



FCC RF Test Report

For

Ring LLC

Test Standards:	<u>Part 15C Subpart C §15.247</u>
Product Description:	<u>Transformer</u>
Tested Model:	<u>5AT1S9</u>
Additional Model No.:	<u>N/A</u>
Brand Name:	<u>Ring</u>
FCC ID:	2AEUPBHALV002
ISED:	20271-BHALV002
Classification	(DTS) Digital Transmission System
Report No.:	<u>EC1903011F02</u>
Tested Date:	<u>2019-03-06 to 2019-03-12</u>
Issued Date:	<u>2019-03-12</u>
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Note: The test results in this report apply exclusively to the tested model / sample. Without written approval of Hunan Ecloud Testing Technology Co., Ltd., the test report shall not be reproduced except in full.

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	2019.03.12	Valid	Original Report

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Summary of Test RESULT

FCC Rule	IC Rule	Description	Limit	Result	Remark
15.247(a)(2)	RSS-247 5.2(1)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
-	RSS-Gen 6.6	99% Bandwidth	-	Pass	-
15.247(b)(1)	RSS-247 A5.4(4)	Peak Output Power	$\leq 30\text{dBm}$	Pass	-
15.247(e)	RSS-247 5.2(2)	Power Spectral Density	$\leq 8\text{dBm}/3\text{kHz}$	Pass	-
15.247(d)	RSS-247 5.5	Conducted Band Edges and Spurious Emission	$\leq 20\text{dBc}$	Pass	-
15.247(d)	RSS-247 5.5	Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 2.51 dB at 3610 MHz
15.207	RSS-Gen 8.8	AC Conducted Emission	15.207(a)	Pass	Under limit 19.42 dB at 0.186 MHz
15.203 & 15.247(b)	N/A	Antenna Requirement	N/A	Pass	-

1. Test Laboratory

1.1 Test facility

CNAS (accreditation number: L11138)

Hunan Ecloud Testing Technology Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1244 , Test Firm Registration Number: 793308)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

ISED(CAB identifier: CN0012)

Hunan Ecloud Testing Technology Co., Ltd. has been listed on the Wireless Device Testing Laboratories list of innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements.

A2LA (Certificate Code: 4895.01)

Hunan Ecloud Testing Technology Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

2. General Description

2.1 Applicant

Ring LLC

1523 26th St, Santa Monica, CA 90404

2.2 Manufacturer

Guangdong Bestek Technology Co., Ltd

No.1, B Road, Longling industrial Zone, YuanCheng District, HeYuan City. China

2.3 General Description Of EUT

Product	Transformer
Model No.	5AT1S9
Additional No.	N/A
Difference Description	N/A
FCC ID	2AEUPBHALV002
IC ID	20271-BHALV002
Power Supply	120Vac
Modulation Technology	BLE / LoRa
Modulation Type	GFSK/ LoRa 500KHz DTS
Operating Frequency	2402MHz ~ 2480MHz - BLE 902.5MHz ~ 927.0MHz – DTS 903.0MHz~914.2MHz – DTS 923.3MHz~926.9MHz – DTS
Max. Output Power	12.847 dBm (19.26 mW)
Antenna Type	BLE: PCB Antenna type with -2.5dBi gain Lora: PCB Antenna type with -3.8dBi gain
I/O Ports	Refer to user's manual

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

2.4 Modification of EUT

No modifications are made to the EUT during all test items.

2.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.247
- ♦ ANSI C63.10-2013
- ♦ IC RSS-247 Issue 2
- ♦ IC RSS-Gen Issue 5
- ♦ FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05r01

Remark:

1. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, ICES-005 recorded in a separate test report.

3. Test Configuration of Equipment Under Test

3.1 Descriptions of Test Mode

The transmitter has a maximum peak conducted output power as follows:

Channel	Frequency	Lora RF Output Power
Mode 1 low	902.5MHz	12.847
Mode 1 middle	914.5MHz	11.887
Mode 1 high	926.5MHz	10.525
Channel	Frequency	Lora RF Output Power
Mode 2 low	903.0MHz	12.762
Mode 2 middle	912.6MHz	12.003
Mode 2 high	926.9MHz	10.457

- a. Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Channel list: Mode 1

Description	LoRa 500KHz DTS 902.5MHz~926.5MHz				
No. of Channel	31				
Channel 1	902.5	MHz	Channel 17	915.3	MHz
Channel 2	903.3	MHz	Channel 18	916.1	MHz
Channel 3	904.1	MHz	Channel 19	916.9	MHz
Channel 4	904.9	MHz	Channel 20	917.7	MHz
Channel 5	905.7	MHz	Channel 21	918.5	MHz
Channel 6	906.5	MHz	Channel 22	919.3	MHz
Channel 7	907.3	MHz	Channel 23	920.1	MHz
Channel 8	908.1	MHz	Channel 24	920.9	MHz
Channel 9	908.9	MHz	Channel 25	921.7	MHz
Channel 10	909.7	MHz	Channel 26	922.5	MHz
Channel 11	910.5	MHz	Channel 27	923.3	MHz
Channel 12	911.3	MHz	Channel 28	924.1	MHz
Channel 13	912.1	MHz	Channel 29	924.9	MHz
Channel 14	912.9	MHz	Channel 30	925.7	MHz
Channel 15	913.7	MHz	Channel 31	926.5	MHz
Channel 16	914.5	MHz			

Mode 2

Description	LoRa 500KHz DTS 903MHz~914.2MHz		Description	LoRa 500KHz DTS 923.3MHz~926.9MHz	
No. of Channel	14				
Channel 1	903	MHz	Channel 8	923.3	MHz
Channel 2	904.6	MHz	Channel 9	923.9	MHz
Channel 3	906.2	MHz	Channel 10	924.5	MHz
Channel 4	907.8	MHz	Channel 11	925.1	MHz
Channel 5	909.4	MHz	Channel 12	925.7	MHz
Channel 6	911	MHz	Channel 13	926.3	MHz
Channel 7	912.6	MHz	Channel 14	926.9	MHz

3.2 Test Mode

3.2.1 Antenna Port Conducted Measurement

Summary table of Test Cases		
Test Item	Data Rate / Modulation	
	Lora 500KHz DTS	
Conducted Test Cases	Mode 1	Low : 902.5 MHz Middle: 914.5 MHz High : 926.5 MHz
	Mode 2	Low : 903.0 MHz Middle : 912.6 MHz High : 926.9 MHz

3.2.2 Radiated Emission Test (Below 1GHz)

Radiated Test Cases	Lora 500KHz DTS	
	Mode 1 Transmitting	Low : 902.5 MHz Middle: 914.5 MHz High : 926.5 MHz
	Mode 2 Transmitting	Low : 903.0 MHz Middle : 912.6 MHz High : 926.9 MHz

- Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.
2. All above modes were tested, but only the worst case test mode was reported .

3.2.3 Radiated Emission Test (Above 1GHz)

Radiated Test Cases	Lora 500KHz DTS	
	Mode 1 Transmitting	Low : 902.5 MHz Middle: 914.5 MHz High : 926.5 MHz
	Mode 2 Transmitting	Low : 903.0 MHz Middle : 912.6 MHz High : 926.9 MHz

Note : 1. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture) and packet type.

2. Following channel(s) was (were) selected for the final test as listed above

3.2.4 Power Line Conducted Emission Test:

AC Conducted Emission	Mode 1 : Lora Mode
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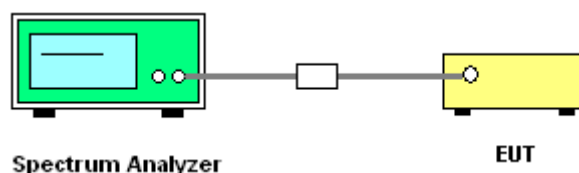
3.3 Support Equipment

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	Lenovo	E470C	FCC DoC	N/A	shielded cable DC O/P 1.8 m unshielded AC I/P cable 1.2 m
2.	Cement resistance	NA	50W1RJ	N/A	N/A	50W, 1Ω

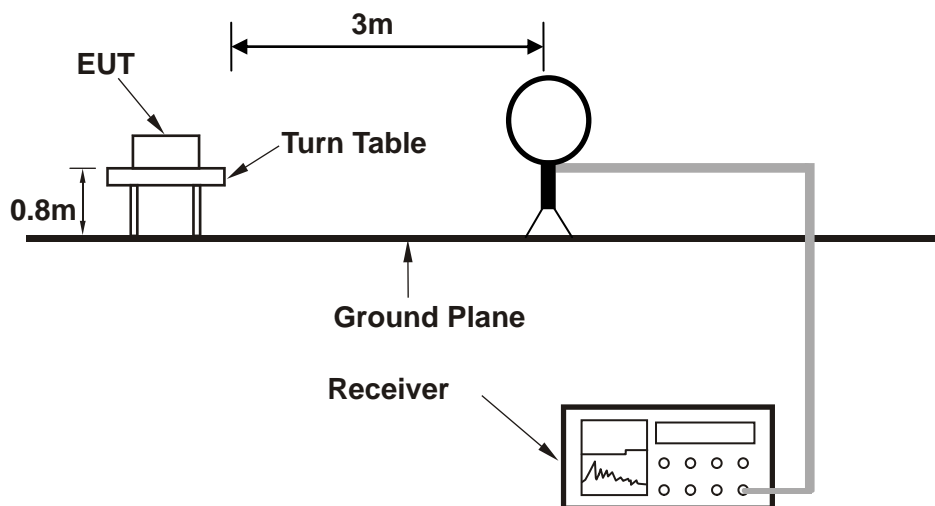
3.4 Test Setup

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

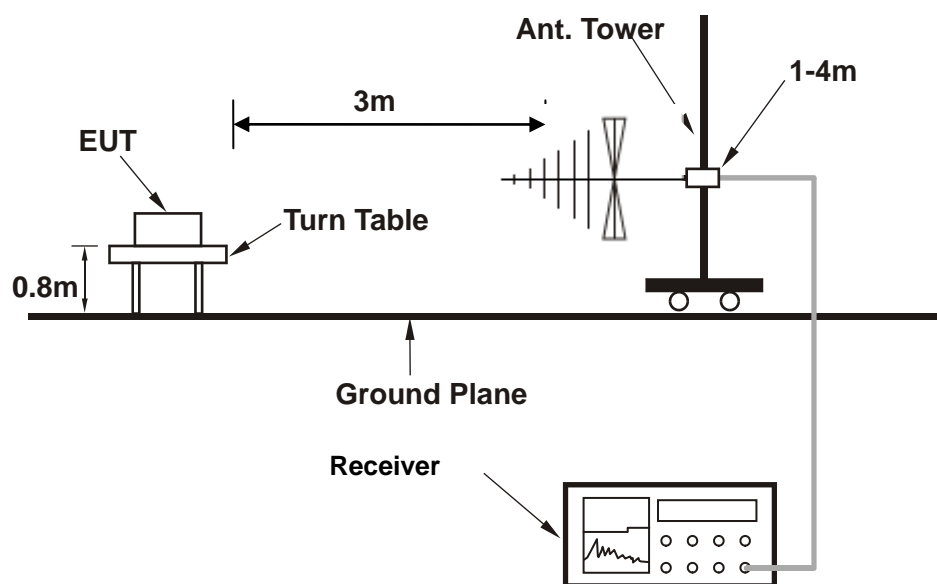
Setup diagram for Conducted Test



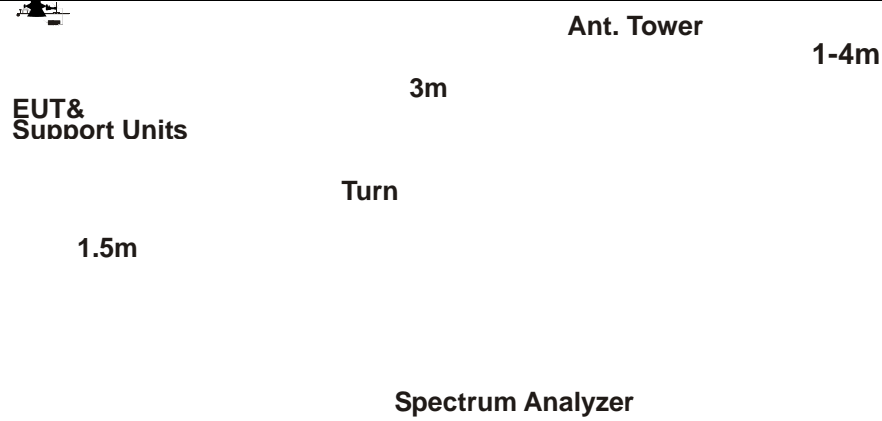
Setup diagram for Raidation(9KHz~30MHz) Test



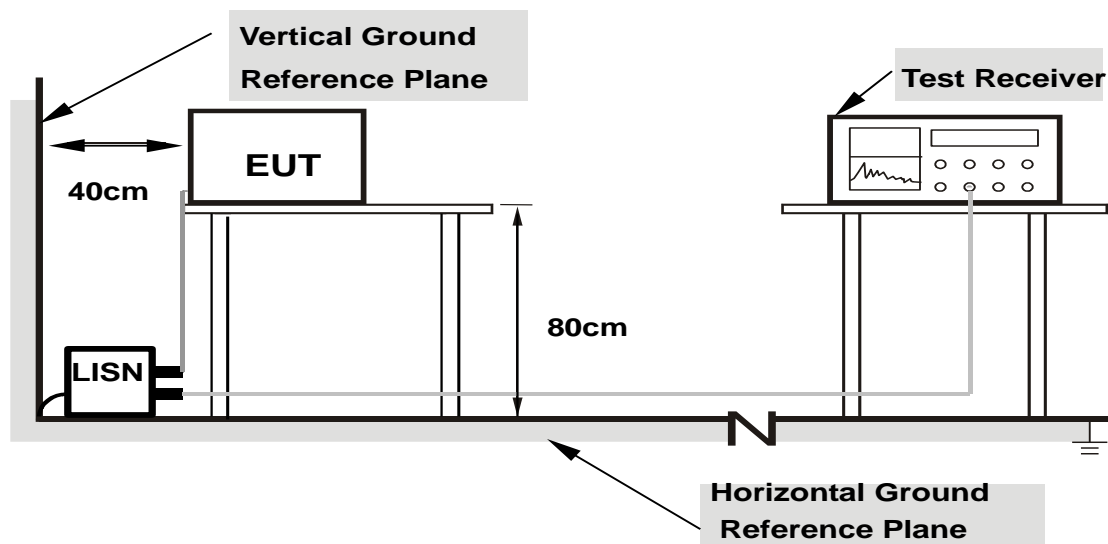
Setup diagram for Raidation(Below 1G) Test



Setup diagram for Raidation(Above1G) Test



Setup diagram for AC Conducted Emission Test



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5 dB and 10dB attenuator.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 5 + 10 = 15 \text{ (dB)} \end{aligned}$$

4. Test Result

4.1 6dB and 99% Bandwidth Measurement

4.1.1 Limit of 6dB and 99% Bandwidth

FCC §15.247 (a) (2)

IC RSS-247 5.2(1)

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

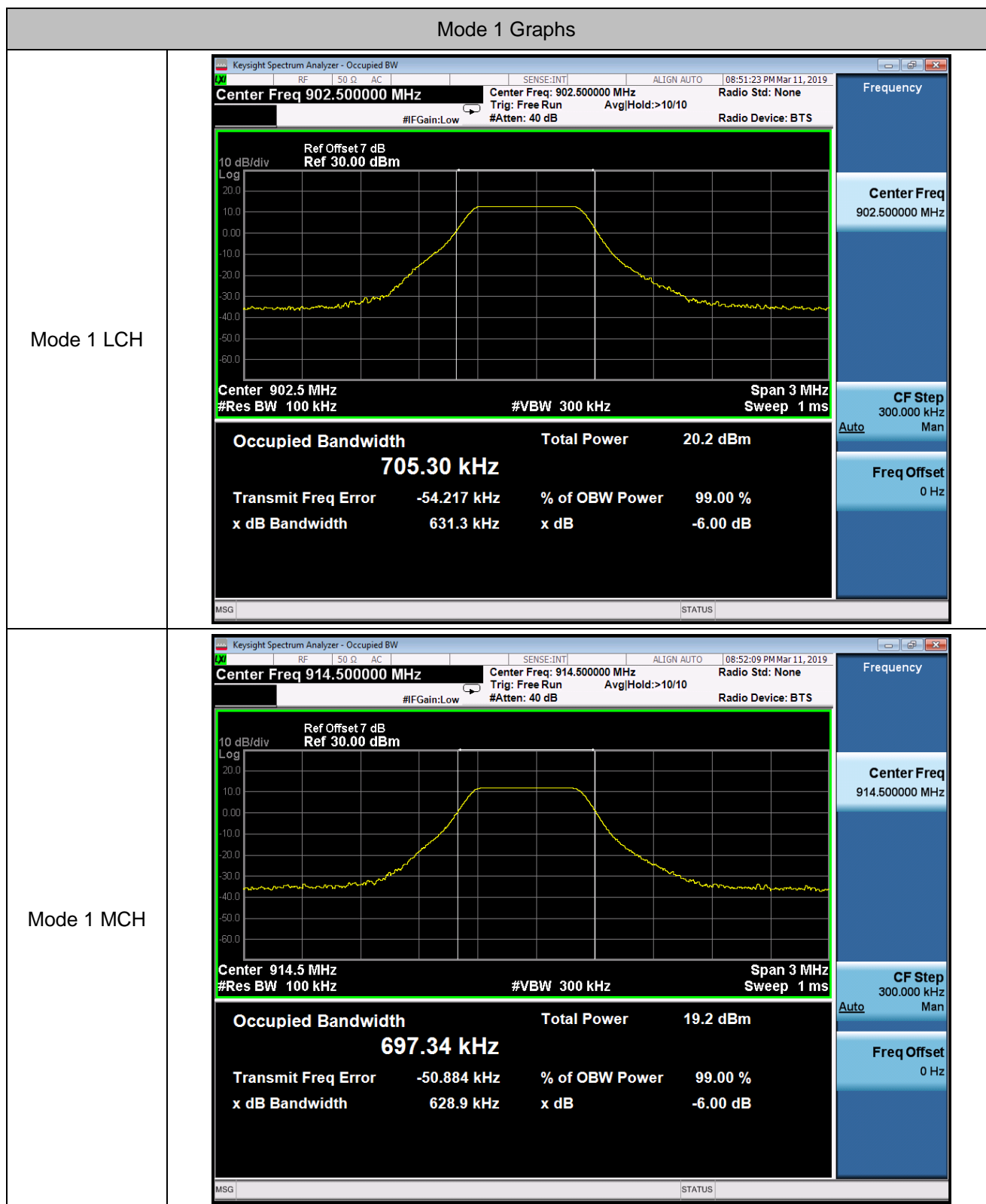
4.1.2 Test Procedures

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. Set to the maximum power setting and enable the EUT transmit continuously
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 30kHz and set the Video bandwidth (VBW) = 100kHz.

4.1.3 Test Result of 6dB and 99% Bandwidth

Test Mode :		Mode 1 Transmitting	Temperature :	24~26°C	
Test Engineer :		Damon Zhang	Relative Humidity :	50~53%	
Channel	Frequency [MHz]	6dB Bandwidth [MHz]	99% OBW[MHz]	Limit 6dB OBW	Verdict
LCH	902.5	0.6313	0.70530	≥500KHz	PASS
MCH	914.5	0.6289	0.69734	≥500KHz	PASS
HCH	926.5	0.6257	0.68638	≥500KHz	PASS
Test Mode :		Mode 2 Transmitting	Temperature :	24~26°C	
Channel	Frequency [MHz]	6dB Bandwidth [MHz]	99% OBW[MHz]	Limit 6dB OBW	Verdict
LCH	903.0	0.6248	0.67826	≥500KHz	PASS
MCH	912.6	0.6231	0.68660	≥500KHz	PASS
HCH	926.9	0.6308	0.72048	≥500KHz	PASS

6dB and 99% Bandwidth Plot

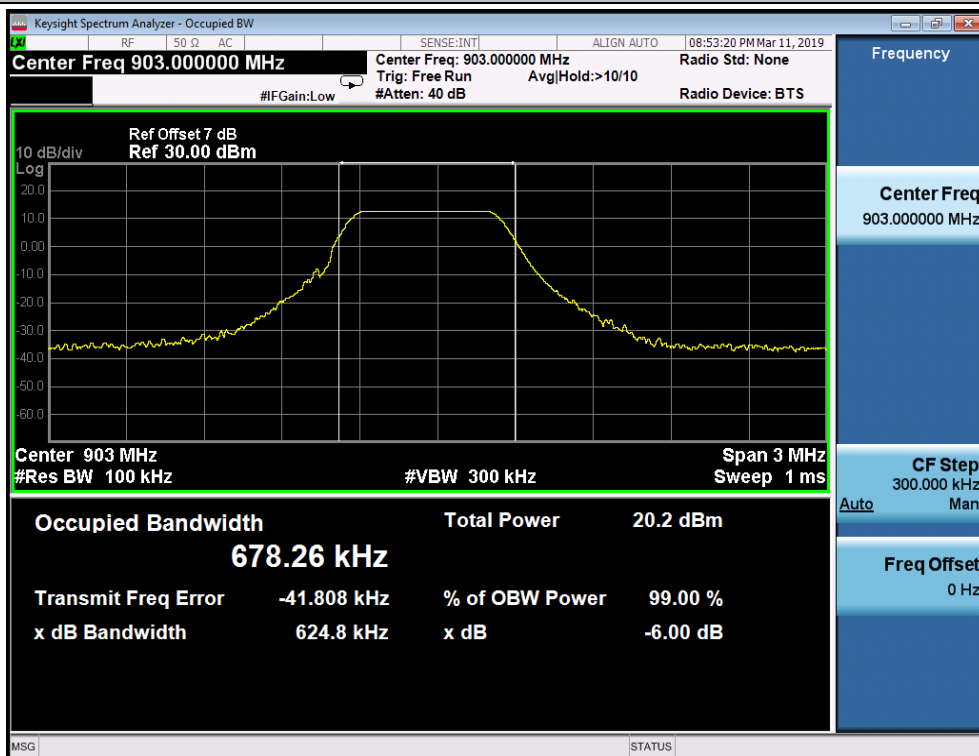


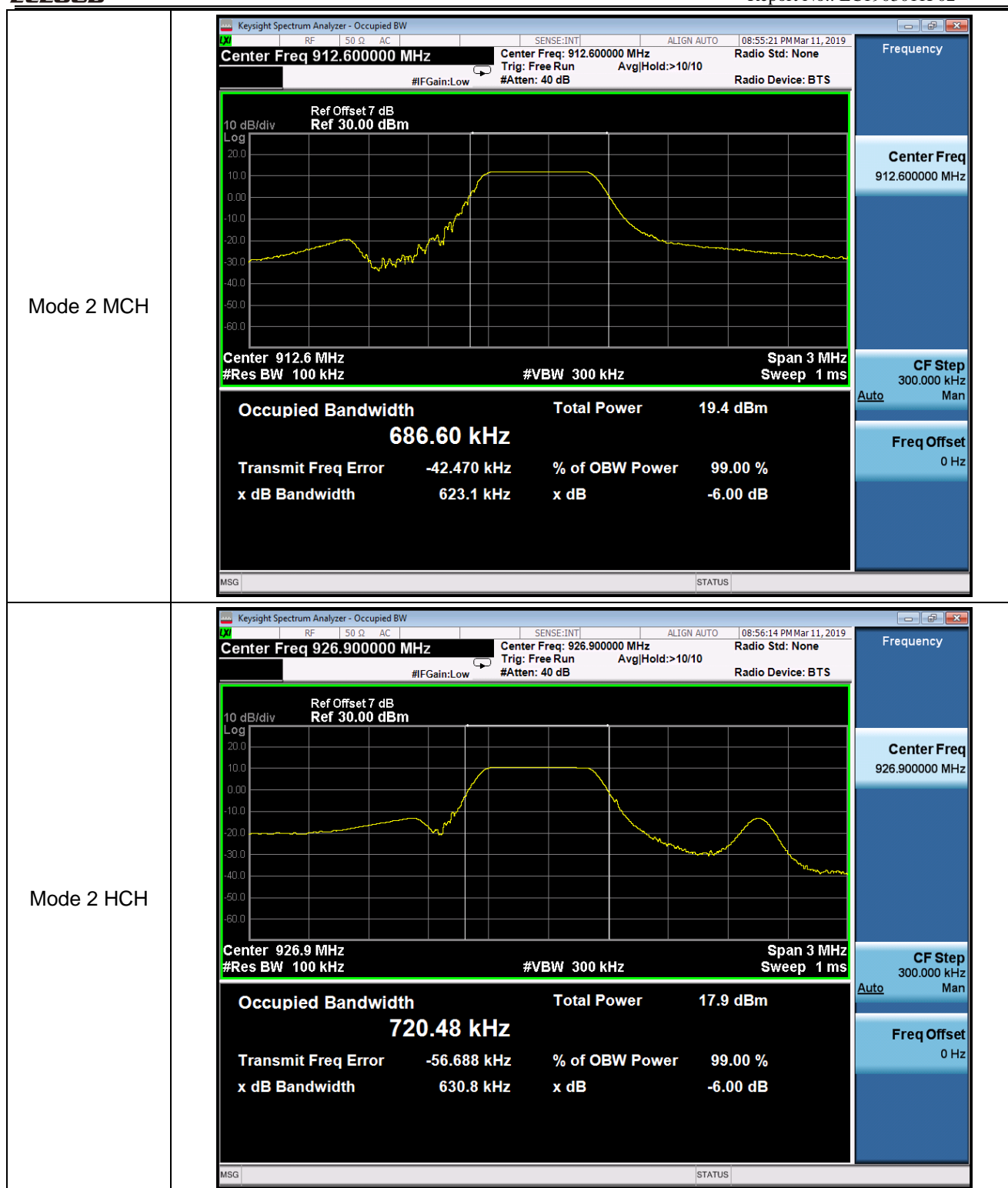
Mode 1 HCH



Mode 2 Graphs

Mode 2 LCH





4.2 Peak Output Power Measurement

4.2.1 Limit of Peak Output Power

FCC §15.247 (b)(3)

IC RSS-247 A5.4(4)

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

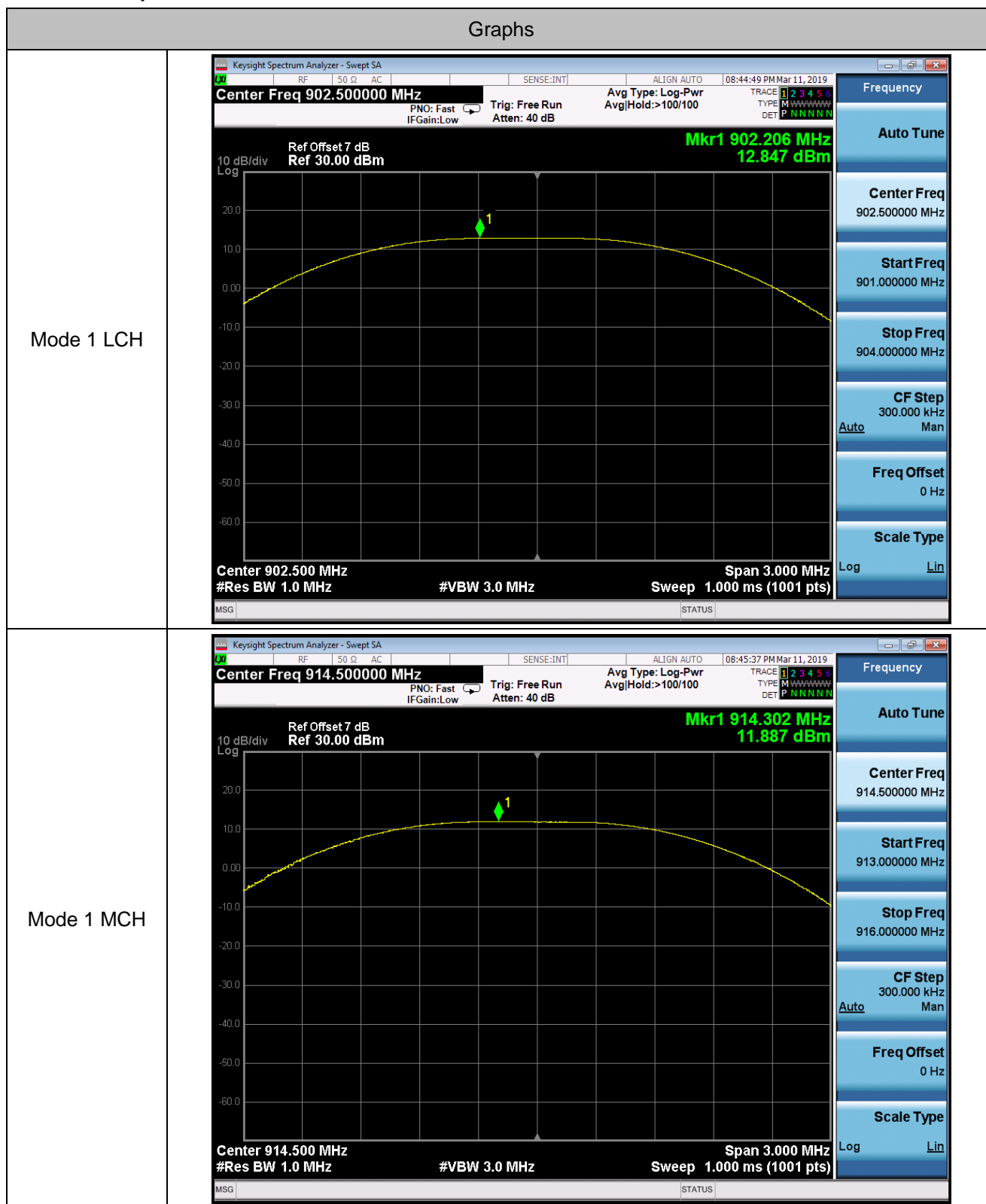
4.2.2 Test Procedures

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to spectrum analyzer.
3. Set to the maximum power setting and enable the EUT transmit continuously
4. Set the RBW \geq DTS Bandwidth,VBW \geq 3*RBW,Span \geq 3*RBW,Detector=Peak,Sweep time=auto couple,Trace mode=max hold.
5. Allow trace to fully stabilize, Use peak marker function to determine the peak amplitude level.
6. Measure the conducted output power

4.2.3 Test Result of Peak Output Power

Test Mode :	Mode 1 Transmitting	Temperature :	24~26°C
Test Engineer :	Damon Zhang	Relative Humidity :	50~53%
Channel	Frequency	Conduct Peak Power[dBm]	Verdict
LCH	902.5	12.847	PASS
MCH	914.5	11.887	PASS
HCH	926.5	10.525	PASS
Test Mode :	Mode 2 Transmitting	Temperature :	24~26°C
Channel	Frequency	Conduct Peak Power[dBm]	Verdict
LCH	903.0	12.762	PASS
MCH	912.6	12.003	PASS
HCH	926.9	10.457	PASS

Peak Output Power Plot

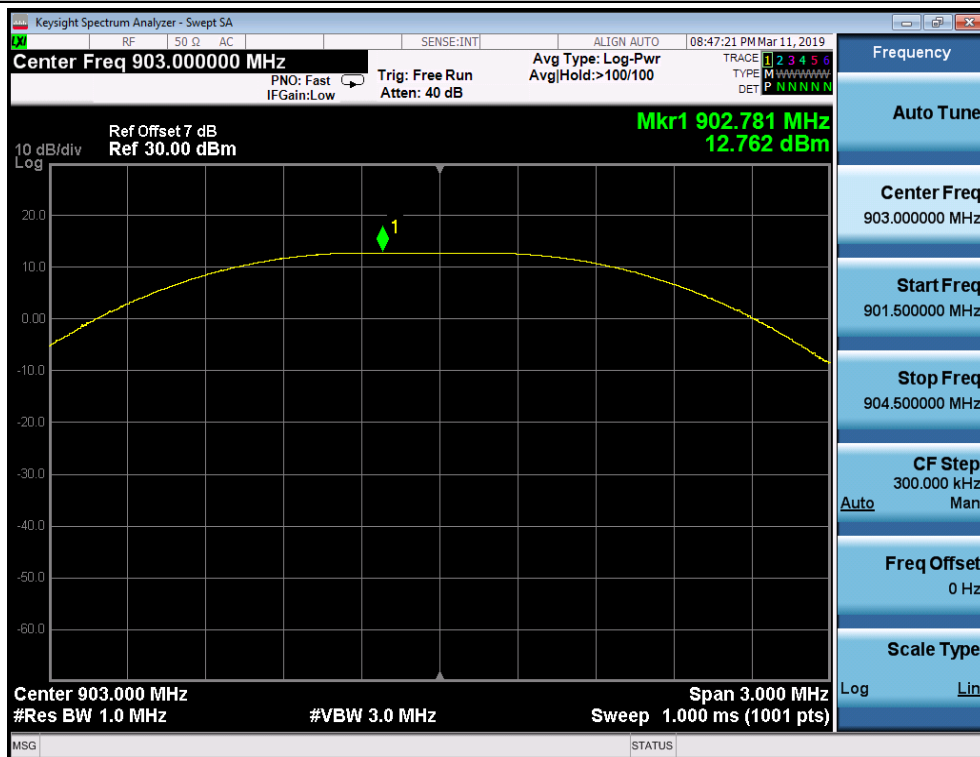


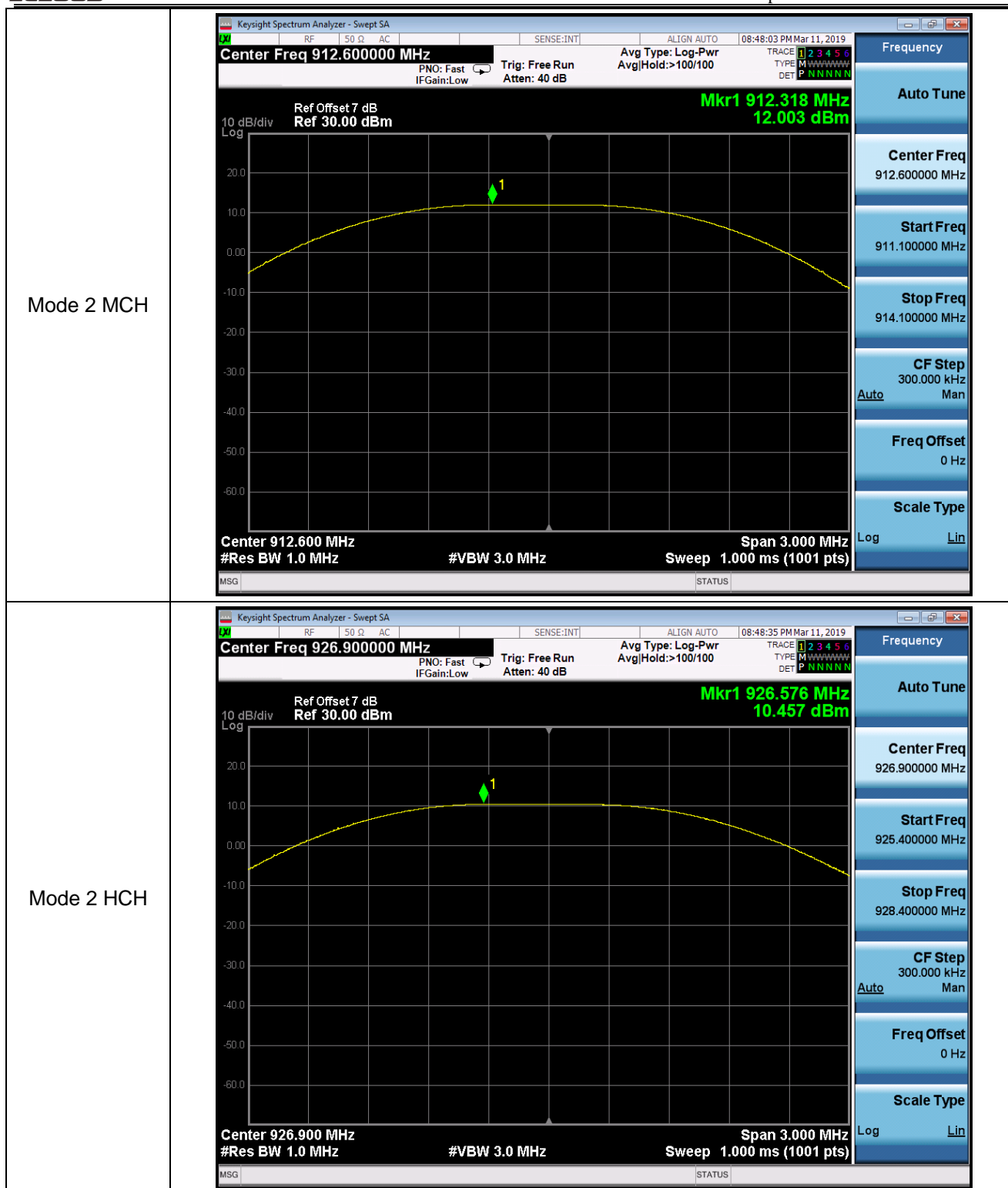
Mode 1 HCH



Mode 2 Graphs

Mode 2 LCH





4.3 Power Spectral Density Measurement

4.3.1 Limits of Power Spectral Density

FCC§15.247(e)

IC RSS-247 5.2(2)

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

4.3.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
4. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
5. Measure and record the results in the test report.
6. The Measured power density (dBm)/ 100kHz is a reference level and used as 20dBc down limit line for Conducted Band Edges and Conducted Spurious Emission.

4.3.3 Test Result of Power Spectral Density

Test Mode :	Mode 1 Transmitting	Temperature :	24~26℃
Test Engineer :	Damon Zhang	Relative Humidity :	50~53%
Channel	Frequency	PSD [dBm]	Verdict
LCH	902.5	0.466	PASS
MCH	914.5	-0.419	PASS
HCH	926.5	-1.898	PASS
Test Mode :	Mode 2 Transmitting	Temperature :	24~26℃
Channel	Frequency	PSD [dBm]	Verdict
LCH	903.0	0.632	PASS
MCH	912.6	-0.760	PASS
HCH	926.9	-2.227	PASS

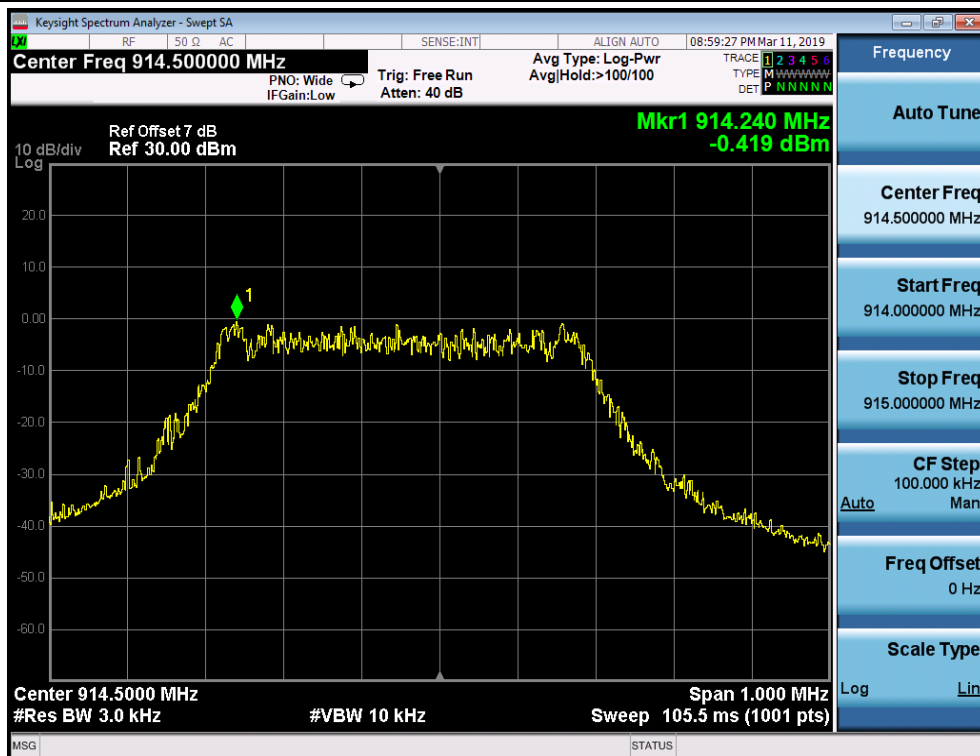
Power Spectral Density Plot

Mode1 Graphs

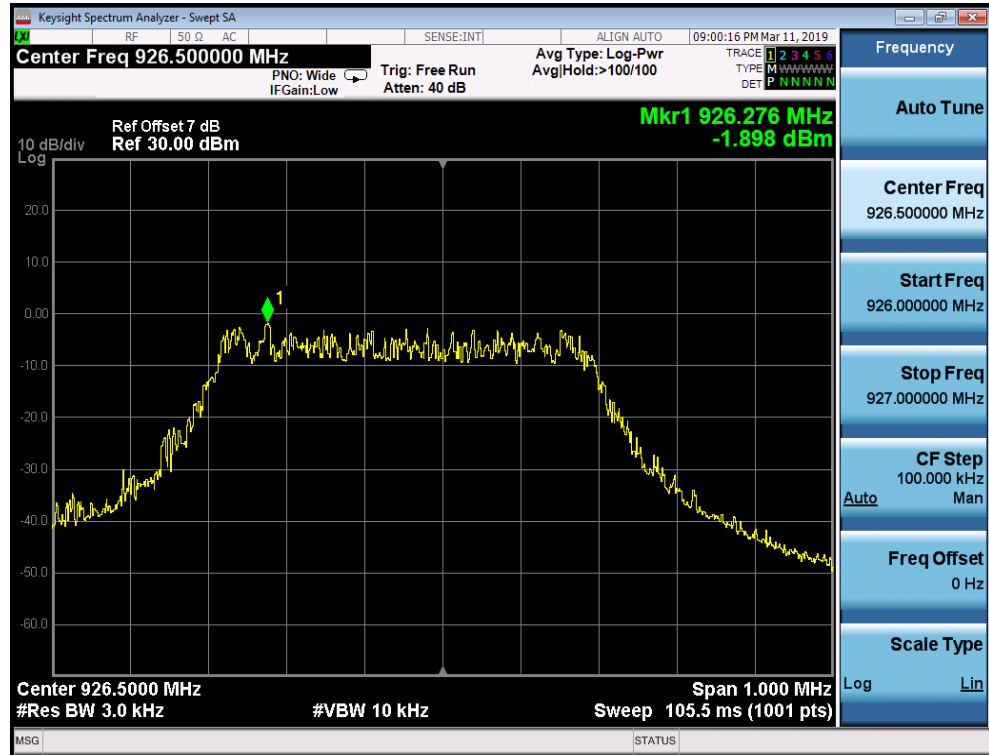
Mode1 LCH



Mode1 MCH

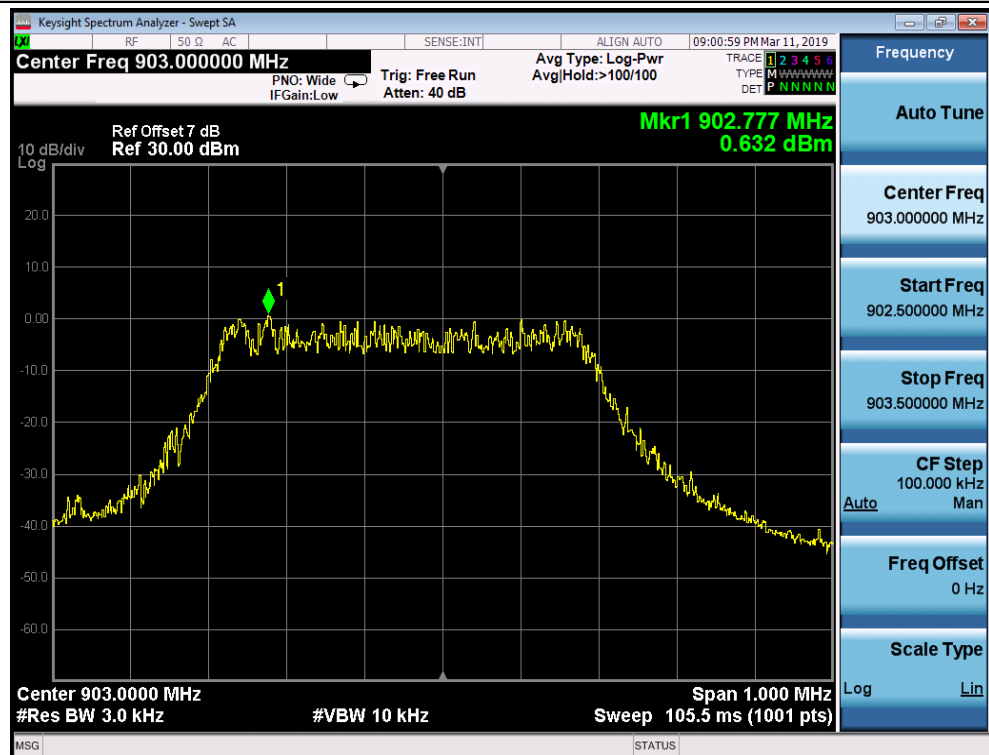


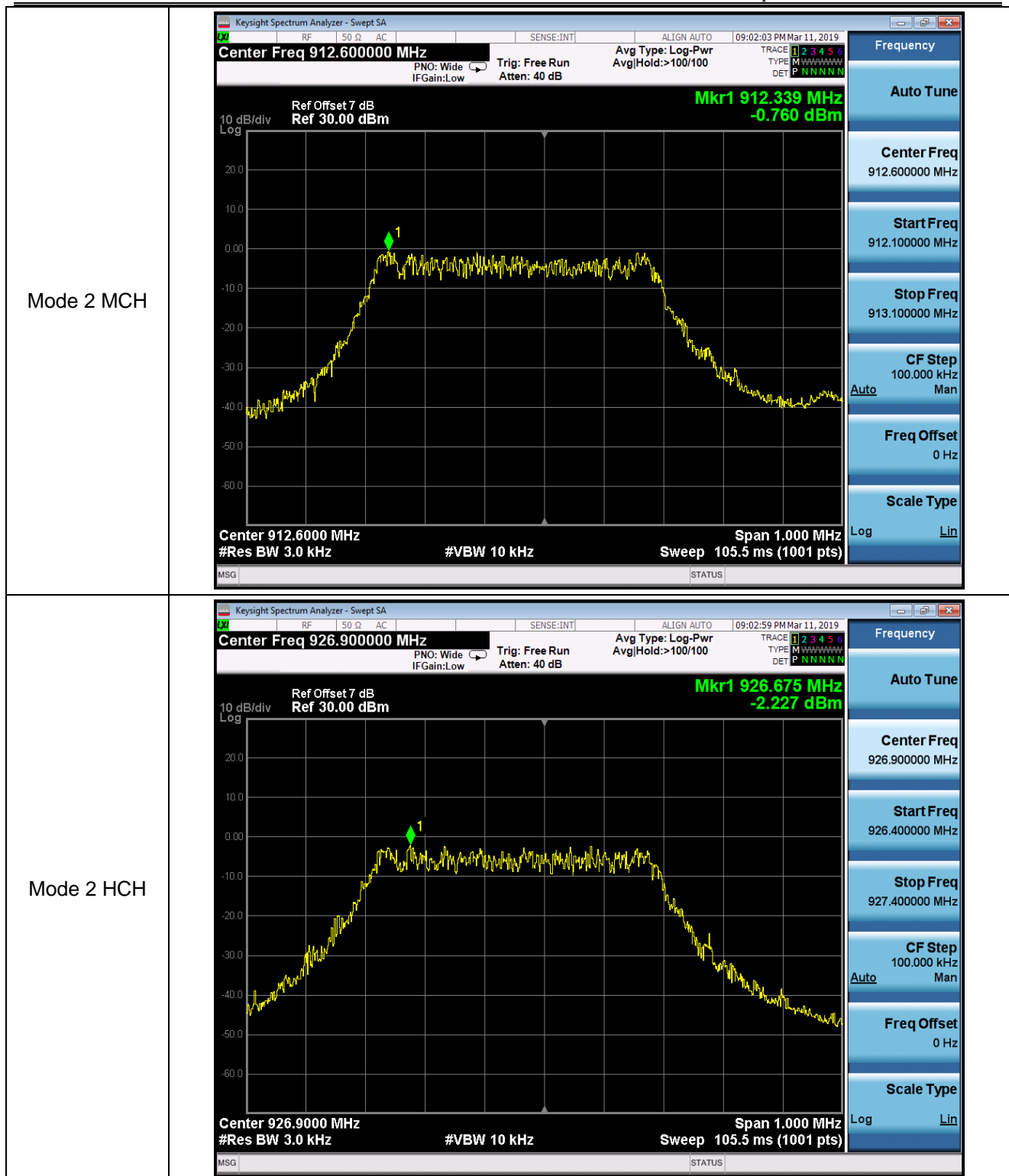
Mode1 HCH



Mode 2 Graphs

Mode 2 LCH





4.4 Conducted Band Edges and Spurious Emission Measurement

4.4.1 Limit of Conducted Band Edges and Spurious Emission

FCC §15.247 (d)

IC RSS-247 5.5

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

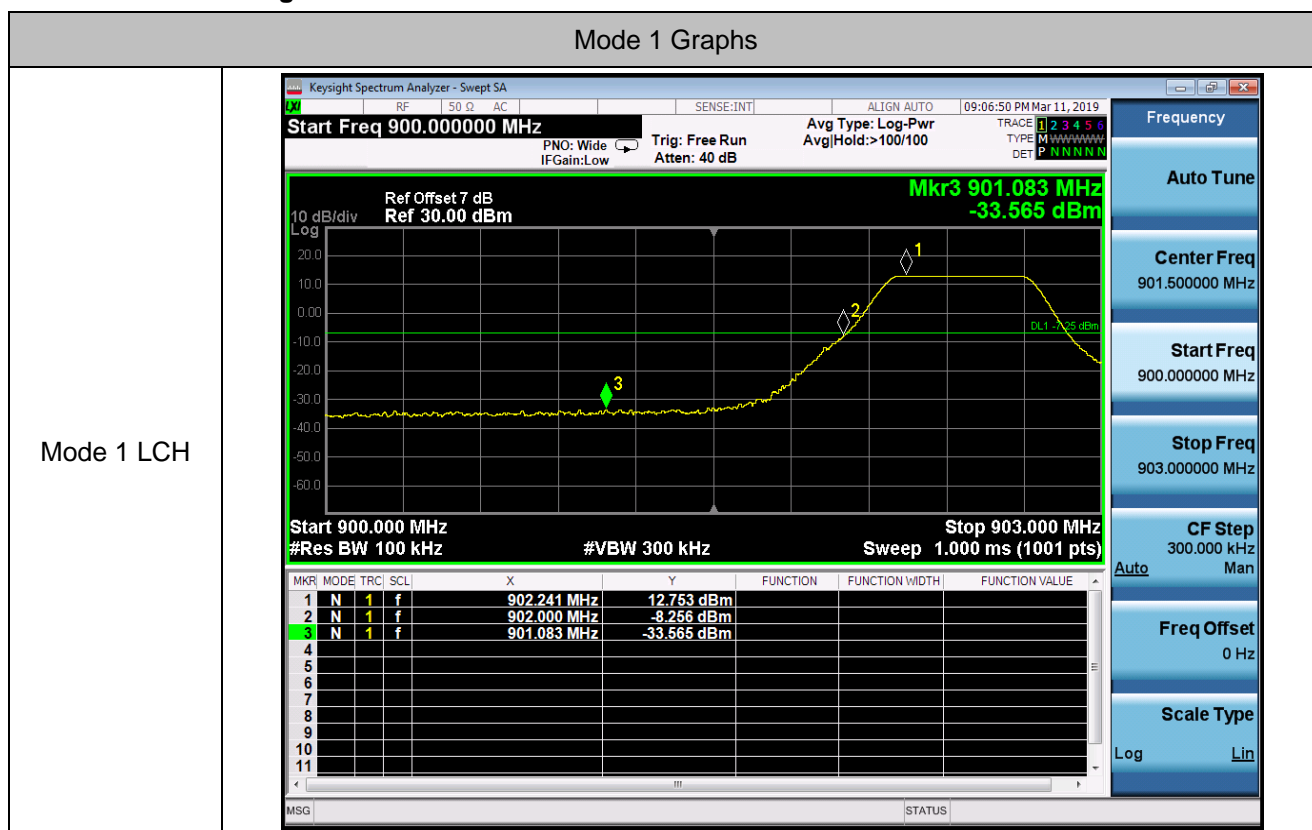
4.4.2 Test Procedures

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument.
3. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
4. Measure and record the results in the test report.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

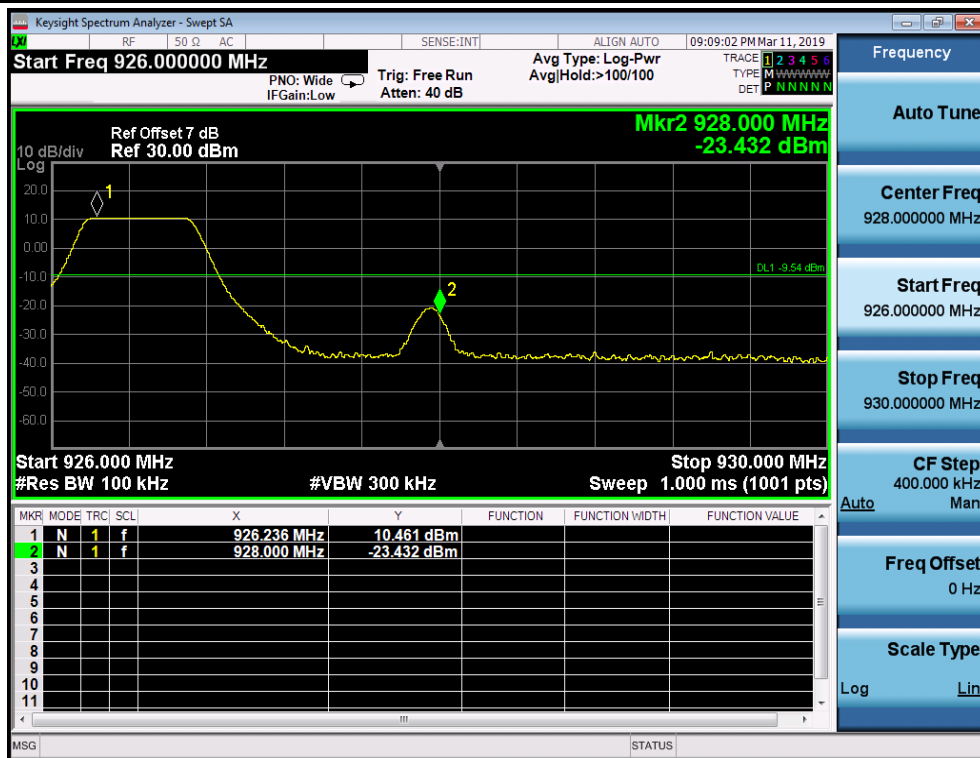
4.4.3 Test Result of Conducted Band Edges

Test Mode :		Mode 1 Transmitting		Temperature :	24~26°C
Test Engineer :		Damon Zhang		Relative Humidity :	50~53%
Channel	Frequency	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
LCH	902.5	12.753	-8.256	-7.247	PASS
HCH	926.5	10.461	-23.432	-9.539	PASS
Test Mode :		Mode 2 Transmitting		Temperature :	24~26°C
Channel	Frequency	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
LCH	903.0	12.725	-34.395	-7.275	PASS
HCH	926.9	10.391	-15.461	-9.609	PASS

Conducted Band Edges Plot

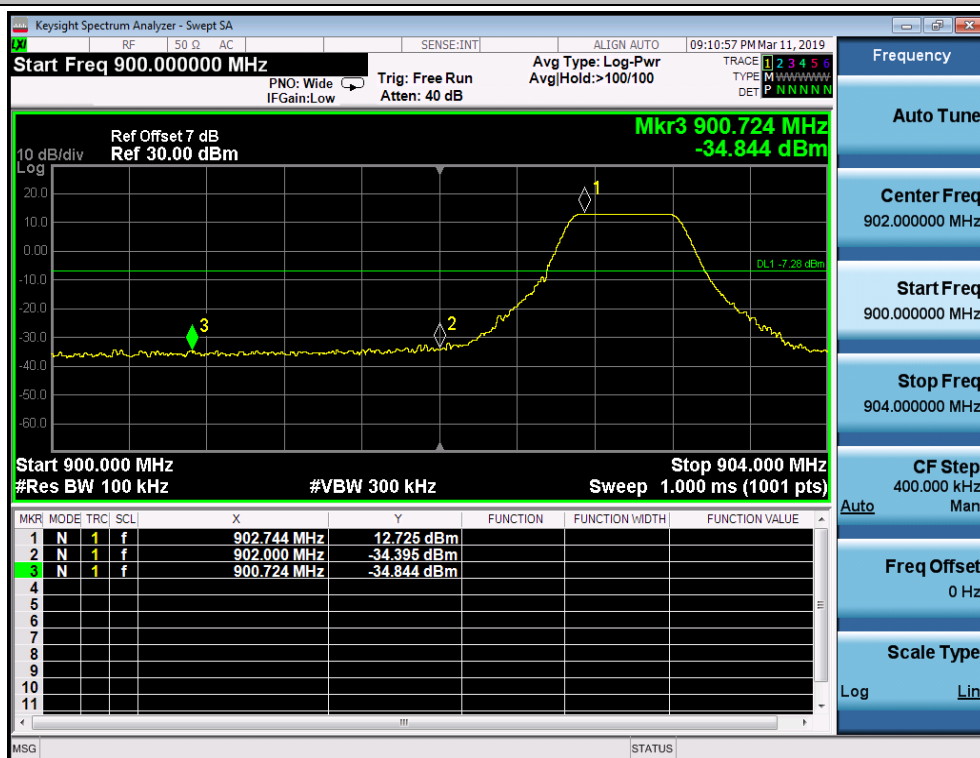


Mode 1 HCH

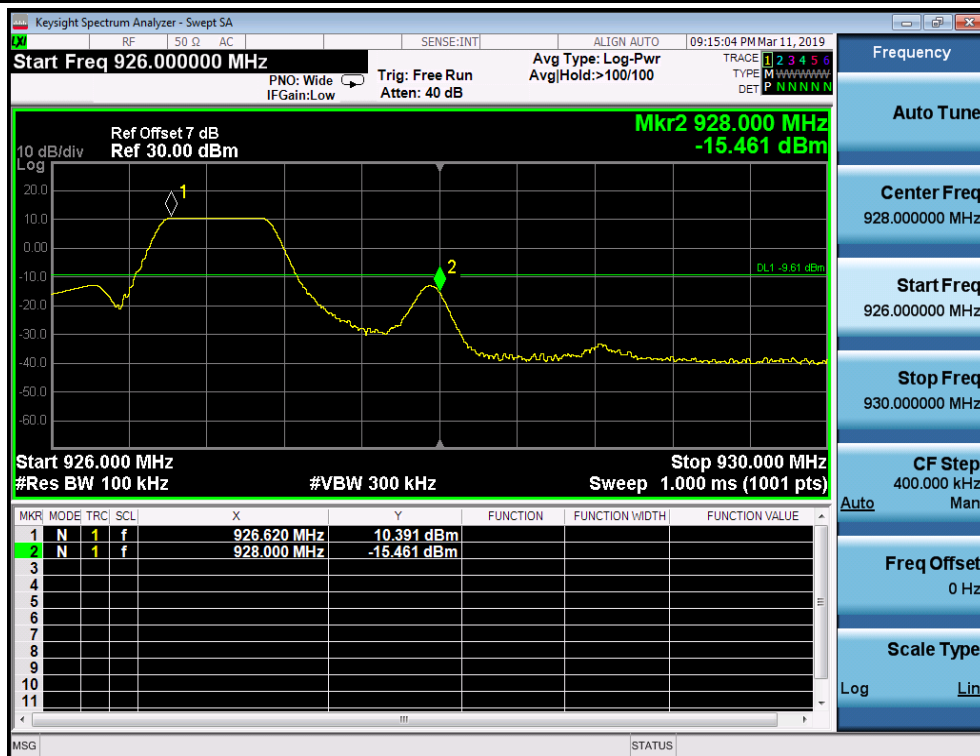


Mode 2 Graphs

Mode 2 LCH



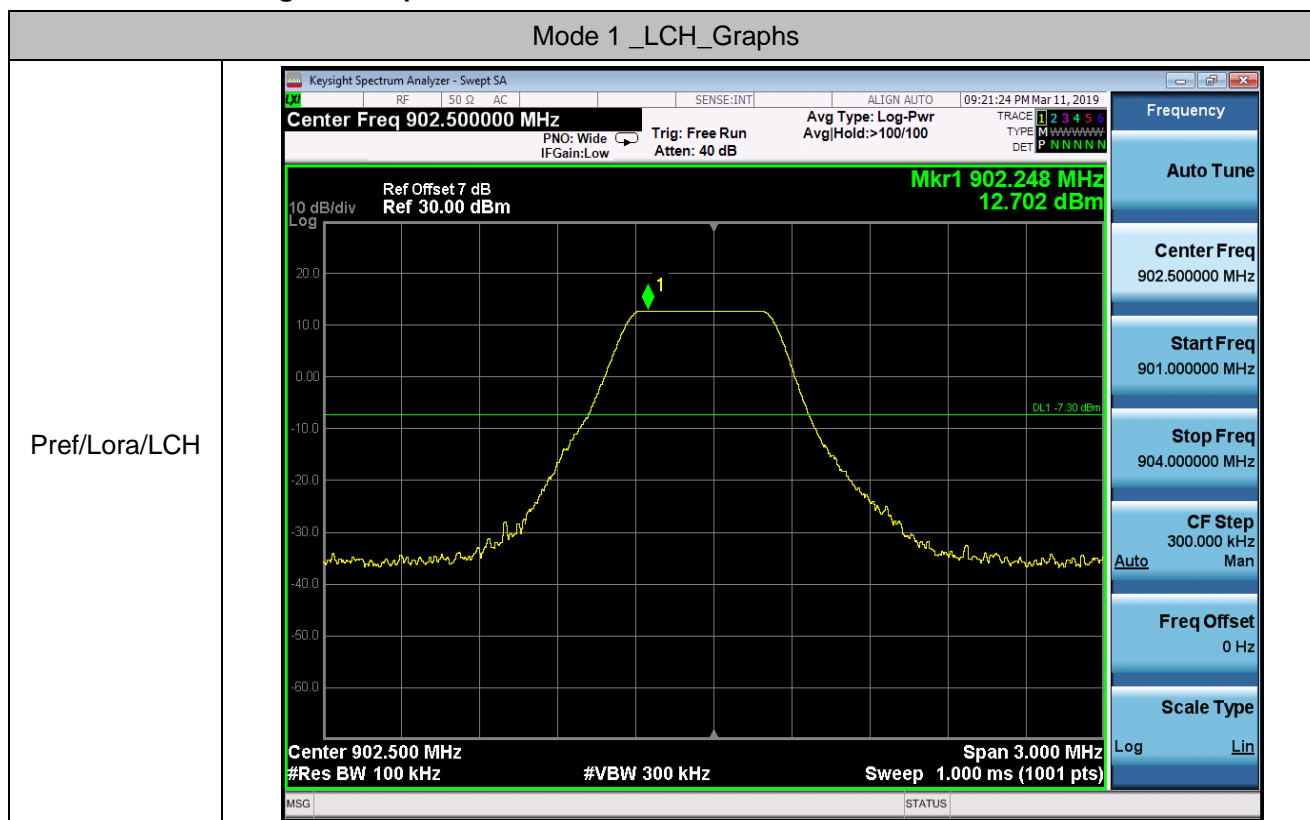
Mode 2 HCH



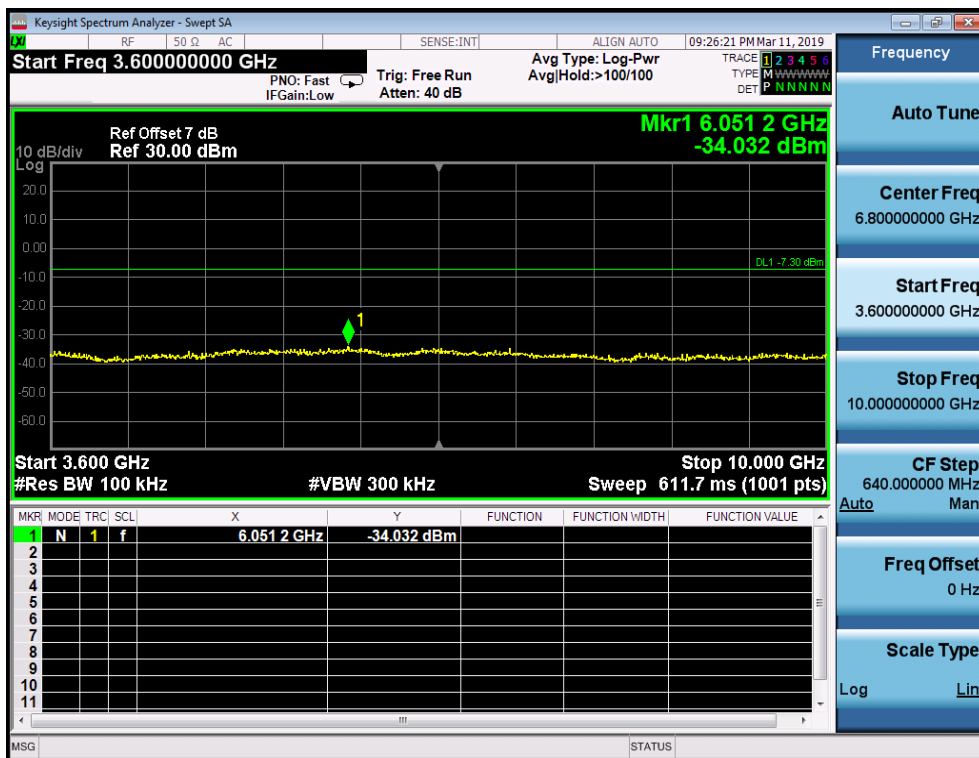
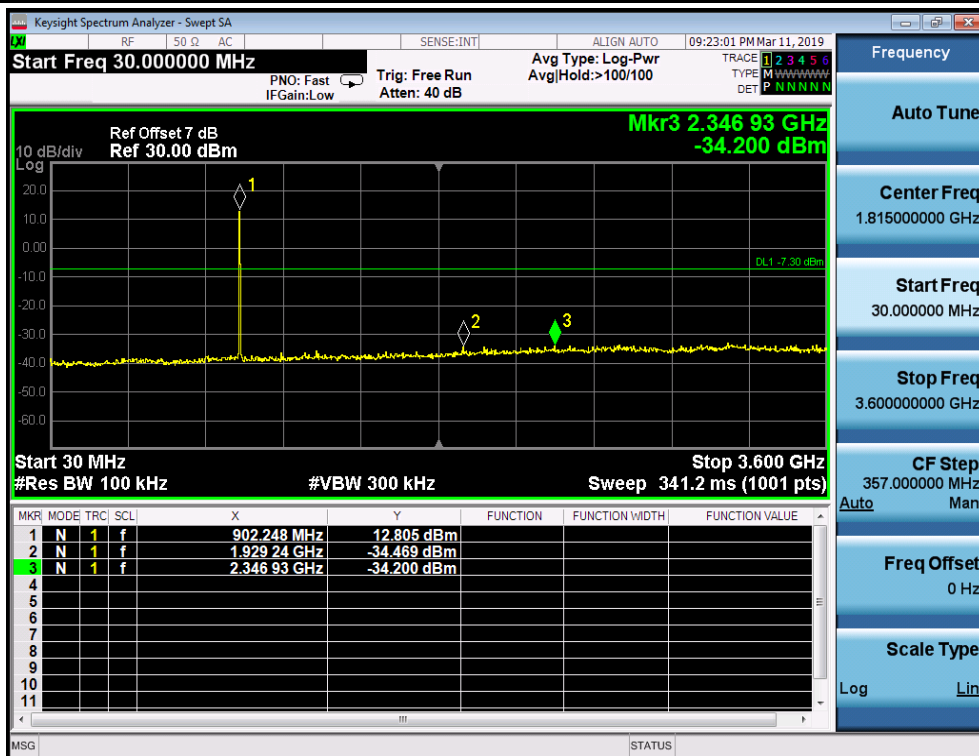
4.4.4 Test Result of Conducted Spurious Emission

Test Mode :		Transmitting	Temperature :	24~26°C	
Test Engineer :		Damon Zhang	Relative Humidity :	50~53%	
Channel	Frequency	Pref [dBm]	Puw[dBm]	Verdict	
LCH	902.5	12.702	<Limit	PASS	
MCH	914.5	11.739	<Limit	PASS	
HCH	926.5	10.434	<Limit	PASS	
Test Mode :		Transmitting	Temperature :	24~26°C	
Channel	Frequency	Pref [dBm]	Puw[dBm]	Verdict	
LCH	903.0	12.704	<Limit	PASS	
MCH	912.6	11.953	<Limit	PASS	
HCH	926.9	10.393	<Limit	PASS	

Conducted Band Edges and Spurious Emission Plot

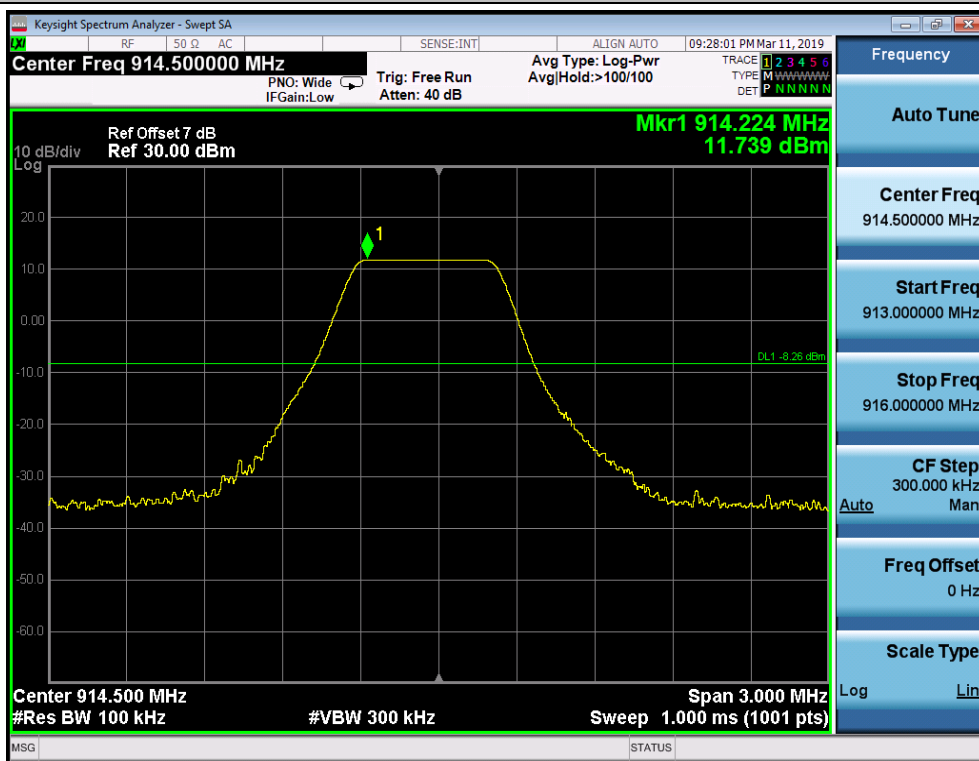


Puw/Lora/LCH

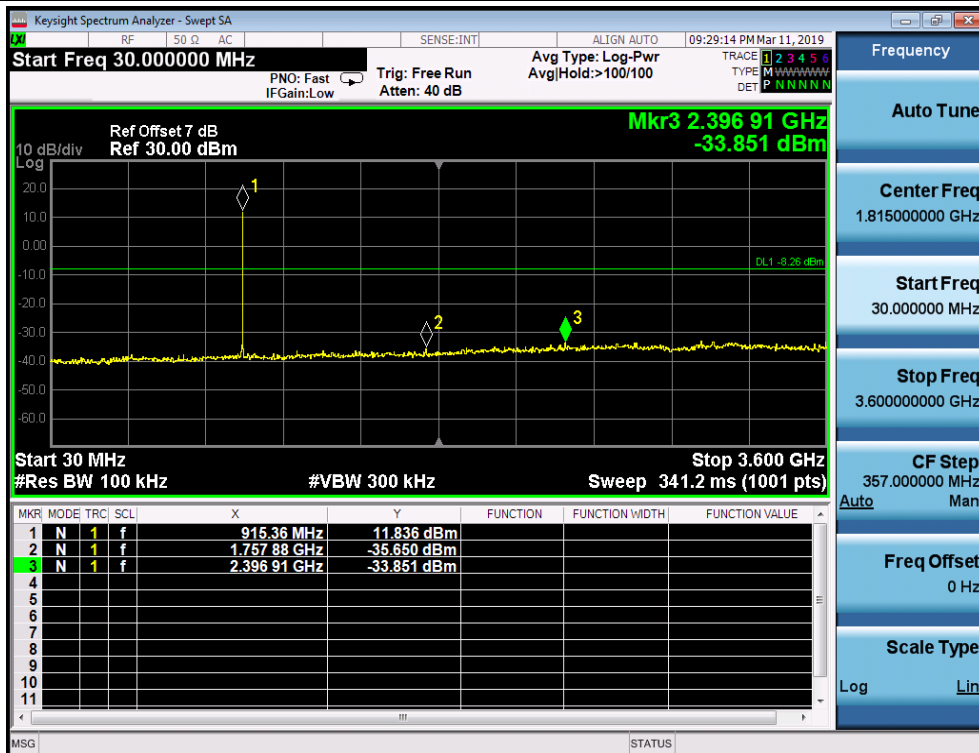


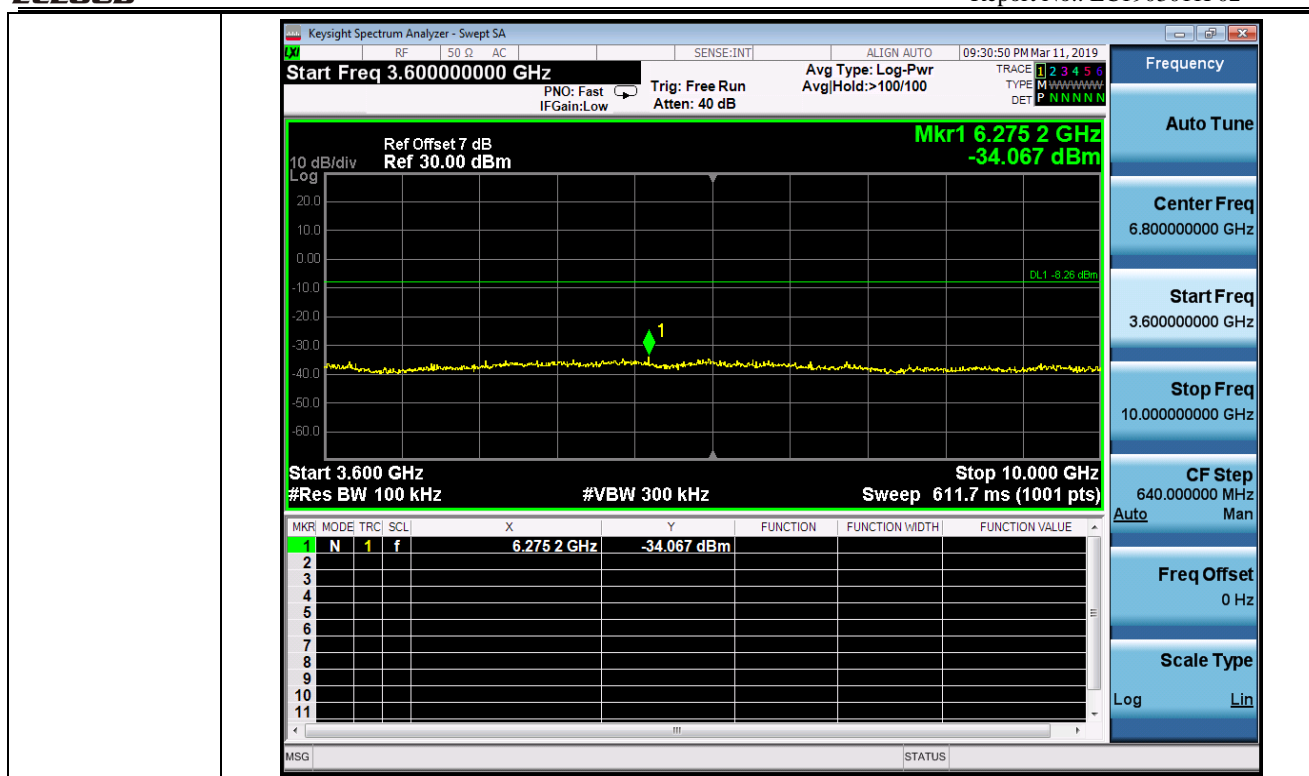
Mode 1 _MCH_Graphs

Pref/LORA/MCH



Puw/LORA/MCH



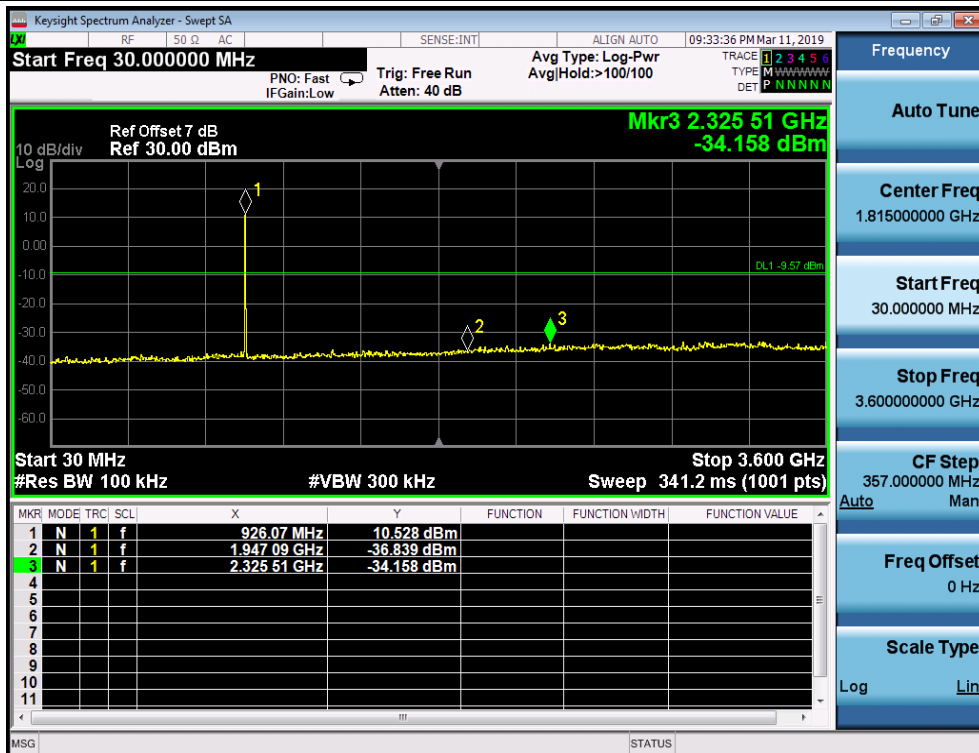


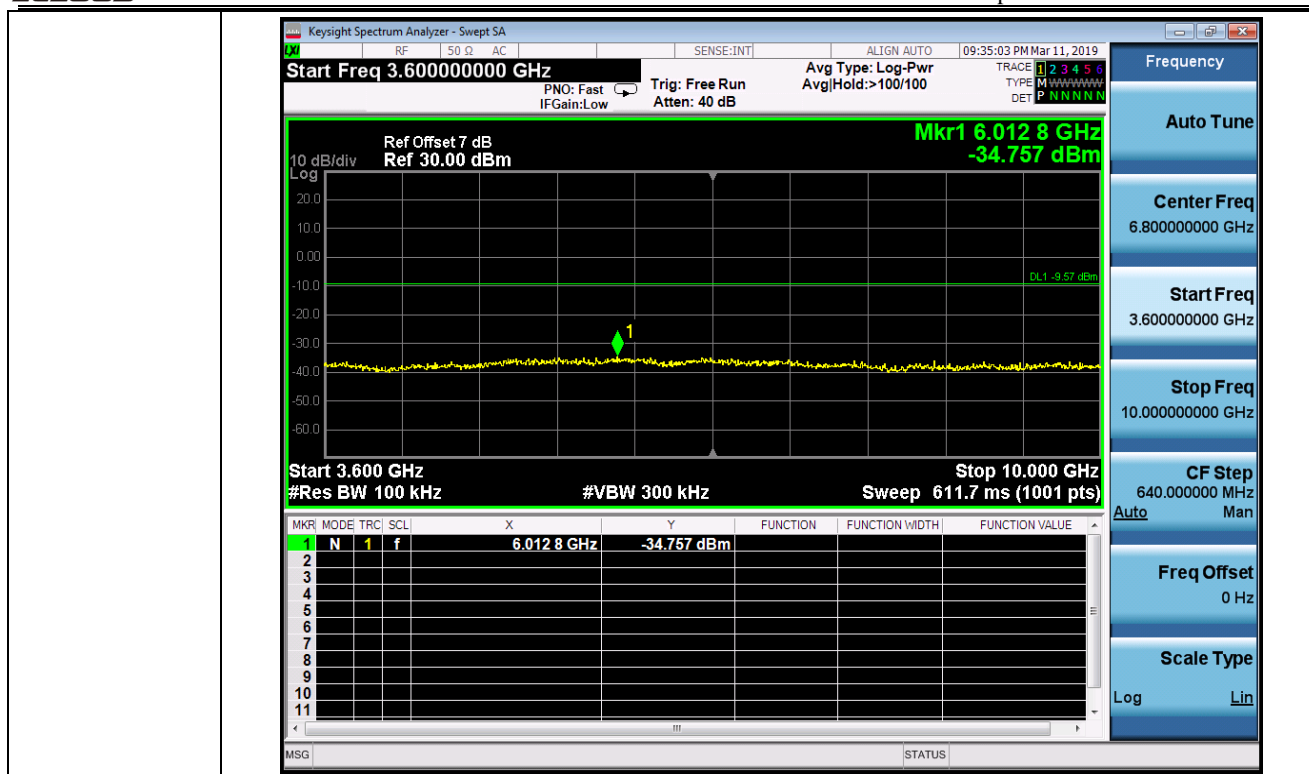
Mode 1 _HCH_Graphs

Pref/LORA/HCH



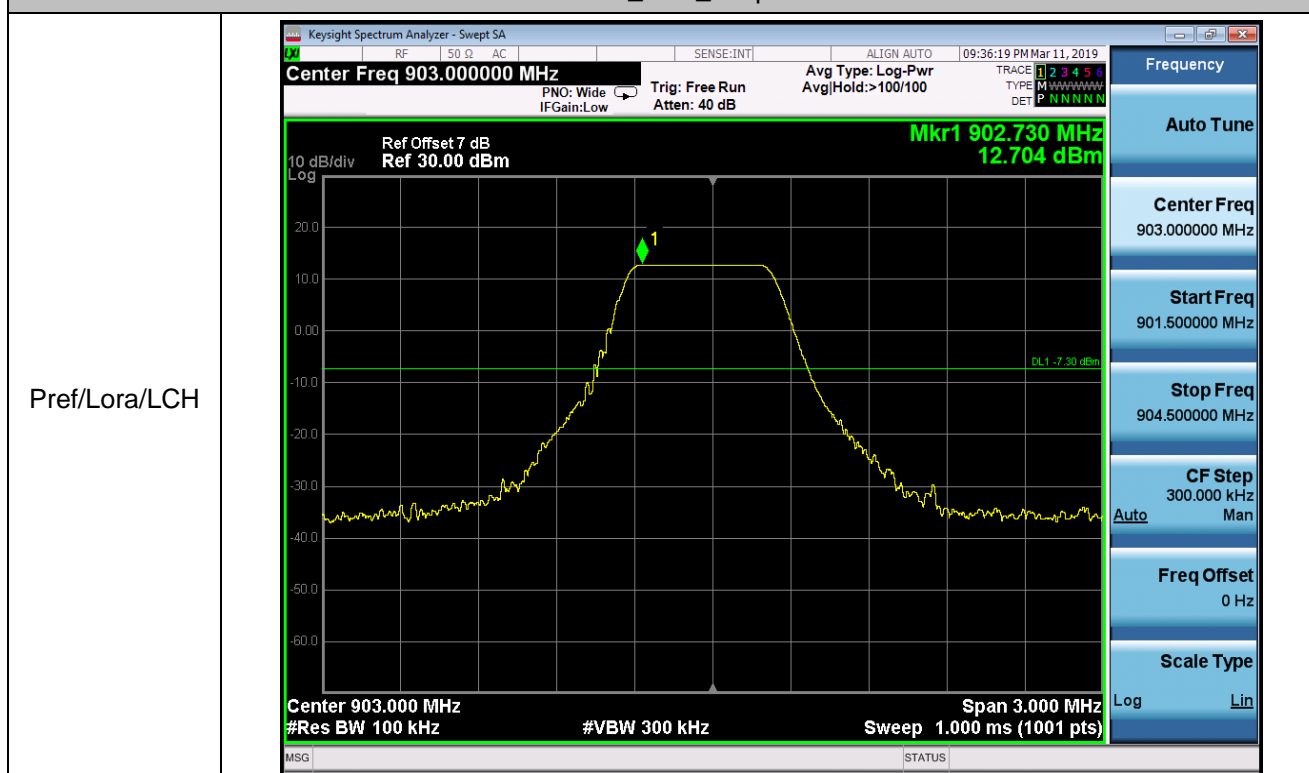
Puw/LORA/HCH





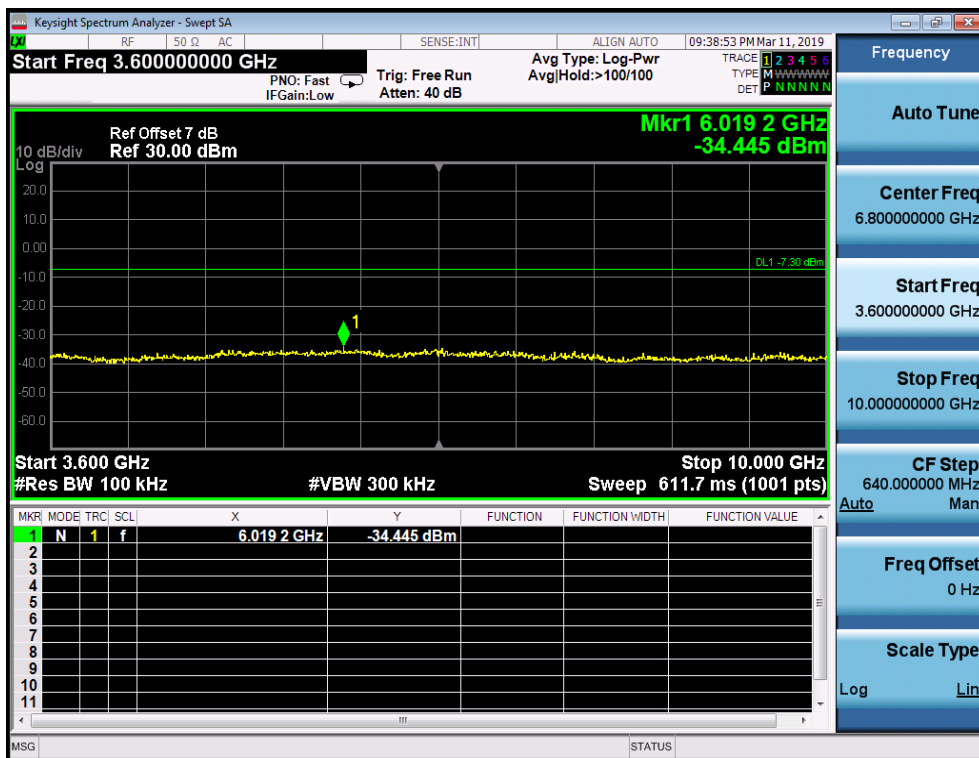
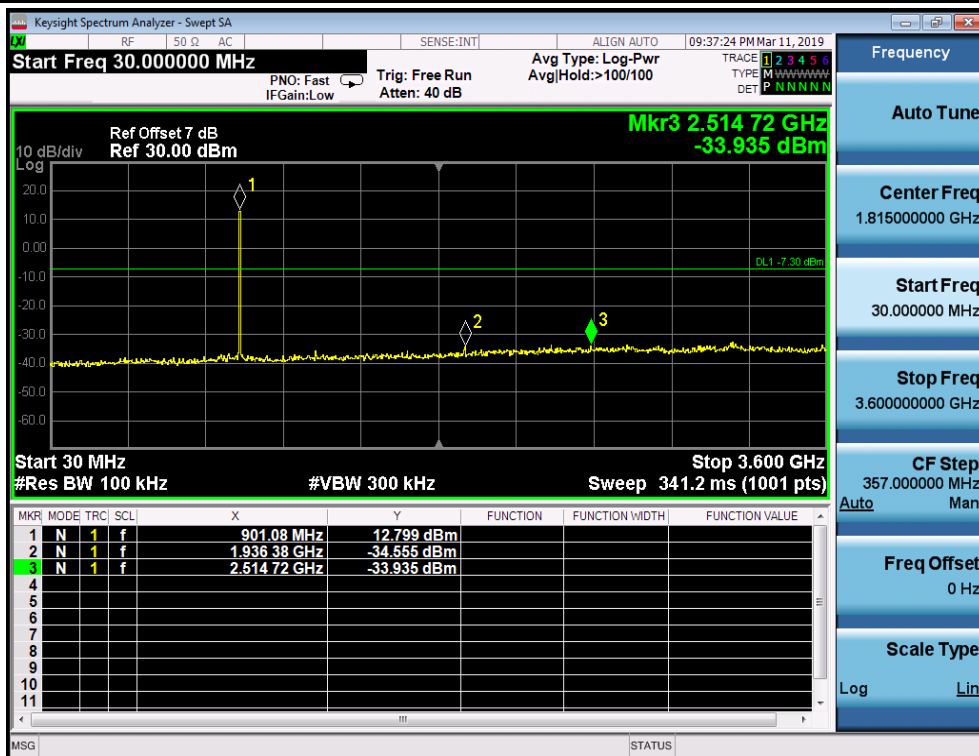
Conducted Band Edges and Spurious Emission Plot

Mode 2 _LCH_Graphs



Pref/Lora/LCH

Puw/Lora/LCH

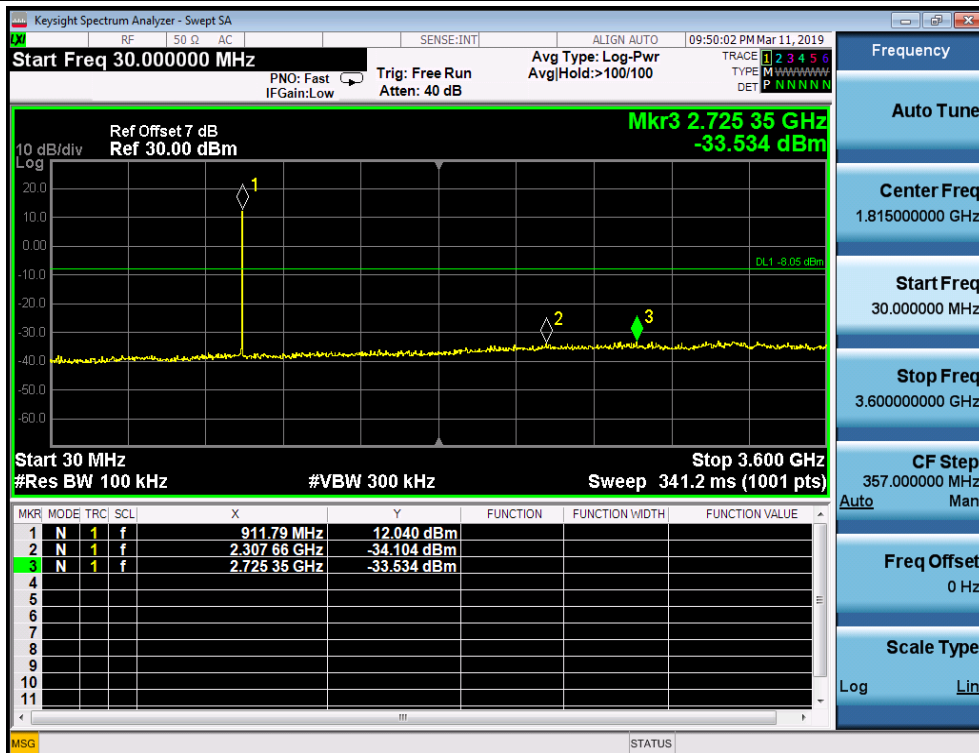


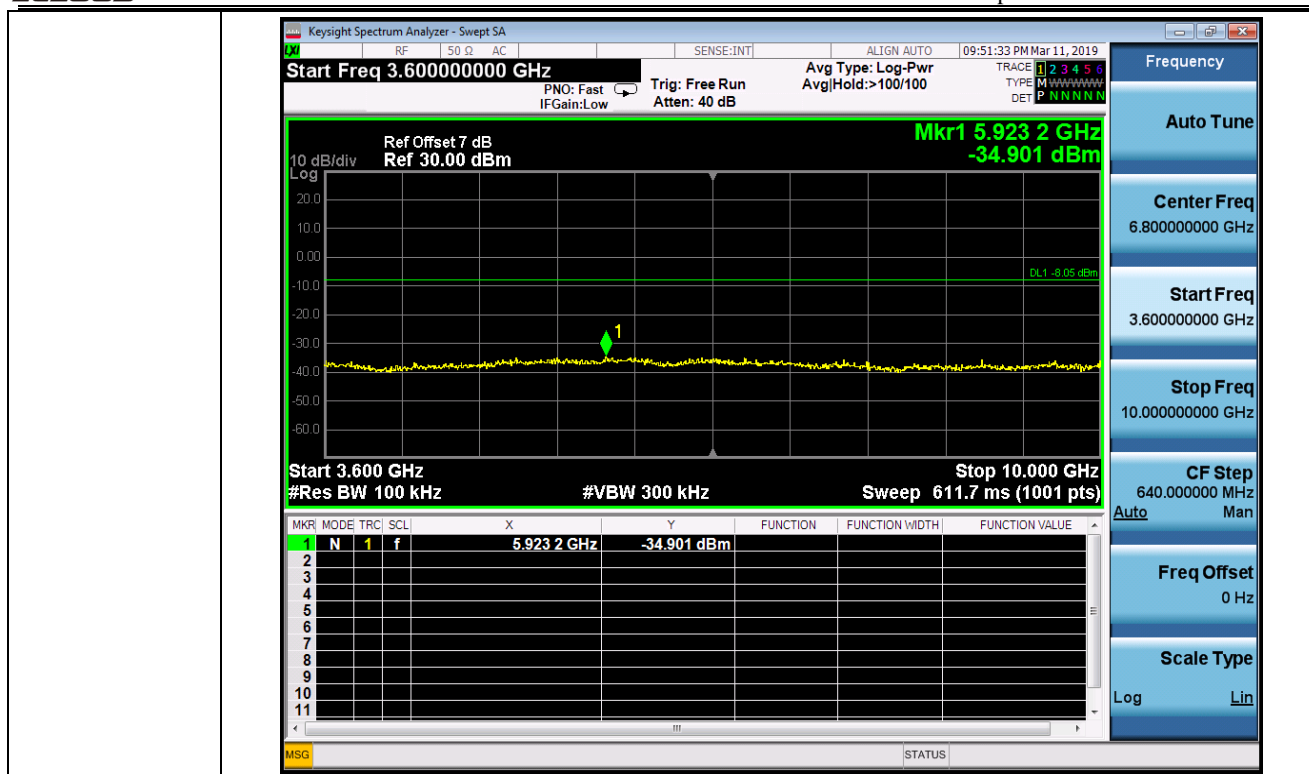
Mode 2 _MCH_Graphs

Pref/LORA/MCH



Puw/LORA/MCH



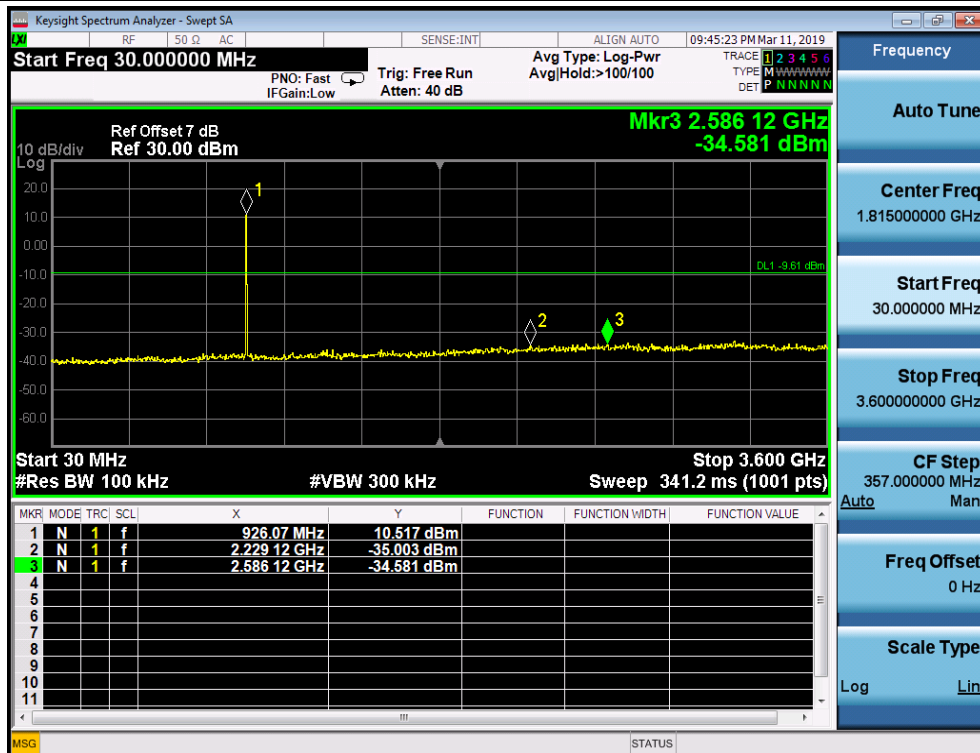


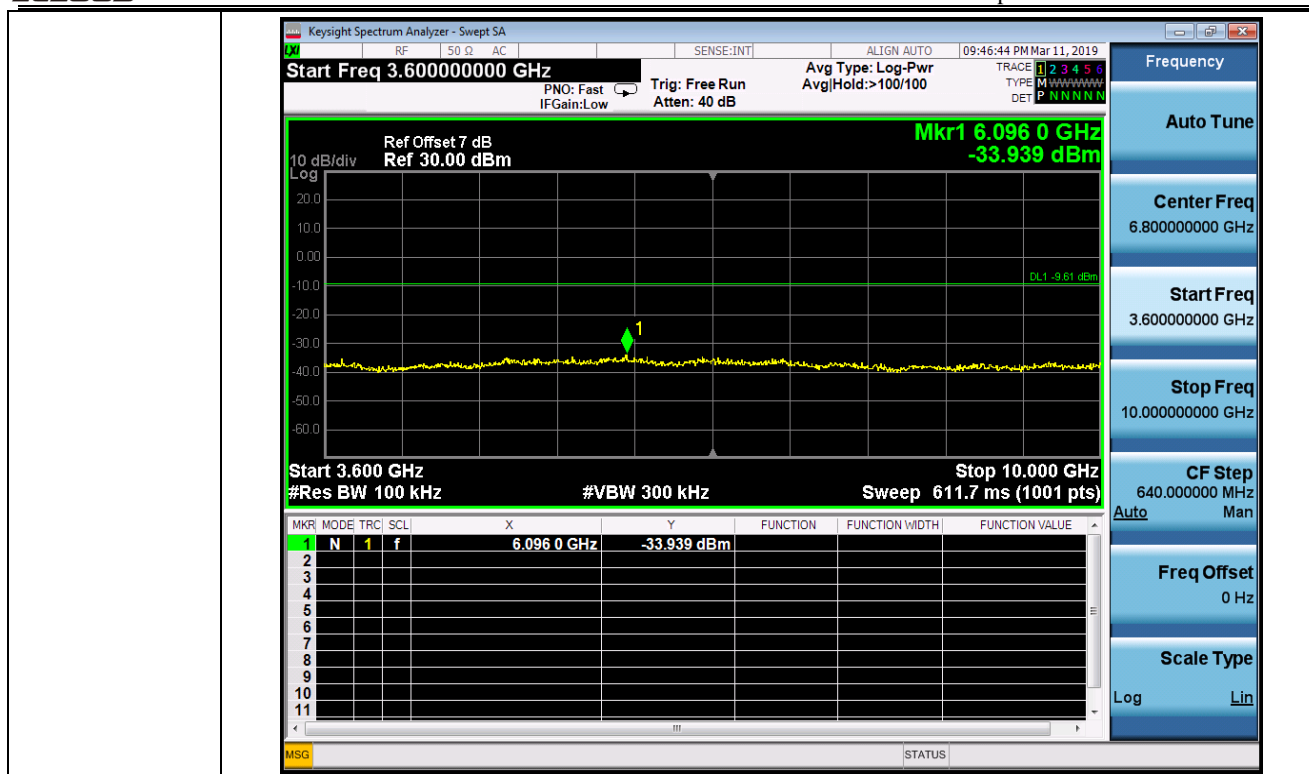
Mode 2 _HCH_Graphs

Pref/LORA/HCH



Puw/LORA/HCH





4.5 Radiated Spurious Emission Measurement

4.5.1 Limit of Radiated Spurious Emission

FCC §15.247 (d)

IC RSS-247 5.5

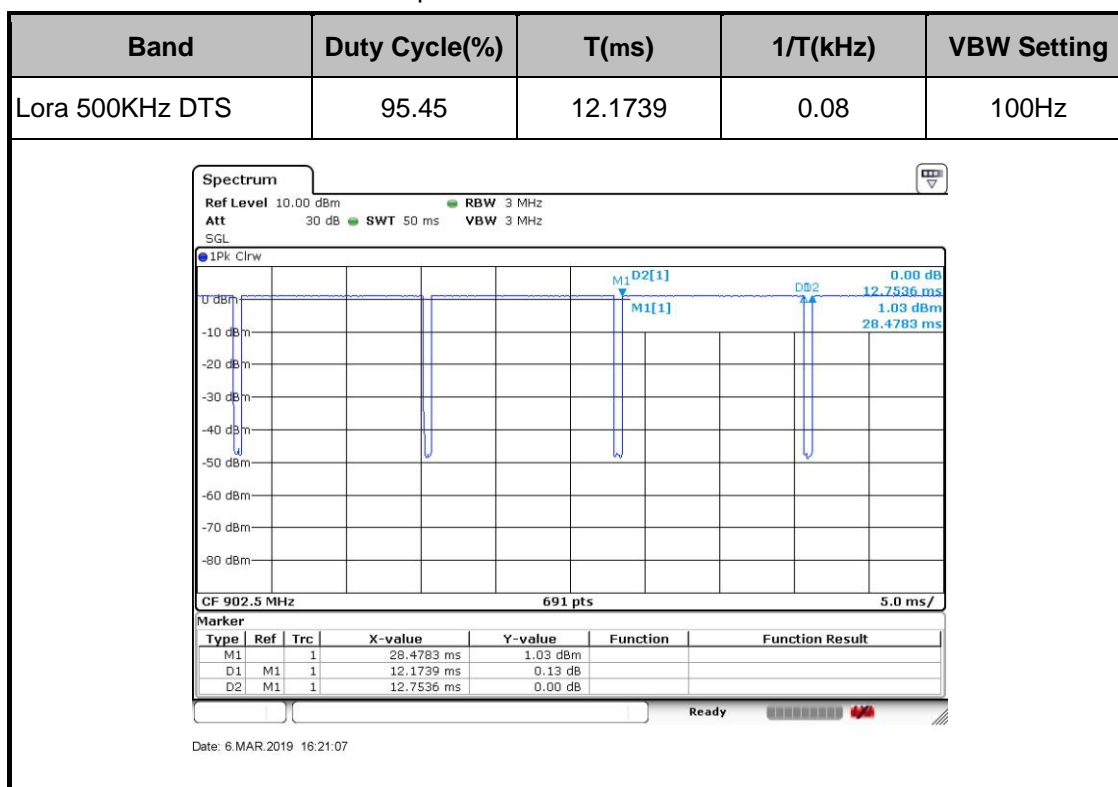
In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

Note: The frequency range from 9KHz to 10th harmonic (25GHz) are checked, and no any emissions were found from 18GHz to 25GHz, So the radiated emissions from 18GHz to 25GHz were not record.

4.5.2 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The measurement distance is 3 meter.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz, RBW=1MHz for $f > 1$ GHz ; VBW RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
 - (3) For average measurement:
 VBW = 10 Hz, when duty cycle is no less than 98 percent.
 VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

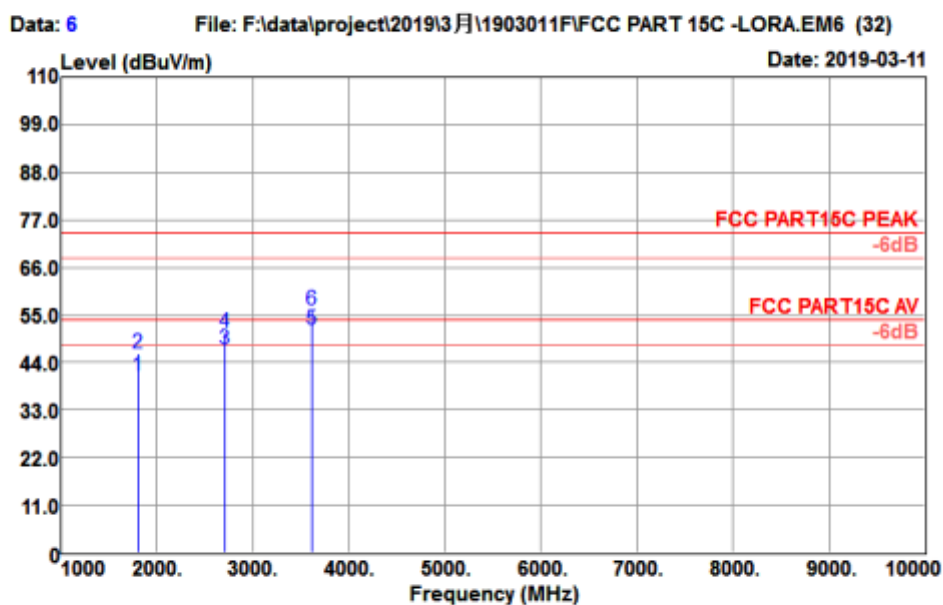
4.5.3 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

4.5.4 Test Result of Radiated Spurious Emission (1GHz ~ 10th Harmonic)

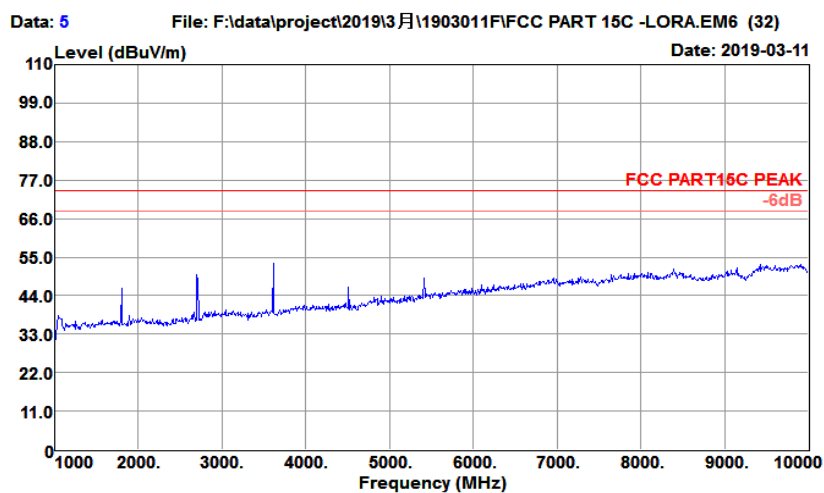
Mode 1 Low Channel Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 902.5MHz		



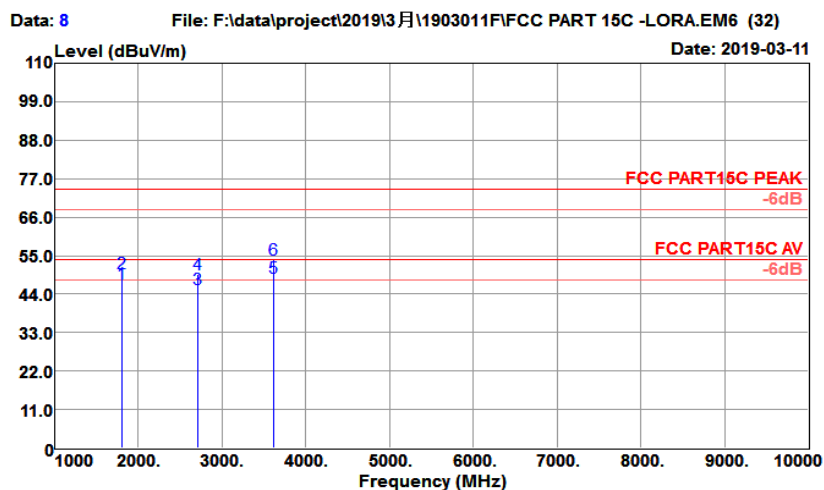
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
1805.000	47.18	25.79	2.87	35.09	40.75	54.00	-13.25	Average	216	57
1805.000	52.46	25.79	2.87	35.09	46.03	74.00	-27.97	Peak	216	57
2707.500	52.42	27.94	3.70	36.92	47.14	54.00	-6.86	Average	232	93
2707.500	56.19	27.94	3.70	36.92	50.91	74.00	-23.09	Peak	232	93
3610.000	54.62	29.07	4.79	36.99	51.49	54.00	-2.51	Average	232	267
3610.000	59.34	29.07	4.79	36.99	56.21	74.00	-17.79	Peak	232	267

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 902.5MHz		



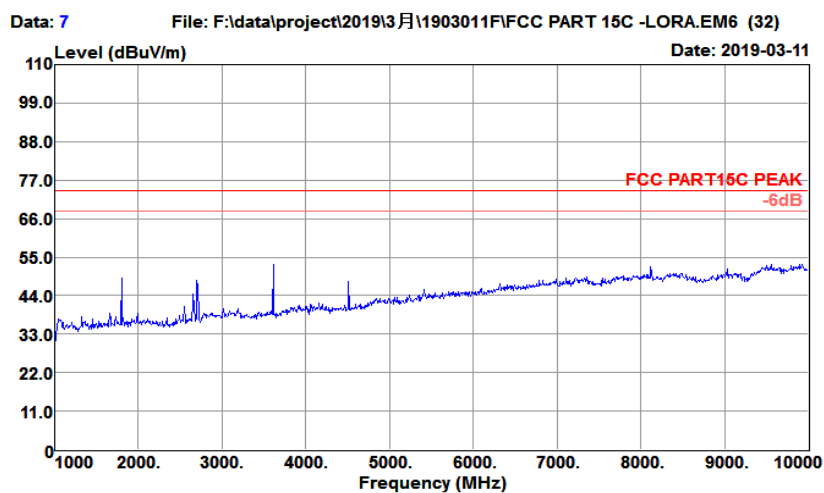
Mode 1 Low Channel Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating	: AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 902.5MHz		



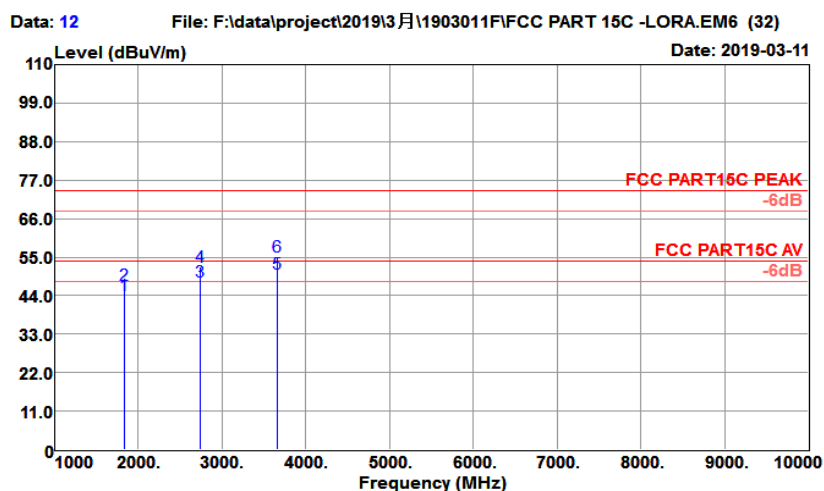
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
1805.000	53.63	25.79	2.87	35.09	47.20	54.00	-6.80	Average	150	166
1805.000	56.47	25.79	2.87	35.09	50.04	74.00	-23.96	Peak	150	166
2707.500	50.78	27.94	3.70	36.92	45.50	54.00	-8.50	Average	185	306
2707.500	54.92	27.94	3.70	36.92	49.64	74.00	-24.36	Peak	185	306
3610.000	51.94	29.07	4.79	36.99	48.81	54.00	-5.19	Average	150	56
3610.000	57.02	29.07	4.79	36.99	53.89	74.00	-20.11	Peak	150	56

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 902.5MHz		



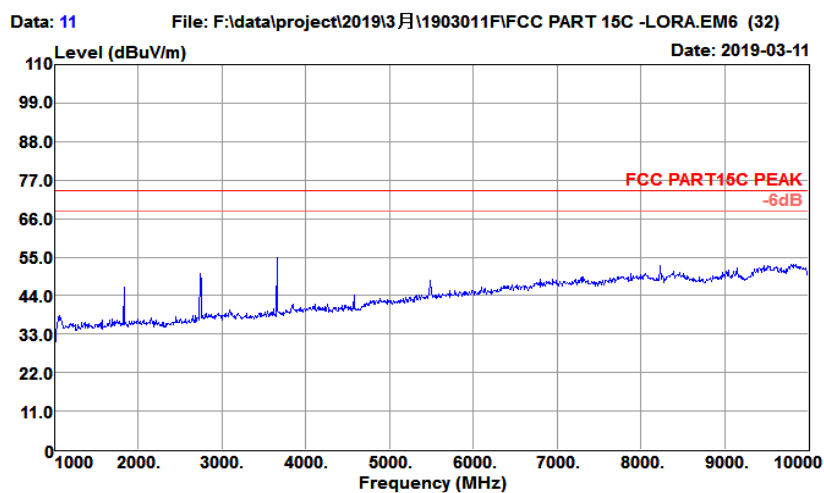
Mode 1 Middle Channel Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 914.5MHz		



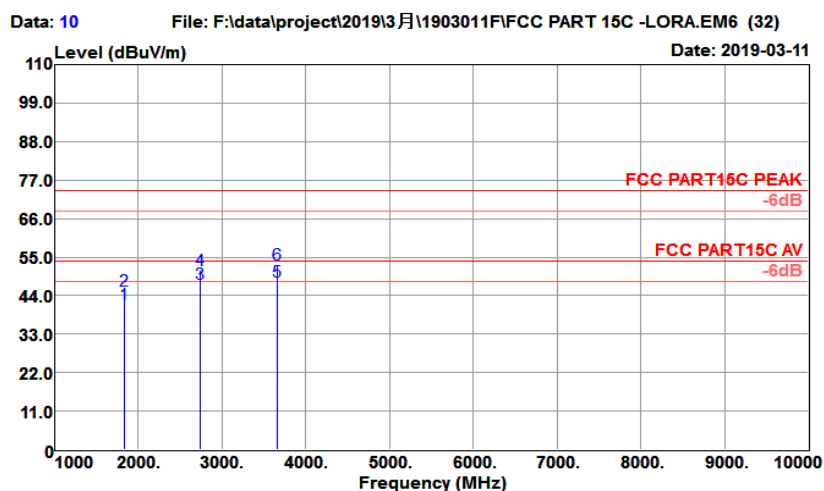
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
1829.000	50.62	25.83	2.87	35.08	44.24	54.00	-9.76	Average	232	158
1829.000	53.59	25.83	2.87	35.08	47.21	74.00	-26.79	Peak	232	158
2743.500	53.25	28.03	3.70	37.01	47.97	54.00	-6.03	Average	245	233
2743.500	57.57	28.03	3.70	37.01	52.29	74.00	-21.71	Peak	245	233
3658.000	53.23	29.09	4.89	36.94	50.27	54.00	-3.73	Average	162	62
3658.000	58.28	29.09	4.89	36.94	55.32	74.00	-18.68	Peak	162	59

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating	: AC 120V/60Hz
Model No.	: 5AT1S9-BENØ	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 914.5MHz		



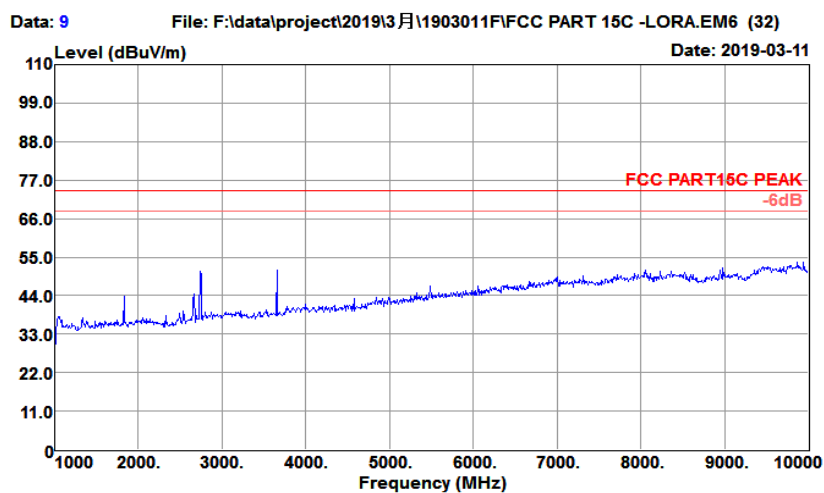
Mode 1 Middle Channel Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 914.5MHz		



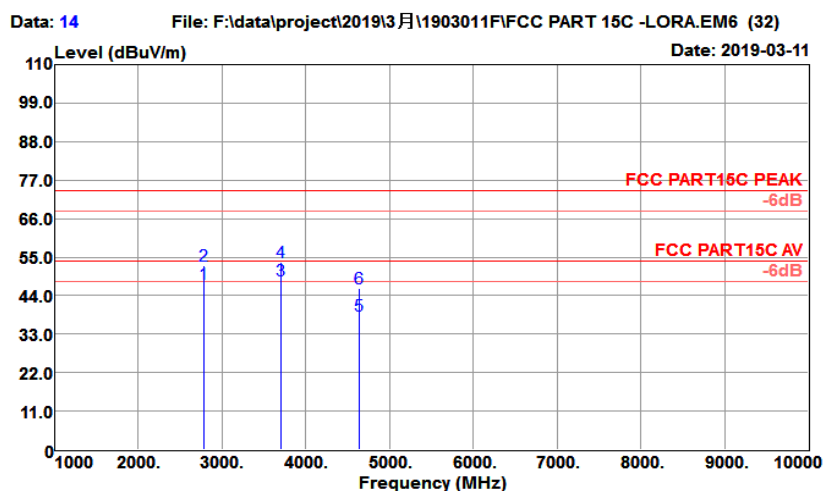
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
1829.000	47.79	25.83	2.87	35.08	41.41	54.00	-12.59	Average	150	110
1829.000	51.87	25.83	2.87	35.08	45.49	74.00	-28.51	Peak	150	110
2743.500	52.58	28.03	3.70	37.01	47.30	54.00	-6.70	Average	150	109
2743.500	56.57	28.03	3.70	37.01	51.29	74.00	-22.71	Peak	150	109
3658.000	50.88	29.09	4.89	36.94	47.92	54.00	-6.08	Average	157	49
3658.000	55.99	29.09	4.89	36.94	53.03	74.00	-20.97	Peak	157	49

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 914.5MHz		



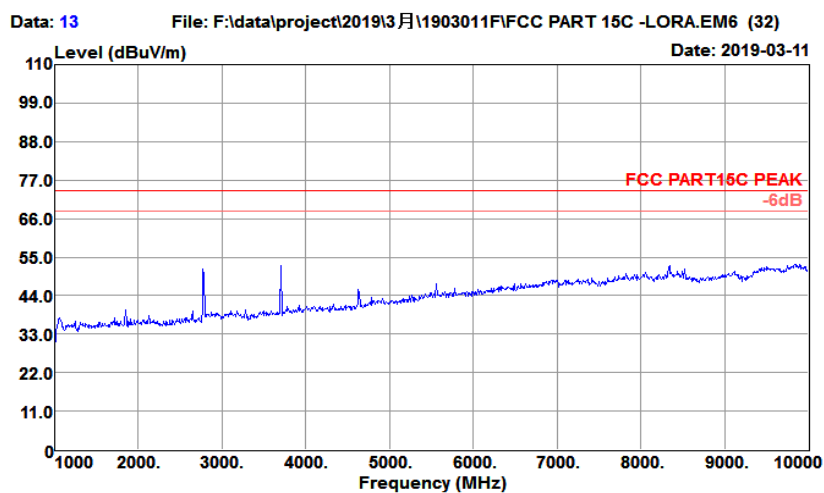
Mode 1 High Channel Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 926.5MHz		



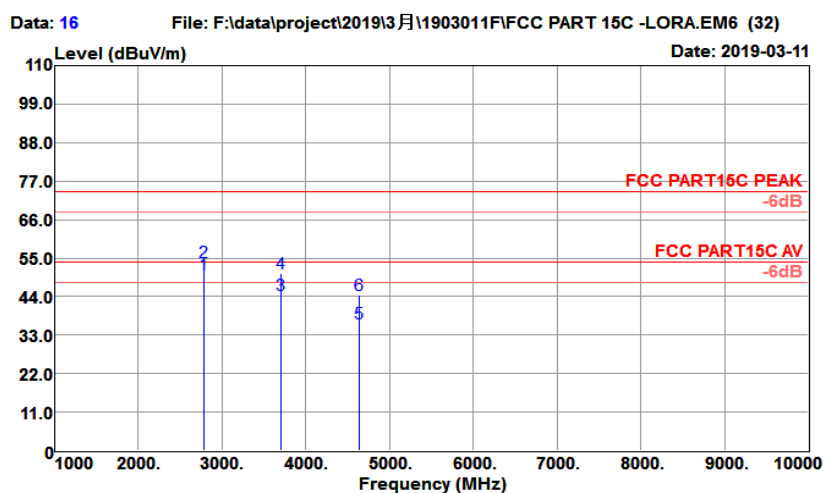
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
2779.500	52.81	28.13	3.69	37.11	47.52	54.00	-6.48	Average	232	217
2779.500	57.74	28.13	3.69	37.11	52.45	74.00	-21.55	Peak	232	217
3706.000	51.31	29.12	4.98	36.89	48.52	54.00	-5.48	Average	221	302
3706.000	56.35	29.12	4.98	36.89	53.56	74.00	-20.44	Peak	221	302
4632.500	38.55	30.82	5.22	36.33	38.26	54.00	-15.74	Average	222	163
4632.500	46.38	30.82	5.22	36.33	46.09	74.00	-27.91	Peak	222	163

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 926.5MHz		



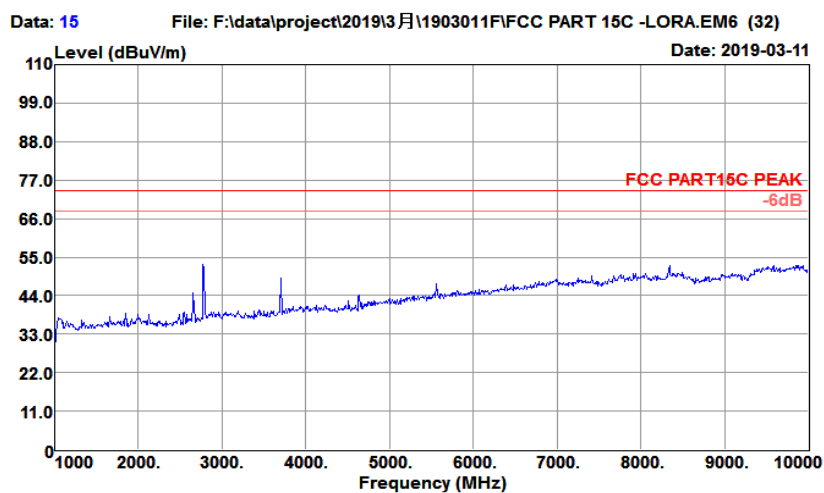
Mode 1 High Channel Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating	: AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 926.5MHz		



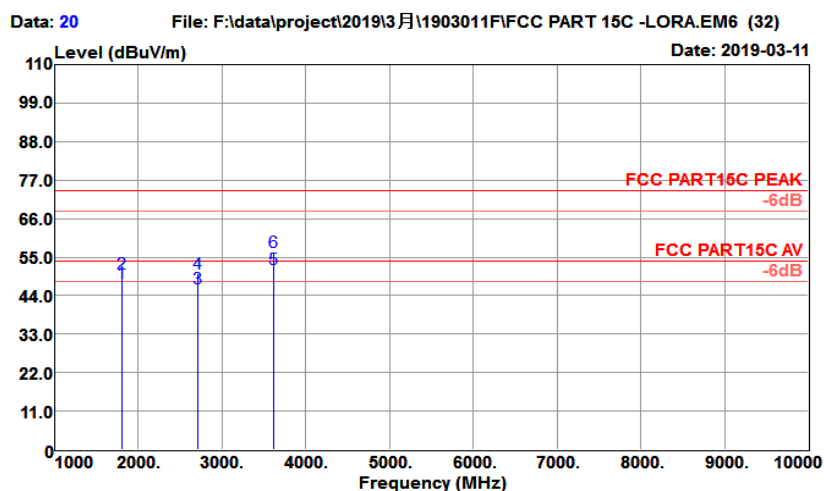
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
2779.500	55.49	28.13	3.69	37.11	50.20	54.00	-3.80	Average	150	297
2779.500	59.08	28.13	3.69	37.11	53.79	74.00	-20.21	Peak	150	297
3706.000	47.23	29.12	4.98	36.89	44.44	54.00	-9.56	Average	150	334
3706.000	53.27	29.12	4.98	36.89	50.48	74.00	-23.52	Peak	150	334
4632.500	36.57	30.82	5.22	36.33	36.28	54.00	-17.72	Average	150	332
4632.500	44.68	30.82	5.22	36.33	44.39	74.00	-29.61	Peak	150	332

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 926.5MHz		



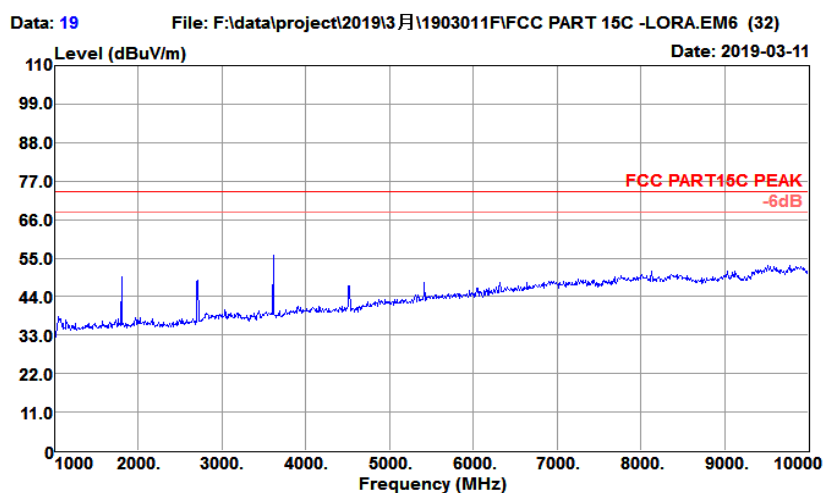
Mode 2 Low Channel Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 903MHz		



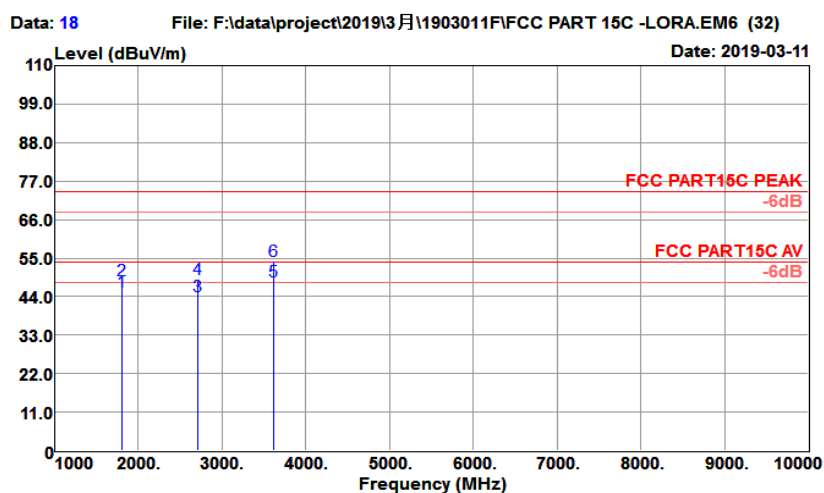
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
1806.000	54.04	25.79	2.87	35.09	47.61	54.00	-6.39	Average	212	52
1806.000	56.77	25.79	2.87	35.09	50.34	74.00	-23.66	Peak	212	52
2709.000	51.41	27.94	3.70	36.92	46.13	54.00	-7.87	Average	212	94
2709.000	55.45	27.94	3.70	36.92	50.17	74.00	-23.83	Peak	212	94
3612.000	54.76	29.07	4.79	36.99	51.63	54.00	-2.37	Average	224	101
3612.000	59.65	29.07	4.79	36.99	56.52	74.00	-17.48	Peak	224	101

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating	: AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 903MHz		



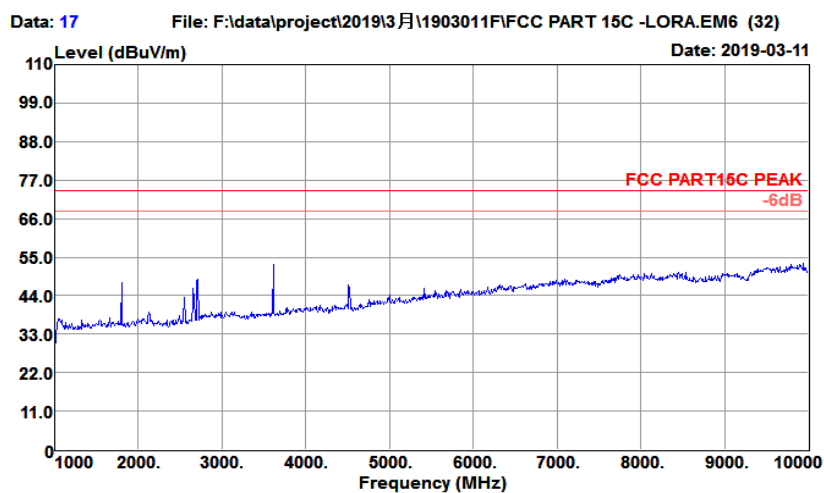
Mode 2 Low Channel Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating	: AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 903MHz		



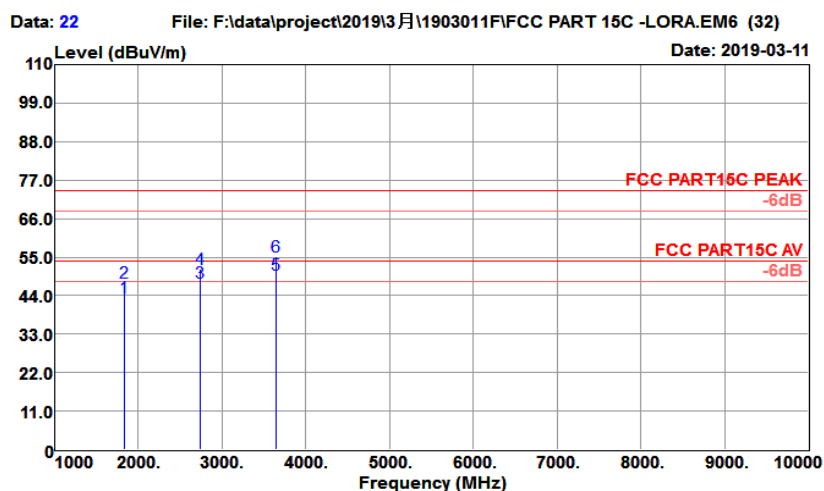
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
1806.000	52.03	25.79	2.87	35.09	45.60	54.00	-8.40	Average	150	115
1806.000	55.01	25.79	2.87	35.09	48.58	74.00	-25.42	Peak	150	115
2709.000	49.30	27.94	3.70	36.92	44.02	54.00	-9.98	Average	150	308
2709.000	54.15	27.94	3.70	36.92	48.87	74.00	-25.13	Peak	150	308
3612.000	51.64	29.07	4.79	36.99	48.51	54.00	-5.49	Average	150	48
3612.000	57.20	29.07	4.79	36.99	54.07	74.00	-19.93	Peak	150	48

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 903MHz		



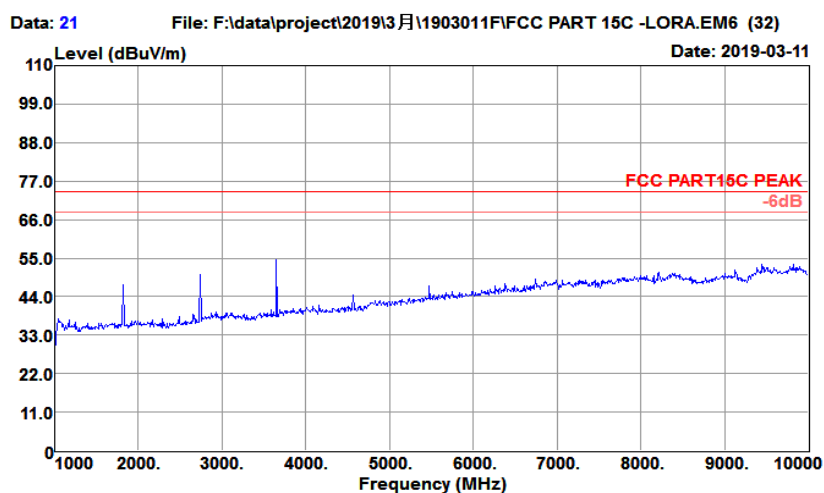
Mode 2 Middle Channel Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 912.6MHz		



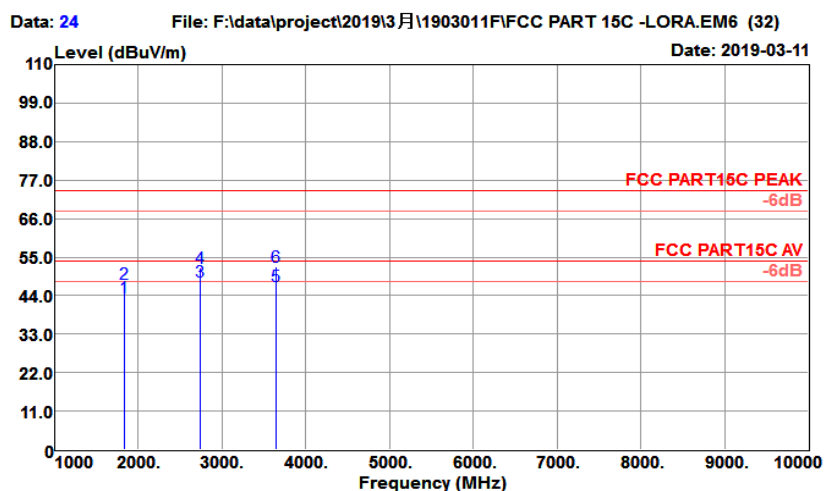
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
1825.200	50.03	25.82	2.87	35.08	43.64	54.00	-10.36	Average	255	254
1825.200	54.26	25.82	2.87	35.08	47.87	74.00	-26.13	Peak	255	254
2737.800	53.15	28.02	3.70	37.00	47.87	54.00	-6.13	Average	255	230
2737.800	56.90	28.02	3.70	37.00	51.62	74.00	-22.38	Peak	255	230
3650.400	52.97	29.09	4.87	36.95	49.98	54.00	-4.02	Average	168	267
3650.400	58.14	29.09	4.87	36.95	55.15	74.00	-18.85	Peak	168	267

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating	: AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 912.6MHz		



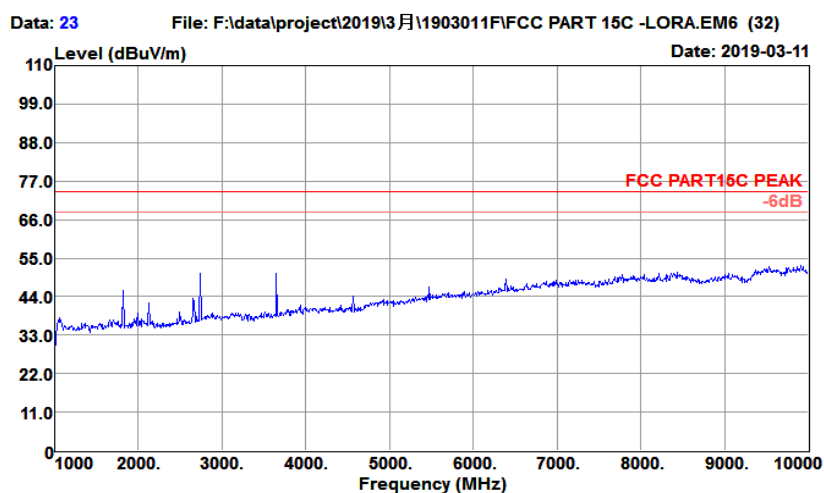
Mode 2 Middle Channel Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 912.6MHz		



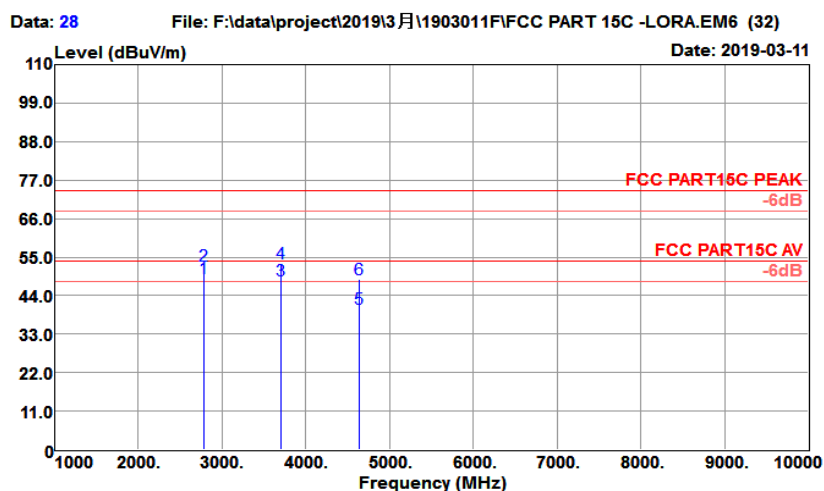
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamplifier factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
1825.200	49.86	25.82	2.87	35.08	43.47	54.00	-10.53	Average	150	305
1825.200	53.89	25.82	2.87	35.08	47.50	74.00	-26.50	Peak	150	305
2737.800	53.35	28.02	3.70	37.00	48.07	54.00	-5.93	Average	223	306
2737.800	57.07	28.02	3.70	37.00	51.79	74.00	-22.21	Peak	223	306
3650.400	49.71	29.09	4.87	36.95	46.72	54.00	-7.28	Average	150	47
3650.400	55.24	29.09	4.87	36.95	52.25	74.00	-21.75	Peak	150	47

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating	: AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 912.6MHz		



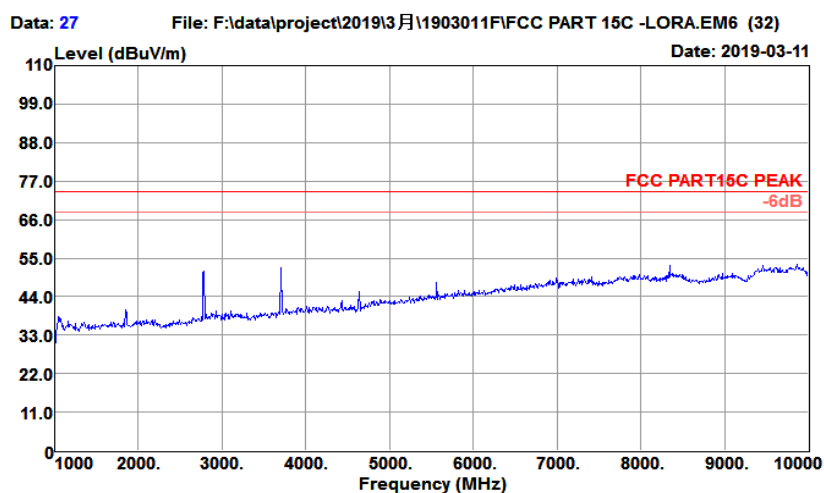
Mode 2 High Channel Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 926.9MHz		



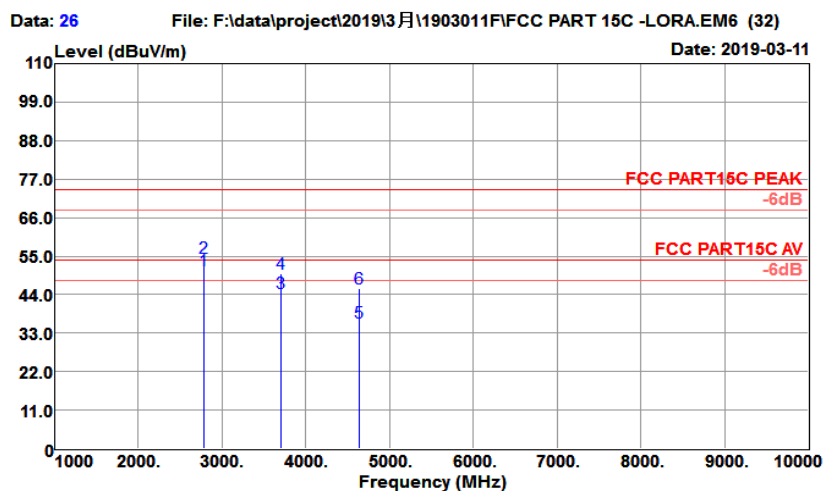
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
2780.700	54.15	28.13	3.69	37.11	48.86	54.00	-5.14	Average	168	68
2780.700	57.91	28.13	3.69	37.11	52.62	74.00	-21.38	Peak	168	68
3707.600	51.29	29.12	4.99	36.88	48.52	54.00	-5.48	Average	324	292
3707.600	56.00	29.12	4.99	36.88	53.23	74.00	-20.77	Peak	324	292
4634.500	40.61	30.82	5.22	36.33	40.32	54.00	-13.68	Average	324	290
4634.500	49.10	30.82	5.22	36.33	48.81	74.00	-25.19	Peak	324	290

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating	: AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 926.9MHz		



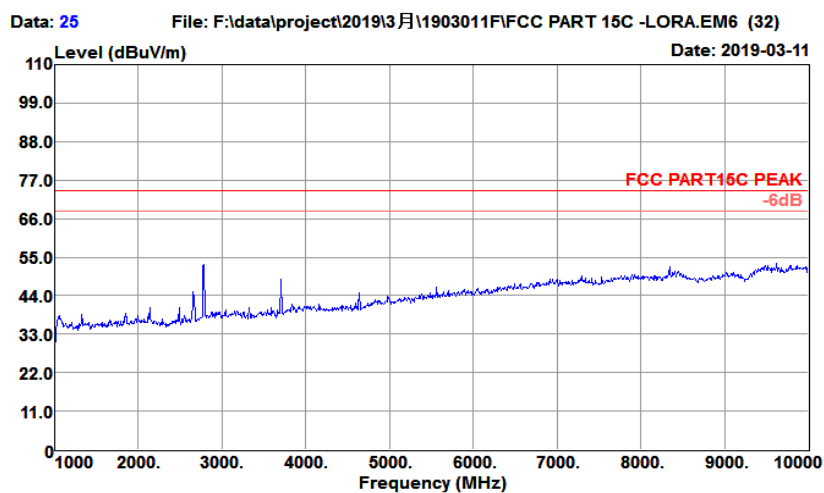
Mode 2 High Channel Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating	: AC 120V/60Hz
Model No.	: 5AT1S9-BENØ	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 926.9MHz		



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
2780.700	56.39	28.13	3.69	37.11	51.10	54.00	-2.90	Average	150	122
2780.700	59.82	28.13	3.69	37.11	54.53	74.00	-19.47	Peak	150	122
3707.600	47.11	29.12	4.99	36.88	44.34	54.00	-9.66	Average	150	41
3707.600	52.67	29.12	4.99	36.88	49.90	74.00	-24.10	Peak	150	41
4634.500	36.19	30.82	5.22	36.33	35.90	54.00	-18.10	Average	150	46
4634.500	45.92	30.82	5.22	36.33	45.63	74.00	-28.37	Peak	150	46

Test Site	: 3m Chamber	Temp/Humi	: 17°C/50%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 926.9MHz		

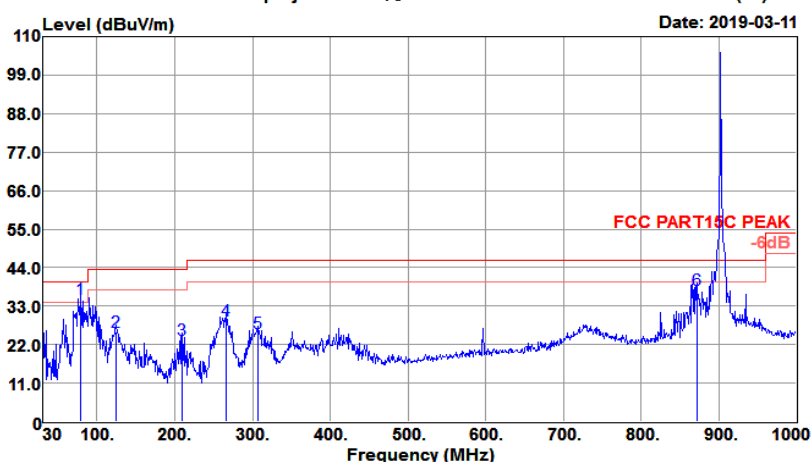


4.5.5 Test Result of Radiated Spurious Emission (30MHz ~ 1GHz)

Mode 1 Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/53%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 902.5MHz		

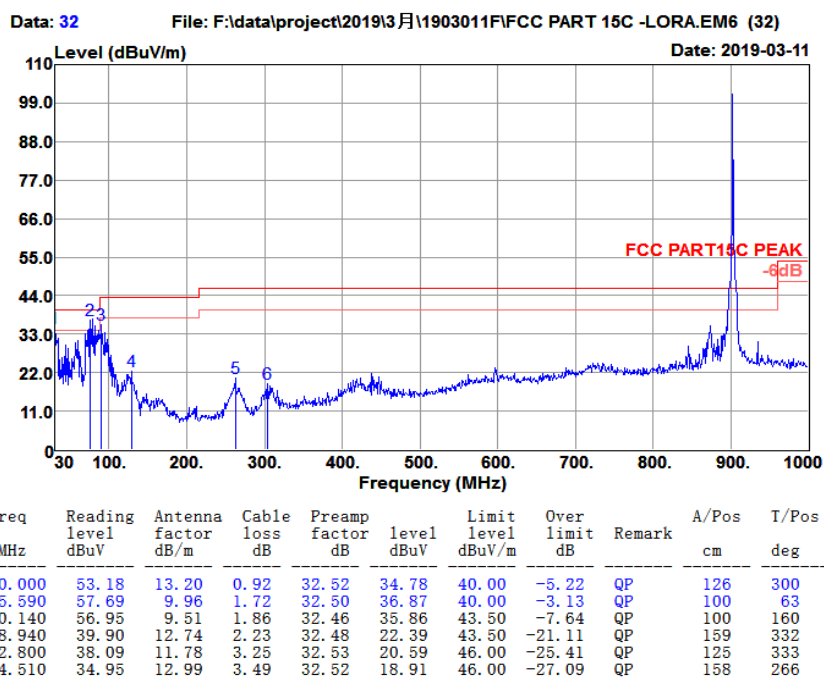
Data: 31 File: F:\data\project\2019\3月\1903011F\FCC PART 15C -LORA.EM6 (32)



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamplifier factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
79.470	56.29	9.38	1.72	32.49	34.90	40.00	-5.10	QP	262	45
125.060	43.46	12.50	2.18	32.48	25.66	43.50	-17.84	QP	220	239
209.450	42.74	10.18	2.90	32.55	23.27	43.50	-20.23	QP	128	250
266.680	46.20	11.90	3.26	32.53	28.83	46.00	-17.17	QP	100	300
306.450	41.35	13.02	3.50	32.52	25.35	46.00	-20.65	QP	100	49
871.960	42.17	21.45	6.19	32.24	37.57	46.00	-8.43	QP	296	220

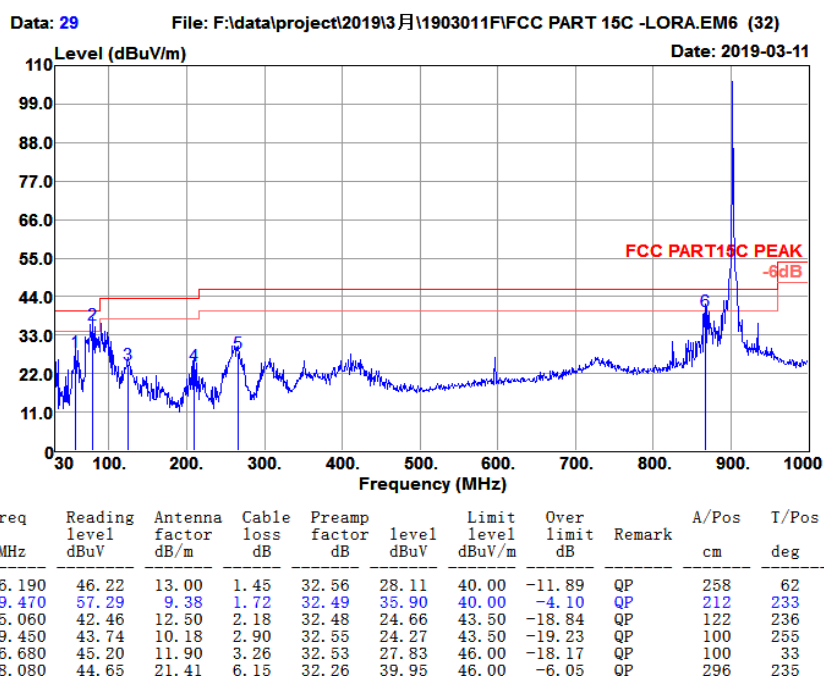
Mode 1 Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/53%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 902.5MHz		



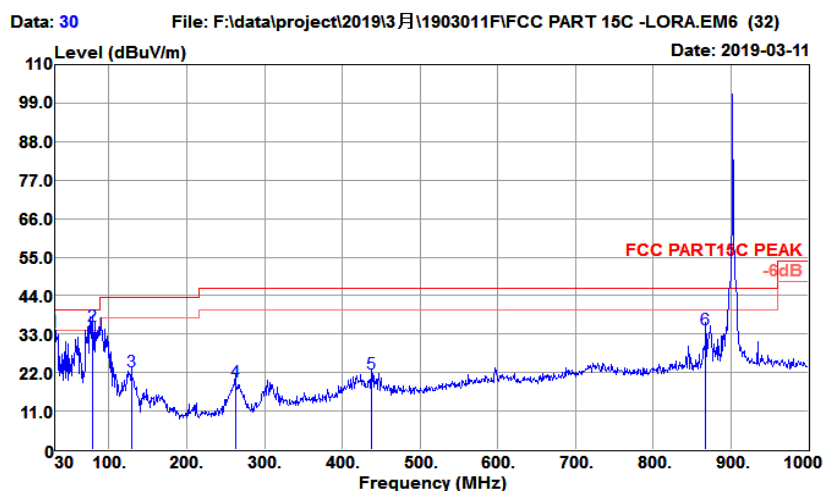
Mode 2 Horizontal:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/53%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: HORIZONTAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 903MHz		



Mode 2 Vertical:

Test Site	: 3m Chamber	Temp/Humi	: 17°C/53%
Tested by	: Damon	Power rating:	AC 120V/60Hz
Model No.	: 5AT1S9-BEN0	Pol/Phase	: VERTICAL
EUT	: Transformer		
Test Mode	: Lora 500KHz DTS 903MHz		



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark	A/Pos cm	T/Pos deg
30.000	52.18	13.20	0.92	32.52	33.78	40.00	-6.22	QP	122	302
79.470	56.73	9.38	1.72	32.49	35.34	40.00	-4.66	QP	123	66
128.940	39.90	12.74	2.23	32.48	22.39	43.50	-21.11	QP	100	145
262.800	37.09	11.78	3.25	32.53	19.59	46.00	-26.41	QP	156	253
437.400	34.44	15.44	4.22	32.50	21.60	46.00	-24.40	QP	125	313
868.080	39.04	21.41	6.15	32.26	34.34	46.00	-11.66	QP	152	226

4.6 AC Conducted Emission Measurement

4.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

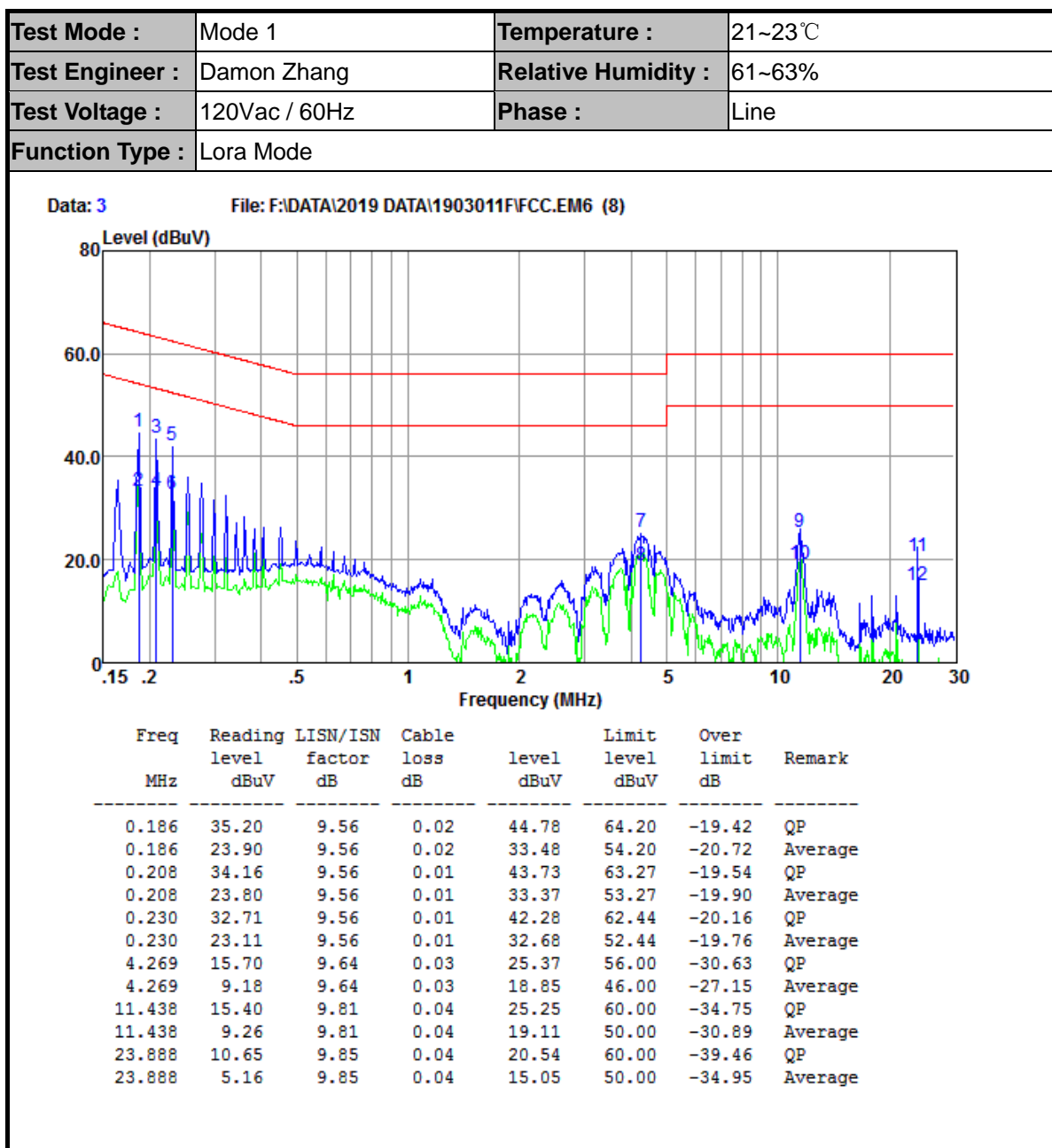
Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

4.6.2 Test Procedures

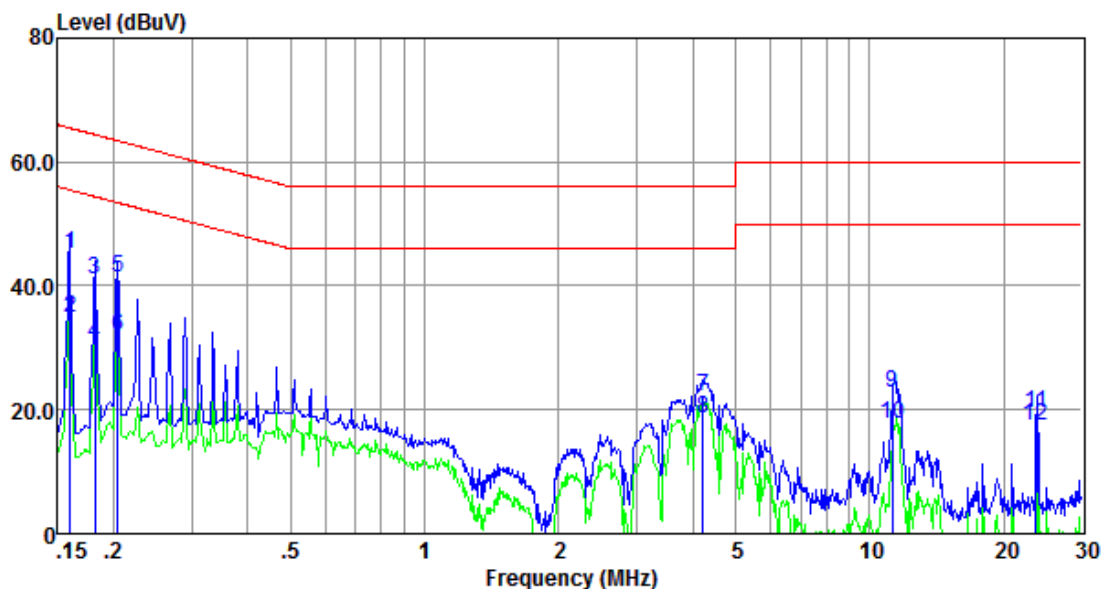
- 1.The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2.Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3.All the support units are connecting to the other LISN.
- 4.The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5.The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- 6.Both sides of AC line were checked for maximum conducted interference.
- 7.The frequency range from 150 kHz to 30 MHz was searched.
- 8.Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

4.6.3 Test Result of AC Conducted Emission



Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Damon Zhang	Relative Humidity :	61~63%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Lora Mode		

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Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.160	35.69	9.55	0.06	45.30	65.46	-20.16	QP
0.160	25.19	9.55	0.06	34.80	55.46	-20.66	Average
0.182	31.30	9.56	0.03	40.89	64.42	-23.53	QP
0.182	21.10	9.56	0.03	30.69	54.42	-23.73	Average
0.204	31.60	9.57	0.01	41.18	63.45	-22.27	QP
0.204	22.20	9.57	0.01	31.78	53.45	-21.67	Average
4.224	12.30	9.69	0.03	22.02	56.00	-33.98	QP
4.224	8.80	9.69	0.03	18.52	46.00	-27.48	Average
11.220	12.91	9.87	0.04	22.82	60.00	-37.18	QP
11.220	7.91	9.87	0.04	17.82	50.00	-32.18	Average
23.620	9.50	9.93	0.04	19.47	60.00	-40.53	QP
23.620	7.30	9.93	0.04	17.27	50.00	-32.73	Average

4.7 Antenna Requirements

4.7.1 Standard Applicable

According to antenna requirement of §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

4.7.2 Antenna Connected Construction

An embedded-in antenna design is used.

4.7.3 Antenna Gain

The antenna peak gain of EUT is -2.5 dBi for BLE and -3.8 dBi for Lora less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

5. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	Keysight	N9010A	MY56070788	2019/1/23	2020/1/22	Conducted
Power Sensor	Keysight	U2021XA	MY56510025	2019/1/23	2020/1/22	Conducted
Power Sensor	Keysight	U2021XA	MY57030005	2019/1/23	2020/1/22	Conducted
Power Sensor	Keysight	U2021XA	MY56510018	2019/1/23	2020/1/22	Conducted
Power Sensor	Keysight	U2021XA	MY56480002	2019/1/23	2020/1/22	Conducted
Thermal Chamber	Sanmtest	SMC-408-CD	2435	2018/7/5	2019/7/4	Conducted
Base Station	R&S	CMW 270	101231	2019/1/23	2020/1/22	Conducted
Signal Generator (Interferer)	Keysight	N5182B	MY56200384	2018/04/10	2019/04/09	Conducted
Signal Generator (Blocker)	Keysight	N5171B	MY56200661	2019/1/23	2020/1/22	Conducted

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV 40	101433	2019/2/18	2020/2/17	Radiation
Amplifier	Sonoma	310	363917	2019/1/22	2020/1/21	Radiation
Amplifier	Schwarzbeck	BBV 9718	327	2019/1/22	2020/1/21	Radiation
Amplifier	Narda	TTA1840-35-HG	2034380	2018/7/18	2019/7/17	Radiation
Broadband Antenna	Schwarzbeck	VULB 9168	9168-757	2017-03-03	2020-03-02	Radiation
Horn Antenna	Schwarzbeck	BBHA 9120 D	1677	2017-03-03	2020-03-02	Radiation
Horn Antenna	COM-POWER	AH-1840	101117	2018-06-20	2021-06-19	Radiation
Test Software	Auidx	E3	6.111221a	N/A	N/A	Radiation
Filter	Micro-Tronics	BRM 50702	G266	N/A	N/A	Radiation

N/A: No Calibration Required

6. Uncertainty of Evaluation

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.64dB
Radiated emission	30MHz ~ 1GMHz	5.05dB
	1GHz ~ 18GHz	5.06 dB
	18GHz ~ 40GHz	3.65dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

-----End of the report-----