



TEST REPORT

REGULATION :

FCC Part 2, 90

RSS-119 Issue 12

Applicant	Testing Laboratory
JVC KENWOOD Corporation 1-16-2, Hakusan, Midori-ku, Yokohama-shi Kanagawa, 226-8525 Japan Tel.: +81 45 939 6254 Fax.: +81 45 939 6261	Intertek Japan K.K. Kashima Laboratory URL: http://www.japan.intertek-etlsemko.com (No.12 Test Site) 298-6 Sada, Kashima, Ibaraki 314-0027 Japan Tel. +81 299 82 8464 (No.1 Test Site) 3-2 Sunayama, Kamisu, Ibaraki 314-0255 Japan Tel. +81 479 40 1097 Intertek Japan K. K. Tochigi Laboratory 870 Nakaawano, Kanuma-shi, Tochigi-ken 322-0306 Japan Tel.: +81 289 86 7121

Equipment type	UHF DIGITAL TRANSCEIVER
Trademark	KENWOOD
FCC Model(s)	NX-3820HG-K2
IC Model(s)	NX-3820HG-K2
Serial No.	90-No.13
FCC ID	K44479301
IC CN and UPN	282F-479301
Test Result	Complied
Report Number	17020200JKA-003
Original Issue Date	March 31, 2017

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Approved by

Hideaki Kosemura

[Technical Manager]

Tested by

Koichi Wagatsuma

[Engineer]



VLAC-008-1

VLAC accreditation are valid for FCC Part90, FCC Part80, RSS-119 (without Receiver Spurious Emissions(Radiated)).
Receiver Spurious Emissions(Radiated) of RSS-119 is outside the scope.

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

Applicant and Manufacture Information	
APPLICANT	
Company	: JVC KENWOOD Corporation
Address	: 1-16-2, Hakusan, Midori-ku, Yokohama-shi Kanagawa, 226-8525 Japan
Contact Person	: Tamaki Shimamura Manager, Communications Systems Division
MANUFACTURER	
Company	: JVC KENWOOD Corporation
Address	: 1-16-2, Hakusan, Midori-ku, Yokohama-shi Kanagawa, 226-8525 Japan
(c)(2) FCC ID	
FCC ID	: K44479301
Model number	: NX-3820HG-K2
Serial number	: 90-No.13
Instruction Manual(S)	
Instruction manual(s)	: Please refer to attached Exhibits F
Type of Emission	
Emission Designation	: 16K0F3E(Wide) 16K0F3E is IC Only 11K0F3E(Narrow) 8K30F1E(Narrow) / 8K30F1D(Narrow) / 8K30F7W(Narrow) 7K60FXD(Narrow) / 7K60FXE(Narrow) 4K00F1E(Very Narrow) / 4K00F1D(Very Narrow) / 4K00F7W(Very Narrow) 4K00F2D(Very Narrow)
Frequency range	
Frequency Range	: FCC: 406.1 to 470 MHz IC: 406.1 to 430 MHz and 450 to 470 MHz
Power Rating	
Output Power	: 5 to 45 W
Type	: Continuously Variable
Maximum Power Rating	
Output Power	: 45W
Voltages & currents in all elements in final RF stage, including final transistor or solid-state device	
Collector Current, A	: 13.0 A Maximum
Collector Voltage, Vdc	: 13.6 Vdc
Supply Voltage, Vdc	: 13.6 Vdc
Other Information	
Number of Channel	: Zone 128max. Channels 512 max.(per Zone)
Maximum Deviation	: ± 5 kHz (16K0F3E), ± 2.5 kHz (11K0F3E)
Frequency Stability	: 1.0 ppm
	:
Antenna Impedance	: 50 Ω Nominal
Note	

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SECTION 1. GENERAL INFORMATION**TEST PERFORMED**

Location	Kashima No.1 Test Site and No.12 Test Site, Tochigi No.1 and No.3 Test Site		
EUT Received	February 20, 2017		
Date of Test	February 22, 2017	to	March 22, 2017
Standard Applied	FCC Part 2, 90 RSS-119 Issue 12		
Measurement Method	ANSI/TIA-603-D-2010 / RSS-119 Issue 12(2015), RSS-Gen Issue 4(2014)		
Deviation from Standard(s)	Not applicable		

QUALIFICATIONS OF TESTING LABORATORY (Kashima Lab.)

ACCREDITATION	SCOPE	LAB. CODE	Remarks
VLAC	EMC Testing	VLAC-008-1	JAPAN
FILING			
VCCI	EMC Testing	A-0126	JAPAN
FCC	EMC Testing	JP0008	
IC	EMC Testing	IC-2042K-3, IC-2042Q-12	CANADA
CB-Scheme	EMC Testing	TL222	IECEE

QUALIFICATIONS OF TESTING LABORATORY (Tochigi Lab.)

ACCREDITATION	SCOPE	LAB. CODE	Remarks
VLAC	EMC Testing	VLAC-008-5	JAPAN
FILING			
VCCI	EMC Testing	A-0129	JAPAN
FCC	EMC Testing	JP0011	USA
IC	EMC Testing	IC-2042P-1, IC-2042P-2, IC-2042P-3	CANADA

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	AFC	Automatic frequency control

Revision Summary

Revised Date	Section	Description of Changes

SECTION 2. SUMMARY OF TEST RESULT

FCC Part2	Part90	IC RSS-119	TEST ITEM	RESULTS	Comments
2.1046 (a)	-	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)	90.210	5.5	Emission Masks (Occupied Bandwidth)	PASS	
-	90.214	5.9	Transient Frequency Behavior	PASS	
2.1047 (a)	-	-	Audio Low Pass Filter (Voice Input)	PASS	
2.1047 (a)	-	-	Audio Frequency Response	PASS	
2.1047 (b)	-	-	Modulation Limiting	PASS	
2.1055 (a) (1)	90.213 (a)	5.3	Frequency Stability (Temperature Variation)	PASS	
2.1055 (d) (1)	90.213 (a)	5.3	Frequency Stability (Voltage Variation)	PASS	
-	-	RSS-Gen 7.1	Receiver Spurious Emissions	PASS	
-	90.203 (j)(3)	-	Certification required (FCC Part 90.203(j)(3))	Complied	
-	90.203 (j)(4)	-	Certification required (FCC Part 90.203(j)(4))	Complied	
-	90.203 (j)(5)	-	Certification required (FCC Part 90.203(j)(5))	Complied	
-	90.203 (e)	-	Certification required (FCC Part 90.203(e))	Complied	
-	-	5.5	99% Occupied Bandwidth	PASS	

Limitation on Results

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

This test report dose 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.

Note:

As for the FCC Part 15 Subpart B-Unintentional Radiators, the EUT has been measured and declared as Verification by JVC Kenwood Corporation.

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 24	Personal Communications Services	N.A.
Part 80	Stations in the Maritime Services	N.A.
Part 90	Private Land Mobile radio Services	YES

IC Rule	Test Item	Tested
RSS-119	Radio Transmitters and Receivers Operating in the Land Mobile and Fixed Services in the Frequency Range 27.4-960 MHz	YES
RSS-134	900MHz Narrowband Personal Communication Service	N.A.
RSS-Gen	General Requirements for Compliance of Radio Apparatus	YES

SECTION 4. INFORMATION ABOUT EUT AND SUPPORT EQUIPMENT(S)**4.1 List of System Configuration**

Symbol	Item	Model No.	Serial No.	Manufacture	Remarks
A	UHF DIGITAL TRANSCEIVER	NX-3820HG-K2	90-No.13	JVC KENWOOD Corporation	EUT
Power Ratings of EUT :		DC 13.6V ± 15%		13.0 A Maximum	
Power Supply :		DC 13.6 V			
Condition of Equipment		Proto type			
Type		Mobile type			
Suppression Devices		No Modifications by the laboratory were made to the device			

Note: Serial No. 0

4.2 Port(s)/Connector(s)

Port Name	Connector Type	Connector Pin	Remarks
ACC	D-sub	15 pin	
External Speaker	3.5 ϕ	2 pin	
RF Antenna	M	2 pin	
Microphone	RJ-45	8 pin	
GPS Antenna	SMA	2 pin	

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

Operating Frequency	Board Name	Remarks
940 MHz	TXRX UNIT	
4960 MHz	Bluetooth 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	Keypad Microphone	KMC-36	None	JVC KENWOOD Corporation	N/A
C	GPS Antenna	KRA-40G	None	JVC KENWOOD Corporation	N/A
D	External Speaker	KES-3	None	JVC KENWOOD Corporation	N/A
E	Dummy Load	CT-03NP	1037408	TME	N/A
F	DC Power Supply	PMC35-3A	LE000716	KIKUSUI	N/A

Supplied Power:

E	AC	100V,60Hz
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SECTION 6. USED CABLE(S)

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

No.	Name	Length (m)	Shield	Connector	Ferrite core
1	Microphone Cable	0.55	No	No	
2	GPS Antenna cable	1.00	No	Yes	
3	KCT-60 (Connection cable)	0.30	No	No	
4	KCT-18 (Ignition sense cable)	3.10	No	No	
5	Speaker cable	2.90	No	No	
6	DC cable for EUT	0.25	No	No	
7	DC cable for EUT	3.00	No	No	
8	Power Cable for DC Power Supply	2.00	No	No	

SECTION 7. TEST CONFIGURATION

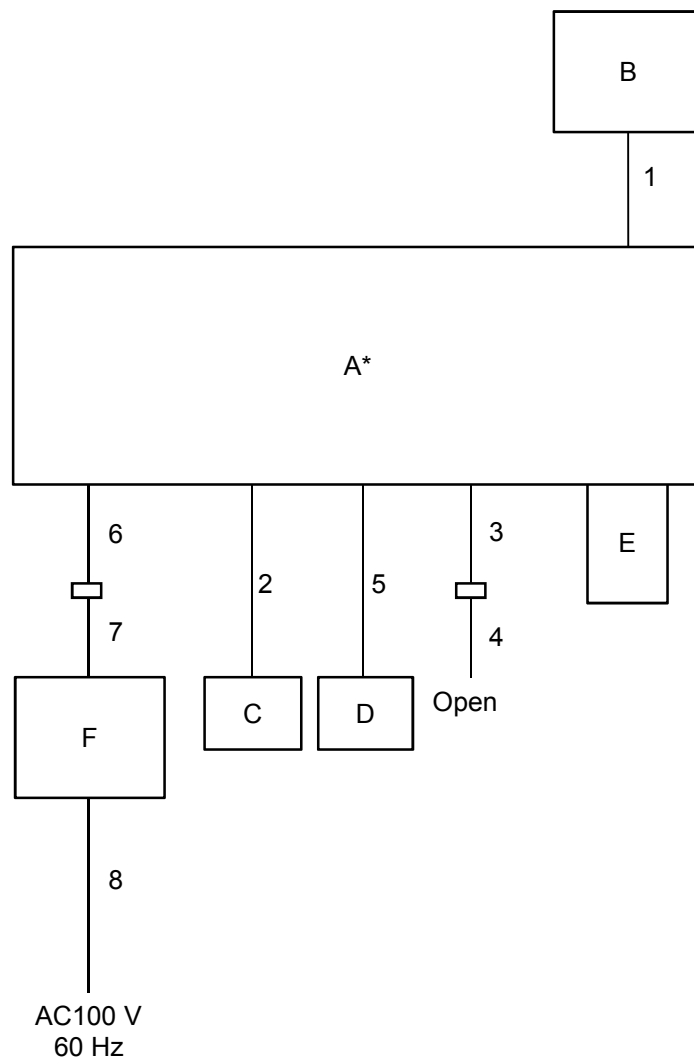
Details of Configuration and Connection

Example: Case of Section 10.10Test

* : EUT

■ : Ferrite core

□ : 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 mode.

(FCC:406.15MHz, 429.95MHz, 469.95MHz, RSS:406.15MHz, 429.95 MHz, 469.95MHz)

(High Power : 45W, Low Power : 5 W)

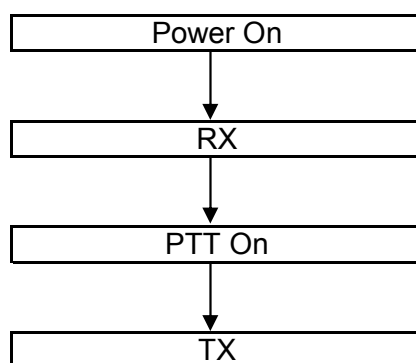
The test was carried out under Receive mode.

(406.15MHz, 429.95 MHz, 469.95MHz)

EUT was examined in the operating conditions that had maximum emissions.

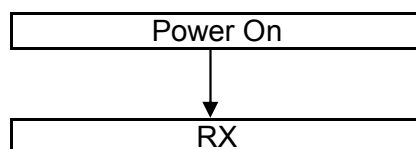
8.2 Operating Flow [Transmit mode]

Following operations were performed continuously.



8.3 Operating Flow [Receive mode]

Following operations were performed continuously.



SECTION 9. MEASUREMENT UNCERTAINTY

Carrier Output Power (Conducted)	U _{lab}	Utia-603-d
	+/- 0.29dB (k = 2)	+/- 0.59 dB
Unwanted Emissions (Transmitter Conducted)		
	+/- 2.19 dB (k = 2)	+/- 1.1 dB
Field Strength of Spurious Radiation		
	+/- 2.78dB (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)	+/- 1.0 %
Frequency Stability (Temperature Variation)		
	+/- 10.1Hz (k=2)	+/-34.2 Hz
Frequency Stability (Voltage Variation)		
	+/- 10.1Hz (k=2)	+/-34.2 Hz
Receiver Spurious Emissions	U _{lab}	U _{cispr}
30-1000MHz	+/- 4.05dB (k = 2)	+/- 6.3 dB
abobe 1GHz	+/- 4.79dB (k = 2)	+/- 5.2 dB

SECTION 10. TEST DATA**10.1 Carrier Output Power (Conducted)**

REGULATIONS : FCC Part 2 Section 1046 (a) / RSS-119 Section 5.4

TEST METHOD/GUIDE : ANSI/TIA-603-D 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.(Only as for the test of RSS)

Measuring Equipments

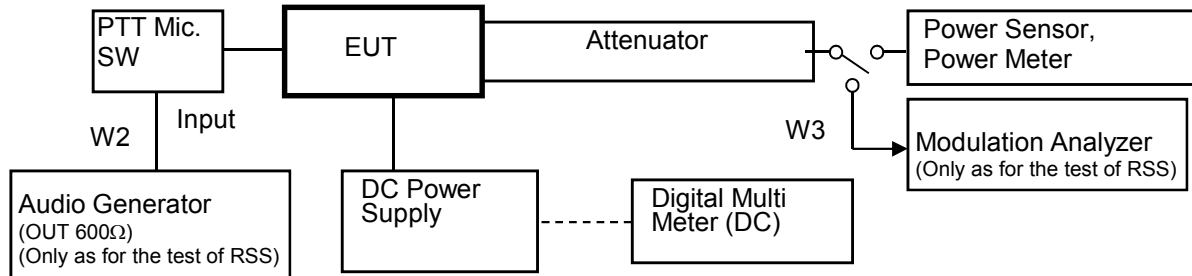
No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Power Meter	Hewlett Packard	E4418B	GB38410265	1Y	May. 31, 17
2	Power Sensor	Hewlett Packard	8482A	US37292237	1Y	May. 31, 17
3	Attenuator (20dB)	Aeroflex/Wenschel	66-20-34	BY4357	1Y	May. 31, 17
4	Attenuator (30dB)	Weinschel	WA-29-30-34	8924	1Y	May. 31, 17
5	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Dec. 31, 17
6	Audio Generator	Anritsu	MG443B	M70150	1Y	May. 31, 17
7	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
8	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 17

Measuring Cables

No.	Cable	Manufacturer	Model No.	Serial No.	Cal. Interval	Effective period
W2	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 17
W3	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 28, 18

Measuring Equipment Configuration

<Analog Modulation Case>



Note: Configuration of other Modulation test is composed without the Audio Generator.

Test Results

Test date	Feb. 22, 2017	
Location	Kashima No.1 Test Site	
temperature	24.0	[degree C]
Humidity Variation	56.0	[%]
Atmospheric Pressure	101.4	[kPa]
Test Engineer	Koichi Wagatsuma	

Test was carried out for all the Authorized Bandwidth.
State the worst case (below).

No.	Frequency (MHz)	Band	Setting	RF Power (W)
1	406.15 (FCC/RSS)	Low	High Power	45
2	429.95 (FCC/RSS)	Middle	High Power	45
3	469.95 (FCC/RSS)	High	High Power	45
4	406.15 (FCC/RSS)	Low	Low Power	5
5	429.95 (FCC/RSS)	Middle	Low Power	5
6	469.95 (FCC/RSS)	High	Low Power	5

RF Power: Peak reading

10.2 Unwanted Emissions (Transmitter Conducted)

REGULATIONS	: FCC Part 2 Section 1051, Part 80 Section 211, Part 90 Section 210 RSS-119 Section 5.8
TEST METHOD/GUIDE	: ANSI/TIA-603-D Section 2.2.13.2 / RSS-119 Section 4.2

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 than that necessary to produce 50 % of rated system deviation.
- 3 Adjust the spectrum analyzer for the following setting:
 - a) RBW : 100 kHz (< 1 GHz), 1 MHz (> 1 GHz).
 - b) VBW : 300 kHz (< 1 GHz), 3 MHz (> 1 GHz).
 - c) Detector mode : Average power (FM Modulation) , Positive peak with peak hold (Digital 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.

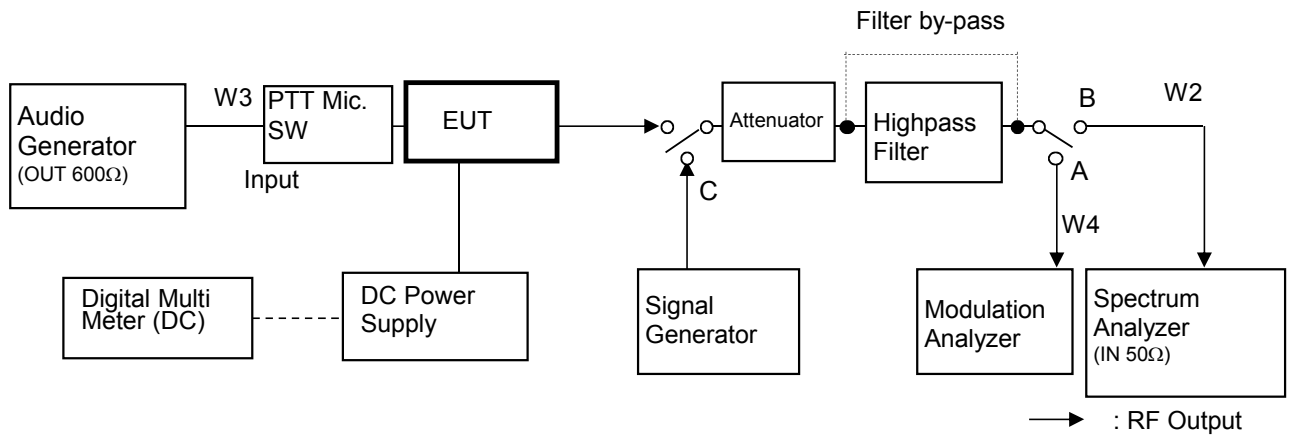
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	May. 31, 17
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8924	1Y	May. 31, 17
3	Highpass Filter	Anritsu	MP526D	6200220657	1Y	Jan. 31, 18
4	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Dec. 31, 17
5	Signal Generator	Rohde&Schwarz	SMB 100A	105709	1Y	Apr. 30, 17
6	Audio Generator	Anritsu	MG443B	M70150	1Y	May. 31, 17
7	Spectrum Analyzer	Agilent	N9030A	US51350220	1Y	Feb. 28, 18
8	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
9	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 17

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
W3	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 17
W4	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 28, 18
W2	Coaxial Cable	Suhner	SUCOFLEX104	KSR00217	1Y	May. 31, 17

Measuring Equipment Configuration



Note: Configuration of other Modulation test is composed without the Audio Generator.

Test Results

Test date	Feb. 23, 2017
Location	Kashima No.1 Test Site
temperature	21 [degree C]
Humidity Variation	61 [%]
Atmospheric Pressure	99.1 [kPa]
Test Engineer	Koichi Wagatsuma

Test was carried out for all the frequency band of section 10.1

State the worst case (below).

State : High Power / Authorized Bandwidth 11.25 kHz

No.	Tuned Frequency (MHz)	Band	Spurious Frequency (MHz)	Correct Level (dBm)	Emission Level (dBc)	Mask D Limit (dBc)	Margin (dB)
1	406.15 (FCC/RSS)	Low	812.30	-37.08	-83.61	-66.5	17.1
2	429.95 (FCC/RSS)	Middle	859.90	-39.03	-85.56	-66.5	19.1
3	469.95 (FCC/RSS)	High	939.90	-38.91	-85.44	-66.5	18.9
There is the margin of 20dB over except for the above points.							

Mask D Limit (dBc) = $-(50+10\log(P))$

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

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

P = Carrier Level (W)

" - " = Measurement Limit

State : Low Power / Authorized Bandwidth 6 kHz

No.	Tuned Frequency (MHz)	Band	Spurious Frequency (MHz)	Correct Level (dBm)	Emission Level (dBc)	Mask E Limit (dBc)	Margin (dB)
1	406.15 (FCC/RSS)	Low	No Point detected	-	-	-62.0	-
2	429.95 (FCC/RSS)	Middle	859.90	-42.49	-79.47	-62.0	17.5
3	469.95 (FCC/RSS)	High	939.90	-41.66	-78.65	-62.0	16.7
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

10.3 Field Strength of Spurious Radiation

REGULATIONS	:	FCC Part 2 Section 1053 (a), Part 90 Section 210 RSS-119 Section 5.8
TEST METHOD/GUIDE	:	ANSI/TIA-603-D Section 2.2.12.2 / RSS-119 Section 4.2

Test Procedure

- The EUT and test equipment were set up as shown on the following page.
- Adjust the spectrum analyzer for the following setting:
 - RBW : 100 kHz (< 1 GHz), 1 MHz (> 1 GHz).
 - VBW : 300 kHz (< 1 GHz), 3 MHz (> 1 GHz).
 - Detector mode : Positive Peak
- The transmitter was placed on a wooden turntable, and it was transmitting into non-radiating load which was also placed on the turntable.
- 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.
- The frequency range up to tenth harmonic of the fundamental frequency was investigated.
- 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.
- Spurious emissions in dB = 10 Log (TX power in Watts/0.001) – the absolute level

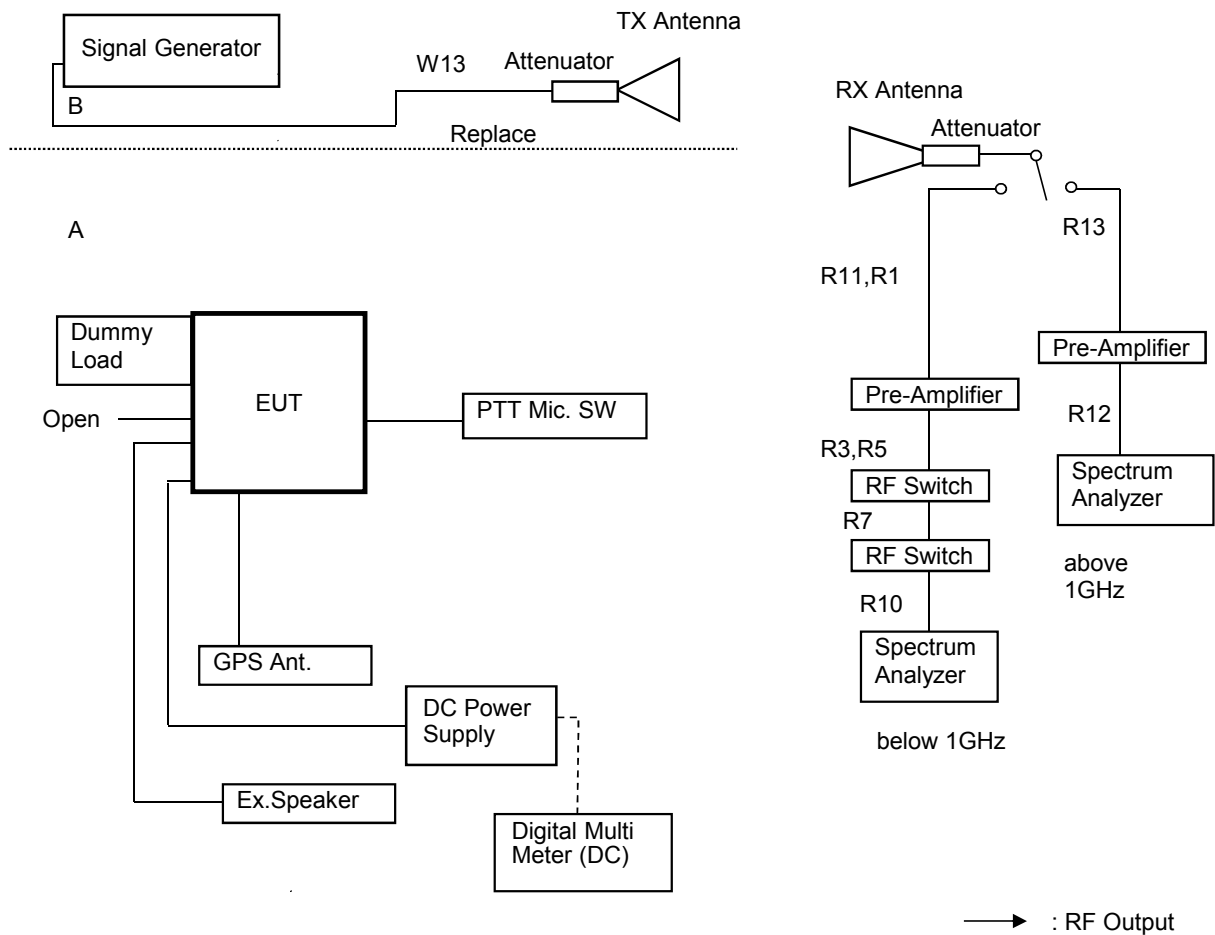
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator(10dB)	HUBER+SUHNER	6810.17B	5061	1Y	Feb. 28, 18
2	Dummy Load	TME	CT-150NP	1138693	1Y	Feb. 28, 18
3	Signal Generator	Rohde&Schwarz	SMB 100A	105709	1Y	Apr. 30, 17
4	Spectrum Analyzer	Agilent	N9000A	MY51260520	1Y	May. 31, 17
5	D.R.G Antenna(RX)	Schwarzbeck	3115	5045	1Y	Mar. 31, 17
6	D.R.G Antenna(TX)	ETS LINDGREN	3117	00055157	1Y	May. 31, 17
7	Dipole Antenna(TX)	Schwarzbeck	UHA9105	AM0082002	1Y	Aug. 31, 17
8	Dipole Antenna(TX)	Schwarzbeck	VHA9103	C01082007	1Y	Aug. 31, 17
9	Tri-log Antenna(RX)	Schwarzbeck	VULB9168WP	126	1Y	Dec. 31, 17
10	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
11	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 17
12	Amplifier	TOYO	TPA0118-30	0402	1Y	Mar. 31, 17
13	Attenuator	HUBER + SUHNER	6803.17.B	5111	1Y	Mar. 31, 17
14	Amplifier	Intertek Japan	ZX60-3018G	005	1Y	Feb. 28, 18
15	Attenuator	TAMAGAWA	CFA-01	A00040805	1Y	Feb. 28, 18
16	RF Switch	Intertek Japan	ACX-150-1	A12301501	1Y	Feb. 28, 18

Measuring Cables

No.	Cable	Manufacturer	Model No.	Serial No.	Cal. Interval	Effective period
R11	Coaxial Cable	FUJIKURA	5D-2W	R11	1Y	Feb. 28, 18
R1	Coaxial Cable	FUJIKURA	5D-2W	R1	1Y	Feb. 28, 18
R3	Coaxial Cable	FUJIKURA	10D-2W	R3	1Y	Feb. 28, 18
R5	Coaxial Cable	FUJIKURA	RG-5A/U	R5	1Y	Feb. 28, 18
R7	Coaxial Cable	MIYAZAKI	5D-2W	R7	1Y	Feb. 28, 18
R10	Coaxial Cable	FUJIKURA	5D-2W	R10	1Y	Feb. 28, 18
R13	Coaxial Cable	SUHNER	SUCOFLEX 104	229603	1Y	Mar. 31, 17
R12	Coaxial Cable	Candox	5B-048-98-98-5000	111130	1Y	Mar. 31, 17
W13	Coaxial Cable	Suhner	SUCOFLEX106	KSR00207	1Y	Feb. 28, 18

Measuring Equipment Configuration



Test Results

Test date	Mar 16, 2017	to	Mar 19, 2017
Location	Kashima No.12 Test Site		
temperature	20.0 to 21.5	[degree C]	
Humidity Variation	30 to 40	[%]	
Atmospheric Pressure	101 to 102	[kPa]	
Test Engineer	Koichi Wagatsuma		

Test was carried out for all the frequency band of section 10.1

State the worst case (below).

State : High Power / Authorized Bandwidth 11.25 kHz / 429.95MHz(FCC /RSS)

No	Frequency (MHz)	Pol	Reading Level (dBm)	SG Out Level (dBm)	Antenna Gain (dBd)	Loss (dB)	Correct Level (dBm)	Emission Level (dBc)	MASK D Limit Level (dBc)	Margin (dB)
1	859.90	Hor.	-64.52	-30.57	0.00	12.36	-42.9	-89.5	-66.5	23.0
		Ver.	-63.97	-28.67	0.00	12.36	-41.0	-87.6	-66.5	21.1
2	1289.85	Hor.	-42.59	-28.12	2.73	12.90	-38.3	-84.8	-66.5	18.3
		Ver.	-41.73	-26.28	2.73	12.90	-36.4	-83.0	-66.5	16.5
3	1719.80	Hor.	-56.30	-41.19	3.51	13.39	-51.1	-97.6	-66.5	31.1
		Ver.	-50.67	-34.44	3.51	13.39	-44.3	-90.9	-66.5	24.4
4	2149.75	Hor.	-58.50	-42.33	3.24	13.84	-52.9	-99.5	-66.5	33.0
		Ver.	-56.72	-39.06	3.24	13.84	-49.7	-96.2	-66.5	29.7
5	2579.70	Hor.	-57.52	-40.25	3.74	14.22	-50.7	-97.3	-66.5	30.8
		Ver.	-57.77	-38.83	3.74	14.22	-49.3	-95.8	-66.5	29.3
6	3009.65	Hor.	-	-	4.76	14.59	-	-	-66.5	-
		Ver.	-60.93	-41.27	4.76	14.59	-51.1	-97.6	-66.5	31.1
7	3439.60	Hor.	-	-	5.76	14.91	-	-	-66.5	-
		Ver.	-	-	5.76	14.91	-	-	-66.5	-
8	3869.55	Hor.	-	-	6.25	15.23	-	-	-66.5	-
		Ver.	-	-	6.25	15.23	-	-	-66.5	-
9	4299.50	Hor.	-	-	6.77	15.49	-	-	-66.5	-
		Ver.	-61.23	-40.01	6.77	15.49	-48.7	-95.3	-66.5	28.8

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

Mask D Limit (dBc) = whichever is the lesser attenuation ; $-(50+10\log(P))$ or -70

Correct Level (dBm) = Substitute SG Level (dBm) + ANT Gain (dBd) - 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 / 429.95MHz(FCC /RSS)

No	Frequency (MHz)	Pol	Reading Level (dBm)	SG Out Level (dBm)	Antenna Gain (dBd)	Loss (dB)	Correct Level (dBm)	Emission Level (dBc)	MASK E Limit Level (dBc)	Margin (dB)
1	859.90	Hor.	-64.85	-30.91	0.00	12.36	-43.3	-80.3	-62.0	18.3
		Ver.	-61.03	-25.74	0.00	12.36	-38.1	-75.1	-62.0	13.1
2	1289.85	Hor.	-56.33	-41.86	2.73	12.90	-52.0	-89.0	-62.0	27.0
		Ver.	-52.30	-36.84	2.73	12.90	-47.0	-84.0	-62.0	22.0
3	1719.80	Hor.	-62.50	-47.39	3.51	13.39	-57.3	-94.3	-62.0	32.3
		Ver.	-58.92	-42.69	3.51	13.39	-52.6	-89.6	-62.0	27.6
4	2149.75	Hor.	-59.10	-42.93	3.24	13.84	-53.5	-90.5	-62.0	28.5
		Ver.	-59.41	-41.75	3.24	13.84	-52.3	-89.3	-62.0	27.3
5	2579.70	Hor.	-	-	3.74	14.22	-	-	-62.0	-
		Ver.	-	-	3.74	14.22	-	-	-62.0	-
6	3009.65	Hor.	-	-	4.76	14.59	-	-	-62.0	-
		Ver.	-	-	4.76	14.59	-	-	-62.0	-
7	3439.60	Hor.	-	-	5.76	14.91	-	-	-62.0	-
		Ver.	-	-	5.76	14.91	-	-	-62.0	-
8	3869.55	Hor.	-	-	6.25	15.23	-	-	-62.0	-
		Ver.	-	-	6.25	15.23	-	-	-62.0	-
9	4299.50	Hor.	-	-	6.77	15.49	-	-	-62.0	-
		Ver.	-	-	6.77	15.49	-	-	-62.0	-

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 (dBd) - Loss (Cable, Attenuator) (dB)

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

P = Carrier Level (W)

" - " = Measurement Limit

10.4 Emission Masks (Occupied Bandwidth)

REGULATIONS	: FCC Part 2 Section 1049 (c) (1), Part 90 Section 210 RSS-119 Section 5.5
TEST METHOD/GUIDE	: ANSI/TIA-603-D Section 2.2.11.2 / RSS-119 Section 5.8

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). (FM modulation).
- 3 With level constant, the signal level was increased 16 dB.
- 4 For EUT supporting digital modulation, the digital modulation mode was operated to its maximum extent.
- 5 Adjust the spectrum analyzer for the following setting:
 - a) RBW : 100Hz (Non modulation and Authorized Band 6 kHz),
100Hz (Non modulation and Authorized Band 11.25 kHz),
300Hz (Non modulation and Authorized Band 20 kHz).
 - b) VBW : 10times the RBW (Non modulation , Authorized Band 6kHz, 11.25 kHz and 20 kHz).
 - c) RBW and VBW : 30 kHz (Non modulation(Digital Modulation)).
- 6 The occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

The selection of Emission Mask

No.	Frequency (MHz)	Audio Filter	Channel Bandwidth (kHz)	Authorized Bandwidth (kHz)	Selection of Emission Mask FCC IC	
Emission Designation : 16K0F3E						
1	406.15 (FCC/RSS)	With	25	20	B	B
2	429.95 (FCC/RSS)	With	25	20	B	B
3	469.95 (FCC/RSS)	With	25	20	B	B
Emission Designation : 11K0F3E						
1	406.15 (FCC/RSS)	With	12.5	11.25	D	D
2	429.95 (FCC/RSS)	With	12.5	11.25	D	D
3	469.95 (FCC/RSS)	With	12.5	11.25	D	D
Emission Designation : 8K30F1E/F1D/F7W						
1	406.15 (FCC/RSS)	Without	12.5	11.25	D	D
2	429.95 (FCC/RSS)	Without	12.5	11.25	D	D
3	469.95 (FCC/RSS)	Without	12.5	11.25	D	D
Emission Designation : 7K60FXE/FXD						
1	406.15 (FCC/RSS)	Without	12.5	11.25	D	D
2	429.95 (FCC/RSS)	Without	12.5	11.25	D	D
3	469.95 (FCC/RSS)	Without	12.5	11.25	D	D
Emission Designation : 4K00F1E/F1D/F7W						
1	406.15 (FCC/RSS)	Without	6.25	6	E	E
2	429.95 (FCC/RSS)	Without	6.25	6	E	E
3	469.95 (FCC/RSS)	Without	6.25	6	E	E
Emission Designation : 4K00F2D						
1	406.15 (FCC/RSS)	Without	6.25	6	E	E
2	429.95 (FCC/RSS)	Without	6.25	6	E	E
3	469.95 (FCC/RSS)	Without	6.25	6	E	E

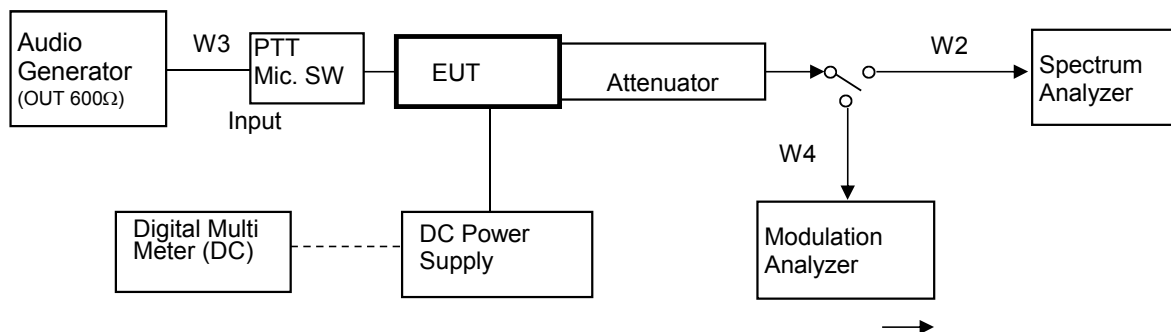
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	May. 31, 17
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8924	1Y	May. 31, 17
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Dec. 31, 17
4	Audio Generator	Anritsu	MG443B	M70150	1Y	May. 31, 17
5	Spectrum Analyzer	Agilent	N9030A	US51350220	1Y	Feb. 28, 18
6	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
7	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 17

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
W3	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 17
W4	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 28, 18
W2	Coaxial Cable	Suhner	SUCOFLEX104	KSR00217	1Y	May. 31, 17

Measuring Equipment Configuration



FM Modulation test is with the the Audio Generator.

Configuration of other Modulation test is composed without the Audio Generator.

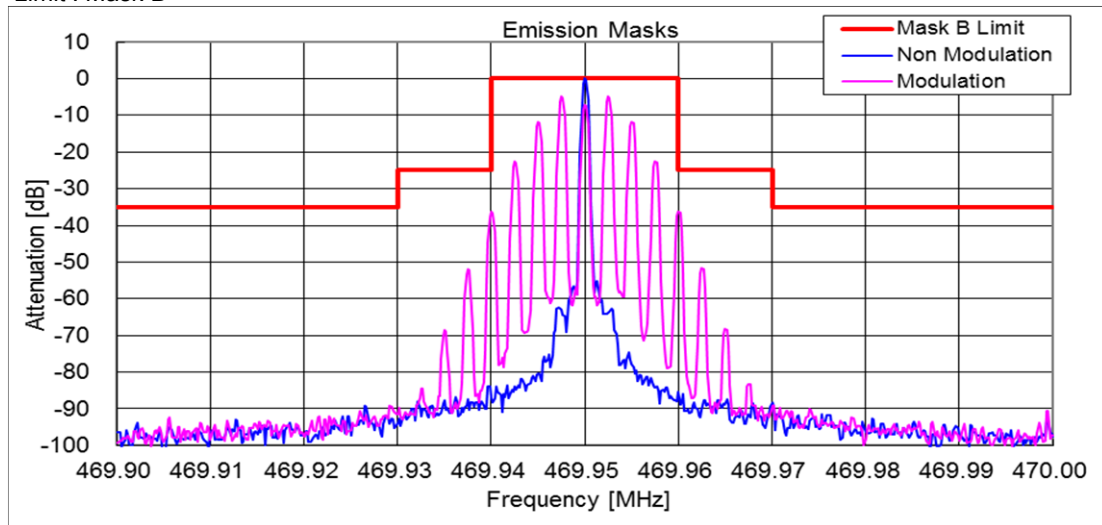
Test Results

Test date	Feb. 27, 2017
Location	Kashima No.1 Test Site
temperature	21 [degree C]
Humidity Variation	50 [%]
Atmospheric Pressure	102.2 [kPa]
Test Engineer	Koichi Wagatsuma

Test was carried out for all the frequency band of section 10.1
State the worst case (below).

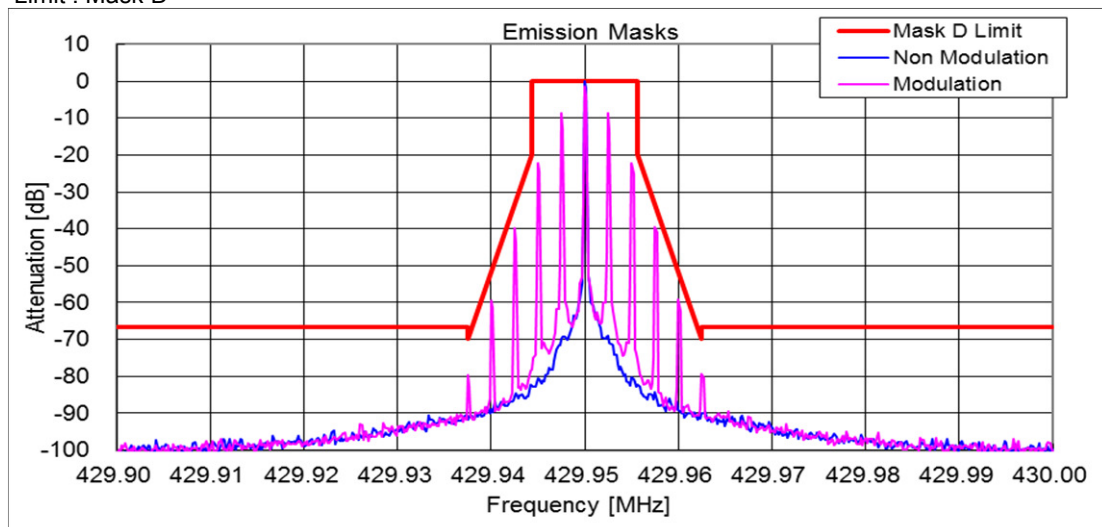
State : High Power / Authorized Bandwidth 20 kHz/ 16K0F3E / 469.95 MHz(RSS)

Limit : Mask B

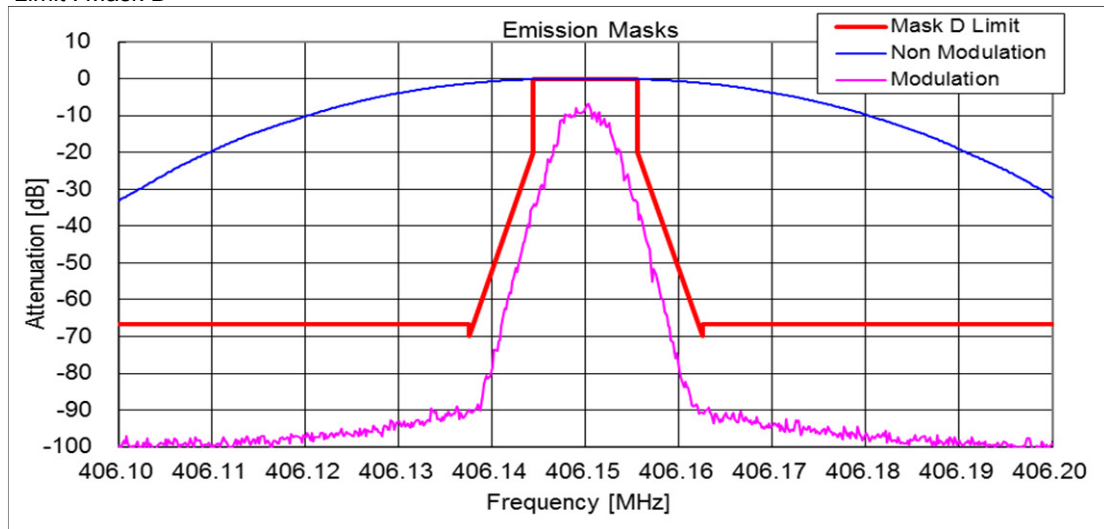


State : High Power / Authorized Bandwidth 11.25 kHz/ 11K0F3E / 429.95 MHz(FCC/RSS)

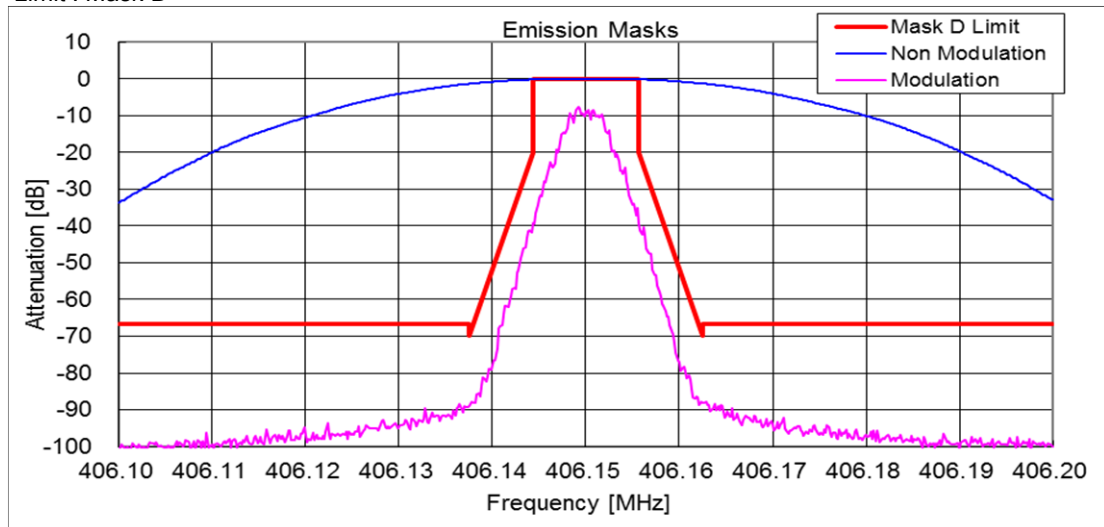
Limit : Mask D



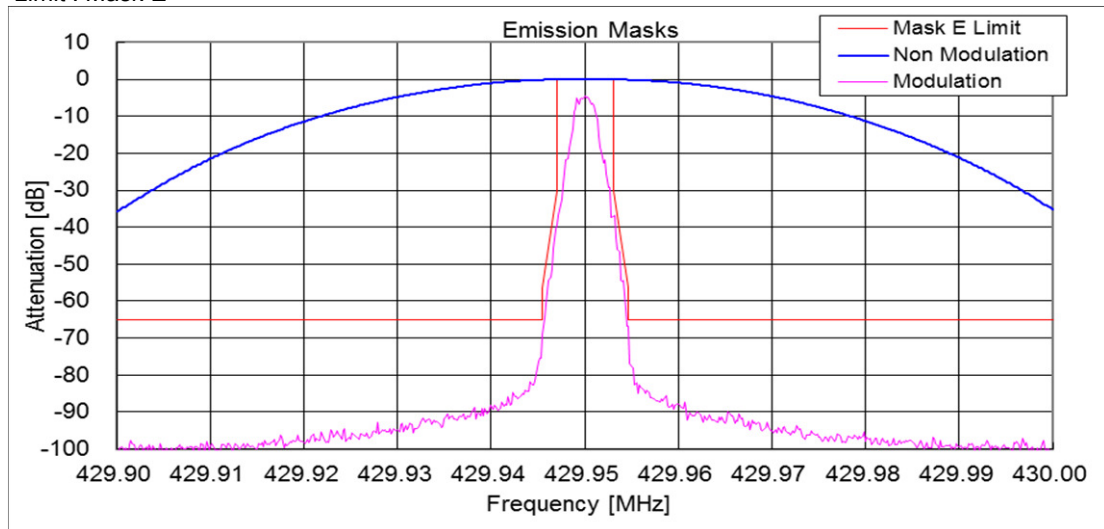
State : High Power / Authorized Bandwidth 11.25 kHz/ 8K30F1E/F1D/F7W / 406.15 MHz(FCC/RSS)
Limit : Mask D



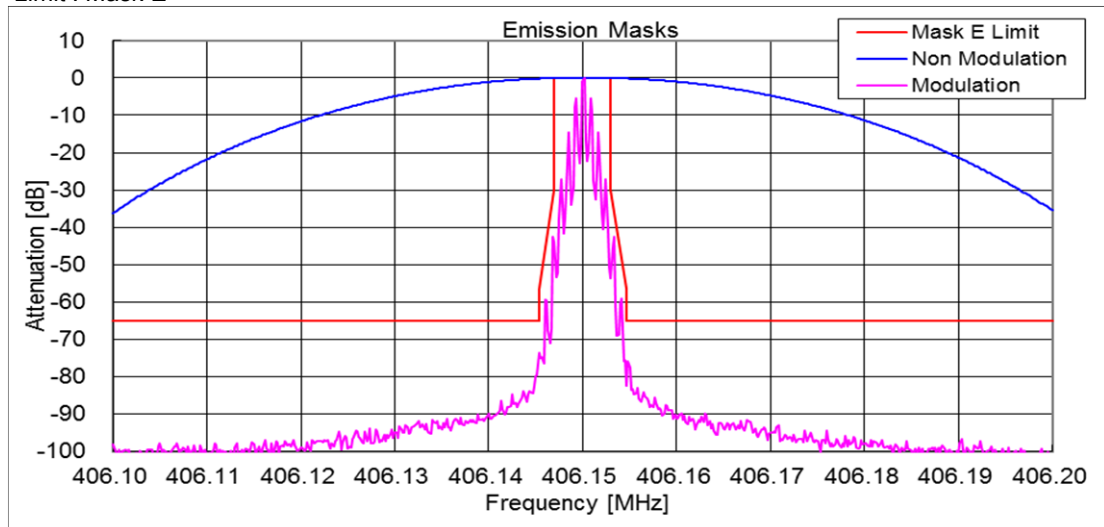
State : High Power / Authorized Bandwidth 11.25 kHz/ 7K60FXD/FXE / 406.15 MHz(FCC/RSS)
Limit : Mask D



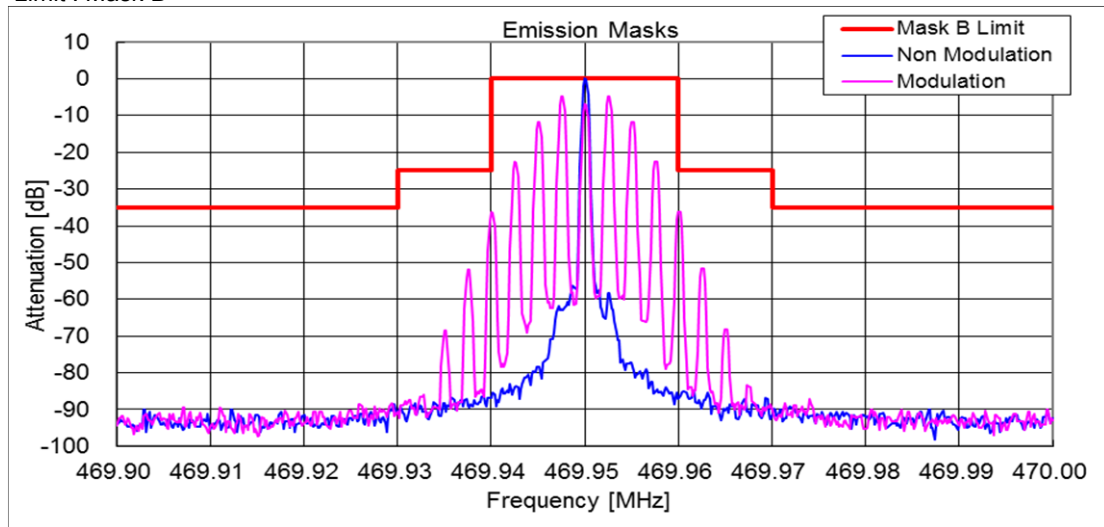
State : High Power / Authorized Bandwidth 6 kHz/ 4K00F1E / F1D / F7W / 429.95 MHz(FCC/RSS)
Limit : Mask E



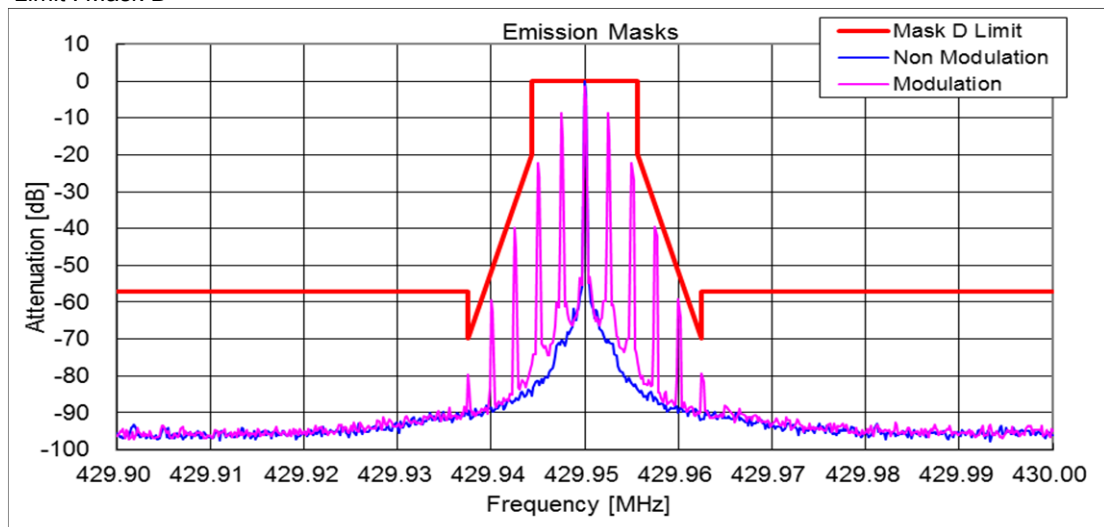
State : High Power / Authorized Bandwidth 6 kHz/ 4K00F2D / 406.15 MHz(FCC/RSS)
Limit : Mask E



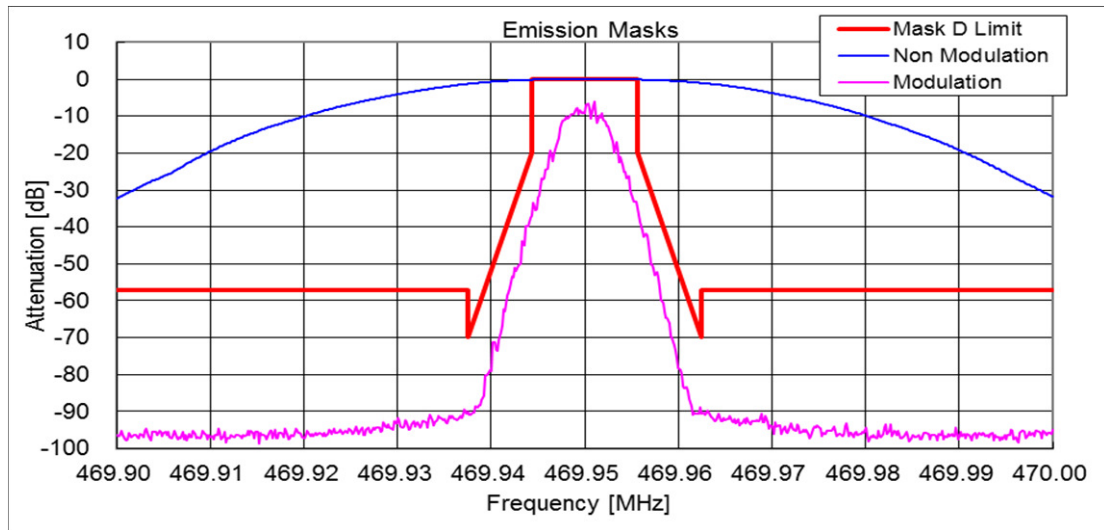
State : Low Power / Authorized Bandwidth 20 kHz/ 16K0F3E / 469.95 MHz(RSS)
Limit : Mask B



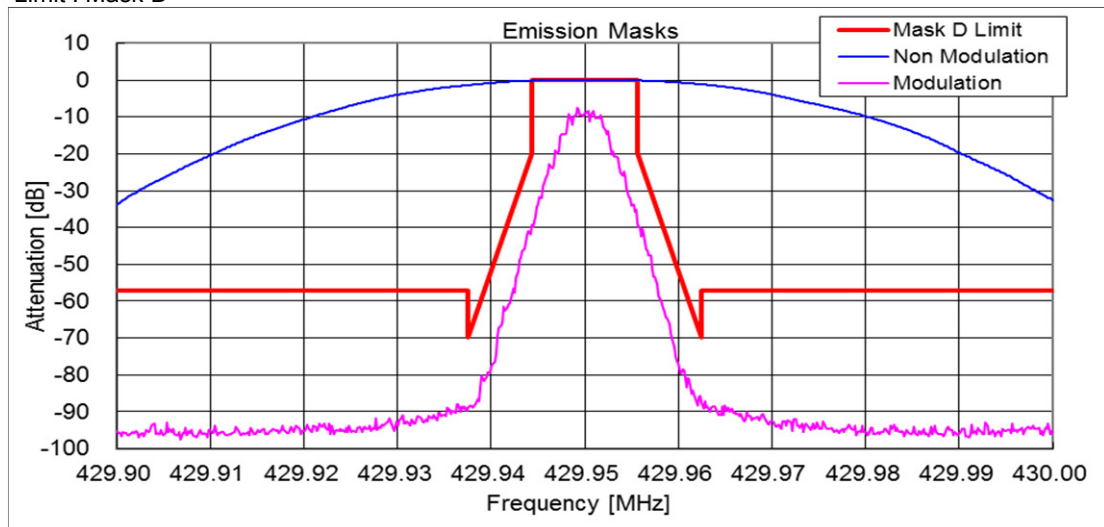
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Limit : Mask D



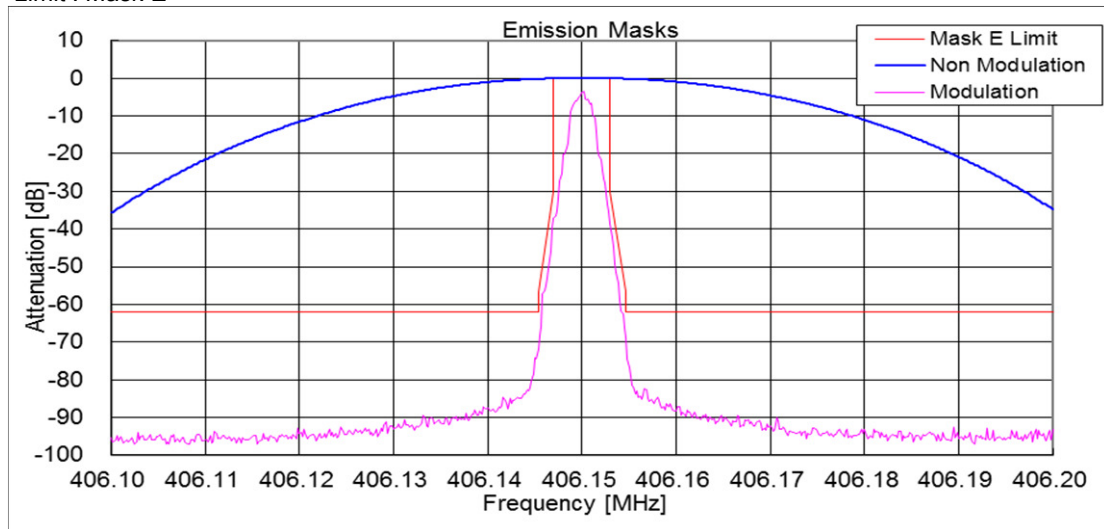
State : Low Power / Authorized Bandwidth 11.25 kHz/ 8K30F1E/F1D/F7W / 469.95 MHz(FCC/RSS)
Limit : Mask D



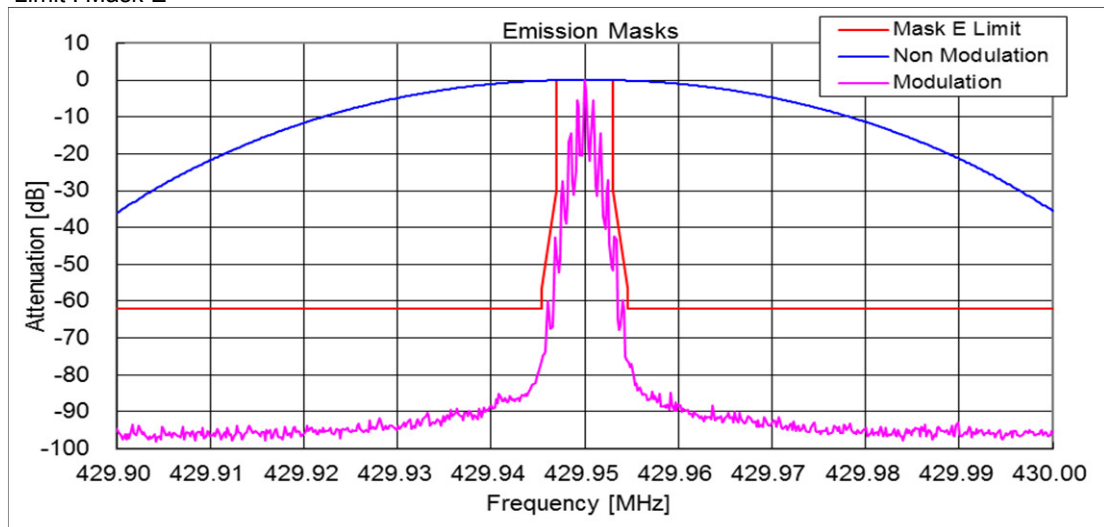
State : Low Power / Authorized Bandwidth 11.25 kHz/ 7K60FXD/FXE / 429.95 MHz(FCC/RSS)
Limit : Mask D



State : Low Power / Authorized Bandwidth 6 kHz/ 4K00F1E / F1D / F7W / 406.15 MHz(FCC/RSS)
Limit : Mask E



State : Low Power / Authorized Bandwidth 6 kHz/ 4K00F1E / 429.95 MHz(FCC/RSS)
Limit : Mask E



10.5 Transient Frequency Behavior

REGULATIONS : FCC Part 90 Section 214

TEST METHOD/GUIDE : ANSI/TIA-603-D, Section 2.2.19.3

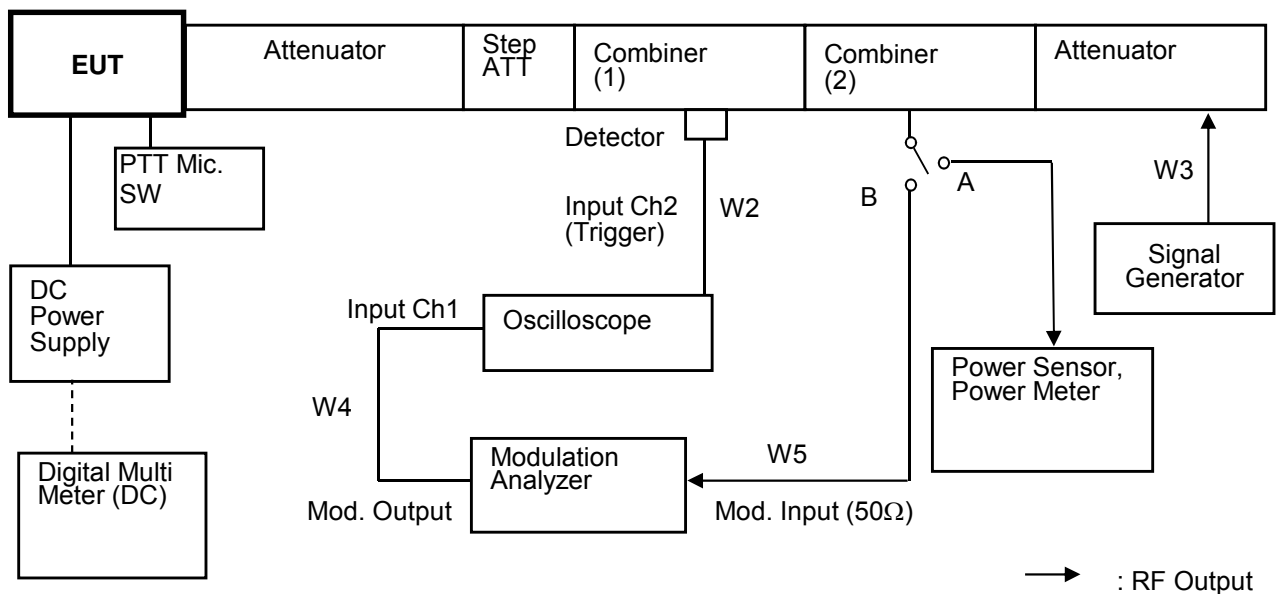
Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 The transmitter was turned on.
- 3 The transmitter carrier level was measured at the output of the combiner .
- 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 -30 dB below the level recorded in Procedure 3, 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-603 steps j and k as a guide, however 1000 Hz tone was adjusted at +- 2.5 /div vertically centered on the display.
- 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 steps m, n, and o was captured and plotted.
- 9 The carrier off-time as referenced in TIA-603 steps p, q, r, and s was captured and plotted.

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Power Meter	Hewlett Packard	E4418B	GB38410265	1Y	May. 31, 17
2	Power Sensor	Hewlett Packard	8482A	US37292237	1Y	May. 31, 17
3	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	May. 31, 17
4	Attenuator (3dB)	TME	CFA-20NPJ-3	679701	1Y	May. 31, 17
5	Attenuator (30dB)	Weinschel	WA-29-30-34	8924	1Y	May. 31, 17
6	Step Attenuator	Hewlett Packard	8494B	272614515	1Y	Jan. 31, 18
7	Combiner(1)	Anritsu	Z-164A	M89249	1Y	Jan. 31, 18
8	Combiner(2)	Anritsu	Z-164A	M89549	1Y	Jan. 31, 18
9	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Dec. 31, 17
10	Signal Generator	Rohde&Schwarz	SMB 100A	105709	1Y	Apr. 30, 17
11	Oscilloscope	Tektronix	TDS 680B	B010292	1Y	Feb. 28, 18
12	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
13	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 17

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
W2	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00097	1Y	Jan. 31, 18
W4	Coaxial Cable	Daiyu Densen	3D-2V	KSR00101	1Y	Feb. 28, 18
W5	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 28, 18
W3	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00041	1Y	Feb. 28, 18

Measuring Equipment Configuration

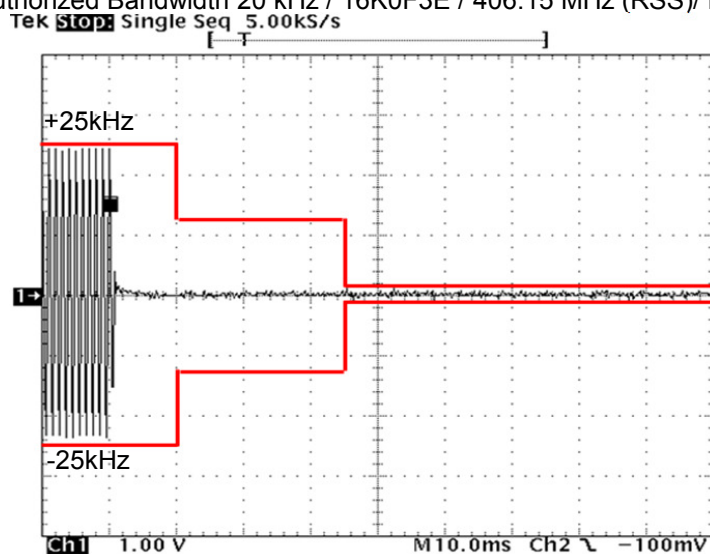
Test Results

Test date	Feb 27, 2017	
Location	Kashima No.1 Test Site	
temperature	20	[degree C]
Humidity Variation	51	[%]
Atmospheric Pressure	102	[kPa]
Test Engineer	Koichi Wagatsuma	

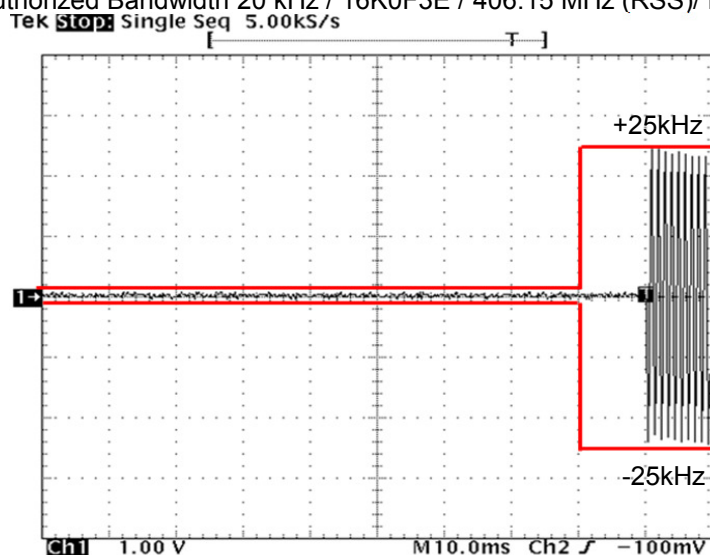
Test was carried out for all the frequency band of section 10.1

State the worst case (below).

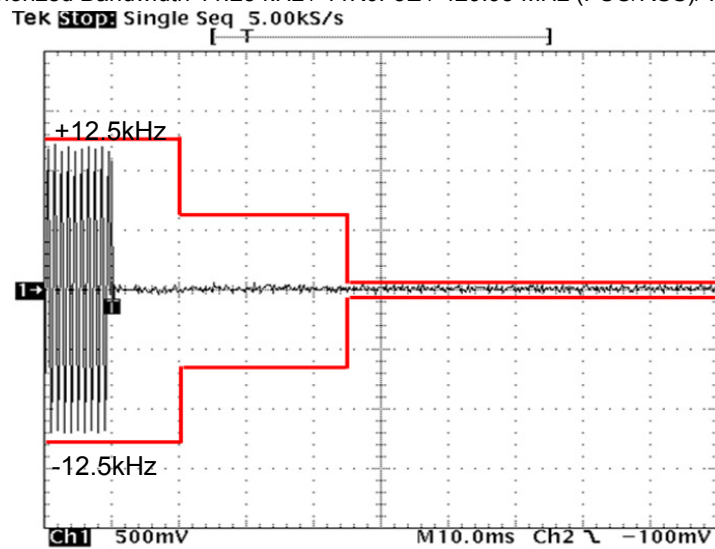
State : High Power / Authorized Bandwidth 20 kHz / 16K0F3E / 406.15 MHz (RSS)/ PTT:OFF -ON



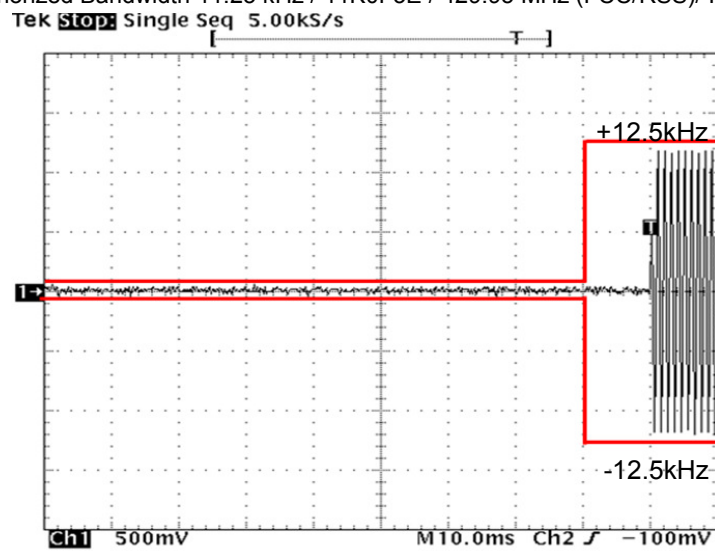
State : High Power / Authorized Bandwidth 20 kHz / 16K0F3E / 406.15 MHz (RSS)/ PTT:ON -OFF



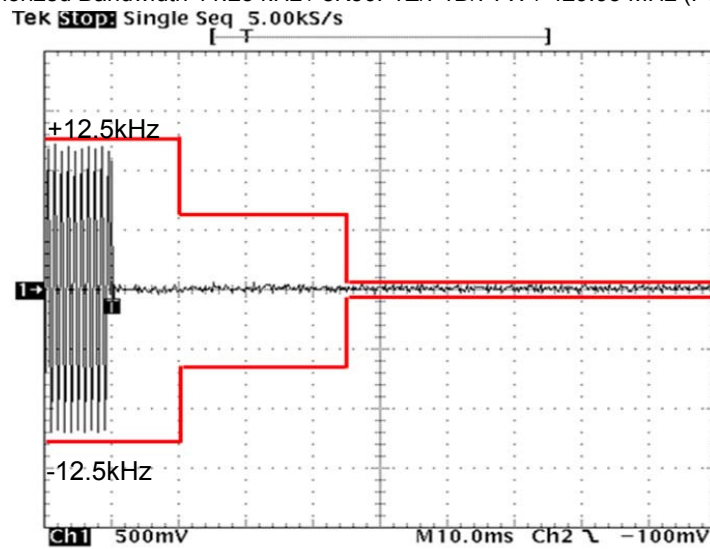
State : High Power / Authorized Bandwidth 11.25 kHz / 11K0F3E / 429.95 MHz (FCC/RSS)/ PTT:OFF -ON



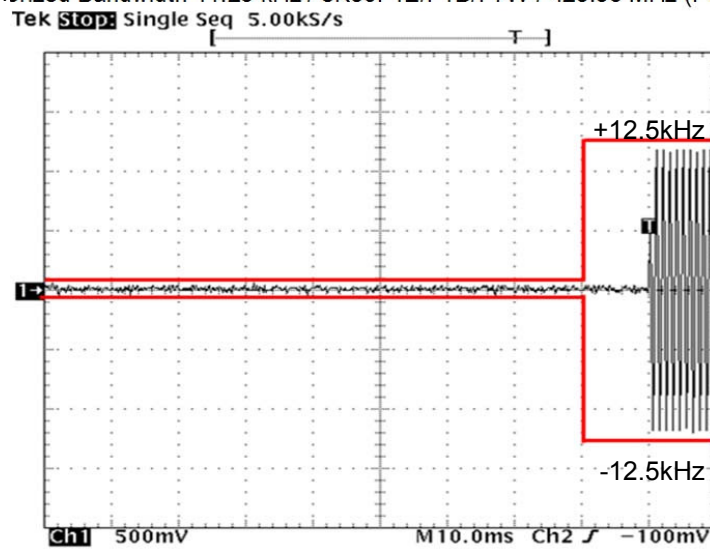
State : High Power / Authorized Bandwidth 11.25 kHz / 11K0F3E / 429.95 MHz (FCC/RSS)/ PTT:ON-OFF



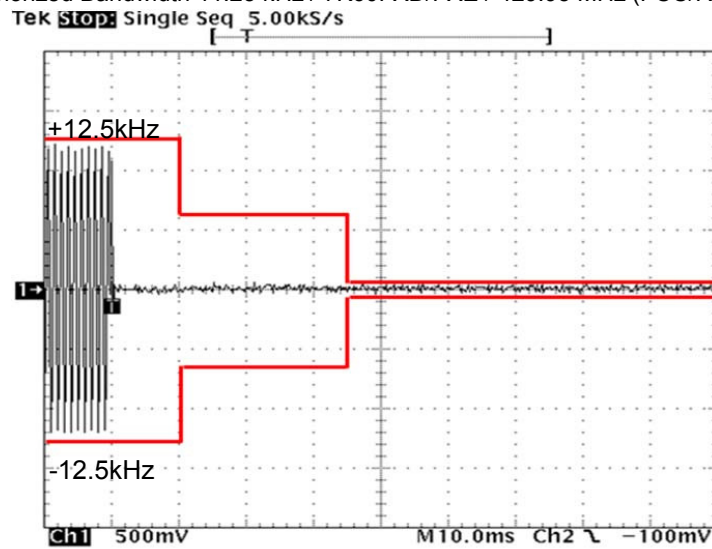
State : High Power / Authorized Bandwidth 11.25 kHz / 8K30F1E/F1D/F7W / 429.95 MHz (FCC/RSS)/ PTT:OFF -ON



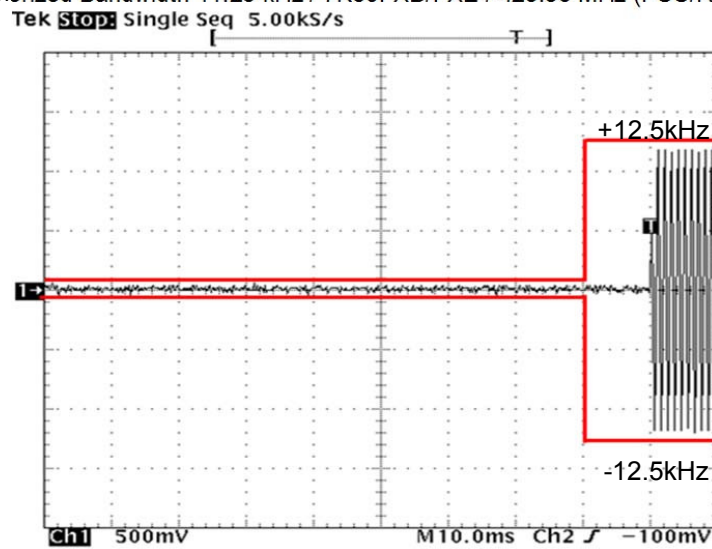
State : High Power / Authorized Bandwidth 11.25 kHz / 8K30F1E/F1D/F7W / 429.95 MHz (FCC/RSS)/ PTT:ON-OFF



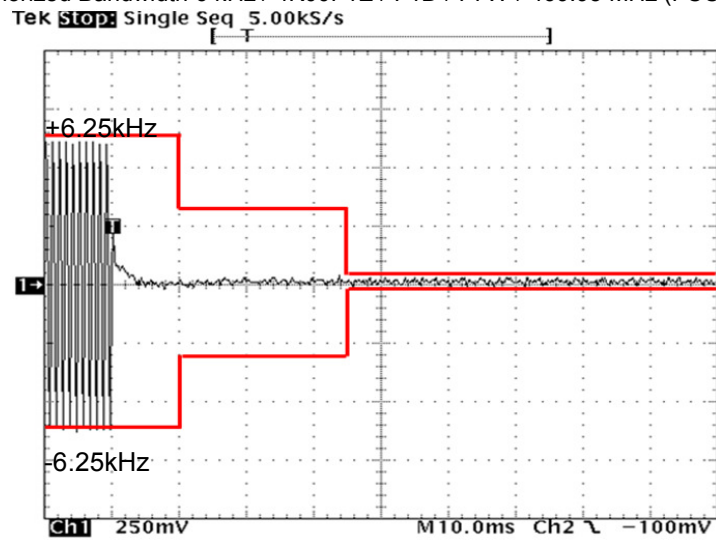
State : High Power / Authorized Bandwidth 11.25 kHz / 7K60FXD/FXE / 429.95 MHz (FCC/RSS)/ PTT:OFF -ON



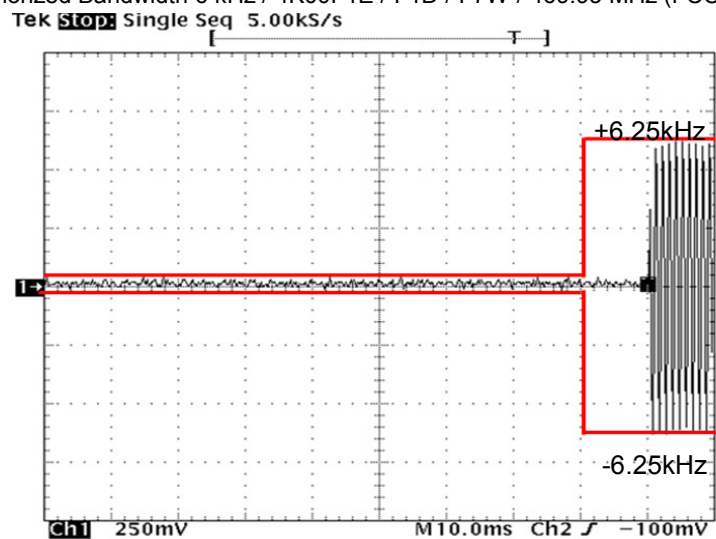
State : High Power / Authorized Bandwidth 11.25 kHz / 7K60FXD/FXE / 429.95 MHz (FCC/RSS)/ PTT:ON-OFF



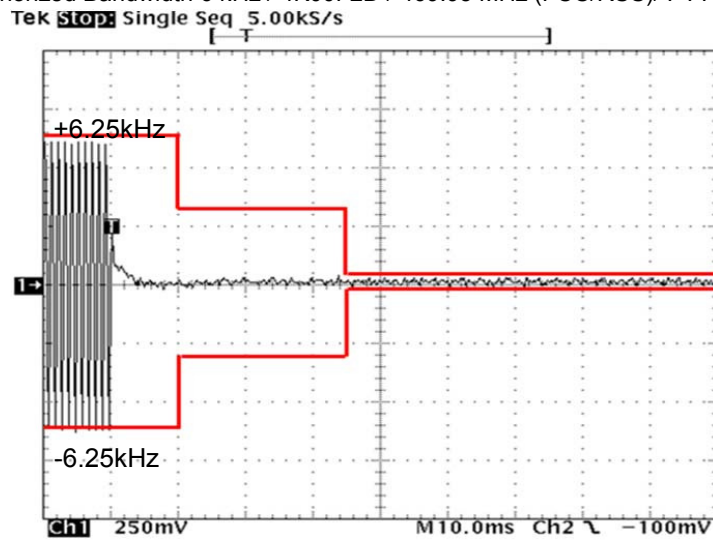
State : High Power / Authorized Bandwidth 6 kHz / 4K00F1E / F1D / F7W / 469.95 MHz (FCC/RSS)/ PTT:OFF -ON



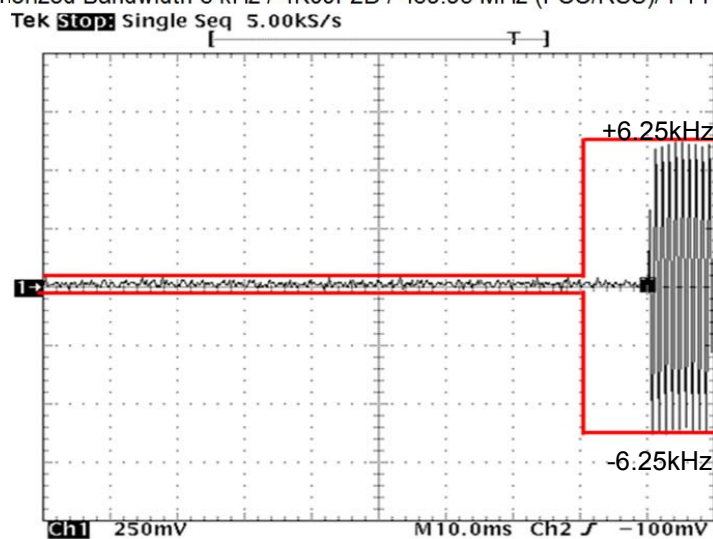
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State : High Power / Authorized Bandwidth 6 kHz / 4K00F2D / 469.95 MHz (FCC/RSS)/ PTT:OFF -ON



State : High Power / Authorized Bandwidth 6 kHz / 4K00F2D / 469.95 MHz (FCC/RSS)/ PTT:ON-OFF



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

REGULATIONS	: FCC Part 2 Section 1047 (a)
TEST METHOD/GUIDE	: ANSI/TIA-603-D Section 2.2.6.2.2, 3.2.6.2

Test Procedure

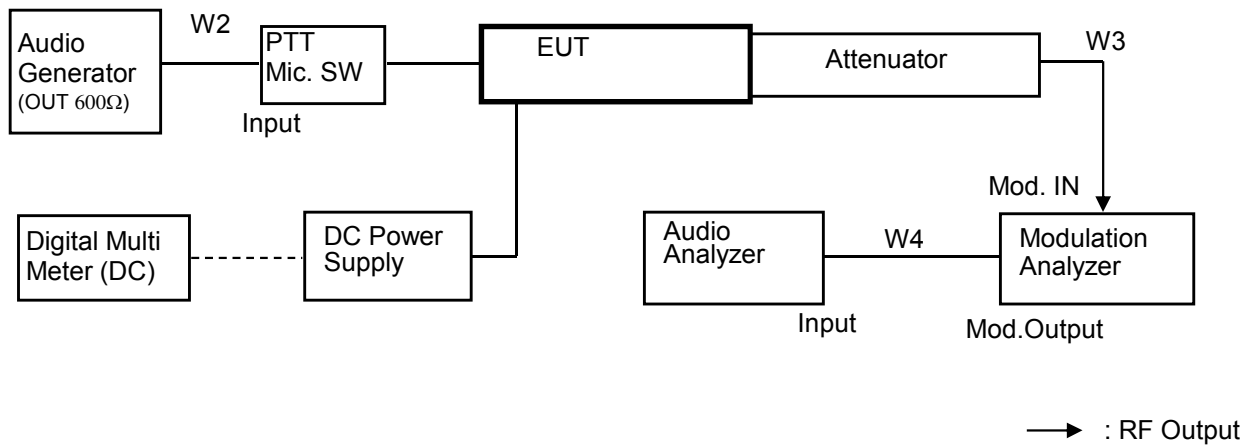
- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Adjust the Modulation Analyzer for the following setting:
 - a) High-pass filter : 50 Hz
 - b) Low-pass filter : 15 kHz
 - c) Detector : positive peak
 - d) Function : FM
- 3 The audio signal input was adjusted to obtain 20 % 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 100 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. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	May. 31, 17
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8924	1Y	May. 31, 17
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Dec. 31, 17
4	Audio Generator	Anritsu	MG443B	M70150	1Y	May. 31, 17
5	Audio Analyzer	Hewlett Packard	8903B	2948A07326	1Y	Sep. 30, 17
6	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
7	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 17

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
W2	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 17
W4	Coaxial Cable	Daiyu Densen	3D-2V	KSR00101	1Y	Feb. 28, 18
W3	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 28, 18

Measuring Equipment Configuration

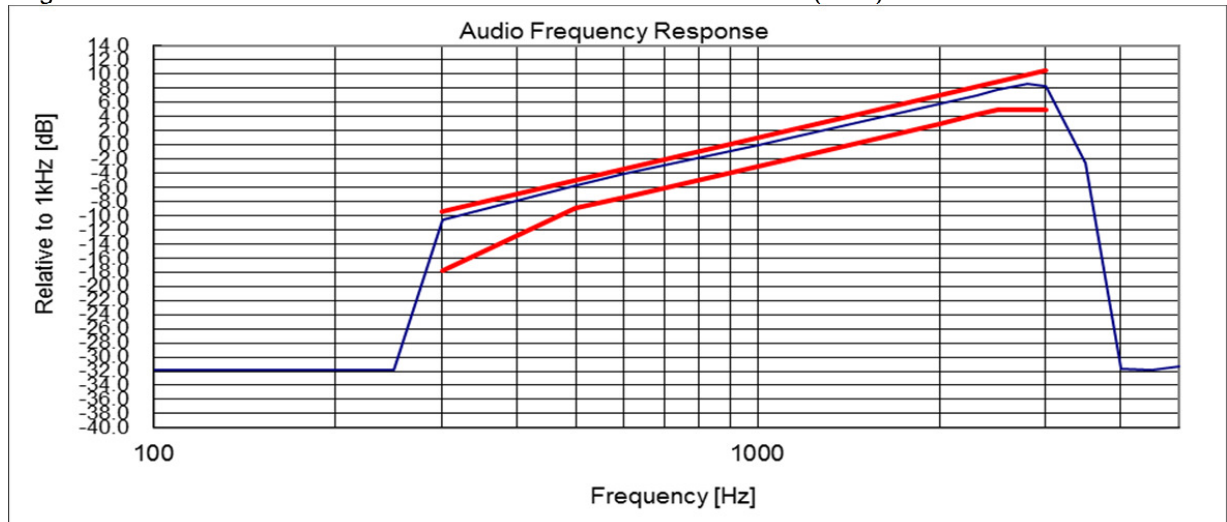
Test Results

Test date	Feb 22, 2017	
Location	Kashima No.1 Test Site	
temperature	20	[degree C]
Humidity Variation	51	[%]
Atmospheric Pressure	102	[kPa]
Test Engineer	Koichi Wagatsuma	

Test was carried out for all the frequency band of section 10.1

State the worst case (below).

State : High Power / Authorized Bandwidth 20 kHz / 16K0F3E / 429.95 MHz(RSS)

**Note:**

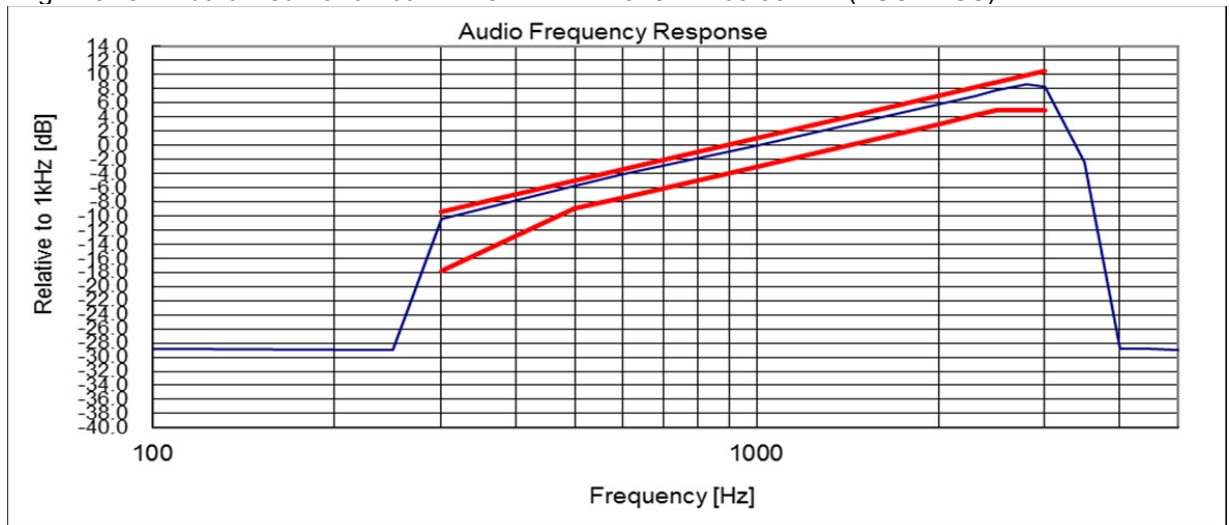
Audio Filter of the above result is substituted with the same structure as Audio Frequency Response.

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.

State : High Power / Authorized Bandwidth 11.25 kHz / 11K0F3E / 469.95 MHz(FCC / RSS)



Note:

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

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	: FCC Part 2 Section 1047 (b)
TEST METHOD/GUIDE	: ANSI/TIA-603-D Section 2.2.3.2, 1.3.4.4

Test Procedure

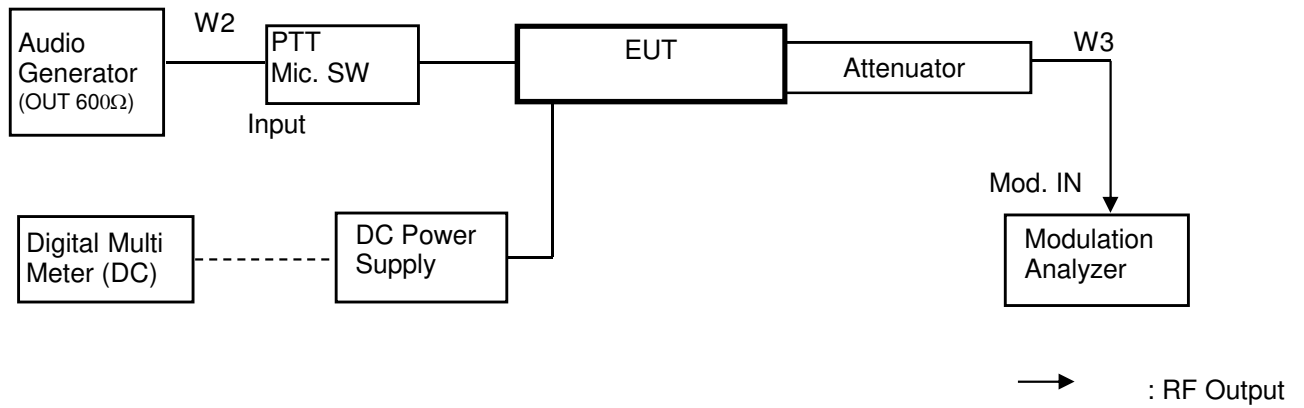
- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Adjust the Modulation Analyzer for the following setting:
 - a) High-pass filter : off
 - b) Low-pass filter : 15 kHz
 - c) Detector : positive peak
 - d) Function : FM
- 3 Apply a 1kHz modulation signal to the transmitter 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 Detector of the Modulation Analyzer Negative Peak.
- 7 Repeat test procedure 4 and 5.

Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	May. 31, 17
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8924	1Y	May. 31, 17
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Dec. 31, 17
4	Audio Generator	Anritsu	MG443B	M70150	1Y	May. 31, 17
5	DC Power Supply	Daichi denpa kogyo	GZV4000	90290931	None	None
4	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 17

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
W2	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 17
W3	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 28, 18

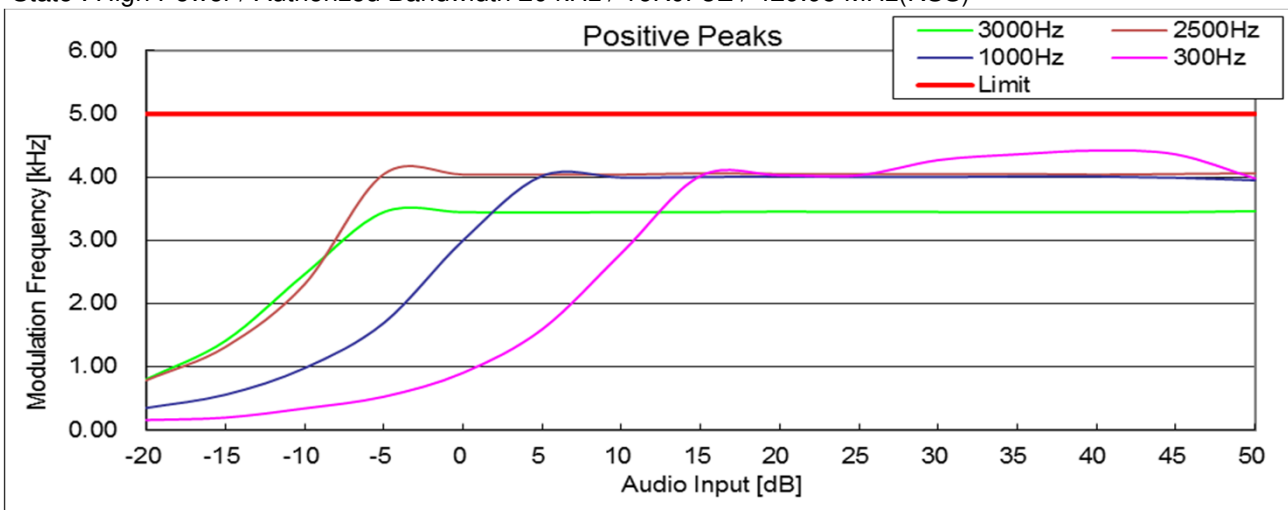
Measuring Equipment Configuration

Test Results

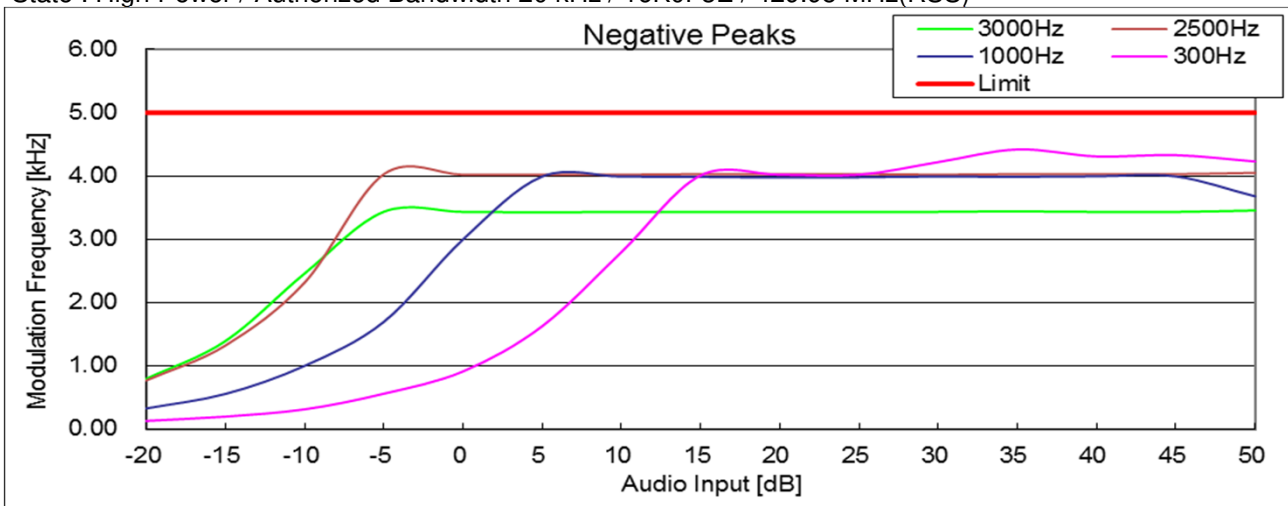
Test date	Feb. 22, 2017		
Location	Kashima No.1 Test Site		
temperature	20	[degree C]	
Humidity Variation	50	[%]	
Atmospheric Pressure	102	[kPa]	
Test Engineer	Koichi Wagatsuma		

Test was carried out for all the frequency band of section 10.1
State the worst case (below).

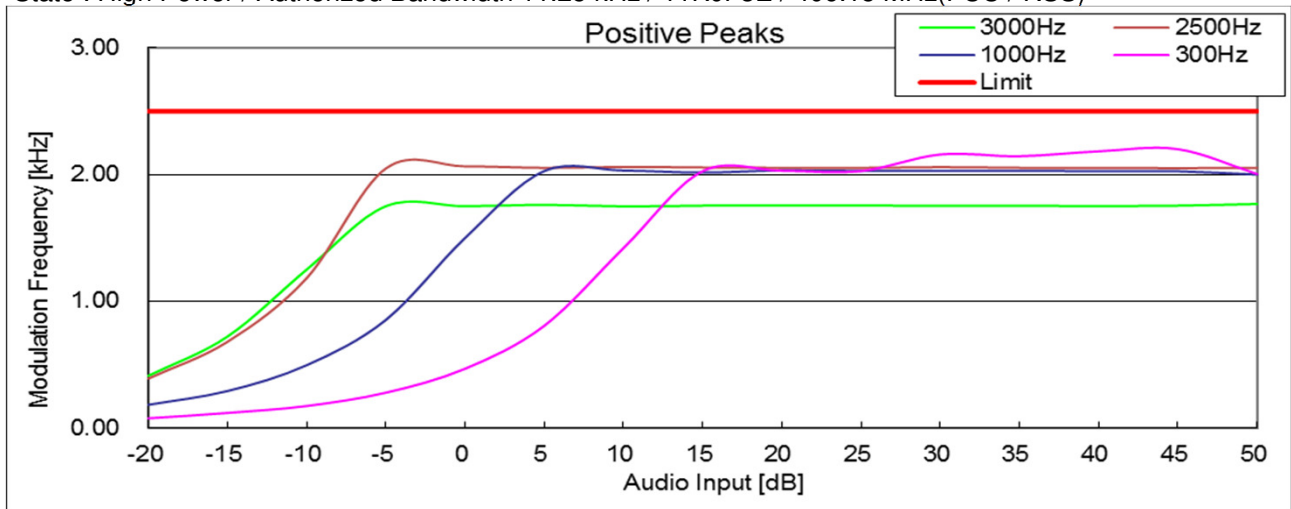
State : High Power / Authorized Bandwidth 20 kHz / 16K0F3E / 429.95 MHz(RSS)



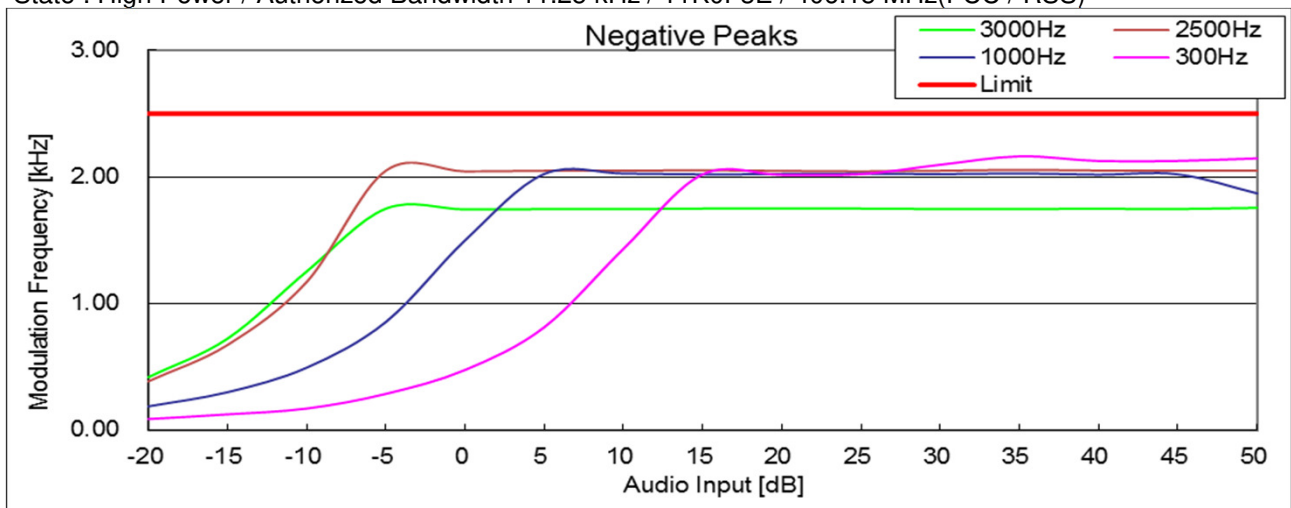
State : High Power / Authorized Bandwidth 20 kHz / 16K0F3E / 429.95 MHz(RSS)



State : High Power / Authorized Bandwidth 11.25 kHz / 11K0F3E / 406.15 MHz(FCC / RSS)



State : High Power / Authorized Bandwidth 11.25 kHz / 11K0F3E / 406.15 MHz(FCC / RSS)



10.8 Frequency Stability (Temperature Variation)

REGULATIONS	: FCC Part 2 Section 1055 (a) (1), Part 90 Section 213(a) RSS-119 Section 5.3
TEST METHOD/GUIDE	: ANSI/TIA-603-D Section 2.2.2.2 RSS-Gen Section 4.7(a)

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.
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 4 to 6.

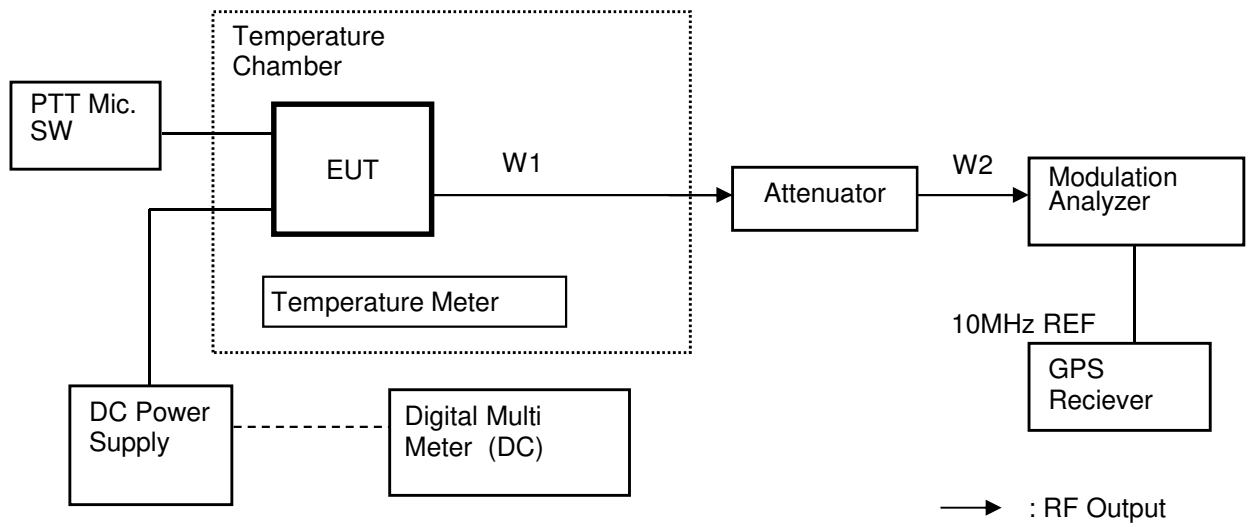
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	May. 31, 17
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8924	1Y	May. 31, 17
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Dec. 31, 17
4	DC Power Supply	Takasago	GP035-20R	1014199060	None	None
5	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 17
6	Temperature Chamber	Tabai	PL-3F	5103661	None	None
7	Temperature Meter	Sato	PC-5000TRH-II	A11999972	1Y	Feb. 28, 18
8	GPS Receiver	Hewlett Packard	HP Z3801A	3542A02414	None	None

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
W2	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00041	1Y	Feb. 28, 18
W1	Coaxial Cable	Suhner	SUCOFLEX104	KSR00042	1Y	May. 31, 17

Measuring Equipment Configuration



Test Results

Test date	Mar. 24, 2017
Location	Kashima No.1 Test Site
Test Engineer	Koichi Wagatsuma

Test was carried out for all the frequency band of section 10.1

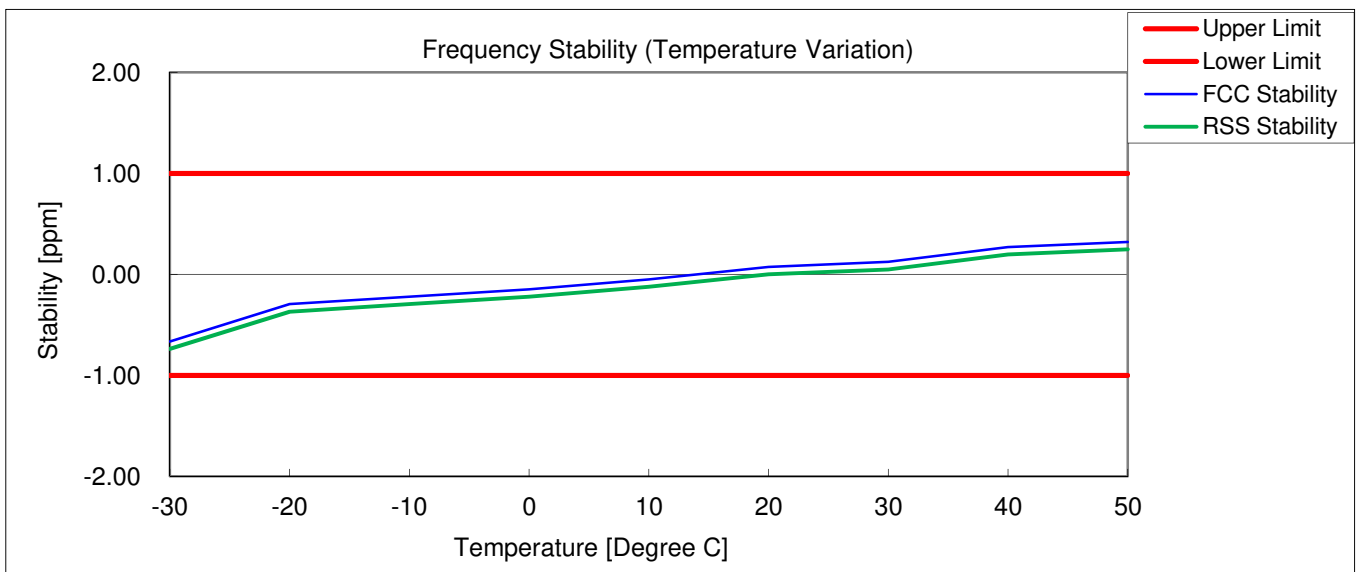
State the worst case (below).

State : High Power / Authorized Bandwidth 11.25 kHz / 406.15 MHz (FCC / RSS)

Reference Frequency: 406.150000 MHz(FCC Stability)

406.150030 MHz(RSS Stability)

No.	Temperature (Degree C)	Frequency (MHz)	FCC Stability (ppm)	RSS Stability (ppm)	Limit (+/- ppm)	Min. Margin (ppm)
1	-30	406.149730	-0.66	-0.74	1.0	0.26
2	-20	406.149880	-0.30	-0.37	1.0	0.63
3	-10	406.149910	-0.22	-0.30	1.0	0.70
4	0	406.149940	-0.15	-0.22	1.0	0.78
5	10	406.149980	-0.05	-0.12	1.0	0.88
6	20	406.150030	0.07	0.00	1.0	0.93
7	30	406.150050	0.12	0.05	1.0	0.88
8	40	406.150110	0.27	0.20	1.0	0.73
9	50	406.150130	0.32	0.25	1.0	0.68



10.9 Frequency Stability (Voltage Variation)

REGULATIONS	: FCC Part 2 Section 1055 (a) (1), Part 90 Section 213(a) RSS-119 Section 5.3
TEST METHOD/GUIDE	: ANSI/TIA-603-D Section 2.2.2.2 RSS-Gen Section 4.7(a)

Test Procedure

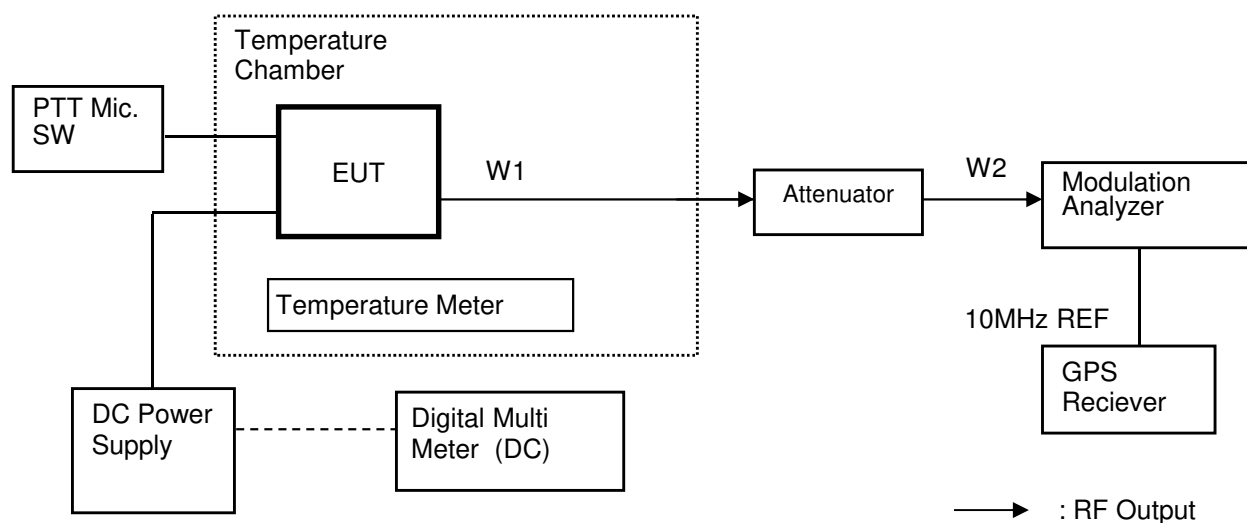
- 1 The EUT and test equipment were set up as shown on the following page.
- 2 The power supply voltage to the EUT was varied from 85 % to 115 % of the nominal value measured at the input to the EUT.

Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	May. 31, 17
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8924	1Y	May. 31, 17
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Dec. 31, 17
4	DC Power Supply	Takasago	GP035-20R	1014199060	None	None
5	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 17
6	Temperature Chamber	Tabai	PL-3F	5103661	None	None
7	Temperature Meter	Sato	PC-5000TRH-II	A11999972	1Y	Feb. 28, 18
8	GPS Receiver	Hewlett Packard	HP Z3801A	3542A02414	None	None

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
W2	Coaxial Cable	Pacific custom	RG-58 C/U	KSR00041	1Y	Feb. 28, 18
W1	Coaxial Cable	Suhner	SUCOFLEX104	KSR00042	1Y	May. 31, 17

Measuring Equipment Configuration

Test Results

Test date	Mar 24, 2017
Location	Kashima No.1 Test Site
Test Engineer	Koichi Wagatsuma

Test was carried out for all the frequency band of section 10.1

State the worst case (below).

State : High Power / Authorized Bandwidth 11.25 kHz / 406.15 MHz (FCC / RSS)

Reference Frequency: 406.150030 MHz

No.	Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Stability (ppm)	Limit +/- (ppm)	Margin (ppm)
1	20+/-5	85	11.56	406.150030	0.00	1.0	1.00
2	20+/-5	100	13.60	406.150030	0.00	1.0	1.00
3	20+/-5	115	15.64	406.150040	0.02	1.0	0.98

10.10 Receiver Spurious Emissions(Radiated)

REGULATIONS : RSS-Gen Section 7

TEST METHOD/GUIDE : RSS-Gen Section 7

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, hanging approx, in the middle between ground plane and table.
- 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 or Biconical and Log periodic 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.
- 11 Preliminary Measurement
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.

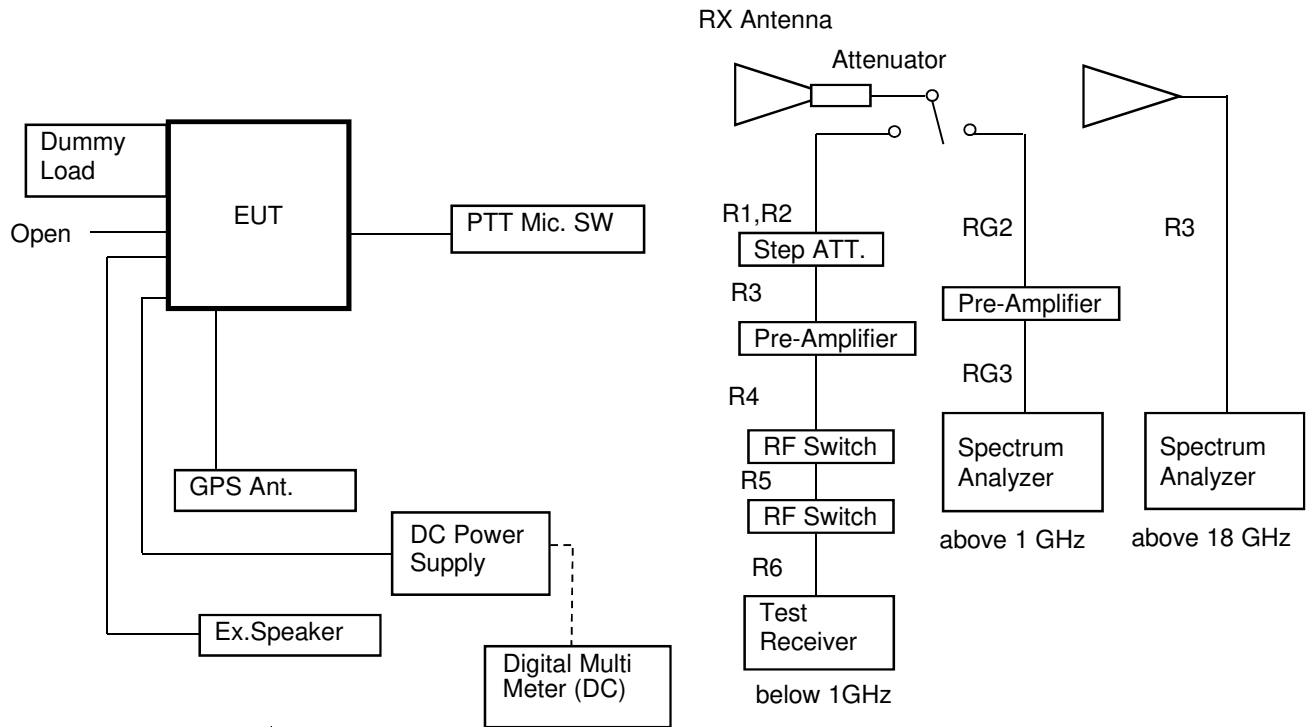
TEST EQUIPMENTS

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Broad Band antenna	Schwarzbeck	VULB9168	218	1Y	Mar. 31, 17
2	6dB Attenuator	TAMAGAWA	CFA-01(NPJ-6)	F0300002	1Y	Apr. 30, 17
3	Step Attenuator	Hewlett Packard	8494B	2812A15595	1Y	May. 31, 17
4	Amplifier	Hewlett Packard	8447D	1937A03130	1Y	May. 31, 17
5	RF Switch	Intertek	ACX-150	F03301501	1Y	May. 31, 17
6	Double ridged antenna	EMCO	3115	9903-5699	1Y	Jul. 31, 17
7	Horn Antenna with Preamplifier	tsj	MLA-18265-B03-30	1694440	1Y	Feb. 28, 18
8	6dB Attenuator	Agilent	8493C	80390	1Y	Nov. 30, 17
9	Amplifier	TOYO	TPA0118-30	1052071(0504)	1Y	Nov. 30, 17
10	Test receiver	Rohde & Schwarz	ESS	842886/013	1Y	Feb. 28, 18
11	Site Attenuation				1Y	Dec. 31, 17
12	SVSWR				1Y	Jun. 30, 17

USED CABLES

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
R1	Coaxial cable	Intertek	5D-2W	3R01a	1Y	May. 31, 17
R2	Coaxial cable	Intertek	10D-2W	3R02a	1Y	May. 31, 17
R3	Coaxial cable	Intertek	RG-5A/U	3R03	1Y	May. 31, 17
R4	Coaxial cable	Intertek	5D-2W	3R04	1Y	May. 31, 17
R5	Coaxial cable	Intertek	5D-2W	3R05	1Y	May. 31, 17
R6	Coaxial cable	Intertek	5D-2W	3R06a	1Y	May. 31, 17
RG1	Coaxial cable	SUHNER	SUCOFLEX	MY19475/4	1Y	Nov. 30, 17
RG2	Coaxial cable	SUHNER	SUCOFLEX	MY19494/4	1Y	Nov. 30, 17
RG3	Coaxial cable	Candox Systems, Inc.	5B-048-98-98-6000	120315	1Y	Oct. 31, 17

MEASUREMENT EQUIPMENT CONFIGURATION



TEST RESULTS

Test date	Mar. 06, 2017 to Mar. 10, 2017
Location	Tochigi No.1 Test Site and No.2 Test site
temperature	18.3 to 23.3 [degree C]
Humidity Variation	29 to 46 [%]
Atmospheric Pressure	100.9 to 101.0 [kPa]
Test Engineer	Koichi Wagatsuma

Test was carried out for the frequency band of section 10.1

State the worst case (below).

State : 469.95 MHz Receiver Condition

No.	Frequency (MHz)	Pol	Mode	Reading Level (dBuv)	Factor* (dB)	Emission Level (dBuV/m)	Limit (dBuV/m)	Level	Margin (dB)
1	38.84	Hor.		-	-6.2	-	40.0		-
		Ver.		25.0	-6.2	18.8	40.0		21.2
2	288.01	Hor.		32.5	-3.2	29.3	46.0		16.7
		Ver.		29.2	-3.2	26.0	46.0		20.0
3	345.60	Hor.		27.8	-1.3	26.5	46.0		19.5
		Ver.		-	-1.3	-	46.0		-
4	469.95	Hor.		21.4	2.5	23.9	46.0		22.1
		Ver.		21.3	2.5	23.8	46.0		22.2
5	704.92	Hor.		20.0	8.1	28.1	46.0		17.9
		Ver.		20.6	8.1	28.7	46.0		17.3
6	939.90	Hor.		21.8	12.1	33.9	46.0		12.1
		Ver.		25.1	12.1	37.2	46.0		8.8
7	1566.52	Hor.	AVG	26.7	4.2	30.9	54.0		23.1
		Ver.	AVG	27.2	4.2	31.4	54.0		22.6
8	3133.07	Hor.	AVG	26.5	10.0	36.5	54.0		17.5
		Ver.	AVG	26.6	10.0	36.6	54.0		17.4
9	3759.65	Hor.	AVG	27.6	11.8	39.4	54.0		14.6
		Ver.	AVG	27.8	11.8	39.6	54.0		14.4

There is the margin of 20dB over except for the above points.
 * Factor = Antenna, Antenna Pad, Cable, Preamp, (Dist. Conversion)
 Emission Level = Reading Level + Factor

Note:

- 1 Measurement distance is 3 metres. (Above 1GHz is 3.9 metres)
- 2 Scanned frequency are 30 to 25000 MHz.
- 3 Highest frequency is 4960 MHz. (TXRX UNIT : 940 MHz.)

10.11 Necessary Bandwidth and Emission Bandwidth

REGULATIONS	: FCC Part 2 Section 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)	3	kHz
Maximum Deviation	(D)	5	kHz
Constant Factor	(K)	1	
Necessary Bandwidth	(Bn)	16	kHz

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

1.types of modulation of the main carrier :

F= Frequency modulation

2.nature of signal(s) modulating the main carrier:

3= A single channel containing analog information

3.type of information to be transmitted:

E= Telephony (including sound broadcasting)

State : 11K0F3E (Authorized Bandwidth 11.25 kHz)

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

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

1.types of modulation of the main carrier :

F= Frequency modulation

2.nature of signal(s) modulating the main carrier:

3= A single channel containing analog information

3.type of information to be transmitted:

E= Telephony (including sound broadcasting)

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

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

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

1.types of modulation of the main carrier :

F= Frequency modulation

2.nature of signal(s) modulating the main carrier:

1= A single channel containing quantized or digital information without the use of a modulating sub-carrier

7= Two or more channels containing quantized or digital information

3.type of information to be transmitted:

E= Telephony (including sound broadcasting)

D= Data transmission, telemetry, telecommand

W= Combination of the above

State : 7K60FXE / 7K60FXD (9600bps, Authorized Bandwidth 11.25 kHz)

Item	Mark		
Digital information rate	(R)	9600	bps
Peak frequency deviation	(D)	3.024	kHz
Signaling states	(S)	4	
Numerical factor	(K)	0.463	
Necessary Bandwidth	(Bn)	7.6	kHz

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

1.types of modulation of the main carrier :

F= Frequency modulation

2.nature of signal(s) modulating the main carrier:

X= Cases not otherwise covered

3.type of information to be transmitted:

E= Telephony (including sound broadcasting)

D= Data transmission, telemetry, telecommand

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

Item	Mark		
Digital information rate	(R)	4800	bps
Peak frequency deviation	(D)	1.55	kHz
Signaling states	(S)	4	
Numerical factor	(K)	0.516	
Necessary Bandwidth	(Bn)	4	kHz

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

1.types of modulation of the main carrier :

F= Frequency modulation

2.nature of signal(s) modulating the main carrier:

1= A single channel containing quantized or digital information without the use of a modulating sub-carrier

7= Two or more channels containing quantized or digital information

3.type of information to be transmitted:

E= Telephony (including sound broadcasting)

D= Data transmission, telemetry, telecommand

W= Combination of the above

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

Item	Mark		
Maximum Modulation	(M)	0.8	kHz
Maximum Deviation	(D)	1.2	kHz
Numerical factor	(K)	1	
Necessary Bandwidth	(Bn)	4	kHz

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

1.types of modulation of the main carrier :

F= Frequency modulation

2.nature of signal(s) modulating the main carrier:

2= A single channel containing quantized or digital information with the

3.type of information to be transmitted:

D= Data transmission, telemetry, telecommand

10.12 99% Occupied Bandwidth

REGULATIONS	: RSS-119 Section 5.5
TEST METHOD/GUIDE	: RSS-Gen Section 6.6

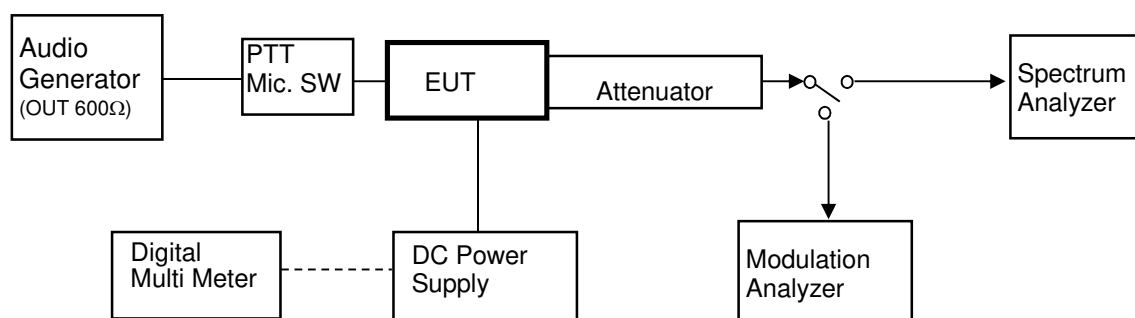
Test Procedure

- 1 The EUT and test equipment were set up as shown on the following page.
- 2 Adjust the test instrument for the following setting:
 - RBW : 1 % to 5 % of the Necessary bandwidth
 - VBW : at least 3 times the RBW
 - Detector : Peak
 - Sweep Time : Auto
 - Trace mode : Max Hold
- 3 Allow trace to fully stabilize.
- 4 Use "Occupied Bandwidth Measurement" function to measure the 99% Occupied Bandwidth.
- 5 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.(Only 16K0F3E, 11K0F3E)

Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenschel	66-20-34	BY4357	1Y	May. 31, 17
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8924	1Y	May. 31, 17
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Dec. 31, 17
4	Audio Generator	Anritsu	MG443B	M70150	1Y	May. 31, 17
5	Spectrum Analyzer	Agilent	N9030A	US51350220	1Y	Feb. 28, 18
6	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
7	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 17
8	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 17
9	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 28, 18
10	Coaxial Cable	Suhner	SUCOFLEX104	KSR00217	1Y	May. 31, 17

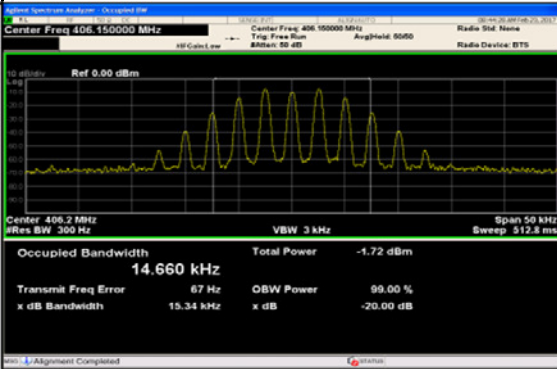
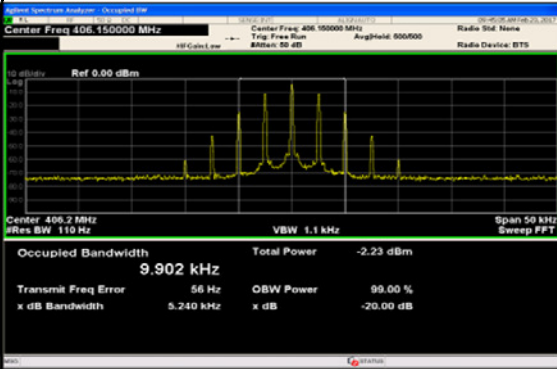
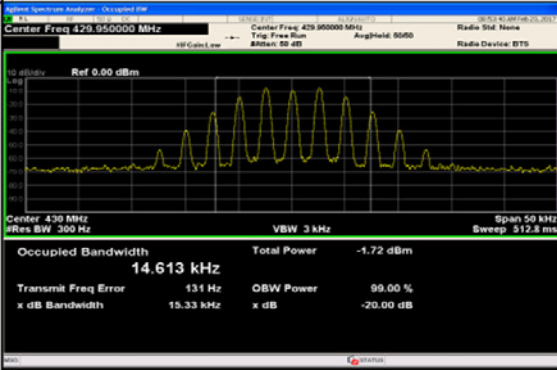
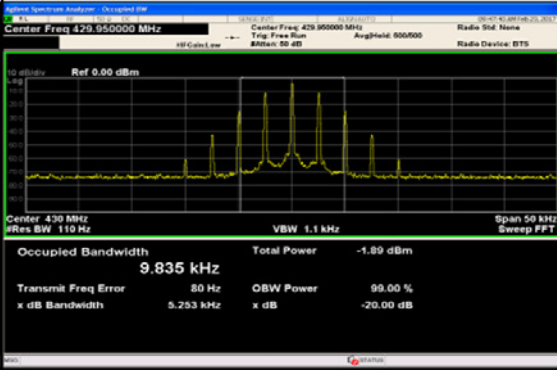
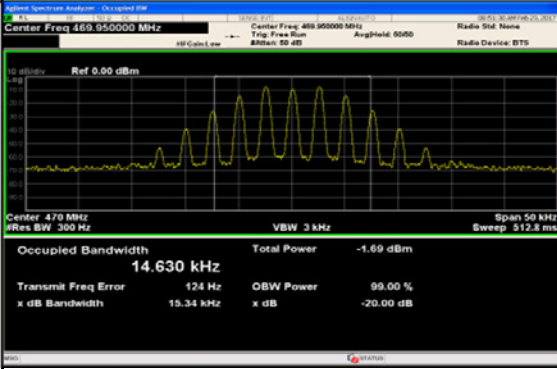
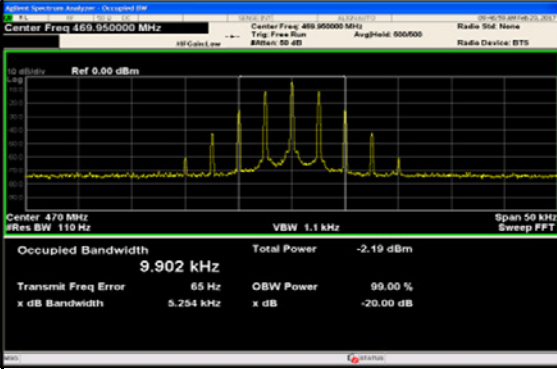
Measuring Equipment Configuration

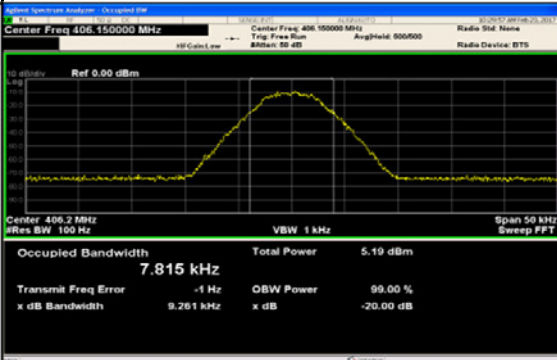
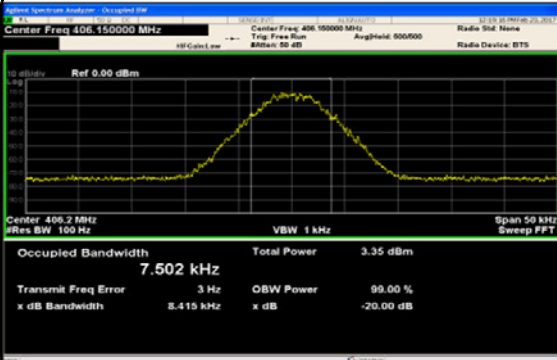
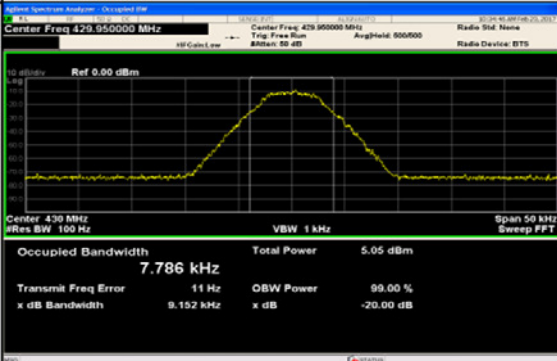
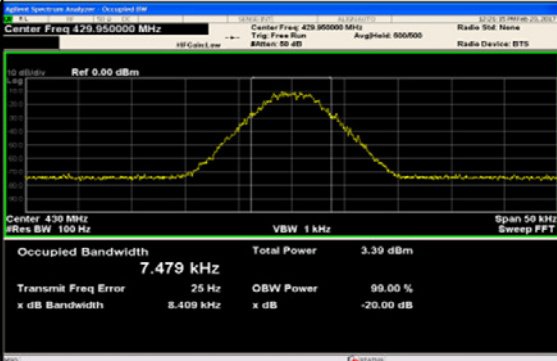
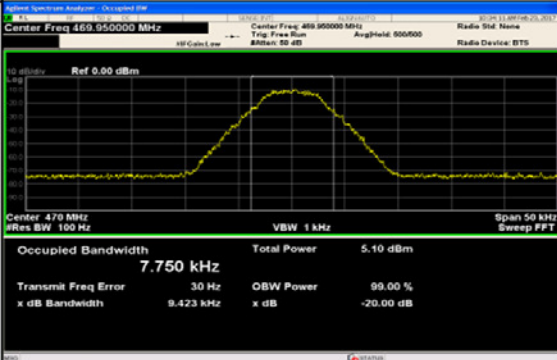
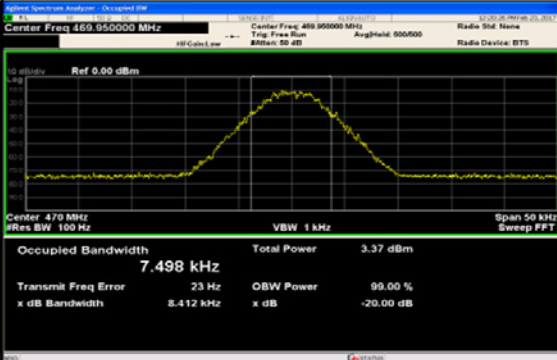


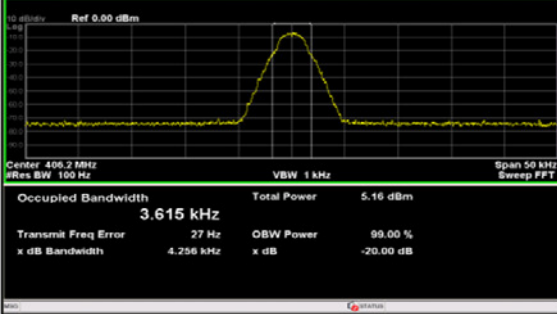
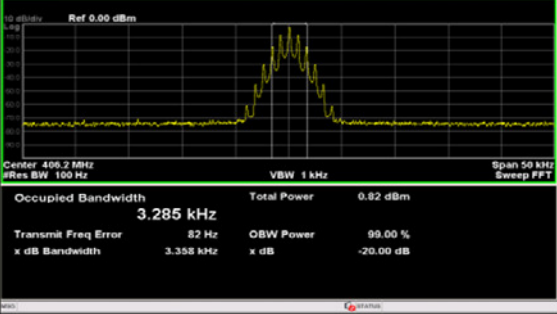
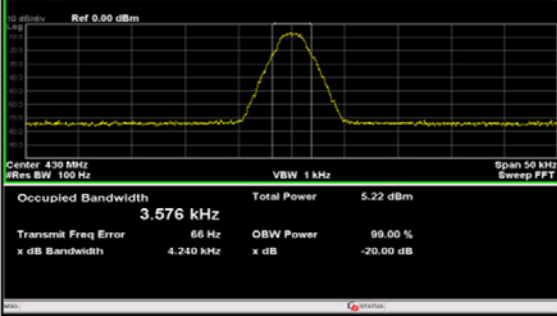
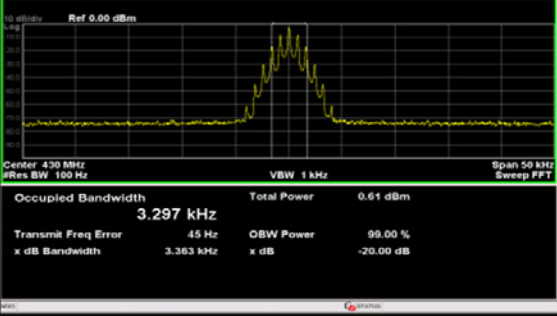
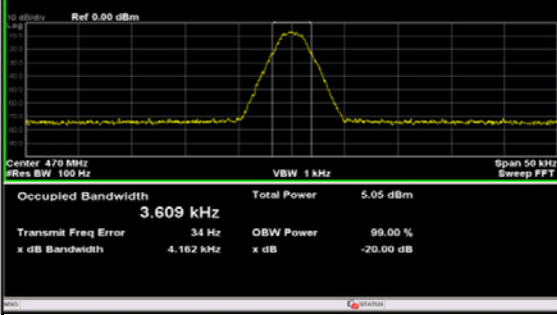
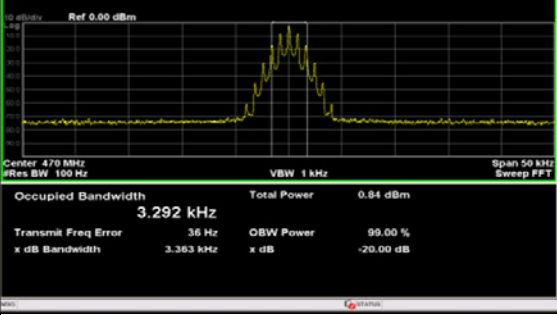
Test Results

Test date	Feb 23, 2017
Location	Kashima No.1 Test Site
temperature	20 [degree C]
Humidity Variation	60 [%]
Atmospheric Pressure	101 [kPa]
Test Engineer	Koichi Wagatsuma

Emission Designation	Frequency (MHz)	99% Occupied Bandwidth (kHz)	Authorized bandwidth (kHz)
16K0F3E	406.15 429.95 469.95	14.660 14.613 14.630	20
11K0F3E	406.15 429.95 469.95	9.902 9.835 9.902	20
8K30F1E/F1D/F7W	406.15 429.95 469.95	7.815 7.786 7.750	11.25
7K60FXD/FFXE	406.15 429.95 469.95	7.502 7.479 7.498	11.25
4K00F1E / F1D / F7W	406.15 429.95 469.95	3.615 3.576 3.609	6
4K00F2D	406.15 429.95 469.95	3.285 3.297 3.292	6

Frequency (MHz)	Emission Designation	
	16K0F3E	11K0F3E
406.15		
429.95		
469.95		

Frequency (MHz)	Emission Designation	
	8K30F1E/F1D/F7W	7K60FXD/FFXE
406.15		
429.95		
469.95		

Frequency (MHz)	Emission Designation	
	4K00F1E / F1D / F7W	4K00F2D
406.15	 Center Freq 406.150000 MHz Trig Free Run AmpHold: 500.000 Radio Std: None Radio Device: BTS Center 406.2 MHz #Res BW 100 Hz VBW 1 kHz Span 50 kHz Sweep FFT Occupied Bandwidth 3.615 kHz Total Power 5.16 dBm Transmit Freq Error 27 Hz OBW Power 99.00 % x dB Bandwidth 4.256 kHz x dB -20.00 dB	 Center Freq 406.150000 MHz Trig Free Run AmpHold: 500.000 Radio Std: None Radio Device: BTS Center 406.2 MHz #Res BW 100 Hz VBW 1 kHz Span 50 kHz Sweep FFT Occupied Bandwidth 3.285 kHz Total Power 0.82 dBm Transmit Freq Error 82 Hz OBW Power 99.00 % x dB Bandwidth 3.355 kHz x dB -20.00 dB
429.95	 Center Freq 429.950000 MHz Trig Free Run AmpHold: 500.000 Radio Std: None Radio Device: BTS Center 430 MHz #Res BW 100 Hz VBW 1 kHz Span 50 kHz Sweep FFT Occupied Bandwidth 3.576 kHz Total Power 5.22 dBm Transmit Freq Error 66 Hz OBW Power 99.00 % x dB Bandwidth 4.240 kHz x dB -20.00 dB	 Center Freq 429.950000 MHz Trig Free Run AmpHold: 500.000 Radio Std: None Radio Device: BTS Center 430 MHz #Res BW 100 Hz VBW 1 kHz Span 50 kHz Sweep FFT Occupied Bandwidth 3.297 kHz Total Power 0.61 dBm Transmit Freq Error 45 Hz OBW Power 99.00 % x dB Bandwidth 3.363 kHz x dB -20.00 dB
469.95	 Center Freq 469.950000 MHz Trig Free Run AmpHold: 500.000 Radio Std: None Radio Device: BTS Center 470 MHz #Res BW 100 Hz VBW 1 kHz Span 50 kHz Sweep FFT Occupied Bandwidth 3.609 kHz Total Power 5.05 dBm Transmit Freq Error 34 Hz OBW Power 99.00 % x dB Bandwidth 4.162 kHz x dB -20.00 dB	 Center Freq 469.950000 MHz Trig Free Run AmpHold: 500.000 Radio Std: None Radio Device: BTS Center 470 MHz #Res BW 100 Hz VBW 1 kHz Span 50 kHz Sweep FFT Occupied Bandwidth 3.292 kHz Total Power 0.84 dBm Transmit Freq Error 36 Hz OBW Power 99.00 % x dB Bandwidth 3.363 kHz x dB -20.00 dB