Audix Technology Corp.
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FCC 15.247 & RSS-247
2.4 GHz Test Report

for

FUTABA Corporation

1080 YabutsukaChosei-son Chosei-gun, Chiba-ken, 299-4395 Japan.

Product Name	**:**	**Radio Control**
Model Name	**:**	**CGY770R2**
Brand	**:**	**Futaba**
FCC ID	**:**	**AZPCGY770R2-24G**
IC	**:**	**2914D-CGY770R2**

Prepared by: **:** **AUDIX Technology Corporation, EMC Department**

Testing Laboratory
1724

The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.

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TEST REPORT

Applicant	:	FUTABA Corporation
Manufacturer	:	FUTABA Corporation
EUT Description		
(1) Product	:	Radio Control
(2) Model	:	CGY770R2
(3) Brand	:	Futaba
(4) Power Supply	:	DC 3.7V ~ 7.4V (Battery)

Applicable Standards:

Title 47 CFR FCC Part 15 Subpart C
RSS-Gen (Issue 5), Amendment 2, February 2021
RSS-247 (Issue 3), August 2023

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.
Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2024. 10. 30

Reviewed by: Sabrina Wang (Sabrina Wang/Administrator)

Approved by: Johnny Hsueh (Johnny Hsueh/Section Manager)

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1. REVISION RECORD OF TEST REPORT

Edition No	Issued Date	Revision Summary	Report Number
0	2024. 10. 30	Original Report	EM-F240483

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2. SUMMARY OF TEST RESULTS

Rule		Description	Results
FCC	IC		
15.207	RSS-Gen §8.8	Conducted Emission	**N/A, NOTE 3**
15.247(d)/15.205	RSS-Gen §8.9 RSS-247 §5.5	Radiated Band Edge and Radiated Spurious Emission	**PASS**
15.247(a)(1)	RSS-247 §5.1(2)	20dB Bandwidth	**PASS**
15.247(a)(1)	RSS-247 §5.1(2)	Carrier Frequency Separation	**PASS**
15.247(a)(1)(iii)	RSS-247 §5.1(4)	Time of Occupancy	**PASS**
15.247(a)(1)(iii)	RSS-247 §5.1(4)	Number of Hopping Channels	**PASS**
15.247(b)(1)	RSS-247 §5.1(2)	Maximum Peak Output Power	**PASS**
15.247(b)(3)	RSS-247 §5.4(4)	Maximum Peak Output Power	**PASS**
15.247(d)	RSS-247 §5.5	Conducted Band Edges and Conducted Spurious Emission	**PASS**
15.247(f)	RSS-247 §5.3	DTS/Occupied Bandwidth	**PASS**
15.247(f)	RSS-247 §5.3	Peak Power Spectral Density	**PASS**
15.203	---	Antenna Requirement	**Compliance**

Note: 1. Decision rule according to the limit of the test standard chapter, the test value is lower than the limit specified in the test chapter, and it is judged as Pass.
2. The uncertainties value is not used in determining the result.
3. The EUT only employs battery power for operation, so it is unnecessary to test.

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3. GENERAL INFORMATION

3.1. Description of Application

Applicant	FUTABA Corporation 1080 Yabutsuka Chosei-mura Chosei-gun Chiba-ken, 299-4395 Japan.
Manufacturer	FUTABA Corporation 1080 Yabutsuka Chosei-mura Chosei-gun Chiba-ken, 299-4395 Japan.
Product	Radio Control
Model	CGY770R2
Brand	Futaba

3.2. Description of EUT

Test Model	CGY770R2
Serial Number	N/A
Software Version	N/A
Power Rating	DC 3.7V ~ 7.4V (Battery)
RF Features	FASSTest, T-FHSS
Transmit Type	1T1R
Test Sample	Sample No. / Test Item / Firmware 01 / RSE, RF Conducted / N/A
Sample Status	Trial sample
Date of Receipt	2024. 10. 08
Date of Test	2024. 10. 14 ~ 18
Interface Ports of EUT	None
Accessories Supplied	None

Note: Pursuant ISO 17025:2017 section 7.8.2, Audix Technology Corp. does not assume responsibility for all EUT's information including RF features, transmit type, antenna information…etc are provided by customer.

3.3. Description of EUT

ANSI C63.10:2013

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3.4. Description of Key Components

None

3.5. Antenna Information

Antenna Type		Manufacture	Antenna Part Number	Frequency (MHz)	Max Gain (dBi)
ANT A	1/4λ antenna	SANSEI	ANTC32-072A0	2400-2500	-5.16
ANT B	1/4λ antenna	SANSEI	ANTC32-072A0	2400-2500	-5.16

3.6. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (kbps)
FASSTest	2405.376 to 2472.960	23	Hybrid	136
T-FHSS	2407.500 to 2467.500	31	Frequency Hopping	128

Mode: FASSTest							
Channel List							
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
00	2405.376	06	2423.808	12	2442.240	18	2460.672
01	2408.448	07	2426.880	13	2445.312	19	2463.744
02	2411.520	08	2429.952	14	2448.384	20	2466.816
03	2414.592	09	2433.024	15	2451.456	21	2469.888
04	2417.664	10	2436.096	16	2454.528	22	2472.960
05	2420.736	11	2439.168	17	2457.600		

Mode: T-FHSS							
Channel List							
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
01	2407.5	09	2423.5	17	2439.5	25	2455.5
02	2409.5	10	2425.5	18	2441.5	26	2457.5
03	2411.5	11	2427.5	19	2443.5	27	2459.5
04	2413.5	12	2429.5	20	2445.5	28	2461.5
05	2415.5	13	2431.5	21	2447.5	29	2463.5
06	2417.5	14	2433.5	22	2449.5	30	2465.5
07	2419.5	15	2435.5	23	2451.5	31	2467.5
08	2421.5	16	2437.5	24	2453.5		

Note: Test modes are presented at section 3.7.

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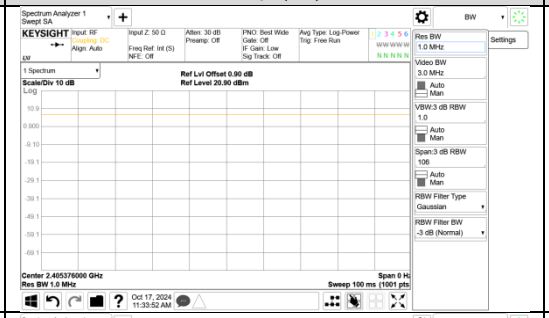
3.7. Test Configuration

Mode	TX_{on} (ms)	TX_{on+off} (ms)	$1/TX_{on}$ (kHz)	Duty Cycle (x)	Duty Cycle Factor [10log(1/x)] (dB)
FASSTest (ANT A)	N/A	N/A	N/A	1	N/A
FASSTest (ANT B)	N/A	N/A	N/A	1	N/A
T-FHSS (ANT A)	N/A	N/A	N/A	1	N/A
T-FHSS (ANT B)	N/A	N/A	N/A	1	N/A

Note: When duty cycle is less than 98% (0.98) that duty cycle factor 10log(1/x) is needed to add in conducted test items measured in average detector.

Mode	TX_{on} (ms)	$T_{on}+T_{off}$(ms)
FASSTest (ANT A)		
FASSTest (ANT B)		
T-FHSS (ANT A)		
T-FHSS (ANT B)		

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Item		Test Frequency	
Radiated Test Case	Radiated Spurious Emission (30MHz~1GHz)	FASSTest	2472.960MHz
		T-FHSS	2467.500MHz
	Radiated Band Edge Note	FASSTest	2405.376MHz
			2408.448MHz
			2469.888MHz
			2472.960MHz
		T-FHSS	2407.500MHz
			2467.500MHz
	Radiated Spurious Emission Note	FASSTest	2405.376MHz
			2439.168MHz
			2472.960MHz
		T-FHSS	2407.500MHz
			2437.500MHz
			2467.500MHz

Note:☑Mobile Device ☐Portable Device and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: ☑Lie ☐Side ☐Stand

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Item		Test Frequency	
Conducted Test Case	20dB Bandwidth	FASSTest (ANT A)	2405.376MHz
			2439.168MHz
			2472.960MHz
		FASSTest (ANT B)	2405.376MHz
			2439.168MHz
			2472.960MHz
		T-FHSS (ANT A)	2407.500MHz
			2437.500MHz
			2467.500MHz
		T-FHSS (ANT B)	2407.500MHz
			2437.500MHz
			2467.500MHz
	Carrier Frequency Separation	FASSTest (ANT A)	2405.376MHz
			2439.168MHz
			2472.960MHz
		FASSTest (ANT B)	2405.376MHz
			2439.168MHz
			2472.960MHz
		T-FHSS (ANT A)	2407.500MHz
			2437.500MHz
			2467.500MHz
		T-FHSS (ANT B)	2407.500MHz
			2437.500MHz
			2467.500MHz
	Time of Occupancy	FASSTest (ANT A)	2405.376MHz
			2439.168MHz
			2472.960MHz
		FASSTest (ANT B)	2405.376MHz
			2439.168MHz
			2472.960MHz
		T-FHSS (ANT A)	2407.500MHz
			2437.500MHz
			2467.500MHz
		T-FHSS (ANT B)	2407.500MHz
			2437.500MHz
			2467.500MHz
	Number of Hopping Channels	FASSTest (ANT A)	2439.168MHz
		FASSTest (ANT B)	2439.168MHz
		T-FHSS (ANT A)	2437.500MHz
		T-FHSS (ANT B)	2437.500MHz
	Maximum Peak Output Power	FASSTest (ANT A)	2405.376MHz
			2439.168MHz
			2472.960MHz
		FASSTest (ANT B)	2405.376MHz
			2439.168MHz
			2472.960MHz
		T-FHSS (ANT A)	2407.500MHz
			2437.500MHz
			2467.500MHz
		T-FHSS (ANT B)	2407.500MHz
			2437.500MHz
			2467.500MHz

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Item		Test Frequency	
Conducted Test Case	Band Edges	FASSTest (ANT A)	2405.376MHz
			2472.960MHz
		FASSTest (ANT B)	2405.376MHz
			2472.960MHz
		T-FHSS (ANT A)	2407.500MHz
			2467.500MHz
		T-FHSS (ANT B)	2407.500MHz
			2467.500MHz
	Spurious Emission	FASSTest (ANT A)	2405.376MHz
			2439.168MHz
			2472.960MHz
		FASSTest (ANT B)	2405.376MHz
			2439.168MHz
			2472.960MHz
		T-FHSS (ANT A)	2407.500MHz
			2437.500MHz
			2467.500MHz
		T-FHSS (ANT B)	2407.500MHz
			2437.500MHz
			2467.500MHz
	DTS/Occupied Bandwidth	FASSTest (ANT A)	2405.376MHz
			2439.168MHz
			2472.960MHz
		FASSTest (ANT B)	2405.376MHz
			2439.168MHz
			2472.960MHz
	Peak Power Spectral Density	FASSTest (ANT A)	2405.376MHz
			2439.168MHz
			2472.960MHz
		FASSTest (ANT B)	2405.376MHz
			2439.168MHz
			2472.960MHz

3.8. Output Power Setting

Mode	Centre Frequency	Power Setting
FASSTest	2405.376MHz	Default
	2439.168MHz	Default
	2472.960MHz	Default
T-FHSS	2407.500MHz	Default
	2437.500MHz	Default
	2467.500MHz	Default

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3.9. Tested Supporting System List

3.9.1. Support Peripheral Unit

No.	Product	Brand	Model No.	Serial No.	Approval
1.	Notebook PC	Acer	N22Q3	NHQGETA002255FD7600	Contains FCC ID: HLZMT7921
2.	Test Jig	Futaba	CIU-3	N/A	N/A
3.	Radio Control	Futaba	GPB-1	N/A	N/A
4.	Battery (DC 6.0V)	Futaba	HT5F1700B	N/A	N/A
5.	Servo*7	Parallax	900-00005	N/A	N/A

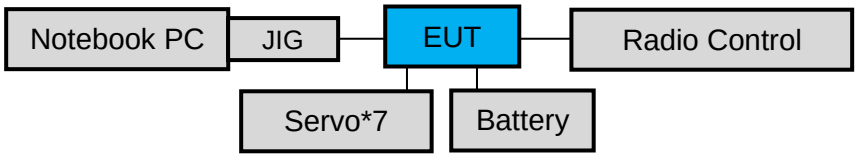
3.9.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	Adapter: LITEON, M/N PA-1900-32 DC Power Cord Shielded, Undetachable, 1.7m, Bonded a ferrite core
2.	Power Wire: Unshielded, Undetectable, 0.45m
3.	Power Wire: Unshielded, Undetectable, 0.30m
4.	Power Wire: Unshielded, Undetectable, 0.30m
5.	Power Wire: Unshielded, Undetectable, 0.45m*7

3.10. Setup Configuration

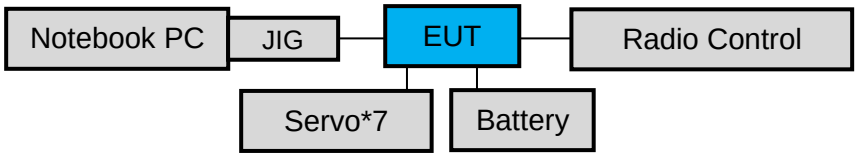
3.10.1. EUT Configuration for Radiated Emission

Maximum Workload Configuration



3.10.2. EUT Configuration for RF Conducted Test Items

Maximum Workload Configuration



3.11. Operating Condition of EUT

The GPB-1 connected to the EUT is used to enter Test Mode, and then the "Futaba Term" testing program is used to control the RF function under continued transmission and channel selection.

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3.12.Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 491, Zhongfu Rd., Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2017 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	FCC OET Designation Number under APEC MRA by NCC is : TW1724 ISED CAB Identifier Number under APEC TEL MRA by NCC is TW1724 (1) No.1 3m Semi Anechoic Chamber

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3.13.Measurement Uncertainty

The measurement uncertainty levels have been estimated as specified in ETSI TR 100 028-2001

Test Items/Facilities			Frequency Range	Uncertainty
Conduction Test	☐	No. 7 Shielded Room	9kHz-150kHz	±3.6dB
			150kHz-30MHz	±3.3dB
	☐	No. 8 Shielded Room	9kHz-150kHz	±3.7dB
			150kHz-30MHz	±3.4dB
Radiation Test	☑	No.1 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.8dB
			200MHz-1000MHz, 3m, Horizontal	±4.2dB
			30MHz-200MHz, 3m, Vertical	±4.7dB
			200MHz-1000MHz, 3m, Vertical	±4.8dB
			1GHz-6GHz, 3m	±4.8dB
			6GHz-18GHz, 3m	±4.3dB
	☐	No.3 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.9dB
			200MHz-1000MHz, 3m, Horizontal	±4.2dB
			30MHz-200MHz, 3m, Vertical	±4.7dB
			200MHz-1000MHz, 3m, Vertical	±4.8dB
			1GHz-6GHz, 3m	±4.5dB
			6GHz-18GHz, 3m	±4.0dB
	☐	No.4 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.9dB
			200MHz-1000MHz, 3m, Horizontal	±4.3dB
			30MHz-200MHz, 3m, Vertical	±4.8dB
			200MHz-1000MHz, 3m, Vertical	±4.9dB
			1GHz-6GHz, 3m	±4.2dB
			6GHz-18GHz, 3m	±3.8dB
	☐	No.5 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.9dB
			200MHz-1000MHz, 3m, Horizontal	±4.1dB
			30MHz-200MHz, 3m, Vertical	±4.8dB
			200MHz-1000MHz, 3m, Vertical	±4.7dB
			1GHz-6GHz, 3m	±4.8dB
			6GHz-18GHz, 3m	±4.6dB
	Radiated emissions (18GHz-40GHz)		18GHz-40GHz, 3m	±3.4dB

Remark：Uncertainty = $ku_c(y)$

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Test Item	Uncertainty
20dB Bandwidth	±0.2kHz
6dB Bandwidth	± 0.05kHz
99% Occupied Bandwidth	±0.38%
Carrier Frequency Separation	±0.2kHz
Time of Occupancy	±0.03sec
Maximum peak Output power	± 0.52dB
Conducted Emission Limitations	± 0.13dB
Power spectral density	± 0.13dB

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4. MEASUREMENT EQUIPMENTLIST

4.1. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2024.08.12	1 Year
2.	Spectrum Analyzer	Keysight	N9010B-544	MY55460198	2024.03.21	1 Year
3.	Test Receiver	R&S	ESCS30	100338	2024.06.18	1 Year
4.	Amplifier	HP	8447D	2944A06305	2023.12.20	1 Year
5.	Microwave Preamplifier	HP	8449B	3008A01284	2024.06.11	1 Year
6.	Microwave Amplifier	Keysight	83051A	MY56480113	2024.09.11	1 Year
7.	Bilog Antenna	TESEQ	CBL6112D	33821	2024.02.17	1 Year
8.	Double-Ridged Waveguide Horn	EMCO	3115	9112-3775	2024.04.30	1 Year
9.	Horn Antenna	COM-POWER	AH-840	101092	2024.01.12	1 Year
10.	2.4GHz Notch Filter	K&L Microwave	7NSL10-2441.5/ E130.5-O/O	2	2024.04.11	1 Year
11.	High-Pass Filter	Microwave	H3G018G1	484796	2024.04.11	1 Year
12.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2024.01.05	1 Year
13.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 106	RE-14	2024.01.05	1 Year
14.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	RE-30	2024.08.20	1 Year
15.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2024.04.11	1 Year
16.	Test Software	Audix	e3	V9 18621a	N.C.R.	N.C.R.

4.2. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9010B	MY59071380	2024.03.29	1 Year
2.	Digital Thermo-Hygro Meter	iMax	HTC-1	RF-03	2024.04.11	1 Year

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5. CONDUCTED EMISSION

【The EUT only employs uses DC power for operation, no conductive emission limits are required according to FCC Part 15 Section §15.207 and RSS-Gen §8.8】

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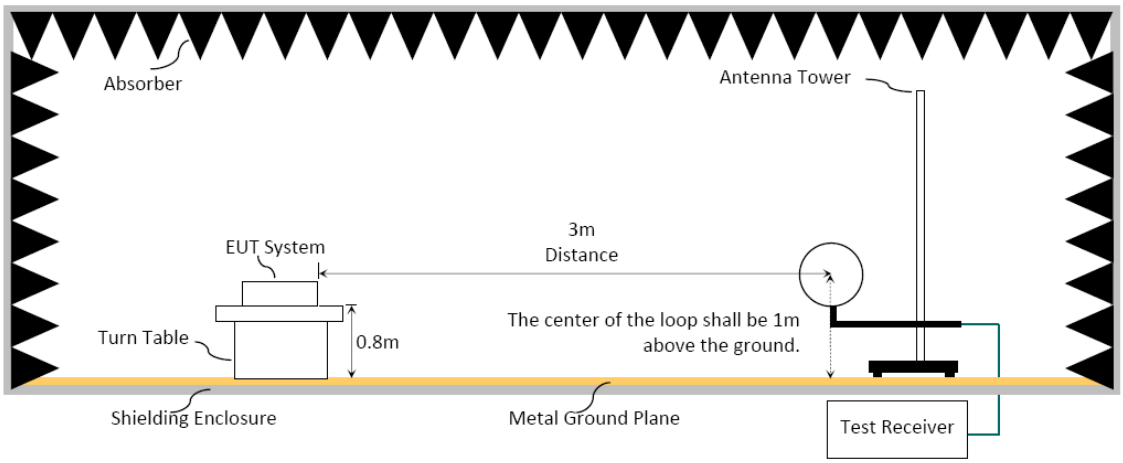
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

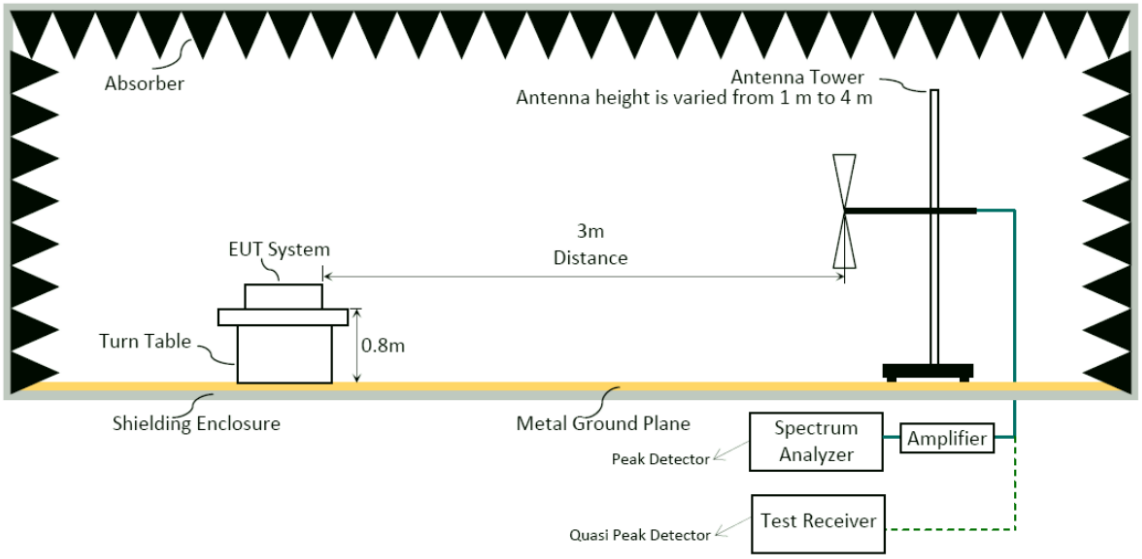
6.1.1. Block Diagram of EUT

Indicated as section 3.10

6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000MHz



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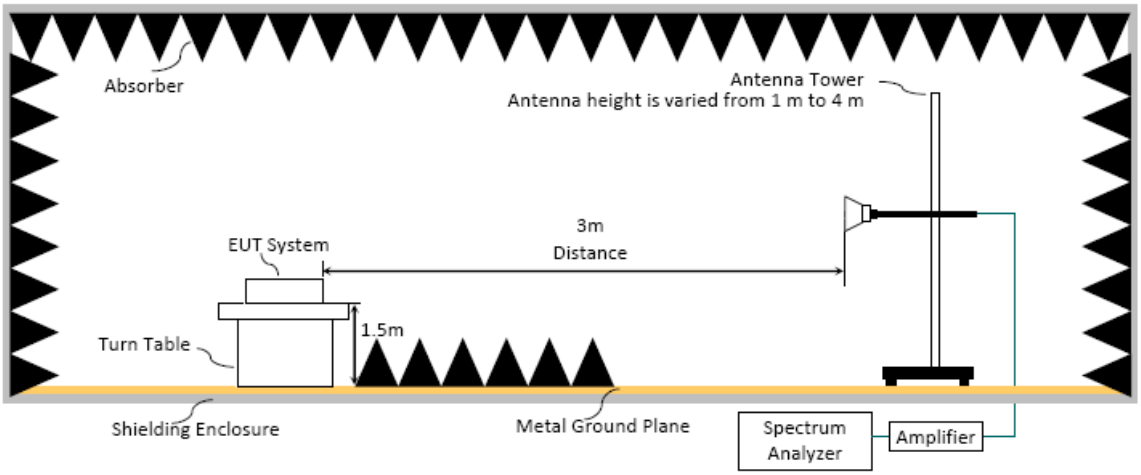
6.1.4. Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205/ RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance(m)	Limits	
		dBμV/m	μV/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dBμV/m (Peak) 54.0 dBμV/m (Average)	

Remark：(1) dBμV/m = 20 log (μV/m)
(2) The tighter limit applies to the edge between two frequency bands.
(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
(4) Fundamental and emission fall within operation band are exempted from this section.
(5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

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6.3. Test Procedure

Frequency Range 9kHz~30MHz:
The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level.
In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

(1) RBW = 9kHz with peak and average detector.

(2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 25GHz:
The EUT setup on the turn table which has 80cm (for 30-1000MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1GHz:
Spectrum Analyzer is used for pre-testing with following setting:

(1)RBW = 120KHz

(2)VBW ≥ 3 x RBW.

(3)Detector = Peak.

(4)Sweep time = auto.

(5)Trace mode = max hold.

(6)Allow sweeps to continue until the trace stabilizes.

Note 1: When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Note 2: When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

Frequency above 1GHz to 10th harmonic(up to 25 GHz):
Peak Detector:

(1)RBW = 1MHz

(2)VBW ≥ 3 x RBW.

(3)Detector = Peak.

(4)Sweep time = auto.

(5)Trace mode = max hold.

(6)Allow sweeps to continue until the trace stabilizes.

Note: When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

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Average Detector:

■**Option 1:**

(1)RBW = 1MHz

(2)VBW ≥ 1/ T. (Duty Cycle < 98%)

(3)VBW = 10Hz (Duty Cycle ≥ 98%, when duty cycle presented in section 3.7)

Modulation Type	VBW Setting (VBW ≥ 1/ T)
T-FHSS	10 Hz

(4)Detector = Peak.

(5)Sweep time = auto.

(6)Trace mode = max hold.

(7)Allow sweeps to continue until the trace stabilizes.

□**Option 2:**

Average Emission Level= Peak Emission Level+ D.C.C.F.

6.4. Measurement Result Explanation

■Peak Emission Level(dBμV/m)=Antenna Factor(dB/m) + Cable Loss (dB)– Preamp Gain (dB)+ Reading(dBμV).

□Average Emission Level(dBμV/m)= Antenna Factor(dB/m) + Cable Loss (dB)– Preamp Gain (dB)+ Reading(dBμV).

■Average Emission Level(dBμV/m)= Peak Emission Level(dBμV/m)+ DCCF(dB)
Duty Cycle Correction Factor (DCCF)(dB)= 20log(TX_{on}/TX_{on+off}) presented in section 3.7.

□ERP(dBm)= Peak Emission Level(dBμV/m) -95.2dB-2.14dB

6.5. Test Results

Please refer to Appendix A.

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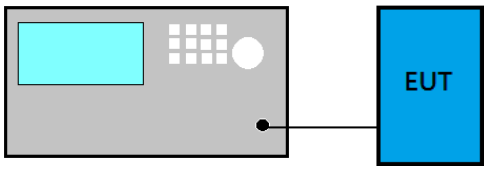
7. 20dB/OCCUPIED BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

7.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

For 20dB Bandwidth

(1) Set Span range 2~5 times the OBW
(2) Set VBW≥3xRBW.
(3) Detector = Peak.
(4) Trace mode = Max hold.
(5) Sweep = Auto couple.
(6) Allow the trace to stabilize.
(7) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

For 99% Occupied Bandwidth

(8) Set Span range 1.5~5 times the OBW
(9) Set RBW close to1% to 5% of OBW.
(10) Set VBW≥3xRBW.
(11) Detector = Peak.
(12) Trace mode = Max hold
(13) Sweep = Auto couple.
(14) Allow the trace to stabilize.

7.4. Test Results

Please refer to Appendix A

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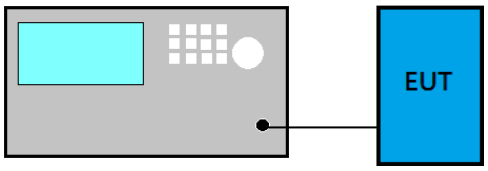
8. CARRIER FREQUENCY SEPARATION

8.1. Block Diagram of Test Setup



8.2. Specification Limits

Alternatively, frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output no greater than 125mW.

8.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

(1) Span = Wide enough to capture the peaks of two adjacent channels
(2) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
(3) VBW≥ RBW
(4) Sweep = Auto
(5) Detector function = Peak
(6) Trace = Max hold
(7) Allow the trace to stabilize.

8.4. Test Results

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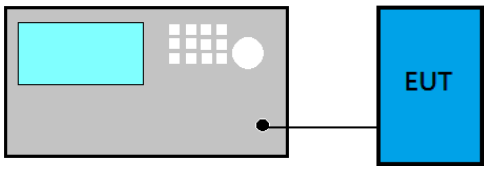
9. TIME OF OCCUPANCY

9.1. Block Diagram of Test Setup



9.2. Specification Limits

Frequency hopping systems in the 2400-2483.5MHz shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by number of hopping channels employed.

9.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

(1) Span: Zero span, centered on a hopping channel.
(2) RBW shall be ≤ channel spacing and where possible RBW should be set >> 1/T, where T is the expected dwell time per channel.
(3) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
(4) Detector function = Peak
(5) Trace = Max hold

9.4. Test Results

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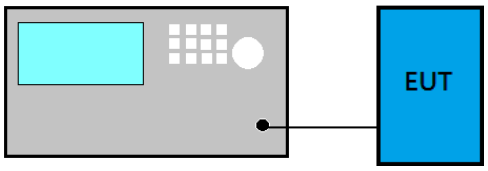
10. NUMBER OF HOPPING CHANNELS

10.1. Block Diagram of Test Setup



10.2. Specification Limits

Frequency hopping systems which use fewer than 20 hopping frequencies may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels.

10.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

(1) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
(2) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
(3) VBW ≥ RBW
(4) Sweep = Auto
(5) Detector function = Peak
(6) Trace = m=Max hold
(7) Allow the trace to stabilize.

10.4. Test Results

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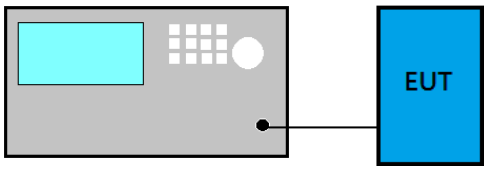
11. MAXIMUM PEAK OUTPUT POWER

11.1. Block Diagram of Test Setup



11.2. Specification Limits

The Limits of maximum Peak Output Power for frequency hopping systems in 2400-2483.5MHz is: 0.125Watt. (21dBm)

11.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

(a) Use the following spectrum analyzer settings

(1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
(2) RBW > 20 dB bandwidth of the emission being measured.
(3) VBW ≥ RBW
(4) Sweep: Auto
(5) Detector function: Peak
(6) Trace: Max hold

(b) Allow trace to stabilize.

(c) Use the marker-to-peak function to set the marker to the peak of the emission.

11.4. Test Results

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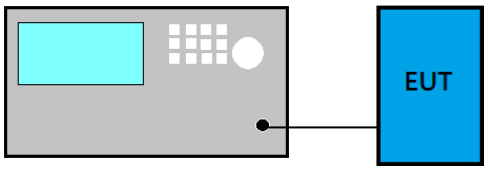
12. EMISSION LIMITATIONS

12.1. Block Diagram of Test Setup



12.2. Specification Limits

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, that the required attenuation shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in Section 15.209(a)/ RSS-Gen Section 8.9 table 4 is not required. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205(a)/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified in Section 15.209(a)/RSS-Gen Section 8.9 table 4. (See Section 15.205(c)).

12.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

(1) Set span wide enough to capture the peak level of the in-band emission and all spurious emissions; up to 10^{th} harmonic.
(2) RBW = 100 kHz
(3) VBW ≥ RBW
(4) Sweep = Auto
(5) Detector function = Peak
(6) Trace = Max hold

12.4. Test Results

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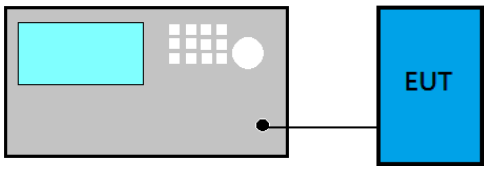
13. DTS/OCCUPIED BANDWIDTH

13.1. Block Diagram of Test Setup



13.2. Specification Limits

The minimum bandwidth shall be at least 500kHz.

13.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

For DTS Bandwidth

(1) Set RBW = 100 kHz.
(2) Set the video bandwidth (VBW) ≥ 3 × RBW.
(3) Detector = Peak.
(4) Trace mode = max hold.
(5) Sweep = auto couple.
(6) Allow the trace to stabilize.
(7) Setting channel bandwidth function x to -6dB power to record the final bandwidth..

For 99% Occupied Bandwidth

(15) Set Span range 1.5~5 times the OBW
(16) Set RBW close to1% to 5% of OBW.
(17) Set VBW≥3xRBW.
(18) Detector = Peak.
(19) Trace mode = Max hold
(20) Sweep = Auto couple.
(21) Allow the trace to stabilize.

13.4. Test Results

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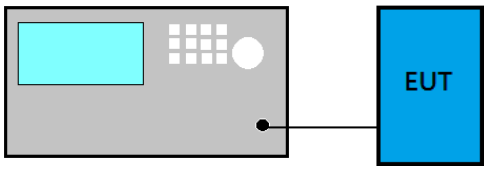
14. POWER SPECTRAL DENSITY

14.1. Block Diagram of Test Setup



14.2. Specification Limits

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band.

14.3. Test Procedure

Following measurement procedure is reference to ANSI C63.10:2013:

■Method PKPSD (peak PSD)

(1) Set analyzer center frequency to DTS channel center frequency.
(2) Set the span to 1.5 times the DTS bandwidth.
(3) Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
(4) Set the VBW ≥ 3 × RBW.
(5) Detector = peak.
(6) Sweep time = auto couple.
(7) Trace mode = max hold.
(8) Allow trace to fully stabilize.
(9) Use the peak marker function to determine the maximum amplitude level.
(10) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

□Method AVGPSD-2

(1) Using peak PSD procedure step 1 to step 4.
(2) Detector= RMS detector
(3) Sweep time = auto couple
(4) Trace mode = trace averaging over a minimum of 100 traces
(5) Use the peak marker function to determine the maximum amplitude level.
(6) Duty cycle factor is added when duty cycle presented in section 3.7< 98%.
(7) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

14.4. Test Results

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15. DEVIATION TO TEST SPECIFICATIONS

【NONE】

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APPENDIX A

TEST DATA AND PLOTS

(Model: CGY770R2)

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APPENDIX B

TEST PHOTOGRAPHS

(Model: CGY770R2)

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