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## FCC PART 15 SUBPART C TEST REPORT

### FCC Part 15.247

**Report Reference No.**.....: **CTL1605181771-WF**

Compiled by

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the tests  
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Manager Tracy Qi

Tracy Qi

Date of issue.....: June 20, 2016

**Test Firm**.....: **Shenzhen CTL Testing Technology Co., Ltd.**

Address.....: Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road,  
Nanshan District, Shenzhen, China 518055

**Applicant's name**.....: **SID Global Sdn Bhd**

Address.....: 11 BK 5A / 2 Bandar Kinrara, 47100 Puchong, Selangor, Malaysia

#### **Test specification:**

Standard .....: FCC Part 15.247: Operation within the bands 902–928 MHz, 2400–  
2483.5 MHz, and 5725–5850 MHz.

Master TRF.....: Dated 2011-01

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**Test item description** .....: UHF RFID Reader

**FCC ID**.....: 2AIUA-UR-004

Trade Mark .....: SID

Model/Type reference.....: UF/UR-004

Work frequency .....: 902.5-927.5 MHz

Type of modulation .....: GFSK

Antenna Gain .....: 5 dBi

Antenna type .....: External

Result.....: **Positive**

## TEST REPORT

Test Report No. :	CTL1605181771-WF	June 20, 2016
		Date of issue

Equipment under Test : UHF RFID Reader

Model /Type : UF/UR-004

Applicant : **SID Global Sdn Bhd**

Address : 11 BK 5A / 2 Bandar Kinrara, 47100 Puchong, Selangor, Malaysia

Manufacturer : **SID Global China**

Address : Block A, 4th Floor, Zhong Jin Industrial Park, NO.3 PuSha South Road. ShaHu Village, TangXia Town, DongGuan City, GuangDong Province, China

**Test Result** according to the standards on page 5:

**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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## 1. TEST STANDARDS

The tests were performed according to following standards:

**FCC Rules Part 15.247:** Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

**ANSI C63.10-2013:** American National Standard for Testing Unlicensed Wireless Devices

**ANSI C63.4-2014**



## 2. SUMMARY

### 2.1. General Remarks

Date of receipt of test sample	:	June 03, 2016
Testing commenced on	:	June 03, 2016
Testing concluded on	:	June 18, 2016

### 2.2. Equipment Under Test

#### Power supply system utilised

Power supply voltage	:	<input checked="" type="radio"/> 120V / 60 Hz	<input type="radio"/> 115V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input type="radio"/> Other (specified in blank below)	

### 2.3. Short description of the Equipment under Test (EUT)

Name of EUT	UHF RFID Reader
Model Number	UF/UR-004
Antenna Type	External
Antenna Gain	5dBi
Operation frequency	902.5-927.5 MHz
Modulation Type	GFSK

Note: The EUT incorporates both SISO and MIMO function . Antenna number : 4; For MIMO mode : Directional antenna gain=5+10log 4=11.02dBi

#### Channels list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	902.5	21	912.5	41	922.5
02	903.0	22	913.0	42	923.0
03	903.5	23	913.5	43	923.5
04	904.0	24	914.0	44	924.0
05	904.5	25	914.5	45	924.5
06	905.0	26	915.0	46	925.0
07	905.5	27	915.5	47	925.5
08	906.0	28	916.0	48	926.0
09	906.5	29	916.5	49	926.5
10	907.0	30	917.0	50	927.0
11	907.5	31	917.5	51	927.5
12	908.0	32	918.0		
13	908.5	33	918.5		
14	909.0	34	919.0		
15	909.5	35	919.5		
16	910.0	36	920.0		
17	910.5	37	920.5		
18	911.0	38	921.0		
19	911.5	39	921.5		
20	912.0	40	922.0		

## 2.4. EUT operation mode

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. There are 51 channels of EUT, and the test carried out at the lowest channel, middle channel and highest channel.

Test Mode	Test Channel	Antenna	Test Frequency
1	Low Channel	1	902.5 MHz
2	Middle Channel	1	915.0 MHz
3	High Channel	1	927.5 MHz
4	Low Channel	2	902.5 MHz
5	Middle Channel	2	915.0 MHz
6	High Channel	2	927.5 MHz
7	Low Channel	3	902.5 MHz
8	Middle Channel	3	915.0 MHz
9	High Channel	3	927.5 MHz
10	Low Channel	4	902.5 MHz
11	Middle Channel	4	915.0 MHz
12	High Channel	4	927.5 MHz
13	Low Channel	MIMO mode	902.5 MHz
14	Middle Channel	MIMO mode	915.0 MHz
15	High Channel	MIMO mode	927.5 MHz

## 2.5. EUT configuration

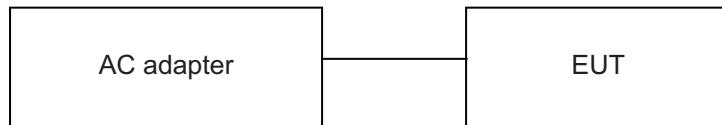
The following peripheral devices and interface cables were connected during the measurement:

- supplied by the manufacturer
- supplied by the lab

<input type="radio"/>	AC adapter	Manufacturer :	SID Global China
		Model No. :	RWX02-ADCW-120200U

## 2.6. Configuration of Tested System

Fig. 2-1 Configuration of Tested System



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

This submittal(s) (test report) is intended for FCC ID: 2AIUA-UR-004 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

## 2.8. Modifications

No modifications were implemented to meet testing criteria.

### 3. TEST ENVIRONMENT

#### 3.1. Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.  
Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 (2013) and CISPR Publication 22.

#### 3.2. Test Facility

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

##### IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

##### FCC-Registration No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December 19, 2013.

#### 3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 °C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

#### 3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	Above 1GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3.5. Test Description

FCC PART 15 Subpart C		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)	20dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious Emission	PASS
FCC Part 15.247(b)	Maximum Peak Output Power	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge	PASS
FCC Part 15.247(a)(1)	Frequency Separation	PASS
FCC Part 15.247(a)(1)(iii)	Number of hopping frequency	PASS
FCC Part 15.247(a)(1)(iii)	Time of Occupancy	PASS

Remark: The measurement uncertainty is not included in the test result.



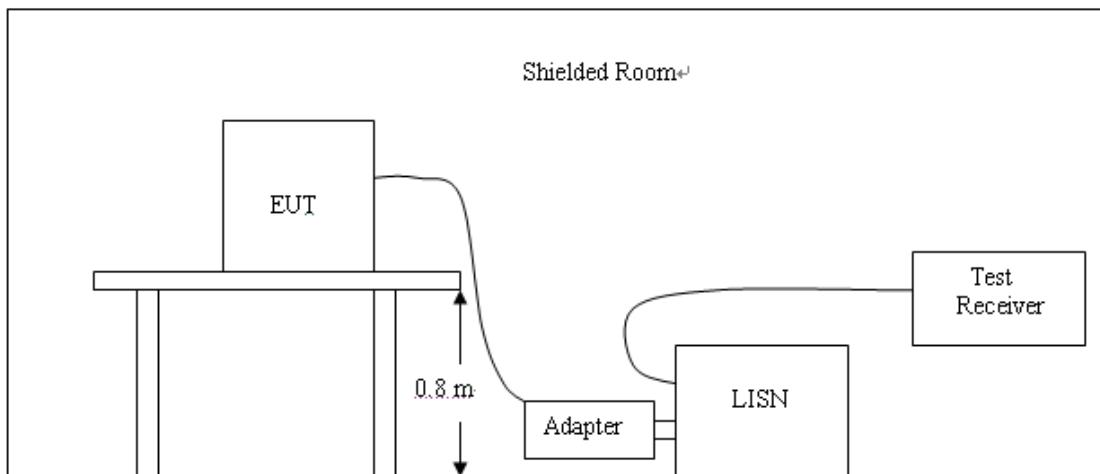
### 3.6. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
ULTRA-ROADBAND ANTENNA	Sunol Sciences Corp.	JB1	A061713	2016/06/02	2017/06/01
EMI Test Receiver	R&S	ESCI	103710	2016/06/02	2017/06/01
Spectrum Analyzer	Agilent	E4407B	MY41440676	2016/05/21	2017/05/20
Controller	EM Electronics	Controller EM 1000	N/A	2016/05/21	2017/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2016/05/19	2017/05/18
Active Loop Antenna	Daze	ZN30900A	N/A	2016/05/19	2017/05/18
LISN	R&S	ENV216	3560.6550.12	2016/06/02	2017/06/01
LISN	R&S	ESH2-Z5	860014/010	2016/06/02	2017/06/01
ISN	FCC	F-071115-1057-1-09	11229	2016/05/19	2017/05/18
Amplifier	Agilent	8349B	3008A02306	2016/05/19	2017/05/18
Amplifier	Agilent	8447D	2944A10176	2016/05/19	2017/05/18
Transient Limiter	SCHWARZCECK	VTSD 9561F	9666	2016/06/02	2017/06/01
Radio Communication Tester	R&S	CMU200	115419	2016/05/22	2017/05/21
Temperature/Humidity Meter	Gangxing	CTH-608	02	2016/05/20	2017/05/19
SIGNAL GENERATOR	Agilent	E4421B	US40051744	2016/05/20	2017/05/19
Power Meter	Agilent	U2531A	TW53323507	2016/05/21	2017/05/20
Power Sensor	Agilent	U2021XA	MY5365004	2016/05/21	2017/05/20
Climate Chamber	ESPEC	EL-10KA	A20120523	2016/05/20	2017/05/19
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2016/05/20	2017/05/19
High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2016/05/20	2017/05/19

## 4. TEST CONDITIONS AND RESULTS

### 4.1. AC Power Conducted Emission

#### TEST CONFIGURATION



#### TEST PROCEDURE

- 1 The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
- 2 Support equipment, if needed, was placed as per ANSI C63.10-2013
- 3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
- 4 The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5 All support equipments received AC power from a second LISN, if any.
- 6 The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7 Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
- 8 During the above scans, the emissions were maximized by cable manipulation.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

#### AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following :

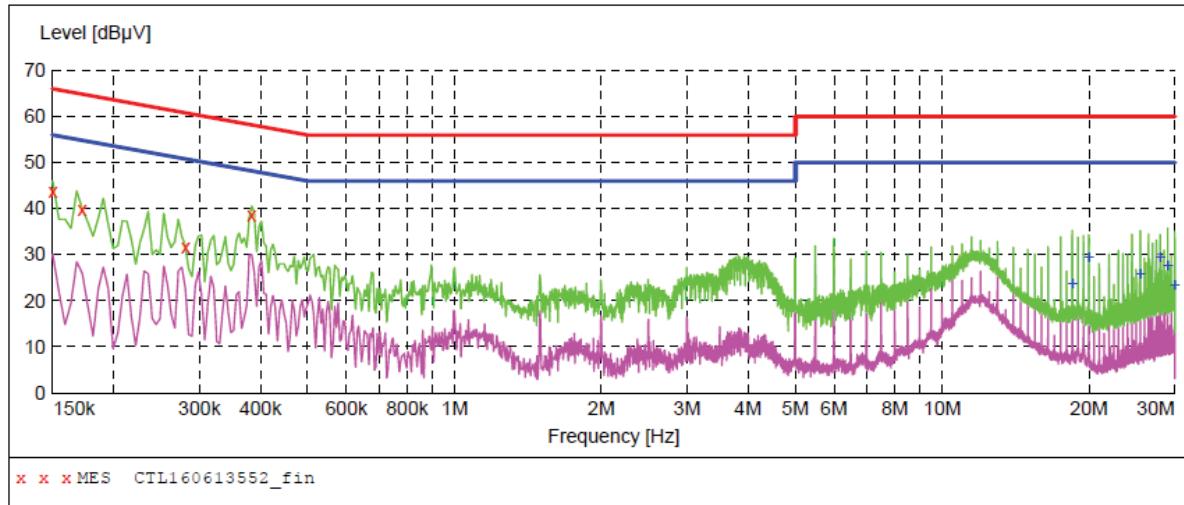
Frequency (MHz)	Maximum RF Line Voltage (dB $\mu$ V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

\* Decreasing linearly with the logarithm of the frequency

**TEST RESULTS**

All modes have been tested ,only (Mode 1) is the worst case and reported

**SCAN TABLE: "Voltage (9K-30M) FIN"**  
Short Description: 150K-30M Voltage

**MEASUREMENT RESULT: "CTL160613552\_fin"**

6/13/2016 8:33PM

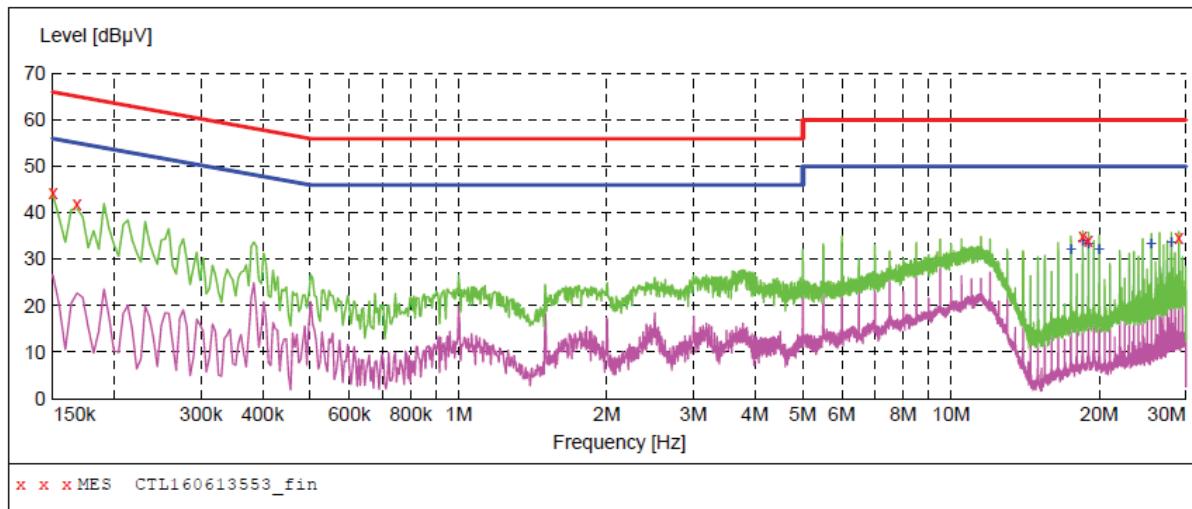
Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
0.150001	43.90	10.2	66	22.1	QP	L1	GND
0.172501	39.90	10.2	65	24.9	QP	L1	GND
0.280501	31.80	10.2	61	29.0	QP	L1	GND
0.384001	38.60	10.2	58	19.6	QP	L1	GND

**MEASUREMENT RESULT: "CTL160613552\_fin2"**

6/13/2016 8:33PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
18.496501	23.80	10.9	50	26.2	AV	L1	GND
19.999501	29.60	10.9	50	20.4	AV	L1	GND
25.498501	25.90	11.1	50	24.1	AV	L1	GND
28.000501	29.50	11.2	50	20.5	AV	L1	GND
28.999501	27.60	11.2	50	22.4	AV	L1	GND
29.998501	23.60	11.3	50	26.4	AV	L1	GND

**SCAN TABLE: "Voltage (9K-30M) FIN"**  
 Short Description: 150K-30M Voltage



**MEASUREMENT RESULT: "CTL160613553\_fin"**

6/13/2016 8:37PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
0.150001	44.30	10.2	66	21.7	QP	N	GND
0.168001	41.80	10.2	65	23.3	QP	N	GND
18.519001	34.90	10.9	60	25.1	QP	N	GND
19.018501	34.20	10.9	60	25.8	QP	N	GND
29.026501	34.60	11.2	60	25.4	QP	N	GND

**MEASUREMENT RESULT: "CTL160613553\_fin2"**

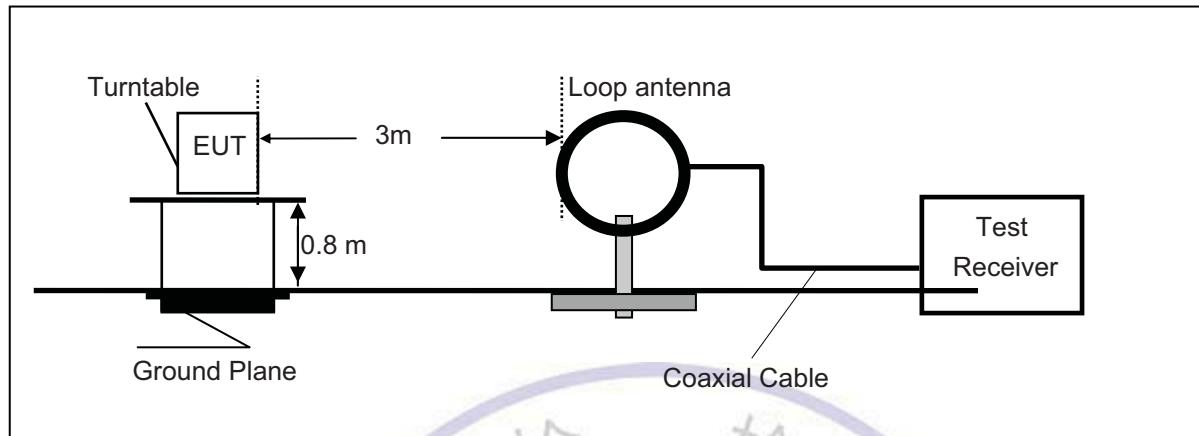
6/13/2016 8:37PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Detector	Line	PE
17.515501	32.30	10.8	50	17.7	AV	N	GND
18.519001	34.00	10.9	50	16.0	AV	N	GND
19.018501	33.40	10.9	50	16.6	AV	N	GND
20.017501	32.30	11.0	50	17.7	AV	N	GND
25.525501	33.60	11.1	50	16.4	AV	N	GND
28.027501	33.70	11.2	50	16.3	AV	N	GND

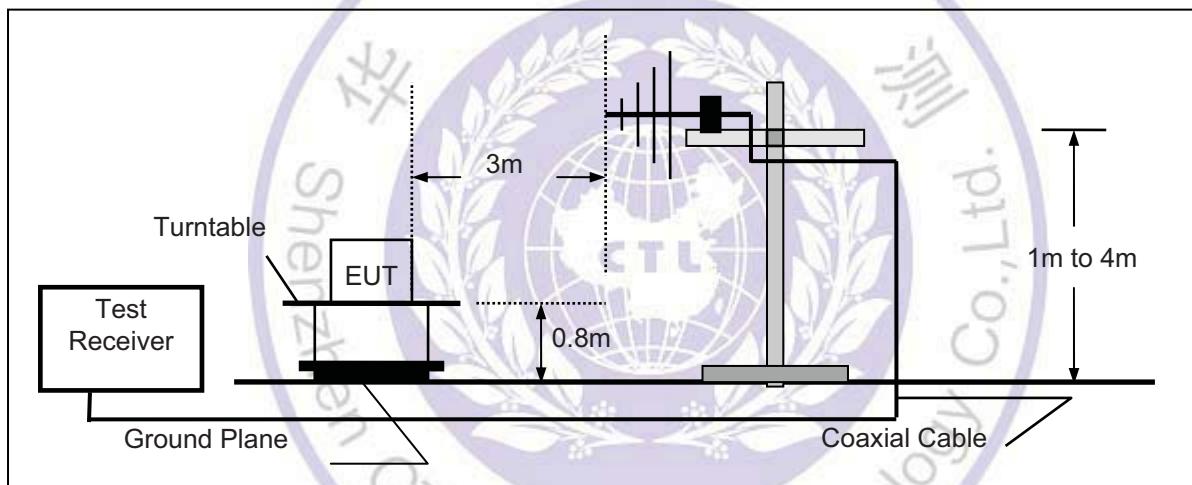
## 4.2. Radiated Emission

### TEST CONFIGURATION

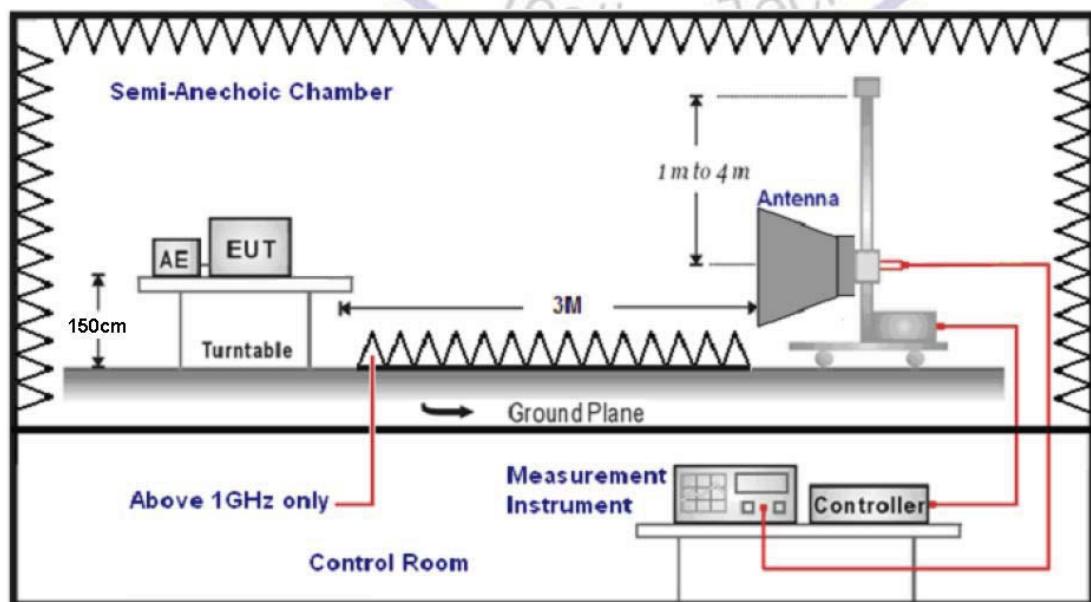
Radiated Emission Test Set-Up  
Frequency range 9KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



## TEST PROCEDURE

- 1 The EUT was placed on a turn table which is 0.8m above ground plane and 1.5m above ground plane above 1GHz.
- 2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The fundamental frequency is 902-928MHz, So the radiation emissions frequency range were tested from 9KHz to 10GHz.

## Field Strength Calculation

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

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

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

For example

Frequency (MHz)	FS (dB $\mu$ V/m)	RA (dB $\mu$ V/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

$$Transd=AF + CL - AG$$

## LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

Frequency (MHz)	Distance (Meters)	Radiated (dB $\mu$ V/m)	Radiated ( $\mu$ V/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

Per 15.247 (c) In any 100 KHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100 KHz bandwidth within the band that contains the highest level of the desired power.

**TEST RESULTS****9KHz-30MHz:**

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note: The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

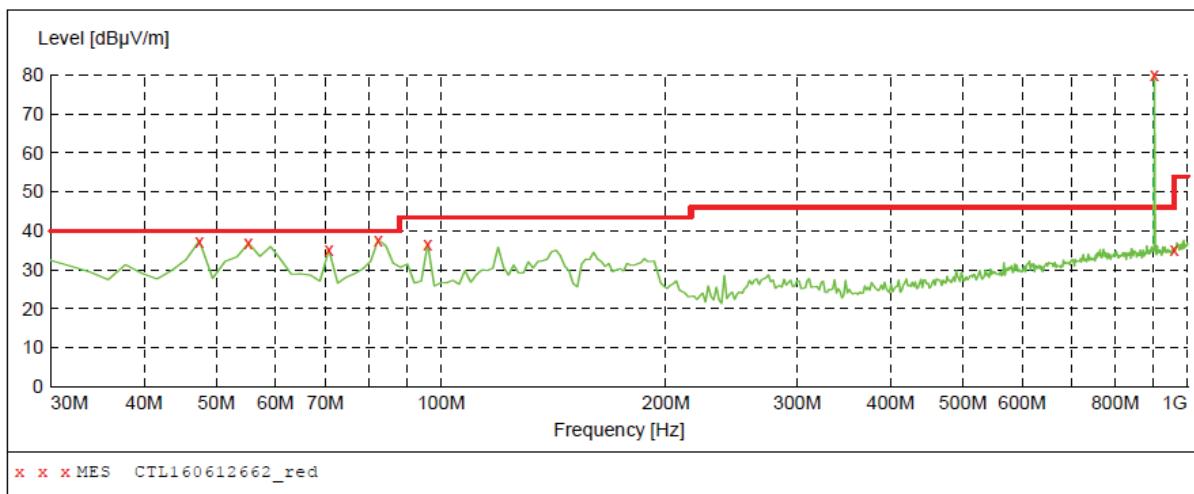
Distance extrapolation factor=  $40 \log (\text{specific distance} / \text{test distance})$  (dB);  
 Limit line= specific limits (dBuV) + distance extrapolation factor.

**30M~1GHz**

The radiated measurement are performed the each test mode, the datum recorded below is the worst case for all the test mode

**antenna 1 TX only:**

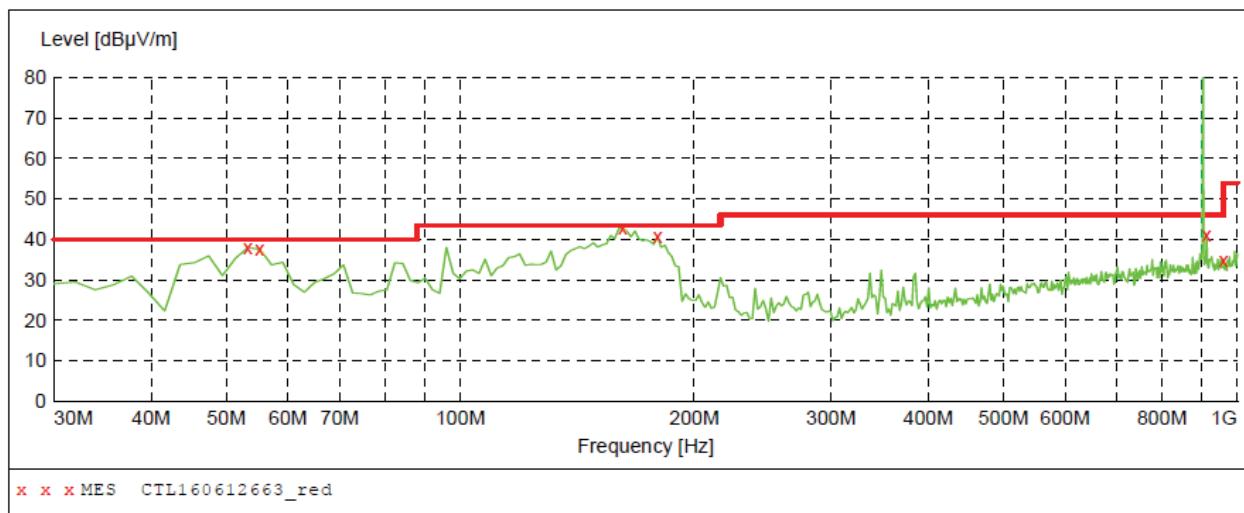
***SWEEP TABLE: "test (30M-1G)"***  
 Short Description: Field Strength  
 Start Stop Detector Meas. IF Transducer  
 Frequency Frequency Time Bandw.  
 30.0 MHz 1.0 GHz MaxPeak 300.0 ms 120 kHz JB1

**MEASUREMENT RESULT: "CTL160612662\_red"**

6/12/2016 12:38PM	Frequency	Level	Transd	Limit	Margin	Det.	Height	Azimuth	Polarization
	MHz	dB $\mu$ V/m	dB	dB $\mu$ V/m	dB		cm	deg	
	47.460000	37.40	8.7	40.0	2.6	---	0.0	0.00	VERTICAL
	55.220000	36.80	8.0	40.0	3.2	---	0.0	0.00	VERTICAL
	70.740000	35.10	8.2	40.0	4.9	---	0.0	0.00	VERTICAL
	82.380000	37.70	8.7	40.0	2.3	---	0.0	0.00	VERTICAL
	95.960000	36.60	10.2	43.5	6.9	---	0.0	0.00	VERTICAL
	960.000000	35.00	26.0	54.0	19.0	---	0.0	0.00	VERTICAL

***SWEEP TABLE: "test (30M-1G)"***

Short Description:		Field Strength			
Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1

***MEASUREMENT RESULT: "CTL160612663\_red"***

6/12/2016 12:41PM

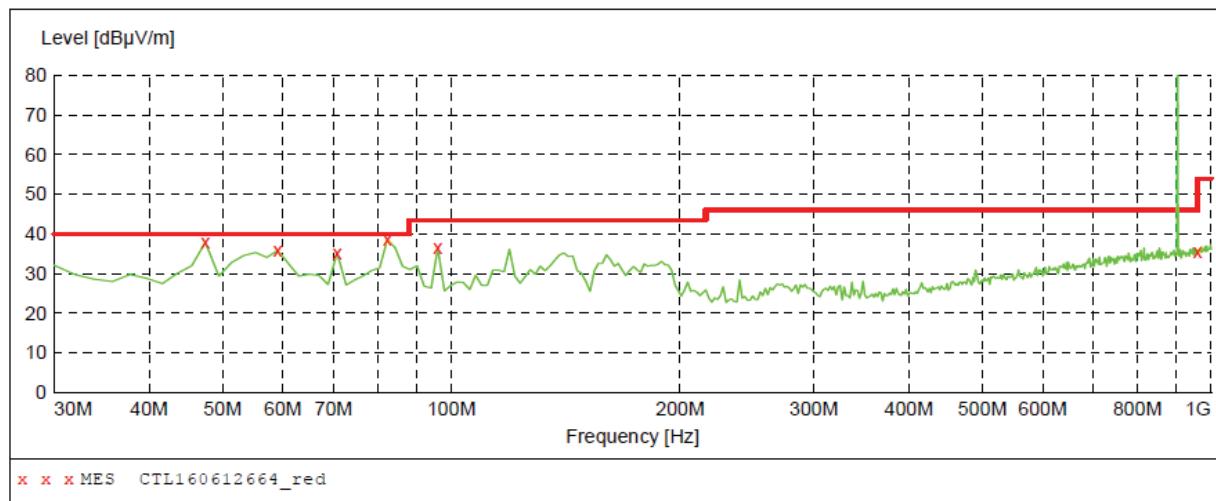
Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
53.280000	37.90	8.0	40.0	2.1	---	0.0	0.00	HORIZONTAL
55.220000	37.50	8.0	40.0	2.5	---	0.0	0.00	HORIZONTAL
161.920000	42.70	13.6	43.5	0.8	---	0.0	0.00	HORIZONTAL
179.380000	40.70	13.0	43.5	2.8	---	0.0	0.00	HORIZONTAL
912.700000	41.20	26.1	46.0	4.8	---	0.0	0.00	HORIZONTAL
960.000000	34.60	26.1	54.0	19.4	---	0.0	0.00	HORIZONTAL



## antenna 2 TX only:

## SWEEP TABLE: "test (30M-1G)"

Short Description:		Field Strength		
Start Frequency	Stop Frequency	Detector	Meas.	IF
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz
				Transducer
				JB1



## MEASUREMENT RESULT: "CTL160612664\_red"

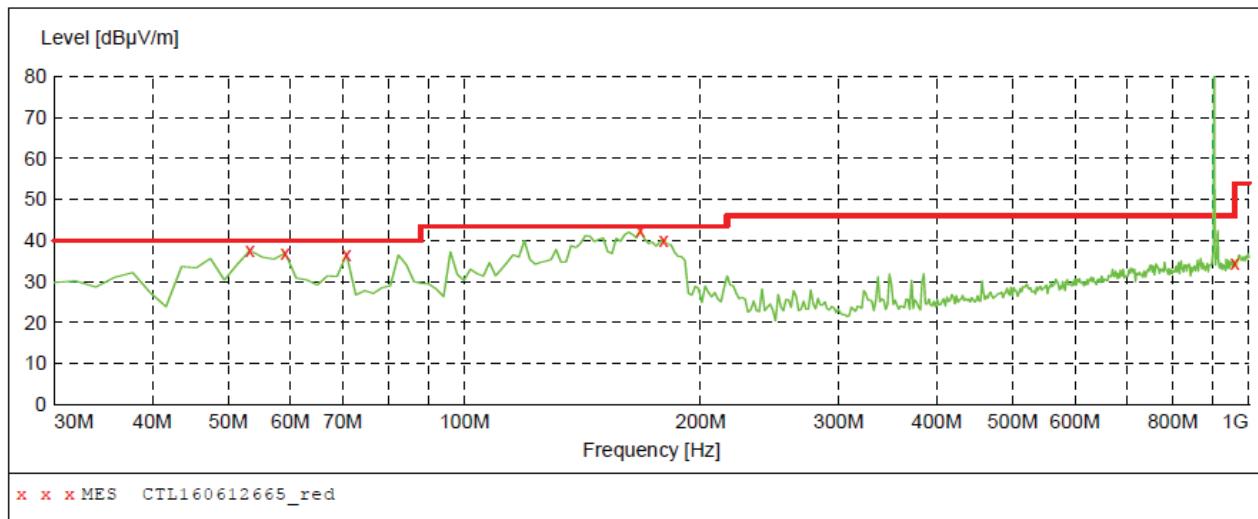
6/12/2016 12:44PM

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	37.80	8.7	40.0	2.2	---	0.0	0.00	VERTICAL
59.100000	35.80	8.0	40.0	4.2	---	0.0	0.00	VERTICAL
70.740000	35.10	8.2	40.0	4.9	---	0.0	0.00	VERTICAL
82.380000	38.60	8.7	40.0	1.4	---	0.0	0.00	VERTICAL
95.960000	36.40	10.2	43.5	7.1	---	0.0	0.00	VERTICAL
960.000000	35.40	26.0	54.0	18.6	---	0.0	0.00	VERTICAL



***SWEEP TABLE: "test (30M-1G)"***

Short Description:		Field Strength		
Start Frequency	Stop Frequency	Detector	Meas.	IF
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz
				JB1

***MEASUREMENT RESULT: "CTL160612665\_red"***

6/12/2016 1:13PM

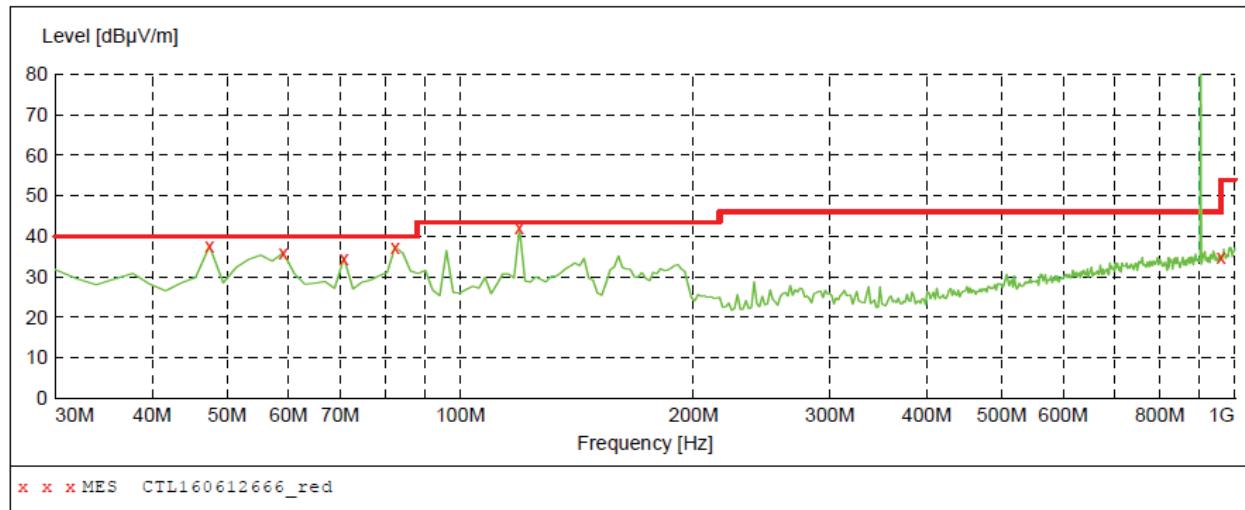
Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det. ---	Height cm	Azimuth deg	Polarization
53.280000	37.50	8.0	40.0	2.5	---	0.0	0.00	HORIZONTAL
59.100000	36.90	8.0	40.0	3.1	---	0.0	0.00	HORIZONTAL
70.740000	36.60	8.2	40.0	3.4	---	0.0	0.00	HORIZONTAL
167.740000	42.40	13.4	43.5	1.1	---	0.0	0.00	HORIZONTAL
179.380000	40.20	13.0	43.5	3.3	---	0.0	0.00	HORIZONTAL
960.000000	34.60	26.0	54.0	19.4	---	0.0	0.00	HORIZONTAL



antenna 3 TX only:

***SWEET TABLE: "test (30M-1G)"***

Short Description:		Field Strength			
Start Frequency	Stop Frequency	Detector	Meas.	IF	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1



***MEASUREMENT RESULT: "CTL160612666\_red"***

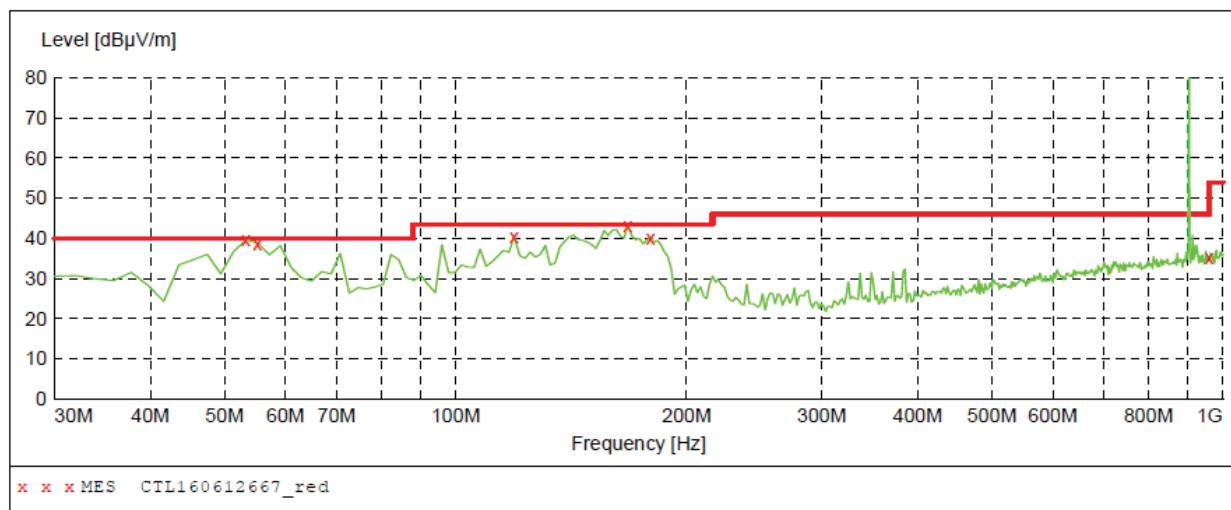
6/12/2016 1:15PM

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	37.50	8.7	40.0	2.5	---	0.0	0.00	VERTICAL
59.100000	35.90	8.0	40.0	4.1	---	0.0	0.00	VERTICAL
70.740000	34.60	8.2	40.0	5.4	---	0.0	0.00	VERTICAL
82.380000	37.30	8.7	40.0	2.7	---	0.0	0.00	VERTICAL
119.240000	42.00	14.7	43.5	1.5	---	0.0	0.00	VERTICAL
960.000000	34.90	26.0	54.0	19.1	---	0.0	0.00	VERTICAL



***SWEET TABLE: "test (30M-1G)"***

Short Description: Field Strength  
 Start Stop Detector Meas. IF Transducer  
 Frequency Frequency Time Bandw.  
 30.0 MHz 1.0 GHz MaxPeak 300.0 ms 120 kHz JB1

***MEASUREMENT RESULT: "CTL160612667\_red"***

6/12/2016 1:18PM

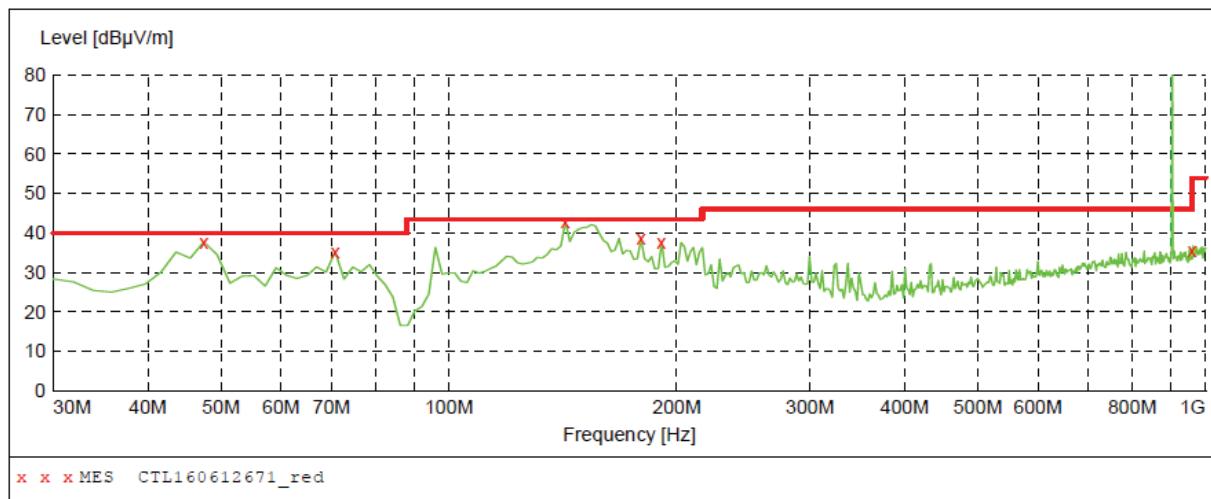
Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
53.280000	39.60	8.0	40.0	0.4	---	0.0	0.00	HORIZONTAL
55.220000	38.80	8.0	40.0	1.2	---	0.0	0.00	HORIZONTAL
119.240000	40.30	14.7	43.5	3.2	---	0.0	0.00	HORIZONTAL
167.740000	43.20	13.4	43.5	0.3	---	0.0	0.00	HORIZONTAL
179.380000	40.10	13.0	43.5	3.4	---	0.0	0.00	HORIZONTAL
960.000000	35.00	26.0	54.0	19.0	---	0.0	0.00	HORIZONTAL



antenna 4 TX only:

**SWEEP TABLE: "test (30M-1G)"**

Short Description:		Field Strength		
Start Frequency	Stop Frequency	Detector	Meas.	IF
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz
				JB1



**MEASUREMENT RESULT: "CTL160612671\_red"**

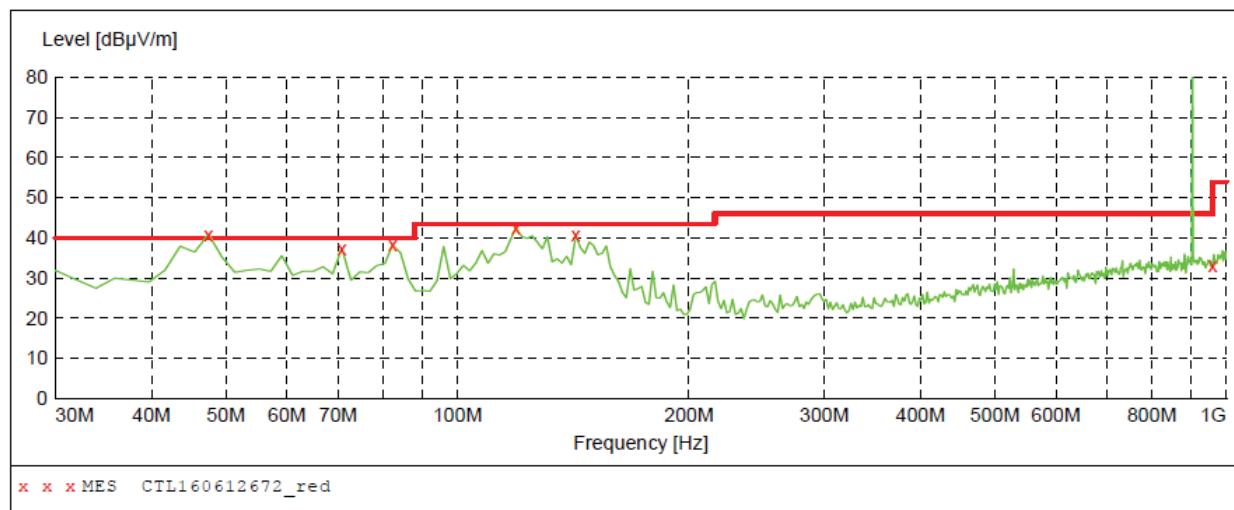
6/12/2016 11:45AM

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	37.70	8.7	40.0	2.3	---	0.0	0.00	HORIZONTAL
70.740000	35.20	8.2	40.0	4.8	---	0.0	0.00	HORIZONTAL
142.520000	42.90	14.2	43.5	0.6	---	0.0	0.00	HORIZONTAL
179.380000	38.50	13.0	43.5	5.0	---	0.0	0.00	HORIZONTAL
191.020000	37.60	13.2	43.5	5.9	---	0.0	0.00	HORIZONTAL
960.000000	35.50	26.0	54.0	18.5	---	0.0	0.00	HORIZONTAL



***SWEET TABLE: "test (30M-1G)"***

Short Description:		Field Strength		
Start Frequency	Stop Frequency	Detector	Meas.	IF
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz
				Transducer
				JB1

***MEASUREMENT RESULT: "CTL160612672\_red"***

6/12/2016 1:27PM

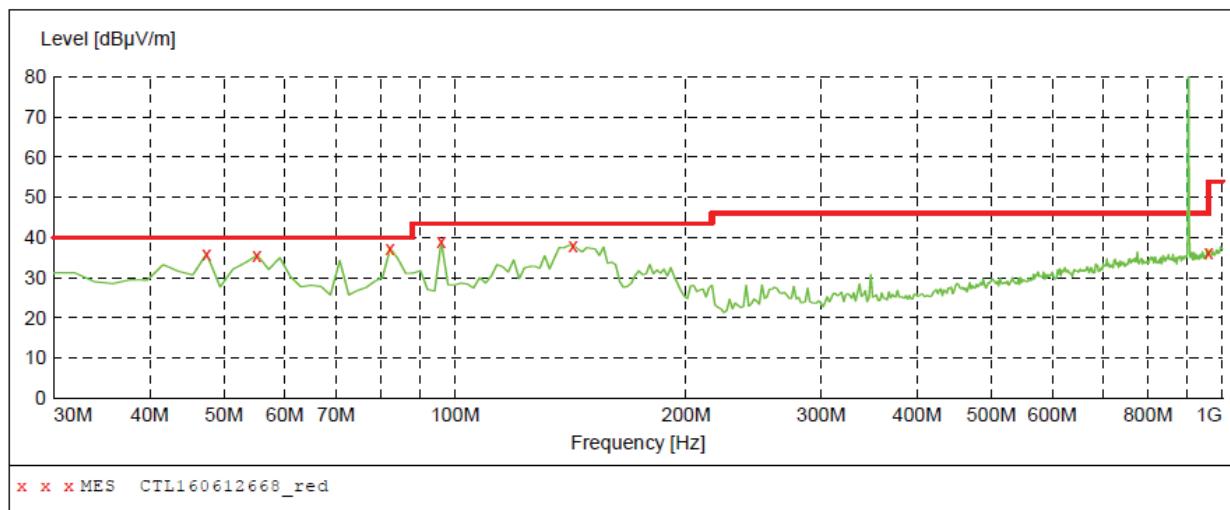
Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	39.40	8.7	40.0	0.6	QP	0.0	0.00	VERTICAL
70.740000	37.40	8.2	40.0	2.6	---	0.0	0.00	VERTICAL
82.380000	38.30	8.7	40.0	1.7	---	0.0	0.00	VERTICAL
119.240000	42.50	14.7	43.5	1.0	---	0.0	0.00	VERTICAL
142.520000	40.70	14.2	43.5	2.8	---	0.0	0.00	VERTICAL
960.000000	33.20	26.0	54.0	20.8	---	0.0	0.00	VERTICAL



MIMO mode TX:

***SWEET TABLE: "test (30M-1G)"***

Short Description:		Field Strength			
Start Frequency	Stop Frequency	Detector	Meas.	IF Time	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1



***MEASUREMENT RESULT: "CTL160612668\_red"***

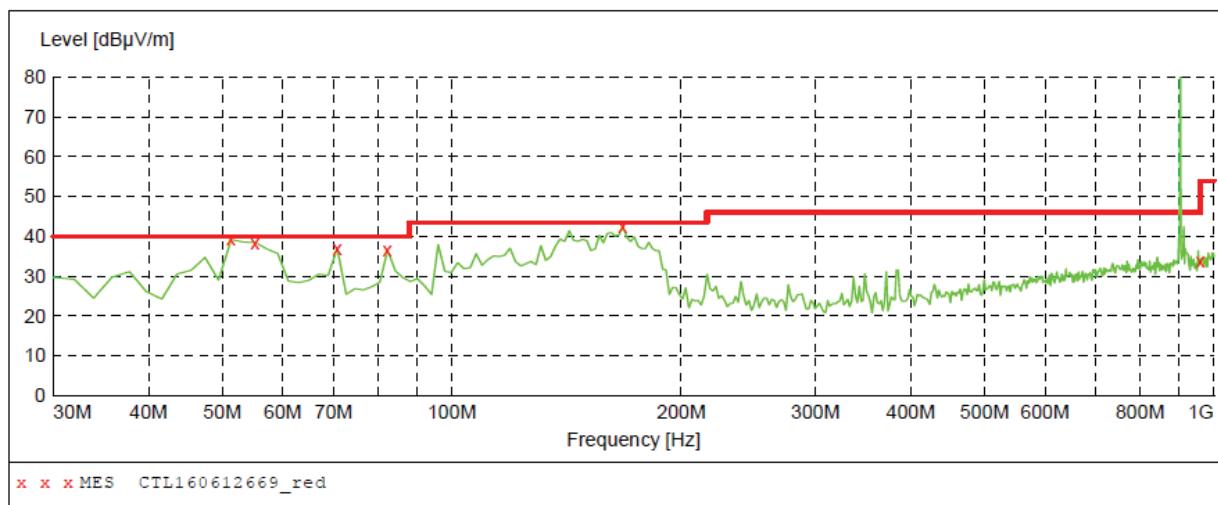
6/12/2016 1:20PM

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
47.460000	35.90	8.7	40.0	4.1	---	0.0	0.00	VERTICAL
55.220000	35.60	8.0	40.0	4.4	---	0.0	0.00	VERTICAL
82.380000	37.40	8.7	40.0	2.6	---	0.0	0.00	VERTICAL
95.960000	38.90	10.2	43.5	4.6	---	0.0	0.00	VERTICAL
142.520000	38.10	14.2	43.5	5.4	---	0.0	0.00	VERTICAL
960.000000	36.30	26.0	54.0	17.7	---	0.0	0.00	VERTICAL



***SWEET TABLE: "test (30M-1G)"***

Short Description:		Field Strength		
Start Frequency	Stop Frequency	Detector	Meas.	IF
30.0 MHz	1.0 GHz	MaxPeak	Time	Bandw.
			300.0 ms	120 kHz
				JB1

***MEASUREMENT RESULT: "CTL160612669\_red"***

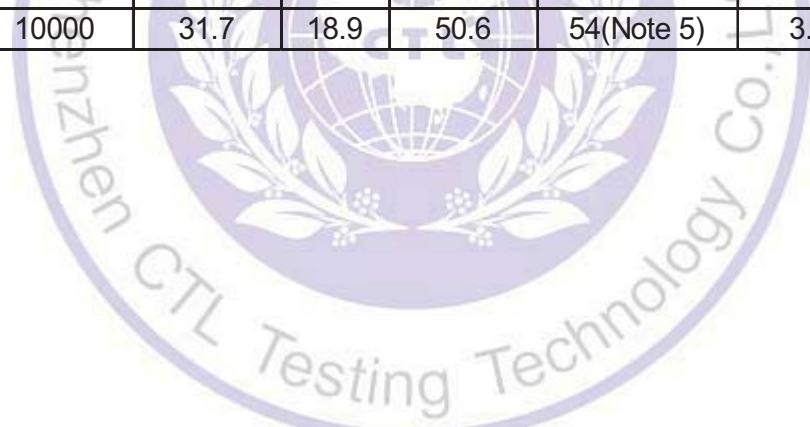
6/12/2016 1:24PM

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Det. ---	Height cm	Azimuth deg	Polarization
51.340000	39.20	7.9	40.0	0.8	---	0.0	0.00	HORIZONTAL
55.220000	38.40	8.0	40.0	1.6	---	0.0	0.00	HORIZONTAL
70.740000	36.90	8.2	40.0	3.1	---	0.0	0.00	HORIZONTAL
82.380000	36.50	8.7	40.0	3.5	---	0.0	0.00	HORIZONTAL
167.740000	42.60	13.4	43.5	0.9	---	0.0	0.00	HORIZONTAL
960.000000	33.80	26.0	54.0	20.2	---	0.0	0.00	HORIZONTAL



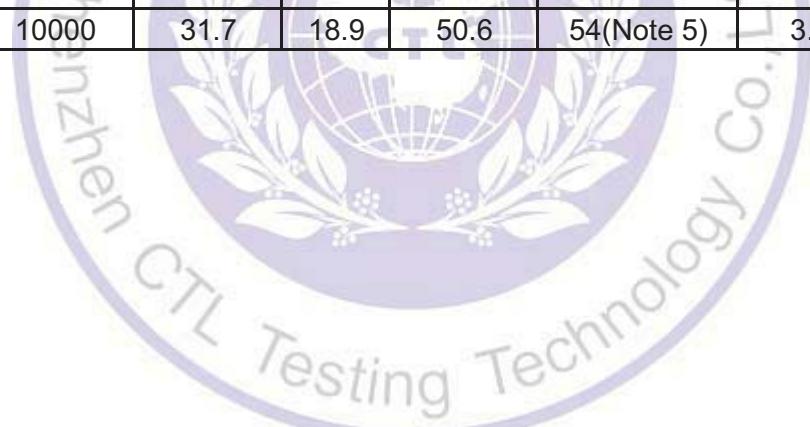
## Above 1GHz(antenna 1 TX only): Antenna polarization(Vertical+ Horizontal )

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	V	1805	65.5	-0.4	65.1	74	8.9	PK
	V	1805	51.1	-0.4	50.7	54	3.3	AV
	V	2707.5	61.7	2.1	63.8	74	10.2	PK
	V	2707.5	42.5	2.1	44.6	54	9.4	AV
	V	3610	59.6	3.5	63.1	74	10.9	PK
	V	3610	39.3	3.5	42.8	54	11.2	AV
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	PK
26	V	1830	65.0	-0.3	64.7	74	9.3	PK
	V	1830	49.5	-0.3	49.2	54	4.8	AV
	V	2745	60.9	2.8	63.7	74	10.3	PK
	V	2745	43.4	2.1	45.5	54	8.5	AV
	V	3660	59.6	3.5	63.1	74	10.9	PK
	V	3660	40.8	3.5	44.3	54	9.7	AV
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	PK
51	V	1855	65.4	-0.3	65.1	74	8.9	PK
	V	1855	49.0	-0.3	48.7	54	5.3	AV
	V	2782.5	61.9	2.3	64.2	74	9.8	PK
	V	2782.5	40.9	2.3	43.2	54	10.8	AV
	V	3710	59.1	3.8	62.9	74	11.1	PK
	V	3710	38.5	3.8	42.3	54	11.7	AV
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	PK



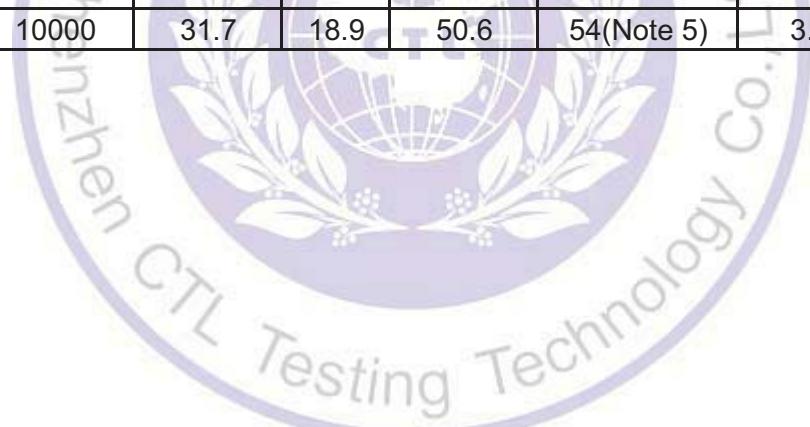
## Above 1GHz(antenna 2 TX only): Antenna polarization(Vertical+ Horizontal )

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	V	1805	65.9	-0.4	65.5	74	8.5	<b>PK</b>
	V	1805	50.8	-0.4	50.4	54	3.6	<b>AV</b>
	V	2707.5	62.3	2.1	64.4	74	9.6	<b>PK</b>
	V	2707.5	41.7	2.1	43.8	54	10.2	<b>AV</b>
	V	3610	58.6	3.5	62.1	74	11.9	<b>PK</b>
	V	3610	39.4	3.5	42.9	54	11.1	<b>AV</b>
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	<b>PK</b>
26	V	1830	65.1	-0.3	64.8	74	9.2	<b>PK</b>
	V	1830	49.8	-0.3	49.5	54	4.5	<b>AV</b>
	V	2745	61.1	2.8	63.9	74	10.1	<b>PK</b>
	V	2745	42.1	2.1	44.2	54	9.8	<b>AV</b>
	V	3660	60.1	3.5	63.6	74	10.4	<b>PK</b>
	V	3660	40.4	3.5	43.9	54	10.1	<b>AV</b>
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	<b>PK</b>
51	V	1855	65.5	-0.3	65.2	74	8.8	<b>PK</b>
	V	1855	47.4	-0.3	47.1	54	6.9	<b>AV</b>
	V	2782.5	62.4	2.3	64.7	74	9.3	<b>PK</b>
	V	2782.5	41.3	2.3	43.6	54	10.4	<b>AV</b>
	V	3710	59.3	3.8	63.1	74	10.9	<b>PK</b>
	V	3710	39.9	3.8	43.7	54	10.3	<b>AV</b>
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	<b>PK</b>



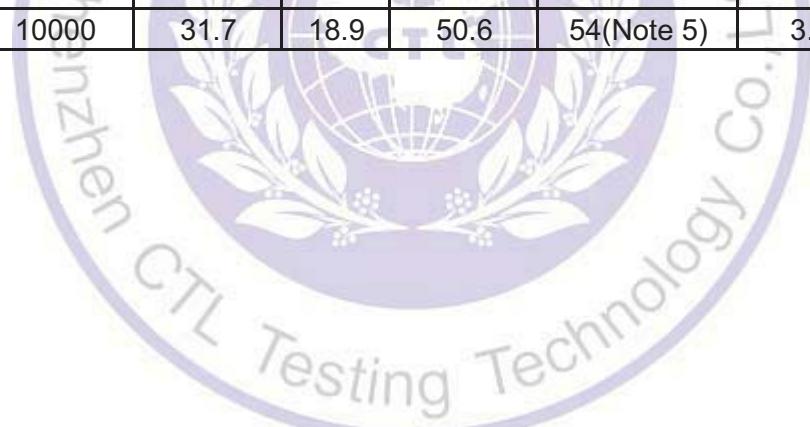
## Above 1GHz(antenna 3 TX only): Antenna polarization(Vertical+ Horizontal )

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	V	1805	64.8	-0.4	64.4	74	9.6	<b>PK</b>
	V	1805	49.6	-0.4	49.2	54	4.8	<b>AV</b>
	V	2707.5	62.7	2.1	64.8	74	9.2	<b>PK</b>
	V	2707.5	41.0	2.1	43.1	54	10.9	<b>AV</b>
	V	3610	60.0	3.5	63.5	74	10.5	<b>PK</b>
	V	3610	40.2	3.5	43.7	54	10.3	<b>AV</b>
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	<b>PK</b>
26	V	1830	65.6	-0.3	65.3	74	8.7	<b>PK</b>
	V	1830	49.1	-0.3	48.8	54	5.2	<b>AV</b>
	V	2745	62.4	2.8	65.2	74	8.8	<b>PK</b>
	V	2745	43.5	2.1	45.6	54	8.4	<b>AV</b>
	V	3660	61.6	3.5	65.1	74	8.9	<b>PK</b>
	V	3660	40.0	3.5	43.5	54	10.5	<b>AV</b>
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	<b>PK</b>
51	V	1855	65.2	-0.3	64.9	74	9.1	<b>PK</b>
	V	1855	48.6	-0.3	48.3	54	5.7	<b>AV</b>
	V	2782.5	61.9	2.3	64.2	74	9.8	<b>PK</b>
	V	2782.5	42.6	2.3	44.9	54	9.1	<b>AV</b>
	V	3710	60.9	3.8	64.7	74	9.3	<b>PK</b>
	V	3710	39.8	3.8	43.6	54	10.4	<b>AV</b>
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	<b>PK</b>



## Above 1GHz(antenna 4 TX only): Antenna polarization(Vertical+ Horizontal )

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	V	1805	65.7	-0.4	65.3	74	8.7	PK
	V	1805	51.0	-0.4	50.6	54	3.4	AV
	V	2707.5	63.0	2.1	65.1	74	8.9	PK
	V	2707.5	44.3	2.1	46.4	54	7.6	AV
	V	3610	60.2	3.5	63.7	74	10.3	PK
	V	3610	41.4	3.5	44.9	54	9.1	AV
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	PK
26	V	1830	66.1	-0.3	65.8	74	8.2	PK
	V	1830	49.8	-0.3	49.5	54	4.5	AV
	V	2745	61.9	2.8	64.7	74	9.3	PK
	V	2745	43.0	2.1	45.1	54	8.9	AV
	V	3660	62.8	3.5	66.3	74	7.7	PK
	V	3660	40.7	3.5	44.2	54	9.8	AV
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	PK
51	V	1855	66.2	-0.3	65.9	74	8.1	PK
	V	1855	49.1	-0.3	48.8	54	5.2	AV
	V	2782.5	63.0	2.3	65.3	74	8.7	PK
	V	2782.5	42.9	2.3	45.2	54	8.8	AV
	V	3710	61.1	3.8	64.9	74	9.1	PK
	V	3710	40.3	3.8	44.1	54	9.9	AV
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	PK



MIMO MODE TX

: Antenna polarization(Vertical+ Horizontal )

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	V	1805	70.7	-0.4	70.3	74	3.7	PK
	V	1805	52.2	-0.4	51.8	54	2.2	AV
	V	2707.5	65.6	2.1	67.7	74	6.3	PK
	V	2707.5	44.4	2.1	46.5	54	7.5	AV
	V	3610	61.7	3.5	65.2	74	8.8	PK
	V	3610	40.1	3.5	43.6	54	10.4	AV
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	PK
26	V	1830	71.2	-0.3	70.9	74	3.1	PK
	V	1830	50.7	-0.3	50.4	54	3.6	AV
	V	2745	63.0	2.8	65.8	74	8.2	PK
	V	2745	45.2	2.1	47.3	54	6.7	AV
	V	3660	61.3	3.5	64.8	74	9.2	PK
	V	3660	42.1	3.5	45.6	54	8.4	AV
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	PK
51	V	1855	71.0	-0.3	70.7	74	3.3	PK
	V	1855	50.5	-0.3	50.2	54	3.8	AV
	V	2782.5	64.5	2.3	66.8	74	7.2	PK
	V	2782.5	43.4	2.3	45.7	54	8.3	AV
	V	3710	64.5	3.8	68.3	74	5.7	PK
	V	3710	43.8	3.8	47.6	54	6.4	AV
	H	10000	31.7	18.9	50.6	54(Note 5)	3.4	PK

Note: 1. Measure Level = Reading Level + Factor.

2. The test results which are attenuated more than 20 dB below the permissible value limit , therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Remark: RBW 1MHz VBW 3MHz peak detector for PK value, RMS detector for AV value

4. During the test , four antennas transmitting at the same time.

5. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

### 4.3. Maximum Peak Output Power

#### TEST CONFIGURATION



#### TEST PROCEDURE

According to C63.10 -2013, The EUT was directly connected to the power meter / spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

Use the wideband power meter to test peak power and record the result.

#### LIMIT

The Maximum Peak Output Power Measurement limit is 30dBm.

#### TEST RESULTS

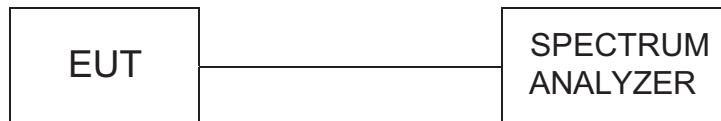
Note: directional gain = $10\log(4)+5=11.02$ (dBi) >6dBi, so Power Limit=30-5.02=24.98(dBm )

Channel Frequency (MHz)	Peak Output Power (dBm)					Peak Power Limit (dBm)	Pass / Fail
	SISO Ant.1	SISO Ant.2	SISO Ant.3	SISO Ant.4	MIMO TOTAL power		
902.5	19.02	18.84	18.72	19.10	24.94	24.98	PASS
915.0	19.09	18.61	18.61	19.08	24.87	24.98	PASS
927.5	19.03	18.57	18.42	19.19	24.83	24.98	PASS



## 4.4. 20dB Bandwidth

### TEST CONFIGURATION



### TEST PROCEDURE

According to ANSI C63.10: 2013.

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel

RBW  $\geq$  1% of the 20dB bandwidth, VBW  $\geq$  RBW, Sweep = auto, Detector function = peak, Trace = max hold

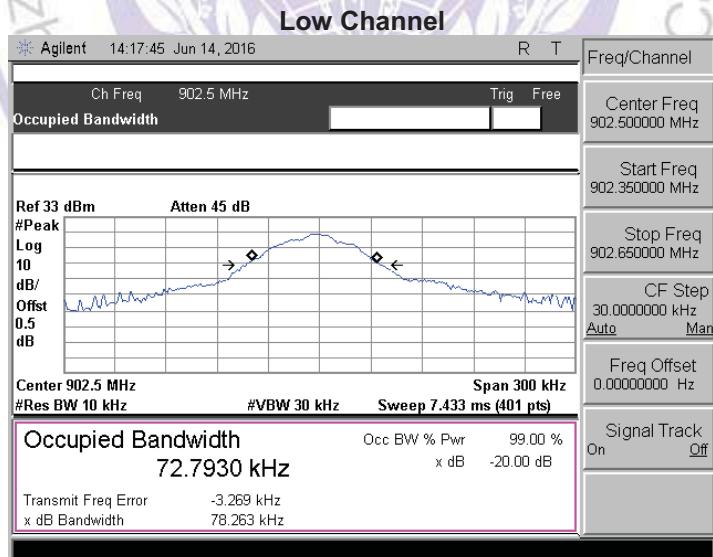
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize.

Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

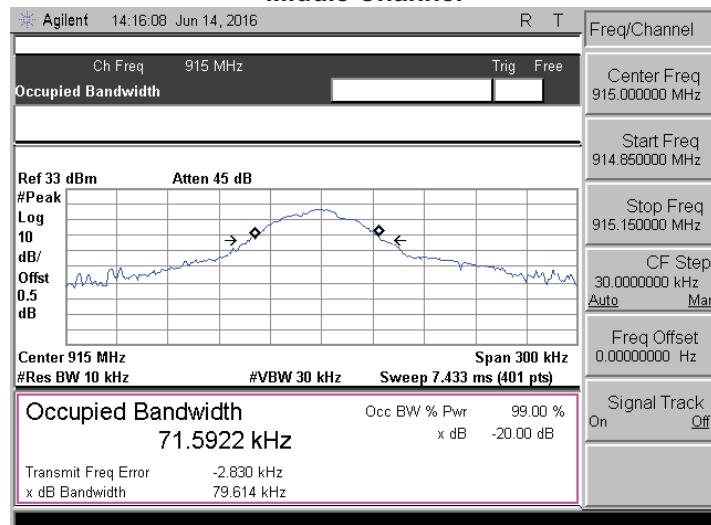
### TEST RESULTS

Antenna 1:

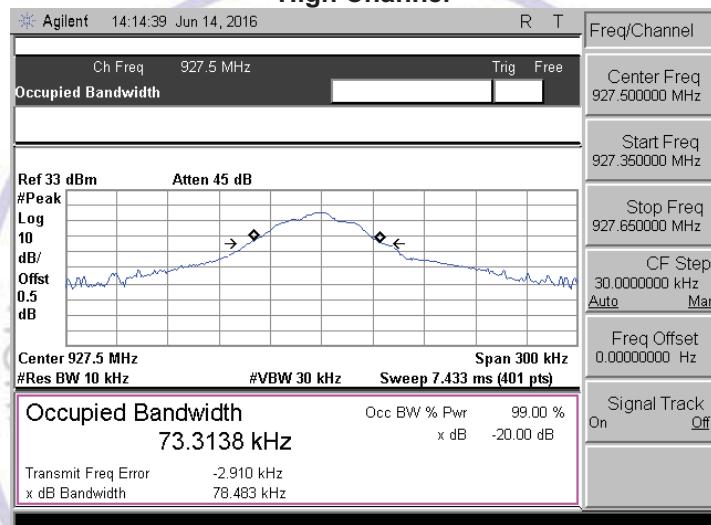
CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (KHz)	LIMIT (KHz)	PASS/FAIL
902.5	78.263	/	PASS
915.0	79.614	/	PASS
927.5	78.483	/	PASS



## Middle Channel



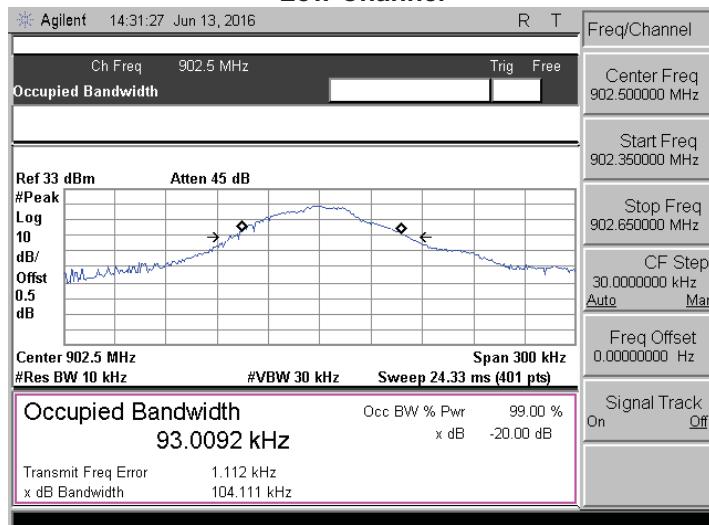
## High Channel



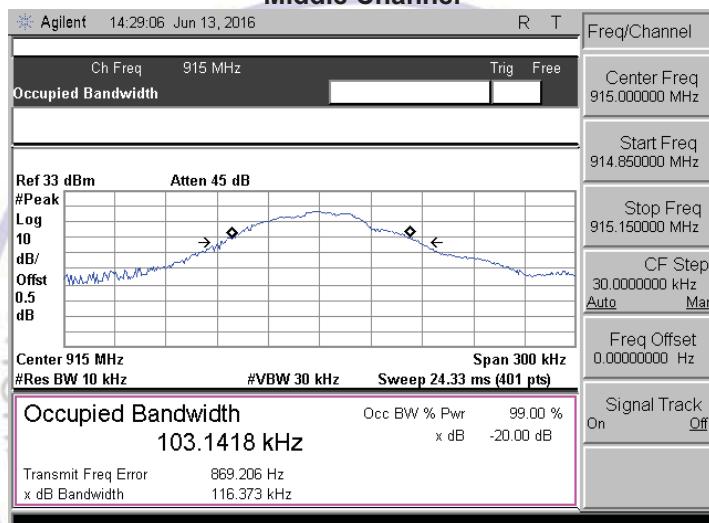
## Antenna 2:

CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (KHz)	LIMIT (KHz)	PASS/FAIL
902.5	104.111	/	PASS
915.0	106.373	/	PASS
927.5	79.548	/	PASS

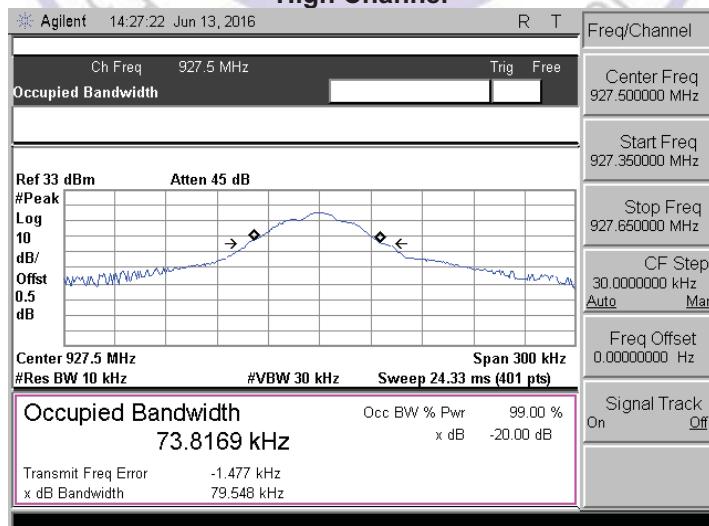
## Low Channel



## Middle Channel



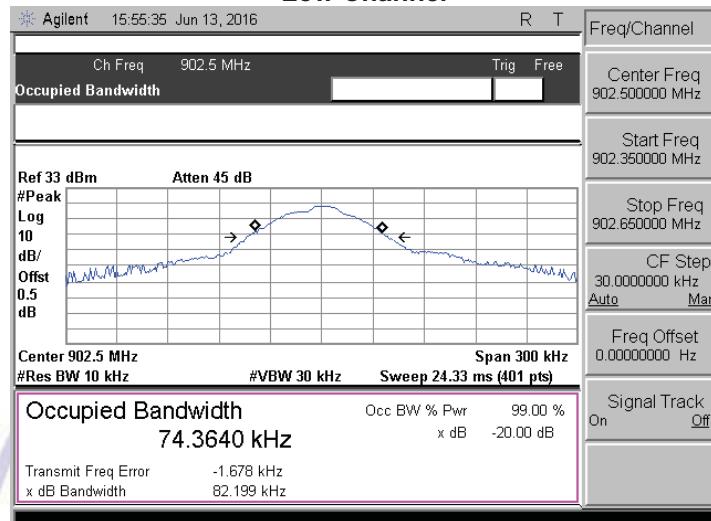
## High Channel



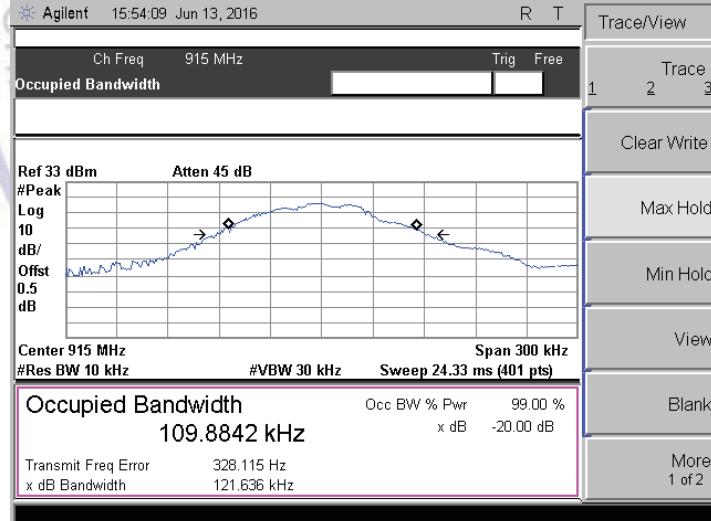
## Antenna 3:

CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (KHz)	LIMIT (KHz)	PASS/FAIL
902.5	82.199	/	PASS
915.0	121.636	/	PASS
927.5	78.367	/	PASS

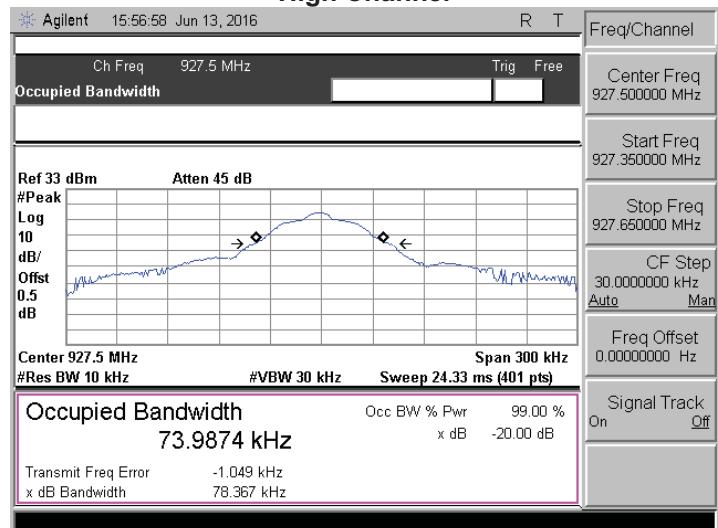
## Low Channel



## Middle Channel



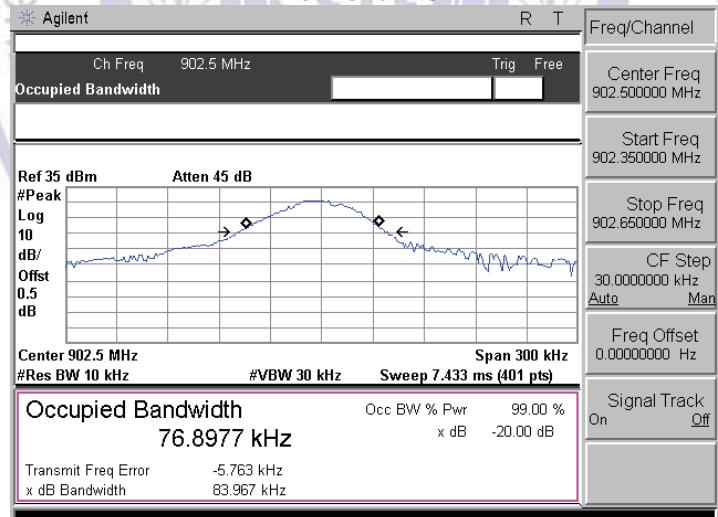
## High Channel



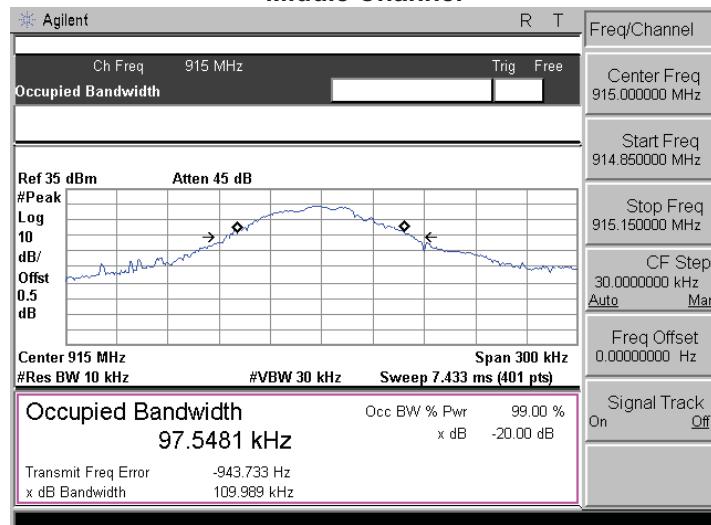
## Antenna 4:

CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (KHz)	LIMIT (KHz)	PASS/FAIL
902.5	83.967	/	PASS
915.0	109.989	/	PASS
927.5	80.479	/	PASS

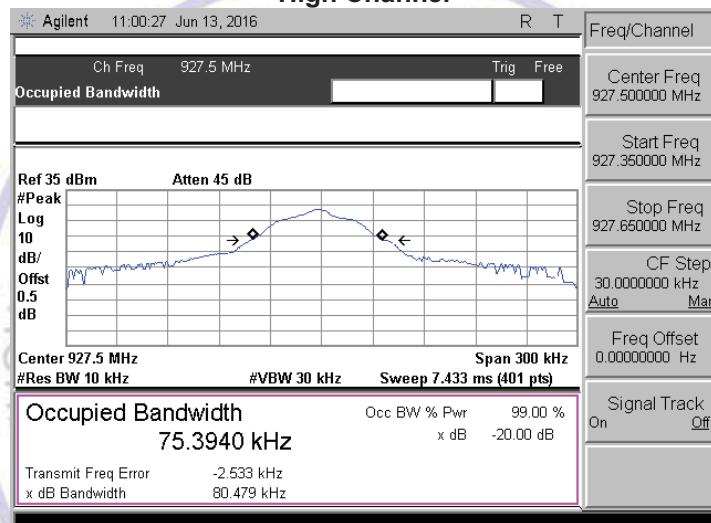
## Low Channel



## Middle Channel



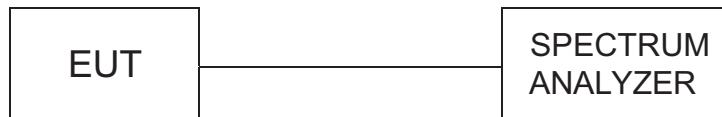
## High Channel



CTL Testing Technology

## 4.5. Frequency Separation

### TEST CONFIGURATION



### TEST PROCEDURE

According to ANSI C63.10: 2013.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW)  $\geq$  1% of the span

Video (or Average) Bandwidth VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

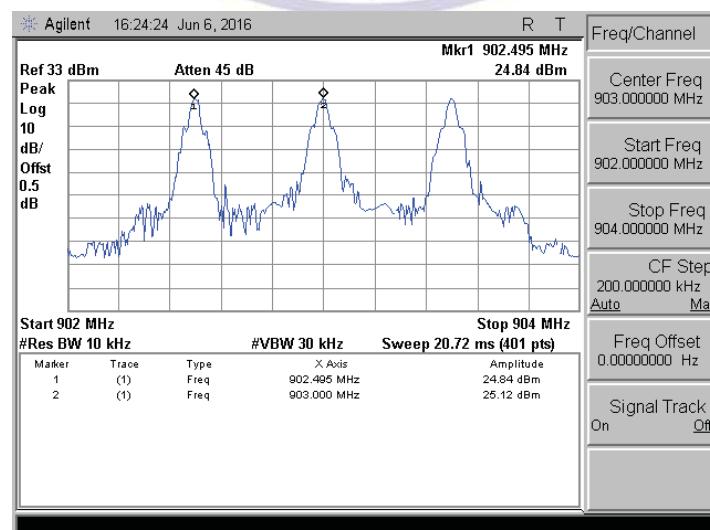
### LIMIT

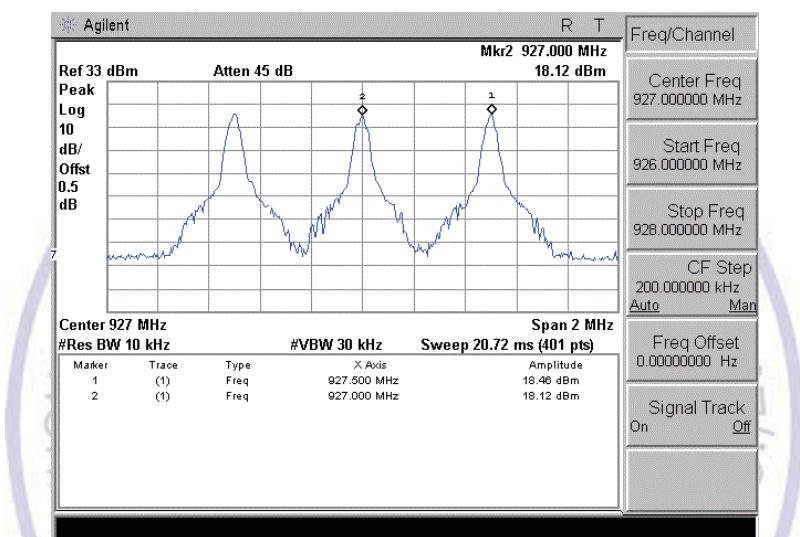
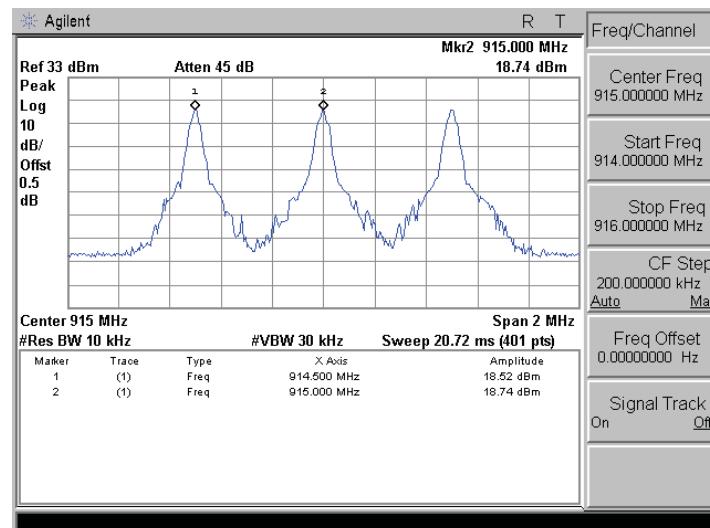
Per 15.247 (a)(1) At least 25 KHz or 20 dB bandwidth of the hopping Channel, whichever is greater

### TEST RESULTS

#### Antenna 1:

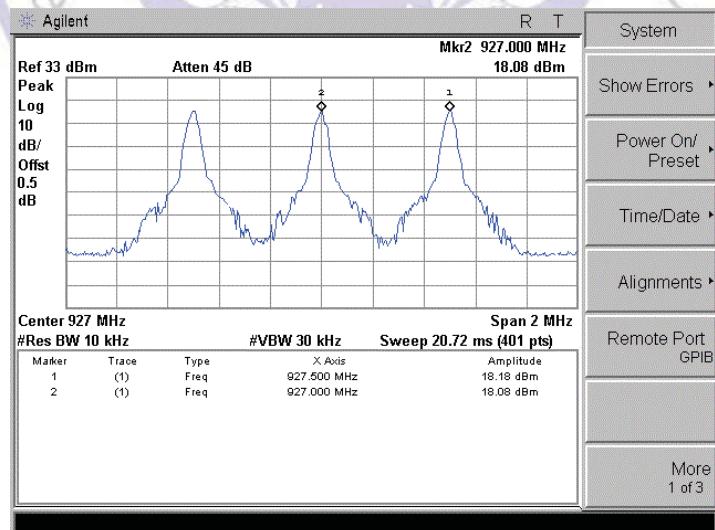
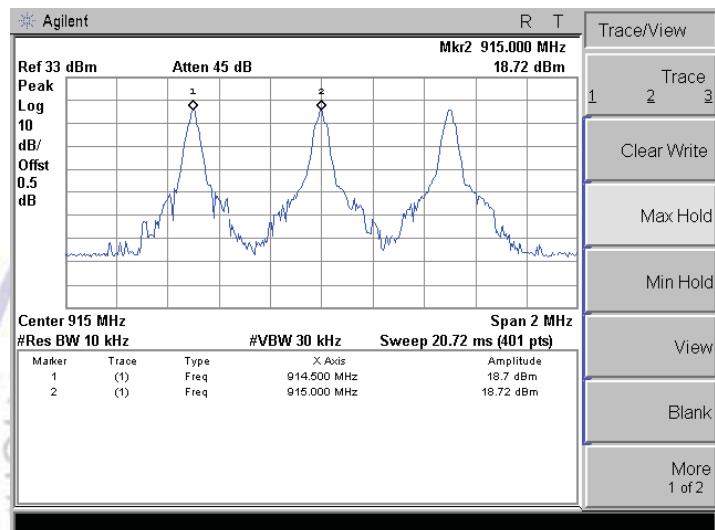
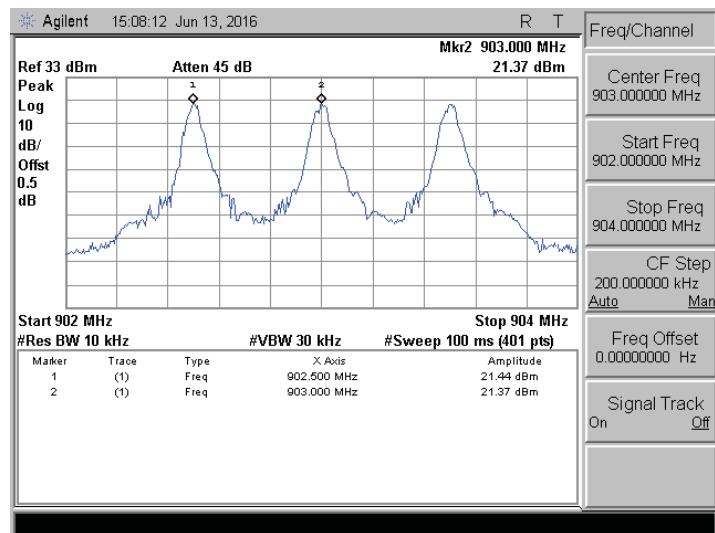
Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	902.5	0.505	25KHz or 20dB bandwidth	Pass
Adjacency Channel	903.0			
Middle Channel	914.5	0.500	25KHz or 20dB bandwidth	Pass
Adjacency Channel	915.0			
High Channel	927.5	0.500	25KHz or 20dB bandwidth	Pass
Adjacency Channel	927.0			





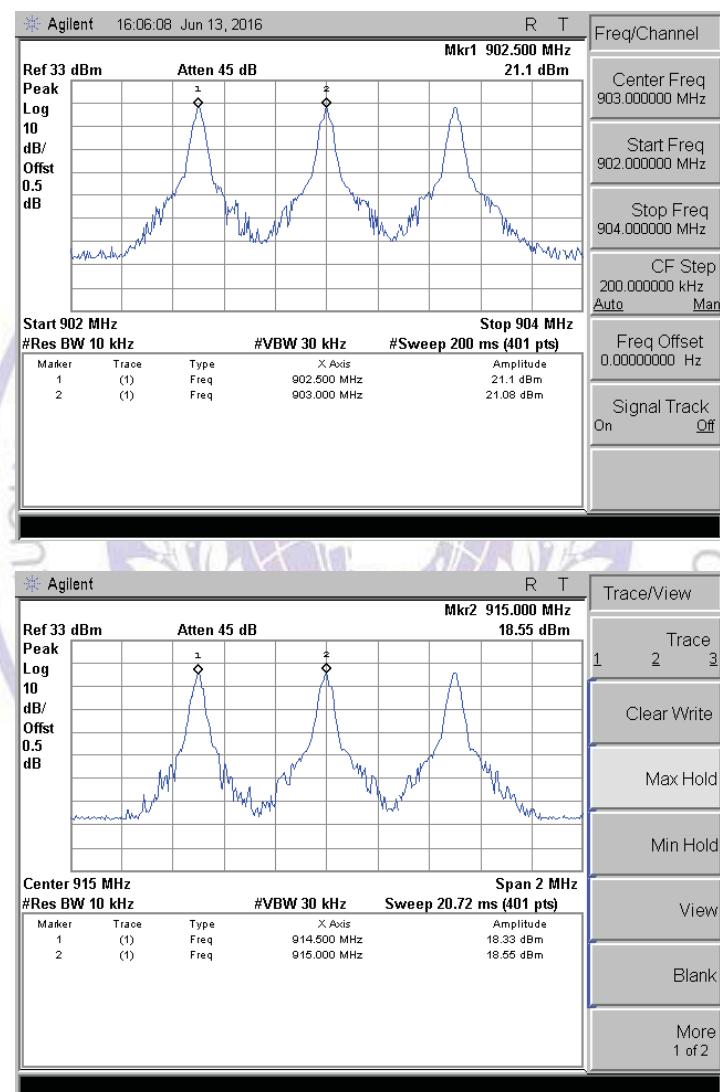
### Antenna 2:

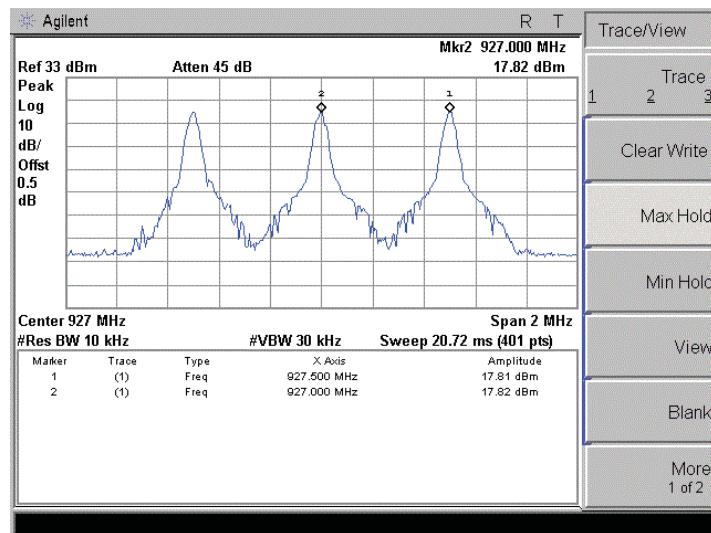
Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	902.5	0.500	25KHz or 20dB bandwidth	Pass
Adjacency Channel	903.0			
Middle Channel	914.5	0.500	25KHz or 20dB bandwidth	Pass
Adjacency Channel	915.0			
High Channel	927.5	0.500	25KHz or 20dB bandwidth	Pass
Adjacency Channel	927.0			



## Antenna 3:

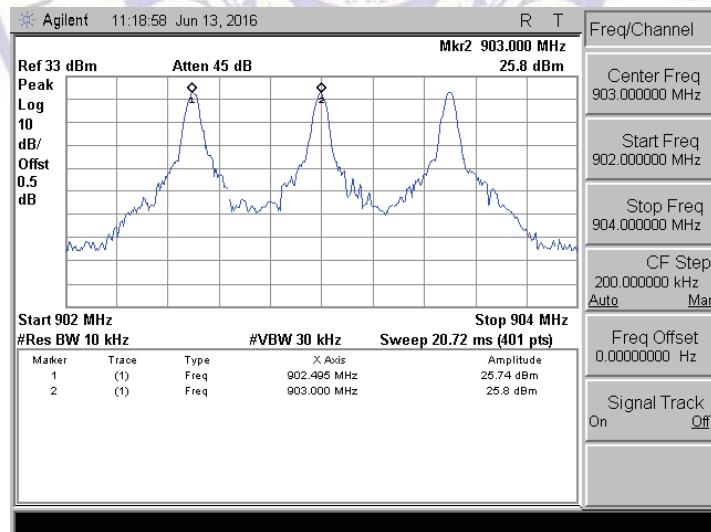
Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	902.5	0.500	25KHz or 20dB bandwidth	Pass
Adjacency Channel	903.0			
Middle Channel	914.5	0.500	25KHz or 20dB bandwidth	Pass
Adjacency Channel	915.0			
High Channel	927.5	0.500	25KHz or 20dB bandwidth	Pass
Adjacency Channel	927.0			

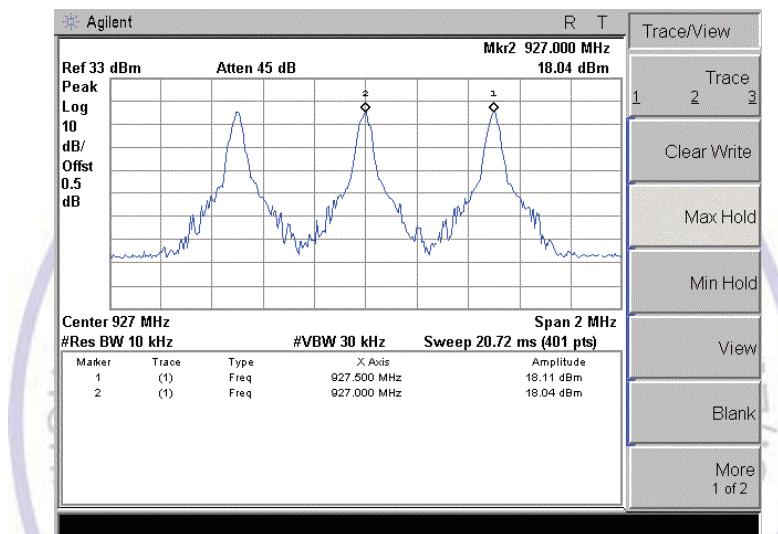
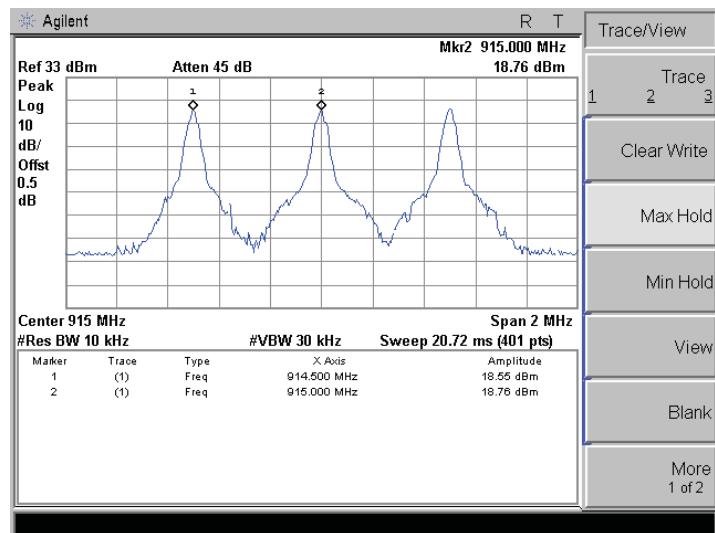




#### Antenna 4:

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	902.5	0.505	25KHz or 20dB bandwidth	Pass
Adjacency Channel	903.0			
Middle Channel	914.5	0.500	25KHz or 20dB bandwidth	Pass
Adjacency Channel	915.0			
High Channel	927.5	0.500	25KHz or 20dB bandwidth	Pass
Adjacency Channel	927.0			





## 4.6. Number of hopping frequency

### TEST CONFIGURATION



### TEST PROCEDURE

According to ANSI C63.10: 2013.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW  $\geq$  1% of the span

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. It may prove necessary to bread the span up to sections, in order to clearly show all of the hopping frequencies.

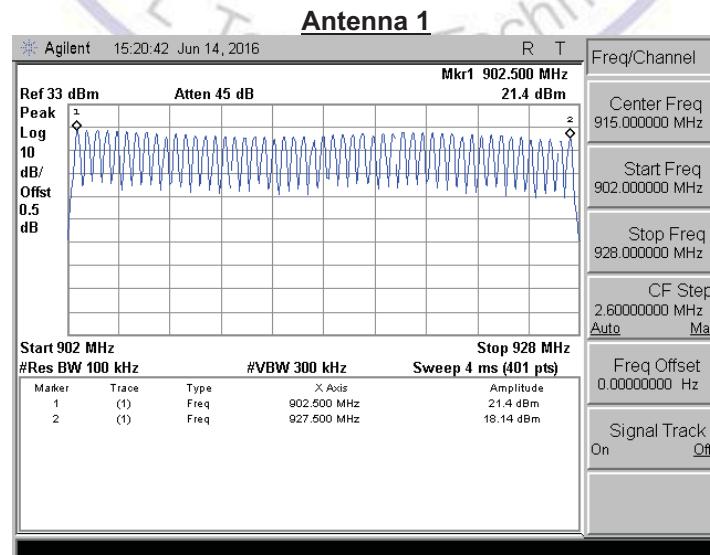
### LIMIT

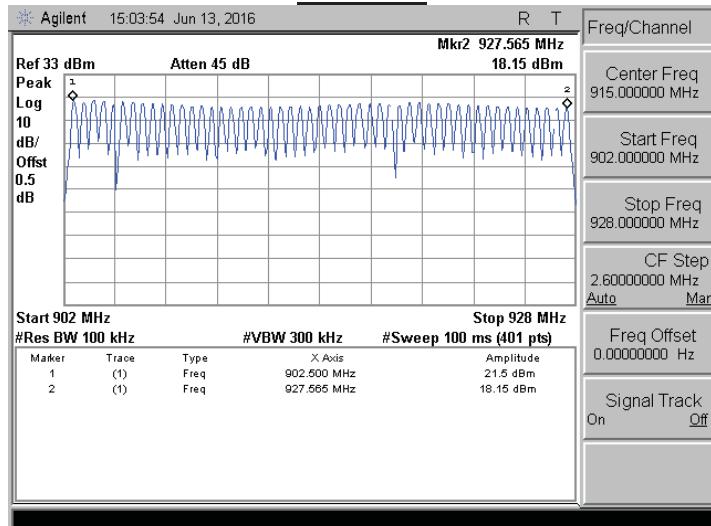
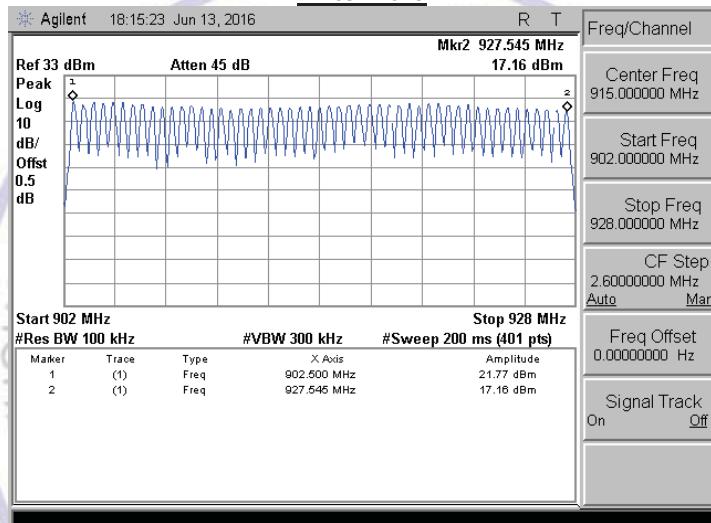
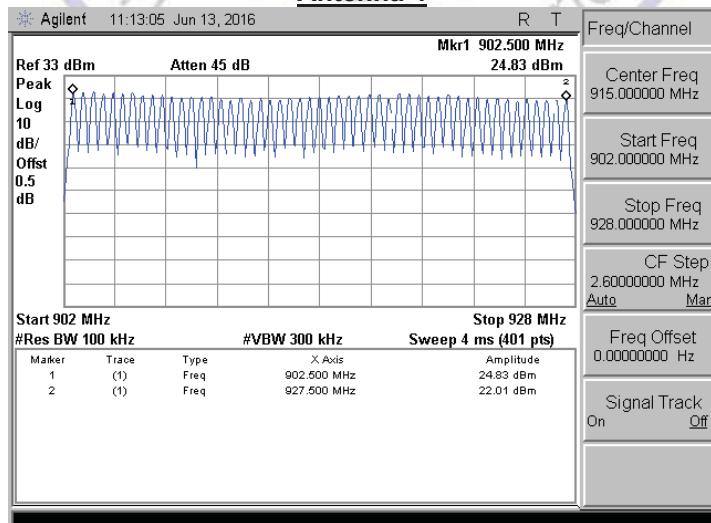
if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period

### TEST RESULTS

Hopping Channel Frequency Range (MHz)	Number of Hopping Channel	Limit
902-928	51	$\geq 15$

### Photos of Number of hopping channel Measurement



Antenna 2Antenna 3Antenna 4

## 4.7. Time Of Occupancy(Dwell Time)

### TEST CONFIGURATION



### TEST PROCEDURE

According to ANSI C63.10: 2013.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW = 1MHz

VBW  $\geq$  RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

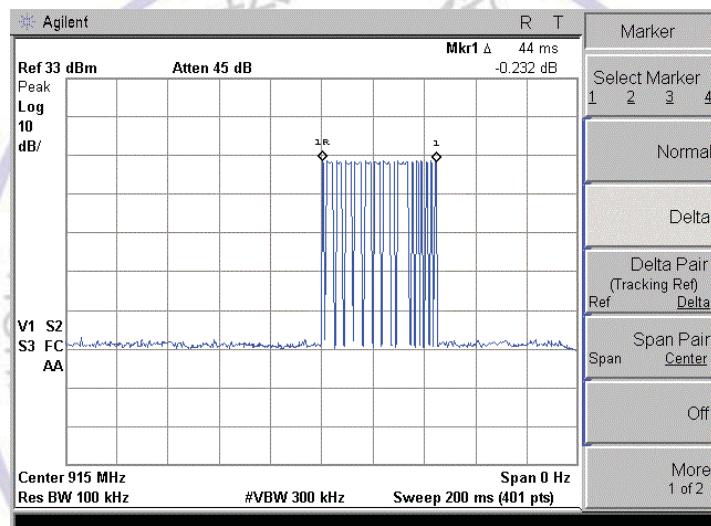
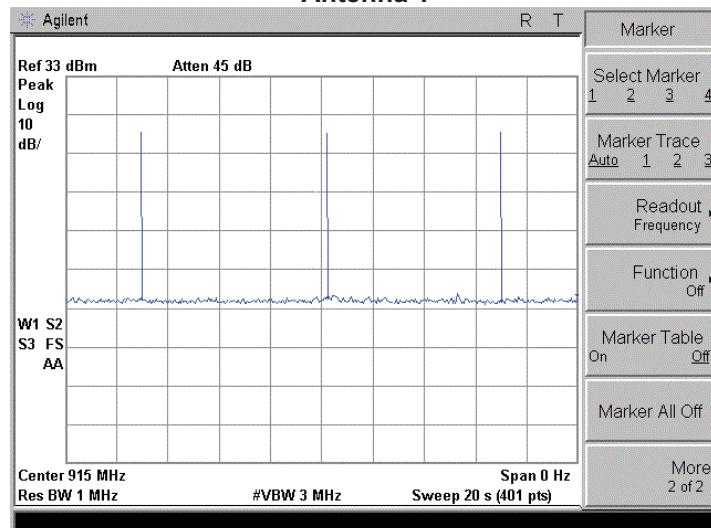
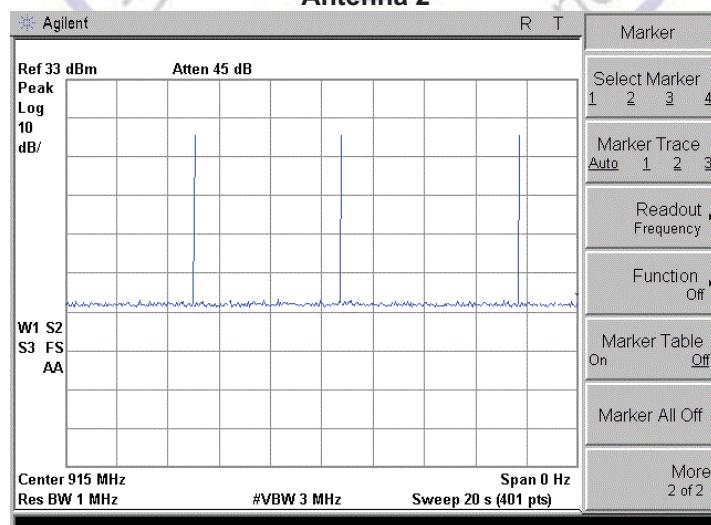
### LIMIT

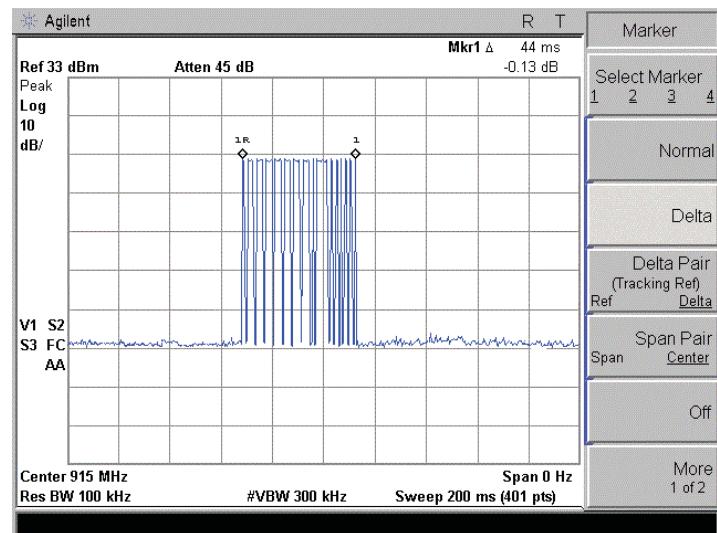
if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period

### TEST RESULTS

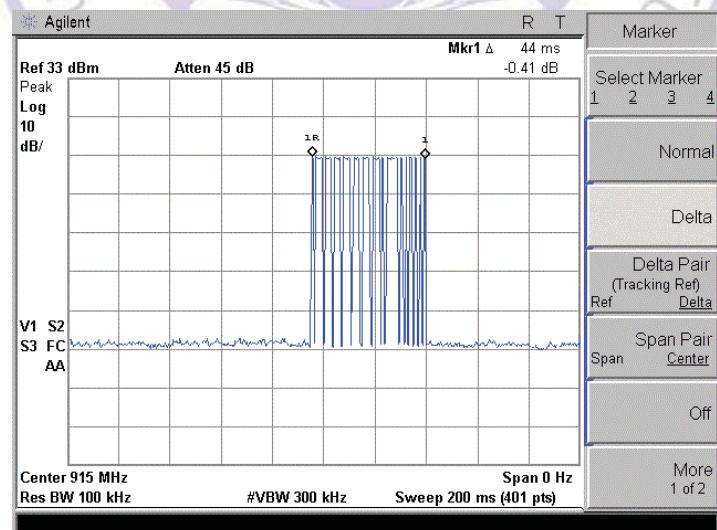
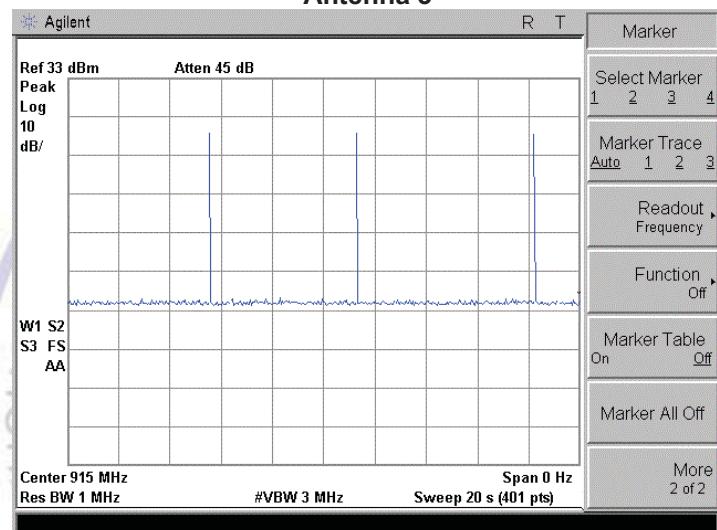
Frequency (MHz)	Antenna	No. of burst	Pulse Width (ms)	Dwell Time (ms)	Limit (ms)	Result
915	Antenna 1	3	44.0	132.0	400	Pass
915	Antenna 2	3	44.0	132.0	400	Pass
915	Antenna 3	3	44.0	132.0	400	Pass
915	Antenna 4	3	44.5	133.5	400	Pass

Dwell Time= No. of burst\* Pulse Width

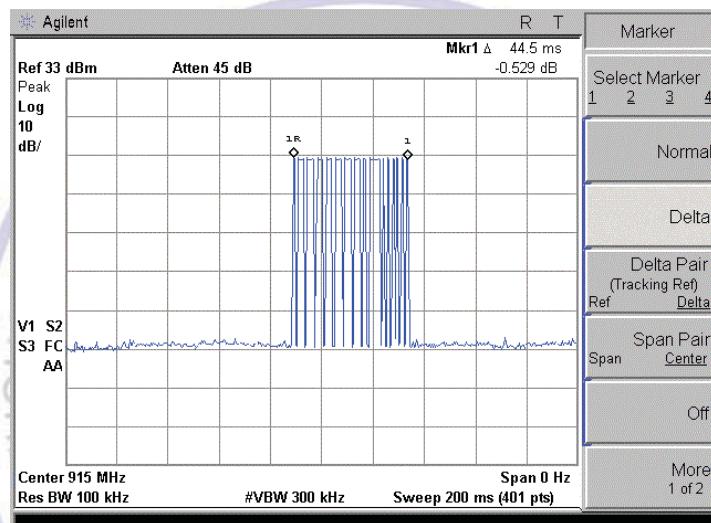
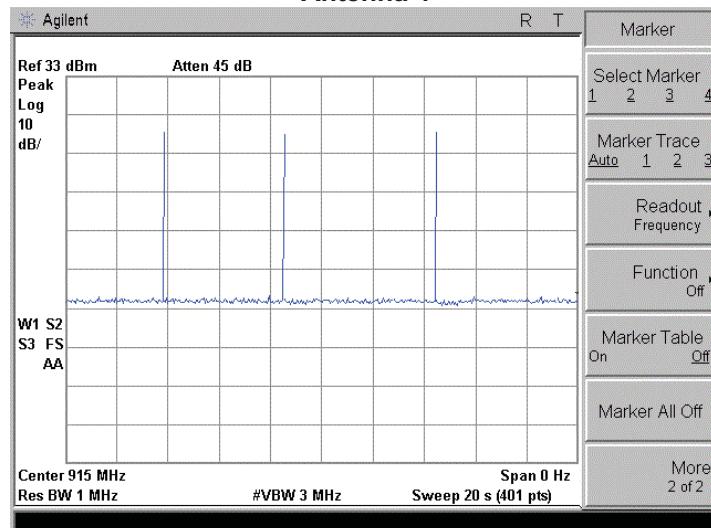
Photos of Dwell Time Measurement:**Antenna 1****Antenna 2**



## Antenna 3

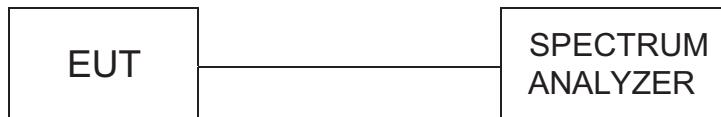


## Antenna 4



## 4.8. Spurious RF Conducted Emissions and bandedge

### TEST CONFIGURATION



### TEST PROCEDURE

According to ANSI C63.10: 2013.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100KHz, VBW  $\geq$  RBW, Sweep =auto, Detector function = peak, Trace = max hold

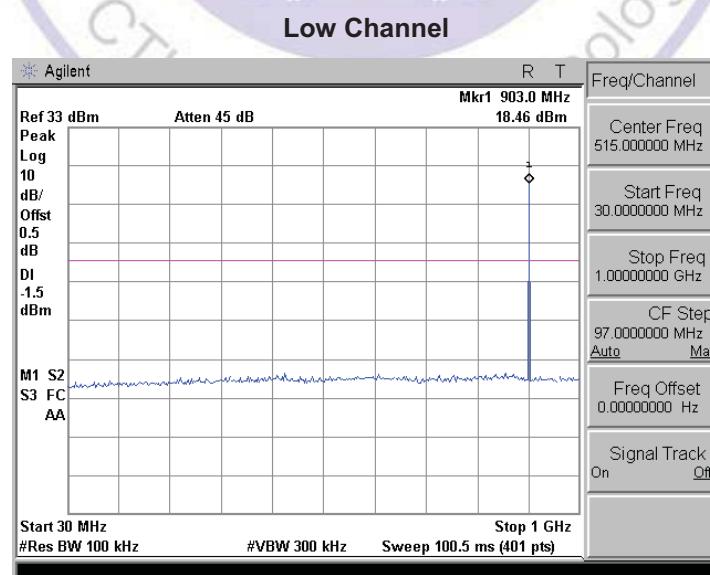
Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this section.

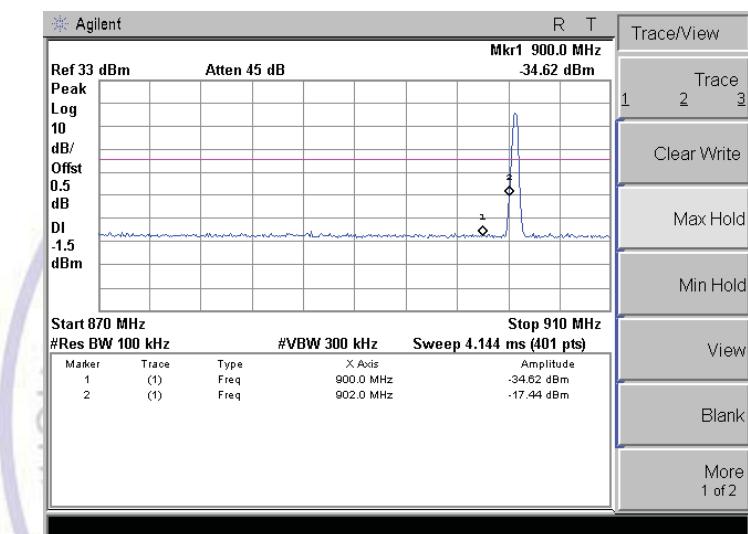
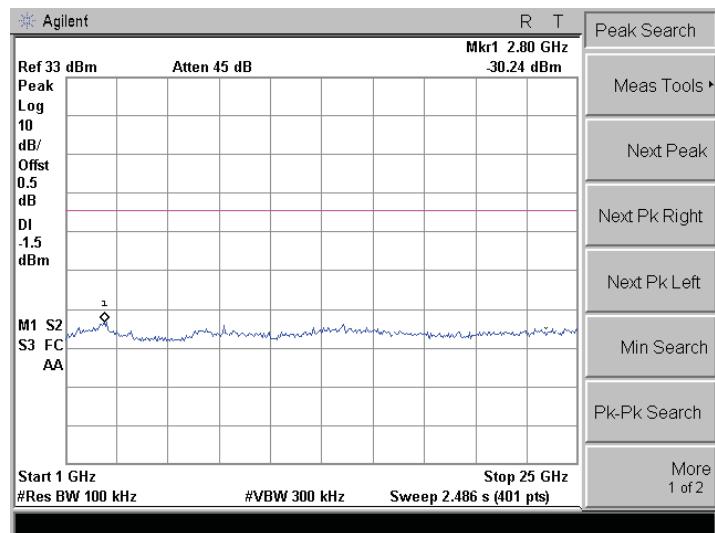
### LIMIT

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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) of FCC part 15 is not required.

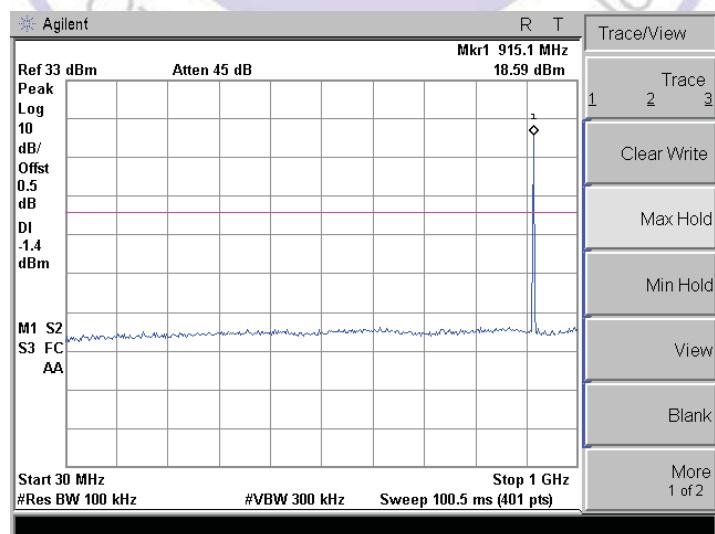
### TEST RESULT

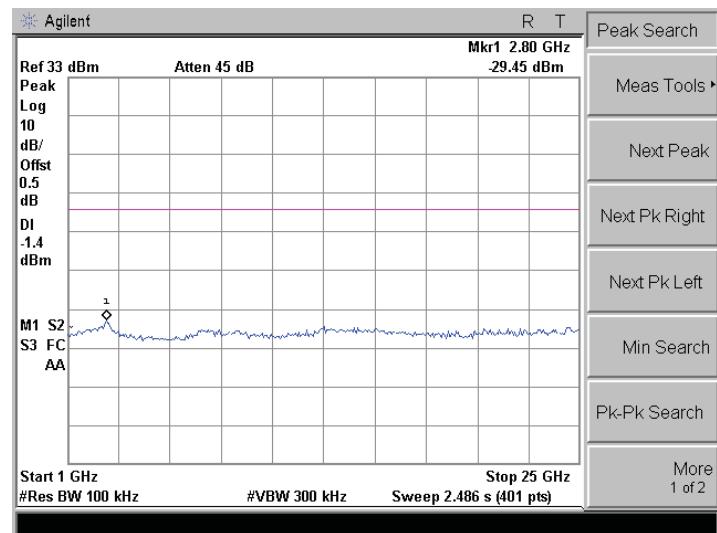
#### Antenna 1:



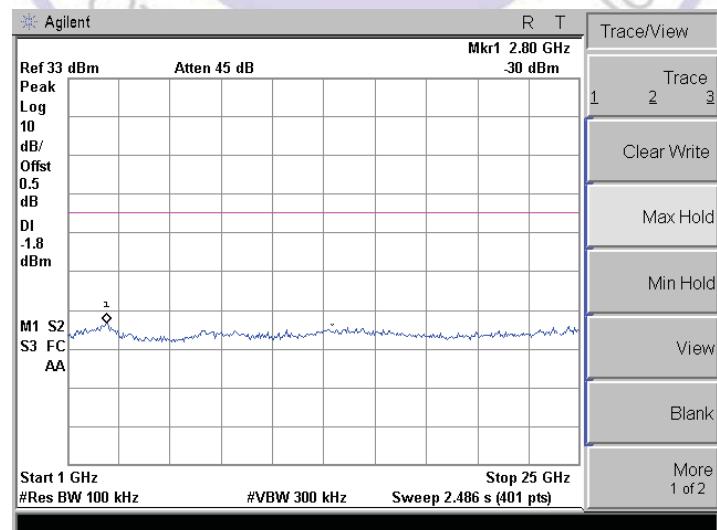
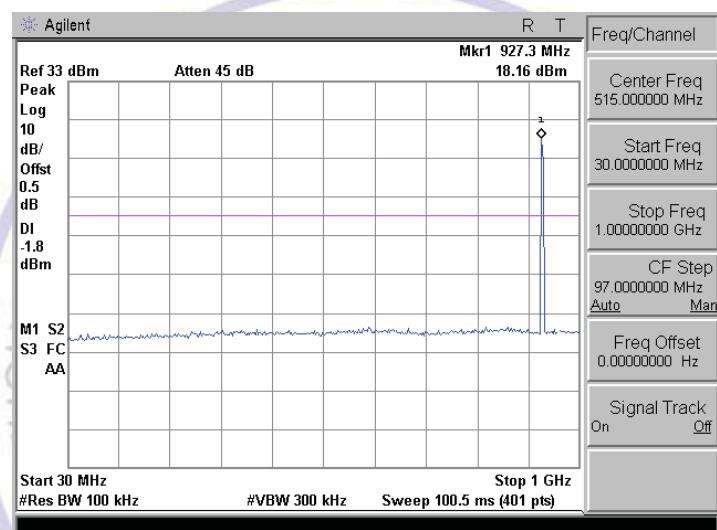


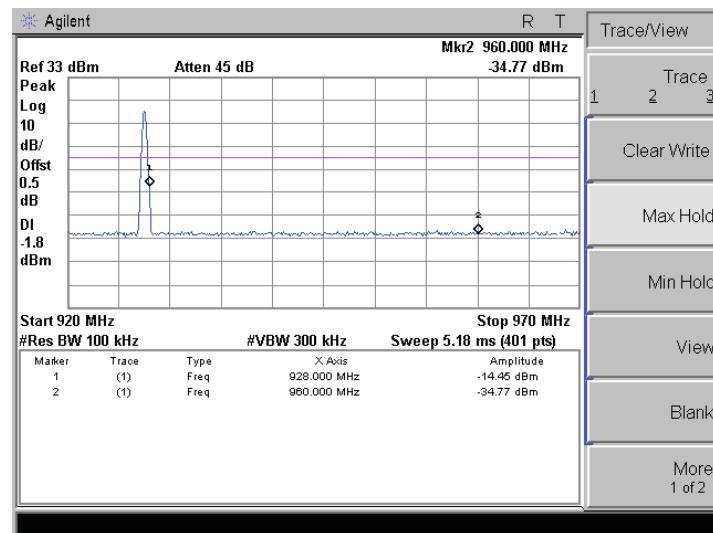
### Middle Channel



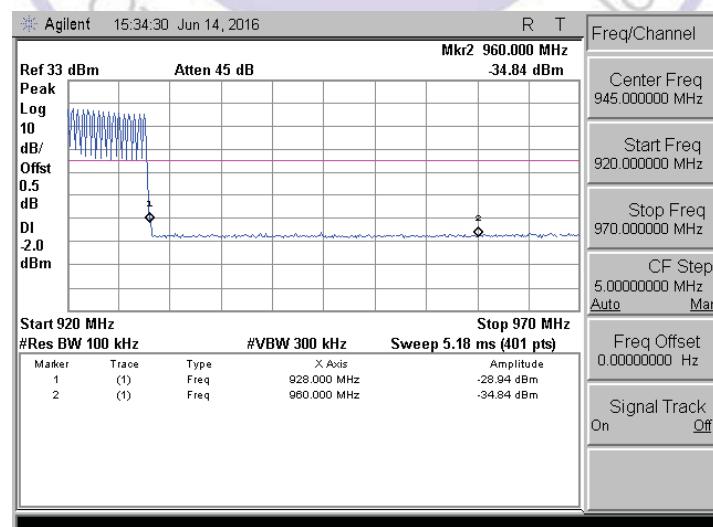
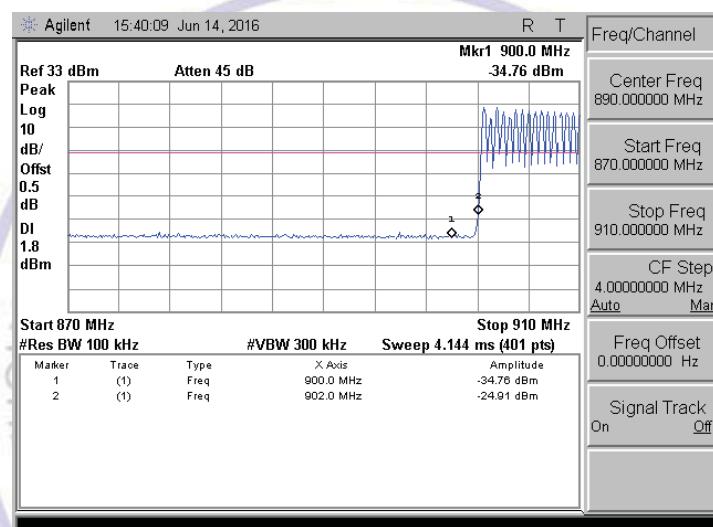


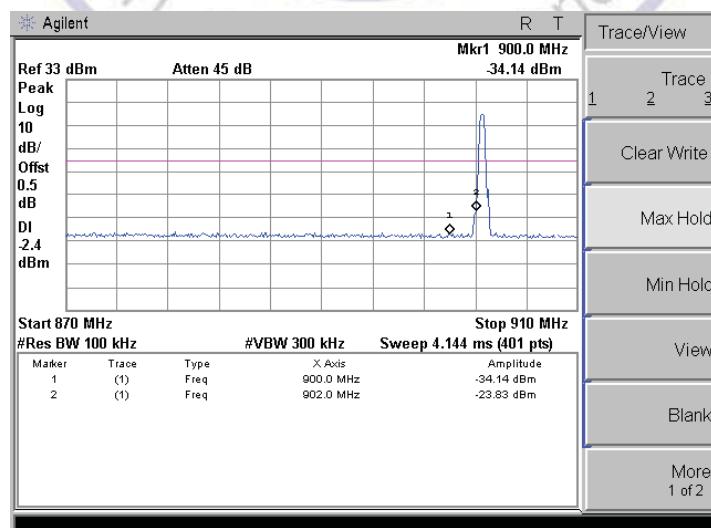
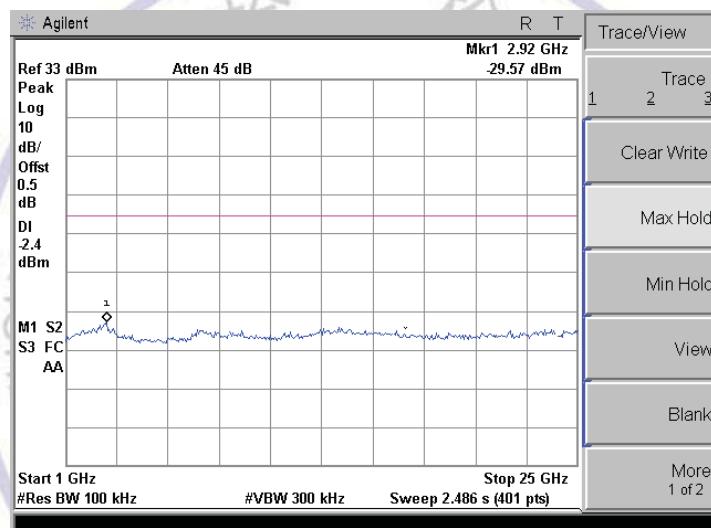
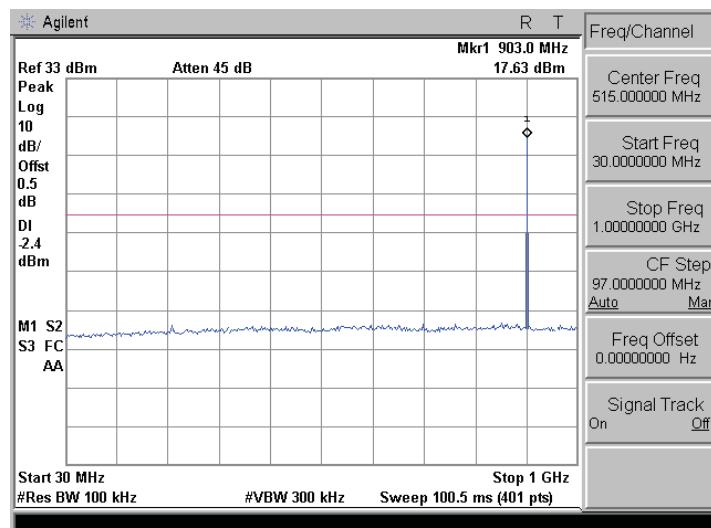
### High Channel



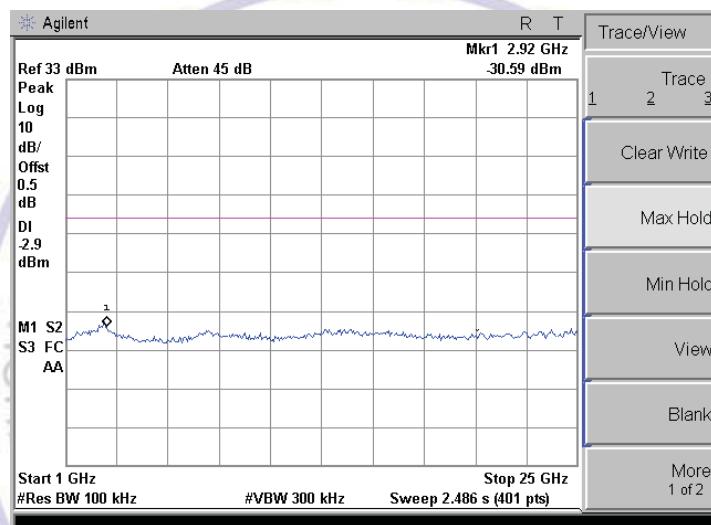
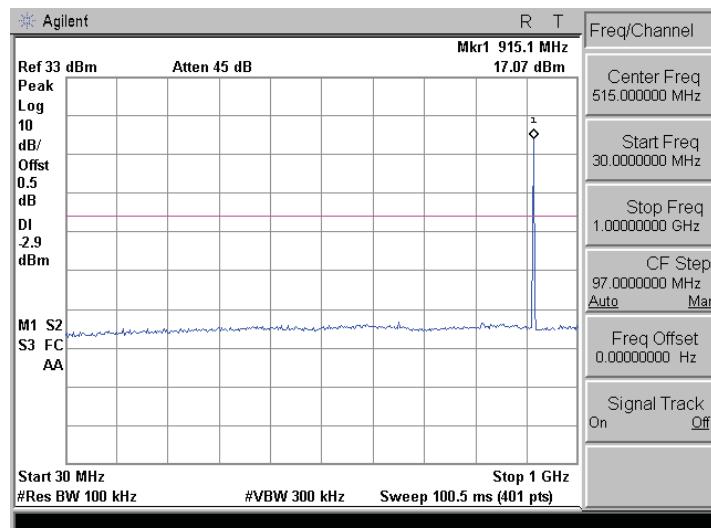


### Hopping Mode

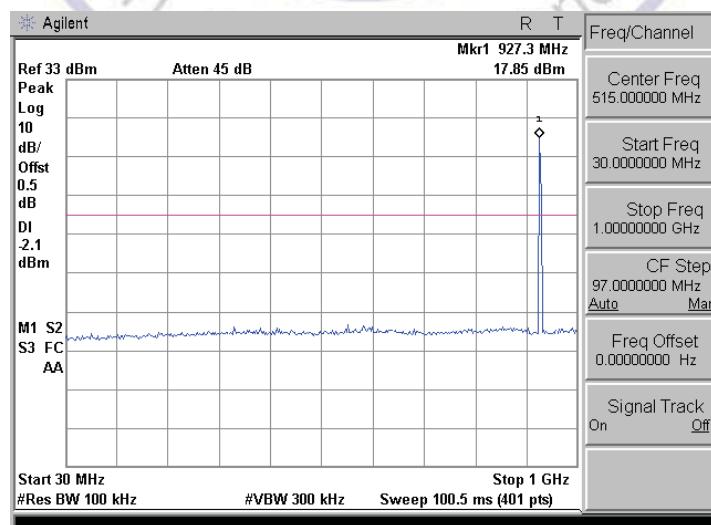


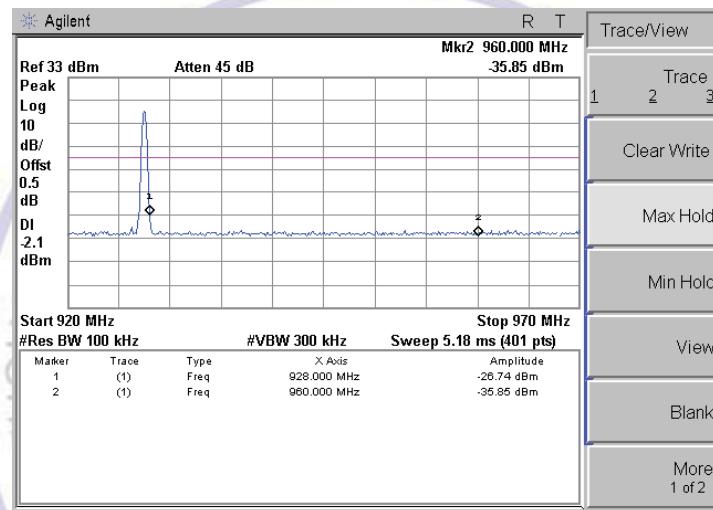
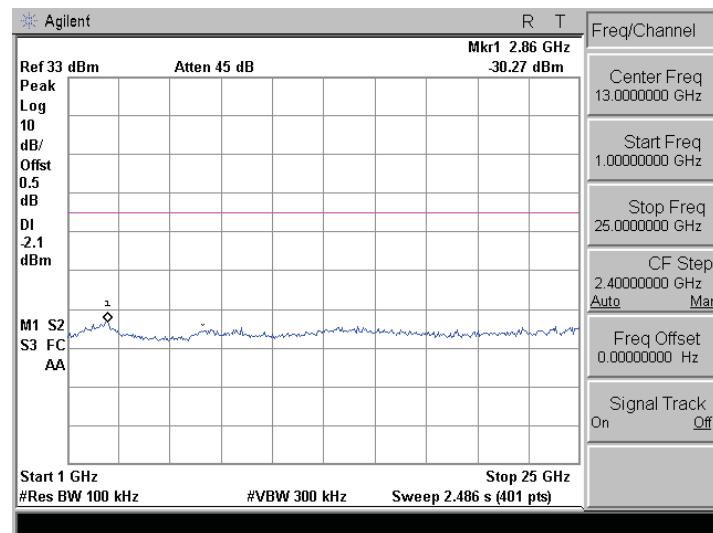
Antenna 2:**Low Channel**

## Middle Channel

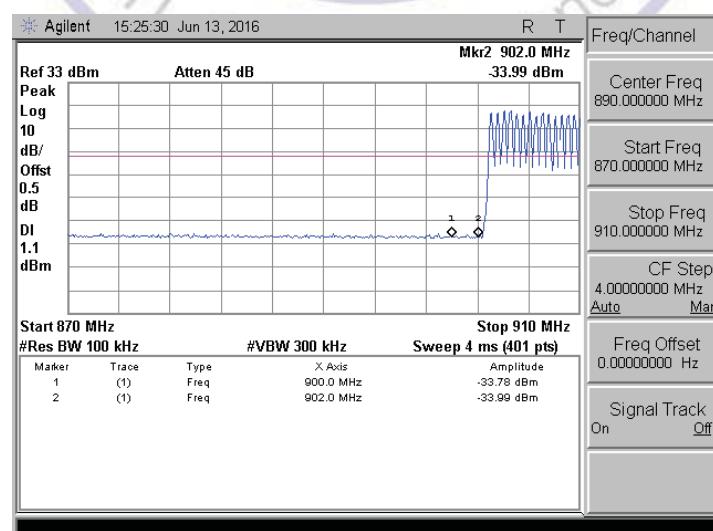


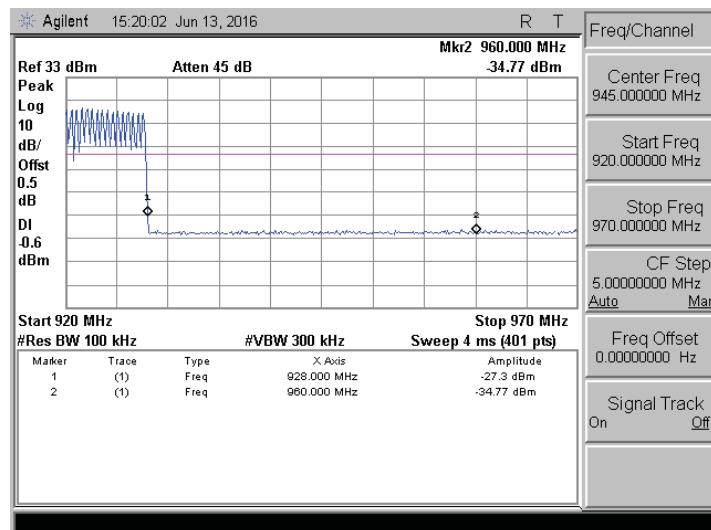
## High Channel



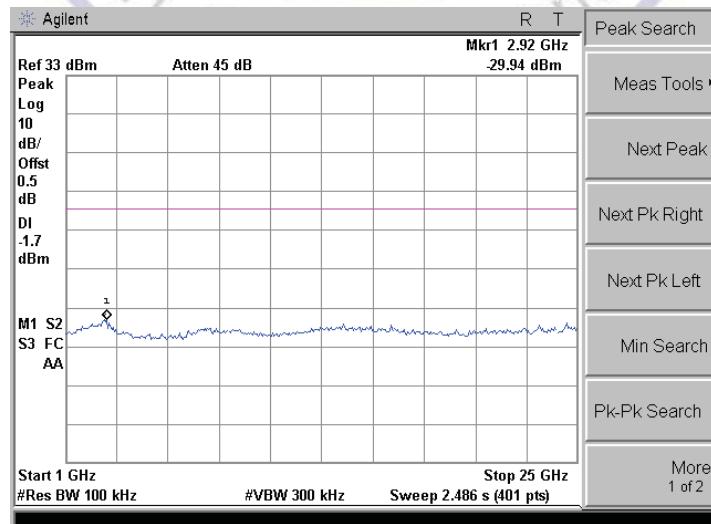
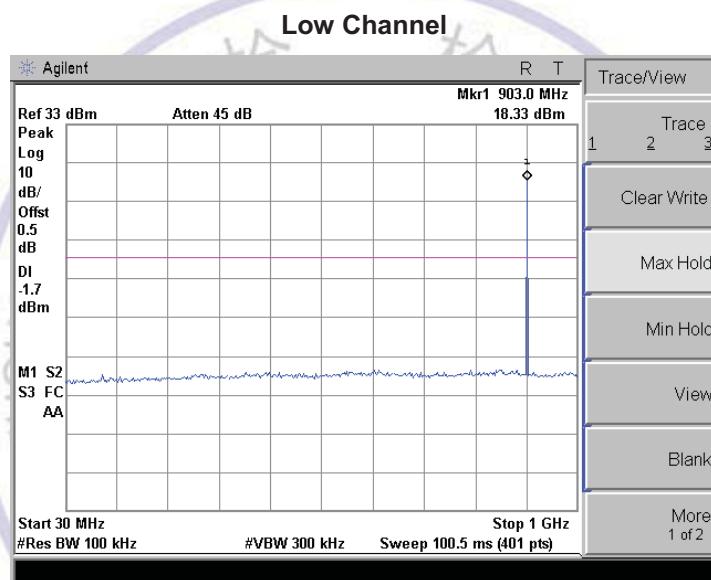


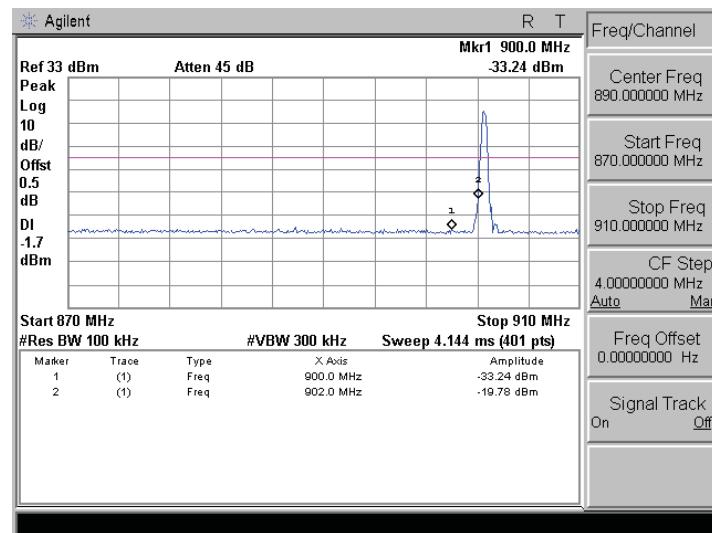
### Hopping Mode



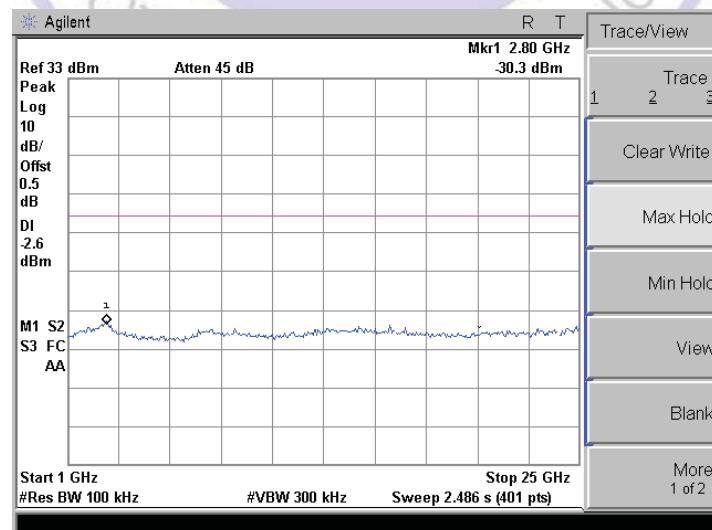
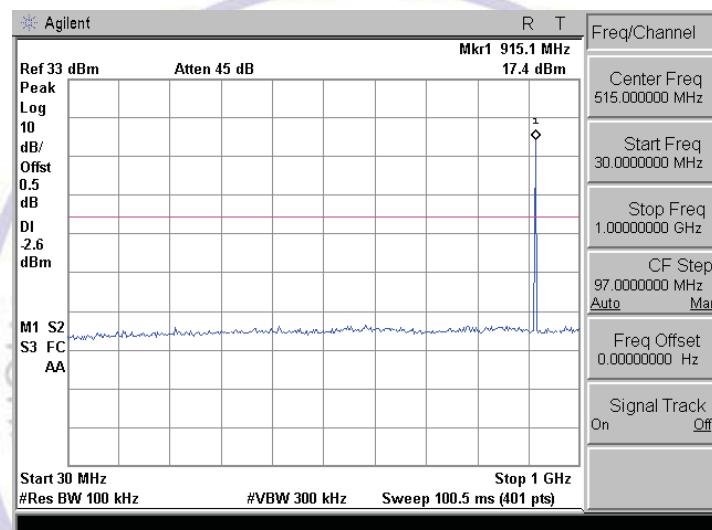


### Antenna 3:

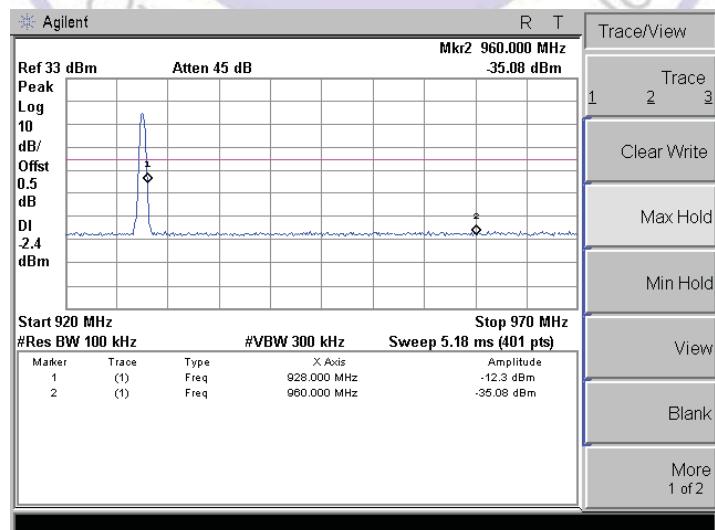
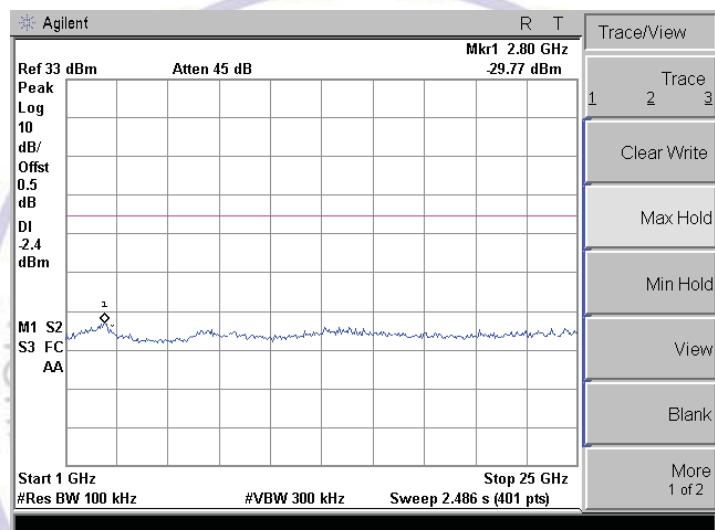
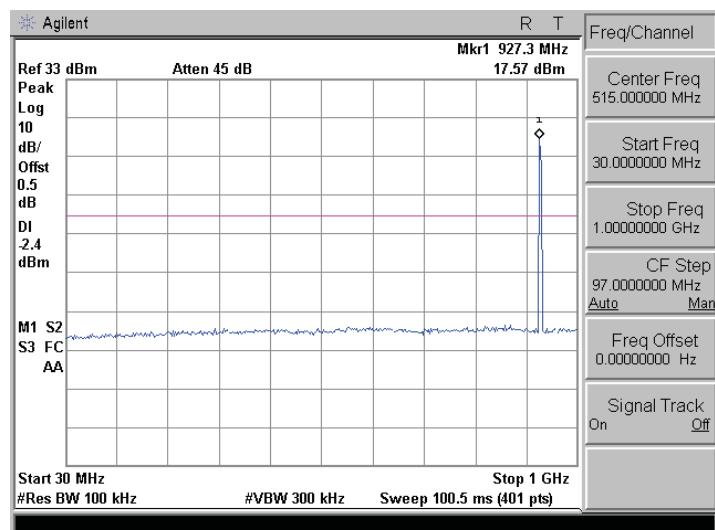




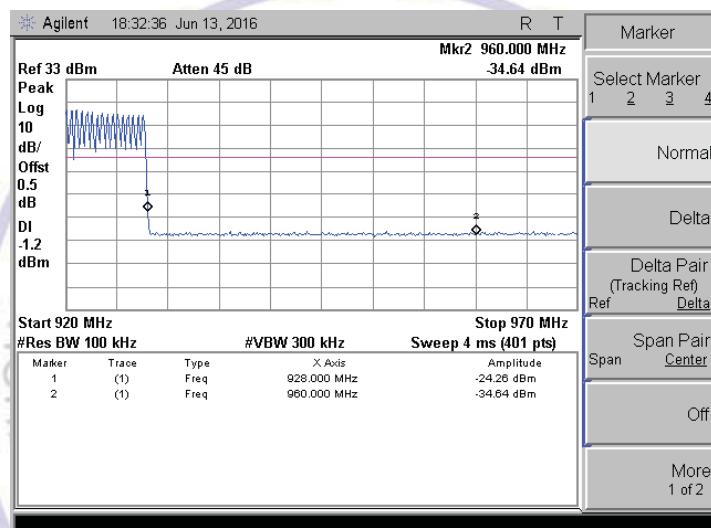
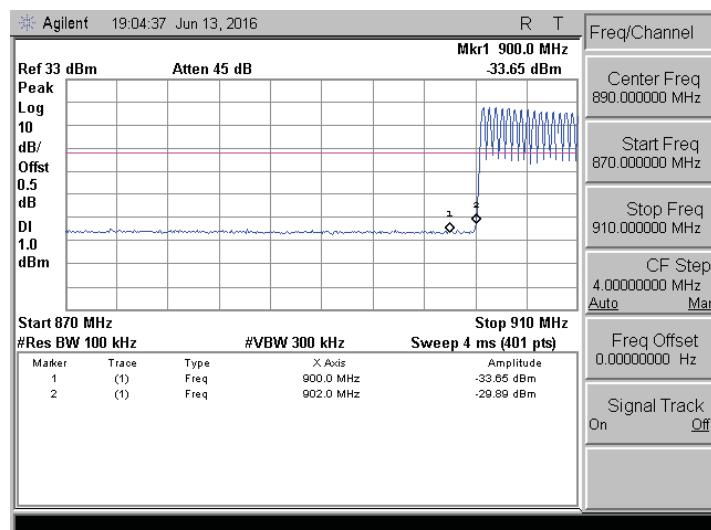
### Middle Channel



## High Channel

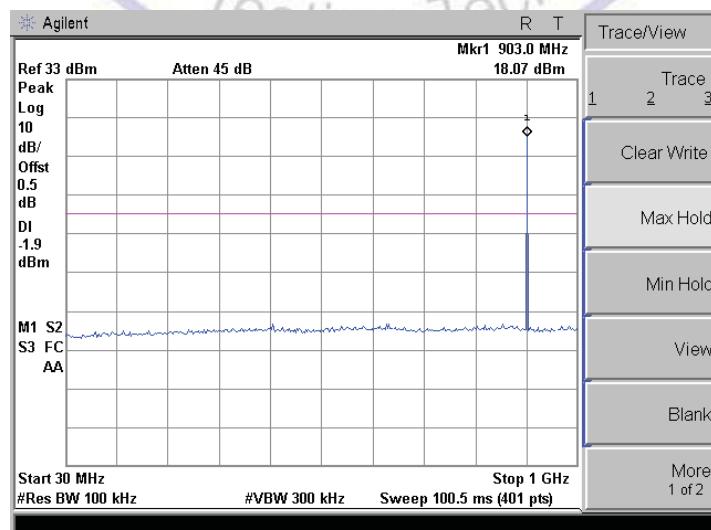


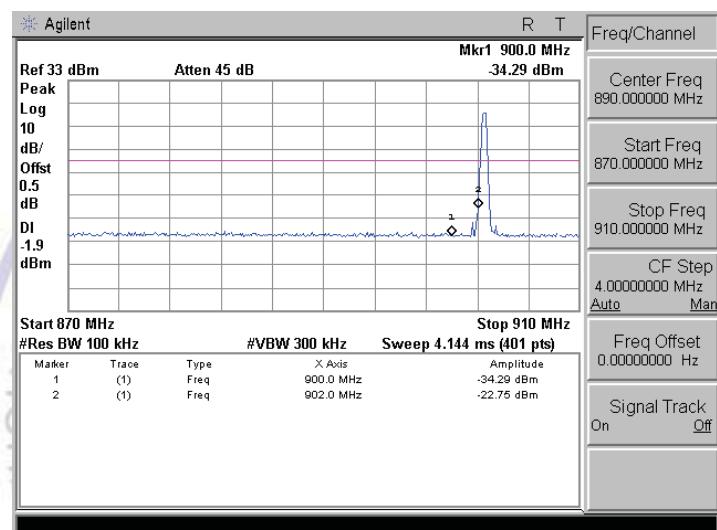
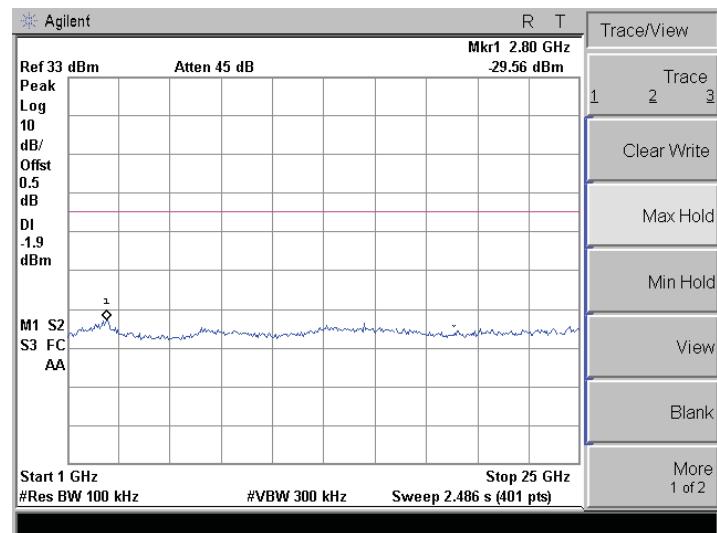
## Hopping Mode



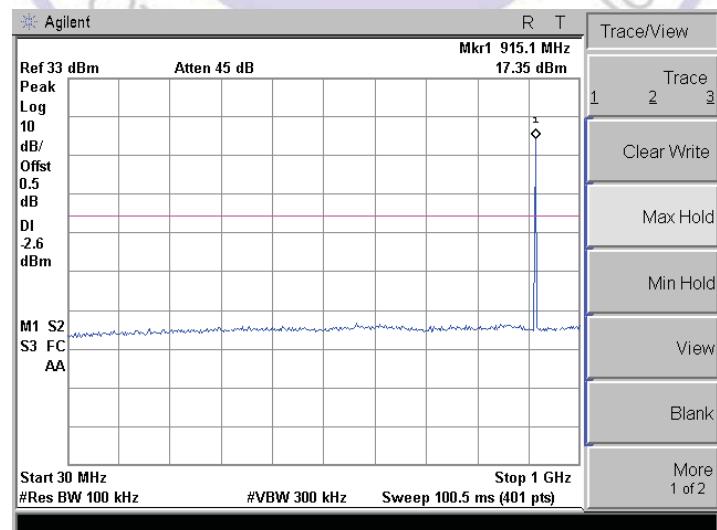
## Antenna 4:

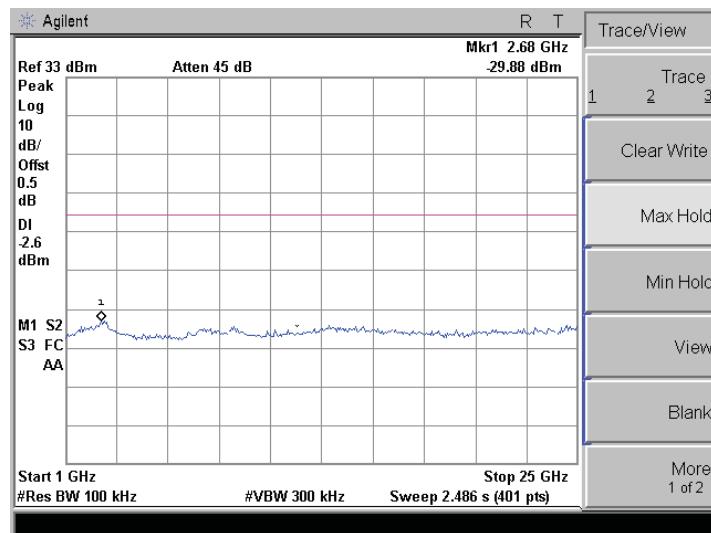
## Low Channel



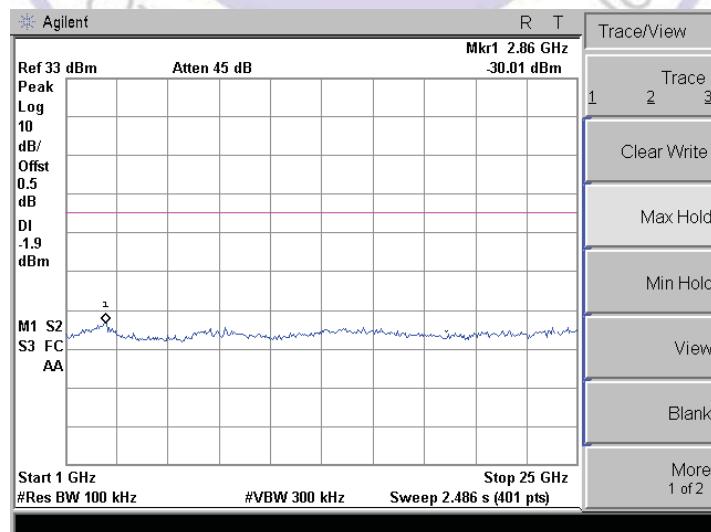
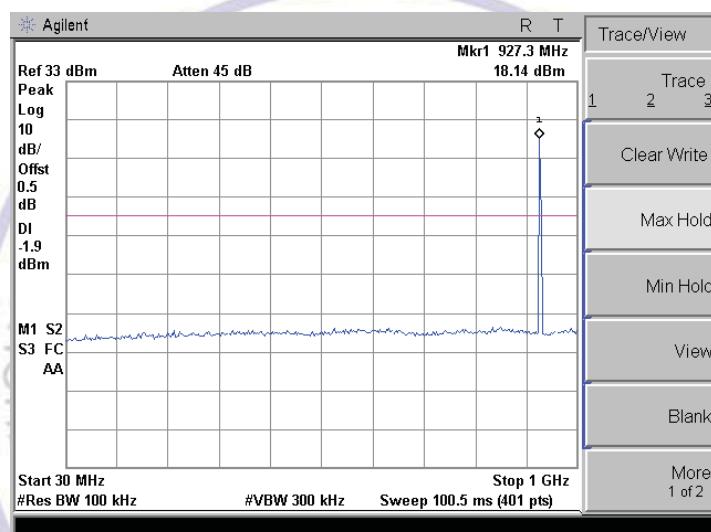


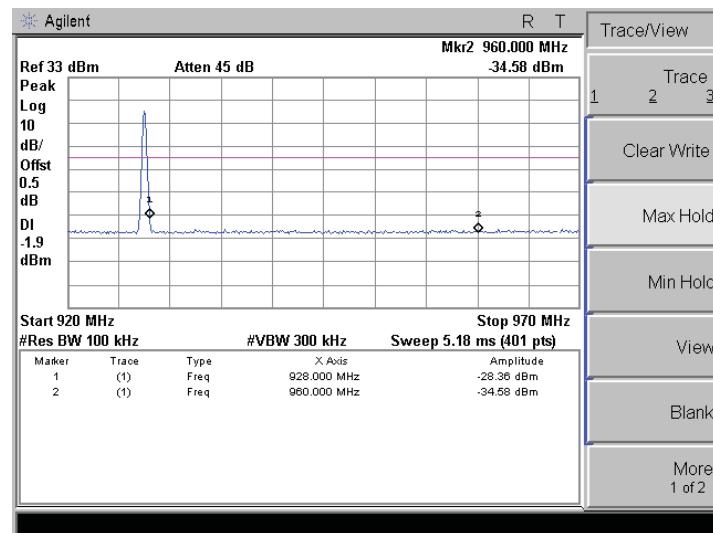
### Middle Channel



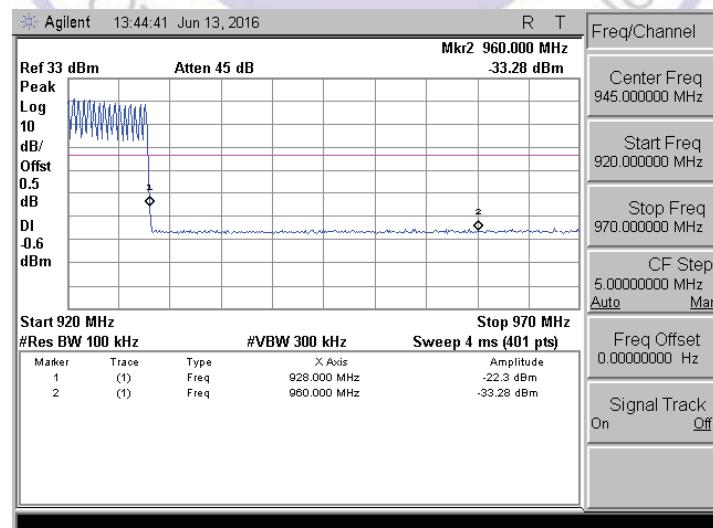
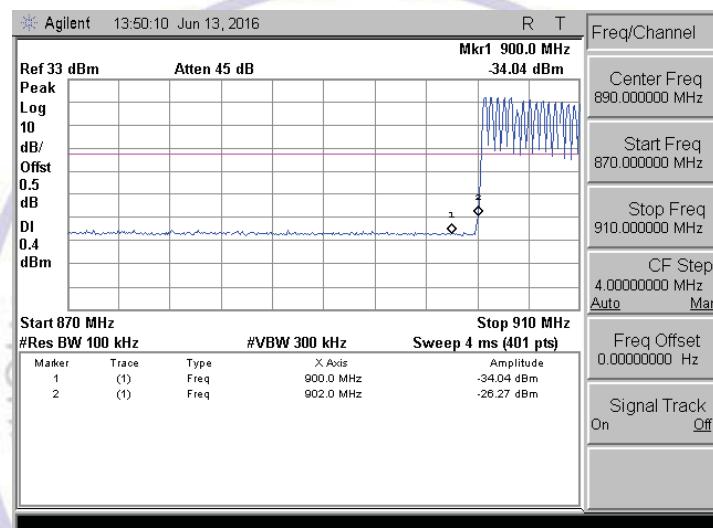


### High Channel





### Hopping Mode



## 4.9. Antenna Requirement

### Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

And according to FCC 47 CFR Section 15.247 (c), if 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 6dBi.

### Refer to statement below for compliance.

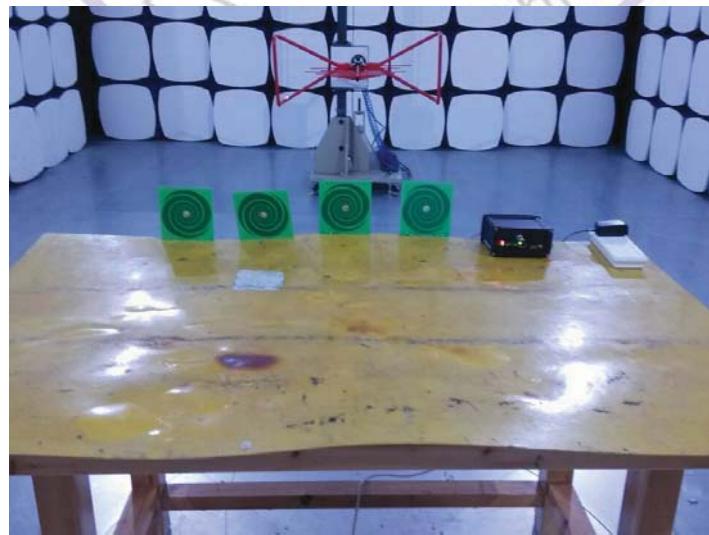
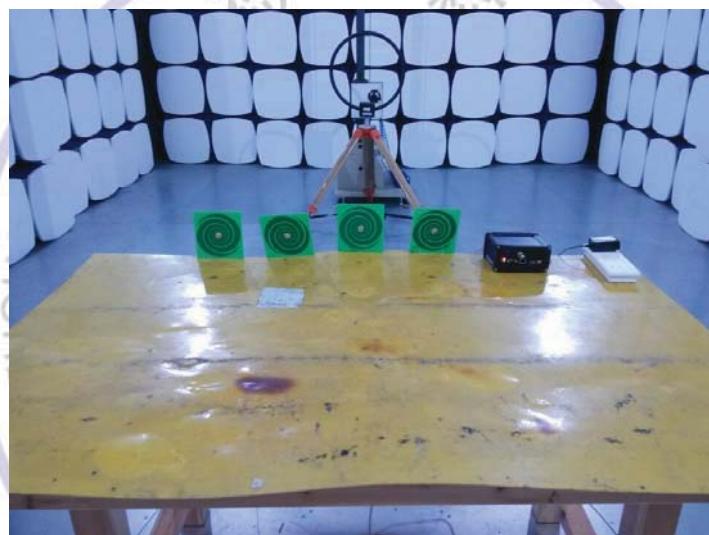
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

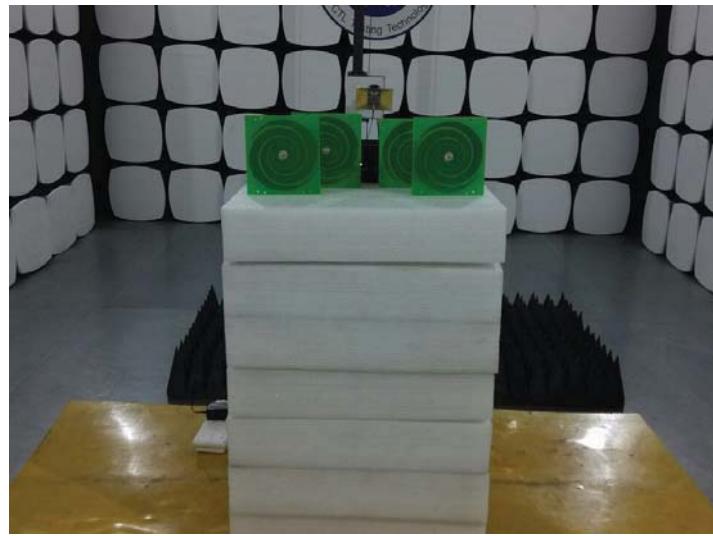
### Antenna Connected Construction

The antenna used in this product is external unstandard Antenna , The directional gains of antenna used for transmitting is 5 dBi.



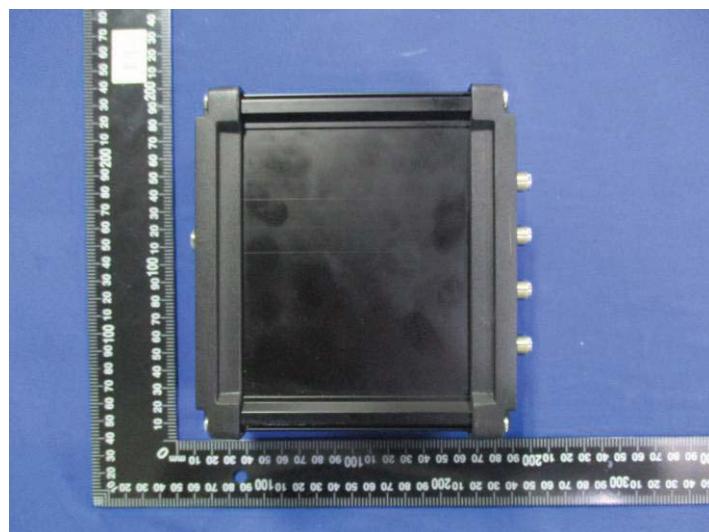
## 5. Test Setup Photos of the EUT



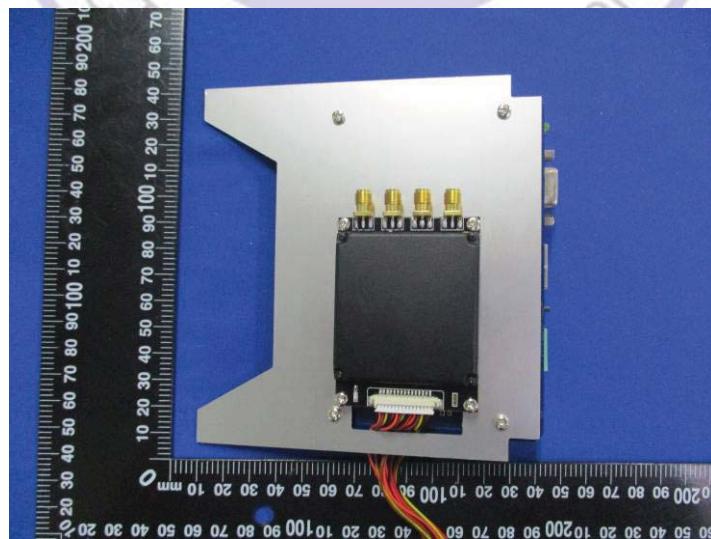
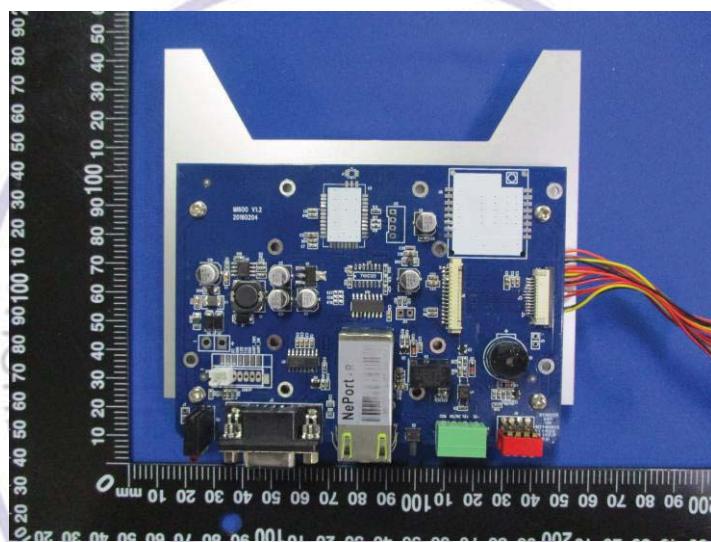


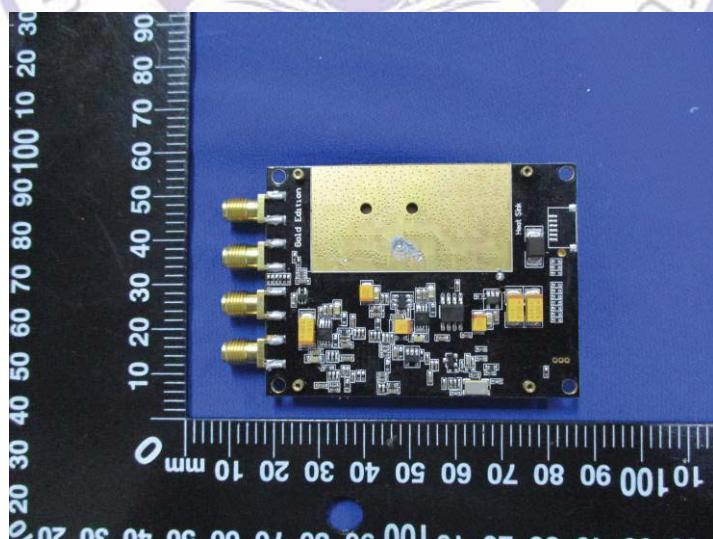
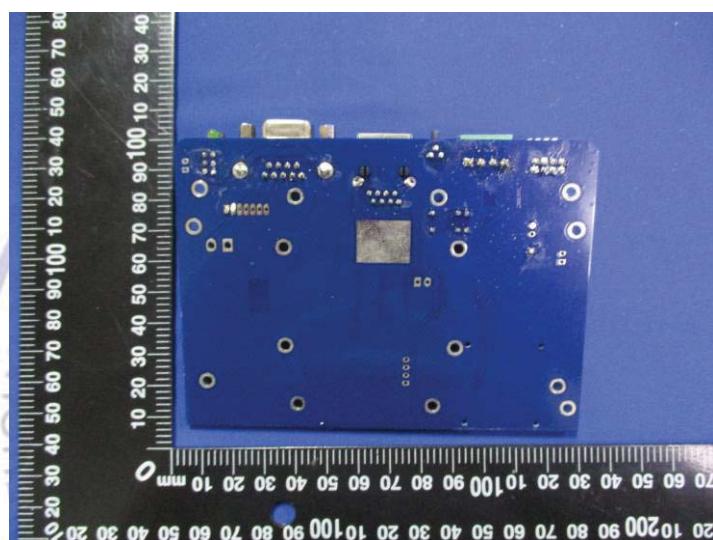
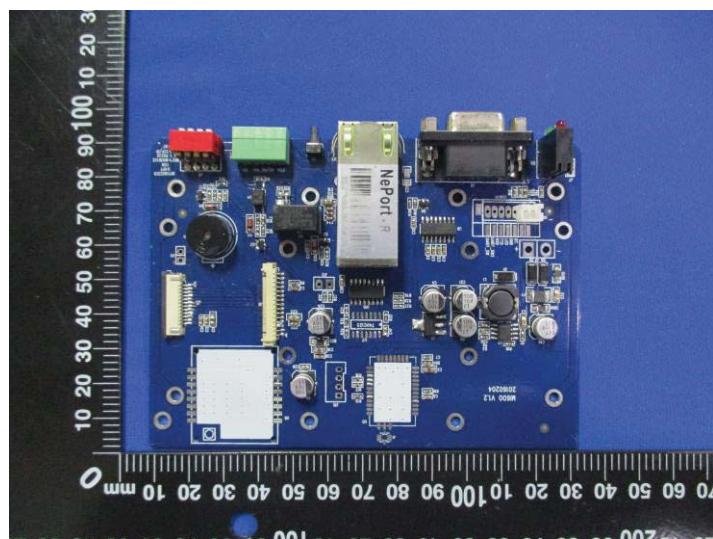
## 6. External and Internal Photos of the EUT

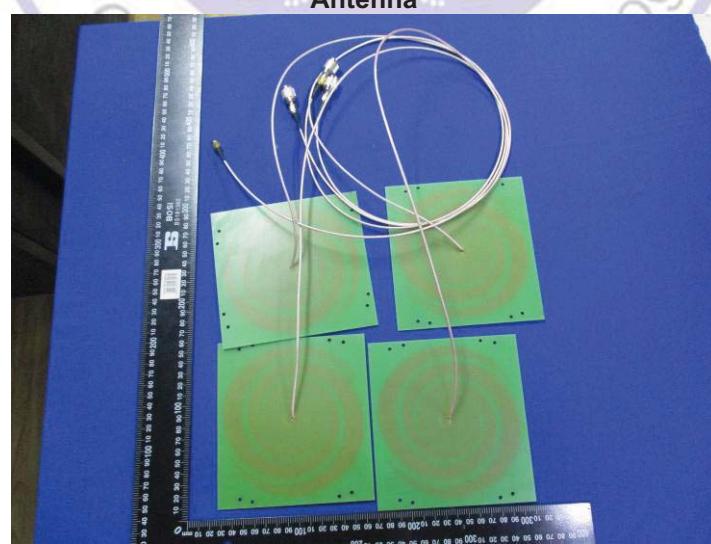
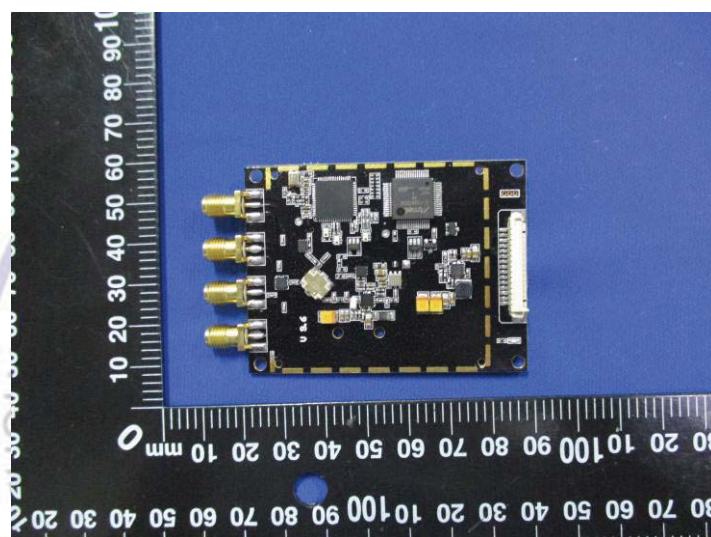
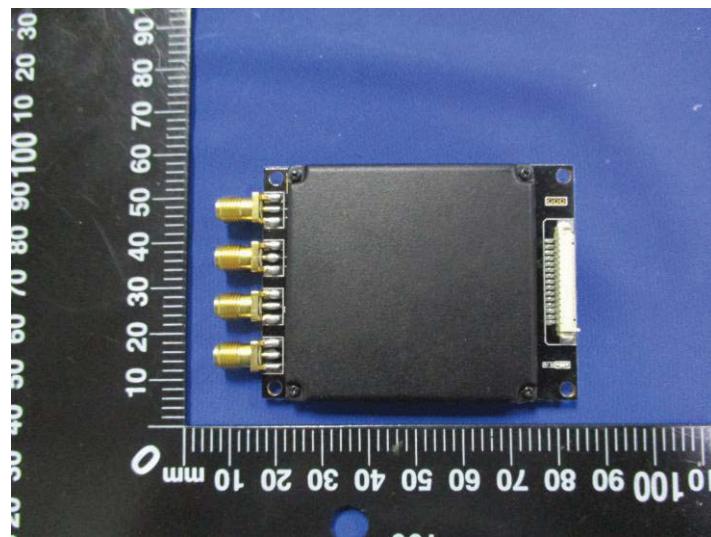
### External Photos of EUT





Internal Photos of EUT







.....End of Report.....