SGS

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FCC REPORT

Application No. : Applicant: Manufacturer:	SZEM1604002629CR GUITENG TOYS COMPANY LIMITED GUITENG TOYS COMPANY LIMITED
Factory:	GUITENG TOYS COMPANY LIMITED
Product Name:	5.8G FPV RC Quadrocopter
Model No.(EUT):	T901F
Add Model No.:	T901, T901C, T901W, T902, T902C, T902W, T903, T905, T905F, T905C, T905W, T906, T906F, T906C, T906W, T907, T907F, T907C, T907W, T908, T908F, T908C, T908W, T909, T910, T910F, T910C, T910W, T911, T911F, T911C, T911W, T912, T912F, T912C, T912W, T913, T913F, T913C, T913W, T915, T915F, T915C, T915W
FCC ID:	2AH2AGTENG20160102
Standards:	47 CFR Part 15, Subpart C (2015)
Date of Receipt:	2016-05-04
Date of Test:	2016-05-13 to 2016-05-20
Date of Issue:	2016-05-26
Test Result:	PASS *

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

Authorized Signature:



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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2 Version

	Revision Record						
Version	Chapter Date Modifier Remark						
00		2016-05-26		Original			

Authorized for issue by:		
Tested By	feter Gene	2016-05-20
	(Peter Geng) /Project Engineer	Date
Prepared By	Iris Zhou	2016-05-26
	(Iris Zhou) /Clerk	Date
Checked By	Eric Fu	2016-05-26
	(Eric Fu) /Reviewer	Date



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3 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
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 (2013)	PASS
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C Section 15.249 (a)	ANSI C63.10 (2013)	PASS
Spurious Emissions	47 CFR Part 15, Subpart C Section 15.249 (a)/15.209	ANSI C63.10 (2013)	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.249(a)/15.205	ANSI C63.10 (2013)	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.215 (c)	ANSI C63.10 (2013)	PASS

Remark:

Model No.: T901, T901F, T901C, T901W, T902, T902C, T902W, T903, T905, T905F, T905C, T905W, T906, T906F, T906C, T906W, T907, T907F, T907C, T907W, T908, T908F, T908C, T908W, T909, T910, T910F, T910C, T910W, T911, T911F, T911C, T911W, T912, T912F, T912C, T912W, T913, T913F, T913C, T913W, T915, T915F, T915C, T915W

Only the model T901F was tested, since the electrical circuit design, layout, components used and internal wiring were identical for all above models, only different on model name.



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5 General Information

5.1 Client Information

Applicant:	GUITENG TOYS COMPANY LIMITED
Address of Applicant:	TONGYI ROAD, CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE CHINA
Manufacturer:	GUITENG TOYS COMPANY LIMITED
Address of Manufacturer:	TONGYI ROAD, CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE CHINA
Factory:	GUITENG TOYS COMPANY LIMITED
Address of Factory:	TONGYI ROAD, CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE CHINA

5.2 General Description of EUT

Name:	5.8G FPV RC Quadrocopter
Model No.:	T901F
Frequency Range:	5745MHz
Channel separation	20MHz
Modulation Type:	FM
Channel number:	1
EUT Function:	5.8G SRD
Antenna Type:	Integral
Antenna Gain:	0dBi
Power Supply:	DC 3.7V (DC 3.7V 500mAh)

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Channel	Frequency
CH1	5745MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:



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5.3 Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	50 % RH
Atmospheric Pressure:	1015 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with all kind of modulation and all kind of data rate.

5.4 Description of Support Units

The EUT has been tested independent unit.

5.5 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.



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5.6 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)

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

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.



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5.10 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	10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2015-08-01	2016-08-01
2	EMI Test Receiver (9k-3GHz)	Rohde & Schwarz	ESCI	SEM004-01	2016-04-25	2017-04-25
3	Trilog-Broadband Antenna(30M-1GHz)	Schwarzbeck	VULB9168	SEM003-17	2016-01-26	2017-01-26
4	Pre-amplifier	Sonoma Instrument Co	310N	SEM005-03	2016-04-25	2017-04-25
5	Loop Antenna	ETS-Lindgren	6502	SEM003-08	2015-08-14	2016-08-14

	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	AUDIX	N/A	SEM001-02	2016-05-13	2017-05-13
2	EMI Test Receiver	Rohde & Schwarz	ESIB26	SEM004-04	2016-04-25	2017-04-25
3	BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-02	2014-11-15	2017-11-15
4	Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2015-10-09	2016-10-09
5	Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2015-06-14	2018-06-14
6	Horn Antenna (18-26GHz)	ETS-Lindgren	3160	SEM003-12	2014-11-24	2017-11-24
7	Low Noise Amplifier	Black Diamond Series	BDLNA- 0118- 352810	SEM005-05	2015-10-09	2016-10-09
8	Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A

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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	ZhaoXin	RXN-305D	SEM011-02	2015-10-09	2016-10-09
2	Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2015-10-17	2016-10-17
3	Signal Generator	Rohde & Schwarz	SML03	SEM006-02	2016-04-25	2017-04-25
4	Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2015-10-09	2016-10-09



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6 Test results and Measurement Data

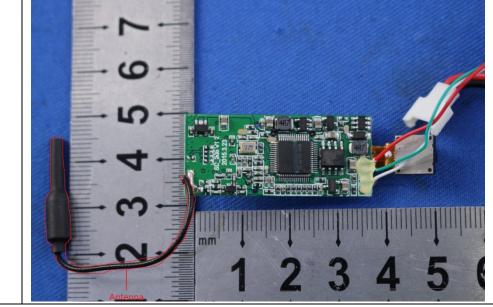
6.1 Antenna Requirement

Standard requirement: 47 CFR Part 15C Section 15.203

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.

EUT Antenna:



The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.

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6.2 Radiated Spurious Emissions

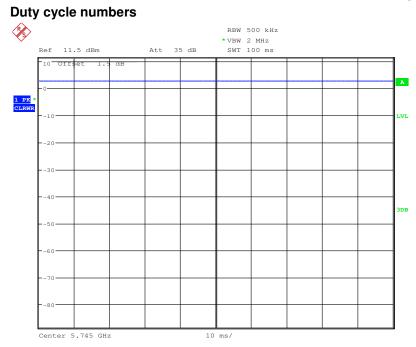
6.2.1 Duty Cycle

Test Requirement:	47 CFR Part 15C Section 15.35 (c)
Test Method:	ANSI C63.10:2013
Test Setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane
Instruments Used:	Refer to section 5.10 for details
Limit:	N/A
Test Mode:	Transmitting mode
Test Results:	Pass

Test plot as follows:



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1									
Test Requirement:	47 CFR Part 15C Section 15.249 and 15.209								
Test Method:	ANSI C63.10: 2013								
Test Site:		Measurement Distance: 3m (Semi-Anechoic Chamber) Measurement Distance: 10m (Semi-Anechoic Chamber)							
Receiver Setup:	Frequency	Detector	RBW	VBW	Rem	ark			
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Pea	ak			
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Avera	age			
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-	peak			
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Pea	ak			
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Avera	age			
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-	peak			
	30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-	peak			
	Above 1GHz	Peak	1MHz	3MHz	Pea	ak			
	Above IGH2	Peak	1MHz	10Hz	Avera	age			
Limit: (Spurious Emissions)	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measure distanc				
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	30	0			
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30)			
	1.705MHz-30MHz	30	-	-	30)			
	30MHz-88MHz	29.9	40.0	Quasi-peak	1(0			
	88MHz-216MHz	44.7	43.5	Quasi-peak	1(0			
	216MHz-960MHz	60.3	46.0	Quasi-peak	1(0			
	960MHz-1GHz	100	54.0	Quasi-peak	1(0			
	Above 1GHz	500	54.0	Average	3				
	Note: 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.								
Limit:	Frequency	Limit (dBu)	√/m @3m)	Rema	urk				
(Field strength of the fundamental signal)		94	94.0 Aver						
		5725MHz-5875MHz 94.0 Average Value							

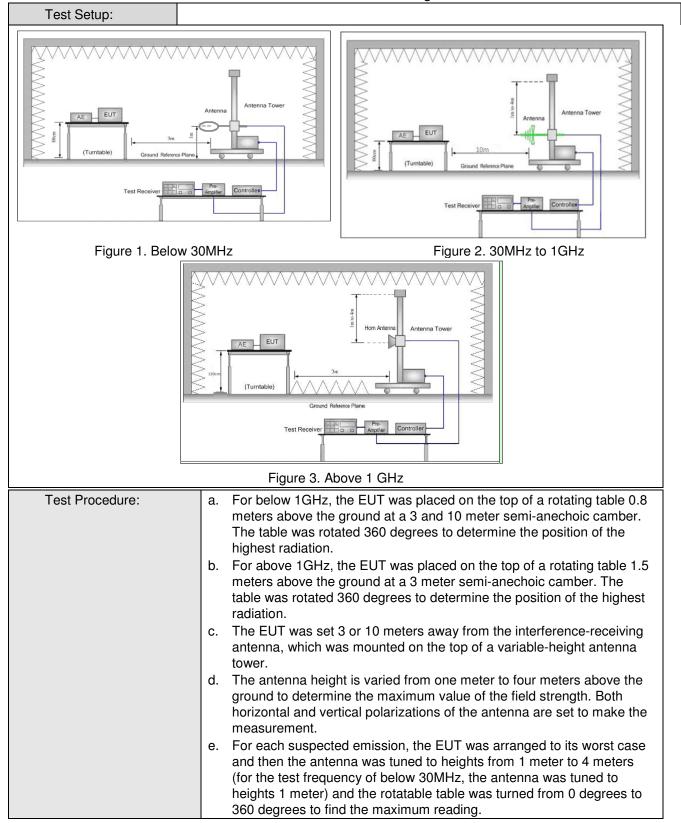
6.2.2 Spurious Emissions

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	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
	 The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. Repeat above procedures until all frequencies measured was complete.
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass



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Measurement Data

6.2.2.1 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
5745.000	35.77	6.93	39.21	90.06	93.55	114.00	20.45	Vertical
5745.000	35.76	6.92	39.21	87.42	90.89	114.00	23.11	Horizontal

Remark:

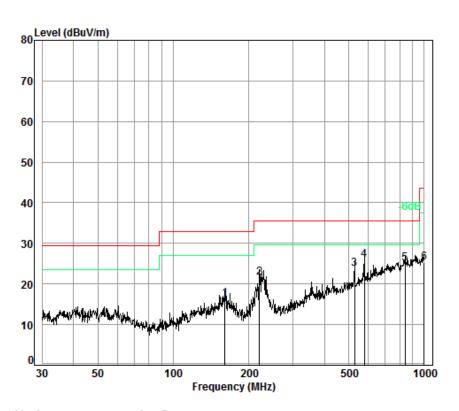
The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.



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6.2.2.2 Spurious Emissions

30MHz~1GHz			
Test mode:	Transmitting mode	Vertical	



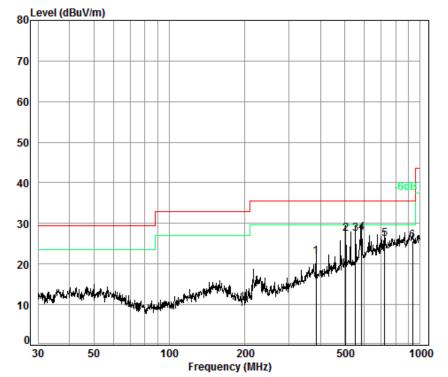
Condition: 10m Vertical Job No. : 2629CR Test Mode: a

		Cable	Ant	Preamp	Read		Limit	0ver
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
-	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	160.91	7.50	13.30	32.73	28.19	16.26	33.00	-16.74
2	220.62	7.70	10.20	32.68	36.34	21.56	35.60	-14.04
3	528.25	8.72	17.33	32.60	30.37	23.82	35.60	-11.78
4 pp	576.64	8.84	18.22	32.60	31.58	26.04	35.60	-9.56
5	839.18	9.30	21.52	32.56	26.82	25.08	35.60	-10.52
6	1000.00	9.60	22.85	32.50	25.29	25.24	43.50	-18.26



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Test mode:	Transmitting mode	Horizontal



Condition: 10m Horizontal Job No. : 2629CR Test Mode: a

	Freq			Preamp Factor				Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 2	383.93 504.71	8.63	16.88	32.60 32.60	34.48	27.39	35.60	-8.21
3 4 pp 5 6	552.88 584.79 721.73 932.27	8.86 9.20	18.39 20.41	32.60 32.60 32.60 32.50	33.04 29.12	27.69 26.13	35.60 35.60	-7.91 -9.47



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Above 1GHz	z									
Test mode:	Trar	nsmitting	Test cha	nnel:	57	45 MHz	Remark:		Pe	ak
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Leve (dBuV	I	Level (dBuV/m)	Limit Line (dBuV/m)	Ov Lin (dE	nit	Polarization
3388.719	7.18	32.75	38.69	45.22	2	46.46	74.00	-27.	54	Vertical
4703.674	6.20	34.64	39.20	47.24	ł	48.88	74.00	-25.	12	Vertical
7838.091	9.39	35.69	39.01	43.90)	49.97	74.00	-24.	03	Vertical
9259.305	9.91	36.64	38.15	42.90)	51.30	74.00	-22.	70	Vertical
11490.000	10.39	38.22	38.46	42.72	2	52.87	74.00	-21.	13	Vertical
17235.000	16.31	41.01	41.69	36.81		52.44	74.00	-21.	56	Vertical
3456.171	7.05	32.84	38.72	45.36	5	46.53	74.00	-27.	47	Horizontal
4884.031	6.59	34.79	39.26	45.42	2	47.54	74.00	-26.	46	Horizontal
8526.748	9.64	35.87	38.63	41.58	3	48.46	74.00	-25.	54	Horizontal
7295.991	9.04	35.53	39.06	45.25	5	50.76	74.00	-23.	24	Horizontal
11490.000	10.39	38.22	38.46	41.6		51.75	74.00	-22.	25	Horizontal
17235.000	16.31	41.01	41.69	37.22	2	52.85	74.00	-21.	15	Horizontal

Remark:

 The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
 Final Test Level – Reseiver Reading + Antenna Factor + Cable Factor - Preamplifier Factor

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

- 2) Scan from 9kHz to 25GHz, 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. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3) As shown in this section, for frequencies 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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6.3 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15	5.209 and 15.205							
Test Method:	ANSI C63.10: 2013								
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)								
Limit(band edge):	Emissions radiated outside of the specified frequency bands, except for armonics, shall be attenuated by at least 50 dB below the level of the undamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.								
	Frequency								
	30MHz-88MHz								
	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						
		74.0	Peak Value						
Test Setup:									
AE EUT (Turntable) Test Receiver	Antenna Tower	AE _ EUT (Turntable) Ground Reference Plane Test Receiver	Antenna Tower						
Figure 1. 30MHz		Figure 2. Above							



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Test Procedure:	a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. 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 semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
	c. The EUT was set 3 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 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. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel
	h. Test the EUT in the lowest channel, the Highest channel
	 The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case.
	 Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting mode, Charge + Transmitting mode
Final Test Mode:	Pretest the EUT at Transmitting mode and Charge +Transmitting mode, found the Charge +Transmitting mode which it is worse case
	Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass



1

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est mode:	Transmitting	Test channel:	5745 MHz	Remark:	Peak	Vertica
120 Leve	l (dBuV/m)					
110						
90				mann		
70			کر		$ \forall $	
50	hh moto marker and	manahar	mand			
30						
10						
0					5760	
3000		Frequency	(MHz)		5100	
Job No:	: 3m Vertical : 2629CR : 5745 Band edge	2				
	Cable Ar	nt Preamp Read or Factor Level L		Over imit		

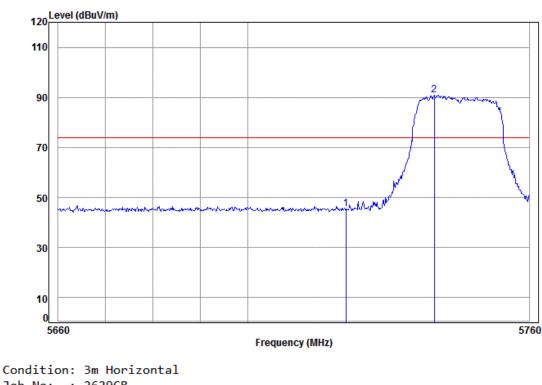
5725.000 6.89 35.73 39.21 49.14 52.55 74.00 -21.45

2 pp 5742.575 6.93 35.77 39.21 90.06 93.55 74.00 19.55



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rest mode. Transmitting rest channel. 5745 Minz Remark. Peak Honzonta		Test mode:	Transmitting	Test channel:	5745 MHz	Remark:	Peak	Horizontal
---	--	------------	--------------	---------------	----------	---------	------	------------



Job No	o: : 262	9CR						
Mode:	: 574	5 Band	edge					
		Cable	Ant	Preamp	Read		Limit	0ver
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
-								
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	5725.000	6.89	35.73	39.21	41.97	45.38	74.00	-28.62
2 pp	5739.759	6.92	35.76	39.21	87.42	90.89	74.00	16.89

Note:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation

with a sample calculation is as follows:

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



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6.4 20dB Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.215				
Test Method:	ANSI C63.10:2013				
Test Setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane				
Limit:	N/A				
Exploratory Test Mode:	Transmitter mode				
Final Test Mode:	Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6Mbps of rate is the worst case of 802.11n(HT20);6Mbps of rate is the worst case of 802.11n(HT40)				
Instruments Used:	Refer to section 5.10 for details				
Test Results:	Pass				

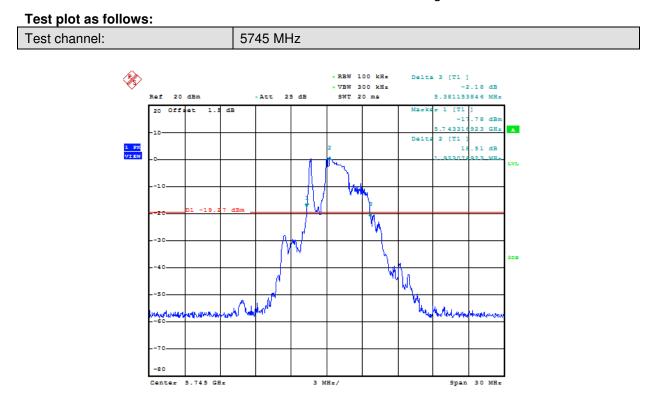
Measurement Data

Test Channel	20dB bandwidth (MHz)	Results
5745 MHz	5.381	Pass

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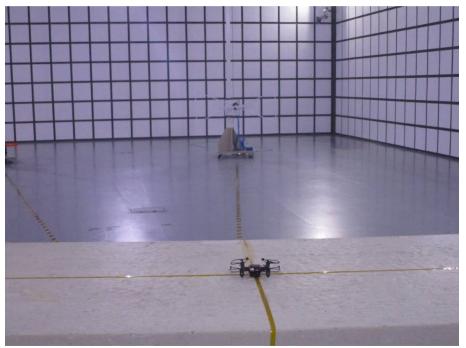


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7 Photographs - EUT Test Setup

Test model No.:T901F

7.1 Radiated Emission



7.2 Radiated Spurious Emission





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8 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1604002629CR.