

TEST REPORT

Reference No. : WTU17S0579073E
FCC ID : 2AHAK-E4SFC5017
Applicant : KUNSHAN KONKA ELECTRONIC CO.,LTD
Address : No.189 East Qianjin Road, KUNSHAN Jiangsu 215300 CHINA
Manufacturer : The same as above
Address : The same as above
Product Name : LCD TV
Model No. . : E4SFC5017
Standards : FCC CFR47 Part 15 C Section 15.247:2016
Date of Receipt sample : May 12, 2017
Date of Test : May 13—May 30, 2017
Date of Issue : May 31, 2017
Test Result : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

Waltek Services (Shenzhen) Co., Ltd.

Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China

Tel :+86-755-83551033

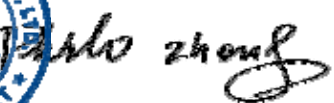
Fax:+86-755-83552400

Compiled by:



Zero Zhou / Test Engineer

Approved by:



Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207(a)	PASS
Radiated Emissions	15.247 15.205(a) 15.209(a)	PASS
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(3),(4)	PASS
Power Spectral Density	15.247(e)	PASS
Band Edge	15.247(d)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

3 Contents

	Page
1 COVER PAGE.....	1
2 TEST SUMMARY	2
3 CONTENTS	3
4 GENERAL INFORMATION.....	5
4.1 GENERAL DESCRIPTION OF E.U.T.	5
4.2 DETAILS OF E.U.T.	5
4.3 CHANNEL LIST	5
4.4 TEST MODE	6
4.5 TEST FACILITY	7
5 EQUIPMENT USED DURING TEST	8
5.1 EQUIPMENTS LIST	8
5.2 DESCRIPTION OF SUPPORT UNITS	9
5.3 MEASUREMENT UNCERTAINTY	9
5.4 TEST EQUIPMENT CALIBRATION	9
6 CONDUCTED EMISSION	10
6.1 E.U.T. OPERATION	10
6.2 EUT SETUP	10
6.3 MEASUREMENT DESCRIPTION	10
6.4 CONDUCTED EMISSION TEST RESULT	11
7 RADIATED EMISSIONS.....	13
7.1 EUT OPERATION.....	13
7.2 TEST SETUP	14
7.3 SPECTRUM ANALYZER SETUP	15
7.4 TEST PROCEDURE	16
7.5 CORRECTED AMPLITUDE & MARGIN CALCULATION	16
7.6 SUMMARY OF TEST RESULTS	17
8 BAND EDGE MEASUREMENT	29
8.1 TEST PRODUCE	29
8.2 TEST RESULT	30
9 6 DB BANDWIDTH MEASUREMENT	38
9.1 TEST PROCEDURE:	38
9.2 TEST RESULT:	38
10 MAXIMUM PEAK OUTPUT POWER	51
10.1 TEST PROCEDURE:	51
10.2 TEST RESULT:	51
11 POWER SPECTRAL DENSITY	52
11.1 TEST PROCEDURE:	52
11.2 TEST RESULT:	52
12 ANTENNA REQUIREMENT	65
13 RF EXPOSURE.....	66
13.1 REQUIREMENTS.....	66
13.2 THE PROCEDURES / LIMIT	66
13.3 MPE CALCULATION METHOD	67
14 PHOTOGRAPHS – MODEL E4SFC5017 TEST SETUP	68
14.1 CONDUCTED EMISSION	68
14.2 RADIATED EMISSION	68

15 PHOTOGRAPHS - CONSTRUCTIONAL DETAILS70

15.1 MODEL E4SFC5017 – EXTERNAL VIEW.....70

15.2 MODEL E4SFC5017– INTERNAL VIEW74

4 General Information

4.1 General Description of E.U.T.

Product Name:	LCD TV
Model No.:	E4SFC5017
Operation Frequency:	802.11b/g/n HT20: 2412MHz ~ 2462MHz, 802.11n HT40: 2422MHz~2452MHz
The Lowest Oscillator:	16MHz
Antenna Gain:	3dBi
Type of modulation:	IEEE 802.11b (CCK/QPSK/BPSK,11Mbps max.) IEEE 802.11g (BPSK/QPSK/16QAM/64QAM,54Mbps max.) IEEE 802.11n (BPSK/QPSK/16QAM/64QAM,HT20:72Mbps max., HT40:150Mbps max.)
Number of transmitter chains:	WIFI:2*2 (MIMO)
The device supports MIMO 2*2, and the MIMO works with STBC(Space-Time Block Coding).The antenna is omnidirectional, does not support any directional gain in any modes.	

MIMO rate, antennas use two different streams, from this side, if RX side need to decode MIMO, data between the two stream should be correlated.

TX power for MIMO rate, the wifi chip has a power/rate table that controls TX power from chipout, it's preset in nvram, FW don't need to calculate it again when MIMO rate is fixed. Of course the real radiation power is also related to antenna efficient.

4.2 Details of E.U.T.

Technical Data:	AC 120V~50/60Hz, 100W
-----------------	-----------------------

4.3 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	2	2417	3	2422	4	2427
5	2432	6	2437	7	2442	8	2447
9	2452	10	2457	11	2462	12	-

4.4 Test Mode

Table 1 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum Peak Output Power	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX
Power Spectral Density	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX
Frequency Range	802.11b	11 Mbps	1/11	TX
	802.11g	54 Mbps	1/11	TX
	802.11n HT20	108 Mbps	1/11	TX
	802.11n HT40	150 Mbps	3/9	TX
Transmitter Spurious Emissions	802.11b	11 Mbps	1/6/11	TX
	802.11g	54 Mbps	1/6/11	TX
	802.11n HT20	108 Mbps	1/6/11	TX
	802.11n HT40	150 Mbps	3/6/9	TX

Note :Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product .

Table 2 Tests Carried Out Under FCC part 15.207 & FCC part 15.209

Test Item	Test Mode
Conduction Emission, 0.15MHz to 30MHz	Communication

4.5 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A**

Waltek Services(Shenzhen) Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A, July 12, 2012.

- **FCC Test Site 2#– Registration No.: 328995**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the

FCC is maintained in our files. Registration 328995, December 3, 2014.

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions Test Site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	Sep.12,2016	Sep.11,2017
2.	LISN	R&S	ENV216	101215	Sep.12,2016	Sep.11,2017
3.	Cable	Top	TYPE16(3.5M)	-	Sep.12,2016	Sep.11,2017
Conducted Emissions Test Site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	101155	Sep.12,2016	Sep.11,2017
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.12,2016	Sep.11,2017
3.	Limiter	York	MTS-IMP-136	261115-001-0024	Sep.12,2016	Sep.11,2017
4.	Cable	LARGE	RF300	-	Sep.12,2016	Sep.11,2017
3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.14,2016	Sep.13,2017
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Oct.15,2016	Oct.14,2017
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.07,2017	Apr.06,2018
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.12,2016	Sep.11,2017
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.07,2017	Apr.06,2018
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Sep.14,2016	Sep.13,2017
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.07,2017	Apr.06,2018
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.07,2017	Apr.06,2018
3m Semi-anechoic Chamber for Radiation Emissions Test site 2#						
Item	Equipment	Manufacturer	Model No.	Serial No	Last Calibration Date	Calibration Due Date
1	Test Receiver	R&S	ESCI	101296	Apr.06,2017	Apr.05,2018
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	Apr.07,2017	Apr.06,2018
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	Sep.14,2016	Sep.13,2017
4	Cable	HUBER+SUHNER	CBL2	525178	Sep.07,2016	Sep.06,2017
RF Conducted Testing						

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	Sep.14,2016	Sep.13,2017
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.12,2016	Sep.11,2017
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	Apr.06,2017	Apr.05,2018

5.2 Description of Support Units

Equipment	Manufacturer	Model No.	Series No.
/	/	/	/

5.3 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

5.4 Test Equipment Calibration

All the test equipments used are valid and calibrated by GUANG ZHOU GRG METROLOGY & TEST CO., LTD. address is No.163, Pingyun Rd. West of Huangpu Ave, Tianhe District, Guangzhou, Guangdong, China.

6 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.10:2013
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

6.1 E.U.T. Operation

Operating Environment :

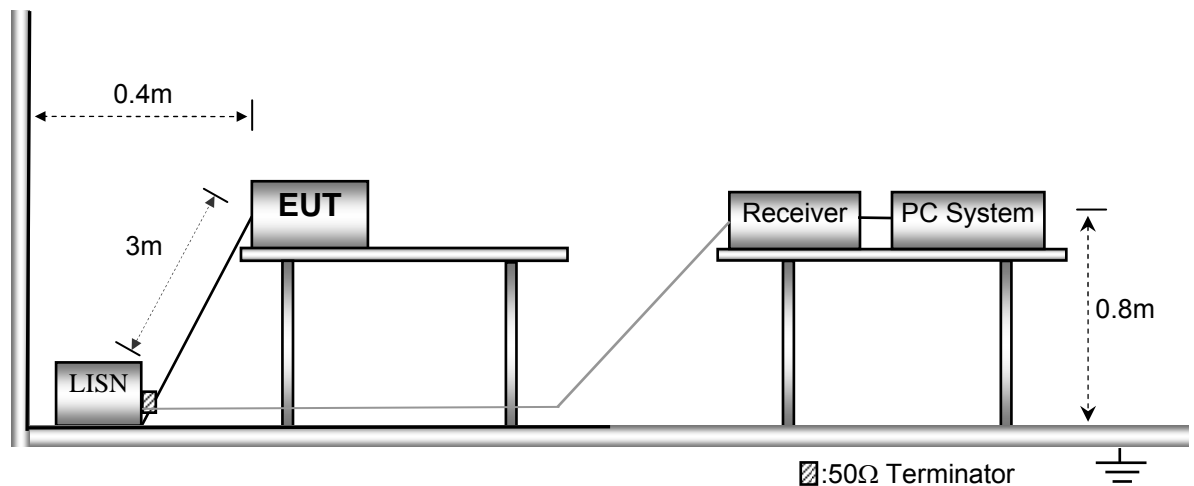
Temperature:	21.5 °C
Humidity:	51.9 % RH
Atmospheric Pressure:	101.2kPa

EUT Operation :

The test was performed in transmitting mode, the test data were shown in the report.

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10.



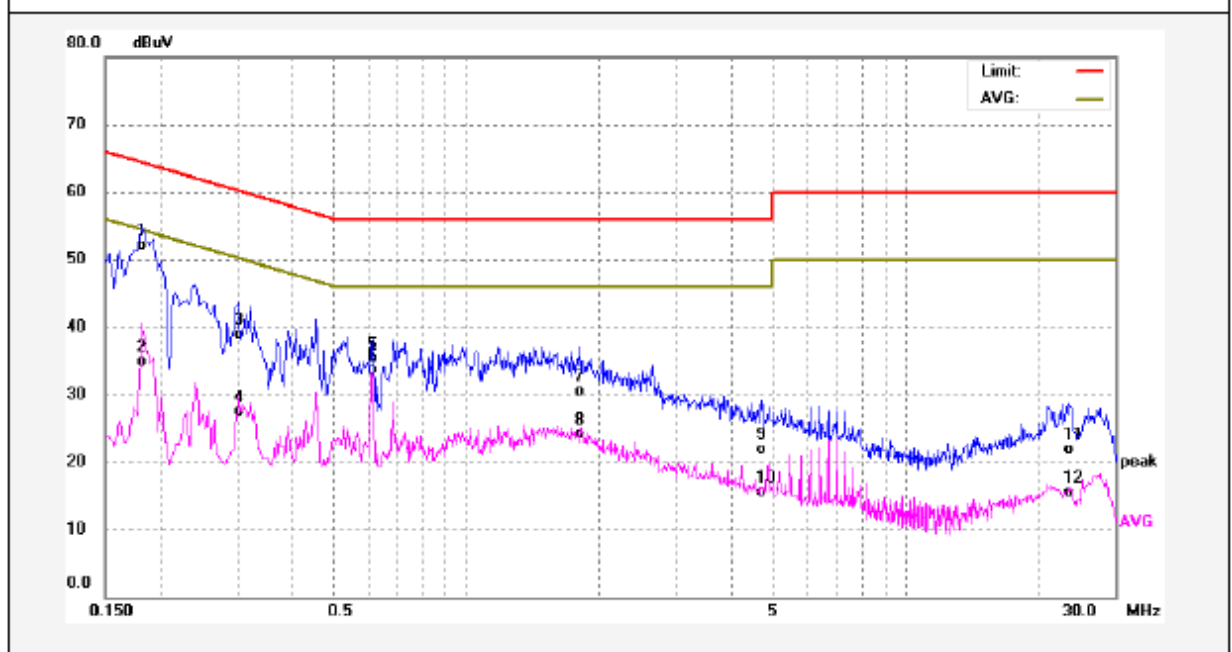
6.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.4 Conducted Emission Test Result

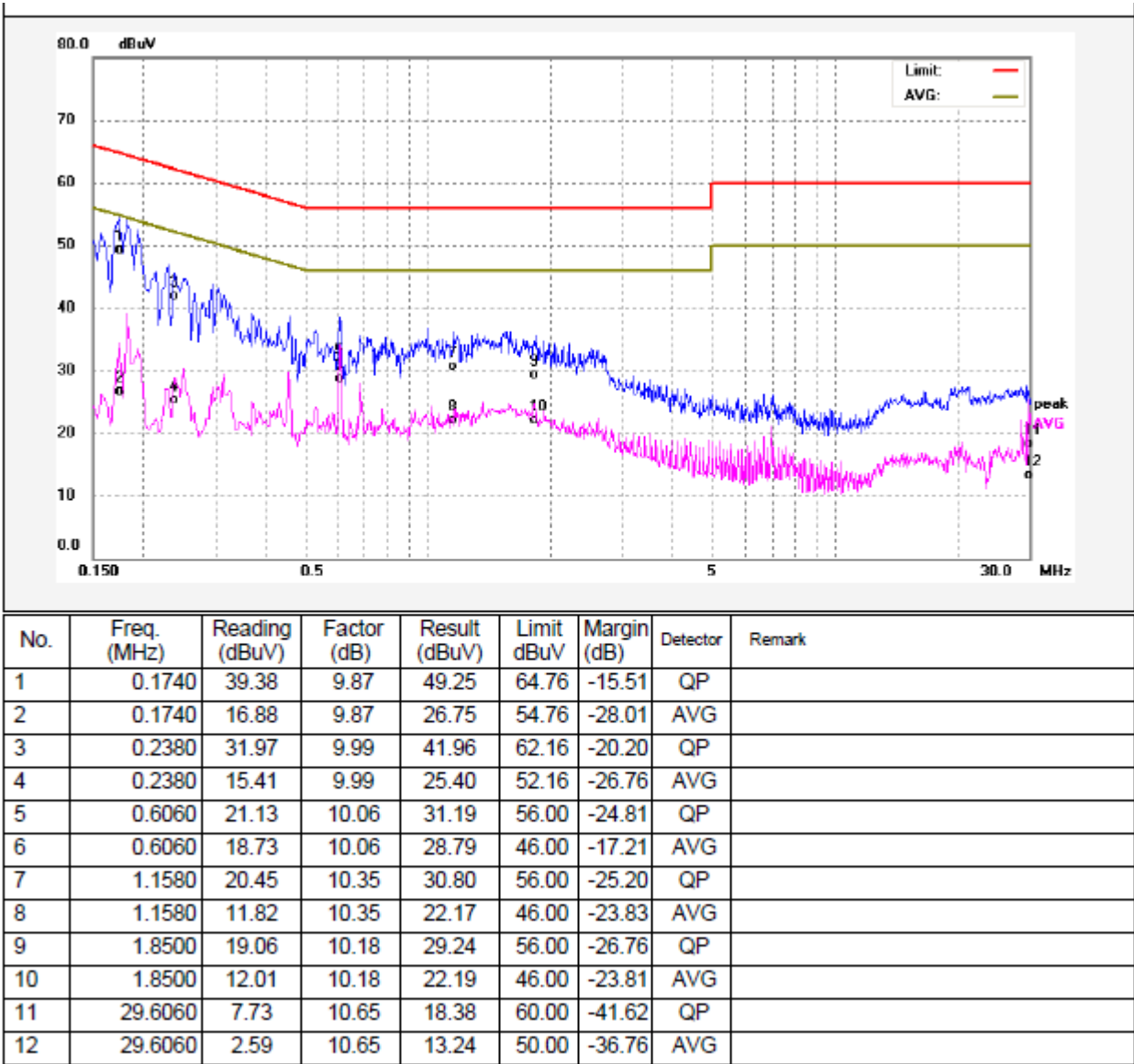
An initial pre-scan was performed on the live and neutral lines.

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1819	42.19	9.88	52.07	64.39	-12.32	QP	
2	0.1819	25.08	9.88	34.96	54.39	-19.43	AVG	
3	0.3020	29.01	9.98	38.99	60.19	-21.20	QP	
4	0.3020	17.49	9.98	27.47	50.19	-22.72	AVG	
5	0.6100	25.32	10.07	35.39	56.00	-20.61	QP	
6	0.6100	23.65	10.07	33.72	46.00	-12.28	AVG	
7	1.8180	20.39	10.18	30.57	56.00	-25.43	QP	
8	1.8180	13.84	10.18	24.02	46.00	-21.98	AVG	
9	4.7100	11.68	10.26	21.94	56.00	-34.06	QP	
10	4.7100	5.19	10.26	15.45	46.00	-30.55	AVG	
11	23.5940	11.44	10.54	21.98	60.00	-38.02	QP	
12	23.5940	4.94	10.54	15.48	50.00	-34.52	AVG	

Neutral line:



7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	$10000 * 2400/F(kHz)$	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	$100 * 24000/F(kHz)$	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	$100 * 30$	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

7.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

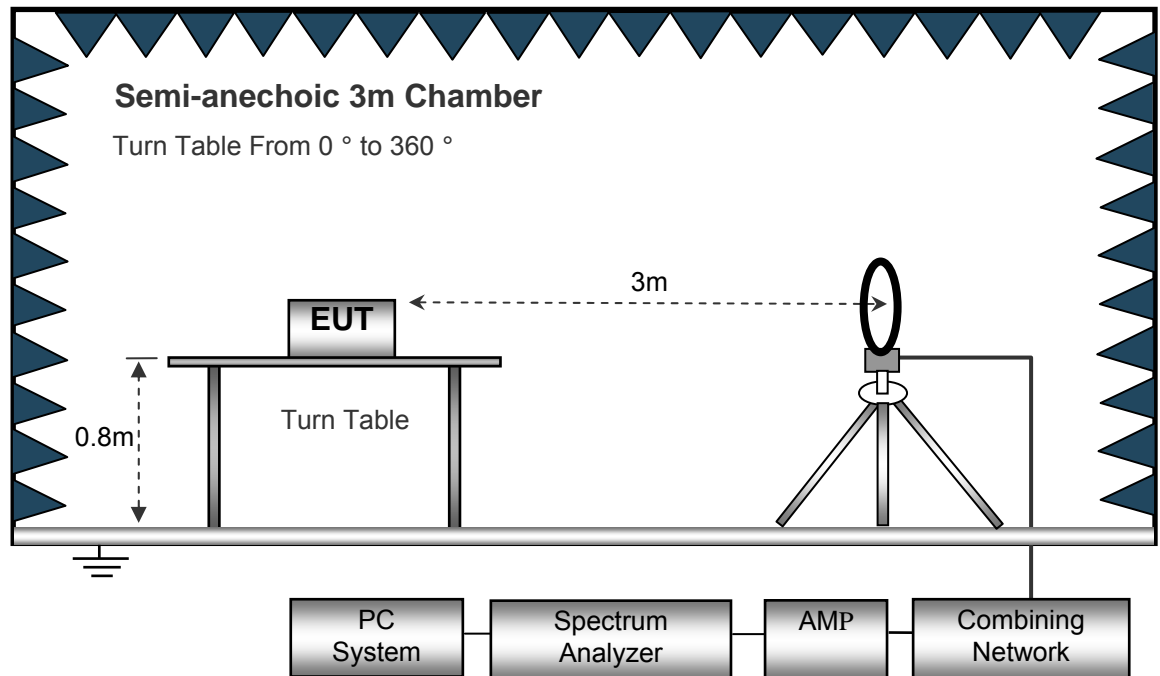
EUT Operation :

The test was performed in transmitting mode, the test data were shown in the report.

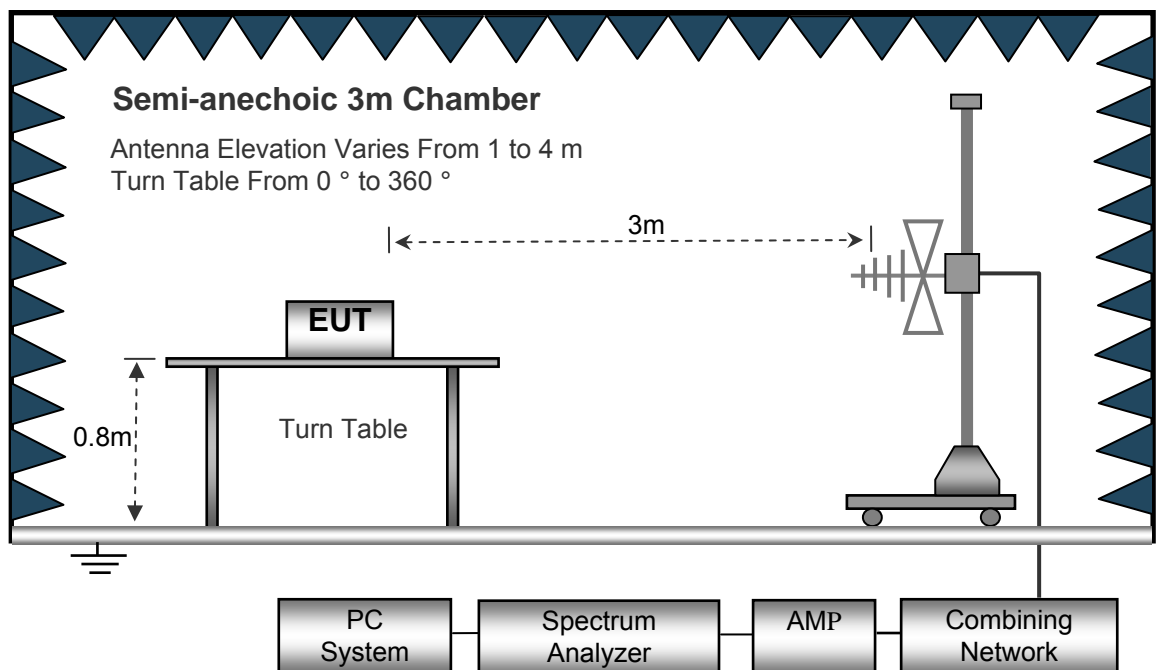
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

The test setup for emission measurement below 30MHz.

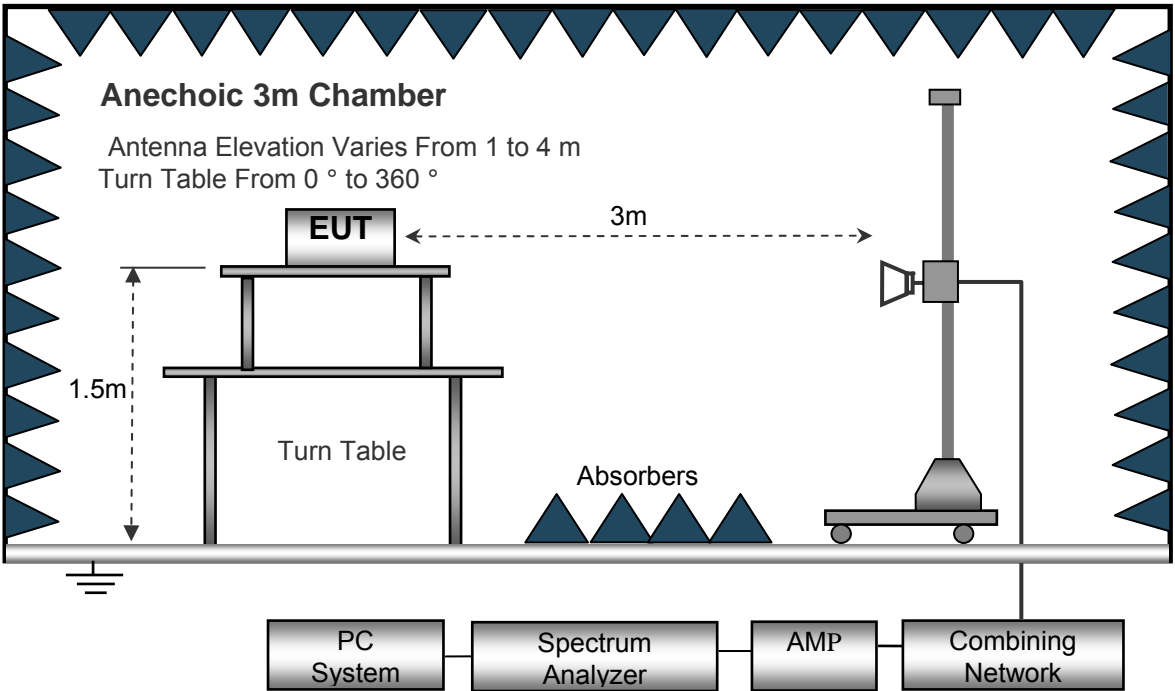


The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.

The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed Auto
Detector PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed Auto
Detector PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in X axis,so the worst data were shown as follow.
8. A 2.4GHz high -pass filter is used during radiated emissions above 1GHz measurement.

7.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

7.6 Summary of Test Results

Test Frequency: 16MHz ~ 30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT0 11b: Low Channel 2412MHz									
223.16	42.19	QP	113.22	1.24	H	11.09	31.10	46.00	-14.90
223.16	36.48	QP	316.66	1.80	V	11.09	25.39	46.00	-20.61
4824.00	50.19	PK	2.27	1.81	V	1.12	49.07	74.00	-24.93
4824.00	46.11	Ave	2.27	1.81	V	1.12	44.99	54.00	-9.01
7236.00	40.00	PK	349.74	1.39	H	1.33	41.33	74.00	-32.67
7236.00	40.08	Ave	349.74	1.39	H	1.33	41.41	54.00	-12.59
2333.72	45.23	PK	68.15	1.14	V	13.24	31.99	74.00	-42.01
2333.72	39.54	Ave	68.15	1.14	V	13.24	26.30	54.00	-27.70
2371.30	43.34	PK	280.86	1.96	H	13.06	30.28	74.00	-43.72
2371.30	38.80	Ave	280.86	1.96	H	13.06	25.74	54.00	-28.26
2491.63	43.73	PK	58.19	1.20	V	13.22	30.51	74.00	-43.49
2491.63	38.98	Ave	58.19	1.20	V	13.22	25.76	54.00	-28.24

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT0 11b: Middle Channel 2437MHz									
223.16	42.12	QP	69.35	1.51	H	11.09	31.03	46.00	-14.97
223.16	35.46	QP	346.65	1.94	V	11.09	24.37	46.00	-21.63
4874.00	49.58	PK	117.67	1.48	V	1.12	48.46	74.00	-25.54
4874.00	45.51	Ave	117.67	1.48	V	1.12	44.39	54.00	-9.61
7311.00	40.84	PK	99.94	1.80	H	2.21	43.05	74.00	-30.95
7311.00	39.14	Ave	99.94	1.80	H	2.21	41.35	54.00	-12.65
2341.79	46.32	PK	117.11	1.80	V	13.24	33.08	74.00	-40.92
2341.79	39.12	Ave	117.11	1.80	V	13.24	25.88	54.00	-28.12
2366.54	43.80	PK	266.13	1.49	H	13.06	30.74	74.00	-43.26
2366.54	38.58	Ave	266.13	1.49	H	13.06	25.52	54.00	-28.48
2493.48	43.67	PK	274.45	1.92	V	13.22	30.45	74.00	-43.55
2493.48	38.98	Ave	274.45	1.92	V	13.22	25.76	54.00	-28.24

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT0 11b: High Channel 2462MHz									
223.16	42.58	QP	304.86	1.37	H	11.09	31.49	46.00	-14.51
223.16	35.18	QP	65.07	1.98	V	11.09	24.09	46.00	-21.91
4924.00	49.55	PK	327.39	1.19	V	1.12	48.43	74.00	-25.57
4924.00	44.11	Ave	327.39	1.19	V	1.12	42.99	54.00	-11.01
7386.00	41.19	PK	293.27	1.93	H	2.84	44.03	74.00	-29.97
7386.00	38.49	Ave	293.27	1.93	H	2.84	41.33	54.00	-12.67
2323.90	46.67	PK	91.33	1.35	V	13.24	33.43	74.00	-40.57
2323.90	39.65	Ave	91.33	1.35	V	13.24	26.41	54.00	-27.59
2359.78	43.10	PK	203.34	1.41	H	13.06	30.04	74.00	-43.96
2359.78	38.16	Ave	203.34	1.41	H	13.06	25.10	54.00	-28.90
2495.77	43.67	PK	41.58	1.69	V	13.22	30.45	74.00	-43.55
2495.77	38.80	Ave	41.58	1.69	V	13.22	25.58	54.00	-28.42

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT1 11b: Low Channel 2412MHz									
223.16	41.08	QP	240.67	1.86	H	11.09	29.99	46.00	-16.01
223.16	34.62	QP	138.42	1.71	V	11.09	23.53	46.00	-22.47
4824.00	49.00	PK	49.70	1.99	V	1.12	47.88	74.00	-26.12
4824.00	43.06	Ave	49.70	1.99	V	1.12	41.94	54.00	-12.06
7236.00	40.65	PK	94.38	1.43	H	1.33	41.98	74.00	-32.02
7236.00	37.47	Ave	94.38	1.43	H	1.33	38.80	54.00	-15.20
2331.64	45.49	PK	88.27	1.78	V	13.24	32.25	74.00	-41.75
2331.64	37.05	Ave	88.27	1.78	V	13.24	23.81	54.00	-30.19
2385.43	42.70	PK	333.40	1.01	H	13.06	29.64	74.00	-44.36
2385.43	38.40	Ave	333.40	1.01	H	13.06	25.34	54.00	-28.66
2487.56	44.63	PK	111.43	1.51	V	13.22	31.41	74.00	-42.59
2487.56	36.05	Ave	111.43	1.51	V	13.22	22.83	54.00	-31.17

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT1 11b: Middle Channel 2437MHz									
223.16	41.27	QP	65.92	1.69	H	11.09	30.18	46.00	-15.82
223.16	35.41	QP	322.24	1.07	V	11.09	24.32	46.00	-21.68
4874.00	47.65	PK	57.25	1.74	V	1.12	46.53	74.00	-27.47
4874.00	43.24	Ave	57.25	1.74	V	1.12	42.12	54.00	-11.88
7311.00	40.42	PK	22.28	1.07	H	2.21	42.63	74.00	-31.37
7311.00	37.16	Ave	22.28	1.07	H	2.21	39.37	54.00	-14.63
2312.94	45.84	PK	188.98	1.82	V	13.24	32.60	74.00	-41.40
2312.94	38.13	Ave	188.98	1.82	V	13.24	24.89	54.00	-29.11
2372.50	42.54	PK	359.66	1.42	H	13.06	29.48	74.00	-44.52
2372.50	36.51	Ave	359.66	1.42	H	13.06	23.45	54.00	-30.55
2497.47	42.44	PK	2.63	1.06	V	13.22	29.22	74.00	-44.78
2497.47	37.21	Ave	2.63	1.06	V	13.22	23.99	54.00	-30.01

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT1 11b: High Channel 2462MHz									
223.16	40.14	QP	194.48	1.82	H	11.09	29.05	46.00	-16.95
223.16	36.19	QP	22.39	1.41	V	11.09	25.10	46.00	-20.90
4924.00	47.60	PK	338.38	1.85	V	1.12	46.48	74.00	-27.52
4924.00	43.34	Ave	338.38	1.85	V	1.12	42.22	54.00	-11.78
7386.00	40.90	PK	289.16	1.35	H	2.84	43.74	74.00	-30.26
7386.00	37.45	Ave	289.16	1.35	H	2.84	40.29	54.00	-13.71
2320.28	45.81	PK	255.11	1.12	V	13.24	32.57	74.00	-41.43
2320.28	38.95	Ave	255.11	1.12	V	13.24	25.71	54.00	-28.29
2354.13	43.73	PK	29.29	1.73	H	13.06	30.67	74.00	-43.33
2354.13	38.52	Ave	29.29	1.73	H	13.06	25.46	54.00	-28.54
2492.19	43.89	PK	168.42	1.57	V	13.22	30.67	74.00	-43.33
2492.19	38.39	Ave	168.42	1.57	V	13.22	25.17	54.00	-28.83

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT0 11g: Low Channel 2412MHz									
223.16	41.17	QP	267.06	1.93	H	11.09	30.08	46.00	-15.92
223.16	34.83	QP	311.85	1.43	V	11.09	23.74	46.00	-22.26
4824.00	47.71	PK	290.63	1.58	V	1.12	46.59	74.00	-27.41
4824.00	42.51	Ave	290.63	1.58	V	1.12	41.39	54.00	-12.61
7236.00	42.12	PK	212.89	1.28	H	1.33	43.45	74.00	-30.55
7236.00	35.99	Ave	212.89	1.28	H	1.33	37.32	54.00	-16.68
2339.52	45.50	PK	216.66	1.65	V	13.24	32.26	74.00	-41.74
2339.52	39.09	Ave	216.66	1.65	V	13.24	25.85	54.00	-28.15
2357.75	43.71	PK	249.67	1.90	H	13.06	30.65	74.00	-43.35
2357.75	37.35	Ave	249.67	1.90	H	13.06	24.29	54.00	-29.71
2495.86	43.13	PK	245.65	1.34	V	13.22	29.91	74.00	-44.09
2495.86	38.52	Ave	245.65	1.34	V	13.22	25.30	54.00	-28.70

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT0 11g: Middle Channel 2437MHz									
223.16	40.98	QP	201.22	1.88	H	11.09	29.89	46.00	-16.11
223.16	33.74	QP	207.33	1.48	V	11.09	22.65	46.00	-23.35
4874.00	46.61	PK	271.66	1.77	V	1.12	45.49	74.00	-28.51
4874.00	41.45	Ave	271.66	1.77	V	1.12	40.33	54.00	-13.67
7311.00	43.52	PK	145.76	1.33	H	2.21	45.73	74.00	-28.27
7311.00	35.44	Ave	145.76	1.33	H	2.21	37.65	54.00	-16.35
2348.82	45.38	PK	83.18	1.85	V	13.24	32.14	74.00	-41.86
2348.82	37.58	Ave	83.18	1.85	V	13.24	24.34	54.00	-29.66
2354.88	43.19	PK	326.36	1.58	H	13.06	30.13	74.00	-43.87
2354.88	36.91	Ave	326.36	1.58	H	13.06	23.85	54.00	-30.15
2489.68	42.69	PK	84.10	1.08	V	13.22	29.47	74.00	-44.53
2489.68	36.04	Ave	84.10	1.08	V	13.22	22.82	54.00	-31.18

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT0 11g: High Channel 2462MHz									
223.16	40.90	QP	265.32	1.71	H	11.09	29.81	46.00	-16.19
223.16	34.12	QP	207.01	1.67	V	11.09	23.03	46.00	-22.97
4924.00	47.55	PK	83.97	1.15	V	1.12	46.43	74.00	-27.57
4924.00	41.77	Ave	83.97	1.15	V	1.12	40.65	54.00	-13.35
7386.00	44.17	PK	204.92	1.67	H	2.84	47.01	74.00	-26.99
7386.00	36.80	Ave	204.92	1.67	H	2.84	39.64	54.00	-14.36
2341.51	45.26	PK	74.88	1.66	V	13.24	32.02	74.00	-41.98
2341.51	39.49	Ave	74.88	1.66	V	13.24	26.25	54.00	-27.75
2375.36	42.11	PK	46.96	1.19	H	13.06	29.05	74.00	-44.95
2375.36	38.64	Ave	46.96	1.19	H	13.06	25.58	54.00	-28.42
2495.42	44.16	PK	301.65	1.70	V	13.22	30.94	74.00	-43.06
2495.42	37.52	Ave	301.65	1.70	V	13.22	24.30	54.00	-29.70

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT1 11g: Low Channel 2412MHz									
223.16	41.29	QP	147.01	1.86	H	11.09	30.20	46.00	-15.80
223.16	33.10	QP	210.15	1.77	V	11.09	22.01	46.00	-23.99
4844.00	46.51	PK	264.35	1.73	V	1.12	45.39	74.00	-28.61
4844.00	40.24	Ave	264.35	1.73	V	1.12	39.12	54.00	-14.88
7266.00	41.19	PK	227.10	1.76	H	1.33	42.52	74.00	-31.48
7266.00	34.89	Ave	227.10	1.76	H	1.33	36.22	54.00	-17.78
2324.98	46.52	PK	48.69	1.28	V	13.24	33.28	74.00	-40.72
2324.98	37.41	Ave	48.69	1.28	V	13.24	24.17	54.00	-29.83
2356.03	44.78	PK	19.72	1.34	H	13.06	31.72	74.00	-42.28
2356.03	38.33	Ave	19.72	1.34	H	13.06	25.27	54.00	-28.73
2497.41	43.04	PK	326.28	1.91	V	13.22	29.82	74.00	-44.18
2497.41	38.03	Ave	326.28	1.91	V	13.22	24.81	54.00	-29.19

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT1 11g: Middle Channel 2437MHz									
223.16	41.08	QP	138.87	1.40	H	11.09	29.99	46.00	-16.01
223.16	33.29	QP	181.68	1.10	V	11.09	22.20	46.00	-23.80
4874.00	46.48	PK	70.18	1.86	V	1.12	45.36	74.00	-28.64
4874.00	39.79	Ave	70.18	1.86	V	1.12	38.67	54.00	-15.33
7311.00	40.92	PK	114.72	1.03	H	2.21	43.13	74.00	-30.87
7311.00	35.53	Ave	114.72	1.03	H	2.21	37.74	54.00	-16.26
2324.42	45.84	PK	247.29	1.40	V	13.24	32.60	74.00	-41.40
2324.42	39.27	Ave	247.29	1.40	V	13.24	26.03	54.00	-27.97
2358.05	42.44	PK	350.33	1.98	H	13.06	29.38	74.00	-44.62
2358.05	37.39	Ave	350.33	1.98	H	13.06	24.33	54.00	-29.67
2499.68	42.22	PK	328.50	1.53	V	13.22	29.00	74.00	-45.00
2499.68	37.56	Ave	328.50	1.53	V	13.22	24.34	54.00	-29.66

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
ANT1 11g: High Channel 2462MHz									
223.16	40.22	QP	66.60	2.00	H	11.09	29.13	46.00	-16.87
223.16	34.00	QP	194.70	1.13	V	11.09	22.91	46.00	-23.09
4904.00	45.81	PK	73.55	1.96	V	1.12	44.69	74.00	-29.31
4904.00	40.27	Ave	73.55	1.96	V	1.12	39.15	54.00	-14.85
7356.00	41.37	PK	17.47	1.39	H	2.84	44.21	74.00	-29.79
7356.00	35.75	Ave	17.47	1.39	H	2.84	38.59	54.00	-15.41
2349.30	46.51	PK	263.58	1.76	V	13.24	33.27	74.00	-40.73
2349.30	37.19	Ave	263.58	1.76	V	13.24	23.95	54.00	-30.05
2379.31	43.33	PK	305.83	1.18	H	13.06	30.27	74.00	-43.73
2379.31	38.09	Ave	305.83	1.18	H	13.06	25.03	54.00	-28.97
2487.26	42.96	PK	284.09	1.44	V	13.22	29.74	74.00	-44.26
2487.26	38.69	Ave	284.09	1.44	V	13.22	25.47	54.00	-28.53

Test Frequency: 18GHz~25GHz

The measurements were more than 20 dB below the limit and not reported.

8 Band Edge Measurement

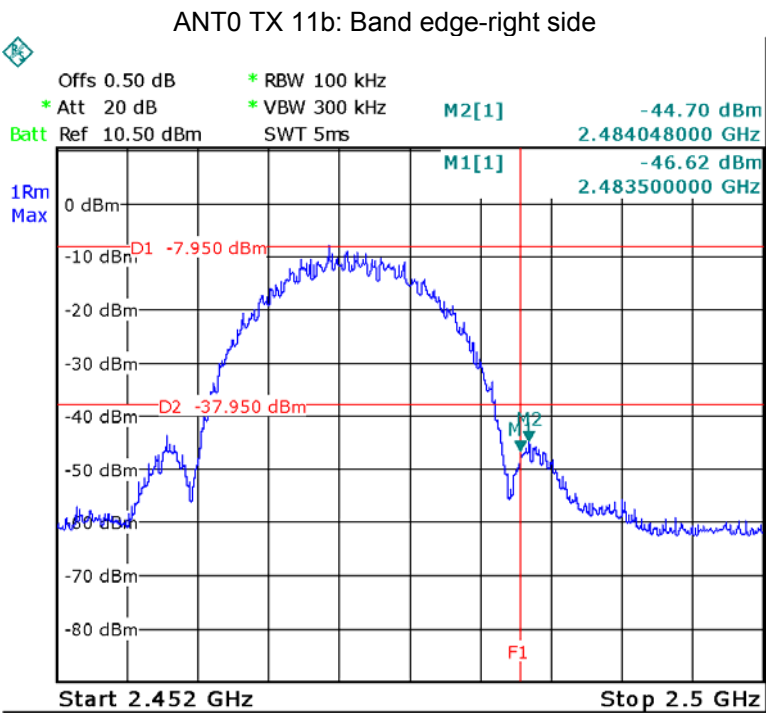
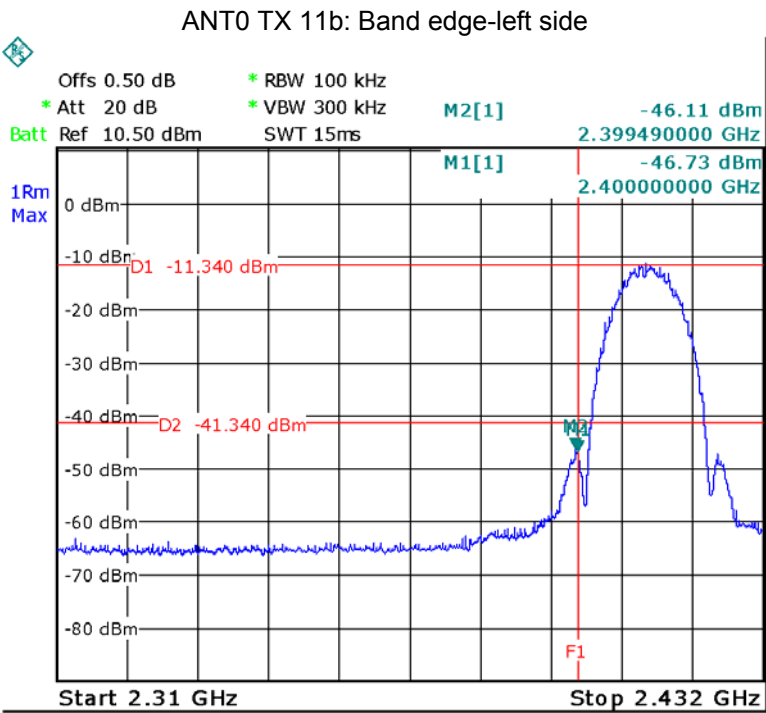
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	KDB558074 D01 DTS Meas Guidance V04
Test Limit:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that 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 §15.209(a) is not required. In addition, radiated emissions 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)).
Test Mode:	Transmitting

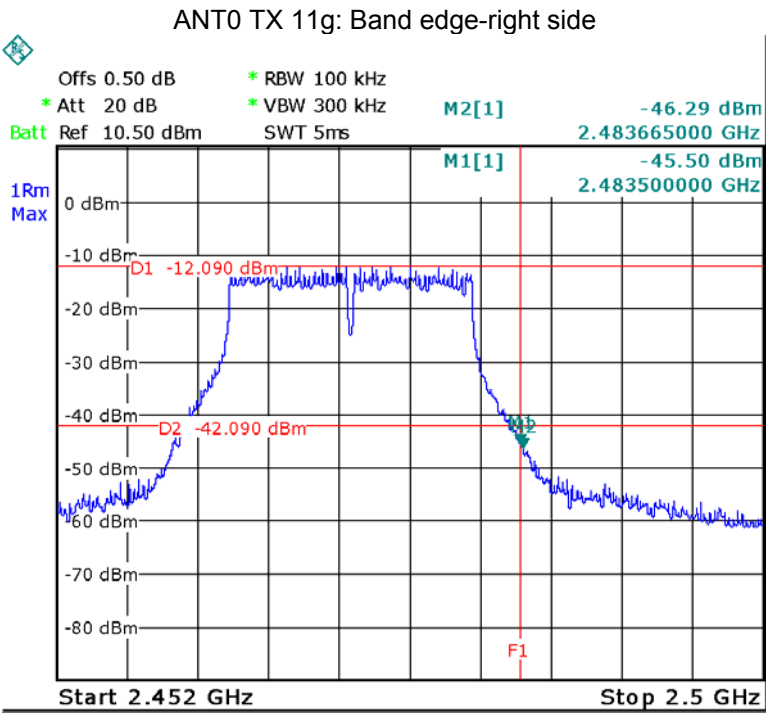
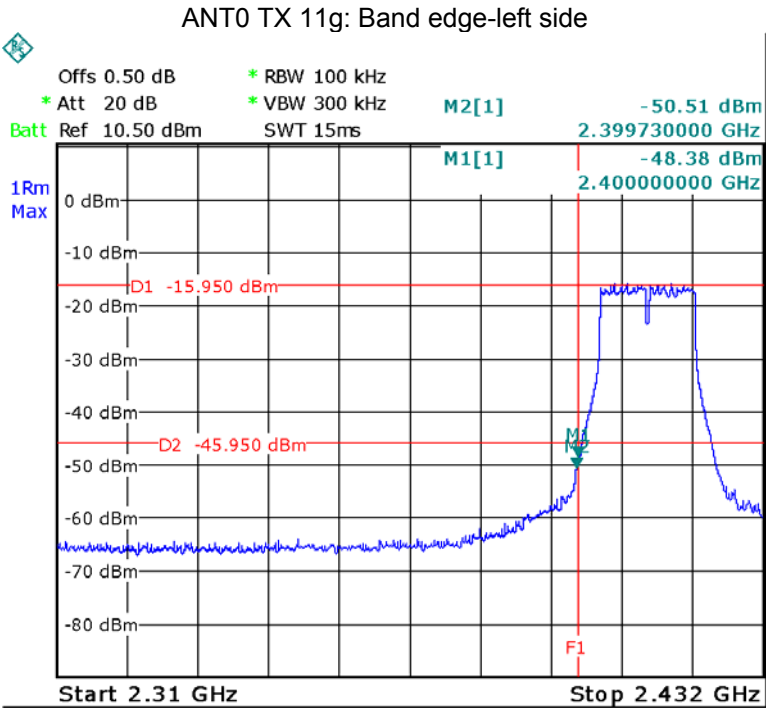
8.1 Test Produce

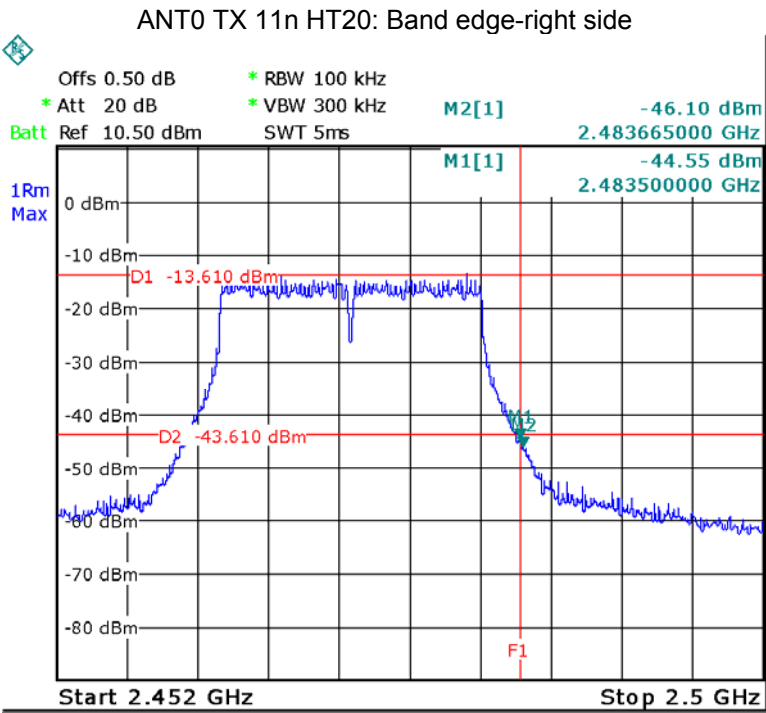
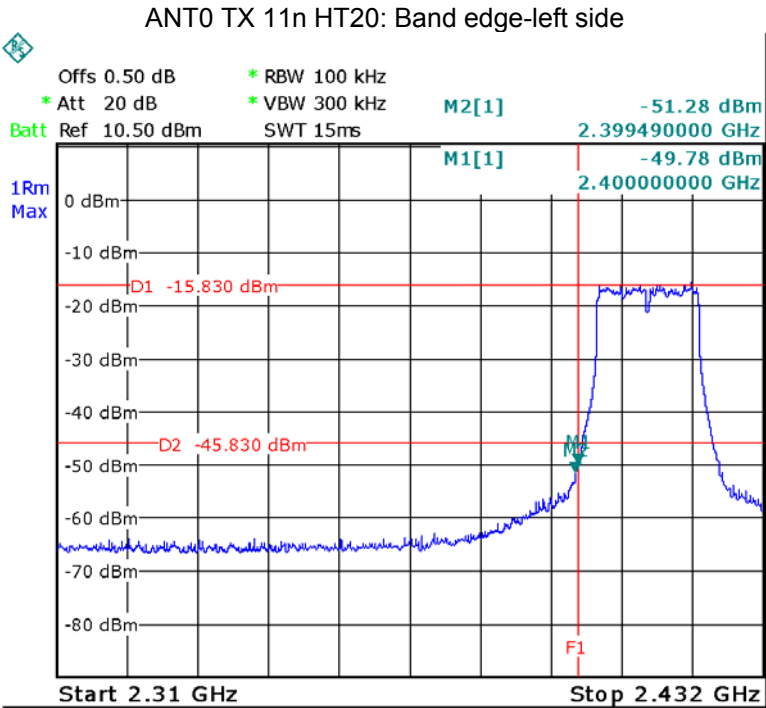
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

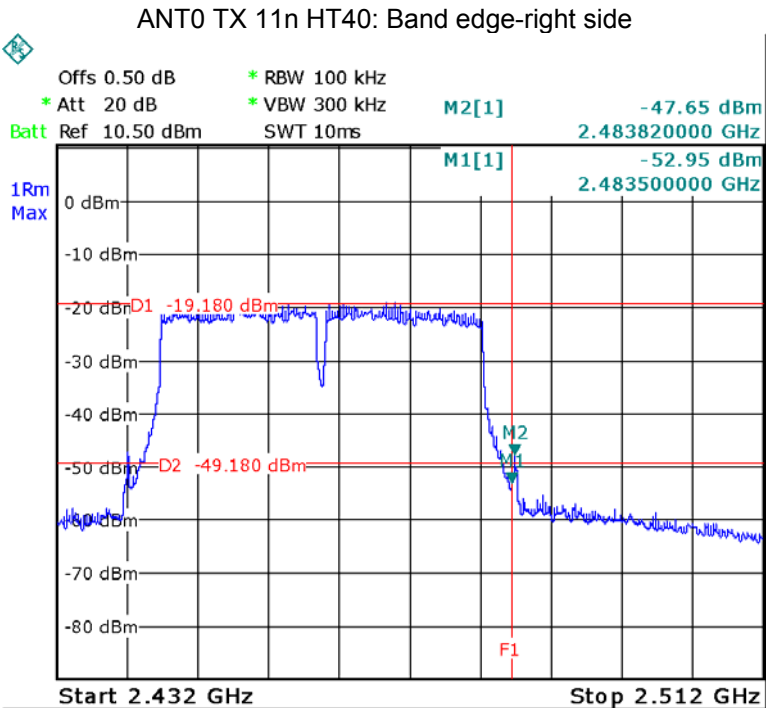
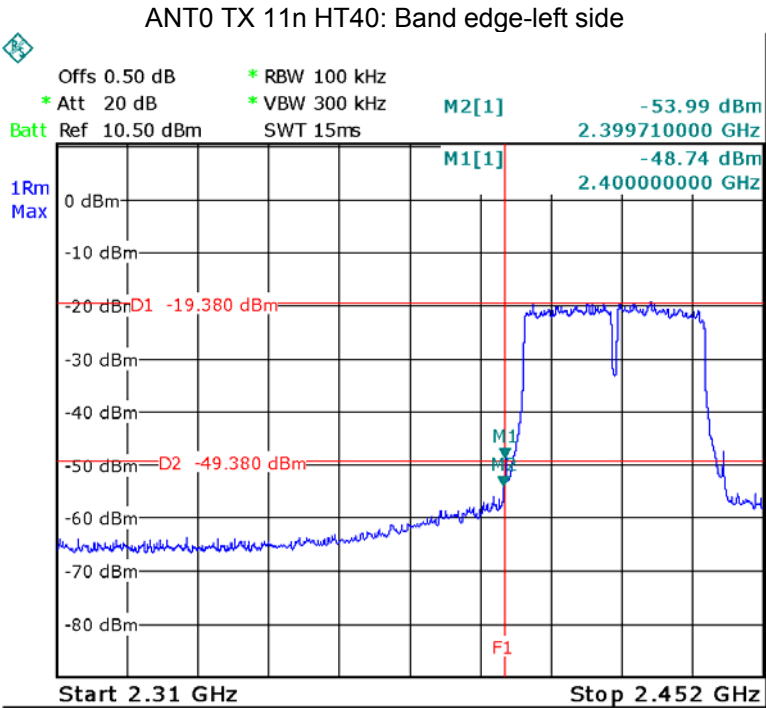
8.2 Test Result

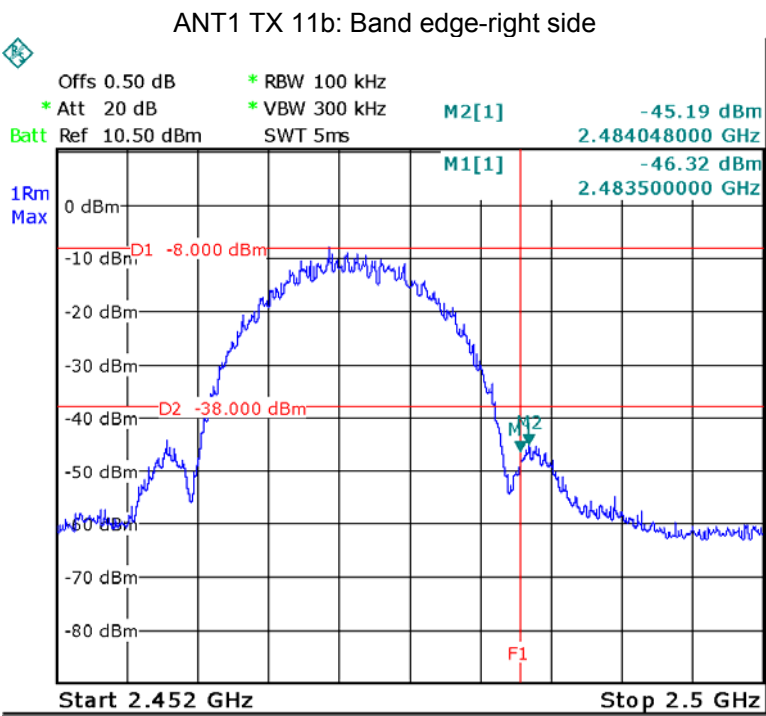
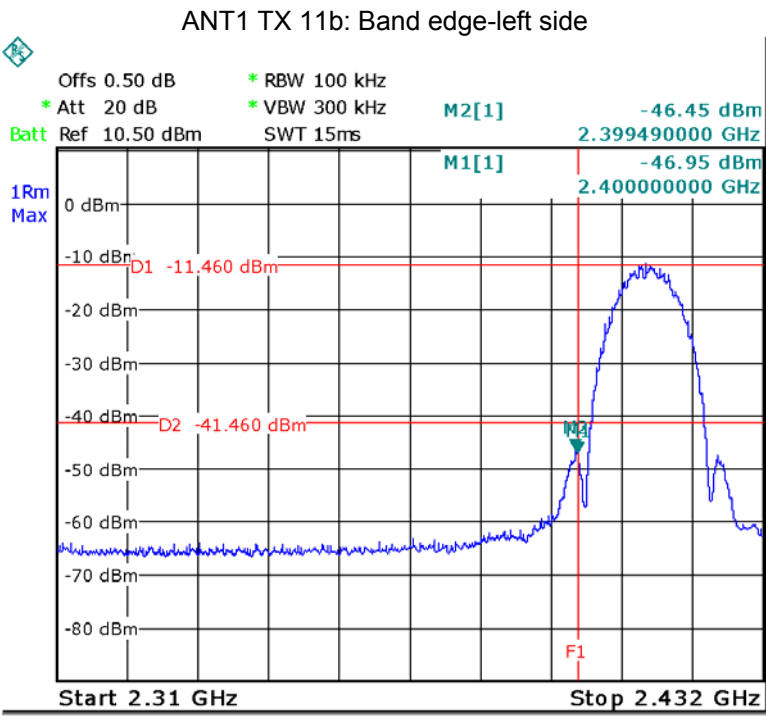
Test result plots shown as follows:

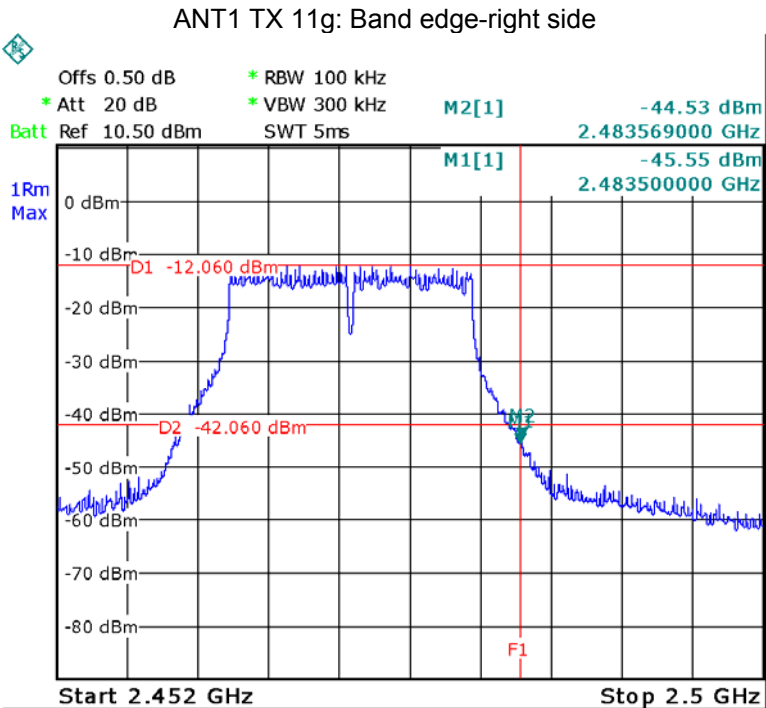
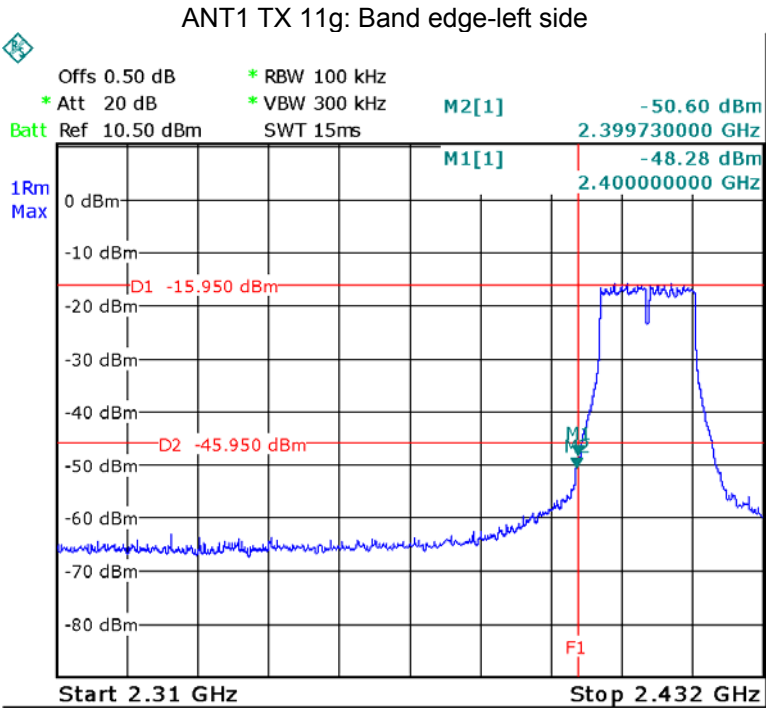


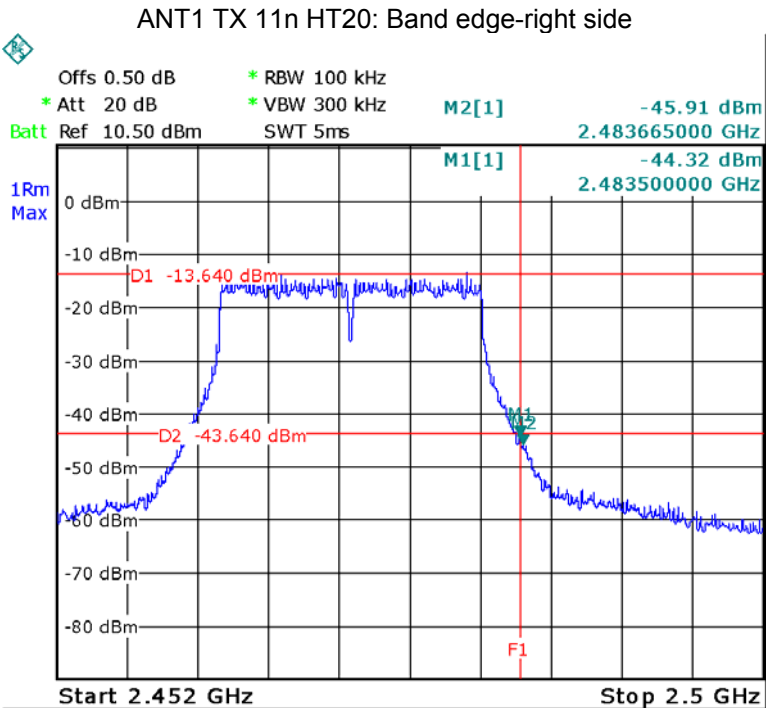
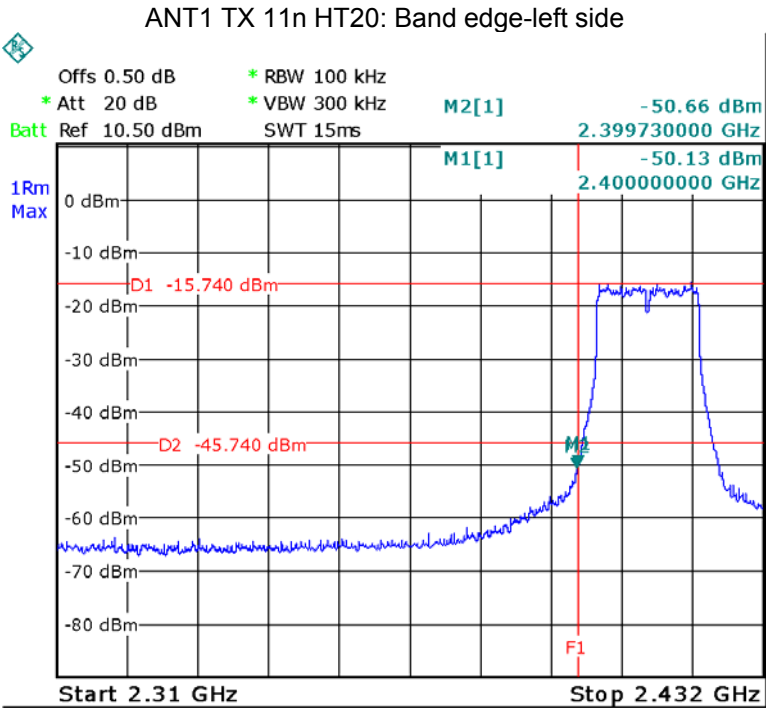


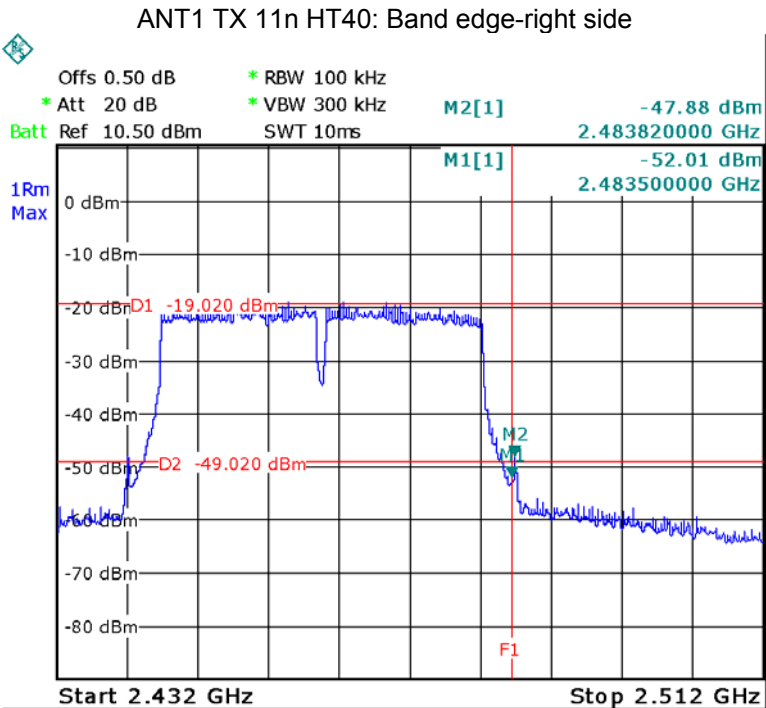
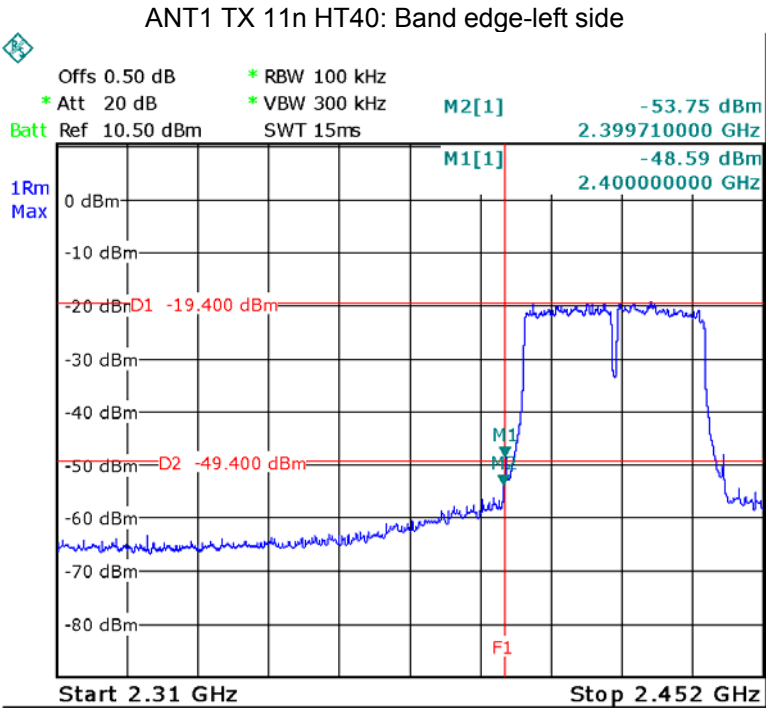












9 6 dB Bandwidth Measurement

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

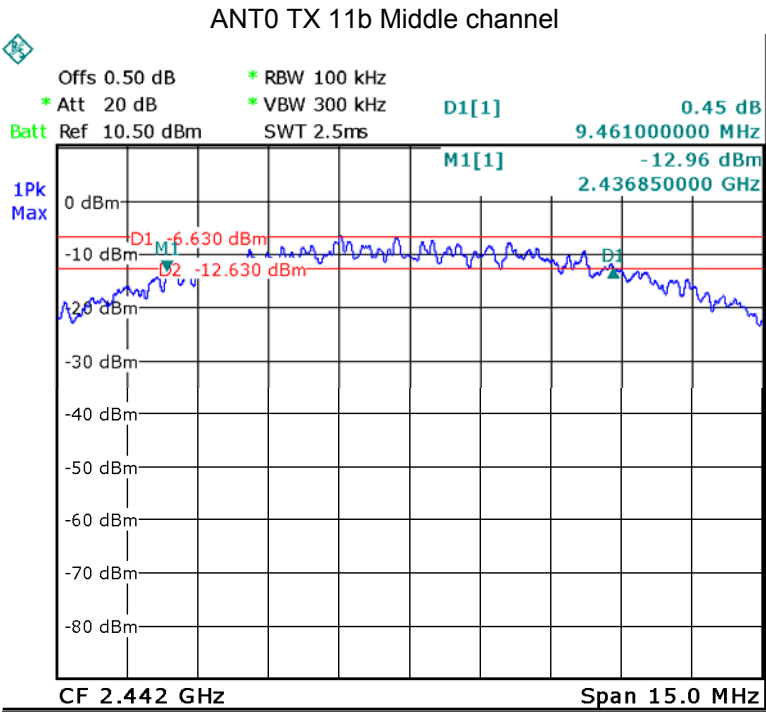
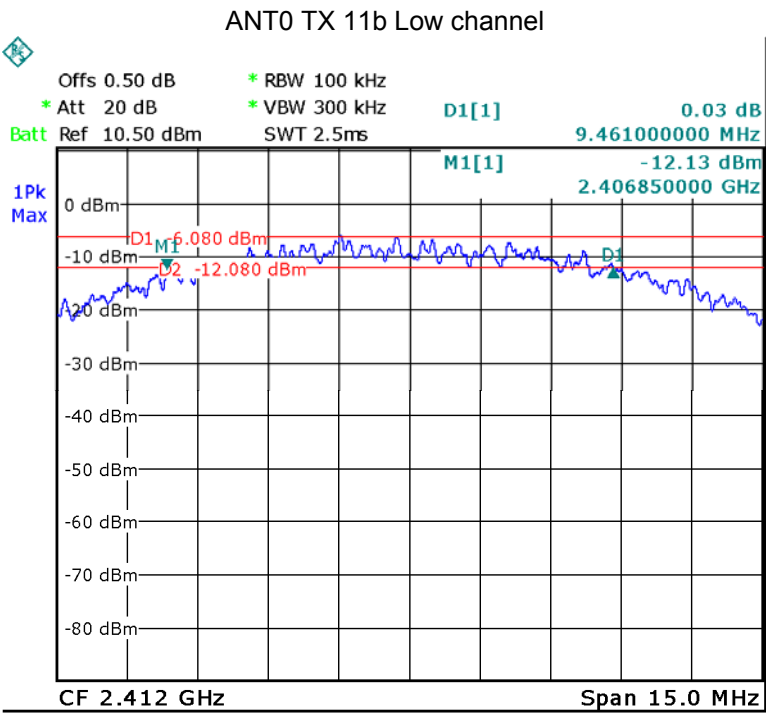
KDB558074 D01 DTS Meas Guidance V04

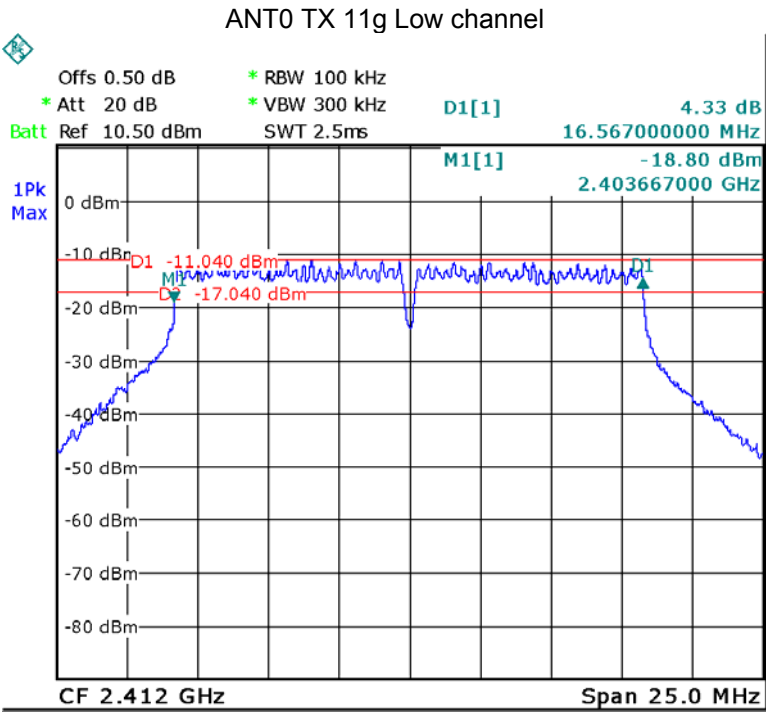
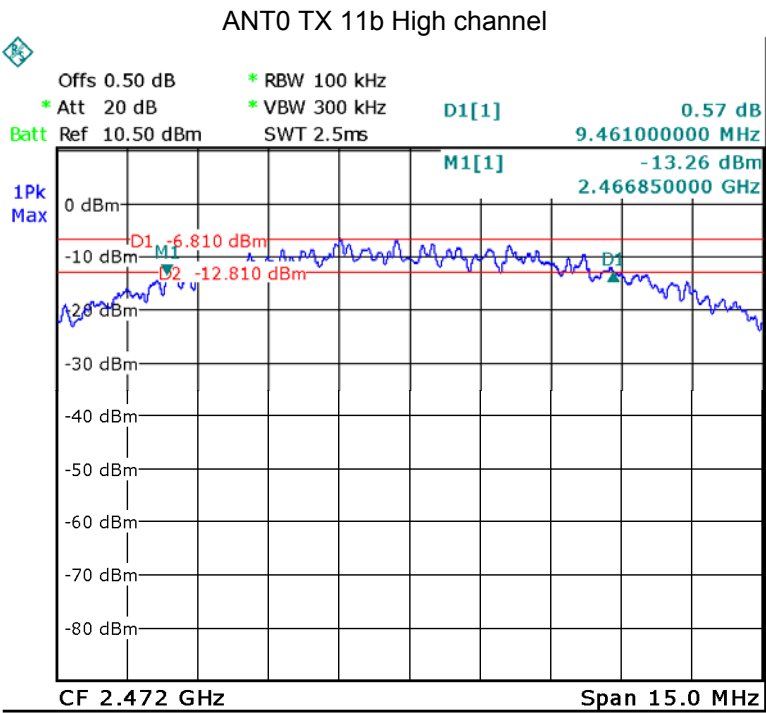
9.1 Test Procedure:

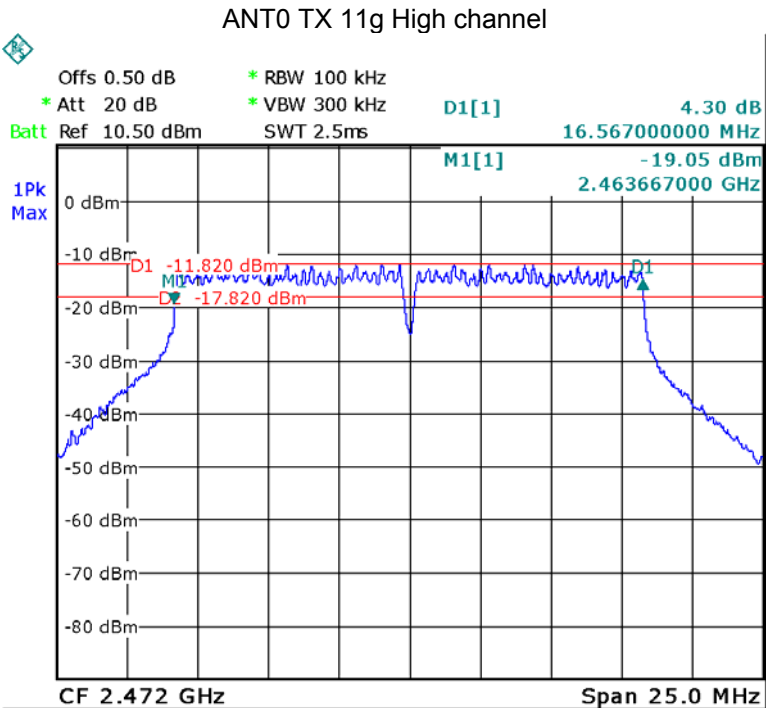
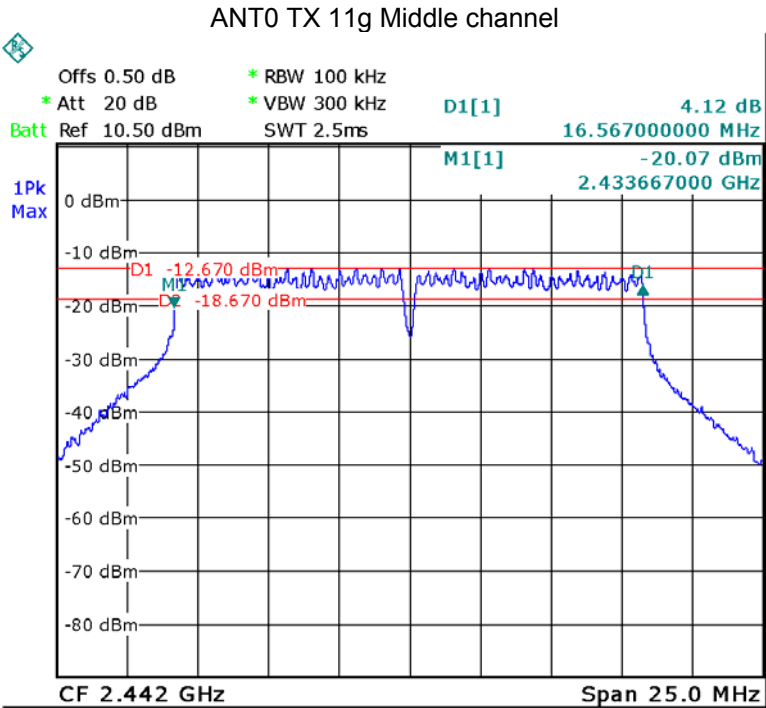
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

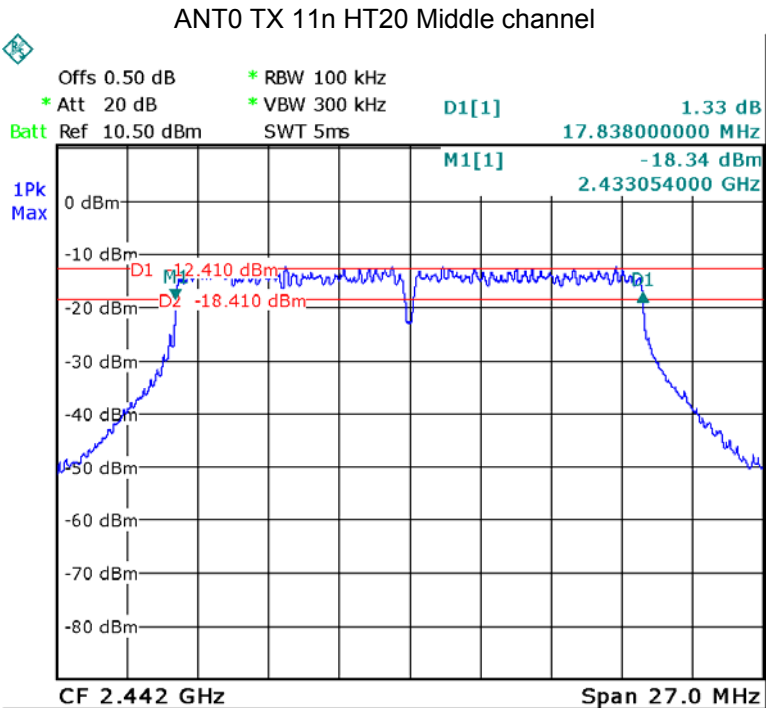
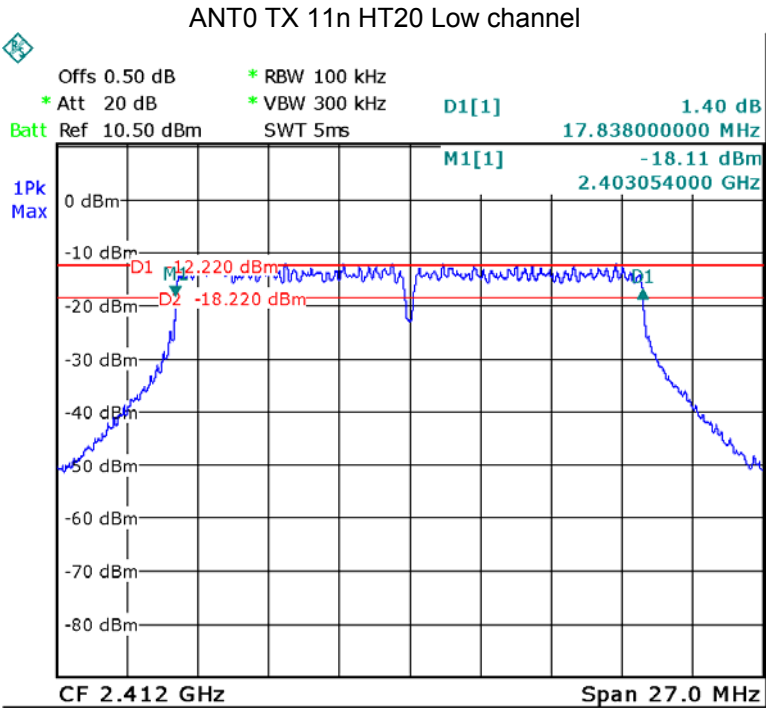
9.2 Test Result:

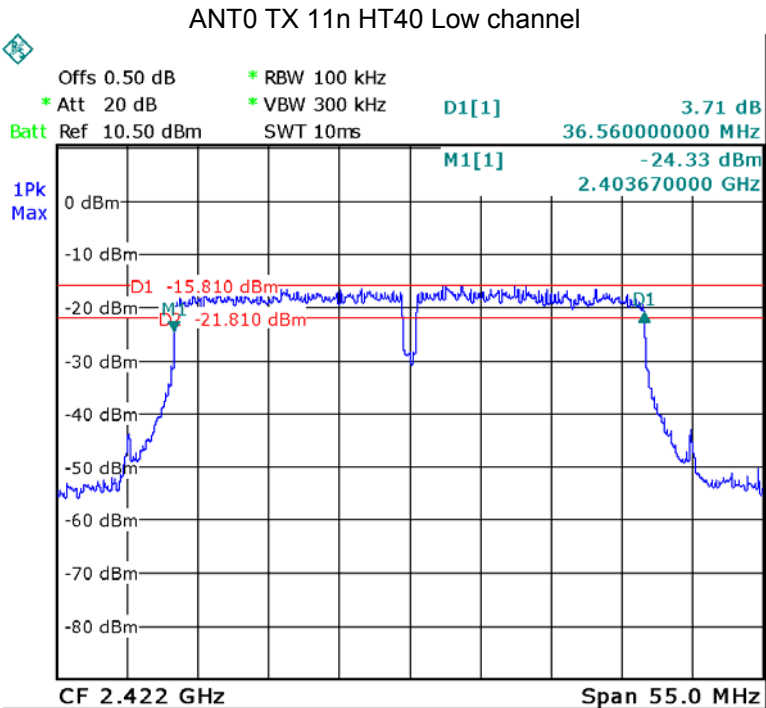
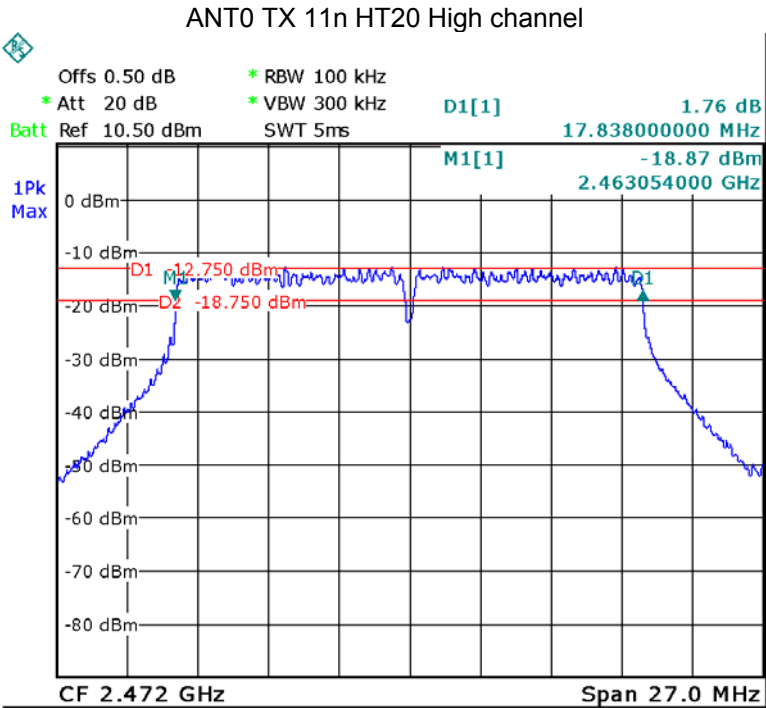
ANT	Operation mode	Bandwidth (MHz)		
		Low	Middle	High
ANT0	11b	9.461	9.461	9.461
	11g	16.567	16.567	16.567
	11n HT20	17.838	17.838	17.838
	11n HT40	36.560	36.560	36.560
ANT1	11b	9.461	9.461	9.461
	11g	16.567	16.567	16.567
	11n HT20	17.838	17.838	17.838
	11n HT40	36.560	36.560	36.560

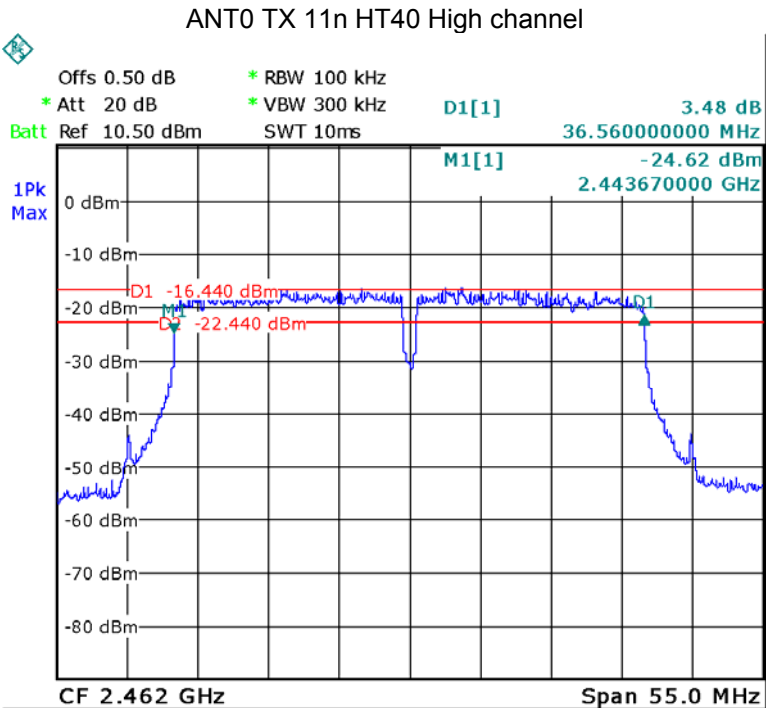
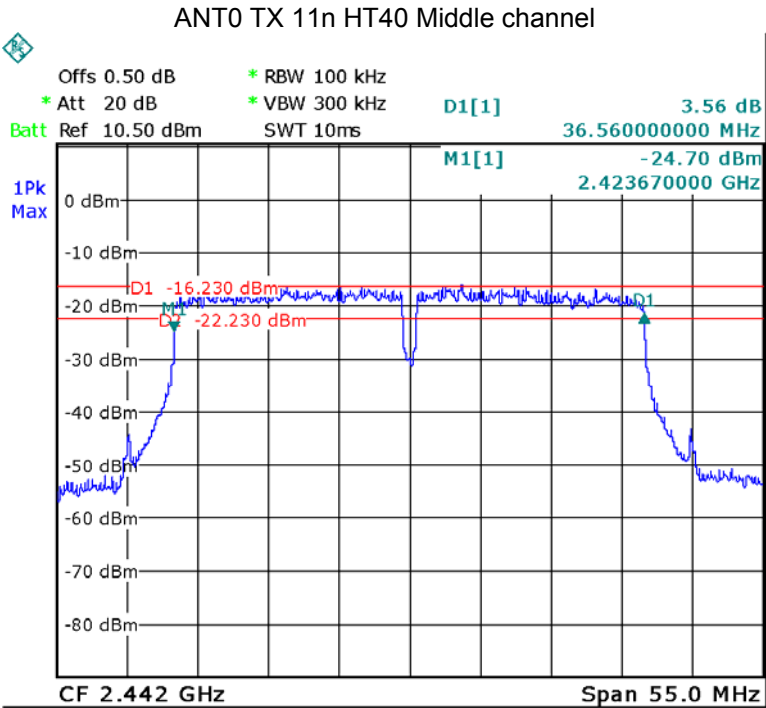


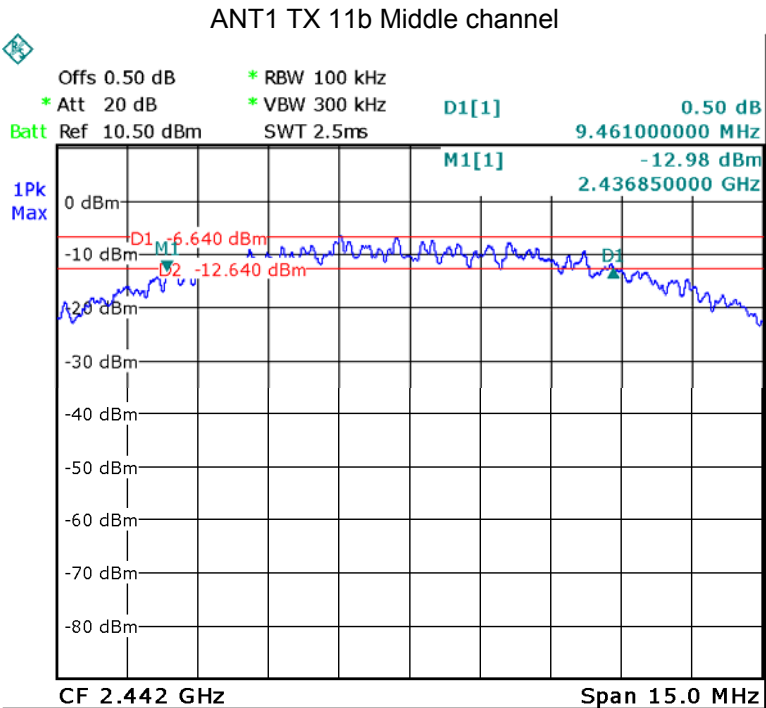
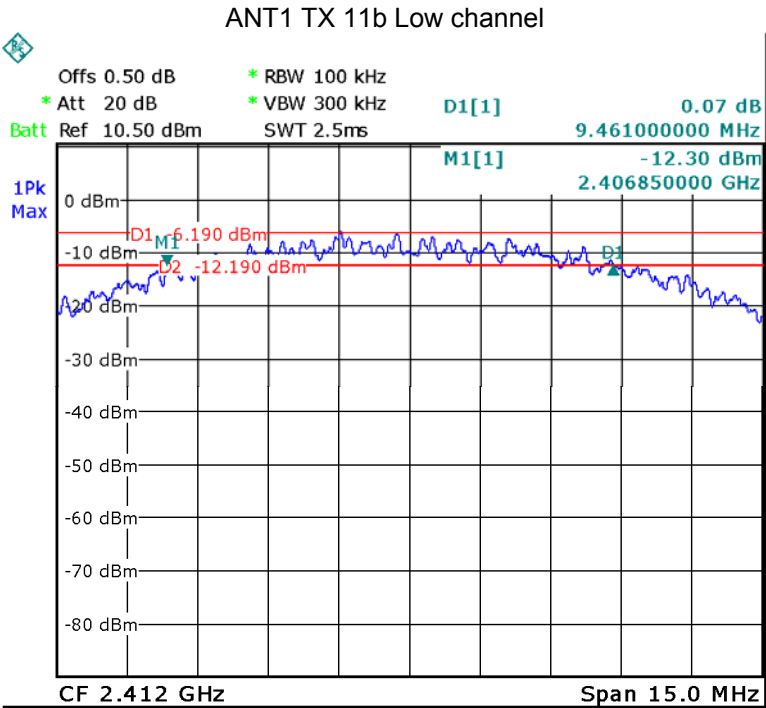




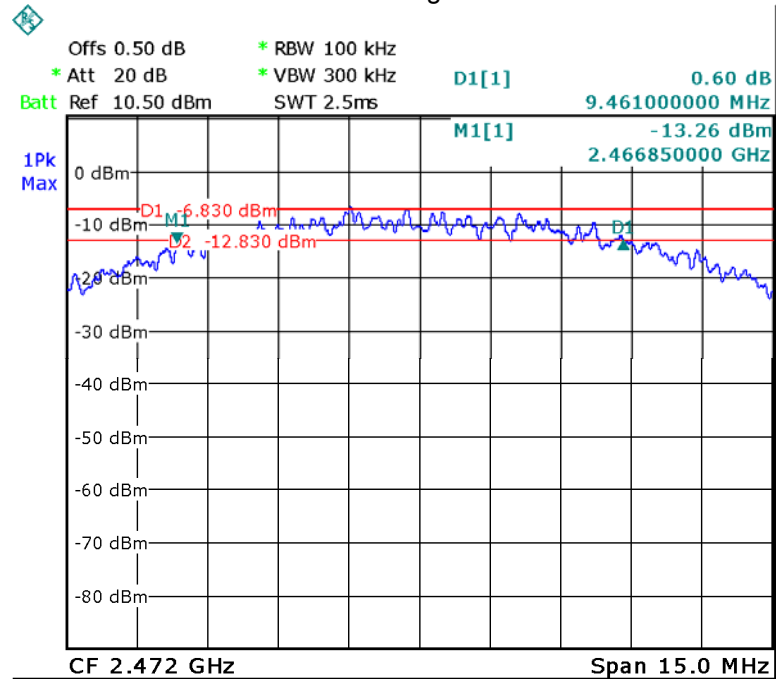


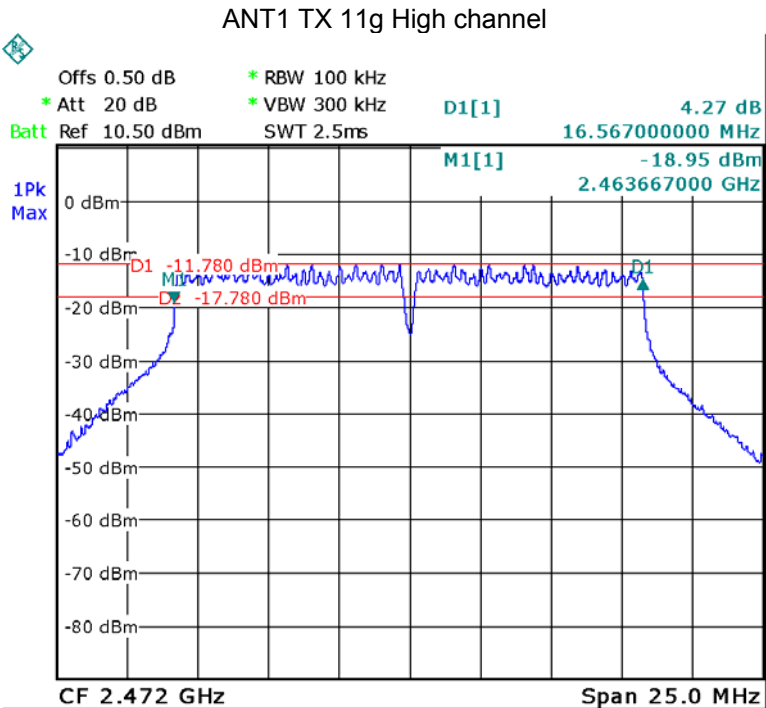
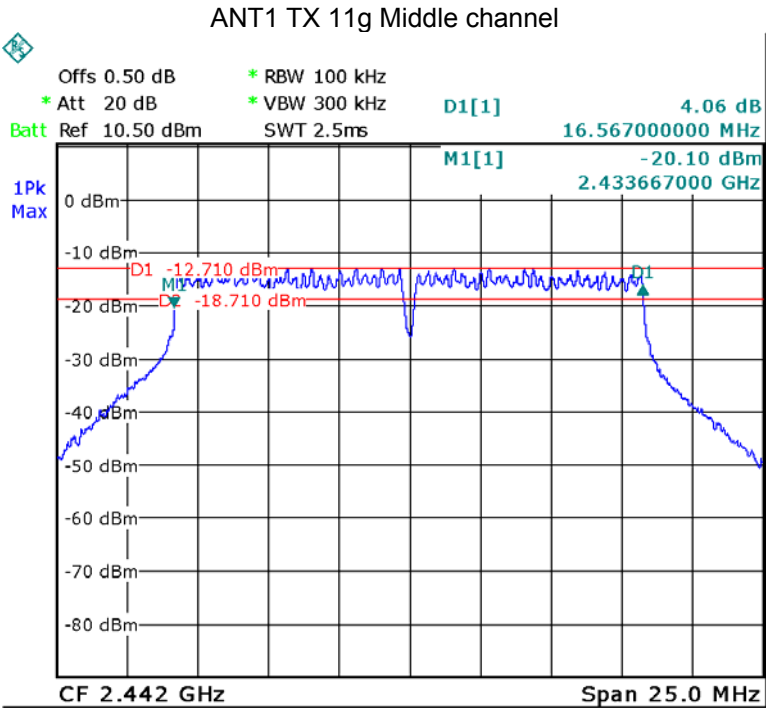


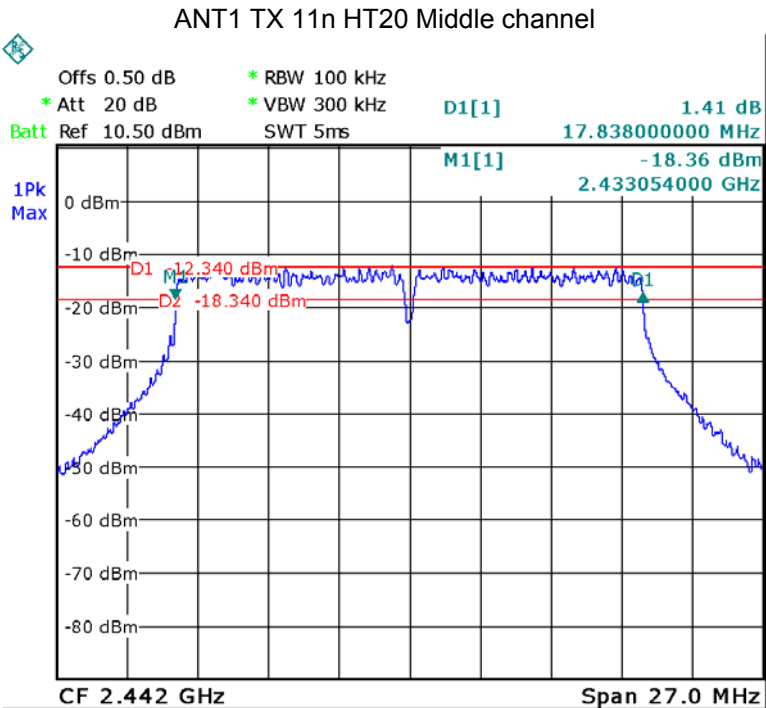
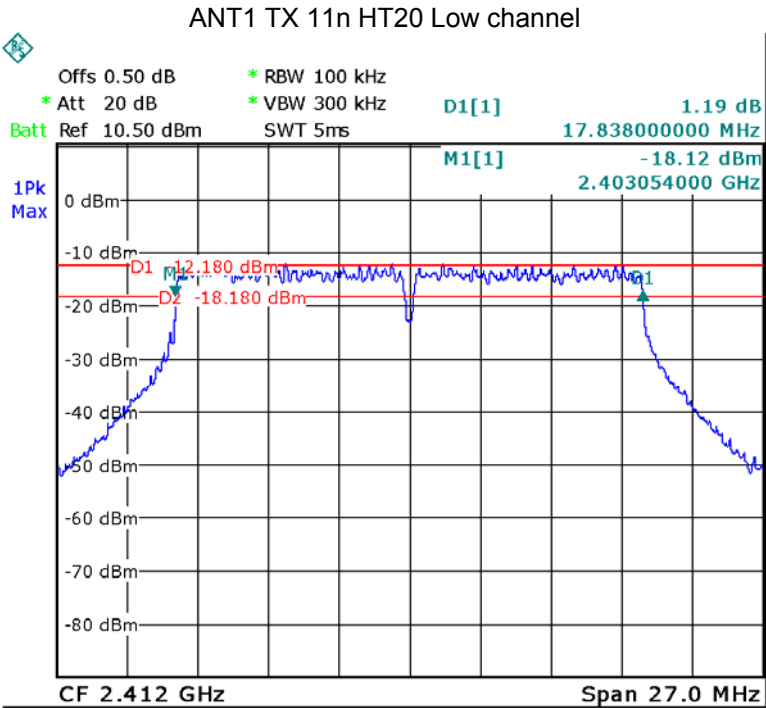


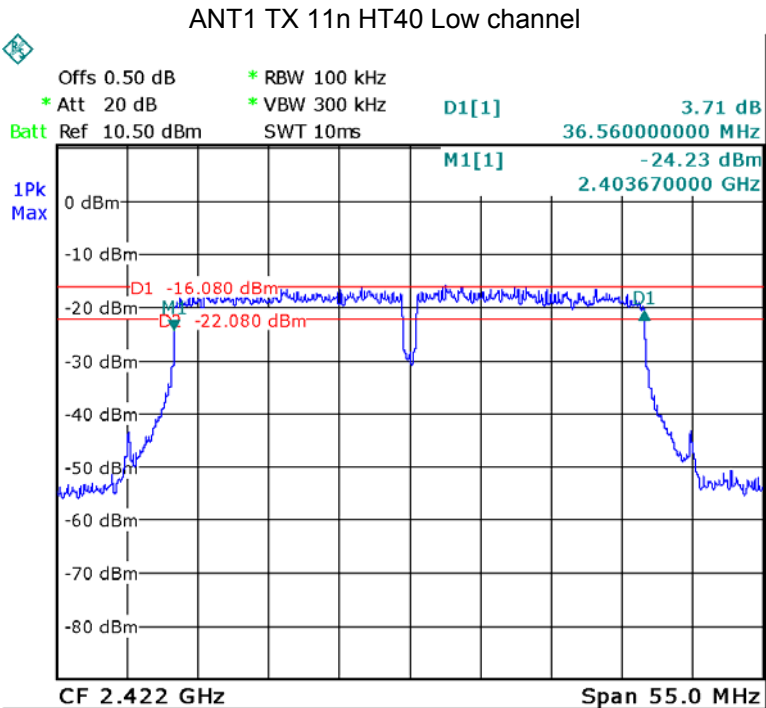
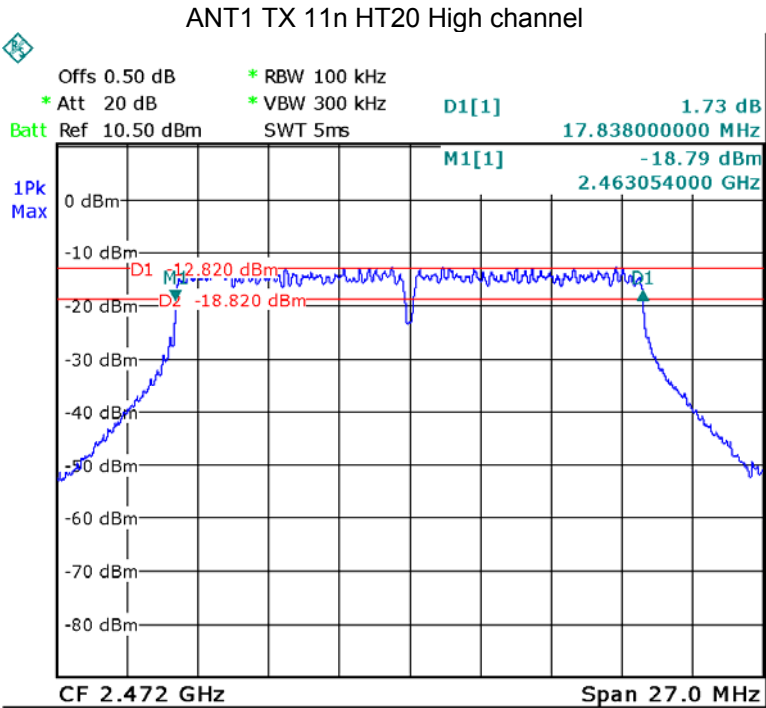


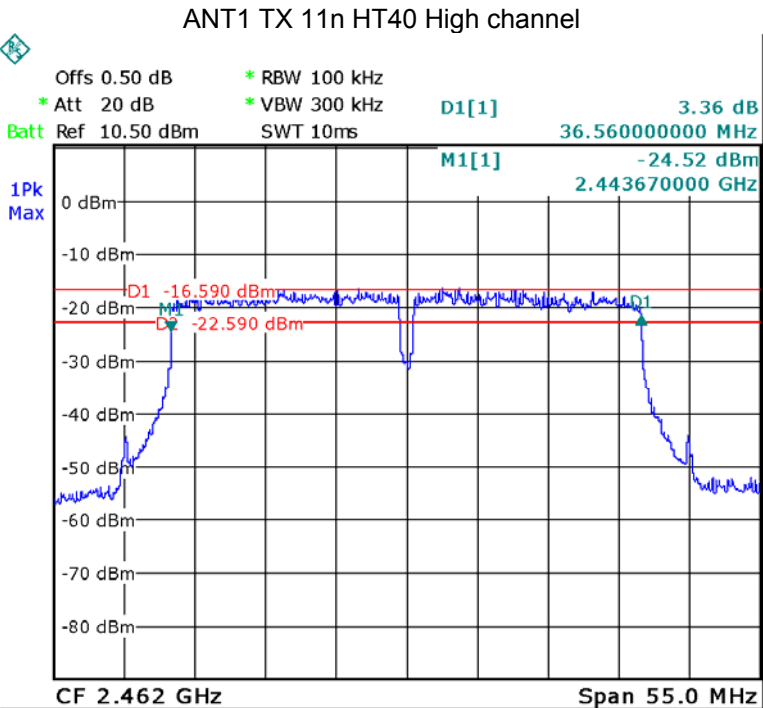
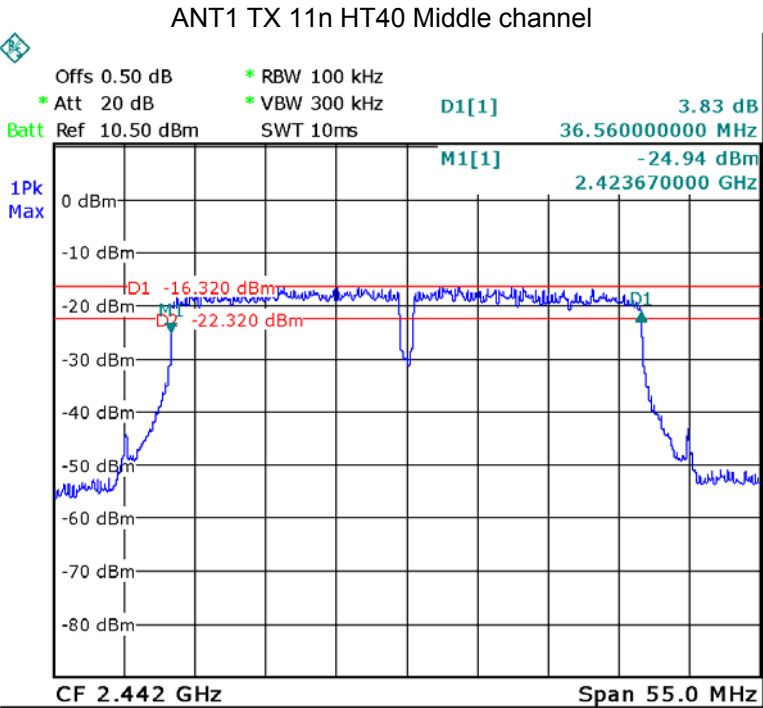
ANT1 TX 11b High channel











10 Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

KDB558074 D01 DTS Meas Guidance V04

10.1 Test Procedure:

KDB558074 D01 DTS Meas Guidance V04 section 9.1.2

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

10.2 Test Result:

Operation mode	ANT	Maximum Peak Output Power (dBm)		
		Low	Middle	High
11b	ANT0	8.79	8.56	8.37
	ANT1	8.96	8.56	8.57
11g	ANT0	9.73	8.21	9.07
	ANT1	9.80	8.20	9.12
11n HT20	ANT0	9.65	9.39	9.43
	ANT1	9.49	9.27	8.86
	ANT0+ANT1	12.58	12.34	12.16
11n HT40	ANT0	9.18	8.83	8.66
	ANT1	8.81	8.57	8.33
	ANT0+ANT1	12.01	11.71	11.51
Limit				
1W/30dBm				

11 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB558074 D01 DTS Meas Guidance V04

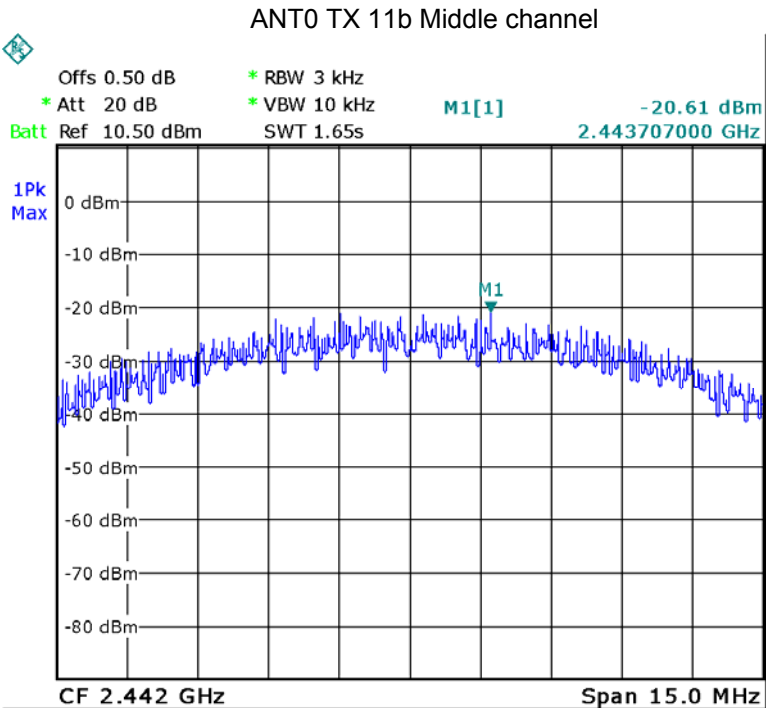
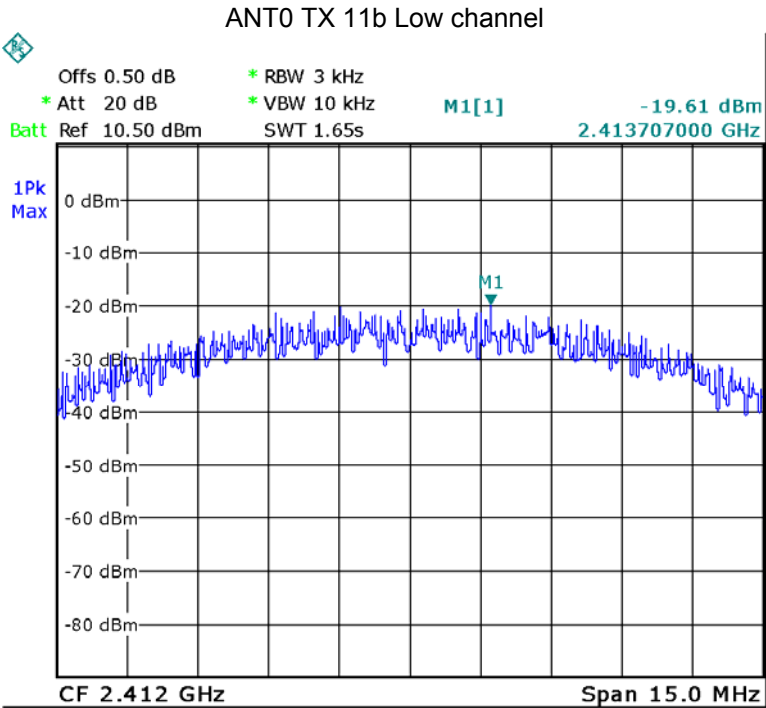
11.1 Test Procedure:

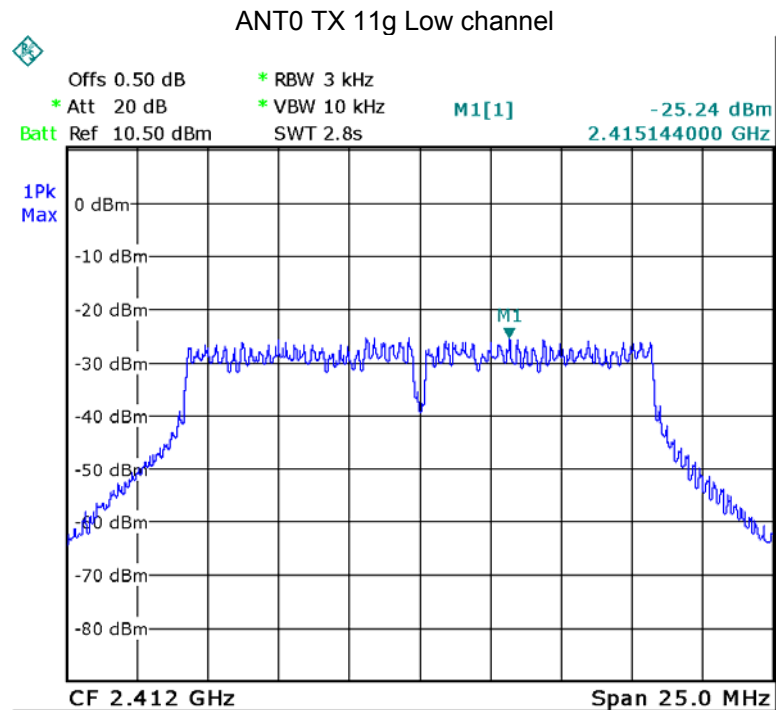
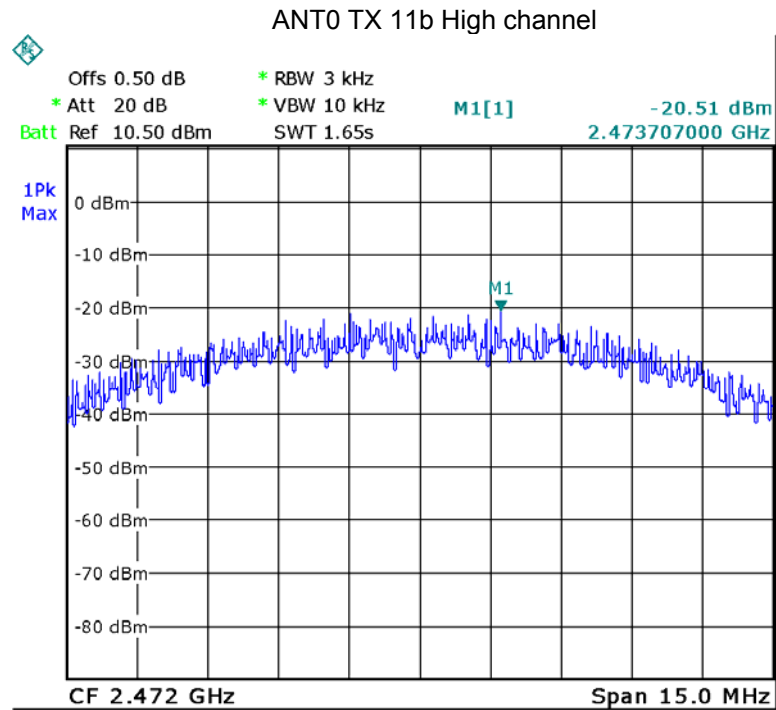
KDB558074 D01 DTS Meas Guidance V04 section 10.2

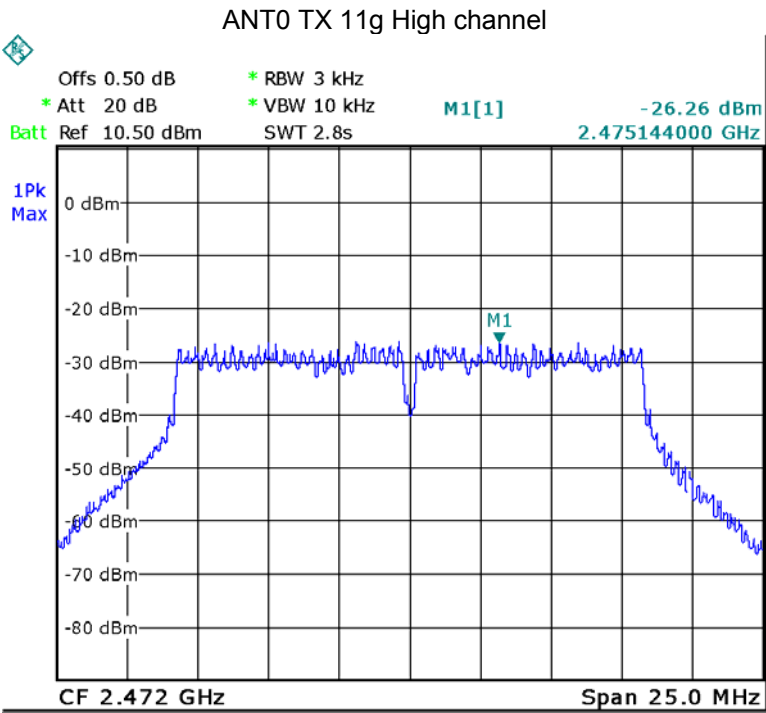
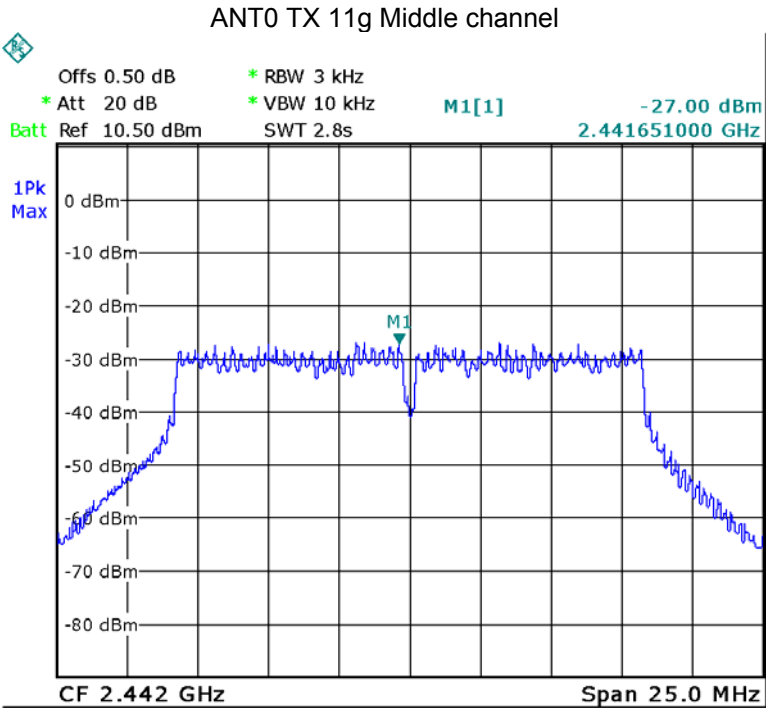
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section
Submit this plot.

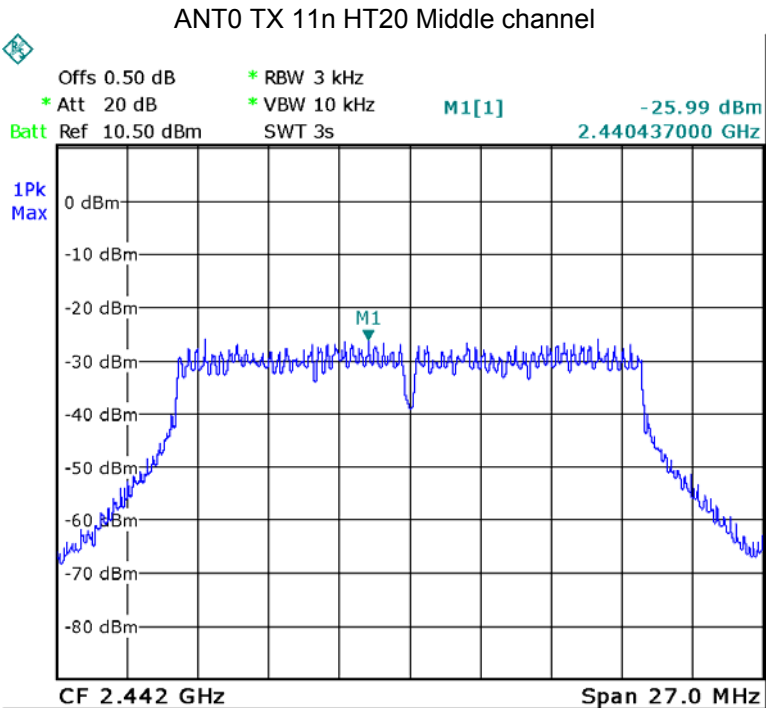
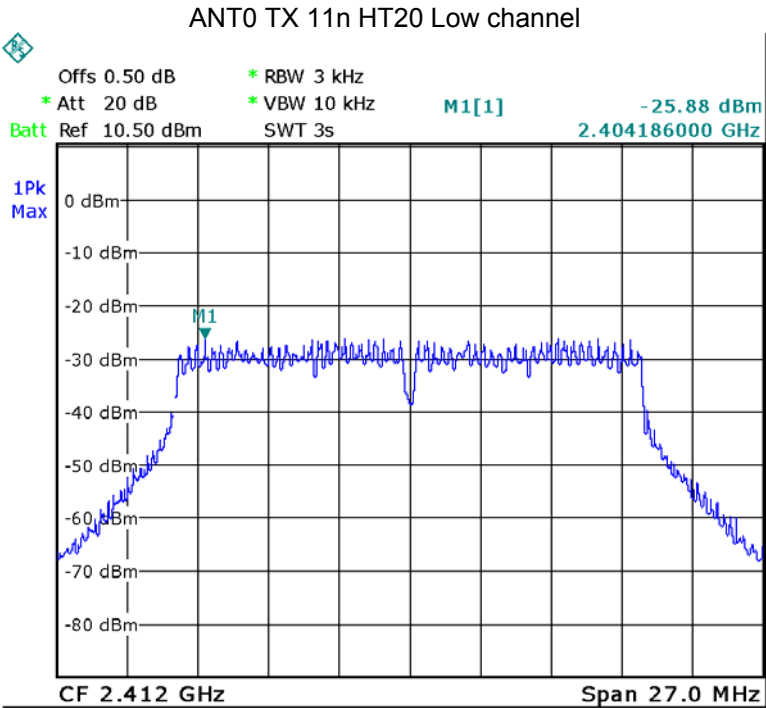
11.2 Test Result:

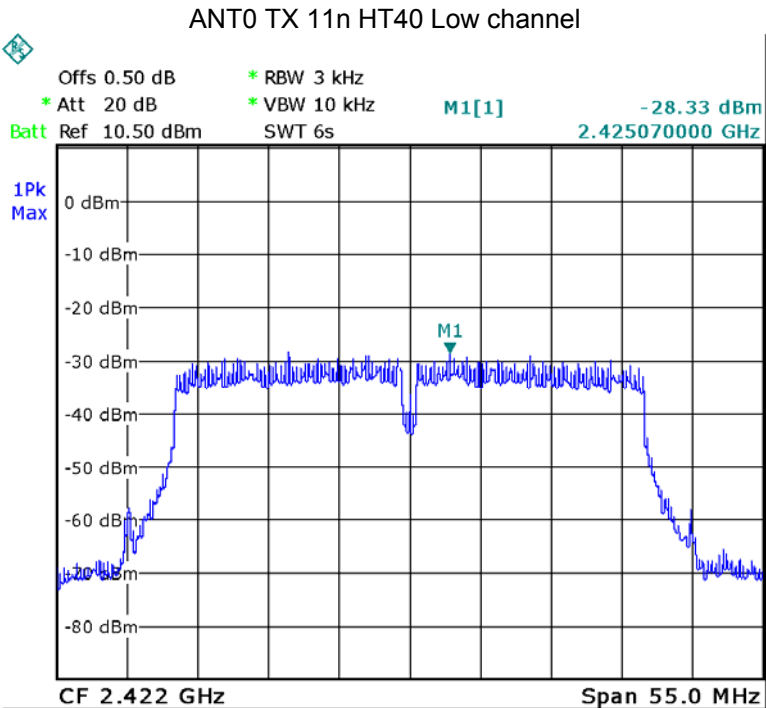
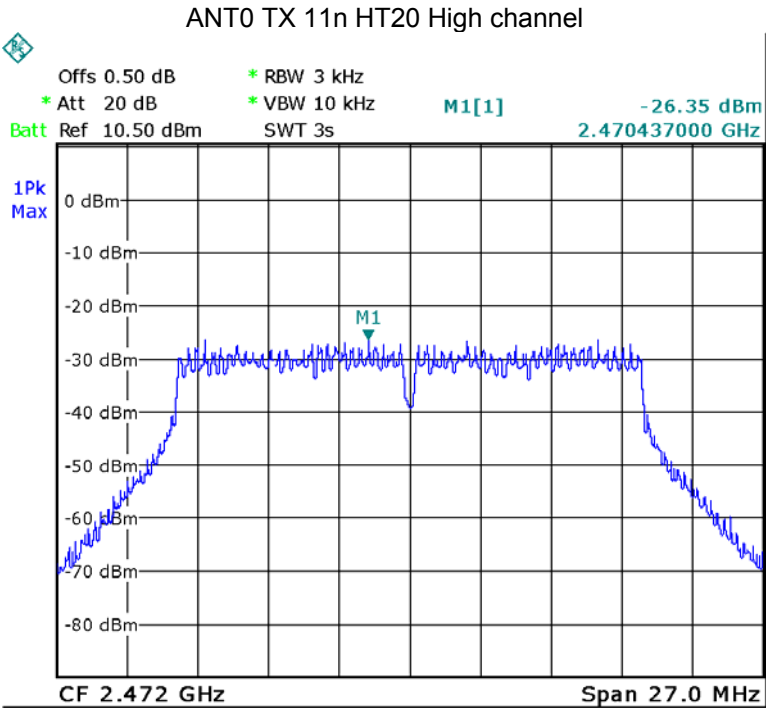
Operation mode	ANT	Maximum Peak Output Power (dBm per 3kHz)		
		Low	Middle	High
11b	ANT0	-19.61	-20.61	-20.51
	ANT1	-19.63	-20.64	-20.55
11g	ANT0	-25.24	-27.00	-26.26
	ANT1	-25.30	-26.91	-26.05
11n HT20	ANT0	-25.88	-25.99	-26.35
	ANT1	-25.73	-26.17	-26.35
	ANT0+ANT1	-22.79	-23.07	-23.34
11n HT40	ANT0	-28.33	-29.52	-29.33
	ANT1	-28.65	-29.85	-29.38
	ANT0+ANT1	-25.48	-26.67	-26.34
Limit				
8dBm per 3kHz				

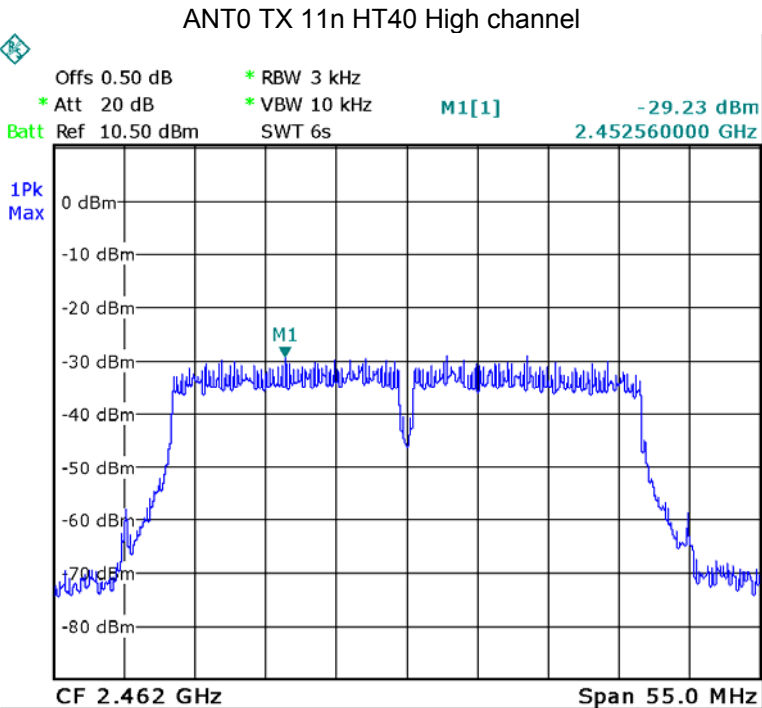
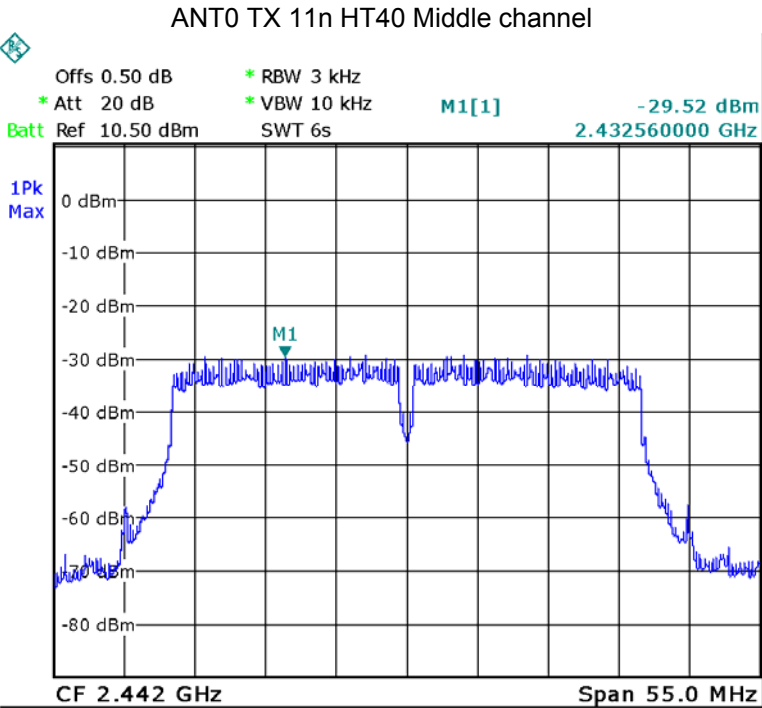


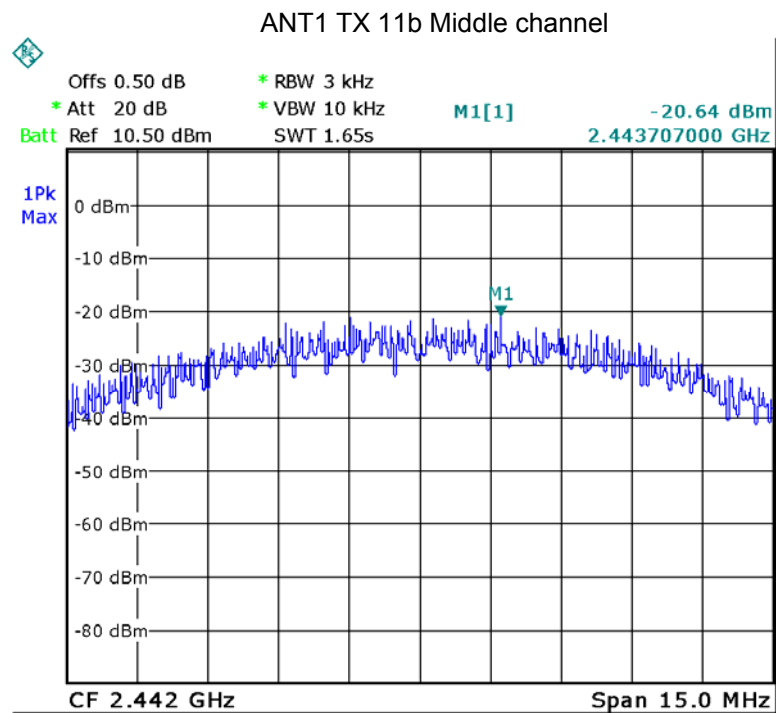
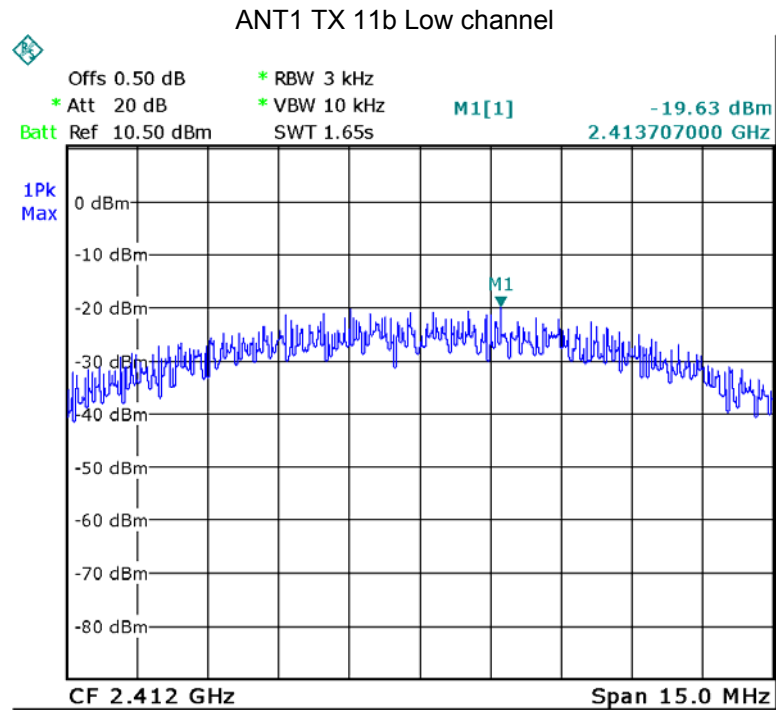


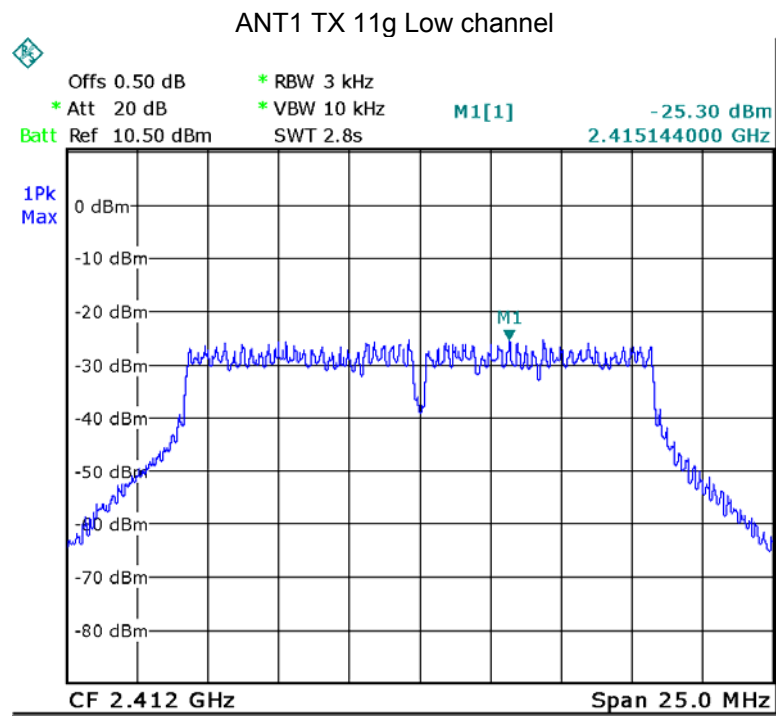
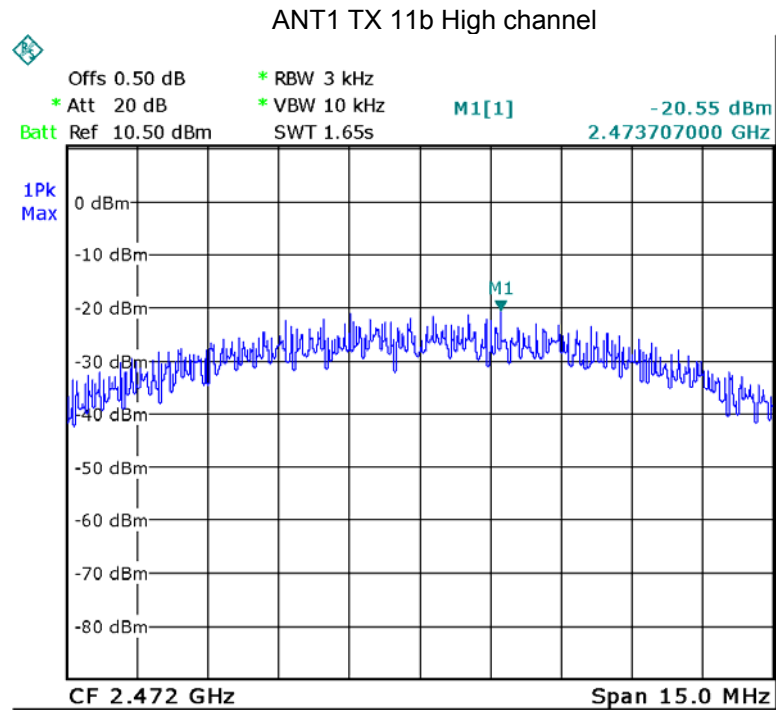


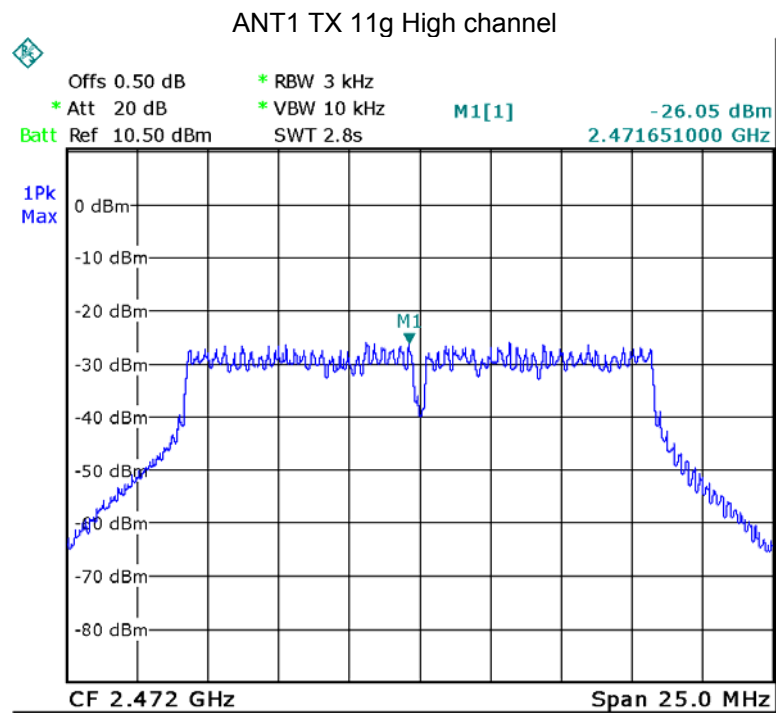
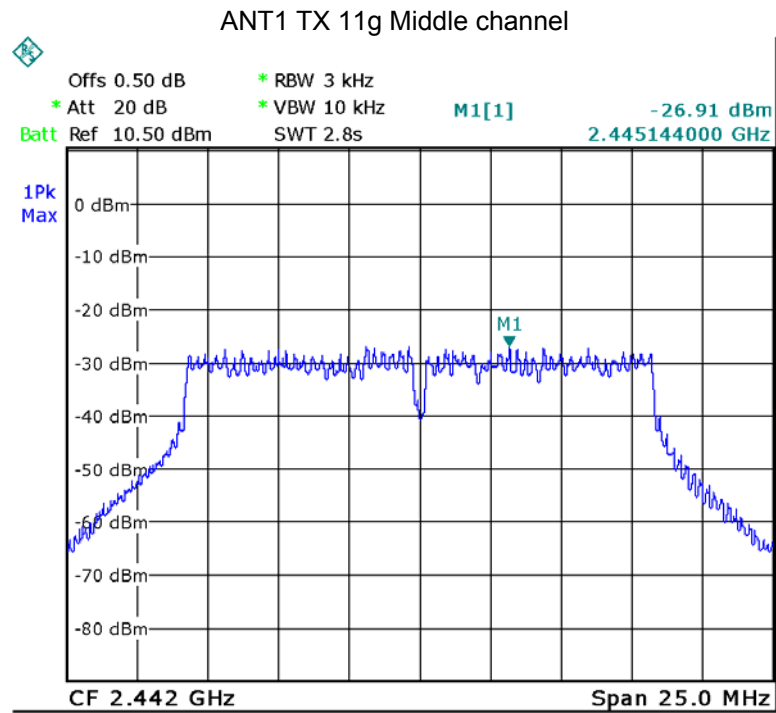


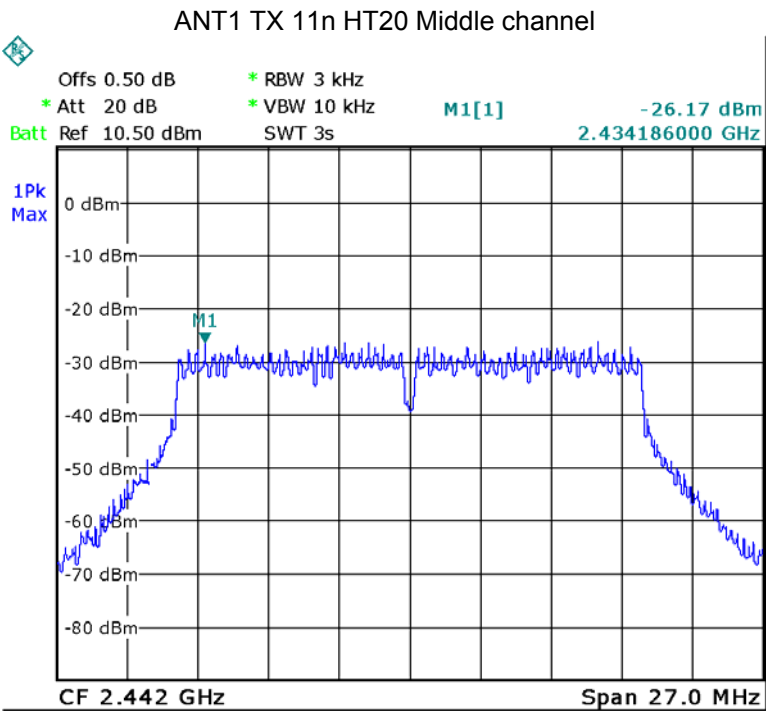
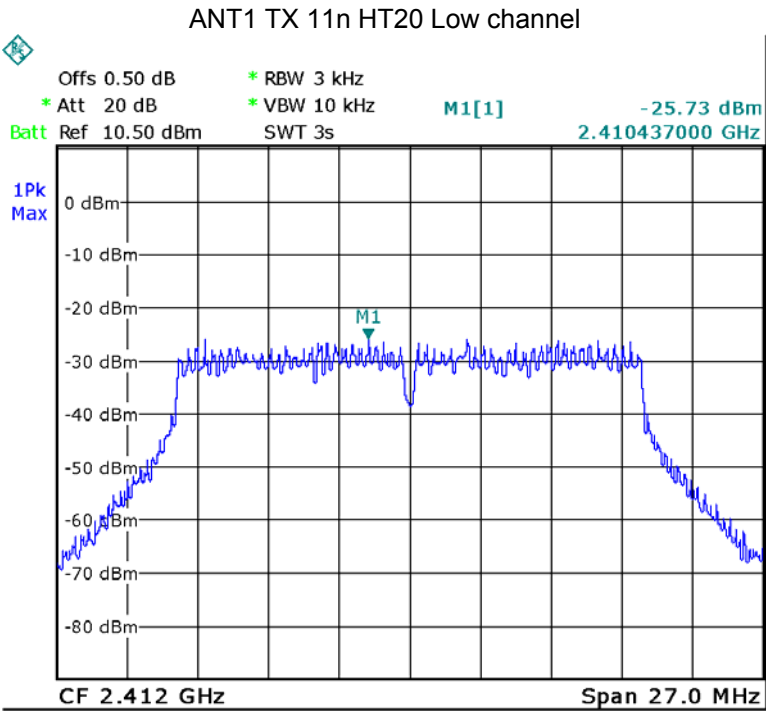


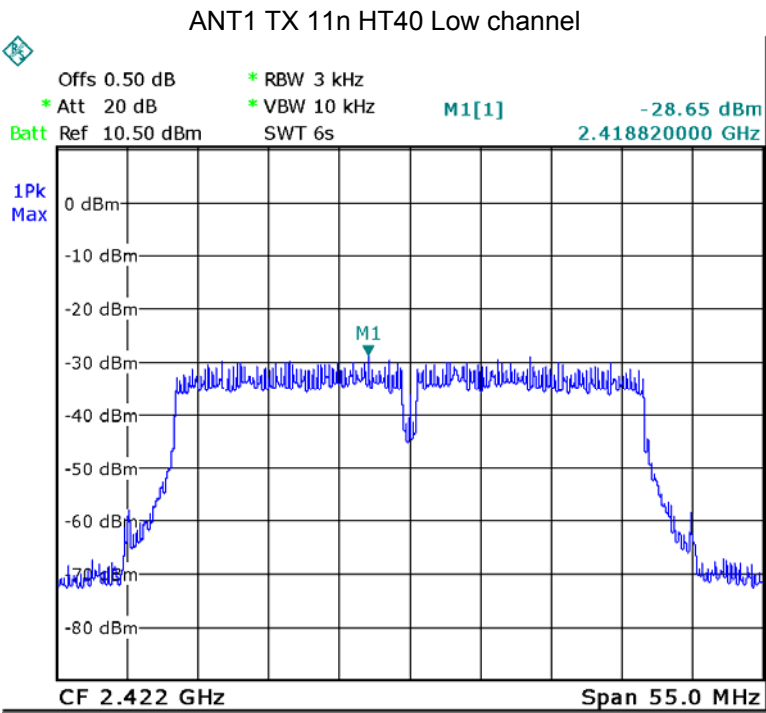
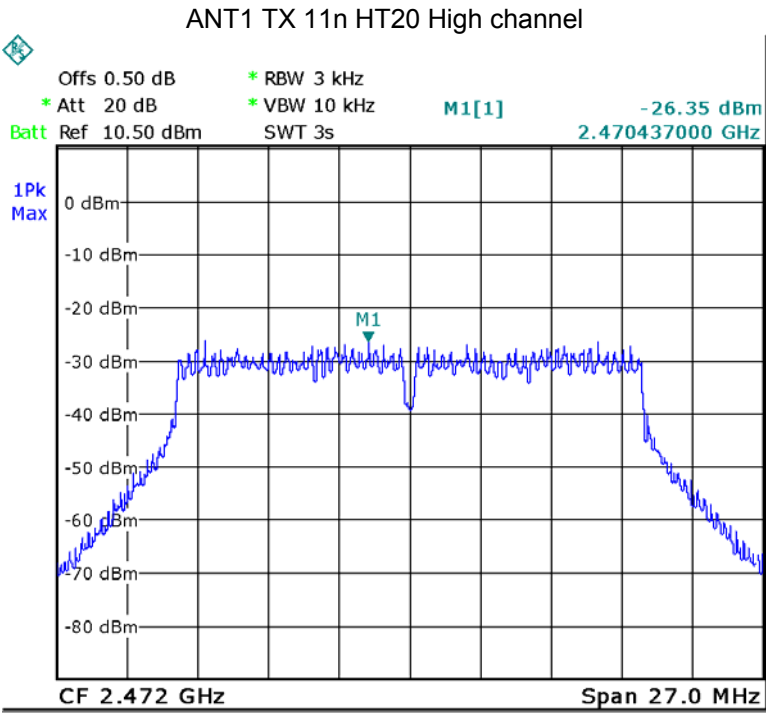


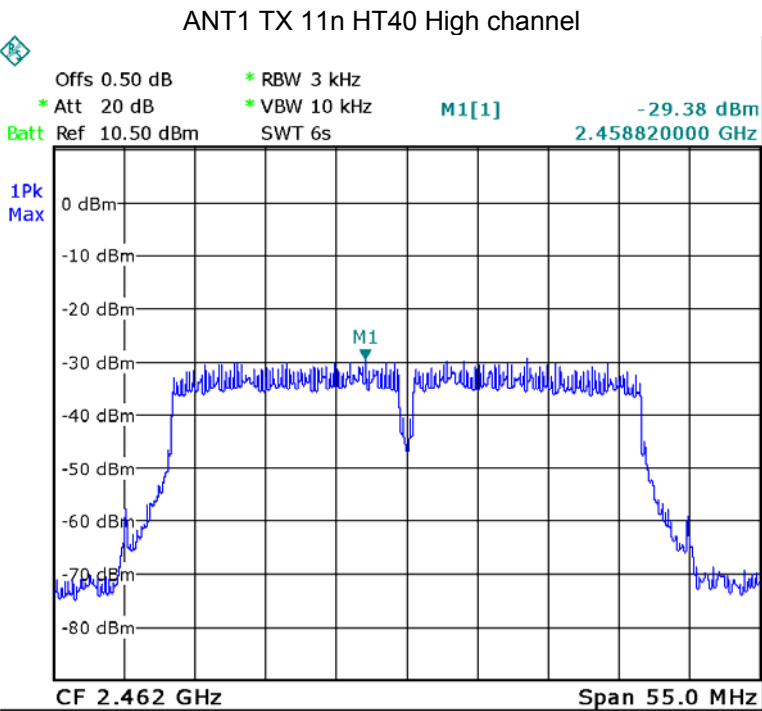
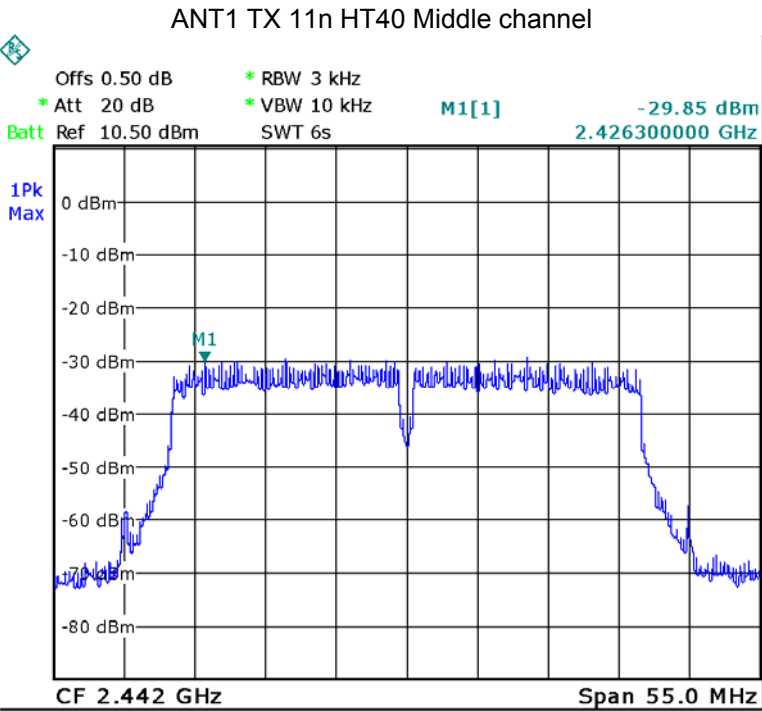






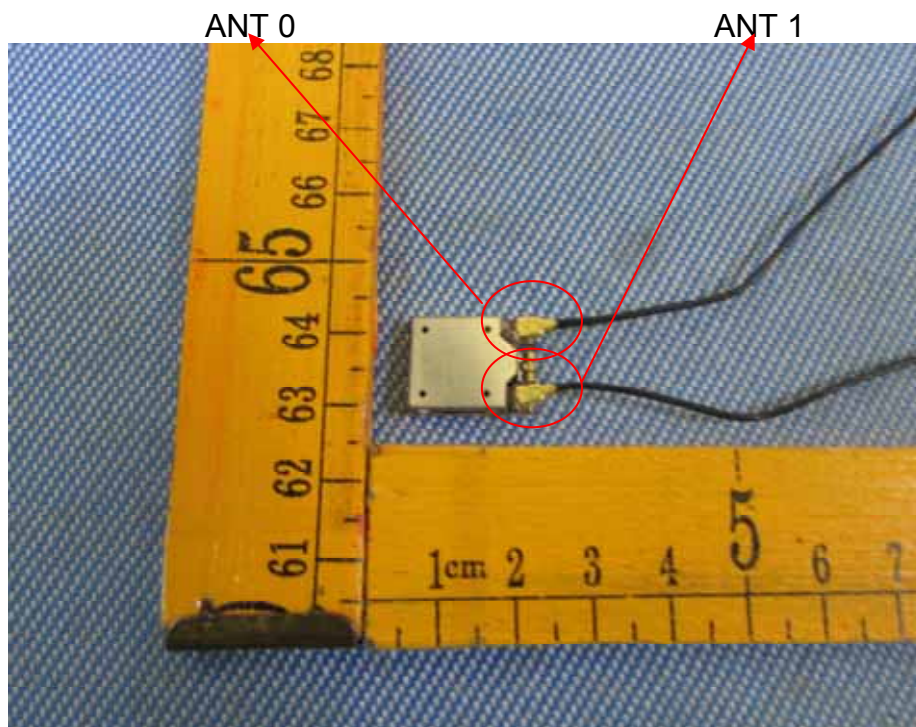






12 Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has an Embedded Antenna fulfill the requirement of this section.



13 RF Exposure

Test Requirement: FCC Part 1.1307

Evaluation Method: FCC Part 2.1091

13.1 Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

13.2 The procedures / limit

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

13.3 MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
3.00	1.995	12.58	18.11	0.007190	1

14 Photographs – Model E4SFC5017 Test Setup

14.1 Conducted Emission

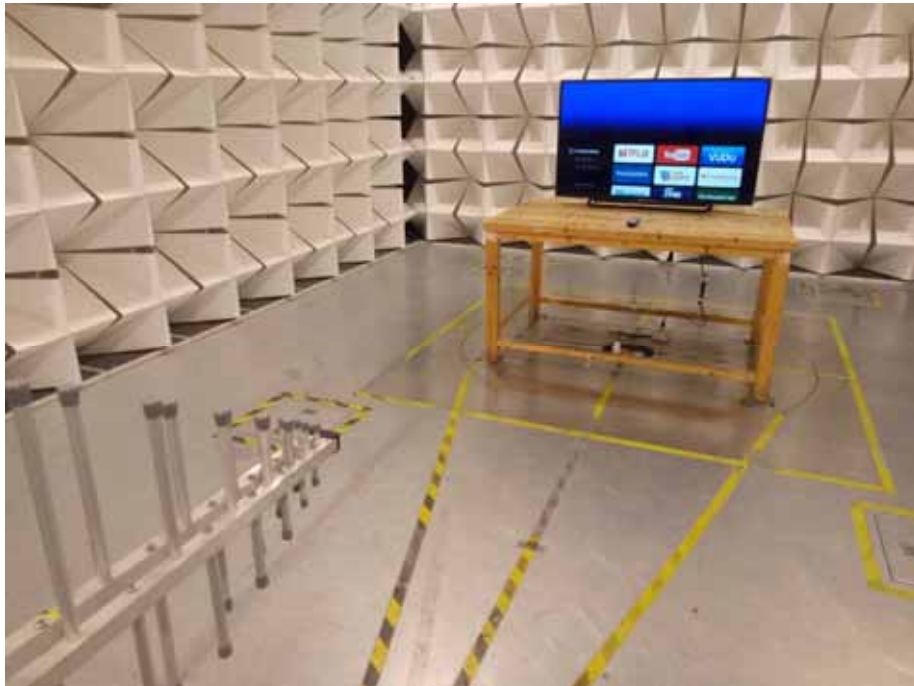


14.2 Radiated Emission

Test frequency below 30MHz



Test frequency from 30MHz to 1GHz



Test frequency above 1GHz



15 Photographs - Constructional Details

15.1 Model E4SFC5017 – External View



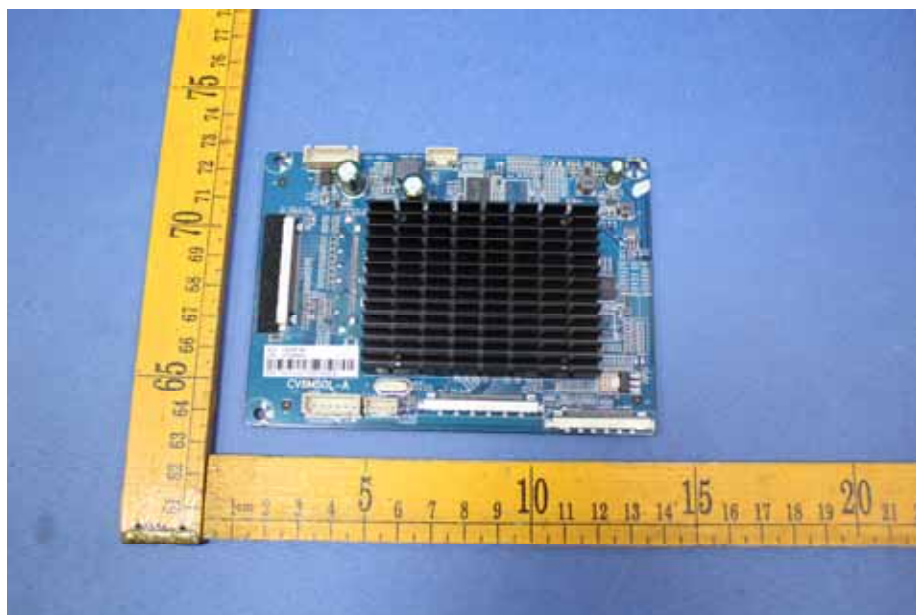




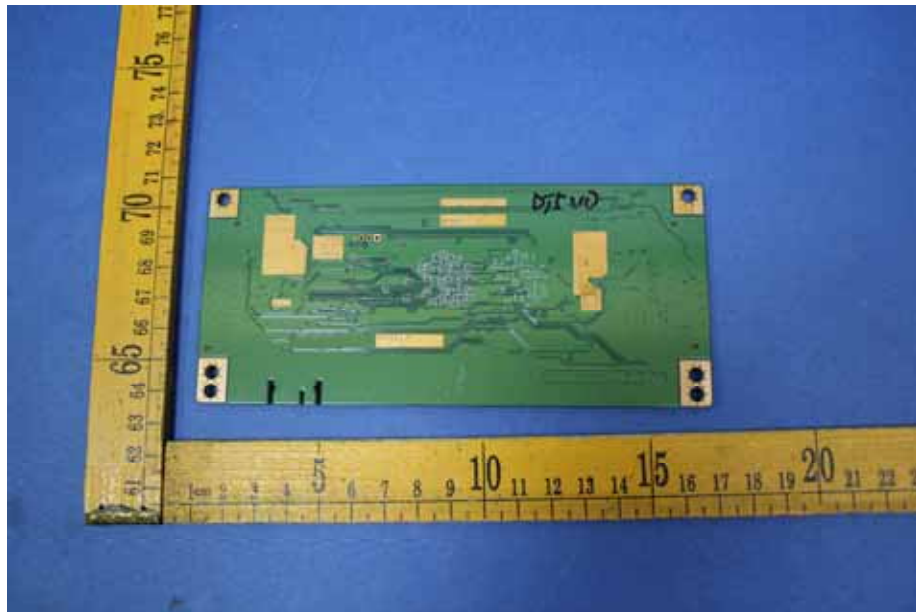


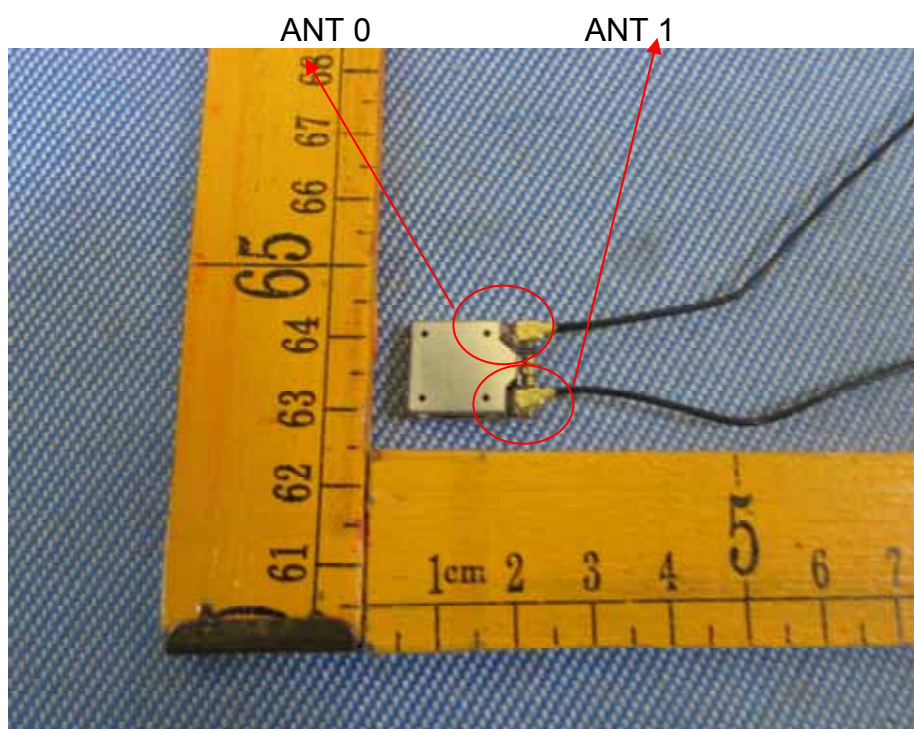
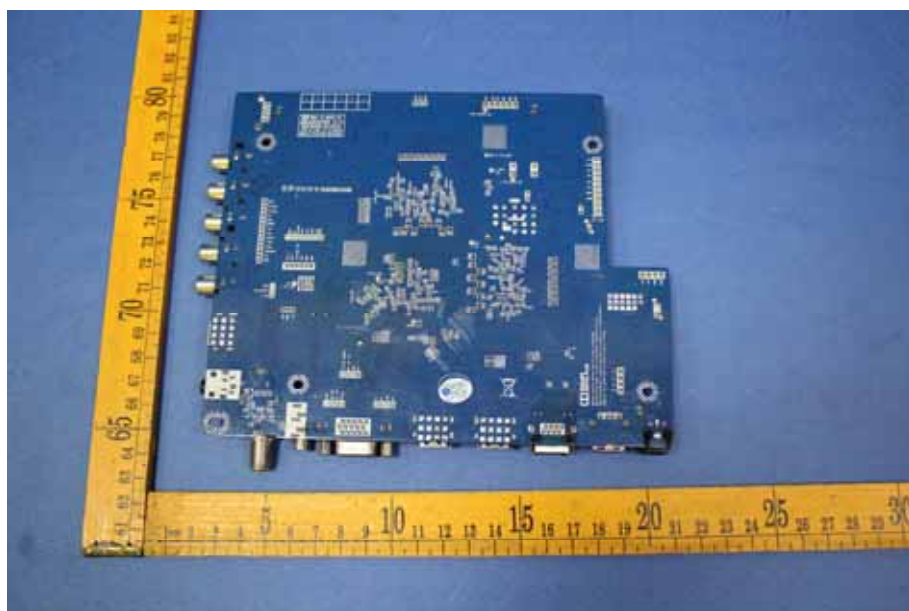
15.2 Model E4SFC5017– Internal View

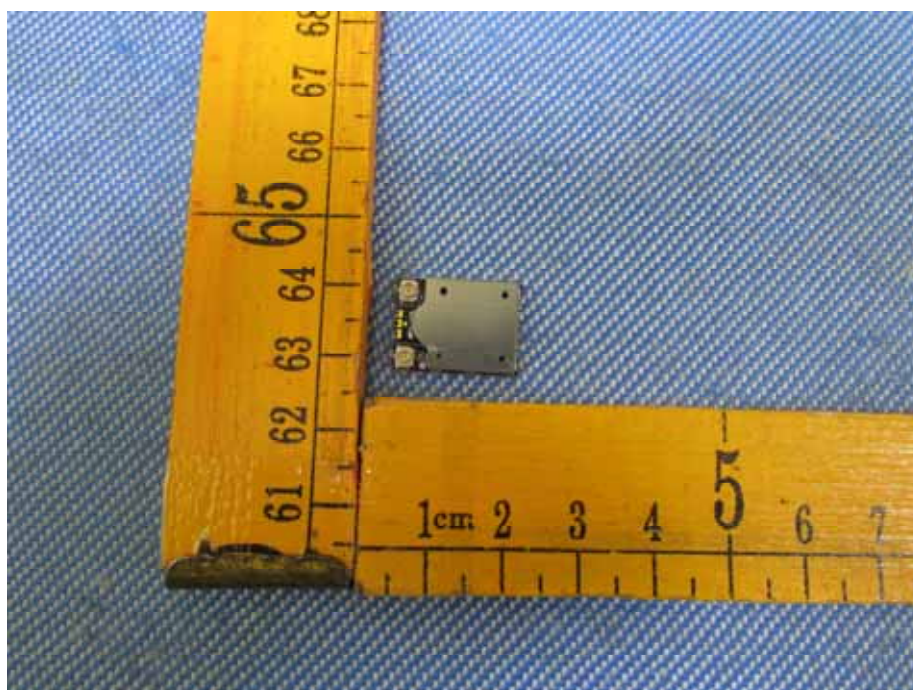
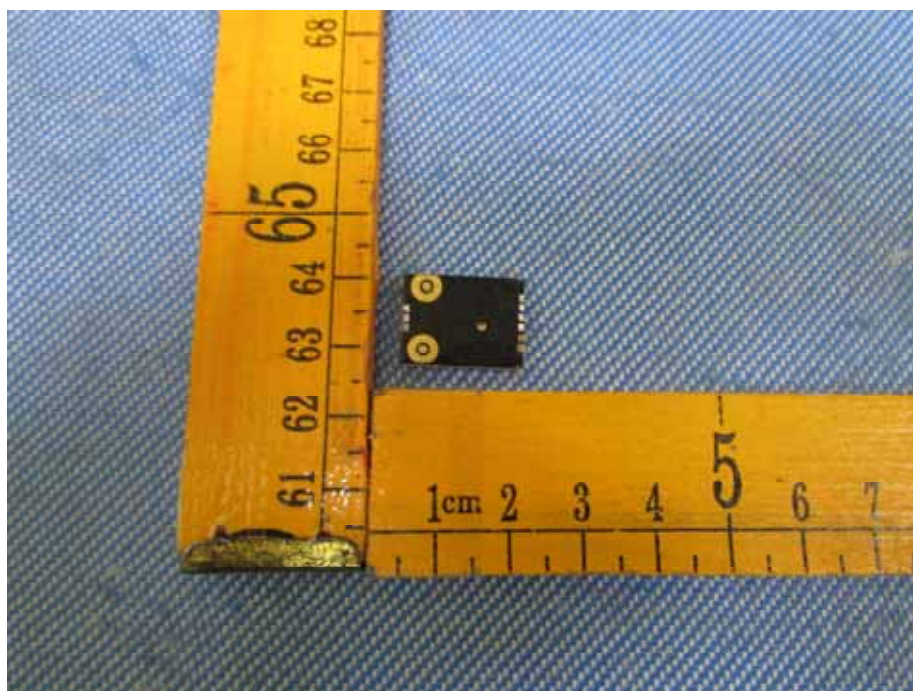


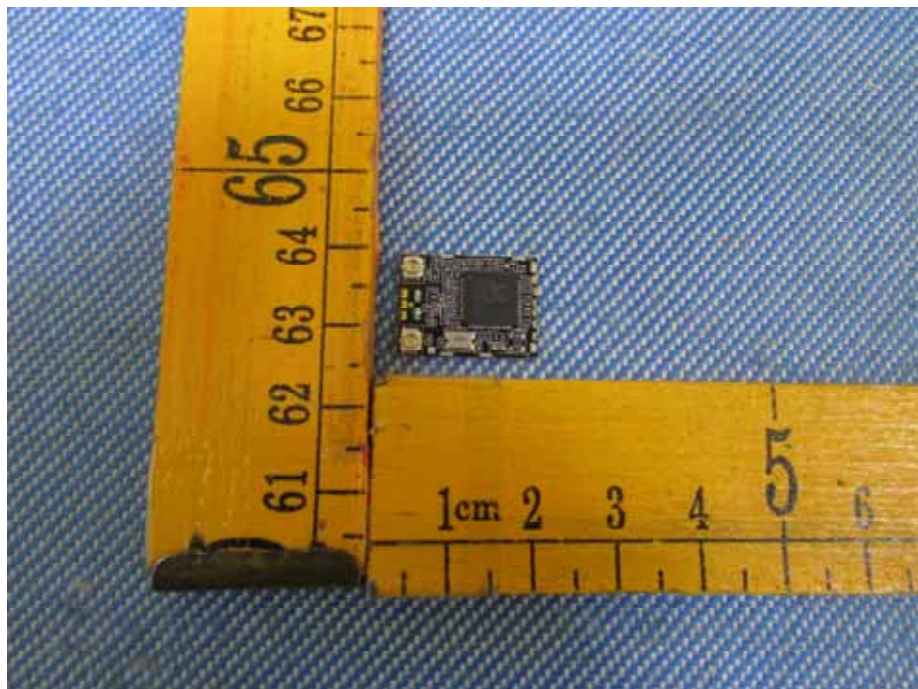
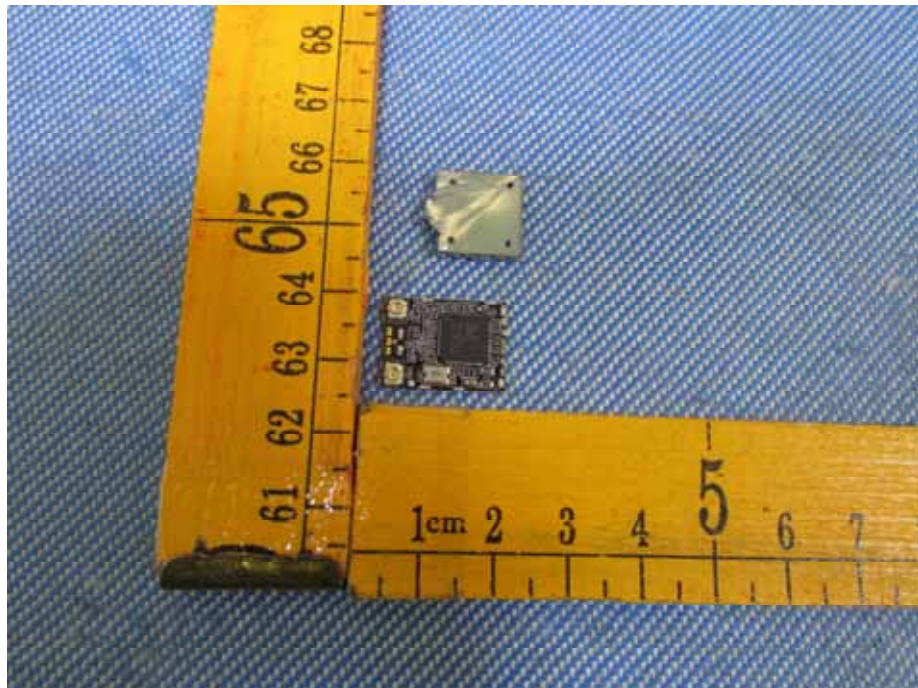












=====End of Report=====