



TEST REPORT

REGULATION :

FCC Part 2, 22, 90

Applicant		Testing Laboratory	
Kenwood Corporation 1-16-2, Hakusan, Midori-ku, Yokohama-shi Kanagawa, 226-8525 Japan Tel.: +81 45 939 6254 Fax.: +81 45 939 7097		Intertek Japan K. K. Kashima Site 3-2, Sunayama, Kamisu-shi, Ibaraki-ken Tel.: +81 479 40 1097 Fax.: +81 479 46 1788 URL: http://www.japan.intertek-etlsemko.com	

Equipment type	VHF FM TRANSCEIVER
Trademark	KENWOOD
Model(s)	TK-690H-2
Serial No.	None
FCC ID	K44229201
Test Result	Complied
Report Number	JK09040026(R1)
Report issue date	May 22, 2009

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The test report JK09040026 was superseded by this test report.

Approved by

Kazuo Gokita

[Site Manager]

Tested by

Naoki Ikeda

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	: K44229201
Model number	: TK-690H-2
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)
(c)(5) Frequency range	
Frequency Range	: 35 to 43 MHz
(c)(6) Power Rating	
Output Power	: 45 to 110 W
Type	: Continuously Variable
(c)(7) Maximum Power Rating	
Output Power	: 110 W
Other Information	
Number of Channel	: 160
Maximum Deviation	: 5 kHz
Frequency Stability	: 5 ppm
Antenna Impedance	: 50 Ω Norminal
Note	

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SECTION 1. GENERAL INFORMATION

TEST PERFORMED

Location	Kashima No.1 Test Site and No.3 Test Site
EUT Received	April 23, 2009
Date of Test	April 24, 2009 to May 11, 2009
Standard Applied	FCC Part 2, 22, 90
Measurement Method	ANSI/TIA-603-C-2004
Deviation from Standard(s)	Not applicable

QUALIFICATIONS OF TESTING LABORATORY

ACCREDITATION	SCOPE	LAB. CODE	Remarks
NVLAP	EMC Testing	100290-0	
VLAC	EMC Testing	VLAC-008-1	JAPAN
BSMI	EMC Testing	SL2-IN-E-6008	TAIWAN
FILING			
VCCI	EMC Testing	R-788, C-278, C-279, T-351, T-352 R-274, C-280, C-281, T-353, T-359 R-272, C-276, C-277, T-360, T-361 R-576, C-590, T-362	JAPAN
FCC	EMC Testing	Designation Number:JP0008	USA
IC	EMC Testing	IC-2042K-1, IC-2042K-3	CANADA
SAUDI ARABIA	EMC Testing	N/A	

ABBREVIATIONS

EUT	Equipment Under Test	DoC	Declaration of Conformity
AMN	Artificial Mains Network	ISN	Impedance Stabilization Network
LISN	Line Impedance Stabilization Network	Q-P	Quasi-peak
AMP	Amplifier	AVG	Average
ATT	Attenuator	PK	Peak
ANT	Antenna	Cal	Calibration
BBA	Broadband Antenna	N/A	Not applicable or Not available
DIP	Dipole Antenna	LCD	Liquid-Crystal Display
AE	Associated Equipment	4LEVEL FSK	4LEVEL Frequency Shift Key
GMSK	Gaussian Maximum Shift Key	CW ID	Continuously Repeating bit stream
FM	Frequency Modulation	C4FM	Constant envelope 4 Level FM
PTT	Push to Talk		

SECTION 2. SUMMARY OF TEST RESULT

FCC Part2	Part22	Part90	TEST ITEM	RESULTS
2.1046 (a)	-	-	Carrier Output Power (Conducted)	PASS
2.1051	-	90.210	Unwanted Emissions (Transmitter Conducted)	PASS
2.1053 (a)	-	90.210	Field Strength of Spurious Radiation	PASS
2.1049 (c) (1)	22.359, 357 (a)	90.210	Emission Masks (Occupied Bandwidth)	PASS
-	-	90.214	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	90.213 (a)	Frequency Stability (Temperature Variation)	PASS
2.1055 (d) (1)	22.355	90.213 (a)	Frequency Stability (Voltage Variation)	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 3. 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	N.A.
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	N.A.
RSS-Gen	General Requirements and Information for the Certification of Radiocommunication Equipment	N.A.

SECTION 4. INFORMATION ABOUT EUT AND SUPPORT EQUIPMENT(S)

4.1 List of System Configuration

Symbol	Item	Model No.	Serial No.	Manufacture	Remarks
A1	VHF FM TRANSCEIVER	TK-690H-2	None	Kenwood	EUT
Power Ratings of EUT :		DC 13.4 V +/- 15 % , 25.0 A Maximum			
Power Supply :		DC 13.4 V +/- 15 %			
Condition of Equipment		Proto type			
Type		Mobile type			
Suppression Devices		No Modifications by the laboratory were made to the device			

4.2 Port(s)/Connector(s)

Port Name	Connector Type	Connector Pin	Remarks
ACC	D-sub	25 pin	
Speaker	Jack	9 pin	
Antenna	M	2 pin	
Microphone	Kenwood original	12 pin	

4.3 Highest Frequency Oscillator(s)/Crystal(s)

Base Clock	Operating Frequency	Board Name	Remarks
53.7 MHz	53.7 MHz	TXRX Unit	

SECTION 5. SUPPORT EQUIPMENT

The EUT was supported by the following equipment during the test.

Symbol	Item	Model No.	Serial No.	Manufacture	FCC ID
B	DC Power Supply	PS-3020	None	Daiwa	N/A
C	External Speaker	KES-5	None	Kenwood	N/A
D	Keypad Microphone	KMC-28	None	Kenwood	N/A
E	Dummy Load	CT-150NP	1138693	TME	N/A
Supplied Power:					
B	AC	100V,60Hz			

SECTION 6. USED CABLE(S)

The following cable(s) was used for the test.

No.	Name	Length (m)	Shield	Connector
1	Speaker cable	2.80	No	Plastic
2	Antenna cable	0.90	Yes	Metal
3	Mic. cable	0.60	No	Plastic
4	DC Sub cable for EUT	0.80	Yes	Metal
5	Ignition sense cable	3.00	No	Plastic
6	ACC cable	1.70	Yes	Metal
7	DC cable for EUT	3.00	No	Plastic
8	Power cable for DC Power Supply	1.70	No	-

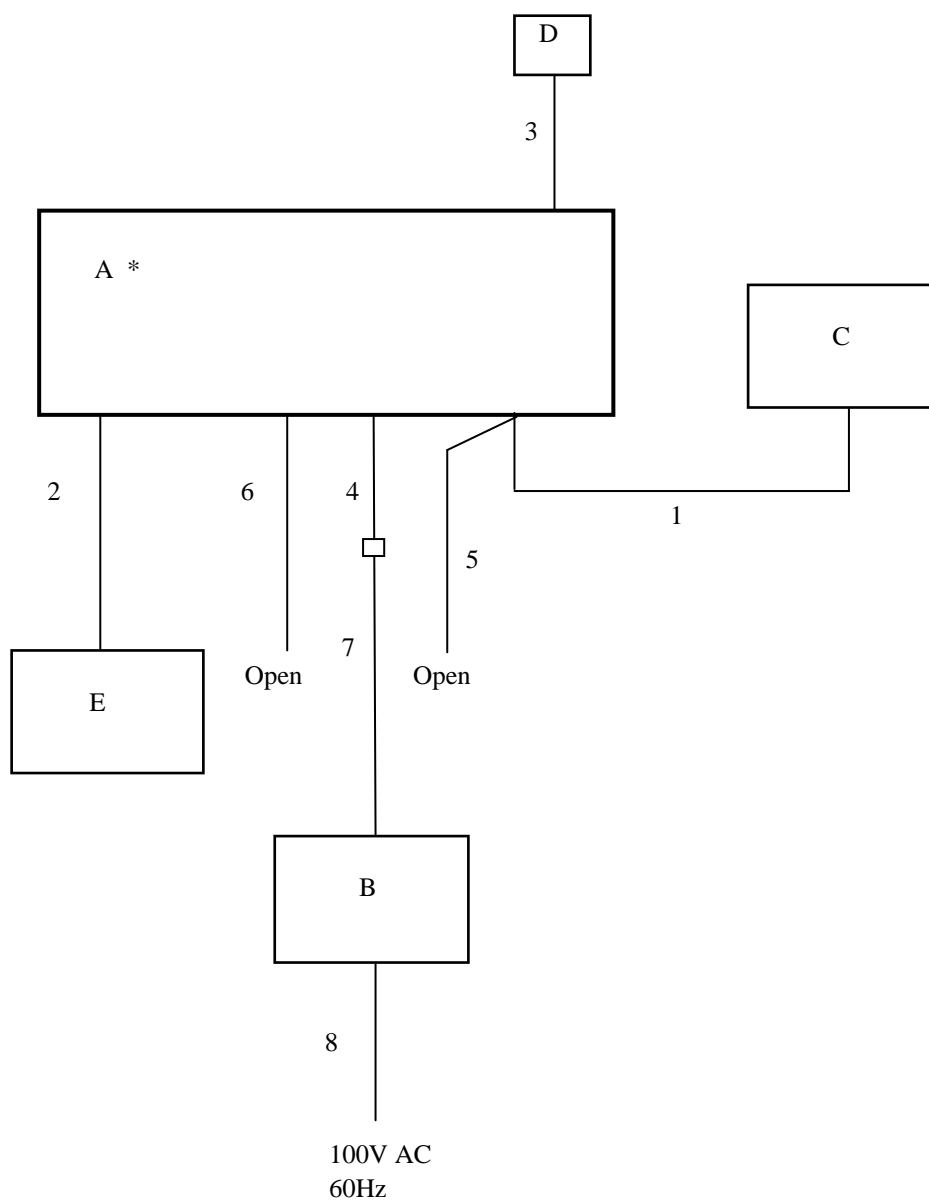
SECTION 7. TEST CONFIGURATION

Details of Configuration and Connection

Example: Case of Section 10.3 Test

* : EUT

□ : Joint Connector



SECTION 8. OPERATING CONDITION

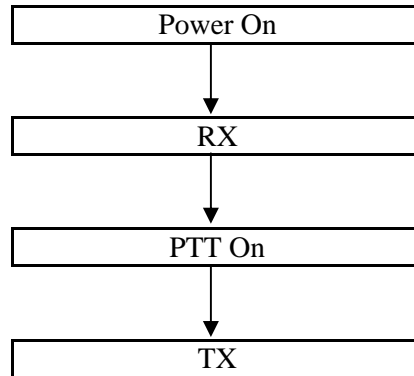
The EUT was operated under the following condition during the test.

8.1 Operating Condition

The test was carried out under Transmit (35.05MHz, 39.05MHz, 42.95MHz) mode.
EUT was examined in the operating conditions that had maximum emissions.

8.2 Operating Flow [Transmit mode]

Following operations were performed continuously.



SECTION 9. MEASUREMENT UNCERTAINTY

Carrier Output Power (Conducted)	U _{lab}	U _{tia-603-c}
	+/- 0.29dB (k = 2)	+/- 0.59 dB
Unwanted Emissions (Transmitter Conducted)		
	+/- 2.19 dB (k = 2)	+/- 1.1 dB
Field Strength of Spurious Radiation		
	+/- 4.8dB (k = 2)	+/- 3.3 dB
Emission Masks (Occupied Bandwidth)		
	+/- 0.5dB (k = 2)	+/- 2.1 dB
Transient Frequency Behavior		
	+/- 1.10% (k = 2)	+/- 21.6 %
Audio Low Pass Filter (Voice Input)		
	+/- 0.1dB (k = 2)	+/- 1.2 dB
Audio Frequency Response		
	+/- 0.1dB (k = 2)	+/- 1.2 dB
Modulation Limiting		
	+/- 1% (k = 2)	+/- 1 %
Frequency Stability (Temperature Variation)		
	+/- 14.9Hz (k=2)	+/-34.2 Hz
Frequency Stability (Voltage Variation)		
	+/- 14.9Hz (k=2)	+/-34.2 Hz
Receiver Spurious Emissions	U _{lab}	U _{cispr}
30-1000MHz	+/- 4.6dB (k = 2)	+/- 5.2 dB
1-40GHz	+/- 4.4dB (k = 2)	

SECTION 10. TEST DATA

10.1 Carrier Output Power (Conducted)

REGULATIONS	: 47 CFR 2.1046 (a)
TEST METHOD/GUIDE	: ANSI/TIA-603-C Section 2.2.1.2

Test Procedure

- The EUT and test equipment were set up as shown on the following page.
- The EUT was conducted to a resistive coaxial attenuator of normal load impedance.

$$\text{RF Power (dBm)} = \text{Power Meter reading (dBm)} + \text{Attenuator Loss (dB)} + \text{Cable Loss (dB)}$$

$$\text{RF Power (W)} = 10^{(\text{RF Power (dBm)}/10)}/1000$$

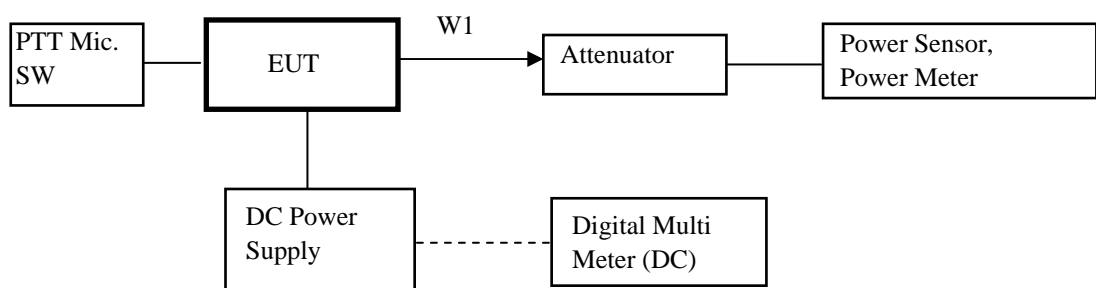
Measuring Equipments

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 09, 08	May. 31, 09
3	Attenuator (20dB)	Aeroflex/Weinschel	66-20-34	BY4357	Mar. 30, 09	Mar. 31, 10
4	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 09	Jun. 30, 10
5	Digital Multi Meter	Sanwa	CD721	KSR00068	Jan. 08, 09	Jan. 31, 10
6	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	Suhner	SCOFLEX100	KSR00091	Jan. 14, 09	Jan. 31, 10

Measuring Equipment Configuration



→ : RF Output

Test Results

Test date	Apr 28, 2009
Location	Kashima No.1 Test Site
temperature	20 to 21 [degree C]
Humidity Variation	45 to 45 [%]
Atmospheric Pressure	102.0 to 102.0 [kPa]
Test Engineer	Naoki Ikeda

No.	Frequency (MHz)	Band	Setting	RF Power (W)
1	35.05	Low	High Power	110
2	39.05	Middle	High Power	110
3	42.95	High	High Power	110
4	35.05	Low	Low Power	45
5	39.05	Middle	Low Power	45
6	42.95	High	Low Power	45

10.2 Unwanted Emissions (Transmitter Conducted)

REGULATIONS	: 47 CFR 2.1051, 90.210
TEST METHOD/GUIDE	: ANSI/TIA-603-C Section 2.2.13.2

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 power (FM Modulation) , Positive peak with peak hold (C4FM Modulation)
- 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.

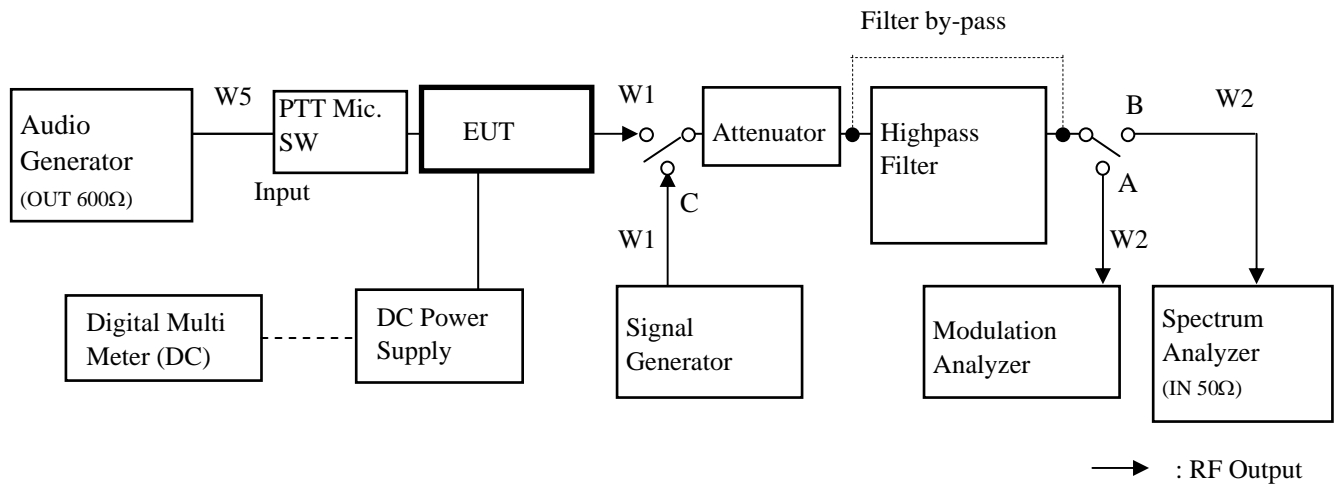
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Audio Generator	Anritsu	MG443B	M70150	Apr. 01, 09	Apr. 30, 10
2	Attenuator (20dB)	Aeroflex/Weinshel	66-20-34	BY4357	Mar. 30, 09	Mar. 31, 10
3	Attenuator (30dB)	Weinshel	WA-29-30-34	8923	Jun. 23, 08	Jun. 30, 09
4	Modulation Analyzer	Hewlett Packard	8901B	2806A01669	Feb. 23, 09	Feb. 28, 10
5	Spectrum Analyzer	Agilent	E7403A	MY42000067	Feb 03, 09	Feb. 28, 10
6	Highpass Filter	Anritsu	MP526G	M39892	Apr. 24, 09	Apr. 30, 10
7	DC Power Supply	Daiwa	PS-3020	None	None	None
8	Digital Multi Meter	Sanwa	CD721	KSR00068	Jan 08, 09	Jan. 31, 10

Measuring Cables

No.	Cable	Manufacturer	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial cable	Suhner	SUCOHFLEX100	KSR00091	Jan. 14, 09	Jan. 31, 10
W2	Coaxial cable	Suhner	SUCOFLEX104	KSR00042	Mar. 12, 09	Mar. 31, 10
W5	Balance cable	Nicoon	3D-2V	KSR00092	Oct. 09, 08	Oct. 31, 09

Measuring Equipment Configuration



Test Results

Test date	Apr 28, 2009
Location	Kashima No.1 Test Site
temperature	20 to 21 [degree C]
Humidity Variation	45 to 45 [%]
Atmospheric Pressure	102.0 to 102.0 [kPa]
Test Engineer	Naoki Ikeda

Test carried out for all the frequency band of section 10.1
Measured for the worst case

State : High Power / Authorized Bandwidth 20 kHz

No.	Band	Frequency (MHz)	Correct Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)
1	Low	70.10	-37.98	-88.39	-63.4	25.0
2	Middle	78.10	-36.53	-86.94	-63.4	23.5
3	High	85.90	-40.97	-91.38	-63.4	28.0
There is the margin of 20dB over except for the above points.						

State : Low Power / Authorized Bandwidth 20 kHz

No.	Band	Frequency (MHz)	Correct Level (dBm)	Emission Level (dBc)	Limit (dBc)	Margin (dB)
1	Low	-	-	-	-59.5	-
2	Middle	78.10	-42.23	-88.76	-59.5	29.2
3	High	85.90	-46.37	-92.90	-59.5	33.4
There is the margin of 20dB over except for the above points.						

Mask B Limit(dBc)=- (43+10Log(P))

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

Emission Level (dBc) = Correct Level (dBm) - 10Log(P*1000)

P = Carrier Level (W)

" - " = Measurement Limit

10.3 Field Strength of Spurious Radiation

REGULATIONS	: 47 CFR 2.1053 (a), 90.210
TEST METHOD/GUIDE	: ANSI/TIA-603-C Section 2.2.12.2

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

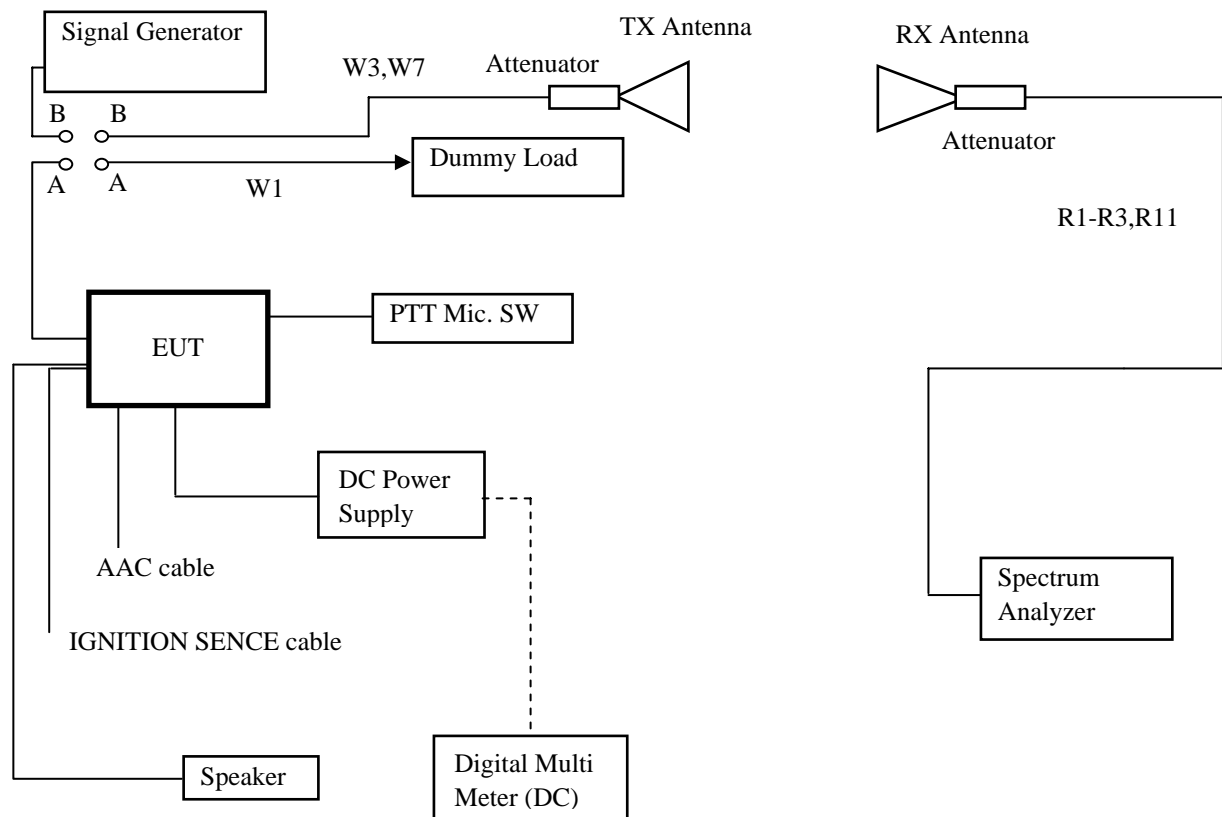
Measuring Equipments

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	Biconical Antenna(TX)	Schwarzbeck	BBA9106	C01082007	May 15, 08	May. 31, 09
3	Dipole Antenna(TX)	Schwarzbeck	UHA9105	AM0082002	May 16, 08	May. 31, 09
4	Tri-log Antenna(RX)	Schwarzbeck	VULB9168	107	Jul. 23, 08	Jul. 31, 09
5	Attenuator(6dB)	Anritsu	MP721B	M56993	Feb. 04, 09	Feb. 28, 10
6	Attenuator(10dB)	HUBER+SUHNER	6810.17B	KSR0044	Jan. 14, 09	Jan. 31, 10
7	Spectrum Analyzer	Agilent	E7403A	MY42000067	Feb. 03, 09	Feb. 28, 10
8	Signal Generator	Rohde & Schwarz	SMG	860289/011	Aug. 18, 08	Aug. 31, 09
9	Dummy Load	TME	CT-150NP	1138693	Sep. 09, 08	Sep. 30, 09
10	Digital Multi Meter	Sanwa	CD721	KSR00068	Jan. 08, 09	Jan. 31, 10
11	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	Suhner	SCOFLEX100	KSR00091	Jan. 14, 09	Jan. 31, 10
W3	Coaxial cable	Suhner	SCOFLEX100	KSR00046	Jan. 14, 09	Jan. 31, 10
W7	Coaxial cable	Radiall	R286401332	KSR00048	Jan. 14, 09	Jan. 31, 10
R1	Coaxial cable	Intertek Japan	5D-2W	None	Feb. 04, 09	Feb. 28, 10
R2	Coaxial cable	Intertek Japan	23D4AF	None	Feb. 04, 09	Feb. 28, 10
R3	Coaxial cable	Intertek Japan	5D-2W	None	Feb. 04, 09	Feb. 28, 10
R11	Coaxial cable	Intertek Japan	5D-2W	None	Feb. 04, 09	Feb. 28, 10

Measuring Equipment Configuration



Test Results

Test date	May 08, 2009 to May 11, 2009
Location	Kashima No.3 Test Site
temperature	20 to 25 [degree C]
Humidity Variation	69 to 74 [%]
Atmospheric Pressure	102.2 to 102.5 [kPa]
Test Engineer	Naoki Ikeda

Test carried out for all the frequency band of section 10.1
Measured for the worst case

State : High Power / Authorized Bandwidth 20 kHz / 42.95 MHz

No	Frequency (MHz)	Pol	Reading Level (dBm)	SG Out Level (dBm)	Loss (dB)	Antenna Gain (dBd)	Correct Level (dBm)	Emission Level (dBc)	Limit Level (dBc)	Margin (dB)
1	85.90	Hor.	-68.10	-25.70	10.71	-0.74	-37.2	-87.6	-63.4	24.2
		Ver.	-51.65	-12.80	10.71	-0.74	-24.3	-74.7	-63.4	11.3
2	128.85	Hor.	-	-	11.01	-3.66	-	-	-63.4	-
		Ver.	-85.75	-44.70	11.01	-3.66	-59.4	-109.8	-63.4	46.4
3	171.80	Hor.	-74.45	-31.80	11.19	0.00	-43.0	-93.4	-63.4	30.0
		Ver.	-74.55	-31.50	11.19	0.00	-42.7	-93.1	-63.4	29.7
4	214.75	Hor.	-73.20	-34.40	11.35	0.00	-45.7	-96.2	-63.4	32.7
		Ver.	-64.60	-21.70	11.35	0.00	-33.0	-83.5	-63.4	20.0
5	257.70	Hor.	-61.95	-20.90	11.47	0.00	-32.4	-82.8	-63.4	19.4
		Ver.	-68.20	-20.10	11.47	0.00	-31.6	-82.0	-63.4	18.6
6	300.65	Hor.	-73.35	-30.30	11.59	0.00	-41.9	-92.3	-63.4	28.9
		Ver.	-76.20	-29.80	11.59	0.00	-41.4	-91.8	-63.4	28.4
7	343.60	Hor.	-84.75	-40.90	11.15	0.00	-52.1	-102.5	-63.4	39.1
		Ver.	-80.50	-33.00	11.15	0.00	-44.2	-94.6	-63.4	31.2
8	386.55	Hor.	-77.30	-31.90	11.23	0.00	-43.1	-93.5	-63.4	30.1
		Ver.	-79.85	-31.33	11.23	0.00	-42.6	-93.0	-63.4	29.6
9	429.50	Hor.	-70.05	-22.50	11.31	0.00	-33.8	-84.2	-63.4	20.8
		Ver.	-75.95	-27.20	11.31	0.00	-38.5	-88.9	-63.4	25.5

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

Mask B Limit (dBc) = $-(43+10\log(P))$

Correct Level (dBm) = Substitute SG Level (dBm) + ANT Gain (dB) - 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 / 42.95 MHz

No	Frequency (MHz)	Pol	Reading Level (dBm)	SG Out Level (dBm)	Loss (dB)	Antenna Gain (dBd)	Correct Level (dBm)	Emission Level (dBc)	Limit Level (dBc)	Margin (dB)
1	85.90	Hor.	-68.35	-25.60	10.71	-0.74	-37.1	-83.6	-59.5	24.1
		Ver.	-52.45	-13.40	10.71	-0.74	-24.9	-71.4	-59.5	11.9
2	128.85	Hor.	-	-	11.01	-3.66	-	-	-	-
		Ver.	-80.85	-39.80	11.01	-3.66	-54.5	-101.0	-59.5	41.5
3	171.80	Hor.	-	-	11.19	0.00	-	-	-	-
		Ver.	-84.90	-42.20	11.19	0.00	-53.4	-99.9	-59.5	40.4
4	214.75	Hor.	-81.35	-42.80	11.35	0.00	-54.1	-100.7	-59.5	41.1
		Ver.	-70.90	-28.30	11.35	0.00	-39.6	-86.2	-59.5	26.6
5	257.70	Hor.	-69.60	-28.40	11.47	0.00	-39.9	-86.4	-59.5	26.9
		Ver.	-73.60	-25.80	11.47	0.00	-37.3	-83.8	-59.5	24.3
6	300.65	Hor.	-75.70	-32.30	11.59	0.00	-43.9	-90.4	-59.5	30.9
		Ver.	-80.70	-34.00	11.59	0.00	-45.6	-92.1	-59.5	32.6
7	343.60	Hor.	-85.60	-42.40	11.15	0.00	-53.6	-100.1	-59.5	40.6
		Ver.	-80.90	-32.40	11.15	0.00	-43.6	-90.1	-59.5	30.6
8	386.55	Hor.	-	-	11.23	0.00	-	-	-	-
		Ver.	-	-	11.23	0.00	-	-	-	-
9	429.50	Hor.	-81.40	-34.00	11.31	0.00	-45.3	-91.8	-59.5	32.3
		Ver.	-85.95	-37.90	11.31	0.00	-49.2	-95.7	-59.5	36.2
There is the margin of 20dB over except for the above points.										

Mask B Limit (dBc) = -(43+10Log(P))

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

Emission Level (dBc) = Correct Level (dBm) - 10Log(P*1000)

P = Carrier Level (W)

" - " = Measurement Limit

10.4 Emission Masks (Occupied Bandwidth)

REGULATIONS : 47 CFR 2.1049 (c) (1), 22.359, 357 (a) (1) , 90.210

TEST METHOD/GUIDE : ANSI/TIA-603-C Section 2.2.11.2

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 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 frequency of maximum response and with output level set for +/- 2.4 kHz or 1.2kHz(GMSK) , +/- 5.2kHz or 3.2kHz(4LFSK) deviation
- 5 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
- 6 The occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

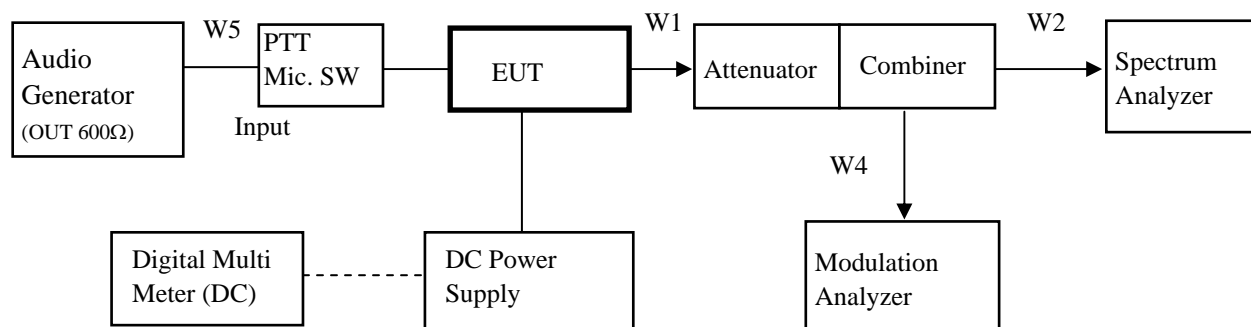
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Audio Generator	Anritsu	MG443B	M70150	Apr. 01, 09	Apr. 30, 10
2	Attenuator (20dB)	Aeroflex/Weinschel	66-20-34	BY4357	Mar. 30, 09	Mar. 31, 10
3	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 08	Jun. 30, 09
4	Combiner	Anritsu	Z-164A	M89549	Sep. 09, 08	Sep. 30, 09
5	Modulation Analyzer	Hewlett Packard	8901B	2806A01669	Feb. 23, 09	Feb. 28, 10
6	Spectrum Analyzer	Agilent	E7403A	MY42000067	Feb. 03, 09	Feb. 28, 10
7	DC Power Supply	Daiwa	PS-3020	None	None	None
8	Digital Multi Meter	Sanwa	CD721	KSR00068	Jan. 08, 09	Jan. 31, 10

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial cable	Suhner	SCOFLEX100	KSR00091	Jan. 14, 09	Jan. 31, 10
W2	Coaxial cable	Suhner	SUCOFLEX104	KSR00042	Mar. 12, 09	Mar. 31, 10
W4	Coaxial cable	Pacific custom	RG-58 C/U	AM90C03	Jan. 14, 09	Jan. 31, 10
W5	Balance cable	Nicoon	3D-2V	KSR00092	Oct. 09, 08	Oct. 31, 09

Measuring Equipment Configuration



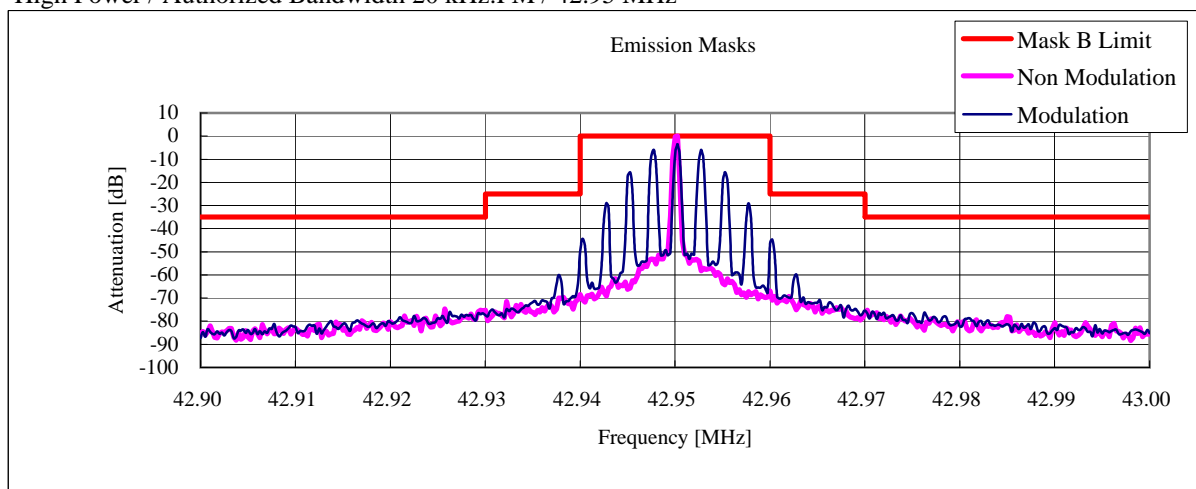
Test Results

Test date	Apr 28, 2009
Location	Kashima No.1 Test Site
temperature	23 to 23 [degree C]
Humidity Variation	45 to 46 [%]
Atmospheric Pressure	102.1 to 102.1 [kPa]
Test Engineer	Naoki Ikeda

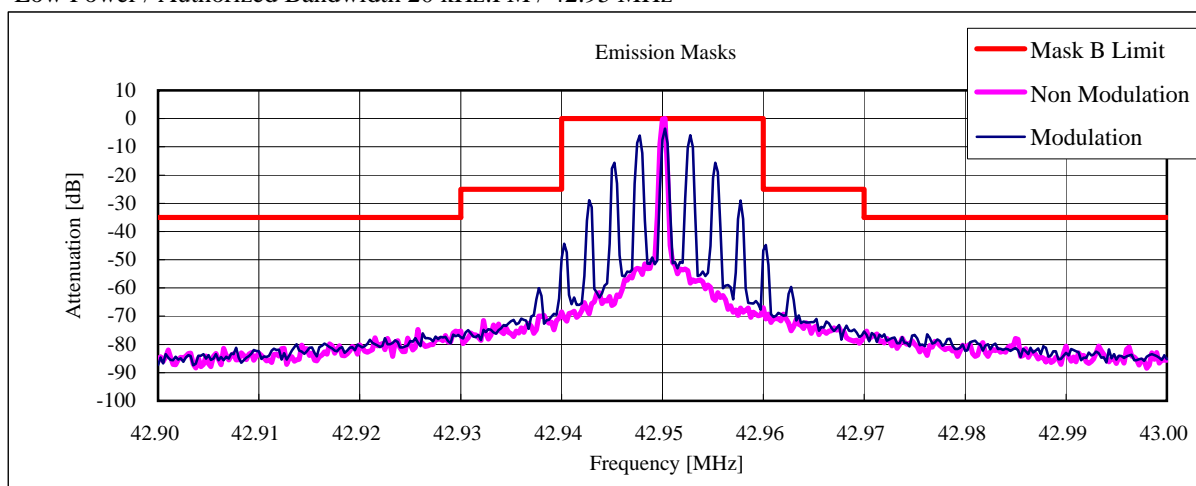
Test carried out for all the frequency band of section 10.1

Measured for the worst case

State : High Power / Authorized Bandwidth 20 kHz:FM / 42.95 MHz



State : Low Power / Authorized Bandwidth 20 kHz:FM / 42.95 MHz



10.5 Transient Frequency Behavior

REGULATIONS	: 47 CFR 90.214
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.

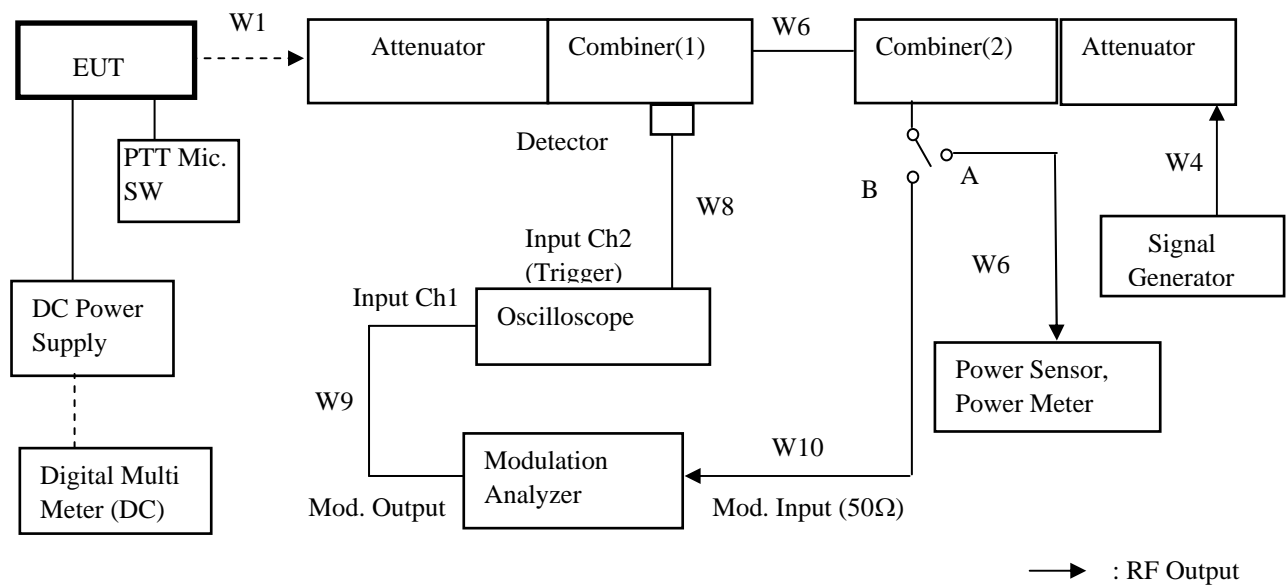
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Signal Generator	Rohde & Schwarz	SMG	860289/011	Aug. 18, 08	Aug. 31, 09
2	Oscilloscope	Tektronix	TDS 680B	B010292	Oct. 14, 08	Oct. 31, 09
3	Power Meter	Hewlett Packard	E4418B	GB38410265	May 09, 08	May. 31, 09
4	Power Sensor	Hewlett Packard	8482A	US37292237	May 09, 08	May. 31, 09
5	Attenuator (20dB)	Aeroflex/Weinschel	66-20-34	BY4357	Mar. 30, 09	Mar. 31, 10
6	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 08	Jun. 30, 09
6	Modulation Analyzer	Hewlett Packard	8901B	2806A01669	Feb. 23, 09	Feb. 28, 10
7	Combiner(1)	Anritsu	Z-164A	M89549	Sep. 09, 08	Sep. 30, 09
8	Combiner(2)	Anritsu	Z-164A	M89249	Sep. 09, 08	Sep. 30, 09
9	Attenuator	TME	CFA-20NPJ-3	679701	Sep. 09, 08	Sep. 30, 09
10	DC Power Supply	Daiwa	PS-3020	None	None	None
11	Digital Multi Meter	Sanwa	CD721	KSR00068	Jan 08, 09	Jan. 31, 10

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial cable	Suhner	SUCOFLEX100	KSR00091	Jan. 14, 09	Jan. 31, 10
W4	Coaxial cable	Pacific custom	RG-58 C/U	AM90C02	Jan. 14, 09	Jan. 31, 10
W6	Coaxial cable	Pacific custom	RG-58 C/U	AM90C03	Jan. 14, 09	Jan. 31, 10
W8	Coaxial cable	Pacific custom	RG-58 C/U	KSR00094	Oct. 09, 08	Oct. 31, 09
W9	Coaxial cable	Pacific custom	RG-58 C/U	KSR00095	Oct. 09, 08	Oct. 31, 09
W10	Coaxial cable	Pacific custom	RG-58 C/U	KSR00096	Oct. 09, 08	Oct. 31, 09

Measuring Equipment Configuration

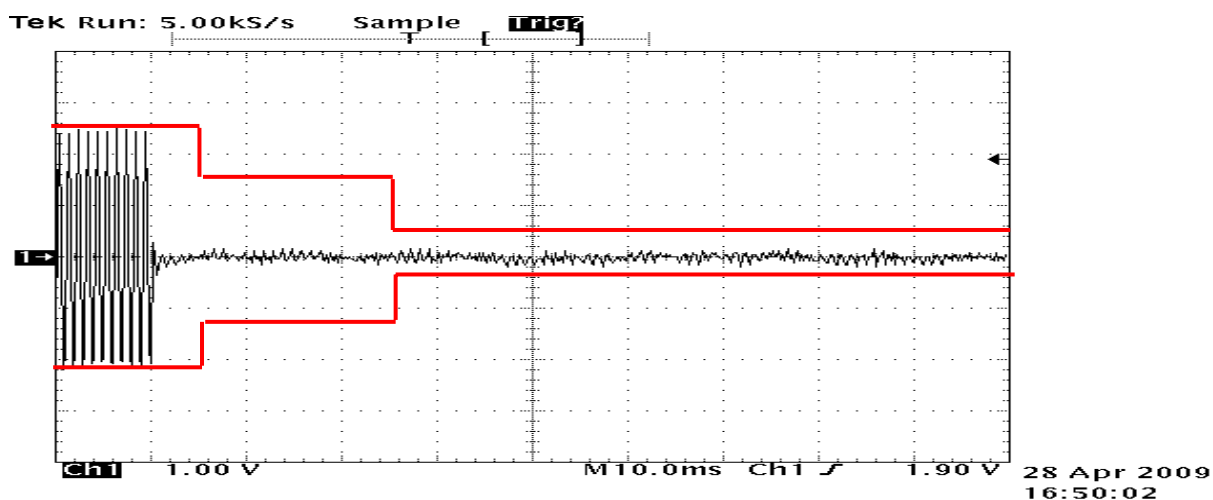


Test Results

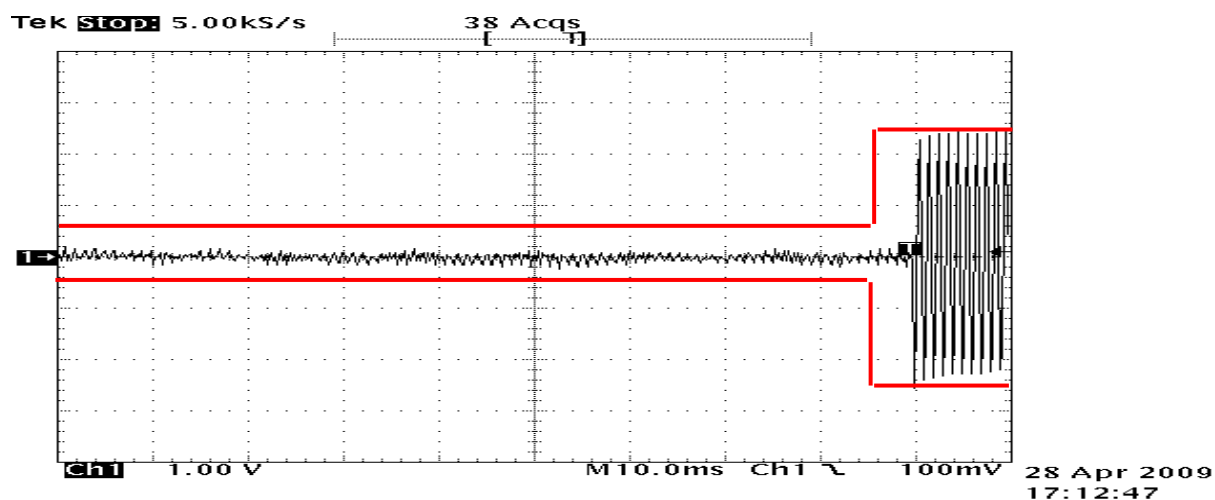
Test date	Apr 28, 2009
Location	Kashima No.1 Test Site
temperature	20 to 21 [degree C]
Humidity Variation	45 to 45 [%]
Atmospheric Pressure	102.0 to 102.0 [kPa]
Test Engineer	Naoki Ikeda

Test carried out for all the frequency band of section 10.1
Measured for the worst case

State : High Power / Authorized Bandwidth 20 kHz / 39.05 MHz / PTT:OFF -ON



State : High Power / Authorized Bandwidth 20 kHz / 39.05 MHz / PTT:ON -OFF



10.6 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

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

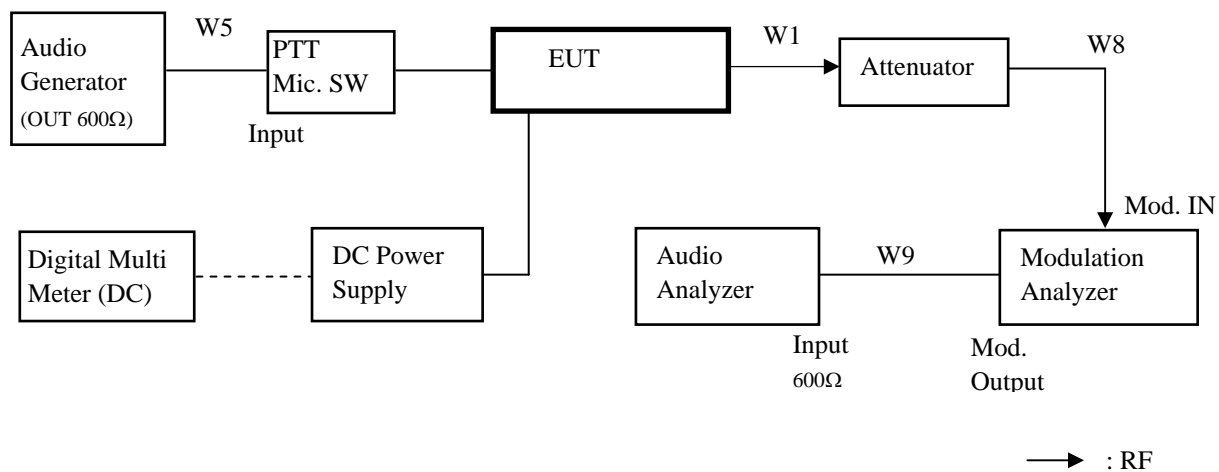
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Audio Generator	Anritsu	MG443B	M70150	Apr. 01, 09	Apr. 30, 10
2	Audio Analyzer	Hewlett Packard	8903B	2948A07326	Mar 31, 09	Mar. 31, 10
3	Attenuator (20dB)	Aeroflex/Weinschel	66-20-34	BY4357	Mar. 30, 09	Mar. 31, 10
4	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 09	Jun. 30, 10
5	Modulation Analyzer	Hewlett Packard	8901B	2806A01669	Feb. 23, 09	Feb. 28, 10
6	DC Power Supply	Daiwa	PS-3020	None	None	None
7	Digital Multi Meter	Sanwa	CD721	KSR00068	Jan 08, 09	Jan. 31, 10

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial cable	Suhner	SCOFLEX100	KSR00091	Jan. 14, 09	Jan. 31, 10
W5	Balance cable	Nicoon	3D-2V	KSR00092	Oct. 09, 08	Oct. 31, 09
W8	Coaxial cable	Pacific custom	RG-58 C/U	KSR00094	Oct. 09, 08	Oct. 31, 09
W9	Coaxial cable	Pacific custom	RG-58 C/U	KSR00095	Oct. 09, 08	Oct. 31, 09

Measuring Equipment Configuration

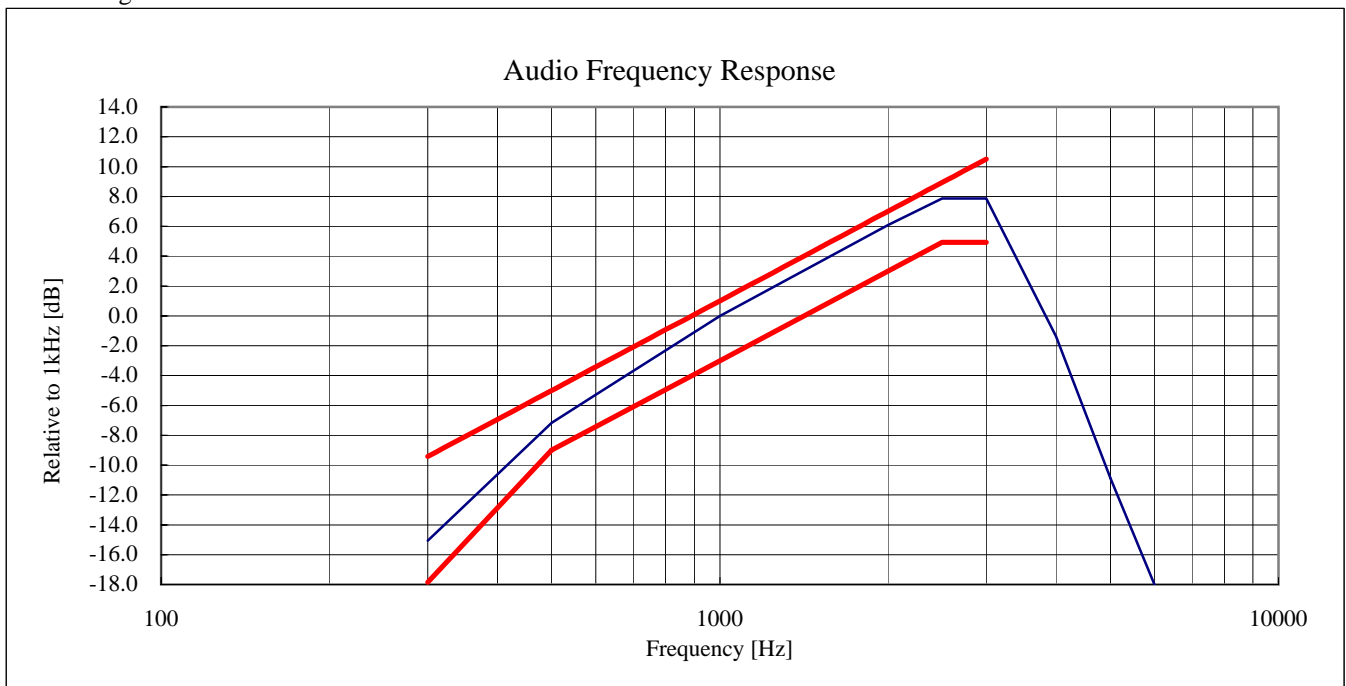


Test Results

Test date	Apr 24, 2009	
Location	Kashima No.1 Test Site	
temperature	21 to 22	[degree C]
Humidity Variation	45 to 46	[%]
Atmospheric Pressure	101.2 to 101.3	[kPa]
Test Engineer	Naoki Ikeda	

Test carried out for all the frequency band of section 10.1
Measured for the worst case

State : High Power / Authorized Bandwidth 20 kHz / 35.05 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.

10.7 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.

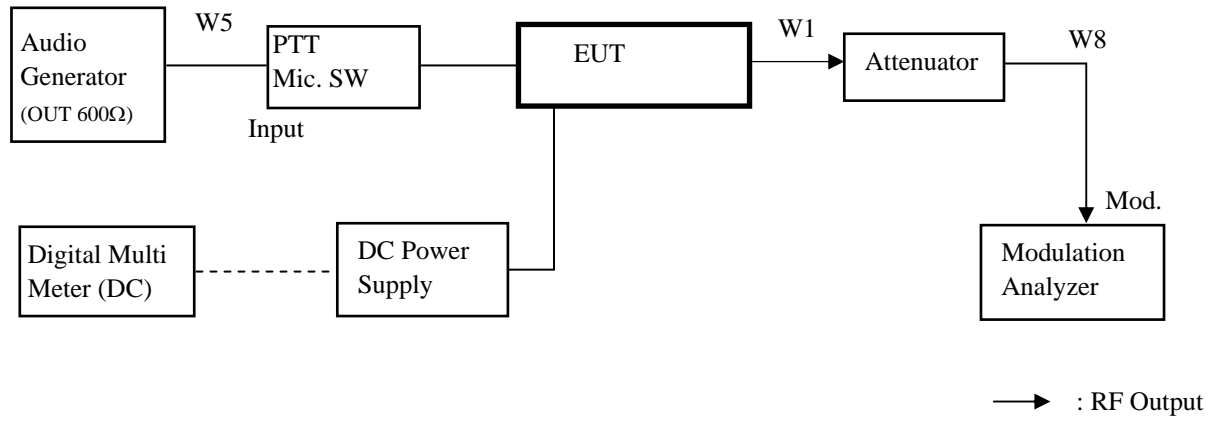
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Audio Generator	Anritsu	MG443B	M70150	Apr. 01, 09	Apr. 30, 10
2	Attenuator (20dB)	Aeroflex/Weinschel	66-20-34	BY4357	Mar. 30, 09	Mar. 31, 10
3	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 09	Jun. 30, 10
4	Modulation Analyzer	Hewlett Packard	8901B	2806A01669	Feb. 23, 09	Feb. 28, 10
5	DC Power Supply	Daiwa	PS-3020	None	None	None
6	Digital Multi Meter	Sanwa	CD721	KSR00068	Jan 08, 09	Jan. 31, 10

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial cable	Suhner	SCOFLEX100	KSR00091	Jan. 14, 09	Jan. 31, 10
W5	Balance cable	Nicoon	3D-2V	KSR00092	Oct. 09, 08	Oct. 31, 09
W8	Coaxial cable	Pacific custom	RG-58 C/U	KSR00094	Oct. 09, 08	Oct. 31, 09

Measuring Equipment Configuration

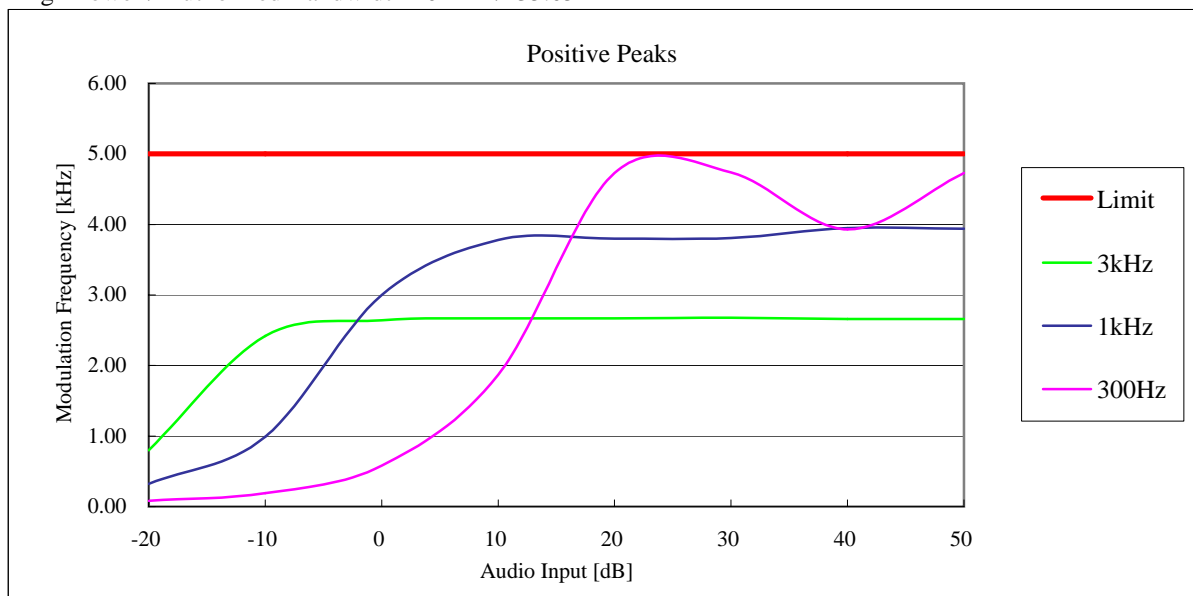


Test Results

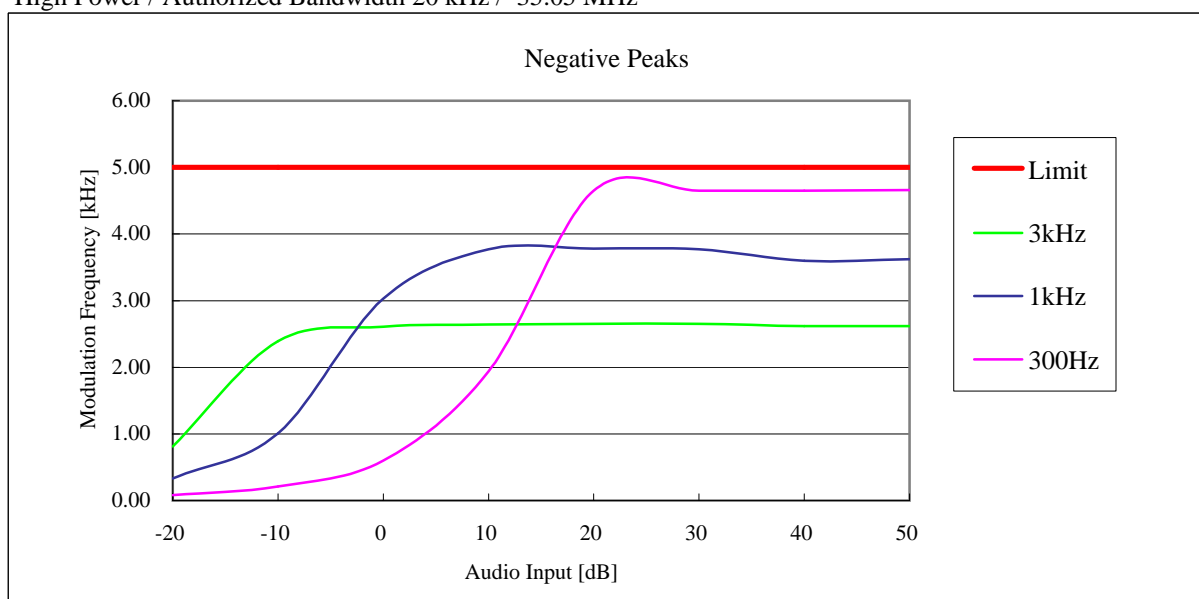
Test date	Apr 24, 2009		
Location	Kashima No.1 Test Site		
temperature	21 to 22	[degree C]	
Humidity Variation	41 to 42	[%]	
Atmospheric Pressure	101.1 to 101.2	[kPa]	
Test Engineer	Naoki Ikeda		

Test carried out for all the frequency band of section 10.1
Measured for the worst case

State : High Power / Authorized Bandwidth 20 kHz / 35.05 MHz



State : High Power / Authorized Bandwidth 20 kHz / 35.05 MHz



10.8 Frequency Stability (Temperature Variation)

REGULATIONS	: 47 CFR 2.1055 (a) (1), 22.355 , 90.213(a)
TEST METHOD/GUIDE	: ANSI/TIA-603-C Section 2.2.2.2

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.

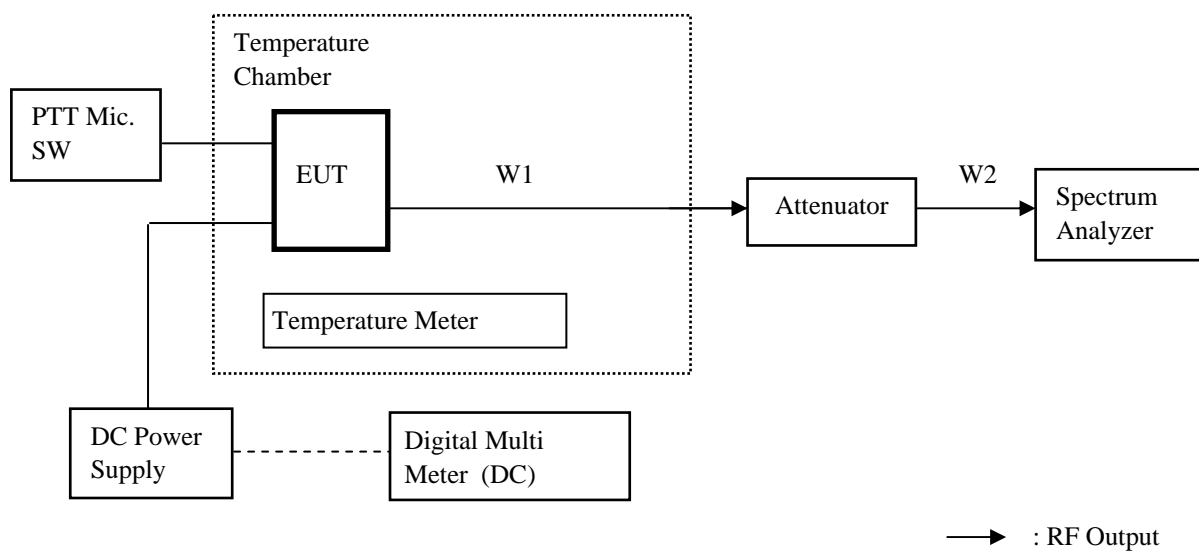
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Spectrum Analyzer	Agilent	E7403A	MY42000067	Feb. 03, 09	Feb. 28, 10
2	Attenuator (20dB)	Aeroflex/Weinschel	66-20-34	BY4357	Mar. 30, 09	Mar. 31, 10
3	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 09	Jun. 30, 10
4	DC Power Supply	Daiwa	PS-3020	None	None	None
5	Digital Multimeter	Sanwa	CD721	KSR00068	Jan 08, 09	Jan. 31, 10
6	Temperature Chamber	Tabai	PL-3F	5103661	None	None
7	Temperature Meter	Sato	PC-5000TRH-II	A11999972	Apr. 10, 09	Apr. 30, 10

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial cable	Suhner	SCOFLEX100	KSR00091	Jan. 14, 09	Jan. 31, 10
W2	Coaxial cable	Suhner	SCOFLEX100	KSR00046	Jan. 14, 09	Jan. 31, 10

Measuring Equipment Configuration



Test Results

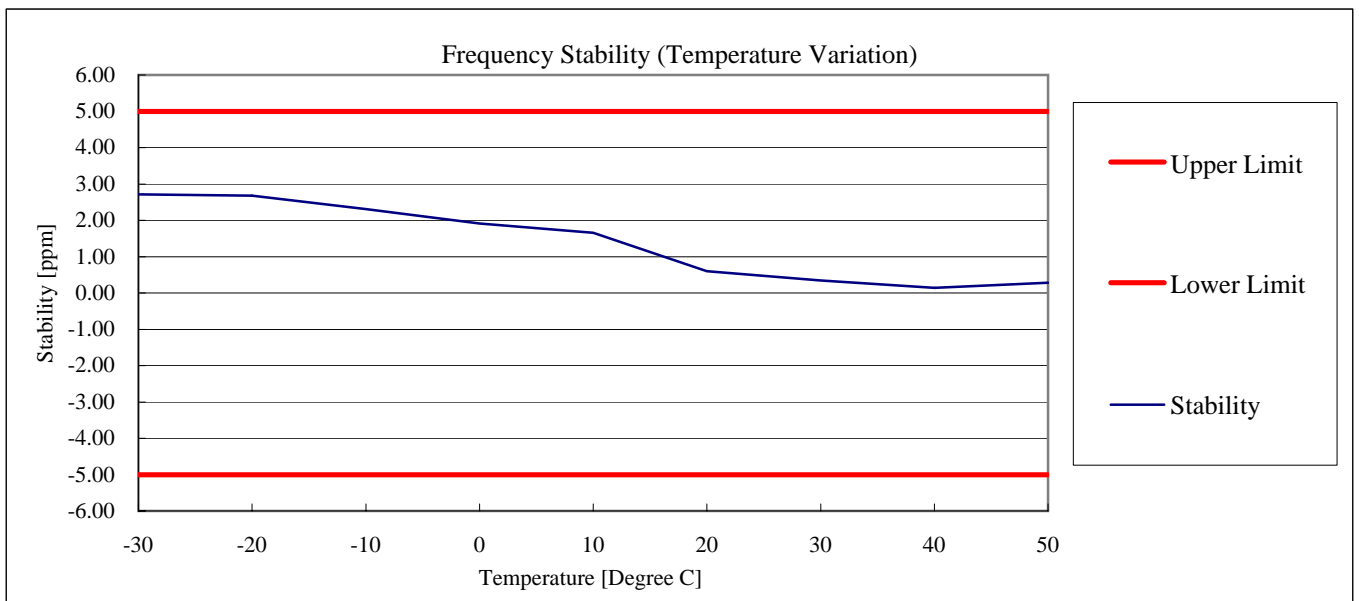
Test date	Apr 30, 2009
Location	Kashima No.1 Test Site
Test Engineer	Naoki Ikeda

Test carried out for all the frequency band of section 10.1

Measured for the worst case

State : High Power / Authorized Bandwidth 20 kHz / 35.05 MHz

No.	Temperature (Degree C)	Frequency (MHz)	Stability (ppm)	Limit (+/- ppm)	Min. Margin (ppm)
1	-30	35.050095	2.71	5.0	2.29
2	-20	35.050094	2.68	5.0	2.32
3	-10	35.050081	2.31	5.0	2.69
4	0	35.050067	1.91	5.0	3.09
5	10	35.050058	1.65	5.0	3.35
6	20	35.050021	0.60	5.0	4.40
7	30	35.050012	0.34	5.0	4.66
8	40	35.050005	0.14	5.0	4.86
9	50	35.050010	0.29	5.0	4.71



10.9 Frequency Stability (Voltage Variation)

REGULATIONS : 47 CFR 2.1055 (d) (1), 22.355, 90.213(a)

TEST METHOD/GUIDE : ANSI/TIA-603-C Section 2.2.2.2

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.

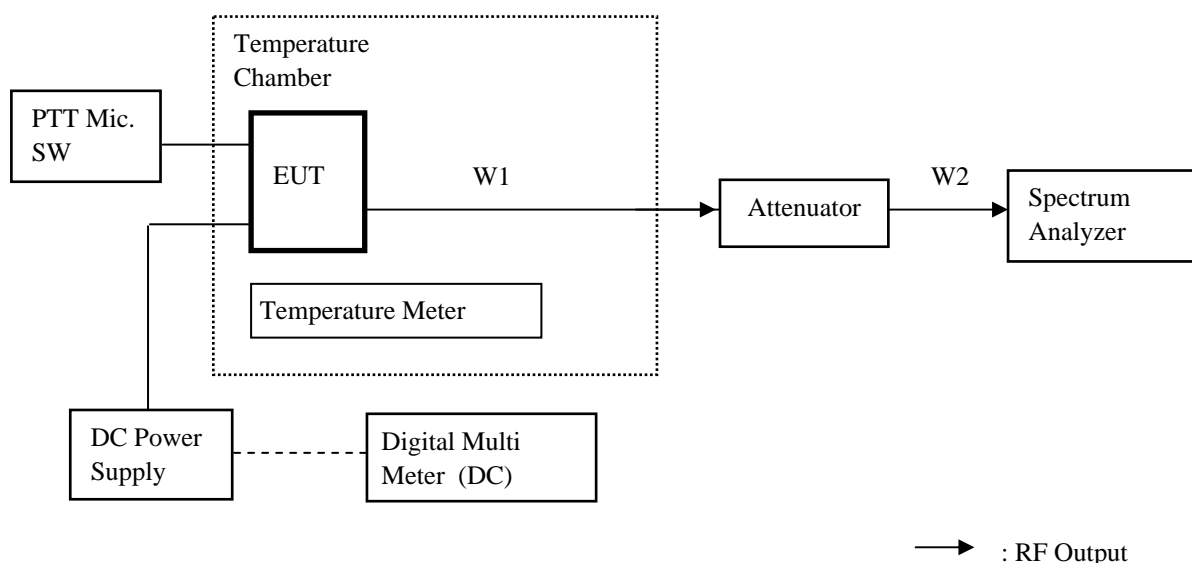
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
1	Spectrum Analyzer	Agilent	E7403A	MY42000067	Feb. 03, 09	Feb. 28, 10
2	Attenuator (20dB)	Aeroflex/Weinschel	66-20-34	BY4357	Mar. 30, 09	Mar. 31, 10
3	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	Jun. 23, 09	Jun. 30, 10
4	DC Power Supply	Daiwa	PS-3020	None	None	None
5	Digital Multimeter	Sanwa	CD721	KSR00068	Jan 08, 09	Jan. 31, 10
6	Temperature Chamber	Tabai	PL-3F	5103661	None	None
7	Temperature Meter	Sato	PC-5000TRH-II	A11999972	Apr. 10, 09	Apr. 30, 10

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal Date	Cal Exp.
W1	Coaxial Cable	Suhner	SCOFLEX100	KSR00091	Jan. 14, 09	Jan. 31, 10
W2	Coaxial Cable	Suhner	SCOFLEX100	KSR00046	Jan. 14, 09	Jan. 31, 10

Measuring Equipment Configuration



Test Results

Test date	Apr 30, 2009
Location	Kashima No.1 Test Site
Test Engineer	Naoki Ikeda

Test carried out for all the frequency band of section 10.1
Measured for the worst case

State : High Power / Authorized Bandwidth 20 kHz / 35.05 MHz

No.	Diviation (%)	Voltage (V)	Frequency (MHz)	Stability (ppm)	Limit +/- (ppm)	Margin (ppm)
1	85	11.4	35.050021	0.60	5.0	4.40
2	100	13.4	35.050021	0.60	5.0	4.40
3	115	15.4	35.050021	0.60	5.0	4.40

10.10 Necessary Bandwidth and Emission Bandwidth

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

State : 16K0F3E (Authorized Bandwidth 20 kHz)

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

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