FCC REPORT

Applicant:	AISOLUTION CO., LTD.
Address of Applicant:	28-4, Samyang-ro 29-gil, Gangbuk-gu, Seoul, South Korea

Equipment Under Test (EUT)

Product Name:	KDCSLED UHF 0.5W Module Pack
Model No.:	KDCSLED-UHF0.5W
FCC ID:	VH9-KDCUHF05
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247
Date of sample receipt:	17 Oct., 2018
Date of Test:	17 Oct., to 30 Nov., 2018
Date of report issued:	03 Dec., 2018
Test Result:	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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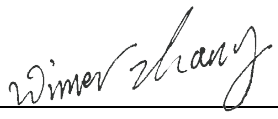
2 Version

Version No.	Date	Description
00	*03 Dec., 2018*	*Original*

Tested by:  ***Date:*** *03 Dec., 2018*

Test Engineer

Reviewed by:  ***Date:*** *03 Dec., 2018*

Project Engineer

3 Contents

Page

1 COVER PAGE 1
2 VERSION 2
3 CONTENTS 3
4 TEST SUMMARY 4
5 GENERAL INFORMATION 5
5.1 CLIENT INFORMATION 5
5.2 GENERAL DESCRIPTION OF E.U.T. 5
5.3 TEST ENVIRONMENT AND TEST MODE 6
5.4 DESCRIPTION OF SUPPORT UNITS 6
5.5 MEASUREMENT UNCERTAINTY 6
5.6 LABORATORY FACILITY 6
5.7 LABORATORY LOCATION 6
5.8 TEST INSTRUMENTS LIST 7
6 TEST RESULTS AND MEASUREMENT DATA 8
6.1 ANTENNA REQUIREMENT 8
6.2 CONDUCTED OUTPUT POWER 9
6.3 20DB OCCUPY BANDWIDTH 11
6.4 CARRIER FREQUENCIES SEPARATION 13
6.5 HOPPING CHANNEL NUMBER 15
6.6 DWELL TIME 17
6.7 PSEUDORANDOM FREQUENCY HOPPING SEQUENCE 19
6.8 BAND EDGE 20
6.8.1 Conducted Emission Method 20
6.8.2 Radiated Emission Method 22
6.9 SPURIOUS EMISSION 27
6.9.1 Conducted Emission Method 27
6.9.2 Radiated Emission Method 29
7 TEST SETUP PHOTO 36
8 EUT CONSTRUCTIONAL DETAILS 38

4 Test Summary

Test Items	Section in CFR 47	Result
Antenna Requirement	15.203 & 15.247 (c)	Pass
Conducted Peak Output Power	15.247 (b)(2)	Pass
20dB Occupied Bandwidth	15.247 (a)(1) (i)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(1) (i)	Pass
Dwell Time	15.247 (a)(1) (i)	Pass
Spurious Emission	15.205 & 15.209	Pass
Pass: The EUT complies with the essential requirements in the standard. *N/A: Not Applicable.*		

5 General Information

5.1 Client Information

Applicant:	AISOLUTION CO., LTD.
Address:	28-4, Samyang-ro 29-gil, Gangbuk-gu, Seoul, South Korea
Manufacturer/Factory:	AISOLUTION CO., LTD.
Address:	28-4, Samyang-ro 29-gil, Gangbuk-gu, Seoul, South Korea

5.2 General Description of E.U.T.

Product Name:	KDCSLED UHF 0.5W Module Pack
Model No.:	KDCSLED-UHF0.5W
Operation Frequency:	917 MHz~927 MHz
Number of channel:	50
Modulation technology:	ASK
Antenna Type:	External Antenna
Antenna gain:	-0.55 dBi
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

Operation Frequency							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	917.1MHz	14	919.9 MHz	28	922.7 MHz	42	925.5 MHz
1	917.3 MHz	15	920.1 MHz	29	922.9 MHz	43	925.7 MHz
2	917.5 MHz	16	920.3 MHz	30	923.1 MHz	44	925.9 MHz
3	917.7 MHz	17	920.5 MHz	31	923.3 MHz	45	926.1 MHz
4	917.9 MHz	18	920.7 MHz	32	923.5 MHz	46	926.3 MHz
5	918.1 MHz	19	920.9 MHz	33	923.7 MHz	47	926.5 MHz
6	918.3 MHz	20	921.1 MHz	34	923.9 MHz	48	926.7 MHz
7	918.5 MHz	21	921.3 MHz	35	924.1 MHz	49	926.9 MHz
8	918.7 MHz	22	921.5 MHz	36	924.3 MHz		
9	918.9 MHz	23	921.7 MHz	37	924.5 MHz		
10	919.1 MHz	24	921.9 MHz	38	924.7 MHz		
11	919.3 MHz	25	922.1 MHz	39	924.9 MHz		
12	919.5 MHz	26	922.3 MHz	40	925.1 MHz		
13	919.7 MHz	27	922.5 MHz	41	925.3 MHz		
Note: Channel 0, 24 & 49 selected as Lowest, Middle and Highest channel.							

5.3 Test environment and test mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test Modes:	
Non-hopping mode:	Keep the EUT in continuous transmitting mode with worst case data rate.
Hopping mode:	Keep the EUT in hopping mode.
The sample was placed 0.8m (below 1GHz)/1.5m (above 1GHz) above the ground plane of 3m chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working with a fresh battery, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

5.4 Description of Support Units

Manufacturer	Description	Model	S/N	FCC ID/DoC
H K ELEPHONE COMMUNICATION TECH CO., LTD	travel charger	KS15004R	N/A	DoC

5.5 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	±2.22 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±2.76 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.28 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.72 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±2.88 dB (k=2)

5.6 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Registration No.: 727551**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

5.8 Test Instruments list

Radiated Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-16-2018	03-15-2019
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-16-2018	03-15-2019
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-16-2018	03-15-2019
Horn Antenna	SCHWARZBECK	BBHA9120D	1805	06-22-2017	06-21-2020
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-21-2017	11-20-2018
				11-21-2018	11-20-2019
EMI Test Software	AUDIX	E3	Version: 6.110919b		
Pre-amplifier	HP	8447D	2944A09358	03-07-2018	03-06-2019
Pre-amplifier	CD	PAP-1G18	11804	03-07-2018	03-06-2019
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-07-2018	03-06-2019
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-21-2017	11-20-2018
				11-21-2018	11-20-2019
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-07-2018	03-06-2019
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-07-2018	03-06-2019
Cable	MICRO-COAX	MFR64639	K10742-5	03-07-2018	03-06-2019
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-07-2018	03-06-2019
RF Switch Unit	MWRFTEST	MW200	N/A	N/A	N/A
Test Software	MWRFTEST	MTS8200	Version: 2.0.0.0		

Conducted Emission:					
Test Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date (mm-dd-yy)**	**Cal. Due date (mm-dd-yy)**
EMI Test Receiver	Rohde & Schwarz	ESCI	101189	03-07-2018	03-06-2019
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-07-2018	03-06-2019
LISN	CHASE	MN2050D	1447	03-19-2018	03-18-2019
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2018	07-20-2019
Cable	HP	10503A	N/A	03-07-2018	03-06-2019
EMI Test Software	AUDIX	E3	Version: 6.110919b		

6 Test results and measurement data

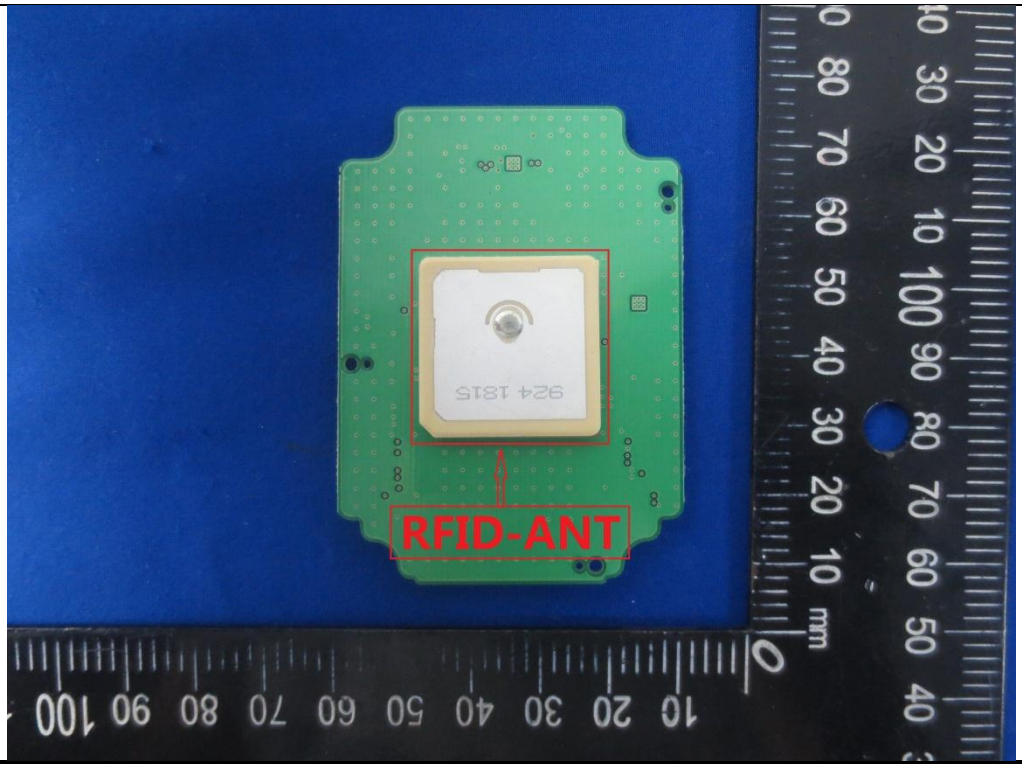
6.1 Antenna Requirement

Standard requirement:	FCC Part 15 C Section 15.203 & 247(c)

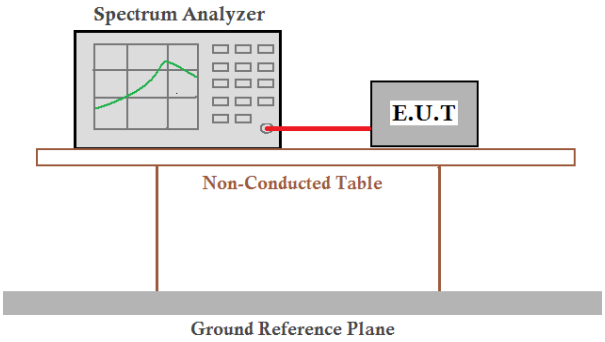
15.203 requirement:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
15.247(c) (1)(i) requirement:
(i) Systems operating in the 902~928 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:	

The antenna is an Dielectric Patch antenna which permanently attached, and the best case gain of the antenna is -0.55 dBi.



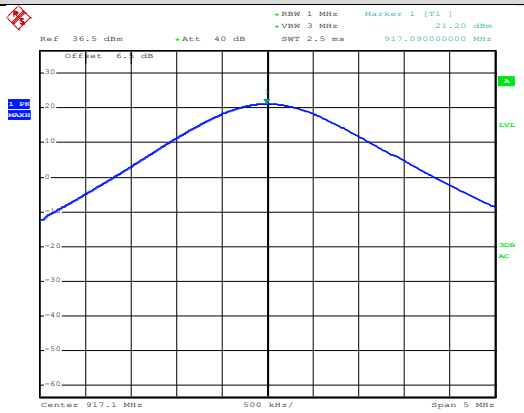
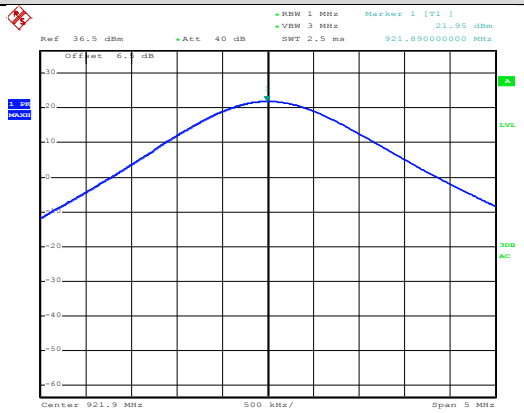
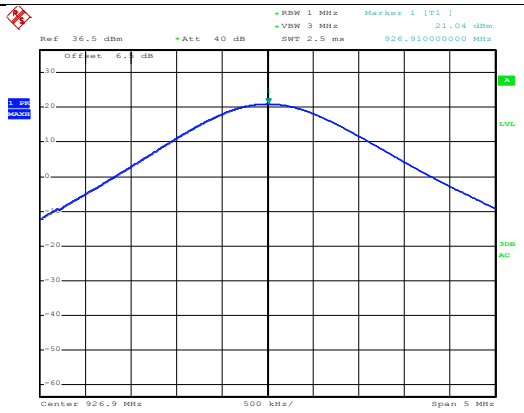
6.2 Conducted Output Power

Test Requirement:	FCC Part 15 C Section 15.247 (b)(2)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=1MHz, VBW=3MHz, Detector=Peak
Limit:	For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass

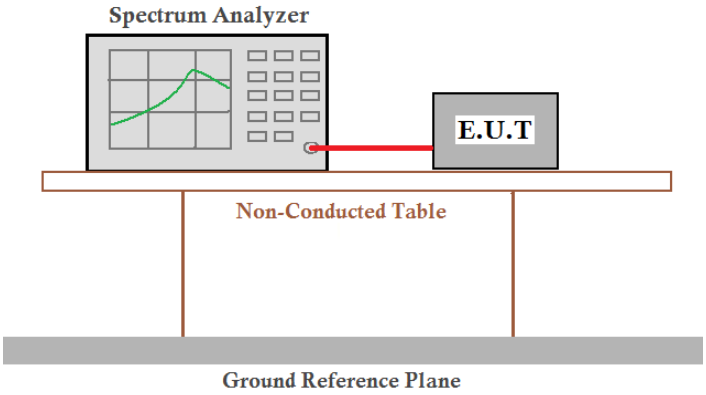
Measurement Data:

Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
ASK mode			
Lowest channel	21.20	24.00	Pass
Middle channel	21.95	24.00	Pass
Highest channel	21.04	24.00	Pass

Test plot as follows:

Modulation mode: ASK	
	
Lowest channel	Middle channel
	
Highest channel	

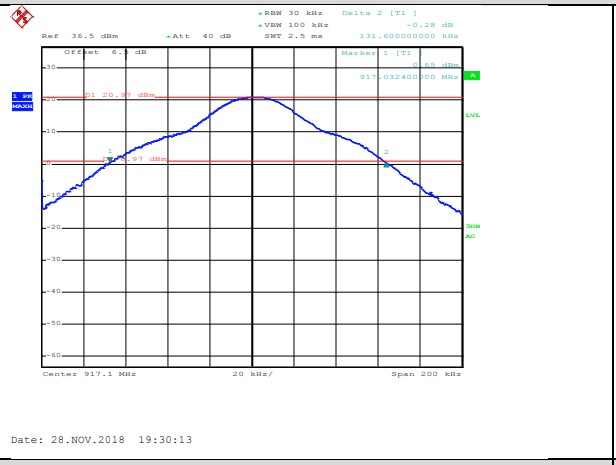
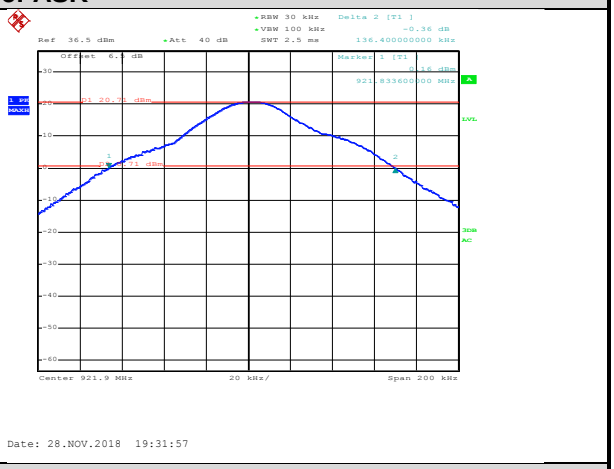
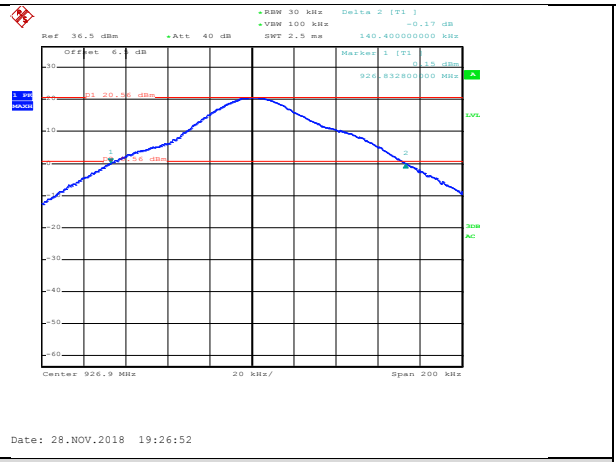
6.3 20dB Occupy Bandwidth

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=30 kHz, VBW=100 kHz, detector=Peak
Limit:	20dB < 250KHz
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass

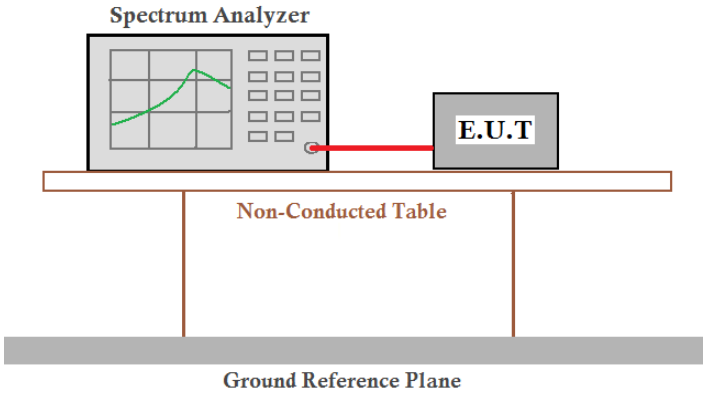
Measurement Data:

Test channel	20dB Occupy Bandwidth (kHz)			
	Lowest	Middle	Highest	Result
	131.60	136.40	140.40	PASS

Test plot as follows:

Modulation mode: ASK	
	
Lowest channel	Middle channel
	
Highest channel	

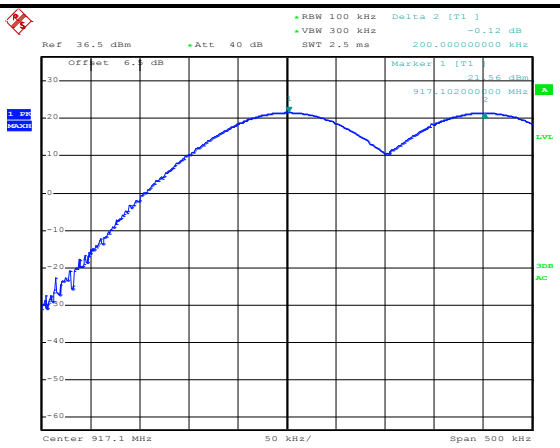
6.4 Carrier Frequencies Separation

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=100 kHz, VBW=300 kHz, detector=Peak
Limit:	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Hopping mode
Test results:	Pass

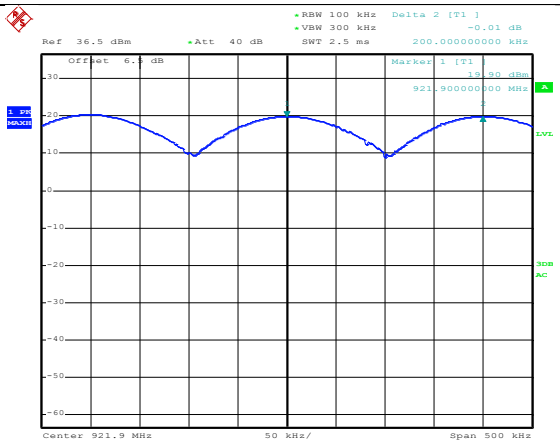
Measurement Data

Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
ASK			
Lowest	200	131.60	Pass
Middle	200	136.40	Pass
Highest	200	140.40	Pass

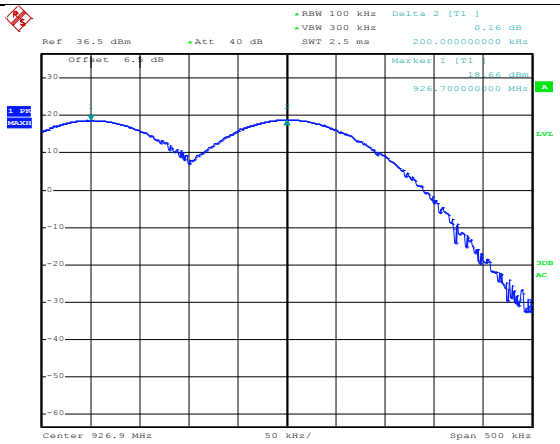
Test plot as follows:



Lowest channel

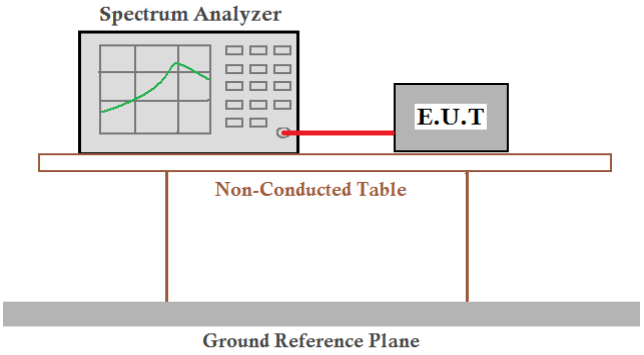


Middle channel



Highest channel

6.5 Hopping Channel Number

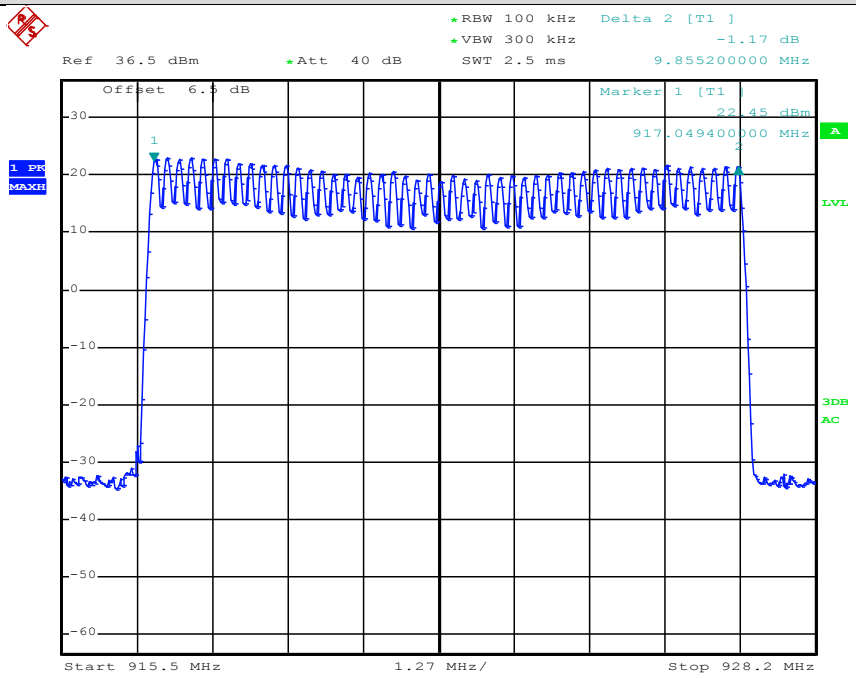
Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Detector=Peak
Limit:	25 channels
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Hopping mode
Test results:	Pass

Measurement Data:

Mode	Hopping channel numbers	Limit	Result
ASK	50	50	Pass

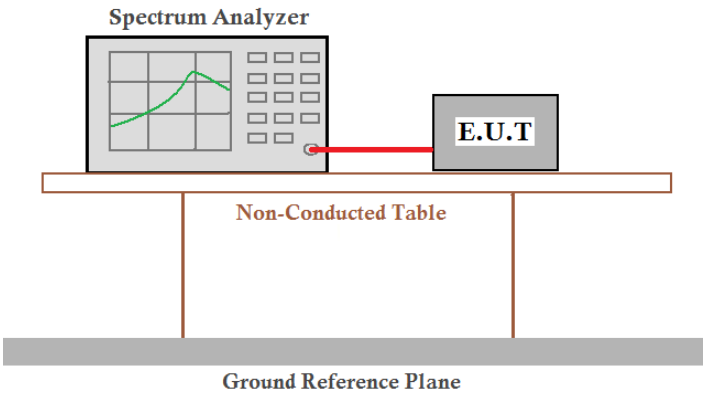
Test plot as follows:

ASK



Date: 28.NOV.2018 15:34:27

6.6 Dwell Time

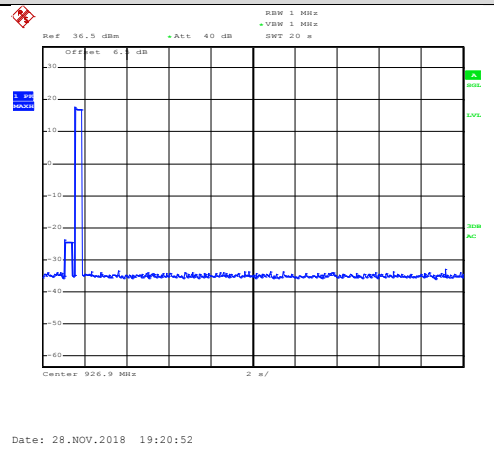
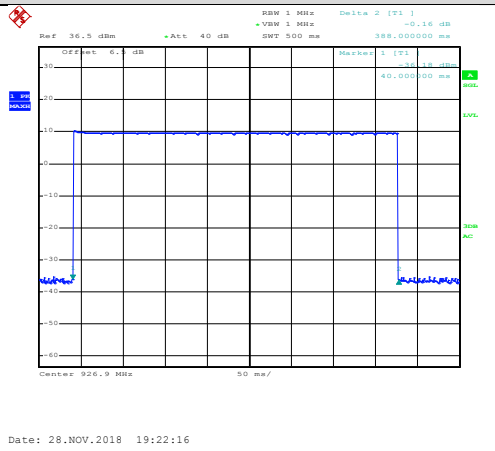
Test Requirement:	FCC Part 15 C Section 15.247 (a)(1)(i)
Test Method:	ANSI C63.10:2013 and KDB DA00-705
Receiver setup:	RBW=1 MHz, VBW=1 MHz, Span=0 Hz, Detector=Peak
Limit:	Occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Hopping mode
Test results:	Pass

Measurement Data:

Mode	20 second period (numbers)	Dwell time (second)	Limit (second)	Result
ASK	1	0.388	0.4	Pass

Note:
Calculation Formula: Dwell time = Ton time per hop * Hopping numbers
For example:
Time slot=0.388*1 =0.388ms

Test plot as follows:

Modulation mode: ASK	
	
20S	500ms

6.7 Pseudorandom Frequency Hopping Sequence

Test Requirement:	FCC Part 15 C Section 15.247 (a)(1) requirement:

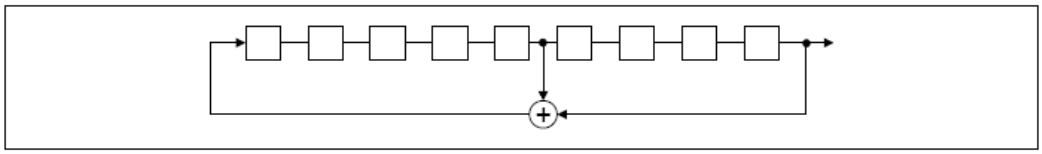
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively. Frequency hopping systems operating in the 902~928 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, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

EUT Pseudorandom Frequency Hopping Sequence

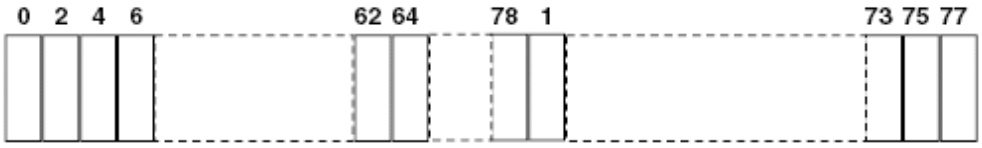
The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

• Number of shift register stages: 9
• Length of pseudo-random sequence: 2^9 -1 = 511 bits
• Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

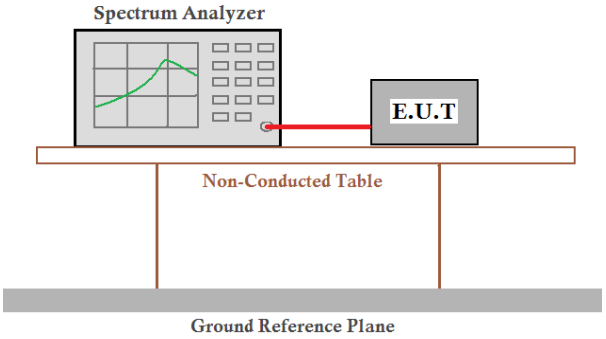


Each frequency used equally on the average by each transmitter.

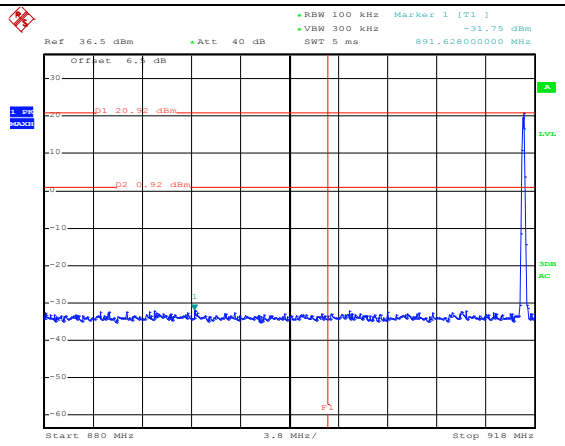
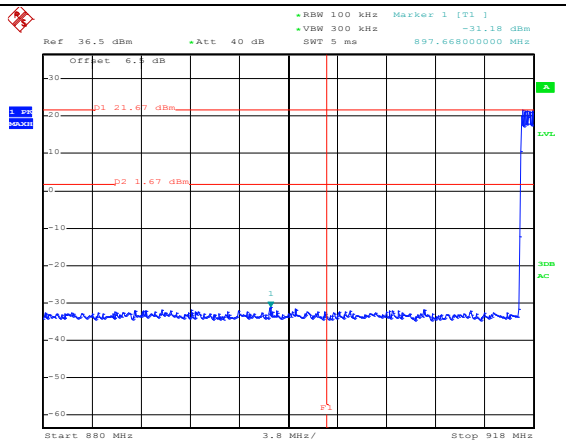
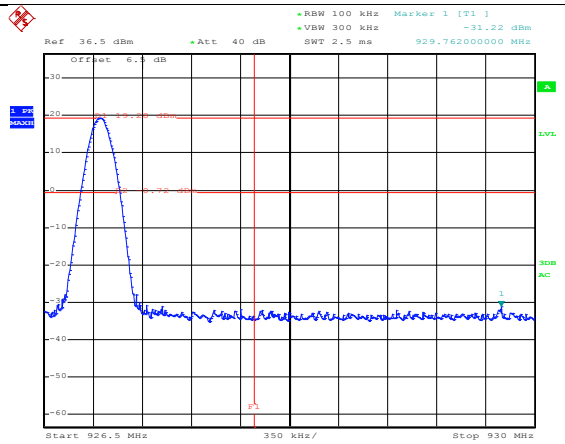
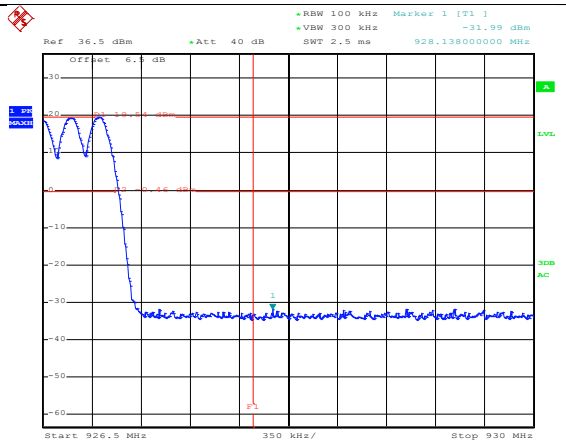
The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

6.8 Band Edge

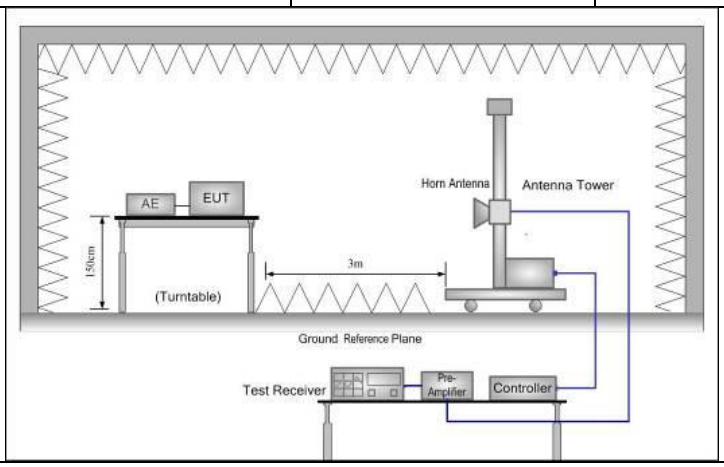
6.8.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and DA00-705
Receiver setup:	RBW=100 kHz, VBW=300 kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode and hopping mode
Test results:	Pass

Test plot as follows:

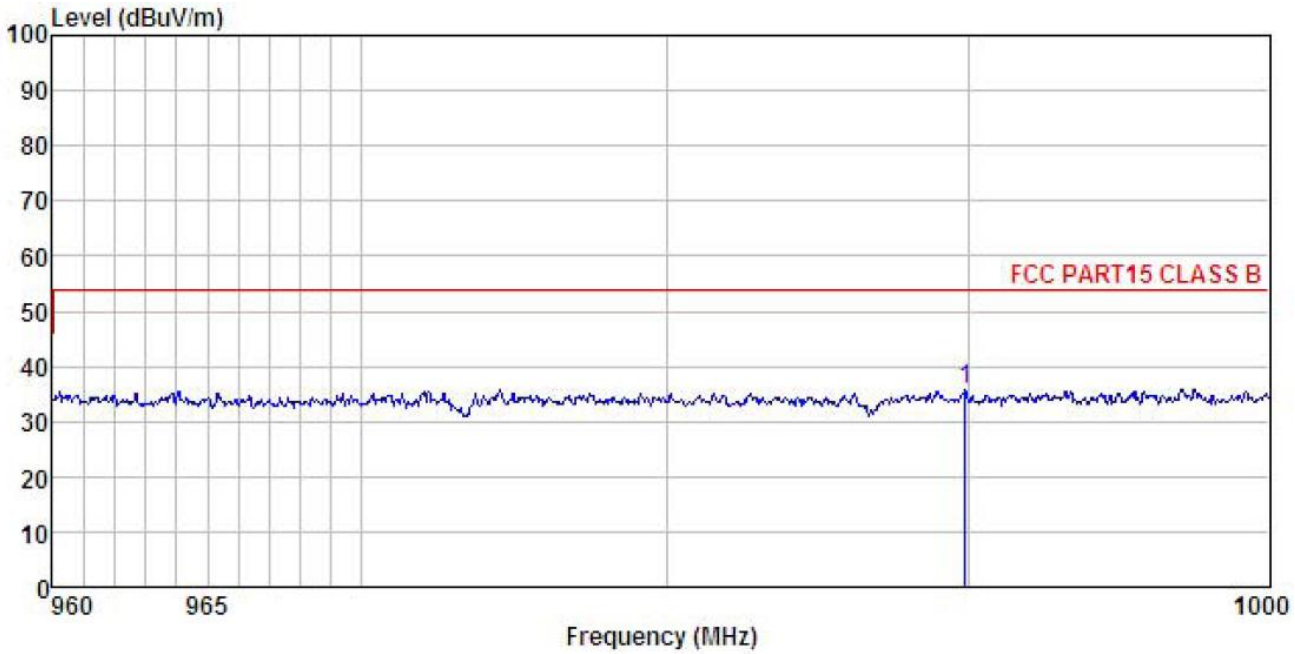
ASK	
Lowest Channel	
	
No-hopping mode	Hopping mode
Highest Channel	
	
No-hopping mode	Hopping mode

6.8.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td colspan="5">FCC Part 15 C Section 15.209 and 15.205</td></tr>
<tr><td>Test Method:</td><td colspan="5">ANSI C63.10: 2013</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="5">960MHz to1240MHz</td></tr>
<tr><td>Test Distance:</td><td colspan="5">3m</td></tr>
<tr><td rowspan="3">Receiver setup:</td><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>RMS</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
<tr><td rowspan="3">Limit:</td><td colspan="2">Frequency</td><td colspan="2">Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td colspan="2" rowspan="2">Above 1GHz</td><td colspan="2">54.00</td><td>Average Value</td></tr>
<tr><td colspan="2">74.00</td><td>Peak Value</td></tr>
<tr><td>Test setup:</td><td colspan="5"> 
</td></tr>
<tr><td>Test Procedure:</td><td colspan="5">1. The EUT was placed on the top of a rotating table 1.5meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</td></tr>
<tr><td>Test Instruments:</td><td colspan="5">Refer to section 5.8 for details</td></tr>
<tr><td>Test mode:</td><td colspan="5">Non-hopping mode</td></tr>
<tr><td>Test results:</td><td colspan="5">Passed</td></tr>
</table>

Below 1GHz:

Product Name:	KDCSLED UHF 0.5W Module Pack	**Product Model:**	KDCSLED-UHF0.5W
Test By:	YT	**Test mode:**	Tx mode
Test Channel:	Highest channel	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%

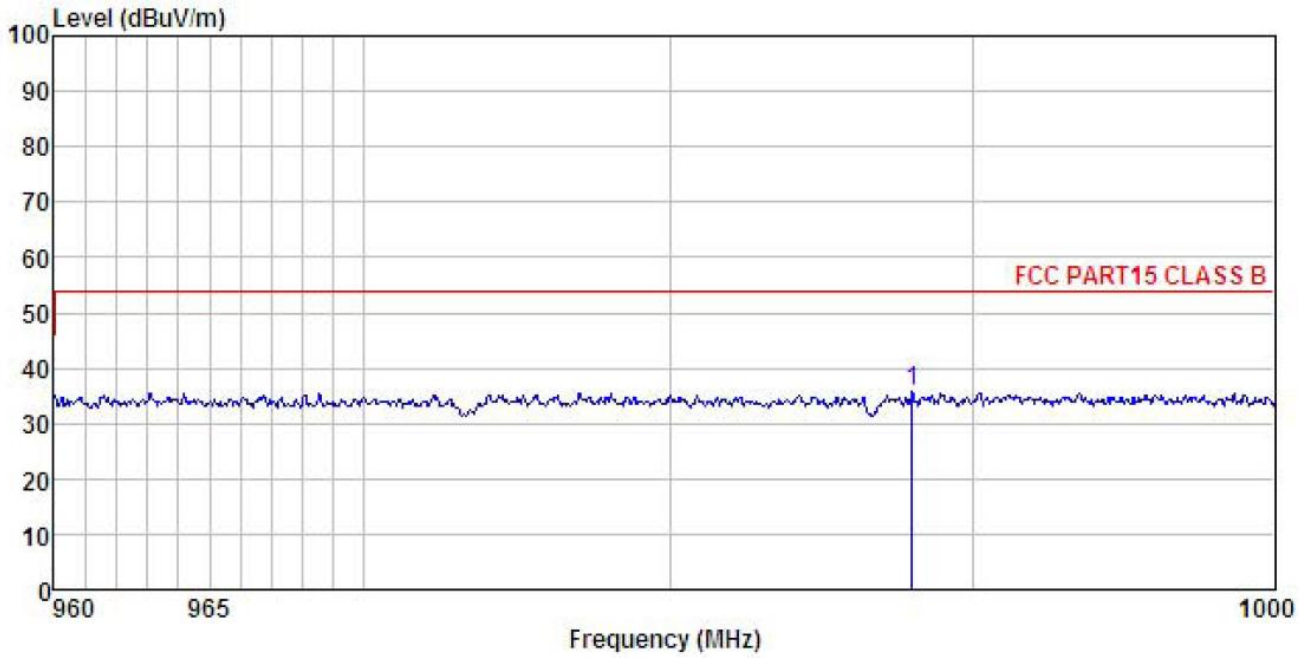


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	989.846	8.53	22.72	4.42	0.00	35.67	54.00	-18.33	

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	KDCSLED UHF 0.5W Module Pack	Product Model:	KDCSLED-UHF0.5W
Test By:	YT	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24℃ Huni: 57%



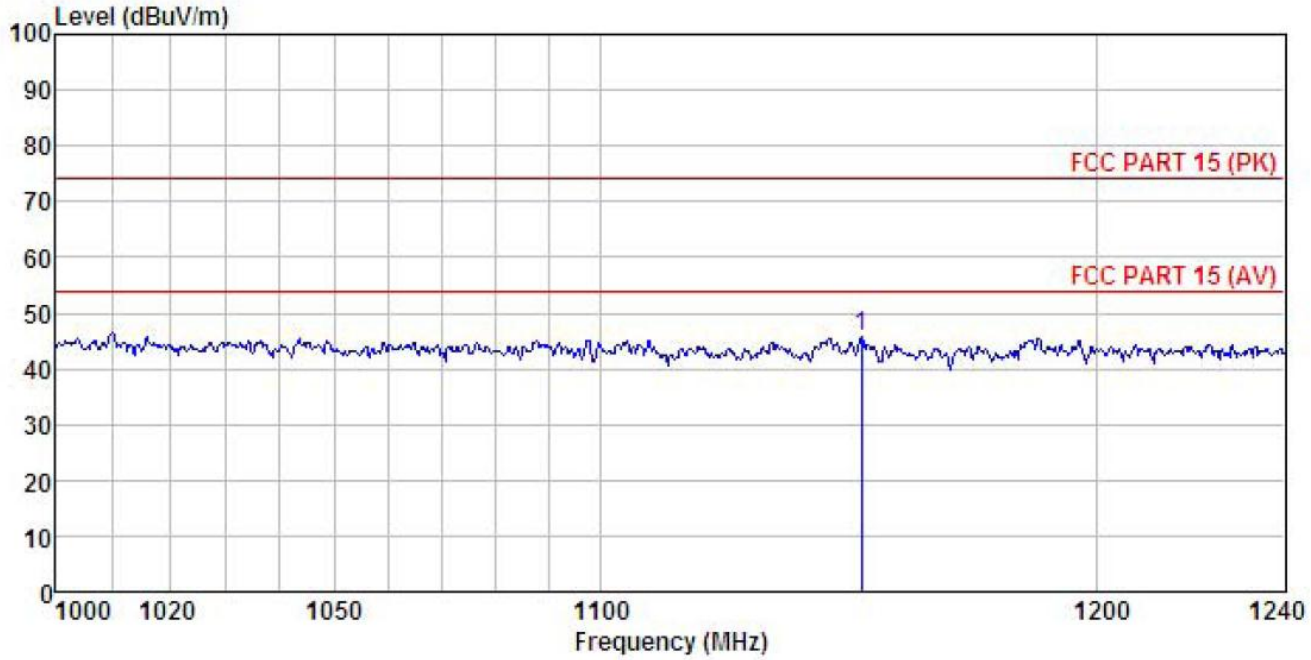
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	987.949	8.52	22.71	4.41	0.00	35.64	54.00	-18.36	

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Above 1GHz:

Product Name:	KDCSLED UHF 0.5W Module Pack	**Product Model:**	KDCSLED-UHF0.5W
Test By:	YT	**Test mode:**	Tx mode
Test Channel:	Highest channel	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%

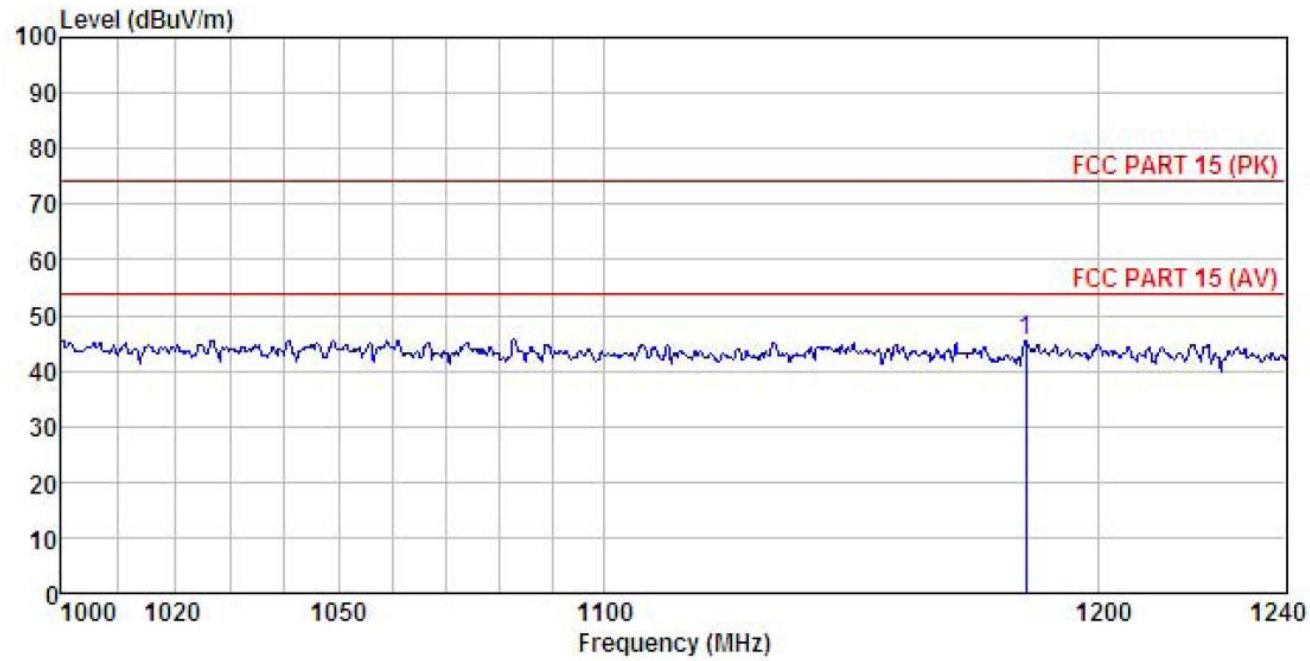


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1151.307	18.16	24.16	3.25	0.00	45.57	74.00	-28.43	

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	KDCSLED UHF 0.5W Module Pack	Product Model:	KDCSLED-UHF0.5W
Test By:	YT	Test mode:	Tx mode
Test Channel:	Highest channel	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24℃ Huni: 57%



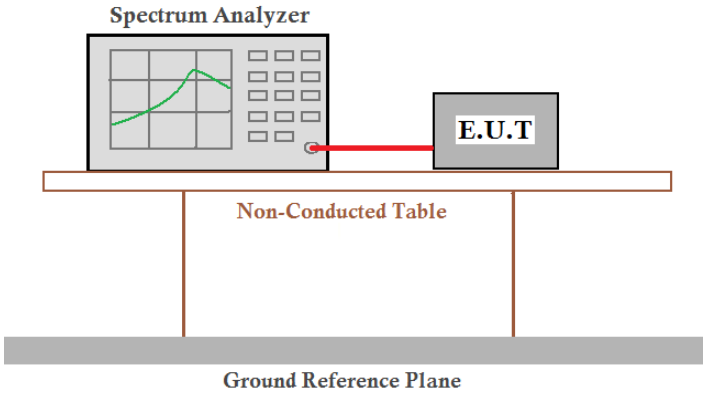
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1184.722	17.90	24.27	3.29	0.00	45.46	74.00	-28.54	

Remark:

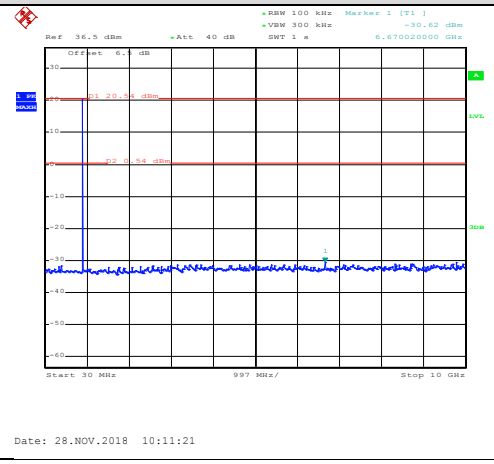
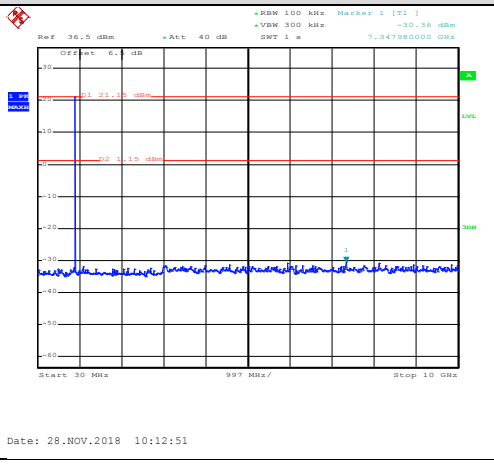
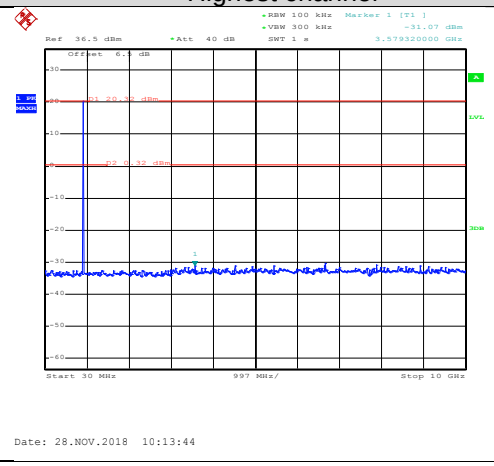
1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

6.9 Spurious Emission

6.9.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d)
Test Method:	ANSI C63.10:2013 and DA00-705
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass

Test plot as follows:

Lowest channel	Middle channel
	
30MHz~10GHz	30MHz~10GHz
Highest channel	
	
30MHz~10GHz	

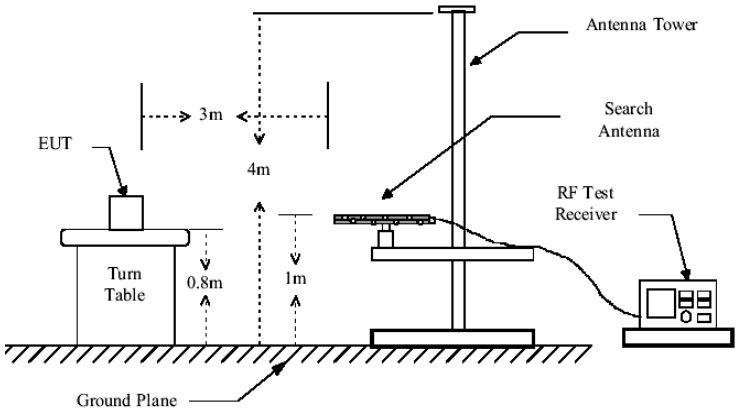
6.9.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	9 kHz to 10 GHz				
Test Distance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value

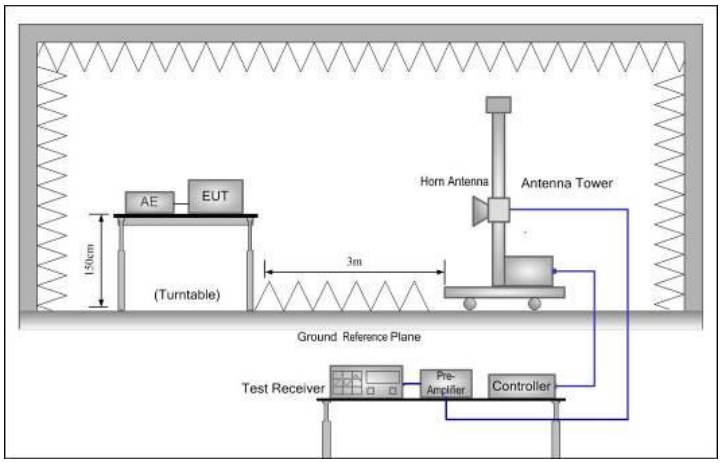
Limit:	Frequency	Limit (dBuV/m @3m)	Remark
	30MHz-88MHz	40.0	Quasi-peak Value
	88MHz-216MHz	43.5	Quasi-peak Value
	216MHz-960MHz	46.0	Quasi-peak Value
	960MHz-1GHz	54.0	Quasi-peak Value
	Above 1GHz	54.0	Average Value
		74.0	Peak Value

Test setup:

Below 1GHz



Above 1GHz



Test Procedure:

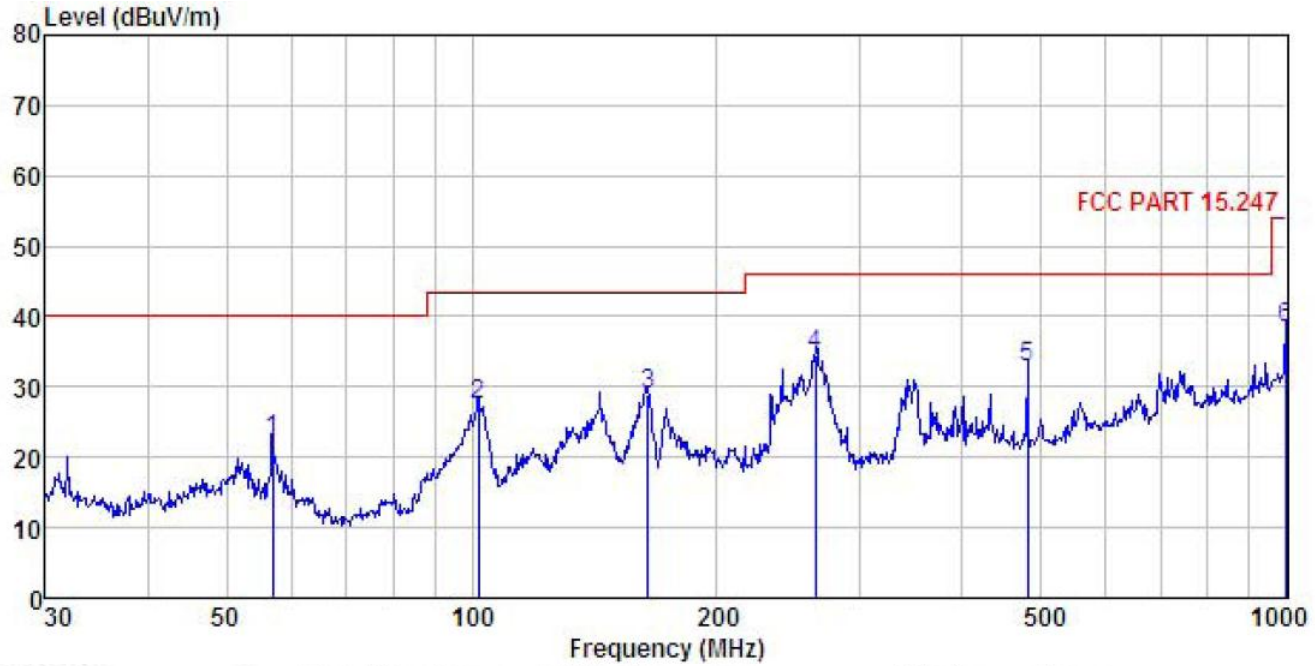
1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz) /1.5m(above 1GHz) above the ground at a 3 meter chamber. The table

	was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Non-hopping mode
Test results:	Pass
Remark:	1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case. 2. 9 kHz to 30 MHz is noise floor, so only shows the data of above 30MHz in this report.

Measurement Data (worst case):

Below 1GHz:

Product Name:	KDCSLED UHF 0.5W Module Pack	**Product Model:**	KDCSLED-UHF0.5W
Test By:	YT	**Test mode:**	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	**Polarization:**	Vertical
Test Voltage:	AC 120/60Hz	**Environment:**	Temp: 24℃ Huni: 57%

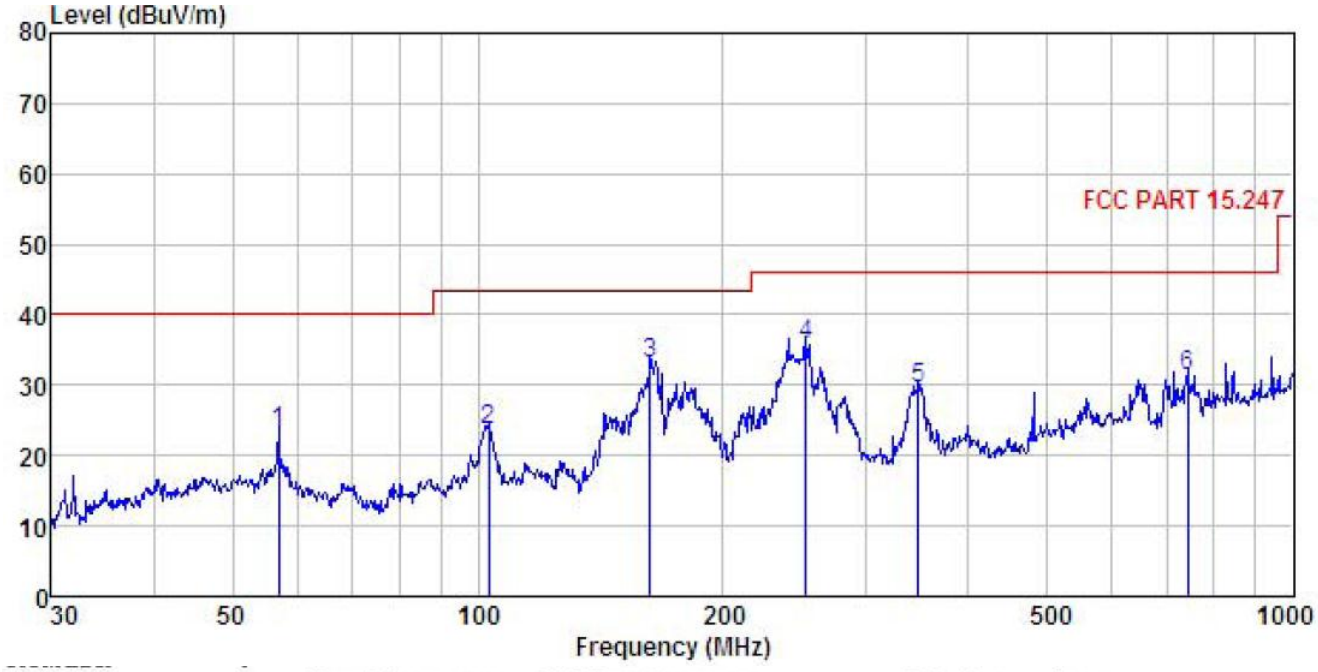


	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	56.991	37.95	12.88	1.37	29.79	22.41	40.00	-17.59	QP
2	102.001	43.23	11.82	1.96	29.51	27.50	43.50	-16.00	QP
3	164.330	46.29	9.23	2.62	29.10	29.04	43.50	-14.46	QP
4	263.819	46.92	13.39	2.85	28.51	34.65	46.00	-11.35	QP
5	480.528	41.30	16.97	3.46	28.92	32.81	46.00	-13.19	QP
6	996.500	38.47	22.77	4.45	27.45	38.24	54.00	-15.76	QP

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Product Name:	KDCSLED UHF 0.5W Module Pack	Product Model:	KDCSLED-UHF0.5W
Test By:	YT	Test mode:	Tx mode
Test Frequency:	30 MHz ~ 1 GHz	Polarization:	Horizontal
Test Voltage:	AC 120/60Hz	Environment:	Temp: 24℃ Huni: 57%



	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	56.991	38.86	12.88	1.37	29.79	23.32	40.00	-16.68	QP
2	103.080	39.34	11.89	1.97	29.51	23.69	43.50	-19.81	QP
3	162.611	50.47	9.18	2.61	29.11	33.15	43.50	-10.35	QP
4	252.948	48.18	13.32	2.82	28.53	35.79	46.00	-10.21	QP
5	346.809	40.34	14.54	3.09	28.55	29.42	46.00	-16.58	QP
6	742.259	34.66	20.82	4.33	28.51	31.30	46.00	-14.70	QP

Remark:

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Above 1GHz:

917.1MHz:

Test channel: Lowest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1853.80	53.53	26.04	4.15	41.29	42.43	74.00	-31.57	Vertical
2780.70	51.42	28.13	5.09	41.71	42.93	74.00	-31.07	Vertical
3707.60	51.17	29.35	5.95	41.62	44.85	74.00	-29.15	Vertical
4634.50	50.62	21.24	6.89	42.13	36.62	74.00	-37.38	Vertical
1834.20	55.96	26.04	4.15	41.29	44.86	74.00	-29.14	Horizontal
2751.30	50.60	28.13	5.09	41.71	42.11	74.00	-31.89	Horizontal
3668.40	51.04	29.35	5.95	41.62	44.72	74.00	-29.28	Horizontal
4585.50	50.86	31.24	6.89	42.13	46.86	74.00	-27.14	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1853.80	44.59	26.04	4.15	41.29	33.49	54.00	-20.51	Vertical
2780.70	42.36	28.13	5.09	41.71	33.87	54.00	-20.13	Vertical
3707.60	40.64	29.35	5.95	41.62	34.32	54.00	-19.68	Vertical
4634.50	41.15	21.24	6.89	42.13	27.15	54.00	-26.85	Vertical
1834.20	45.62	26.04	4.15	41.29	34.52	54.00	-19.48	Horizontal
2751.30	41.62	28.13	5.09	41.71	33.13	54.00	-20.87	Horizontal
3668.40	41.95	29.35	5.95	41.62	35.63	54.00	-18.37	Horizontal
4585.50	42.30	21.24	6.89	42.13	28.30	54.00	-25.70	Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

921.9MHz:

Test channel: Middle channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1853.80	54.70	26.06	4.17	41.31	43.62	74.00	-30.38	Vertical
2780.70	50.19	28.17	5.10	41.70	41.76	74.00	-32.24	Vertical
3707.60	51.17	29.41	5.98	41.66	44.90	74.00	-29.10	Vertical
4634.50	50.20	31.28	6.90	42.14	46.24	74.00	-27.76	Vertical
1843.80	51.23	26.06	4.17	41.31	40.15	74.00	-33.85	Horizontal
2765.70	51.30	28.17	5.10	41.70	42.87	74.00	-31.13	Horizontal
3687.60	50.77	29.41	5.98	41.66	44.50	74.00	-29.50	Horizontal
4609.50	50.39	31.28	6.90	42.14	46.43	74.00	-27.57	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1843.80	45.62	26.06	4.17	41.31	34.54	54.00	-19.46	Vertical
2765.70	42.26	28.17	5.10	41.70	33.83	54.00	-20.17	Vertical
3687.60	41.62	29.41	5.98	41.66	35.35	54.00	-18.65	Vertical
4609.50	41.59	31.28	6.90	42.14	37.63	54.00	-16.37	Vertical
1843.80	42.62	26.06	4.17	41.31	31.54	54.00	-22.46	Horizontal
2765.70	42.36	28.17	5.10	41.70	33.93	54.00	-20.07	Horizontal
3687.60	40.15	29.41	5.98	41.66	33.88	54.00	-20.12	Horizontal
4609.50	42.16	31.28	6.90	42.14	38.20	54.00	-15.80	Horizontal

Remark:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

2. The emission levels of other frequencies are very lower than the limit and not show in test report.

926.9MHz:

Test channel: Highest channel								
Detector: Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1853.80	54.66	26.08	4.17	41.32	43.59	74.00	-30.41	Vertical
2780.70	50.69	28.19	5.12	41.68	42.32	74.00	-31.68	Vertical
3707.60	50.30	29.46	5.99	41.67	44.08	74.00	-29.92	Vertical
4634.50	50.47	31.33	6.88	42.07	46.61	74.00	-27.39	Vertical
1853.80	54.40	26.09	4.18	41.34	43.33	74.00	-30.67	Horizontal
2780.70	50.98	28.19	5.12	41.68	42.61	74.00	-31.39	Horizontal
3707.60	51.44	29.46	5.99	41.67	45.22	74.00	-28.78	Horizontal
4634.50	50.24	31.33	6.88	42.07	46.38	74.00	-27.62	Horizontal
Detector: Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1853.80	44.62	26.08	4.17	41.32	33.55	54.00	-20.45	Vertical
2780.70	41.69	28.19	5.12	41.68	33.32	54.00	-20.68	Vertical
3707.60	42.62	29.46	5.99	41.67	36.40	54.00	-17.60	Vertical
4634.50	41.25	31.33	6.88	42.07	37.39	54.00	-16.61	Vertical
1853.80	44.95	26.09	4.18	41.34	33.88	54.00	-20.12	Horizontal
2780.70	41.65	28.19	5.12	41.68	33.28	54.00	-20.72	Horizontal
3707.60	41.26	29.46	5.99	41.67	35.04	54.00	-18.96	Horizontal
4634.50	42.04	31.33	6.88	42.07	38.18	54.00	-15.82	Horizontal

Remark:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.

2. The emission levels of other frequencies are very lower than the limit and not show in test report.