

TEST REPORT



DSP Research, Inc.



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1. Release Record & Date

Report Number	Description	Received Date	Tested by	Reported by
721115049117_ LTE_Band26	Initial issue	2022/11/24	Kemini Nenbamroong.	Kemini Nenbamroong.
			Kemini Nenbamroong	Kemini Nenbamroong

Issued Date	Approved by
2022/12/13	
	Koichi Minaki

2. Information

2.1. Applicant

Applicant name	Quectel Wireless Solutions Co.,Ltd.
Applicant Address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

2.2. Testing Laboratory

Testing Laboratory	DSP Research, Inc.
Lab. Address	1-4-3 Minatojima, Minamimachi, Chuo-ku, Kobe, Hyogo, Japan 650-0047
Lab. Telephone	+81 78-940-0377
Lab. FAX	+81 78-940-0378

2.3. Product

Model name	SC200E-JP				
Classification of specified radio equipment	Certification Ordinance Article 2 Clause 1 Item 11-19 Single Carrier Frequency Division Multiple Access				
Type of equipment	Land Mobile Station				
Communication method	Frequency Division Duplex (FDD) system				
Multiplexing method	See document				
Modulation method	See document				
Transmission data rate	See document				
Rated output power	Refer to Test Results				
Number of antennas	Refer to Test Results				
Type of emissions	D1A,D1B,D1C,D1D,D1E,D1F,D1X,D7W G1A,G1B,G1C,G1D,G1E,G1F,G1X,G7W				
Supported Band & Channel Bandwidth		5MHz	10MHz	15MHz	20MHz
	Band28	✓	✓	✓	✓
	Band 26	✓	✓	✓	
	Band8	✓	✓		
	Band11+21	✓	✓	✓	
	Band3	✓	✓	✓	✓
	Band1(inc A-MPR)	✓	✓	✓	✓

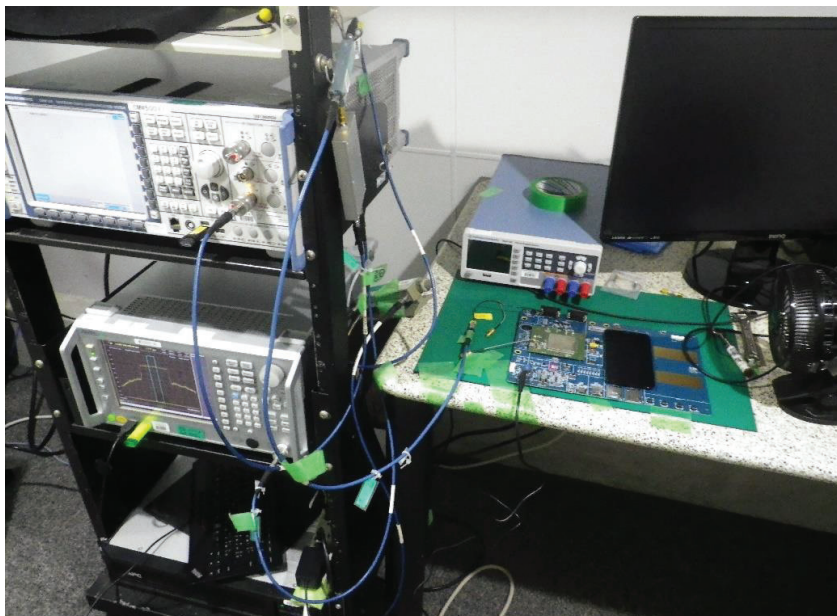
2.4. Opinions and interpretations

* --

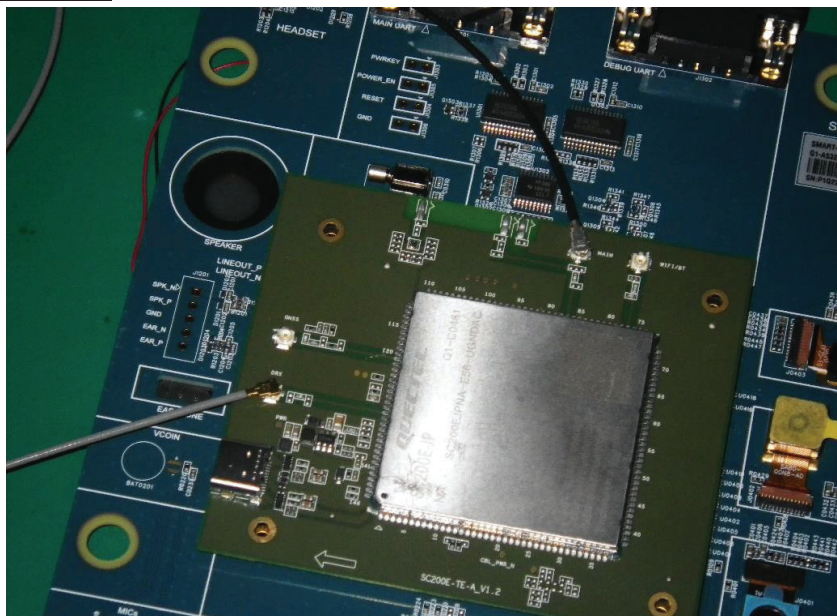
The test results in this report apply exclusively to the tested model/sample, without written approval of DSP Research, Inc. the test report shall not be reproduced except in full.

2.5. Test Conditions Photograph

Measurement State



Connected Part



3. Measurement Equipment List

3.1. Test date and environment information

Test Date	Ambient Temperature [°C]	Relative Humidity [%]
2022/11/27	23	52
2022/11/30	23	60
2022/12/6	24	62
2022/12/9	N/A*	N/A*
2022/12/12	N/A*	N/A*

*Not applicable due to perform the environmental test

3.2. Measurement Equipment

Use	Kind of Equipment	Model Name	Manufacturer	Serial No.	Calibration Authority	Cal Date	Cal Method
X	Spectrum Analyzer	MS2692A	Anritsu Corporation	6201094932	Anritsu Customer Support Co., Ltd.	2022/11/11	b)
X	Temperature & Humidity Chamber	PR-2J	ESPEC Corp.	15010030	ESPEC Corp.	2022/12/2(*1)	d)
X	Vibration Unit	731-B	EMIC CORPORATION	4668	JQA	2022/9/9	b)
X	Wideband Radio Communication Tester	CMW500	ROHDE & SCHWARZ	101183	ROHDE & SCHWARZ	2021/12/9	b)
X	DIGITAL MULTIMETER	MODEL 2001	KYORITSU	192203	DSP Research, Inc.	2022/1/20	d)

Note 1: "X" used equipment.

Note 2: The validity of measurement equipment is one year from the first day of the following month of the calibration date.

(e.g. If the calibration date is December 15th, 2014, measurement equipment can be used from December 15th, 2014 to December 31st, 2015.)

Note 3: Calibration Method

a): Calibration conducted by the National Institute of Information and Communications Technology(NICT)(hereinafter referred to as "NICT") or a designated calibration agency under Article 102-18 paragraph (1)

b): Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992)

c): Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1)

d): Calibration conducted by using measuring instruments and other equipment listed in the right column of Table No. 3 attached hereto, which shall have been given any of calibration, etc. listed above from **a)** to **c)**

Note 4: The equipment of (*1) didn't use before 2022/12/9.

4. Measurement Uncertainty

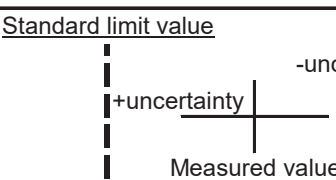
*In this test, the influence of an error or uncertainty may be done according to the following factors.

- Bias of a measurement equipment, Change by aging, Attrition, Noise
- Skill and capability of an inspector
- Environment (Temperature, Humidity)
- Dispersion in a EUT (Equipment Under Test)
- Uncertainty of calibration of a measurement equipment

Therefore, Synthetic uncertainty is calculated using "k=2" of coverage factor, and about 95% of confidence level shall be obtained. In consideration of the above, it judged as

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulat limits or required by manufacturers.

JUDGE	Measured value and Standard limit value	
PASS	Case1  *Even if it takes uncertainty into consideration, a standard limit value is fulfilled.	
	Case2  *Although measured value is in a standard limit value, a limit value won't be fulfilled if uncertainty is taken into consideration.	
FAIL	Case3  *Although measured value exceeds a standard limit value, a limit value will be fulfilled if uncertainty is taken into consideration.	
	Case4  *Even if it takes uncertainty into consideration, a standard limit value isn't fulfilled.	

ITEM	UNCERTAINTY
Frequency Tolerance	5.20 Hz
Occupied Bandwidth (5M00)	42.66 kHz
Occupied Bandwidth (10M0)	135.02 kHz
Occupied Bandwidth (15M0)	135.02 kHz
Occupied Bandwidth (20M0)	148.24 kHz
Tolerance for Output Power	2.36 dB
Spurious Emission or Unwanted Emission Intensity (2f)	0.86 dB
Spurious Emission or Unwanted Emission Intensity (3f)	0.86 dB
Spurious Emission or Unwanted Emission Intensity (4f)	1.09 dB
Spurious Emission or Unwanted Emission Intensity (5f)	1.09 dB

5.A. Test Results for 5 MHz

5.A.1. Testing Information for 5 MHz

Type of application	☒ Type certificate ☐ Test certificate
Input voltage	3.8 VDC (Rated voltage only)
Used software (& version)	--
Firmware version	--
Serial number	D1C22K30F000086
The reason why the tests are performed only at rated voltage	When the input voltage to receiver RF circuit varies below $\pm 1\%$ as the input voltage from the external power supply to the receiver varies $\pm 10\%$ (excluding power supply).
Test Method	The test method of Ordinance Concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment in Annex 1, the Ministry of Internal Affairs and Communication notification in Annex 86 of Article 88, Paragraph 1 or the test method more than equivalent.

Channel bandwidth	5 MHz
Frequency range & number of channels	817.5 ~ 842.5MHz (100kHz interval 251 channels)
Number of antennas	TX : 1 RX : 2 ☐ SDM --

	1st Channel (Lower)	2nd Channel (Middle)	3rd Channel (Upper)
Frequency	817.5 MHz	830 MHz	842.5 MHz
RB / RB start	25 / 0	25 / 0	25 / 0

5.A.2. Summary of test results for 5 MHz

The radio equipment has been tested according to the following specifications:

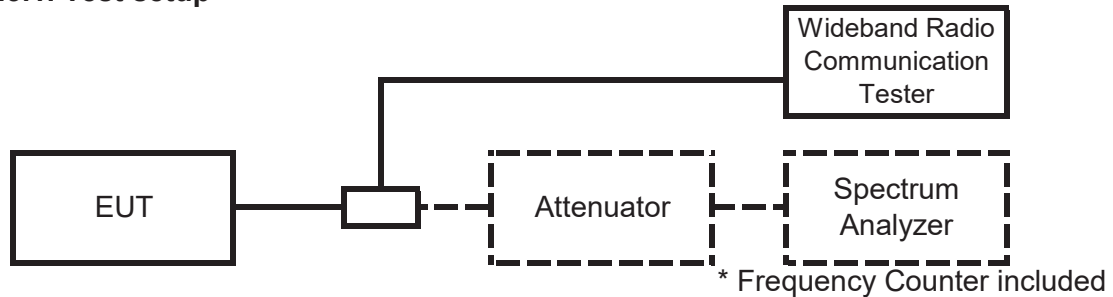
Article 88 Paragraph 1, Appendix 86	ORRE reference	Report reference	Item	Result
Transmitter				
No.2	Article 5	5.A. 3.	Frequency Tolerance	PASS
No.5	Article 6	5.A. 4.	Occupied Bandwidth	PASS
No.6	Article 7	5.A. 5.	Spurious Emission or Unwanted Emission Intensity (1)	PASS
No.6	Article 7	5.A. 6.	Spurious Emission or Unwanted Emission Intensity (2)	PASS
No.7	Article 49-6-9	5.A. 7.	Adjacent Channel Leakage Power	PASS
No.8	Article 14	5.A. 8.	Tolerance for Output Power	PASS
No.9	Article 49-6-9	5.A. 9.	Leakage Power at No-Carrier Transmission	PASS
Receiver				
No.10	Article 24.4,5,6,7	5.A. 10.	Secondary Radiated Emissions	PASS
Transmission Antenna				
Function				
Condition for Frequency Stabilization				
No.1	Article 15.1	5.A. 1.	Voltage fluctuation	Comply
No.4	Article 15.2	5.A. 3.	Environment	PASS
No.3	Article 15.3	5.A. 3.	Vibration	PASS
Etc.				
--	--			
--	--			

ORRE : Ordinance Regulating Radio Equipment

N/A : Not Applicable

5.A.3. Frequency Tolerance [Article 5]

5.A.3.1. Test setup



5.A.3.2. Limit

$\pm (0.1 \times cf \times 10^{-6} + 15) \text{ Hz or less}$

cf : Center Frequency (MHz)

5.A.3.3. Test condition

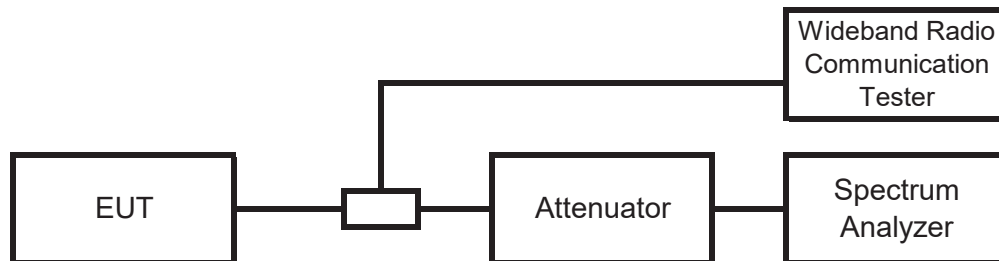
1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.A.3.4. Test result

Center Freq(cf)	1st Channel	2nd Channel	3rd Channel	Unit	Result
<Condition>	817.5 MHz	830 MHz	842.5 MHz		
RB / RB start	25 / 0	25 / 0	25 / 0		--
<Normal>					
Measurement Frequency	817.50000126	830.00000501	842.50000399	MHz	--
Tolerance	1.26	5.01	3.99	Hz	PASS
Limit	± 96.75	± 98.00	± 99.25	Hz	
<After vibration test>					
Measurement Frequency	817.50000210	830.00000475	842.50000360	MHz	--
Tolerance	2.10	4.75	3.60	Hz	PASS
Limit	± 96.75	± 98.00	± 99.25	Hz	
<With high temperature test> Temp. 60 °C R.H. 65 %					
Measurement Frequency	817.50000388	830.00000456	842.50000445	MHz	--
Tolerance	3.88	4.56	4.45	Hz	PASS
Limit	± 96.75	± 98.00	± 99.25	Hz	
<With low temperature test> Temp. -20 °C R.H. -- %					
Measurement Frequency	817.50000255	830.00000764	842.50000415	MHz	--
Tolerance	2.55	7.64	4.15	Hz	PASS
Limit	± 96.75	± 98.00	± 99.25	Hz	
<After high humidity test> Temp. 35 °C R.H. 95 %					
Measurement Frequency	817.50000210	830.00000475	842.50000360	MHz	--
Tolerance	2.10	4.75	3.60	Hz	PASS
Limit	± 96.75	± 98.00	± 99.25	Hz	

5.A.4. Occupied Bandwidth [Article 6]

5.A.4.1. Test setup



5.A.4.2. Limit

5 MHz or less

5.A.4.3. Test condition

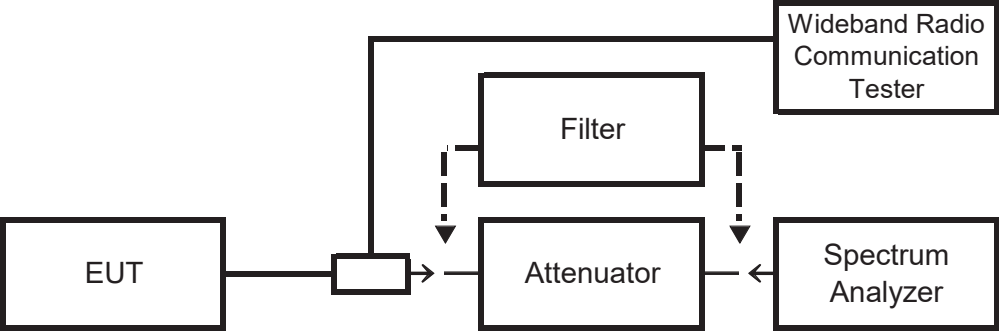
1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.A.4.4. Test result

Center Freq	1st Channel 817.5 MHz	2nd Channel 830 MHz	3rd Channel 842.5 MHz	Limit	Result
RB / RB start	25 / 0	25 / 0	25 / 0	--	--
Occupied Bandwidth (MHz)	4.4625	4.45625	4.4625	5	PASS

5.A.5. Spurious Emission or Unwanted Emission Intensity (1) [Article 7]

5.A.5.1. Test setup



5.A.5.2. Limit

<Unwanted emission intensity in out-band area>

Channel spacing	:	5	MHz
(Detuning frequency	:	-12.5	MHz ~ +12.5 MHz)

cf ± (2.5 to 3.5) MHz	:	-13.5	dBm/30kHz
cf ± (3.5 to 7.5) MHz	:	-8.5	dBm/1MHz
cf ± (7.5 to 8.5) MHz	:	-11.5	dBm/1MHz
cf ± (8.5 to 12.5) MHz	:	-23.5	dBm/1MHz

cf : Center Frequency (MHz)

5.A.5.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

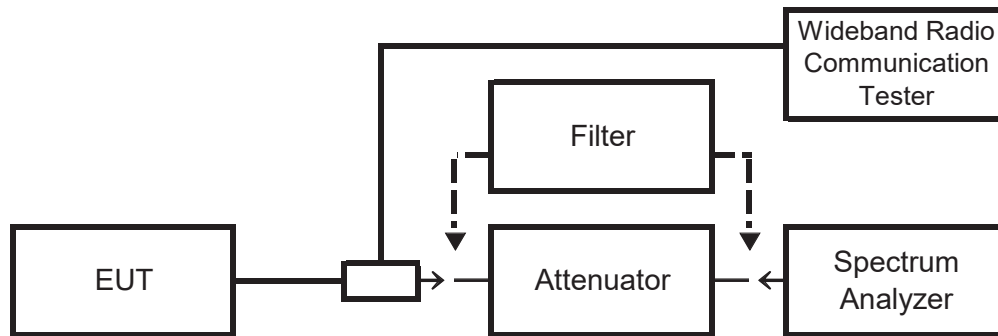
5.A.5.4. Test result

<Unwanted emission intensity in out-band area>

Center Freq (cf) Range	1st Channel 817.5 MHz	2nd Channel 830 MHz	3rd Channel 842.5 MHz	Limit	Result
RB / RB start	25 / 0	25 / 0	25 / 0	--	--
cf - (2.5 to 3.5) MHz	814.9805 MHz	827.4942 MHz	839.9931 MHz	-13.5	PASS
(dBm/30kHz)	-32.41	-31.24	-31.13		
cf + (2.5 to 3.5) MHz	820.0077 MHz	832.5048 MHz	845.008 MHz	-13.5	PASS
(dBm/30kHz)	-33.17	-32.80	-31.67		
cf - (3.5 to 7.5) MHz	814 MHz	826.5 MHz	839 MHz	-8.5	PASS
(dBm/1MHz)	-23.43	-22.03	-21.75		
cf + (3.5 to 7.5) MHz	821 MHz	833.5 MHz	846 MHz	-8.5	PASS
(dBm/1MHz)	-27.22	-26.79	-25.89		
cf - (7.5 to 8.5) MHz	810 MHz	822.4998 MHz	834.9996 MHz	-11.5	PASS
(dBm/1MHz)	-39.84	-39.56	-38.86		
cf + (7.5 to 8.5) MHz	825 MHz	837.5 MHz	850 MHz	-11.5	PASS
(dBm/1MHz)	-37.33	-39.07	-39.60		
cf - (8.5 to 12.5) MHz	809 MHz	820.2462 MHz	832.7197 MHz	-23.5	PASS
(dBm/1MHz)	-43.14	-39.92	-39.74		
cf + (8.5 to 12.5) MHz	826 MHz	839.7808 MHz	851 MHz	-23.5	PASS
(dBm/1MHz)	-39.10	-39.15	-41.28		

5.A.6. Spurious Emission or Unwanted Emission Intensity (2) [Article 7]

5.A.6.1. Test setup



5.A.6.2. Limit

cf : Center Frequency (MHz)

BW: Upper limit of Occupied Bandwidth (MHz)

<Unwanted emission intensity in spurious area>

Detuning frequency	± 12.5 MHz or more	Note: (*1) and (*2) are excluded.
9 to 150 kHz	: -36 dBm/1kHz or less	
150 kHz to 30 MHz	: -36 dBm/10kHz or less	
30 to 1000 MHz	: -36 dBm/100kHz or less	
(*1) 470 to 710 MHz	: -36 dBm/100kHz or less	
(*1) 773 to 803 MHz	: -36 dBm/100kHz or less	
(*1) 773 to 803 MHz	: -36 dBm/100kHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
(*1) 860 to 890 MHz	: -40 dBm/1MHz or less	
(*1) 945 to 960 MHz	: -36 dBm/100kHz or less	
(*1) 945 to 960 MHz	: -36 dBm/100kHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
1 to 12.75 GHz	: -30 dBm/1MHz or less	
(*2) 1475.9 to 1496.6 MHz	: -50 dBm/1MHz or less	
(*2) 1475.9 to 1496.6 MHz	: -30 dBm/1MHz or less	$cf \pm (BW / 2) = 737.95 \sim 748\text{MHz}$
(*2) 1496.6 to 1510.9 MHz	: -50 dBm/1MHz or less	
(*2) 1805 to 1845 MHz	: -30 dBm/1MHz or less	
(*2) 1805 to 1845 MHz	: -30 dBm/1MHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
(*2) 1845 to 1880 MHz	: -50 dBm/1MHz or less	
(*2) 1884.5 to 1915.7 MHz	: -41 dBm/300kHz or less	
(*2) 2010 to 2025 MHz	: -50 dBm/1MHz or less	
(*2) 2110 to 2153.6 MHz	: -50 dBm/1MHz or less	
(*2) 2153.6 to 2170 MHz	: -50 dBm/1MHz or less	
(*2) 2153.6 to 2170 MHz	: -30 dBm/1MHz or less	$cf \pm (BW / 2) = 718 \sim 723.33\text{MHz}$
(*2) 3400 to 3419.4 MHz	: -30 dBm/1MHz or less	
(*2) 3400 to 3419.4 MHz	: -30 dBm/1MHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
(*2) 3500.6 to 3600 MHz	: -30 dBm/1MHz or less	
(*2) 3500.6 to 3600 MHz	: -30 dBm/1MHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$

5.A.6.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.A.6.4. Test result

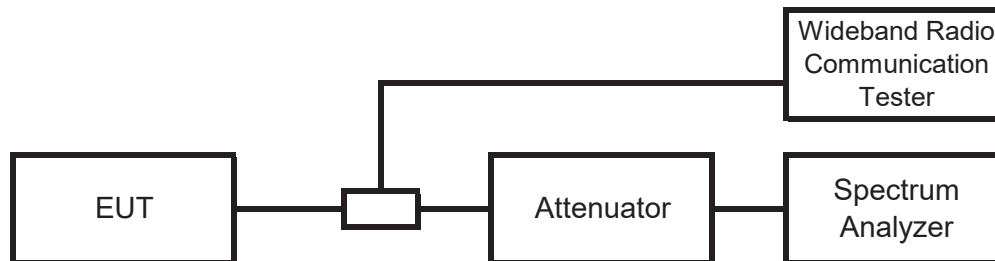
<Unwanted emission intensity in spurious area>

Center Freq (cf) Range	1st Channel 817.5 MHz	2nd Channel 830 MHz	3rd Channel 842.5 MHz	Limit	Result
RB / RB start	25 / 0	25 / 0	25 / 0	--	--
9 to 150 kHz	17.601 kHz	16.3179 kHz	9.1269 kHz	-36	PASS
(dBm/1kHz)	-68.89	-70.00	-66.64		
150 kHz to 30 MHz	0.36492 MHz	0.248505 MHz	0.37089 MHz	-36	PASS
(dBm/10kHz)	-63.59	-71.50	-59.84		
30 to 1000 MHz	830.021 MHz	843.24725 MHz	829.0874 MHz	-36	PASS
(dBm/100kHz)	-45.55	-44.56	-46.40		
470 to 710 MHz	682.4 MHz	629.36 MHz	688.808 MHz	-36	PASS
(dBm/100kHz)	-68.71	-67.60	-68.54		
773 to 803 MHz	790.55 MHz	799.343 MHz	786.272 MHz	1st -36	PASS
(dBm/100kHz)	-69.12	-68.43	-69.05	2nd -36	
				3rd -36	
860 to 890 MHz	863.12 MHz	875.491 MHz	888.867 MHz	-40	PASS
(dBm/1MHz)	-50.61	-50.62	-51.71		
945 to 960 MHz	959.4255 MHz	956.799 MHz	947.064 MHz	1st -36	PASS
(dBm/100kHz)	-67.80	-69.30	-68.89	2nd -36	
				3rd -36	
1 to 12.75 GHz	5094.24 MHz	5637.36 MHz	5098.32 MHz	-30	PASS
(dBm/1MHz)	-46.25	-47.15	-46.36		

Center Freq (cf) Range	1st Channel 817.5 MHz	2nd Channel 830 MHz	3rd Channel 842.5 MHz	Limit	Result
RB / RB start	25 / 0	25 / 0	25 / 0	--	--
1475.9 to 1496.6 MHz	1480.04621 MHz	1476.64106 MHz	1485.72008 MHz	1st -50	PASS
(dBm/1MHz)	-57.53	-57.54	-57.44	2nd -50	
				3rd -50	
1496.6 to 1510.9 MHz	1500.58112 MHz	1497.83552 MHz	1504.56653 MHz	-50	PASS
(dBm/1MHz)	-56.76	-57.15	-57.30		
1805 to 1845 MHz	1817.072 MHz	1813.536 MHz	1838.712 MHz	1st -30	PASS
(dBm/1MHz)	-55.88	-57.22	-55.27	2nd -30	
				3rd -30	
1845 to 1880 MHz	1874.0465 MHz	1845.686 MHz	1862.752 MHz	-50	PASS
(dBm/1MHz)	-57.07	-56.71	-56.01		
1884.5 to 1915.7 MHz	1896.76472 MHz	1892.9864 MHz	1885.61696 MHz	-41	PASS
(dBm/300kHz)	-62.28	-61.70	-63.02		
2010 to 2025 MHz	2012.9205 MHz	2024.4045 MHz	2017.227 MHz	-50	PASS
(dBm/1MHz)	-57.02	-55.94	-55.77		
2110 to 2153.6 MHz	2151.85164 MHz	2144.00364 MHz	2140.38484 MHz	-50	PASS
(dBm/1MHz)	-55.45	-55.90	-55.37		
2153.6 to 2170 MHz	2156.66516 MHz	2163.6532 MHz	2160.87668 MHz	1st -50	PASS
(dBm/1MHz)	-54.80	-55.95	-55.66	2nd -50	
				3rd -50	
3400 to 3419.4 MHz	3408.76492 MHz	3410.3596 MHz	3400.1455 MHz	1st -30	PASS
(dBm/1MHz)	-54.35	-56.61	-56.27	2nd -30	
				3rd -30	
3500.6 to 3600 MHz	3562.59578 MHz	3559.27582 MHz	3515.93742 MHz	1st -30	PASS
(dBm/1MHz)	-55.94	-54.70	-55.56	2nd -30	
				3rd -30	

5.A.7. Adjacent Channel Leakage Power [Article 49-6-9]

5.A.7.1. Test setup



5.A.7.2. Limit

<Channel spacing 5 MHz>

Detuning frequency: cf ± 5 MHz	: -32.2 dBc / 3.84 MHz or less
Detuning frequency: cf ± 10 MHz	: -35.2 dBc / 3.84 MHz or less
Detuning frequency: cf ± 5 MHz	: -29.2 dBc / 4.5 MHz or less

5.A.7.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.A.7.4. Test result< Detuning frequency: cf $\pm$ 5 MHz, Frequency width: 3.84 MHz >

	1st Channel 817.5 MHz	2nd Channel 830 MHz	3rd Channel 842.5 MHz	Limit	Result
RB / RB start	25 / 0	25 / 0	25 / 0	--	--
cf - 5 MHz (dBc/3.84MHz)	-40.73	-39.63	-39.30	-32.2	PASS
cf + 5 MHz (dBc/3.84MHz)	-44.43	-44.63	-43.78		

< Detuning frequency: cf $\pm$ 10 MHz, Frequency width: 3.84 MHz >

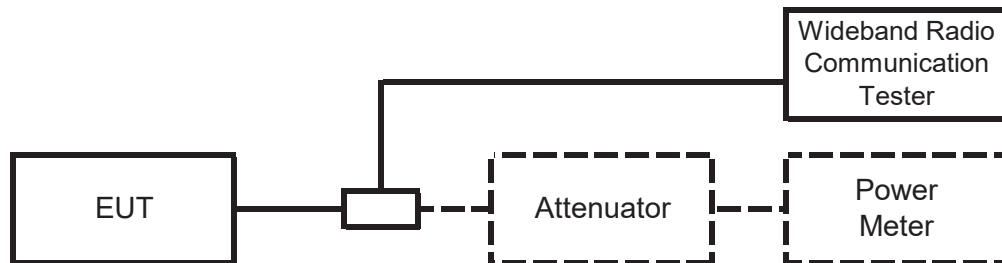
	1st Channel 817.5 MHz	2nd Channel 830 MHz	3rd Channel 842.5 MHz	Limit	Result
RB / RB start	25 / 0	25 / 0	25 / 0	--	--
cf - 10 MHz (dBc/3.84MHz)	-59.47	-55.10	-54.91	-35.2	PASS
cf + 10 MHz (dBc/3.84MHz)	-54.55	-54.33	-57.18		

< Detuning frequency: cf $\pm$ 5 MHz, Frequency width: 4.5 MHz >

	1st Channel 817.5 MHz	2nd Channel 830 MHz	3rd Channel 842.5 MHz	Limit	Result
RB / RB start	25 / 0	25 / 0	25 / 0	--	--
cf - 5 MHz (dBc/4.5MHz)	-39.79	-38.57	-38.32	-29.2	PASS
cf + 5 MHz (dBc/4.5MHz)	-43.14	-43.13	-42.40		

5.A.8. Tolerance for Output Power [Article 14]

5.A.8.1. Test setup



5.A.8.2. Limit

+87 ~ -79%

Note;

$$\text{Power Tolerance} = \{[(\text{O.P.}) - (\text{R.O.P.})] \div (\text{R.O.P.})\} \times 100$$

O.P. : Output power

R.O.P. : Rated Output Power

5.A.8.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

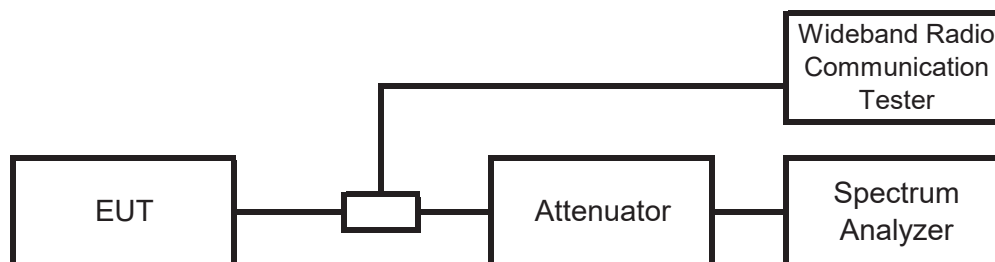
5.A.8.4. Test result

Frequency	1st Channel 817.5 MHz	2nd Channel 830 MHz	3rd Channel 842.5 MHz	Limit	Result
Rated Output Power	200 mW	200 mW	200 mW	200	PASS

	1st Channel 817.5 MHz	2nd Channel 830 MHz	3rd Channel 842.5 MHz	Limit	Result
RB / RB start	25 / 0	25 / 0	25 / 0	--	--
Measured Value (dBm)	22.66	22.28	22.09	--	--
Output Power (mW)	184.50	169.04	161.81	--	--
Power Tolerance (%)	-7.75	-15.48	-19.10	+87 ~ -79%	PASS

5.A.9. Leakage Power at No-Carrier Transmission [Article 49-6-9]

5.A.9.1. Test setup



5.A.9.2. Limit

-48.5 dBm / 4.5 MHz or less

5.A.9.3. Test condition

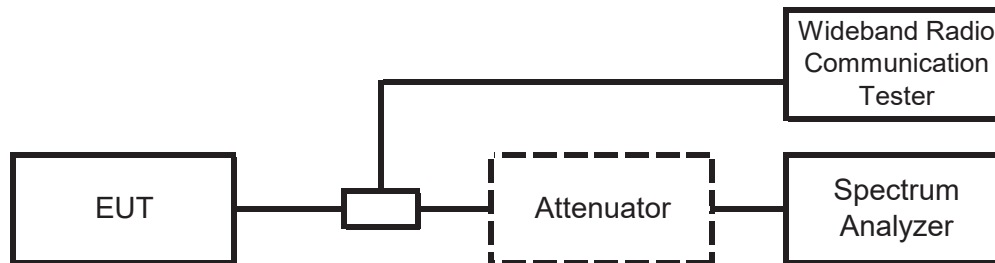
1. Turn on the wideband radio communication tester and set up it to make EUT stop transmitting.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.A.9.4. Test result

	1st Channel 817.5 MHz	2nd Channel 830 MHz	3rd Channel 842.5 MHz	Limit	Result
RB / RB start	25 / 0	25 / 0	25 / 0	--	--
Measured Value (dBm/4.5MHz)	-72.23	-71.23	-71.33	-48.5	PASS

5.A.10. Secondary Radiated Emissions [Article 24.4,5,6,7]

5.A.10.1. Test setup



5.A.10.2. Limit

30 MHz ~ 1000 MHz	:	-57 dBm / 100kHz or less
1 GHz ~ 12.75 GHz	:	-47 dBm / 1MHz or less

5.A.10.3. Test condition

1. Turn off the wideband radio communication tester to make EUT stop transmitting. Then set EUT to receive mode.
2. The EUT should be receiving at 1st, 2nd and 3rd channel.

5.A.10.4. Test result

Center Freq (cf) Range	1st Channel 817.5 MHz	2nd Channel 830 MHz	3rd Channel 842.5 MHz	Limit	Result
<RX1>					
30 to 1000 MHz	977.205 MHz	975.071 MHz	703.859 MHz	-60.02	PASS
(dBm/100kHz)	-87.75	-87.37	-86.94		
1 to 12.75 GHz	5915 MHz	5756 MHz	5212.5 MHz	-50.02	PASS
(dBm/1MHz)	-73.56	-73.01	-72.65		
<RX2>					
30 to 1000 MHz	996.702 MHz	943.158 MHz	977.011 MHz	-60.02	PASS
(dBm/100kHz)	-87.30	-87.19	-86.81		
1 to 12.75 GHz	5477 MHz	5590 MHz	5076 MHz	-50.02	PASS
(dBm/1MHz)	-73.10	-73.62	-73.01		
<RX3>					
30 to 1000 MHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/100kHz)	--	--	--		
1 to 12.75 GHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/1MHz)	--	--	--		
<RX4>					
30 to 1000 MHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/100kHz)	--	--	--		
1 to 12.75 GHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/1MHz)	--	--	--		
<RX1 + RX2>					

5.B. Test Results for 10 MHz

5.B.1. Testing Information for 10 MHz

Type of application	☒ Type certificate ☐ Test certificate
Input voltage	3.8 VDC (Rated voltage only)
Used software (& version)	--
Firmware version	--
Serial number	D1C22K30F000086
The reason why the tests are performed only at rated voltage	When the input voltage to receiver RF circuit varies below $\pm 1\%$ as the input voltage from the external power supply to the receiver varies $\pm 10\%$ (excluding power supply).
Test Method	The test method of Ordinance Concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment in Annex 1, the Ministry of Internal Affairs and Communication notification in Annex 86 of Article 88, Paragraph 1 or the test method more than equivalent.

Channel bandwidth	10 MHz
Frequency range & number of channels	820 ~ 840MHz (100kHz interval 201 channels)
Number of antennas	TX : 1 RX : 2 ☐ SDM --

	1st Channel (Lower)	2nd Channel (Middle)	3rd Channel (Upper)
Frequency	820 MHz	830 MHz	840 MHz
RB / RB start	50 / 0	50 / 0	50 / 0

5.B.2. Summary of test results for 10 MHz

The radio equipment has been tested according to the following specifications:

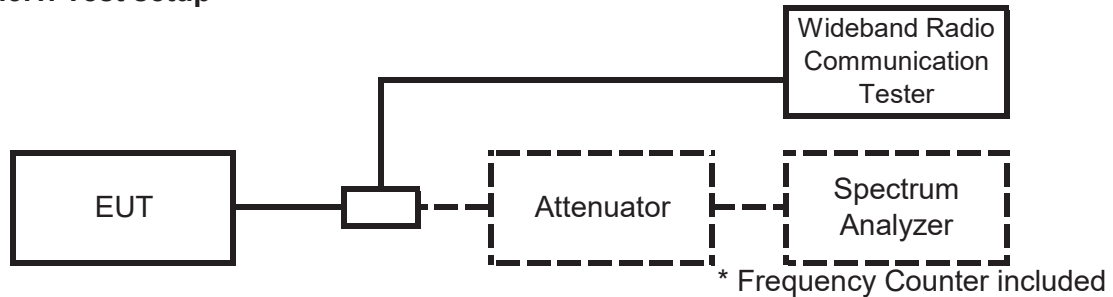
Article 88 Paragraph 1, Appendix 86	ORRE reference	Report reference	Item	Result
Transmitter				
No.2	Article 5	5.B. 3.	Frequency Tolerance	PASS
No.5	Article 6	5.B. 4.	Occupied Bandwidth	PASS
No.6	Article 7	5.B. 5.	Spurious Emission or Unwanted Emission Intensity (1)	PASS
No.6	Article 7	5.B. 6.	Spurious Emission or Unwanted Emission Intensity (2)	PASS
No.7	Article 49-6-9	5.B. 7.	Adjacent Channel Leakage Power	PASS
No.8	Article 14	5.B. 8.	Tolerance for Output Power	PASS
No.9	Article 49-6-9	5.B. 9.	Leakage Power at No-Carrier Transmission	PASS
Receiver				
No.10	Article 24.4,5,6,7	5.B. 10.	Secondary Radiated Emissions	PASS
Transmission Antenna				
Function				
Condition for Frequency Stabilization				
No.1	Article 15.1	5.B. 1.	Voltage fluctuation	Comply
No.4	Article 15.2	5.B. 3.	Environment	PASS
No.3	Article 15.3	5.B. 3.	Vibration	PASS
Etc.				
--	--			
--	--			

ORRE : Ordinance Regulating Radio Equipment

N/A : Not Applicable

5.B.3. Frequency Tolerance [Article 5]

5.B.3.1. Test setup



5.B.3.2. Limit

$\pm (0.1 \times cf \times 10^{-6} + 15) \text{ Hz or less}$

cf : Center Frequency (MHz)

5.B.3.3. Test condition

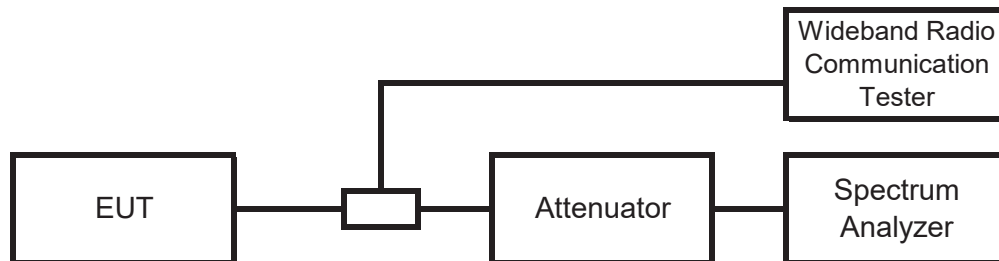
1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.B.3.4. Test result

Center Freq(cf)	1st Channel	2nd Channel	3rd Channel	Unit	Result
<Condition>	820 MHz	830 MHz	840 MHz		
RB / RB start	50 / 0	50 / 0	50 / 0		--
<Normal>					
Measurement Frequency	820.00000260	830.00000406	840.00000875	MHz	--
Tolerance	2.60	4.06	8.75	Hz	PASS
Limit	± 97.00	± 98.00	± 99.00	Hz	
<After vibration test>					
Measurement Frequency	820.00000299	830.00000306	840.00000528	MHz	--
Tolerance	2.99	3.06	5.28	Hz	PASS
Limit	± 97.00	± 98.00	± 99.00	Hz	
<With high temperature test> Temp. 60 °C R.H. 65 %					
Measurement Frequency	820.00000250	830.00000348	840.00000358	MHz	--
Tolerance	2.50	3.48	3.58	Hz	PASS
Limit	± 97.00	± 98.00	± 99.00	Hz	
<With low temperature test> Temp. -20 °C R.H. -- %					
Measurement Frequency	820.00000163	830.00000296	840.00000525	MHz	--
Tolerance	1.63	2.96	5.25	Hz	PASS
Limit	± 97.00	± 98.00	± 99.00	Hz	
<After high humidity test> Temp. 35 °C R.H. 95 %					
Measurement Frequency	820.00000299	830.00000306	840.00000528	MHz	--
Tolerance	2.99	3.06	5.28	Hz	PASS
Limit	± 97.00	± 98.00	± 99.00	Hz	

5.B.4. Occupied Bandwidth [Article 6]

5.B.4.1. Test setup



5.B.4.2. Limit

10 MHz or less

5.B.4.3. Test condition

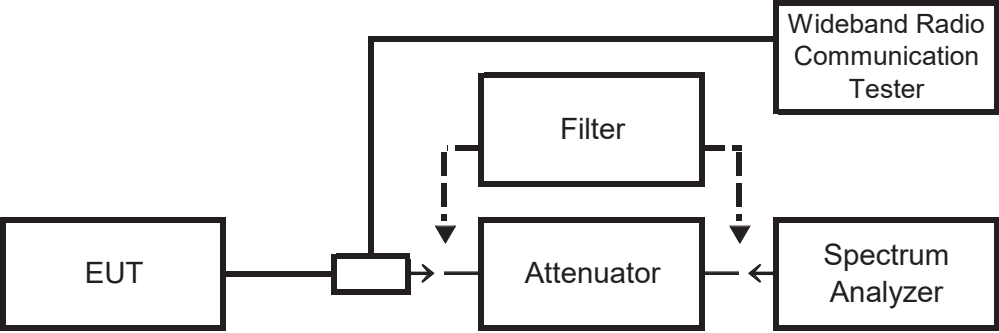
1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.B.4.4. Test result

Center Freq	1st Channel 820 MHz	2nd Channel 830 MHz	3rd Channel 840 MHz	Limit	Result
RB / RB start	50 / 0	50 / 0	50 / 0	--	--
Occupied Bandwidth (MHz)	8.91	8.9075	8.9025	10	PASS

5.B.5. Spurious Emission or Unwanted Emission Intensity (1) [Article 7]

5.B.5.1. Test setup



5.B.5.2. Limit

<Unwanted emission intensity in out-band area>

Channel spacing	:	10	MHz
(Detuning frequency	:	-20	MHz ~ +20 MHz)

cf ± (5 to 6) MHz	:	-16.5	dBm/30kHz
cf ± (6 to 10) MHz	:	-8.5	dBm/1MHz
cf ± (10 to 15) MHz	:	-11.5	dBm/1MHz
cf ± (15 to 20) MHz	:	-23.5	dBm/1MHz

cf : Center Frequency (MHz)

5.B.5.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

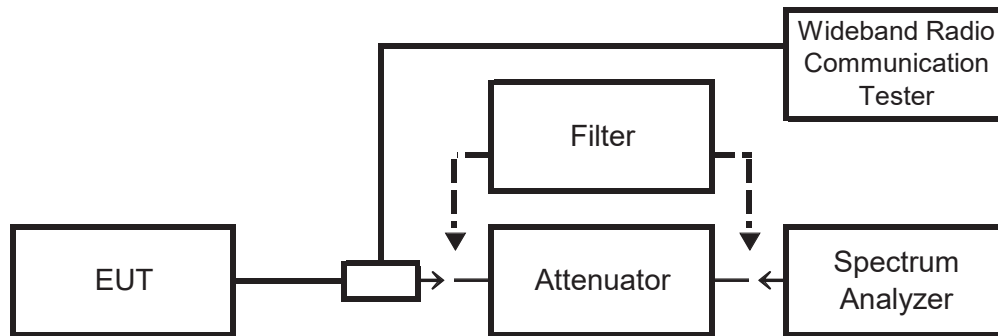
5.B.5.4. Test result

<Unwanted emission intensity in out-band area>

Center Freq (cf) Range	1st Channel 820 MHz	2nd Channel 830 MHz	3rd Channel 840 MHz	Limit	Result
RB / RB start	50 / 0	50 / 0	50 / 0	--	--
cf - (5 to 6) MHz	814.9953 MHz	824.9979 MHz	834.9265 MHz	-16.5	PASS
(dBm/30kHz)	-36.95	-35.89	-36.55		
cf + (5 to 6) MHz	825.0066 MHz	835.0044 MHz	845.0841 MHz	-16.5	PASS
(dBm/30kHz)	-36.81	-37.66	-37.99		
cf - (6 to 10) MHz	814 MHz	823.9995 MHz	834 MHz	-8.5	PASS
(dBm/1MHz)	-27.68	-25.43	-25.99		
cf + (6 to 10) MHz	826 MHz	836 MHz	846 MHz	-8.5	PASS
(dBm/1MHz)	-27.46	-28.31	-27.33		
cf - (10 to 15) MHz	810 MHz	820 MHz	830 MHz	-11.5	PASS
(dBm/1MHz)	-36.78	-34.13	-34.88		
cf + (10 to 15) MHz	830 MHz	840 MHz	850 MHz	-11.5	PASS
(dBm/1MHz)	-30.62	-31.82	-32.24		
cf - (15 to 20) MHz	805 MHz	811.049 MHz	824.9994 MHz	-23.5	PASS
(dBm/1MHz)	-53.13	-43.39	-42.34		
cf + (15 to 20) MHz	835 MHz	845.0552 MHz	855 MHz	-23.5	PASS
(dBm/1MHz)	-40.36	-41.76	-53.71		

5.B.6. Spurious Emission or Unwanted Emission Intensity (2) [Article 7]

5.B.6.1. Test setup



5.B.6.2. Limit

<Unwanted emission intensity in spurious area>

cf : Center Frequency (MHz)

BW: Upper limit of Occupied Bandwidth (MHz)

Detuning frequency	±	20	MHz or more	Note: (*1) and (*2) are excluded.
9 to 150 kHz	:	-36	dBm/1kHz or less	
150 kHz to 30 MHz	:	-36	dBm/10kHz or less	
30 to 1000 MHz	:	-36	dBm/100kHz or less	
(*1) 470 to 710 MHz	:	-36	dBm/100kHz or less	
(*1) 773 to 803 MHz	:	-36	dBm/100kHz or less	
(*1) 773 to 803 MHz	:	-36	dBm/100kHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
(*1) 860 to 890 MHz	:	-40	dBm/1MHz or less	
(*1) 945 to 960 MHz	:	-36	dBm/100kHz or less	
(*1) 945 to 960 MHz	:	-36	dBm/100kHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
1 to 12.75 GHz	:	-30	dBm/1MHz or less	
(*2) 1475.9 to 1496.6 MHz	:	-50	dBm/1MHz or less	
(*2) 1475.9 to 1496.6 MHz	:	-30	dBm/1MHz or less	$cf \pm (BW / 2) = 737.95 \sim 748\text{MHz}$
(*2) 1496.6 to 1510.9 MHz	:	-50	dBm/1MHz or less	
(*2) 1805 to 1845 MHz	:	-30	dBm/1MHz or less	
(*2) 1805 to 1845 MHz	:	-30	dBm/1MHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
(*2) 1845 to 1880 MHz	:	-50	dBm/1MHz or less	
(*2) 1884.5 to 1915.7 MHz	:	-41	dBm/300kHz or less	
(*2) 2010 to 2025 MHz	:	-50	dBm/1MHz or less	
(*2) 2110 to 2153.6 MHz	:	-50	dBm/1MHz or less	
(*2) 2153.6 to 2170 MHz	:	-50	dBm/1MHz or less	
(*2) 2153.6 to 2170 MHz	:	-30	dBm/1MHz or less	$cf \pm (BW / 2) = 718 \sim 723.33\text{MHz}$
(*2) 3400 to 3419.4 MHz	:	-30	dBm/1MHz or less	
(*2) 3400 to 3419.4 MHz	:	-30	dBm/1MHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
(*2) 3500.6 to 3600 MHz	:	-30	dBm/1MHz or less	
(*2) 3500.6 to 3600 MHz	:	-30	dBm/1MHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$

5.B.6.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

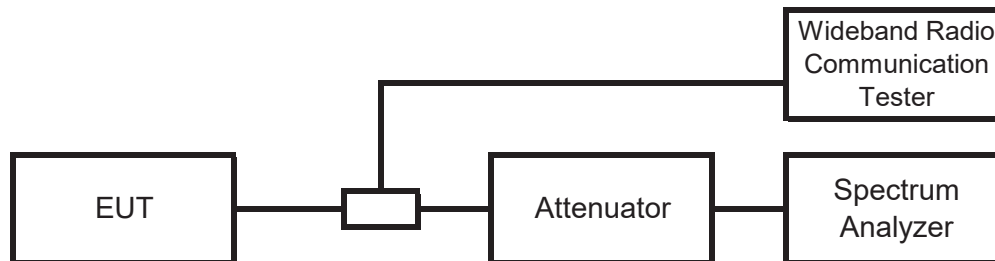
5.B.6.4. Test result**<Unwanted emission intensity in spurious area>**

Center Freq (cf) Range	1st Channel 820 MHz	2nd Channel 830 MHz	3rd Channel 840 MHz	Limit	Result
RB / RB start	50 / 0	50 / 0	50 / 0	--	--
9 to 150 kHz	135.1527 kHz	9 kHz	9.2679 kHz	-36	PASS
(dBm/1kHz)	-67.41	-66.20	-67.14		
150 kHz to 30 MHz	0.22164 MHz	0.367905 MHz	0.367905 MHz	-36	PASS
(dBm/10kHz)	-69.72	-59.87	-62.62		
30 to 1000 MHz	840.956 MHz	850.186 MHz	818.6332 MHz	-36	PASS
(dBm/100kHz)	-48.71	-47.90	-43.48		
470 to 710 MHz	524.864 MHz	705.872 MHz	619.952 MHz	-36	PASS
(dBm/100kHz)	-68.87	-68.80	-68.08		
773 to 803 MHz	784.241 MHz	785.357 MHz	793.55 MHz	1st -36	PASS
(dBm/100kHz)	-68.76	-68.70	-68.58	2nd -36	
				3rd -36	
860 to 890 MHz	865.22 MHz	875.899 MHz	884.951 MHz	-40	PASS
(dBm/1MHz)	-51.33	-52.60	-51.91		
945 to 960 MHz	959.7585 MHz	952.698 MHz	957.3735 MHz	1st -36	PASS
(dBm/100kHz)	-67.39	-69.72	-67.57	2nd -36	
				3rd -36	
1 to 12.75 GHz	5965.44 MHz	5156.64 MHz	5122.32 MHz	-30	PASS
(dBm/1MHz)	-46.83	-46.34	-47.04		

Center Freq (cf) Range	1st Channel 820 MHz	2nd Channel 830 MHz	3rd Channel 840 MHz	Limit	Result
RB / RB start	50 / 0	50 / 0	50 / 0	--	--
1475.9 to 1496.6 MHz	1486.10096 MHz	1487.76317 MHz	1494.78254 MHz	1st -50	PASS
(dBm/1MHz)	-56.78	-57.06	-57.42	2nd -50	
				3rd -50	
1496.6 to 1510.9 MHz	1502.01684 MHz	1503.11937 MHz	1501.47916 MHz	-50	PASS
(dBm/1MHz)	-56.24	-56.33	-57.29		
1805 to 1845 MHz	1817.992 MHz	1840.628 MHz	1838.716 MHz	1st -30	PASS
(dBm/1MHz)	-57.26	-56.07	-56.96	2nd -30	
				3rd -30	
1845 to 1880 MHz	1846.673 MHz	1853.5715 MHz	1879.132 MHz	-50	PASS
(dBm/1MHz)	-56.84	-55.69	-57.23		
1884.5 to 1915.7 MHz	1906.27448 MHz	1885.63568 MHz	1914.07448 MHz	-41	PASS
(dBm/300kHz)	-62.02	-62.64	-61.90		
2010 to 2025 MHz	2012.9775 MHz	2013.99 MHz	2021.1585 MHz	-50	PASS
(dBm/1MHz)	-56.66	-56.61	-56.04		
2110 to 2153.6 MHz	2128.28584 MHz	2110.12208 MHz	2148.74732 MHz	-50	PASS
(dBm/1MHz)	-55.33	-55.58	-56.14		
2153.6 to 2170 MHz	2167.29892 MHz	2166.65768 MHz	2155.19572 MHz	1st -50	PASS
(dBm/1MHz)	-56.12	-57.11	-56.00	2nd -50	
				3rd -50	
3400 to 3419.4 MHz	3411.41884 MHz	3406.87342 MHz	3405.6939 MHz	1st -30	PASS
(dBm/1MHz)	-55.20	-56.08	-55.61	2nd -30	
				3rd -30	
3500.6 to 3600 MHz	3541.62238 MHz	3555.3197 MHz	3558.09296 MHz	1st -30	PASS
(dBm/1MHz)	-55.95	-56.29	-55.61	2nd -30	
				3rd -30	

5.B.7. Adjacent Channel Leakage Power [Article 49-6-9]

5.B.7.1. Test setup



5.B.7.2. Limit

<Channel spacing 10 MHz>

- Detuning frequency: $cf \pm 7.5 \text{ MHz}$: -32.2 dBc / 3.84 MHz or less
Detuning frequency: $cf \pm 12.5 \text{ MHz}$: -35.2 dBc / 3.84 MHz or less
Detuning frequency: $cf \pm 10 \text{ MHz}$: -29.2 dBc / 9 MHz or less

5.B.7.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.B.7.4. Test result< Detuning frequency: cf $\pm$ 7.5 MHz, Frequency width: 3.84 MHz >

	1st Channel 820 MHz	2nd Channel 830 MHz	3rd Channel 840 MHz	Limit	Result
RB / RB start	50 / 0	50 / 0	50 / 0	--	--
cf - 7.5 MHz (dBc/3.84MHz)	-45.01	-42.51	-42.95	-32.2	PASS
cf + 7.5 MHz (dBc/3.84MHz)	-43.38	-44.10	-43.56		

< Detuning frequency: cf $\pm$ 12.5 MHz, Frequency width: 3.84 MHz >

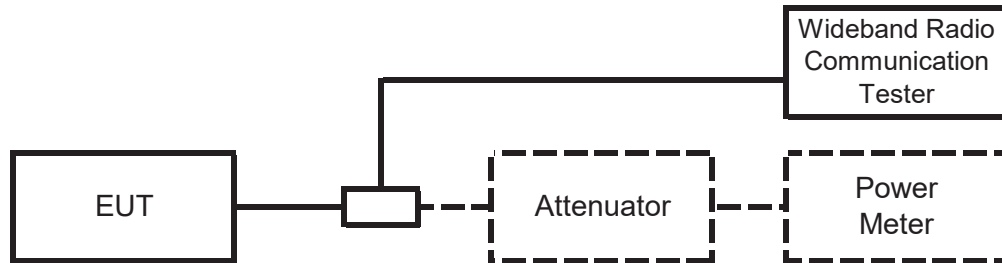
	1st Channel 820 MHz	2nd Channel 830 MHz	3rd Channel 840 MHz	Limit	Result
RB / RB start	50 / 0	50 / 0	50 / 0	--	--
cf - 12.5 MHz (dBc/3.84MHz)	-56.91	-53.20	-53.14	-35.2	PASS
cf + 12.5 MHz (dBc/3.84MHz)	-47.87	-49.88	-50.76		

< Detuning frequency: cf $\pm$ 10 MHz, Frequency width: 9 MHz >

	1st Channel 820 MHz	2nd Channel 830 MHz	3rd Channel 840 MHz	Limit	Result
RB / RB start	50 / 0	50 / 0	50 / 0	--	--
cf - 10 MHz (dBc/9MHz)	-44.29	-41.68	-42.08	-29.2	PASS
cf + 10 MHz (dBc/9MHz)	-41.22	-42.43	-42.09		

5.B.8. Tolerance for Output Power [Article 14]

5.B.8.1. Test setup



5.B.8.2. Limit

+87 ~ -79%

Note;

$$\text{Power Tolerance} = \{[(\text{O.P.}) - (\text{R.O.P.})] \div (\text{R.O.P.})\} \times 100$$

O.P. : Output power

R.O.P. : Rated Output Power

5.B.8.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

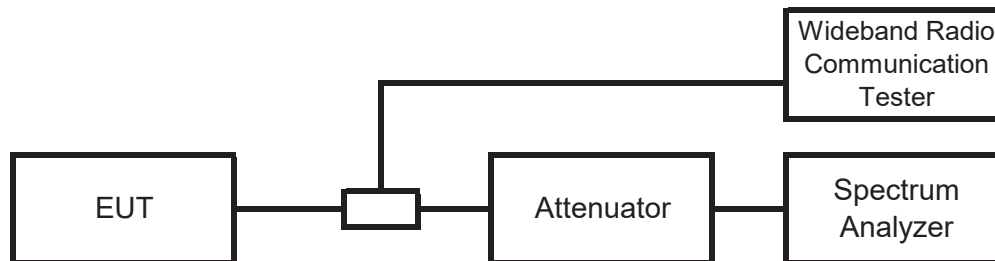
5.B.8.4. Test result

Frequency	1st Channel 820 MHz	2nd Channel 830 MHz	3rd Channel 840 MHz	Limit	Result
Rated Output Power	200 mW	200 mW	200 mW	200	PASS

	1st Channel 820 MHz	2nd Channel 830 MHz	3rd Channel 840 MHz	Limit	Result
RB / RB start	50 / 0	50 / 0	50 / 0	--	--
Measured Value (dBm)	22.55	22.37	22.18	--	--
Output Power (mW)	179.89	172.58	165.20	--	--
Power Tolerance (%)	-10.06	-13.71	-17.40	+87 ~ -79%	PASS

5.B.9. Leakage Power at No-Carrier Transmission [Article 49-6-9]

5.B.9.1. Test setup



5.B.9.2. Limit

-48.5 dBm / 9 MHz or less

5.B.9.3. Test condition

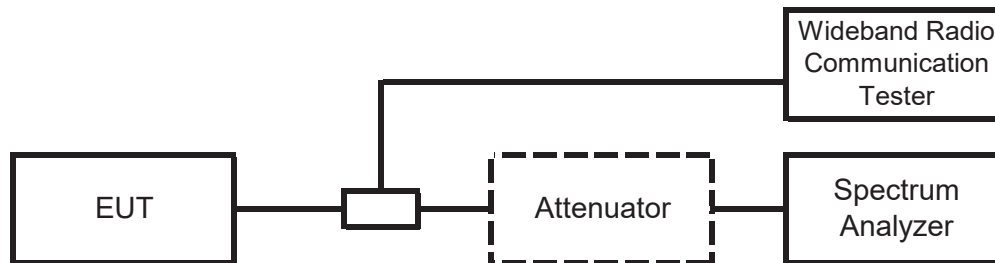
1. Turn on the wideband radio communication tester and set up it to make EUT stop transmitting.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.B.9.4. Test result

	1st Channel 820 MHz	2nd Channel 830 MHz	3rd Channel 840 MHz	Limit	Result
RB / RB start	50 / 0	50 / 0	50 / 0	--	--
Measured Value (dBm/9MHz)	-68.73	-67.29	-68.52	-48.5	PASS

5.B.10. Secondary Radiated Emissions [Article 24.4,5,6,7]

5.B.10.1. Test setup



5.B.10.2. Limit

30 MHz ~ 1000 MHz	:	-57 dBm / 100kHz or less
1 GHz ~ 12.75 GHz	:	-47 dBm / 1MHz or less

5.B.10.3. Test condition

1. Turn off the wideband radio communication tester to make EUT stop transmitting.
Then set EUT to receive mode.
2. The EUT should be receiving at 1st, 2nd and 3rd channel.

5.B.10.4. Test result

Center Freq (cf) Range	1st Channel 820 MHz	2nd Channel 830 MHz	3rd Channel 840 MHz	Limit	Result
<RX1>					
30 to 1000 MHz	962.946 MHz	828.892 MHz	931.906 MHz	-60.02	PASS
(dBm/100kHz)	-86.16	-87.98	-87.37		
1 to 12.75 GHz	5520.5 MHz	5212 MHz	5113 MHz	-50.02	PASS
(dBm/1MHz)	-73.46	-71.94	-72.68		
<RX2>					
30 to 1000 MHz	961.006 MHz	947.814 MHz	949.172 MHz	-60.02	PASS
(dBm/100kHz)	-87.24	-87.03	-87.22		
1 to 12.75 GHz	5540.5 MHz	5474.5 MHz	4837 MHz	-50.02	PASS
(dBm/1MHz)	-73.00	-72.89	-73.39		
<RX3>					
30 to 1000 MHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/100kHz)	--	--	--		
1 to 12.75 GHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/1MHz)	--	--	--		
<RX4>					
30 to 1000 MHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/100kHz)	--	--	--		
1 to 12.75 GHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/1MHz)	--	--	--		
<RX1 + RX2> * The worst result x Number of antenna port					
30 to 1000 MHz	962.946 MHz	947.814 MHz	949.172 MHz	-57	PASS
(dBm/100kHz)	-83.14	-84.01	-84.20		
1 to 12.75 GHz	5540.5 MHz	5212 MHz	5113 MHz	-47	PASS
(dBm/1MHz)	-69.98	-68.92	-69.66		

5.E. Test Results for 15 MHz

5.E.1. Testing Information for 15 MHz

Type of application	☒ Type certificate ☐ Test certificate
Input voltage	3.8 VDC (Rated voltage only)
Used software (& version)	--
Firmware version	--
Serial number	D1C22K30F000086
The reason why the tests are performed only at rated voltage	When the input voltage to receiver RF circuit varies below $\pm 1\%$ as the input voltage from the external power supply to the receiver varies $\pm 10\%$ (excluding power supply).
Test Method	The test method of Ordinance Concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment in Annex 1, the Ministry of Internal Affairs and Communication notification in Annex 86 of Article 88, Paragraph 1 or the test method more than equivalent.

Channel bandwidth	15 MHz
Frequency range & number of channels	822.5 ~ 837.5MHz (100kHz interval 151 channels)
Number of antennas	TX : 1 RX : 2 ☐ SDM --

	1st Channel (Lower)	2nd Channel (Middle)	3rd Channel (Upper)
Frequency	822.5 MHz	830 MHz	837.5 MHz
RB / RB start	75 / 0	75 / 0	75 / 0

5.E.2. Summary of test results for 15 MHz

The radio equipment has been tested according to the following specifications:

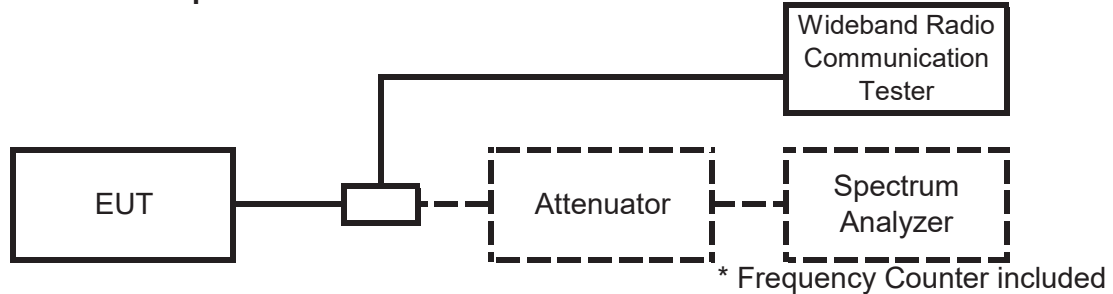
Article 88 Paragraph 1, Appendix 86	ORRE reference	Report reference	Item	Result
Transmitter				
No.2	Article 5	5.E. 3.	Frequency Tolerance	PASS
No.5	Article 6	5.E. 4.	Occupied Bandwidth	PASS
No.6	Article 7	5.E. 5.	Spurious Emission or Unwanted Emission Intensity (1)	PASS
No.6	Article 7	5.E. 6.	Spurious Emission or Unwanted Emission Intensity (2)	PASS
No.7	Article 49-6-9	5.E. 7.	Adjacent Channel Leakage Power	PASS
No.8	Article 14	5.E. 8.	Tolerance for Output Power	PASS
No.9	Article 49-6-9	5.E. 9.	Leakage Power at No-Carrier Transmission	PASS
Receiver				
No.10	Article 24.4,5,6,7	5.E. 10.	Secondary Radiated Emissions	PASS
Transmission Antenna				
Function				
Condition for Frequency Stabilization				
No.1	Article 15.1	5.E. 1.	Voltage fluctuation	Comply
No.4	Article 15.2	5.E. 3.	Environment	PASS
No.3	Article 15.3	5.E. 3.	Vibration	PASS
Etc.				
--	--			
--	--			

ORRE : Ordinance Regulating Radio Equipment

N/A : Not Applicable

5.E.3. Frequency Tolerance [Article 5]

5.E.3.1. Test setup



5.E.3.2. Limit

$\pm (0.1 \times cf \times 10^{-6} + 15) \text{ Hz or less}$

cf : Center Frequency (MHz)

5.E.3.3. Test condition

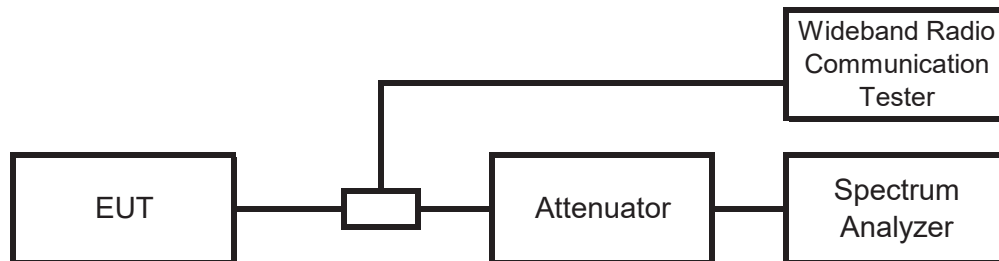
1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.E.3.4. Test result

Center Freq(cf)	1st Channel	2nd Channel	3rd Channel	Unit	Result
<Condition>	822.5 MHz	830 MHz	837.5 MHz		
RB / RB start	75 / 0	75 / 0	75 / 0		--
<Normal>					
Measurement Frequency	822.50000279	830.00000305	837.50000283	MHz	--
Tolerance	2.79	3.05	2.83	Hz	PASS
Limit	± 97.25	± 98.00	± 98.75	Hz	
<After vibration test>					
Measurement Frequency	822.50000328	830.00000330	837.50000346	MHz	--
Tolerance	3.28	3.30	3.46	Hz	PASS
Limit	± 97.25	± 98.00	± 98.75	Hz	
<With high temperature test> Temp. 60 °C R.H. 65 %					
Measurement Frequency	822.50000276	830.00000213	837.49999770	MHz	--
Tolerance	2.76	2.13	-2.30	Hz	PASS
Limit	± 97.25	± 98.00	± 98.75	Hz	
<With low temperature test> Temp. -20 °C R.H. -- %					
Measurement Frequency	822.50000710	830.00000342	837.50000338	MHz	--
Tolerance	7.10	3.42	3.38	Hz	PASS
Limit	± 97.25	± 98.00	± 98.75	Hz	
<After high humidity test> Temp. 35 °C R.H. 95 %					
Measurement Frequency	822.50000328	830.00000330	837.50000346	MHz	--
Tolerance	3.28	3.30	3.46	Hz	PASS
Limit	± 97.25	± 98.00	± 98.75	Hz	

5.E.4. Occupied Bandwidth [Article 6]

5.E.4.1. Test setup



5.E.4.2. Limit

15 MHz or less

5.E.4.3. Test condition

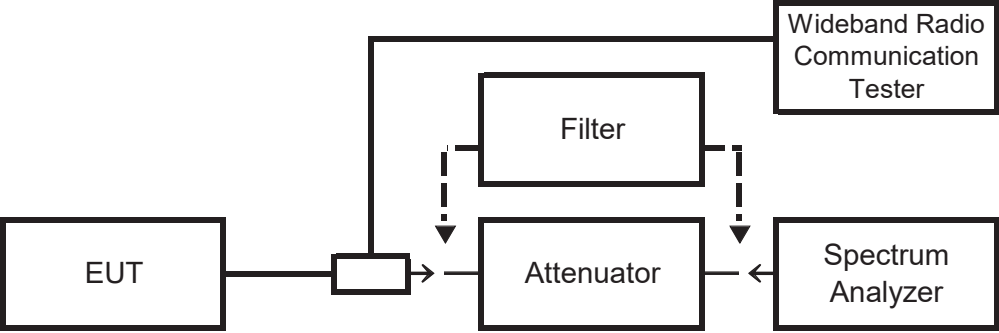
1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.E.4.4. Test result

Center Freq	1st Channel 822.5 MHz	2nd Channel 830 MHz	3rd Channel 837.5 MHz	Limit	Result
RB / RB start	75 / 0	75 / 0	75 / 0	--	--
Occupied Bandwidth (MHz)	13.335	13.35375	13.3425	15	PASS

5.E.5. Spurious Emission or Unwanted Emission Intensity (1) [Article 7]

5.E.5.1. Test setup



5.E.5.2. Limit

<Unwanted emission intensity in out-band area>

Channel spacing	:	15	MHz
(Detuning frequency	:	-27.5	MHz ~ +27.5 MHz)

cf ± (7.5 to 8.5) MHz	:	-18.5	dBm/30kHz
cf ± (8.5 to 12.5) MHz	:	-8.5	dBm/1MHz
cf ± (12.5 to 22.5) MHz	:	-11.5	dBm/1MHz
cf ± (22.5 to 27.5) MHz	:	-23.5	dBm/1MHz

cf : Center Frequency (MHz)

5.E.5.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

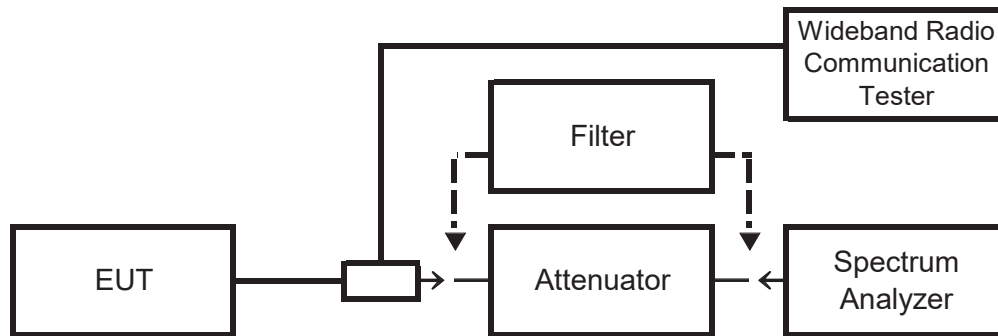
5.E.5.4. Test result

<Unwanted emission intensity in out-band area>

Center Freq (cf) Range	1st Channel 822.5 MHz	2nd Channel 830 MHz	3rd Channel 837.5 MHz	Limit	Result
RB / RB start	75 / 0	75 / 0	75 / 0	--	--
cf - (7.5 to 8.5) MHz	815 MHz	822.499 MHz	829.8614 MHz	-18.5	PASS
(dBm/30kHz)	-40.51	-39.47	-40.65		
cf + (7.5 to 8.5) MHz	830.0212 MHz	837.5261 MHz	845.0008 MHz	-18.5	PASS
(dBm/30kHz)	-39.86	-40.52	-39.90		
cf - (8.5 to 12.5) MHz	814 MHz	821.499 MHz	829 MHz	-8.5	PASS
(dBm/1MHz)	-29.27	-27.93	-28.09		
cf + (8.5 to 12.5) MHz	831 MHz	838.5 MHz	846.013 MHz	-8.5	PASS
(dBm/1MHz)	-27.07	-27.90	-27.07		
cf - (12.5 to 22.5) MHz	810 MHz	817.5 MHz	825 MHz	-11.5	PASS
(dBm/1MHz)	-37.00	-34.24	-34.08		
cf + (12.5 to 22.5) MHz	835.0594 MHz	843.4703 MHz	850.0066 MHz	-11.5	PASS
(dBm/1MHz)	-30.13	-31.25	-30.99		
cf - (22.5 to 27.5) MHz	799.6021 MHz	807.5 MHz	813.513 MHz	-23.5	PASS
(dBm/1MHz)	-57.33	-48.84	-43.29		
cf + (22.5 to 27.5) MHz	845.2358 MHz	852.5006 MHz	863.8514 MHz	-23.5	PASS
(dBm/1MHz)	-42.58	-45.20	-56.99		

5.E.6. Spurious Emission or Unwanted Emission Intensity (2) [Article 7]

5.E.6.1. Test setup



5.E.6.2. Limit

<Unwanted emission intensity in spurious area>

cf : Center Frequency (MHz)

BW: Upper limit of Occupied Bandwidth (MHz)

Detuning frequency	± 27.5 MHz or more	Note: (*1) and (*2) are excluded.
9 to 150 kHz	: -36 dBm/1kHz or less	
150 kHz to 30 MHz	: -36 dBm/10kHz or less	
30 to 1000 MHz	: -36 dBm/100kHz or less	
(*1) 470 to 710 MHz	: -36 dBm/100kHz or less	
(*1) 773 to 803 MHz	: -36 dBm/100kHz or less	
(*1) 773 to 803 MHz	: -36 dBm/100kHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
(*1) 860 to 890 MHz	: -40 dBm/1MHz or less	
(*1) 945 to 960 MHz	: -36 dBm/100kHz or less	
(*1) 945 to 960 MHz	: -36 dBm/100kHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
1 to 12.75 GHz	: -30 dBm/1MHz or less	
(*2) 1475.9 to 1496.6 MHz	: -50 dBm/1MHz or less	
(*2) 1475.9 to 1496.6 MHz	: -30 dBm/1MHz or less	$cf \pm (BW / 2) = 737.95 \sim 748\text{MHz}$
(*2) 1496.6 to 1510.9 MHz	: -50 dBm/1MHz or less	
(*2) 1805 to 1845 MHz	: -30 dBm/1MHz or less	
(*2) 1805 to 1845 MHz	: -30 dBm/1MHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
(*2) 1845 to 1880 MHz	: -50 dBm/1MHz or less	
(*2) 1884.5 to 1915.7 MHz	: -41 dBm/300kHz or less	
(*2) 2010 to 2025 MHz	: -50 dBm/1MHz or less	
(*2) 2110 to 2153.6 MHz	: -50 dBm/1MHz or less	
(*2) 2153.6 to 2170 MHz	: -50 dBm/1MHz or less	
(*2) 2153.6 to 2170 MHz	: -30 dBm/1MHz or less	$cf \pm (BW / 2) = 718 \sim 723.33\text{MHz}$
(*2) 3400 to 3419.4 MHz	: -30 dBm/1MHz or less	
(*2) 3400 to 3419.4 MHz	: -30 dBm/1MHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$
(*2) 3500.6 to 3600 MHz	: -30 dBm/1MHz or less	
(*2) 3500.6 to 3600 MHz	: -30 dBm/1MHz or less	$cf \pm (BW / 2) = 1750 \sim 1785\text{MHz}$

5.E.6.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.E.6.4. Test result

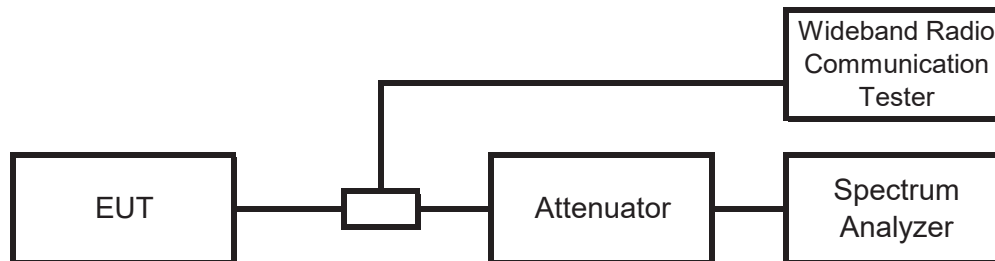
<Unwanted emission intensity in spurious area>

Center Freq (cf) Range	1st Channel 822.5 MHz	2nd Channel 830 MHz	3rd Channel 837.5 MHz	Limit	Result
RB / RB start	75 / 0	75 / 0	75 / 0	--	--
9 to 150 kHz	117.006 kHz	135.0681 kHz	44.3064 kHz	-36	PASS
(dBm/1kHz)	-66.96	-65.72	-69.28		
150 kHz to 30 MHz	0.44253 MHz	0.385815 MHz	0.367905 MHz	-36	PASS
(dBm/10kHz)	-69.80	-60.38	-60.01		
30 to 1000 MHz	851.897 MHz	935.1715 MHz	808.1254 MHz	-36	PASS
(dBm/100kHz)	-46.88	-61.72	-48.50		
470 to 710 MHz	596.696 MHz	517.16 MHz	616.352 MHz	-36	PASS
(dBm/100kHz)	-68.06	-68.63	-67.74		
773 to 803 MHz	780.878 MHz	791.225 MHz	776.447 MHz	1st -36	PASS
(dBm/100kHz)	-68.99	-67.44	-69.74	2nd -36	
				3rd -36	
860 to 890 MHz	863.987 MHz	874.857 MHz	878.174 MHz	-40	PASS
(dBm/1MHz)	-53.39	-52.26	-53.78		
945 to 960 MHz	946.011 MHz	953.043 MHz	956.0595 MHz	1st -36	PASS
(dBm/100kHz)	-68.85	-67.91	-68.40	2nd -36	
				3rd -36	
1 to 12.75 GHz	5368.32 MHz	5979.84 MHz	5432.88 MHz	-30	PASS
(dBm/1MHz)	-46.17	-47.57	-45.91		

Center Freq (cf) Range	1st Channel 822.5 MHz	2nd Channel 830 MHz	3rd Channel 837.5 MHz	Limit	Result
RB / RB start	75 / 0	75 / 0	75 / 0	--	--
1475.9 to 1496.6 MHz	1495.5857 MHz	1476.0656 MHz	1489.31153 MHz	1st -50	PASS
(dBm/1MHz)	-56.85	-56.99	-57.41	2nd -50	
				3rd -50	
1496.6 to 1510.9 MHz	1506.8531 MHz	1499.74457 MHz	1509.31556 MHz	-50	PASS
(dBm/1MHz)	-56.57	-56.53	-56.75		
1805 to 1845 MHz	1838.48 MHz	1821.76 MHz	1807.416 MHz	1st -30	PASS
(dBm/1MHz)	-56.64	-57.13	-57.35	2nd -30	
				3rd -30	
1845 to 1880 MHz	1859.819 MHz	1855.003 MHz	1854.7335 MHz	-50	PASS
(dBm/1MHz)	-56.64	-56.01	-56.58		
1884.5 to 1915.7 MHz	1905.04208 MHz	1910.70176 MHz	1895.95664 MHz	-41	PASS
(dBm/300kHz)	-60.98	-62.58	-62.32		
2010 to 2025 MHz	2012.085 MHz	2024.478 MHz	2023.293 MHz	-50	PASS
(dBm/1MHz)	-55.50	-56.84	-56.21		
2110 to 2153.6 MHz	2114.87448 MHz	2135.8984 MHz	2137.62932 MHz	-50	PASS
(dBm/1MHz)	-56.28	-56.02	-56.13		
2153.6 to 2170 MHz	2157.99684 MHz	2167.2366 MHz	2159.45644 MHz	1st -50	PASS
(dBm/1MHz)	-55.45	-55.05	-56.22	2nd -50	
				3rd -50	
3400 to 3419.4 MHz	3402.12624 MHz	3401.5714 MHz	3417.61714 MHz	1st -30	PASS
(dBm/1MHz)	-55.95	-56.63	-56.55	2nd -30	
				3rd -30	
3500.6 to 3600 MHz	3503.46272 MHz	3552.86452 MHz	3591.08382 MHz	1st -30	PASS
(dBm/1MHz)	-56.28	-56.04	-56.98	2nd -30	
				3rd -30	

5.E.7. Adjacent Channel Leakage Power [Article 49-6-9]

5.E.7.1. Test setup



5.E.7.2. Limit

<Channel spacing 15 MHz>

Detuning frequency: $cf \pm 10$ MHz	: -32.2 dBc / 3.84 MHz or less
Detuning frequency: $cf \pm 15$ MHz	: -35.2 dBc / 3.84 MHz or less
Detuning frequency: $cf \pm 15$ MHz	: -29.2 dBc / 13.5 MHz or less

5.E.7.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.E.7.4. Test result< Detuning frequency: cf $\pm$ 10 MHz, Frequency width: 3.84 MHz >

	1st Channel 822.5 MHz	2nd Channel 830 MHz	3rd Channel 837.5 MHz	Limit	Result
RB / RB start	75 / 0	75 / 0	75 / 0	--	--
cf - 10 MHz (dBc/3.84MHz)	-44.56	-43.37	-43.32	-32.2	PASS
cf + 10 MHz (dBc/3.84MHz)	-40.89	-41.89	-41.07		

< Detuning frequency: cf $\pm$ 15 MHz, Frequency width: 3.84 MHz >

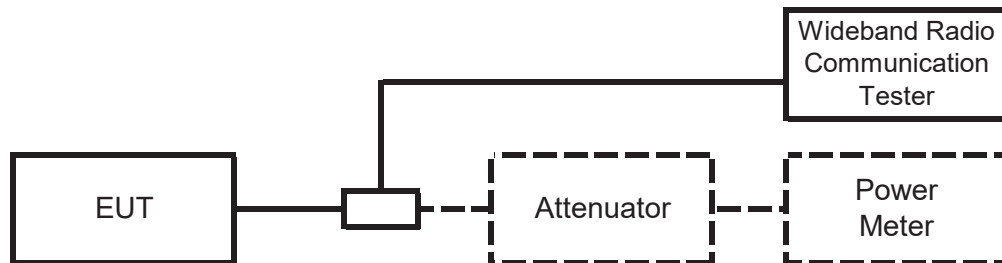
	1st Channel 822.5 MHz	2nd Channel 830 MHz	3rd Channel 837.5 MHz	Limit	Result
RB / RB start	75 / 0	75 / 0	75 / 0	--	--
cf - 15 MHz (dBc/3.84MHz)	-55.28	-50.56	-50.56	-35.2	PASS
cf + 15 MHz (dBc/3.84MHz)	-45.51	-46.45	-47.73		

< Detuning frequency: cf $\pm$ 15 MHz, Frequency width: 13.5 MHz >

	1st Channel 822.5 MHz	2nd Channel 830 MHz	3rd Channel 837.5 MHz	Limit	Result
RB / RB start	75 / 0	75 / 0	75 / 0	--	--
cf - 15 MHz (dBc/13.5MHz)	-44.13	-42.30	-42.29	-29.2	PASS
cf + 15 MHz (dBc/13.5MHz)	-39.02	-40.15	-39.97		

5.E.8. Tolerance for Output Power [Article 14]

5.E.8.1. Test setup



5.E.8.2. Limit

+87 ~ -79%

Note;

$$\text{Power Tolerance} = \{[(\text{O.P.}) - (\text{R.O.P.})] \div (\text{R.O.P.})\} \times 100$$

O.P. : Output power

R.O.P. : Rated Output Power

5.E.8.3. Test condition

1. Turn on the wideband radio communication tester and set up it to make EUT transmit wave required.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

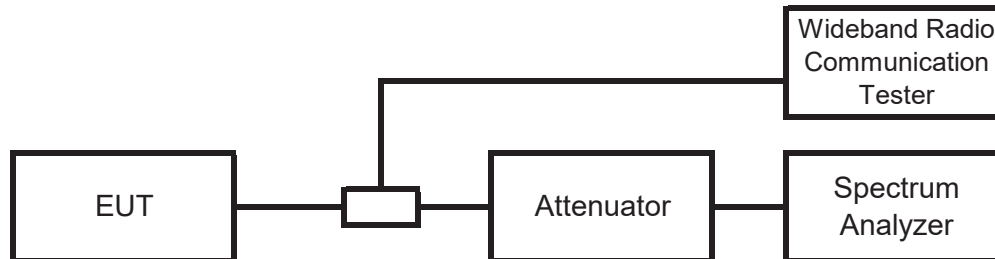
5.E.8.4. Test result

Frequency	1st Channel 822.5 MHz	2nd Channel 830 MHz	3rd Channel 837.5 MHz	Limit	Result
Rated Output Power	200 mW	200 mW	200 mW	200	PASS

	1st Channel 822.5 MHz	2nd Channel 830 MHz	3rd Channel 837.5 MHz	Limit	Result
RB / RB start	75 / 0	75 / 0	75 / 0	--	--
Measured Value (dBm)	22.35	22.24	22.17	--	--
Output Power (mW)	171.79	167.49	164.82	--	--
Power Tolerance (%)	-14.10	-16.25	-17.59	+87 ~ -79%	PASS

5.E.9. Leakage Power at No-Carrier Transmission [Article 49-6-9]

5.E.9.1. Test setup



5.E.9.2. Limit

-48.5 dBm / 13.5 MHz or less

5.E.9.3. Test condition

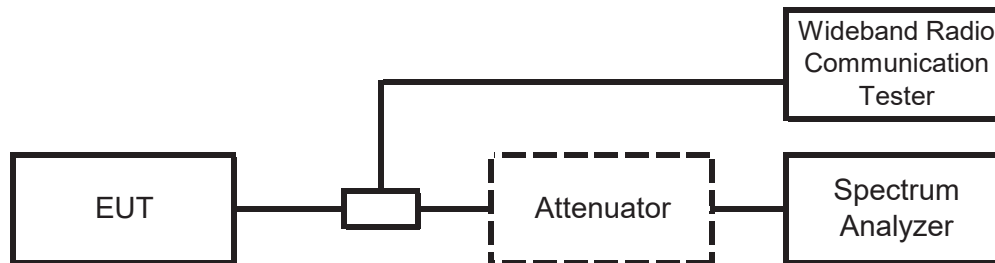
1. Turn on the wideband radio communication tester and set up it to make EUT stop transmitting.
2. The EUT should be transmitting at 1st, 2nd and 3rd channel.

5.E.9.4. Test result

	1st Channel 822.5 MHz	2nd Channel 830 MHz	3rd Channel 837.5 MHz	Limit	Result
RB / RB start	75 / 0	75 / 0	75 / 0	--	--
Measured Value (dBm/13.5MHz)	-67.53	-66.88	-66.95	-48.5	PASS

5.E.10. Secondary Radiated Emissions [Article 24.4,5,6,7]

5.E.10.1. Test setup



5.E.10.2. Limit

30 MHz ~ 1000 MHz	:	-57 dBm / 100kHz or less
1 GHz ~ 12.75 GHz	:	-47 dBm / 1MHz or less

5.E.10.3. Test condition

1. Turn off the wideband radio communication tester to make EUT stop transmitting.
Then set EUT to receive mode.
2. The EUT should be receiving at 1st, 2nd and 3rd channel.

5.E.10.4. Test result

Center Freq (cf) Range	1st Channel 822.5 MHz	2nd Channel 830 MHz	3rd Channel 837.5 MHz	Limit	Result
<RX1>					
30 to 1000 MHz	959.26 MHz	680.967 MHz	802.702 MHz	-60.02	PASS
(dBm/100kHz)	-87.17	-87.06	-86.77		
1 to 12.75 GHz	5050.5 MHz	5134.5 MHz	5851 MHz	-50.02	PASS
(dBm/1MHz)	-73.37	-72.97	-72.56		
<RX2>					
30 to 1000 MHz	947.426 MHz	974.683 MHz	852.851 MHz	-60.02	PASS
(dBm/100kHz)	-87.07	-87.12	-86.41		
1 to 12.75 GHz	5236 MHz	5315.5 MHz	5128.5 MHz	-50.02	PASS
(dBm/1MHz)	-72.88	-72.25	-71.88		
<RX3>					
30 to 1000 MHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/100kHz)	--	--	--		
1 to 12.75 GHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/1MHz)	--	--	--		
<RX4>					
30 to 1000 MHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/100kHz)	--	--	--		
1 to 12.75 GHz	-- MHz	-- MHz	-- MHz	--	--
(dBm/1MHz)	--	--	--		
<RX1 + RX2>					

6. Appendix

Refer to appendixes as follows.

Appendix : The image of the measurement result

- * The test results presented in this report relate only to the offered test sample.
- * This test report shall not be reproduced except in full without the written approval of DSP Research, Inc.
- * The applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.

- End of report -