JQA File No. : 400-200111-18(T)
Issue Date : September 27, 2021

TEST REPORT

Applicant	:	JVCKENWOOD Corporation
Address	:	2967-3 Ishikawa-machi, Hachioji-shi, Tokyo 192-8525 Japan
Products	:	DIGITAL MEDIA RECEIVER
Model No.	:	KD-X472DBT
Serial No.	:	134X0053 134X0052
Test Standard	:	ETSI EN 300 328 V2.2.2 (2019-07)
Test Results	:	**Passed**
Date of Receipt	:	February 9, 2021 (for updating) September 26, 2019 (for the base report)
Date of Test	:	September 27, 2019 ~ October 3, 2019 and February 16, 2021

Makimoto Kazuyuki
Manager
Japan Quality Assurance Organization
SAFETY & EMC CENTER
Testing Dept.
EMC Testing Div.
4-4-4, Minamiosawa, Hachioji-shi, Tokyo 192-0364, Japan

Lab Accreditation
VLAC-001-5

- The test results in this test report was made by using the measuring instruments which are traceable to national standards of measurement in accordance with ISO/IEC 17025.
- The applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.
- The following contents such as identification information in this clause are provided by the applicant. Discrepancies for these contents can affect the validity of results.
- The test results presented in this report relate only to the offered test sample.
- The contents of this test report cannot be used for the purposes, such as advertisement for consumers.
- This test report shall not be reproduced except in full without the written approval of JQA.
- VLAC does not approve, certify or warrant the product by this test report.

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REVISION HISTORY

File No.	Contents	Issue Date
400-200111-18	Initial Issue	March 22, 2021
400-200111-18(R)	Correct the date of receipt of the DUT.	April, 6, 2021
400-200111-18(S)	Added missing description of receiver blocking.	August 23, 2021
400-200111-18(T)	Corrected an error in the test date.	September 27, 2021

1 Summary of Test Results

Applied Standard : ETSI EN 300 328 V2.2.2 (2019-07)
Wideband transmission systems;
Data transmission equipment operating in the 2,4 GHz band;
Harmonised Standard for access to radio spectrum

Item	Standard (Procedure)	Result	Note
RF Output Power	ETSI EN 300 328 V2.2.2	PASS	-
Power Spectral Density	ETSI EN 300 328 V2.2.2	Not Applicable	1
Duty Cycle, Tx-sequence, Tx-gap	ETSI EN 300 328 V2.2.2	Not Applicable	2
Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	ETSI EN 300 328 V2.2.2	PASS	-
Hopping Frequency Separation	ETSI EN 300 328 V2.2.2	PASS	-
Medium Utilization factor	ETSI EN 300 328 V2.2.2	Not Applicable	2
Adaptivity	ETSI EN 300 328 V2.2.2	Not Applicable	2
Occupied Channel Bandwidth	ETSI EN 300 328 V2.2.2	PASS	-
Transmitter unwanted emissions in the out-of-band domain	ETSI EN 300 328 V2.2.2	PASS	-
Transmitter unwanted emissions in the spurious domain	ETSI EN 300 328 V2.2.2	PASS	-
Receiver spurious emissions	ETSI EN 300 328 V2.2.2	PASS	-
Receiver Blocking	ETSI EN 300 328 V2.2.2	PASS	-
Geo-location capability	ETSI EN 300 328 V2.2.2	Not Tested	3

1) This requirement does not apply because Frequency Hopping equipment.
2) This requirement does not apply because the RF Output power is less than 10 dBm EIRP
3) This section requests for equipment specifications. There is no requirement for the test.

In the approval of test results,

- Determining compliance with the limits in this report was based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- Instrumentation uncertainty (MIU).
- The expanded MIUs for the CISPR measurement methods determined by JQA are less than U cispr according to CISPR 16-4-2.
- No deviations were employed from the applied standard.
- No measures were taken to reduce the influence of the surroundings.
- No modifications were conducted by JQA to achieve compliance to the limitations.

Reviewed by
Toru Koshima / Engineer
SAFETY & EMC CENTER
Testing Dept. EMC Testing Div.

T. Koshima

Tested by
Naohiko Ueno / Assistant Manager
SAFETY & EMC CENTER
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N. Ueno

2 Description of the Equipment Under Test

2.1 General Information

Manufacturer	JVCKENWOOD Corporation 2967-3 Ishikawa-machi, Hachioji-shi, Tokyo 192-8525 Japan
Products	DIGITAL MEDIA RECEIVER
Model No.	KD-X472DBT
Serial No.	134X0053 134X0052
Product Type	Pre-Production
Date of Manufacture	-
Power Rating	12.0 VDC (Nominal) 10.5-16.0 VDC (Operating voltage range)
EUT Grounding	None
Modulation Type	FHSS Bluetooth 4.2 GFSK, π/4DQPSK and 8DPSK
Equipment Type	Adaptive
Receiver Category	2
Operating Frequency Range	2400.0 MHz –2483.5MHz
Highest Frequency Used/Generated	2483.5 MHz (for Transciever) 8200.0 MHz (for Tuner IC)
Operating Temperature Range	-30°C to 70°C
RF Output Power	1.36 dBm e.i.r.p (Measured Value)
Antenna Type	PCB antenna (Integral)
Antenna Gain	0.25 dBi

3 Test Location

Japan Quality Assurance Organization
SAFETY & EMC CENTER
Testing Dept.
EMC Testing Div.
4-4-4, Minamiosawa, Hachioji-shi, Tokyo 192-0364, Japan

4 Accreditation of Test Laboratory

JQA is accredited under ISO/IEC 17025 by following accreditation bodies and the test facility of Testing Division is registered by the following bodies .

Test Facility	Accreditation or Registration		Expiry Date
	Body	Code/Number	
(1) Safety & EMC Center (2) SAITO (3) SHIKATSU (4) TSURU	VLAC	(1) VLAC-001-5 (2) VLAC-001-2 (3) VLAC-001-3 (4) VLAC-001-4	March 30, 2022
	VCCI	(1) A-0001 (2) A-0002 (3) A-0003 (4) A-0004	September 30, 2022
	BSMI	(2) SL2-IS-E-6006, SL2-IN-E-6006, SL2-R1/R2-E-6006, SL2-A1-E-6006 (4) SL2-IS-E-6004, SL2-IN-E-6004, SL2-R1/R2-E-6004, SL2-A1-E-6004	August 9, 2023
	FCC	(1) JP5192 (2) JP5008 (3) JP0004 (4) JP0005	March 30, 2022
	IC	(3) JP0014	November 30, 2021
	CNAS	(2) (4) L8352	October 8, 2025
	Conformity assessment body for Japan electrical appliances and material by METI		February 22, 2022

5 Measurement Uncertainty

Measurement Item	Range	Uncertainty (*U*)
Temperature	-40 to +100 deg	± 0.5 deg
Supply Voltages	DC	± 0.04 %
Time	-	± 0.9 %
RF output power, Conducted	-	± 0.7 dB
Power Spectral Density, Conducted	-	± 1.2 dB
Occupied Channel Bandwidth	-	± 0.131 %
Unwanted Emission, Conducted		± 1.2 dB
All emissions, Radiated	30 – 1GHz 1 – 26.5 GHz	± 1.2 dB ± 2.5 dB

The reported expanded uncertainty of measurement, *U* is described with using the coverage factor k = 2, to give a level of confidence of approximately 95 %.

6 Setup of EUT

6.1 Test Configuration

The EUT consists of :

Sign	Item	Manufacturer	Model No.	Serial No.
A	DIGITAL MEDIA RECEIVER	JVCKENWOOD Corporation	KD-X472DBT	134X0053 *1 *3 134X0052 *2

*1) Used for Antenna Conducted Emission
*2) Used for Field Strength of Spurious Emission
*3) Used for Receiver Blocking

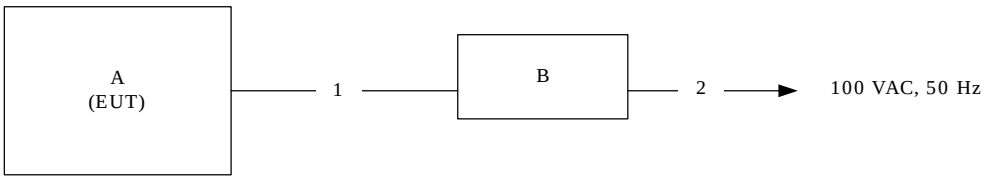
The AE used for testing :

Sign	Item	Manufacturer	Model No.	Serial No.
B	DC Power Supply	Kikusui Electronics Co., Ltd.	PBZ40-10	QB001180
C	Speaker	-		-

Type of Cable used for testing:

No.	Description	Identification (Manu. Etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	DC Power Cable	-	No	No	No	1.6
2	AC Power Cable	-	No	No	No	2.0

6.2 Test Arrangement (Drawings)



6.3 Operating Condition

Power Supply Voltage : 12 VDC

Operation Mode:
The EUT is set with the test mode, the specification of the test mode is as followings.
(1) Tx Mode (0ch : 2402MHz)
(2) Tx Mode (39ch : 2441MHz)
(3) Tx Mode (78ch : 2480MHz)
(4) Hopping Mode
(5) Rx Mode

Used application to controlled: The test mode is instructed by the applicant.

Unless otherwise stated this test report, the worst case testing settings for each mode is determined as follows, it is based on preliminary tests .(This was confirmed through separated measurement.)
All final tests in Tx mode were made at GFSK DH5.
EUT with temporary antenna port was used in conducted measurement.

7 Test Item

7.1 RF Output Power

Since there is no difference in the results between the current version and this item, the data from the previous version V2.1.1 (2016-11) has been reused.

7.1.1 Test Site and Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Environmental Test Chamber	PFL-3K	Espec	-	N/A	N/A
USB Power Sensor	U2063XA	Keysight	PM02	2018/12	1 Year
RF Cable	MWX322	Junkosha	CS11	2018/12	1 Year
DC Power Supply	PAB 18-2.5DU	KIKUSUI	-	N/A	N/A
Digital Multi-meter	VOAC7413	Iwatsu Electric	MM01	2019/3	1 Year

Note : Calibration data is current at the time of testing.

7.1.2 Test Method and Test Setup (Diagrammatic illustration)

Step 1:

- Use a fast power sensor suitable for 2,4 GHz and capable of 1 MS/s.
- Use the following settings:
  - Sample speed 1 MS/s or faster.
  - The samples must represent the power of the signal

Step 2:

- For conducted measurements on devices with one transmit chain:
  - Connect the power sensor to the transmit port, sample the transmit signal and store the raw data. Use these stored samples in all following steps.

Step 3:

- Find the start and stop times of each burst in the stored measurement samples.

Step 4:

- Between the start and stop times of each individual burst calculate the RMS power over the burst. Save these Pburst values, as well as the start and stop times for each burst.

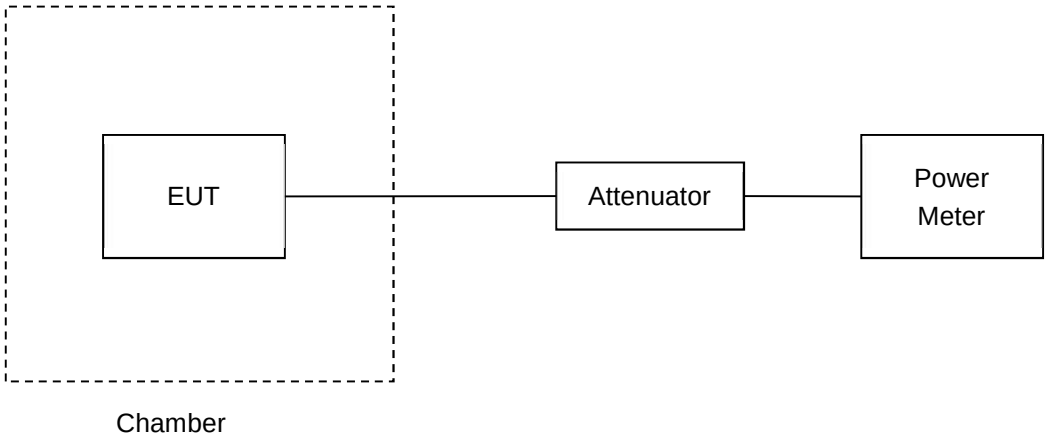
Step 5:

- The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.

Step 6:

- Add the (stated) antenna assembly gain "G" in dBi of the individual antenna.
- The RF Output Power (P) shall be calculated using the formula below:

$$P = A + G$$



7.1.3 Test Data

The test data was appropriated from the previous version V2.1.1 (2016-11).

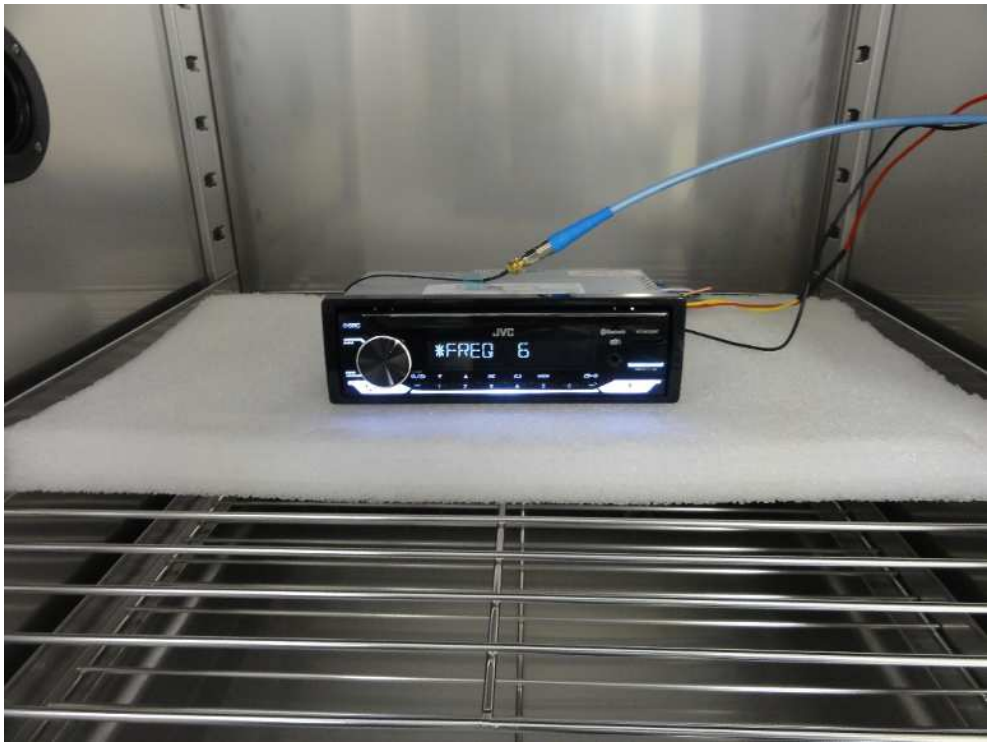
Date : September 27 ,2019
Temp. : 22 ℃
Humi. : 48 %

Mode of EUT : Tx (Hopping)
Test Port : Temporary antenna connector
Data Packet : DH5

Temperature (℃)	Supply Voltage (VDC)	Correction Factor (dB)	Antenna Gain (dBi)	Meter Reading (dBm)	Power (dBm)	Limit (dBm)	Margin (dB)
-30.0	12.0	1.57	0.25	-1.15	0.67	20.00	19.33
30.0	12.0	1.57	0.25	-0.46	1.36	20.00	18.64
70.0	12.0	1.57	0.25	-0.97	0.85	20.00	19.15

Note : 1) The measurement was carried out with EUT with temporary antenna port.
2) The manufacturer defines the range of power supply voltage.
3) The correction facter containes the cable loss and attenuator loss.
4) The antenna gain value provided by applicant.
5) A sample calculation was made at (-30.0 ℃, 12.0 (VDC)).
CF + AG + MR = 1.57 + 0.25 + (-1.15) = 0.67 (dBm)
CF : Correction Factor AG : Antenna Gain
MR : Meter Reading

7.1.4 Test Setup (Photographs)



7.2 Accumulated Transmit time, Frequency Occupation & Hopping Sequence

Since there is no difference in the results between the current version and this item, the data from the previous version V2.1.1 (2016-11) has been reused.

7.2.1 Test Site and Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Environmental Test Chamber	PFL-3K	Espec	-	N/A	N/A
Test Receiver	ESW44	Rohde & Schwarz	R04	2018/11	1 Year
RF Cable	MWX322	Junkosha	CS11	2018/12	1 Year
DC Power Supply	PAB 18-2.5DU	KIKUSUI	-	N/A	N/A
Digital Multi-meter	VOAC7413	Iwatsu Electric	MM01	2019/3	1 Year

Note : Calibration data is current at the time of testing.

7.2.2 Test Method and Test Setup (Diagrammatic illustration)

The test procedure shall be as follows:

[Accumulated Transmit Time]

Step 1:

Connect the EUT to the spectrum analyzer and use the following settings:

- Centre Frequency: Equal to the hopping frequency being investigated
- Frequency Span: 0 Hz
- Resolution BW: ~ 50 % of the Occupied Channel Bandwidth
- Video BW: ≥ RBW
- Detector Mode: Peak
- Sweep time: Equal to the Dwell Time × Minimum number of hopping frequencies (N)
- Number of sweep points: 30,000 or Enough time resolution method.
- Trace mode: Clear / Write
- Trigger: Free Run

Step 2:

- Save the trace data to a file for further analysis by a computing device using an appropriate software application or program.

Step 3:

- Indentify the data points related to the frequency being investigated by applying a threshold.
- Count the number of data points identified as resulting from transmissions on the frequency being investigated and multiply this number by the time difference between two consecutive data points.

Step 4:

- The result in step 3 is the Accumulated Transmit Time which shall be recorded in the test report.

[Frequency Occupation requirement] Option 1

Step 5:

- Make the following changes on the analyzer and repeat steps 2 and 3.
  " Sweep time: 4 × Dwell Time × Actual number of hopping frequencies in use"
  The result shall be recorded in the test report.

[hopping sequence]

Step 6:

Make the following changes on the analyzer:

- Start Frequency: 2 400 MHz, Stop Frequency: 2 483,5 MHz
- Resolution BW: ~ 50 % of the Occupied Channel Bandwidth
- Video BW: ≥ RBW
- Detector Mode: RMS
- Sweep time: Auto
- Trace mode: Max Hold
- Trigger: Free Run

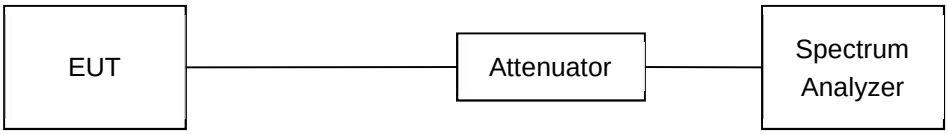
Step 7:

- When the trace has completed, indentify the number of hopping frequencies used by the hopping sequence.
- The result shall be recorded in the test report.

[hopping sequence]

Step 8:

- For adaptive systems, using the lowest and highest -20 dB points from the total spectrum envelope obtained in step 6, it shall be verified whether the system uses 70 % of the band specified in clause 1. The result shall be recorded in the test report.



7.2.3 Test Data

The test data was appropriated from the previous version V2.1.1 (2016-11).

[Accumulated Transmit Time]

Date : September 27 ,2019
Temp. : 22 ℃
Humi. : 48 %

Mode of EUT : Full Hopping
Test Port : Temporary antenna connector
Data Packet : DH5 (Worst case)

Test Frequency (MHz)	Duration of Test (sec.)	No. of Burst (Times)	Burst Duration (msec.)	Acc. Transmit Time (msec.)	Limit (msec.)	Margin (msec.)
2402.0	31.6	107	2.897	310.0	400.0	90.0
2480.0	31.6	106	2.898	307.2	400.0	92.8

Note : 1) The measurement was carried out with EUT with temporary antenna port.
2) The minimum hoppingf channel(N) is 79 therefore the "duration of test" = 400 msec. * 79 = 31.6 sec.

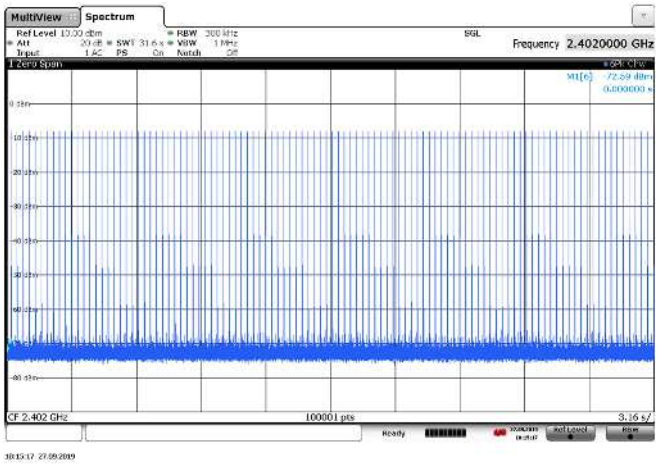
Mode of EUT : Adaptive Hopping
Test Port : Temporary antenna connector
Data Packet : DH5 (Worst case)

Test Frequency (MHz)	Duration of Test (sec.)	No. of Burst (Times)	Burst Duration (msec.)	Acc. Transmit Time (msec.)	Limit (msec.)	Margin (msec.)
2402.0	8.0	106	2.900	307.4	400.0	92.6
2480.0	8.0	107	2.901	310.4	400.0	89.6

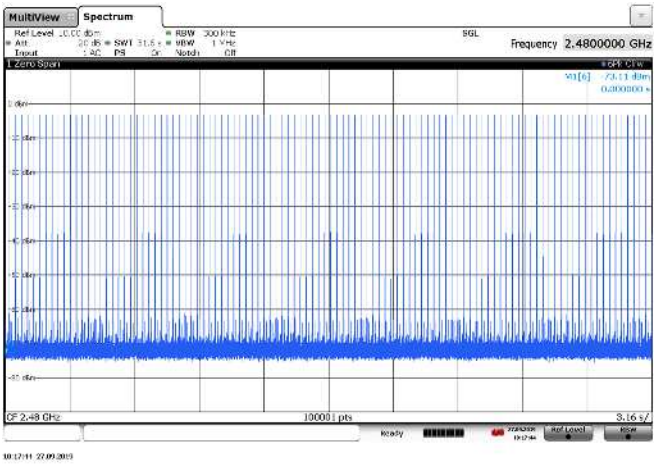
Note : 1) The measurement was carried out with EUT with temporary antenna port.
2) The minimum hoppingf channel(N) is 20 therefore the "duration of test" = 400 msec. * 20 = 8,000 msec.

Mode of EUT: Full Hopping

TX 2402 MHz

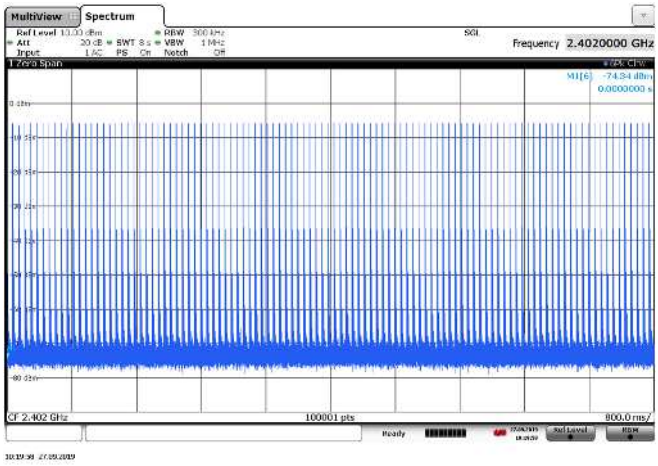


TX 2480 MHz

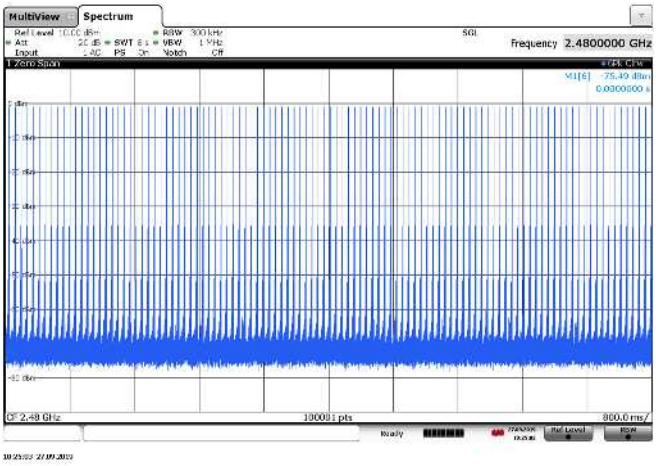


Mode of EUT: Adaptive Hopping

TX 2402 MHz



TX 2480 MHz



[Frequency Occupation requirement]

Date : September 27 ,2019
Temp. : 22 ℃
Humi. : 48 %

Mode of EUT : Full Hopping
Test Port : Temporary antenna connector
Data Packet : DH1 (Worst case)

Test Frequency (MHz)	Dwell Time (msec.)	Duration of Test (msec.)	No. of Burst (Times)	Freq. Occupation (msec.)	Limit (msec.)
2402.0	0.395	124.8	1	0.395	0.395
2480.0	0.394	124.5	1	0.394	0.394

Note : 1) The measurement was carried out with EUT with temporary antenna port.
2) The minimum hoppingf channel(N) is 79
therefore the "duration of test"(Sweep time) = 4 * Dwell Time * 79

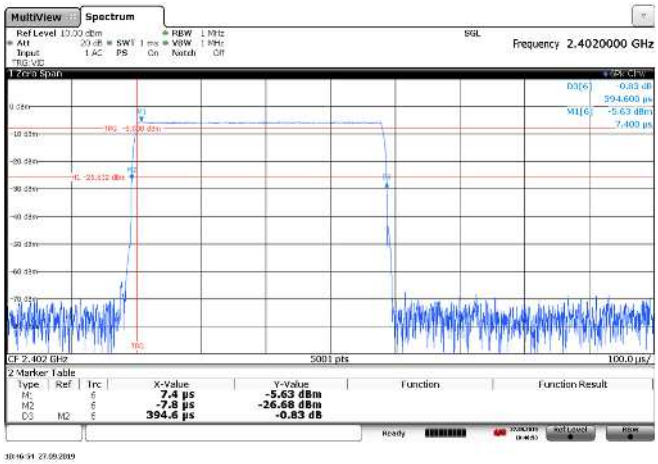
Mode of EUT : Adaptive Hopping
Test Port : Temporary antenna connector
Data Packet : DH1 (Worst case)

Test Frequency (MHz)	Dwell Time (msec.)	Duration of Test (msec.)	No. of Burst (Times)	Freq. Occupation (msec.)	Limit (msec.)
2402.0	0.395	31.6	1	0.395	0.395
2480.0	0.394	31.5	1	0.394	0.394

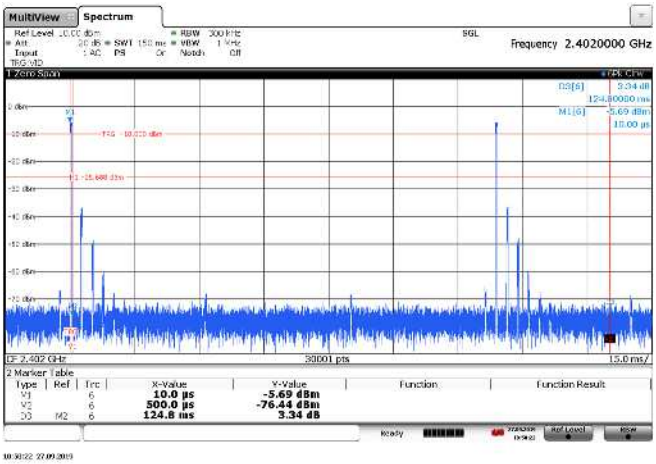
Note : 1) The measurement was carried out with EUT with temporary antenna port.
2) The minimum hoppingf channel(N) is 20
therefore the "duration of test"(Sweep time) = 4 * Dwell Time * 20

Mode of EUT: Full Hopping

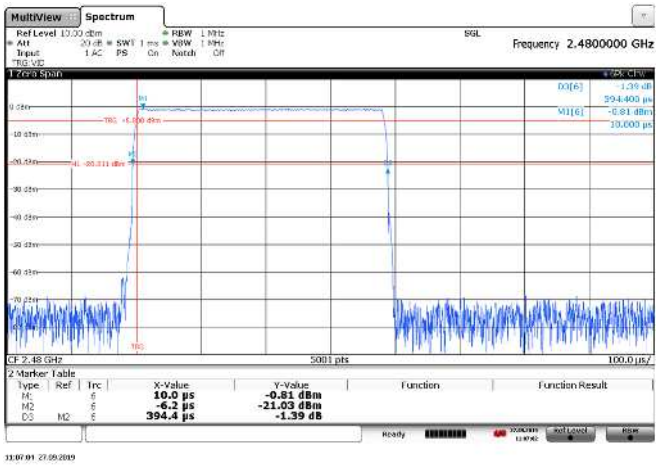
TX 2402 MHz(Transmit Time)



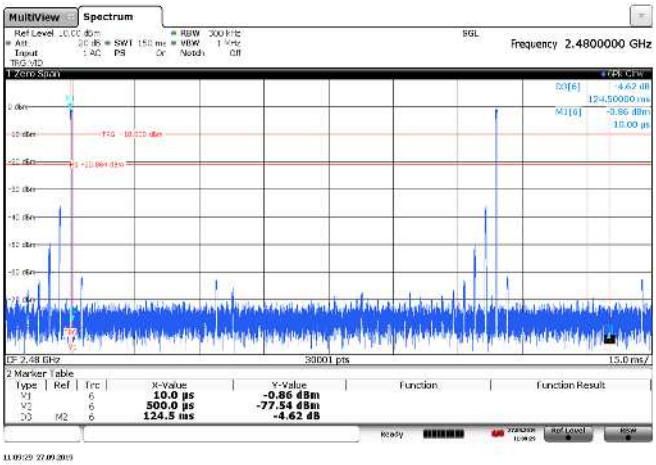
TX 2402 MHz(Frequency Occupation)



TX 2480 MHz(Transmit Time)

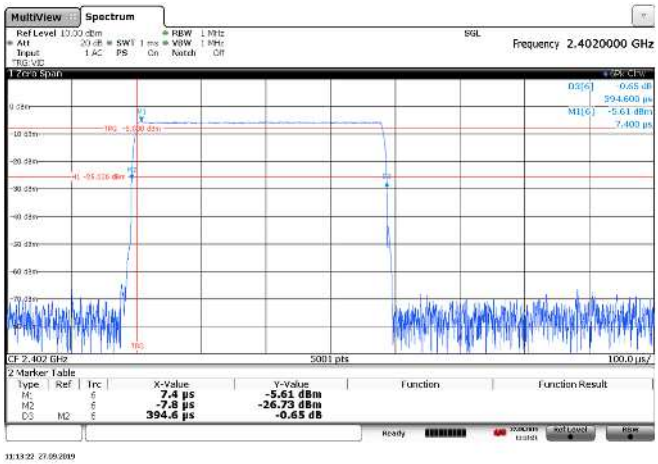


TX 2480 MHz(Frequency Occupation)

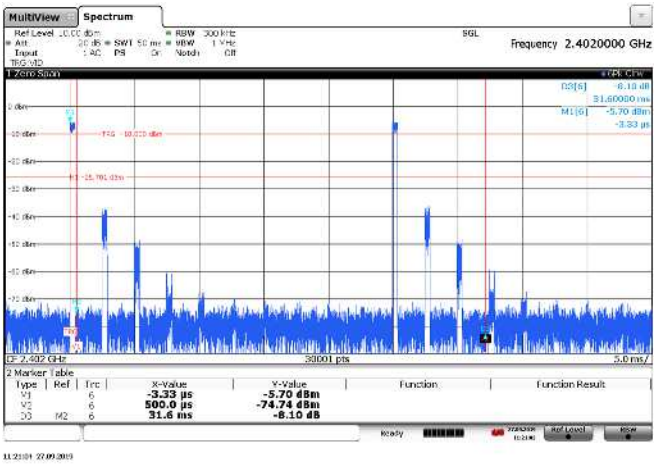


Mode of EUT: Adaptive Hopping

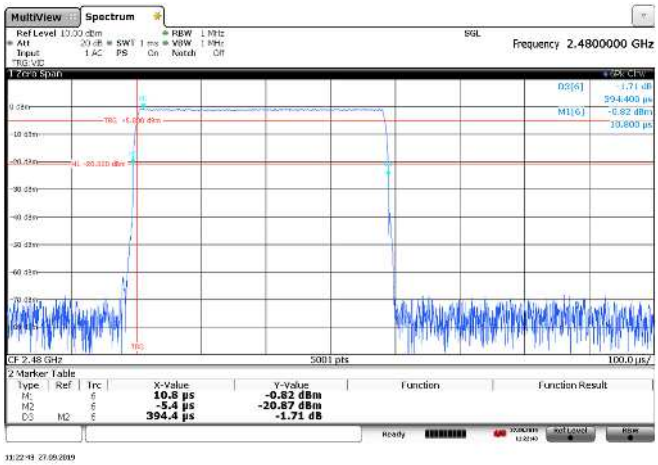
TX 2402 MHz(Transmit Time)



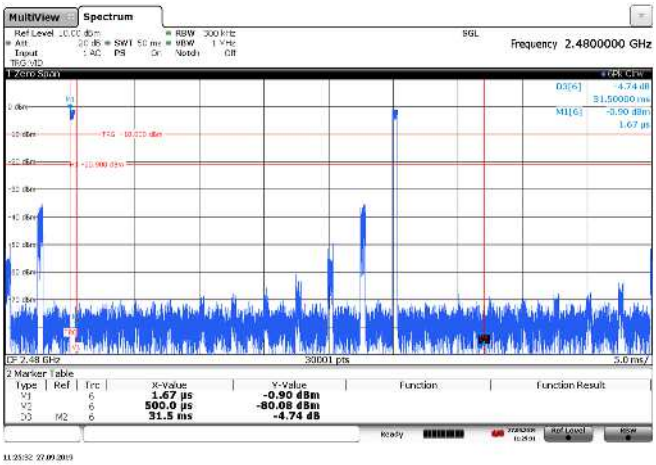
TX 2402 MHz(Frequency Occupation)



TX 2480 MHz(Transmit Time)



TX 2480 MHz(Frequency Occupation)



[Hopping Sequence]

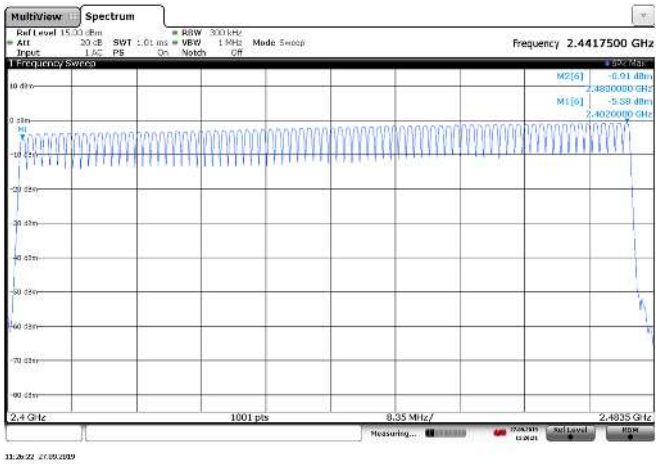
Date : September 27 ,2019
Temp. : 22 ℃
Humi. : 48 %

Mode of EUT : Full Hopping
Test Port : Temporary antenna connector
Data Packet : DH5

Mode of EUT	Number of Hopping Freqencies (N)	Limit
Full Hopping	79	15
Adaptive Hopping	20	15

Note : 1) The measurement was carried out with EUT with temporary antenna port.
2) The hopping frequency separation is 1 MHz therefore limitation is minimum 15 hopping frequencies.

Mode of EUT: Full Hopping



Mode of EUT: Adaptive Hopping

[Band Utilization]

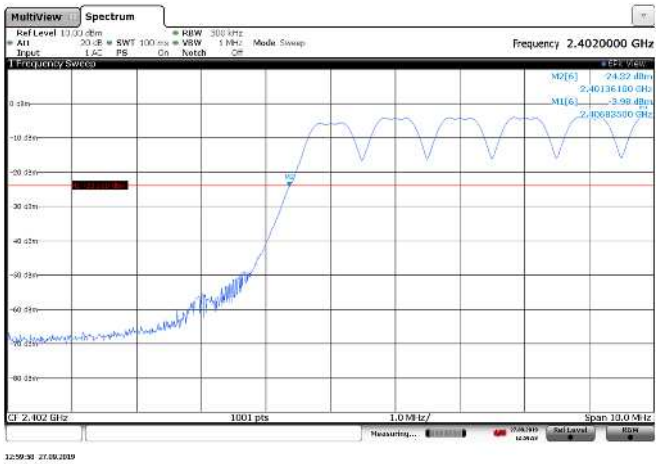
Date : September 27 ,2019
Temp. : 22 ℃
Humi. : 48 %

Mode of EUT : Adaptive Hopping
Test Port : Temporary antenna connector
Data Packet : DH5

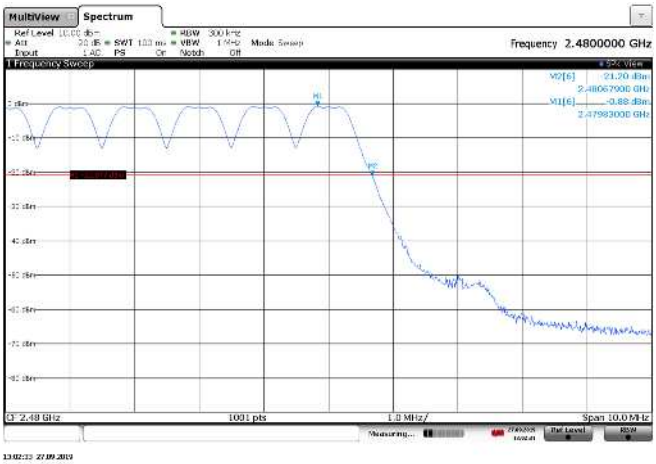
Freq. Low Edge (MHz)	Freq. High Edge (MHz)	Band Utilization (%)	Limit (%)
2401.4	2480.7	95.0	70.0

Note : 1) The measurement was carried out with EUT with temporary antenna port.
2) Band Utilization = (2480.679MHz – 2401.361MHz) / (2483.5MHz – 2400MHz) x 100 = 95(%)

Lower Band



Upper Band



7.2.4 Test Setup (Photographs)

Refer to 7.1.4 Test Setup photograph that is same configuration for measurement.

7.3 Hopping Frequency Separation

Since there is no difference in the results between the current version and this item, the data from the previous version V2.1.1 (2016-11) has been reused.

7.3.1 Test Site and Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Environmental Test Chamber	PFL-3K	Espec	-	N/A	N/A
Test Receiver	ESW44	Rohde & Schwarz	R04	2018/11	1 Year
RF Cable	MWX322	Junkosha	CS11	2018/12	1 Year
DC Power Supply	PAB 18-2.5DU	KIKUSUI	-	N/A	N/A
Digital Multi-meter	VOAC7413	Iwatsu Electric	MM01	2019/3	1 Year

Note : Calibration data is current at the time of testing.

7.3.2 Test Method and Test Setup (Diagrammatic illustration)

The test procedure shall be selected from following 2 options. The selected option shall be stated in the test report.

[Option 1]

(Step 1):

Connect the EUT to the spectrum analyzer and use the following settings:

- Centre Frequency: Centre of the two adjacent hopping frequencies
- Frequency Span: Sufficient to see the complete power envelope of both hopping frequencies
- Resolution BW: 1 % of the Span
- Video BW: 3 × RBW
- Detector Mode: RMS
- Sweep time: Auto
- Trace mode: Max Hold

(Step 2):

- Allow the trace to stabilize.
- Use the marker function of the analyser to define the lower- and the upper -20 dBr points for both hopping frequencies F1 and F2. This will result in F1L and F1H for hopping frequency F1 and in F2L and F2H for hopping frequency F2. These values shall be recorded in the report.

(Step 3):

- Calculate the centre frequencies F1C and F2C for both hopping frequencies using the formulas below. These values shall be recorded in the report.

- Calculate the -20 dBr channel bandwidth (BWCHAN) using the formula below. This value shall be recorded in the report.

$$BW_{CHAN} = F1_H - F1_L$$

- Calculate the Hopping Frequency Separation (FHS) using the formula below. This value shall be recorded in the report.

$$F_{HS} = F2_C - F1_C$$

- Compare the measured Hopping Frequency Separation with the limit defined in clause 4.3.1.4.2. In addition, for non-Adaptive Frequency Hopping equipment, the Hopping Frequency Separation shall be equal to or greater than the -20 dBr channel bandwidth or:

$$F_{HS} \geq BW_{CHAN}$$

[Option 2]

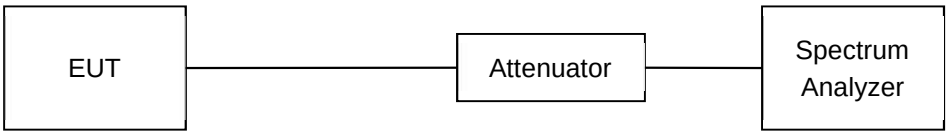
(Step 1):

Connect the EUT to the spectrum analyzer and use the following settings:

- Centre Frequency: Centre of the two adjacent hopping frequencies
- Frequency Span: Sufficient to see the complete power envelope of both hopping frequencies
- Resolution BW: 1 % of the Span
- Video BW: 3 × RBW
- Detector Mode: RMS
- Sweep time: Auto
- Trace mode: Max Hold

(Step 2):

- Allow the trace to stabilize.
- Use the marker-delta function to determine the Hopping Frequency Separation between the peaks of the two adjacent hopping frequencies. This value shall be compared with the limits and shall be recorded in the test report.



7.3.3 Test Data

The test data was appropriated from the previous version V2.1.1 (2016-11).

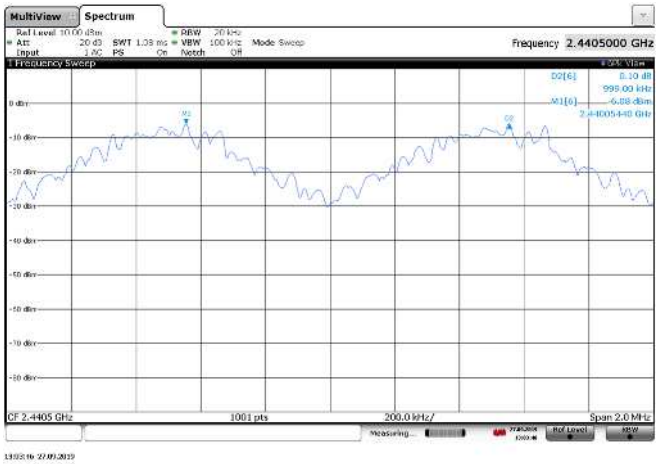
Date : September 27 ,2019
Temp. : 22 ℃
Humi. : 48 %

Mode of EUT : Full Hopping & Adaptive Hopping
Test Port : Temporary antenna connector
Data Packet : DH5

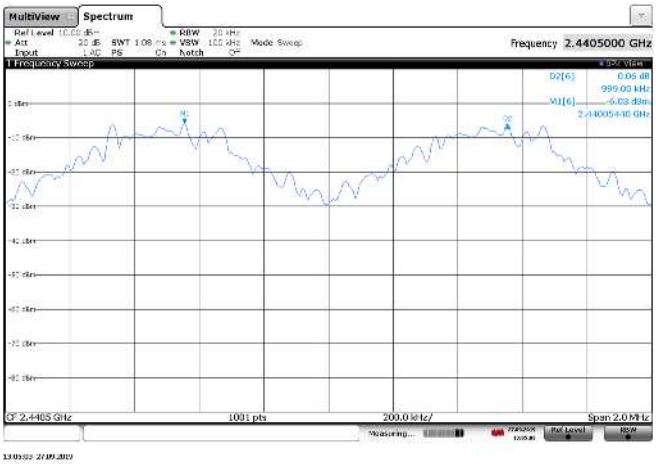
Tx Mode	Hopping Freqency Separation (kHz)	Limit (kHz)
Full Hopping	999	100
Adaptive Hopping	999	100

Note : 1) The measurement was carried out with EUT with temporary antenna port.
2) The measurement was performed in accordance with the test method option 2.

Mode of EUT: Full Hopping



Mode of EUT: Adaptive Hopping



7.3.4 Test Setup (Photographs)

Refer to 7.1.4 Test Setup photograph that is same configuration for measurement.

7.4 Occupied Channel Bandwidth

Since there is no difference in the results between the current version and this item, the data from the previous version V2.1.1 (2016-11) has been reused.

7.4.1 Test Site and Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Environmental Test Chamber	PFL-3K	Espec	-	N/A	N/A
Test Receiver	ESW44	Rohde & Schwarz	R04	2018/11	1 Year
RF Cable	MWX322	Junkosha	CS11	2018/12	1 Year
DC Power Supply	PAB 18-2.5DU	KIKUSUI	-	N/A	N/A
Digital Multi-meter	VOAC7413	Iwatsu Electric	MM01	2019/3	1 Year

Note : Calibration data is current at the time of testing.

7.4.2 Test Method and Test Setup (Diagrammatic illustration)

Step 1:

Connect the EUT to the spectrum analyzer and use the following settings:

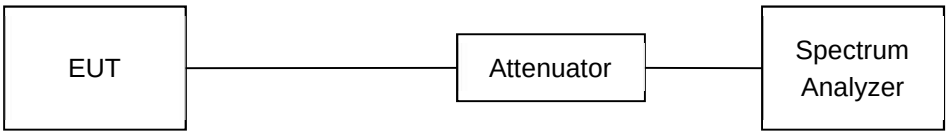
- Centre Frequency: The centre frequency of the channel under test
- Resolution BW: ~ 1 % of the span without going below 1 %
- Video BW: 3 × RBW
- Frequency Span: 2 × Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
- Detector Mode: RMS

Step 2:

Wait until the trace is completed.

Step 3:

Measure the 99 % bandwidth of the EUT.



7.4.3 Test Data

The test data was appropriated from the previous version V2.1.1 (2016-11).

Date : September 27 ,2019
Temp. : 22 ℃
Humi. : 48 %

Mode of EUT : Tx
Test Port : Temporary antenna connector
Data Packet : DH5

Tx Freqency (MHz)	Spectrum Analyzer Reading (MHz)		99% OBW (MHz)	Limit (MHz)		Margin (MHz)
	Lower	Upper		Lower	Upper	
2402.0	2401.570	2402.354	0.784	2400.0	2483.5	1.570
2480.0	2479.556	2480.418	0.862	2400.0	2483.5	3.082

Mode of EUT : Tx
Test Port : Temporary antenna connector
Data Packet : 2DH5

Tx Freqency (MHz)	Spectrum Analyzer Reading (MHz)		99% OBW (MHz)	Limit (MHz)		Margin (MHz)
	Lower	Upper		Lower	Upper	
2402.0	2401.408	2402.574	1.166	2400.0	2483.5	1.408
2480.0	2479.409	2480.574	1.166	2400.0	2483.5	2.926

Mode of EUT : Tx
Test Port : Temporary antenna connector
Data Packet : 3DH5

Tx Freqency (MHz)	Spectrum Analyzer Reading (MHz)		99% OBW (MHz)	Limit (MHz)		Margin (MHz)
	Lower	Upper		Lower	Upper	
2402.0	2401.411	2402.573	1.162	2400.0	2483.5	1.411
2480.0	2479.411	2480.572	1.161	2400.0	2483.5	2.928

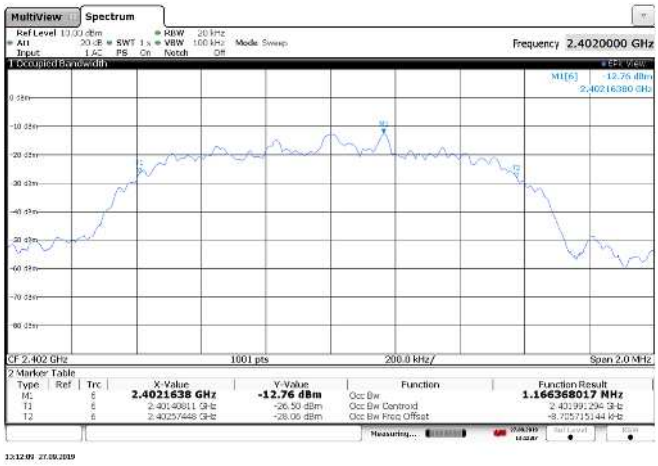
Note : 1) The measurement was carried out with EUT with temporary antenna port.
2) Setting of measuring instrument(s):

Detector	RES B.W.	Video B.W.
RMS	1% of span	3 x RBW

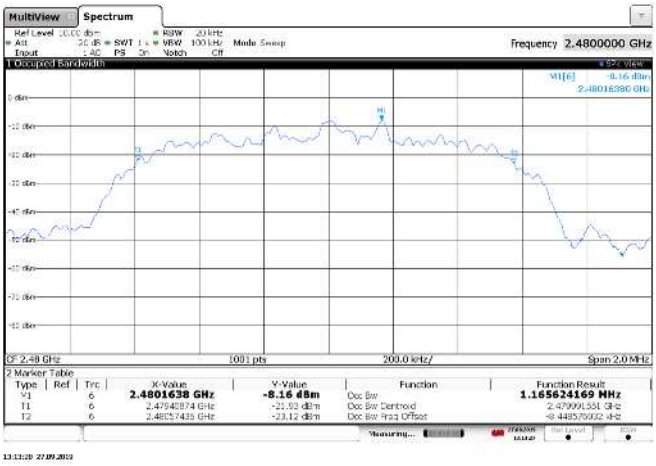
DH5 Low Channel

DH5 High Channel

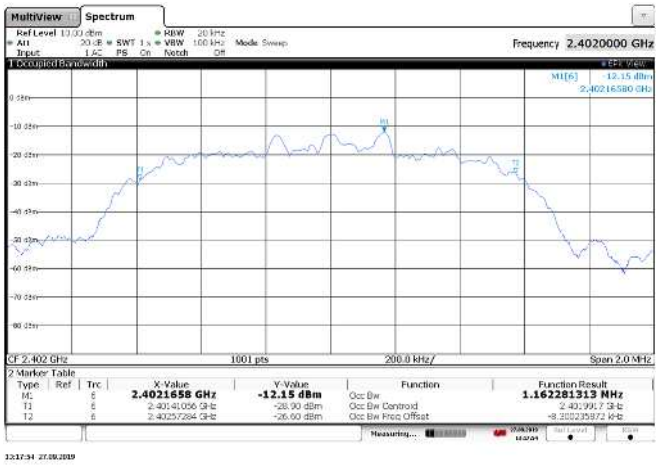
2DH5 Low Channel



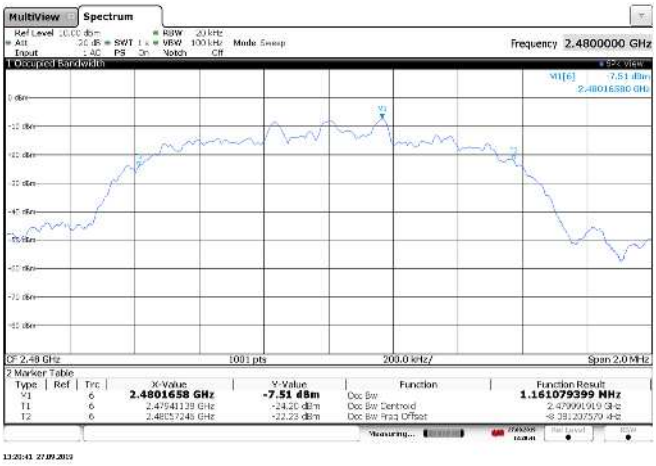
2DH5 High Channel



3DH5 Low Channel



3DH5 High Channel



7.4.4 Test Setup (Photographs)

Refer to 7.1.4 Test Setup photograph that is same configuration for measurement.

7.5 Transmitter unwanted emissions in the out-of-band domain

Since there is no difference in the results between the current version and this item, the data from the previous version V2.1.1 (2016-11) has been reused.

7.5.1 Test Site and Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Environmental Test Chamber	PFL-3K	Espec	-	N/A	N/A
Test Receiver	ESW44	Rohde & Schwarz	R04	2018/11	1 Year
RF Cable	MWX322	Junkosha	CS11	2018/12	1 Year
DC Power Supply	PAB 18-2.5DU	KIKUSUI	-	N/A	N/A
Digital Multi-meter	VOAC7413	Iwatsu Electric	MM01	2019/3	1 Year

Note : Calibration data is current at the time of testing.

7.5.2 Test Method and Test Setup (Diagrammatic illustration)

Step 1:

Connect the EUT to the spectrum analyzer and use the following settings:

- Start/Stop Frequency: The value of the band to estimate
- Resolution BW: 1 MHz
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Max Hold
- Sweep Mode: Continuous
- Trigger Mode: Free Run

Step 2:

Wait until the trace is completed.

Find the peak value of the trace and place the analyzer marker on this peak.

Step 3:

The analyzer is set as follows:

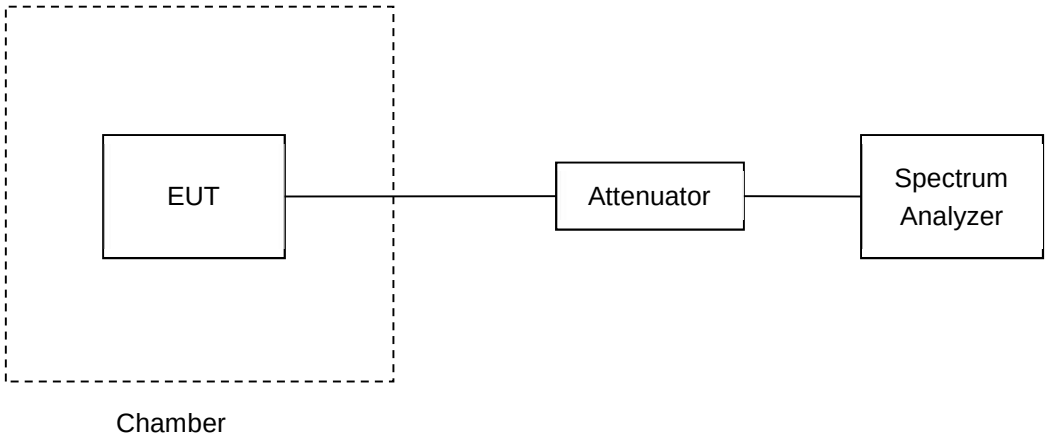
- Centre Frequency: the peak value of the step 2
- Span: 0 Hz
- Resolution BW: 1 MHz
- Video BW: 3 MHz
- Detector Mode: RMS
- Trace Mode: Clear / Write
- Sweep Mode: Continuous
- Trigger Mode: Video trigger
- Sweep Time: Suitable to capture one transmission burst

Step 4:

Adjust the trigger level to select the transmissions with the highest power level.

Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.

Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment. Compare this value with the applicable limit provided by the mask.



7.5.3 Test Data

The test data was appropriated from the previous version V2.1.1 (2016-11).

Date : September 27 ,2019
Temp. : 22 ℃
Humi. : 48 %

Mode of EUT : Tx Hopping
Test Port : Temporary antenna connector
Data rate : DH5

Measurement Band	Correction Factor (dB)	Antenna Gain (dBi)	Meter Reading (dBm/MHz)	Power (dBm/MHz) e.i.r.p	Limit (dBm/MHz) e.i.r.p	Margin (dB)
2400MHz - BW to 2400MHz	1.57	0.25	-68.31	-66.49	-10.00	56.49
2400MHz - 2BW to 2400MHz - BW	1.57	0.25	-73.15	-71.33	-20.00	51.33

Mode of EUT : Tx Hopping
Test Port : Temporary antenna connector
Data rate : DH5

Measurement Band	Correction Factor (dB)	Antenna Gain (dBi)	Meter Reading (dBm/MHz)	Power (dBm/MHz) e.i.r.p	Limit (dBm/MHz) e.i.r.p	Margin (dB)
2483.5MHz to 2483.5MHz + BW	1.57	0.25	-65.52	-63.70	-10.00	53.70
2483.5MHz + BW to 2483.5MHz + 2BW	1.57	0.25	-65.50	-63.68	-20.00	43.68

Note : 1) The measurement was carried out with EUT with temporary antenna port.
2) The manufacturer defines the range of power supply voltage.
3) The correction facter containes the cable loss and attenuator loss.
4) The antenna gain value provided by applicant.
5) Setting of measuring instrument(s):

Detector	RES B.W.	Video B.W.
RMS	1 MHz	3 MHz

6) A sample calculation was made at Low Band Edge
CF + AG + M/R = 1.57 + 0.25 + -68.31 = -66.49 (dBm/MHz e.i.r.p.)
CF : Correction Factor AG : Antenna Gain
M/R : Meter Reading

7.5.4 Test Setup (Photographs)

Refer to 7.1.4 Test Setup photograph that is same configuration for measurement.

7.6 Transmitter unwanted emissions in the spurious domain

Since there is no difference in the results between the current version and this item, the data from the previous version V2.1.1 (2016-11) has been reused.

7.6.1 Test Site and Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Anechoic Chamber	--	TDK	A-1	2019/6	1 Year
Test Receiver	ESW44	Rohde & Schwarz	R04	2018/11	1 Year
Dipole Antenna	KBA-522	Kyoritsu	AD03	2019/6	1 Year
Dipole Antenna	KBA-511A	Kyoritsu	AD01	2019/6	1 Year
Dipole Antenna	KBA-611	Kyoritsu	AD02	2019/6	1 Year
Biconical Antenna	VHA9103/BBA9106	Schwarzbeck	AB01	2019/8	1 Year
Log-periodic Antenna	VULP9118A	Schwarzbeck	AL04	2019/8	1 Year
RF Cable	MWX122	Junkosha Inc.	CS12	2019/9	1 Year
RF Cable	MWX211	Junkosha Inc.	CS02	2019/9	1 Year
Power Meter	ML2495A	Anritsu	PM01	2019/6	1 Year
Power Sensor	MA2491A	Anritsu	PM01-S1	2019/6	1 Year
Signal Generator	SMB100B	Rohde & Schwarz	SG10	2019/6	1 Year
Log-periodic Antenna	HL050	Rohde & Schwarz	AL03	2019/2	1 Year
RF Cable	MWX211	Junkosha Inc.	CS10	2019/7	1 Year
RF Cable	F130-S1S1-394	MEGA PHASE	CS08	2019/10	1 Year
Attenuator	43KC-20	Anritsu	ATT02	2019/10	1 Year
RF Amplifier	MLA-100M26-B02	Techno Science Japan	PA07	2019/1	1 Year
Band Rejection Filter	BRM12294	MICRO-TRONICS	F03	2018/10	1 Year
Horn Antenna	3115	ETS LINGGREN	AH05	2019/6	1 Year

Note : Calibration data is current at the time of testing.

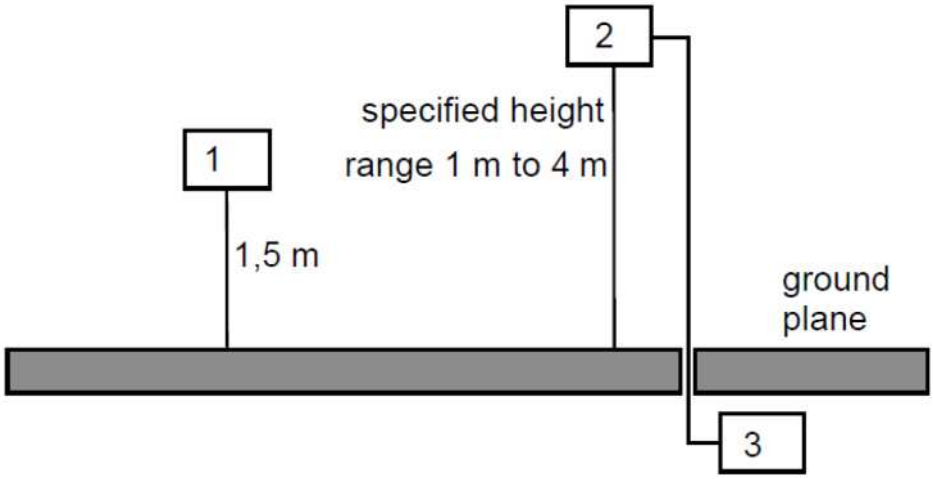
7.6.2 Test Method and Test Setup (Diagrammatic illustration)

According to description of EN 300 328 V2.2.2 Annex C, the radiated emissions measurement were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

-Test Method-

The spurious radiation for transmitter were measured at the distance 3 m away from the EUT which was placed on a non-conducted support 1.5 m in height and was varying at three orthogonal axes. The receiving antenna was oriented for vertical polarization and varied from 1 m to 4 m until the maximum emission level was detected on the measuring instrument. The EUT was rotated 360 degrees until the maximum emission was received. The measurement was also repeated with the receiving antenna in the horizontal polarization.

The EUT was replaced to substitution antenna at the same polarized under the same condition as step 1.
The RF power was fed to the transmitting antenna from the signal generator.
In order to obtain the maximum emission level, the height of the receiving antenna was varied from 1 m to 4 m.
The power of the signal generator is adjusted until the same level is obtained in the step1.
Then the RF power into the substitution antenna was P (dBm).



1) UUT
2) Measurement antenna
3) Measurement equipment

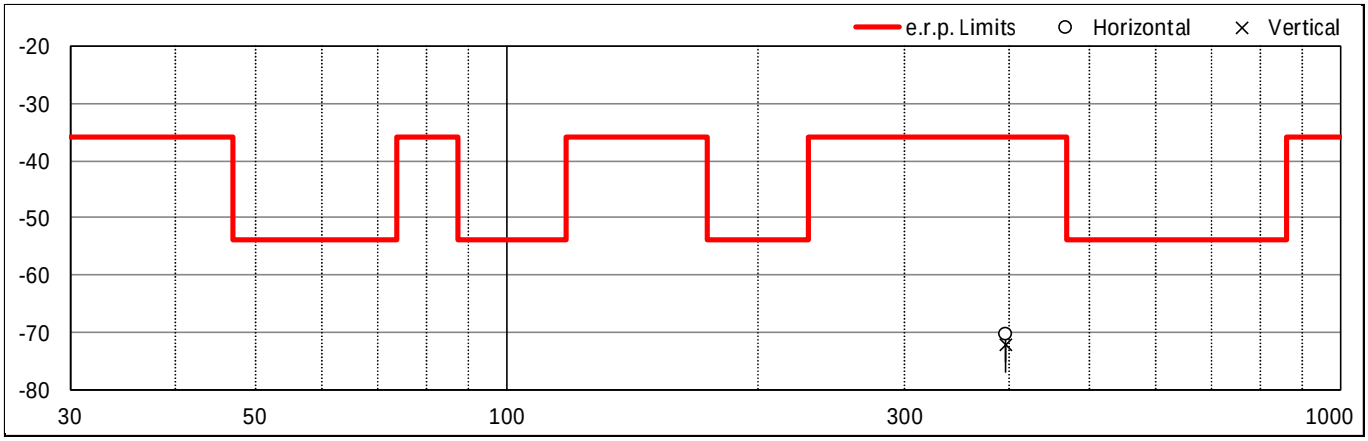
7.6.3 Test Data

The test data was appropriated from the previous version V2.1.1 (2016-11).

Mode of EUT : Tx Mode
Test Port : Enclosure

Date : October 3 ,2019
Temp. : 22 ℃
Humi. : 48 %

Freqency (MHz)	Emission Levels e.r.p (dBm) Horizontal	Vertical	Limits (dBm)	Margin (dB) Horizontal	Vertical
269.240	< -75.0	< -75.0	-36.0	> 39.0	> 39.0
332.900	< -75.0	< -75.0	-36.0	> 39.0	> 39.0
396.080	-70.2	-72.0	-36.0	34.2	36.0
465.620	< -75.0	< -75.0	-36.0	> 39.0	> 39.0
599.990	< -75.0	< -75.0	-54.0	> 21.0	> 21.0
737.270	< -75.0	< -75.0	-54.0	> 21.0	> 21.0
786.410	< -75.0	< -75.0	-54.0	> 21.0	> 21.0
835.580	< -75.0	< -75.0	-54.0	> 21.0	> 21.0



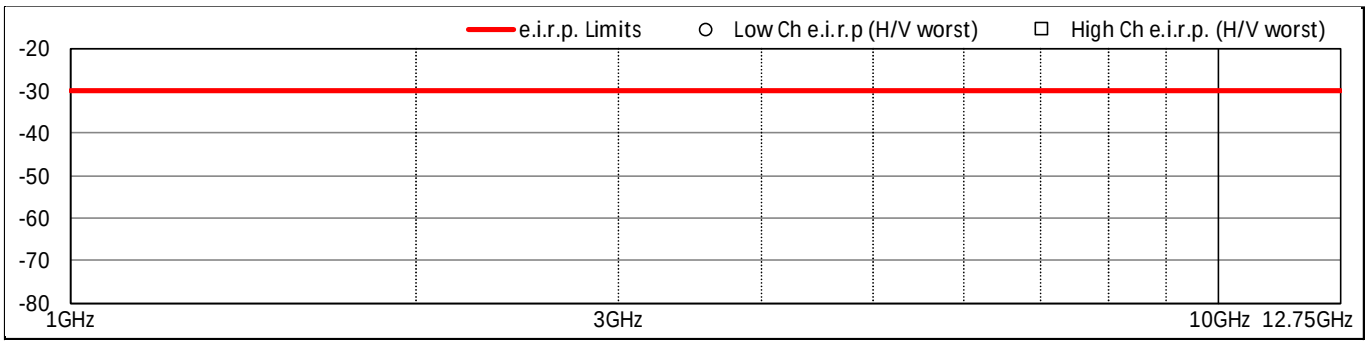
NOTES
1) The spectrum was checked from 30 MHz to 1000 MHz.
2) The symbol of "<" means "or less".
3) The symbol of ">" means "or greater".
4) Measuring Instrument Setting :

Detector Function	Resolution Bandwidth	Video Bandwidth
RMS	100kHz	300kHz

Mode of EUT : Tx Mode
Test Port : Enclosure

Date : October 3 ,2019
Temp. : 22 ℃
Humi. : 48 %

Freqency (MHz)	Emission Levels e.i.r.p (dBm) Horizontal	Vertical	Limits (dBm)	Margin (dB) Horizontal	Vertical
Low Channel : 0 ch (2402 MHz)					
1188.300	< -83.3	< -83.3	-30.0	> 53.3	> 53.3
1451.000	< -81.3	< -81.3	-30.0	> 51.3	> 51.3
1613.900	< -79.8	< -79.8	-30.0	> 49.8	> 49.8
1882.600	< -78.6	< -78.6	-30.0	> 48.6	> 48.6
4804.000	< -68.3	< -68.3	-30.0	> 38.3	> 38.3
7206.000	< -63.7	< -63.7	-30.0	> 33.7	> 33.7
9608.000	< -59.6	< -59.6	-30.0	> 29.6	> 29.6
12010.000	< -56.4	< -56.4	-30.0	> 26.4	> 26.4
High Channel : 79 ch (2480 MHz)					
1188.300	< -83.3	< -83.3	-30.0	> 53.3	> 53.3
1451.000	< -81.3	< -81.3	-30.0	> 51.3	> 51.3
1613.900	< -79.8	< -79.8	-30.0	> 49.8	> 49.8
1882.600	< -78.6	< -78.6	-30.0	> 48.6	> 48.6
4960.000	< -68.0	< -68.0	-30.0	> 38.0	> 38.0
7440.000	< -63.2	< -63.2	-30.0	> 33.2	> 33.2
9920.000	< -58.4	< -58.4	-30.0	> 28.4	> 28.4
12400.000	< -55.8	< -55.8	-30.0	> 25.8	> 25.8

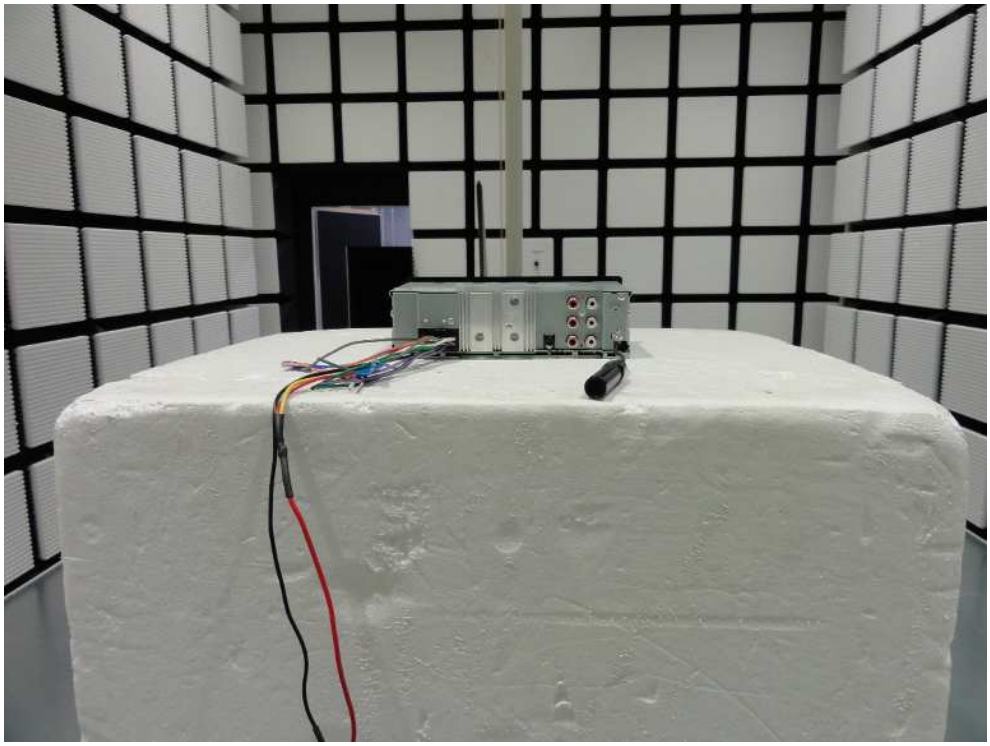


NOTES
1) The spectrum was checked from 1GHz to 12.75GHz.
2) The symbol of "<" means "or less".
3) The symbol of ">" means "or greater".
4) Measuring Instrument Setting :

Detector Function	Resolution Bandwidth	Video Bandwidth
RMS	1MHz	3MHz

7.6.4 Test Setup (Photographs)

– Front View –



– Rear View –

7.7 Receiver spurious emissions

Since there is no difference in the results between the current version and this item, the data from the previous version V2.1.1 (2016-11) has been reused.

7.7.1 Test Site and Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Anechoic Chamber	--	TDK	A-1	2019/6	1 Year
Test Receiver	ESW44	Rohde & Schwarz	R04	2018/11	1 Year
Dipole Antenna	KBA-522	Kyoritsu	AD03	2019/6	1 Year
Dipole Antenna	KBA-511A	Kyoritsu	AD01	2019/6	1 Year
Dipole Antenna	KBA-611	Kyoritsu	AD02	2019/6	1 Year
Biconical Antenna	VHA9103/BBA9106	Schwarzbeck	AB01	2019/8	1 Year
Log-periodic Antenna	VULP9118A	Schwarzbeck	AL04	2019/8	1 Year
RF Cable	MWX122	Junkosha Inc.	CS12	2019/9	1 Year
RF Cable	MWX211	Junkosha Inc.	CS02	2019/9	1 Year
Power Meter	ML2495A	Anritsu	PM01	2019/6	1 Year
Power Sensor	MA2491A	Anritsu	PM01-S1	2019/6	1 Year
Signal Generator	SMB100B	Rohde & Schwarz	SG10	2019/6	1 Year
Log-periodic Antenna	HL050	Rohde & Schwarz	AL03	2019/2	1 Year
RF Cable	MWX211	Junkosha Inc.	CS10	2019/7	1 Year
RF Cable	F130-S1S1-394	MEGA PHASE	CS08	2019/10	1 Year
Attenuator	43KC-20	Anritsu	ATT02	2019/10	1 Year
RF Amplifier	MLA-100M26-B02	Techno Science Japan	PA07	2019/1	1 Year
Band Rejection Filter	BRM12294	MICRO-TRONICS	F03	2018/10	1 Year
Horn Antenna	3115	ETS LINGGREN	AH05	2019/6	1 Year

Note : Calibration data is current at the time of testing.

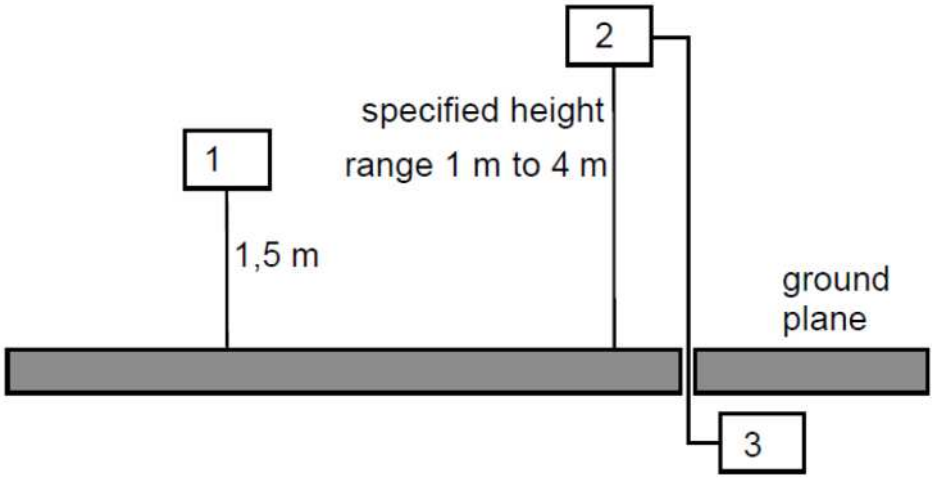
7.7.2 Test Method and Test Setup (Diagrammatic illustration)

According to description of EN 300 328 V2.2.2 Annex C, the radiated emissions measurement were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

-Test Method-

The spurious radiation for transmitter were measured at the distance 3 m away from the EUT which was placed on a non-conducted support 1.5 m in height and was varying at three orthogonal axes. The receiving antenna was oriented for vertical polarization and varied from 1 m to 4 m until the maximum emission level was detected on the measuring instrument. The EUT was rotated 360 degrees until the maximum emission was received. The measurement was also repeated with the receiving antenna in the horizontal polarization.

The EUT was replaced to substitution antenna at the same polarized under the same condition as step 1.
The RF power was fed to the transmitting antenna from the signal generator.
In order to obtain the maximum emission level, the height of the receiving antenna was varied from 1 m to 4 m.
The power of the signal generator is adjusted until the same level is obtained in the step1.
Then the RF power into the substitution antenna was P (dBm).



1) UUT
2) Measurement antenna
3) Measurement equipment

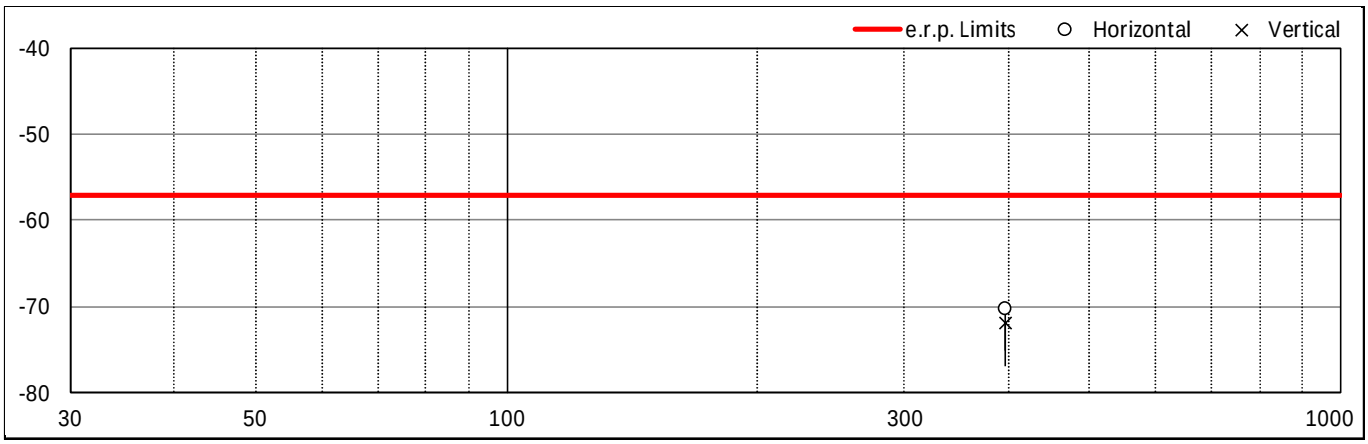
7.7.3 Test Data

The test data was appropriated from the previous version V2.1.1 (2016-11).

Mode of EUT : Rx Mode
Test Port : Enclosure

Date : October 3 ,2019
Temp. : 22 ℃
Humi. : 48 %

Freqency (MHz)	Emission Levels e.r.p (dBm) Horizontal	Vertical	Limits (dBm)	Margin (dB) Horizontal	Vertical
269.240	< -75.0	< -75.0	-57.0	> 18.0	> 18.0
332.900	< -75.0	< -75.0	-57.0	> 18.0	> 18.0
396.080	-70.2	-72.0	-57.0	13.2	15.0
465.620	< -75.0	< -75.0	-57.0	> 18.0	> 18.0
599.990	< -75.0	< -75.0	-57.0	> 18.0	> 18.0
737.270	< -75.0	< -75.0	-57.0	> 18.0	> 18.0
786.410	< -75.0	< -75.0	-57.0	> 18.0	> 18.0
835.580	< -75.0	< -75.0	-57.0	> 18.0	> 18.0



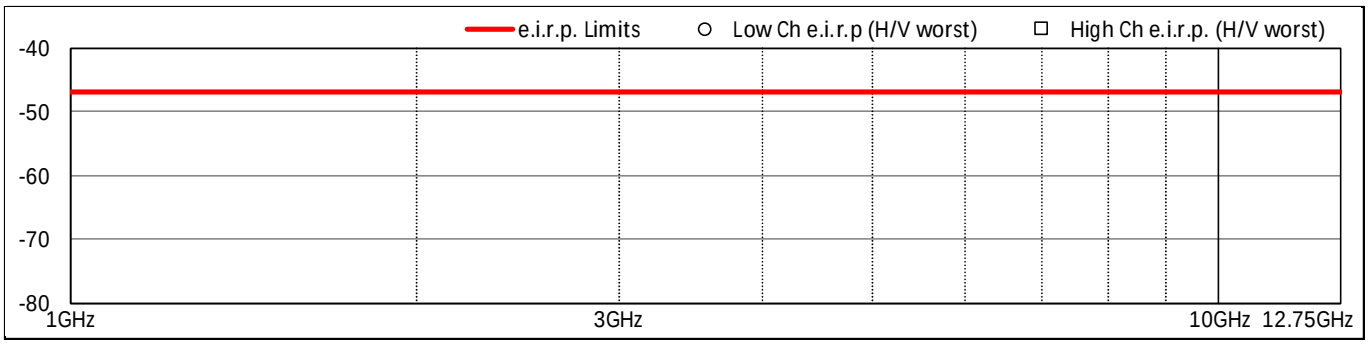
NOTES
1) The spectrum was checked from 30 MHz to 1000 MHz.
2) The symbol of "<" means "or less".
3) The symbol of ">" means "or greater".
4) Measuring Instrument Setting :

Detector Function	Resolution Bandwidth	Video Bandwidth
RMS	100kHz	300kHz

Mode of EUT : Rx Mode
Test Port : Enclosure

Date : October 3 ,2019
Temp. : 22 ℃
Humi. : 48 %

Freqency (MHz)	Emission Levels e.i.r.p (dBm) Horizontal	Vertical	Limits (dBm)	Margin (dB) Horizontal	Vertical
Low Channel : 0 ch (2402 MHz)					
1188.300	< -83.3	< -83.3	-47.0	> 36.3	> 36.3
1451.000	< -81.3	< -81.3	-47.0	> 34.3	> 34.3
1613.900	< -79.8	< -79.8	-47.0	> 32.8	> 32.8
1882.600	< -78.6	< -78.6	-47.0	> 31.6	> 31.6
2402.000	< -76.1	< -76.1	-47.0	> 29.1	> 29.1
4804.000	< -68.3	< -68.3	-47.0	> 21.3	> 21.3
7206.000	< -63.7	< -63.7	-47.0	> 16.7	> 16.7
9608.000	< -59.6	< -59.6	-47.0	> 12.6	> 12.6
High Channel : 79 ch (2480 MHz)					
1188.300	< -83.3	< -83.3	-47.0	> 36.3	> 36.3
1451.000	< -81.3	< -81.3	-47.0	> 34.3	> 34.3
1613.900	< -79.8	< -79.8	-47.0	> 32.8	> 32.8
1882.600	< -78.6	< -78.6	-47.0	> 31.6	> 31.6
2480.000	< -75.8	< -75.8	-47.0	> 28.8	> 28.8
4960.000	< -68.0	< -68.0	-47.0	> 21.0	> 21.0
7440.000	< -63.2	< -63.2	-47.0	> 16.2	> 16.2
9920.000	< -58.4	< -58.4	-47.0	> 11.4	> 11.4



NOTES
1) The spectrum was checked from 1GHz to 12.75GHz.
2) The symbol of "<" means "or less".
3) The symbol of ">" means "or greater".
4) Measuring Instrument Setting :

Detector Function	Resolution Bandwidth	Video Bandwidth
RMS	1MHz	3MHz

7.7.4 Test Setup (Photographs)

Refer to 7.6.4 Test Setup photograph that is same configuration for measurement

7.8 Receiver Blocking

7.8.1 Test Site and Instruments

Type	Model	Manufacturer	ID No.	Last Cal.	Interval
Shield Room	--	TDK	M-1	-	-
Signal Generator	SMB100A	Rohde & Schwarz	SG06	2020/12	1 Year
Direct Coupler	3292-1	narda	-	2020/9	1 Year
Step Attenuator	8494B	Keysight	-	2020/12	1 Year
Step Attenuator	8496B	Keysight	-	2020/12	1 Year
Combiner	1575	Weuschel	R-31	2020/10	1 Year
Signal Analyzer	N9010	Keysight	SA04	2020/12	1 Year
RF Cable	MWX221	Junkosha	CS03	2020/3	1 Year
RF Cable	MWX221	Junkosha	CS10	2020/7	1 Year

7.8.2 Test Method and Test Setup (Diagrammatic illustration)

Step 1:

For non-FHSS equipment, the UUT shall be set to the lowest operating channel.

Step 2:

The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure.

The level of the wanted signal set to the value provided in the table corresponding to the receiver category and type of equipment.

This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT.

The resulting level for the wanted signal at the input of the UUT is Pmin. This signal level (Pmin) is increased by the value provided in note 2 of the applicable table corresponding to the receiver category and type of equipment.

Step 4:

The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment.

If the performance criteria as specified met then proceed to step 6.

Step 5:

If the performance criteria as specified not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the Occupied Channel Bandwidth except.

It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used.Step 6:

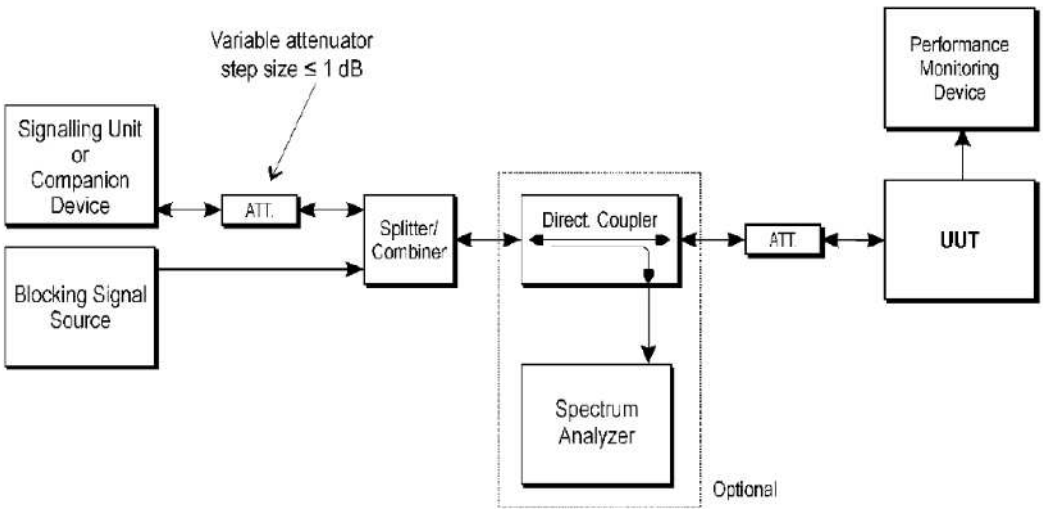
Repeat step 4 and step 5 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 7:

For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the highest operating channel on which the blocking test has to be performed.

Step 8:

It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.



7.8.3 Test Data

Tested Date : February 16, 2021
Climatic Conditions : Ambient Temperature : 20 ℃
Relative Humidity : 35 %

Wanted signal mean Power from companion device (dBm)	Blocking signal Frequency (MHz)	Blocking signal Power (dBm)	Type of blocking signal	Result
-69 *1 *2	2380	-34 *2	CW	Pass
	2504	-34 *2	CW	Pass
-69 *1 *2	2300	-34 *2	CW	Pass
	2584	-34 *2	CW	Pass

*1 : The smaller of (-139 dBm + 10 × log10(OCBW) + 10 dB) and -74 dBm + 10 dB was based on EN300328 V2.2.2 Table 7 of the standard. or whichever is less.
*2 : The input values of the desired signal and block signal are added to the antenna gain and the value of the cable loss extended for conduction.

Performance Criteria
Confirmed profiles: HFP, A2DP
I reproduced sound of 1 kHz from companion device,
and confirmed that there was no loss of link and no sound interruption.

7.8.4 Test Setup (Photographs)

Appendix A : Similar Models

The EUT has the following similar models.
The similar model details are shown as follow table;

Model	Brand	Difference
KD-X472DBT	JVC	Base
KD-X272DBT	JVC	Key coloe RED, None iPod/iPhone I/F, 1-Preout
KD-X470BHS	JVC	None LW,Non DAB, Destination
KMR-M506DAB	KENWOOD	2-Preout
KMM-BT506DAB	KENWOOD	2-Preout
KMM-X704	KENWOOD	None LW,Non DAB, Destination
KMM-BT728HD	KENWOOD	None LW,Non DAB, Destination

--- END OF REPORT ---