

# **FCC Test Report**

Report No.: AGC00008180402FE05

**FCC ID** : TW5GD9003

**APPLICATION PURPOSE**: Original Equipment

**PRODUCT DESIGNATION**: WiFi Borescope Camera

BRAND NAME : N/A

MODEL NAME : GD9003

**CLIENT**: Shenzhen Gospell Smarthome Electronic Co., Ltd.

**DATE OF ISSUE** : May 10, 2018

STANDARD(S)

TEST PROCEDURE(S) : FCC Part 15.247

**REPORT VERSION**: V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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Attestation of Global Compliance

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# REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	PO W	May 10, 2018	Valid	Initial Release

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# 1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen Gospell Smarthome Electronic Co., Ltd.
Address	F/12 F518 Idea Land Baoyuan Road Baoan Central Area Shenzhen City P.R China
Manufacturer	Shenzhen Gospell Smarthome Electronic Co., Ltd.
Address	East of 01st-04st Floor, Block A,No.1 Industrial park, Fenghuanggang, South of No.1 Baotian Road, Xixiang street, Bao'an District, Shenzhen City, Guangdong Province 518126, P.R. China
Product Designation	WiFi Borescope Camera
Brand Name	N/A
Test Model	GD9003
Date of test	Apr. 25, 2018 to May 10, 2018
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass A The Control of
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.

Tested By	Now Zhang	GC free
GC ***	Max Zhang(Zhang Yi)	May 10, 2018
Reviewed By	Bore xie	
CC in	Bart Xie(Xie Xiaobin)	May 10, 2018
Approved By	Lowesto ce	
C Martin de colonie -	Forrest Lei(Lei Yonggang) Authorized Officer	May 10, 2018

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### 2. GENERAL INFORMATION

# 2.1. PRODUCT DESCRIPTION

The EUT is designed as "WiFi Borescope 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

Operation Frequency	2.412 GHz~2.462GHz
Output Power	IEEE 802.11b:15.72dBm; IEEE 802.11g:10.95dBm; IEEE 802.11n(20):10.66dBm; IEEE 802.11n(40):9.12dBm
Modulation	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
Number of channels	11 m
Hardware Version	GD9003M02
Software Version	V1.0.4
Antenna Designation	Internal antenna
Antenna Gain	1.0dBi
Power Supply	DC 3.7V by battery or DC 5V by Micro-USB

### 2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
SE STORY COMPANY SE STORY OF S	CC 100	2412 MHZ
SGC MAN	2	2417 MHZ
	3 1 1 1 1 1 1 1 1	2422 MHZ
a Colona Companio	60 <sup>4</sup>	2427 MHZ
CG Manuscriptor	5	2432 MHZ
2400~2483.5MHZ	<b>1</b> 6	2437 MHZ
The Third Company	7 Same Control of Cont	2442 MHZ
of Colonia Compilation of Colonia Colo	8	2447 MHZ
Sec 10	9	2452 MHZ
- iiil	10	2457 MHZ
The Charles of the Control of the Co	2 11 00	2462 MHZ

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11, For 40MHZ bandwidth system use Channel 3 to Channel 9

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#### 2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss   Modulation	Modulation	R	NBPSC	NCI	BPS	NDBPS		Data rate(Mbps 800nsGl	Mbps)
d III				20MHz	40MHz	20MHz	40MHz	20MHz	40MHz	
0	1	BPSK	1/2	15	52	108	26	54	6.5	13.5
1	Cont liance	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1 8	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	類 Tallon of	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 ill	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 <sub>2</sub> M	Guard interval	

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

This submittal(s) (test report) is intended for **FCC ID: TW5GD9003** filing to comply with the FCC Part 15 requirements.

# 2.5. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

### 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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### 3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in measurement" (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB

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### 4. DESCRIPTION OF TEST MODES

NO.			TE	ST MODE DESCRIPT	ION	7.00
Kan jill	T TO THE	· · · · · · · · · · · · · · · · · · ·	Finon of Global	Low channel TX	1 200	100
2	The station of Global Control	-GO	-GC	Middle channel TX		THE MANUE
3	Pin			High channel TX	TK KE JULY	(S) And and Charles Comments
4	A Sills	· · · · · · · · · · · · · · · · · · ·	® # tation of Gir	Normal operating	® ## Globa	GC - CC

#### 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)

Transmit by 802.11n (40MHz) with Date rate (13.5/27/40.5/54/81/108/121.5/135)

#### Note:

- 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.
- 3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

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# 5. SYSTEM TEST CONFIGURATION

# **5.1. CONFIGURATION OF EUT SYSTEM**

Radiated Emission Configure :

EUT

Conducted Emission Configure:

EUT Support

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

	Item	Equipment	Model No.	ID or Specification	Remark
310	10	WiFi Borescope Camera	GD9003	TW5GD9003	EUT
9	2	Adapter	K-T50501000E1	DC5V/1A	Support

### **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

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# 6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd			
Location	1-2F., Bldg.2, No.1-4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District B112-B113, Bldg.12, Baoan Bldg Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen 518012			
NVLAP LAB CODE	600153-0			
Designation Number	CN5028			
FCC Test Firm Registration Number	682566			
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by National Voluntary Laboratory Accreditation program, NVLAP Code 600153-0			

# TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	M ESPI	101206	Jun.20, 2017	Jun.19, 2018
LISN	R&S	ESH2-Z5	100086	Aug.21, 2017	Aug.20, 2018

# **TEST EQUIPMENT OF RADIATED EMISSION TEST**

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun.20, 2017	Jun.19, 2018
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.08, 2017	Dec.07, 2018
Power sensor	Aglient	U2021XA	MY54110007	Sep.21, 2017	Sep.20, 2018
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.20, 2017	Sep.19, 2018
preamplifier	ChengYi	EMC184045SE	980508	Sep.15, 2017	Sep.14, 2018
Active loop antenna (9K-30MHz)	A.H.	SAS-562B	N/A	Mar.01, 2018	Feb.28, 2020
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May.18, 2017	May.17, 2019
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.20, 2017	Jun.19, 2018
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.28, 2017	Sep.27, 2018

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### 7. OUTPUT POWER

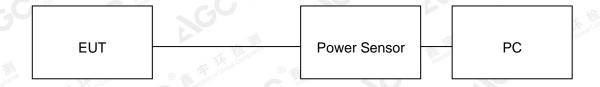
### 7.1. MEASUREMENT PROCEDURE

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) AVERAGE POWER SETUP



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# 7.3. LIMITS AND MEASUREMENT RESULT

TEST ITEM	OUTPUT POWER	100	100°	Co
TEST MODE	802.11b with data rate 1		·mi	The filling

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	15.34	30	Pass
2.437	15.72	30	Pass
2.462	15.18	30	Pass

TEST ITEM	OUTPUT POWER	The Manual Completions	Of The State of Company
TEST MODE	802.11g with data rate 6	G Medicinal	

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	10.85	30	Pass
2.437	10.74	30	Pass
2.462	10.95	30	Pass

TEST ITEM	OUTPUT POWER	NO	
TEST MODE	802.11n 20 with data rate 6.5	700	The Completion

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	10.53	30	Pass
2.437	10.66	30	Pass
2.462	10.04	30	Pass

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TEST ITEM	OUTPUT POWER	© Francisco de Colora	(a) ### Application	(S) Allestation of C
TEST MODE	802.11n 40 with data rate 13.5	30 , 30		

Frequency (GHz)	Average Power (dBm)		
2.422	8.87	30	Pass
2.437	9.12	30	Pass
2.452	8.54	30	Pass

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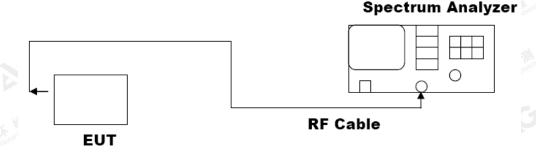
### 8. 6 DB BANDWIDTH

### **8.1. 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 Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW ≥ 3×RBW.
- 4. 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.

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



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# 8.3. LIMITS AND MEASUREMENT RESULTS

TEST ITEM	6DB BANDWIDTH	(S) Altestation of Column	® Mestation of Goods	(® Allestation of A
TEST MODE	802.11b with data rate 11			

	LIMITS AND MEAS	SUREMENT RESULT			
Applicable Limits		Applicable Limits			
Applicable Ellints	Test D	Test Data (MHz)			
	Low Channel	10.06	PASS		
>500KHZ	Middle Channel	10.10	PASS		
	High Channel	10.10	PASS		

TEST ITEM	6DB BANDWIDTH	® Attestation of C	CG Mediatron	C
TEST MODE	802.11g with data rate 54			

LIMITS AND MEASUREMENT RESULT					
Applicable Limite		Applicable Limits			
Applicable Limits	Test Data (MHz) Criteria				
NGO.	Low Channel	15.11	PASS		
>500KHZ	Middle Channel	15.12	PASS		
© Marian dictional Control	High Channel	15.11	PASS		

TEST ITEM	6DB BANDWIDTH	on of Gobbs	anion of condi	100
TEST MODE	802.11n 20 with data rate 6		· ini	· 承

	LIMITS AND MEASU	JREMENT RESULT	
Appliaghla Limita		Applicable Limits	
Applicable Limits	Test Dat	Criteria	
	Low Channel	15.12	PASS
>500KHZ	Middle Channel	15.11	PASS
3 abar Comm	High Channel	15.11	PASS

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TEST ITEM	6DB BANDWIDTH	® Management Clobal Co	(S) Mary and Global Const	(S) State and the state of the
TEST MODE	802.11n 40 with data rate 135	GO " CO		

	LIMITS AND MEASURE	EMENT RESULT			
Applicable Limits					
Applicable Limits	Test Data (I	Criteria			
a C	Low Channel	32.57	PASS		
>500KHZ	Middle Channel	33.81	PASS		
	High Channel	35.05	PASS		

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# **802.11b TEST RESULT**TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



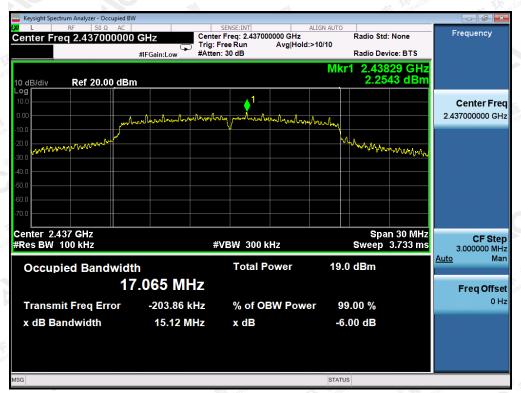
# 802.11g TEST RESULT TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



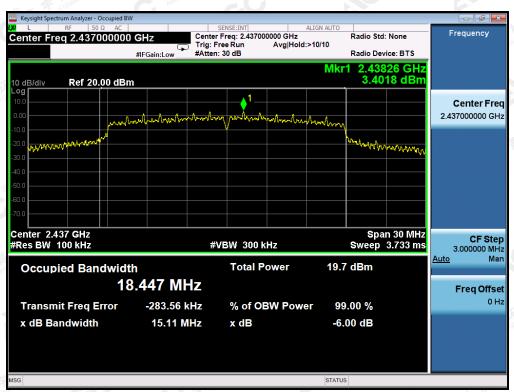
The results spound this jest report refer only to the sample(s) tested unless otherwise stated and the sample(s) are retained for 30 days only. The document is issued by XCC, this document cannot be reproduced except in full with our prior written permission. The more details and the authenticity of the report will be confirmed at a true www.ago.gent.com.



# 802.11n (20) TEST RESULT TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



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#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



802.11n (40) TEST RESULT
TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



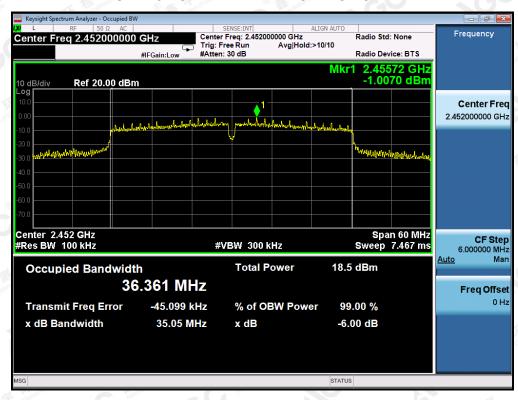
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#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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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 USED

The same as described in section 6.

#### 9.4. LIMITS AND MEASUREMENT RESULT

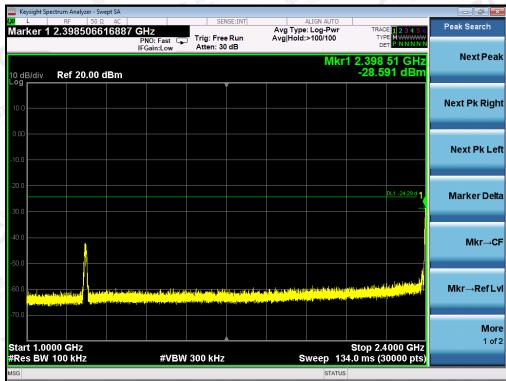
LIMITS AND MEASUREMENT RESULT				
Annih ali la	Measurement Result			
Applicable Limits	Test Data	Criteria		
In any 100 KHz Bandwidth Outside the	At least -30dBc than the limit	The Clothal Company		
frequency band in which the spread spectrum	Specified on the BOTTOM	PASS		
intentional radiator is operating, the radio frequency	Channel			
power that is produce by the intentional radiator		The state of the s		
shall be at least 30 dB below that in 100KHz		Thomas Compliance		
bandwidth within the band that contains the highest		® Marinestation of Glove		
level of the desired power.	At least -30dBc than the limit	PASS		
In addition, radiation emissions which fall in the	Specified on the TOP Channel	PASS		
restricted bands, as defined in §15.205(a), must also		-mil		
comply with the radiated emission limits specified		Compliance ® # Hono		
in§15.209(a))	The Total Control of the Control of	Shall Allest		

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# TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11b FOR MODULATION IN LOW CHANNEL





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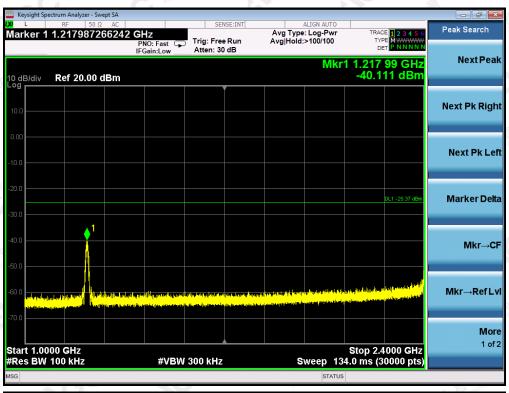


# TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11b FOR MODULATION IN MIDDLE CHANNEL



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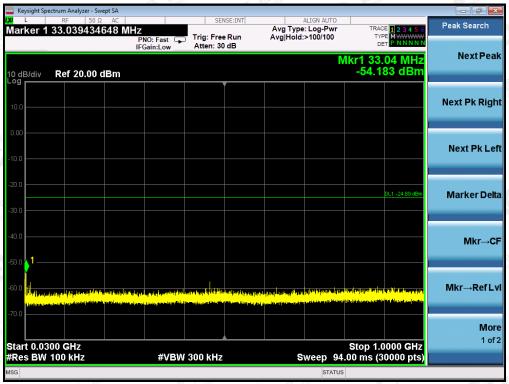


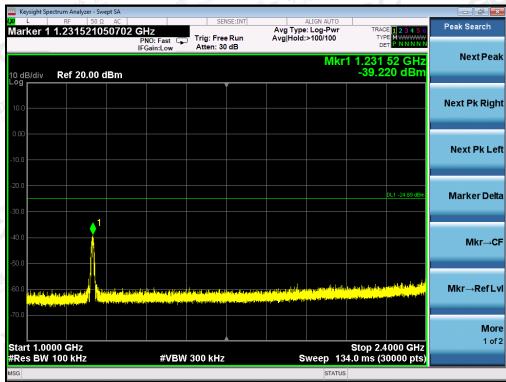


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# TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11b FOR MODULATION IN HIGH CHANNEL





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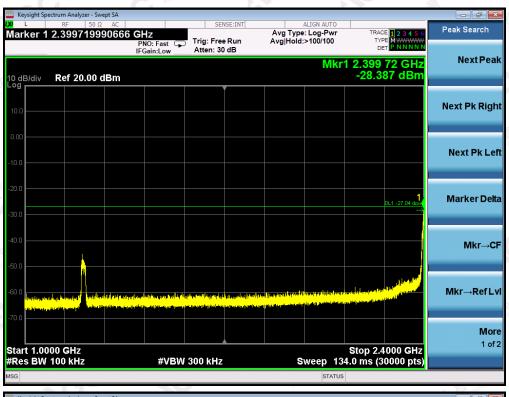


# TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11g FOR MODULATION IN LOW CHANNEL



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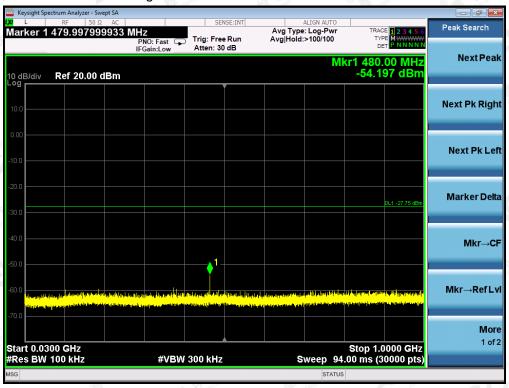


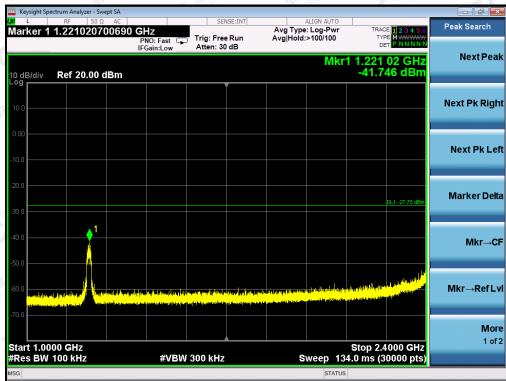


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# TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11g FOR MODULATION IN MIDDLE CHANNEL



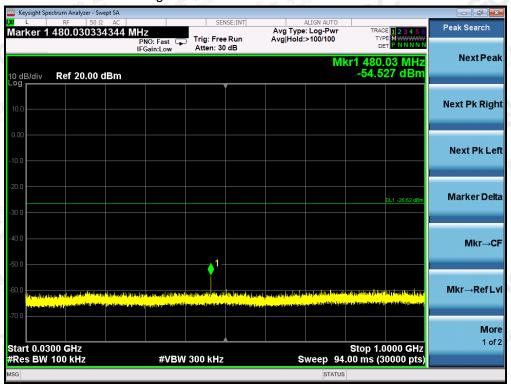


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# TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11q FOR MODULATION IN HIGH CHANNEL



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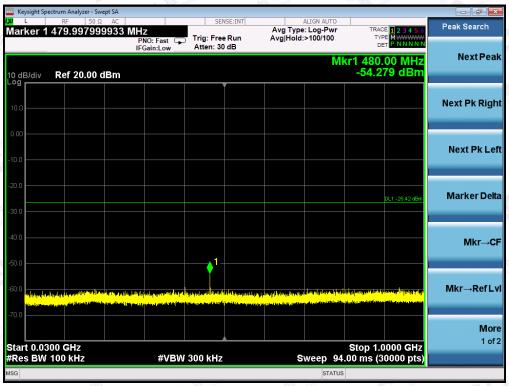


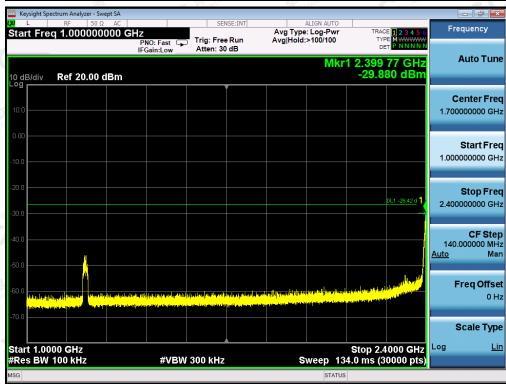


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# TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11n20 FOR MODULATION IN LOW CHANNEL



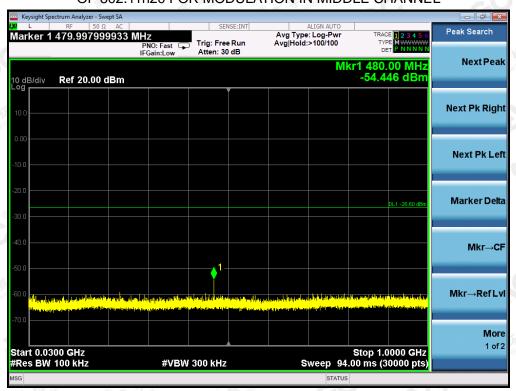


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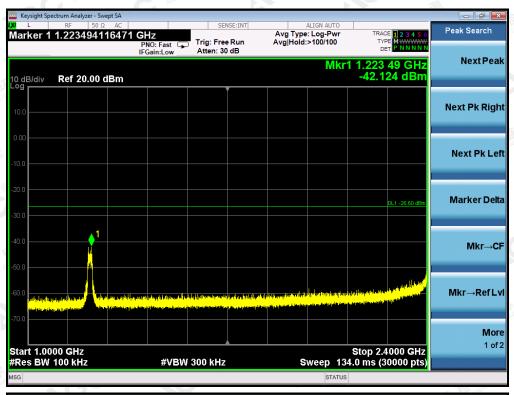


# TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n20 FOR MODULATION IN MIDDLE CHANNEL



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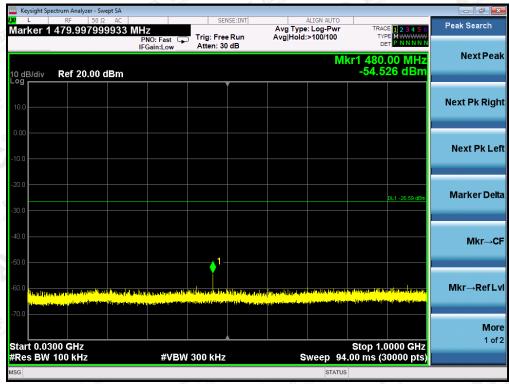


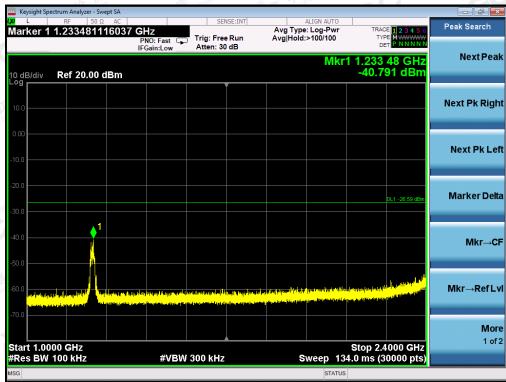


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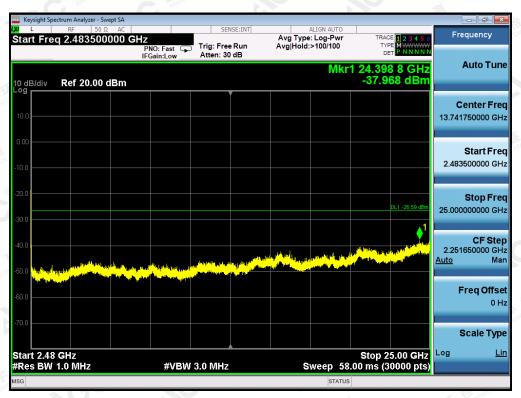
# TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n20 FOR MODULATION IN HIGH CHANNEL



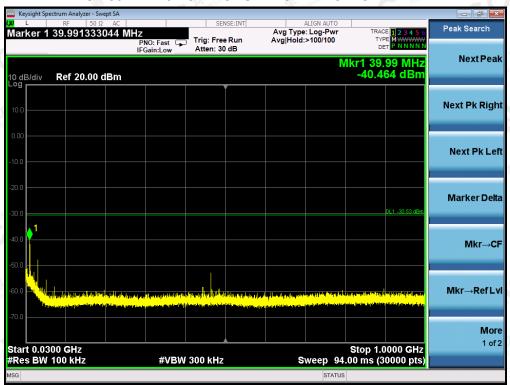


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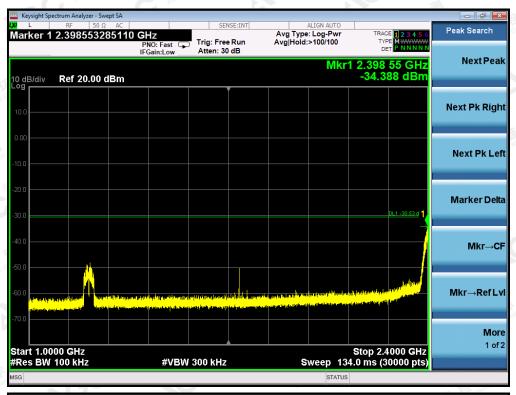


# TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 802.11n40 FOR MODULATION IN LOW CHANNEL



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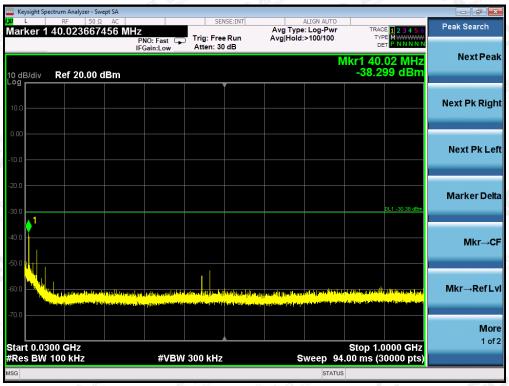


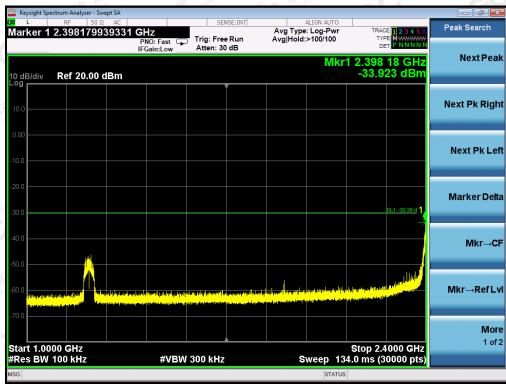


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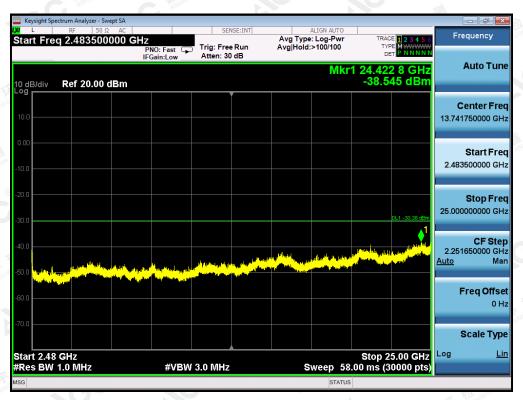
# TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n40 FOR MODULATION IN MIDDLE CHANNEL



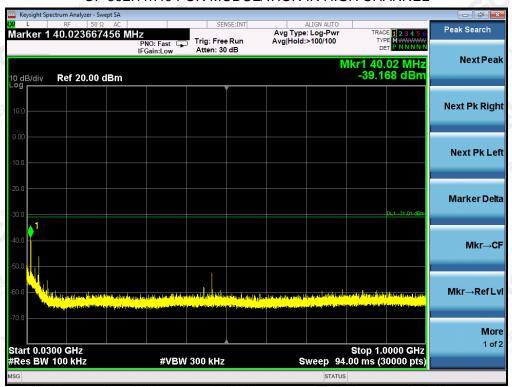


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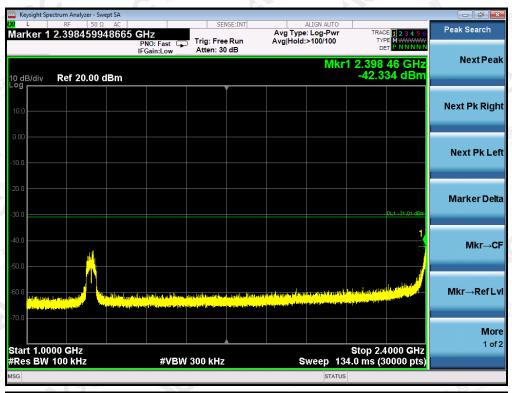


# TEST PLOT OF OUT OF BAND EMISSIONS THE WORST CASE OF 802.11n40 FOR MODULATION IN HIGH CHANNEL



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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 AVGPSD-1 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 ITEM	POWER SPECTRAL DENSITY	The Jonathanes	The Compliance ®
TEST MODE	802.11b with data rate 1	© Medical Constitution of Cons	Ades prior o

Channel No.	Power density (dBm/20kHz)		
Low Channel	4.867	8	Pass
Middle Channel	4.143	8	Pass
High Channel	4.768	8	Pass

TEST ITEM	POWER SPECTRAL DENSITY		
TEST MODE	802.11g with data rate 6	The Till	® # The of Codes Company

Channel No.	Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	-2.530	The transfer 8 It to the transfer of the trans	Pass
Middle Channel	-3.143	8	Pass
High Channel	-3.766	8	Pass

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TEST ITEM	POWER SPECTRAL DENSITY	The Compliance	The Mariane
TEST MODE	802.11n 20 with data rate 6.5	® Allesation of Car	Mention of Comments of Management of Managem

Channel No.	No. Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	-3.134	8	Pass
Middle Channel	-3.055	8	Pass
High Channel	-3.331	8	Pass

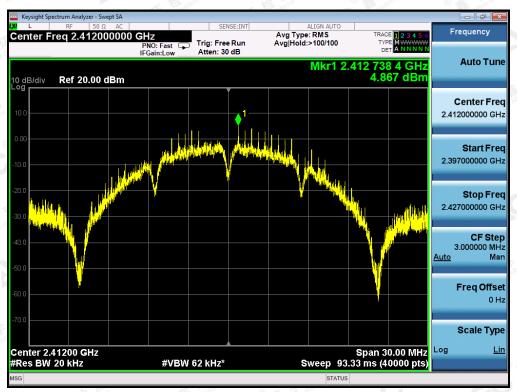
TEST ITEM	POWER SPECTRAL DENSITY	C	:111
TEST MODE	802.11n 40 with data rate 13.5	The Complainte	The Separation of the Separati

Channel No.	Power density (dBm/20kHz)	Limit (dBm/3kHz)	Result
Low Channel	-5.782	8	Pass
Middle Channel	-6.502	8	Pass
High Channel	-6.745	8	Pass

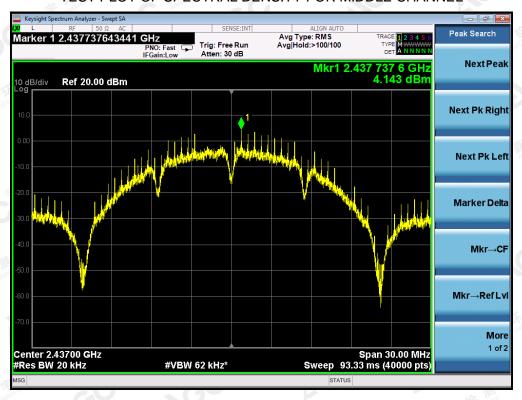
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# 802.11b TEST RESULT TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



#### TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



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