

Project No.: TM-2305000465P
Report No.: TMWK2305001705KR

FCC ID: 2AGBW9290035625X

Page: 1 / 107
Rev.: 03

RADIO TEST REPORT

FCC 47 CFR PART 15 SUBPART C

Test Standard	FCC Part 15.247
Product name	Digital Device
Brand Name	Philips
Model No.	9290035625, 9290035626
Test Result	Pass
Statements of Conformity	Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory)

Approved by:



Shawn Wu
Supervisor

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com.tw/Terms-and-Conditions> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com.tw/Terms-and-Conditions>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instruction, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced, except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 2, 2023	Initial Issue	ALL	Doris Chu
01	August 14, 2023	See the following Note Rev. (01)	P.5, P.8, P.18-19, P.35, P.53, P.12, P.4	Doris Chu
02	August 17, 2023	See the following Note Rev. (02)	P.12, P.42, P.4	Doris Chu
03	August 18, 2023	See the following Note Rev. (03)	P.4	Doris Chu

Rev. (01)

1. Modify antenna type to Monopole in section 1.3.
2. Modify 966D Equipment to EXA Signal Analyzer in section 1.6.
3. Add 240V Conduction data in section 4.1.4.
4. Modify Test Procedure in section 4.4.2.
5. Modify Band Edge in section 4.5.4.
6. Modify test mode in section 3.2.
7. Add Serial Number and modify Model Discrepancy in section 1.1.

Rev. (02)

1. Modify remark in section 3.2.
2. Modify test date in section 4.5.4.
3. Modify Serial Number in section 1.1.

Rev. (03)

1. Remove HW Version in section 1.1.

Table of contents

1.	GENERAL INFORMATION.....	4
1.1	EUT INFORMATION.....	4
1.2	EUT CHANNEL INFORMATION.....	5
1.3	ANTENNA INFORMATION.....	5
1.4	MEASUREMENT UNCERTAINTY.....	6
1.5	FACILITIES AND TEST LOCATION.....	7
1.6	INSTRUMENT CALIBRATION.....	8
1.7	SUPPORT AND EUT ACCESSORIES EQUIPMENT.....	9
1.8	TEST METHODOLOGY AND APPLIED STANDARDS.....	9
2.	TEST SUMMARY.....	10
3.	DESCRIPTION OF TEST MODES.....	11
3.1	THE WORST MODE OF OPERATING CONDITION.....	11
3.2	THE WORST MODE OF MEASUREMENT.....	12
3.3	EUT DUTY CYCLE.....	13
4.	TEST RESULT.....	15
4.1	AC POWER LINE CONDUCTED EMISSION.....	15
4.2	6DB BANDWIDTH AND OCCUPIED BANDWIDTH (99%).....	20
4.3	OUTPUT POWER MEASUREMENT.....	30
4.4	POWER SPECTRAL DENSITY.....	35
4.5	CONDUCTED BANDEDGE AND SPURIOUS EMISSION.....	41
4.6	RADIATION BANDEDGE AND SPURIOUS EMISSION.....	54
	APPENDIX 1 - PHOTOGRAPHS OF EUT.....	A-1

1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	Signify (China) Investment Co., Ltd. Building no.9, Lane 888, Tianlin Road, Minhang District, Shanghai, 200233, China	
Manufacturer	Signify (China) Investment Co., Ltd. Building no.9, Lane 888, Tianlin Road, Minhang District, Shanghai, 200233, China	
Equipment	Digital Device	
Model Name	9290035625, 9290035626	
Model Discrepancy	Model	Difference
	9290035625	1.without Battery components 2. without level shift IC 3. Zigbee Antenna model: RFFPA203007IMAB402 WiFi Antenna model: RFFPA203006IMLB403
	9290035626	1. with Battery components 2.with level shift IC 3. Zigbee Antenna model: RFFPA203007IMAB401 WiFi Antenna model: RFFPA203006IMLB402
Brand Name	Philips	
Received Date	June 2, 2023	
Date of Test	June 9 ~ August 8, 2023	
Power Supply	1. Power from Power Adapter. I/P: 100-240VAC, 0.6A, 50-60Hz O/P: 12.0VDC, 2.0A, 24.0W 2. Power from Battery. (DC 3.7V) (for 9290035626)	
SW Version	V1.0.02R25	
Serial Number	Radiated: 9290035625: E53080 9290035626: 0DF5C2 Conducted 9290035625: FB2287 Conduction 9290035626: 74F6BF	

Remark:

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
3. Disclaimer: The variant model numbers / trademarks are assessed as identical in hardware and software to each other, hence all variants are fully covered by the test results in this test report without further verification test.

1.2 EUT CHANNEL INFORMATION

Frequency Range	802.11b/g/n HT20 / ac VHT20: 2412 MHz ~ 2462 MHz 802.11n HT40/ ac VHT40: 2422 MHz ~ 2452 MHz
Modulation Type	1. IEEE 802.11b mode: DSSS 2. IEEE 802.11g mode: OFDM 3. IEEE 802.11n HT20 mode: OFDM 4. IEEE 802.11n HT40 mode: OFDM 5. IEEE 802.11ac VHT20 mode: OFDM 6. IEEE 802.11ac VHT40 mode: OFDM
Number of channels	1. IEEE 802.11b mode: 11 Channels 2. IEEE 802.11g mode: 11 Channels 3. IEEE 802.11n HT20 mode: 11 Channels 4. IEEE 802.11n HT40 mode: 7 Channels 5. IEEE 802.11ac VHT20 mode: 11 Channels 6. IEEE 802.11ac VHT40 mode: 7 Channels

Remark:

Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
<input type="checkbox"/> 1 MHz or less	1	Middle
<input type="checkbox"/> 1 MHz to 10 MHz	2	1 near top and 1 near bottom
<input checked="" type="checkbox"/> More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Type	<input checked="" type="checkbox"/> Monopole <input type="checkbox"/> PCB <input type="checkbox"/> Dipole <input type="checkbox"/> Coils
Antenna Gain	9290035625: Gain: 1.45 dBi 9290035626: Gain: 1.81 dBi
Antenna connector	I-PEX

Notes:

1. The antenna(s) of the EUT are permanently attached and there are no provisions for connection to an external antenna. So the EUT complies with the requirements of §15.203.

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	± 2.213 dB
Channel Bandwidth	± 2.7 %
RF output power (Power Meter + Power sensor)	± 0.243 dB
Power Spectral density	± 2.739 dB
Conducted Bandedge	± 2.739 dB
Conducted Spurious Emission	± 2.742 dB
Radiated Emission_9kHz-30MHz	± 3.115 dB
Radiated Emission_30MHz-200MHz	± 4.071 dB
Radiated Emission_200MHz-1GHz	± 4.419 dB
Radiated Emission_1GHz-6GHz	± 5.023 dB
Radiated Emission_6GHz-18GHz	± 5.068 dB
Radiated Emission_18GHz-26GHz	± 3.349 dB
Radiated Emission_26GHz-40GHz	± 3.229 dB

Remark:

- 1.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

Report No.: TMWK2305001705KR

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

AC Powerline Conducted Emission and Conducted:

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

Radiated emission 9kHz to 40GHz:

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

No. 12, Ln. 116, Wugong 3rd Rd., Wugu Dist., New Taipei City, Taiwan 24803

CAB identifier: TW1309

Test site	Test Engineer	Remark
AC Conduction Room	Tony Chao	-
Radiation	Czerny Lin	-
RF Conducted	Allen Shen	-

Remark: The lab has been recognized as the FCC accredited lab. under the KDB 974614 D01 and is listed in the FCC public Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309

1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Power Sensor	Anritsu	MA2411B	1911386	2022-08-08	2023-08-07
				2023-07-25	2024-07-24
Power Sensor	Anritsu	MA2411B	1911387	2022-08-08	2023-08-07
				2023-07-25	2024-07-24
EXA Signal Analyzer	KEYSIGHT	N9010A	MY54200716	2022-10-13	2023-10-12
Power Meter	Anritsu	ML2496A	2136002	2022-11-24	2023-11-23
Software	Radio Test Software Ver. 21 & E3-Ver: 6.11-20180413 LTE Measurement_Power-Ver.21				

Wugu 966 Chamber D					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Antenna	SHWARZBECK	VULB 9168	1277	2023-01-13	2024-01-12
Pre-Amplifier	EMCI	EMC118A4 5SE	980820	2022-12-23	2023-12-22
Pre-Amplifier	EMCI	EMC330N	980853	2022-12-23	2023-12-22
Coaxial Cable	EMC	EMC101G- KM-KM-900 0	220407+21122 8+230205	2023-03-21	2024-03-20
EXA Signal Analyzer	Agilent	N9010A	MY52220817	2023-03-09	2024-03-08
Coaxial Cable	EMC	EMCCFD4 00	211212+211222 +211020	2023-03-21	2024-03-20
High Pass Filter	TITAN	T04H30001 800070S01	211215-7-1	2023-02-02	2024-02-01
Thermo-Hygro Meter	EDSDS	EDS-A49	966D1	2023-05-11	2024-05-10
Pre-Amplifier	EMCI	EMC18404 5SE	980872	2023-01-03	2024-01-02
Horn Antenna	RF SPIN	DRH18-E	210301A18ES	2023-02-03	2024-02-02
Horn Antenna	SHWARZBECK	BBHA 9170	1134	2022-12-30	2023-12-29
Loop Antenna	SCHWARZBEC K	FMZB 1513-60	1513-60-028	2022-12-27	2023-12-26
Software	e3 V9-210616c				

AC Conducted Emissions Test Site					
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due
EMI Test Receiver	R&S	ESCI	100064	2023-06-07	2024-06-06
LISN	TESEQ	LN2-16N	22012	2023-03-08	2024-03-07
Cable	EMCI	CFD300-NL	CERF	2022-06-27	2023-06-26
				2023-06-27	2024-06-26
Software	EZ-EMC(CCS-3A1-CE-WUGU)				

Remark:

1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

EUT Accessories Equipment						
No.	Equipment	Brand	Model	Series No.	FCC ID	IC
	N/A					

Support Equipment					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(E)	Lenovo	T460	N/A	N/A

1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247, KDB 662911 and KDB 558074.

2. TEST SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.207(a)	4.1	AC Conducted Emission	Pass
15.247(a)(2)	4.2	6 dB Bandwidth	Pass
-	4.2	Occupied Bandwidth (99%)	Pass
15.247(b)	4.3	Output Power Measurement	Pass
15.247(e)	4.4	Power Spectral Density	Pass
15.247(d)	4.5	Conducted Band Edge	Pass
15.247(d)	4.5	Conducted Spurious Emission	Pass
15.247(d)	4.6	Radiation Band Edge	Pass
15.247(d)	4.6	Radiation Spurious Emission	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	IEEE 802.11b mode:1Mbps IEEE 802.11g mode:6Mbps IEEE 802.11n HT20 mode: MCS0 IEEE 802.11n HT40 mode: MCS0 IEEE 802.11ac VHT20 mode: MCS0 IEEE 802.11ac VHT40 mode: MCS0
Operation Transmitter	IEEE 802.11b mode: 1T1R IEEE 802.11g mode: 1T1R IEEE 802.11n HT20 mode: 1T1R IEEE 802.11n HT40 mode: 1T1R IEEE 802.11ac VHT20 mode: 1T1R IEEE 802.11ac VHT20 mode: 1T1R
Test Channel Frequencies	IEEE 802.11b mode: 1. Lowest Channel: 2412 MHz 2. Middle Channel: 2437MHz 3. Highest Channel: 2462 MHz IEEE 802.11g mode : 1. Lowest Channel: 2412 MHz 2. Middle Channel: 2437MHz 3. Highest Channel: 2462 MHz IEEE 802.11n HT20 mode : 1. Lowest Channel: 2412 MHz 2. Middle Channel: 2437MHz 3. Highest Channel: 2462 MHz IEEE 802.11ac VHT20 mode : 1. Lowest Channel: 2412 MHz 2. Middle Channel: 2437MHz 3. Highest Channel: 2462 MHz IEEE 802.11n HT40 mode : 1. Lowest Channel: 2422 MHz 2. Middle Channel: 2437MHz 3. Highest Channel: 2452 MHz IEEE 802.11ac VHT40 mode : 1. Lowest Channel: 2422 MHz 2. Middle Channel: 2437MHz 3. Highest Channel: 2452 MHz

Remark:

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.
2. The mode IEEE 802.11ac VHT20 and VHT40 are only different in control messages with IEEE 802.11n 20 MHz and HT40, and have same power setting. Therefore, the highest power(IEEE 802.11n 20 MHz and HT40) were test conducted and radiated measurement and recorded in this report.

Report No.: TMWK2305001705KR

3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Power supply Mode	Mode 1: EUT (Model: 9290035626) Power by Adapter-1.5m(S024CSM1200200) Mode 2: EUT (Model: 9290035625) Power by Adapter-1.5m(S024CSM1200200)
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT (Model: 9290035626) Power by Adapter-1.5m(S024CSM1200200) Mode 2: EUT (Model: 9290035625) Power by Adapter-1.5m(S024CSM1200200)
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Worst Position	<input type="checkbox"/> Placed in fixed position. <input type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input checked="" type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT (Model: 9290035626) Power by Adapter-1.5m(S024CSM1200200) Mode 2: EUT (Model: 9290035625) Power by Adapter-1.5m(S024CSM1200200)
Worst Mode	<input type="checkbox"/> Mode 1 <input checked="" type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

Remark:

1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(Z-Plane) were recorded in this report
3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest band edge and Harmonics channel as worse case.

Report No.: TMWK2305001705KR

3.3 EUT DUTY CYCLE

Temperature: 22.3 ~ 25.4°C

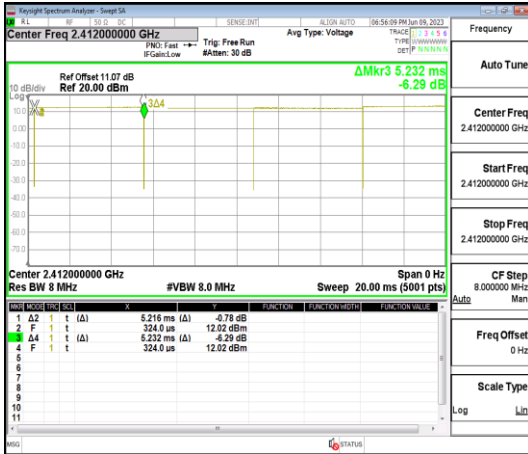
Test date: June 9 ~ 16, 2023

Humidity: 57 ~ 61% RH

Tested by: Allen Shen

Duty Cycle				
Configuration	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)
802.11b	99.69	0.01	0.19	0.01
802.11g	98.76	0.05	0.48	0.01
802.11n_20	98.67	0.06	0.52	0.01
802.11n_40	97.23	0.12	1.06	2.00
802.11ac_20	98.67	0.06	0.52	0.01
802.11ac_40	97.24	0.12	1.05	2.00

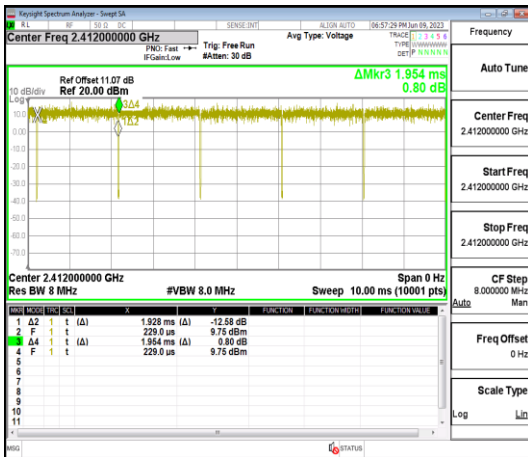
802.11b



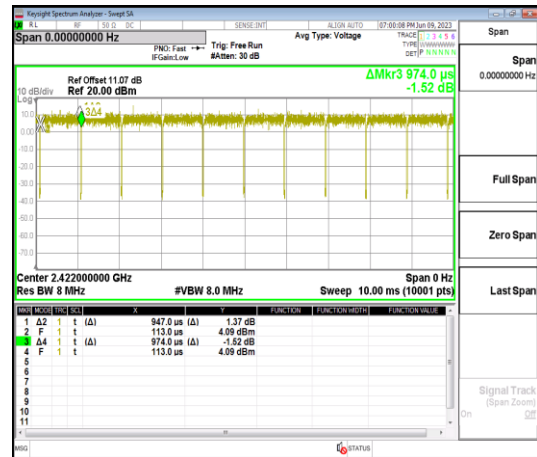
802.11g



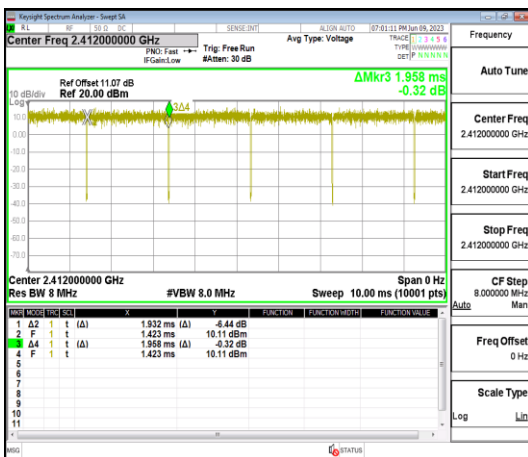
802.11n HT20



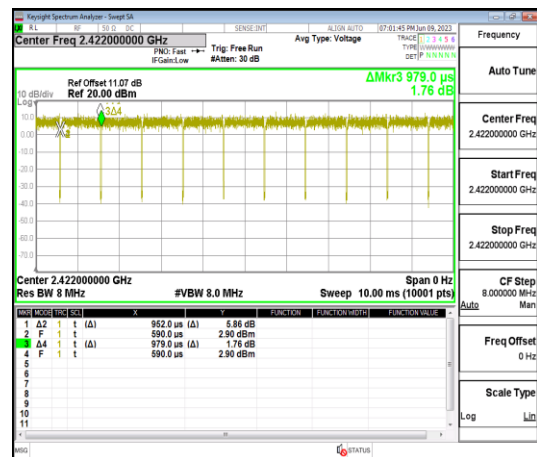
802.11n HT40



802.11ac VHT20



802.11ac VHT40



Report No.: TMWK2305001705KR

4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a)(2)

Frequency Range (MHz)	Limits(dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

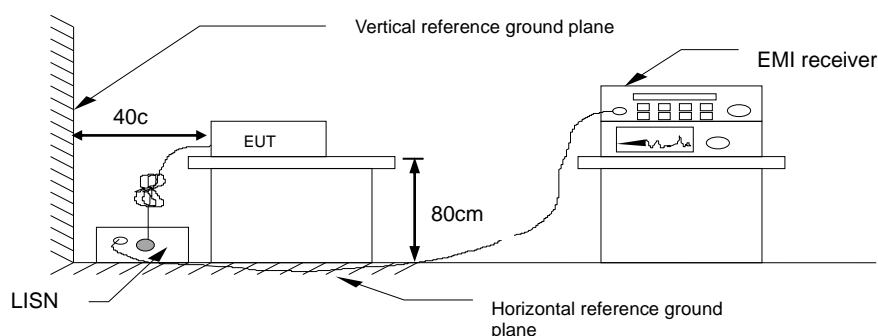
* Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

4.1.3 Test Setup

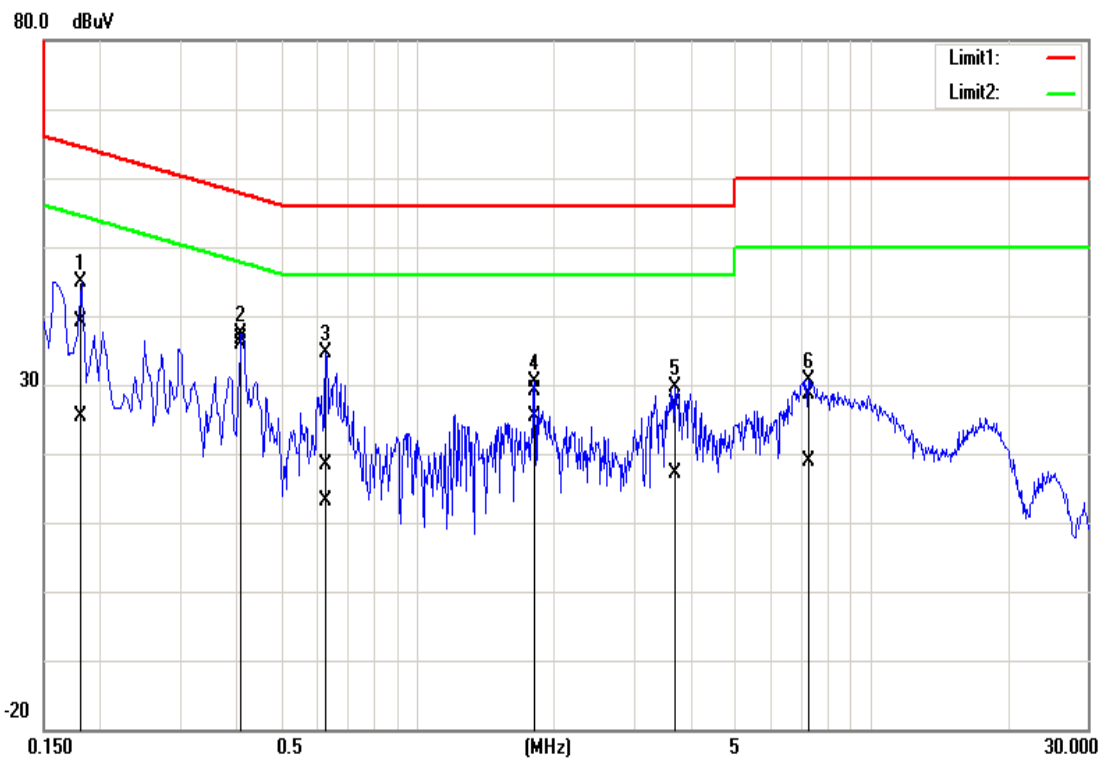


4.1.4 Test Result

Pass.

Test Data

Test Mode:	Mode 1	Temp/Hum	24.8(°C)/ 57%RH
Phase:	Line	Test Date	June 19, 2023
Test Voltage:	120Vac, 60Hz	Test Engineer	Tony Chao

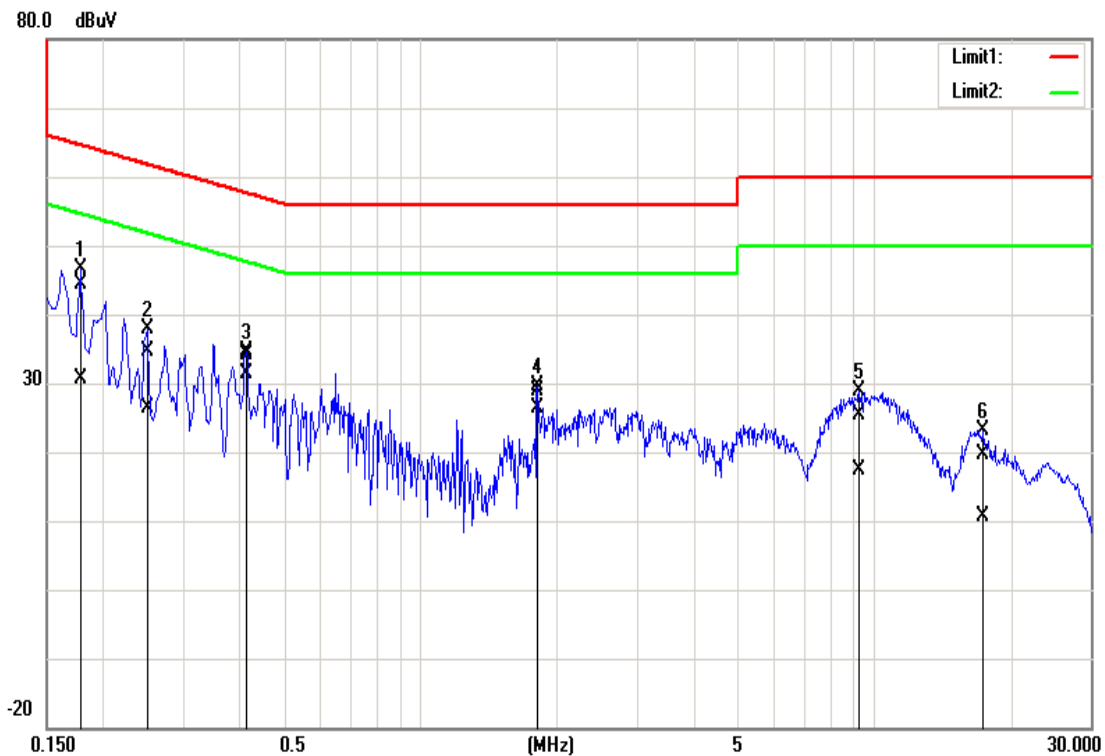


Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (d uV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1820	39.01	25.13	0.15	39.16	25.28	64.39	54.39	-25.23	-29.11	Pass
0.4100	36.43	35.65	0.15	36.58	35.80	57.65	47.65	-21.07	-11.85	Pass
0.6300	18.25	13.07	0.15	18.40	13.22	56.00	46.00	-37.60	-32.78	Pass
1.8100	29.01	25.10	0.20	29.21	25.30	56.00	46.00	-26.79	-20.70	Pass
3.6860	26.94	16.92	0.25	27.19	17.17	56.00	46.00	-28.81	-28.83	Pass
7.2820	28.35	18.55	0.31	28.66	18.86	60.00	50.00	-31.34	-31.14	Pass

Note: 1. Correction factor = LISN loss + Cable loss.

Report No.: TMWK2305001705KR

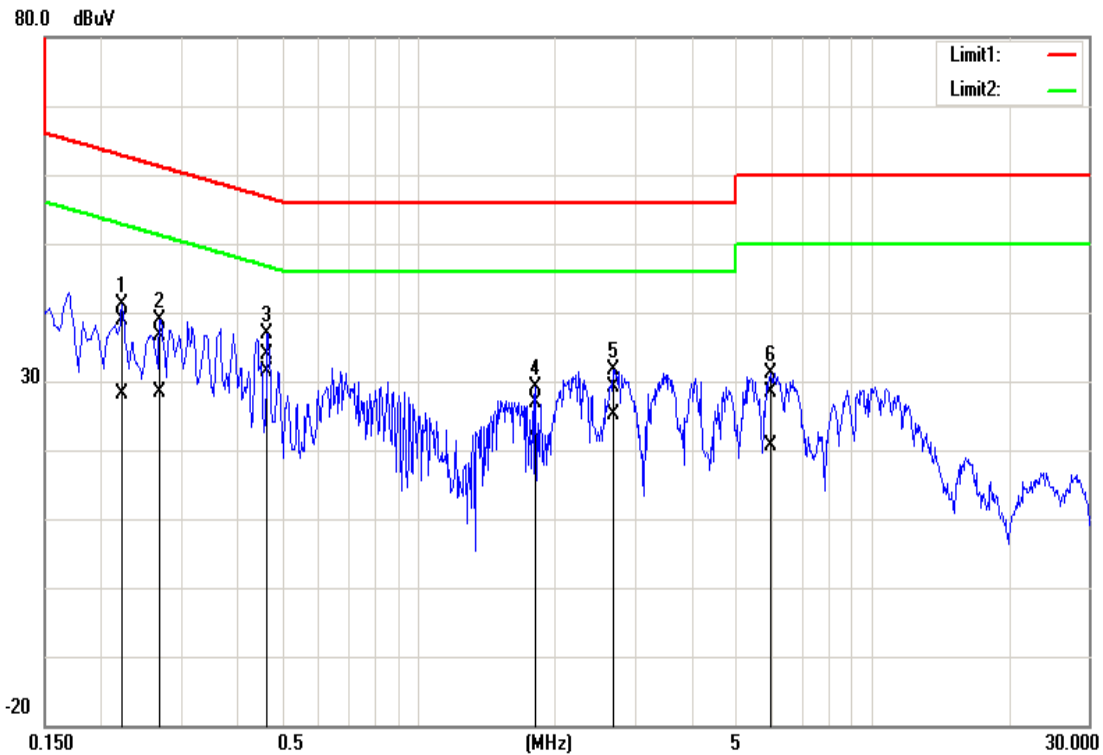
Test Mode:	Mode 1	Temp/Hum	24.8(°C)/ 57%RH
Phase:	Neutral	Test Date	June 19, 2023
Test Voltage:	120Vac, 60Hz	Test Engineer	Tony Chao



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1780	44.25	30.40	0.20	44.45	30.60	64.58	54.58	-20.13	-23.98	Pass
0.2500	34.32	26.25	0.19	34.51	26.44	61.76	51.76	-27.25	-25.32	Pass
0.4140	33.84	31.19	0.19	34.03	31.38	57.57	47.57	-23.54	-16.19	Pass
1.8100	28.70	26.07	0.24	28.94	26.31	56.00	46.00	-27.06	-19.69	Pass
9.2860	24.98	16.92	0.37	25.35	17.29	60.00	50.00	-34.65	-32.71	Pass
17.4140	19.25	10.18	0.47	19.72	10.65	60.00	50.00	-40.28	-39.35	Pass

Note: 1. Correction factor = LISN loss + Cable loss.

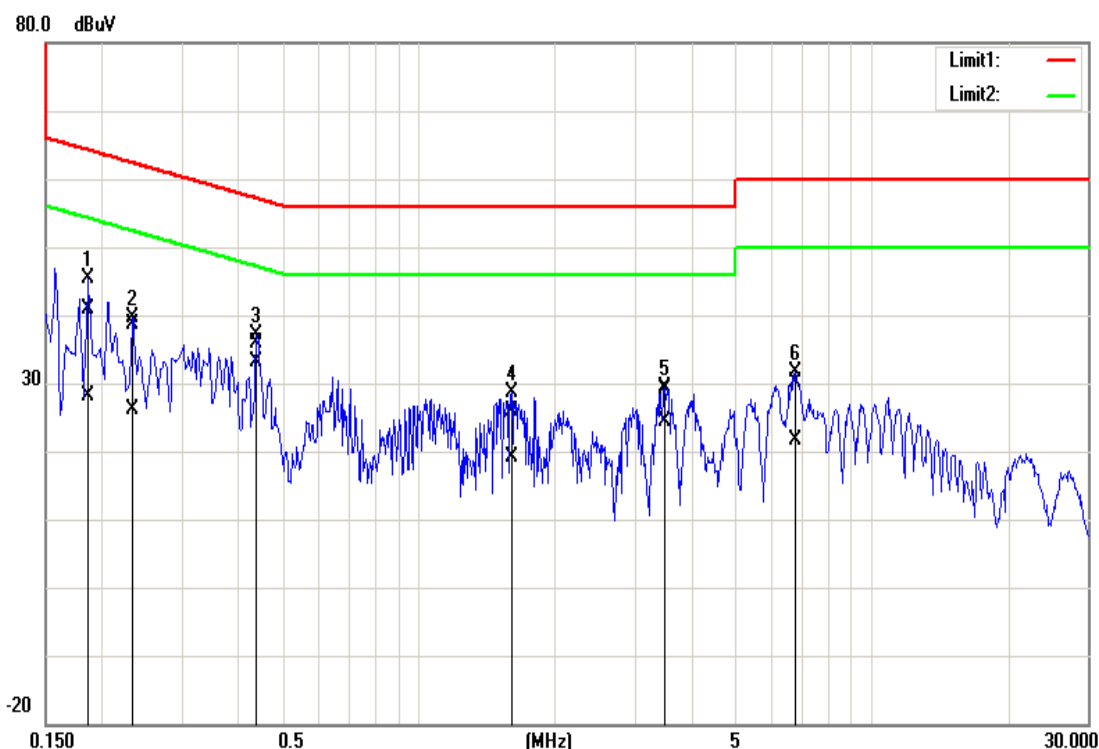
Test Mode:	Mode 1	Temp/Hum	24.3(°C)/ 52%RH
Phase:	Line	Test Date	August 8, 2023
Test Voltage:	240Vac, 50Hz	Test Engineer	Tony Chao



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (d uV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.2220	38.84	28.00	0.15	38.99	28.15	62.74	52.74	-23.75	-24.59	Pass
0.2700	36.41	28.26	0.15	36.56	28.41	61.12	51.12	-24.56	-22.71	Pass
0.4660	33.84	31.22	0.15	33.99	31.37	56.58	46.58	-22.59	-15.21	Pass
1.8140	26.71	21.20	0.21	26.92	21.41	56.00	46.00	-29.08	-24.59	Pass
2.6900	28.98	25.00	0.24	29.22	25.24	56.00	46.00	-26.78	-20.76	Pass
5.9900	28.00	20.41	0.29	28.29	20.70	60.00	50.00	-31.71	-29.30	Pass

Note: 1. Correction factor = LISN loss + Cable loss.

Test Mode:	Mode 1	Temp/Hum	24.3(°C)/ 52%RH
Phase:	Neutral	Test Date	August 8, 2023
Test Voltage:	240Vac, 50Hz	Test Engineer	Tony Chao



Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak limit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1860	40.58	27.83	0.20	40.78	28.03	64.21	54.21	-23.43	-26.18	Pass
0.2340	38.54	25.89	0.19	38.73	26.08	62.31	52.31	-23.58	-26.23	Pass
0.4380	35.66	32.85	0.19	35.85	33.04	57.10	47.10	-21.25	-14.06	Pass
1.6100	25.55	18.85	0.24	25.79	19.09	56.00	46.00	-30.21	-26.91	Pass
3.5020	28.89	24.12	0.30	29.19	24.42	56.00	46.00	-26.81	-21.58	Pass
6.7700	29.80	21.31	0.34	30.14	21.65	60.00	50.00	-29.86	-28.35	Pass

Note: 1. Correction factor = LISN loss + Cable loss.

Report No.: TMWK2305001705KR

4.2 6dB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

4.2.1 Test Limit

According to §15.247(a)(2)

6 dB Bandwidth :

Limit	Shall be at least 500kHz
-------	--------------------------

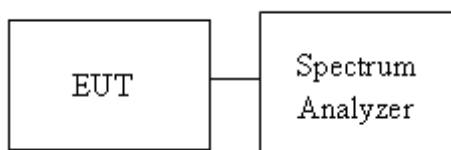
Occupied Bandwidth(99%) : For reporting purposes only.

4.2.2 Test Procedure

Test method Refer as ANSI C63.10: 2013,

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 100kHz, VBW = 300kHz and Detector = Peak, to measurement 6 dB Bandwidth.
4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth. in the test report.

4.2.3 Test Setup



4.2.4 Test Result

Temperature: 22.3 ~ 25.4°C

Test date: June 9 ~ 16, 2023

Humidity: 57 ~ 61% RH

Tested by: Allen Shen

Test mode: IEEE 802.11b mode / 2412-2462 MHz				
Channel	Frequency (MHz)	OBW (99%) (MHz)	6dB BW (kHz)	6dB limit (kHz)
1	2412	13.150	9080.00	≥500
6	2437	13.077	9095.00	
11	2462	13.032	9064.00	

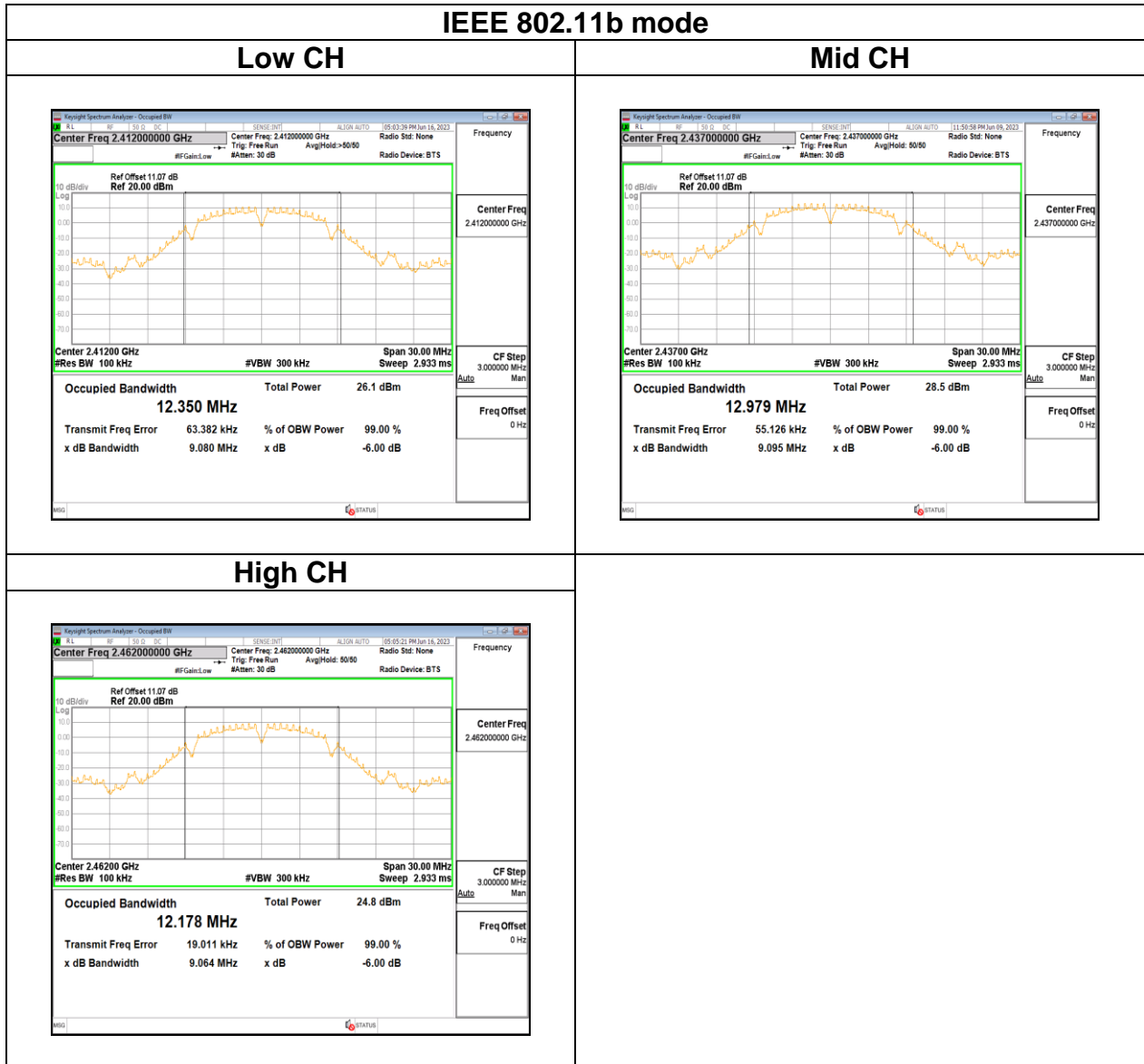
Test mode: IEEE 802.11g mode / 2412-2462 MHz				
Channel	Frequency (MHz)	OBW (99%) (MHz)	6dB BW (kHz)	6dB limit (kHz)
1	2412	17.550	16340.00	≥500
6	2437	17.589	16320.00	
11	2462	17.546	16340.00	

Test mode: IEEE 802.11n HT20 mode / 2412-2462 MHz				
Channel	Frequency (MHz)	OBW (99%) (MHz)	6dB BW (kHz)	6dB limit (kHz)
1	2412	18.435	17580.00	≥500
6	2437	18.502	17570.00	
11	2462	18.529	17570.00	

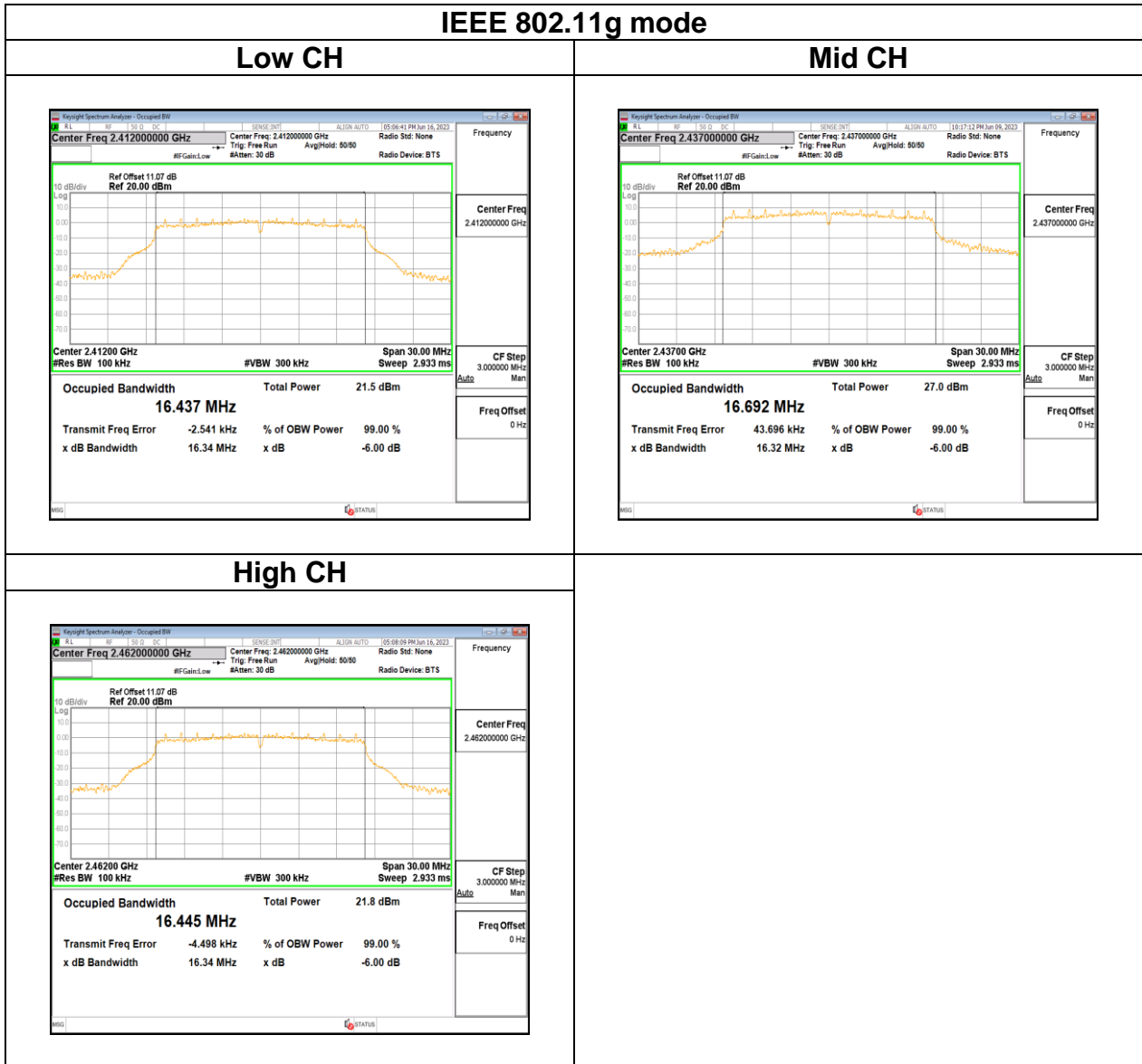
Test mode: IEEE 802.11n HT40 mode / 2422-2452 MHz				
Channel	Frequency (MHz)	OBW (99%) (MHz)	6dB BW (kHz)	6dB limit (kHz)
3	2422	36.906	36410.00	≥500
6	2437	36.999	36410.00	
9	2452	36.978	36400.00	

Report No.: TMWK2305001705KR

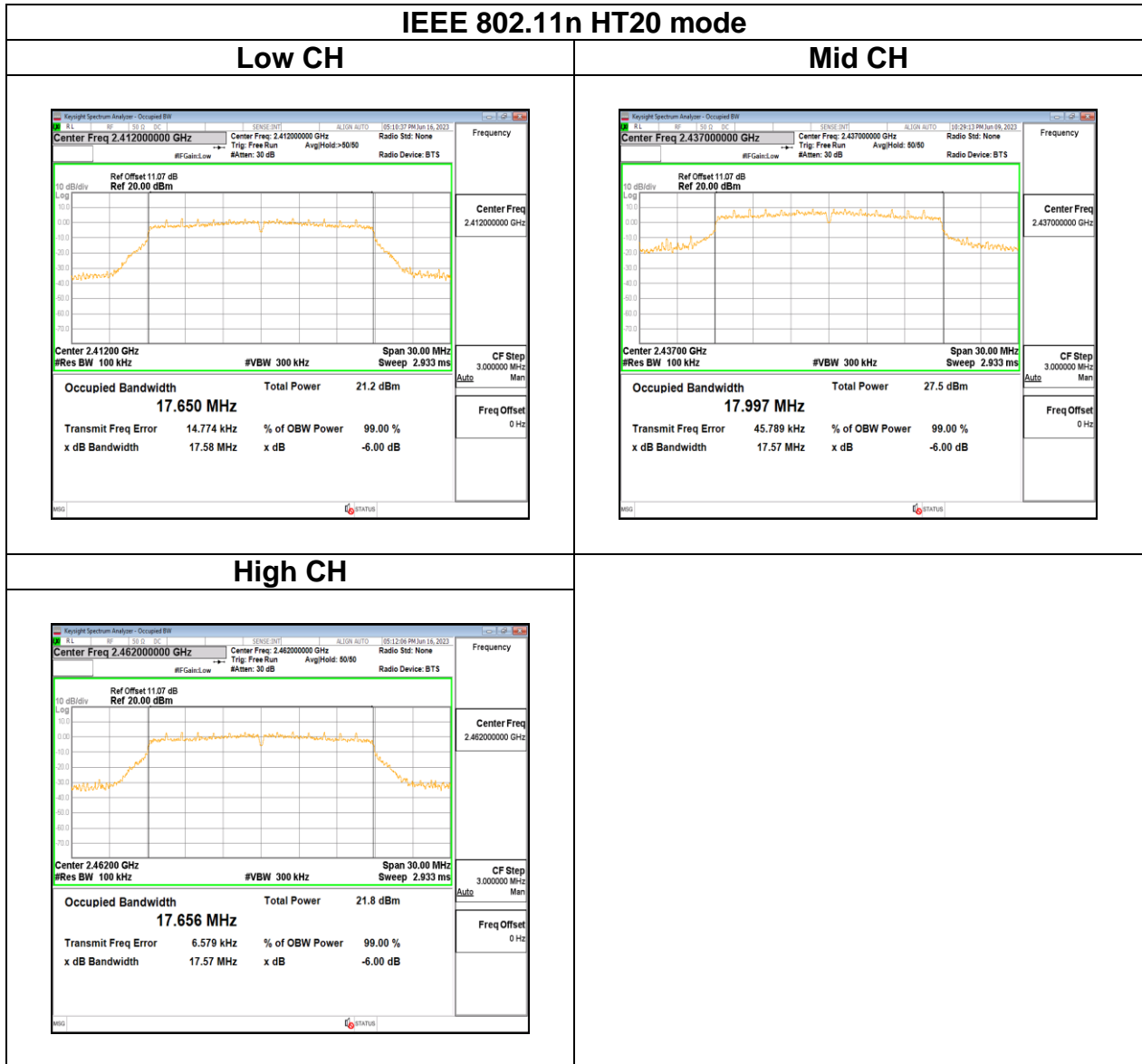
Test Data 6dB BANDWIDTH

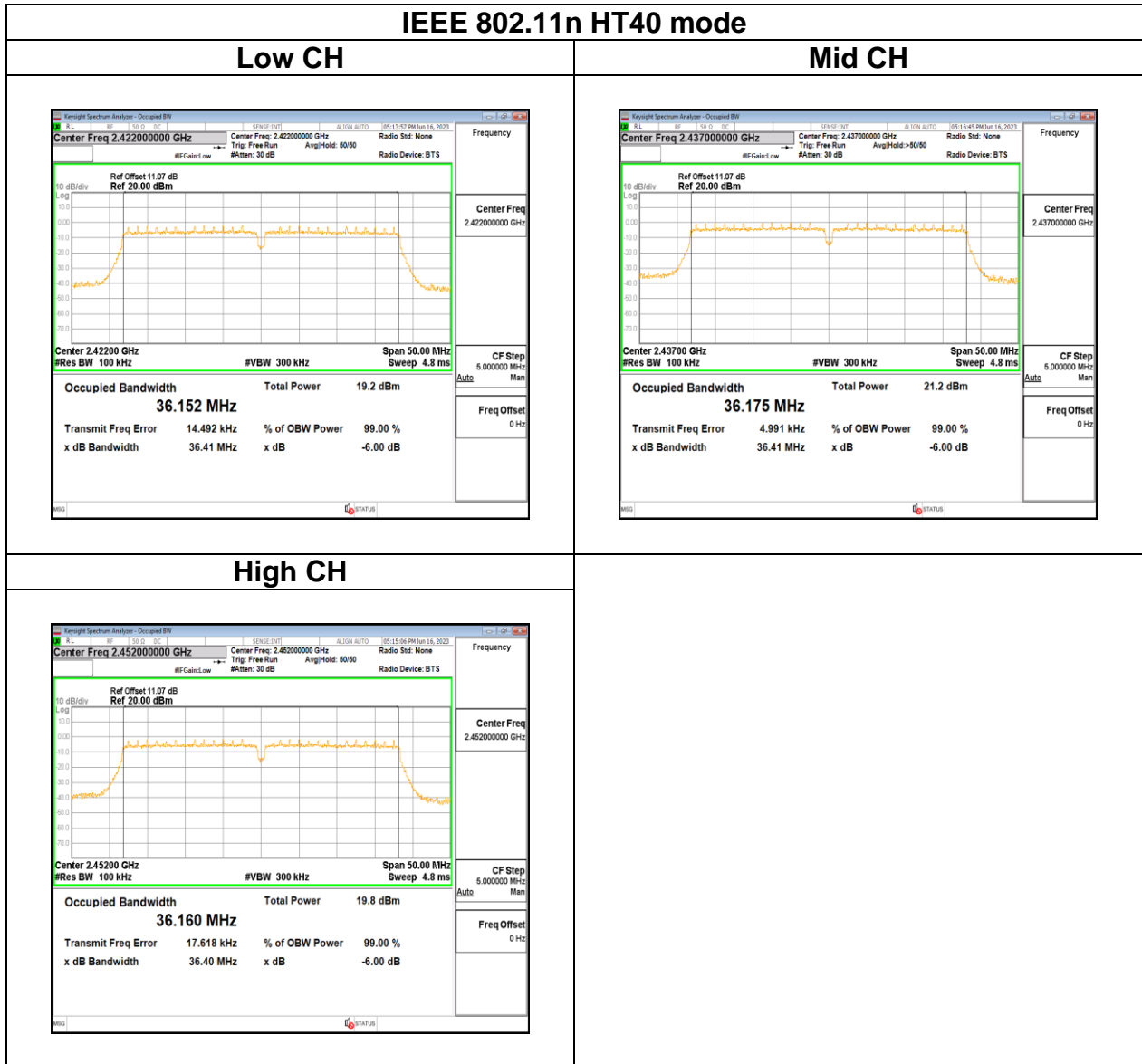


Report No.: TMWK2305001705KR



Report No.: TMWK2305001705KR



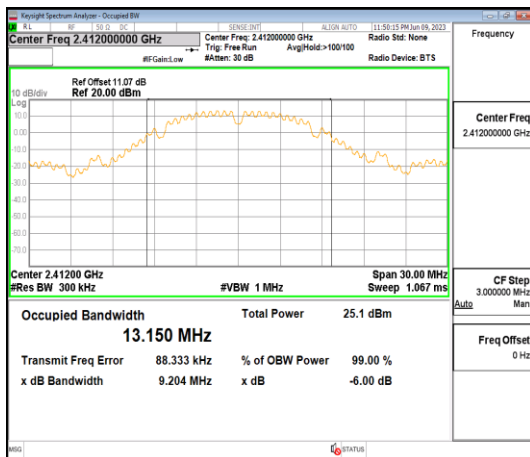


Report No.: TMWK2305001705KR

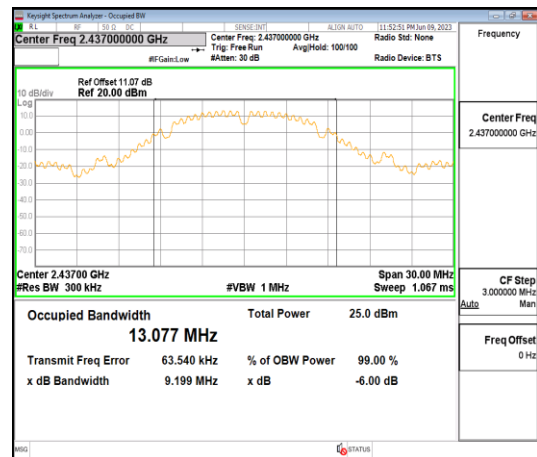
Test Data BANDWIDTH 99%

IEEE 802.11b mode

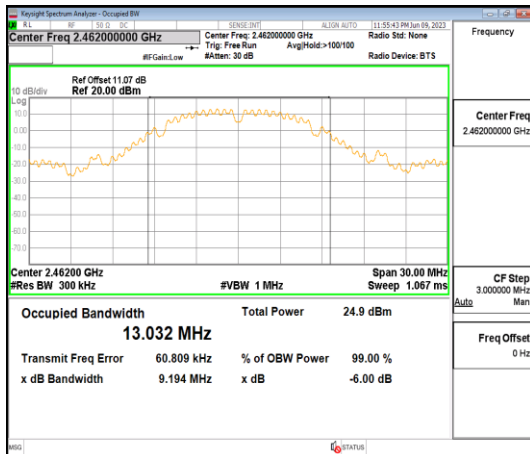
Low CH



Mid CH

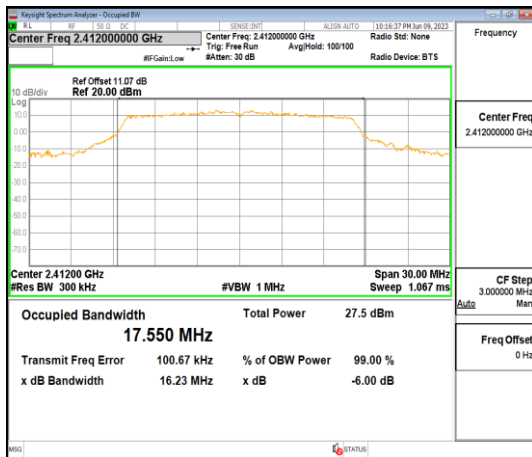


High CH

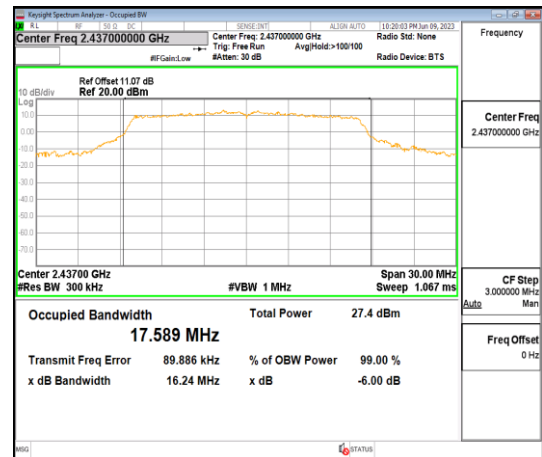


IEEE 802.11g mode

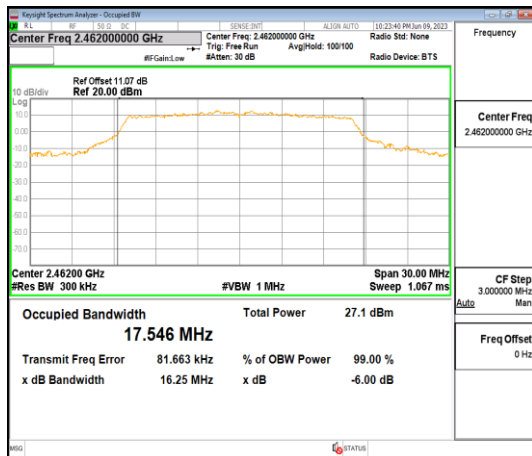
Low CH



Mid CH

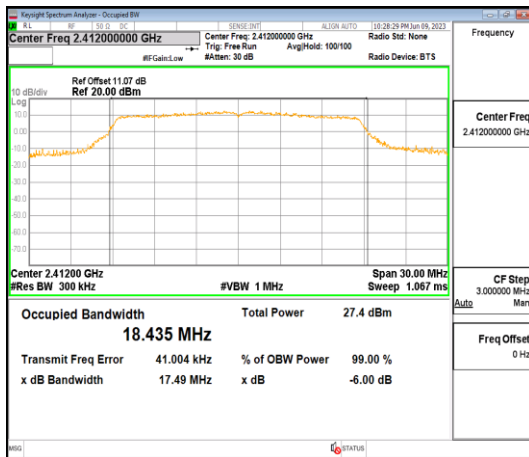


High CH

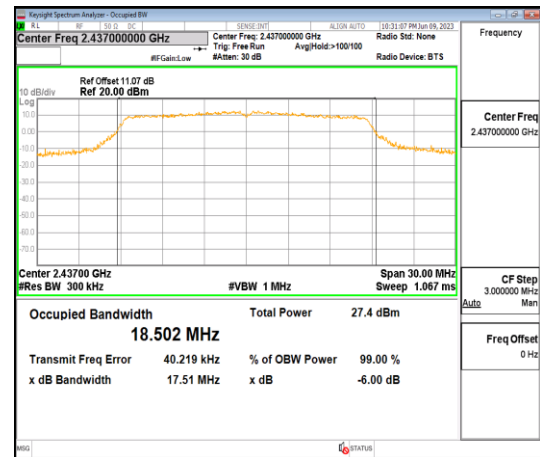


IEEE 802.11n HT20 mode

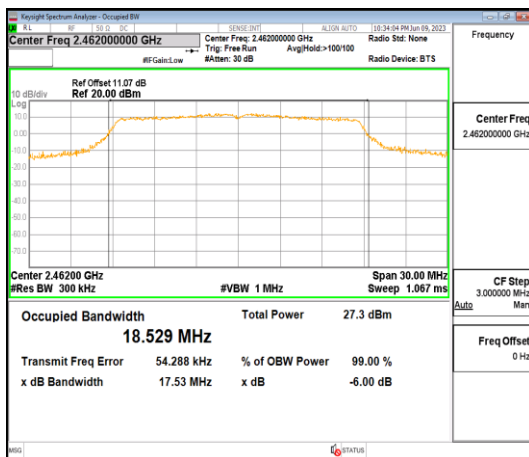
Low CH

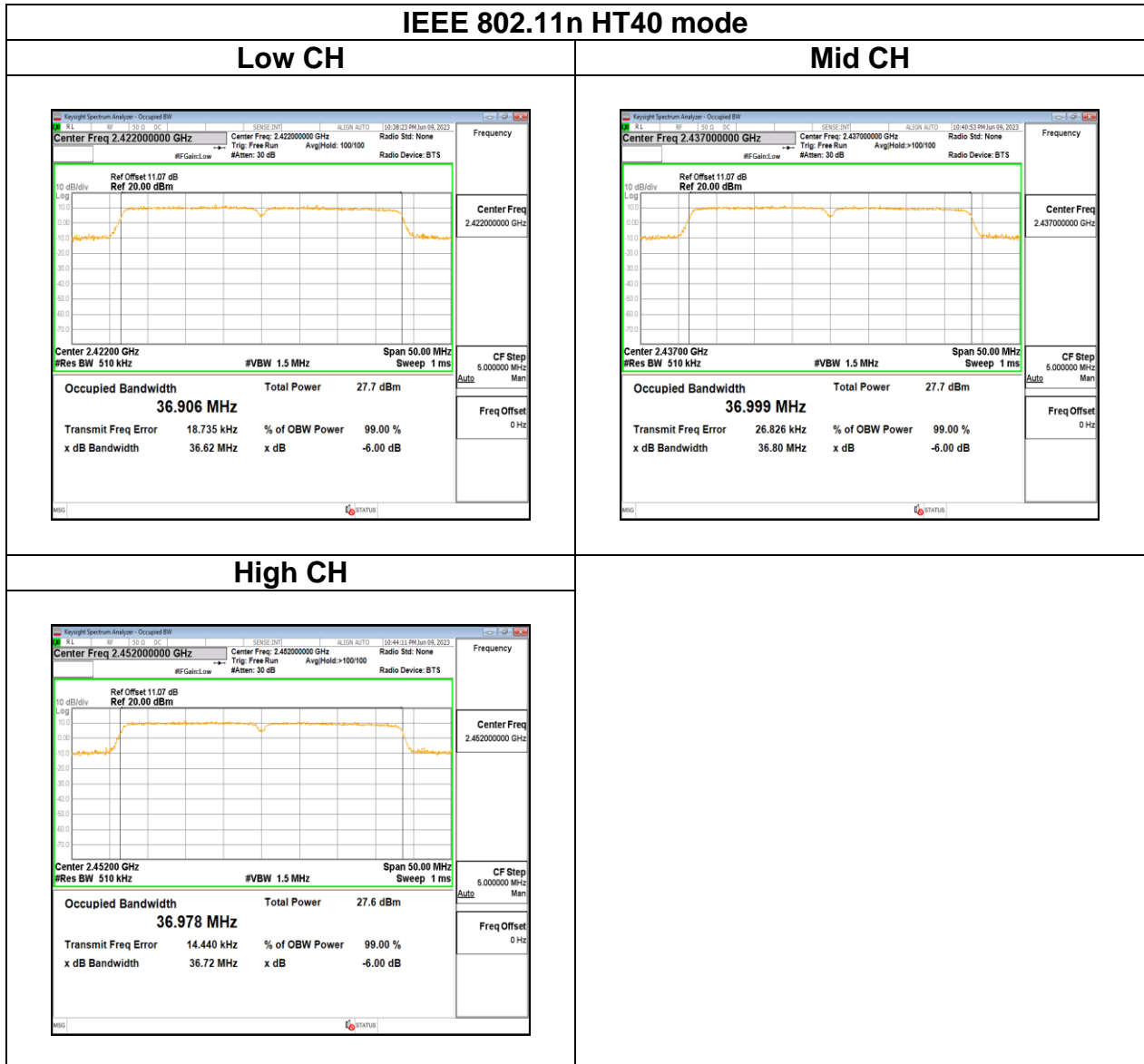


Mid CH



High CH





4.3 OUTPUT POWER MEASUREMENT

4.3.1 Test Limit

According to §15.247(b)

Peak output power :

For systems using digital modulation in the 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt(30 dBm) and the e.i.r.p. shall not exceed 4Watt(36 dBm), base on the use of antennas with directional gain not exceed 6 dBi If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced 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 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Limit	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 30dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : [Limit = 30 – (DG – 6)] <input type="checkbox"/> Point-to-point operation :
-------	---

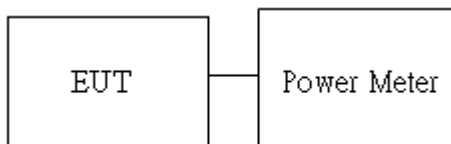
Average output power : For reporting purposes only.

4.3.2 Test Procedure

Test method Refer as ANSI C63.10:2013.

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Peak output power and Average output power. in the test report.

4.3.3 Test Setup



4.3.4 Test Result

Temperature: 22.3 ~ 25.4°C

Test date: June 9 ~ 16, 2023

Humidity: 57 ~ 61% RH

Tested by: Allen Shen

Peak Output Power

802.11b Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	72	21.01	30.00	PASS
6	2437	1	76	22.02	30.00	PASS
11	2462	1	69	19.76	30.00	PASS

802.11g Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	55	23.20	30.00	PASS
6	2437	6	73	23.51	30.00	PASS
11	2462	6	58	23.13	30.00	PASS

802.11n_HT_20M Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	53	23.02	30.00	PASS
6	2437	MCS0	73	23.59	30.00	PASS
11	2462	MCS0	57	23.11	30.00	PASS

802.11n_HT_40M Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	44	21.46	30.00	PASS
6	2437	MCS0	54	22.37	30.00	PASS
9	2452	MCS0	48	21.94	30.00	PASS

Note: Since DG<6dBi, there is no need to modify the limit value.

802.11ac_VHT_20M Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	53	22.94	30.00	PASS
6	2437	MCS0	73	23.51	30.00	PASS
11	2462	MCS0	57	23.04	30.00	PASS

802.11ac_VHT_40M Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Peak Output Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	44	21.41	30.00	PASS
6	2437	MCS0	54	22.29	30.00	PASS
9	2452	MCS0	48	21.63	30.00	PASS

Note: Since DG<6dBi, there is no need to modify the limit value.

Average Output Power

802.11b Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	1	72	18.31	30.00	PASS
6	2437	1	76	19.65	30.00	PASS
11	2462	1	69	17.12	30.00	PASS

802.11g Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	6	55	14.14	30.00	PASS
6	2437	6	73	18.36	30.00	PASS
11	2462	6	58	14.48	30.00	PASS

802.11n_HT_20M Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	53	13.56	30.00	PASS
6	2437	MCS0	73	18.33	30.00	PASS
11	2462	MCS0	57	14.27	30.00	PASS

802.11n_HT_40M Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	44	11.43	30.00	PASS
6	2437	MCS0	54	13.47	30.00	PASS
9	2452	MCS0	48	12.13	30.00	PASS

Note: Since DG<6dBi, there is no need to modify the limit value.

802.11ac_VHT_20M Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)	Limit (dBm)	RESULT
1	2412	MCS0	53	13.48	30.00	PASS
6	2437	MCS0	73	17.95	30.00	PASS
11	2462	MCS0	57	14.19	30.00	PASS

802.11ac_VHT_40M Ch0						
CH	Freq. (MHz)	Data Rate	Power set	Avg. Output Power (dBm)	Limit (dBm)	RESULT
3	2422	MCS0	44	11.33	30.00	PASS
6	2437	MCS0	54	13.45	30.00	PASS
9	2452	MCS0	48	12.10	30.00	PASS

Note: Since DG<6dBi, there is no need to modify the limit value.

Report No.: TMWK2305001705KR

4.4 POWER SPECTRAL DENSITY

4.4.1 Test Limit

According to §15.247(e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

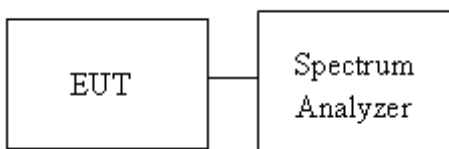
Limit	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 8dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : [Limit = 8 – (DG – 6)] <input type="checkbox"/> Point-to-point operation :
-------	---

4.4.2 Test Procedure

Test method Refer as ANSI C63.10:2013,

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. SA set RBW = 3kHz, VBW = 10kHz, Span = 1.5 times DTS Bandwidth (6 dB BW), Detector = Peak, Sweep Time = Auto and Trace = Max hold.
4. The path loss were compensated to the results for each measurement by SA.
5. Mark the maximum level.
6. Measure and record the result of power spectral density. in the test report.

4.4.3 Test Setup



Report No.: TMWK2305001705KR

4.4.4 Test Result

Temperature: 22.3 ~ 25.4°C

Test date: June 9 ~ 16, 2023

Humidity: 57 ~ 61% RH

Tested by: Allen Shen

POWER DENSITY 802.11b				
Freq. (MHz)	Ch0 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-4.32	-4.32	8.00	PASS
2437	-1.79	-1.79	8.00	PASS
2462	-5.44	-5.44	8.00	PASS

POWER DENSITY 802.11g				
Freq. (MHz)	Ch0 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-10.044	-10.044	8.00	PASS
2437	-3.68	-3.68	8.00	PASS
2462	-9.13	-9.13	8.00	PASS

POWER DENSITY 802.11n HT20				
Freq. (MHz)	Ch0 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2412	-10.257	-10.257	8.00	PASS
2437	-3.85	-3.85	8.00	PASS
2462	-10.03	-10.03	8.00	PASS

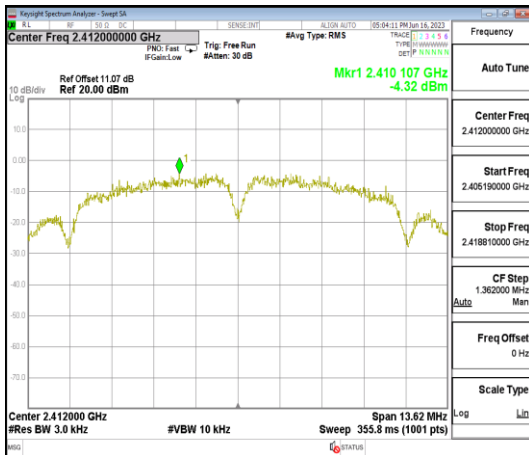
POWER DENSITY 802.11n HT40				
Freq. (MHz)	Ch0 PSD	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
2422	-16.02	-16.02	8.00	PASS
2437	-14.99	-14.99	8.00	PASS
2452	-15.65	-15.65	8.00	PASS

Report No.: TMWK2305001705KR

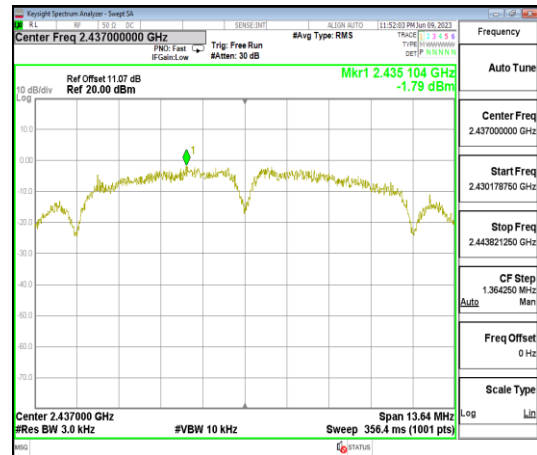
Test Data:

IEEE 802.11b mode

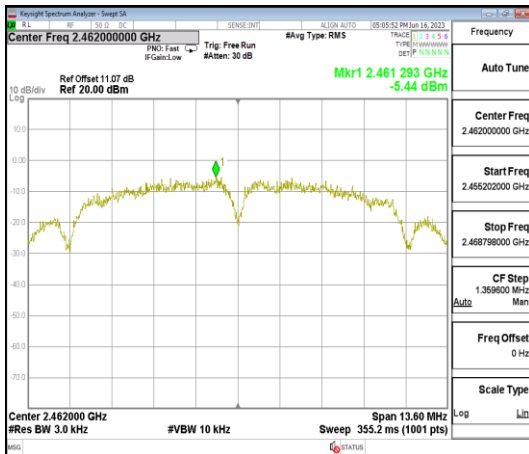
Low CH



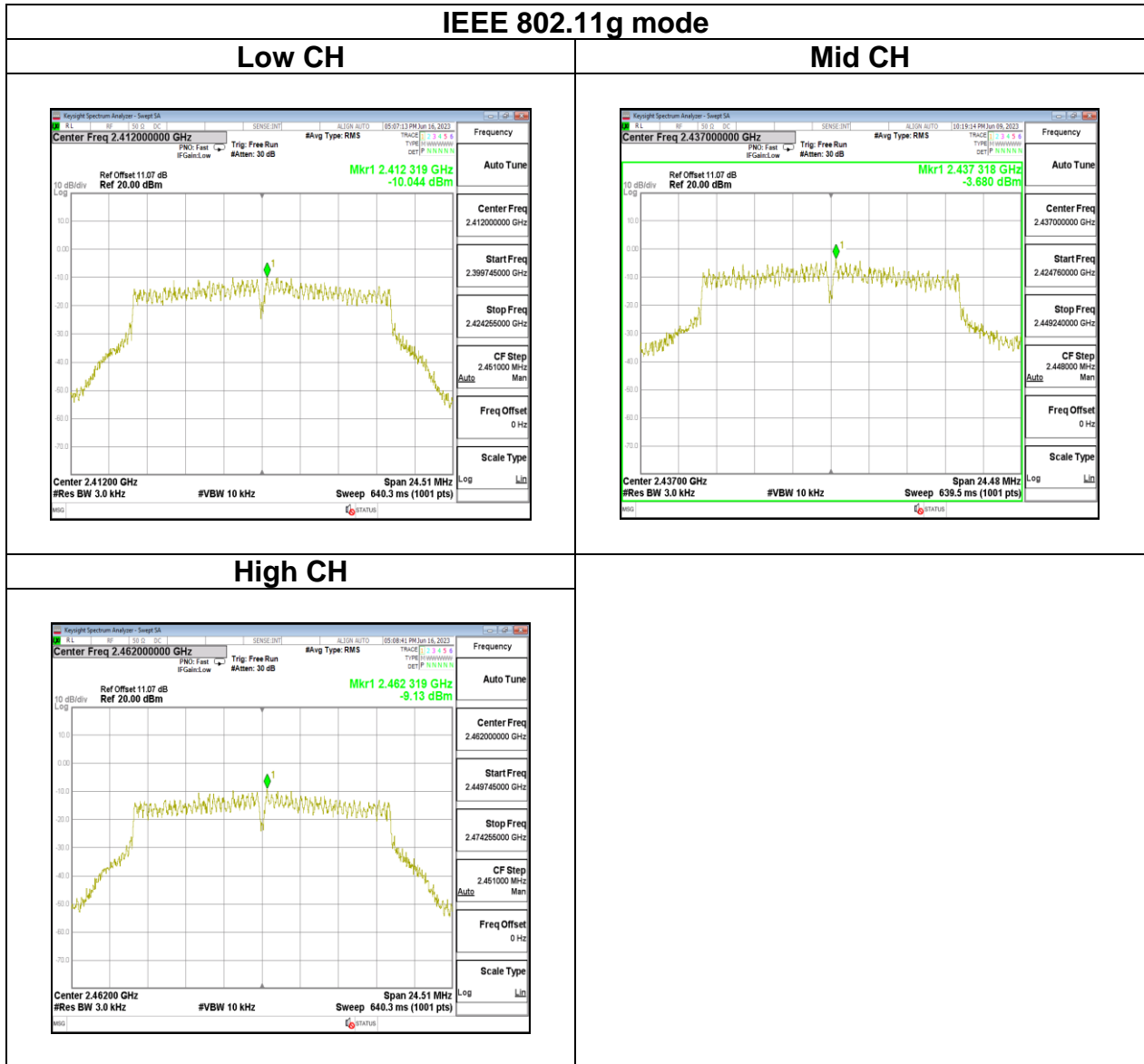
Mid CH

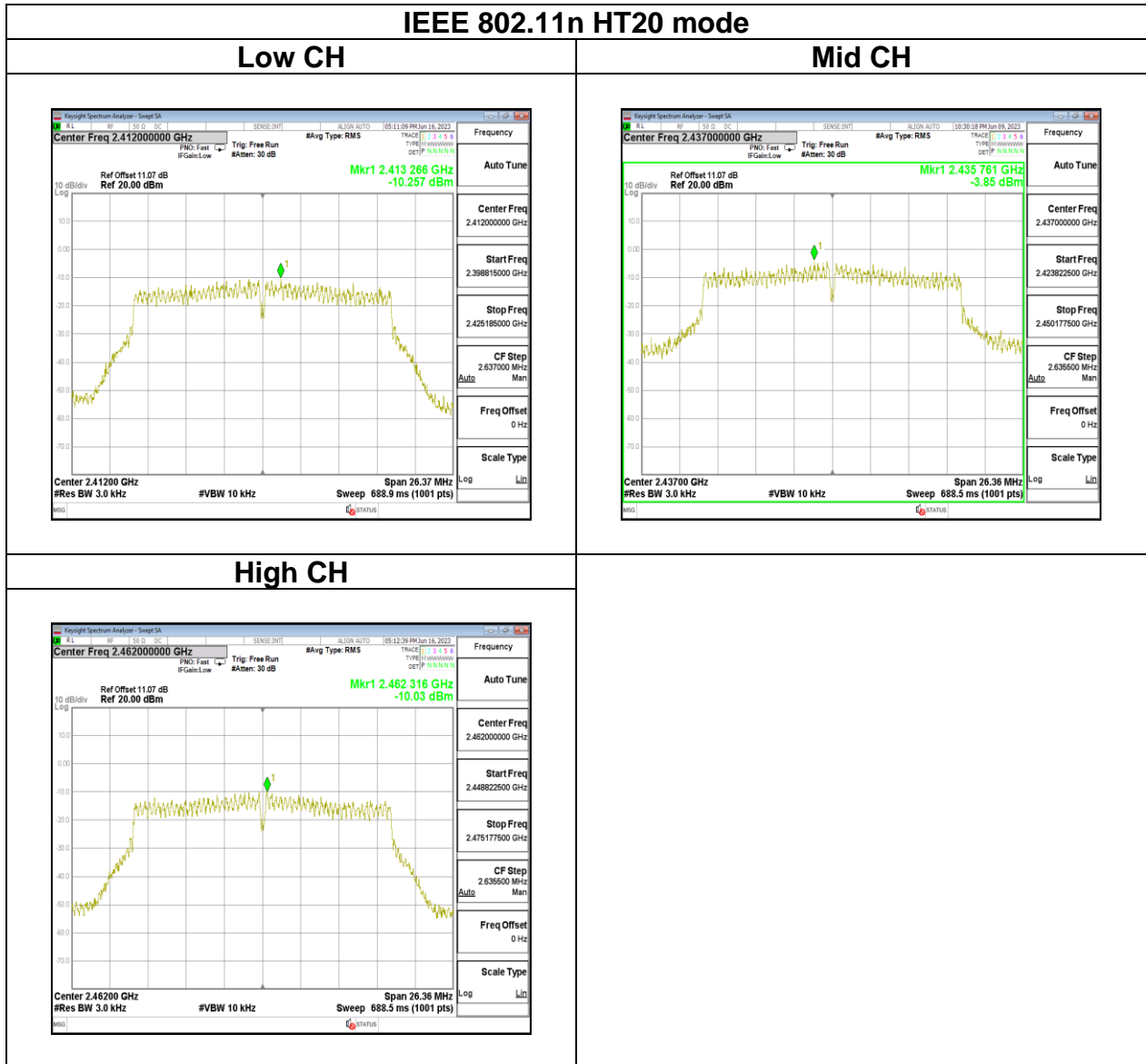


High CH

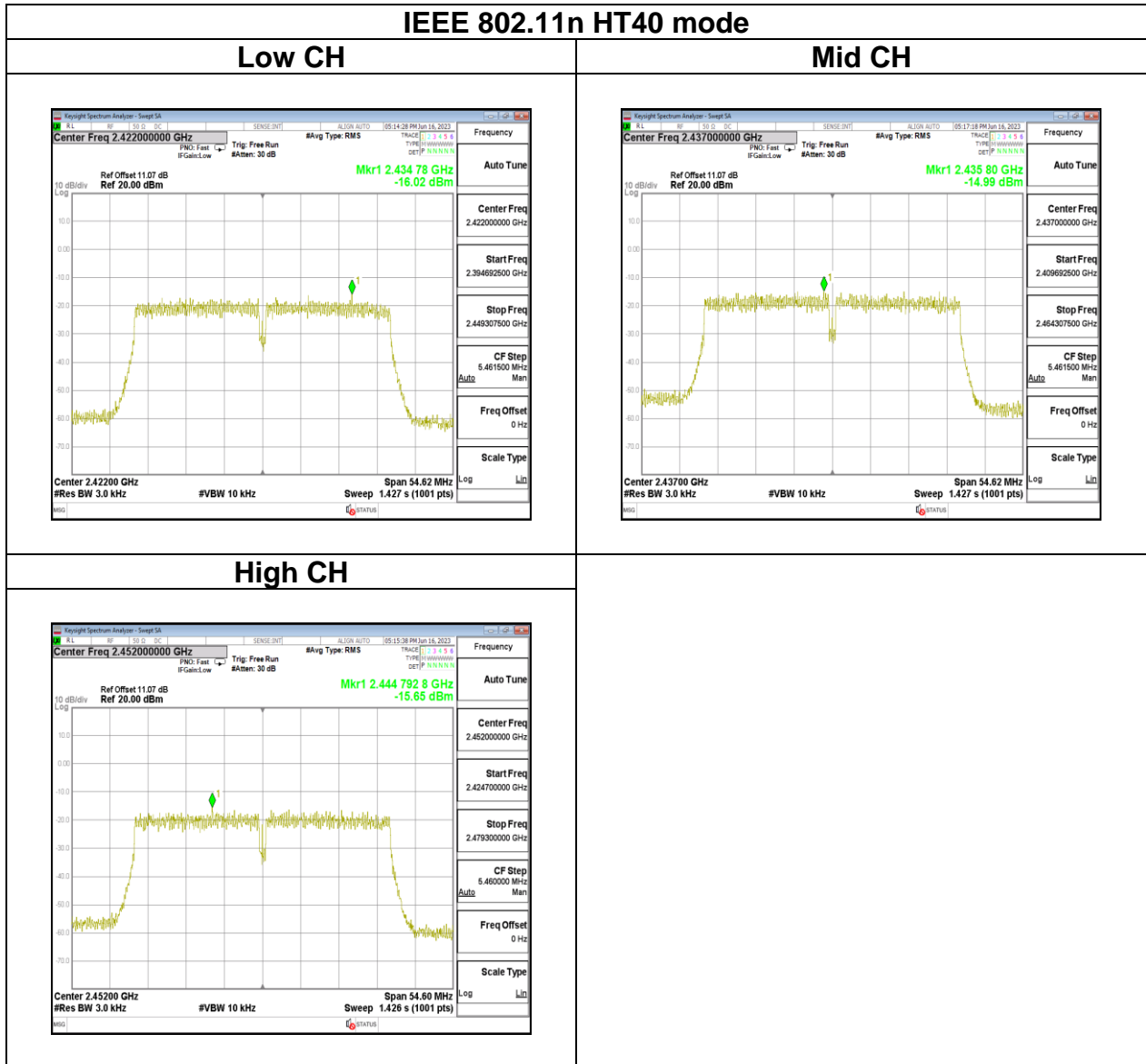


Report No.: TMWK2305001705KR





Report No.: TMWK2305001705KR



4.5 CONDUCTED BANDEDGE AND SPURIOUS EMISSION

4.5.1 Test Limit

According to §15.247(d),

In any 100 kHz bandwidth outside the authorized frequency band,

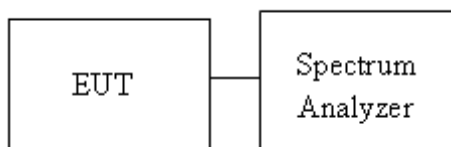
Non-restricted bands shall be attenuated at least 20 dB/30 dB relative to the maximum PSD level in 100 kHz by RF conducted or a radiated measurement which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

4.5.2 Test Procedure

Test method Refer as ANSI C63.10:2013.

1. EUT RF output port connected to the SA by RF cable, and the path loss was compensated to result.
2. SA setting, RBW=100kHz, VBW=300kHz, Detector=Peak, Trace mode = max hold, SWT = Auto.
3. In any 100 kHz bandwidth outside the authorized frequency band, shall be attenuated at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when conducted power procedure is used. 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.

4.5.3 Test Setup



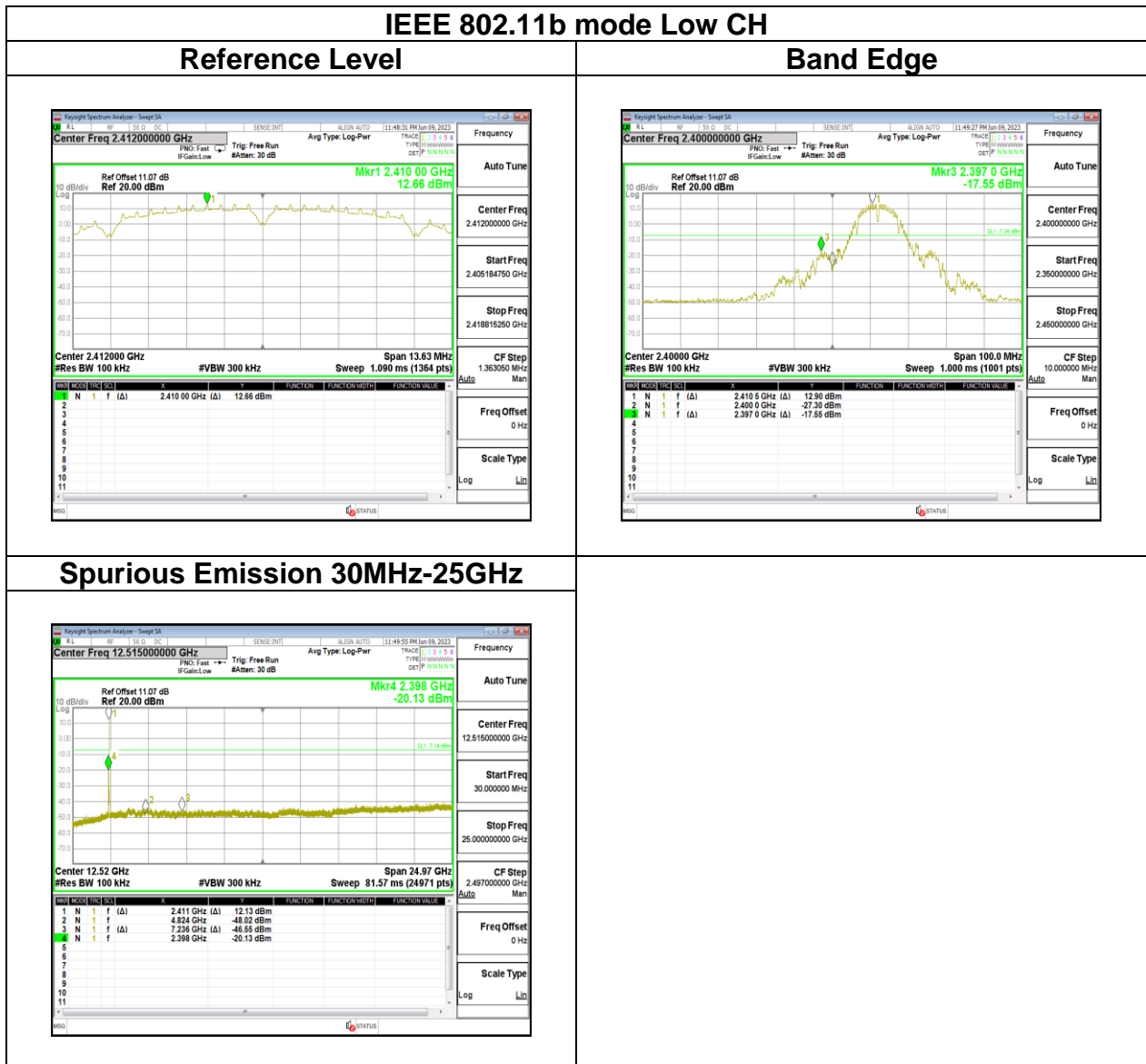
Report No.: TMWK2305001705KR

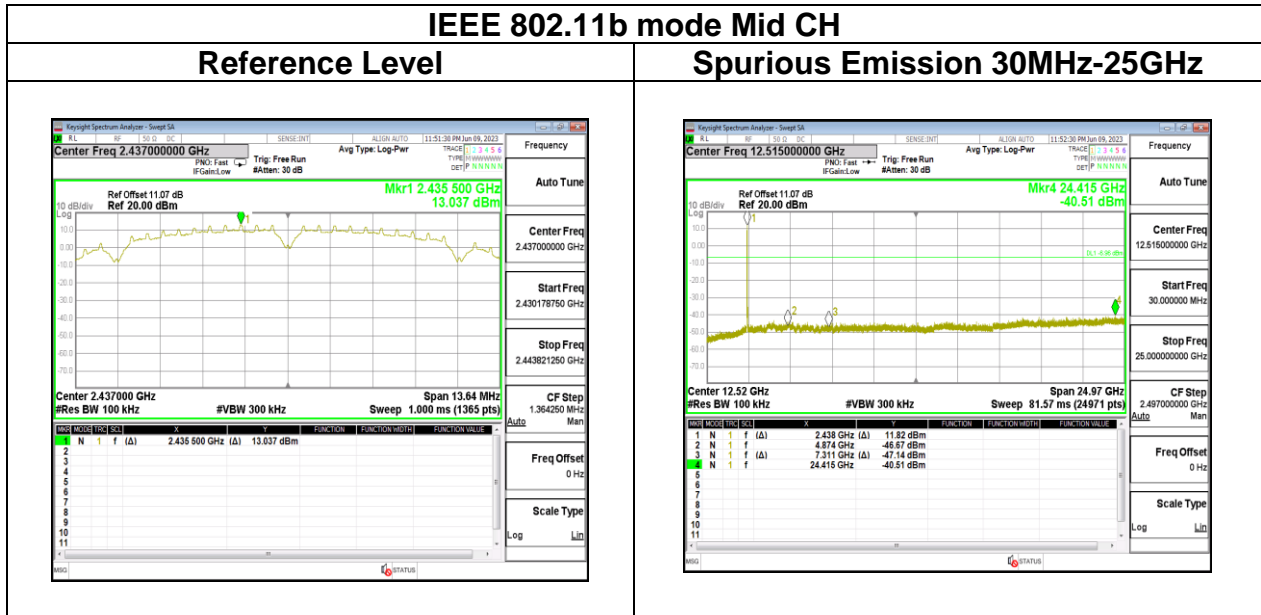
4.5.4 Test Result

Temperature: 22.3 ~ 25.4°C
Humidity: 57 ~ 61% RH

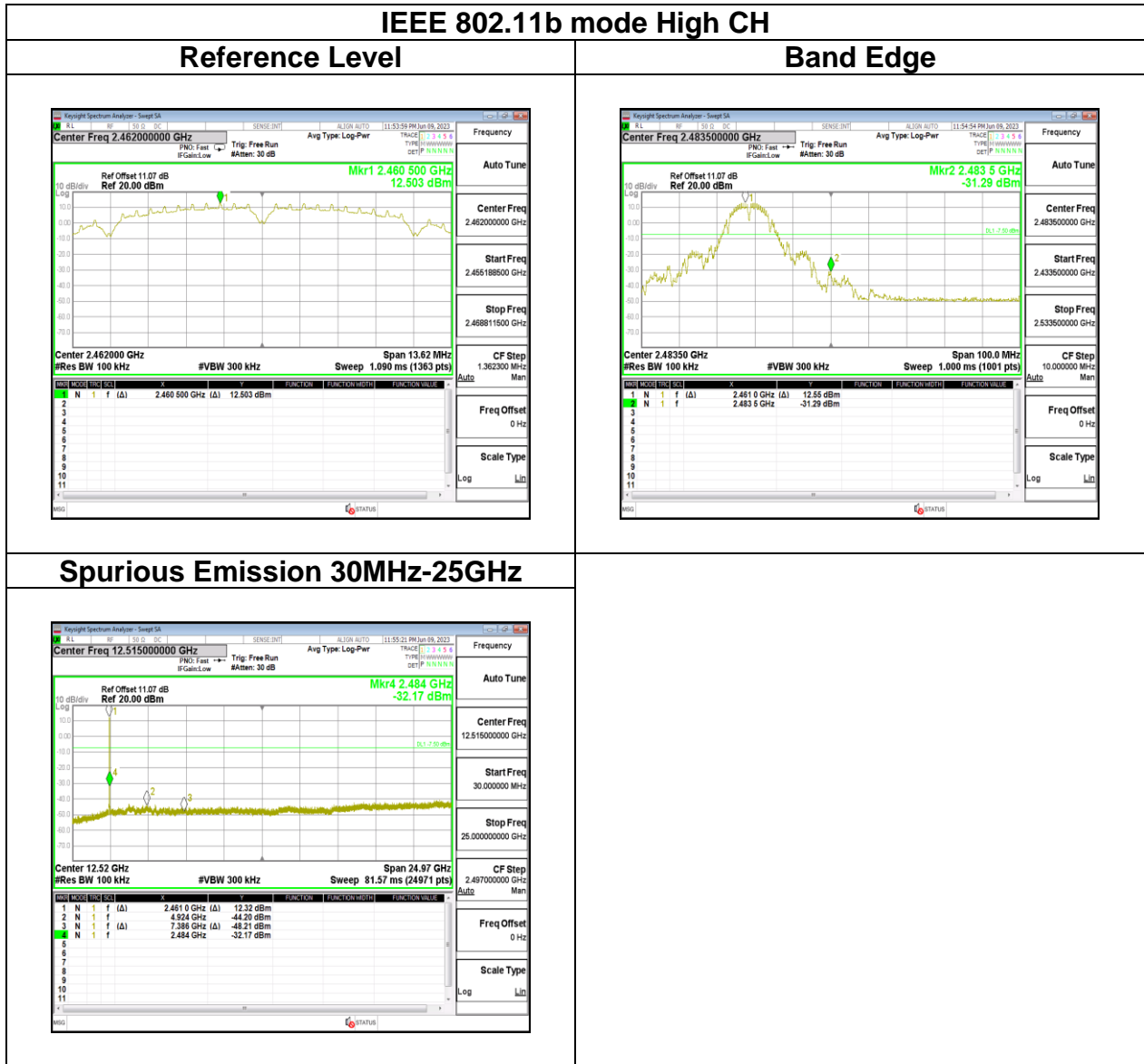
Test date: June 9 ~ August 8, 2023
Tested by: Allen Shen

Test Data

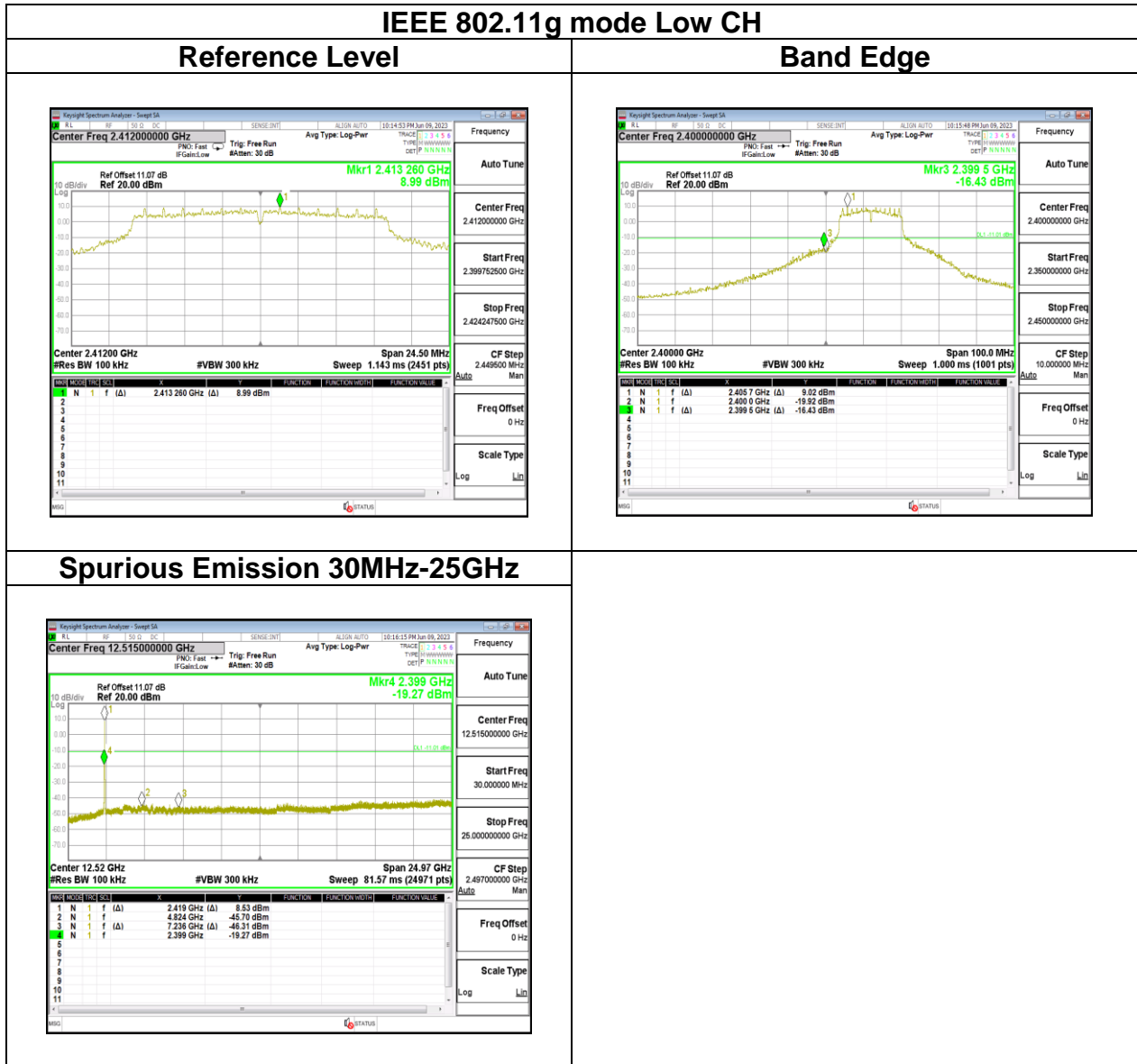




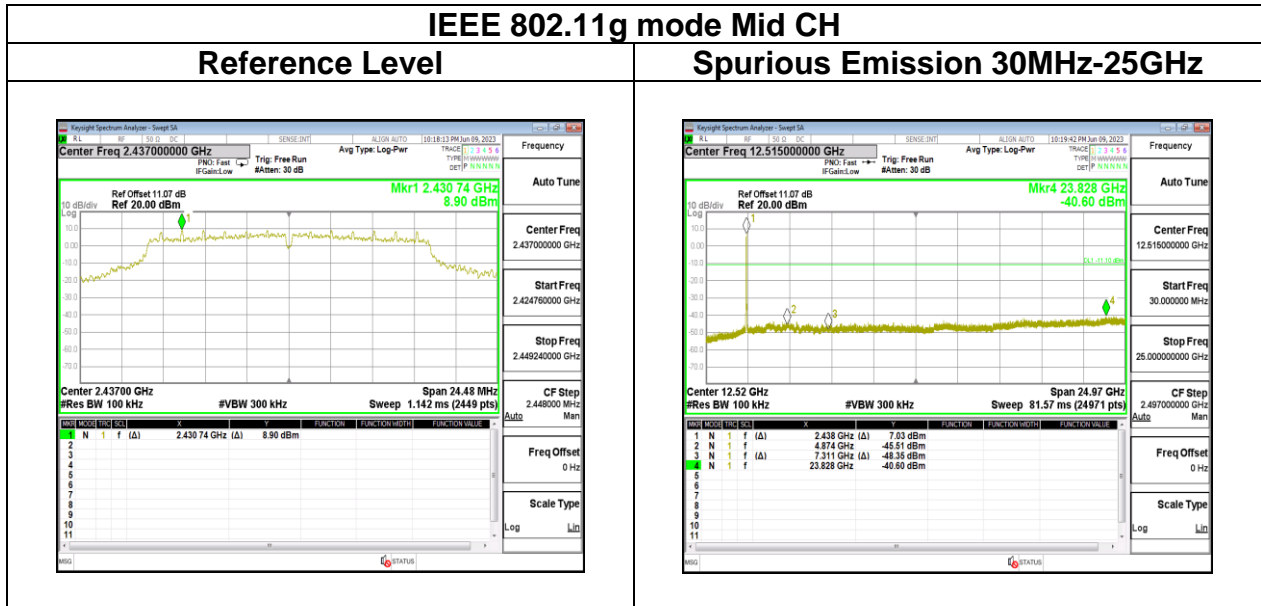
Report No.: TMWK2305001705KR

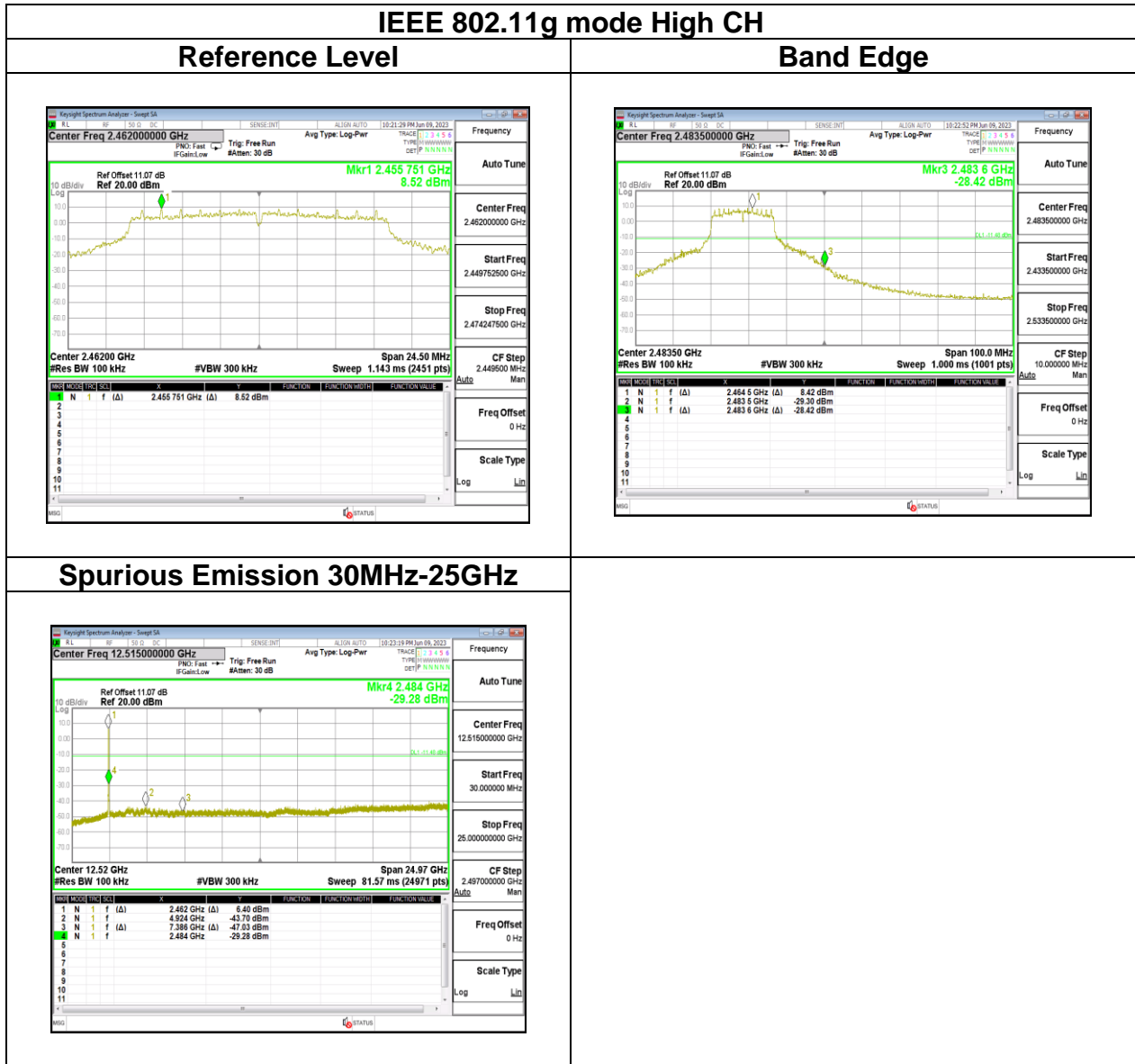


Report No.: TMWK2305001705KR

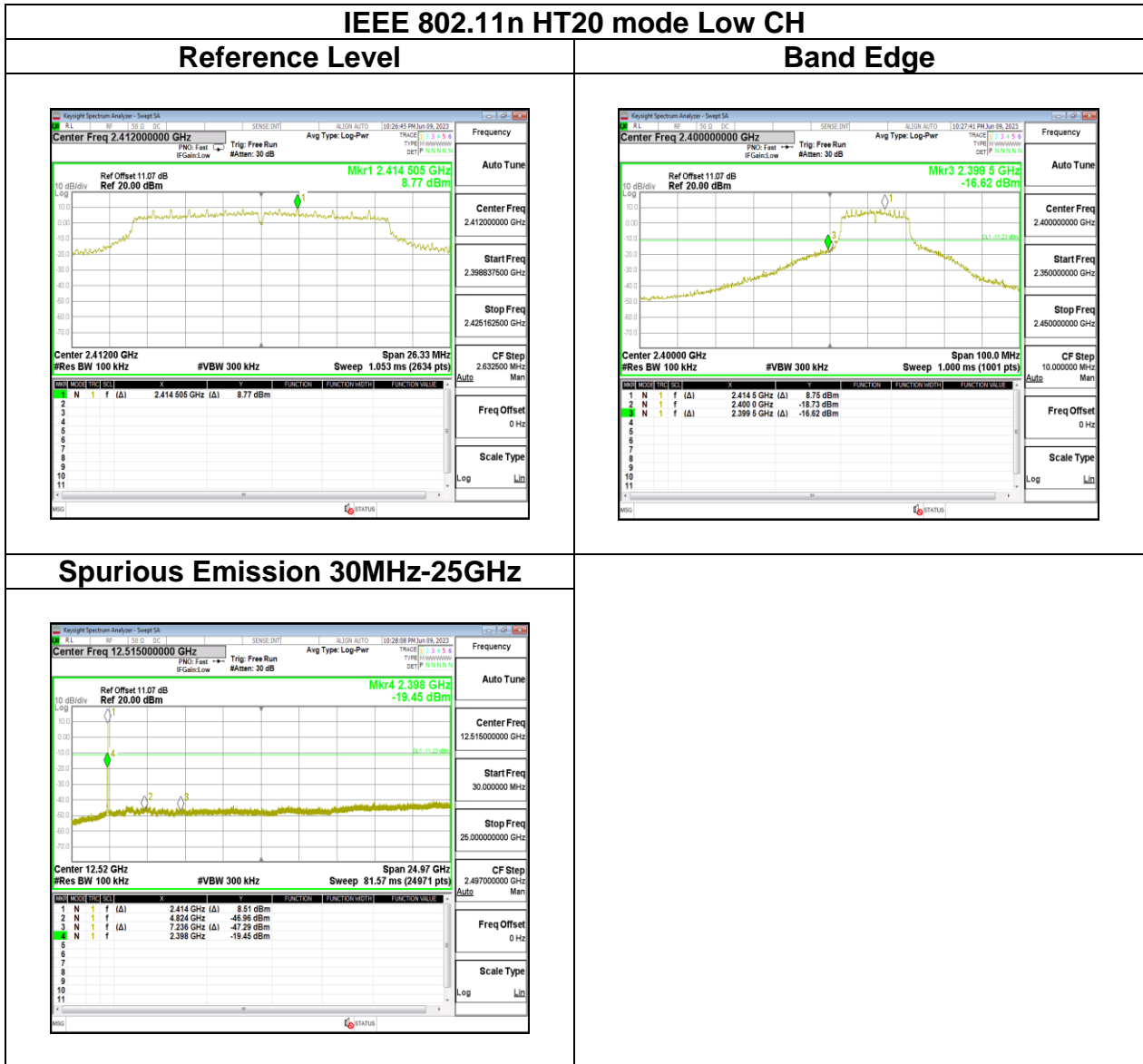


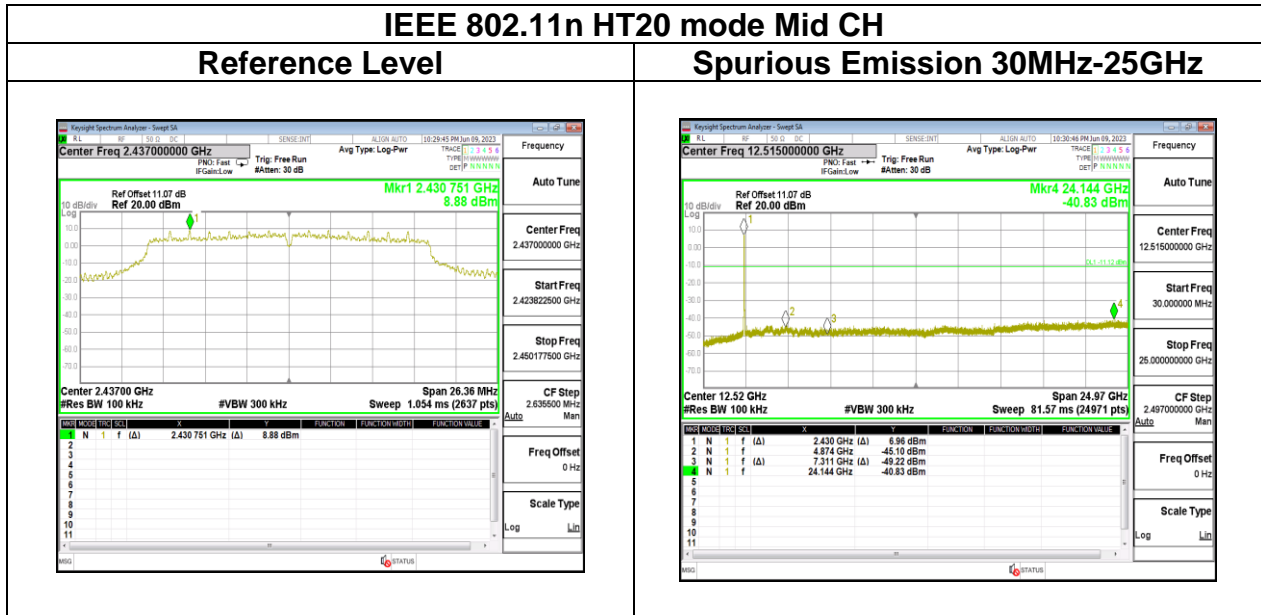
Report No.: TMWK2305001705KR





Report No.: TMWK2305001705KR





Report No.: TMWK2305001705KR

