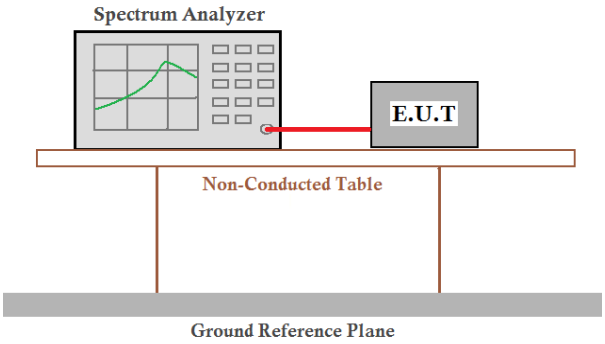
6.9 Band Edge

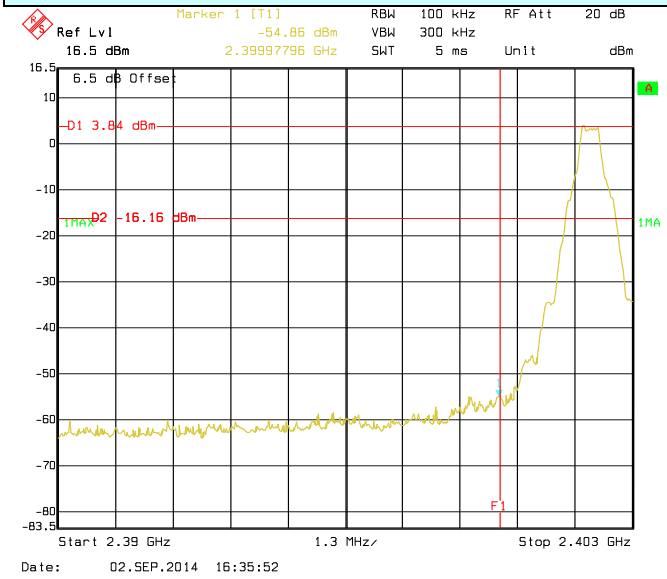
6.9.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and DA00-705
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Non-hopping mode and hopping mode
Test results:	Pass

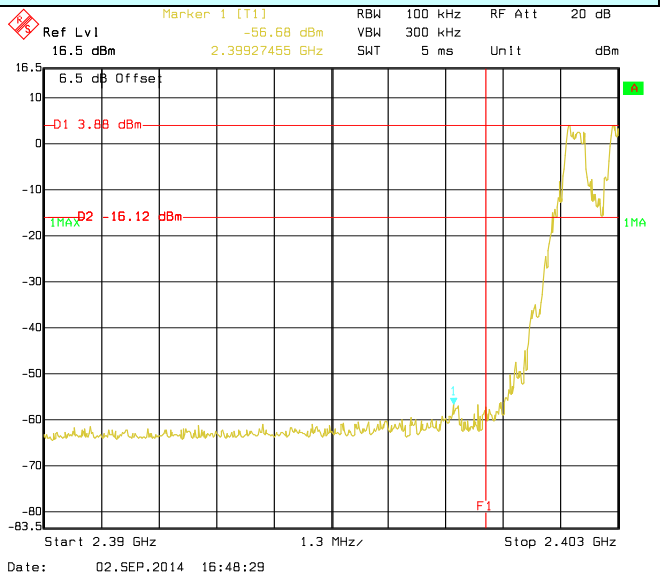
Test plot as follows:

GFSK

Test channel:	Lowest channel

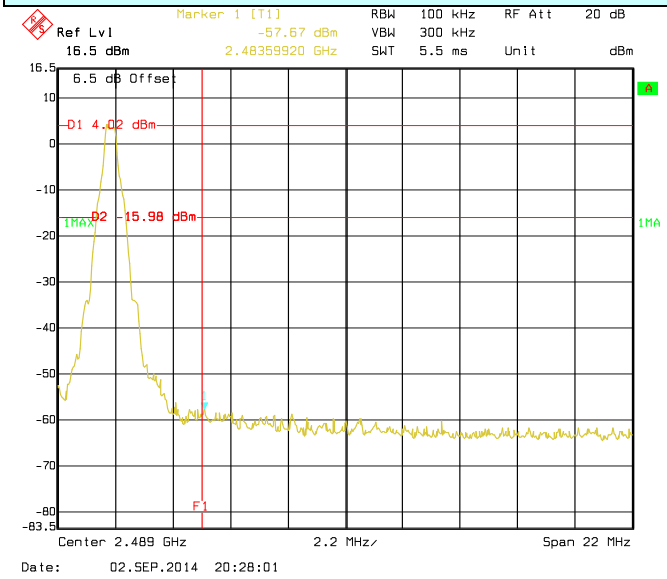


No-hopping mode

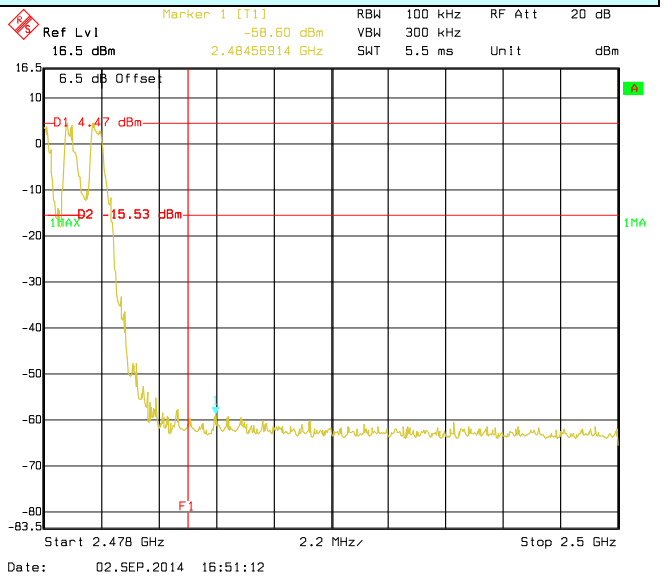


Hopping mode

Test channel:	Highest channel



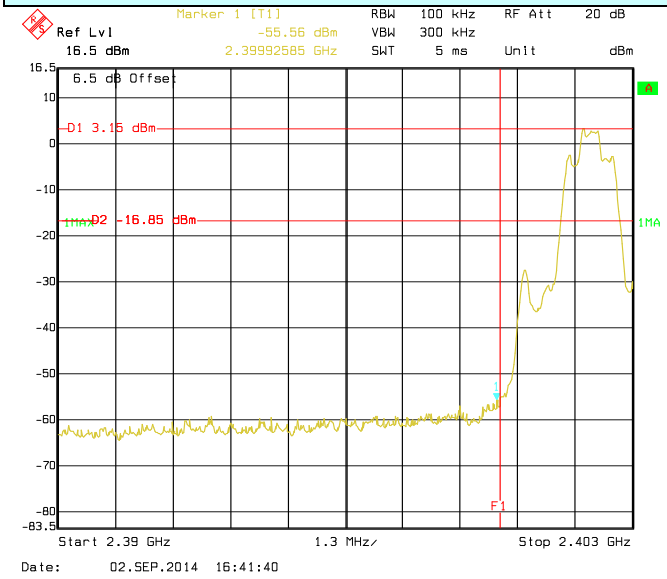
No-hopping mode



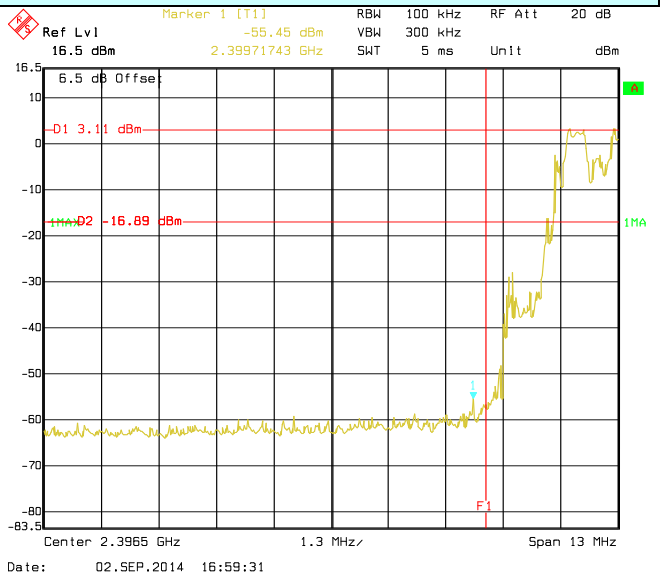
Hopping mode

π/4-DQPSK

Test channel:	Lowest channel

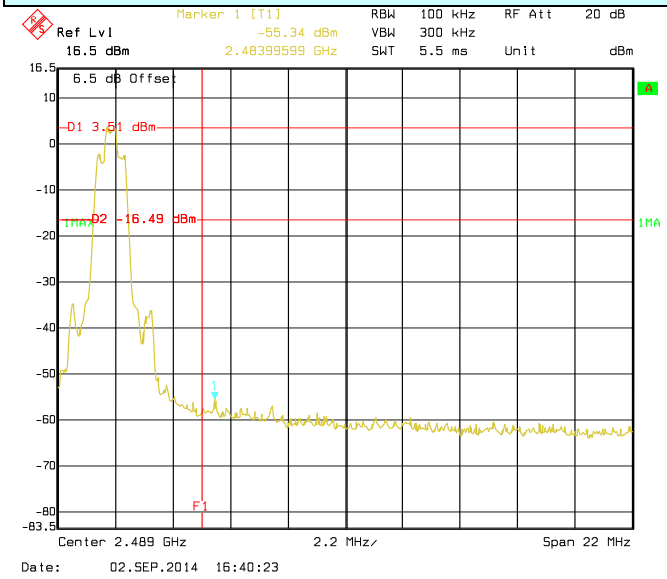


No-hopping mode

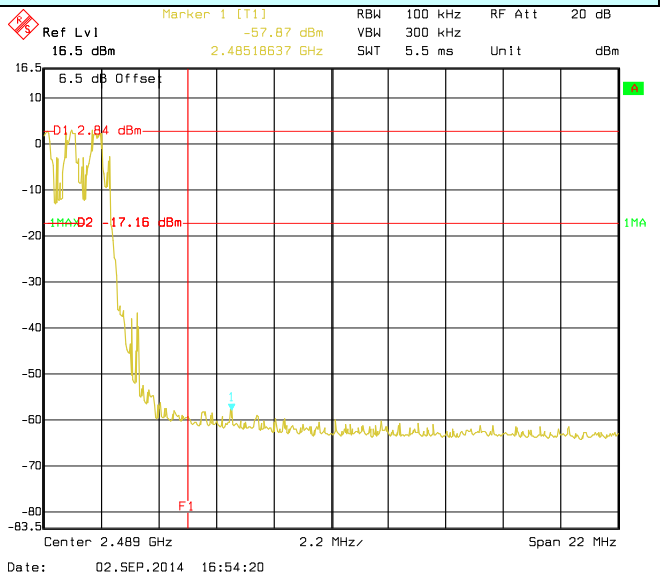


Hopping mode

Test channel:	Highest channel



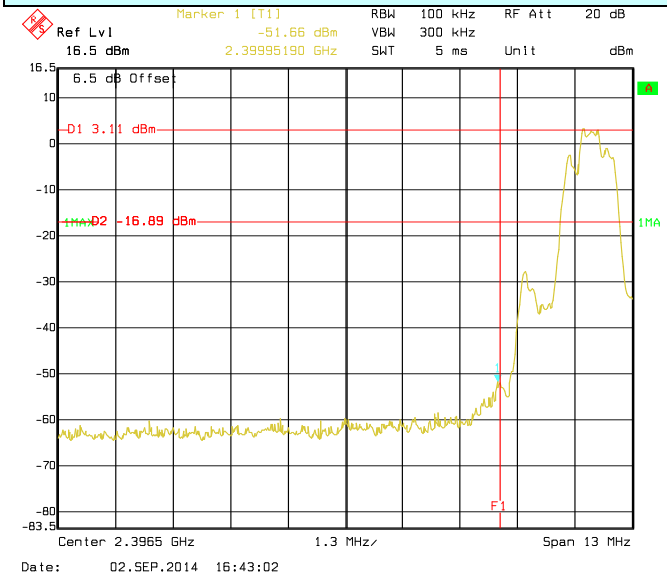
No-hopping mode



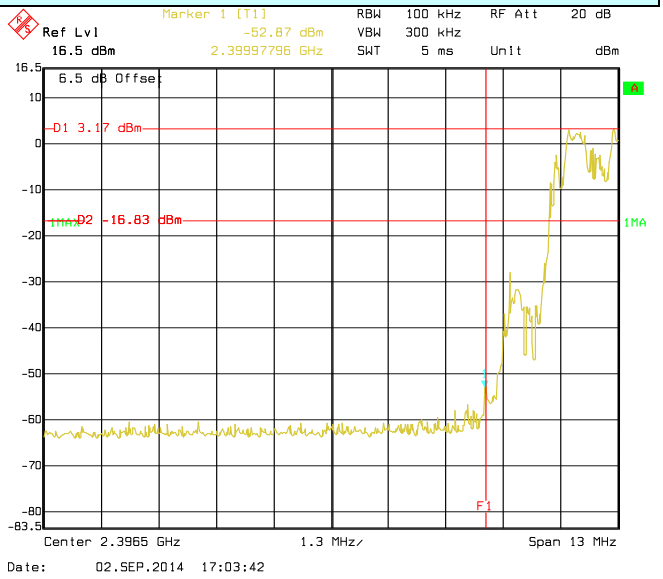
Hopping mode

8DPSK

Test channel:	Lowest channel

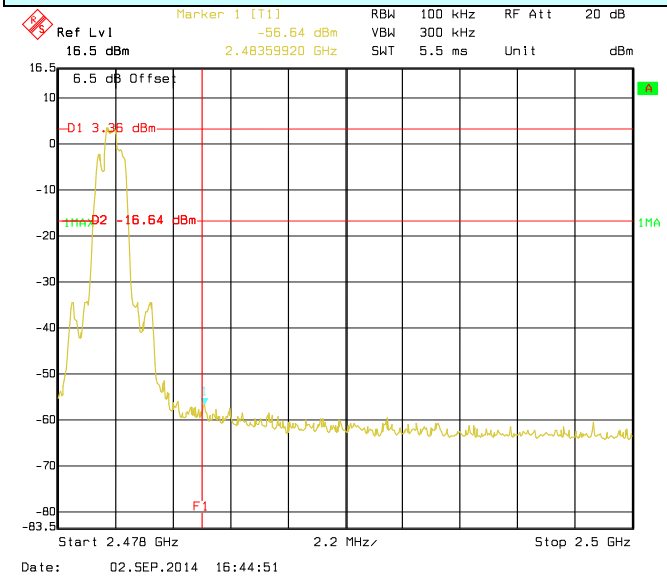


No-hopping mode

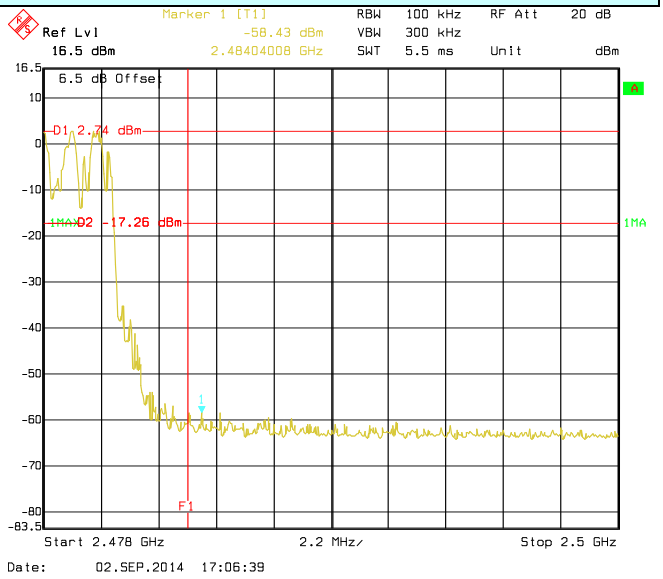


Hopping mode

Test channel:	Highest channel

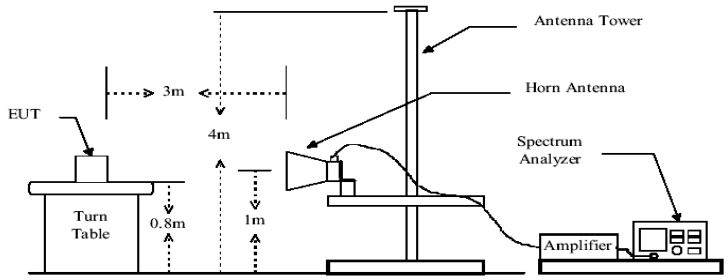


No-hopping mode



Hopping mode

6.9.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.4: 2003</td></tr>
<tr><td>Test Frequency Range:</td><td>2.3GHz to 2.5GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>10Hz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.00</td><td>Average Value</td></tr>
<tr><td>74.00</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td> 
</td></tr>
<tr><td>Test Procedure:</td><td>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</td></tr>
<tr><td>Test Instruments:</td><td>Refer to section 5.7 for details</td></tr>
<tr><td>Test mode:</td><td>Non-hopping mode</td></tr>
<tr><td>Test results:</td><td>Passed</td></tr>
</table>

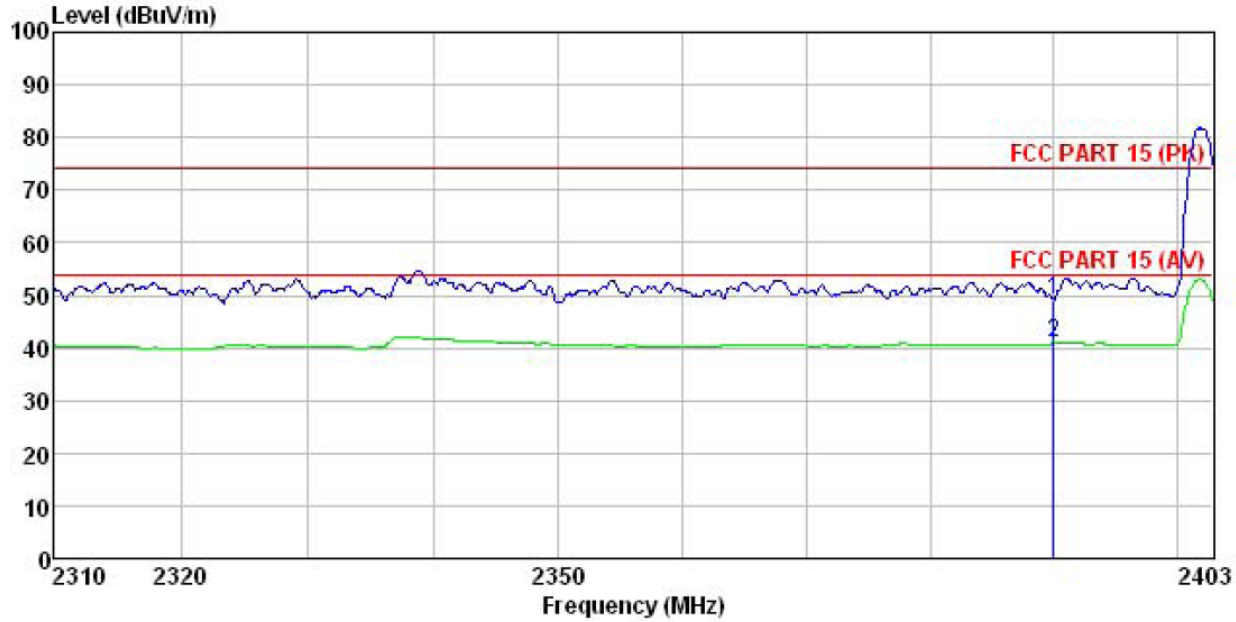
Remark:

1. *During the test, pre-scan the GFSK, π/4-DQPSK, 8DPSK, and all data were shown in report.*
2. *Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case.*

GFSK mode

Test channel: Lowest

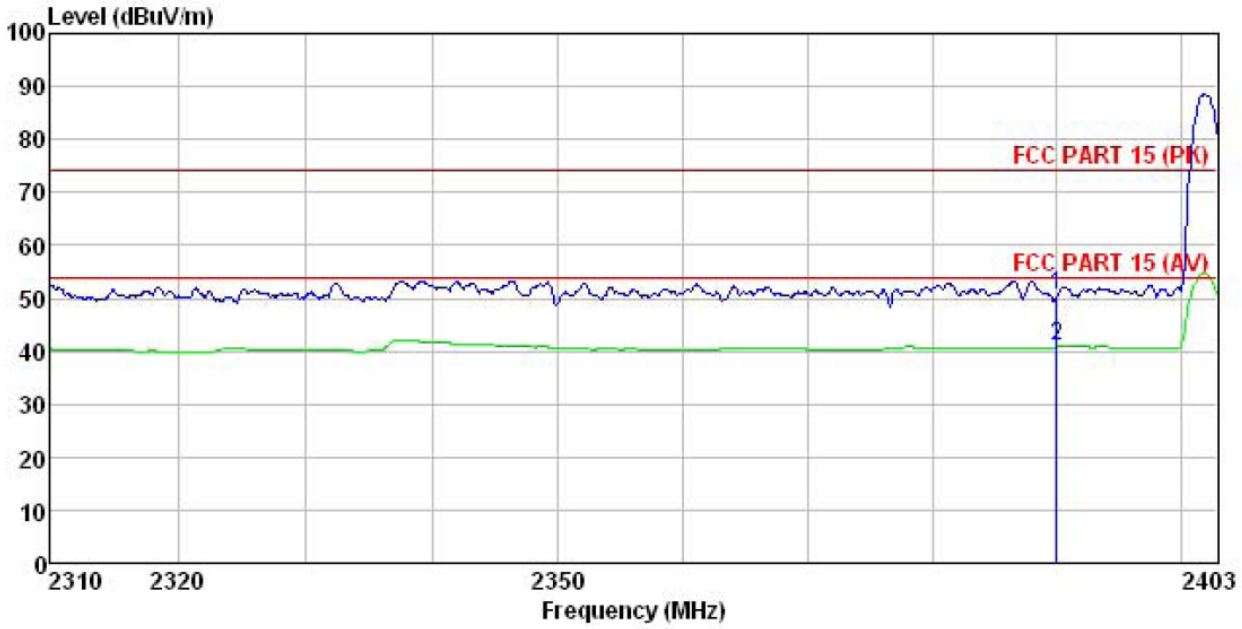
Horizontal:




```
Site          : 3m chamber
Condition     : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
Jobi NO.      : T36RF
EUT           : T97601T4
Model         : Bang
Test mode     : BT-DH1-L mode
Power Rating  : AC 120V/60Hz
Environment   : Temp:25.5'C  Huni:55%
Test Engineer: Carey
```

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	15.95	27.58	5.67	0.00	49.20	74.00	-24.80	Peak
2	2390.000	7.60	27.58	5.67	0.00	40.85	54.00	-13.15	Average

Vertical:

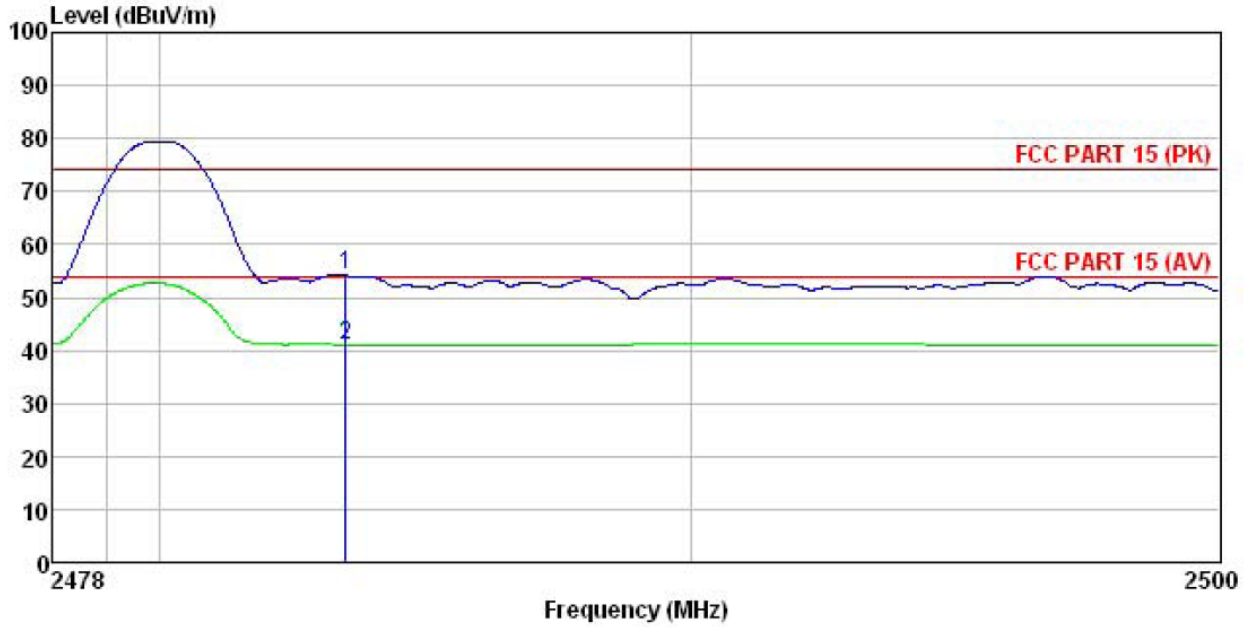


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
Jobi NO. : T36RF
EUT : T97601T4
Model : Bang
Test mode : BT-DH1-L mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	17.15	27.58	5.67	0.00	50.40	74.00	-23.60	Peak
2	2390.000	7.57	27.58	5.67	0.00	40.82	54.00	-13.18	Average

Test channel: Highest

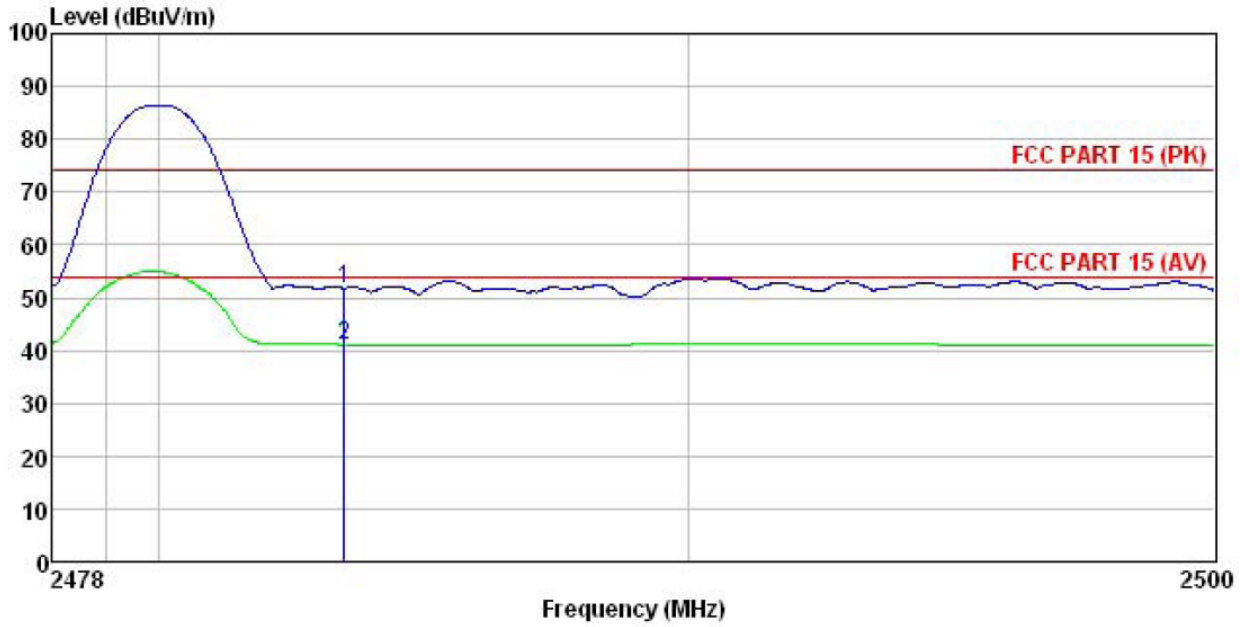
Horizontal:



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
Jobi NO. : 736RF
EUT : T97601T4
Model : Bang
Test mode : BT-DH1-H mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	20.90	27.52	5.70	0.00	54.12	74.00	-19.88	Peak
2	2483.500	7.89	27.52	5.70	0.00	41.11	54.00	-12.89	Average

Vertical:

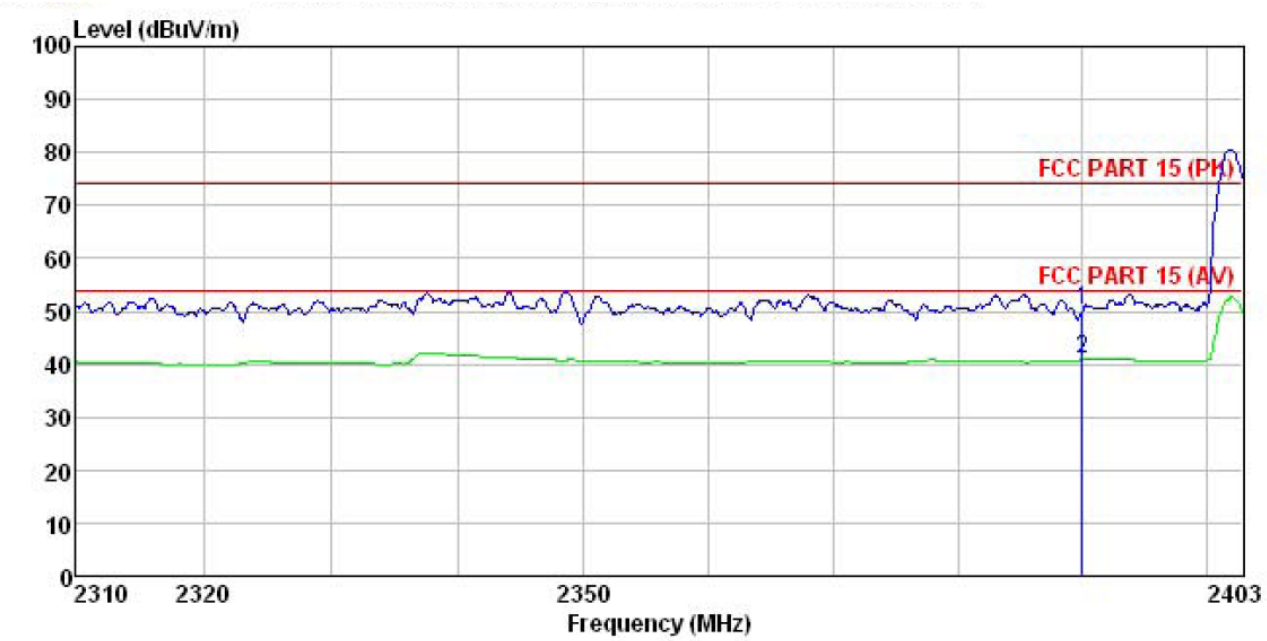


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
Jobi NO. : 736RF
EUT : T97601T4
Model : Bang
Test mode : BT-DH1-H mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	18.57	27.52	5.70	0.00	51.79	74.00	-22.21	Peak
2	2483.500	7.89	27.52	5.70	0.00	41.11	54.00	-12.89	Average

π/4-DQPSK mode
Test channel: Lowest

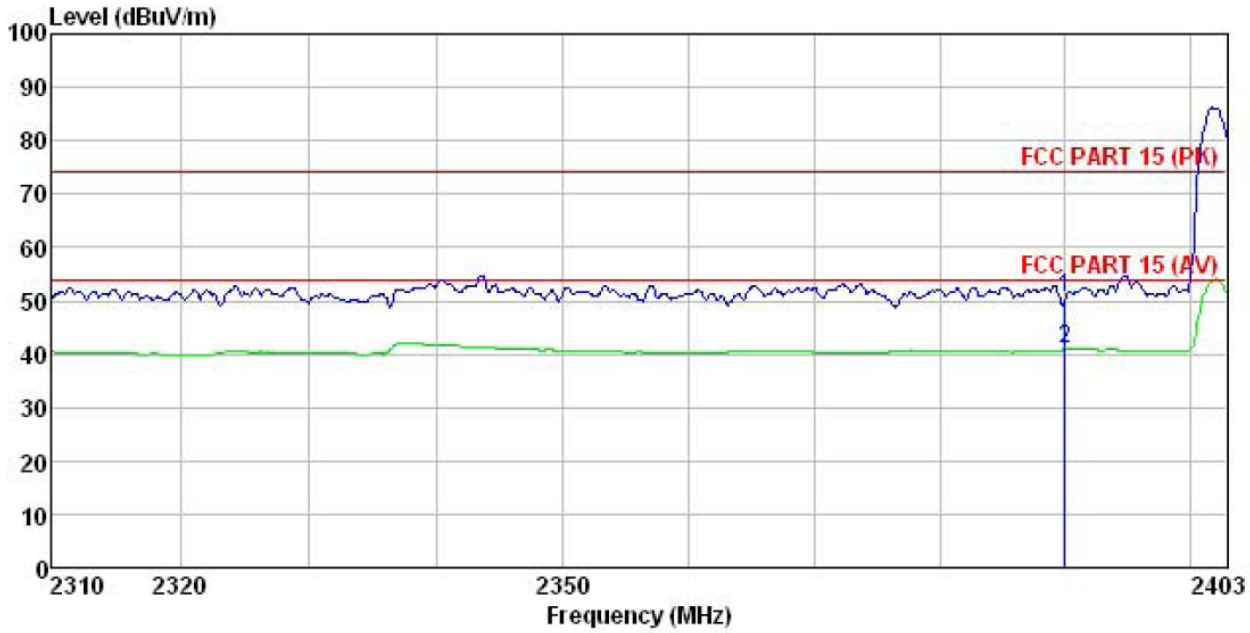
Horizontal:



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
Jobi NO. : 736RF
EUT : T97601T4
Model : Bang
Test mode : BT-2DH1-L mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	17.11	27.58	5.67	0.00	50.36	74.00	-23.64	Peak
2	2390.000	7.58	27.58	5.67	0.00	40.83	54.00	-13.17	Average

Vertical:

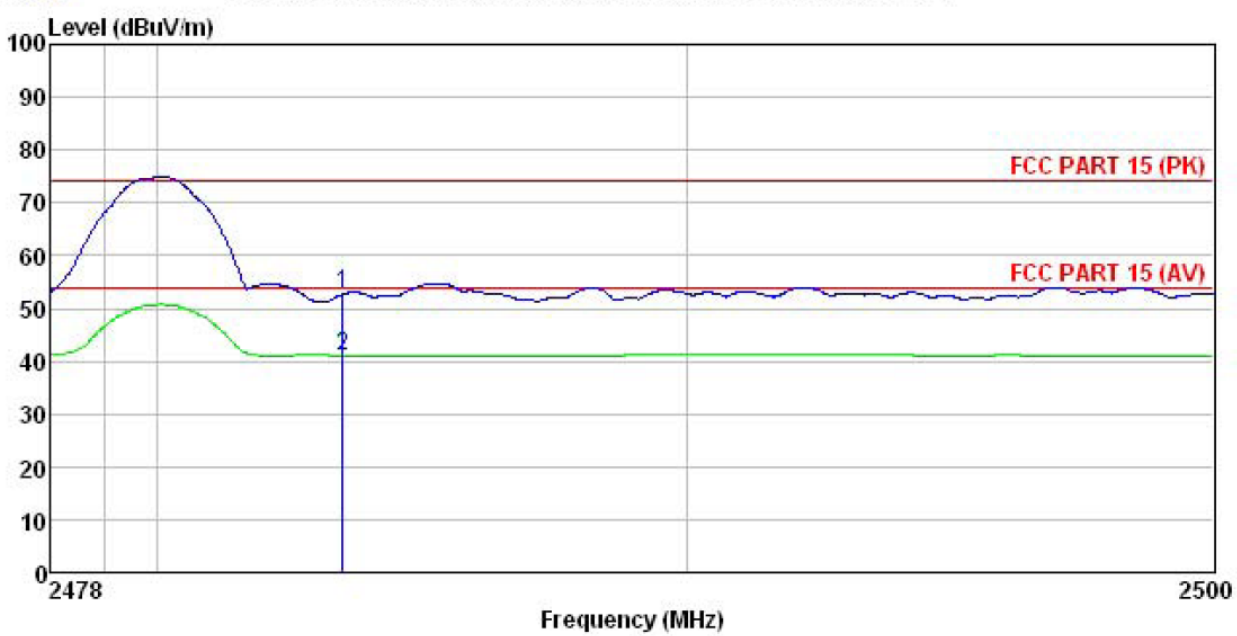


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
Jobi NO. : 736RF
EUT : T97601T4
Model : Bang
Test mode : BT-2DH1-L mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	17.28	27.58	5.67	0.00	50.53	74.00	-23.47	Peak
2	2390.000	7.62	27.58	5.67	0.00	40.87	54.00	-13.13	Average

Test channel: Highest

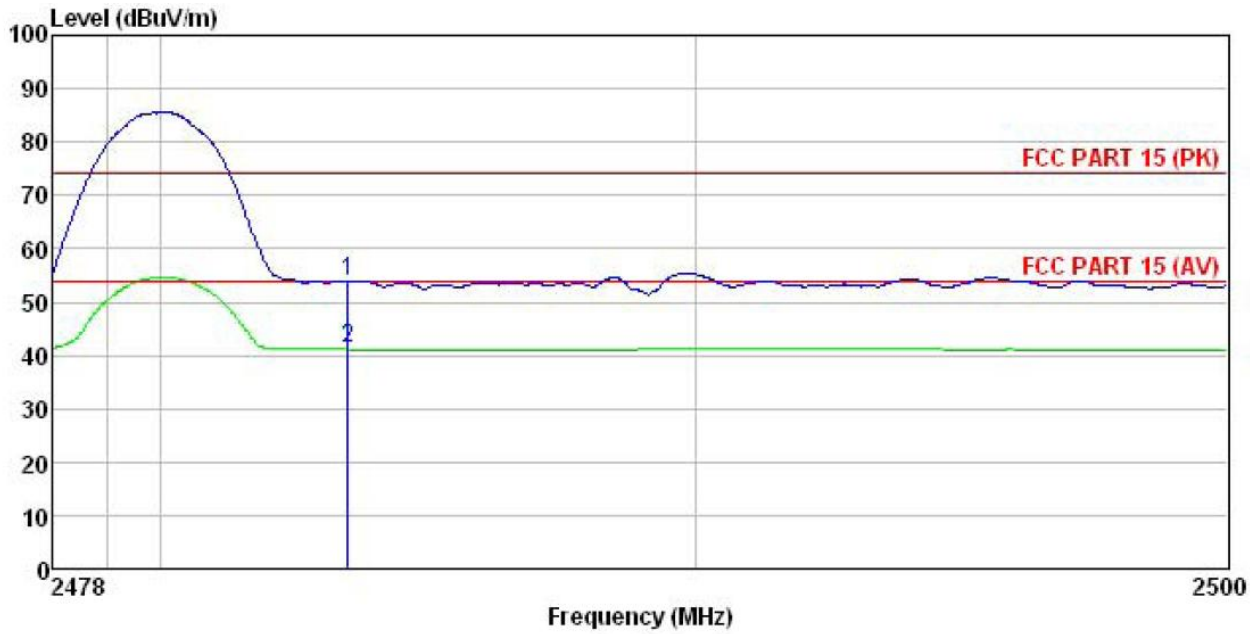
Horizontal:



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
Jobi NO. : T36RF
EUT : T97601T4
Model : Bang
Test mode : BT-2DH1-H mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	19.47	27.52	5.70	0.00	52.69	74.00	-21.31	Peak
2	2483.500	7.88	27.52	5.70	0.00	41.10	54.00	-12.90	Average

Vertical:



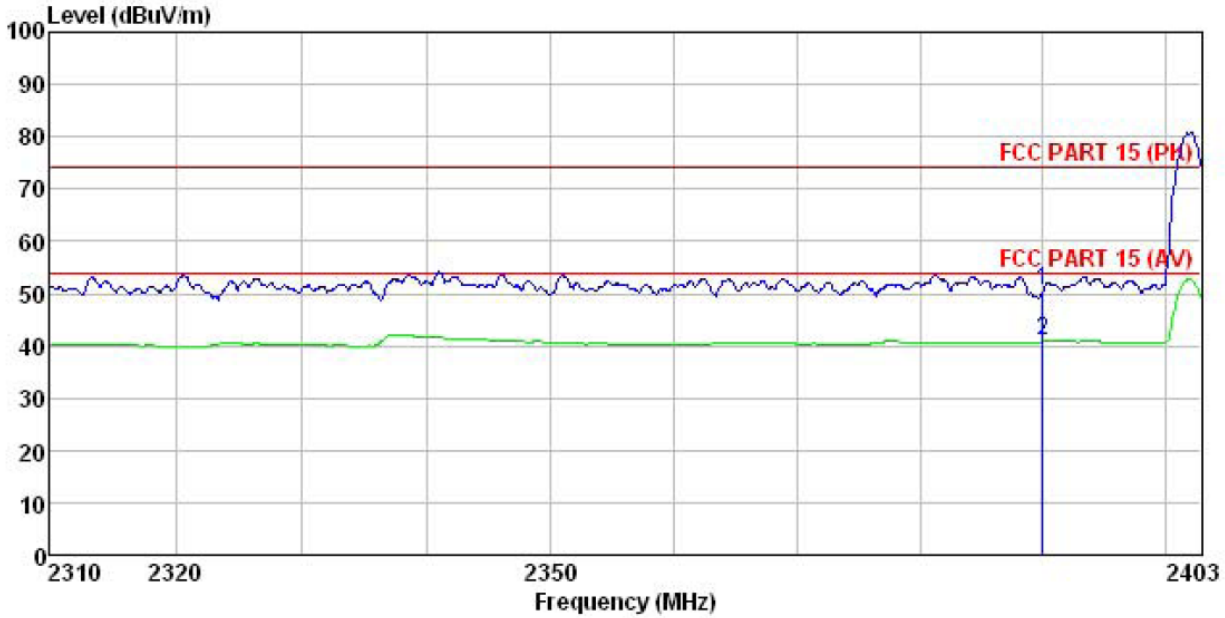
Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
Jobi NO. : T36RF
EUT : T97601T4
Model : Bang
Test mode : BT-2DH1-H mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	20.78	27.52	5.70	0.00	54.00	74.00	-20.00	Peak
2	2483.500	7.92	27.52	5.70	0.00	41.14	54.00	-12.86	Average

8DPSK mode

Test channel: Lowest

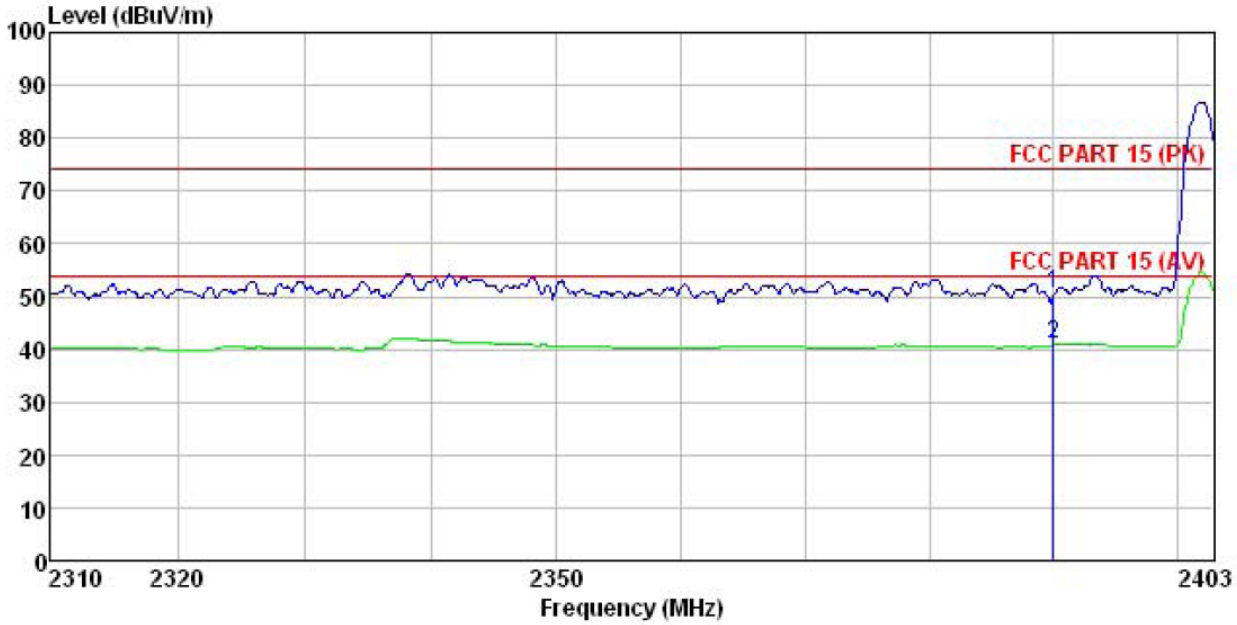
Horizontal:



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
Jobi NO. : 736RF
EUT : T97601T4
Model : Bang
Test mode : BT-3DH1-L mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	17.34	27.58	5.67	0.00	50.59	74.00	-23.41	Peak
2	2390.000	7.55	27.58	5.67	0.00	40.80	54.00	-13.20	Average

Vertical:

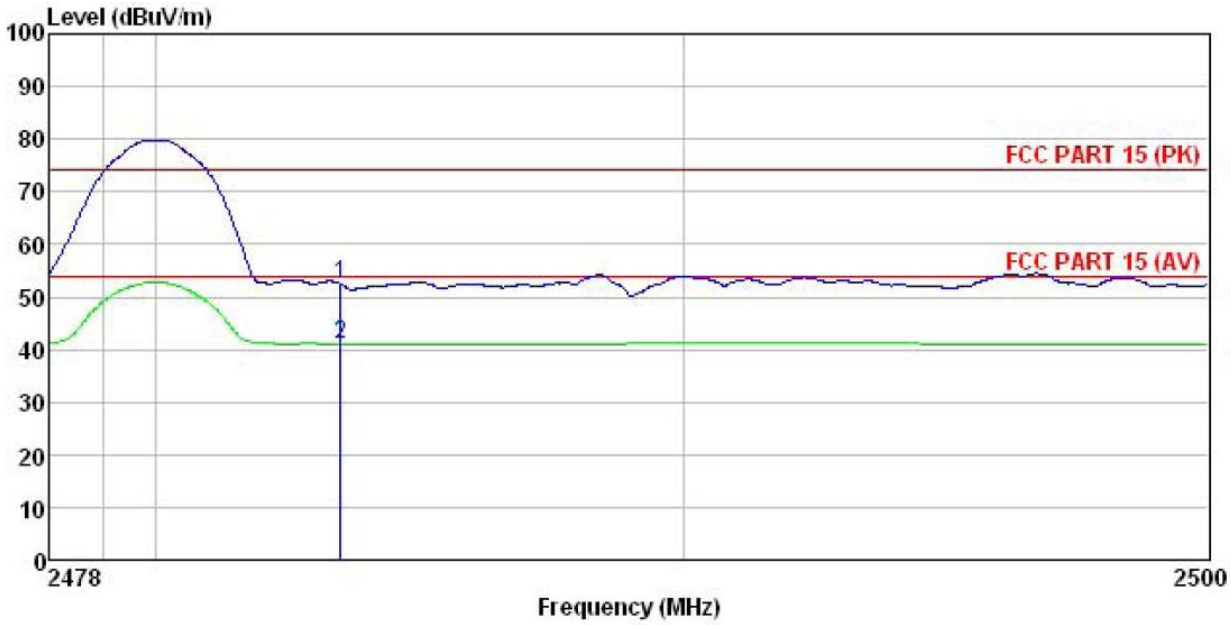


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
Jobi NO. : 736RF
EUT : T97601T4
Model : Bang
Test mode : BT-3DH1-L mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5℃ Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	17.12	27.58	5.67	0.00	50.37	74.00	-23.63	Peak
2	2390.000	7.55	27.58	5.67	0.00	40.80	54.00	-13.20	Average

Test channel: Highest

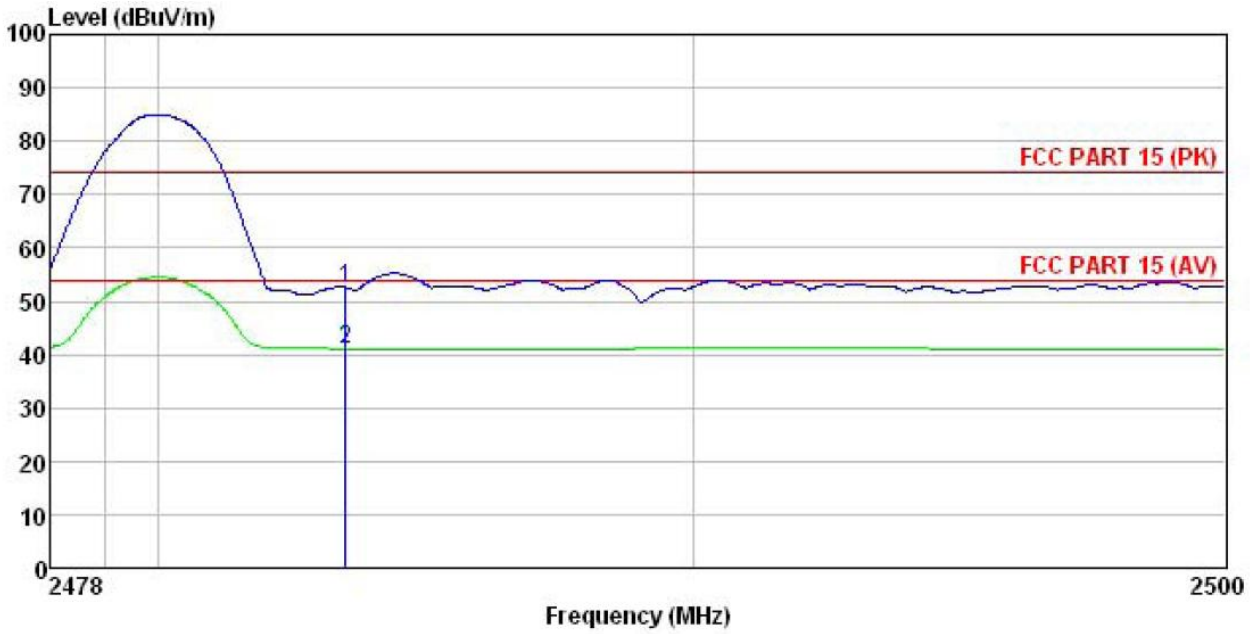
Horizontal:



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) HORIZONTAL
Jobi NO. : 736RF
EUT : T97601T4
Model : Bang
Test mode : BT-3DH1-H mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	19.22	27.52	5.70	0.00	52.44	74.00	-21.56	Peak
2	2483.500	7.87	27.52	5.70	0.00	41.09	54.00	-12.91	Average

Vertical:

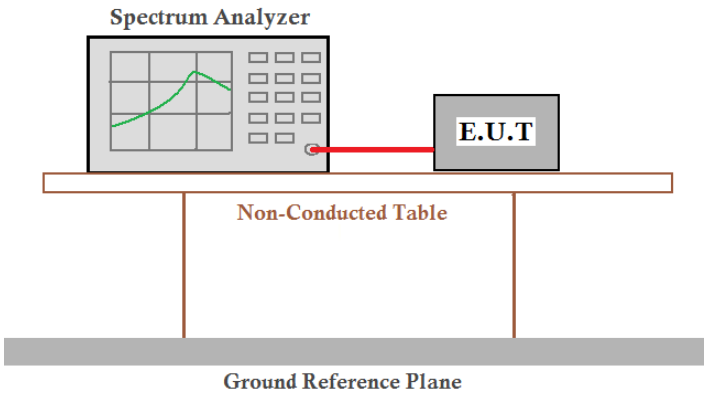


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18) VERTICAL
Jobi NO. : T36RF
EUT : T97601T4
Model : Bang
Test mode : BT-3DH1-H mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	19.36	27.52	5.70	0.00	52.58	74.00	-21.42	Peak
2	2483.500	7.88	27.52	5.70	0.00	41.10	54.00	-12.90	Average

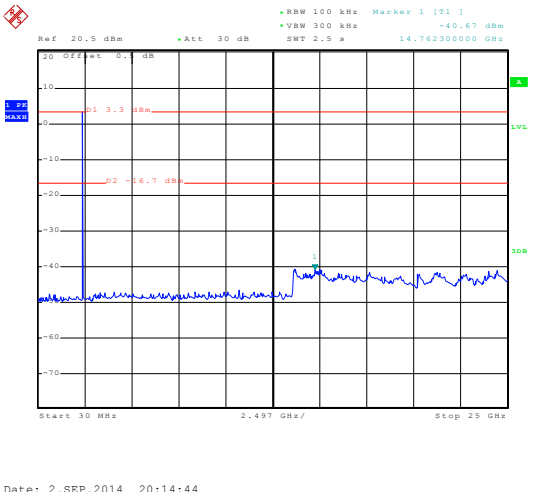
6.10 Spurious Emission

6.10.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and DA00-705
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Non-hopping mode
Test results:	Pass

GFSK

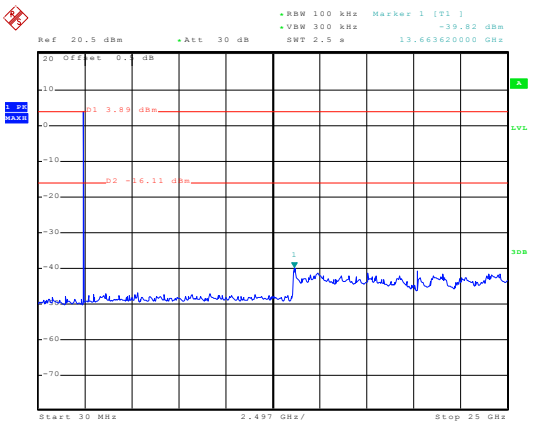
Lowest channel



Date: 2.SEP.2014 20:14:44

30MHz~25GHz

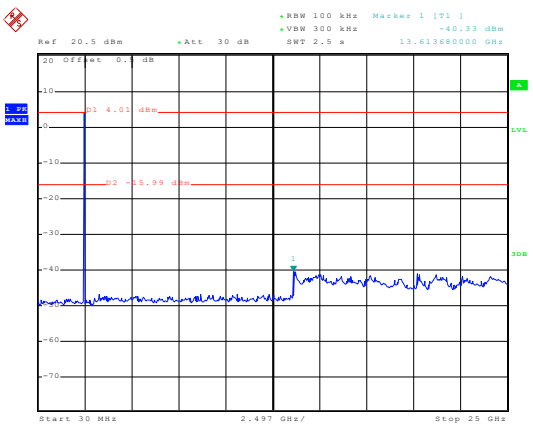
Middle channel



Date: 2.SEP.2014 20:15:53

30MHz~25GHz

Highest channel

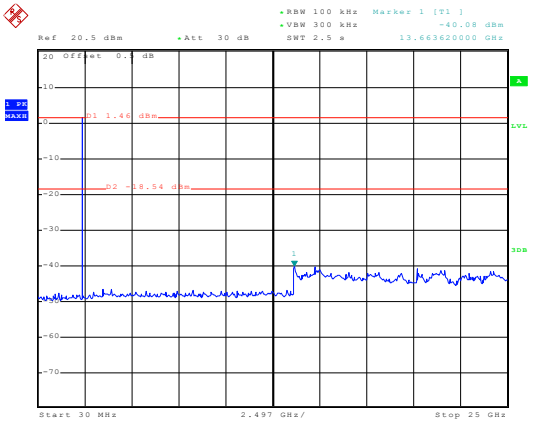


Date: 2.SEP.2014 20:17:35

30MHz~25GHz

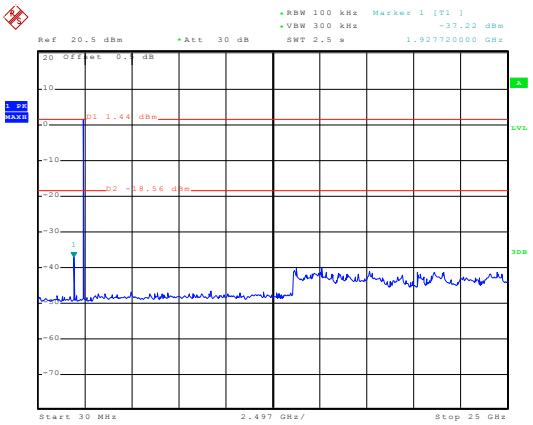
π/4-DQPSK

Lowest channel



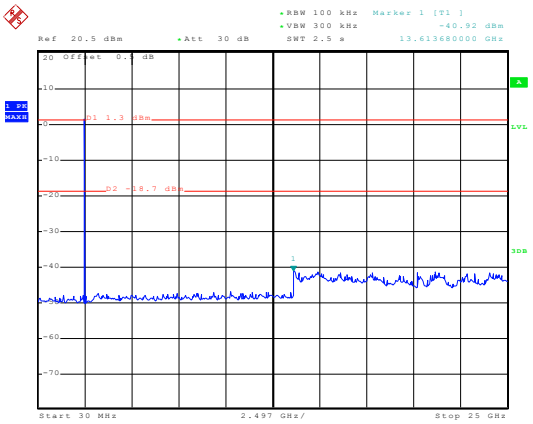
30MHz~25GHz

Middle channel



30MHz~25GHz

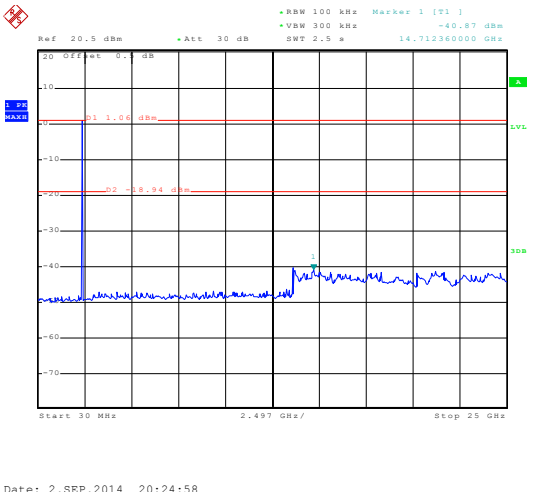
Highest channel



30MHz~25GHz

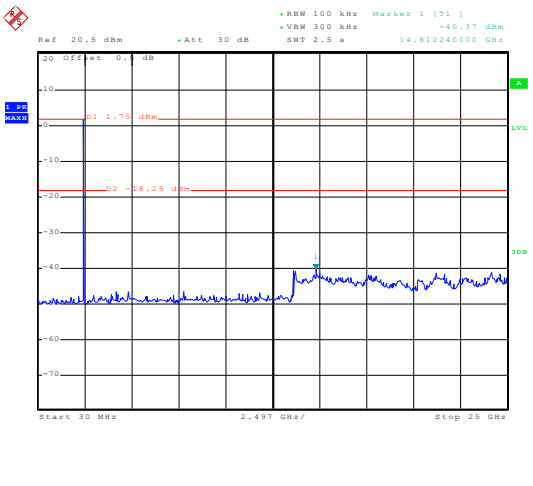
8DPSK

Lowest channel



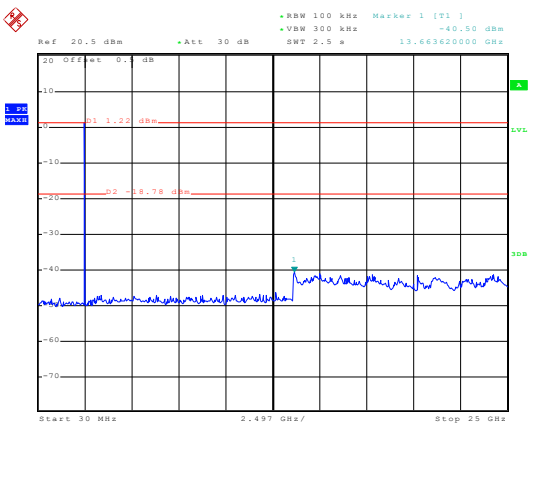
30MHz~25GHz

Middle channel



30MHz~25GHz

Highest channel



30MHz~25GHz

6.10.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.4: 2003
Test Frequency Range:	9 kHz to 25 GHz
Test site:	Measurement Distance: 3m

Receiver setup:

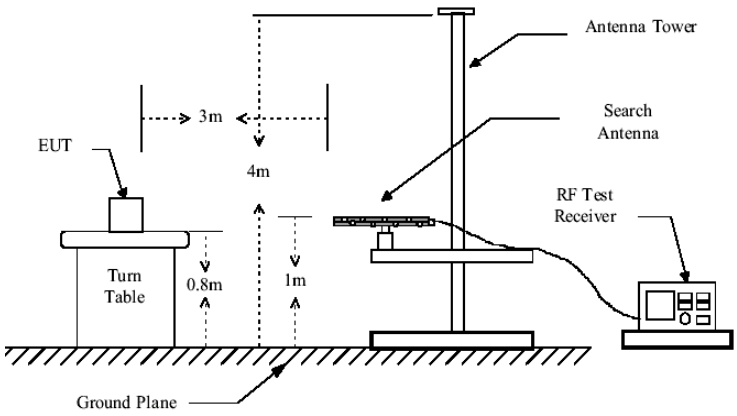
Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Peak	1MHz	10Hz	Average Value

Limit:

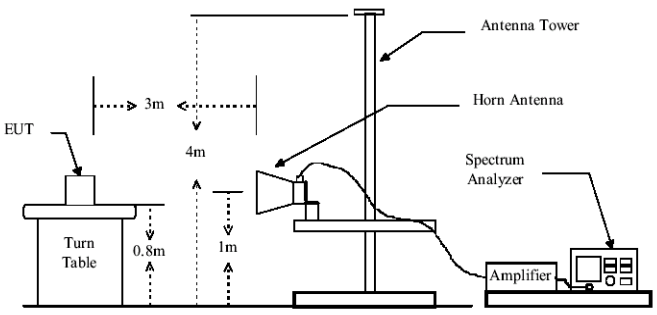
Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

Test setup:

Below 1GHz



Above 1GHz



Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 5.7 for details
Test mode:	Non-hopping mode
Test results:	Pass

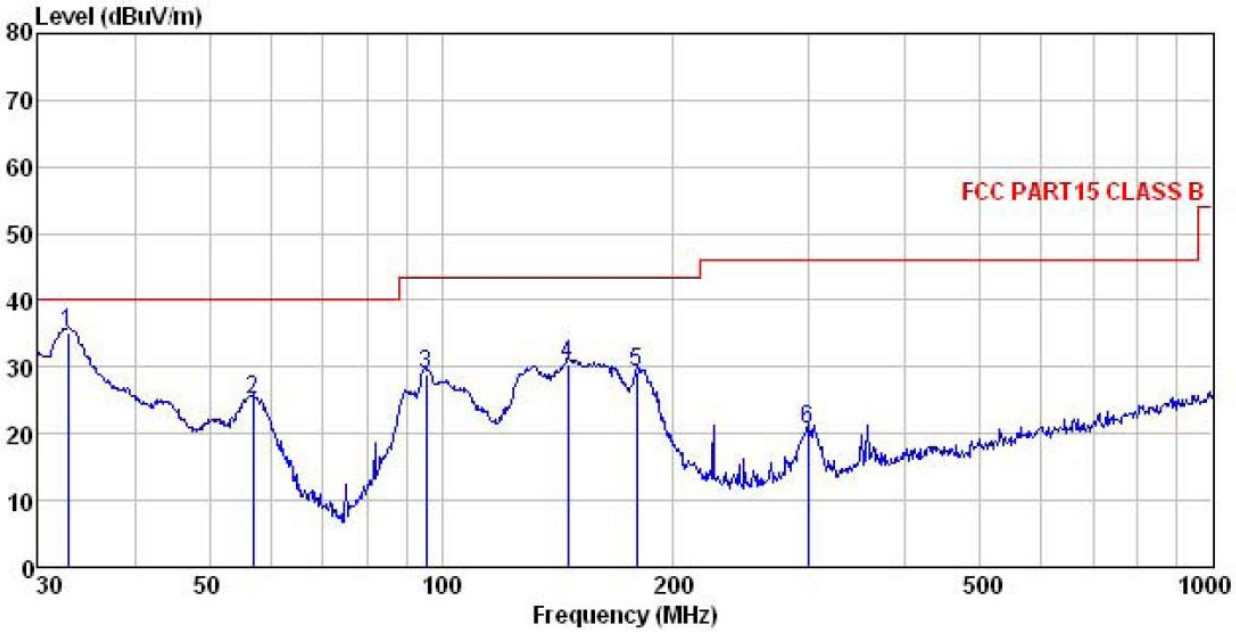
Remark:

1. *During the test, pre-scan the GFSK, π/4-DQPSK, 8DPSK modulation, and found the GFSK modulation is the worst case.*
2. *Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case.*
3. *9 kHz to 30 MHz is noise floor, so only shows the data of above 30MHz in this report.*

Measurement data:

Below 1GHz

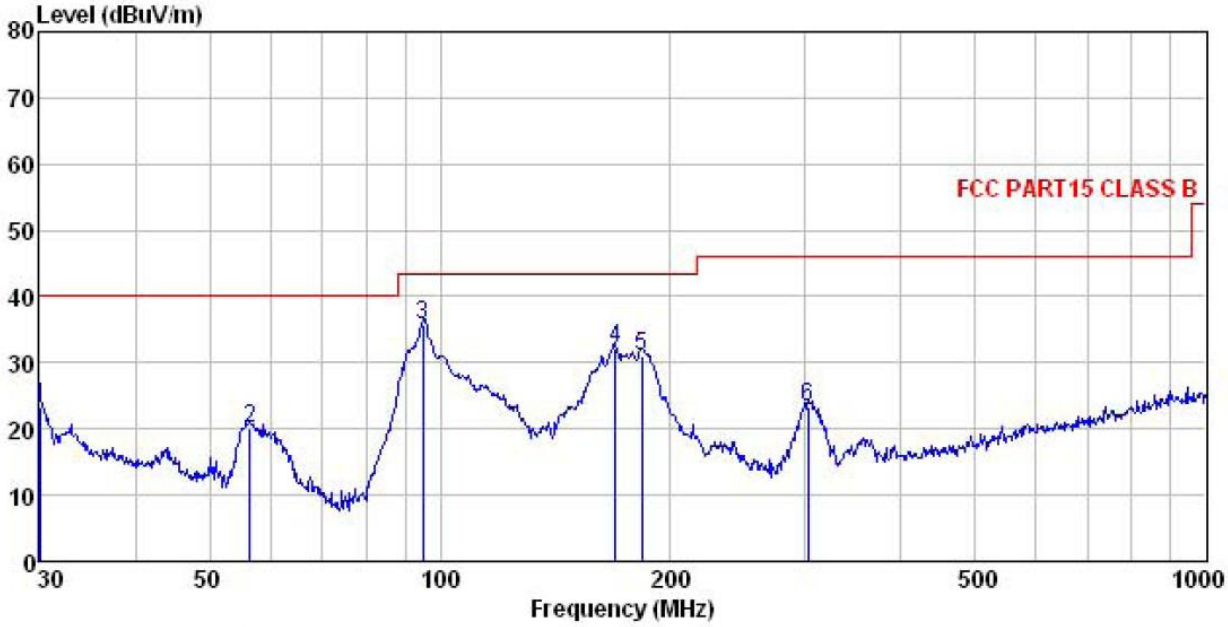
Vertical:



Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) VERTICAL
Jobi NO. : T36RF
EUT : T97601T4
Model : Bang
Test mode : BT mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	32.749	52.26	12.31	0.46	29.96	35.07	40.00	-4.93	QP
2	56.991	41.20	12.91	0.67	29.79	24.99	40.00	-15.01	QP
3	95.427	44.59	12.87	0.93	29.55	28.84	43.50	-14.66	QP
4	145.861	50.14	8.23	1.30	29.24	30.43	43.50	-13.07	QP
5	179.386	47.20	9.62	1.36	28.98	29.20	43.50	-14.30	QP
6	298.268	34.39	13.00	1.76	28.45	20.70	46.00	-25.30	QP

Horizontal:



Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163(30M1G) HORIZONTAL
Jobi NO. : 736RF
EUT : T97601T4
Model : Bang
Test mode : BT mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.5'C Huni:55%
Test Engineer: Carey

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	30.105	40.56	12.33	0.43	29.98	23.34	40.00	-16.66	QP
2	56.395	36.26	12.95	0.66	29.79	20.08	40.00	-19.92	QP
3	95.093	51.52	12.84	0.93	29.55	35.74	43.50	-7.76	QP
4	169.599	50.93	8.95	1.35	29.05	32.18	43.50	-11.32	QP
5	183.201	48.79	9.92	1.36	28.95	31.12	43.50	-12.38	QP
6	302.481	37.04	13.08	1.78	28.45	23.45	46.00	-22.55	QP

Above 1GHz:

Test channel:	Lowest	Level:	Peak

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	48.93	31.53	8.90	40.24	49.12	74.00	-24.88	Vertical
4804.00	47.41	31.53	8.90	40.24	47.60	74.00	-26.40	Horizontal

Test channel:	Lowest	Level:	Average

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	38.87	31.53	8.90	40.24	39.06	54.00	-14.94	Vertical
4804.00	37.84	31.53	8.90	40.24	38.03	54.00	-15.97	Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Test channel:	Middle	Level:	Peak

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4882.00	47.07	31.58	8.98	40.15	47.48	74.00	-26.52	Vertical
4882.00	46.04	31.58	8.98	40.15	46.45	74.00	-27.55	Horizontal

Test channel:	Middle	Level:	Average

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4882.00	36.93	31.58	8.98	40.15	37.34	54.00	-16.66	Vertical
4882.00	36.25	31.58	8.98	40.15	36.66	54.00	-17.34	Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Test channel:	Highest	Level:	Peak

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	45.76	31.69	9.08	40.03	46.50	74.00	-27.50	Vertical
4960.00	47.28	31.69	9.08	40.03	48.02	74.00	-25.98	Horizontal

Test channel:	Highest	Level:	Average

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	36.28	31.69	9.08	40.03	37.02	54.00	-16.98	Vertical
4960.00	37.52	31.69	9.08	40.03	38.26	54.00	-15.74	Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*