TEST REPORT

Application No.:	SZEM1904013417CR
Applicant:	HUAJIA TECHNOLOGY INDUSTRY CO., LTD.
Address of Applicant:	Jiafa Mansion, NO. 9, Guangyi Road, Chenghai District, Shantou City, Gaungdong Province, China
Equipment Under Test (EUT):	
EUT Name:	remote control toys
Model No.:	Please refer to section 2 ♣
♣	Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Standard(s) :	EN 300 440 V2.1.1
Date of Receipt:	2019-04-30(for original report SZEM190401341602)
Date of Test:	2019-05-05 to 2019-05-08(for original report SZEM190401341602)
Date of Issue:	2019-05-10(for original report SZEM190401341602) 2019-06-03(for new report SZEM190401341702)
Test Result:	**Pass***

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

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EU Declaration of Conformity and compliance with all relevant EU Directives.

Keny Xu
EMC Laboratory Manager

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2019-06-03		Original

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

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Duty cycle	EN 300 440 V2.1.1	EN 300 440 V2.1.1 clause 4.2.5.3	EN 300 440 V2.1.1 clause 4.2.5.4	Pass

Radio Spectrum Matter Part				
Item	**Standard**	**Method**	**Requirement**	**Result**
Equivalent isotropically radiated power	EN 300 440 V2.1.1	EN 300 440 V2.1.1 clause 4.2.2.3	EN 300 440 V2.1.1 clause 4.2.2	Pass
Permitted range of operating frequencies	EN 300 440 V2.1.1	EN 300 440 V2.1.1 clause 4.2.3.3	EN 300 440 V2.1.1 clause 4.2.3	Pass
Unwanted emissions in the spurious domain	EN 300 440 V2.1.1	EN 300 440 V2.1.1 clause 4.2.4.3	EN 300 440 V2.1.1 clause 4.2.4	Pass
Spurious Emission	EN 300 440 V2.1.1	EN 300 440 V2.1.1 clause 4.3.5.3	EN 300 440 V2.1.1 clause 4.3.5	Pass

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Remark for report SZEM190401341702:

Original model No. in report SZEM190401341602: RQ2023, RQ2024, RQ2022, RQ2024, RQ2024A, RQ2025, RQ2044, RQ2045, RQ2046, RQ2027, RQ2028, RQ2051, RQ2052, RQ2053, RQ2054, RQ2055, RQ2056, RQ2057, RQ2058, RQ2059, RQ2060, RQ2061, RQ2062, RQ2063, RQ2064, RQ2065, RQ2066, RQ2067, RQ2068, RQ2069, RQ2070, RQ2071, RQ2072, RQ2073, RQ2074, RQ2075, RQ2076, RQ2077, RQ2078, RQ2079, RQ2080, RQ2081, RQ2082, RQ2083, RQ2084, RQ2085, RQ2086, RQ2087, RQ2088, RQ2089, RQ2090, RQ2040, RQ2041, RQ2042, RQ2043, RQ77-27, RQ77-28, RQ77-31, RQ77-31A, RQ77-32, RQ77-33, RQ77-34, RQ77-35, RQ2047, RQ2020A, RQ2020B, YR577-2, YR577-3, 9053G, RQ77-14W, RQ77-15W, RQ77-16W, RQ77-17W, RQ77-18W, RQ77-24, 008, 333-165, 333-220, 333-240, 333-360

Only the model RQ2023 was tested in report SZEM190401341602, since the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, with only difference on color, appearance and packaging.

New model No. in report SZEM190401341702: RC1101, RC1102, RC1103, RC1104, RC1105, RC1106, RC1107, RC1108, RC1109, RC1110, RC1111, RC1112, RC1113, RC1114, RC1115, RC1116, RC1117, RC1118, RC1119, RC1120, RC1121, RC1122, RC1123, RC1124, RC1125, RC1126, RC1127, RC1128, RC1129, RC1130, RC1131, RC1132, RC1133, RC1134, RC1135, RC1136, RC1137, RC1138, RC1139, RC1140, RC1141, RC1142, RC1143, RC1144, RC1145, RC1146, RC1147, RC1148, RC1149, RC1150, RC1151, RC1152, RC1153, RC1154, RC1155, RC1156, RC1157, RC1158, RC1159, RC1160, RC1161, RC1162, RC1163, RC1164, RC1165, RC1166, RC1167, RC1168, RC1169, RC1170, RC1171, RC1172, RC1173, RC1174, RC1175, RC1176, RC1177, RC1178, RC1179, RC1180

This report was an additional report copied from the report SZEM190401341602, just changed the information of applicant and model No.. Since the electrical circuit design, layout, components used and internal wiring for the models in this report were exactly the same as the models in the original report SZEM190401341602, with only difference on color, appearance and packaging.

Therefore original data were kept in this report.

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4 General Information

4.1 Details of E.U.T.

Power supply:	TX:DC 3.0V by 1.5V x 2"AA" batteries RX:Rechargeable battery DC 4.8V 500mAh(Charge by USB)
USB cable:	55cm unshielded
Operation Frequency:	2405MHz to 2480MHz
Modulation Type:	GFSK
Number of Channels:	76
Channel Spacing:	1MHz
Antenna Type:	Integral antenna
Antenna Gain:	0dBi

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2405MHz	20	2424MHz	39	2443MHz	58	2462MHz
2	2406MHz	21	2425MHz	40	2444MHz	59	2463MHz
3	2407MHz	22	2426MHz	41	2445MHz	60	2464MHz
4	2408MHz	23	2427MHz	42	2446MHz	61	2465MHz
5	2409MHz	24	2428MHz	43	2447MHz	62	2466MHz
6	2410MHz	25	2429MHz	44	2448MHz	63	2467MHz
7	2411MHz	26	2430MHz	45	2449MHz	64	2468MHz
8	2412MHz	27	2431MHz	46	2450MHz	65	2469MHz
9	2413MHz	28	2432MHz	47	2451MHz	66	2470MHz
10	2414MHz	29	2433MHz	48	2452MHz	67	2471MHz
11	2415MHz	30	2434MHz	49	2453MHz	68	2472MHz
12	2416MHz	31	2435MHz	50	2454MHz	69	2473MHz
13	2417MHz	32	2436MHz	51	2455MHz	70	2474MHz
14	2418MHz	33	2437MHz	52	2456MHz	71	2475MHz
15	2419MHz	34	2438MHz	53	2457MHz	72	2476MHz
16	2420MHz	35	2439MHz	54	2458MHz	73	2477MHz
17	2421MHz	36	2440MHz	55	2459MHz	74	2478MHz
18	2422MHz	37	2441MHz	56	2460MHz	75	2479MHz
19	2423MHz	38	2442MHz	57	2461MHz	76	2480MHz

Using test software was control EUT work in continuous transmitter and receiver mode.and select test channel as below:

Channel	Frequency
The Lowest channel(CH1)	2405MHz
The Middle channel(CH44)	2448MHz
The Highest channel(CH76)	2480MHz

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	± 7.25 x 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 (Below 1GHz)
		± 4.8dB (Above 1GHz)
9	Temperature test	± 1℃
10	Humidity test	± 3%
11	Supply voltages	± 1.5%
12	Time	± 3%

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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.

- **Innovation, Science and Economic Development Canada**

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

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

RF conducted test

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (yyyy-mm-dd)	Cal. Due date (yyyy-mm-dd)
DC Power Supply	ZhaoXin	PS-3005D	SEM011-05	2018-09-25	2019-09-24
Spectrum Analyzer (20Hz-43GHz)	Rohde & Schwarz	FSU43	SEM004-08	2019-04-12	2020-04-11
Signal Generator (9kHz-40GHz)	KEYSIGHT	N5173B	SEM006-05	2018-09-27	2019-09-26
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.6	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-01	2018-07-12	2019-07-11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Programmable Temperature & Humidity Chamber	Votsch Industrietechnik GmbH	VT 4002	SEM002-15	2019-04-01	2020-03-31

RE in Chamber

Test 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
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2018-09-25	2019-09-24
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2019-04-01	2020-03-31
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2018-07-12	2019-07-11

Unwanted emissions in the spurious domain

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2018-07-12	2019-07-11
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11

BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-06-27	2020-06-26
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2018-09-25	2019-09-24
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2018-11-12	2019-11-11
Pre-amplifier (18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2018-09-25	2019-09-24
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

Spurious Emission					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2018-07-12	2019-07-11
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-06-27	2020-06-26
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2018-09-25	2019-09-24
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2018-11-12	2019-11-11
Pre-amplifier (18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31

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Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2018-09-25	2019-09-24
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21

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	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2018-09-27	2019-09-26
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2019-04-04	2020-04-03

6 Radio Spectrum Technical Requirement

6.1 Duty cycle

6.1.1 Test Requirement:

EN 300 440 V2.1.1 clause 4.2.5.4

Limit:

Table 6: Duty cycle limits

Frequency	Duty cycle	Application	Notes
2 400 MHz to 2 483,5 MHz	No Restriction	Generic use	
2 400 MHz to 2 483,5 MHz	No Restriction	Detection, movement and alert applications	
(a) 2 446 MHz to 2 454 MHz	No Restriction	RFID	See annex C
(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	RFID	See annex C
5 725 MHz to 5 875 MHz	No Restriction	Generic use	
9 200 MHz to 9 500 MHz	No Restriction	Radiodetermination: radar, detection, movement and alert applications	
9 500 MHz to 9 975 MHz	No Restriction	Radiodetermination: Radar, detection, movement and alert applications	
10,5 GHz to 10,6 GHz	No Restriction	Radiodetermination: Radar, detection, movement and alert applications	
13,4 GHz to 14,0 GHz	No Restriction	Radiodetermination: Radar, detection, movement and alert applications	
17,1 GHz to 17,3 GHz	DAA or Equivalent techniques	Radiodetermination: GBSAR detection, movement and alert applications	See annex E
24,00 GHz to 24,25 GHz	No Restriction	Generic use and Radiodetermination: radar, detection, movement and alert applications	

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6.1.2 Conclusion

Standard Requirement:

For automatic operated devices, either software controlled or pre-programmed devices, the provider shall declare the duty cycle for the equipment under test, see table 6.

For manual operated or event dependant devices, with or without software controlled functions, the provider shall declare whether the device once triggered, follows a pre-programmed cycle, or whether the transmitter remains on until the trigger is released or the device is manually reset. The provider shall also give a description of the application for the device and include a typical usage pattern. The typical usage pattern as declared by the provider shall be used to determine the duty cycle and compare to the limit in table 6. Where an acknowledgement is required, the additional transmitter on-time shall be included and declared by the provider.

For devices with a 100 % duty cycle transmitting an unmodulated carrier most of the time, a time-out shut-off facility shall be implemented in order to improve the efficient use of spectrum. The method of implementation shall be declared by the provider.

Duty Cycle	86.2%

7 Radio Spectrum Matter Test Results

7.1 Equivalent isotropically radiated power

Test Requirement EN 300 440 V2.1.1 clause 4.2.2

Test Method: EN 300 440 V2.1.1 clause 4.2.2.3

Measurement Distance: 3m

Limit:

Table 4: Maximum radiated peak power (e.i.r.p.)

Frequency	Power	Application	Notes
2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Generic use	
2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Detection, movement and alert applications	
(a) 2 446 MHz to 2 454 MHz	500 mW e.i.r.p.	RFID	See also table 6 and annex C
(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	RFID	See also table 6 and annex C
5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Generic use	
9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radiodetermination: radar, detection, movement and alert applications	
9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radiodetermination: Radar, detection, movement and alert applications	
10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radiodetermination: Radar, detection, movement and alert applications	
13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radiodetermination: Radar, detection, movement and alert applications	
17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radiodetermination: GBSAR detection, movement and alert applications	See annex E
24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Generic use and Radiodetermination: radar, detection, movement and alert applications	

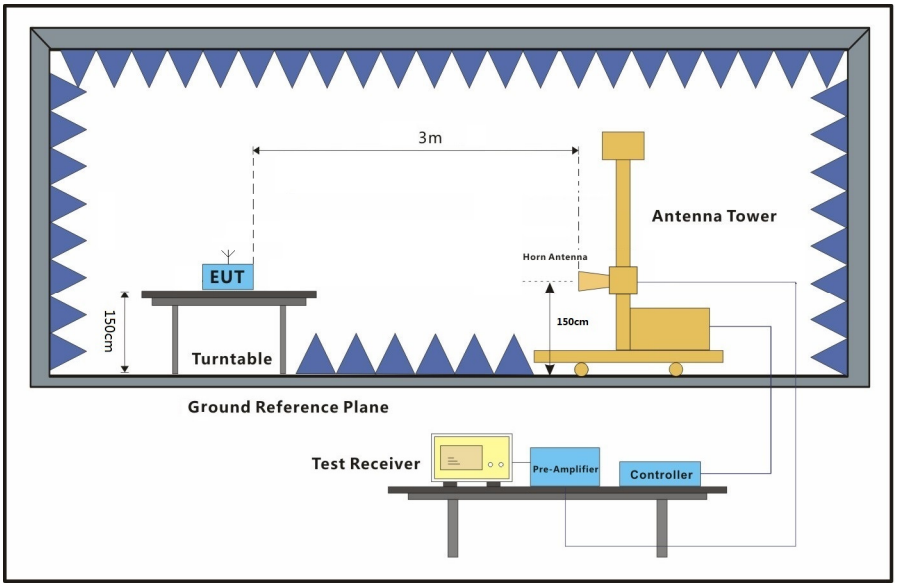
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 21.4 °C Humidity: 52.1 % RH Atmospheric Pressure: 1005 mbar

Test mode a:TX mode_Keep the EUT in transmitting mode

7.1.2 Test Setup Diagram



7.1.3 Measurement Procedure and Data

1. Using test software to set up the lowest channel, the middle channel, the highest channel.

2. The technique used to find the radiated power of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual EIRP emission levels of the EUT.

The following test procedure as below:

1) The EUT was powered ON and placed on a table in the chamber. The antenna of the transmitter was extended to its maximum length.

2) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3) Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4) The transmitter was then removed and replaced with substitution antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.

6) The output power into the substitution antenna was then measured.

7) Steps 5) and 6) were repeated with both antennas polarized.

8) Pretest the EUT at different transmission time slot data and worst case data in the report.

9) Calculate power in dBm by the following formula:

EIRP valuse (dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

where:

Pg is the generator output power into the substitution antenna.

The detailed test data see: Appendix 300440

7.2 Permitted range of operating frequencies

Test Requirement EN 300 440 V2.1.1 clause 4.2.3

Test Method: EN 300 440 V2.1.1 clause 4.2.3.3

Limit:

The width of the power spectrum envelope is fH -fL for a given operating frequency. In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allowed band. The frequency range is determined by the lowest value of fL and the highest value of fH resulting from the adjustment of the equipment to the lowest and highest operating frequencies.

The occupied bandwidth (i.e. the bandwidth in which 99 % of the wanted emission is contained) and the necessary bandwidth of the transmitter shall fall within the assigned frequency band.

For all equipment the frequency range shall lie within the frequency band. For non-harmonized frequency bands the available frequency range may differ between national administrations.

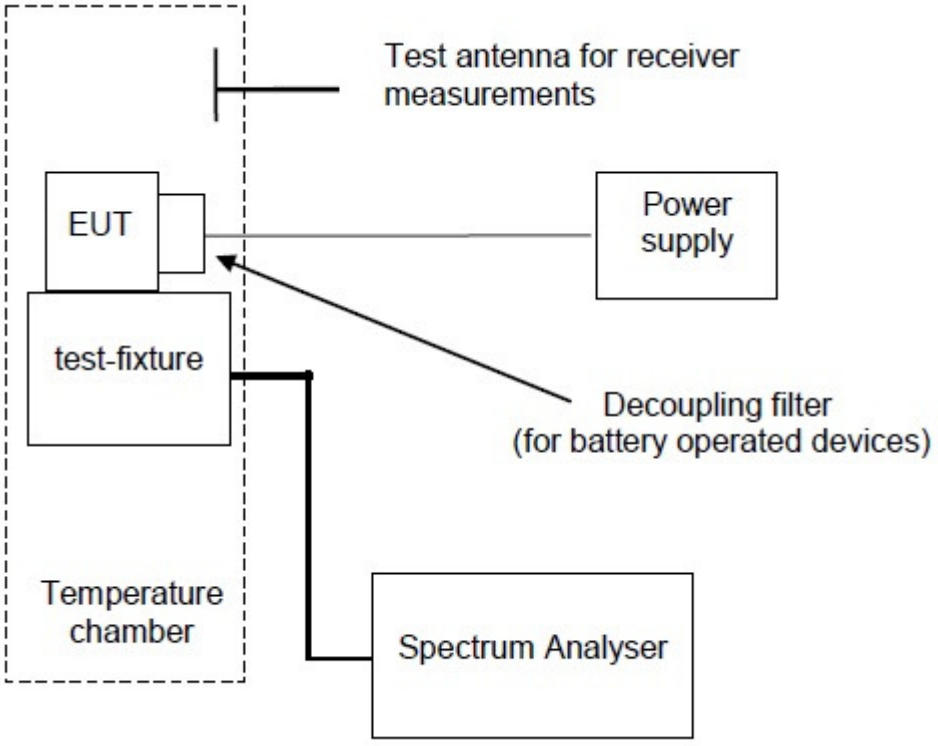
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22.5 °C Humidity: 55.1 % RH Atmospheric Pressure: 1005 mbar

Test mode a:TX mode_Keep the EUT in transmitting mode

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 300440

7.3 Unwanted emissions in the spurious domain

Test Requirement EN 300 440 V2.1.1 clause 4.2.4
Test Method: EN 300 440 V2.1.1 clause 4.2.4.3
Measurement Distance: 3m
Limit:

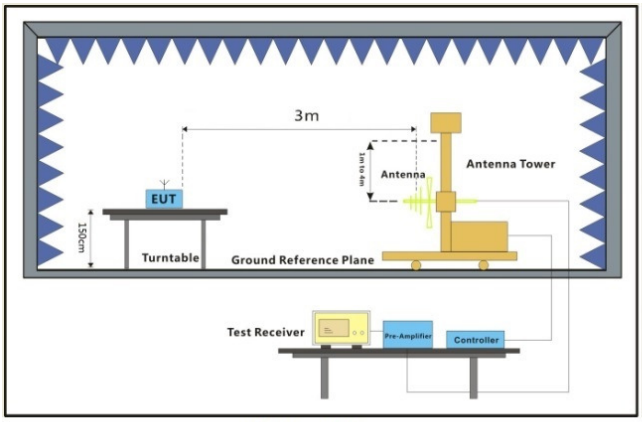
Table 5: Spurious emissions

Frequency ranges	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies ≤1 000 MHz	Frequencies >1 000 MHz
Operating	4nW (-54dBm)	250nW (-36dBm)	1uW (-30dBm)
Standby	2nW (-57dBm)	2nW (-57dBm)	20nW (-47dBm)

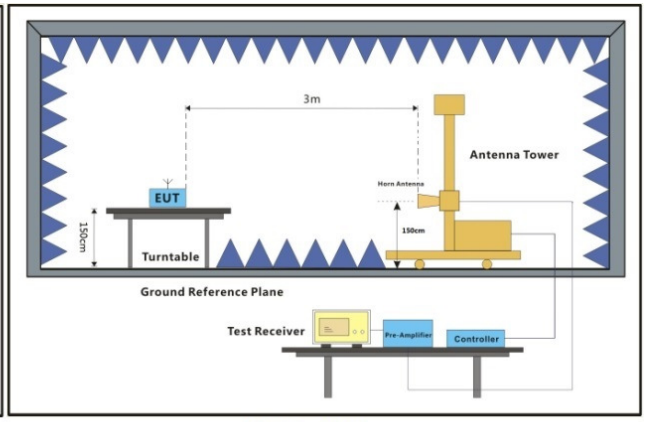
7.3.1 E.U.T. Operation

Operating Environment:
Temperature: 21.4 °C Humidity: 52.3 % RH Atmospheric Pressure: 1005 mbar
Test mode a:TX mode_Keep the EUT in transmitting mode

7.3.2 Test Setup Diagram



30MHz-1GHz



Above 1GHz

7.3.3 Measurement Procedure and Data

1. Using test software to set up the lowest channel, the middle channel and the highest channel.

2. Scan from 25MHz to 25GHz, find the maximum radiation frequency to measure. No Standby Mode apply for the EUT.

3. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Below 1GHz test procedure as below:

1) The EUT was powered ON and placed on a table in the chamber. The antenna of the transmitter was extended to its maximum length. If possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.

2) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3) Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.

6) The output power into the substitution antenna was then measured.

7) Steps 5) and 6)were repeated with both antennas polarized.

8) Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

where:

Pg is the generator output power into the substitution antenna.

Above 1GHz test procedure as below:

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber.

2) Calculate power in dBm by the following formula:

EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

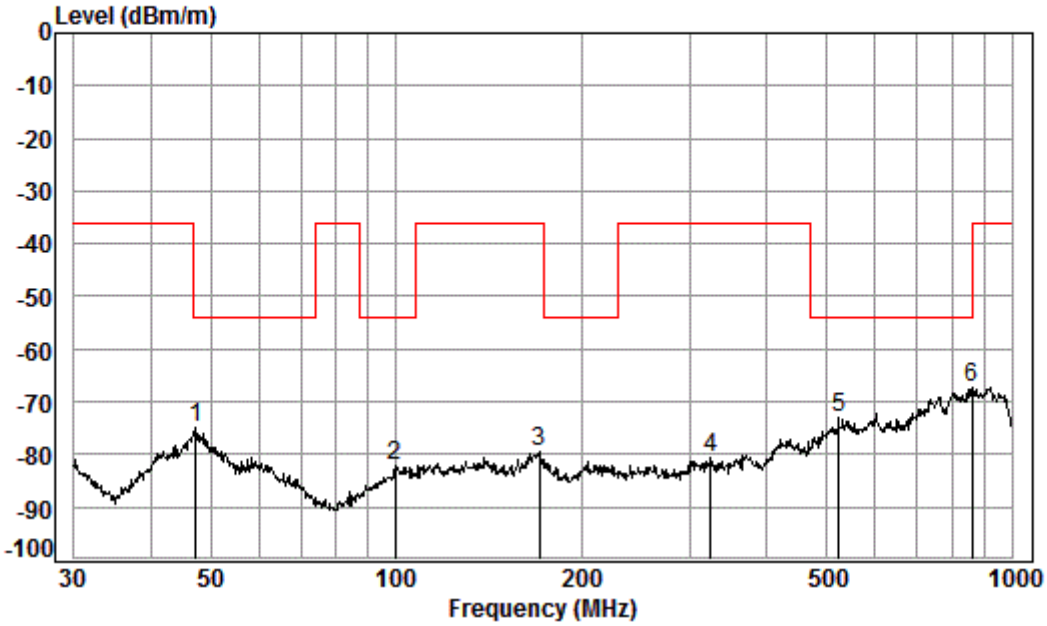
where:

Pg is the generator output power into the substitution antenna.

Standby mode test procedure as below:

1) Steps 1) to 8) and 1) to 2) shall be repeated with the transmitter in the standby condition if this option is available.

Below 1GHz
Mode: a; Polarization: Horizontal;



Condition: 3m HORIZONTAL
Job No. : 13416CR
Test mode: a

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBm	dBm/m	dBm/m	dB
1	47.33	17.14	15.01	27.61	-79.36	-74.82	-54.00	-20.82
2	99.53	11.15	13.96	27.51	-79.73	-82.13	-54.00	-28.13
3	170.79	13.73	15.72	27.52	-81.57	-79.64	-36.00	-43.64
4	324.46	10.58	20.36	27.59	-84.07	-80.72	-36.00	-44.72
5 pp	522.72	11.53	25.09	27.84	-81.78	-73.00	-54.00	-19.00
6	863.06	10.69	29.34	27.20	-80.23	-67.40	-36.00	-31.40

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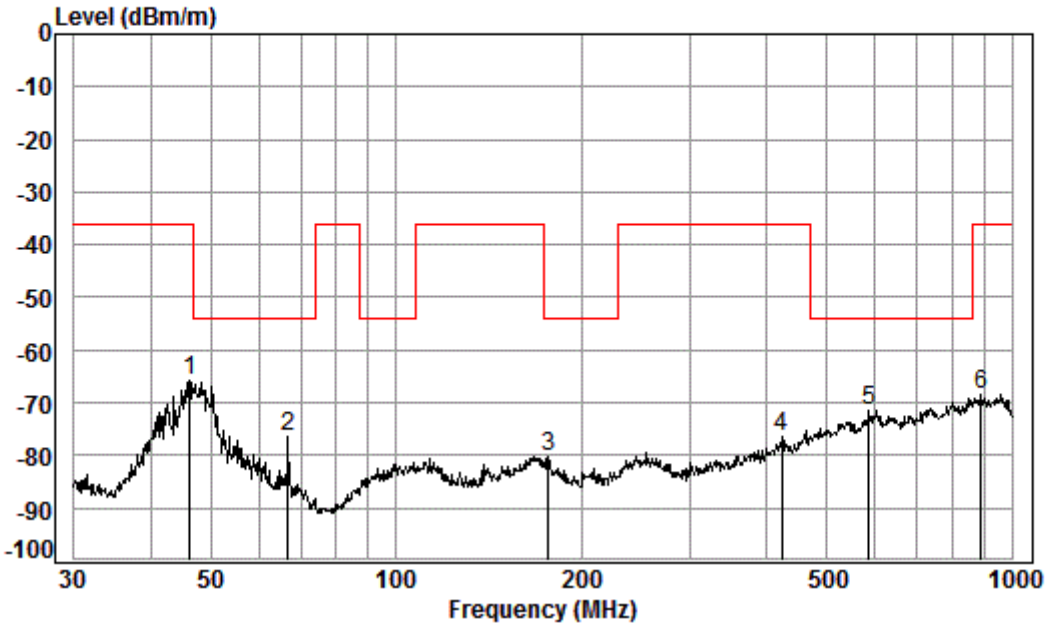
Mode :a; Polarization: Vertical

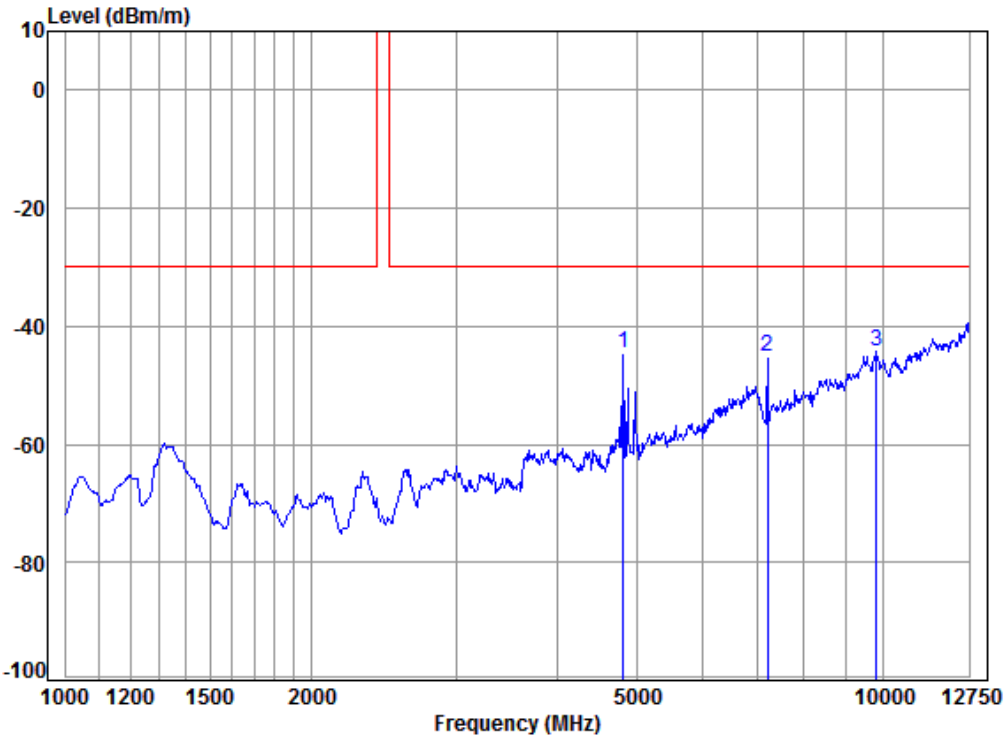


Condition: 3m VERTICAL
Job No. : 13416CR
Test mode: a

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBm	dBm/m	dBm/m	dB
1	46.34	16.24	15.32	27.61	-69.87	-65.92	-36.00	-29.92
2	66.73	11.83	12.92	27.54	-73.55	-76.34	-54.00	-22.34
3	176.89	12.98	15.84	27.53	-81.58	-80.29	-54.00	-26.29
4	423.54	10.17	22.96	27.77	-81.92	-76.56	-36.00	-40.56
5 pp	586.84	11.42	26.36	27.72	-81.50	-71.44	-54.00	-17.44
6	890.73	11.28	29.69	27.11	-82.38	-68.52	-36.00	-32.52

Above 1GHz

Mode: a; Polarization: Horizontal; Channel: Low



Condition: 3m HORIZONTAL
Job No.: 13416CR
Test mode: 2405 TX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4810.00	-44.56	-30.00	-14.56
2	7215.00	-45.20	-30.00	-15.20
3	9809.40	-44.37	-30.00	-14.37

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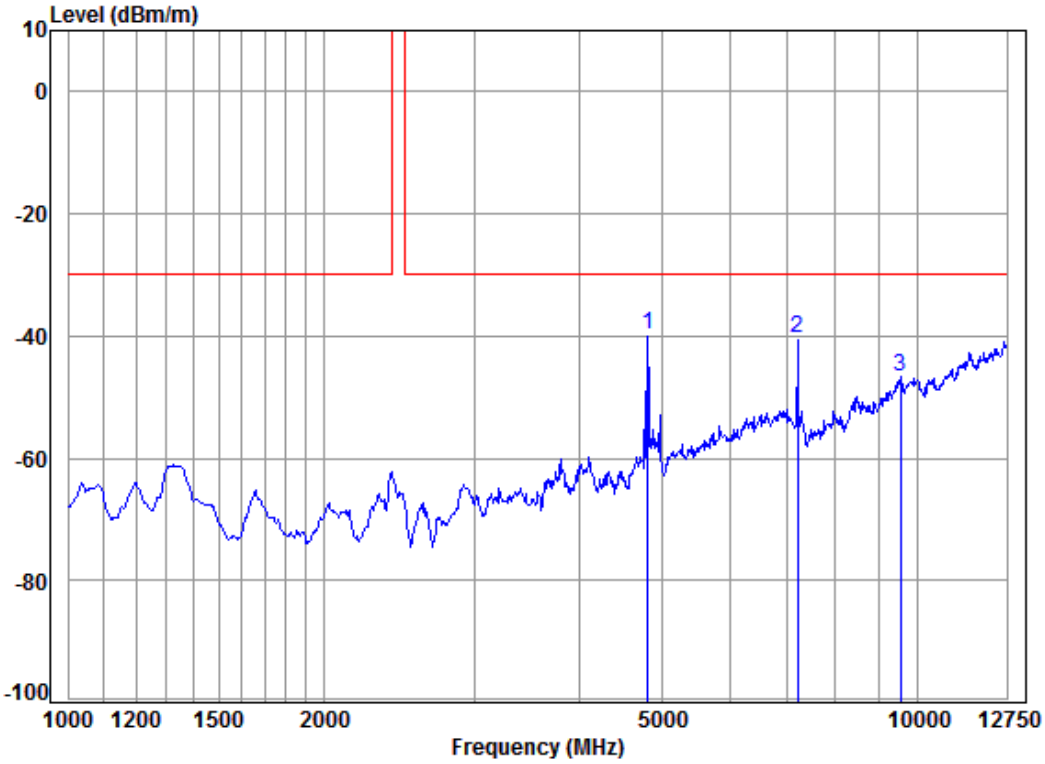
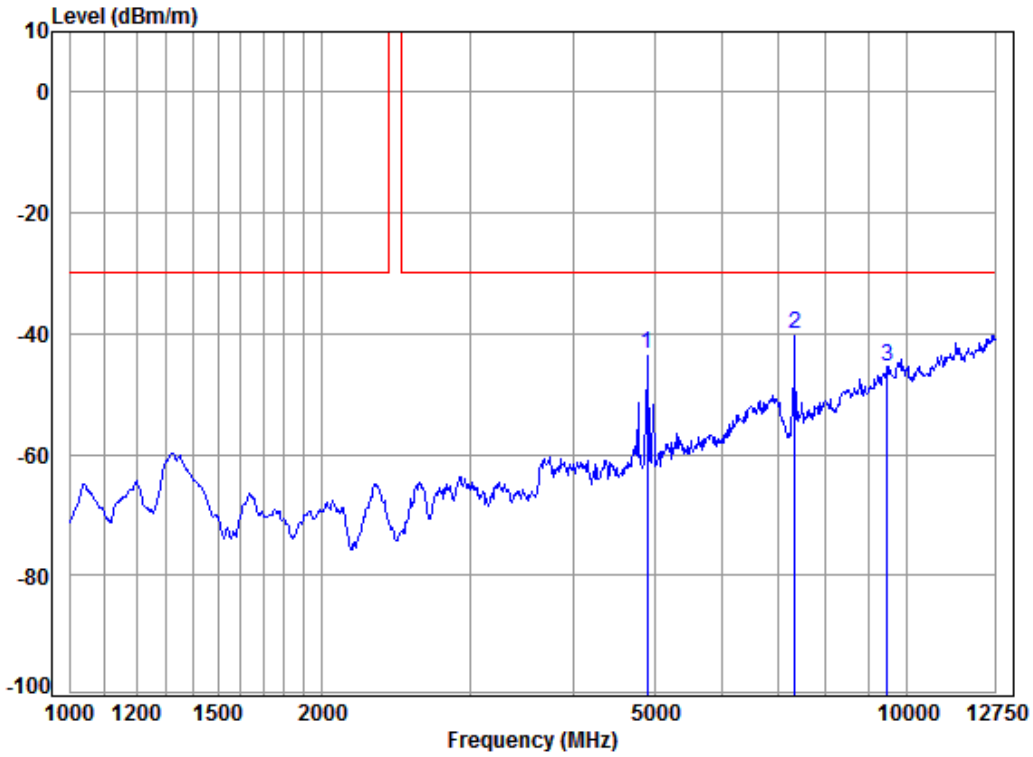
Mode :a; Polarization: Vertical; Channel: Low



Condition: 3m VERTICAL
Job No.: 13416CR
Test mode: 2405 TX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4810.00	-39.76	-30.00	-9.76
2	7215.00	-40.39	-30.00	-10.39
3	9538.54	-46.67	-30.00	-16.67

Mode: a; Polarization: Horizontal; Channel: middle



Condition: 3m HORIZONTAL
Job No.: 13416CR
Test mode: 2448 TX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4896.00	-43.43	-30.00	-13.43
2	7344.00	-40.04	-30.00	-10.04
3	9465.98	-45.35	-30.00	-15.35

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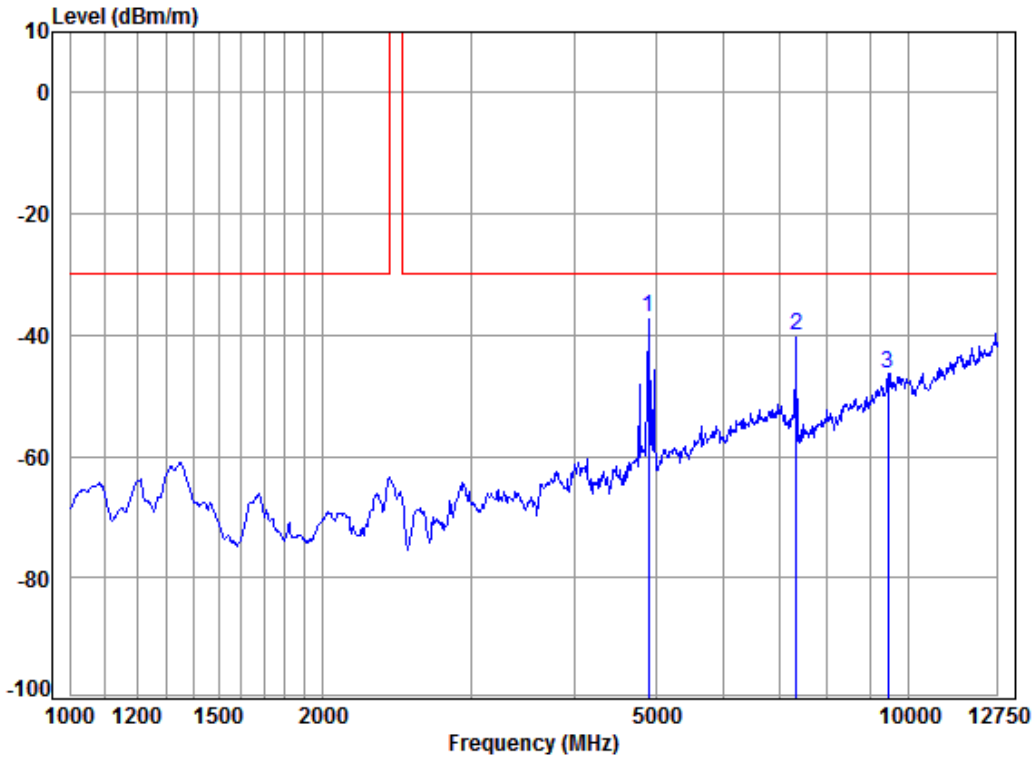
Mode :a; Polarization: Vertical; Channel: middle



Condition: 3m VERTICAL
Job No.: 13416CR
Test mode: 2448 TX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4896.00	-37.18	-30.00	-7.18
2	7344.00	-40.10	-30.00	-10.10
3	9441.91	-46.22	-30.00	-16.22

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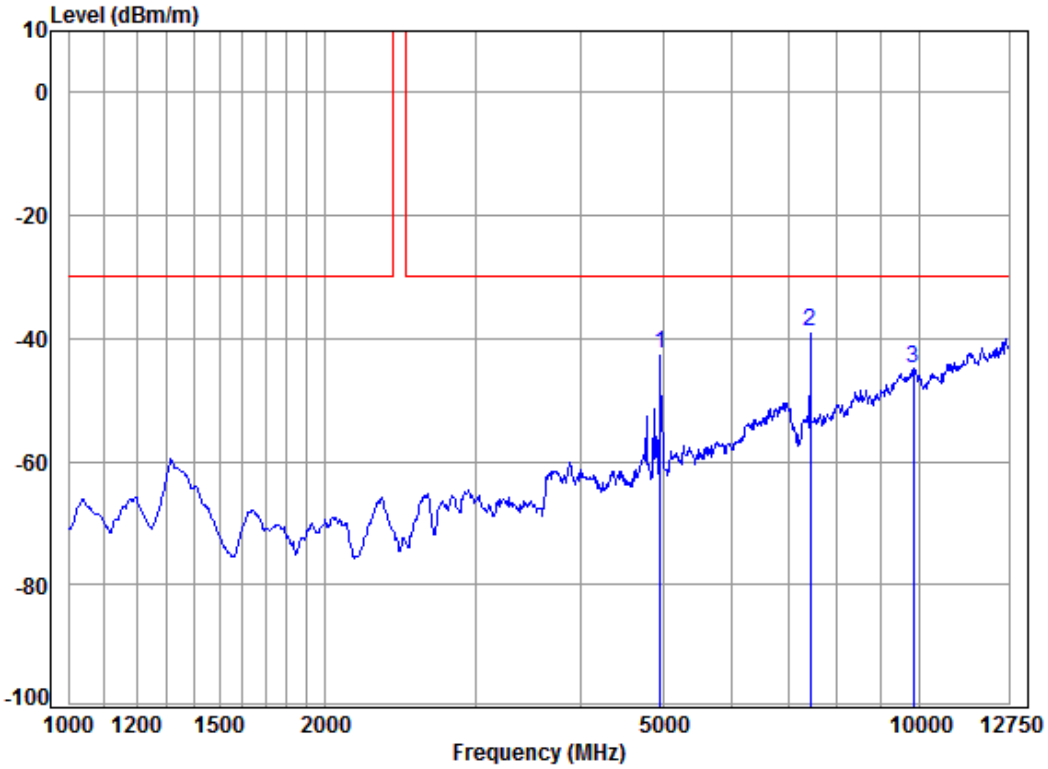
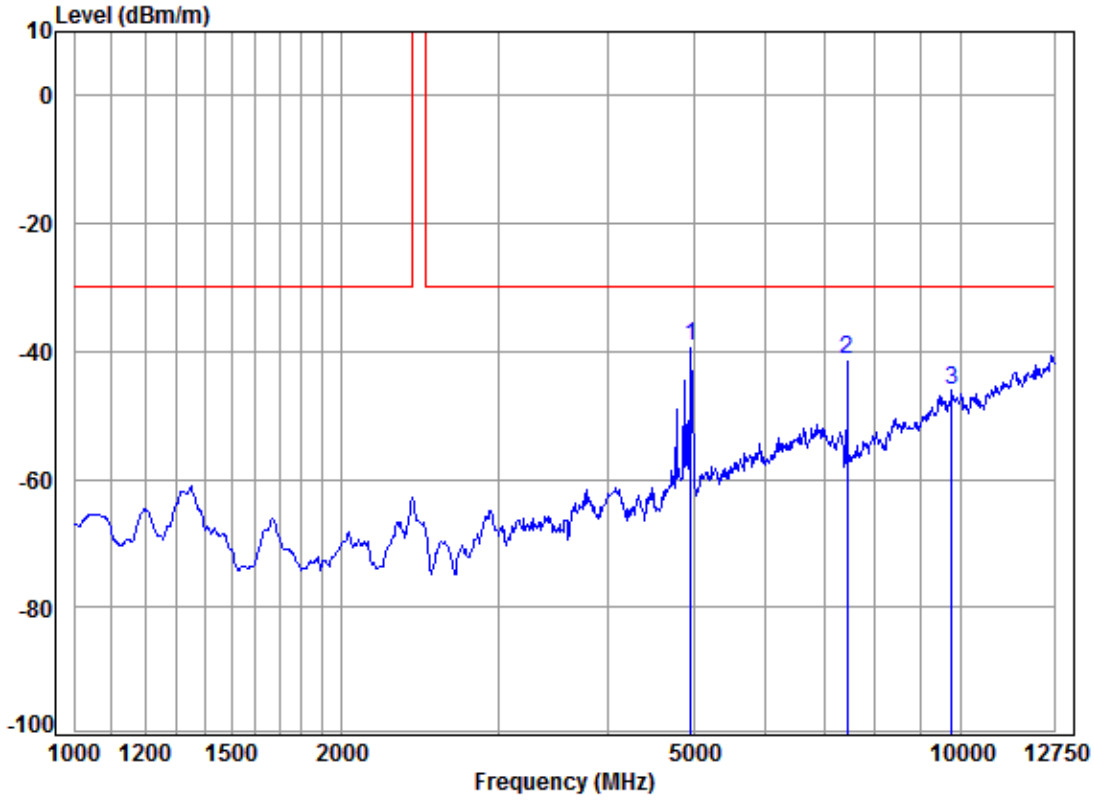
Mode: a; Polarization: Horizontal; Channel: High



Condition: 3m HORIZONTAL
Job No.: 13416CR
Test mode: 2480 TX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4960.00	-42.41	-30.00	-12.41
2	7440.00	-38.90	-30.00	-8.90
3	9834.41	-44.96	-30.00	-14.96

Mode :a; Polarization: Vertical; Channel: High



Condition: 3m VERTICAL
Job No.: 13416CR
Test mode: 2480 TX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	4960.00	-39.18	-30.00	-9.18
2	7440.00	-41.37	-30.00	-11.37
3	9759.59	-46.04	-30.00	-16.04

7.4 Spurious Emission

Test Requirement EN 300 440 V2.1.1 clause 4.3.5
Test Method: EN 300 440 V2.1.1 clause 4.3.5.3
Measurement Distance: 3m
Limit:

The spurious emissions of the receiver shall not exceed the values in tables in the indicated bands:

Frequency Range	Limit
25 MHz to 1 GHz	2nW(-57dBm)
Above 1GHz	20nW(-47dBm)

7.4.1 E.U.T. Operation

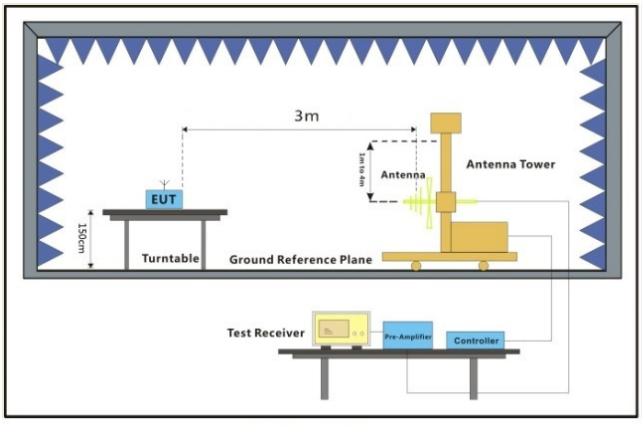
Operating Environment:

Temperature: 21.4 °C Humidity: 51.8 % RH Atmospheric Pressure: 1005 mbar

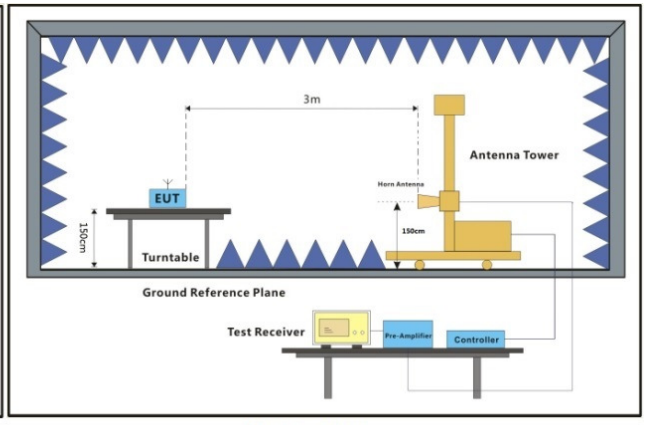
Pretest these modes to find the worst case: b:RX mode_Keep the EUT in receiving mode
c:Standby mode_Keep the EUT in standby mode.

The worst case for final test: b:RX mode_Keep the EUT in receiving mode

7.4.2 Test Setup Diagram



30MHz-1GHz



Above 1GHz

7.4.3 Measurement Procedure and Data

1. Using test software to set up the lowest channel, the middle channel and the highest channel.

2. Scan from 25MHz to 25GHz, find the maximum radiation frequency to measure. No Standby Mode apply for the EUT.

3. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Below 1GHz test procedure as below:

1) The EUT was powered ON and placed on a table in the chamber. The antenna of the transmitter was extended to its maximum length. Receiver mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.

2) The disturbance of the transmitter was maximized on the test receiver display by raising and lowering the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

3) Steps 1) and 2) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

4) The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

5) A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 2) is obtained for this set of conditions.

6) The output power into the substitution antenna was then measured.

7) Steps 5) and 6)were repeated with both antennas polarized.

8) Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

where:

Pg is the generator output power into the substitution antenna.

Above 1GHz test procedure as below:

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber.

2) Calculate power in dBm by the following formula:

EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

where:

Pg is the generator output power into the substitution antenna.

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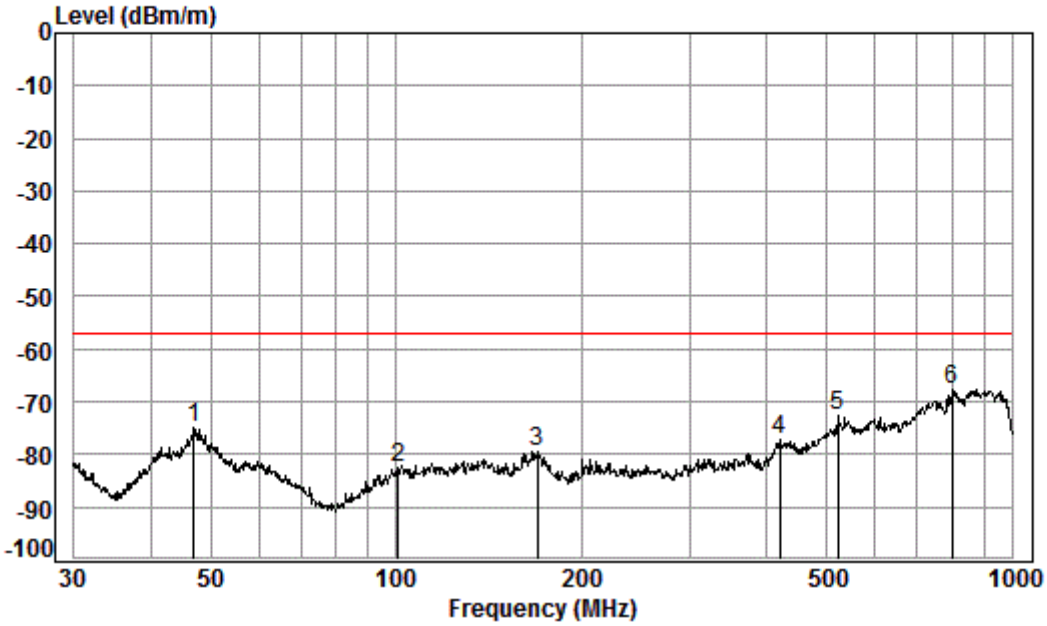
Below 1GHz
Mode: b; Polarization: Horizontal;



Condition: 3m HORIZONTAL
Job No. : 13416CR
Test mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBm	dBm/m	dBm/m	dB
1	46.99	17.46	15.12	27.61	-80.04	-75.07	-57.00	-18.07
2	100.93	11.17	13.95	27.51	-80.19	-82.58	-57.00	-25.58
3	169.60	13.77	15.70	27.52	-81.42	-79.47	-57.00	-22.47
4	420.58	10.10	22.89	27.76	-82.48	-77.25	-57.00	-20.25
5	520.89	11.48	25.05	27.84	-81.47	-72.78	-57.00	-15.78
6 pp	798.98	10.59	28.49	27.42	-79.16	-67.50	-57.00	-10.50

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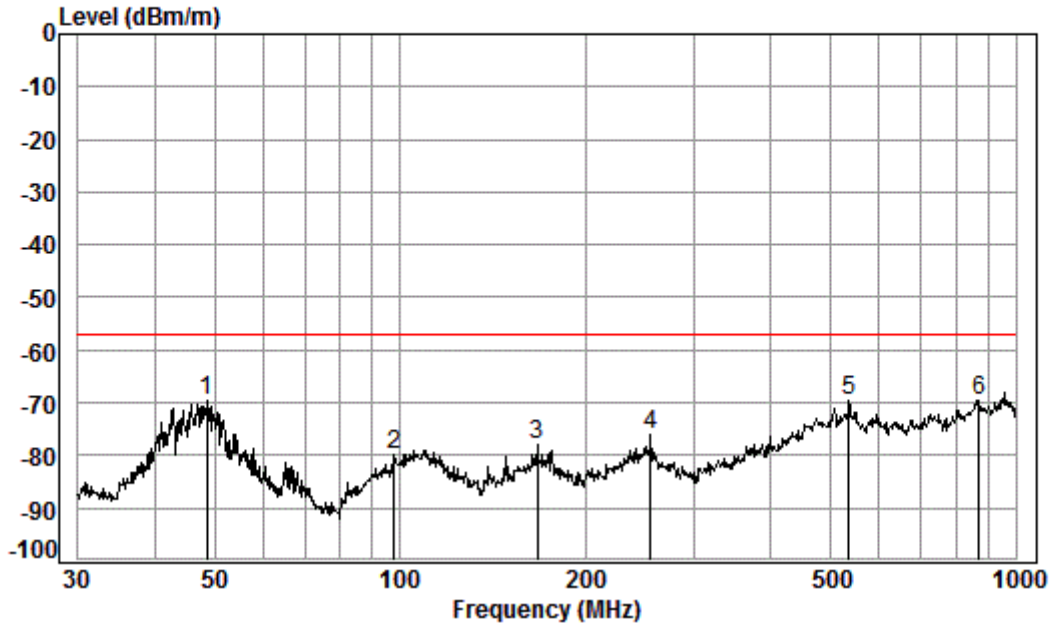
Mode :b; Polarization: Vertical

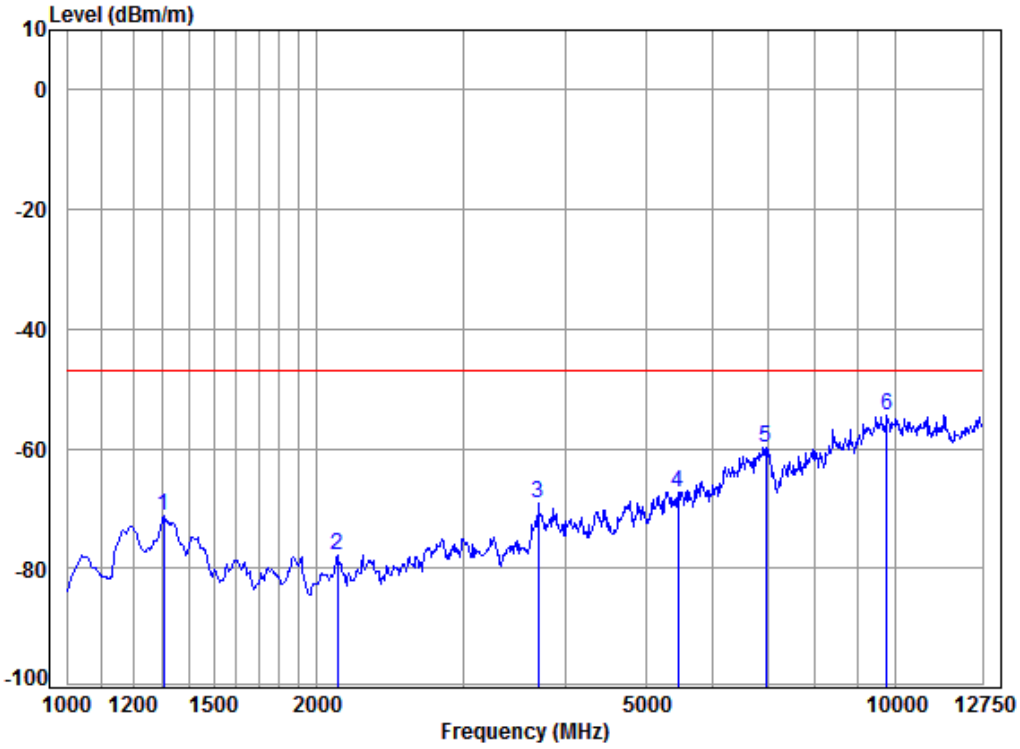


Condition: 3m VERTICAL
Job No. : 13416CR
Test mode: b

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBm	dBm/m	dBm/m	dB
1	48.67	15.88	14.60	27.60	-72.42	-69.54	-57.00	-12.54
2	97.80	11.03	13.81	27.51	-77.27	-79.94	-57.00	-22.94
3	167.24	13.74	15.65	27.52	-79.98	-78.11	-57.00	-21.11
4	255.62	11.16	19.04	27.54	-78.87	-76.21	-57.00	-19.21
5	535.71	11.49	25.36	27.81	-78.71	-69.67	-57.00	-12.67
6 pp	872.18	10.84	29.45	27.17	-82.57	-69.45	-57.00	-12.45

Above 1GHz

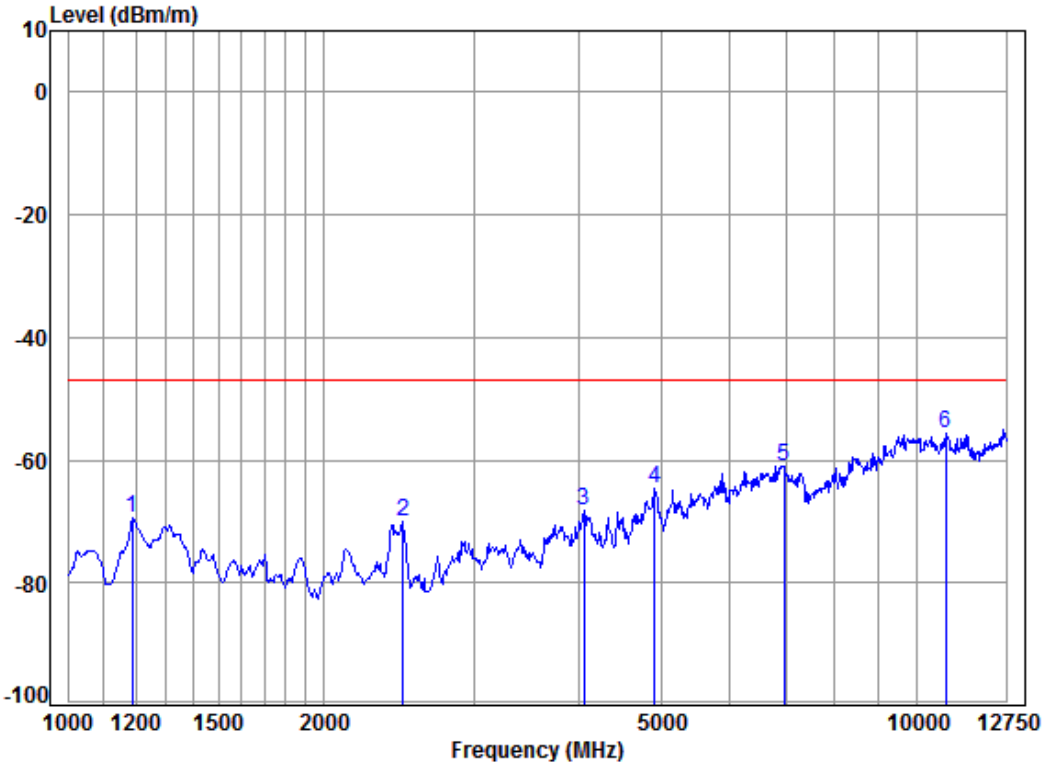
Mode: b; Polarization: Horizontal; Channel: Low



Condition: 3m HORIZONTAL
Job No.: 13416CR
Test mode: 2405 RX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	1306.41	-71.34	-47.00	-24.34
2	2118.97	-77.95	-47.00	-30.95
3	3700.26	-69.17	-47.00	-22.17
4	5462.30	-67.22	-47.00	-20.22
5	6974.36	-59.71	-47.00	-12.71
6	9759.59	-54.33	-47.00	-7.33

Mode :b; Polarization: Vertical; Channel: Low



Condition: 3m VERTICAL
Job No.: 13416CR
Test mode: 2405 RX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	1188.98	-69.33	-47.00	-22.33
2	2481.23	-70.17	-47.00	-23.17
3	4045.06	-68.34	-47.00	-21.34
4	4908.44	-64.55	-47.00	-17.55
5	6974.36	-60.92	-47.00	-13.92
6	10805.68	-55.62	-47.00	-8.62

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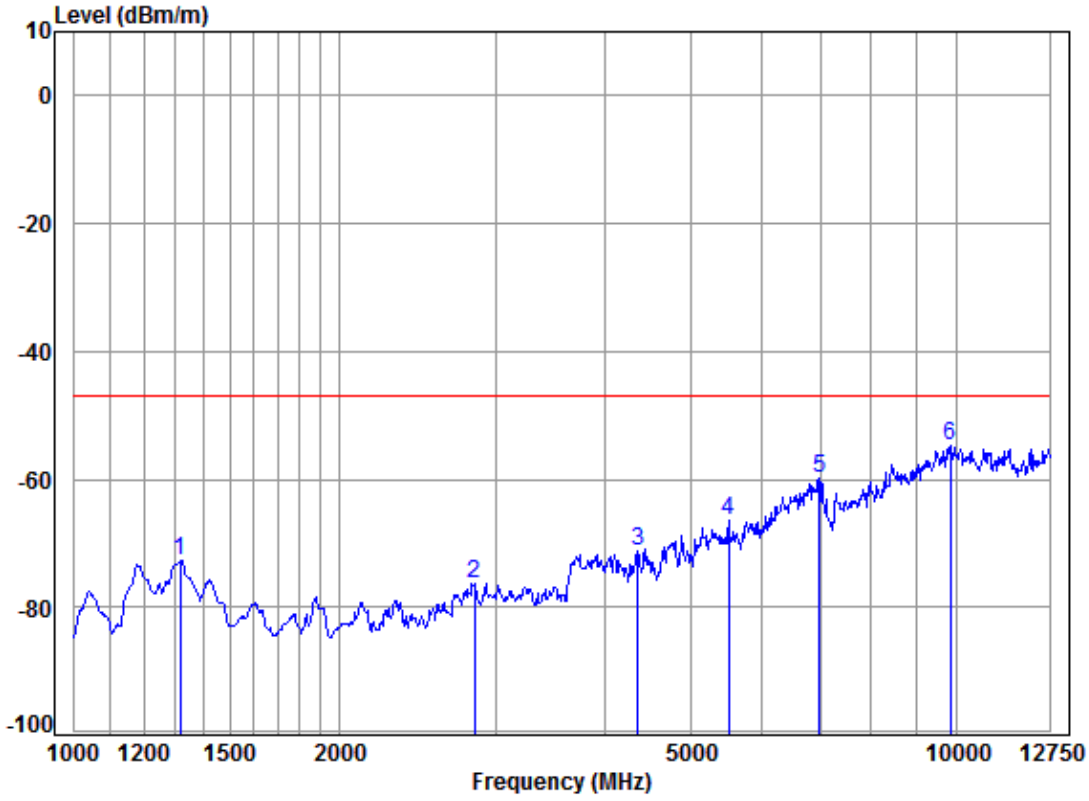
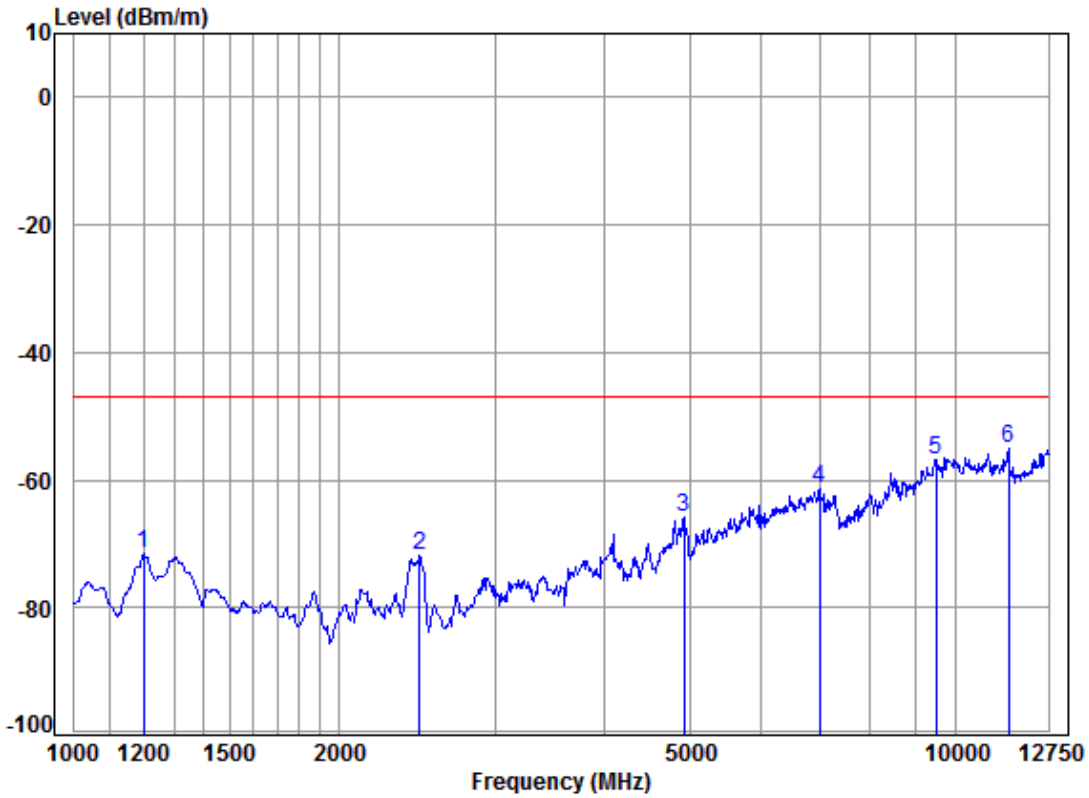
Mode: b; Polarization: Horizontal; Channel: middle



Condition: 3m HORIZONTAL
Job No.: 13416CR
Test mode: 2448 RX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	1319.78	-72.80	-47.00	-25.80
2	2839.61	-76.32	-47.00	-29.32
3	4354.97	-71.09	-47.00	-24.09
4	5518.20	-66.57	-47.00	-19.57
5	6992.14	-59.74	-47.00	-12.74
6	9834.41	-54.67	-47.00	-7.67

Mode :b; Polarization: Vertical; Channel: middle



Condition: 3m VERTICAL
Job No.: 13416CR
Test mode: 2448 RX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	1201.15	-71.60	-47.00	-24.60
2	2468.63	-71.73	-47.00	-24.73
3	4920.96	-65.75	-47.00	-18.75
4	7009.96	-61.33	-47.00	-14.33
5	9490.10	-56.70	-47.00	-9.70
6	11486.41	-55.14	-47.00	-8.14

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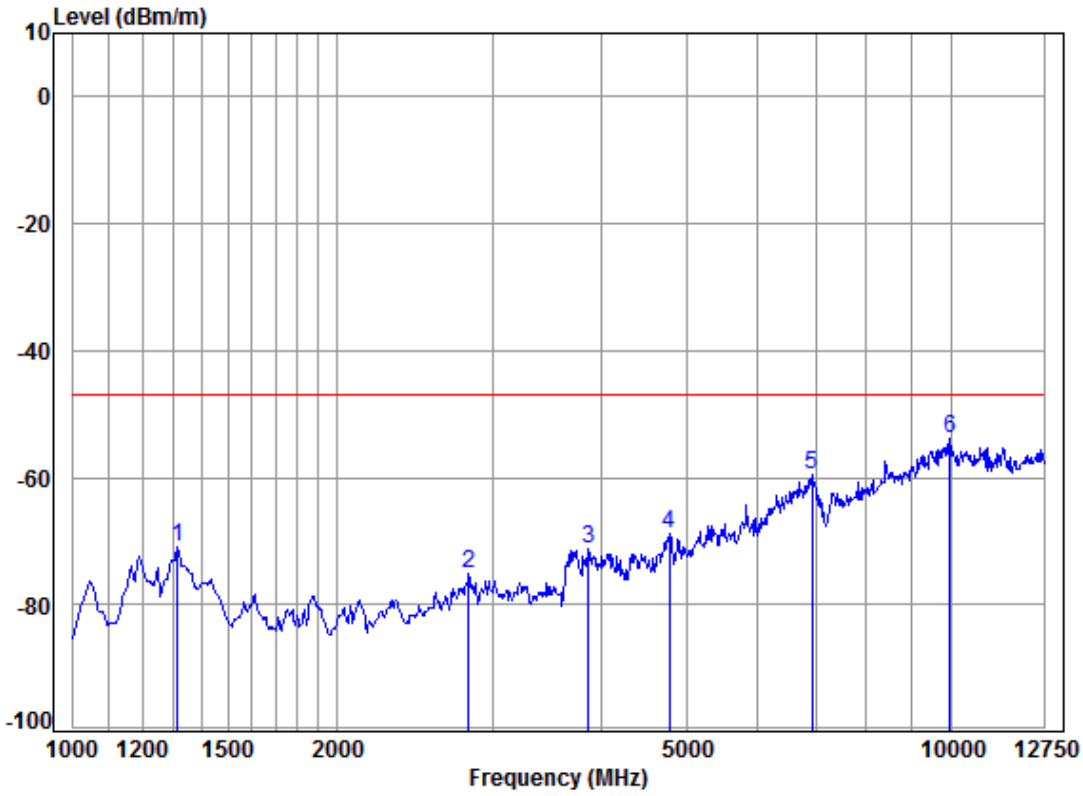
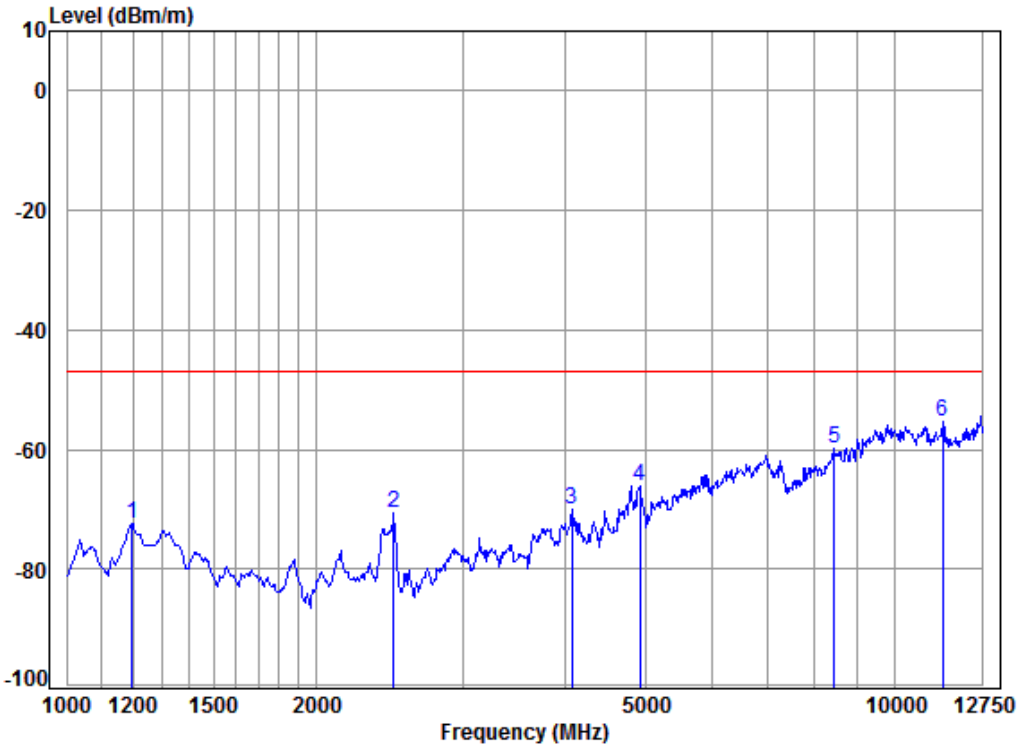
Mode: b; Polarization: Horizontal; Channel: High



Condition: 3m HORIZONTAL
Job No.: 13416CR
Test mode: 2480 RX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	1316.42	-70.87	-47.00	-23.87
2	2818.01	-75.10	-47.00	-28.10
3	3863.90	-71.08	-47.00	-24.08
4	4772.91	-68.85	-47.00	-21.85
5	6938.94	-59.64	-47.00	-12.64
6	9960.38	-53.86	-47.00	-6.86

Mode :b; Polarization: Vertical; Channel: High



Condition: 3m VERTICAL
Job No.: 13416CR
Test mode: 2480 RX SE

Marker	Freq. MHz	Level dBm	Limit dBm	Over Limit dB
1	1198.10	-72.37	-47.00	-25.37
2	2481.23	-70.55	-47.00	-23.55
3	4065.71	-70.04	-47.00	-23.04
4	4920.96	-66.26	-47.00	-19.26
5	8441.46	-59.71	-47.00	-12.71
6	11428.08	-55.26	-47.00	-8.26

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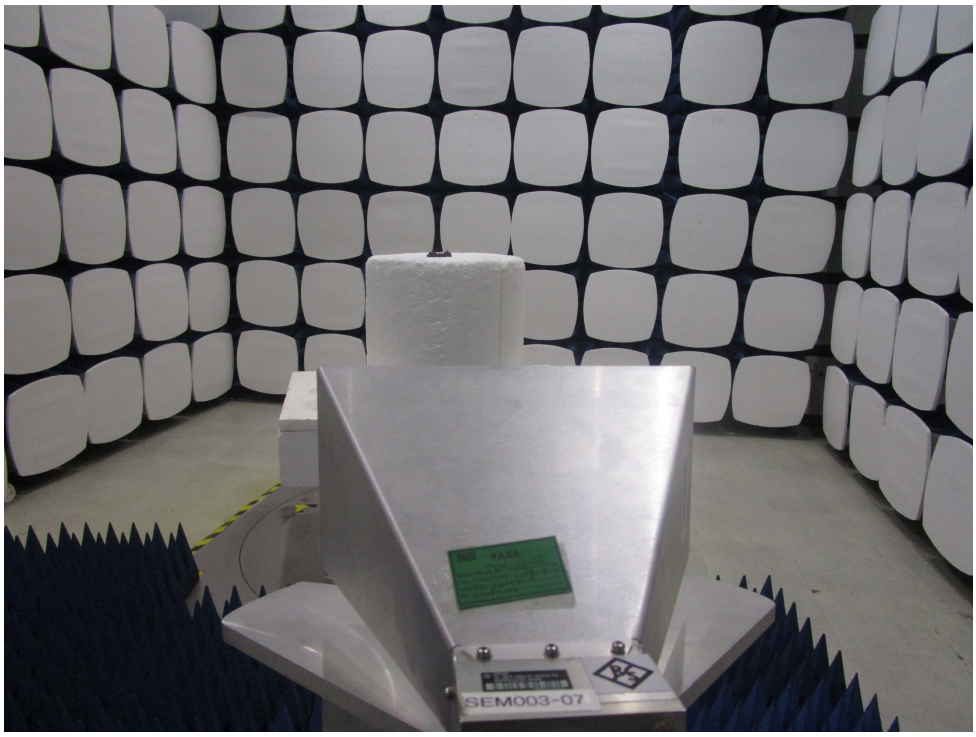
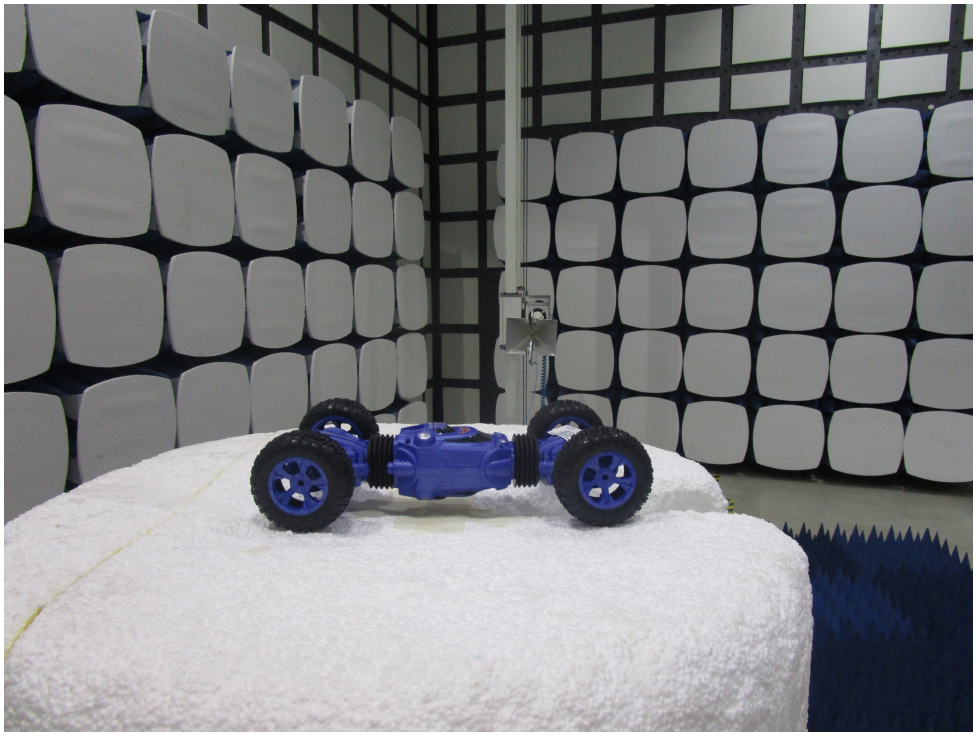
8 Photographs

8.1 Unwanted emissions in the spurious domain Test Setup



8.2 Spurious Emission Test Setup



8.3 EUT Constructional Details (EUT Photos)

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1904013417CR.

9 Appendix

9.1 Appendix 300440

1. -6dB Bandwidth

Mode	Channel (Frequency)	-6dB Bandwidth(MHz)	Conclusion
GFSK	L	0.994	N/A
	M	1.030	N/A
	H	1.053	N/A

2. Equivalent Isotropically Radiated Power

Test Conditions Temp (℃)/ Volt (V DC)	Mode	Channel (Frequency)	EIRP Value (dBm)	Limit (dBm)	Result
TNVN	GFSK	L	-2.57	10	PASS
		M	-2.88	10	PASS
		H	-1.85	10	PASS
VLTL	GFSK	L	-3.08	10	PASS
		M	-3.08	10	PASS
		H	-2.00	10	PASS
VHTL	GFSK	L	-2.73	10	PASS
		M	-3.34	10	PASS
		H	-2.17	10	PASS
VLTH	GFSK	L	-2.65	10	PASS
		M	-2.94	10	PASS
		H	-1.96	10	PASS
VHTH	GFSK	L	-2.88	10	PASS
		M	-3.02	10	PASS
		H	-2.07	10	PASS
Remark: EIRP= Read EIRP value (dBm) + 10 log (1/x) X=duty cycle					

3. Permitted Range of Operating Frequencies

Test Conditions Temp (℃)/ Volt (V DC)	Mode	CH(Frequency)	Result(MHz)	Limit (MHz)	Conclusion
VNTN	GFSK	L	2404.49	>2400	PASS
		H	2480.52	<2483.5	PASS
VLTL	GFSK	L	2404.47	>2400	PASS
		H	2480.57	<2483.5	PASS
VLTH	GFSK	L	2404.44	>2400	PASS
		H	2480.59	<2483.5	PASS
VHTL	GFSK	L	2404.51	>2400	PASS
		H	2480.50	<2483.5	PASS
VHTH	GFSK	L	2404.54	>2400	PASS
		H	2480.46	<2483.5	PASS

- End of the Report -

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