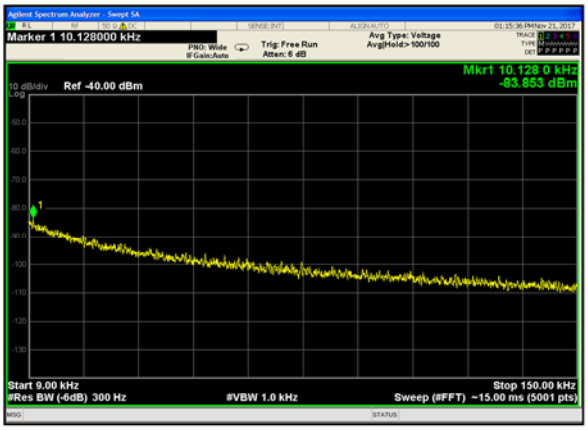
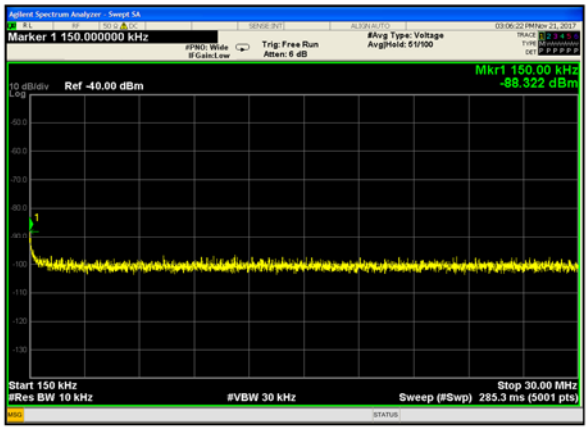
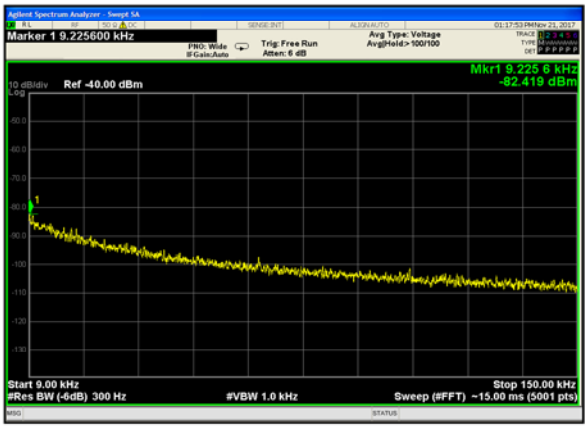
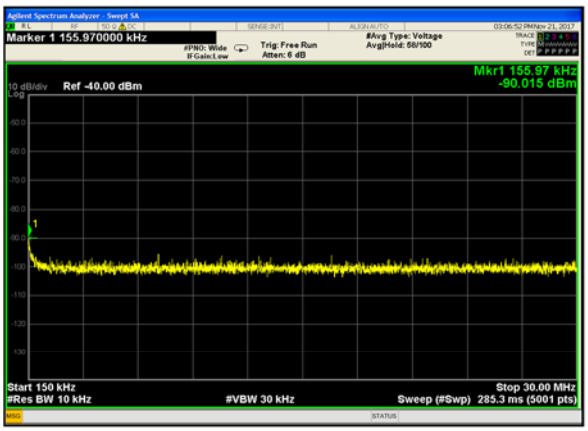
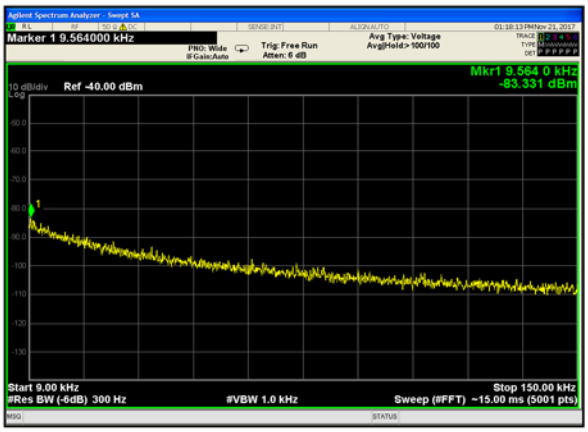
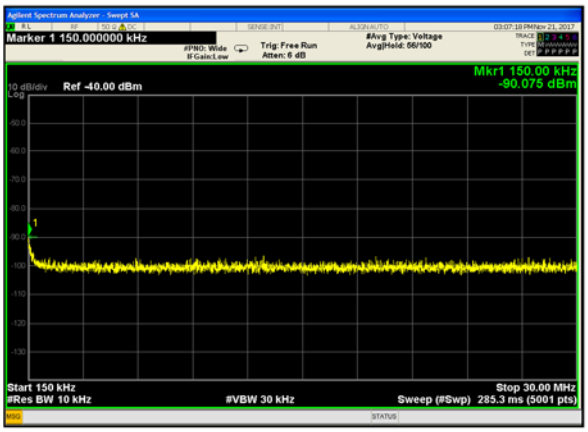
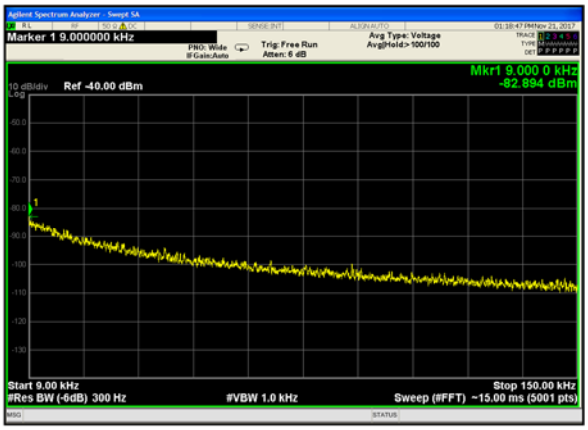
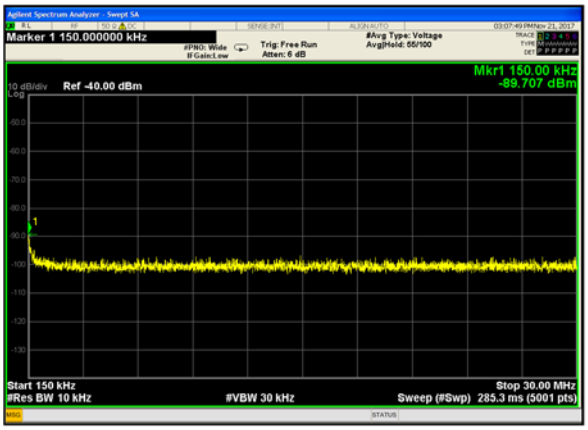
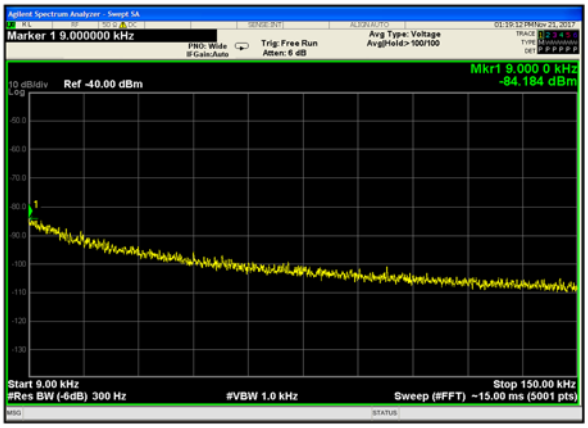
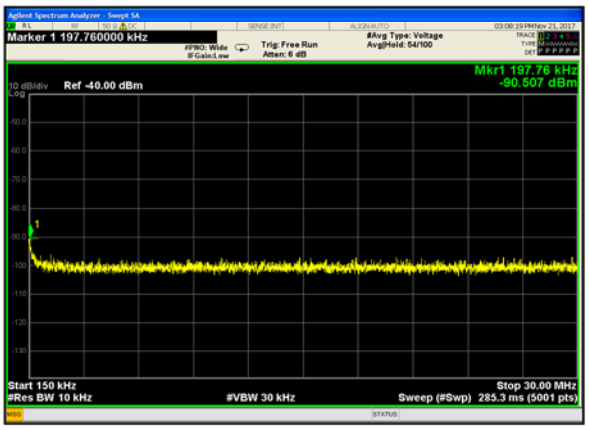
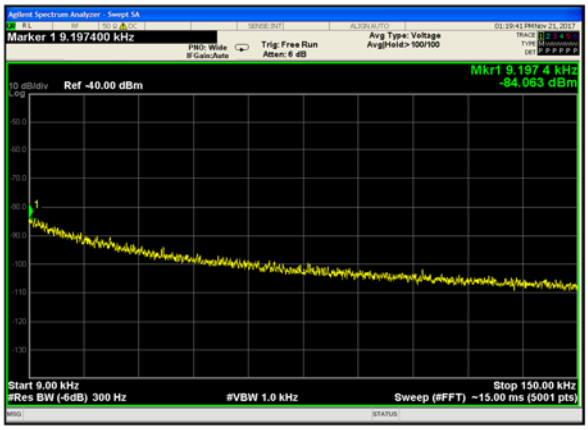
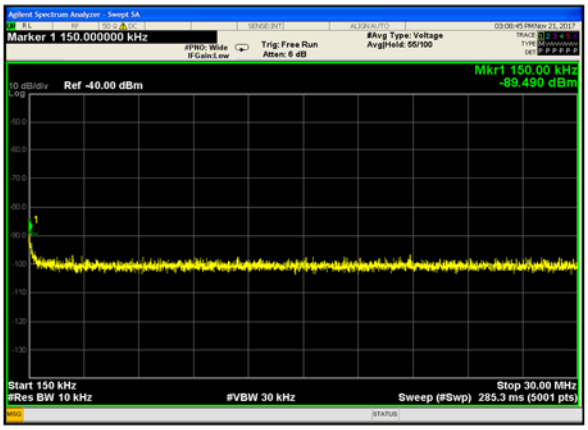
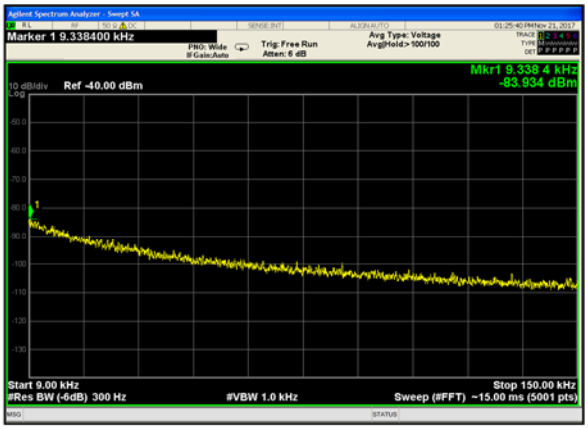
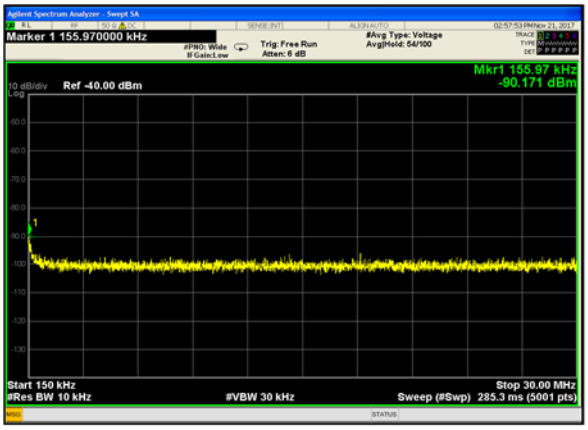
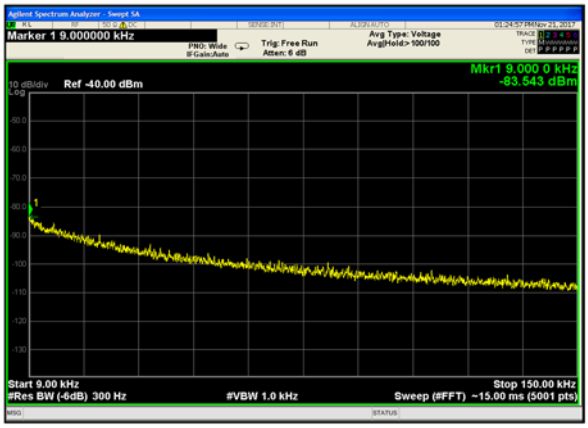
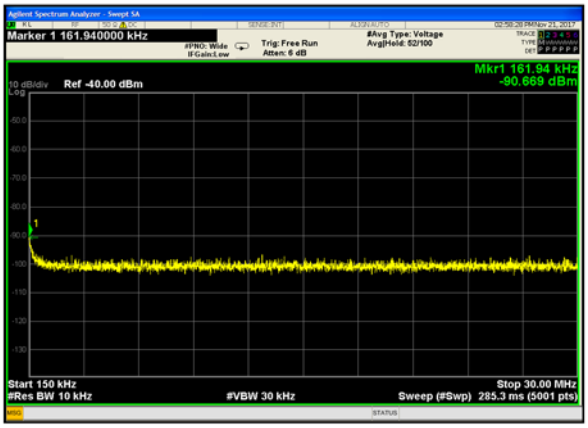
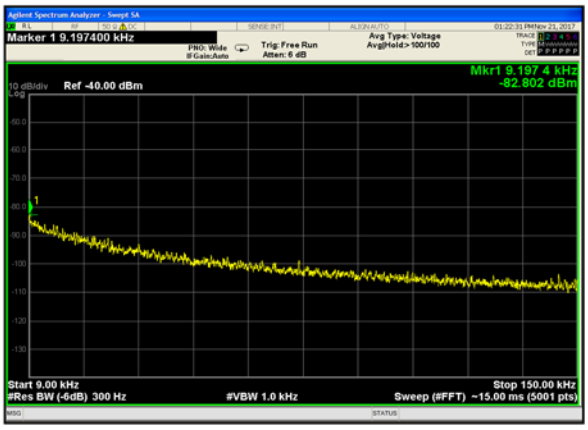
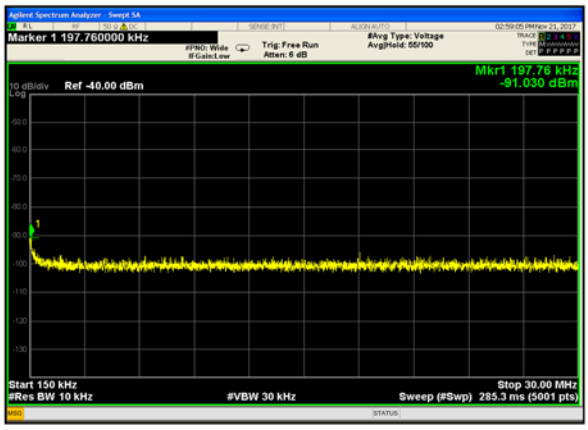
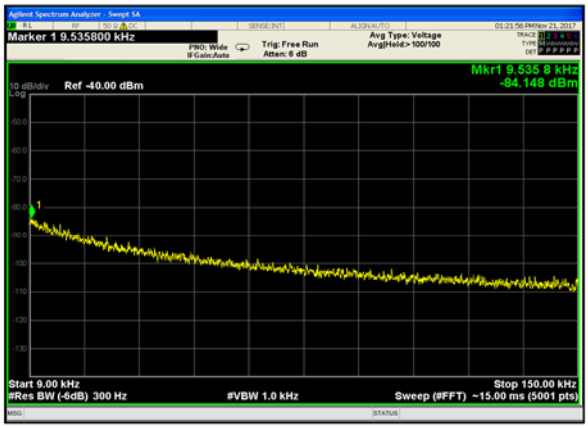
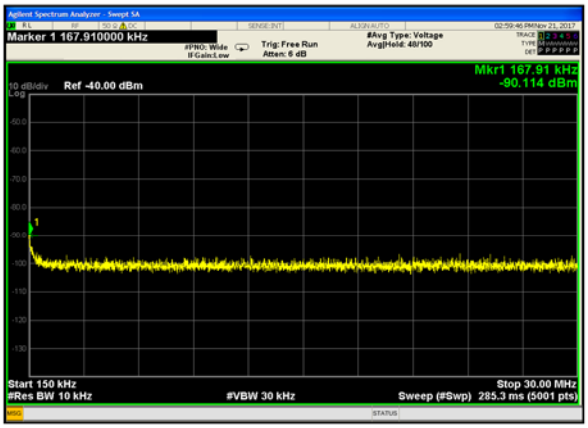
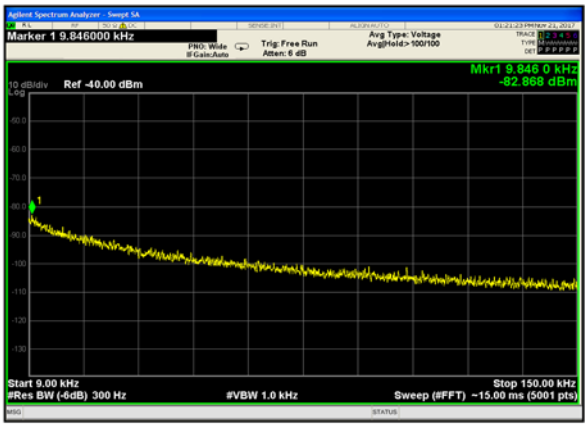
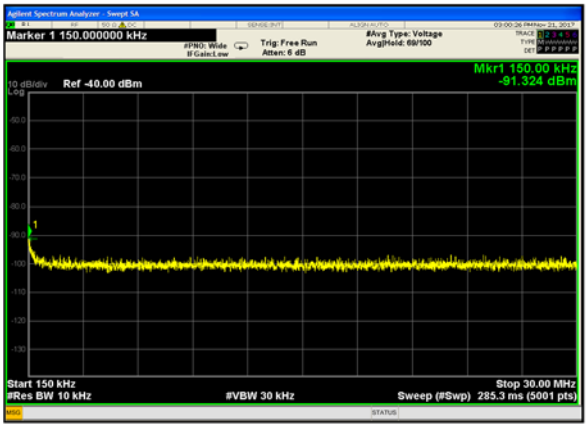
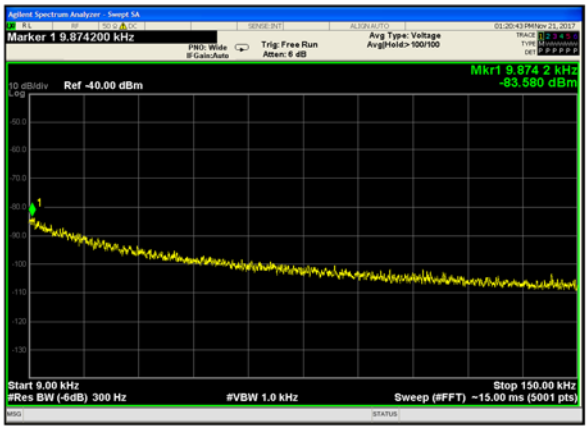
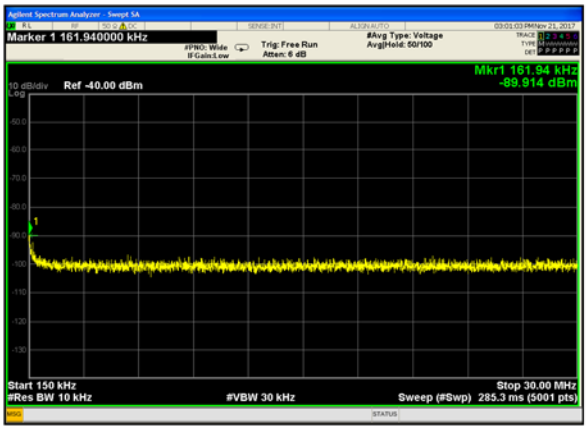
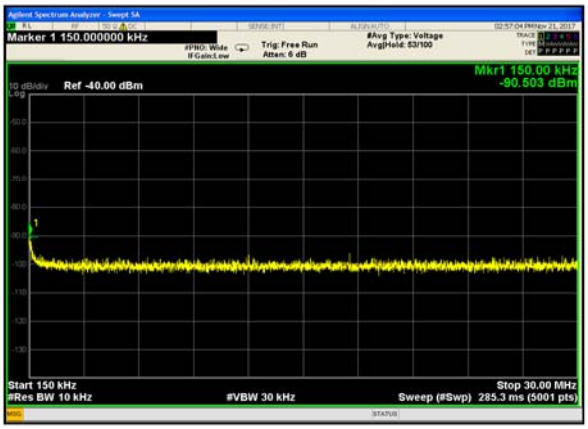
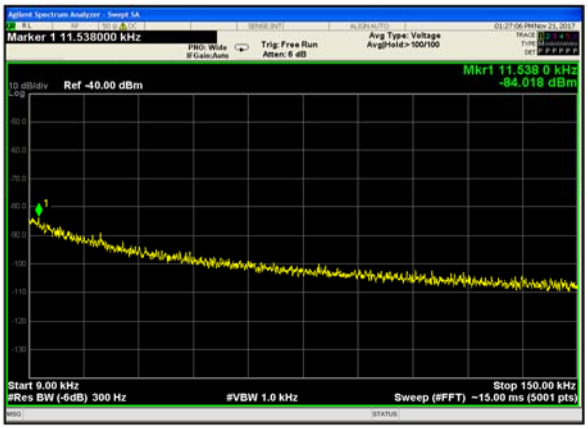
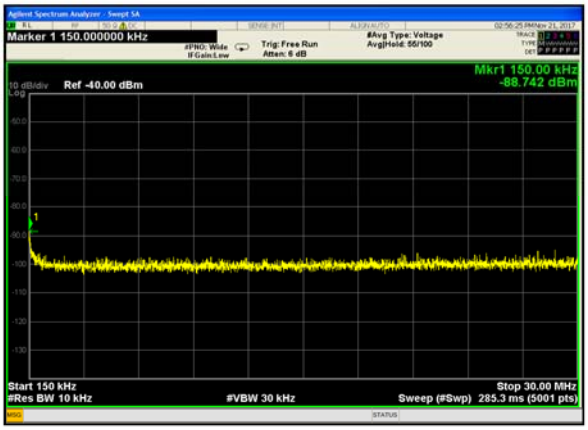
Below 30MHz (Conducted measurement)

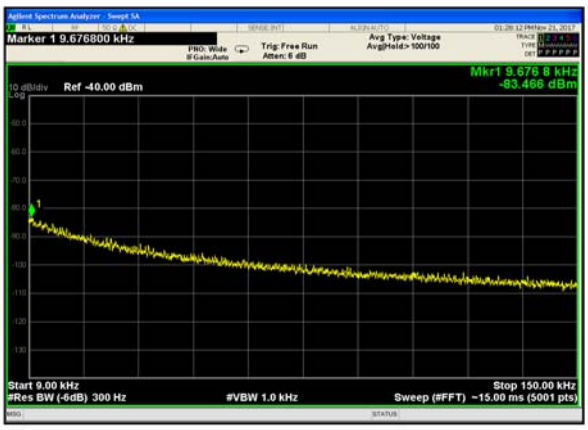
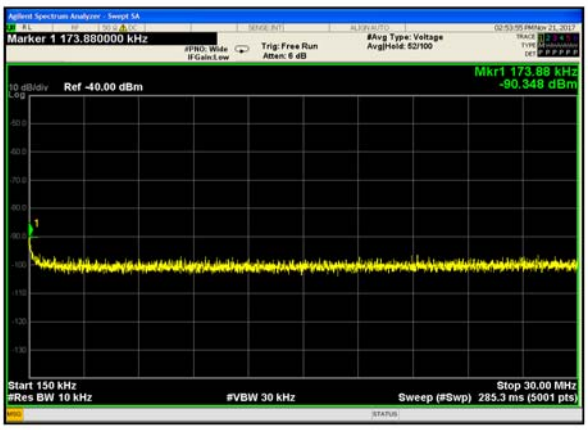
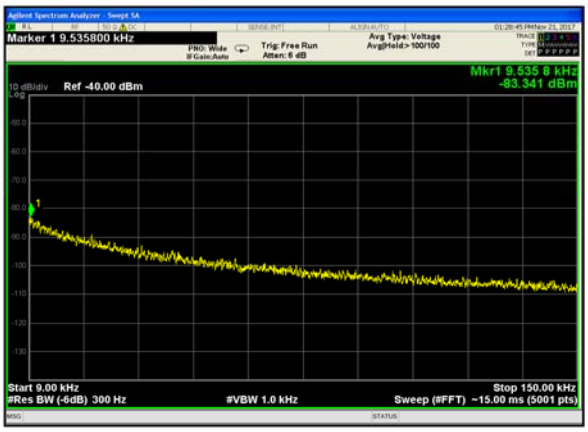
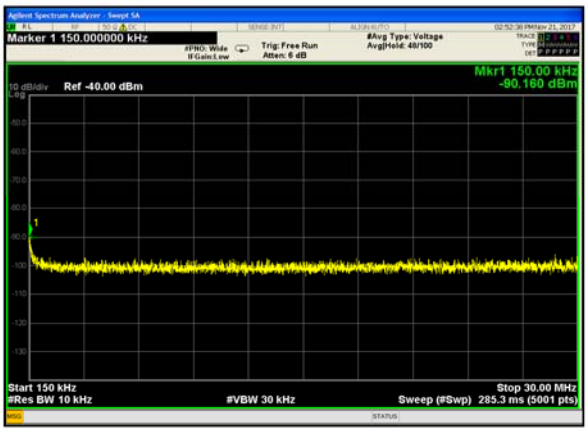
11a	
5180MHz	
9kHz-150kHz	150kHz-30MHz
	
5220MHz	
9kHz-150kHz	150kHz-30MHz
	
5240MHz	
9kHz-150kHz	150kHz-30MHz
	

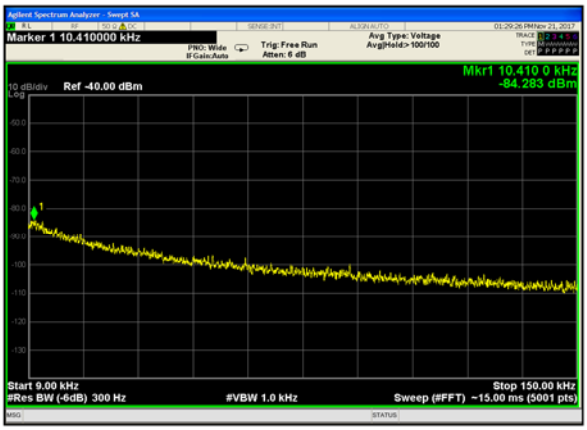
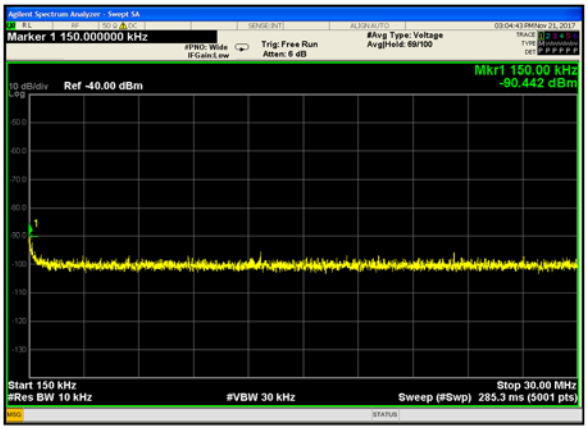
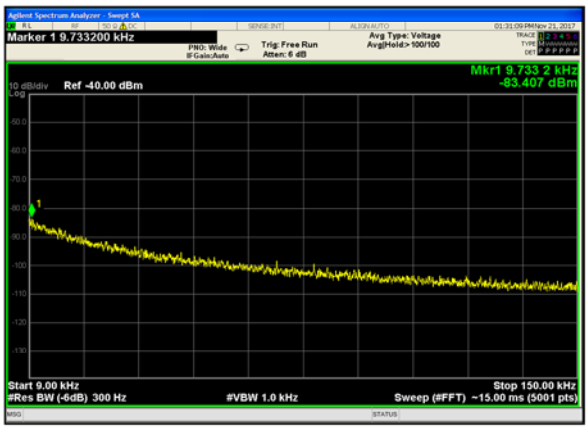
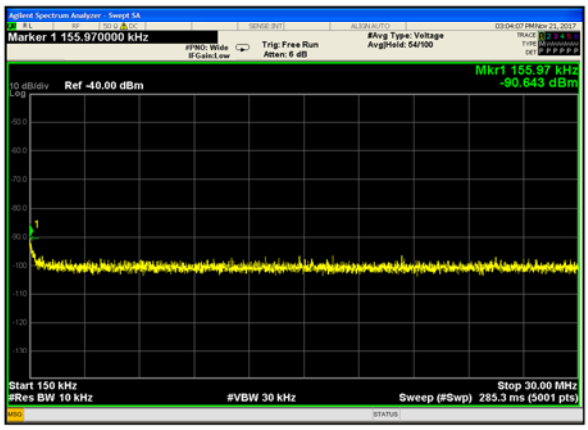
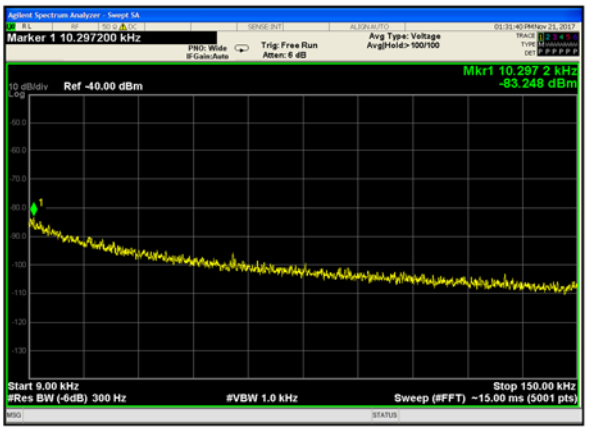
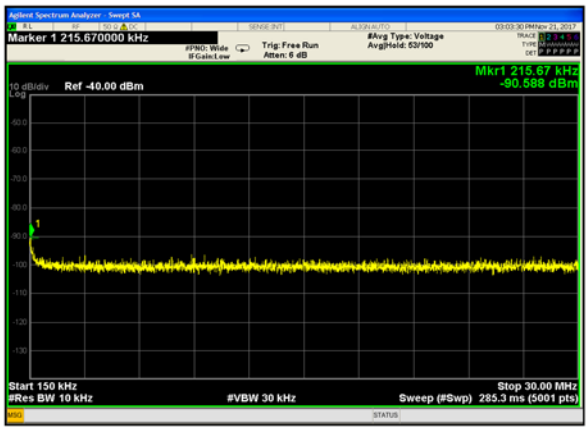
11a	
5745MHz	
9kHz-150kHz	150kHz-30MHz
	
5785MHz	
9kHz-150kHz	150kHz-30MHz
	
5825MHz	
9kHz-150kHz	150kHz-30MHz
	

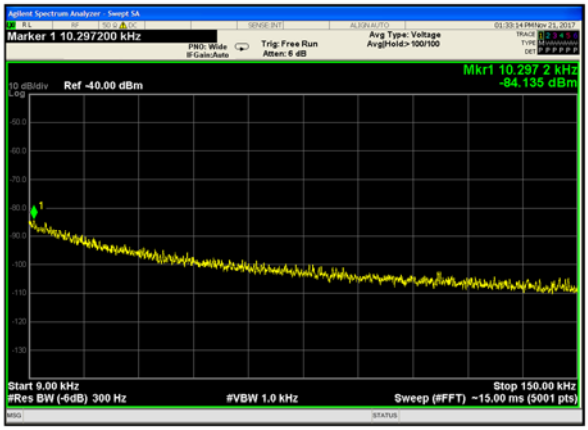
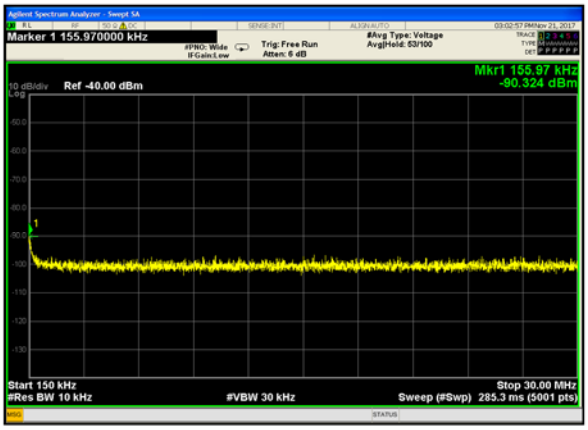
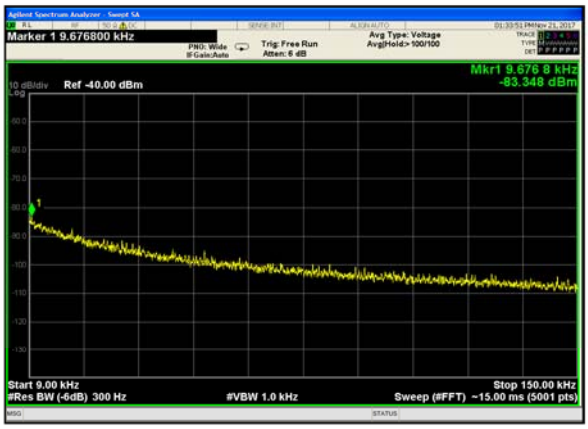
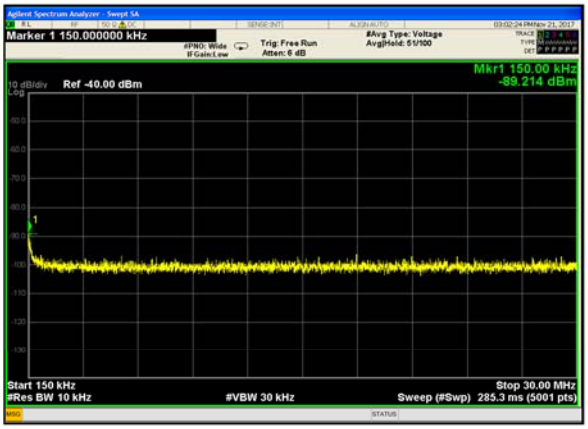
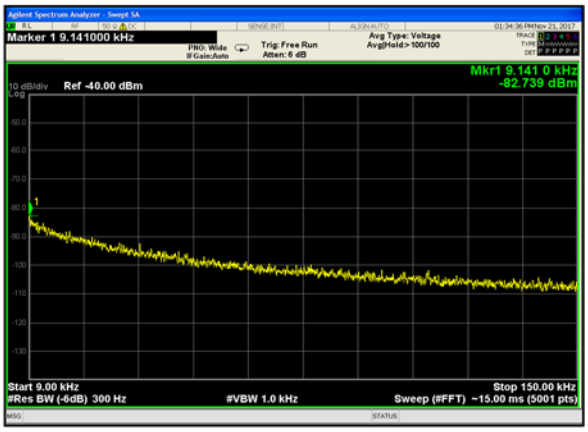
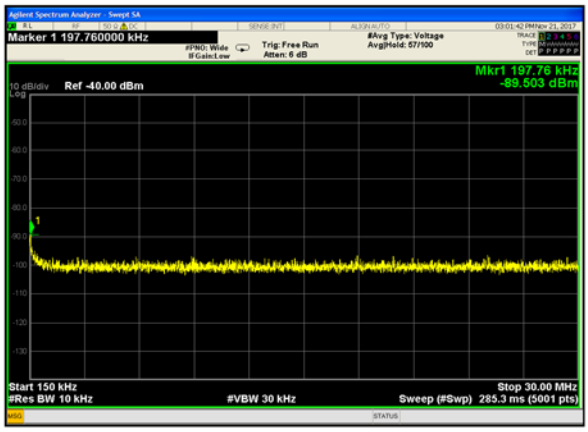
11n-HT20	
5180MHz	
9kHz-150kHz	150kHz-30MHz
	
5220MHz	
9kHz-150kHz	150kHz-30MHz
	
5240MHz	
9kHz-150kHz	150kHz-30MHz
	

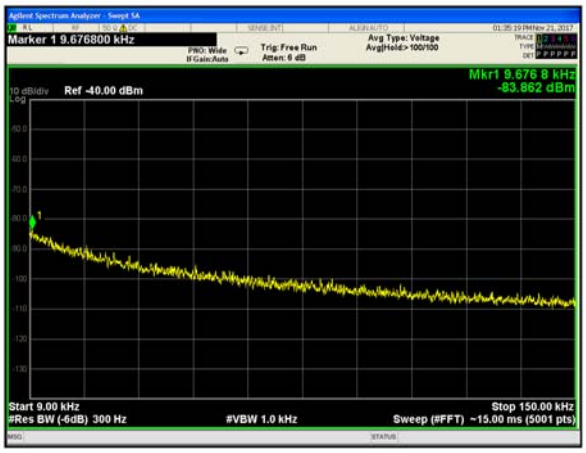
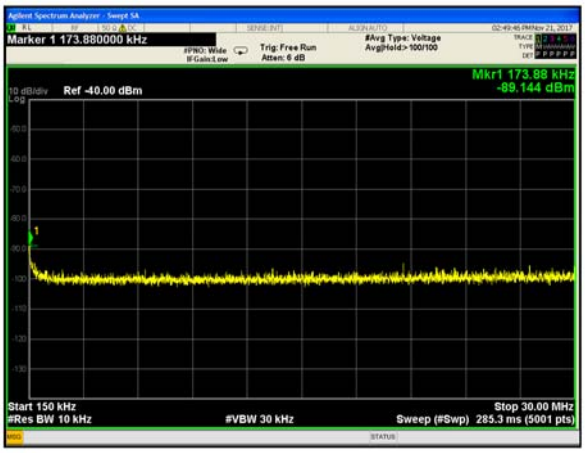
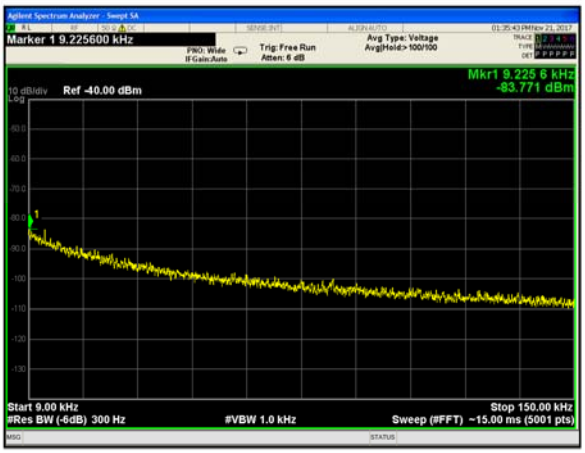
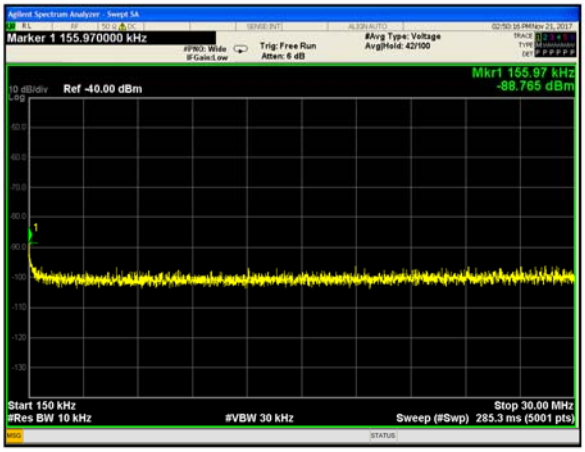
11n-HT20	
5745MHz	
9kHz-150kHz	150kHz-30MHz
	
5785MHz	
9kHz-150kHz	150kHz-30MHz
	
5825MHz	
9kHz-150kHz	150kHz-30MHz
	

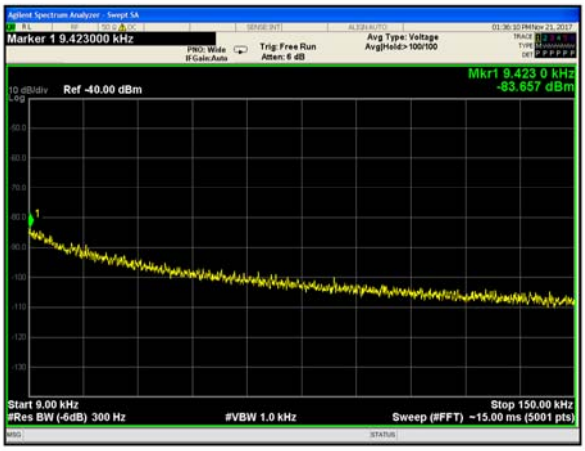
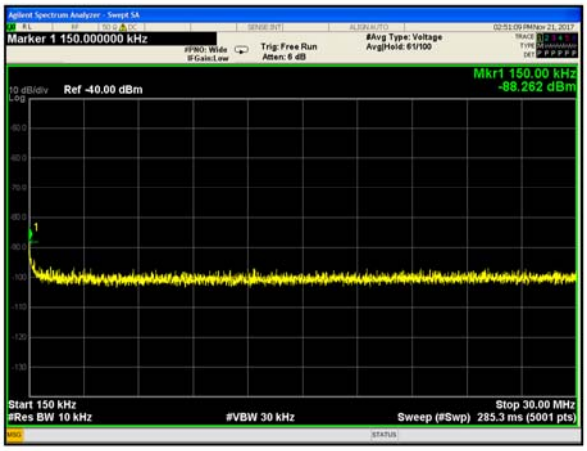
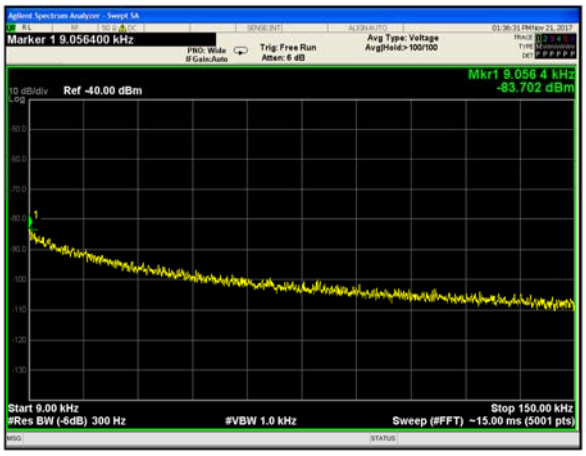
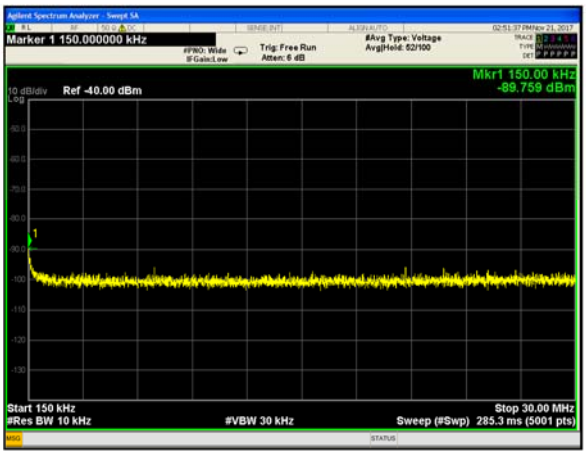
11n-HT40	
5190MHz	
9kHz-150kHz	150kHz-30MHz
	
5230MHz	
9kHz-150kHz	150kHz-30MHz
	

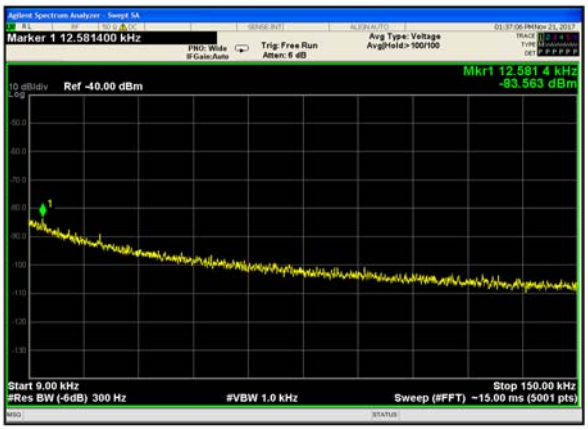
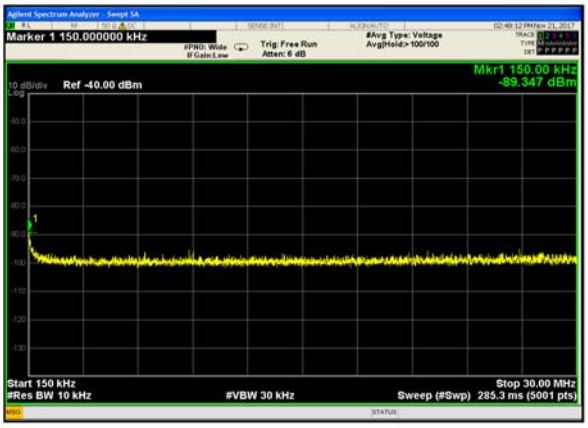
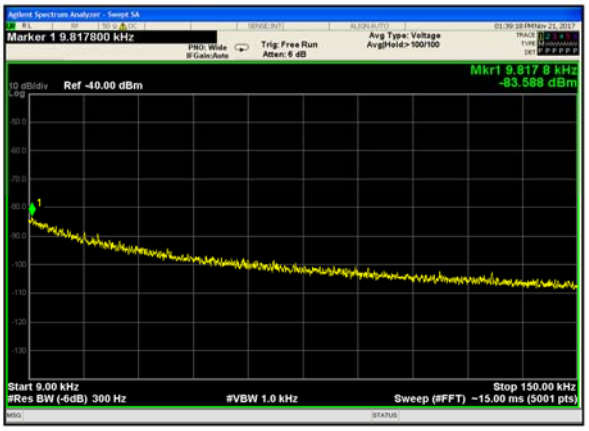
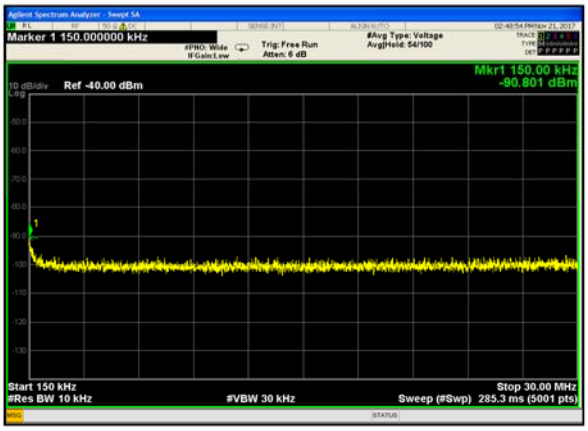
11n-HT40	
5755MHz	
9kHz-150kHz	150kHz-30MHz
	
5795MHz	
9kHz-150kHz	150kHz-30MHz
	

11ac-HT20	
5180MHz	
9kHz-150kHz	150kHz-30MHz
	
5220MHz	
9kHz-150kHz	150kHz-30MHz
	
5240MHz	
9kHz-150kHz	150kHz-30MHz
	

11ac-HT20	
5745MHz	
9kHz-150kHz	150kHz-30MHz
	
5785MHz	
9kHz-150kHz	150kHz-30MHz
	
5825MHz	
9kHz-150kHz	150kHz-30MHz
	

11ac-HT40	
5190MHz	
9kHz-150kHz	150kHz-30MHz
	
5230MHz	
9kHz-150kHz	150kHz-30MHz
	

11ac-HT40	
5755MHz	
9kHz-150kHz	150kHz-30MHz
	
5795MHz	
9kHz-150kHz	150kHz-30MHz
	

11ac-HT80	
5210MHz	
9kHz-150kHz	150kHz-30MHz
	
5775MHz	
9kHz-150kHz	150kHz-30MHz
	

Tested Date	Environment	
	Temperature	Humidity
15 November 2017	22°C	45 %

10. FREQUENCY STABILITY

10.1. Test Procedure

(1) Connect the EUT RF output port to spectrum analyzer via calibrated coaxial cable and suitable attenuator (if necessary).
(2) Activates the EUT System and execute the software prepared for test, if necessary.
(3) The operating frequency measured by using frequency counter function of spectrum analyzer (*1) .
(4) Frequency stability measurement was carried out from the high temperature to low temperature in order.

[Note]
(*1) Spectrum Analyzer Set Up Conditions

Center Frequency	: Carrier frequency
Resolution bandwidth	: 1kHz
Video bandwidth	: 10kHz
Detector function	: Peak
Function	: Frequency counter

10.2. Test Results

11a/n-HT20/ac-HT20

Test Condition		Original Frequency	Measured Frequency	Tolerance	Tolerance
Temp.	Voltage	(MHz)	(MHz)	(kHz)	(ppm)
20deg.C	3.3V	5180.00	5180.009097	9.097	1.7562
		5220.00	5220.009925	9.925	1.9013
		5240.00	5240.009814	9.814	1.8729
		5745.00	5745.010623	10.623	1.8491
		5785.00	5785.011502	11.502	1.9882
		5825.00	5825.012130	12.130	2.0824
0deg.C	3.3V	5180.00	5180.024310	24.310	4.6931
		5220.00	5220.025594	25.594	4.9031
		5240.00	5240.027124	27.124	5.1763
		5745.00	5745.030431	30.431	5.2970
		5785.00	5785.030762	30.762	5.3175
		5825.00	5825.030917	30.917	5.3076
	3.135V	5180.00	5180.025708	25.708	4.9629
		5220.00	5220.026137	26.137	5.0071
		5240.00	5240.026849	26.849	5.1239
		5745.00	5745.030634	30.634	5.3323
		5785.00	5785.030769	30.769	5.3188
		5825.00	5825.030680	30.680	5.2670
	3.465V	5180.00	5180.025133	25.133	4.8519
		5220.00	5220.025196	25.196	4.8268
		5240.00	5240.027445	27.445	5.2376
		5745.00	5745.030185	30.185	5.2541
		5785.00	5785.031021	31.021	5.3623
		5825.00	5825.030856	30.856	5.2972
60deg.C	3.3V	5180.00	5179.990375	-9.625	-1.8581
		5220.00	5219.990790	-9.210	-1.7644
		5240.00	5239.990542	-9.458	-1.8050
		5745.00	5744.989488	-10.512	-1.8298
		5785.00	5784.989684	-10.316	-1.7832
		5825.00	5824.989211	-10.789	-1.8522
	3.135V	5180.00	5179.989519	-10.481	-2.0234
		5220.00	5219.990446	-9.554	-1.8303
		5240.00	5239.990492	-9.508	-1.8145
		5745.00	5744.990588	-9.412	-1.6383
		5785.00	5784.989393	-10.607	-1.8335
		5825.00	5824.989103	-10.897	-1.8707
	3.465V	5180.00	5179.990222	-9.778	-1.8876
		5220.00	5219.990470	-9.530	-1.8257
		5240.00	5239.990476	-9.524	-1.8176
		5745.00	5744.989453	-10.547	-1.8359
		5785.00	5784.989454	-10.546	-1.8230
		5825.00	5824.989197	-10.803	-1.8546

11n-HT40/ac-HT40

Test Condition		Original Frequency	Measured Frequency	Tolerance	Tolerance
Temp.	Voltage	(MHz)	(MHz)	(kHz)	(ppm)
20deg.C	3.3V	5190.00	5190.008192	8.192	1.5784
		5230.00	5230.010853	10.853	2.0751
		5755.00	5755.010952	10.952	1.9030
		5795.00	5795.011175	11.175	1.9284
0deg.C	3.3V	5190.00	5190.027531	27.531	5.3046
		5230.00	5230.027785	27.785	5.3126
		5755.00	5755.030465	30.465	5.2937
		5795.00	5795.030576	30.576	5.2763
	3.135V	5190.00	5190.027461	27.461	5.2911
		5230.00	5230.027813	27.813	5.3180
		5755.00	5755.030482	30.482	5.2966
		5795.00	5795.030445	30.445	5.2537
	3.465V	5190.00	5190.027345	27.345	5.2688
		5230.00	5230.027617	27.617	5.2805
		5755.00	5755.030461	30.461	5.2930
		5795.00	5795.030420	30.420	5.2494
60deg.C	3.3V	5190.00	5189.990011	-9.989	-1.9247
		5230.00	5229.990340	-9.660	-1.8470
		5755.00	5754.990076	-9.924	-1.7244
		5795.00	5794.989621	-10.379	-1.7910
	3.135V	5190.00	5189.990025	-9.975	-1.9220
		5230.00	5229.990064	-9.936	-1.8998
		5755.00	5754.990128	-9.872	-1.7154
		5795.00	5794.989392	-10.608	-1.8305
	3.465V	5190.00	5189.990303	-9.697	-1.8684
		5230.00	5229.990461	-9.539	-1.8239
		5755.00	5754.989536	-10.464	-1.8182
		5795.00	5794.989619	-10.381	-1.7914

11ac-HT80

Test Condition		Original Frequency	Measured Frequency	Tolerance	Tolerance
Temp.	Voltage	(MHz)	(MHz)	(kHz)	(ppm)
20deg.C	3.3V	5210.00	5210.010129	10.129	1.9441
		5775.00	5775.011185	11.185	1.9368
0deg.C	3.3V	5210.00	5210.027325	27.325	5.2447
		5775.00	5775.030201	30.201	5.2296
	3.135V	5210.00	5210.027019	27.019	5.1860
		5775.00	5775.030233	30.233	5.2352
	3.465V	5210.00	5210.027271	27.271	5.2344
		5775.00	5775.030113	30.113	5.2144
60deg.C	3.3V	5210.00	5209.990183	-9.817	-1.8843
		5775.00	5774.990222	-9.778	-1.6932
	3.135V	5210.00	5209.990153	-9.847	-1.8900
		5775.00	5774.990273	-9.727	-1.6843
	3.465V	5210.00	5209.990124	-9.876	-1.8956
		5775.00	5774.990096	-9.904	-1.7150

[Calculation method]

Tolerance (kHz) = Result - Frequency

Tolerance (ppm) = Tolerance (kHz) / Channel Frequency $*10^6$

[Test Condition]

(1) EUT operation : non-modulation

(2) Temperature and voltage tolerance : EUT specification (Declare of Applicant)
Operation temperature : 0 ° deg C ~ +60 ° deg C
Operation voltage : DC 3.3V ± 5%

Tested Date	Environment	
	Temperature	Humidity
21 November 2017	20 °C	30 %

11. TEST EQUIPMENT

・Conducted Emission

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-144	Low Power Attenuator	HUBER+SUHNER	6810.01.A	2017/06	2018/06
FL-110	LISN	KYORITSU	KNW-242	2017/06	2018/06
MM-252	RF Relay Matrix	TSJ	RFM-E121	2017/06	2018/06
SA-067	Test Receiver	Keysight Technologies	N9038A	2017/09	2018/09

・Emission Bandwidth
・Power Spectral Density

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-148	Fixed Attenuator	Anritsu	41KC-10	2017/04	2018/04
SA-065	Signal Analyzer	Agilent	N9030A	2016/12	2017/11

・Maximum Conducted Output Power

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-148	Fixed Attenuator	Anritsu	41KC-10	2017/04	2018/04
VV-061	Power Meter	Agilent	N1912A	2017/11	2018/11
VV-061-1	Wideband Power Sensor	Agilent	N1921A	2017/11	2018/11

・Spurious Emission (Radiated) 30-1000MHz

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AM-028	Pre-Amplifier	Anritsu	Anritsu	2017/04	2018/04
AN-094	Biconical Antenna	Schwarzbeck	VHA9103/BBA9106	2017/04	2018/04
AN-250	LPDA Antenna	Schwarzbeck	UHALP9108A	2017/04	2018/04
AT-159	Fixed Attenuator	Anritsu	MP721B	2017/04	2018/04
FS-099	Test Receiver	ROHDE & SCHWARZ	ESS	2017/01	2018/01
MM-530	RF Relay Matrix Unit	TSJ	RFM-E321	2017/04	2018/04
SA-059	Spectrum Analyzer	Agilent	N9010A	2017/07	2018/07

・Spurious Emission (Radiated) Above 1GHz

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AM-053	Pre-Amplifier	HP	8449B	2017/05	2018/05
AM-131	Pre-Amplifier	TOYO	TPA0118-36	2017/03	2018/03
AN-357	DRG Antenna	ETS LINDGREN	3117	2017/04	2018/04
AN-104	Std. Gain Horn Antenna	Scientific-Atlanta	12-5.8	2017/04	2020/04
AN-107	Std. Gain Horn Antenna	Scientific-Atlanta	12A-18	2017/05	2020/05
AN-109	Std. Gain Horn Antenna	Scientific-Atlanta	12A-26	2017/05	2020/05
AN-145	Std. Gain Horn Antenna	Scientific-Atlanta	12-12	2017/04	2020/04
AN-210	Std. Gain Horn Antenna	Scientific-Atlanta	12-8.2	2017/04	2020/04
AN-337	DRG Horn Antenna	ETS LINDGREN	3117	2017/04	2018/04
AT-148	Fixed Attenuator	Anritsu	41KC-10	2017/04	2018/04
FL-223	Band-stop Filter	TOYO	9BRM5250/T600	2017/04	2018/04
FL-224	Band-stop Filter	TOYO	6BRM5600/T700	2017/04	2018/04
FS-111	Test Receiver	ROHDE & SCHWARZ	ESW26	2017/03	2018/03
SA-065	Signal Analyzer	Agilent	N9030A	2016/12	2017/11

・Spurious Emission (Conducted) Below 30MHz

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-148	Fixed Attenuator	Anritsu	41KC-10	2017/04	2018/04
SA-067	Test Receiver	Keysight Technologies	N9038A	2017/09	2018/09

Note : (*1) KEC checked the performance, before using this device.

The overall program of calibration and verification of equipment is designed and operated so as to ensure that measurements made by KEC are traceable to the national standards of measurement or equivalent abroad.

APPENDIX A (DECLARATION OF COMPLIANCE TO MAXIMUM PERMISSIBLE EXPOSURE LIMITS FOR HUMANS)

The Model U9W31 with 5150-5850MHz transmitter complies with Maximum permissible exposure limits for humans as called out in §1.1310. It is exempt from Maximum Permissible Exposure based on its operating frequency, and power density 0.01mW/cm^2.

Calculation formula :

$$S = PG / 4\pi D^2$$

S : power density (W/m^2)
P : average output power (W)
G : antenna gain (isotropic)
D : measurement distance (m)

Where :
・Ant A
P = 10.87dBm at 5190 MHz, 11n-HT40 (see 29 page)
G = 1.62dBi
・Ant B
P = 11.72dBm at 5190 MHz, 11n-HT40 (see 29 page)
G = 3.34dBi

Therefore :

$$S(W/m^2) = \frac{(10^{\frac{10.87}{10}} \times 10^{-3} \times 10^{\frac{1.62}{10}}) + (10^{\frac{11.72}{10}} \times 10^{-3} \times 10^{\frac{3.34}{10}})}{4 \times \pi \times 0.2 \times 0.2} = 0.1$$

S≒0.01 (mW/cm^2)

This would be less than 1mW/cm^2 when the separation distance between the user and the device's radiating element is no less than 20cm.