

Report No.: SZEM191202129002

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TEST REPORT

Application No.: SZEM1912021290CR **Applicant:** QIFENG TOYS FACTORY

Address of Applicant: CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE,

CHINA

Manufacture: QIFENG TOYS FACTORY

Address of Applicant: CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE,

CHINA

Equipment Under Test (EUT):

EUT Name: Remote control plane

Model No.: QF001, QF002, QF003, QF004, QF005, QF006, QF007, QF008, QF009,

QF010, QF011, QF012, QF013, QF014, QF015, QF016, QF017, QF018, QF019, QF020, QF021, QF022, QF023, QF024, QF025, QF026, QF027, QF028, QF029, F030, QF031, QF032, QF033, QF034, QF035, QF036,

QF037, QF038, QF039, QF040 *

Please refer to section 2 of this report which indicates which model was

actually tested and which were electrically identical.

FCC ID: 2AVNDQF008

Standard(s): 47 CFR Part 15, Subpart C 15.249

Date of Receipt: 2019-12-16

Date of Test: 2019-12-18 to 2020-01-13

Date of Issue: 2020-01-13

Test Result: Pass*



Ceny. Ku



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



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	Revision Record					
Version	Chapter	Date	Modifier	Remark		
01		2020-01-13		Original		

Authorized for issue by:			
	Peter. Grag		
	Peter Geng /Project Engineer	-	
	EvicFu		
	Eric Fu /Reviewer	-	



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Test Summary

Radio Spectrum Technical Requirement					
Item	Standard	Method	Requirement	Result	
Antenna Requirement	47 CFR Part 15, Subpart C 15.249	N/A	47 CFR Part 15, Subpart C 15.203	Pass	

Radio Spectrum Matt	ter Part			
Item	Standard	Method	Requirement	Result
20dB Bandwidth	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Field Strength of the Fundamental Signal (15.249(a))	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.5&6.6	47 CFR Part 15, Subpart C 15.249(a)	Pass
Restricted Band Around Fundamental Frequency	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209	Pass
Radiated Emissions	47 CFR Part 15, Subpart C 15.249	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)	Pass

Remark:

Model No.: QF001, QF002, QF003, QF004, QF005, QF006, QF007, QF008, QF009, QF010, QF011, QF012, QF013, QF014, QF015, QF016, QF017, QF018, QF019, QF020, QF021, QF022, QF023, QF024, QF025, QF026, QF027, QF028, QF029, F030, QF031, QF032, QF033, QF034, QF035, QF036, QF037, QF038, QF039, QF040

Only the model QF008 was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on color, appearance and packaging.



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General Information

Details of E.U.T.

Power Supply:	Remote: DC 4.5V by 3x1.5V "AA" batteries
Operation Frequency:	2405-2475MHz
Modulation Type:	GFSK
Number of Channels:	71
Channel Spacing:	1MHz
Antenna Type:	integral antenna
Antenna Gain:	2dBi

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	Dedicted Courieus amission tost	± 4.5dB (Below 1GHz)
4	Radiated Spurious emission test	± 4.8dB (Above 1GHz)
5	Temperature test	± 1 ℃
6	Humidity test	± 3%
7	Supply voltages	± 1.5%
8	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:

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





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Equipment List

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
DC Power Supply	Zhao Xin	KXN-6020D	SEM011-08	2019-09-24	2020-09-23
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2019-09-24	2020-09-23
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2019-07-11	2020-07-10
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019-09-24	2020-09-23
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019-09-24	2020-09-23
Electric and Magnetic Field Analyzer	Narda	NBM- 550/EHP-50F	EMC2143	2018-02-07	2020-02-06
Electric Field Probe (100KHz-3GHz)	WANDEL & GOLTERMANN	EMR-20	EMC0907	2019-05-21	2020-05-20
EMF Tester	Narda	ELT-400	SZE039-4	2019-07-08	2020-07-07

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	2019-07-11	2020-07-10
EXA Spectrum Analyzer	AgilentTechnologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
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 (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2019-09-24	2020-09-23
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	KXN-6020D	SEM011-08	2019-09-24	2020-09-23

6502



Active Loop Antenna

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SEM003-08

2020-08-21

2017-08-22



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Radiated Emissions (30MHz-1GHz)					
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	2019-09-24	2020-09-23
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	2019-07-11	2020-07-10

General used equipmen	t				
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2019-09-26	2020-09-25
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2019-09-26	2020-09-25
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2019-04-04	2020-04-03



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Radio Spectrum Technical Requirement 6

Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 Limit:

15.203 requirement:

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.

6.1.2 Conclusion

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2dBi.



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Radio Spectrum Matter Test Results 7

7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215 Test Method: ANSI C63.10 (2013) Section 6.9

Limit: N/A

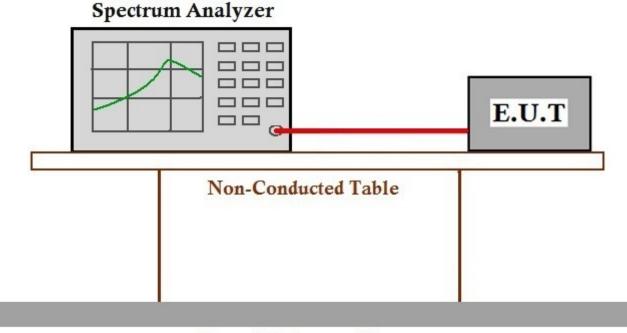
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

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

7.1.2 Test Setup Diagram



Ground Reference Plane

7.1.3 Measurement Procedure and Data



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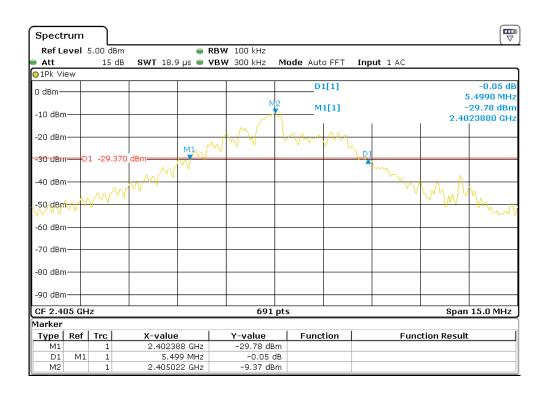
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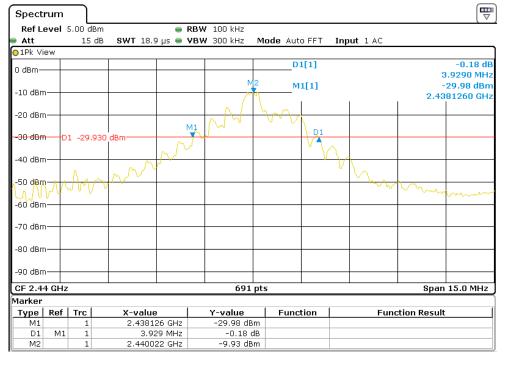
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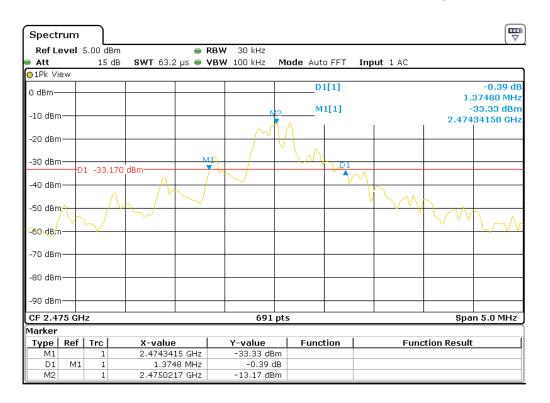
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7.2 Field Strength of the Fundamental Signal (15.249(a))

Test Requirement 47 CFR Part 15, Subpart C 15.249(a) Test Method: ANSI C63.10 (2013) Section 6.5&6.6

Measurement Distance: 3m

Limit:

Fundamental frequency(MHz)	Field strength of fundamental(millivolts/meter)	Field strength of harmonics(microvolts/meter)
902-928	50	500
2400-2483.5	50	500
5725-5875	50	500
24000-24250	250	2500

Remark: 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.

For fundamental frequency in "902-928MHz", the field strength of fundamental is based on Quasi-Peak.

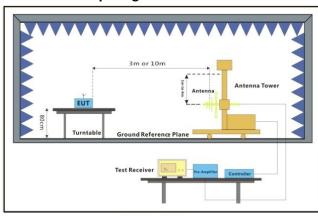
7.2.1 E.U.T. Operation

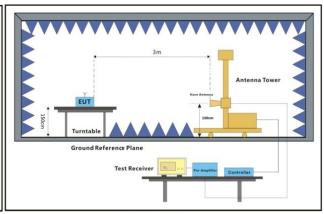
Operating Environment:

Temperature: Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

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

7.2.2 Test Setup Diagram





30MHz-1GHz Above 1GHz



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7.2.3 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 or 10 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.
- a. 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. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark2: 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. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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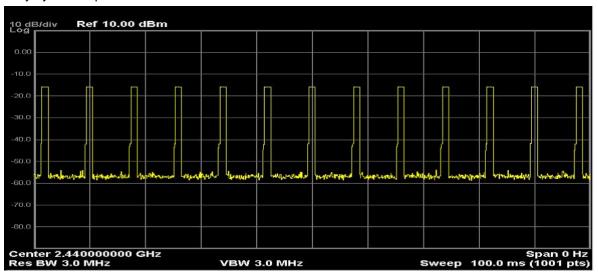
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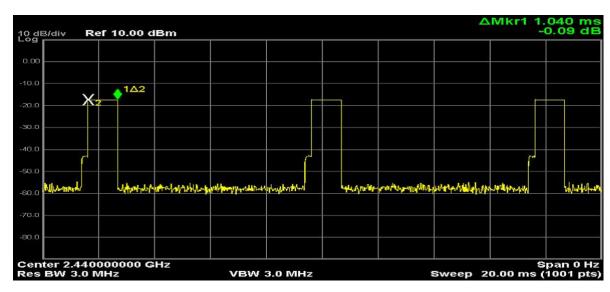
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Average value:

	Average value=Peak value + PDCF
Calculate Formula:	PDCF=20 log(Duty cycle)
	Duty cycle= T on time / T period
	Ton time =1.04ms
Test data:	T period =8ms
	PDCF value= -17.72dB

Duty cycle test plots:







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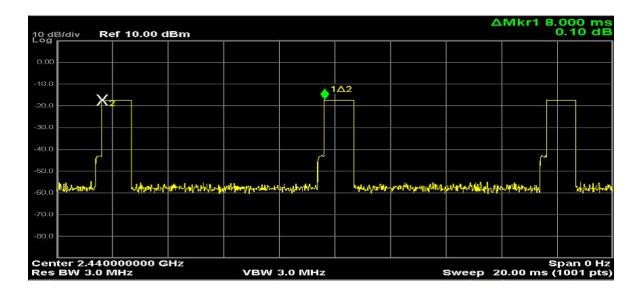
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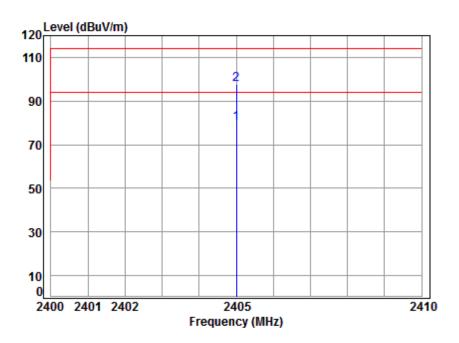
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Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:Low



Condition: 3m HORIZONTAL

Job No : 21290CR

Mode : 2405 Field Strength

Cable Ant Preamp Read Limit 0ver Loss Factor Factor Level Level Line Limit Remark MHz dΒ dBuV dBuV/m dBuV/m dB/m dΒ dB 1 pp 2405.000 5.49 29.12 41.88 87.02 79.75 94.00 -14.25 Average 2 pk 2405.000 5.49 29.12 41.88 104.74 97.47 114.00 -16.53 peak



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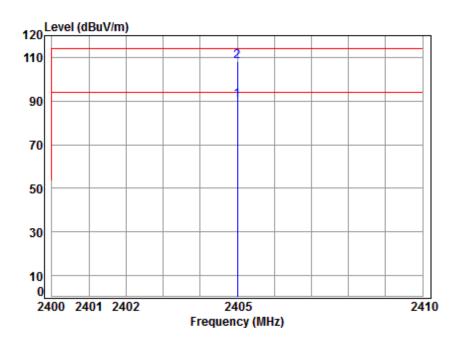
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Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:Low



Condition: 3m VERTICAL

: 21290CR Job No

: 2405 Field Strength Mode

Freq						Limit Line		
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
 2405.000								_



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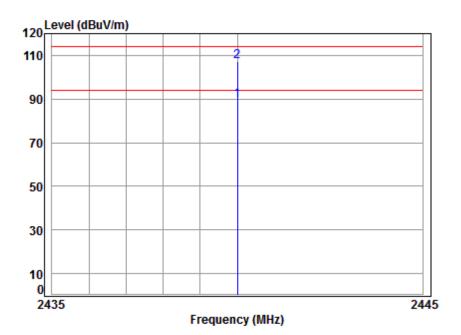
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Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:middle



Condition: 3m HORIZONTAL

: 21290CR Job No

Mode : 2440 Field Strength

ouc	Freq	Cable	Ant	Preamp			Limit Line	Over Limit R	emark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
	2440.000 2440.000								_



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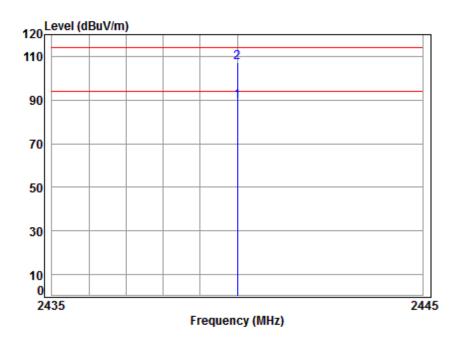
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Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:middle



Condition: 3m VERTICAL

Job No : 21290CR

Mode : 2440 Field Strength

,u		. 244	o Liei	u stre	ngen						
			Cable	Ant	Preamp	Read		Limit	0ver		
		Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark	
		MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		-
1	pp	2440.000	5.54	29.23	41.89	96.67	89.55	94.00	-4.45	Average	
2	pk	2440.000	5.54	29.23	41.89	114.39	107.27	114.00	-6.73	Peak	



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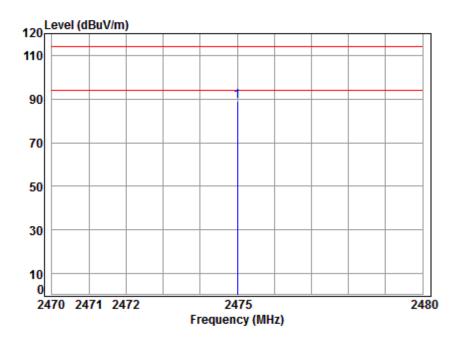
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Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:High



Condition: 3m HORIZONTAL

Job No : 21290CR

Mode : 2475 Field Strength

Cable Ant Preamp Read Limit Over

Freq Loss Factor Factor Level Level Line Limit Remark

MHz dB dB/m dB dBuV dBuV/m dBuV/m dB

1 pp 2475.000 5.59 29.33 41.91 95.93 88.94 114.00 -25.06 peak



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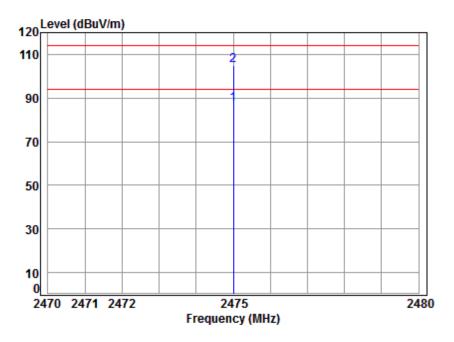
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Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:High



Condition: 3m VERTICAL Job No : 21290CR

Mode : 2475 Field Strength

Limit Cable Ant Preamp Read 0ver Loss Factor Factor Level Level Line Limit Remark dBuV dBuV/m dBuV/m MHz dB dB/m dΒ dB

1 pp 2475.000 5.59 29.33 41.91 94.27 87.28 94.00 -6.72 Average 2 pk 2475.000 5.59 29.33 41.91 111.99 105.00 114.00 -9.00 peak



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7.3 Restricted Band Around Fundamental Frequency

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.249(d) & 15.209

ANSI C63.10 (2013) Section 6.4&6.5&6.6 Test Method:

Measurement Distance: 3m

Limit:

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
Above 1GHz	74.0	Peak Value

Emission radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

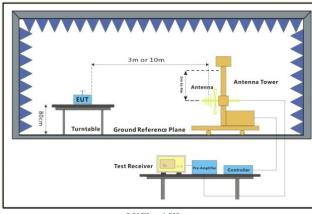
7.3.1 E.U.T. Operation

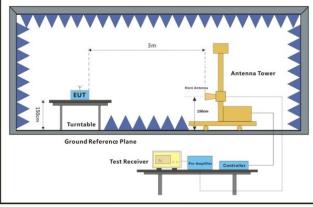
Operating Environment:

Temperature: 25 °C Humidity: Atmospheric Pressure: 1015 mbar % RH

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

7.3.2 Test Setup Diagram





Above 1GHz 30MHz-1GHz



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7.3.3 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 or 10 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.
- a. 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. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark2: 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. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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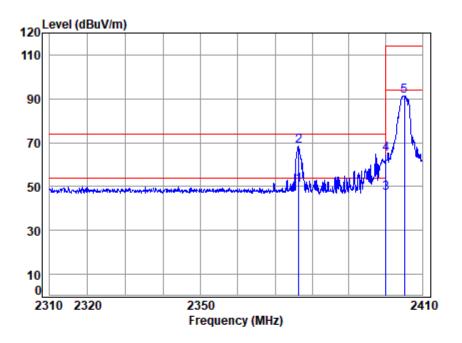
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Mode:a; Polarization:Horizontal; Modulation Type:GFSK; Channel: Low



Site : chamber

Condition: 3m HORIZONTAL

Job No : 21290CR

Mode : 2405 Band edge

	Freq				Read Level				Remark
	MHz	dB	dB/m	——dB	dBuV	dBuV/m	dBuV/m	——dB	
1	2376.329	3.78	28.50	40.97	59.47	50.78	54.00	-3.22	Average
2	2376.329	3.78	28.50	40.97	77.19	68.50	74.00	-5.50	Peak
3	2400.000	3.64	28.53	40.98	55.68	46.87	54.00	-7.13	Average
4	2400.000	3.64	28.53	40.98	73.40	64.59	74.00	-9.41	peak
5	2405.103	3.64	28.54	40.98	100.24	91.44	114.00	-22.56	peak



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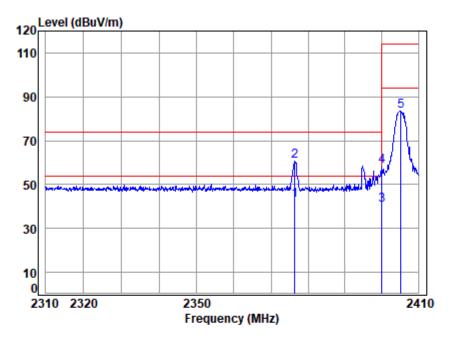
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Mode:a; Polarization: Vertical; Modulation Type: GFSK; Channel: Low



Site : chamber Condition: 3m VERTICAL Job No : 21290CR

Mode : 2405 Band edge

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2376.430	3.78	28.50	40.97	51.72	43.03	54.00	-10.97	Average
2	2376.430	3.78	28.50	40.97	69.44	60.75	74.00	-13.25	Peak
3	2400.000	3.65	28.53	40.97	49.37	40.58	54.00	-13.42	Average
4	2400.000	3.65	28.53	40.97	67.09	58.30	74.00	-15.70	peak
5	2405.205	3.64	28.54	40.98	92.28	83.48	114.00	-30.52	peak



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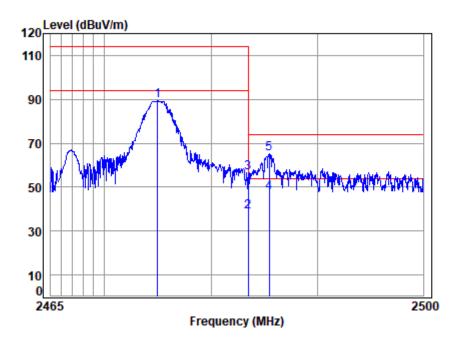
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Mode:a; Polarization:Horizontal; Modulation Type:GFSK; Channel: High



Site : chamber

Condition: 3m HORIZONTAL

Job No : 21290CR

Mode : 2475 Band edge

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	2474.995	3.97	28.66	41.01	97.60	89.22	114.00	-24.78	peak
2	2483.500	4.01	28.67	41.01	47.22	38.89	54.00	-15.11	Average
3	2483.500	4.01	28.67	41.01	64.94	56.61	74.00	-17.39	peak
4	2485.485	4.01	28.68	41.01	55.90	47.58	54.00	-6.42	Average
5	2485.485	4.01	28.68	41.01	73.62	65.30	74.00	-8.70	Peak



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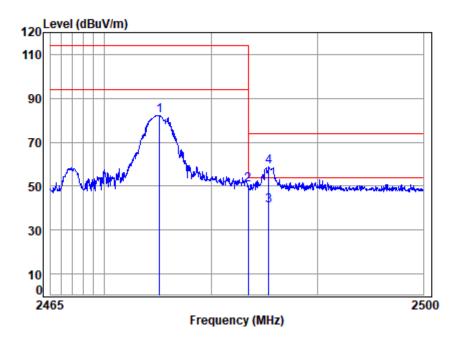
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Mode:a; Polarization: Vertical; Modulation Type: GFSK; Channel: High



Site : chamber Condition: 3m VERTICAL

Job No : 21290CR

1 2 3

Mode : 2475 Band edge

		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
	2475.169	3.97	28.66	41.01	90.43	82.05	114.00	-31.95	peak
2	2483.500	4.01	28.67	41.01	59.12	50.79	74.00	-23.21	peak
3	2485.415	4.01	28.68	41.01	49.47	41.15	54.00	-12.85	Average
Ļ	2485.415	4.01	28.68	41.01	67.19	58.87	74.00	-15.13	Peak



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7.4 Radiated Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.249 (a),(d)

Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6

Measurement Distance: 3m

Limit:

Frequency(MHz)	Field strength	Limit	Detector	Measurement Distance
1 requeriey(Wi112)	(microvolts/meter)	(dBuV/m)	Detector	(meters)
0.009-0.490	2400/F(kHz)	-	-	300
0.490-1.705	24000/F(kHz)	-	-	30
1.705-30	30	-	-	30
30-88	100	40.0	QP	3
88-216	150	43.5	QP	3
216-960	200	46.0	QP	3
960-1000	500	54.0	QP	3
Above 1000	500	54.0	AV	3



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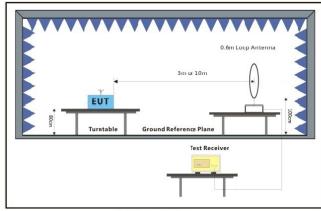
7.4.1 E.U.T. Operation

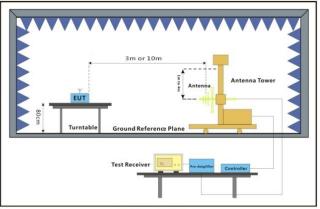
Operating Environment:

Temperature: Humidity: 51 % RH Atmospheric Pressure: 1015 mbar

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

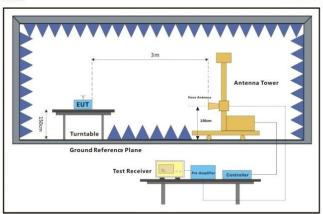
7.4.2 Test Setup Diagram





Below 30MHz

30MHz-1GHz



Above 1GHz



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7.4.3 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 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. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark2: Remark: for below 30MHz, all tests margins are more than 10 dB relative to the limit, so it is not reported and it is deemed to comply with the requirement.

Remark3: 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. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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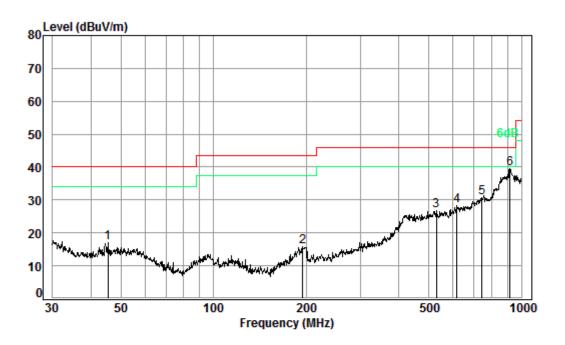
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Radiated emission below 1GHz

Detector: QP

Mode:a; Polarization:Horizontal



Condition: 3m HORIZONTAL

Job No. : 21290CR

Test Mode: a

	Freq			Preamp Factor				
-	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	45.38	0.71	15.64	27.61	28.25	16.99	40.00	-23.01
2	195.14	1.39	16.36	27.53	25.69	15.91	43.50	-27.59
3	530.10	2.63	25.24	27.82	26.67	26.72	46.00	-19.28
4	616.37	2.74	26.83	27.68	26.26	28.15	46.00	-17.85
5	744.87	3.04	28.18	27.49	26.95	30.68	46.00	-15.32
6 pp	919.29	3,62	29,90	27.02	33.01	39.51	46.00	-6.49



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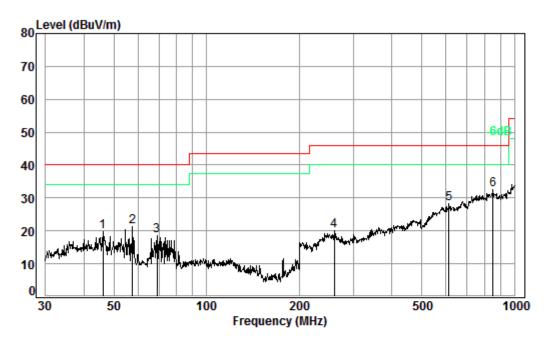
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Mode:a; Polarization:Vertical



Condition: 3m VERTICAL Job No. : 21290CR

Test Mode: a

	Frea			Preamp Factor				Over
	rreq	LUSS	ractor	ractor	Level	rever	LINE	LIMIT
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	46.18	0.73	15.38	27.61	31.13	19.63	40.00	-20.37
2	57.59	0.80	13.42	27.57	34.78	21.43	40.00	-18.57
3	69.11	0.80	12.83	27.53	32.49	18.59	40.00	-21.41
4	260.14	1.72	19.10	27.54	26.68	19.96	46.00	-26.04
5	612.06	2.73	26.77	27.68	26.48	28.30	46.00	-17.70
6 pp	851.04	3.41	29.18	27.24	27.12	32.47	46.00	-13.53



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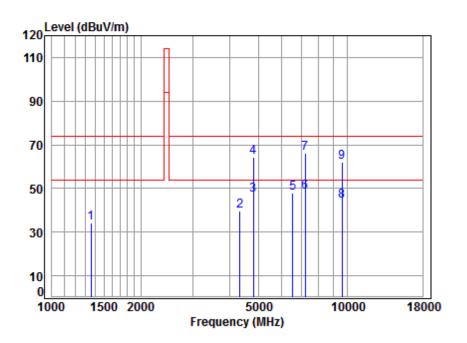


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Transmitter emission above 1GHz

Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:Low



Condition: 3m HORIZONTAL

Job No : 21290CR Mode : 2405 TX SE

			Cable	Ant	Preamp	Read		Limit	0ver	
		Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
		MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
				-				-		
1		1358.498	5.01	25.21	41.31	45.39	34.30	74.00	-39.70	peak
2		4329.354	7.37	33.60	42.39	41.14	39.72	74.00	-34.28	peak
3		4810.000	7.90	34.17	42.47	47.19	46.79	54.00	-7.21	Average
4		4810.000	7.90	34.17	42.47	64.91	64.51	74.00	-9.49	peak
5		6545.263	11.41	35.23	41.18	42.38	47.84	74.00	-26.16	peak
6	pp	7215.000	10.07	36.41	40.71	42.79	48.56	54.00	-5.44	Average
7	pk	7215.000	10.07	36.41	40.71	60.51	66.28	74.00	-7.72	peak
8		9620.000	10.75	37.52	37.72	33.66	44.21	54.00	-9.79	Average
9		9620.000	10.75	37.52	37.72	51.38	61.93	74.00	-12.07	peak



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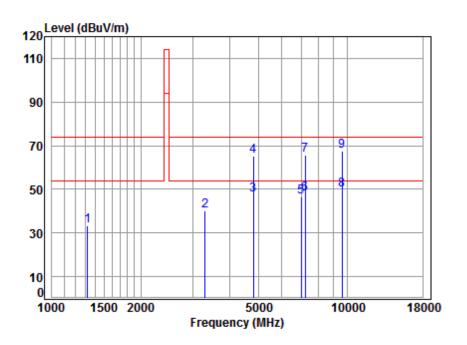
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Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:Low



Condition: 3m VERTICAL : 21290CR Job No

: 2405 TX SE Mode

	Freq	Cable Loss		Preamp Factor	Read Level		Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1319.794	4.87	25.04	41.28	44.89	33.52	74.00	-40.48	peak
2	3308.894	6.29	31.87	42.18	44.01	39.99	74.00	-34.01	peak
3	4810.000	7.90	34.17	42.47	47.91	47.51	54.00	-6.49	Average
4	4810.000	7.90	34.17	42.47	65.63	65.23	74.00	-8.77	peak
5	6995.172	10.14	36.49	40.86	40.70	46.47	74.00	-27.53	peak
6	7215.000	10.07	36.41	40.71	42.11	47.88	54.00	-6.12	Average
7	7215.000	10.07	36.41	40.71	59.83	65.60	74.00	-8.40	peak
8 p	p 9620.000	10.75	37.52	37.72	39.07	49.62	54.00	-4.38	Average
9 p	k 9620.000	10.75	37.52	37.72	56.79	67.34	74.00	-6.66	peak



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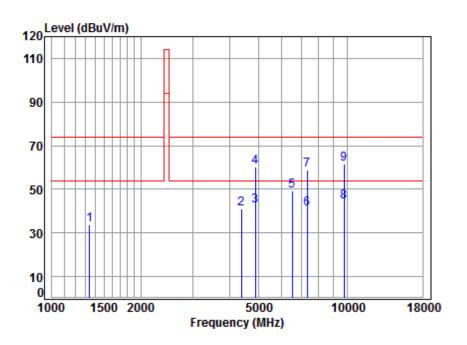
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Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:middle



Condition: 3m HORIZONTAL

: 21290CR Job No : 2440 TX SE Mode

		Freq	Cable Loss		Preamp Factor	Read Level		Limit Line	Over Limit	Remark
	-	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1		1339.006	4.94	25.13	41.29	45.02	33.80	74.00	-40.20	peak
2		4379.699	7.43	33.60	42.40	42.30	40.93	74.00	-33.07	peak
3		4880.000	7.97	34.29	42.48	42.86	42.64	54.00	-11.36	Average
4		4880.000	7.97	34.29	42.48	60.58	60.36	74.00	-13.64	peak
5		6507.536	11.52	35.12	41.21	43.90	49.33	74.00	-24.67	peak
6		7320.000	10.05	36.37	40.63	35.47	41.26	54.00	-12.74	Average
7		7320.000	10.05	36.37	40.63	53.19	58.98	74.00	-15.02	peak
8	pp	9760.000	10.82	37.55	37.53	33.22	44.06	54.00	-9.94	Average
9	pk	9760.000	10.82	37.55	37.53	50.94	61.78	74.00	-12.22	peak



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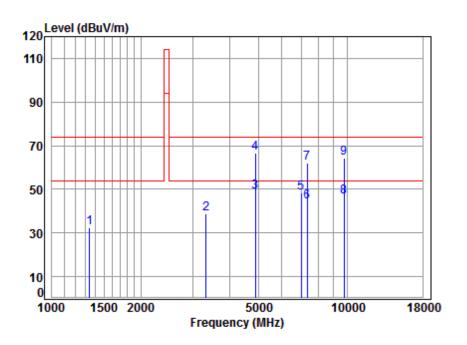
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Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:middle



Condition: 3m VERTICAL : 21290CR Job No

: 2440 TX SE Mode

	Freq	Cable Loss		Preamp Factor	Read Level		Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1339.006	4.94	25.13	41.29	43.67	32.45	74.00	-41.55	peak
2	3328.077	6.30	31.91	42.18	42.63	38.66	74.00	-35.34	peak
3 рр	4880.000	7.97	34.29	42.48	49.03	48.81	54.00	-5.19	Average
4 pk	4880.000	7.97	34.29	42.48	66.75	66.53	74.00	-7.47	peak
5	6974.982	10.20	36.43	40.87	42.57	48.33	74.00	-25.67	peak
6	7320.000	10.05	36.37	40.63	38.35	44.14	54.00	-9.86	Average
7	7320.000	10.05	36.37	40.63	56.07	61.86	74.00	-12.14	peak
8	9760.000	10.82	37.55	37.53	35.74	46.58	54.00	-7.42	Average
9	9760.000	10.82	37.55	37.53	53.46	64.30	74.00	-9.70	peak



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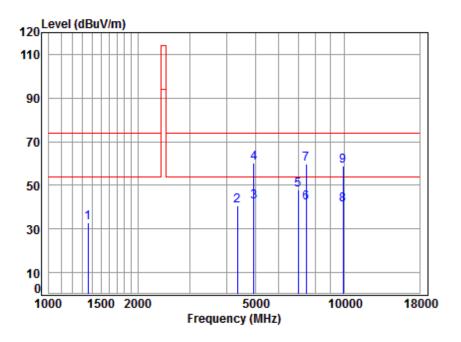
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Mode:a; Polarization:Horizontal; Modulation:GFSK; Channel:High



Condition: 3m HORIZONTAL

: 21290CR Job No : 2475 TX SE Mode

	Freq	Cable Loss		Preamp Factor	Read Level		Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1358.498	5.01	25.21	41.31	44.16	33.07	74.00	-40.93	peak
2	4354.454	7.40	33.60	42.39	42.20	40.81	74.00	-33.19	peak
3 рр	4950.000	8.04	34.41	42.49	42.54	42.50	54.00	-11.50	Average
4 pk	4950.000	8.04	34.41	42.49	60.26	60.22	74.00	-13.78	peak
5	6995.172	10.14	36.49	40.86	42.01	47.78	74.00	-26.22	peak
6	7425.000	10.02	36.33	40.57	36.35	42.13	54.00	-11.87	Average
7	7425.000	10.02	36.33	40.57	54.07	59.85	74.00	-14.15	peak
8	9900.000	10.89	37.58	37.34	30.07	41.20	54.00	-12.80	Average
9	9900.000	10.89	37.58	37.34	47.79	58.92	74.00	-15.08	peak



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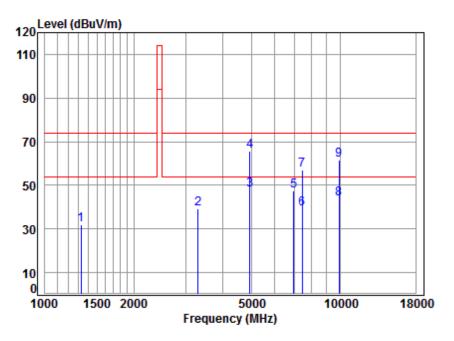
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Mode:a; Polarization:Vertical; Modulation:GFSK; Channel:High



Condition: 3m VERTICAL Job No : 21290CR Mode : 2475 TX SE

	Freq	Cable Loss		Preamp Factor	Read Level		Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1323.614	4.88	25.06	41.28	43.30	31.96	74.00	-42.04	peak
2	3308.894	6.29	31.87	42.18	43.28	39.26	74.00	-34.74	peak
3 рр	4950.000	8.04	34.41	42.49	47.98	47.94	54.00	-6.06	Average
4 pk	4950.000	8.04	34.41	42.49	65.70	65.66	74.00	-8.34	peak
5	6954.852	10.25	36.38	40.89	41.82	47.56	74.00	-26.44	peak
6	7425.000	10.02	36.33	40.57	33.50	39.28	54.00	-14.72	Average
7	7425.000	10.02	36.33	40.57	51.22	57.00	74.00	-17.00	peak
8	9900.000	10.89	37.58	37.34	32.79	43.92	54.00	-10.08	Average
9	9900.000	10.89	37.58	37.34	50.51	61.64	74.00	-12.36	peak



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8 Photographs

8.1 Radiated Emissions Test Setup

Please refer to setup photos.

8.2 EUT Constructional Details (EUT Photos)

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1912021290CR.

- End of the Report -



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