



FCC Test Report

Report No: FCS202312062W02

Issued for

Applicant:	Shenzhen shentaian Digital Techno logy Co.Ltd
Address:	Fucheng Street, Longhua District, Shenzhen Room 201, Building 14, No. 121, Xi Keng Road ShenZhen
Product Name:	Projector
Brand Name:	Lonnovix TOPBEN
Model Name:	L8
Series Model:	L8Pro, L9, L1120, L1121, L1130, V6, V6Pro, V7, V8
FCC ID:	2AYTD-L8
Issued By: Flux Compliance Service Laboratory Add: Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan Tel: 769-27280901 Fax:769-27280901 http://www.FCS-lab.com	

TEST RESULT CERTIFICATION

Applicant's Name.....: Shenzhen shentaian Digital Technology Co.Ltd

Address.....: Fucheng Street, Longhua District, Shenzhen Room 201, Building 14, No. 121, Xi Keng Road ShenZhen

Manufacture's Name.....: Shenzhen shentaian Digital Technology Co.Ltd

Address.....: Fucheng Street, Longhua District, Shenzhen Room 201, Building 14, No. 121, Xi Keng Road ShenZhen

Product Description

Product Name.....: Projector

Model Name.....: Lonnovix TOPBEN

Brand Name.....: L8

Series Model.....: L8Pro, L9, L1120, L1121, L1130, V6, V6Pro, V7, V8

Test Standards.....: FCC Part15.247

Test Procedure.....: ANSI C63.10-2013

This device described above has been tested by Flux Compliance Service Laboratory, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

This report shall not be reproduced except in full, without the written approval of Flux Compliance Service Laboratory, this document may be altered or revised by Flux Compliance Service Laboratory, personal only, and shall be noted in the revision of the document..

Date of Test.....:

Date (s) of performance of tests.: Dec 19, 2023 ~ Jan 16, 2024

Date of Issue.....: Jan 18, 2024

Test Result.....: Pass

Tested by : Scott Shen
(Scott Shen)

Reviewed by : Duke Qian
(Duke Qian)

Approved by : Jack Wang
(Jack Wang)



Table of Contents	Page
1. SUMMARY OF TEST RESULTS	6
1.1 TEST FACTORY	7
1.2 MEASUREMENT UNCERTAINTY	7
2. GENERAL INFORMATION	8
2.1 GENERAL DESCRIPTION OF THE EUT	8
2.2 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
2.3 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS	10
2.4 EQUIPMENTS LIST	12
3. 6DB BANDWIDTH	13
3.1 Limit	13
3.2 Test Procedure	13
3.3 Test setup	13
3.4 Test results	14
4 CONDUCTED OUTPUT POWER	17
4.1 limit	17
4.2 test procedure	17
4.3 TEST SETUP	17
4.5 test results	17
5. POWER SPECTRAL DENSITY	18
5.1 LIMIT	18
5.2 TEST PROCEDURE	18
5.3 TEST SETUP	18
5.4 TEST RESULTS	19
5.5 original test data	20
6. Band edge and spurious(conducted)	22
6.1 LIMIT	22
6.2 TEST PROCEDURE	22
6.3 TEST SETUP	22
6.5 TEST RESULTS	23
6.5 Original test data	23

Table of Contents	Page
802.11b Low CH	23
6.6 Spurious emissions 30MHz-25GHz	25
7 RADIATED EMISSION MEASUREMENT	27
8 CONDUCTED EMISSION TEST	52
9. ANTENNA REQUIREMENT	56
9.1 STANDARD REQUIREMENT	56
9.2 RESULT	56

Revision History

Rev.	Issue Date	Effect Page	Contents
00	Jan 18, 2024	N/A	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 15.247 Meas Guidance v05r02

FCC Part 15.247, Subpart C			
Standard Section	Test Item	Judgment	Remark
FCC 15.247 (a) (2)	6dB Bandwidth	PASS	--
FCC 15.247 (b) (3)	Conducted Output Power	PASS	--
FCC 15.247 (e)	Power Spectral Density	PASS	--
FCC 15.247 (d)	Band-edge and Spurious Emissions (Conducted)	PASS	--
FCC 15.247 (d) FCC 15.209 FCC 15.205	Radiated Spurious Emissions	PASS	--
FCC 15.247 (d) FCC 15.209 FCC 15.205	Radiated Band Edge Compliance	PASS	--
FCC 15.207	Power Line Conducted Emission	PASS	--
FCC 15.203	Antenna requirement	PASS	--
15.205	Restricted Band Edge Emission	PASS	--

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report
- (2) All tests are according to ANSI C63.10-2013

1.1 TEST FACTORY

Company Name:	Flux Compliance Service Laboratory
Address:	Room 105 Floor Bao hao Technology Building 1 NO.15 Gong ye West Road Hi-Tech Industrial, Song shan lake Dongguan
Telephone:	+86-769-27280901
Fax:	+86-769-27280901
Laboray Accreditations:	
FCC Test Firm Registration Number:	514908
CNAS Number:	L15566
Designation number:	CN0127
A2LA accreditation number:	5545.01
ISED Number:	25801
CAB ID:	CN0097

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95 %**.

No.	Item	Uncertainty
1	RF output power, conducted	$\pm 0.71 \text{ dB}$
2	Unwanted Emissions, conducted	$\pm 2.988 \text{ dB}$
3	Conducted Emission (9KHz-150KHz)	$\pm 4.13 \text{ dB}$
4	Conducted Emission (150KHz-30MHz)	$\pm 4.74 \text{ dB}$
5	All emissions radiated (9KHz -30MHz)	$\pm 3.1 \text{ dB}$
6	All emissions,radiated(<1G) 30MHz-1000MHz	$\pm 5.2 \text{ dB}$
7	All emissions,radiated 1GHz -18GHz	$\pm 4.66 \text{ dB}$
8	All emissions,radiated 18GHz -40GHz	$\pm 4.31 \text{ dB}$
9	Occupied bandwidth	$\pm 0.3 \text{ dB}$
10	Power Spectral Density	$\pm 0.48 \text{ dB}$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Projector
Trade Name	Lonnovix TOPBEN
Model Name	L8
Series Model	L8Pro, L9, L1120, L1121, L1130, V6, V6Pro, V7, V8
Model Difference	The above product with same circuit, PCB layout, electrical parts, materials and wiring structures, the materials of decorative accessories is same, For the product appearance difference, the size is the same, but the color of the product is different
Channel List	Please refer to the Note 2.
Operation frequency	IEEE 802.11b: 2412MHz-2462MHz IEEE 802.11g: 2412MHz-2462MHz IEEE 802.11n HT20: 2412MHz-2462MHz IEEE 802.11n HT40: 2422MHz-2452MHz
Modulation:	IEEE 802.11b: DSSS (CCK, QPSK, BPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20, HT40: OFDM (64QAM, 16QAM, QPSK, BPSK)
Transmitter rate:	IEEE 802.11b: 1, 2, 5.5, 11 Mbps IEEE 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps IEEE 802.11n HT20: up to 20MHz max 65Mbps IEEE 802.11n HT40: up to 40MHz max 135Mbps
Power supply	INPUT:AC100-240V 50/60Hz
Battery	N/A
Number of samples	FCS202312062W02
Hardware version number	V1.0
Software version number	V1.0
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

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

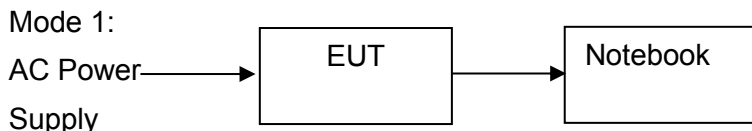
3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	Internal antenna	N/A	1.85dBi	Antenna

2.2 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Block diagram of EUT configuration for test



Test software:MTK_WiFi_test_tool.exe

The test software was used to control EUT work in continuous TX mode, and select test channel, Wireless mode as below table

Tested mode, channel, and data rate information				
Mode	Setting Tx Power	data rate (Mbps) (see Note)	Channel	Frequency (MHz)
IEEE 802.11b	8	1	LCH: CH1	2412
	8	1	MCH: CH6	2437
	8	1	HCH: CH11	2462
IEEE 802.11g	20	6	LCH: CH1	2412
	20	6	MCH: CH6	2437
	20	6	HCH: CH11	2462
IEEE 802.11n HT20	20	MCS 8	LCH: CH1	2412
	20	MCS 8	MCH: CH6	2437
	20	MCS 8	HCH: CH11	2462
IEEE 802.11n HT40	20	MCS 8	LCH: CH3	2422
	20	MCS 8	MCH: CH6	2437
	20	MCS 8	HCH: CH9	2452

Note:

- (1) According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test,
- (2) During the test, the dutycycle>98%, the test voltage was tuned from 85% to 115% of the Nominal rate supply votage, and found that the worst case was the nominal rated supply condition, So the report just shows that condition's data

2.3 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
1	notebook	Lenovo	E495	N/A	Test using

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
1	N/A	N/A	N/A	N/A	N/A

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.4 EQUIPMENTS LIST

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESRP 3	FCS-E001	2023. 08.29	2024. 08.28
Signal Analyzer	R&S	FSV40-N	FCS-E012	2023. 08.29	2024. 08.28
Active loop Antenna	ZHINAN	ZN30900C	FCS-E013	2023. 08.29	2024. 08.28
Bilog Antenna	SCHWARZBECK	VULB 9168	FCS-E002	2023. 08.29	2024. 08.28
Horn Antenna	SCHWARZBECK	BBHA 9120D	FCS-E003	2023. 08.29	2024. 08.28
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	FCS-E018	2023. 08.29	2024. 08.28
Pre-Amplifier(0.1M-3G Hz)	EMCI	EM330N	FCS-E004	2023. 08.29	2024. 08.28
Pre-Amplifier (1G-18GHz)	N/A	TSAMP-0518SE	FCS-E014	2023. 08.29	2024. 08.28
Pre-Amplifier (18G-40GHz)	TERA-MW	TRLA-0400	FCS-E019	2023. 08.29	2024. 08.28
Temperature & Humidity	HTC-1	victor	FCS-E005	2023. 08.29	2024. 08.28

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	FCS-E020	2023. 08.29	2024. 08.28
LISN	R&S	ENV216	FCS-E007	2023. 08.29	2024. 08.28
LISN	ETS	3810/2NM	FCS-E009	2023. 08.29	2024. 08.28
Temperature & Humidity	HTC-1	victor	FCS-E008	2023. 08.29	2024. 08.28

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
MXA SIGNAL Analyzer	Keysight	N9020A	FCS-E015	2023. 08.29	2024. 08.28
Spectrum Analyzer	Agilent	E4447A	MY50180039	2023. 08.29	2024. 08.28
Spectrum Analyzer	R&S	FSV-40	101499	2023. 08.29	2024. 08.28
Power Sensor	Agilent	UX2021XA	FCS-E021	2023. 08.29	2024. 08.28

3. 6DB BANDWIDTH

3.1 Limit

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz

3.2 Test Procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Set the spectrum analyzer as follows

RBW: 100kHz

VBW: 300kHz

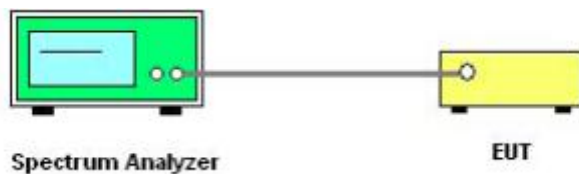
Detector Mode: Peak

Sweep time: auto

Trace mode Max hold

(3) Allow the trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

3.3 Test setup

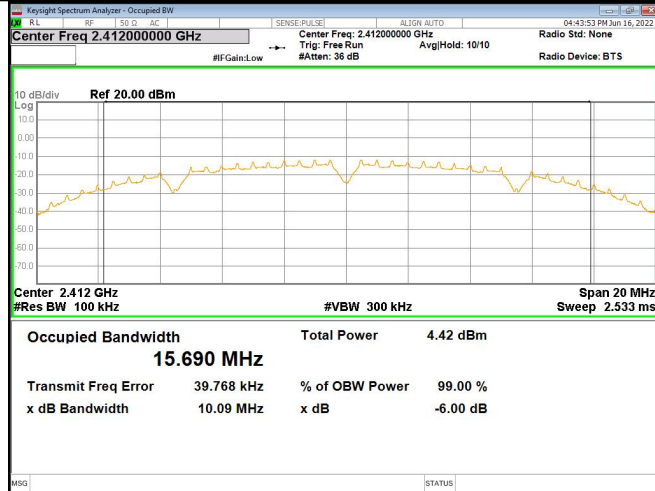


3.4 Test results

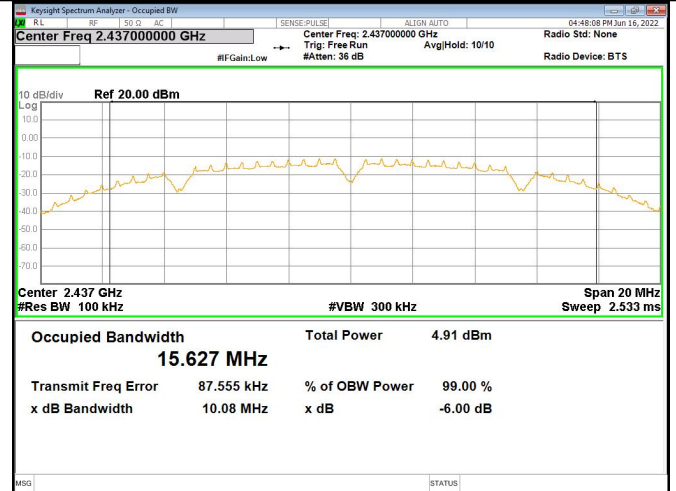
TestMode	Channel (MHz)	6dB Bandwidth (MHz)	Limit [MHz]	Verdict
802.11b	2412MHz	10.09	0.5	Pass
802.11b	2437MHz	10.08	0.5	Pass
802.11b	2462MHz	10.09	0.5	Pass
802.11g	2412MHz	16.32	0.5	Pass
802.11g	2437MHz	16.30	0.5	Pass
802.11g	2462MHz	16.31	0.5	Pass
802.11n 20	2412MHz	17.25	0.5	Pass
802.11n 20	2437MHz	15.97	0.5	Pass
802.11n 20	2462MHz	16.88	0.5	Pass
802.11n 40	2422MHz	36.01	0.5	Pass
802.11n 40	2437MHz	36.04	0.5	Pass
802.11n 40	2452MHz	35.77	0.5	Pass

3.5 Original Test Data

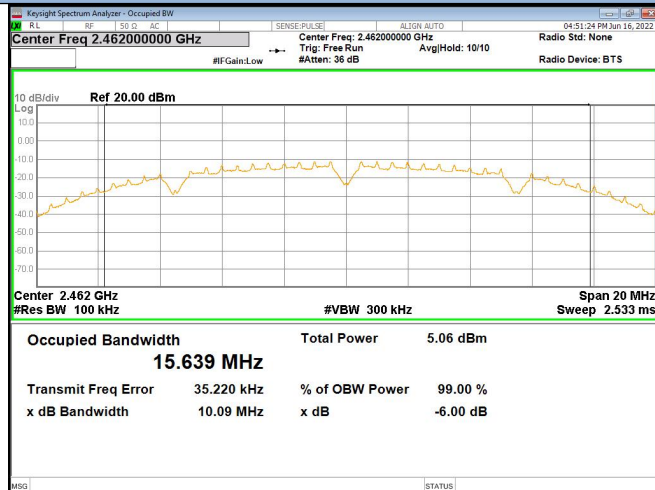
802.11b 2412 MHz



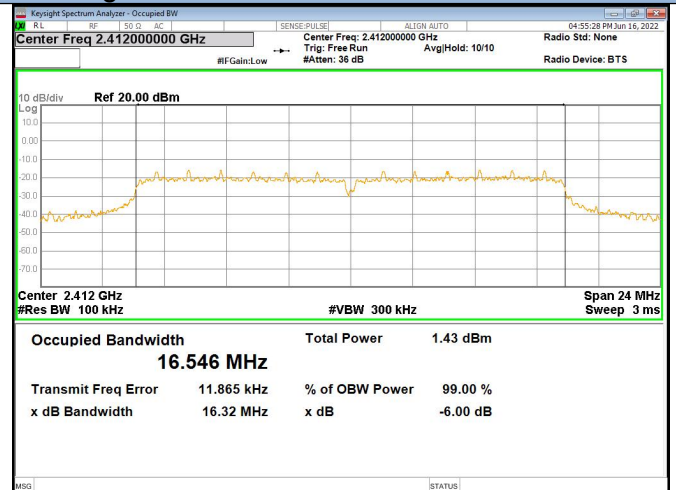
802.11b 2437 MHz



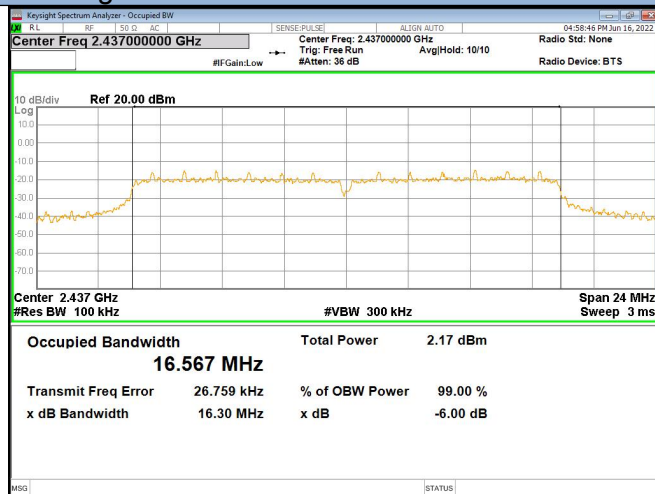
802.11b 2462 MHz



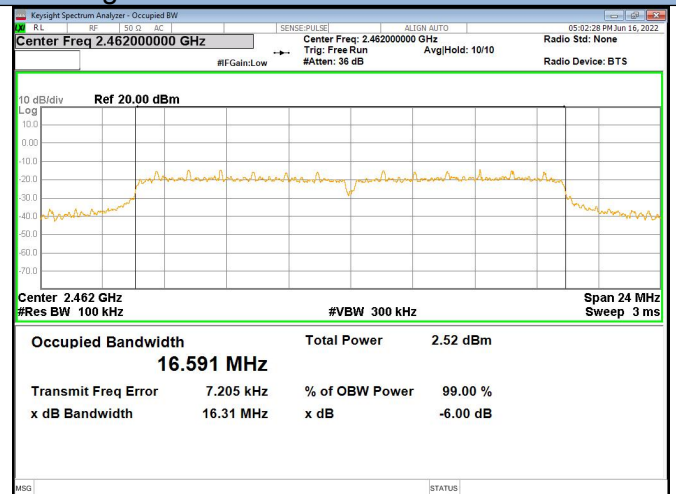
802.11g 2412 MHz



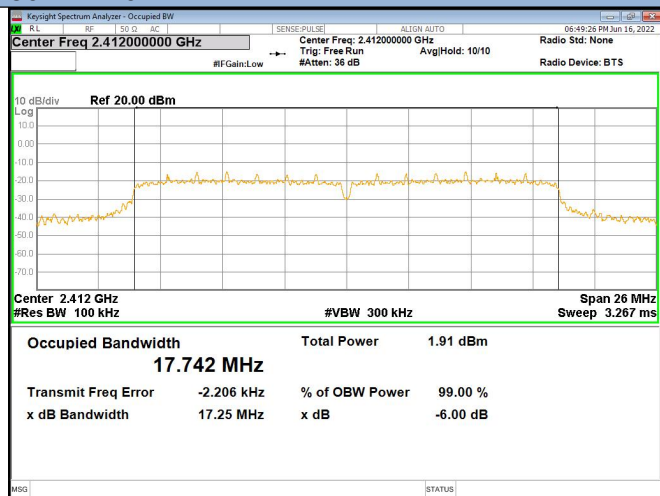
802.11g 2437 MHz



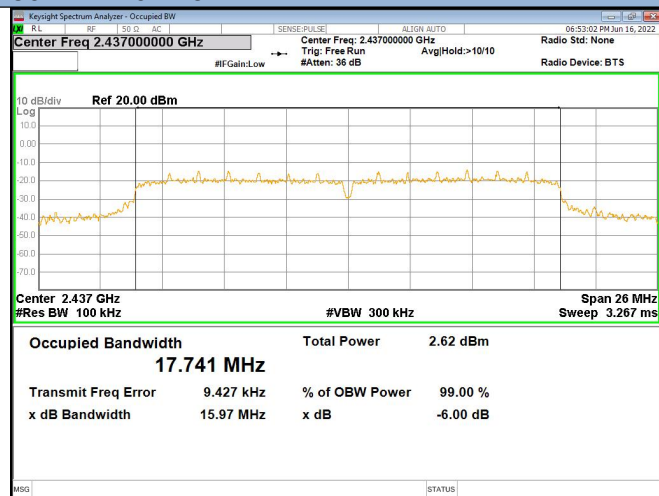
802.11g 2462 MHz



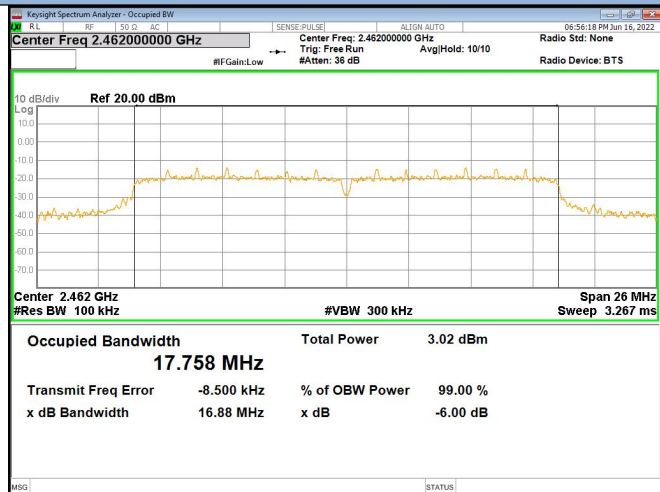
802.11 20n 2412 MHz



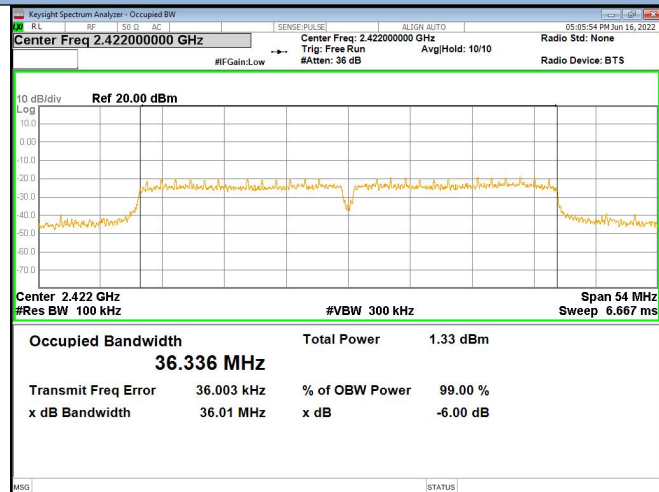
802.11n20 2437 MHz



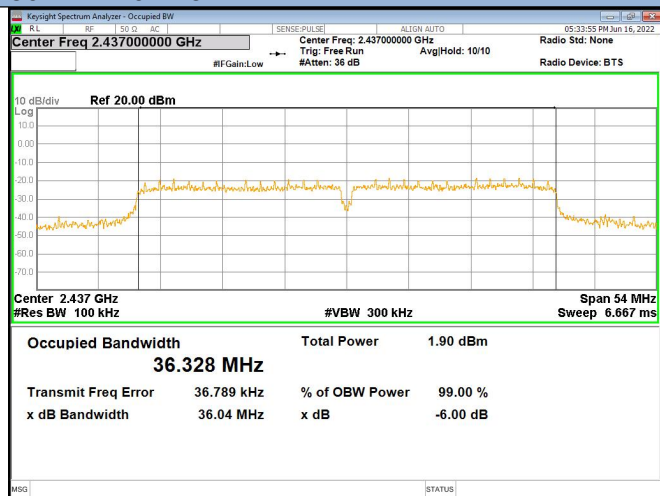
802.11n20 2462 MHz



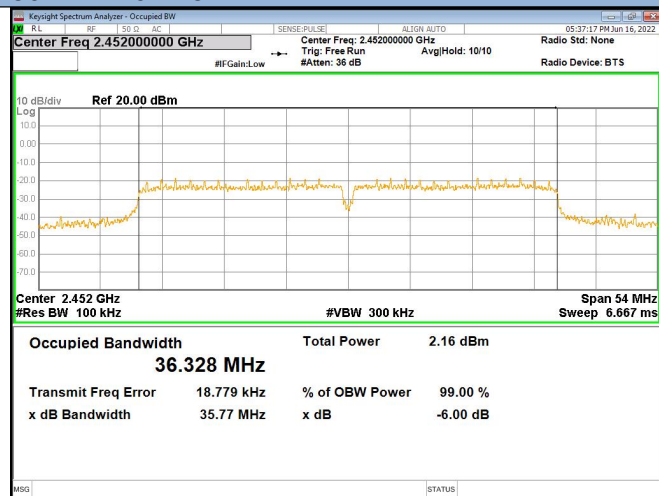
802.11n40 2422 MHz



802.11n40 2437 MHz



802.11n40 2452 MHz



4 CONDUCTED OUTPUT POWER

4.1 limit

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.2 test procedure

- Connect each EUT's antenna output to power sensor by RF cable and attenuator
- Measure the PK output power of each antenna port by power sensor.

4.3 TEST SETUP



4.5 test results

TestMode	Channel (MHz)	Result (dBm)	Limit (dBm)	Verdict
802.11b	2412MHz	12.26	30	Pass
802.11b	2437MHz	11.77	30	Pass
802.11b	2462MHz	11.95	30	Pass
802.11g	2412MHz	11.31	30	Pass
802.11g	2437MHz	11.01	30	Pass
802.11g	2462MHz	11.40	30	Pass
802.11n 20	2412MHz	11.74	30	Pass
802.11n 20	2437MHz	11.60	30	Pass
802.11n 20	2462MHz	10.78	30	Pass
802.11n 40	2422MHz	10.23	30	Pass
802.11n 40	2437MHz	10.87	30	Pass
802.11n 40	2452MHz	10.20	30	Pass

5. POWER SPECTRAL DENSITY

5.1 LIMIT

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

5.2 TEST PROCEDURE

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

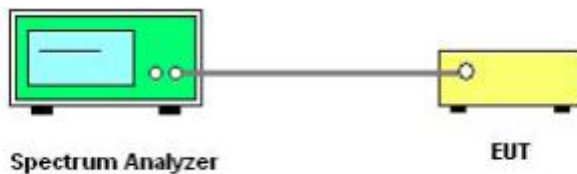
(2) Set the spectrum analyzer as follows:

Center frequency	DTS Channel center frequency
RBW:	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW:	$\geq 3\text{RBW}$
Span	1.5 times the DTS bandwidth
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

(3) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude level within the RBW

(4) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.3 TEST SETUP

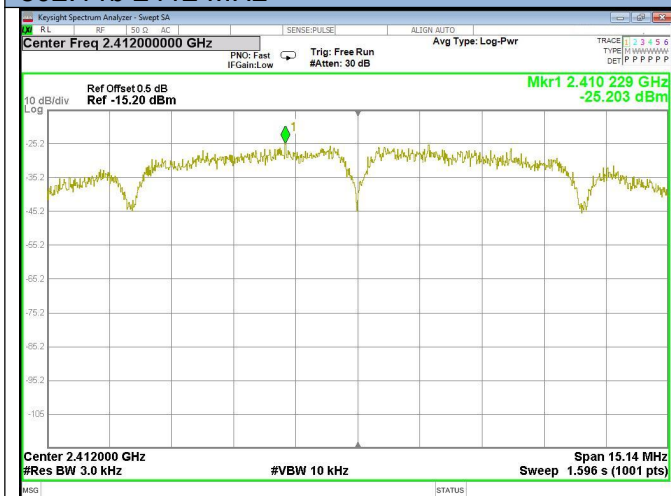


5.4 TEST RESULTS

TestMode	Channel (MHz)	Result (dBm/3KHz)	Limit (dBm/3KHz)	Verdict
802.11b	2412MHz	-25.20	8	Pass
802.11b	2437MHz	-24.25	8	Pass
802.11b	2462MHz	-23.79	8	Pass
802.11g	2412MHz	-30.30	8	Pass
802.11g	2437MHz	-29.62	8	Pass
802.11g	2462MHz	-28.63	8	Pass
802.11n 20	2412MHz	-29.77	8	Pass
802.11n 20	2437MHz	-29.21	8	Pass
802.11n 20	2462MHz	-25.20	8	Pass
802.11n 40	2422MHz	-31.62	8	Pass
802.11n 40	2437MHz	-31.18	8	Pass
802.11n 40	2452MHz	-31.20	8	Pass

5.5 original test data

802.11b 2412 MHz



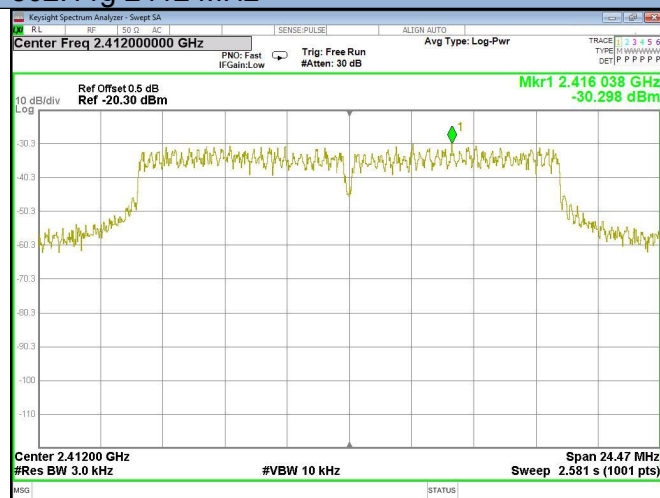
802.11b 2437 MHz



802.11b 2462 MHz



802.11g 2412 MHz



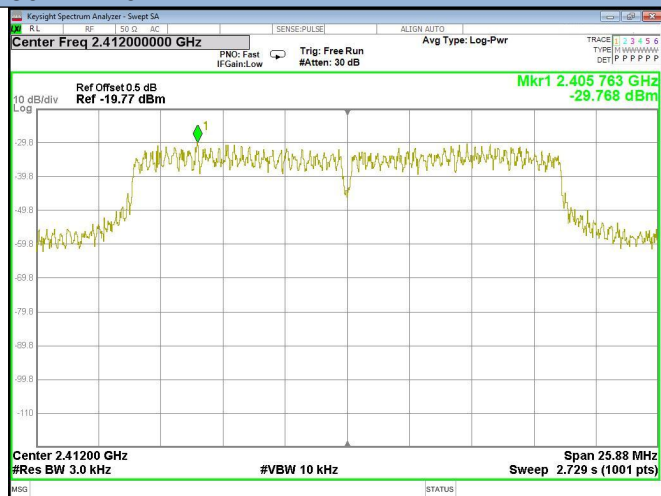
802.11g 2437 MHz



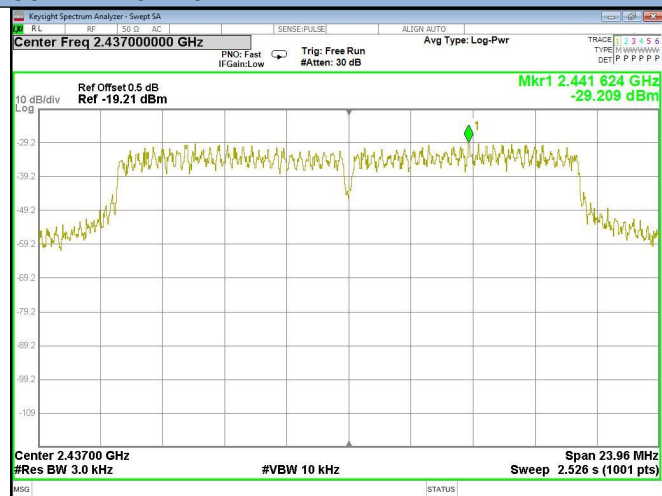
802.11g 2462 MHz



802.11 20n 2412 MHz



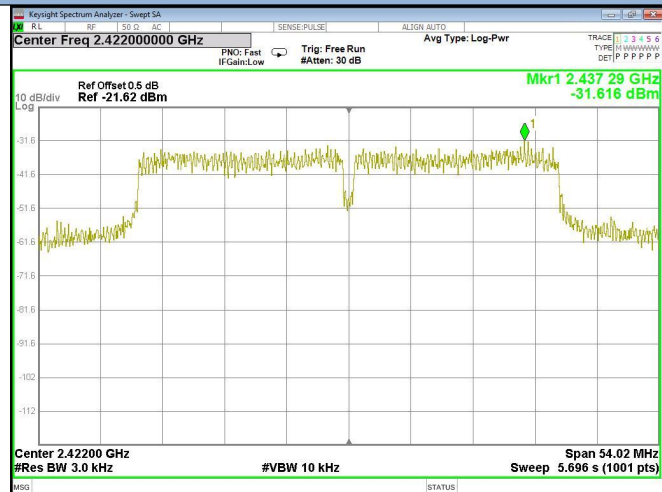
802.11n20 2437 MHz



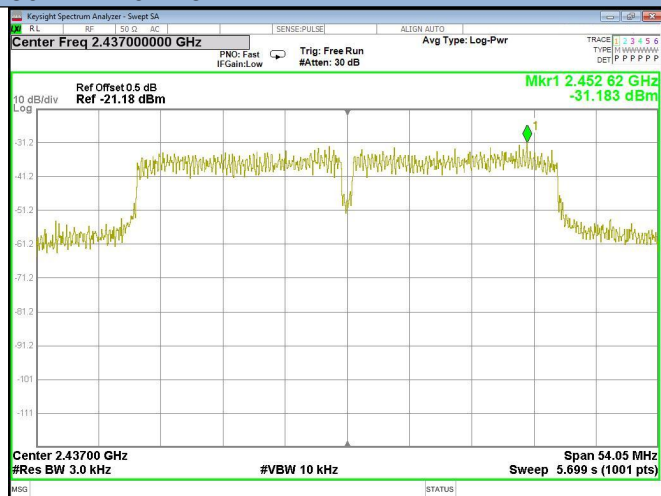
802.11n20 2462 MHz



802.11n40 2422 MHz



802.11n40 2437 MHz



802.11n40 2452 MHz

