

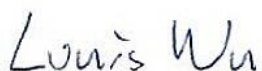
NCC RADIO TEST REPORT

Equipment : Bar Code Scanner
Brand Name : Zebra
Model Name : RS5100
Applicant : 台灣斑馬科技股份有限公司
 台北市信義區松高路 9 號 13 樓
Manufacturer : Zebra Technologies Corporation
 1 Zebra Plaza, Holtsville, NY 11742
Standard : NCC LP0002 (2018-01-10)

The product was received on Jul. 18, 2019 and testing was started from Aug. 27, 2019 and completed on Oct. 25, 2019. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures NCC LP0002 (2018-01-10) and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
TR971801A	01	Initial issue of report	Oct. 29, 2019
TR971801A	02	Adding description of different scanner	Oct. 31, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	LP0002 3.10.1.6 (1)(A)	Number of Channels	Pass	-
3.2	LP0002 3.10.1.6 (1)(A)	Hopping Channel Separation	Pass	-
3.3	LP0002 3.10.1.6 (1)(A)	Dwell Time of Each Channel	Pass	-
3.4	LP0002 3.10.1.6 (1)(A)	20dB Bandwidth	Pass	-
3.4	-	99% Occupied Bandwidth	Reporting only	-
3.5	LP0002 3.10.1.6 (1)(A)	Peak Output Power	Pass	-
3.6	LP0002 3.10.1.5	Conducted Band Edges	Pass	-
3.7	LP0002 3.10.1.5	Conducted Spurious Emission	Pass	-
3.8	LP0002 3.10.1.5	Radiated Band Edges and Radiated Spurious Emission	Pass	Under limit 6.90 dB at 729.370 MHz
3.9	LP0002 2.3	AC Conducted Emission	Pass	Under limit 20.11 dB at 0.157 MHz
3.10	LP0002 2.2 3.10.1.3 3.10.1.4	Antenna Requirement	Pass	-
Annex A	LP0002 2.11	Receiver Radiated Emission	Pass	Please refer to Annex A

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Dara Chiu

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Bar Code Scanner
Brand Name	Zebra
Model Name	RS5100
Sample 1	EV Sample
Sample 2	DV Sample
EUT supports Radios application	Bluetooth BR/EDR/LE NFC tag
HW Version	DV
FW Version	R00
MFD	27SEP19
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer.

Specification of Accessories				
Battery	Brand Name	Zebra	Model Name	BT-000397
Power supply (50W)	Brand Name	Zebra	Part Number	PWR-BGA12V50W0WW
DC Line Cable (50W)	Brand Name	Zebra	Model Name	CBL-DC-388A1-01

Supported Unit Used in Test Configuration and System				
Terminal	Brand Name	Zebra	Model Name	WT6000
Cradle	Brand Name	Zebra	Model Name	RS5100 4-Slot Ring Scanner Charger

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Maximum Output Power to Antenna	Bluetooth BR(1Mbps) : 7.05 dBm (0.0051 W) Bluetooth EDR (2Mbps) : 9.49 dBm (0.0089 W) Bluetooth EDR (3Mbps) : 10.04 dBm (0.0101 W)
99% Occupied Bandwidth	Bluetooth BR(1Mbps) : 0.834MHz Bluetooth EDR (2Mbps) : 1.190MHz Bluetooth EDR (3Mbps) : 1.169MHz
Antenna Type / Gain	PIFA Antenna with gain 1.73 dBi
Type of Modulation	Bluetooth BR (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth EDR (3Mbps) : 8-DPSK

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH05-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855	
Test Site No.	Sporton Site No.	
	03CH16-HY	

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190 and TW0007

1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ NCC LP0002 (2018-01-10)
- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	27	2429	54	2456
	1	2403	28	2430	55	2457
	2	2404	29	2431	56	2458
	3	2405	30	2432	57	2459
	4	2406	31	2433	58	2460
	5	2407	32	2434	59	2461
	6	2408	33	2435	60	2462
	7	2409	34	2436	61	2463
	8	2410	35	2437	62	2464
	9	2411	36	2438	63	2465
	10	2412	37	2439	64	2466
	11	2413	38	2440	65	2467
	12	2414	39	2441	66	2468
	13	2415	40	2442	67	2469
	14	2416	41	2443	68	2470
	15	2417	42	2444	69	2471
	16	2418	43	2445	70	2472
	17	2419	44	2446	71	2473
	18	2420	45	2447	72	2474
	19	2421	46	2448	73	2475
	20	2422	47	2449	74	2476
	21	2423	48	2450	75	2477
	22	2424	49	2451	76	2478
	23	2425	50	2452	77	2479
	24	2426	51	2453	78	2480
	25	2427	52	2454	-	-
	26	2428	53	2455	-	-

2.2 Test Mode

Channel	Frequency	Bluetooth Average Output Power		
		GFSK / 1Mbps		
		DH1	DH3	DH5
Ch00	2402MHz	7.01 dBm	6.92 dBm	6.81 dBm
Ch39	2441MHz	6.40 dBm	6.29 dBm	6.24 dBm
Ch78	2480MHz	6.77 dBm	6.68 dBm	6.66 dBm

Channel	Frequency	Bluetooth Average Output Power		
		$\pi/4$ -DQPSK / 2Mbps		
		2DH1	2DH3	2DH5
Ch00	2402MHz	6.93 dBm	6.90 dBm	6.85 dBm
Ch39	2441MHz	6.34 dBm	6.29 dBm	6.24 dBm
Ch78	2480MHz	6.68 dBm	6.65 dBm	6.62 dBm

Channel	Frequency	Bluetooth Average Output Power		
		8-DPSK / 3Mbps		
		3DH1	3DH3	3DH5
Ch00	2402MHz	7.03 dBm	7.05 dBm	7.02 dBm
Ch39	2441MHz	6.29 dBm	6.35 dBm	6.29 dBm
Ch78	2480MHz	6.60 dBm	6.63 dBm	6.62 dBm

Channel	Frequency	Bluetooth Peak Output Power		
		GFSK / 1Mbps		
		DH1	DH3	DH5
Ch00	2402MHz	7.05 dBm	7.04 dBm	7.03 dBm
Ch39	2441MHz	6.36 dBm	6.35 dBm	6.33 dBm
Ch78	2480MHz	6.67 dBm	6.66 dBm	6.65 dBm

Channel	Frequency	Bluetooth Peak Output Power		
		$\pi/4$ -DQPSK / 2Mbps		
		2DH1	2DH3	2DH5
Ch00	2402MHz	9.49 dBm	9.48 dBm	9.47 dBm
Ch39	2441MHz	9.03 dBm	9.02 dBm	8.99 dBm
Ch78	2480MHz	9.45 dBm	9.43 dBm	9.42 dBm

Channel	Frequency	Bluetooth Peak Output Power		
		8-DPSK / 3Mbps		
		3DH1	3DH3	3DH5
Ch00	2402MHz	10.04 dBm	10.02 dBm	10.01 dBm
Ch39	2441MHz	9.61 dBm	9.60 dBm	9.59 dBm
Ch78	2480MHz	10.04 dBm	10.01 dBm	10.00 dBm

Remark: The data rate was set in 3Mbps for all the test items due to the highest RF output power.

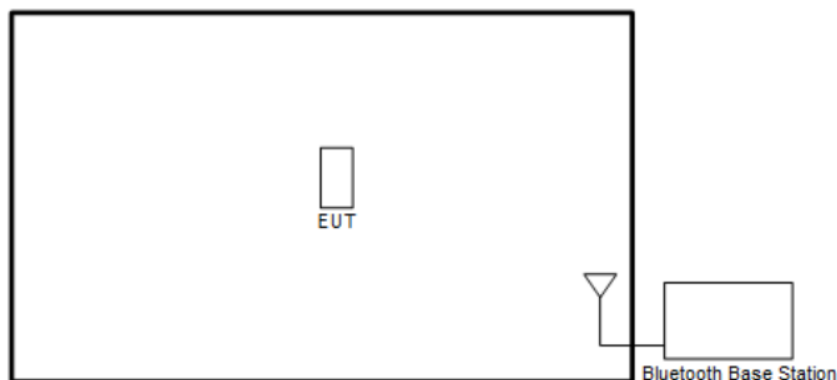
- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report, and the worst mode of radiated spurious emissions is Bluetooth 3Mbps mode, and recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

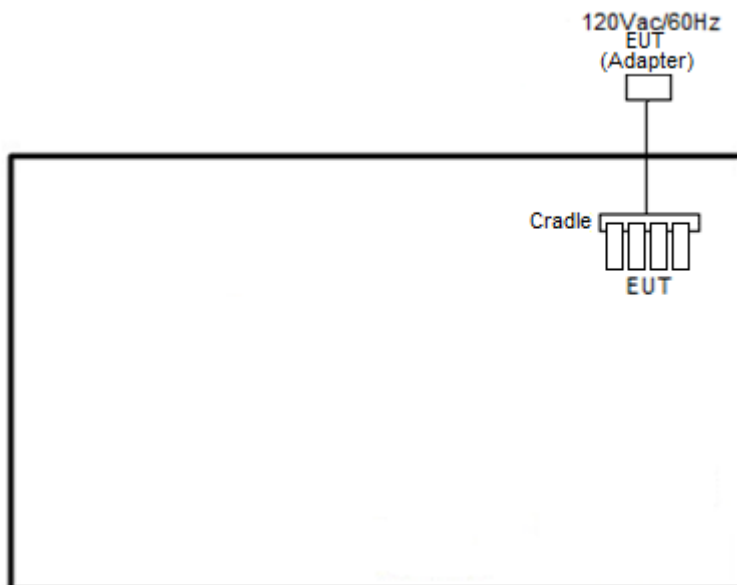
Summary table of Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth BR 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Conducted Test Cases	Mode 1: CH00_2402 MHz	Mode 4: CH00_2402 MHz	Mode 7: CH00_2402 MHz
	Mode 2: CH39_2441 MHz	Mode 5: CH39_2441 MHz	Mode 8: CH39_2441 MHz
	Mode 3: CH78_2480 MHz	Mode 6: CH78_2480 MHz	Mode 9: CH78_2480 MHz
Radiated Test Cases	Bluetooth EDR 3Mbps 8-DPSK		
	Mode 1: CH00_2402 MHz with Scanner (SE4710)		
	Mode 2: CH39_2441 MHz with Scanner (SE4710)		
	Mode 3: CH78_2480 MHz with Scanner (SE4710)		
	Mode 4: CH78_2480 MHz with Scanner (SE4770)		
AC Conducted Emission	Mode 1: RS5100 4-Slot Ring Scanner Charger + Scanner 1 (SE4710) with Single trigger *2 + Scanner 2 (SE4770) with Single trigger *2 + AC Adapter (PWR-BGA12V50W0WW) for Sample 1		
Remark:			
1. For radiated test cases, the worst mode data rate 3Mbps was reported only since the highest RF output power in the preliminary tests. The conducted spurious emissions and conducted band edge measurement for other data rates were not worse than 3Mbps, and no other significantly frequencies found in conducted spurious emission.			
2. For Radiated Test Cases, the tests were performed with sample 2.			
3. SE4710 & SE4770 are the model name of different source scanner. Test case evaluation with SE4710 is full test, and verification with SE4770.			

2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m

2.5 EUT Operation Test Setup

The RF test items, utility “BT Regulatory Test app” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to contact with base station to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

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

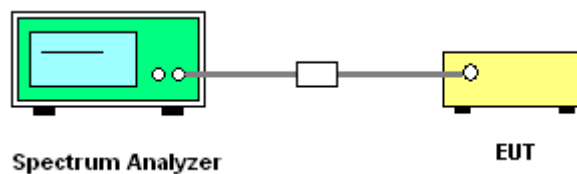
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation;
RBW = 300kHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

3.1.4 Test Setup

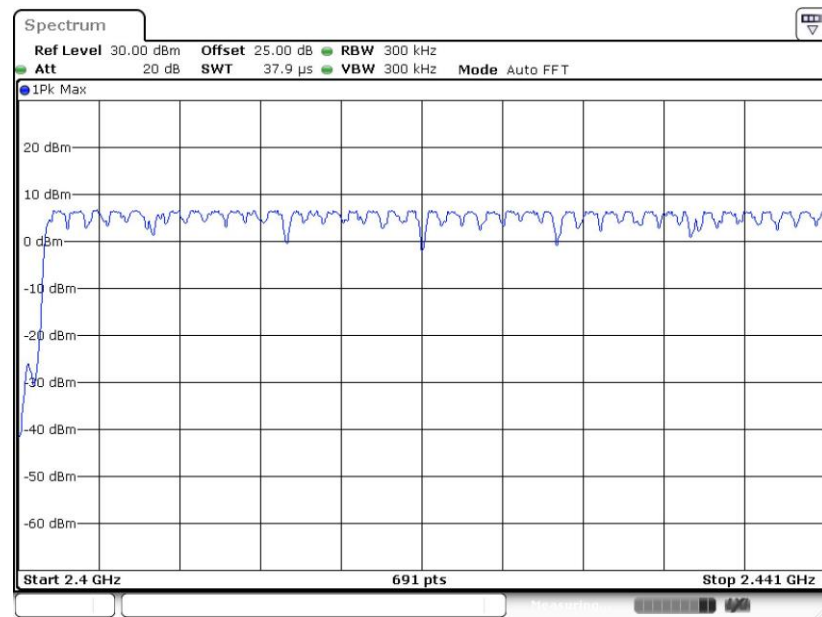


3.1.5 Test Result of Number of Hopping Frequency

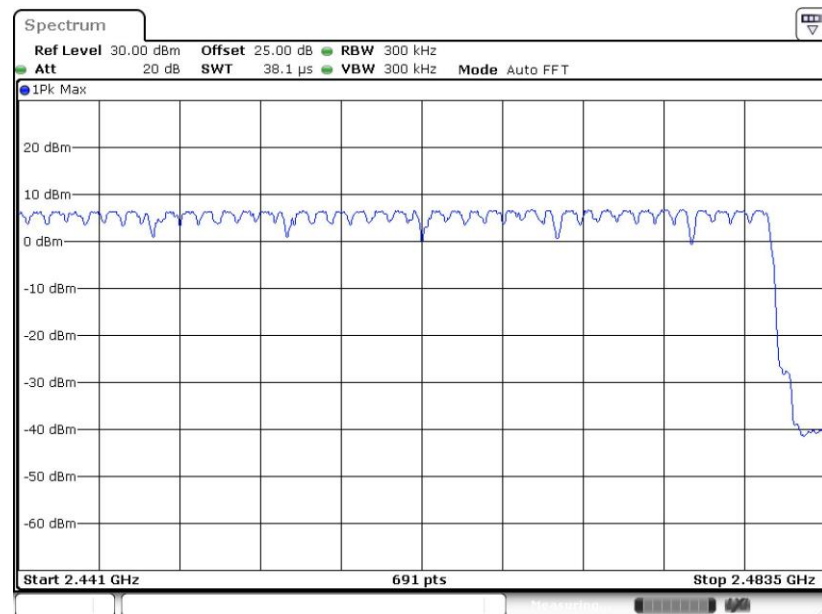
Test Engineer :	Owen Yang	Temperature :	21~25℃
		Relative Humidity :	51~54%

Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail
79	20	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78



Date: 17.OCT.2019 19:28:18



Date: 17.OCT.2019 19:29:48

3.2 Hopping Channel Separation Measurement

3.2.1 Limit of Hopping Channel Separation

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.

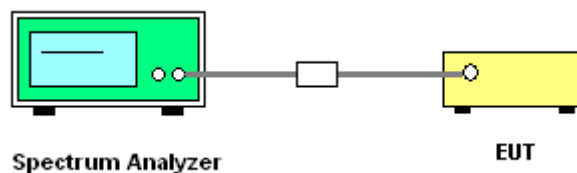
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.2.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels;
RBW = 300kHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.2.4 Test Setup



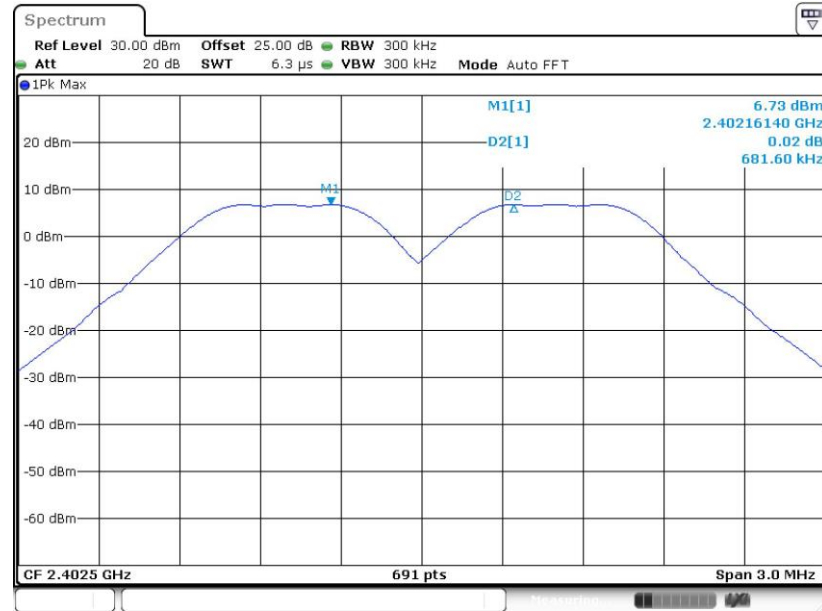
3.2.5 Test Result of Hopping Channel Separation

Test Engineer :	Owen Yang	Temperature :	21~25℃
		Relative Humidity :	51~54%

Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Hopping Channel Separation Measurement (MHz)	Hopping Channel Separation Measurement Limit (MHz)	Pass/Fail
DH	1Mbps	1	0	2402	0.682	0.6175	Pass
DH	1Mbps	1	39	2441	0.682	0.6020	Pass
DH	1Mbps	1	78	2480	0.994	0.6155	Pass
2DH	2Mbps	1	0	2402	0.994	0.8770	Pass
2DH	2Mbps	1	39	2441	1.003	0.8741	Pass
2DH	2Mbps	1	78	2480	0.994	0.8770	Pass
3DH	3Mbps	1	0	2402	1.003	0.8539	Pass
3DH	3Mbps	1	39	2441	0.999	0.8539	Pass
3DH	3Mbps	1	78	2480	1.003	0.8509	Pass

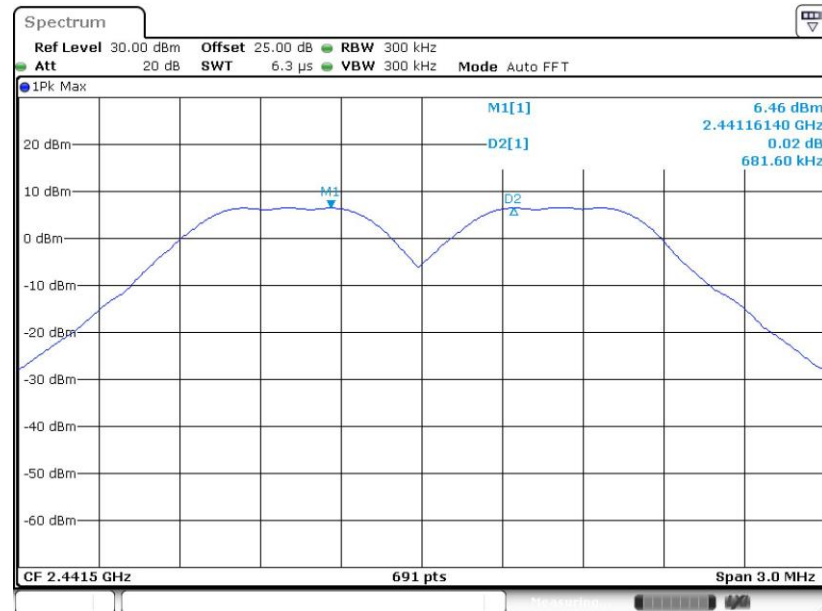
<1Mbps>

Channel Separation Plot on Channel 00 - 01



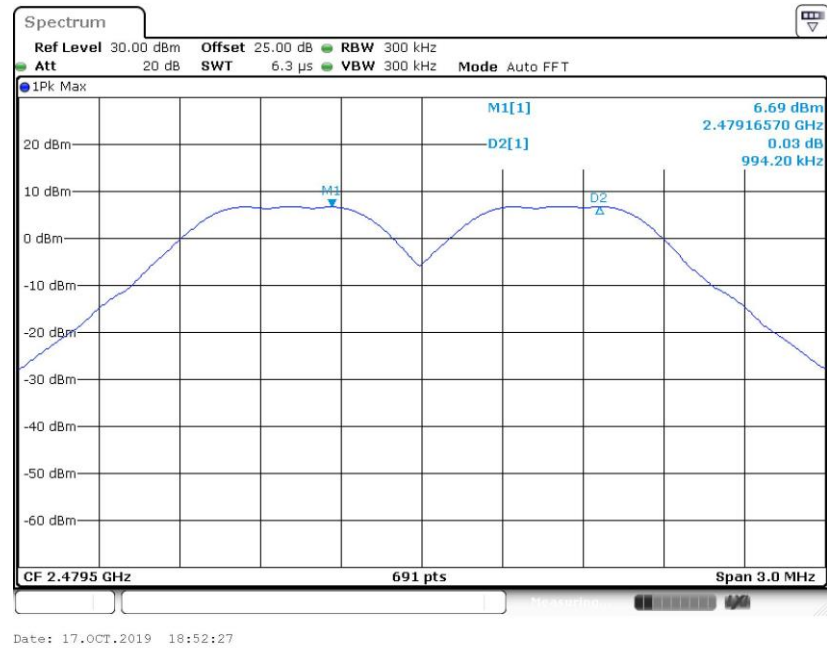
Date: 17.OCT.2019 19:50:13

Channel Separation Plot on Channel 39 - 40



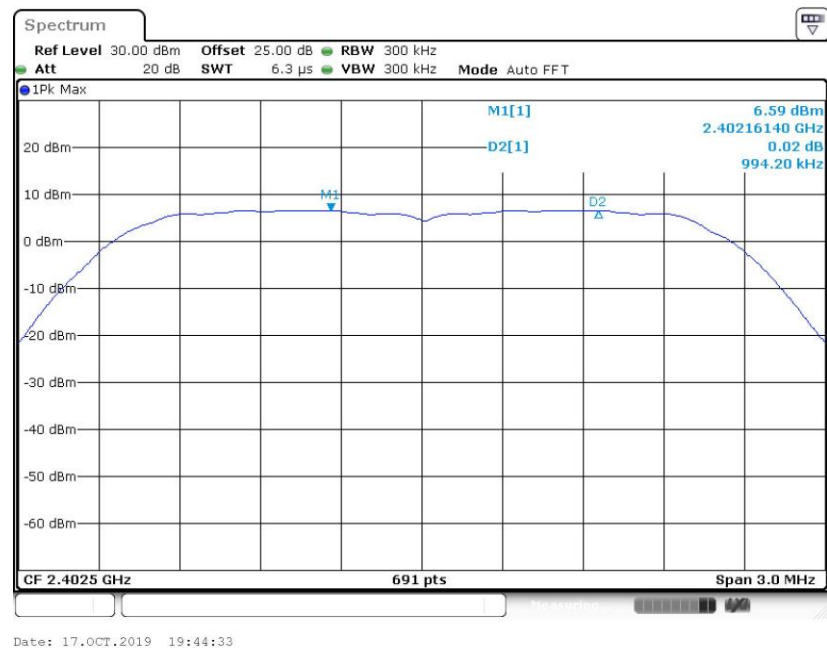
Date: 17.OCT.2019 18:48:18

Channel Separation Plot on Channel 77 - 78

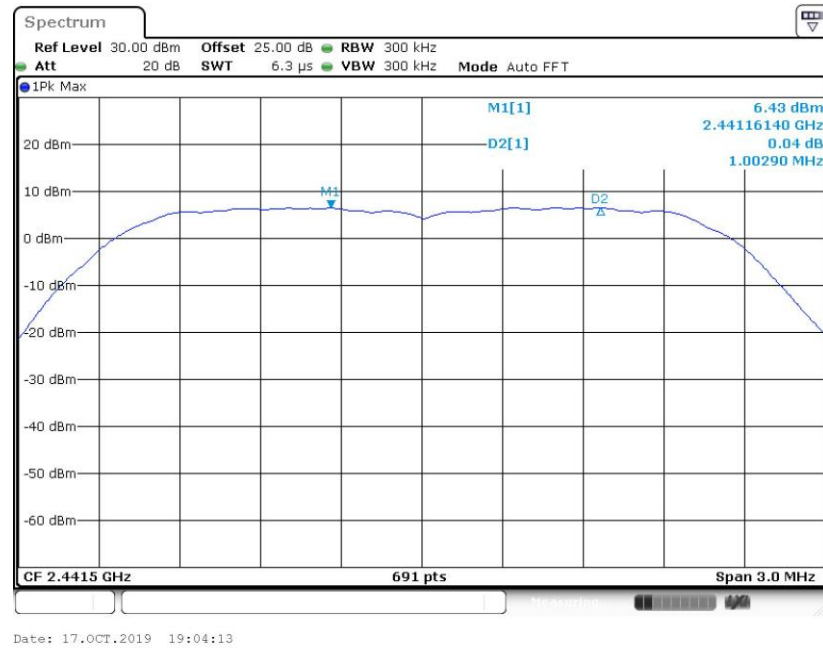


<2Mbps>

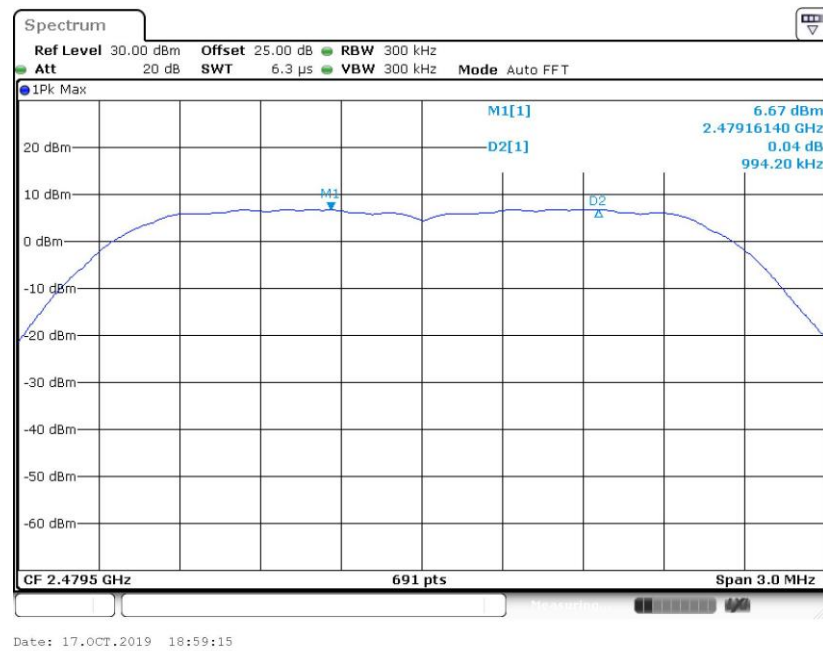
Channel Separation Plot on Channel 00 - 01



Channel Separation Plot on Channel 39 - 40

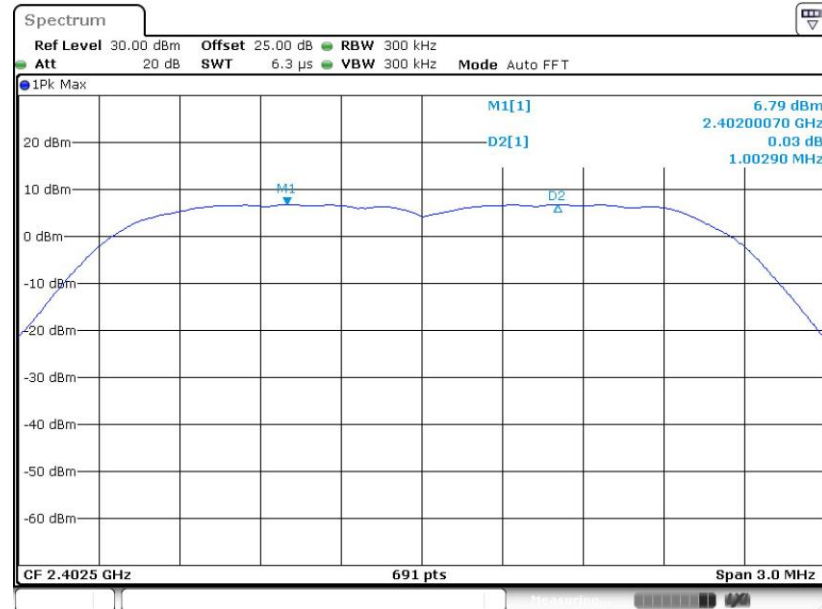


Channel Separation Plot on Channel 77 - 78



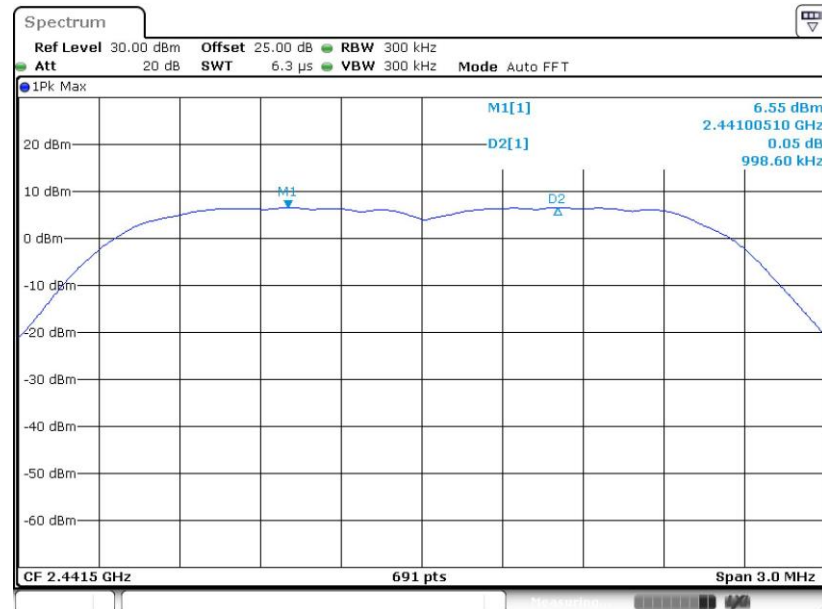
<3Mbps>

Channel Separation Plot on Channel 00 - 01



Date: 17.OCT.2019 19:14:25

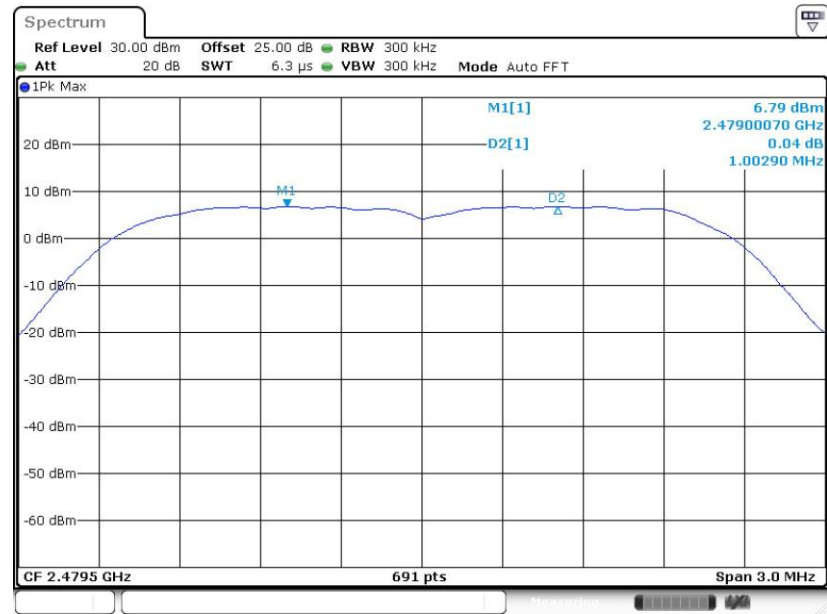
Channel Separation Plot on Channel 39 - 40



Date: 17.OCT.2019 19:18:39



Channel Separation Plot on Channel 77 - 78



Date: 17.OCT.2019 19:22:36

3.3 Dwell Time Measurement

3.3.1 Limit of Dwell Time

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.

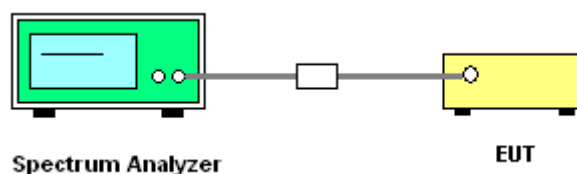
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.4.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW $\geq$ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.3.4 Test Setup

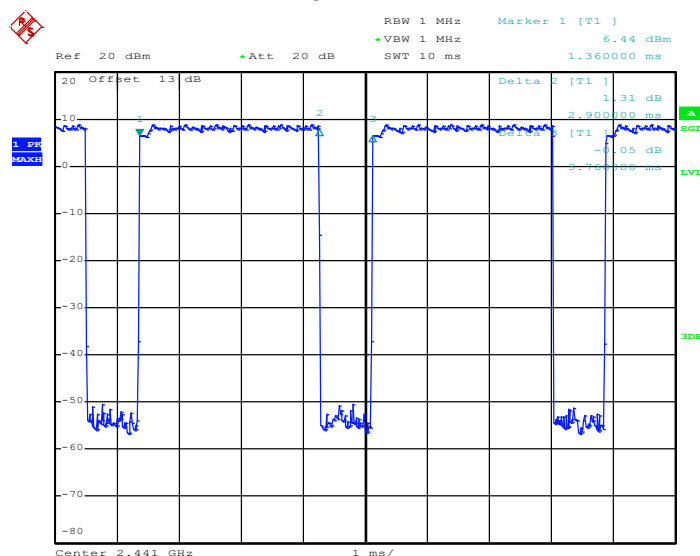


3.3.5 Test Result of Dwell Time

Test Engineer :	Owen Yang	Temperature :	21~25℃
		Relative Humidity :	51~54%

Mod.	Hopping Channel Number Rate	Hops Over Occupancy Time(hops)	Package Transfer Time (msec) (MHz)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Nomal	79	106.67	2.90	0.31	0.4	Pass
AFH	20	53.33	2.90	0.15	0.4	Pass

Package Transfer Time Plot



Date: 11.OCT.2019 16:34:20

Remark:

1. In normal mode, hopping rate is 1600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4 x 79) (s), Hops Over Occupancy Time comes to (1600 / 6 / 79) x (0.4 x 79) = 106.67 hops.
2. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels. With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4 x 20) (s), Hops Over Occupancy Time comes to (800 / 6 / 20) x (0.4 x 20) = 53.33 hops.
3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

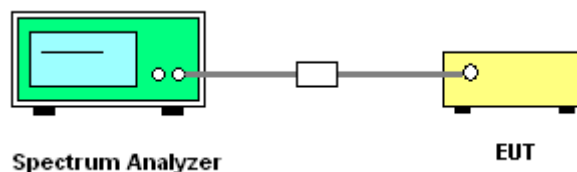
3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel;
RBW $\geq$ 1% of the 20 dB bandwidth; VBW $\geq$ RBW; Sweep = auto; Detector function = peak;
Trace = max hold.
5. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
Span = approximately 1.5 to 5 times the 99% bandwidth, centered on a hopping channel;
RBW $\geq$ 1-5% of the 99% bandwidth; VBW $\geq$ 3 * RBW; Sweep = auto; Detector function = peak;
Trace = max hold.
6. Measure and record the results in the test report.

3.4.4 Test Setup



**3.4.5 Test Result of 20dB Bandwidth**

Test Engineer :	Owen Yang	Temperature :	21~25℃
		Relative Humidity :	51~54%

Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	20db BW (MHz)	Pass/Fail
DH	1Mbps	1	0	2402	0.926	Pass
DH	1Mbps	1	39	2441	0.903	Pass
DH	1Mbps	1	78	2480	0.923	Pass
2DH	2Mbps	1	0	2402	1.316	Pass
2DH	2Mbps	1	39	2441	1.311	Pass
2DH	2Mbps	1	78	2480	1.316	Pass
3DH	3Mbps	1	0	2402	1.281	Pass
3DH	3Mbps	1	39	2441	1.281	Pass
3DH	3Mbps	1	78	2480	1.276	Pass

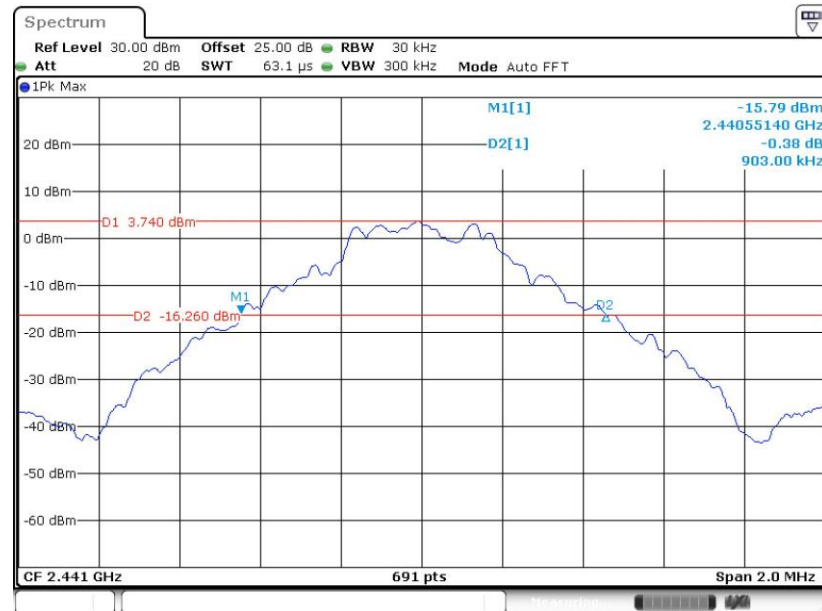
<1Mbps>

20 dB Bandwidth Plot on Channel 00



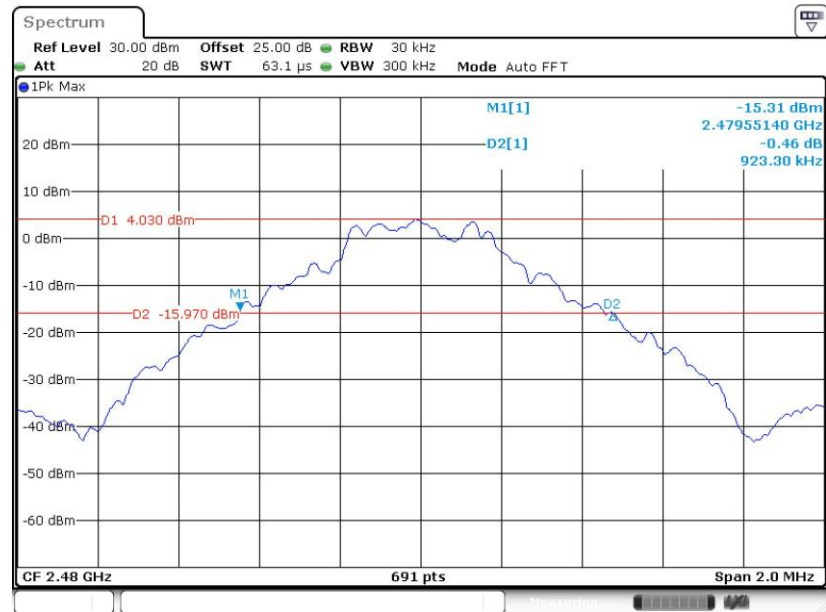
Date: 17.OCT.2019 18:45:03

20 dB Bandwidth Plot on Channel 39



Date: 17.OCT.2019 18:49:40

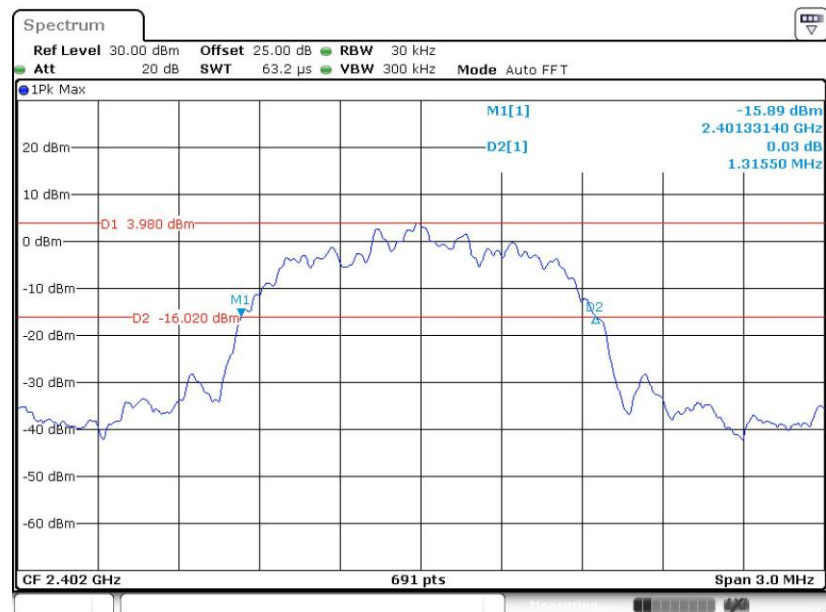
20 dB Bandwidth Plot on Channel 78



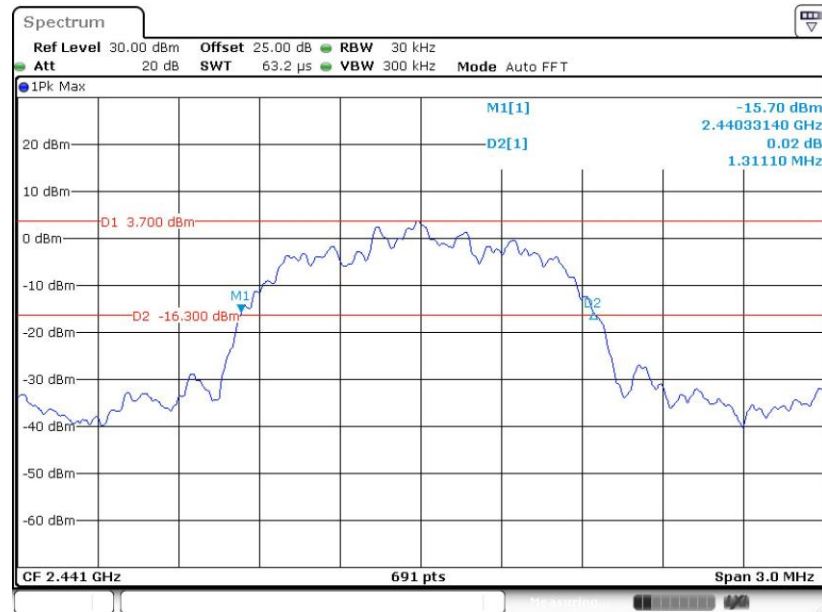
Date: 17.OCT.2019 18:53:48

<2Mbps>

20 dB Bandwidth Plot on Channel 00



Date: 17.OCT.2019 19:11:16

20 dB Bandwidth Plot on Channel 39


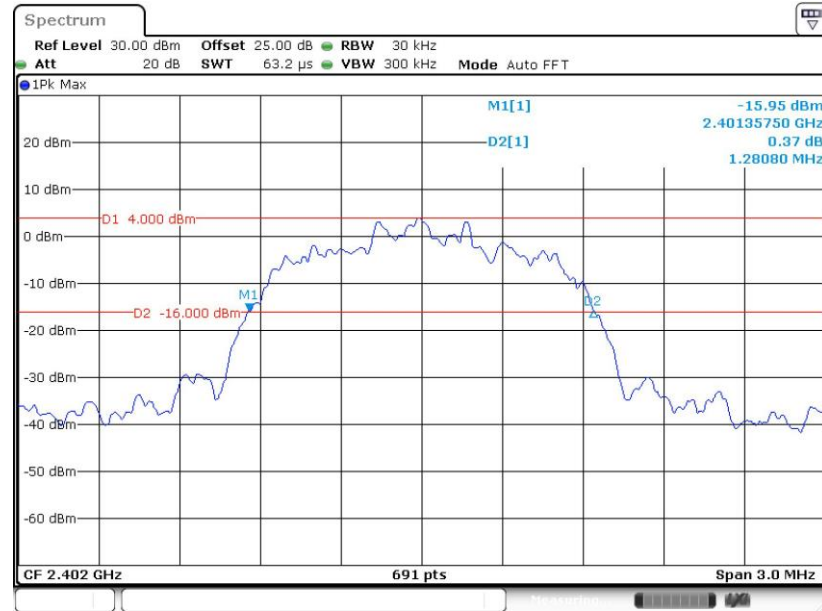
Date: 17.OCT.2019 19:05:38

20 dB Bandwidth Plot on Channel 78


Date: 17.OCT.2019 19:01:15

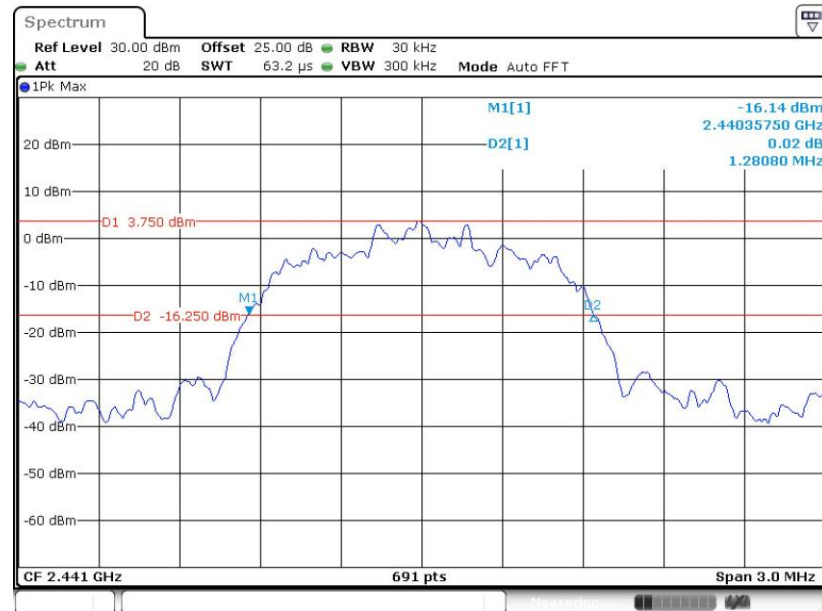
<3Mbps>

20 dB Bandwidth Plot on Channel 00



Date: 17.OCT.2019 19:15:55

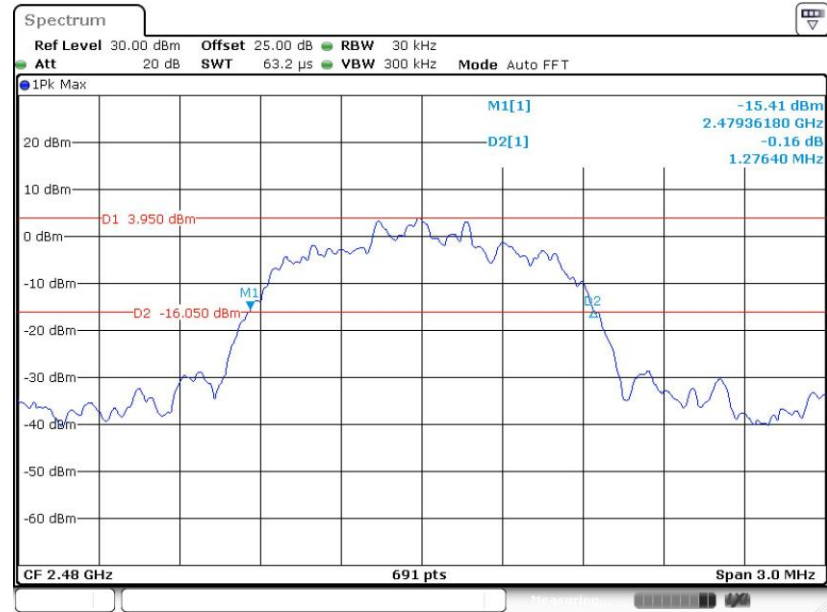
20 dB Bandwidth Plot on Channel 39



Date: 17.OCT.2019 19:20:03



20 dB Bandwidth Plot on Channel 78



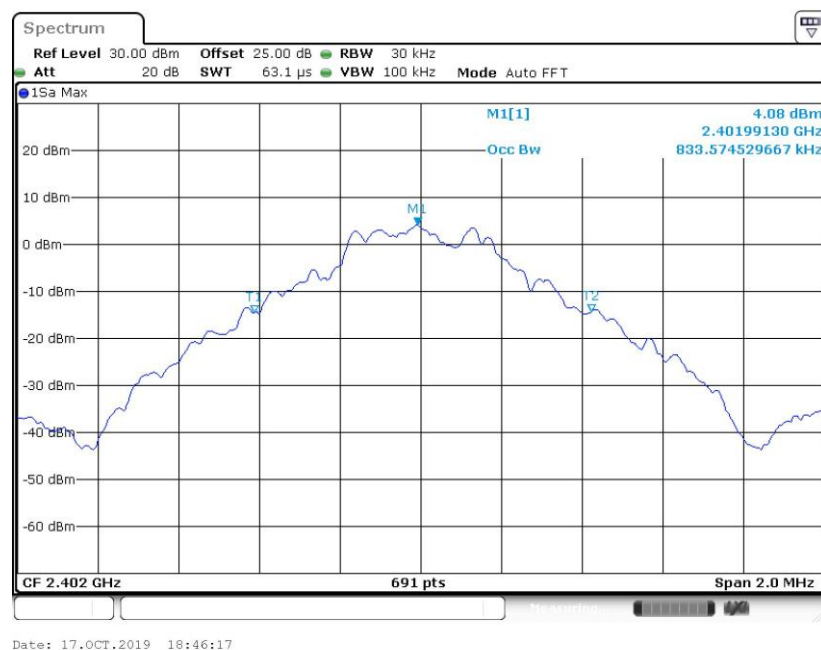
3.4.6 Test Result of 99% Occupied Bandwidth

Test Engineer :	Owen Yang	Temperature :	21~25℃
		Relative Humidity :	51~54%

Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	99% Bandwidth (MHz)	Pass/Fail
DH	1Mbps	1	0	2402	0.834	Pass
DH	1Mbps	1	39	2441	0.831	Pass
DH	1Mbps	1	78	2480	0.834	Pass
2DH	2Mbps	1	0	2402	1.181	Pass
2DH	2Mbps	1	39	2441	1.190	Pass
2DH	2Mbps	1	78	2480	1.187	Pass
3DH	3Mbps	1	0	2402	1.169	Pass
3DH	3Mbps	1	39	2441	1.169	Pass
3DH	3Mbps	1	78	2480	1.169	Pass

<1Mbps>

99% Occupied Bandwidth Plot on Channel 00



99% Occupied Bandwidth Plot on Channel 39

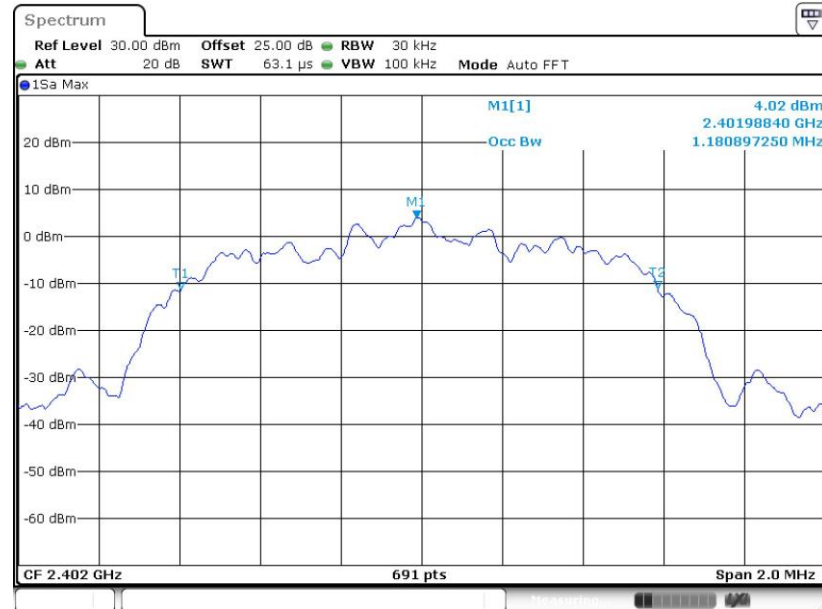


99% Occupied Bandwidth Plot on Channel 78



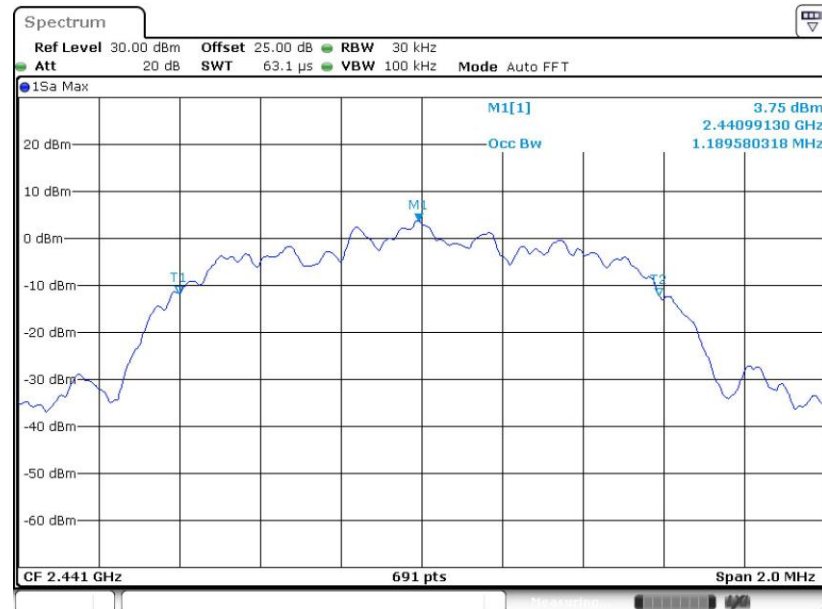
<2Mbps>

99% Occupied Bandwidth Plot on Channel 00



Date: 17.OCT.2019 19:12:24

99% Occupied Bandwidth Plot on Channel 39



Date: 17.OCT.2019 19:06:13

99% Occupied Bandwidth Plot on Channel 78



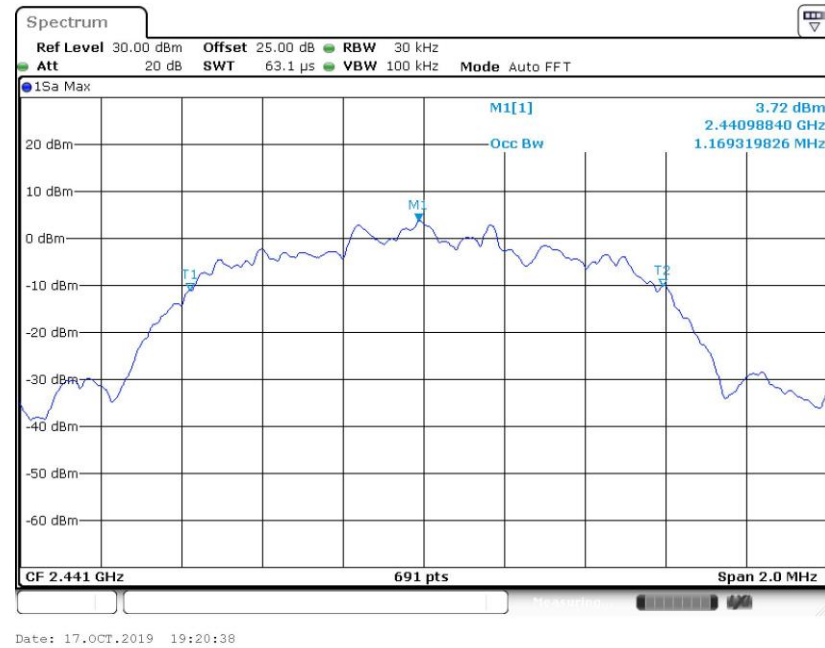
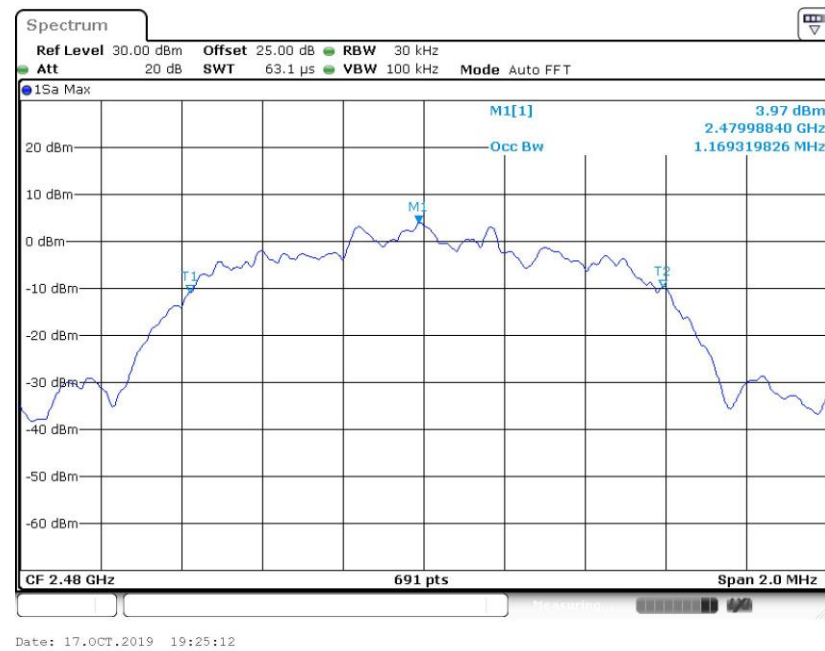
Date: 17.OCT.2019 19:02:09

<3Mbps>

99% Occupied Bandwidth Plot on Channel 00



Date: 17.OCT.2019 19:16:46

99% Occupied Bandwidth Plot on Channel 39

99% Occupied Bandwidth Plot on Channel 78


Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.5 Output Power Measurement

3.5.1 Limit of Output Power

The maximum peak conducted output power of the intentional radiator shall not exceed the following:
For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts. The power limit for 1Mbps, 2Mbps, 3Mbps and AFH modes are 0.125 watts.

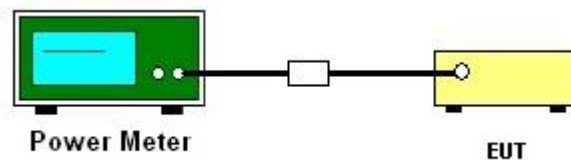
3.5.2 Measuring Instruments

See list of measuring equipment of this test report.

3.5.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.5.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

3.5.4 Test Setup



3.5.5 Test Result of Peak Output Power

Test Engineer :	Owen Yang	Temperature :	21~25℃
		Relative Humidity :	51~54%

DH	CH.	N _{TX}	Peak Power (dBm)	Power Limit (dBm)	Test Result
DH1	0	1	7.05	20.97	Pass
	39	1	6.36	20.97	Pass
	78	1	6.67	20.97	Pass

2DH	CH.	N _{TX}	Peak Power (dBm)	Power Limit (dBm)	Test Result
2DH1	0	1	9.49	20.97	Pass
	39	1	9.03	20.97	Pass
	78	1	9.45	20.97	Pass

3DH	CH.	N _{TX}	Peak Power (dBm)	Power Limit (dBm)	Test Result
3DH1	0	1	10.04	20.97	Pass
	39	1	9.61	20.97	Pass
	78	1	10.04	20.97	Pass

3.5.6 Test Result of Average Output Power (Reporting Only)

Test Engineer :	Owen Yang	Temperature :	21~25℃
		Relative Humidity :	51~54%

DH	CH.	N _{TX}	Average Power (dBm)	Duty Factor (dB)
DH1	0	1	7.01	5.12
	39	1	6.40	5.12
	78	1	6.77	5.12

2DH	CH.	N _{TX}	Average Power (dBm)	Duty Factor (dB)
2DH1	0	1	6.93	5.07
	39	1	6.34	5.07
	78	1	6.68	5.07

3DH	CH.	N _{TX}	Average Power (dBm)	Duty Factor (dB)
3DH1	0	1	7.05	5.03
	39	1	6.35	5.03
	78	1	6.63	5.03

3.6 Conducted Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

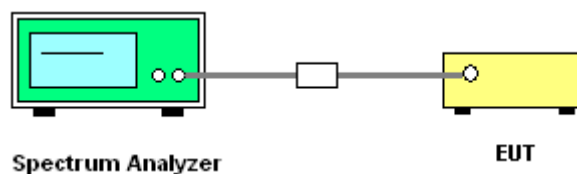
3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

3.6.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.6.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100kHz, VBW = 300kHz. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

3.6.4 Test Setup

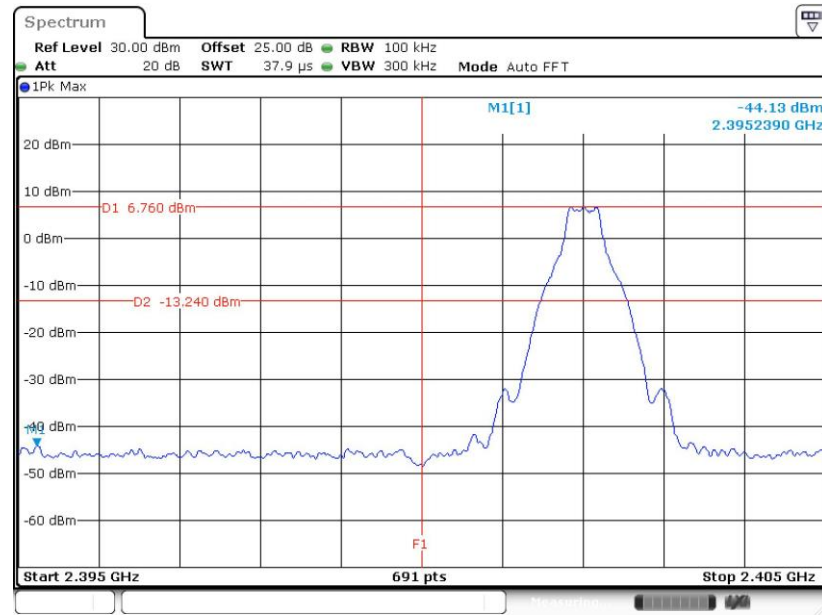


3.6.5 Test Result of Conducted Band Edges

Test Engineer :	Owen Yang	Temperature :	21~25°C
		Relative Humidity :	51~54%

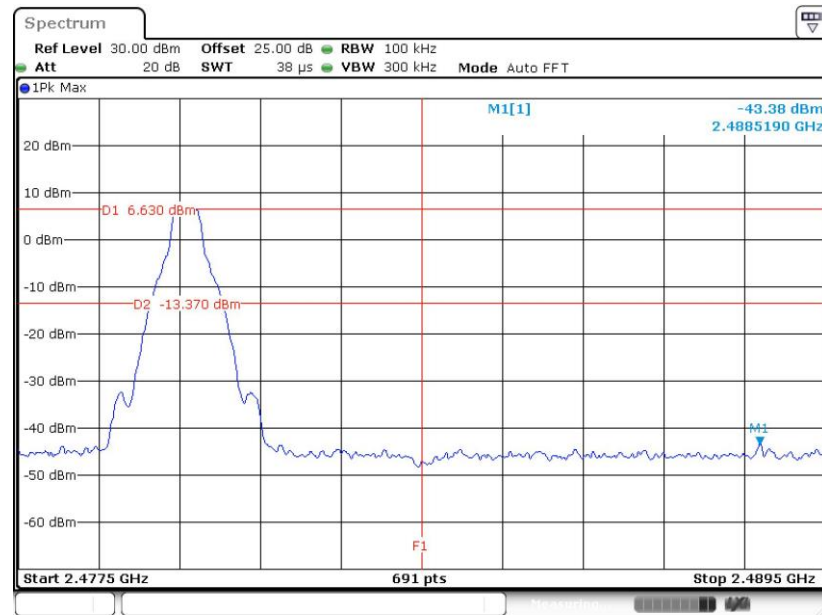
<1Mbps>

Low Band Edge Plot on Channel 00



Date: 17.OCT.2019 18:45:24

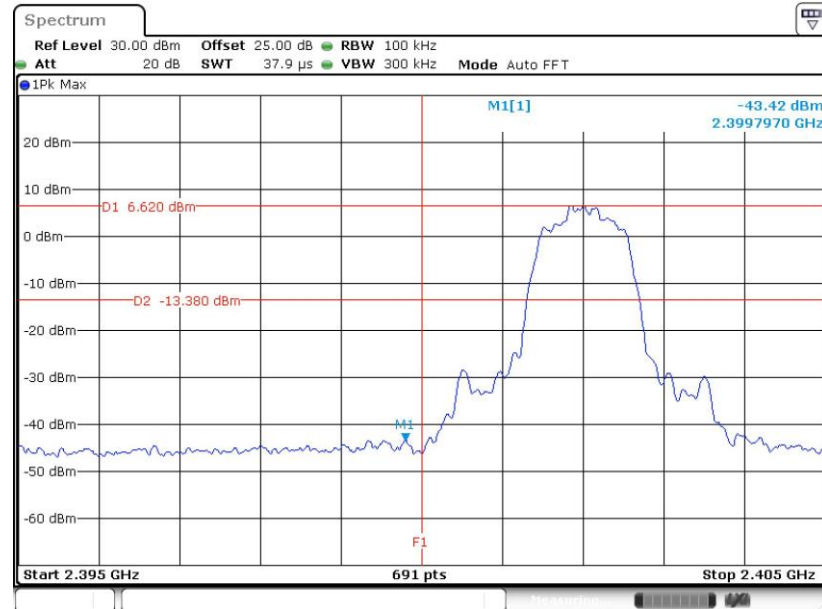
High Band Edge Plot on Channel 78



Date: 17.OCT.2019 18:54:06

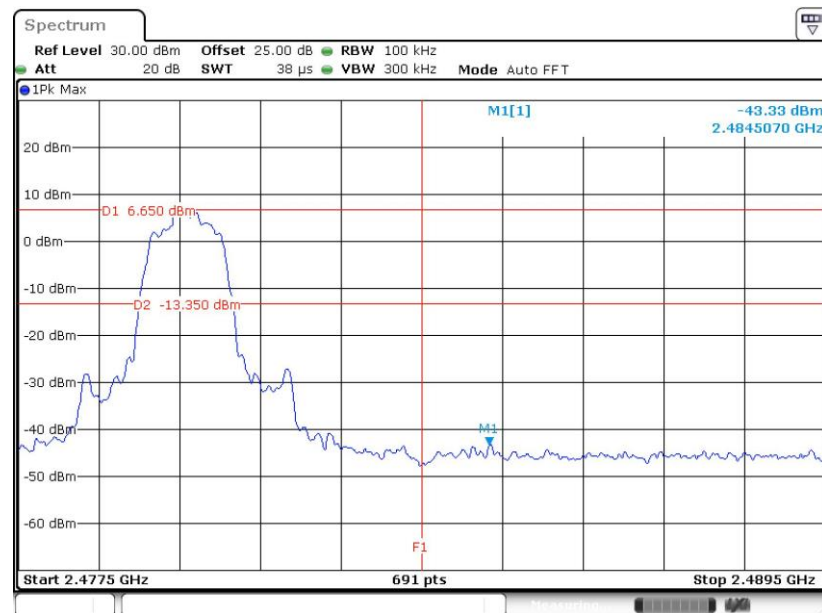
<2Mbps>

Low Band Edge Plot on Channel 00



Date: 17.OCT.2019 19:11:51

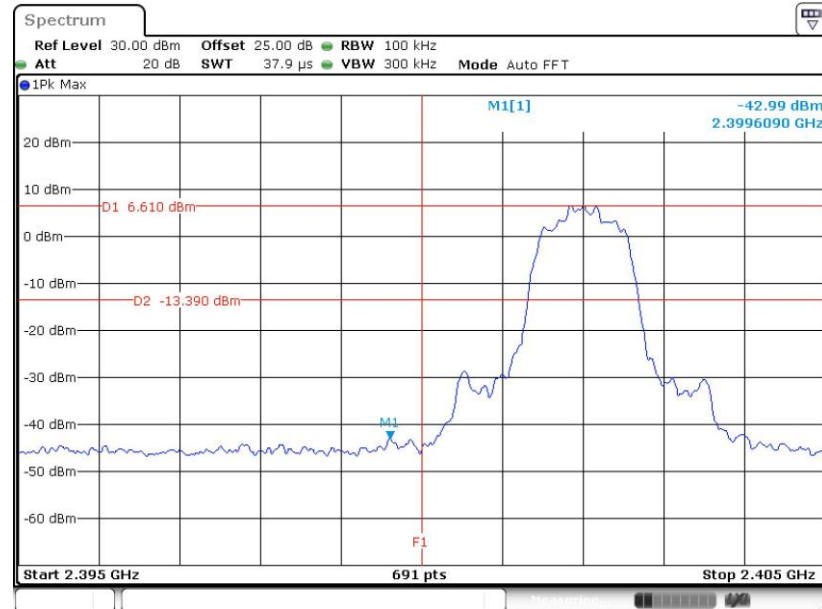
High Band Edge Plot on Channel 78



Date: 17.OCT.2019 19:01:35

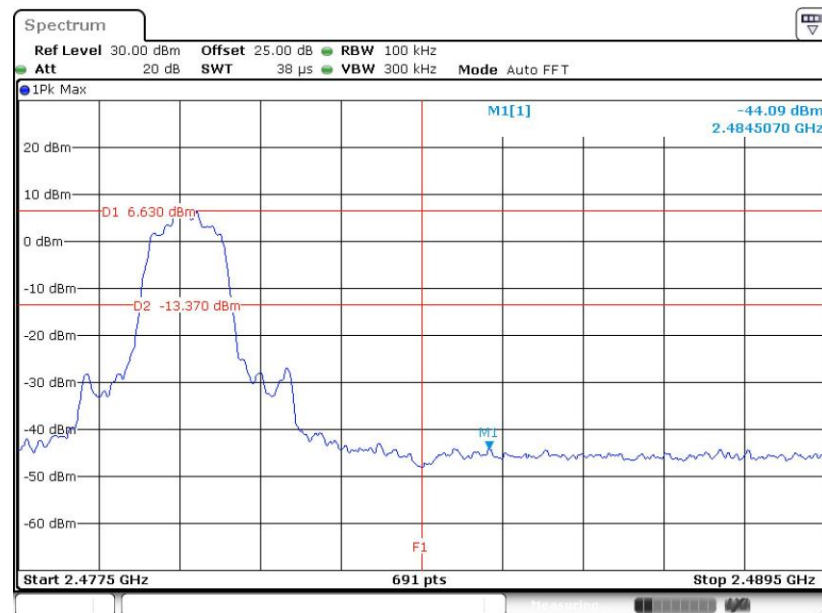
<3Mbps>

Low Band Edge Plot on Channel 00



Date: 17.OCT.2019 19:16:13

High Band Edge Plot on Channel 78

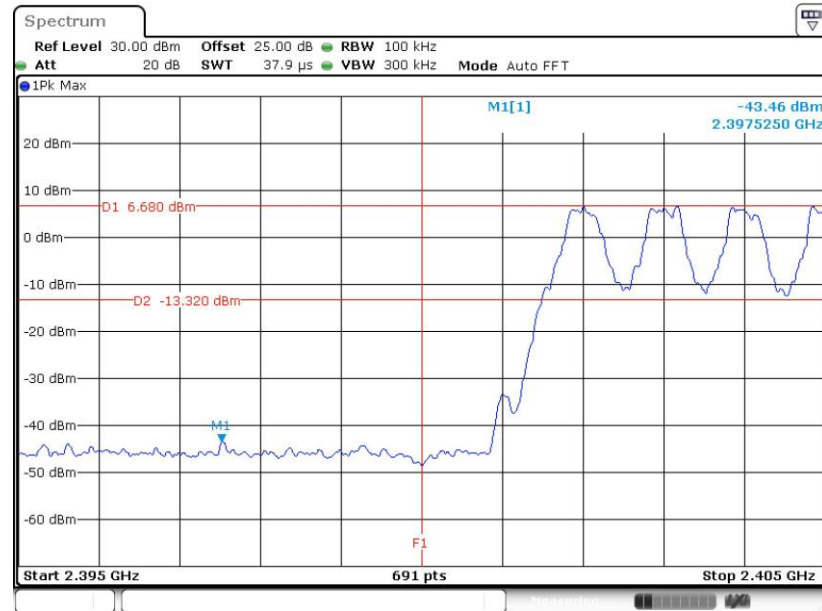


Date: 17.OCT.2019 19:24:39

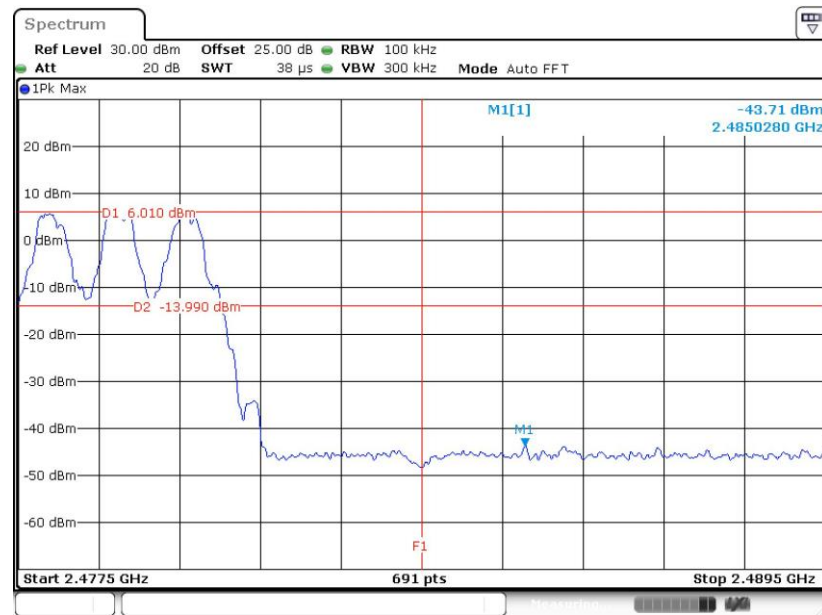
3.6.6 Test Result of Conducted Hopping Mode Band Edges

<1Mbps>

Hopping Mode Low Band Edge Plot

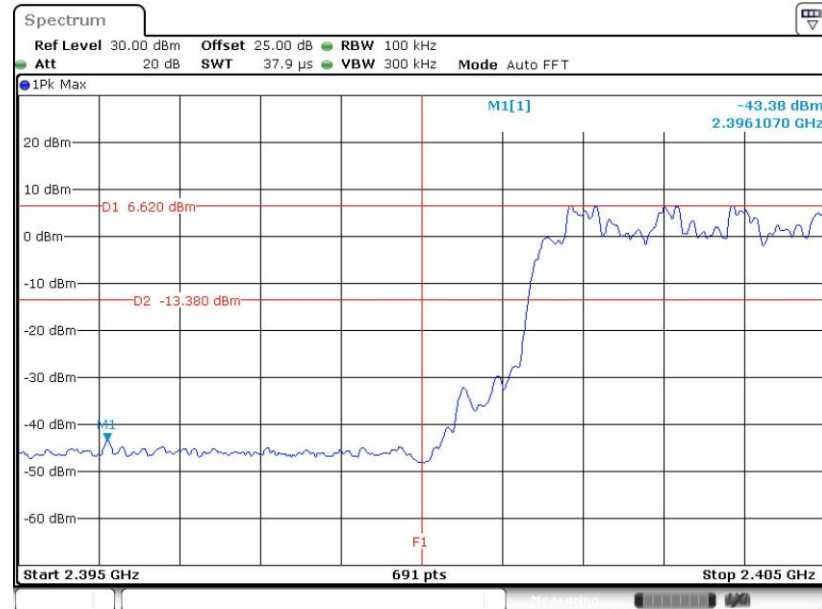


Hopping Mode High Band Edge Plot



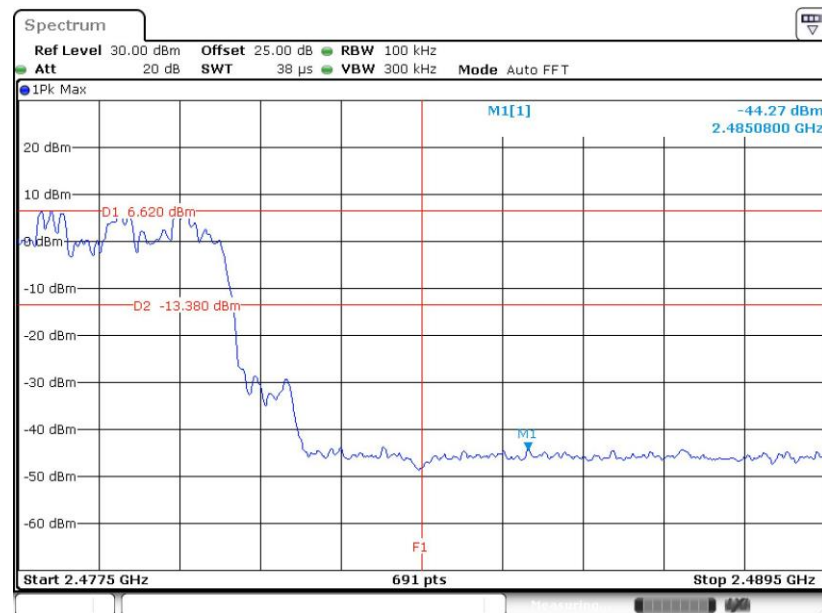
<2Mbps>

Hopping Mode Low Band Edge Plot



Date: 17.OCT.2019 18:57:41

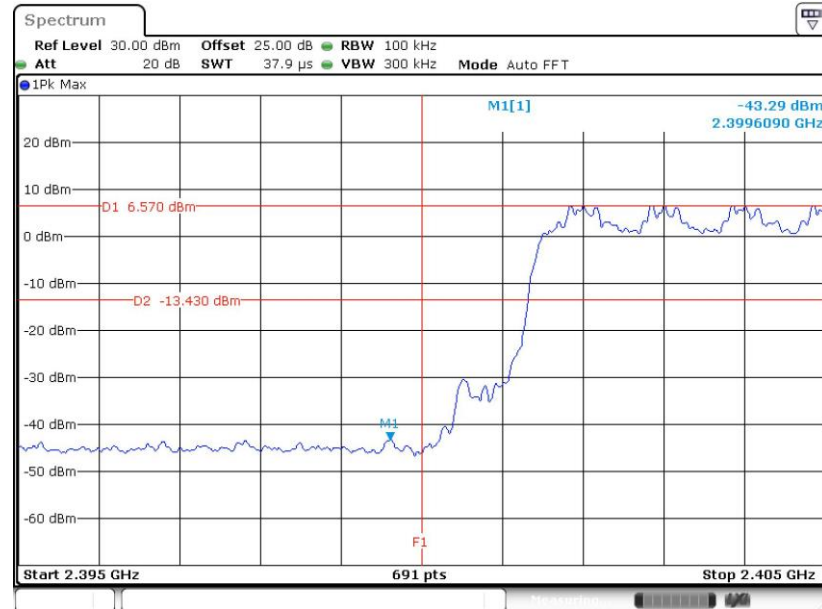
Hopping Mode High Band Edge Plot



Date: 17.OCT.2019 18:58:01

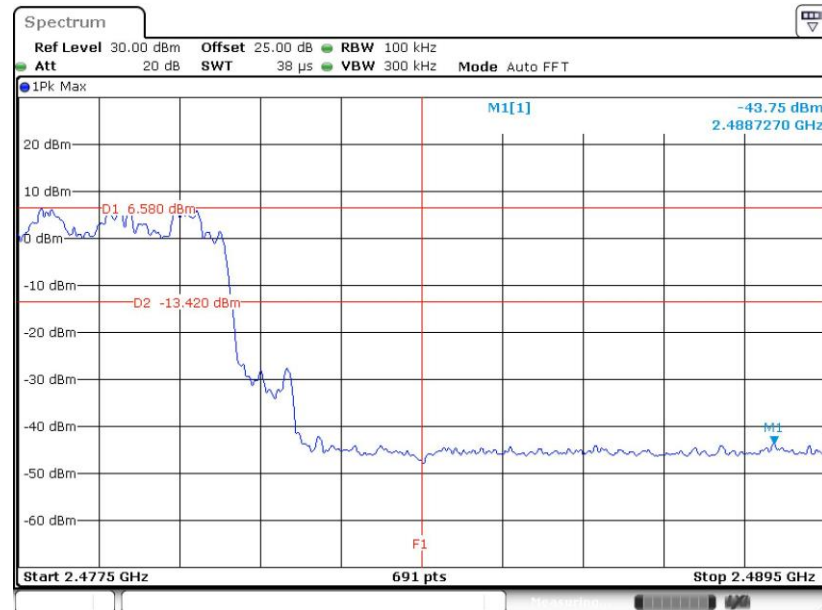
<3Mbps>

Hopping Mode Low Band Edge Plot



Date: 17.OCT.2019 19:31:29

Hopping Mode High Band Edge Plot



Date: 17.OCT.2019 19:27:29

3.7 Conducted Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

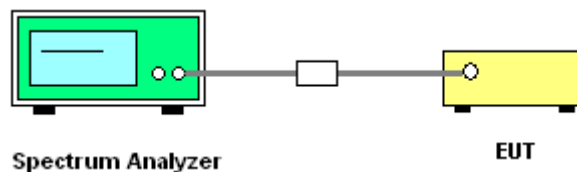
3.7.2 Measuring Instruments

See list of measuring equipment of this test report.

3.7.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.8.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.7.4 Test Setup



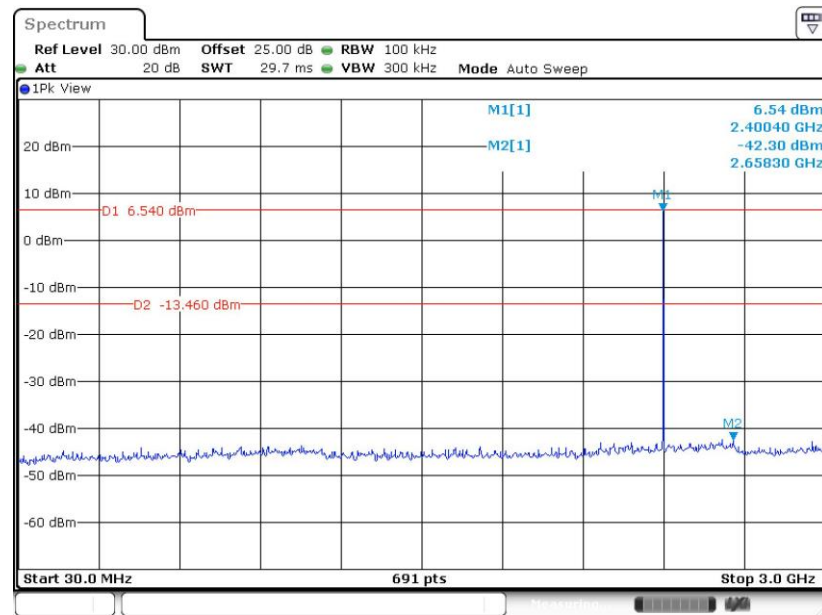


3.7.5 Test Result of Conducted Spurious Emission

Test Engineer :	Owen Yang	Temperature :	21~25°C
		Relative Humidity :	51~54%

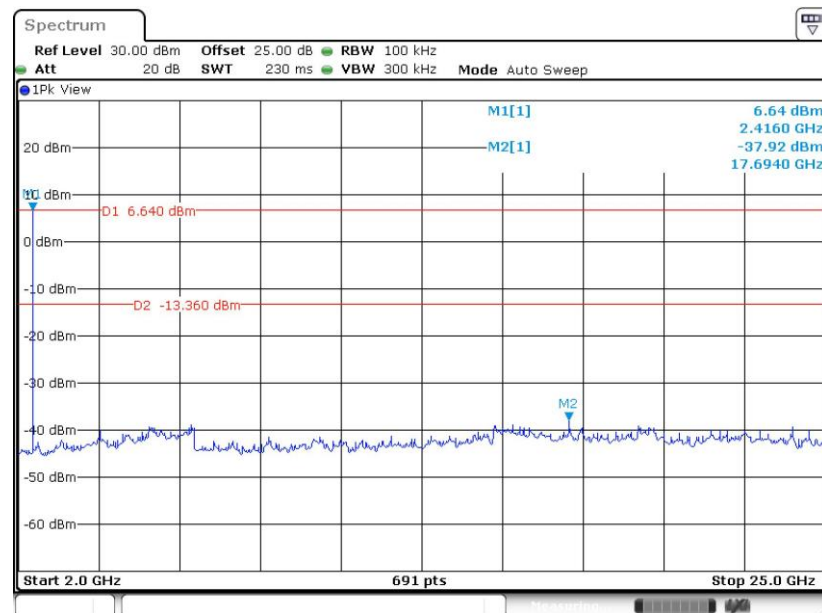
<1Mbps>

CSE Plot on Ch 00 between 30MHz ~ 3 GHz

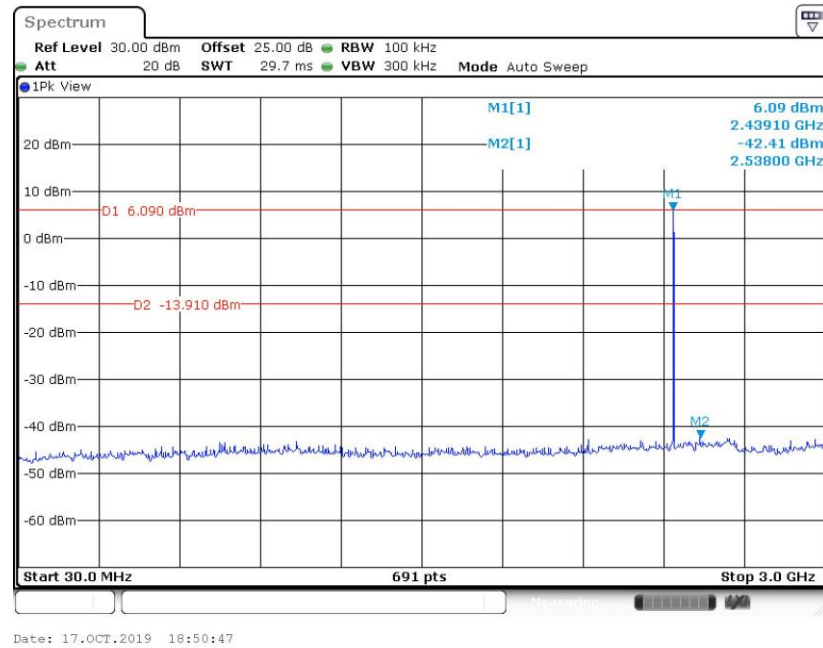
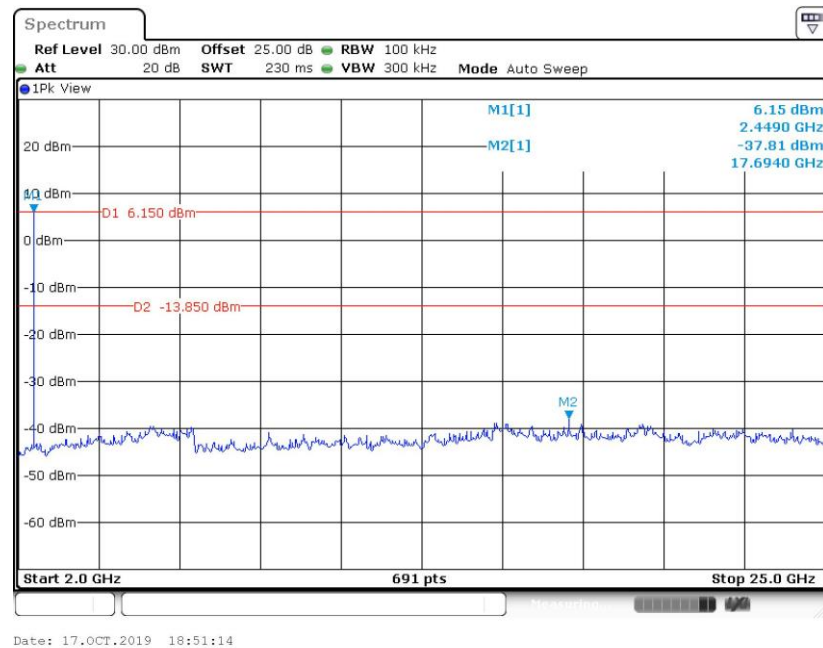


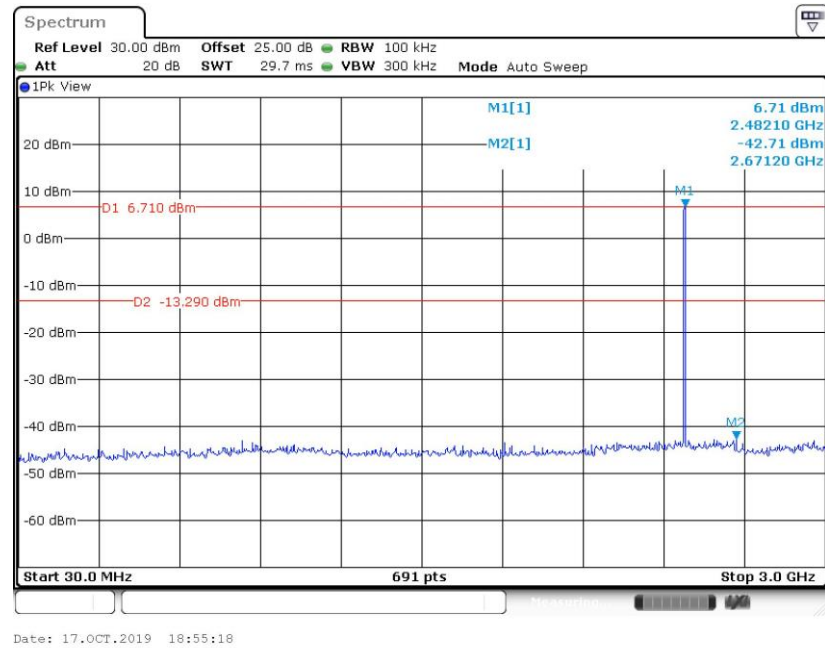
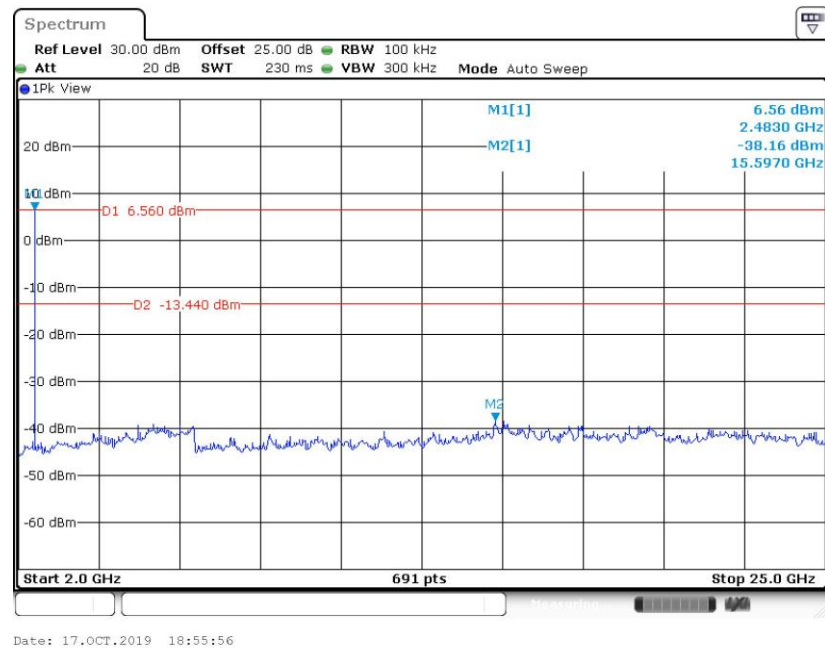
Date: 17.OCT.2019 18:46:51

1Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



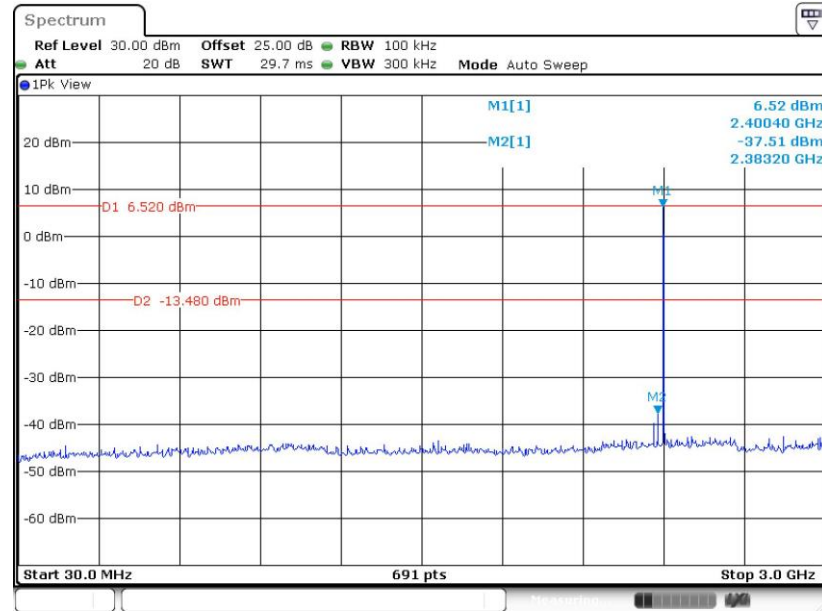
Date: 17.OCT.2019 18:47:17

CSE Plot on Ch 39 between 30MHz ~ 3 GHz

CSE Plot on Ch 39 between 2 GHz ~ 25 GHz


CSE Plot on Ch 78 between 30MHz ~ 3 GHz

CSE Plot on Ch 78 between 2 GHz ~ 25 GHz


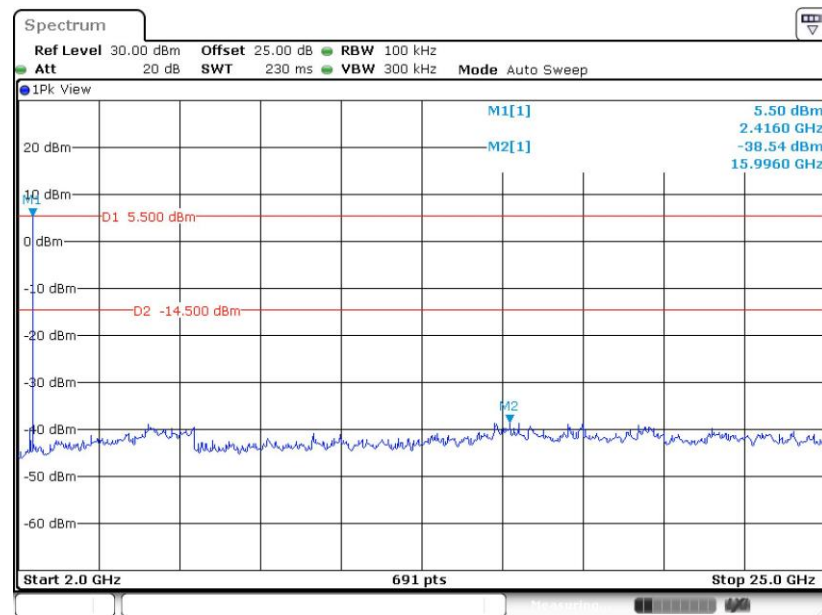
<2Mbps>

CSE Plot on Ch 00 between 30MHz ~ 3 GHz

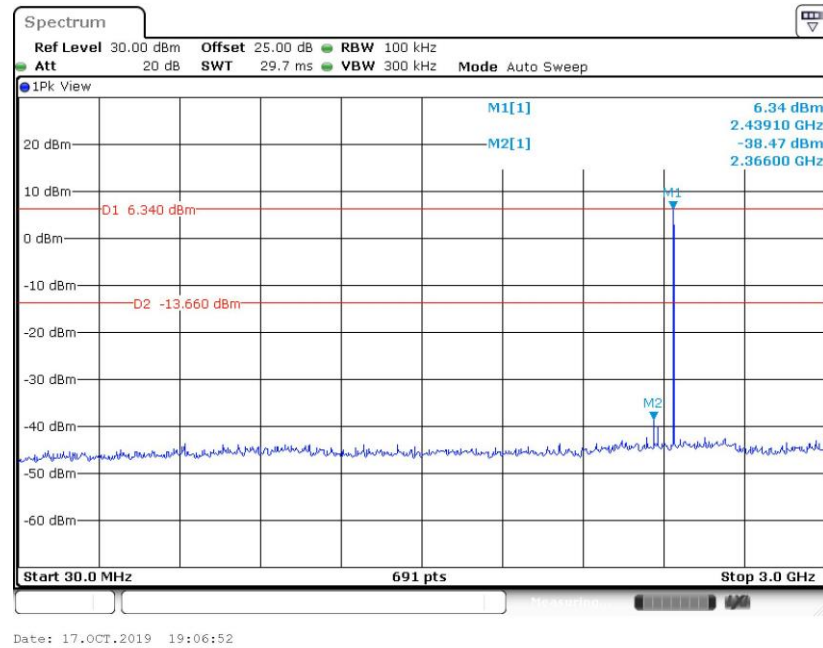
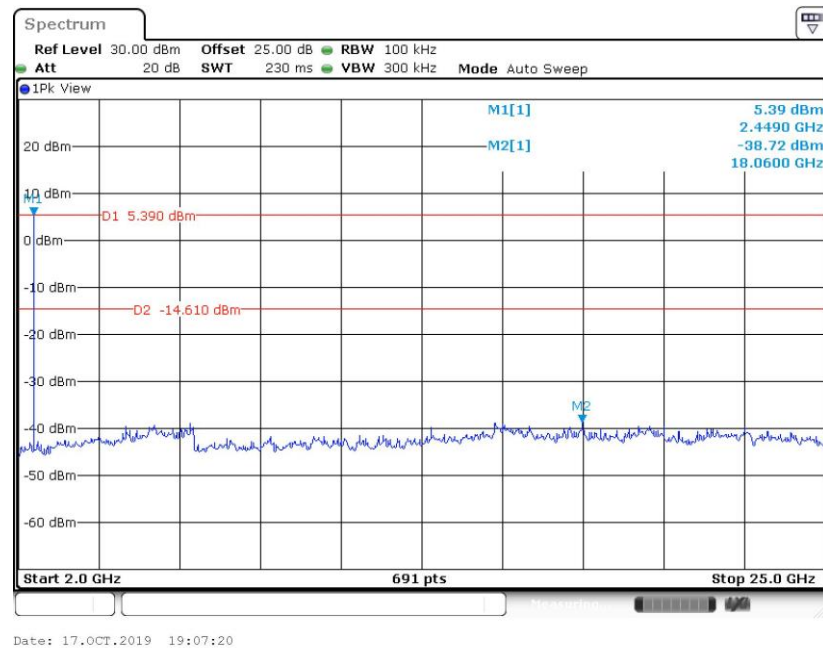


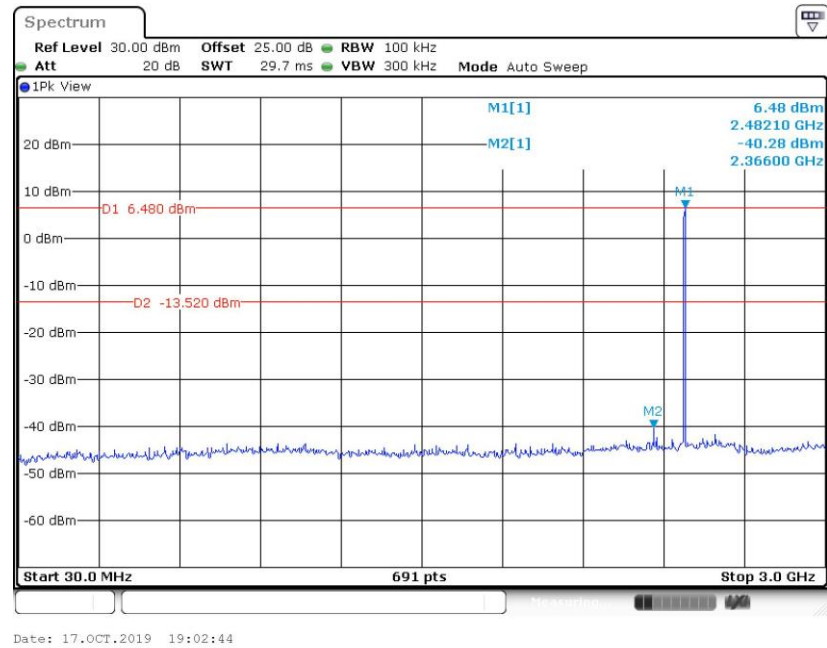
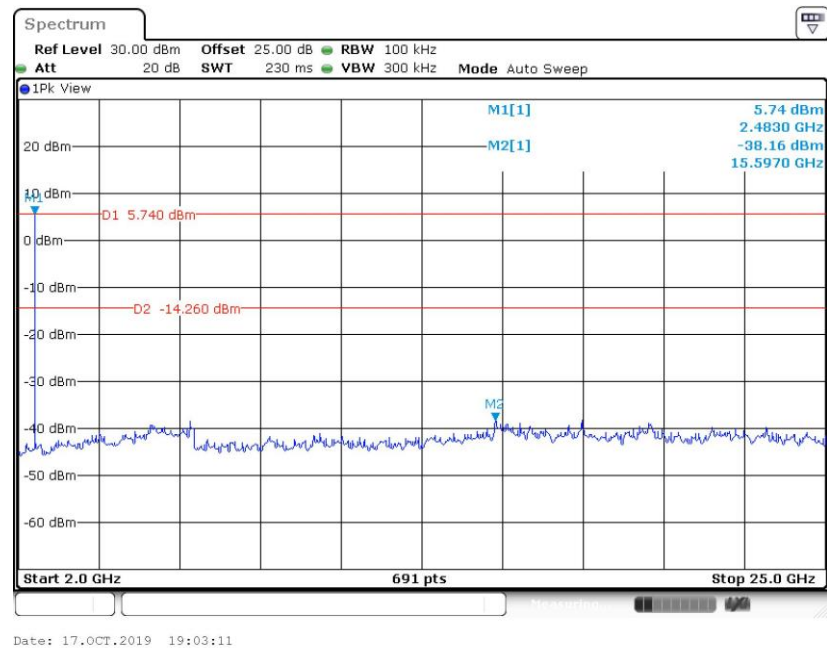
Date: 17.OCT.2019 19:12:54

CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



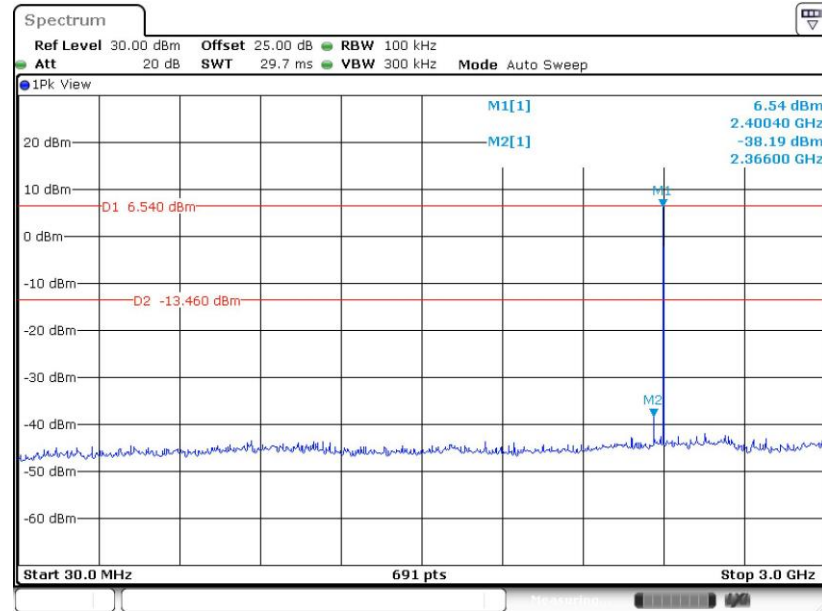
Date: 17.OCT.2019 19:13:21

CSE Plot on Ch 39 between 30MHz ~ 3 GHz

CSE Plot on Ch 39 between 2 GHz ~ 25 GHz


CSE Plot on Ch 78 between 30MHz ~ 3 GHz

CSE Plot on Ch 78 between 2 GHz ~ 25 GHz


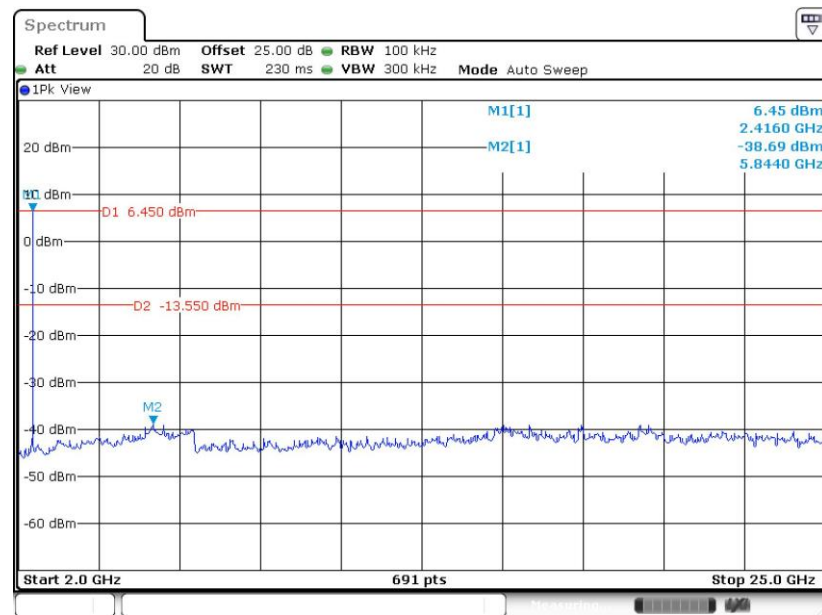
<3Mbps>

CSE Plot on Ch 00 between 30MHz ~ 3 GHz

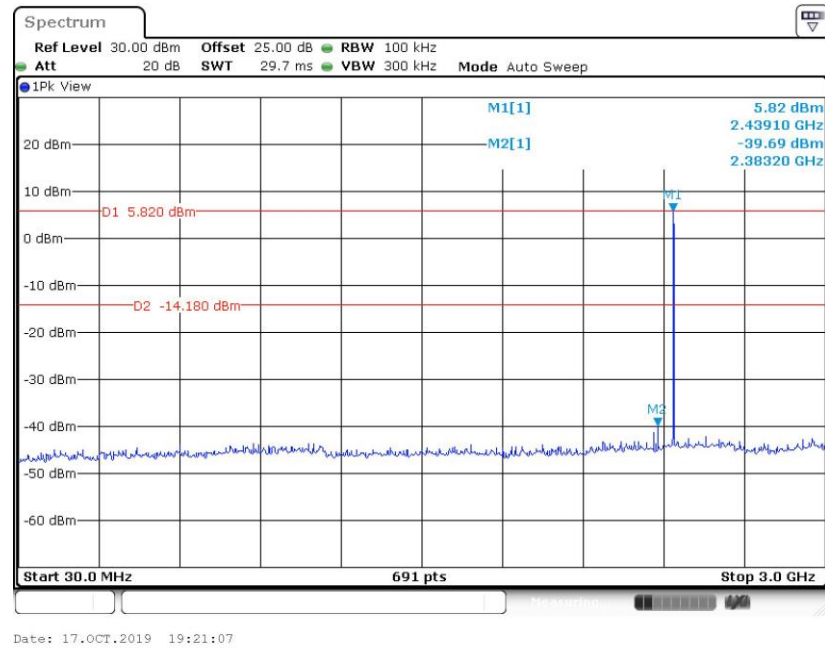
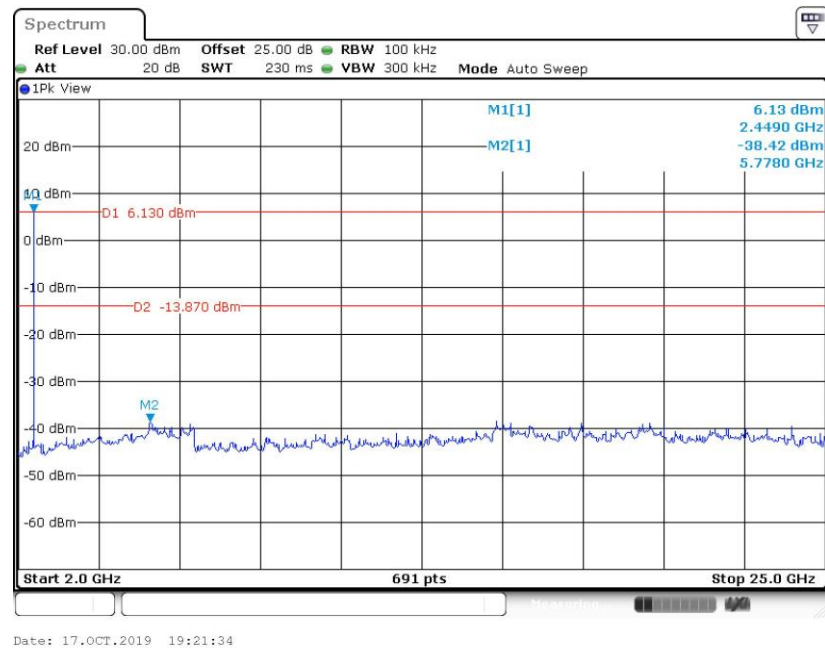


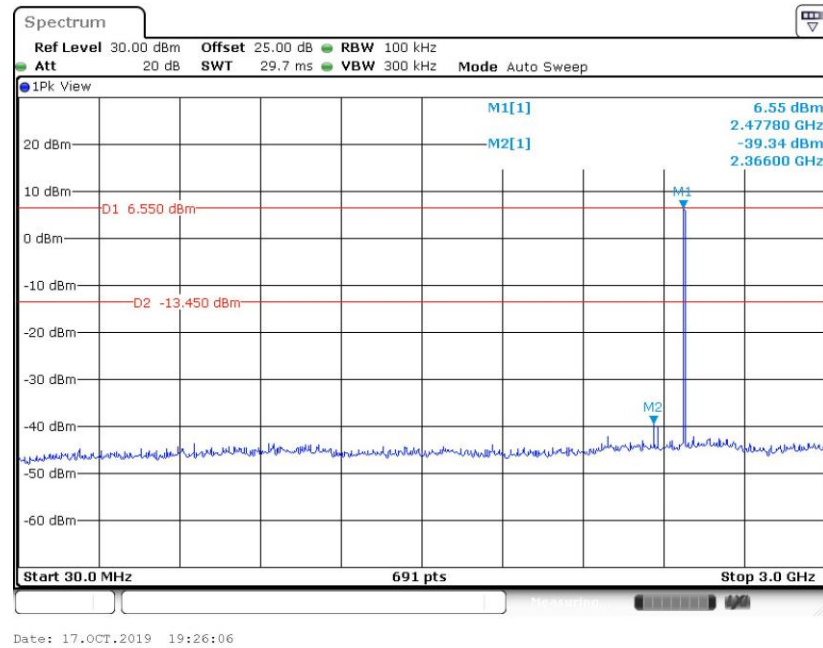
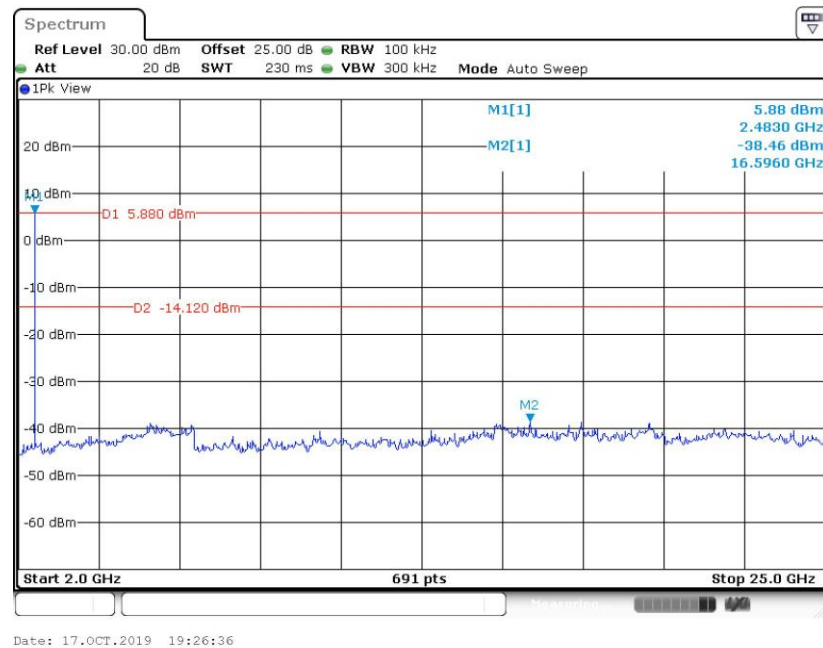
Date: 17.OCT.2019 19:17:15

CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 17.OCT.2019 19:17:42

CSE Plot on Ch 39 between 30MHz ~ 3 GHz

CSE Plot on Ch 39 between 2 GHz ~ 25 GHz


CSE Plot on Ch 78 between 30MHz ~ 3 GHz

CSE Plot on Ch 78 between 2 GHz ~ 25 GHz


3.8 Radiated Band Edges and Spurious Emission Measurement

3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the NCC LP0002 section 2.8 limits as below.

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

3.8.2 Measuring Instruments

See list of measuring equipment of this test report.

3.8.3 Test Procedures

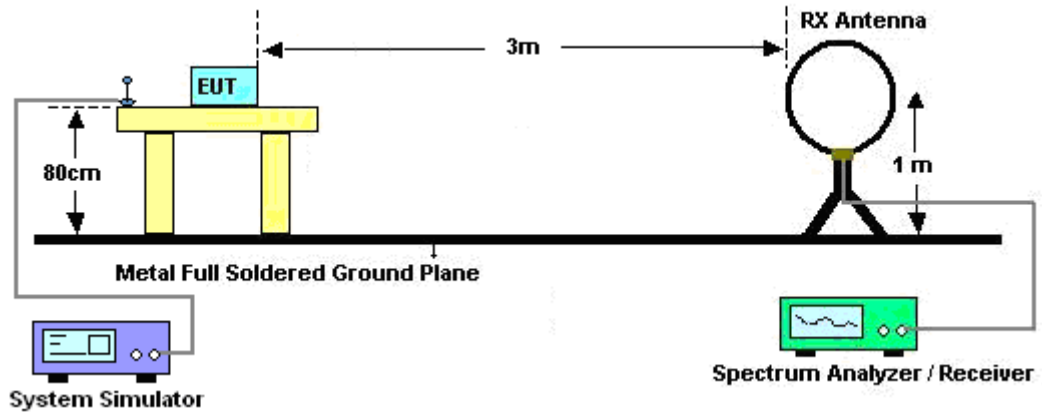
1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz, RBW=1MHz for $f > 1$ GHz ; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
 - (3) For average measurement: use duty cycle correction factor method per 15.35(c).
Duty cycle = On time/100 milliseconds
$$\text{On time} = N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{n-1} + N_n * L_n$$

Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.
Average Emission Level = Peak Emission Level + $20 * \log(\text{Duty cycle})$
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
7. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

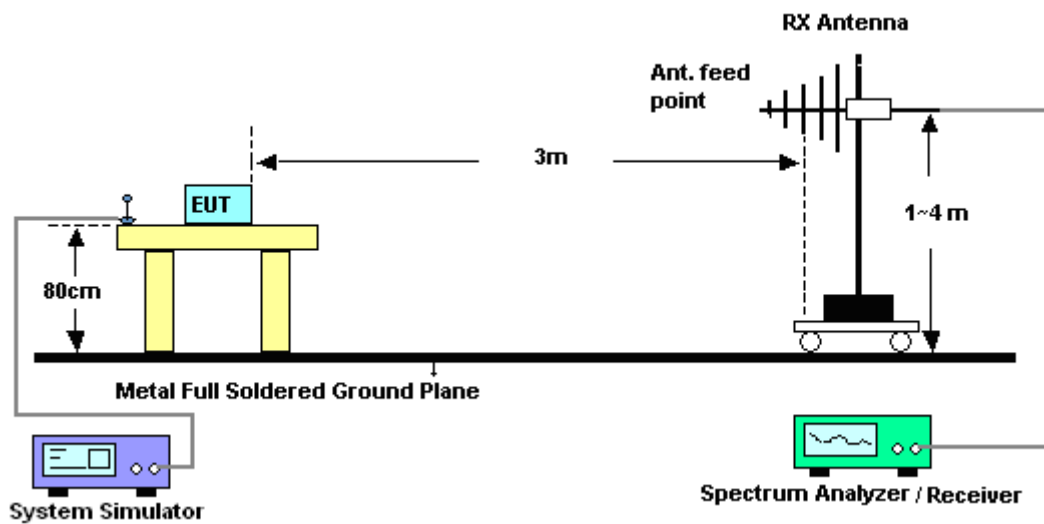
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.73dB for Scanner (SE4710); -24.76dB for Scanner (SE4770)) derived from $20 \log(\text{dwell time}/100\text{ms})$. This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

3.8.4 Test Setup

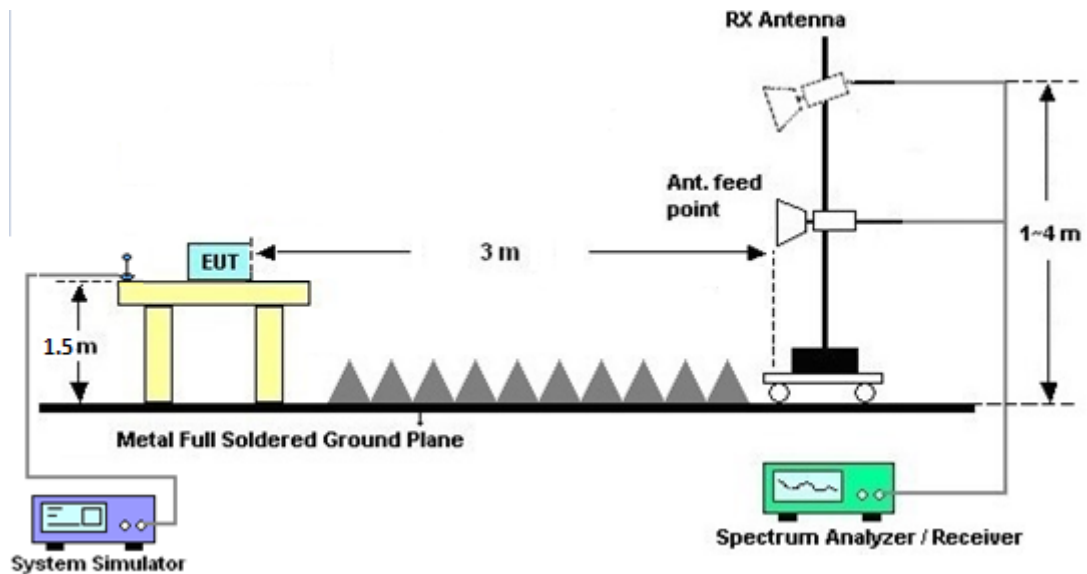
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.8.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per NCC LP0002 section 5.13 was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.8.7 Duty Cycle

Please refer to Appendix D.

3.8.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B and C.

3.9 AC Conducted Emission Measurement

3.9.1 Limit of AC Conducted Emission

For equipment that 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 the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

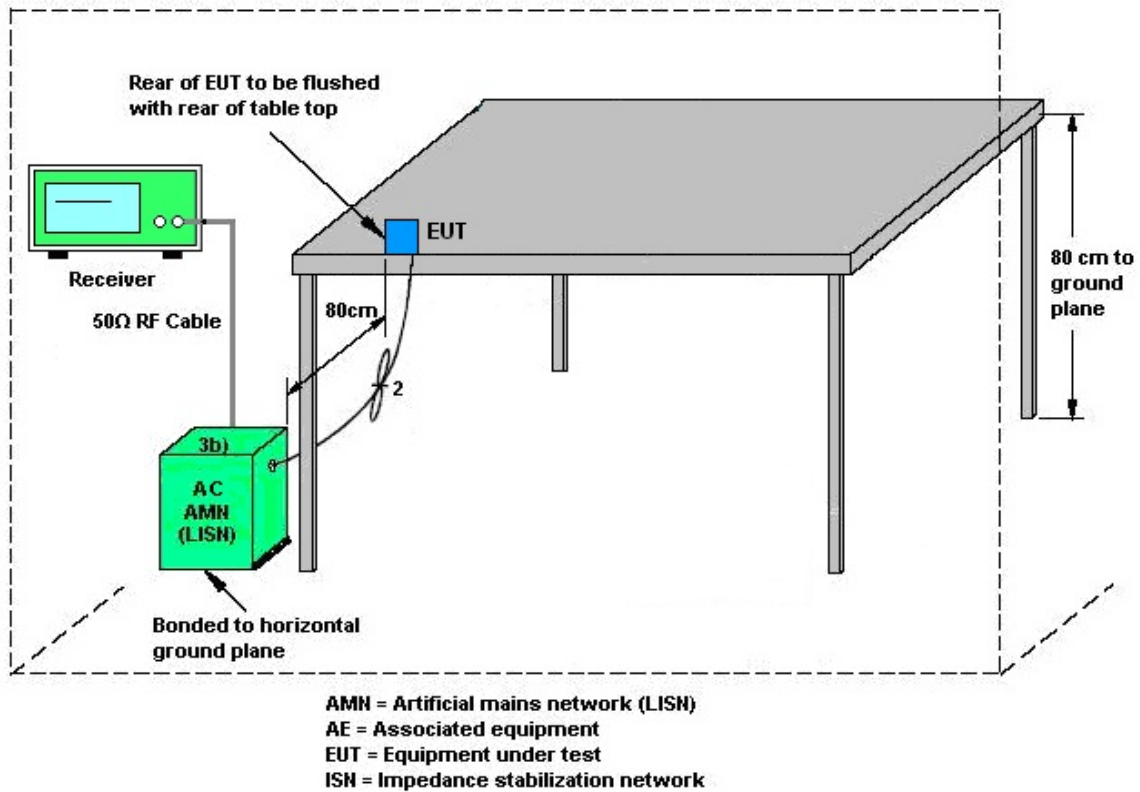
3.9.2 Measuring Instruments

See list of measuring equipment of this test report.

3.9.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.9.4 Test Setup



3.9.5 Test Result of AC Conducted Emission

Please refer to Appendix A.



3.10 Antenna Requirements

3.10.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the LP0002 Section 2.2, Section 3.10.1.3, and Section 3.10.1.4.

3.10.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.10.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Agilent	E4416A	GB41292344	N/A	Dec. 27, 2018	Oct. 11, 2019~ Oct. 17, 2019	Dec. 26, 2019	Conducted (TH05-HY)
Power Sensor	Agilent	E9327A	US40441548	50MHz~18GHz	Dec. 27, 2018	Oct. 11, 2019~ Oct. 17, 2019	Dec. 26, 2019	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 13, 2018	Oct. 11, 2019~ Oct. 17, 2019	Nov. 12, 2019	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz~40GHz	Nov. 21, 2018	Oct. 11, 2019~ Oct. 17, 2019	Nov. 20, 2019	Conducted (TH05-HY)
BT Base Station (Measure)	Rohde & Schwarz	CBT32	100519	N/A	Jun. 04, 2019	Oct. 11, 2019~ Oct. 17, 2019	Jun. 03, 2020	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC1208382	N/A	Mar. 27, 2019	Oct. 11, 2019~ Oct. 17, 2019	Mar. 26, 2020	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Aug. 27, 2019	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 12, 2018	Aug. 27, 2019	Nov. 11, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	Aug. 27, 2019	Nov. 13, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Aug. 27, 2019	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	Aug. 27, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	Aug. 27, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Jan. 11, 2019	Oct. 21, 2019 ~ Oct. 25, 2019	Jan. 10, 2020	Radiation (03CH16-HY)
Bilog Antenna	TESEQ	CBL6111D&00802N1D01N-06	47020&06	30MHz to 1GHz	Oct. 13, 2019	Oct. 21, 2019 ~ Oct. 25, 2019	Oct. 12, 2020	Radiation (03CH16-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1G~18GHz	Sep. 19, 2019	Oct. 21, 2019 ~ Oct. 25, 2019	Sep. 18, 2020	Radiation (03CH16-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	18GHz ~ 40GHz	Nov. 20, 2018	Oct. 21, 2019 ~ Oct. 25, 2019	Nov. 19, 2019	Radiation (03CH16-HY)
Amplifier	SONOMA	310N	371607	9kHz~1000MHz	Oct. 02, 2019	Oct. 21, 2019 ~ Oct. 25, 2019	Oct. 01, 2020	Radiation (03CH16-HY)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800054001	1GHz~18GHz	May 19, 2019	Oct. 21, 2019 ~ Oct. 25, 2019	May 18, 2020	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270264	1GHz~26.5GHz	Dec. 12, 2018	Oct. 21, 2019 ~ Oct. 25, 2019	Dec.11, 2019	Radiation (03CH16-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 06, 2018	Oct. 21, 2019 ~ Oct. 25, 2019	Dec. 05, 2019	Radiation (03CH16-HY)
EMI Test Receiver	Keysight	N9038A (MXE)	MY57290111	3Hz~26.5GHz	Nov. 29, 2018	Oct. 21, 2019 ~ Oct. 25, 2019	Nov. 28, 2019	Radiation (03CH16-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	Apr. 29, 2019	Oct. 21, 2019 ~ Oct. 25, 2019	Apr. 28, 2020	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11680/4PE	NA	Aug. 30, 2019	Oct. 21, 2019 ~ Oct. 25, 2019	Aug. 29, 2020	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY11688/4PE	NA	Aug. 30, 2019	Oct. 21, 2019 ~ Oct. 25, 2019	Aug. 29, 2020	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	EC-A5-300-5757	NA	Aug. 30, 2019	Oct. 21, 2019 ~ Oct. 25, 2019	Aug. 29, 2020	Radiation (03CH16-HY)
Software	Audix	E3 6.2009-8-24	RK-001136	N/A	N/A	Oct. 21, 2019 ~ Oct. 25, 2019	N/A	Radiation (03CH16-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.20
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.9
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

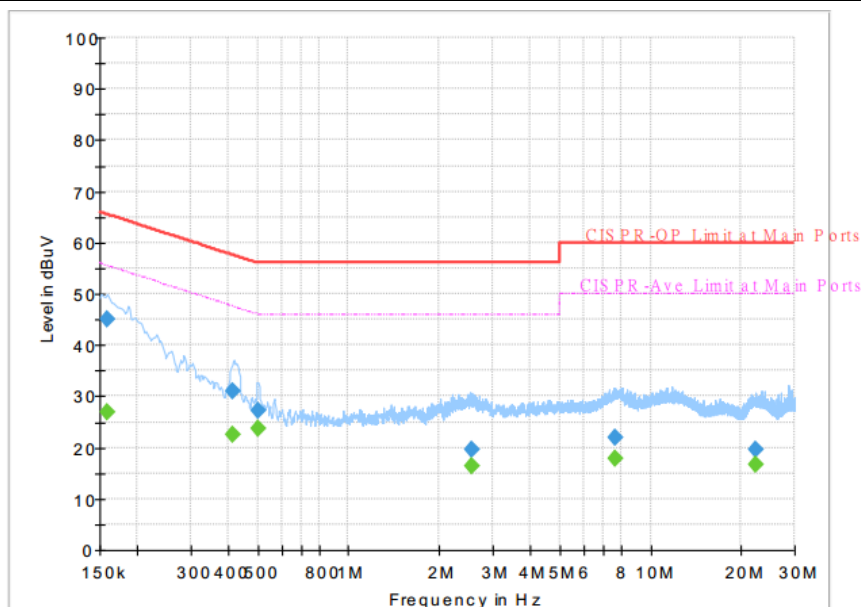
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	5.8
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.9
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Appendix A. AC Conducted Emission Test Results

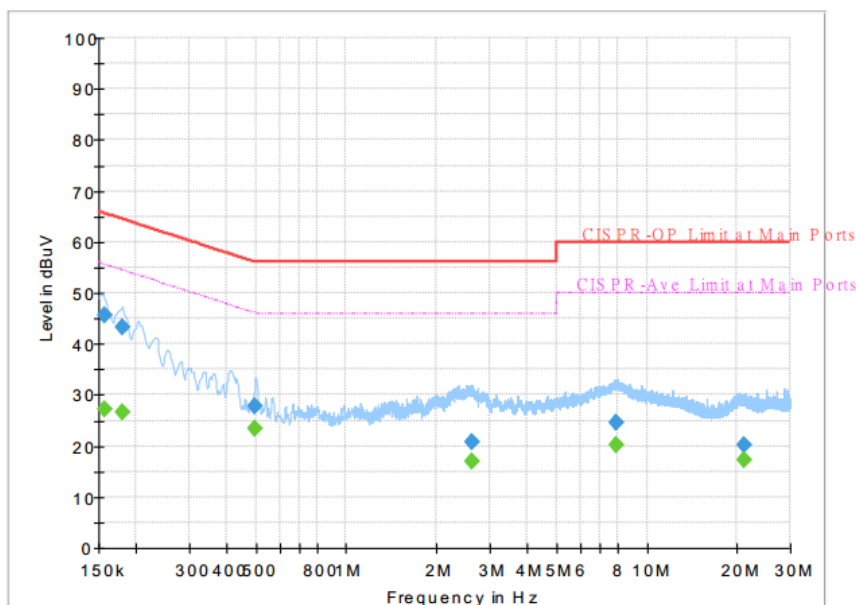
Test Engineer :	Jimmy Chang	Temperature :	24~26℃
		Relative Humidity :	50~52%
Test Voltage :	120Vac / 60Hz	Phase :	Line



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.159000	---	26.86	55.52	28.66	L1	OFF	19.4
0.159000	45.17	---	65.52	20.35	L1	OFF	19.4
0.415500	---	22.51	47.54	25.03	L1	OFF	19.4
0.415500	30.99	---	57.54	26.55	L1	OFF	19.4
0.501000	---	23.63	46.00	22.37	L1	OFF	19.4
0.501000	27.19	---	56.00	28.81	L1	OFF	19.4
2.546250	---	16.34	46.00	29.66	L1	OFF	19.5
2.546250	19.71	---	56.00	36.29	L1	OFF	19.5
7.615500	---	17.95	50.00	32.05	L1	OFF	19.6
7.615500	21.83	---	60.00	38.17	L1	OFF	19.6
22.278750	---	16.67	50.00	33.33	L1	OFF	19.7
22.278750	19.71	---	60.00	40.29	L1	OFF	19.7

Test Engineer :	Jimmy Chang	Temperature :	24~26°C
		Relative Humidity :	50~52%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156750	45.52	---	65.63	20.11	N	OFF	19.4
0.156750	---	27.11	55.63	28.52	N	OFF	19.4
0.179250	43.25	---	64.52	21.27	N	OFF	19.4
0.179250	---	26.71	54.52	27.81	N	OFF	19.4
0.498750	27.72	---	56.02	28.30	N	OFF	19.5
0.498750	---	23.53	46.02	22.49	N	OFF	19.5
2.625000	20.67	---	56.00	35.33	N	OFF	19.5
2.625000	---	17.08	46.00	28.92	N	OFF	19.5
7.867500	24.67	---	60.00	35.33	N	OFF	19.6
7.867500	---	20.23	50.00	29.77	N	OFF	19.6
21.178500	20.22	---	60.00	39.78	N	OFF	19.8
21.178500	---	17.36	50.00	32.64	N	OFF	19.8



Appendix B. Radiated Spurious Emission

Test Engineer :	Jacky Hung, Andy Yang, and CR Liao	Temperature :	20~25°C
		Relative Humidity :	50~60%

<Scanner (SE4710)>

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BT CH00 2402MHz		2347.485	51.49	-22.51	74	45.88	27.81	8.1	30.3	105	42	P	H
		2347.485	26.76	-27.24	54	-	-	-	-	-	-	A	H
	*	2402	98.29	-	-	92.78	27.6	8.19	30.28	105	42	P	H
	*	2402	73.56	-	-	-	-	-	-	-	-	A	H
													H
													H
		2347.59	61.19	-12.81	74	55.58	27.81	8.1	30.3	124	200	P	V
		2347.59	36.46	-17.54	54	-	-	-	-	-	-	A	V
	*	2402	105.5	-	-	99.99	27.6	8.19	30.28	124	200	P	V
	*	2402	80.77	-	-	-	-	-	-	-	-	A	V
													V
													V
BT CH 39 2441MHz		2385.04	52.03	-21.97	74	46.48	27.66	8.17	30.28	100	43	P	H
		2385.04	27.3	-26.7	54	-	-	-	-	-	-	A	H
	*	2441	97.65	-	-	92.06	27.6	8.26	30.27	100	43	P	H
	*	2441	72.92	-	-	-	-	-	-	-	-	A	H
		2487.19	46.98	-27.02	74	41.37	27.53	8.33	30.25	100	43	P	H
		2487.19	22.25	-31.75	54	-	-	-	-	-	-	A	H
		2347.38	60.71	-13.29	74	55.1	27.81	8.1	30.3	119	200	P	V
		2347.38	35.98	-18.02	54	-	-	-	-	-	-	A	V
	*	2441	103.77	-	-	98.18	27.6	8.26	30.27	119	200	P	V
	*	2441	79.04	-	-	-	-	-	-	-	-	A	V
		2491.6	49.15	-24.85	74	43.54	27.52	8.34	30.25	119	200	P	V
		2491.6	24.42	-29.58	54	-	-	-	-	-	-	A	V



BT CH 78 2480MHz		2348	51.12	-22.88	74	45.51	27.81	8.1	30.3	100	46	P	H
		2348	26.39	-27.61	54	-	-	-	-	-	-	A	H
		2386	51.94	-22.06	74	46.39	27.66	8.17	30.28	100	46	P	H
		2386	27.21	-26.79	54	-	-	-	-	-	-	A	H
	*	2480	96.94	-	-	91.34	27.54	8.32	30.26	100	46	P	H
	*	2480	72.21	-	-	-	-	-	-	-	-	A	H
		2485.12	52.87	-21.13	74	47.26	27.53	8.33	30.25	100	46	P	H
		2485.12	28.14	-25.86	54	-	-	-	-	-	-	A	H
		2348	60.73	-13.27	74	55.12	27.81	8.1	30.3	119	196	P	V
		2348	36	-18	54	-	-	-	-	-	-	A	V
		2386	61.02	-12.98	74	55.47	27.66	8.17	30.28	119	196	P	V
		2386	36.29	-17.71	54	-	-	-	-	-	-	A	V
	*	2480	102.37	-	-	96.77	27.54	8.32	30.26	119	196	P	V
	*	2480	77.64	-	-	-	-	-	-	-	-	A	V
		2485.08	56.82	-17.18	74	51.21	27.53	8.33	30.25	119	196	P	V
		2485.08	32.09	-21.91	54	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BT CH 00 2402MHz		4804	38.47	-35.53	74	53.04	31.11	12.43	58.11	100	0	P	H
		4804	13.74	-40.26	54	-	-	-	-	-	-	A	H
													H
													H
		4804	37.37	-36.63	74	51.94	31.11	12.43	58.11	100	0	P	V
		4804	12.64	-41.36	54	-	-	-	-	-	-	A	V
													V
													V
BT CH 39 2441MHz		4882	36.67	-37.33	74	51.23	31.07	12.5	58.13	100	0	P	H
		4882	11.94	-42.06	54	-	-	-	-	-	-	A	H
		7323	50.6	-23.4	74	56	36.49	15.6	57.49	100	0	P	H
		7323	25.87	-28.13	54	-	-	-	-	-	-	A	H
		4882	36.74	-37.26	74	51.3	31.07	12.5	58.13	100	0	P	V
		4882	12.01	-41.99	54	-	-	-	-	-	-	A	V
		7323	47.86	-26.14	74	53.26	36.49	15.6	57.49	100	0	P	V
		7323	23.13	-30.87	54	-	-	-	-	-	-	A	V
BT CH 78 2480MHz		4960	37.84	-36.16	74	52.16	31.26	12.56	58.14	100	0	P	H
		4960	13.11	-40.89	54	-	-	-	-	-	-	A	H
		7440	51.46	-22.54	74	56.49	36.58	15.72	57.33	100	0	P	H
		7440	26.73	-27.27	54	-	-	-	-	-	-	A	H
		4960	36.68	-37.32	74	51	31.26	12.56	58.14	100	0	P	V
		4960	11.95	-42.05	54	-	-	-	-	-	-	A	V
		7440	46.72	-27.28	74	51.75	36.58	15.72	57.33	100	0	P	V
		7440	21.99	-32.01	54	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
2.4GHz BT LF		181.32	22.32	-21.18	43.5	37.2	14.98	2.45	32.31	-	-	P	H	
		275.41	19.59	-26.41	46	29.93	19.03	2.98	32.35	-	-	P	H	
		384.05	22.66	-23.34	46	30.25	21.24	3.4	32.23	-	-	P	H	
		565.44	28.1	-17.9	46	29.9	26.05	4.13	31.98	-	-	P	H	
		774.96	31.09	-14.91	46	30.4	28.21	4.79	32.31	-	-	P	H	
		935.98	34.76	-11.24	46	30.64	30.29	5.33	31.5	100	0	P	H	
													H	
													H	
													H	
													H	
													H	
													H	
													H	
		177.44	19.07	-24.43	43.5	33.78	15.16	2.43	32.3	32.3	-	-	P	V
		337.49	20.49	-25.51	46	29.58	20.01	3.2	32.3	32.3	-	-	P	V
		455.83	24.43	-21.57	46	29.64	23.24	3.69	32.14	32.14	-	-	P	V
		639.16	28.36	-17.64	46	29.78	26.21	4.38	32.01	32.01	-	-	P	V
		755.56	30.85	-15.15	46	30.18	28.2	4.74	32.27	32.27	-	-	P	V
		909.79	33.19	-12.81	46	30.45	29.31	5.23	31.8	31.8	100	0	P	V
														V
														V
														V
														V
													V	
													V	
													V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.													



<Scanner (SE4770)>

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BT CH 78 2480MHz		2360	51.79	-22.21	74	46.2	27.76	8.12	30.29	100	340	P	H
		2380	50.65	-23.35	74	45.1	27.68	8.16	30.29	100	340	P	H
	*	2480	94.71	-	-	89.11	27.54	8.32	30.26	100	340	P	H
		2483.76	47.11	-26.89	74	41.51	27.53	8.32	30.25	100	340	P	H
													H
													H
		2360	61.96	-12.04	74	56.37	27.76	8.12	30.29	148	216	P	V
		2380	61.32	-12.68	74	55.77	27.68	8.16	30.29	148	216	P	V
	*	2480	99.72	-	-	94.12	27.54	8.32	30.26	148	216	P	V
		2484.32	51.37	-22.63	74	45.77	27.53	8.32	30.25	148	216	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**2.4GHz 2400~2483.5MHz****BT (Harmonic @ 3m)**

BT	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BT CH 78 2480MHz		4960	37.41	-36.59	74	51.73	31.26	12.56	58.14	100	0	P	H
		4960	12.65	-41.35	54	-	-	-	-	-	-	A	H
		7440	50.21	-23.79	74	55.24	36.58	15.72	57.33	100	0	P	H
		7440	25.45	-28.55	54	-	-	-	-	-	-	A	H
		4960	37.23	-36.77	74	51.55	31.26	12.56	58.14	100	0	P	V
		4960	12.47	-41.53	54	-	-	-	-	-	-	A	V
		7440	46.71	-27.29	74	51.74	36.58	15.72	57.33	100	0	P	V
		7440	21.95	-32.05	54	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BT (LF)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.	
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.		
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
2.4GHz BT LF		246.31	26.73	-19.27	46	38.14	18.08	2.68	32.34	-	-	P	H	
		363.68	22.78	-23.22	46	30.94	20.8	3.2	32.26	-	-	P	H	
		452.92	24.77	-21.23	46	30.04	23.19	3.58	32.14	-	-	P	H	
		621.7	28.82	-17.18	46	30.44	26	4.19	31.97	-	-	P	H	
		755.56	30.82	-15.18	46	30.15	28.2	4.59	32.27	-	-	P	H	
		914.64	38.52	-7.48	46	35.59	29.44	5.03	31.75	100	0	P	H	
													H	
													H	
													H	
													H	
													H	
													H	
		180.35	18.2	-25.3	43.5	33.05	15.02	2.25	32.31	-	-	P	V	
		340.4	20.36	-25.64	46	29.35	20.1	3.1	32.3	-	-	P	V	
		554.77	27.56	-18.44	46	29.71	25.78	3.94	32	-	-	P	V	
		626.55	28.64	-17.36	46	30.21	26.06	4.2	31.98	-	-	P	V	
		729.37	39.1	-6.9	46	39.09	27.56	4.51	32.21	100	0	P	V	
		857.41	32.52	-13.48	46	30.44	29.12	4.89	32.11	-	-	P	V	
														V
														V
														V
														V
														V
														V
Remark	1. No other spurious found. 2. All results are PASS against limit line.													



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	P eak or A verage
H/V	H orizontal or V ertical

A calculation example for radiated spurious emission is shown as below:

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 00 2402MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
= 55.45 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
= 43.54 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 43.54(dBμV/m) – 54(dBμV/m)
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.



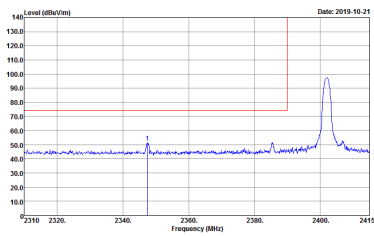
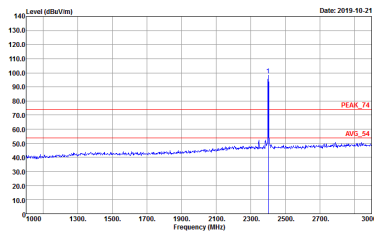
Appendix C. Radiated Spurious Emission Plots

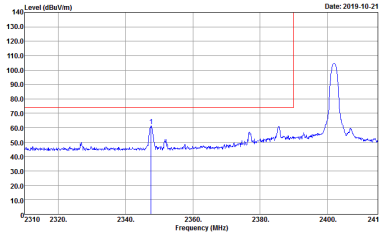
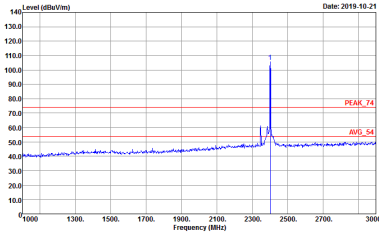
Test Engineer :	Jacky Hung, Andy Yang, and CR Liao	Temperature :	20~25°C
		Relative Humidity :	50~60%

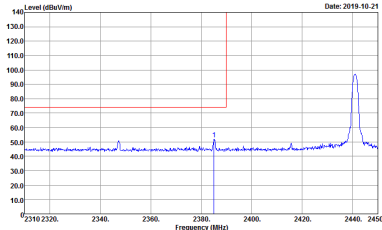
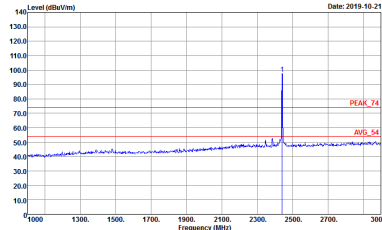
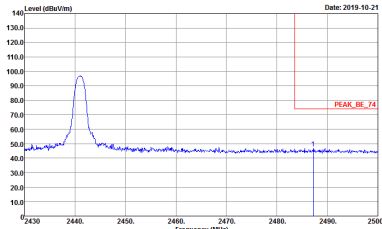
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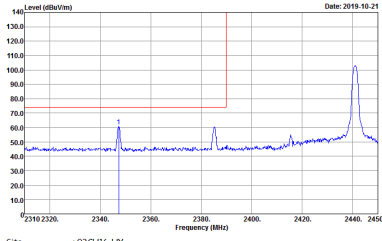
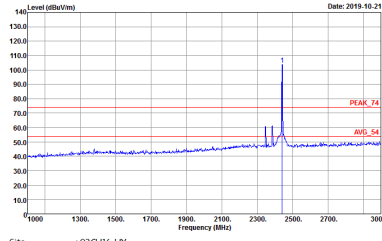
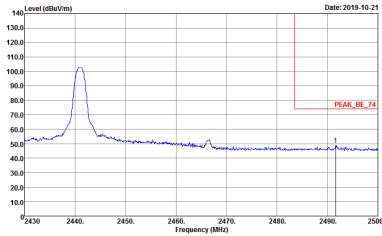
2.4GHz 2400~2483.5MHz

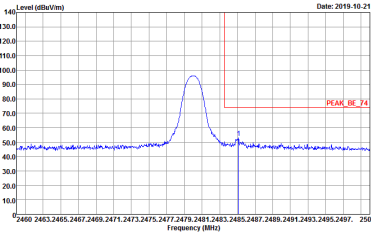
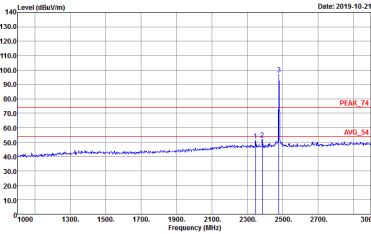
BT (Band Edge @ 3m)

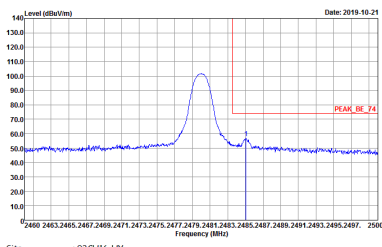
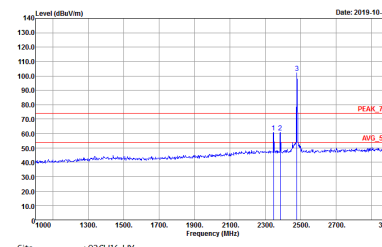
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH00 2402MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL Detector : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Detector : Peak	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL Detector : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Detector : Peak

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH00 2402MHz	
	Vertical	Fundamental
Peak	 Site : 03CH16-11Y Condition : PEAK_85_74 3m 91200_1522 VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak	 Site : 03CH16-11Y Condition : PEAK_74 3m 91200_1522 VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak

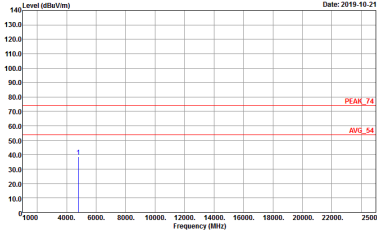
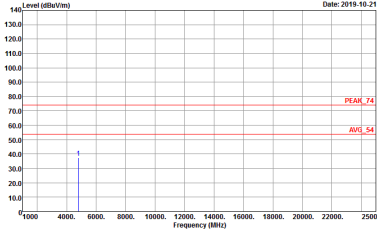
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH39 2441MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL Detector : Peak	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL Detector : Peak
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL Detector : Peak	Left blank

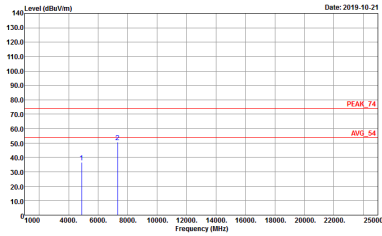
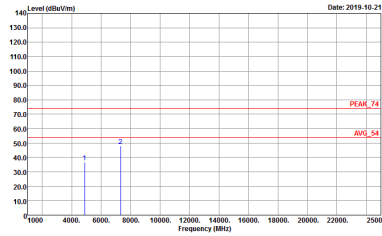
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH39 2441MHz	
	Vertical	Fundamental
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 VERTICAL Detector : Peak	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL Detector : Peak
Peak	 Site : 03CH16-HY Condition : PEAK_BE_74 3m 91200_1522 VERTICAL Detector : Peak	Left blank

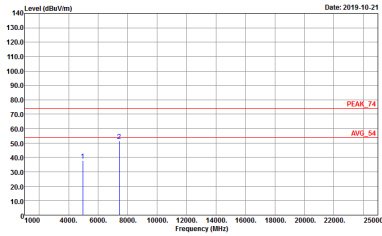
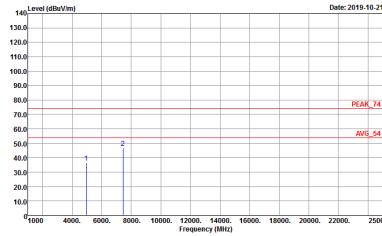
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH78 2480MHz	
	Horizontal	Fundamental
Peak	 Site : 03CH16-14Y Condition : PEAK_BC_74 3m 91200_1522 HORIZONTAL Detector : Peak	 Site : 03CH16-14Y Condition : PEAK_74 3m 91200_1522 HORIZONTAL Detector : Peak

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH78 2480MHz	
	Vertical	Fundamental
Peak	 Site : 03CH16-14Y Condition : PEAK_B6_74 3m 91200_1522 VERTICAL Detector : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Detector : Peak	 Site : 03CH16-14Y Condition : PEAK_74 3m 91200_1522 VERTICAL Detector : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Detector : Peak

2.4GHz 2400~2483.5MHz
BT (Harmonic @ 3m)

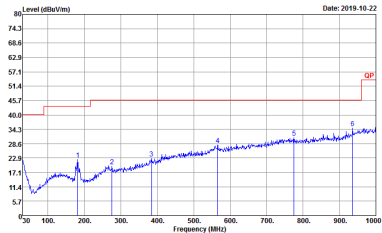
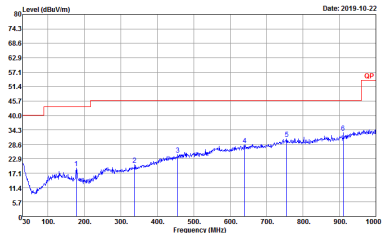
BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BT CH00 2402MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL Detector : Peak	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL Detector : Peak

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BT CH39 2441MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL Detector : Peak	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL Detector : Peak

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BT CH78 2480MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL Detector : Peak	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL Detector : Peak

Emission below 1GHz

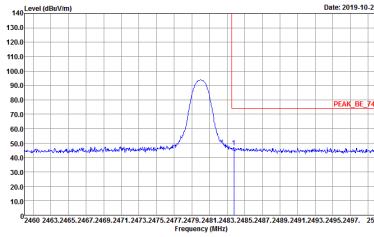
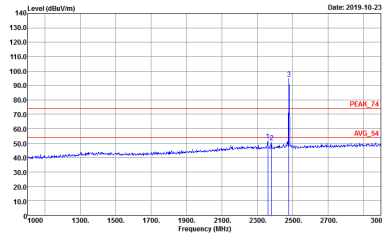
2.4GHz BT (LF)

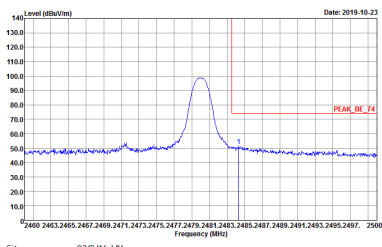
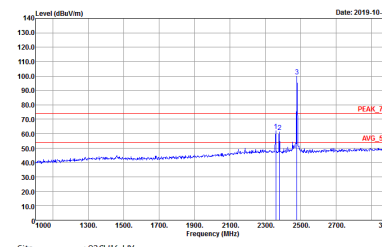
BT	2.4GHz 2400~2483.5MHz	
	BT LF	
	Horizontal	Vertical
QP / Peak	 Site : 03CH16-HY Condition : QP 3m BILOG_47020606 HORIZONTAL Detector : Peak	 Site : 03CH16-HY Condition : QP 3m BILOG_47020606 VERTICAL Detector : Peak

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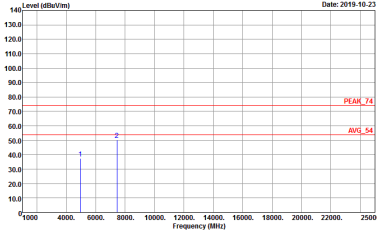
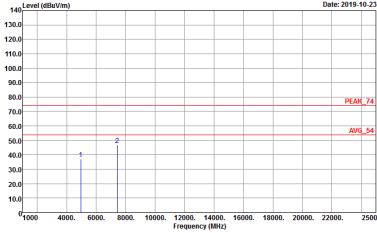
2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH78 2480MHz	
	Horizontal	Fundamental
Peak	 Site : 03C-H6-14Y Condition : PEAK_BE_74 3m 91200_1522 HORIZONTAL RBW:1000.0000kHz VBW:3000.0000kHz SWT:Auto Detector : Peak	 Site : 03C-H6-14Y Condition : PEAK_74 3m 91200_1522 HORIZONTAL RBW:1000.0000kHz VBW:3000.0000kHz SWT:Auto Detector : Peak

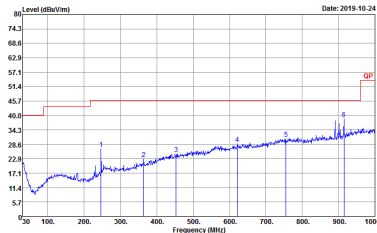
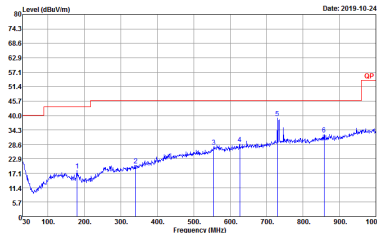
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BT CH78 2480MHz	
	Vertical	Fundamental
Peak	 Site : 03CH16-14Y Condition : PEAK_B6_74 3m 91200_1522 VERTICAL Detector : Peak	 Site : 03CH16-14Y Condition : PEAK_74 3m 91200_1522 VERTICAL Detector : Peak

2.4GHz 2400~2483.5MHz
BT (Harmonic @ 3m)

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BT CH78 2480MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 HORIZONTAL Detector : Peak	 Site : 03CH16-HY Condition : PEAK_74 3m 91200_1522 VERTICAL Detector : Peak

Emission below 1GHz

2.4GHz BT (LF)

BT	2.4GHz 2400~2483.5MHz	
	BT LF	
	Horizontal	Vertical
QP / Peak	 Site : 03CH16-HY Condition : QP 3m BILOG_47020406 HORIZONTAL Detector : Peak	 Site : 03CH16-HY Condition : QP 3m BILOG_47020406 VERTICAL Detector : Peak

Annex. A Receiver Radiated Emission Measurement

A.1 Limit of Receiver Radiated Emission

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

A.2 Measuring Instruments

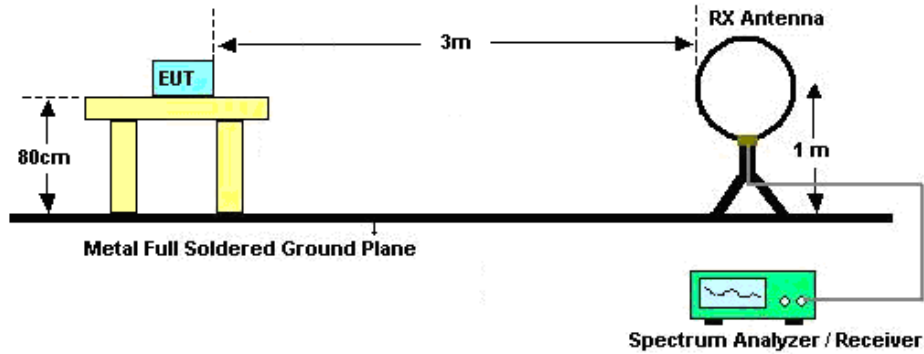
See list of measuring equipment of this test report.

A.3 Test Procedures

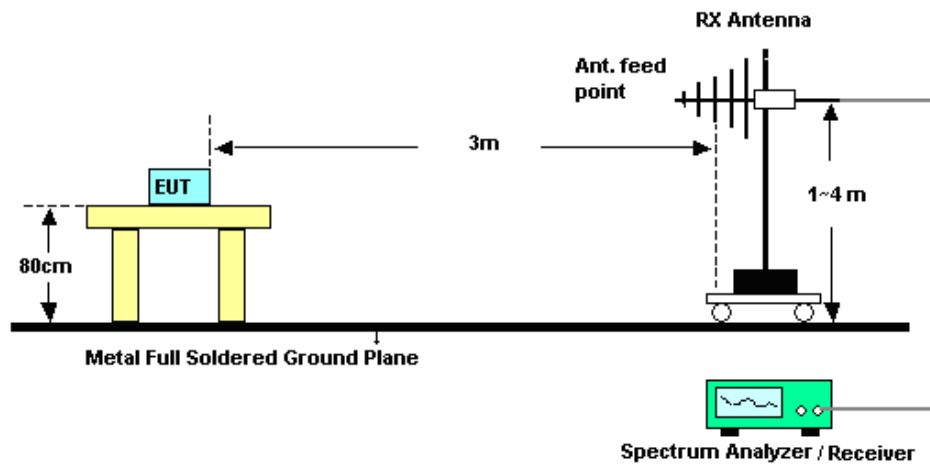
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

A.4 Test Setup

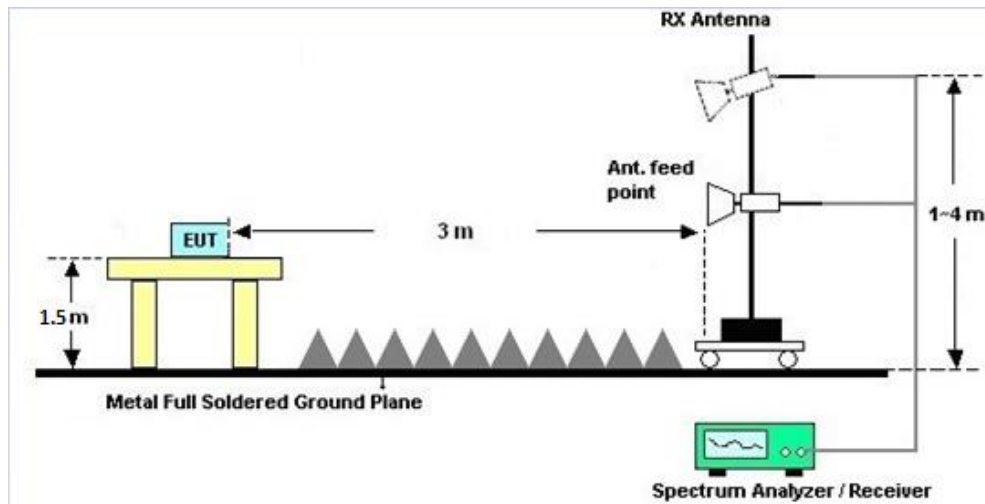
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

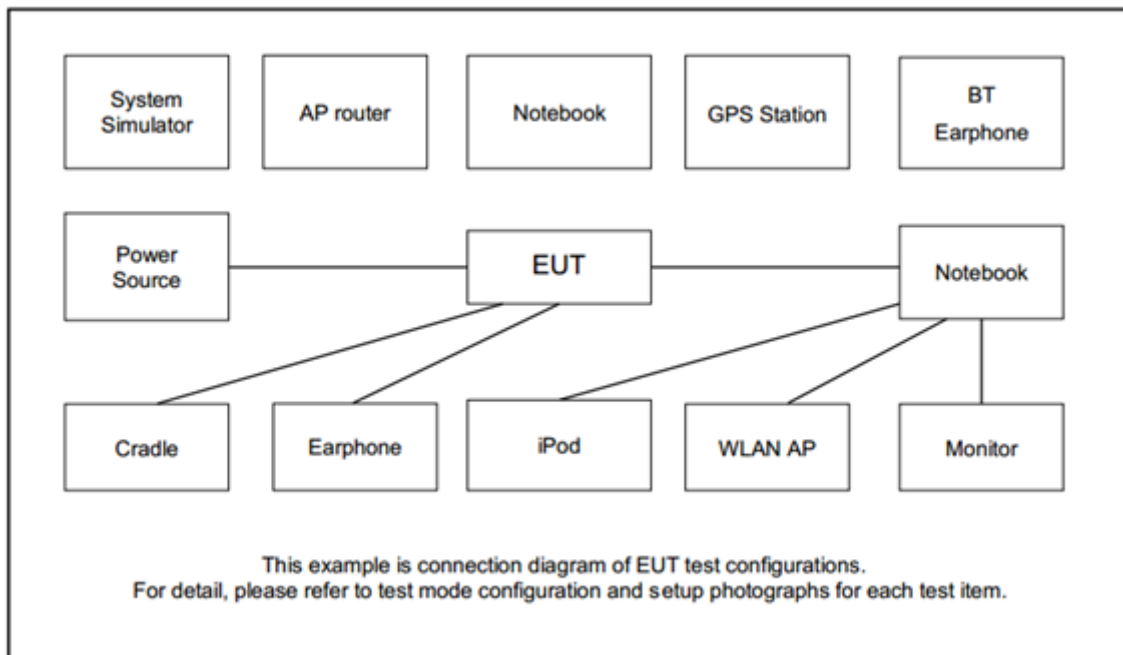


A.5 Test Result of Receiver Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per NCC LP0002 section 5.13 was not reported.

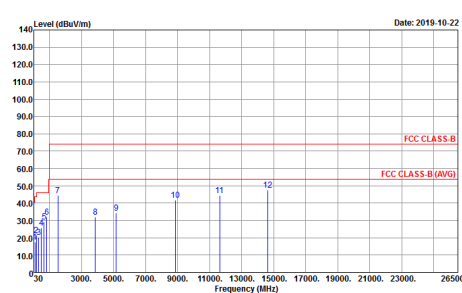
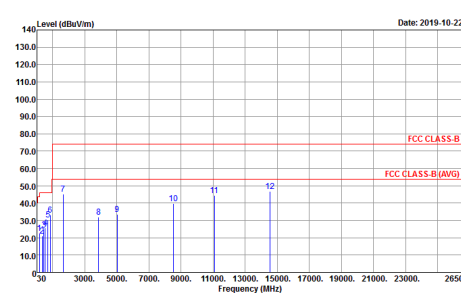
There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

A.6 Connection Diagram of Test System



A.7 Test Result of Receiver Radiated Spurious Emission (30MHz ~ 5th Harmonic)

Test Engineer :	Jacky Hung, Andy Yang, and CR Liao	Temperature :	20~25°C
		Relative Humidity :	50~60%
Frequency	854.500 MHz	Margin	Under 12.86 dB
Test Mode	Bluetooth Rx + NFC Tag for Scanner (SE4710)		

	Idle Mode																																																																																																																																																																																																																																																																																																																																																							
	Horizontal	Vertical																																																																																																																																																																																																																																																																																																																																																						
Peak Avg.	 Site : 03CH16-HY Condition : FCC CLASS-B 3m 91200_1522 HORIZONTAL Detector : Peak Project : 971801-06 <table><tr><th></th><th>Over</th><th>Limit</th><th>ReadAntenna</th><th>Cable</th><th>Preamp</th><th>A/Pos</th><th>T/Pos</th><th>Remark</th></tr><tr><th>Freq</th><th>Level</th><th>Line</th><th>Level</th><th>Factor</th><th>Loss</th><th>Factor</th><th></th><th></th></tr><tr><th>MHz</th><th>dBuV/m</th><th>dB</th><th>dBuV/m</th><th>dB/m</th><th>dB</th><th>dB</th><th>cm</th><th>deg</th></tr><tr><td>1</td><td>107.60</td><td>17.42</td><td>-26.08</td><td>43.50</td><td>30.95</td><td>16.86</td><td>1.75</td><td>32.26</td><td>---</td><td>---</td><td>Peak</td></tr><tr><td>2</td><td>181.32</td><td>21.48</td><td>-22.02</td><td>43.50</td><td>36.36</td><td>14.98</td><td>2.26</td><td>32.31</td><td>---</td><td>---</td><td>Peak</td></tr><tr><td>3</td><td>339.43</td><td>20.39</td><td>-25.61</td><td>46.00</td><td>29.42</td><td>20.07</td><td>3.89</td><td>32.30</td><td>---</td><td>---</td><td>Peak</td></tr><tr><td>4</td><td>495.60</td><td>25.60</td><td>-20.40</td><td>46.00</td><td>30.02</td><td>23.87</td><td>3.69</td><td>32.09</td><td>---</td><td>---</td><td>Peak</td></tr><tr><td>5</td><td>675.05</td><td>29.07</td><td>-16.93</td><td>46.00</td><td>30.24</td><td>26.45</td><td>4.33</td><td>32.09</td><td>---</td><td>---</td><td>Peak</td></tr><tr><td>6</td><td>840.92</td><td>31.86</td><td>-14.14</td><td>46.00</td><td>30.07</td><td>28.96</td><td>4.84</td><td>32.19</td><td>100</td><td>0</td><td>Peak</td></tr><tr><td>7</td><td>1540.00</td><td>44.62</td><td>-29.38</td><td>74.00</td><td>43.68</td><td>25.26</td><td>6.53</td><td>30.85</td><td>---</td><td>---</td><td>Peak</td></tr><tr><td>8</td><td>3876.00</td><td>32.00</td><td>-42.00</td><td>74.00</td><td>49.84</td><td>29.56</td><td>10.59</td><td>57.99</td><td>---</td><td>---</td><td>Peak</td></tr><tr><td>9</td><td>5172.00</td><td>34.44</td><td>-39.56</td><td>74.00</td><td>49.00</td><td>31.61</td><td>12.35</td><td>58.52</td><td>---</td><td>---</td><td>Peak</td></tr><tr><td>10</td><td>8859.00</td><td>41.68</td><td>-32.32</td><td>74.00</td><td>45.03</td><td>37.52</td><td>16.66</td><td>57.53</td><td>---</td><td>---</td><td>Peak</td></tr><tr><td>11</td><td>11631.00</td><td>44.31</td><td>-29.69</td><td>74.00</td><td>45.03</td><td>39.68</td><td>20.35</td><td>60.75</td><td>---</td><td>---</td><td>Peak</td></tr><tr><td>12</td><td>14634.00</td><td>47.39</td><td>-26.61</td><td>74.00</td><td>42.16</td><td>42.23</td><td>23.17</td><td>60.17</td><td>100</td><td>0</td><td>Peak</td></tr></table>		Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark	Freq	Level	Line	Level	Factor	Loss	Factor			MHz	dBuV/m	dB	dBuV/m	dB/m	dB	dB	cm	deg	1	107.60	17.42	-26.08	43.50	30.95	16.86	1.75	32.26	---	---	Peak	2	181.32	21.48	-22.02	43.50	36.36	14.98	2.26	32.31	---	---	Peak	3	339.43	20.39	-25.61	46.00	29.42	20.07	3.89	32.30	---	---	Peak	4	495.60	25.60	-20.40	46.00	30.02	23.87	3.69	32.09	---	---	Peak	5	675.05	29.07	-16.93	46.00	30.24	26.45	4.33	32.09	---	---	Peak	6	840.92	31.86	-14.14	46.00	30.07	28.96	4.84	32.19	100	0	Peak	7	1540.00	44.62	-29.38	74.00	43.68	25.26	6.53	30.85	---	---	Peak	8	3876.00	32.00	-42.00	74.00	49.84	29.56	10.59	57.99	---	---	Peak	9	5172.00	34.44	-39.56	74.00	49.00	31.61	12.35	58.52	---	---	Peak	10	8859.00	41.68	-32.32	74.00	45.03	37.52	16.66	57.53	---	---	Peak	11	11631.00	44.31	-29.69	74.00	45.03	39.68	20.35	60.75	---	---	Peak	12	14634.00	47.39	-26.61	74.00	42.16	42.23	23.17	60.17	100	0	Peak	 Site : 03CH16-HY Condition : FCC CLASS-B 3m 91200_1522 VERTICAL Detector : Peak Project : 971801-06 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		Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark																																																																																																																																																																																																																																																																																																																																															
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2	181.32	21.48	-22.02	43.50	36.36	14.98	2.26	32.31	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
3	339.43	20.39	-25.61	46.00	29.42	20.07	3.89	32.30	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
4	495.60	25.60	-20.40	46.00	30.02	23.87	3.69	32.09	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
5	675.05	29.07	-16.93	46.00	30.24	26.45	4.33	32.09	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
6	840.92	31.86	-14.14	46.00	30.07	28.96	4.84	32.19	100	0	Peak																																																																																																																																																																																																																																																																																																																																													
7	1540.00	44.62	-29.38	74.00	43.68	25.26	6.53	30.85	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
8	3876.00	32.00	-42.00	74.00	49.84	29.56	10.59	57.99	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
9	5172.00	34.44	-39.56	74.00	49.00	31.61	12.35	58.52	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
10	8859.00	41.68	-32.32	74.00	45.03	37.52	16.66	57.53	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
11	11631.00	44.31	-29.69	74.00	45.03	39.68	20.35	60.75	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
12	14634.00	47.39	-26.61	74.00	42.16	42.23	23.17	60.17	100	0	Peak																																																																																																																																																																																																																																																																																																																																													
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1	178.41	22.74	-20.76	43.50	37.50	15.11	2.24	32.30	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
2	353.01	21.09	-24.91	46.00	29.00	20.51	3.15	32.28	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
3	467.47	24.53	-21.47	46.00	29.53	23.41	3.62	32.13	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
4	544.10	25.89	-20.11	46.00	29.19	24.70	3.89	32.02	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
5	709.00	30.26	-15.74	46.00	31.08	26.77	4.44	32.17	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
6	854.50	33.14	-12.86	46.00	31.11	29.09	4.88	32.12	100	0	Peak																																																																																																																																																																																																																																																																																																																																													
7	1668.00	45.11	-28.89	74.00	43.99	25.04	6.81	30.73	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
8	3868.00	31.83	-42.17	74.00	49.72	29.51	10.58	57.98	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
9	5028.00	33.52	-40.48	74.00	47.96	31.61	12.16	58.21	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
10	8551.00	39.92	-34.08	74.00	43.85	36.90	16.68	57.51	---	---	Peak																																																																																																																																																																																																																																																																																																																																													
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