FCC PART 15.247

TEST REPORT

For

Qingdao Hisense Intelligent Commercial System Co., Ltd.

Bldg 3, 151 Zhuzhou Lu, Laoshan, Qingdao, China

FCC ID: GQK-HM618

Report Type:	Product Type:
Original Report	Tablet POS

Test Engineer:	Kyle Xu
Report Number:	RSHA170823001-00B
Report Date:	2017-10-14
Reviewed By:	Oscar Ye RF Leader
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road,Kunshan,Jiangsu province,China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Qingdao Hisense Intelligent Commercial System Co., Ltd.
Tested Model	HM618
Series Model	HM616
Product Type	Tablet POS
Dimension	Tablet: 282 mm(L)×198 mm(W)×18 mm(H) Dock: 151 mm(L)×121 mm(W)×92 mm(H) Multifunctional dock: 236 mm(L)×218 mm(W)×370 mm(H)
Power Supply	Tablet: DC 3.7V from battery and DC 5.0V charging by adapter Dock: DC5.0V charging by adapter Multifunctional dock: DC24.0V charging by adapter

Adapter-1 Information:
Model: ADS-25SGP-06 05020E
Input: AC100-240V, 50/60Hz, 0.7A
Output:5.0V, 4.0A

Adapter-2 Information:
Model: FSP060-DAAN2
Input: AC100-240V, 50/60Hz, 0.7A
Output:24.0V, 2.5A

** Note: The difference between tested model and series model was explained in the declaration letter.*

**All measurement and test data in this report was gathered from production sample serial number: 20170823001 (Assigned by the BACL. The EUT supplied by the applicant was received on 2017-08-23)*

Objective

This report is prepared on behalf of Qingdao Hisense Intelligent Commercial System Co., Ltd. in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS, Part 15.247 DTS, Part 15.407 NII and Part 15.225 DXX submission with FCC ID: GQK-HM618.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices and FCC KDB558074 D01 DTS Meas Guidance v04.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	4.88dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Channel list for BLE mode:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	…	…
…	…	38	2478
19	2440	39	2480

EUT was tested with channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

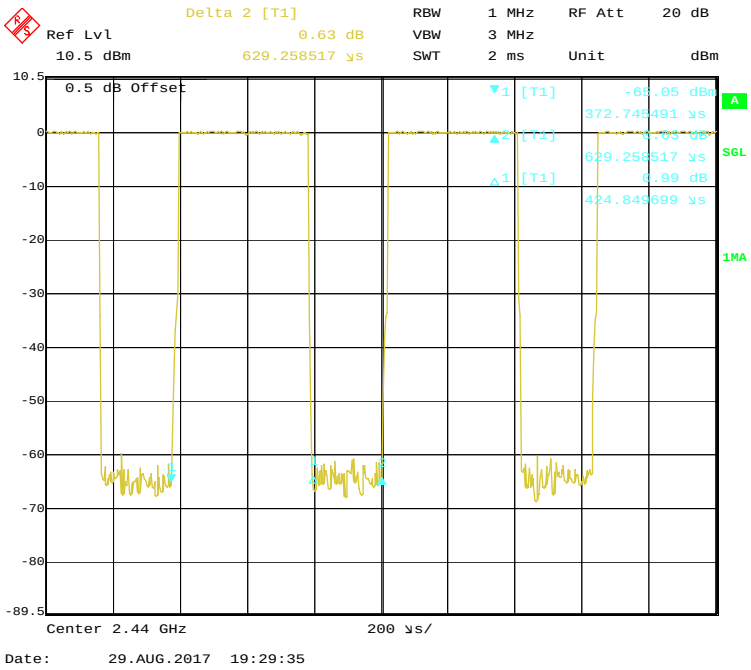
RF test tool: BLUETOOL_MI_1.9.2.0

The worst case was performed under:

The device was tested with 67.52% duty cycle and the worst case was performed as below:
BLE : Power level: 0

Duty Cycle:

Middle Channel



Band	Duty Cycle	T(ms)	1/T(kHz)	VBW Setting	10log(1/x)
BLE	67.52%	0.425	2.353	3kHz	1.71

Support Equipment List and Details

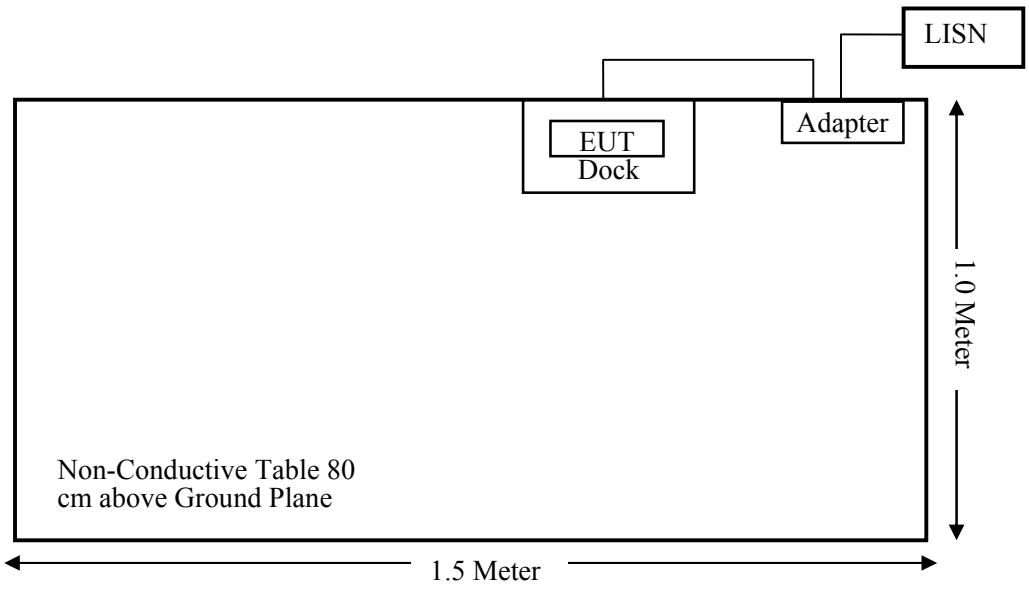
Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

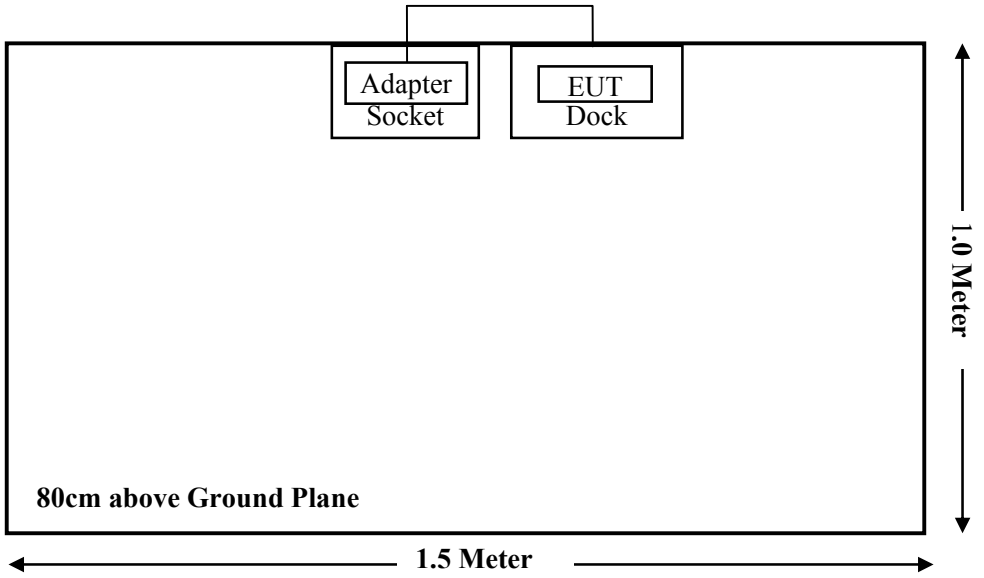
Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup

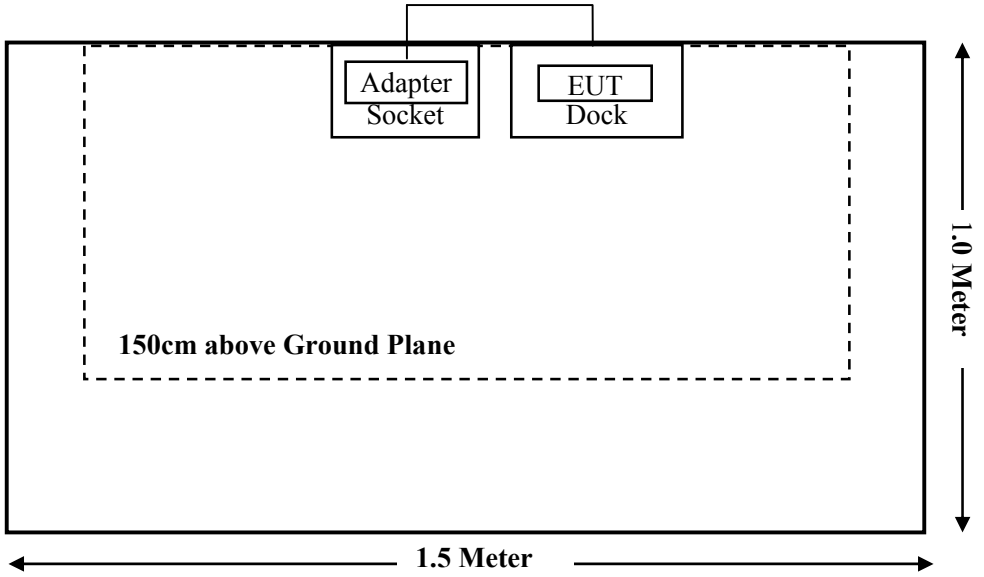
For Conducted Emissions:



For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310 &§2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.247(d)	Spurious Emissions at Antenna Port	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Conducted Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A040914-2	2016-01-09	2019-01-08
Sonoma Instrunent	Pre-amplifier	310N	171205	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2017-08-15	2018-08-14
Radiated Emission Test（Chamber 2#）					
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2016-12-12	2017-12-11
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2017-08-15	2018-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2017-09-21	2017-09-20
Hisense	RF Cable	N/A	N/A	2017-08-28	2018-08-27
Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2016-10-10	2017-10-09
Rohde & Schwarz	LISN	ENV216	3560655016	2016-11-25	2017-11-24
BACL	BACL-EMC	V1.0	CE001	/	/
Narda	Attenuator/6dB	10690812-2	26850-6	2017-01-10	2018-01-09
MICRO-COAX	Coaxial Cable	Cable-15	015	2017-08-15	2018-08-14

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC§1.1310 &§2.1093 –RF EXPOSURE

Applicable Standard

According to§2.1093and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB447498 D01 General RF Exposure Guidance v06:

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:
[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR

·f(GHz) is the RF channel transmit frequency in GHz
·Power and distance are rounded to the nearest mW and mm before calculation
·The result is rounded to one decimal place for comparison
·When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

Standalone SAR test exclusion

Mode	Frequency Range (MHz)	Conducted Output Power			Minimum Distance (mm)	Calculated Value	Threshold (1-g)	SAR Test Exclusion
		ANT0 (dBm)	ANT1 (dBm)	ANT0+ANT1 (dBm)				
Bluetooth	2402-2480	-1.00	/	/	5.00	0.3	3.00	Yes
BLE	2402-2480	-1.00	/	/	5.00	0.3	3.00	Yes
802.11b	2412~2462	8.50	8.00	/	5.00	2.2	3.00	Yes
802.11g	2412~2462	8.00	7.50	/	5.00	2.0	3.00	Yes
802.11n20	2412~2462	6.00	5.00	8.00	5.00	2.0	3.00	Yes
802.11n40	2422~2452	5.00	4.50	8.00	5.00	2.0	3.00	Yes
802.11a	5180~5240	7.50	7.00	/	5.00	2.6	3.00	Yes
	5745~5825	7.50	7.00	/	5.00	2.7	3.00	Yes
802.11n20	5180~5240	5.00	4.00	7.50	5.00	2.6	3.00	Yes
	5745~5825	4.50	4.00	7.00	5.00	2.4	3.00	Yes
802.11n40	5190~5230	4.50	4.00	7.00	5.00	2.3	3.00	Yes
	5755~5795	5.00	4.00	7.50	5.00	2.7	3.00	Yes
802.11ac20	5180~5240	5.00	4.00	7.50	5.00	2.6	3.00	Yes
	5745~5825	5.00	4.00	7.50	5.00	2.7	3.00	Yes
802.11ac40	5180~5240	5.00	4.00	7.50	5.00	2.6	3.00	Yes
	5755~5795	5.00	4.00	7.50	5.00	2.7	3.00	Yes
802.11ac80	5210	4.50	3.50	7.00	5.00	2.3	3.00	Yes
	5775	5.00	4.00	7.50	5.00	2.7	3.00	Yes

Standalone SAR estimation:

Mode	Frequency Range (MHz)	Max tune-up power (dBm)		Max tune-up power (mW)		Distance (mm)	Estimated $_{1-g}$ (W/kg)	
		ANT 0	ANT 1	ANT 0	ANT 1		ANT 0	ANT 1
Bluetooth	2402-2480	-1.00	/	0.79	/	5	0.03	/
BLE	2402-2480	-1.00	/	0.79	/	5	0.03	/
802.11b	2412~2462	8.50	8.00	7.08	6.31	5	0.30	0.26
802.11g	2412~2462	8.00	7.50	6.31	5.62	5	0.26	0.24
802.11n20	2412~2462	6.00	5.00	3.98	3.16	5	0.17	0.13
802.11n40	2422~2452	5.00	4.50	3.16	2.82	5	0.13	0.12
802.11a	5180~5240	7.50	7.00	5.62	5.01	5	0.34	0.31
	5745~5825	7.50	7.00	5.62	5.01	5	0.36	0.32
802.11n20	5180~5240	5.00	4.00	3.16	2.51	5	0.19	0.15
	5745~5825	4.50	4.00	2.82	2.51	5	0.18	0.16
802.11n40	5190~5230	4.50	4.00	2.82	2.51	5	0.17	0.15
	5755~5795	5.00	4.00	3.16	2.51	5	0.20	0.16
802.11ac20	5180~5240	5.00	4.00	3.16	2.51	5	0.19	0.15
	5745~5825	5.00	4.00	3.16	2.51	5	0.20	0.16
802.11ac40	5180~5240	5.00	4.00	3.16	2.51	5	0.19	0.15
	5755~5795	5.00	4.00	3.16	2.51	5	0.20	0.16
802.11ac80	5210	4.50	3.50	2.82	2.24	5	0.17	0.14
	5775	5.00	4.00	3.16	2.51	5	0.20	0.16

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
[(*max. power of channel, including* ***tune-up tolerance****, mW*)/(*min. test separation distance, mm*)]·[√f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm;
where $x = 7.5$ for 1-g SAR.
When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

Simultaneous Transmission:

Description of Simultaneous Transmit Capabilities		
Transmitter Combination		Simultaneous?
ANT 0	ANT 1	
2.4G BT/BLE	2.4GWi-Fi	×
2.4G BT/BLE	5G Wi-Fi	√
2.4G Wi-Fi	2.4G Wi-Fi	√
2.4G Wi-Fi	5G Wi-Fi	×
5G Wi-Fi	2.4G Wi-Fi	×
5G Wi-Fi	5G Wi-Fi	√

Simultaneous SAR test exclusion considerations:

Mode (ANT 0+ ANT 1)	Reported SAR (W/kg)		ΣSAR < 1.6W/kg
	ANT 0	ANT 1	
2.4G BT +5G Wi-Fi	0.03	0.32	0.35
2.4G Wi-Fi	0.30	0.26	0.56
5G Wi-Fi	0.36	0.32	0.68

Conclusion: ΣSAR < 1.6 W/kg therefore simultaneous transmission SAR is not required.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT has a FPCB antenna arrangement for BLE, which the antenna gain is 1.2 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

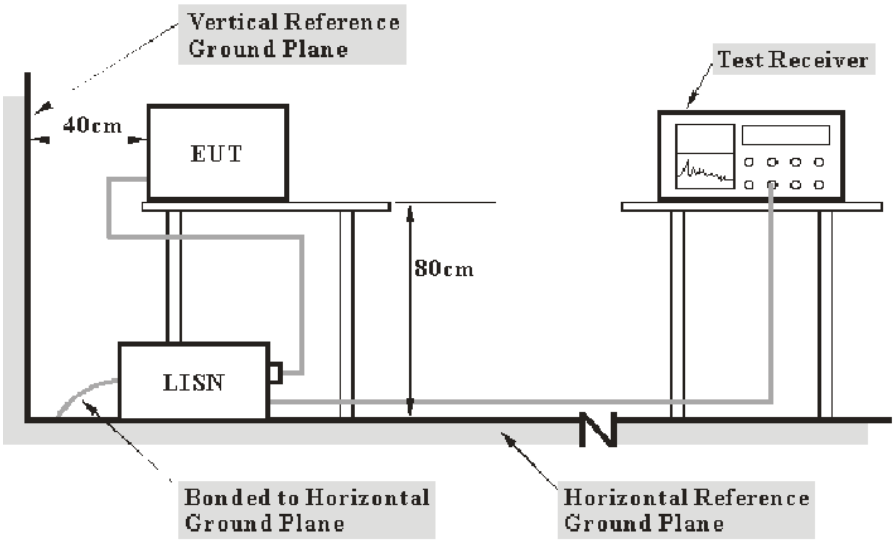
Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a)

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

Environmental Conditions

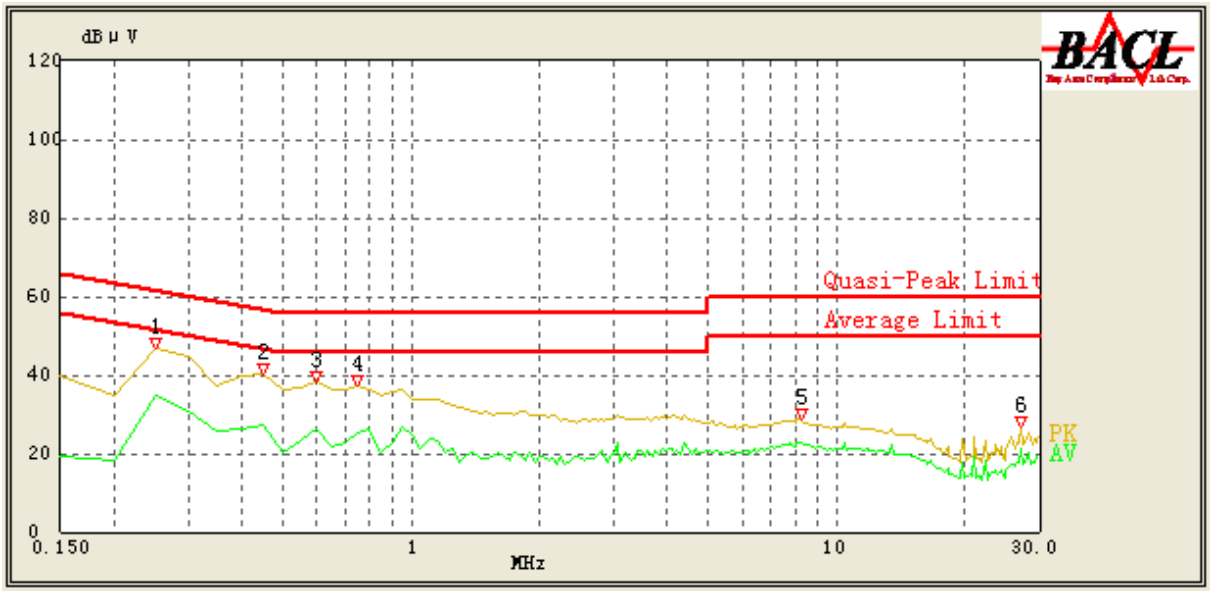
Temperature:	20.2 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Kyle Xu on 2017-08-29.

EUT operation mode: Transmitting in high channel of GFSK (Worst case)

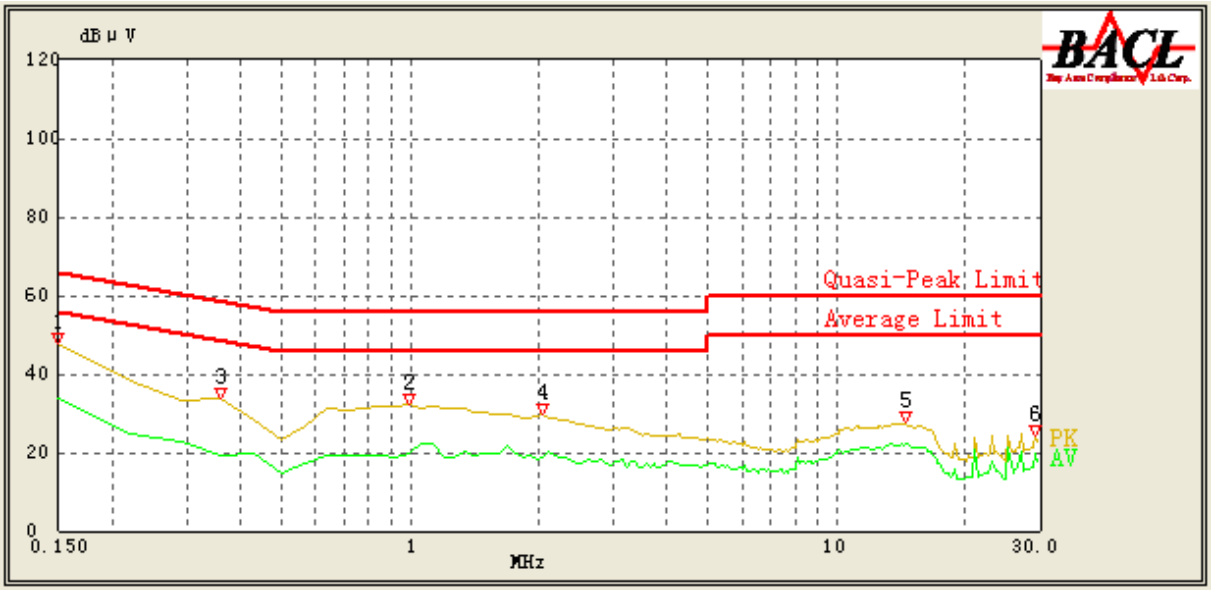
Adapter 1

AC 120V/60 Hz, Line



Frequency (MHz)	Reading (dBµV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Correction (dB)	Limit (dBµV)	Margin (dB)	Comment
0.250	46.81	PK	9.000	L1	16.02	63.14	16.33	Compliance
0.250	34.51	AV	9.000	L1	16.02	53.14	18.63	Compliance
0.450	40.29	PK	9.000	L1	16.07	57.43	17.14	Compliance
0.450	27.40	AV	9.000	L1	16.07	47.43	20.03	Compliance
0.600	38.27	PK	9.000	L1	16.01	56.00	17.73	Compliance
0.600	26.47	AV	9.000	L1	16.01	46.00	19.53	Compliance
0.750	37.23	PK	9.000	L1	15.94	56.00	18.77	Compliance
0.750	25.38	AV	9.000	L1	15.94	46.00	20.62	Compliance
8.250	28.82	PK	9.000	L1	16.01	60.00	31.18	Compliance
8.200	22.64	AV	9.000	L1	16.01	50.00	27.36	Compliance
27.100	26.52	PK	9.000	L1	16.51	60.00	33.48	Compliance
27.100	21.31	AV	9.000	L1	16.51	50.00	28.69	Compliance

AC 120V/60 Hz, Neutral



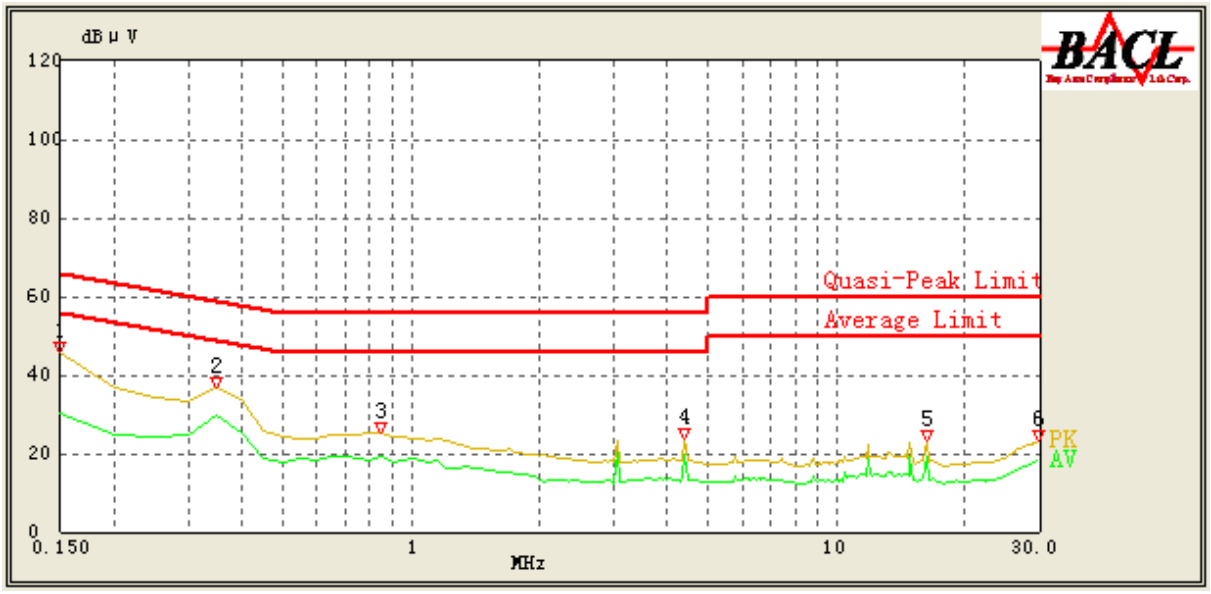
Frequency (MHz)	Reading (dBµV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Correction (dB)	Limit (dBµV)	Margin (dB)	Comment
0.150	47.71	PK	9.000	N	16.06	66.00	18.29	Compliance
0.150	34.00	AV	9.000	N	16.06	56.00	22.00	Compliance
0.990	32.34	PK	9.000	N	15.94	56.00	23.66	Compliance
0.990	19.55	AV	9.000	N	15.94	46.00	26.45	Compliance
0.360	33.88	PK	9.000	N	16.08	60.00	26.12	Compliance
0.360	19.14	AV	9.000	N	16.08	50.00	30.86	Compliance
2.040	29.58	PK	9.000	N	15.91	56.00	26.42	Compliance
2.040	18.77	AV	9.000	N	15.91	46.00	27.23	Compliance
14.570	27.84	PK	9.000	N	16.01	60.00	32.16	Compliance
14.570	22.09	AV	9.000	N	16.01	50.00	27.91	Compliance
29.130	24.05	PK	9.000	N	16.32	60.00	35.95	Compliance
29.130	19.62	AV	9.000	N	16.32	50.00	30.38	Compliance

Note:

1) Corr.=LISN VDF (Voltage Division Factor) + Cable Loss
2) Corrected Amplitude = Reading + Corr.
3) Margin = Limit –Corrected Amplitude

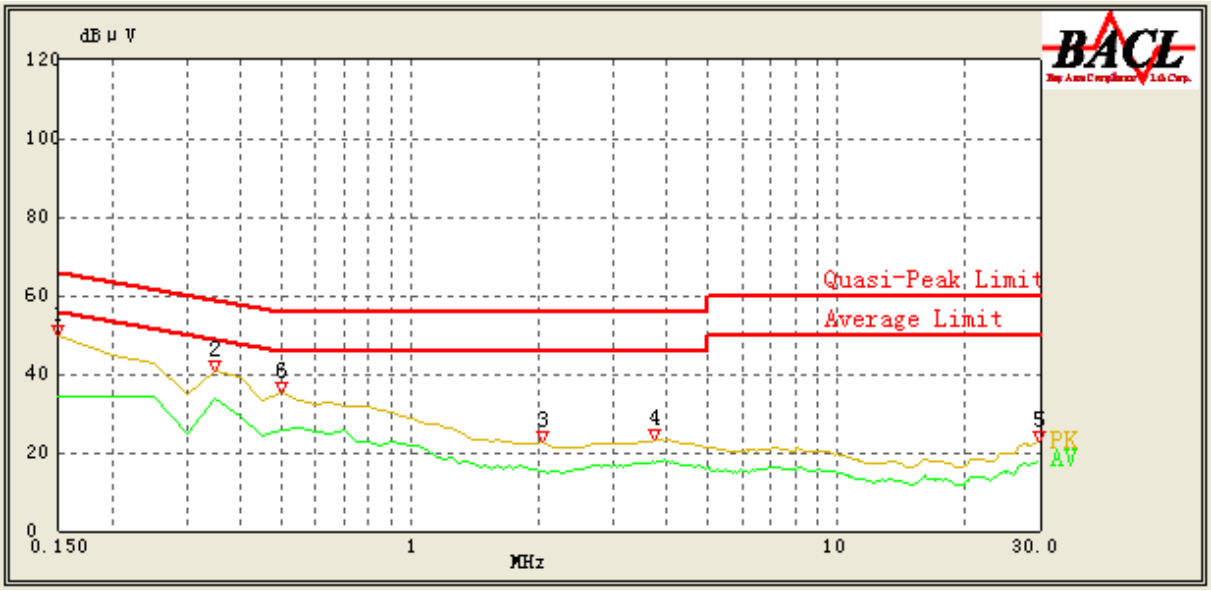
Adapter 2

AC 120V/60 Hz, Line



Frequency (MHz)	Reading (dBµV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Correction (dB)	Limit (dBµV)	Margin (dB)	Comment
0.150	45.98	PK	9.000	L1	16.06	66.00	20.02	Compliance
0.150	30.16	AV	9.000	L1	16.06	56.00	25.84	Compliance
0.350	36.95	PK	9.000	L1	16.05	60.29	23.34	Compliance
0.350	29.78	AV	9.000	L1	16.05	50.29	20.51	Compliance
0.850	25.47	PK	9.000	L1	15.91	56.00	30.53	Compliance
0.850	19.40	AV	9.000	L1	15.91	46.00	26.60	Compliance
4.400	23.51	PK	9.000	L1	15.85	56.00	32.49	Compliance
4.400	19.72	AV	9.000	L1	15.85	46.00	26.28	Compliance
16.250	23.22	PK	9.000	L1	16.27	60.00	36.78	Compliance
16.250	19.32	AV	9.000	L1	16.27	50.00	30.68	Compliance
29.700	23.06	PK	9.000	L1	16.58	60.00	36.94	Compliance
29.850	18.07	AV	9.000	L1	16.59	50.00	31.93	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	Reading (dBµV)	Detector (PK/AV/QP)	Bandwidth (kHz)	Line	Correction (dB)	Limit (dBµV)	Margin (dB)	Comment
0.150	49.87	PK	9.000	N	16.06	66.00	16.13	Compliance
0.150	34.41	AV	9.000	N	16.06	56.00	21.59	Compliance
0.350	40.57	PK	9.000	N	16.08	60.29	19.72	Compliance
0.350	33.65	AV	9.000	N	16.08	50.29	16.64	Compliance
2.050	22.74	PK	9.000	N	15.91	56.00	33.26	Compliance
2.050	15.33	AV	9.000	N	15.91	46.00	30.67	Compliance
3.750	23.13	PK	9.000	N	15.89	56.00	32.87	Compliance
3.750	17.13	AV	9.000	N	15.89	46.00	28.87	Compliance
29.950	22.65	PK	9.000	N	16.34	60.00	37.35	Compliance
29.900	18.04	AV	9.000	N	16.34	50.00	31.96	Compliance
0.500	35.48	PK	9.000	N	16.11	56.00	20.52	Compliance
0.500	25.84	AV	9.000	N	16.11	46.00	20.16	Compliance

Note:

1) Corr.=LISN VDF (Voltage Division Factor) + Cable Loss
2) Corrected Amplitude = Reading + Corr.
3) Margin = Limit –Corrected Amplitude

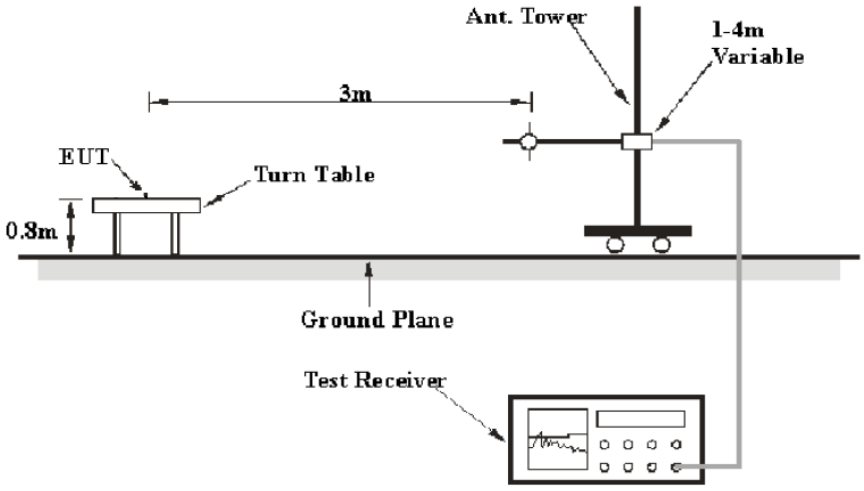
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

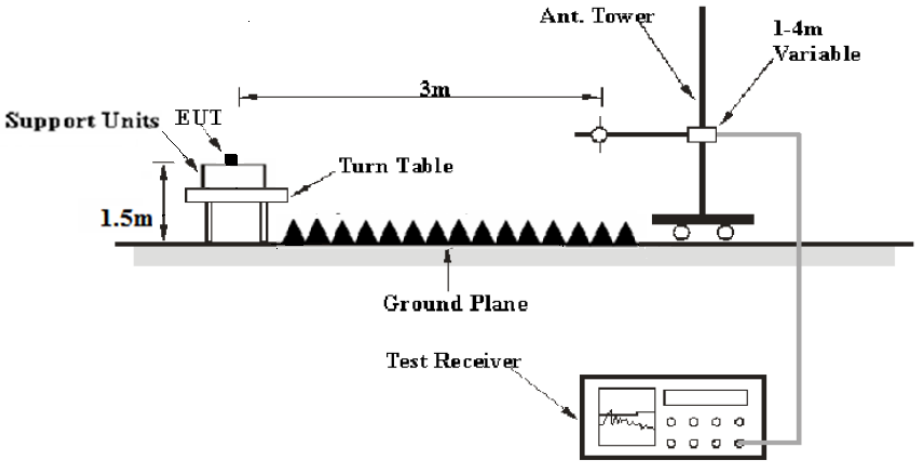
FCC §15.247 (d); §15.209; §15.205;

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP

Frequency Range	RBW	Video B/W	Duty cycle	Detector
1GHz – 25GHz	1MHz	3 MHz	Any	PK
	1MHz	10 Hz	>98%	Ave.
	1MHz	1/T	<98%	

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247.

Test Data

Environmental Conditions

Temperature:	24.1 ℃
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

The testing was performed by Kyle Xu on 2017-10-14.

EUT operation mode: Transmitting (Scan with X-Axis, Y-Axis and Z-Axis position, the worst case is X-Axis with adapter 2)

30MHz-25GHz

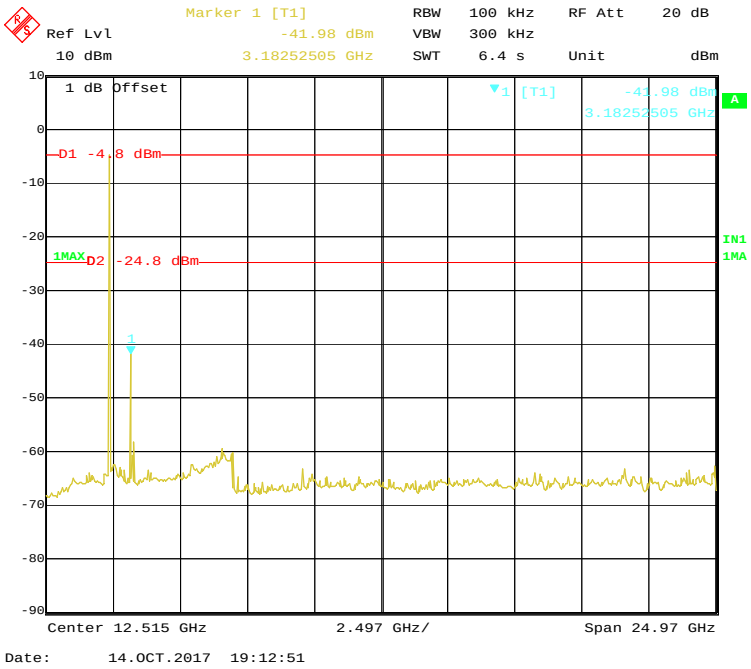
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/ Ave.)		Height (cm)	Polar (H/V)			Limit (dBμ V/m)	Margin (dB)
Low Channel (2402 MHz)									
247.23	53.32	QP	342	145	V	-13.30	40.02	46	5.98
2402.00	99.35	PK	67	110	V	-4.93	94.42	/	/
2402.00	93.21	Ave	67	110	V	-4.93	88.28	/	/
2402.00	96.32	PK	245	144	H	-4.93	91.39	/	/
2402.00	91.11	Ave	245	144	H	-4.93	86.18	/	/
2390.00	44.32	PK	243	109	V	-4.96	39.36	74	34.64
2390.00	38.11	Ave	243	109	V	-4.96	33.15	54	20.85
2400.00	46.23	PK	73	160	V	-4.94	41.29	74	32.71
2400.00	41.09	Ave	73	160	V	-4.94	36.15	54	17.85
1269.35	40.32	PK	169	121	V	-9.74	30.58	74	43.42
1269.35	35.01	Ave	169	121	V	-9.74	25.27	54	28.73
4804.00	41.25	PK	187	214	V	2.47	43.72	74	30.28
4804.00	35.68	Ave	187	214	V	2.47	38.15	54	15.85
7206.00	36.12	PK	126	237	V	9.79	45.91	74	28.09
7206.00	30.16	Ave	126	237	V	9.79	39.95	54	14.05

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Middle Channel (2440 MHz)									
247.23	53.16	QP	341	221	V	-13.30	39.86	46	6.14
2440.00	100.21	PK	234	140	V	-4.83	95.38	/	/
2440.00	95.02	Ave	234	140	V	-4.83	90.19	/	/
2440.00	96.35	PK	26	201	H	-4.83	91.52	/	/
2440.00	90.84	Ave	26	201	H	-4.83	86.01	/	/
1235.52	40.35	PK	147	149	H	-9.98	30.37	74	43.63
1235.52	35.03	Ave	147	149	H	-9.98	25.05	54	28.95
3136.54	40.02	PK	276	204	H	-1.73	38.29	74	35.71
3136.54	34.83	Ave	276	204	H	-1.73	33.10	54	20.90
4880.00	42.11	PK	142	170	V	2.64	44.75	74	29.25
4880.00	35.30	Ave	142	170	V	2.64	37.94	54	16.06
6469.00	41.32	PK	43	137	H	8.63	49.95	74	24.05
6469.00	34.93	Ave	43	137	H	8.63	43.56	54	10.44
7320.00	35.30	PK	108	191	V	9.96	45.26	74	28.74
7320.00	29.24	Ave	108	191	V	9.96	39.20	54	14.80

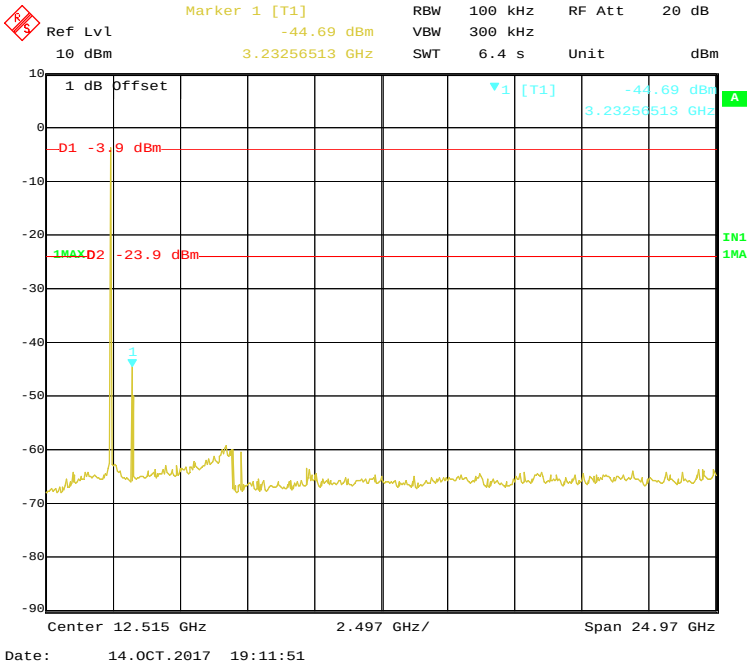
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (cm)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2480MHz)									
247.23	53.61	QP	108	168	V	-13.30	40.31	46	5.69
2480.00	100.35	PK	230	173	V	-4.72	95.63	/	/
2480.00	94.63	Ave	230	173	V	-4.72	89.91	/	/
2480.00	95.82	PK	78	246	H	-4.72	91.10	/	/
2480.00	90.32	Ave	78	246	H	-4.72	85.60	/	/
2483.50	41.36	PK	231	225	H	-4.71	36.65	74	37.35
2483.50	35.74	Ave	231	225	H	-4.71	31.03	54	22.97
3514.54	40.02	PK	118	235	H	-0.87	39.15	74	34.85
3514.54	34.35	Ave	118	235	H	-0.87	33.48	54	20.52
4960.00	40.13	PK	275	197	V	2.82	42.95	74	31.05
4960.00	34.35	Ave	275	197	V	2.82	37.17	54	16.83
6678.60	40.23	PK	340	184	H	8.70	48.93	74	25.07
6678.60	35.11	Ave	340	184	H	8.70	43.81	54	10.19
7440.00	35.32	PK	308	131	H	10.14	45.46	74	28.54
7440.00	28.36	Ave	308	131	H	10.14	38.50	54	15.50

Conducted Spurious Emissions at Antenna Port

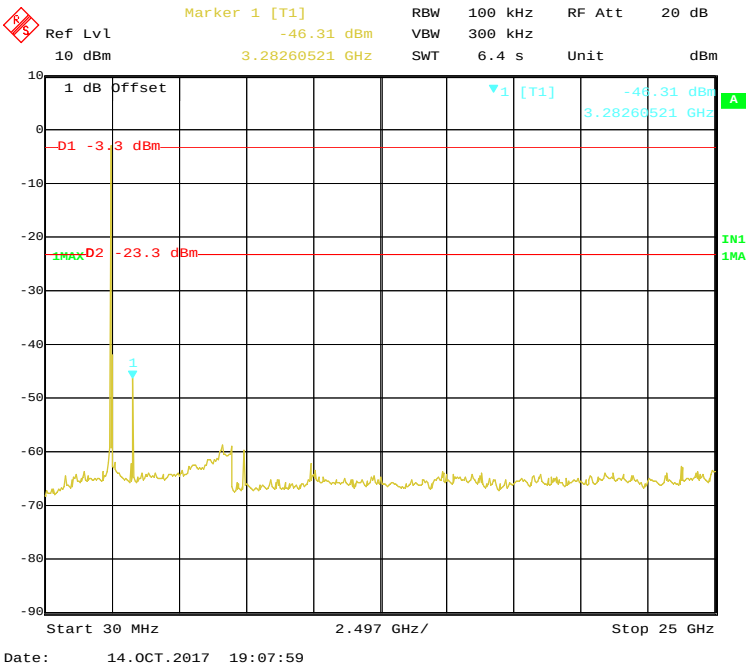
Low Channel



Middle Channel



High Channel



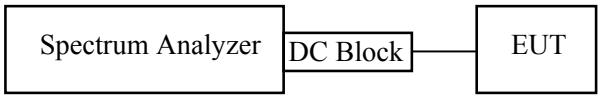
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Procedure

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



Test Data

Environmental Conditions

Temperature:	24 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

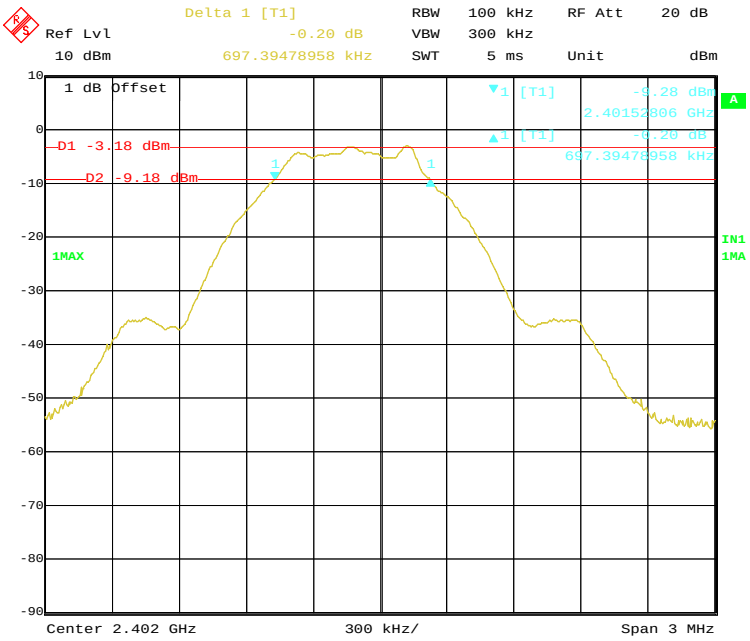
The testing was performed by Kyle Xu on 2017-10-14.

Test Result: Pass.

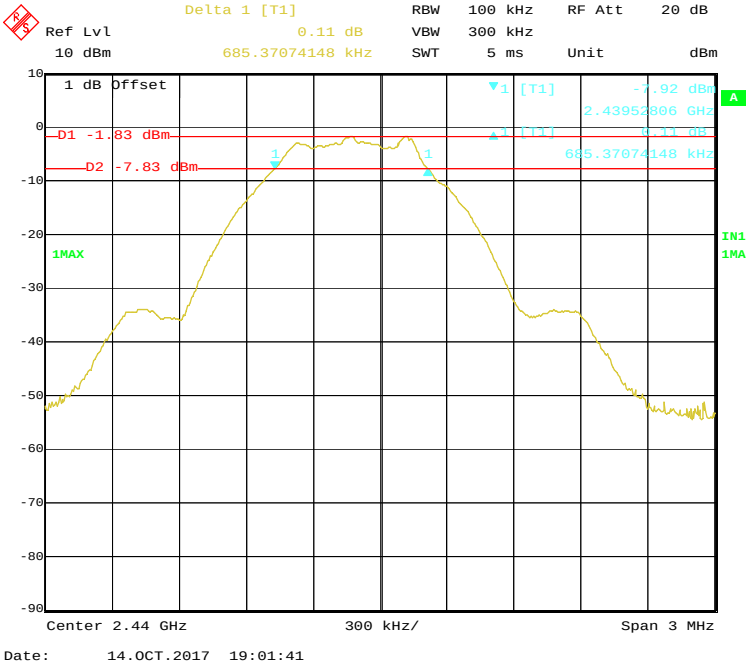
EUT operation mode: Transmitting

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (MHz)
Low	2402	0.697	≥0.5
Middle	2440	0.685	≥0.5
High	2480	0.697	≥0.5

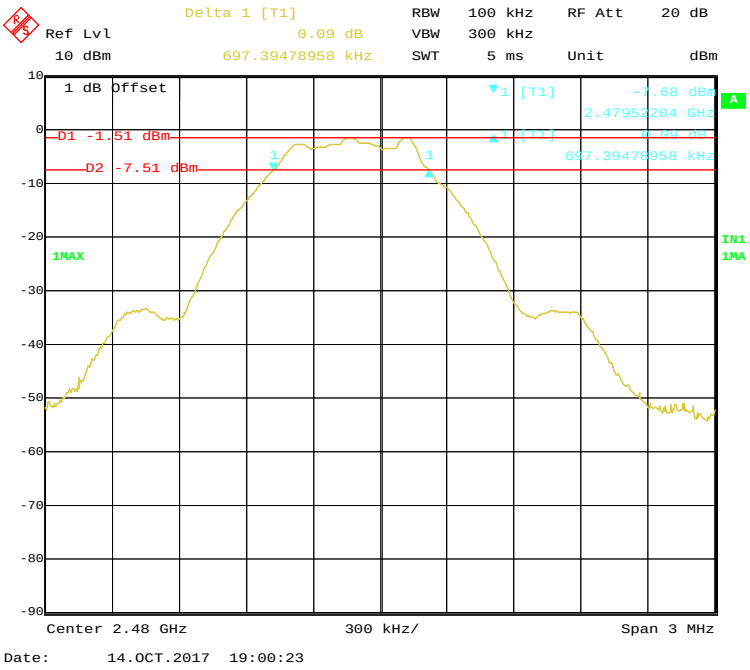
Low Channel



Middle Channel



High Channel



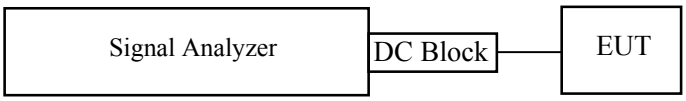
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

Test Procedure

1. Set the RBW ≥ *DTS bandwidth.*
2. Set VBW ≥ 3 x RBW.
3. Set span ≥ 3 x RBW
4. Sweep time = auto couple.
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.



Test Data

Environmental Conditions

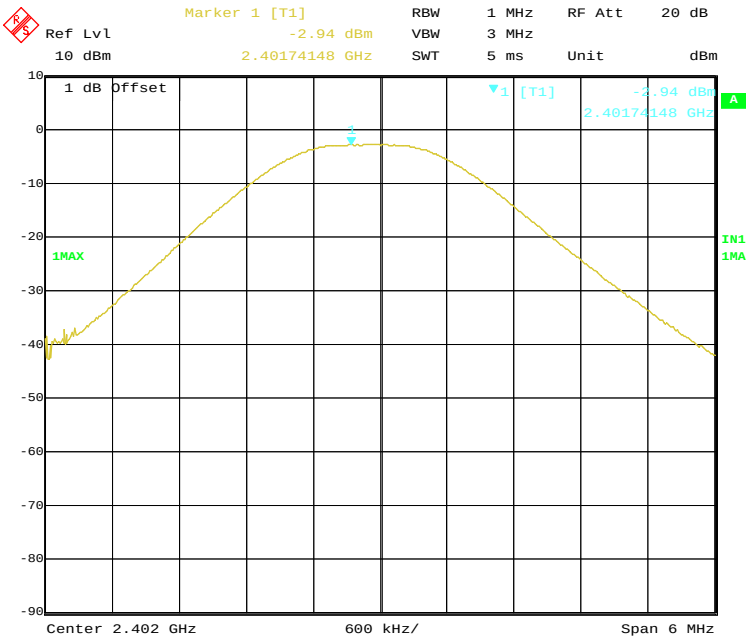
Temperature:	23.8℃
Relative Humidity:	54 %
ATM Pressure:	101.2 kPa

The testing was performed by Kyle Xu on 2017-10-14.

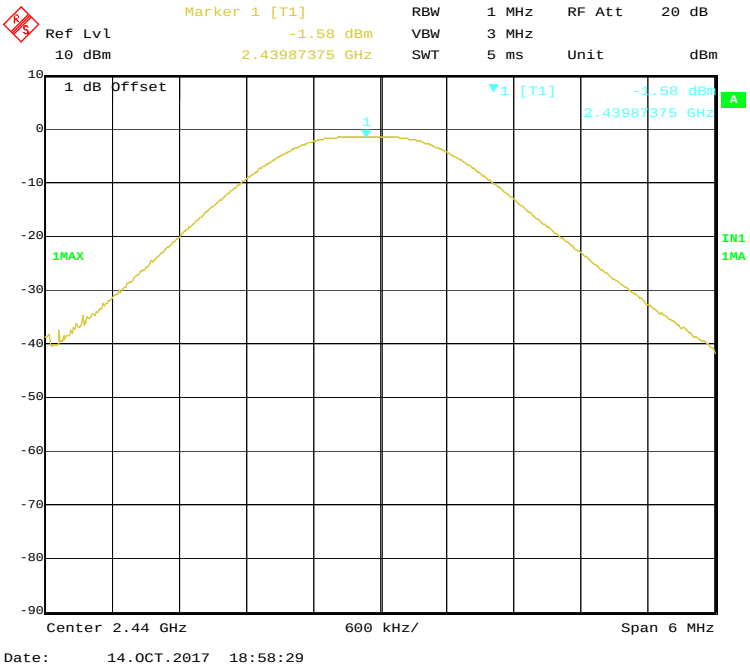
EUT operation mode: Transmitting

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)	Result
Low	2402	-2.94	30	Pass
Middle	2440	-1.58	30	Pass
High	2480	-1.20	30	Pass

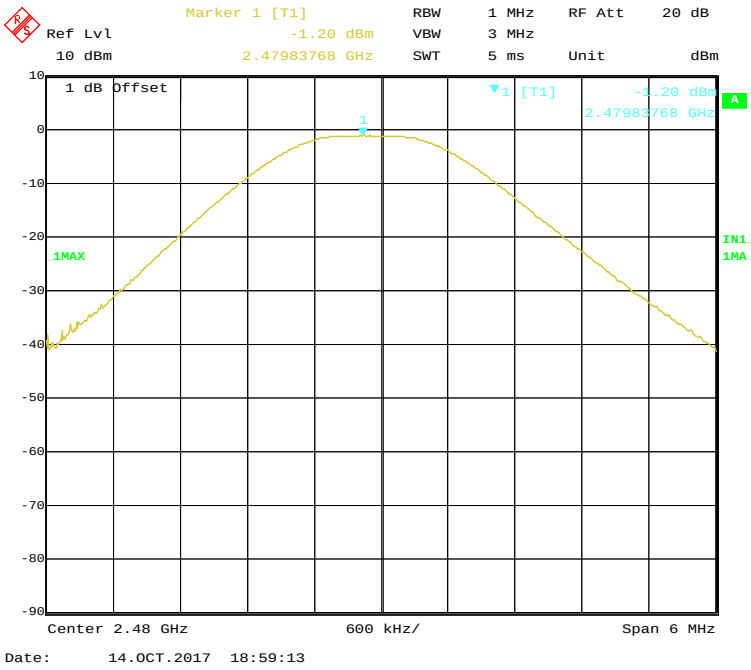
Low Channel



Middle Channel



High Channel



FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Data

Environmental Conditions

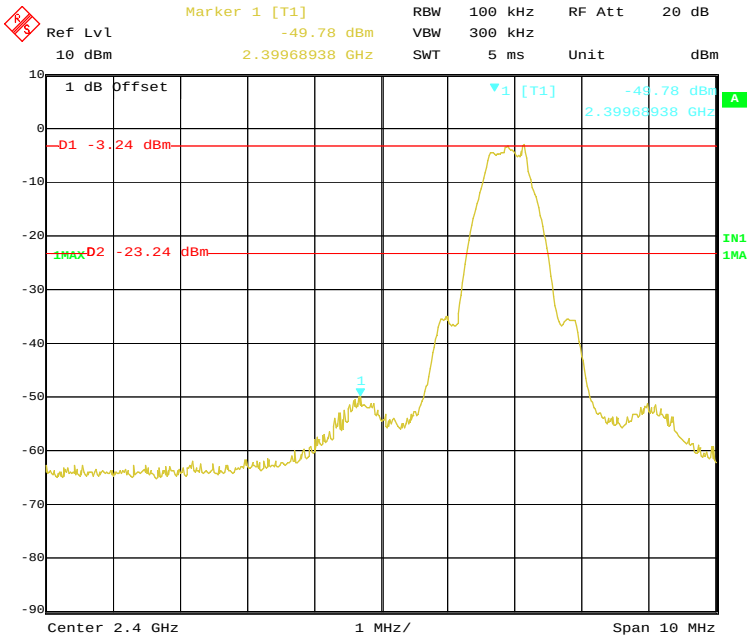
Temperature:	24.3 ℃
Relative Humidity:	50 %
ATM Pressure:	101.3 kPa

The testing was performed by Kyle Xu on 2017-10-14.

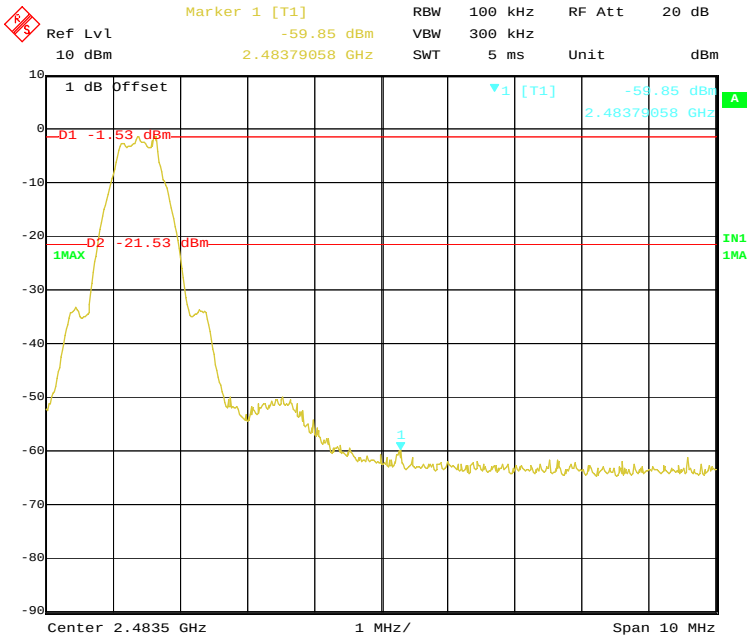
Test Result: *Compliance*

Band Edge

Left Side



Right Side



FCC §15.247(e) - POWER SPECTRAL DENSITY

Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Procedure

According to KDB558074 D01 DTS Meas Guidance v04.

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Data

Environmental Conditions

Temperature:	24.1 ℃
Relative Humidity:	50%
ATM Pressure:	101.3 kPa

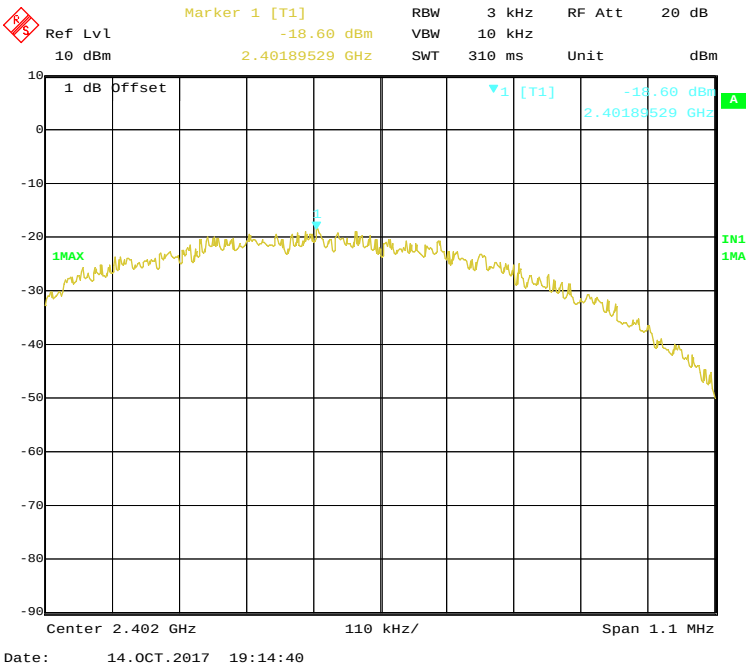
The testing was performed by Kyle Xu on 2017-10-14.

EUT operation mode: Transmitting

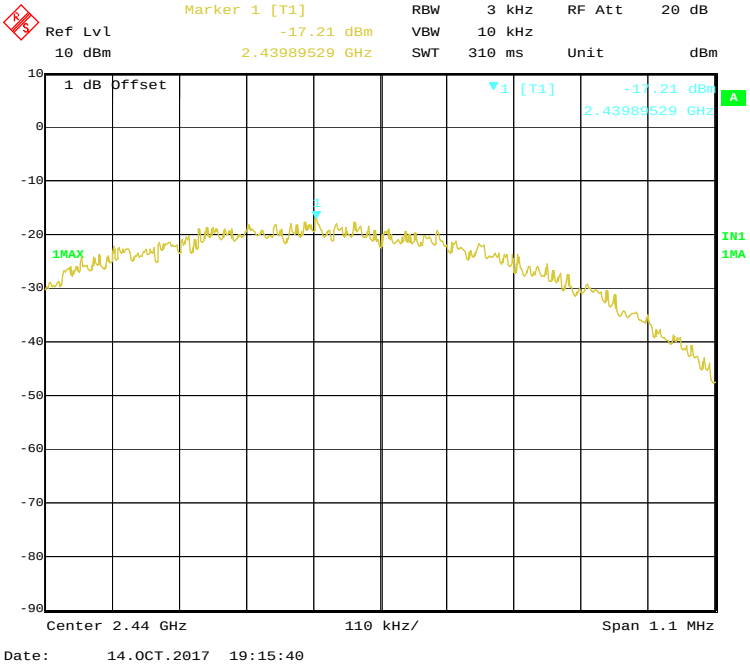
Test Result: Pass

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
Low	2402	-18.60	≤8
Middle	2440	-17.21	≤8
High	2480	-16.92	≤8

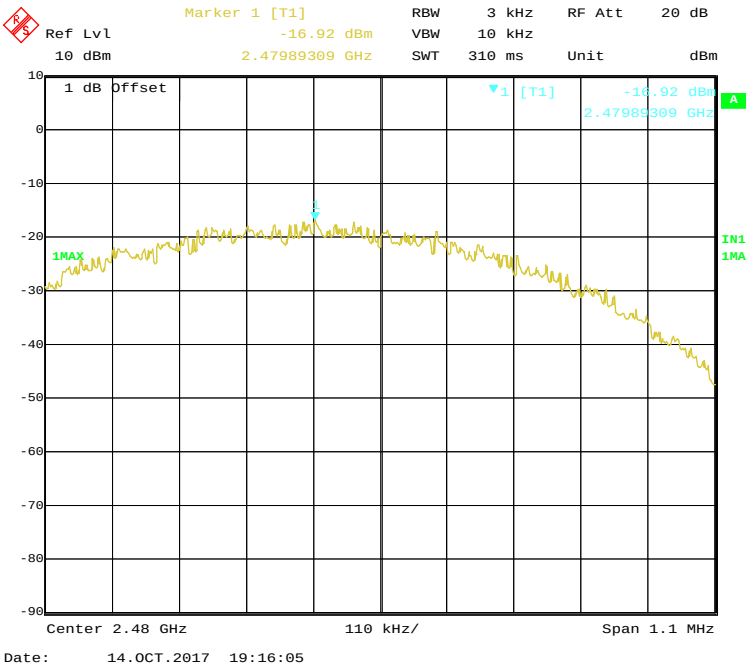
Low Channel



Middle Channel



High Channel



******* END OF REPORT *******