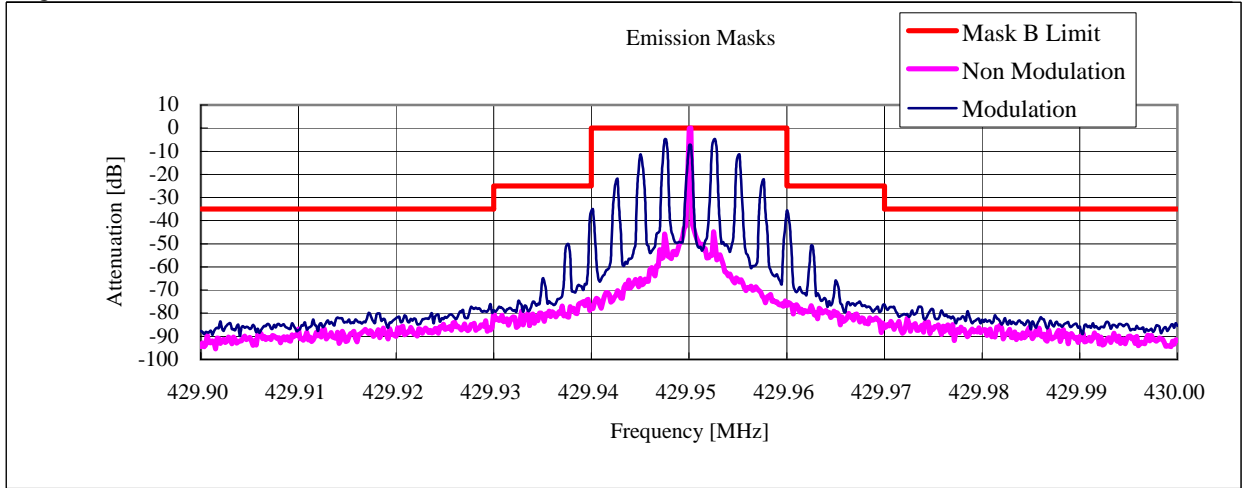
Measurement uncertainty is +/- 1.0dB (k = 2)

Test Results

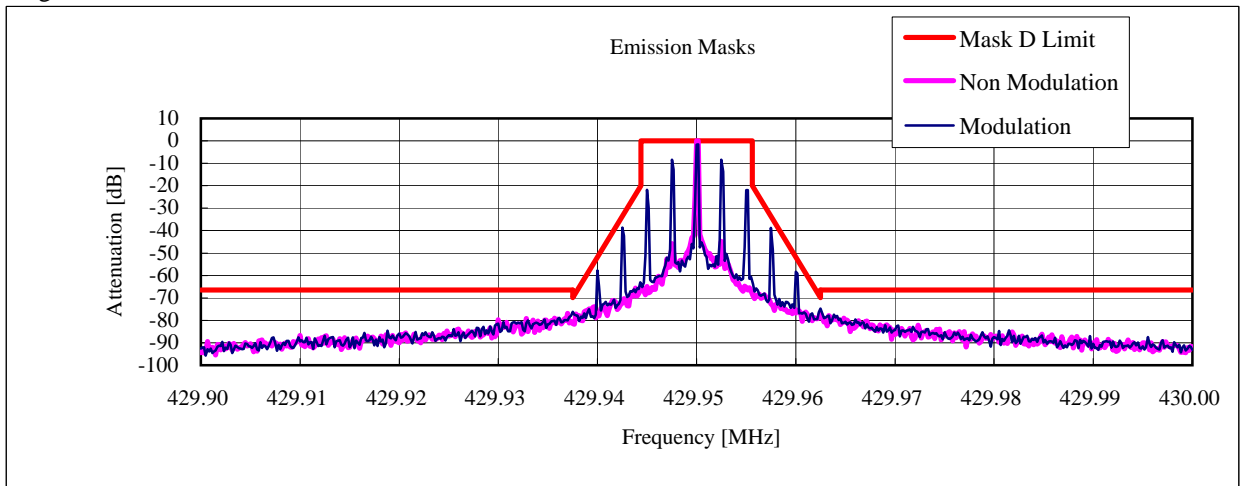
Test carried out for all the frequency band of section 5.1

Measured for the worst case

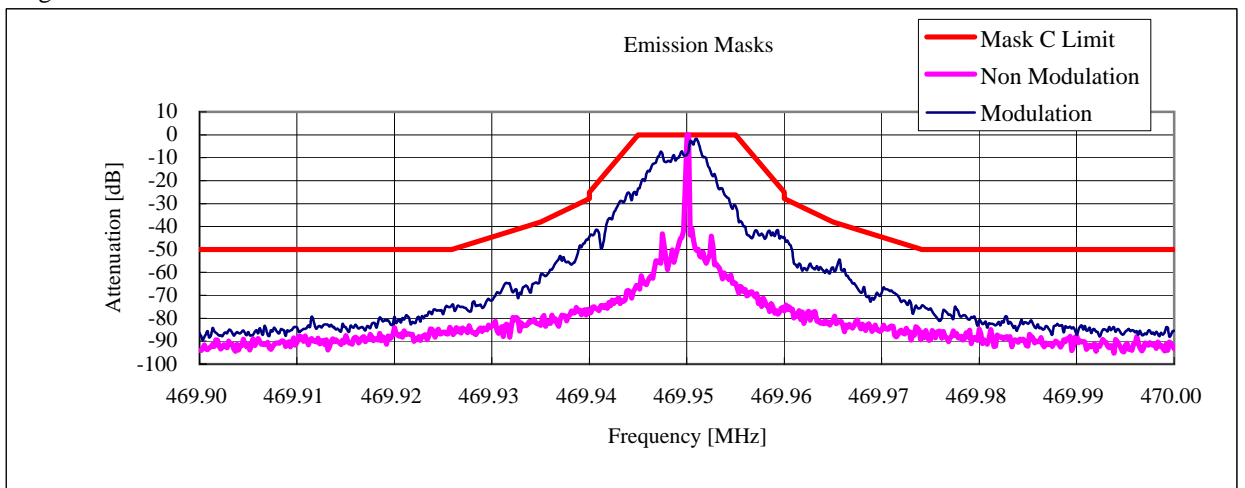
State : High Power / Authorized Bandwidth 20 kHz:FM / 429.95 MHz



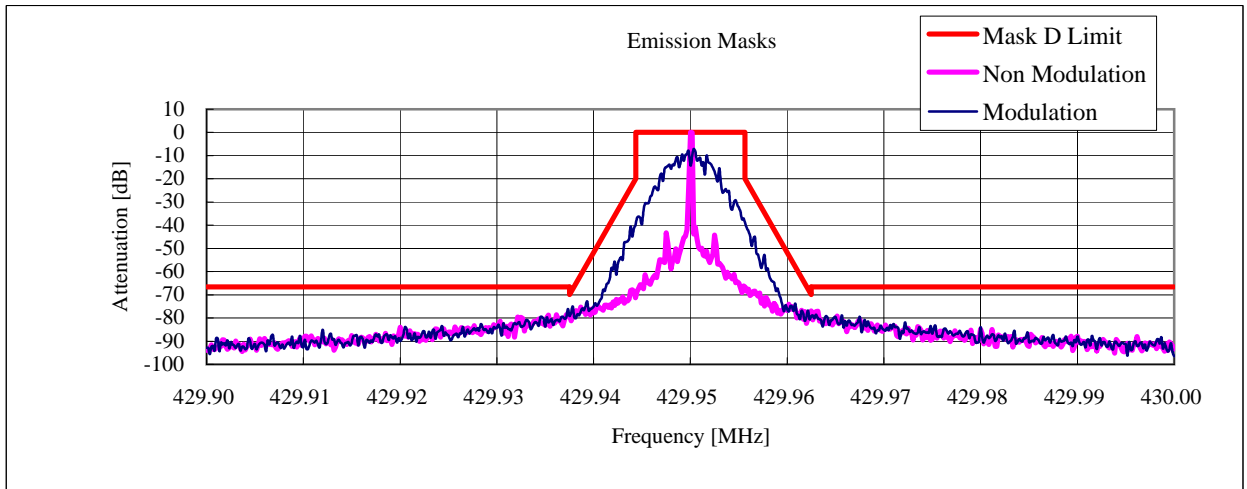
State : High Power / Authorized Bandwidth 11.25 kHz:FM / 429.95 MHz



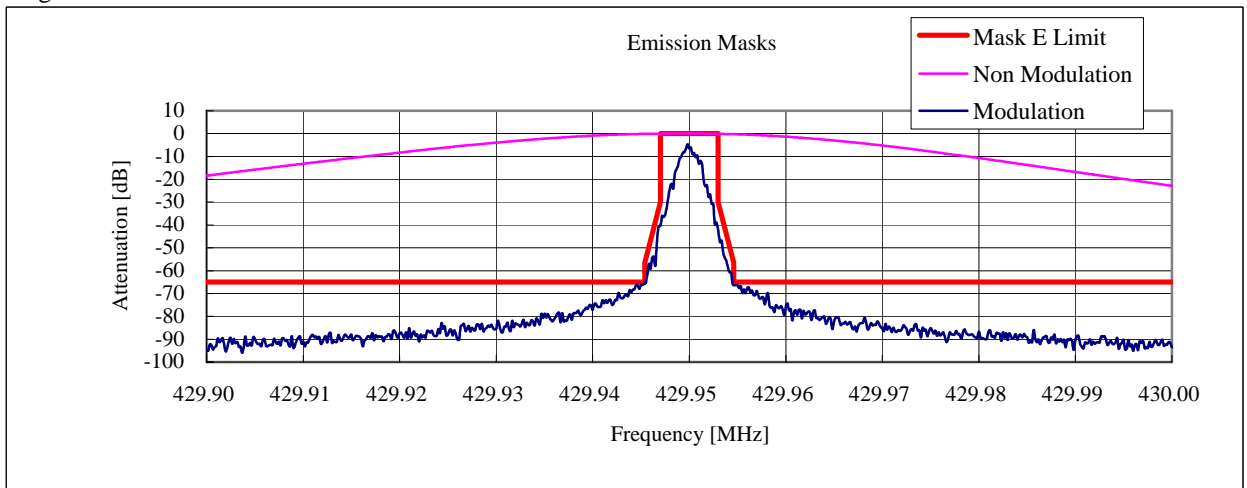
State : High Power / Authorized Bandwidth 20 kHz:GMSK / 469.95 MHz



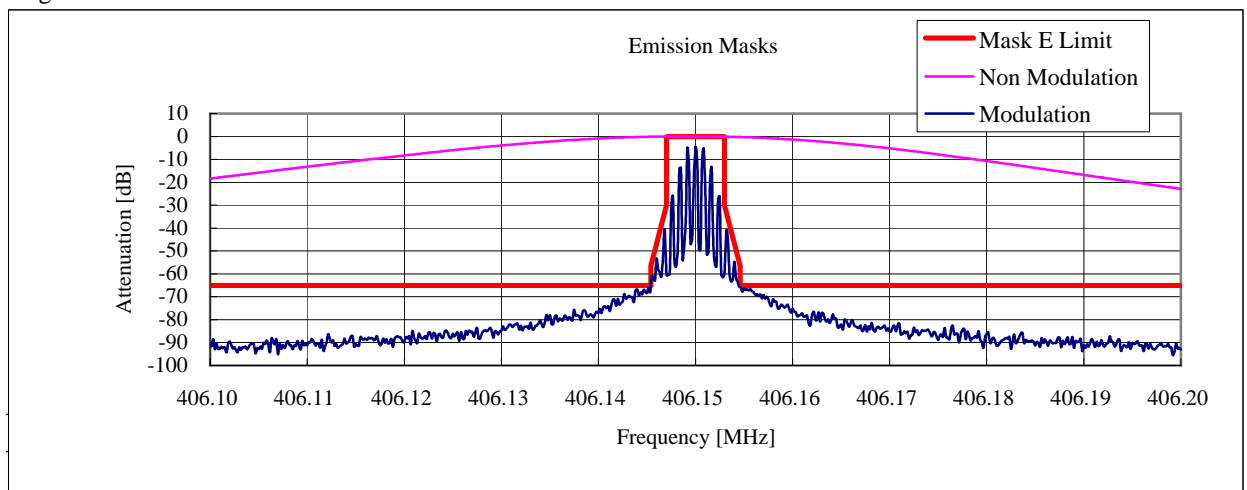
State : High Power / Authorized Bandwidth 11.25 kHz:4Level FSK / 429.95 MHz



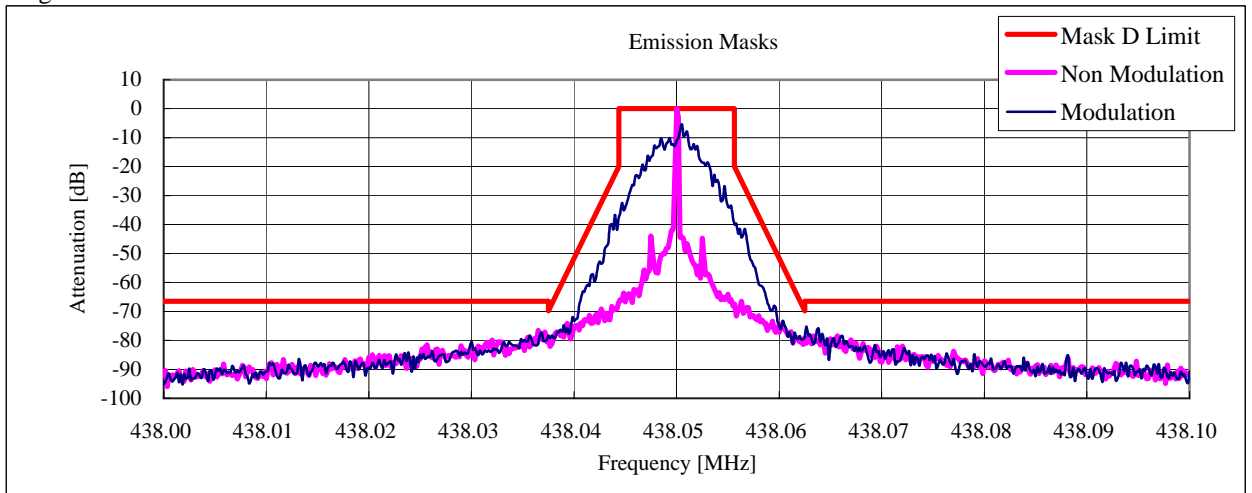
State : High Power / Authorized Bandwidth 6 kHz:4Level FSK / 429.95 MHz



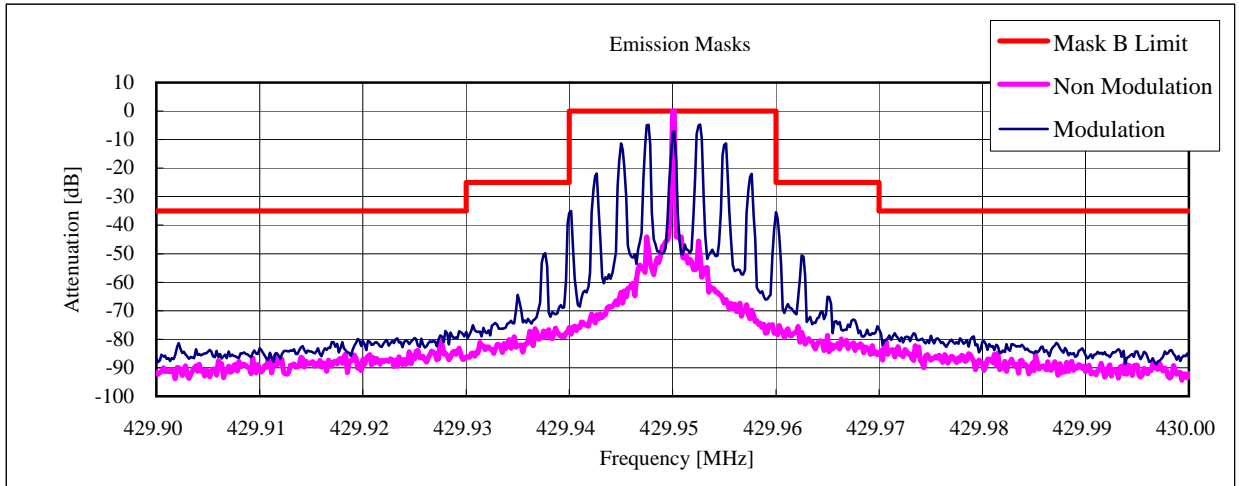
State : High Power / Authorized Bandwidth 6 kHz:CWID / 406.15 MHz



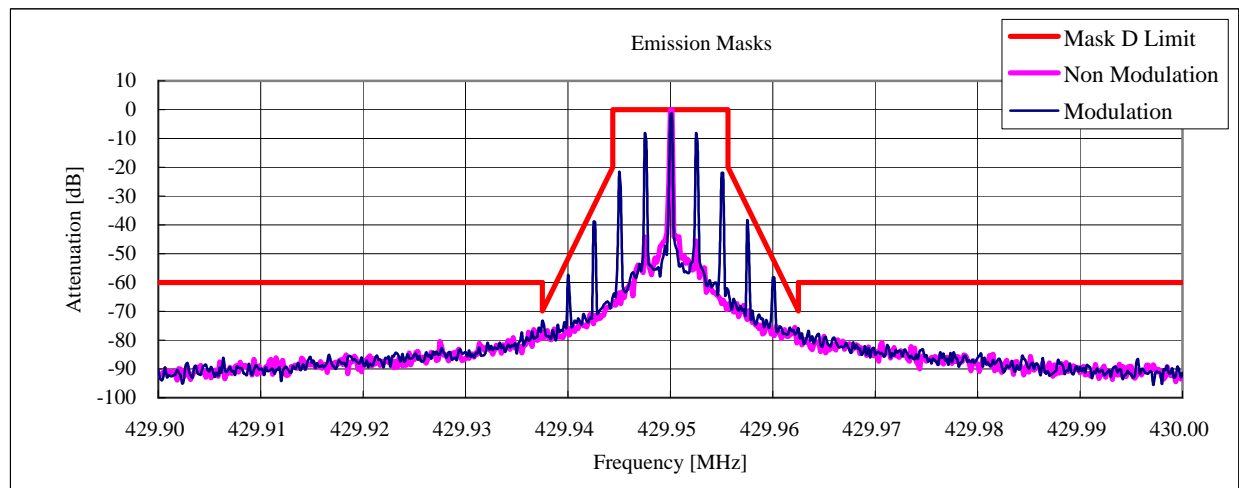
State : High Power / Authorized Bandwidth 11.25 kHz:C4FM / 438.05 MHz



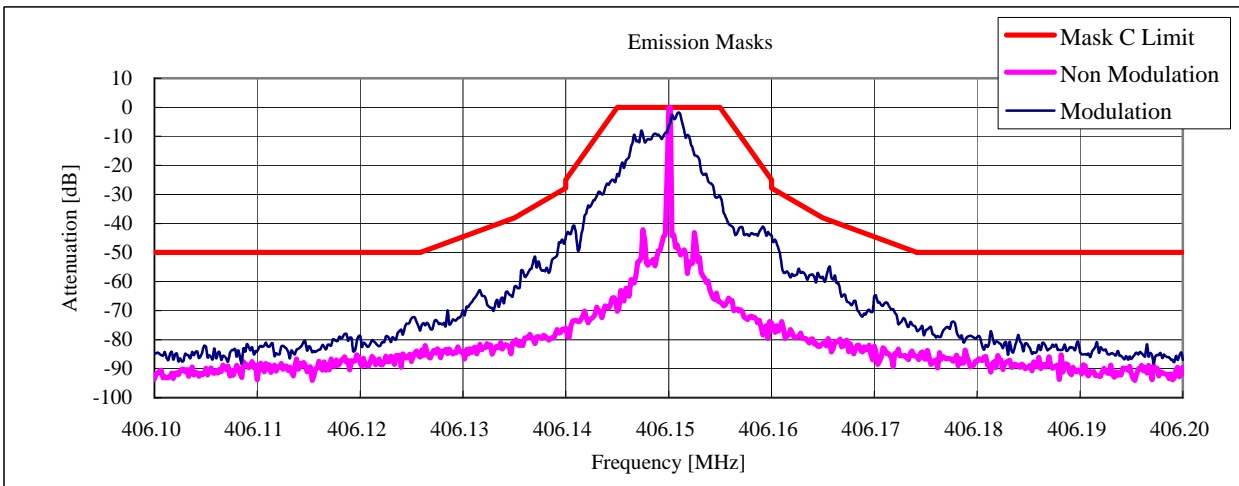
State : Low Power / Authorized Bandwidth 20 kHz:FM / 429.95 MHz



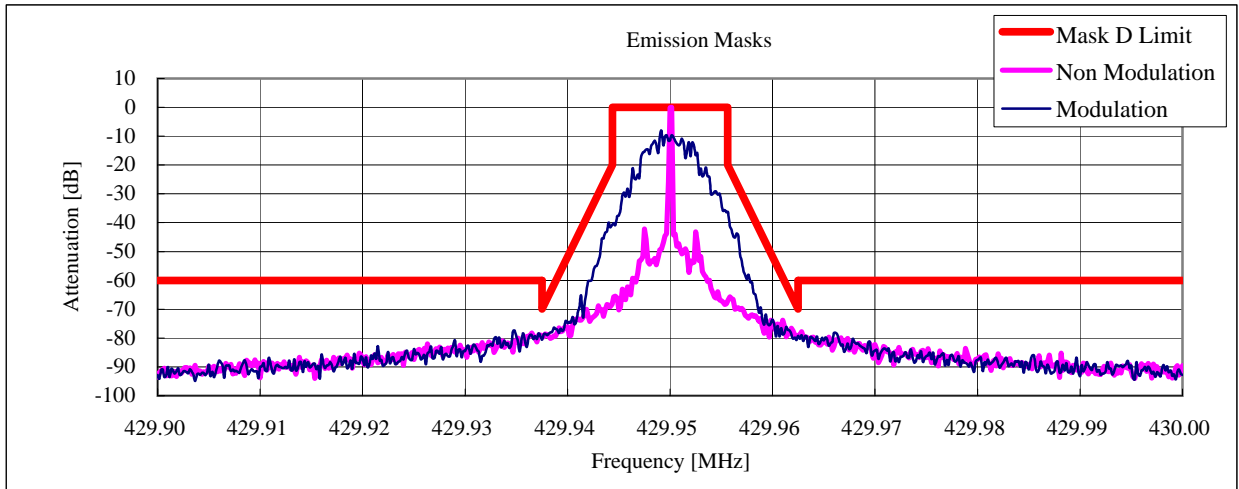
State : Low Power / Authorized Bandwidth 11.25 kHz:FM / 429.95 MHz



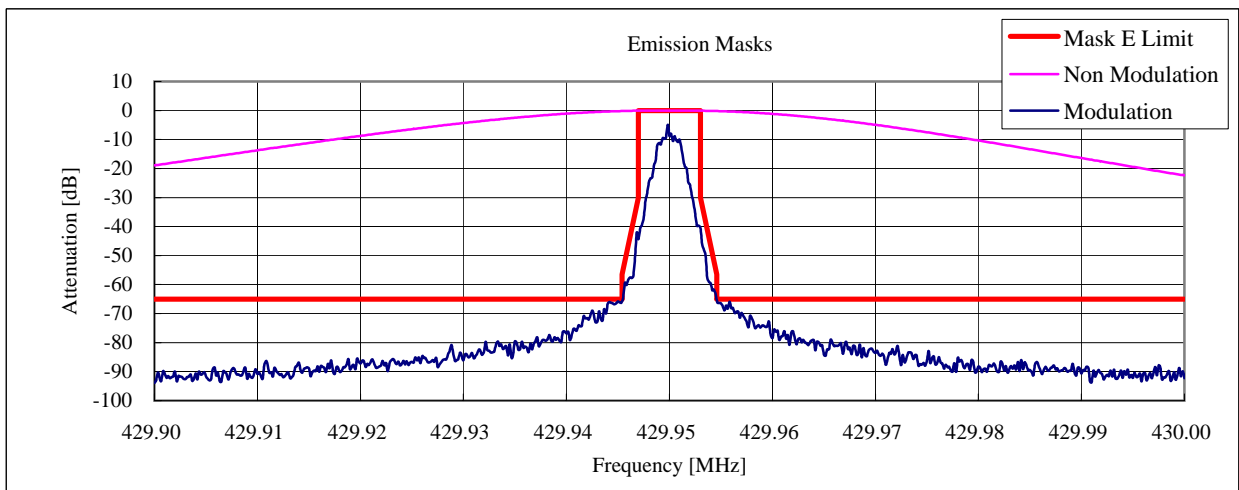
Low Power / Authorized Bandwidth 20 kHz:GMSK / 406.15 MHz



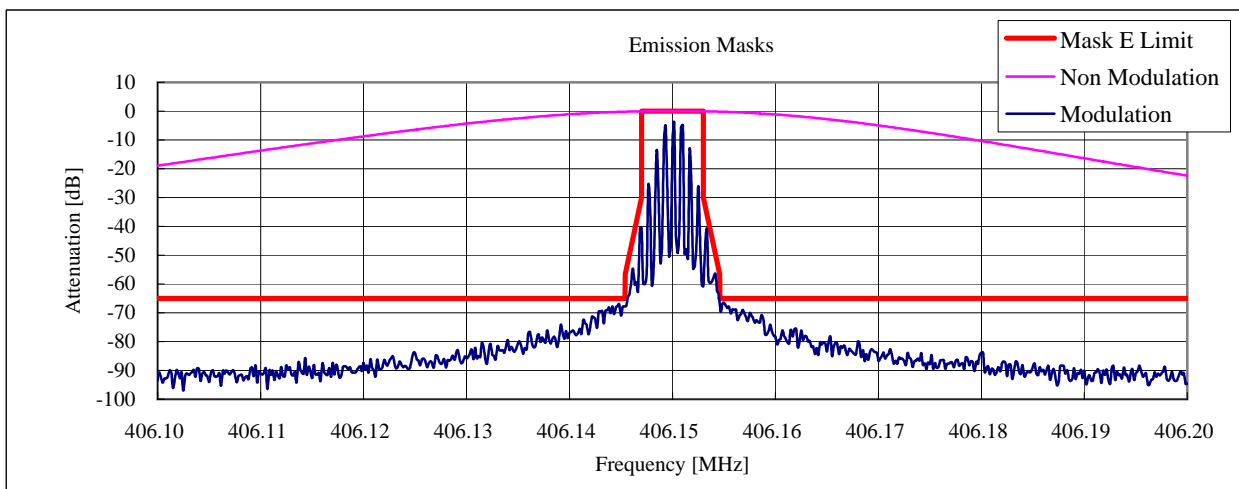
State : Low Power / Authorized Bandwidth 11.25 kHz:4 Level FSK / 429.95 MHz



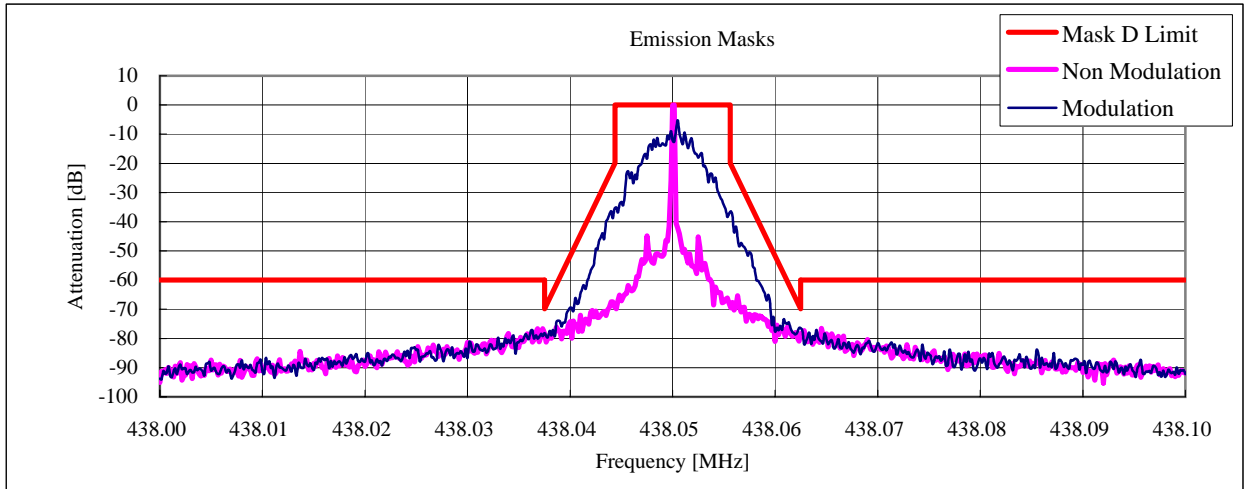
State : Low Power / Authorized Bandwidth 6 kHz:4Level FSK / 429.95 MHz



State : Low Power / Authorized Bandwidth 6 kHz:CWID / 406.15 MHz



State : Low Power / Authorized Bandwidth 11.25 kHz:C4FM / 438.05 MHz



5.5 Transient Frequency Behavior

REGULATIONS	: 47 CFR 90.214 / RSS-119 Section 5.9
TEST METHOD/GUIDE	: ANSI/TIA-603-C Section 2.2.19.3

Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 The transmitter was turned on.
- 3 Sufficient attenuation was provided so that the transmitter carrier level measured at the output of the combiner was 40 dB below the maximum input level of the test receiver.
This level was recorded as step f.
- 4 The transmitter was turned off.
- 5 An RF signal generator (1) modulated with a 1 kHz tone at either 25 kHz or 12.5 kHz or 6.25 kHz deviation, and set to the same frequency as the assigned transmitter frequency, (2) was adjusted to a level -20 dB below the level recorded for step f, as measured at the output of the combiner.
This level was then fixed for the remainder of the test and is recorded at step h.
- 6 The oscilloscope was setup using TIA-603C steps j and k as a guide, and to 10 msec./div.
- 7 The transmitter was turned on, and the level of the carrier at the output of the combiner was recorded as step l.
- 8 The carrier on-time as referenced in TIA-603-C steps m, n, and o was captured and plotted.
- 9 The carrier off-time as referenced in TIA-603-C steps p, q, r, and s was captured and plotted.

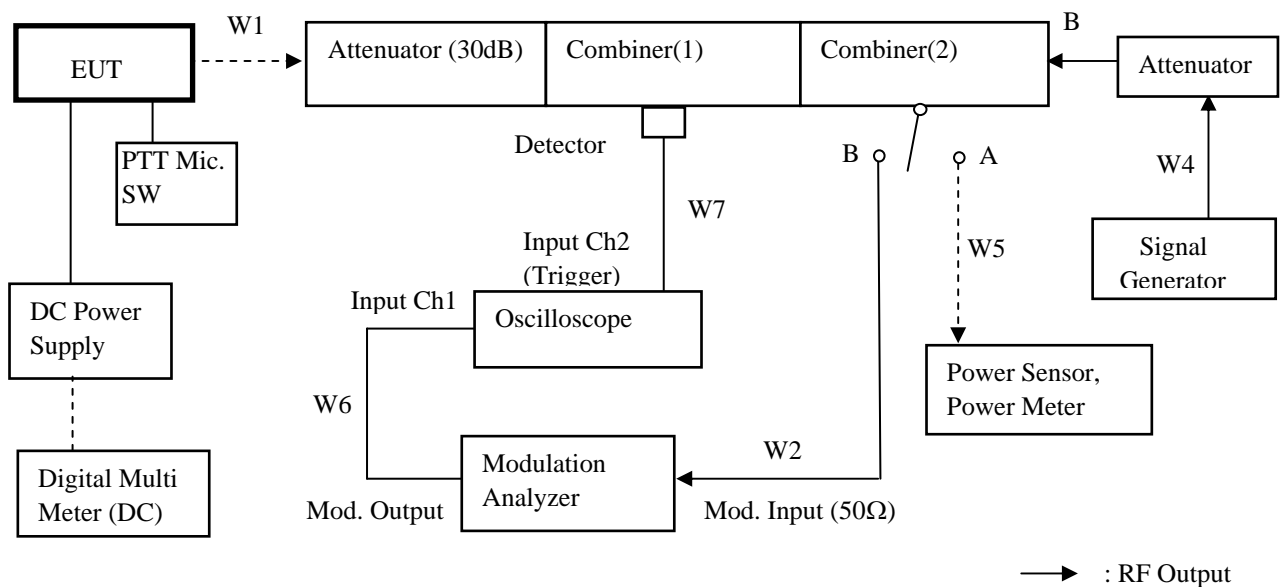
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Signal Generator	Rohde & Schwarz	SMY01	844484/013	Nov. 02, 07	Nov. 30, 08
2	Oscilloscope	Tektronix	TDS 680B	B010292	Sep. 11, 07	Sep. 30, 08
3	Power Meter	Hewlett Packard	E4418B	GB38410265	May 09, 08	May 31, 09
4	Power Sensor	Hewlett Packard	8482A	US37292237	May 12, 08	May 31, 09
5	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 08	Jun. 30, 09
6	Attenuator (10dB)	TME	CFA-05NPJ-10	262856	Aug. 16, 07	Aug. 31, 08
6	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	Jun. 17, 08	Jun. 30, 09
7	Combiner(1)	Anritsu	Z-164A	M89549	Aug. 16, 07	Aug. 31, 08
8	Combiner(2)	Anritsu	Z-164A	M89249	Aug. 16, 07	Aug. 31, 08
9	Attenuator	TME	CFA-20NPJ-3	679701	Aug. 16, 07	Aug. 31, 08
10	DC Power Supply	Daiwa	PS-3020	None	None	None
11	Digital Multi Meter	Sanwa	CD721	3051002	Dec 10, 07	Dec 31, 08

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C02	Aug. 31, 07	Aug. 31, 08
W2	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C03	Aug. 31, 07	Aug. 31, 08
W4	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00093	Aug. 31, 07	Aug. 31, 08
W5	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00041	Aug. 30, 07	Aug. 31, 08
W6	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00094	Aug. 30, 07	Aug. 31, 08
W7	Coaxial Cable	JOIN	3D-2V	KSR00101	Aug. 30, 07	Aug. 31, 08

Measuring Equipment Configuration



Uncertainty

Measurement uncertainty is +/- 1.1dB (k = 2)

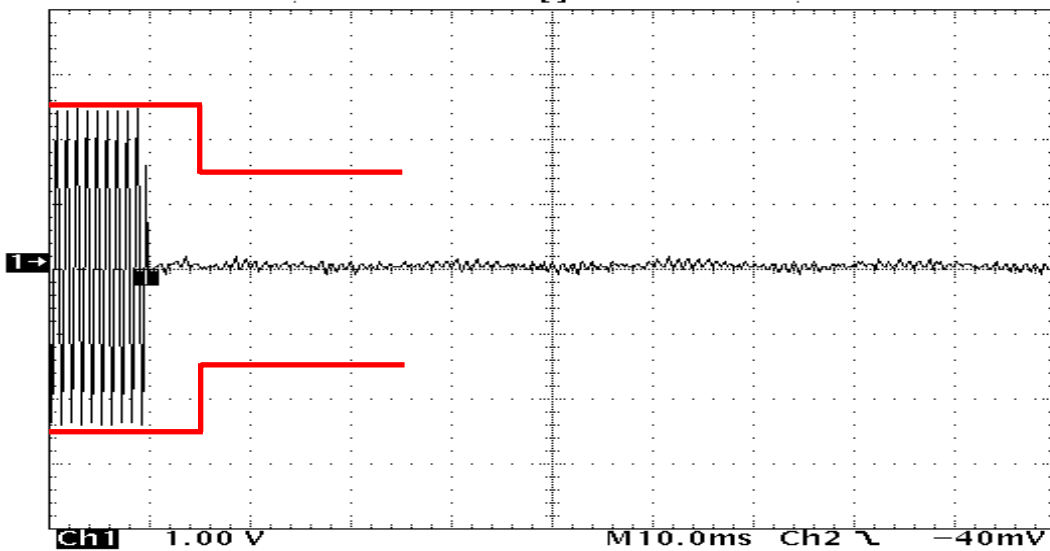
Test Results

Test carried out for all the frequency band of section 5.1

Measured for the worst case

State : High Power / Authorized Bandwidth 20 kHz / 429.95 MHz / PTT:OFF -ON

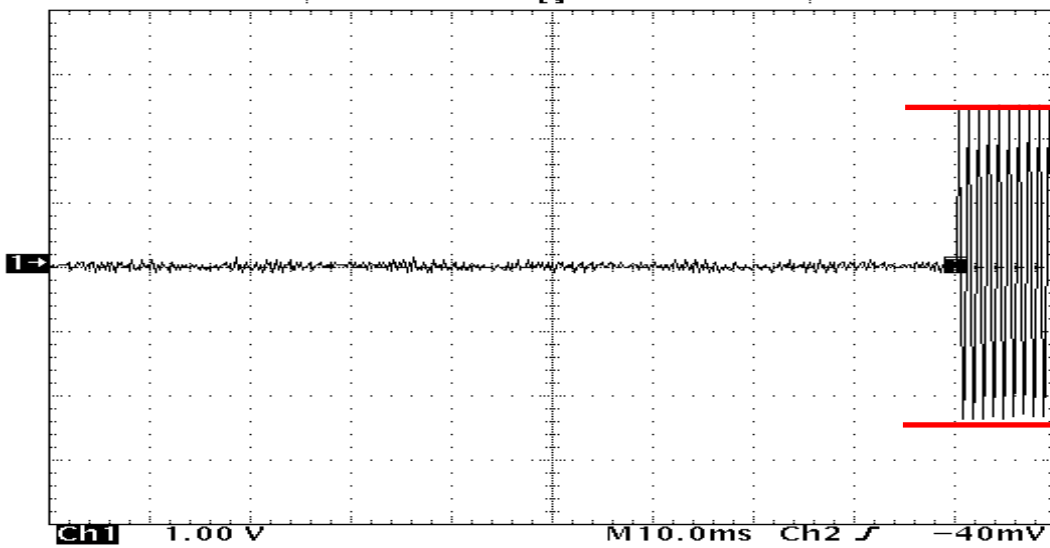
Tek Run: 5.00kS/s Sample



8 Aug 2008
11:46:54

State : High Power / Authorized Bandwidth 20 kHz / 429.95 MHz / PTT:ON -OFF

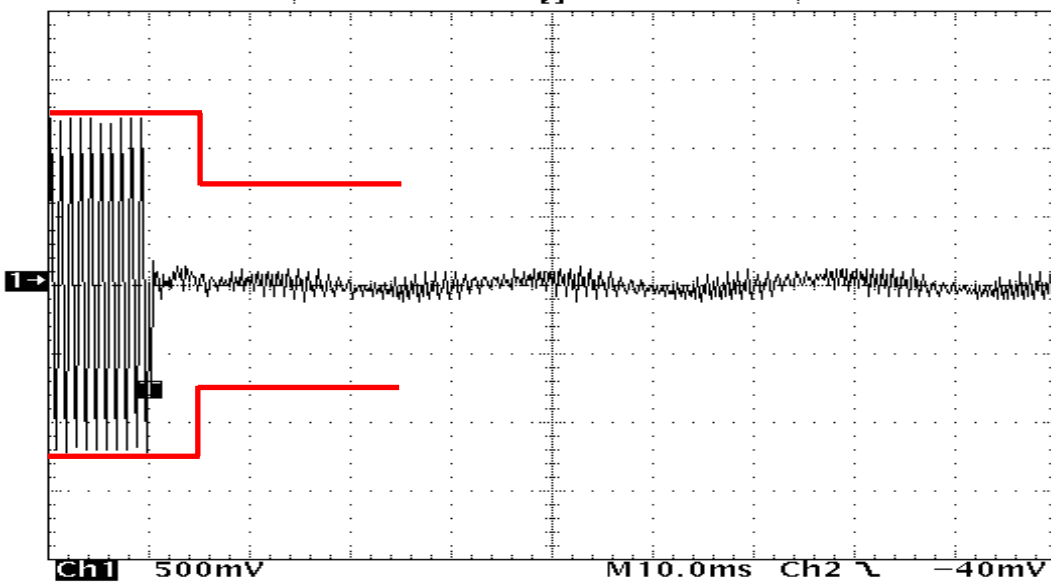
Tek Run: 5.00kS/s Sample



8 Aug 2008
14:03:39

State : High Power / Authorized Bandwidth 11.25 kHz / 429.95 MHz / PTT:OFF -ON

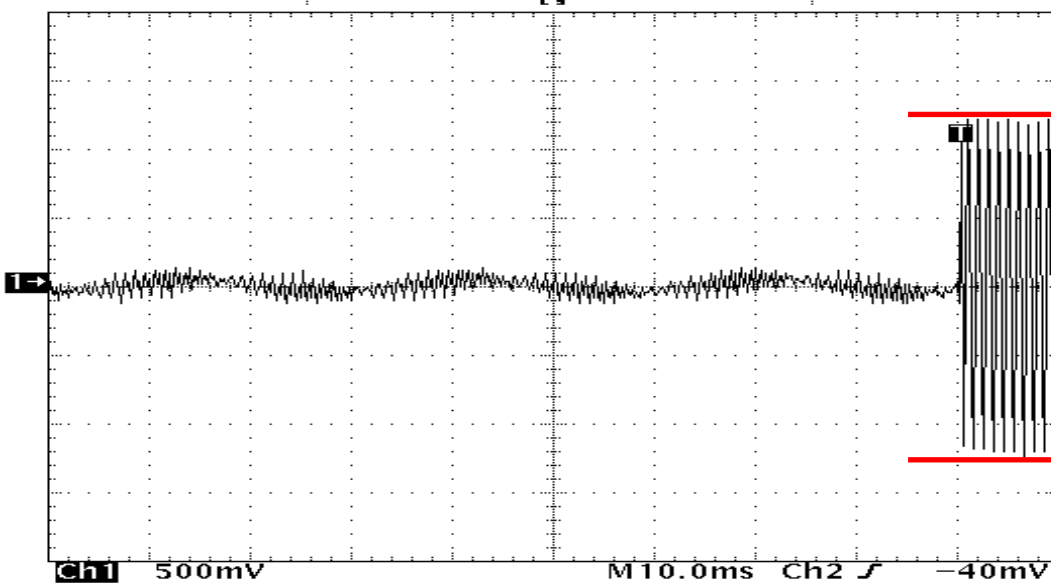
Tek Run: 5.00kS/s Sample **11102**



8 Aug 2008
14:36:55

State : High Power / Authorized Bandwidth 11.25 kHz / 429.95 MHz / PTT:ON -OFF

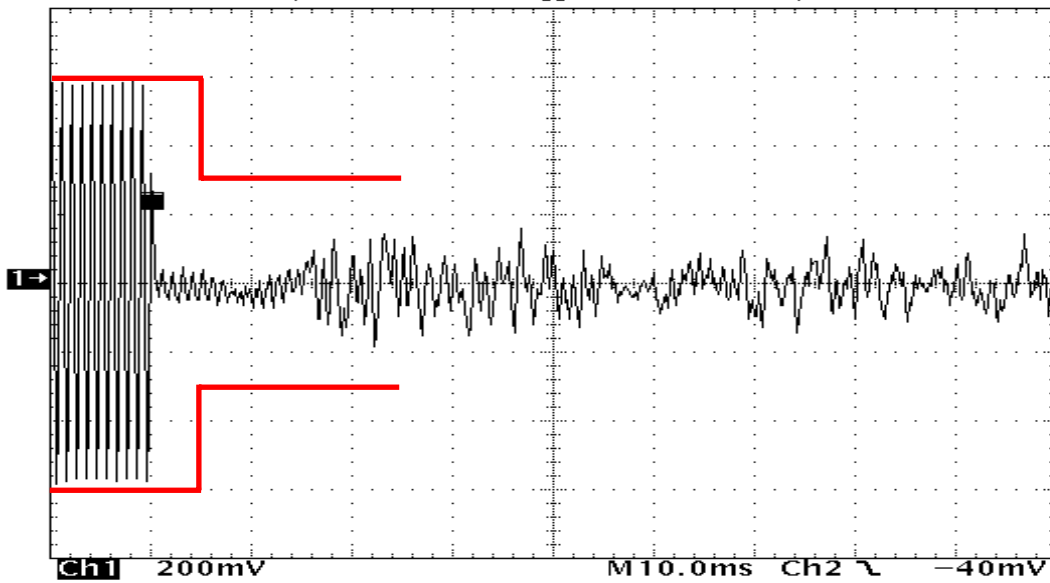
Tek Run: 5.00kS/s Sample **11102**



8 Aug 2008
14:51:10

State : High Power / Authorized Bandwidth 6 kHz / 429.95 MHz / PTT:OFF -ON

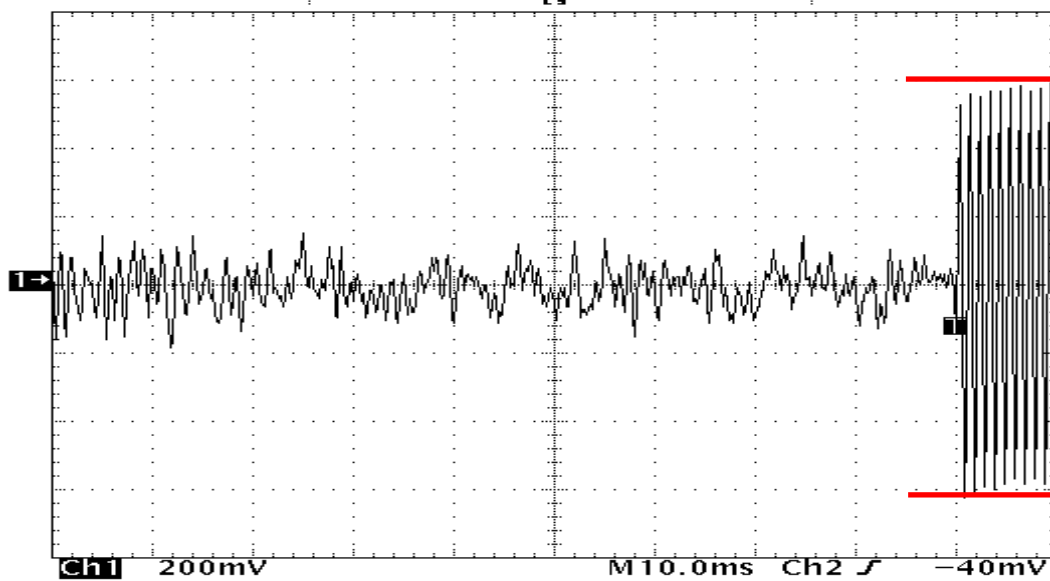
Tek Run: 5.00kS/s Sample **11102**



8 Aug 2008
15:20:02

State : High Power / Authorized Bandwidth 6 kHz / 429.95 MHz / PTT:ON -OFF

Tek Run: 5.00kS/s Sample **11102**



8 Aug 2008
15:33:49

5.6 Audio Frequency Response / Audio Low Pass Filter (Voice Input)

REGULATIONS	: 47 CFR 2.1047 (a)
TEST METHOD/GUIDE	: ANSI/TIA-603-C Section 2.2.6.2.2, 3.2.6.2

Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Adjust the Modulation Analyzer for the following setting:
 - a) High-pass filter : 50 Hz
 - b) Low-pass filter : 15 kHz
 - c) Detector : positive peak
 - d) Function : FM
- 3 The audio signal input was adjusted to obtain 20 % modulation at 1 kHz, and this point was taken as the 0 dB reference level.
- 4 With input levels held constant and below limiting at all frequencies, the audio signal generator was varied from 300 Hz to 5 kHz.
- 5 The response in dB relative to 1 kHz was then measured, using the Modulation Analyzer.

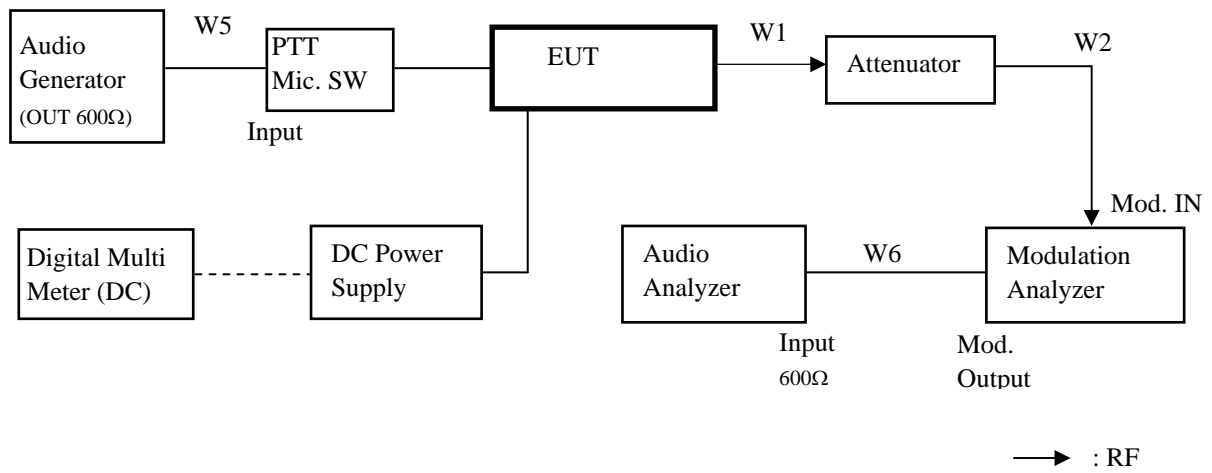
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Audio Generator	Anritsu	MG443B	M70150	Jul. 25, 08	Jul. 31, 09
2	Audio Analyzer	Hewlett Packard	8903B	2948A07326	May 14, 08	May 31, 09
3	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 08	Jun. 30, 09
4	Attenuator (10dB)	TME	CFA-05NPJ-10	262856	Aug. 16, 07	Aug. 31, 08
5	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	Jun. 17, 08	Jun. 30, 09
6	DC Power Supply	Daiwa	PS-3020	None	None	None
7	Digital Multi Meter	Sanwa	CD721	3051002	Dec. 10, 07	Dec. 31, 08

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C02	Aug. 31, 07	Aug. 31, 08
W2	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C03	Aug. 31, 07	Aug. 31, 08
W5	Balance Cable	Nicoon	3D-2V	KSR00092	Oct. 16, 07	Oct. 31, 08
W6	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00094	Aug. 30, 07	Aug. 31, 08

Measuring Equipment Configuration



Uncertainty

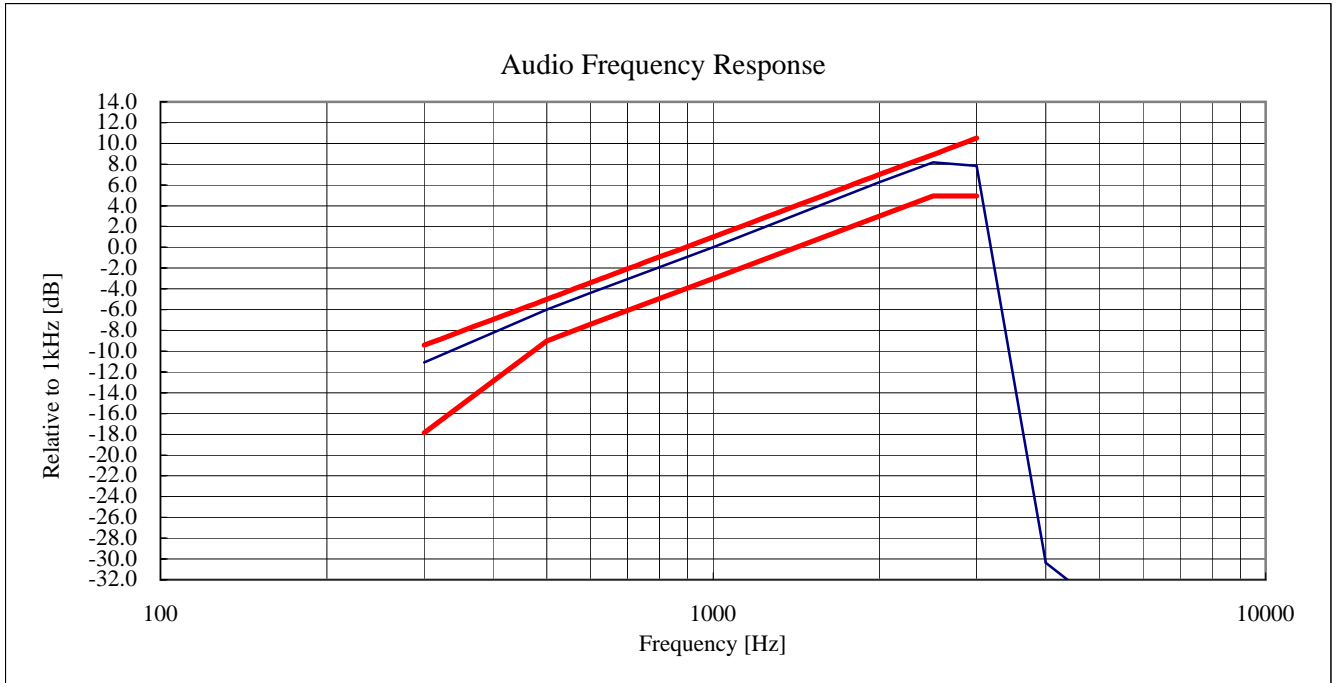
Measurement uncertainty is +/- 0.3dB (k = 2)

Test Results

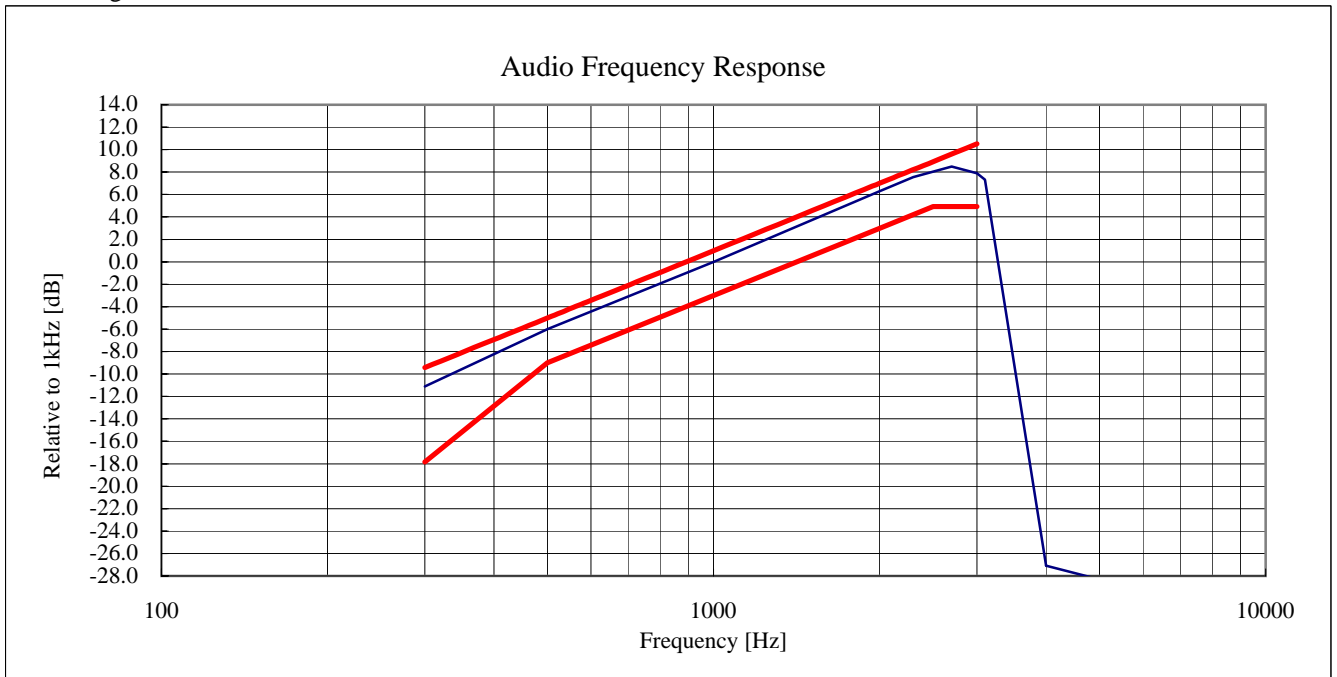
Test carried out for all the frequency band of section 5.1

Measured for the worst case

State : High Power / Authorized Bandwidth 20 kHz / 438.05 MHz



State : High Power / Authorized Bandwidth 11.25 kHz / 438.05 MHz



Note:

Audio Filter of the above result is substituted with the same structure as Audio Frequency Resonse.

On the transmission condition below 3kHz, Transceiver shows pre-emphasis condition of transmission function.

On the transmission condition above 3kHz, Transceiver shows Audio Low Pass Filter.

5.7 Modulation Limiting

REGULATIONS	: 47 CFR 2.1047 (b)
TEST METHOD/GUIDE	: ANSI/TIA-603-C Section 2.2.3.2, 1.3.4.4

Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Adjust the Modulation Analyzer for the following setting:
 - a) High-pass filter : off
 - b) Low-pass filter : 15 kHz
 - c) Detector : positive peak
 - d) Function : FM
- 3 Apply a 1kHz modulation signal to the transmitter from the audio generator, and adjust the level to obtain 60% of full rated system deviation.
- 4 Measure the modulation frequency that was showed on the Modulation Analyzer when the output levels of the Audio Generator were changed from -20 dB to +50 dB by 10 dB.
- 5 Set the output frequencies of the Audio Generator 300 Hz and 3 kHz, and repeat test procedure 4.
- 6 Set the the Detector of the Modulation Analyzer Negative Peak.
- 7 Repeat test procedure 4 and 5.

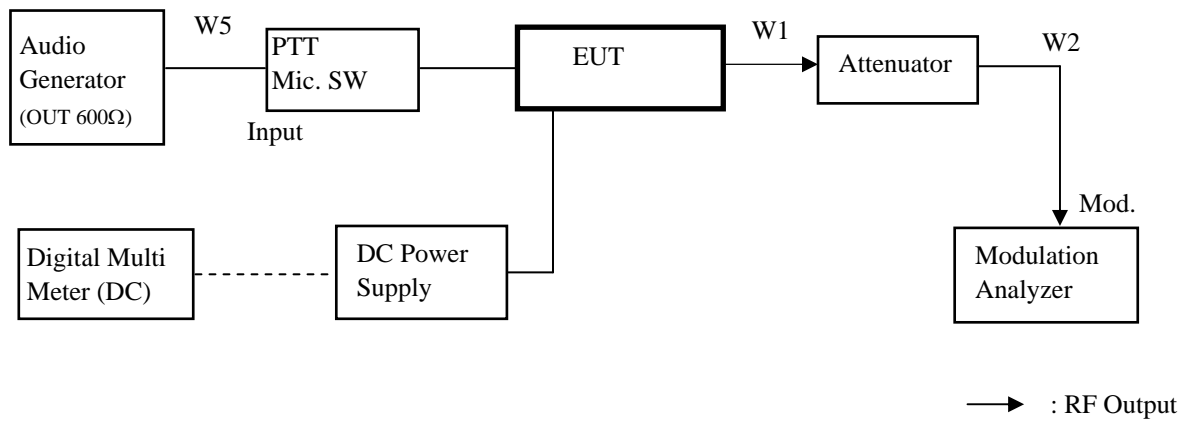
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Audio Generator	Anritsu	MG443B	M70150	Jul. 25, 08	Jul. 31, 09
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 08	Jun. 30, 09
3	Attenuator (10dB)	TME	CFA-05NJPJ-10	262856	Aug. 16, 07	Aug. 31, 08
4	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	Jun. 17, 08	Jun. 30, 09
5	DC Power Supply	Daiwa	PS-3020	None	None	None
6	Digital Multi Meter	Sanwa	CD721	3051002	Dec. 10, 07	Dec. 31, 08

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C02	Aug. 31, 07	Aug. 31, 08
W2	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C03	Aug. 31, 07	Aug. 31, 08
W5	Balance Cable	Nicoon	3D-2V	KSR00092	Oct. 16, 07	Oct. 31, 08

Measuring Equipment Configuration



Uncertainty

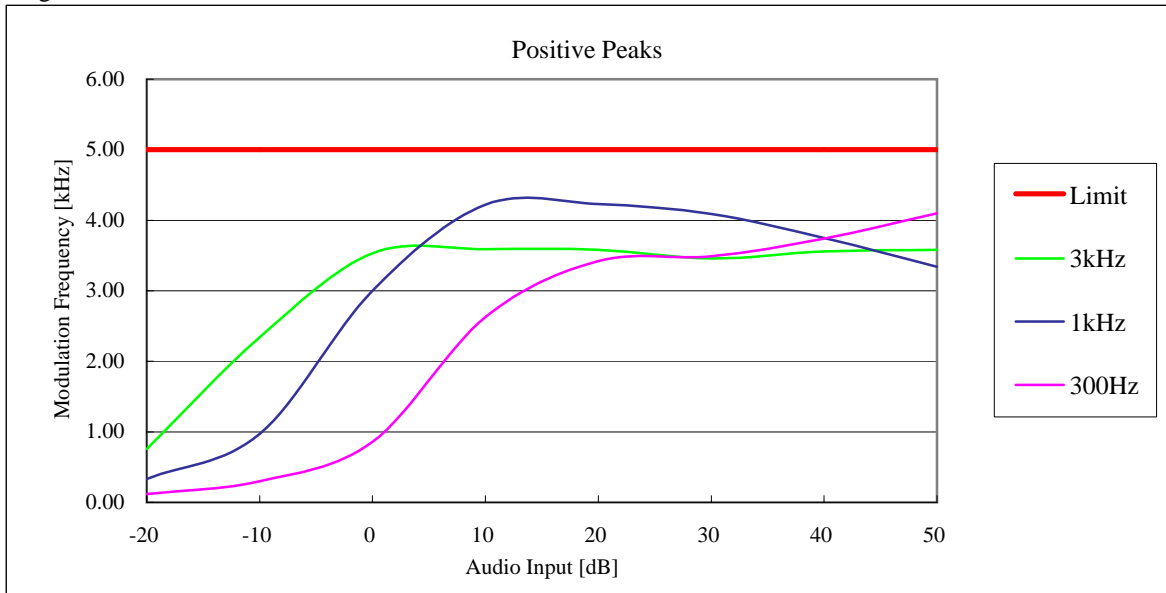
Measurement uncertainty is +/- 0.3dB (k = 2)

Test Results

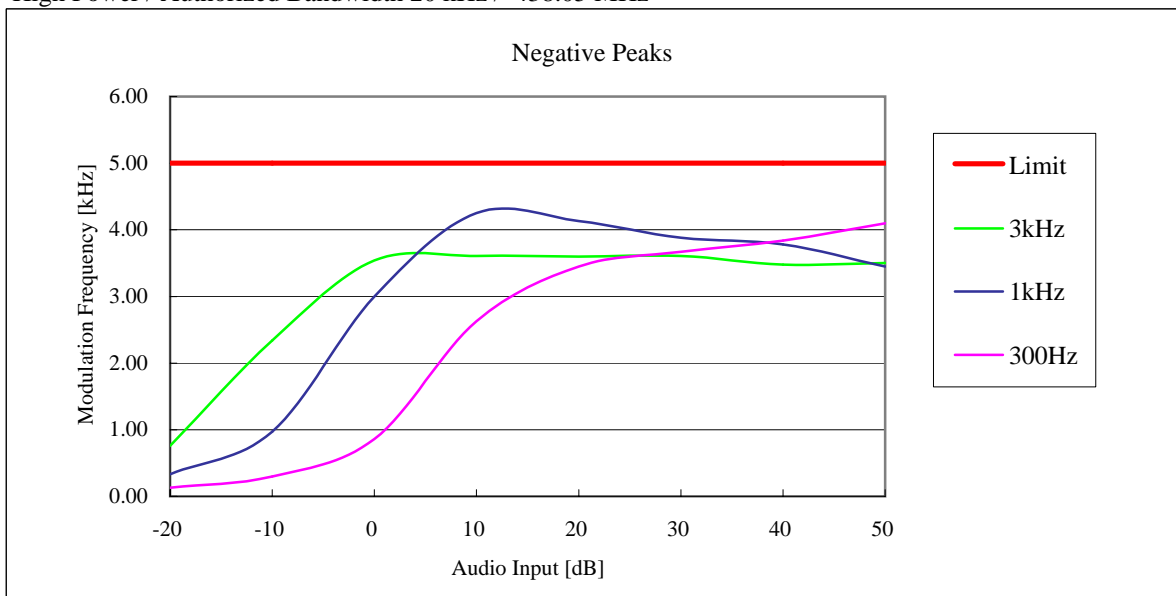
Test carried out for all the frequency band of section 5.1

Measured for the worst case

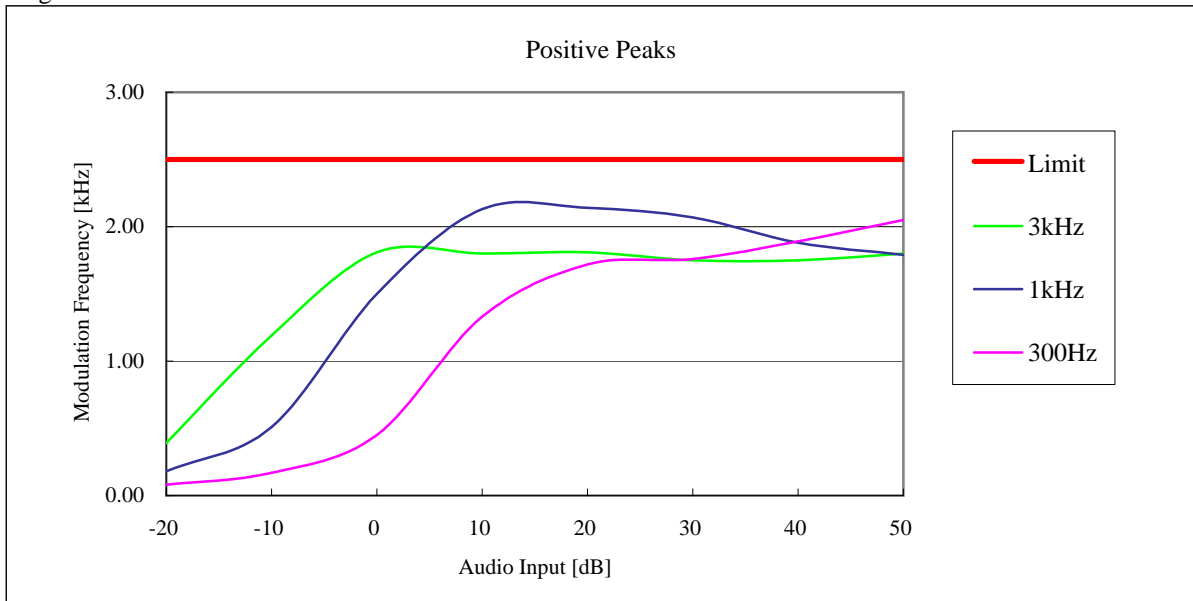
State : High Power / Authorized Bandwidth 20 kHz / 438.05 MHz



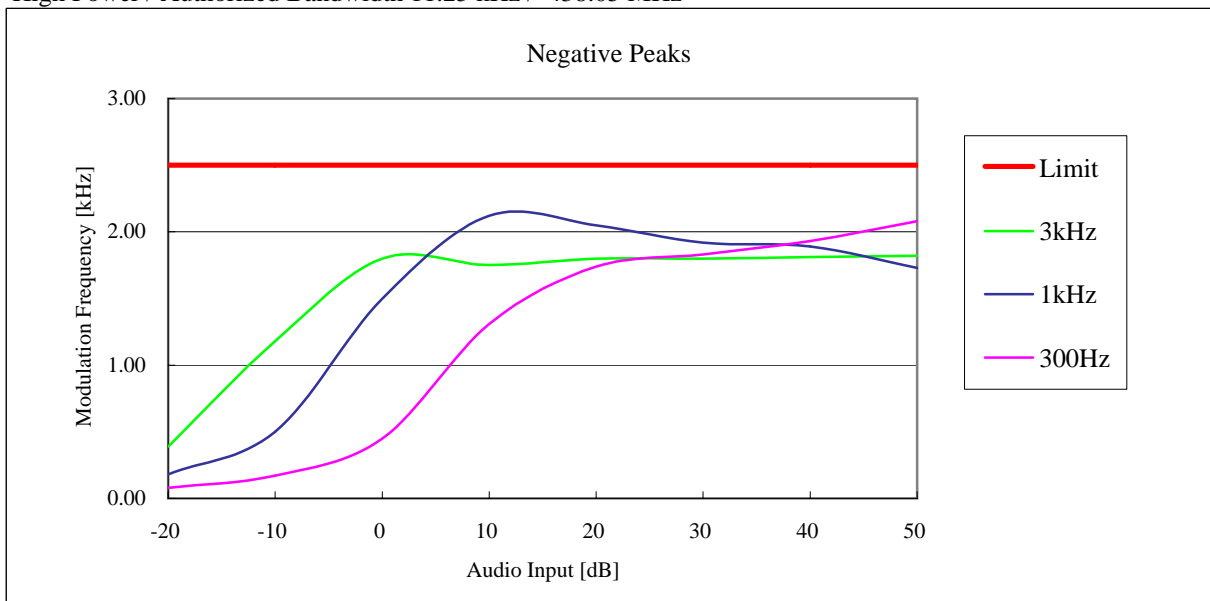
State : High Power / Authorized Bandwidth 20 kHz / 438.05 MHz



State : High Power / Authorized Bandwidth 11.25 kHz / 438.05 MHz



State : High Power / Authorized Bandwidth 11.25 kHz / 438.05 MHz



5.8 Frequency Stability (Temperature Variation)

REGULATIONS	: 47 CFR 2.1055 (a) (1), 22.355 , 74.464 , 90.213(a) / RSS-119 Section 5.3
-------------	----------------------------------------------------------------------------

TEST METHOD/GUIDE	: ANSI/TIA-603-C Section 2.2.2.2 / RSS-Gen Section 4.7(a)
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Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Set the temperature -30 degrees C.
- 3 Leave the EUT for 1 hour after it became the temperature that was set up.
- 4 Make the EUT the transmitting state.
Two minutes later, measure the output frequency.
- 5 Make the EUT the receiving state.
- 6 Set the temperature 50 degrees C by 10 degrees C.
And repeat test procedure 3 to 5.

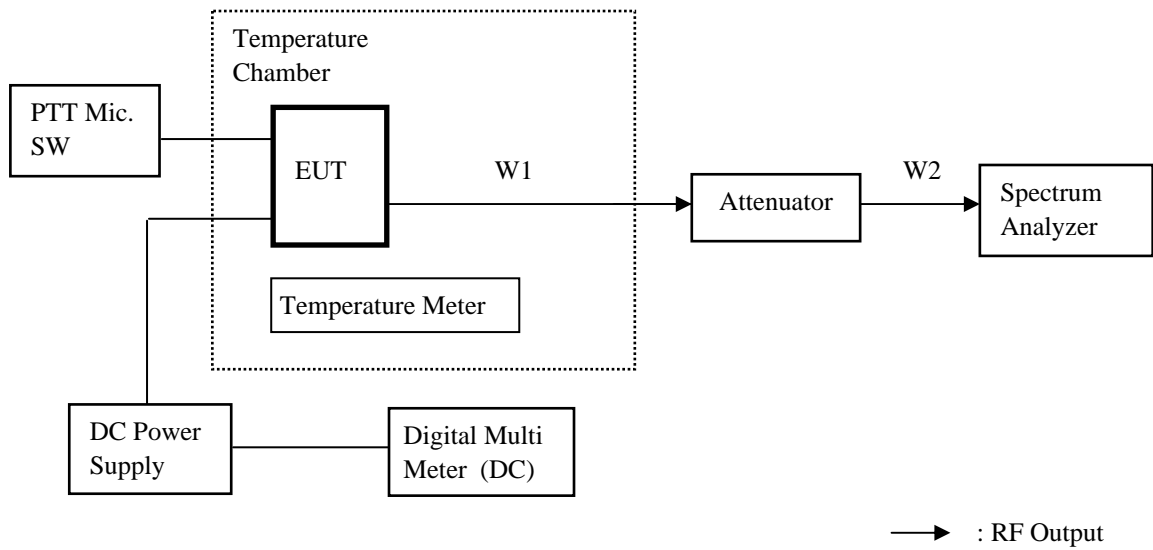
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Spectrum Analyzer	Agilent	E4407B	MY45102460	Jan. 09, 08	Jan. 31, 09
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 08	Jun. 30, 09
3	Attenuator (10dB)	TME	CFA-05NPJ-10	262856	Aug. 16, 07	Aug. 31, 08
4	DC Power Supply	Daiwa	PS-3020	None	None	None
5	Digital Multimeter	Sanwa	CD721	3215593	Dec. 10, 07	Dec. 31, 08
6	Temperature Chamber	Tabai	PL-3F	5103661	None	None
7	Temperature Meter	Sato	PC-5000TRH-II	A11999972	Mar. 14, 08	Mar. 31, 09

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	Aug. 31, 07	Aug. 31, 08
W2	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00093	Aug. 31, 07	Aug. 31, 08

Measuring Equipment Configuration



Uncertainty

Measurement uncertainty is +/- 0.2ppm

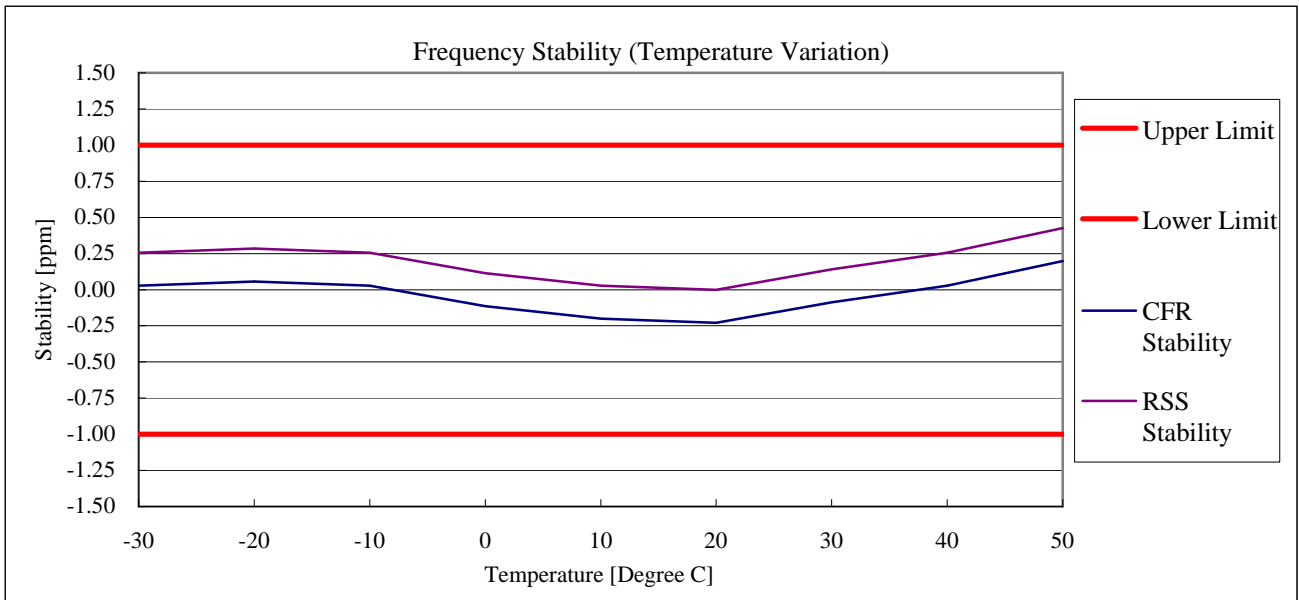
Test Results

Test carried out for all the frequency band of section 5.1

Measured for the worst case

State : High Power / Authorized Bandwidth 6 kHz / 438.05 MHz

No.	Temperature (Degree C)	Frequency (MHz)	CFR Stability (ppm)	RSS Stability (ppm)	Limit (+/- ppm)	Min. Margin (ppm)
1	-30	438.050012	0.03	0.26	1.0	0.97
2	-20	438.050025	0.06	0.29	1.0	0.94
3	-10	438.050012	0.03	0.26	1.0	0.97
4	0	438.049950	-0.11	0.11	1.0	0.89
5	10	438.049912	-0.20	0.03	1.0	0.80
6	20	438.049900	-0.23	0.00	1.0	0.77
7	30	438.049962	-0.09	0.14	1.0	0.91
8	40	438.050012	0.03	0.26	1.0	0.97
9	50	438.050087	0.20	0.43	1.0	0.80



5.9 Frequency Stability (Voltage Variation)

REGULATIONS	: 47 CFR 2.1055 (d) (1), 22.355 , 74.464 , 90.213(a) / RSS-119 Section 5.3
TEST METHOD/GUIDE	: ANSI/TIA-603-C Section 2.2.2.2 / RSS-Gen Section 4.7(b)

Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 The power supply voltage to the EUT was varied from 85 % to 115 % of the nominal value measured at the input to the EUT.

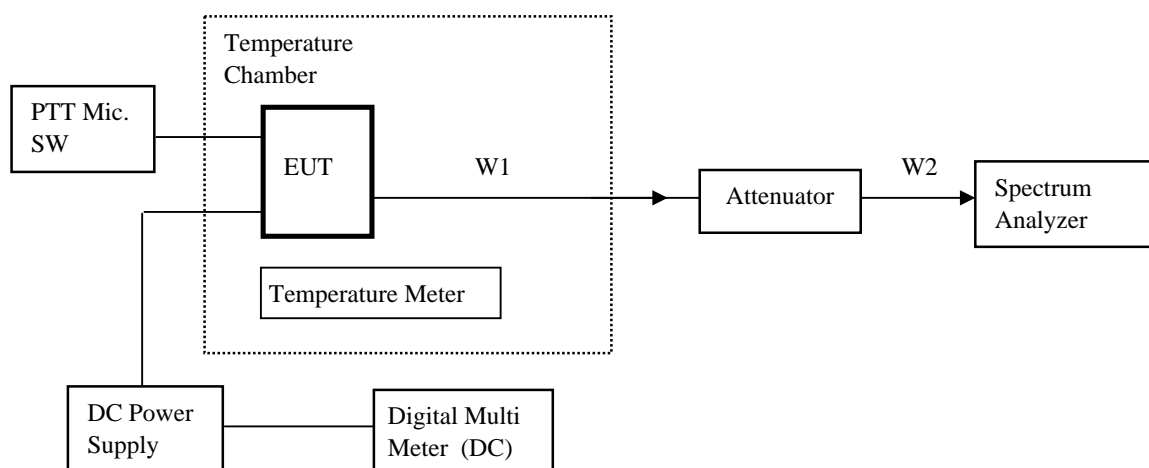
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Spectrum Analyzer	Agilent	E4407B	MY45102460	Jan. 09, 08	Jan. 31, 09
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 08	Jun. 30, 09
3	Attenuator (10dB)	TME	CFA-05NPJ-10	262856	Aug. 16, 07	Aug. 31, 08
4	DC Power Supply	Daiwa	PS-3020	None	None	None
5	Digital Multimeter	Sanwa	CD721	3215593	Dec. 10, 07	Dec. 31, 08
6	Temperature Chamber	Tabai	PL-3F	5103661	None	None
7	Temperature Meter	Sato	PC-5000TRH-II	A11999972	Mar. 14, 08	Mar. 31, 09

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	Aug. 31, 07	Aug. 31, 08
W2	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00093	Aug. 31, 07	Aug. 31, 08

Measuring Equipment Configuration



→ : RF Output

Uncertainty

Measurement uncertainty is +/- 0.2ppm

Test Results

Test carried out for all the frequency band of section 5.1

Measured for the worst case

State : High Power / Authorized Bandwidth 6 kHz / 438.05 MHz

No.	Diviation (%)	Voltage (V)	Frequency (MHz)	Stability (ppm)	Limit +/- (ppm)	Margin (ppm)
1	85	11.6	438.049950	-0.11	1.0	0.89
2	100	13.6	438.049900	-0.23	1.0	0.77
3	115	15.6	438.050025	0.06	1.0	0.94

5.10 Receiver Spurious Emissions(Radiated)

REGULATIONS : RSS-119 Section 5.11, RSS-Gen Section 6

TEST METHOD/GUIDE : RSS-Gen Section 4.10

TEST PROCEDURE

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Tabletop Equipment
EUT is placed on the wooden table, the top of which is 0.8meter above the metal ground plane(turntable).
- 3 Interconnecting Cables
Excess part of the interconnecting cables longer than 1 meter are bundled in the center.
Cables that hang closer than 40 cm to the ground plane is folded back and forth forming bundle 30 to 40 cm long,
- 4 Measuring Instruments
Measuring instruments list and their calibration schedule are shown on Measurement Equipment Configuration.
The brief description are as follows;
- 5 Antennas
The broadband Bi-cog antenna is used for measurement on the frequency range 30 – 1000 MHz.
The Double ridged guide antenna is used for frequency higher than 1000 MHz
- 6 Pre-amplifier
The broadband pre-amplifier is used for radiated emission measurement.
The signal to noise ratio is improved by using pre-amplifier.
- 7 Spectrum Analyzer
The spectrum analyzer is used for preliminary measurement of frequency range 30 – 1000 MHz, and also used for final measurement of higher than 1000 MHz (RBW : 1 MHz).
- 8 EMI Test Receiver
The Quasi-peak detector (IF bandwidth : 120 kHz) built in test receiver is used for final measurement of the frequency 30 – 1000 MHz.
The test receiver is complied with the specification of the CISPR publication 16.
- 9 Turntable
The turntable is capable for EUT weight and rotatable 0 to 360 degree horizontally by remote control in the test room.
- 10 Antenna Mast
The antenna mast is attachable to all antennas described on antenna height is adjustable 1 to 4 meters continuously by remote control at the test room, and antenna polarization is also changed by the remote control.
Preliminary Measurement
- 11 EUT is tested on all operating conditions.
The spectrum analyzer is set max-hold mode and swept during turntable was rotated 0 to 360 degree. Then spectrum chart are plotted out to find the worst emission conditions in configuration, operating mode, or ambient noise notation.

12 Final Measurement

The EUT operated in the condition where maximum emission is found in the preliminary test.

The turntable azimuth(EUT direction) and antenna height are adjusted the position so that maximum field strength is obtained for each frequency spectrum to be measured.

The equipment and cables are arranged or manipulated within the range of the test standard in the above condition.

When the uncertain result was obtained, the measurement is retried by using the half wave dipole antenna instead of the broadband antenna

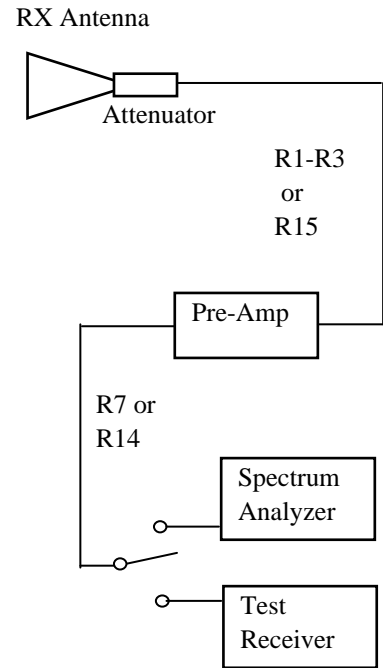
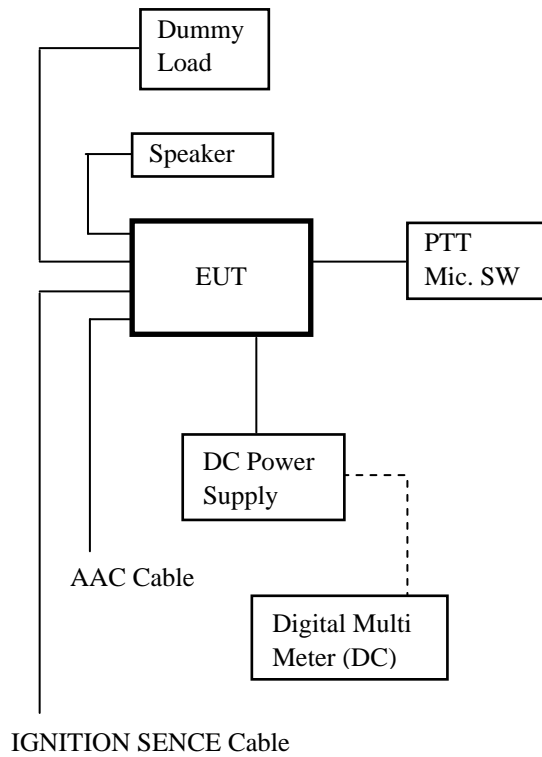
TEST EQUIPMENTS

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Tri-log Antenna	Schwarzbeck	VULB9168WP	287	Dec. 03, 07	Dec. 31, 08
2	D.R.G Antenna	Schwarzbeck	3115	5044	Jun. 18, 08	Jun. 30, 09
3	Step Attenuator	Hewlett Packard	8494B	2726A14513	Nov. 30, 07	Nov. 30, 08
4	Pre-Amplifier	Intertek Japan	ZX60-3018G	001	Nov. 30, 07	Nov. 30, 08
5	Pre-Amplifier	Hewlett Packard	83051A	3332A00329	Oct. 11, 07	Oct. 31, 08
6	Attenuator (6dB)	Anritsu	MP721B	M57593	Nov. 30, 07	Nov. 30, 08
7	Attenuator (3dB)	Narda	1047577	79	Oct. 11, 07	Oct. 31, 08
8	Spectrum Analyzer	Hewlett Packard	8564E	3643A00665	May 08, 08	May 31, 09
9	Test Receiver	Rohde & Schwarz	ESS	844861/004	Jun. 05, 08	Jun. 30, 09
10	Dummy Load	TME	CT-150NP	1138693	Aug. 30, 07	Aug. 31, 08
11	DC Power Supply	Daiwa	PS-3020	None	None	None
12	Digital Multimater	Sanwa Sanwa	CD721	3051002	Dec 10, 07	Dec 31, 08

USED CABLES

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
R1	Coaxial Cable	Intertek Japan	5D-2W	None	Nov. 30, 07	Nov. 30, 08
R2	Coaxial Cable	Intertek Japan	10D-2W	None	Nov. 30, 07	Nov. 30, 08
R3	Coaxial Cable	Intertek Japan	5D-2W	None	Nov. 30, 07	Nov. 30, 08
R4	Coaxial Cable	Intertek Japan	5D-2W	None	Nov. 30, 07	Nov. 30, 08
R5	Coaxial Cable	Intertek Japan	5D-2W	None	Nov. 30, 07	Nov. 30, 08
R6	Coaxial Cable	Intertek Japan	5D-2W	None	Nov. 30, 07	Nov. 30, 08
R7	Coaxial Cable	Intertek Japan	5D-2W	None	Nov. 30, 07	Nov. 30, 08
R14	Coaxial Cable	Suhner	SUCOFLEX102	712/2	Oct. 11, 07	Oct. 31, 08
R15	Coaxial Cable	Insulated Wire	KSP-1501-1969-KPS	03292003	Oct. 11, 07	Oct. 31, 08

MEASUREMENT EQUIPMENT CONFIGURATION



UNCERTAINTY

Measurement uncertainty is +/- 4.8dB (k = 2)

TEST RESULTS

Test carried out for the RSS frequency band of section 5.1
 Measured for the worst case

State : 469.95 MHz Receiver Condition

No.	Frequency (MHz)	Pol	Mode	Reading Level (dBuv)	Factor* (dB)	Emission Level (dBuV/m)	Limit Level (dBuV/m)	Margin (dB)
1	44.23	Hor.		-	-2.70	-	40.0	-
		Ver.		19.70	-2.70	17.00	40.0	23.0
2	210.13	Hor.		-	-3.90	-	43.5	-
		Ver.		16.00	-3.90	12.10	43.5	31.4
3	823.80	Hor.		15.50	11.80	27.30	46.0	18.7
		Ver.		19.50	11.80	31.30	46.0	14.7
4	829.44	Hor.		-	11.80	-	46.0	-
		Ver.		15.50	11.80	27.30	46.0	18.7
5	847.87	Hor.		-	12.20	-	46.0	-
		Ver.		14.90	12.20	27.10	46.0	18.9
6	884.74	Hor.		14.40	13.00	27.40	46.0	18.6
		Ver.		15.50	13.00	28.50	46.0	17.5
7	949.25	Hor.		14.20	14.00	28.20	46.0	17.8
		Ver.		14.80	14.00	28.80	46.0	17.2
9	1647.70	Hor.	AVG	28.30	0.60	28.90	54.0	25.1
		Ver.	AVG	28.80	0.60	29.40	54.0	24.6
10	2059.71	Hor.	AVG	28.10	2.60	30.70	54.0	23.3
		Ver.	AVG	28.20	2.60	30.80	54.0	23.2
11	3296.01	Hor.	AVG	28.30	7.60	35.90	54.0	18.1
		Ver.	AVG	28.40	7.60	36.00	54.0	18.0

There is the margin of 20dB over except for the above points.

* Factor = Antenna,Antenna Pad,Cable,Preamp

Emission Level = Reading Level + Factor

Note:

- 1 Measurement distance is 3 metres.
- 2 Scanned frequency are 30 to 5000 MHz.
- 3 Maximum local oscillator frequency is 470 MHz.

5.11 Necessary Bandwidth and Emission Bandwidth

REGULATIONS	: 47 CFR 2.202 (g) & Federal Register/ Vol.68, No236 TRC 43
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Calculation Results

State : 16K0F3E (Authorized Bandwidth 20 kHz)

Item	Mark	
Maximum Modulation	(M)	3kHz
Maximum Deviation	(D)	5kHz
Constant Factor	(K)	1
Necessary Bandwidth	(Bn)	16kHz

$$B_n = (2 \times M) + (2 \times D \times K)$$

State : 14K4F1D (GMSK / 9600bps, Authorized Bandwidth 20 kHz)

Item	Mark	
Digital information rate	(R)	9600bps
Peak frequency deviation	(D)	2.4kHz
Signaling states	(S)	2
Numerical factor	(K)	1
Necessary Bandwidth	(Bn)	14.4kHz

$$B_n = (R / \log_2 S) + 2 \times D \times K$$

State : 11K0F3E (Authorized Bandwidth 11.25 kHz)

Item	Mark	
Maximum Modulation	(M)	3kHz
Maximum Deviation	(D)	2.5kHz
Constant Factor	(K)	1
Necessary Bandwidth	(Bn)	11kHz

$$B_n = (2 \times M) + (2 \times D \times K)$$

State : 8K30F1E / 8K30F1D / 8K30F7W (4Level FSK / 9600bps, Authorized Bandwidth 11.25 kHz)

Item	Mark	
Digital information rate	(R)	9600bps
Peak frequency deviation	(D)	3.391kHz
Signaling states	(S)	4
Numerical factor	(K)	0.516
Necessary Bandwidth	(Bn)	8.3kHz

$$B_n = (R / \log_2 S) + 2 \times D \times K$$

State : 4K00F1E / 4K00F1D / 4K00F7W (4Level FSK / 4800bps, Authorized Bandwidth 6 kHz)

Item	Mark	
Digital information rate	(R)	4800bps
Peak frequency deviation	(D)	1.550kHz
Signaling states	(S)	4
Numerical factor	(K)	0.516
Necessary Bandwidth	(Bn)	4.0kHz

$$B_n = (R / \log_2 S) + 2 \times D \times K$$

State : 4K00F2D (CWID, Authorized Bandwidth 6 kHz)

Item	Mark	
Maximum Modulation	(M)	0.8kHz
Maximum Deviation	(D)	1.2kHz
Numerical factor	(K)	1
Necessary Bandwidth	(Bn)	4.0kHz

$$B_n = (2 \times M) + (2 \times D \times K)$$

State : 8K10F2D / 8K10F1E (C4FM / 9600bps, Authorized Bandwidth 11.25 kHz)

Item	Mark		
Digital information rate	(R)	9600bps	
Peak frequency deviation	(D)	3.111kHz	
Signaling states	(S)	4	
Numerical factor	(K)	1	
Necessary Bandwidth	(Bn)	8.1kHz	Measurements were done*

*Measurements per Rule 47CFR Part 2.202(c)(4) were done because Part 2.202(g) Table III-A.1. formulation produces an excessive result using the value of K recommended in the Table. Therefore the 99% energy rule(title 47CFR 2.202(a)) was used for digital mode and is more accurate than Carson's rule. It basically states that 99% of the modulation energy falls within X kHz, in this case, 8.10kHz. Measurements were performed in accordance with TIA/EIA 102.CAAA-A Section 2.2.5.2. The emission mask was obtained from 47CFR 90.210(d).




6. VALIDITY OF TEST REPORT




The test result of this report is effective for equipment under test itself and under the test configuration described on the report.

This test report does not assure that whether the test result taken in other testing laboratory is compatible or reproducible to the test result on this report or not.

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7. DESCRIPTION OF TEST LABORATORY

ACCREDITATION			SCOPE	LAB. CODE
 LAB CODE 100290-0	NVLAP	USA	EMC Testing	100290-0
	NVLAP	USA	Calibration	100290-0
	NVLAP	USA	Telecommunication	100290-0
	VLAC	JAPAN	EMC Testing	VLAC-008-1
	BSMI	TAIWAN	EMC Testing	SL2-IN-E-6008
	NATA	AUSTRALIA	Calibration	13491
	NATA	AUSTRALIA	Telecommunication	100290-0

FILING			SCOPE	LAB. CODE
	VCCI	JAPAN	EMC Testing	
	FCC	USA	EMC Testing	JP0008
	IC	CANADA	EMC Testing	IC-2065A-1
	IC	CANADA	Telecommunication	IC-2065A
		SAUDI ARABIA	EMC Testing	

Note 1 : NVLAP accreditation does not constitute any product endorsement by NVLAP or any agent of the U.S. Government.