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FCC PART 15 SUBPART C TEST REPORT

Part 15.247

Report Reference No......: **CTL1412082952-WF**

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Tracy Qi

Date of issue.....: Dec. 30, 2014

Test Laboratory Name: **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.....: **Shenzhen Hollyland Technology Co.,Ltd**

Address: 6/F, 3rd Bldg., 2nd South Zone, Honghualing Industrial Park, No.1213 Liuxian Avenue, Xili Town, Nanshan District, Shenzhen, China P.C.518055

Test specification:

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

TRF Originator.....: Shenzhen CTL Testing Technology Co., Ltd.

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

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Test item description: **Wireless Video Transmission System**

FCC ID.....: **2ADZCHLWH003B**

Trade Mark: N/A

Model/Type reference: HLWH003B, HLWH005, HLWH006

Modulation: OFDM

Work Frequency Range: 5750MHz~5830MHz

Antenna Type: Undetachable

Antenna Gain.....: 2.5dBi

Result: **Positive**

TEST REPORT

Test Report No. : CTL1412082952-WF	Dec. 30, 2014
	Date of issue

Equipment under Test : Wireless Video Transmission System

Type / Model(s) : HLWH003B

Listed Models : HLWH005, HLWH006

Difference Description : Only the color and model's name is different

Applicant : **Shenzhen Hollyland Technology Co.,Ltd**

Address : 6/F, 3rd Bldg., 2nd South Zone, Honghualing Industrial Park, No.1213
Liuxian Avenue, Xili Town, Nanshan District, Shenzhen, China
P.C.518055

Manufacturer : **Shenzhen Hollyland Technology Co.,Ltd**

Address : 6/F, 3rd Bldg., 2nd South Zone, Honghualing Industrial Park, No.1213
Liuxian Avenue, Xili Town, Nanshan District, Shenzhen, China
P.C.518055

Test Result according to the standards on page 4:	Positive
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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 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 C63.10-2009](#): American National Standard for Testing Unlicensed Wireless Devices.

[ANSI C63.4-2009](#)

[KDB Publication No. 558074 D01 v03r02 Guidance on Measurements for Digital Transmission Systems](#)



2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Dec. 10, 2014
Testing commenced on	:	Dec. 10, 2014
Testing concluded on	:	Jan. 21, 2015

2.2. Equipment Under Test

Power supply system utilised

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

DC 7.4V from battery

Channel list:

Channel	Frequency(MHz)
1	5750
2	5790
3	5830

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

Wireless Video Transmission System, work range 5750~5830 MHz.

For more details, refer to the user's manual of the EUT.

Serial number: Prototype

2.4. EUT operation mode

Test Mode:

1. Test program used to control the EUT for staying in continuous transmitting mode is programmed. Channel low (5750MHz), mid (5790MHz) and high (5830MHz) with highest data rate are chosen for full testing.
2. Test Mode:

Test Mode(TM)	Description	Remark
1	Transmitting	5750MHz
2	Transmitting	5790MHz
3	Transmitting	5830MHz

2.5. EUT configuration

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

- supplied by the manufacturer

- supplied by the lab

Battery

Manufacturer: Jingnengte

Model: F970

2.6. NOTE

The EUT is a Wireless Video Transmission System, The functions of the EUT listed as below:

	Test Standards	Reference Report
Wireless Video Transmission System(5750-5830MHz)	FCC Part 15 Subpart C (Section15.247)	CTL1412082952-WF
	FCC Per 47 CFR 2.1091(b)	CTL1412082952-WM

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

This submittal(s) (test report) is intended for FCCID: 2ADZCHLWH003B filing to comply with of the FCC part15.247 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 C6230, ANSI C63.4 (2009) 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.

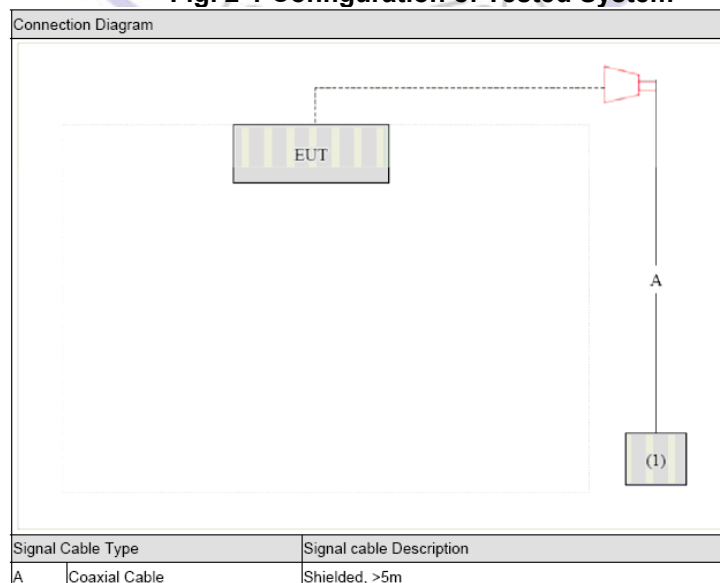
3.3. Environmental conditions

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

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

3.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System



3.5. Duty Cycle

Operated Mode for Worst Duty Cycle		
<input type="checkbox"/> Operated normally mode for worst duty cycle		
<input checked="" type="checkbox"/> Operated test mode for worst duty cycle		
Test Mode	Duty Cycle (%)	Duty Factor (dB)
1	100	0
2	100	0
3	100	0

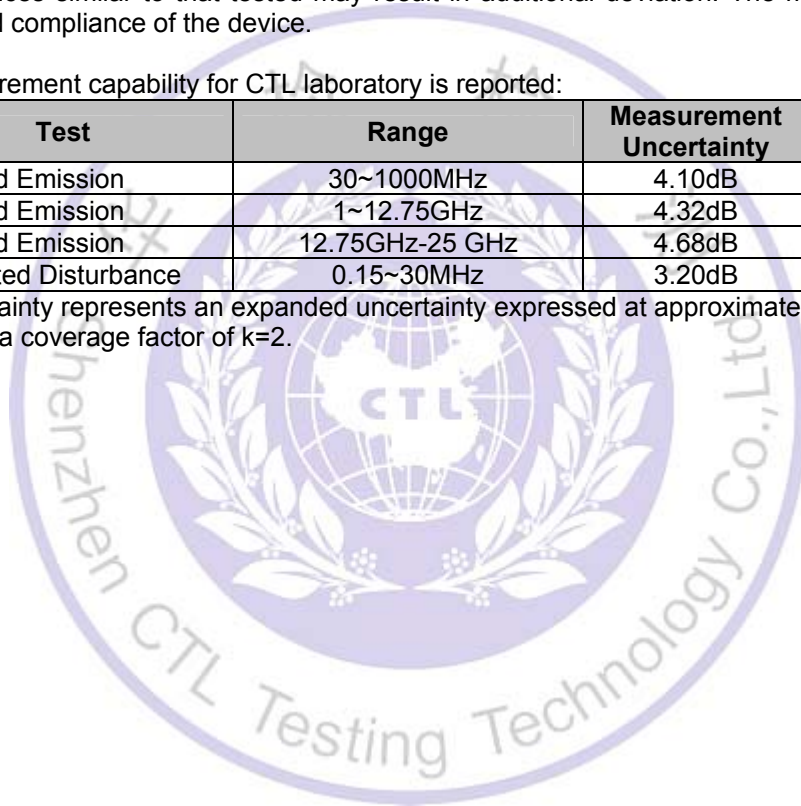
3.6. Statement of the measurement uncertainty

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	1~12.75GHz	4.32dB	(1)
Radiated Emission	12.75GHz-25 GHz	4.68dB	(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.



3.7. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2014/07/12	2015/07/11
EMI Test Receiver	R&S	ESCI	103710	2014/07/10	2015/07/09
Spectrum Analyzer	Agilent	E4407B	MY45108355	2014/07/06	2015/07/05
Controller	EM Electronics	Controller EM 1000	N/A	2014/07/06	2015/07/05
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2014/07/12	2015/07/11
Horn Antenna	SCHWARZBECK	BBHA9170	1562	2014/07/12	2015/07/11
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2014/07/12	2015/07/11
LISN	R&S	ENV216	101316	2014/07/10	2015/07/09
LISN	SCHWARZBECK	NSLK8127	8127687	2014/07/10	2015/07/09
Microwave Preamplifier	HP	8349B	3155A00882	2014/07/10	2015/07/09
Amplifier	HP	8447D	3113A07663	2014/07/10	2015/07/09
Transient Limiter	Com-Power	LIT-153	532226	2014/07/10	2015/07/09
Radio Communication Tester	R&S	CMU200	3655A03522	2014/07/06	2015/07/05
Temperature/Humidity Meter	zhicheng	ZC1-2	22522	2014/07/10	2015/07/09
SIGNAL GENERATOR	HP	8647A	3200A00852	2014/07/10	2015/07/09
Wideband Peak Power Meter	Anritsu	ML2495A	220.23.35	2014/07/06	2015/07/05
Power Sensor	Anritsu	MA2411B	0738552	2014/07/06	2015/07/05
Climate Chamber	ESPEC	EL-10KA	A20120523	2014/07/06	2015/07/05
High-Pass Filter	K&L	9SH10-2700/X12750-O/O	/	2014/07/06	2015/07/05
High-Pass Filter	K&L	41H10-1375/U12750-O/O	/	2014/07/06	2015/07/05
RF Cable	HUBER+SUHNER	RG214	/	2014/07/09	2015/07/08

3.8. Summary of Test Result

FCC PART 15		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Peak Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge Compliance of RF Emission	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

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

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Test Mode	Data Rate	Channel
Maximum Peak Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission	1	150 Mbps	1/2/3
	2	150 Mbps	1/2/3
	3	150 Mbps	1/2/3
Radiated Emission 30MHz~1GHz	1	150 Mbps	1/2/3
	2	150 Mbps	1/2/3
	3	150 Mbps	1/2/3
Radiated Emission 1GHz~10th Harmonic	1	150 Mbps	1/2/3
	2	150 Mbps	1/2/3
	3	150 Mbps	1/2/3
Band Edge Compliance of RF Emission	1	150 Mbps	1/3
	2	150 Mbps	1/3
	3	150 Mbps	1/3

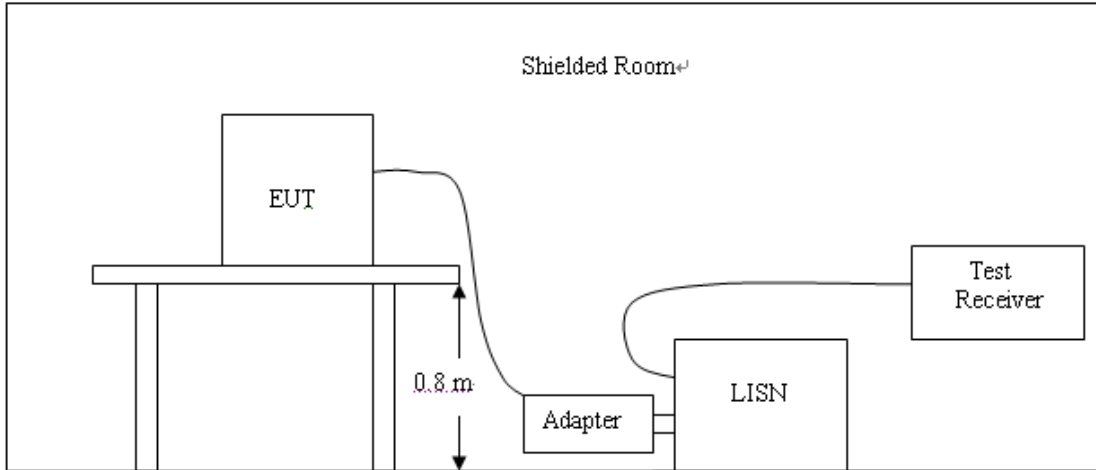
Note1: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.

Note2: This device use MIMO 2X2 antennas, all the radiated spurious emissions and band edge test were performed with two antennas transmit synchronous.

4. TEST CONDITIONS AND RESULTS

4.1. Conducted Emissions Test

TEST CONFIGURATION



TEST PROCEDURE

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following:

Frequency (MHz)	Maximum RF Line Voltage (dBµV)			
	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

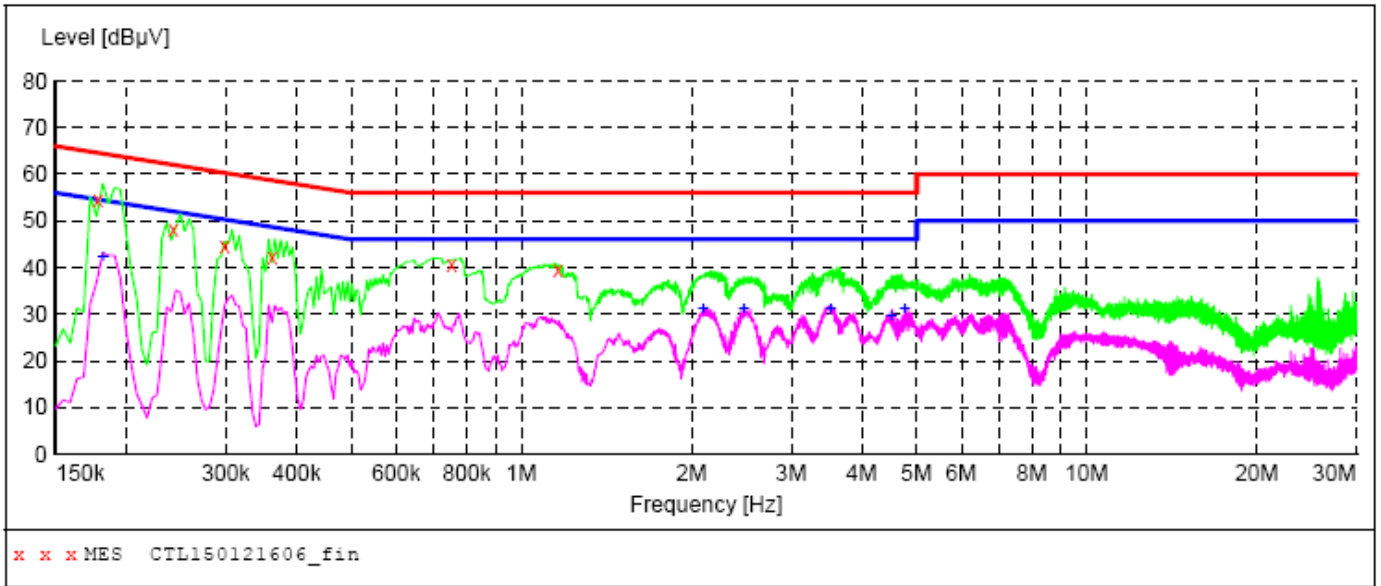
For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

1. Please follow the guidelines in ANSI C63.4-2009.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

TEST RESULTS

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL150121606_fin"

1/21/2015 1:41PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.178000	54.50	10.2	65	10.1	QP	L1	GND
0.242000	48.10	10.2	62	13.9	QP	L1	GND
0.298000	44.80	10.2	60	15.5	QP	L1	GND
0.362000	42.10	10.2	59	16.6	QP	L1	GND
0.752000	40.80	10.2	56	15.2	QP	L1	GND
1.160000	39.60	10.3	56	16.4	QP	L1	GND

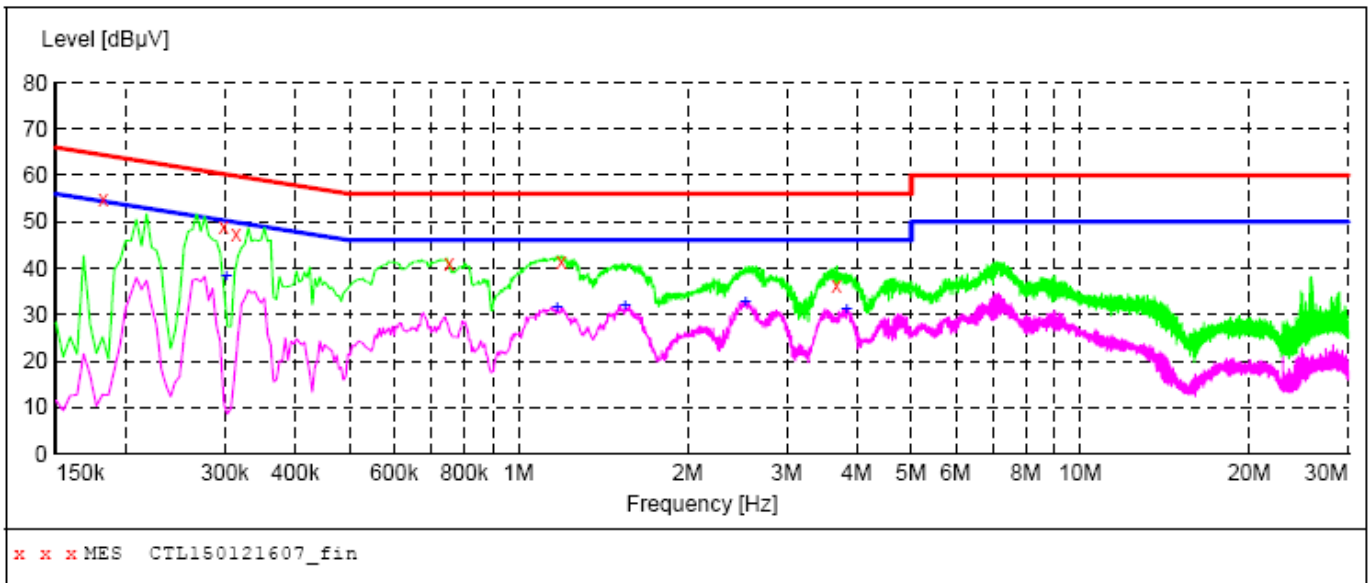
MEASUREMENT RESULT: "CTL150121606_fin2"

1/21/2015 1:41PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.182000	42.30	10.2	54	12.1	AV	L1	GND
2.096000	31.00	10.4	46	15.0	AV	L1	GND
2.474000	31.20	10.4	46	14.8	AV	L1	GND
3.524000	31.20	10.4	46	14.8	AV	L1	GND
4.514000	29.60	10.4	46	16.4	AV	L1	GND
4.766000	31.10	10.4	46	14.9	AV	L1	GND

SCAN TABLE: "Voltage (9K-30M) FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL150121607_fin"

1/21/2015 1:45PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.182000	54.70	10.2	64	9.7	QP	N	GND
0.298000	48.80	10.2	60	11.5	QP	N	GND
0.314000	47.20	10.2	60	12.7	QP	N	GND
0.752000	40.90	10.2	56	15.1	QP	N	GND
1.190000	41.40	10.3	56	14.6	QP	N	GND
3.680000	36.20	10.4	56	19.8	QP	N	GND

MEASUREMENT RESULT: "CTL150121607_fin2"

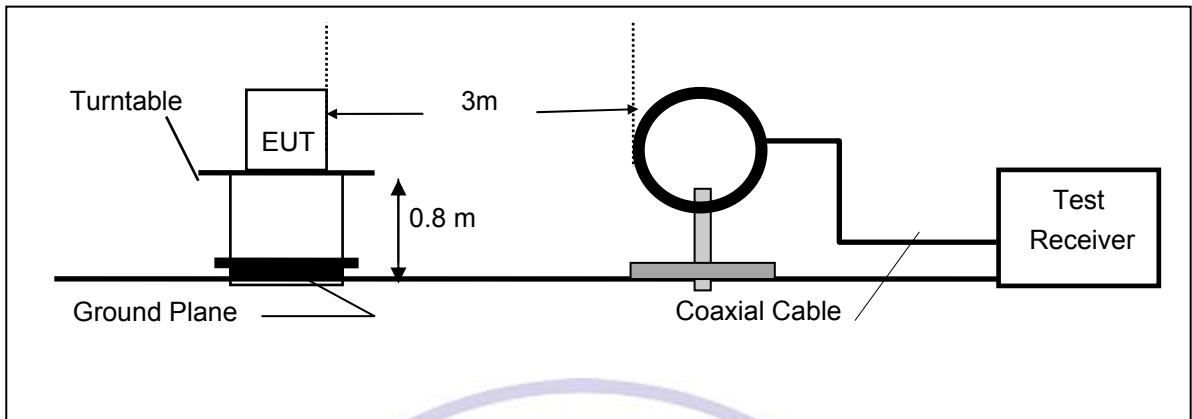
1/21/2015 1:45PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.302000	38.30	10.2	50	11.9	AV	N	GND
1.172000	31.40	10.3	46	14.6	AV	N	GND
1.550000	32.00	10.3	46	14.0	AV	N	GND
2.534000	32.70	10.4	46	13.3	AV	N	GND
3.836000	31.00	10.4	46	15.0	AV	N	GND

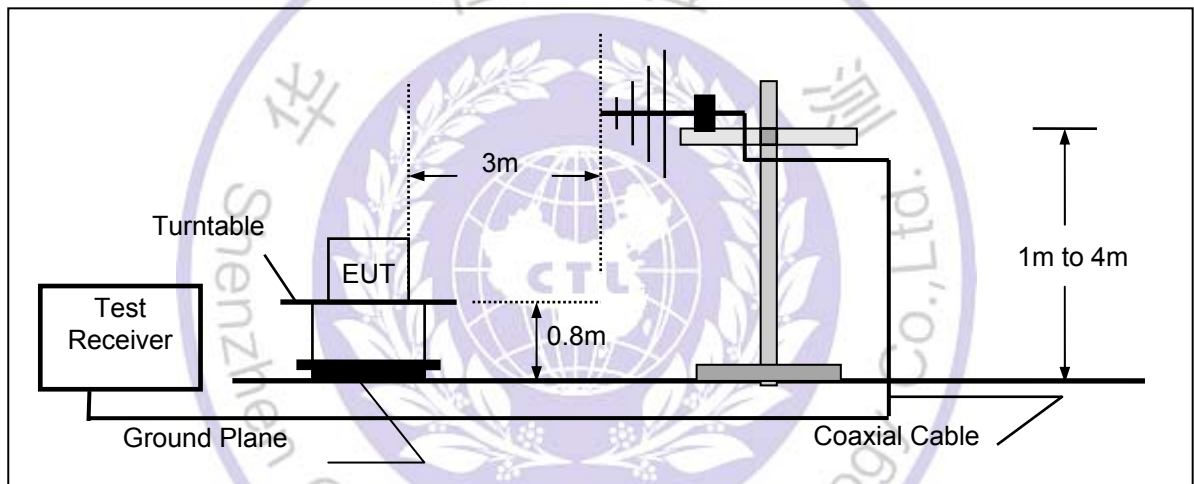
4.2. Radiated Emission Test

TEST CONFIGURATION

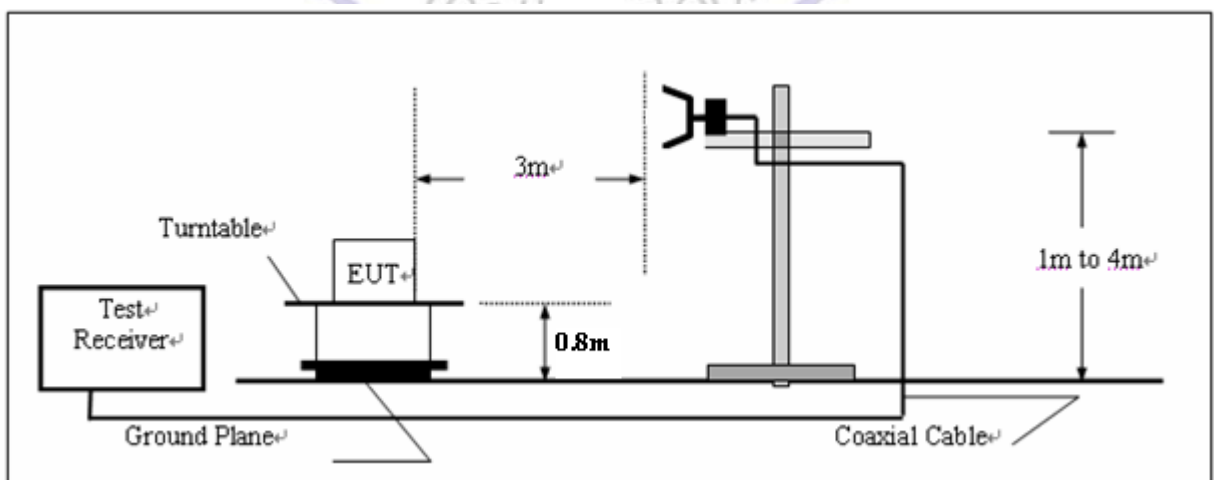
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



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	

TEST PROCEDURE

1. The testing follows FCC KDB Publication No. 558074 D01 v03r02 (Measurement Guidelines of DTS).
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f > 1 GHz, 100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Repeat above procedures until all frequency measurements have been completed.

Note:

When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 60 degrees for H-plane and 90 degrees for E-plane.

Remark : For above 1GHz, RBW 1MHz, VBW 3MHz, Peak detector for PK value, RMS detector for AV value.

LIMIT

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/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

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above 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 the 100kHz bandwidth within the band that contains the highest level of 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.

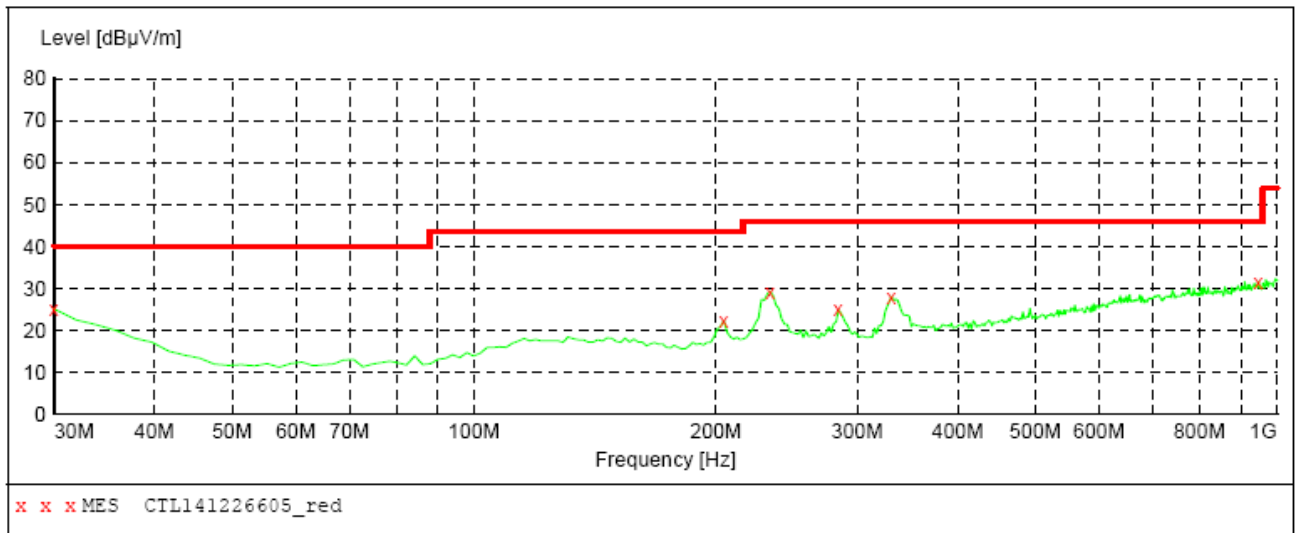
Distance extrapolation factor= 40 log (specific distance/ test distance) (dB);
 Limit line= specific limits (dBuV) + distance extrapolation factor.

Below 1GHz:

The radiated measurement are performed the each test mode, the datum recorded below (mode1) is the worst case for all the test mode and channel.

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

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



MEASUREMENT RESULT: "CTL141226605_red"

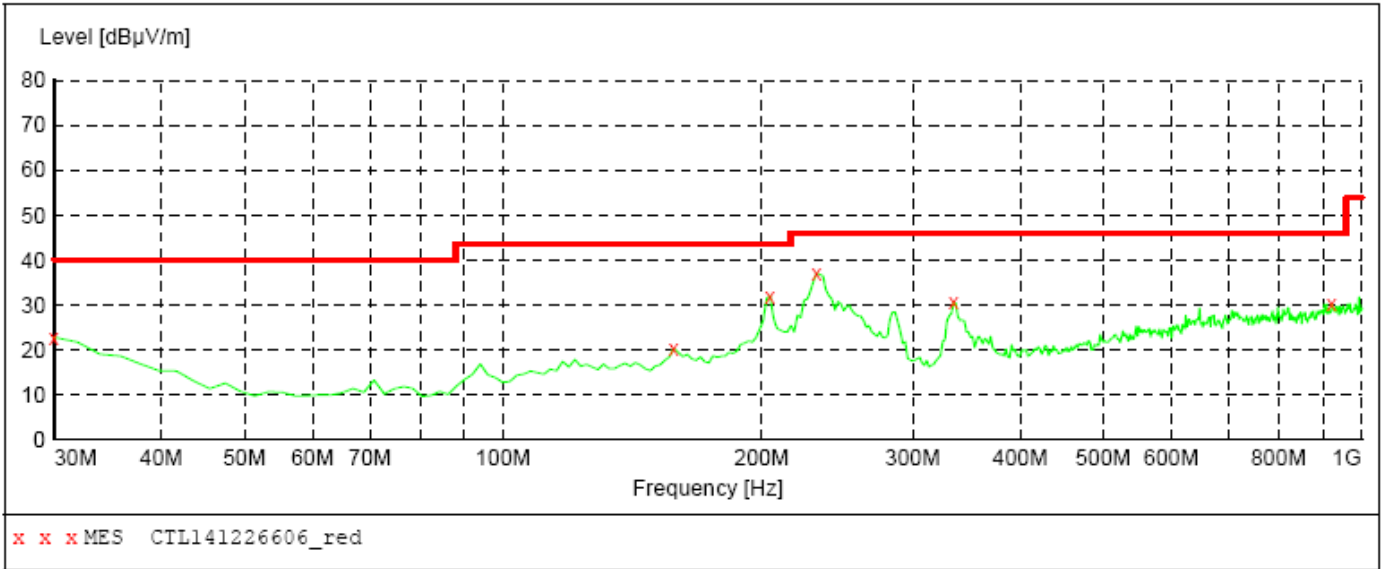
12/26/2014 9:25AM

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	25.00	21.1	40.0	15.0	---	0.0	0.00	HORIZONTAL
204.600000	22.30	14.4	43.5	21.2	---	0.0	0.00	HORIZONTAL
233.700000	29.20	14.1	46.0	16.8	---	0.0	0.00	HORIZONTAL
284.140000	24.90	15.4	46.0	21.1	---	0.0	0.00	HORIZONTAL
330.700000	28.00	16.3	46.0	18.0	---	0.0	0.00	HORIZONTAL
947.620000	31.60	26.6	46.0	14.4	---	0.0	0.00	HORIZONTAL

Remark: During the test the EUT was keeping MIMO TX mode.

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

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

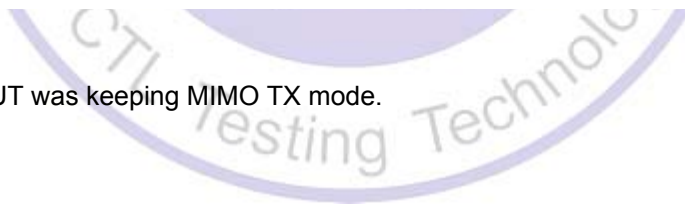


MEASUREMENT RESULT: "CTL141226606_red"

12/26/2014 9:26AM

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	22.70	21.1	40.0	17.3	---	0.0	0.00	VERTICAL
158.040000	20.30	14.0	43.5	23.2	---	0.0	0.00	VERTICAL
204.600000	32.00	14.4	43.5	11.5	---	0.0	0.00	VERTICAL
231.760000	37.00	14.1	46.0	9.0	---	0.0	0.00	VERTICAL
334.580000	30.70	16.4	46.0	15.3	---	0.0	0.00	VERTICAL
922.400000	30.20	26.3	46.0	15.8	---	0.0	0.00	VERTICAL

Remark: During the test the EUT was keeping MIMO TX mode.



Above 1GHz:

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	V	5750.0	101.2	8.52	109.7	Fundamental	/	PK
	V	182.9	13.6	14.87	28.5	46	17.5	QP
	V	521.6	15.3	19.76	35.1	46	10.9	QP
	V	3200.0	46.1	1.25	47.3	54(note3)	6.7	PK
	V	7803.0	38.8	11.67	50.5	54(note3)	3.5	PK
	V	11500.1	50.0	18.87	68.9	74	5.1	PK
	V	11500.4	30.7	18.87	49.6	54	4.4	AV
	H	17250.0	18.8	34.05	52.8	54(note3)	1.2	PK
	V	----	----	----	----	----	----	----
6	V	5790.0	100.5	8.61	109.1	Fundamental	/	PK
	V	314.3	16.7	13.94	30.6	46	15.4	QP
	V	609.8	14.9	19.25	34.1	46	11.9	QP
	V	3200.0	45.1	1.25	46.3	54(note3)	7.7	PK
	V	7876.0	40.2	12.16	52.4	54(note3)	1.6	PK
	V	11580.1	50.4	18.91	69.3	74	4.7	PK
	V	11580.3	32.1	18.91	51.0	54	3.0	AV
	H	17370.0	17.8	34.93	52.7	54(note3)	1.3	PK
	V	----	----	----	----	----	----	----
11	V	5830.0	100.3	8.63	108.9	Fundamental	/	PK
	V	443.1	15.8	13.59	29.4	46	16.6	QP
	H	512.9	12.7	19.01	31.7	46	14.3	QP
	V	3200.0	44.6	1.25	45.8	54(note3)	8.2	PK
	V	7927.0	39.5	12.22	51.7	54(note3)	2.3	PK
	V	11660.5	49.8	19.16	69.0	74	5.0	PK
	V	11660.0	32.6	19.16	51.8	54	2.2	AV
	H	17490.0	17.4	34.97	52.4	54(note3)	1.6	PK
	V	----	----	----	----	----	----	----

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

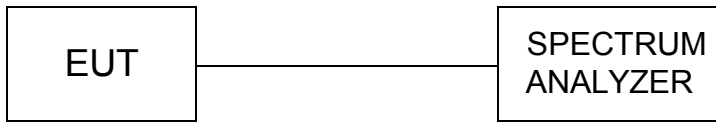
2. The test results which are attenuated more than 20 dB below the permissible value limit (the test frequency range: 9kHz~30MHz, 18GHz~40GHz), therefore no data appear in the report.

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.

4. ---- means that the emission level is too low to be measured or at least 20 dB down than the limit.

4.3. 6dB Bandwidth Measurement

TEST CONFIGURATION



TEST PROCEDURE

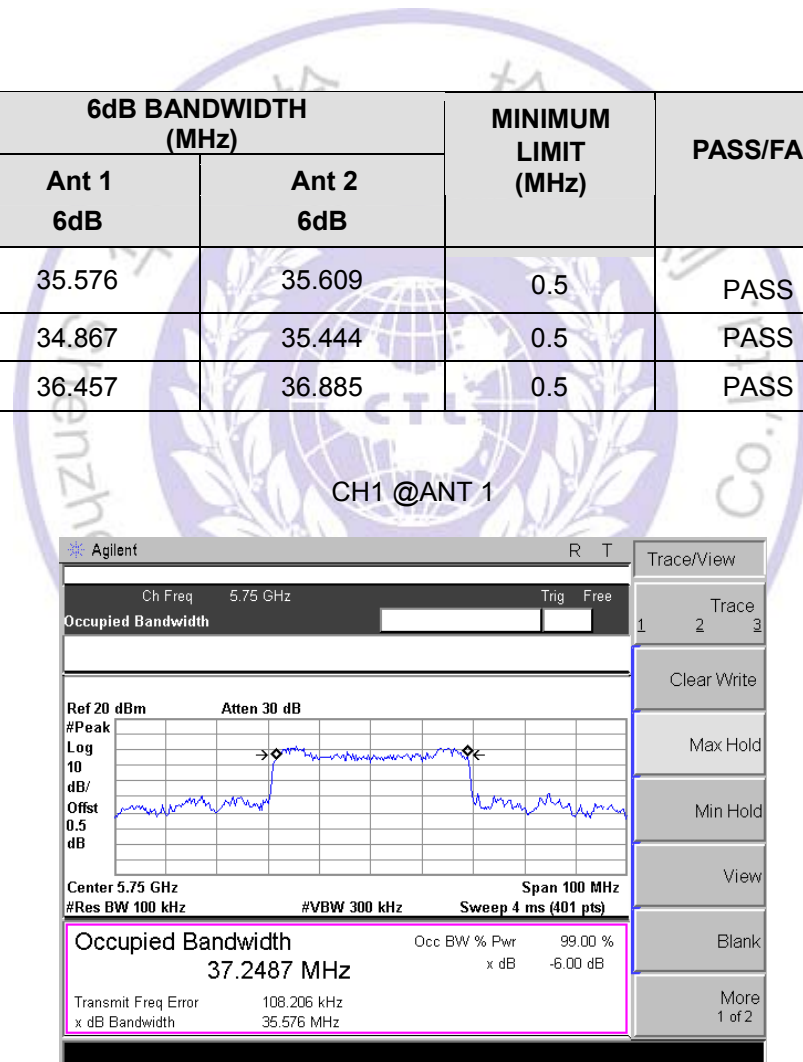
1. The testing follows FCC KDB Publication No. 558074 D01 v03r02 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.
4. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

LIMIT

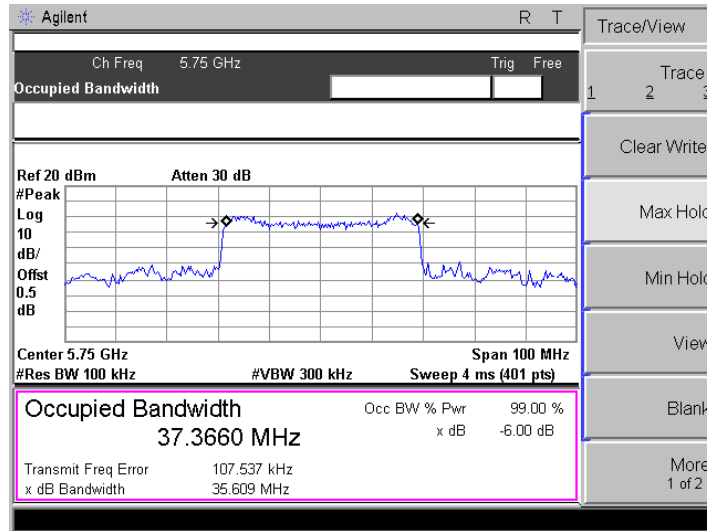
For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST RESULTS

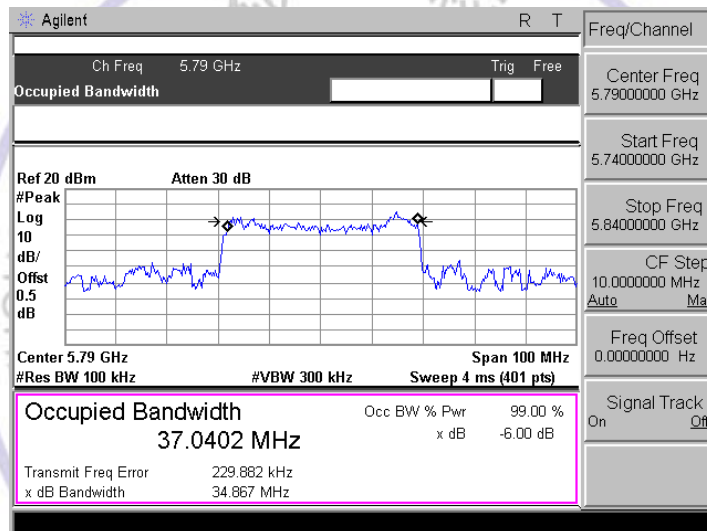
CHANNEL	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS/FAIL
	Ant 1 6dB	Ant 2 6dB		
1	35.576	35.609	0.5	PASS
2	34.867	35.444	0.5	PASS
3	36.457	36.885	0.5	PASS



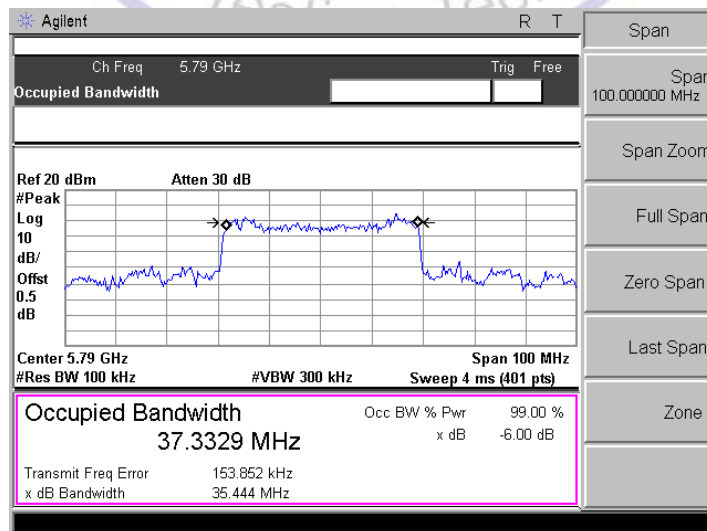
CH1 @ANT 2



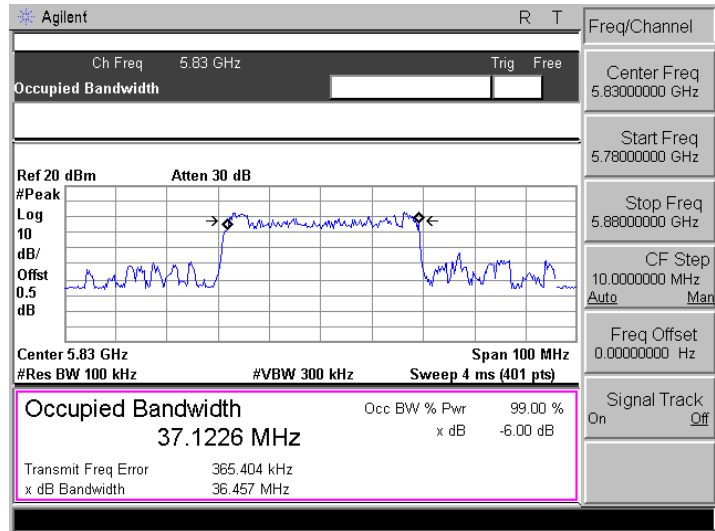
CH2 @ANT 1



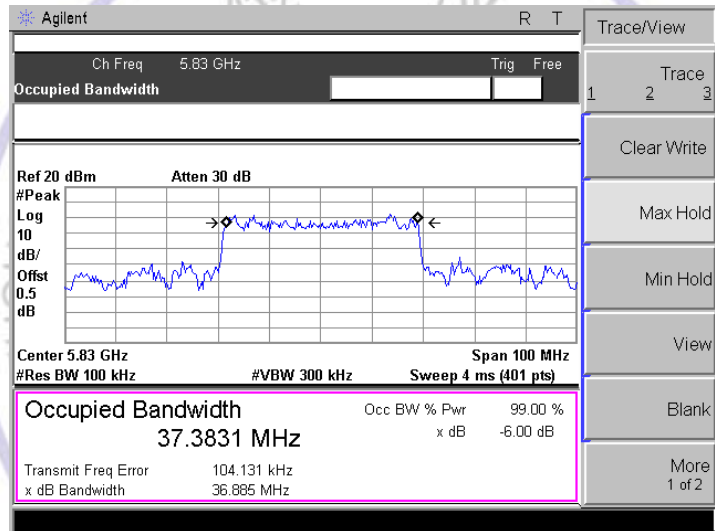
CH2 @ANT 2



CH3 @ANT 1

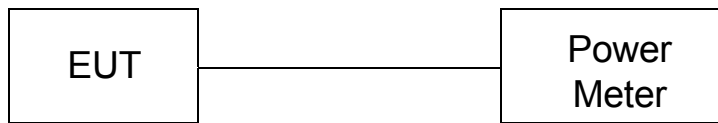


CH3 @ANT 2



4.4. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to C63.10 -2009 and KDB558074 D01 v03r02, 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 Peak Output Power Measurement limits are 30dBm.

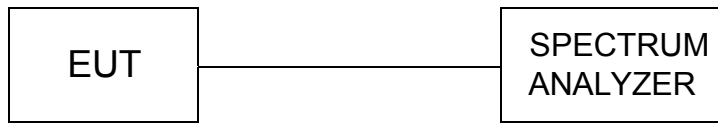
TEST RESULTS

Channel	Peak Power Output (dBm)			Peak Power Limit (dBm)	PASS / FAIL
	Ant1	Ant 2	Total		
1	9.93	9.75	12.85	30	PASS
2	9.72	9.83	12.79	30	PASS
3	9.69	9.87	12.79	30	PASS

Note: The test results including the cable lose.

4.5. Band Edge Measurement

TEST CONFIGURATION



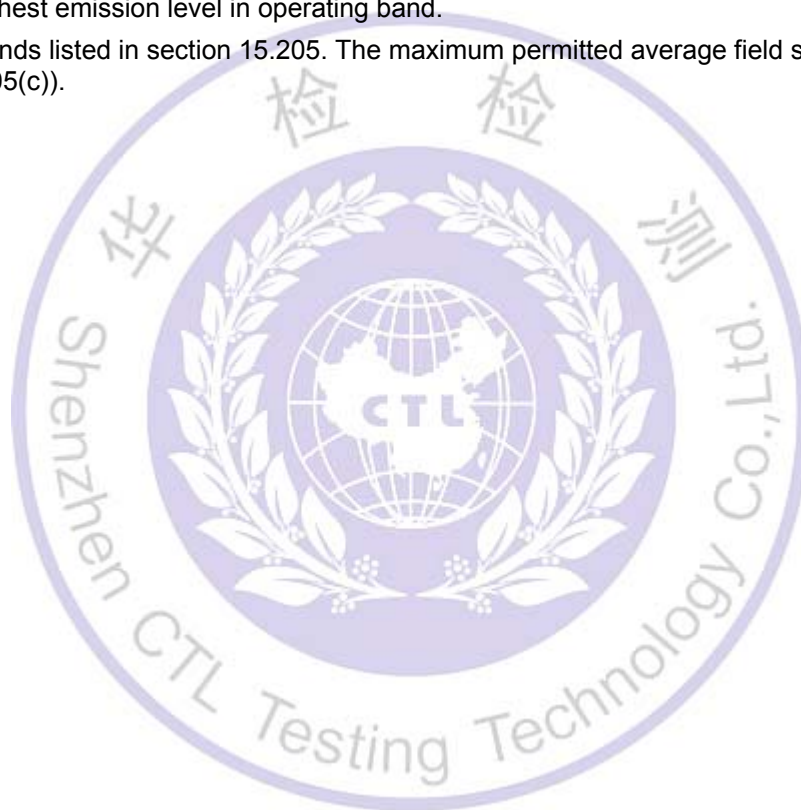
TEST PROCEDURE

For above 1GHz, RBW 1MHz, VBW 3MHz, Peak detector for PK value, RMS detector for AV value.

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel.

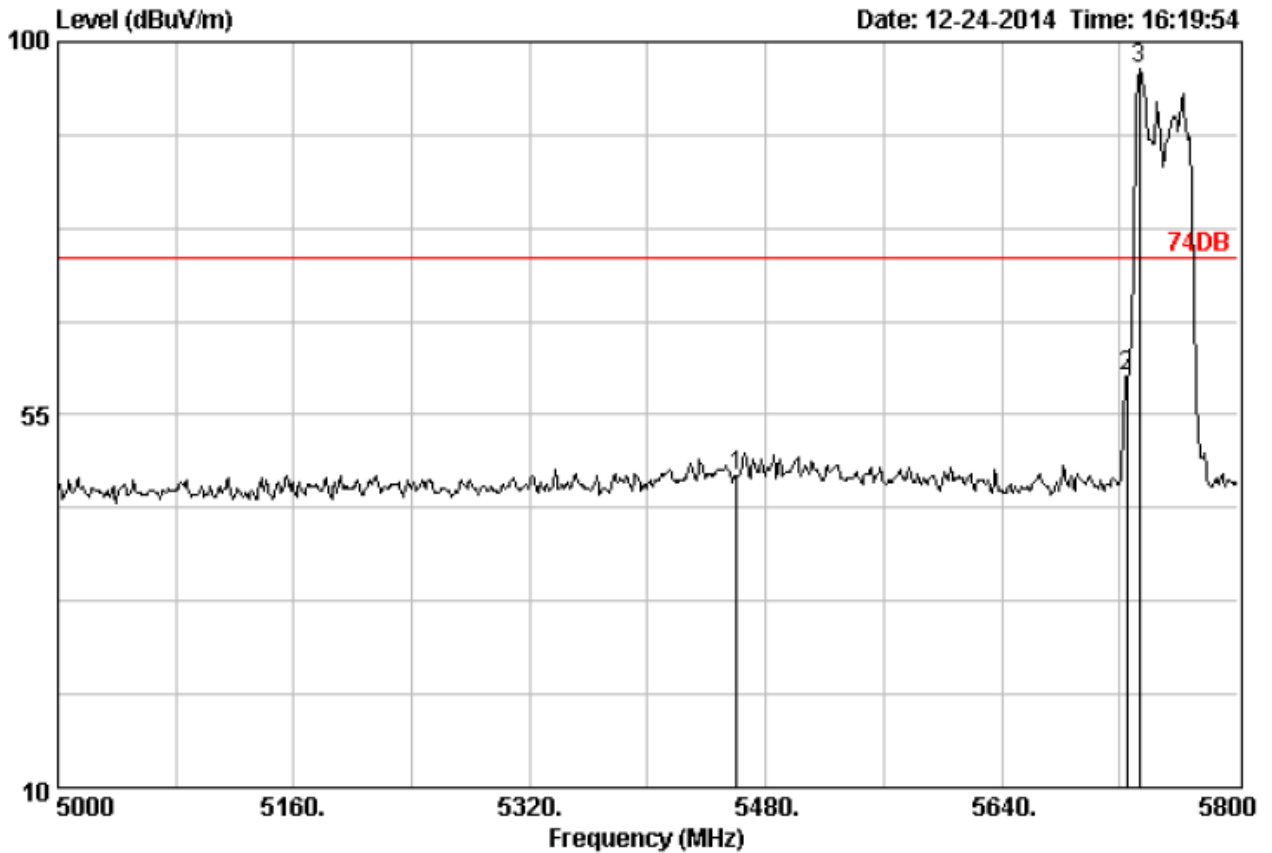
LIMIT

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209(see Section 15.205(c)).



TEST RESULTS

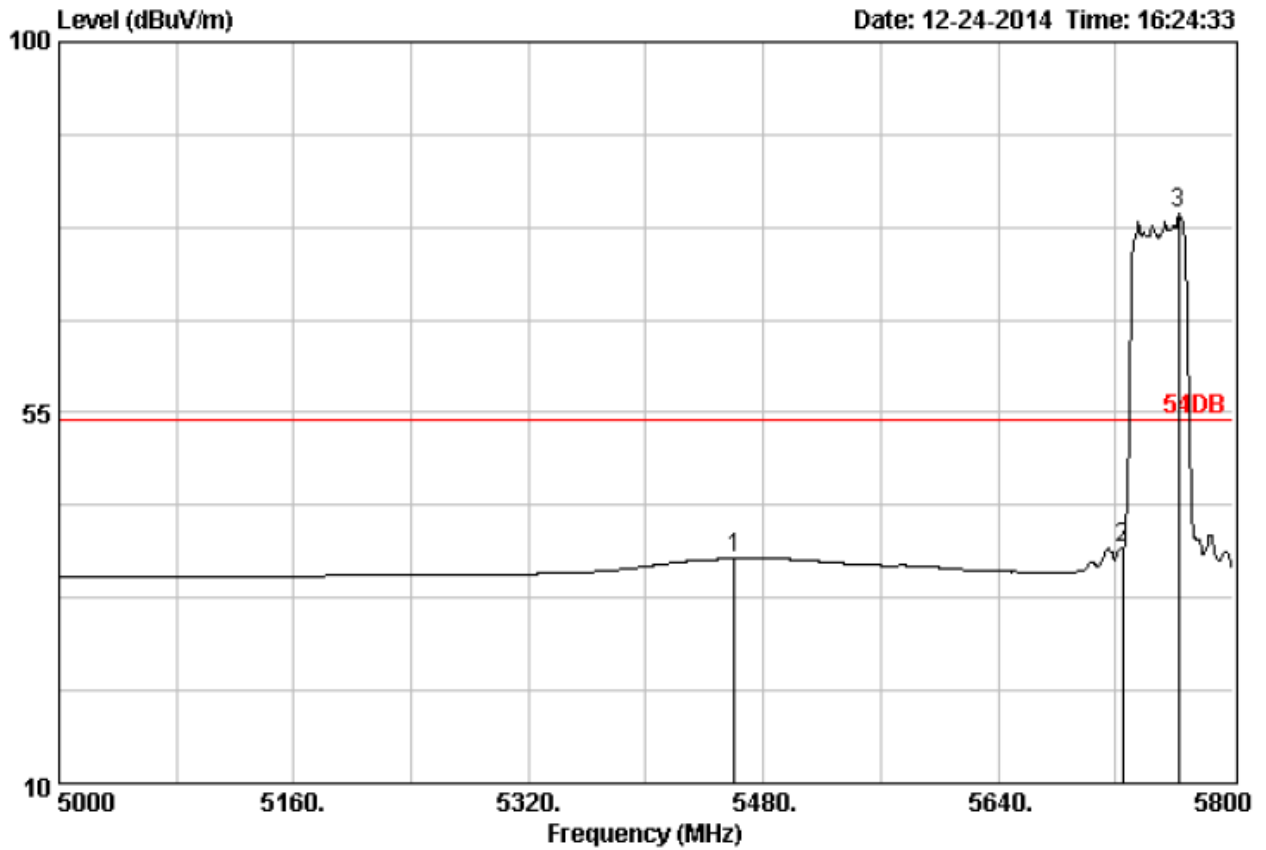
KEEPING MIMO TX MODE Mode:



```

Site no.      : 3m Chamber           Data no. : 1348
Dis. / Ant.  : 3m DRH-118          Ant. pol. : HORIZONTAL
Limit        : 74DB
Env. / Ins.  : 23*C/54%
Engineer     :
EUT          :
Power        :
M/N         :
Test Mode    :
    
```

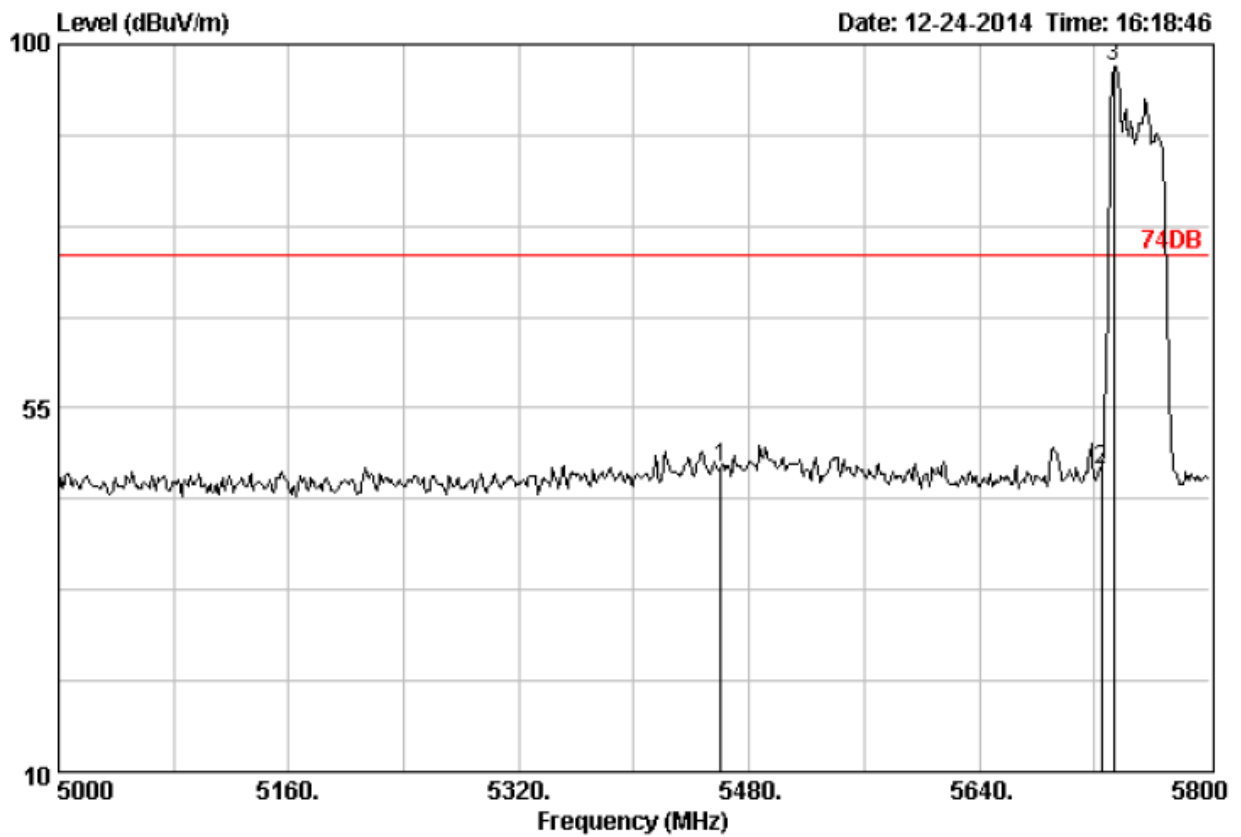
	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBUV)	Emission			Remark
					Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	
1	5460.00	34.75	7.29	40.07	47.71	74.00	26.29	Peak
2	5725.00	34.79	7.44	51.95	59.69	74.00	14.31	Peak
3	5733.60	34.79	7.44	88.90	96.64	74.00	-22.64	Peak



Site no. : 3m Chamber
 Dis. / Ant. : 3m DRH-118
 Limit : 54DB
 Env. / Ins. : 23*C/54%
 Engineer :
 EUT :
 Power :
 M/N :
 Test Mode :

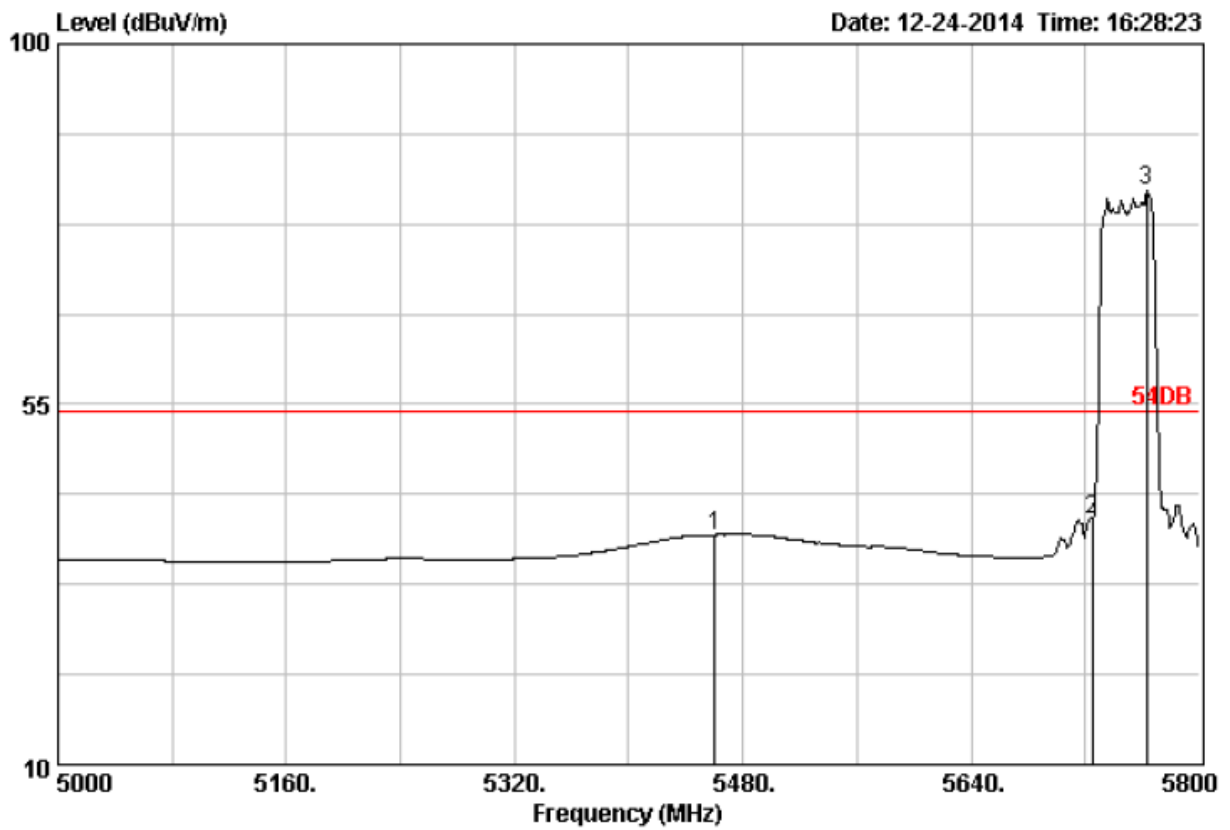
Data no. : 1349
 Ant. pol. : HORIZONTAL

	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBUV)	Emission			Remark
					Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	
1	5460.00	34.75	7.29	29.66	37.30	54.00	16.70	Average
2	5725.00	34.79	7.44	30.78	38.52	54.00	15.48	Average
3	5763.20	34.80	7.46	71.45	79.21	54.00	-25.21	Average



Site no. : 3m Chamber Data no. : 1347
 Dis. / Ant. : 3m DRH-118 Ant. pol. : VERTICAL
 Limit : 74DB
 Env. / Ins. : 23*C/54%
 Engineer :
 EUT :
 Power :
 M/N :
 Test Mode :

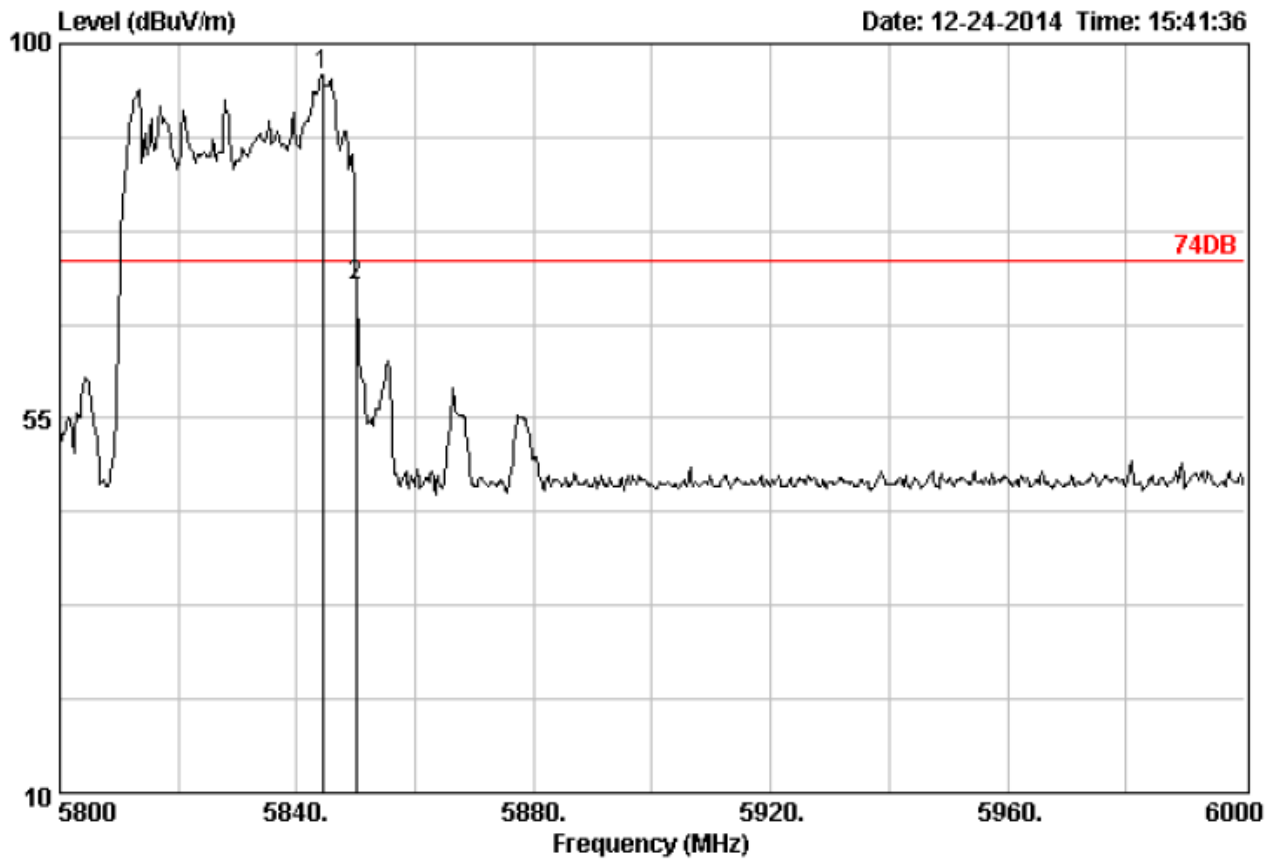
	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBUV)	Emission			Remark
					Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	
1	5460.00	34.75	7.29	40.00	47.64	74.00	26.36	Peak
2	5725.00	34.79	7.44	39.74	47.48	74.00	26.52	Peak
3	5733.60	34.79	7.44	89.50	97.24	74.00	-23.24	Peak



Site no. : 3m Chamber
 Dis. / Ant. : 3m DRH-118
 Limit : 54DB
 Env. / Ins. : 23°C/54%
 Engineer :
 EUT :
 Power :
 M/N :
 Test Mode :

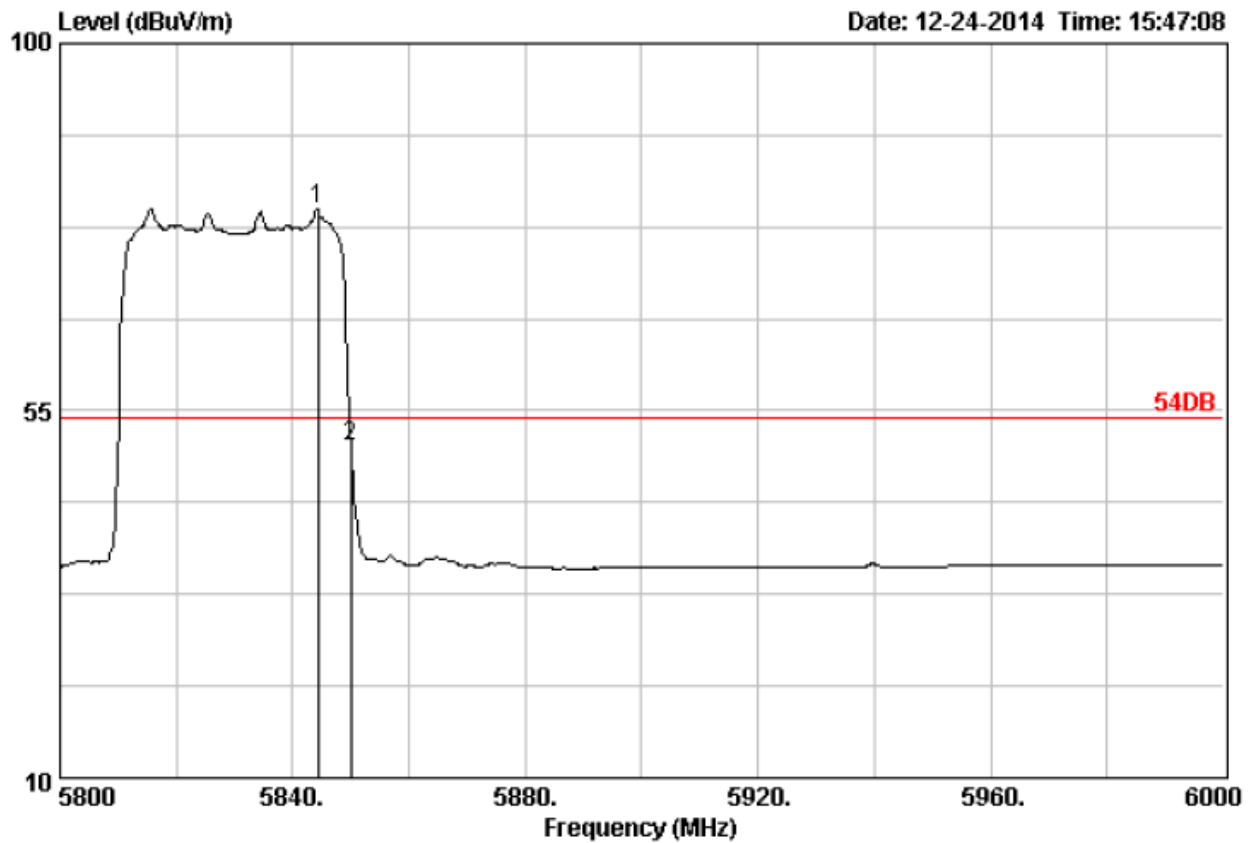
Data no. : 1350
 Ant. pol. : VERTICAL

	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission		Margin (dB)	Remark
					Level (dBuV/m)	Limits (dBuV/m)		
1	5460.00	34.75	7.29	31.05	38.69	54.00	15.31	Average
2	5725.00	34.79	7.44	32.88	40.62	54.00	13.38	Average
3	5763.20	34.80	7.46	74.01	81.77	54.00	-27.77	Average



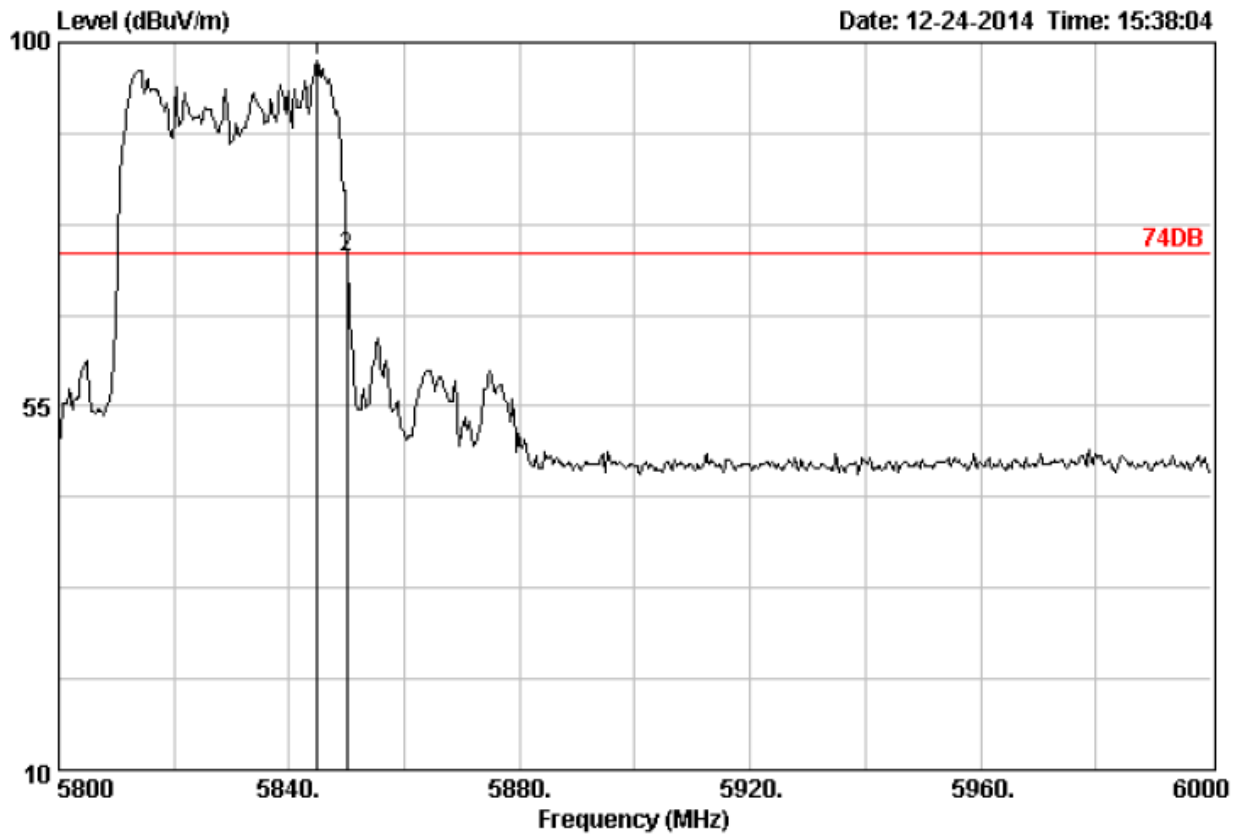
Site no. : 3m Chamber Data no. : 1344
 Dis. / Ant. : 3m DRH-118 Ant. pol. : HORIZONTAL
 Limit : 74DB
 Env. / Ins. : 23*C/54%
 Engineer :
 EUT :
 Power :
 M/N :
 Test Mode :

	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5844.40	34.81	7.50	88.53	96.31	74.00	-22.31	Peak
2	5850.00	34.81	7.50	63.23	71.00	74.00	3.00	Peak



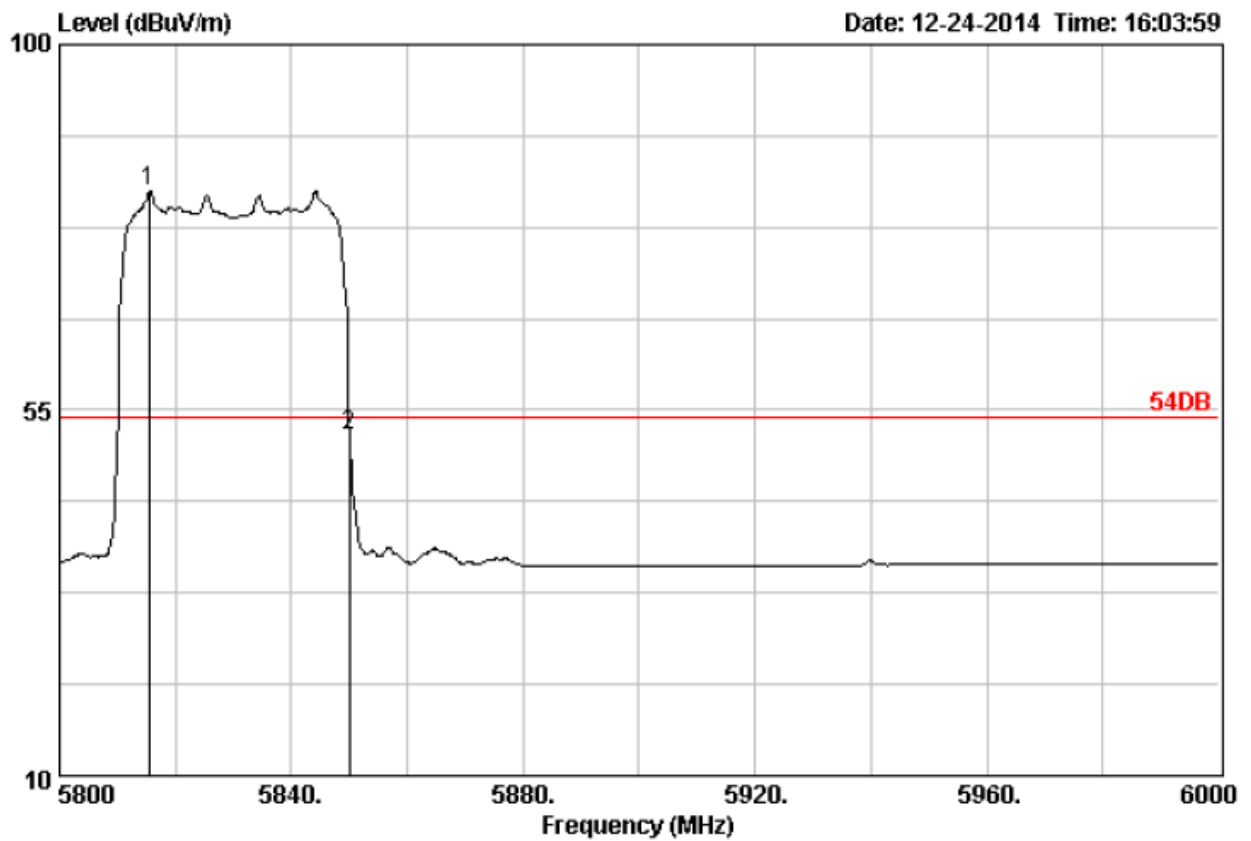
Site no. : 3m Chamber Data no. : 1345
 Dis. / Ant. : 3m DRH-118 Ant. pol. : HORIZONTAL
 Limit : 54DB
 Env. / Ins. : 23°C/54%
 Engineer :
 EUT :
 Power :
 M/N :
 Test Mode :

	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission			Remark
					Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	
1	5844.40	34.81	7.50	72.04	79.82	54.00	-25.82	Average
2	5850.00	34.81	7.50	42.92	50.69	54.00	3.31	Average



Site no. : 3m Chamber Data no. : 1343
 Dis. / Ant. : 3m DRH-118 Ant. pol. : VERTICAL
 Limit : 74DB
 Env. / Ins. : 23°C/54%
 Engineer :
 EUT :
 Power :
 M/N :
 Test Mode :

	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Emission Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5844.80	34.81	7.50	89.90	97.68	74.00	-23.68	Peak
2	5850.00	34.81	7.50	65.75	73.52	74.00	0.48	Peak

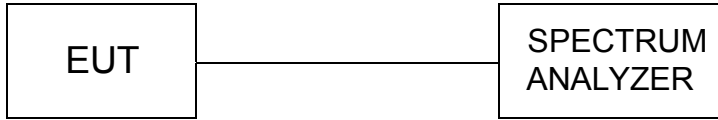


Site no. : 3m Chamber Data no. : 1346
 Dis. / Ant. : 3m DRH-118 Ant. pol. : VERTICAL
 Limit : 54DB
 Env. / Ins. : 23*C/54%
 Engineer :
 EUT :
 Power :
 M/N :
 Test Mode :

	Freq. (MHz)	Ant. Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	5815.40	34.81	7.49	74.17	81.95	54.00	-27.95	Average
2	5850.00	34.81	7.50	44.01	51.78	54.00	2.22	Average

4.6. Power Spectral Density Measurement

TEST CONFIGURATION



TEST PROCEDURE

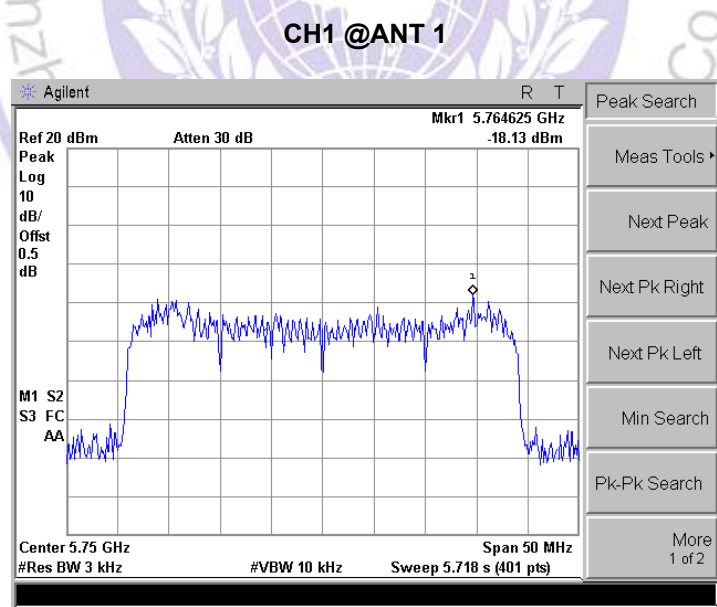
The EUT was tested according to KDB558074 D01 v03r02 for compliance to FCC 47CFR 15.247 requirements. Set RBW= 3 kHz, VBW ≥ 10KHz, SPAN to 1.5 times greater than the EBW,.

LIMIT

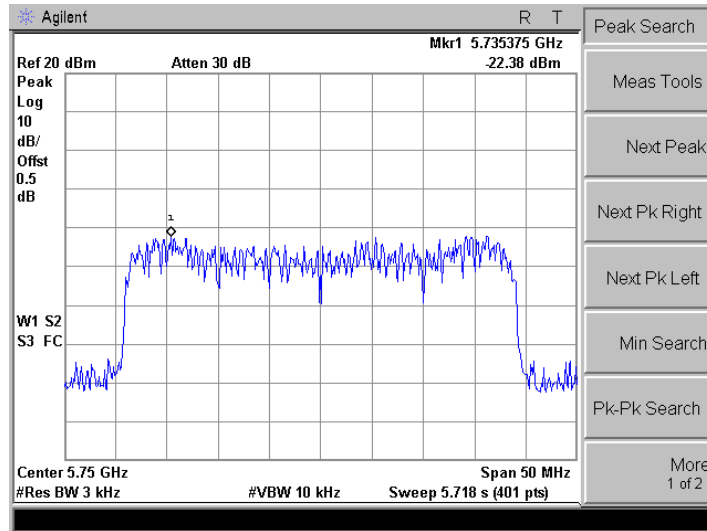
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST RESULTS

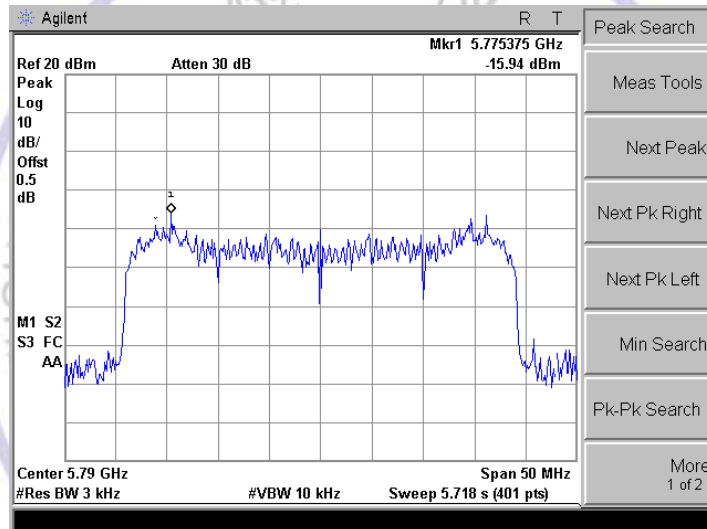
Channel	Channel Frequency (MHz)	PSD (dBm/3KHz)			Maximum limit (dBm/3KHz)	PASS / FAIL
		Ant1	Ant 2	Total		
1	5750	-18.13	-22.38	-16.74	8	PASS
2	5790	-15.94	-15.87	-12.89	8	PASS
3	5830	-15.75	-16.73	-13.20	8	PASS



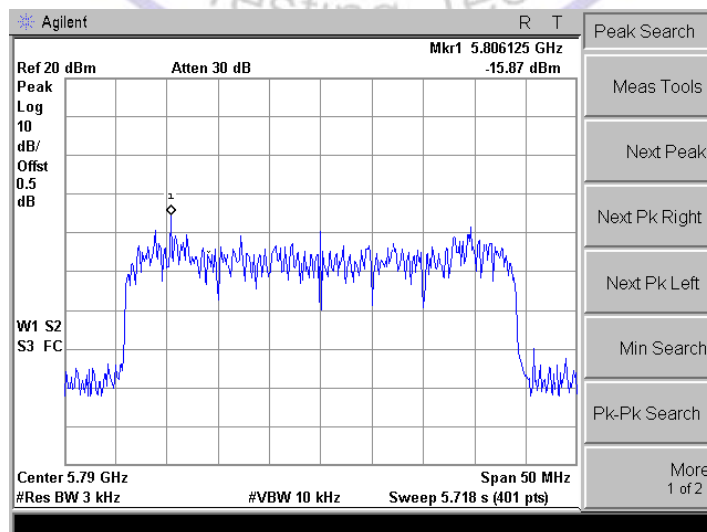
CH1@ANT 2



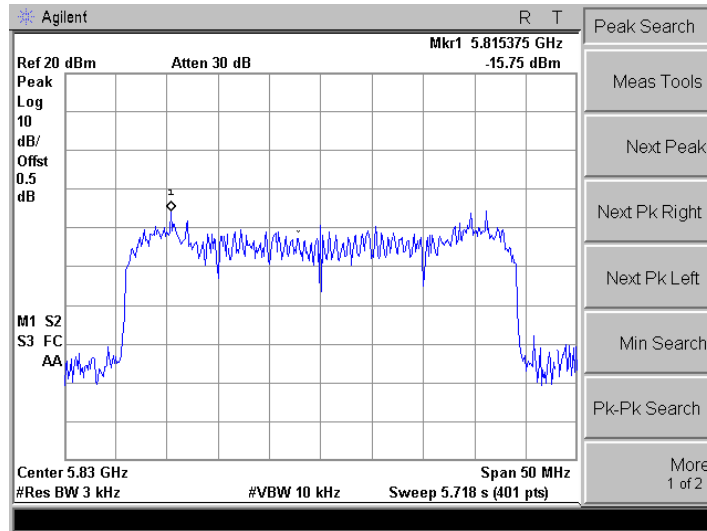
CH2 @ANT 1



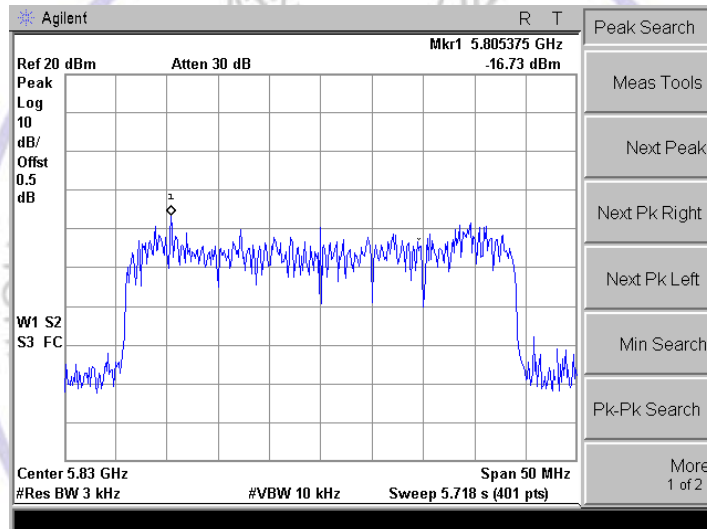
CH2 @ANT 2



CH3 @ANT 1

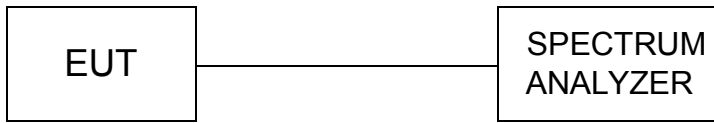


CH3 @ANT 2



4.7. Spurious RF Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

The EUT was tested according to KDB558074 D01 v03r02 for compliance to FCC 47CFR 15.247 requirements.

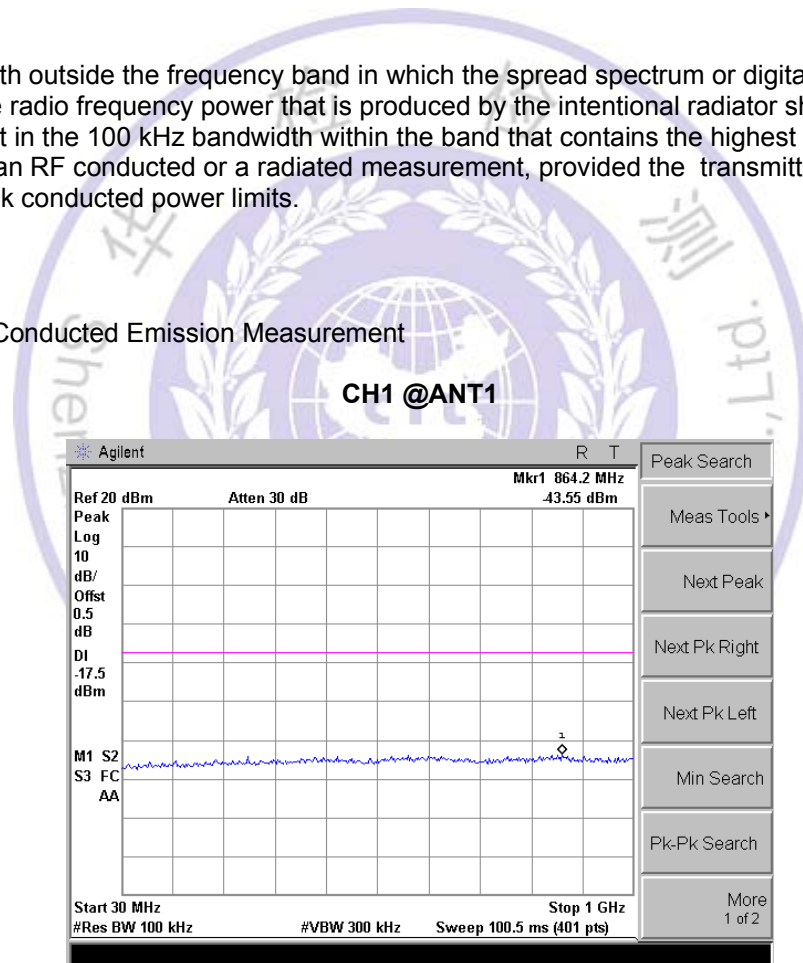
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2009 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBM= 300KHz to measure the peak field strength , and measure frequency range from 30MHz to 40GHz.

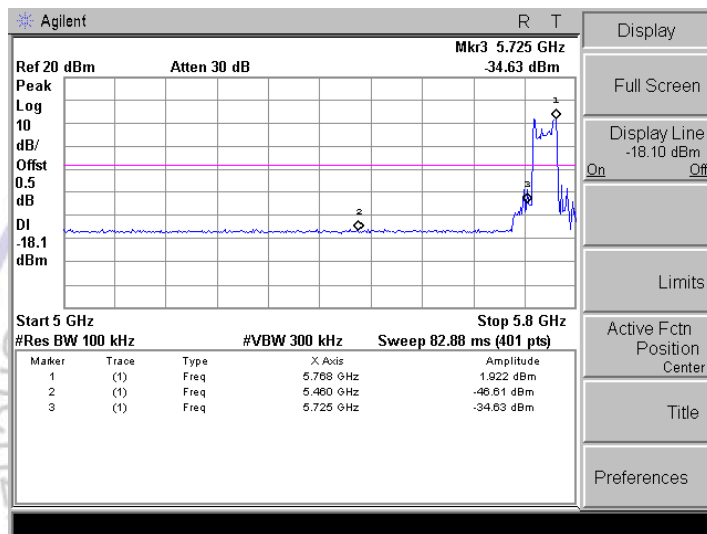
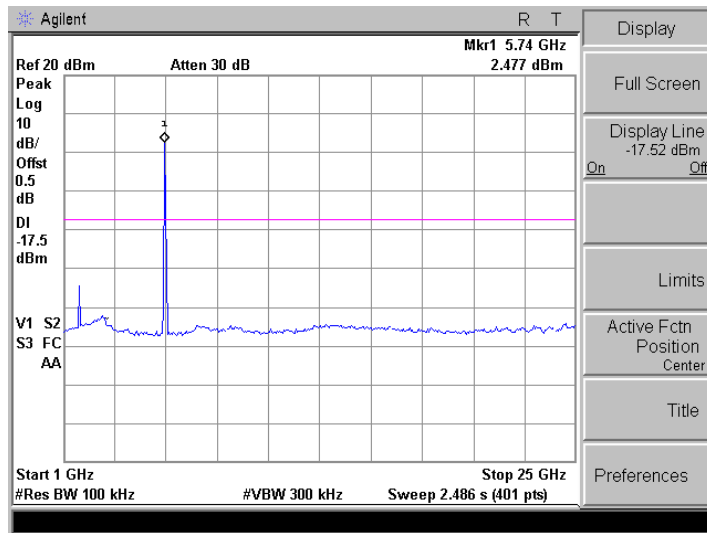
LIMIT

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 power limits.

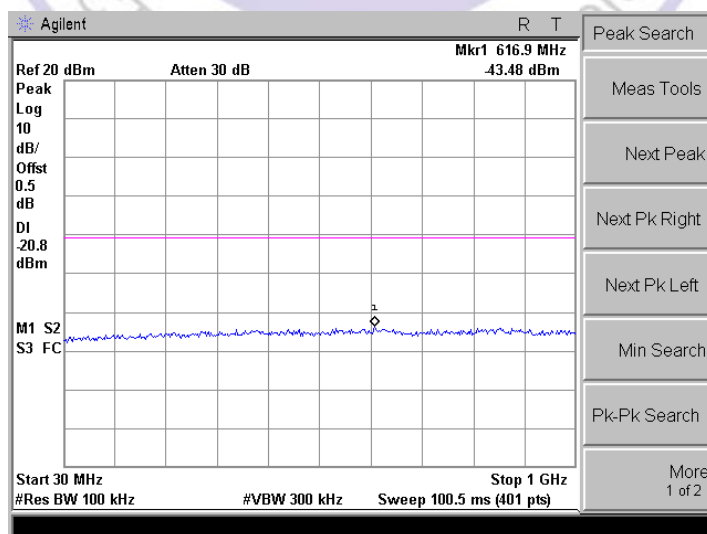
TEST RESULTS

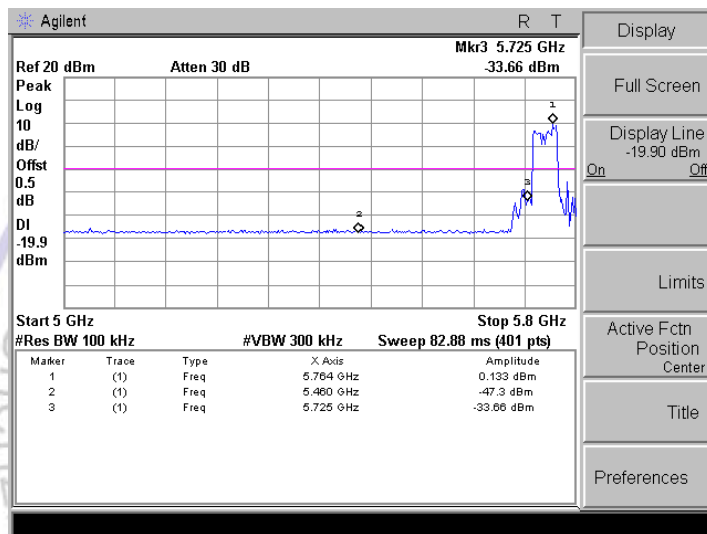
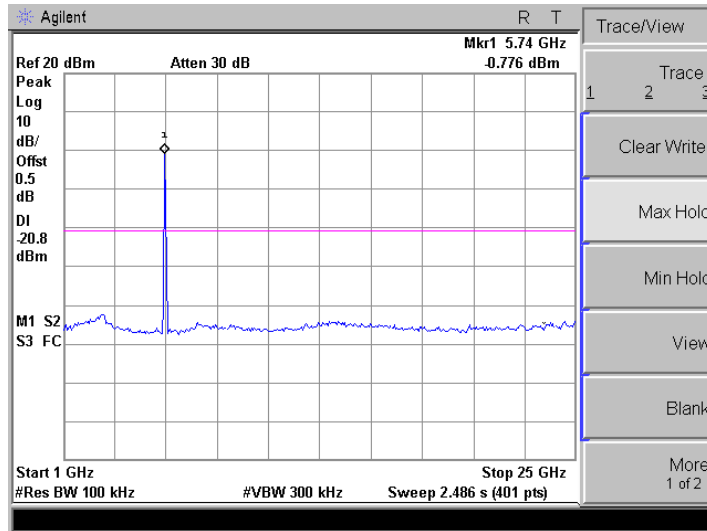
Photos of Spurious RF Conducted Emission Measurement



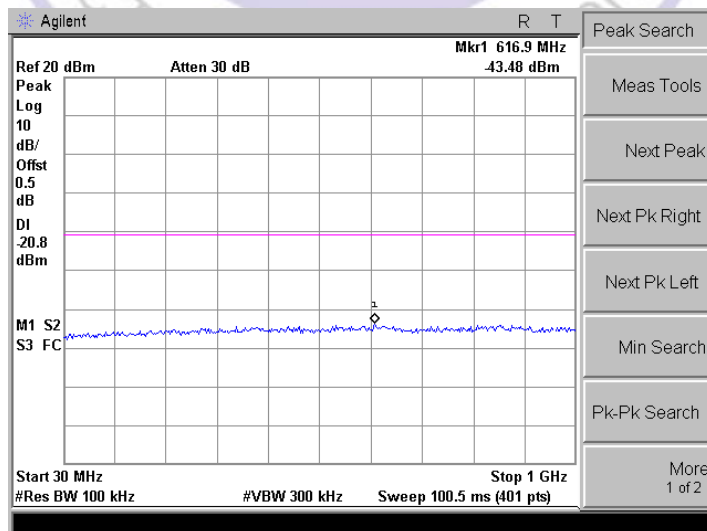


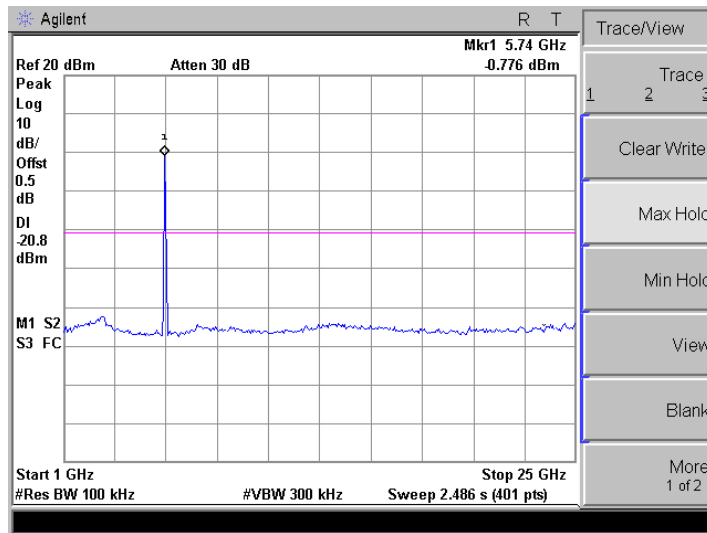
CH1 @ANT 2



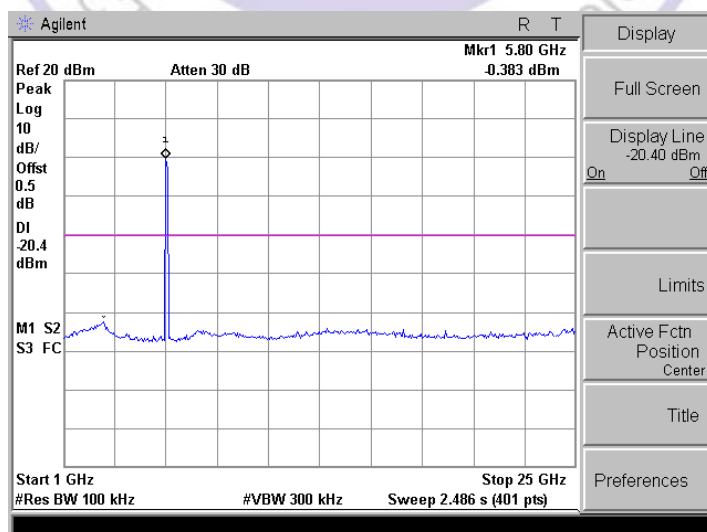
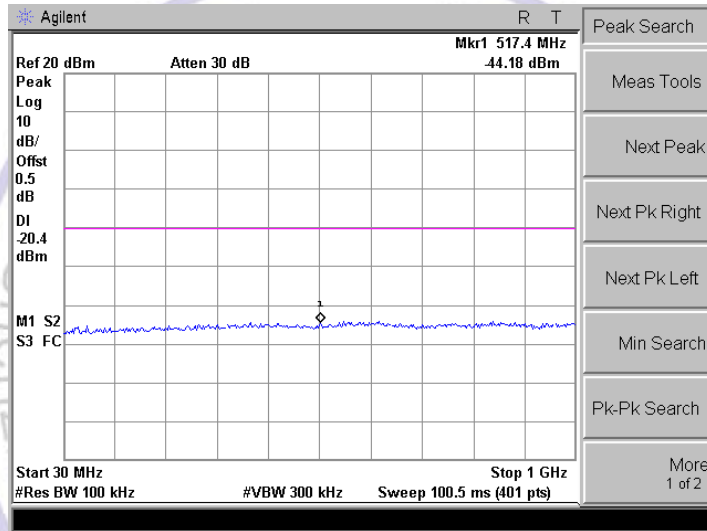


CH2 @ANT 1

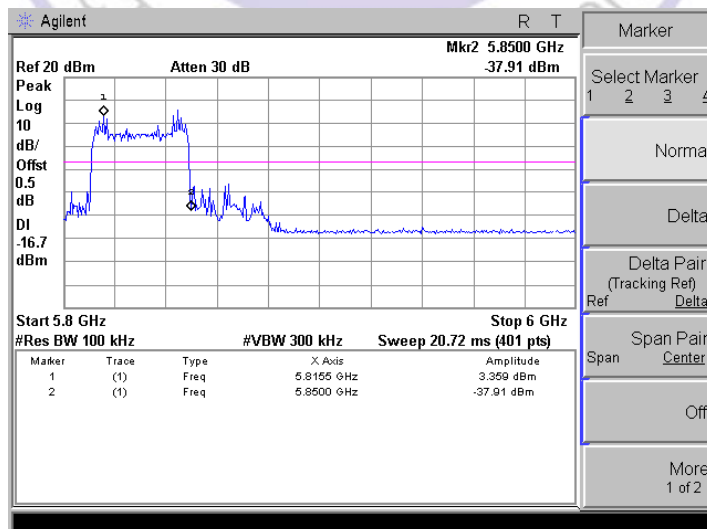
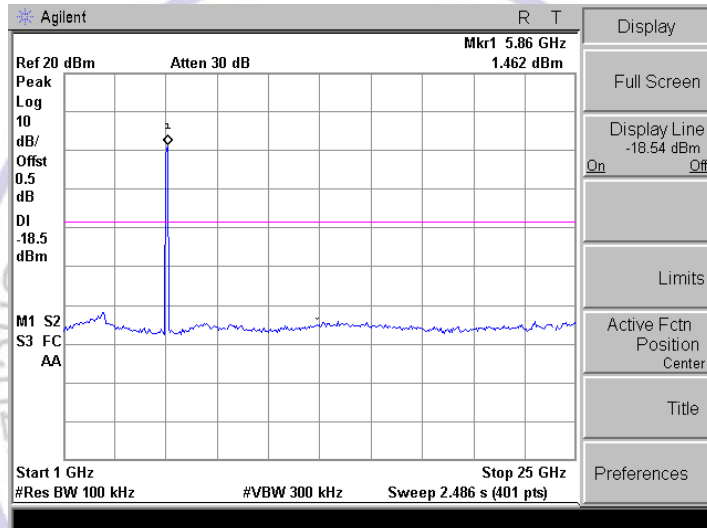
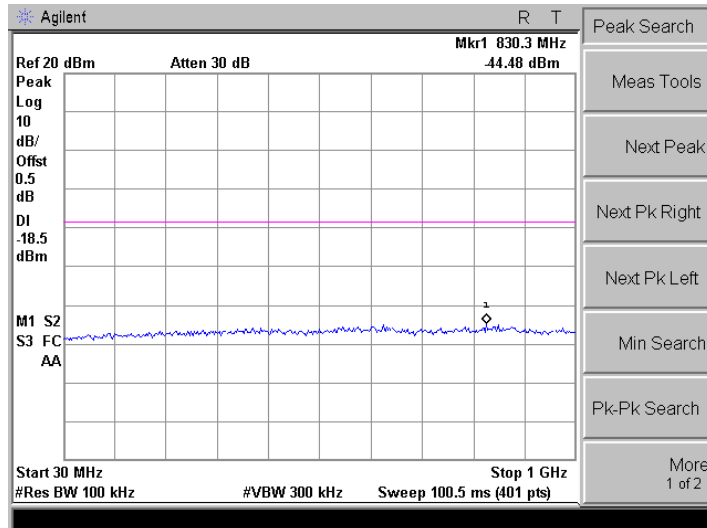




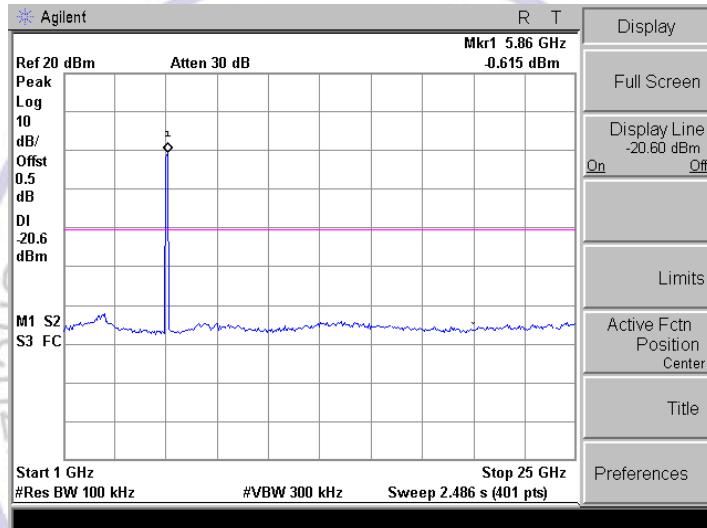
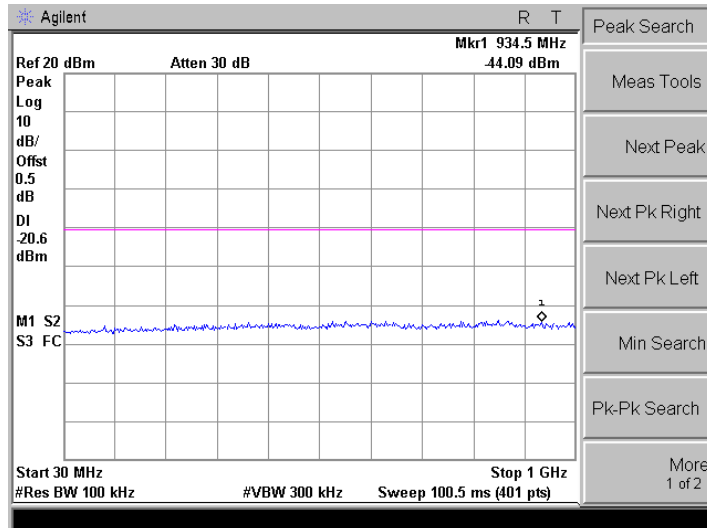
CH2 @ANT 2



CH3 @ANT 1



CH3 @ANT 2



Remark: No emission found from 25G to 40GHz.

4.8. 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.

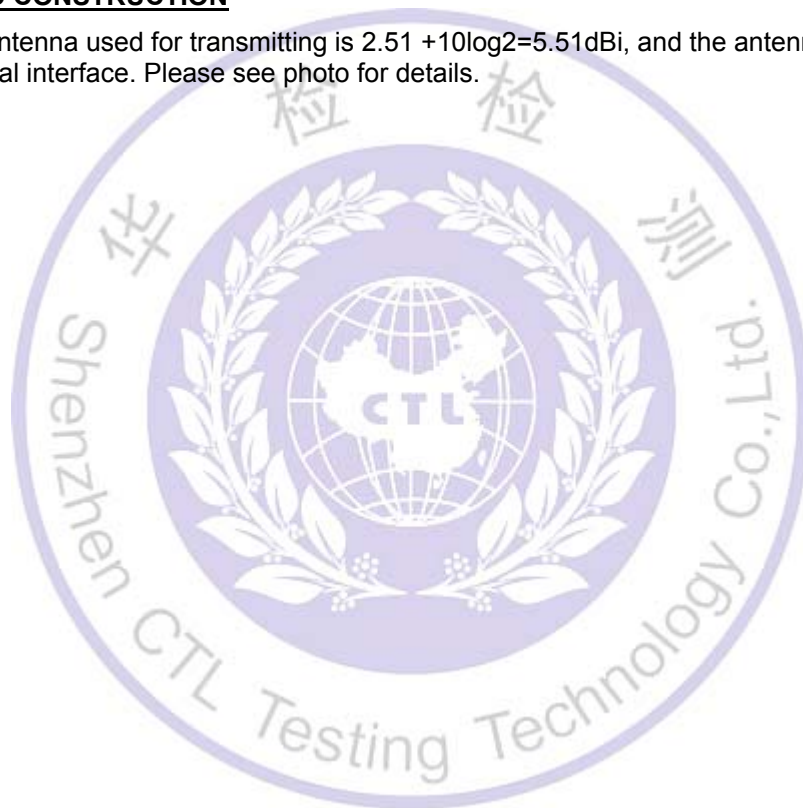
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance.

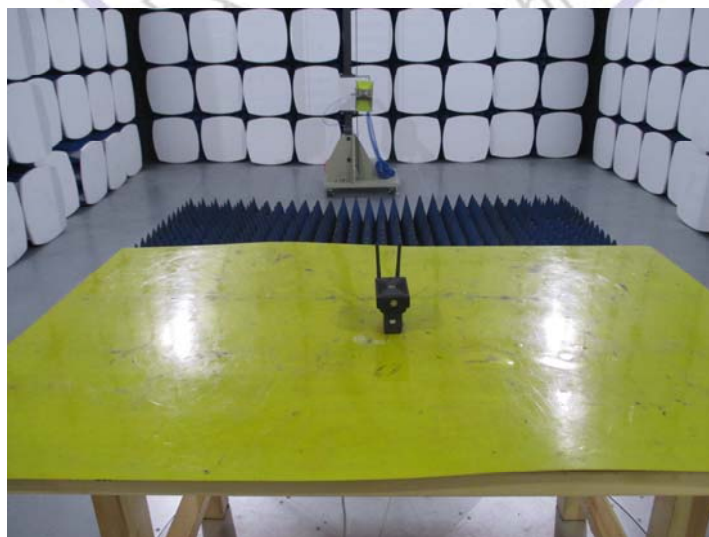
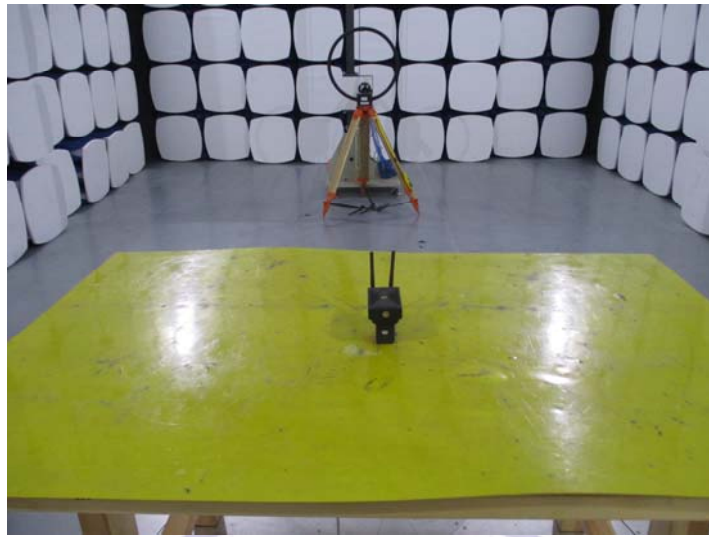
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

ANTENNA CONNECTED CONSTRUCTION

The directional gains of antenna used for transmitting is $2.51 + 10\log 2 = 5.51\text{dBi}$, and the antenna connector is a non-standard and inverse spiral interface. Please see photo for details.



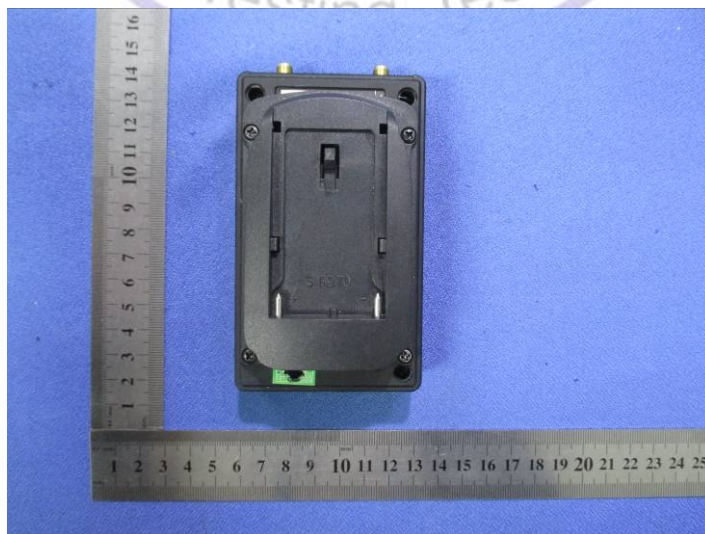
5. Test Setup Photos of the EUT



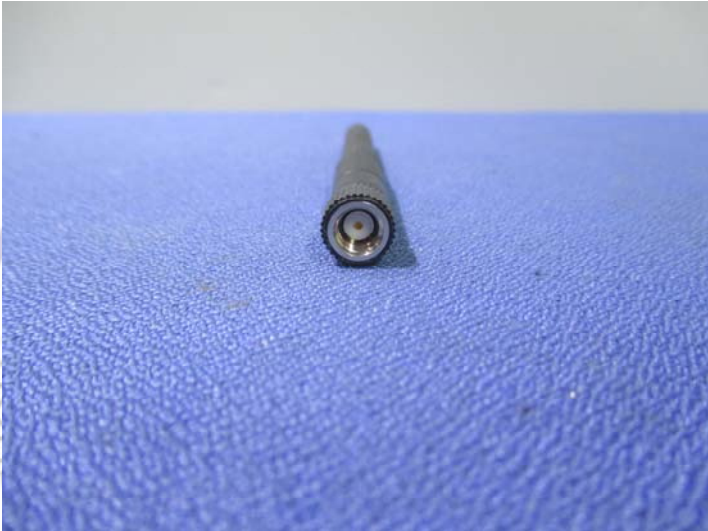


6. External and Internal Photos of the EUT

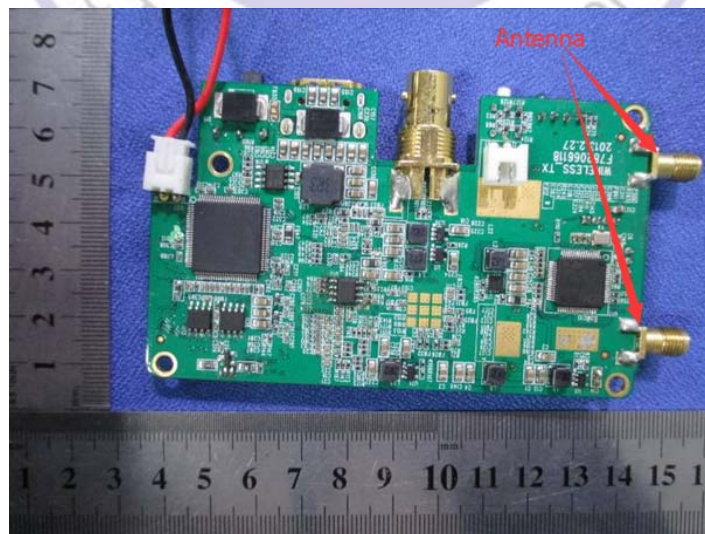
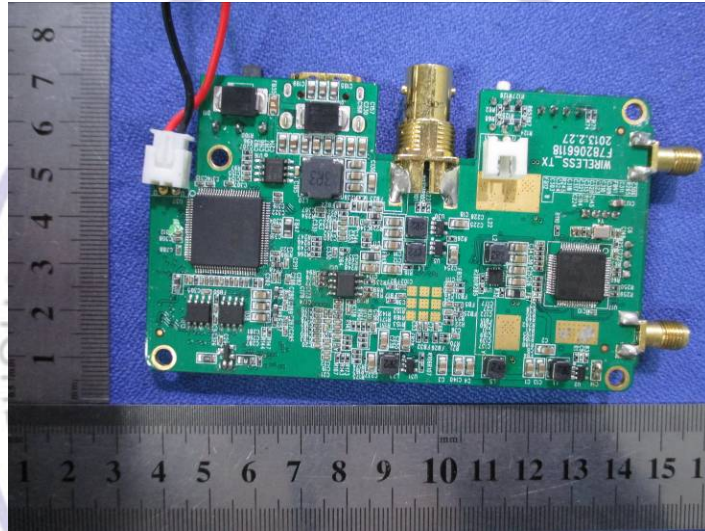
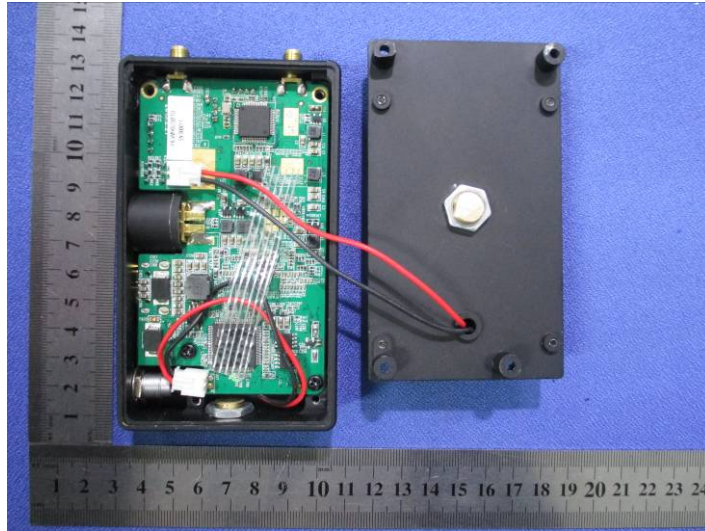
External Photos of EUT

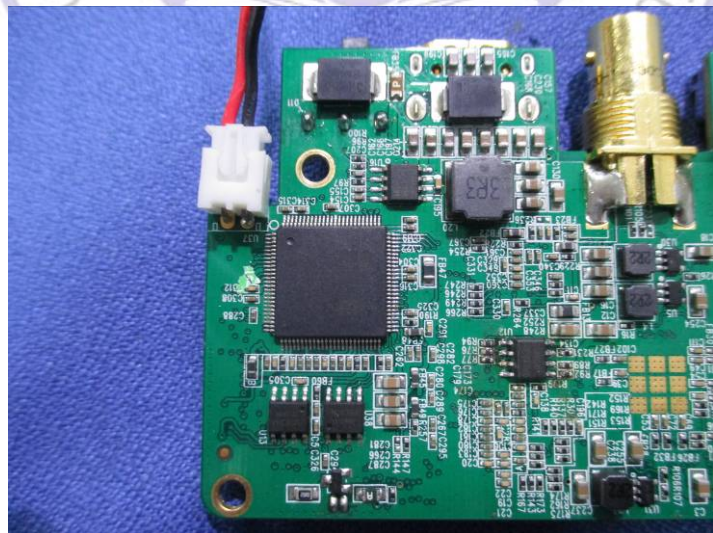
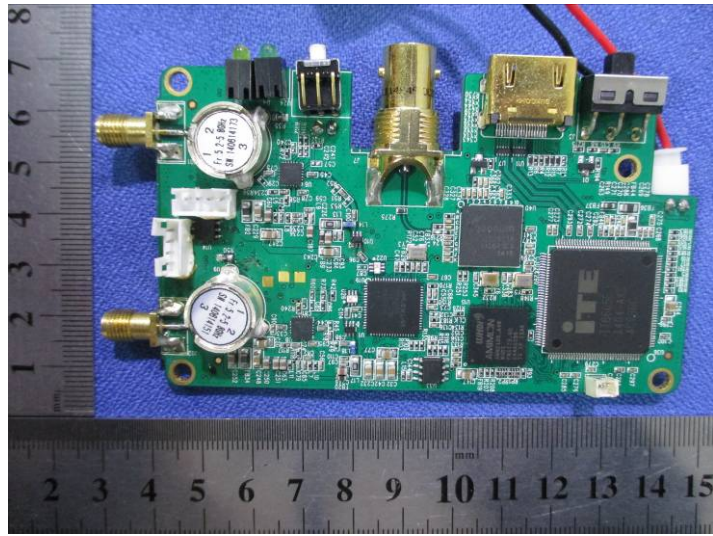


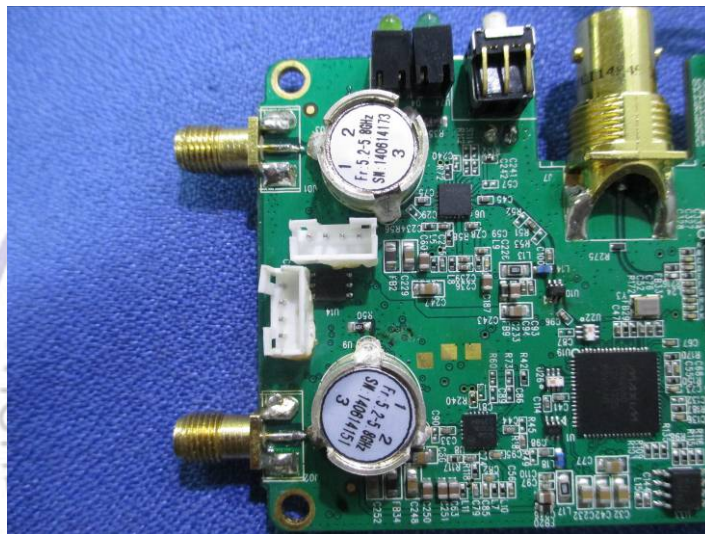
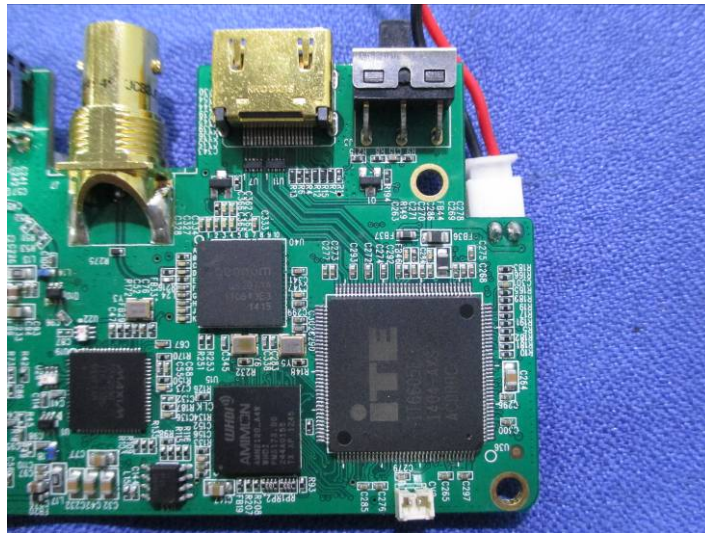




Internal Photos of EUT







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

