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FCC 15.247 & RSS-247
2.4 GHz Test Report

for

FUTABA Corporation

1080 Yabutsuka Chosei-mura Chosei-gun Chiba-ken 229-4395 JAPAN

Product Name	**:**	**Radio Control**
Model Name	**:**	**R7108SB**
Brand		**Futaba**
FCC ID	**:**	**AZP-R7108SB-24G**
IC	**:**	**2914D-R7108SB**

Prepared by: **:** **AUDIX Technology Corporation, EMC Department**

Testing Laboratory
1724

TESTING
NVLAP LAB CODE 200077-0

The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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Audix Technology Corp.
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TEST REPORT CERTIFICATION

Applicant	:	FUTABA Corporation
Manufacturer	:	FUTABA Corporation
EUT Description		
(1) Product	:	Radio Control
(2) Model	:	R7108SB
(3) Brand	:	Futaba
(4) Power Rating	:	DC 3.5 ~ 8.4V

Applicable Standards:

47 CFR FCC Part 15 Subpart C
RSS-Gen (Issue 5), April 2018
RSS-247 (Issue 2), February 2017
ANSI C63.10:2013
KDB 558074 D01 DTS Meas Guidance v05

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.
Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2018. 12. 17

Reviewed by: Sabrina Wang (Sabrina Wang/Administrator)

Approved by: Ben Cheng (Ben Cheng/Manager)

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1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2018. 12. 17	Original Report	EM-F180539

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2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	**N/A, Note**
15.247(d)/ 15.205	RSS-Gen §8.9 RSS-247 §5.5	Radiated Band Edge and Radiated Spurious Emission	**PASS**
15.247(a)(2)	RSS-247 §5.2(1)	6dB Bandwidth	**PASS**
15.247(b)(3)	RSS-247 §5.4(4)	Maximum Peak Output	**PASS**
15.247(d)	RSS-247 §5.5	Conducted Band Edges and Conducted Spurious Emission	**PASS**
15.247 (e)	RSS-247 §5.2(2)	Peak Power Spectral Density	**PASS**
15.203	RSS-Gen §8.3	Antenna Requirement	**Compliance**
Note: The EUT only employs Batteries.			

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3. GENERAL INFORMATION

3.1. Description of Application

Applicant	FUTABA Corporation 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713 Korea.
Manufacturer	FUTABA Corporation 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 451-713 Korea.
Product	Radio Control
Brand	Futaba
Model	R7108SB

3.2. Description of EUT

Test Model	R7108SB
Serial Number	N/A
Power Rating	DC 3.5~8.4V
RF Features	DSSS (1)FASSTest (2)FASST (Receive only)
Sample Status	Production
Date of Receipt	2018. 10. 31
Date of Test	2018. 12. 11 ~ 17
Interface Ports of EUT	• None
Accessories Supplied	• None

3.3. Antenna Information

Antenna Part Number	Manufacture	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
JA1R0227A	Wanshih Electronic Co., Ltd.,	2.4GHz Ant A	1/4λ Antenna	-5.16dBi
		2.4GHz Ant B	1/4λ Antenna	-5.16 dBi

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3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (kbps)
DSSS	2405.376 to 2472.960	23	FASSTest	Up to 214.3
DSSS	2405.376 to 2477.056	36	FASST (Receive only)	Up to 136

FASSTest Channel List				FASST Channel List (Receive only)			
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
00	2405.376	18	2460.672	00	2405.376	18	2442.240
01	2408.448	19	2463.744	01	2407.424	19	2444.288
02	2411.520	20	2466.816	02	2409.472	20	2446.336
03	2414.592	21	2469.888	03	2411.520	21	2448.384
04	2417.664	22	2472.960	04	2413.568	22	2450.432
05	2420.736			05	2415.616	23	2452.480
06	2423.808			06	2417.664	24	2454.528
07	2462.880			07	2419.712	25	2456.576
08	2429.952			08	2421.760	26	2458.624
09	2433.024			09	2423.808	27	2460.672
10	2436.096			10	2425.856	28	2462.720
11	2439.168			11	2427.904	29	2464.768
12	2442.240			12	2429.952	30	2466.816
13	2445.312			13	2432.000	31	2468.864
14	2448.384			14	2434.048	32	2470.912
15	2451.456			15	2436.096	33	2472.960
16	2454.528			16	2438.144	34	2475.008
17	2457.600			17	2440.192	35	2477.056

3.5. Descriptions of Key Components

None

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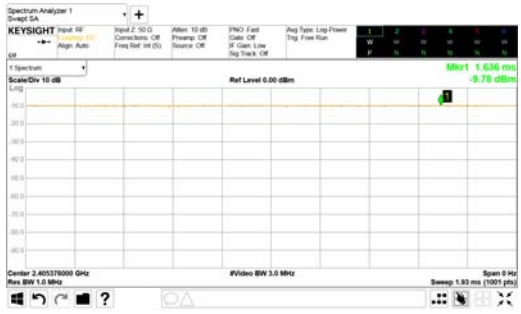
3.6. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Duty Cycle Factor (dB)
FASSTest	1	N/A	0

Note: When duty cycle is less than 98% (0.98) that duty cycle factor 10log(1/x) is needed to add in conducted test items measured in average detector.

Mode	Duty Cycle (x)
FASSTest	

Item		Mode	Test Channel
Radiated Test Case	Radiated Band Edge Note1	FASSTest	0/22
	Radiated Spurious Emission Note1	FASSTest	0/11/22
Conducted Test Case	6dB Bandwidth	FASSTest	0/11/22
	Peak Output Power Note2	FASSTest	0/11/22
	Band Edge	FASSTest	0/11/22
	Spurious Emission	FASSTest	0/11/22
	Peak Power Spectral Density	FASSTest	0/11/22

Note 1: ■Mobile Device
□Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: □ Lie □ Side□ Stand
Note 2: Due to used different Antenna Type So this test item would be test.
Note 3: The worse Ant A was tested on this test item.

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3.7. Tested Supporting System List

3.7.1. Support Peripheral Unit

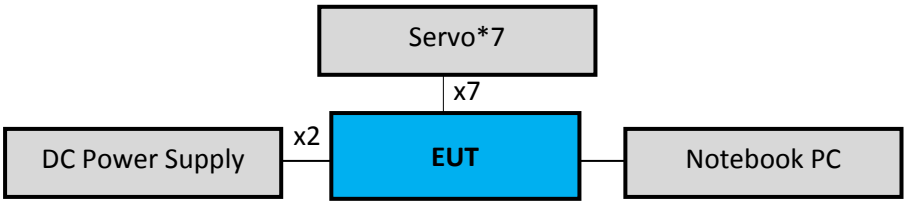
No.	Product	Brand	Model No.	Serial No.	Approval
1.	DC Power Supply	TOP WARD	6303A	N/A	N/A
2.	Notebook PC	ASUS	X5502E	N/A	Contains FCC ID: PPD-AAR5B225
3.	Servo*7	Futaba	S3003	N/A	N/A

3.7.2. Cable Lists

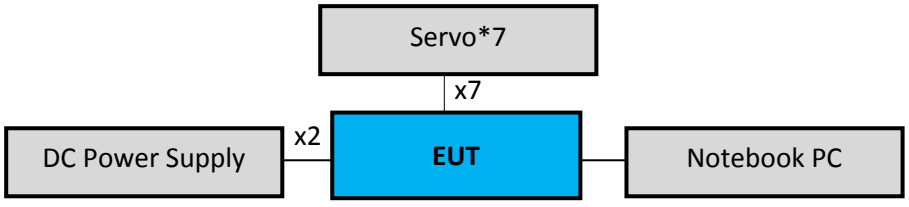
No.	Cable Description Of The Above Support Units
1.	DC Power Cord*2: Unshielded, Detachable, 0.7m AC Power Cord: Unshielded, Undetectable, 1.8m
2.	USB Jig Cable: Unshielded, Detachable, 0.5m Adapter: Enerironix, M/N EXA1208UH, AC Power Cord: Shielded, Detachable, 1.8m DC Power Cord: Unshielded, Undetectable, 1.8m, Bonded a ferrite core
3.	Power Wire: Unshielded, Undetectable, 0.20m*7

3.8. Setup Configuration

3.8.1. EUT Configuration for Radiated Emission



3.8.2. EUT Configuration for RF Conducted Test Items



3.9. Operating Condition of EUT

Test program “Futaba Term” is used for enabling EUT RF function under continue transmitting and choosing channel.

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3.10.Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2005 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	FCC OET Designation Number under APEC MRA by NCC is : TW1724 (1) No. 8 Shielding Room (2) Semi-Anechoic Chamber (IC Test Site Registration No.:5183B-1)

3.11.Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 3.68dB
	Above 1GHz	±5.82dB

Remark：Uncertainty = $ku_c(y)$

Test Item	Uncertainty
6dB Bandwidth	± 0.05kHz
Maximum peak output power	± 0.33dB
Power spectral density	± 0.13dB
Conducted Emission Limitations	± 0.13dB

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4. MEASUREMENT EQUIPMENT LIST

4.1. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2018. 09. 12	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2018. 06. 20	1 Year
3.	Amplifier	HP	8447D	2944A06305	2018. 01. 30	1 Year
4.	Amplifier	HP	8449B	3008A00529	2018. 01. 24	1 Year
5.	Loop Antenna	R&S	HFH2-Z2	891847/27	2017. 12. 18	1 Year
6.	Bilog Antenna	CHASE	CBL6112D	33821	2018. 01. 21	1 Year
7.	Horn Antenna	COM-POWER	AH-840	101092	2018 .05. 07	1 Year
8.	Horn Antenna	EMCO	3115	9609-4927	2018. 06. 22	1 Year
9.	2.4GHz Notch Filter	K&L	7NSL10-2441. 5E130.5-00	1	2018. 07. 24	1 Year
10.	High-Pass Filter	Microwave	H3G018G1	484796	2018. 08. 22	1 Year
11.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2018. 04. 20	1 Year
12.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.2. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9010B-544	MY55460198	2018. 04. 26	1 Year
2.	Digital Thermo-Hygro Meter	Shenzhen Datronn Electronics	KT-905	RF	2018. 04. 20	1 Year

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5. CONDUCTED EMISSION

【The EUT only employs battery power for operation, no conductive emission limits are required according to FCC Part 15 Section §15.207 and RSS-Gen §8.8】

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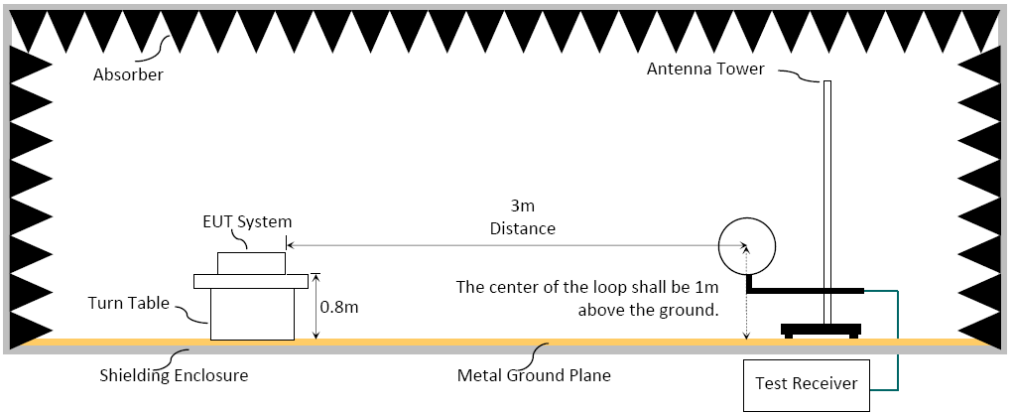
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

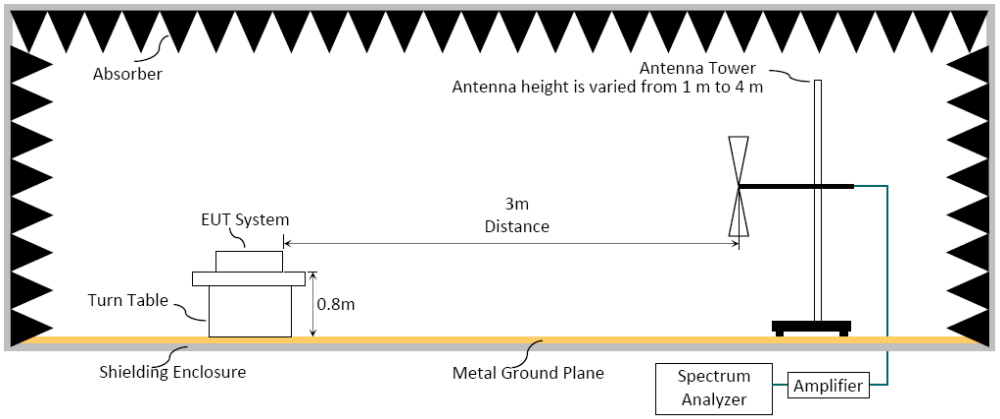
6.1.1. Block Diagram of EUT

Indicated as section 3.8

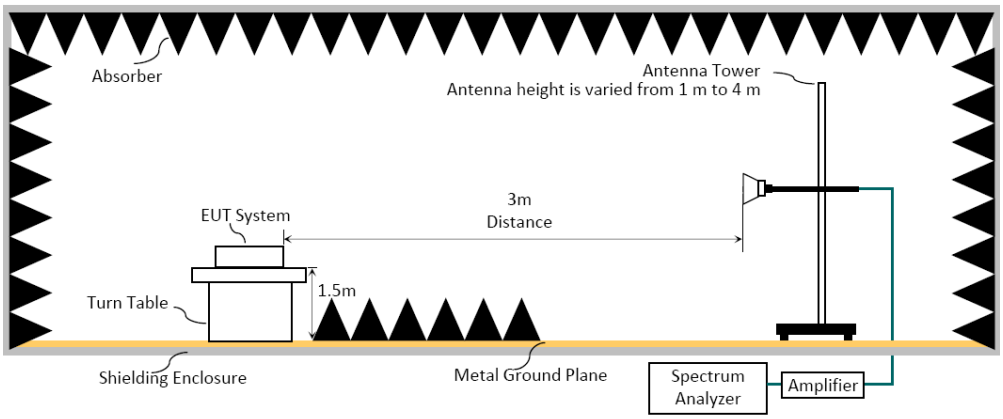
6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000 MHz



6.1.4. Setup Diagram for above 1GHz



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6.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance (m)	Limits	
		dBμV/m	μV/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dBμV/m (Peak) 54.0 dBμV/m (Average)	

Remark：(1) dBμV/m = 20 log (μV/m)

(2) The tighter limit applies to the edge between two frequency bands.

(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(4) Fundamental and emission fall within operation band are exempted from this section.

(5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

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6.3. Test Procedure

Frequency Range 9kHz~30MHz:
The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level.
In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

(1) RBW = 9kHz with peak and average detector.
(2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 25GHz:
The EUT setup on the turn table which has 80 cm (for 30-1000 MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1 GHz:
Spectrum Analyzer is used for pre-testing with following setting:
(1)RBW = 120KHz
(2)VBW ≥ 3 x RBW.
(3)Detector = Peak.
(4)Sweep time = auto.
(5)Trace mode = max hold.
(6)Allow sweeps to continue until the trace stabilizes.
(7)When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Frequency above 1GHz to 10th harmonic (up to 25 GHz):
Peak Detector:
(1)RBW = 1MHz
(2)VBW ≥ 3 x RBW.
(3)Detector = Peak.
(4)Sweep time = auto.
(5)Trace mode = max hold.
(6)Allow sweeps to continue until the trace stabilizes.
(7)When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

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Average Detector:

■**Option 1:**

(1)RBW = 1MHz

(2)VBW ≥ 1/ T.

Modulation Type	T (ms)	1/ T (kHz)	VBW Setting (kHz)
FASSTest	N/A	N/A	10Hz

N/A: 1/ T is not implemented when duty cycle presented in section 3.6 is ≥98 %.

(1)Detector = Peak.

(2)Sweep time = auto.

(3)Trace mode = max hold.

(4)Allow sweeps to continue until the trace stabilizes.

□**Option 2:**

Average Emission Level= Peak Emission Level+ D.C.C.F.

6.4. Measurement Result Explanation

■Peak Emission Level=Antenna Factor + Cable Loss + Meter Reading

■Average Emission Level l=Antenna Factor + Cable Loss + Meter Reading

□Average Emission Level= Peak Emission Level+ DCCF

Duty Cycle Correction Factor (DCCF)= 20log (TX_{on}/TX_{on+off}) presented in section 3.6

□ERP= Peak Emission Level-95.2dB-2.14dB

6.5. Test Results

Please refer to Appendix A.

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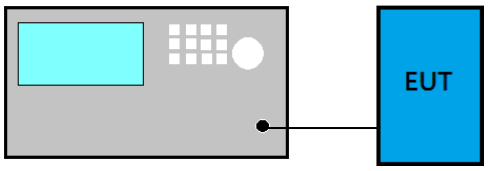
7. 6dB BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

The minimum 6dB bandwidth shall be at least 500kHz.

7.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05:

(1) Set RBW = 100 kHz.
(2) Set the video bandwidth (VBW) ≥ 3 × RBW.
(3) Detector = Peak.
(4) Trace mode = max hold.
(5) Sweep = auto couple.
(6) Allow the trace to stabilize.
(7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

7.4. Test Results

Please refer to Appendix A

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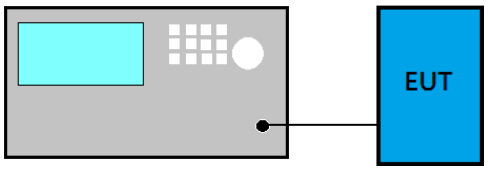
8. MAXIMUM PEAK OUTPUT POWER

8.1. Block Diagram of Test Setup



8.2. Specification Limits

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm), and E.I.R.P.: 4Watt (36dBm)

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8.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05:

☐**PKPM1 Peak power meter method:**

EUT is connected to power sensor and record the maximum output power.

■**Maximum peak conducted output power method:**

(1) Set the RBW ≥ DTS bandwidth
(2) Set VBW ≥ 3 × RBW
(3) Set span ≥ 3 × RBW.
(4) Sweep time = auto couple
(5) Detector = peak.
(6) Trace mode = max hold.
(7) Allow trace to fully stabilize.
(8) Use peak marker function to determine the peak amplitude level.

☐**Method AVGPM (Measurement using an RF average power meter):**

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

☐**Method AVGSA-2 (Spectrum channel power)**

(1) Set span to at least 1.5 times the OBW
(2) Set RBW = 1 -5% of OBW
(3) Set the video bandwidth (VBW) ≥ 3 × RBW.
(4) Detector = RMS.
(5) Trace mode = trace average at least 100 traces
(6) Sweep = auto couple.
(7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
(8) Duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

8.4. Test Results

Please refer to Appendix A

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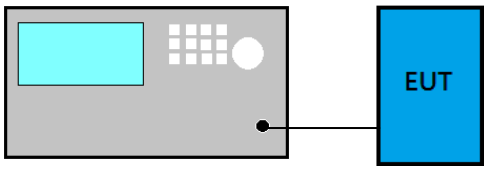
9. EMISSION LIMITATIONS

9.1. Block Diagram of Test Setup



9.2. Specification Limits

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in Section 15.209(a)/RSS-Gen Section 8.9 table 4 is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a)/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified in Section 15.209(a)/RSS-Gen Section 8.9 table 4 (See Section 15.205(c)).

9.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05:

■Reference Level

(1) Set analyzer center frequency to DTS channel center frequency.
(2) Set the span to 1.5 times the DTS bandwidth.
(3) Set the RBW to: 100 kHz.
(4) Set the VBW ≥ 3 × RBW.
(5) Detector = peak.
(6) Sweep time = auto couple.
(7) Trace mode = max hold.
(8) Allow trace to fully stabilize to find the max PSD as reference level.

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■Emission Level Measurement

(1) Set analyzer center frequency to DTS channel center frequency.
(2) Set the span to 1.5 times the DTS bandwidth.
(3) Set the RBW to: 100 kHz.
(4) Set the VBW ≥ 3 × RBW.
(5) Detector = peak.
(6) Sweep time = auto couple.
(7) Trace mode = max hold.
(8) Allow trace to fully stabilize to find the max level.

9.4. Test Results

Please refer to Appendix A

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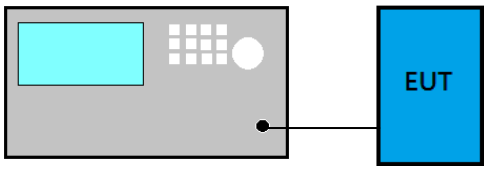
10. POWER SPECTRAL DENSITY

10.1. Block Diagram of Test Setup



10.2. Specification Limits

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

10.3. Test Procedure

Following measurement procedure is reference to KDB 558074 D01 DTS Meas Guidance v05:

■Method PKPSD (peak PSD)

(1) Set analyzer center frequency to DTS channel center frequency.
(2) Set the span to 1.5 times the DTS bandwidth.
(3) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
(4) Set the VBW ≥ 3 × RBW.
(5) Detector = peak.
(6) Sweep time = auto couple.
(7) Trace mode = max hold.
(8) Allow trace to fully stabilize.
(9) Use the peak marker function to determine the maximum amplitude level.
(10) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

□Method AVGPSD-2

(1) Using peak PSD procedure step 1 to step 4.
(2) Detector= RMS detector
(3) Sweep time = auto couple
(4) Trace mode = trace averaging over a minimum of 100 traces
(5) Use the peak marker function to determine the maximum amplitude level.
(6) Duty cycle factor is added when duty cycle presented in section 3.7 < 98%.
(7) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

10.4. Test Results

Please refer to Appendix A

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11. DEVIATION TO TEST SPECIFICATIONS

【NONE】

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APPDNDIX A

TEST DATA AND PLOTS

(Model: R7108SB)

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Audix Technology Corp.
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A.1 RADIATED EMISSION

Test Date	2018/12/13	Temp./Hum.	22℃/55%
Test Voltage	DC 6V (Via Power Supply)		

A.1.1 Emissions within Restricted Frequency Bands

A.2.1.1 Frequency 9kHz~30MHz

The emissions (9kHz~30MHz) not reported for there is no emission be found.

A.2.1.2 Frequency Below 1 GHz

Mode	FASSTest	Frequency	TX 2439.168MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
72.68	12.91	2.12	13.57	28.60	40.00	11.40	Peak
120.21	18.81	2.99	9.56	31.36	43.50	12.14	Peak
261.83	19.51	4.07	14.02	37.60	46.00	8.40	Peak
431.58	22.87	5.87	6.71	35.45	46.00	10.55	Peak
886.51	27.11	8.03	1.87	37.01	46.00	8.99	Peak
982.54	28.14	8.50	1.89	38.53	54.00	15.47	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
34.85	22.53	1.62	11.92	36.07	40.00	3.93	Peak
120.21	18.81	2.99	7.07	28.87	43.50	14.63	Peak
322.94	20.51	4.70	8.58	33.79	46.00	12.21	Peak
586.78	24.81	6.45	2.71	33.97	46.00	12.03	Peak
734.22	25.72	7.25	2.64	35.61	46.00	10.39	Peak
981.57	28.14	8.50	2.59	39.23	54.00	14.77	Peak

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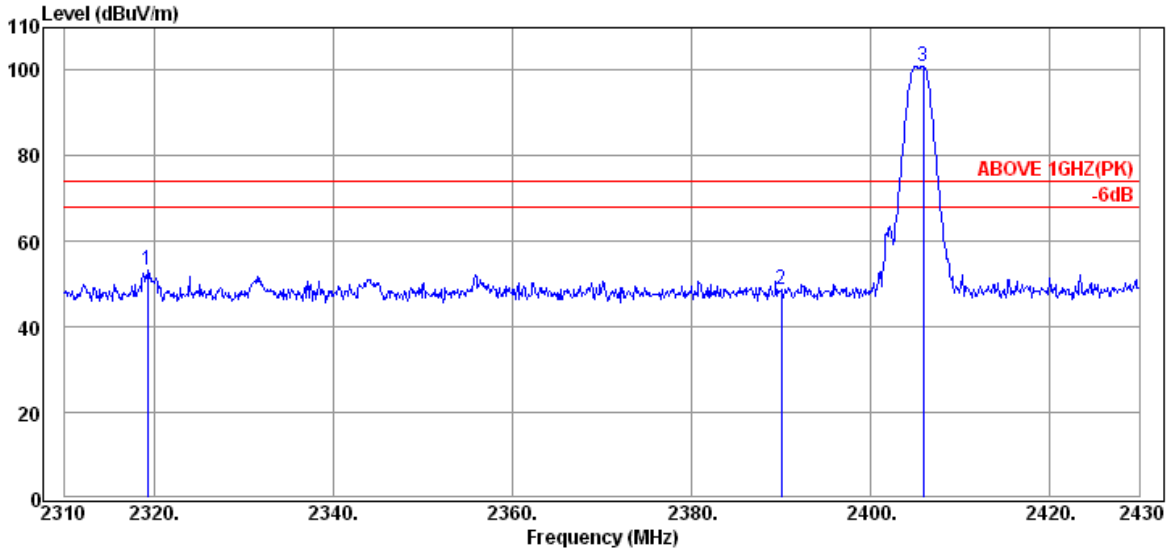
A.2.1.3 Frequency Above 1 GHz to 10th harmonics

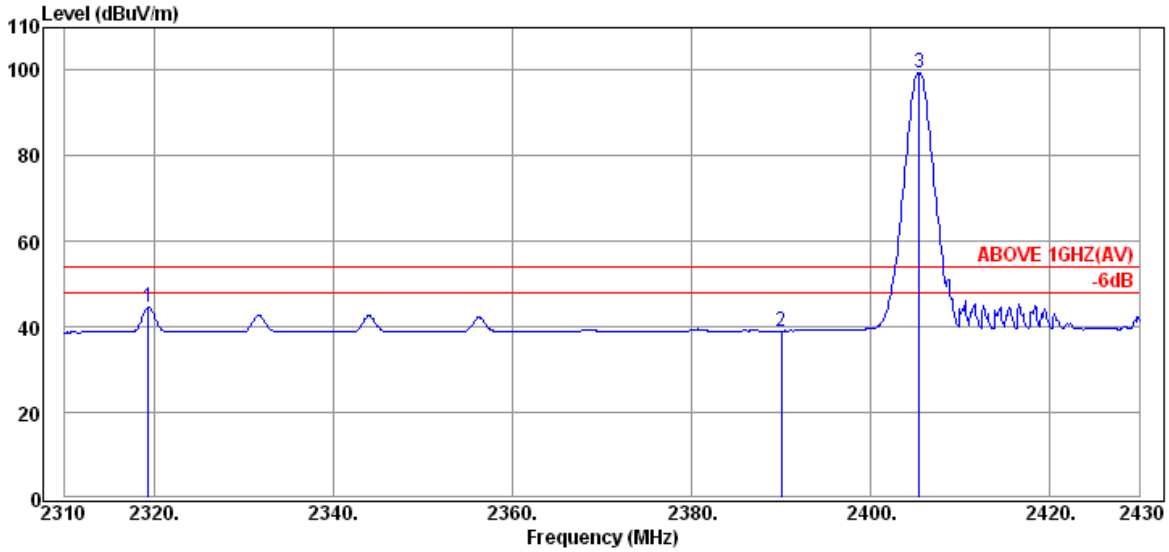
Band Edge:

Mode	FASSTest	Frequency	TX 2405.376MHz



Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
	2319.24	28.20	5.19	19.94	53.33	74.00	20.67	Peak
	2390.00	28.28	5.24	15.32	48.84	74.00	25.16	Peak
@	2405.88	28.30	5.25	67.37	100.92	---	---	Peak



Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
	2319.36	28.20	5.19	11.25	44.64	54.00	9.36	Average
	2390.00	28.28	5.24	5.57	39.09	54.00	14.91	Average
@	2405.40	28.30	5.25	66.05	99.60	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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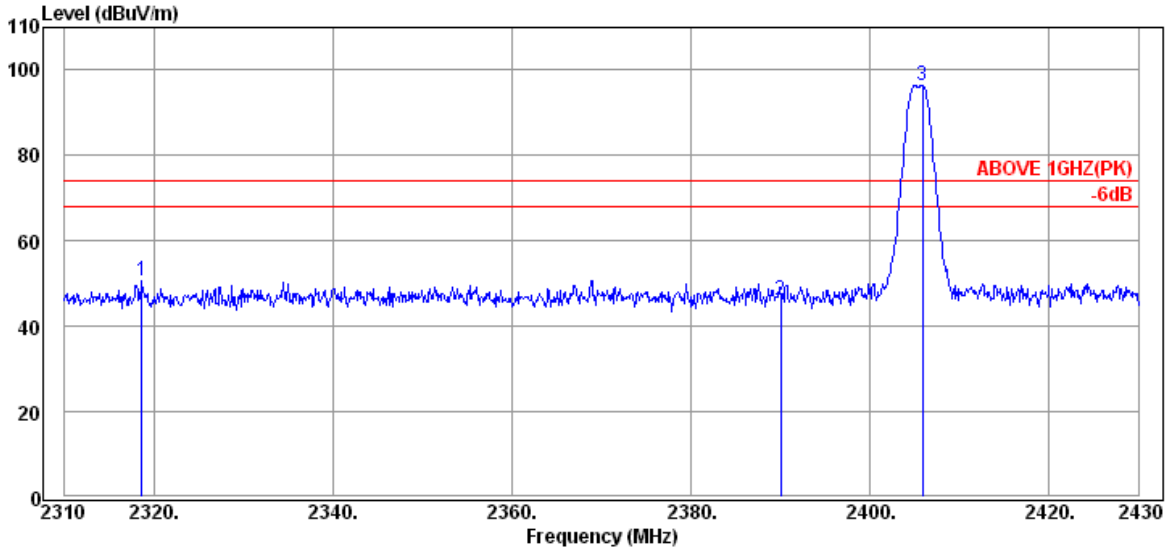
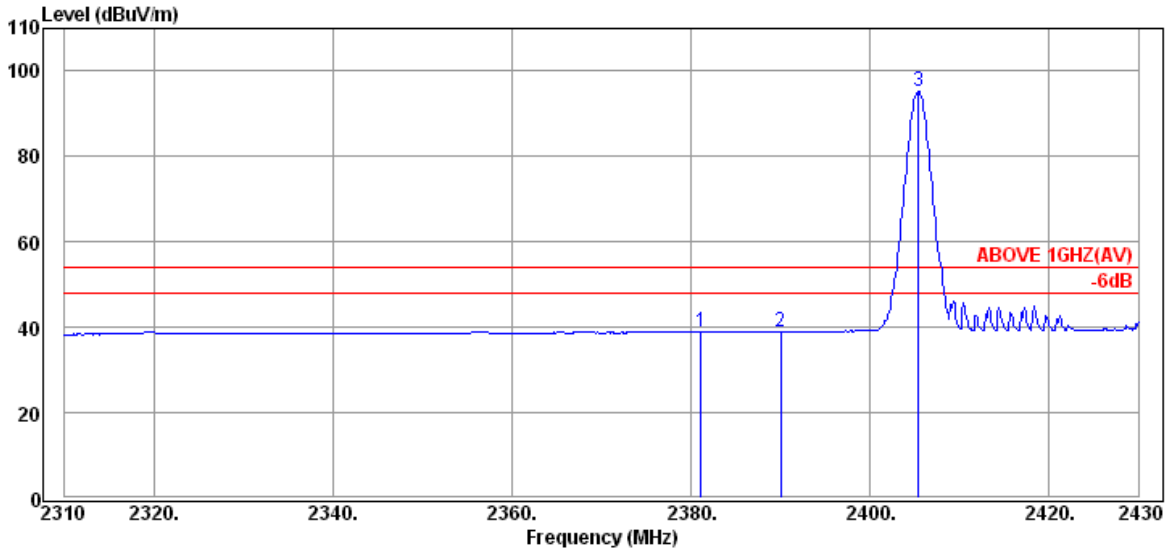
Mode	FASSTest	Frequency	TX 2405.376MHz



Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector
	2318.64	28.20	5.19	17.15	50.54	74.00	23.46	Peak
	2390.00	28.28	5.24	12.56	46.08	74.00	27.92	Peak
@	2405.88	28.30	5.25	62.89	96.44	---	---	Peak



Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector
	2381.16	28.27	5.23	5.48	38.98	54.00	15.02	Average
	2390.00	28.28	5.24	5.40	38.92	54.00	15.08	Average
@	2405.40	28.30	5.25	61.56	95.11	---	---	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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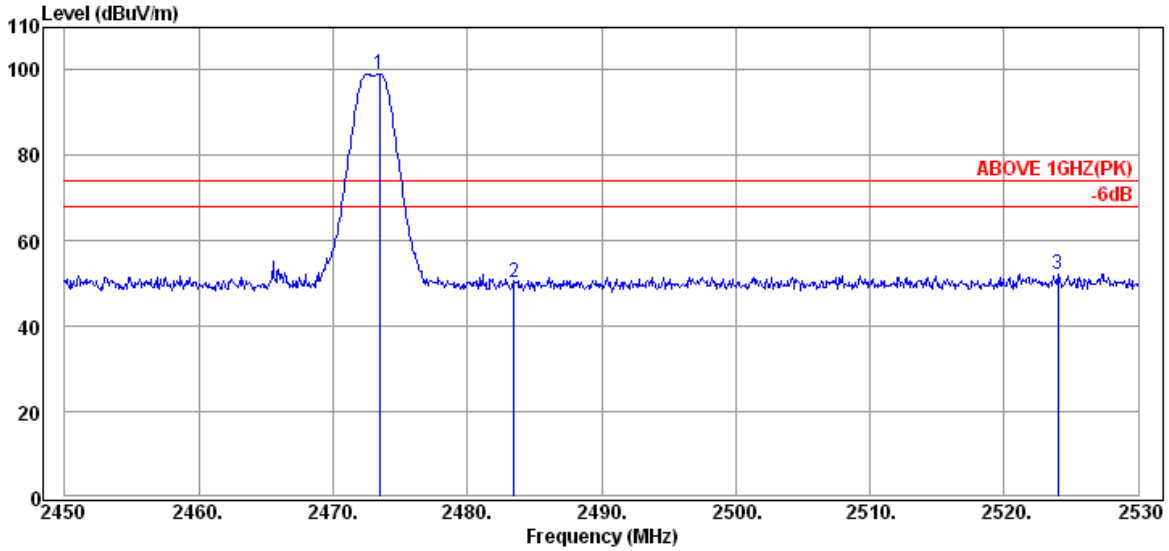
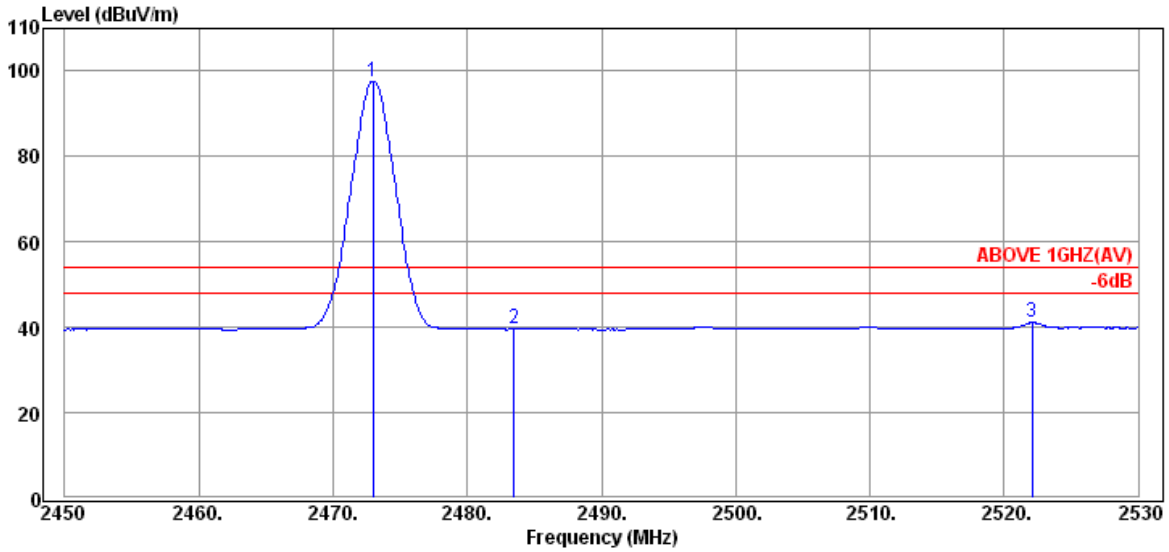
Mode	FASSTest	Frequency	TX 2472.96MHz



Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector
@	2473.44	28.37	5.30	65.54	99.21	---	---	Peak
	2483.50	28.38	5.31	16.53	50.22	74.00	23.78	Peak
	2524.00	28.48	5.34	18.32	52.14	74.00	21.86	Peak



Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector
@	2472.96	28.37	5.30	63.99	97.66	---	---	Average
	2483.50	28.38	5.31	5.90	39.59	54.00	14.41	Average
	2522.08	28.48	5.34	7.28	41.10	54.00	12.90	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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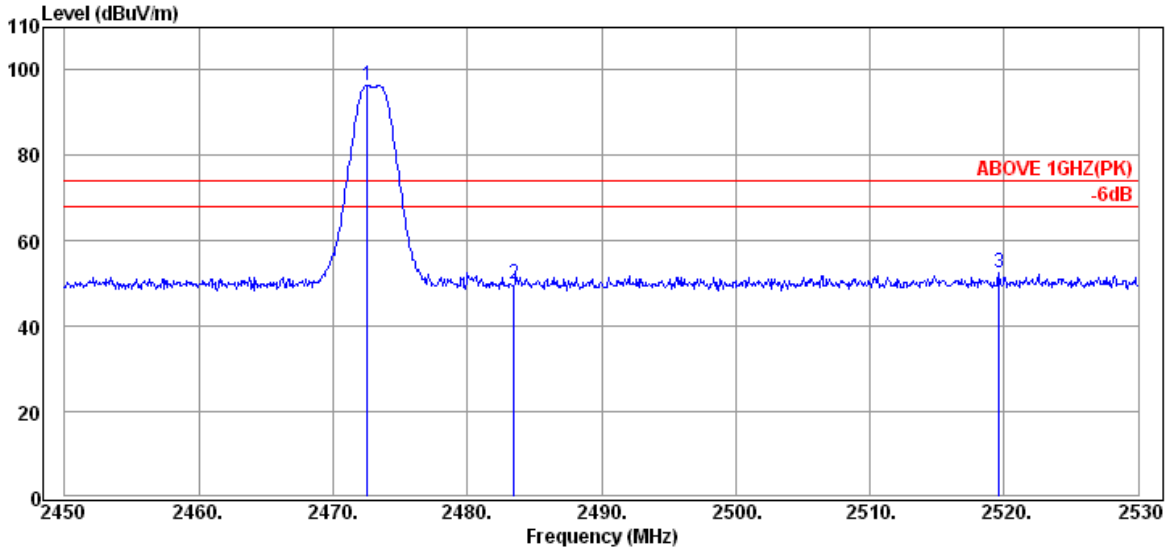
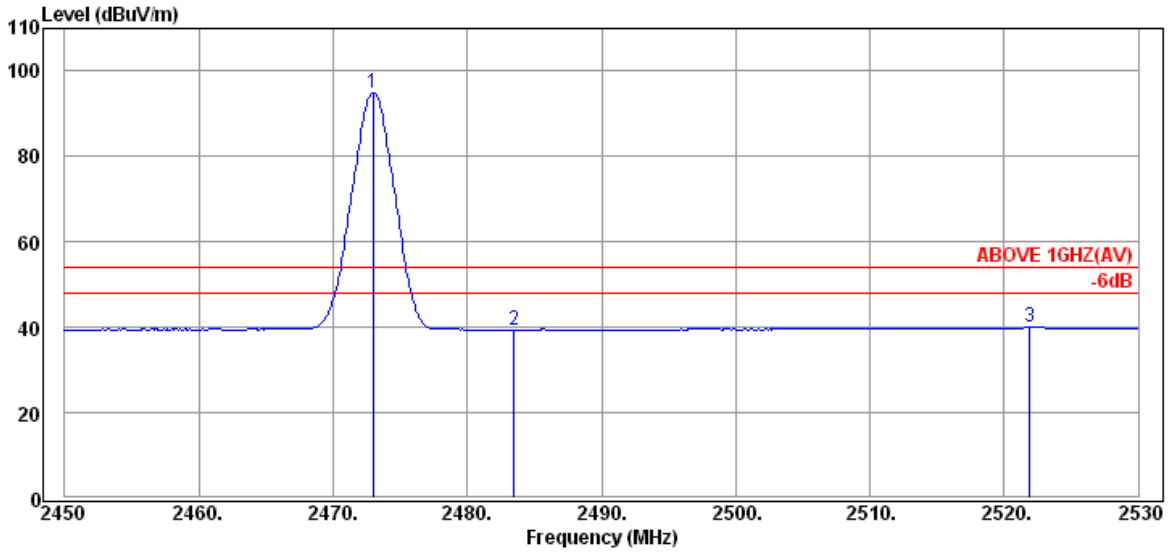
Mode	FASSTest	Frequency	TX 2472.96MHz



Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector
@	2472.56	28.37	5.30	62.73	96.40	---	---	Peak
	2483.50	28.38	5.31	16.27	49.96	74.00	24.04	Peak
	2519.60	28.48	5.33	18.84	52.65	74.00	21.35	Peak



Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBµV)	Emission Level (dBµV/m)	Limits (dBµV/m)	Margin (dB)	Detector
@	2472.96	28.37	5.30	61.22	94.89	---	---	Average
	2483.50	28.38	5.31	5.74	39.43	54.00	14.57	Average
	2521.92	28.48	5.34	6.20	40.02	54.00	13.98	Average

Remark: The "@" means fundamental frequency, it is ignored in this section.

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A.1.2 Emissions outside the frequency band:

The emissions (up to 25GHz) not reported for there is no emission be found.

Mode	FASSTest	Frequency	TX 2405.376MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3208.00	30.49	6.20	15.05	51.74	54.00	2.26	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3208.00	30.49	6.20	16.26	52.95	74.00	21.05	Peak
4812.00	32.85	8.98	5.83	47.66	54.00	6.34	Average
4812.00	32.85	8.98	12.68	54.51	74.00	19.49	Peak

Mode	FASSTest	Frequency	TX 2439.168MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3252.00	30.58	6.31	10.28	47.17	54.00	6.83	Peak
4876.00	32.96	9.08	5.51	47.55	54.00	6.45	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3252.00	30.58	6.31	12.35	49.24	74.00	24.76	Peak
4878.00	32.96	9.08	7.17	49.21	54.00	4.79	Average
4878.00	32.96	9.08	13.46	55.50	74.00	18.50	Peak

Mode	FASSTest	Frequency	TX 2472.960MHz

Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3298.00	30.66	6.39	12.76	49.81	54.00	4.19	Peak
4944.00	33.09	9.16	5.47	47.72	54.00	6.28	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
3298.00	30.66	6.39	13.87	50.92	54.00	3.08	Peak
4948.00	33.09	9.18	6.96	49.23	54.00	4.77	Average
4948.00	33.09	9.18	14.52	56.79	74.00	17.21	Peak

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A.1.3 Emissions in Non-restricted Frequency Bands:

Pursuant to KDB 558074 D01 DTS Meas Guidance v05 that emission levels below the FCC 15.209(a)/RSS-Gen Section 8.9 table 4 general radiated emissions limits is not required.

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A.2 6dB BANDWIDTH

Test Date	2018/12/11	Temp./Hum.	22℃/55%
Cable Loss	1.58dB	Test Voltage	DC 6V (Via Power Supply)

A.2.1 6dB Bandwidth Result

Mode	Centre Frequency (MHz)	6 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz) (Reference only)	Limit
FASSTest	2405.376	1.308	1.7601	>500kHz
	2439.168	1.338	1.7856	
	2472.960	1.376	1.7970	

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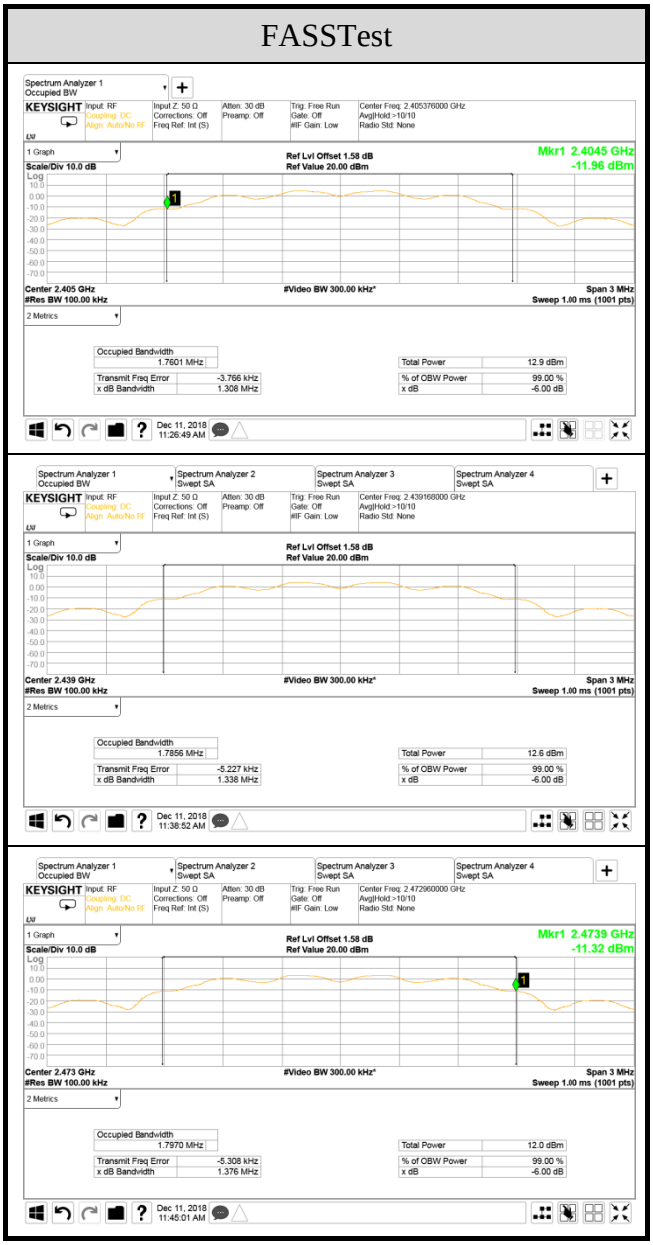
A.2.2 Measurement Plots

FASSTest



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A.3 MAXIMUM PEAK OUTPUT POWER

Test Date	2018/12/17	Temp./Hum.	21℃/52%
Cable Loss	0.50dB	Test Voltage	DC 6V (Via Power Supply)

A.3.1 Peak Output Power

Mode	Centre Frequency (MHz)	Peak Output Power (dBm)		Max. Peak Output Power		Antenna Gain (dBi)	Output Power (E.I.R.P.)		Limit
		ANT A	ANT B	(dBm)	(W)		(dBm)	(W)	
FASSTest	2405.376	7.47	6.88	7.47	0.0056	-5.16	2.31	0.0017	< 30dBm (1W) (Maximum Peak Output Power) < 36dBm (4W) (E.I.R.P)
	2439.168	6.97	6.72	6.97	0.0050		1.81	0.0015	
	2472.960	6.90	6.70	6.90	0.0049		1.74	0.0015	

Note: The results have been included cable loss.

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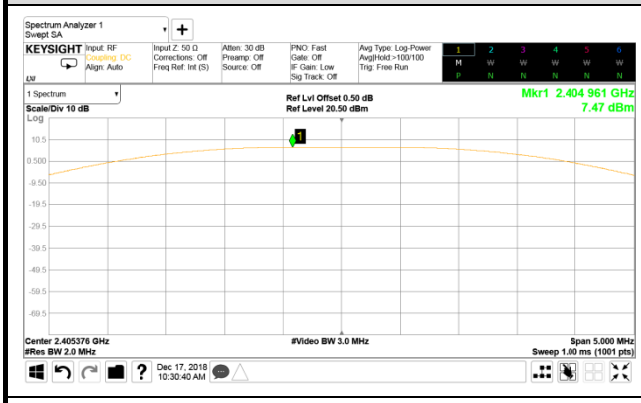
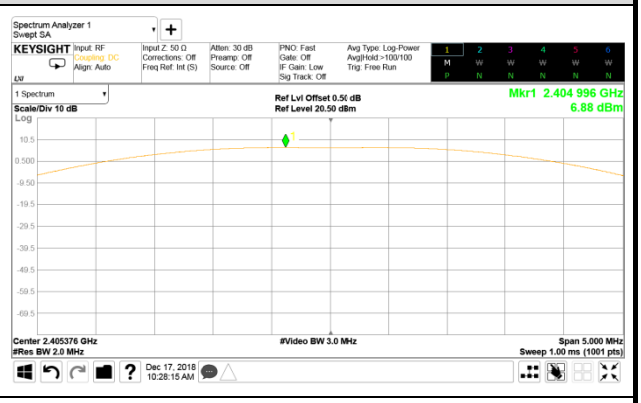
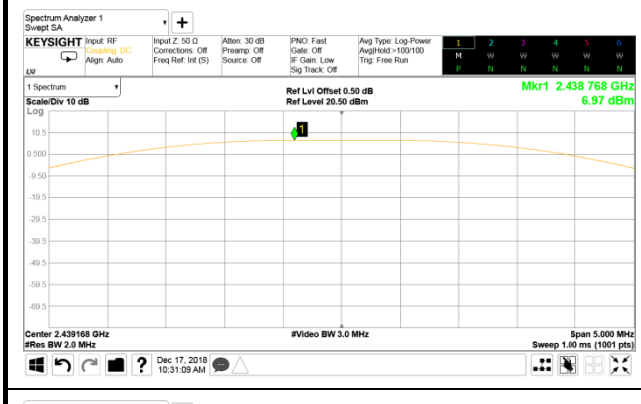
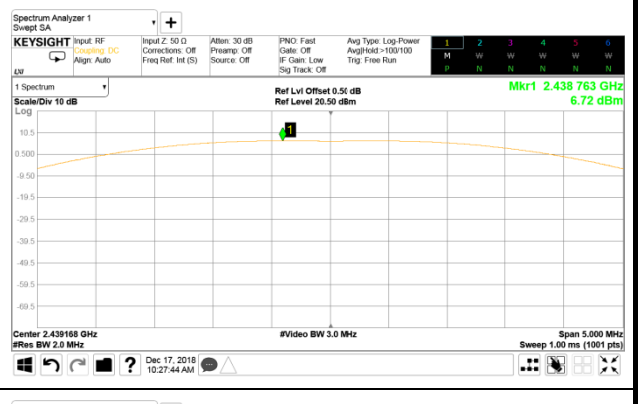
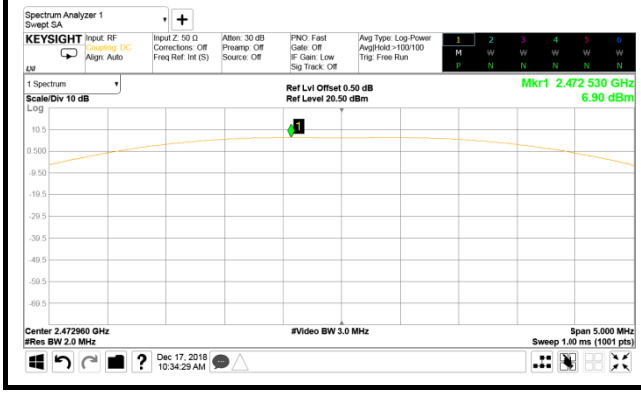
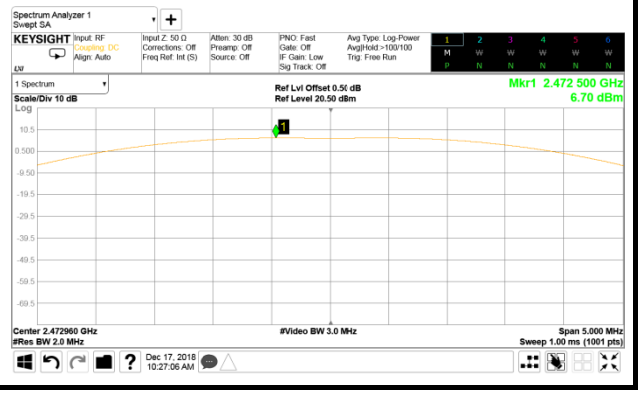
A.3.2 Measurement Plots

FASSTest	
ANT A	ANT B
	
	
	

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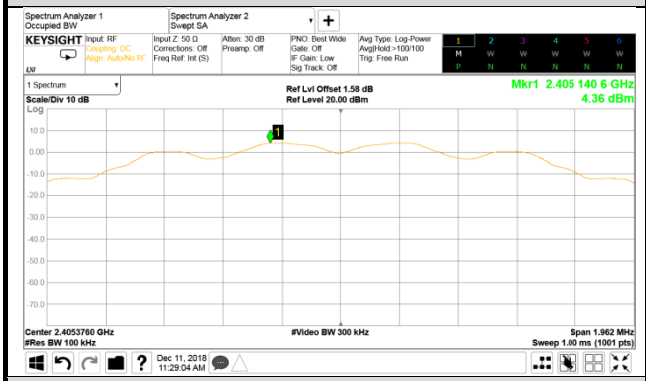
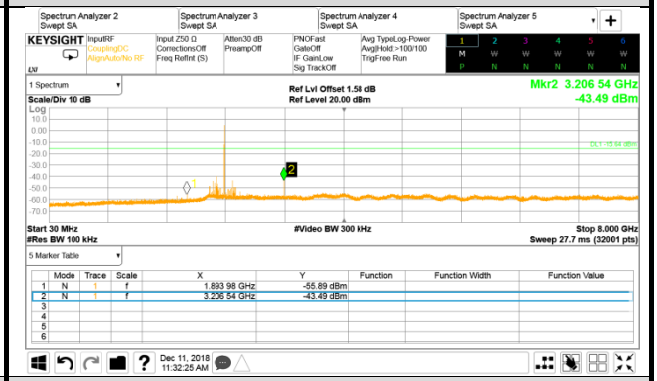
A.4 EMISSION LIMITATIONS

Test Date	2018/12/11	Temp./Hum.	22℃/55%
Cable Loss	1.58dB	Test Voltage	DC 6V (Via Power Supply)
Mode	FASSTest	Frequency	TX 2405.376MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0

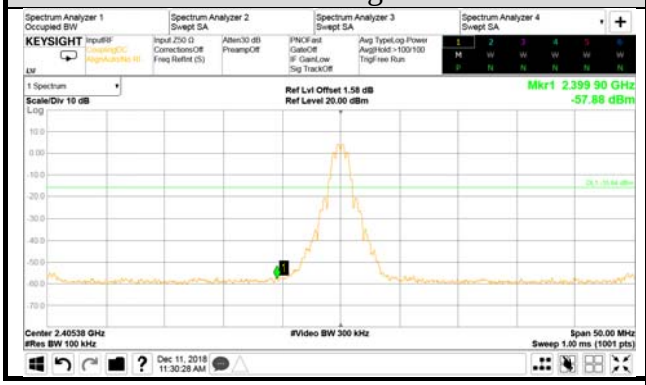
Reference Level



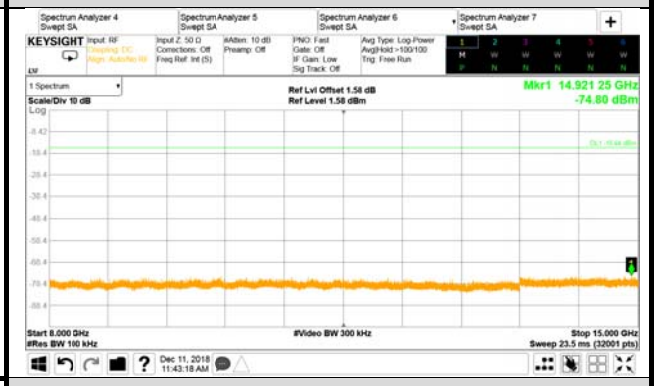
30MHz – 8GHz



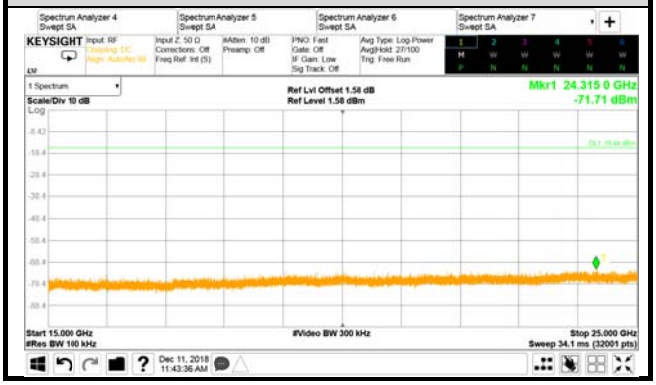
Band Edge



8GHz – 15GHz



15GHz – 25GHz



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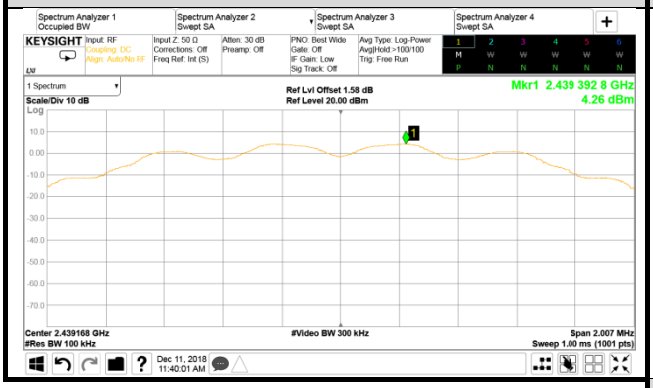
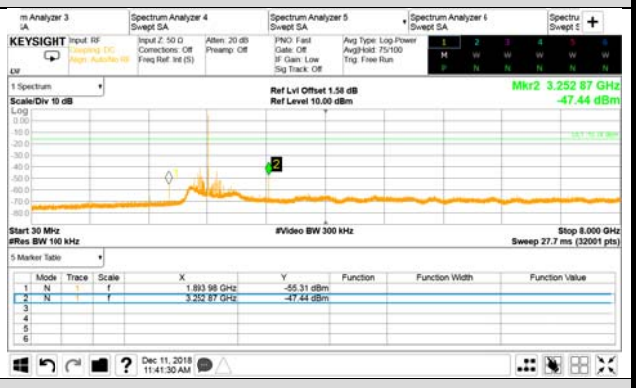
Test Date	2018/12/11	Temp./Hum.	22℃/55%
Cable Loss	1.58dB	Test Voltage	DC 6V (Via Power Supply)
Mode	FASSTest	Frequency	TX 2439.168MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0

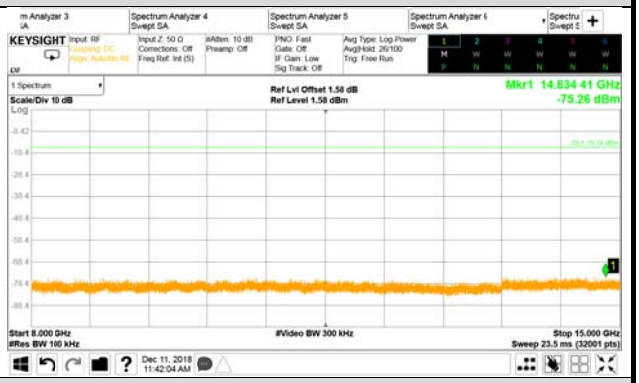
Reference Level



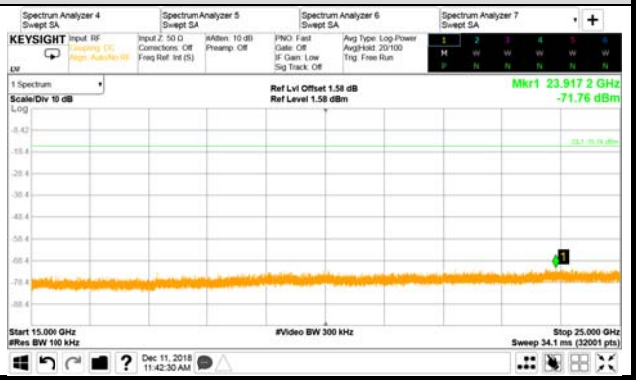
30MHz – 8GHz



8GHz – 15GHz



15GHz – 25GHz



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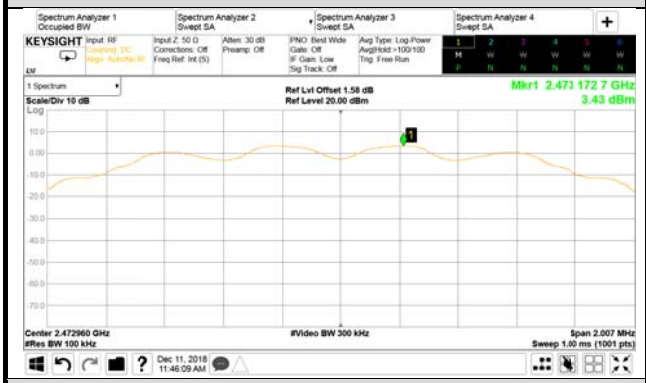
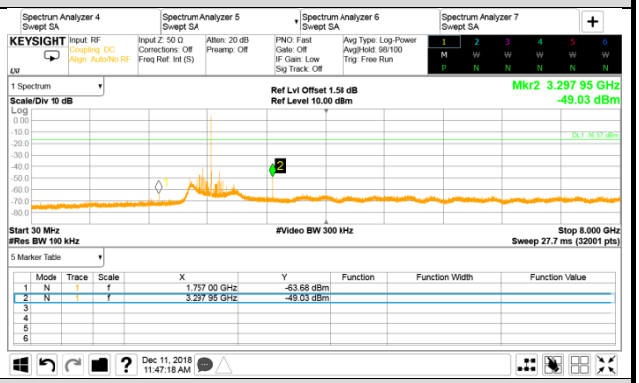
Test Date	2018/12/11	Temp./Hum.	22℃/55%
Cable Loss	1.58dB	Test Voltage	DC 6V (Via Power Supply)
Mode	FASSTest	Frequency	TX 2472.96MHz
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0

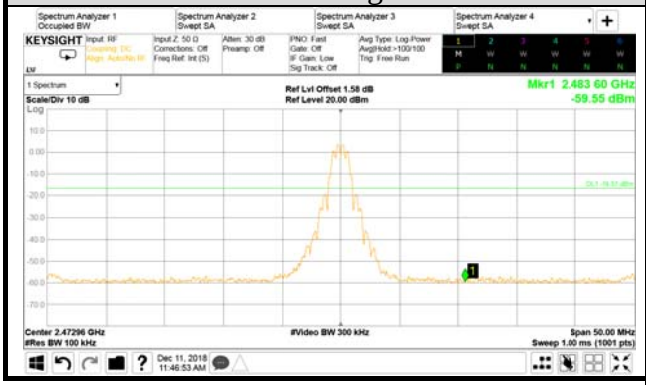
Reference Level



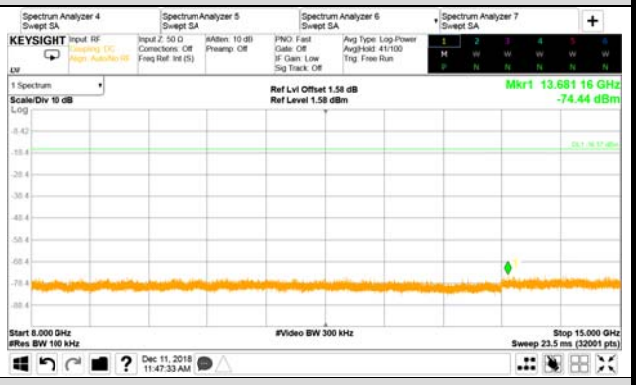
30MHz – 8GHz



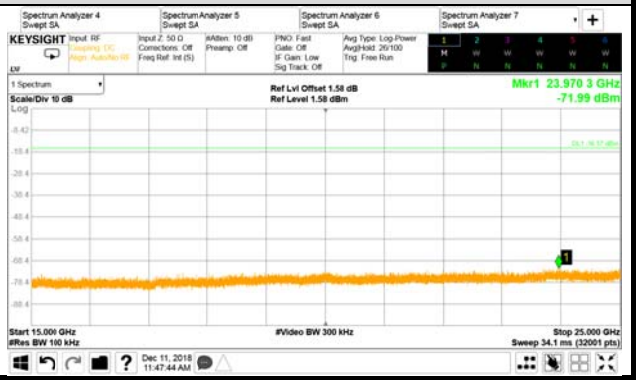
Band Edge



8GHz – 15GHz



15GHz – 25GHz



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A.5 POWER SPECTRAL DENSITY

Test Date	2018/12/11	Temp./Hum.	22℃/55%
Cable Loss	1.58dB	Test Voltage	DC 6V (Via Power Supply)
Simultaneous Factor10 log(n) (Note: “n” is antenna number)			0

A.5.1 Power Spectral Density Result

Mode	Centre Frequency (MHz)	Power Spectral Density (dBm)	Limit
FASSTest	2405.376	4.36	< 8 dBm/3kHz
	2439.168	4.26	
	2472.960	3.43	

Note: 1. All results have been included cable loss and Simultaneous Factor.
2. For KDB558074 D01V05, in the test result, when RBW set at 100kHz is stricter than 3kHz.

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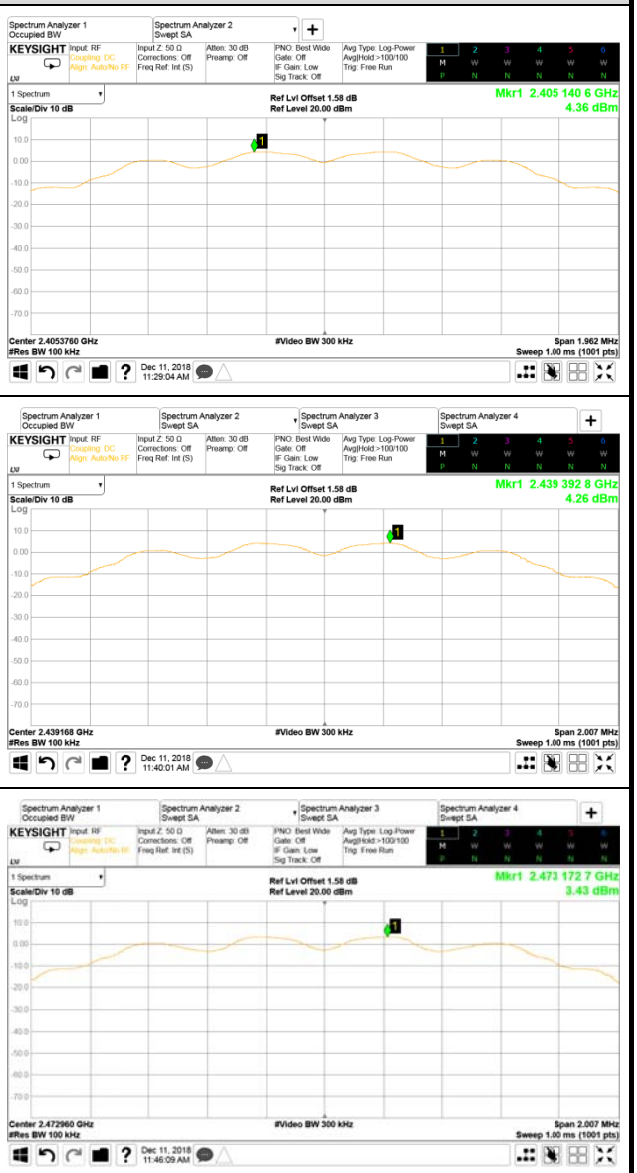
A.5.2 Measurement Plots

FASSTest



Note: All results have been included cable loss and Simultaneous Factor.

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APPDNDIX B

TEST PHOTOGRAPHS

(Model: R7108SB)