

# FCC Test Report

Part 15 subpart C

# **Client Information:**

Applicant:	Guangzhou Panyu Juda Car Audio Equipment Co., Ltd.				
Applicant add.:	Vtrek Dewei Industrial Garden, Shibei Industrial Road, Dashi Town, Panyu				
Applicant add	Borough, Guangzhou City ,Guangdong Province, China				

# Product Information:

Product Name:	Rugged Speaker System XL
Product description :	BT SPEAKER SYSTEM
Model No.:	NS-HLPS5018
Brand Name:	INSIGNIA
FCC ID:	ESX-HLPS5018
Standards:	CFR 47 FCC PART 15 SUBPART C:2017 section 15.247

Prepared By:

### **UL-CCIC Company Limited**

Add. : Electronic Building, Parage Electronic Industrial Park, No. 8 Nanyun Er Road, Guangzhou Science Park, Guangzhou, 510663 China

Date of Receipt:	Feb. 15, 2017	Date of Test:	Feb. 15, 2017~Mar. 12, 2017
Date of Issue:	Mar. 13, 2017	Test Result:	Pass

This device described above has been tested by Dongguan Yaxu (AiT) Technology Limited, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Donny Grang Reviewed by: \_

Approved by:



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# 2 Test Summary

# 2.1 Compliance with FCC Part 15 subpart C

Test	Test Requirement	Standard Paragraph	Result			
Antenna Requirement	FCC Part 15 C:2017	Section 15.247(c)	PASS			
Conduction Emissions	FCC Part 15 C:2017	Section 15.207(a)	PASS			
Radiated Emissions	FCC Part 15 C:2017	Section 15.247(d)	PASS			
Occupied Bandwidth	FCC Part 15 C:2017	Section 15.247(a)(2)	PASS			
Peak power density	FCC Part 15 C:2017	Section 15.247(e)	PASS			
Maximum Peak Output Power	FCC Part 15 C:2017	Section 15.247(b)(1)	PASS			
Band edge	FCC Part 15 C:2017	Section 15.247(d)	PASS			
Conducted Spurious Emissions	FCC Part 15 C:2017	Section 15.247(d)	PASS			
Note:						
(1) Reference to the	(1) Reference to the KDB 558074 D01 DTS Guidance v03r05 and ANSI C63.10:2013.					
(2) The pouduct support for Bluetooth basic rate / EDR and low energy connections						

(2) The pouduct support for Bluetooth basic rate / EDR and low energy connections Bluetooth 4.0Dual-mode, this report is low energy connection test mode, for basic rate / EDR connection please refers to the report number 4787838689-1-1.

# 2.2 Test Location

All tests were performed at:

Dongguan Yaxu (AiT) Technology Limited No.22, Jinqianling Third Street, Jitigang, Huangjiang,Dongguan, Guangdong, China Tel.: +86.769.82020499 Fax.: +86.769.82020495



# 2.3 Measurement Uncertainty

All measurements involve certain levels of uncertainties, the maximum value of the uncertainty as below:

No.	Item	Uncertainty
1	Conducted Emission Test	1.20dB
2	Radiated Emission Test	3.30dB
3	RF power,conducted	0.16dB
4	RF power density, conducted	0.24dB
5	Spurious emissions,conducted	0.21dB
6	All emissions, radiated (<1G)	4.68dB
7	All emissions, radiated (>1G)	4.89dB



# 3 Test Facility

#### The test facility is recognized, certified or accredited by the following organizations:

#### .CNAS- Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2005 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Apr. 18, 2013

#### .FCC- Registration No: 248337

The 3m Semi-Anechoic Chamber, 3m/10m Open Area Test Site and Shielding Room of Dongguan Yaxu (AiT) Technology Limited have been registered by Federal Communications Commission (FCC) on Aug.29, 2014.

#### .Industry Canada(IC)-Registration No: IC6819A-1

The 3m Semi-Anechoic Chamber and 3m/10m Open Area Test Site of Dongguan Yaxu (AiT) Technology Limited have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing on Oct. 12, 2014.

# 3.1 Deviation from standard

None

# **3.2** Abnormalities from standard conditions

None



# **4** General Information

# 4.1 General Description of EUT

Manufacturer:	Guangzhou Panyu Juda Car Audio Equipment Co., Ltd.		
Manufacturer Address: Vtrek Dewei Industrial Garden, Shibei Industrial Road, Dashi Town, Panyu Bord Guangzhou City, Guangdong Province, China			
EUT Name:	Rugged Speaker System XL		
Model No:	NS-HLPS5018		
Brand Name:	INSIGNIA		
Operation frequency:	2402 MHz to 2480 MHz		
NUMBER OF CHANNEL:	40		
Modulation Technology:	GFSK		
Bluetooth version:	BT4.0 Dual-mode (BLE)		
Antenna Type:	PCB Antenna		
Antenna Gain:	maximum 0 dBi		
H/W No.:	VER:01		
S/W No.:	00		
Serial No:	N/A		
Power Supply Range:	AC 100-240V 50/60Hz		
Power Supply:	AC 120V/60Hz		
Power Cord:	1.5 m AC cable		
Output power (max) :	6.94dBm		
Note:	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		

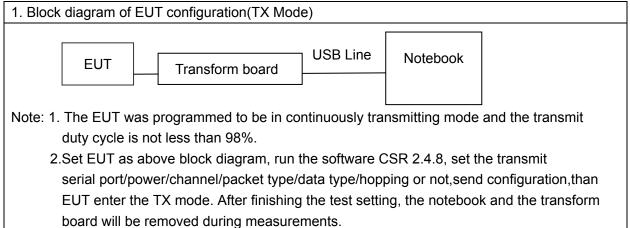


Description of Channel:					
Channel	Frequency (MHz)	Channel	Frequency (MHz)		
00	2402	20	2442		
01	2404	21	2444		
02	2406	22	2446		
03	2408	23	2448		
04	2410	24	2450		
05	2412	25	2452		
06	2414	26	2454		
07	2416	27	2456		
08	2418	28	2458		
09	09 2420		2460		
10	10 2422		2462		
11	2424	31	2464		
12	2426	32	2466		
13	2428	33	2468		
14	2430	34	2470		
15	2432	35	2472		
16	2434	36	2474		
17	2436	37	2476		
18	2438	38	2478		
19	2440	39	2480		



# 4.2 Description of Test conditions

(1) EUT was tested in normal configuration (Please See following Block diagram)



(2) E.U.T. test conditions:

15.31(e): For intentional radiators, measurements of the variation of the input power or the adiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

(3) Test frequencies:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. If required reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over	Number of	Location in
which device operates	frequencies	the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More then 10 Mila	2	1 near top, 1 near middle and
More than 10 MHz	3	1 near bottom

(4) Frequency range of radiated measurements:

According to the 15.33, the test range will be up to the tenth harmonic of the highest fundamental frequency.



# 4.3 Test Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	Laptop	ASUS	N/A	X401A	X16-96072	N/A	N/A
2	Adapter (laptop)	ASUS	N/A	EXA070 3YH	N/A	1.8m/unshielded /detachable	N/A
3	USB line	N/A	N/A	N/A	N/A	N/A	1.2m/unshielded /detachable
4	Transform board	N/A	N/A	N/A	N/A	N/A	N/A

# 4.4 EUT Peripheral List

No	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	AC line	N/A	N/A	N/A	N/A	N/A	1.5m/ detachable



# 5 Equipments List for All Test Items

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date		
1	SIGNAL ANALYZER	R&S	FSV40	101470	2016.06.29	2017.06.28		
2	EMI Measuring Receiver	R&S	ESR	101660	2016.06.29	2017.06.28		
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2016.06.29	2017.06.28		
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2016.06.29	2017.06.28		
5	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2016.06.29	2017.06.28		
6	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2016.06.29	2017.06.28		
7	SHF-EHF Horn	SCHWARZBECK	BBHA9170	BBHA9170367	2016.06.29	2017.06.28		
8	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.06.29	2017.06.28		
9	EMI Test Receiver	R&S	ESCI	100124	2016.06.29	2017.06.28		
10	LISN	Kyoritsu	KNW-242	8-837-4	2016.06.29	2017.06.28		
11	LISN	Kyoritsu	KNW-407	8-1789-3	2016.06.29	2017.06.28		
12	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.06.29	2017.06.28		
13	Loop Antenna	ETS	6512	00165355	2016.06.29	2017.06.28		
14	Radiated Cable 1# (30MHz-1GHz)	FUJIKURA	5D-2W	01	2016.12.25	2017.12.24		
15	Radiated Cable 2# (1GHz -25GHz)	FUJIKURA	10D2W	02	2016.12.25	2017.12.24		
16	Conducted Cable 1#(9KHz-30MHz)	FUJIKURA	1D-2W	01	2016.12.25	2017.12.24		
17	SMA Antenna connector	Dosin	Dosin-SMA	N/A	N/A	N/A		
Note:	Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.							



# 6 Test Result

# 6.1 Antenna Requirement

#### 6.1.1 Standard requirement

15.203 requirement: For intentional device, according to 15.203: 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.

15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

### 6.1.2 EUT Antenna

The antenna is layout on PCB in the EUT and no consideration of replacement. Antenna gain is maximum 0 dBi from 2.4GHz to 2.5GHz.



# 6.2 Conduction Emissions Measurement

### 6.2.1 Applied procedures / Limit

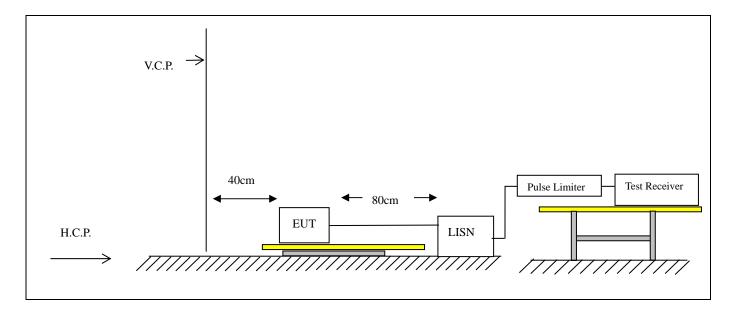
Frequency of Emission (MHz)	Conducted Limit (dBµV)		
	Quasi-peak	Average	
0.15-0.5	66 to 56 *	56 to 46 *	
0.5-5	56	46	
5-30	60	50	

Note: Decreases with the logarithm of the frequency.

### 6.2.2 Test procedure

EUT was placed upon a wooden test table 0.1m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and placed at a distance of 10cm from each other. A receiver was connected to the RF output port of the AMN. Both average and quasi-peak value were detected.

### 6.2.3 Test setup





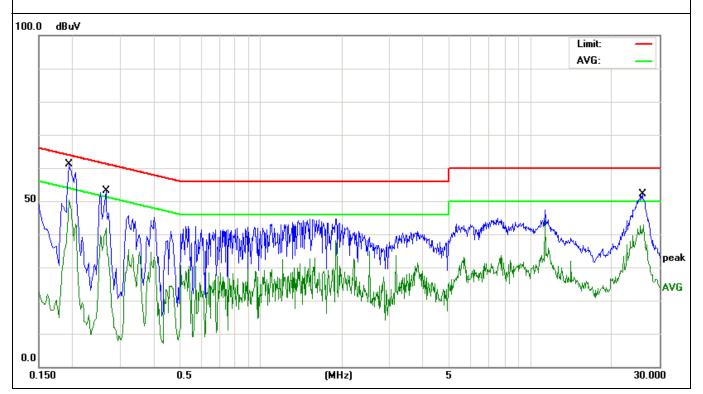
### 6.2.4 Test results

EUT:	Rugged Speaker System XL	Model Name. :	NS-HLPS5018
Temperature:	<b>26</b> ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	2017-03-08
Test Mode:	RF Link mode	Phase :	Line
Test Voltage :	AC 120V/60Hz		

Frequency (MHz)	Meter Reading (dBµV)	Factor(dB)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Detector
0.1940	46.79	11.21	58.00	63.86	-5.86	Quasi-Peak
0.1940	39.23	11.21	50.44	53.86	-3.42	Average
0.2660	42.31	10.84	53.15	61.24	-8.09	Quasi-Peak
0.2660	30.97	10.84	41.81	51.24	-9.43	Average
25.9460	49.98	2.14	52.12	60.00	-7.88	Quasi-Peak
26.2139	40.75	2.13	42.88	50.00	-7.12	Average

Remark:

1. Factor = Insertion Loss + Cable Loss + Pulse limit.



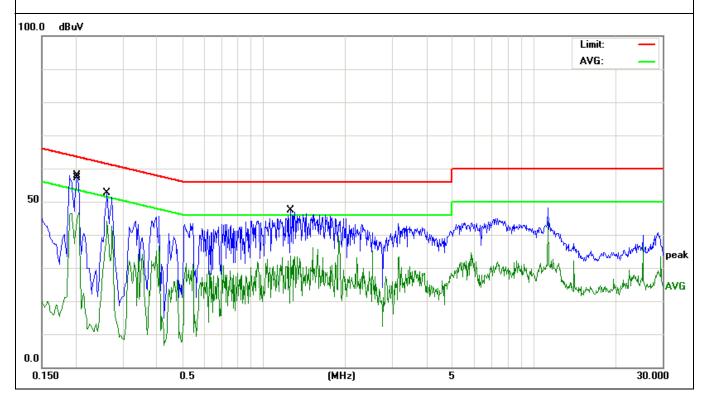


EUT:	Rugged Speaker System XL	Model Name. :	NS-HLPS5018
Temperature:	<b>26</b> ℃	Relative Humidity:	54%
Pressure:	1010hPa	Test Date :	2017-03-08
Test Mode:	RF Link mode	Phase :	Neutral
Test Voltage :	AC 120V/60Hz		

Frequency (MHz)	Meter Reading (dBµV)	Factor(dB)	Emission Level (dBµV)	Limits (dBµV)	Margin (dB)	Detector
0.2020	46.76	11.12	57.88	63.52	-5.64	Quasi-Peak
0.2060	35.56	11.09	46.65	53.36	-6.71	Average
0.2620	41.84	10.85	52.69	61.36	-8.67	Quasi-Peak
0.2620	33.27	10.85	44.12	51.36	-7.24	Average
1.2620	37.52	9.96	47.48	56.00	-8.52	Quasi-Peak
1.2620	23.75	9.96	33.71	46.00	-12.29	Average

Remark:

1. Factor = Insertion Loss + Cable Loss + Pulse limit.





# 6.3 Radiated Emissions Measurement

### 6.3.1 Applied procedures / Limit

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

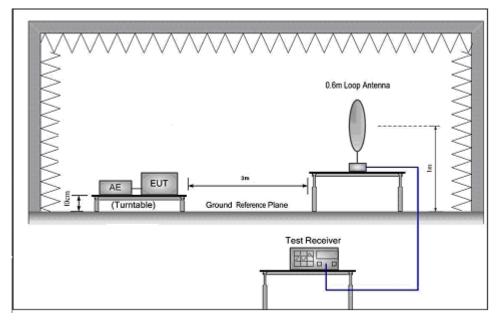
Evenuency of Emission (MU)	Field Strer	ngth	Measurement
Frequency of Emission (MHz)	μV/m	dBµV/m	Distance (meters)
0.009-0.49	2400/F(kHz)		300
0.49-1.705	24000/F(kHz)		30
1.705-30	30		30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3



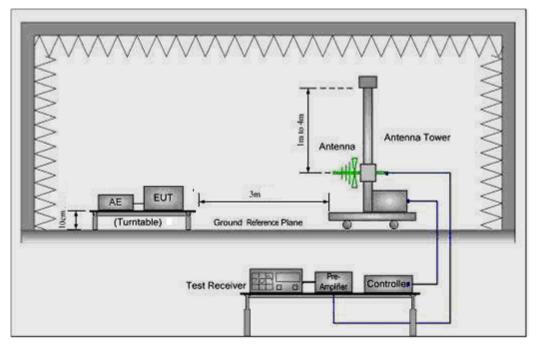
### 6.3.2 Test setup

#### **Test Configuration:**

1) 9 kHz to 30 MHz emissions:

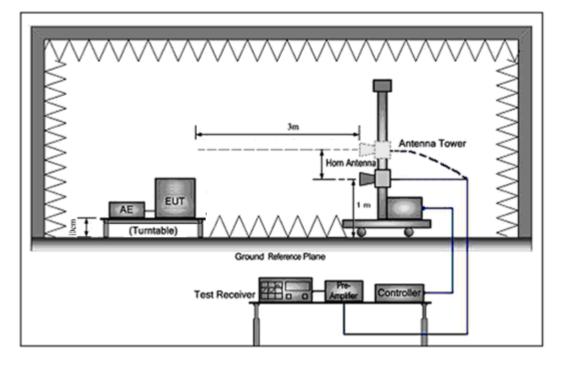


2) 30 MHz to 1 GHz emissions:





3) 1 GHz to 25 GHz emissions:





### 6.3.3 Test procedure

- a. The EUT was placed on the top of a wooden table 0.1 meters (for measurement at frequency below 1GHz) and a wooden table 0.1 meters (for measurement at frequency above 1GHz) above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter, for the test frequency of above 1GHz, horn antenna opening in the test would have been facing the EUT when rise or fall) and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. The resolution bandwidth and video bandwidth of the test receiver was 1MHz and 1MHz for Peak detection at frequency above 1GHz.
- g. Test the EUT in the lowest channel (2402MHz), the middle channel (2441MHz), the Highest channel (2480MHz)
- h. Repeat above procedures until all frequencies measured was complete.

#### For measurement at frequency above 1GHz

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.

In 18GHz to 25GHz, The EUT was checked by Horn ANT. But the test result at least have 20dB margin.The EUT was tested in Chamber Site.



### 6.3.4 Test Result

#### Radiated Emissions Test Data Below 30MHz

EUT:	Rugged Speaker System XL	Model Name :	NS-HLPS5018		
Temperature:	<b>25</b> ℃	Test Data	2017-03-08		
Pressure:	1005 hPa	Relative Humidity:	60%		
Test Mode :	TX(1Mbps worst case)	Test Voltage :	AC 120V/60Hz		
Measurement Distance	3 m Frenqucy Range 9KHz to 30MHz				
RBW/VBW	9KHz~150KHz/RB 200Hz for QP, 150KHz~30MHz/RB 9KHz for QP				

No emission found between lowest internal used/generated frequencies to 30MHz.



#### **Radiated Emissions Test Data Below 1GHz**

EUT:	Rugged Speaker System XL	Model Name :	NS-HLPS5018		
Temperature:	<b>25</b> ℃	Test Data	2017-03-08		
Pressure:	1010 hPa	Relative Humidity:	60%		
Test Mode :	TX (1Mbps) CH00 (worst case)	Test Voltage :	AC 120V/60Hz		
Measurement Distance	3 m Frenqucy Range 30MHz to 1GHz				
RBW/VBW	100KHz / 300KHz for spectrum, RBW=120KHz for receiver.				

#### (a) Antenna polarization: Horizontal

Frequency	Reading	Correct	Measure	Limit	Margin	Detector Type
(MHz)	Level	Factor	Level	(dBuV/m)	(dB)	
	(dBuV)	(dB)	(dBuV/m)			
180.6488	52.10	-12.00	40.10	43.50	-3.40	QUASIPEAK
271.3246	41.59	-12.38	29.21	46.00	-16.79	QUASIPEAK
410.3825	40.98	-6.62	34.36	46.00	-11.64	QUASIPEAK
479.9126	43.00	-5.92	37.08	46.00	-8.92	QUASIPEAK
672.8444	41.06	-0.83	40.23	46.00	-5.77	QUASIPEAK
866.0879	36.00	1.77	37.77	46.00	-8.23	QUASIPEAK

#### (b) Antenna polarization: vertical

Frequency	Reading	Correct	Measure	Limit	Margin	Detector Type
(MHz)	Level	Factor	Level	(dBuV/m)	(dB)	
	(dBuV)	(dB)	(dBuV/m)			
33.7986	51.83	-16.96	34.87	40.00	-5.13	QUASIPEAK
38.8878	47.77	-16.64	31.13	40.00	-8.87	QUASIPEAK
53.5052	51.77	-19.72	32.05	40.00	-7.95	QUASIPEAK
271.3246	51.75	-12.38	39.37	46.00	-6.63	QUASIPEAK
513.6331	42.31	-4.98	37.33	46.00	-8.67	QUASIPEAK
864.0899	32.00	1.68	33.68	46.00	-12.32	QUASIPEAK

#### Note:

Measurement Level = Reading Level + Factor

Factor= Ant Factor + Cable Loss - Pre-amplifier



#### **Radiated Emissions Test Data Above 1GHz**

EUT:	Rugged Speaker System XL	Model Name :	NS-HLPS5018		
Temperature:	<b>25</b> ℃	Test Data	2017-03-08		
Pressure:	1010 hPa	Relative Humidity:	60%		
Test Mode :	TX(1Mbps)	Test Voltage :	AC 120V/60Hz		
Measurement Distance	3 m	1GHz to 25GHz			
RBW/VBW	Spurious emission: 1MHz/1MHz for Peak, 1MHz/10Hz for Average.				
	non-restricted band: 100KHz/300KHz for Peak.				

#### (a) Antenna polarization: Horizontal

Frequency	Reading	Correct	Measure	Limit	Margin	Detector
(MHz)	Level	Factor	Level	(dBuV/m)	(dB)	Туре
	(dBuV)	(dB)	(dBuV/m)			
4804.000	52.54	5.06	57.60	74.00	-16.40	PEAK
4804.000	41.94	5.06	47.00	54.00	-7.00	AVERAGE
7206.000	43.61	7.03	50.64	74.00	-23.36	PEAK
7206.000	34.03	7.03	41.06	54.00	-12.94	AVERAGE

#### (b) Antenna polarization: Vertical

Frequency	Reading	Correct	Measure	Limit	Margin	Detector
(MHz)	Level	Factor	Level	(dBuV/m)	(dB)	Туре
	(dBuV)	(dB)	(dBuV/m)			
4804.000	54.34	5.06	59.4	74.00	-14.60	PEAK
4804.000	43.72	5.06	48.78	54.00	-5.22	AVERAGE
7206.000	45.93	7.03	52.96	74.00	-21.04	PEAK
7206.000	34.36	7.03	41.39	54.00	-12.61	AVERAGE

Note:

#### 8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor Factor= Ant Factor + Cable Loss - Pre-amplifier Low Channel 00: 2402 MHz Data rate: 1Mbps



Frequency	Reading	Correct	Measure	Limit	Margin	Detector
(MHz)	Level	Factor	Level	(dBuV/m)	(dB)	Туре
	(dBuV)	(dB)	(dBuV/m)			
4880.000	53.48	5.14	58.62	74.00	-15.38	PEAK
4880.000	42.38	5.14	47.52	54.00	-6.48	AVERAGE
7320.000	42.94	7.52	50.46	74.00	-23.54	PEAK
7320.000	32.36	7.52	39.88	54.00	-14.12	AVERAGE

#### (a) Antenna polarization: Horizontal

#### (b) Antenna polarization: Vertical

Frequency	Reading	Correct	Measure	Limit	Margin	Detector
(MHz)	Level	Factor	Level	(dBuV/m)	(dB)	Туре
	(dBuV)	(dB)	(dBuV/m)			
4880.000	55.78	5.14	60.92	74.00	-13.08	PEAK
4880.000	44.39	5.14	49.53	54.00	-4.47	AVERAGE
7320.000	43.83	7.52	51.35	74.00	-22.65	PEAK
7320.000	32.96	7.52	40.48	54.00	-13.52	AVERAGE

#### Note:

#### 8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor Factor= Ant Factor + Cable Loss - Pre-amplifier Low Channel 19: 2440 MHz

Data rate: 1Mbps



#### (a) Antenna polarization: Horizontal

Frequency	Reading	Correct	Measure	Limit	Margin	Detector
(MHz)	Level	Factor	Level	(dBuV/m)	(dB)	Туре
	(dBuV)	(dB)	(dBuV/m)			
4960.000	54.11	5.22	59.33	74.00	-14.67	PEAK
4960.000	42.12	5.22	47.34	54.00	-6.66	AVERAGE
7440.000	44.04	8.06	52.10	74.00	-21.90	PEAK
7440.000	33.85	8.06	41.91	54.00	-12.09	AVERAGE

#### (b) Antenna polarization: Vertical

Frequency	Reading	Correct	Measure	Limit	Margin	Detector
(MHz)	Level	Factor	Level	(dBuV/m)	(dB)	Туре
	(dBuV)	(dB)	(dBuV/m)			
4960.000	55.91	5.22	61.13	74.00	-12.87	PEAK
4960.000	43.81	5.22	49.03	54.00	-4.97	AVERAGE
7440.000	44.37	8.06	52.43	74.00	-21.57	PEAK
7440.000	32.99	8.06	41.05	54.00	-12.95	AVERAGE

Note:

#### 8~25GHz at least have 20dB margin. No recording in the test report.

Measurement Level = Reading Level + Factor Factor= Ant Factor + Cable Loss - Pre-amplifier Low Channel 39: 2480 MHz Data rate: 1Mbps



# 6.3.5 TEST RESULTS (Restricted Bands Requirements)

EUT:	Rugged Speaker System XL	Model Name :	NS-HLPS5018
Temperature:	<b>25</b> ℃	Test Data	2017-03-08
Pressure:	1010 hPa	Relative Humidity:	60%
Test Mode :	TX(1Mbps)	Test Voltage :	AC 120V/60Hz
RBW/VBW	1MHz/1MHz for Peak, 1MHz/10Hz	for Average.	
	<ol> <li>The transmitter was setup to strength was measured at 2310-</li> <li>The transmitter was setup to strength was measured at 2483.</li> <li>The data of 2390MHz and 2483</li> </ol>	-2390 MHz. transmit at the hig 5-2500 MHz.	hest channel. Then the field

Test	Ant.Pol.	Freq.	Rea	ding	Ant/CF	A	ct	Lir	nit
Mode	H/V	(MHz)	Peak	AV	CF(dB)	Peak	AV	Peak	AV
			(dBuv)	(dBuv)		(dBuv/m)	(dBuv/m)	(dBuv/m)	(dBuv/m)
	Н	2390.000	45.91	34.22	-5.79	40.12	28.43	74.00	54.00
TX Data rate	V	2390.000	46.92	35.08	-5.79	41.13	29.29	74.00	54.00
1Mbps	Н	2483.500	43.37	34.88	-4.98	38.39	29.90	74.00	54.00
	V	2483.500	44.97	34.84	-4.98	39.99	29.86	74.00	54.00



# 6.4 BANDWIDTH TEST

### 6.4.1 Applied procedures / Limit

15.247(a) (2) Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 6.4.2 Test procedure

- a. The testing follows FCC KDB publication No. 558074 D01 DTS Meas. Guidance v03r05
- b. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- c. Spectrum Setting: RBW= 100KHz, VBW≧3×RBW, Sweep time = Auto, Detector Function = Peak, centering on a hopping channel Trace = Max Hold.
- d. Mark the peak frequency and -6 dB points bandwidth.

#### 6.4.3 Deviation from standard

No deviation.

### 6.4.4 Test setup



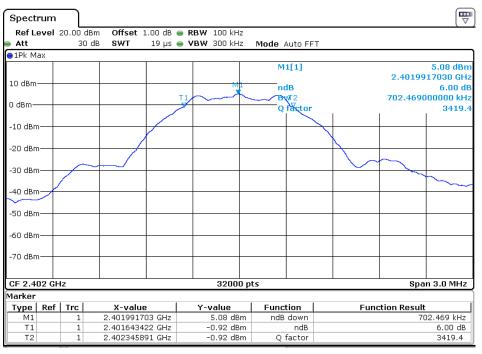


### 6.4.5 Test results

EUT:	Rugged Speaker System XL	Model Name :	NS-HLPS5018
Temperature:	<b>26</b> ℃	Relative Humidity:	53%
Pressure:	1010 hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX(1Mbps)		

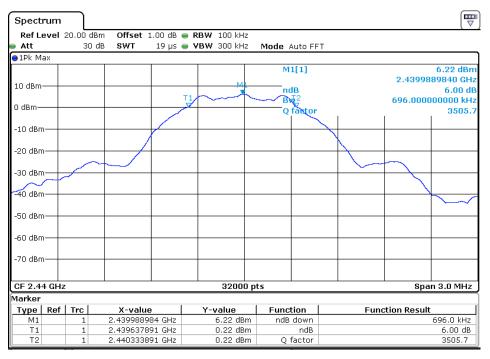
Test Mode	Test Channel	Frequency	6 dB Bandwidth	Limit
		(MHz)	(KHz)	(kHz)
	CH00	2402	702.469	≧500
Data rate 1Mbps	CH19	2440	696.000	≧500
	CH39	2480	684.281	≧500







(1Mbps) The Middle Channel 19: 2440 MHz



(1Mbps) The High Channel 39: 2480MHz

Spectrum						
Ref Level	20.00 dB	m Offset 1.00 dB (	• RBW 100 kHz			
Att	30 c	lB <b>SWT</b> 19 µs 🤅	<b>VBW</b> 300 kHz	Mode Auto FF	т	
⊖1Pk Max						
				M1[1]		6.82 dBm
10 dBm			м			2.4799898280 GHz
10 0000				ndB		6.00 dB
			3	<u> </u>		684.281000000 kHz 3624.2
				Q factor	1	30Z4.Z
-10 dBm						
					X	
-20 dBm						
	$\sim$					$\sim$
-30 dBm						
-40 dBm						
Fo do-						
-50 dBm						
-60 dBm						
-00 0011						
-70 dBm						
CF 2.48 GH:				h		Span 3.0 MHz
Marker	<u> </u>		32000 p	15		apari 3.0 MHz
	Trc	X-value	Y-value	Function	Eupo	tion Result
M1	1	2.479989828 GHz	6.82 dBm	ndB down	Func	684.281 kHz
T1	1	2.479642766 GHz	0.82 dBm	ndB		6.00 dB
T2	1	2.480327047 GHz	0.82 dBm	Q factor		3624.2



# 6.5 Peak Power Density

### 6.5.1 Applied procedures / Limit

15.247(a) (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 6.5.2 Test procedure

- a. The testing follows Measurement procedure 10.2 Method PKPSD of FCC KDB publication No. 558074 D01 DTS Meas. Guidance v03r05
- b. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- c. Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as center frequency to channel center frequency, span=1.5 times the bandwith, detector = peak 3kHz≤RBW≤100kHz, VBW≥3×RBW kHz, Sweep time=Auto.
- d. Trace mode = max hold. Mark the peak.
- e. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

#### 6.5.3 Deviation from standard

No deviation.



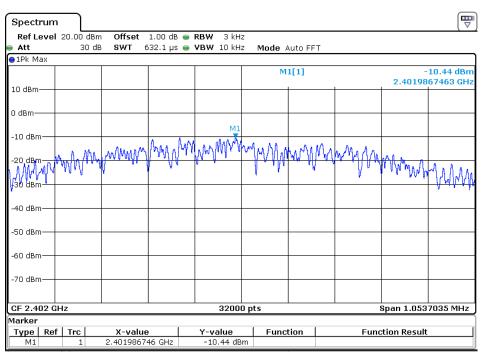
### 6.5.4 Test results

EUT:	Rugged Speaker System XL	Model Name :	NS-HLPS5018
Temperature:	<b>24</b> ℃	Relative Humidity:	53%
Pressure:	1010 hPa	Test Power :	AC 120V/60Hz
Test Mode :	TX(1Mbps)		

Test Mode	Channel frenqucy (MHz)	Power Density PSD 3kHz (dBm/3kHz)	Limit (dBm/3kHz)	Result
ту	2402	-10.44	8	Pass
TX (1Mbpa)	2440	-9.16	8	Pass
(1Mbps)	2480	-8.51	8	Pass

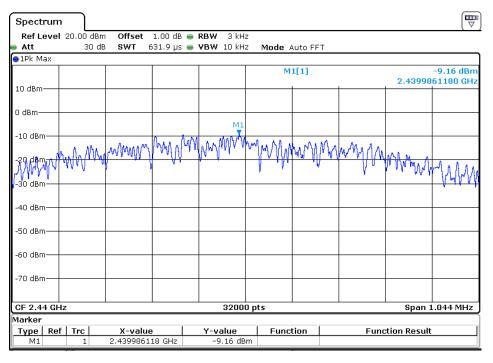
Note: The cable loss is 1.0dB

#### PSD 3kHz (1Mbps) The Lowest Channel 00: 2402MHz

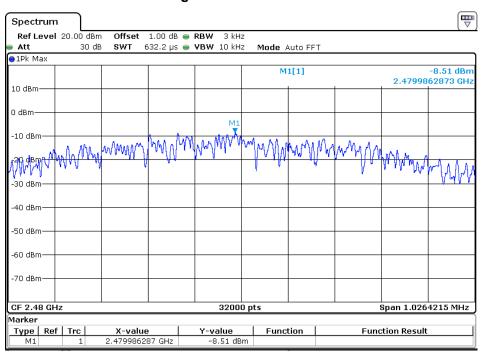




#### PSD 3kHz (1Mbps) The Middle Channel 19: 2440MHz



#### PSD 3kHz (1Mbps) The High Channel 39: 2480MHz





# 6.6 Maximum Peak Output Power

### 6.6.1 Applied procedures / Limit

15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

#### 6.6.2 Test procedure

- a. The testing follows FCC KDB publication No. 558074 D01 DTS Meas. Guidance v03r05
- b. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- <sup>c.</sup> Spectrum Setting: RBW≥Bandwidth, VBW≥3×RBW, Sweep time = Auto, Span≥3×RBW,
- d Detector = peak. Trace mode = max hold.
- e. Use peak marker function to determine the peak amplitude level.

#### 6.6.3 Deviation from standard

No deviation.

#### 6.6.4 Test setup



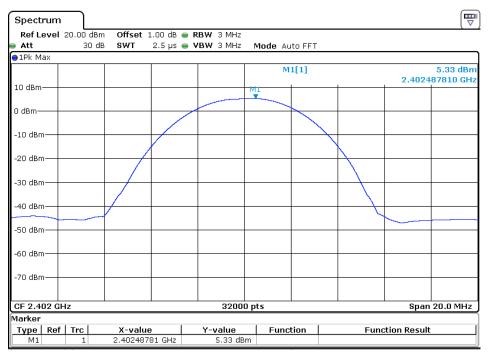


### 6.6.5 Test results

EUT:	Rugged Speaker System XL	Model Name :	NS-HLPS5018
Temperature:	<b>26</b> ℃	Relative Humidity:	60%
Pressure:	1010 hPa	Test Voltage :	AC 120V/60Hz
Test Mode :	TX (1Mbps)		
Note: N/A			

Test Mode	Frequency	Peak Output Power (dBm)	Limit (dBm)	Result
	2402 MHz	5.33	30	Pass
Data rate 1Mbps	2440 MHz	6.39	30	Pass
	2480 MHz	6.94	30	Pass

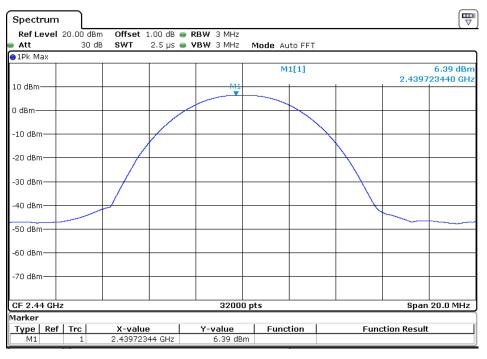
Note: The cable loss is 1.0dB



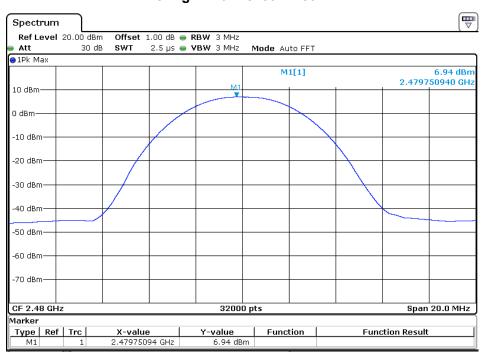




(1Mbps) The Middle Channel 19: 2440MHz



(1Mbps) The High Channel 39: 2480MHz





# 6.7 Band edge

### 6.7.1 Applied procedures / Limit

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.205(c)).

### 6.7.2 Test procedure

- a The testing follows FCC KDB publication No. 558074 D01 DTS Meas. Guidance v03r05
- b. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- c. Spectrum Setting: RBW=100kHz, VBW≧300kHz, Sweep time=Auto, Detector Function=Peak.
- d. The band edges was measured and recorded Result:

The Lower Edges attenuated more than 20dB. The Upper Edges attenuated more than 20dB.

#### 6.7.3 Deviation from standard

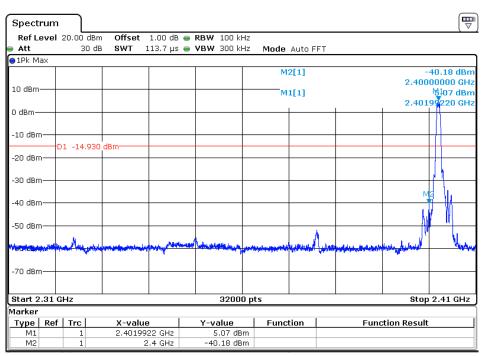
No deviation.

#### 6.7.4 Test setup

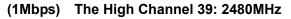


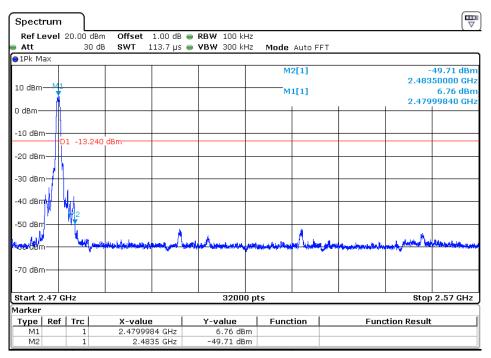


### 6.7.5 Test results



#### (1Mbps) The Lowest Channel 00: 2402MHz







# 6.8 Conducted Spurious Emissions

### 6.8.1 Applied procedures / Limit

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.205(c)).

### 6.8.2 Test procedure

- a. The testing follows FCC KDB publication No. 558074 D01 DTS Meas. Guidance v03r05
- b. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
- c. Spectrum Setting: RBW=100kHz, VBW=300kHz, Sweep time=Auto, Detector Function=Peak, sweep points ≥ investigated frequency range/RBW.

### 6.8.3 Deviation from standard

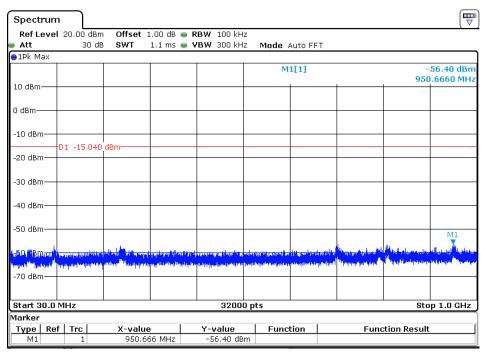
No deviation.

### 6.8.4 Test setup





### 6.8.5 Test results



#### The Lowest Channel 00 (1Mbps): 2402MHz

Spectrum	, )									
Ref Level Att		lBm Offset 1 dB SWT		<ul> <li>RBW 100 kH</li> <li>VBW 300 kH</li> </ul>		Auto Sv	veep			
●1Pk Max										
10 dBm						2[1]				43.46 dBm 80310 GHz
10 dbiii					м	1[1]	M1		2 40	4.96 dBm 120310 GHz
0 dBm									2.10	
-10 dBm										
-20 dBm	D1 -15.0	)40 dBm								
-30 dBm										
-40 dBm								M2		
-50 dBm								<u>   </u> ,		
udantanta		فليصافدون البراقي الرابي	Heleter Marte	والمتعالية والمتعالية المتعادي	and the local designation of the	and and a	when when		والمعاركة مرادا والم	الأمر <mark>المتري فيل روي المراجع المريم</mark>
-70 dBm-	0-1		lana sa kaba ƙara				and a second s			
-70 0011										
Start 1.0 G	Hz	1		3200	D pts				Sto	p 3.0 GHz
Marker										
	Trc	X-value		Y-value	Func	tion		Fund	ction Result	:
M1 M2	1	2,40203		4.96 dB -43.46 dB						





Spectrun	n								
Ref Leve Att	l 20.00 dBm 30 dB		00 dB 👄 R 100 ms 👄 V	<b>BW</b> 100 kH <b>'BW</b> 300 kH		Auto Swi	зер		
●1Pk Max									
					М	1[1]			52.06 dBn 06090 GH:
10 dBm									
0 dBm									
-10 dBm—									
-20 dBm—	D1 -15.040	dBm							
-30 dBm									
-40 dBm—									
-50 dBm									M1
أحدالكما ومناطاتهما	بطيلي ويرومهم	and the providence of the	An and All And All And	an an an all an an an	أعدار وفراغلا ورطاوطت	and the second second	and a state of the state		ار الأدور الأسام. معد مناسب
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-70 dBm—									
Start 3.0 (	GHz	1	1	3200	0 pts	1	1	Stop	13.0 GHz
Marker									
Type Re		X-value		Y-value	Func	tion	Fund	ction Result	
M1	1	12.606	J9 GHz	-52.06 dB	m				

Spectrum					
RefLevel 20.00 dB Att 30 c		<ul> <li>RBW 100 kHz</li> <li>VBW 300 kHz</li> </ul>	Mode Auto Sv	veep	× .
●1Pk Max					
			M1[1]		-48.03 dBm 20.115060 GHz
10 dBm					
0 dBm					
-10 dBm					
-20 dBm	0 dBm				
-30 dBm					
-40 dBm			MI		
-50 dBm	in a base by the first starting of			Aprill <sup>1</sup> Regard and a state of the state of	a ma kitering ya manga <sup>kita</sup> ng kitera panang k <sup>ita</sup> ng k
l≌601dBm	and the state of the	والمرارية المرابع ويتلفن وتصفين والأملة		i Daga an <sup>196</sup> 1 Tang tang pagta di kateng bili dari I	
-70 dBm					
Start 13.0 GHz		32000 p	ts		Stop 25.0 GHz
Marker		1		_	
TypeRefTrcM11	X-value 20.11506 GHz	Y-value -48.03 dBm	Function	Func	tion Result



The Middle Channel 19(1Mbps): 2440MHz

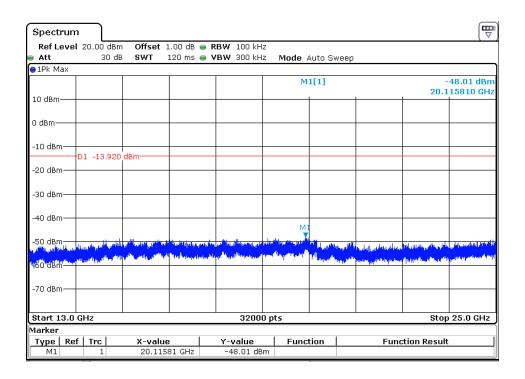
Spectrum					
Ref Level 20.00 dBm	0ffset 1.00 dB 🖷 1	RBW 100 kHz			
Att 30 dB	6 SWT 1.1 ms 👄 '	<b>VBW</b> 300 kHz	Mode Auto FFT		
●1Pk Max					
			M1[1]		-56.34 dBm 67.9970 MHz
10 dBm					07.5570 0012
0 dBm					
-10 dBm					
-20 dBm	dBm				
-30 dBm					
-40 dBm					
-50 dBm					
-60 Boomt - Alexandrate	in the property of the state of	and the second second second of the	tinistanika pitati pitata da pita	den el la companya de la companya d	ante i la ditta de la la contra di
-70 dBm	للي من يو أي من المنها الله الي الألفان على الله المنه المعرف المعار المالية المالية المالية ( المالية المالية المالية المالية المالية المالية المالية المالية المالية ( المالية المالية : ( معر مالية المالية ( المالية المالي	an a	ىلى أريا يويون باريا ي <mark>امين هاي يعاري الماري الماري الماري الماريين الماريين الماريين الماريين الماريين الماريين ا</mark> لم	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	a na ang ang ang ang ang ang ang ang ang
Start 30.0 MHz		32000 pt	s		Stop 1.0 GHz
Marker Type Ref Trc M1 1	X-value 67.997 MHz	<b>Y-value</b> -56.34 dBm	Function	Function R	esult

Spectre	ım													
Ref Le <sup>.</sup> Att	vel 3		dBm 0 dB	Offset SWT		_	3W 100 kH 3W 300 kH		Auto	Culoop				
All 1Pk Ma:	,	3	o ub	3991	32 1115	• •	DIV JUUKH	2 191046	Auto	Sweep				
10 dBm-									M2[1] M1[1]		M	1		-46.51 dBm 5960310 GHz 6.08 dBm 4400310 GHz
0 dBm—			_		_				+		-			
-10 dBm-	D	1 -13.	920 di	3m										
-20 dBm-	_													
-30 dBm-			_						-					
-40 dBm-												м	2	
-50 dBm-														
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-70 dBm-		dowed					in the second	nt na man an an Anna An		igenseid Agg		Terle ( ) and some plate of		
Start 1.0	) GH	z					3200	) pts					8	top 3.0 GHz
Marker														
Type M1	Ref			X-valu			<u>Y-value</u> 6.08 dB		nction			Func	tion Res	ult
M1 M2		1			031 GHz 031 GHz		-46.51 dB							





Spectrur	n								
Ref Leve Att	l 20.00 dBr 30 d		_	RBW 100 kHz VBW 300 kHz	Mode /	Auto Swee	p		
●1Pk Max									
					м	1[1]			50.81 dBn 33590 GH:
10 dBm							1	10.0	
0 dBm									
-10 dBm—	D1 -13.920	   d8m							
-20 dBm—	01 -13.520								
-30 dBm—									
-40 dBm—									
-50 dBm							M1		
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n provinski provinski stali Na stali provinski stali stali Na stali s	ang ng n	1111 Contraction			and the second				
-70 dBm—									
Start 3.0 (	GHz			32000	pts			Stop	13.0 GHz
Marker									
Type Re	ef   Trc	X-value		Y-value	Func	tion	Fund	tion Result	
M1	1	10.633	59 GHz	-50.81 dBm	1				





Spectrun	ı )								
Ref Leve	I 20.00 dB	m Offset	1.00 dB 🧃	• RBW 100 kH:	2				
Att	30 c	B SWT	1.1 ms 🍯	• <b>VBW</b> 300 kH:	Mode /	Auto FFT			
⊖1Pk Max									
					М	1[1]			57.00 dBm ).8180 MHz
10 dBm		-					1		
0 dBm									
-10 dBm	D1 -13.17	0. d9m							
-20 dBm—	01 -13.17								
-30 dBm									
-40 dBm—									
-50 dBm									M1
-60.MBm	to short, so allot	- Color		Charles in the second second	and de la canada a statute de la canada a statute de la canada de la canada de la canada de la canada de la ca	1	tert shiple and the	والمتعادية والمتعادة	سير بالمعالمين
-70 dBm	toppole and the second	tangan bi <sup>ka</sup> n penangan	is for the set	Reading and the second s	adaaadiy amiyaa	dig al parte de la constant de	higus Modella Constanting a Min	All Assessments Con-	te-talian <sup>te</sup> nandrad
Start 30.0	MHz			32000	) pts			Sto	p 1.0 GHz
Marker									]
Type Re	f Trc 1	X-value 949.8	9 18 MHz	Y-value -57.00 dB	Tunc n	tion	Fund	tion Result	

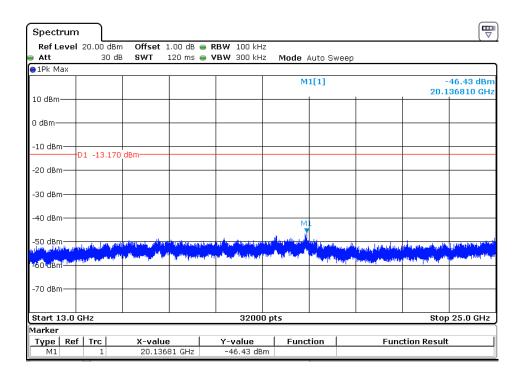
# The High Channel 39(1Mbps): 2480MHz

Spect	rum						
Ref L Att	evel	20.00 30		3 🖷 RBW 100 kHz 5 🖷 VBW 300 kHz	Mode Auto Sw	еер	, , , , , , , , , , , , , , , , , , ,
⊖1Pk M	ax						
10 dBm					M2[1]	M1	-45.95 dBm 2.5842810 GHz 6.83 dBm 2.4800310 GHz
0 dBm–	_						2.4800310 GHz
-10 dBn		4 40	170 dBm				
-20 dBn		1 -13.					
-30 dBn	n						
-40 dBn	n					Ma	
-50 dBn	n						
-69. dBo	h	بارمىيىيە	والمراجع والمحمد والمحمد والمحمد والمحمد	والمغمينية بالمحمد والمعادية والمحمد المحمد والا	مار بارس کار منطق ومواد د	and a state by the state	
-70 dBn	n						
Start 1	.0 GF	Iz		32000 p	ts		Stop 3.0 GHz
Marker	<b>P</b> (	l <b>-</b> l	×	1		-	
Type M1	Ref	Trc 1	2,480031 GH	Y-value 2 6.83 dBm	Function	Func	tion Result
M2		1	2.584281 GH				





Spectru	n								
	el 20.00 dBm		_	BW 100 kH					
• Att • 1Pk Max	30 de	SWT	100 ms 🖶 V	' <b>BW</b> 300 kH	z Mode i	Auto Sweep	)		
JIPK Max					М	1[1]			51.75 dBn 21090 GH
10 dBm								12.9	21090 011
0 dBm——									
-10 dBm—	-D1 -13.170	dBm							
-20 dBm—									
-30 dBm—									
-40 dBm—									
-50 dBm—			العرمو لفارحون وبقار الأ					والمحافظ والمحاف	ا بالعنفر بساهير ا
الطالب ومعالين بلغ	- Contraction and a state	Ingeleektern verst	al a constant a state	Installed a state of the	and the second states of the	ing a state of the	1.000		and a state of the second state
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-70 dBm—									
Start 3.0				3200	Dinte			Cton	13.0 GHz
arker	9112			3200	u hrz			асор	13.0 GHZ
Type   Re	ef Trc	X-value		Y-value	Func	tion	Fund	ction Result	
M1	1	12.921	U9 GHZ	-51.75 dB	m				

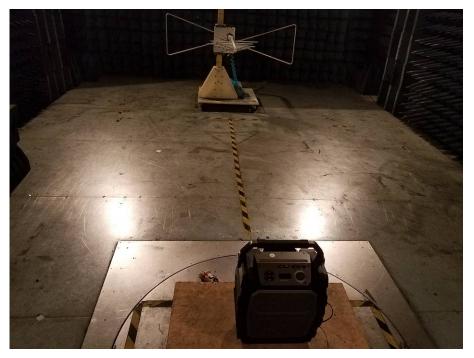




# 7 Photographs

# 7.1 Radiated Emission Test Setup

Below 1G



Above 1G





Report No.: 4787838689-1-2 Issued Date: 2017-03-13

# 7.2 Conducted Emissions Test Setup





# 7.3 EUT Constructional Details

Please refer to report 4787838689-1-1.

\*\*End of report\*\*