TEST REPORT

REGULATIONS : FCC Part15 C §15.247
RSS-247 Issue 2

Applicant	Testing Laboratory
HERUTU ELECTRONICS CORPORATION 62-1 Toyooka-cho Kita-ku Hamamatsu-shi Japan 433-8103 Tel.: +81-53-438-3511	Intertek Japan K.K. Matsuda Laboratory (Open area test site) 1283 Yadoriki, Matsuda-machi, Ashigarakami-gun, Kanagawa-ken, 258-0001 Japan Tel.: +81 465 89 2316 URL: http://www.japan.intertek-etlsemko.com

Equipment Type	2.4GHz Wireless module
Trademark	HERUTU
Model(s)	HRF-2403
Serial No.	A000330 / A000331
FCC ID	T82-HRF2403
IC	10608A-HRF2403
PMN	HRF-2403
HVIN	V1.00
FVIN	V1.00
Test Result	Complied
Report Number	20090329JMA-001
Original Issue Date	January 13, 2021

Approved by H. Kosemura
Hideaki Kosemura
[Reviewer]

Tested by Y. Yoneyama
Yoshiaki Yoneyama
[Engineer]

N. Murakami
Naohei Murakami
[Engineer]

VLAC-008

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

NVLAP LAB CODE 600234-0
NVLAP accreditation are valid for RSS-247.
FCC Part15C is outside the NVLAP scope.
This report contains data that are not covered by the NVLAP accreditation.

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SECTION 1. GENERAL INFORMATION

Test Performed

EUT Received	December 9, 2020	
Date of Test	From December 10, 2020, to January 8, 2021	
Standard Applied	FCC	IC
	FCC Part15 C §15.247	RSS-247 Issue 2
Test methods	ANSI C63.10-2013 KDB 558074 D01 DTS Meas Guidance v05r02	RSS-Gen Issue 5 ANSI C63.10-2013
Deviation from Standard(s)	None	

Qualifications of Testing Laboratory (Matsuda Lab.)

Accreditation	**Scope**	**Lab. Code**	**Remarks**
VLAC	Wireless / EMC Testing	VLAC-008-3	JAPAN
NVLAP	Wireless / EMC Testing	600234-0	USA
FCC	Wireless / EMC Testing	JP0009	USA
ISED	Wireless Testing	JP0004(CABID)	CANADA
BSMI	EMC Testing	SL2-IN-E-6009	TAIWAN
SABS	EMC Testing	N/A	South Africa
Filing			
VCCI	EMC Testing	A-0127	JAPAN

Abbreviations

EUT	Equipment Under Test	DoC	Declaration of Conformity
AMN	Artificial Mains Network	ISN	Impedance Stabilization Network
LISN	Line Impedance Stabilization Network	Q-P	Quasi-Peak
AMP	Amplifier	AVG	Average
ATT	Attenuator	PK	Peak
ANT	Antenna	Cal	Calibration
BBA	Broadband Antenna	N/A	Not applicable or Not available
DIP	Dipole Antenna	LCD	Liquid-Crystal Display
AE	Associated Equipment	HDMI	High-Definition Multimedia Interface
AFH	Adaptive Hopping Frequency		

SECTION 2. SUMMARY OF TEST RESULTS

Test Item	Specification	Results	Detail
6 dB Bandwidth and 99 % Occupied Bandwidth	FCC Part15C §15.247 (a) (2)	PASS	Section 9.1
Maximum Peak Output Power	FCC Part15C §15.247 (b)	PASS	Section 9.2
Radiated Spurious Emissions and Restricted Band edge	FCC Part15C §15.209, §15.205	PASS	Section 9.3
Band Edge of Authorized Frequency Band	FCC Part15C §15.247 (d)	PASS	Section 9.4
Spurious RF Conducted Emissions	FCC Part15C §15.247 (d)	PASS	Section 9.5
Power Density	FCC Part15C §15.247 (e)	PASS	Section 9.6
AC Conducted Emissions	FCC Part15C §15.207	PASS	Section 9.7

Limitation on Results

The test result of this report is effective equipment under test itself and under the test configuration described on the report.
This test report does not assure that whether the test result taken in other testing laboratory is compatible or reproducible to the test result on this report or not.

SECTION 3. EQUIPMENT UNDER TEST

The equipment under test (EUT) consisted of the following apparatus.
The information of this section is provided by the Applicant or customer. Intertek doesn't take any responsibility for the information.

3.1 System Configuration

Symbol	Item	Model No.	Serial No.	Manufacturer	Note
A1	2.4GHz Wireless module	HRF-2403	A000330	HERUTU ELECTRONICS CORPORATION	1/4λ Monopole antenna (chip antenna, Layout A)
A2	2.4GHz Wireless module	HRF-2403	A000331	HERUTU ELECTRONICS CORPORATION	1/2λ Dipole PIFA 1/2λ Dipole antenna Antenna Conducted Tests
Rated Power : DC3 V					
Supplied Power : DC3 V					
Condition of Equipment	Preproduction				
Type	Built-in type				
Suppression Devices	No Modifications by the laboratory were made to the device				

3.2 Port(s)/Connector(s)

Port Name	Connector Type	Connector Pin	Remarks
Antenna Port	Coaxial	1	-

3.3 Highest Frequency Generated / Used

Operating Frequency	Board Name	Remarks
16 MHz	-	-

3.4 Over View of EUT

Mode of operation	Half duplex
Rated Output Power	+4dBm (Max.)
Frequency Range of Operating	2403 – 2478 MHz
Number of Channels	76 ch, 1 MHz step
Modulation Method	GFSK
Antenna Type and Gain	1. 1/4λ Monopole antenna (chip antenna): 0.55dBi 2. 1/2λ Dipole PIFA (Coaxial connector): 0.90dBi 3. 1/2λ Dipole antenna (Coaxial connector): 2dBi

SECTION 4. SUPPORT EQUIPMENT

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

Symbol	Item	Model No.	Serial No.	Manufacturer
B	chip antenna	ACA5036	None	INPAQ Technology Co., LTD
C	IFA	ANTP-1431 / M-AB-58B	None	NISSEI ELECTRIC CO., LTD
D	Dipole Antenna	M35-FL-113-100-IPEX	None	Apex Technology Japan Co., Ltd.
E	Jig SW	-	-	-
F	DC Power Supply	DM-112MV	15328078	ALINCO INCORPORATED
Supplied Power:				
F	AC120 V, 60 Hz			

SECTION 5. USED CABLE(S)

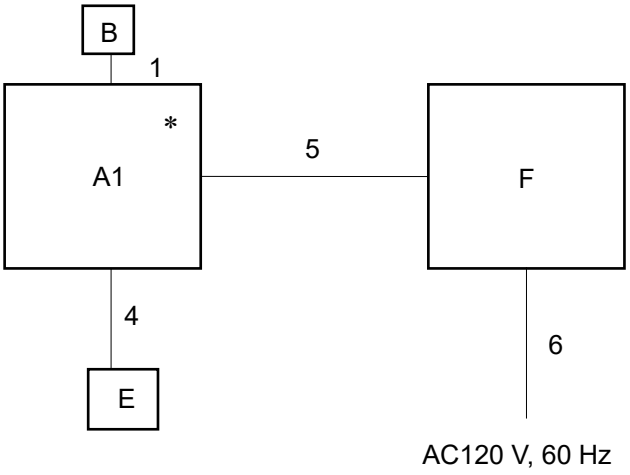
The following cable(s) was used for the test.

No.	Name	Length (m)	Shield	Metal Connector	Ferrite Core
1	Coaxial cable	0.015	Yes	Yes	-
2	Coaxial cable	0.06	Yes	Yes	-
3	Coaxial cable	0.12	Yes	Yes	-
4	Signal cable	0.15	No	No	-
5	DC Power cable	1.80	No	No	-
6	AC Power cable	1.30	No	No	-

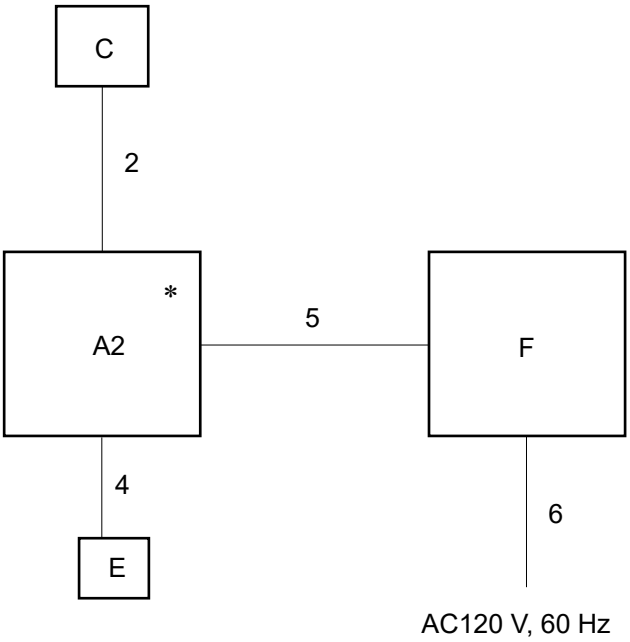
SECTION 6. TEST CONFIGURATION

∗ : EUT

6.1 1/4λ Monopole antenna (chip antenna)



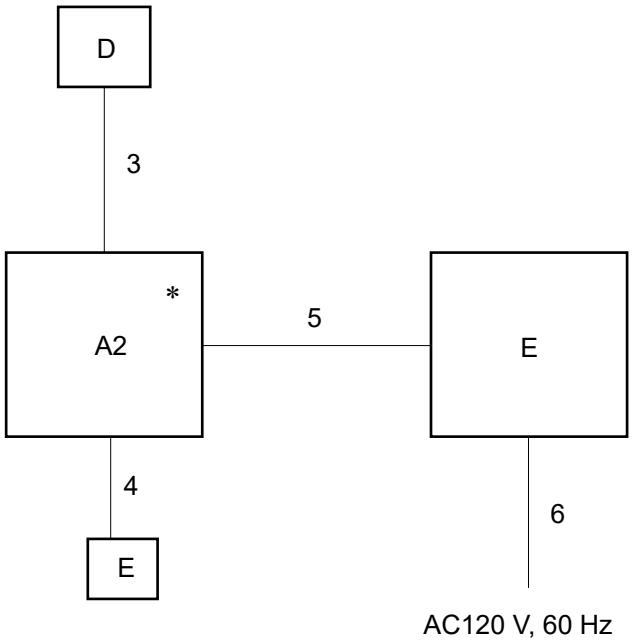
6.2 1/2λ Dipole PIFA



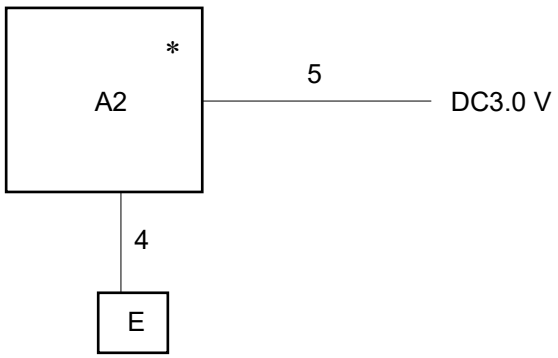
The symbols and numbers assigned to the equipment and cables on this diagram correspond to the ones in Sections 3 to 5.

∗ : EUT

6.3 1/2λ Dipole antenna



6.4 Antenna Terminal Conducted Tests



The symbols and numbers assigned to the equipment and cables on this diagram correspond to the ones in Sections 3 to 5.

SECTION 7. OPERATING CONDITION

The test was carried out under the following mode.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

7.1 Test Channel

In accordance with Section 15.31 (m), all test items were conducted in the following three channels:

Test Channel	Frequency [MHz]
Low	2403
Middle	2441
High	2478

7.2 Test modes

Test Item	Operating modes
6dB Bandwidth and 99 % Occupied Bandwidth	2403MHz, 2441MHz, 2478MHz
Maximum Peak Output Power	2403MHz, 2441MHz, 2478MHz
Radiated Spurious Emissions and Restricted Band edge	2403MHz, 2441MHz, 2478MHz
Band Edge of Authorized Frequency Band	2403MHz, 2441MHz, 2478MHz
Spurious RF Conducted Emissions	2403MHz, 2441MHz, 2478MHz
Power Density	2403MHz, 2441MHz, 2478MHz
AC Conducted Emissions	2403MHz, 2441MHz, 2478MHz

Note: The Test modes were configured in typical fashion as a customer would normally use it.

SECTION 8. UNCERTAINTY

The following uncertainty represents the expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of *k* = 2.
Traceability to national standard in SI units is ensured with these values.
Compliance with the limits in this standard are determined without in consideration of the measurement uncertainty of the measurement instrumentation.

8.1 Emission tests

Test items	U_{lab} [*k* = 2]	U_{cispr}
Radiated Spurious Emissions at 3m		
30 MHz – 1000 MHz	+/- 3.96 dB	6.3 dB
Above 1 GHz	+/- 4.91 dB	5.2 dB
AC Conducted Emissions		
150 kHz – 30 MHz	+/- 2.80 dB	3.4 dB

The above expanded instrumentation uncertainty, $U_{lab.}$, is estimated in accordance with CISPR 16-4-2:2011.

8.2 RF Conducted tests

Test Items	U_{lab} [*k* = 2]
Bandwidth	+/- 1.42 %
Maximum Output Power	+/- 1.96 dB
Conducted Emissions	+/- 1.82 dB

SECTION 9. TEST DATA

9.1 6dB Bandwidth and 99 % Occupied Bandwidth

Regulations	FCC Part15C §15.247 (a) (2) RSS-247 5.1 (2) RSS-Gen 6.6
Test Method/Guide	ANSI C63.10-2013 clause 6.9.2

Test Procedure

1. The EUT and test instrument were set up as shown on section 10.1.
2. Adjust the test instrument for the following setting:

RBW	:	100 kHz
VBW	:	≥ 3 x RBW
Detector	:	Peak
Sweep Time	:	Auto
Trace mode	:	Max Hold

3. Allow trace to fully stabilize.
4. Use “Occupied Bandwidth Measurement” function to measure the 20 dB bandwidth.

Test Result

Location	Matsuda No.1 Test Site
Test date	December 13, 2020
Temperature	22.0 [degree C]
Humidity variation	41 [%]
Test Engineer	Naohei Murakami

Operating modes	Frequency [MHz]	6 dB Bandwidth [MHz]	99 % Bandwidth [MHz]
Modulation On (GFSK)	2403	0.617	1.095
	2441	0.648	1.096
	2478	0.680	1.068

Spectrum Plots

See ANNEX A.1.

9.2 Maximum Peak Output Power

Regulations	FCC Part15C §15.247 (b) (1) RSS-247 5.4 (2)
Test Method/Guide	ANSI C63.10-2013 clause 7.8.5

Test Procedure

1. The EUT and test instrument were set up as shown on section 10.1.
2. Adjust the test instrument for the following setting:

   RBW : ≥ the 6 dB bandwidth (DTS bandwidth)
   VBW : ≥ 3 x RBW
   Span : ≥ 3 x RBW
   Detector : Peak
   Sweep Time : Auto
   Trace mode : Max Hold
   Note: The value of the “6 dB bandwidth”, from the result of section 9.1.
3. Allow trace to fully stabilize.
4. Use the peak search function to measure the peak of the emission.
5. Measurement data correction;

   Measured Value [dBm] = Reading [dBm] + Factor [dB]

   *Factor = Cable Loss [dB] + Attenuator [dB]

   Margin [dB] = Limit [dBm] - Measured Value [dBm]

Test Result

Location	Matsuda No.1 Test Site
Test date	December 13, 2020
Temperature	22.0 [degree C]
Humidity variation	41 [%]
Test Engineer	Naohei Murakami

Operating modes	Freq. [MHz]	Reading [dBm]	Factor [dB]	Measured Value [dBm]	Limit		Margin [dB]
					[mW]	[dBm]	
Modulation On (GFSK)	2403	-18.12	21.55	3.43	1000	30	26.57
	2441	-17.89	21.55	3.66			26.34
	2478	-17.90	21.55	3.65			26.35

Spectrum Plots

See ANNEX A.2

9.3 Radiated Spurious Emissions and Band Edge of Restricted Band

Regulations	FCC Part15C §15.209, §15.205 RSS-247 5.5 RSS-Gen 8.9
Test Method/Guide	ANSI C63.10-2013 clause 6.5 and 6.6

Test Procedure

1. The EUT and test instrument were set up as shown on section 10.2.
2. The measurement antenna was placed at a distance of 3 m from the EUT.
4. The turntable azimuth (EUT direction) and antenna height are adjusted the position so that maximum field strength is obtained for each frequency spectrum to be measured.
   The equipment and cables are arranged or manipulated within the range of the test standard in the above condition. At least six highest spectrums are measured by the test receiver (below 1 GHz) and spectrum analyzer (above 1 GHz).
5. Adjust the test instrument for the following setting:

Frequency	Instruments	Detector	RBW	VBW	Remarks
30 – 1000 MHz	CISPR Receiver	QP	120 kHz	N/A	-
1000 MHz - 18000 MHz	CISPR Receiver	Peak	1 MHz	N/A	-
		AVG	1 MHz	N/A	-
Above 18000 MHz	Spectrum Analyzer	N/A	1 MHz	3 MHz	for Peak
		N/A	1 MHz	10 Hz	for Average

6. Measurement data correction;

   Emission Level [dBuV/m] = Reading [dBuV] + Factor [dB/m]

   Margin [dB] = Limit [dBuV/m] – Emission Level [dBuV/m]

   * Factor = Antenna Factor + Amplifier gain + Cable loss + Attenuator (+ Filter)
   (+ Distance Conversion Factor)*

   * For other than Standard distance:
   Distance Conversion Factor = 20 log (Measurement distance / Standard distance)

Note: Did not carried out the final measurement about frequency range of 9 kHz to 30 MHz, because result of pre-check in shield room, spurious emissions was not detected.

Test Result

Operating mode	**2403 MHz (Low) 1/4λ Monopole antenna (chip antenna)**			
Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Jan. 6, 2021,	Dec. 12, 2020	
Temperature	23.0	20.0	22.0	[degree C]
Humidity variation	42	42	40	[%]
Test Engineer	Yoshiaki Yoneyama			

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	432.00	Quasi-Peak	37.0	32.4	1.7	38.7	34.1	46.0	7.3	11.9
2	480.00	Quasi-Peak	37.3	30.6	2.9	40.2	33.5	46.0	5.8	12.5
3	944.00	Quasi-Peak	24.8	25.1	12.5	37.3	37.6	46.0	8.7	8.4
4	1007.99	Peak	43.5	42.8	1.9	45.4	44.7	74.0	28.6	29.3
5	1007.99	Average	33.0	31.0	1.9	34.9	32.9	54.0	19.1	21.1
6*	2313.44	Peak	41.1	41.1	7.0	48.1	48.1	74.0	25.9	25.9
7*	2313.44	Average	27.9	27.8	7.0	34.9	34.8	54.0	19.1	19.2
8*	2390.00	Peak	40.3	41.1	7.1	47.4	48.2	74.0	26.6	25.8
9*	2390.00	Average	27.3	27.3	7.1	34.4	34.4	54.0	19.6	19.6
10	4806.00	Peak	41.5	41.6	13.0	54.5	54.6	74.0	19.5	19.4
11	4806.00	Average	27.4	27.5	13.0	40.4	40.5	54.0	13.6	13.5
12	7209.00	Peak	43.7	43.3	17.6	61.3	60.9	74.0	12.7	13.1
13	7209.00	Average	29.5	29.6	17.6	47.1	47.2	54.0	6.9	6.8
14	9612.50	Peak	44.0	43.7	20.8	64.8	64.5	74.0	9.2	9.5
15	9612.50	Average	30.0	30.1	20.8	50.8	50.9	54.0	3.2	3.1

Note.
* : Restricted Band

Spurious emissions were not detected in the restricted band.
Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Spectrum Plot of Restricted Band
See ANNEX A.3

Operating mode	**2441 MHz (Middle) 1/4λ Monopole antenna (chip antenna)**			
Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Jan. 6, 2021,	Dec. 12, 2020	
Temperature	23.0	20.0	22.0	[degree C]
Humidity variation	42	42	40	[%]
Test Engineer	Yoshiaki Yoneyama			

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	432.00	Quasi-Peak	25.4	24.5	1.7	27.1	26.2	46.0	18.9	19.8
2	480.00	Quasi-Peak	35.2	28.9	2.9	38.1	31.8	46.0	7.9	14.2
3	944.00	Quasi-Peak	27.4	25.5	12.5	39.9	38.0	46.0	6.1	8.0
4	1007.99	Peak	48.9	43.3	1.9	50.8	45.2	74.0	23.2	28.8
5	1007.99	Average	36.0	32.4	1.9	37.9	34.3	54.0	16.1	19.7
6	4882.00	Peak	40.0	40.7	13.2	53.2	53.9	74.0	20.8	20.1
7	4882.00	Average	26.7	26.0	13.2	39.9	39.2	54.0	14.1	14.8
8	7323.00	Peak	43.0	42.9	18.2	61.2	61.1	74.0	12.8	12.9
9	7323.00	Average	29.7	29.6	18.2	47.9	47.8	54.0	6.1	6.2
10	9764.50	Peak	44.2	43.8	20.9	65.1	64.7	74.0	8.9	9.3
11	9764.50	Average	30.2	30.1	20.9	51.1	51.0	54.0	2.9	3.0

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode	**2478 MHz (High) 1/4λ Monopole antenna (chip antenna)**			
Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Jan. 6, 2021,	Dec. 12, 2020	
Temperature	23.0	20.0	22.0	[degree C]
Humidity variation	42	42	40	[%]
Test Engineer	Yoshiaki Yoneyama			

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	432.00	Quasi-Peak	24.5	23.7	1.7	26.2	25.4	46.0	19.8	20.6
2	480.00	Quasi-Peak	35.2	29.7	2.9	38.1	32.6	46.0	7.9	13.4
3	944.00	Quasi-Peak	27.1	25.2	12.5	39.6	37.7	46.0	6.4	8.3
4	1007.99	Peak	42.4	42.5	1.9	44.3	44.4	74.0	29.7	29.6
5	1007.99	Average	29.2	29.5	1.9	31.1	31.4	54.0	22.9	22.6
6*	2483.50	Peak	51.2	55.2	7.2	58.4	62.4	74.0	15.6	11.6
7*	2483.50	Average	28.0	30.0	7.2	35.2	37.2	54.0	18.8	16.8
8*	2492.22	Peak	43.6	43.9	7.2	50.8	51.1	74.0	23.2	22.9
9*	2492.22	Average	28.7	28.9	7.2	35.9	36.1	54.0	18.1	17.9
10	4956.00	Peak	39.8	40.6	13.3	53.1	53.9	74.0	20.9	20.1
11	4956.00	Average	26.7	26.8	13.3	40.0	40.1	54.0	14.0	13.9
12	7434.00	Peak	43.3	43.2	18.5	61.8	61.7	74.0	12.2	12.3
13	7434.00	Average	29.7	29.6	18.5	48.2	48.1	54.0	5.8	5.9
14	9912.50	Peak	44.0	44.3	21.3	65.3	65.6	74.0	8.7	8.4
15	9912.50	Average	30.5	30.4	21.3	51.8	51.7	54.0	2.2	2.3

Note.
* : Restricted Band

Spurious emissions were not detected in the restricted band.
Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Spectrum Plot of Restricted Band
See ANNEX A.3

Operating mode	**2403 MHz (Low) 1/2λ Dipole PIFA**			
Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Jan. 6, 2021,	Dec. 12, 2020	
Temperature	23.0	20.0	22.0	[degree C]
Humidity variation	42	42	40	[%]
Test Engineer	Yoshiaki Yoneyama			

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	480.00	Quasi-Peak	39.5	37.0	2.9	42.4	39.9	46.0	3.6	6.1
2	496.00	Quasi-Peak	37.2	37.6	3.5	40.7	41.1	46.0	5.3	4.9
3	944.00	Quasi-Peak	30.4	26.8	12.5	42.9	39.3	46.0	3.1	6.7
4	1104.00	Peak	44.4	44.1	2.2	46.6	46.3	74.0	27.4	27.7
5	1104.00	Average	35.6	35.5	2.2	37.8	37.7	54.0	16.2	16.3
6*	2314.57	Peak	41.9	49.2	7.0	48.9	56.2	74.0	25.1	17.8
7*	2314.57	Average	27.2	27.2	7.0	34.2	34.2	54.0	19.8	19.8
8*	2370.21	Peak	45.5	52.6	7.1	52.6	59.7	74.0	21.4	14.3
9*	2370.21	Average	27.3	27.5	7.1	34.4	34.6	54.0	19.6	19.4
10*	2390.00	Peak	40.4	48.8	7.1	47.5	55.9	74.0	26.5	18.1
11*	2390.00	Average	27.1	27.3	7.1	34.2	34.4	54.0	19.8	19.6
12	4806.00	Peak	43.8	42.9	13.0	56.8	55.9	74.0	17.2	18.1
13	4806.00	Average	33.3	32.1	13.0	46.3	45.1	54.0	7.7	8.9
14	7209.00	Peak	47.1	47.2	17.6	64.7	64.8	74.0	9.3	9.2
15	7209.00	Average	34.2	33.9	17.6	51.8	51.5	54.0	2.2	2.5
16	9612.50	Peak	44.7	44.1	20.8	65.5	64.9	74.0	8.5	9.1
17	9612.50	Average	30.9	30.8	20.8	51.7	51.6	54.0	2.3	2.4

Note.
* : Restricted Band

Spurious emissions were not detected in the restricted band.
Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Spectrum Plot of Restricted Band
See ANNEX A.3

Operating mode	**2441 MHz (Middle) 1/2λ Dipole PIFA**			
Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Jan. 6, 2021,	Dec. 12, 2020	
Temperature	23.0	20.0	22.0	[degree C]
Humidity variation	42	42	40	[%]
Test Engineer	Yoshiaki Yoneyama			

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	480.00	Quasi-Peak	35.0	32.2	2.9	37.9	35.1	46.0	8.1	10.9
2	496.00	Quasi-Peak	33.5	33.4	3.5	37.0	36.9	46.0	9.0	9.1
3	944.00	Quasi-Peak	28.3	26.2	12.5	40.8	38.7	46.0	5.2	7.3
4	1104.00	Peak	43.4	42.5	2.2	45.6	44.7	74.0	28.4	29.3
5	1104.00	Average	34.5	31.1	2.2	36.7	33.3	54.0	17.3	20.7
6	4882.00	Peak	43.9	43.1	13.2	57.1	56.3	74.0	16.9	17.7
7	4882.00	Average	34.8	32.8	13.2	48.0	46.0	54.0	6.0	8.0
8	7323.00	Peak	46.8	48.3	18.2	65.0	66.5	74.0	9.0	7.5
9	7323.00	Average	33.7	33.3	18.2	51.9	51.5	54.0	2.1	2.5
10	9764.50	Peak	44.5	44.5	20.9	65.4	65.4	74.0	8.6	8.6
11	9765.50	Average	30.9	30.7	20.9	51.8	51.6	54.0	2.2	2.4

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode	2478 MHz (High) 1/2λ Dipole PIFA			
Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Jan. 6, 2021,	Dec. 12, 2020	
Temperature	23.0	20.0	22.0	[degree C]
Humidity variation	42	42	40	[%]
Test Engineer	Yoshiaki Yoneyama			

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	480.00	Quasi-Peak	35.2	33.9	2.9	38.1	36.8	46.0	7.9	9.2
2	496.00	Quasi-Peak	33.0	33.8	3.5	36.5	37.3	46.0	9.5	8.7
3	944.00	Quasi-Peak	26.7	24.5	12.5	39.2	37.0	46.0	6.8	9.0
4	1104.00	Peak	44.3	42.1	2.2	46.5	44.3	74.0	27.5	29.7
5	1104.00	Average	31.9	31.0	2.2	34.1	33.2	54.0	19.9	20.8
6*	2483.50	Peak	43.7	50.3	7.2	50.9	57.5	74.0	23.1	16.5
7*	2483.50	Average	28.2	29.1	7.2	35.4	36.3	54.0	18.6	17.7
8*	2494.20	Peak	47.4	57.8	7.2	54.6	65.0	74.0	19.4	9.0
9*	2494.20	Average	27.8	28.9	7.2	35.0	36.1	54.0	19.0	17.9
10	4956.00	Peak	44.9	43.8	13.3	58.2	57.1	74.0	15.8	16.9
11	4956.00	Average	34.8	34.2	13.3	48.1	47.5	54.0	5.9	6.5
12	7434.00	Peak	46.3	43.2	18.5	64.8	61.7	74.0	9.2	12.3
13	7434.00	Average	31.4	32.2	18.5	49.9	50.7	54.0	4.1	3.3
14	9912.50	Peak	44.1	44.4	21.3	65.4	65.7	74.0	8.6	8.3
15	9912.50	Average	30.6	30.7	21.3	51.9	52.0	54.0	2.1	2.0

Note.
* : Restricted Band

Spurious emissions were not detected in the restricted band.
Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Spectrum Plot of Restricted Band
See ANNEX A.3

Operating mode	**2403 MHz (Low) 1/2λ Dipole antenna**			
Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Jan. 6, 2021,	Dec. 12, 2020	
Temperature	23.0	20.0	22.0	[degree C]
Humidity variation	42	42	40	[%]
Test Engineer	Yoshiaki Yoneyama			

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	432.00	Quasi-Peak	38.9	33.4	1.7	40.6	35.1	46.0	5.4	10.9
2	928.00	Quasi-Peak	26.9	22.0	12.1	39.0	34.1	46.0	7.0	11.9
3	944.00	Quasi-Peak	25.2	22.5	12.5	37.7	35.0	46.0	8.3	11.0
4	1184.00	Peak	42.3	43.8	2.5	44.8	46.3	74.0	29.2	27.7
5	1184.00	Average	30.6	33.7	2.5	33.1	36.2	54.0	20.9	17.8
6*	2313.84	Peak	40.6	51.4	7.0	47.6	58.4	74.0	26.4	15.6
7*	2313.84	Average	27.7	27.9	7.0	34.7	34.9	54.0	19.3	19.1
8*	2369.60	Peak	41.2	55.4	7.1	48.3	62.5	74.0	25.7	11.5
9*	2369.60	Average	27.8	28.3	7.1	34.9	35.4	54.0	19.1	18.6
10*	2390.00	Average	42.5	52.0	7.1	49.6	59.1	74.0	24.4	14.9
11*	2390.00	Peak	27.3	27.9	7.1	34.4	35.0	54.0	19.6	19.0
12	4806.00	Peak	41.5	41.4	13.0	54.5	54.4	74.0	19.5	19.6
13	4806.00	Average	28.4	29.0	13.0	41.4	42.0	54.0	12.6	12.0
14	7209.00	Peak	44.0	46.8	17.6	61.6	64.4	74.0	12.4	9.6
15	7209.00	Average	30.7	33.7	17.6	48.3	51.3	54.0	5.7	2.7
16	9612.50	Peak	43.4	43.9	20.8	64.2	64.7	74.0	9.8	9.3
17	9612.50	Average	30.8	31.2	20.8	51.6	52.0	54.0	2.4	2.0

Note.
* : Restricted Band

Spurious emissions were not detected in the restricted band.
Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Spectrum Plot of Restricted Band
See ANNEX A.3

Operating mode	**2441 MHz (Middle) 1/2λ Dipole antenna**			
Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Jan. 6, 2021,	Dec. 12, 2020	
Temperature	23.0	20.0	22.0	[degree C]
Humidity variation	42	42	40	[%]
Test Engineer	Yoshiaki Yoneyama			

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	432.00	Quasi-Peak	28.6	24.6	1.7	30.3	26.3	46.0	15.7	19.7
2	928.00	Quasi-Peak	23.5	21.8	12.1	35.6	33.9	46.0	10.4	12.1
3	944.00	Quasi-Peak	23.2	22.1	12.5	35.7	34.6	46.0	10.3	11.4
4	1184.00	Peak	41.9	43.6	2.5	44.4	46.1	74.0	29.6	27.9
5	1184.00	Average	29.3	33.0	2.5	31.8	35.5	54.0	22.2	18.5
6	4882.00	Peak	41.2	42.5	13.2	54.4	55.7	74.0	19.6	18.3
7	4882.00	Average	28.3	30.7	13.2	41.5	43.9	54.0	12.5	10.1
8	7323.00	Peak	44.8	48.2	18.2	63.0	66.4	74.0	11.0	7.6
9	7323.00	Average	31.8	33.9	18.2	50.0	52.1	54.0	4.0	1.9
10	9764.50	Peak	43.7	43.8	20.9	64.6	64.7	74.0	9.4	9.3
11	9765.50	Average	30.4	30.5	20.9	51.3	51.4	54.0	2.7	2.6

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode	2478 MHz (High) 1/2λ Dipole antenna			
Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Jan. 6, 2021,	Dec. 12, 2020	
Temperature	23.0	20.0	22.0	[degree C]
Humidity variation	42	42	40	[%]
Test Engineer	Yoshiaki Yoneyama			

No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	432.00	Quasi-Peak	27.8	24.2	1.7	29.5	25.9	46.0	16.5	20.1
2	928.00	Quasi-Peak	23.3	22.1	12.1	35.4	34.2	46.0	10.6	11.8
3	943.00	Quasi-Peak	22.2	22.5	12.5	34.7	35.0	46.0	11.3	11.0
4	1184.00	Peak	41.3	42.3	2.5	43.8	44.8	74.0	30.2	29.2
5	1184.00	Average	28.1	31.7	2.5	30.6	34.2	54.0	23.4	19.8
6*	2483.50	Peak	43.6	52.0	7.2	50.8	59.2	74.0	23.2	14.8
7*	2483.50	Average	27.8	31.3	7.2	35.0	38.5	54.0	19.0	15.5
8*	2492.62	Peak	46.8	57.2	7.2	54.0	64.4	74.0	20.0	9.6
9*	2492.62	Average	28.4	29.8	7.2	35.6	37.0	54.0	18.4	17.0
10	4956.00	Peak	41.7	42.3	13.3	55.0	55.6	74.0	19.0	18.4
11	4956.00	Average	29.5	32.0	13.3	42.8	45.3	54.0	11.2	8.7
12	7434.00	Peak	45.3	46.8	18.5	63.8	65.3	74.0	10.2	8.7
13	7434.00	Average	32.5	33.0	18.5	51.0	51.5	54.0	3.0	2.5
14	9912.50	Peak	44.0	43.6	21.3	65.3	64.9	74.0	8.7	9.1
15	9912.50	Average	30.3	30.5	21.3	51.6	51.8	54.0	2.4	2.2

Note.
* : Restricted Band

Spurious emissions were not detected in the restricted band.
Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Spectrum Plot of Restricted Band
See ANNEX A.3

9.4 Band Edge of Authorized Frequency Band

Regulations	FCC Part15C §15.247 (d) RSS-247 5.5
Test Method/Guide	ANSI C63.10-2013 clause 6.10.4

Test Procedure

1. The EUT and test instrument were set up as shown on section 10.1.
2. Adjust the measurement instrument for the following setting:

RBW	:	100 kHz
VBW	:	300 kHz
Span	:	10 MHz or less
Detector	:	Peak
Sweep Time	:	Auto
Correction Factor	:	Input Cable loss and Attenuator
Trace mode	:	Max Hold

3. Allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within in-band emission.
5. Use the marker function to ensure that the band edge level of the authorized frequency band was attenuated by at least the minimum requirements specified.
6. Band Edge Measurement data correction;

   Limit [dBm] = Peak level within in-band emission [dBm] - 20 [dB]

   Margin [dB] = Limit [dBm] – Band edge Level [dBm]

Test Result

Location	Matsuda No.1 Test Site
Test date	January 8, 2021
Temperature	22.0 [degree C]
Humidity variation	42 [%]
Test Engineer	Naohei Murakami

2403 MHz (Low)

Freq. [MHz]	Peak level within in-band emission [dBm]	Limit [dBm]	Band edge level [dBm]	Margin [dB]
2400.00	-17.940	-37.940	-67.590	29.640

2478 MHz (High)

Freq. [MHz]	Peak level within in-band emission [dBm]	Limit [dBm]	Band edge level [dBm]	Margin [dB]
2483.50	-17.781	-37.781	-77.301	39.520

Spectrum Plots

See ANNEX A.4

9.5 Spurious RF Conducted Emissions

Regulations	FCC Part15C §15.247 (d) RSS-247 5.5
Test Method/Guide	ANSI C63.10-2013 clause 7.8.8

Test Procedure

1. The EUT and test instrument were set up as shown on section 10.1.
2. Adjust the measurement instrument for the following setting:

RBW	:	100 kHz
VBW	:	300 kHz
Span	:	Set span to encompass the spectrum to be examined
Detector	:	Peak
Sweep Time	:	Auto
Correction Factor	:	Input Cable loss and Attenuator
Trace mode	:	Max Hold, Allow trace to fully stabilize.

3. Use the marker function to ensure that the amplitude of all unwanted emissions outside of the authorized frequency band is attenuated by at least the minimum requirements specified.

Spectrum Plots

See ANNEX A.5

Location	Matsuda No.1 Test Site	
Test date	December 13, 2020	
Temperature	22.0	[degree C]
Humidity variation	41	[%]
Test Engineer	Naohei Murakami	

9.6 AC Conducted Emissions

Regulations	FCC Part15C §15.207 RSS-Gen 7.2.2
Test Method/Guide	ANSI C63.10-2013 clause 6.2

Note: Test was not carried out because the EUT did not have applicable ports for the test.

Test Procedure

1. The EUT and test instrument were set up as shown on section 10.3.
2. The spectrum analyzer is controlled by the computer program to sweep the frequency range to be measured, then spectrum chart is plotted out to find the worst emission.
   At least six highest spectrum are measured in Quasi-Peak and average (if necessary) using the CISPR Receiver.
3. Adjust the test instrument for the following setting:

Frequency	Instruments	Detector	RBW	VBW
0.15 – 30 MHz	CISPR Receiver	QP	9 kHz	N/A
		AVG		

6. Measurement data correction;
   Emission Level [dBuV] = Reading [dBuV] + Factor [dB]
   Margin [dB] = Limit [dBuV] – Emission Level [dBuV]
   * Factor = LISN Factor + Cable loss + Attenuator

Test Result

Test date	December 10, 2020
Location	Matsuda No.2 Test Site
Temperature	23.0 [degree C]
Humidity variation	45 [%]
Test Engineer	Yoshiaki Yoneyama

Operating mode			**1/4λ Monopole antenna (chip antenna) TX Ch41 (2441 MHz)**								
No.	**Freq [MHz]**	**Detector**	**Reading [dBuV]**		**Factor [dB]**		**Emission Level [dBuV]**		**Limit [dBuV]**	**Margin [dB]**	
			L1	**L2**	**L1**	**L2**	**L1**	**L2**		**L1**	**L2**
1	0.1500	QP	25.0	26.8	10.1	9.9	35.1	36.7	66.0	30.9	29.3
2	0.2000	QP	12.3	11.4	10.0	9.9	22.3	21.3	63.6	41.3	42.3
3	0.5000	QP	-4.0	-3.8	10.2	10.1	6.2	6.3	56.0	49.8	49.7
4	1.0000	QP	-4.0	-3.8	10.3	10.2	6.3	6.4	56.0	49.7	49.6
5	5.0000	QP	-3.8	-3.9	10.7	10.6	6.9	6.7	56.0	49.1	49.3
6	10.0000	QP	-3.8	-3.6	11.1	11.0	7.3	7.4	60.0	52.7	52.6
7	28.0000	QP	-0.3	-2.6	11.5	11.7	11.2	9.1	60.0	48.8	50.9

The pre-test was carried out with the following mode
TX Ch03, TX Ch41, TX Ch78, RX Ch03, RX Ch41, RX, Ch78

The final-test was carried out with the following mode.
TX Ch41

Test Result

Test date	December 10, 2020
Location	Matsuda No.2 Test Site
Temperature	23.0 [degree C]
Humidity variation	45 [%]
Test Engineer	Yoshiaki Yoneyama

Operating mode			**1/2λ Dipole PIFA TX Ch41 (2441 MHz)**								
No.	**Freq [MHz]**	**Detector**	**Reading [dBuV]**		**Factor [dB]**		**Emission Level [dBuV]**		**Limit [dBuV]**	**Margin [dB]**	
			L1	**L2**	**L1**	**L2**	**L1**	**L2**		**L1**	**L2**
1	0.1500	QP	15.6	19.3	10.1	9.9	25.7	29.2	66.0	40.3	36.8
2	0.2000	QP	5.9	9.6	10.0	9.9	15.9	19.5	63.6	47.7	44.1
3	0.5000	QP	-3.7	-3.5	10.2	10.1	6.5	6.6	56.0	49.5	49.4
4	1.0000	QP	-3.6	-3.6	10.3	10.2	6.7	6.6	56.0	49.3	49.4
5	5.0000	QP	-3.8	-3.9	10.7	10.6	6.9	6.7	56.0	49.1	49.3
6	10.0000	QP	-3.5	-3.6	11.1	11.0	7.6	7.4	60.0	52.4	52.6
7	28.0000	QP	-3.0	-2.9	11.5	11.7	8.5	8.8	60.0	51.5	51.2

The pre-test was carried out with the following mode
TX Ch03, TX Ch41, TX Ch78, RX Ch03, RX Ch41, RX, Ch78

The final-test was carried out with the following mode.
TX Ch41

Test Result

Test date	December 10, 2020
Location	Matsuda No.2 Test Site
Temperature	23.0 [degree C]
Humidity variation	45 [%]
Test Engineer	Yoshiaki Yoneyama

Operating mode			**1/2λ Dipole antenna TX Ch41 (2441 MHz)**								
No.	**Freq [MHz]**	**Detector**	**Reading [dBuV]**		**Factor [dB]**		**Emission Level [dBuV]**		**Limit [dBuV]**	**Margin [dB]**	
			L1	**L2**	**L1**	**L2**	**L1**	**L2**		**L1**	**L2**
1	0.1500	QP	12.0	9.6	10.1	9.9	22.1	19.5	66.0	43.9	46.5
2	0.2000	QP	3.6	4.5	10.0	9.9	13.6	14.4	63.6	50.0	49.2
3	0.5000	QP	-3.7	-3.5	10.2	10.1	6.5	6.6	56.0	49.5	49.4
4	1.0000	QP	-3.7	-3.7	10.3	10.2	6.6	6.5	56.0	49.4	49.5
5	5.0000	QP	-3.5	-3.6	10.7	10.6	7.2	7.0	56.0	48.8	49.0
6	10.0000	QP	-3.6	-3.6	11.1	11.0	7.5	7.4	60.0	52.5	52.6
7	28.0000	QP	-2.6	-2.5	11.5	11.7	8.9	9.2	60.0	51.1	50.8

The pre-test was carried out with the following mode
TX Ch03, TX Ch41, TX Ch78, RX Ch03, RX Ch41, RX, Ch78

The final-test was carried out with the following mode.
TX Ch41

9.7 Receiver Spurious Emissions

Regulations	RSS-Gen 7.1
Test Method/Guide	ANSI C63.10-2013 clause 6.5 and 6.6

Test Procedure

See section 9.6

Note: Did not carried out the final measurement about frequency range of 9 kHz to 30 MHz, because result of pre-check in shield room, spurious emissions was not detected.

Test Result

Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Dec. 14, 2020,	Dec. 14, 2020	
Temperature	23.0	20.0	20.0	[degree C]
Humidity variation	42	44	44	[%]
Test Engineer	Yoshiaki Yoneyama			

Operating mode		**2403 MHz (Low) 1/4λ Monopole antenna (chip antenna)**								
No.	**Freq. [MHz]**	**Detector**	**Reading [dBuV]**		**Factor [dB/m]**	**Emission Level [dBuV/m]**		**Limit [dBuV/m]**	**Margin [dB]**	
			Hori	**Vert**		**Hori**	**Vert**		**Hori**	**Vert**
1	432.00	Quasi-Peak	36.9	32.6	1.7	38.6	34.3	46.0	7.4	11.7
2	480.00	Quasi-Peak	36.5	29.8	2.9	39.4	32.7	46.0	6.6	13.3
3	944.00	Quasi-Peak	28.1	24.5	12.5	40.6	37.0	46.0	5.4	9.0
4	1008.00	Peak	42.9	42.7	1.8	44.7	44.5	74.0	29.3	29.5
5	1008.00	Average	32.0	31.6	1.8	33.8	33.4	54.0	20.2	20.6
6	1056.00	Peak	41.9	41.7	1.8	43.7	43.5	74.0	30.3	30.5
7	1056.00	Average	30.3	29.8	1.8	32.1	31.6	54.0	21.9	22.4
8	2748.56	Peak	44.5	43.5	7.9	52.4	51.4	74.0	21.6	22.6
9	2748.56	Average	37.6	33.8	7.9	45.5	41.7	54.0	8.5	12.3

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode		**2441 MHz (Middle) 1/4λ Monopole antenna (chip antenna)**								
No.	**Freq. [MHz]**	**Detector**	**Reading [dBuV]**		**Factor [dB/m]**	**Emission Level [dBuV/m]**		**Limit [dBuV/m]**	**Margin [dB]**	
			Hori	**Vert**		**Hori**	**Vert**		**Hori**	**Vert**
1	432.00	Quasi-Peak	27.6	25.2	1.7	29.3	26.9	46.0	16.7	19.1
2	480.00	Quasi-Peak	31.0	29.8	2.9	33.9	32.7	46.0	12.1	13.3
3	944.00	Quasi-Peak	27.1	25.3	12.5	39.6	37.8	46.0	6.4	8.2
4	1008.00	Peak	41.7	41.5	1.8	43.5	43.3	74.0	30.5	30.7
5	1008.00	Average	30.3	30.1	1.8	32.1	31.9	54.0	21.9	22.1
6	1056.00	Peak	41.8	41.3	1.8	43.6	43.1	74.0	30.4	30.9
7	1056.00	Average	29.0	29.5	1.8	30.8	31.3	54.0	23.2	22.7
8	2792.00	Peak	44.2	43.5	8.0	52.2	51.5	74.0	21.8	22.5
9	2792.00	Average	36.7	34.0	8.0	44.7	42.0	54.0	9.3	12.0

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode		2478 MHz (High) 1/4λ Monopole antenna (chip antenna)								
No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	432.00	Quasi-Peak	26.4	24.6	1.7	28.1	26.3	46.0	17.9	19.7
2	480.00	Quasi-Peak	32.9	28.6	2.9	35.8	31.5	46.0	10.2	14.5
3	944.00	Quasi-Peak	26.8	24.8	12.5	39.3	37.3	46.0	6.7	8.7
4	1008.00	Peak	42.4	41.9	1.8	44.2	43.7	74.0	29.8	30.3
5	1008.00	Average	31.7	30.4	1.8	33.5	32.2	54.0	20.5	21.8
6	1056.00	Peak	41.7	41.8	1.8	43.5	43.6	74.0	30.5	30.4
7	1056.00	Average	30.3	31.5	1.8	32.1	33.3	54.0	21.9	20.7
8	2834.28	Peak	43.9	43.4	8.0	51.9	51.4	74.0	22.1	22.6
9	2834.28	Average	35.0	34.6	8.0	43.0	42.6	54.0	11.0	11.4

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Dec. 14, 2020,	Dec. 14, 2020	
Temperature	23.0	20.0	20.0	[degree C]
Humidity variation	42	44	44	[%]
Test Engineer	Yoshiaki Yoneyama			

Operating mode		**2403 MHz (Low) 1/2λ Dipole PIFA**								
No.	**Freq. [MHz]**	**Detector**	**Reading [dBuV]**		**Factor [dB/m]**	**Emission Level [dBuV/m]**		**Limit [dBuV/m]**	**Margin [dB]**	
			Hori	**Vert**		**Hori**	**Vert**		**Hori**	**Vert**
1	464.00	Quasi-Peak	38.8	34.8	2.6	41.4	37.4	46.0	4.6	8.6
2	928.00	Quasi-Peak	29.2	26.3	12.1	41.3	38.4	46.0	4.7	7.6
3	944.00	Quasi-Peak	30.2	26.8	12.5	42.7	39.3	46.0	3.3	6.7
4	1008.00	Peak	44.1	44.2	1.8	45.9	46.0	74.0	28.1	28.0
5	1008.00	Average	35.6	36.5	1.8	37.4	38.3	54.0	16.6	15.7
6	1056.00	Peak	43.4	43.6	1.8	45.2	45.4	74.0	28.8	28.6
7	1056.00	Average	34.9	35.3	1.8	36.7	37.1	54.0	17.3	16.9
8	2748.56	Peak	45.2	44.4	7.9	53.1	52.3	74.0	20.9	21.7
9	2748.56	Average	37.6	36.5	7.9	45.5	44.4	54.0	8.5	9.6

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode		**2441 MHz (Middle) 1/2λ Dipole PIFA**								
No.	**Freq. [MHz]**	**Detector**	**Reading [dBuV]**		**Factor [dB/m]**	**Emission Level [dBuV/m]**		**Limit [dBuV/m]**	**Margin [dB]**	
			Hori	**Vert**		**Hori**	**Vert**		**Hori**	**Vert**
1	464.00	Quasi-Peak	32.3	29.5	2.6	34.9	32.1	46.0	11.1	13.9
2	928.00	Quasi-Peak	26.3	26.3	12.1	38.4	38.4	46.0	7.6	7.6
3	944.00	Quasi-Peak	26.8	26.8	12.5	39.3	39.3	46.0	6.7	6.7
4	1008.00	Peak	42.3	44.4	1.8	44.1	46.2	74.0	29.9	27.8
5	1008.00	Average	30.4	36.4	1.8	32.2	38.2	54.0	21.8	15.8
6	1056.00	Peak	43.9	43.4	1.8	45.7	45.2	74.0	28.3	28.8
7	1056.00	Average	33.5	35.0	1.8	35.3	36.8	54.0	18.7	17.2
8	2792.00	Peak	46.0	43.5	8.0	54.0	51.5	74.0	20.0	22.5
9	2792.00	Average	39.1	36.9	8.0	47.1	44.9	54.0	6.9	9.1

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode		2478 MHz (High) 1/2λ Dipole PIFA								
No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	464.00	Quasi-Peak	29.3	29.5	2.6	31.9	32.1	46.0	14.1	13.9
2	928.00	Quasi-Peak	26.2	23.6	12.1	38.3	35.7	46.0	7.7	10.3
3	944.00	Quasi-Peak	26.4	24.2	12.5	38.9	36.7	46.0	7.1	9.3
4	1008.00	Peak	42.6	42.3	1.8	44.4	44.1	74.0	29.6	29.9
5	1008.00	Average	30.9	31.2	1.8	32.7	33.0	54.0	21.3	21.0
6	1056.00	Peak	42.9	42.3	1.8	44.7	44.1	74.0	29.3	29.9
7	1056.00	Average	33.0	33.2	1.8	34.8	35.0	54.0	19.2	19.0
8	2834.28	Peak	46.1	42.4	8.0	54.1	50.4	74.0	19.9	23.6
9	2834.28	Average	40.6	36.9	8.0	48.6	44.9	54.0	5.4	9.1

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Location	Matsuda No.2 Test Site,	Matsuda No.1 Test Site		
Frequency	30 – 1000 MHz,	1-18 GHz,	18 – 25 GHz	
Test date	Dec. 13, 2020	Dec. 14, 2020,	Dec. 14, 2020	
Temperature	23.0	20.0	20.0	[degree C]
Humidity variation	42	44	44	[%]
Test Engineer	Yoshiaki Yoneyama			

Operating mode		**2403 MHz (Low) 1/2λ Dipole antenna**								
No.	**Freq. [MHz]**	**Detector**	**Reading [dBuV]**		**Factor [dB/m]**	**Emission Level [dBuV/m]**		**Limit [dBuV/m]**	**Margin [dB]**	
			Hori	**Vert**		**Hori**	**Vert**		**Hori**	**Vert**
1	432.00	Quasi-Peak	38.2	32.6	1.7	39.9	34.3	46.0	6.1	11.7
2	928.00	Quasi-Peak	30.0	22.0	12.1	42.1	34.1	46.0	3.9	11.9
3	944.00	Quasi-Peak	29.8	22.6	12.5	42.3	35.1	46.0	3.7	10.9
4	1056.00	Peak	41.4	44.8	1.8	43.2	46.6	74.0	30.8	27.4
5	1056.00	Average	29.8	37.2	1.8	31.6	39.0	54.0	22.4	15.0
6	1216.00	Peak	46.4	42.4	2.3	48.7	44.7	74.0	25.3	29.3
7	1216.00	Average	27.9	31.5	2.3	30.2	33.8	54.0	23.8	20.2
8	2748.56	Peak	43.6	42.7	7.9	51.5	50.6	74.0	22.5	23.4
9	2748.56	Average	34.0	33.3	7.9	41.9	41.2	54.0	12.1	12.8

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode		**2441 MHz (Middle) 1/2λ Dipole antenna**								
No.	**Freq. [MHz]**	**Detector**	**Reading [dBuV]**		**Factor [dB/m]**	**Emission Level [dBuV/m]**		**Limit [dBuV/m]**	**Margin [dB]**	
			Hori	**Vert**		**Hori**	**Vert**		**Hori**	**Vert**
1	432.00	Quasi-Peak	31.2	25.9	1.7	32.9	27.6	46.0	13.1	18.4
2	928.00	Quasi-Peak	22.7	21.7	12.1	34.8	33.8	46.0	11.2	12.2
3	943.00	Quasi-Peak	21.7	22.0	12.5	34.2	34.5	46.0	11.8	11.5
4	1056.00	Peak	40.8	42.7	1.8	42.6	44.5	74.0	31.4	29.5
5	1056.00	Average	28.5	33.0	1.8	30.3	34.8	54.0	23.7	19.2
6	1216.00	Peak	40.2	41.6	2.3	42.5	43.9	74.0	31.5	30.1
7	1216.00	Average	27.7	30.9	2.3	30.0	33.2	54.0	24.0	20.8
8	2792.00	Peak	44.1	44.4	8.0	52.1	52.4	74.0	21.9	21.6
9	2792.00	Average	36.1	36.0	8.0	44.1	44.0	54.0	9.9	10.0

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

Operating mode		2478 MHz (High) 1/2λ Dipole antenna								
No.	Freq. [MHz]	Detector	Reading [dBuV]		Factor [dB/m]	Emission Level [dBuV/m]		Limit [dBuV/m]	Margin [dB]	
			Hori	Vert		Hori	Vert		Hori	Vert
1	432.00	Quasi-Peak	30.5	25.0	1.7	32.2	26.7	46.0	13.8	19.3
2	928.00	Quasi-Peak	22.6	22.0	12.1	34.7	34.1	46.0	11.3	11.9
3	943.00	Quasi-Peak	21.7	22.0	12.5	34.2	34.5	46.0	11.8	11.5
4	1056.00	Peak	41.3	42.6	1.8	43.1	44.4	74.0	30.9	29.6
5	1056.00	Average	28.4	33.1	1.8	30.2	34.9	54.0	23.8	19.1
6	1216.00	Peak	41.5	41.7	2.3	43.8	44.0	74.0	30.2	30.0
7	1216.00	Average	27.7	29.7	2.3	30.0	32.0	54.0	24.0	22.0
8	2834.28	Peak	44.4	43.5	8.0	52.4	51.5	74.0	21.6	22.5
9	2834.28	Average	37.4	34.1	8.0	45.4	42.1	54.0	8.6	11.9

Note.

Any Spurious emissions higher than the frequency reported in the table above were not detected during the measurement.

SECTION 10. LIST AND DIAGRUM OF MEASURING INSTRUMENTS

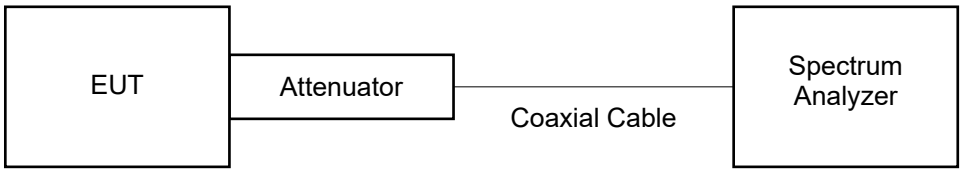
Test instruments are calibrated according to Quality Manual and Calibration Rules of Intertek Japan K.K.

10.1 RF Conducted

Measurement Instruments

Instrument	Model No.	Serial No.	Manufacturer	Cal. Interval	Effective period
Spectrum Analyzer	N9030A	MY52350520	Agilent	1 Y	Jan.31, 2021
20 dB Attenuator	8493C	85450	Agilent	1 Y	May 31, 2021
Coaxial Cable	5B-048-98-98-1000	ECE0081	CANDOX Systems	1 Y	Jul.31, 2021

Measurement Equipment Configuration



10.2 Radiated Emission

Measurement Instruments

Instrument	Model No.	Serial No.	Manufacturer	Cal. Interval	Effective period
Radiated disturbance					
Below 1000 MHz					
Loop Antenna	HFH2-Z2	882964/28	Rohde & Schwarz	1 Y	Dec. 31, 2020
6dB Attenuator	MP721B	M87938	ANRITSU	1 Y	Jan. 31, 2021
Coaxial Cable (M1)	5D-2W(8.0m)	EM0CS012	SUHNER	1 Y	Jan. 31, 2021
Test Receiver	ESS (Firmware 1.21)	839643/008	Rohde & Schwarz	1 Y	Aug. 31, 2021
30 – 1000 MHz					
Broad Band Antenna	VULB9168	124	Schwarzbeck	1 Y	Jul. 30, 2021
Amplifier	8447D	2727A05809	Hewlett Packard	1 Y	Jan. 31, 2021
Step Attenuator	8494B	2805A14576	Hewlett Packard	1 Y	Jan. 31, 2021
6dB Attenuator	MP721B	M87938	ANRITSU	1 Y	Jan. 31, 2021
Coaxial Cable (R1)	RG214HF(8.0m)	MTS02R3-1	SUHNER	1 Y	Jan. 31, 2021
Coaxial Cable (R2)	12D-SFA(28.0m)	MTS02R3-2	Intertek	1 Y	Jan. 31, 2021
Coaxial Cable (R3)	RG214HF(2.0m)	MTS02R3-3	SUHNER	1 Y	Jan. 31, 2021
Coaxial Cable (R4)	RG214HF(0.4m)	MTS02R3-4	SUHNER	1 Y	Jan. 31, 2021
Coaxial Cable (R5)	RG214HF(0.4m)	MTS02R3-5	SUHNER	1 Y	Jan. 31, 2021
Coaxial Cable (R6)	RG214HF(1.5m)	MTS02R3-6	SUHNER	1 Y	Jan. 31, 2021
Coaxial Cable (R7)	RG214HF(1.5m)	MTS02R3-7	SUHNER	1 Y	Jan. 31, 2021
Coaxial Cable (R8)	RG214HF(1.5m)	MTS02R3-8	SUHNER	1 Y	Jan. 31, 2021
Coaxial Cable (R9)	5D-2W(8.0m)	MTS02R3-9	SUHNER	1 Y	Jan. 31, 2021
RF Switch(1)	MP59B	M7736	ANRITSU	1 Y	Jan. 31, 2021
RF Switch(2)	ACX-150-1	E02301501	Intertek	1 Y	Jan. 31, 2021
Site Attenuation	-	-	-	1 Y	Apr. 30, 2021
Test Receiver	ESS (Firmware 1.21)	839643/008	Rohde & Schwarz	1 Y	Aug. 31, 2021

Above 1000 MHz					
Test Receiver	ESR26 (Firmware 3.46 SP1)	101629	Rohde & Schwarz	1 Y	Mar. 31, 2021
Spectrum Analyzer	N9030A	MY52350520	Agilent	1 Y	Jan.31, 2021
Double Ridged Antenna	3115	2568	EMCO	1 Y	Feb. 30, 2021
Amplifier	TPA0118-30	950186	TOYO Corporation	1 Y	Feb. 30, 2021
6dB Attenuator	6806.17.B	E00AT6GA	HUBER+SUHNER	1 Y	Feb. 30, 2021
Coaxial Cable (R11)	S04272B/11N/11SMA	38242_1	HUBER+SUHNER	1 Y	Nov. 30, 2021
Coaxial Cable (R12)	SUCOFLEX 104	808144/4	HUBER+SUHNER	1 Y	Nov. 30, 2021
2.4GHz Notch Filter	BRM50702	111	MICRO-TRONICS	1 Y	May 31, 2021
Horn Antenna	MLA-18265-B03-30	1694440	TSJ	1 Y	Apr. 30, 2021
Coaxial Cable (R13)	5B-048-98-98-6000	120315	Candox Systems	1 Y	Apr. 30, 2021
SVSWR(1 – 18GHz)				1 Y	Sep. 30, 2021

Note: The effective period is to the last day of month listed.

Measurement Instruments Configurations

Diagram of the measuring instruments (Below 30MHz)

Diagram of the measurement instruments (30 - 1000 MHz)

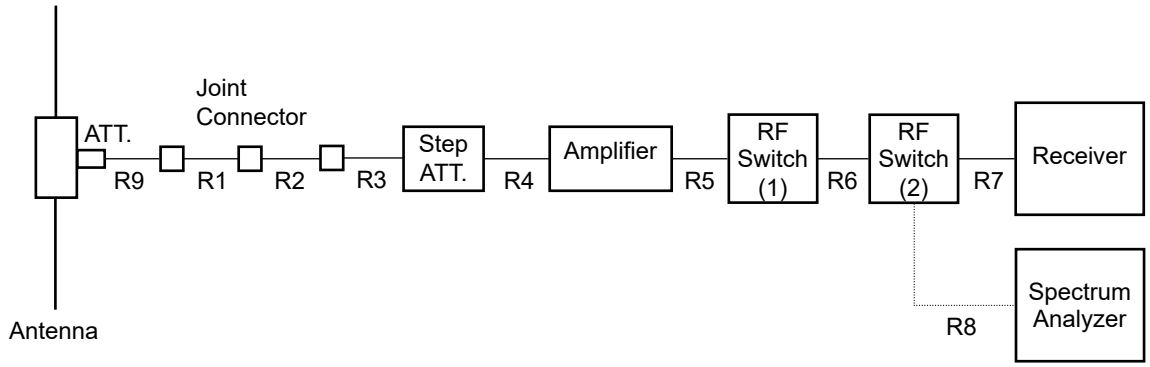


Diagram of the measurement instruments (1000 - 2000 and 3000 - 18000 MHz)

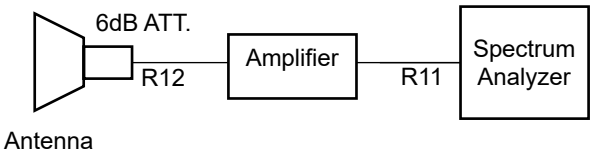


Diagram of the measurement instruments (2000 - 3000 MHz MHz)

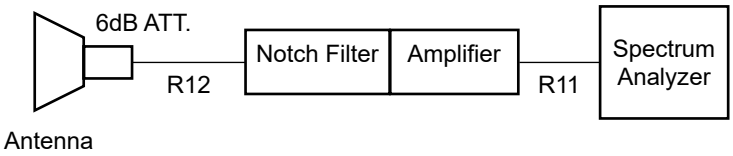
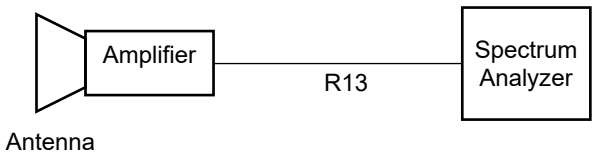
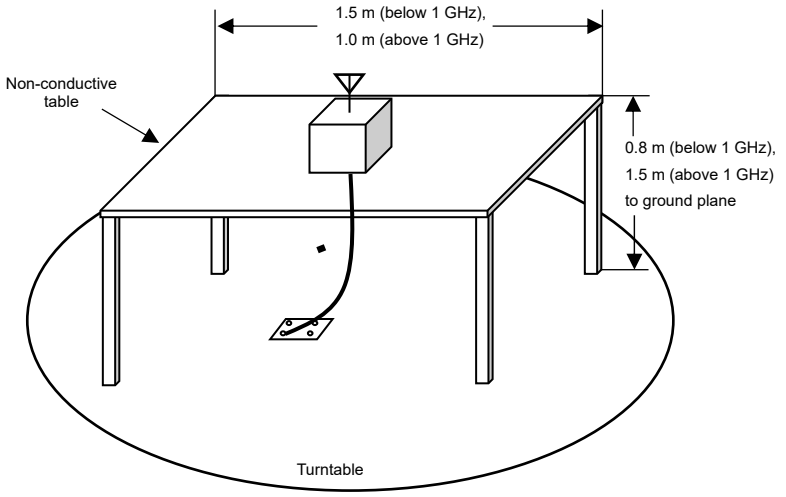


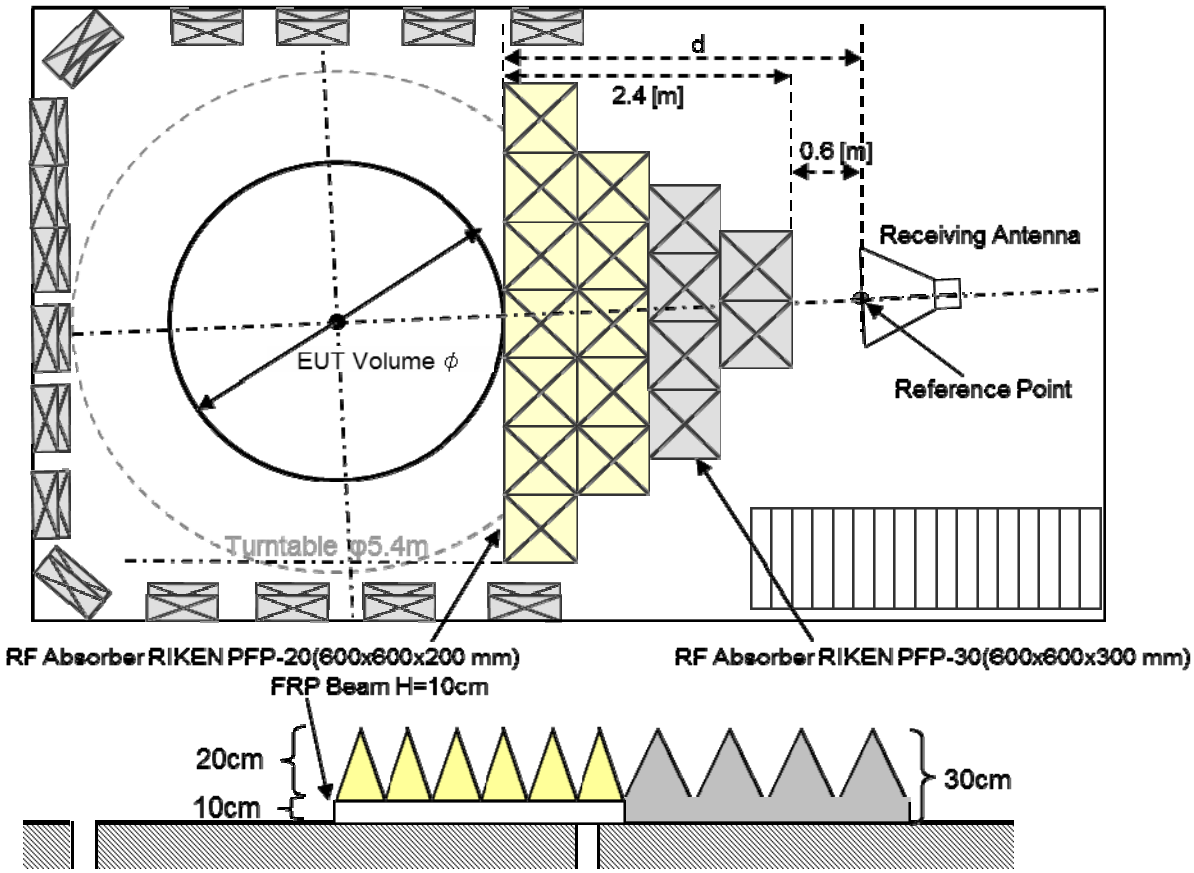
Diagram of the measurement instruments (Above - 18000 MHz)



EUT set-up as per standard



Absorber placement and Receive Antenna location in Radiated disturbance above 1 GHz

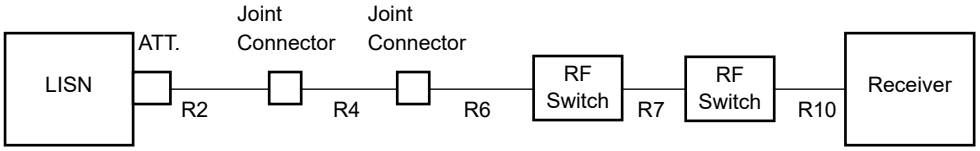


10.3 AC Line Conducted Emission

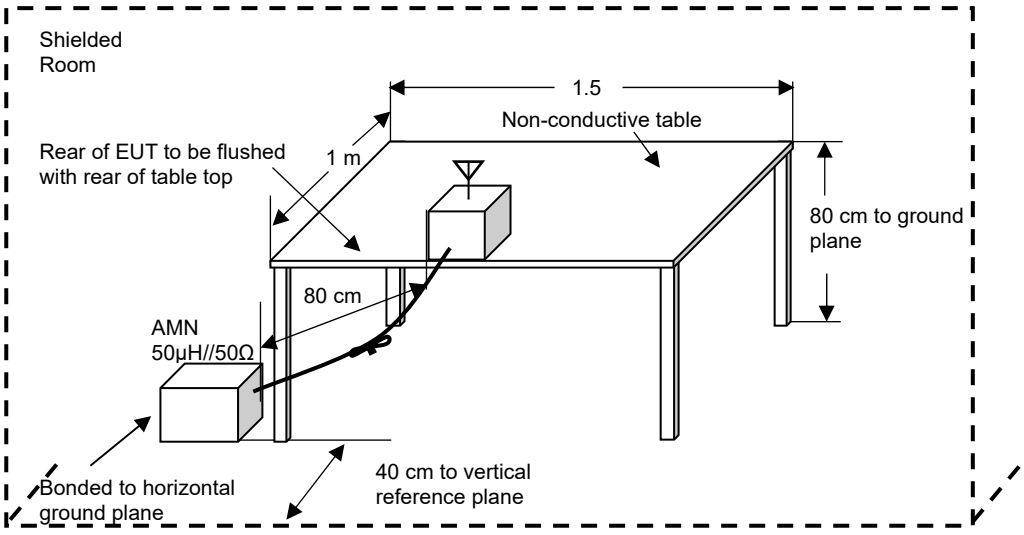
Measurement Instruments

Instrument	Model No.	Serial No.	Manufacturer	Cal. Interval	Effective period
Conducted disturbance at mains terminals					
LISN(EUT)	ESH2-Z5	882395/019	Rohde & Schwarz	1 Y	Jun. 30, 2021
10dB LISN Pad	CFA-01	E04AT10B	TAMAGAWA	1 Y	Jun. 30, 2021
Coaxial Cable (C1)	3D-2W(7.8m)	MTS02CSR-1	Intertek	1 Y	Jan. 31, 2021
Coaxial Cable (C2)	RG-5A/U(12.0m)	MTS02CSR-2	Intertek	1 Y	Jan. 31, 2021
Coaxial Cable (C3)	RG214HF(1.5m)	MTS02CSR-3	SUHNER	1 Y	Jan. 31, 2021
Coaxial Cable (C4)	RG214HF(1.5m)	MTS02CSR-4	SUHNER	1 Y	Jan. 31, 2021
Coaxial Cable (C5)	RG214HF(1.5m)	MTS02CSR-5	SUHNER	1 Y	Jan. 31, 2021

Measurement Instruments Configurations



Test setup as per standard



* Reference Ground plane : greater than 2 x 2m

ANNEX

A. HARD COPY OF SPECTRUM PLOTS

A.1 6 dB Bandwidth and 99 % Occupied Bandwidth

2403 MHz

2441 MHz

2478 MHz

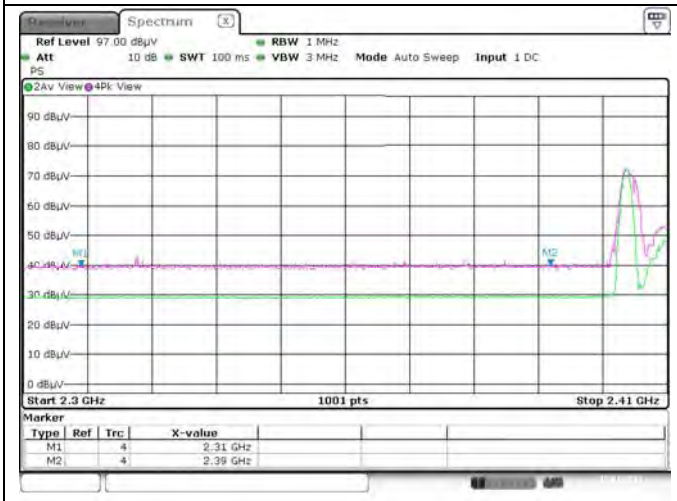
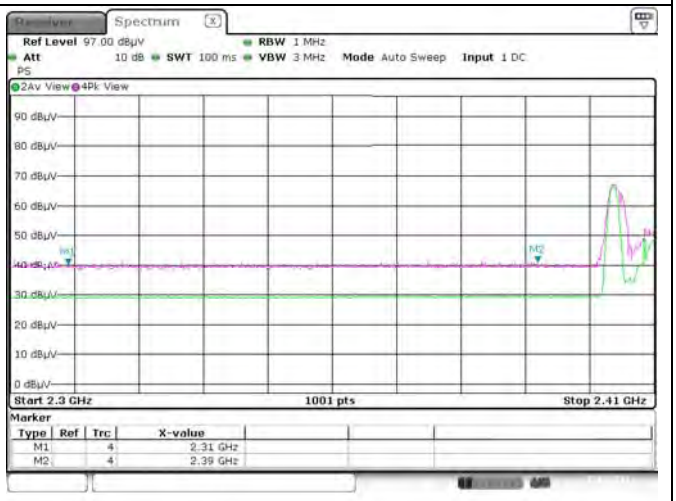
A.2 Maximum Peak Output Power

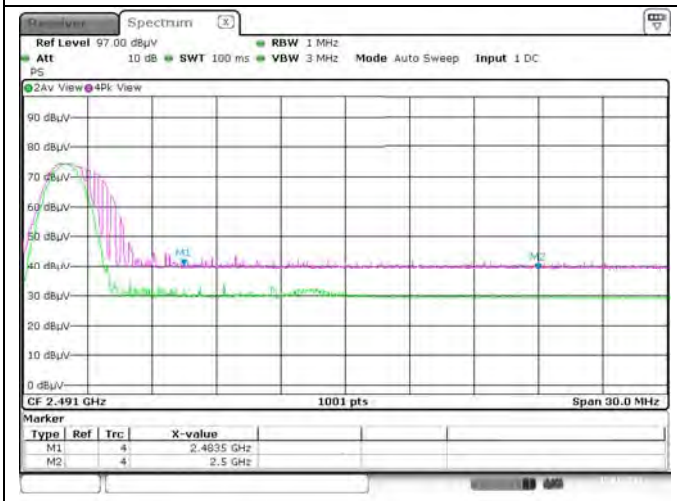
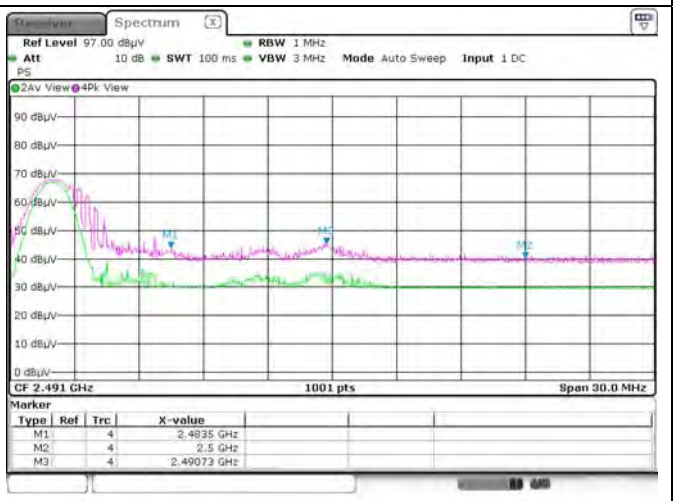
2403 MHz

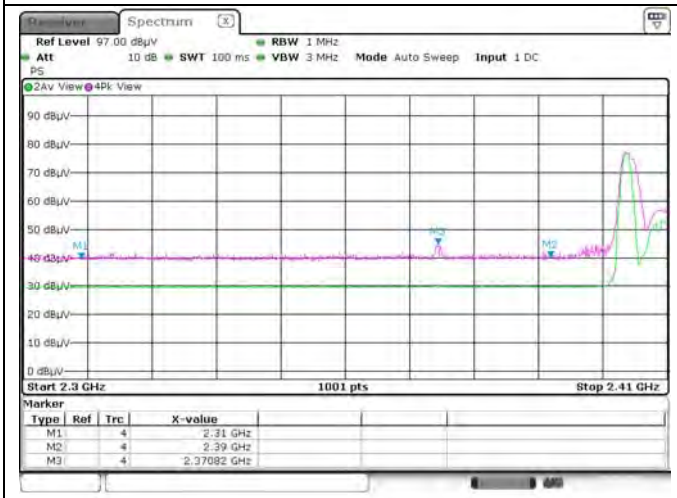
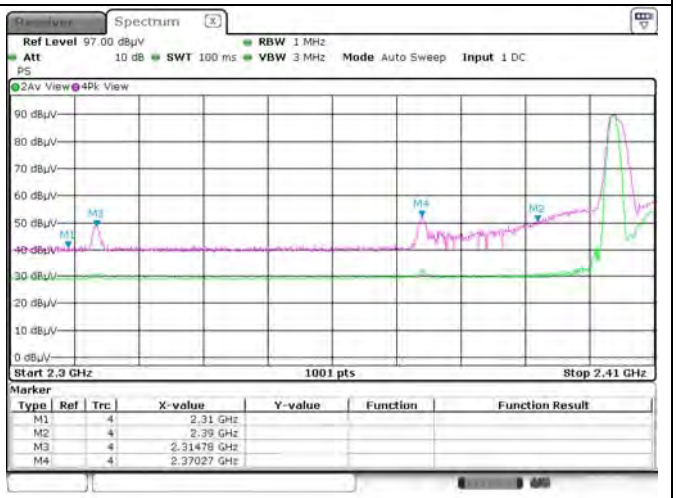
2441 MHz

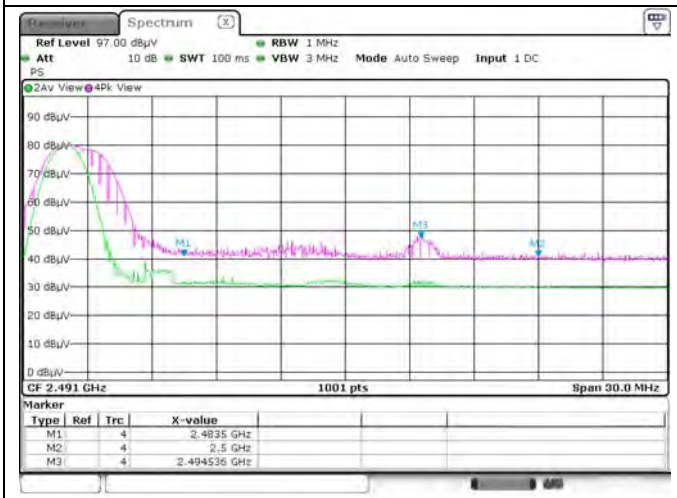
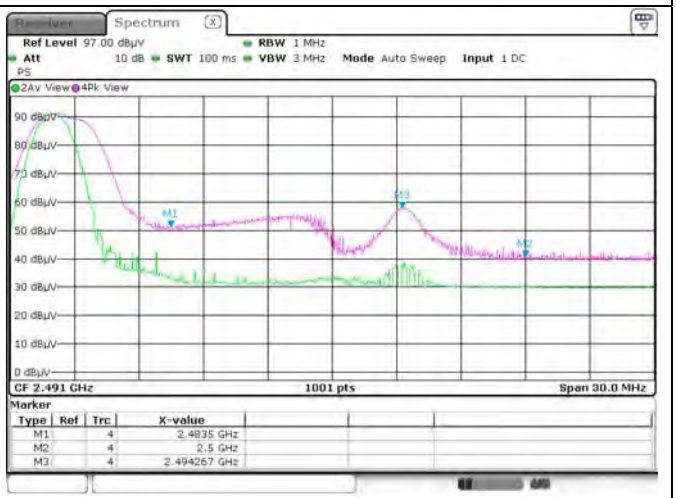
2478 MHz

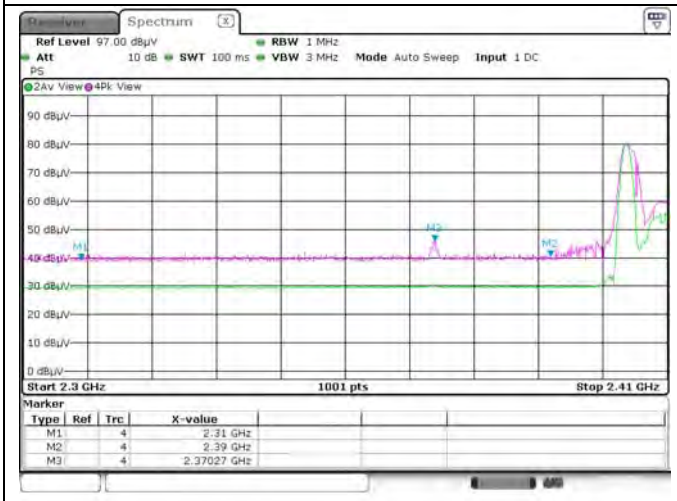
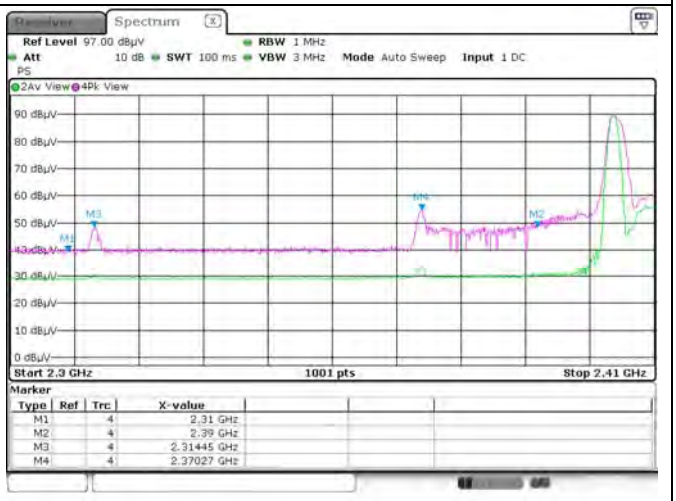
A.3 Restricted Band

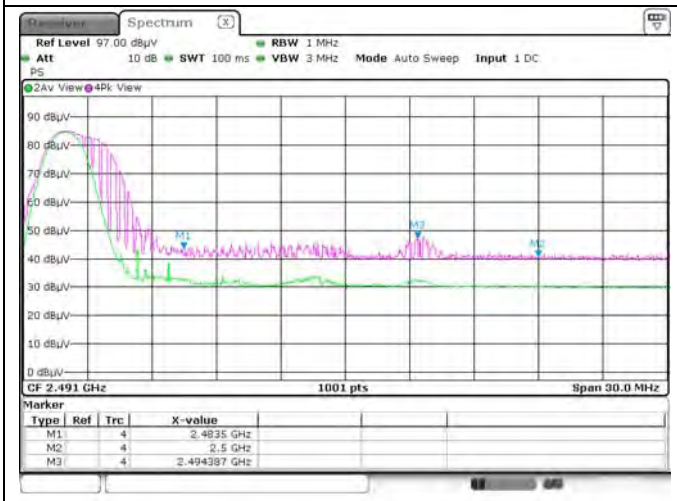
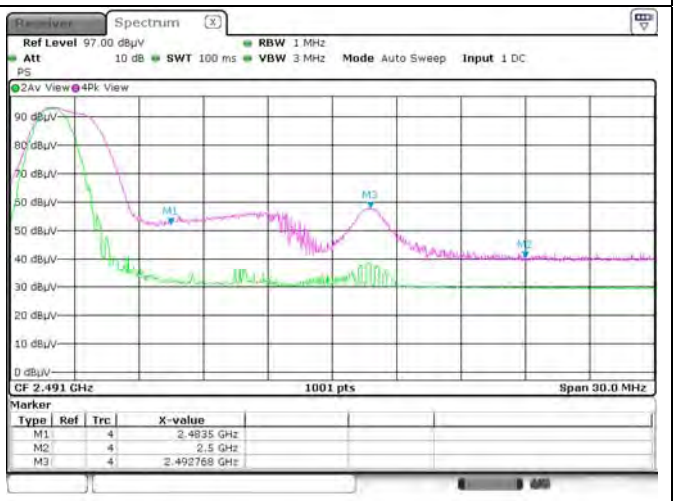
2403 MHz (Low) 1/4λ Monopole antenna (chip antenna)	
Restricted Band (2310-2390 MHz)	
Horizontal	**Vertical**
	

2478 MHz (High) 1/4λ Monopole antenna (chip antenna)	
Restricted Band (2483.5-2500 MHz)	
Horizontal	**Vertical**
	

2403 MHz (Low) 1/2λ Dipole PIFA (Coaxial connector)	
Restricted Band (2310-2390 MHz)	
Horizontal	**Vertical**
	

2478 MHz (High) 1/2λ Dipole PIFA (Coaxial connector)	
Restricted Band (2483.5-2500 MHz)	
Horizontal	**Vertical**
	

2403 MHz (Low) 1/2λ Dipole antenna (Coaxial connector)	
Restricted Band (2310-2390 MHz)	
Horizontal	**Vertical**
	

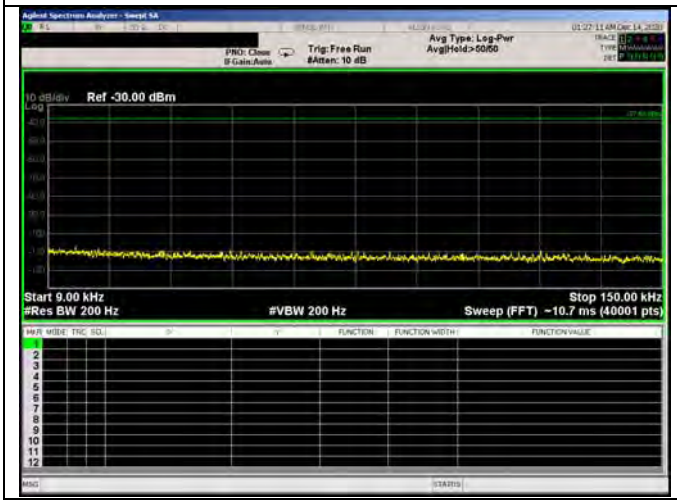
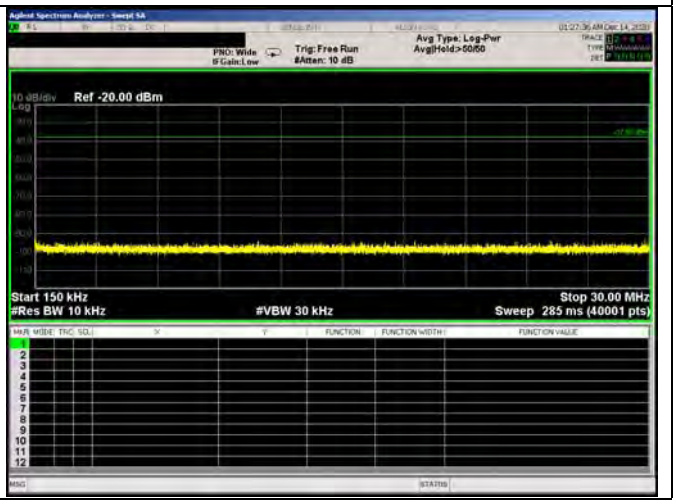
2478 MHz (High) 1/2λ Dipole antenna (Coaxial connector)	
Restricted Band (2483.5-2500 MHz)	
Horizontal	**Vertical**
	

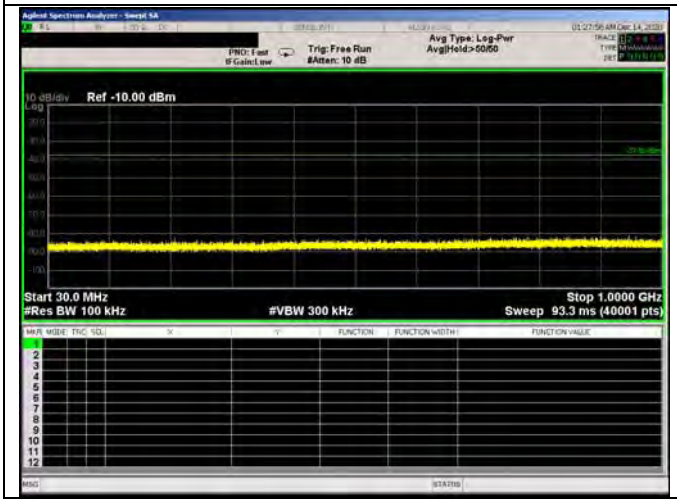
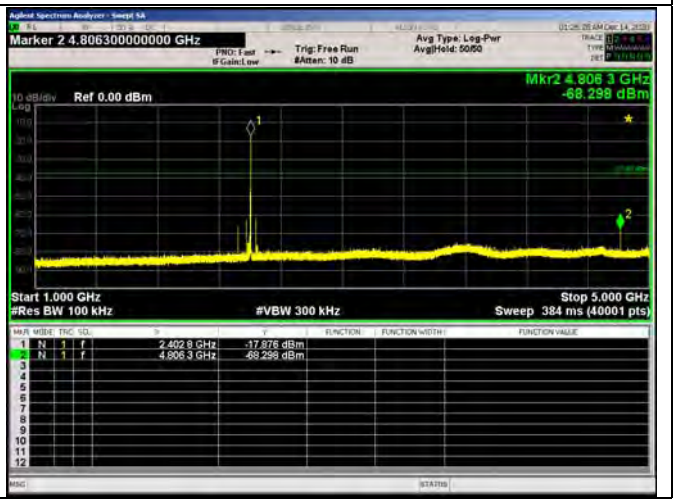
A.4 Band Edge of Authorized Frequency Band

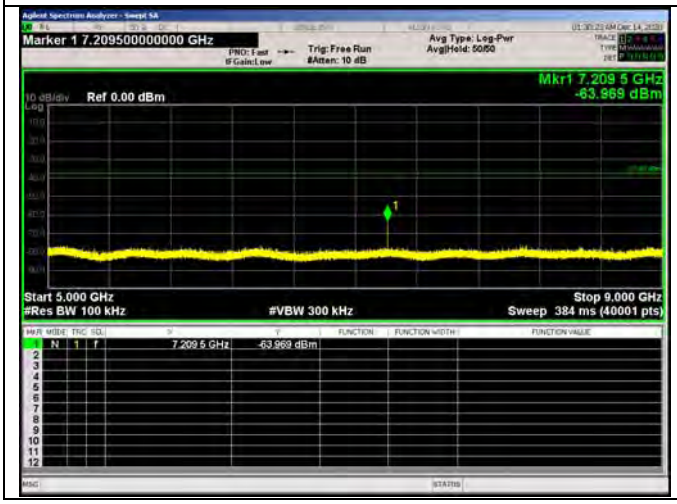
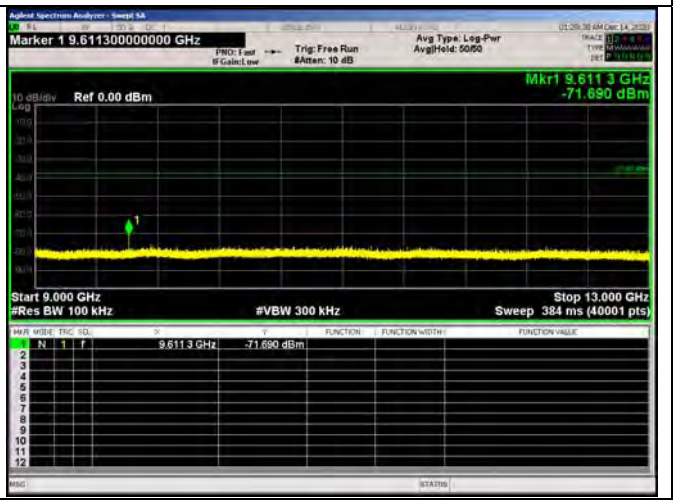
2400 MHz	**2483.5 MHz**
	

A.5 Spurious RF Conducted Emissions

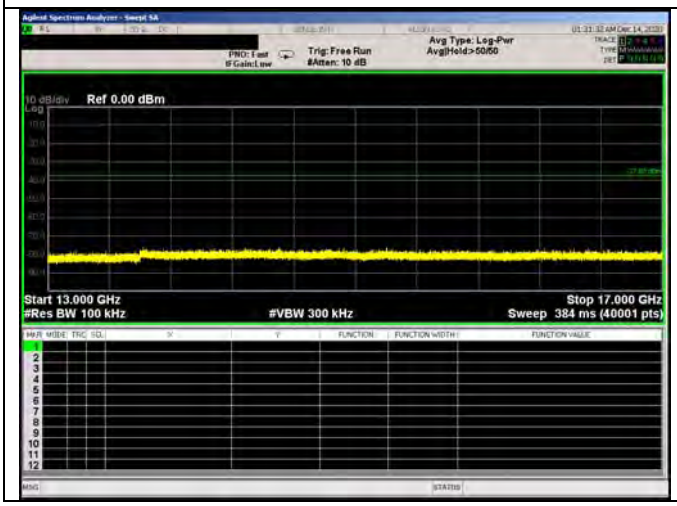
2403 MHz (Low)

0.009 – 0.15 MHz	0.15 – 30 MHz
	

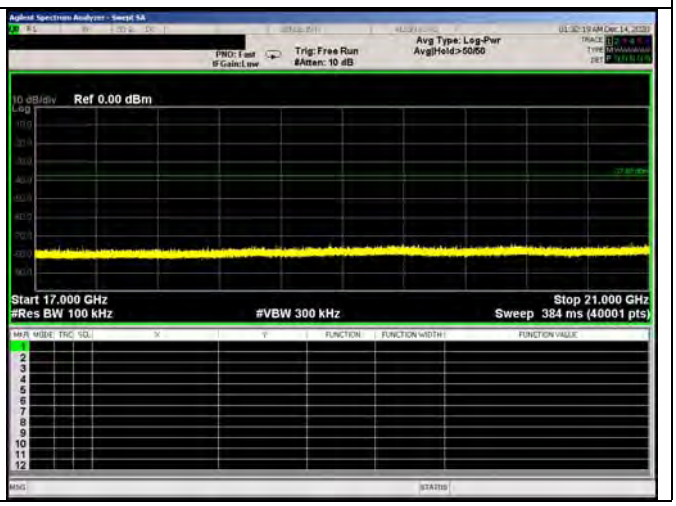
30 – 1000 MHz	1 - 5 GHz
	

5 – 9 GHz	9 – 13 GHz
	

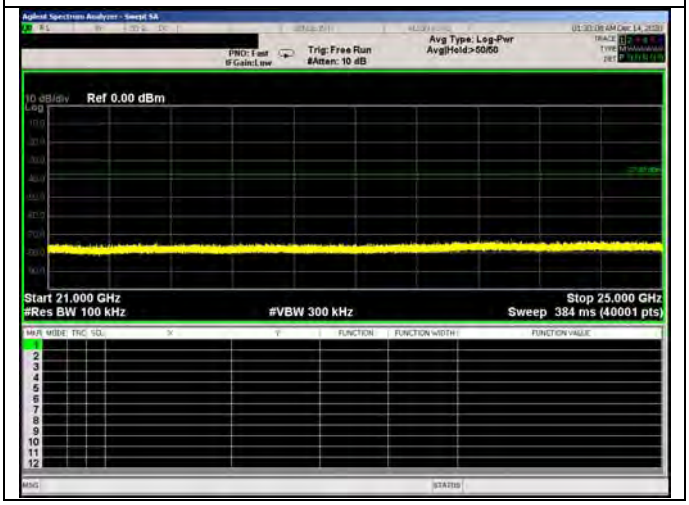
13 – 17 GHz



17 – 21 GHz

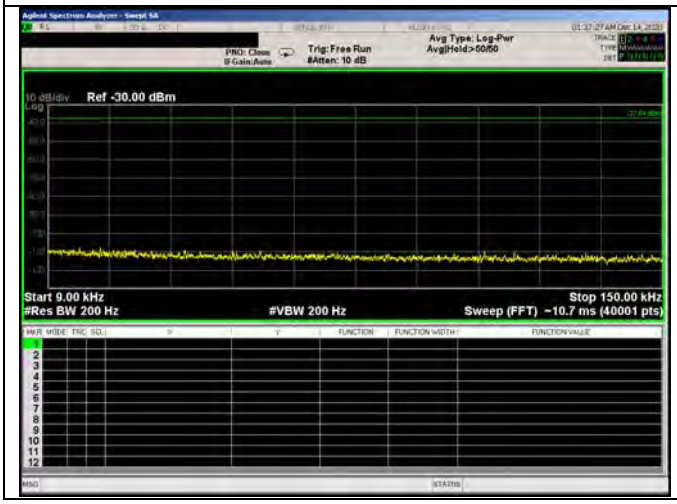


21 – 25 GHz

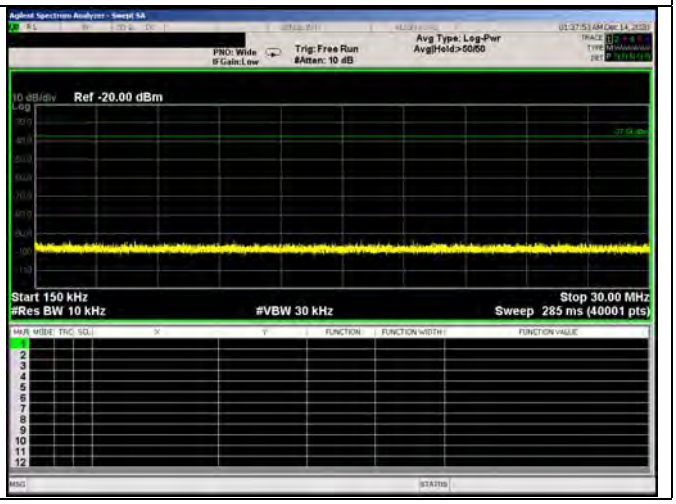


2441 MHz (Middle)

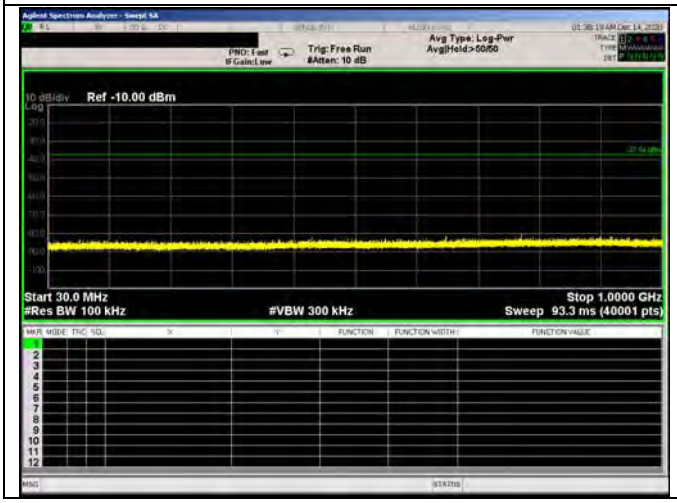
0.009 – 0.15 MHz



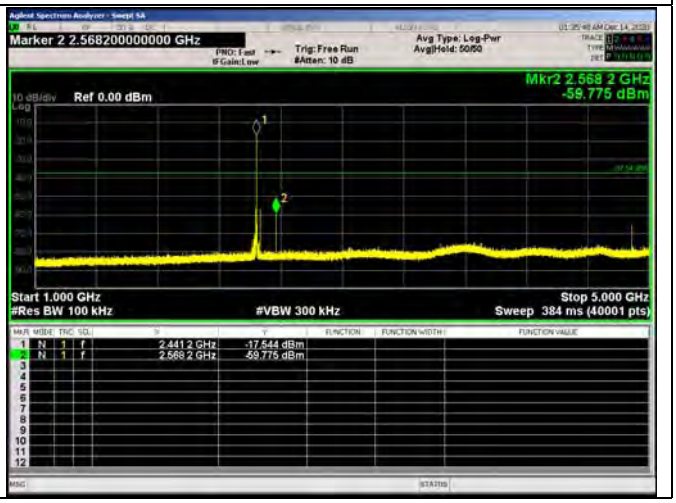
0.15 – 30 MHz



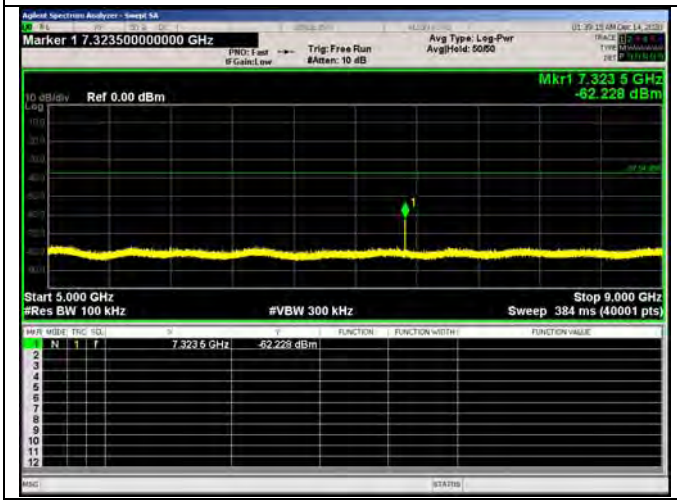
30 – 1000 MHz



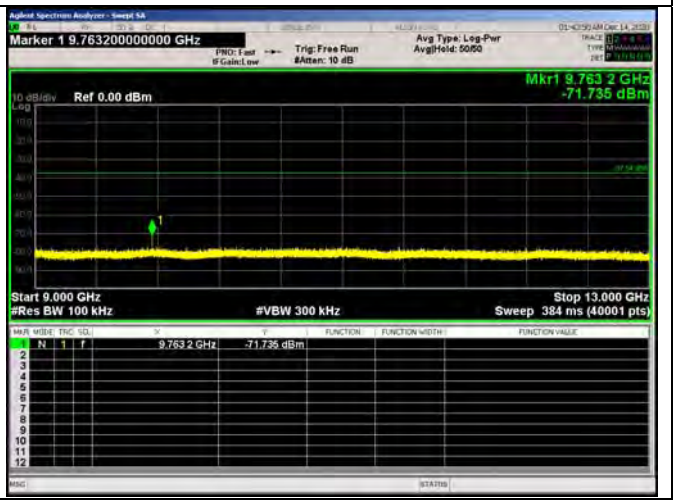
1 - 5 GHz



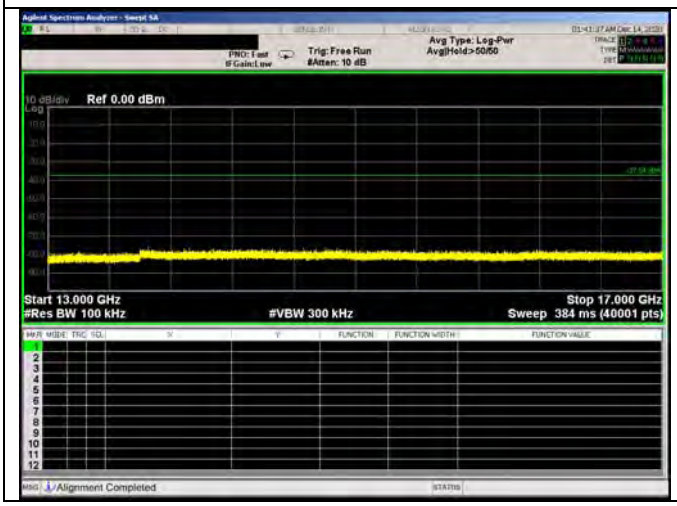
5 – 9 GHz



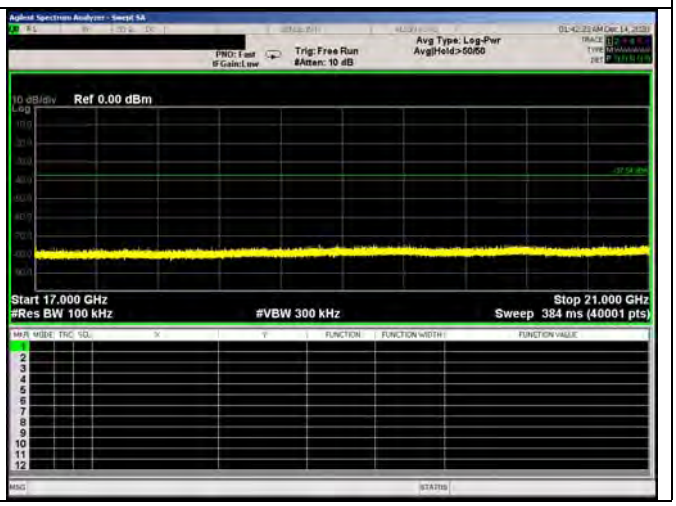
9 – 13 GHz



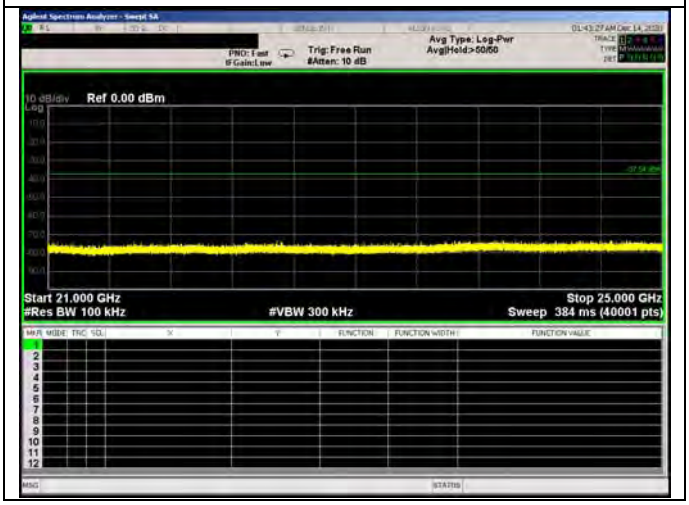
13 – 17 GHz



17 – 21 GHz

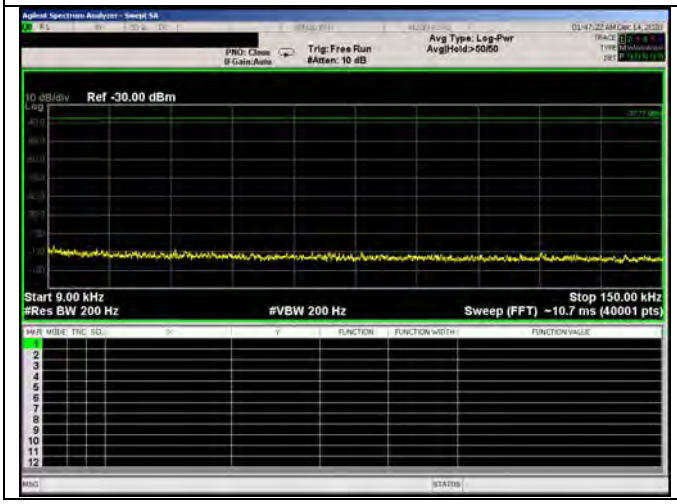


21 – 25 GHz

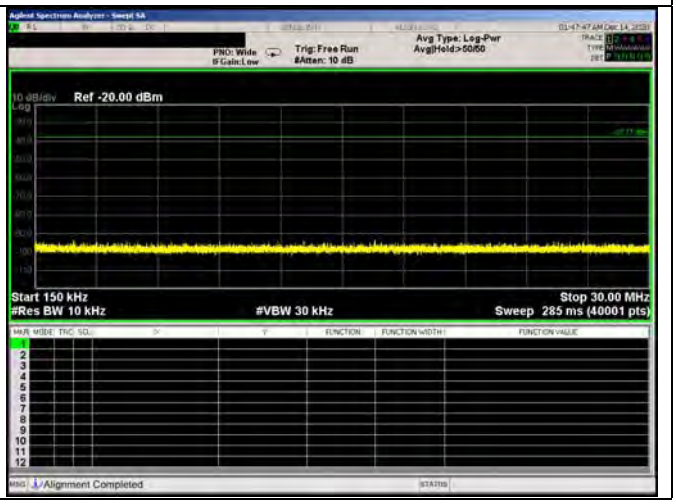


2478 MHz (High)

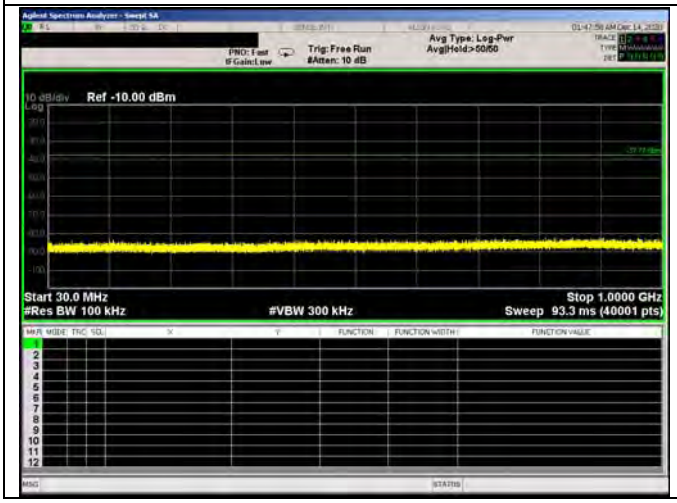
0.009 – 0.15 MHz



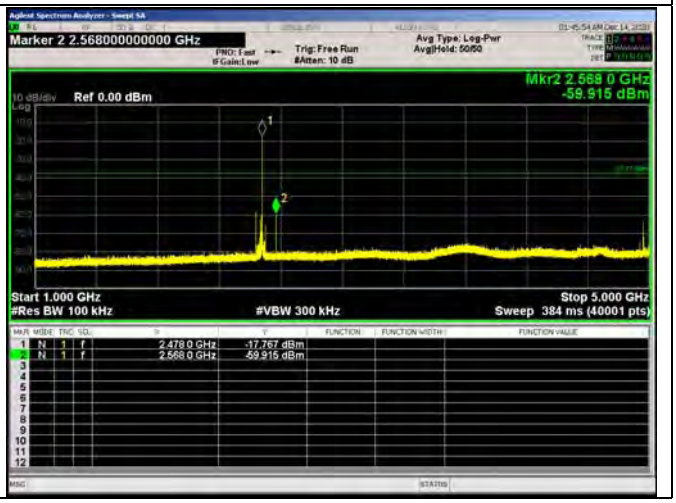
0.15 – 30 MHz



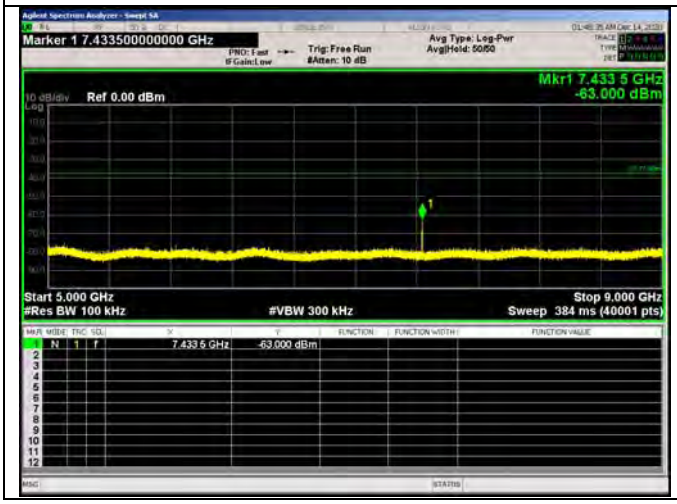
30 – 1000 MHz



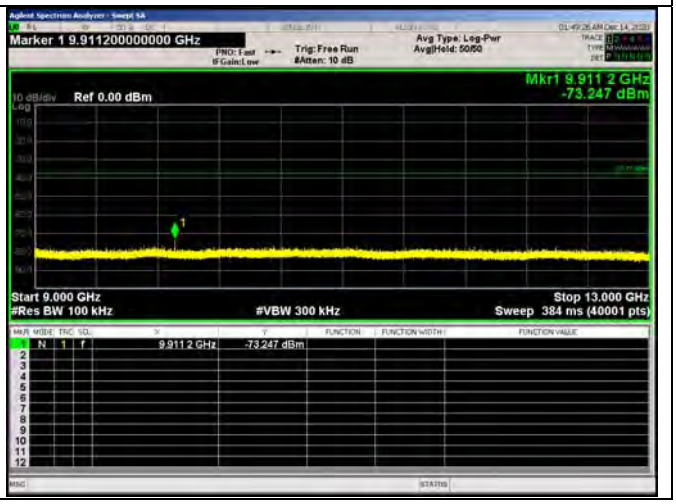
1 - 5 GHz

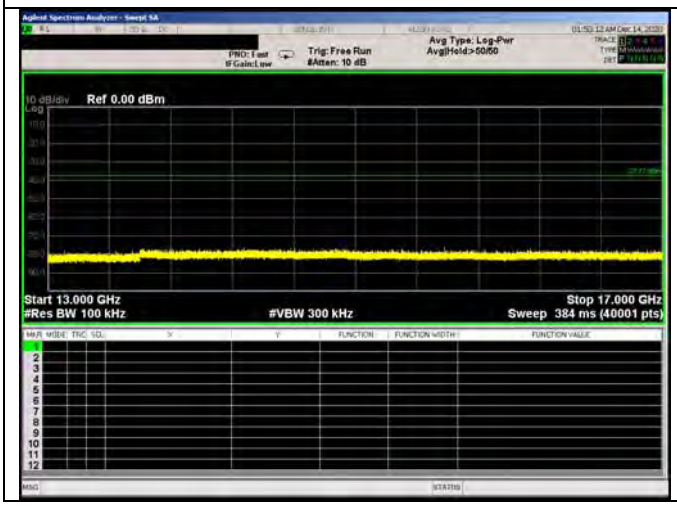
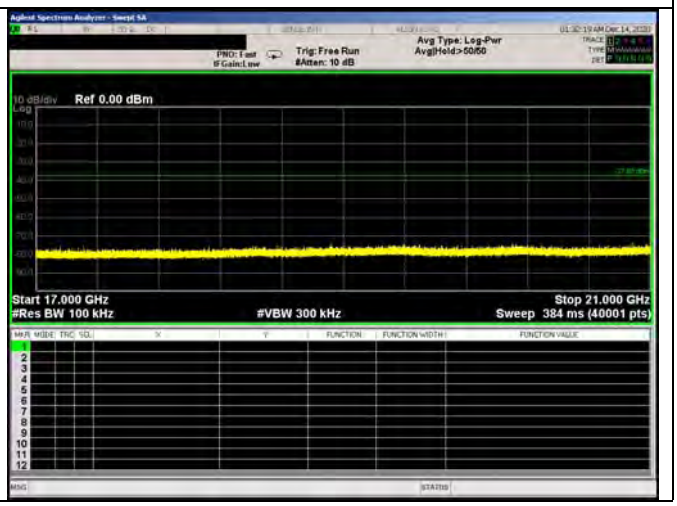


5 – 9 GHz



9 – 13 GHz



13 – 17 GHz	17 – 25 GHz
	

21 – 25 GHz