FCC Test Report

Product Name	Data Collector
Model No.	PI-1060
FCC ID.	NBF-PI-1X60

Applicant	Argox Information Co.,Ltd.
Address	7F., No.126, Ln. 235, Baociao Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)

Date of Receipt	Jan. 13, 2017
Issued Date	Oct. 02, 2018
Report No.	1850384R-RFUSP23V00
Report Version	V1.0

Testing Laboratory
3023

The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
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Test Report

Issued Date: Oct. 02, 2018
Report No.: 1850384R-RFUSP23V00

Product Name	Data Collector
Applicant	Argox Information Co.,Ltd.
Address	7F., No.126, Ln. 235, Baociao Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)
Manufacturer	Argox Information Co.,Ltd.
Model No.	PI-1060
FCC ID.	NBF-PI-1X60
EUT Rated Voltage	AC 100-240V / 50-60Hz or DC 3.6V by Battery or DC 5V by USB
EUT Test Voltage	AC 120V / 60Hz
Trade Name	ARGOX
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2017 ANSI C63.4: 2014, ANSI C63.10: 2013 KDB 558074 D01 15.247 Meas Guidance v05
Test Result	Complied

Documented By : Joanne Lin

(Senior Adm. Specialist / Joanne Lin)

Tested By : Nova Chu

(Engineer / Nova Chu)

Approved By :

(Director / Vincent Lin)

TABLE OF CONTENTS

	Description	Page
1.	**GENERAL INFORMATION**	**5**
1.1.	EUT Description	5
1.2.	Operational Description	7
1.3.	Tested System Details	8
1.4.	Configuration of Tested System	8
1.5.	EUT Exercise Software	9
1.6.	Test Facility	10
1.7.	List of Test Equipment	11
2.	**CONDUCTED EMISSION**	**12**
2.1.	Test Setup	12
2.2.	Limits	12
2.3.	Test Procedure	13
2.4.	Uncertainty	13
2.5.	Test Result of Conducted Emission	14
3.	**PEAK POWER OUTPUT**	**18**
3.1.	Test Setup	18
3.2.	Limit	18
3.3.	Test Procedure	18
3.4.	Uncertainty	18
3.5.	Test Result of Peak Power Output	19
4.	**RADIATED EMISSION**	**21**
4.1.	Test Setup	21
4.2.	Limits	22
4.3.	Test Procedure	23
4.4.	Uncertainty	23
4.5.	Test Result of Radiated Emission	24
5.	**RF ANTENNA CONDUCTED TEST**	**33**
5.1.	Test Setup	33
5.2.	Limits	33
5.3.	Test Procedure	33
5.4.	Uncertainty	33
5.5.	Test Result of RF Antenna Conducted Test	34
6.	**BAND EDGE**	**36**
6.1.	Test Setup	36
6.2.	Limit	37
6.3.	Test Procedure	37
6.4.	Uncertainty	37
6.5.	Test Result of Band Edge	38
7.	**CHANNEL NUMBER**	**50**
7.1.	Test Setup	50
7.2.	Limit	50
7.3.	Test Procedure	50
7.4.	Uncertainty	50
7.5.	Test Result of Channel Number	51
8.	**CHANNEL SEPARATION**	**53**
8.1.	Test Setup	53
8.2.	Limit	53
8.3.	Test Procedure	53
8.4.	Uncertainty	53
8.5.	Test Result of Channel Separation	54
9.	**DWELL TIME**	**58**
9.1.	Test Setup	58
9.2.	Limit	58
9.3.	Test Procedure	58
9.4.	Uncertainty	58
9.5.	Test Result of Dwell Time	59
10.	**OCCUPIED BANDWIDTH**	**63**
10.1.	Test Setup	63

10.2. Limits....63
10.3. Test Procedure....63
10.4. Uncertainty....63
10.5. Test Result of Occupied Bandwidth....64
11. EMI REDUCTION METHOD DURING COMPLIANCE TESTING....68
Attachment 1: EUT Test Photographs
Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Data Collector
Trade Name	ARGOX
Model No.	PI-1060
FCC ID.	NBF-PI-1X60
Frequency Range	2402 – 2480MHz
Channel Number	79
Type of Modulation	FHSS: GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)
Antenna Type	PIFA Antenna
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”
Base (Option)	1 Set
USB Cable	Shielded, 2.0m
RS232 Cable	Shielded, 2.0m
USB Power Cable	Non-Shielded, 0.5m
Power Adapter (Option)	MFR: Powertron, M/N: PS1012-050HIB200 Input: AC 100-240V~50-60Hz 0.4A Output: 5V 2.0A Cable Out: Non-Shielded, 1.5m

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Auden	BT-0911	PIFA Antenna	-1.26dBi in 2.4 GHz

Note: The antenna of EUT conforms to FCC 15.203.

Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz	Channel 76:	2478 MHz
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz	Channel 77:	2479 MHz
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz	Channel 78:	2480 MHz
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

Note:

1. The EUT is a Data Collector with a built-in WLAN、Bluetooth transceiver, this report for Bluetooth.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. Bluetooth operation was evaluated at both 1Mb/s and 3Mb/s data rates. 2Mb/s data rate was found, through pre-testing, to produce emissions similar to those for 3Mb/s.

Test Mode	Mode 1: Transmit - 1Mbps Mode 2: Transmit - 3Mbps Mode 3: Charger Mode

1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Transmitter Mode

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	P62G	9TSGJC2	Non-Shielded, 1.8m
2	Test Fixture	CSR	N/A	N/A	N/A

Signal Cable Type		Signal cable Description
A	RS232 to USB Cable	Non-shielded, 1m
B	RS232 Cable	Shielded, 2m
C	USB Cable	Non-shielded, 1m
D	Signal Cable	Non-shielded, 0.3m

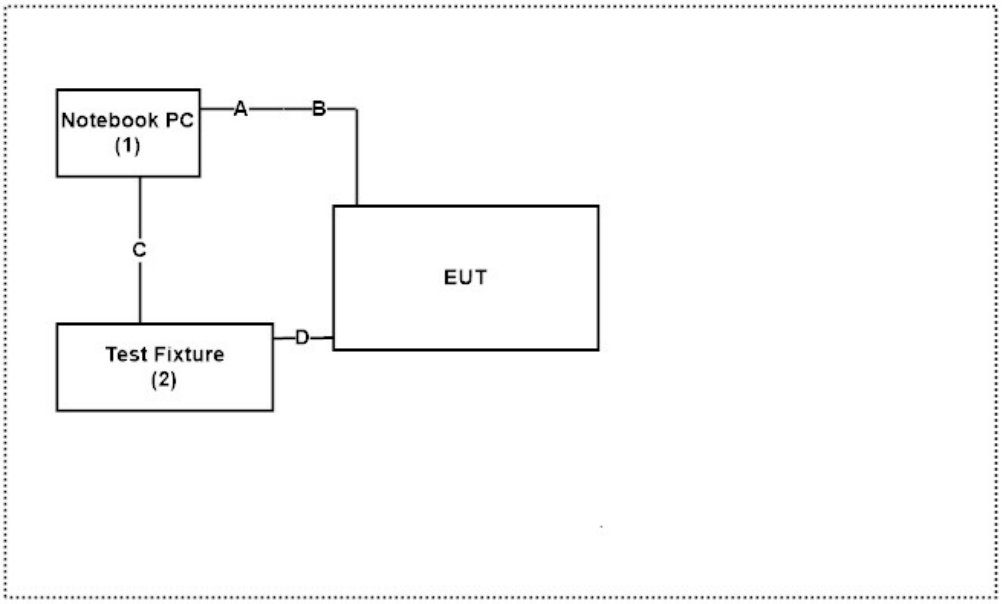
Charger Mode

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	P62G	9TSGJC2	Non-Shielded, 1.8m

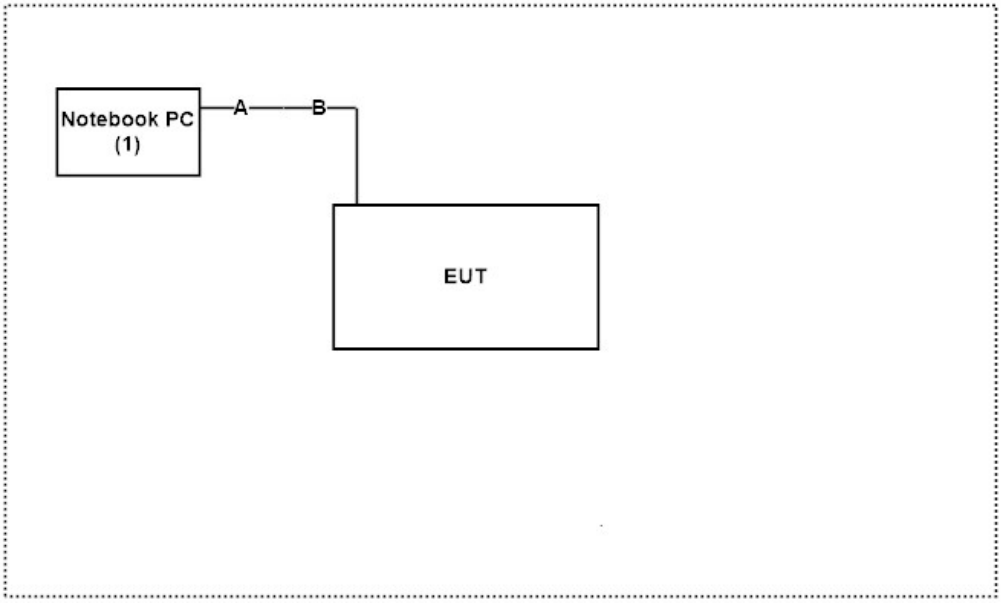
Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 2m

1.4. Configuration of Tested System

Transmitter Mode



Charger Mode



1.5. EUT Exercise Software

1. Setup the EUT as shown in Section 1.4.
2. Execute “Blue Suite 2.6.2” on the Notebook.
3. Configure the test mode, the test channel, and the data rate.
4. Press “OK” to start the continuous Transmit.
5. Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

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E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW0023

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	EMI Test Receiver	R&S	ESR7	101601	2018.02.08	2019.02.07
X	Two-Line V-Network	R&S	ENV216	101306	2018.03.09	2019.03.08
X	Two-Line V-Network	R&S	ENV216	101307	2018.03.20	2019.03.19
X	Coaxial Cable	Quietek	RG400_BNC	RF001	2018.05.24	2019.05.23

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

For Conducted measurements /ASR4

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103464	2018.01.23	2019.01.22
X	Power Meter	Anritsu	ML2496A	1548003	2017.12.11	2018.12.10
X	Power Sensor	Anritsu	MA2411B	1531024	2017.12.11	2018.12.10
X	Power Sensor	Anritsu	MA2411B	1531025	2017.12.11	2018.12.10
	Bluetooth Tester	R&S	CBT	101238	2018.01.18	2019.01.17

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek Conduction Test System V8.0.110

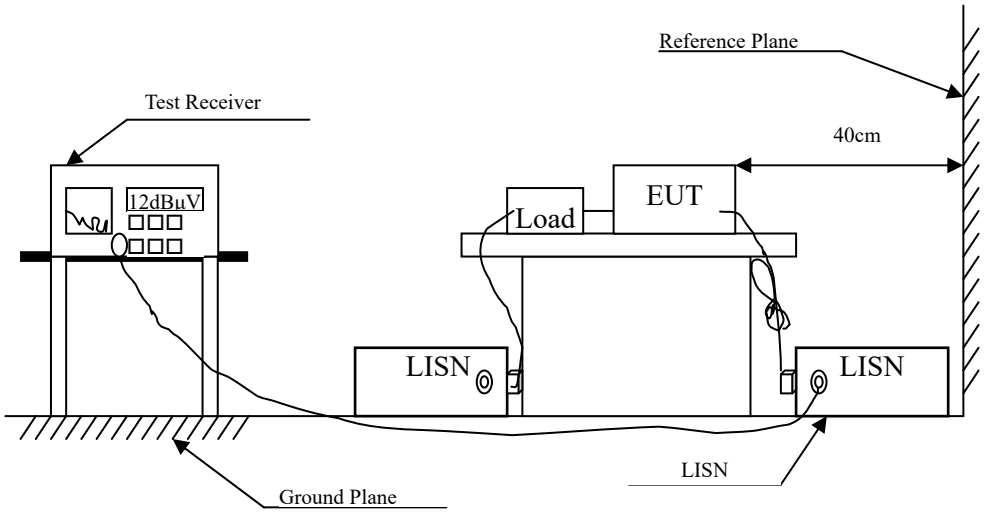
For Radiated measurements /ACB1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	TESEQ	HLA6121	37133	2018.01.26	2019.01.25
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2018.04.02	2019.04.01
X	Horn Antenna	ETS-Lindgren	3117	00203800	2017.11.10	2018.11.09
X	Horn Antenna	Com-Power	AH-840	101087	2018.06.01	2019.05.31
X	Pre-Amplifier	EMCI	EMC001330	980316	2018.06.01	2019.05.31
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2018.06.04	2019.06.03
X	Pre-Amplifier	EMCI	EMC05820SE	980310	2018.06.04	2019.06.03
X	Pre-Amplifier	EMCI	EMC184045SE	980314	2018.05.16	2019.05.15
X	Filter	MICRO TRONICS	BRM50702	G251	2017.08.30	2018.08.29
	Filter	MICRO TRONICS	BRM50716	G188	2017.08.30	2018.08.29
X	EMI Test Receiver	R&S	ESR7	101602	2017.12.11	2018.12.10
X	Spectrum Analyzer	R&S	FSV40	101148	2018.02.08	2019.02.07
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2018.05.25	2019.05.24
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2018.05.16	2019.05.15

Note:
1. Loop Antenna is calibrated every two year, the other equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT setup and the test procedure are according to ANSI C63.4, 2014 to comply with the requirements of FCC 47CFR Subpart C.

2.4. Uncertainty

±2.35dB

2.5. Test Result of Conducted Emission

Product : Data Collector
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 3: Charger Mode
Test Date : 2017/03/27

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV	dB	dBμV
LINE 1					
Quasi-Peak					
0.152	9.561	27.662	37.223	-28.720	65.943
0.332	9.569	15.265	24.834	-35.966	60.800
0.483	9.579	15.677	25.256	-31.230	56.486
0.685	9.580	11.622	21.202	-34.798	56.000
2.675	9.587	18.535	28.122	-27.878	56.000
24.576	9.690	26.261	35.951	-24.049	60.000
Average					
0.152	9.561	11.527	21.088	-34.855	55.943
0.332	9.569	0.593	10.162	-40.638	50.800
0.483	9.579	0.582	10.161	-36.325	46.486
0.685	9.580	2.536	12.116	-33.884	46.000
2.675	9.587	12.930	22.517	-23.483	46.000
24.576	9.690	24.549	34.239	-15.761	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Data Collector
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 3: Charger Mode
Test Date : 2017/03/27

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 2					
Quasi-Peak					
0.152	9.552	27.412	36.963	-28.980	65.943
0.328	9.565	17.189	26.754	-34.160	60.914
0.474	9.570	20.059	29.628	-27.115	56.743
0.683	9.579	20.898	30.477	-25.523	56.000
2.299	9.583	20.356	29.939	-26.061	56.000
24.576	9.730	34.597	44.327	-15.673	60.000
Average					
0.152	9.552	14.013	23.565	-32.378	55.943
0.328	9.565	8.545	18.110	-32.804	50.914
0.474	9.570	4.224	13.793	-32.950	46.743
0.683	9.579	14.268	23.847	-22.153	46.000
2.299	9.583	13.380	22.963	-23.037	46.000
24.576	9.730	33.583	43.313	-6.687	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Data Collector
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 2: Transmit - 3Mbps (2441MHz)
Test Date : 2017/03/06

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 1					
Quasi-Peak					
0.154	9.561	24.200	33.760	-32.126	65.886
0.200	9.560	25.597	35.157	-29.414	64.571
0.330	9.568	13.920	23.488	-37.369	60.857
0.530	9.580	13.517	23.097	-32.903	56.000
1.367	9.580	8.384	17.964	-38.036	56.000
2.700	9.587	20.335	29.922	-26.078	56.000
Average					
0.154	9.561	13.605	23.165	-32.721	55.886
0.200	9.560	11.143	20.703	-33.868	54.571
0.330	9.568	-0.305	9.263	-41.594	50.857
0.530	9.580	0.748	10.328	-35.672	46.000
1.367	9.580	-0.357	9.223	-36.777	46.000
2.700	9.587	14.534	24.121	-21.879	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Data Collector
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 2: Transmit - 3Mbps (2441MHz)
Test Date : 2017/03/06

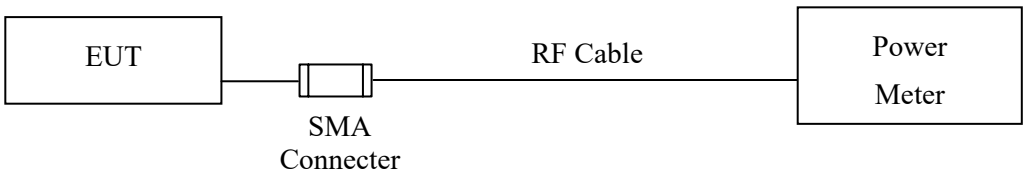
Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 2					
Quasi-Peak					
0.170	9.554	24.397	33.951	-31.478	65.429
0.340	9.565	18.807	28.372	-32.199	60.571
0.490	9.570	16.000	25.570	-30.716	56.286
0.960	9.580	10.483	20.063	-35.937	56.000
2.239	9.582	19.903	29.485	-26.515	56.000
2.751	9.588	22.395	31.982	-24.018	56.000
Average					
0.170	9.554	11.139	20.693	-34.736	55.429
0.340	9.565	6.380	15.945	-34.626	50.571
0.490	9.570	6.800	16.370	-29.916	46.286
0.960	9.580	1.422	11.002	-34.998	46.000
2.239	9.582	14.159	23.741	-22.259	46.000
2.751	9.588	15.508	25.095	-20.905	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

3.1. Test Setup



3.2. Limit

The maximum peak power shall be less 1Watt.

3.3. Test Procedure

Tested according to FHSS test procedure of KDB 558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

3.4. Uncertainty

±0.86 dB

3.5. Test Result of Peak Power Output

Product : Data Collector
Test Item : Peak Power Output
Test Mode : Mode 1: Transmit - 1Mbps
Test Date : 2017/03/24

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	3.82	1 Watt= 30 dBm	Pass
Channel 39	2441.00	3.67	1 Watt= 30 dBm	Pass
Channel 78	2480.00	3.46	1 Watt= 30 dBm	Pass

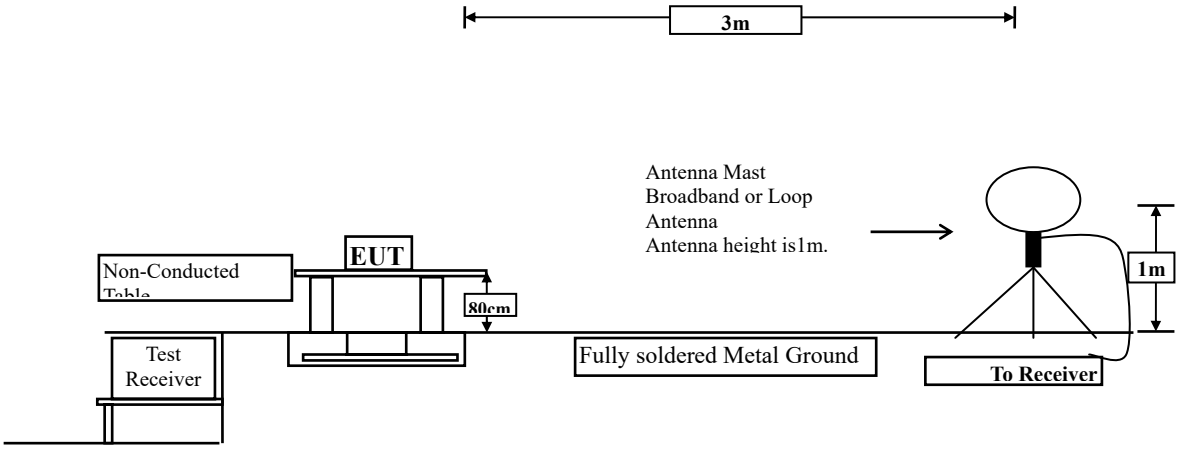
Product : Data Collector
Test Item : Peak Power Output
Test Mode : Mode 2: Transmit - 3Mbps
Test Date : 2017/03/24

Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit	Result
Channel 00	2402.00	2.22	1 Watt= 30 dBm	Pass
Channel 39	2441.00	1.93	1 Watt= 30 dBm	Pass
Channel 78	2480.00	1.64	1 Watt= 30 dBm	Pass

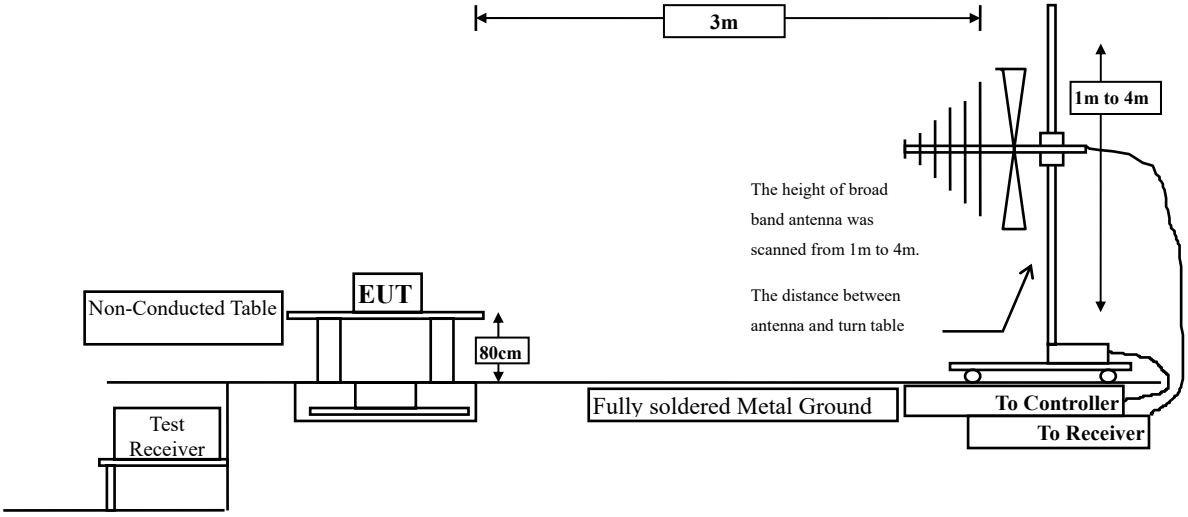
4. Radiated Emission

4.1. Test Setup

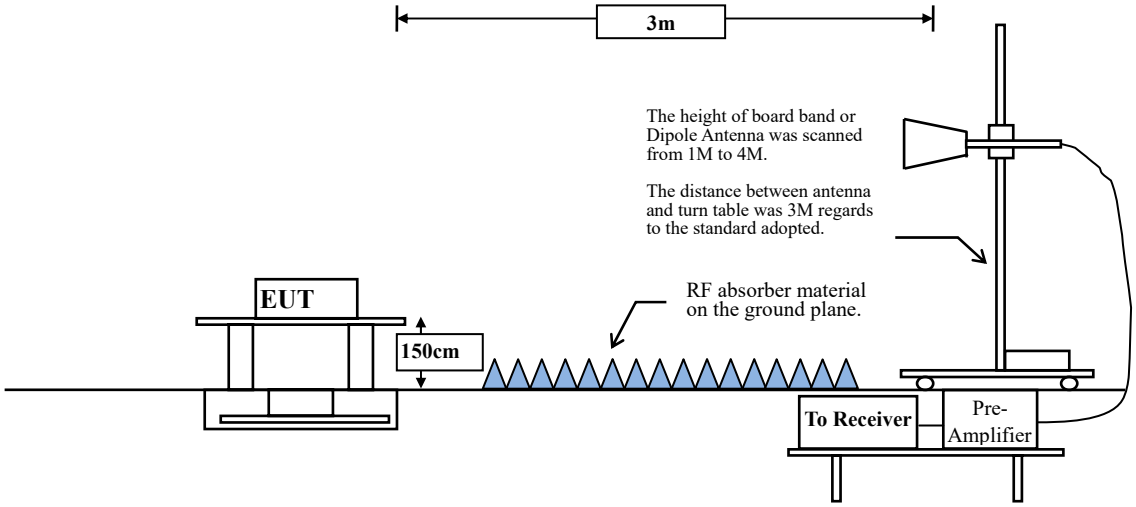
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.2. Limits

➢ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

4.4. Uncertainty

Horizontal polarization：

30-300MHz: ±4.08dB；300M-1GHz: ±3.86dB；1-18GHz: ±3.77dB；18-40GHz: ±3.98dB

Vertical polarization：

30-300MHz: ±4.81dB；300M-1GHz: ±3.87dB；1-18GHz：±3.83dB；18-40GHz: ±3.98dB

4.5. Test Result of Radiated Emission

Product : Data Collector
Test Item : Harmonic Radiated Emission
Test Mode : Mode 1: Transmit - 1Mbps(2402MHz)
Test Date : 2017/03/04

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4804.000	-6.114	53.210	47.096	-26.904	74.000
7206.000	-3.112	40.580	37.468	-36.532	74.000
9608.000	-0.801	36.230	35.430	-38.570	74.000
Average					
Detector:					
--					54.000
Vertical					
Peak Detector:					
4804.000	-6.114	54.100	47.986	-26.014	74.000
7206.000	-3.112	42.090	38.978	-35.022	74.000
9608.000	-0.801	36.510	35.710	-38.290	74.000
Average					
Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Data Collector
Test Item : Harmonic Radiated Emission
Test Mode : Mode 1: Transmit - 1Mbps(2441MHz)
Test Date : 2017/03/04

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4882.000	-6.066	51.800	45.734	-28.266	74.000
7323.000	-3.022	40.580	37.558	-36.442	74.000
9764.000	-0.522	34.710	34.187	-39.813	74.000
Average Detector:					
--					54.000
Vertical					
Peak Detector:					
4882.000	-6.066	52.260	46.194	-27.806	74.000
7323.000	-3.022	43.320	40.298	-33.702	74.000
9764.000	-0.522	35.040	34.517	-39.483	74.000
Average Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Data Collector
Test Item : Harmonic Radiated Emission
Test Mode : Mode 1: Transmit - 1Mbps(2480MHz)
Test Date : 2017/03/04

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4960.000	-6.055	47.160	41.105	-32.895	74.000
7440.000	-2.861	37.000	34.138	-39.862	74.000
9920.000	-0.306	34.960	34.654	-39.346	74.000
Average					
Detector:					
--					54.000
Vertical					
Peak Detector:					
4960.000	-6.055	51.760	45.705	-28.295	74.000
7440.000	-2.861	39.800	36.938	-37.062	74.000
9920.000	-0.306	35.410	35.104	-38.896	74.000
Average					
Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Data Collector
Test Item : Harmonic Radiated Emission
Test Mode : Mode 2: Transmit - 3Mbps(2402MHz)
Test Date : 2017/03/04

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
Peak Detector:					
4804.000	-6.114	44.980	38.866	-35.134	74.000
7206.000	-3.112	36.190	33.078	-40.922	74.000
9608.000	-0.801	35.950	35.150	-38.850	74.000
Average					
Detector:					
--					54.000
Vertical					
Peak Detector:					
4804.000	-6.114	45.500	39.386	-34.614	74.000
7206.000	-3.112	36.260	33.148	-40.852	74.000
9608.000	-0.801	35.880	35.080	-38.920	74.000
Average					
Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Data Collector
Test Item : Harmonic Radiated Emission
Test Mode : Mode 2: Transmit - 3Mbps (2441MHz)
Test Date : 2017/03/04

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
Peak Detector:					
4882.000	-6.066	43.850	37.784	-36.216	74.000
7323.000	-3.022	36.150	33.128	-40.872	74.000
9764.000	-0.522	34.520	33.997	-40.003	74.000
Average					
Detector:					
--					54.000
Vertical					
Peak Detector:					
4882.000	-6.066	44.120	38.054	-35.946	74.000
7323.000	-3.022	36.310	33.288	-40.712	74.000
9764.000	-0.522	34.600	34.077	-39.923	74.000
Average					
Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Data Collector
Test Item : Harmonic Radiated Emission
Test Mode : Mode 2: Transmit - 3Mbps (2480MHz)
Test Date : 2017/03/04

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
Peak Detector:					
4960.000	-6.055	40.480	34.425	-39.575	74.000
7440.000	-2.861	35.790	32.928	-41.072	74.000
9920.000	-0.306	34.810	34.504	-39.496	74.000
Average					
Detector:					
--					54.000
Vertical					
Peak Detector:					
4960.000	-6.055	43.330	37.275	-36.725	74.000
7440.000	-2.861	35.720	32.858	-41.142	74.000
9920.000	-0.306	34.970	34.664	-39.336	74.000
Average					
Detector:					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Data Collector
Test Item : General Radiated Emission
Test Mode : Mode 3: Charger Mode
Test Date : 2017/03/25

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
142.367	-11.010	47.239	36.228	-7.272	43.500
251.296	-11.783	47.244	35.462	-10.538	46.000
368.497	-8.461	45.686	37.225	-8.775	46.000
482.336	-5.852	39.341	33.489	-12.511	46.000
605.897	-3.286	38.955	35.669	-10.331	46.000
787.294	-0.809	36.823	36.014	-9.986	46.000
Vertical					
207.433	-13.338	47.265	33.928	-9.572	43.500
310.267	-9.852	46.964	37.113	-8.887	46.000
416.055	-7.210	43.928	36.718	-9.282	46.000
636.852	-3.035	36.408	33.374	-12.626	46.000
770.198	-1.004	37.029	36.024	-9.976	46.000
910.498	0.651	36.468	37.119	-8.881	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : Data Collector
Test Item : General Radiated Emission
Test Mode : Mode 1: Transmit - 1Mbps (2441MHz)
Test Date : 2017/03/04

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBμV	dBμV/m	dB	dBμV/m
Horizontal					
111.536	-14.233	46.134	31.901	-11.599	43.500
207.130	-13.623	51.795	38.172	-5.328	43.500
415.188	-7.703	39.408	31.705	-14.295	46.000
624.652	-3.907	39.130	35.224	-10.776	46.000
753.986	-2.055	36.272	34.217	-11.783	46.000
858.014	-0.862	33.965	33.103	-12.897	46.000
Vertical					
127.000	-12.697	43.621	30.924	-12.576	43.500
287.261	-10.752	41.562	30.810	-15.190	46.000
415.188	-7.703	42.211	34.508	-11.492	46.000
468.609	-6.541	40.560	34.019	-11.981	46.000
597.942	-4.103	34.552	30.448	-15.552	46.000
728.681	-2.496	35.872	33.376	-12.624	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : Data Collector
Test Item : General Radiated Emission
Test Mode : Mode 2: Transmit - 3Mbps (2441MHz)
Test Date : 2017/03/04

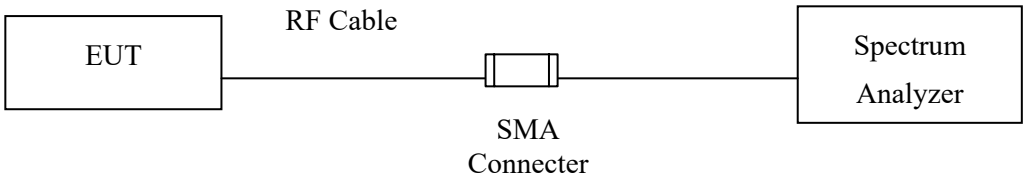
Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
127.000	-12.697	49.449	36.752	-6.748	43.500
224.000	-13.188	51.924	38.736	-7.264	46.000
415.188	-7.703	39.036	31.333	-14.667	46.000
572.638	-4.701	38.761	34.059	-11.941	46.000
649.957	-3.751	38.650	34.898	-11.102	46.000
806.000	-1.627	34.644	33.017	-12.983	46.000
Vertical					
111.536	-14.233	49.455	35.222	-8.278	43.500
207.130	-13.623	47.280	33.657	-9.843	43.500
287.261	-10.752	45.123	34.371	-11.629	46.000
415.188	-7.703	42.859	35.156	-10.844	46.000
572.638	-4.701	36.331	31.629	-14.371	46.000
806.000	-1.627	37.608	35.981	-10.019	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

5. RF Antenna Conducted Test

5.1. Test Setup



5.2. Limits

According to FCC Section 15.247(d). In any 100 kHz 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 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 measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.3. Test Procedure

Tested according to FHSS test procedure of KDB558074 section 9 b) for compliance to FCC 47CFR 15.247 requirements.

5.4. Uncertainty

±1.23dB

5.5. Test Result of RF Antenna Conducted Test

Product	:	Data Collector
Test Item	:	RF Antenna Conducted Test
Test Mode	:	Mode 1: Transmit - 1Mbps
Test Date	:	2017/02/10

Figure Channel 00:

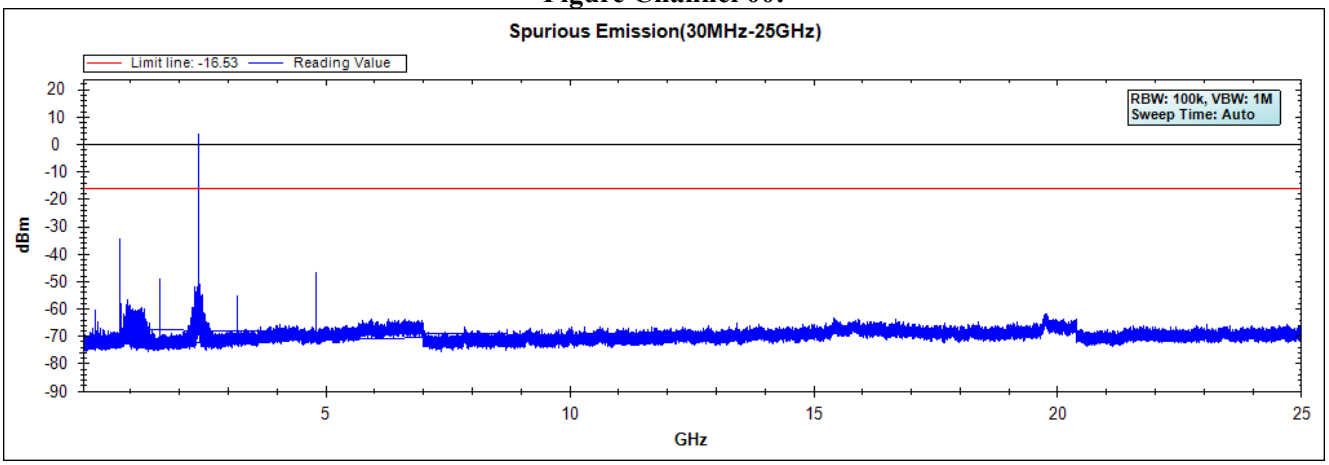


Figure Channel 39:

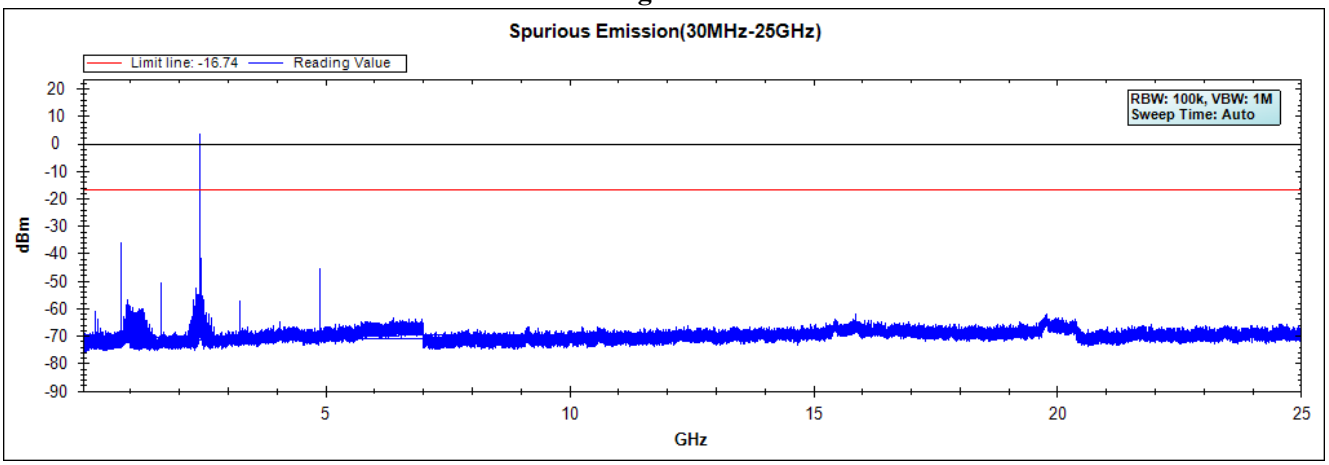
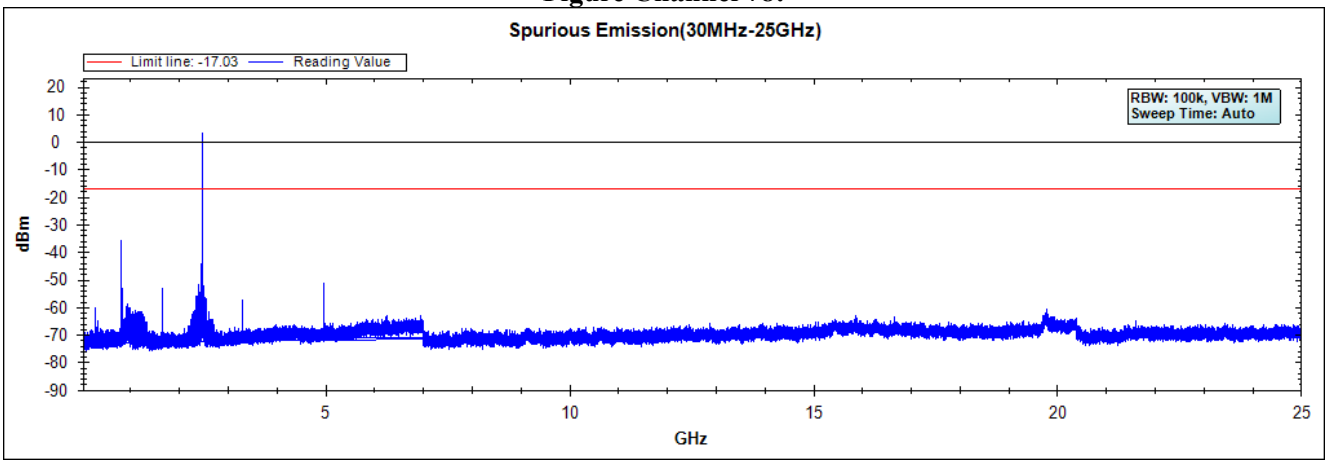


Figure Channel 78:



Note: The above test pattern is synthesized by multiple of the frequency range.

Product	:	Data Collector
Test Item	:	RF Antenna Conducted Test
Test Mode	:	Mode 2: Transmit - 3Mbps
Test Date	:	2017/02/10

Figure Channel 00:

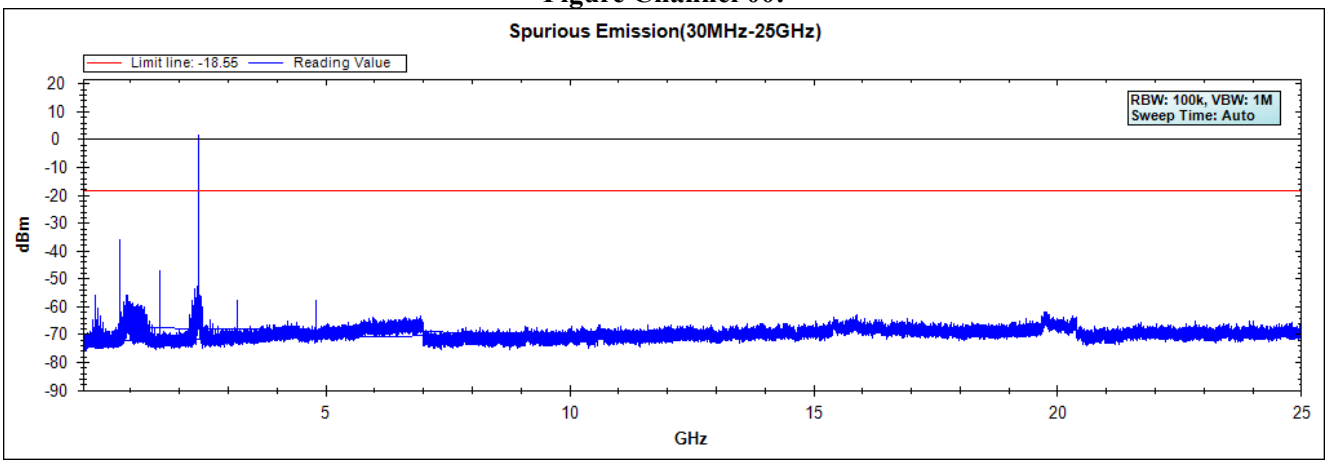


Figure Channel 39:

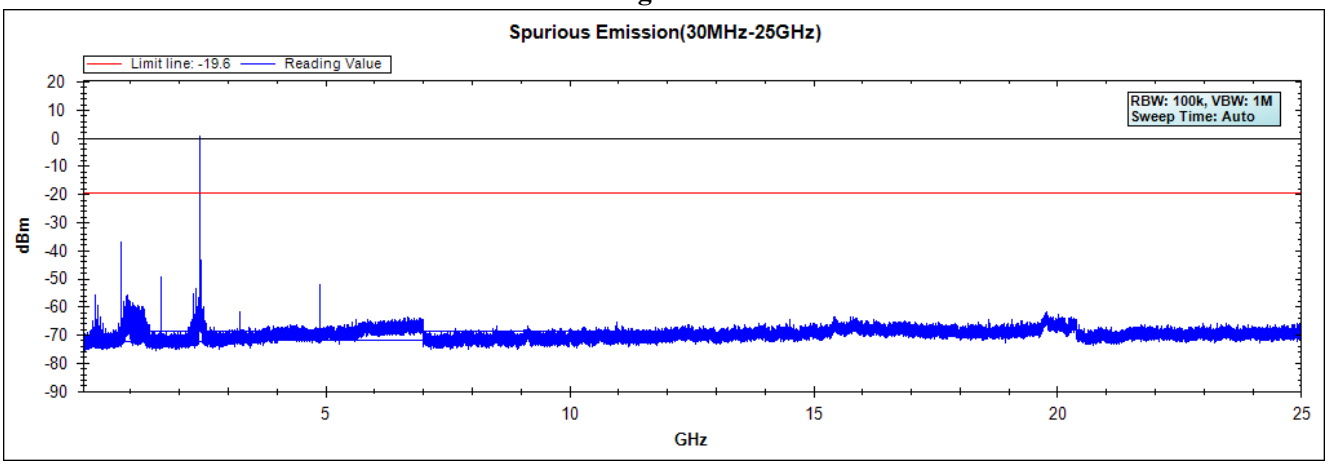
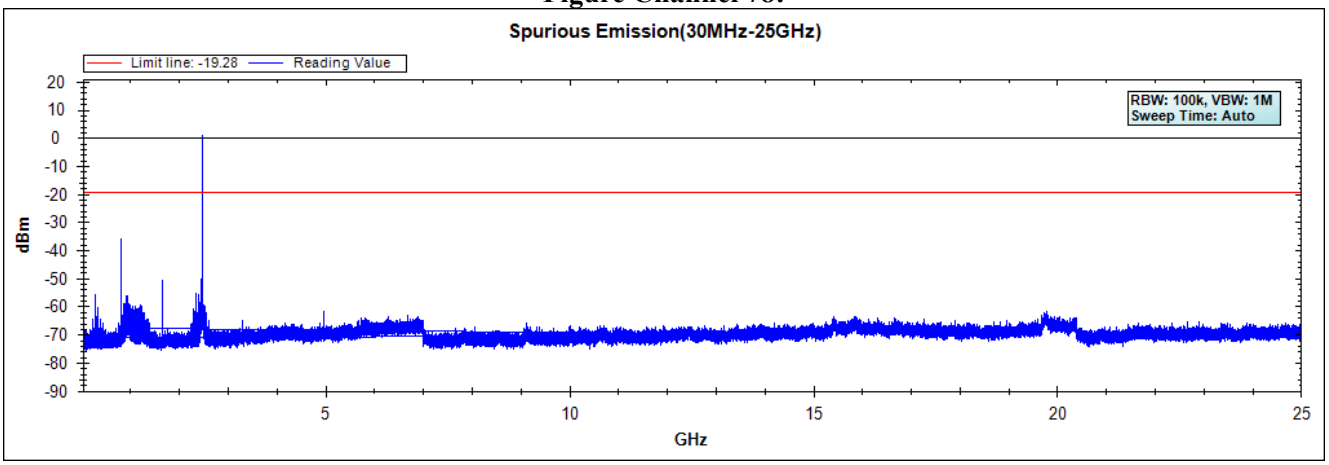


Figure Channel 78:

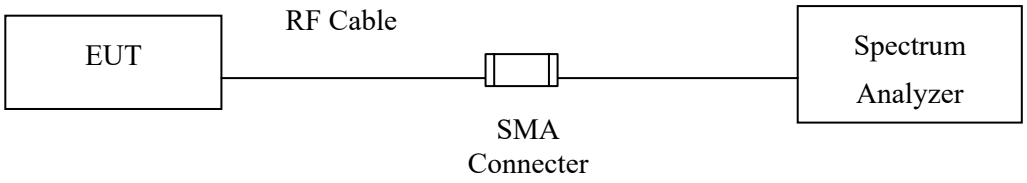


Note: The above test pattern is synthesized by multiple of the frequency range.

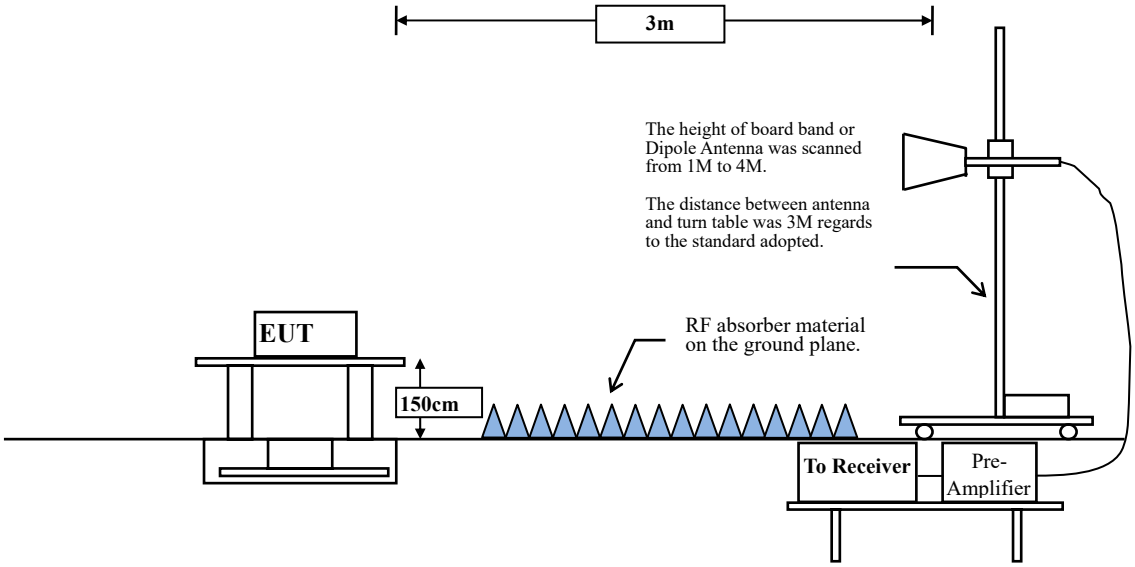
6. Band Edge

6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



6.2. Limit

According to FCC Section 15.247(d). In any 100 kHz 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 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 measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.3. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.
The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

6.4. Uncertainty

Conducted: ±1.23dB
Radiated:
Horizontal polarization：1-18GHz: ±3.77dB
Vertical polarization：1-18GHz : ±3.83dB

6.5. Test Result of Band Edge

Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 1: Transmit - 1Mbps (2402MHz)
Test Date : 2017/03/14

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
00 (Peak)	2385.652	10.244	42.840	53.084	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	37.190	47.452	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	56.224	66.527	--	--	--
00 (Peak)	2401.884	10.311	86.490	96.801	--	--	--
00 (Average)	2385.797	10.244	34.191	44.435	74.00	54.00	Pass
00 (Average)	2390.000	10.262	24.609	34.871	74.00	54.00	Pass
00 (Average)	2400.000	10.304	42.313	52.616	--	--	--
00 (Average)	2402.029	10.312	73.583	83.895	--	--	--

Figure Channel 00: Horizontal (Peak)

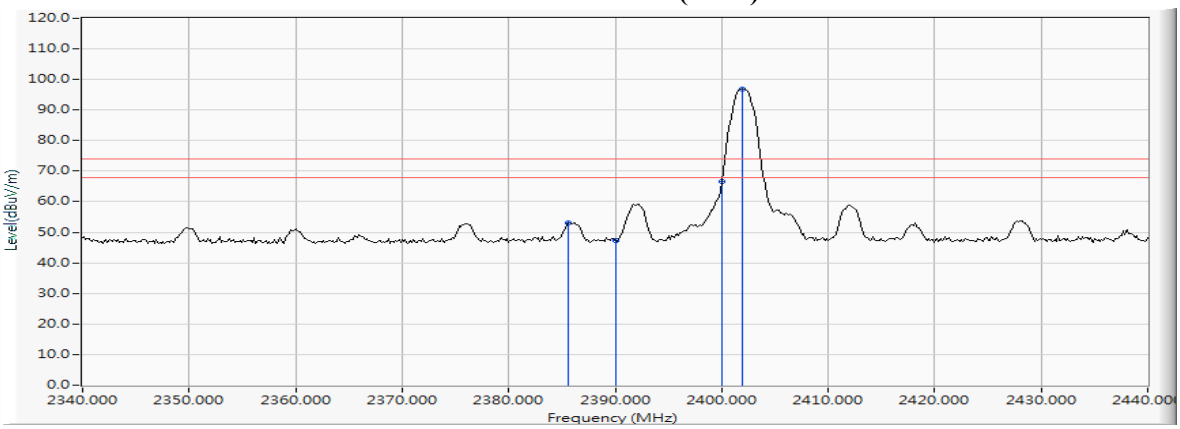
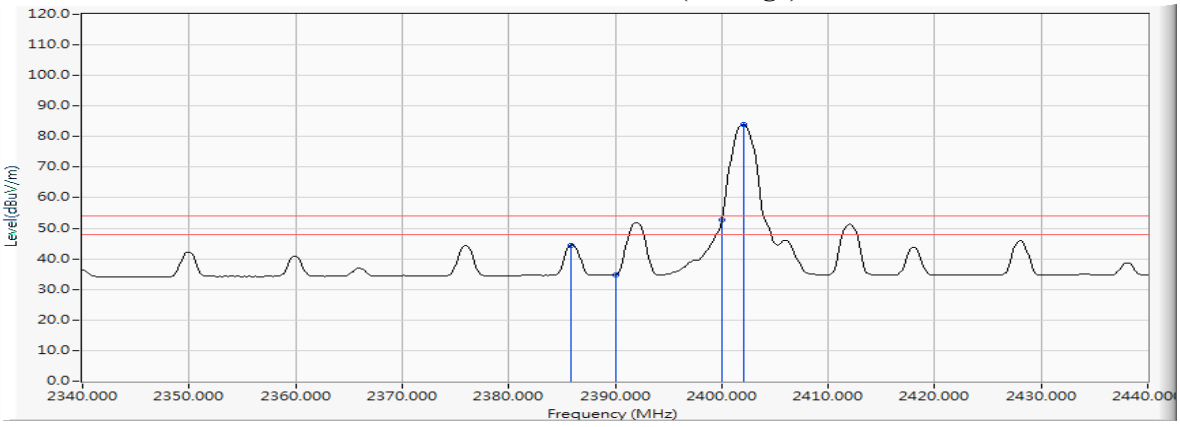


Figure Channel 00: Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correction Factor.
6. The average measurement was not performed when the peak measured data is under the limit of average detection.

Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 1: Transmit - 1Mbps (2402MHz)
Test Date : 2017/03/14

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Emission Level (dBµV/m)	Peak Limit (dBµV/m)	Arerage Limit (dBµV/m)	Result
00 (Peak)	2386.232	10.246	39.520	49.766	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	37.201	47.463	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	50.513	60.816	--	--	--
00 (Peak)	2401.884	10.311	80.940	91.251	--	--	--
00 (Average)	2386.087	10.245	27.562	37.807	74.00	54.00	Pass
00 (Average)	2390.000	10.262	24.291	34.553	74.00	54.00	Pass
00 (Average)	2400.000	10.304	39.435	49.739	--	--	--
00 (Average)	2402.029	10.312	68.568	78.968	--	--	--

Figure Channel 00: VERTICAL (Peak)

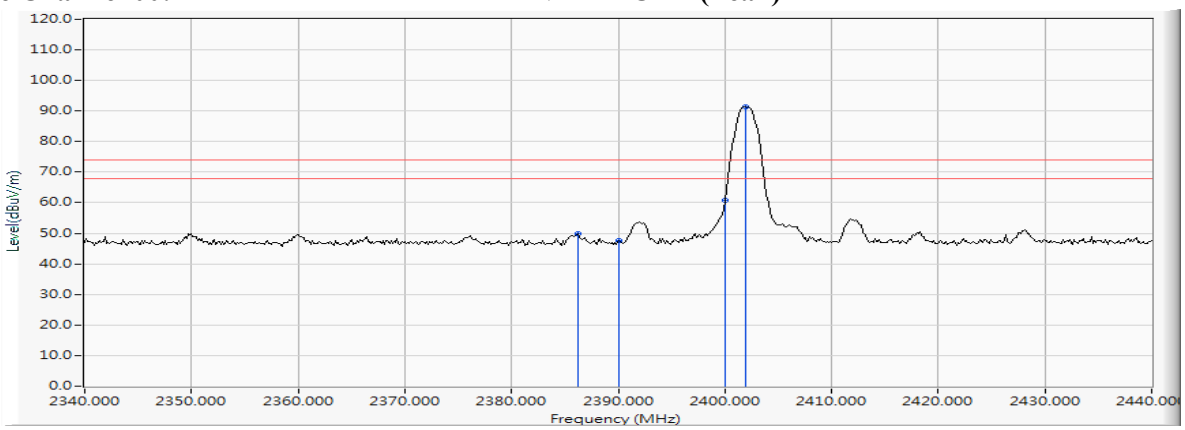
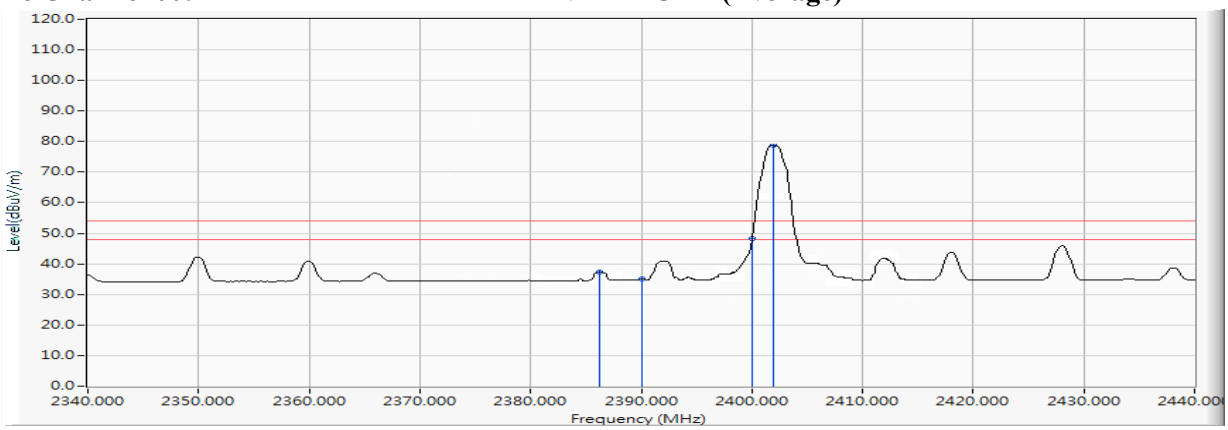


Figure Channel 00: VERTICAL (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correction Factor.
6. The average measurement was not performed when the peak measured data is under the limit of average detection.

Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 1: Transmit - 1Mbps (2480MHz)
Test Date : 2017/03/14

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
78 (Peak)	2480.022	10.628	86.956	97.584	--	--	--
78 (Peak)	2483.500	10.640	46.684	57.325	74.00	54.00	Pass
78 (Average)	2480.022	10.628	73.955	84.583	--	--	--
78 (Average)	2483.500	10.640	34.022	44.663	74.00	54.00	Pass
78 (Average)	2490.022	10.667	38.234	48.900	74.00	54.00	Pass

Figure Channel 78: Horizontal (Peak)

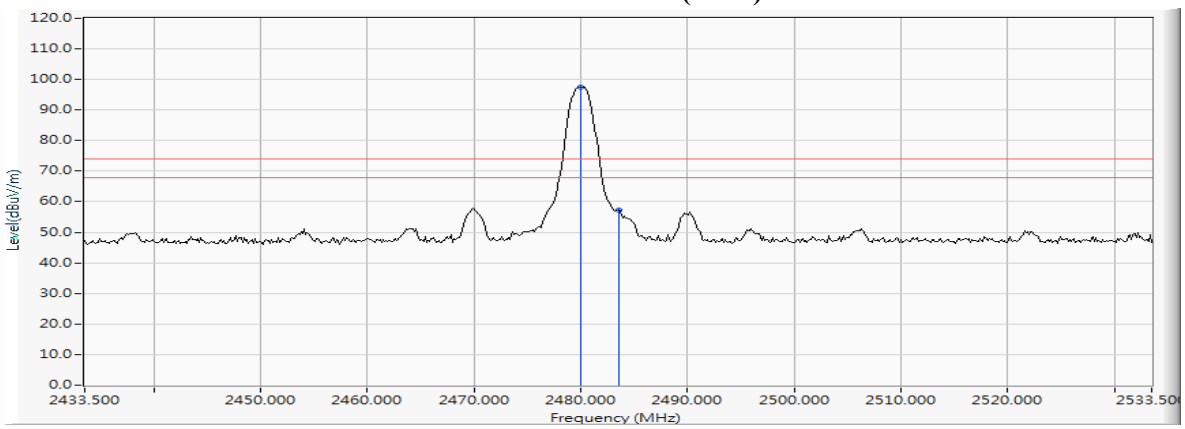
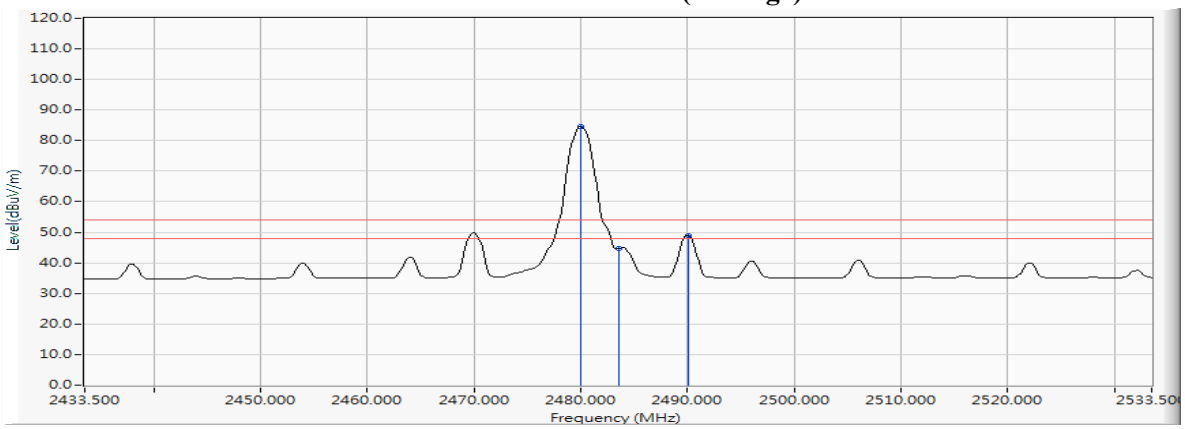


Figure Channel 78: Horizontal (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correction Factor.
6. The average measurement was not performed when the peak measured data is under the limit of average detection.

Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 1: Transmit - 1Mbps (2480MHz)
Test Date : 2017/03/14

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
78 (Peak)	2480.022	10.628	81.335	91.963	--	--	--
78 (Peak)	2483.500	10.640	42.556	53.197	74.00	54.00	Pass
78 (Peak)	2490.022	10.667	43.470	54.136	74.00	54.00	Pass
78 (Average)	2480.022	10.628	69.398	80.026	--	--	--
78 (Average)	2483.500	10.640	30.475	41.116	74.00	54.00	Pass
78 (Average)	2489.877	10.667	34.761	45.427	74.00	54.00	Pass

Figure Channel 78: VERTICAL (Peak)

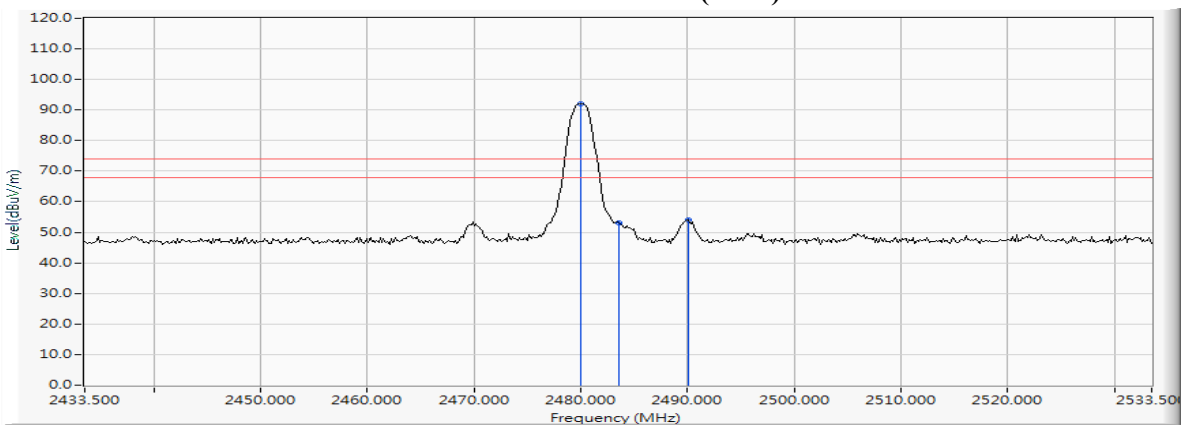
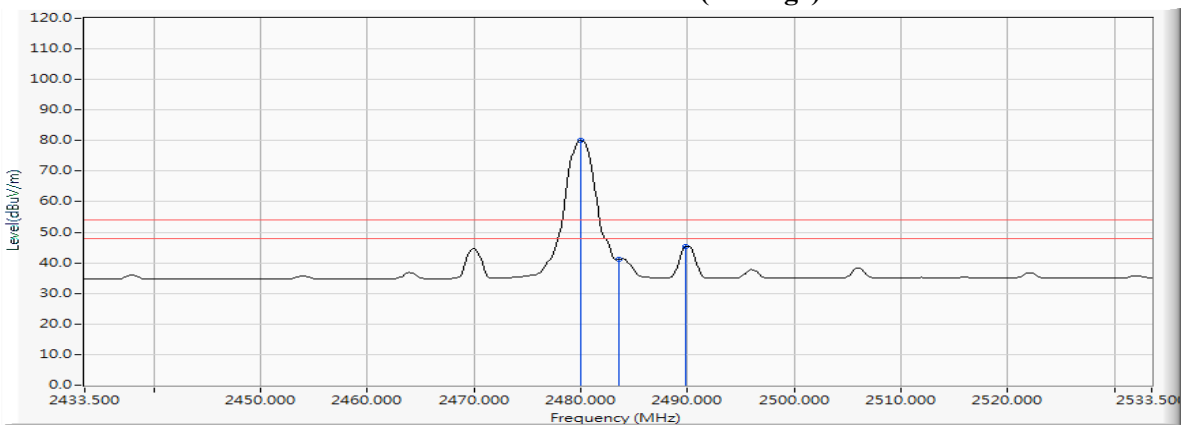


Figure Channel 78: VERTICAL (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correction Factor.
6. The average measurement was not performed when the peak measured data is under the limit of average detection.

Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 2: Transmit - 3Mbps (2402MHz)
Test Date : 2017/03/14

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
00 (Peak)	2385.797	10.244	41.176	51.420	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	37.400	47.662	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	59.315	69.618	--	--	--
00 (Peak)	2402.029	10.312	84.101	94.413	--	--	--
00 (Average)	2385.797	10.244	29.348	39.592	74.00	54.00	Pass
00 (Average)	2390.000	10.262	24.648	34.910	74.00	54.00	Pass
00 (Average)	2400.000	10.304	43.332	53.635	--	--	--
00 (Average)	2402.029	10.312	69.303	79.615	--	--	--

Figure Channel 00: Horizontal (Peak)

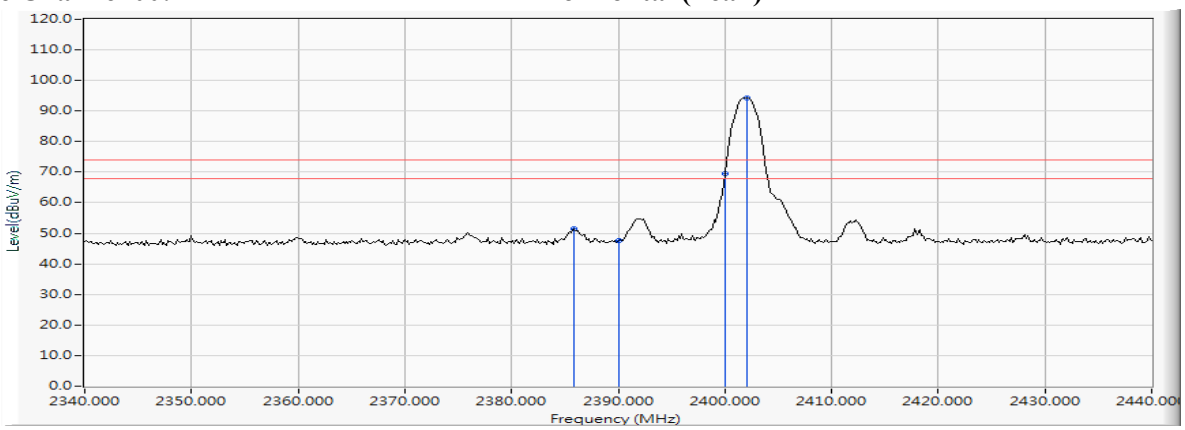
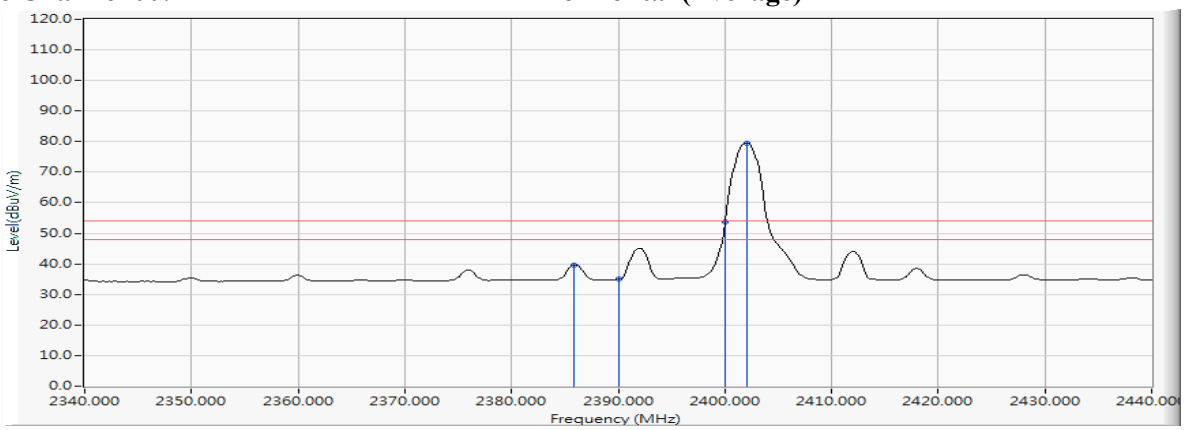


Figure Channel 00: Horizontal (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correction Factor.
6. The average measurement was not performed when the peak measured data is under the limit of average detection.

Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 2: Transmit - 3Mbps (2402MHz)
Test Date : 2017/03/14

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
00 (Peak)	2386.232	10.246	39.000	49.246	74.00	54.00	Pass
00 (Peak)	2390.000	10.262	36.815	47.077	74.00	54.00	Pass
00 (Peak)	2400.000	10.304	53.483	63.786	--	--	--
00 (Peak)	2402.029	10.312	78.393	88.705	--	--	--
00 (Average)	2386.087	10.245	26.033	36.279	74.00	54.00	Pass
00 (Average)	2390.000	10.262	24.239	34.501	74.00	54.00	Pass
00 (Average)	2400.000	10.304	38.855	49.158	--	--	--
00 (Average)	2402.029	10.312	64.645	74.957	--	--	--

Figure Channel 00: VERTICAL (Peak)

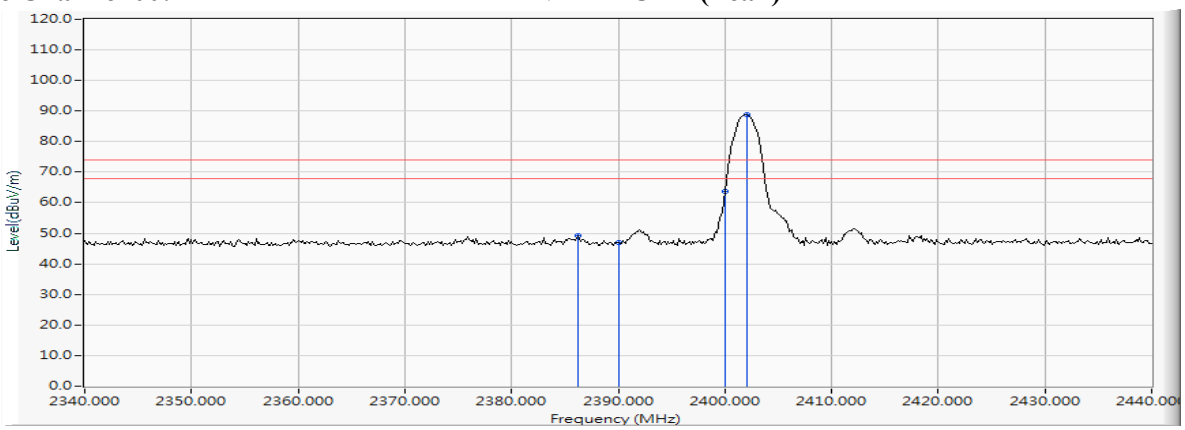
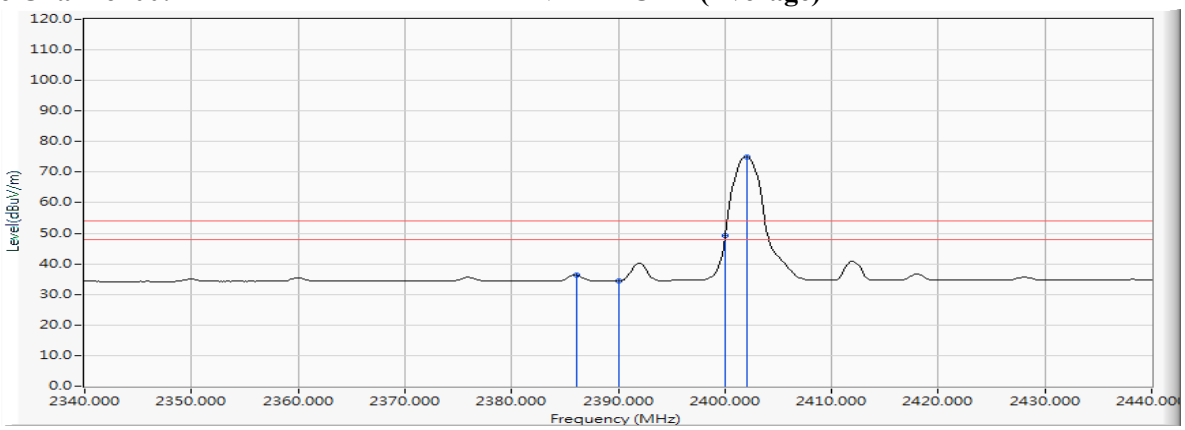


Figure Channel 00: VERTICAL (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correction Factor.
6. The average measurement was not performed when the peak measured data is under the limit of average detection.

Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 2: Transmit - 3Mbps (2480MHz)
Test Date : 2017/03/14

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
78 (Peak)	2480.022	10.628	84.713	95.341	--	--	--
78 (Peak)	2483.500	10.640	49.785	60.426	74.00	54.00	Pass
78 (Average)	2480.022	10.628	69.735	80.363	--	--	--
78 (Average)	2483.500	10.640	34.633	45.274	74.00	54.00	Pass

Figure Channel 00: Horizontal (Peak)

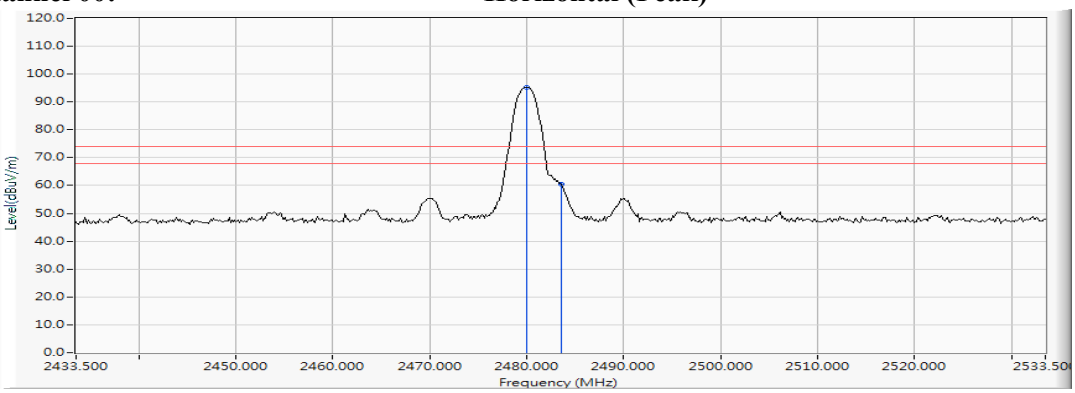
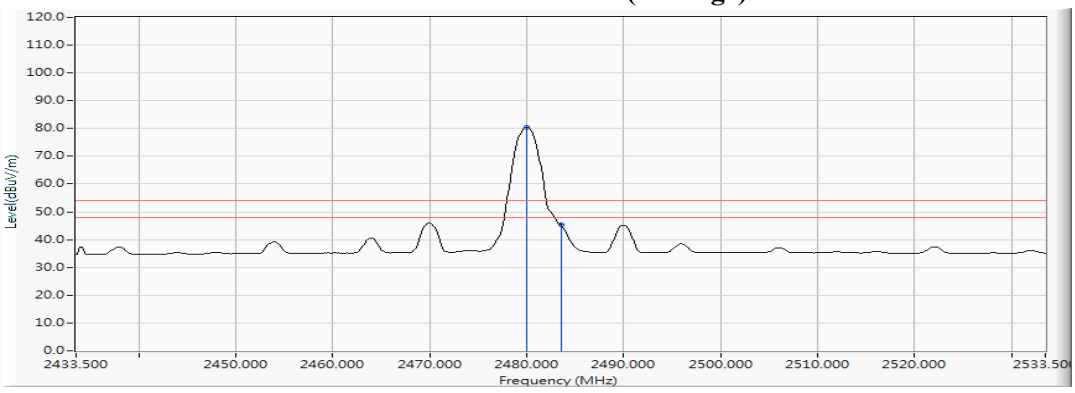


Figure Channel 00: Horizontal (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correction Factor.
6. The average measurement was not performed when the peak measured data is under the limit of average detection.

Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 2: Transmit - 3Mbps (2480MHz)
Test Date : 2017/03/14

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Arerage Limit (dBμV/m)	Result
78 (Peak)	2480.022	10.628	78.781	89.409	--	--	--
78 (Peak)	2483.500	10.640	45.406	56.047	74.00	54.00	Pass
78 (Average)	2480.022	10.628	64.939	75.567	--	--	--
78 (Average)	2483.500	10.640	30.690	41.331	74.00	54.00	Pass
78 (Average)	2490.167	10.667	30.882	41.549	74.00	54.00	Pass

Figure Channel 78: VERTICAL (Peak)

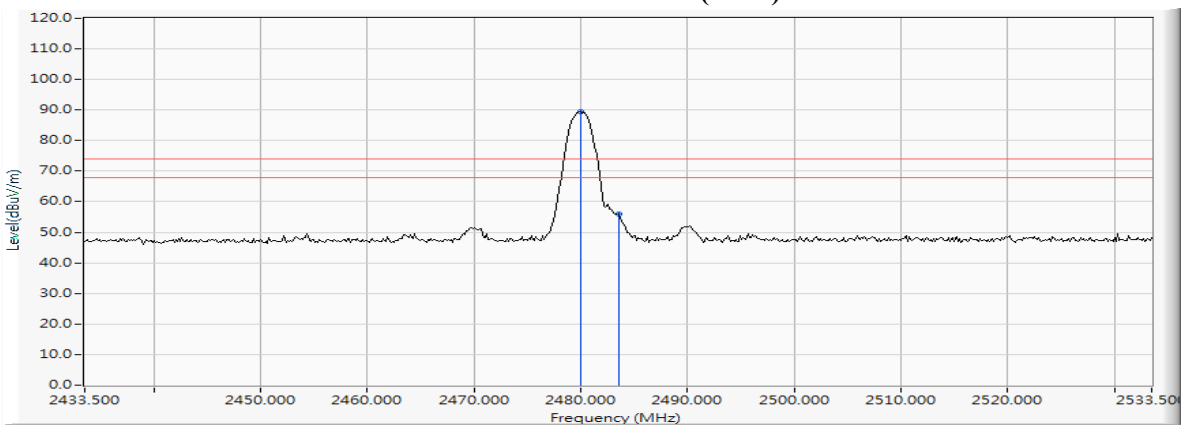
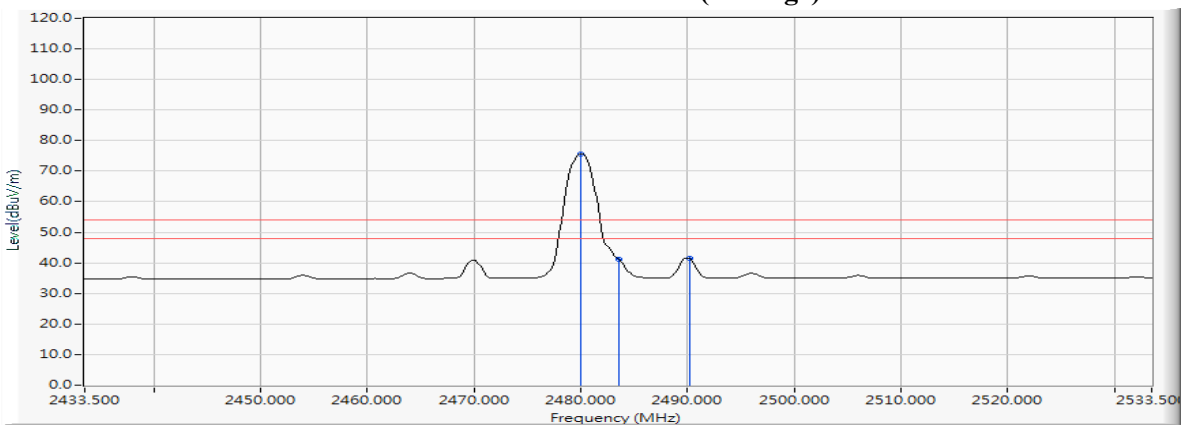


Figure Channel 78: VERTICAL (Average)



Note:
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correction Factor.
6. The average measurement was not performed when the peak measured data is under the limit of average detection.

Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 1: Transmit - 1Mbps(Hopping off)
Test Date : 2017/02/10

Measurement Level Δ (dB)	Result
> 20	PASS

Figure Channel 00:

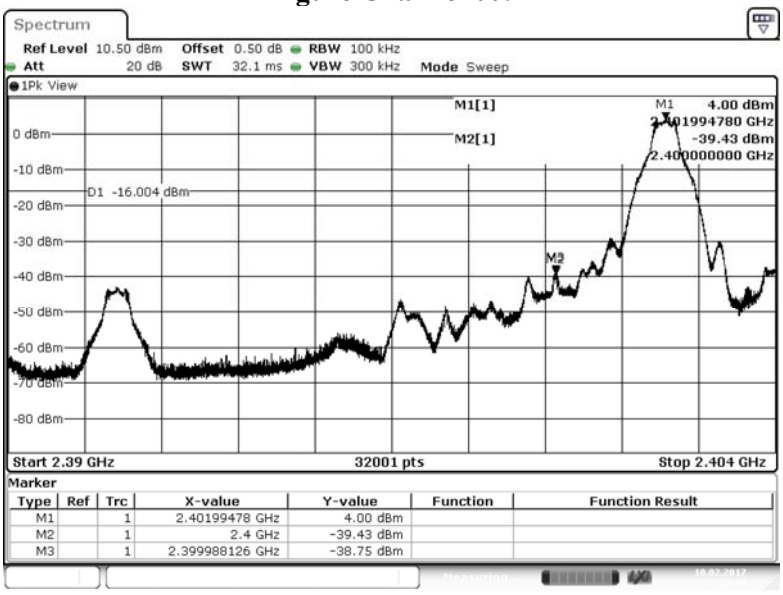
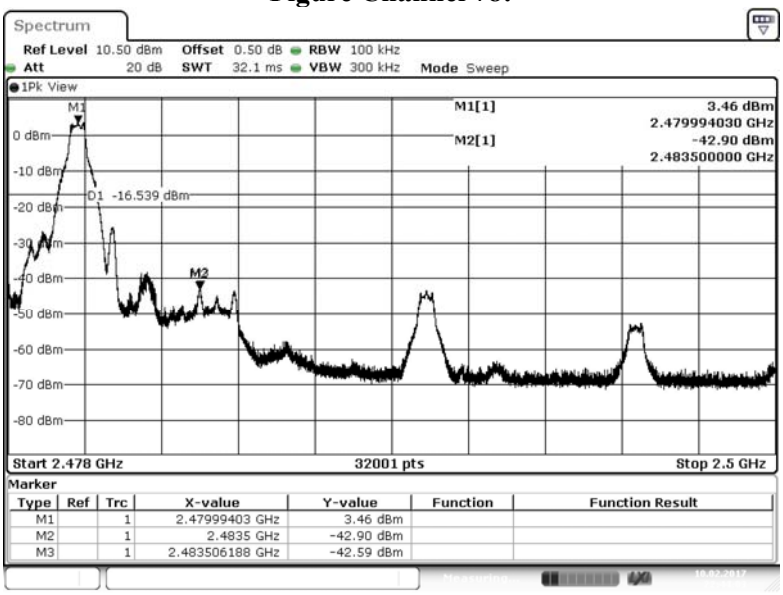


Figure Channel 78:



Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 2: Transmit - 3Mbps (Hopping off)
Test Date : 2017/02/10

Measurement Level Δ (dB)	Result
> 20	PASS

Figure Channel 00:

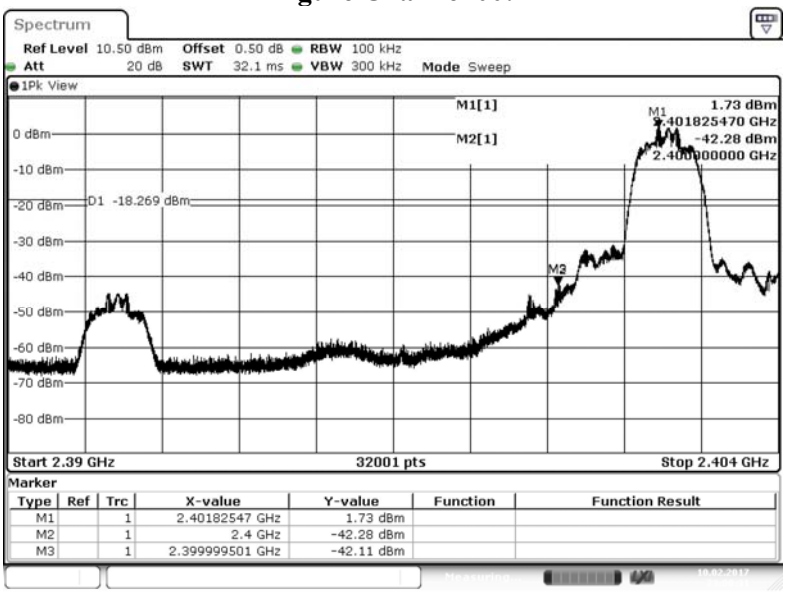
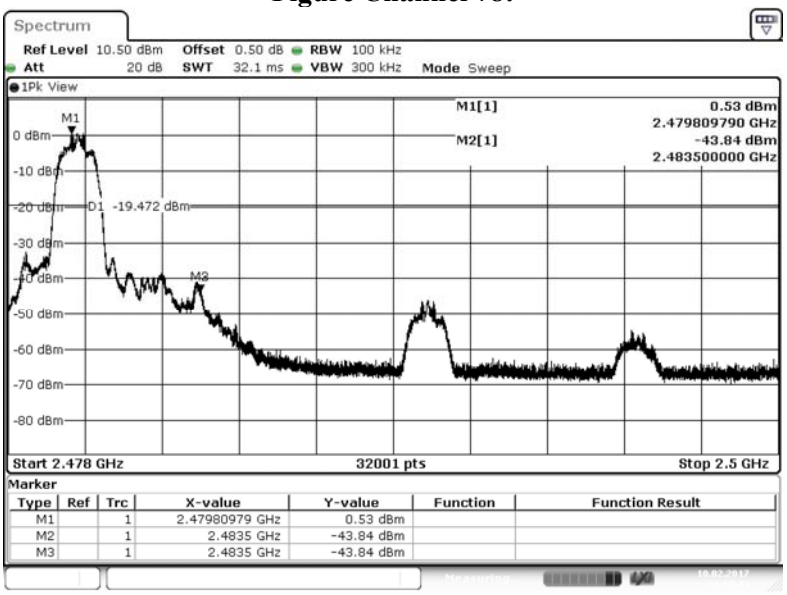


Figure Channel 78:



Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 1: Transmit - 1Mbps(Hopping on)
Test Date : 2017/02/10

Measurement Level Δ (dB)	Result
> 20	PASS

Figure Channel Hopping:

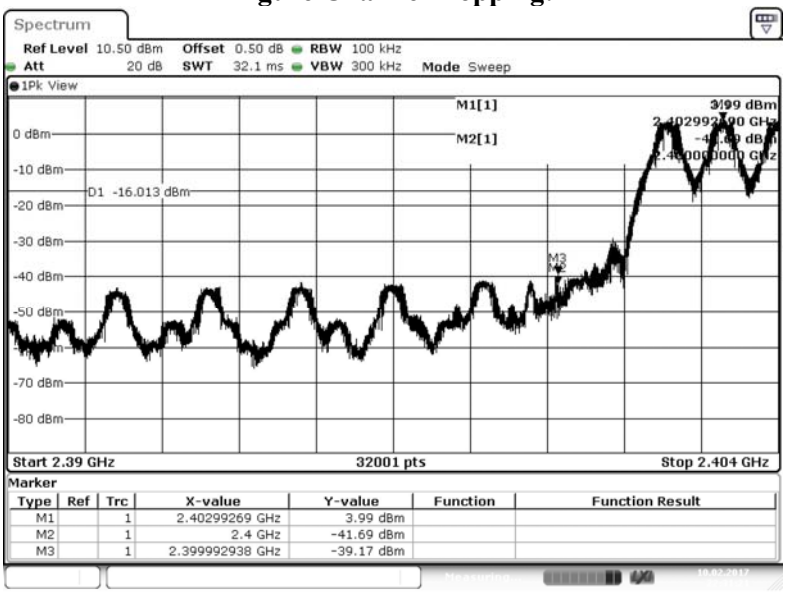
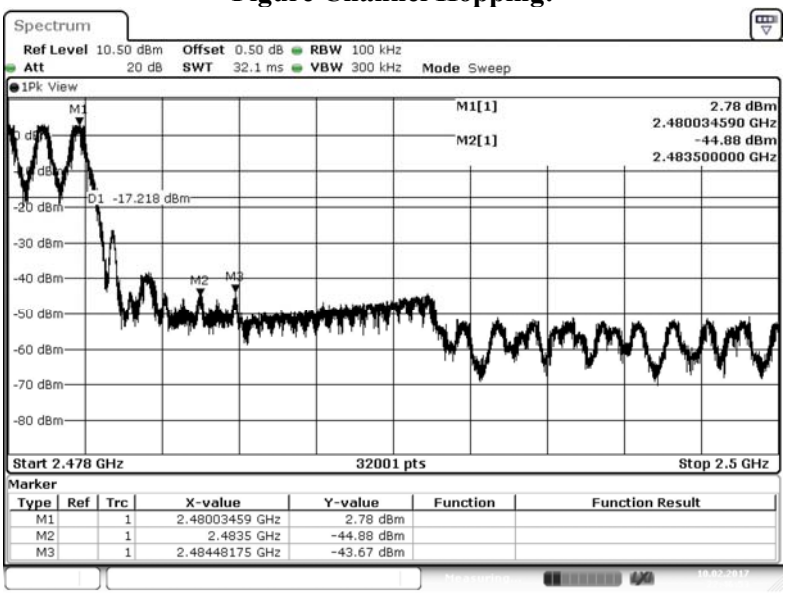


Figure Channel Hopping:



Product : Data Collector
Test Item : Band Edge
Test Mode : Mode 2: Transmit - 3Mbps (Hopping on)
Test Date : 2017/02/10

Measurement Level Δ (dB)	Result
> 20	PASS

Figure Channel Hopping:

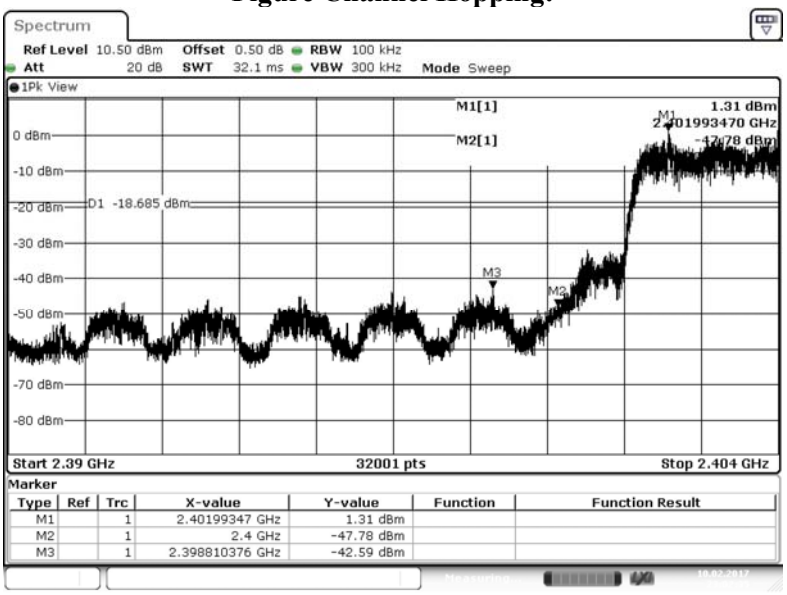
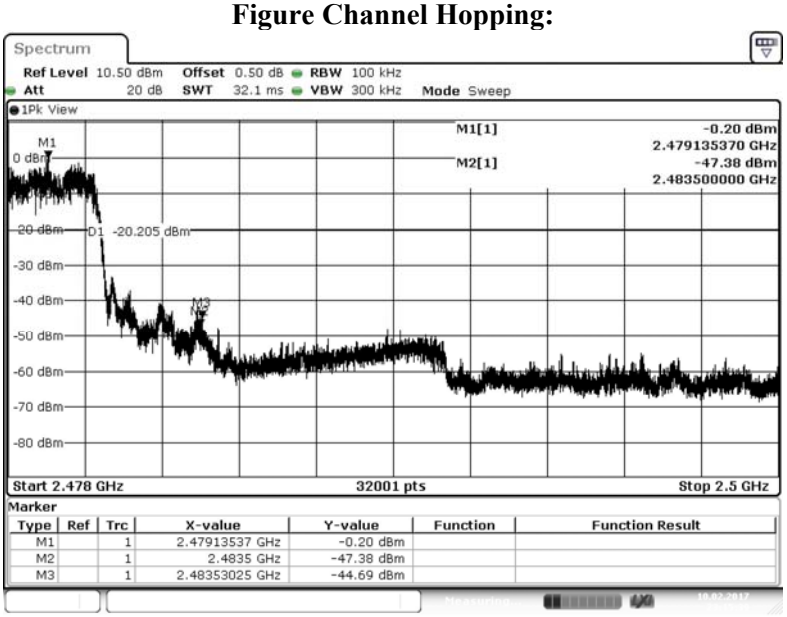
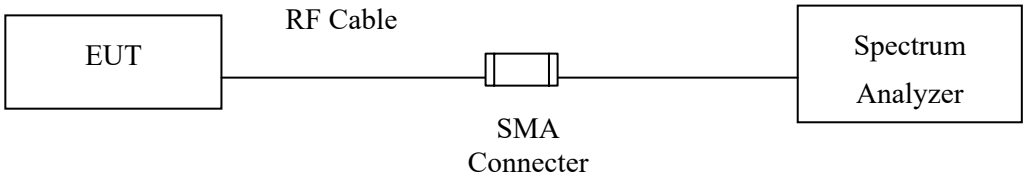


Figure Channel Hopping:



7. Channel Number

7.1. Test Setup



7.2. Limit

Frequency hopping systems operating in the 2400-2483.5 MHz bands shall use at least 75 hopping frequencies.

7.3. Test Procedure

Tested according to FHSS test procedure of KDB558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

7.4. Uncertainty

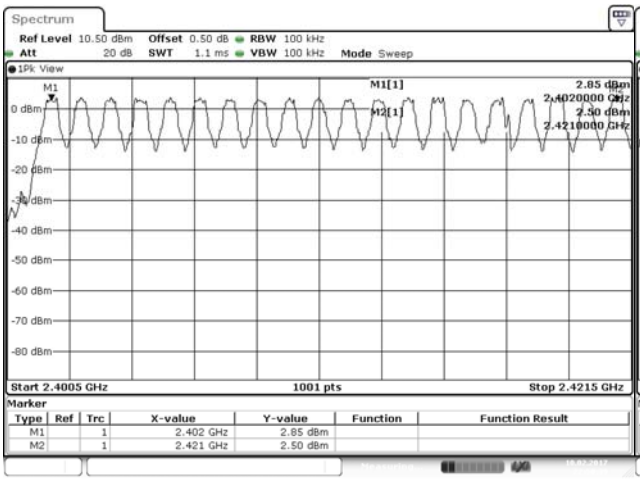
N/A

7.5. Test Result of Channel Number

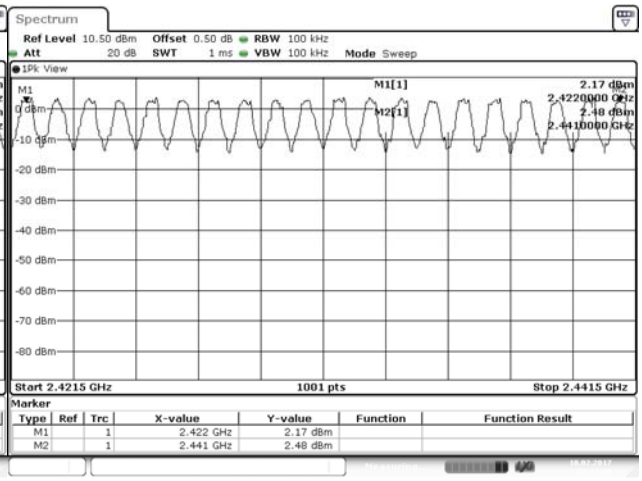
Product : Data Collector
Test Item : Channel Number
Test Mode : Mode 1: Transmit - 1Mbps
Test Date : 2017/02/10

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

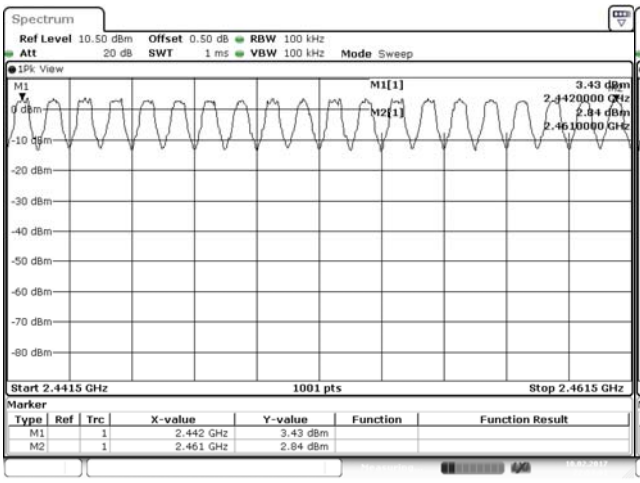
2402-2421MHz



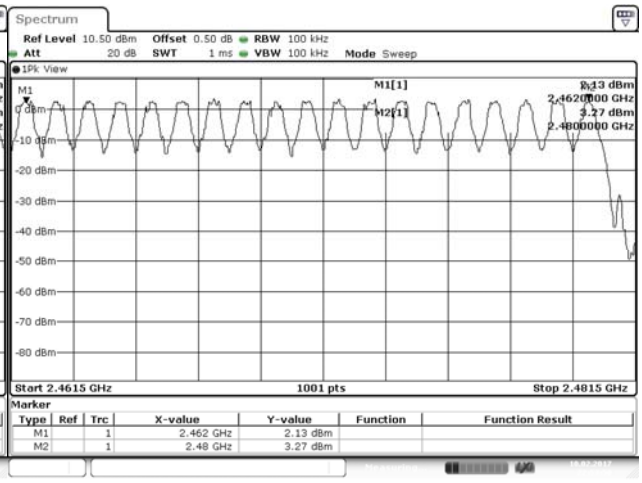
2422-2441MHz



2442-2461MHz



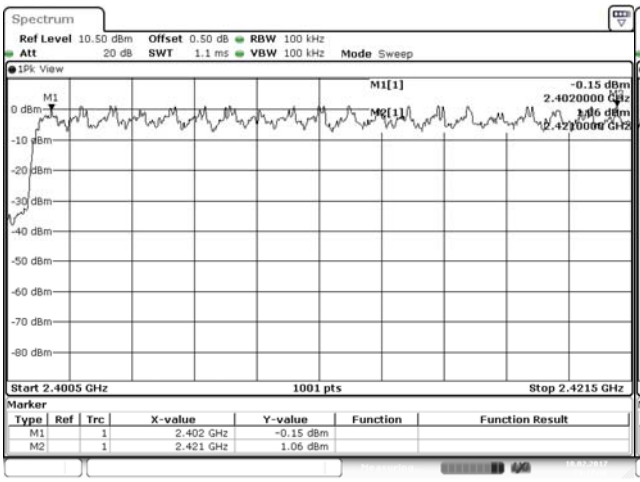
2462-2480MHz



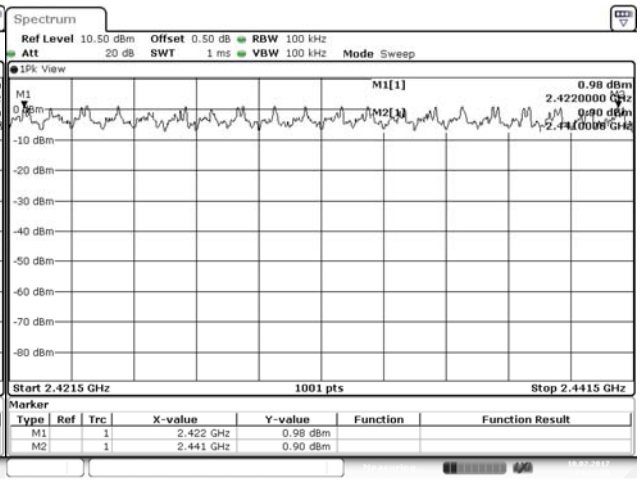
Product : Data Collector
Test Item : Channel Number
Test Mode : Mode 2: Transmit - 3Mbps
Test Date : 2017/02/10

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

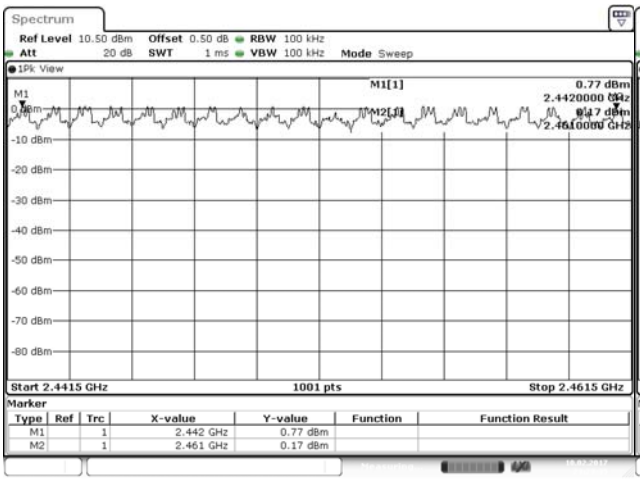
2402-2421MHz



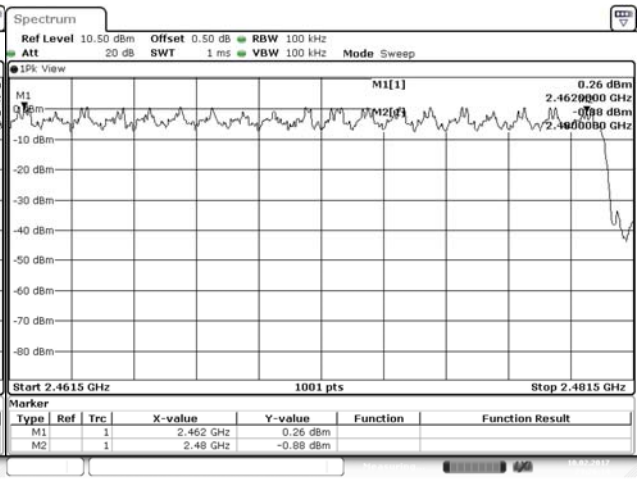
2422-2441MHz



2442-2461MHz

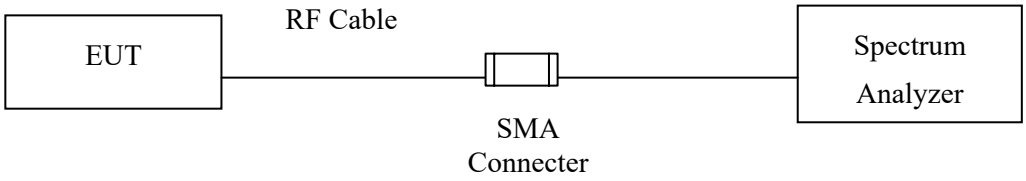


2462-2480MHz



8. Channel Separation

8.1. Test Setup



8.2. Limit

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.

8.3. Test Procedure

Tested according to FHSS test procedure of KDB558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

8.4. Uncertainty

±279.2Hz

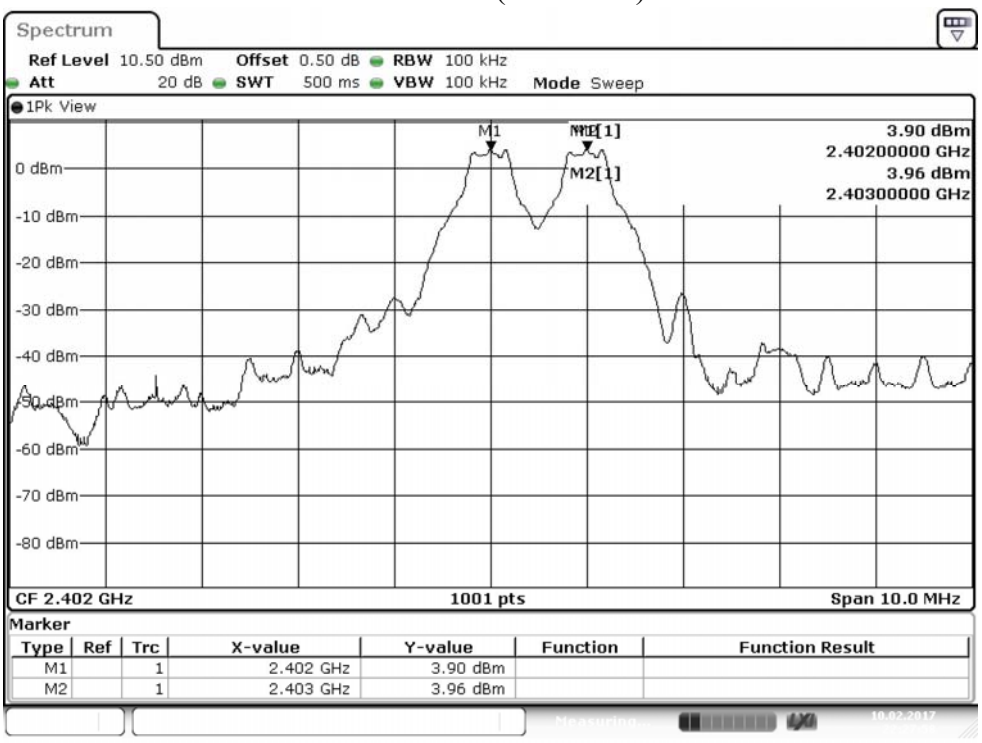
8.5. Test Result of Channel Separation

Product : Data Collector
Test Item : Channel Separation
Test Mode : Mode 1: Transmit - 1Mbps
Test Date : 2017/02/10

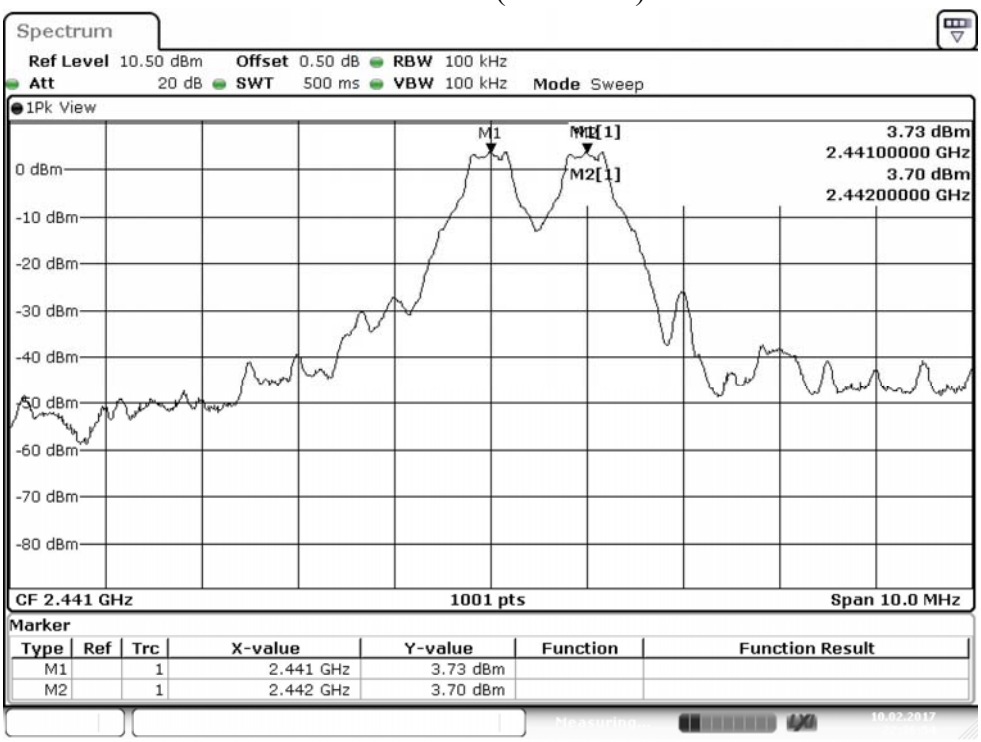
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
00	2402	1000	>25 kHz	628.0	Pass
39	2441	1000	>25 kHz	630.0	Pass
78	2480	1000	>25 kHz	630.0	Pass

NOTE: The 20dB Bandwidth is refer to section 10.

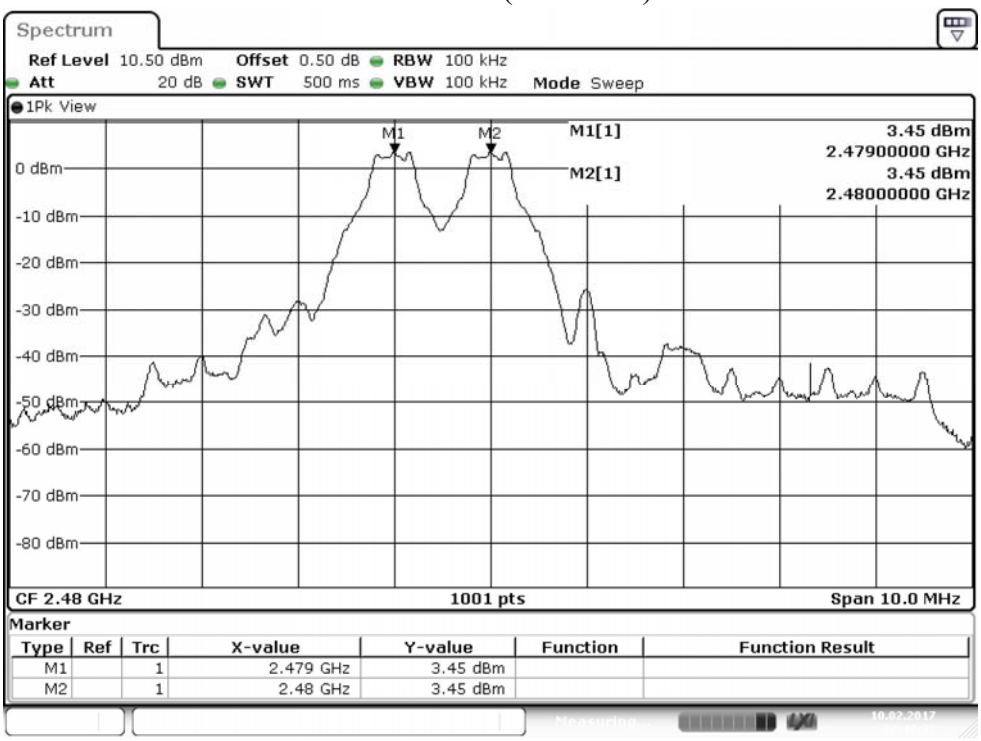
Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)

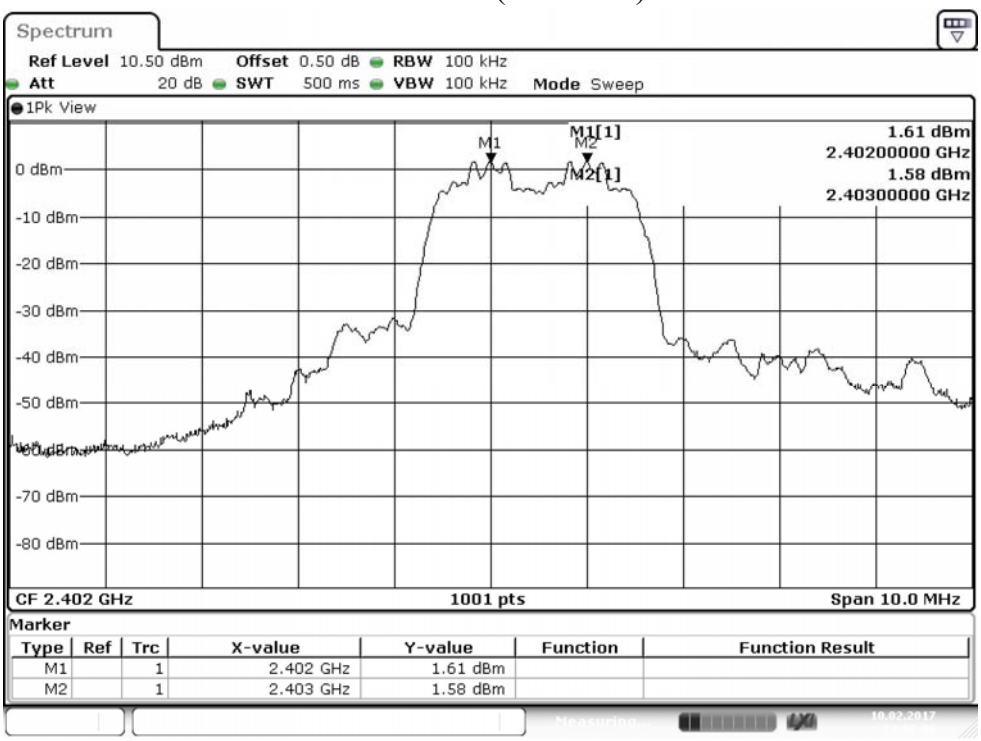


Product : Data Collector
Test Item : Channel Separation
Test Mode : Mode 2: Transmit - 3Mbps
Test Date : 2017/02/10

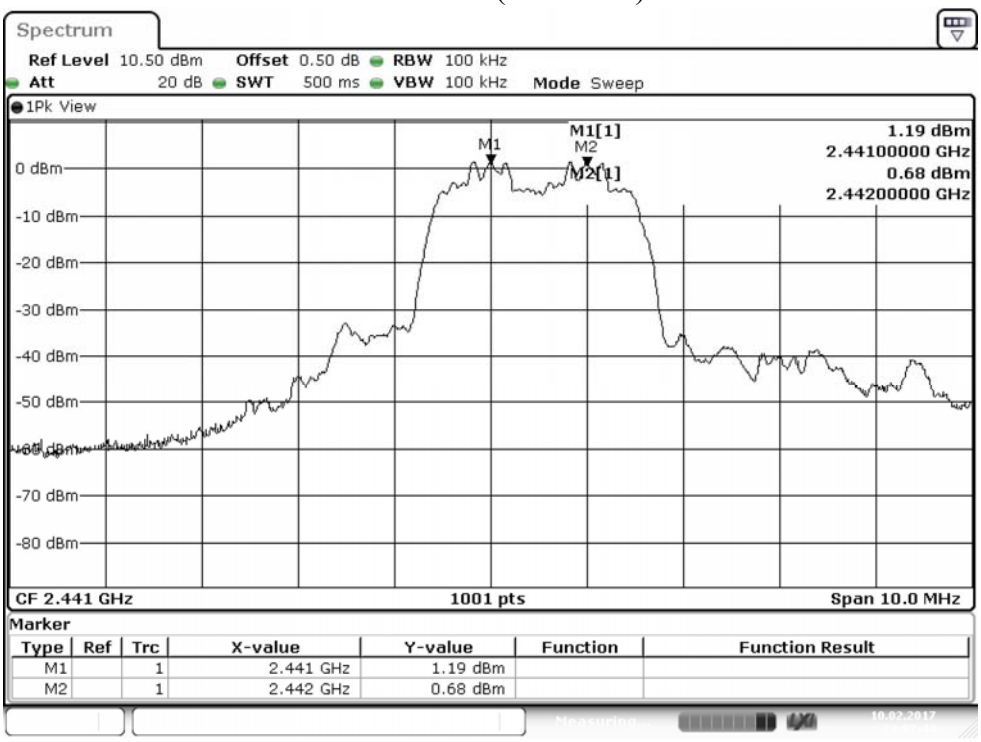
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Limit (kHz)	Limit of (2/3)*20dB Bandwidth (kHz)	Result
00	2402	1000	>25 kHz	842.0	Pass
39	2441	1000	>25 kHz	840.0	Pass
78	2480	1000	>25 kHz	840.0	Pass

NOTE: The 20dB Bandwidth is refer to section 10.

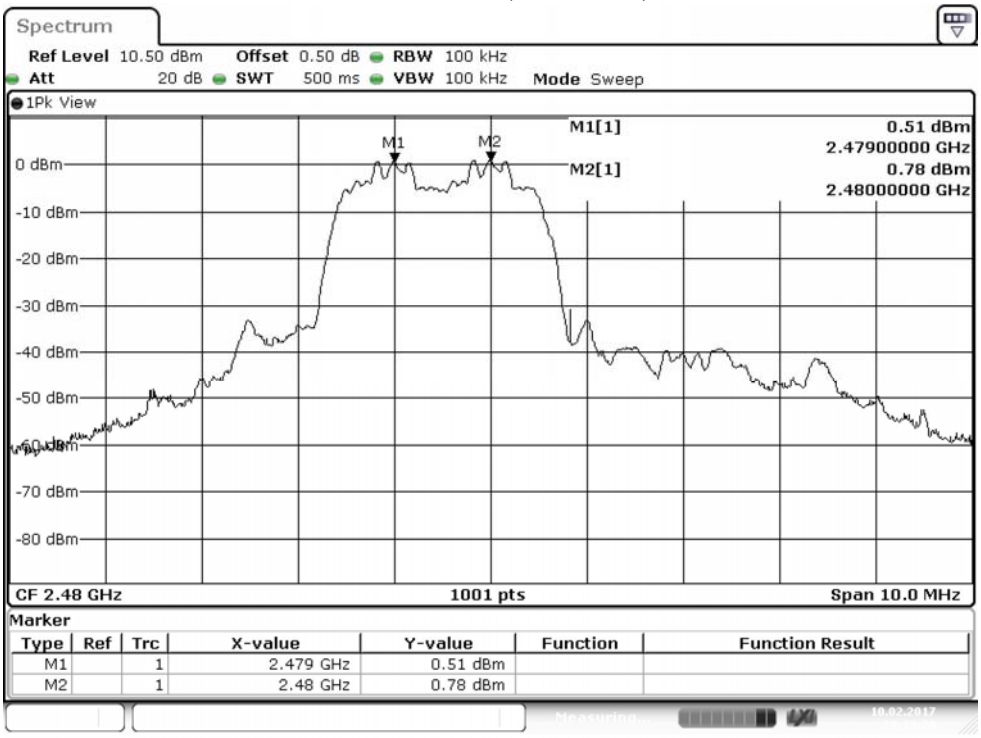
Channel 00 (2402MHz)



Channel 39 (2441MHz)

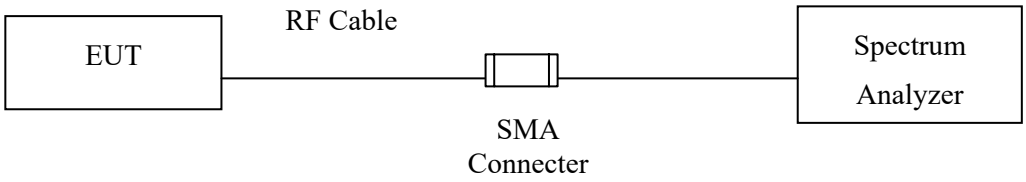


Channel 78 (2480MHz)



9. Dwell Time

9.1. Test Setup



9.2. Limit

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.

9.3. Test Procedure

Tested according to FHSS test procedure of KDB558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

9.4. Uncertainty

±2.31msec

9.5. Test Result of Dwell Time

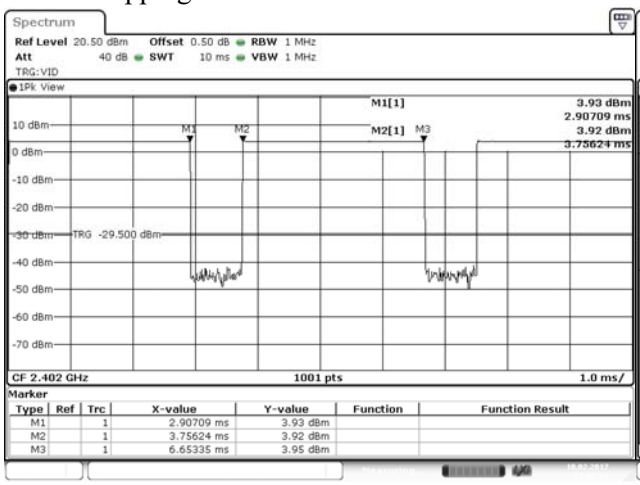
Product : Data Collector
Test Item : Dwell Time
Test Mode : Mode 1: Transmit - 1Mbps (Channel 00,39,78)
Test Date : 2017/02/10

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.897	13	50	0.75	0.301	0.4	Pass
2441	2.897	13	50	0.75	0.301	0.4	Pass
2480	2.897	13	50	0.75	0.301	0.4	Pass

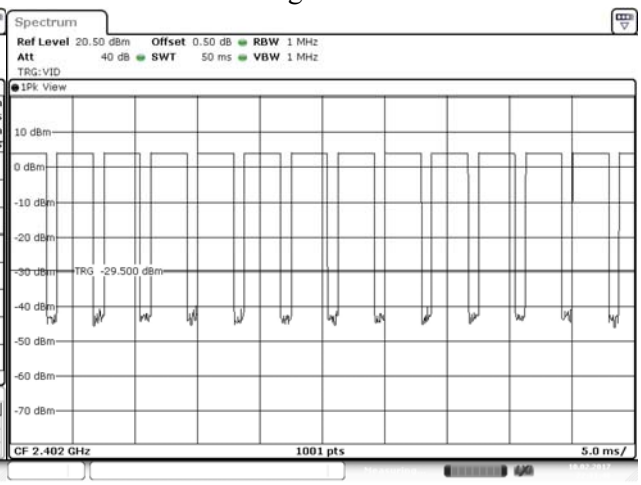
Duty cycle = ((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

Dwell time = (Duty cycle /79) * (79*0.4)

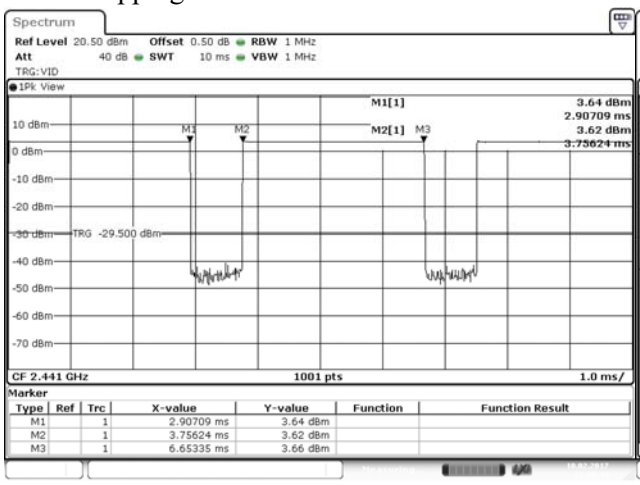
CH 00 Hopping of Number



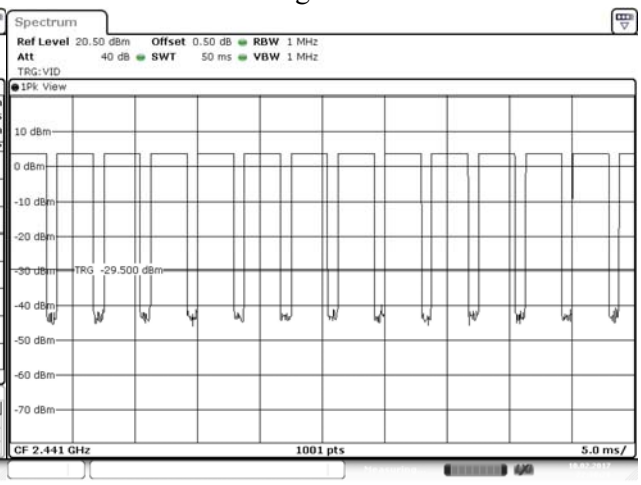
CH 00 Time slot length



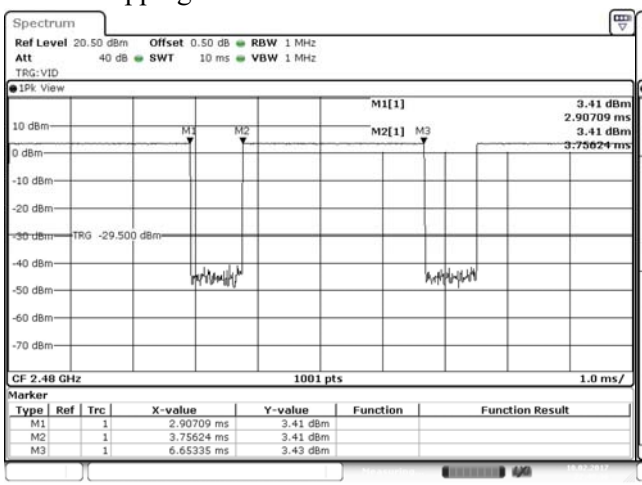
CH39 Hopping of Number



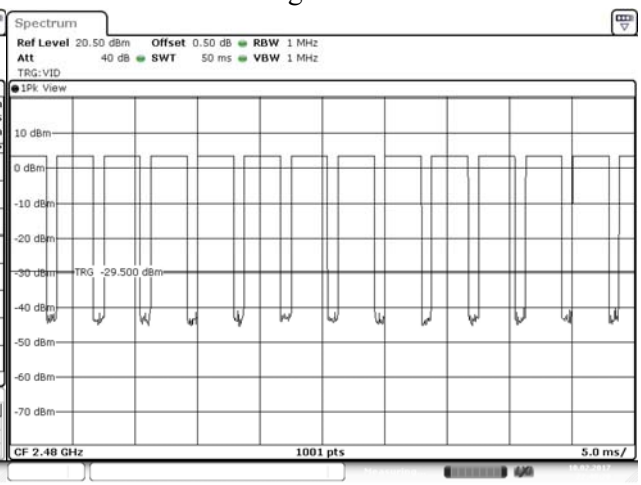
CH 39 Time slot length



CH 78 Hopping of Number



CH 78 Time slot length



Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.

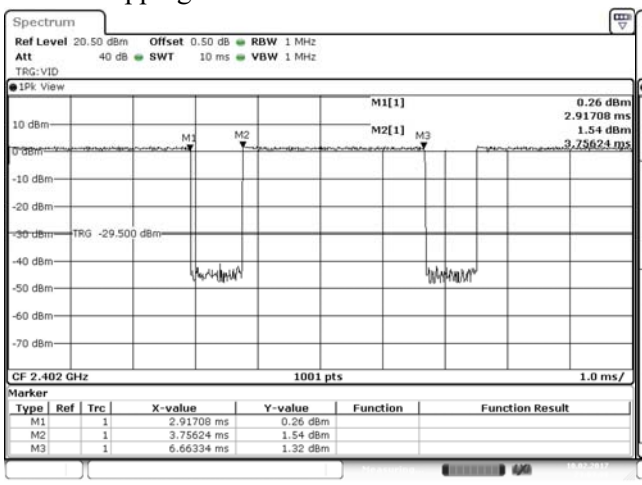
Product : Data Collector
Test Item : Dwell Time
Test Mode : Mode 2: Transmit - 3Mbps (Channel 00,39,78)
Test Date : 2017/02/10

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.907	13	50	0.76	0.302	0.4	Pass
2441	2.907	13	50	0.76	0.302	0.4	Pass
2480	2.907	13	50	0.76	0.302	0.4	Pass

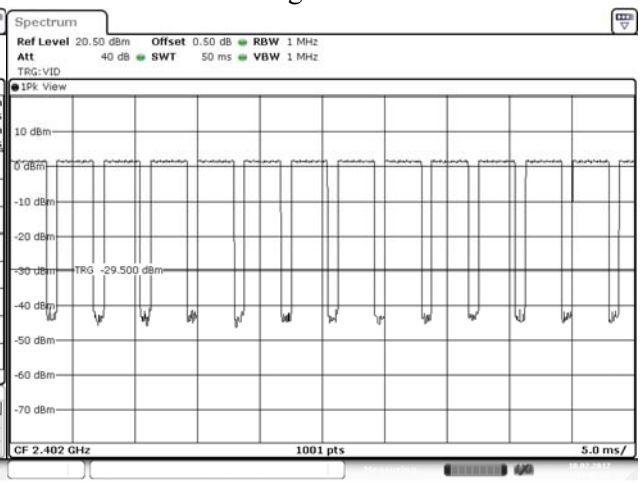
Duty cycle =((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

Dwell time = (Duty cycle /79) * (79*0.4)

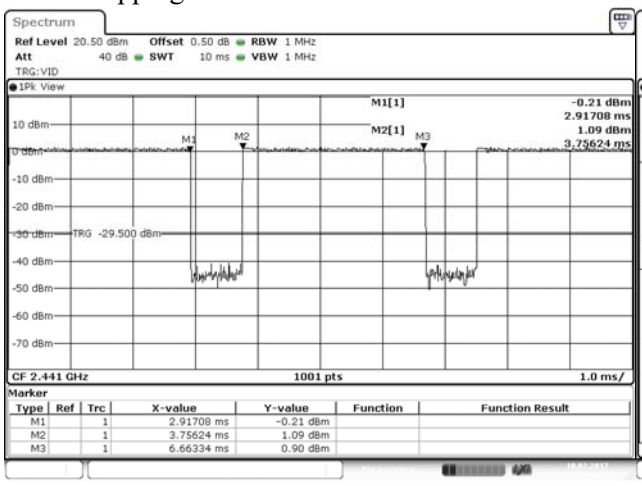
CH 00 Hopping of Number



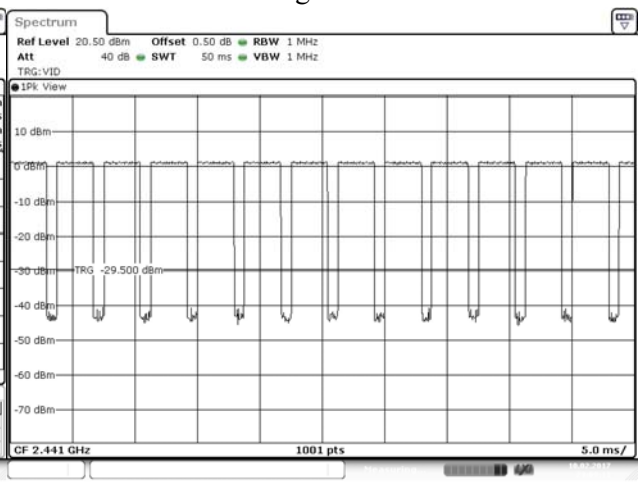
CH 00 Time slot length



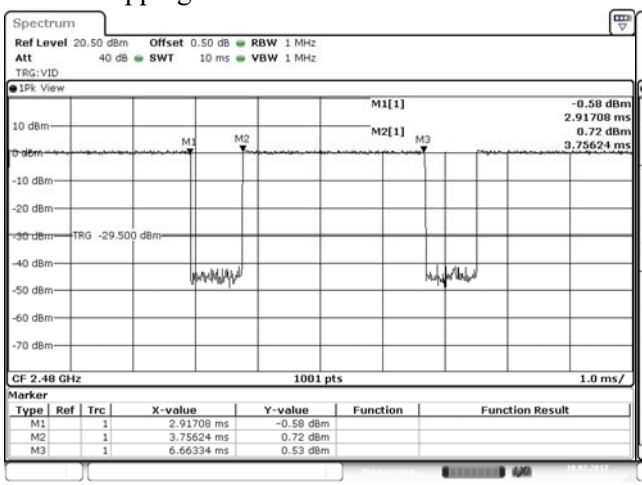
CH39 Hopping of Number



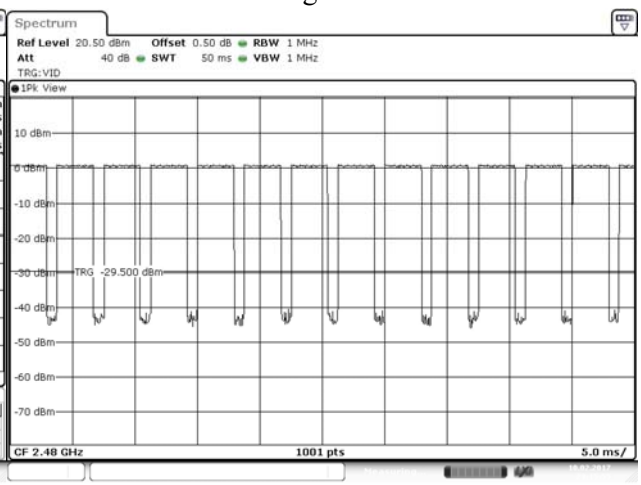
CH 39 Time slot length



CH 78 Hopping of Number



CH 78 Time slot length

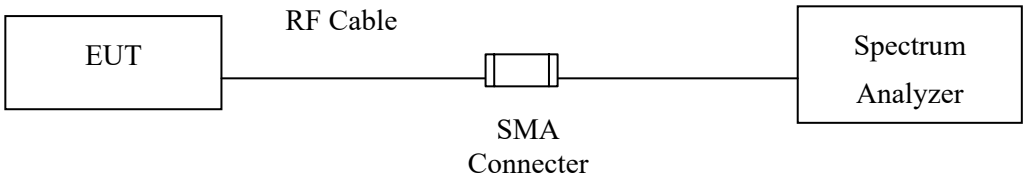


Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.

10. Occupied Bandwidth

10.1. Test Setup



10.2. Limits

N/A

10.3. Test Procedure

Tested according to FHSS test procedure of KDB558074 section 9 (b for compliance to FCC 47CFR 15.247 requirements.

10.4. Uncertainty

±279.2Hz

10.5. Test Result of Occupied Bandwidth

Product : Data Collector
Test Item : Occupied Bandwidth Data
Test Mode : Mode 1: Transmit - 1Mbps
Test Date : 2017/02/10

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	942	--	NA
39	2441	945	--	NA
78	2480	945	--	NA

Figure Channel 00:

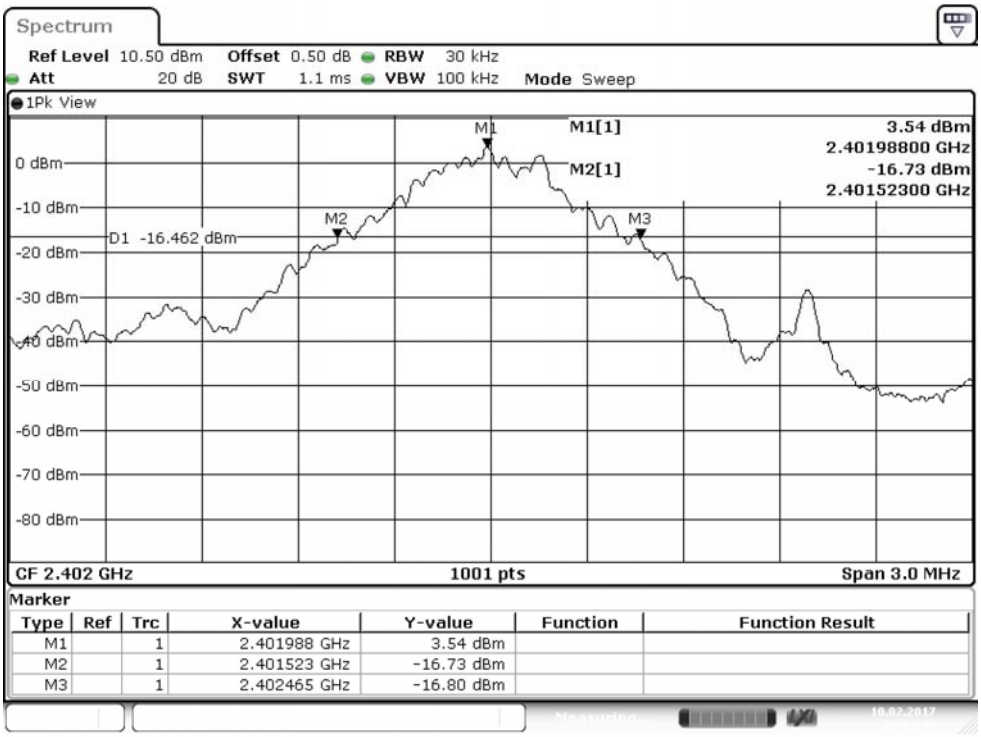


Figure Channel 39:

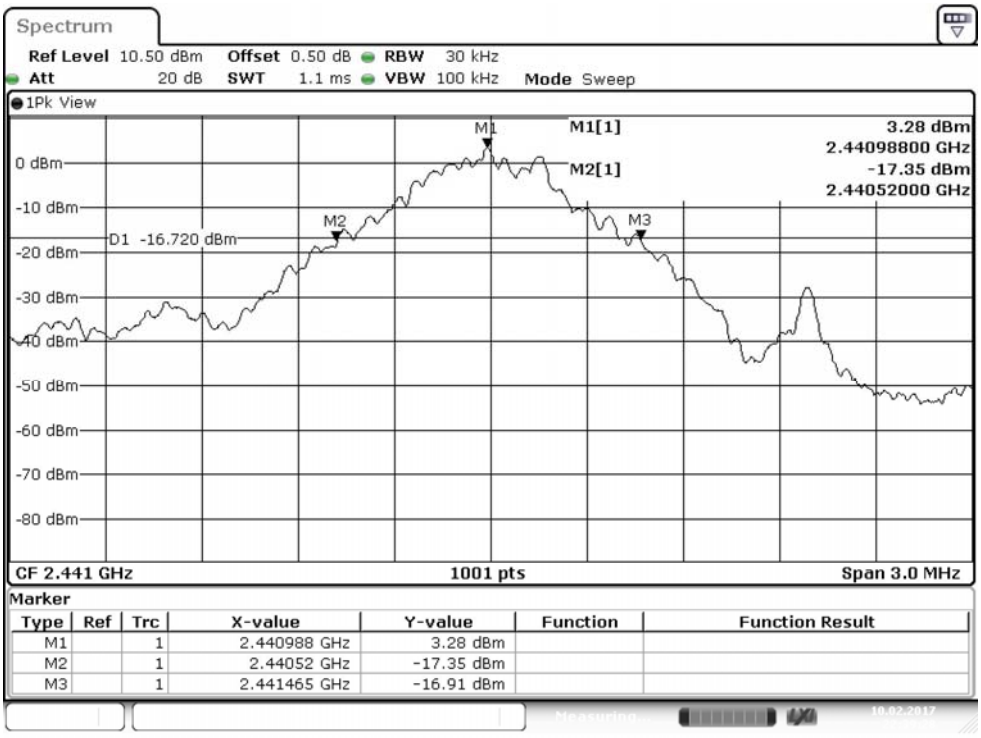
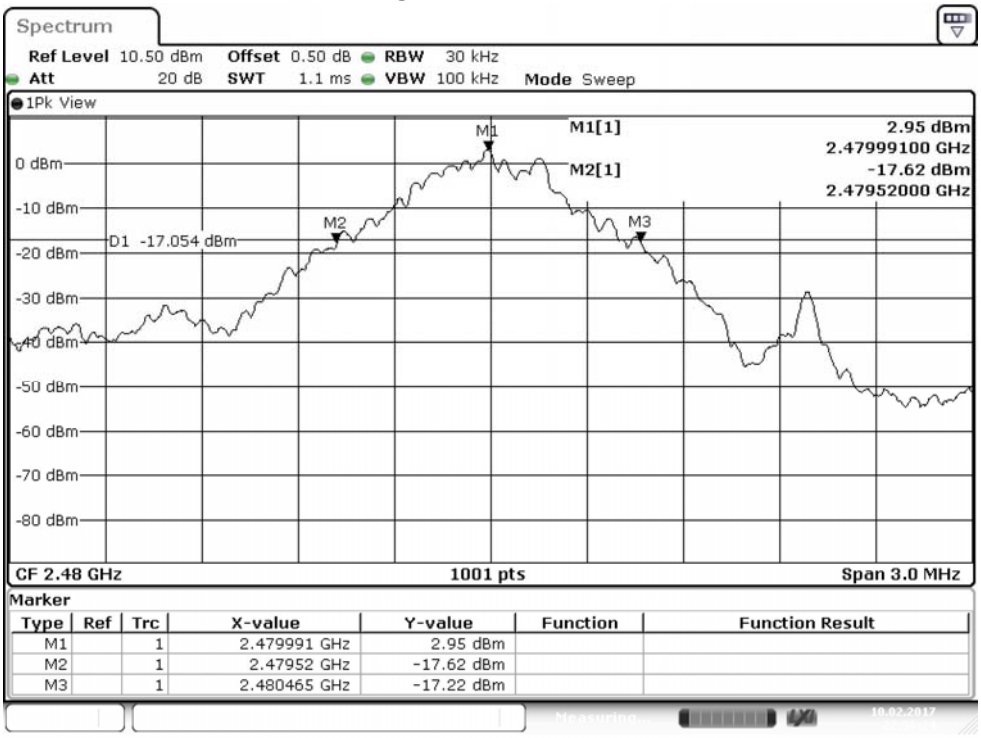


Figure Channel 78:



Product : Data Collector
Test Item : Occupied Bandwidth Data
Test Mode : Mode 2: Transmit - 3Mbps (2402MHz)
Test Date : 2017/02/10

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1263	--	NA
39	2441	1260	--	NA
78	2480	1260	--	NA

Figure Channel 00:

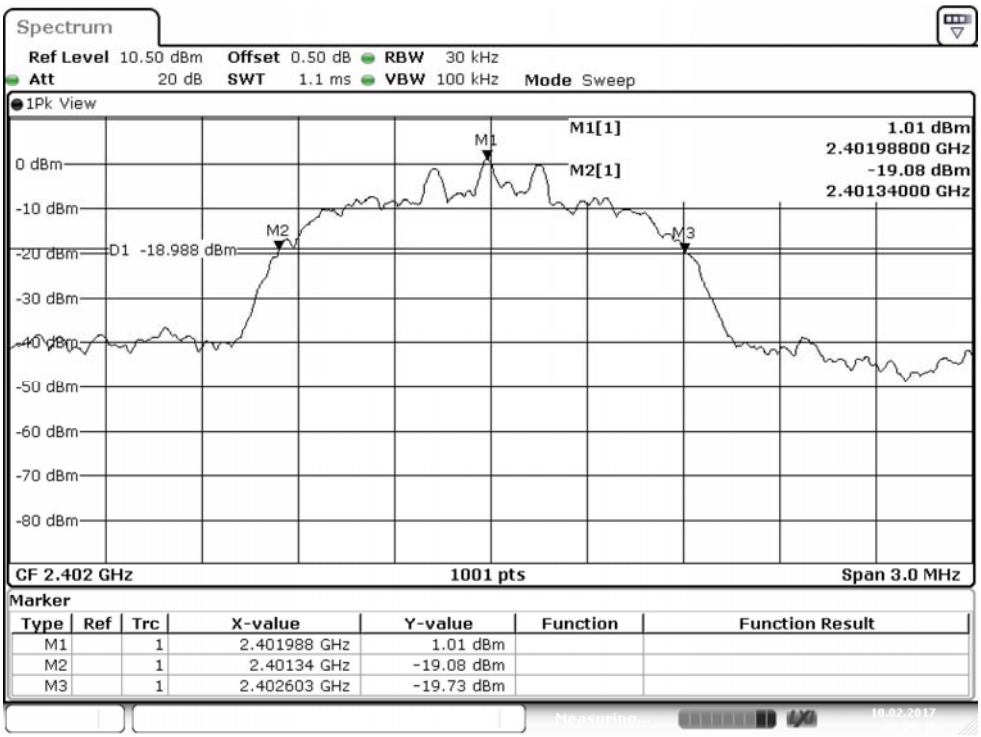


Figure Channel 39:

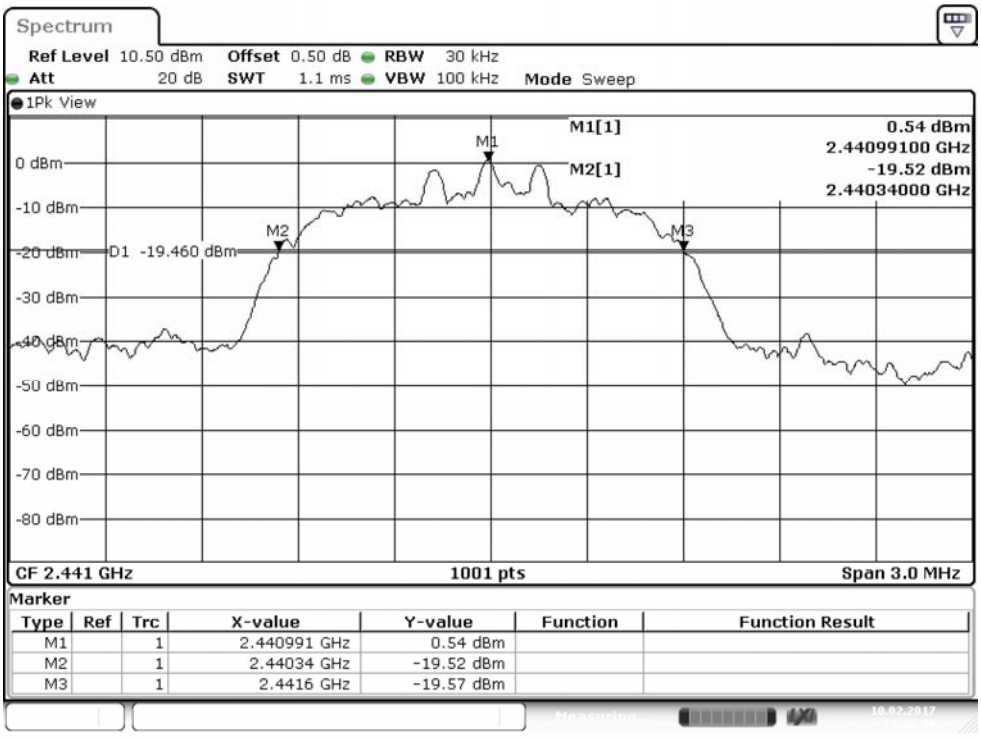
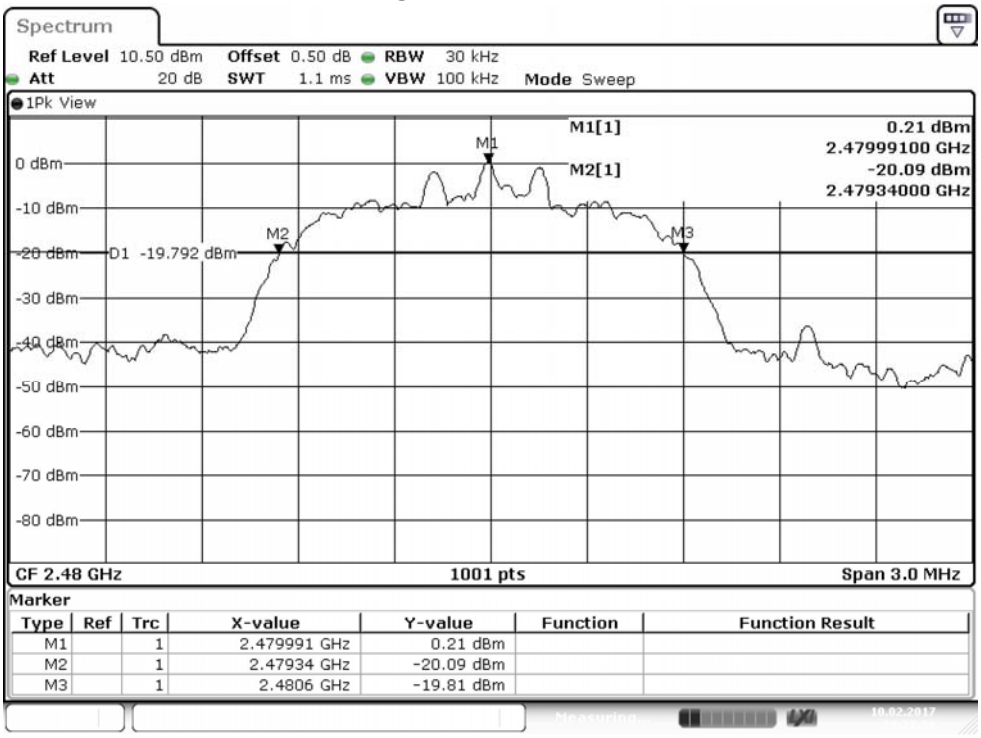


Figure Channel 78:



11. EMI Reduction Method During Compliance Testing

No modification was made during testing.