



**SGS-CSTC Standards Technical Services Ltd.
Shenzhen Branch**

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Report No.: SZEM151100703101
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FCC REPORT

Application No.: SZEM1511007031CR(SGS GZ No.:GZEM1511005850CR)
Applicant: Bosch Security Systems, Inc.
Manufacturer: Bosch (Zhuhai) Security Systems Company, Ltd.
Factory: Bosch (Zhuhai) Security Systems Company, Ltd.
Product Name: Security Escort Transmitter 90sec 304Mhz
Model No.(EUT): SE88A-90S-304
Trade Mark: Bosch
FCC ID: ESV-0117-05
Standards: 47 CFR Part 15, Subpart C (2014)
Date of Receipt: 2015-11-17
Date of Test: 2015-11-27
Date of Issue: 2015-12-02

Test Result:	PASS *
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*In the configuration tested, the EUT detailed in this report complied with the standards specified above.

Authorized Signature:



Jack Zhang
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.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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1 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2015-12-02		Original

Authorized for issue by:				
Tested By				2015-11-27
		<hr/>		<hr/>
		(Martin Li) /Project Engineer		Date
Prepared By				2015-12-02
		<hr/>		<hr/>
		(Joyce Shi) /Clerk		Date
Checked By				2015-12-02
		<hr/>		<hr/>
		(Eric Fu) /Reviewer		Date

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2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10(2009)	PASS
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C Section 15.231 (e)	ANSI C63.10(2009)	PASS
Spurious Emissions	47 CFR Part 15, Subpart C Section 15.231 (e)/15.209	ANSI C63.10(2009)	PASS
20dB Bandwidth	47 CFR Part 15, Subpart C Section 15.231 (c)	ANSI C63.10(2009)	PASS
Dwell Time	47 CFR Part 15, Subpart C Section 15.231 (e)	ANSI C63.10(2009)	PASS



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4 General Information

4.1 Client Information

Applicant:	Bosch Security Systems, Inc.
Address of Applicant:	130 Perinton Parkway, Fairport, NY, 14450, US
Manufacturer:	Bosch (Zhuhai) Security Systems Company, Ltd.
Address of Manufacturer:	20 Ji Chang Bei Road, Qingwan Industrial Estate Sanzao town, Jinwan district, Zhuhai 519040, P.R. China.
Factory:	Bosch (Zhuhai) Security Systems Company, Ltd.
Address of Factory:	20 Ji Chang Bei Road, Qingwan Industrial Estate Sanzao town, Jinwan district, Zhuhai 519040, P.R. China.

4.2 General Description of EUT

Name:	Security Escort Transmitter 90sec 304Mhz
Model No.:	SE88A-90S-304
Trade Mark:	Bosch
Sample Type:	Mobile production
Operation Frequency:	Wireless 304MHz
Channel Numbers:	1
Modulation Type:	Manchester
Antenna Type:	Integral
Antenna Gain:	0dBi
EUT power supply:	DC3.7V



4.3 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1020 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with modulation.

4.4 Description of Support Units

The EUT has been tested independent unit.

4.5 Test Location

All tests were performed at:

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

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.



4.6 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 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

- **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen 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 No.: 556682.

- **Industry Canada (IC)**

The 3m Semi-anechoic chambers and the 10m Semi-anechoic chambers 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-2, 4620C-3.

4.7 Deviation from Standards

None.

4.8 Abnormalities from Standard Conditions

None.

4.9 Other Information Requested by the Customer

None.



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4.10 Equipment List

RE in Chamber						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2015-05-13	2016-05-13
2	EMI Test Receiver	Agilent Technologies	N9038A	SEL0312	2015-09-16	2016-09-16
3	EMI Test software	AUDIX	E3	SEL0050	N/A	N/A
4	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2014-11-15	2017-11-15
5	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2015-10-17	2016-10-17
6	Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEL0076	2014-11-24	2017-11-24
7	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2015-05-13	2016-05-13
8	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2015-10-17	2016-10-17
9	Coaxial cable	SGS	N/A	SEL0027	2015-05-13	2016-05-13
10	Coaxial cable	SGS	N/A	SEL0189	2015-05-13	2016-05-13
11	Coaxial cable	SGS	N/A	SEL0121	2015-05-13	2016-05-13
12	Coaxial cable	SGS	N/A	SEL0178	2015-05-13	2016-05-13
13	Band filter	Amindeon	82346	SEL0094	2015-05-13	2016-05-13
14	Barometer	Chang Chun	DYM3	SEL0088	2015-05-13	2016-05-13
15	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2015-10-09	2016-10-09
16	Humidity/ Temperature Indicator	Shanghai Qixiang	ZJ1-2B	SEL0103	2015-10-24	2016-10-24
17	Signal Generator (10M-27GHz)	Rohde & Schwarz	SMR27	SEL0067	2015-05-13	2016-05-13
18	Loop Antenna	Beijing Daze	ZN30401	SEL0203	2015-05-13	2016-05-13

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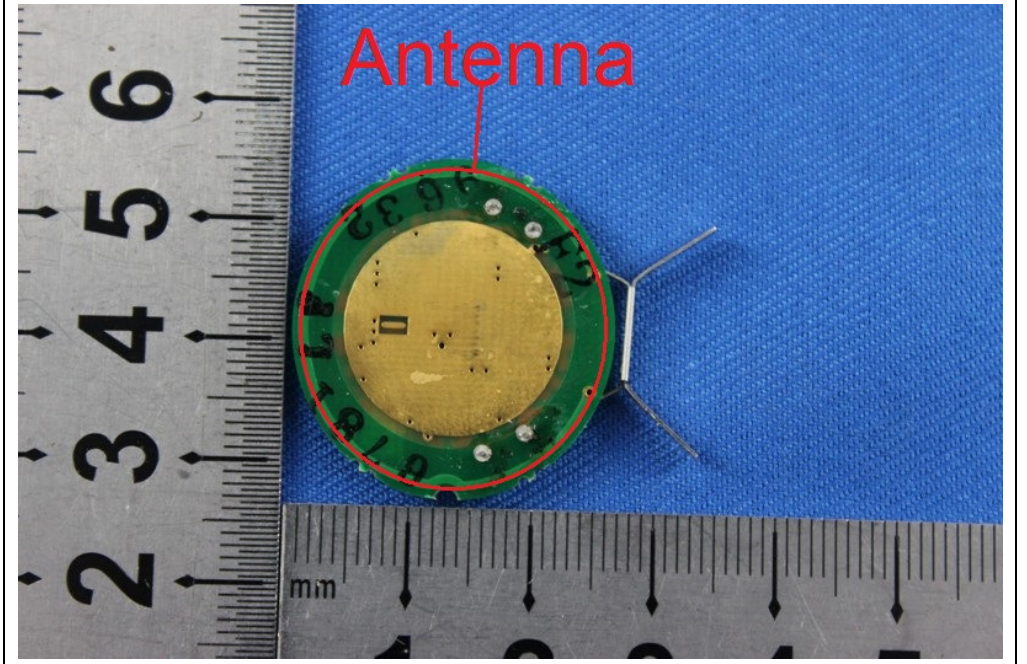
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RF connected test						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2015-10-09	2016-10-09
2	Humidity/ Temperature Indicator	HYGRO	ZJ1-2B	SEL0033	2015-10-24	2016-10-24
3	Spectrum Analyzer	Rohde & Schwarz	FSP	SEL0154	2015-10-17	2016-10-17
4	Coaxial cable	SGS	N/A	SEL0178	2015-05-13	2016-05-13
5	Coaxial cable	SGS	N/A	SEL0179	2015-05-13	2016-05-13
6	Barometer	ChangChun	DYM3	SEL0088	2015-05-13	2016-05-13
7	Signal Generator	Rohde & Schwarz	SML03	SEL0068	2015-04-25	2016-04-25
8	POWER METER	R & S	NRVS	SEL0144	2015-10-09	2016-10-09
9	Attenuator	Beijin feihang taida	TST-2-6dB	SEL0205	2015-04-25	2016-04-25

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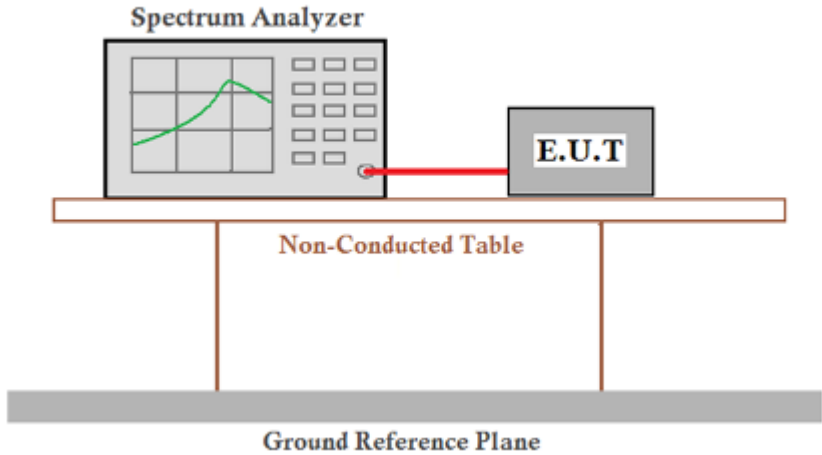
5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203
<p>15.203 requirement:</p> <p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p>	
EUT Antenna:	
<p>The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.</p>	

5.2 Spurious Emissions

5.2.1 Duty Cycle

Test Requirement:	47 CFR Part 15C Section 15.35 (c)
Test Method:	ANSI C63.10:2009
Test Setup:	
Limit:	N/A
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

Measurement data:	
Calculate Formula:	$PDCF = 20 \log(\text{Duty cycle})$
	$\text{Duty cycle} = T_{\text{on time}} / T_{\text{period}}$
Test data:	$T_{\text{on time}} = 14.65\text{ms}$
	$T_{\text{period}} = 100\text{ms}$
	$PDCF = -16.68$

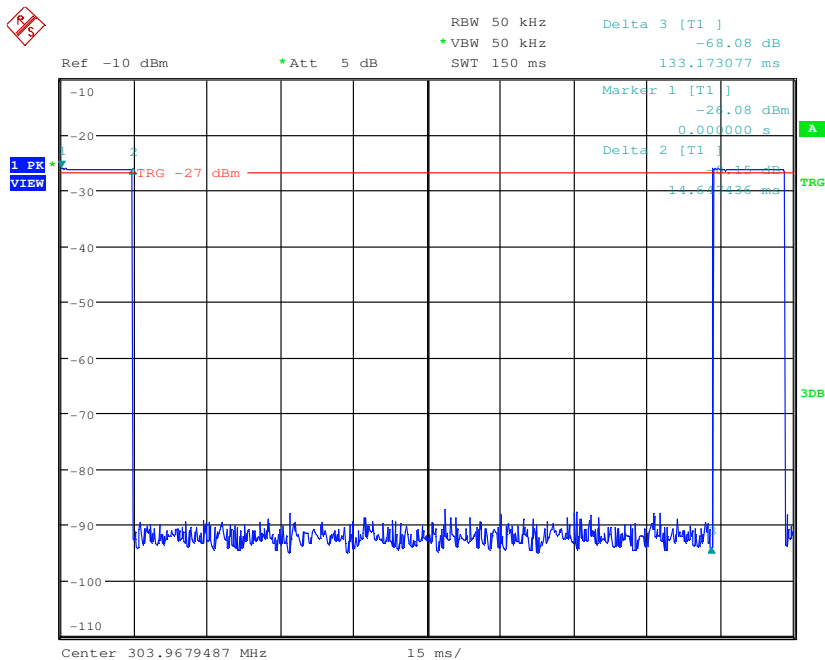


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Test plot as follows:

Time slot:



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5.2.2 Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.231(e) and 15.209				
Test Method:	ANSI C63.10: 2009				
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
Peak		1MHz	10Hz	Average	
Limit: (Spurious Emissions)	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
<p>Note:</p> <p>(1). 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.</p> <p>(2). Spurious emissions shall be attenuated to the general limits shown above in § 15.209, which is a higher field strength than the limit shown in table of 15.231(e).</p>					

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Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)	Remark
	304MHz	86.98	Average Value
		66.98	Peak Value
Test Procedure:	<p>a. 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.</p> <p>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>c. 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.</p> <p>d. 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.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>f. 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.</p> <p>g. 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.</p>		
Test Setup:			

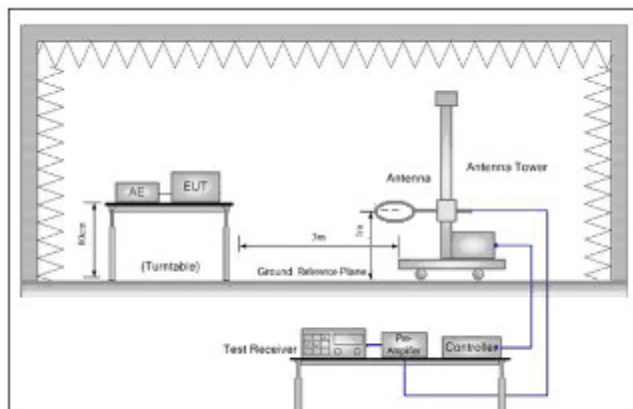


Figure 1. Below 30MHz

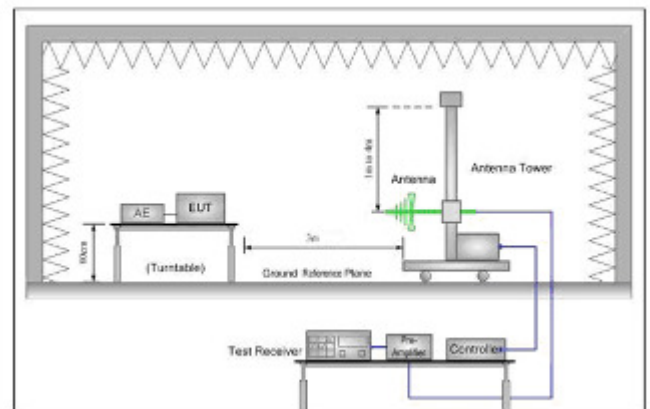


Figure 2. 30MHz to 1GHz

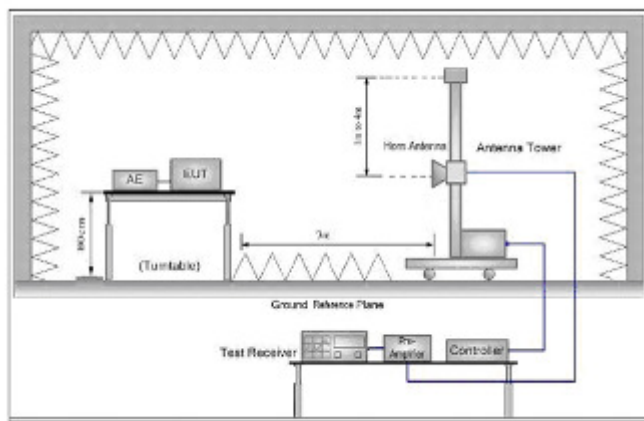


Figure 3. Above 1 GHz

Test Mode:	Transmitting mode
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

Measurement Data

5.2.2.1 Field Strength Of The Fundamental Signal

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	2.81	14.05	25	77.2	69.06	86.98	-17.38	Vertical
304	2.81	14.05	25	67.52	59.38	86.98	-27.6	Horizontal

Average value=Peak value + PDCF

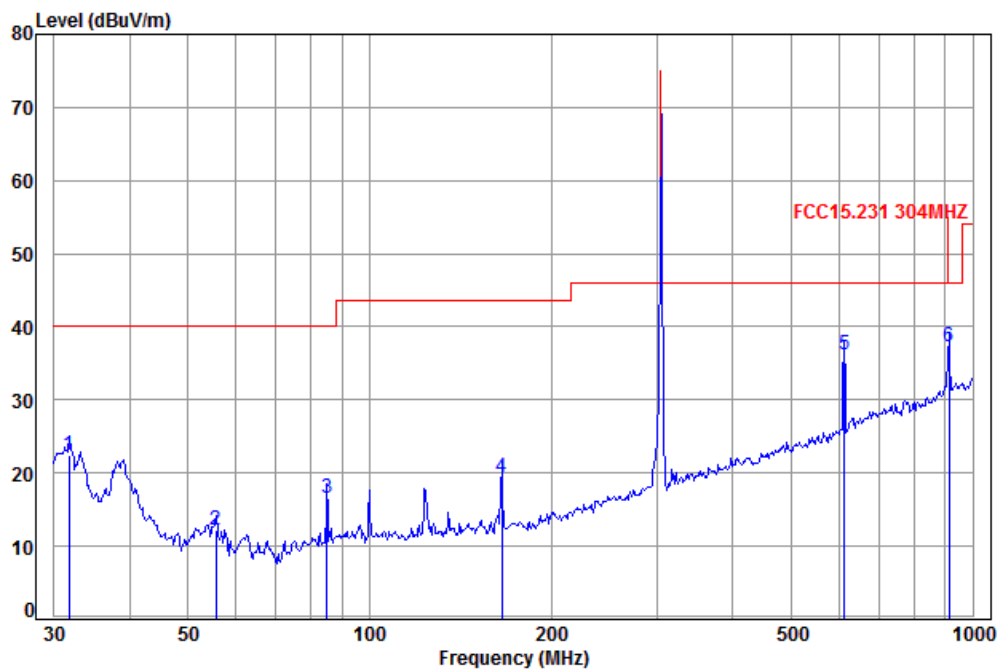
Average value:				
Frequency (MHz)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
304	52.38	66.98	-14.6	Vertical
304	42.70	66.98	-24.28	Horizontal



5.2.2.2 Spurious Emissions

Below 1GHz

Vertical



Condition: FCC15.231 304MHZ 3m Vertical

Job No: : 7031CR

Mode: : TX mode

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB	
1	31.73	0.67	17.61	25.69	29.82	22.41	40.00	-17.59 QP
2	55.61	1.00	7.83	25.68	28.98	12.13	40.00	-27.87 QP
3	85.00	1.32	8.21	25.07	32.15	16.61	40.00	-23.39 QP
4	165.49	1.93	9.34	24.98	33.20	19.49	43.50	-24.01 QP
5	612.06	4.29	20.00	26.66	38.55	36.18	46.00	-9.82 QP
6	pp 912.86	5.32	23.23	25.40	34.10	37.25	46.00	-8.75 QP

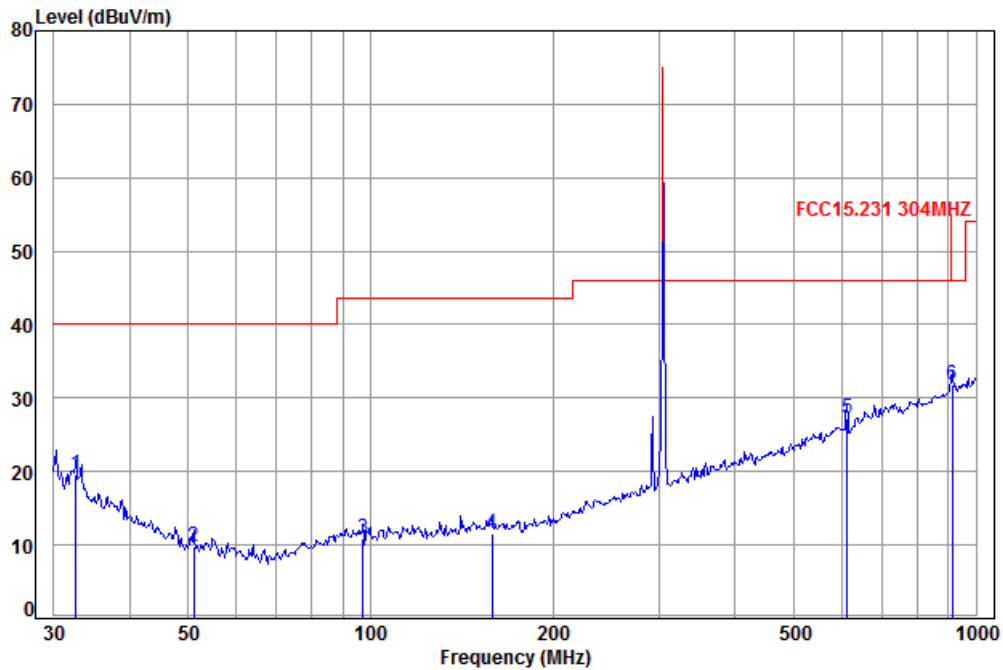
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Horizontal



Condition: FCC15.231 304MHZ 3m Horizontal

Job No: : 7031CR

Mode: : TX mode

	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	32.63	0.69	17.06	25.70	27.56	19.61	40.00	-20.39	QP
2	51.12	0.94	8.52	25.70	26.13	9.89	40.00	-30.11	QP
3	97.11	1.41	8.99	25.42	25.86	10.84	43.50	-32.66	QP
4	158.67	1.88	9.20	24.99	25.55	11.64	43.50	-31.86	QP
5	612.06	4.29	20.00	26.66	29.67	27.30	46.00	-18.70	QP
6 pp	912.86	5.32	23.23	25.40	28.60	31.75	46.00	-14.25	QP

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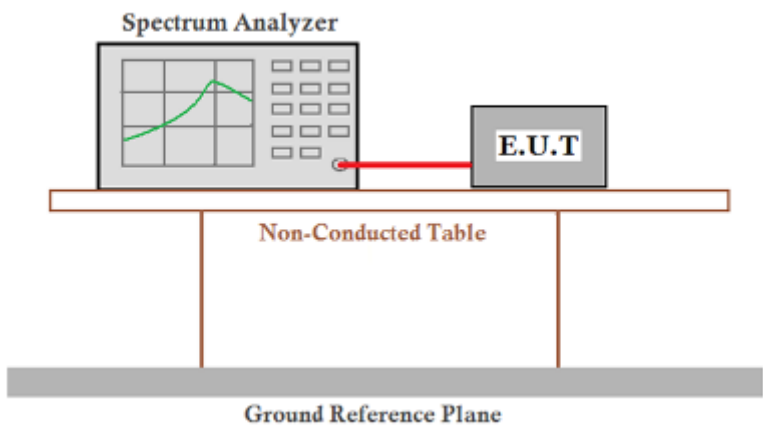
Above 1GHz								
Peak value:								
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1216.000	5.30	24.25	37.98	51.00	42.57	74	-31.43	Vertical
1520.000	5.97	25.66	38.03	46.92	40.52	74	-33.48	Vertical
1824.000	6.45	26.90	38.07	48.90	44.18	74	-29.82	Vertical
2128.000	7.07	28.10	38.10	58.79	55.86	74	-18.14	Vertical
2432.000	7.48	28.75	38.11	60.38	58.50	74	-15.50	Vertical
2736.000	7.95	29.57	38.13	61.40	60.79	74	-13.21	Vertical
1216.000	5.30	24.25	37.98	43.96	35.53	74	-38.47	Horizontal
1520.000	5.97	25.66	38.03	42.53	36.13	74	-37.87	Horizontal
1824.000	6.45	26.90	38.07	43.57	38.85	74	-35.15	Horizontal
2128.000	7.07	28.10	38.10	50.82	47.89	74	-26.11	Horizontal
2432.000	7.48	28.75	38.11	54.05	52.17	74	-21.83	Horizontal
2736.000	7.95	29.57	38.13	57.16	56.55	74	-17.45	Horizontal

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:
$$\text{Final Test Level} = \text{Receiver Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$
- 2) The disturbance above 13GHz and 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.
- 3) As shown in this section, for frequencies above 1GHz, 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.

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5.3 20dB Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.231 (c)
Test Method:	ANSI C63.10:2009
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
Test Setup:	
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

Measurement Data

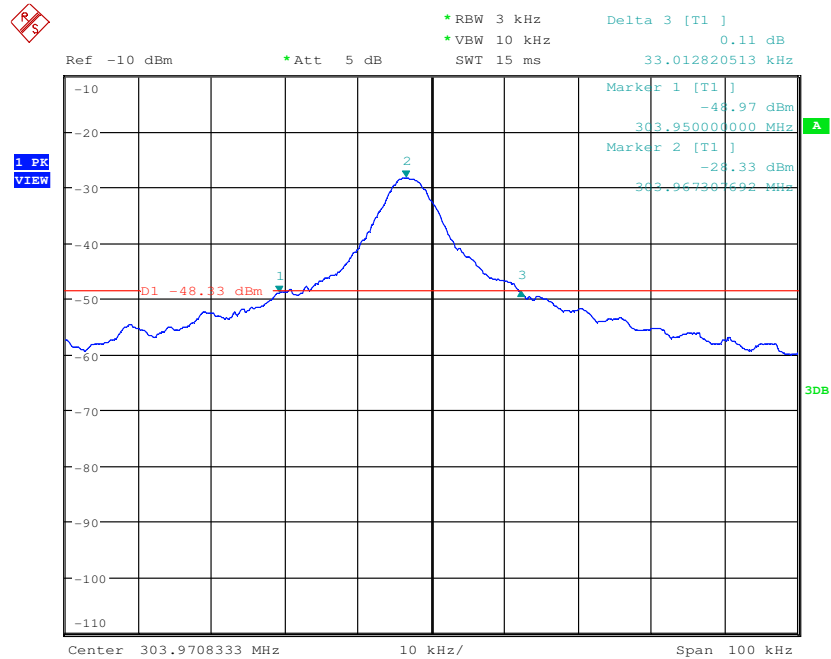
20dB bandwidth (MHz)	Limit (MHz)	Results
0.033	0.76	PASS



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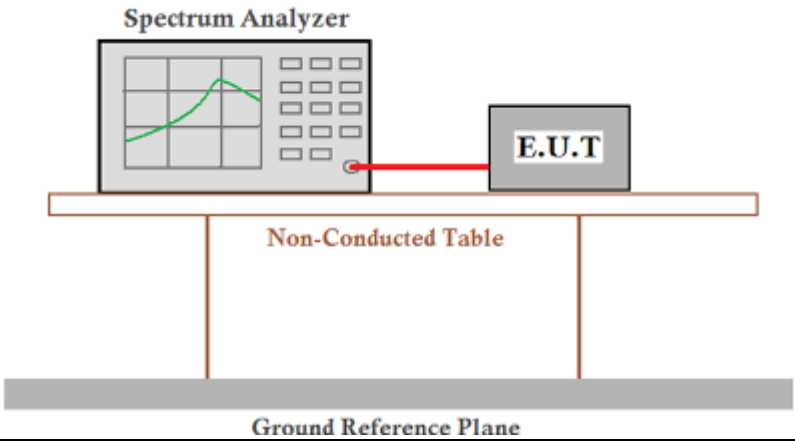
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Test plot as follows:



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5.4 Dwell time

Test Requirement:	47 CFR Part 15C Section 15.231 (e)
Test Method:	ANSI C63.10:2009
Test Setup:	
Limit:	The duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

Measurement Data

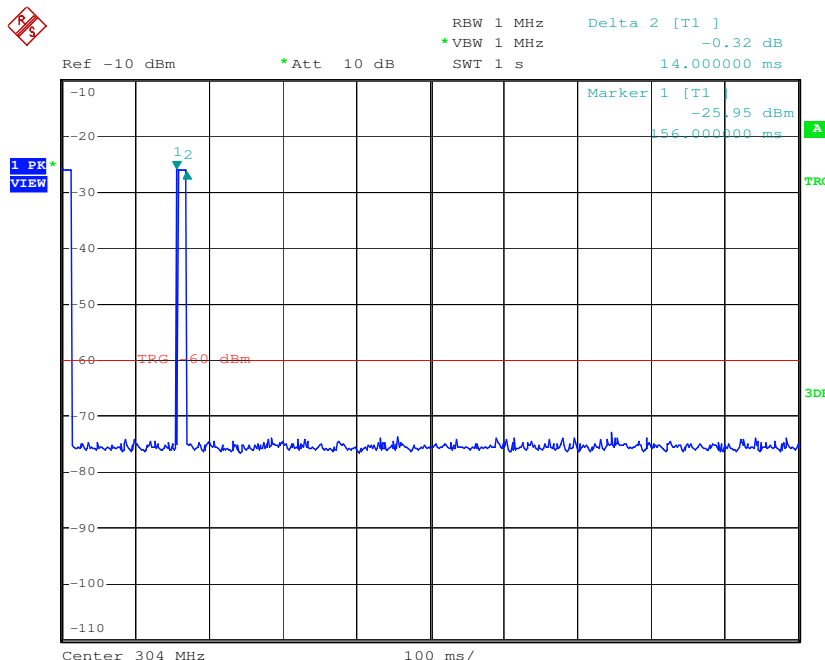
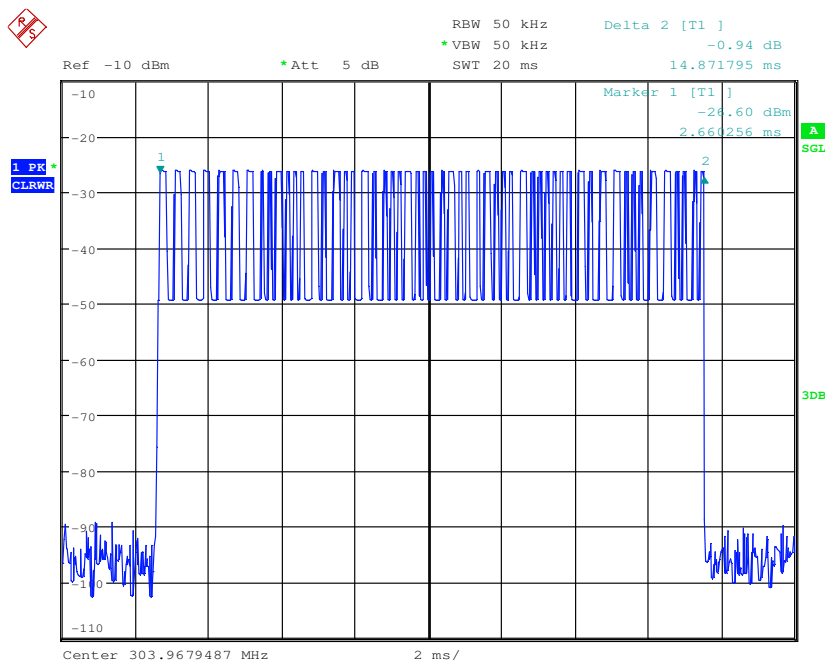
Test item	Limit	Results
Transmitting time	<1s	Pass
The silent period	More than 30 times the transmitting time and more than 10s	Pass



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Test plot as follows:



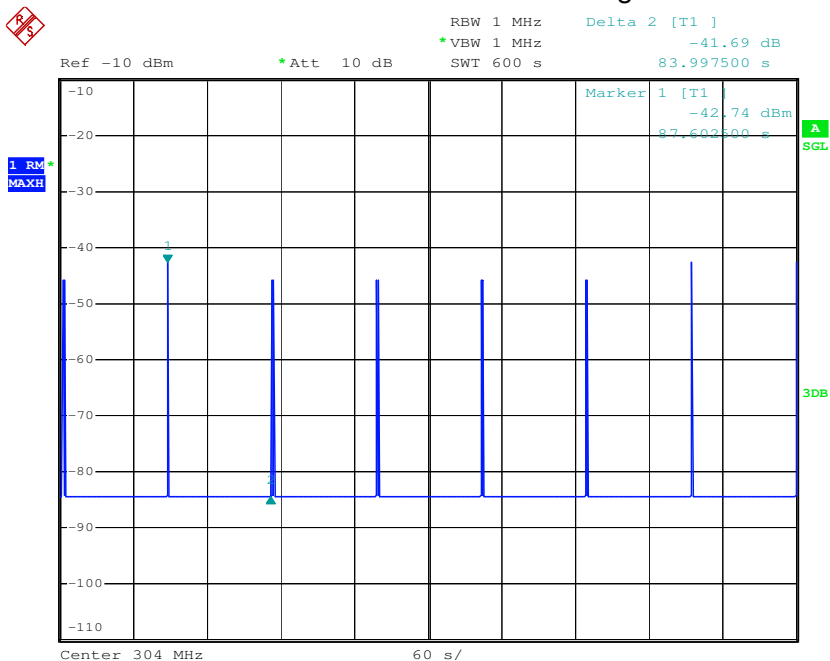
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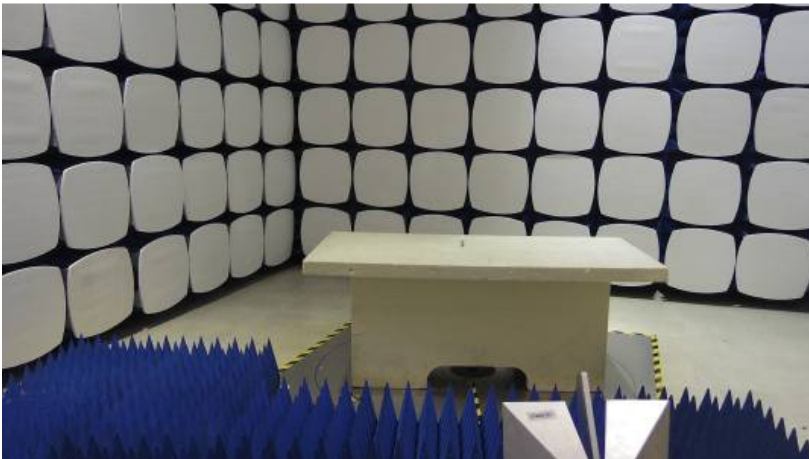


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6 Photographs - EUT Test Setup

Test model No.: SE88A-90S-304

6.1 Radiated Emission



7 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1511007031CR.