



TEST REPORT

REGULATION : FCC Part 2, 22, 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

Equipment type	VHF DIGITAL TRANSCEIVER
Trademark	KENWOOD
Model(s)	NX-5600H-F3, VM5630H-F3
Serial No.	26 25 (for Receiver Spurious Emissions(Radiated))
FCC ID	K44499100
IC CN and UPN	282F-499100
Test Result	Complied
Report Number	19020362JKA-002
Original Issue Date	April 02, 2019

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Approved by

Hideaki Kosemura

[Technical Manager]

Tested by

Koichi Wagatsuma

[Engineer]



NVLAP accreditation are valid for RSS-119 .
 FCC Part90 and FCC Part22 are outside the NVLAP 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	: K44499100
Model number	: NX-5600H-F3, VM5630H-F3
Serial number	: 26 25 (for Receiver Spurious Emissions(Radiated))
Instruction Manual(S)	
Instruction manual(s)	: Please refer to attached Exhibits F
Type of Emission	
Emission Designation	: 16K0F3E 8K30F1E(Narrow) / 8K30F1D(Narrow) / 8K30F7W(Narrow)
Frequency range	
Frequency Range	: 39 to 50 MHz
Power Rating	
Output Power	: 25 to 110 W (FCC) 25 to 110 W (RSS Fixed and base), 25 to 30 W(RSS: Mobile Device)
Type	: Continuously Variable
Maximum Power Rating	
Output Power	: 110 W (FCC) 110 W (RSS Fixed and base), 30 W(RSS: Mobile Device)
Voltages & currents in all elements in final RF stage, including final transistor or solid-state device	
Collector Current, A	: 30.0 A Maximum
Collector Voltage, Vdc	: 13.4 Vdc
Supply Voltage, Vdc	: 13.4 Vdc
Other Information	
Number of Channel	: Zone 128max. Cannels 512 max.(per Zone)
Maximum Deviation	: ± 5 kHz (16K0F3E),
Frequency Stability	: 1.0 ppm
	:
Antenna Impedance	: 50 Ω Norminal
Note	

TABLE OF CONTENTS

	Page
SECTION 1. GENERAL INFORMATION	4
SECTION 2. SUMMARY OF TEST RESULT	5
SECTION 3. TEST AND MEASUREMENT DATA	6
SECTION 4. INFORMATION ABOUT EUT AND SUPPORT EQUIPMENT(S)	7
SECTION 5. SUPPORT EQUIPMENT	8
SECTION 6. USED CABLE(S)	9
SECTION 7. TEST CONFIGURATION	10
SECTION 8. OPERATING CONDITION	11
SECTION 9. MEASUREMENT UNCERTAINTY	12
SECTION 10. TEST DATA	
10.1 Carrier Output Power (Conducted)	13
10.2 Unwanted Emissions (Transmitter Conducted)	16
10.3 Field Strength of Spurious Radiation	20
10.4 Emission Masks (Occupied Bandwidth)	25
10.5 Audio Frequency Response / Audio Low Pass Filter (Voice Input)	31
10.6 Modulation Limiting	34
10.7 Frequency Stability (Temperature Variation)	37
10.8 Frequency Stability (Voltage Variation)	40
10.9 Receiver Spurious Emissions(Radiated)	42
10.10 Necessary Bandwidth and Emission Bandwidth	46
10.11 99% Occupied Bandwidth	47
APPENDIX PHOTOGRAPHS	

SECTION 1. GENERAL INFORMATION

TEST PERFORMED

Location	Kashima No.12 Test Site		
EUT Received	March 05, 2019		
Date of Test	March 05, 2019	to	March 20, 2019
Standard Applied	FCC Part 2, 22, 90 RSS-119 Issue 12		
Measurement Method	ANSI/TIA-603-E-2016 / RSS-119 Issue 12(2015), RSS-Gen Issue 5(2018) ANSI C63.26 2015		
Deviation from Standard(s)	Not applicable		

QUALIFICATIONS OF TESTING LABORATORY (Kashima Lab.)

ACCREDITATION	SCOPE	LAB. CODE	Remarks
VLAC	Wireless / EMC Testing	VLAC-008-1	JAPAN
NVLAP	Wireless Testing	600233-0	USA
FCC	Wireless / EMC Testing	JP0008	USA
ISED	Wireless Testing	JP0008(CABID)	Canada
FILING			
VCCI	EMC Testing	A-0126	JAPAN
CB-Scheme	EMC Testing	TL222	IECEE

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
Apr 02, 2019	10.1(15 page)	Changed to "RF Power: Maximum reading"

SECTION 2. SUMMARY OF TEST RESULT

FCC Part2	Part22	Part90	ISED RSS-119	TEST ITEM	RESULTS	Comments
2.1046 (a)	-	-	5.4	Carrier Output Power (Conducted)	PASS	
2.1051	22.359	90.210	5.8	Unwanted Emissions (Transmitter Conducted)	PASS	
2.1053 (a)	22.359	90.210	5.8	Field Strength of Spurious Radiation	PASS	
2.1049 (c) (1)	22.359	90.210	5.5	Emission Masks (Occupied Bandwidth)	PASS	
-	-	90.214	5.9	Transient Frequency Behavior	N/A	
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)	22.355	90.213 (a)	5.3	Frequency Stability (Temperature Variation)	PASS	
2.1055 (d) (1)	22.355	90.213 (a)	5.3	Frequency Stability (Voltage Variation)	PASS	
-	-	-	RSS-Gen 7.1	Receiver Spurious Emissions	PASS	
-	-	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 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.

Note:

As for the FCC Part 15 Subpart B-Unintentional Radiators, the EUT has been measured and declared as Supplier's Declaration of Conformity (SDoC) 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 22	Non Cellular	YES
Part 90	Private Land Mobile radio Services	YES

IC Rule	Test Item	Tested
RSS-119	Radio Ttransmitters and Receivers Operating in the Land Mobile and Fixed Services in the Frequency Range 27.4-960 MHz	YES
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	VHF DIGITAL TRANSCEIVER	NX-5600H-F3 VM5630H-F3	26	JVC KENWOOD Corporation	EUT 25 (for Receiver Spurious Emissions(Radiated))
Power Ratings of EUT :		DC 13.4V ± 15%		30.0 A Maximum	
Power Supply :		DC 13.4 V			
Condition of Equipment		Proto type			
Type		Fixed and base / Mobile Device			
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
RF Antenna	M	2pin	
GPS Antenna	SMA	2 pin	
ACC	Molex9P	9 pin	
ACC	D-sub	25pin	
ACC	B to B connector	16pin	
USB	Micro AB	5pin	For maintenance

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

Operating Frequency	Board Name	Remarks
401.6 MHz	TXRX UNIT	
4960 MHz	Bluetooth UNIT	
3142.648 MHz	GPS UNIT	

SECTION 5. SUPPORT EQUIPMENT

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

Example: Case of Section 10.9Test

Symbol	Item	Model No.	Serial No.	Manufacture	FCC ID
B	SECURE CRYPTOGRAPHIC MODULE	KWD-AE30	25	JVC KENWOOD	N/A
C	Micro SD card	THNSQ008GCB6 KE(LB6	None	TOSHIBA DEVICE CORPORATION	DoC
D	REMOTE CONTROL HEAD	KCH-20R	B8310057	JVC KENWOOD	K44473100
E	Dummy Load	UT-01	ATS016628	TME	N/A
F	GPS Antenna	KRA-40G	None	JVC KENWOOD	N/A
G	External Speaker	KES-5	None	JVC KENWOOD	N/A
H	External Speaker	KES-5	None	JVC KENWOOD	N/A
I	External MIC KIT	KCT-73MIC	None	JVC KENWOOD	N/A
J	External PTT KIT	KCT-74PTT	None	JVC KENWOOD	N/A
K	External Speaker	KES-5	None	JVC KENWOOD	N/A
L	REMOTE KIT	KRK-15B	None	JVC KENWOOD	N/A
M	DC Power Supply (1)	PMC35-3A	LE000716	Kikusui	N/A
N	DC Power Supply (2)	PS-3020	301027	Daiwa	N/A
O	UHF DIGITAL TRANSCEIVER	NX-5800-K	B5200134	JVC KENWOOD	K44471200
P	REMOTE KIT	KRK-15B	None	JVC KENWOOD	N/A
Q	700/800MHz DIGITAL TRANSCEIVER	NX-5900-K	B5A90004	JVC KENWOOD	K44478500
R	REMOTE KIT	KRK-14H	None	JVC KENWOOD	N/A
S	Dummy Load	UT-01	EM120	TME	N/A
T	Dummy Load	UT-01	EM117	TME	N/A
U	CONTROL HEAD	KCH-19	None	JVC KENWOOD	N/A
V	KEYPAD MICROPHONE	KMC-36	None	JVC KENWOOD	N/A
W	KEYPAD MICROPHONE	KMC-36	None	JVC KENWOOD	N/A

Supplied Power:

M, N	AC	100V,60Hz
------	----	-----------

SECTION 6. USED CABLE(S)

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

Example: Case of Section 10.9Test

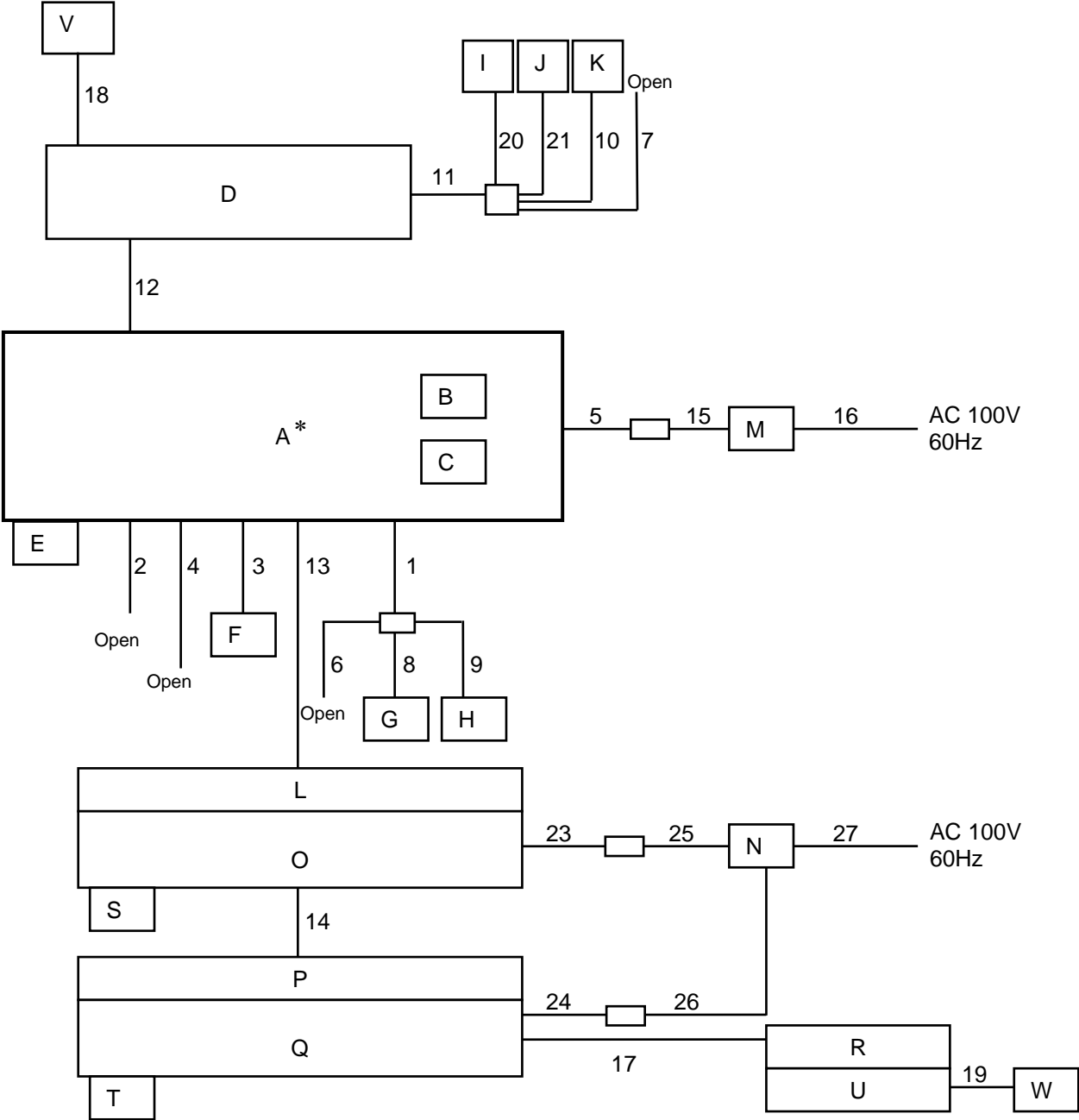
No.	Name	Length (m)	Shield	Metal Connector	Ferrite core
1	ACC cable	0.20	No	No	
2	USB cable	0.22	No	No	
3	GPS Antenna cable	2.00	Yes	Yes	
4	ACC cable	2.00	Yes	Yes	
5	DC cable for EUT	0.25	No	No	
6	Ignition sense cable (KCT-18)	3.20	No	No	
7	Ignition sense cable (KCT-18)	3.20	No	No	
8	Speaker cable	3.00	No	No	
9	Speaker cable	3.00	No	No	
10	Speaker cable	3.00	No	No	
11	ACC cable	0.32	No	No	
12	REMOTE CABLE(KCT-71 M3)	7.60	Yes	Yes	
13	REMOTE CABLE(KCT-71 M3)	7.60	Yes	Yes	
14	REMOTE CABLE(KCT-71 M3)	7.60	Yes	Yes	
15	DC cable for EUT	3.00	No	No	
16	Power cable for DC Power Supply (1) (3 core)	1.00	No	No	
17	REMOTE CABLE(KCT-71 M3)	7.60	Yes	Yes	
18	Mic. cable	0.60	No	No	
19	Mic. cable	0.60	No	No	
20	External MIC KIT cable	3.00	No	No	
21	External PTT KIT cable	3.00	No	No	
23	DC cable for UHF DIGITAL TRANSCEIVER	0.25	No	No	
24	DC cable for 700/800MHz DIGITAL TRANSCEIVER	0.25	No	No	
25	DC cable for UHF DIGITAL TRANSCEIVER	3.00	No	No	
26	DC cable for 700/800MHz DIGITAL TRANSCEIVER	3.00	No	No	
27	Power cable for DC Power Supply (2) (2 core)	1.30	No	No	

SECTION 7. TEST CONFIGURATION

Details of Configuration and Connection

Example: Case of Section 10.9 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 mode.

(FCC: 39.05 MHz, 44.55 MHz, 49.95 MHz)

(RSS: 39.05 MHz, 44.55 MHz, 49.95 MHz)

(High Power : 110W, High Power 2 : 30W, Low Power : 25W)

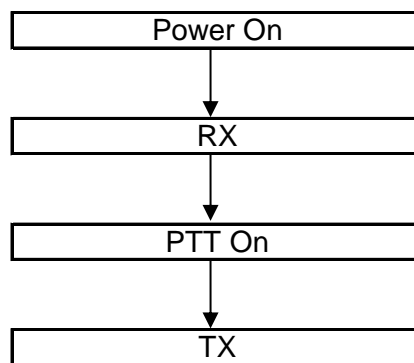
The test was carried out under Receive mode.

(39.05 MHz, 44.55 MHz, 49.95 MHz)

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

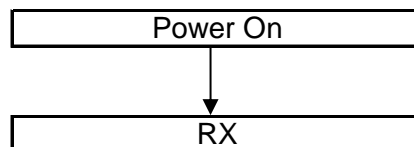
8.2 Operating Flow [Transmit mode]

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-e
	+/- 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}	Ucisp
30-1000MHz	+/- 4.05dB (k = 2)	+/- 6.3 dB
abobe 1GHz	+/- 4.79dB (k = 2)	+/- 5.2 dB
Bandwidth		
	+/- 1.02% (k = 2)	-

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-E Section 2.2.1.2 / RSS-119 Section 4.1 ANSI C63.5 Section 5.2

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.
 $RF\ Power\ (dBm) = Power\ Meter\ reading\ (dBm) + Attenuator\ Loss\ (dB) + Cable\ Loss\ (dB)$
 $RF\ Power\ (W) = 10^{(RF\ Power\ (dBm)/10)}/1000$
- 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)

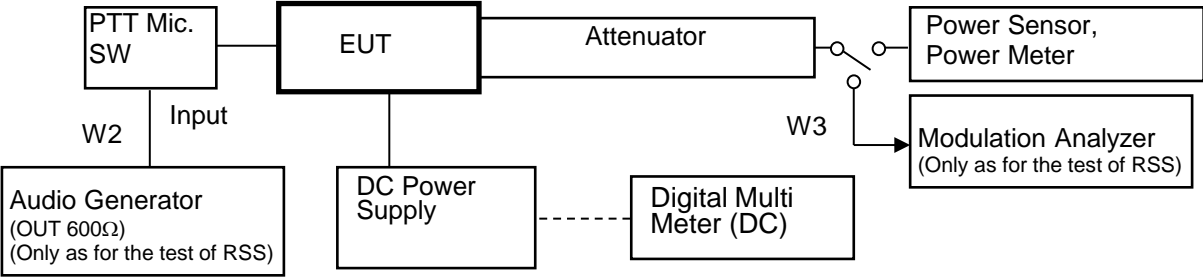
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Power Meter	Hewlett Packard	E4418B	GB38410265	1Y	Sep. 30, 19
2	Power Sensor	Hewlett Packard	8482A	US37292237	1Y	Sep. 30, 19
3	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	Jul. 31, 19
4	Attenuator (30dB)	Weinschel	WA-29-30-34	8924	1Y	Jul. 31, 19
5	Modulation	Hewlett Packard	8901B	3403A04852	1Y	Jan. 31, 20
6	Audio Generator	Anritsu	MG443B	M70150	1Y	Sep. 30, 19
7	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
8	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 19

Measuring Cables

No.	Cable	Manufacturer	Model No.	Serial No.	Cal. Interval	Effective period
W2	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 19
W3	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 29, 20

Measuring Equipment Configuration



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

Test Results

Test date	Mar. 05, 2019	
Location	Kashima No.12 Test Site	
temperature	25.5	[degree C]
Humidity Variation	40.0	[%]
Atmospheric Pressure	101.5	[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	39.05	Low	High Power	110
2	44.55	Middle	High Power	110
3	49.95	High	High Power	110
4	39.05	Low	High Power 2	30
5	44.55	Middle	High Power 2	30
6	49.95	High	High Power 2	30
7	39.05	Low	Low Power	25
8	44.55	Middle	Low Power	25
9	49.95	High	Low Power	25

RF Power: Maximum reading

10.2 Unwanted Emissions (Transmitter Conducted)

REGULATIONS	: FCC Part 2 Section 1051, Part 22 Section 359, Part 90 Section 210 RSS-119 Section 5.8
TEST METHOD/GUIDE	: ANSI/TIA-603-E Section 2.2.13.2 / RSS-119 Section 4.2 ANSI C63.26 Section 5.7

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 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.

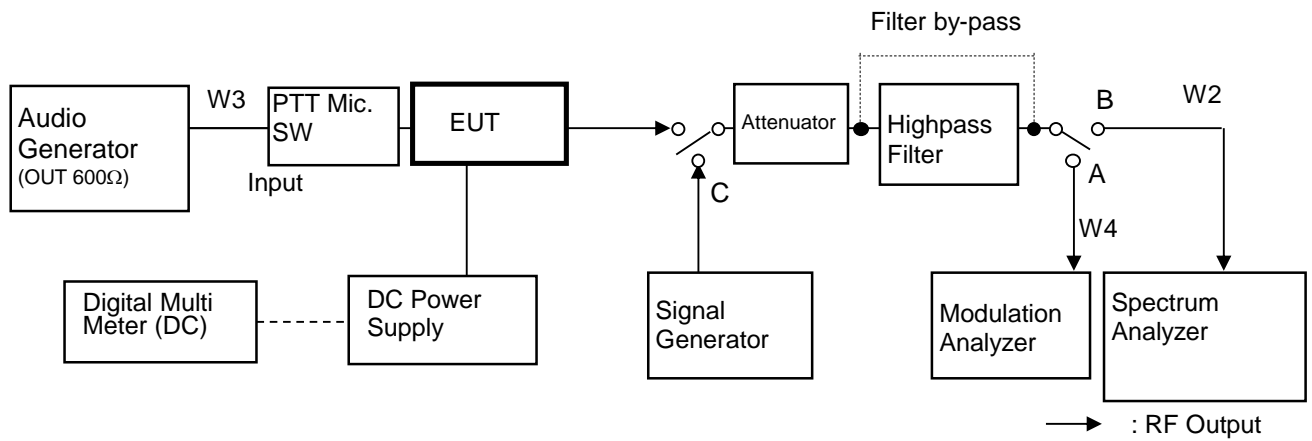
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	Jul. 31, 19
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	1Y	Jul. 31, 19
3	Highpass Filter	TME	VHP-123HPF	3188869E	1Y	Dec. 31, 19
4	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Jan. 31, 20
5	Signal Generator	Rohde&Schwarz	SMB 100A	105709	1Y	Apr. 30, 19
6	Audio Generator	Anritsu	MG443B	M70150	1Y	Sep. 30, 19
7	Spectrum Analyzer	Agilent	N9030A	US51350220	1Y	Mar. 31, 19
8	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
9	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 19

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
W3	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 19
W4	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 29, 20
W2	Coaxial Cable	Suhner	SUCOFLEX104	F0000017	1Y	Jul. 31, 19

Measuring Equipment Configuration



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

Test Results

Test date	Mar. 07, 2019
Location	Kashima No.12 Test Site
temperature	23 [degree C]
Humidity Variation	44 [%]
Atmospheric Pressure	99.7 [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 (8K30F1E/F1D/F7W)

No.	Tuned Frequency (MHz)	Band	Spurious Frequency (MHz)	Correct Level (dBm)	Emission Level (dBc)	Mask C Limit (dBc)	Margin (dB)
1	39.05	Low	78.10	-34.88	-85.29	-63.4	21.9
2	44.55	Middle	89.10	-33.90	-84.31	-63.4	20.9
3	49.95	High	99.90	-34.33	-84.74	-63.4	21.3

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

Mask C 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

State : High Power 2 / Authorized Bandwidth 20 kHz (8K30F1E/F1D/F7W)

No.	Tuned Frequency (MHz)	Band	Spurious Frequency (MHz)	Correct Level (dBm)	Emission Level (dBc)	Mask C Limit (dBc)	Margin (dB)
1	39.05	Low	78.10	-38.63	-83.40	-57.8	25.6
2	44.55	Middle	89.10	-41.89	-86.66	-57.8	28.9
3	49.95	High	99.90	-41.48	-86.25	-57.8	28.4

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

Mask C 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

State : Low Power / Authorized Bandwidth 20 kHz (8K30F1E/F1D/F7W)

No.	Tuned Frequency (MHz)	Band	Spurious Frequency (MHz)	Correct Level (dBm)	Emission Level (dBc)	Mask C Limit (dBc)	Margin (dB)
1	39.05	Low	78.10	-38.50	-82.47	-57.0	25.5
2	44.55	Middle	89.10	-42.67	-86.65	-57.0	29.7
3	49.95	High	99.90	-43.19	-87.17	-57.0	30.2

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

Mask C Limit(dBc)=- $(43+10\log(P))$
 Correct Level (dBm) = Substitute SG Level (dBm)
 Emission Level (dBc) = Correct Level (dBm) - $10\log(P*1000)$
 P = Carrier Level (W)
 " - " = Measurement Limit

10.3 Field Strength of Spurious Radiation

REGULATIONS	:	FCC Part 2 Section 1053 (a), Part 22 Section 359 , Part 90 Section 210 RSS-119 Section 5.8
TEST METHOD/GUIDE	:	ANSI/TIA-603-E Section 2.2.12.2 / RSS-119 Section 4.2 ANSI C63.26 Section 5.5

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 : 100 kHz (< 1 GHz), 1 MHz (> 1 GHz).
 - b) VBW : 300 kHz (< 1 GHz), 3 MHz (> 1 GHz).
 - c) 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

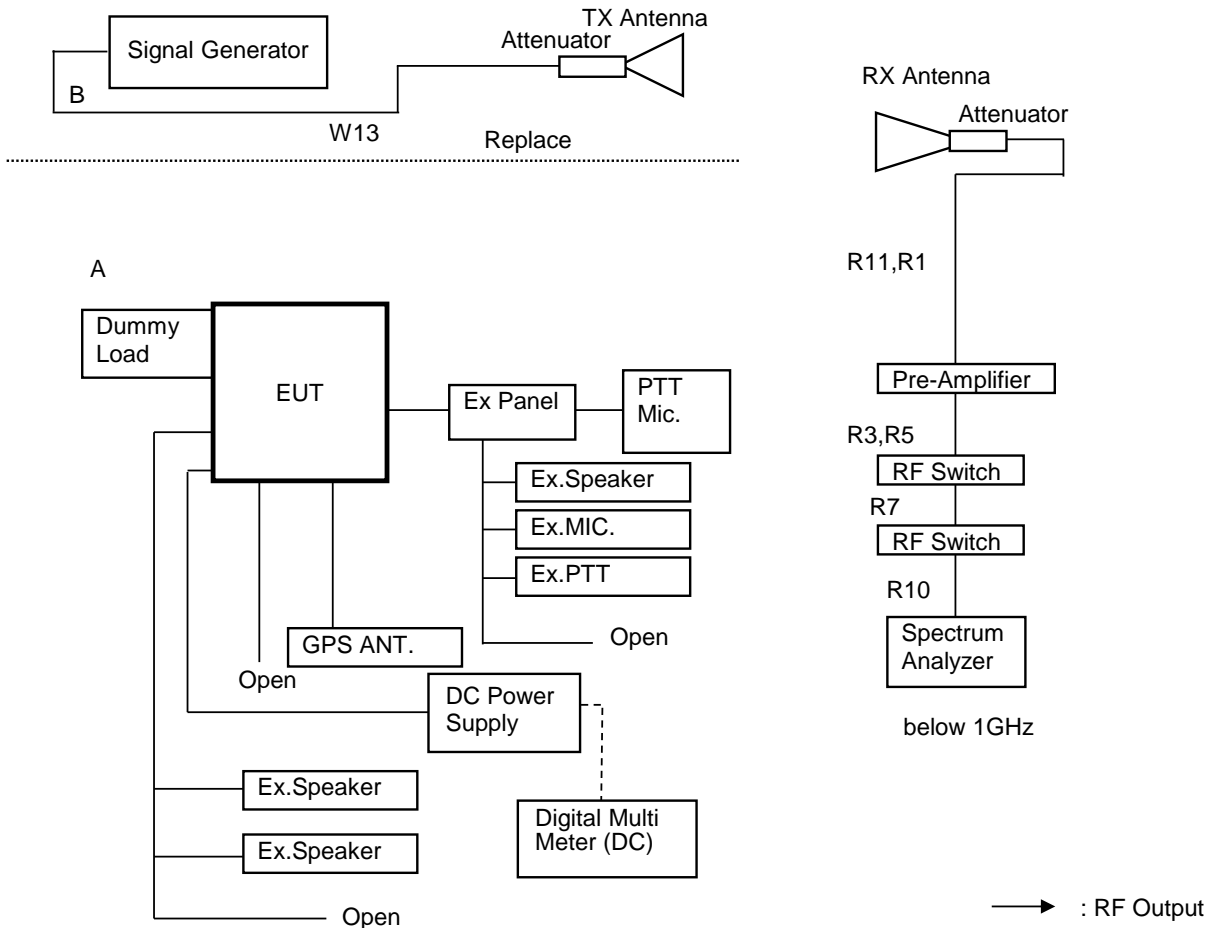
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator(10dB)	HUBER+SUHNER	6810.17B	5061	1Y	Feb. 29, 20
2	Dummy Load	TME	CT-150NP	1138693	1Y	Feb. 29, 20
3	Signal Generator	Rohde&Schwarz	SMB 100A	105709	1Y	Apr. 30, 19
4	Spectrum Analyzer	Agilent	N9030A	US51350220	1Y	Mar. 31, 19
5	Dipole Antenna(TX)	Schwarzbeck	UHA9105	AM0082002	1Y	May. 31, 19
6	Dipole Antenna(TX)	Schwarzbeck	VHA9103	C01082007	1Y	May. 31, 19
7	Biconical Antenna(TX)	Schwarzbeck	VHA9103/BBA9106	A09082007	1Y	Nov. 30, 19
8	Tri-log Antenna(RX)	Schwarzbeck	VULB9168WP	288	1Y	Jul. 31, 19
9	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
10	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 19
11	Amplifier	Intertek Japan	ZX60-3018G	002	1Y	Aug. 31, 19
12	Attenuator	TAMAGAWA	CFA-01	A00040805	1Y	Aug. 31, 19
13	RF Switch	Intertek Japan	ACX-150-1	A12301501	1Y	Aug. 31, 19

Measuring Cables

No.	Cable	Manufacturer	Model No.	Serial No.	Cal. Interval	Effective period
R11	Coaxial Cable	FUJIKURA	5D-2W	R11	1Y	Aug. 31, 19
R1	Coaxial Cable	FUJIKURA	5D-2W	R1	1Y	Aug. 31, 19
R3	Coaxial Cable	FUJIKURA	10D-2W	R3	1Y	Aug. 31, 19
R5	Coaxial Cable	FUJIKURA	RG-5A/U	R5	1Y	Aug. 31, 19
R7	Coaxial Cable	MIYAZAKI	5D-2W	R7	1Y	Aug. 31, 19
R10	Coaxial Cable	FUJIKURA	5D-2W	R10	1Y	Aug. 31, 19
W13	Coaxial Cable	Suhner	SUCOFLEX106	KSR00207	1Y	Feb. 29, 20

Measuring Equipment Configuration



Test Results

Test date	Mar 20, 2019	
Location	Kashima No.12 Test Site	
temperature	20 to 22	[degree C]
Humidity Variation	45 to 60	[%]
Atmospheric Pressure	101.4 to 102.5	[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 / 49.95MHz

No	Frequency (MHz)	Pol	Reading Level (dBm)	SG Out Level (dBm)	Antenna Gain (dBd)	Loss (dB)	Correct Level (dBm)	Emission Level (dBc)	MASK B / C Limit Level (dBc)	Margin (dB)
1	99.90	Hor.	-76.68	-60.01	-2.25	10.81	-73.1	-123.5	-63.4	60.1
		Ver.	-74.33	-59.36	-2.25	10.81	-72.4	-122.8	-63.4	59.4
2	149.85	Hor.	-69.30	-50.49	-0.51	10.96	-62.0	-112.4	-63.4	49.0
		Ver.	-73.53	-54.88	-0.51	10.96	-66.3	-116.8	-63.4	53.4
3	199.80	Hor.	-67.15	-53.69	-0.99	11.10	-65.8	-116.2	-63.4	52.8
		Ver.	-63.07	-45.27	-0.99	11.10	-57.4	-107.8	-63.4	44.4
4	249.75	Hor.	-62.11	-46.80	-0.36	11.25	-58.4	-108.8	-63.4	45.4
		Ver.	-62.44	-39.73	-0.36	11.25	-51.3	-101.8	-63.4	38.4
5	299.70	Hor.	-69.99	-51.01	-0.97	11.40	-63.4	-113.8	-63.4	50.4
		Ver.	-72.17	-48.99	-0.97	11.40	-61.4	-111.8	-63.4	48.4
6	349.65	Hor.	-84.84	-63.84	-0.19	11.50	-75.5	-125.9	-63.4	62.5
		Ver.	-85.17	-60.03	-0.19	11.50	-71.7	-122.1	-63.4	58.7
7	399.60	Hor.	-81.91	-60.23	-0.18	11.61	-72.0	-122.4	-63.4	59.0
		Ver.	-82.02	-56.47	-0.18	11.61	-68.3	-118.7	-63.4	55.3
8	449.55	Hor.	-	-	-0.45	11.71	-	-	-63.4	-
		Ver.	-	-	-0.45	11.71	-	-	-63.4	-
9	499.50	Hor.	-	-	-0.84	11.82	-	-	-63.4	-
		Ver.	-	-	-0.84	11.82	-	-	-63.4	-

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

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

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 : High Power 2/ Authorized Bandwidth 20 kHz / 39.05MHz

No	Frequency (MHz)	Pol	Reading Level (dBm)	SG Out Level (dBm)	Antenna Gain (dBd)	Loss (dB)	Correct Level (dBm)	Emission Level (dBc)	MASK B / C Limit (dBc)	Margin (dB)
1	78.10	Hor.	-82.07	-65.57	-0.75	10.72	-77.0	-121.8	-57.8	64.0
		Ver.	-81.75	-66.35	-0.75	10.72	-77.8	-122.6	-57.8	64.8
2	117.15	Hor.	-82.40	-63.93	-3.09	10.86	-77.9	-122.7	-57.8	64.9
		Ver.	-82.96	-64.50	-3.09	10.86	-78.4	-123.2	-57.8	65.4
3	156.20	Hor.	-82.86	-64.64	-15.81	10.50	-91.0	-135.7	-57.8	77.9
		Ver.	-83.62	-65.15	-15.81	10.50	-91.5	-136.2	-57.8	78.4
4	195.25	Hor.	-74.49	-60.70	-0.78	11.09	-72.6	-117.3	-57.8	59.5
		Ver.	-66.17	-48.21	-0.78	11.09	-60.1	-104.8	-57.8	47.0
5	234.30	Hor.	-	-	-0.52	11.21	-	-	-57.8	-
		Ver.	-	-	-0.52	11.21	-	-	-57.8	-
6	273.35	Hor.	-	-	-0.61	11.32	-	-	-57.8	-
		Ver.	-83.79	-60.17	-0.61	11.32	-72.1	-116.9	-57.8	59.1
7	312.40	Hor.	-	-	-0.31	11.43	-	-	-57.8	-
		Ver.	-	-	-0.31	11.43	-	-	-57.8	-
8	351.45	Hor.	-	-	-0.19	11.51	-	-	-57.8	-
		Ver.	-	-	-0.19	11.51	-	-	-57.8	-
9	390.50	Hor.	-	-	-0.17	11.59	-	-	-57.8	-
		Ver.	-	-	-0.17	11.59	-	-	-57.8	-

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

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

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 20 kHz / 39.05MHz

No	Frequency (MHz)	Pol	Reading Level (dBm)	SG Out Level (dBm)	Antenna Gain (dBd)	Loss (dB)	Correct Level (dBm)	Emission Level (dBc)	MASK B / C Limit Level (dBc)	Margin (dB)
1	78.10	Hor.	-82.34	-65.84	-0.75	10.72	-77.3	-121.3	-57.0	64.3
		Ver.	-81.67	-66.27	-0.75	10.72	-77.7	-121.7	-57.0	64.7
2	117.15	Hor.	-80.61	-62.15	-3.09	10.86	-76.1	-120.1	-57.0	63.1
		Ver.	-84.35	-65.88	-3.09	10.86	-79.8	-123.8	-57.0	66.8
3	156.20	Hor.	-84.14	-65.93	-15.81	10.50	-92.2	-136.2	-57.0	79.2
		Ver.	-84.12	-65.65	-15.81	10.50	-92.0	-135.9	-57.0	78.9
4	195.25	Hor.	-76.61	-62.82	-0.78	11.09	-74.7	-118.7	-57.0	61.7
		Ver.	-68.45	-50.48	-0.78	11.09	-62.4	-106.3	-57.0	49.3
5	234.30	Hor.	-	-	-0.52	11.21	-	-	-57.0	-
		Ver.	-	-	-0.52	11.21	-	-	-57.0	-
6	273.35	Hor.	-	-	-0.61	11.32	-	-	-57.0	-
		Ver.	-81.52	-57.90	-0.61	11.32	-69.8	-113.8	-57.0	56.8
7	312.40	Hor.	-	-	-0.31	11.43	-	-	-57.0	-
		Ver.	-	-	-0.31	11.43	-	-	-57.0	-
8	351.45	Hor.	-	-	-0.19	11.51	-	-	-57.0	-
		Ver.	-	-	-0.19	11.51	-	-	-57.0	-
9	390.50	Hor.	-	-	-0.17	11.59	-	-	-57.0	-
		Ver.	-	-	-0.17	11.59	-	-	-57.0	-

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

Mask B / C 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

10.4 Emission Masks (Occupied Bandwidth)

REGULATIONS	: FCC Part 2 Section 1049 (c) (1), Part 22 Section 359 , Part 90 Section 210 RSS-119 Section 5.8
TEST METHOD/GUIDE	: ANSI/TIA-603-E 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	39.05	With	20	20	B	B
2	44.55	With	20	20	B	B
3	49.95	With	20	20	B	B
Emission Designation :		8K30F1E/F1D/F7W				
1	39.05	Without	20	20	C	C
2	44.55	Without	20	20	C	C
3	49.95	Without	20	20	C	C

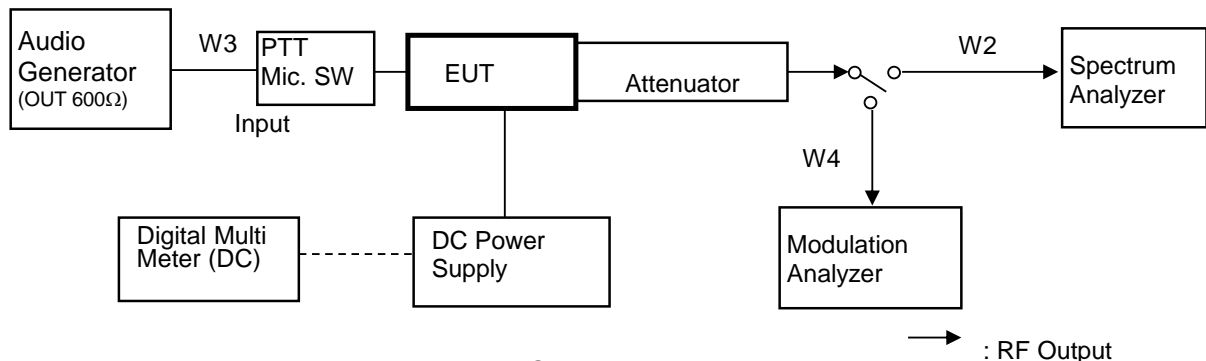
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	Jul. 31, 19
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	1Y	Jul. 31, 19
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Jan. 31, 20
4	Audio Generator	Anritsu	MG443B	M70150	1Y	Sep. 30, 19
5	Spectrum Analyzer	Agilent	N9030A	US51350220	1Y	Mar. 31, 19
6	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
7	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 19

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
W3	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 19
W4	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 29, 20
W2	Coaxial Cable	Suhner	SUCOFLEX104	F0000017	1Y	Jul. 31, 19

Measuring Equipment Configuration



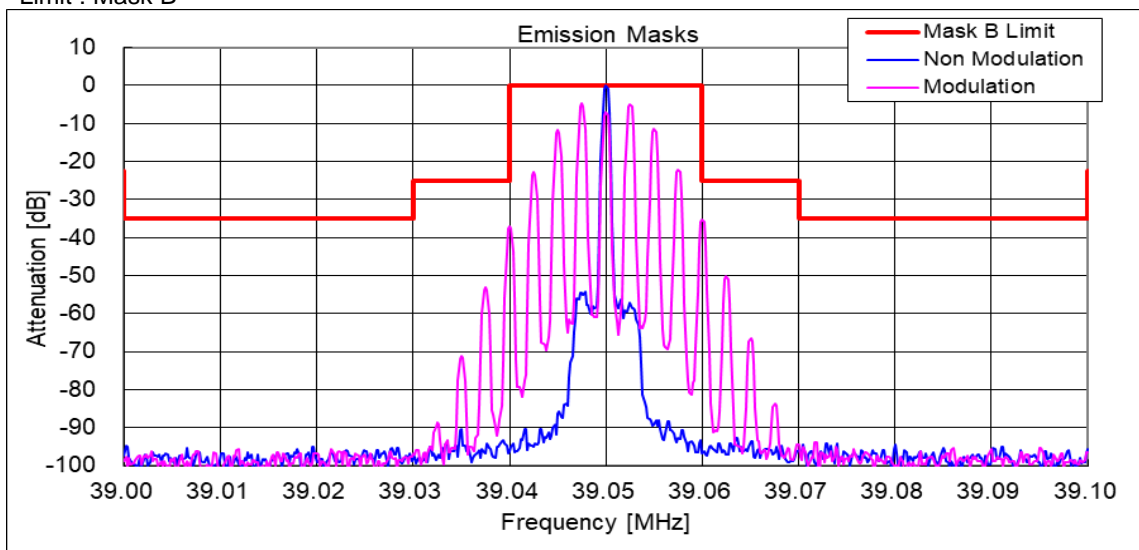
FM Modulation test is with the the Audio Generator.
 Configuration of other Modulation test is composed without the Audio Generator.

Test Results

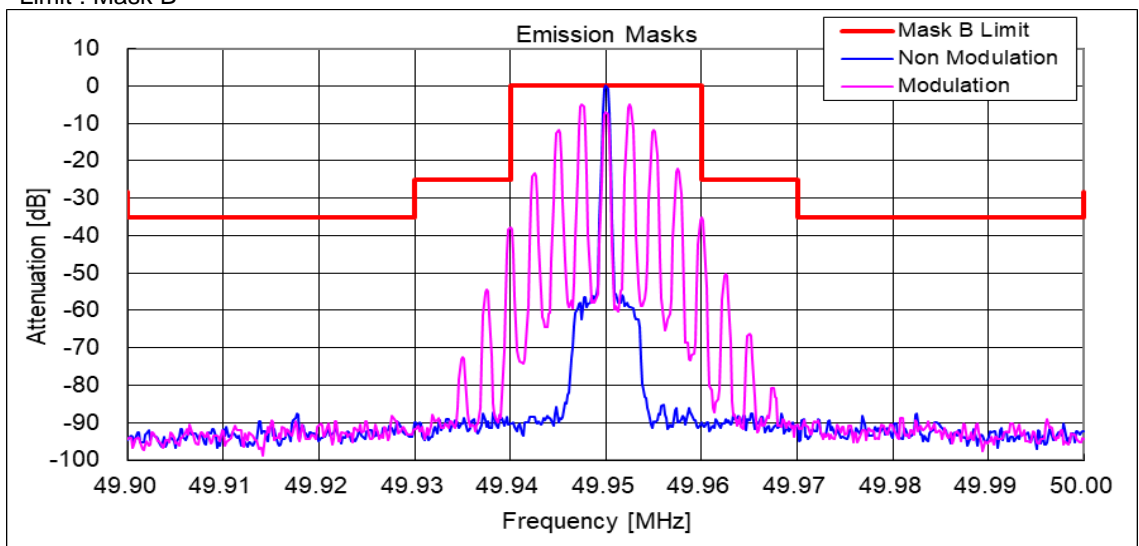
Test date	Mar. 07, 2019	
Location	Kashima No.12 Test Site	
temperature	24.3	[degree C]
Humidity Variation	35	[%]
Atmospheric Pressure	101.4	[kPa]
Test Engineer	Koichi Wagatsuma	

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

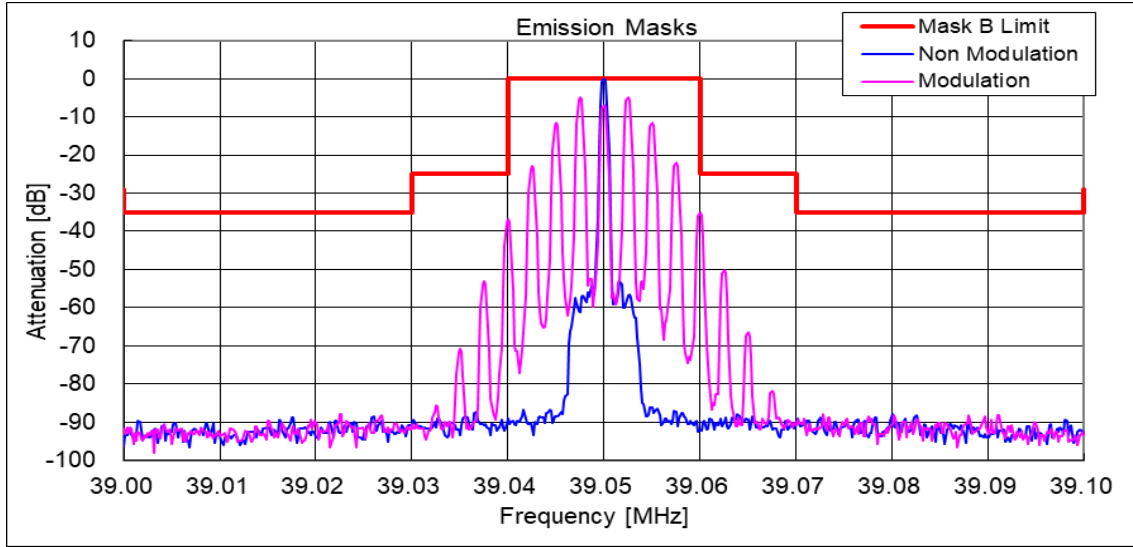
State : High Power / Authorized Bandwidth 20 kHz/ 16K0F3E / 39.05 MHz
 Limit : Mask B



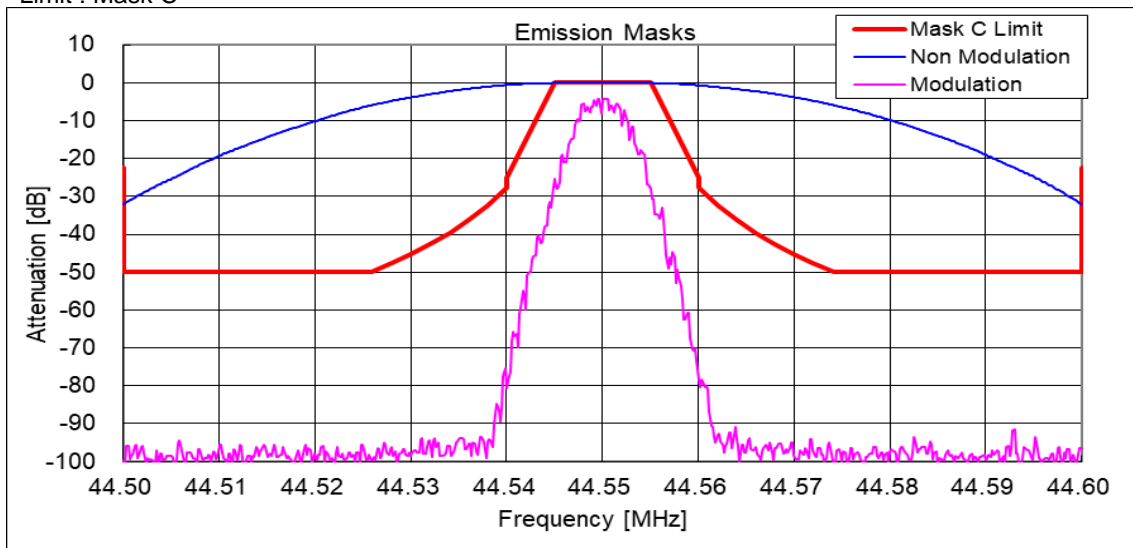
State : High Power 2/ Authorized Bandwidth 20 kHz/ 16K0F3E / 49.95 MHz
 Limit : Mask B



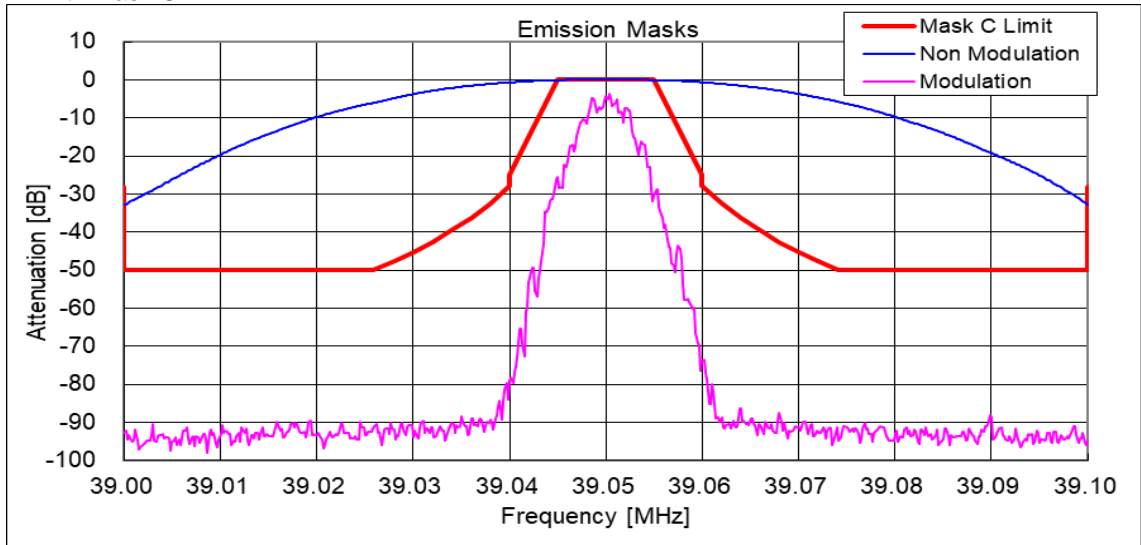
State : Low Power / Authorized Bandwidth 20 kHz/ 16K0F3E / 39.05 MHz
Limit : Mask B



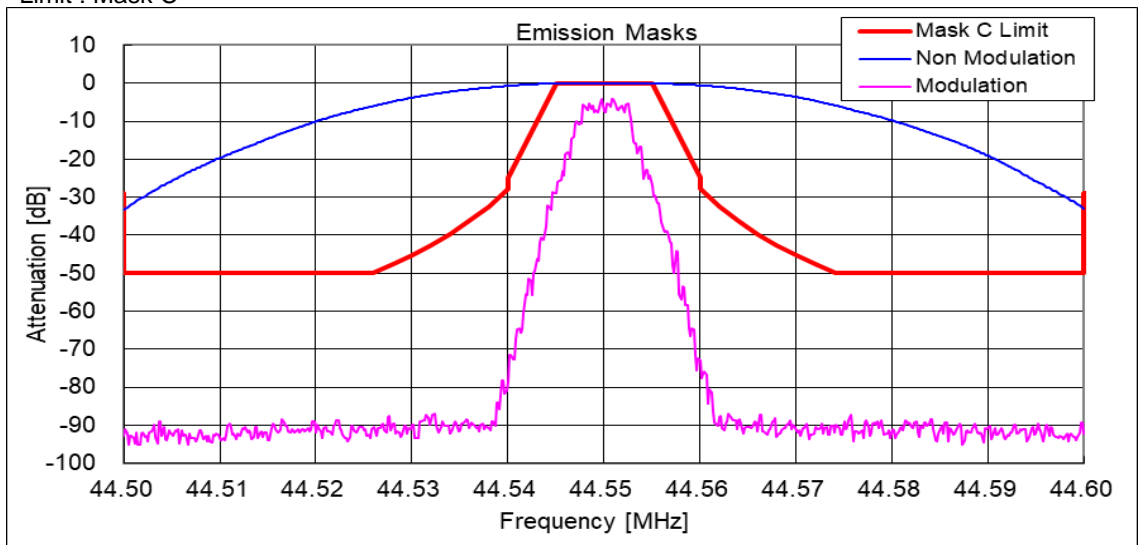
State : High Power / Authorized Bandwidth 20 kHz/ 8K30F1E/F1D/F7W / 44.55 MHz
Limit : Mask C



State : High Power 2/ Authorized Bandwidth 20 kHz/ 8K30F1E/F1D/F7W / 39.05 MHz
Limit : Mask C



State : Low Power / Authorized Bandwidth 20 kHz/ 8K30F1E/F1D/F7W / 44.55 MHz
Limit : Mask C



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

REGULATIONS	: FCC Part 2 Section 1047 (a)
TEST METHOD/GUIDE	: ANSI/TIA-603-E Section 2.2.6.2.2, 3.2.6.2 ANSI C63.26 Section 5.3.3

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.

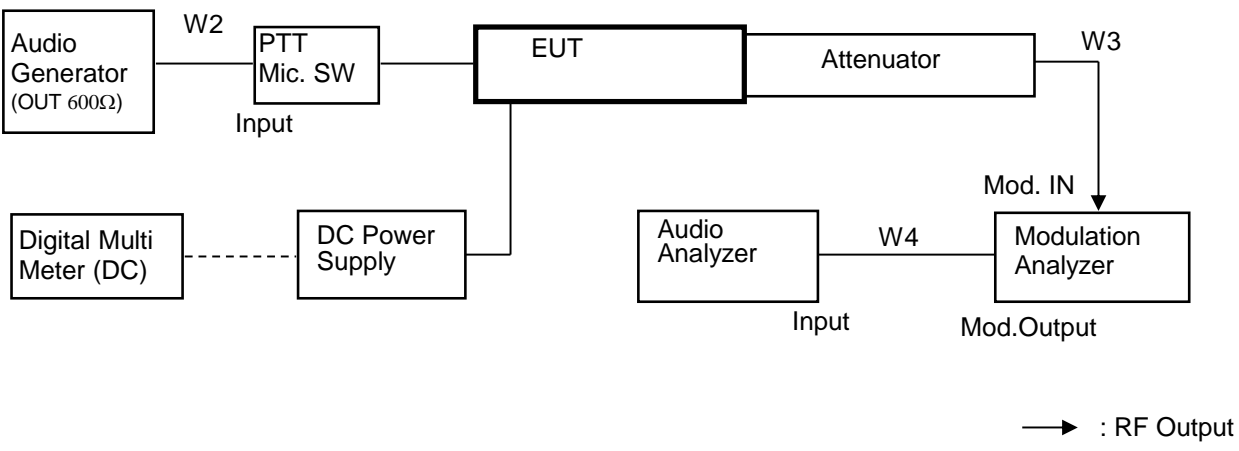
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	Jul. 31, 19
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	1Y	Jul. 31, 19
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Jan. 31, 20
4	Audio Generator	Anritsu	MG443B	M70150	1Y	Sep. 30, 19
5	Audio Analyzer	Hewlett Packard	8903B	2948A07326	1Y	Mar. 31, 19
6	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
7	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 19

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
W2	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 19
W4	Coaxial Cable	Daiyu Densen	3D-2V	KSR00101	1Y	May. 31, 19
W3	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 29, 20

Measuring Equipment Configuration

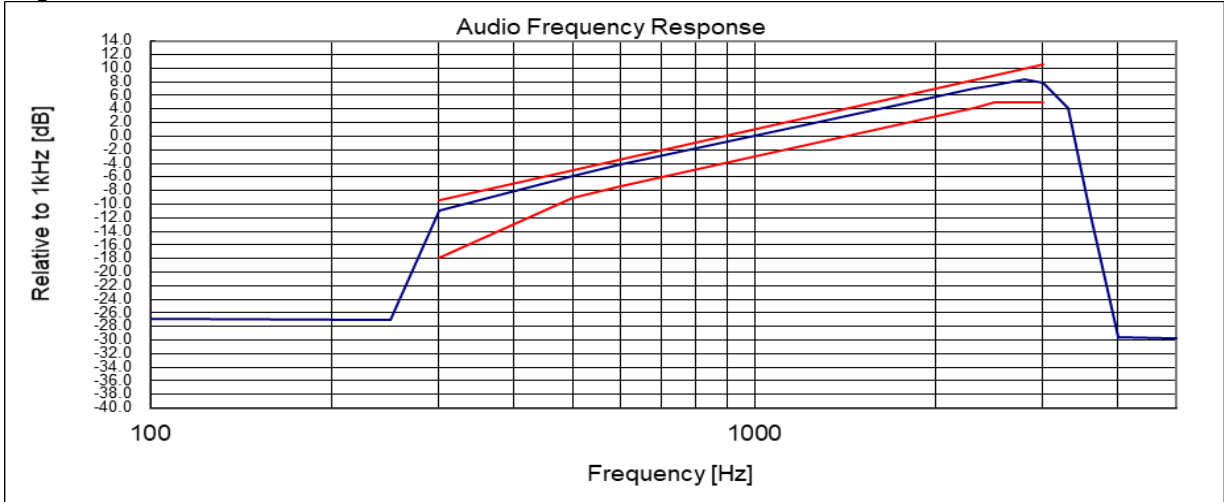


Test Results

Test date	Mar 06, 2019	
Location	Kashima No.12 Test Site	
temperature	26.1	[degree C]
Humidity Variation	40	[%]
Atmospheric Pressure	101.5	[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 / 49.95 MHz



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.

10.6 Modulation Limiting

REGULATIONS	: FCC Part 2 Section 1047 (b)
TEST METHOD/GUIDE	: ANSI/TIA-603-E Section 2.2.3.2, 1.3.4.4 ANSI C63.26 Section 5.3.2

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 : 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.

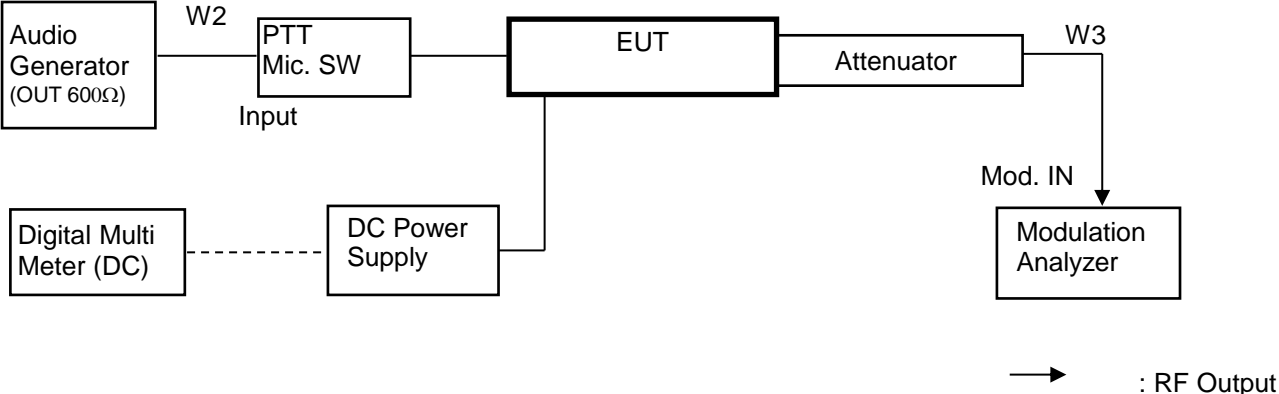
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	Jul. 31, 19
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	1Y	Jul. 31, 19
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Jan. 31, 20
4	Audio Generator	Anritsu	MG443B	M70150	1Y	Sep. 30, 19
5	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
4	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 19

Measuring Cables

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
W2	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 19
W3	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 29, 20

Measuring Equipment Configuration

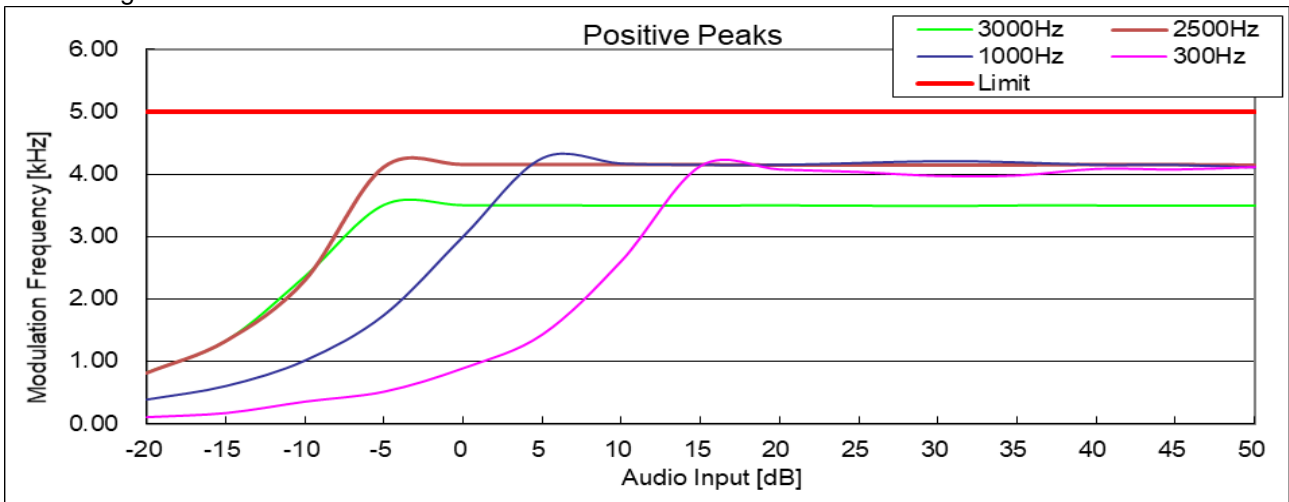


Test Results

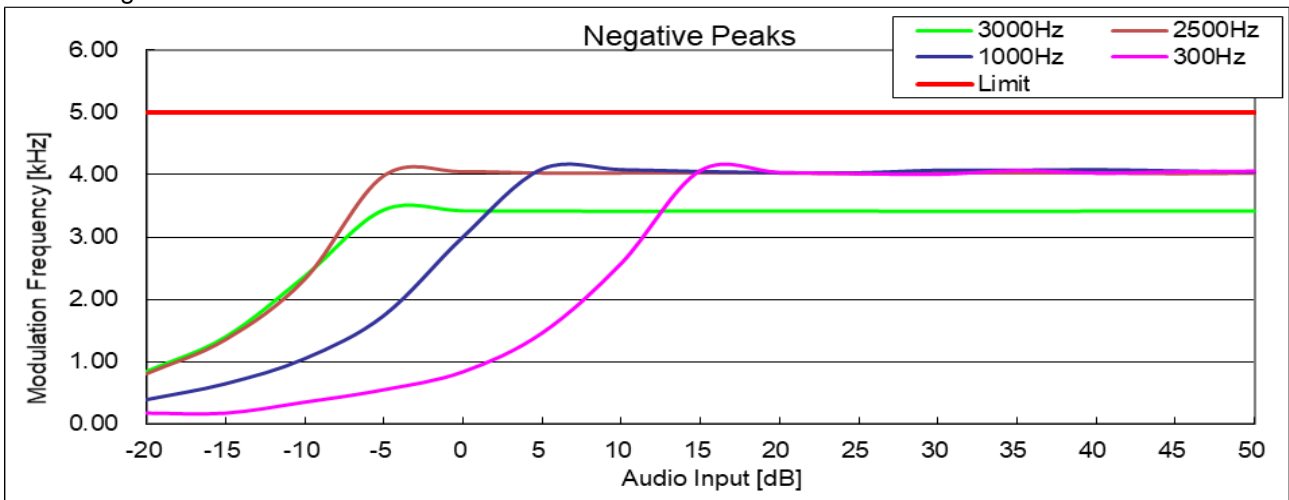
Test date	Mar. 06, 2019	
Location	Kashima No.12 Test Site	
temperature	26.1	[degree C]
Humidity Variation	40	[%]
Atmospheric Pressure	101.5	[kPa]
Test Engineer	Koichi Wagatsuma	

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 / 39.05 MHz



State : High Power / Authorized Bandwidth 20 kHz / 16K0F3E / 39.05 MHz



10.7 Frequency Stability (Temperature Variation)

REGULATIONS	: FCC Part 2 Section 1055 (a) (1), Part 80 Section 209, Part 90 Section 213(a) RSS-119 Section 5.3
TEST METHOD/GUIDE	: ANSI/TIA-603-E Section 2.2.2.2 / RSS-Gen Section 6.11 ANSI C63.26 Section 5.6

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.

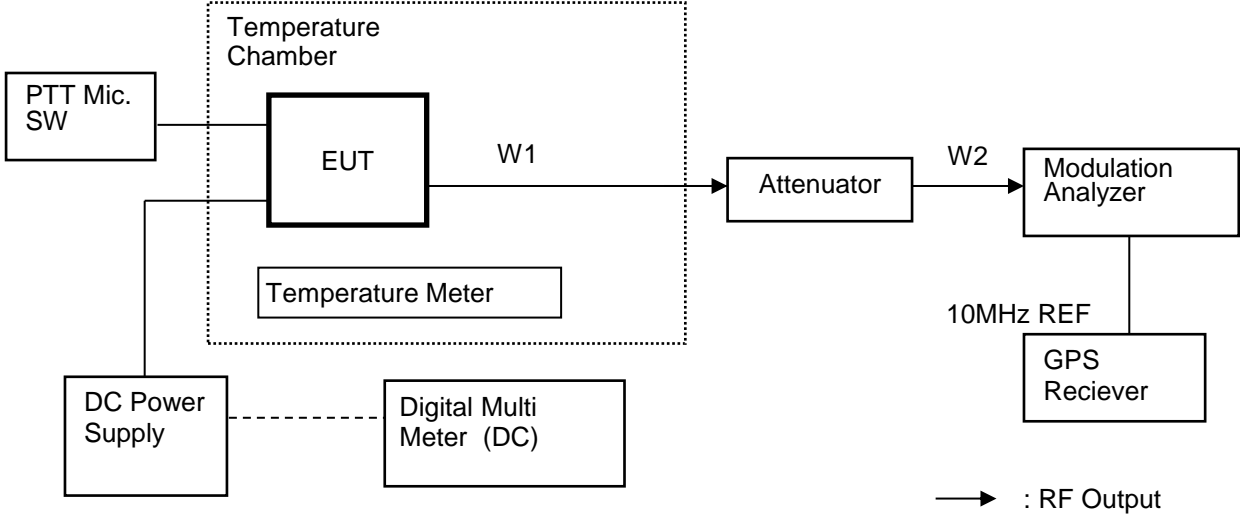
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	Jul. 31, 19
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	1Y	Jul. 31, 19
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Jan. 31, 20
4	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290932	None	None
5	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 19
6	Temperature Chamber	Tabai	PL-3F	5103661	None	None
7	Temperature Meter	T&D	TR-71nw	52160B67	1Y	Jan. 31, 20
8	GPS Receiver	Hewlett Packard	HP Z3801A	3542A02414	1Y	Jan. 31, 20

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. 29, 20
W1	Coaxial Cable	Suhner	SUCOFLEX104	KSR00042	1Y	Jul. 31, 19

Measuring Equipment Configuration



Test Results

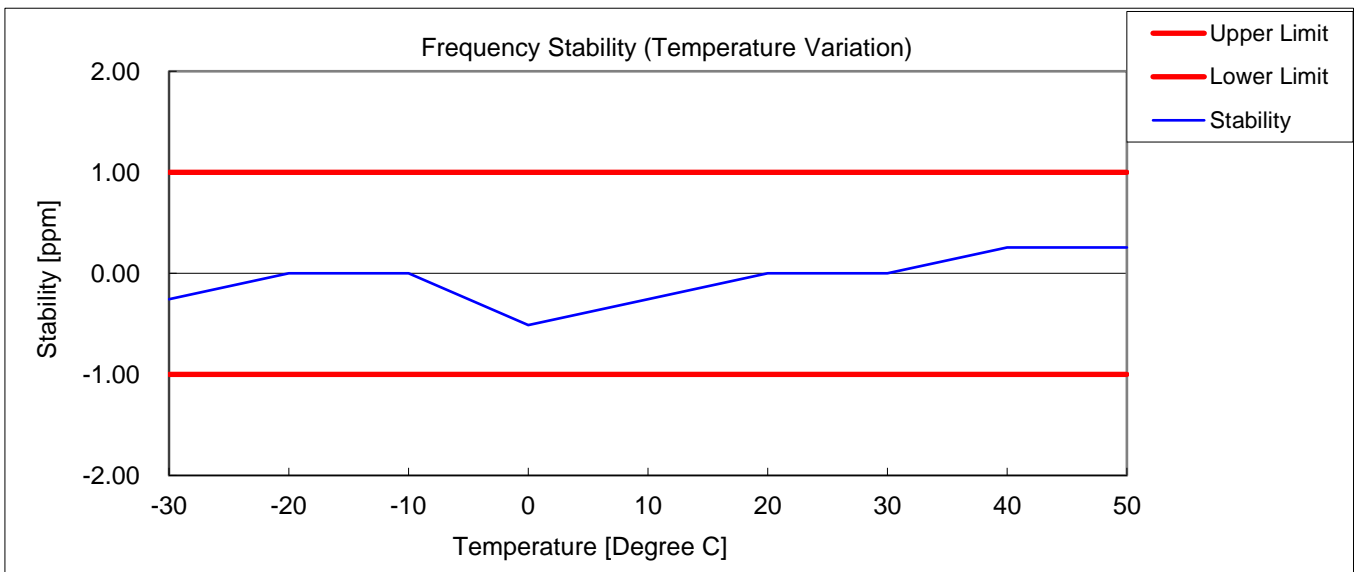
Test date	Mar. 08, 2019
Location	Kashima No.12 Test Site
Test Engineer	Koichi Wagatsuma

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

State : High Power / Authorized Bandwidth 20 kHz / 39.05 MHz

Reference Frequency: 39.050000 MHz

No.	Temperature (Degree C)	Frequency (MHz)	Stability (ppm)	Limit (+/- ppm)	Min. Margin (ppm)
1	-30	39.049990	-0.26	1.0	0.74
2	-20	39.050000	0.00	1.0	1.00
3	-10	39.050000	0.00	1.0	1.00
4	0	39.049980	-0.51	1.0	0.49
5	10	39.049990	-0.26	1.0	0.74
6	20	39.050000	0.00	1.0	1.00
7	30	39.050000	0.00	1.0	1.00
8	40	39.050010	0.26	1.0	0.74
9	50	39.050010	0.26	1.0	0.74



10.8 Frequency Stability (Voltage Variation)

REGULATIONS	: FCC Part 2 Section 1055 (a) (1), Part 22 Section 355, Part 90 Section 213(a) RSS-119 Section 5.3
TEST METHOD/GUIDE	: ANSI/TIA-603-E Section 2.2.2.2 / RSS-Gen Section 6.11 ANSI C63.26 Section 5.6

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.

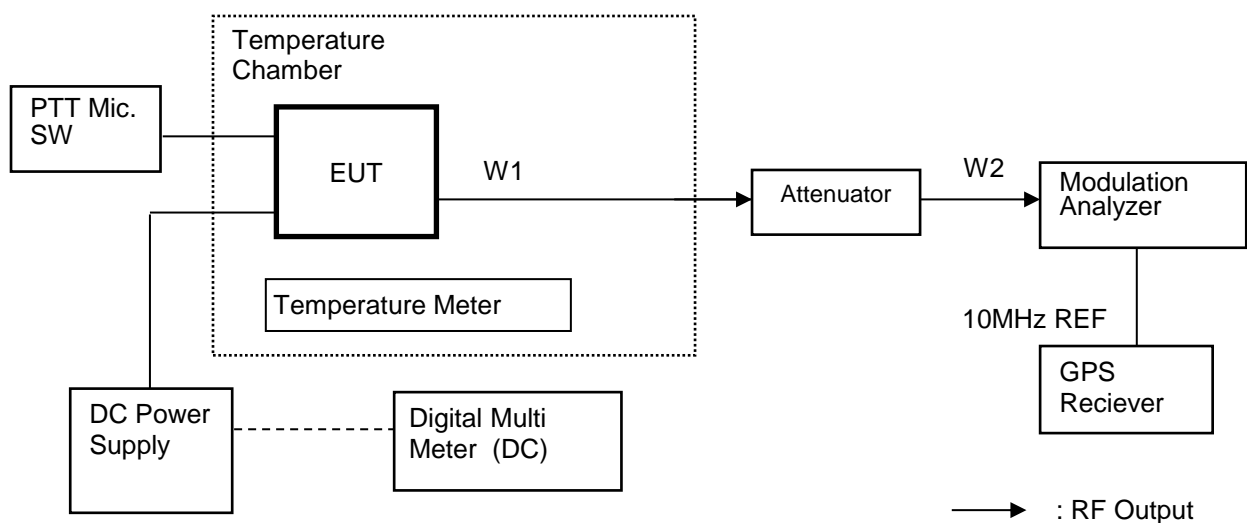
Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	Jul. 31, 19
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	1Y	Jul. 31, 19
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Jan. 31, 20
4	DC Power Supply	Daiichi denpa kogy	GZV4000	90290932	None	None
5	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 19
6	Temperature Chamber	Tabai	PL-3F	5103661	None	None
7	Temperature Meter	T&D	TR-71nw	52160B67	1Y	Jan. 31, 20
8	GPS Receiver	Hewlett Packard	HP Z3801A	3542A02414	1Y	Jan. 31, 20

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. 29, 20
W1	Coaxial Cable	Suhner	SUCOFLEX104	KSR00042	1Y	Jul. 31, 19

Measuring Equipment Configuration



Test Results

Test date	Mar 08, 2019
Location	Kashima No.12 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 20 kHz / 39.05 MHz

Reference Frequency: 39.050000 MHz

No.	Temperature (Degree C)	Diviation (%)	Voltage (V)	Frequency (MHz)	Stability (ppm)	Limit +/- (ppm)	Margin (ppm)
1	20+/-5	85	11.39	39.049990	-0.26	1.0	0.74
2	20+/-5	100	13.40	39.050000	0.00	1.0	1.00
3	20+/-5	115	15.41	39.049990	-0.26	1.0	0.74

10.9 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.

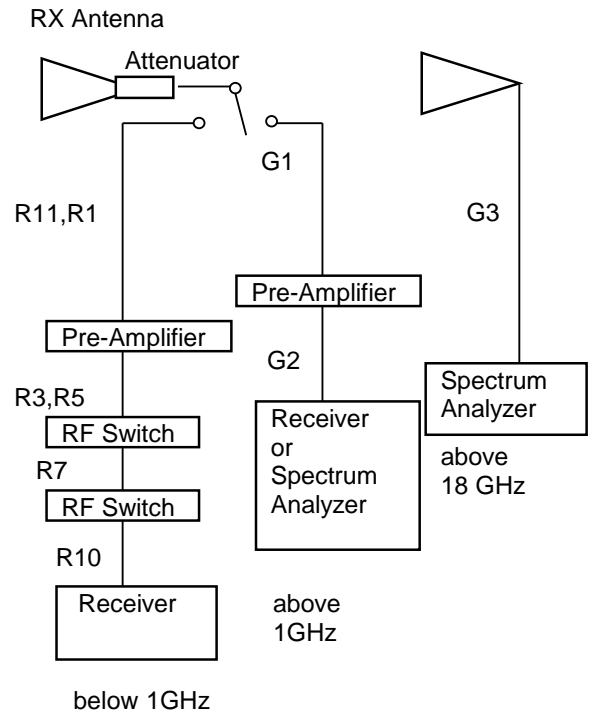
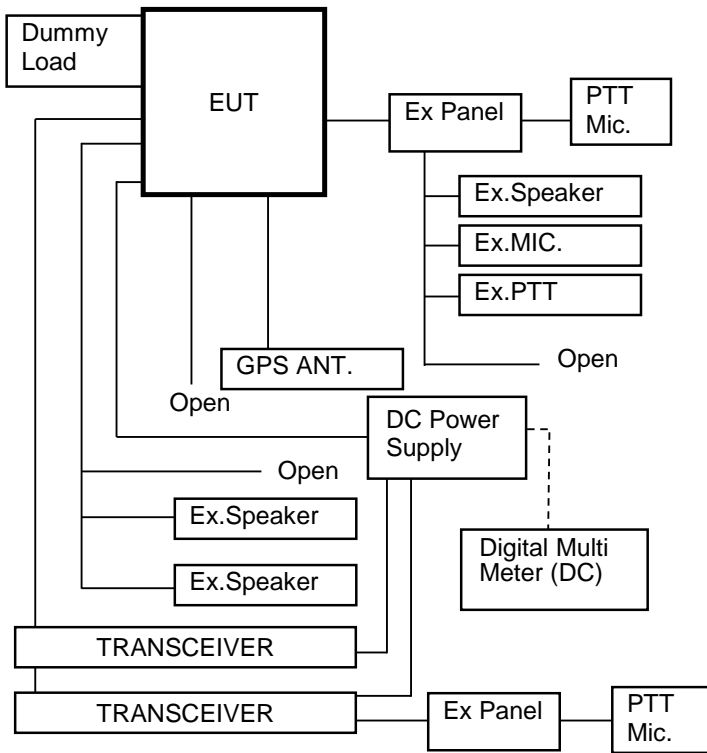
TEST EQUIPMENTS

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Spectrum Analyzer	Agilent	N9030A	US51350220	1Y	Mar. 31, 19
2	Receiver	Agilent	N9038A	MY51210201	1Y	Nov. 30, 19
3	D.R.G Antenna	Schwarzbeck	3115	5044	1Y	Apr. 30, 19
4	Tri-log Antenna	Schwarzbeck	VULB9168WP	288	1Y	Jul. 31, 19
5	Horn Antenna with Pre-amplifier	TSJ	MLA-18265-B03-30	1694440	1Y	Mar. 31, 19
6	DC Power Supply	Kikusui	PMC35-3A		None	None
7	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 19
8	Amplifier	TOYO	TPA0118-30	0402	1Y	May. 31, 19
9	Attenuator	HUBER + SUHNER	6803.17.B	5111	1Y	May. 31, 19
10	Amplifier	Intertek Japan	ZX60-3018G	002	1Y	Aug. 31, 19
11	Attenuator	TAMAGAWA	CFA-01	A00040805	1Y	Aug. 31, 19
12	RF Switch	Intertek Japan	ACX-150-1	A12301501	1Y	Aug. 31, 19
13	Site Attenuation	-	-	-	1Y	Feb. 29, 20
14	SVSWR	-	-	-	1Y	Jan. 31, 20

USED CABLES

No.	Cable	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
R11	Coaxial Cable	FUJIKURA	5D-2W	R11	1Y	Aug. 31, 19
R1	Coaxial Cable	FUJIKURA	5D-2W	R1	1Y	Aug. 31, 19
R3	Coaxial Cable	FUJIKURA	10D-2W	R3	1Y	Aug. 31, 19
R5	Coaxial Cable	FUJIKURA	RG-5A/U	R5	1Y	Aug. 31, 19
R7	Coaxial Cable	MIYAZAKI	5D-2W	R7	1Y	Aug. 31, 19
R10	Coaxial Cable	FUJIKURA	5D-2W	R10	1Y	Aug. 31, 19
G1	Coaxial Cable	SUHNER	SUCOFLEX 104	229603	1Y	May. 31, 19
G2	Coaxial Cable	Candox	5B-048-98-98-5000	111130	1Y	May. 31, 19
G3	Coaxial Cable	Candox	5B-048-98-98-6000	120315	1Y	May. 31, 19

MEASUREMENT EQUIPMENT CONFIGURATION



TEST RESULTS

Test date	Mar. 21, 2019 to Mar. 22, 2019
Location	Kashima No.12 Test Site
temperature	19.5 to 20.0 [degree C]
Humidity Variation	45 to 53 [%]
Atmospheric Pressure	99.5 to 101.6 [kPa]
Test Engineer	Koichi Wagatsuma

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

State : 39.05 MHz Receiver Condition

No.	Frequency (MHz)	Pol	Mode	Reading Level (dBuv)	Factor* (dB)	Emission Level (dBuV/m)	Limit Level (dBuV/m)	Margin (dB)
1	144.00	Hor.		-	-1.3	-	43.5	-
		Ver.		23.8	-1.3	22.5	43.5	21.0
2	153.60	Hor.		-	-1.0	-	43.5	-
		Ver.		23.3	-1.0	22.3	43.5	21.2
3	288.00	Hor.		37.8	0.8	38.6	46.0	7.4
		Ver.		34.7	0.8	35.5	46.0	10.5
4	326.40	Hor.		28.8	2.4	31.2	46.0	14.8
		Ver.		-	2.4	-	46.0	-
5	384.00	Hor.		27.7	4.2	31.9	46.0	14.1
		Ver.		-	4.2	-	46.0	-
6	576.00	Hor.		20.7	9.7	30.4	46.0	15.6
		Ver.		-	9.7	-	46.0	-
7	614.40	Hor.		27.4	10.6	38.0	46.0	8.0
		Ver.		23.8	10.6	34.4	46.0	11.6
8	652.80	Hor.		23.7	11.2	34.9	46.0	11.1
		Ver.		17.5	11.2	28.7	46.0	17.3
9	1036.80	Hor.	AVG	35.0	-4.5	30.5	54.0	23.5
		Ver.	AVG	31.5	-4.5	27.0	54.0	27.0
10	4960.00	Hor.	AVG	23.1	6.2	29.3	54.0	24.7
		Ver.	AVG	23.3	6.2	29.5	54.0	24.5

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 3.4 meters)
- 2 Scanned frequency are 30 to 25000 MHz.
- 3 Highest oscillator frequency is 4960 MHz.
(TXRX UNIT : 401.6MHz)

10.10 Necessary Bandwidth and Emission Bandwidth

REGULATIONS	: FCC Part 2 Section 202 (g) & Federal Register/ Vol.68, No236 TRC 43
-------------	--

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 : 8K30F1E / 8K30F1D / 8K30F7W (4Level FSK / 9600bps, Authorized Bandwidth 20 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

10.11 99% Occupied Bandwidth

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

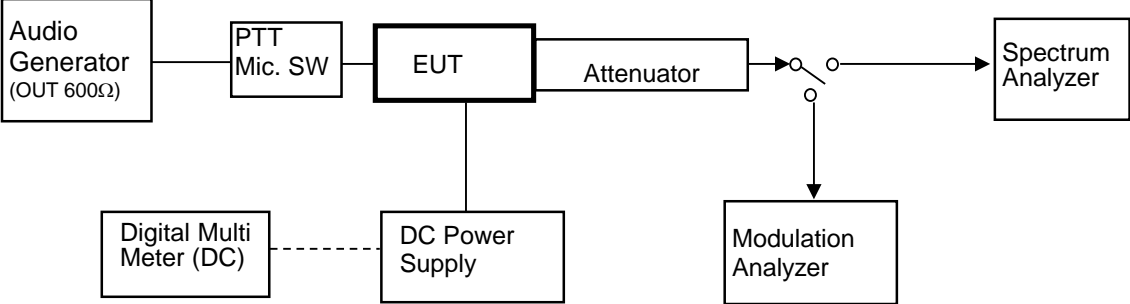
Test Procedure

- 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, 14K0F3E, 11K0F3E)

Measuring Equipments

No.	Equipment	Manufacture	Model No.	Serial No.	Cal. Interval	Effective period
1	Attenuator (20dB)	Aeroflex/Wenshel	66-20-34	BY4357	1Y	Jul. 31, 19
2	Attenuator (30dB)	Weinschel	WA-29-30-34	8923	1Y	Jul. 31, 19
3	Modulation Analyzer	Hewlett Packard	8901B	3403A04852	1Y	Jan. 31, 20
4	Audio Generator	Anritsu	MG443B	M70150	1Y	Sep. 30, 19
5	Spectrum Analyzer	Agilent	N9030A	US51350220	1Y	Mar. 31, 19
6	DC Power Supply	Daiichi denpa kogyo	GZV4000	90290931	None	None
7	Digital Multi Meter	FLUKE	8846A	9642018	1Y	Sep. 30, 19
8	Balance Cable	Huber+Suher	RG59BU/11BNC	KSR00218	1Y	May. 31, 19
9	Coaxial Cable	Pacific custom	RG-58 C/U	AM90C04	1Y	Feb. 29, 20
10	Coaxial Cable	Suhner	SUCOFLEX104	F0000017	1Y	Jul. 31, 19

Measuring Equipment Configuration



Test Results

Test date	Mar 07, 2019		
Location	Kashima No.12 Test Site		
temperature	24.3	[degree C]	
Humidity Variation	35.0	[%]	
Atmospheric Pressure	101.4	[kPa]	
Test Engineer	Koichi Wagatsuma		

Emission Designation	Frequency (MHz)	99% Occupied Bandwidth (kHz)	Authorized bandwidth (kHz)
16K0F3E	39.05	14.745	20
	44.55	14.695	
	49.95	14.620	
8K30F1E/F1D/F7W	39.05	7.753	20
	44.55	7.729	
	49.95	7.712	

Ferquency (MHz)	Emission Designation	
	16K0F3E	8K30F1E/F1D/F7W
39.05	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq 39.050000 MHz Occupied Bandwidth: 14.745 kHz Total Power: 2.46 dBm Transmit Freq Error: 39 Hz x dB Bandwidth: 15.35 kHz</p>	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq 39.050000 MHz Occupied Bandwidth: 7.753 kHz Total Power: 7.57 dBm Transmit Freq Error: 73 Hz x dB Bandwidth: 8.922 kHz</p>
44.55	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq 44.550000 MHz Occupied Bandwidth: 14.695 kHz Total Power: 2.47 dBm Transmit Freq Error: 60 Hz x dB Bandwidth: 15.34 kHz</p>	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq 44.550000 MHz Occupied Bandwidth: 7.729 kHz Total Power: 7.61 dBm Transmit Freq Error: 74 Hz x dB Bandwidth: 8.916 kHz</p>
49.95	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq 49.950000 MHz Occupied Bandwidth: 14.620 kHz Total Power: 2.44 dBm Transmit Freq Error: 84 Hz x dB Bandwidth: 15.33 kHz</p>	<p>Agilent Spectrum Analyzer - Occupied BW Center Freq 49.950000 MHz Occupied Bandwidth: 7.712 kHz Total Power: 7.58 dBm Transmit Freq Error: 78 Hz x dB Bandwidth: 8.911 kHz</p>