

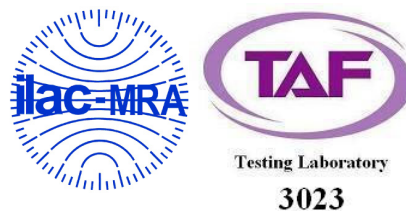
FCC Test Report

(Class II Permissive Change)

Product Name	DIGITAL CAMERA
Model No	R04010
FCC ID.	BBP-R04010

Applicant	Ricoh Company Ltd
Address	2-7-1 Izumi Ebina Kanagawa, 243-0460 Japan.

Date of Receipt	Jun. 27, 2022
Issue Date	Jul. 12, 2022
Report No.	2260825R-RFNAOTHV02-A
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Report

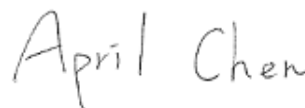
Issue Date: Jul. 12, 2022

Report No.: 2260825R-RFNAOTHV02-A



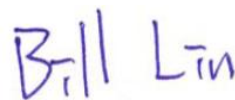
Product Name	DIGITAL CAMERA
Applicant	Ricoh Company Ltd
Address	2-7-1 Izumi Ebina Kanagawa, 243-0460 Japan.
Manufacturer	Ricoh Company, Ltd.
Model No.	R04010
FCC ID.	BBP-R04010
EUT Rated Voltage	DC 5V by USB or DC 3.6V by Battery
EUT Test Voltage	DC 5V by USB
Trade Name	RICOH
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By :



(Senior Project Specialist / April Chen)

Tested By :



(Senior Engineer / Bill Lin)

Approved By :



(Senior Engineer / Alan Chen)

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Revision History

Report No.	Version	Description	Issued Date
2260825R-RFNAOTHV02-A	V1.0	Initial issue of report.	Jul. 12, 2022

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	DIGITAL CAMERA
Trade Name	RICOH
Model No.	R04010
FCC ID.	BBP-R04010
Frequency Range	2412-2462MHz for 802.11b/g/n-20BW
Number of Channels	802.11b/g/n-20MHz
Data Speed	802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: 14.4-144.4Mbps
Channel separation	802.11b/g/n: 5 MHz
Type of Modulation	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type	PIFA Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto
USB Cable	Trade Name: YiChenXing, M/N: YCX-A0020184A, Shielded, 0.40m
Serial No.	A0M63P000070
FW version	0.89

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	LYNwave	ALX20M-222AAA-00(Main) ALX20M-222AAA-01(Aux)	PIFA Antenna	1.4 dBi for 2.4 GHz

Note: The antenna of EUT is conforming to FCC 15.203.

802.11b/g/n-20MHz Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2412 MHz	Channel 02:	2417 MHz	Channel 03:	2422 MHz	Channel 04:	2427 MHz
Channel 05:	2432 MHz	Channel 06:	2437 MHz	Channel 07:	2442 MHz	Channel 08:	2447 MHz
Channel 09:	2452 MHz	Channel 10:	2457 MHz	Channel 11:	2462 MHz		

Note:

1. The EUT is an DIGITAL CAMERA with a built-in WLAN and Bluetooth transceiver, this report for 2.4GHz WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
5. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g/n transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.
6. This is to request a Class II permissive change for FCC ID: BBP-R04010, originally granted on 12/20/2021.

The major change filed under this application is:

Change #1: Addition SISO A/ SISO B output power in test report, SISO A/ SISO B output power is the same than the original application. In addition, only the worst case of power density, band edge and spurious emissions is evaluated and displayed in the test report.

Test Mode:	Mode 1: Transmit (802.11b 1Mbps)
	Mode 2: Transmit (802.11g 6Mbps)
	Mode 3: Transmit (802.11n MCS8 14.4Mbps 20M-BW)

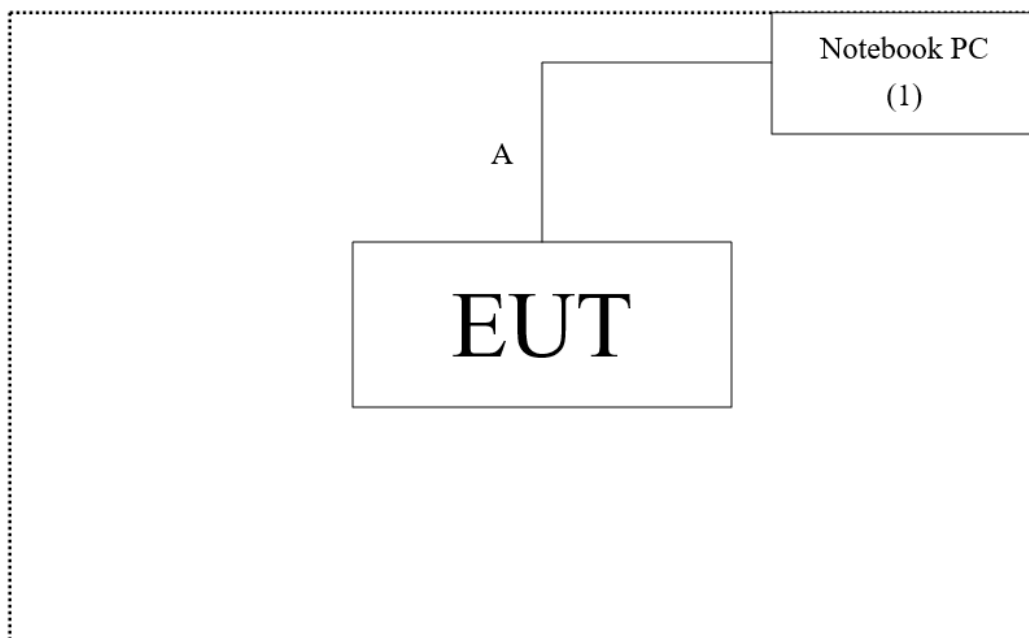
1.2. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Lenovo	TP00067C	PF-0EW0C3	Lenovo	N/A

	Signal Cable Type	Signal cable Description
A	USB Cable	Shielded, 0.4m

1.3. Configuration of Tested System



1.4. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Execute software "Qualcomm ® Radio Control Toolkit Version 4.0.00172.0" on the Notebook PC.
3. Configure the test mode, the test channel, and the data rate.
4. Press "OK" to start the continuous Transmit.
5. Verify that the EUT works properly.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Radiated Emission	Temperature (°C)	10~40 °C	23.4 °C
	Humidity (%RH)	10~90 %	52.2 %
Conductive	Temperature (°C)	10~40 °C	25.2 °C
	Humidity (%RH)	10~90 %	49.0 %

USA : FCC Registration Number: TW0033

Canada : CAB Identifier Number: TW3023 / Company Number: 26930

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No. 5-22, Ruishukeng Linkou District, New Taipei City,
24451, Taiwan

Performed Location : No. 26, Huaya 1st Rd., Guishan Dist., Taoyuan City
333411, Taiwan, R.O.C.

Phone number : +886-3-275-7255
Fax number : +866-3-327-8031
Email address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

1.6. List of Test Item and Equipment

For Conducted measurements /HY-SR02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
X	Spectrum Analyzer	R&S	FSV40	101149	2022/03/25	2023/03/24
X	Power Meter	Anritsu	ML2496A	1548003	2021.12.20	2022/12/19
X	Power Sensor	Anritsu	MA2411B	1531024	2021.12.20	2022/12/19
X	Power Sensor	Anritsu	MA2411B	1531025	2021.12.20	2022/12/19

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : RF Conducted Test Tools R3 V3.0.1.19.

For Radiated measurements /HY-CB03

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
	Loop Antenna	AMETEK	HLA6121	49611	2022/03/18	2023/03/17
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2021/08/11	2022/08/10
X	Horn Antenna	ETS-Lindgren	3117	00227700	2021/10/12	2022/10/11
X	Horn Antenna	Com-Power	AH-840	101100	2021/10/04	2022/10/03
X	Pre-Amplifier	SGH	0301	20211007-10	2022/02/22	2023/02/21
X	Pre-Amplifier	SGH	PRAMP118	20200202	2022/03/23	2023/03/22
X	Pre-Amplifier	EMCI	EMC05820SE	980309	2021/09/27	2022/09/26
	Pre-Amplifier	EMCI	EMC184045SE	980369		
X	Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314	2022/05/12	2023/05/11
	Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242		
X	Filter	MICRO TRONICS	BRM50702	G251	2021/09/16	2022/09/15
	Filter	MICRO TRONICS	BRM50716	G188	2021/09/16	2022/09/15
X	EMI Test Receiver	R&S	ESR	102793	2021/12/15	2022/12/14
X	Spectrum Analyzer	R&S	FSV3044	101114	2022/02/11	2023/02/10
	Coaxial Cable	SGH	SGH18	2021005-3		
X	Coaxial Cable	SGH	SGH18	202108-4	2022/3/18	2023/03/17
	Coaxial Cable	SGH	SGH18	202110223-1		
	Coaxial Cable	SGH	HA800	GD20110222-3		

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : E3 210616 dekra V9.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty	
Peak Power Output	±0.91 dB	
Radiated Emission	Under 1GHz ±4.06 dB	Above 1GHz ±3.73 dB
Band Edge	Under 1GHz ±4.06 dB	Above 1GHz ±3.73 dB
Power Density	±2.53 dB	
Duty Cycle	±2.31 ms	

2. Peak Power Output

2.1. Test Setup



2.2. Limits

The maximum peak power shall be less 1 Watt.

2.3. Test Procedure

The EUT was tested according to C63.10:2013 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using C63.10:2013 Section 11.9.1.3 PKPM1 Peak power meter method. The maximum average conducted output power using C63.10:2013 Section 11.9.2.3 Measurement using a power meter (PM). (Measurement using a gated RF average-reading power meter).

2.4. Test Result of Peak Power Output

Product : DIGITAL CAMERA
 Test Item : Peak Power Output Data
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) -SISOA
 Test Date : 2022/07/01

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)				Peak Power	Required Limit	Result
		1	2	5.5	11			
		Measurement Level (dBm)						
01	2412	11.04	--	--	--	13.38	<30dBm	Pass
06	2437	11.06	--	--	--	13.21	<30dBm	Pass
11	2462	11.1	--	--	--	13.22	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

Product : DIGITAL CAMERA
 Test Item : Peak Power Output Data
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) -SISOA
 Test Date : 2022/07/01

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		6	9	12	18	24	36	48	54	6		
		Measurement Level (dBm)										
01	2412	11	--	--	--	--	--	--	--	16.91	<30dBm	Pass
06	2437	10.96	--	--	--	--	--	--	--	17.03	<30dBm	Pass
11	2462	10.98	--	--	--	--	--	--	--	16.78	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

Product : DIGITAL CAMERA
 Test Item : Peak Power Output Data
 Test Mode : Mode 3: Transmit (802.11n MCS8 14.4Mbps 20M-BW) -SISOA
 Test Date : 2022/07/01

Channel No	Frequency (MHz)	Average Power								Peak Power	Required Limit	Result
		For different Data Rate (Mbps)										
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	14.4		
Measurement Level (dBm)												
01	2412	10.96	--	--	--	--	--	--	--	16.95	<30dBm	Pass
06	2437	11.02	--	--	--	--	--	--	--	16.61	<30dBm	Pass
11	2462	10.94	--	--	--	--	--	--	--	17.17	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

Product : DIGITAL CAMERA
 Test Item : Peak Power Output Data
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) -SISOB
 Test Date : 2022/07/01

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)				Peak Power	Required Limit	Result
		1	2	5.5	11			
		Measurement Level (dBm)						
01	2412	10.72	--	--	--	12.97	<30dBm	Pass
06	2437	10.88	--	--	--	13.07	<30dBm	Pass
11	2462	10.93	--	--	--	13.12	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

Product : DIGITAL CAMERA
 Test Item : Peak Power Output Data
 Test Mode : Mode 2: Transmit (802.11g 6Mbps) -SISOB
 Test Date : 2022/07/01

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		6	9	12	18	24	36	48	54	6		
		Measurement Level (dBm)										
01	2412	10.8	--	--	--	--	--	--	--	16.76	<30dBm	Pass
06	2437	10.84	--	--	--	--	--	--	--	16.85	<30dBm	Pass
11	2462	10.85	--	--	--	--	--	--	--	16.74	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

Product : DIGITAL CAMERA
 Test Item : Peak Power Output Data
 Test Mode : Mode 3: Transmit (802.11n MCS8 14.4Mbps 20M-BW) -SISOB
 Test Date : 2022/07/01

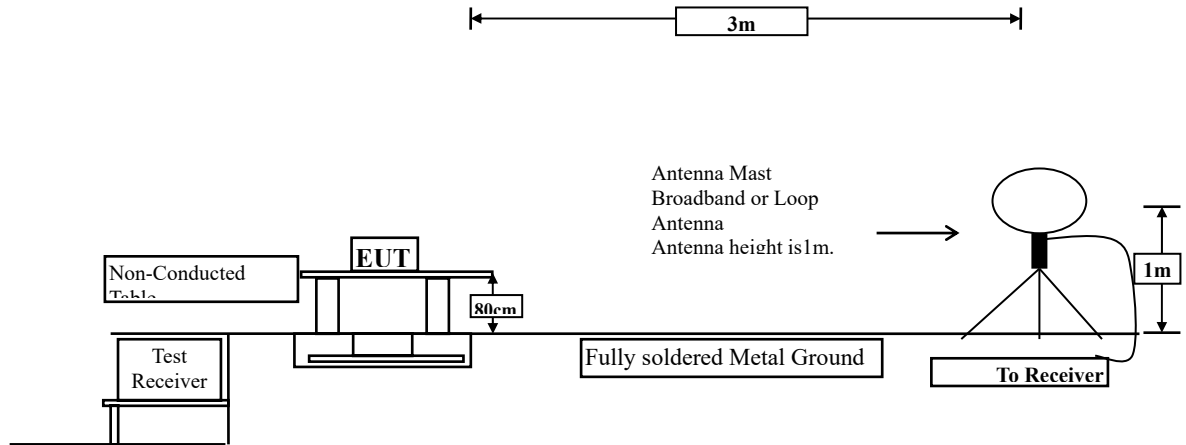
Channel No	Frequency (MHz)	Average Power								Peak Power	Required Limit	Result
		For different Data Rate (Mbps)										
		14.4	28.9	43.3	57.8	86.7	115.6	130	144.4	14.4		
Measurement Level (dBm)												
01	2412	10.69	--	--	--	--	--	--	--	16.92	<30dBm	Pass
06	2437	10.77	--	--	--	--	--	--	--	16.68	<30dBm	Pass
11	2462	10.78	--	--	--	--	--	--	--	16.75	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

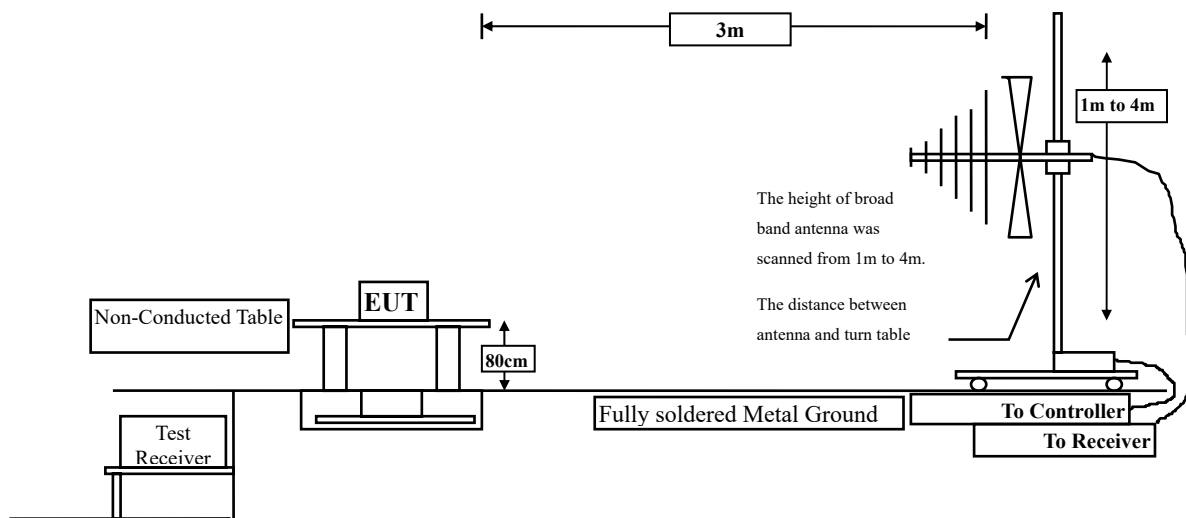
3. Radiated Emission

3.1. Test Setup

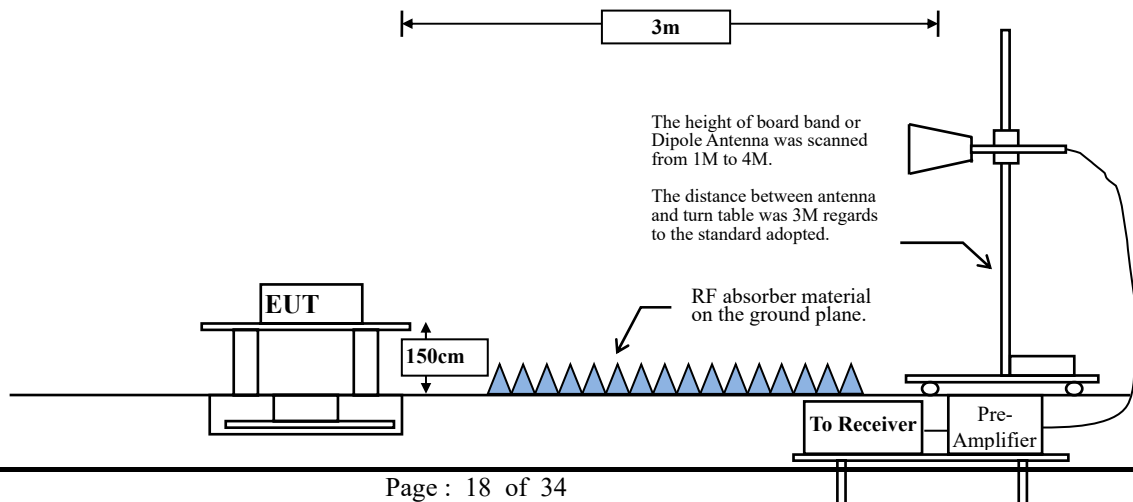
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



3.2. Limits

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

- Remarks:
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to C63.10:2013 Section 11.12.1 for compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure.

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to C63.10 Section 11.12.2.5 Average measurement procedure.

RBW = 1MHz.

VBW = 10Hz, when duty cycle $\geq 98 \%$

$VBW \geq 1/T$, when duty cycle $< 98 \%$

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

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2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11 n20	96.93	1.8920	529	1000

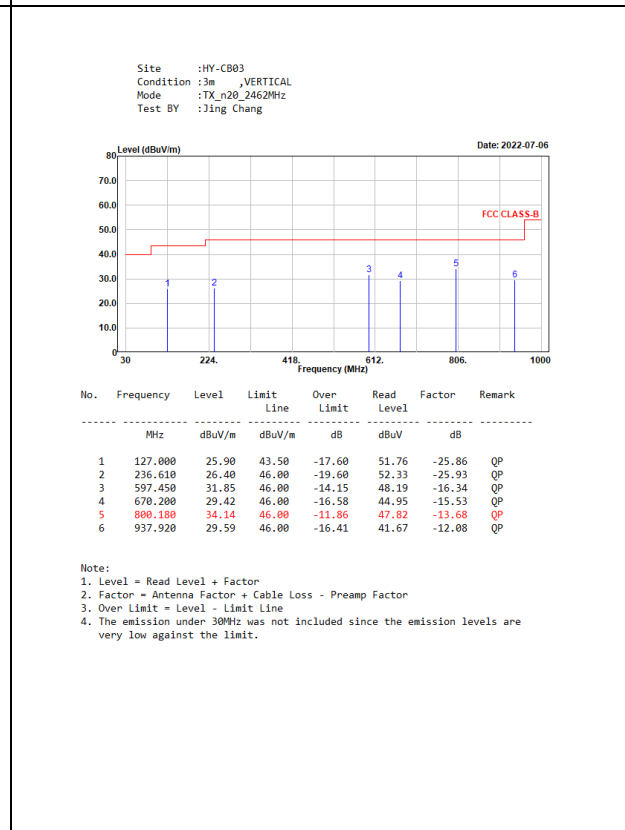
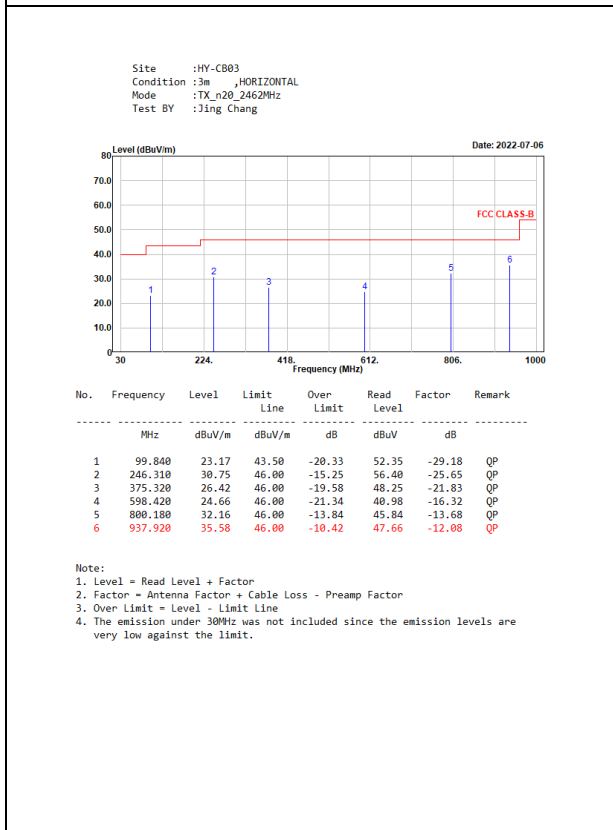
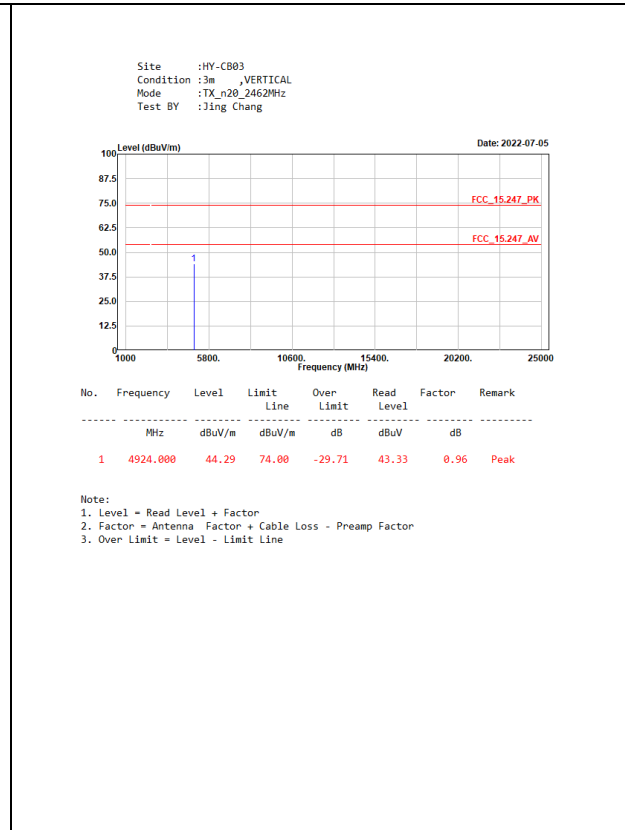
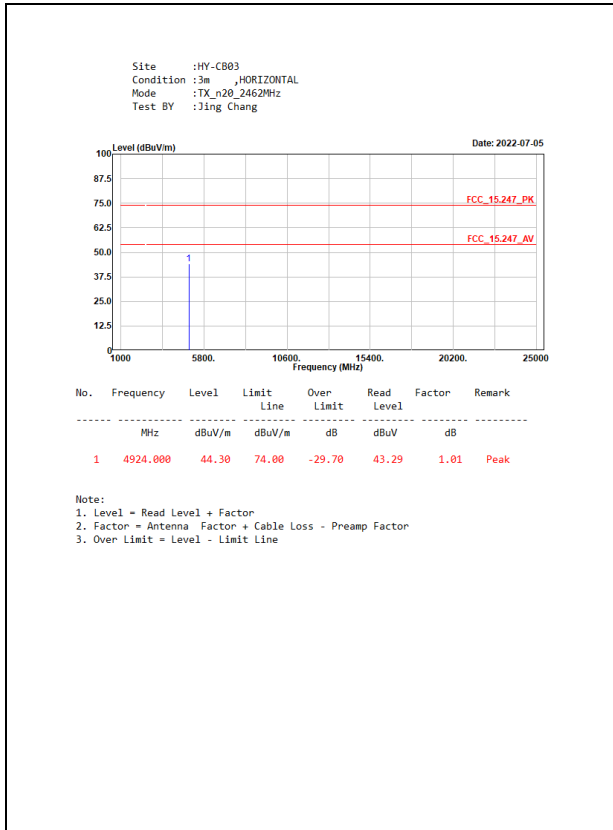
SISOB

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11 n20	95.91	1.8760	533	1000

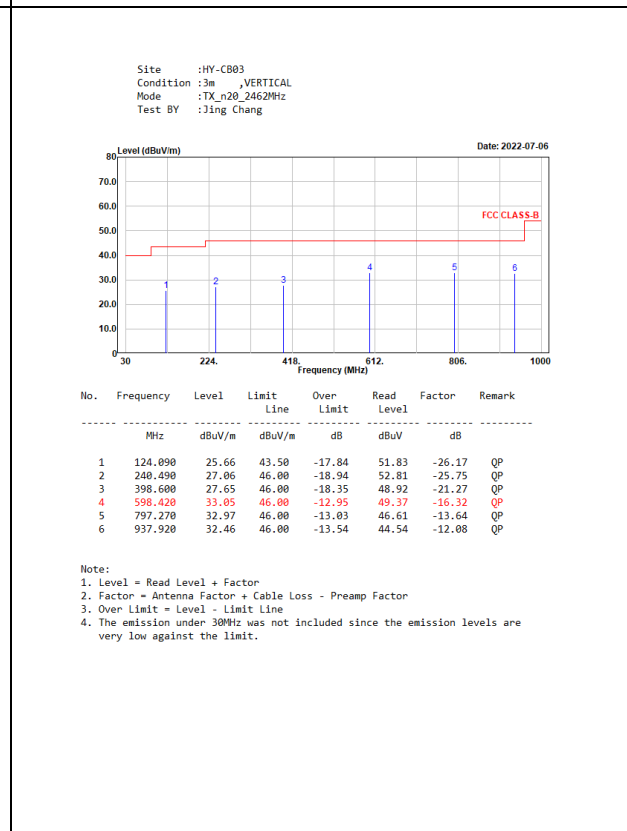
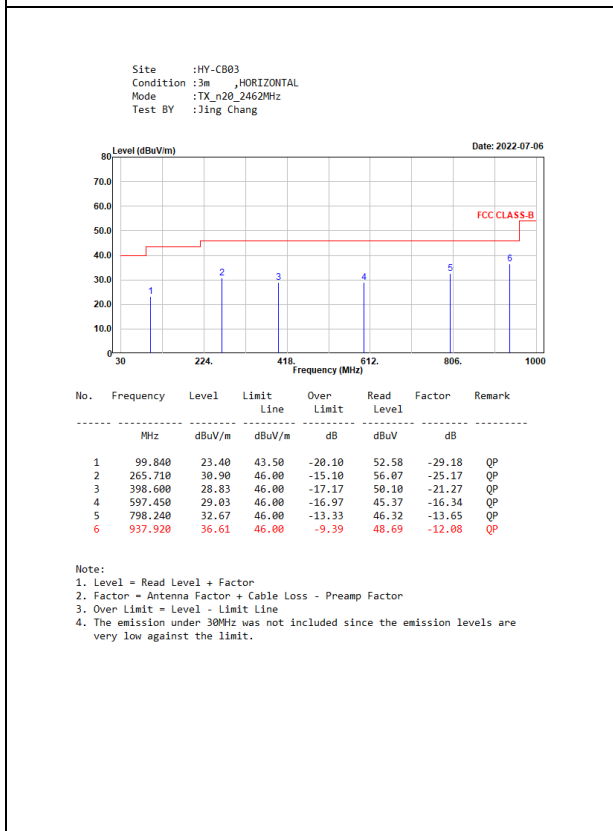
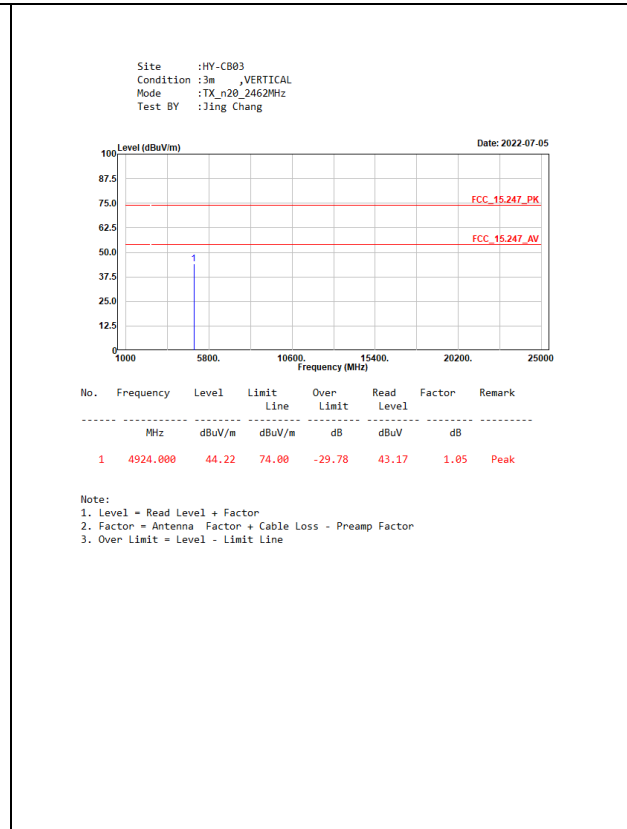
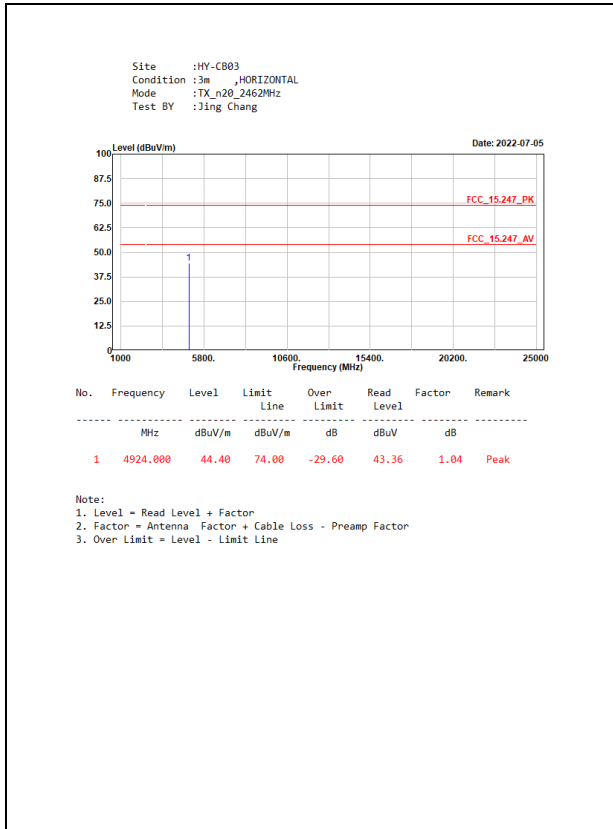
Note: Duty Cycle Refer to Section 9

3.4. Test Result of Radiated Emission

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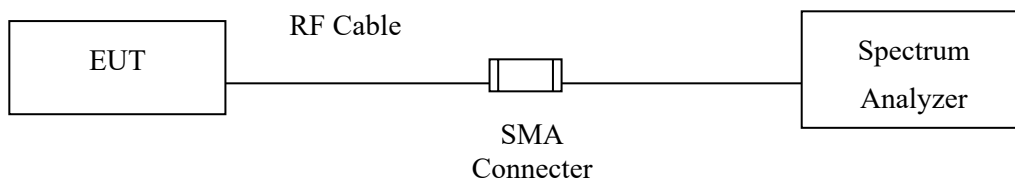
SISOB



4. Band Edge

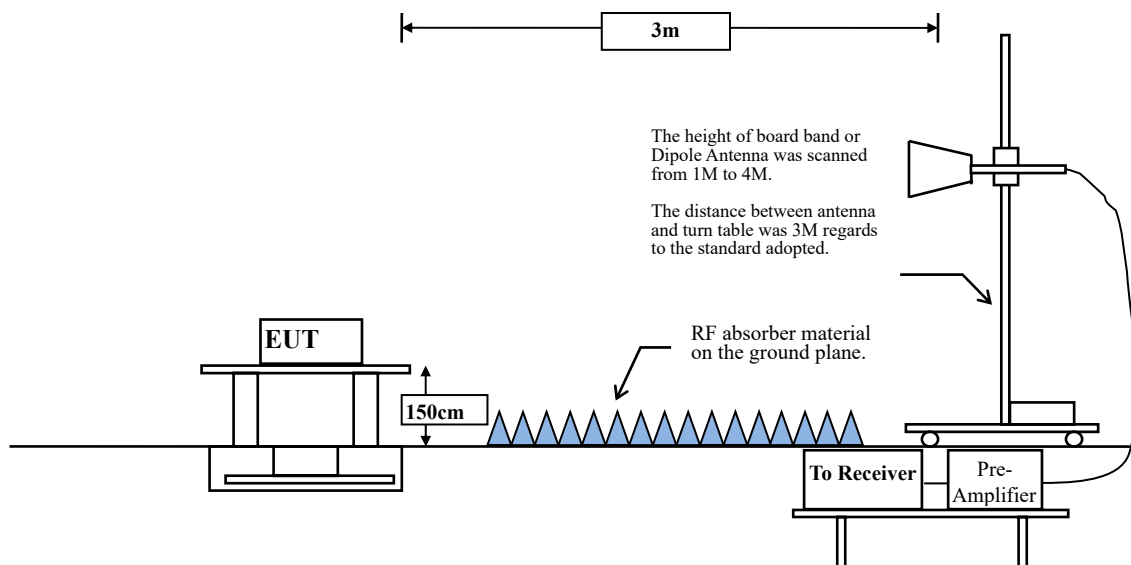
4.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:

Above 1GHz



4.2. Limits

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

4.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to C63.10:2013 Section 11.12.1 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure.

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to C63.10 Section 11.12.2.5 Average measurement procedure.

RBW = 1MHz.

VBW = 10Hz, when duty cycle $\geq 98\%$

$VBW \geq 1/T$, when duty cycle $< 98\%$

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

SISOA

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11 n20	96.93	1.8920	529	1000

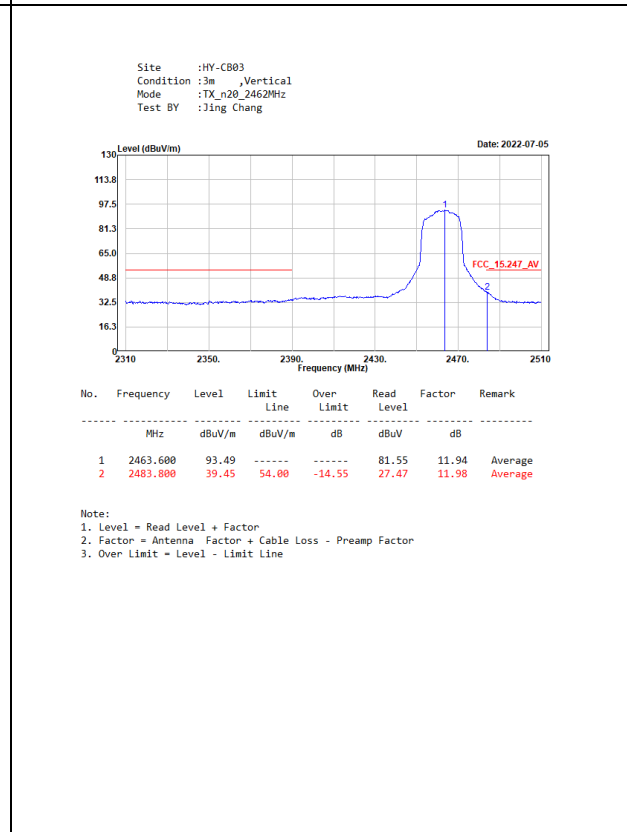
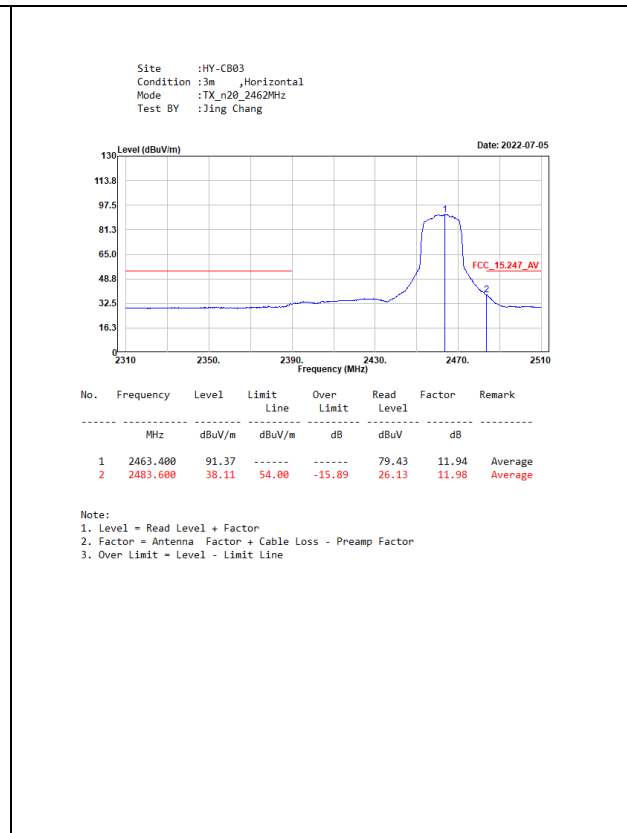
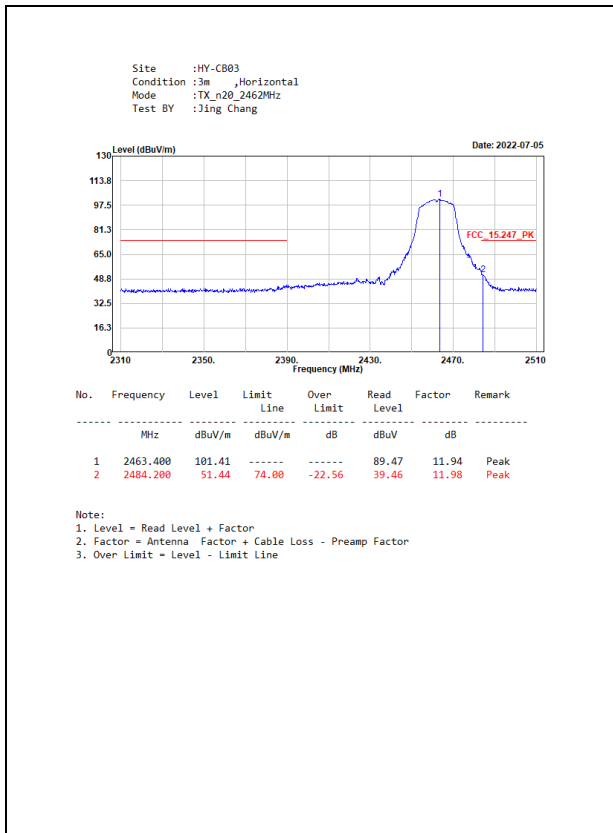
SISOB

2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11 n20	95.91	1.8760	533	1000

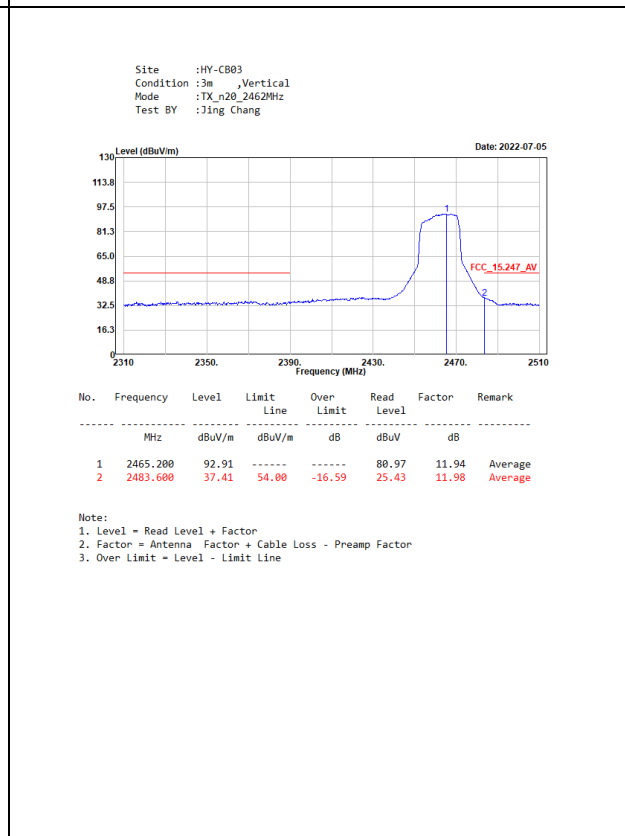
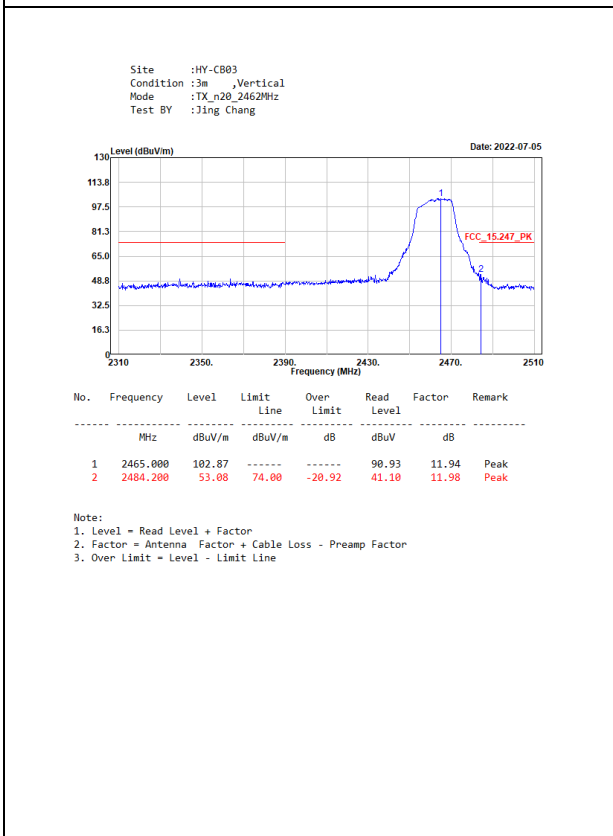
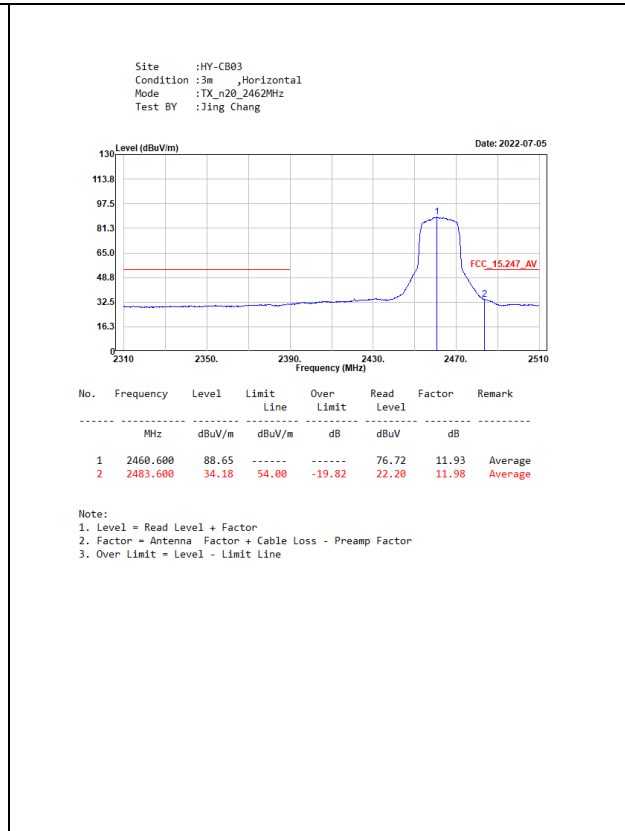
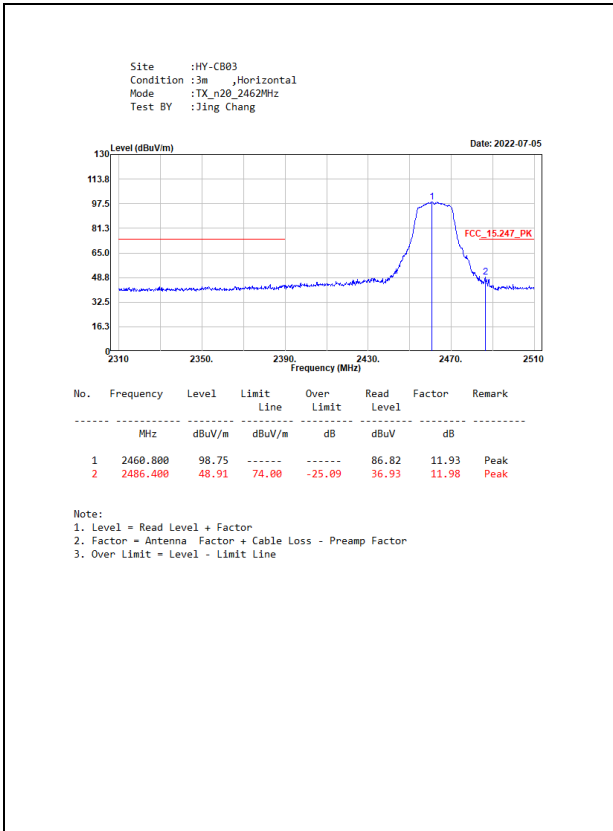
Note: Duty Cycle Refer to Section 9

4.4. Test Result of Band Edge

SISOA

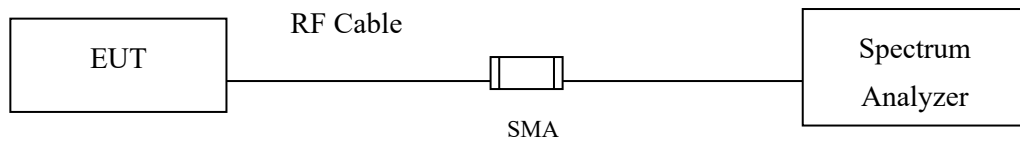


SISOB



5. Power Density

5.1. Test Setup



5.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

5.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The maximum power spectral density using C63.10 Section 11.10.2 Method PKPSD (peak PSD)

5.4. Uncertainty

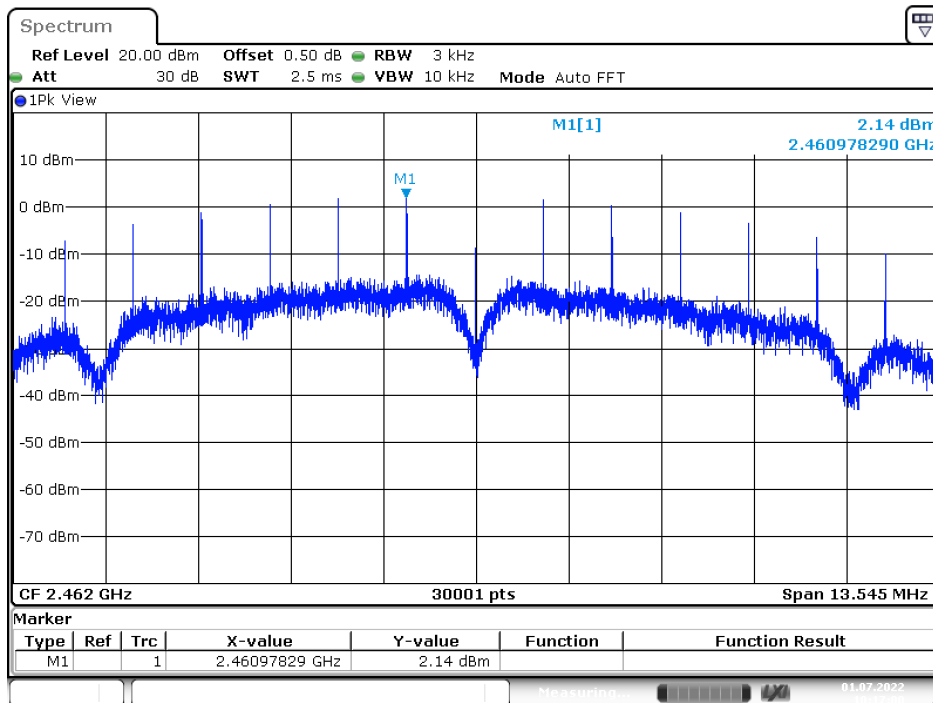
± 1.23 dB

5.5. Test Result of Power Density

Product : DIGITAL CAMERA
 Test Item : Power Density Data
 Test Mode : Mode 1: Transmit (802.11b 1Mbps) -SISOA

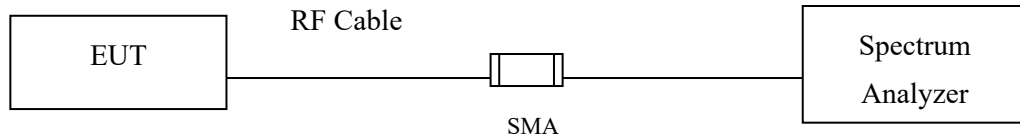
Channel No.	Frequency (MHz)	Data Rate (Mbps)	PPSD/MHz (dBm)	Limit (dBm)	Result
11	2462	1	2.140	≤ 8dBm	Pass

Figure Channel 11:



6. Duty Cycle

6.1. Test Setup



6.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to ANSI C63.10 2013 for compliance to FCC 47CFR 15.247 requirements.

6.3. Test Result of Duty Cycle

Product : DIGITAL CAMERA
 Test Item : Duty Cycle
 Test Mode : Transmit - SISOA

Duty Cycle Formula:

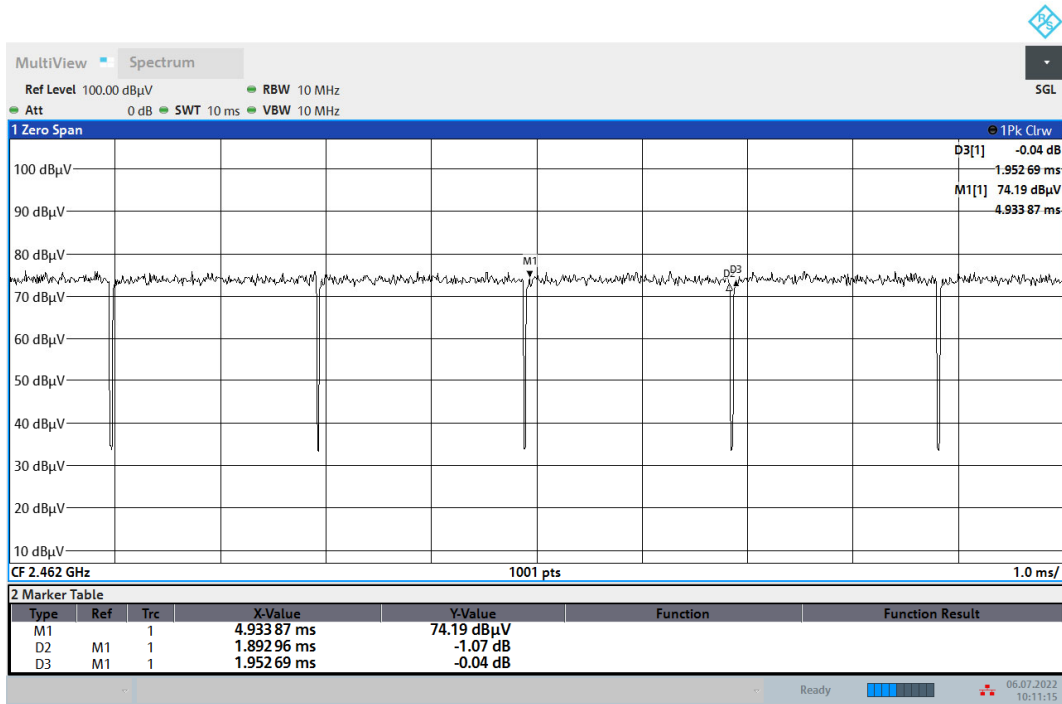
$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

$$\text{Duty Factor} = 10 \text{ Log} (1/\text{Duty Cycle})$$

Results:

2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11n20	1.8920	1.9520	96.93	0.14

802.11n20



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Product : DIGITAL CAMERA
 Test Item : Duty Cycle
 Test Mode : Transmit - SISOB

Duty Cycle Formula:

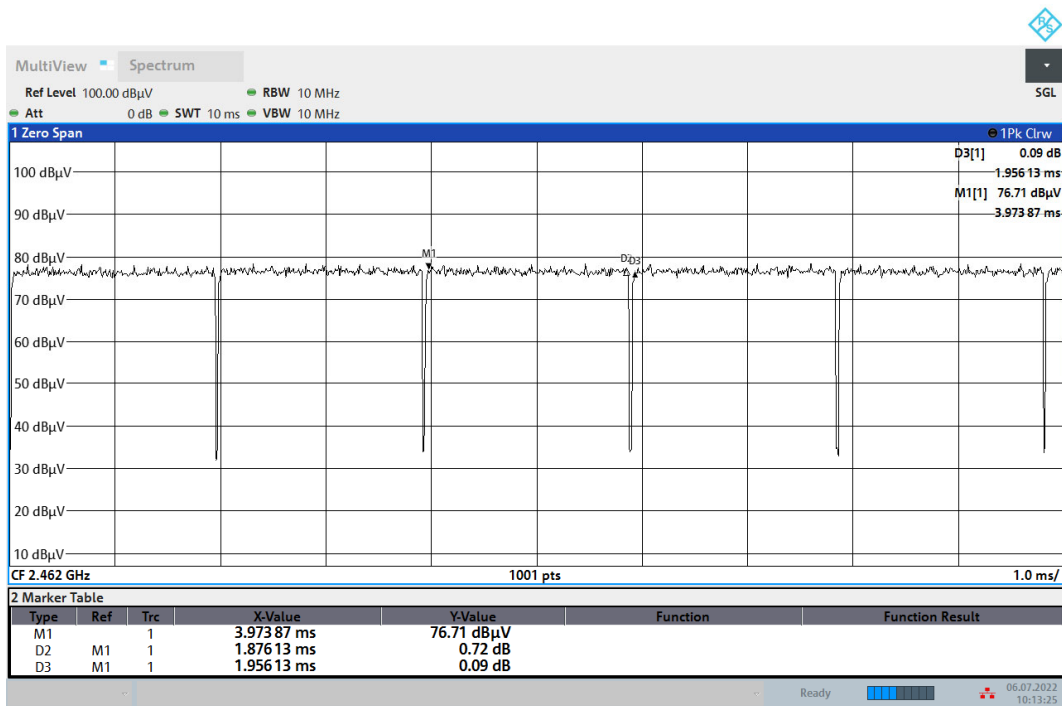
$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

$$\text{Duty Factor} = 10 \text{ Log} (1/\text{Duty Cycle})$$

Results:

2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11n20	1.8760	1.9560	95.91	0.18

802.11n20



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7. **EMI Reduction Method During Compliance Testing**

No modification was made during testing.