

**FCC SUBPART C PART 15.231 TEST REPORT**

**for**

**Smart Home Alarm System**

**Model No.: HPGW<sub>x</sub>-xxxxx-xxxxx**

**Series (x=0~9, A~Z or blank)**

**FCC ID: GX9HPGWG5DT16**

**of**

Applicant: Climax Technology Co Ltd  
Address: No. 258, Sinhu 2nd Rd., Neihu District  
Taipei City 114 Taiwan ( R.O.C.)

Tested and Prepared

by

**Worldwide Testing Services (Taiwan) Co., Ltd.**

**FCC Registration No.: 930600**

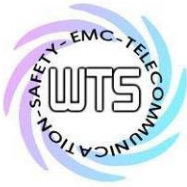
**Industry Canada filed test laboratory Reg. No. IC 5679A-1, IC-5107A-1**

**A2LA Accredited No.: 2732.01**



**Report No.: W6R21610-16279-C-1**

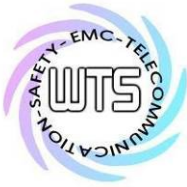
6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.  
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**1 General Information**

**1.1 Notes**

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.


Neither is there any guarantee that such a test sample will interwork with other genuinely open systems. The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.

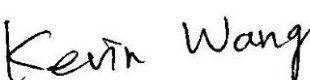
The test report may only be reproduced or published in full.

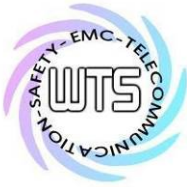
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**Tester:**

January 03, 2017	Kent Lin	
Date	WTS-Lab. Name	Signature

**Technical responsibility for area of testing:**

January 03, 2017	Kevin Wang	
Date	WTS Name	Signature



# **Worldwide Testing Services(Taiwan) Co., Ltd.**

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## **1.2 Testing laboratory**

### 1.2.1 Location

OATS

No.5-1, Lishui, Shuang Sing Village,  
Wanli Dist., New Taipei City 207,  
Taiwan (R.O.C.)

3 meter semi-anechoic chamber

No.35, Aly. 21, Ln. 228, Ankang Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

TEL:886-2-6613-0228

FAX:886-2-2791-5046

Company

Worldwide Testing Services(Taiwan) Co., Ltd.

6F, NO. 58, LANE 188, RUEY-KUANG RD.

NEIHU, TAIPEI 114, TAIWAN R.O.C.

Tel : 886-2-66068877

Fax : 886-2-66068879

### 1.2.2 Details of accreditation status

Accredited testing laboratory

A2LA accredited number: 2732.01

FCC filed test laboratory Reg. No. 930600

Industry Canada filed test laboratory Reg. No. IC 5679A-1, IC 5107A-1

**Test location, where different from Worldwide Testing Services (Taiwan) Co., Ltd. :**

Name: ./.

Accredited number: ./.

Street: ./.

Town: ./.

Country: ./.

Telephone: ./.

Fax: ./.

## **1.3 Details of approval holder**

Name : CLIMAX TECHNOLOGY CO., LTD.

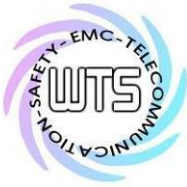
Street : No. 258, Sinhu 2nd Rd., Neihu District

Town : 114 Taipei City

Country : Taiwan (R.O.C.)

Telephone : +886-2-2794-0001

Fax : +886-2-2792-6618



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## **1.4 Application details**

Date of receipt of test item (1<sup>st</sup>): July 23, 2015  
Date of test (1<sup>st</sup>): from July 24, 2015 to September 15, 2015  
Date of receipt of test item (2<sup>nd</sup>): October 11, 2016  
Date of test (2<sup>nd</sup>): from October 12, 2016 to January 03, 2017

## **1.5 Test item**

Description of test item: Smart Home Alarm System  
Type identification: HPGWx-xxxxx-xxxxx Series (x=0~9, A~Z or blank)  
Brand name: ./.  
Multi-listing model number: ./.  
Transmitting frequency: 433.82 MHz  
Operation mode: Half-duplex  
Voltage supply: Adapter: AC 100-240V~ 50/60Hz, 0.6A  
DC 12V, 2A  
Battery: 1.2\*6 VDC, 1600 mAh

(The device is tested under fresh battery condition.)

Highest clock frequency: 433.82 MHz  
Antenna type: PCB Antenna  
Photos: see Annex

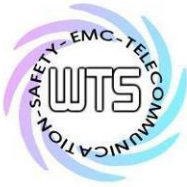
### **Manufacturer (if applicable)**

Name: ./.  
Street: ./.  
Town: ./.  
Country: ./.

Additional information: ./.

## **1.6 Test standards**

Technical standard : FCC RULES PART 15 SUBPART C § 15.231 (e) (2015-10)



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## **2 Technical test**

### **2.1 Summary of test results**

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

**or**

The deviations as specified in 3 were ascertained in the course of the tests performed.

### **2.2 Test environment**

Temperature: 23 °C  
Relative humidity content: 20 ... 75 %  
Air pressure: 86 ... 103 kPa  
Details of power supply: Adapter: AC 100-240V~ 50/60Hz, 0.6A  
DC 12V, 2A  
Battery: 1.2\*6 VDC, 1600 mAh

#### **Special statement:**

1. This test report is valid in connection to the model has been tested, any modification to the product which is different from the test model will avoid the certification of the test report.
2. This test report shall always be duplicated in full pages unless the written approval of the testing laboratory is obtained.
3. The x in model number is representing different case shape, case colors, led mask color, and control ID.
4. The model number of EUT is HPGW-G5-DT16. This model does not contain logo.



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## 2.3 Test equipment utilized

No.	Test equipment	Type	Serial No.	Manufacturer	Cal. Date	Next Cal. Date
ETSTW-CE 001	EMI TEST RECEIVER	ESHS10	842121/013	R&S	2016/5/20	2017/5/19
ETSTW-CE 003	AC POWER SOURCE	APS-9102	D161137	GW	Function Test	
ETSTW-CE 008	HF-EICHLITUNG RF STEP ATTENUATOR 139dB DPSP	334.6010.02	844581/024	R&S	Function Test	
ETSTW-CE 009	TEMP.&HUMIDITY CHAMBER	GTH-225-40-1P-U	MAA0305-009	GIANT FORCE	2016/7/15	2017/7/14
ETSTW-CE 016	TWO-LINE V-NETWORK	ENV216	100050	R&S	2016/9/12	2017/9/11
ETSTW-CE 028	MXE EMI Receiver	N9038A	MY53220110	Agilent	2016/8/26	2017/8/25
ETSTW-RE 003	EMI TEST RECEIVER	ESI 26	831438/001	R&S	2016/5/20	2017/5/19
ETSTW-RE 004	EMI TEST RECEIVER	ESI 40	832427/004	R&S	2016/5/25	2017/5/24
ETSTW-RE 005	EMI TEST RECEIVER	ESVS10	843207/020	R&S	2016/7/4	2017/7/3
ETSTW-RE 012	TUNABLE BANDREJECT FILTER	D.C 0309	146	K&L	Function Test	
ETSTW-RE 013	TUNABLE BANDREJECT FILTER	D.C 0336	397	K&L	Function Test	
ETSTW-RE 018	MICROWAVE HORN ANTENNA	AT4560	27212	AR	2016/6/24	2017/6/23
ETSTW-RE 027	Passive Loop Antenna	6512	00034563	ETS-Lindgren	2016/6/29	2017/6/28
ETSTW-RE 030	Double-Ridged Guide Horn Antenna	3117	00035224	ETS-Lindgren	2016/3/23	2017/3/22
ETSTW-RE 042	Biconical Antenna	HK116	100172	R&S	2016/1/25	2017/1/24
ETSTW-RE 043	Log-Periodic Dipole Antenna	HL223	100166	R&S	2016/3/28	2017/3/27
ETSTW-RE 044	Log-Periodic Antenna	HL050	100094	R&S	2016/4/14	2017/4/13
ETSTW-RE 045	ESA-E SERIES SPECTRUM ANALYZER	E4404B	MY45111242	Agilent	Pre-test Use	
ETSTW-RE 050	Attenuator 10dB	50HF-010-1	None	JFW	2016/2/25	2017/2/24
ETSTW-RE 051	Attenuator 6dB	50HF-006-1	None	JFW	2016/2/25	2017/2/24
ETSTW-RE 053	Attenuator 3dB	50HF-003-1	None	JFW	2016/2/25	2017/2/24
ETSTW-RE 055	SPECTRUM ANALYZER	FSU 26	200074	R&S	2016/2/27	2017/2/26
ETSTW-RE 060	Attenuator 30dB	5015-30	F651012z-01	ATM	2016/2/25	2017/2/24
ETSTW-RE 062	Amplifier Module	CHC 2	None	KMIC	2016/4/13	2017/4/12
ETSTW-RE 064	Bluetooth Test Set	MT8852B-042	6K00005709	Anritsu	Function Test	
ETSTW-RE 069	Double-Ridged Guide Horn Antenna	3117	00069377	ETS-Lindgren	Function Test	
ETSTW-RE 072	CELL SITE TEST SET	8921A	3339A00375	HP	2016/9/8	2017/9/7
ETSTW-RE 088	SOLID STATE AMPLIFIER	KMA180265A01	99057	KMIC	2016/9/20	2017/9/19
ETSTW-RE 099	DC Block	50DB-007-1	None	JFW	2016/2/25	2017/2/24
ETSTW-RE 112	AC POWER SOURCE	TFC-1005	T-0A023536	T-Power	Function test	
ETSTW-RE 115	2.4GHz Notch Filter	N0124411	473874	MICROWAVE CIRCUITS	2016/1/13	2017/1/12
ETSTW-RE 120	RF Player	MP9200	MP9210-111022	ADIVIC	Function test	
ETSTW-RE 122	SIGNAL GENERATOR	SMF100A	102149	R&S	2016/5/23	2017/5/22
ETSTW-RE 125	5GHz Notch filter	5NSL11-5200/E221.3-O/O	1	K&L Microwave	2016/8/10	2017/8/9
ETSTW-RE 126	5GHz Notch filter	5NSL12-5800/E221.3-O/O	1	K&L Microwave	2016/8/10	2017/8/9

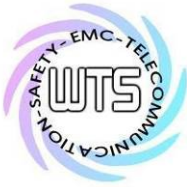


# Worldwide Testing Services(Taiwan) Co., Ltd.

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ETSTW-RE 127	RF Switch Box	RFS-01	None	WTS	2016/2/25	2017/2/24
ETSTW-RE 128	5.3GHz Notch filter	N0153001	SN487233	Microwave Circuits	2016/8/10	2017/8/9
ETSTW-RE 129	5.5GHz Notch filter	N0555984	SN487234	Microwave Circuits	2016/8/10	2017/8/9
ETSTW-RE 130	Handheld RF Spectrum Analyzer	N9340A	CN0147000204	Agilent	Pre-test Use	
ETSTW-RE 142	Amplifier	8447D	2805A03378	Agilent	2016/4/13	2017/4/12
ETSTW-RE 143	Humidity Temperature Meter	TES-1260	110104623	TES	2016/8/19	2017/8/18
ETSTW-RE 147	Bi-log Hybrid Antenna	MCTD 2786B	BLB16M04005	ETC	2016/3/31	2017/3/30
ETSTW-EMI 011	USB Compact Modulator	SFC-U	101689	R&S	2016/5/4	2017/5/3
ETSTW-GSM 002	Universal Radio Communication Tester	CMU 200	109439	R&S	2016/3/4	2017/3/3
ETSTW-GSM 003	Radio Communication Analyzer	MT8820C	6201342073	Anritsu	2016/2/3	2017/2/2
ETSTW-GSM 019	Band Reject Filter	WRCTF824/849-822/851-40 /12+9SS	3	WI	2016/1/13	2017/1/12
ETSTW-GSM 020	Band Reject Filter	WRCD1747/1748-1743/1752-32/5SS	1	WI	2016/1/13	2017/1/12
ETSTW-GSM 021	Band Reject Filter	WRCD1879.5/1880.5-1875.5/1884.5-32/5SS	3	WI	2016/1/13	2017/1/12
ETSTW-GSM 022	Band Reject Filter	WRCT901.9/903.1-904.25-50/8SS	1	WI	2016/1/13	2017/1/12
ETSTW-GSM 023	Power Divider	4901.19.A	None	SUHNER	2016/9/14	2017/9/13
ETSTW-Cable 010	BNC Cable	RGS-142	None	THERMAX	2016/9/12	2017/9/11
ETSTW-Cable 011	SMA to N type Cable	RGU-400	None	THERMAX	Pre-test Use NCR	
ETSTW-Cable 012	BNC Cable	RGS-400	None	THERMAX	2016/9/12	2017/9/11
ETSTW-Cable 016	BNC Cable	Switch Box	B Cable 1	Schwarz beck	2016/2/24	2017/2/23
ETSTW-Cable 017	BNC Cable	X Cable	B Cable 2	Schwarz beck	2016/2/24	2017/2/23
ETSTW-Cable 018	BNC Cable	Y Cable	B Cable 3	Schwarz beck	2016/2/24	2017/2/23
ETSTW-Cable 019	BNC Cable	Z Cable	B Cable 4	Schwarz beck	2016/2/24	2017/2/23
ETSTW-Cable 020	N TYPE Cable	OATS Cable 1	N30N30-L335-15M	JYE BAO CO.,LTD.	2016/4/22	2017/4/21
ETSTW-Cable 022	N TYPE Cable	5006	0002	JYE BAO CO.,LTD.	2016/4/7	2017/4/6
ETSTW-Cable 026	Microwave Cable	SUCOFLEX 104	279075	HUBER+SUHNER	2016/2/25	2017/2/24
ETSTW-Cable 027	Microwave Cable	SUCOFLEX 104	279083	HUBER+SUHNER	2016/5/13	2017/5/12
ETSTW-Cable 028	Microwave Cable	FA147A0015M2020	30064-2	UTIFLEX	2016/9/20	2017/9/19
ETSTW-Cable 029	Microwave Cable	FA147A0015M2020	30064-3	UTIFLEX	2016/9/20	2017/9/19
ETSTW-Cable 030	Microwave Cable	SUCOFLEX 104 (S Cable 9)	279067	HUBER+SUHNER	2016/2/25	2017/2/24
ETSTW-Cable 031	Microwave Cable	SUCOFLEX 104 (S Cable 10)	238092	HUBER+SUHNER	2016/4/13	2017/4/12
ETSTW-Cable 043	Microwave Cable	SUCOFLEX 104	317576	HUBER+SUHNER	2016/4/13	2017/4/12
ETSTW-Cable 048	Microwave Cable	SUCOFLEX 104	325518	HUBER+SUHNER	2016/4/13	2017/4/12
ETSTW-Cable 058	Microwave Cable	SUCOFLEX 104	none	HUBER+SUHNER	2016/4/7	2017/4/6
ETSTW-Cable 064	Microwave Cable	SUCOFLEX 104	MY28891	HUBER+SUHNER	2016/4/13	2017/4/12
ETSTW-Cable 066	SMA type cable	32022	None	ASTROLAB	2016/9/12	2017/9/11
WTSTW-SW 002	EMI TEST SOFTWARE	EZ EMC	None	Farad	Version ETS-03A1	
WTSTW-SW 006	EMI TEST SOFTWARE	e3	None	AUDIX	Version 9.161014	
WTSTW-SW 008	Signal studio	Agilent	None	AUDIX	Version 2.0.0.1	





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## **2.4 General Test Procedure**

**POWER LINE CONDUCTED INTERFERENCE:** The procedure used was ANSI STANDARD C63.10-2013 6.2 using a LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

**RADIATION INTERFERENCE:** The test procedure used was ANSI STANDARD C63.10-2013 6.3 using a spectrum analyzer. The bandwidth of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was the 100 kHz and the video bandwidth was 300 kHz.

**FORMULA OF CONVERSION FACTORS:** The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dB $\mu$ V) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

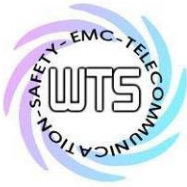
Freq (MHz)      METER READING + ACF + CABLE LOSS (to the receiver) = FS  
33                      20 dB $\mu$ V + 10.36 dB/m + 6 dB = 36.36 dB $\mu$ V/m @3m

**ANSI STANDARD C63.10-2013 6.2.2 MEASUREMENT PROCEDURES:** The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m (non metallic table). The EUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to 10<sup>th</sup> harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings.

Measurements were made by Worldwide Testing Services(Taiwan) Co., Ltd. at the registered open field test site located at. The Regist

**ANSI STANDARD C63.4-2009 10.2.7:** Any measurements that utilize special test software shall be indicated and referenced in the test report. During testing, test software 'EZ EMC' was used for setting up different operation modes.



# Worldwide Testing Services(Taiwan) Co., Ltd.

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## 3 Test results (enclosure)

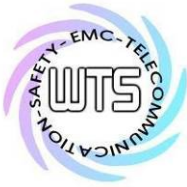
1st test

test after modification

production test

TEST CASE	Para. Number	Required	Test passed	Test failed
Transmission Requirements	FCC 15.231(a)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiated Emission	FCC 15.231(b)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bandwidth of Emission	FCC 15.231(c)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Frequency Tolerance	FCC 15.231(d)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Period Alternate Field Strength Requirements	FCC 15.231(e)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Antenna Requirement	FCC 15.203	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conducted Measurement at (AC) Power Line	FCC 15.207	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The following is intentionally left blank.



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### **3.1 Transmission Requirements**

FCC 15.231(a)

#### **3.1.1 Limit of Transmission Time**

Devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

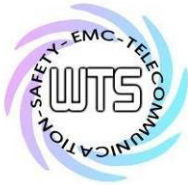
#### **3.1.2 Active Time**

This manually operated transmitter employs software to control the duration of each transmission and silent period between transmissions. The real measured result for the duration of each transmission is \_\_\_\_\_ ms, and the result for silent period between transmissions is \_\_\_\_\_ second.

This transmitter is operated by automatic activation, and the duration of each transmission and silent period between transmissions will be controlled by software. The real measured result for the duration of each transmission is 480.961924ms, and the result for silent period between transmissions is 12.384770 second.

Explanation: See attached diagrams in appendix.

Test equipment used : ETSTW-RE 004 ETSTW-RE 062, ETSTW-RE 142, ETSTW-RE 147



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**3.2 Output Power (Field Strength)**

HPGWx-xxxxx-  
 xxxxx Series (x=0~9,

Model: A~Z or blank Date: 2016/12/30  
 Mode: Power Temperature: 24 °C Engineer: Roy  
 Polarization: Horizontal Humidity: 60 %

Frequency (MHz)	Reading (dBuV) Peak	Factor (dB)		Result @3m (dBuV/m)		Limit @3m (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
		Corr.	Duty	Peak	Ave.	Peak	Ave.			
433.8202	48.34	25.33	-1.88	73.67	71.79	92.86	72.86	-1.07	35	100

Polarization: Vertical

Frequency (MHz)	Reading (dBuV) Peak	Factor (dB)		Result @3m (dBuV/m)		Limit @3m (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
		Corr.	Duty	Peak	Ave.	Peak	Ave.			
433.8192	46.77	25.33	-1.88	72.10	70.22	92.86	72.86	-2.64	125	100

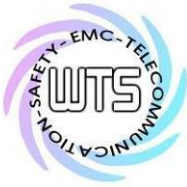
Limit 15.231(b)

Fundamental Frequency (MHz)	Field strength of fundamental, limit μV/m
40.66 – 40.70	2,250
70 – 130	1,250
130 – 174	1,250 to 3,750
174 – 260	3,750
260 – 470	3,750 to 12,500** (433.82 MHz: 72.86 dBμV/m = 4397.014 μV/m)
Above 470	12,500

\*\* linear interpolation

Explanation: See attached diagrams in appendix.

Test equipment used: ETSTW-RE 004, ETSTW-RE 111



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### **3.3 Out of Band Radiated Emissions**

FCC Rule: 15.231(b) , 15.35

For out of band emissions that are close to or that exceed the 20 dB attenuation requirement described in the specification, radiated measurements were performed at a 3 m separation distance to determine whether these emissions complied with the general radiated emission requirement.

Guidance on Measurement of pulsed emission: 15.35(c)

“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 value.”

Duty Cycle correction =  $20 \log (\text{dwell time}/100\text{ms or one period})$

Limits:

For frequencies (Average measurements)

Correction factor conform 15.35 (c) (Average measurements)

Duty cycle correction :

Max. Peak reading – duty cycle correction

Max permitted average Limits = Max permitted Fundamental limit – 20 dB

For example for 433.82 fundamental carrier:

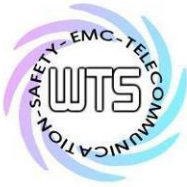
Max permitted average Limit:  $72.86 \text{ dB}\mu\text{V/m} - 20 \text{ dB} = 52.86 \text{ dB}\mu\text{V/m}$

For frequencies above 1GHz (Peak measurements).

Modified Limits for peak conform 15.35 (b) = Max Permitted average Limits + 20dB (because Peak detector is used)

Explanation: See attached diagrams in appendix.

Test equipment used: ETSTW-RE 004, ETSTW-RE 030, ETSTW-RE 111



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**3.4 Transmitter Radiated Emissions in restricted Bands**

FCC Rules: 15.231 (b), 15.205, 15.209, 15.35

Radiated emission measurements were performed from 30 MHz to 8000 MHz.

For radiated emission tests, the analyzer setting was as followings:

RES BW VID BW

Frequency <1 GHz 100 kHz 100 kHz (Peak measurements)

Frequency >1 GHz 1 MHz 1 MHz (Peak measurements)

1 MHz 1 MHz (Average measurements)

Limits:

For frequencies below 1GHz :

Frequency of Emission (MHz)	Field strength (microvolts/meter)	Field Strength (dB microvolts/meter)
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0

For frequencies above 1GHz (Average measurements).

Guidance on Measurement of pulsed emission:

“If the emission is pulsed, modify the unit for continues operation , use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

For frequencies above 1GHz (Average measurements).

The correction factor, based on the channel dwell time in a 100 ms period, may be mathematically applied to a measurement made with an average detector, to further reduce the value.

Duty cycle correction = 20 log (dwell time/100ms)

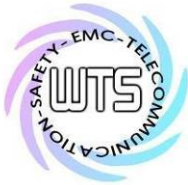
No duty cycle correction was added to the reading

Modified Limits for peak conform 15.35 (b) = Max Permitted average Limits + 20dB (because Peak detector is used)

Above 960 MHz

For mode DSSS CW: 54 dBμV/m + 20 dB = 74 dBμV/m

Explanation: See attached diagrams in appendix.



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**3.5 Spurious Emission radiated, Transmitter**

Spurious emission was measured with modulation (declared by manufacturer).

The limits on the field strength of the spurious emission in the table § 15.231(b) are based on the fundamental frequency of the intentional radiator. Spurious emission shall be attenuated to the average (or alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in § 15.209, whichever limit permits a higher field strength.

In addition, radiated emission which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (See § 15.205(c)).

SAMPLE CALCULATION OF LIMIT. All results will be updated by an automatic measuring system in accordance to point 2.3.

Calculation of test results:

Such factors like antenna correction, cable loss, external attenuation etc. are already included in the provided measurement results. This is done by using validated test software and calibrated test system according the accreditation requirements.

The peak and average spurious emission plots was measured with the average limits.

In the Table being listed the critical peak and average value an exhibit the compliance with the above calculated Limits.

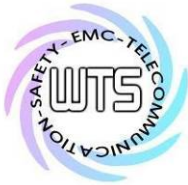
Summary table with radiated data of the test plots

HPGWx-xxxxx-xxxxx Series

Model: (x=0~9, A~Z or blank) Date: 2016/12/30  
 Mode: 433.82MHz Temperature: 24 °C Engineer: Roy  
 Polarization: Horizontal Humidity: 60 %

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
101.9637	18.88	peak	11.20	30.08	72.86	-42.78	85	100
229.1182	11.59	peak	13.38	24.97	72.86	-47.89	270	100
713.8277	1.06	peak	29.34	30.40	72.86	-42.46	155	100
867.0000	-1.38	peak	31.93	30.55	72.86	-42.31	240	100

Frequency (MHz)	Reading (dBuV) Peak	Factor (dB)		Result @3m (dBuV/m)		Limit @3m (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
		Corr.	Duty	Peak	Ave.	Peak	Ave.			
1857.7150	50.14	-7.37	-1.88	42.77	40.89	72.86	52.86	-11.97	155	100
2602.0000	43.03	-5.25	-1.88	37.78	35.90	72.86	52.86	-16.96	30	100
3470.9420	45.63	-3.76	-1.88	41.87	39.99	72.86	52.86	-12.87	235	100
4338.2000	42.69	-1.81	-1.88	40.88	39.00	74.00	54.00	-15.00	100	100



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Polarization: Vertical

Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
98.1764	25.45	peak	10.46	35.91	72.86	-36.95	135	100
228.5772	11.18	peak	13.33	24.51	72.86	-48.35	145	100
625.4510	2.70	peak	28.64	31.34	72.86	-41.52	60	100
867.0000	-0.86	peak	31.93	31.07	72.86	-41.79	175	100

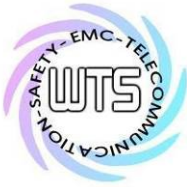
Frequency (MHz)	Reading (dBuV) Peak	Factor (dB)		Result @3m (dBuV/m)		Limit @3m (dBuV/m)		Margin (dB)	Table Degree (Deg.)	Ant. High (cm)
		Corr.	Duty	Peak	Ave.	Peak	Ave.			
1857.7150	50.04	-7.37	-1.88	42.67	40.79	72.86	52.86	-12.07	215	100
2602.0000	42.74	-5.25	-1.88	37.49	35.61	72.86	52.86	-17.25	210	100
3470.9420	46.87	-3.76	-1.88	43.11	41.23	72.86	52.86	-11.63	40	100
4338.2000	42.78	-1.81	-1.88	40.97	39.09	74.00	54.00	-14.91	290	100

- Note**
1. Correction Factor = Antenna factor + Cable loss - Preamplifier
  2. The formula of measured value as: Test Result = Reading + Correction Factor
  3. Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average
  4. All not in the table noted test results are more than 20 dB below the relevant limits.
  5. Measurement uncertainty for 3m measurement: 30-1000 MHz = ± 4.69 dB, 1-18 GHz = ± 4.78 dB, 18-40 GHz = ± 2.44 dB ; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k = 2.
  6. See attached diagrams in appendix.

All other not noted test plots do not contain significant test results in relation to the limits  
 Test results: The unit meet the FCC requirements.

Test equipment used: ETSTW-RE 004, ETSTW-RE 030, ETSTW-RE 111





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### 3.6 Channel Bandwidth

Measurement of Necessary Bandwidth (BN)

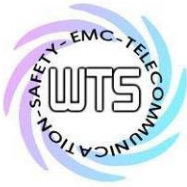
Used frequency	Bandwidth	Limit
433.82 MHz	58.11623246 kHz	1.08455 MHz

Explanation: The bandwidth fulfills the requirements of FCC § 15.231,  
See attached diagrams in appendix.

Limits:

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test equipment used: ETSTW-RE 055, ETSTW-RE 004



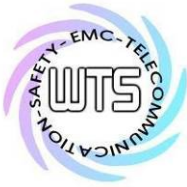
Registration number: W6R21610-16279-C-1  
FCC ID: GX9HPGWG5DT16

### 3.7 Antenna requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

Explanation: This PCB antenna is integral antenna which passes antenna requirement.

The equipment meets the requirements	yes <input checked="" type="checkbox"/>	no <input type="checkbox"/>
--------------------------------------	--	--------------------------------



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### 3.8 Duty Cycle

The correction factor, based on the channel dwell time in a 100ms period, may be mathematically applied to a measurement made with an average detector, to further reduce the measured value.

Average Reading = Peak Reading (dBuV/m) + Duty Cycle Correction

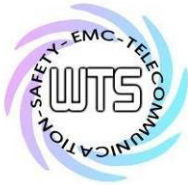
Duty Cycle Correction =  $20 \log(\text{Cycle})$

In order to determine the Duty Cycle, the EUT is measured as:

Testing Mode	T period (ms)	T on (ms)	Duty Cycle	Duty Cycle Correction $20*\log(\text{Duty Cycle})$
Transmitting Mode	100	20.14028	0.80561124	-1.88

Explanation: See attached diagrams in appendix.

Test equipment used: ETSTW-RE 055, ETSTW-RE 004

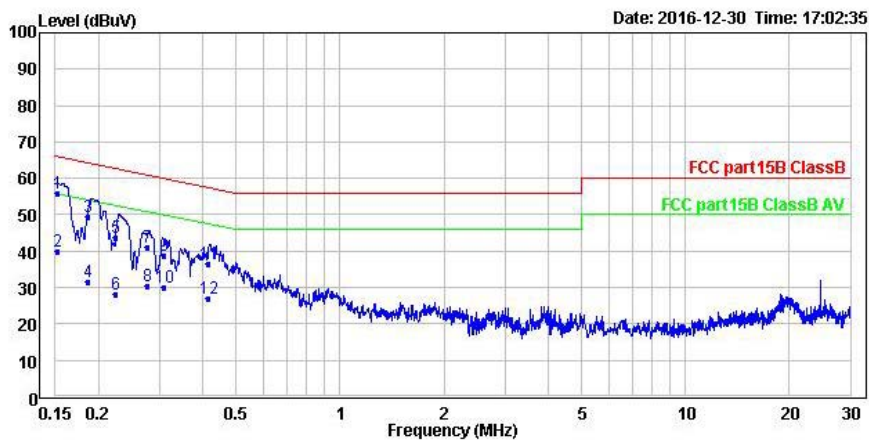


Registration number: W6R21610-16279-C-1  
 FCC ID: GX9HPGWG5DT16

## 3.9 Conducted Measurement at (AC) Power Line

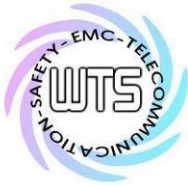
For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the table bellows with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

This measurement was transact first with instrumentation using an average and peak detector and a 10 kHz bandwidth. If the peak detector achieves a calculated level, the measurement is repeated by an instrumentation using a quasi-peak detector.

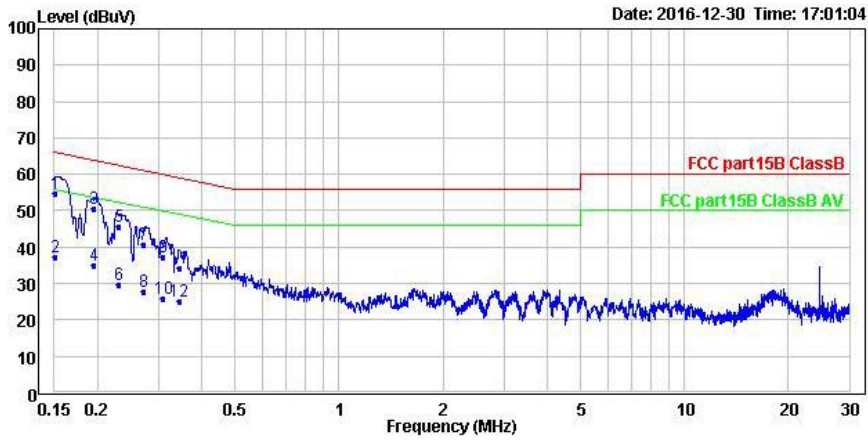


Condition: FCC part15B ClassB ENV216 neutral  
 EUT : W6R21610-16279  
 Mode :  
 Power : 120 Va.c.  
 Operator : Kent  
 Note :

	Freq	Level	Read	Limit	Over	Pol/Phase	Remark
	MHz	dBuV	Level	Line	Limit		
			dBuV		dBuV	dB	
1 *	0.153	56.00	46.20	9.80	65.85	-9.85	neutral QP
2	0.153	39.88	30.08	9.80	55.85	-15.97	neutral Average
3	0.187	49.41	39.64	9.77	64.19	-14.78	neutral QP
4	0.187	31.74	21.97	9.77	54.19	-22.45	neutral Average
5	0.224	43.58	33.81	9.77	62.66	-19.08	neutral QP
6	0.224	28.05	18.28	9.77	52.66	-24.61	neutral Average
7	0.277	41.05	31.27	9.78	60.91	-19.86	neutral QP
8	0.277	30.23	20.45	9.78	50.91	-20.68	neutral Average
9	0.309	38.84	29.06	9.78	60.00	-21.16	neutral QP
10	0.309	30.15	20.37	9.78	50.00	-19.85	neutral Average
11	0.416	36.51	26.71	9.80	57.53	-21.02	neutral QP
12	0.416	27.16	17.36	9.80	47.53	-20.37	neutral Average



Registration number: W6R21610-16279-C-1  
 FCC ID: GX9HPGWG5DT16



Condition: FCC part15B ClassB ENV216 line  
 EUT : W6R21610-16279  
 Mode :  
 Power : 120 Va.c.  
 Operator : Kent  
 Note :

	Freq	Level	Read	Limit	Over		
	MHz	dBuV	Level	Line	Limit	Pol/Phase	Remark
			dBuV	dBuV	dBuV		
1 *	0.150	54.88	45.04	9.84	65.97	-11.09	line QP
2	0.150	37.12	27.28	9.84	55.97	-18.85	line Average
3	0.195	50.38	40.57	9.81	63.83	-13.45	line QP
4	0.195	35.00	25.19	9.81	53.83	-18.83	line Average
5	0.230	45.60	35.79	9.81	62.45	-16.85	line QP
6	0.230	29.80	19.99	9.81	52.45	-22.65	line Average
7	0.272	40.79	30.98	9.81	61.06	-20.27	line QP
8	0.272	27.91	18.10	9.81	51.06	-23.15	line Average
9	0.310	37.20	27.40	9.80	59.97	-22.77	line QP
10	0.310	25.86	16.06	9.80	49.97	-24.11	line Average
11	0.344	34.28	24.48	9.80	59.11	-24.83	line QP
12	0.344	24.92	15.12	9.80	49.11	-24.19	line Average

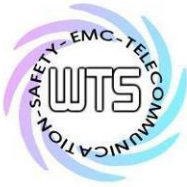
**Note**

1. The formula of measured value as:  $\text{Test Result} = \text{Reading} + \text{Correction Factor}$
2. The Correction Factor = Cable Loss + LISN Insertion Loss + Pulse Limit Loss
3. Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average
4. All not in the table noted test results are more than 20 dB below the relevant limits.
5. Measurement uncertainty =  $\pm 1.14$  dB; Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .

**Limits:**

Frequency of Emission (MHz)	Conducted Limit (dBUV)	
	Quasi Peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Test equipment used: ETSTW-CE 001, ETSTW-CE 016, ETSTW-CE 028



## **Appendix**

### **Measurement diagrams**

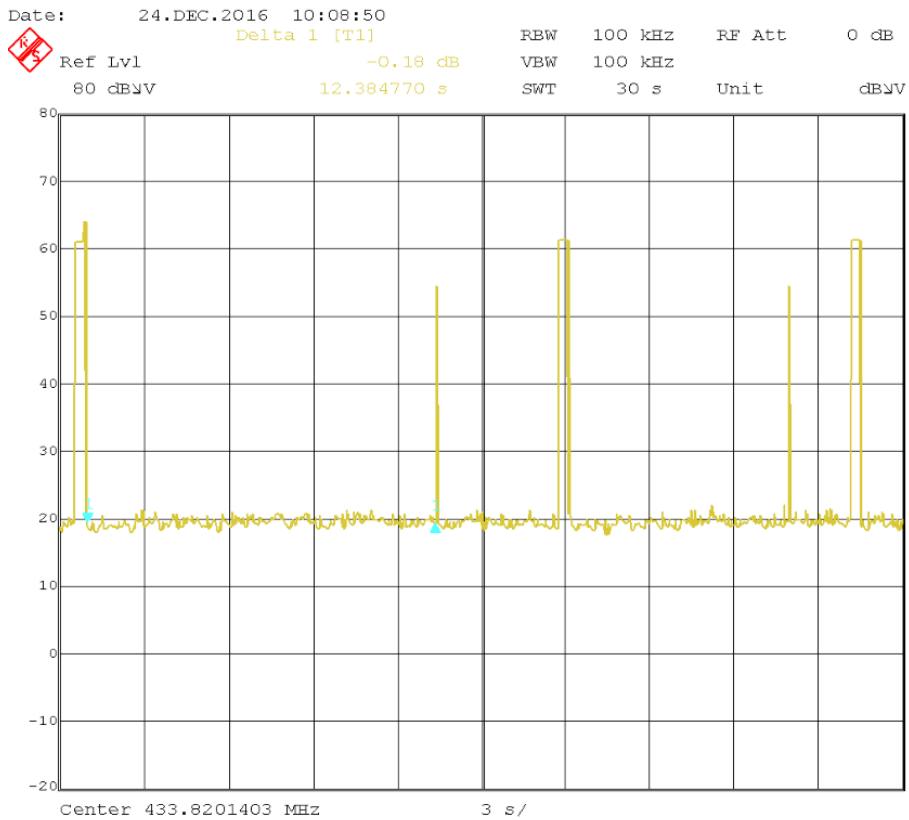
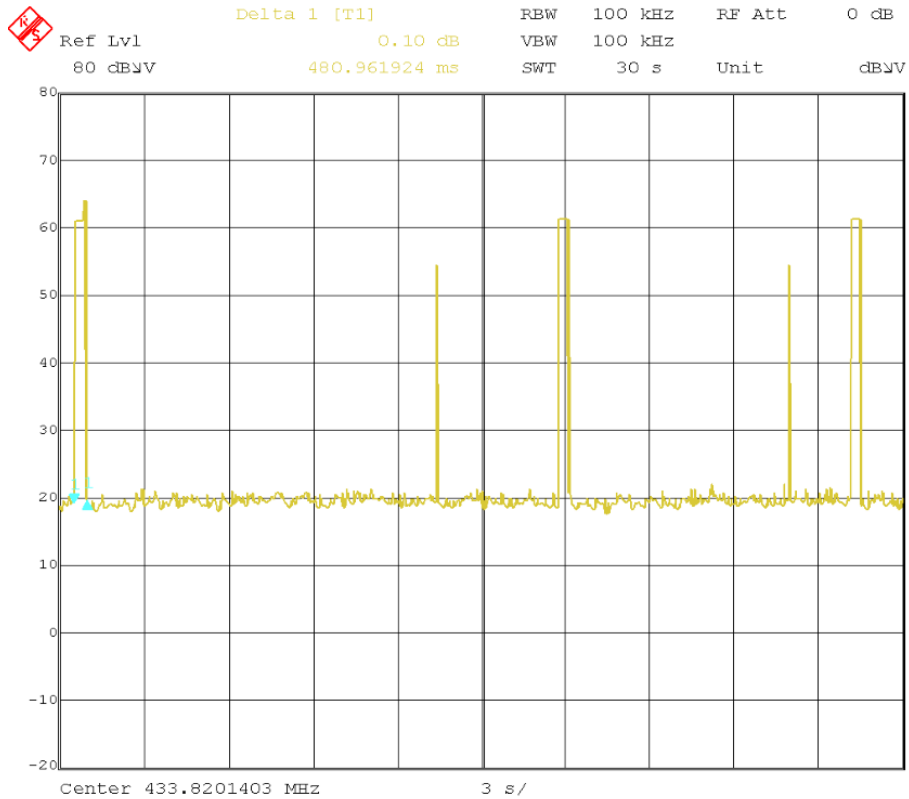
1. Active Time
2. Output Power
3. Spurious Emissions radiated
4. Bandwidth
5. Duty Cycle



# Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6R21610-16279-C-1  
FCC ID: GX9HPGWG5DT16

## Active Time



Date: 24.DEC.2016 10:09:22

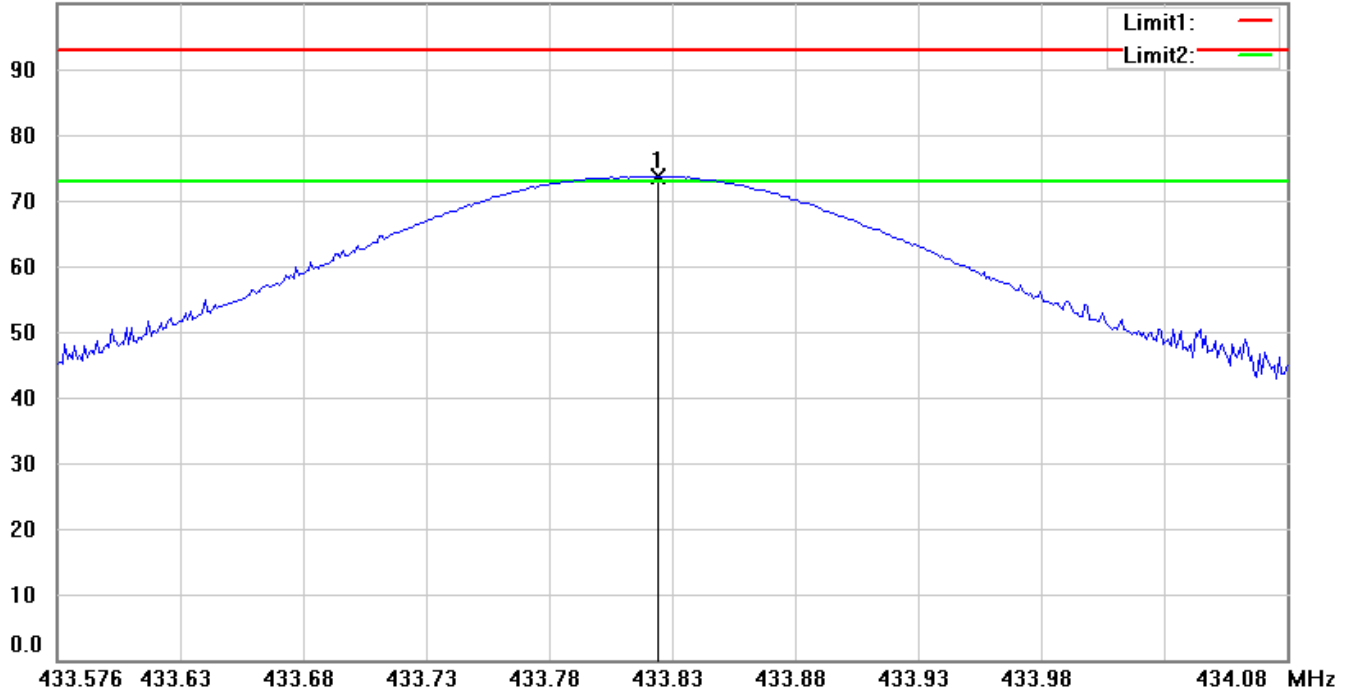


Registration number: W6R21610-16279-C-1  
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## Output Power

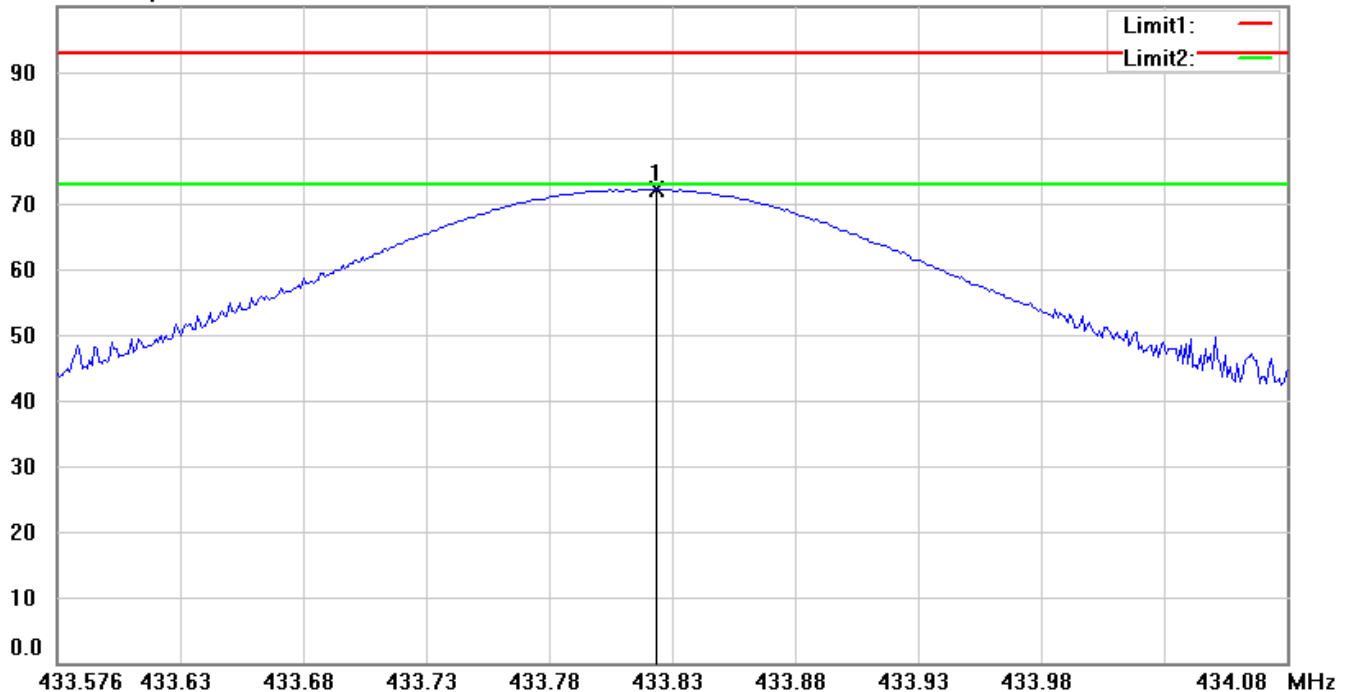
Antenna Polarization H

100.0 dBuV/m



Antenna Polarization V

100.0 dBuV/m



### Note:

Up Line: Peak Limit Line, Down Line: Ave Limit Line

1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of Field Strength test data of this test report.



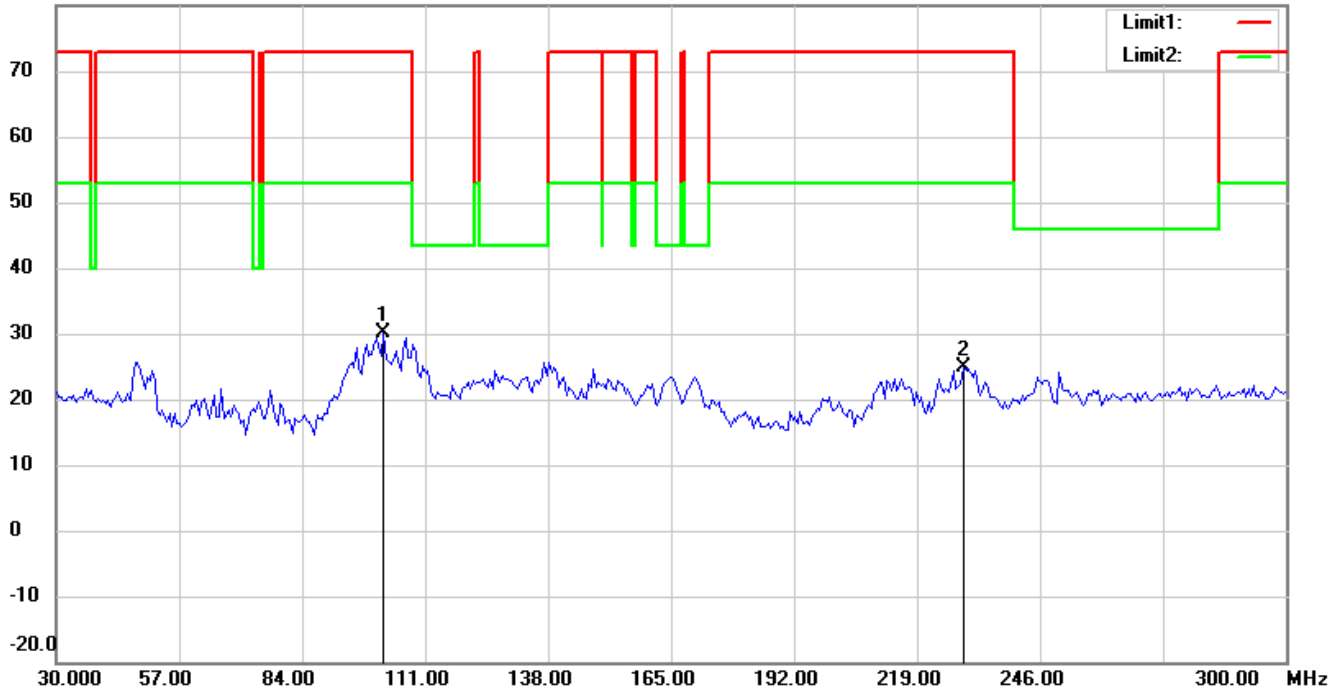


Registration number: W6R21610-16279-C-1  
FCC ID: GX9HPGWG5DT16

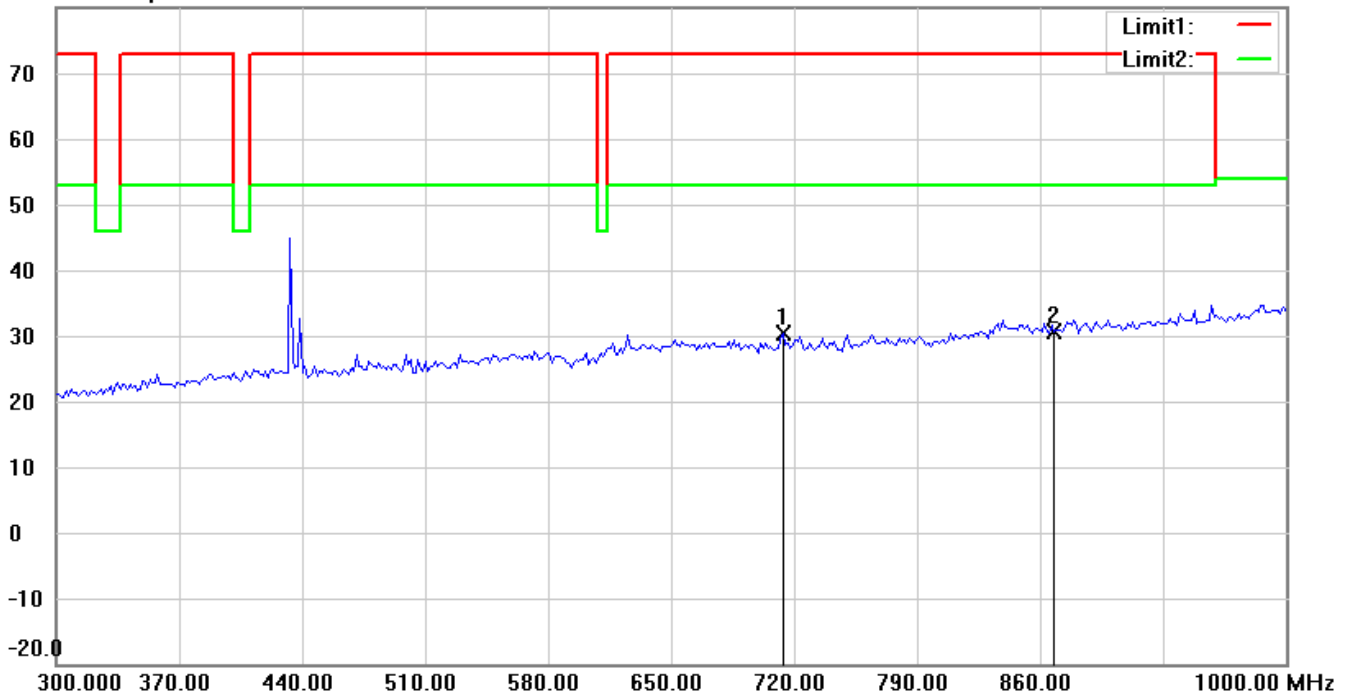
## Spurious Emissions radiated

Antenna Polarization H

80.0 dBuV/m



80.0 dBuV/m



### Note:

Up Line: Peak Limit Line, Down Line: Ave Limit Line

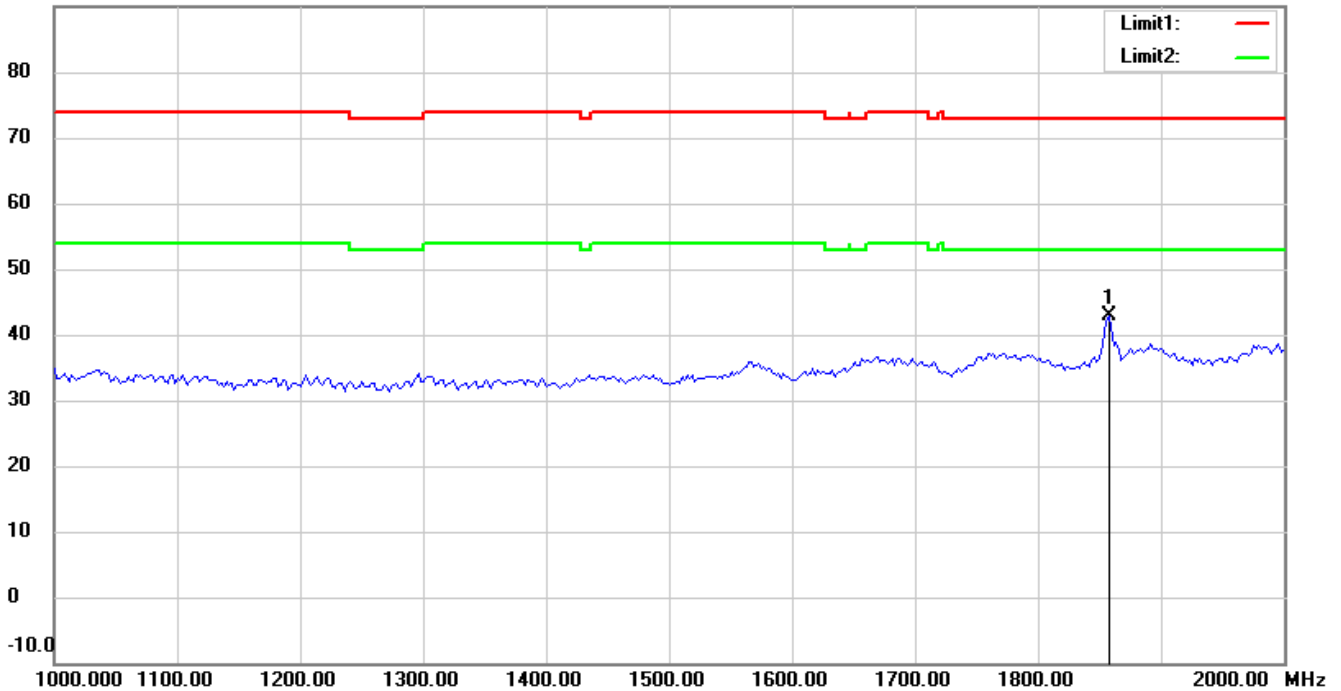
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



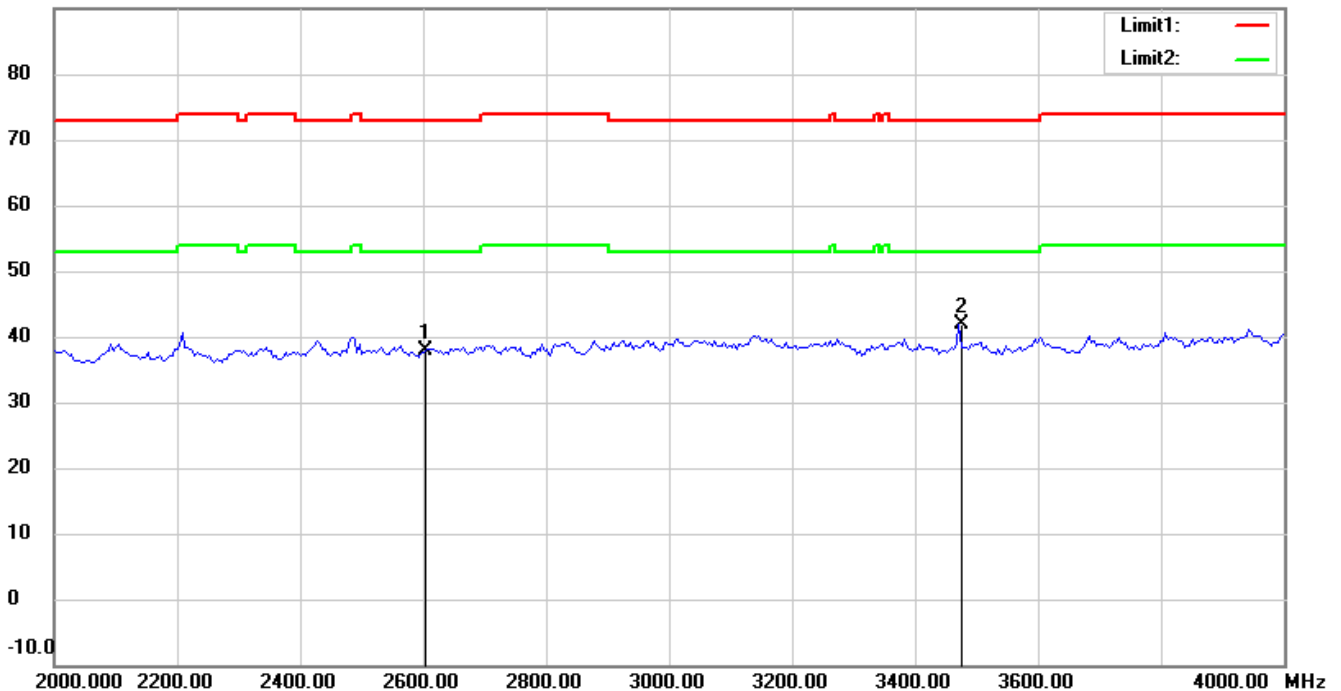
Registration number: W6R21610-16279-C-1

FCC ID: GX9HPGWG5DT16

90.0 dBuV/m



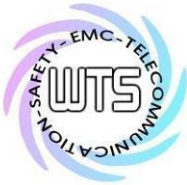
90.0 dBuV/m



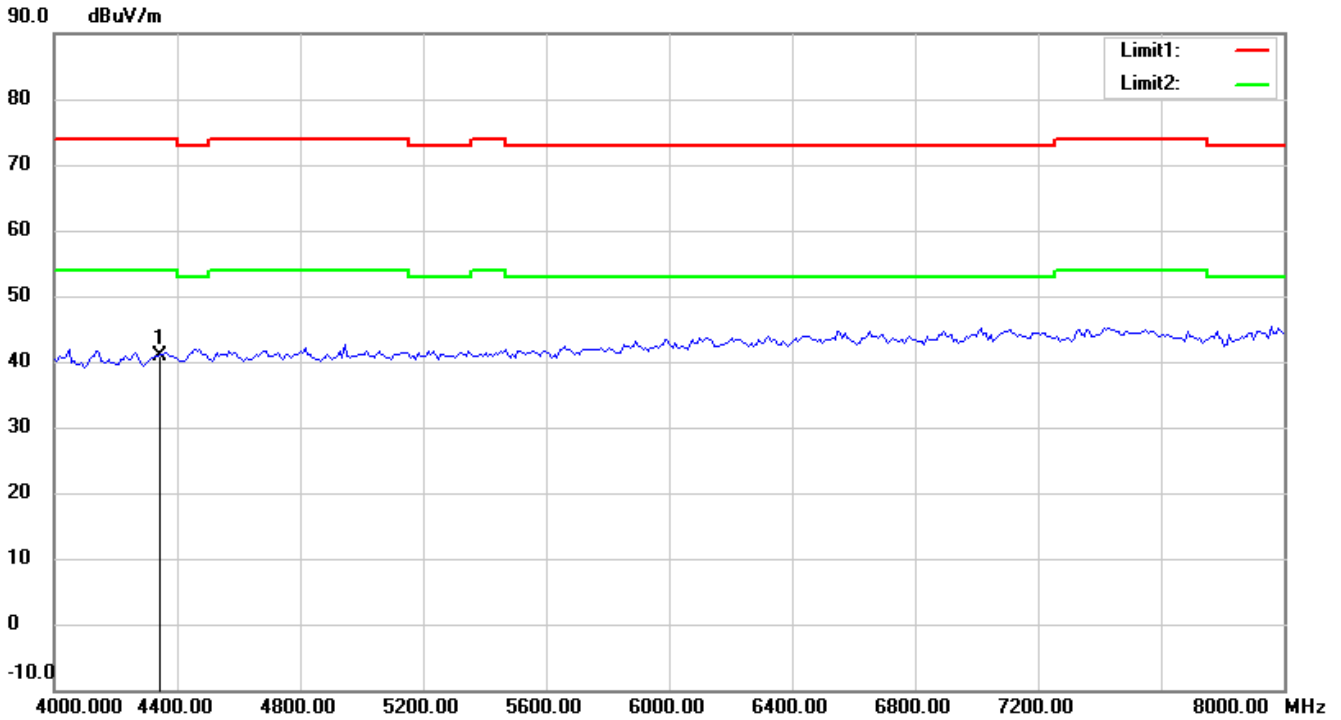
**Note:**

**Up Line: Peak Limit Line, Down Line: Ave Limit Line**

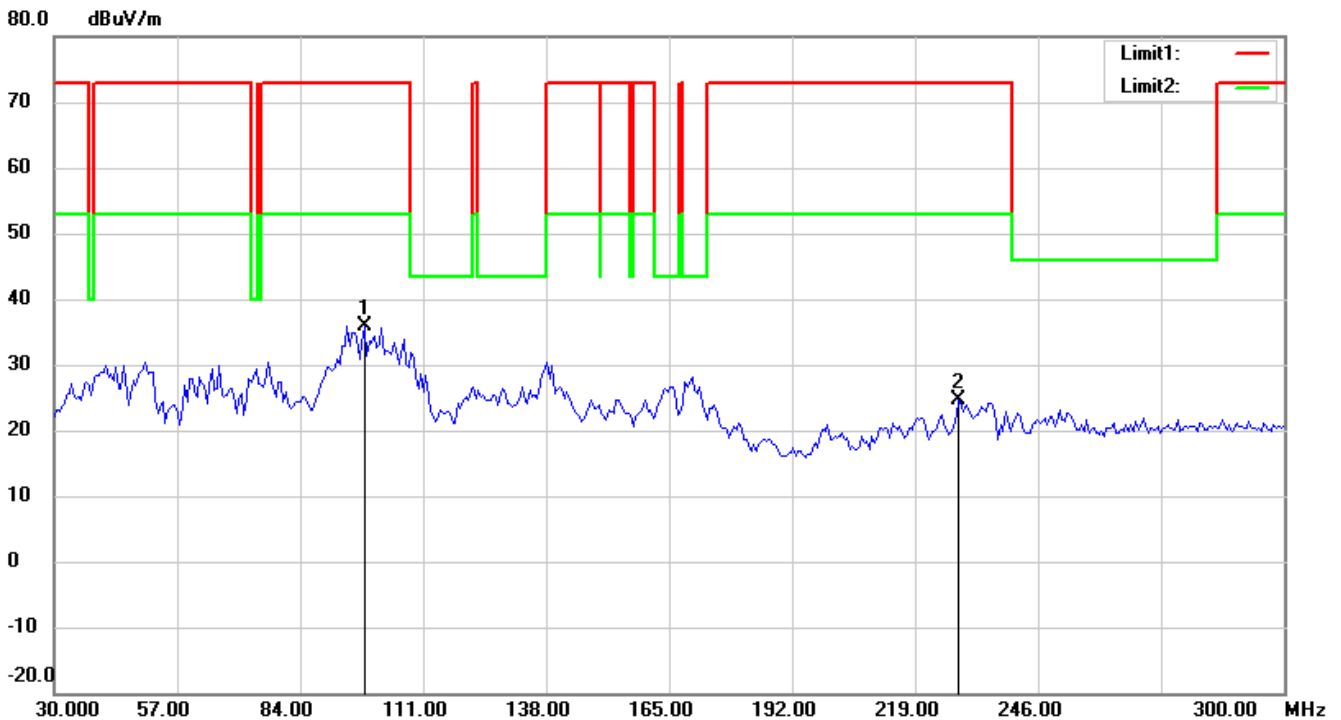
1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



Registration number: W6R21610-16279-C-1  
FCC ID: GX9HPGWG5DT16



Antenna Polarization V



**Note:**

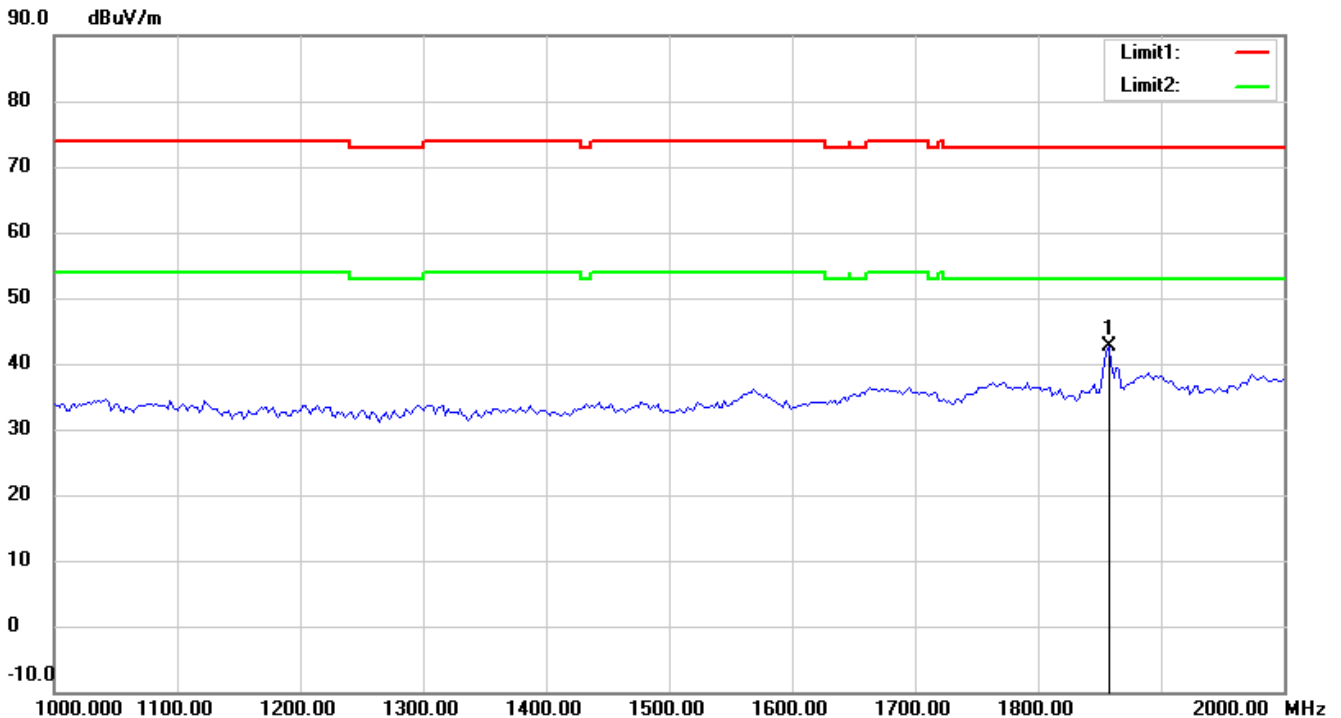
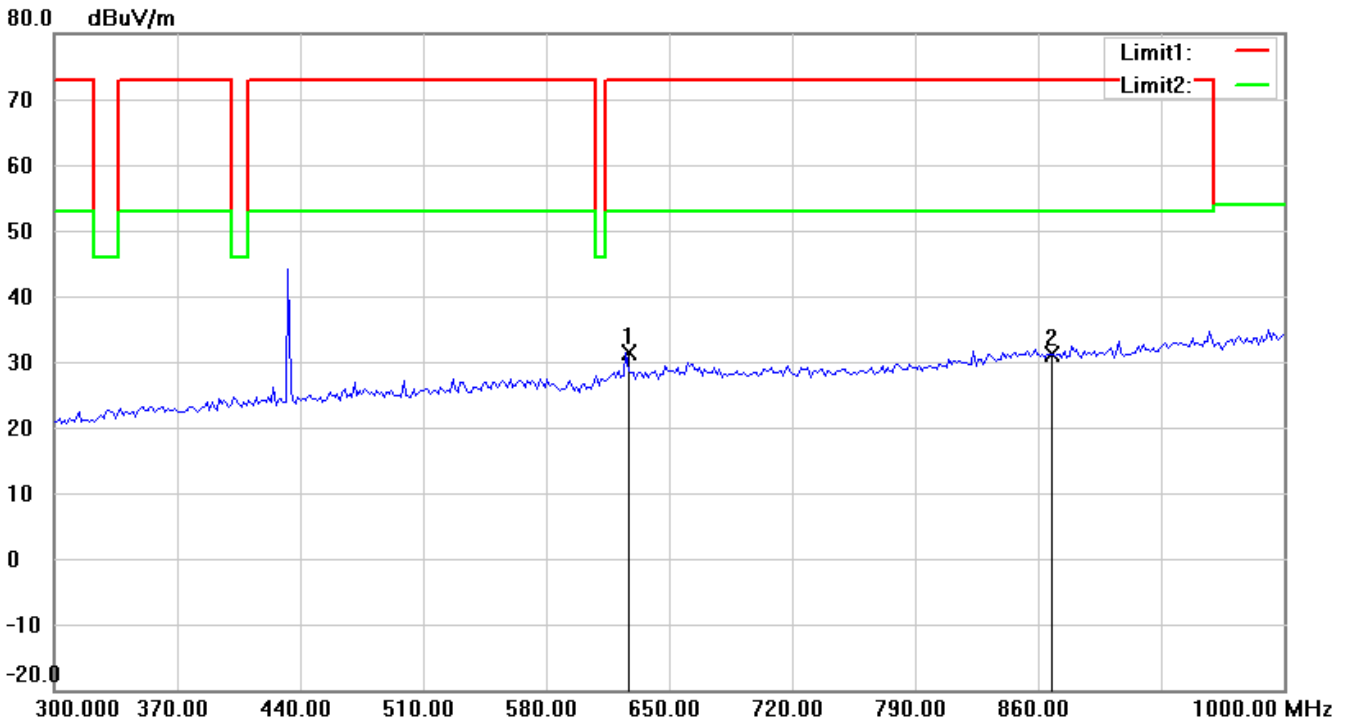
**Up Line: Peak Limit Line, Down Line: Ave Limit Line**

1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



# Worldwide Testing Services(Taiwan) Co., Ltd.

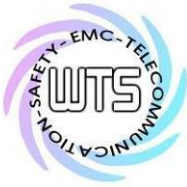
Registration number: W6R21610-16279-C-1  
FCC ID: GX9HPGWG5DT16



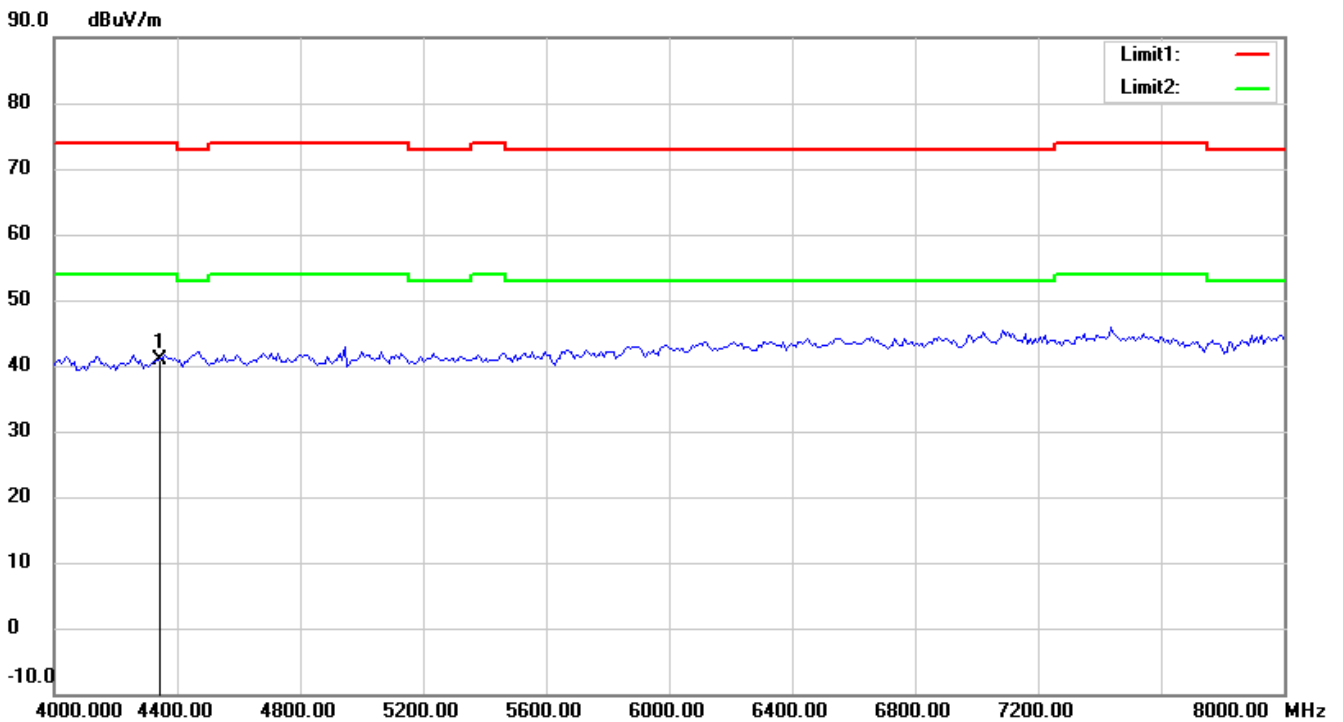
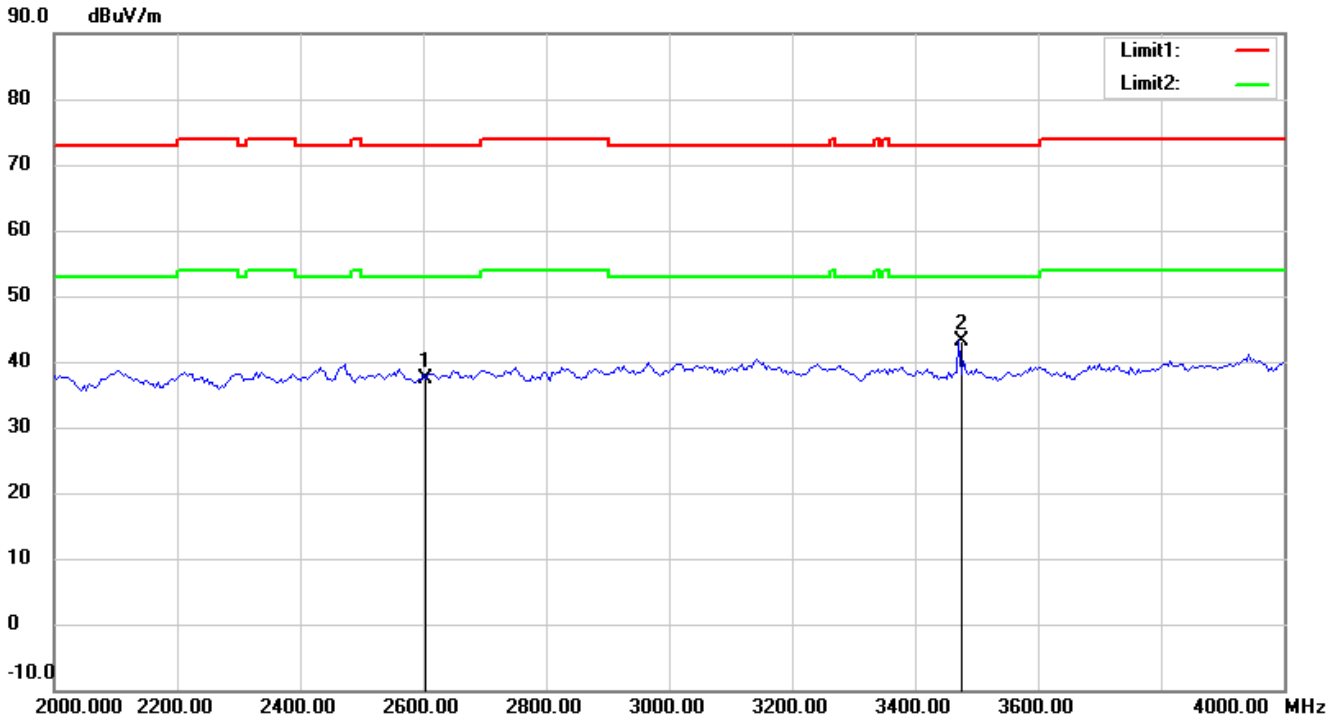
**Note:**

**Up Line: Peak Limit Line, Down Line: Ave Limit Line**

1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.



Registration number: W6R21610-16279-C-1  
FCC ID: GX9HPGWG5DT16



**Note:**

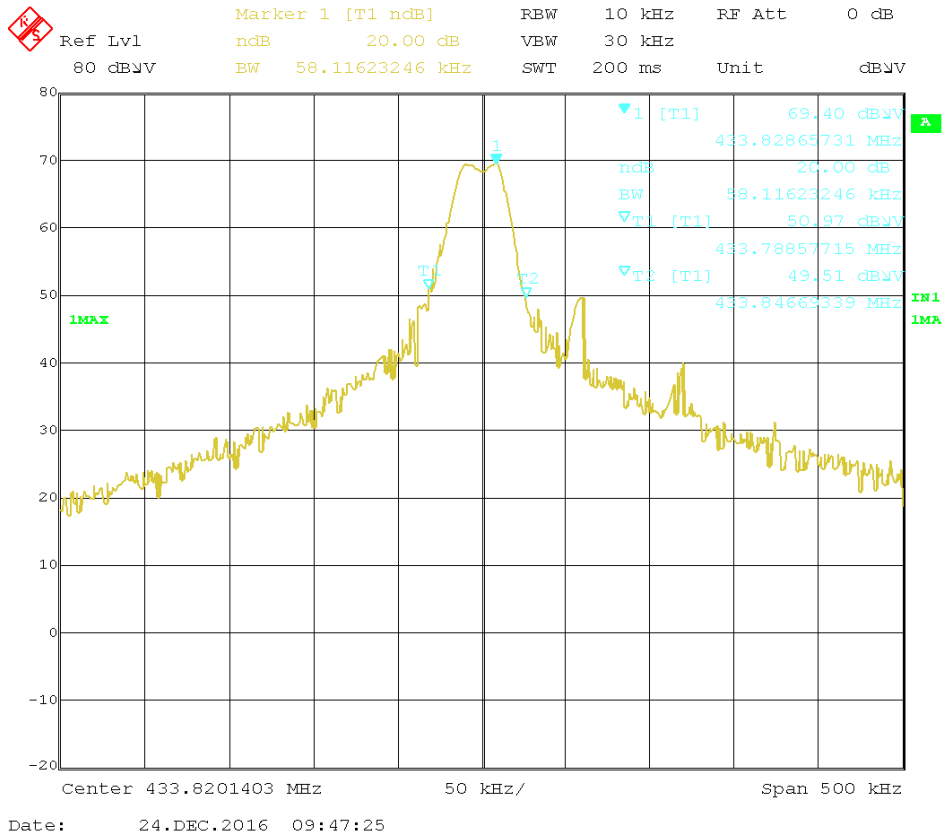
**Up Line: Peak Limit Line, Down Line: Ave Limit Line**

1. The attached measurement plots are preliminarily pre-scanned with peak detector for determining the final checking frequencies and are for reference only.
2. The some frequencies may exceed the limit line without the specified detectors, but that cannot present the results are failed to the specification of test standard.
3. For corrected test results are listed in the relevant table of radiated test data of this test report.

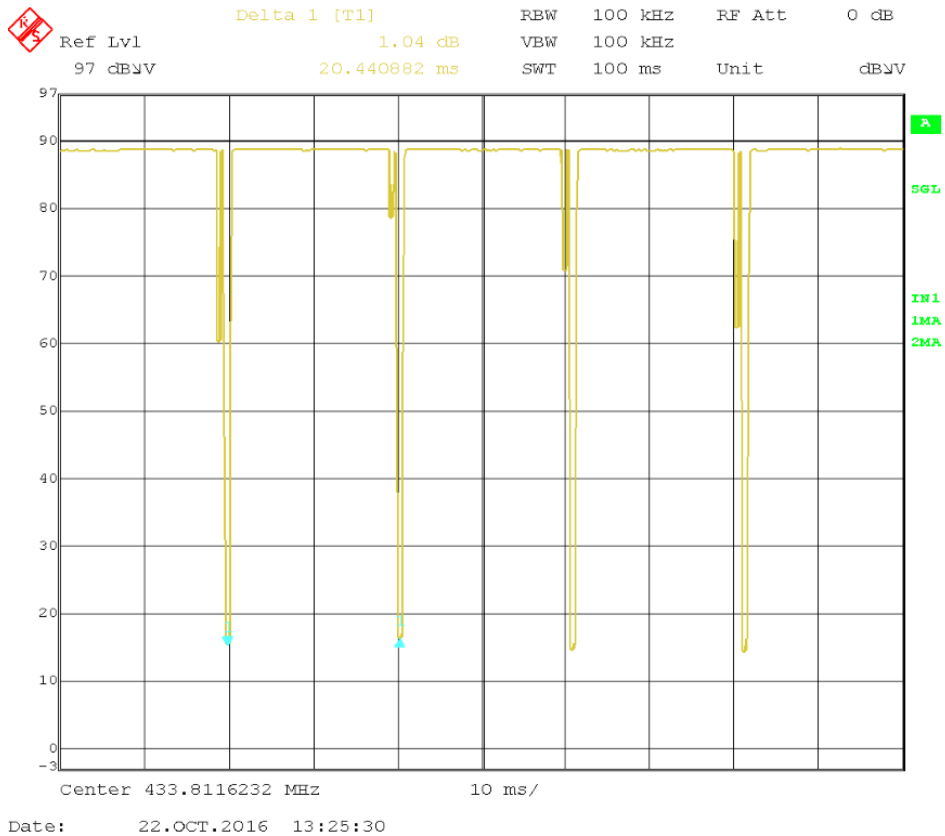


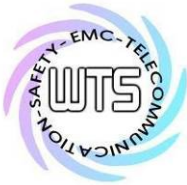
Registration number: W6R21610-16279-C-1  
 FCC ID: GX9HPGWG5DT16

## Bandwidth



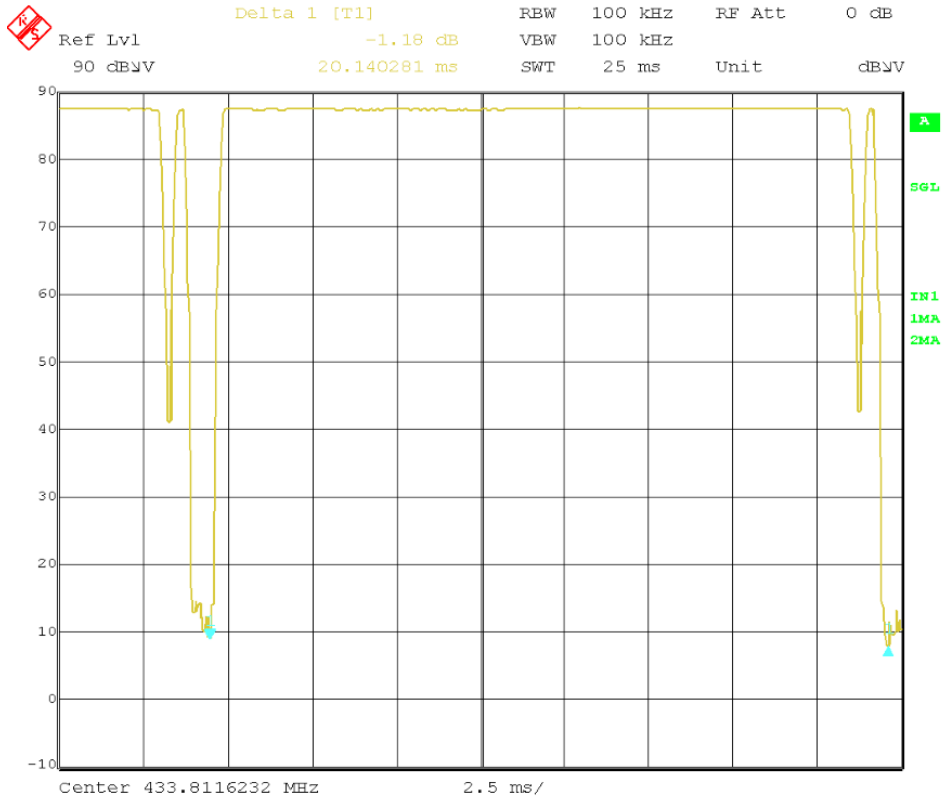
## Duty Cycle





# Worldwide Testing Services(Taiwan) Co., Ltd.

Registration number: W6R21610-16279-C-1  
FCC ID: GX9HPGWG5DT16



Date: 22.OCT.2016 13:32:25