

TEST REPORT

of

FCC Part 15 Subpart C

☒ New Application; ☐ Class I PC; ☐ Class II PC

Product : Aristotle Hub

Brand: MATTEL

Model: FMT67

Model Difference: N/A

FCC ID: PU5FMT67

FCC Rule Part: §15.249, Cat: DXX

Applicant: Wistron Corporation

Address: 21F., No. 88, Sec. 1, HsinTai 5th Rd., Hsichih
Dist, New Taipei City 221

Test Performed by:

International Standards Laboratory

<Lung-Tan LAB>

*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3;

*Address:

No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

*Tel : 886-3-407-1718; Fax: 886-3-407-1738

Report No.: ISL-16LR332FCDXX

Issue Date : 2017/01/05

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

This report MUST not be used to claim product endorsement by TAF, NVLAP or any agency of the Government.

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VERIFICATION OF COMPLIANCE

Applicant: Wistron Corporation
Product Description: Aristotle Hub
Brand Name: MATTEL
Model No.: FMT67
Model Difference: N/A
FCC ID: PU5FMT67
Date of test: 2016/12/08 ~ 2017/01/04
Date of EUT Received: 2016/12/08

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:**Date:**

2017/01/05

*Dino Chen / Engineer***Prepared By:****Date:**

2017/01/05

*Gigi Yeh / Specialist***Approved By:****Date:**

2017/01/05

Vincent Su / Technical Manager

Version

Version No.	Date	Description
00	2017/01/05	Initial creation of document

Uncertainty of Measurement

Description Of Test	Uncertainty
Conducted Emission (AC power line)	2.586 dB
Field Strength of Spurious Radiation	<=30MHz: 2.96dB 30-1GHz: 4.22 dB 1-40 GHz: 4.08 dB
Conducted Power	2.412 GHz: 1.30 dB 5.805 GHz: 1.55 dB
Power Density	2.412 GHz: 1.30 dB 5.805 GHz: 1.67 dB
Frequency	0.0032%
Time	0.01%
DC Voltage	1%

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1. GENERAL INFORMATION

1.1. Product Description

General:

Product Name	Aristotle Hub	
Brand Name	MATTEL	
Model Name	FMT67	
Model Difference	N/A	
HDMI Port:	One	
Micro sd card	One	
Power Supply	12Vdc from AC adapter	
	Adapter:	Model No.: WA-30J12FU

WLAN: 1TX/1RX

Wi-Fi	Frequency Range (MHz)	Channels	Peak / Average Power	Modulation Technology
802.11b	2412 – 2462	11	18.00dBm (PK)	DSSS
802.11g	2412 – 2462	11	21.00dBm (PK)	OFDM
802.11n	HT20 2412 – 2462	11	20.00dBm (PK)	
Modulation type		CCK, DQPSK, DBPSK for DSSS 256QAM.64QAM. 16QAM, QPSK, BPSK for OFDM		
Antenna Designation		Chip Antenna 4.9 dBi		
Tune up power		+/- 1 dB		

Bluetooth: 1TX/1RX

Frequency Range:	2402– 2480MHz	
Bluetooth Version:	BT2.1+BT3.0	BT BLE 4.0+ 4.1
Channel number:	79 channels	40 channels
Modulation type	GFSK + $\pi/4$ DQPSK + 8DPSK	GFSK
Transmit Power:	11.00 dBm Peak	1.00 dBm Peak
Tune up power	+/- 1 dB	
Dwell Time:	<= 0.4s	N/A
Antenna Designation:	Chip Antenna 4.9dBi	

Zigbee: 1TX/1RX

Frequency Range(MHz)	2405-2480MHz
Modulation type	OQPSK
Channel Number	16
Antenna Designation:	Chip Antenna 3.6 dBi

This report applies for 2.4GHz Zigbee

1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID:PU5FMT67** filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of **International Standards Laboratory** <Lung-Tan LAB> No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2014, ANSI C63.10: 2013. FCC Registration Number is: 872200; Designation Number is: TW1036, Canada Registration Number: 4067B-4.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. Equipment Modifications

Not available for this EUT intended for grant.

2. System Test Configuration

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The Transmitter was operated in the engineering operating mode. the Tx frequency was fixed at 2405, 2440 and 2480MHz which were for the purpose of the measurements.

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 6 of ANSI C63.10: 2013. Con-ducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR 16-1-1 Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m/1.5m(Frequency above 1GHz) above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 6 and 11 of ANSI C63.10: 2013.

2.4. Limitation

(1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 - 56	56 - 46
0.5 – 5	56	46
5 - 30	60	50

(2) Radiated Emission 15.249(a)

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following.

Frequency (MHz)	Field strength of Fundamental	Field strength of Harmonics	Distance (m)
902 - 928	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
2400 – 2483.5	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
5725 – 5875	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3

(3) Radiated Emission 15.249 (d)

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

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance (m)	Field strength at 3m $\text{dB}\mu\text{V/m}$
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

(4) Radiated Emission 15.249(e)

For frequencies above 1000MHz, the above field strength limits are based on average limits. The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.

- Remark:
1. Emission level in $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205
 4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of § 15.205, then the general radiated emission limits in § 15.209 apply.

2.5. Configuration of Tested System

Fig. 1 Configuration of Tested System

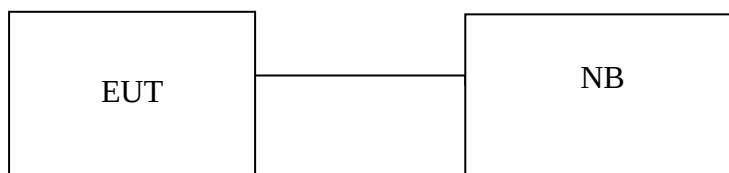


Table 1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	NB	HP	440i	N/A	N/A	No- Shielding

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

3. Summary of Test Results

FCC Rules	Description Of Test	Result
§ 15.207/	Conducted Emission	Compliant
§ 15.249(a)(d)(e)	Field Strength Measurement	Compliant
§ 15.215(c)	20dB band width Measurement	Compliant
	99% bandwidth Measurement	Compliant

Description of test modes

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receive mode is programmed.

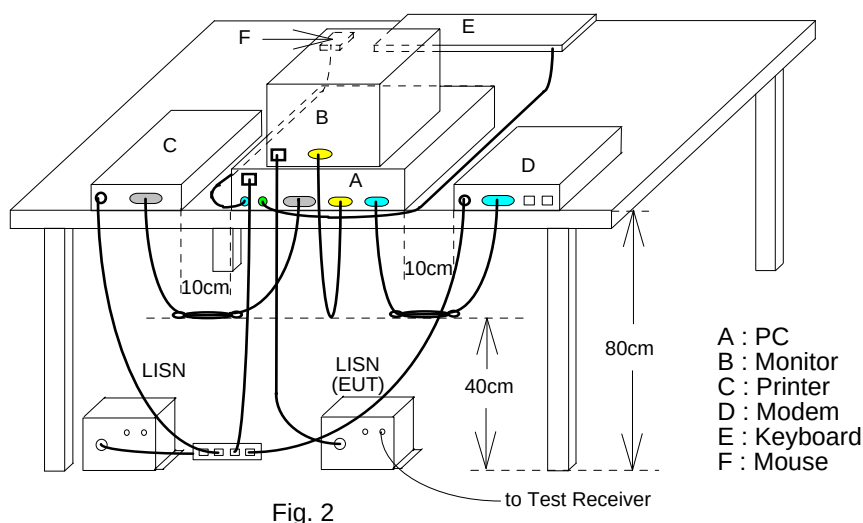
Channel low (2405MHz)、mid (2440MHz) and high (2480MHz) with highest data rate are chosen for full testing.

4. Conducted Emissions Test

4.1 Measurement Procedure:

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

4.2 Test SET-UP (Block Diagram of Configuration)



4.3 Measurement Equipment Used:

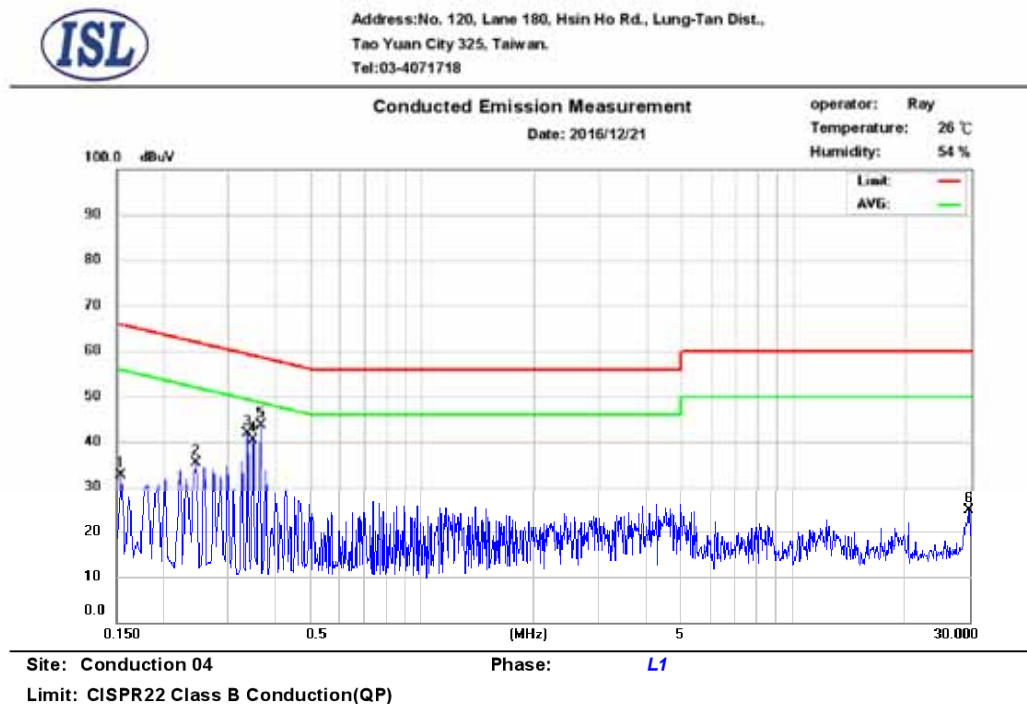
Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Conduction 04-3 Cable	WOKEN	CFD 300-NL	Conduction 04 -3	07/27/2016	07/26/2017
EMI Receiver 17	Rohde & Schwarz	ESCI 7	100887	09/08/2016	09/07/2017
LISN 18	ROHDE & SCHWARZ	ENV216	101424	02/11/2016	02/10/2017
LISN 19	ROHDE & SCHWARZ	ENV216	101425	03/12/2016	03/11/2017
Test Software	Farad	EZEMC Ver:ISL-03A2	N/A	N/A	N/A

4.4 Measurement Result:

Note: Refer to next page for measurement data and plots.

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode	Test Date:	2016/12/21
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No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.154	24.23	2.03	9.69	33.92	65.78	-31.86	11.72	55.78	-44.06
2	0.246	21.51	0.87	9.69	31.20	61.89	-30.69	10.56	51.89	-41.33
3	0.338	26.91	3.86	9.69	36.60	59.25	-22.65	13.55	49.25	-35.70
4	0.350	29.28	5.06	9.69	38.97	58.96	-19.99	14.75	48.96	-34.21
5	0.366	28.07	4.53	9.69	37.76	58.59	-20.83	14.22	48.59	-34.37
6	29.878	7.63	0.12	10.14	17.77	60.00	-42.23	10.26	50.00	-39.74

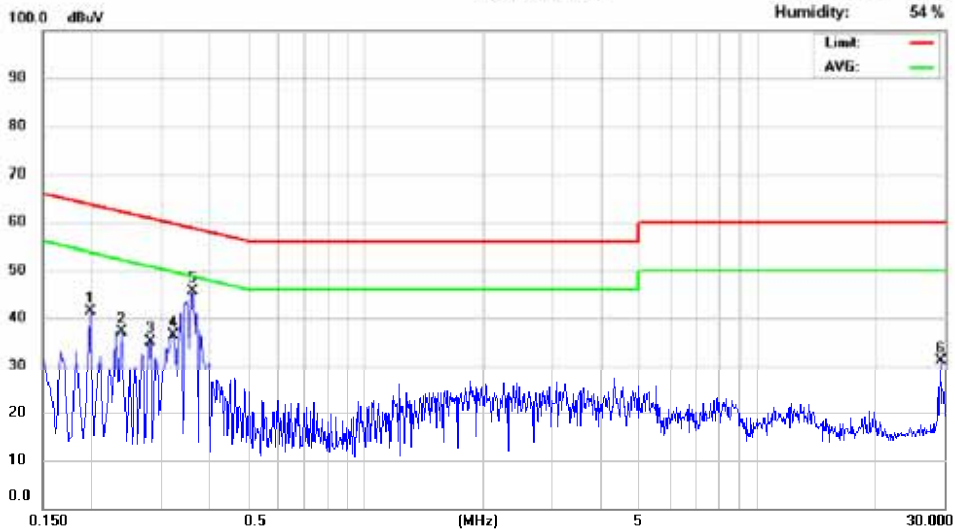


Address: No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,
Tao Yuan City 325, Taiwan.
Tel: 03-4071718

Conducted Emission Measurement

Date: 2016/12/21

operator: Ray
Temperature: 26 °C
Humidity: 54 %



Site: Conduction 04

Phase: N

Limit: CISPR22 Class B Conduction(QP)

No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.198	21.58	1.02	9.68	31.26	63.69	-32.43	10.70	53.69	-42.99
2	0.238	22.65	1.38	9.68	32.33	62.17	-29.84	11.06	52.17	-41.11
3	0.282	19.66	0.23	9.69	29.35	60.76	-31.41	9.92	50.76	-40.84
4	0.322	21.93	1.77	9.68	31.61	59.66	-28.05	11.45	49.66	-38.21
5	0.362	31.52	7.12	9.68	41.20	58.68	-17.48	16.80	48.68	-31.88
6	29.294	9.95	-0.51	10.30	20.25	60.00	-39.75	9.79	50.00	-40.21

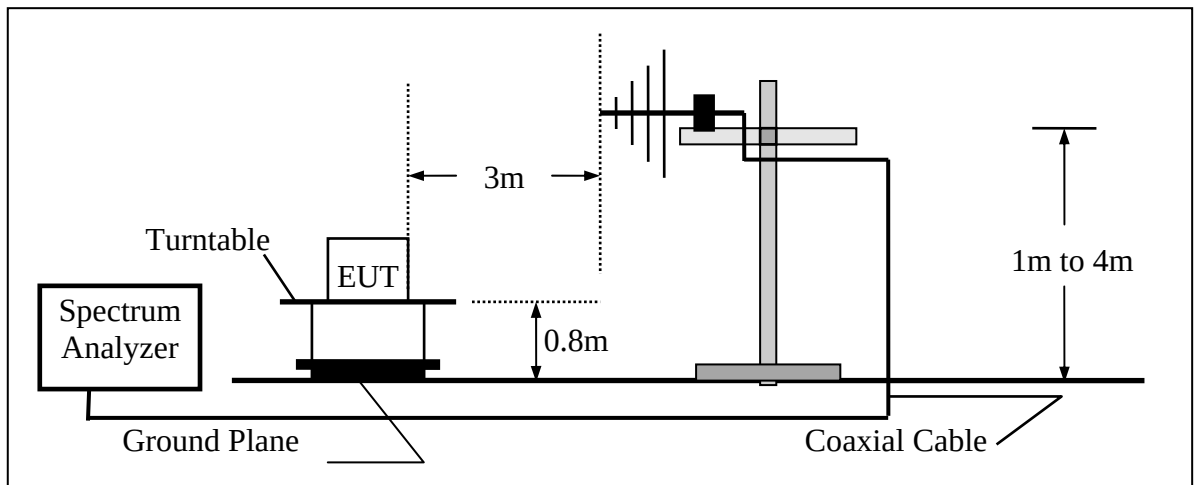
5. Radiated Emission Test

5.1 Measurement Procedure

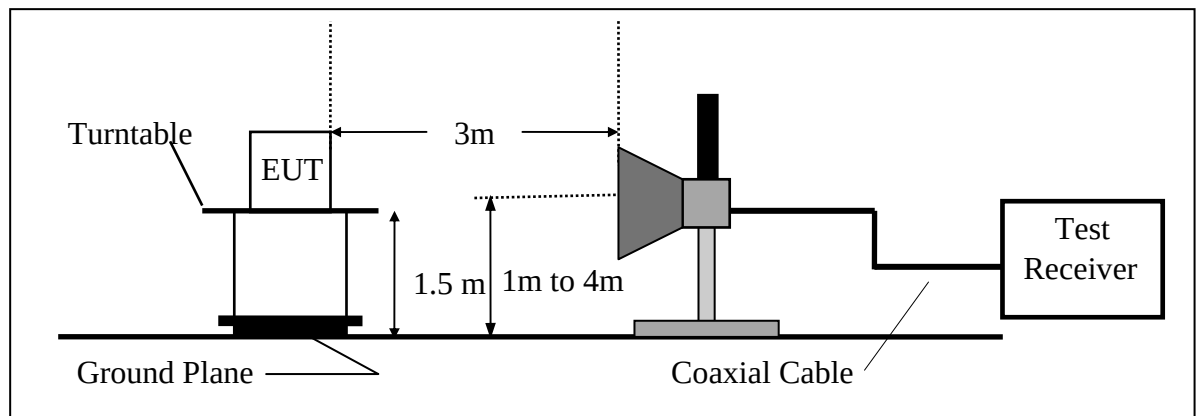
1. The EUT was placed on a turntable that is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

5.2 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-Up Frequency Over 1 GHz



5.3 Measurement Equipment Used:

Chamber 14(966)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer 21(26.5GHz)	Agilent	N9010A	MY49060537	11/14/2016	11/13/2017
Spectrum Analyzer 20(6.5GHz)	Agilent	E4443A	MY48250315	05/20/2016	05/19/2017
Spectrum Analyzer 22(43GHz)	R&S	FSU43	100143	05/22/2016	05/21/2017
Loop Antenna9K-30M	A.H.SYSTEM	SAS-564	294	06/17/2015	06/16/2017
Bilog Antenna30-1G	Schaffner	CBL 6112D	37873	07/22/2016	07/21/2017
Horn antenna1-18G	ETS	3117	00066665	07/22/2016	07/21/2017
Horn antenna26-40G(05)	Com-power	AH-640	100A	01/21/2015	01/20/2017
Horn antenna18-26G(04)	Com-power	AH-826	081001	07/24/2015	07/23/2017
Preamplifier9-1000M	HP	8447D	NA	03/09/2016	03/08/2017
Preamplifier1-18G	MITEQ	AFS44-001018 00-25-10P-44	1329256	07/27/2016	07/26/2017
Preamplifier1-26G	EM	EM01M26G	NA	03/10/2016	03/09/2017
Preamplifier26-40G	MITEQ	JS-26004000-2 7-5A	818471	07/23/2015	07/22/2017
Cable1-18G	HUBER SUHNER	Sucoflex 106	NA	11/25/2016	11/24/2017
Cable UP to 1G	HUBER SUHNER	RG 214/U	NA	10/02/2016	10/01/2017
SUCOFLEX 1GHz~40GHz cable	HUBER SUHNER	Sucoflex 102	27963/2&3742 1/2	11/03/2015	11/02/2017
2.4G Filter	Micro-Tronics	Brm50702	76	12/25/2016	12/24/2017
Test Software	Audix	E3 Ver:6.12023	N/A	N/A	N/A
Test Software	Farad	EZEMC Ver:ISL-03A2	N/A	N/A	N/A

5.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

5.5 Measurement Result

Fundamental Emission Measurement Result

Operation Mode : TX mode Test Date : 2016/12/23
Fundamental Frequency : 2405 MHz, 2440 MHz, 2480MHz Test By : Dino
Temp : 25 °C Hum. : 60%

CH Low:

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2404.97	93.99	-5.65	88.34	114.00	-25.66	Peak	VERTICAL
1	2404.97	96.61	-5.65	90.96	94.00	-3.04	Average	HORIZONTAL
2	2404.97	109.49	-5.65	103.84	114.00	-10.16	Peak	HORIZONTAL

CH Mid:

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2450.00	86.67	-5.52	81.15	94.00	-12.85	Average	VERTICAL
2	2450.00	100.14	-5.52	94.62	114.00	-19.38	Peak	VERTICAL
1	2449.98	97.73	-5.52	92.21	94.00	-1.79	Average	HORIZONTAL
2	2449.98	110.73	-5.52	105.21	114.00	-8.79	Peak	HORIZONTAL

CH High:

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark	Pol V/H
1	2479.94	86.81	-5.43	81.38	94.00	-12.62	Average	VERTICAL
2	2479.94	99.81	-5.43	94.38	114.00	-19.62	Peak	VERTICAL
1	2479.97	97.83	-5.43	92.40	94.00	-1.60	Average	HORIZONTAL
2	2479.97	110.83	-5.43	105.40	114.00	-8.60	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 10KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH Low	Test Date	2016/12/23
Fundamental Frequency	2405 MHz	Test By	Dino
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over L imit dB	Remark	Pol V/H
1	60.07	42.71	-6.02	36.69	40.00	-3.31	Peak	VERTICAL
2	153.19	43.83	-4.95	38.88	43.50	-4.62	Peak	VERTICAL
3	244.37	44.59	-6.00	38.59	46.00	-7.41	Peak	VERTICAL
4	362.71	38.31	-2.94	35.37	46.00	-10.63	Peak	VERTICAL
5	479.11	32.01	-0.83	31.18	46.00	-14.82	Peak	VERTICAL
6	541.19	32.78	-0.14	32.64	46.00	-13.36	Peak	VERTICAL
1	60.07	36.47	-6.02	30.45	40.00	-9.55	Peak	HORIZONTAL
2	153.19	39.90	-4.95	34.95	43.50	-8.55	Peak	HORIZONTAL
3	238.55	46.95	-6.16	40.79	46.00	-5.21	Peak	HORIZONTAL
4	362.71	35.49	-2.94	32.55	46.00	-13.45	Peak	HORIZONTAL
5	475.23	34.20	-0.88	33.32	46.00	-12.68	Peak	HORIZONTAL
6	833.16	30.38	5.07	35.45	46.00	-10.55	Peak	HORIZONTAL

Remark:

- Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH Mid	Test Date	2016/12/23
Fundamental Frequency	2440 MHz	Test By	Dino
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over L imit dB	Remark	Pol V/H
1	60.07	43.68	-6.02	37.66	40.00	-2.34	Peak	VERTICAL
2	151.25	45.25	-5.01	40.24	43.50	-3.26	Peak	VERTICAL
3	246.31	43.95	-5.96	37.99	46.00	-8.01	Peak	VERTICAL
4	362.71	38.40	-2.94	35.46	46.00	-10.54	Peak	VERTICAL
5	553.80	32.20	0.13	32.33	46.00	-13.67	Peak	VERTICAL
6	833.16	31.20	5.07	36.27	46.00	-9.73	Peak	VERTICAL
1	60.07	39.31	-6.02	33.29	40.00	-6.71	Peak	HORIZONTAL
2	153.19	39.39	-4.95	34.44	43.50	-9.06	Peak	HORIZONTAL
3	242.43	44.23	-6.05	38.18	46.00	-7.82	Peak	HORIZONTAL
4	311.30	36.03	-3.78	32.25	46.00	-13.75	Peak	HORIZONTAL
5	476.20	32.62	-0.86	31.76	46.00	-14.24	Peak	HORIZONTAL
6	833.16	31.39	5.07	36.46	46.00	-9.54	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode TX CH High
Fundamental Frequency 2480 MHz
Temperature 25 °C

Test Date 2016/12/23
Test By Dino
Humidity 60 %

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over L imit dB	Remark	Pol V/H
1	60.07	41.53	-6.02	35.51	40.00	-4.49	Peak	VERTICAL
2	153.19	43.95	-4.95	39.00	43.50	-4.50	Peak	VERTICAL
3	245.34	44.80	-5.97	38.83	46.00	-7.17	Peak	VERTICAL
4	362.71	37.96	-2.94	35.02	46.00	-10.98	Peak	VERTICAL
5	513.06	33.76	-0.36	33.40	46.00	-12.60	Peak	VERTICAL
6	833.16	31.04	5.07	36.11	46.00	-9.89	Peak	VERTICAL
1	60.07	36.06	-6.02	30.04	40.00	-9.96	Peak	HORIZONTAL
2	153.19	40.86	-4.95	35.91	43.50	-7.59	Peak	HORIZONTAL
3	246.31	44.78	-5.96	38.82	46.00	-7.18	Peak	HORIZONTAL
4	362.71	35.54	-2.94	32.60	46.00	-13.40	Peak	HORIZONTAL
5	479.11	32.90	-0.83	32.07	46.00	-13.93	Peak	HORIZONTAL
6	547.01	32.75	-0.08	32.67	46.00	-13.33	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	: TX CH Low	Test Date	: 2016/12/23
Fundamental Frequency	: 2405 MHz	Test By	: Dino
Temp	: 25 °C	Hum.	: 60%

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over L imit dB	Remark	Pol V/H
1	1994.00	45.88	-5.39	40.49	74.00	-33.51	Peak	VERTICAL
2	2400.00	48.08	-3.16	44.92	74.00	-29.08	Peak	VERTICAL
3	4810.00	32.88	3.23	36.11	74.00	-37.89	Peak	VERTICAL
1	4810.00	33.60	3.23	36.83	74.00	-37.17	Peak	HORIZONTAL
2	2400.00	49.21	-3.16	46.05	74.00	-27.95	Peak	HORIZONTAL
3	7195.00	33.89	9.96	43.85	74.00	-30.15	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode : TX CH Mid Test Date : 2016/12/23
Fundamental Frequency : 2440 MHz Test By : Dino
Temp : 25 °C Hum. : 60%

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over L imit dB	Remark	Pol V/H
1	2001.00	44.88	-5.34	39.54	74.00	-34.46	Peak	VERTICAL
2	4900.00	32.99	3.46	36.45	74.00	-37.55	Peak	VERTICAL
1	4900.00	32.99	3.46	36.45	74.00	-37.55	Peak	HORIZONTAL
2	6964.00	34.19	8.63	42.82	74.00	-31.18	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode : TX CH High Test Date : 2016/12/23
Fundamental Frequency : 2480 MHz Test By : Dino
Temp : 25 °C Hum. : 60%

No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Over L imit dB	Remark	Pol V/H
1	1994.00	43.46	-5.39	38.07	74.00	-35.93	Peak	VERTICAL
2	2483.50	49.18	-3.11	46.07	74.00	-27.93	Peak	VERTICAL
3	4960.00	33.58	3.60	37.18	74.00	-36.82	Peak	VERTICAL
1	1994.00	39.96	-5.39	34.57	74.00	-39.43	Peak	HORIZONTAL
2	2483.50	53.74	-3.11	50.63	74.00	-23.37	Peak	HORIZONTAL
3	4960.00	33.11	3.60	36.71	74.00	-37.29	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

6. 20 dB Band Width Measurement

6.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set ETU normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW = 100kHz, VBW = 300kHz, Span = 5MHz.
4. Set SPA Max hold. Mark peak, -20dB.

6.2 Test SET-UP (Block Diagram of Configuration)

Same as 4.2 Radiated Emission Measurement.

6.3 Measurement Equipment Used:

Same as 4.2 Radiated Emission Measurement.

6.4 Measurement Results:

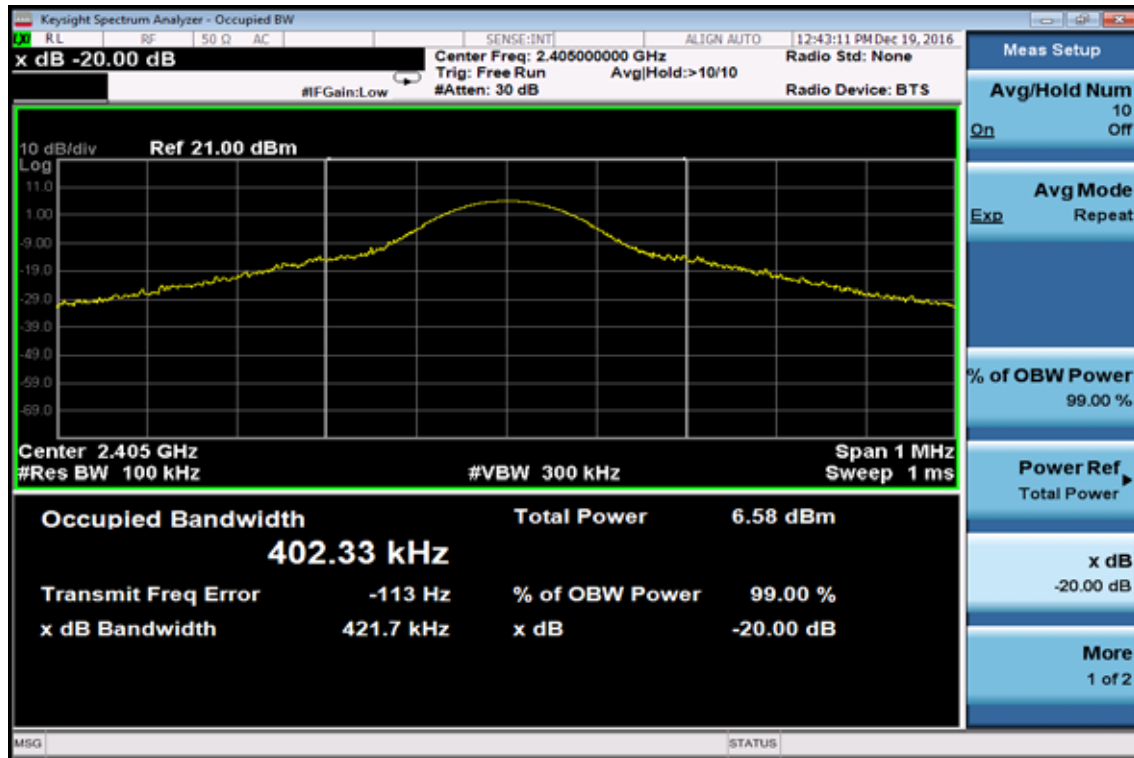
2405 Channel = 0.4217MHz

2440 Channel = 0.4723MHz

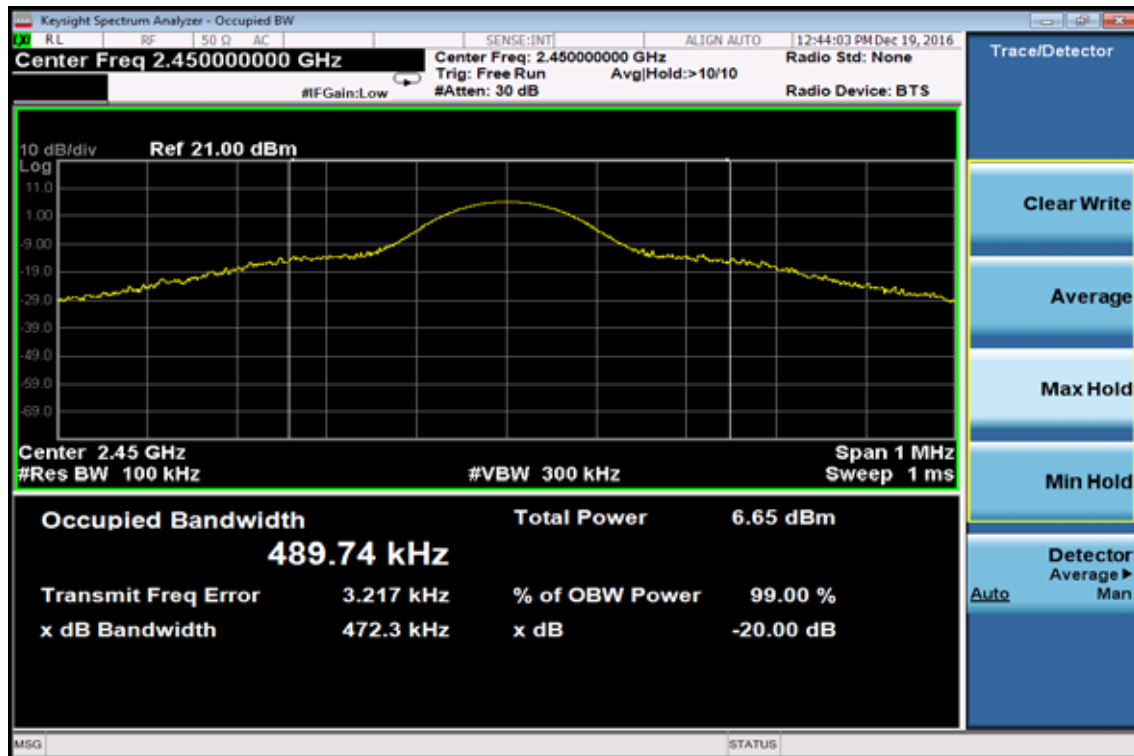
2480 Channel = 0.8375MHz

Refer to attached data chart.

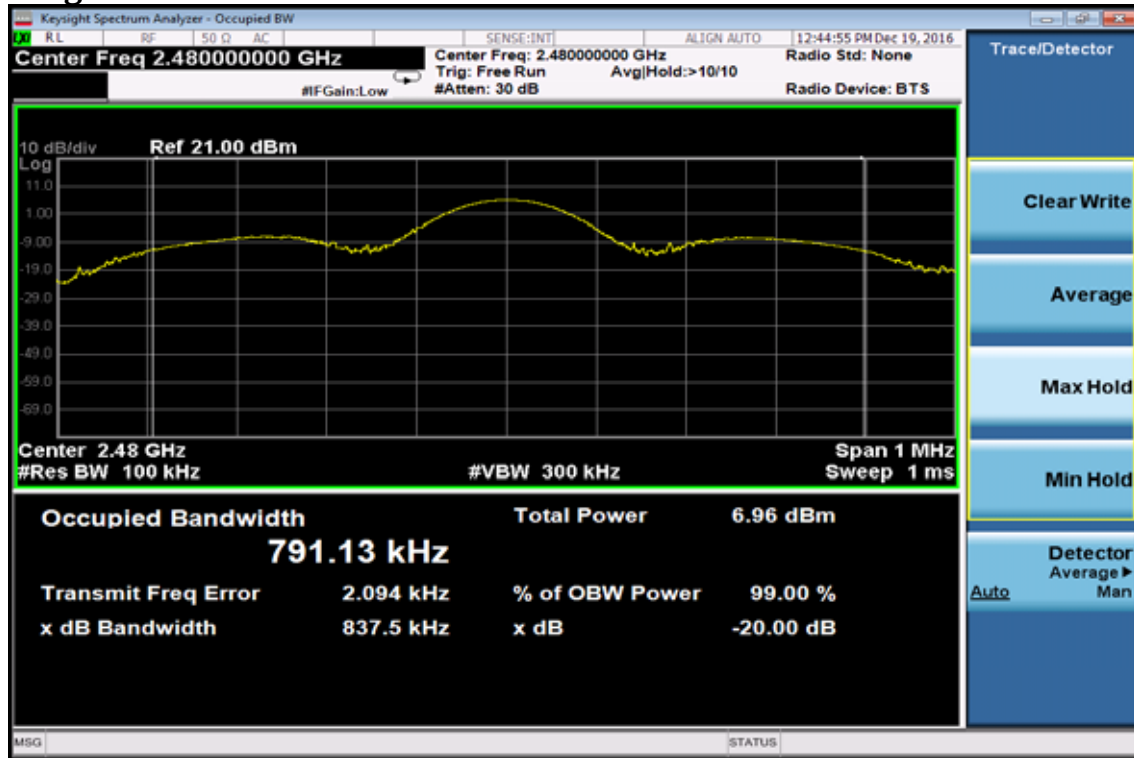
20dB Band Width test Plot CH Low



CH Mid



CH High



7. 99% Band Width Measurement

7.1 Measurement Procedure

- 1 Place the EUT on the table and set it in transmitting mode.
- 2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3 Set the spectrum analyzer as RBW=1% of the approximate emission bandwidth, VBW = 3 times RBW, Span= approximately 20dB below the peak level. Sweep=auto
- 4 Turn on the 99% bandwidth function, max reading.
- 5 Repeat above procedures until all frequency measured were complete.

7.2 Test SET-UP (Block Diagram of Configuration)

Same as 4.2 Radiated Emission Measurement.

7.3 Measurement Equipment Used:

Same as 4.2 Radiated Emission Measurement.

7.4 Measurement Results:

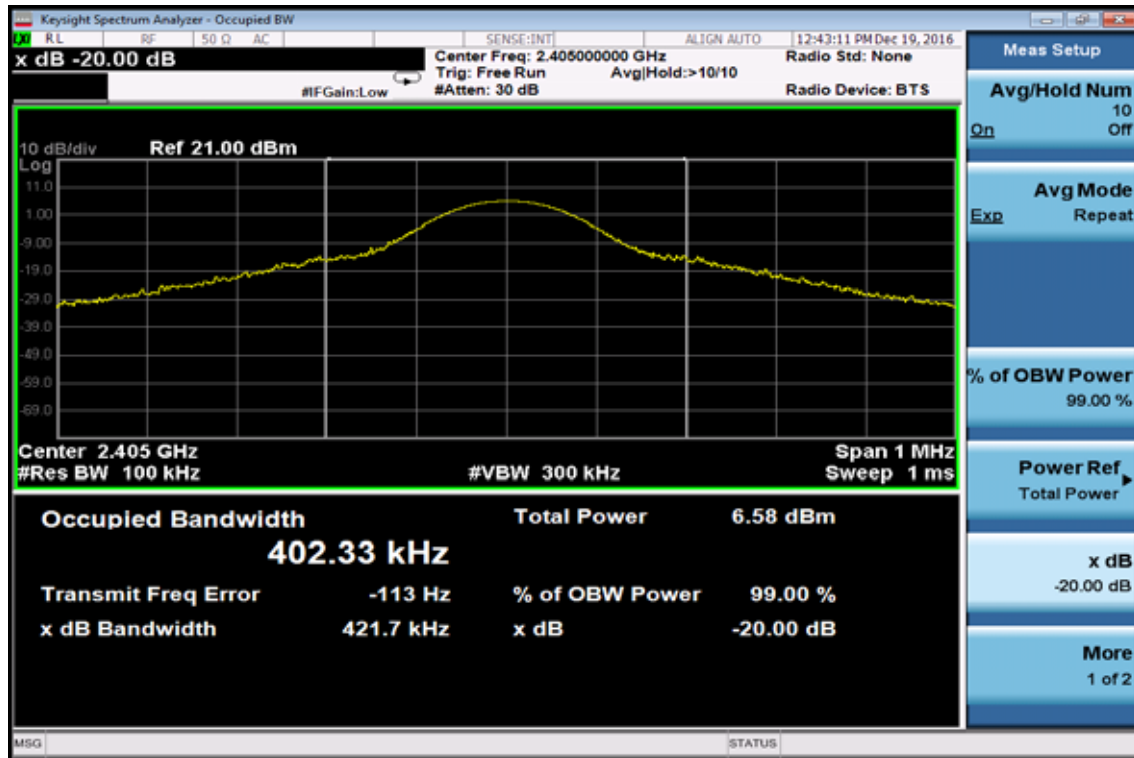
2405 Channel = 0.40233MHz

2440 Channel = 0.48974MHz

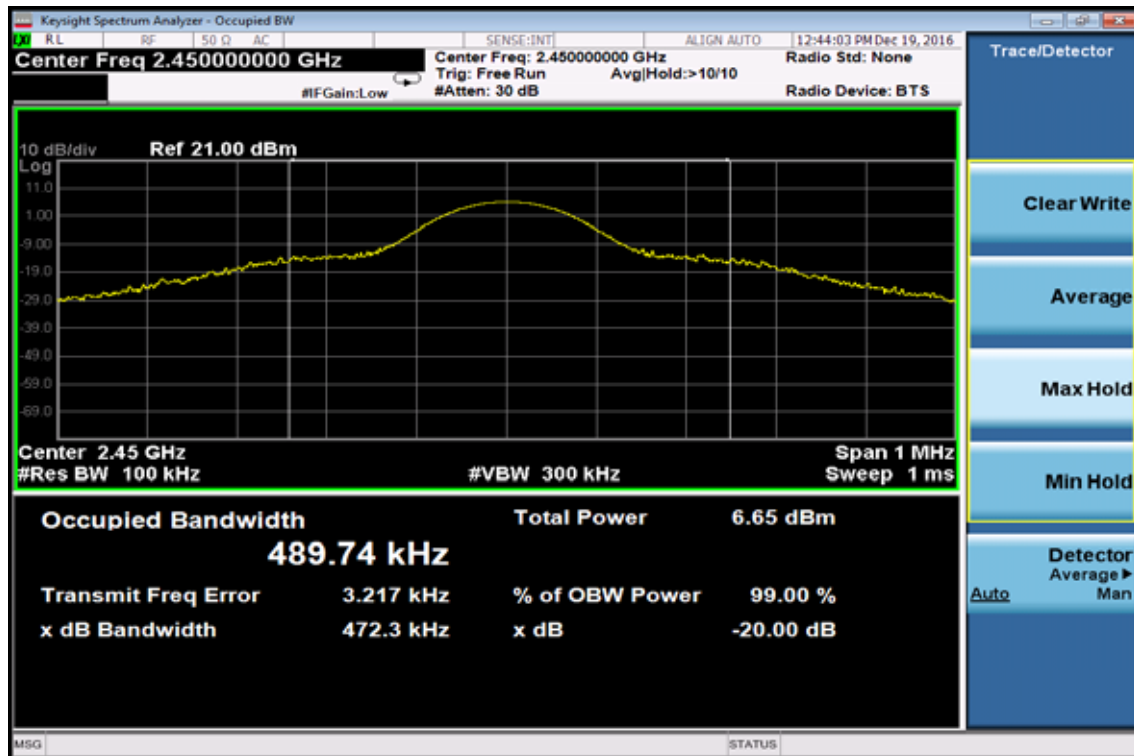
2480 Channel = 0.79113MHz

Refer to attached data chart.

99% Band Width test Plot CH Low



CH Mid



CH High

