SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park,
Shenzhen, Guangdong, China 518057

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TEST REPORT

Application No.:	SZEM1707007528CR
Applicant:	Robert Bosch Security Solutions Pte Ltd
Address of Applicant:	11 Bishan Street 21 Singapore 573943
Manufacturer:	Bosch (Zhuhai) Security Systems co., Ltd
Address of Manufacturer:	20 Ji Chang Bei Road, Qingwan Industrial Estate, Sanzao, Jinwan, Zhuhai, 519040, Guangdong, China
Factory:	Bosch (Zhuhai) Security Systems co., Ltd
Address of Factory:	20 Ji Chang Bei Road, Qingwan Industrial Estate, Sanzao, Jinwan, Zhuhai, 519040, Guangdong, China
Equipment Under Test (EUT):	
EUT Name:	Point Tracking Transmitter, 303/304MHz
Model No.:	SEC-3402-304
Trade mark:	BOSCH
FCC ID:	2AMLH-SEC-3402-304
Standards:	47 CFR Part 15, Subpart C 15.231
Date of Receipt:	2017-07-18
Date of Test:	2017-07-31 to 2018-01-08
Date of Issue:	2018-01-12
Test Result :	Pass*

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

SGS-CSTC STANDARDS TECHNICAL SERVICES CO., LTD. SHENZHEN BRANCH

Keny Xu
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2018-01-12		*Original*

Authorized for issue by:				
				
		Bill Chen /Project Engineer		
				
		Eric Fu /Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart C 15.231	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.231(c)	Pass
Dwell Time (15.231(a))	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.231(a)	Pass
Field Strength of the Fundamental Signal (15.231(b))	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.5	47 CFR Part 15, Subpart C 15.231(b)	Pass
Radiated Emissions	47 CFR Part 15, Subpart C 15.209	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C 15.209	Pass

3 Contents

4 General Information

4.1 Details of E.U.T.

EUT Name:	Point Tracking Transmitter, 303/304MHz
Model No.:	SEC-3402-304
Operation Frequency:	303.825MHz; 304MHz
Channel Numbers:	2
Modulation Type:	ASK
Antenna Type:	Helical
Antenna Gain:	-15dBi
Sample Type:	Portable production
Power supply:	DC 3.0V(1x3.0 "CR123A" LITHIUM BATTERY) DC input 12V

4.2 Description of Support Units

Description	Manufacturer	Model No.
Adapter	Lab to provide	N/A
USB Cable	PHILIPS	SWR2101

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.25×10^{-8}
2	Duty cycle	0.37%
3	Occupied Bandwidth	3%
4	RF conducted power	0.75dB
5	RF power density	2.84dB
6	Conducted Spurious emissions	0.75dB
7	RF Radiated power	4.5dB (below 1GHz)
		4.8dB (above 1GHz)
8	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-18GHz)
9	Temperature test	1℃
10	Humidity test	3%
11	Supply voltages	1.5%
12	Time	3%

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

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

• **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

• **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2017-05-10	2018-05-09
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2017-07-13	2018-07-12
LISN	Rohde & Schwarz	ENV216	SEM007-01	2017-09-27	2018-09-26
LISN	ETS-LINDGREN	3816/2	SEM007-02	2017-04-14	2018-04-13
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2017-04-14	2018-04-13
Cable	SGS	CE	--	2017-10-09	2018-10-09

RF conducted					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2017-10-09	2018-10-09
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2017-10-09	2018-10-09
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Signal Generator	Rohde & Schwarz	SML03	SEM006-02	2017-04-14	2018-04-13
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2017-10-09	2018-10-09

Field Strength of the Fundamental Signal					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2017-10-09	2018-10-09
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-11-01	2020-11-01
Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEM003-11	2015-10-17	2018-10-17
Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEM003-12	2017-11-24	2018-11-24

Radiated Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2017-05-10	2018-05-10
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
EMI Test Receiver (9kHz-3GHz)	Rohde & Schwarz	ESCI	SEM004-01	2017-04-14	2018-04-13
Trilog-Broadband Antenna (30MHz-1GHz)	Schwarzbeck	VULB9168	SEM003-17	2016-01-26	2019-01-26
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-03	2017-06-05	2018-06-04
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2015-08-14	2018-08-14

RE in Chamber					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2017-05-10	2018-05-10
EXA Signal Analyzer (10Hz-26.5GHz)	Agilent Technologies Inc	N9010A	SEM004-09	2017-06-05	2018-06-04
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-11-01	2020-11-01
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2015-06-14	2018-06-13
Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2017-10-09	2020-10-09
Low Noise Amplifier (100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2017-10-09	2020-10-09
Band filter	N/A	N/A	N/A	N/A	N/A
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2017-10-12	2018-10-12
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2017-10-12	2018-10-12
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2017-10-12	2018-10-12
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2017-04-18	2018-04-18

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

Standard Requirment:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -15dBi.

Antenna location: Refer to Appendix(Internal photos)

7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207
Test Method: ANSI C63.10 (2013) Section 6.2
Limit:

Frequency of emission(MHz)	Conducted limit(dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
*Decreases with the logarithm of the frequency.		

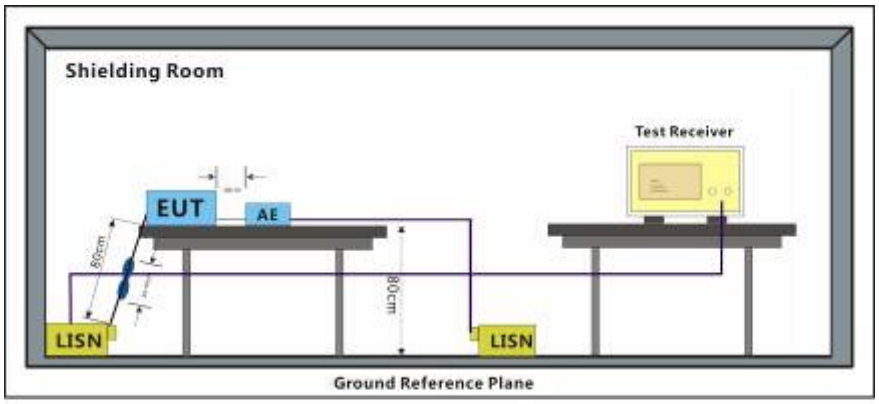
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1000 mbar

Test mode: a:TX mode_Keep the EUT in transmitting with modulation mode.

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

1) The mains terminal disturbance voltage test was conducted in a shielded room.

2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

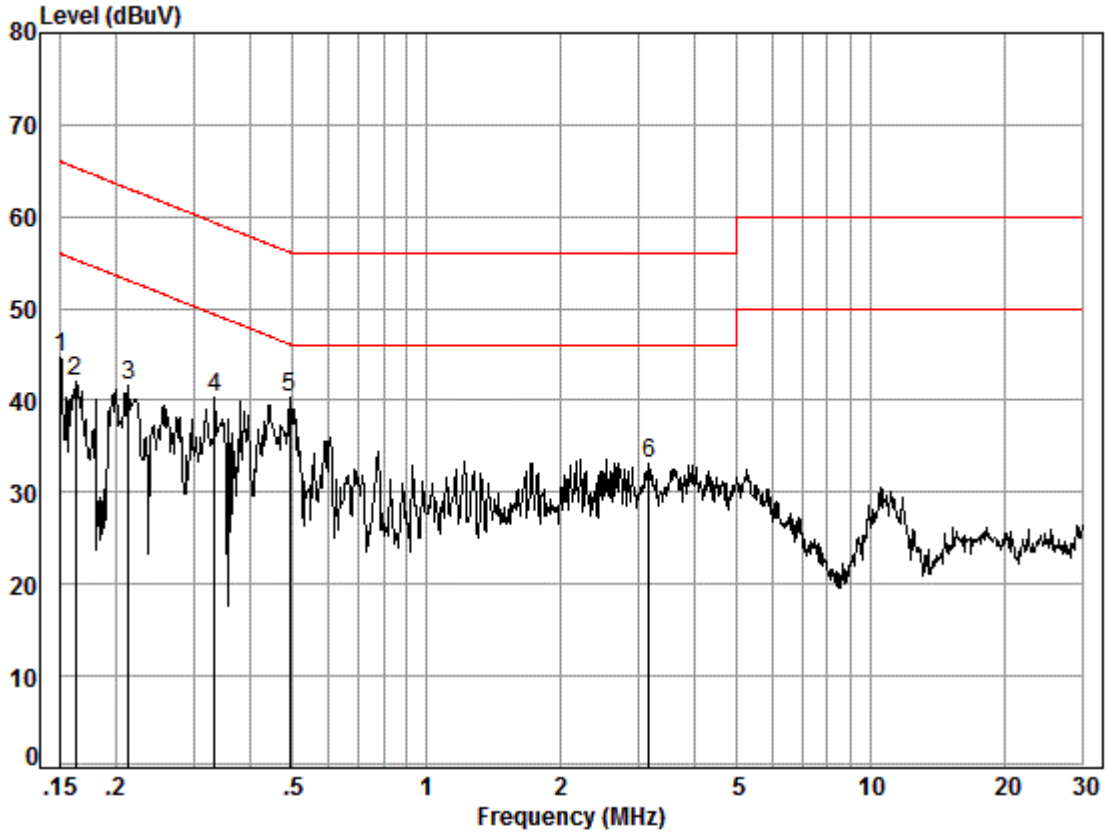
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor

303.825MHz

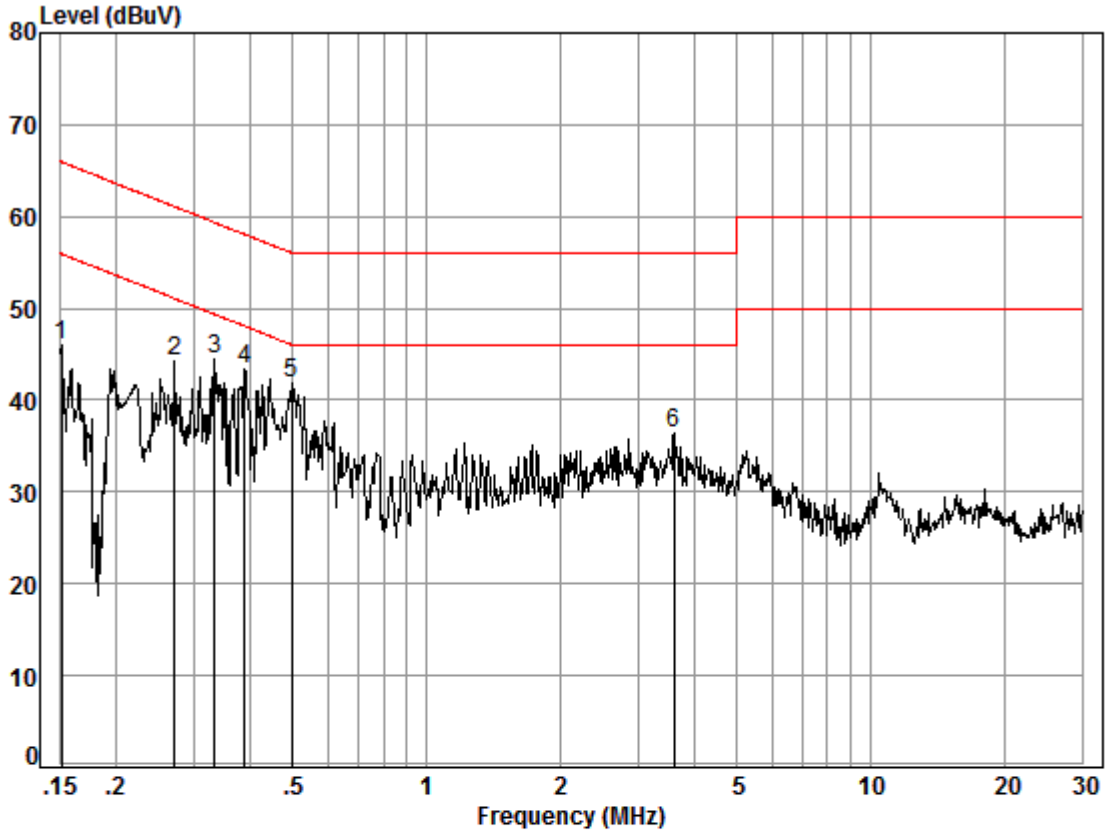
Mode:a; Line:Live Line



Site : Shielding Room
Condition: Line
Job No. : 07528CR
Test mode: a
: 303.825

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15	0.02	9.64	35.12	44.78	56.00	-11.22	Peak
2	0.16	0.02	9.63	32.44	42.09	55.34	-13.25	Peak
3	0.21	0.02	9.63	32.09	41.74	53.05	-11.31	Peak
4	0.33	0.01	9.63	30.62	40.26	49.35	-9.09	Peak
5	0.49	0.01	9.63	30.61	40.25	46.14	-5.89	Peak
6	3.17	0.02	9.67	23.50	33.19	46.00	-12.81	Peak

Mode:a; Line:Neutral Line

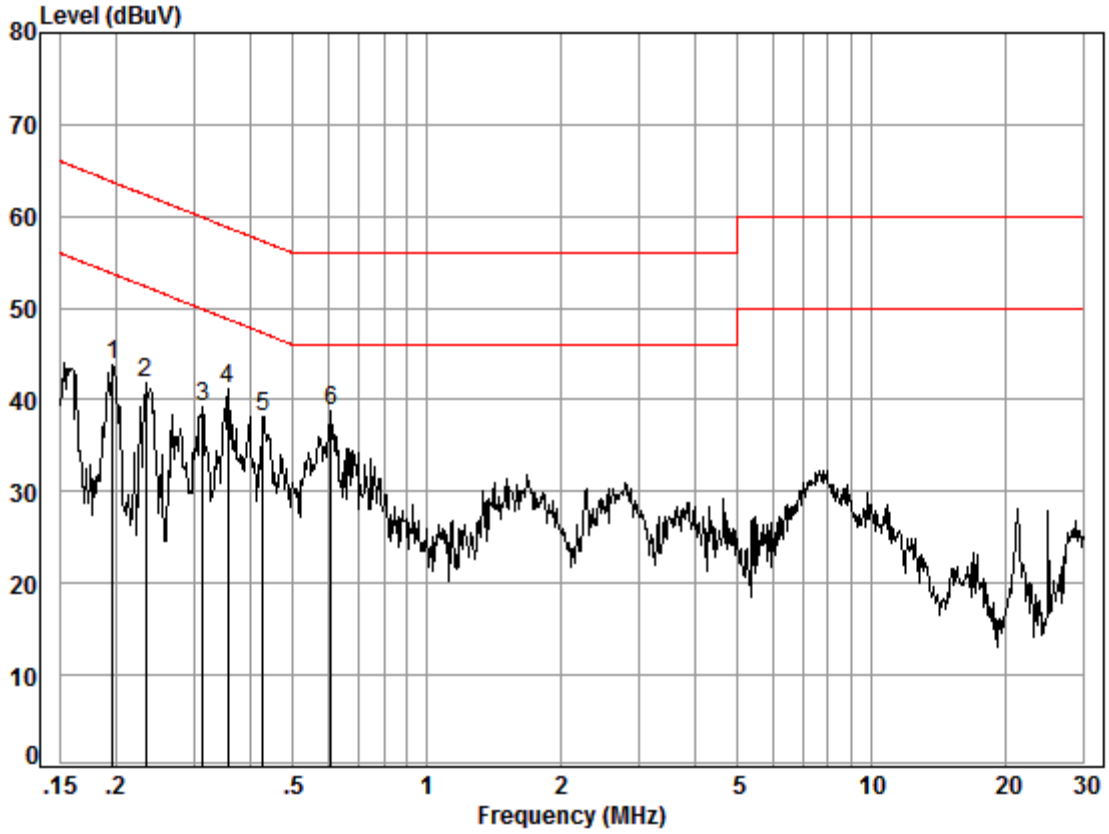


Site : Shielding Room
Condition: Neutral
Job No. : 07528CR
Test mode: a
: 303.825

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.15	0.02	9.64	36.42	46.08	55.96	-9.88	Peak
2	0.27	0.01	9.63	34.63	44.27	51.07	-6.80	Peak
3	0.33	0.01	9.63	34.74	44.38	49.35	-4.97	Peak
4	0.39	0.01	9.63	33.65	43.29	48.08	-4.79	Peak
5	0.50	0.01	9.63	32.27	41.91	46.05	-4.14	Peak
6	3.60	0.02	9.68	26.66	36.36	46.00	-9.64	Peak

304MHz

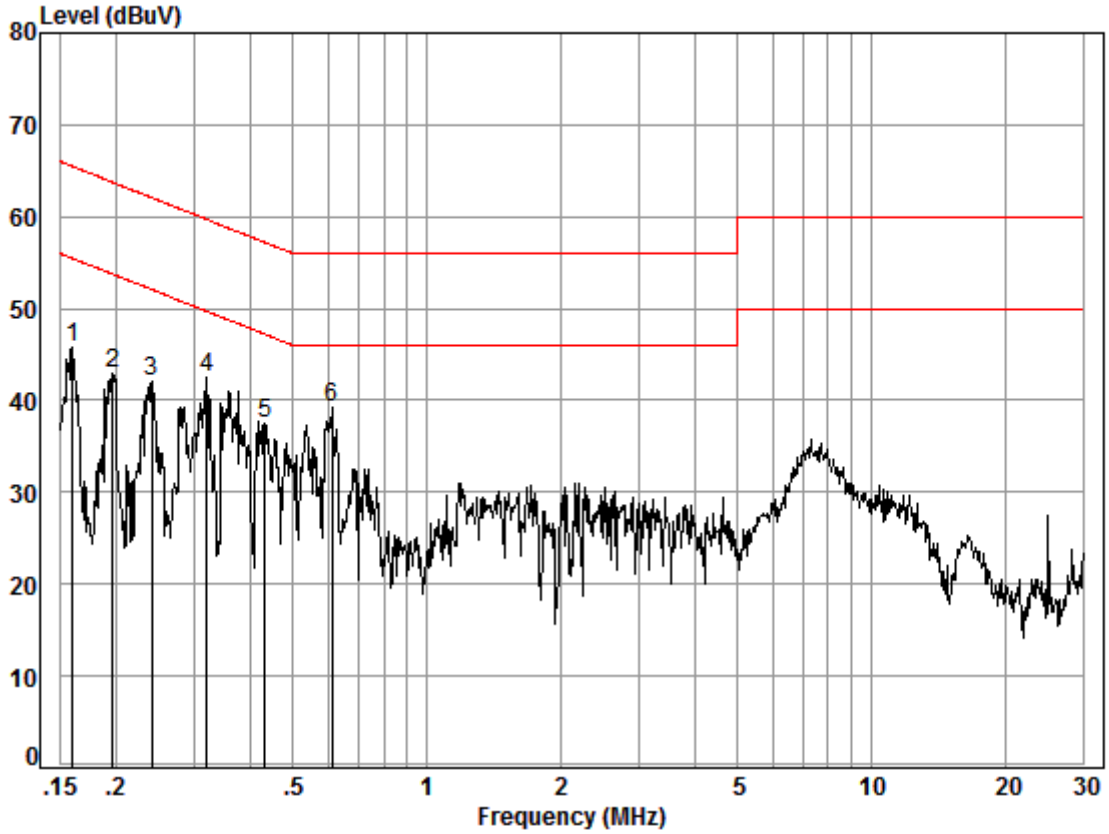
Mode:a; Line:Live Line



Site : Shielding Room
Condition: Line
Job No. : 07528CR
Test mode: a
: 304

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.20	0.02	9.50	34.21	43.73	53.76	-10.03	Peak
2	0.23	0.02	9.51	32.24	41.77	52.35	-10.58	Peak
3	0.31	0.01	9.51	29.66	39.18	49.88	-10.70	Peak
4	0.36	0.01	9.50	31.70	41.21	48.78	-7.57	Peak
5	0.43	0.01	9.49	28.55	38.05	47.29	-9.24	Peak
6	0.61	0.02	9.53	29.25	38.80	46.00	-7.20	Peak

Mode:a; Line:Neutral Line



Site : Shielding Room
Condition: Neutral
Job No. : 07528CR
Test mode: a
: 304

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.02	9.59	36.15	45.76	55.47	-9.71	Peak
2	0.20	0.02	9.57	33.33	42.92	53.76	-10.84	Peak
3	0.24	0.01	9.58	32.43	42.02	52.08	-10.06	Peak
4	0.32	0.01	9.58	32.88	42.47	49.71	-7.24	Peak
5	0.43	0.01	9.59	27.87	37.47	47.20	-9.73	Peak
6	0.61	0.02	9.62	29.69	39.33	46.00	-6.67	Peak

7.2 20dB Bandwidth

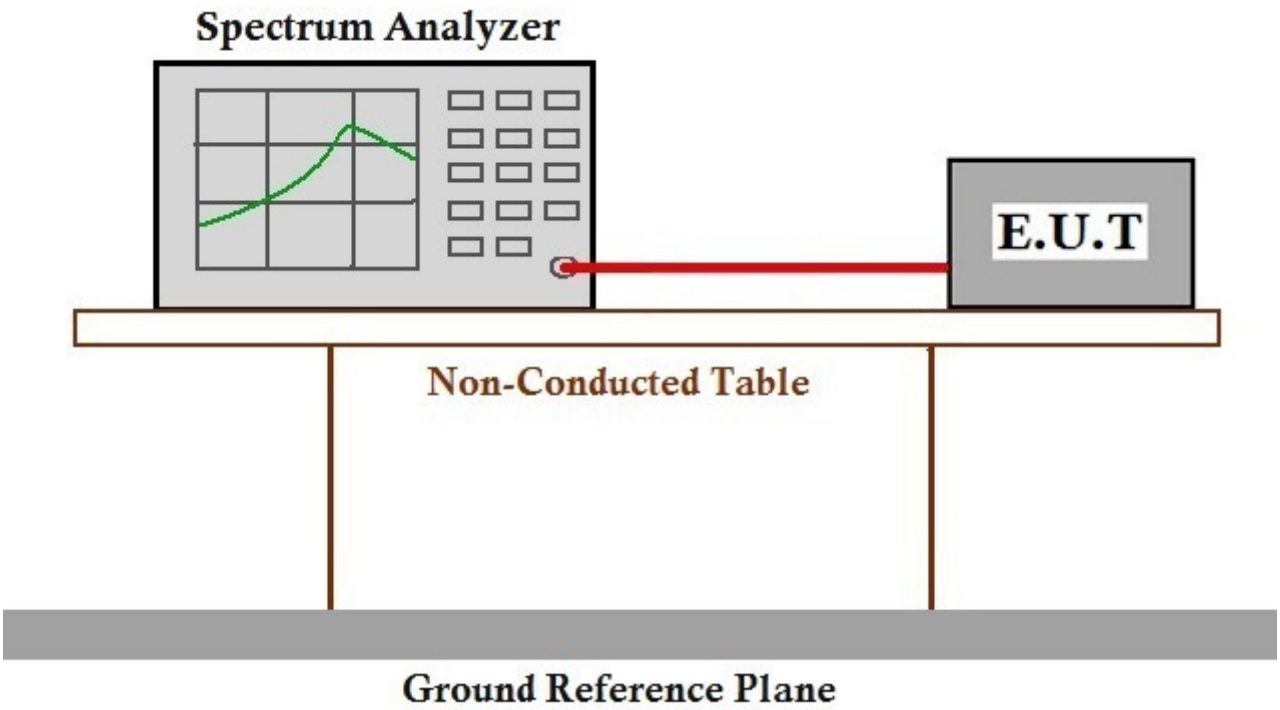
Test Requirement 47 CFR Part 15, Subpart C 15.231(c)
Test Method: ANSI C63.10 (2013) Section 6.9
Limit:

Frequency range(MHz)	Limit
70-900	No wider than 0.25% of the center frequency
Above 900	No wider than 0.5% of the center frequency

7.2.1 E.U.T. Operation

Operating Environment:
Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1000 mbar
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.2.2 Test Setup Diagram



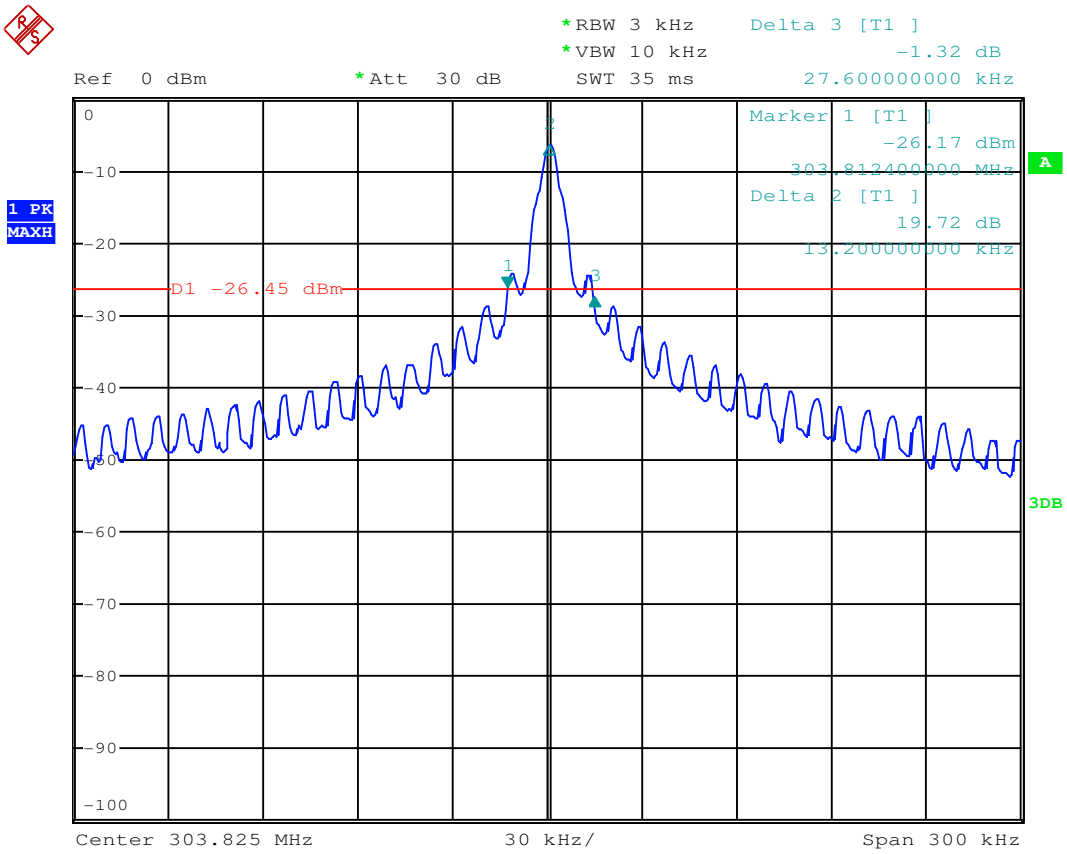
7.2.3 Measurement Procedure and Data

Transmitter mode

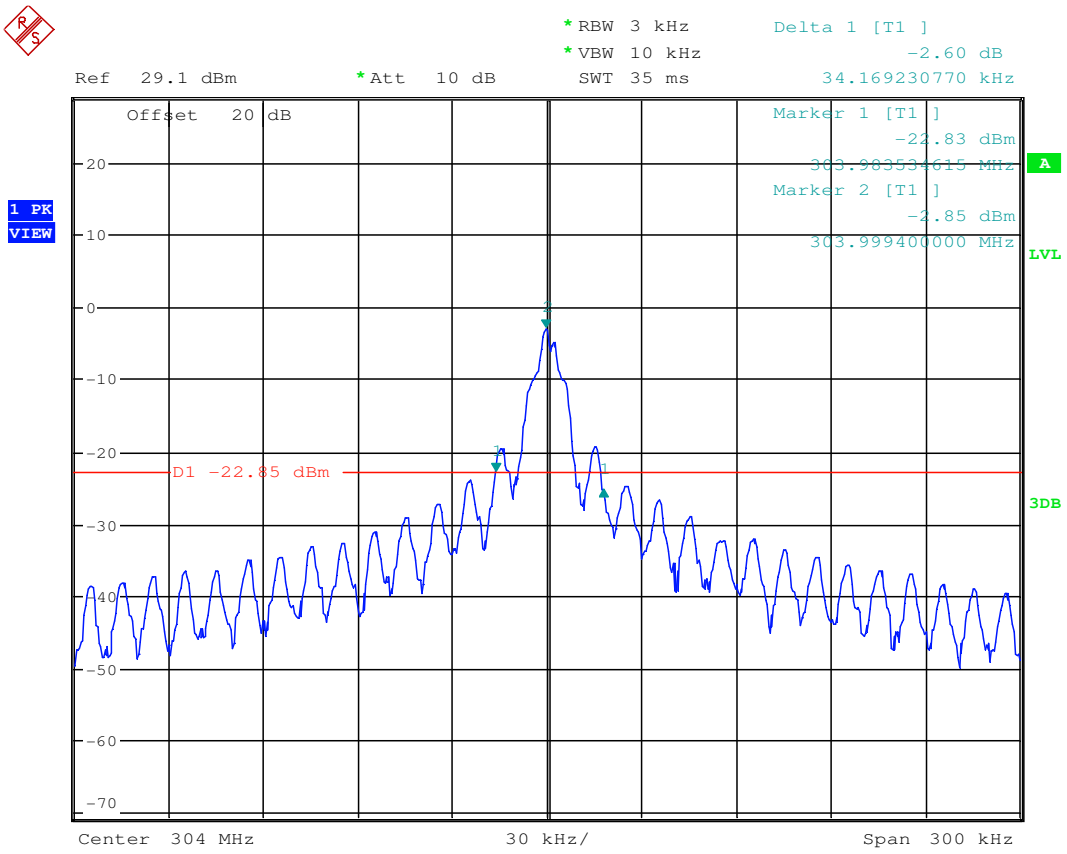
Test channel	20dB Bandwidth (KHz)	Limit (KHz)	Results
303.825MHz	27.60	759.56	Pass
304MHz	34.17	760	Pass

Test plot as follows:

Mode:a



Mode:a



7.3 Dwell Time (15.231(a))

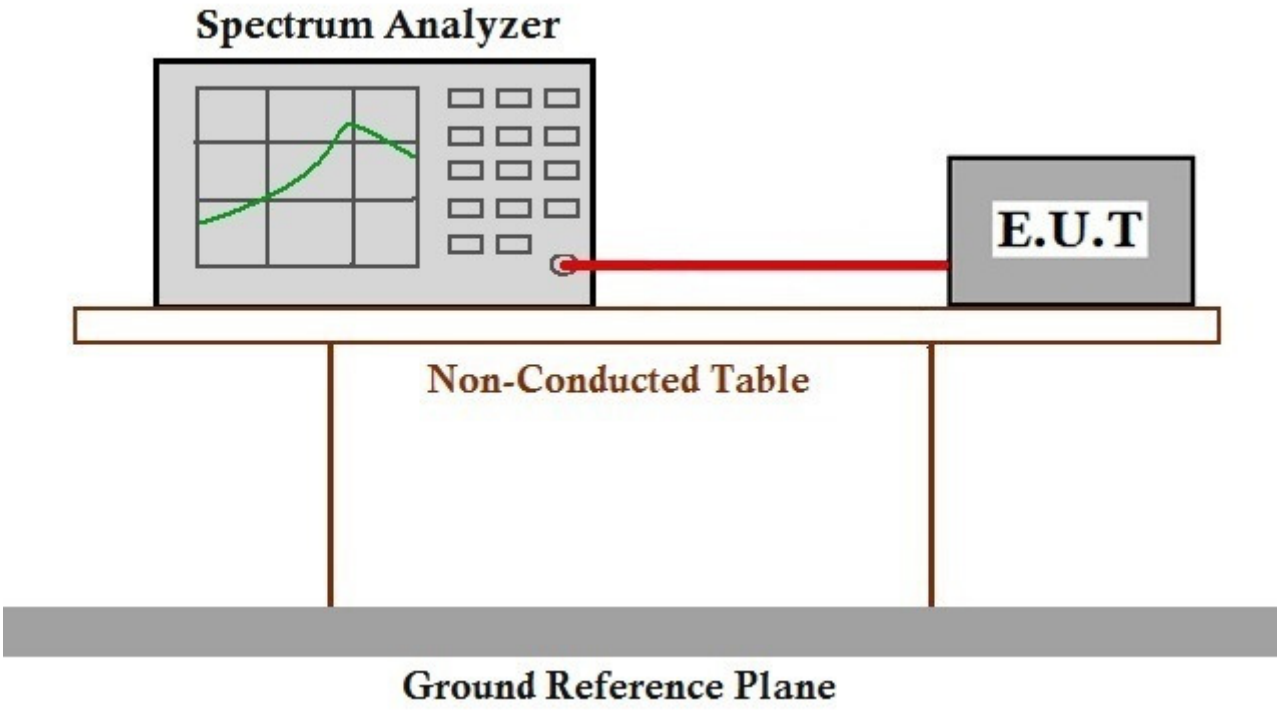
Test Requirement 47 CFR Part 15, Subpart C 15.231(a)
Test Method: ANSI C63.10 (2013) Section 7.8.4
Limit:

Device type	Limit
Manually operated transmitter	The switch automatically deactivate the transmitter within not more than 5 seconds of being released
Automatically actived transmitter	Cease transmission within 5 seconds after activation
Periodic transmissions to determine system integrity of transmitters used in security or safety applications	The total transmission time does not exceed 2 seconds per hour

7.3.1 E.U.T. Operation

Operating Environment:
Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1000 mbar
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

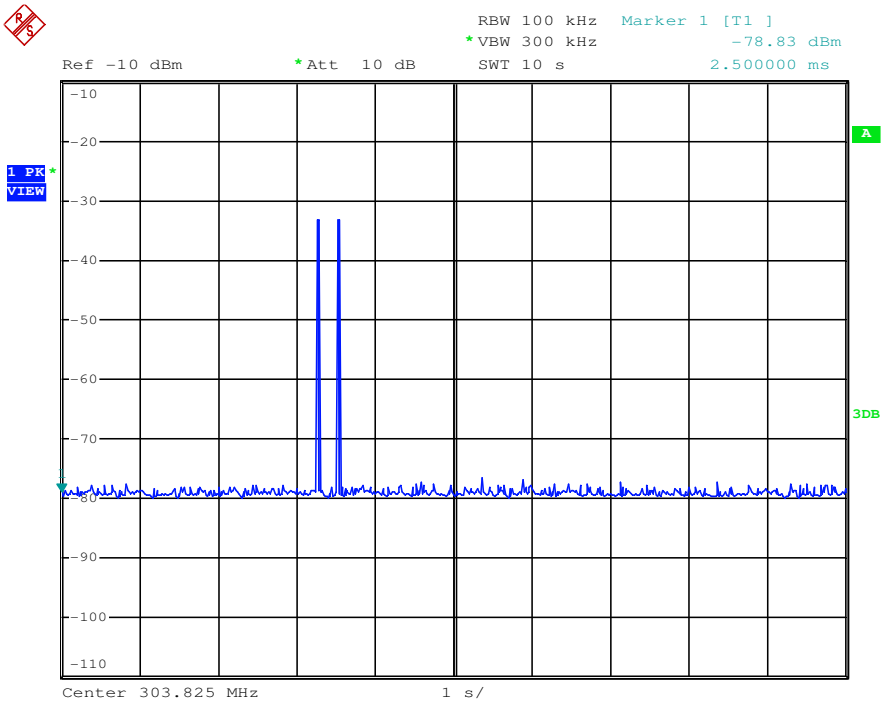
7.3.2 Test Setup Diagram



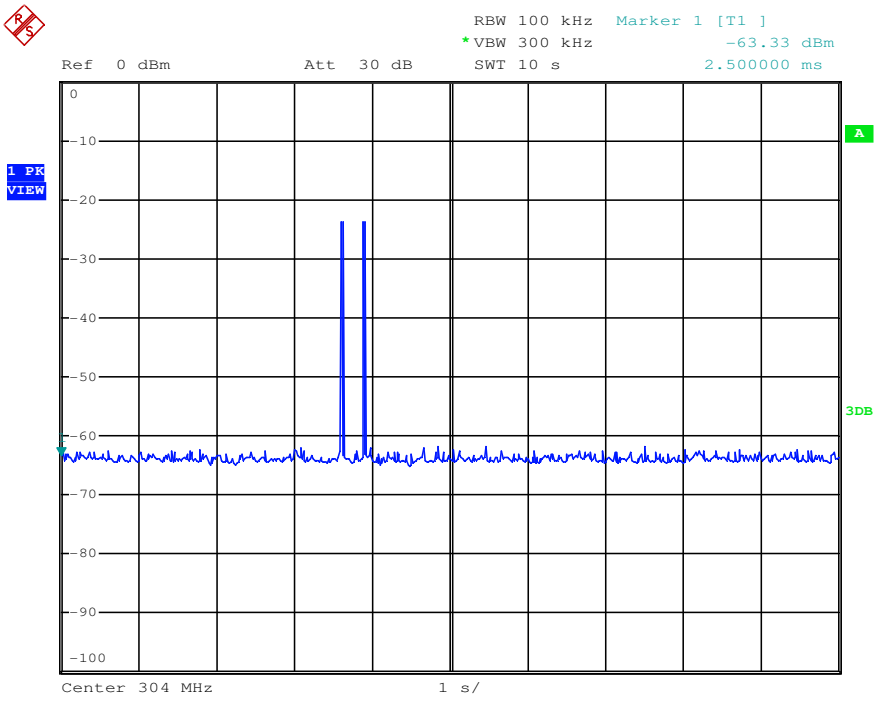
7.3.3 Measurement Procedure and Data

Test item	Limit (MHz)	Results
Transmitting time	⩽5S	Pass

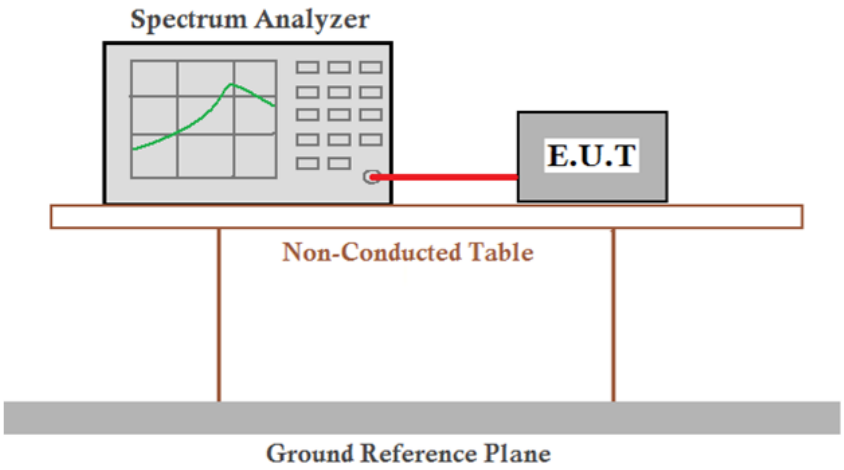
Mode:a



Mode:a

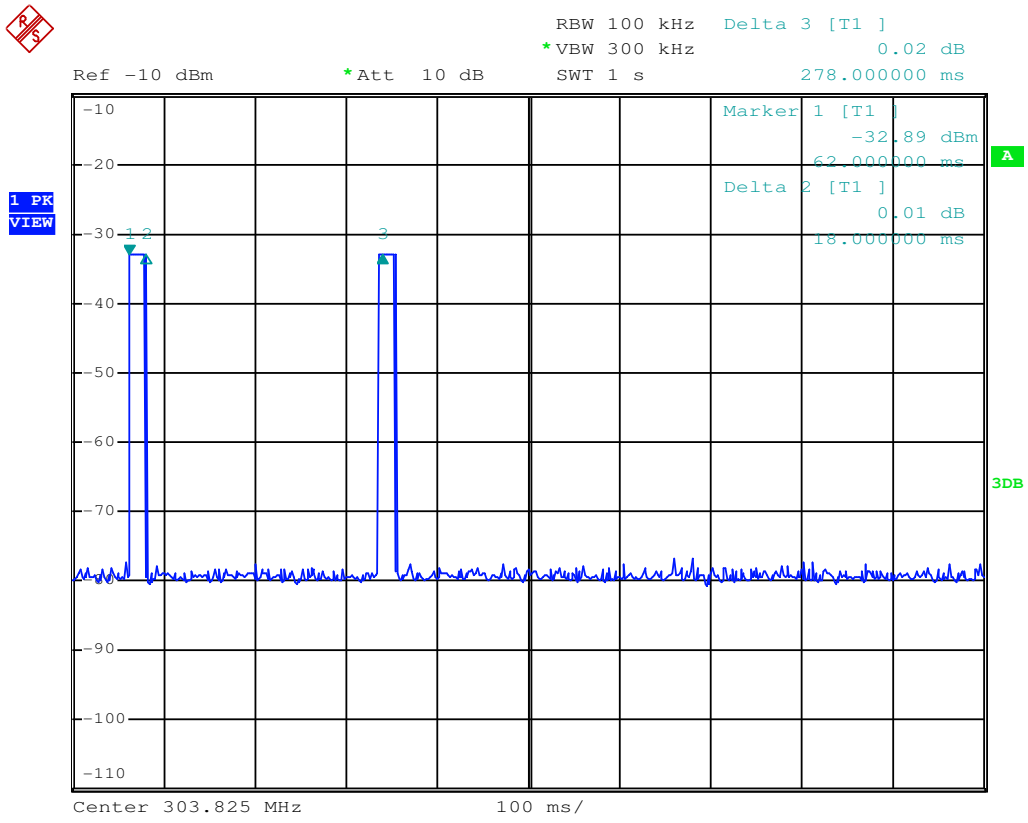


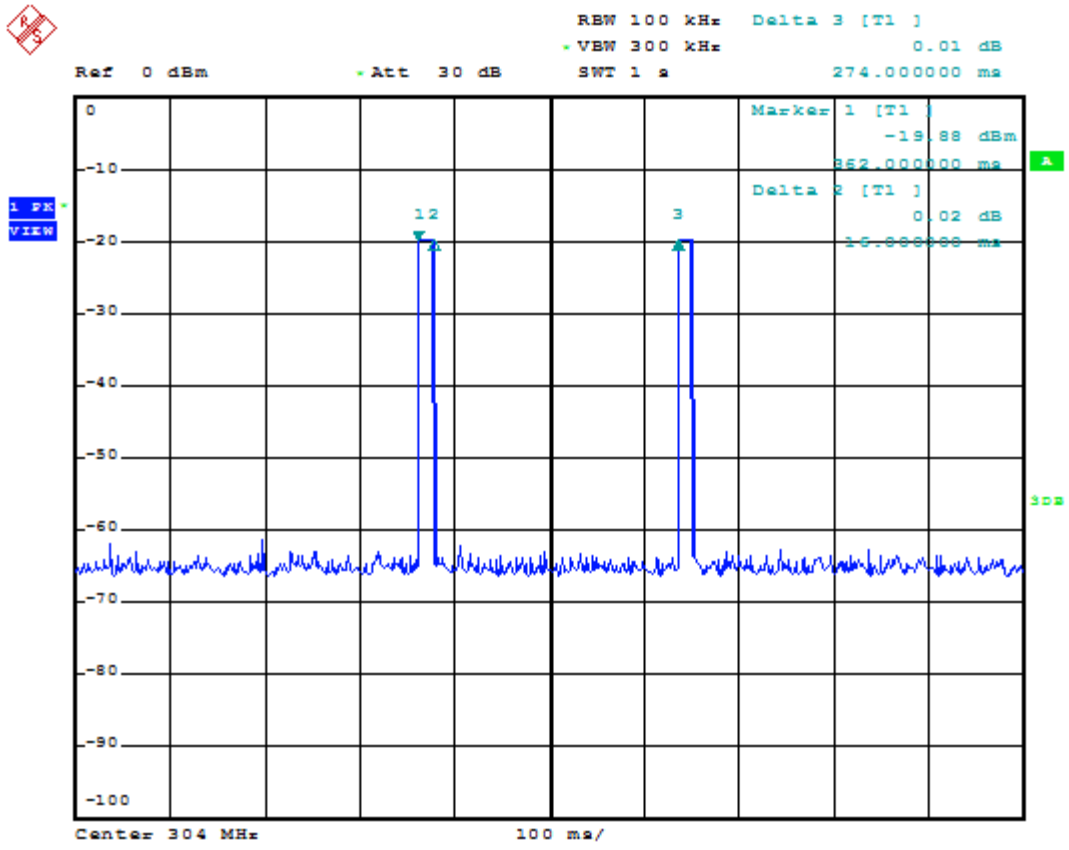
7.4 Duty Cycle

Test Requirement:	47 CFR Part 15C Section 15.35 (c)
Test Method:	ANSI C63.10:2013
Test Setup:	
Limit:	N/A
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 5 for details
Test Results:	Pass

Test plot as follows:

Duty cycle numbers





7.5 Field Strength of the Fundamental Signal (15.231(b))

Test Requirement 47 CFR Part 15, Subpart C 15.231(b)
Test Method: ANSI C63.10 (2013) Section 6.5
Measurement Distance: 3m
Limit:

Fundamental frequency(MHz)	Field strength of fundamental(microvolts/meter)	Field strength of spurious emissions(microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750	125 to 375
174-260	3750	375
260-470	3750 to 12500	375 to 1250
Above 470	12500	1250
Remark: the emission limit is based on measurement instrumentation employing an average detector at a distance of 3 meters. The frequencies above 1000MHz are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

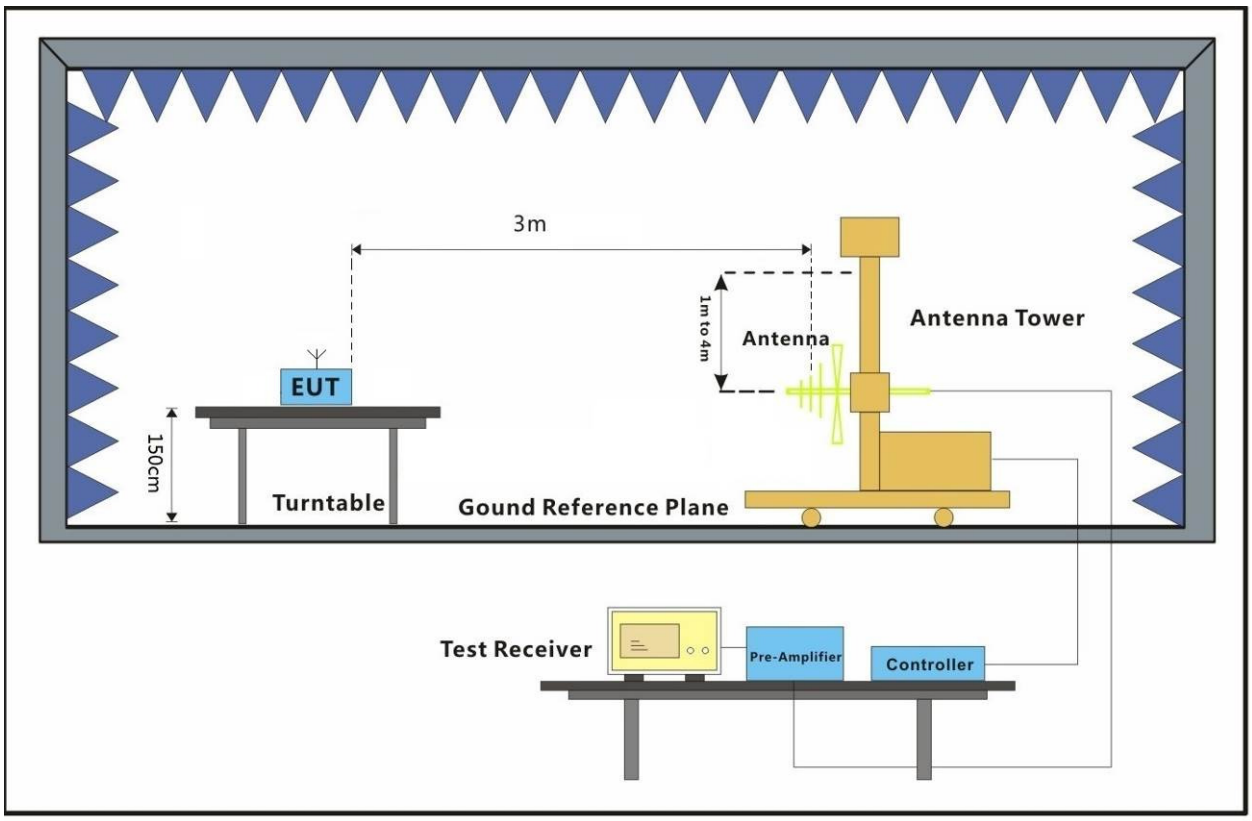
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1005 mbar

Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

303.825MHz

Average value:

Calculate Formula:	Average value=Peak value + PDCF
	PDCF=20 log(Duty cycle)= 20 log(18/100)=-14.9
	Duty cycle= T on time / T period
Test data:	Ton time =18ms
	T period =100ms

Peak value:

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
303.825	1.91	14.04	26.42	92.6	82.13	94.92	-12.79	Horizontal
303.825	1.91	14.04	26.42	84.34	73.87	94.92	-21.05	Vertical

Average Value:

Frequency (MHz)	PCDF	Average Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
303.825	-14.9	67.23	74.92	-7.69	Horizontal
303.825		58.97	74.92	-15.95	Vertical

304MHz

Average value:

Calculate Formula:	Average value=Peak value + PDCF
	PDCF=20 log(Duty cycle)= 20 log(16/100)=-15.92
	Duty cycle= T on time / T period
Test data:	Ton time =16ms
	T period =100ms

Peak value:

Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
304.000	1.91	14.04	26.42	92.61	82.14	94.93	-12.79	Horizontal
304.000	1.91	14.04	26.42	84.35	73.88	94.93	-21.05	Vertical

Average Value:

Frequency (MHz)	PCDF	Average Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
304.000	-15.92	66.22	74.93	-8.71	Horizontal
304.000		57.46	74.93	-17.47	Vertical

7.6 Radiated Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209
Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6
Measurement Distance: 3m
Limit:

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3
Remark: the emission limit is based on measurement instrumentation employing an average detector at a distance of 3 meters. The frequencies above 1000MHz are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.		

7.6.1 E.U.T. Operation

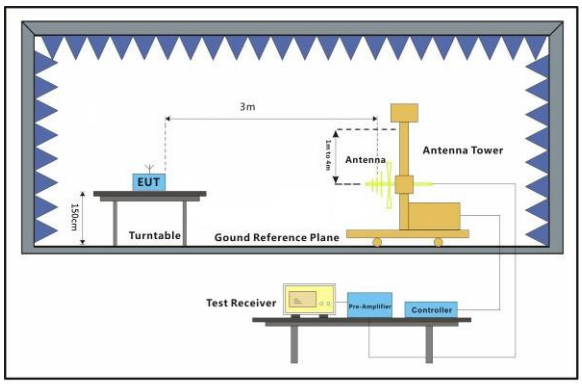
Operating Environment:

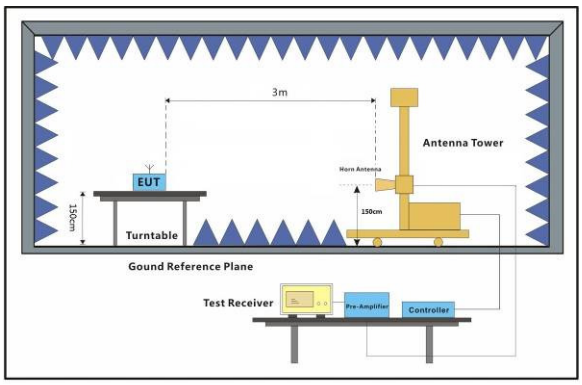
Temperature: 25 °C Humidity: 54 % RH Atmospheric Pressure: 1000 mbar

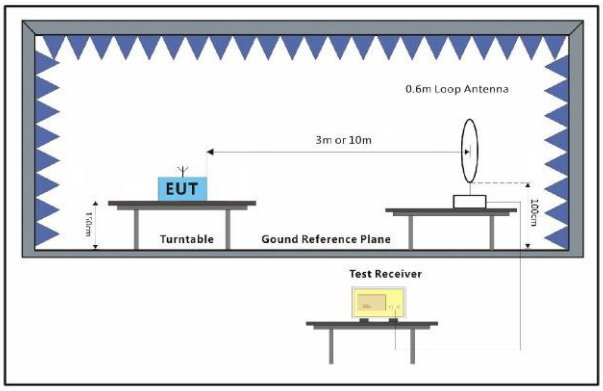
Test mode a:TX mode_Keep the EUT in transmitting with modulation mode.

Only the data of worst case is recorded in the report.

7.6.2 Test Setup Diagram







7.6.3 Measurement Procedure and Data

a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

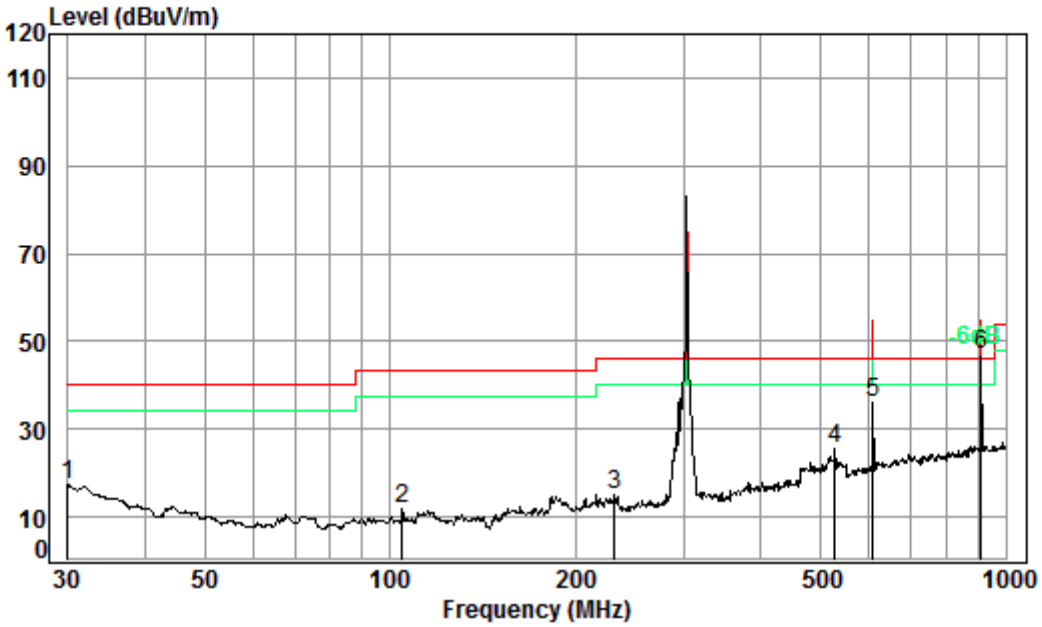
f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

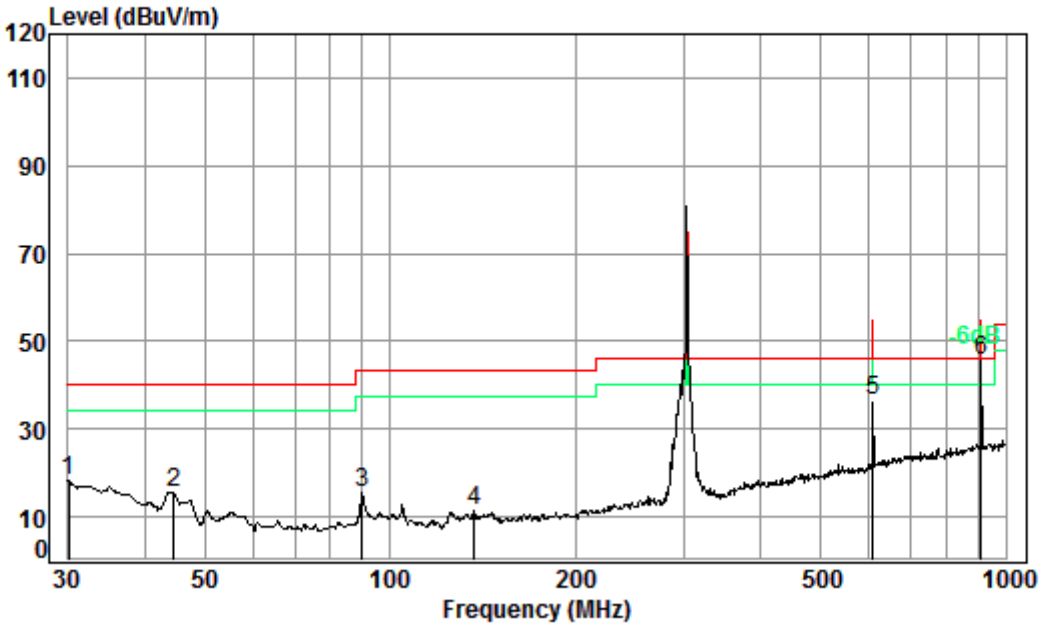
Below 1GHz
Detection:Peak
303.825MHz
Mode:a; Polarization:Horizontal



Condition: 3m HORIZONTAL
Job No. : 07528CR
Test mode: a
: 303.825

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.00	0.60	18.70	27.36	25.40	17.34	40.00	-22.66
2	104.54	1.21	8.87	27.17	28.90	11.81	43.50	-31.69
3	231.72	1.58	11.71	26.59	28.35	15.05	46.00	-30.95
4	528.25	2.63	18.55	27.65	32.12	25.65	46.00	-20.35
5 pp	607.79	2.72	20.02	27.53	40.86	36.07	46.00	-9.93
6 pk	912.86	3.61	23.25	26.71	46.98	47.13	74.93	-27.80

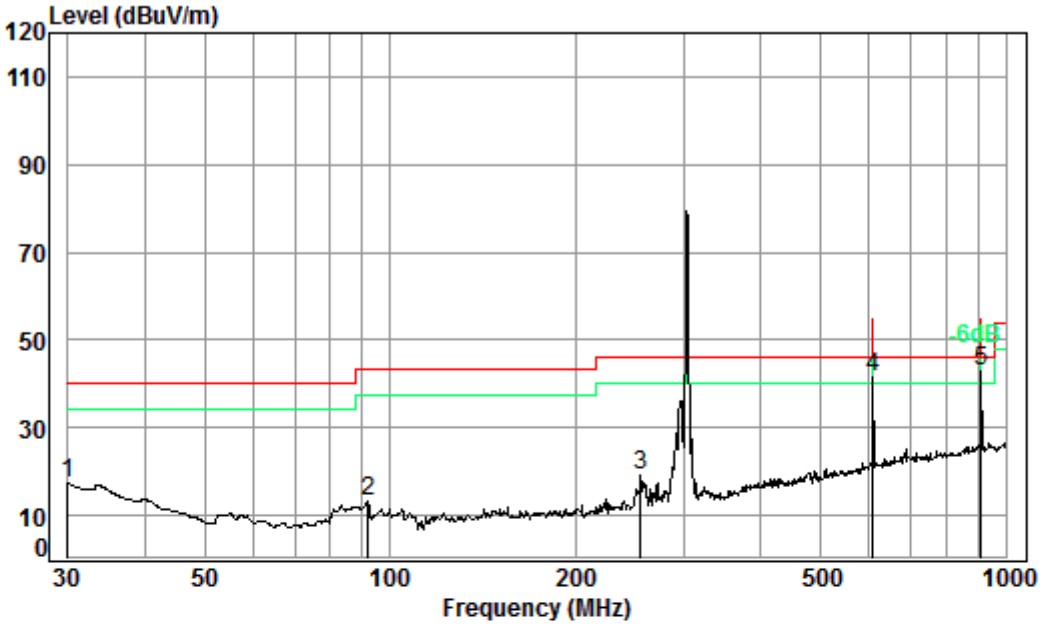
Mode:a; Polarization:Vertical



Condition: 3m VERTICAL
Job No. : 07529CR
Test mode: a
: 303.825

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.11	0.60	18.64	27.36	26.24	18.12	40.00	-21.88
2	44.59	0.70	11.08	27.31	31.11	15.58	40.00	-24.42
3	90.22	1.10	8.71	27.21	32.83	15.43	43.50	-28.07
4	136.94	1.29	7.98	26.97	28.96	11.26	43.50	-32.24
5 pp	607.79	2.72	20.02	27.53	41.22	36.43	46.00	-9.57
6 pk	912.86	3.61	23.25	26.71	45.50	45.65	74.93	-29.28

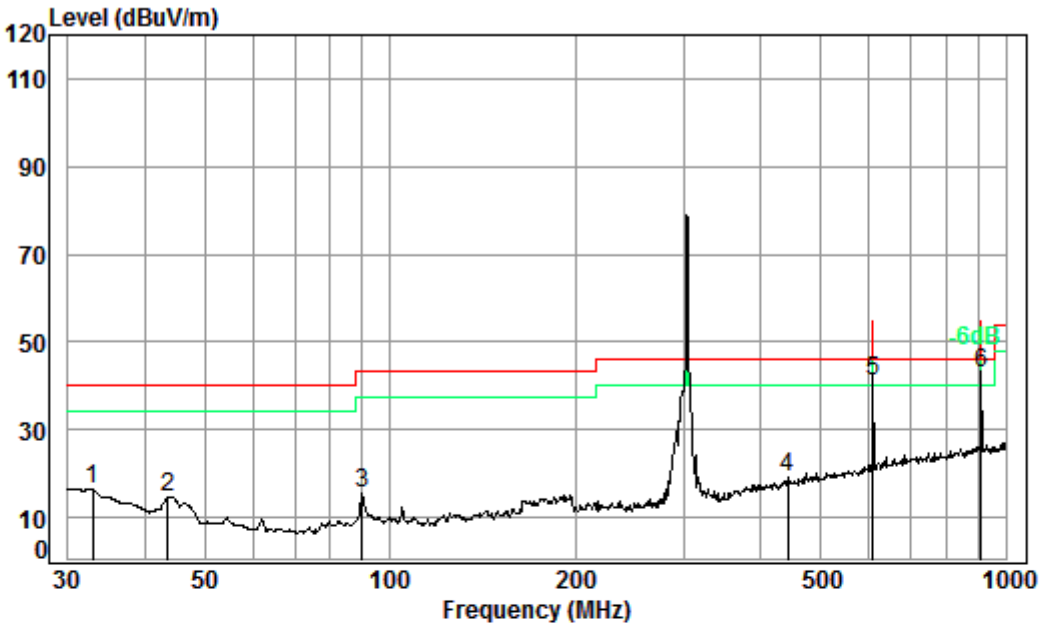
304MHz
Mode:a; Polarization:Horizontal



Condition: 3m HORIZONTAL
Job No. : 07528CR
Test mode: a
: 304

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.00	0.60	18.70	27.36	25.52	17.46	40.00	-22.54
2	92.14	1.12	8.79	27.21	30.36	13.06	43.50	-30.44
3	255.62	1.70	12.41	26.52	31.72	19.31	46.00	-26.69
4	607.79	2.72	20.02	27.53	46.25	41.46	46.00	-4.54
5 pp	912.86	3.61	23.25	26.71	42.68	42.83	46.00	-3.17

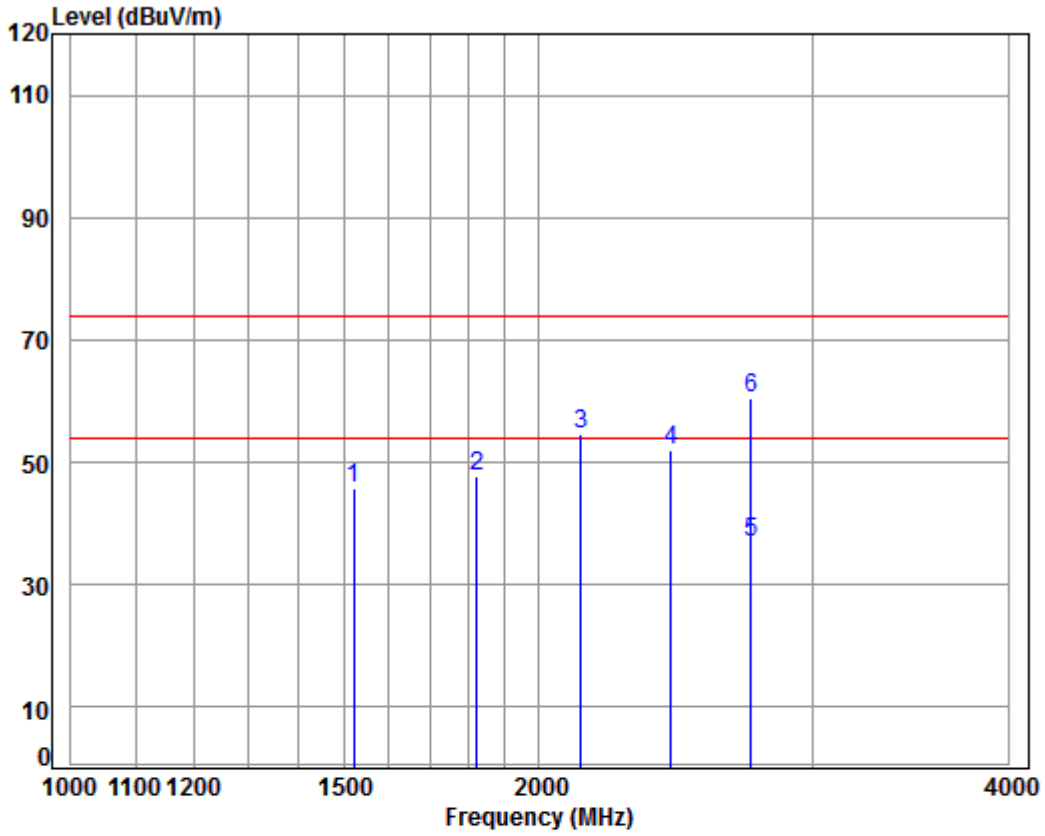
Mode:a; Polarization:Vertical



Condition: 3m VERTICAL
Job No. : 07528CR
Test mode: a
: 304

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	32.86	0.60	17.10	27.35	26.30	16.65	40.00	-23.35
2	43.51	0.68	11.56	27.31	29.69	14.62	40.00	-25.38
3	90.22	1.10	8.71	27.21	33.13	15.73	43.50	-27.77
4	441.74	2.38	16.73	27.40	27.50	19.21	46.00	-26.79
5	607.79	2.72	20.02	27.53	46.01	41.22	46.00	-4.78
6 pp	912.86	3.61	23.25	26.71	42.60	42.75	46.00	-3.25

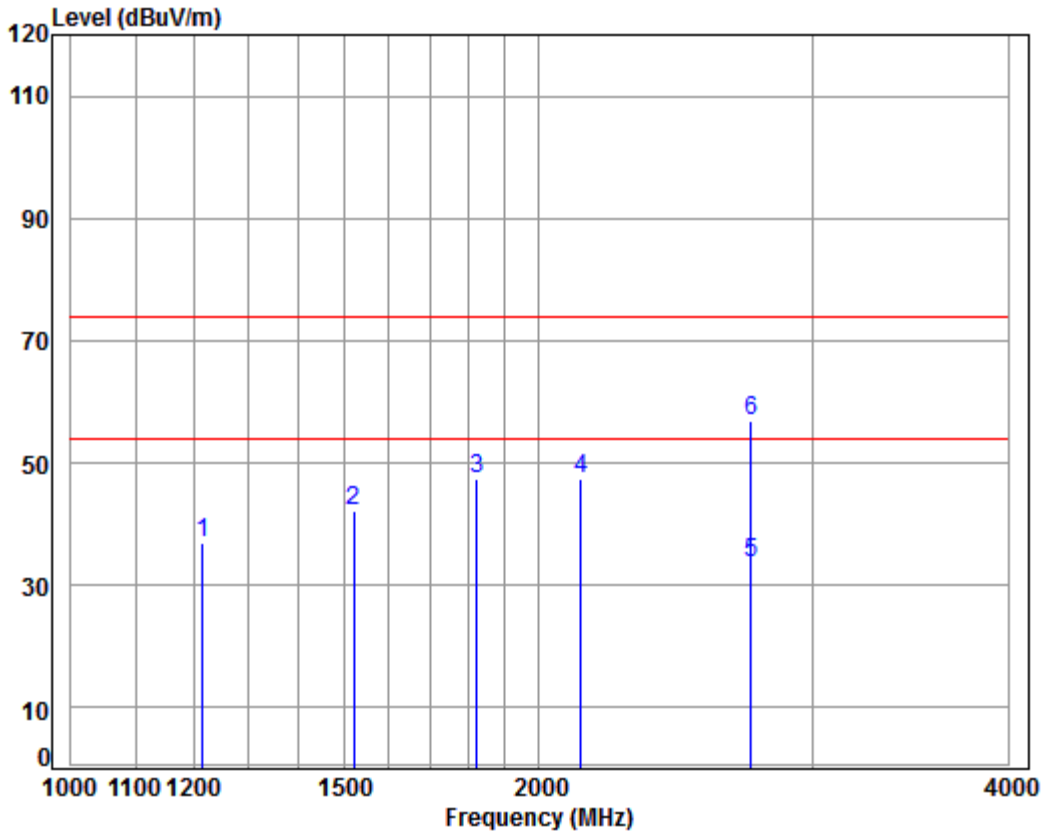
Above 1GHz
303.825MHz
Mode:a; Polarization:Horizontal



Condition: 3m HORIZONTAL
Job No : 07528CR/07529CR
Mode : 303.825 TX SE
Note :

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1519.125	5.45	25.89	37.74	52.12	45.72	74.00	-28.28	Peak
2	1822.950	5.08	27.16	37.71	53.34	47.87	74.00	-26.13	Peak
3	2126.775	5.10	28.25	37.68	58.89	54.56	74.00	-19.44	Peak
4	2430.600	5.58	29.31	37.65	54.72	51.96	74.00	-22.04	Peak
5 av	2734.425	5.80	30.34	37.62	38.54	37.06	54.00	-16.94	Average
6 pp	2734.425	5.80	30.34	37.62	61.83	60.35	74.00	-13.65	Peak

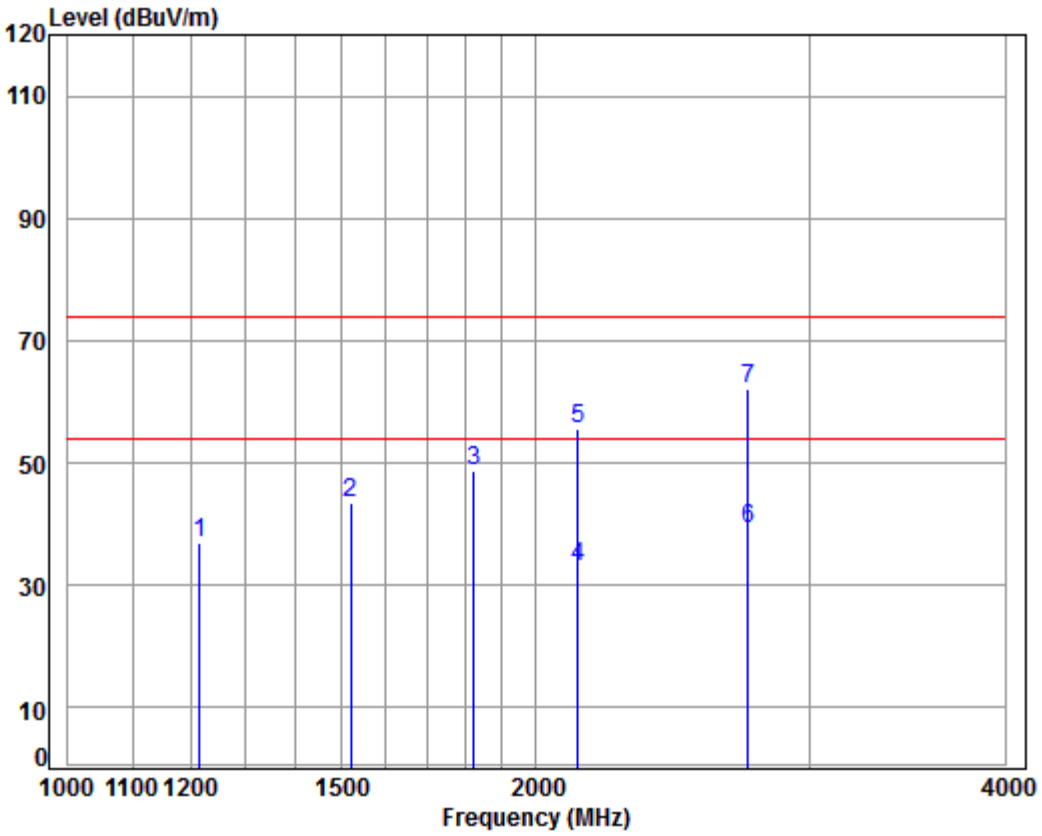
Mode:a; Polarization:Vertical



Condition: 3m VERTICAL
Job No : 07528CR/07529CR
Mode : 303.825 TX SE
Note :

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1215.300	4.48	24.56	37.77	45.77	37.04	74.00	-36.96	Peak
2	1519.125	5.45	25.89	37.74	48.53	42.13	74.00	-31.87	Peak
3	1822.950	5.00	27.45	37.71	52.67	47.41	74.00	-26.59	Peak
4	2126.775	5.10	28.25	37.68	51.84	47.51	74.00	-26.49	Peak
5 av	2734.425	5.80	30.34	37.62	35.03	33.55	54.00	-20.45	Average
6 pp	2734.425	5.80	30.34	37.62	58.32	56.84	74.00	-17.16	Peak

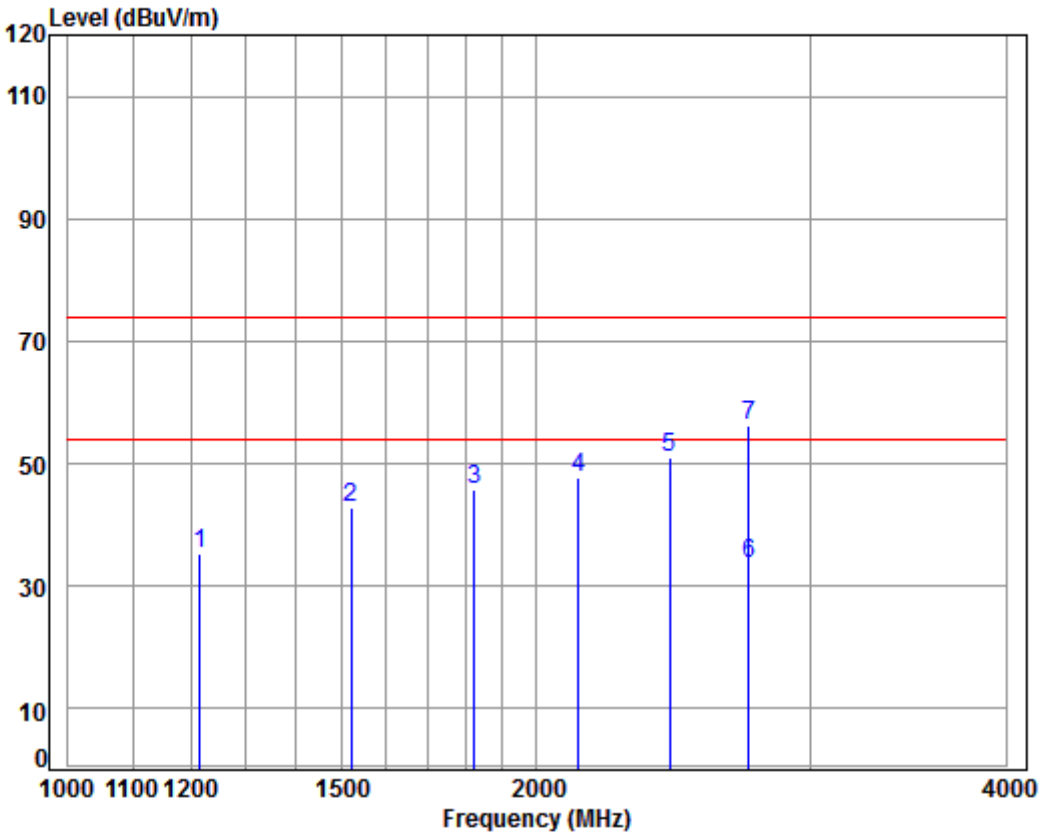
304MHz
Mode:a; Polarization:Horizontal



Condition: 3m HORIZONTAL
Job No : 07528CR/07529CR
Mode : 304 TX SE
Note :

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1216.000	4.48	24.56	37.77	45.74	37.01	74.00	-36.99	Peak
2	1520.000	5.45	25.89	37.74	50.00	43.60	74.00	-30.40	Peak
3	1824.000	5.08	27.16	37.71	54.09	48.62	74.00	-25.38	Peak
4	2128.000	5.10	28.25	37.68	37.35	33.02	54.00	-20.98	Average
5	2128.000	5.10	28.25	37.68	60.00	55.67	74.00	-18.33	Peak
6 av	2736.000	5.80	30.34	37.62	40.87	39.39	54.00	-14.61	Average
7 pp	2736.000	5.80	30.34	37.62	63.52	62.04	74.00	-11.96	Peak

Mode:a; Polarization:Vertical



Condition: 3m VERTICAL
Job No : 07528CR/07529CR
Mode : 304 TX SE
Note :

		Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
		MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1		1216.000	4.48	24.56	37.77	44.11	35.38	74.00	-38.62	Peak
2		1520.000	5.45	25.89	37.74	49.19	42.79	74.00	-31.21	Peak
3		1824.000	5.08	27.16	37.71	51.37	45.90	74.00	-28.10	Peak
4		2128.000	5.10	28.25	37.68	51.92	47.59	74.00	-26.41	Peak
5		2432.000	5.58	29.32	37.65	53.67	50.92	74.00	-23.08	Peak
6	av	2736.000	5.80	30.34	37.62	35.17	33.69	54.00	-20.31	Average
7	pp	2736.000	5.80	30.34	37.62	57.82	56.34	74.00	-17.66	Peak

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 4GHz, the disturbance below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

3) As shown in this section, for frequencies 30MHz to 4GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

8 Photographs

8.1 EUT Constructional Details

Refer to EUT external and internal photos.