

FCC 15.247 & RSS-247 2.4GHz Test Report

for

FUTABA Corporation

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

Product Name : RECEIVER
Model Name : (1)R7214SB (2)R7314SB
Brand Futaba
FCC ID : AZPR7214SB-24G
IC : 2914D-R7214SB

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



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 : RECEIVER
(2) Model : (1)R7214SB (2)R7314SB
(3) Brand : Futaba
(4) Power Supply: DC 3.5 ~ DC 8.4V

Applicable Standards:

Title 47 CFR FCC Part 15 Subpart C
RSS-Gen (Issue 5), Amendment 2, February 2021
RSS-247 (Issue 2), February 2017

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.

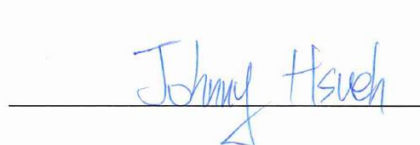
Date of Report: 2023. 06. 07

Reviewed by:



(Annie Yu/Administrator)

Approved by:



(Johnny Hsueh/Section Manager)

1. REVISION RECORD OF TEST REPORT

Edition No	Issued Date	Revision Summary	Report Number
0	2023. 06. 07	Original Report	EM-F230300

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)(2)	RSS-247 §5.2(1)	DTS/Occupied Bandwidth	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 (e)	RSS-247 §5.2(2)	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.

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	RECEIVER							
Model	(1)R7214SB (2)R7314SB The difference between models is as following. The models R7214SB and R7314SB were tested in this report.							
	<table border="1"> <thead> <tr> <th>Difference Model</th> <th>Antenna</th> </tr> </thead> <tbody> <tr> <td>R7214SB</td> <td>HIROSE ELECTRIC CO., LTD, U.FL-LP-068N1T-21-(120)D, Type: 1/4λ mono pole antenna, Antenna Gain: -5.16dBi</td> </tr> <tr> <td>R7314SB</td> <td>SANSEI ELECTRIC CO., LTD, ANTB24-104A0, Type: 1/2λ sleeve antenna, Antenna Gain: 2.10dBi</td> </tr> </tbody> </table>		Difference Model	Antenna	R7214SB	HIROSE ELECTRIC CO., LTD, U.FL-LP-068N1T-21-(120)D, Type: 1/4λ mono pole antenna, Antenna Gain: -5.16dBi	R7314SB	SANSEI ELECTRIC CO., LTD, ANTB24-104A0, Type: 1/2λ sleeve antenna, Antenna Gain: 2.10dBi
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R7314SB	SANSEI ELECTRIC CO., LTD, ANTB24-104A0, Type: 1/2λ sleeve antenna, Antenna Gain: 2.10dBi							
Brand	Futaba							

3.2. Description of EUT

Test Model	(1)R7214SB (2)R7314SB											
Serial Number	N/A											
Power Rating	DC 3.5 ~ DC 8.4V											
Software Version	N/A											
RF Features	FASSTest											
Transmit Type	1T1R											
Test Sample	<table border="1"><thead><tr><th>Sample No.</th><th>Test Item</th><th>Firmware</th></tr></thead><tbody><tr><td>01 (Model: R7214SB)</td><td>RSE</td><td>N/A</td></tr><tr><td>01 (Model: R7314SB)</td><td>RSE, RF Conducted</td><td>N/A</td></tr></tbody></table>	Sample No.	Test Item	Firmware	01 (Model: R7214SB)	RSE	N/A	01 (Model: R7314SB)	RSE, RF Conducted	N/A		
	Sample No.	Test Item	Firmware									
	01 (Model: R7214SB)	RSE	N/A									
01 (Model: R7314SB)	RSE, RF Conducted	N/A										
Sample Status	Trial sample											
Date of Receipt	2023. 05. 04											
Date of Test	2023. 05. 26 ~ 29											
Interface Ports of EUT	None											
Accessories Supplied	None											

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. Reference Test Guidance

ANSI C63.10:2013

3.4. Antenna Information

For Mode R7214SB						
No.	Antenna Type		Manufacture	Antenna Part Number	Frequency (MHz)	Max Gain (dBi)
1.	ANT A	1/4λ mono pole antenna	HIROSE ELECTRIC CO., LTD	U.FL-LP-068N 1T-21-(120)D	2400 - 2500	-5.16
	ANT B	1/4λ mono pole antenna	HIROSE ELECTRIC CO., LTD	U.FL-LP-068N 1T-21-(120)D	2400 - 2500	-5.16

For Mode R7314SB						
No.	Antenna Type		Manufacture	Antenna Part Number	Frequency (MHz)	Max Gain (dBi)
1.	ANT A	1/2λ sleeve antenna	SANSEI ELECTRIC CO., LTD	ANTB24-104 A0	2400 - 2500	2.10
	ANT B	1/2λ sleeve antenna	SANSEI ELECTRIC CO., LTD	ANTB24-104 A0	2400 - 2500	2.10

3.5. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (kbps)
FASSTest	2405.376 - 2472.960	23	DSSS	136

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		

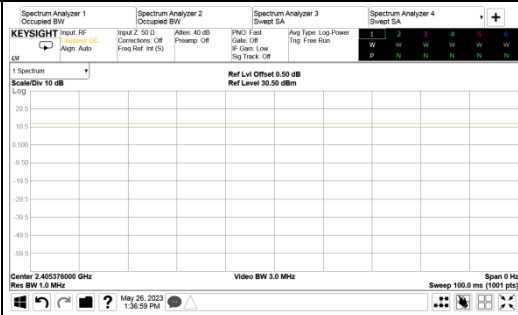
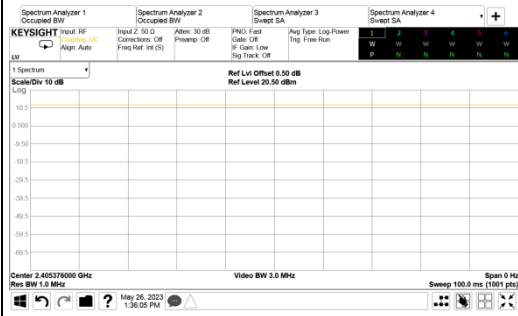
3.6. Descriptions of Key Components

None

3.7. Test Configuration

Mode	TX _{on} (ms)	TX _{on+off} (ms)	Duty Cycle (x)	Duty Cycle Factor [10log(1/x)] (dB)
FASSTest (ANT A)	1.000	1.000	1.000	N/A
FASSTest (ANT B)	1.000	1.000	1.000	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)		---

Item		Mode	ANT Port	Test Channel
Radiated Test Case	Radiated Spurious Emission (30MHz~1GHz)	FASSTest	ANT A	72
			ANT B	72

Item		Mode	Test Model	Test Channel
Radiated Test Case	Radiated Band Edge ^{Note}	FASSTest	ANT A	0/22
			ANT B	0/22
	Radiated Spurious Emission ^{Note}	FASSTest	ANT A	0/11/22
			ANT B	0/11/22

Item		Mode	ANT Port	Test Channel
Conducted Test Case ^{Note 3}	DTS/Occupied Bandwidth	FASSTest	ANT A	00/11/22
			ANT B	00/11/22
	Peak Output Power	FASSTest	ANT A	00/11/22
			ANT B	00/11/22
	Band Edge	FASSTest	ANT A	00/22
			ANT B	00/22
	Spurious Emission	FASSTest	ANT A	00/11/22
			ANT B	00/11/22
	Peak Power Spectral Density	FASSTest	ANT A	00/11/22
			ANT B	00/11/22

- Note 1: Mobile Device Portable Device
 and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow:
 Lie Side Stand
- Note 2: Low, mid, and high channels were measured, only the worst channel of each modulation was presented in this report.
- Note 3: Both of models have identical RF mechanism. The difference is used antenna, so we presented conducted test case with model R7314SB.

3.8. Output Power Setting

Mode	Centre Frequency (MHz)	Power Setting
FASSTest	2405.376	Default
	2439.168	Default
	2472.960	Default

3.9. Tested Supporting System List

3.9.1. Support Peripheral Unit

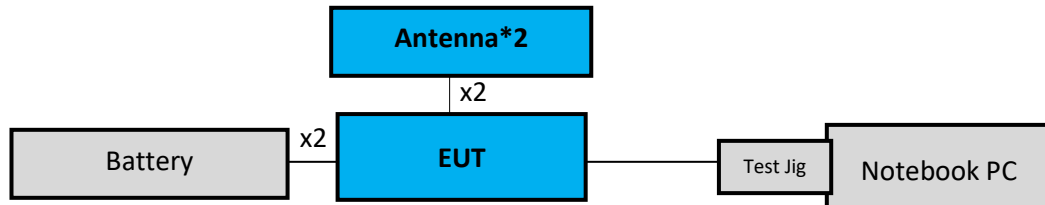
No.	Product	Brand	Model No.	Serial No.	Approval
1.	Notebook PC (Radiated Emission Test Used)	hp	TPN-Q189	5CD8175992	Contains FCC ID: PD93168NG Contains IC: 1000M-3168NG
	Notebook PC (RF Conducted Test Used)	Dynabook	CS40L-HB	51144042H	N/A
2.	Test Jig	Futaba	CIU-3	N/A	N/A
3.	Battery (DC 6.0V)	Futaba	HT5F1800B	N/A	N/A

3.9.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	Adapter: hp, M/N PPP-012C-S DC Cord : Shielded, Undetachable, 1.8m, Bonded a ferrite core AC Power Cord : Unshielded, Detachable, 1.0m
	Adapter: BSY, M/N BSY065T1902103 D, DC Cord : Shielded, Undetachable, 1.8m, Bonded a ferrite core AC Power Cord : Unshielded, Detachable, 1.5m
2.	Signal Cable: Unshielded, Detachable, 0.62m
3.	Power Wire: Unshielded, Detachable, 0.08m*2

3.10. Setup Configuration

3.10.1. EUT Configuration for Power Line & Radiated Emission



3.10.2. EUT Configuration for RF Conducted Test Items



3.11. Operating Condition of EUT

Test program “Futaba Term” is used for enabling EUT RF function under continue transmitting and choosing channel.

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

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	<input type="checkbox"/>	No. 7 Shielded Room	9kHz-150kHz	±3.7dB
			150kHz-30MHz	±3.4dB
	<input type="checkbox"/>	No. 8 Shielded Room	9kHz-150kHz	±3.7dB
			150kHz-30MHz	±3.5dB
Radiation Test	<input checked="" type="checkbox"/>	No.1 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±3.6dB
			200MHz-1000MHz, 3m, Horizontal	±4.3dB
			30MHz-200MHz, 3m, Vertical	±4.4dB
			200MHz-1000MHz, 3m, Vertical	±4.8dB
			1GHz-6GHz, 3m	±4.8dB
			6GHz-18GHz, 3m	±4.5dB
	<input type="checkbox"/>	No.3 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.0dB
			200MHz-1000MHz, 3m, Horizontal	±4.4dB
			30MHz-200MHz, 3m, Vertical	±4.7dB
			200MHz-1000MHz, 3m, Vertical	±4.5dB
			1GHz-6GHz, 3m	±4.8dB
			6GHz-18GHz, 3m	±4.5dB
	<input type="checkbox"/>	No.4 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.3dB
			200MHz-1000MHz, 3m, Horizontal	±4.2dB
			30MHz-200MHz, 3m, Vertical	±4.8dB
			200MHz-1000MHz, 3m, Vertical	±4.7dB
			1GHz-6GHz, 3m	±4.6dB
			6GHz-18GHz, 3m	±4.4dB
	<input type="checkbox"/>	No.5 3m Semi Anechoic Chamber	30MHz-200MHz, 3m, Horizontal	±4.6dB
			200MHz-1000MHz, 3m, Horizontal	±4.4dB
			30MHz-200MHz, 3m, Vertical	±4.5dB
			200MHz-1000MHz, 3m, Vertical	±4.9dB
			1GHz-6GHz, 3m	±4.9dB
			6GHz-18GHz, 3m	±4.6dB
	Radiated emissions (18GHz-40GHz)		18GHz-40GHz, 3m	±3.4dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
Bandwidth	$\pm 0.05\text{kHz}$
Maximum peak output power	$\pm 0.33\text{dB}$
Power spectral density	$\pm 0.13\text{dB}$
Conducted Emission Limitations	$\pm 0.13\text{dB}$

4. MEASUREMENT EQUIPMENT LIST

4.1. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2022.08.24	1 Year
2.	Spectrum Analyzer	Keysight	N9010B-544	MY55460198	2023.03.29	1 Year
3.	Test Receiver	R&S	ESCS30	100338	2022.06.15	1 Year
4.	Amplifier	HP	8447D	2944A06305	2022.12.29	1 Year
5.	Microwave Preamplifier	Agilent	8449B	3008A02678	2023.02.17	1 Year
6.	Microwave Amplifier	Keysight	83051A	MY56480113	2022.09.07	1 Year
7.	Bilog Antenna	TESEQ	CBL6112D	33821	2022.07.01	1 Year
8.	Double-Ridged Waveguide Horn	EMCO	3115	9609-4927	2022.07.13	1 Year
9.	Horn Antenna	COM-POWER	AH-840	101092	2022.12.30	1 Year
10.	2.4GHz Notch Filter	K&L Microwave	7NSL10-2441.5/E130.5-O/O	2	2022.07.23	1 Year
11.	High-Pass Filter	Microwave	H3G018G1	484796	2022.07.23	1 Year
12.	Coaxial Cable	MIYAZAKI	5D2W	RE-11	2023.01.07	1 Year
13.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 106	RE-14	2023.01.07	1 Year
14.	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	RE-30	2022.08.22	1 Year
15.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2023.04.13	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	N9030B	MY61330403	2022.12.16	1 Year
2.	Digital Thermo-Hygro Meter	iMax	HTC-1	RF-03	2023.04.13	1 Year

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】

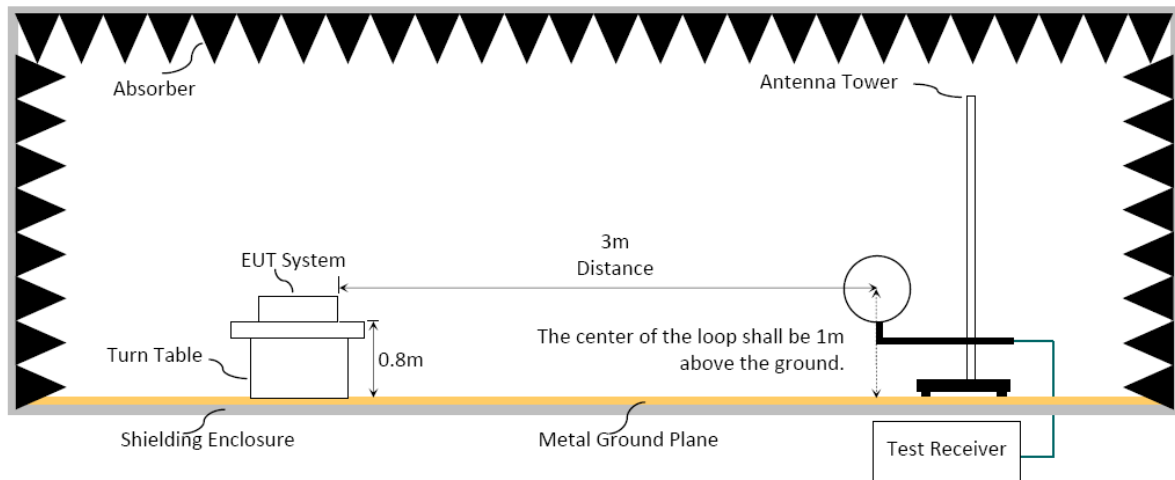
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

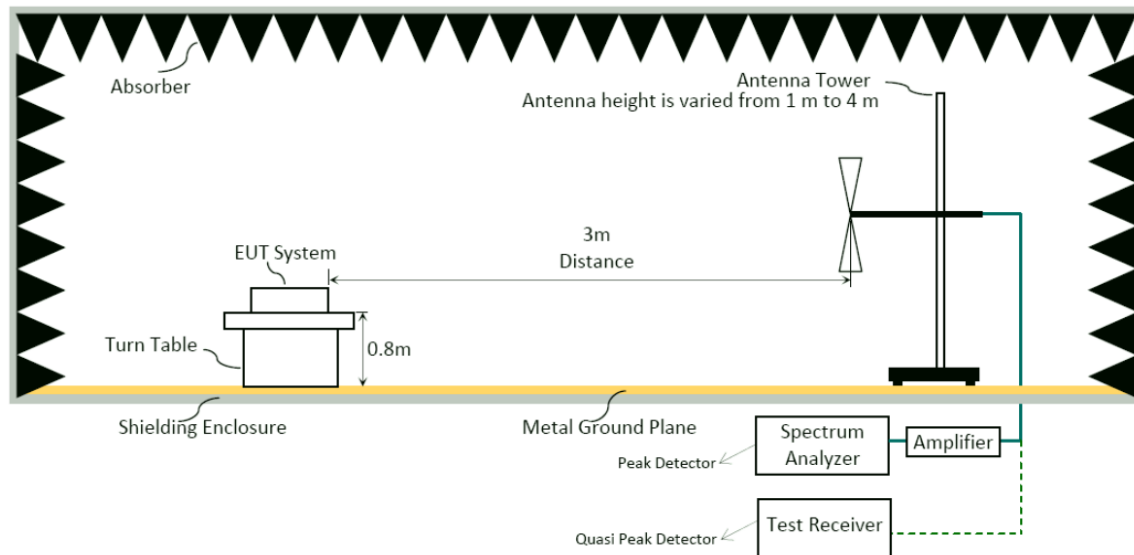
6.1.1. Block Diagram of EUT

Indicated as section 3.10

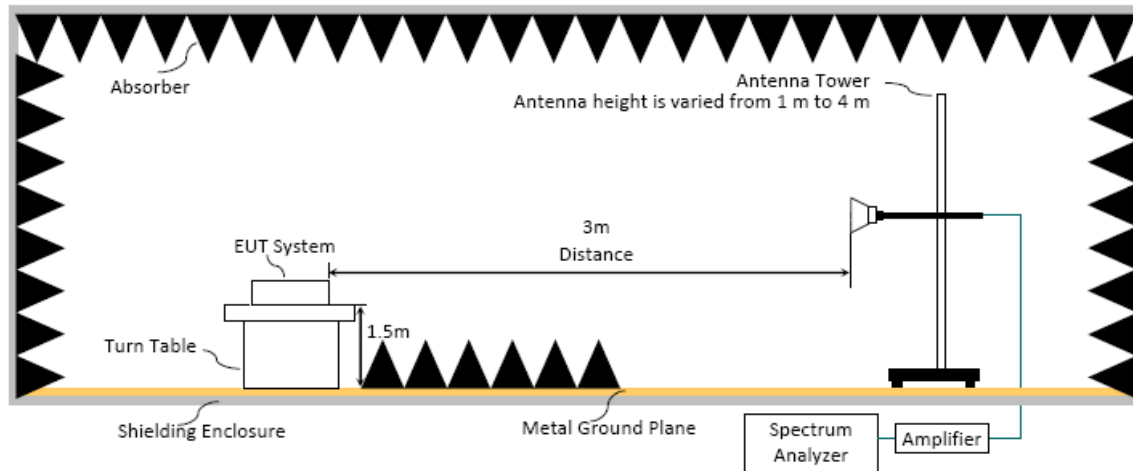
6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000MHz



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	
		dB μ V/m	μ V/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 dB μ V/m (Peak) 54.0 dB μ V/m (Average)	

Remark : (1) dB μ V/m = 20 log (μ V/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.

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 $\geq 3 \times$ 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 $\geq 3 \times$ 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.

Average Detector:**■ Option 1:**

(1) RBW = 1MHz

(2) VBW $\geq 1/T$. (Duty Cycle < 98%)(3) VBW = 10Hz (Duty Cycle $\geq 98\%$, when duty cycle presented in section 3.7)

Modulation Type	VBW Setting
FASSTest	10Hz

(4) Detector = Peak.

(5) Sweep time = auto.

(6) Trace mode = max hold.

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

□ Option 2:

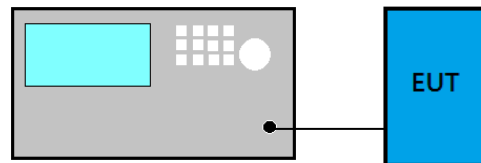
Average Emission Level = Peak Emission Level + D.C.C.F.

6.4. Measurement Result Explanation**■** Peak Emission Level (dB μ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) + Reading (dB μ V).**■** Average Emission Level (dB μ V/m) = Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) + Reading (dB μ V).**□** Average Emission Level (dB μ V/m) = Peak Emission Level (dB μ V/m) + DCCF (dB)
Duty Cycle Correction Factor (DCCF) (dB) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.7.**□** ERP (dBm) = Peak Emission Level (dB μ V/m) - 95.2dB - 2.14dB**6.5. Test Results**

Please refer to Appendix A.

7. DTS/OCCUPIED BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

The minimum bandwidth shall be at least 500kHz.

7.3. 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) $\geq 3 \times$ 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

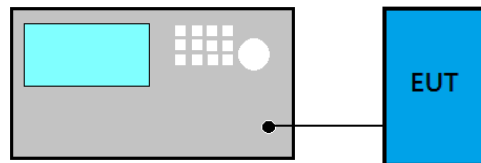
- (1) Set Span range 1.5~5 times the OBW
- (2) Set RBW close to 1% to 5% of OBW.
- (3) Set $VBW \geq 3 \times RBW$.
- (4) Detector = Peak.
- (5) Trace mode = Max hold
- (6) Sweep = Auto couple.
- (7) Allow the trace to stabilize.

7.4. Test Results

Please refer to Appendix A

8. MAXIMUM PEAK OUTPUT POWER

8.1. Block Diagram of Test Setup



8.2. Specification Limits

The Limits of maximum Peak Output Power for digital modulation in 2400-2483.5MHz is : 1Watt. (30dBm), and E.I.R.P.: 4Watt (36dBm)

8.3. Test Procedure

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

PKPM1 Peak power meter method:

EUT is connected to power sensor and record the maximum output power.

Maximum peak conducted output power method:

- (1) Set the RBW \geq DTS bandwidth
- (2) Set VBW $\geq 3 \times$ RBW
- (3) Set span $\geq 3 \times$ RBW.
- (4) Sweep time = auto couple
- (5) Detector = peak.
- (6) Trace mode = max hold.
- (7) Allow trace to fully stabilize.
- (8) Use peak marker function to determine the peak amplitude level.

Method AVGPM (Measurement using an RF average power meter):

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is $< 98\%$.

Method AVGSA-2 (Spectrum channel power)

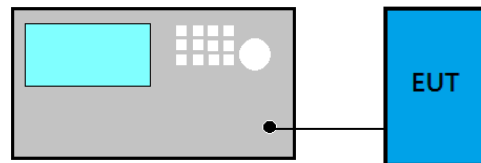
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 -5% of OBW
- (3) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
- (8) Duty cycle factor is added when duty cycle presented in section 3.7 is $< 98\%$.

8.4. Test Results

Please refer to Appendix A

9. EMISSION LIMITATIONS

9.1. Block Diagram of Test Setup



9.2. 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)).

9.3. Test Procedure

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

■ Reference Level

- (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: 100 kHz.
- (4) Set the VBW $\geq 3 \times$ RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize to find the max PSD as reference level.

■ Emission Level Measurement

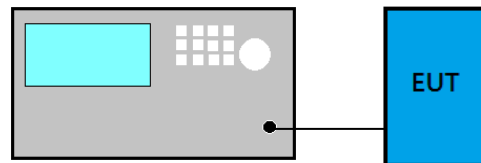
- (1) Set analyzer center frequency to DTS channel center frequency.
- (2) Set the span to 1.5 times the DTS bandwidth.
- (3) Set the RBW to: 100 kHz.
- (4) Set the VBW $\geq 3 \times$ RBW.
- (5) Detector = peak.
- (6) Sweep time = auto couple.
- (7) Trace mode = max hold.
- (8) Allow trace to fully stabilize to find the max level.

9.4. Test Results

Please refer to Appendix A

10. POWER SPECTRAL DENSITY

10.1. Block Diagram of Test Setup



10.2. 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.

10.3. 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: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- (4) Set the VBW $\geq 3 \times \text{RBW}$.
- (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.

10.4. Test Results

Please refer to Appendix A

11.DEVIATION TO TEST SPECIFICATIONS

【NONE】



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APPDNDIX A

TEST DATA AND PLOTS

(Model: (1)R7214SB (2)R7314SB)



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APPDNDIX B

TEST PHOTOGRAPHS

(Model: (1)R7214SB (2)R7314SB)