



# FCC RADIO TEST REPORT

FCC ID : PY7-58237R  
Equipment : GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, NFC, FM receiver and GNSS  
Brand Name : SONY  
Applicant : Sony Corporation  
1-7-1 Konan Minato-ku Tokyo, 108-0076 Japan  
Manufacturer : Sony Corporation  
1-7-1 Konan Minato-ku Tokyo, 108-0076 Japan  
Standard : FCC Part 15 Subpart C §15.247  
Test Date(s) : Dec. 23, 2021 ~ Feb. 06, 2022

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

*Jason Jia*

Reviewed by: Jason Jia / Supervisor

*Alex Wang*

Approved by: Alex Wang / Manager



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People's Republic of China**



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### History of this test report

Report No.	Version	Description	Issued Date
FR1D0404C	01	Initial issue of report	Mar. 02, 2022
FR1D0404C	02	Updated test mode description in section 3.3 spot check table	Mar. 07, 2022



### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.247(a)(2)	6dB Bandwidth	-	See Note
-	2.1049	99% Occupied Bandwidth	-	See Note
4.1	15.247(b)	Power Output Measurement	Pass	-
-	15.247(e)	Power Spectral Density	-	See Note
-	15.247(d)	Conducted Band Edges	-	See Note
		Conducted Spurious Emission	-	See Note
4.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	Under limit 5.56 dB at 2389.950 MHz
-	15.207	AC Conducted Emission	-	See Note
4.3	15.203 & 15.247(b)	Antenna Requirement	Pass	-

**Note:** Refer to information of Section 3 Spot Check Evaluation.

<b>Declaration of Conformity:</b>
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
<b>Comments and Explanations:</b>
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.



# 1 General Description

## 1.1 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, DTS/UNII a/b/g/n/ac, NFC, FM Receiver, and GNSS.

Standards-related Product Specification	
Antenna Type / Gain	<Ant.6>: PIFA Antenna with gain 2.3 dBi <Ant.7>: PIFA Antenna with gain -2.6 dBi

**Remark:** The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

## 1.2 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.3 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH06-KS TH01-KS	CN1257	314309

## 1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ ANSI C63.10-2013

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

## 2 Test Configuration of Equipment Under Test

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (1GHz to the 10<sup>th</sup> harmonic). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape), and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and find X plane as worst plane. The worst case position of the EUT was investigated under two configurations: EUT with AC adapter and earphone, EUT with standalone. The EUT with standalone configuration was determined to be worst-case configurations; therefore, all final tests were performed on the EUT with standalone.

### 2.1 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11n HT20	MCS0

### 2.2 Connection Diagram of Test System



### 2.3 EUT Operation Test Setup

The RF test items, utility "FTM" was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.



### 3 Spot Check Evaluation

#### 3.1 Introduction Section

This application for certification is leveraging the data reuse procedures from KDB 484596 D01 based on reference FCC ID PY7-34943G/ PY7-81713C to cover variant model FCC ID PY7-58237R (this model). The major difference between the parent/reference model and the variant model are NFC chipset change and the difference bands supported on cellular circuits. All other circuitry and features are identical.

For details, please refer to Theory of operation Appendix B.

Sony Corporation takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

#### 3.2 Difference Section

Difference between PY7-34943G (lead) and PY7-58237R (this model):

Sony Corporation, hereby declares the differences between PY7-34943G (lead) and PY7-58237R (this model) are related only to the cellular part and NFC, other functions are not affected. Therefore the WLAN and Bluetooth report/data of PY7-34943G (lead) may represent for PY7-58237R (this model).

#### 3.3 Spot Check Verification Data Section

Conducted power test and radiated spurious emission test against the variant model based on the worst-case condition from the original model was performed in this filing and the verification test results similar to the original FCC ID. All tests meet FCC technical limits. Detail spot check test result can be found in the variant model report, please refer to the detail section table in section 3.4.

Summary of the spot check:

Test Item	Test Mode	PY7-34943G Worst Result	PY7-58237R Worst Result	Difference (dB)
Conducted Power (dBm)	11n HT20 CH11	21.50	21.34	0.16
Radiated Spurious Emission (dBuV/m) @ 3m	11n HT20 CH01	47.8	48.44	-0.64

#### 3.4 Reference detail Section

Rule Part	Equipment Class	Wireless Technology	Frequency Band (MHz)	Original FCC ID	Original Report	Variant Model FCC ID	Variant Model Report
15C	DTS	Wi-Fi	2400~2483.5	PY7-34943G	Part 15C (FR1D0310C)	PY7-58237R	Part 15C (FR1D0404C)

## 4 Test Result

### 4.1 Output Power Measurement

#### 4.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5 MHz, the limit for output power is 30 dBm. If transmitting antenna with directional gain greater than 6 dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

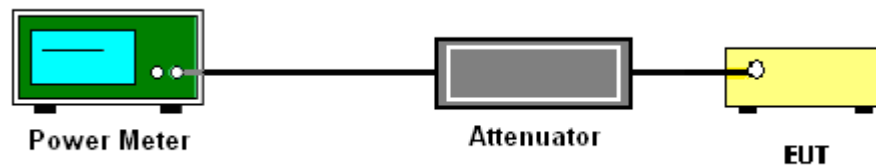
#### 4.1.2 Measuring Instruments

See list of measuring equipment of this test report.

#### 4.1.3 Test Procedures

1. For Peak Power, the testing follows ANSI C63.10 Section 11.9.1.3 PKPM1
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set the maximum power setting and enable the EUT to transmit continuously.
4. Measure the conducted output power and record the results in the test report.

#### 4.1.4 Test Setup



#### 4.1.5 Test Result of Peak Output Power

Please refer to Appendix A.





## 4.2 Radiated Band Edges and Spurious Emission Measurement

### 4.2.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

### 4.2.2 Measuring Instruments

See list of measuring equipment of this test report.

### 4.2.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1 GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1 GHz, the emission level of the EUT in peak mode was 20 dB lower than average limit (that means the emission level in average mode also complies with the limit in

average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

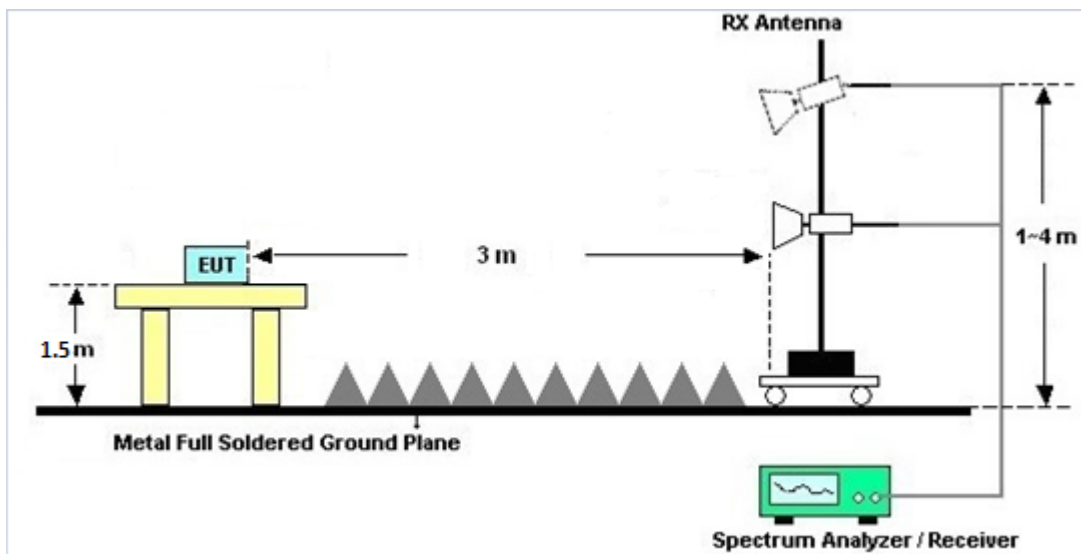
8. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW = 100 kHz for  $f < 1$  GHz;  $VBW \geq RBW$ ; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz,  $VBW = 3$  MHz for  $f \geq 1$  GHz for peak measurement.

For average measurement:

  - $VBW = 10$  Hz, when duty cycle is no less than 98 percent.
  - $VBW \geq 1/T$ , when duty cycle is less than 98 percent where T is 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.

**4.2.4 Test Setup**

For radiated test from 1GHz to 18GHz



**4.2.5 Test Result of Radiated Spurious Emission**

Please refer to Appendix B and C

**4.2.6 Duty Cycle**

Please refer to Appendix D.



### 4.3 Antenna Requirements

#### 4.3.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

#### 4.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

#### 4.3.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G<sub>ANT</sub> + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(N<sub>ANT</sub>/N<sub>SS</sub>=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for N<sub>ANT</sub> ≤ 4.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G<sub>ANT</sub> set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain G<sub>ANT</sub> is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain "DG" is calculated as following table.

<CDD Modes>						
			DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
	Ant. 6 (dBi)	Ant. 7 (dBi)				
2.4 GHz	2.30	-2.60	2.30	3.20	0.00	0.00

Power Limit Reduction = DG(Power) – 6dBi, ( min = 0 )

PSD Limit Reduction = DG(PSD) – 6dBi, ( min = 0 )



## 5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 14, 2021	Dec. 23, 2021	Oct. 13, 2022	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 06, 2021	Dec. 23, 2021	Jan. 05, 2022	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 06, 2021	Dec. 23, 2021	Jan. 05, 2022	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz;Max 30dBm	Oct. 16, 2021	Feb. 06, 2022	Oct. 15, 2022	Radiation (03CH06-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz~44GHz	Apr. 12, 2021	Feb. 06, 2022	Apr. 11, 2022	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218652	1GHz~18GHz	Apr. 25, 2021	Feb. 06, 2022	Apr. 24, 2022	Radiation (03CH06-KS)
SHF-EHF Horn	Com-power	AH-840	101093	18GHz~40GHz	Jan. 05, 2022	Feb. 06, 2022	Jan. 04, 2023	Radiation (03CH06-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2022	Feb. 06, 2022	Jan. 04, 2023	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Jul. 30, 2021	Feb. 06, 2022	Jul. 29, 2022	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Feb. 06, 2022	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Feb. 06, 2022	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Feb. 06, 2022	NCR	Radiation (03CH06-KS)

NCR: No Calibration Required



## 6 Uncertainty of Evaluation

### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.0dB
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# Appendix A. Conducted Test Results

Test Engineer:	Lex Wu	Temperature:	0-40	°C
Test Date:	2021/12/23	Relative Humidity:	51~54	%

**TEST RESULTS DATA**  
**Peak Output Power**

2.4GHz Band																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	2	1	2412	16.01	14.74	18.43	30.00		2.30		20.73		36.00		Pass
11b	1Mbps	2	6	2437	16.07	14.82	18.50	30.00		2.30		20.80		36.00		Pass
11b	1Mbps	2	11	2462	15.99	14.68	18.39	30.00		2.30		20.69		36.00		Pass
11g	6Mbps	2	1	2412	18.44	17.28	20.91	30.00		2.30		23.21		36.00		Pass
11g	6Mbps	2	6	2437	18.59	17.31	21.01	30.00		2.30		23.31		36.00		Pass
11g	6Mbps	2	11	2462	18.50	17.37	20.98	30.00		2.30		23.28		36.00		Pass
HT20	MCS0	2	1	2412	18.81	17.72	21.31	30.00		2.30		23.61		36.00		Pass
HT20	MCS0	2	6	2437	18.51	17.41	21.01	30.00		2.30		23.31		36.00		Pass
HT20	MCS0	2	11	2462	18.74	17.88	21.34	30.00		2.30		23.64		36.00		Pass

Note: Measured power (dBm) has offset with cable loss.



## Appendix B. Radiated Spurious Emission

Test Engineer :	Henry Li	Temperature :	22~23°C
		Relative Humidity :	41~42%





2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
6+7		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	(P/A)	(H/V)
802.11n HT20 CH 01 2412MHz		2389.95	60.2	-13.8	74	54.94	30.94	7.16	32.84	100	78	P	H
		2389.95	48.11	-5.89	54	42.85	30.94	7.16	32.84	100	78	A	H
		2408	102.33	---	---	96.99	31	7.18	32.84	100	78	P	H
		2404	94.56	---	---	89.22	31	7.18	32.84	100	78	A	H
		2389.95	60.83	-13.17	74	55.57	30.94	7.16	32.84	337	88	P	V
		2389.95	48.44	-5.56	54	43.18	30.94	7.16	32.84	337	88	A	V
		2408	101.29	---	---	95.95	31	7.18	32.84	337	88	P	V
		2408	92.72	---	---	87.38	31	7.18	32.84	337	88	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz  
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 6+7	Note	Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB/m )	Path Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20		4830	49.11	-24.89	74	64.32	34.57	10.26	60.04	300	0	P	H
CH 01 2412MHz		4830	43.28	-30.72	74	58.49	34.57	10.26	60.04	100	0	P	V
<b>Remark</b>	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**Note symbol**

*	<b>Fundamental Frequency</b> which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is <b>over limit</b> line.
P/A	<b>Peak</b> or <b>Average</b>
H/V	<b>Horizontal</b> or <b>Vertical</b>



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		( MHz )	( dBμV/m )	( dB )	( dBμV/m )	( dBμV )	( dB/m )	( dB )	( dB )	( cm )	( deg )	( P/A )	( H/V )
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =  
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

**For Peak Limit @ 2390MHz:**

1. Level(dBμV/m)  
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)  
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)  
= 55.45 (dBμV/m)
2. Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 55.45(dBμV/m) – 74(dBμV/m)  
= -18.55(dB)

**For Average Limit @ 2390MHz:**

1. Level(dBμV/m)  
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)  
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)  
= 43.54 (dBμV/m)
2. Over Limit(dB)  
= Level(dBμV/m) – Limit Line(dBμV/m)  
= 43.54(dBμV/m) – 54(dBμV/m)  
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



## Appendix C. Radiated Spurious Emission Plots

### Note symbol

-L	Low channel location
-R	High channel location



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

Table with 4 columns: WIFI (2.4GHz 2400~2483.5MHz Band Edge @ 3m), ANT (802.11n HT20 CH01 2412MHz), 6+7 (Horizontal, Fundamental), and Peak/Avg. Each cell contains a graph and data table.



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m																																																													
ANT	802.11n HT20 CH01 2412MHz																																																													
6+7	Vertical	Fundamental																																																												
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2.4GHz 2400~2483.5MHz  
WIFI 802.11n HT20 (Harmonic @ 3m)

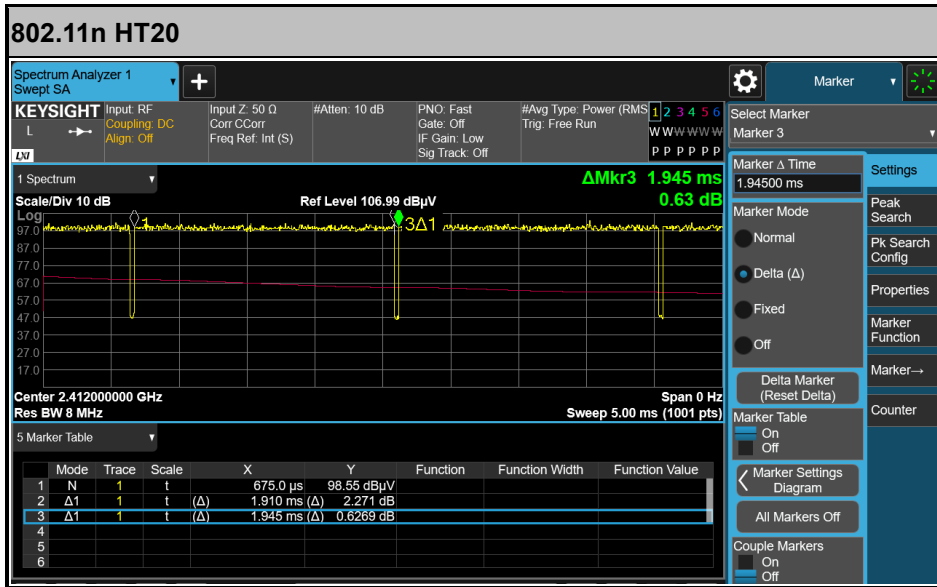
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### Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
WLAN 2.4GHz 802.11n-HT20	98.20	-	-	10Hz



————THE END————