



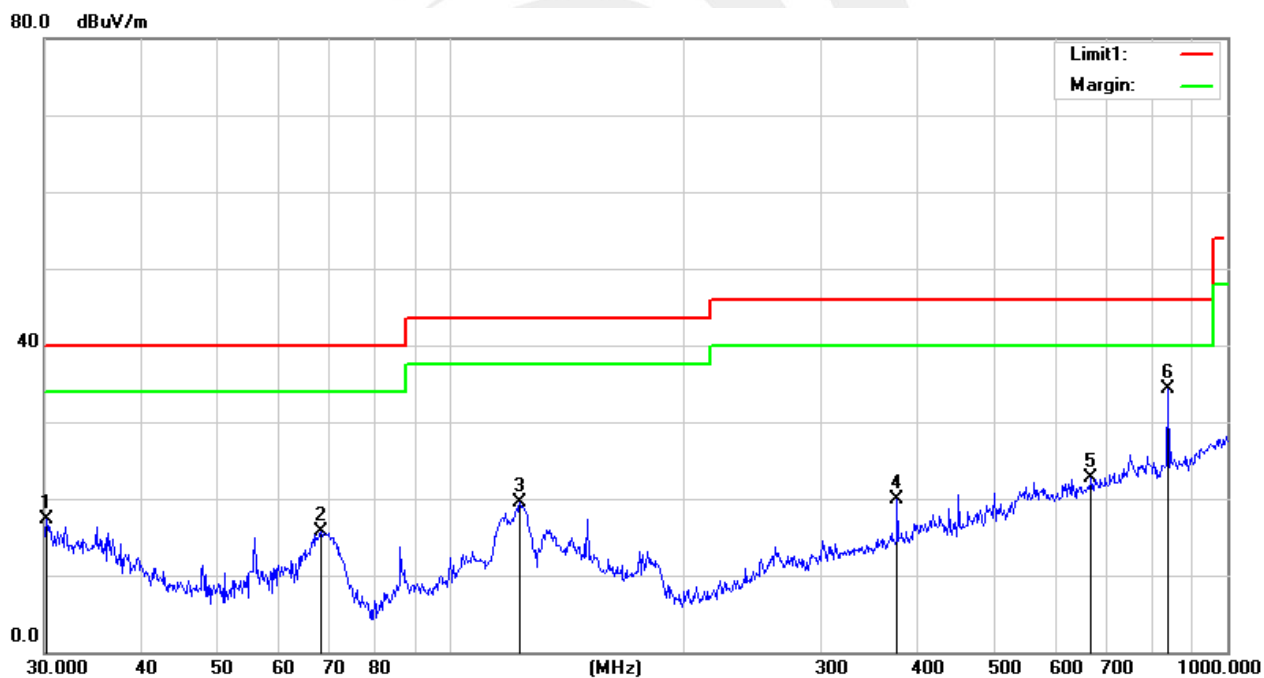
(30MHz - 1000MHz)

Temperature:	26.9°C	Relative Humidity:	62%
Test Voltage:	DC 3.7V	Polarization :	Horizontal
Test Mode:	Mode 1/2/3 (Mode 3 worst case)		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
30.2111	28.55	-11.30	17.25	40.00	-22.75	QP
68.1514	39.77	-24.15	15.62	40.00	-24.38	QP
122.8340	37.10	-17.65	19.45	43.50	-24.05	QP
375.9385	32.65	-12.73	19.92	46.00	-26.08	QP
668.1423	28.73	-6.05	22.68	46.00	-23.32	QP
839.1818	37.15	-2.78	34.37	46.00	-11.63	QP

Remark:

1. Margin = Result (Result = Reading + Factor) - Limit



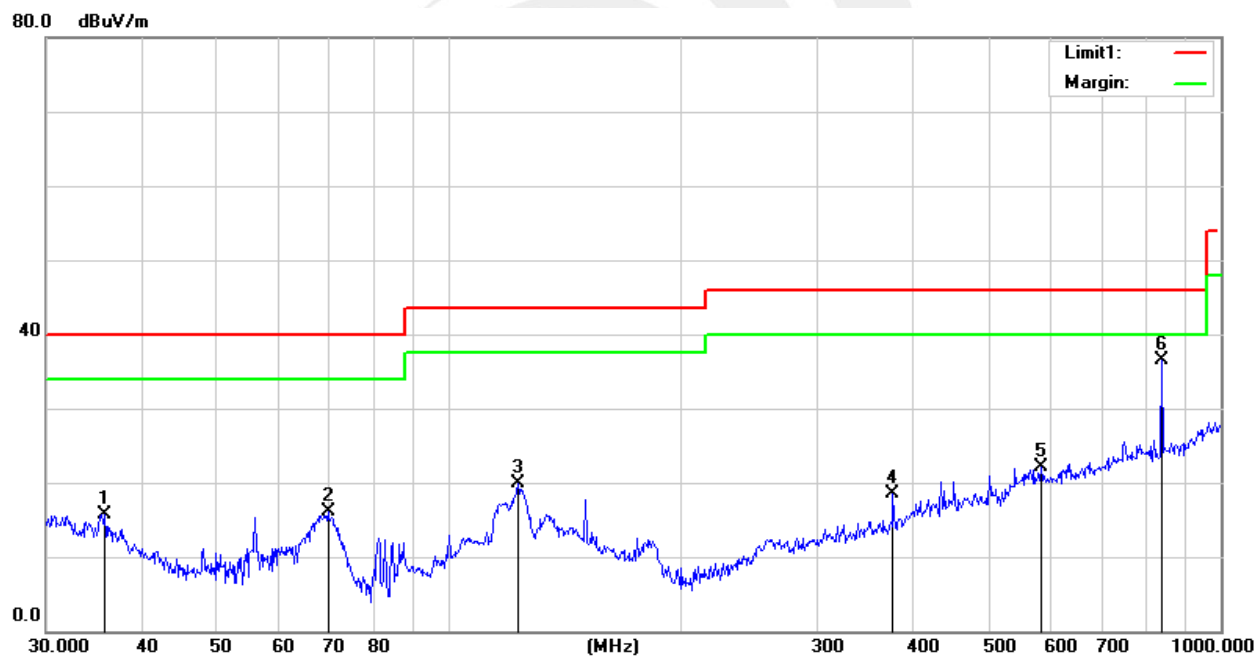


Temperature:	26.9℃	Relative Humidity:	62%
Test Voltage:	DC 3.7V	Polarization :	Vertical
Test Mode:	Mode 1/2/3 (Mode 3 worst case)		

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
35.7490	29.94	-14.14	15.80	40.00	-24.20	QP
69.6004	40.12	-24.11	16.01	40.00	-23.99	QP
122.8340	37.52	-17.65	19.87	43.50	-23.63	QP
375.9384	31.22	-12.73	18.49	46.00	-27.51	QP
584.7894	28.97	-6.82	22.15	46.00	-23.85	QP
839.1817	39.35	-2.78	36.57	46.00	-9.43	QP

Remark:.

1. Margin = Result (Result = Reading + Factor) – Limit





(1GHz-18GHz) Restricted band and Spurious emission Requirements

Low Channel

Frequency	Reading	Amplifier	Loss	Antenna	Corrected	Emission				
(MHz)	(dBμV)	(dB)	(dB)	Factor	Factor	Level	Limits	Margin	Detector	Comment
Low Channel (2402 MHz)										
3264.80	49.05	44.70	6.70	28.20	-9.80	39.25	74.00	-34.75	PK	Vertical
3264.80	38.04	44.70	6.70	28.20	-9.80	28.24	54.00	-25.76	AV	Vertical
3264.80	48.83	44.70	6.70	28.20	-9.80	39.03	74.00	-34.97	PK	Horizontal
3264.80	38.08	44.70	6.70	28.20	-9.80	28.28	54.00	-25.72	AV	Horizontal
4804.54	58.31	44.20	9.04	31.60	-3.56	54.75	74.00	-19.25	PK	Vertical
4804.54	49.32	44.20	9.04	31.60	-3.56	45.76	54.00	-8.24	AV	Vertical
4804.36	58.81	44.20	9.04	31.60	-3.56	55.25	74.00	-18.75	PK	Horizontal
4804.36	49.17	44.20	9.04	31.60	-3.56	45.61	54.00	-8.39	AV	Horizontal
5359.86	45.34	44.20	9.86	32.00	-2.34	43.00	74.00	-31.00	PK	Vertical
5359.86	38.08	44.20	9.86	32.00	-2.34	35.74	54.00	-18.26	AV	Vertical
5359.76	45.96	44.20	9.86	32.00	-2.34	43.62	74.00	-30.38	PK	Horizontal
5359.76	38.19	44.20	9.86	32.00	-2.34	35.85	54.00	-18.15	AV	Horizontal
7205.88	51.68	43.50	11.40	35.50	3.40	55.08	74.00	-18.92	PK	Vertical
7205.88	42.95	43.50	11.40	35.50	3.40	46.35	54.00	-7.65	AV	Vertical
7205.68	51.09	43.50	11.40	35.50	3.40	54.49	74.00	-19.51	PK	Horizontal
7205.68	41.91	43.50	11.40	35.50	3.40	45.31	54.00	-8.69	AV	Horizontal



Mid Channel

Middle Channel										
Frequency	Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	Comment
Middle Channel (2440 MHz)										
3264.62	48.33	44.70	6.70	28.20	-9.80	38.53	74.00	-35.47	PK	Vertical
3264.62	38.14	44.70	6.70	28.20	-9.80	28.34	54.00	-25.66	AV	Vertical
3264.60	48.45	44.70	6.70	28.20	-9.80	38.65	74.00	-35.35	PK	Horizontal
3264.60	38.93	44.70	6.70	28.20	-9.80	29.13	54.00	-24.87	AV	Horizontal
4880.50	59.55	44.20	9.04	31.60	-3.56	55.99	74.00	-18.01	PK	Vertical
4880.50	50.38	44.20	9.04	31.60	-3.56	46.82	54.00	-7.18	AV	Vertical
4880.42	59.14	44.20	9.04	31.60	-3.56	55.58	74.00	-18.42	PK	Horizontal
4880.42	50.54	44.20	9.04	31.60	-3.56	46.98	54.00	-7.02	AV	Horizontal
5359.67	45.88	44.20	9.86	32.00	-2.34	43.54	74.00	-30.46	PK	Vertical
5359.67	38.07	44.20	9.86	32.00	-2.34	35.73	54.00	-18.27	AV	Vertical
5359.74	45.86	44.20	9.86	32.00	-2.34	43.52	74.00	-30.48	PK	Horizontal
5359.74	37.79	44.20	9.86	32.00	-2.34	35.45	54.00	-18.55	AV	Horizontal
7310.75	50.99	43.50	11.40	35.50	3.40	54.39	74.00	-19.61	PK	Vertical
7310.75	41.60	43.50	11.40	35.50	3.40	45.00	54.00	-9.00	AV	Vertical
7310.68	50.93	43.50	11.40	35.50	3.40	54.33	74.00	-19.67	PK	Horizontal
7310.68	41.61	43.50	11.40	35.50	3.40	45.01	54.00	-8.99	AV	Horizontal



High Channel

Frequency	Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	Comment
High Channel (2480 MHz)										
3264.70	47.98	44.70	6.70	28.20	-9.80	38.18	74.00	-35.82	PK	Vertical
3264.70	39.63	44.70	6.70	28.20	-9.80	29.83	54.00	-24.17	AV	Vertical
3264.67	48.33	44.70	6.70	28.20	-9.80	38.53	74.00	-35.47	PK	Horizontal
3264.67	38.22	44.70	6.70	28.20	-9.80	28.42	54.00	-25.58	AV	Horizontal
4960.51	59.31	44.20	9.04	31.60	-3.56	55.75	74.00	-18.25	PK	Vertical
4960.51	50.00	44.20	9.04	31.60	-3.56	46.44	54.00	-7.56	AV	Vertical
4960.50	58.16	44.20	9.04	31.60	-3.56	54.60	74.00	-19.40	PK	Horizontal
4960.50	49.68	44.20	9.04	31.60	-3.56	46.12	54.00	-7.88	AV	Horizontal
5359.88	45.23	44.20	9.86	32.00	-2.34	42.89	74.00	-31.11	PK	Vertical
5359.88	37.66	44.20	9.86	32.00	-2.34	35.32	54.00	-18.68	AV	Vertical
5359.82	45.47	44.20	9.86	32.00	-2.34	43.13	74.00	-30.87	PK	Horizontal
5359.82	37.97	44.20	9.86	32.00	-2.34	35.63	54.00	-18.37	AV	Horizontal
7439.91	51.05	43.50	11.40	35.50	3.40	54.45	74.00	-19.55	PK	Vertical
7439.91	42.71	43.50	11.40	35.50	3.40	46.11	54.00	-7.89	AV	Vertical
7439.68	51.91	43.50	11.40	35.50	3.40	55.31	74.00	-18.69	PK	Horizontal
7439.68	40.86	43.50	11.40	35.50	3.40	44.26	54.00	-9.74	AV	Horizontal

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

2. Emission Level = Reading + Factor

Margin = Limit - Emission Level

3. The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.



18GHz – 25GHz										
Meter		Antenna		Orrected	Emission					
Frequency	Reading	Amplifier	Loss	Factor	Factor	Level	Limits	Margin	Detector	
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	Comment
Low Channel (2402 MHz)										
19523.71	38.48	32.16	12.57	43.60	24.01	62.49	74.00	-11.51	PK	Vertical
19523.71	25.96	32.16	12.57	43.60	24.01	49.97	54.00	-4.03	AV	Vertical
19523.52	38.37	32.16	12.57	43.60	24.01	62.38	74.00	-11.62	PK	Horizontal
19523.52	27.37	32.16	12.57	43.60	24.01	51.38	54.00	-2.62	AV	Horizontal
23890.50	38.82	30.57	13.92	43.20	26.55	65.37	74.00	-8.63	PK	Horizontal
23890.50	27.21	30.57	13.92	43.20	26.55	53.76	54.00	-0.24	AV	Horizontal
Middle Channel (2440 MHz)										
19523.78	38.18	32.16	12.57	43.60	24.01	62.19	74.00	-11.81	PK	Vertical
19523.78	25.85	32.16	12.57	43.60	24.01	49.86	54.00	-4.14	AV	Vertical
19523.59	38.41	32.16	12.57	43.60	24.01	62.42	74.00	-11.58	PK	Horizontal
19523.59	26.63	32.16	12.57	43.60	24.01	50.64	54.00	-3.36	AV	Horizontal
23890.57	38.19	30.57	13.92	43.20	26.55	64.74	74.00	-9.26	PK	Horizontal
23890.57	26.53	30.57	13.92	43.20	26.55	53.08	54.00	-0.92	AV	Horizontal
High Channel (2480 MHz)										
19523.76	38.73	32.16	12.57	43.60	24.01	62.74	74.00	-11.26	PK	Vertical
19523.76	27.65	32.16	12.57	43.60	24.01	51.66	54.00	-2.34	AV	Vertical
19523.71	39.32	32.16	12.57	43.60	24.01	63.33	74.00	-10.67	PK	Horizontal
19523.71	27.65	32.16	12.57	43.60	24.01	51.66	54.00	-2.34	AV	Horizontal

Remark:

1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

2. Emission Level = Reading + Factor

Margin = Limit - Emission Level

3. The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.



3.3.7 TEST RESULTS (BAND EDGE REQUIREMENTS)

Frequency	Reading	Amplifier	Loss	Antenna	Corrected	Emission				
(MHz)	(dBμV)	(dB)	(dB)	Factor	Factor	Level	Limits	Margin	Detector	
				(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	Comment
2390.00	68.42	43.80	4.91	25.90	-12.99	55.43	74.00	-18.57	PK	Vertical
2390.00	54.16	43.80	4.91	25.90	-12.99	41.17	54.00	-12.83	AV	Vertical
2390.00	68.88	43.80	4.91	25.90	-12.99	55.89	74.00	-18.11	PK	Horizontal
2390.00	52.70	43.80	4.91	25.90	-12.99	39.71	54.00	-14.29	AV	Horizontal
2483.50	69.55	43.80	5.12	25.90	-12.78	56.77	74.00	-17.23	PK	Vertical
2483.50	53.51	43.80	5.12	25.90	-12.78	40.73	54.00	-13.27	AV	Vertical
2483.50	69.36	43.80	5.12	25.90	-12.78	56.58	74.00	-17.42	PK	Horizontal
2483.50	53.05	43.80	5.12	25.90	-12.78	40.27	54.00	-13.73	AV	Horizontal

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Low measurement frequencies is range from 2300 to 2422 MHz, high measurement frequencies is range from 2452 to 2500 MHz.

Only show the worst point data of the emissions in the frequency 2300-2422 MHz and 2452-2500 MHz.

4 CONDUCTED SPURIOUS & BAND EDGE EMISSION

4.1 APPLIED PROCEDURES / LIMIT

According to FCC Part 15.247(d)and, in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

4.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

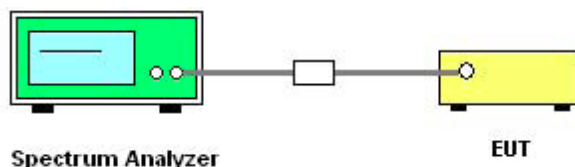
For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300 to 2422 MHz Upper Band Edge: 2452to 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

4.5 EUT OPERATION CONDITIONS

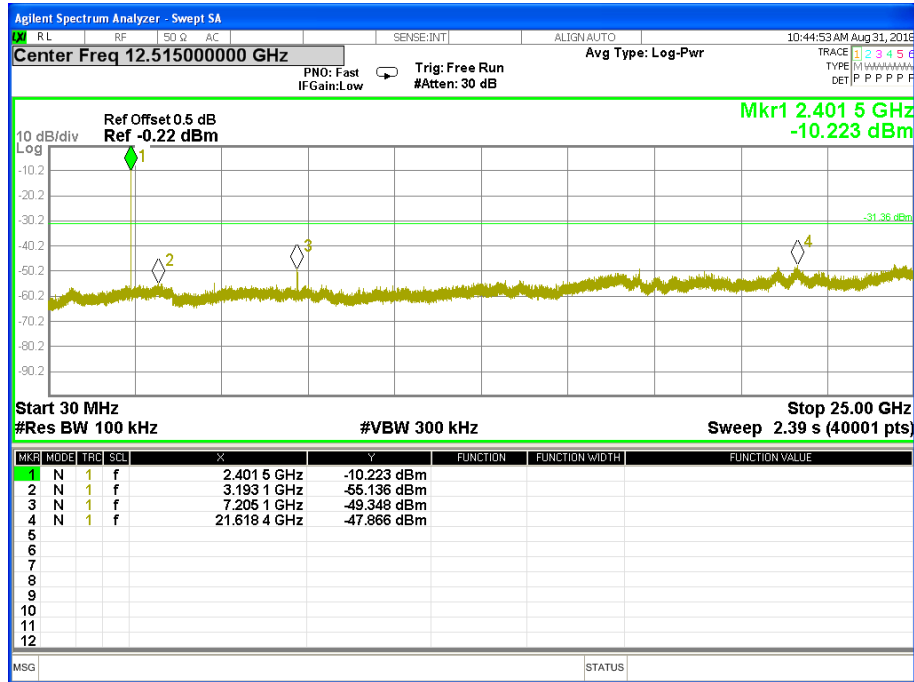
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



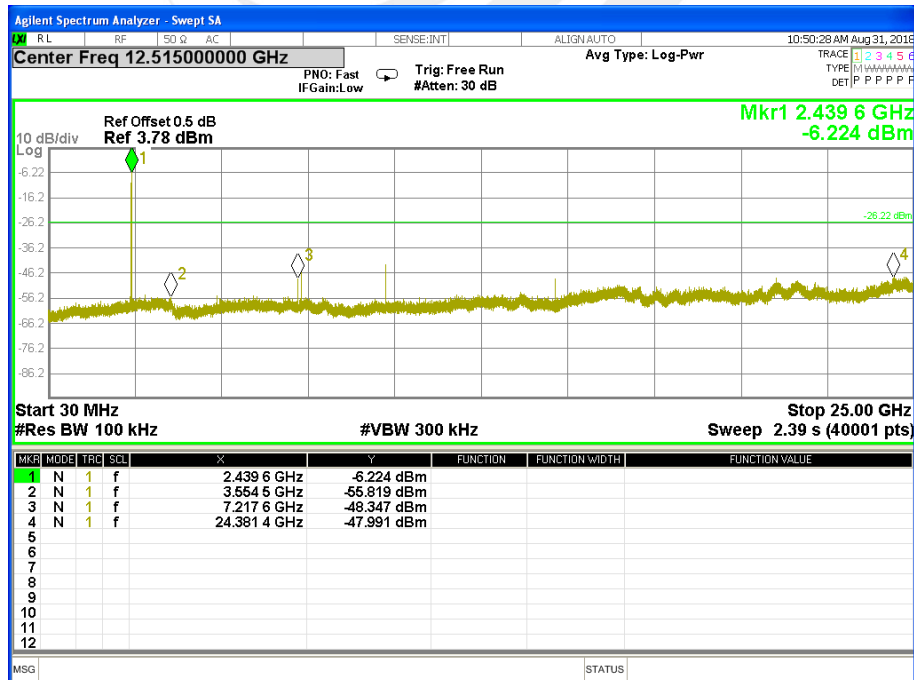
4.6 TEST RESULTS

Temperature :	25°C	Relative Humidity :	60%
Test Voltage :	DC 3.7V	Test Mode :	TX Mode /CH37, CH17, CH39

CH37

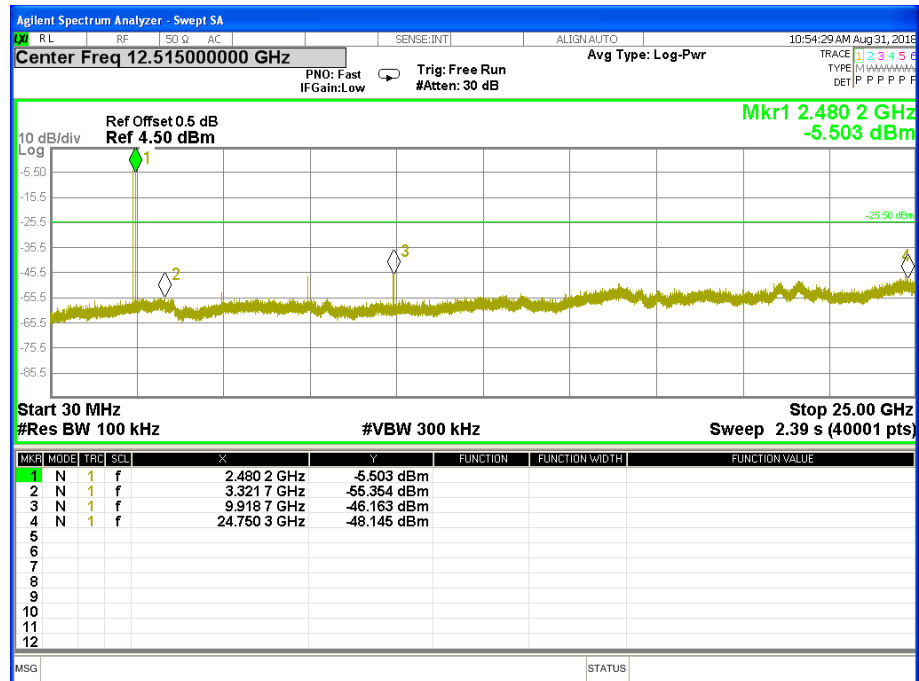


CH17





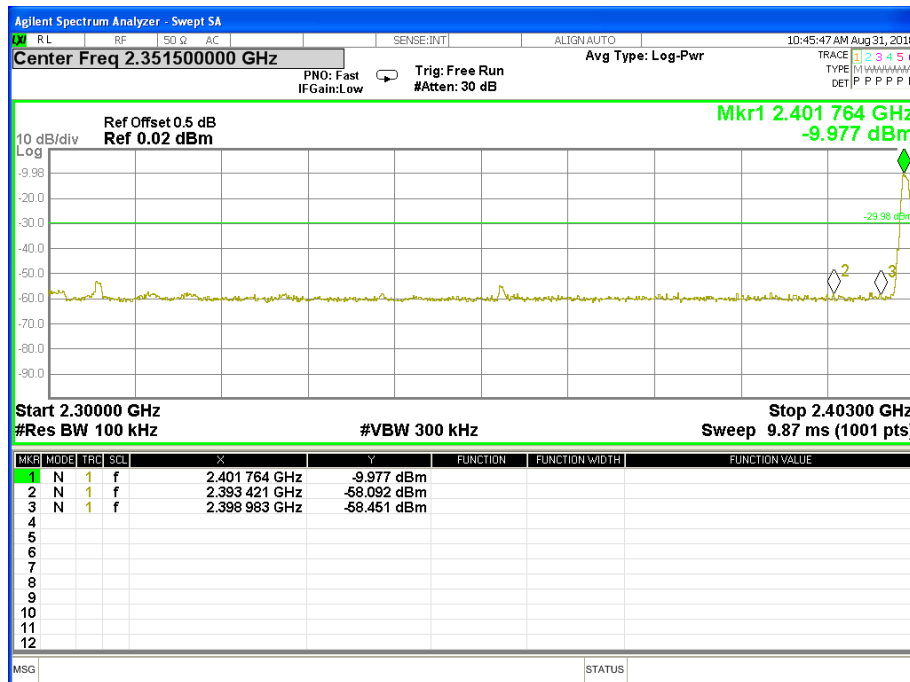
CH39



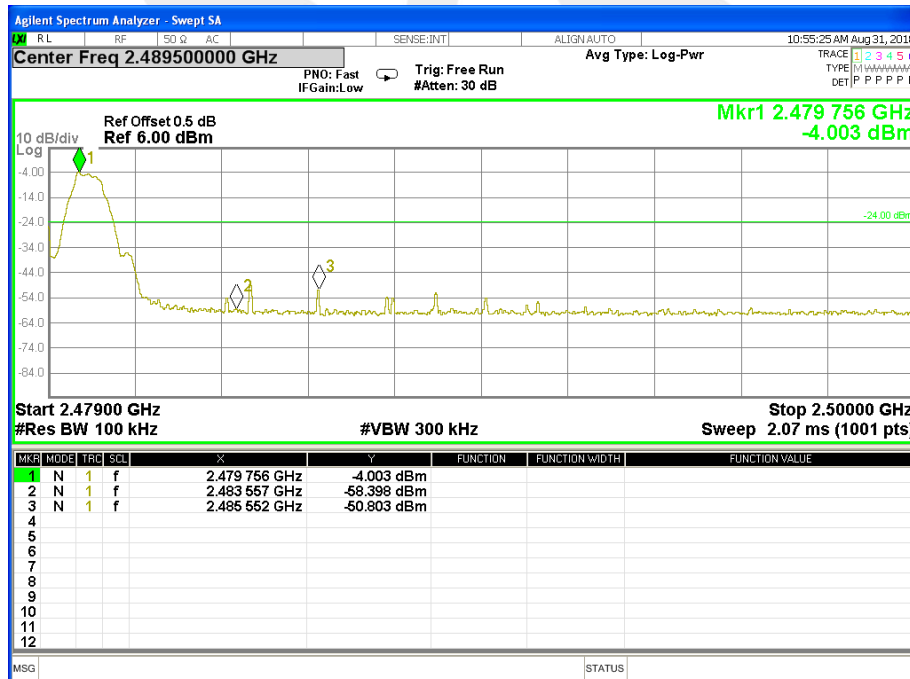


Band edge

CH37



CH39





5 POWER SPECTRAL DENSITY TEST

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	Power Spectral Density	≤ 8 dBm (RBW ≥ 3 KHz)	2400-2483.5	PASS

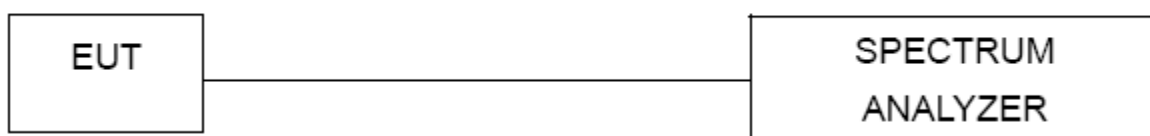
5.2 TEST PROCEDURE

- 1) Set analyzer center frequency to DTS channel center frequency.
- 2) Set the span to 1.5 times the DTS channel bandwidth.
- 3) Set the $100 \text{ kHz} \geq \text{RBW} \geq 3 \text{ kHz}$.
- 4) Set the $\text{VBW} \geq 3 \times \text{RBW}$.
- 5) Detector = peak.
- 6) Sweep time = auto couple.
- 7) Trace mode = max hold.
- 8) Allow trace to fully stabilize.
- 9) Use the peak marker function to determine the maximum amplitude level.
- 10) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP



5.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

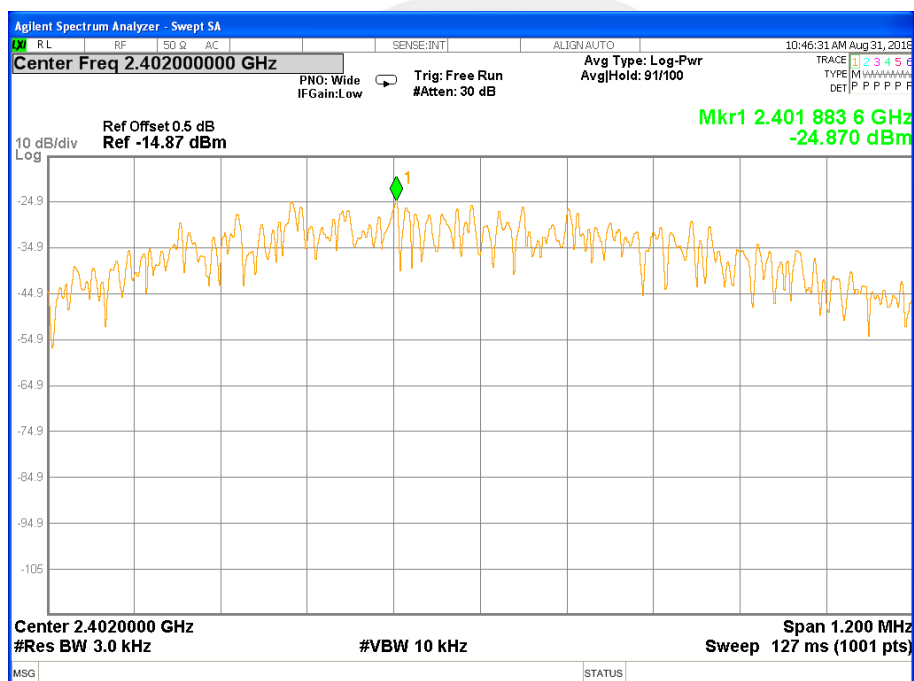


5.6 TEST RESULTS

Temperature:	25°C	Relative Humidity:	60%
Test Voltage:	DC 3.7V	Test Mode:	TX Mode /CH37, CH17, CH39

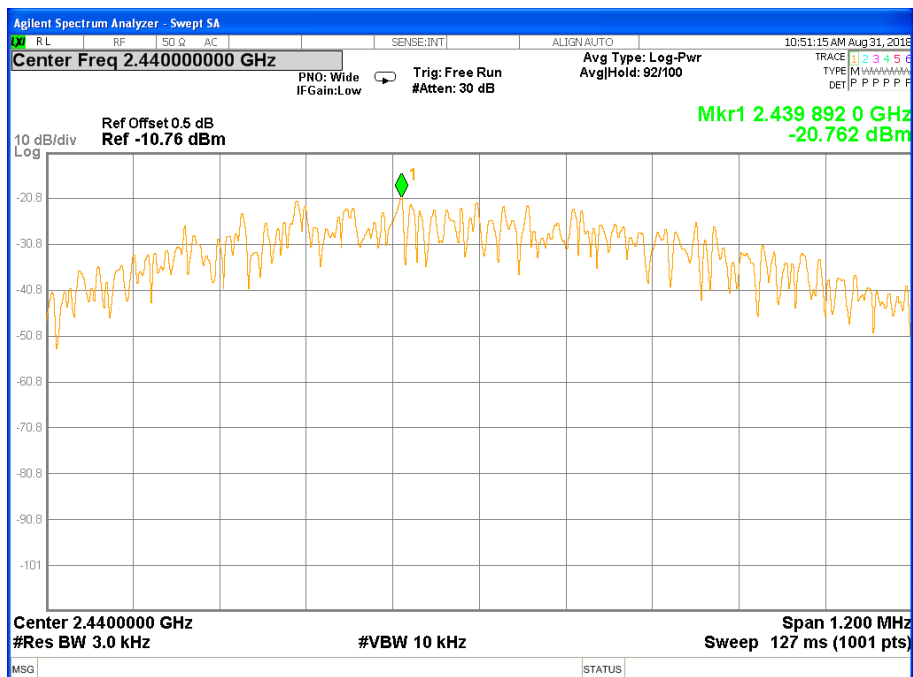
Test Mode	Frequency (MHz)	Power Density (dBm/3kHz)	Limit (dBm/3KHz)	Result
BLE mode (1 Mbps)	2402.00	-24.87	≤ 8.00	PASS
	2440.00	-20.76	≤ 8.00	PASS
	2480.00	-18.05	≤ 8.00	PASS

TX CH37

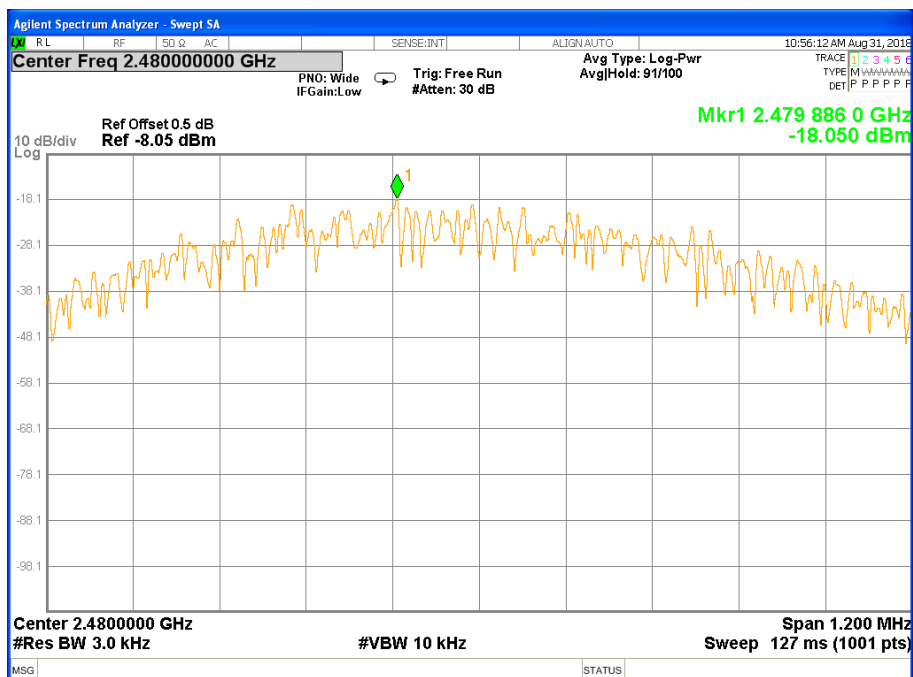




TX CH17



TX CH39





6 BANDWIDTH TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	6dB Bandwidth	$\geq 500\text{KHz}$	2400-2483.5	PASS

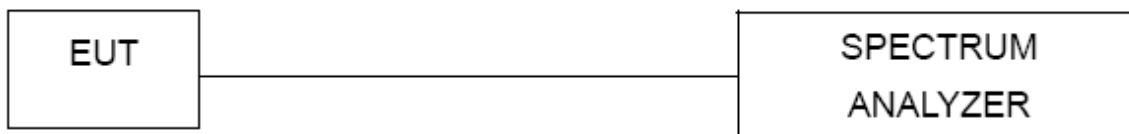
6.2 TEST PROCEDURE

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW $\geq$ 3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



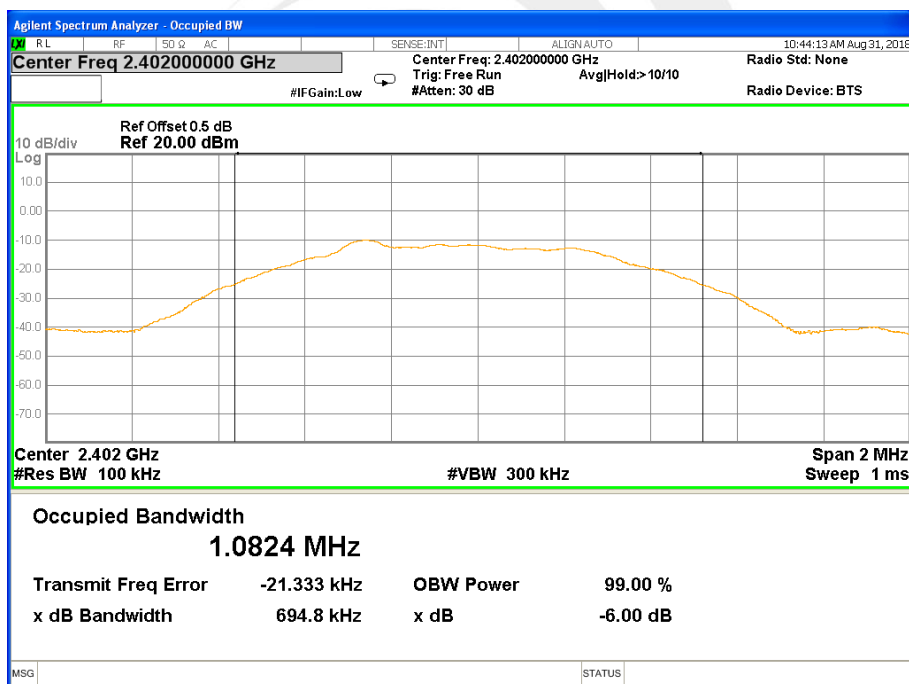
6.6 TEST RESULTS

Temperature:	25°C	Relative Humidity:	60%
Test Voltage:	DC 3.7V	Test Mode:	TX Mode /CH37, CH17, CH39

Remark: PEAK DETECTOR IS USED

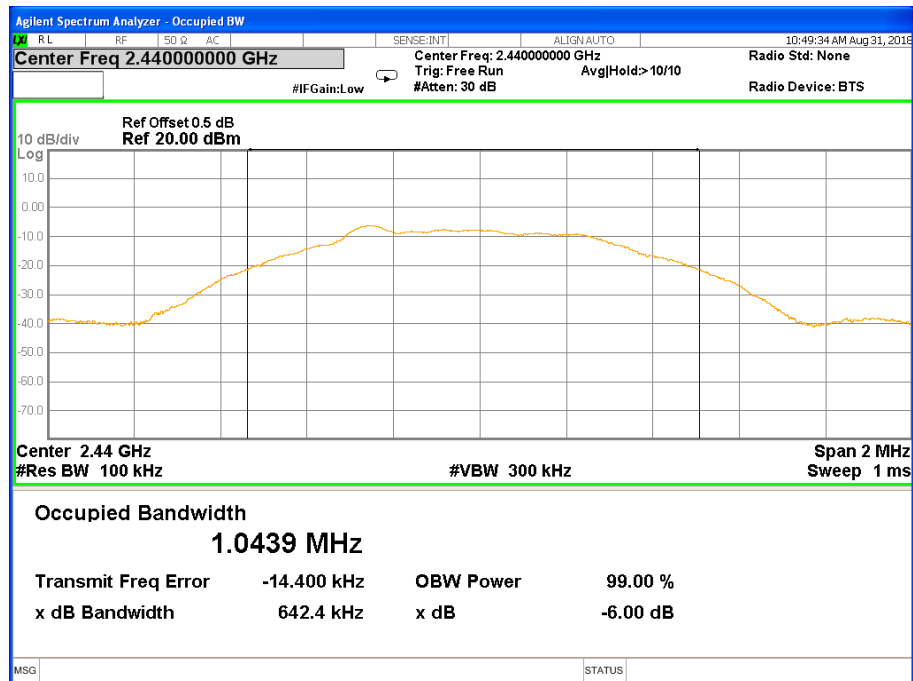
Test Mode	Frequency (MHz)	6dB Bandwidth (MHz)	Limit of 6dB Bandwidth (MHz)	Result
BLE mode (1 Mbps)	2402.00	0.695	≥ 0.50	PASS
	2440.00	0.642	≥ 0.50	PASS
	2480.00	0.636	≥ 0.50	PASS

6dB Bandwidth
TX CH37

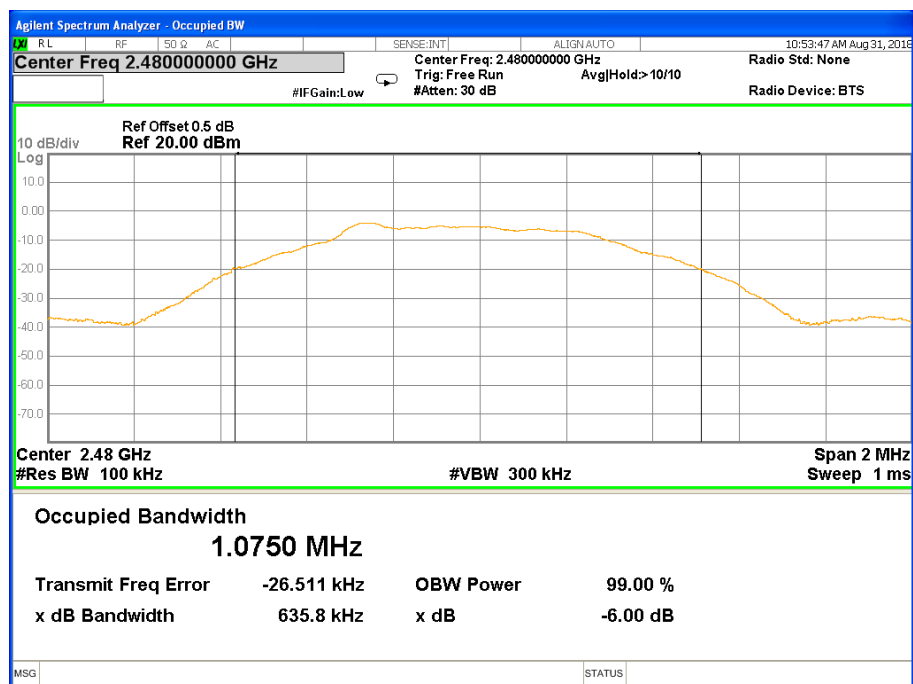




TX CH17



TX CH39





7 PEAK OUTPUT POWER TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Output Power	1 watt or 30dBm	2400-2483.5	PASS

7.2 TEST PROCEDURE

- a. The EUT was directly connected to the Power Meter

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.



7.6 TEST RESULTS

Temperature :	25°C	Relative Humidity :	60%
Test Voltage :	DC 3.7V		

Test Channel	Frequency (MHz)	Conducted Output Power		Limit (dBm)
		Peak(dBm)	AVG(dBm)	
CH37	2402.00	-8.70	-10.50	30.00
CH17	2440.00	-4.90	-6.80	30.00
CH39	2480.00	-2.10	-4.10	30.00

Note:

- 1) The cable loss and antenna gain are taken into account in results.
- 2) Antenna gain(G): -0.5 dBi





8 ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

8.2 EUT ANTENNA

The EUT antenna is PCB Antenna. It comply with the standard requirement.

