Report on the RF Testing of:

KYOCERA Corporation
Mobile Phone, Model: EB1136
FCC ID: JOYEB1136

In accordance with FCC Part 22 Subpart H

Japan

Add value.
Inspire trust.

Prepared for: KYOCERA Corporation
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COMMERCIAL-IN-CONFIDENCE

Document Number: JPD-TR-22177-0

SIGNATURE			
Hiroaki Suzuki			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Hiroaki Suzuki	Deputy Manager of RF Group	Approved Signatory	2022.10.21

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Japan Ltd. document control rules.

EXECUTIVE SUMMARY - Result: Complied
A sample(s) of this product was tested and the result above was confirmed in accordance with FCC Part 22 Subpart H.

ACCREDITED
Certificate #3686.03

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Japan

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1 Summary of Test

1.1 Modification history of the test report

Document Number	Modification History	Issue Date
JPD-TR-22177-0	First Issue	Refer to the cover page

1.2 Standards

CFR47 FCC Part 22 Subpart H

1.3 Test methods

KDB 971168 D01 Power Meas License Digital Systems v03r01
ANSI/TIA/EIA 603-E-2016
ANSI C63.26-2015

1.4 Deviation from standards

None

1.5 List of applied test(s) of the EUT

Test item section	Test item	Condition	Result	Remark
2.1046	Conducted Output Power	Conducted	PASS	*1
22.913(a)	Effective Radiated Power	Radiated	PASS	-
22.917(a) 2.1049	Occupied Bandwidth	Conducted	PASS	*2
22.917(a) 2.1051	Band Edge Spurious and Harmonic at Antenna Terminal	Conducted	PASS	*2
22.917(a) 2.1053	Radiated emissions and Harmonic Emissions	Radiated	PASS	-
22.355 2.1055	Frequency Stability	Conducted	PASS	*2

*1: Refer to RF Exposure Report (Test Report_SAR)
*2: Since there is no change in Module from FCC ID: JOYEB1134, so WCDMA Band V item has not been tested. Please refer to the test report “JPD-TR-22090-0” of “FCC ID: JOYEB1134”.

1.6 Test information

None

1.7 Test set up

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1.8 Test period

12-September-2022 - 23-September-2022

Japan

2 Equipment Under Test

All information in this chapter was provided by the applicant.

2.1 EUT information

Applicant	KYOCERA Corporation Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi, Kanagawa, Japan Phone: +81-45-943-6253 Fax: +81-45-943-6314
Equipment Under Test (EUT)	Mobile Phone
Model number	EB1136
Serial number	354649890001247, 354649890001254, 354649890001262, 350246240000211, 350246240000229
Trade name	Kyocera
Number of sample(s)	5
EUT condition	Pre-Production
Power rating	Battery: DC 3.8 V
Size	(W) 112.9 mm × (D) 51.3 mm × (H) 18.1 mm
Environment	Indoor and Outdoor use
Terminal limitation	-20˚C to 60˚C
Hardware version	DMT1
Software version	0.090GC.0015.a
Firmware version	Not applicable
RF Specification	
Frequency of Operation	Up Link GSM850: 824.2-848.8 MHz WCDMA Band V: 826.4-846.6 MHz LTE Band V: 824.7-848.3 MHz Down Link GSM850: 869.2-893.8 MHz WCDMA Band V: 871.4-891.6 MHz LTE Band V: 869.7-893.3 MHz
Modulation type	GSM850: GMSK WCDMA Band V: QPSK, 16QAM LTE Band V: QPSK, 16QAM
Emission designator	GSM850: 243KGXW WCDMA Band V: 4M18F9W LTE Band V: BW 1.4M QPSK: 1M11G7D, 16QAM: 1M10W7D BW 3M QPSK: 2M71G7D, 16QAM: 2M69W7D BW 5M QPSK: 4M50G7D, 16QAM: 4M48W7D BW 10M QPSK: 8M96G7D, 16QAM: 8M97W7D

Effective Radiated Power (E.R.P.)	GSM850: 4.266 W (36.3 dBm) WCDMA Band V: 0.617 W (27.9 dBm) LTE Band V: 0.661 W (28.2 dBm)
Antenna type	Internal antenna
Antenna gain	GSM850: 0.81 dBi WCDMA Band V: 0.81 dBi LTE Band V: 0.81dBi

Japan

2.2 Modification to the EUT

The table below details modifications made to the EUT during the test project.

Modification State	Description of Modification	Modification fitted by	Date of Modification
Model: EB1136, Serial Number: 354649890001247, 354649890001254, 354649890001262, 350246240000211, 350246240000229			
0	As supplied by the applicant	Not Applicable	Not Applicable

2.3 Variation of family model(s)

2.3.1 List of family model(s)

EB1136 has model with camera and without camera.

2.3.2 Reason for selection of EUT

Not applicable

2.4 Description of test mode

The EUT had been tested under operating condition.
There are three channels have been tested as following:

Band	Modulation	Bandwidth [MHz]	Channel	Frequency [MHz]
GSM850	GMSK	-	128, 190, 251	824.2, 836.6, 848.8
WCDMA Band V	QPSK, 16QAM	-	4132, 4183, 4233	826.4, 836.6, 846.6
LTE Band V	QPSK, 16QAM	1.4	20407, 20525, 20643	824.7, 836.5, 848.3
		3	20415, 20525, 20635	825.5, 836.5, 847.5
		5	20425, 20525, 20625	826.5, 836.5, 846.5
		10	20450, 20525, 20600	829.0, 836.5, 844.0

The field strength of spurious emissions was measured at each position of all three axis X, Y and Z to compare the level, and the maximum noise.
The worst emission was found in Z-axis, Open, With camera (GSM850 and LTE Band V), Z-axis, Open, Without camera (WCDMA Band V) and the worst case recorded.
Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports.

Japan

3 Configuration of Equipment

Numbers assigned to equipment on the diagram in “3.2 System configuration” correspond to the list in “3.1 Equipment used”.
This test configuration is based on the manufacture’s instruction.
Cabling and setup(s) were taken into consideration and test data was taken under worse case condition.

3.1 Equipment used

No.	Equipment	Company	Model No.	Serial No.	FCC ID/DoC	Comment
1	Mobile Phone	KYOCERA	EB1136	354649890001247, 354649890001254, 354649890001262, 350246240000211, 350246240000229	JOYEB1136	EUT

3.2 System configuration

4 Test Result

4.1 Effective Radiated Power

4.1.1 Measurement procedure

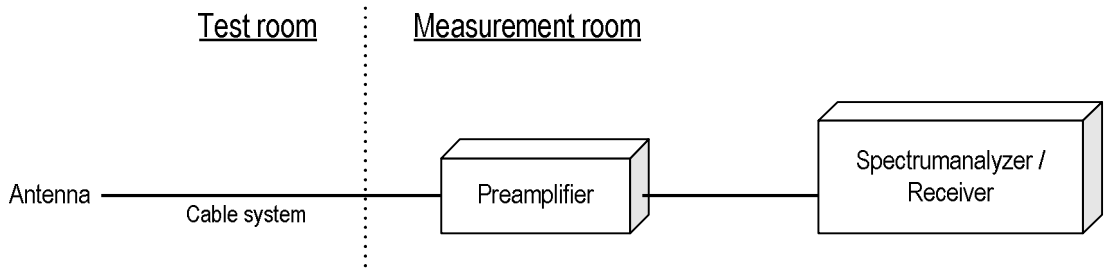
[FCC 22.913(a)]

<Step 1>
The EUT and support equipment are placed on a 1 meter x 1 meter surface, 0.8 meter height styrene foam table. Radiated emission measurements are performed at 3 meter distance with the broadband antenna (Log periodic antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1 to 4 meters and stopped at height producing the maximum emission.
The turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission.

<Step 2>
The substitution antenna is replaced by the transmitter antenna (EUT).
The frequency of the signal generator is adjusted to the measurement frequency.
Level of the signal generator is adjusted to the level that is obtained from step 1, and record the emission level of signal generator.

The spectrum analyzer is set to;
a) Span = 1.5 times the OBW
b) RBW = 1-5% of the expected OBW, not to exceed 1 MHz
c) VBW ≥ 3 x RBW
d) Number of sweep points ≥ 2 x span / RBW
e) Sweep time = auto-couple
f) Detector = RMS (power averaging)
g) If the EUT can be configured to transmit continuously (i.e., burst duty cycle ≥ 98%), then set the trigger to free run.
h) If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98 %), then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Ensure that the sweep time is less than or equal to the transmission burst duration.
i) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with the band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

- Test configuration



4.1.2 Calculation method

Result (ERP) = Ant. Input - Cable loss + Antenna Gain
Margin = Limit – Result (ERP)

Example:
Limit @ 836.6 MHz : 38.45 dBm
Ant. Input = 40.0 dBm Cable loss = 0.8 dB Ant. Gain = -6.7 dBd
Result = 40.0 - 0.8 + (-6.7) = 32.5 dBm
Margin = 38.45 – 32.5 = 5.95 dB

4.1.3 Limit

7 W (38.45 dBm)

Japan

4.1.4 Test data

Date	:	13~14-September-2022			
Temperature	:	23.9 [˚C]			
Humidity	:	63.6 [%]	Test engineer	:	
Test place	:	3m Semi-anechoic chamber			Chiaki Kanno
Date	:	14~15-September-2022			
Temperature	:	23.4 [˚C]			
Humidity	:	58.9 [%]	Test engineer	:	
Test place	:	3m Semi-anechoic chamber			Chiaki Kanno
Date	:	15~16-September-2022			
Temperature	:	23.1 [˚C]			
Humidity	:	59.1 [%]	Test engineer	:	
Test place	:	3m Semi-anechoic chamber			Chiaki Kanno
Date	:	20~21-September-2022			
Temperature	:	21.5 [˚C]			
Humidity	:	54.6 [%]	Test engineer	:	
Test place	:	3m Semi-anechoic chamber			Chiaki Kanno

[GSM850 – Z-axis, Open, With camera]

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Result [W]	Limit [dBm]	Margin [dB]
H	824.2	-28.5	43.5	0.8	-8.7	36.3	4.266	38.45	2.2
H	836.6	-31.5	41.0	0.8	-8.7	33.7	2.344	38.45	4.8
H	848.8	-30.8	41.7	0.8	-8.7	34.4	2.754	38.45	4.1

[WCDMA Band V – Z-axis, Open, Without camera]

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Result [W]	Limit [dBm]	Margin [dB]
H	826.4	-27.8	35.1	0.8	-8.7	27.9	0.617	38.45	10.6
H	836.6	-29.2	34.1	0.8	-8.7	26.8	0.479	38.45	11.7
H	846.6	-29.3	33.8	0.8	-8.7	26.5	0.447	38.45	12.0

[LTE Band V – Z-axis, Open, With camera]
QPSK, BW 1.4MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Result [W]	Limit [dBm]	Margin [dB]
H	824.7	-29.1	33.7	0.8	-8.7	26.5	0.447	38.45	12.0
H	836.5	-29.3	34.0	0.8	-8.7	26.7	0.468	38.45	11.8
H	848.3	-30.2	33.0	0.8	-8.7	25.7	0.372	38.45	12.8

16QAM, BW 1.4MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Result [W]	Limit [dBm]	Margin [dB]
H	824.7	-30.0	32.8	0.8	-8.7	25.6	0.363	38.45	12.9
H	836.5	-30.2	33.1	0.8	-8.7	25.8	0.380	38.45	12.7
H	848.3	-31.2	32.0	0.8	-8.7	24.7	0.295	38.45	13.8

[LTE Band V – Z-axis, Open, With camera]

QPSK, BW 3MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Result [W]	Limit [dBm]	Margin [dB]
H	825.5	-29.2	33.6	0.8	-8.7	26.4	0.437	38.45	12.1
H	836.5	-29.5	33.8	0.8	-8.7	26.5	0.447	38.45	12.0
H	847.5	-30.1	33.1	0.8	-8.7	25.8	0.380	38.45	12.7

16QAM, BW 3MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Result [W]	Limit [dBm]	Margin [dB]
H	825.5	-30.0	32.8	0.8	-8.7	25.6	0.363	38.45	12.9
H	836.5	-30.1	33.2	0.8	-8.7	25.9	0.389	38.45	12.6
H	847.5	-31.2	32.0	0.8	-8.7	24.7	0.295	38.45	13.8

QPSK, BW 5MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Result [W]	Limit [dBm]	Margin [dB]
H	826.5	-27.9	35.0	0.8	-8.7	27.8	0.603	38.45	10.7
H	836.5	-28.1	35.2	0.8	-8.7	27.9	0.617	38.45	10.6
H	846.5	-28.9	34.2	0.8	-8.7	26.9	0.490	38.45	11.6

16QAM, BW 5MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Result [W]	Limit [dBm]	Margin [dB]
H	826.5	-29.2	33.7	0.8	-8.7	26.5	0.447	38.45	12.0
H	836.5	-28.7	34.6	0.8	-8.7	27.3	0.537	38.45	11.2
H	846.5	-29.8	33.3	0.8	-8.7	26.0	0.398	38.45	12.5

QPSK, BW 10MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Result [W]	Limit [dBm]	Margin [dB]
H	829.0	-27.7	35.4	0.8	-8.7	28.2	0.661	38.45	10.3
H	836.5	-27.9	35.4	0.8	-8.7	28.1	0.646	38.45	10.4
H	844.0	-28.3	34.8	0.8	-8.7	27.5	0.562	38.45	11.0

16QAM, BW 10MHz

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBd]	Result [dBm]	Result [W]	Limit [dBm]	Margin [dB]
H	829.0	-29.9	33.2	0.8	-8.7	26.0	0.398	38.45	12.5
H	836.5	-30.3	33.0	0.8	-8.7	25.7	0.372	38.45	12.8
H	844.0	-30.6	32.5	0.8	-8.7	25.2	0.331	38.45	13.3

Japan

4.2 Occupied Bandwidth

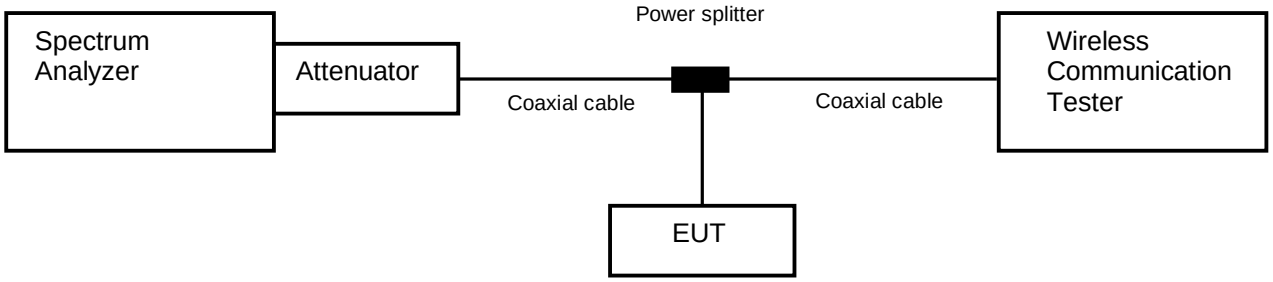
4.2.1 Measurement procedure

[FCC 22.917(a), 2.1049]

The Occupied bandwidth was measured with a spectrum analyzer connected to the antenna terminal. The spectrum analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth.

The spectrum analyzer is set to;
a) RBW = 1-5% of the expected OBW & VBW ≥ 3 x RBW
b) Detector = Peak
c) Trace mode = Max hold
d) Sweep time = auto-couple

- Test configuration



4.2.2 Limit

None

Japan

4.2.3 Measurement result

Date : 12-September-2022
Temperature : 23.3 [˚C]
Humidity : 49.6 [%] Test engineer : Kazunori Saito
Test place : Shielded room No.4

Date : 14-September-2022
Temperature : 23.9 [˚C]
Humidity : 54.4 [%] Test engineer : Kazunori Saito
Test place : Shielded room No.4

Band	Channel	Frequency (MHz)	Test Result (kHz)
GSM850	128	824.2	243.4961
	190	836.6	243.3675
	251	848.8	242.3796

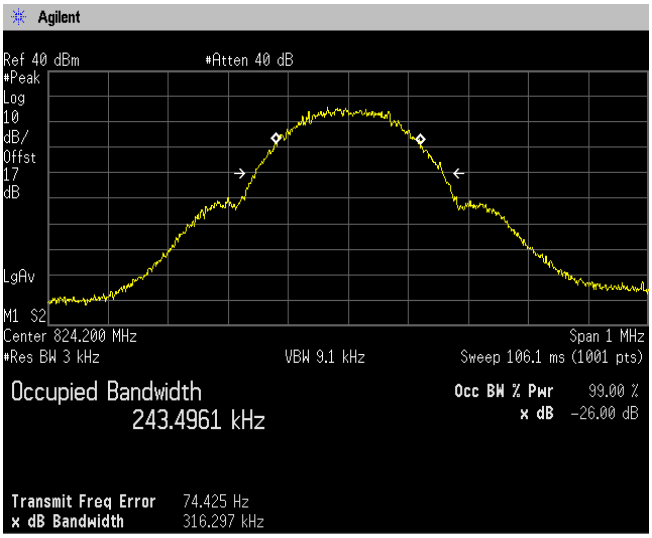
Band	Channel	Frequency [MHz]	Bandwidth [MHz]	Modulation	RB	Test Result [MHz]
LTE Band V	20525	836.5	1.4	QPSK	3-1	0.6004
					6-0	1.1052
				16QAM	3-1	0.6023
					6-0	1.0960
			3	QPSK	8-4	1.5103
					15-0	2.7073
				16QAM	8-4	1.5233
					15-0	2.6916
			5	QPSK	12-7	2.3035
					25-0	4.4950
				16QAM	12-7	2.2834
					25-0	4.4842
			10	QPSK	25-12	4.6204
					50-0	8.9610
				16QAM	25-12	4.6322
					50-0	8.9746

Japan

4.2.4 Trace data

[GSM850]

Channel: 128



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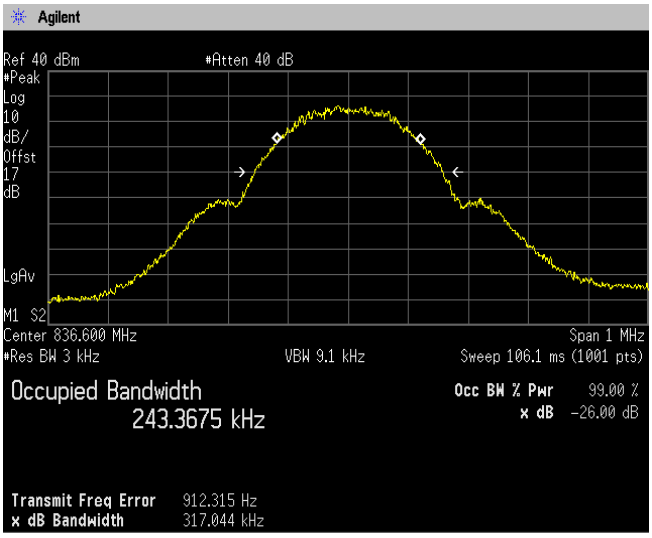
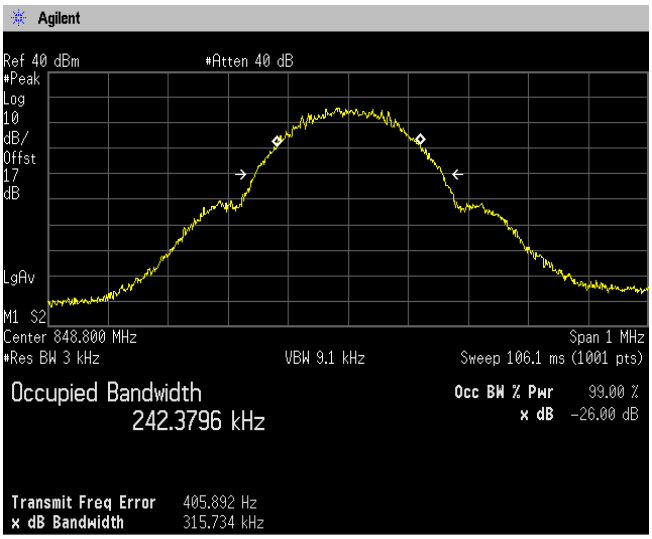


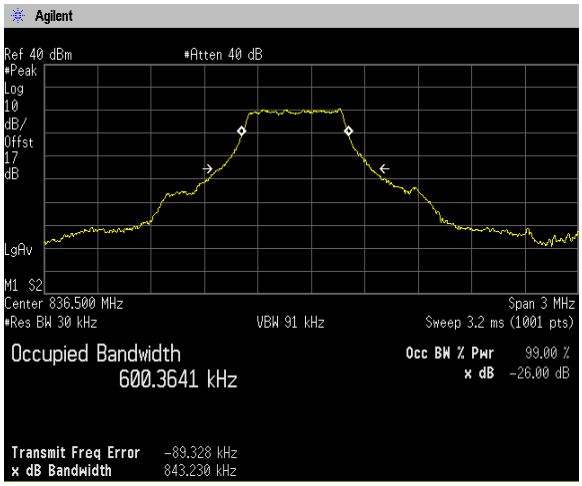
Channel: 251



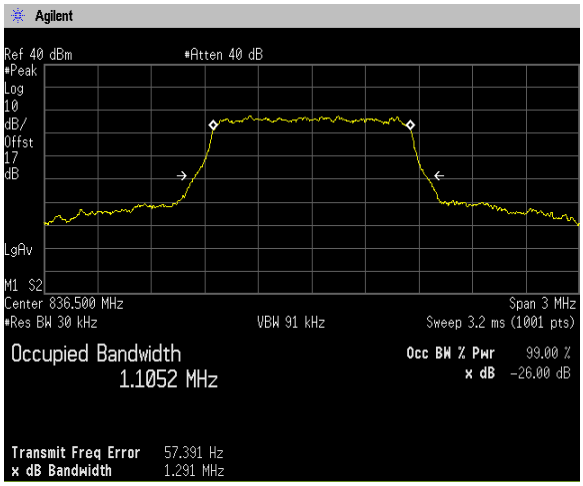
[LTE Band V]
Channel: 20525

QPSK, BW 1.4MHz

RB3-1

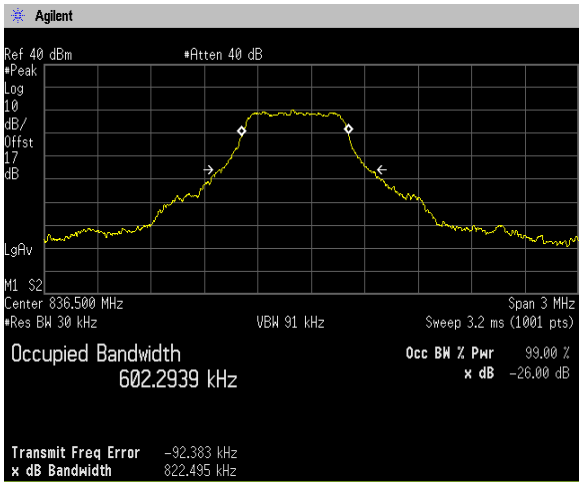


RB6-0

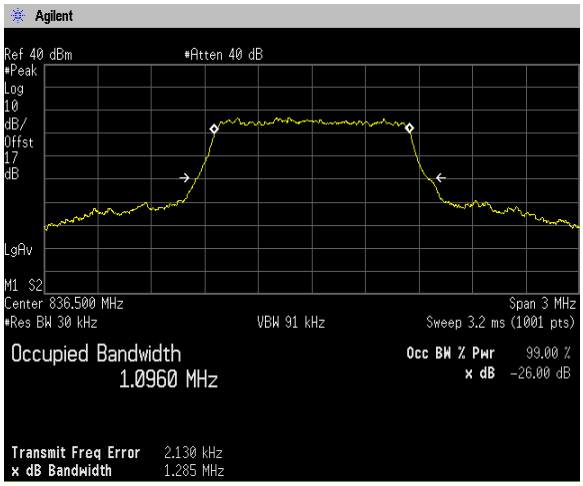


16QAM, BW 1.4MHz

RB3-1



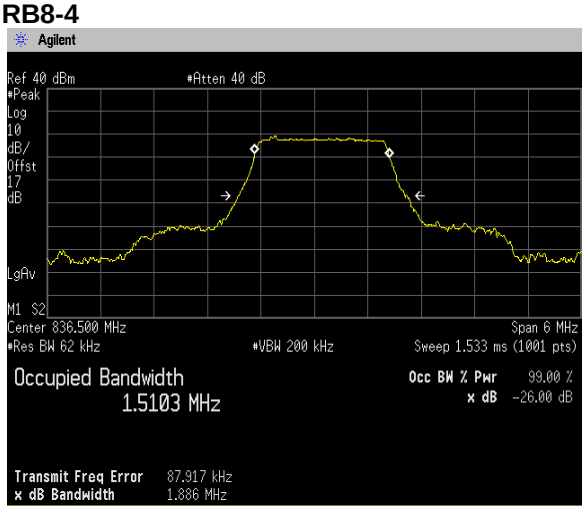
RB6-0



Japan

QPSK, BW 3MHz

RB8-4



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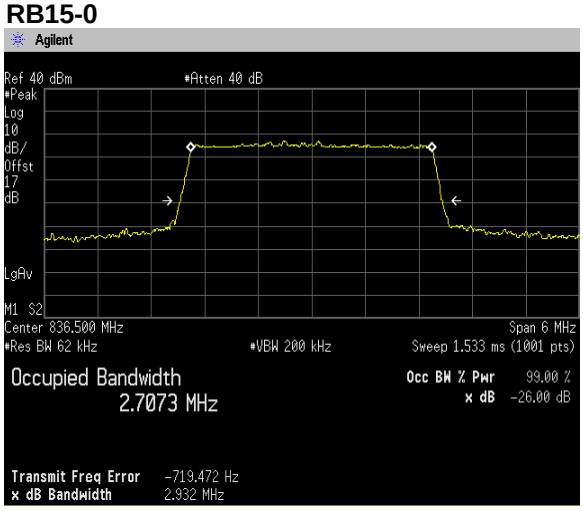
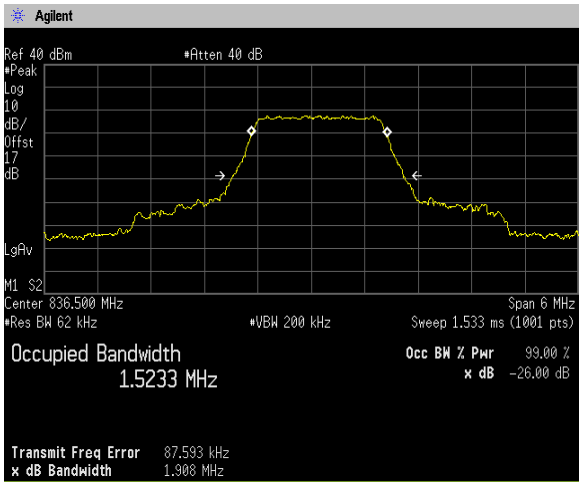


16QAM, BW 3MHz

RB8-4



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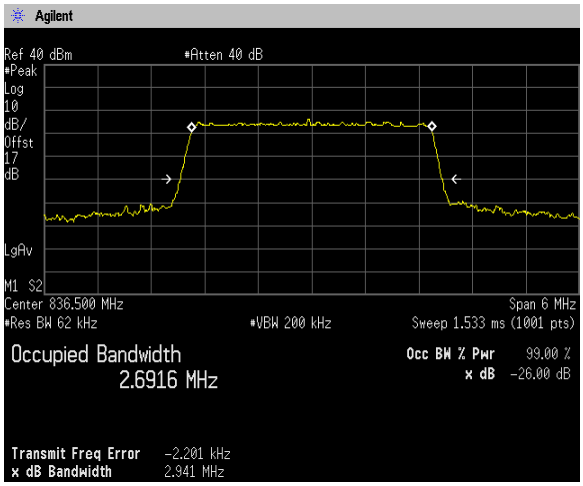
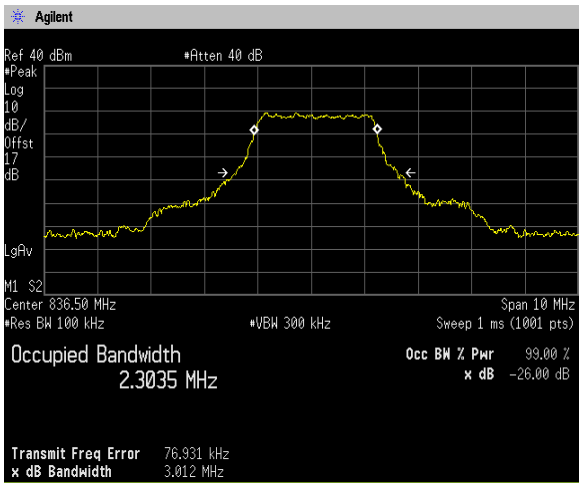
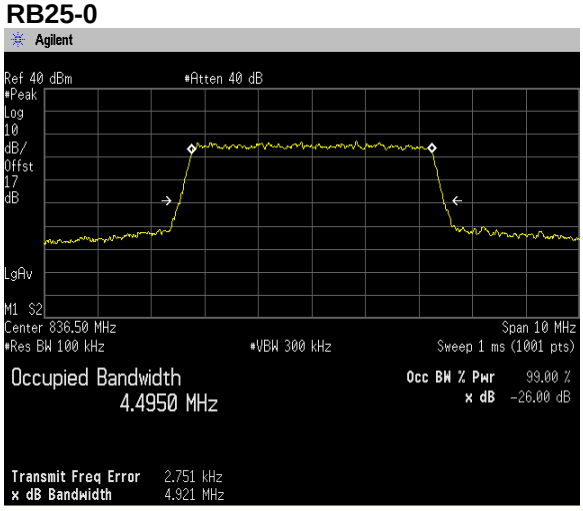


QPSK, BW 5MHz

RB12-7

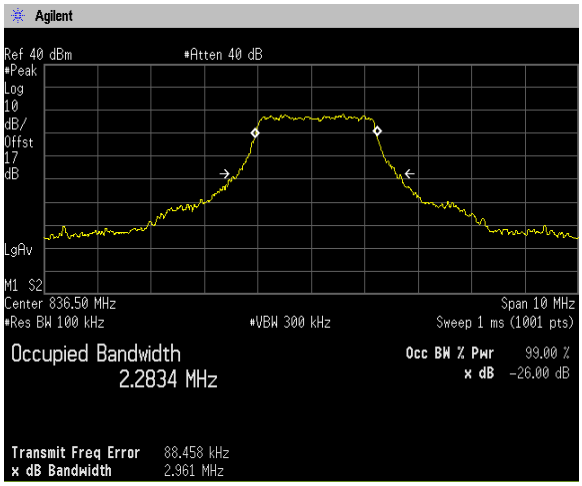


RB25-0

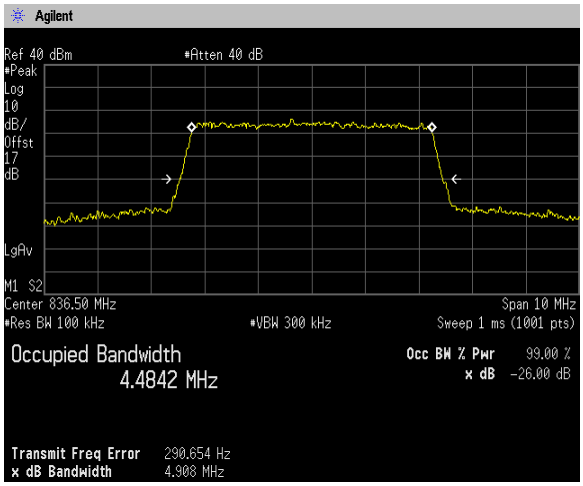


16QAM, BW 5MHz

RB12-7



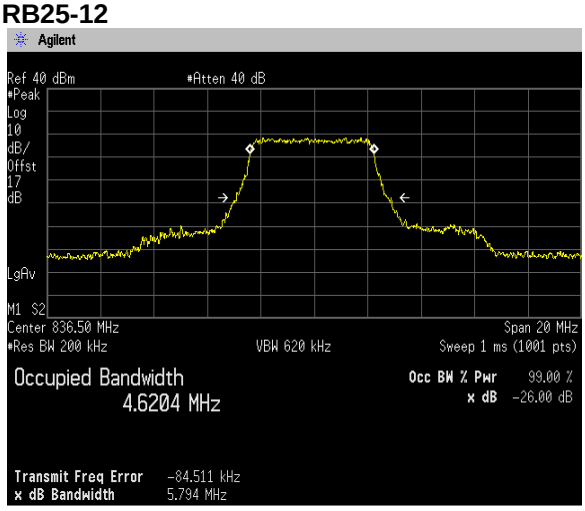
RB25-0



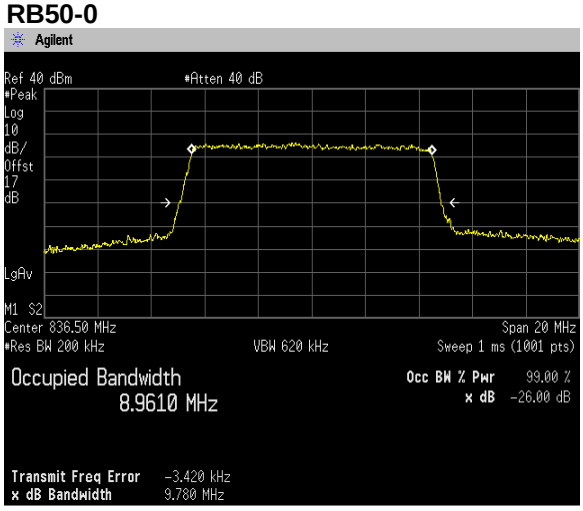
Japan

QPSK, BW 10MHz

RB25-12

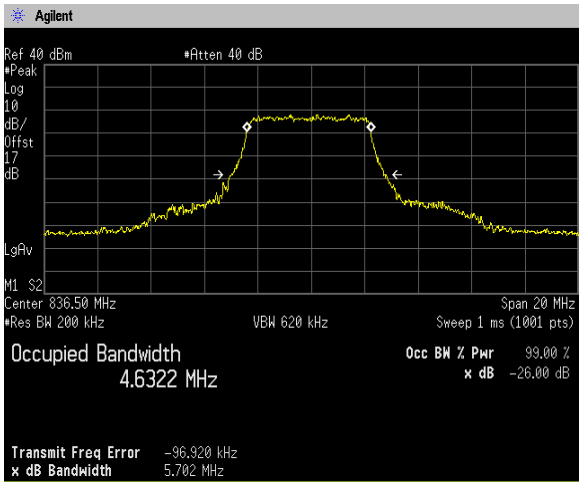


RB50-0

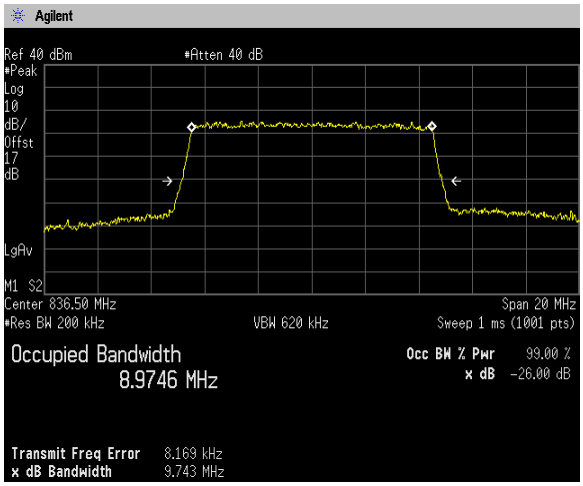


16QAM, BW 10MHz

RB25-12



RB50-0



4.3 Band Edge Spurious and Harmonic at Antenna Terminals

4.3.1 Measurement procedure

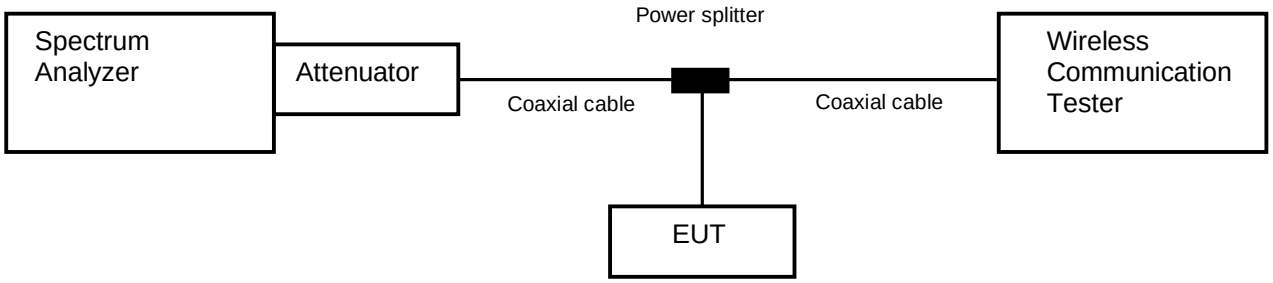
[FCC 22.917(a), 2.1051]

The band edge spurious and harmonic was measured with a spectrum analyzer connected to the antenna terminal.

The spectrum analyzer is set to;
<Band Edge>
a) Span was set large enough so as to capture all out of band emissions near the band edge
b) RBW ≥ 1% of the emission bandwidth or 2% of the emission bandwidth
c) VBW ≥ 3 x RBW
d) Detector = RMS
e) Trace mode = Max hold
f) Sweep time = auto-couple
g) Number of sweep point ≥ 2 x span / RBW

<Spurious Emissions>
a) RBW = 1MHz & VBW ≥ 3 x RBW
b) Detector = Peak
c) Trace mode = Max hold
d) Sweep time = auto-couple
e) Number of sweep point ≥ 2 x span / RBW

- Test configuration



4.3.2 Limit

-13 dBm or less

Japan

4.3.3 Measurement result

Date : 12-September-2022
Temperature : 23.3 [˚C]
Humidity : 49.6 [%] Test engineer :
Test place : Shielded room No.4 Kazunori Saito

Date : 14-September-2022
Temperature : 23.9 [˚C]
Humidity : 54.4 [%] Test engineer :
Test place : Shielded room No.4 Kazunori Saito

Band	Channel/BW	Frequency [MHz]	Limit [dBm]	Results	
GSM850	128	824.2	-13.0	See the trace data	PASS
	251	848.8	-13.0	See the trace data	PASS

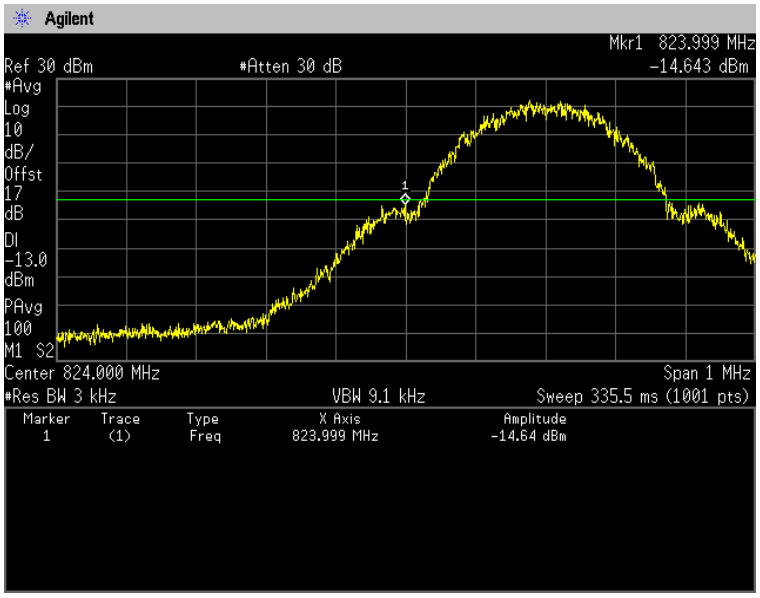
Band	Modulation	Bandwidth [MHz]	Channel	Frequency [MHz]	Limit [dBm]	Results	
LTE Band V	QPSK, 16QAM	1.4	20407	824.7	-13.0	See the trace data	PASS
			20643	848.3	-13.0	See the trace data	PASS
		3	20415	825.5	-13.0	See the trace data	PASS
			20635	847.5	-13.0	See the trace data	PASS
		5	20425	826.5	-13.0	See the trace data	PASS
			20625	846.5	-13.0	See the trace data	PASS
		10	20450	829.0	-13.0	See the trace data	PASS
			20600	844.0	-13.0	See the trace data	PASS

Japan

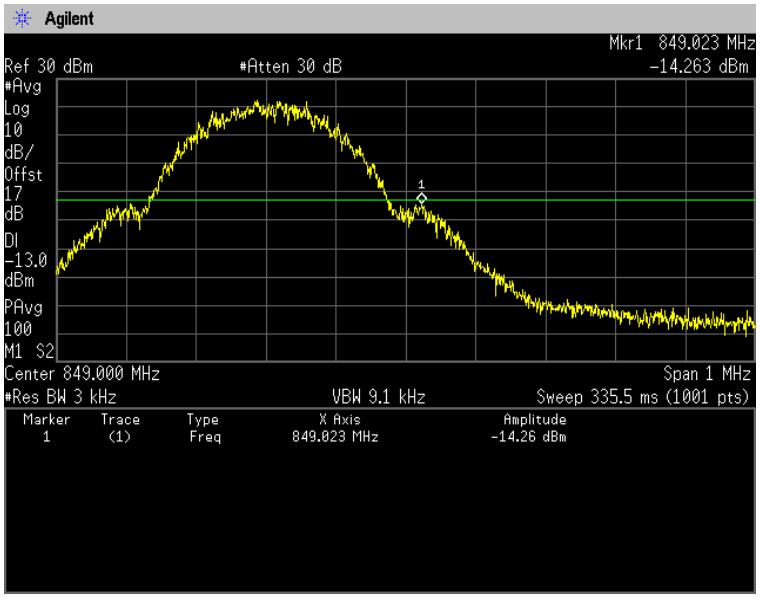
4.3.4 Trace data

[GSM850]
(Band Edge)

Channel: 128



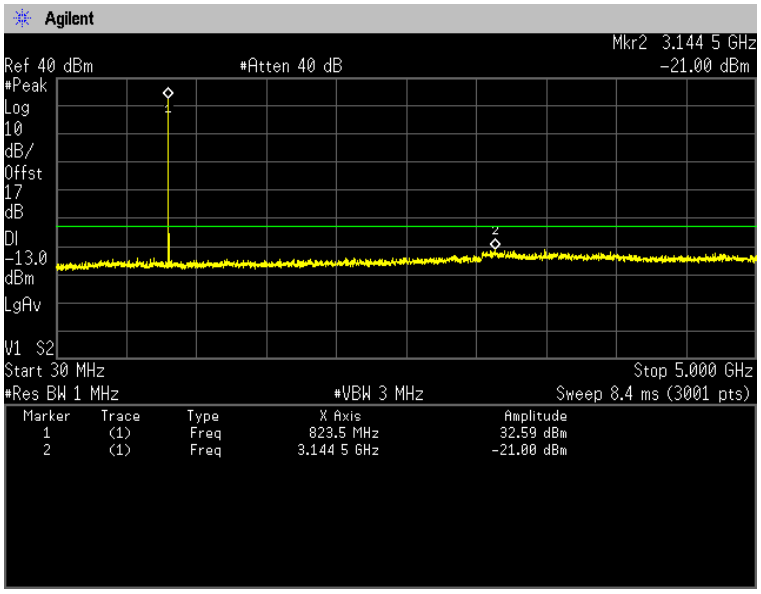
Channel: 251



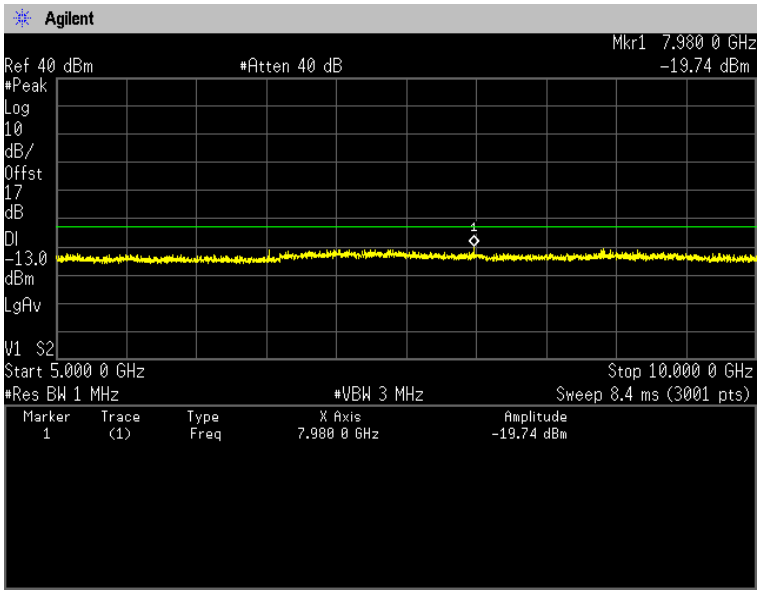
Japan

(Spurious Emissions)
Note: Conducted spurious test was measured in the worst case of conducted output power.

Channel: 128
30MHz-5GHz



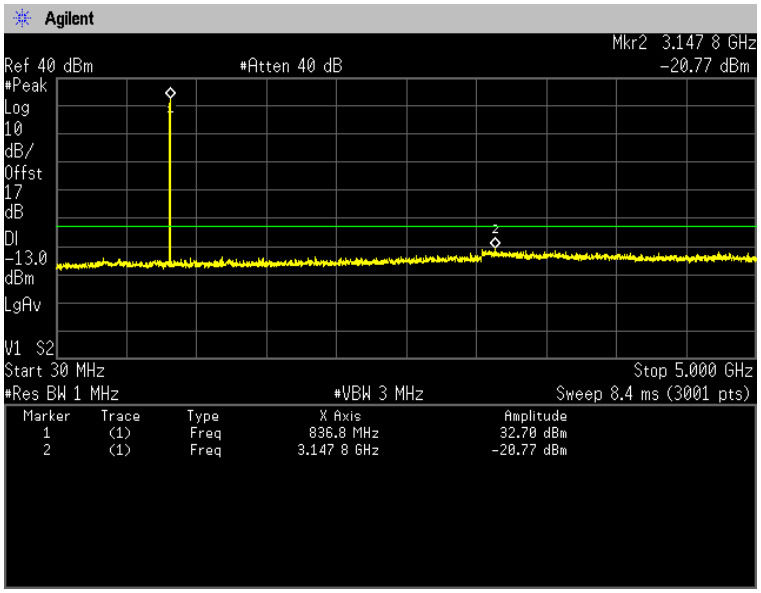
5GHz-10GHz



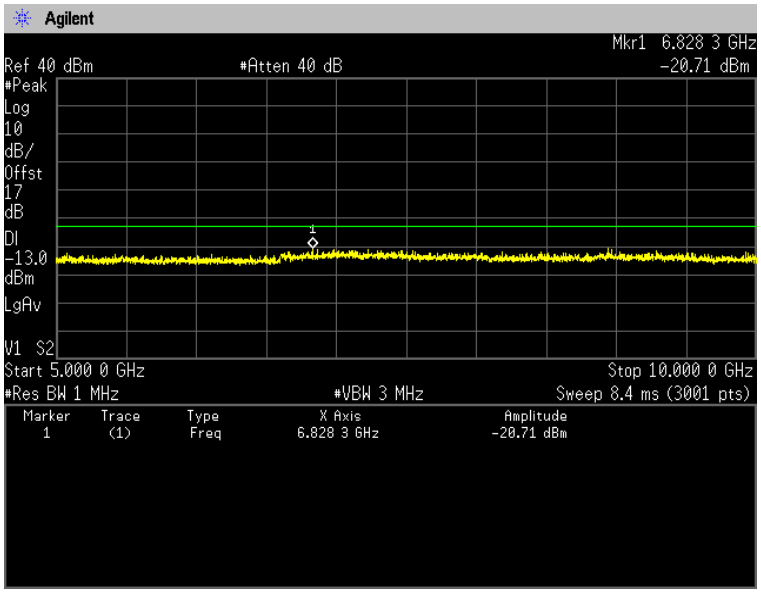
Japan

Channel: 190

30MHz-5GHz

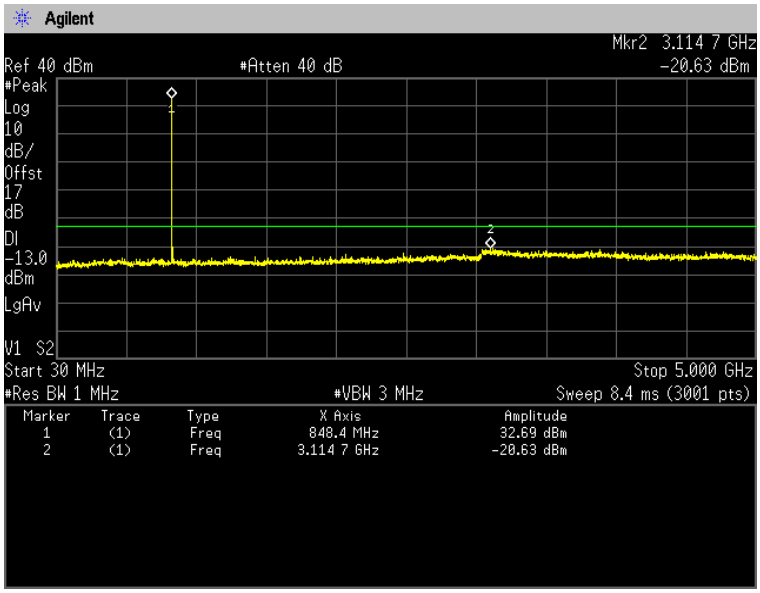


5GHz-10GHz

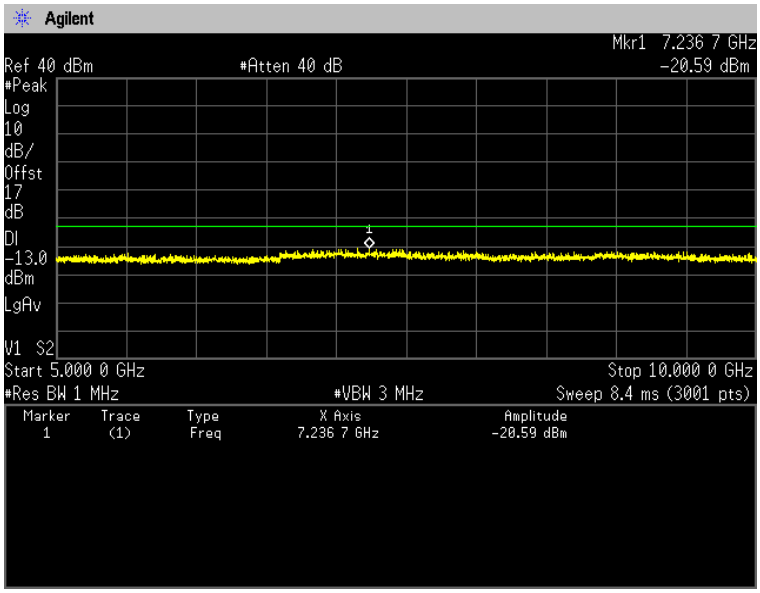


Japan

Channel: 251
30MHz-5GHz



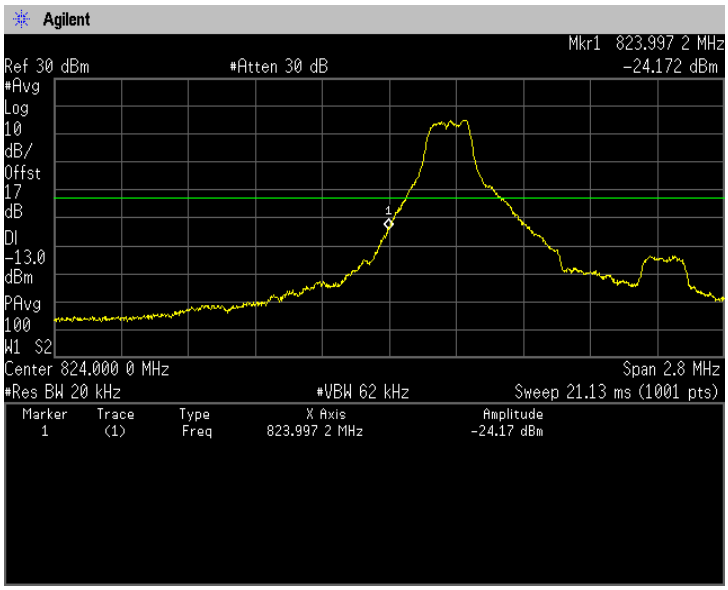
5GHz-10GHz



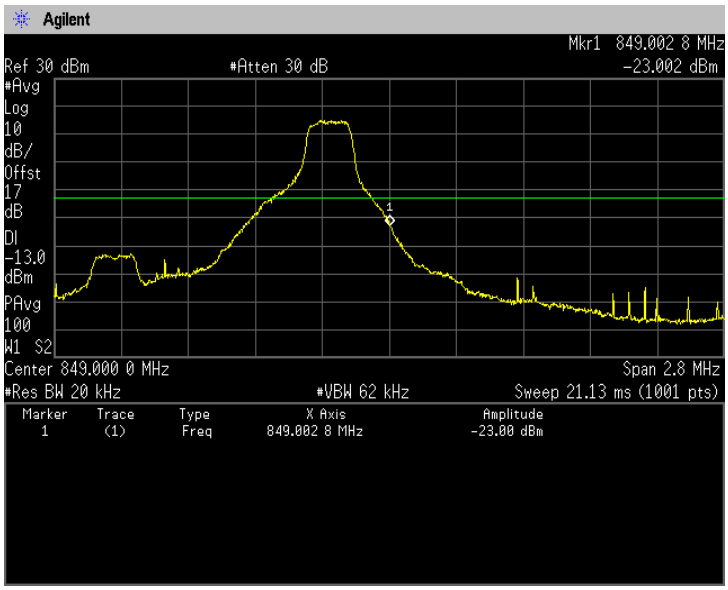
Japan

[LTE Band V]
(Band Edge)

1.4MHz, QPSK, RB1-0
Low: 20407

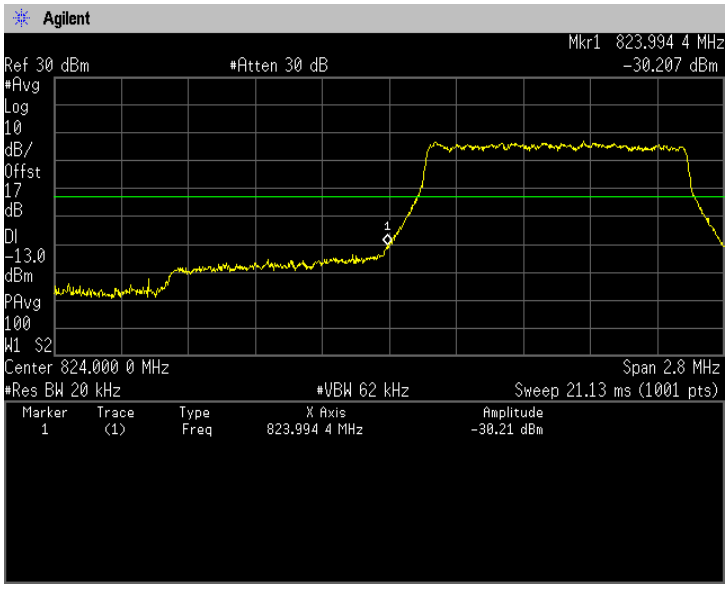


1.4MHz, QPSK, RB1-5
High: 20643

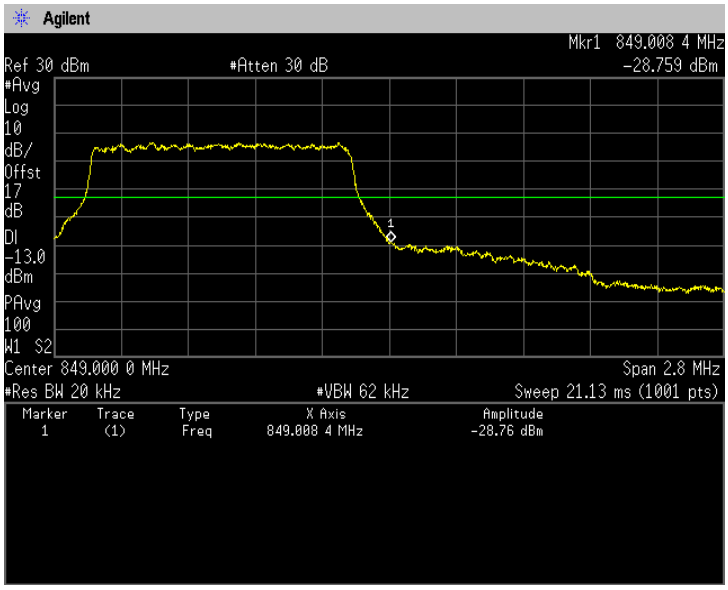


Japan

1.4MHz, QPSK, RB6-0
Low: 20407

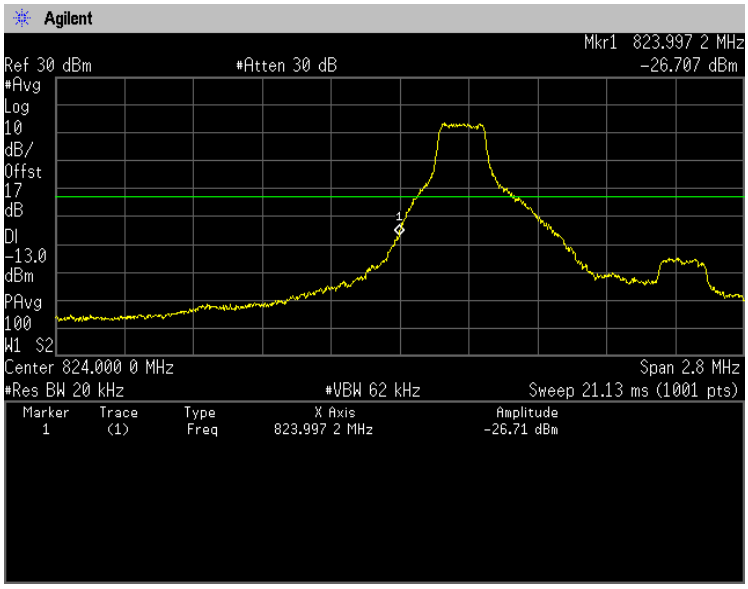


1.4MHz, QPSK, RB6-0
High: 20643

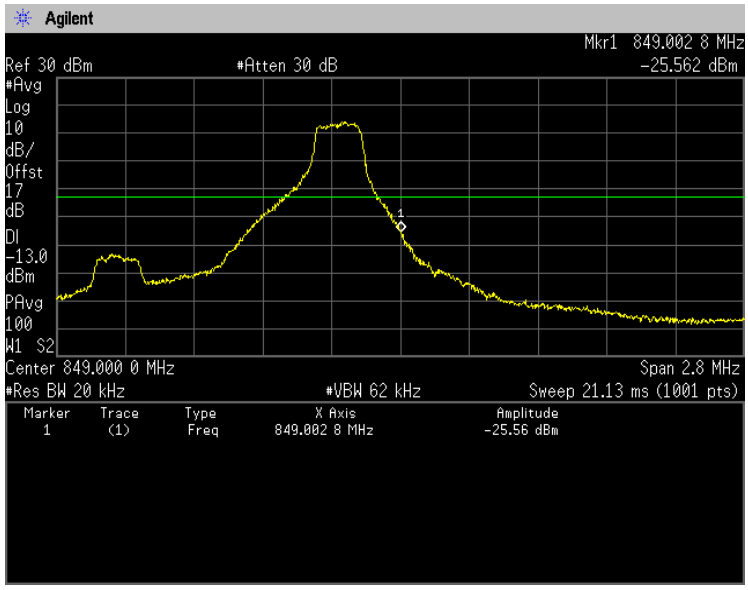


Japan

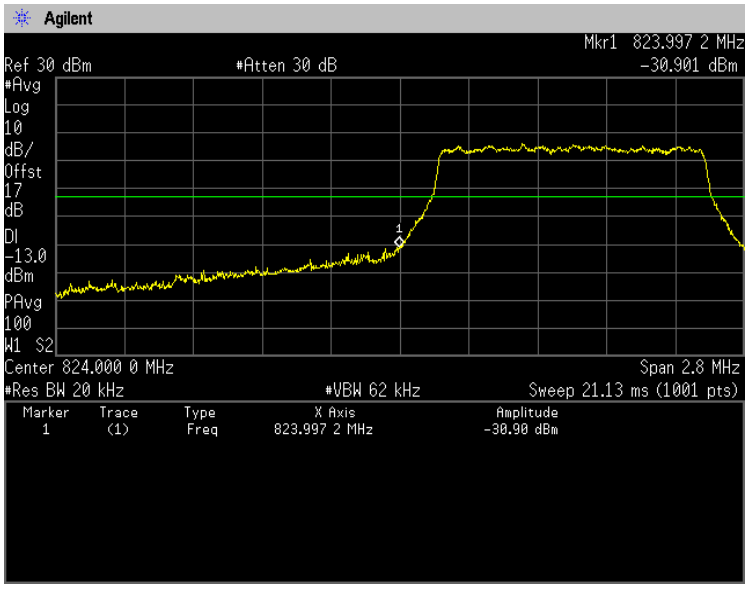
1.4MHz, 16QAM, RB1-0
Low: 20407



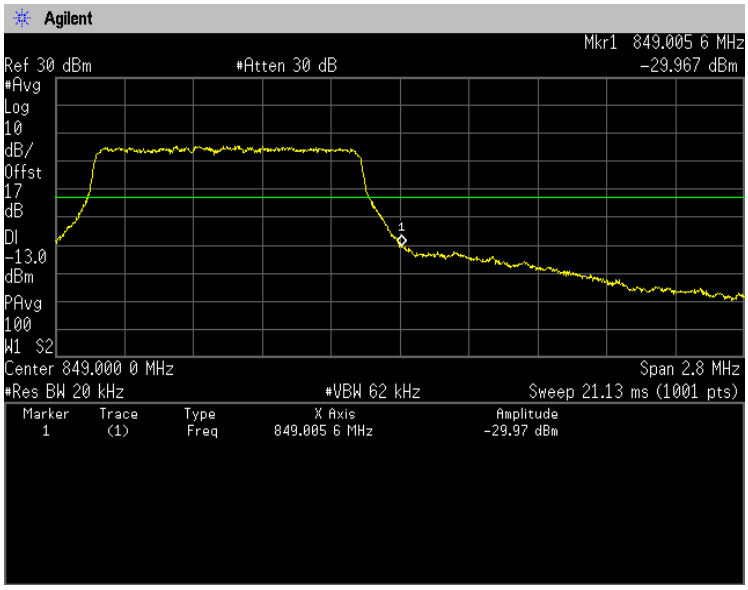
1.4MHz, 16QAM, RB1-5
High: 20643



1.4MHz, 16QAM, RB6-0
Low: 20407

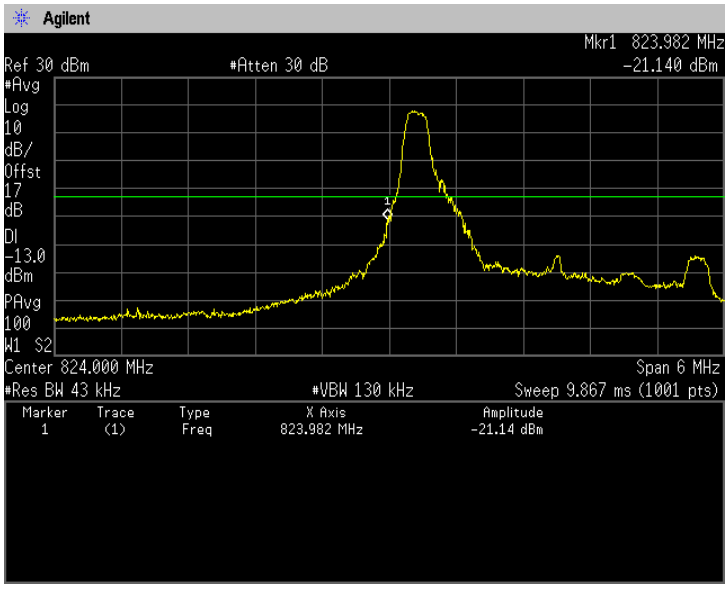


1.4MHz, 16QAM, RB6-0
High: 20643

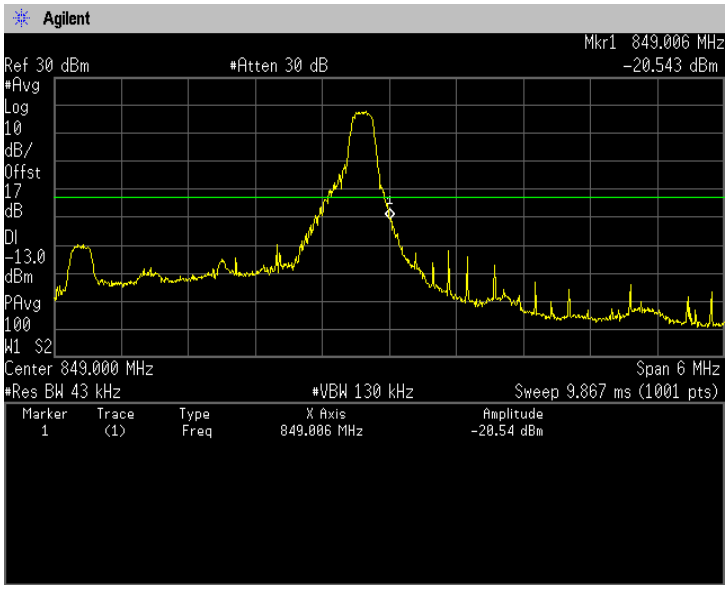


Japan

3MHz, QPSK, RB1-0
Low: 20415

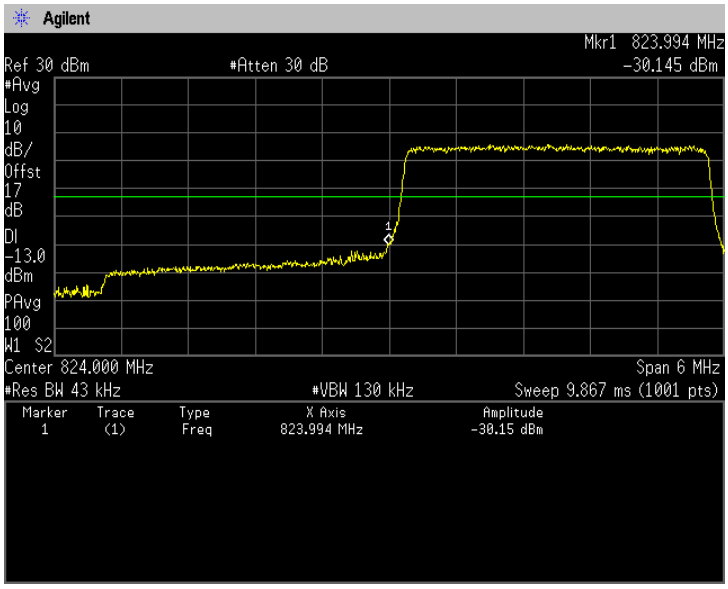


3MHz, QPSK, RB1-14
High: 20635

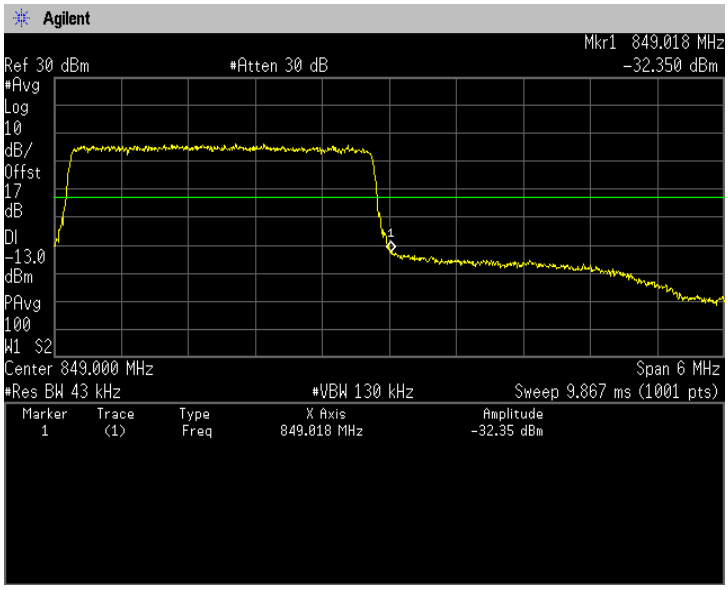


Japan

3MHz, QPSK, RB15-0
Low: 20415

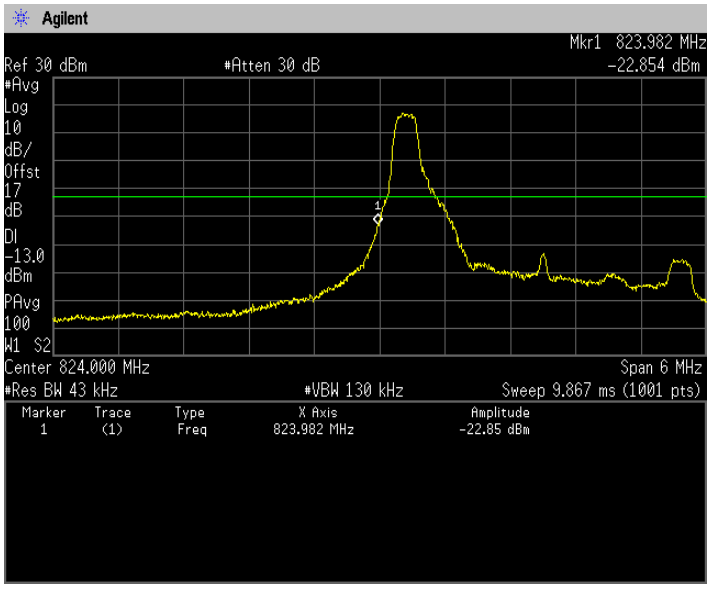


3MHz, QPSK, RB15-0
High: 20635

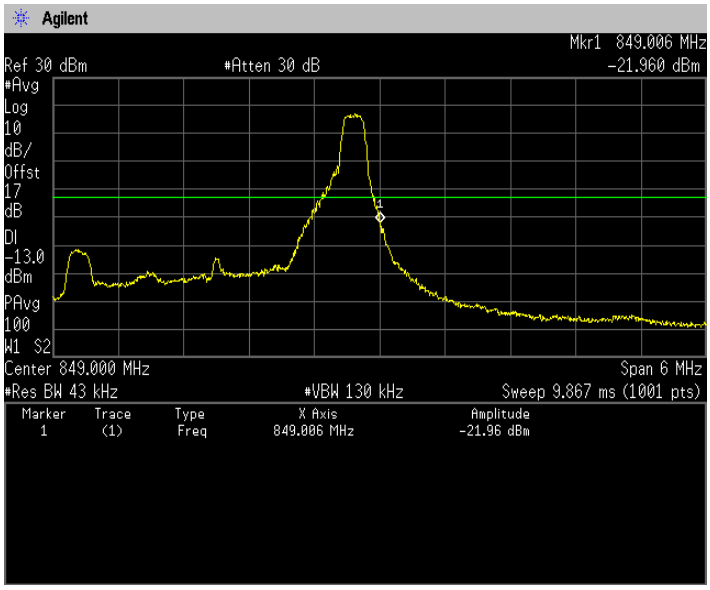


Japan

3MHz, 16QAM, RB1-0
Low: 20415

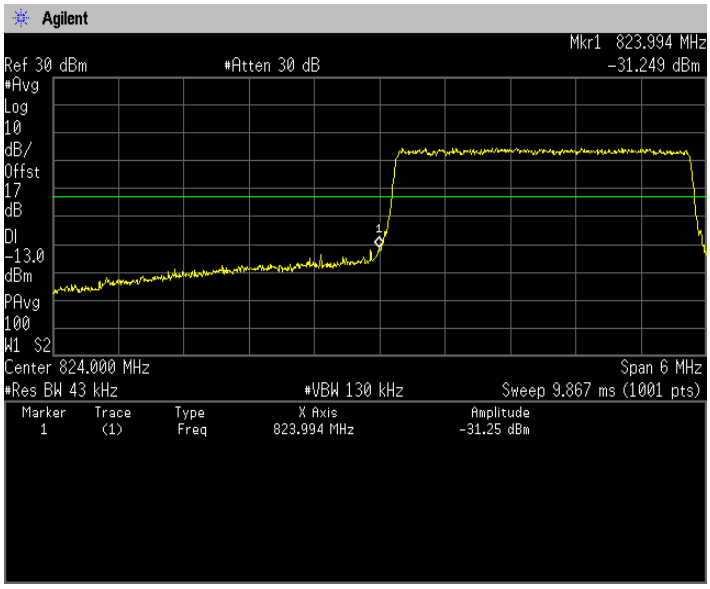


3MHz, 16QAM, RB1-14
High: 20635

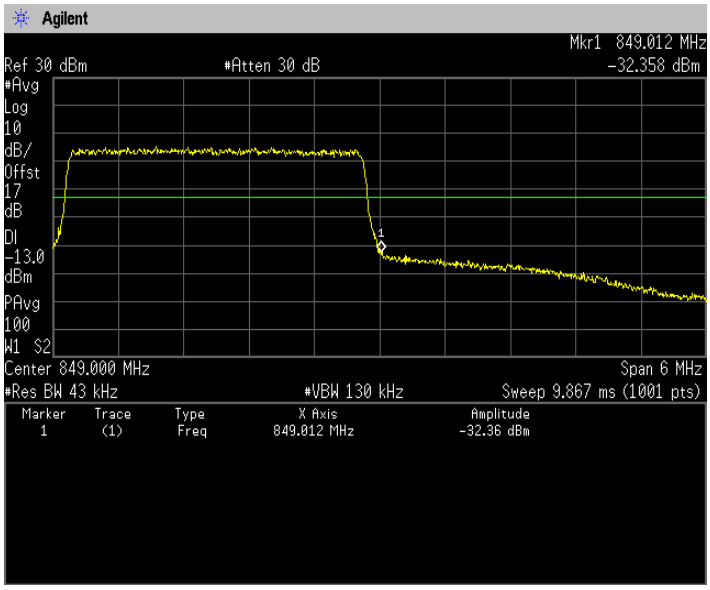


Japan

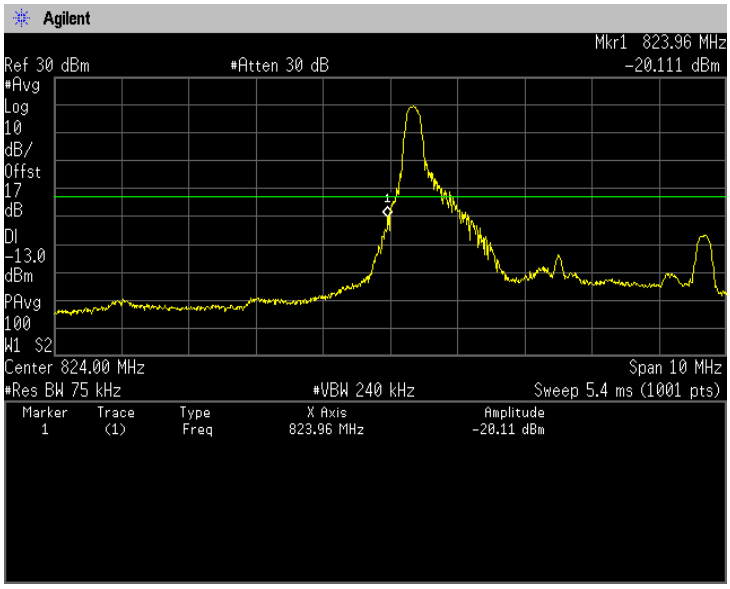
3MHz, 16QAM, RB15-0
Low: 20415



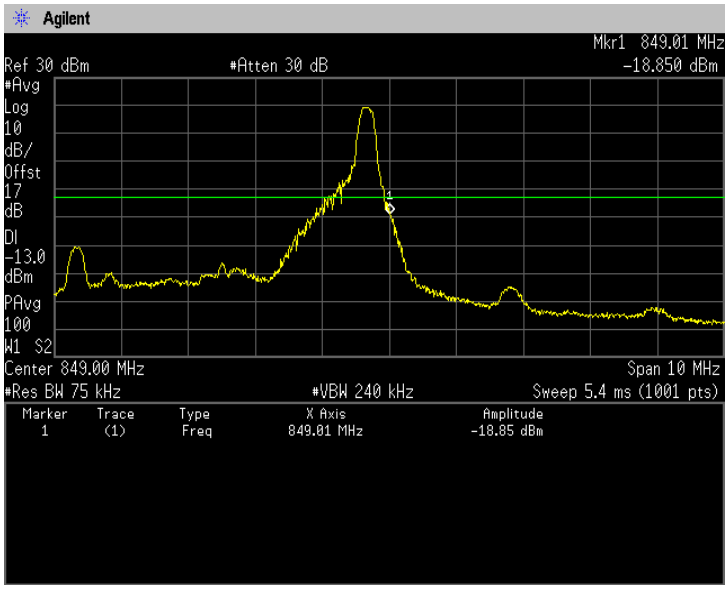
3MHz, 16QAM, RB15-0
High: 20635



5MHz, QPSK, RB1-0
Low: 20425

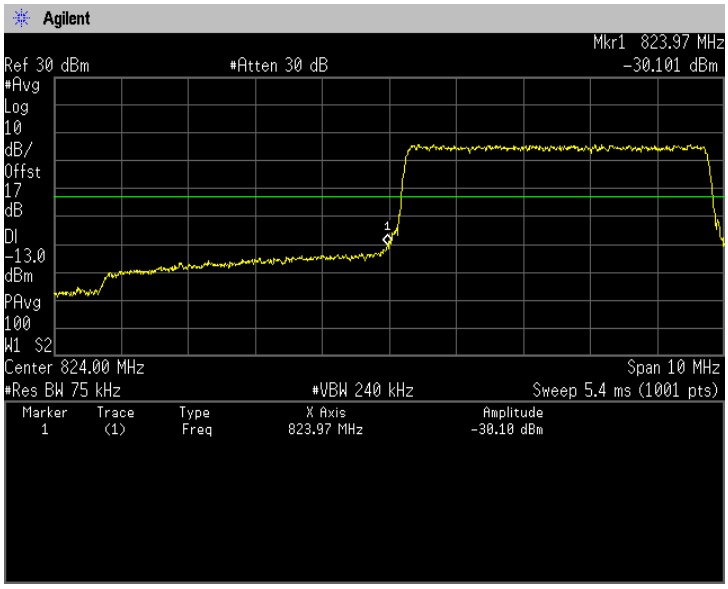


5MHz, QPSK, RB1-24
High: 20625

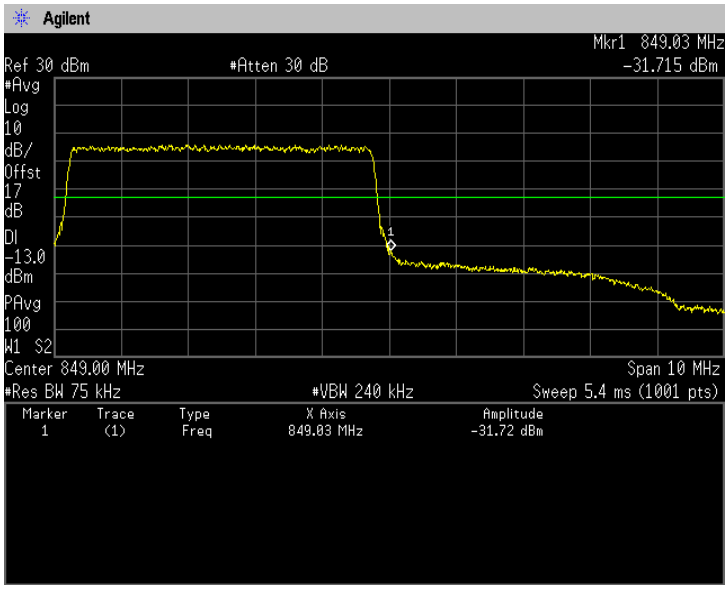


Japan

5MHz, QPSK, RB25-0
Low: 20425

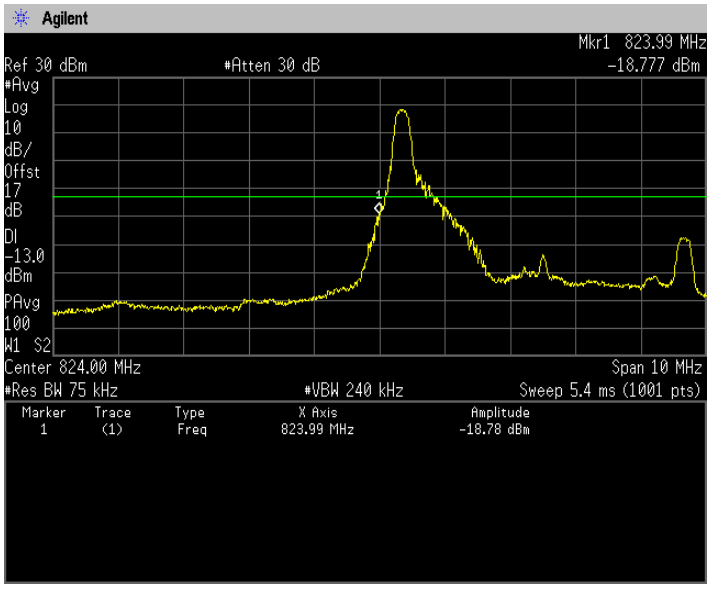


5MHz, QPSK, RB25-0
High: 20625

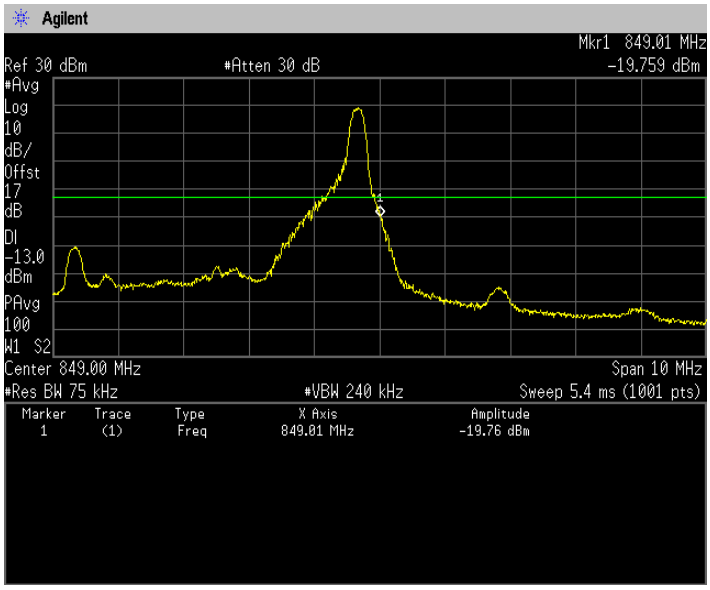


Japan

5MHz, 16QAM, RB1-0
Low: 20425

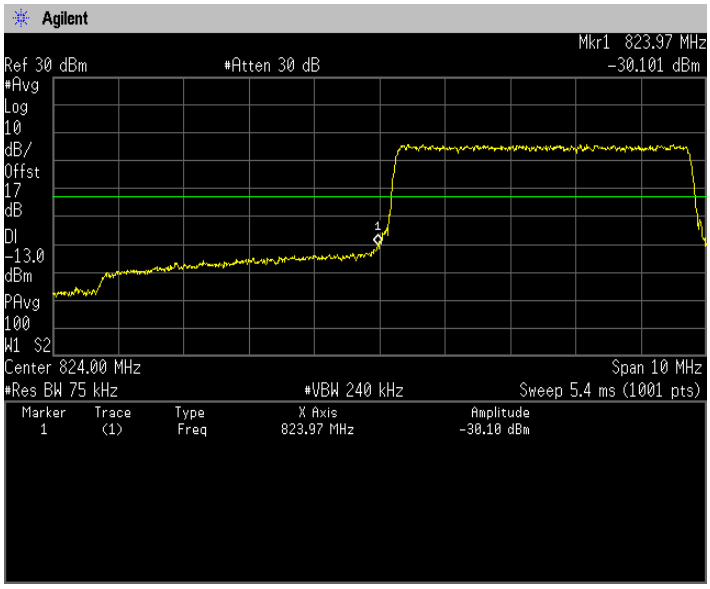


5MHz, 16QAM, RB1-24
High: 20625

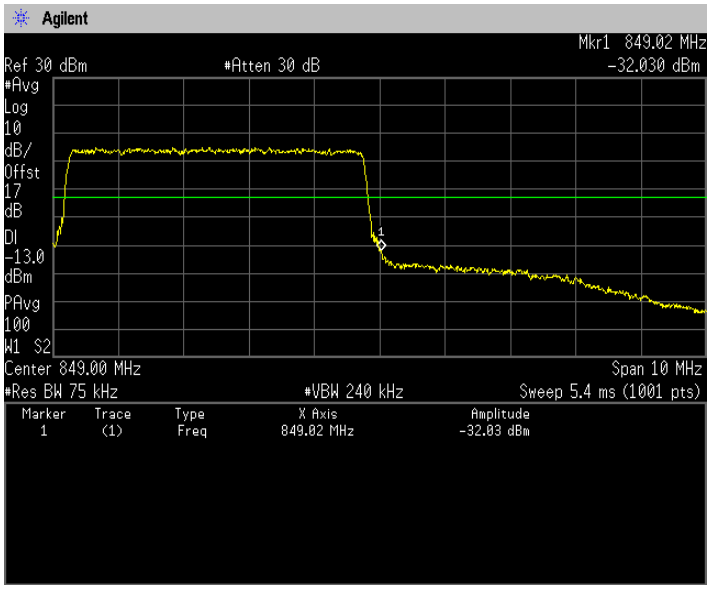


Japan

5MHz, 16QAM, RB25-0
Low: 20425

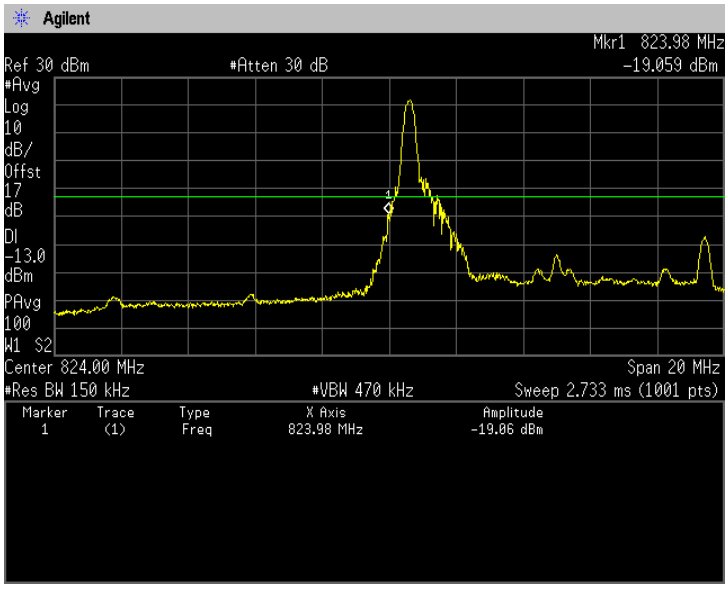


5MHz, 16QAM, RB25-0
High: 20625

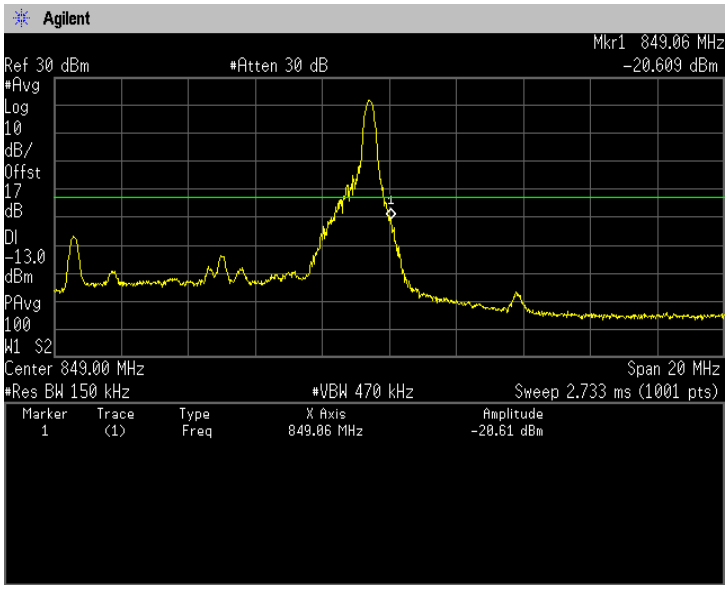


Japan

10MHz, QPSK, RB1-0
Low: 20450

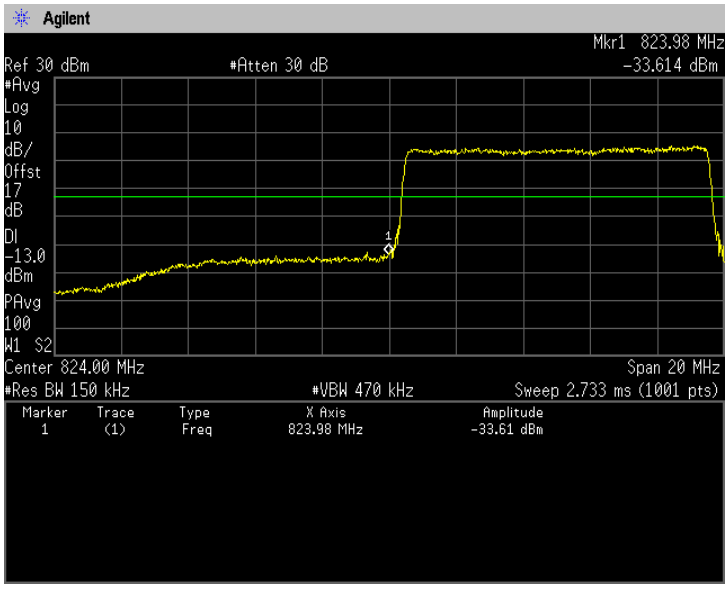


10MHz, QPSK, RB1-49
High: 20600

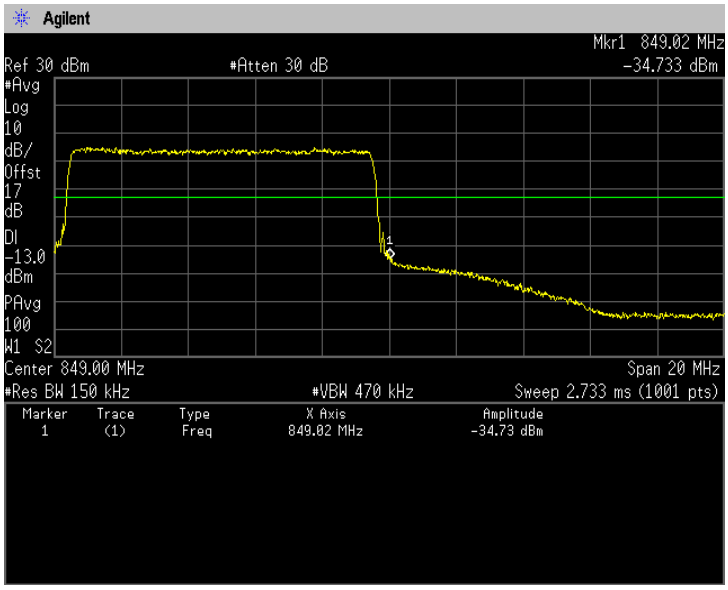


Japan

10MHz, QPSK, RB50-0
Low: 20450

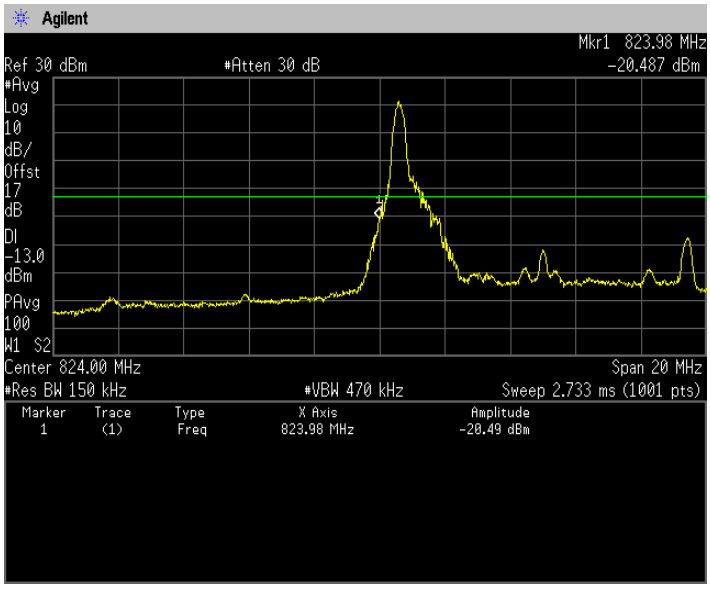


10MHz, QPSK, RB50-0
High: 20600

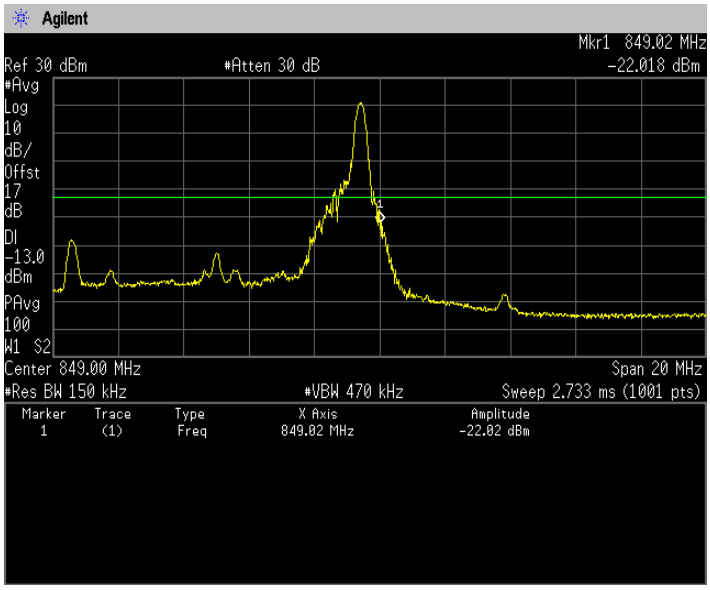


Japan

10MHz, 16QAM, RB1-0
Low: 20450

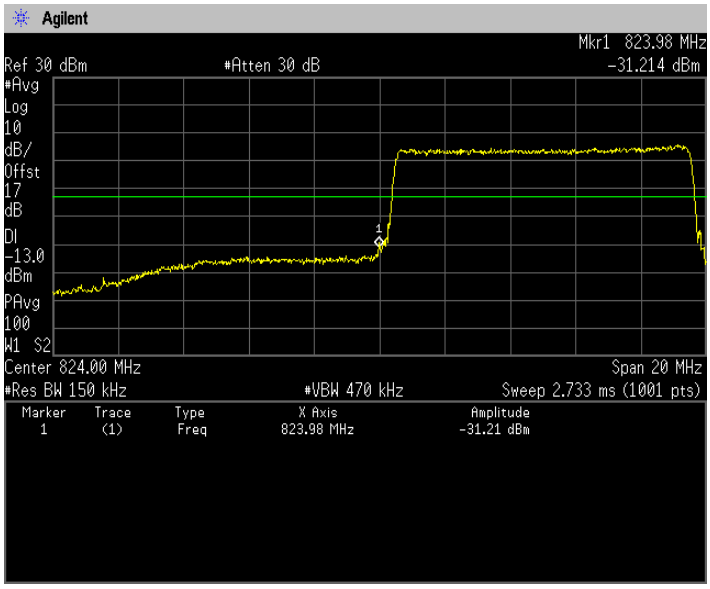


10MHz, 16QAM, RB1-49
High: 20600

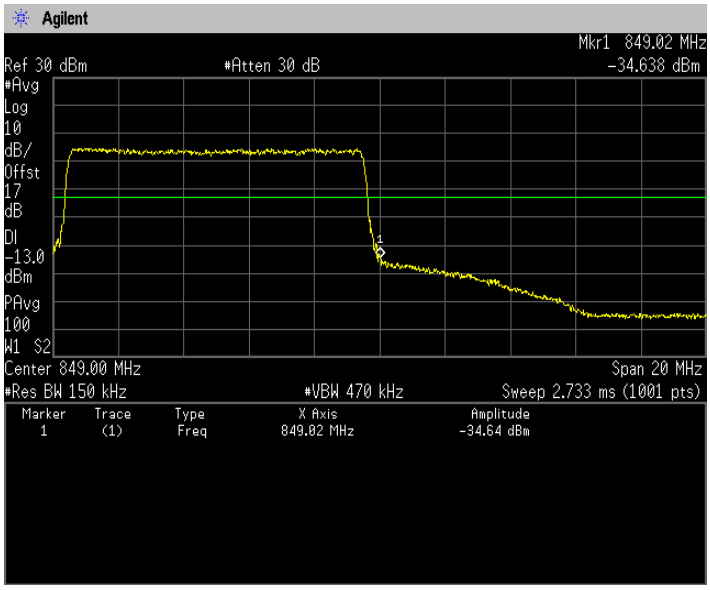


Japan

10MHz, 16QAM, RB50-0
Low: 20450



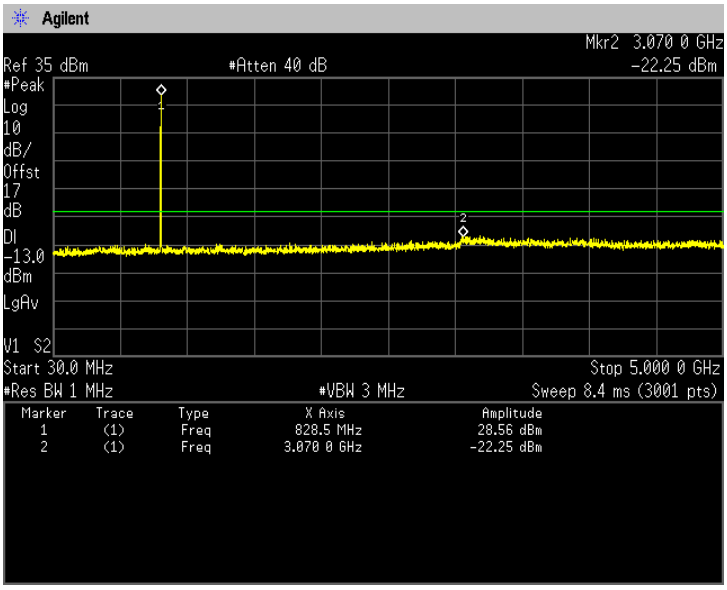
10MHz, 16QAM, RB50-0
High: 20600



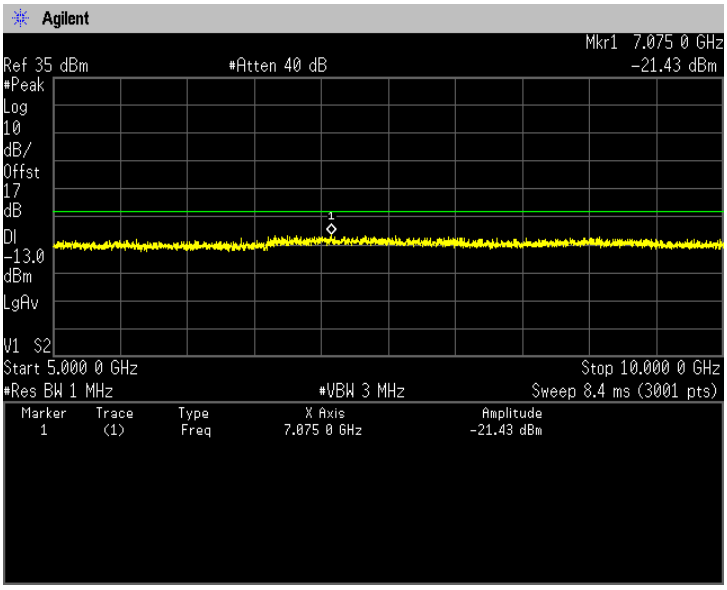
Japan

(Spurious Emissions)
Note: Conducted spurious test was measured in the worst case of Effective Radiated Power.

10MHz, QPSK, RB1-25
829.0MHz Low: 20450
30MHz-5GHz

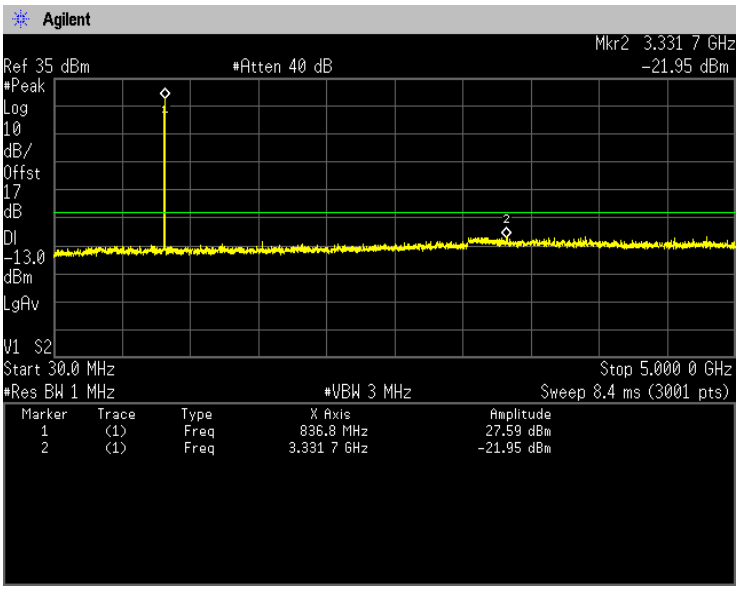


5GHz-10GHz

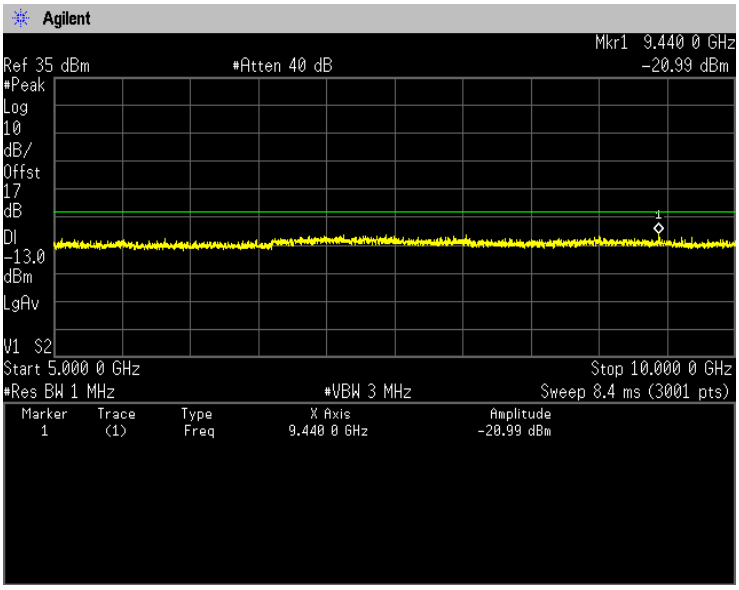


Japan

10MHz, QPSK, RB1-25
836.5MHz Low: 20525
30MHz-5GHz

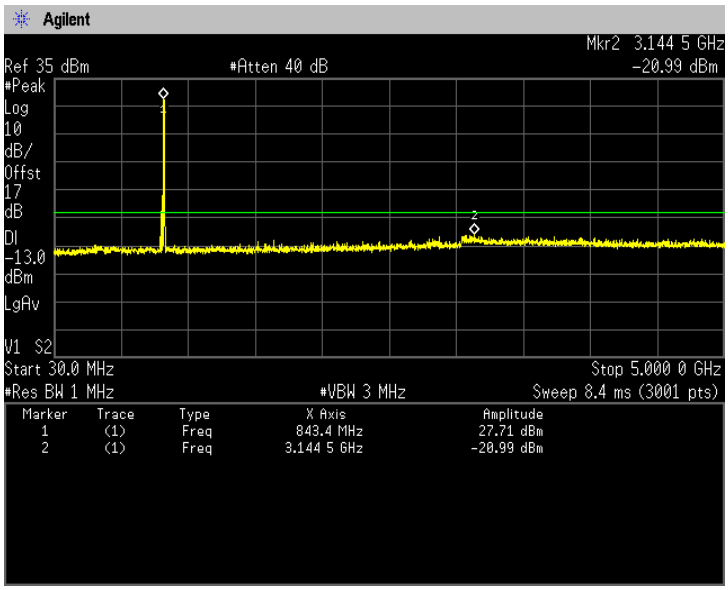


5GHz-10GHz

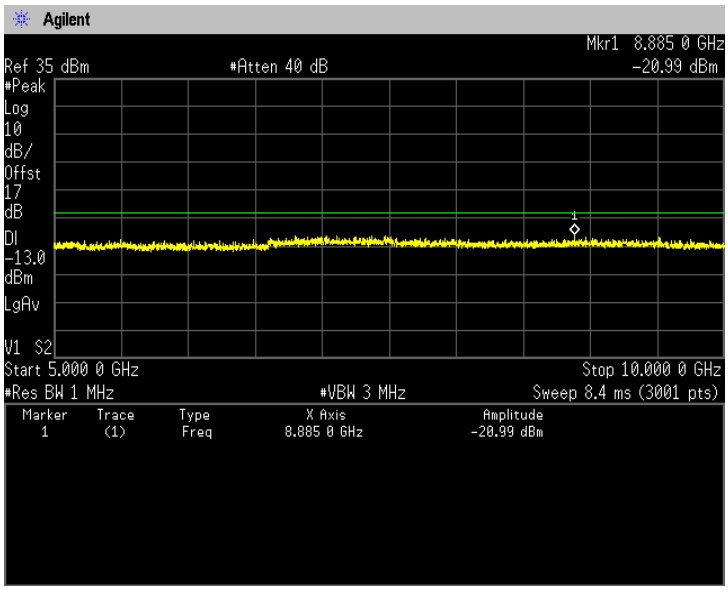


Japan

10MHz, QPSK, RB1-25
844.0MHz Low: 20600
30MHz-5GHz



5GHz-10GHz



Japan

4.4 Radiated Emissions and Harmonic Emissions

4.4.1 Measurement procedure

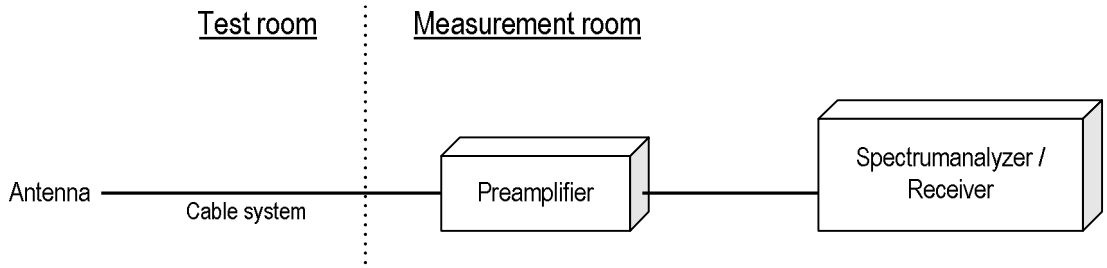
[FCC 22.917(a), 2.1053]

<Step 1>
The EUT and support equipment are placed on a 1 meter x 1 meter surface, 0.8 meter height (Below 1GHz) or 0.6 meter x 0.6 meter surface, 1.5 meter height (Above 1GHz) styrene foam table. Radiated emission measurements are performed at 3 meter distance with the broadband antenna (Biconical antenna, Log periodic antenna and double ridged guide antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1 to 4 meters and stopped at height producing the maximum emission.
The bandwidth of the spectrum analyzer is set to 1MHz. The turntable is rotated by 360 degrees and stopped at azimuth of producing the maximum emission. The frequency is investigated up to 20GHz.

<Step 2>
The substitution antenna is replaced by the transmitter antenna (EUT).
The frequency of the signal generator is adjusted to the measurement frequency.
Level of the signal generator is adjusted to the level that is obtained from step 1, and record the emission level of signal generator.

The spectrum analyzer is set to;
a) RBW = 100kHz for below 1GHz and 1MHz for above 1GHz / VBW ≥ 3 x RBW
b) Detector = Peak
c) Trace mode = Max hold
d) Sweep time = auto-couple

- Test configuration



Japan

4.4.2 Calculation method

Result (EIRP) = Ant. Input - Cable loss + Antenna Gain
Margin = Limit – Result (EIRP)

Example:
Limit @ 1673.2 MHz : -13.0 dBm
Ant. Input = -56.4 dBm Cable loss = 1.0 dB Ant. Gain = 6.9 dBi
Result = -56.4 - 1.0 + 6.9 = -50.5 dBm
Margin = -13.0 - (-50.5) = 37.5 dB

4.4.3 Limit

-13 dBm or less

Japan

4.4.4 Test data

Date : 20~21-September-2022
Temperature : 21.5 [˚C]
Humidity : 54.6 [%] Test engineer :
Test place : 3m Semi-anechoic chamber Chiaki Kanno

Date : 21~22-September-2022
Temperature : 20.6 [˚C]
Humidity : 51.1 [%] Test engineer :
Test place : 3m Semi-anechoic chamber Chiaki Kanno

Date : 23-September-2022
Temperature : 21.5 [˚C]
Humidity : 61.9 [%] Test engineer :
Test place : 3m Semi-anechoic chamber Kazunori Saito

[GSM850 - Z-axis, Open, With camera]
(Channel: 128)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1648.4	-53.0	-45.0	1.1	6.2	-39.9	-13.0	26.9

(Channel: 190)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1673.2	-52.8	-45.0	1.1	5.8	-40.3	-13.0	27.3

(Channel: 251)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1697.6	-53.3	-45.0	1.1	5.5	-40.6	-13.0	27.6

[WCDMA Band V - Z-axis, Open, Withot camera]
(Channel: 4132)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1652.8	-55.4	-50.0	1.1	6.1	-45.0	-13.0	32.0

(Channel: 4183)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1673.2	-55.0	-50.0	1.1	5.8	-45.3	-13.0	32.3

(Channel: 4233)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1693.2	-55.4	-50.0	1.1	5.5	-45.6	-13.0	32.6

[LTE Band V - Z-axis, Open, With camera]
QPSK, BW 1.4MHz
(Channel: 20407)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1649.4	-55.2	-50.0	1.1	6.2	-44.9	-13.0	31.9

(Channel: 20525)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1673.0	-55.5	-50.0	1.1	5.8	-45.3	-13.0	32.3

(Channel: 20643)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1696.6	-54.2	-50.0	1.1	5.5	-45.6	-13.0	32.6

16QAM, BW 1.4MHz
(Channel: 20407)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1649.4	-55.8	-50.0	1.1	6.2	-44.9	-13.0	31.9

(Channel: 20525)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1673.0	-55.9	-50.0	1.1	5.8	-45.3	-13.0	32.3

(Channel: 20643)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1696.6	-55.1	-50.0	1.1	5.5	-45.6	-13.0	32.6

QPSK, BW 3MHz
(Channel: 20415)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1651.0	-55.1	-50.0	1.1	6.2	-45.0	-13.0	32.0

(Channel: 20525)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1673.0	-55.1	-50.0	1.1	5.8	-45.3	-13.0	32.3

(Channel: 20635)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1695.0	-54.7	-50.0	1.1	5.5	-45.6	-13.0	32.6

16QAM, BW 3MHz
(Channel: 20415)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1651.0	-55.3	-50.0	1.1	6.2	-45.0	-13.0	32.0

(Channel: 20525)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1673.0	-55.5	-50.0	1.1	5.8	-45.3	-13.0	32.3

(Channel: 20635)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1695.0	-55.4	-50.0	1.1	5.5	-45.6	-13.0	32.6

QPSK, BW 5MHz
(Channel: 20425)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1653.0	-55.1	-50.0	1.1	6.1	-45.0	-13.0	32.0

(Channel: 20525)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1673.0	-55.0	-50.0	1.1	5.8	-45.3	-13.0	32.3

(Channel: 20625)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1693.0	-54.4	-50.0	1.1	5.5	-45.6	-13.0	32.6

16QAM, BW 5MHz
(Channel: 20425)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1653.0	-55.2	-50.0	1.1	6.1	-45.0	-13.0	32.0

(Channel: 20525)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1673.0	-55.2	-50.0	1.1	5.8	-45.3	-13.0	32.3

(Channel: 20625)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1693.0	-55.2	-50.0	1.1	5.5	-45.6	-13.0	32.6

[LTE Band V]
QPSK, BW 10MHz
(Channel: 20450)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1658.0	-54.8	-50.0	1.1	6.1	-45.1	-13.0	32.1

(Channel: 20525)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1673.0	-55.0	-50.0	1.1	5.8	-45.3	-13.0	32.3

(Channel: 20600)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1688.0	-54.1	-50.0	1.1	5.6	-45.5	-13.0	32.5

16QAM, BW 10MHz
(Channel: 20450)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1658.0	-55.1	-50.0	1.1	6.1	-45.1	-13.0	32.1

(Channel: 20525)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1673.0	-55.4	-50.0	1.1	5.8	-45.3	-13.0	32.3

(Channel: 20600)

H/V	Frequency [MHz]	S.A Reading [dBm]	Ant. Input [dBm]	Cable loss [dB]	Ant.Gain [dBi]	Result [dBm]	Limit [dBm]	Margin [dB]
H	1688.0	-54.6	-50.0	1.1	5.6	-45.5	-13.0	32.5

Japan

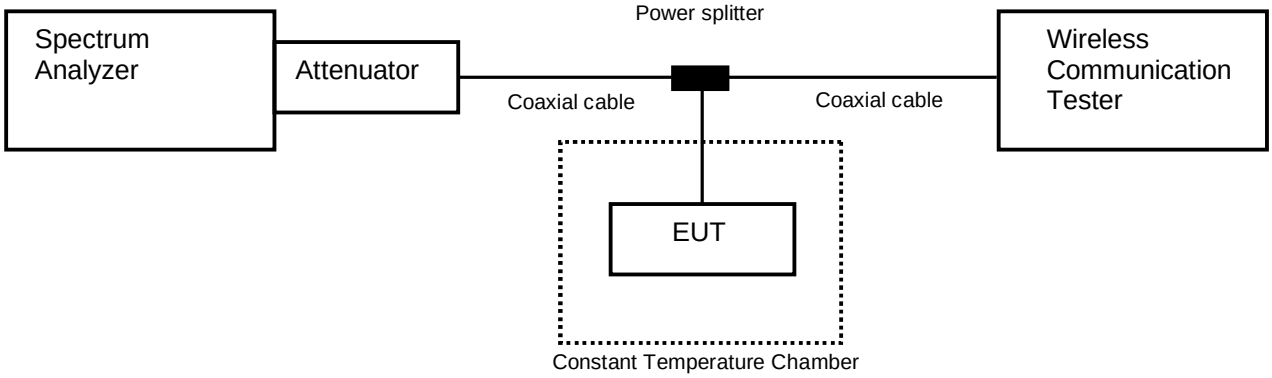
4.5 Frequency Stability

4.5.1 Measurement procedure

[FCC 22.355, 2.1055]

The EUT was placed of an inside of an constant temperature chamber as the temperature in the chamber was varied between -30˚C and +50˚C. The temperature was incremented by 10˚C intervals and the unit was allowed to stabilize at each measurement. The frequency drift was measured with the normal Temperature and voltage tolerance and it is presented as the ppm unit.

- Test configuration



4.5.2 Limit

±2.5 ppm

Japan

4.5.3 Measurement result

Date : 15-September-2022
Temperature : 23.3 [˚C]
Humidity : 42.6 [%] Test engineer :
Test place : Shielded room No.4 Kazunori Saito

[GSM850]
(Channel: 190)

Limit: ±0.00025% = ±2.5 ppm					
Power Supply [V]	**Temperature [ºC]**	**Measurements Frequency [Hz]**	**Frequency Tolerance [ppm]**	**Limit [ppm]**	**Result**
3.80	25(Ref.)	836,599,986	0.00000	±2.5	Pass
	50	836,599,979	-0.00781	±2.5	Pass
	40	836,599,981	-0.00634	±2.5	Pass
	30	836,599,987	0.00139	±2.5	Pass
	20	836,599,980	-0.00684	±2.5	Pass
	10	836,599,979	-0.00791	±2.5	Pass
	0	836,599,976	-0.01146	±2.5	Pass
	-10	836,599,978	-0.00973	±2.5	Pass
	-20	836,599,977	-0.01100	±2.5	Pass
	-30	836,599,953	-0.03964	±2.5	Pass
3.42	25	836,599,970	-0.01915	±2.5	Pass
4.18	25	836,599,992	0.00741	±2.5	Pass

[LTE Band V]
QPSK, BW 10MHz, RB 50-0
(Channel: 20525)

Limit: ±0.00025% = ±2.5 ppm					
Power Supply [V]	**Temperature [ºC]**	**Measurements Frequency [Hz]**	**Frequency Tolerance [ppm]**	**Limit [ppm]**	**Result**
3.80	25(Ref.)	836,499,990	0.00000	±2.5	Pass
	50	836,499,982	-0.01015	±2.5	Pass
	40	836,499,984	-0.00710	±2.5	Pass
	30	836,499,988	-0.00256	±2.5	Pass
	20	836,499,992	0.00160	±2.5	Pass
	10	836,499,991	0.00030	±2.5	Pass
	0	836,499,989	-0.00146	±2.5	Pass
	-10	836,499,992	0.00185	±2.5	Pass
	-20	836,499,988	-0.00343	±2.5	Pass
	-30	836,499,985	-0.00606	±2.5	Pass
3.42	25	836,499,987	-0.00357	±2.5	Pass
4.18	25	836,499,990	-0.00098	±2.5	Pass

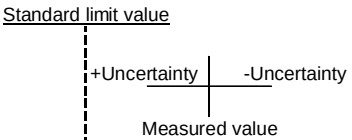
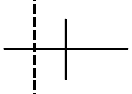
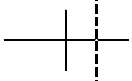
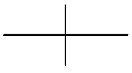
Calculation:
Frequency Tolerance (ppm) = Measurements Frequency (Hz) – Reference Frequency (Hz) / Reference Frequency (Hz) x 1000000

Japan

5 Measurement Uncertainty

Expanded uncertainties stated are calculated with a coverage Factor k=2.
Please note that these results are not taken into account when measurement uncertainty considerations contained in ETSI TR 100 028 Parts 1 and 2 determining compliance or non-compliance with test result.

Test item	Measurement uncertainty
Conducted emission, AMN (9 kHz – 150 kHz)	±3.7 dB
Conducted emission, AMN (150 kHz – 30 MHz)	±3.3 dB
Radiated emission (9kHz – 30 MHz)	±3.2 dB
Radiated emission (30 MHz – 1000 MHz)	±5.5 dB
Radiated emission (1 GHz – 6 GHz)	±4.8 dB
Radiated emission (6 GHz – 18 GHz)	±4.4 dB
Radiated emission (18 GHz – 40 GHz)	±6.4 dB
Radio Frequency	$\pm 1.3 * 10^{-8}$
RF power, conducted	±0.7 dB
Adjacent channel power	±1.5 dB
Temperature	±0.6 °C
Humidity	±1.2 %
Voltage (DC)	±0.4 %
Voltage (AC, <10kHz)	±0.2 %

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.

Japan

6 Laboratory Information

Testing was performed and the report was issued at:

TÜV SÜD Japan Ltd. Yonezawa Testing Center

Address: 5-4149-7 Hachimanpara, Yonezawa-shi, Yamagata, 992-1128 Japan
Phone: +81-238-28-2881

Accreditation and Registration
A2LA
Certificate #3686.03

VLAC
Accreditation No.: VLAC-013

BSMI
Laboratory Code: SL2-IN-E-6018, SL2-A1-E-6018

Innovation, Science and Economic Development Canada
ISED#: 4224A

VCCI Council
Registration number: A-0166

Japan

Appendix A. Test Equipment

Antenna port conducted test

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
Spectrum analyzer	Agilent Technologies	E4440A	US40420937	31-Dec-2022	13-Dec-2021
Attenuator	HUBER+SUHNER	6810.19.A	N/A(S450)	31-Dec-2022	21-Dec-2021
Microwave cable	Junkosha Inc.	MWX221/1m	N/A(S400)	31-Mar-2023	02-Mar-2022
Power divider	Keysight	11636B	MY51359874	30-Sep-2022	15-Sep-2021
Wideband Radio Frequency Tester	ROHDE&SCHWARZ	CMW500	116338	31-Aug-2023	04-Aug-2022
Temperature and humidity chamber	ESPEC	PL1KP	14007261	30-Sep-2023	02-Sep-2022

Radiated emission

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
EMI Receiver	ROHDE&SCHWARZ	ESCI	100765	30-Sep-2022	15-Sep-2021
Spectrum analyzer	Agilent Technologies	E4440A	US44302655	30-Sep-2023	05-Sep-2022
Preamplifier	SONOMA	310	372170	30-Sep-2022	15-Sep-2021
Biconical antenna	Schwarzbeck	VHBB9124/BBA9106	1332	30-Nov-2022	08-Nov-2021
Log periodic antenna	Schwarzbeck	VUSLP9111B	346	31-Oct-2022	15-Oct-2021
Attenuator	TOYO Connector	NA-PJ-6/6dB	N/A(S541)	30-Sep-2022	16-Sep-2021
Attenuator	TAMAGAWA.ELEC	CFA-10/3dB	N/A(S503)	31-Jul-2023	14-Jul-2022
Preamplifier	TSJ	MLA-100M18-B02-40	1929118	31-Dec-2022	22-Dec-2021
Attenuator	AEROFLEX	26A-10	081217-08	31-Dec-2022	22-Dec-2021
Double ridged guide antenna	ETS LINDGREN	3117	00052315	30-Jun-2023	22-Jun-2022
Attenuator	HUBER+SUHNER	6803.17.B	N/A(2340)	31-Dec-2022	23-Dec-2021
Double ridged guide antenna	A.H.Systems Inc.	SAS-574	469	31-Aug-2023	19-Aug-2022
Preamplifier	TSJ	MLA-1840-B03-35	1240332	31-Aug-2023	19-Aug-2022
Notch Filter	Micro-Tronics	BRM50706	003	31-Jul-2023	14-Jul-2022
Signal generator	ROHDE&SCHWARZ	SMB100A	177525	31-Dec-2022	08-Dec-2021
RF power amplifier	R&K	CGA020M602-2633R	B40240	30-Jun-2023	16-Jun-2022
Attenuator	HUBER+SUHNER	6820.19.A	N/A(2399)	30-Sep-2022	15-Sep-2021
Microwave cable	HUBER+SUHNER	SUCOFELX102/2m	31648	31-Mar-2023	02-Mar-2022
Dipole antenna	Schwarzbeck	VHAP	1020	31-Jul-2023	05-Jul-2022
Dipole antenna	Schwarzbeck	UHAP	994	31-Jul-2023	05-Jul-2022
Double ridged guide antenna	ETS LINDGREN	3117	00218815	31-Dec-2022	06-Dec-2021
Wideband Radio Frequency Tester	ROHDE&SCHWARZ	CMW500	126079	31-Aug-2023	15-Aug-2022
Wideband Radio Frequency Tester	ROHDE&SCHWARZ	CMW500	116338	31-Aug-2023	04-Aug-2022
Microwave cable	HUBER+SUHNER	SUCOFLEX104/9m	MY30037/4	31-Dec-2022	22-Dec-2021
		SUCOFLEX104/1m	my24610/4	31-Dec-2022	22-Dec-2021
		SUCOFLEX104/8m	SN MY30033/4	31-Dec-2022	22-Dec-2021
		SUCOFLEX104/1m	MY32976/4	31-Dec-2022	22-Dec-2021
		SUCOFLEX104/2m	SN MY28404/4	31-Dec-2022	22-Dec-2021
		SUCOFLEX104/7m	41625/6	31-Dec-2022	22-Dec-2021
PC	DELL	DIMENSION E521	75465BX	N/A	N/A
Software	TOYO Corporation	EP5/RE-AJ	0611193/V6.0.140	N/A	N/A
Absorber	RIKEN	PFP30	N/A	N/A	N/A
3m Semi an-echoic Chamber	TOKIN	N/A	N/A(9002-NSA)	31-May-2023	28-May-2022
3m Semi an-echoic Chamber	TOKIN	N/A	N/A(9002-SVSWR)	31-May-2023	28-May-2022

*: The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.