



# FCC PART 15.245 TEST REPORT

For

## Hangzhou Hikvision Digital Technology Co., Ltd.

No. 555 Qianmo Road, Binjiang District, Hangzhou 310052, China

FCC ID: 2ADTD-D0301002

Report Type:		Product Type:	
Original Report		Wireless Outdoor Dual-tech	
		Detector	
Test Engineer:	Alisa Gao	Alisa. Gao	
Report Number:	RKSA180410007-00C		
Report Date:	2018-06-17		
Reviewed By:	Oscar Ye RF Leader	Oscar. Ye	
Prepared By:		38934268	

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## TABLE OF CONTENTS

Report No.: RKSA180410007-00C

GENERAL INFORMATION	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	
Objective	3
RELATED SUBMITTAL(S)/GRANT(S)	3
TEST METHODOLOGY	3
MEASUREMENT UNCERTAINTY	
TEST FACILITY	4
SYSTEM TEST CONFIGURATION	5
JUSTIFICATION	5
EUT Exercise Software	
SUPPORT EQUIPMENT LIST AND DETAILS	5
External I/O Cable	
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	7
TEST EQUIPMENT LIST	8
FCC§15.203 - ANTENNA REQUIREMENT	9
APPLICABLE STANDARD	9
Antenna Connector Construction	9
FCC§15.205, §15.209 &§15.245(B) - RADIATED EMISSIONS& OUT OF BAND EMISSION	10
APPLICABLE STANDARD	10
EUT SETUP	11
TEST EQUIPMENT SETUP	12
TEST PROCEDURE	12
CORRECTED AMPLITUDE & MARGIN CALCULATION	
TEST RESULTS SUMMARY	
TEST DATA	13
FCC §15.215(C) – 20 DB BANDWIDTH TESTING	23
APPLICABLE STANDARD	23
TEST PROCEDURE	
Test Data	

#### **GENERAL INFORMATION**

#### **Product Description for Equipment under Test (EUT)**

Applicant	Hangzhou Hikvision Digital Technology Co., Ltd.
Tested Model	DS-PD2-T10P-WEH
Series Model	DS-RD2-T10P-WEH; DS-QD2-T10P-WEH; DS-1T2-T10P-WEH
Product Type	Wireless Outdoor Dual-tech Detector
Dimension	105mm(L)* 80 mm(W)* 180mm(H)
Power Supply	DC 3.0V from 2pcs Lithium batteries

Report No.: RKSA180410007-00C

#### **Objective**

This type approval report is prepared on behalf of *Hangzhou Hikvision Digital Technology Co., Ltd.* in accordance with Part 2-Subpart J, and 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, 15.209 and 15.245 rules.

#### Related Submittal(s)/Grant(s)

FCC Part 15.231(a) DSC submission with FCC ID: 2ADTD-D0301002.

#### **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.

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

FCC Part 15.245 Page 3 of 25

<sup>\*</sup> Note: The difference between tested model and series model was explained in the declaration letter.

<sup>\*</sup>All measurement and test data in this report was gathered from production sample serial number: 20180410007 (Assigned by the BACL. The EUT supplied by the applicant was received on 2018-04-10)

#### **Measurement Uncertainty**

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

Report No.: RKSA180410007-00C

#### **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.

FCC Part 15.245 Page 4 of 25

## SYSTEM TEST CONFIGURATION

#### Justification

Channel list:

Channel	Frequency (MHz)
1	10515
2	10525
3	10535

Report No.: RKSA180410007-00C

#### **EUT Exercise Software**

No software was used during the test.

## **Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number
/	1	1	/

#### **External I/O Cable**

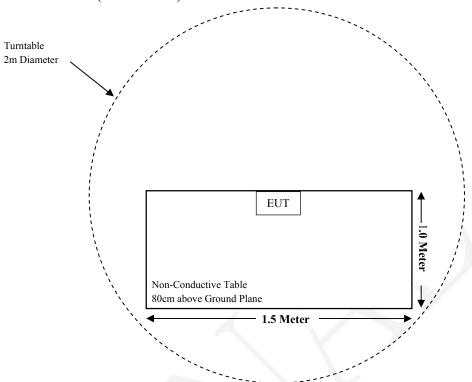
Cable Description	Shielding Type	Length (m)	From Port	То
/	/	1	/	/

FCC Part 15.245 Page 5 of 25

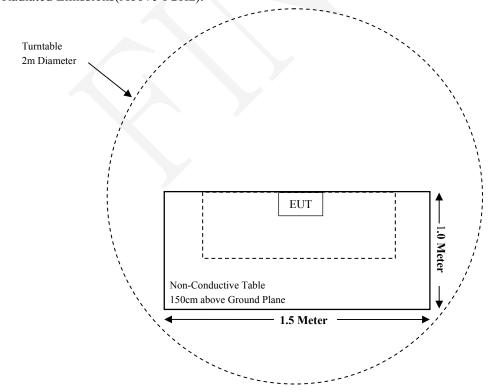
#### Report No.: RKSA180410007-00C

## **Block Diagram of Test Setup**

For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):



FCC Part 15.245 Page 6 of 25

## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conducted Emissions	Not Applicable (See Note)
15.205, §15.209, §15.245	Radiated Emissions& Out of Band Emission	Compliance
§15.215 (c)	20 dB Bandwidth	Compliance

Report No.: RKSA180410007-00C

Note: The EUT is powered by batteries.

FCC Part 15.245 Page 7 of 25

## TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
	Radiat	ed Emission Test (	Chamber 1#)		
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2017-11-12	2018-11-11
Sunol Sciences	Broadband Antenna	ЈВ3	A090413-1	2016-12-26	2019-12-25
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	EMI Test Receiver	ESU40	100207	2017-08-27	2018-08-26
Rohde & Schwarz	FSV40 Signal Analyzer	FSV40	101116	2017-07-22	2018-07-21
НР	Spectrum Analyzer	8565EC	3946A00131	2017-07-22	2018-07-21
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	2516	2016-12-12	2019-12-11
Wisewave	Horn Antenna	ARH-1923-02	11648-02	2016-12-12	2019-12-11
Sonoma Instrunent	Pre-amplifier	310N	185700	2017-08-15	2018-08-14
Mini-Circuits	Amplifier	ZVA-183W-S+	220701818	2018-05-20	2019-05-19
EM Electronics Corporation	Amplifier	EM18G40G	060726	2018-03-22	2019-03-21
Narda	Attenuator/10dB	10dB	/	2017-08-15	2018-08-14
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

Report No.: RKSA180410007-00C

FCC Part 15.245 Page 8 of 25

<sup>\*</sup> 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§15.203 - ANTENNA REQUIREMENT

#### **Applicable Standard**

For intentional device, 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.

Report No.: RKSA180410007-00C

#### **Antenna Connector Construction**

The EUT has a PCB antenna for 10.5GHz and the antenna gain is 8.0 dBi, which was furnished by the responsible party, fulfill the requirement of this section, please refer to the EUT photos.

**Result:** Compliant.

FCC Part 15.245 Page 9 of 25

# FCC§15.205, §15.209 &§15.245(b) - RADIATED EMISSIONS& OUT OF BAND EMISSION

#### **Applicable Standard**

According to FCC§15.245 (b), The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Report No.: RKSA180410007-00C

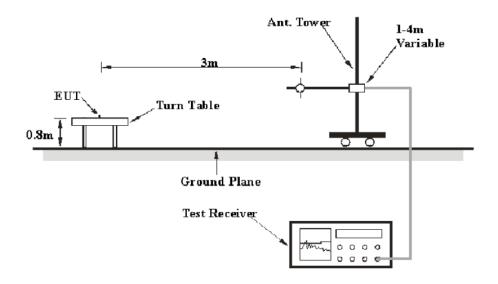
Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902–928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25.0
24075-24175	2500	25.0

- (1) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:
- (i) For the second and third harmonics of field disturbance sensors operating in the 24075-24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.
- (ii) For all other field disturbance sensors, 7.5 mV/m.
- (iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075-24175 MHz band, fully comply with the limits given in §15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).
- (2) Field strength limits are specified at a distance of 3 meters.
- (3) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.
- (4) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

FCC Part 15.245 Page 10 of 25

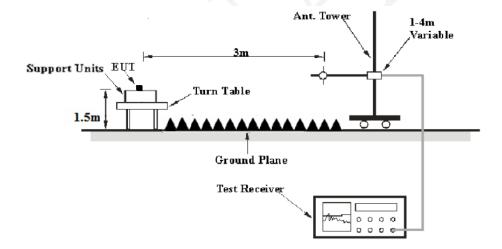
## **EUT Setup**

#### Below 1 GHz:



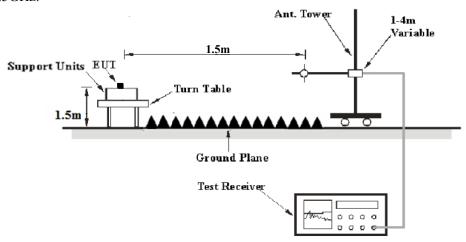
Report No.: RKSA180410007-00C

#### 1 GHz-18GHz:



FCC Part 15.245 Page 11 of 25

18 GHz-53.5GHz:



Report No.: RKSA180410007-00C

The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.205, 15.209 and FCC 15.245 limits.

#### **Test Equipment Setup**

The system was investigated from 30 MHz to 53.5 GHz.

During the radiated emission test, the EMI test receiver setup was 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
Abovo 1CHz	1MHz	3 MHz	/	PK
Above 1GHz	1MHz	3 MHz	/	Ave.

#### **Test Procedure**

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

All data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak detection mode above 1 GHz.

FCC Part 15.245 Page 12 of 25

#### **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:

Report No.: RKSA180410007-00C

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 data in the following table, the EUT complied with the FCC Part 15.205 &15.209 & 15.245(b).

#### **Test Data**

#### **Environmental Conditions**

Temperature:	24.2°C
Relative Humidity:	51 %
ATM Pressure:	101.2kPa

The testing was performed by Alisa Gao on 2018-04-28 to 2018-06-16.

*Test mode: Transmitting* 

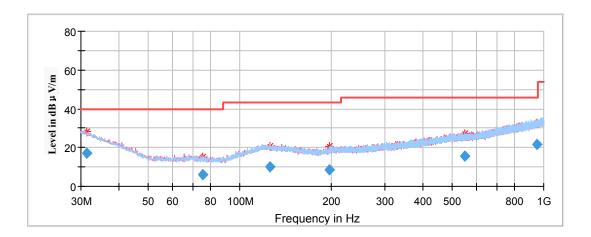
FCC Part 15.245 Page 13 of 25

#### **Spurious Emissions:**

#### *30MHz-1GHz:*

(Pre-scan with channel1, channel2, channel3 of operation in the X,Y and Z axes of orientation, the worst case channel2 of operation in the X-axis of orientation was recorded)

Report No.: RKSA180410007-00C



Frequency	Corrected Amplitude	Rx Antenna		Turntable	Corrected	Limit	Margin
(MHz)	QuasiPeak (dBμV/m)	Height (cm)	Polar (H/V)	Degree	Factor (dB/m)	(dBµV/m)	(dB)
31.28	17.28	101.0	V	182.00	-5.20	40.00	22.72
75.40	6.27	101.0	V	130.00	-18.00	40.00	33.73
125.81	9.91	199.0	V	91.00	-11.80	43.50	33.59
196.99	8.45	101.0	Н	103.00	-13.00	43.50	35.05
551.80	15.48	199.0	Н	342.00	-5.80	46.00	30.52
950.26	21.83	199.0	V	244.00	1.20	46.00	24.17

FCC Part 15.245 Page 14 of 25

#### 1GHz-18GHz:

Note:

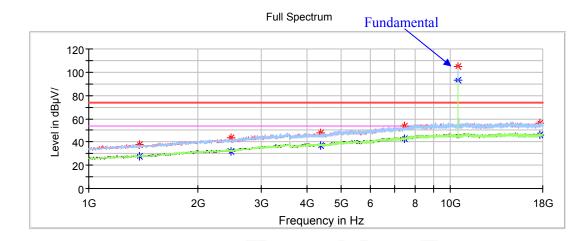
Corrected Factor = Antenna factor (RX) + Cable Loss - Amplifier Factor

Corrected Amplitude = Corrected Factor + Reading

Margin = Limit - Corrected. Amplitude

#### Channel 1: 10515MHz

(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)



Report No.: RKSA180410007-00C

Frequency	Corrected A	Amplitude	Rx A	ntenna	Turntable	Corrected	Limit	Margin
(MHz)	MaxPeak (dBμV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)	Degree	Factor (dB/m)	(dBµV/m)	(dB)
1377.400000		27.77	150.0	V	173.0	-2.0	54.00	26.23
1377.400000	37.87		150.0	V	173.0	-2.0	74.00	36.13
2475.600000		32.26	100.0	Н	90.0	3.0	54.00	21.74
2475.600000	43.28		100.0	Н	90.0	3.0	74.00	30.72
4386.400000		37.24	100.0	V	251.0	9.2	54.00	16.76
4386.400000	47.76		100.0	V	251.0	9.2	74.00	26.24
7449.800000		42.76	150.0	V	251.0	15.6	54.00	11.24
7449.800000	53.70		150.0	V	251.0	15.6	74.00	20.30
17670.200000		46.30	150.0	V	256.0	18.7	54.00	7.70
17670.200000	55.83		150.0	V	256.0	18.7	74.00	18.17

FCC Part 15.245 Page 15 of 25

Channel 2: 10525MHz

100

1G

Level in dB µ V/m

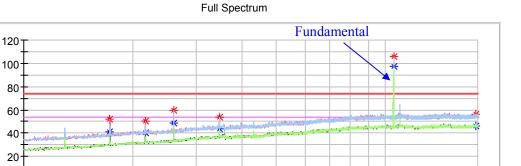
(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)

3G

4G

Frequency in Hz

2G



5G

6

Report No.: RKSA180410007-00C

10G

8

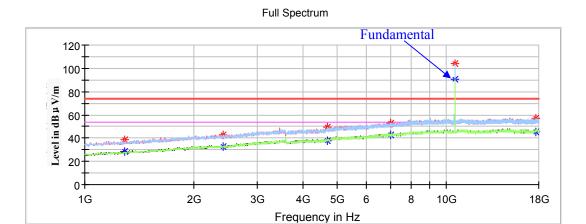
18G

Frequency	Corrected .	orrected Amplitude Rx		Rx Antenna		Corrected	Limit	Margin
(MHz)	MaxPeak (dBμV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)	Turntable Degree	Factor (dB/m)	(dBµV/m)	(dB)
1731.000000		40.97	200.0	V	8.0	0.4	54.00	13.03
1731.000000	52.11		200.0	V	8.0	0.4	74.00	21.89
2166.200000		40.29	150.0	Н	2.0	2.4	54.00	13.71
2166.200000	49.95		150.0	Н	2.0	2.4	74.00	24.05
2601.400000		48.54	100.0	V	37.0	3.7	54.00	5.46
2601.400000	59.77		100.0	V	37.0	3.7	74.00	14.23
3468.400000		43.80	100.0	V	37.0	7.2	54.00	10.20
3468.400000	54.08		100.0	V	37.0	7.2	74.00	19.92
17724.600000		46.07	200.0	V	231.0	18.8	54.00	7.93
17724.600000	56.25		200.0	V	231.0	18.8	74.00	17.75

FCC Part 15.245 Page 16 of 25

Channel 3: 10535MHz

(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)



Report No.: RKSA180410007-00C

Frequency	Corrected Amplitude		Rx A	Rx Antenna		Rx Antenna		Corrected	Limit	Margin
(MHz)	MaxPeak (dBμV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)	Turntable Degree	Factor (dB/m)	(dBµV/m)	(dB)		
1289.000000		28.78	150.0	V	147.0	-2.5	54.00	25.22		
1289.000000	38.73		150.0	V	147.0	-2.5	74.00	35.27		
2417.800000		32.42	200.0	Н	159.0	2.9	54.00	21.58		
2417.800000	42.74		200.0	Н	159.0	2.9	74.00	31.26		
4699.200000		37.81	100.0	V	356.0	10.2	54.00	16.19		
4699.200000	49.29		100.0	V	356.0	10.2	74.00	24.71		
7024.800000		42.80	200.0	V	345.0	15.0	54.00	11.20		
7024.800000	52.97		200.0	V	345.0	15.0	74.00	21.03		
17714.400000		45.73	200.0	V	215.0	18.8	54.00	8.27		
17714.400000	56.98		200.0	V	215.0	18.8	74.00	17.02		

FCC Part 15.245 Page 17 of 25

#### 18GHz-53.5GHz:

Note:

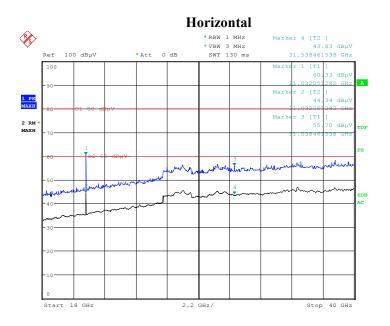
1. The test distance is 1.5m, the limit for Peak is 74dBuV/m@3m=80dBuV/m@1.5m, the limit for Average is 54dBuV/m@3m=60dBuV/m@1.5m

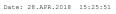
Report No.: RKSA180410007-00C

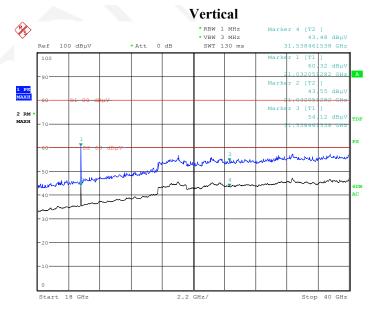
2. For 40GHz-53GHz, the spurious emission which is 20dB to the limit was not recorded.

#### Channel 1: 10515MHz

(Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded)







Date: 28.APR.2018 15:36:12

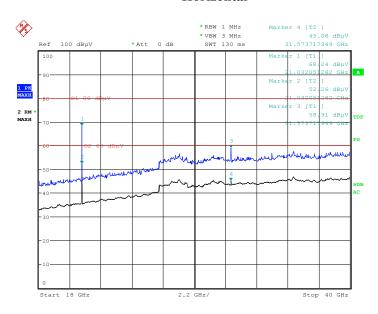
FCC Part 15.245 Page 18 of 25

#### Channel 2: 10525MHz

(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)

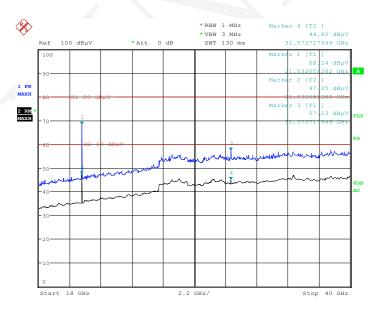
#### Horizontal

Report No.: RKSA180410007-00C



Date: 28.APR.2018 15:20:14

#### Vertical



Date: 28.APR.2018 15:11:43

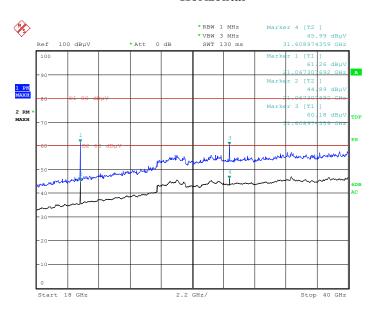
FCC Part 15.245 Page 19 of 25

#### Channel 3: 10535MHz

(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded)

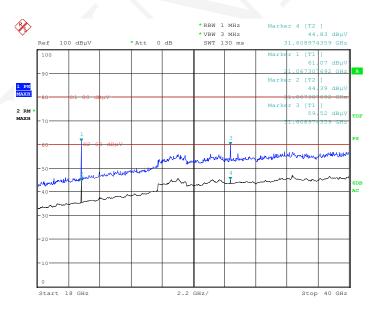
#### Horizontal

Report No.: RKSA180410007-00C



Date: 28.APR.2018 16:51:58

#### Vertical



Date: 28.APR.2018 17:19:10

FCC Part 15.245 Page 20 of 25

	Corrected .	Amplitude	Ry A	ntenna		Corrected				
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)	Turntable Degree	Factor (dB/m)	Limit (dBµV/m)	Margin (dB)		
	Channel 1: 10515MHz									
21030.00	60.33		196.0	Н	296.0	24.8	114.00	53.67		
21030.00		44.34	196.0	Н	296.0	24.8	94.00	49.66		
21030.00	60.32		186.0	V	262.0	24.8	114.00	53.68		
21030.00		43.55	186.0	V	262.0	24.8	94.00	50.45		
31545.00		43.83	160.0	Н	126.0	31.2	94.00	50.17		
31545.00	55.70		160.0	Н	126.0	31.2	114.00	58.30		
31545.00	54.12		238.0	V	226.0	31.2	114.00	59.88		
31545.00		43.48	238.0	V	226.0	31.2	94.00	50.52		
	Channel 2: 10525MHz									
21050.00	68.24		199.0	Н	141.0	24.8	114.00	45.76		
21050.00		52.26	199.0	Н	141.0	24.8	94.00	41.74		
21050.00	68.24		241.0	V	46.0	24.8	114.00	45.76		
21050.00		47.25	241.0	V	46.0	24.8	94.00	46.75		
31575.00	58.91		169.0	Н	319.0	31.2	114.00	55.09		
31575.00		45.08	169.0	Н	319.0	31.2	94.00	48.92		
31575.00	57.23		202.0	V	69.0	31.2	114.00	56.77		
31575.00		44.80	202.0	V	69.0	31.2	94.00	49.20		
			Channel	3: 10535M	Hz					
21070.00	61.26		231.0	Н	267.0	24.8	114.00	52.74		
21070.00		44.89	231.0	Н	267.0	24.8	94.00	49.11		
21070.00	61.07		193.0	V	264.0	24.8	114.00	52.93		
21070.00		44.39	193.0	V	264.0	24.8	94.00	49.61		
31605.00	60.18		188.0	Н	67.0	31.2	114.00	53.82		
31605.00		45.99	188.0	Н	67.0	31.2	94.00	48.01		
31605.00		44.83	157.0	V	136.0	31.2	94.00	49.17		
31605.00	59.52		157.0	V	136.0	31.2	114.00	54.48		

Report No.: RKSA180410007-00C

#### Note:

- 1. The test distance is 1.5m, the limit for Peak is 108dBuV/m@3m=114dBuV/m@1.5m, the limit for Average is 88dBuV/m@3m=94dBuV/m@1.5m
- 2. Corrected Factor = Antenna factor (RX) + Cable Loss Amplifier Factor Corrected Amplitude = Corrected Factor + Reading Margin = Limit Corrected. Amplitude

FCC Part 15.245 Page 21 of 25

#### **Fundamental Test & Restricted Bands Emissions Test:**

(Pre-scan in the X,Y and Z axes of orientation, the worst case X-axis of orientation was recorded)

Report No.: RKSA180410007-00C

Note:

Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Corrected Amplitude = Corrected Factor + Reading

Margin = Limit - Corrected. Amplitude

Engguenav	Corrected A	Amplitude	Rx A	Antenna		Corrected	Limit	Margin		
Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Height (cm)	Polar (H/V)	Turntable Degree	Factor (dB/m)	(dBµV/m)	(dB)		
	Channel 1: 10515MHz									
10515.00		97.80	200.0	Н	260.0	17.0	128.00	30.20		
10515.00	104.33		200.0	Н	260.0	17.0	148.00	43.67		
10515.00		99.53	150.0	V	263.0	17.0	128.00	28.47		
10515.00	106.48		150.0	V	263.0	17.0	148.00	41.52		
10500.00	54.25		250.0	V	235.0	17.0	74.00	19.75		
10500.00		45.74	250.0	V	235.0	17.0	54.00	8.26		
	•		Channel	2: 10525M	Hz					
10525.00	107.31		200.0	Н	176.0	17.0	148.00	40.69		
10525.00		97.31	200.0	Н	176.0	17.0	128.00	30.69		
10525.00	108.93		100.0	V	17.0	17.0	148.00	39.07		
10525.00		98.65	100.0	V	17.0	17.0	128.00	29.35		
	•		Channel	3: 10535M	Hz					
10535.00		94.73	200.0	Н	173.0	17.0	128.00	33.27		
10535.00	104.42		200.0	Н	173.0	17.0	148.00	43.58		
10535.00		96.39	150.0	V	72.0	17.0	128.00	31.61		
10535.00	106.51		150.0	V	72.0	17.0	148.00	41.49		
10550.00	52.89		200.0	V	125.0	17.0	74.00	21.11		
10550.00		45.64	200.0	V	125.0	17.0	54.00	8.36		

FCC Part 15.245 Page 22 of 25

#### FCC §15.215(c) – 20 dB BANDWIDTH TESTING

#### **Applicable Standard**

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through §15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Report No.: RKSA180410007-00C

#### **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 on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- 3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
- 4. Repeat above procedures until all frequencies measured were complete.

#### **Test Data**

#### **Environmental Conditions**

Temperature:	24.2°C
Relative Humidity:	51 %
ATM Pressure:	101.2kPa

The testing was performed by Alisa Gao on 2018-05-04.

Test Result: Compliant.

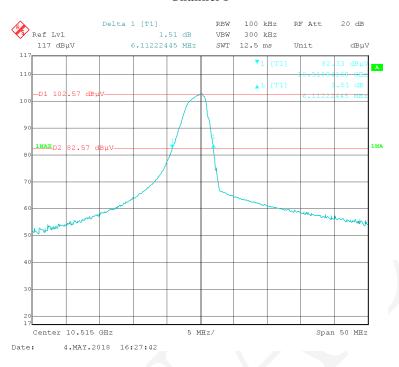
Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
1	10515	6.112
2	10525	7.615
3	10535	5.711

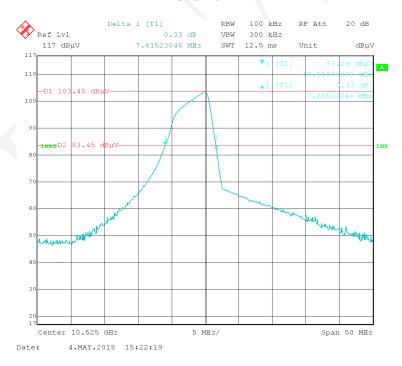
FCC Part 15.245 Page 23 of 25

#### **Channel 1**

Report No.: RKSA180410007-00C



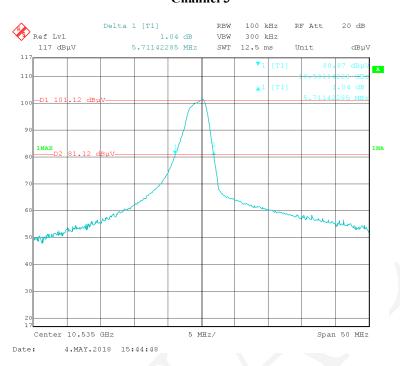
#### Channel 2



FCC Part 15.245 Page 24 of 25

#### **Channel 3**

Report No.: RKSA180410007-00C



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

FCC Part 15.245 Page 25 of 25