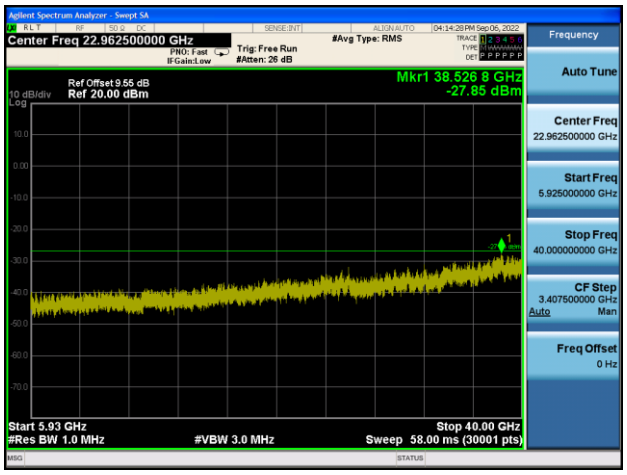
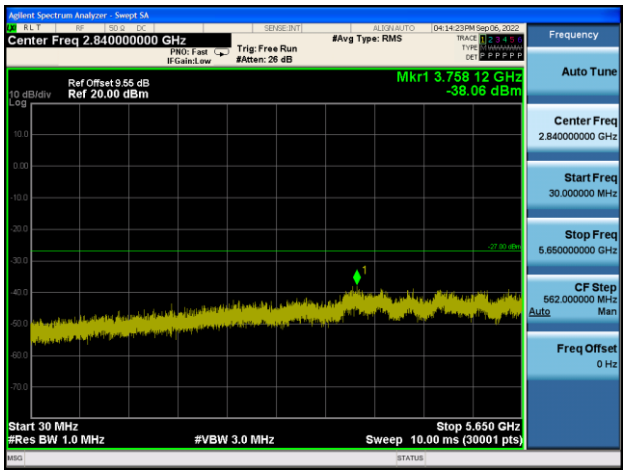
11ac80	
channel	channel
	

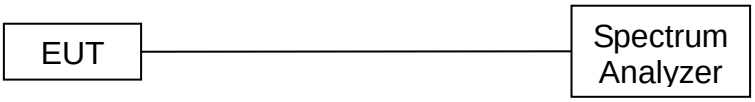
5.7 Conducted band edge

5.7.1 Limits

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

Frequency Band (MHz)	Limit
5150 - 5250	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5250 - 5350	Outside of the 5.15-5.35 GHz band: e.i.r.p. -27 dBm
5470 - 5725	Outside of the 5.47-5.725 GHz band: e.i.r.p. -27 dBm
5725 - 5850	All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

5.7.2 Test setup



5.7.3 Test procedure

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

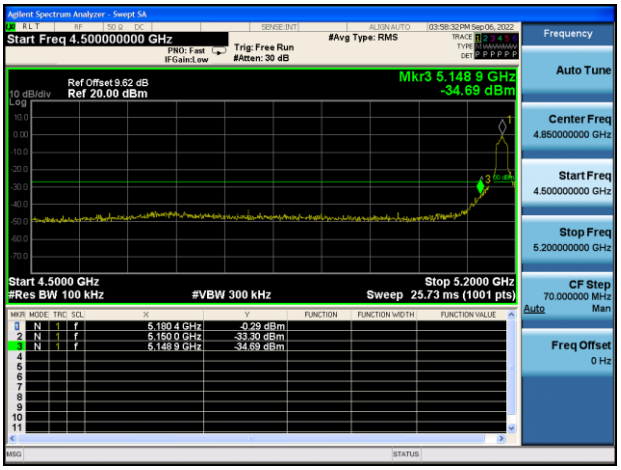
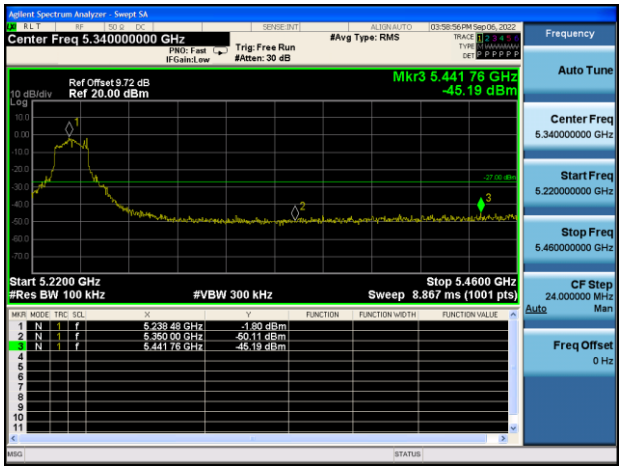
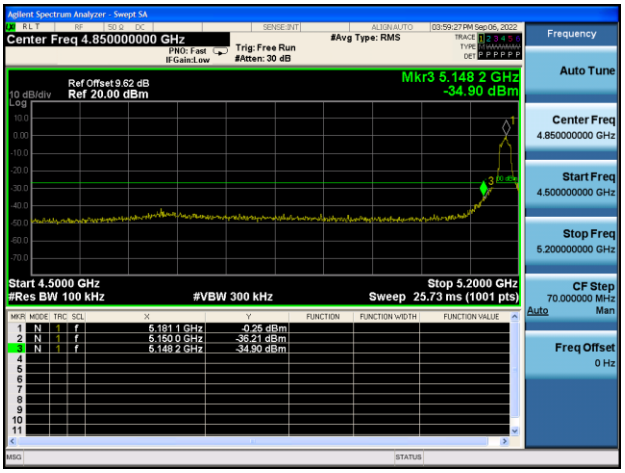
c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.

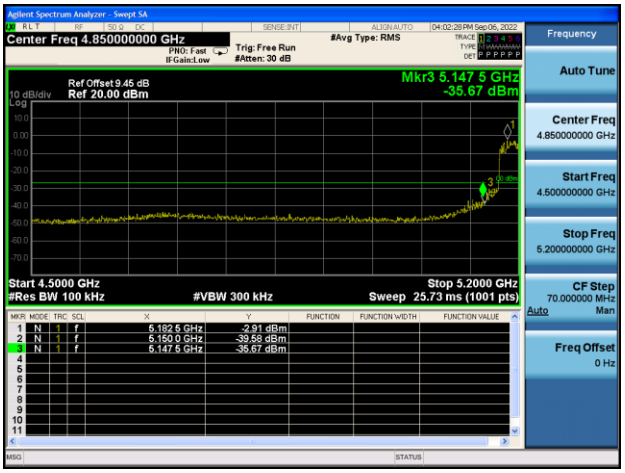
d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

e) Repeat above procedures until all measured frequencies were complete.

5.7.4 Test result

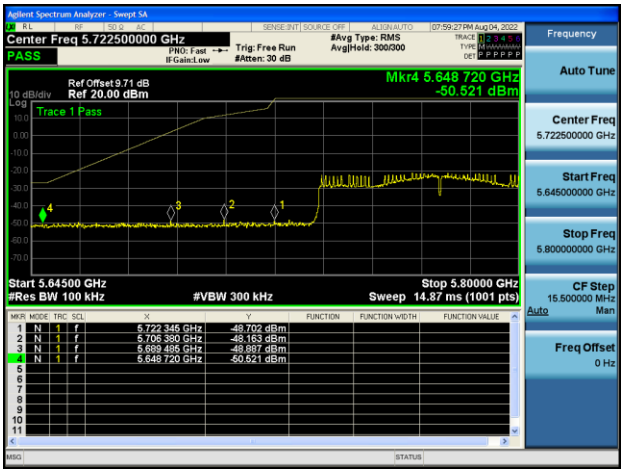
For U-NII-1

11a	
Band Edge-Left Side	Band Edge-Left Side
	
11ac20	
Band Edge-Left Side	Band Edge-Left Side
	

11a40	
Band Edge-Left Side	Band Edge-Left Side
	
11ac80	
Band Edge-Left Side	Band Edge-Left Side
	

For U-NII-3

11a	
Band Edge-Left Side	Band Edge-Left Side
	
11ac20	
Band Edge-Left Side	Band Edge-Left Side
	

11ac40	
Band Edge-Left Side	Band Edge-Left Side
	
11ac80	
Band Edge-Left Side	Band Edge-Left Side
	

5.8 Radiated spurious emission

5.8.1 Radiated Emission Limits

1. For transmitters operating in the 5.15-5.25 GHz band:
   All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

2. For transmitters operating in the 5.25-5.35 GHz band:
   All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

3. For transmitters operating in the 5.47-5.725 GHz band:
   All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

4. For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

Frequencies (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

Frequency Range	RBW	VBW	Measurement
30MHz-1GHz	1MHz	3MHz	Peak
Above 1GHz	1MHz	10Hz[Note1]	Average
	1MHz	>1/T [Note2]	Average
Note1	When duty cycle is no less than 98%		
Note2	When duty cycle is less than 98%		

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

5.8.2 Test procedure

The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the floor on a support that is RF transparent for the frequencies of interest. Final measurements for the EUT require a measurement antenna height scan of 1 m to 4 m.

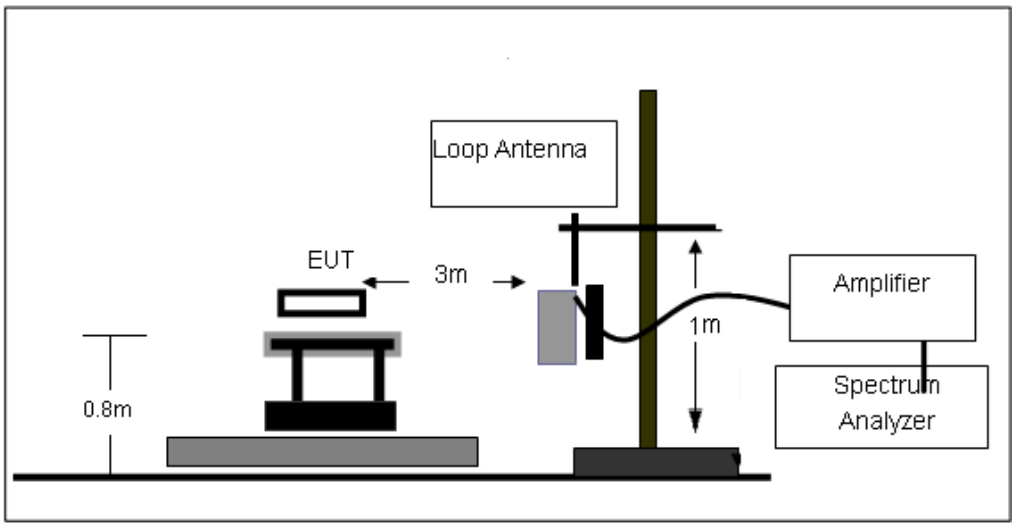
The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.

If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
For the actual test configuration, please refer to the related Item –EUT Test Photos.

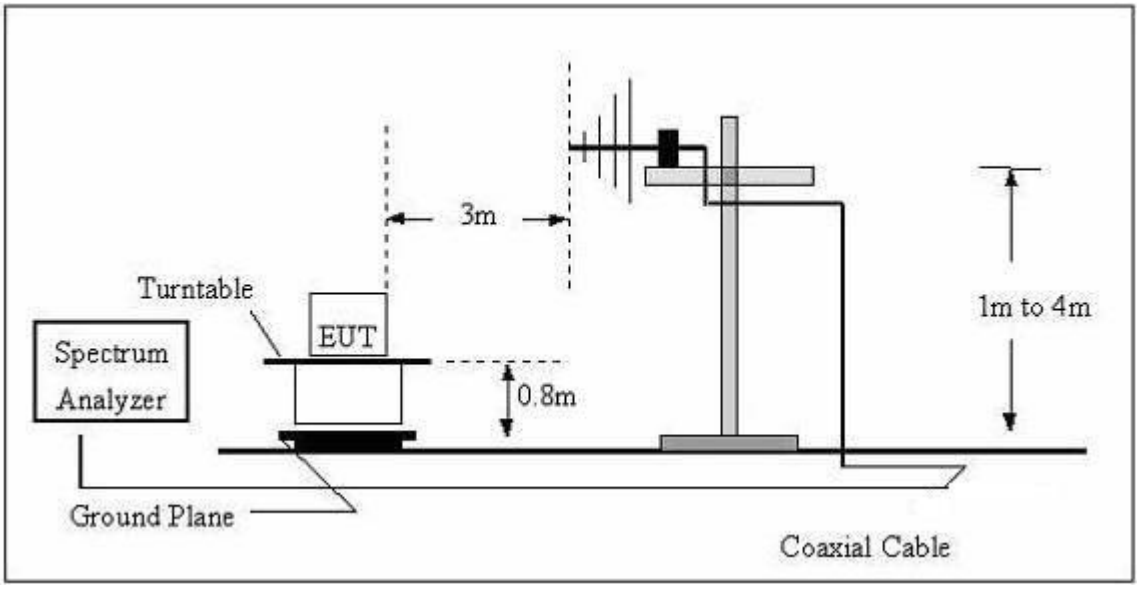
Note: Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

5.8.3 Test setup

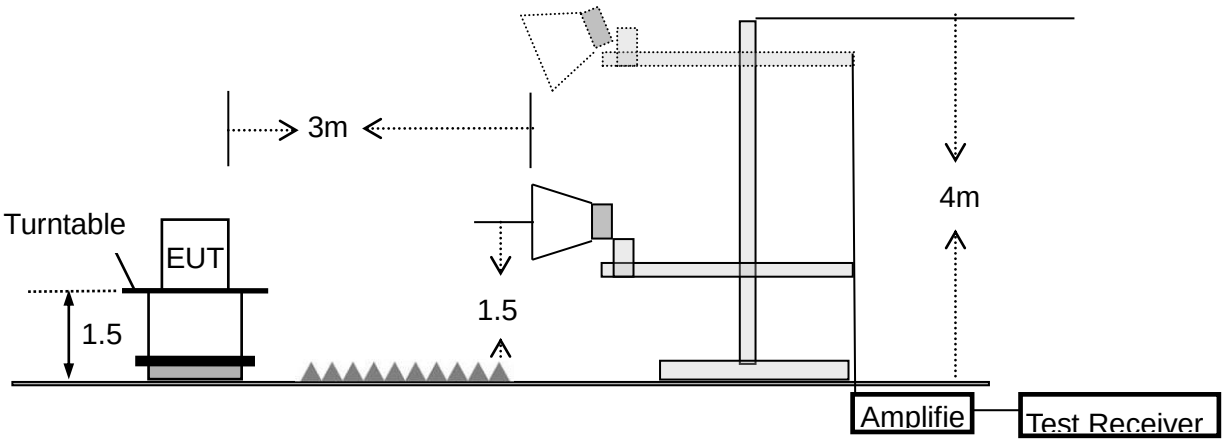
（A）Radiated Emission test-up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



5.8.4 Test results

EUT:	Time Clock	Model Name:	PCEXPRESS
Pressure:	1010 hPa	Test Voltage:	DC 12V from adapter AC 120V/60Hz
Test Mode:	TX	Polarization:	--

Below 30MHz

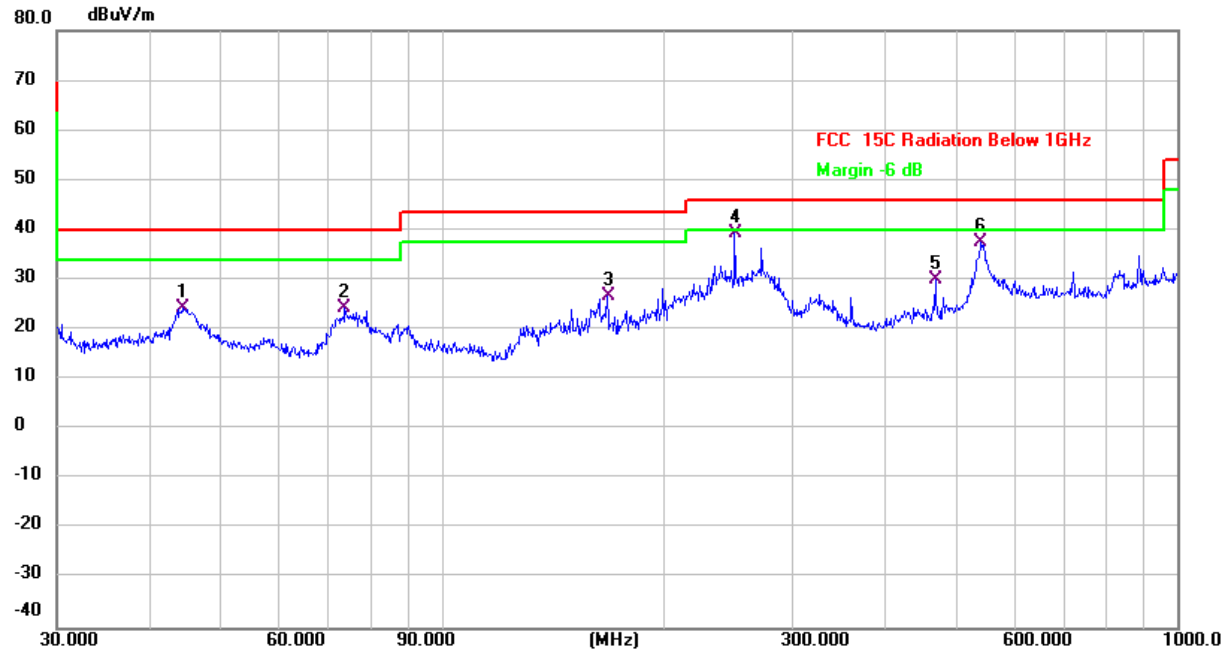
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	Pass
--	--	--	--	Pass

Note:

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor =40 log (specific distance/test distance)(dB);Limit line = specific limits (dBuV) + distance extrapolation factor.

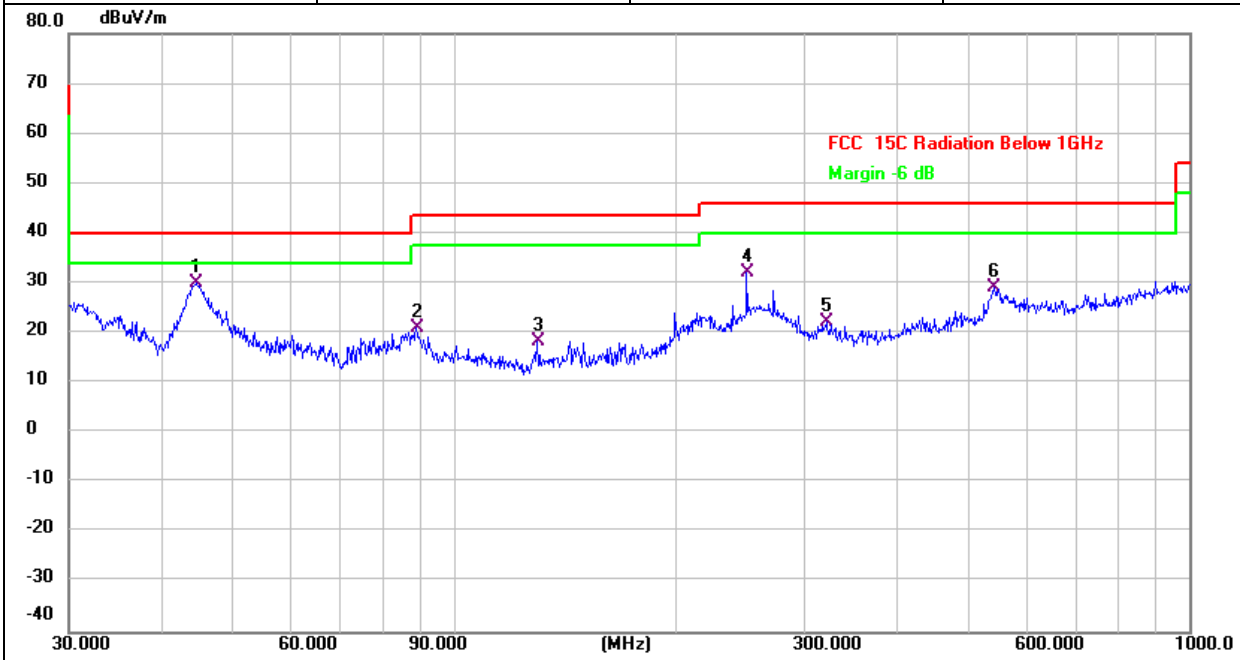
Between 30MHz – 1GHz
For U-NII-1

EUT:	Time Clock	Model Name:	PCEXPRESS
Pressure:	1010 hPa	Phase:	H
Test Voltage:	DC 12V from adapter AC 120V/60Hz	Mode:	Charging+TX



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		44.4308	31.68	-7.47	24.21	40.00	-15.79	QP
2		73.8756	34.41	-10.09	24.32	40.00	-15.68	QP
3		167.8243	36.41	-9.66	26.75	43.50	-16.75	QP
4	*	250.3012	45.11	-5.84	39.27	46.00	-6.73	QP
5		468.8762	33.57	-3.51	30.06	46.00	-15.94	QP
6		541.3725	39.24	-1.67	37.57	46.00	-8.43	QP

EUT:	Time Clock	Model Name:	PCEXPRESS
Pressure:	1010 hPa	Phase:	V
Test Voltage:	DC 12V from adapter AC 120V/60Hz	Mode:	Charging+TX



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	44.7433	37.61	-7.42	30.19	40.00	-9.81	QP
2		88.9639	30.13	-9.04	21.09	43.50	-22.41	QP
3		129.9226	29.18	-10.79	18.39	43.50	-25.11	QP
4		250.3012	38.11	-5.84	32.27	46.00	-13.73	QP
5		321.0608	27.09	-4.72	22.37	46.00	-23.63	QP
6		543.2742	30.74	-1.59	29.15	46.00	-16.85	QP

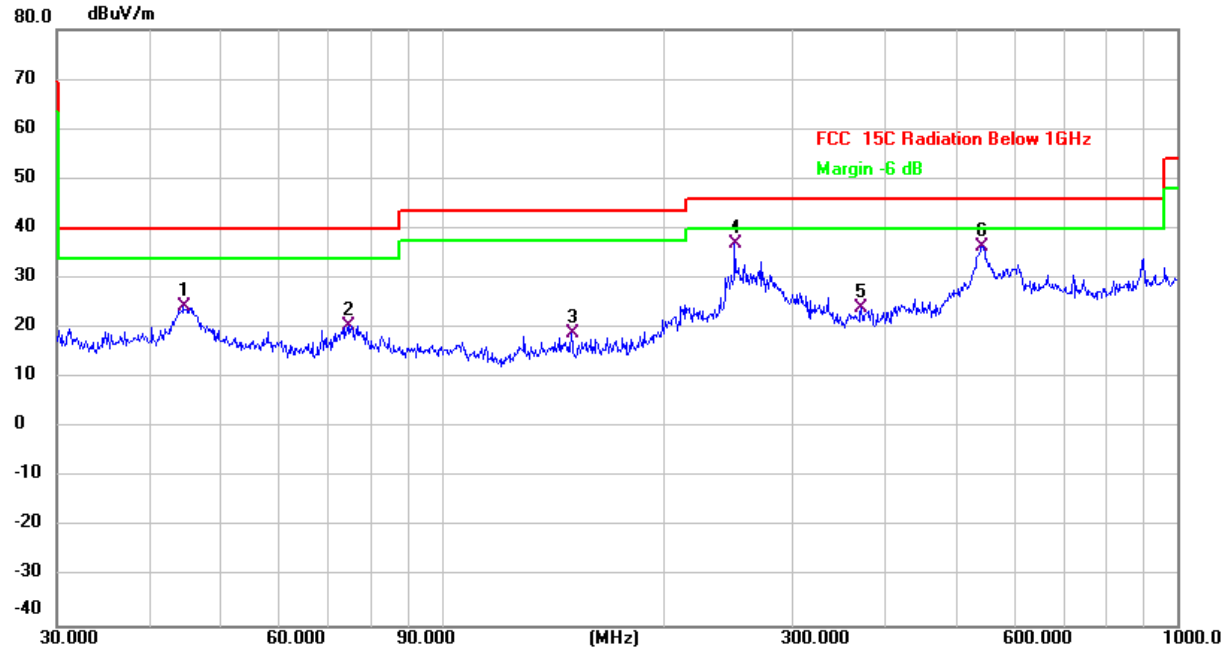
Note:

1. All the mode has been tested for this test, the mode 11a CH48 is the worst mode. Just report the worst data.
2. Emission Level = Meter Reading + Factor, Margin= Emission Level- Limit, Factor = Antenna Factor + Cable Loss – Pre-amplifier.

The peak value is less than the AV value, AV value is not required Factor added by measurement software automatically.

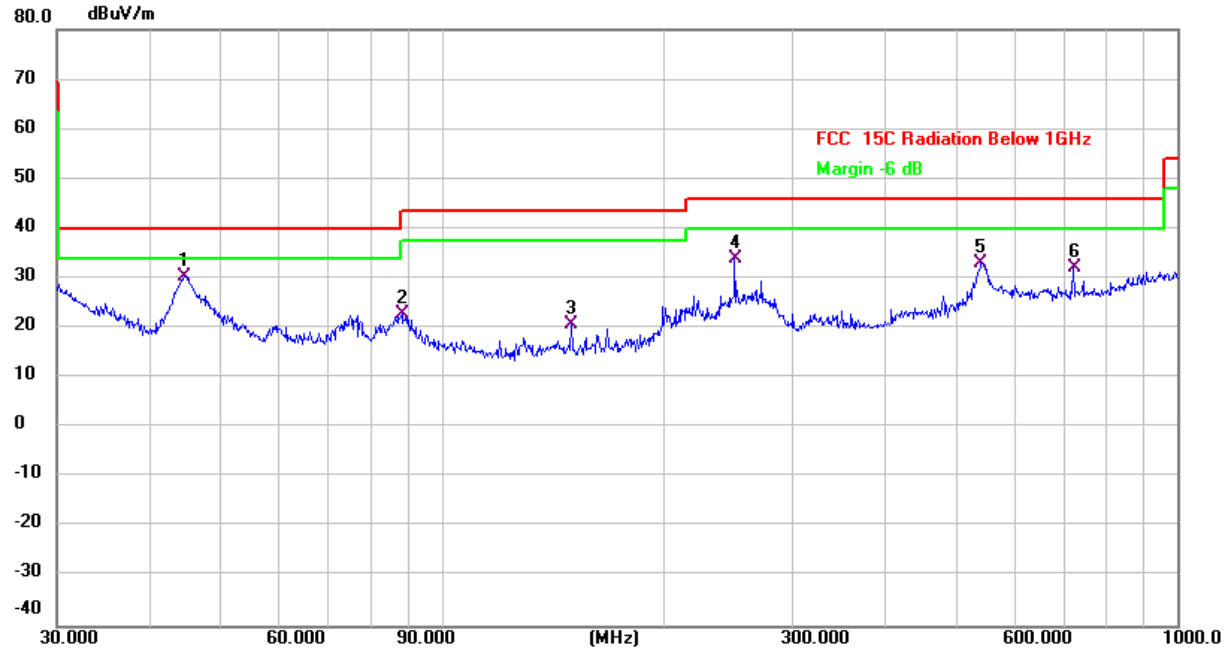
For U-NII-3

EUT:	Time Clock	Model Name:	PCEXPRESS
Pressure:	1010 hPa	Phase:	H
Test Voltage:	DC 12V from adapter AC 120V/60Hz	Mode:	Charging+TX



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		44.5868	31.80	-7.44	24.36	40.00	-15.64	QP
2		74.6568	30.69	-10.10	20.59	40.00	-19.41	QP
3		150.0108	29.44	-10.36	19.08	43.50	-24.42	QP
4	*	250.3011	42.85	-5.84	37.01	46.00	-8.99	QP
5		372.0045	28.39	-4.47	23.92	46.00	-22.08	QP
6		541.3725	38.03	-1.67	36.36	46.00	-9.64	QP

EUT:	Time Clock	Model Name:	PCEXPRESS
Pressure:	1010 hPa	Phase:	V
Test Voltage:	DC 12V from adapter AC 120V/60Hz	Mode:	Charging+TX



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	44.7433	37.73	-7.42	30.31	40.00	-9.69	QP
2		88.3421	31.94	-9.13	22.81	43.50	-20.69	QP
3		150.0108	31.03	-10.36	20.67	43.50	-22.83	QP
4		250.3012	39.85	-5.84	34.01	46.00	-11.99	QP
5		541.3725	34.79	-1.67	33.12	46.00	-12.88	QP
6		721.7259	31.76	0.35	32.11	46.00	-13.89	QP

Note:

3. All the mode has been tested for this test, the mode 11a CH165 is the worst mode. Just report the worst data.
4. Emission Level = Meter Reading + Factor, Margin= Emission Level- Limit, Factor = Antenna Factor + Cable Loss – Pre-amplifier.
5. The peak value is less than the AV value, AV value is not required Factor added by measurement software automatically.

1GHz-40GHz:

For U-NII-1

Frequency	Reading Level	Correct Factor	Measurement	Limits	Over	Detector	Polarization
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
802.11a - Low Channel (5180 MHz)-Above 1G							
10360.00	44.88	7.09	51.97	74.00	-22.03	Peak	V
10360.00	34.29	7.09	41.38	54.00	-12.62	AVG	V
15540.00	44.69	13.41	58.10	74.00	-15.90	Peak	V
15540.00	34.68	13.41	48.09	54.00	-5.91	AVG	V
10360.00	44.33	7.09	51.42	74.00	-22.58	Peak	H
10360.00	34.14	7.09	41.23	54.00	-12.77	AVG	H
15540.00	44.74	13.41	58.15	74.00	-15.85	Peak	H
15540.00	34.70	13.41	48.11	54.00	-5.89	AVG	H
802.11a - Middle Channel (5200 MHz)-Above 1G							
10440.00	41.74	7.24	48.98	74.00	-25.02	Peak	V
10440.00	31.10	7.24	38.34	54.00	-15.66	AVG	V
15660.00	43.60	13.47	57.07	74.00	-16.93	Peak	V
15660.00	33.20	13.47	46.67	54.00	-7.33	AVG	V
10440.00	42.34	7.24	49.58	74.00	-24.42	Peak	H
10440.00	32.05	7.24	39.29	54.00	-14.71	AVG	H
15660.00	45.06	13.47	58.53	74.00	-15.47	Peak	H
15660.00	34.81	13.47	48.28	54.00	-5.72	AVG	H
802.11a - High Channel (5240 MHz)-Above 1G							
10480.00	42.73	7.31	50.04	74.00	-23.96	Peak	V
10480.00	32.80	7.31	40.11	54.00	-13.89	AVG	V
15720.00	44.58	13.50	58.08	74.00	-15.92	Peak	V
15720.00	34.60	13.50	48.10	54.00	-5.90	AVG	V
10480.00	41.25	7.31	48.56	74.00	-25.44	Peak	H
10480.00	30.93	7.31	38.24	54.00	-15.76	AVG	H
15720.00	45.27	13.50	58.77	74.00	-15.23	Peak	H
15720.00	34.67	13.50	48.17	54.00	-5.83	AVG	H

For U-NII-3

Frequency	Reading Level	Correct Factor	Measurement	Limits	Over	Detector	Polarization
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
802.11a -Low Channel (5745 MHz)-Above 1G							
11490.00	41.25	9.26	50.51	74.00	-23.49	Peak	V
11490.00	30.97	9.26	40.23	54.00	-13.77	AVG	V
17235.00	42.32	14.63	56.95	74.00	-17.05	Peak	V
17235.00	32.04	14.63	46.67	54.00	-7.33	AVG	V
11490.00	41.46	9.26	50.72	74.00	-23.28	Peak	H
11490.00	30.97	9.26	40.23	54.00	-13.77	AVG	H
17235.00	42.79	14.63	57.42	74.00	-16.58	Peak	H
17235.00	32.66	14.63	47.29	54.00	-6.71	AVG	H
802.11a -Middle Channel (5785MHz)-Above 1G							
11570.00	41.89	9.40	51.29	74.00	-22.71	Peak	V
11570.00	31.76	9.40	41.16	54.00	-12.84	AVG	V
17355.00	42.75	14.80	57.55	74.00	-16.45	Peak	V
17355.00	32.45	14.80	47.25	54.00	-6.75	AVG	V
11570.00	41.58	9.40	50.98	74.00	-23.02	Peak	H
11570.00	30.69	9.40	40.09	54.00	-13.91	AVG	H
17355.00	43.47	14.80	58.27	74.00	-15.73	Peak	H
17355.00	33.37	14.80	48.17	54.00	-5.83	AVG	H
802.11a -High Channel (5825 MHz)-Above 1G							
11650.00	42.82	9.58	52.40	74.00	-21.60	Peak	V
11650.00	32.75	9.58	42.33	54.00	-11.67	AVG	V
17475.00	43.44	14.97	58.41	74.00	-15.59	Peak	V
17475.00	33.22	14.97	48.19	54.00	-5.81	AVG	V
11650.00	41.89	9.58	51.47	74.00	-22.53	Peak	H
11650.00	31.80	9.58	41.38	54.00	-12.62	AVG	H
17475.00	43.20	14.97	58.17	74.00	-15.83	Peak	H
17475.00	33.15	14.97	48.12	54.00	-5.88	AVG	H

Band edge - radiated

For U-NII-1

For 802.11a mode: (CH36 5180MHz-CH48 5240MHz)

Frequency	Reading Level	Correct Factor	Measurement	Limits	Over	Detector	Polarization
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
802.11a – Low band-edge							
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
4500.000	46.22	0.91	47.13	74.00	-26.87	Peak	V
4500.000	36.39	0.91	37.30	54.00	-16.70	AVG	V
5150.000	48.79	2.41	51.20	74.00	-22.80	Peak	V
5150.000	39.43	2.41	41.84	54.00	-12.16	AVG	V
4500.000	45.32	0.91	46.23	74.00	-27.77	Peak	H
4500.000	36.49	0.91	37.40	54.00	-16.60	AVG	H
5150.000	47.24	2.41	49.65	74.00	-24.35	Peak	H
5150.000	38.17	2.41	40.58	54.00	-13.42	AVG	H
802.11a – High band-edge							
5350.000	46.64	3.05	49.69	74.00	-24.31	Peak	V
5350.000	37.11	3.05	40.16	54.00	-13.84	AVG	V
5460.000	48.18	3.41	51.59	74.00	-22.41	Peak	V
5460.000	37.66	3.41	41.07	54.00	-12.93	AVG	V
5350.000	46.48	3.05	49.53	74.00	-24.47	Peak	H
5350.000	37.00	3.05	40.05	54.00	-13.95	AVG	H
5460.000	46.29	3.41	49.70	74.00	-24.30	Peak	H
5460.000	37.42	3.41	40.83	54.00	-13.17	AVG	H

For 802.11ac-(HT20) mode: (CH36 5180MHz-CH48 5240MHz)

Frequency	Reading Level	Correct Factor	Measurement	Limits	Over	Detector	Polarization
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
802.11ac-(HT20) – Low band-edge							
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
4500.000	46.12	0.91	47.03	74.00	-26.97	Peak	V
4500.000	36.45	0.91	37.36	54.00	-16.64	AVG	V
5150.000	49.61	2.41	52.02	74.00	-21.98	Peak	V
5150.000	39.35	2.41	41.76	54.00	-12.24	AVG	V
4500.000	45.40	0.91	46.31	74.00	-27.69	Peak	H
4500.000	36.47	0.91	37.38	54.00	-16.62	AVG	H
5150.000	47.67	2.41	50.08	74.00	-23.92	Peak	H
5150.000	38.35	2.41	40.76	54.00	-13.24	AVG	H
802.11ac-(HT20) – High band-edge							
5350.000	47.46	3.05	50.51	74.00	-23.49	Peak	V
5350.000	37.19	3.05	40.24	54.00	-13.76	AVG	V
5460.000	47.67	3.41	51.08	74.00	-22.92	Peak	V
5460.000	37.56	3.41	40.97	54.00	-13.03	AVG	V
5350.000	47.14	3.05	50.19	74.00	-23.81	Peak	H
5350.000	36.91	3.05	39.96	54.00	-14.04	AVG	H
5460.000	46.54	3.41	49.95	74.00	-24.05	Peak	H
5460.000	37.22	3.41	40.63	54.00	-13.37	AVG	H

For 802.11ac-(HT40) mode: (CH38 5190MHz-CH46 5230MHz)

Frequency	Reading Level	Correct Factor	Measurement	Limits	Over	Detector	Polarization
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
802.11ac-(HT40) – Low band-edge							
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
4500.000	45.53	0.91	46.44	74.00	-27.56	Peak	V
4500.000	36.53	0.91	37.44	54.00	-16.56	AVG	V
5150.000	54.67	2.41	57.08	74.00	-16.92	Peak	V
5150.000	42.12	2.41	44.53	54.00	-9.47	AVG	V
4500.000	45.94	0.91	46.85	74.00	-27.15	Peak	H
4500.000	36.42	0.91	37.33	54.00	-16.67	AVG	H
5150.000	52.85	2.41	55.26	74.00	-18.74	Peak	H
5150.000	40.14	2.41	42.55	54.00	-11.45	AVG	H
802.11ac-(HT40) – High band-edge							
5350.000	46.10	3.05	49.15	74.00	-24.85	Peak	V
5350.000	37.61	3.05	40.66	54.00	-13.34	AVG	V
5460.000	46.49	3.41	49.90	74.00	-24.10	Peak	V
5460.000	37.57	3.41	40.98	54.00	-13.02	AVG	V
5350.000	46.87	3.05	49.92	74.00	-24.08	Peak	H
5350.000	37.26	3.05	40.31	54.00	-13.69	AVG	H
5460.000	48.00	3.41	51.41	74.00	-22.59	Peak	H
5460.000	37.46	3.41	40.87	54.00	-13.13	AVG	H

For 802.11ac80 mode: (CH42 5210MHz)

Frequency	Reading Level	Correct Factor	Measurement	Limits	Over	Detector	Polarization
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
802.11ac-(HT80) – Low band-edge							
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
4500.000	45.50	0.91	46.41	74.00	-27.59	Peak	V
4500.000	36.51	0.91	37.42	54.00	-16.58	AVG	V
5150.000	56.58	2.41	58.99	74.00	-15.01	Peak	V
5150.000	45.78	2.41	48.19	54.00	-5.81	AVG	V
4500.000	45.81	0.91	46.72	74.00	-27.28	Peak	H
4500.000	36.42	0.91	37.33	54.00	-16.67	AVG	H
5150.000	52.48	2.41	54.89	74.00	-19.11	Peak	H
5150.000	41.95	2.41	44.36	54.00	-9.64	AVG	H
802.11ac-(HT80) – High band-edge							
5350.000	50.50	3.05	53.55	74.00	-20.45	Peak	V
5350.000	38.89	3.05	41.94	54.00	-12.06	AVG	V
5460.000	46.85	3.41	50.26	74.00	-23.74	Peak	V
5460.000	37.96	3.41	41.37	54.00	-12.63	AVG	V
5350.000	47.43	3.05	50.48	74.00	-23.52	Peak	H
5350.000	37.77	3.05	40.82	54.00	-13.18	AVG	H
5460.000	46.93	3.41	50.34	74.00	-23.66	Peak	H
5460.000	37.46	3.41	40.87	54.00	-13.13	AVG	H

For U-NII-3

For 802.11a mode: (CH149 5745MHz-CH165 5825MHz)

Frequency	Reading Level	Correct Factor	Measurement	Limits	Over	Detector	Polarization
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
802.11a – Low band-edge							
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
5650.000	46.75	3.95	50.70	68.20	-17.50	Peak	V
5700.000	48.15	4.08	52.23	105.2	-52.97	Peak	V
5720.000	47.69	4.14	51.83	110.8	-58.97	Peak	V
5725.000	48.93	4.15	53.08	122.2	-69.12	Peak	V
5650.000	46.36	3.95	50.31	68.20	-17.89	Peak	H
5700.000	46.06	4.08	50.14	105.2	-55.06	Peak	H
5720.000	46.44	4.14	50.58	110.8	-60.22	Peak	H
5725.000	46.93	4.15	51.08	122.2	-71.12	Peak	H
802.11a – High band-edge							
5850.000	48.08	4.49	52.57	122.2	-69.63	Peak	V
5855.000	48.86	4.50	53.36	110.8	-57.44	Peak	V
5875.000	46.87	4.55	51.42	105.2	-53.78	Peak	V
5925.000	47.15	4.69	51.84	68.20	-16.36	Peak	V
5850.000	46.88	4.49	51.37	122.2	-70.83	Peak	H
5855.000	46.35	4.50	50.85	110.8	-59.95	Peak	H
5875.000	46.86	4.55	51.41	105.2	-53.79	Peak	H
5925.000	46.81	4.69	51.50	68.20	-16.70	Peak	H

For 802.11ac-(HT20) mode: (CH149 5745MHz-CH165 5825MHz)

Frequency	Reading Level	Correct Factor	Measurement	Limits	Over	Detector	Polarization
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
802.11ac-(HT20) – Low band-edge							
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
5650.000	47.00	3.95	50.95	68.20	-17.25	Peak	V
5700.000	47.71	4.08	51.79	105.2	-53.41	Peak	V
5720.000	48.79	4.14	52.93	110.8	-57.87	Peak	V
5725.000	52.17	4.15	56.32	122.2	-65.88	Peak	V
5650.000	46.71	3.95	50.66	68.20	-17.54	Peak	H
5700.000	46.57	4.08	50.65	105.2	-54.55	Peak	H
5720.000	46.80	4.14	50.94	110.8	-59.86	Peak	H
5725.000	48.18	4.15	52.33	122.2	-69.87	Peak	H
802.11ac-(HT20) – High band-edge							
5850.000	47.83	4.49	52.32	122.2	-69.88	Peak	V
5855.000	48.84	4.50	53.34	110.8	-57.46	Peak	V
5875.000	47.88	4.55	52.43	105.2	-52.77	Peak	V
5925.000	47.03	4.69	51.72	68.20	-16.48	Peak	V
5850.000	46.56	4.49	51.05	122.2	-71.15	Peak	H
5855.000	47.20	4.50	51.70	110.8	-59.10	Peak	H
5875.000	47.23	4.55	51.78	105.2	-53.42	Peak	H
5925.000	48.67	4.69	53.36	68.20	-14.84	Peak	H

For 802.11ac-(HT40) mode: (CH151 5755MHz-CH159 5795MHz)

Frequency	Reading Level	Correct Factor	Measurement	Limits	Over	Detector	Polarization
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
802.11ac-(HT40) – Low band-edge							
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
5650.000	46.89	3.95	50.84	68.20	-17.36	Peak	V
5700.000	47.22	4.08	51.30	105.2	-53.90	Peak	V
5720.000	53.39	4.14	57.53	110.8	-53.27	Peak	V
5725.000	52.28	4.15	56.43	122.2	-65.77	Peak	V
5650.000	46.04	3.95	49.99	68.20	-18.21	Peak	H
5700.000	46.40	4.08	50.48	105.2	-54.72	Peak	H
5720.000	48.88	4.14	53.02	110.8	-57.78	Peak	H
5725.000	49.11	4.15	53.26	122.2	-68.94	Peak	H
802.11ac-(HT40) – High band-edge							
5850.000	47.35	4.49	51.84	122.2	-70.36	Peak	V
5855.000	48.13	4.50	52.63	110.8	-58.17	Peak	V
5875.000	48.90	4.55	53.45	105.2	-51.75	Peak	V
5925.000	46.80	4.69	51.49	68.20	-16.71	Peak	V
5850.000	46.61	4.49	51.10	122.2	-71.10	Peak	H
5855.000	46.44	4.50	50.94	110.8	-59.86	Peak	H
5875.000	46.78	4.55	51.33	105.2	-53.87	Peak	H
5925.000	47.16	4.69	51.85	68.20	-16.35	Peak	H

For 802.11ac80 mode: (CH155 5775MHz)

Frequency	Reading Level	Correct Factor	Measurement	Limits	Over	Detector	Polarization
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
802.11ac-(HT80) – Low band-edge							
(MHz)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	Peak/AVG	H/V
5650.000	46.69	3.95	50.64	68.20	-17.56	Peak	V
5700.000	50.15	4.08	54.23	105.2	-50.97	Peak	V
5720.000	54.99	4.14	59.13	110.8	-51.67	Peak	V
5725.000	55.23	4.15	59.38	122.2	-62.82	Peak	V
5650.000	46.33	3.95	50.28	68.20	-17.92	Peak	H
5700.000	47.90	4.08	51.98	105.2	-53.22	Peak	H
5720.000	49.52	4.14	53.66	110.8	-57.14	Peak	H
5725.000	49.83	4.15	53.98	122.2	-68.22	Peak	H
802.11ac-(HT80) – High band-edge							
5850.000	50.41	4.49	54.90	122.2	-67.30	Peak	V
5855.000	49.99	4.50	54.49	110.8	-56.31	Peak	V
5875.000	49.19	4.55	53.74	105.2	-51.46	Peak	V
5925.000	48.66	4.69	53.35	68.20	-14.85	Peak	V
5850.000	47.10	4.49	51.59	122.2	-70.61	Peak	H
5855.000	46.88	4.50	51.38	110.8	-59.42	Peak	H
5875.000	47.44	4.55	51.99	105.2	-53.21	Peak	H
5925.000	46.40	4.69	51.09	68.20	-17.11	Peak	H

5.9 Power spectral density

5.9.1 Limit

For the band 5.15-5.25 GHz

For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.25-5.35 GHz and 5.47-5.725 GHz

The maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz

The maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.9.2 Test procedure

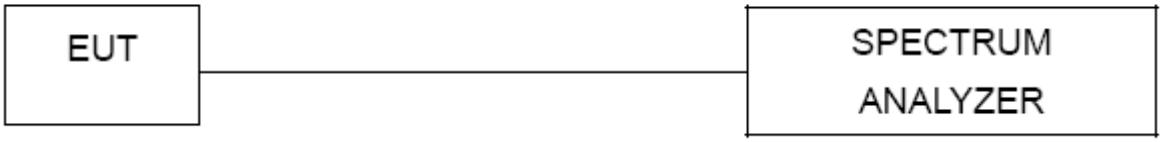
For U-NII-1

1. Set analyzer center frequency to NII channel center frequency.
2. Set the RBW ≥ 1MHz.
3. Set the VBW ≥ 3 x RBW.
4. Detector = Average.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

For U-NII-3

1. Set analyzer center frequency to NII channel center frequency.
2. Set the RBW ≥ 510kHz.
3. Set the VBW ≥ 3 x RBW.
4. Detector = Average.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

5.9.3 Test setup



5.9.4 Test results

For U-NII-1

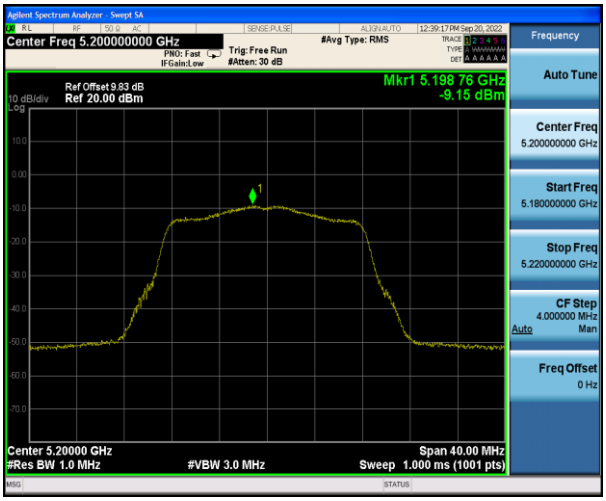
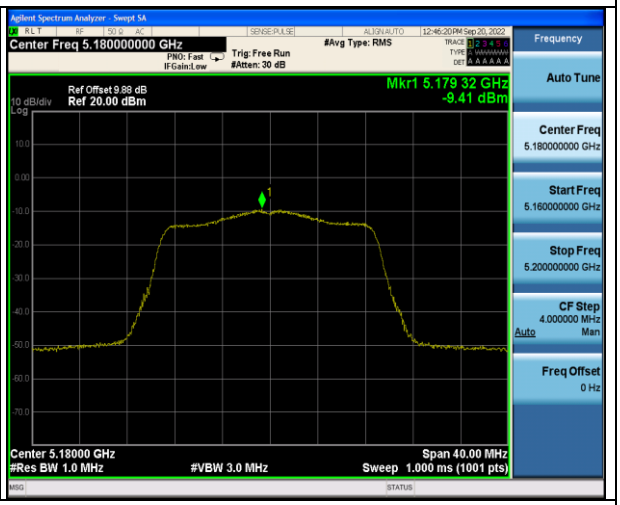
Mode	Channel	Frequency (MHz)	Average Measurement PSD (dBm/MHz)	Duty Cycle Factor (dB)	Result (dBm/MHz)	Limit (dBm/MHz)	Result
11a	CH36	5180	-9.04	0.12	-8.92	11	Pass
11a	CH44	5220	-9.15	0.12	-9.03	11	Pass
11a	CH48	5240	-8.89	0.12	-8.77	11	Pass
11ac (HT20)	CH36	5180	-9.41	0.16	-9.25	11	Pass
11ac (HT20)	CH40	5200	-9.64	0.16	-9.48	11	Pass
11ac (HT20)	CH48	5240	-9.48	0.16	-9.32	11	Pass
11ac (HT40)	CH38	5190	-12.63	0.32	-12.31	11	Pass
11ac (HT40)	CH46	5230	-12.83	0.32	-12.51	11	Pass
11ac (HT80)	CH42	5210	-14.52	0.50	-14.02	11	Pass

For U-NII-3

Mode	Channel	Frequency (MHz)	Average PSD (dBm/510kHz)	Average PSD (dBm/500kHz)	Duty Cycle Factor (dB)	Result (dBm/500kHz)	Limit (dBm/500kHz)	Result
11a	CH149	5745	-16.08	-16.17	0.12	-16.05	30	Pass
11a	CH157	5785	-17.12	-17.21	0.12	-17.09	30	Pass
11a	CH165	5825	-18.02	-18.11	0.12	-17.99	30	Pass
11ac20	CH149	5745	-16.4	-16.49	0.16	-16.33	30	Pass
11ac20	CH157	5785	-17.5	-17.59	0.16	-17.43	30	Pass
11ac20	CH165	5825	-18.13	-18.22	0.13	-18.09	30	Pass
11ac40	CH151	5755	-19.64	-19.73	0.32	-19.41	30	Pass
11ac40	CH159	5795	-20.36	-20.45	0.26	-20.19	30	Pass
11ac80	CH155	5775	-22.25	-22.34	0.50	-21.84	30	Pass

Test plots

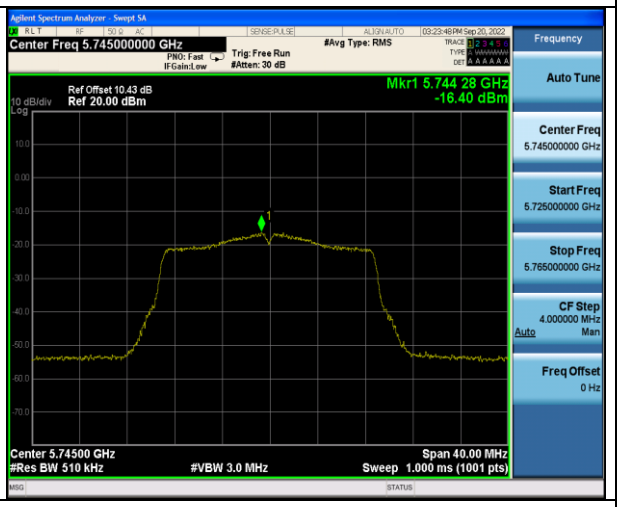
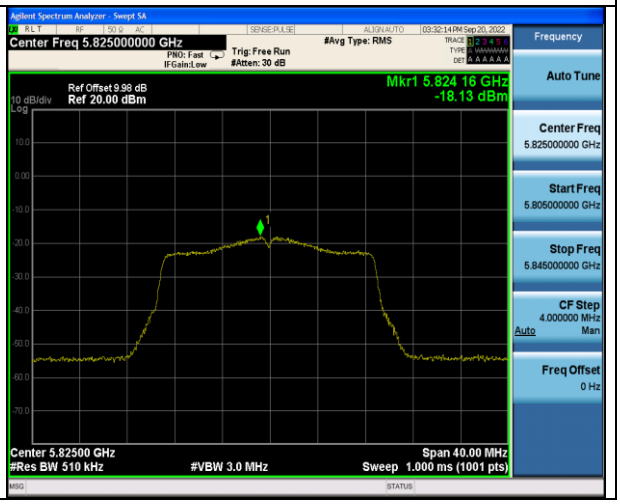
For U-NII-1

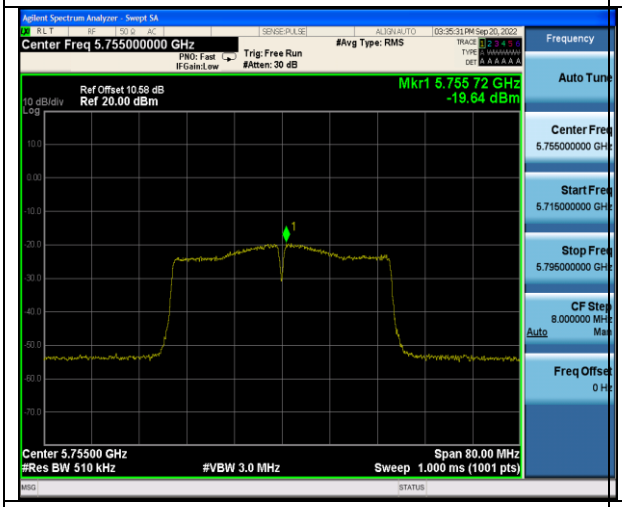
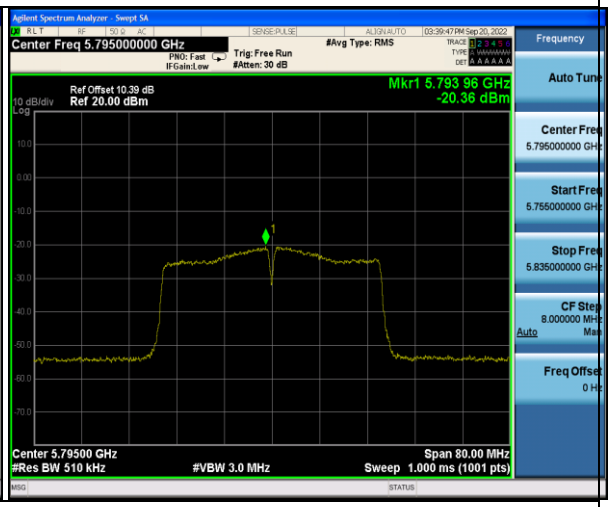
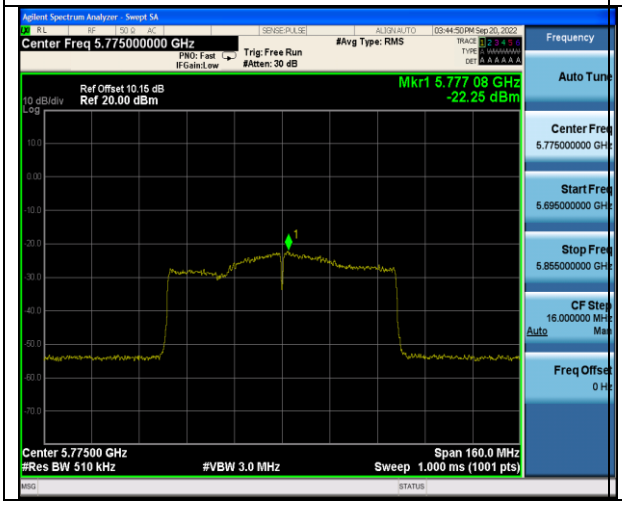
11a CH36	11a CH44
	
11a CH48	**11ac20 CH36**
	
11ac20 CH40	**11ac20 CH48**
	

11ac40 CH38	11ac40 CH46
	
11ac80 CH42	
	

Test plots

For U-NII-3

11a CH149	11a CH157
	
11a CH165	**11ac20 CH149**
	
11ac20 CH157	**11ac20 CH165**
	

11ac40 CH151	11ac40 CH159
	
11ac80 CH155	
	

5.10 Frequency Stability Measurement

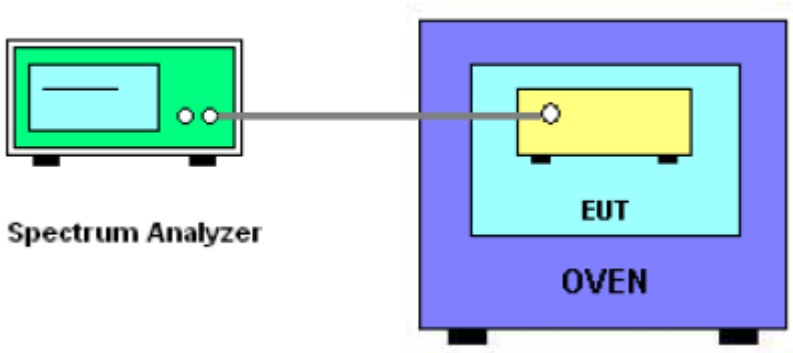
5.10.1 Limit

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

5.10.2 Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and max hold settings.
5. Fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is -20°C~70°C.

5.10.3 Test Setup Layout



5.10.4 EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

5.10.5 TEST RESULTS

Note: All modes have been tested. The report only shows the worst mode.

For U-NII-1

Voltage vs. Frequency Stability

Test conditions				Reference Frequency:5180			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12	5179.953	5180	0.047	-9.073
		V max (V)	13.2	5179.948	5180	0.033	-10.039
		V min (V)	10.8	5179.946	5180	0.054	-10.425
Limit				Within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

Test conditions				Reference Frequency:5180			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	T (°C)	-20	5179.938	5180	0.062	-11.969
		T (°C)	-10	5179.936	5180	0.064	-12.355
		T (°C)	0	5179.940	5180	0.06	-11.583
		T (°C)	10	5179.942	5180	0.058	-11.197
		T (°C)	20	5179.947	5180	0.053	-10.232
		T (°C)	30	5179.950	5180	0.05	-9.653
		T (°C)	40	5179.945	5180	0.055	-10.618
		T (°C)	50	5179.943	5180	0.057	-11.004
		T (°C)	60	5179.934	5180	0.066	-12.741
		T (°C)	70	5179.931	5180	0.069	-13.320
Limit				Within 5150-5250MHz			
Result				Complies			

Voltage vs. Frequency Stability

Test conditions	Reference Frequency:5200			
	f	fc	Max.	Max.

						Deviation (MHz)	Deviation (ppm)
T nom (°C)	20	V nom (V)	12	5199.981	5200	0.019	-3.654
		V max (V)	13.2	5199.972	5200	0.028	-5.385
		V min (V)	10.8	5199.970	5200	0.03	-5.769
Limit				Within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

Test conditions				Reference Frequency:5200			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	T (°C)	-20	5199.970	5200	0.03	-5.769
		T (°C)	-10	5199.972	5200	0.028	-5.385
		T (°C)	0	5199.975	5200	0.025	-4.808
		T (°C)	10	5199.978	5200	0.022	-4.231
		T (°C)	20	5199.976	5200	0.024	-4.615
		T (°C)	30	5199.974	5200	0.026	-5.000
		T (°C)	40	5199.973	5200	0.027	-5.192
		T (°C)	50	5199.967	5200	0.033	-6.346
		T (°C)	60	5199.962	5200	0.038	-7.308
		T (°C)	70	5199.960	5200	0.04	-7.692
Limit				Within 5150-5250MHz			
Result				Complies			

Voltage vs. Frequency Stability

Test conditions				Reference Frequency:5240			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12	5239.976	5240	0.024	-4.580
		V max (V)	13.2	5239.974	5240	0.026	-4.962
		V min (V)	10.8	5239.973	5240	0.027	-5.153
Limit				Within 5150-5250MHz			
Result				Complies			

Temperature vs. Frequency Stability

Test conditions				Reference Frequency:5240			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	T (°C)	-20	5239.969	5240	0.031	-5.916
		T (°C)	-10	5239.972	5240	0.028	-5.344
		T (°C)	0	5239.971	5240	0.029	-5.534
		T (°C)	10	5239.973	5240	0.027	-5.153
		T (°C)	20	5239.970	5240	0.03	-5.725
		T (°C)	30	5239.968	5240	0.032	-6.107
		T (°C)	40	5239.963	5240	0.037	-7.061
		T (°C)	50	5239.962	5240	0.038	-7.252
		T (°C)	60	5239.960	5240	0.04	-7.634
		T (°C)	70	5239.959	5240	0.041	-7.824
Limit				Within 5150-5250MHz			
Result				Complies			

For U-NII-3

Test conditions				Reference Frequency:5745			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12	5745.0174	5745	0.01750	-3.0461
		V max (V)	13.2	5745.0172	5745	0.01640	-2.8547
		V min (V)	10.8	5745.0178	5745	0.01955	-3.4030
Limit				Within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

Test conditions				Reference Frequency:5745			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	T (°C)	-20	5745.0187	5745	0.0187	-3.255
		T (°C)	-10	5745.0179	5745	0.0179	-3.116
		T (°C)	0	5745.0171	5745	0.0171	-2.977
		T (°C)	10	5745.0178	5745	0.0178	-3.098
		T (°C)	20	5745.0182	5745	0.0182	-3.168
		T (°C)	30	5745.0185	5745	0.0185	-3.220
		T (°C)	40	5745.0187	5745	0.0187	-3.255
		T (°C)	50	5745.0188	5745	0.0188	-3.272
		T (°C)	60	5745.0190	5745	0.019	-3.307
		T (°C)	70	5745.0193	5745	0.0193	-3.359
Limit				Within 5725-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

Test conditions				Reference Frequency:5785			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12	5785.01533	5785	0.01533	-2.6500
		V max (V)	13.2	5785.01781	5785	0.01781	-3.0787
		V min (V)	10.8	5785.01701	5785	0.01701	-2.9404
Limit				Within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

Test conditions				Reference Frequency:5785			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	T (°C)	-20	5785.0156	5785	0.01564	-2.7035
		T (°C)	-10	5785.0177	5785	0.01765	-3.0510
		T (°C)	0	5785.0162	5785	0.01620	-2.8003
		T (°C)	10	5785.0157	5785	0.01570	-2.7139
		T (°C)	20	5785.0159	5785	0.01590	-2.7485
		T (°C)	30	5785.0168	5785	0.01680	-2.9041
		T (°C)	40	5785.0169	5785	0.01690	-2.9213
		T (°C)	50	5785.0159	5785	0.01590	-2.7485
		T (°C)	60	5785.0161	5785	0.01610	-2.7831
		T (°C)	70	5785.0165	5785	0.01650	-2.8522
Limit				Within 5725-5850MHz			
Result				Complies			

Voltage vs. Frequency Stability

Test conditions				Reference Frequency:5825			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	12	5825.0133	5825	0.01330	-2.2833
		V max (V)	13.2	5825.0164	5825	0.01640	-2.8155
		V min (V)	10.8	5825.0155	5825	0.01550	-2.6609
Limit				Within 5725-5850MHz			
Result				Complies			

Temperature vs. Frequency Stability

Test conditions				Reference Frequency:5825			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	T (°C)	-20	5825.0162	5825	0.01620	-2.7811
		T (°C)	-10	5825.0159	5825	0.01590	-2.7296
		T (°C)	0	5825.0171	5825	0.01710	-2.9356
		T (°C)	10	5825.0167	5825	0.01670	-2.8670
		T (°C)	20	5825.0162	5825	0.01620	-2.7811
		T (°C)	30	5825.0158	5825	0.01580	-2.7124
		T (°C)	40	5825.0163	5825	0.01630	-2.7983
		T (°C)	50	5825.0174	5825	0.01740	-2.9871
		T (°C)	60	5825.0159	5825	0.01590	-2.7296
		T (°C)	70	5825.0162	5825	0.01620	-2.7811
Limit				Within 5725-5850MHz			
Result				Complies			

5.11 Duty Cycle

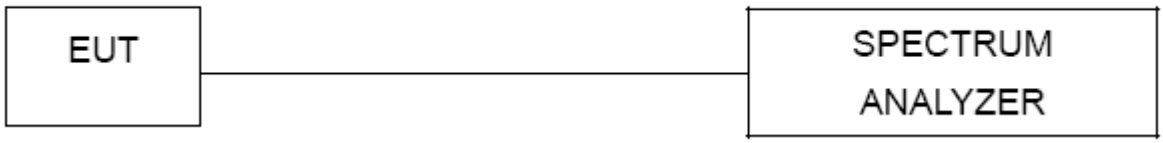
5.11.1 Limit

No limit requirement.

5.11.2 Measuring instruments

The Measuring equipment is listed in the section 4 of this test report.

5.11.3 Test setup



5.11.4 Test procedure

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, 6.0(b) in KDB 558074

The largest availble value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if T ≤ 6.25 microseconds. (50/6.25 = 8)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/T.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
Set to the maximum power setting and enable the EUT transmit continuously.
The EUT was operating in controlled its channel.
Use the following spectrum analyzer settings:
Span = Zero Span
RBW = 8MHz (the largest available value)
VBW = 8MHz (≥ RBW)
Number of points in Sweep >100
Detector function = peak
Trace = Clear write
Measure T total and Ton
Calculate Duty Cycle = Ton / T total

5.11.5 Test Results

EUT:	Time Clock	Model Name:	PCEXPRESS
Pressure:	1012 hPa	Test Voltage:	DC 12V from adapter AC 120V/60Hz
Test Mode:	TX		

For U-NII-1

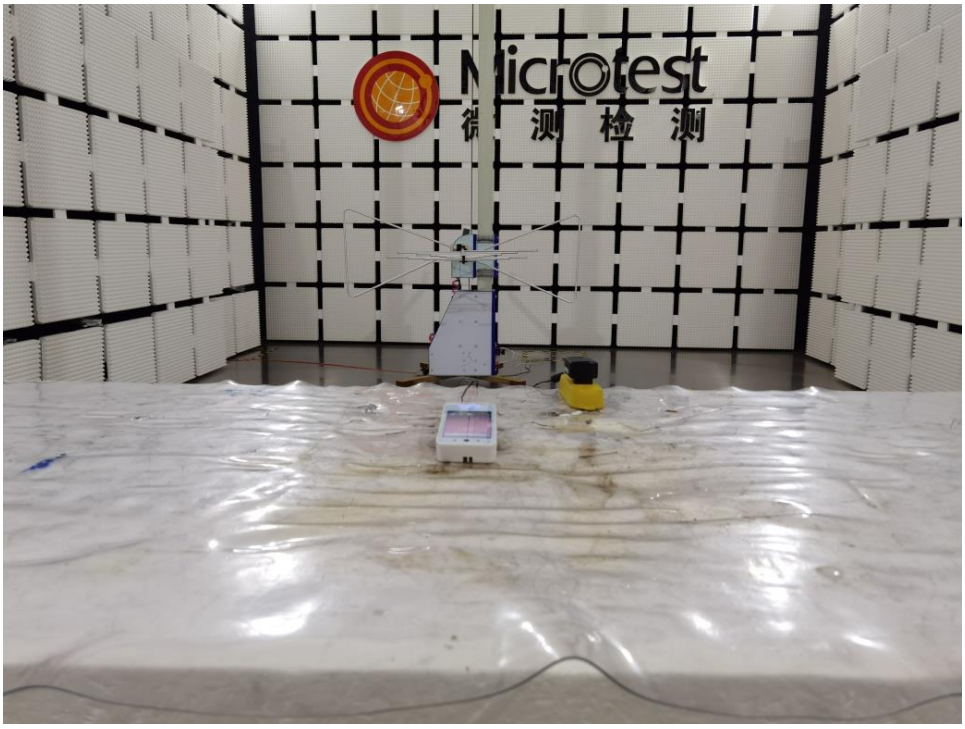
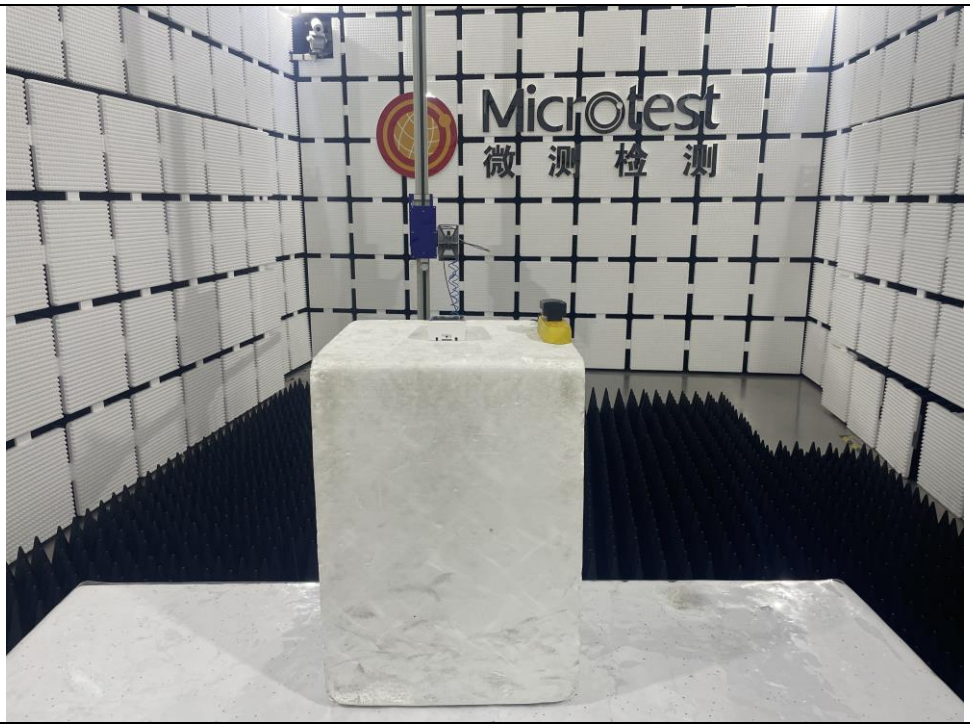
Test Mode	Antenna	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Duty Cycle Factor [dB]
11A	Ant1	5180	1.40	1.44	97.22	0.12
		5200	1.40	1.44	97.22	0.12
		5240	1.40	1.44	97.22	0.12
11AC20SISO	Ant1	5180	1.31	1.36	96.32	0.16
		5200	1.31	1.36	96.32	0.16
		5240	1.31	1.36	96.32	0.16
11AC40SISO	Ant1	5190	0.65	0.70	92.86	0.32
		5230	0.65	0.70	92.86	0.32
11AC80SISO	Ant1	5210	0.33	0.37	89.19	0.50

For U-NII-3

Test Mode	Antenna	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]	Duty Cycle Factor [dB]
11A	Ant1	5745	1.40	1.44	97.22	0.12
		5785	1.40	1.44	97.22	0.12
		5825	1.39	1.43	97.20	0.12
11AC20SISO	Ant1	5745	1.31	1.36	96.32	0.16
		5785	1.31	1.36	96.32	0.16
		5825	1.32	1.36	97.06	0.13
11AC40SISO	Ant1	5755	0.65	0.70	92.86	0.32
		5795	0.66	0.70	94.29	0.26
11AC80SISO	Ant1	5775	0.33	0.37	89.19	0.50

Note: All modes have been tested. The report only shows the worst mode.

Photographs of the Test Setup

Radiated emission below 1G

Radiated emission above 1G


Conducted emission


Photographs of the EUT

See the Appendix - EUT Photos.

----END OF REPORT----