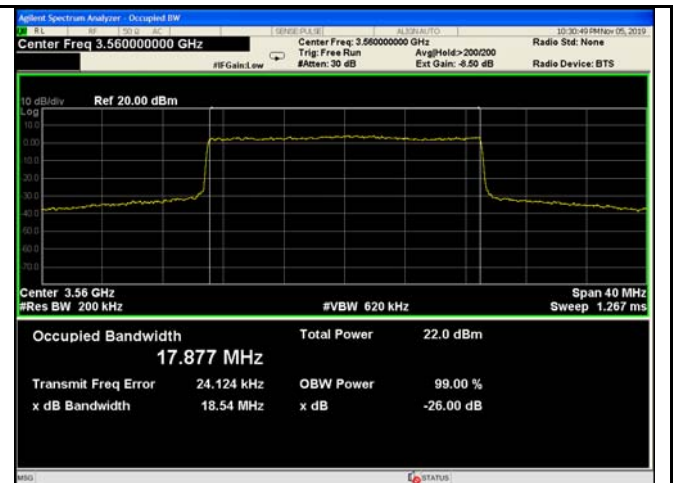
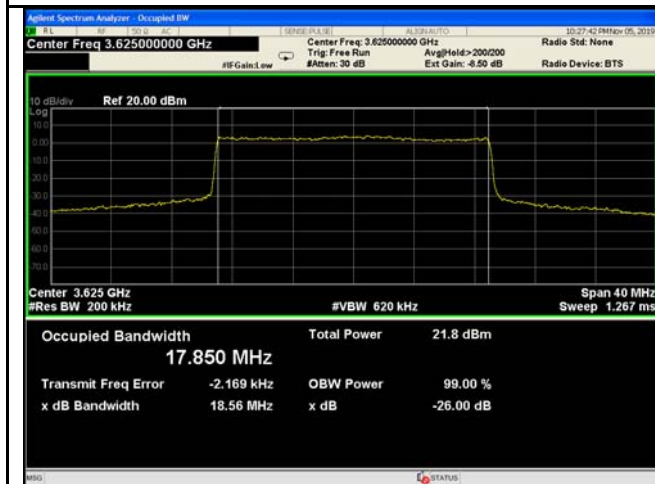


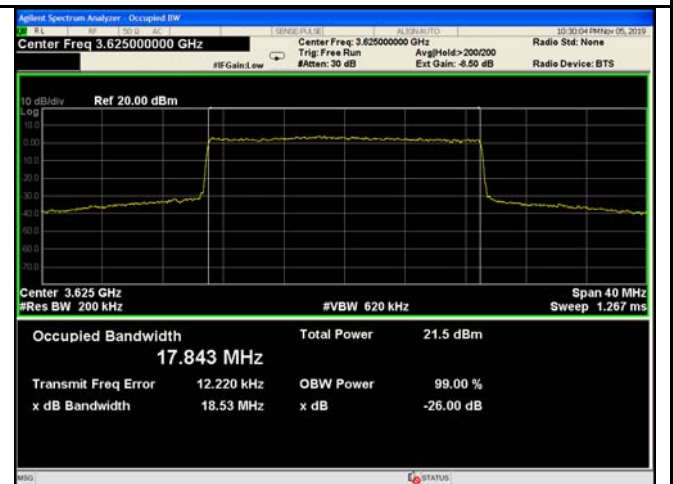
20MHz - Low CH QPSK



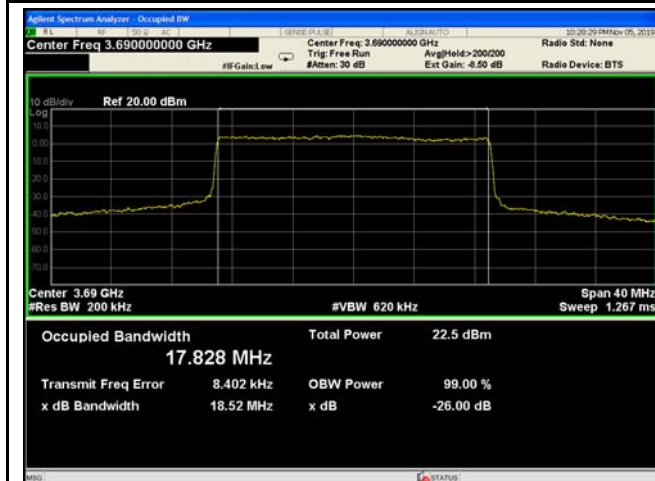
20MHz - Low CH 16QAM



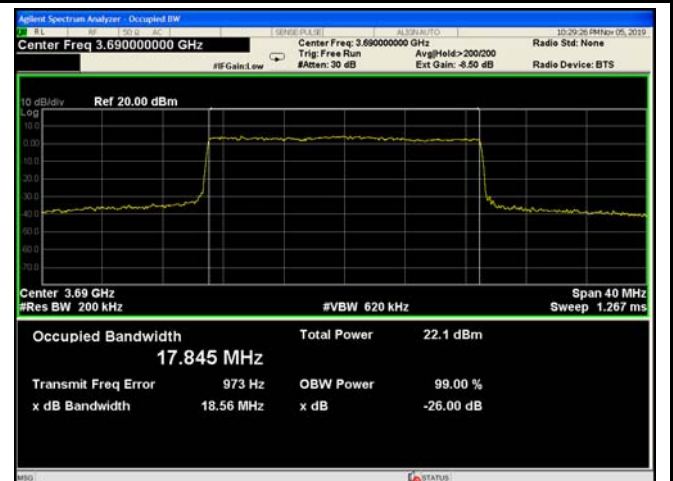
20MHz - Middle CH QPSK



20MHz - Middle CH 16QAM



20MHz - High CH QPSK



20MHz - High CH 16QAM

10 Emission outside the fundamental

Test Requirement:	FCC part 96.41(e)
Test Method:	ANSI/TIA-603-E:2016, ANSI C63.26:2015
Test Mode:	Data communicating mode
Limit:	<ul style="list-style-type: none">• within 0 MHz to 10 MHz above and below the assigned channel ≤ -13 dBm/MHz• greater than 10 MHz above and below the assigned channel ≤ -25 dBm/MHz• any emission below 3530 MHz and above 3720 MHz ≤ -40 dBm/MHz

10.1 EUT Operation

Operating Environment :	
Temperature:	22.7 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	102.3kPa

10.2 Test Procedure

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. Measurements must be performed for low, mid, and high channels.
3. RBW=1% of fundamental for measurements within 1 MHz immediately outside the authorized channel; and 1 MHz for beyond 1 MHz outside the authorized channel. (eg. For 5MHz, RBW=51KHz within 1 MHz immediately outside the authorized channel)
4. Trace average at least 100 traces

10.3 Test Result

Test Plots





10MHz - Low CH QPSK- Chain 0



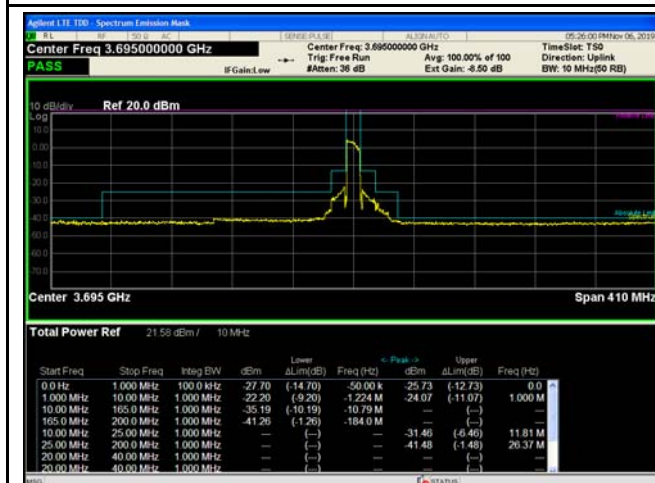
10MHz - Low CH QPSK - Chain 1



10MHz - Middle CH QPSK- Chain 0



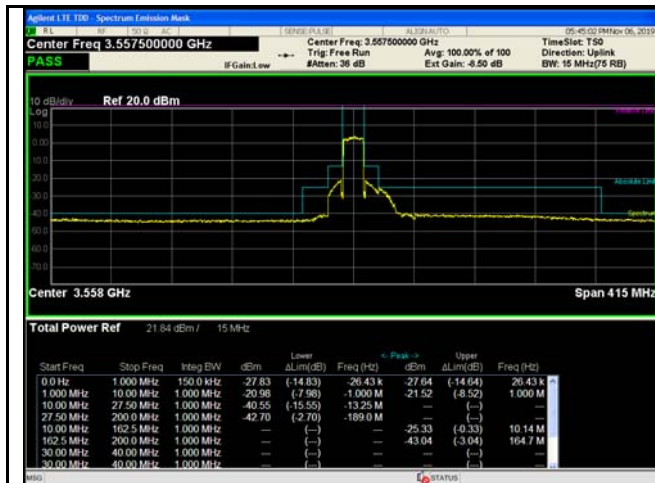
10MHz - Middle CH QPSK - Chain 1



10MHz - High CH QPSK- Chain 0



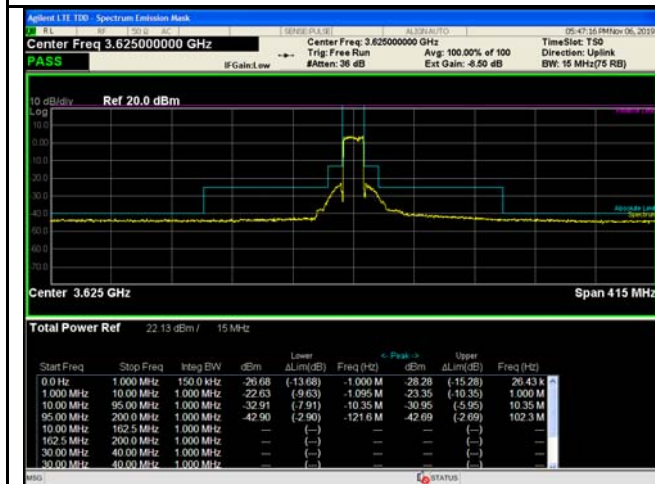
10MHz - High CH QPSK - Chain 1



15MHz - Low CH QPSK- Chain 0



15MHz - Low CH QPSK - Chain 1



15MHz - Middle CH QPSK- Chain 0



15MHz - Middle CH QPSK - Chain 1



15MHz - High CH QPSK- Chain 0



15MHz - High CH QPSK - Chain 1



20MHz - Low CH QPSK- Chain 0



20MHz - Low CH QPSK - Chain 1



20MHz - Middle CH QPSK- Chain 0



20MHz - Middle CH QPSK - Chain 1



20MHz - High CH QPSK- Chain 0



20MHz - High CH QPSK - Chain 1

11 Out of band emission at antenna terminals

Test Requirement:	FCC part 96.41(e)
Test Method:	ANSI/TIA-603-E:2016, ANSI C63.26:2015
Test Mode:	Data communicating mode
Limit:	below 3530 MHz and above 3720 MHz \leq -40dBm

11.1 EUT Operation

Operating Environment :

Temperature:	23.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.3kPa

11.2 Test Procedure

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was 1MHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

11.3 Test Result

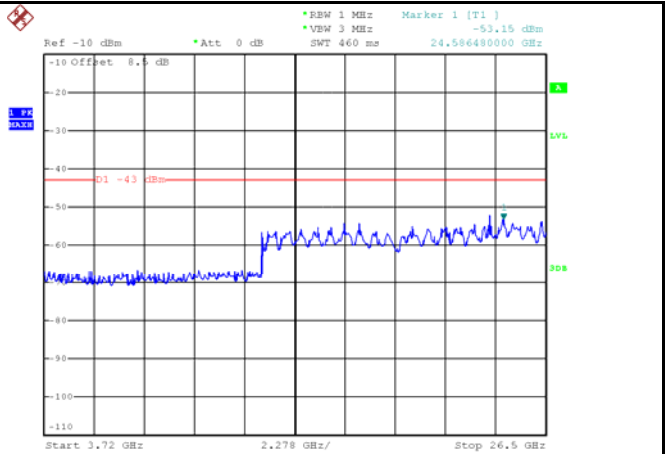
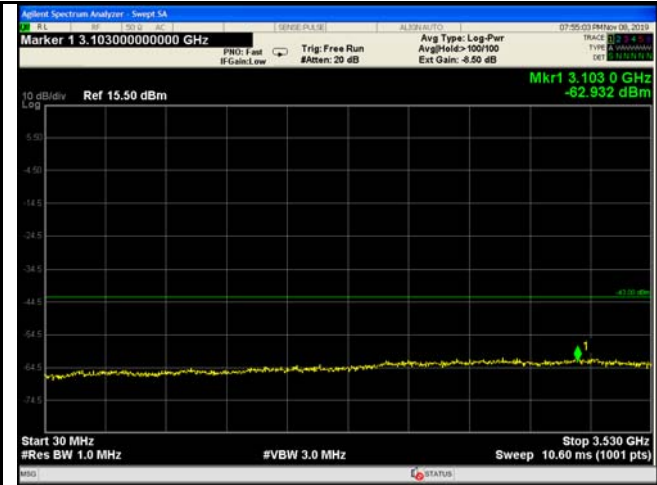
Remark: During the test, pre-scan the QPSK, 16QAM modulation, and found the QPSK modulation(5MHz/10MHz/15MHz/20MHz) is the worst case.

The permit frequency range of Part 96 is from 3550-3700MHz. Notes as below:

Note 1: This device can be implement MIMO function, so the limit of spurious emissions needs to be reduced by $10\log(\text{Numbers}_{\text{ANT}})$ according to KDB 662911
The general limit = -40dBm
For 2x2 MIMO, the limit = -40dBm - $10\log 2$ = -43dBm.

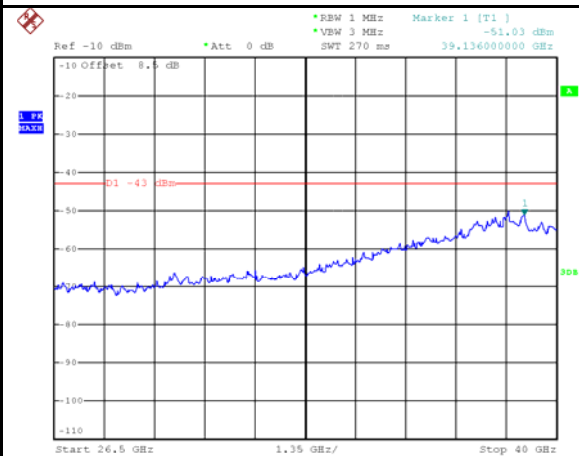
Test Plots (Worst case)

Spurious emission
Chain 0



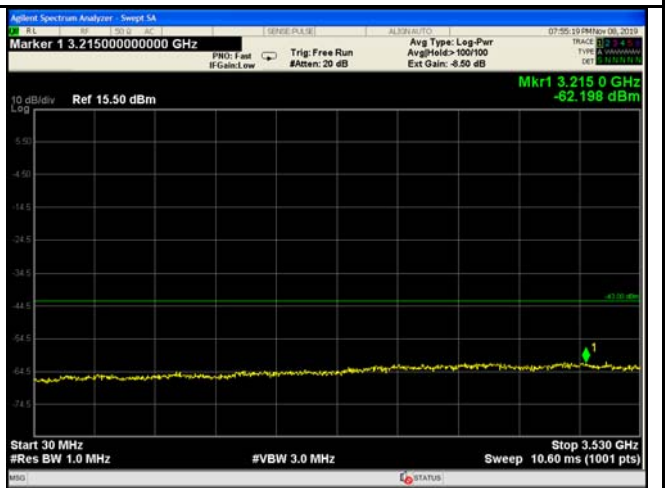
Date: 8.NOV.2019 00:15:37

5MHz - Low CH 30MHz~3.53GHz



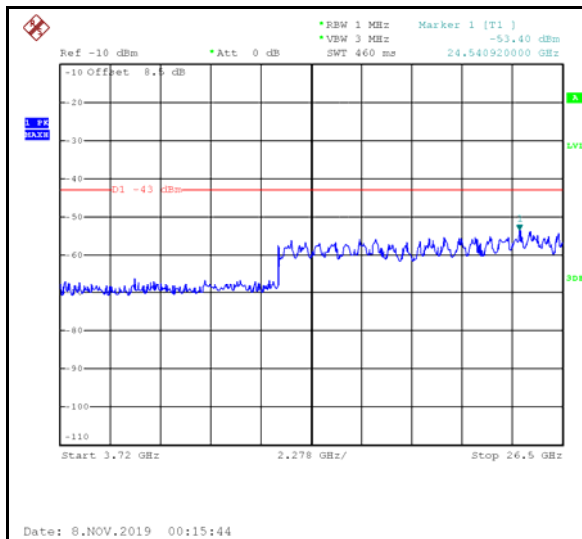
Date: 8.NOV.2019 00:20:31

5MHz - Low CH 3.72GHz~26.5GHz

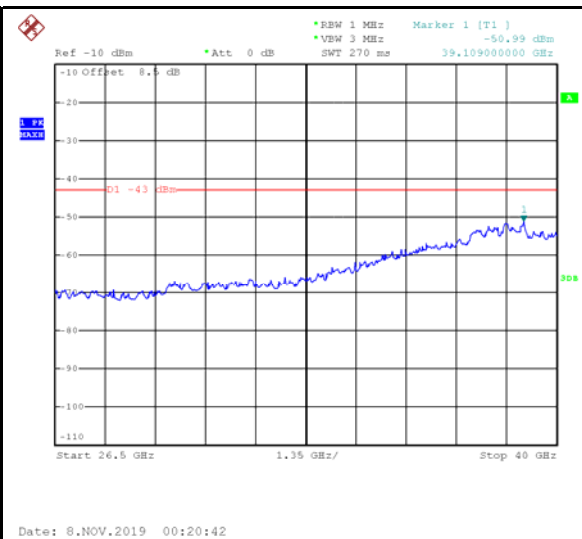


5MHz - Low CH 26.5GHz~40GHz

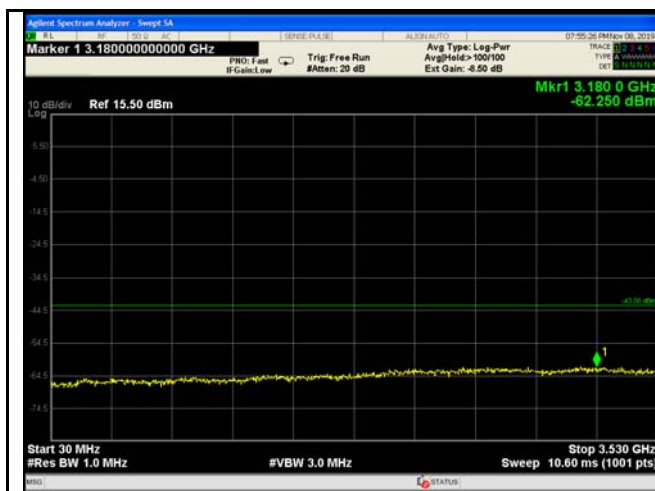
5MHz - Middle CH 30MHz~3.53GHz



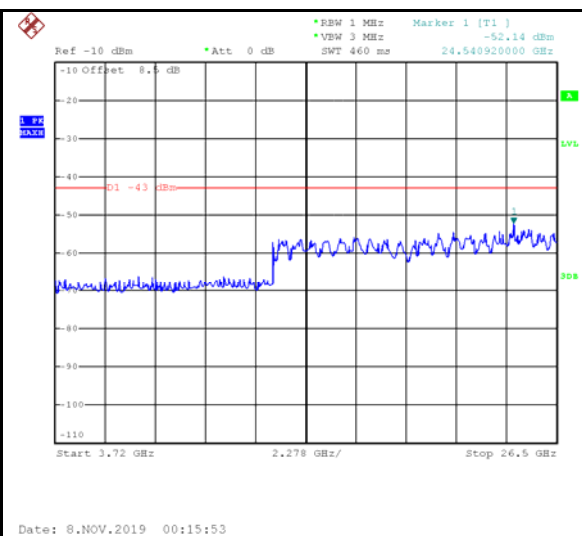
5MHz - Middle CH 3.72GHz~26.5GHz



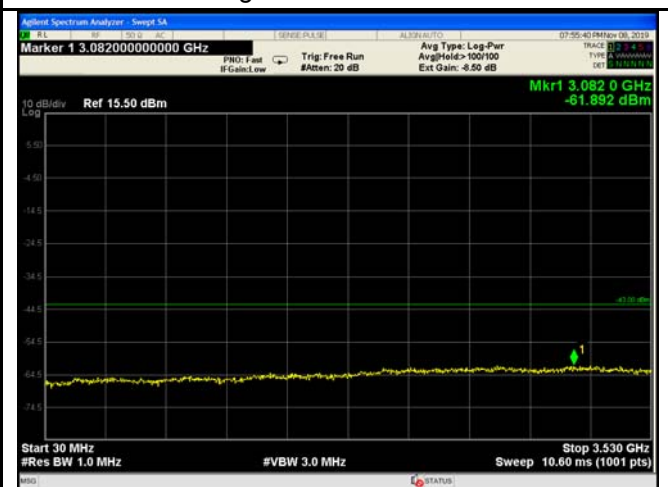
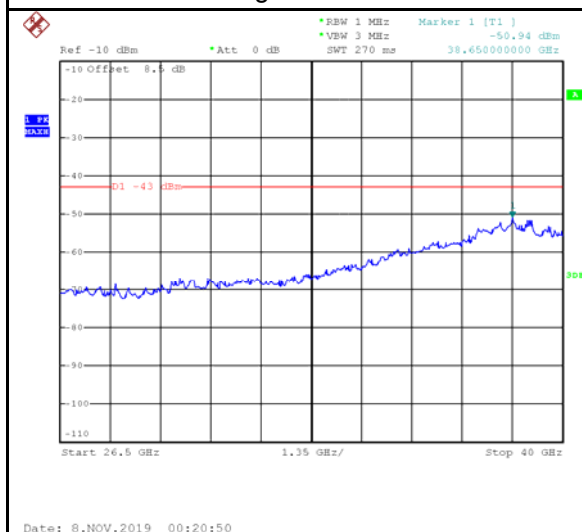
5MHz - Middle CH 26.5GHz~40GHz

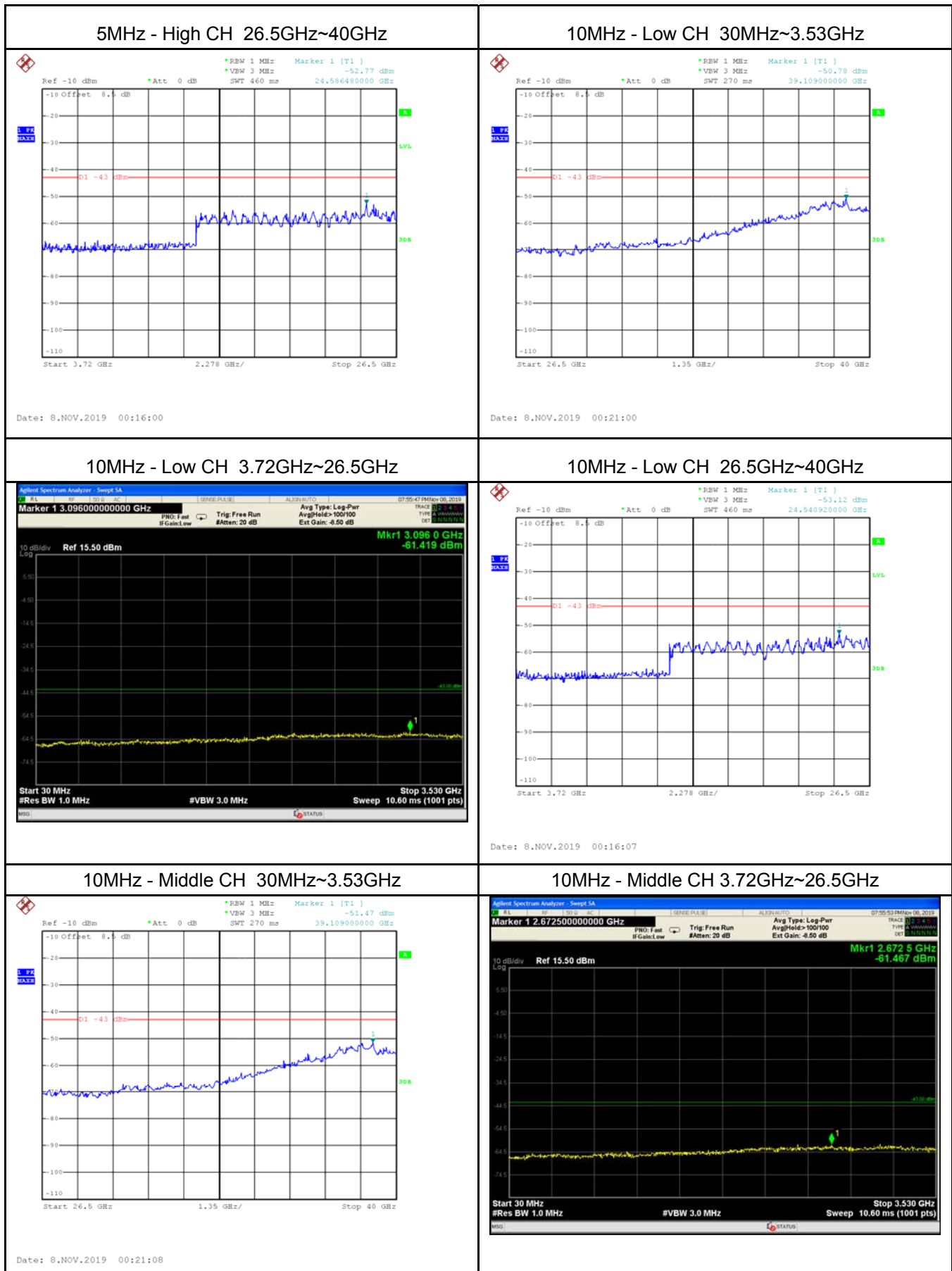


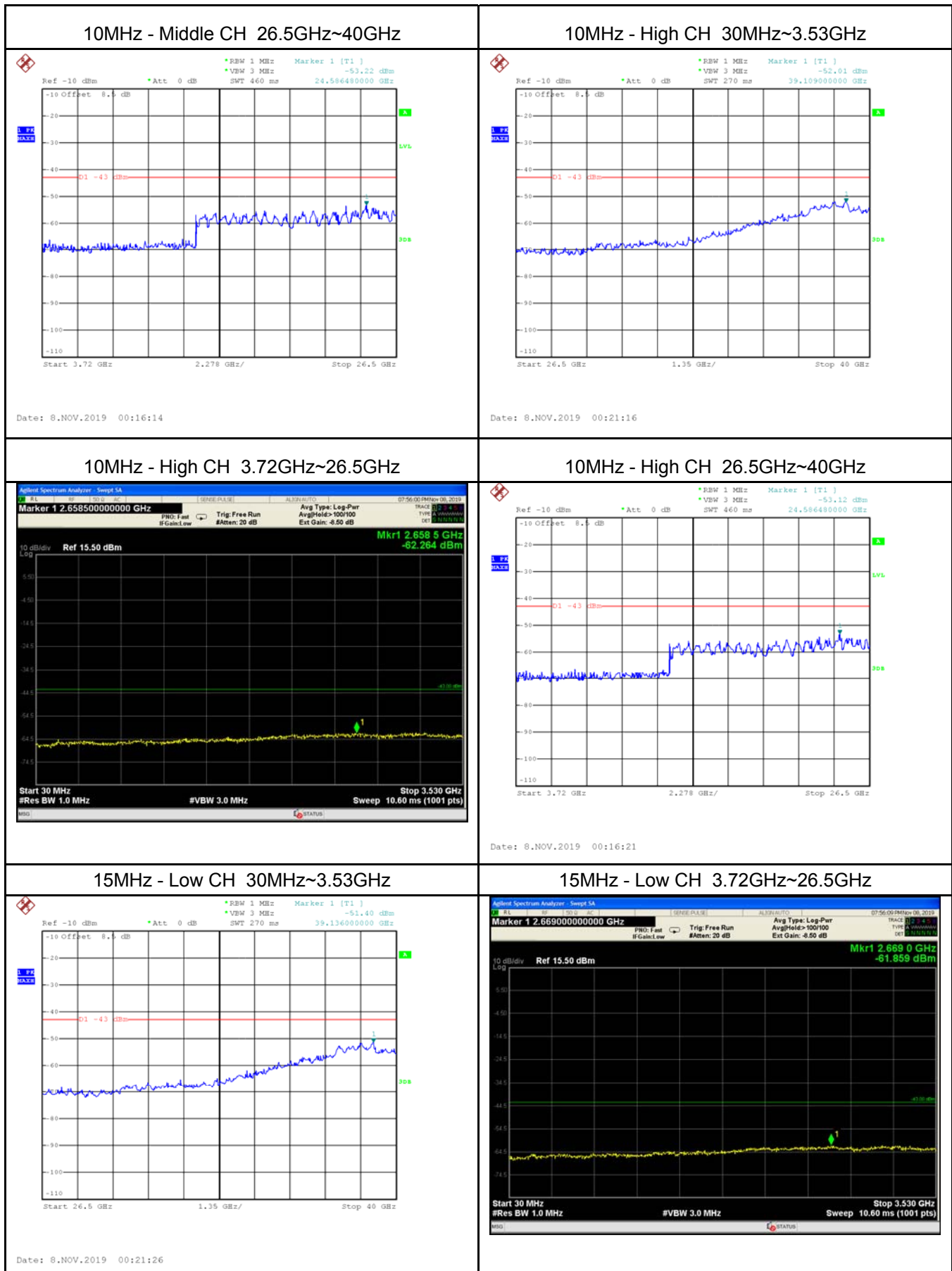
5MHz - High CH 30MHz~3.53GHz

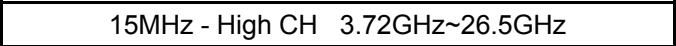
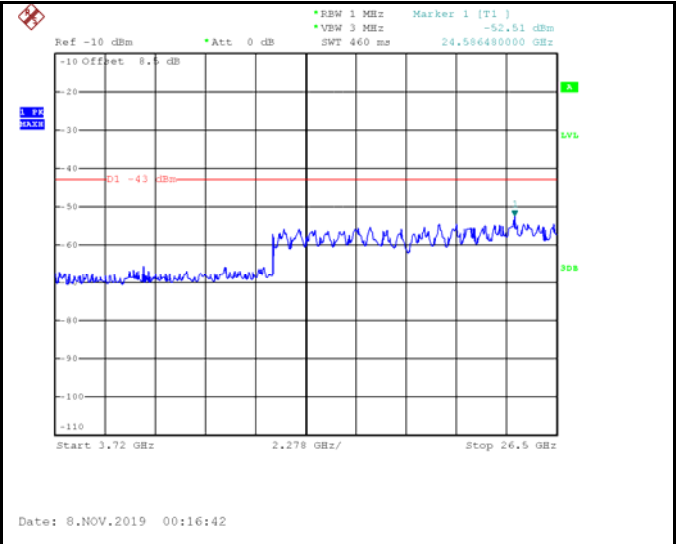
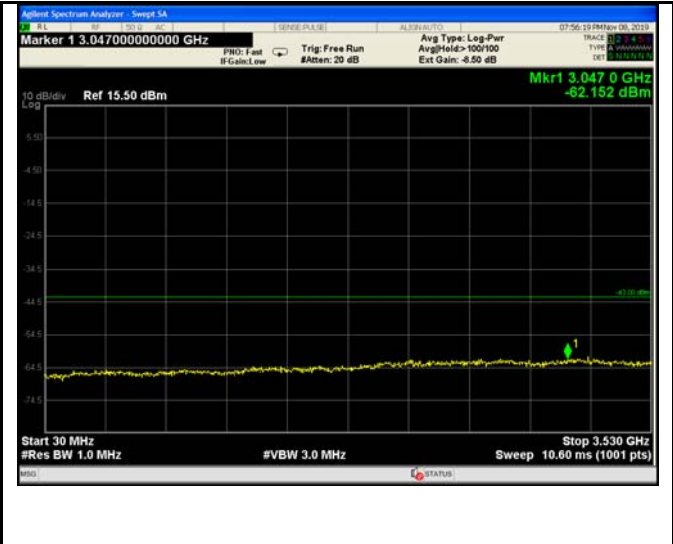
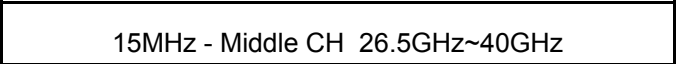
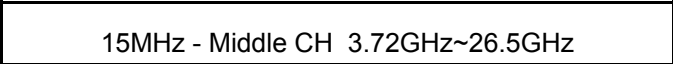
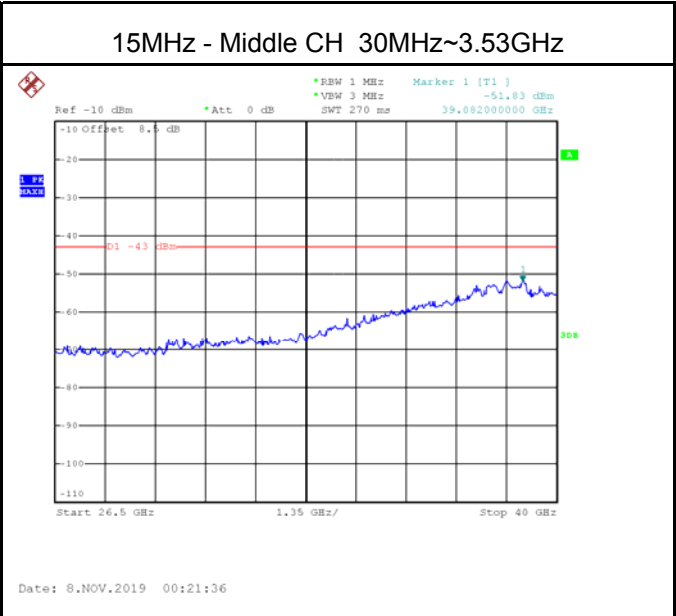
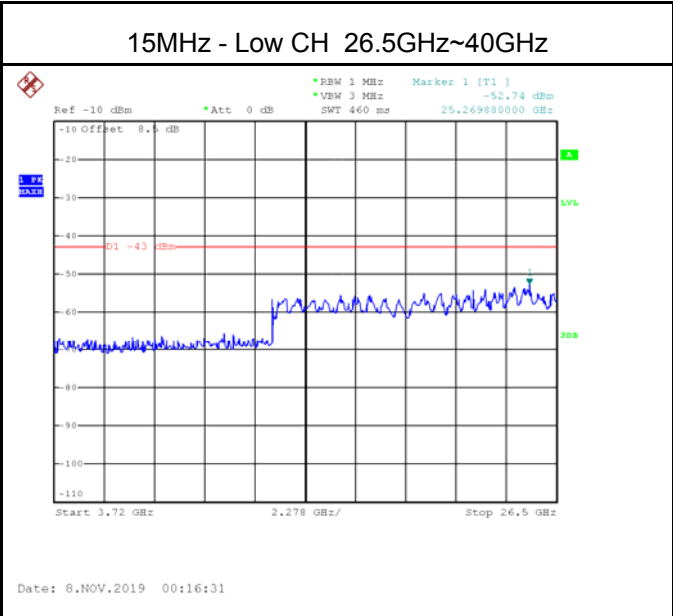


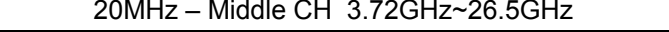
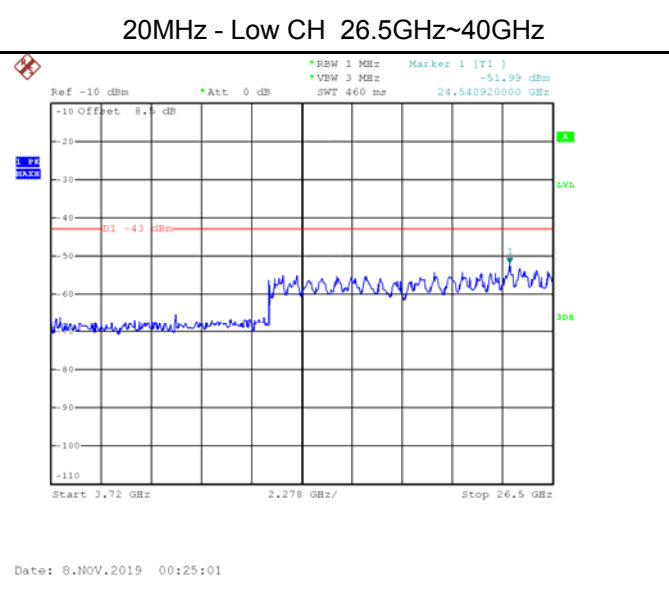
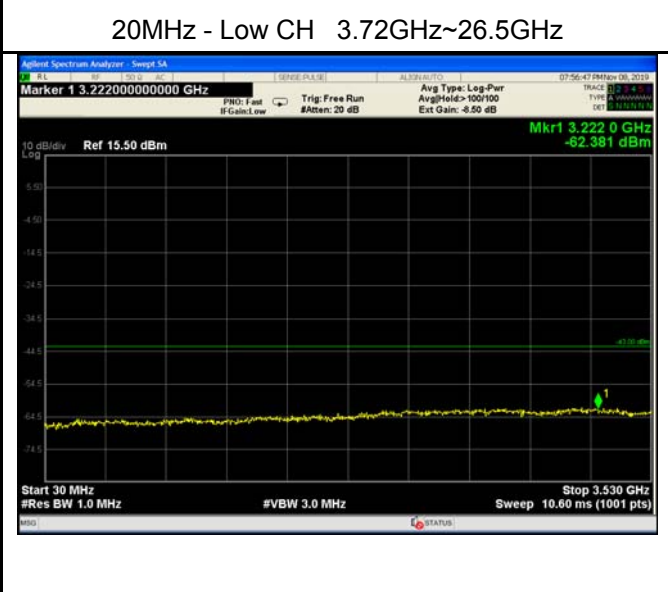
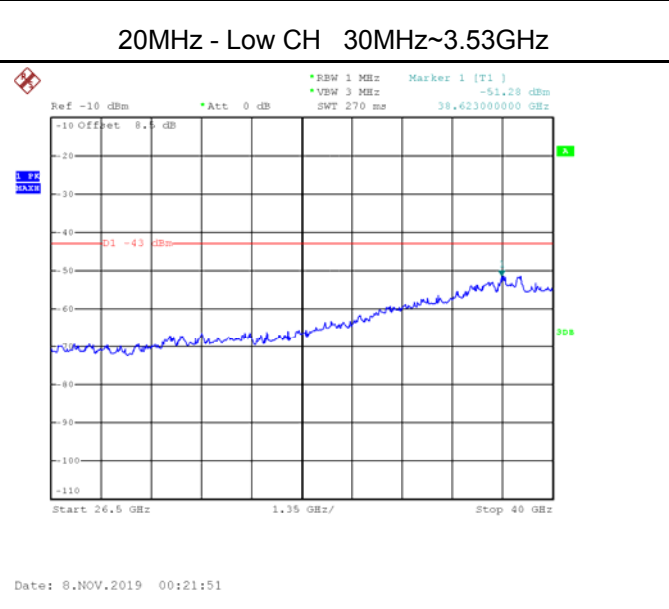
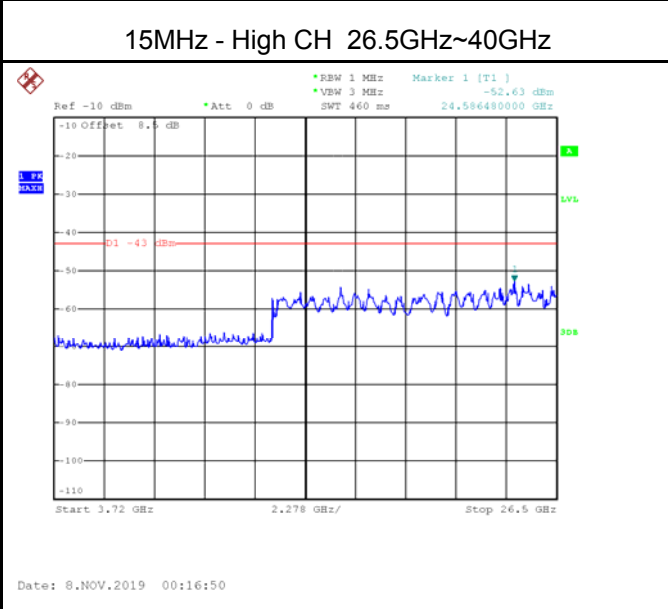
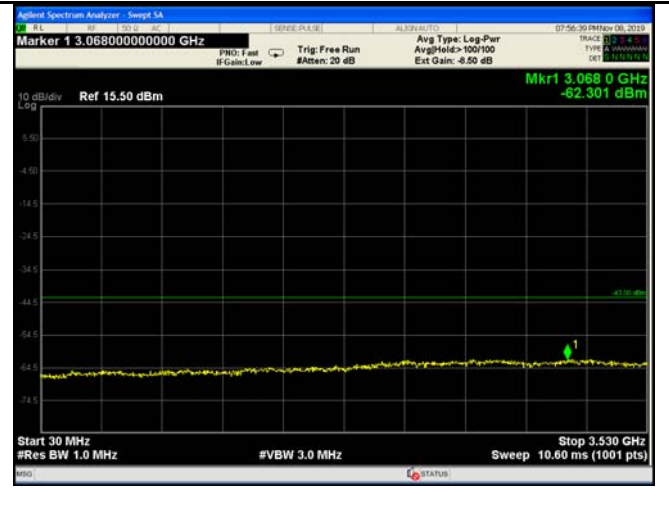
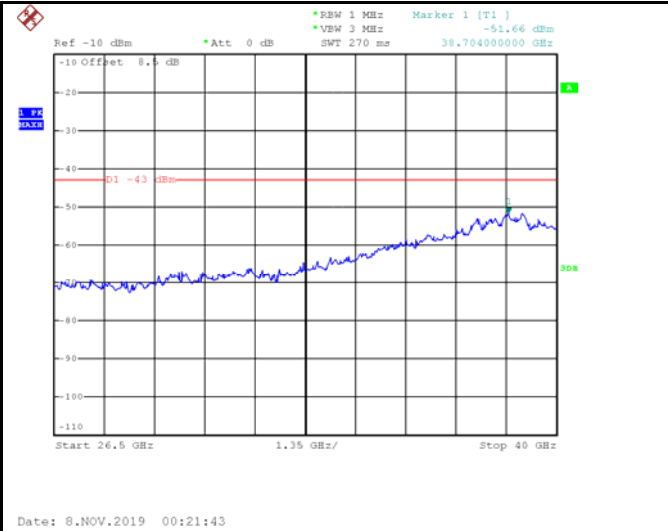
5MHz - High CH 3.72GHz~26.5GHz

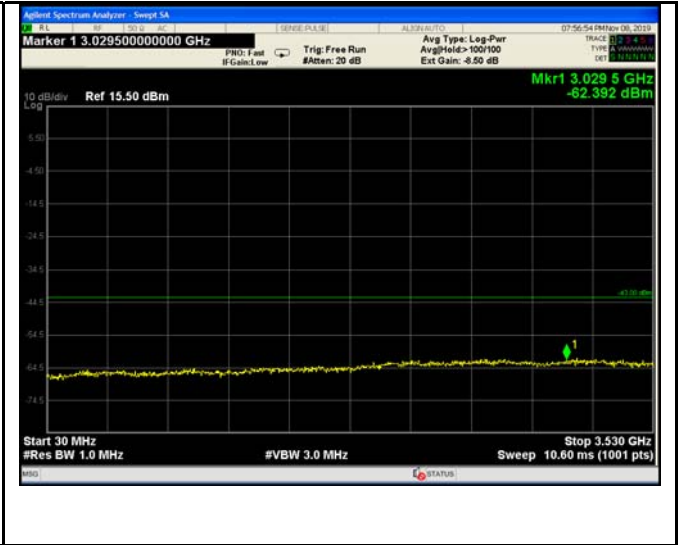
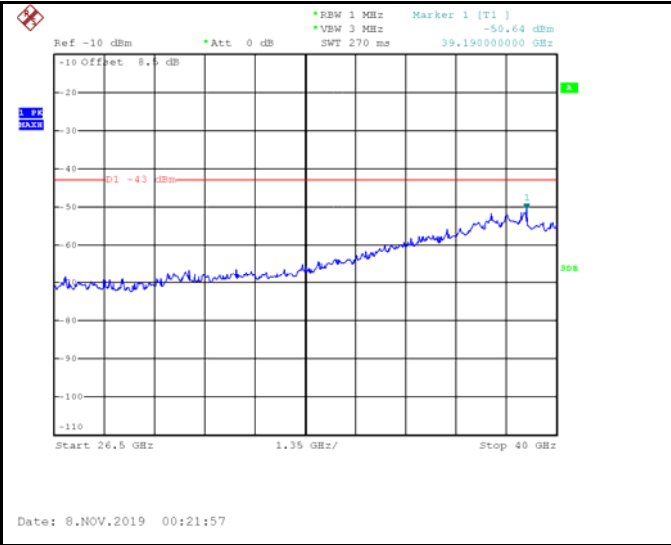






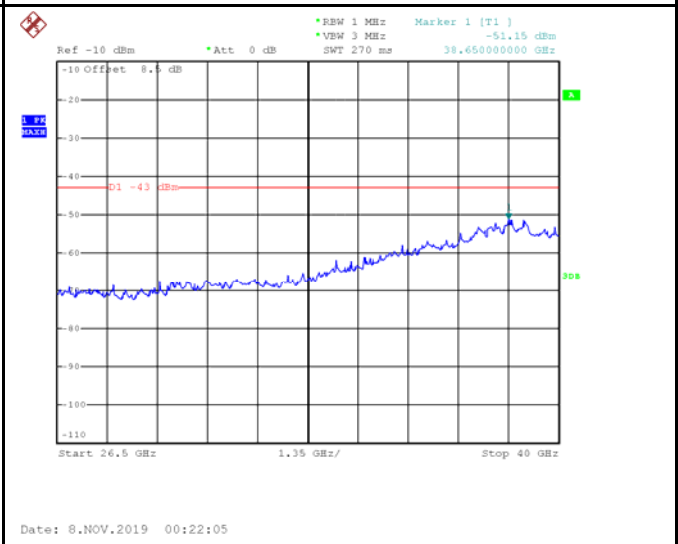
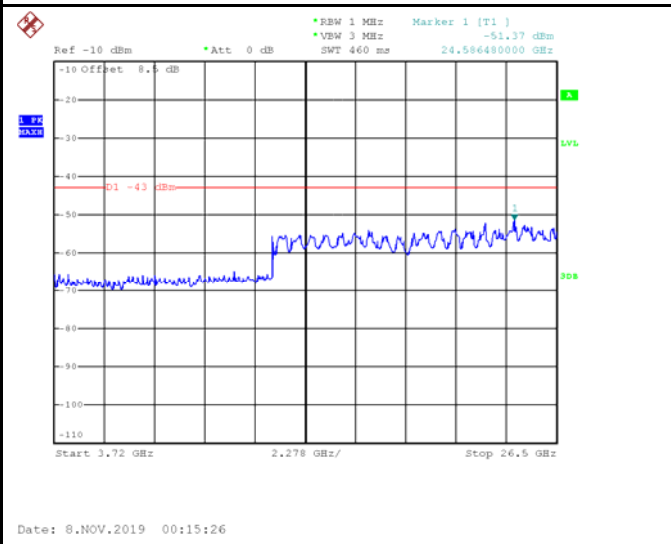






20MHz - Middle CH 26.5GHz~40GHz

20MHz - High CH 30MHz~3.53GHz



20MHz - High CH 3.72GHz~26.5GHz

20MHz - High CH 26.5GHz~40GHz

12 Field strength of spurious radiation measurement

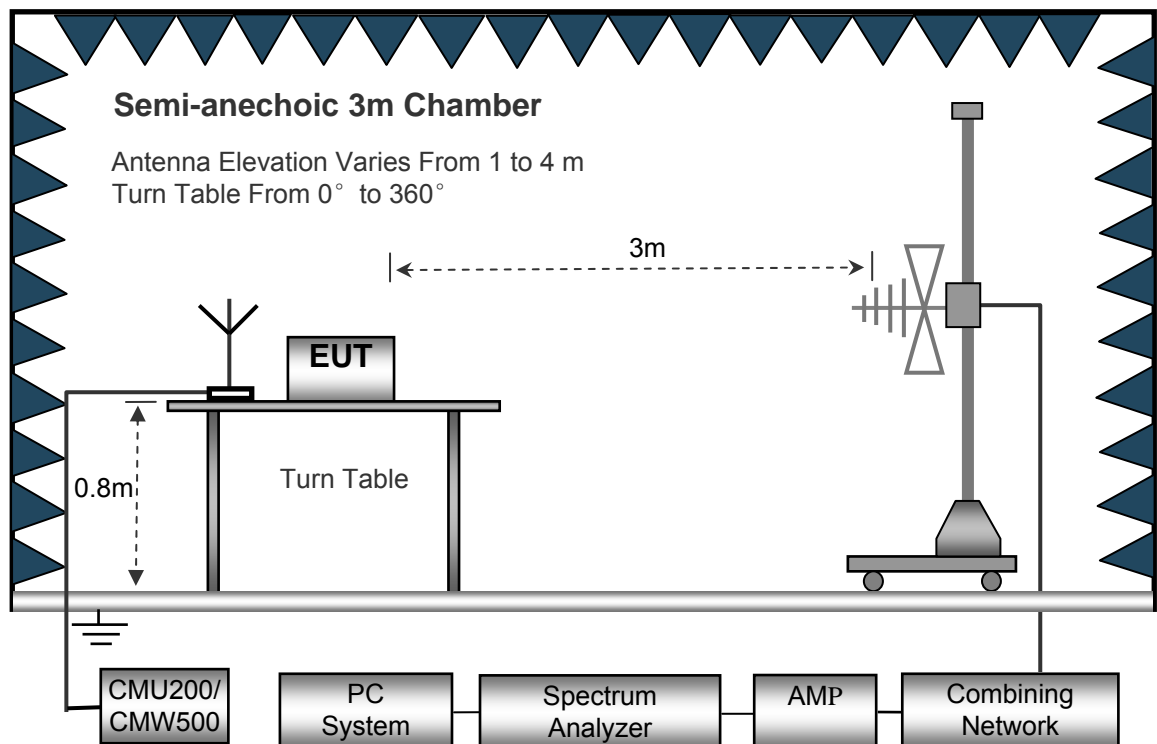
Test Requirement:	FCC part 96.41(e)
Test Method:	ANSI/TIA-603-E:2016, ANSI C63.26:2015
Test Mode:	Data communicating mode
Limit:	-40dBm

12.1 EUT Operation

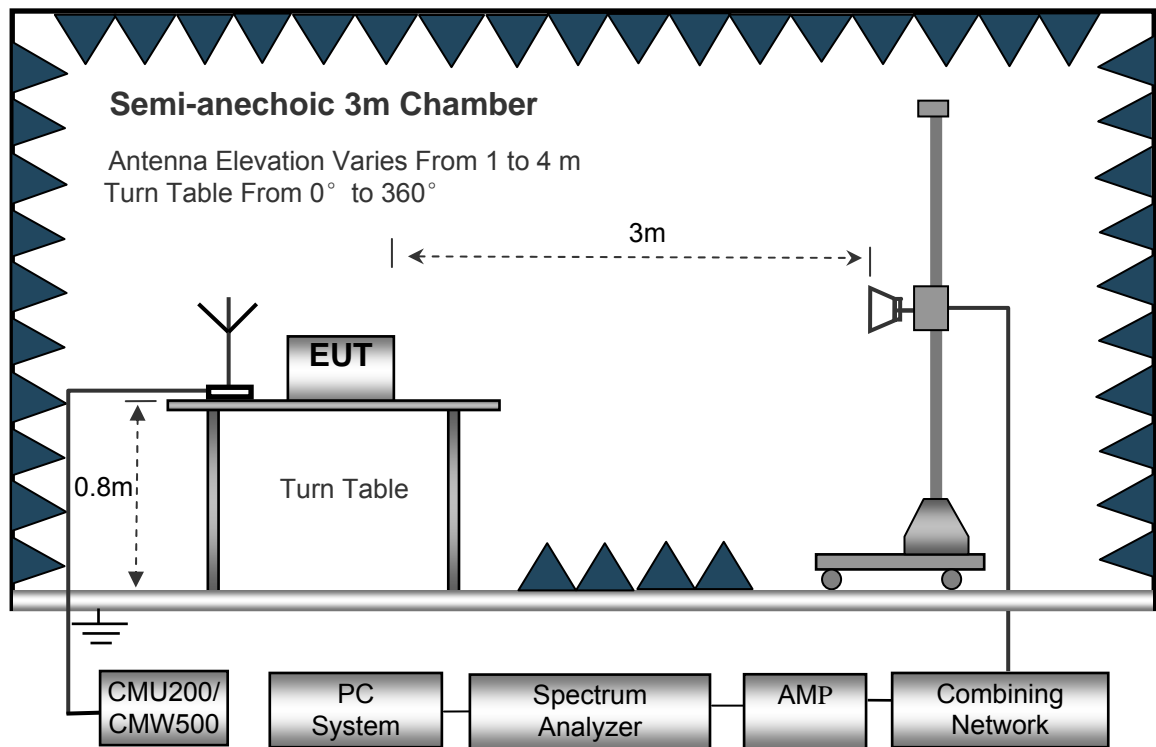
Operating Environment :	
Temperature:	23.5 °C
Humidity:	52.1 % RH
Atmospheric Pressure:	101.2kPa

12.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site. The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



12.3 Spectrum Analyzer Setup

30MHz ~ 1GHz

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

Above 1GHz

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

12.4 Test Procedure

1. The EUT was placed on a non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.
2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.
3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.
4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$$\text{ERP / EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain(dB/dBi)} - \text{Cable Loss (dB)}$$

12.5 Test Result

30MHz-18GHz

Remark: During the test, pre-scan the QPSK, 16QAM modulation, and found the QPSK modulation and 10MHz bandwidth is the worst case.

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Substituted			Absolute Level	Result	
			Height	Polar	SG Level	Cable	Antenna Gain		Limit	Margin
(MHz)	(dBμV)	Degree	(m)	(H/V)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)
Low channel										
223.12	48.69	42	1.7	H	-61.82	0.15	0.00	-61.97	-40	-21.97
223.12	46.58	60	1.3	V	-61.01	0.15	0.00	-61.16	-40	-21.16
7110	60.58	265	1.5	H	-53.39	0.30	9.40	-44.29	-40	-4.29
7110	58.23	225	2.1	V	-55.30	0.30	9.40	-46.20	-40	-6.20
10665	57.64	238	1.6	H	-56.36	0.43	10.60	-46.19	-40	-6.19
10665	49.65	153	1.3	V	-60.63	0.43	10.60	-50.46	-40	-10.46
Middle channel										
199.38	46.26	29	1.8	H	-64.25	0.15	0.00	-64.40	-40	-24.40
199.38	44.32	69	1.1	V	-63.27	0.15	0.00	-63.42	-40	-23.42
7250	60.54	150	1.8	H	-53.43	0.30	9.40	-44.33	-40	-4.33
7250	58.32	25	1.4	V	-55.21	0.30	9.40	-46.11	-40	-6.11
10875	56.29	254	1.9	H	-57.71	0.43	10.60	-47.54	-40	-7.54
10875	48.54	172	1.5	V	-61.74	0.43	10.60	-51.57	-40	-11.57
High channel										
199.38	47.59	114	1.2	H	-62.92	0.15	0.00	-63.07	-40	-23.07
199.38	46.98	186	1.3	V	-60.61	0.15	0.00	-60.76	-40	-20.76
7390	59.95	235	2.1	H	-54.02	0.30	9.40	-44.92	-40	-4.92
7390	57.48	184	1.3	V	-56.05	0.30	9.40	-46.95	-40	-6.95
11085	57.21	277	1.6	H	-56.79	0.43	10.60	-46.62	-40	-6.62
11085	50.36	168	1.4	V	-59.92	0.43	10.60	-49.75	-40	-9.75

Remark:

Test Frequency: 18GHz~40GHz

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

13 Frequency stability V.S. Temperature measurement

Test Requirement: FCC Part2.1055
 Test Method: FCC Part2.1055
 Test Mode: Data communicating mode
 Limit:

Frequency range (MHz)	Fixed and base stations (±ppm)	Mobile stations (±ppm)	
		Over 2 watts output power	2 watts or less output power
Below 25	100	100	200
25-50	20	20	50
72-76	5		50
150-174	5	5	50
216-220	1.0		1.0
220-222	0.1	1.5	1.5
421-512	2.5	5	5
806-809	1.0	1.5	1.5
809-824	1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	0.1	1.5	1.5
902-928	2.5	2.5	2.5
902-928	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	300	300	300
Above 2450			

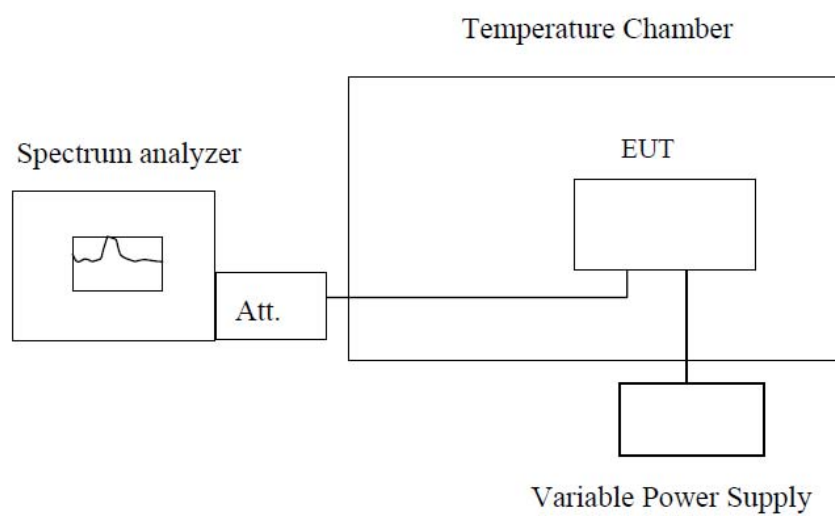
13.1 EUT Operation

Operating Environment :

Temperature: 23.6 °C
 Humidity: 52.2 % RH
 Atmospheric Pressure: 101.3kPa

13.2 Test Procedure

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.



Note : Measurement setup for testing on Antenna connector

13.3 Test Result

Remark: All three channels of all modulations have been tested, but only the worst channel and the worst modulation show in this test item.

Chain 0

Test Frequency: 3552.5MHz QPSK 5MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	105	0.0296
-25		98	0.0276
-10		96	0.0270
0		98	0.0276
10		96	0.0270
20		90	0.0253
30		97	0.0273
40		105	0.0296
55		103	0.0290

Test Frequency: 3555MHz QPSK 10MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	102	0.0287
-25		92	0.0259
-10		104	0.0293
0		100	0.0281
10		106	0.0298
20		96	0.0270
30		106	0.0298
40		97	0.0273
55		95	0.0267

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	91	0.0256
-25		91	0.0256
-10		95	0.0267
0		97	0.0273
10		103	0.0290
20		100	0.0281
30		95	0.0267
40		104	0.0292
55		96	0.0270

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	89	0.0250
-25		99	0.0278
-10		91	0.0256
0		92	0.0258
10		94	0.0264
20		91	0.0256
30		101	0.0284
40		90	0.0253
55		99	0.0278

Chain 1

Test Frequency: 3552.5MHz QPSK 5MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	98	0.0276
-25		97	0.0273
-10		93	0.0262
0		99	0.0279
10		94	0.0265
20		106	0.0298
30		92	0.0259
40		105	0.0296
55		103	0.0290

Test Frequency: 3555MHz QPSK 10MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	87	0.0245
-25		87	0.0245
-10		88	0.0248
0		93	0.0262
10		92	0.0259
20		94	0.0264
30		84	0.0236
40		91	0.0256
55		100	0.0281

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	94	0.0264
-25		91	0.0256
-10		84	0.0236
0		91	0.0256
10		93	0.0261
20		90	0.0253
30		95	0.0267
40		85	0.0239
55		89	0.0250

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
-40	120	101	0.0284
-25		100	0.0281
-10		89	0.0250
0		95	0.0267
10		88	0.0247
20		99	0.0278
30		103	0.0289
40		90	0.0253
55		100	0.0281

14 Frequency stability V.S. Voltage measurement

Test Requirement: FCC Part2.1055
 Test Method: FCC Part2.1055
 Test Mode: Data communicating mode
 Limit: FCC:

Frequency range (MHz)	Fixed and base stations (±ppm)	Mobile stations (±ppm)	
		Over 2 watts output power	2 watts or less output power
Below 25	100	100	200
25-50	20	20	50
72-76	5		50
150-174	5	5	50
216-220	1.0		1.0
220-222	0.1	1.5	1.5
421-512	2.5	5	5
806-809	1.0	1.5	1.5
809-824	1.5	2.5	2.5
851-854	1.0	1.5	1.5
854-869	1.5	2.5	2.5
896-901	0.1	1.5	1.5
902-928	2.5	2.5	2.5
902-928	2.5	2.5	2.5
929-930	1.5		
935-940	0.1	1.5	1.5
1427-1435	300	300	300
Above 2450			

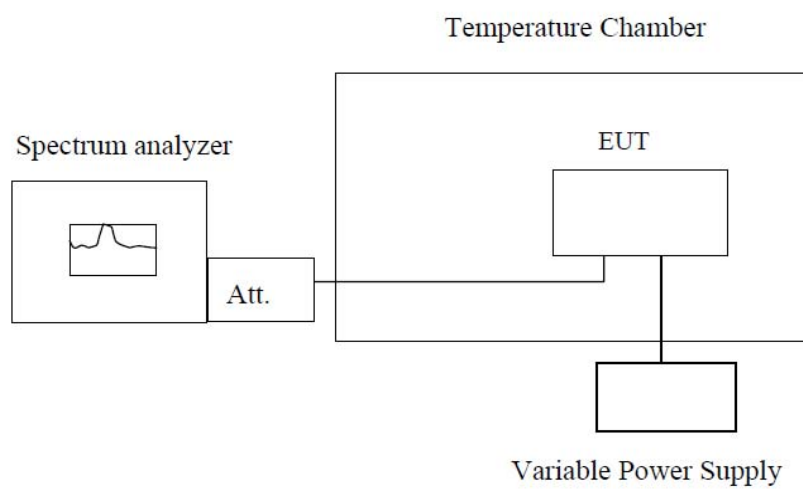
14.1 EUT Operation

Operating Environment :

Temperature: 23.7 °C
 Humidity: 52.9 % RH
 Atmospheric Pressure: 101.4kPa

14.2 Test Procedure

1. Set chamber temperature to 25°C. Use a variable DC power source to power the EUT and set the voltage to rated voltage.
2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
3. Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.



Note : Measurement setup for testing on Antenna connector

14.3 Test Result

Remark: All three channels of all modulations have been tested, but only the worst channel and the worst modulation show in this test item.

Chain 0

Test Frequency: 3552.5MHz QPSK 5MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	96	0.0270
	120	95	0.0267
	144	85	0.0239

Test Frequency: 3555MHz QPSK 10MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	88	0.0248
	120	101	0.0284
	144	90	0.0253

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	91	0.0256
	120	92	0.0259
	144	99	0.0278

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	90	0.0253
	120	94	0.0264
	144	101	0.0284

Chain 1

Test Frequency: 3552.5MHz QPSK 5MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	101	0.0284
	120	100	0.0281
	144	98	0.0276

Test Frequency: 3555MHz QPSK 10MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	90	0.0253
	120	96	0.0270
	144	91	0.0256

Test Frequency: 3557.5MHz QPSK 15MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	85	0.0239
	120	86	0.0242
	144	90	0.0253

Test Frequency: 3560MHz QPSK 20MHz			
Temperature (°C)	Power Supply (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
25	105	102	0.0287
	120	101	0.0284
	144	93	0.0261

15 Photographs of test setup and EUT.

Note: Please refer to appendix: EG7010A-M11_Photos.

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