



FCC COMPLIANCE TEST REPORT

Technical Statement of Conformity
in accordance with 47 CFR Part 15 Subpart C

The product

Equipment Under Test	: Slim Multi-Link Bluetooth Keyboard with Stand
Model Number	: GKB632B
Product Series	: BT-7128C
Report Number	: HA150667-RA
Issue Date	: 01-Oct-2015
Test Result	: Compliance

is produced by
ATEN Technology Inc., DBA IOGEAR
19641 Da Vinci, Foothill Ranch, CA 92610



HongAn TECHNOLOGY CO., LTD.

NO.15-1, CWEISHUH KENG, CWEIPIN VILLAGE,
LINKOU, TAIPEI COUNTY,
TAIWAN, R. O. C.

TEL: +886-2-26030362

FAX: +886-2-26019259

E-mail: hatlab@ms19.hinet.net

BSMI Registration No.: SL2-IN-E-0023, SL2-A1-E-0023,
SL2-IS-E-0023, SL2-R1-E-0023,
SL2-R2-E-0023, SL2-L1-E-0023

FCC Designation No.: TW1071

TAF Accreditation No.: 1163

VCCI Registration No.: R-2156, C-2329, T-219

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Test Result Certification

Applicant	: ATEN Technology Inc., DBA IOGEAR
Address of Applicant	: 19641 Da Vinci, Foothill Ranch, CA 92610
Manufacturer	: Lexking Technology Co., Ltd.
Address of Manufacturer	: 7F-5 No.155, Zhongyang Road, Xindian Dist. New Taipei City, Taiwan 23150(R.O.C)
Trade Name	: IOGEAR/ LEXKING
Equipment Under Test	: Slim Multi-Link Bluetooth Keyboard with Stand
Model Number	: GKB632B
Product Series	: BT-7128C
FCC ID	: QLEGKB632B
Filing Type	: Certification
Sample Received Date	: 01-Oct-2015
Test Standard	:

☒ FCC Part 15 Subpart C §15.247

Deviations from standard test methods & any other specifications : NONE

Remark:

1. This report details the results of the test carried out on one sample.
2. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in both ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.203, 15.207, 15.209, 15.247.
3. This report applies to the above sample only and shall not be reproduced in part without written approval of HongAn Technology Co., Ltd.

Documented by:

Kay Wang/ ADM. Dept Staff

2015-10-01

Tested by:

Eason Hsieh / ENG. Dept. Staff

2015-09-17

Approved by:

Peter Chin / Section Manager

Date: 2015-10-01



Summary of Test Result

	Test Item	Applicable Standard	Test Result
1	Antenna Requirement	FCC part 15 subpart C §203	Compliance
2	Conducted limits	FCC part 15 subpart C §207	Not applicable
3	Radiated emission limits	FCC part 15 subpart C §209	Compliance
4	20 dB Bandwidth	FCC part 15 subpart C §247(a)(1)	Compliance
5	Hopping Frequency Separation	FCC part 15 subpart C §247(a)(1)	Compliance
6	Number of Hopping Channels	FCC part 15 subpart C §247(a)(1)	Compliance
7	Average Time of Occupancy	FCC part 15 subpart C §247(a)(1)(iii)	Compliance
8	Peak Output Power	FCC part 15 subpart C §247(b)	Compliance
9	100kHz Bandwidth of Band Edges	FCC part 15 subpart C §247(d)	Compliance
10	Spurious RF Conducted Emissions	FCC part 15 subpart C §247(d)	Compliance

1 General Description

1.1 Description of EUT

Equipment Under Test	:	Slim Multi-Link Bluetooth Keyboard with Stand							
Model Number of EUT	:	GKB632B							
Product Series	:	BT-7128C							
Power Supply	:	AAA Battery x 2 DC 3 V							
Frequency Range	:	2402~2480 MHz							
Transmit Power	:	-18.78 dBm							
Number of Channels	:	79 Channels							
Carrier Frequency of Each Channel	:								
		00	2402	20	2422	40	2442	60	2462
		01	2403	21	2423	41	2443	61	2463
		02	2404	22	2424	42	2444	62	2464
		03	2405	23	2425	43	2445	63	2465
		04	2406	24	2426	44	2446	64	2466
		05	2407	25	2427	45	2447	65	2467
		06	2408	26	2428	46	2448	66	2468
		07	2409	27	2429	47	2449	67	2469
		08	2410	28	2430	48	2450	68	2470
		09	2411	29	2431	49	2451	69	2471
		10	2412	30	2432	50	2452	70	2472
		11	2413	31	2433	51	2453	71	2473
		12	2414	32	2434	52	2454	72	2474
		13	2415	33	2435	53	2455	73	2475
		14	2416	34	2436	54	2456	74	2476
		15	2417	35	2437	55	2457	75	2477
		16	2418	36	2438	56	2458	76	2478
		17	2419	37	2439	57	2459	77	2479
		18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	-	-		
Antenna Specification	:	PCB Antenna/ Gain: 3 dBi*							
Modulation Technique	:	Bluetooth 3.0 FHSS Bluetooth : GFSK							
Transmit Data Rate	:	Bluetooth : 1Mbps							



Specification	:	Dimensions : 285 mm (L) X 120 mm (W) X 18 mm (H) Weight : 275g Function : The EUT is a Bluetooth Keyboard. ✂For more detail specification, please refer to the User Manual.
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1.2 Test Instruments

HA2

Instrument Name	Manufacture Mode	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
RF Amplifier	Schaffner	CPA9231A	0405	01-JUN-2015	31-MAY-2016
EMI Receiver	R&S	ESCI	100931	25-JUL-2015	24-JUL-2016
Spectrum Analyzer	R&S	FSV	101629	27-JAN-2015	26-JAN-2016
Preamplifier	HD	HD17187	004	01-JUN-2015	31-MAY-2016
Bilog Antenna	TESEQ	CBL6111D	38521	04-JUN-2015	03-JUN-2016
Double-Ridged Waveguide Horn	EMCO	3115	9912-5992	01-JUN-2015	31-MAY-2016
Horn Antenna (18-40GHz)	Com-Power	AH-840	101042	02-JUN-2015	01-JUN-2016
Microwave Preamplifier	Com-Power	PAM-840	461269	04-JUN-2015	03-JUN-2016
L.I.S.N.	Rolf Heine Hochfrequenztechnik	NNB-4/32T	00001	18-MAR-2015	17-MAR-2016
L.I.S.N.	EMCO	3810/2NM	9702-1818	20-MAR-2015	19-MAR-2016

※ The test equipments used are calibrated and can be traced to National ITRI and International Standards.

1.3 Auxiliary Equipments

- 1.3.1. Provided by HongAn Technology Co., Ltd. for Emission Test.
N/A
- 1.3.2. Provided by the Manufacturer
N/A

1.4 EUT SETUP



Note: Main Test Sample: GKB632B

1.5 Identifying the Final Test Mode

1. Mode 1: TX BT mode (1Mbps) CH 00.
2. Mode 2: TX BT mode (1Mbps) CH 39.
3. Mode 3: TX BT mode (1Mbps) CH 78.

Note:

1. After pre-test, we identified that the TX (Packet type DH5 and X axis) was most likely to cause maximum disturbance and most likely to be susceptible to disturbance. Therefore, the Final Assessment was performed for the worst case.
2. The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.
3. Channel Low (2402 MHz), Mid (2441 MHz) and High (2480 MHz) were chosen for full testing.
4. According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.
5. New dry batteries were used during all hereafter testing.

1.6 Final Test Mode

Conducted Emission: N/A.

Field Strength: All Mode.

Radiated Emission (30~1000 MHz): Mode 1.

Radiated Emission (1~26.5GHz): All Mode.



1.7 Condition of Power Supply

DC 3 V, AAA battery x 2.

1.8 EUT Configuration

1. Setup the EUT as shown in Sec.1.4 Block Diagram.
2. Turn on the power of all equipments.
3. Activate the selected Final Test Mode.

1.9 Test Methodology

The tests documented in this report were performed in accordance with ANSI C63.10 (2013) and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.203, 15.207, 15.209 and 15.247.

1.10 General Test Procedures

Conducted Emissions

The EUT is set according to the requirements in Section 6.2 of ANSI C63.10 (2013).

Radiated Emissions

The EUT is set according to the requirements in Section 6.3 of ANSI C63.10 (2013).

1.11 Modification

N/A

1.12 FCC Part 15.205 restricted bands of operations

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37635-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



1.13 Qualification of Test Facility

BSMI Certificate No. : SL2-IS-E-0023, SL2-IN-E-0023, SL2-R1-E-0023, SL2-R2-E-0023,
SL2-A1-E-0023, SL2-L1-E-0023.

FCC Designation No. : TW1071

TAF Accreditation No. : 1163

VCCI Certificate No. : R-2156, C-2329, T-219



2 Power line Conducted Emission Measurement

2.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

2.2 Test Arrangement and Procedure

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

2.3 Limit (§ 15.207)

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency (MHz)	Limits (dBuV)	
	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.0	56	46
5.0 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

2.4 Test Result

Not applicable.

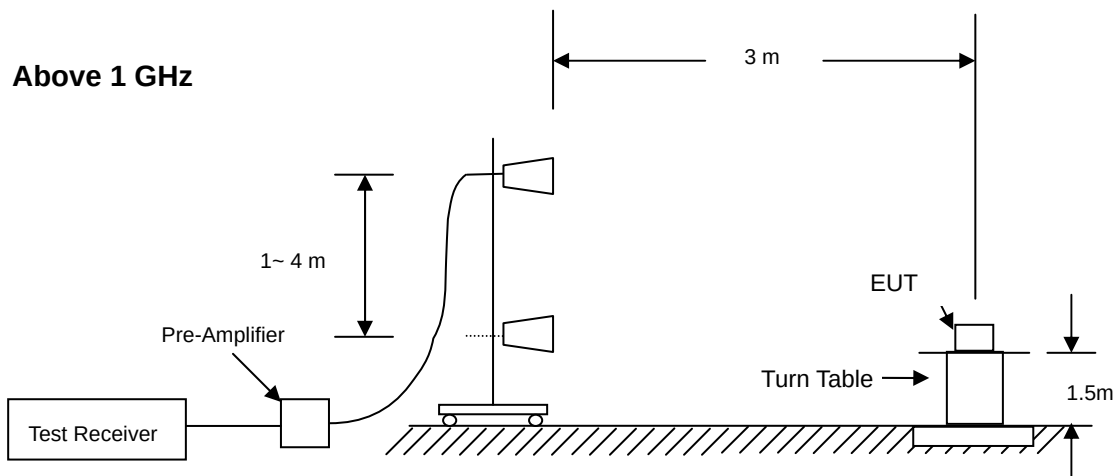
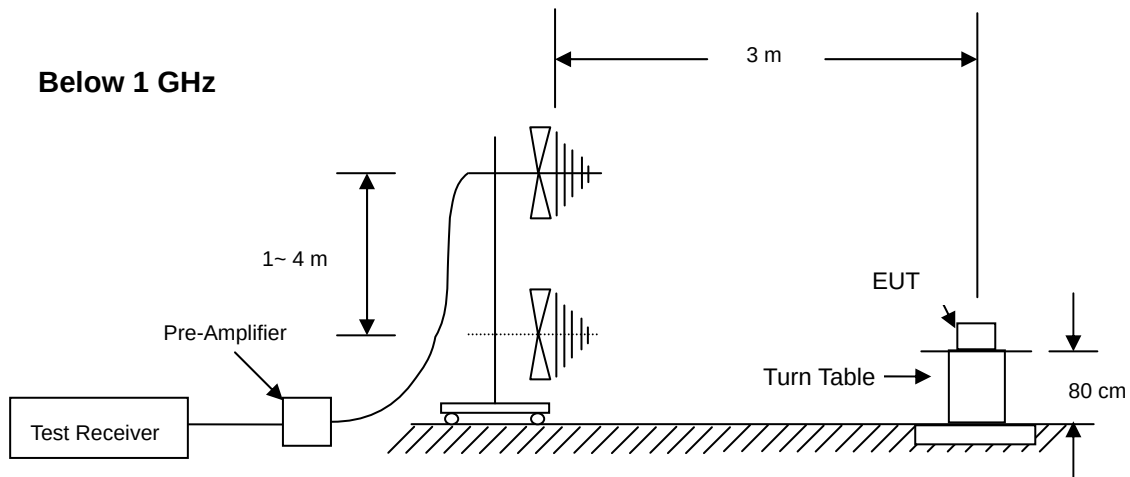


3 Radiated Emission Test

3.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

3.2 Test Arrangement and Procedure



1. The EUT is placed on a turntable, which is 0.8 m (below 1GHz) and 1.5m (above 1GHz) above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
 - (a) Below 1 GHz: RBW =100 kHz/ VBW = 1 MHz/ Sweep = AUTO.



(b) Above 1 GHz: Peak: RBW = VBW = 1MHz/ Sweep = AUTO; Average: RBW = 1MHz/ VBW = 10Hz/ Sweep = AUTO.

7. Repeat above procedures until the measurements for all frequencies are complete.

3.3 Limit (§ 15.205 & § 15.209)

1.2.1. Limit of Restricted Band of Operation (§ 15.205)

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

Frequency Band			
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	
13.36-13.41			

1.2.2. Limit of Spurious Emission (§ 15.209)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is lesser attenuation.

Frequency (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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

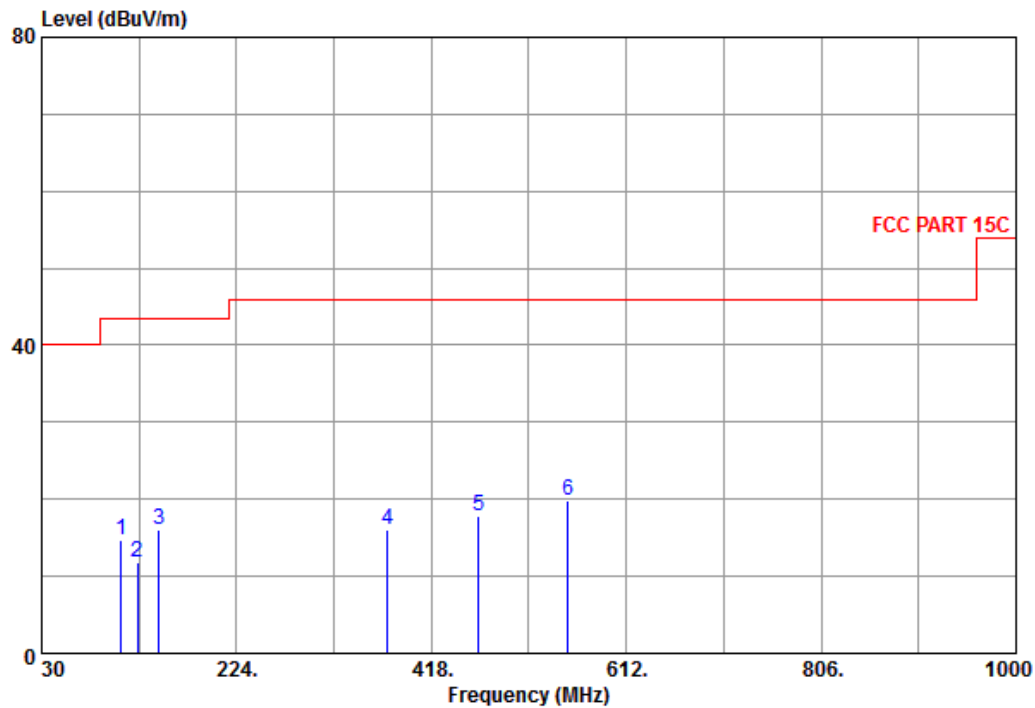
3.4 Test Result

Compliance

The final test data are shown on the following page(s).

Radiated Emission Test Data (Below 1 GHz)

Temperature	: 28.4°C	Humidity	: 47%
Test Date	: 17-Sep-2015	Tested by	: Eason Hsieh
Polarization	: Vertical	Channel	: CH00 (2402MHz)
EUT Position	: Vertical		



	Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1	109.540	32.23	-17.63	14.60	43.50	-28.90	---	---	Peak
2	125.060	28.61	-16.85	11.76	43.50	-31.74	---	---	Peak
3	146.400	33.47	-17.40	16.07	43.50	-27.43	---	---	Peak
4	374.350	28.76	-12.63	16.13	46.00	-29.87	---	---	Peak
5	464.560	28.04	-10.17	17.87	46.00	-28.13	---	---	Peak
6 @	553.800	28.05	-8.17	19.88	46.00	-26.12	---	---	Peak

C.F = Antenna Factor + Cable Loss - Preamp gain
Result = Reading + C.F ; Margin = Result - Limit

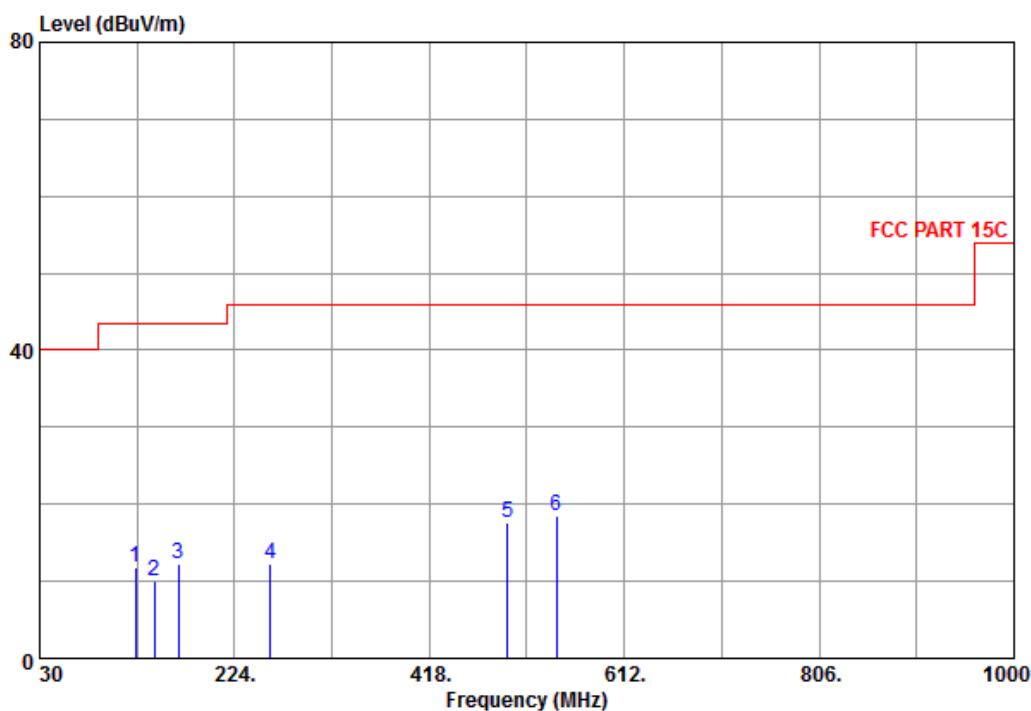
@ : Maximum Data x : Over Limit

Remark :

1. Measuring frequencies from 30 MHz to 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
4. All readings are Peak values. None of the peak value reading exceeds the Q.P. limit. Hence, Q.P. reading was not measured.
5. The IF bandwidth of SPA between 30 MHz to 1 GHz was 100 kHz.

Radiated Emission Test Data (Below 1 GHz)

Temperature	: 28.4°C	Humidity	: 47%
Test Date	: 17-Sep-2015	Tested by	: Eason Hsieh
Polarization	: Horizontal	Channel	: CH00 (2402MHz)
EUT Position	: Vertical		



	Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1	125.060	28.64	-16.85	11.79	43.50	-31.71	---	---	Peak
2	144.460	27.40	-17.31	10.09	43.50	-33.41	---	---	Peak
3	167.740	30.99	-18.77	12.22	43.50	-31.28	---	---	Peak
4	259.890	26.64	-14.49	12.15	46.00	-33.85	---	---	Peak
5	495.600	27.38	-9.70	17.68	46.00	-28.32	---	---	Peak
6 @	544.100	26.82	-8.36	18.46	46.00	-27.54	---	---	Peak

C.F = Antenna Factor + Cable Loss - Preamp gain
Result = Reading + C.F ; Margin = Result - Limit

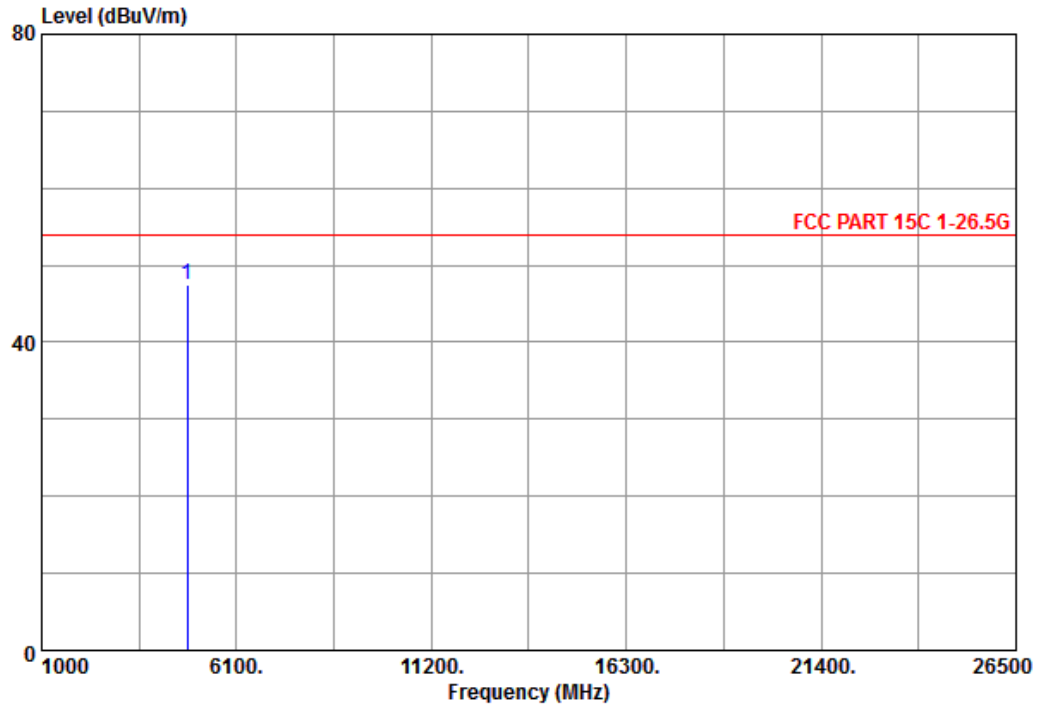
@ : Maximum Data x : Over Limit

Remark :

1. Measuring frequencies from 30 MHz to 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
4. All readings are Peak values. None of the peak value reading exceeds the Q.P. limit. Hence, Q.P. reading was not measured.
5. The IF bandwidth of SPA between 30 MHz to 1 GHz was 100 kHz.

**Radiated Emission Test Data (Above 1G and Field Strength to 10th Harmonic)**

Temperature	: 28.4°C	Humidity	: 47%
Test Date	: 17-Sep-2015	Tested by	: Eason Hsieh
Polarization	: Vertical	Channel	: CH00 (2402MHz)
EUT Position	: Vertical		



Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1 @4804.000	44.90	2.54	47.44	54.00	-6.56	---	---	Peak

C.F = Antenna Factor + Cable Loss - Preamp gain
Result = Reading + C.F ; Margin = Result - Limit

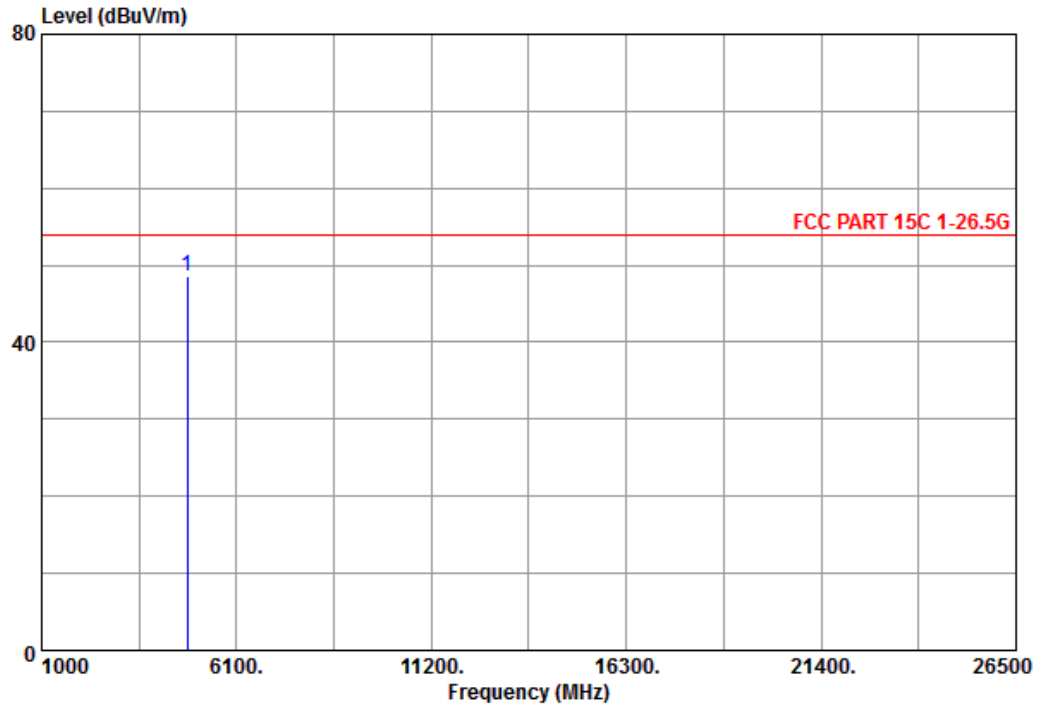
@ : Maximum Data x : Over Limit

Remark :

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode.
4. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
5. Spectrum setting:
 - (a) Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

**Radiated Emission Test Data (Above 1G and Field Strength to 10th Harmonic)**

Temperature	: 28.4°C	Humidity	: 47%
Test Date	: 17-Sep-2015	Tested by	: Eason Hsieh
Polarization	: Horizontal	Channel	: CH00 (2402MHz)
EUT Position	: Vertical		



Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1 @4804.000	46.08	2.54	48.62	54.00	-5.38	---	---	Peak

C.F = Antenna Factor + Cable Loss - Preamp gain
Result = Reading + C.F ; Margin = Result - Limit

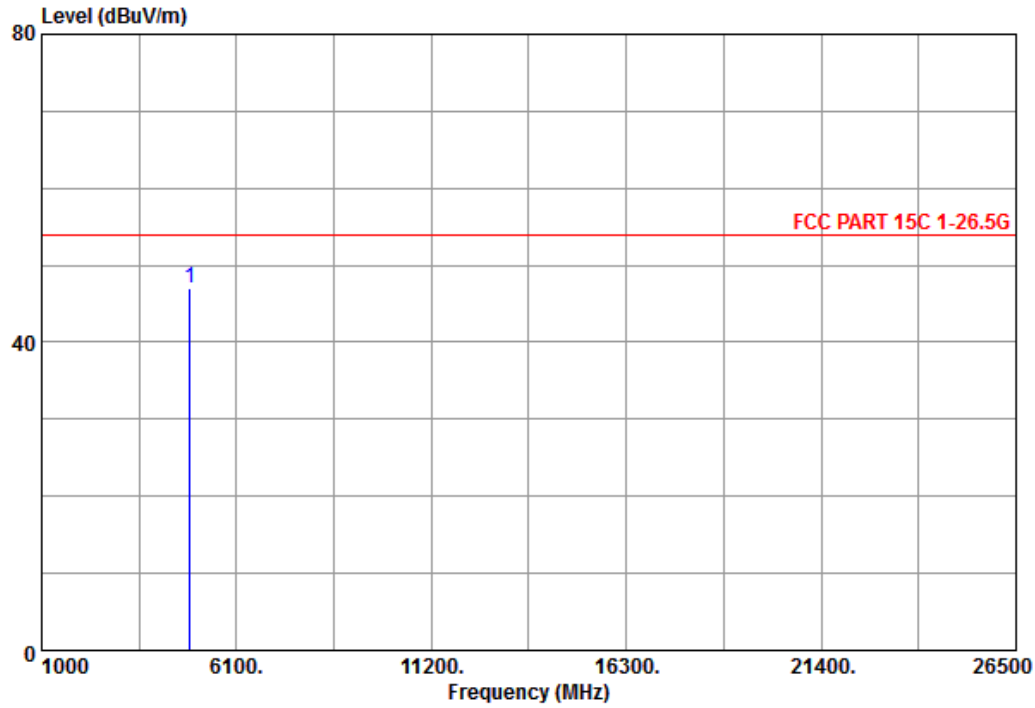
@ : Maximum Data x : Over Limit

Remark :

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode.
4. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
5. Spectrum setting:
 - (a) Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

Radiated Emission Test Data (Above 1G and Field Strength to 10th Harmonic)

Temperature	: 28.4°C	Humidity	: 47%
Test Date	: 17-Sep-2015	Tested by	: Eason Hsieh
Polarization	: Vertical	Channel	: CH39 (2441MHz)
EUT Position	: Vertical		



Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1 @4882.000	44.37	2.72	47.09	54.00	-6.91	---	---	Peak

C.F = Antenna Factor + Cable Loss - Preamp gain
 Result = Reading + C.F ; Margin = Result - Limit

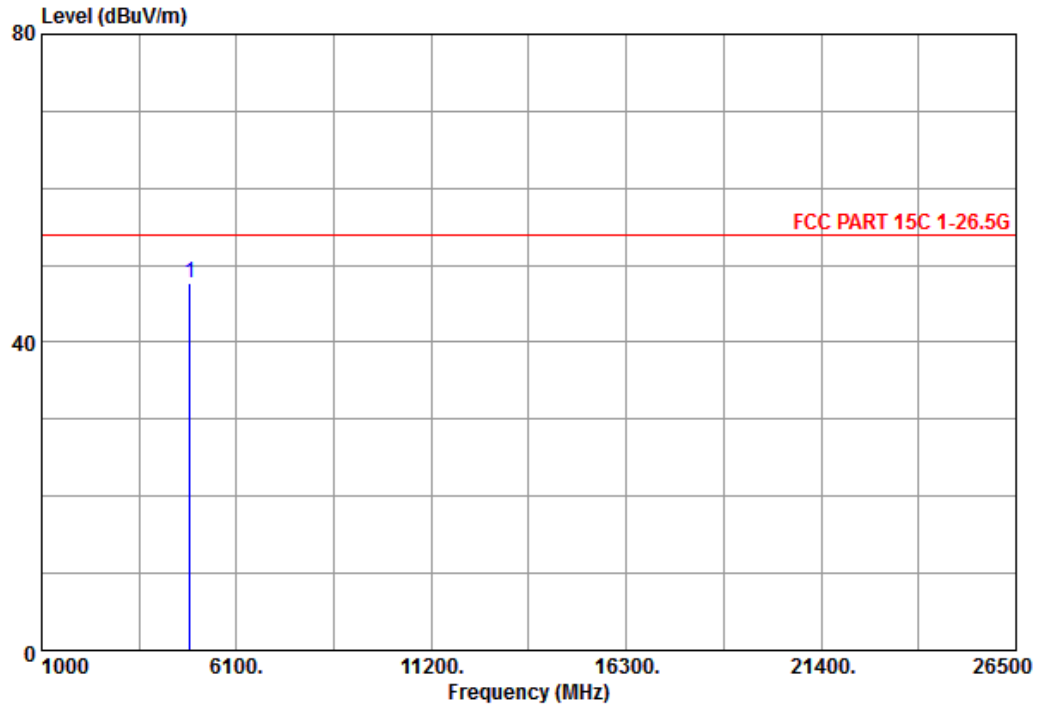
@ : Maximum Data x : Over Limit

Remark :

- Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode.
- All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
- Spectrum setting:
 - Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

**Radiated Emission Test Data (Above 1G and Field Strength to 10th Harmonic)**

Temperature	: 28.4°C	Humidity	: 47%
Test Date	: 17-Sep-2015	Tested by	: Eason Hsieh
Polarization	: Horizontal	Channel	: CH39 (2441MHz)
EUT Position	: Vertical		



Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1 @4884.000	44.99	2.72	47.71	54.00	-6.29	---	---	Peak

C.F = Antenna Factor + Cable Loss - Preamp gain
Result = Reading + C.F ; Margin = Result - Limit

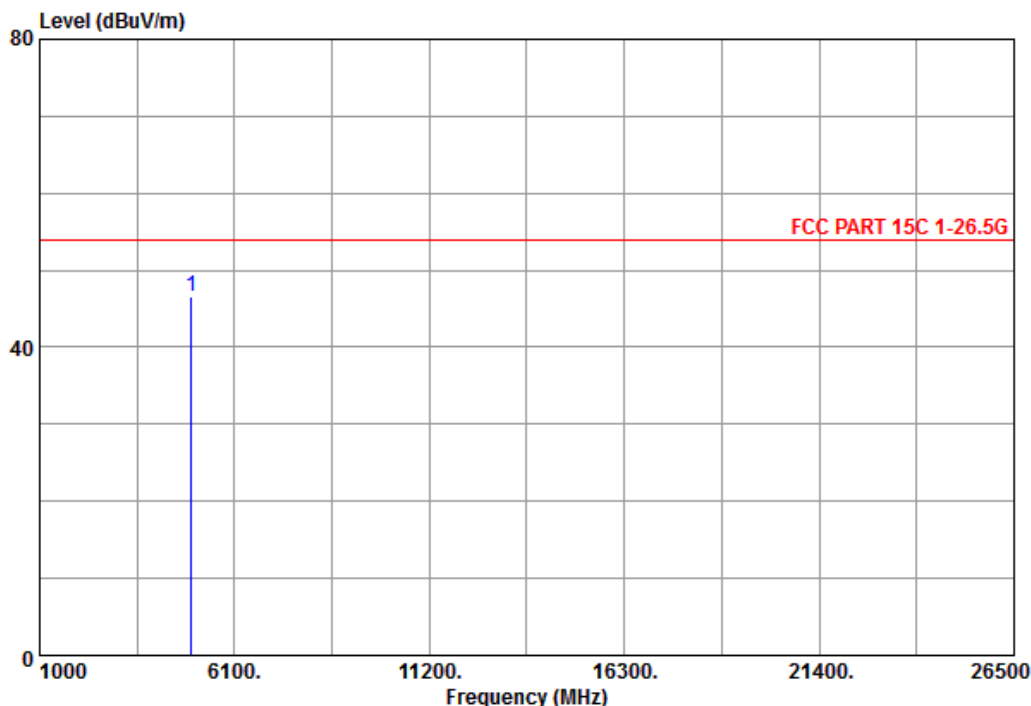
@ : Maximum Data x : Over Limit

Remark :

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode.
4. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
5. Spectrum setting:
 - (a) Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

**Radiated Emission Test Data (Above 1G and Field Strength to 10th Harmonic)**

Temperature	: 28.4°C	Humidity	: 47%
Test Date	: 17-Sep-2015	Tested by	: Eason Hsieh
Polarization	: Vertical	Channel	: CH78 (2480MHz)
EUT Position	: Vertical		



Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1 @4960.000	43.60	2.92	46.52	54.00	-7.48	---	---	Peak

C.F = Antenna Factor + Cable Loss - Preamp gain
Result = Reading + C.F ; Margin = Result - Limit

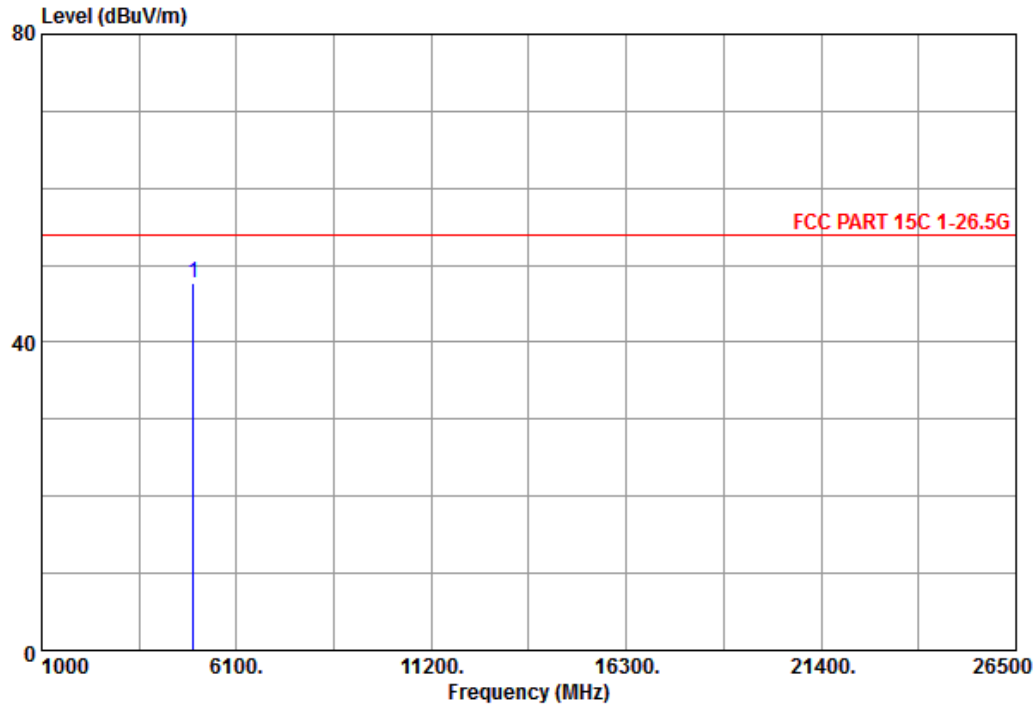
@ : Maximum Data x : Over Limit

Remark :

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode.
4. All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
5. Spectrum setting:
 - (a) Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

Radiated Emission Test Data (Above 1G and Field Strength to 10th Harmonic)

Temperature	: 28.4°C	Humidity	: 47%
Test Date	: 17-Sep-2015	Tested by	: Eason Hsieh
Polarization	: Horizontal	Channel	: CH78 (2480MHz)
EUT Position	: Vertical		



Freq	Reading	C.F	Result	Limit	Margin	A/pos	T/pos	Remark
MHz	dBuV	dB	dBuV/m	dBuV/m	dB			
1 @4960.000	44.76	2.92	47.68	54.00	-6.32	---	---	Peak

C.F = Antenna Factor + Cable Loss - Preamp gain
Result = Reading + C.F ; Margin = Result - Limit

@ : Maximum Data x : Over Limit

Remark :

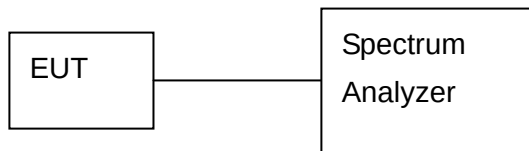
- Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
- Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
- Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode.
- All readings are Peak values. None of the peak value reading exceeds the A.V. limit. Hence, A.V. reading was not measured.
- Spectrum setting:
 - Peak Setting 1GHz to 10th harmonics of fundamental, RBW = VBW = 1MHz, Sweep = AUTO.

4 20 dB Bandwidth

4.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

4.2 Test Arrangement and Procedure



1. The transmitter output was connected to a spectrum analyzer (through an attenuator, if it's necessary).
2. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW. Measured the -20 dB bandwidth and plotted the graph.

4.3 Limit

None; For report purpose only.

4.4 Test Result

No non-compliance noted.

The final test data are shown on the following page(s).

Bluetooth 1 Mbps (DH1)		
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	1.0376
Middle	2441	1.0434
High	2480	1.0434

Bluetooth 1 Mbps (DH3)		
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	1.0376
Middle	2441	1.0434
High	2480	1.0333

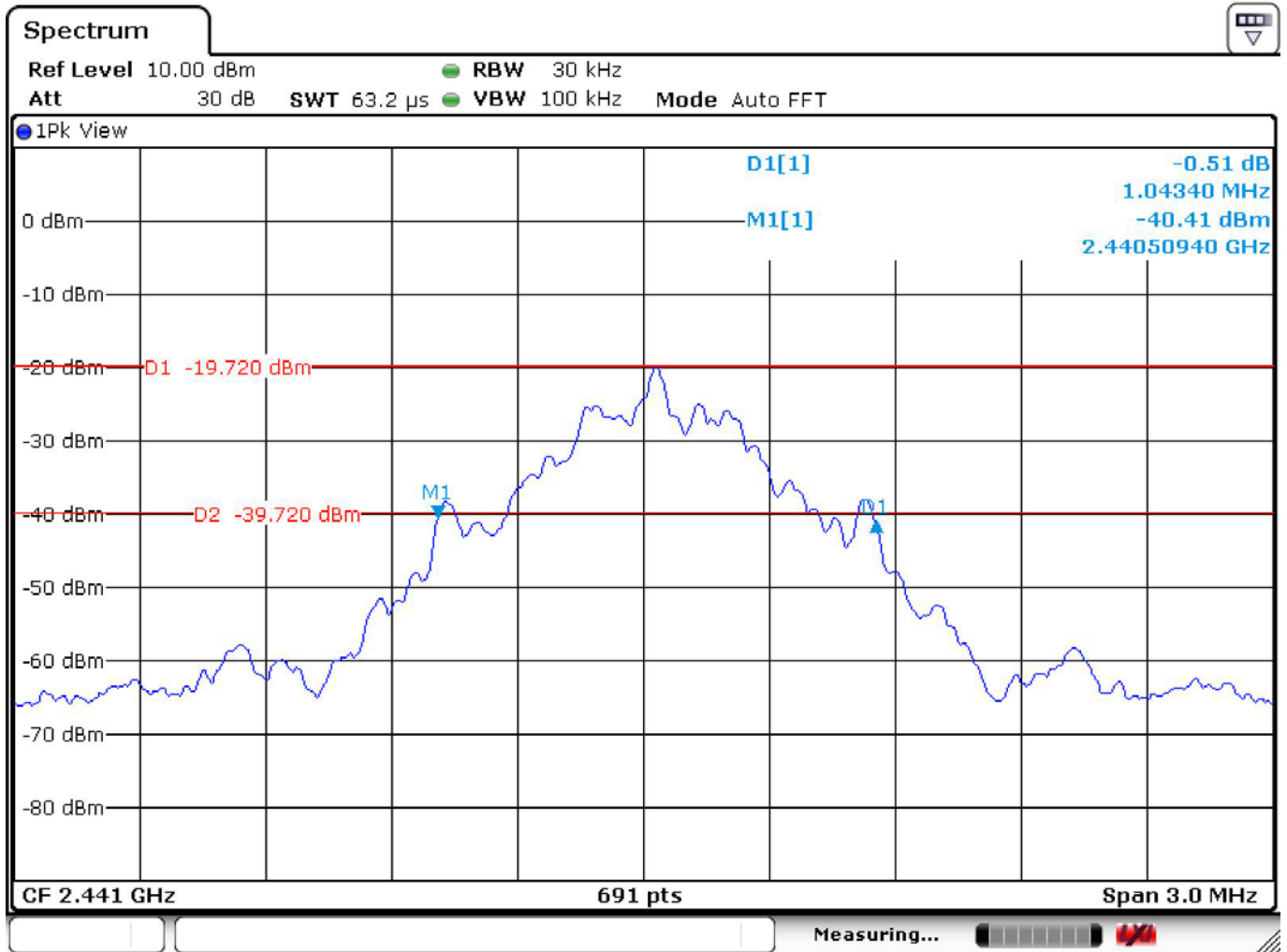
Bluetooth 1 Mbps (DH5)		
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2402	1.0376
Middle	2441	1.0434
High	2480	1.0333



Temperature	: 28.4°C	Humidity	: 47%
Test Date	: 17-Sep-2015	Tested by	: Eason Hsieh
Test Mode	: BT (1 Mbps) DH1	Channel	: 00

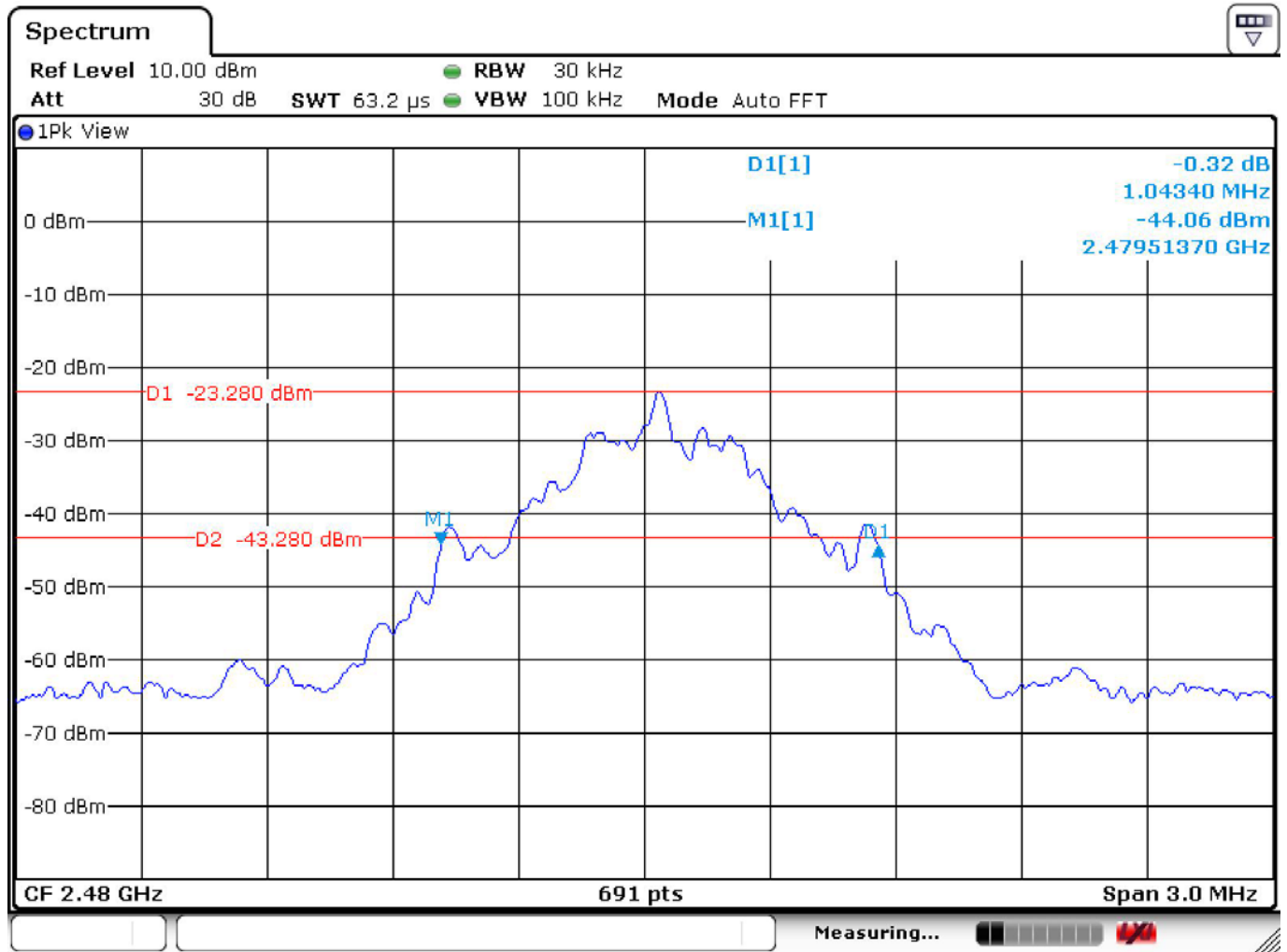


Test Mode	: BT (1 Mbps) DH1	Channel	: 39
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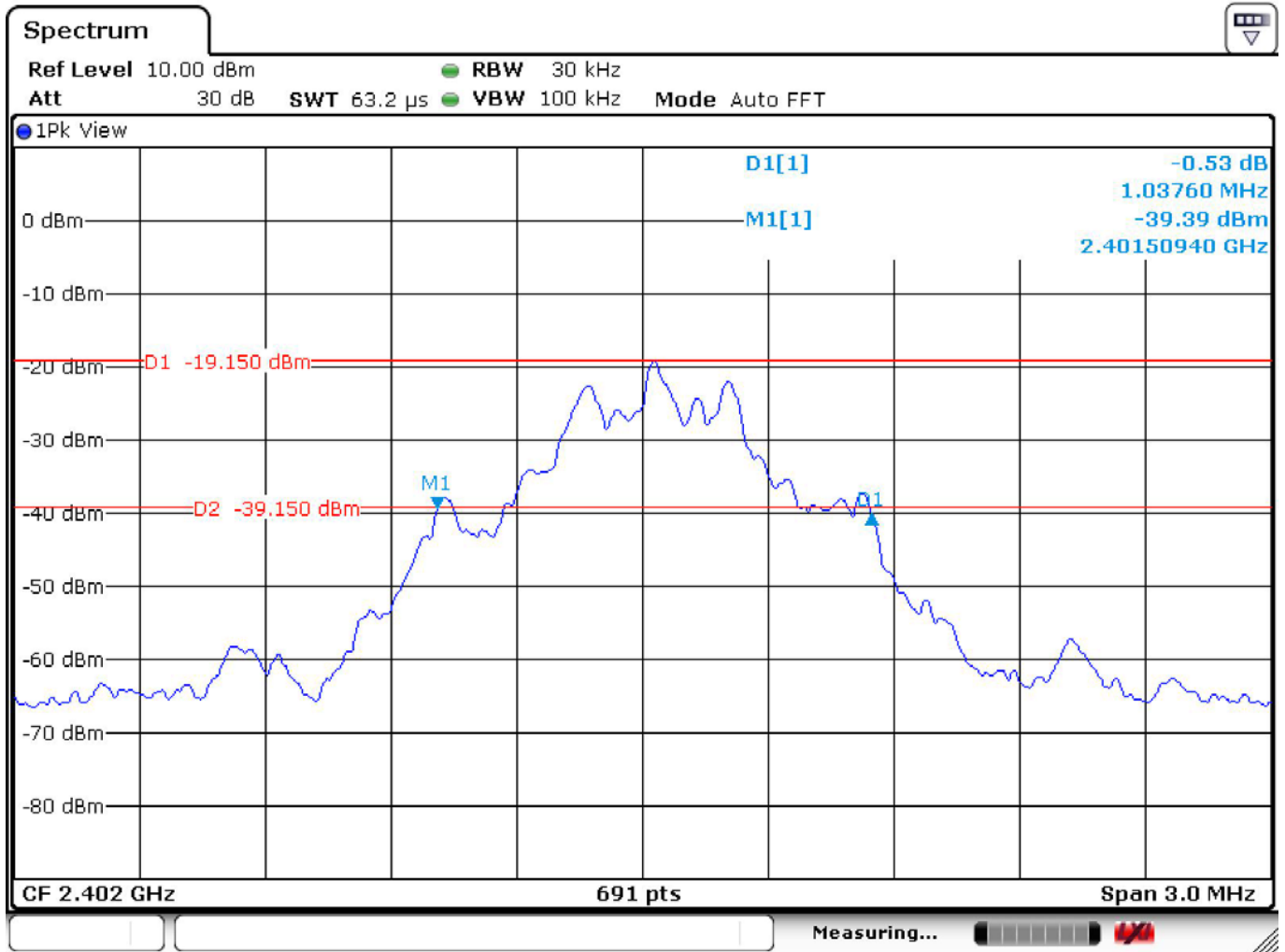




Test Mode : BT (1 Mbps) DH1 Channel : 78

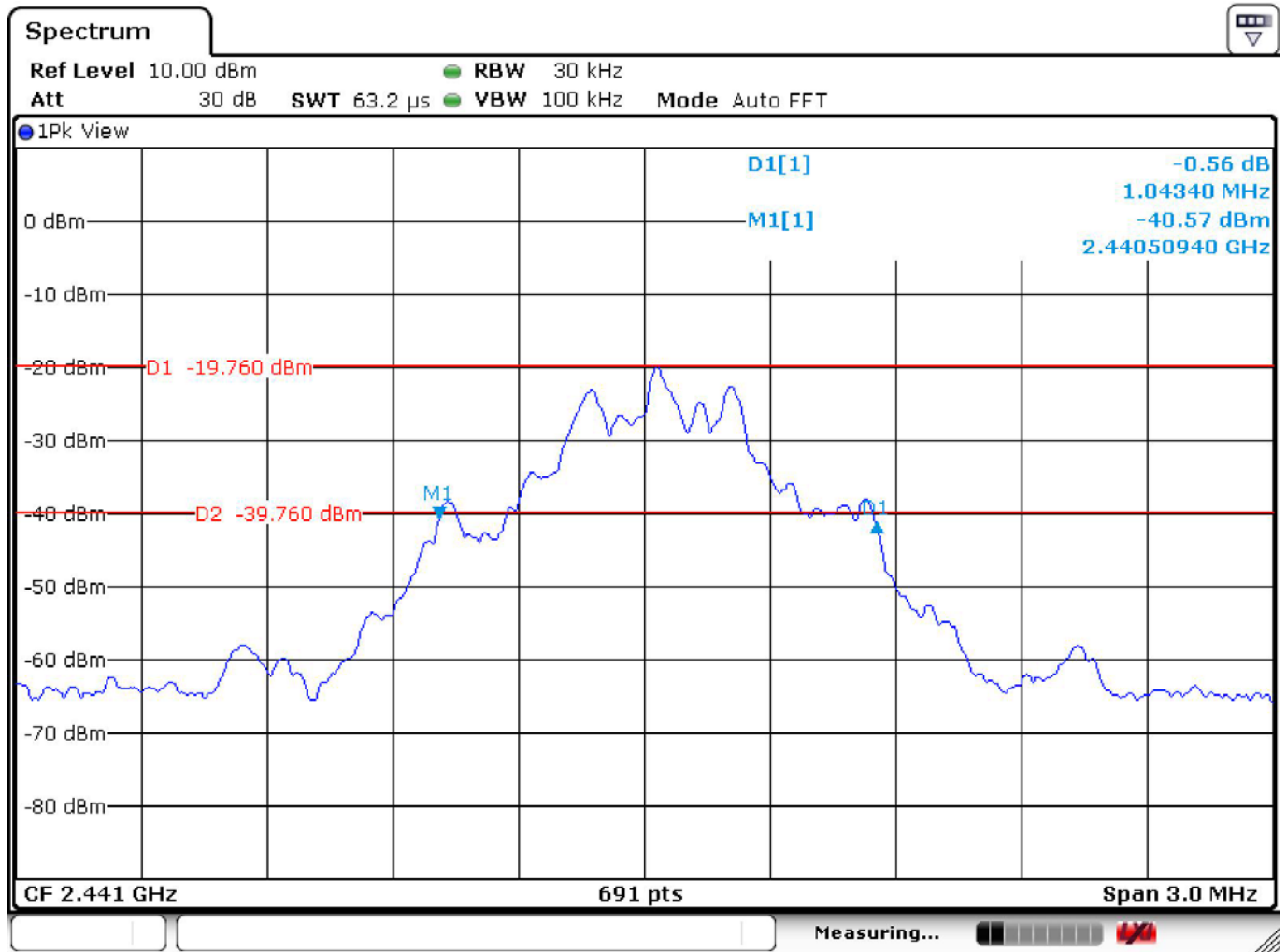


Test Mode : BT (1 Mbps) DH3 Channel : 00

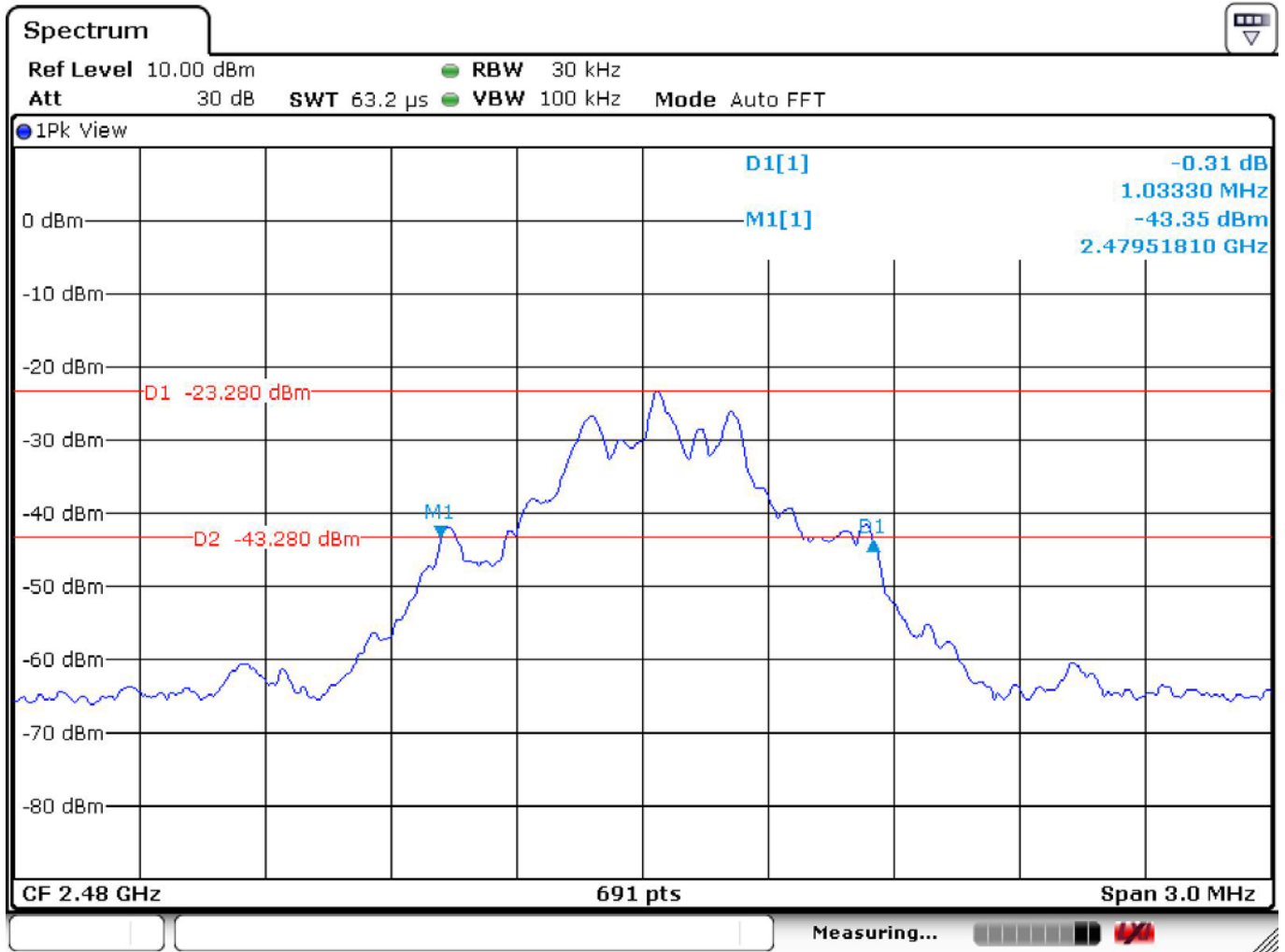




Test Mode : BT (1 Mbps) DH3 Channel : 39

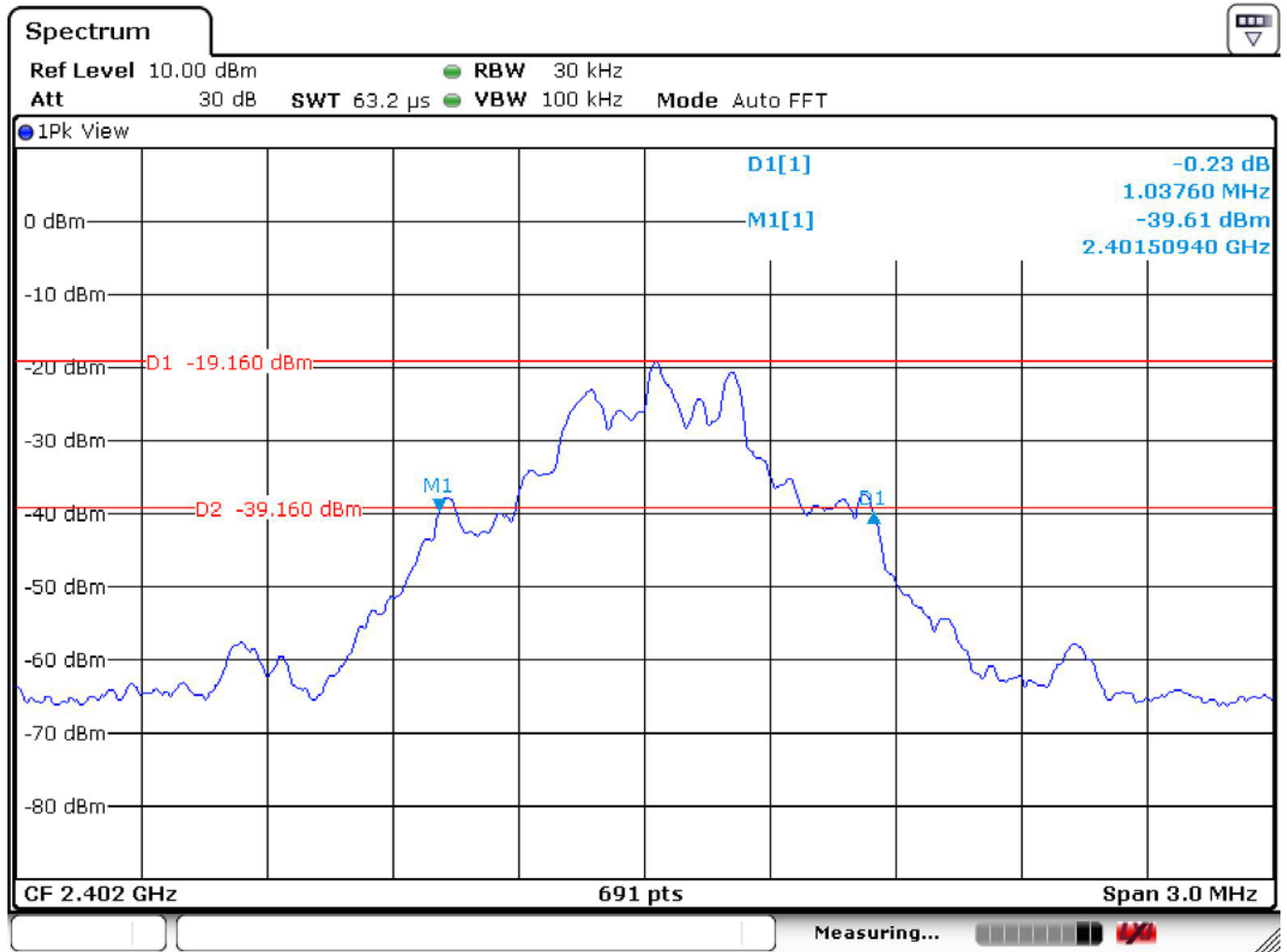


Test Mode : BT (1 Mbps) DH3 Channel : 78

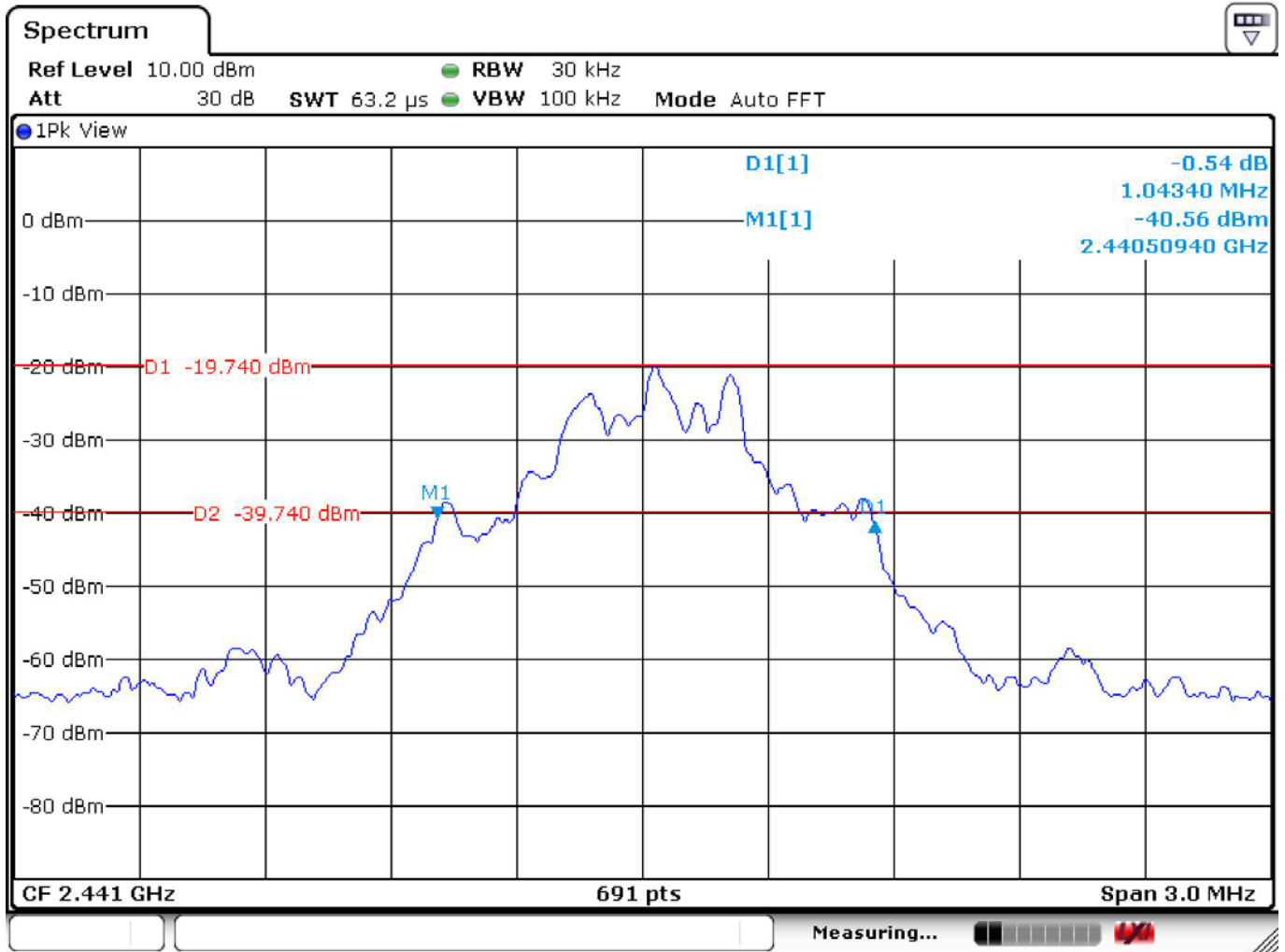




Test Mode : BT (1 Mbps) DH5 Channel : 00

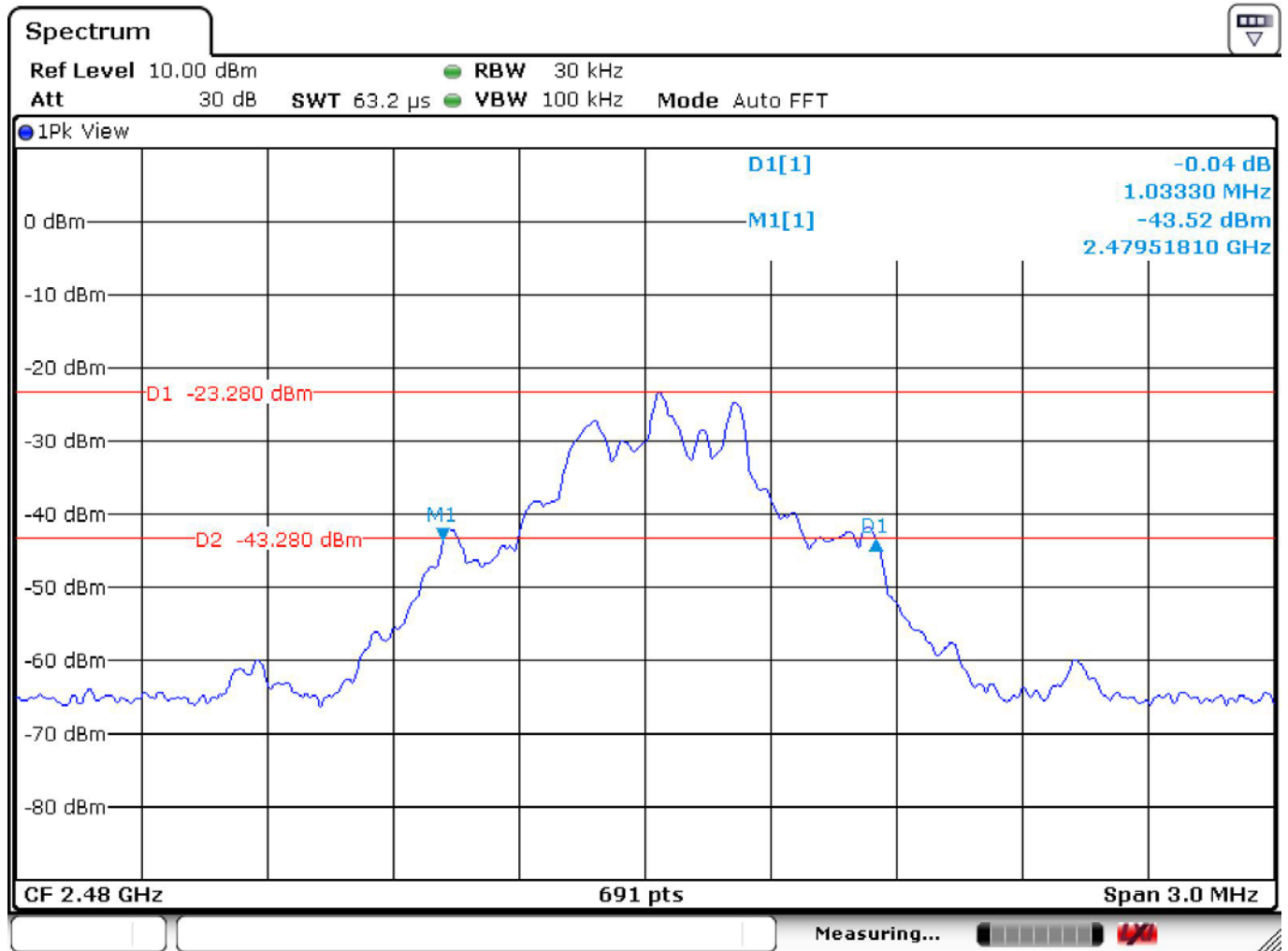


Test Mode : BT (1 Mbps) DH5 Channel : 39





Test Mode : BT (1 Mbps) DH5 Channel : 78



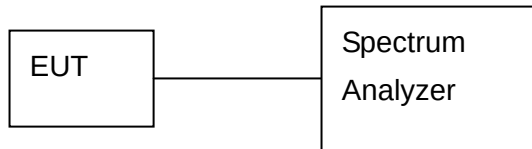


5 Hopping Frequency Separation

5.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

5.2 Test Arrangement and Procedure



1. The transmitter output was connected to a spectrum analyzer (through an attenuator, if it's necessary).
2. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW.
3. Mark the peak outputs of two adjacent channels. And, measured the separation between the marked peak outputs of two adjacent channels.

5.3 Limit (§ 15.247(a)(1))

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

5.4 Test Result

Compliance.

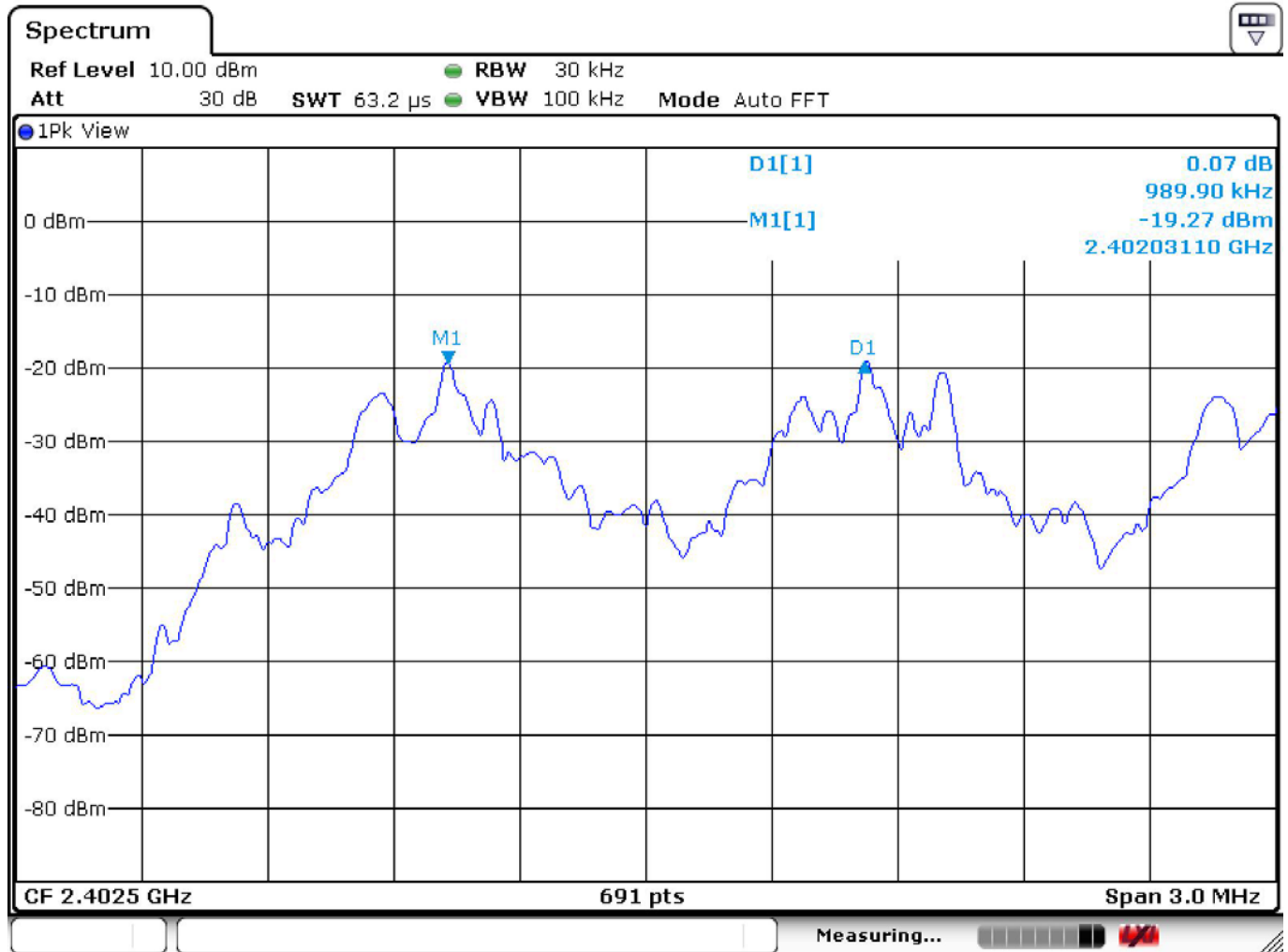
The final test data are shown on the following page(s).

**Bluetooth 1 Mbps DH5**

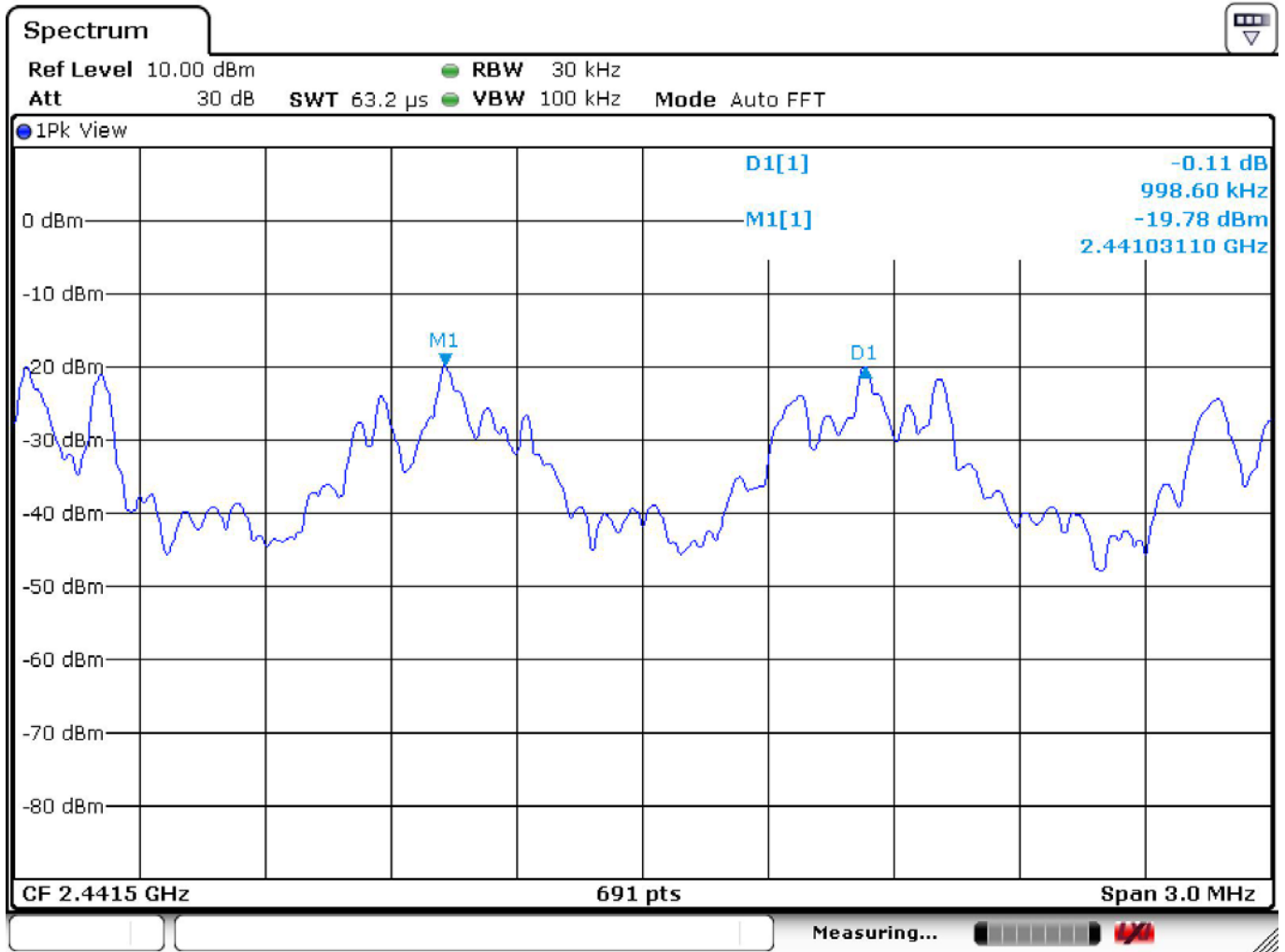
Channel	Frequency (MHz)	20 dB bandwidth (MHz)	Limit (2/3 of 20dB bandwidth) (MHz)	Result	Verdict
Low	2402	1.0376	0.69173	0.9899	Pass
Middle	2441	1.0434	0.6956	0.9986	Pass
High	2480	1.0333	0.6888	1.0029	Pass



Temperature	: 28.4°C	Humidity	: 47%
Test Date	: 17-Sep-2015	Tested by	: Eason Hsieh
Test Mode	: BT (1 Mbps) DH5	Channel	: Low



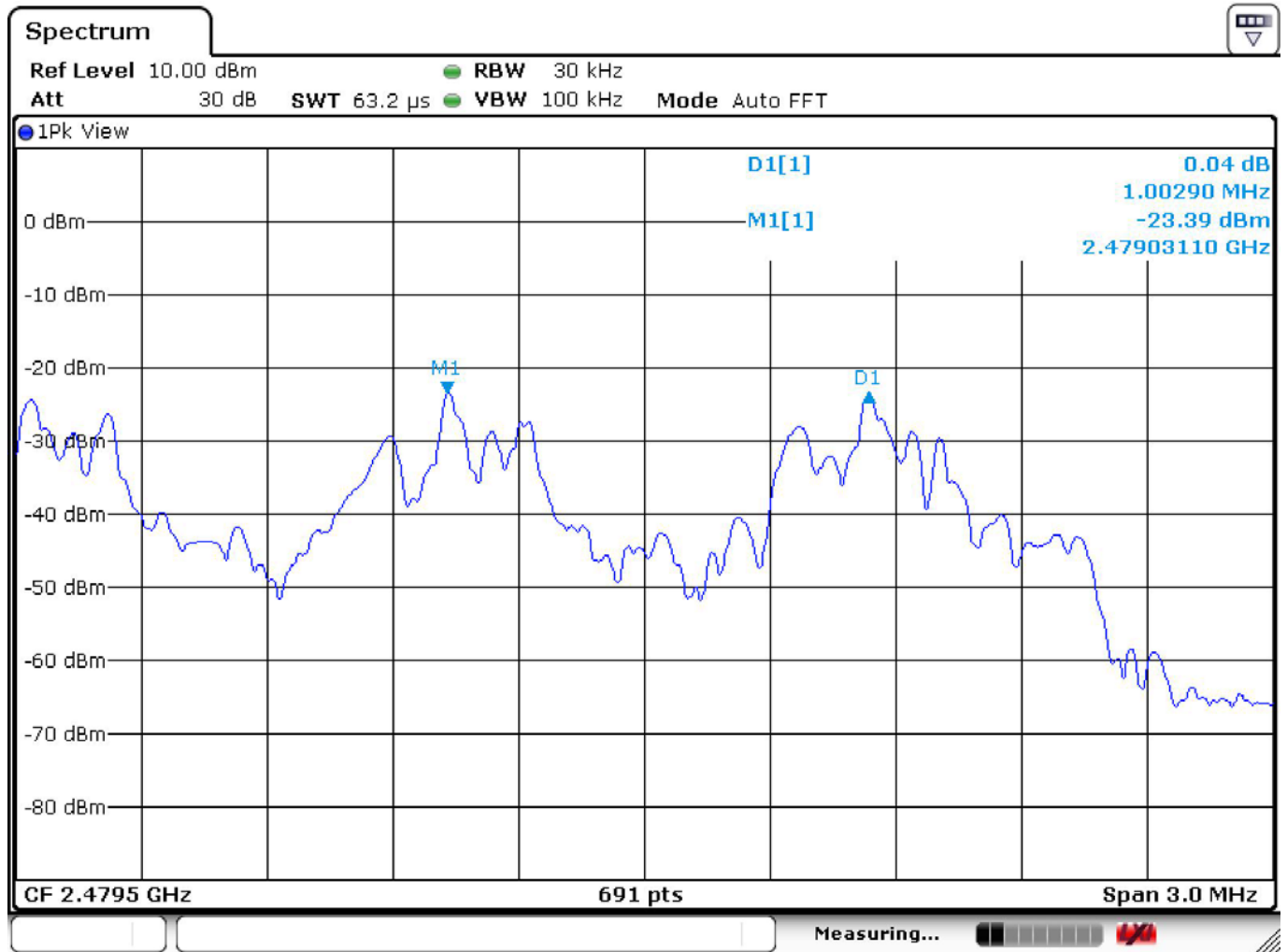
Test Mode	: BT (1 Mbps) DH5	Channel	: Middle
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Test Mode : BT (1 Mbps) DH5

Channel : High



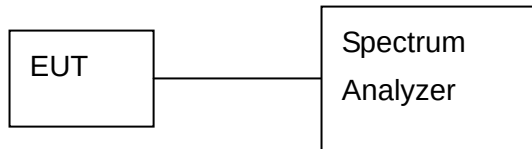


6 Number of Hopping Channels

6.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

6.2 Test Arrangement and Procedure



1. The transmitter output was connected to a spectrum analyzer (through an attenuator, if it's necessary).
2. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps.
3. The RBW is set to 1 MHz and VBW is set to 1 MHz .
4. Max Hold.

6.3 Limit (§ 15.247(a)(1)(iii))

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

6.4 Test Result

79 Channels have been used.

Compliance.

The final test data are shown on the following page(s).



Spectrum



Ref Level 10.00 dBm

RBW 1 MHz

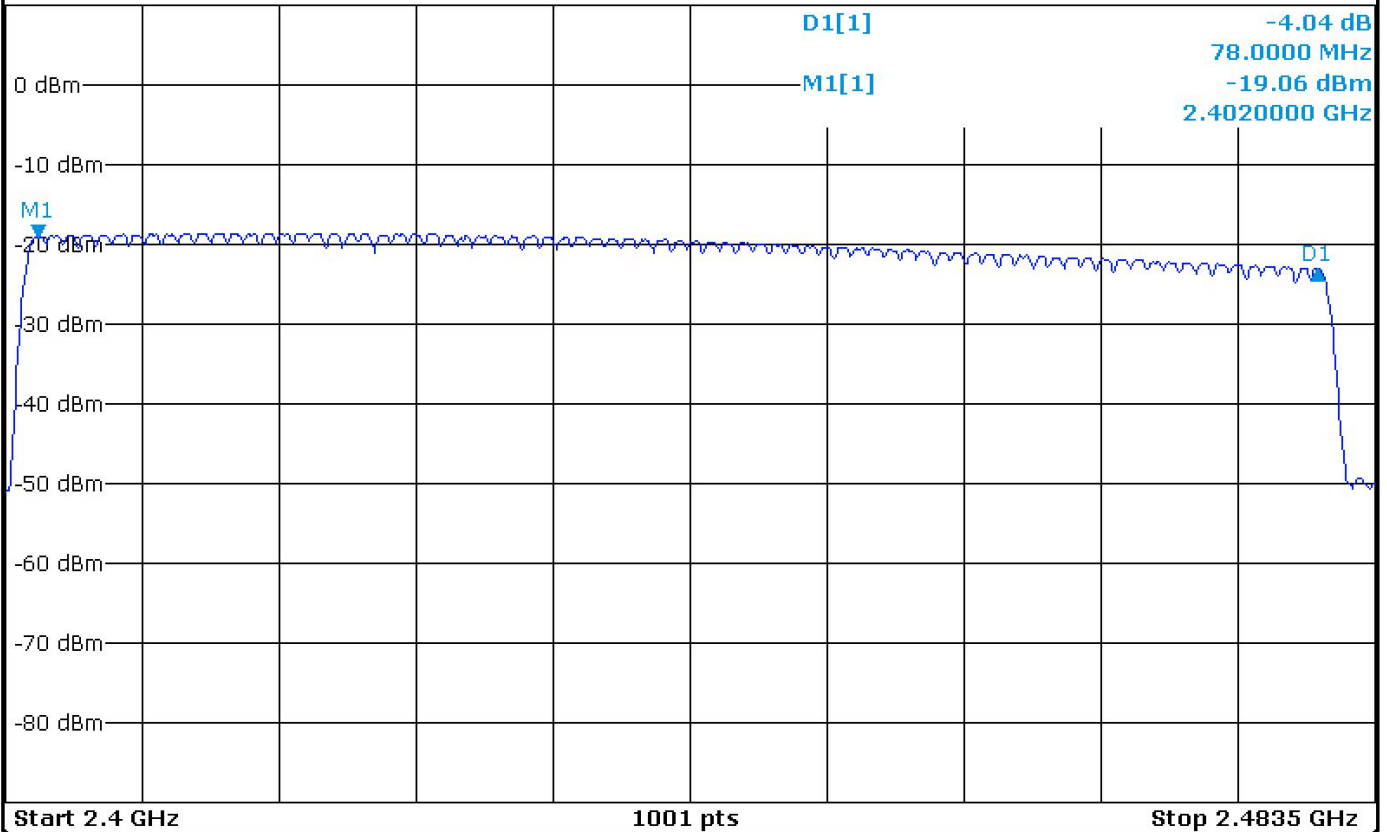
Att 30 dB

SWT 11.4 μ s

VBW 1 MHz

Mode Auto FFT

1Pk View



Measuring...



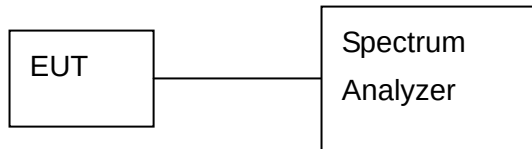


7 Average Time of Occupancy

7.1 Test Instruments

Refer to Sec. 1.2 Test Instruments.

7.2 Test Arrangement and Procedure



1. The transmitter output was connected to a spectrum analyzer (through an attenuator, if it's necessary).
2. First, measure the number of pulses per 5 second, the RBW is set to 100 kHz and VBW is set to 100 kHz. Sweep is set to 5 sec. Span 0 Hz.
3. Second, measure the Pulse width, the RBW is set to 1MHz and VBW is set to 1MHz. Sweep is adjusted to appropriate time to show a complete pulse. Span 0 Hz.

7.3 Limit (§ 15.247(a)(1)(iii))

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

7.4 Test Result

Compliance.

The final test data are shown on the following page(s).

Bluetooth (1 Mbps) Channel <u>00</u>					
DH Packet	Number of Hopping channels	Number of Pulses per 5 sec	Pulse Width (sec)	AV time of Occupancy (sec)	Limit (sec)
DH1	79	50	0.00043188	0.136474	0.4
DH3	79	26	0.0017	0.279344	0.4
DH5	79	17	0.00294638	0.316559	0.4

Bluetooth (1 Mbps) Channel <u>39</u>					
DH Packet	Number of Hopping channels	Number of Pulses per 5 sec	Pulse Width (sec)	AV time of Occupancy (sec)	Limit (sec)
DH1	79	49	0.00043478	0.134643	0.4
DH3	79	23	0.0017	0.247112	0.4
DH5	79	19	0.00294348	0.353453	0.4

Bluetooth (1 Mbps) Channel <u>78</u>					
DH Packet	Number of Hopping channels	Number of Pulses per 5 sec	Pulse Width (sec)	AV time of Occupancy (sec)	Limit (sec)
DH1	79	49	0.00043188	0.133745	0.4
DH3	79	27	0.00170725	0.291325	0.4
DH5	79	17	0.00294348	0.316247	0.4

Remark:

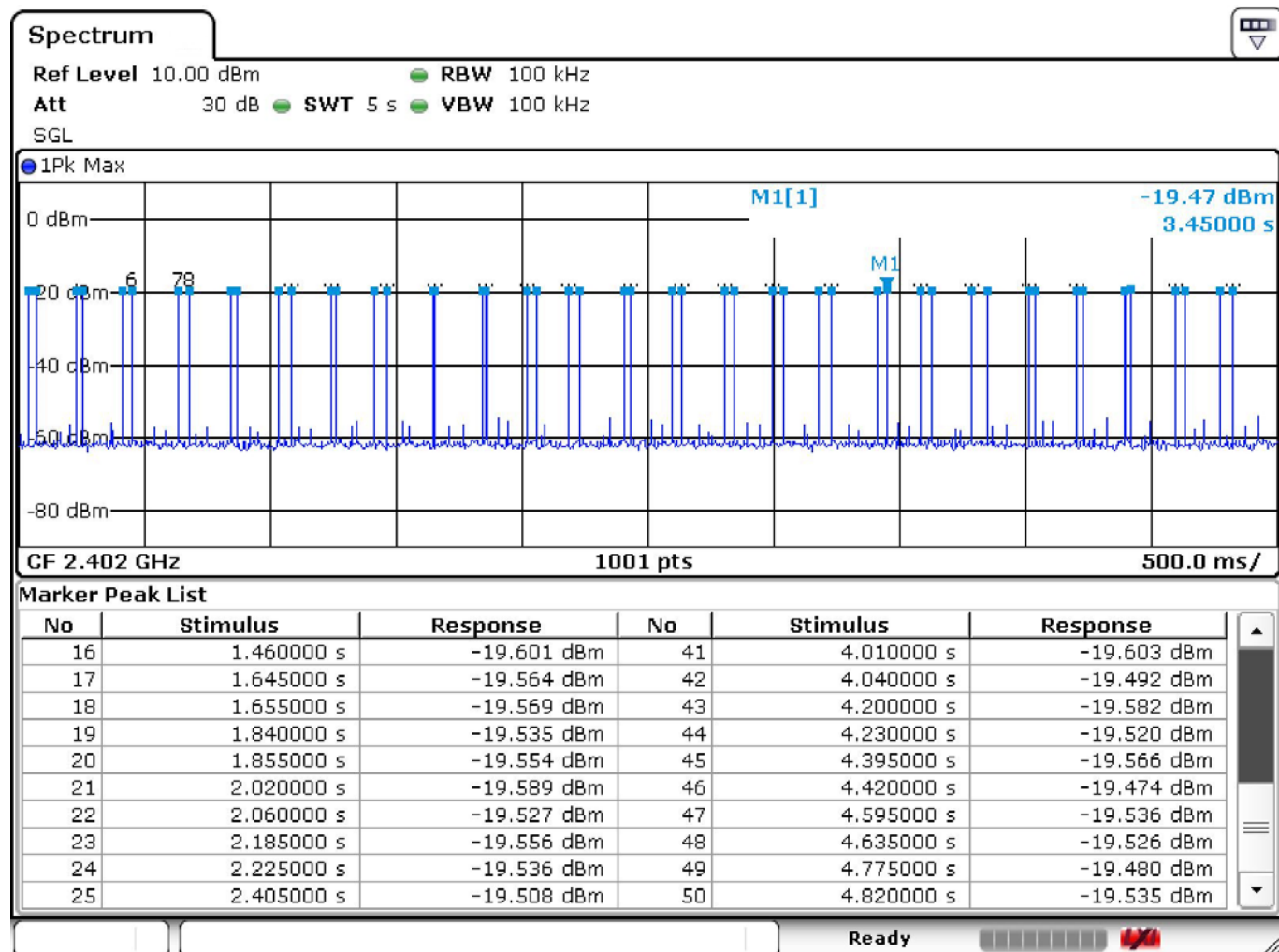
AV time of Occupancy (sec) = 79 (number of hopping channels) * 0.4 (sec) * Number of Pulses per 5 sec / 5 * Pulse Width (sec)

Note : 1. The EUT does not support AFH mode.

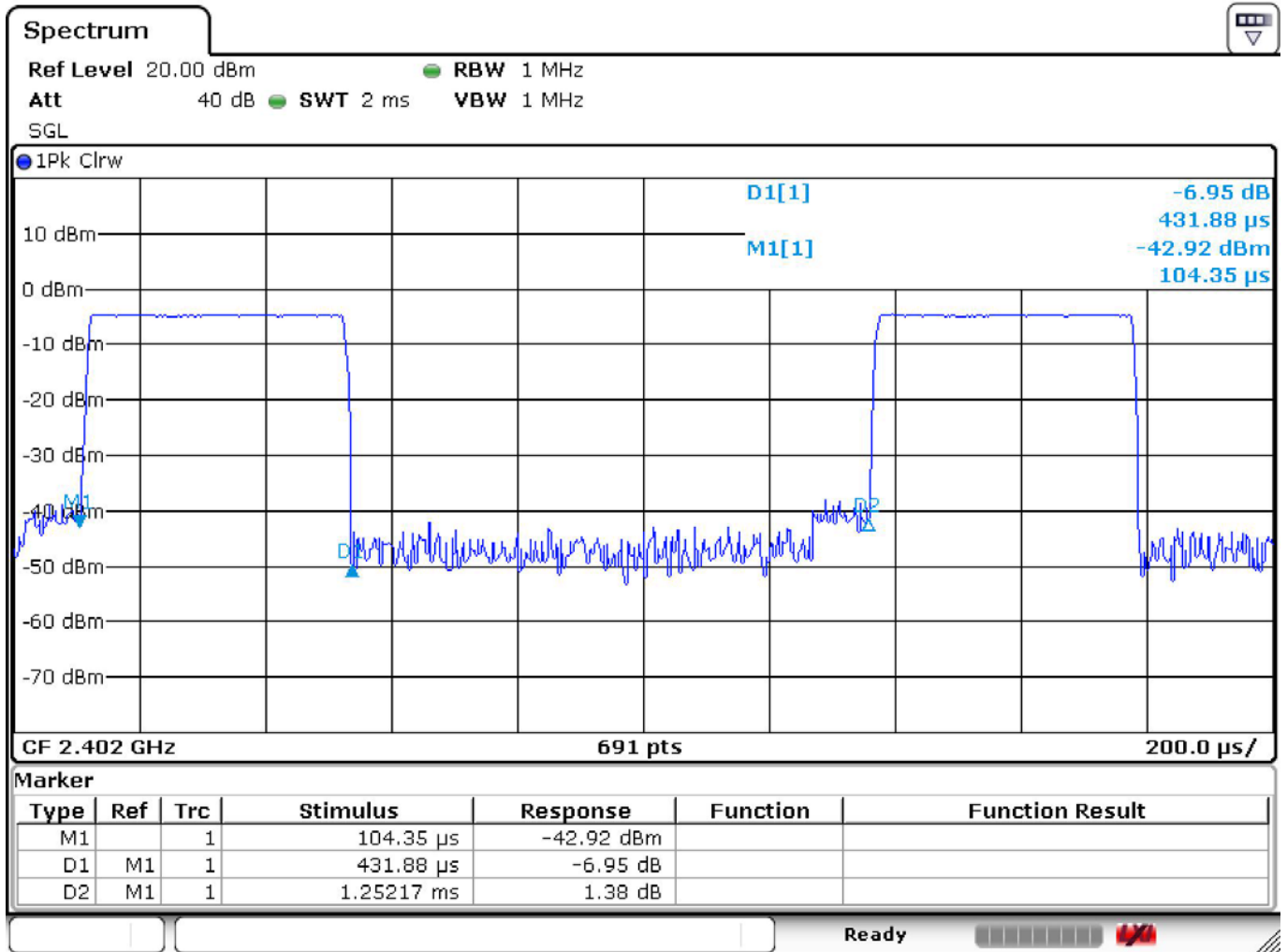


Temperature	: 28.4°C	Humidity	: 47%
Test Date	: 17-Sep-2015	Tested by	: Eason Hsieh
Test Mode	: BT (1 Mbps) DH1	Channel	: 00

Number of Pulses Per 5 sec



Pulse Width (sec)

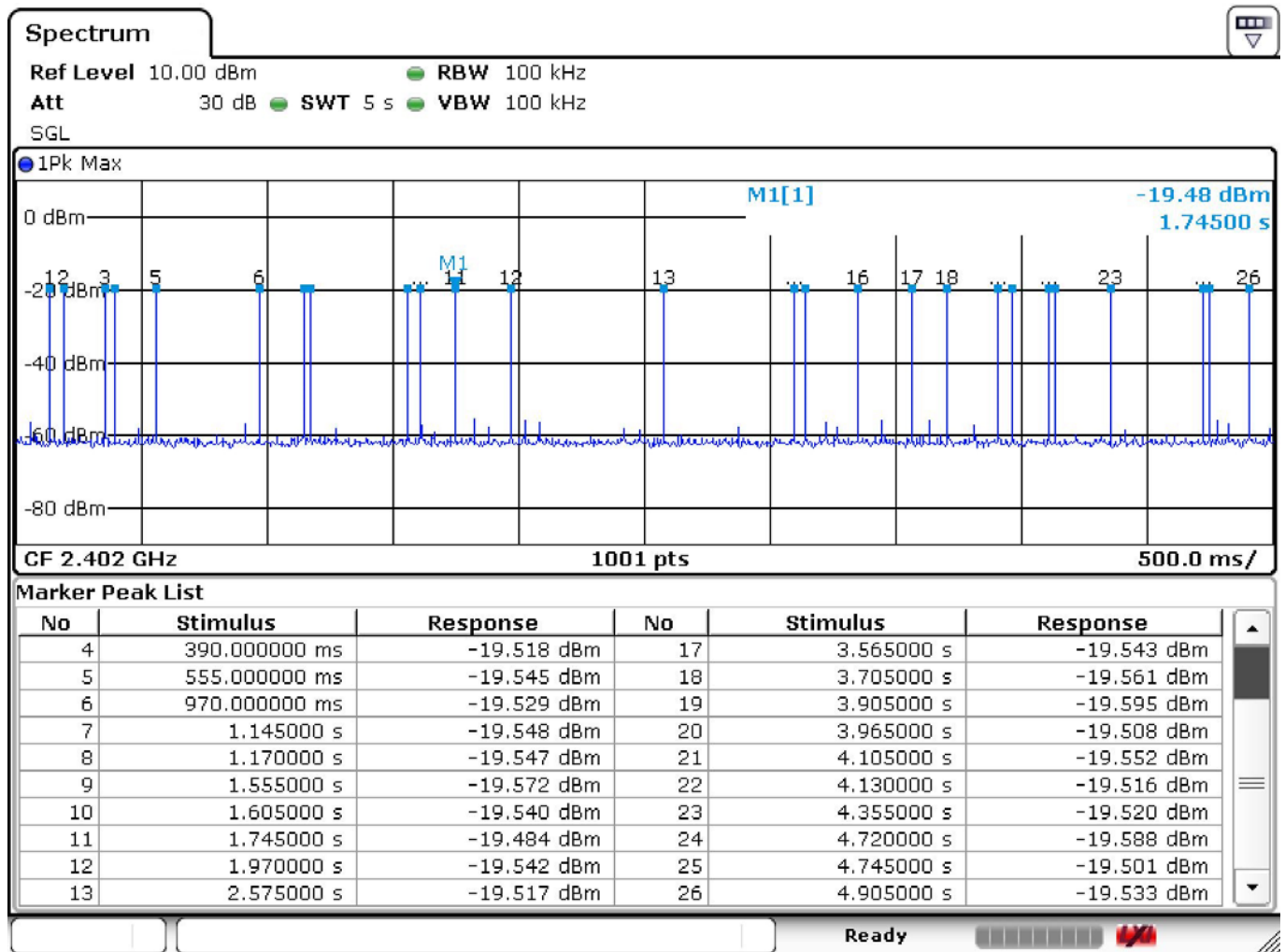




Test Mode : BT (1 Mbps) DH3

Channel : 00

Number of Pulses Per 5 sec



Pulse Width (sec)



Spectrum



Ref Level 20.00 dBm

RBW 1 MHz

Att

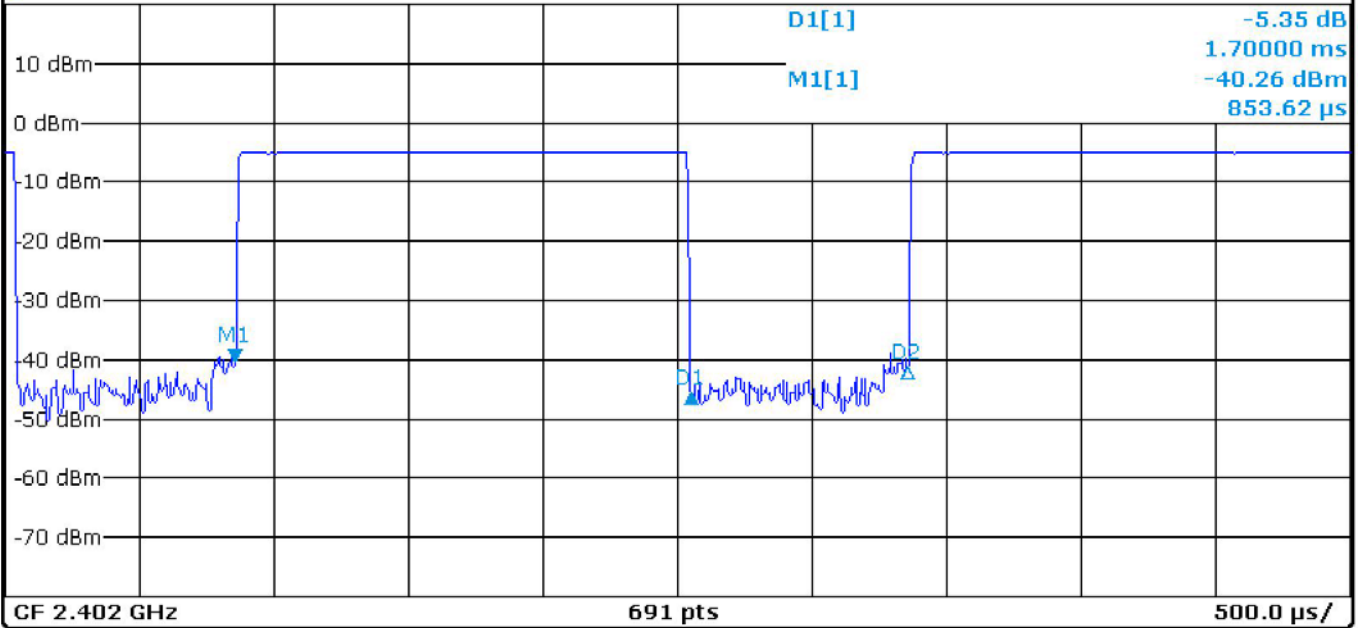
40 dB

SWT 5 ms

VBW 1 MHz

SGL

1Pk Clrw



Marker

Type	Ref	Trc	Stimulus	Response	Function	Function Result
M1		1	853.62 μs	-40.26 dBm		
D1	M1	1	1.7 ms	-5.35 dB		
D2	M1	1	2.49855 ms	-0.96 dB		

Ready

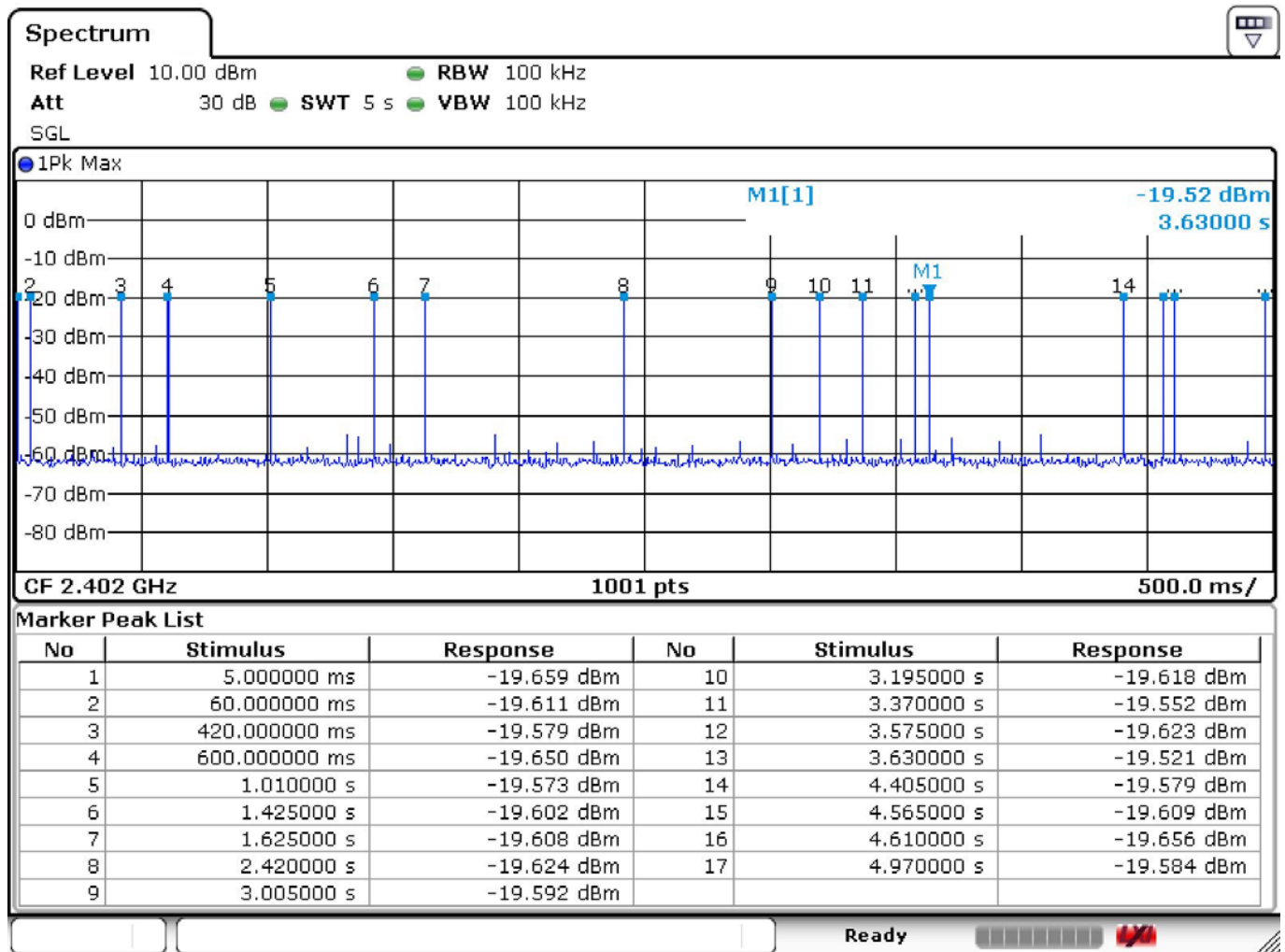




Test Mode : BT (1 Mbps) DH5

Channel : 00

Number of Pulses Per 5 sec



Pulse Width (sec)



Spectrum



Ref Level 20.00 dBm

RBW 1 MHz

Att

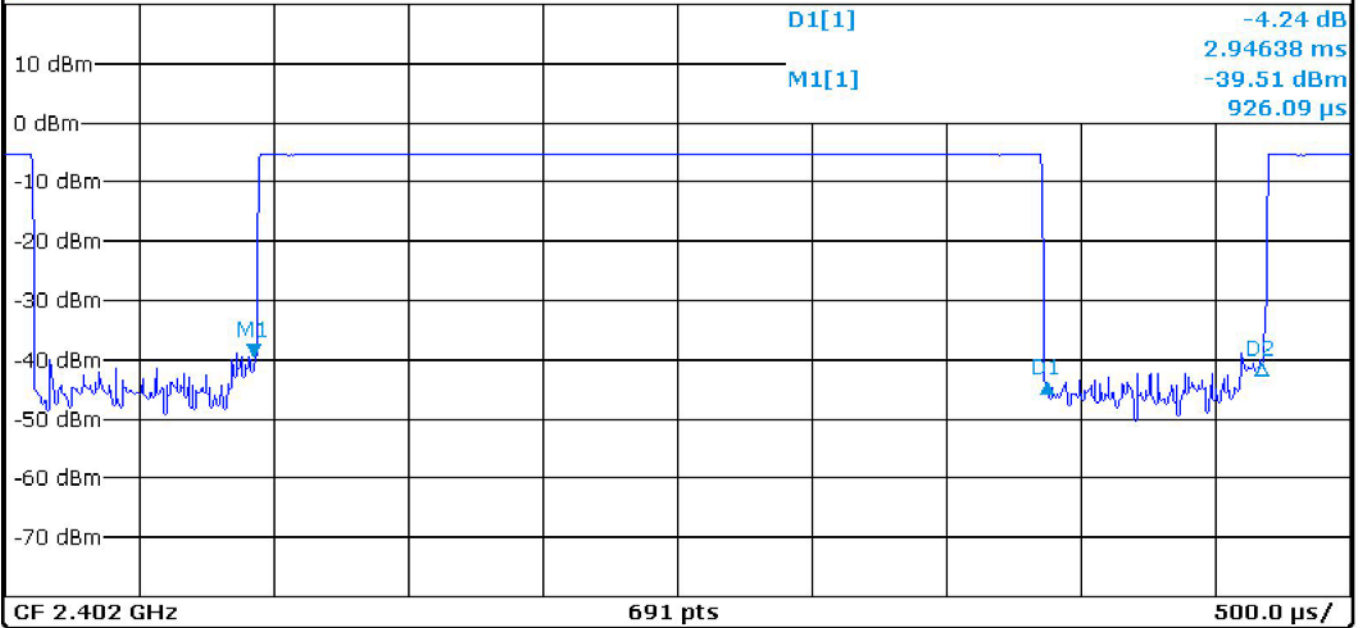
40 dB

SWT 5 ms

VBW 1 MHz

SGL

1Pk Clrw



Marker

Type	Ref	Trc	Stimulus	Response	Function	Function Result
M1		1	926.09 μs	-39.51 dBm		
D1	M1	1	2.94638 ms	-4.24 dB		
D2	M1	1	3.74493 ms	-1.06 dB		

Ready

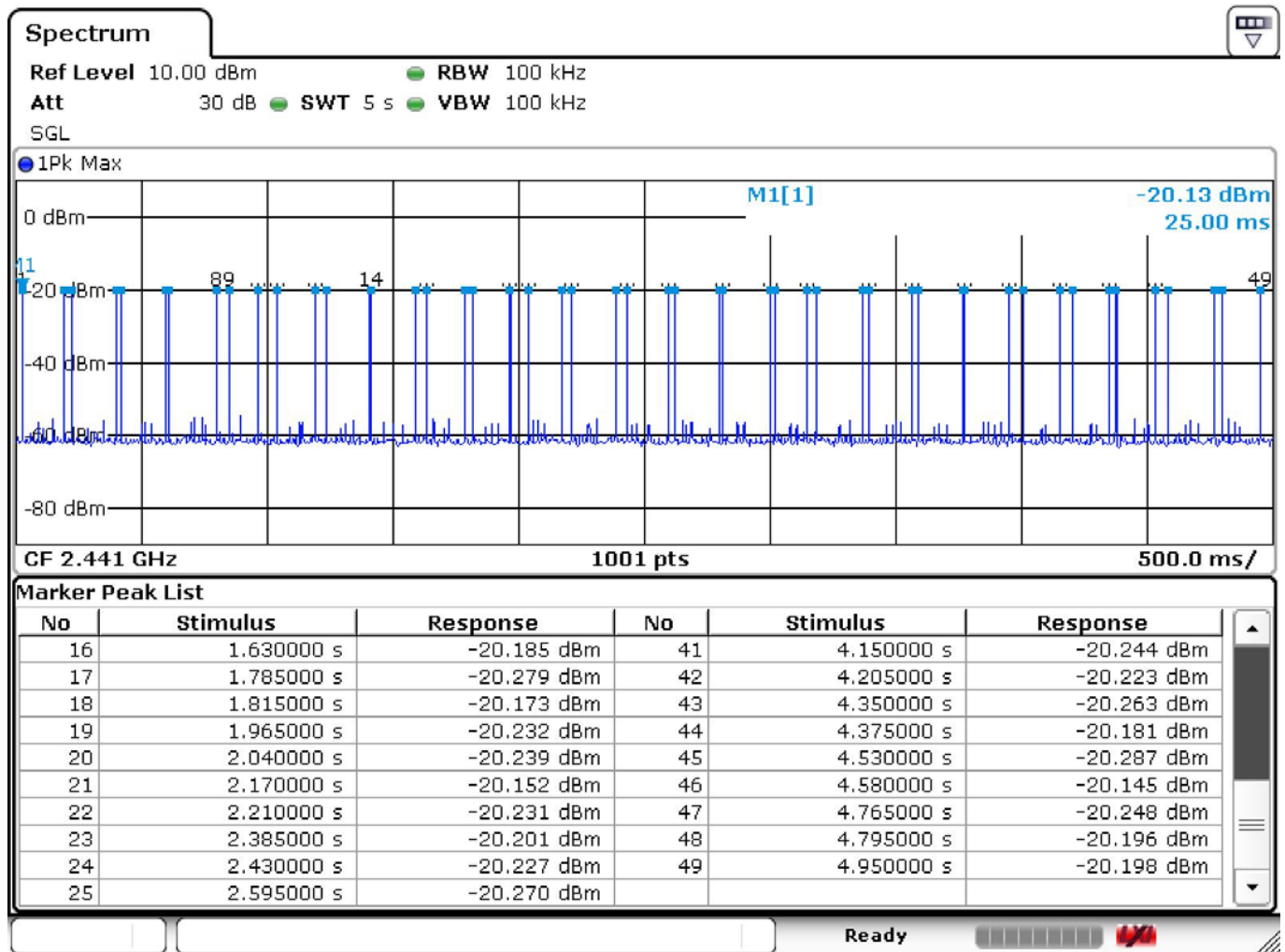




Test Mode : BT (1 Mbps) DH1

Channel : 39

Number of Pulses Per 5 sec



Pulse Width (sec)



Spectrum



Ref Level 20.00 dBm

RBW 1 MHz

Att

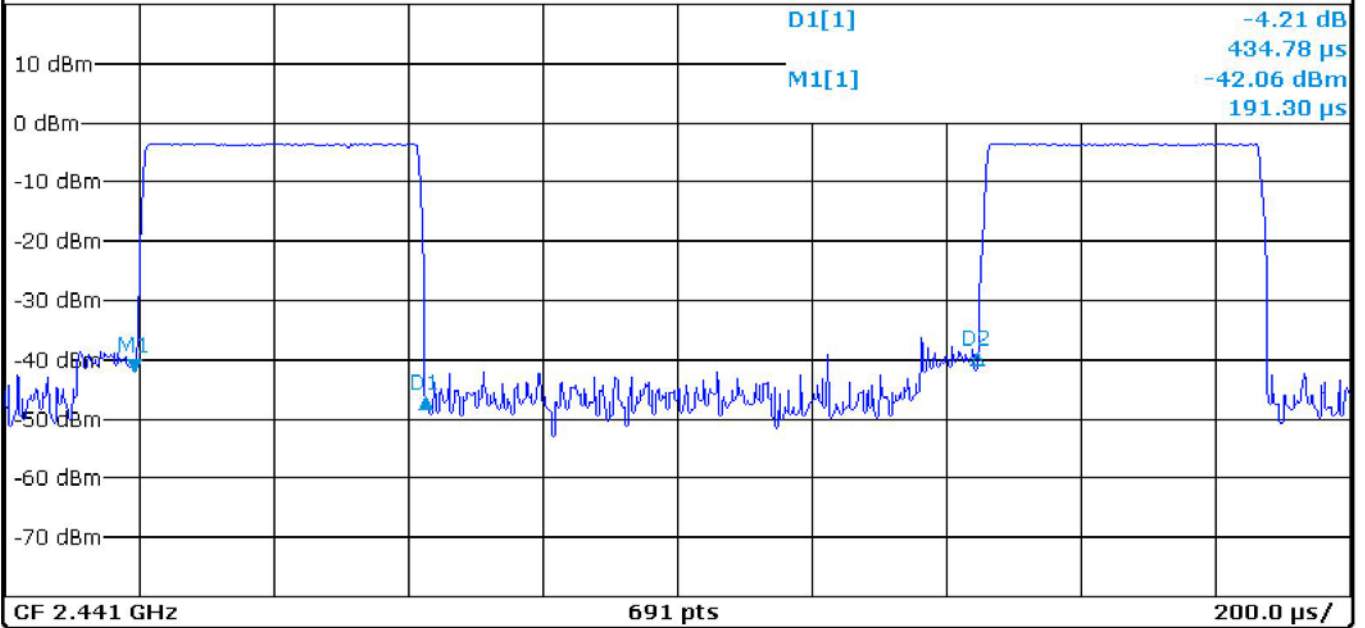
40 dB

SWT 2 ms

VBW 1 MHz

SGL

1Pk Clrw



Marker

Type	Ref	Trc	Stimulus	Response	Function	Function Result
M1		1	191.3 μs	-42.06 dBm		
D1	M1	1	434.78 μs	-4.21 dB		
D2	M1	1	1.25507 ms	3.03 dB		

Ready

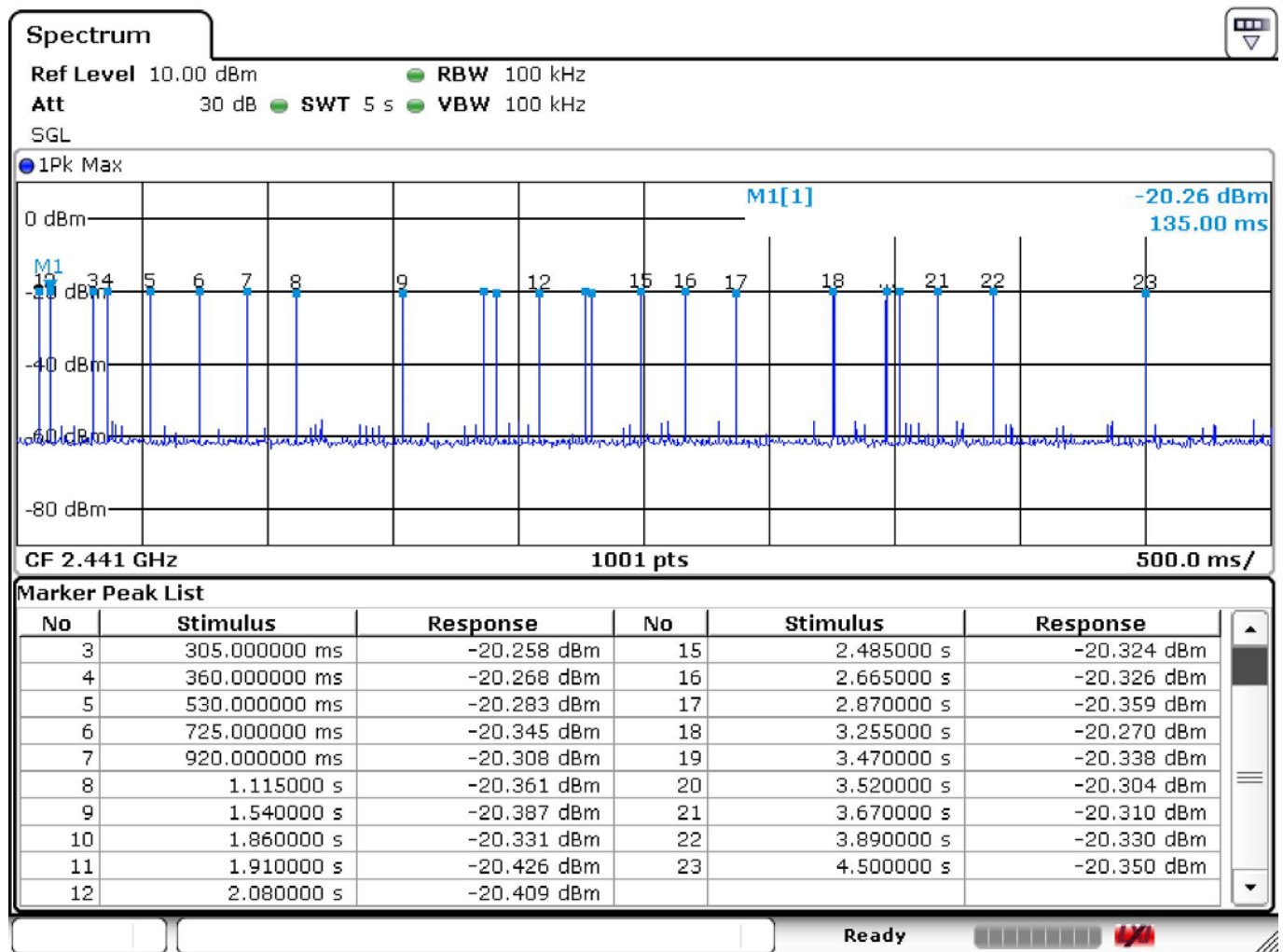




Test Mode : BT (1 Mbps) DH3

Channel : 39

Number of Pulses Per 5 sec



Pulse Width (sec)



Spectrum



Ref Level 20.00 dBm

RBW 1 MHz

Att

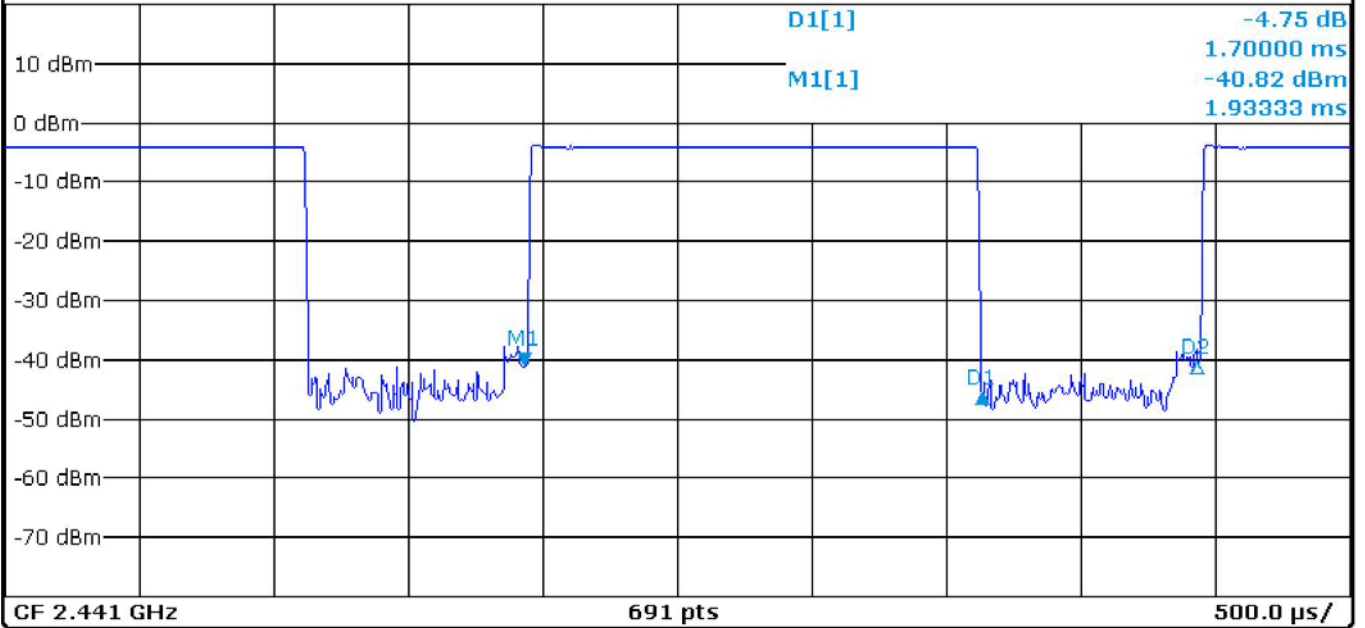
40 dB

SWT 5 ms

VBW 1 MHz

SGL

1Pk Clrw



Marker

Type	Ref	Trc	Stimulus	Response	Function	Function Result
M1		1	1.93333 ms	-40.82 dBm		
D1	M1	1	1.7 ms	-4.75 dB		
D2	M1	1	2.49855 ms	0.51 dB		

Ready

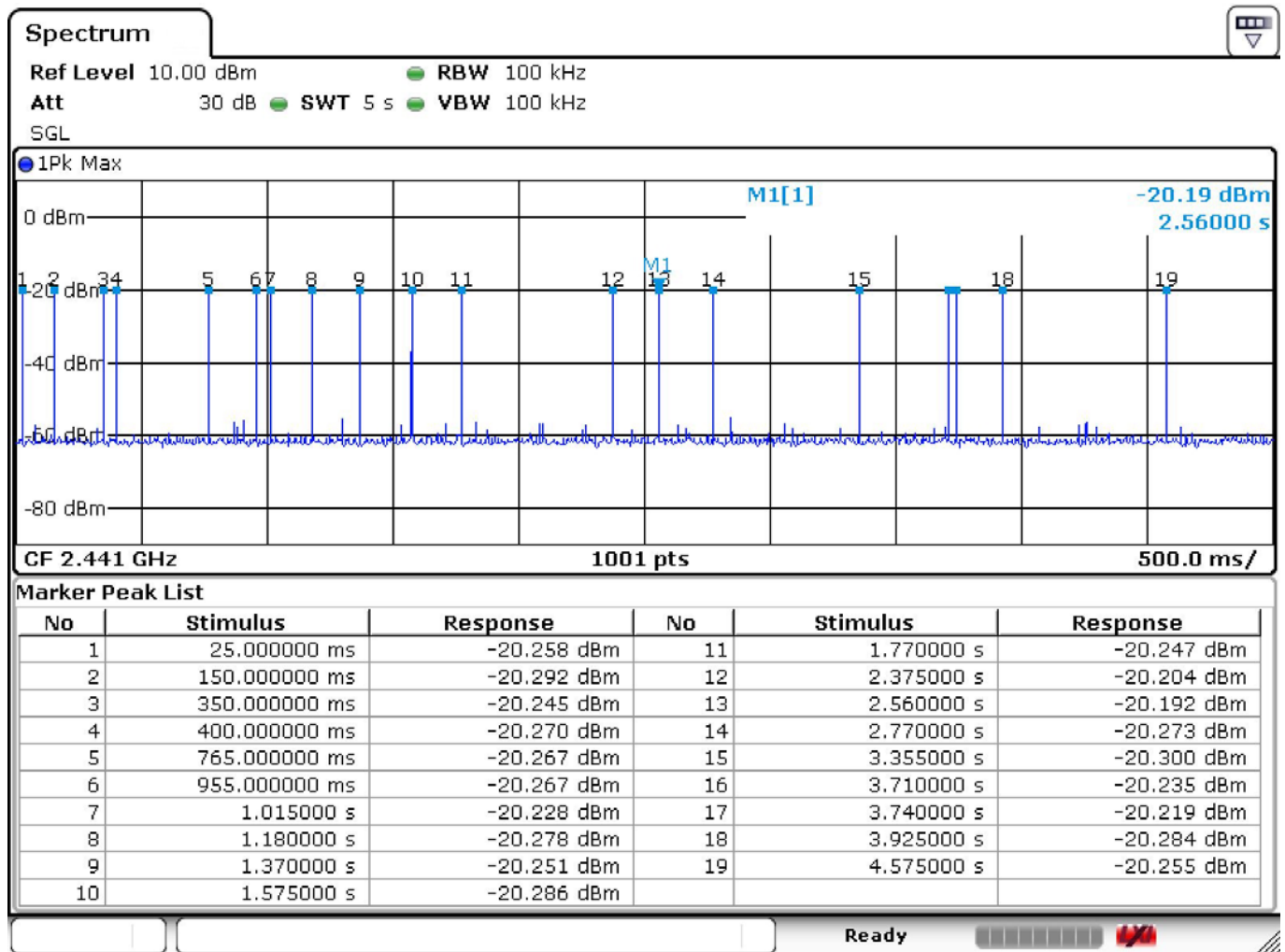




Test Mode : BT (1 Mbps) DH5

Channel : 39

Number of Pulses Per 5 sec



Pulse Width (sec)



Spectrum



Ref Level 20.00 dBm

RBW 1 MHz

Att

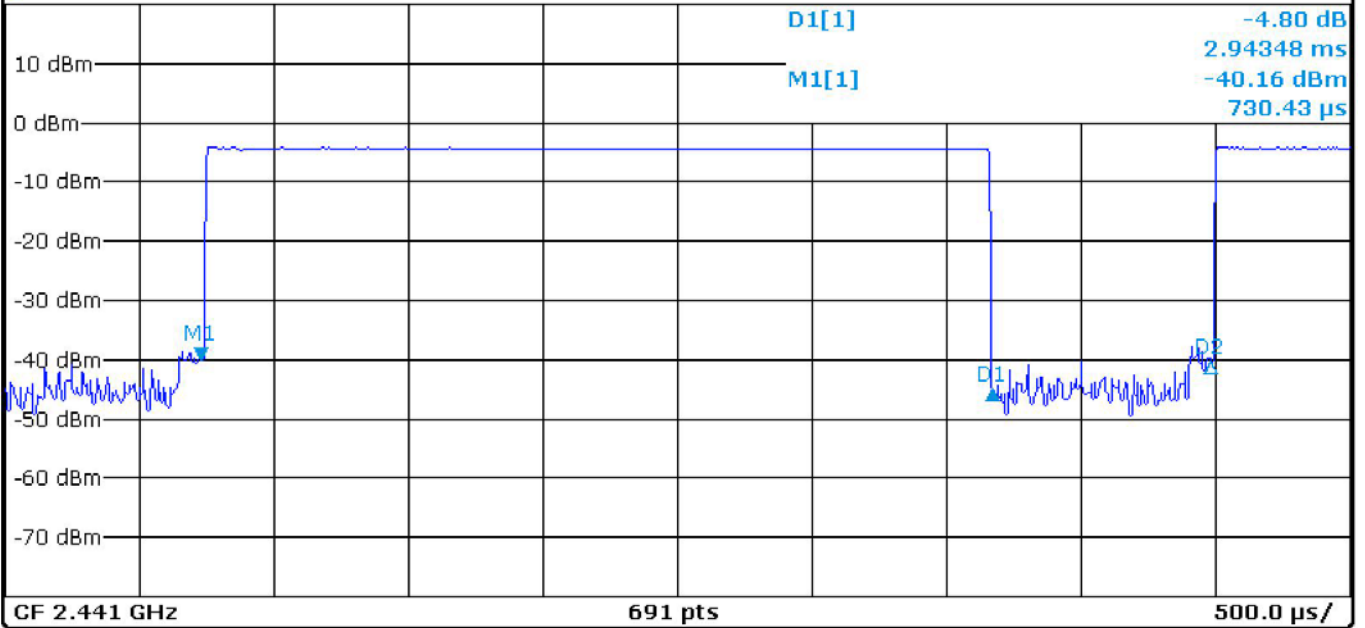
40 dB

SWT 5 ms

VBW 1 MHz

SGL

1Pk Clrw



Marker

Type	Ref	Trc	Stimulus	Response	Function	Function Result
M1		1	730.43 μs	-40.16 dBm		
D1	M1	1	2.94348 ms	-4.80 dB		
D2	M1	1	3.75217 ms	-0.28 dB		

Ready

