



FCC TEST REPORT

for

47 CFR Part 15 Subpart C

Equipment : **Pocket PC**
Trade Name : **FUJITSU SIEMENS COMPUTER**
Model No. : **PL718MD**
FCC ID : **NM8BALI**
Filing Type : **Certification**
Applicant : **High Tech Computer Corp.**
23 Hsin Hua Rd., Taoyuan 330, Taiwan

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
- **Certificate or Test Report must not be used by the applicant to claim the product in this test report endorsement by NVLAP or any agency of U.S. government.**
- The data shown in this test report were carried out on Oct. 13, 2004 at **Sporton International Inc. LAB.**

Dr. Daniel Lee
EMC/SAR Manager

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

SPORTON International Inc.

TEL : 886-2-2696-2468

FAX : 886-2-2696-2255



Table of Contents

History of this test report..... ii

1. General Description of Equipment under Test..... 1

 1.1. Applicant..... 1

 1.2. Manufacturer..... 1

 1.3. Basic Description of Equipment under Test..... 1

 1.4. Feature of Equipment under Test..... 2

2 Test Configuration of Equipment under Test.....4

 2.1 Test Manner..... 4

 2.2 Test Mode..... 4

 2.3 Connection Diagram of Test System 5

 2.4 Ancillary Equipment List..... 5

3. RF Utility6

4. General Information of Test.....7

 4.1 Test Voltage..... 7

 4.2 Standard for Methods of Measurement 7

 4.3 Test in Compliance with 7

 4.4 Frequency Range Investigated..... 7

 4.5 Test Distance..... 7

5. Test Data and Test Result.....8

 5.1 List of Measurements and Examinations 8

 5.2 6dB Bandwidth Measurement 10

 5.3 Power Spectral Density Measurement..... 14

 5.4 Band Edges Measurement..... 18

 5.5 Hopping Channel Separation 24

 5.6 Number of Hopping Frequency 28

 5.7 Hopping Channel Bandwidth 30

 5.8 Dwell Time of Each Frequency within a 30 Seconds Period 34

 5.9 Peak Output Power Measurement..... 38

 5.10 Conducted Emission Measurement..... 39

 5.11 Radiated Emission Measurement 48

 5.11 Antenna Requirements 61

6. List of Measuring Equipments Used62

7. Uncertainty Evaluation.....64

Appendix A. Photographs of EUT External

Appendix B. Photographs of EUT Internal

Appendix C. Photographs of Setup



History of this test report

Original Report Issue Date: Nov. 15, 2004

No additional attachment.

Additional attachment were issued as following record:

Attachment No.	Issue Date	Description



1. General Description of Equipment under Test

1.1. Applicant

High Tech Computer Corp.
23 Hsin Hua Rd., Taoyuan 330, Taiwan

1.2 Manufacturer

High Tech Computer Corp.
23 Hsin Hua Rd., Taoyuan 330, Taiwan

1.3 Basic Description of Equipment under Test

Equipment	: Pocket PC
Trade Name	: FUJITSU SIEMENS COMPUTER
Model No.	: PL718MD
FCC ID	: NM8BALI
Power Supply Type	: Switching
AC Power Cord	: AC 120V/ 60Hz, Non-shielded ,1.7meter,2pin



1.4 Feature of Equipment under Test

The Emission Mode: Wireless LAN

Product Feature & Specification				
1. Type of Modulation	802.11b:CCK(11Mbps),DQPSK(5.5Mbps) DQPSK(2Mbps),DBPSK(1Mbps);			
2. Number of Channels	USA/Canada:11	V	European:13	
	Japan:13.14		Other:	
3. Frequency Band	2.4GHz~2.4835GHz			
4. Carrier Frequency of each channel	2412MHz+(n-1)*5MHz, n=1~11			
5. Channel Spacing	5MHz			
6. Maximum Output Power to Antenna (Normal Condition)	14.68 dBm			
7. Type of Antenna Connector	SMT switch connector			
8. Antenna Type	Inveted-F Antenna			
9. Antenna Gain	-4 dBi			
10. Function Type	Transmitter		Transceiver	V
11. Power Rating (DC/AC Voltage)	DC 5V			
12. Temperature Range	0~ +45 degree C			
13. Duty Cycle	N/A			
14. Basic function of product	With Wireless LAN for data networking applications			



The Emission Mode: Bluetooth

Product Feature & Specification			
15. Type of Modulation	GFSK		
16. Number of Channels	79		
17. Frequency Band	2.4GHz~2.4835GHz		
18. Carrier Frequency of each channel	2402MHz+n*MHz, n=0~78		
19. Channel Spacing	1MHz		
20. Maximum Output Power to Antenna (Normal Condition)	2.9 dBm		
21. Type of Antenna Connector	SMT switch connector		
22. Antenna Type	Chip antenna		
23. Antenna Gain	-7 dBi		
24. Function Type	Transmitter		Transceiver <input checked="" type="checkbox"/>
25. Power Rating (DC/AC Voltage)	DC 5V		
26. Temperature Range	0~ +45 degree C		
27. Duty Cycle	N/A		
28. Basic function of product	With Bluetooth for data networking applications		



2 Test Configuration of Equipment under Test

2.1 Test Manner

- a. The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.
- b. For spurious emission below 1GHz, only one channel of each application was tested because it is not related to channel selection.
- c. The EUT is programmed to transmit signal continuously for all testings.
- d. Frequency range investigated: conduction 150 kHz to 30 MHz, radiation 30 MHz to 25000MHz.

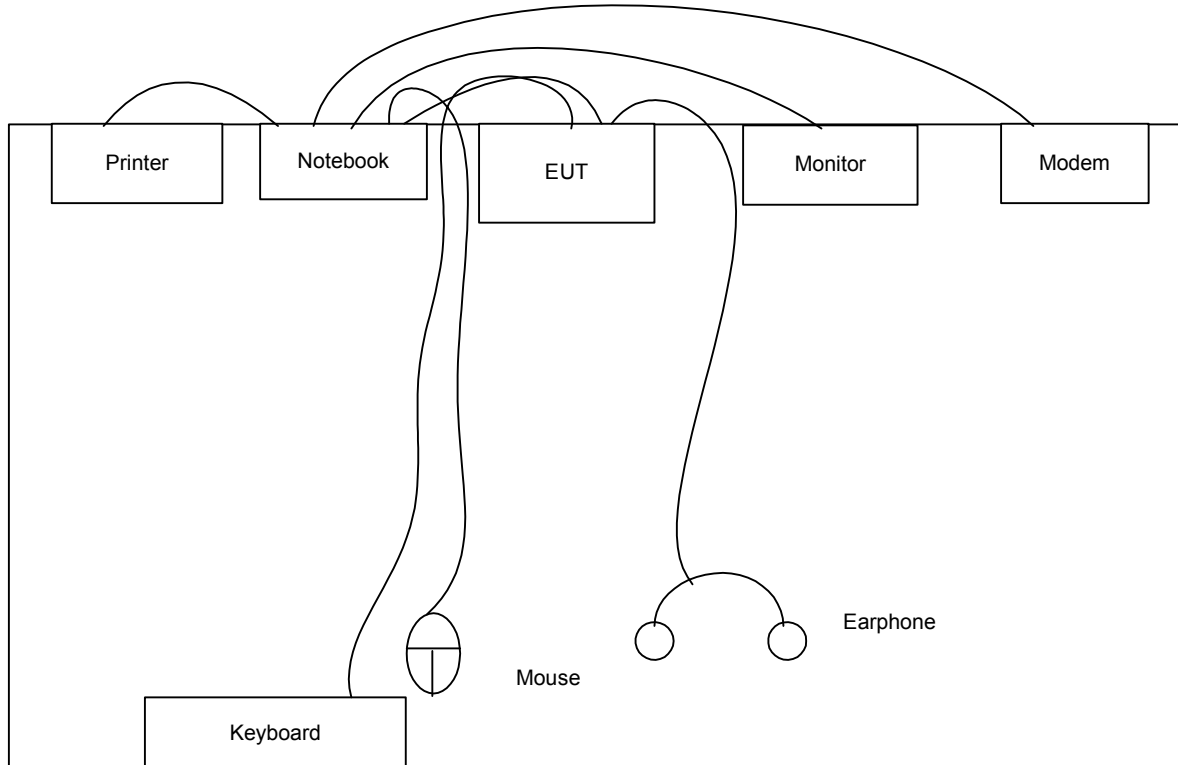
2.2 Test Mode

Application	802.11b
Data Rate	11 Mbps
Radiated Emission	Mode 1: WLAN CH06 + Bluetooth CH39 for PL718MD Mode 2: TX- BT CH00 (2402 MHz), WLAN CH01 (2412MHz) Mode 3: TX- BT CH39 (2441 MHz), WLAN CH06 (2437 MHz) Mode 4: TX- WLAN CH06 (2437 MHz) Mode 5: TX- BT CH78 (2480 MHz), WLAN CH11 (2462 MHz) Mode 6: TX- BT CH 78 (2480 MHz)
Conducted Emission	Mode 1: EUT Only Mode Mode 2: Cradle Mode Mode 3: Cradle+USB Mode Mode 4: USB Mode

Remark:

For the serial model, PL7180MD, the WLAN and BT portions were kept the same. The only differences were display and camera, so only radiated emission with WLAN and BT Co-transmission was re-tested.

2.3 Connection Diagram of Test System



2.4 Ancillary Equipment List

Item	Equipment	Model No.	Serial No.
1.	Earphone(STEREO)	HP-300	SP0042
2.	Monitor (VIEWSONIC)	VCDTS21553-3P	SP0050
3.	USB MOUSE (LCGITECH)	M-8E58	SP0052
4.	PRINTER (EPSON)	STYLUS COLRO 680	SP0054
5.	MODEM (ACEEX)	CM141	SP0058
6.	Notebook (DELL)	PP05L	SP0061
7.	Keyboard(IBM)	N/A	SP0064



3. RF Utility

The programmed RF Utility is either installed in EUT or Notebook to provide channel selection, power level, data rate and the application type. RF Utility can send transmitting signal for all testings.



4. General Information of Test

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,
Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
TEL : 886-3-327-3456
FAX : 886-3-318-0055

Test Site No : CO01-HY, 03CH06-HY

4.1 Test Voltage

110V/ 60Hz

4.2 Standard for Methods of Measurement

ANSI C63.4-2003

4.3 Test in Compliance with

47 CFR Part 15 Subpart C

4.4 Frequency Range Investigated

- a. Conduction: from 150 kHz to 30 MHz
- b. Radiation: from 30 MHz to 25000 MHz

4.5 Test Distance

The test distance of radiated emission from antenna to EUT is 3 m.



5. Test Data and Test Result

5.1 List of Measurements and Examinations

The Emission Mode: Wireless LAN

FCC Rule	Description of Test	Result
15.207	Conducted Emission	Pass
15.247(a)(2)	6dB Bandwidth	Pass
15.247(b)	Maximum Peak Output Power	Pass
15.209(a)	Radiated Emission	Pass
15.247 (c)	100kHz Bandwidth of Frequency Band Edges	Pass
15.247(d)	Power Spectral Density	Pass
15.203 15.247(b)(4)	Antenna Requirement	Pass

**The Emission Mode: Bluetooth**

FCC Rule	Description of Test	Result
<u>15.247(a) (1)</u>	Hopping Channel Bandwidth	Pass
<u>15.247(a)(1)</u>	Hopping Channel Separation	Pass
<u>15.247(a)(1)(iii)</u>	Number of Hopping Frequency Used	Pass
<u>15.247(a)(1)(iii)</u>	Dwell Time of Each Frequency	Pass
<u>15.247(b) (1)</u>	Output Power	Pass
15.247(c)	100KHz Bandwidth of Frequency Band Edges	Pass
15.207	Conducted Emission	Pass
15.209	Radiated Emission	Pass
<u>15.203</u>	Antenna Requirement	Pass

5.2 6dB Bandwidth Measurement

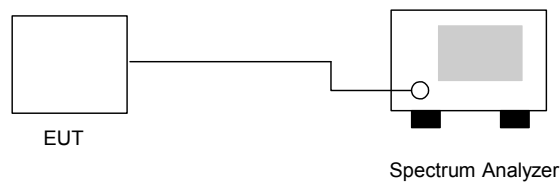
5.2.1 Measuring Instruments :

As described in chapter 6 of this test report.

5.2.2 Test Procedure :

1. The transmitter output was connected to the spectrum analyzer directly.
2. Set RBW of spectrum analyzer to 100kHz and VBW to 100kHz.
3. The 6 dB bandwidth is defined as the frequency range where the power is higher than the peak power minus 6dB.

5.2.3 Test Setup Layout :



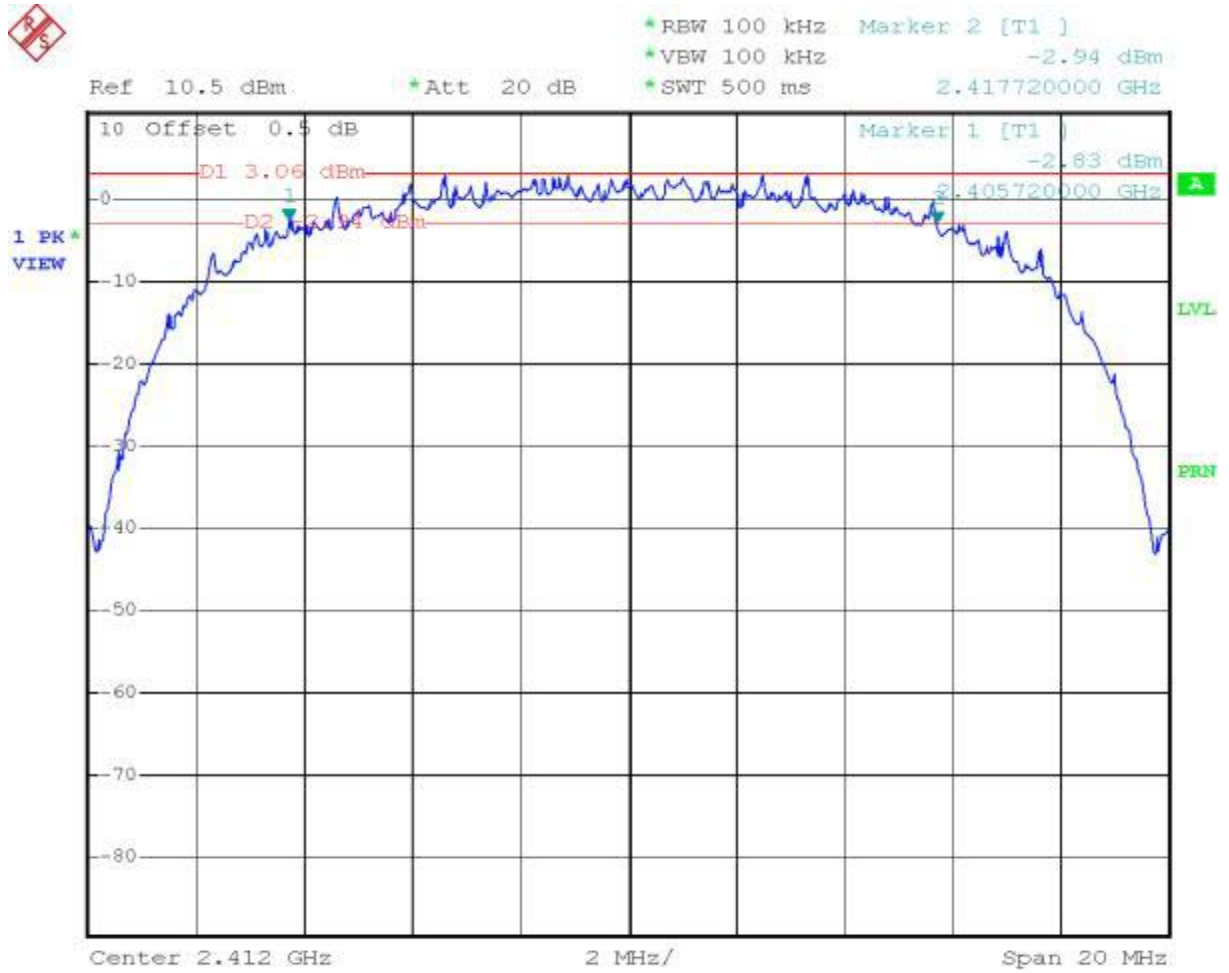
5.2.4 Test Result :

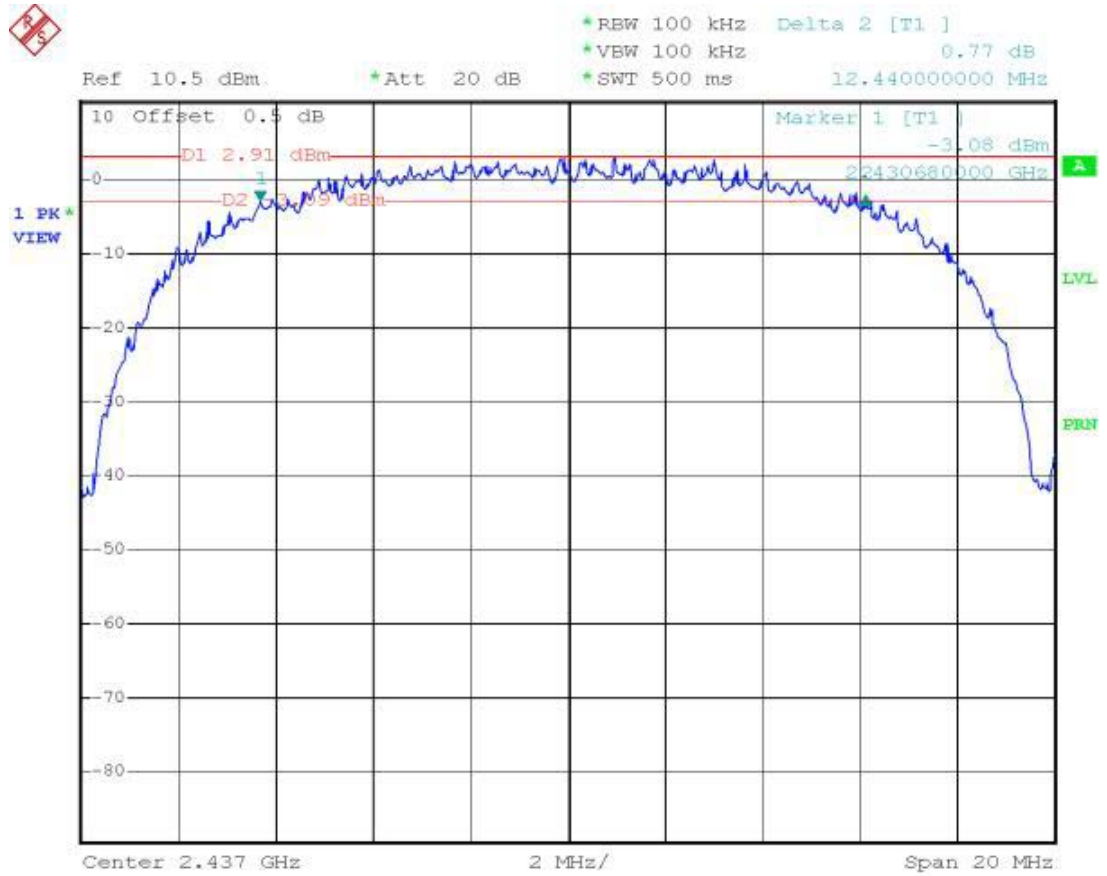
- Application Type : WLAN 802.11b
- Temperature : 26°C
- Relative Humidity : 53%
- Test Enginner : Jay

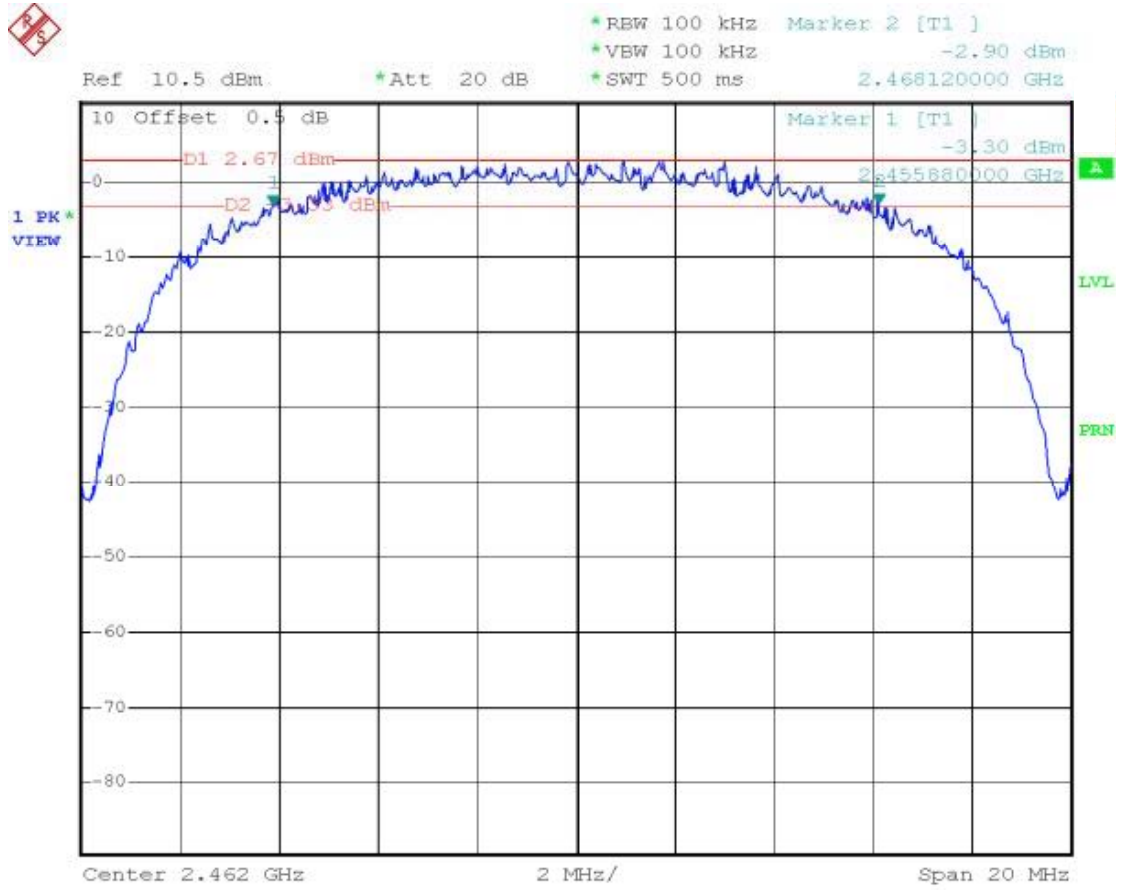
Channel	Frequency (MHz)	6dB Emission bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
01	2412	12.00	0.5	Mode 1
06	2437	12.44	0.5	Mode 2
11	2462	12.24	0.5	Mode 3



5.2.5 6dB Bandwidth







5.3 Power Spectral Density Measurement

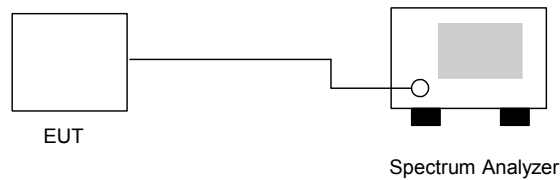
5.3.1 Measuring Instruments :

As described in chapter 6 of this test report.

5.3.2 Test Procedure :

1. The transmitter output was connected to spectrum analyzer directly.
2. The spectrum analyzer's resolution bandwidth was set at 3kHz RBW and 30kHz VBW as that of the fundamental frequency. Set the sweep time=span/3kHz.
3. The power spectral density was measured and recorded.
4. The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

5.3.3 Test Setup Layout :



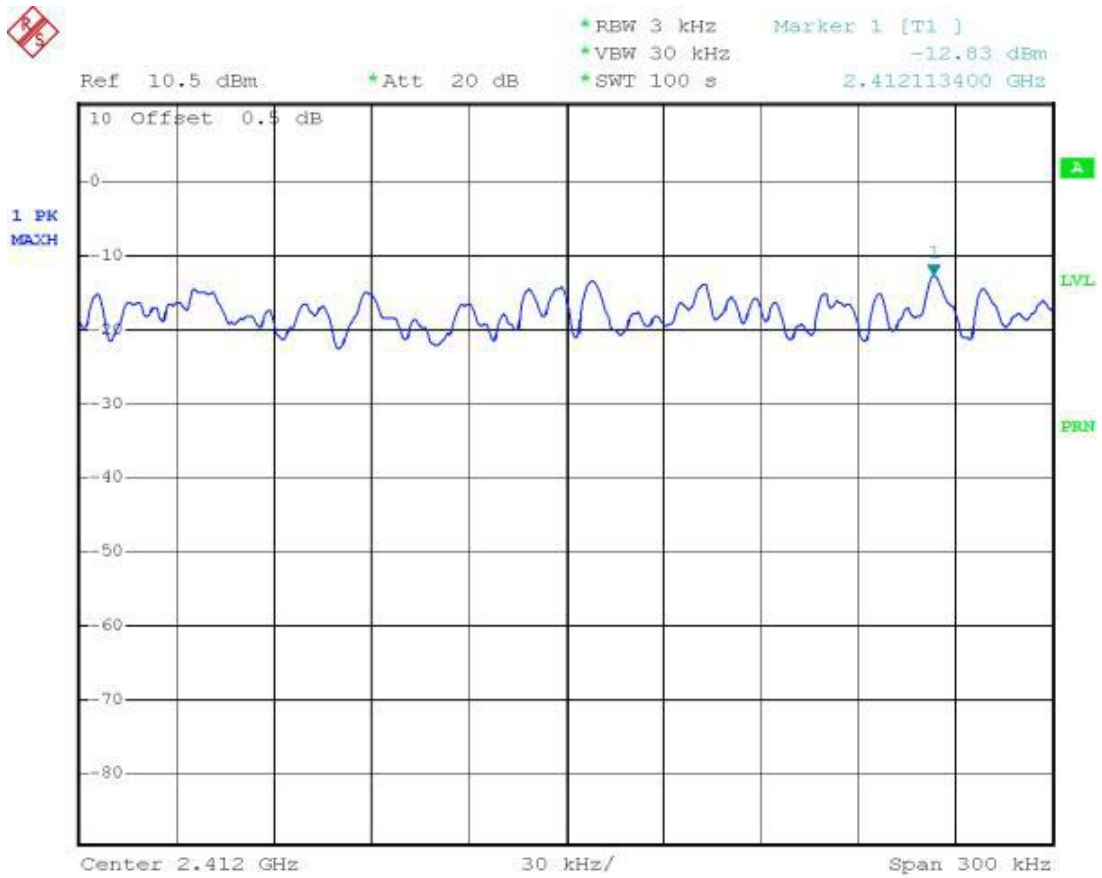
5.3.4 Test Result :

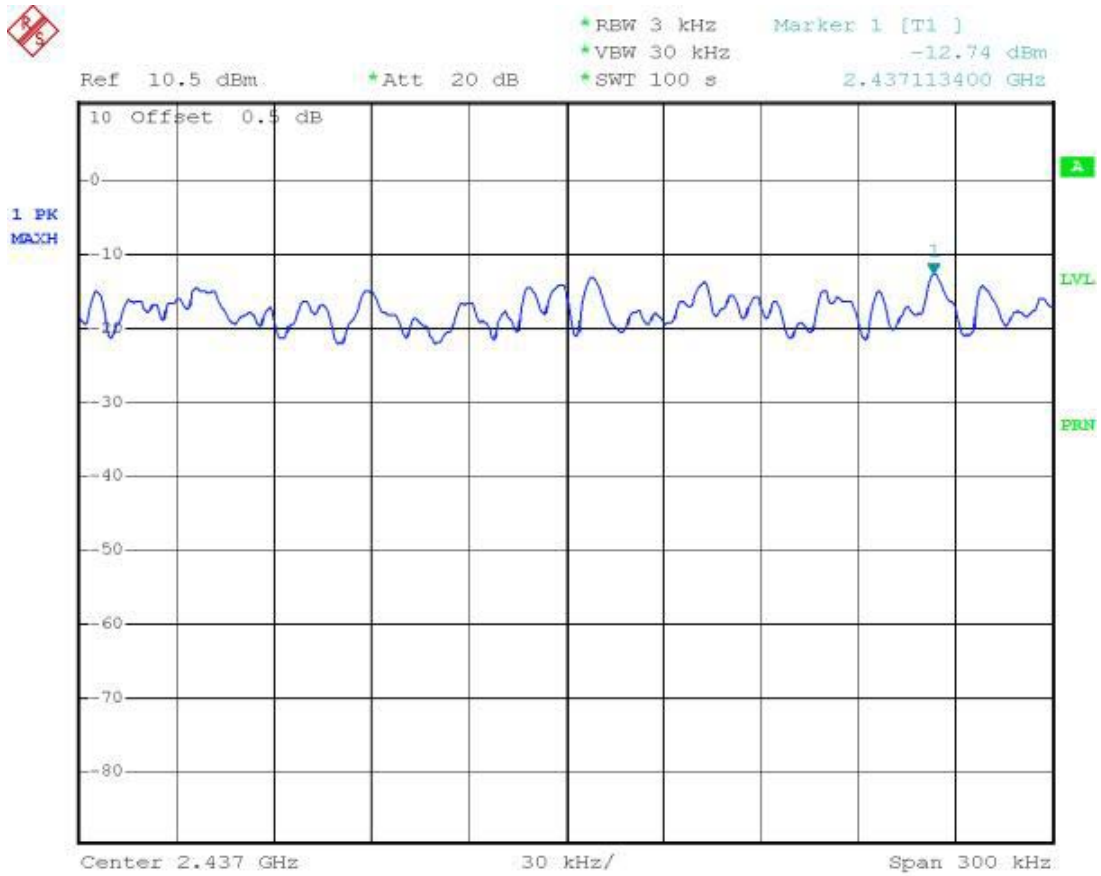
- Application Type : 802.11b
- Temperature : 26°C,
- Relative Humidity : 53%
- Test Enginner : Jay

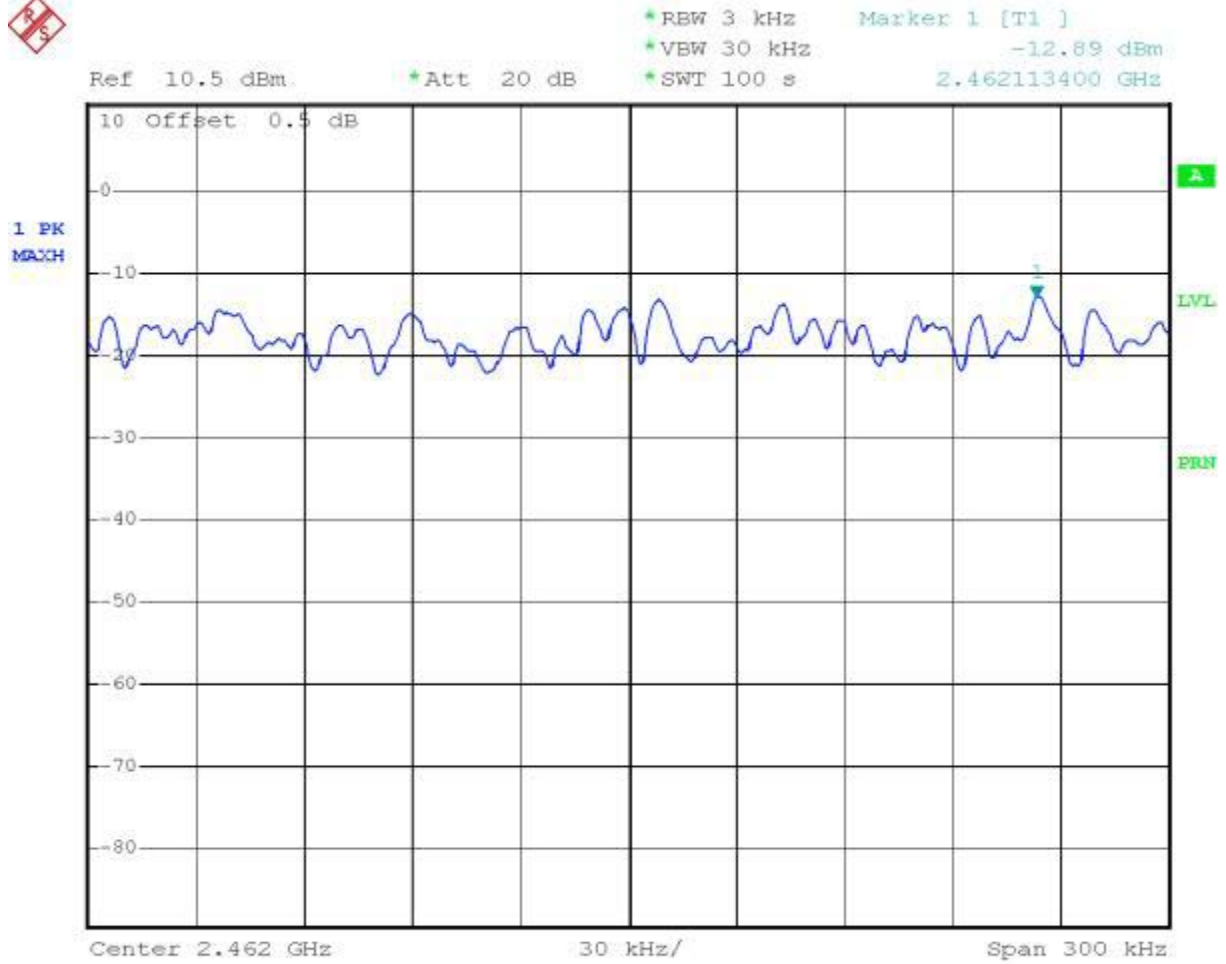
Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limits (dBm)	Plot Ref. No.
01	2412	-12.83	8	Mode 1
06	2437	-12.74	8	Mode 2
11	2462	-12.89	8	Mode 3



5.3.5 Power Spectral Density









5.4 Band Edges Measurement

5.4.1 Measuring Instruments :

As described in chapter 6 of this test report.

5.4.2 Test Procedure :

- 1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100 kHz bandwidth from band edge.
3. The band edges was measured and recorded.

5.4.3 Test Result :

- Application Type : WLAN 802.11b and BT
Temperature : 26°C,
Relative Humidity : 53%
Test Enginner : Jay
Test Result in WLAN lower band (Channel 1) : PASS
Test Result in WLAN higher band (Channel 11) : PASS
Test Result in BT lower band (Channel 00) PASS
Test Result in BT higher band (Channel 78) PASS

5.4.4 Note on Band Edge Emission :

Horizontal (below 2400 MHz)

Table with 12 columns: Freq, Level, Over Limit, Limit Line, Read Level, Probe Factor, Cable Loss, Preamp Factor, Remark, Ant Pos, Table Pos. Contains 2 rows of data for frequencies 2388.960 MHz.

Vertical (below 2400 MHz)

Table with 12 columns: Freq, Level, Over Limit, Limit Line, Read Level, Probe Factor, Cable Loss, Preamp Factor, Remark, Ant Pos, Table Pos. Contains 2 rows of data for frequencies 2386.880 MHz.



Horizontal (above 2483 MHz)

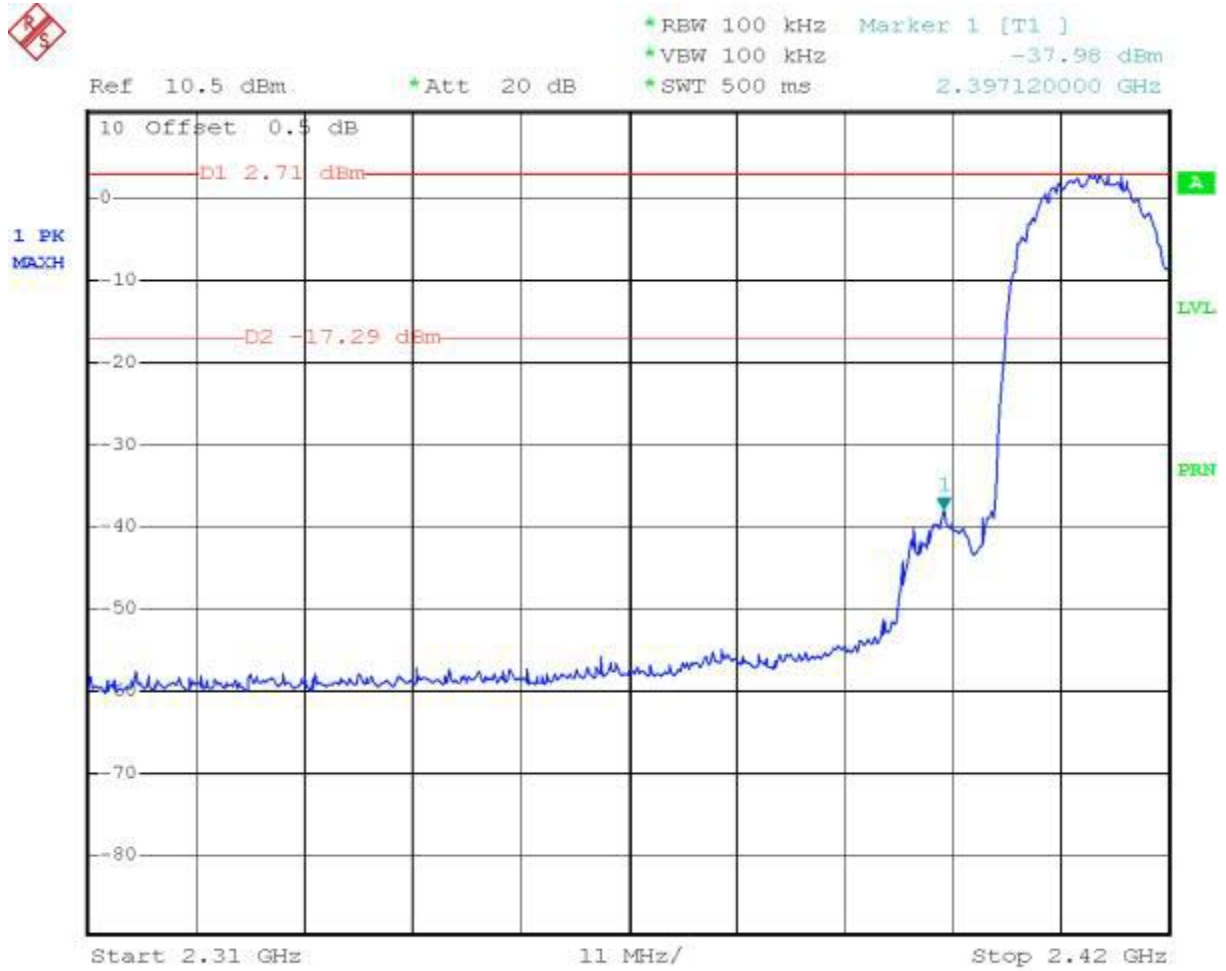
	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2484.330	55.50	-18.50	74.00	25.34	28.37	1.79	0.00	Peak	---	---
2	2484.330	42.31	-11.69	54.00	12.15	28.37	1.79	0.00	Average	100	245

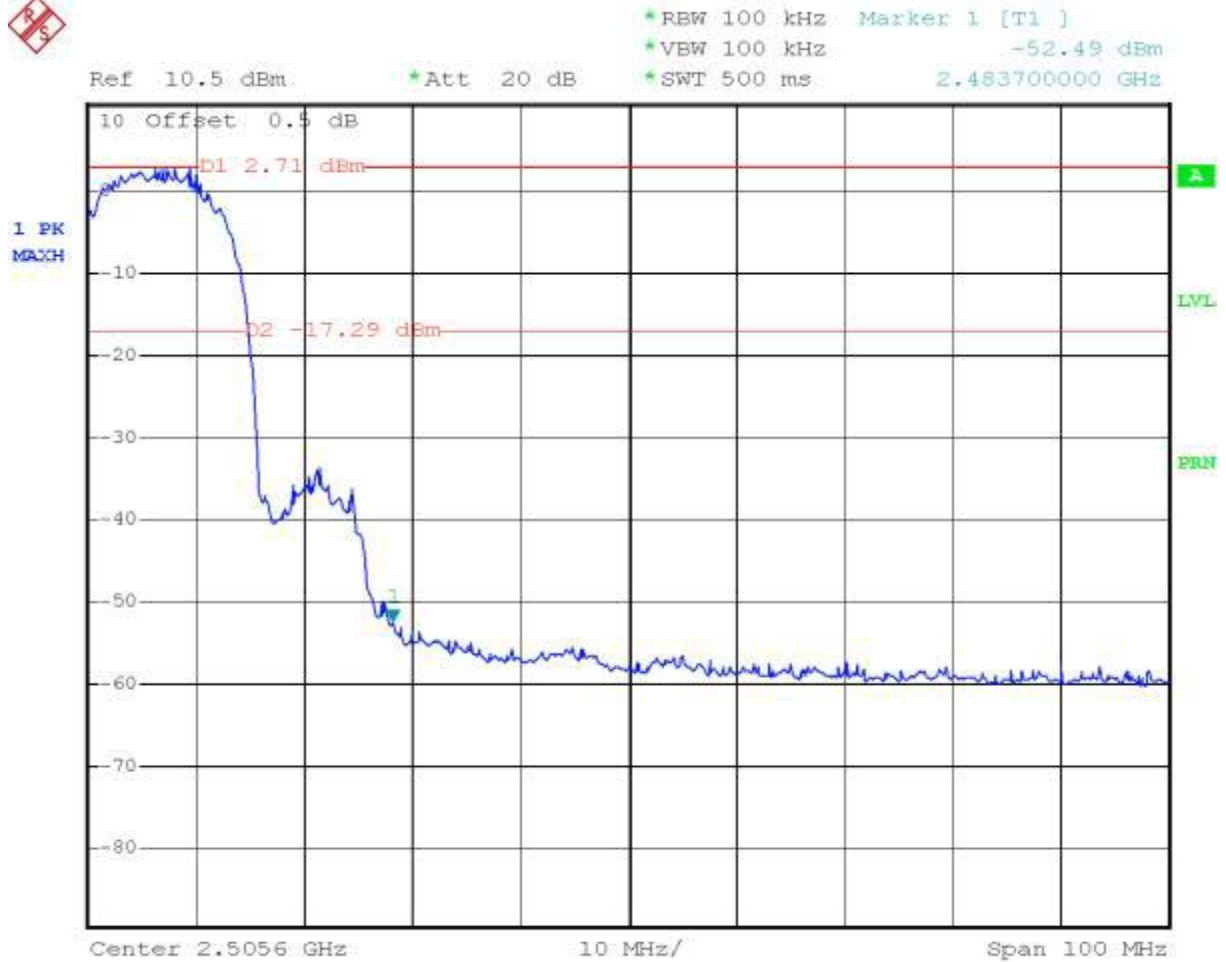
Vertical (above 2483 MHz)

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2483.500	56.40	-17.60	74.00	26.24	28.37	1.79	0.00	Peak	---	---
2	2483.500	44.10	-9.90	54.00	13.94	28.37	1.79	0.00	Average	100	78



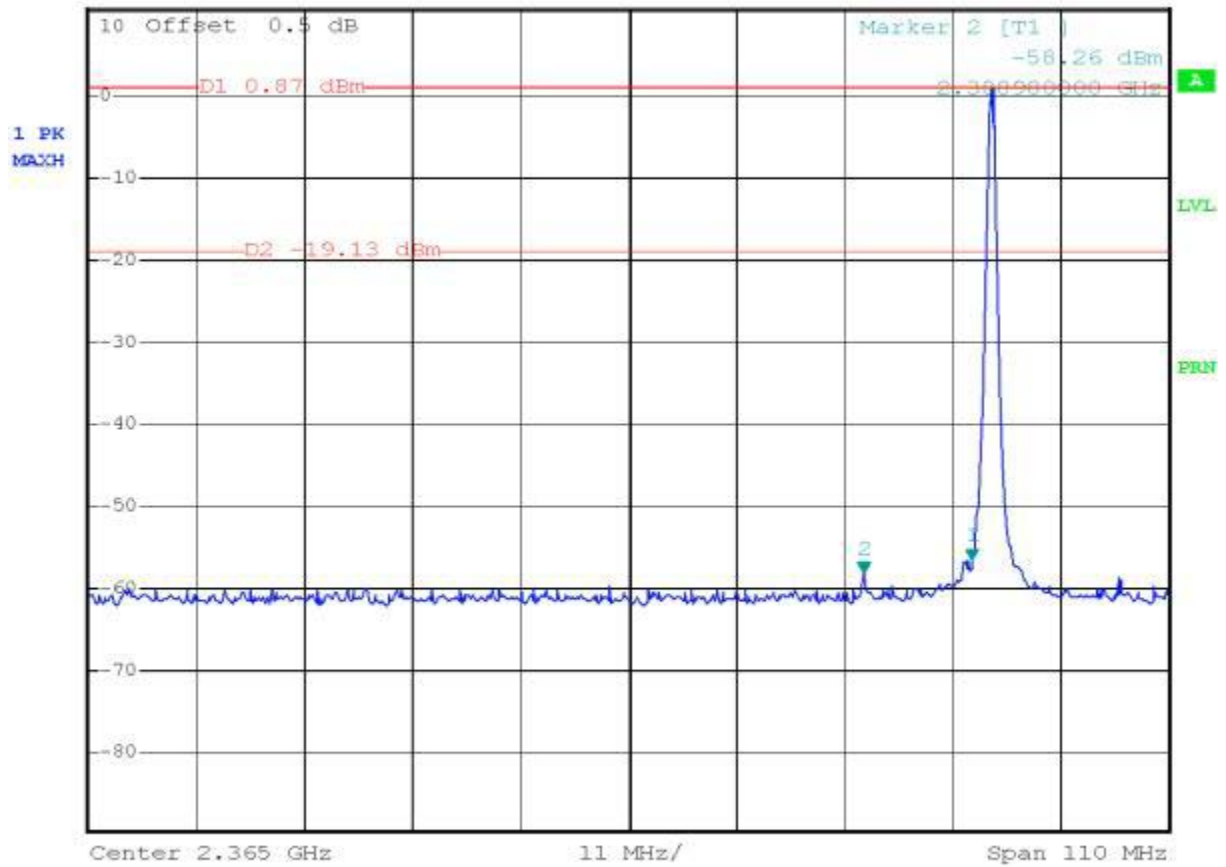
5.4.7 20dB Band Edge

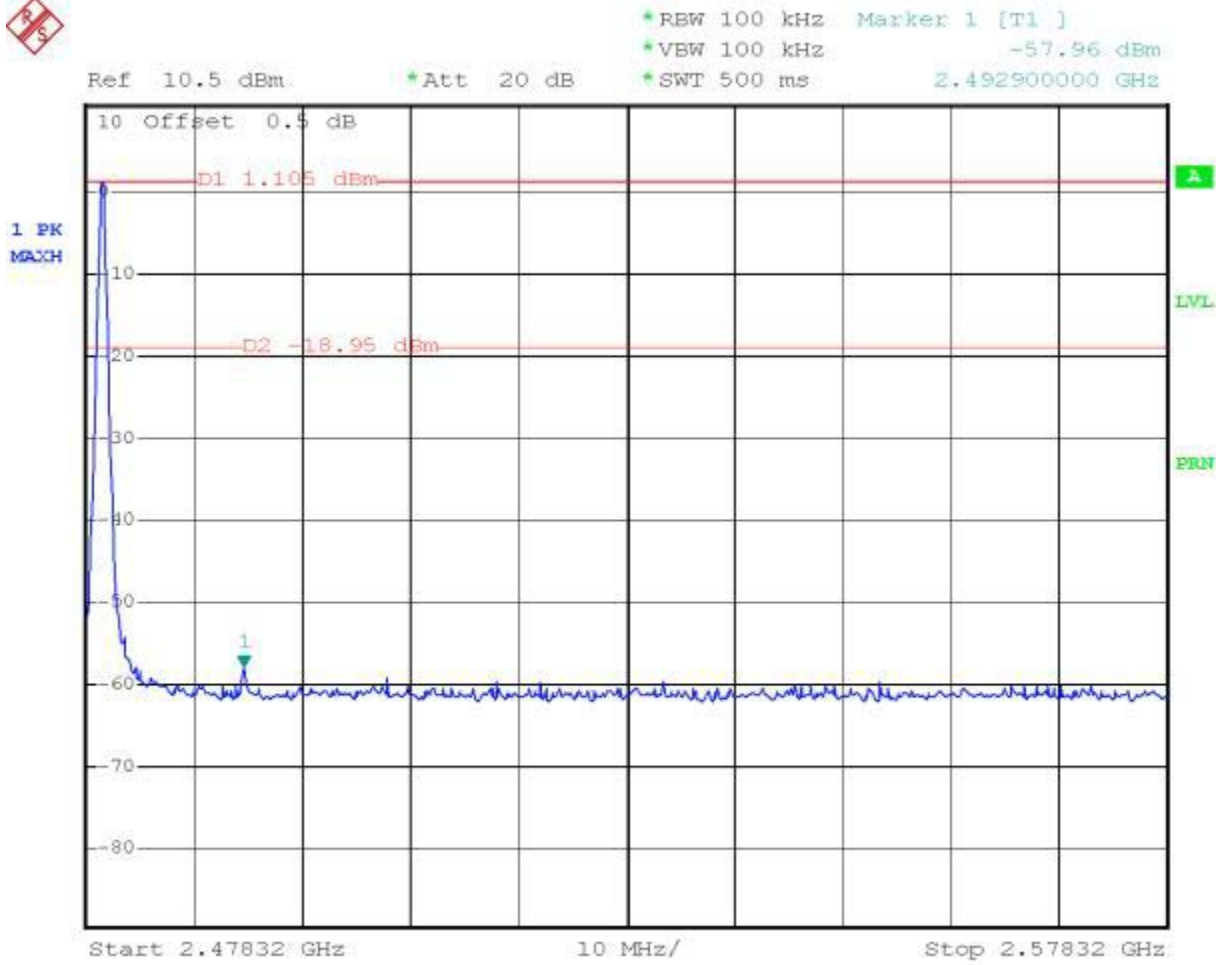






Ref 10.5 dBm *Att 20 dB *RBW 100 kHz Marker 1 [T1]
*VBW 100 kHz -56.63 dBm
*SWT 500 ms 2.400000000 GHz





5.5 Hopping Channel Separation

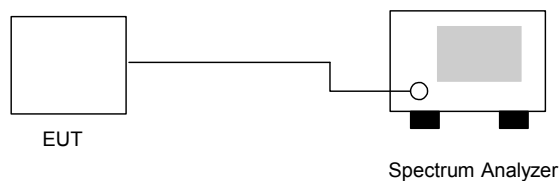
5.5.1 Measuring Instruments :

As described in chapter 9 of this test report.

5.5.2 Test Procedure :

1. The output of EUT was connected to the spectrum analyzer by a low loss cable..
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. The Hopping Channel Separation is defined as the channel is separated with the next channel.

5.5.3 Test Setup Layout :



5.5.4 Test Result : The spectrum analyzer plots are attached as below

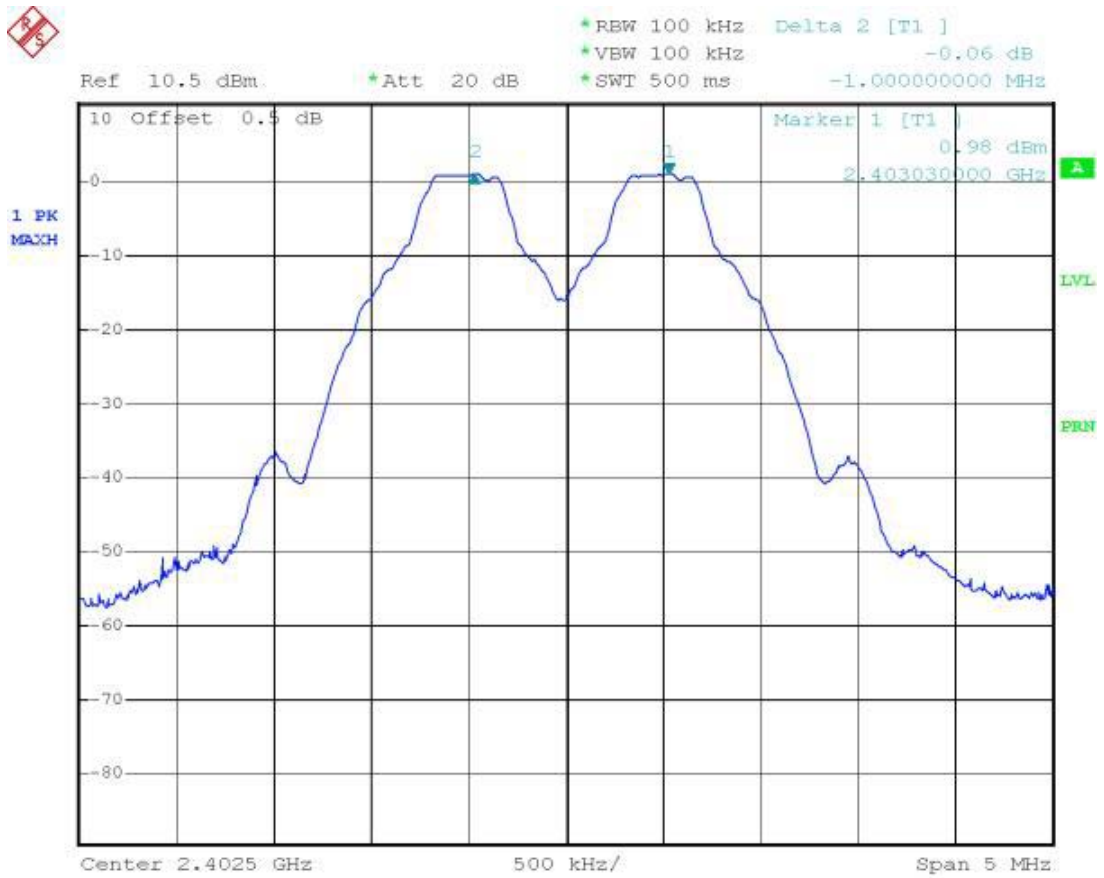
- Application Type : BT
- Temperature : 26°C,
- Relative Humidity : 53%
- Test Enginner : Jay

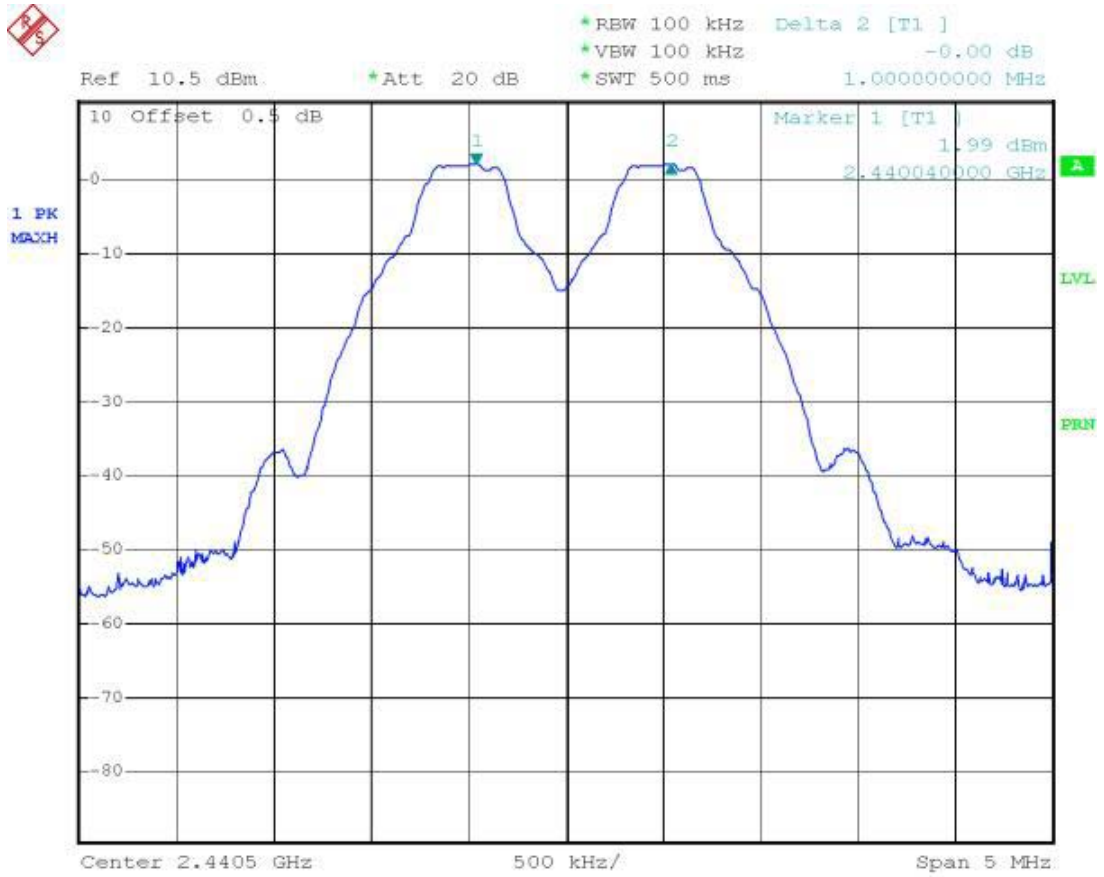
Channel	Carrier Frequency		Limits	Plot
	Frequency (MHz)	Separation (KHz)		
00	2402	1000	0.96KHz	Mode 1
39	2441	1000	0.96KHz	Mode 2
78	2480	990	0.96KHz	Mode 3

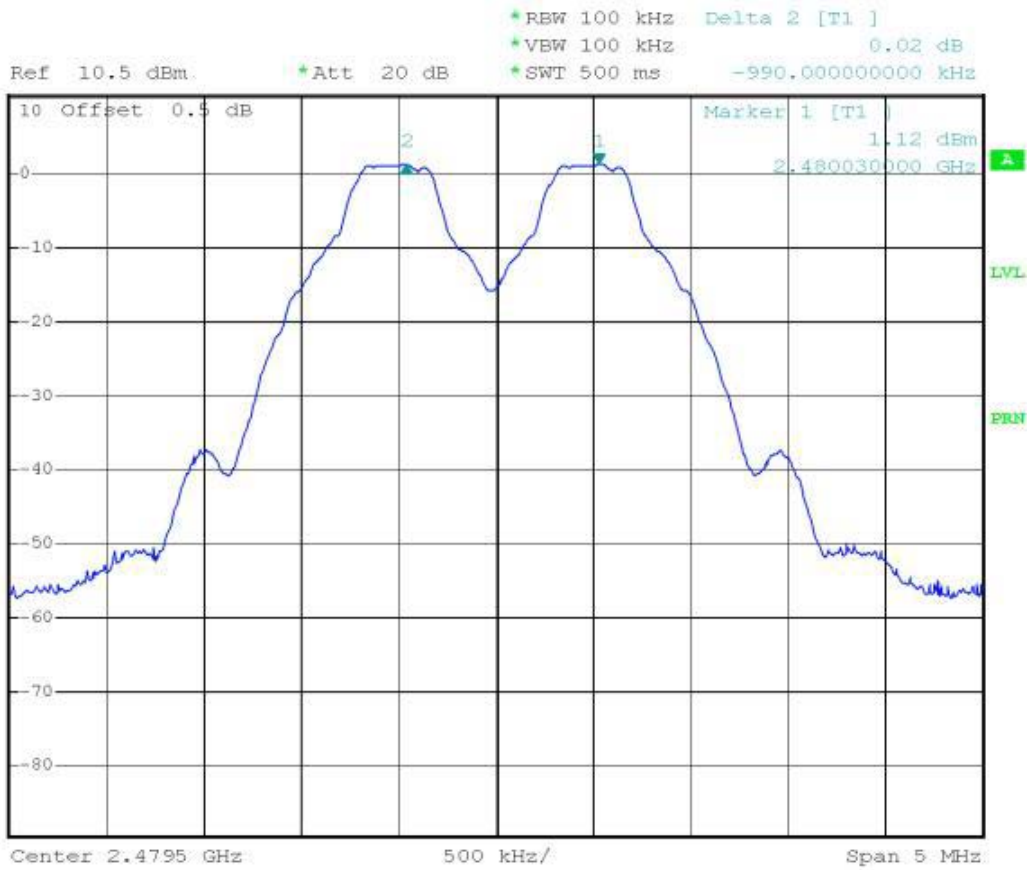
Note: Limits =25KHz or the 20dB bandwidth of the hopping channel, which ever is greater.



5.5.5 Hopping Channel Separation







5.6 Number of Hopping Frequency

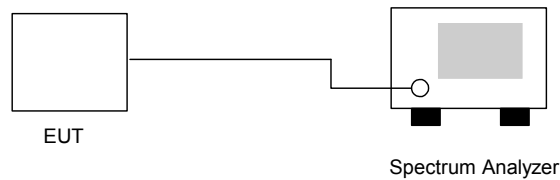
5.6.1 Measuring Instruments :

As described in chapter 9 of this test report.

5.6.2 Test Procedure :

1. The output of EUT was connected to the spectrum analyzer by a low loss cable.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. The number of hopping frequency used is defined as the device has the numbers of total channel.

5.6.3 Test Setup Layout :



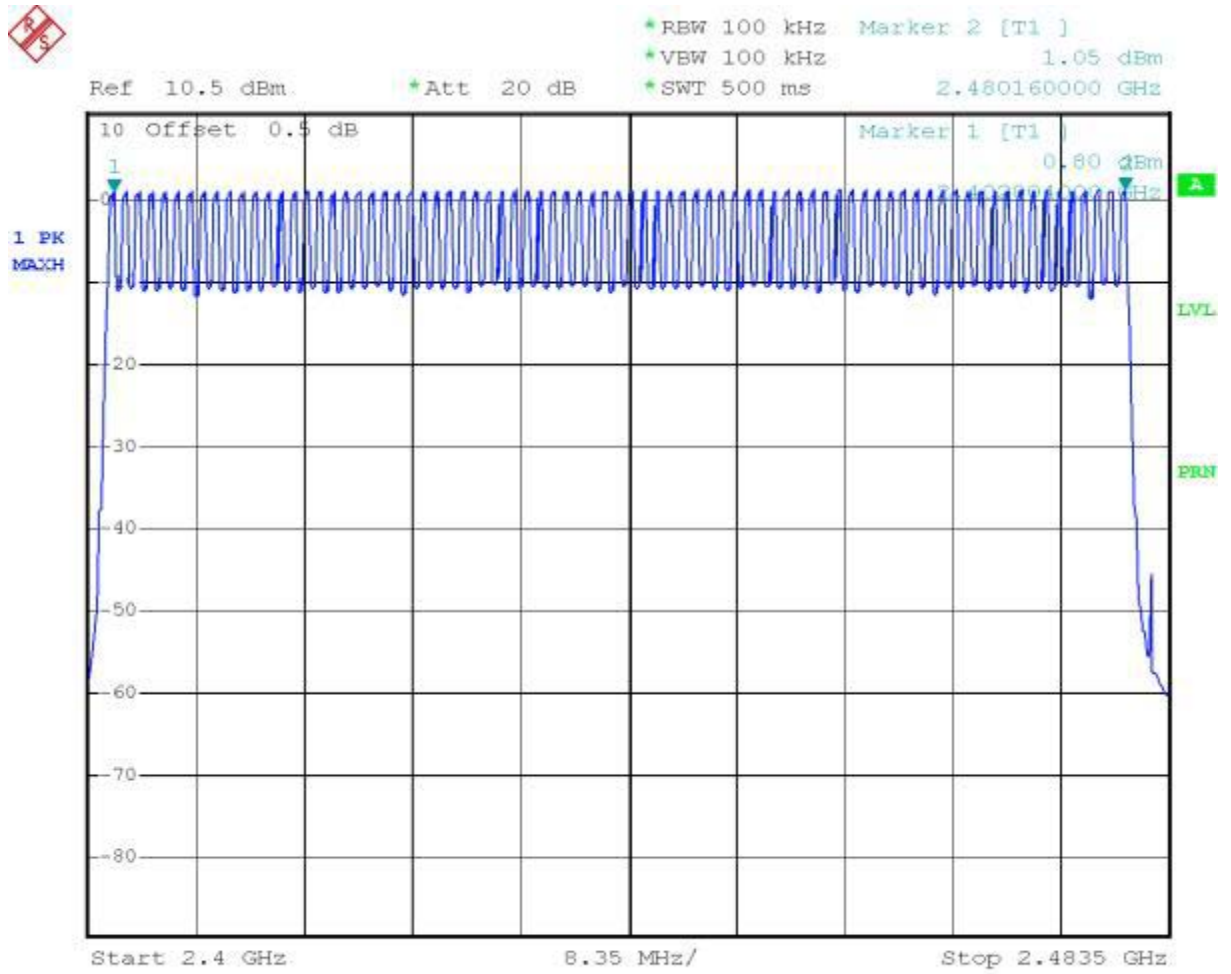
5.6.4 Test Result : See spectrum analyzer plots below

- Application Type : BT
 - Temperature : 26°C,
 - Relative Humidity : 53%
- Test Engineer : Jay

Number of Hopping Frequency (Channel)	Limits (Channel)
79	75



5.6.5 Number of Hopping Frequency



5.7 Hopping Channel Bandwidth

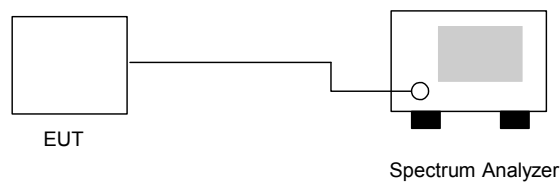
5.7.1 Measuring Instruments :

As described in chapter 9 of this test report.

5.7.2 Test Procedure :

1. The transmitter output was connected to the spectrum analyzer by a low loss cable.
2. Set RBW of spectrum analyzer to 30KHz and VBW to 300KHz.
3. The Hopping Channel bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

5.7.3 Test Setup Layout :



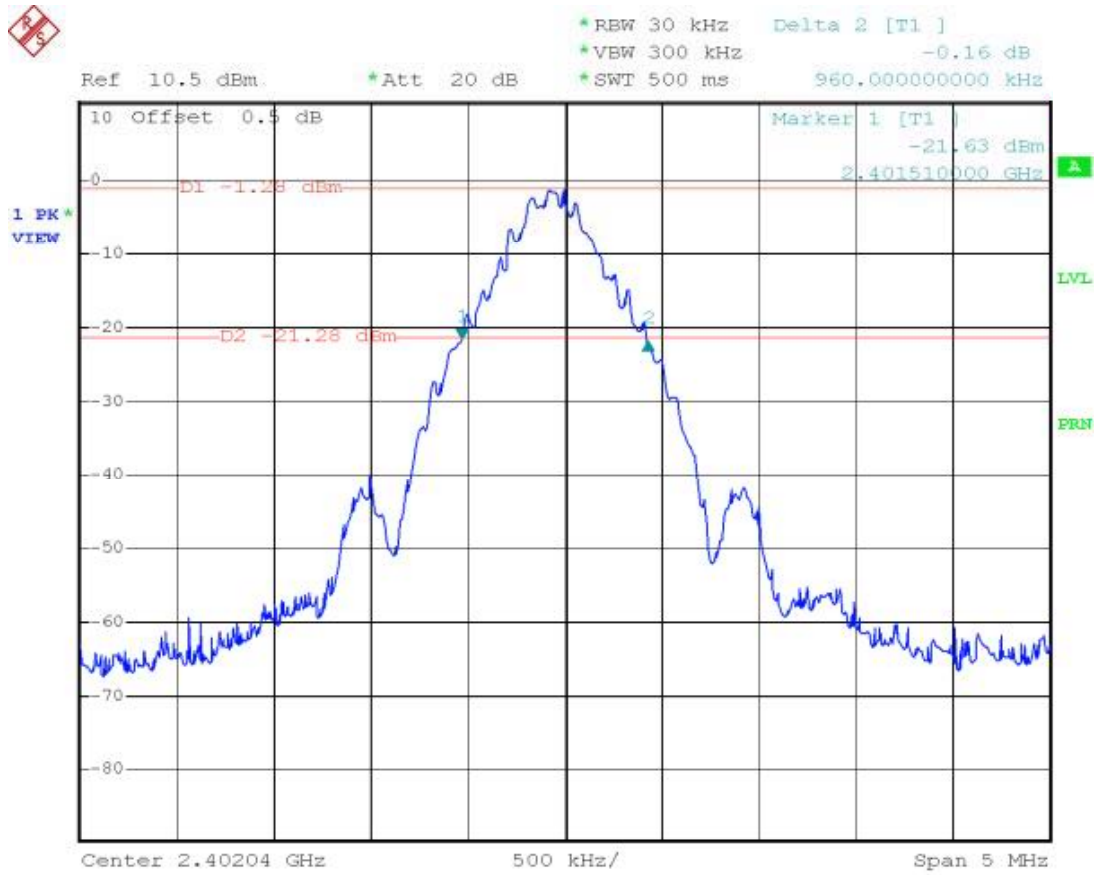
5.7.4 Test Result : See spectrum analyzer plots below

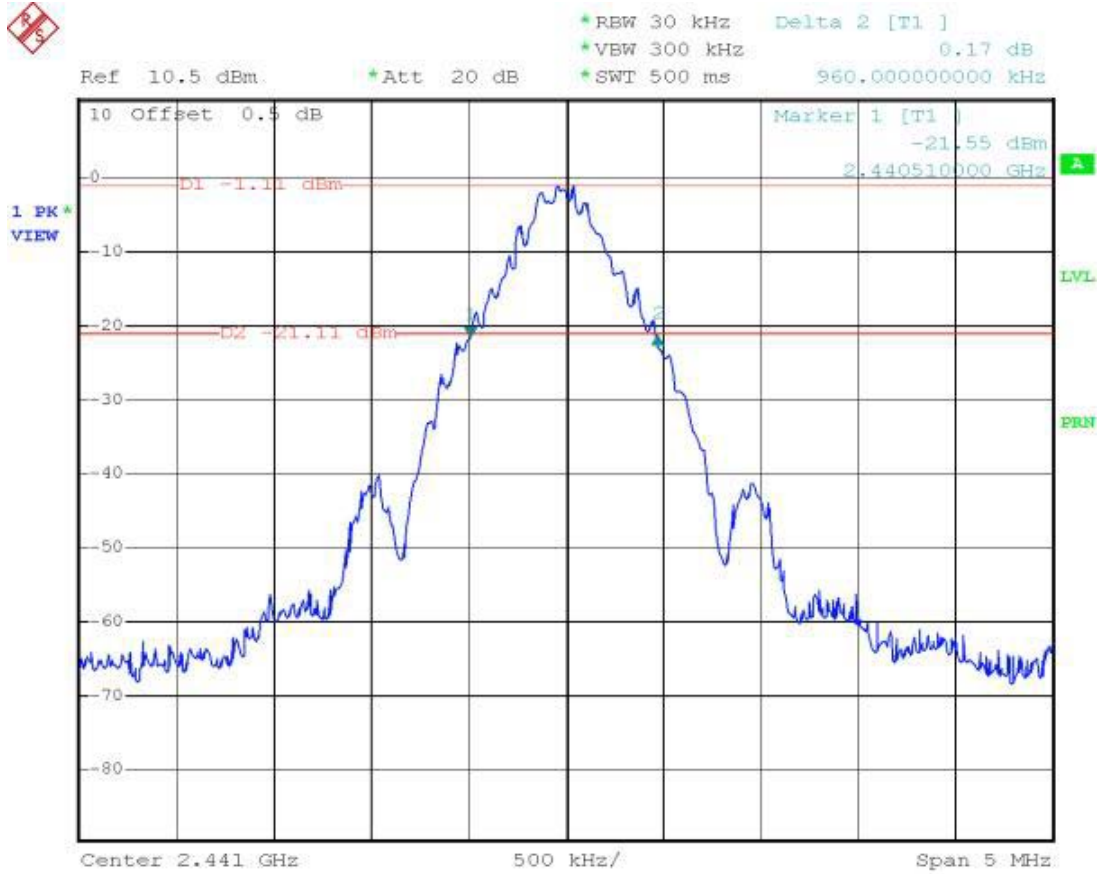
- Application Type : BT
- Temperature : 26°C,
- Relative Humidity : 53%
- Test Enginner : Jay

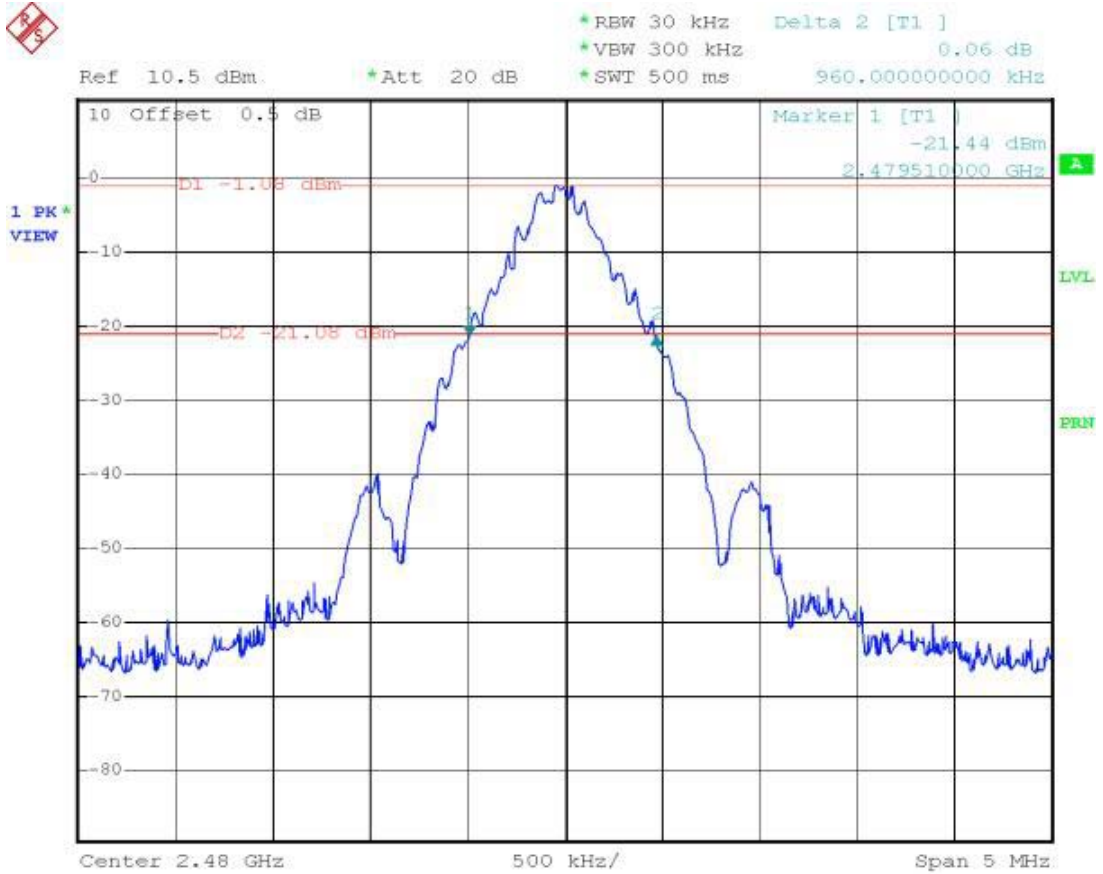
Channel	Frequency (MHz)	Hopping Channel Bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
00	2402	0.9600	1.0	Mode 1
39	2441	0.9600	1.0	Mode 2
78	2480	0.9600	1.0	Mode 3



5.7.5 Hopping Channel Bandwidth







5.8 Dwell Time of Each Frequency within a 30 Seconds Period

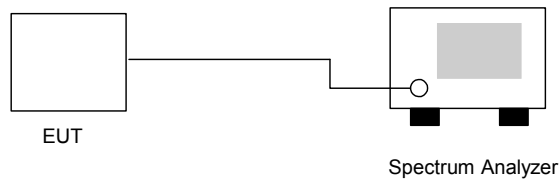
5.8.1 Measuring Instruments :

As described in chapter 9 of this test report.

5.8.2 Test Procedure :

1. The transmitter output was connected to the spectrum analyzer by a low loss cable.
2. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
3. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
4. The calculate $= 0.4 * 79 * (1600/79) * t$ (t = the time duration of one single pulse)

5.8.3 Test Setup Layout :



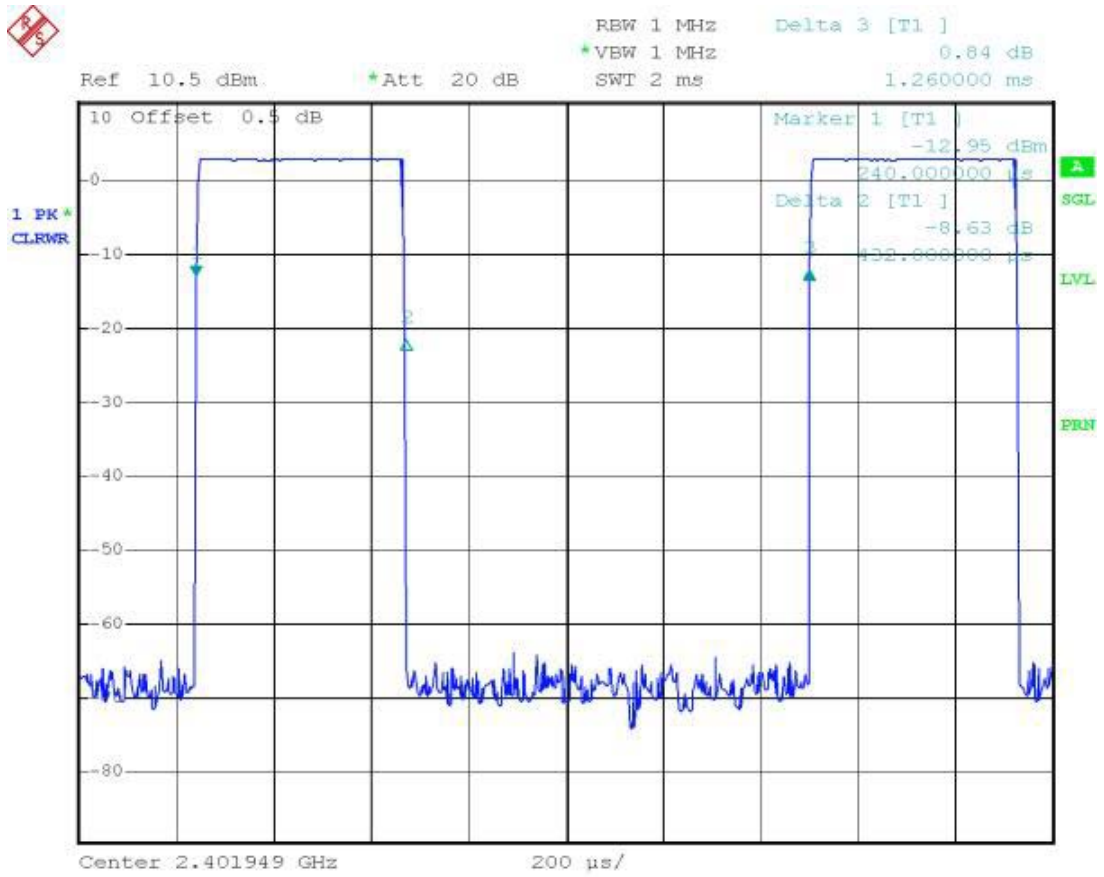
5.8.4 Test Result : See spectrum analyzer plots below

- Application Type : BT
- Temperature : 26°C,
- Relative Humidity : 53%
- Test Enginner : Jay

Channel	Frequency (MHz)	Dwell Time (s)	Limits (s)	Plot Ref. No.
00	2402	0.28	0.4	Mode 1
39	2441	0.28	0.4	Mode 2
78	2480	0.28	0.4	Mode 3

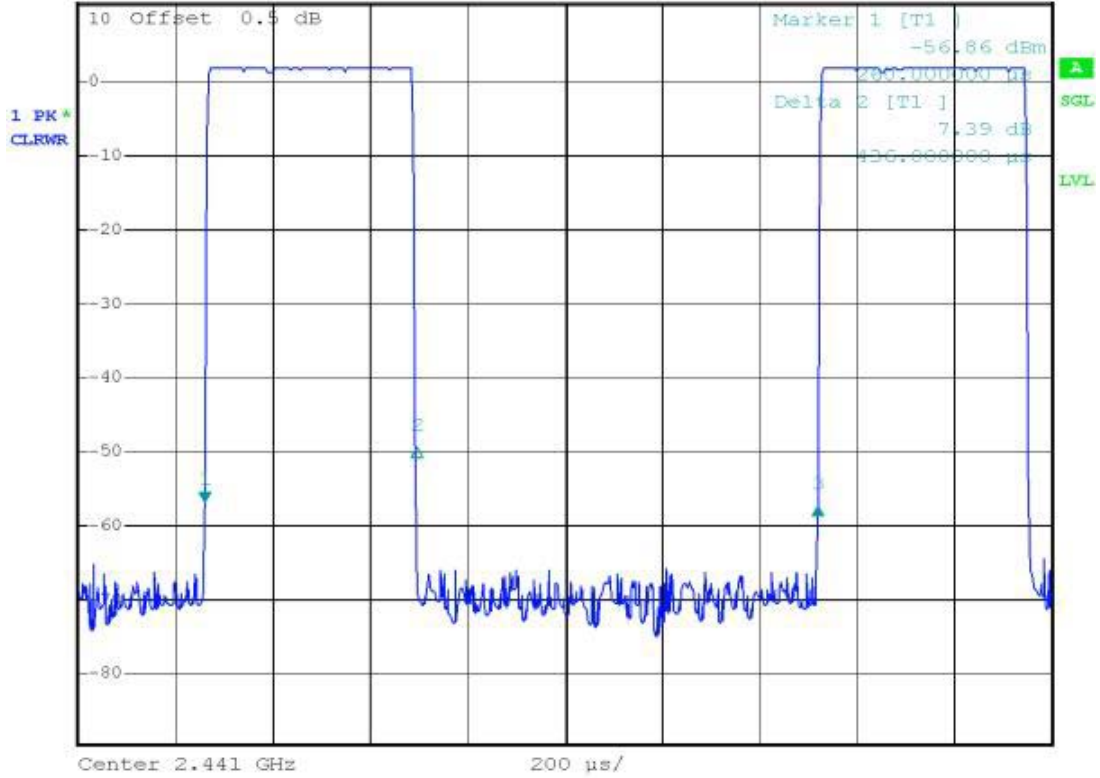


5.8.5 Dell Time





Ref 10.5 dBm *Att 20 dB RBW 1 MHz Delta 3 [T1] -0.50 dB
*VBW 1 MHz SWT 2 ms 1.260000 ms





Ref 10.5 dBm *Att 20 dB RBW 1 MHz Delta 3 [T1] 1.82 dB
*VBW 1 MHz SWT 2 ms 1.260000 ms

