

# **FCC Test Report**

Report No.: AGC12713210903FE05

**FCC ID** : 2AXEK-X83

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION**: Smart Battery Camera

**BRAND NAME** : N/A

MODEL NAME : X83

**APPLICANT**: Shenzhen General Technology Co., Ltd

**DATE OF ISSUE** : Apr. 18, 2022

STANDARD(S)

TEST PROCEDURE(S)

: FCC Part 15.247

**REPORT VERSION**: V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd





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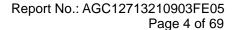
#### REPORT REVISE RECORD

Report Version	Revise Time	ne Issued Date Valid Versi		Notes		
V1.0	/	Apr. 18, 2022	Valid	Initial Release		



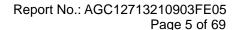
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#### 1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen General Technology Co., Ltd
Address	Floor 1-3, Building A, NO.11 Xiantian Road, Longgang District, Shenzhen, China
Manufacturer	Shenzhen General Technology Co., Ltd
Address	Floor 1-3, Building A, NO.11 Xiantian Road, Longgang District, Shenzhen, China
Factory	Shenzhen General Technology Co., Ltd
Address	Floor 1-3, Building A, NO.11 Xiantian Road, Longgang District, Shenzhen, China
Product Designation	Smart Battery Camera
Brand Name	N/A
Test Model	X83
Date of test	Apr. 06, 2022 to Apr. 18, 2022
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BGN/RF

# We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

Prepared By	Thea Huang	
	Thea Huang (Project Engineer)	Apr. 18, 2022
Reviewed By	Calin Lin	
	Calvin Liu (Reviewer)	Apr. 18, 2022
Approved By	Max Zhang	
	Max Zhang (Authorized Officer)	Apr. 18, 2022



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# 2. GENERAL INFORMATION

#### 2.1. PRODUCT DESCRIPTION

The EUT is designed as "Smart Battery Camera". It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

Attrajor tecrinical description of Eo F is described as following				
Operation Frequency	2.412GHz~2.462GHz			
Output Power (Average)	IEEE 802.11b:13.69dBm; IEEE 802.11g:17.25dBm;			
Output Fower (Average)	IEEE 802.11n(20):15.91dBm			
Output Bower (Book)	IEEE 802.11b:16.26dBm; IEEE 802.11g:24.75dBm;			
Output Power (Peak)	IEEE 802.11n(20):23.25dBm			
Modulation	DSSS(DBPSK/DQPSK/CCK); OFDM(BPSK/QPSK/16-QAM/64-QAM)			
Number of channels	11			
Hardware Version	CG621_C03_V2			
Software Version	0.5.5			
Antenna Designation	Integral antenna (Comply with requirements of the FCC part 15.203)			
Antenna Gain	0dBi			
Power Supply	DC 3.7V by battery or DC 5V by adapter			

#### 2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	1	2412 MHZ
	2	2417 MHZ
	3	2422 MHZ
	4	2427 MHZ
	5	2432 MHZ
2400~2483.5MHZ	6	2437 MHZ
	7	2442 MHZ
	8	2447 MHZ
	9	2452 MHZ
	10	2457 MHZ
	11	2462 MHZ

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11.



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# 2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	R	NBPSC	NCBPS NDBPS		NDBPS		Da rate(N 800r	<u> </u>
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

# 2.4. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID**: **2AXEK-X83** filing to comply with the FCC Part 15 requirements.

#### 2.5. TEST METHODOLOGY

KDB 558074 D01 15.247 Meas Guidance v05: Guidance for compliance measurements on Digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules

ANSI C63.10:2013: American National Standard for Testing Unlicensed Wireless Devices

# 2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

# 2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.



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#### 2.8. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

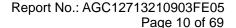


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# 3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±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%

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 2.9 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 3.8 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.9 \text{ dB}$
Uncertainty of total RF power, conducted	$U_c = \pm 0.8 \text{ dB}$
Uncertainty of RF power density, conducted	$U_c = \pm 2.6 \text{ dB}$
Uncertainty of spurious emissions, conducted	U <sub>c</sub> = ±2 %
Uncertainty of Occupied Channel Bandwidth	U <sub>c</sub> = ±2 %





#### 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel transmitting (TX)
2	Middle channel transmitting (TX)
3	High channel transmitting (TX)

#### Note:

Transmit by 802.11b with Date rate (1/2/5.5/11)

Transmit by 802.11g with Date rate (6/9/12/18/24/36/48/54)

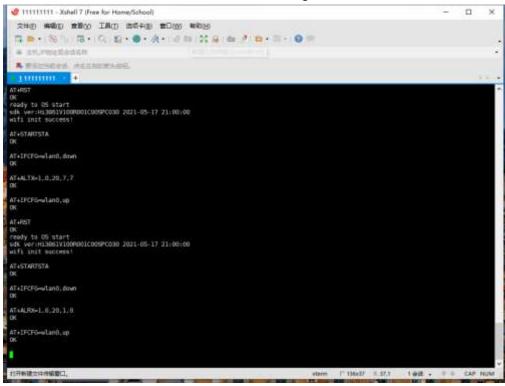
Transmit by 802.11n (20MHz) with Date rate (6.5/13/19.5/26/39/52/58.5/65)

The test channel for 20MHZ bandwidth system is channel 1, 6 and 11.

#### Note:

- 1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the EUT is operating at its maximum duty cycle>or equal 98%
- 2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.

# Software Setting



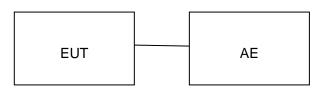


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# 5. SYSTEM TEST CONFIGURATION

# **5.1. CONFIGURATION OF EUT SYSTEM**

Configure:

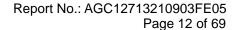


#### **5.2. EQUIPMENT USED IN EUT SYSTEM**

Item	Equipment	Equipment Model No. ID or Specification		Remark			
1	Smart Battery Camera	X83	2AXEK-X83	EUT			
2	Control Box	USB-TTL	N/A	AE			
3	Adapter	TPA-23A050200CU01	DC 5V	AE			
4	Adapter	GYS-A5010S1	DC 5V	AE			
5	Charger line	N/A	0.8m shielded	Accessory			

# **5.3. SUMMARY OF TEST RESULTS**

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Output Power	Compliant
§15.247	6 dB Bandwidth	Compliant
§15.247	Conducted Spurious Emission	Compliant
§15.247	Maximum Conducted Output Power Spectral Density	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant





# 6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

#### TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESPI	101206	Mar. 28, 2022	Mar. 27, 2023
Artificial power network	R&S	ESH2-Z5	100086	Jun. 09, 2021	Jun. 08, 2022
Test Software	FARA	EZ-EMC(Ver. AGC-CON03A1)	N/A	N/A	N/A

#### **TEST EQUIPMENT OF RADIATED EMISSION TEST**

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESCI	10096	Mar. 28, 2022	Mar. 27, 2023
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Nov. 17, 2021	Nov. 16, 2022
Signal Analyzer	Aglient	N9020A	MY52090123	Sep. 06, 2021	Sep. 05, 2022
2.4GHz Filter	EM Electronics	N/A	N/A	Mar. 18, 2022	Mar. 19, 2024
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn Antenna	SCHWARZBEC	BBHA9170	768	Oct. 31, 2021	Oct. 30, 2023
Active Loop Antenna (9K-30Mhz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Double-Ridged Waveguide Horn	ETS	3117	00154520	Sep. 06, 2021	Sep. 05, 2023
Preamplifier Assembly	ETS	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
Wideband Antenna	SCHWARZBEC K	VULB9168	VULB9168-494	Jan. 08, 2021	Jan. 07, 2023
Test Software	FARA	EZ-EMC(Ver.R A-03A)	N/A	N/A	N/A

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# 7. OUTPUT POWER

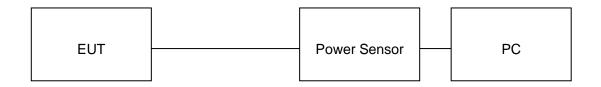
# 7.1. MEASUREMENT PROCEDURE

For average power test:

- 1. Connect EUT RF output port to power sensor through an RF attenuator.
- 2. Connect the power sensor to the PC.
- 3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 4. Record the maximum power from the software.

**Note**: The EUT was tested according to ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements.

# 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

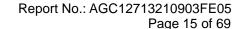




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#### 7.3. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power					
Test Mode	Test Channel (MHz)	Average Power (dBm)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
	2412	12.97	15.55	<b>\$</b> 0	Pass
802.11b	2437	13.69	16.26	<b>⊴</b> 30	Pass
	2462	12.90	15.53	<b>⊴</b> 30	Pass
802.11g	2412	17.18	24.68	<b>⊴</b> 30	Pass
	2437	17.25	24.75	<b>⊴</b> 30	Pass
	2462	17.18	24.66	<b>≪3</b> 0	Pass
802.11n20	2412	15.46	22.88	<b>⊴</b> 30	Pass
	2437	15.91	23.25	<b>≪3</b> 0	Pass
	2462	15.37	22.89	<b>≪3</b> 0	Pass





#### 8. BANDWIDTH

#### **8.1. MEASUREMENT PROCEDURE**

#### 6dB bandwidth:

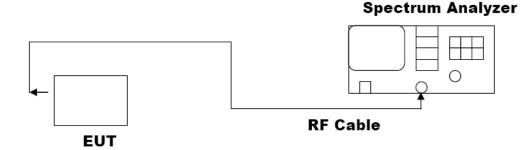
- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 kHz, VBW≥3×RBW.
- 4. Set SPA Trace 1 Max hold, then View.

# Occupied bandwidth:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hoping channel
  The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video
  bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
- 4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

# 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)





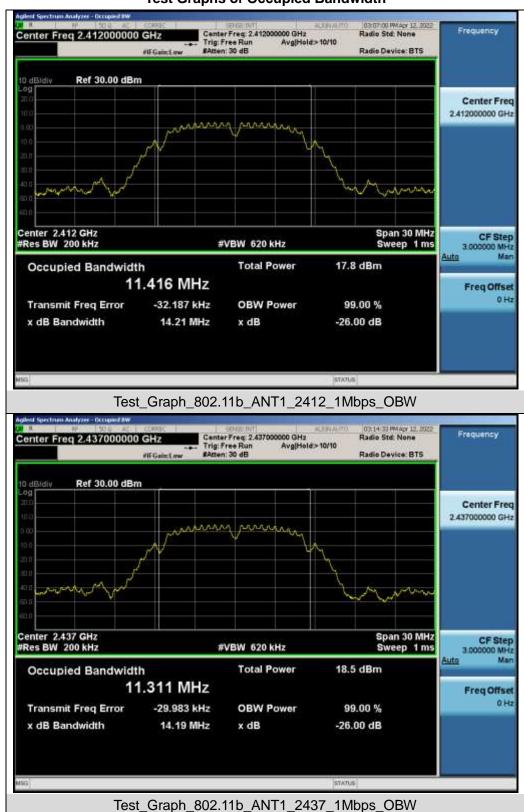
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#### 8.3. LIMITS AND MEASUREMENT RESULTS

Test Data of Occupied Bandwidth and DTS Bandwidth					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-6dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
	2412	11.416	9.097	∌.5	Pass
802.11b	2437	11.311	9.104	∌.5	Pass
	2462	11.227	9.100	<b>∌</b> .5	Pass
802.11g	2412	16.608	15.112	∌.5	Pass
	2437	16.605	15.143	<b>∌</b> .5	Pass
	2462	16.625	15.106	<b>≥</b> 0.5	Pass
802.11n20	2412	17.493	15.105	∌.5	Pass
	2437	17.736	15.423	<b>≥</b> 0.5	Pass
	2462	17.511	15.098	<b>∌</b> .5	Pass

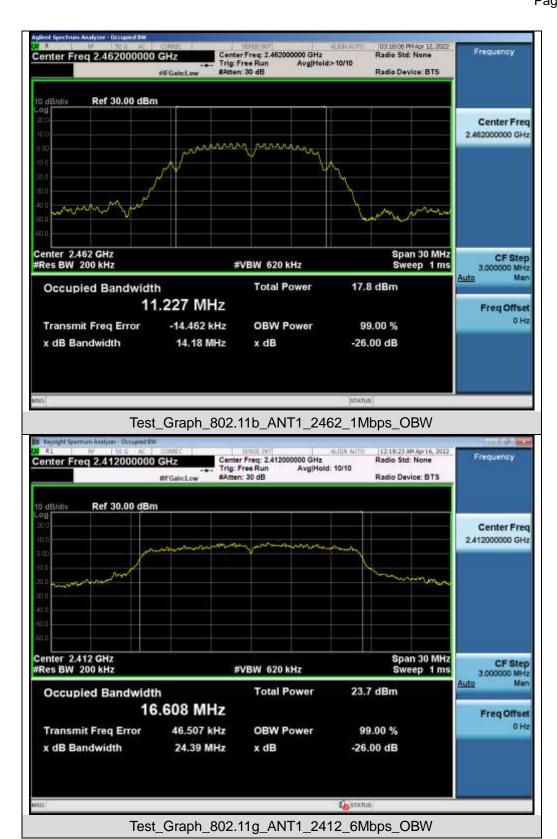


# **Test Graphs of Occupied Bandwidth**

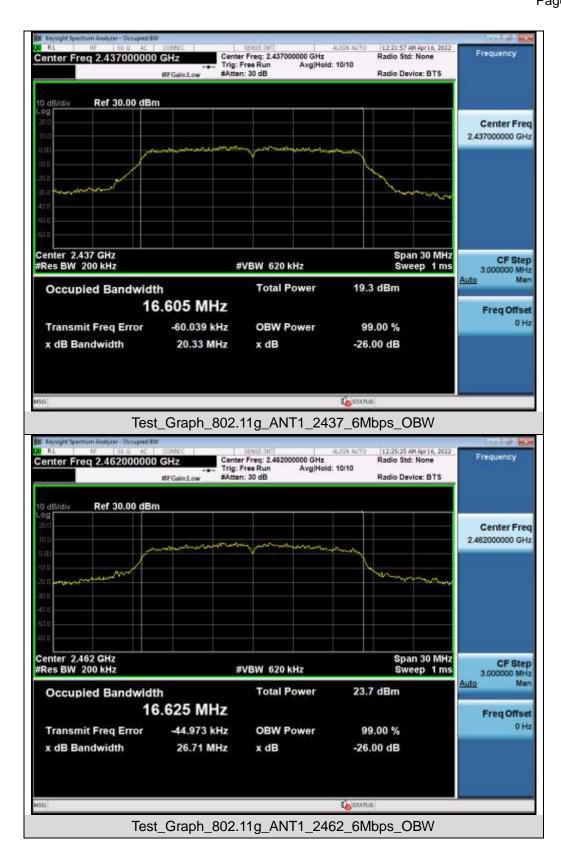


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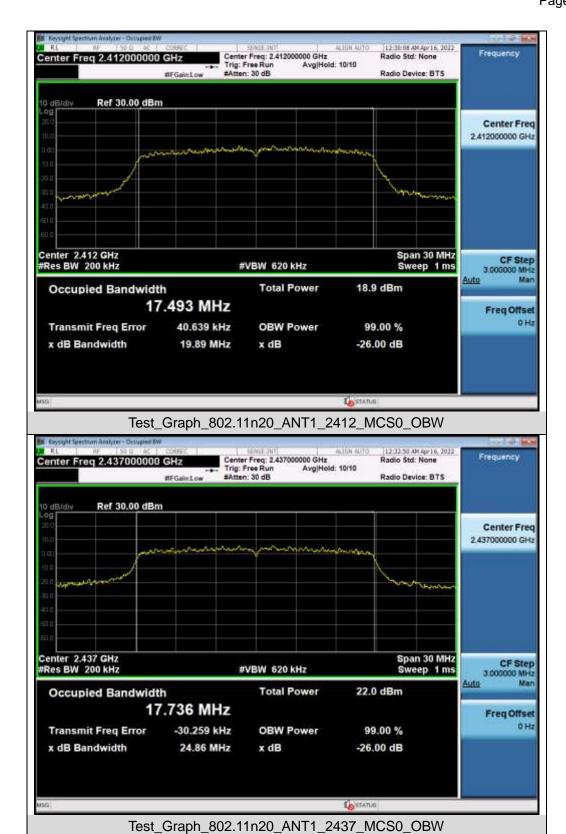




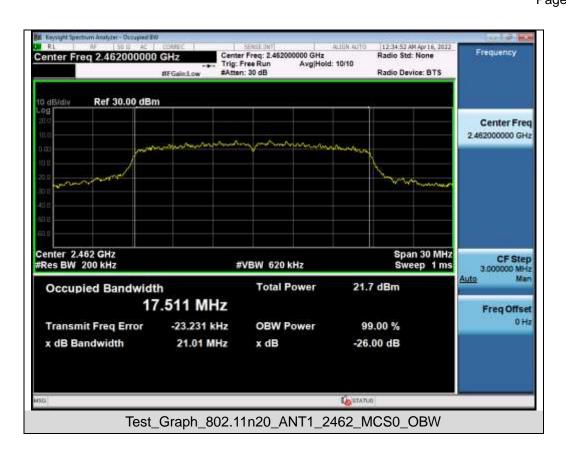






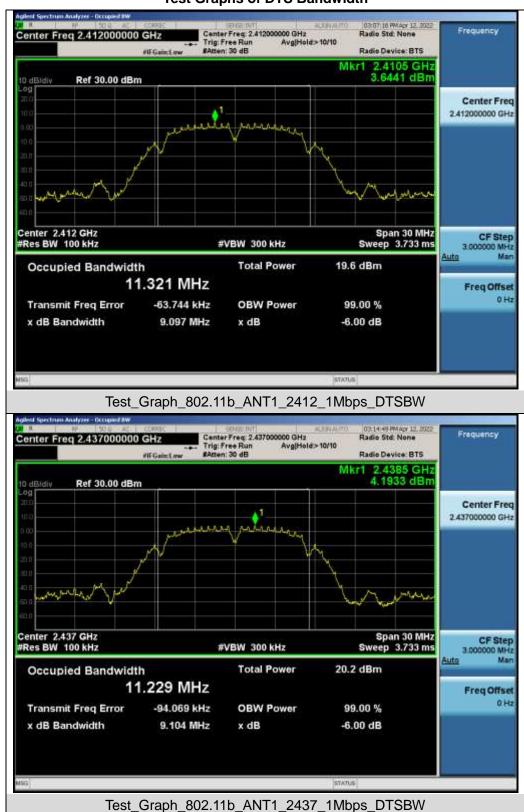






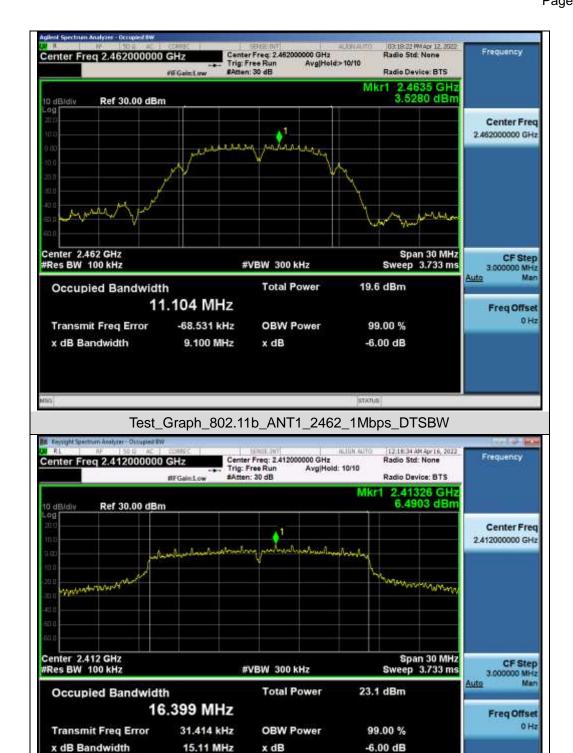


# Test Graphs of DTS Bandwidth



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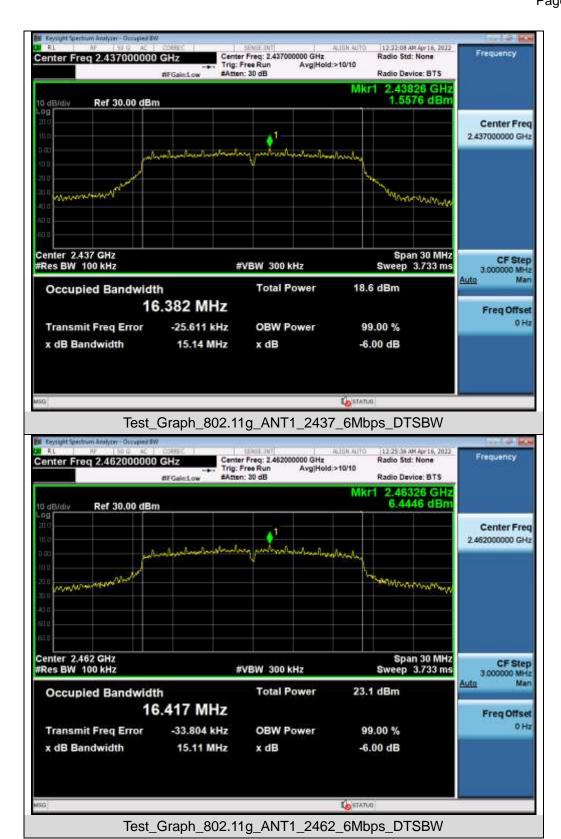




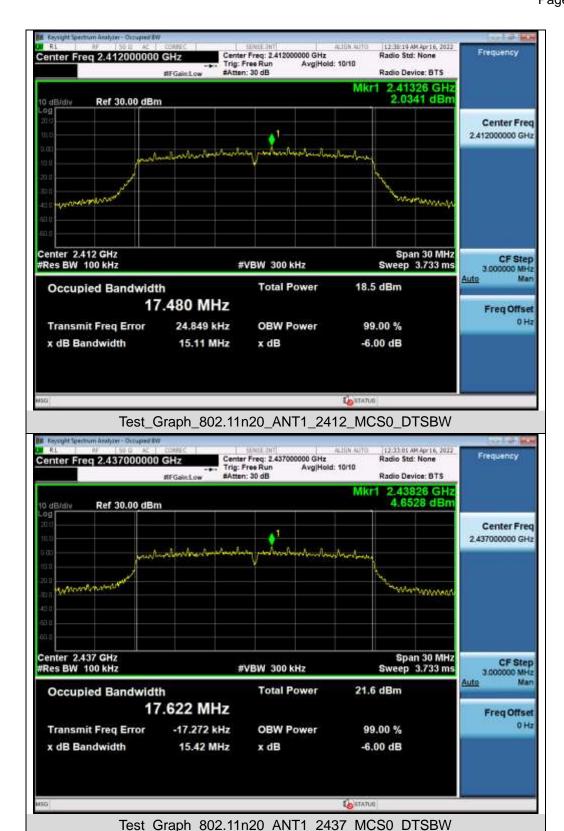
Test\_Graph\_802.11g\_ANT1\_2412\_6Mbps\_DTSBW

LO STATUS

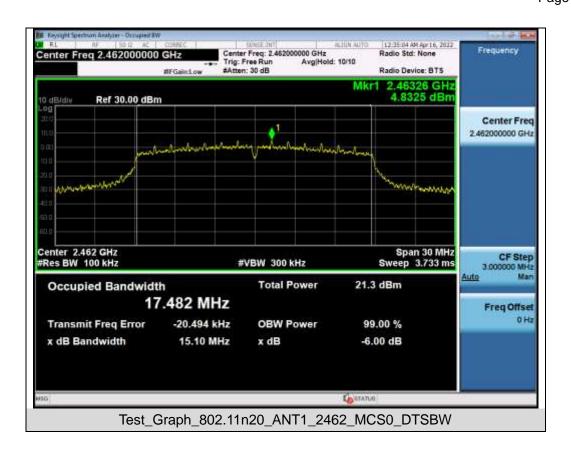














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# 9. CONDUCTED SPURIOUS EMISSION

#### 9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Trace 1 Max hold, then View.

**Note:** The EUT was tested according to ANSI C63.10 (2013) for compliance to FCC 47CFR 15.247 requirements. Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW>RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW>RBW) are conform to the requirement.

# 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2.

#### 9.3. MEASUREMENT EQUIPMENT USEDJN

The same as described in section 6.

#### 9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT				
Applicable Limite	Measurement Result			
Applicable Limits	Test Data	Criteria		
In any 100 KHz Bandwidth Outside the	At least -20dBc than the limit			
frequency band in which the spread spectrum	Specified on the BOTTOM	PASS		
intentional radiator is operating, the radio frequency	Channel			
power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth				
within the band that contains the highest level of the				
desired power.	At least -20dBc than the limit	DA 00		
In addition, radiation emissions which fall in the	Specified on the TOP Channel	PASS		
restricted bands, as defined in §15.205(a), must also				
comply with the radiated emission limits specified				
in§15.209(a))				

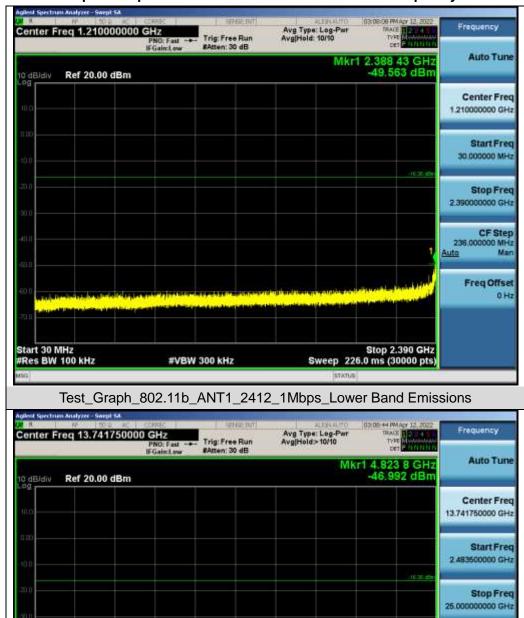
Note: The limits reference level is according to the test plot of -6dB bandwidth.

CF Step

Freq Offset



# Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands



Test\_Graph\_802.11b\_ANT1\_2412\_1Mbps\_Higher Band Emissions

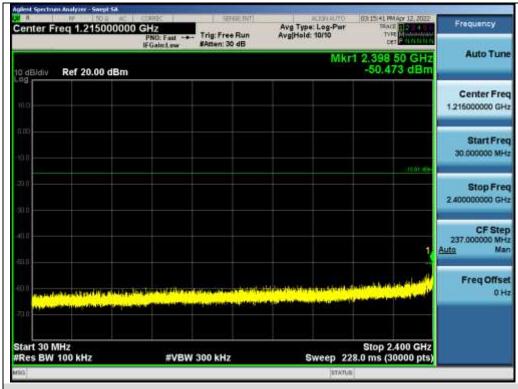
Stop 25.00 GHz Sweep 2.152 s (30000 pts)

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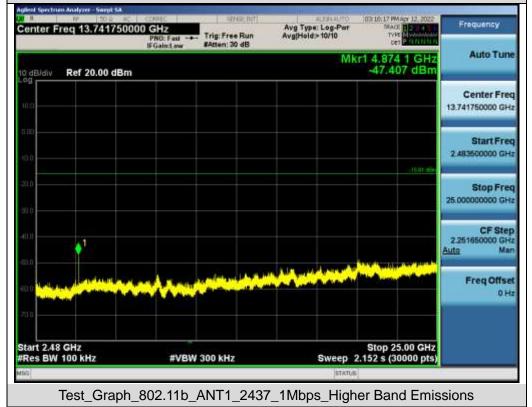
**#VBW 300 kHz** 

Start 2.48 GHz #Res BW 100 kHz

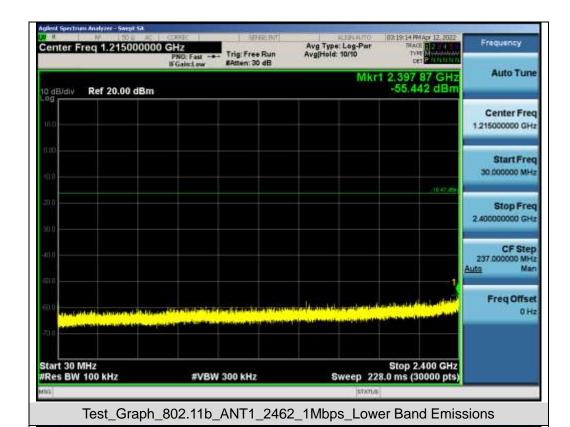




Test\_Graph\_802.11b\_ANT1\_2437\_1Mbps\_Lower Band Emissions





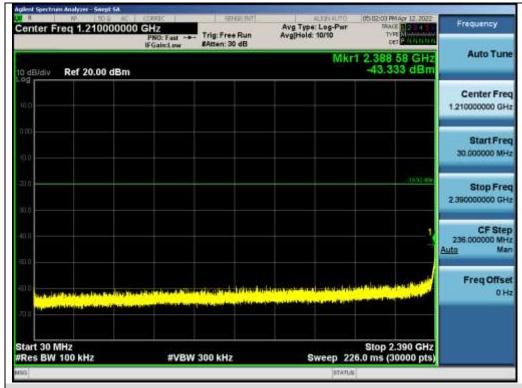


Avg Type: Log-Par Avg[Hold>10/10 Center Freq 13.750000000 GHz Trig: Free Run #Atten: 30 dB Auto Tun Mkr1 20.550 1 GHz -47,774 dBm Ref 20.00 dBm 0 dB/div Center Freq 13.750000000 GHz Start Freq 2.500000000 GHz Stop Freq 25.000000000 GHz **CF Step** 2.250000000 GH uto Ma Freq Offset 0 Hz Stop 25.00 GHz Sweep 2.152 s (30000 pts Start 2.50 GHz #Res BW 100 kHz **#VBW 300 kHz** 

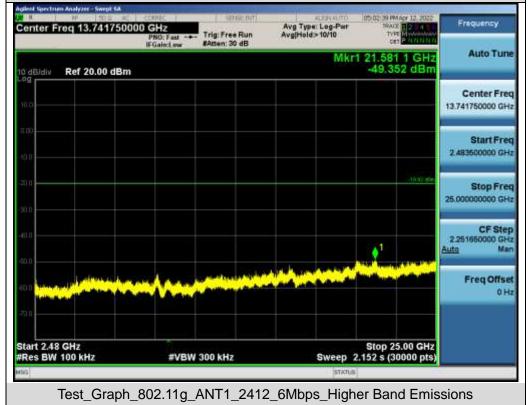
Test\_Graph\_802.11b\_ANT1\_2462\_1Mbps\_Higher Band Emissions

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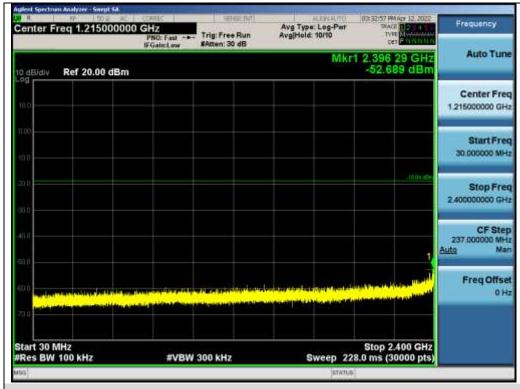




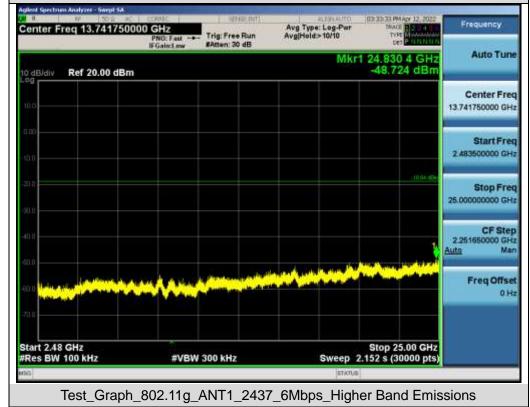
Test\_Graph\_802.11g\_ANT1\_2412\_6Mbps\_Lower Band Emissions



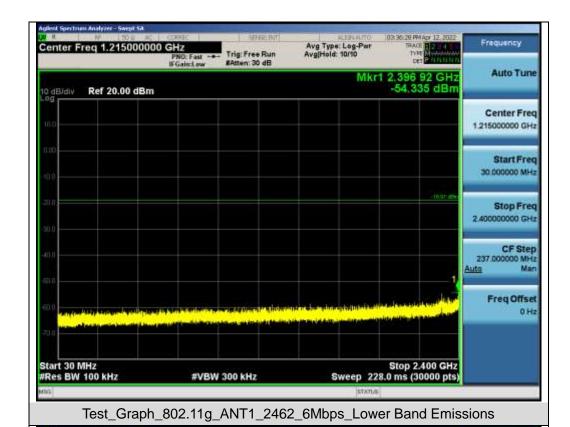




Test\_Graph\_802.11g\_ANT1\_2437\_6Mbps\_Lower Band Emissions





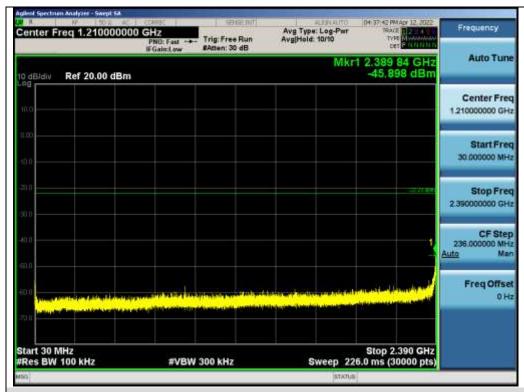


Avg Type: Log-Peri Avg[Hold>10/10 Center Freq 13.750000000 GHz Trig: Free Run #Atten: 30 dB Auto Tun Mkr1 24.969 2 GHz -48.788 dBm Ref 20.00 dBm 0 dB/div Center Freq 13.750000000 GHz Start Freq 2.500000000 GHz Stop Freq 25.000000000 GHz **CF Step** 2.250000000 GH uto Ma Freq Offset 0 Hz Stop 25.00 GHz Sweep 2.152 s (30000 pts) Start 2.50 GHz #Res BW 100 kHz **#VBW 300 kHz** 

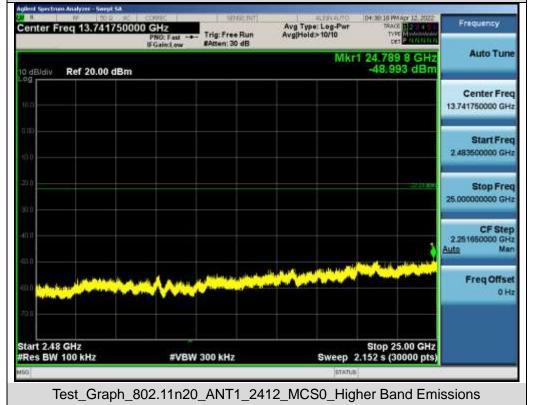
Test\_Graph\_802.11g\_ANT1\_2462\_6Mbps\_Higher Band Emissions

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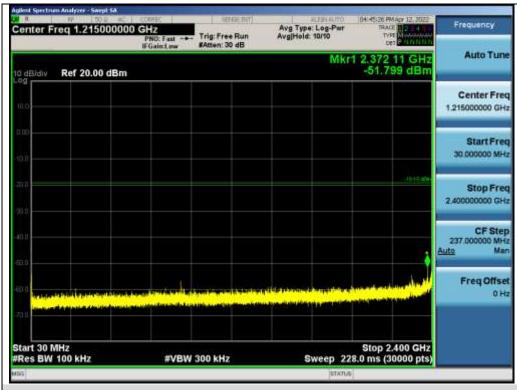




Test\_Graph\_802.11n20\_ANT1\_2412\_MCS0\_Lower Band Emissions



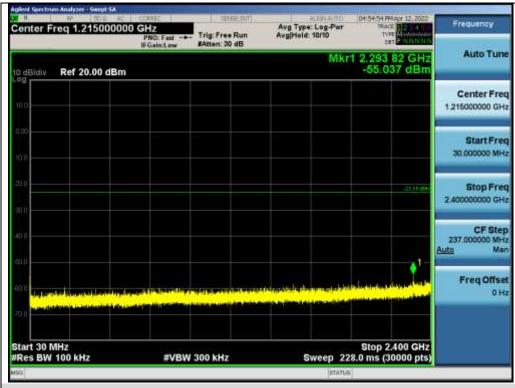




Test\_Graph\_802.11n20\_ANT1\_2437\_MCS0\_Lower Band Emissions







Test\_Graph\_802.11n20\_ANT1\_2462\_MCS0\_Lower Band Emissions





## Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands

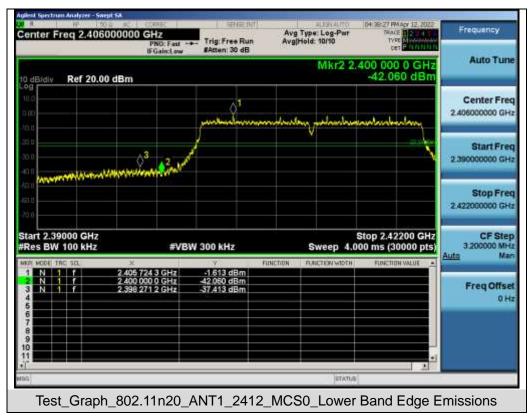




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Note: Emissions from 2483.5-2500MHz which fall in the restricted bands had been considered with the radiated emission limits specified.



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### 10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

### **10.1 MEASUREMENT PROCEDURE**

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the ANSI C63.10 (2013) item 11.10 was used in this testing.

### 10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer to Section 8.2.

#### **10.3 MEASUREMENT EQUIPMENT USED**

Refer to Section 6.

## **10.4 LIMITS AND MEASUREMENT RESULT**

	Test Data of Conducted Output Power Spectral Density								
Test Mode	Test Channel (MHz)	Power density (dBm/20kHz)	Power density (dBm/3kHz)	Limit (dBm/3kHz)	Pass or Fail				
	2412	-1.130	-9.369		Pass				
802.11b	2437	-0.039	-8.278	- \$8	Pass				
	2462	-0.804	-9.043		Pass				
	2412	1.522	-6.717	- \$8	Pass				
802.11g	2437	0.714	-7.525		Pass				
	2462	0.053	-8.186	- \$8	Pass				
	2412	-0.479	-8.718		Pass				
802.11n20	2437	-0.642	-8.881	- \$8	Pass				
	2462	-0.223	-8.462	- \$8	Pass				

Note: Power density(dBm/3kHz) = Power density(dBm/20kHz) - 10\*log(20/3).



## **Test Graphs of Conducted Output Power Spectral Density**



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Test\_Graph\_802.11b\_ANT1\_2437\_1Mbps\_PSD





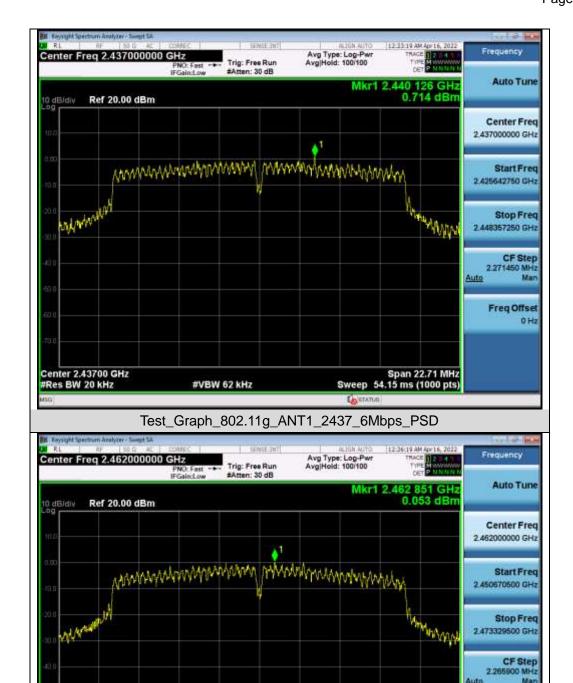


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Freq Offset

Span 22.66 MHz Sweep 54.01 ms (1000 pts)





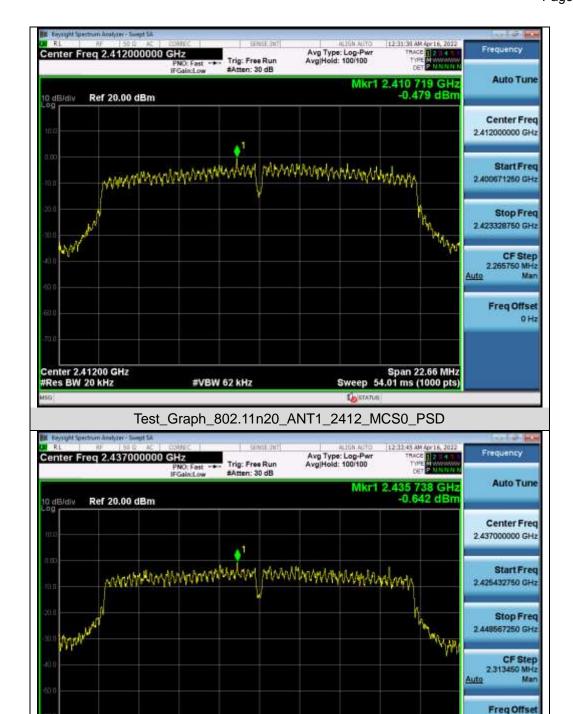
Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

Test\_Graph\_802.11g\_ANT1\_2462\_6Mbps\_PSD

**#VBW 62 kHz** 

Center 2.46200 GHz #Res BW 20 kHz





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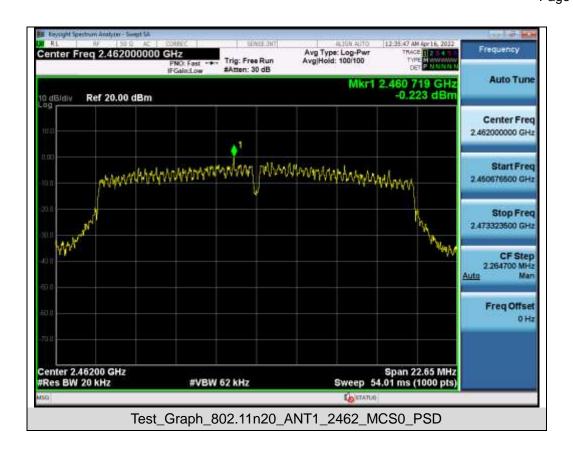
Test\_Graph\_802.11n20\_ANT1\_2437\_MCS0\_PSD

**#VBW 62 kHz** 

Span 23.13 MHz Sweep 55.14 ms (1000 pts)

Center 2.43700 GHz #Res BW 20 kHz







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#### 11. RADIATED EMISSION

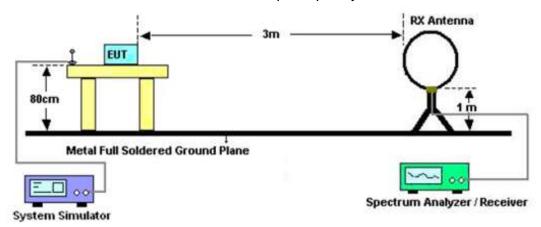
#### 11.1. MEASUREMENT PROCEDURE

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

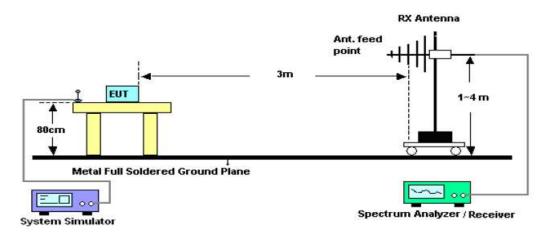


#### 11.2. TEST SETUP

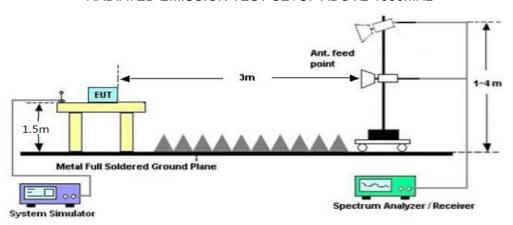
### Radiated Emission Test-Setup Frequency Below 30MHz



#### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



### RADIATED EMISSION TEST SETUP ABOVE 1000MHz





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#### 11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (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

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

#### 11.4. TEST RESULT

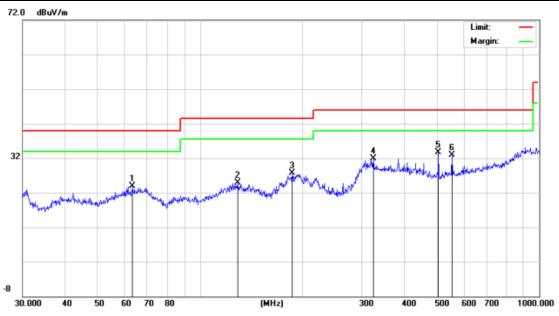
#### Radiated emission below 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.



#### Radiated emission from 30MHz to 1000MHz

EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Horizontal

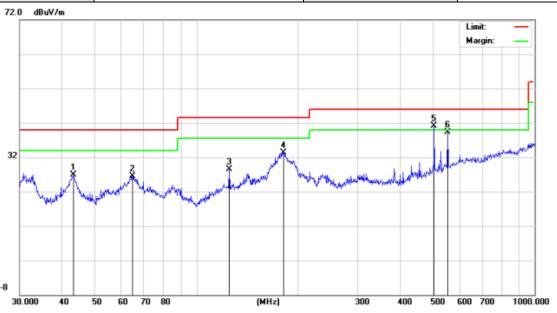


No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		63.0916	6.20	17.67	23.87	40.00	-16.13	peak
2		129.0146	6.12	18.82	24.94	43.50	-18.56	peak
3		187.0958	12.61	15.03	27.64	43.50	-15.86	peak
4		324.4561	7.72	24.25	31.97	46.00	-14.03	peak
5	*	504.7062	11.60	22.05	33.65	46.00	-12.35	peak
6		552.8832	10.30	22.51	32.81	46.00	-13.19	peak

**RESULT: PASS** 



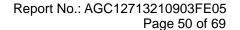
EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		43.2017	11.36	15.54	26.90	40.00	-13.10	peak
2		64.6594	8.48	17.98	26.46	40.00	-13.54	peak
3		125.0066	9.38	19.04	28.42	43.50	-15.08	peak
4		180.6488	15.35	18.00	33.35	43.50	-10.15	peak
5	*	504.7062	17.94	23.13	41.07	46.00	-4.93	peak
6		552.8832	14.79	24.56	39.35	46.00	-6.65	peak

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

- 2. The "Factor" value can be calculated automatically by software of measurement system.
- 3. All test modes had been pre-tested. The 802.11b at low channel is the worst case and recorded in the report.





Radiated emission above 1GHz

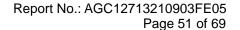
EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4824.000	55.36	0.08	55.44	74	-18.56	peak
4824.000	46.11	0.08	46.19	54	-7.81	AVG
7236.000	48.97	2.21	51.18	74	-22.82	peak
7236.000	41.67	2.21	43.88	54	-10.12	AVG
Remark:						
actor = Anter	nna Factor + Cabl	e Loss – Pre-a	amplifier.			

EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2412MHz	Antenna	Vertical

Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
56.54	0.08	56.62	74	-17.38	peak
45.54	0.08	45.62	54	-8.38	AVG
51.07	2.21	53.28	74	-20.72	peak
40.78	2.21	42.99	54	-11.01	AVG
	(dBµV) 56.54 45.54 51.07	(dBµV) (dB) 56.54 0.08 45.54 0.08 51.07 2.21	(dBμV)     (dB)     (dBμV/m)       56.54     0.08     56.62       45.54     0.08     45.62       51.07     2.21     53.28	(dBμV)     (dB)     (dBμV/m)     (dBμV/m)       56.54     0.08     56.62     74       45.54     0.08     45.62     54       51.07     2.21     53.28     74	(dBμV)     (dB)     (dBμV/m)     (dBμV/m)     (dB)       56.54     0.08     56.62     74     -17.38       45.54     0.08     45.62     54     -8.38       51.07     2.21     53.28     74     -20.72

Factor = Antenna Factor + Cable Loss – Pre-amplifier.





EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHz	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4874.000	55.84	0.14	55.98	74	-18.02	peak
4874.000	45.64	0.14	45.78	54	-8.22	AVG
7311.000	50.37	2.36	52.73	74	-21.27	peak
7311.000	40.43	2.36	42.79	54	-11.21	AVG
omark:						
emark:						

EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2437MHz	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4874.000	56.28	0.14	56.42	74	-17.58	peak	
4874.000	46.24	0.14	46.38	54	-7.62	AVG	
7311.000	41.37	2.36	43.73	74	-30.27	peak	
7311.000	41.53	2.36	43.89	54	-10.11	AVG	
Remark:	Remark:						
Factor = Anter	Factor = Antenna Factor + Cable Loss – Pre-amplifier.						



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EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHz	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4924.000	54.63	0.22	54.85	74	-19.15	peak
4924.000	44.87	0.22	45.09	54	-8.91	AVG
7386.000	49.48	2.64	52.12	74	-21.88	peak
7386.000	40.15	2.64	42.79	54	-11.21	AVG

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHz	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Tree
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	<ul><li>Value Type</li></ul>
4924.000	56.72	0.22	56.94	74	-17.06	peak
4924.000	44.53	0.22	44.75	54	-9.25	AVG
7386.000	51.91	2.64	54.55	74	-19.45	peak
7386.000	40.74	2.64	43.38	54	-10.62	AVG

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

#### **RESULT: PASS**

#### Note:

The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor = Antenna Factor + Cable loss - Amplifier gain, Margin=Emission-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

All test modes had been pre-tested. The 802.11b mode is the worst case and recorded in the report.



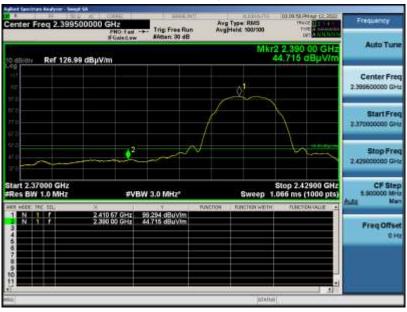
## Test result for band edge emission at restricted bands

EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHz	Antenna	Horizontal

## Test Graph for Peak Measurement



Test Graph for Average Measurement

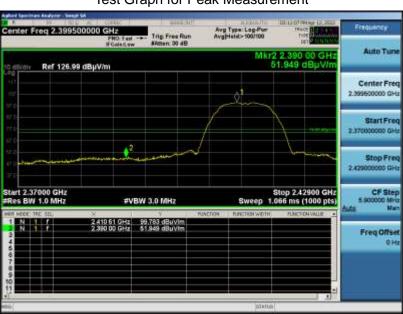


**RESULT: PASS** 



EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement





EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHz	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement





EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHz	Antenna	Vertical

Test Graph for Peak Measurement



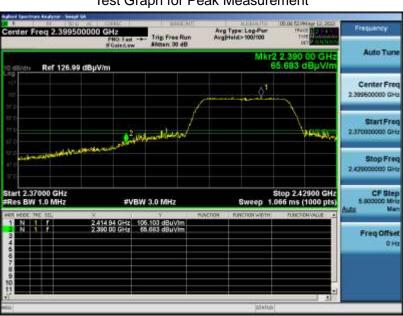
Test Graph for Average Measurement





EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHz	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



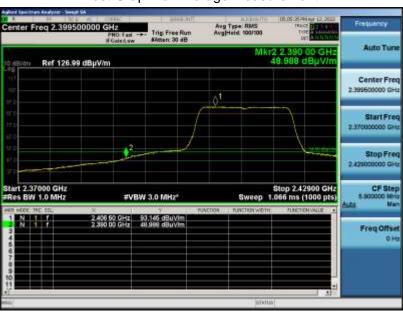


EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2412MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement





EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHz	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement





EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11g with data rate 6 2462MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement





EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2412MHz	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement



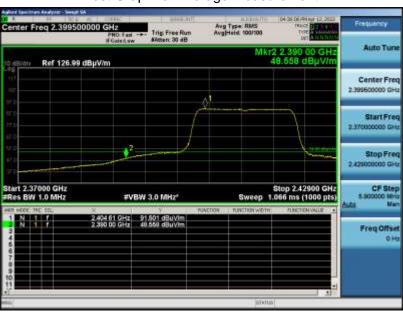


EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2412MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



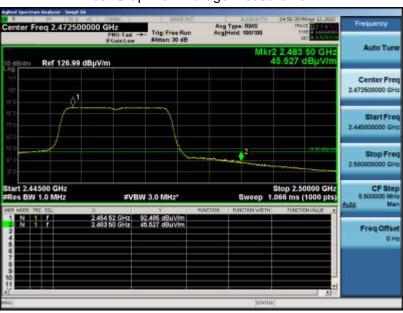


EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2462MHz	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement





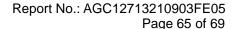
EUT	Smart Battery Camera	Model Name	X83
Temperature	25°C	Relative Humidity	55%
Pressure	985hPa	Test Voltage	Normal Voltage
Test Mode	802.11n20 with data rate 6.5 2462MHz	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement







### 12. LINE CONDUCTED EMISSION TEST

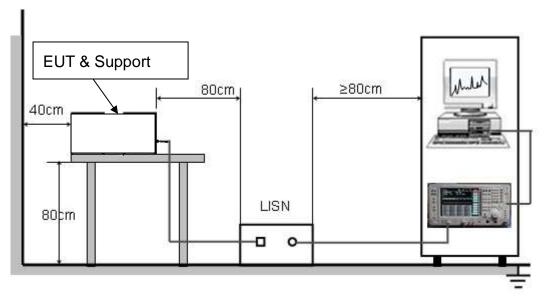
### 12.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Francis	Maximum RF Line Voltage				
Frequency	Q.P (dBµV)	Average (dBμV)			
150kHz~500kHz	66-56	56-46			
500kHz~5MHz	56	46			
5MHz~30MHz	60	50			

Note: 1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST





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#### 12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2. Support equipment, if needed, was placed as per ANSI C63.10.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4. All support equipment received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received DC 5V power from adapter which received AC120V/60Hz power from a LISN.
- 6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 Ohm load; the second scan had Line 1 connected to a 50 Ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

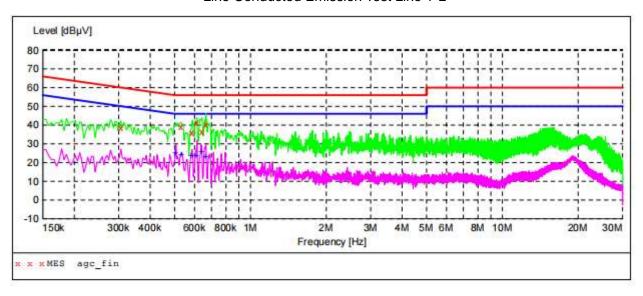
## 12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- 2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less – 2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3. The test data of the worst case was reported on the Summary Data page.



#### 12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Line Conducted Emission Test Line 1-L



## MEASUREMENT RESULT: "agc fin"

2022/4/8 15:1 Frequency MHz	7 Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.306000	38.70	6.0	60	21.4	QP	Ll	GND
0.530000	39.20	5.4	56	16.8	QP	L1	GND
0.590000	36.20	5.4	56	19.8	QP	L1	GND
0.614000	41.10	5.4	56	14.9	QP	L1	GND
0.642000	36.30	5.4	56	19.7	QP	L1	GND
0.666000	40.10	5.4	56	15.9	QP	LI	GND

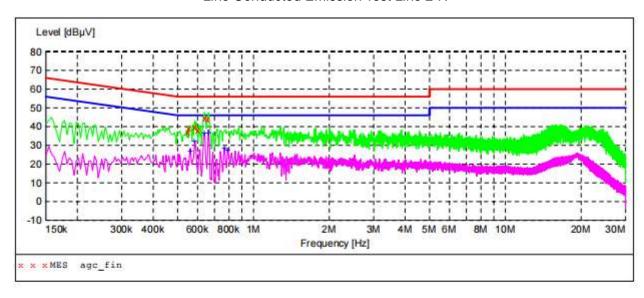
# MEASUREMENT RESULT: "agc\_fin2"

15:17 cy Level Hz dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
00 25.50	5.4	46	20.5	AV	Ll	GND
00 24.00	5.4	46	22.0	AV	L1	GND
00 23.90	5.4	46	22.1	AV	LI	GND
00 23.70	5.4	46	22.3	AV	L1	GND
25.80	5.4	46	20.2	AV	L1	GND
00 23.10	5.4	46	22.9	AV	LI	GND
֡	Cy Level Hz dBμV 00 25.50 00 24.00 00 23.90 00 23.70 00 25.80	Cy Level Transd dB	Cy Level Transd Limit dBμV dB dBμV dB dBμV 00 25.50 5.4 46 00 23.90 5.4 46 00 23.70 5.4 46 00 25.80 5.4 46	Cy Level Transd Limit Margin dB μV dB dB dBμV dB dB dBμV dB dB dBμV dB dB dBμV dB	Cy Level Transd Limit Margin Detector Hz dBμV dB dBμV dB  00 25.50 5.4 46 20.5 AV 00 24.00 5.4 46 22.0 AV 00 23.90 5.4 46 22.1 AV 00 23.70 5.4 46 22.3 AV 00 25.80 5.4 46 20.2 AV	Cy Level Transd Limit Margin Detector Line dBμV dB dBμV dB dB dBμV dB dB dBμV L1 dB dBμV L1 dB dBμV L1 dB dBμV L1 dB dBμV dB dB dBμV L1 dBμν L1 d

#### **RESULT: PASS**



#### Line Conducted Emission Test Line 2-N



### MEASUREMENT RESULT: "agc fin"

2022/4/8 15:14 Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.550000	36.90	5.4	56	19.1	QP	N	GND
0.558000	39.00	5.4	56	17.0	QP	N	GND
0.586000	39.60	5.4	56	16.4	QP	N	GND
0.606000	38.10	5.4	56	17.9	QP	N	GND
0.642000	44.50	5.4	56	11.5	QP	N	GND
0.662000	44.10	5.4	56	11.9	QP	N	GND

## MEASUREMENT RESULT: "agc fin2"

2022/4/8	15:14							
Freque	ncy	Level	Transd	Limit	Margin	Detector	Line	PE
	MHz	dBµV	dB	dBµV	dB			
0.562	000	26.80	5.4	46	19.2	AV	N	GND
0.586	000	32.30	5.4	46	13.7	AV	N	GND
0.638	000	36.40	5.4	46	9.6	AV	N	GND
0.662	000	36.70	5.4	46	9.3	AV	N	GND
0.766	000	28.20	5.4	46	17.8	AV	N	GND
0.790	000	27.50	5.4	46	18.5	AV	N	GND

#### **RESULT: PASS**

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### APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC12713210903AP02

**APPENDIX B: PHOTOGRAPHS OF EUT** 

Refer to the Report No.: AGC12713210903AP03

----END OF REPORT----



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- 5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
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- 8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
- 9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.