

Report No: FCS202305137W01

Issued for

Applicant:	Suzhou Etag-Technology Corporation			
Address:	Room 236,2/F Ming De Building, No.166 Ren ai Road, Suzhou Industrial Park			
Product Name:	LCD Digital Display			
Brand Name:	ETGtag			
Model Name:	ET471A			
Series Model:	ET231A, ET350A, ET378A			
FCC ID:	2ARJ5-ET471A			
Lacrad Dru Elius Camplianas Camina Laboratani				

Issued By: Flux Compliance Service Laboratory

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Tel: 769-27280901



TEST RESULT CERTIFICATION

	Applicant's Name:	:	Suzhou Etag-Technology Corporation
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Suzhou Industrial Park

Manufacture's Name...... Suzhou Etag-Technology Corporation

Suzhou Industrial Park

Product Description

Product Name.....: LCD Digital Display

Model Name ETGtag
Brand Name ET471A

Series Model...... ET231A, ET350A, ET378A

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.

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Date of Test....:

Date (s) of performance of tests.: May 23, 2023 ~ Jun 7, 2023

Date of Issue...... Jun 7, 2023

Test Result.....: Pass

Tested by : Scott Shen

(Scott Shen)

Reviewed by : Dutedow

(Duke Qian)

Approved by :

(Jack Wang)



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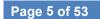


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Revision History

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Rev.	Issue Date	Effect Page	Contents
00	Jun 7, 2023	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)	Dadiated Spurious Emissions		
FCC 15.209	Radiated Spurious Emissions	PASS	
FCC 15.205			
FCC 15.247 (d)	Dadiated Dand Edge Compliance		
FCC 15.209	Radiated Band Edge Compliance	PASS	
FCC 15.205			
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	

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1.2 MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	RF output power, conducted	±0.71dB
2	Unwanted Emissions, conducted	±2.988 dB
3	Conducted Emission (9KHz-150KHz)	±4.13 dB
4	Conducted Emission (150KHz-30MHz)	±4.74 dB
5	All emissions radiated (9KHz -30MHz)	±3.1 dB
6	All emissions,radiated(<1G) 30MHz-1000MHz	\pm 5.2 dB
7	All emissions,radiated 1GHz -18GHz	±4.66 dB
8	All emissions,radiated 18GHz -40GHz	±4.31 dB

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	LCD Digital Display
Trade Name	ETGtag
Model Name	ET471A
Series Model	ET231A, ET350A, ET378A
Model Difference	The above products have the same circuit, PCB layout, electrical components, materials, circuit structure, and materials of decorative accessories, but with different shapes, sizes, and colors.
Channel List	Please refer to the Note 2.
	IEEE 802.11b: 2412MHz-2462MHz
Operation frequency	IEEE 802.11g: 2412MHz-2462MHz
	IEEE 802.11n HT20: 2412MHz-2462MHz
	IEEE 802.11b: DSSS (CCK, QPSK, BPSK)
Modulation:	IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20,: OFDM (64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11b: 1, 2, 5.5, 11 Mbps
Transmitter rate:	IEEE 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
	IEEE 802.11n HT20: up to 20MHz max 65Mbps, 40MHz max
Power supply	INPUT:AC 100-240V 50/60Hz 0.6A Max OUTPUT: DC12V=2.0A
Battery	N/A
Number of samples	FCS202305137
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	0.38dBi	Antenna

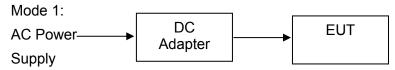
4

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.

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Block diagram of EUT configuration for test



Test software: the sscom5.13.1.exe

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

Mode	Setting Tx Power	data rate (Mbps) (see Note)	Channel	Frequency (MHz)
	8	1	LCHCH1	2412
IEEE 802.11b	8	1	MCH: CH6	2437
	8	1	HCH:CH11	2462
	20	6	LCH: CH1	2412
IEEE 802.11g	20	6	MCH: CH6	2437
	20	6	HCH: CH11	2462
	20	MCS8	LCH:CH1	2412
EEE 802.11n HT20	20	MCS8	MCH: CH6	2437
	20	MCS8	HCHCH11	2462

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	Adapter	N/A	MYX-1202000CP	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 <code>[Length]</code> 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	2022. 08.30	2023. 08.29
Signal Analyzer	R&S	FSV40-N	FCS-E012	2022. 08.30	2023. 08.29
Active loop Antenna	ZHINAN	ZN30900C	FCS-E013	2022. 08.30	2023. 08.29
Bilog Antenna	SCHWARZBECK	VULB 9168	FCS-E002	2022. 08.30	2023. 08.29
Horn Antenna	SCHWARZBECK	BBHA 9120D	FCS-E003	2022. 08.30	2023. 08.29
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	FCS-E018	2022. 08.30	2023. 08.29
Pre-Amplifier(0.1M-3G Hz)	EMCI	EM330N	FCS-E004	2022. 08.30	2023. 08.29
Pre-Amplifier (1G-18GHz)	N/A	TSAMP-0518SE	FCS-E014	2022. 08.30	2023. 08.29
Pre-Amplifier (18G-40GHz)	TERA-MW	TRLA-0400	FCS-E019	2022. 08.30	2023. 08.29
Temperature & Humidity	HTC-1	victor	FCS-E005	2022. 08.30	2023. 08.29

Conduction Test equipment

	aipinone				
Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	FCS-E020	2022. 08.30	2023. 08.29
LISN	R&S	ENV216	FCS-E007	2022. 08.30	2023. 08.29
LISN	ETS	3810/2NM	FCS-E009	2022. 08.30	2023. 08.29
Temperature & Humidity	HTC-1	victor	FCS-E008	2022. 08.30	2023. 08.29

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
MXA SIGNAL Analyzer	Keysight	N9020A	FCS-E015	2022. 08.30	2023. 08.29
Spectrum Analyzer	Agilent	E4447A	MY50180039	2022. 08.30	2023. 08.29
Spectrum Analyzer	R&S	FSV-40	101499	2022. 08.30	2023. 08.29
Power Sensor	Agilent	UX2021XA	FCS-E021	2022. 08.30	2023. 08.29



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3. 6DB BANDWIDTH

3.1 Limit

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

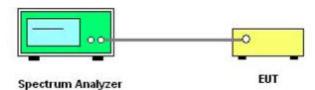
3.2 Test Procedure

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) Set the spectrum analyzer as follows

RBW: 100kHz 300kHz VBW: Peak **Detector Mode:** 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

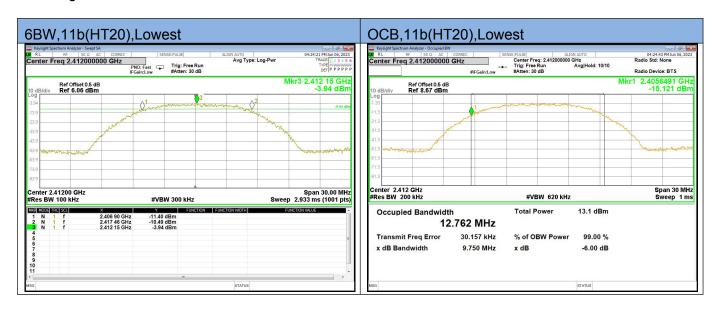




3.4 Test results

TestMode	Channel (MHz)	99%OBW (MHz)	6dB Bandwidth (MHz)	Frequency Range(MHz)	Verdict
802.11b	2412MHz	12.762	10.560	2400-2483.5	Pass
802.11b	2437MHz	12.608	9.360	2400-2483.5	Pass
802.11b	2462MHz	12.886	10.290	2400-2483.5	Pass
802.11g	2412MHz	17.579	16.320	2400-2483.5	Pass
802.11g	2437MHz	17.561	16.650	2400-2483.5	Pass
802.11g	2462MHz	17.548	16.980	2400-2483.5	Pass
802.11n 20	2412MHz	18.267	18.210	2400-2483.5	Pass
802.11n 20	2437MHz	18.314	18.360	2400-2483.5	Pass
802.11n 20	2462MHz	18.359	16.800	2400-2483.5	Pass

3.5 Original Test Data

















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

- a. Connect each EUT's antenna output to power sensor by RF cable and attenuator
- b. 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	10.90	30	Pass
802.11b	2437MHz	11.89	30	Pass
802.11b	2462MHz	10.36	30	Pass
802.11g	2412MHz	11.22	30	Pass
802.11g	2437MHz	12.02	30	Pass
802.11g	2462MHz	11.57	30	Pass
802.11n 20	2412MHz	10.23	30	Pass
802.11n 20	2437MHz	10.84	30	Pass
802.11n 20	2462MHz	10.65	30	Pass



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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: ≥ 3RBW

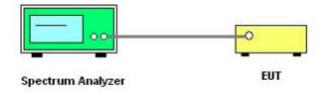
Span 1.5 times the DTS bandwidth

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







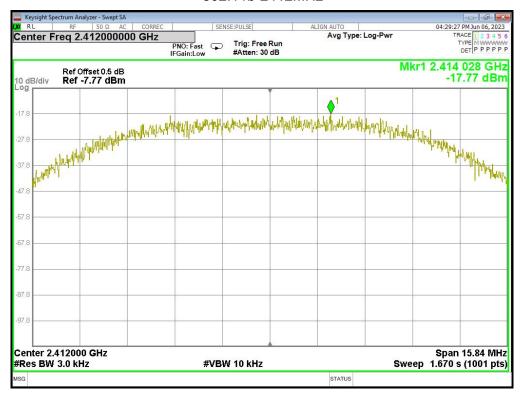
5.4 TEST RESULTS

TestMode	Channel (MHz)	Result (dBm/3KHz)	Limit (dBm/3KHz)	Verdict
802.11b	2412MHz	-17.77	8	Pass
802.11b	2437MHz	-15.68	8	Pass
802.11b	2462MHz	-18.48	8	Pass
802.11g	2412MHz	-18.93	8	Pass
802.11g	2437MHz	-18.86	8	Pass
802.11g	2462MHz	-21.21	8	Pass
802.11n 20	2412MHz	-22.30	8	Pass
802.11n 20	2437MHz	-19.72	8	Pass
802.11n 20	2462MHz	-21.48	8	Pass

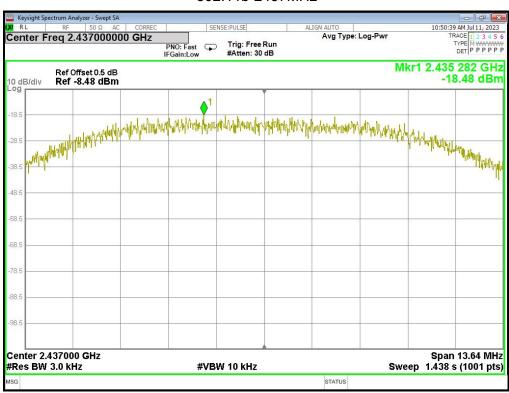


5.5 original test data

802.11b-2412MHz

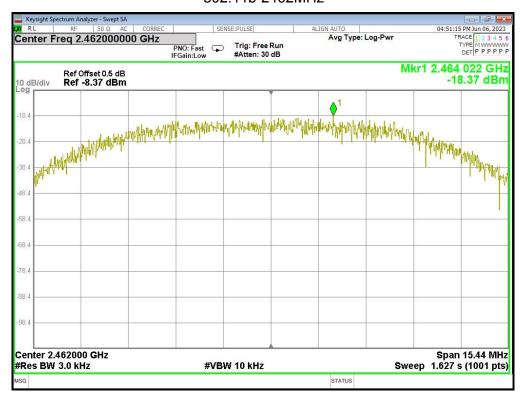


802.11b-2437MHz

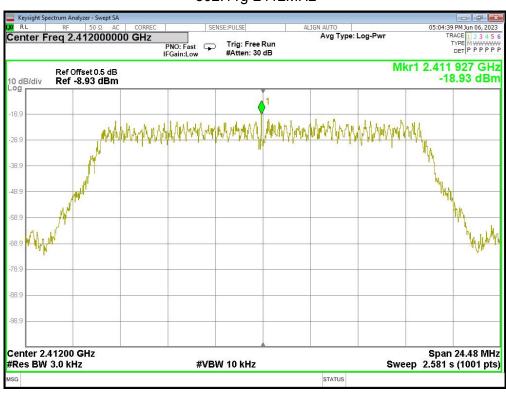




802.11b-2462MHz

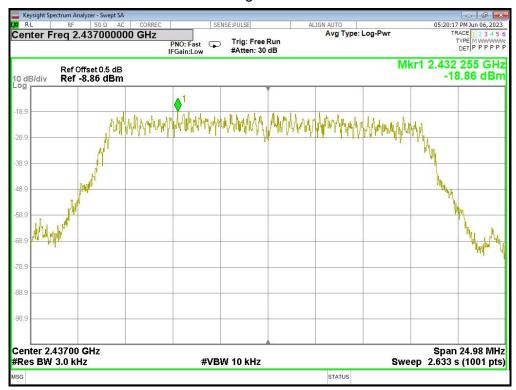


802.11g-2412MHz

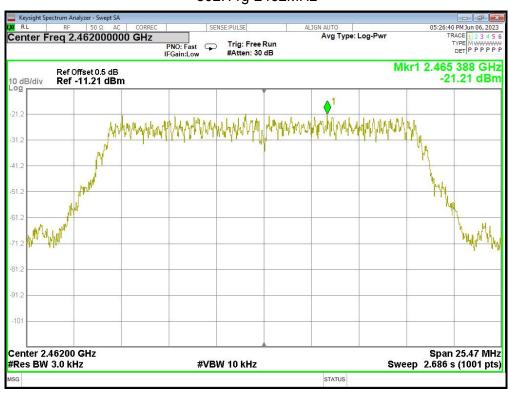




802.11g-2437MHz

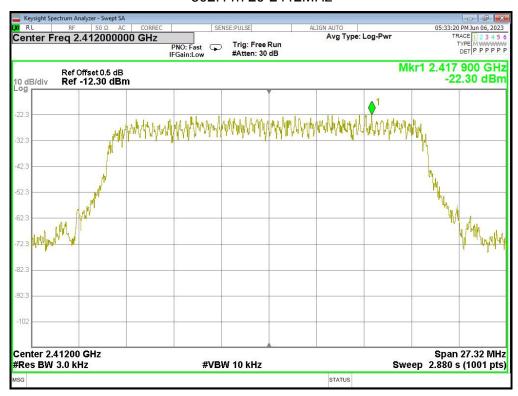


802.11g-2462MHz

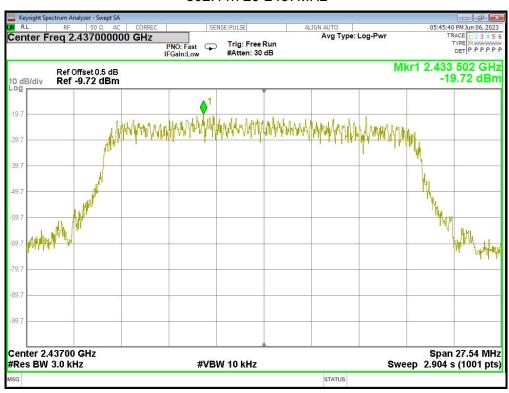




802.11n 20-2412MHz

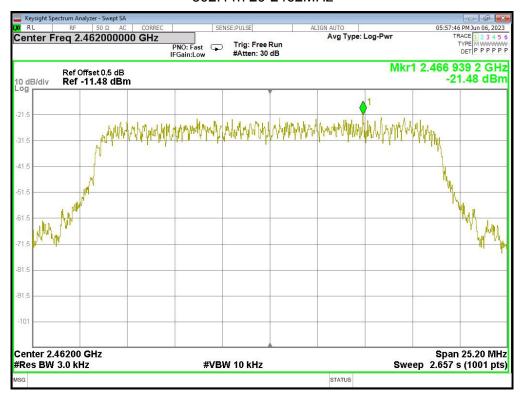


802.11n 20-2437MHz





802.11n 20-2462MHz







6. Band edge and spurious(conducted)

6.1 LIMIT

In any 100kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 30dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

6.2 TEST PROCEDURE

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) Establish a reference level by using the following procedure:

Center frequency DTS Channel center

frequency

RBW: 100kHz VBW: 300kHz

Span 1.5times the DTS bandwidth

Detector Mode: Peak
Sweep time: auto

Trace mode Max hold

- (3) Establish Allow the trace to stabilize, use the peak marker function to determine the maximum peak power level to establish the reference level.
- (4) Set the spectrum analyzer as follows:

RBW: 100kHz VBW: 300kHz

Span Encompass frequency range to be

measured

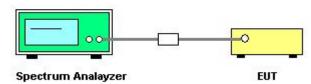
Number of measurement points ≥span/RBW

Detector Mode: Peak
Sweep time: auto

Trace mode Max hold

(5) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude of all unwanted emissions outside of the authorized frequency band

6.3 TEST SETUP





6.5 TEST RESULTS

Eut set mode	CH or Frequency	Result
802.11b	CH1	Pass
	CH11	Pass
802.11g	CH1	Pass
	CH11	Pass
802.11n 20	CH1	Pass
	CH11	Pass

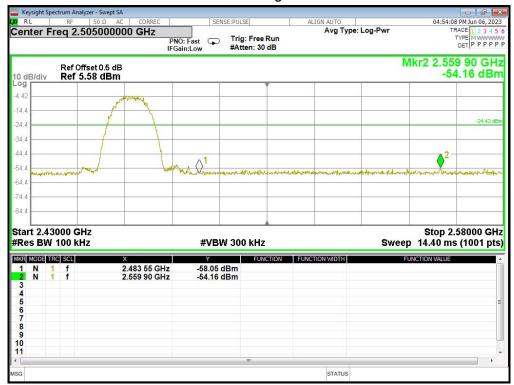
6.5 Original test data

802.11b Low CH





802.11b High CH

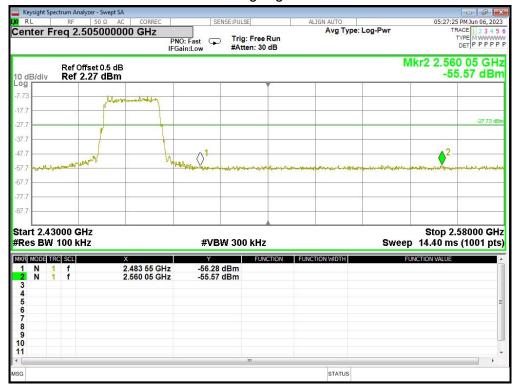


802.11g low CH

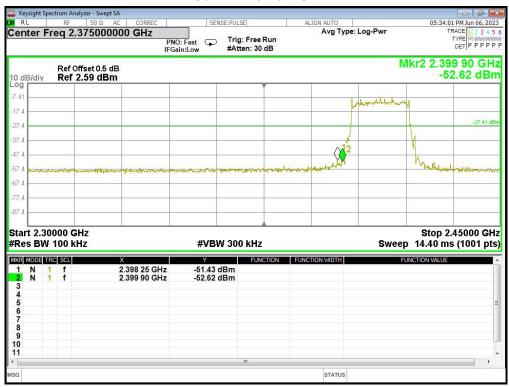




802.11g High CH

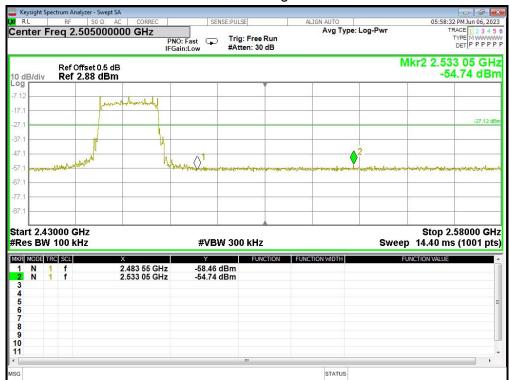


802.11n20 Low CH





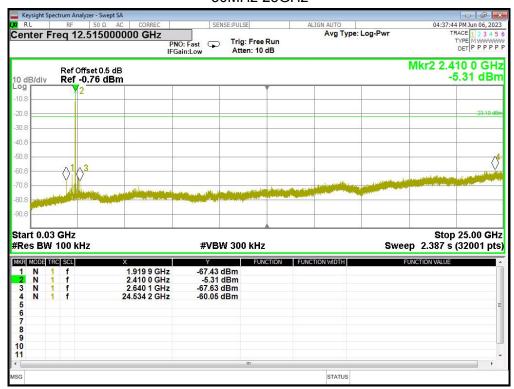
802.11n20 High CH





6.6 Spurious emissions (802.11b) Lowest channel

30MHz-25GHz

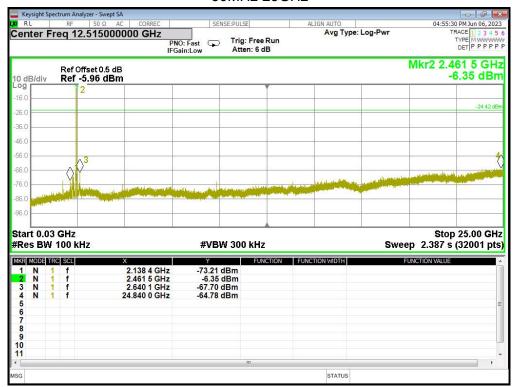


802.11b Middle CH, 2437MHz

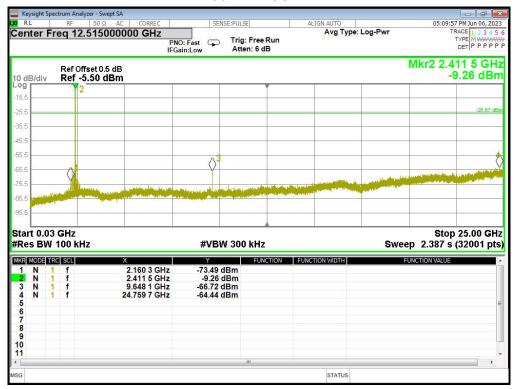




802.11b High CH, 2462MHz 30MHz-25GHz

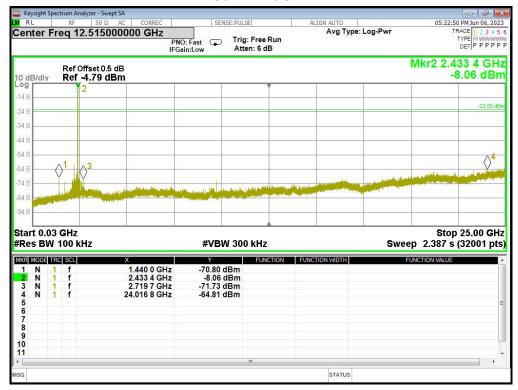


802.11g Low CH, 2412MHz 30MHz-25GHz

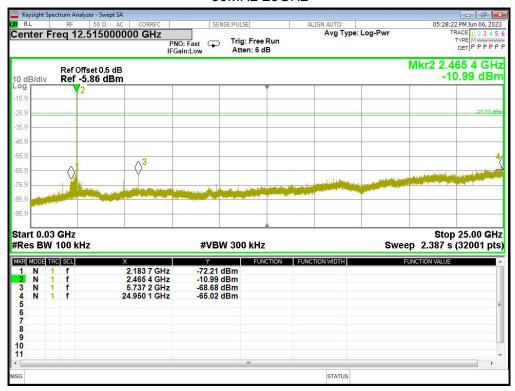




802.11g Middle CH, 2437MHz 30MHz-25GHz

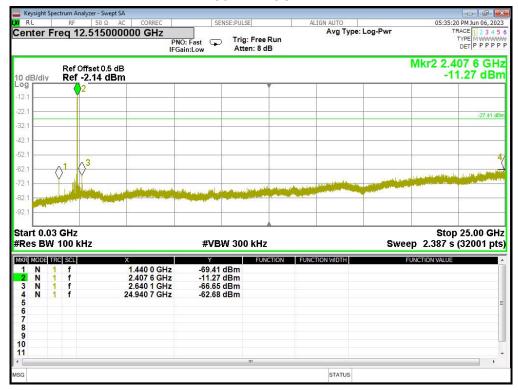


802.11g High CH, 2462MHz 30MHz-25GHz

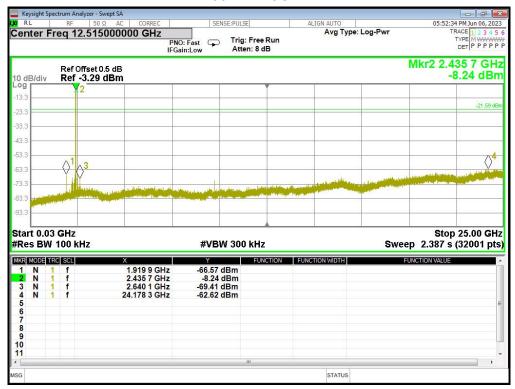




802.11n 20 Low CH, 2412MHz 30MHz-25GHz

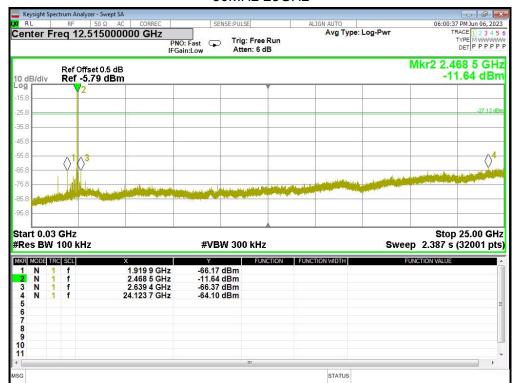


802.11n 20 Middle CH, 2437MHz 30MHz-25GHz





802.11n 20 High CH, 2462MHz 30MHz-25GHz





7 RADIATED EMISSION MEASUREMENT

7.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed

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LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

Frequencies	Field Strength	Measurement Distance
(MHz)	(micorvolts/meter)	(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

LIMITS OF RADIATED EMISSION MEASUREMENT (1GHz-25 GHz)

	(dBuV/m) (at 3M)		
FREQUENCY (MHz)	PEAK	AVERAGE	
Above 1000	74	54	

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted	
band)	PK=1MHz / 1MHz, AV=1 MHz /10 Hz

For Band edge

Spectrum Parameter	Setting		
Detector Peak/AV			
Start/Stop Frequency	Lower Band Edge: 2300 to 2403 MHz		
	Upper Band Edge: 2479 to 2500 MHz		
RB / VB (emission in restricted band)	PK=1MHz / 1MHz, AV=1 MHz / 10 Hz		





Receiver Parameter	Setting			
Attenuation	Auto			
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV			
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP			
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV			
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP			
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP			

7.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
- b. The EUT was placed on the top of a rotating table 0.8 meters (above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then QuasiPeak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos. Note:

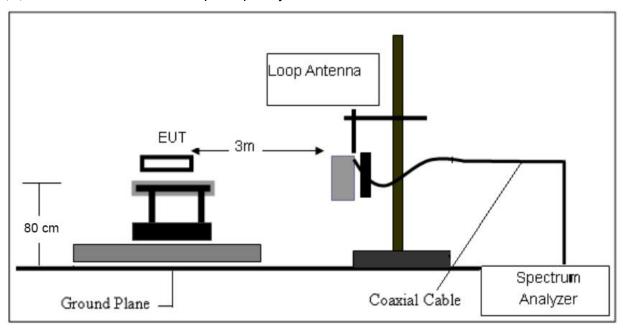
Both horizontal and vertical antenna polarities were tested

and performed pretest to three orthogonal axis. The worst case emissions were reported

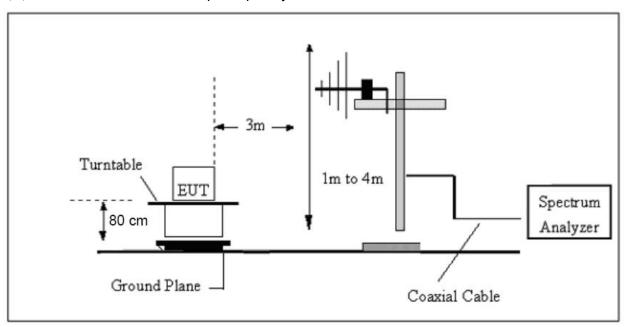


7.3 TESTSETUP

(A) Radiated Emission Test-Up Frequency Below 30MHz

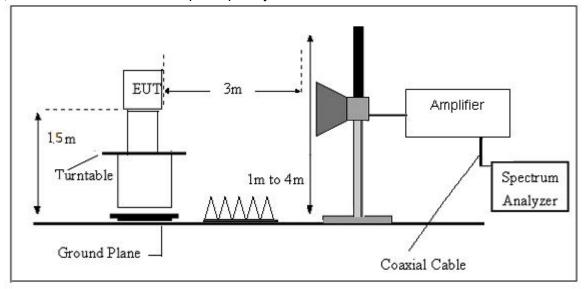


(B) Radiated Emission Test-Up Frequency 30MHz~1GHz





(C) Radiated Emission Test-Up Frequency Above 1GHz





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7.4. TEST RESULTS

(9KHz-30MHz)

Temperature:	22.7℃	Relative Humidity:	61%
Test Voltage:	DC 12V	Test Mode:	802.11b

Freq.	Reading	Limit	Margin	State	Test Result
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F	
					PASS
					PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =40 log (specific distance/test distance)(dB);

Limit line = specific limits (dBuv) + distance extrapolation factor.