TEST REPORT

Product Name:	Card Reader
FCC ID:	2AHCR-ACRCRP12
Trademark:	Akuvox
Model Number:	ACR-CRP12
Prepared For:	AKUVOX (XIAMEN) NETWORKS CO., LTD.
Address:	10/F, No.56 Guanri Road, Software Park II, Xiamen 361009, China
Manufacturer:	AKUVOX (XIAMEN) NETWORKS CO., LTD.
Address:	10/F, No.56 Guanri Road, Software Park II, Xiamen 361009, China
Prepared By:	Shenzhen CTB Testing Technology Co., Ltd.
Address:	1&2/F., Building A, No.26, Xinhe Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	Apr. 17, 2025
Sample tested Date:	Apr. 17, 2025 to May. 09, 2025
Issue Date:	May. 09, 2025
Report No.:	CTB25041702404RF02
Test Standards	FCC CFR Title 47 Part 15 Subpart C Section 15.247 ANSI C63.10:2013
Test Results	PASS
Remark:	This is RFID radio test report.

Compiled by:	Reviewed by:	Approved by:
Zhou Kui	Arron Liu	Bin Mei
Zhou Kui	Arron Liu	Bin Mei / Director

Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client. "*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope.

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(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
CTB25041702404RF02	May. 09, 2025	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

Test Item	Test Requirement	Test method	Result
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	PASS
Radiated Spurious emissions	47 CFR Part 15 Subpart C Section 15.205/15.209/15.247(d)	ANSI C63.10-2013	PASS
Band edge and RF Conducted Spurious Emissions	47 CFR Part 15 Subpart C Section 15.247(d)/15.205(a)	ANSI C63.10-2013	PASS
Conducted Peak Output Power	47 CFR Part 15 Subpart C Section 15.247 (b)(2)	ANSI C63.10-2013	PASS
20dB Occupied Bandwidth	47 CFR Part 15 Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
Carrier Frequencies Separation	47 CFR Part 15 Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
Hopping Channel Number	47 CFR Part 15 Subpart C Section 15.247 (b)	ANSI C63.10-2013	PASS
Dwell Time	47 CFR Part 15 Subpart C Section 15.247 (a)(1)	ANSI C63.10-2013	PASS
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS

Remark:
Test according to ANSI C63.10-2013.

3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Item	Uncertainty
Occupancy bandwidth	U=±54.3Hz
Conducted output power Above 1G	U=±1.0dB
Conducted output power below 1G	U=±0.9dB
Power Spectral Density , Conduction	U=±1.0dB
Conduction spurious emissions	U=±2.8dB
Out of band emission	U=±54Hz
3m camber Radiated spurious emission(30MHz-1GHz)	U=±4.3dB
3m chamber Radiated spurious emission(1GHz-18GHz)	U=±4.5dB
humidity uncertainty	U=±5.3%
Temperature uncertainty	U=±0.59℃
Supply voltages	U=±3%
Time	U=±5%

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	ACR-CRP12
Model Description:	N/A
Hardware Version:	V2.01
Software Version:	V4.28
Operation Frequency:	902-928MHz
Max. RF output power:	18.638dBm
Type of Modulation:	ASK
Antenna installation:	Internal antenna
Antenna Gain:	12dBi
Ratings:	DC 12V ＜200mA 2.4W

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Data Cable	Power Cord
1.	---	---	---	---	---	--

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Channel List

Channel List							
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
1	902.3	14	903.6	27	904.9	40	906.2
2	902.4	15	903.7	28	905.0	41	906.3
3	902.5	16	903.8	29	905.1	42	906.4
4	902.6	17	903.9	30	905.2	43	906.5
5	902.7	18	904.0	31	905.3	44	906.6
6	902.8	19	904.1	32	905.4	45	906.7
7	902.9	20	904.2	33	905.5	46	906.8
8	903.0	21	904.3	34	905.6	47	906.9
9	903.1	22	904.4	35	905.7	48	907.0
10	903.2	23	904.5	36	905.8	49	907.1
11	903.3	24	904.6	37	905.9	50	907.2
12	903.4	25	904.7	38	906.0	51	907.3
13	903.5	26	904.8	39	906.1	52	907.4
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
53	907.5	66	908.8	79	910.1	92	911.4
54	907.6	67	908.9	80	910.2	93	911.5
55	907.7	68	909.0	81	910.3	94	911.6
56	907.8	69	909.1	82	910.4	95	911.7
57	907.9	70	909.2	83	910.5	96	911.8
58	908.0	71	909.3	84	910.6	97	911.9
59	908.1	72	909.4	85	910.7	98	912.0
60	908.2	73	909.5	86	910.8	99	912.1
61	908.3	74	909.6	87	910.9	100	912.2
62	908.4	75	909.7	88	911.0	101	912.3
63	908.5	76	909.8	89	911.1	102	912.4
64	908.6	77	909.9	90	911.2	103	912.5
65	908.7	78	910.0	91	911.3	104	912.6
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
105	912.7	118	914.0	131	915.3	144	916.6
106	912.8	119	914.1	132	915.4	145	916.7
107	912.9	120	914.2	133	915.5	146	916.8
108	913.0	121	914.3	134	915.6	147	916.9
109	913.1	122	914.4	135	915.7	148	917.0
110	913.2	123	914.5	136	915.8	149	917.1
111	913.3	124	914.6	137	915.9	150	917.2
112	913.4	125	914.7	138	916.0	151	917.3
113	913.5	126	914.8	139	916.1	152	917.4
114	913.6	127	914.9	140	916.2	153	917.5
115	913.7	128	915.0	141	916.3	154	917.6
116	913.8	129	915.1	142	916.4	155	917.7
117	913.9	130	915.2	143	916.5	156	917.8
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**

157	917.9	170	919.2	183	920.5	196	921.8
158	918.0	171	919.3	184	920.6	197	921.9
159	918.1	172	919.4	185	920.7	198	922.0
160	918.2	173	919.5	186	920.8	199	922.1
161	918.3	174	919.6	187	920.9	200	922.2
162	918.4	175	919.7	188	921.0	201	922.3
163	918.5	176	919.8	189	921.1	202	922.4
164	918.6	177	919.9	190	921.2	203	922.5
165	918.7	178	920.0	191	921.3	204	922.6
166	918.8	179	920.1	192	921.4	205	922.7
167	918.9	180	920.2	193	921.5	206	922.8
168	919.0	181	920.3	194	921.6	207	922.9
169	919.1	182	920.4	195	921.7	208	923.0
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
209	923.1	222	924.4	235	925.7	248	927.0
210	923.2	223	924.5	236	925.8	249	927.1
211	923.3	224	924.6	237	925.9	250	927.2
212	923.4	225	924.7	238	926.0	251	927.3
213	923.5	226	924.8	239	926.1	252	927.4
214	923.6	227	924.9	240	926.2	253	927.5
215	923.7	228	925.0	241	926.3		
216	923.8	229	925.1	242	926.4		
217	923.9	230	925.2	243	926.5		
218	924.0	231	925.3	244	926.6		
219	924.1	232	925.4	245	926.7		
220	924.2	233	925.5	246	926.8		
221	924.3	234	925.6	247	926.9		

4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Low channel	Middle channel	High channel
Transmitting (8FSK)	902.3MHz	914.9MHz	927.5MHz
Receiving (8FSK)	902.3MHz	914.9MHz	927.5MHz

4.6 Test Environment

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Normal Voltage(DC)(V):	12
Normal Temperature(℃)	23
Low Temperature(℃)	0
High Temperature(℃)	40

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at 1&2F., Building A, No. 26, Xinhe Road, Xinqiao, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

FCC Test Firm Registration Number: CN1276

5.2 Test Instrument Used

No.	Equipment	Manufacturer	Type No.	Serial No.	Firmware Version	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	A.14.16	2025/6/28
2	Power Sensor	Agilent	U2021XA	MY56120032	/	2025/6/28
3	Power Sensor	Agilent	U2021XA	MY56120034	/	2025/6/28
4	Communication test set	R&S	CMW500	108058	V3.5.80	2025/6/28
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	A.14.16	2025/6/28
6	Signal Generator	Agilent	N5181A	MY50140365	A.01.60	2025/6/28
7	Vector signal generator	Agilent	N5182A	MY47420195	A.01.87	2025/6/28
8	Communication test set	Agilent	E5515C	MY50102567	B.19.07 (E1962B)	2025/6/28
9	2.4 GHz Filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	/	2025/6/30
10	5 GHz Filter	Shenxiang	MSF5150-5850MS-1155	20181015001	/	2025/6/30
11	Filter	Xingbo	XBLBQ-DZA120	190821-1-1	/	2025/6/30
12	BT&WI-FI Automatic test software	Micowave	MTS8310	Ver. 2.0.0.0	/	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	/	2025/6/28
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	/	2025/6/28
15	234G Automatic test software	Micowave	MTS8200	Ver. 2.0.0.0	/	/
16	966 chamber	C.R.T.	966	/	/	2027/6/21
17	Receiver	R&S	ESPI	100362	RF_ATTEN_7 (104489/003)	2025/6/28
18	Amplifier	HP	8447E	2945A02747	/	2025/6/28
19	Amplifier	Agilent	8449B	3008A01838	/	2025/6/28
20	TRILOG Broadband	Schwarzbeck	VULB 9168	00869	/	2025/6/28

	Antenna					
21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	/	2025/6/28
22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/	/
23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	/	2025/6/28
24	loop antenna	ZHINAN	ZN30900A	GTS534	/	/
25	40G Horn antenna	A/H/System	SAS-574	588	/	2025/6/28
26	Amplifier	AEROFLEX	Aeroflex	097	/	2025/6/28
27	Power Metter	KEYSIGHT	N1912AP	N/A	A.05.00	2025/6/28

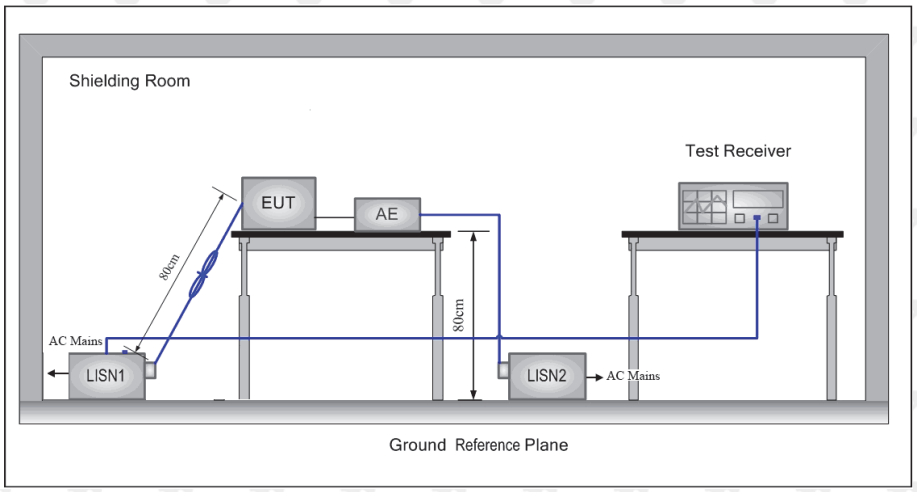
Continuous disturbance						
No.	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Calibrated until
1	843 Shield Room	C/ R/ T	843	/	/	2027/6/21
2	AMN	ROHDE&SCHWARZ	ESH3-Z5	831551852	/	2025/6/30
3	Pulse limiter	ROHDE&SCHWARZ	ESH3Z2	357881052	/	2025/6/28
4	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100428	V4.42.SP3	2025/6/30
5	Coaxial cable	ZDECL	Z302S	18091904	/	2025/6/30
6	ISN	Schwarzbeck	NTFM8158	183	/	2025/6/30
7	Voltage sensor	Schwarzbeck	TK 9420	01189	/	2025/10/25
8	EZ-EMC	Frad	EMC-con3A1.1	/	/	/
9	Current Probe	FCC	F-52B	199453	/	2025/5/27
10	Communication test set	R&S	CMW500	108058	B.19.07 (E1962B)	2025/6/28
11	Communication test set	Agilent	E5515C	MY50102567	V3.5.80	2025/6/28

Radiated emission(No.1 Chamber)						
No.	Equipment	Manufacturer	Model No.	Serial No.	Firmware version	Calibrated until
1	966 Chamber	C/ R/ T	966	/	/	2027/6/21
2	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	01911	/	2025/7/06
3	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	/	2025/6/29
4	Amplifier	Agilent	8449B	3008A01838	/	2025/6/30
5	Amplifier	HP	8447E	2945A02747	/	2025/6/28

6	loop antenna	Schwarzbeck	FMZB 1519B	1519B-224	/	2025/6/29
7	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESPI	100362	RF_ATTEN_7 (104489/003)	2025/6/28
8	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	A.14.16	2025/6/28
9	Coaxial cable	ETS	RFC-SNS-100-NMS-80	/	/	2025/6/28
10	Coaxial cable	ETS	RFC-SN-100-NMS-20	/	/	2025/6/28
11	Coaxial cable	ETS	RFC-SNS-100-SMS-20	/	/	2025/6/28
12	Coaxial cable	ETS	RFC-NNS-100-NMS-300	/	/	2025/6/28
13	EMI test software	Frad	EZ-EMC	Ver/ FA-03A2 RE	/	/
14	Communication test set	R&S	CMW500	108058	B.19.07 (E1962B)	2025/6/28
15	Communication test set	Agilent	E5515C	MY50102567	V3.5.80	2025/6/28

6. AC POWER LINE CONDUCTED EMISSION

6.1 Block Diagram Of Test Setup



6.2 Limit

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

6.3 Test procedure

1) The mains terminal disturbance voltage test was conducted in a shielded room.

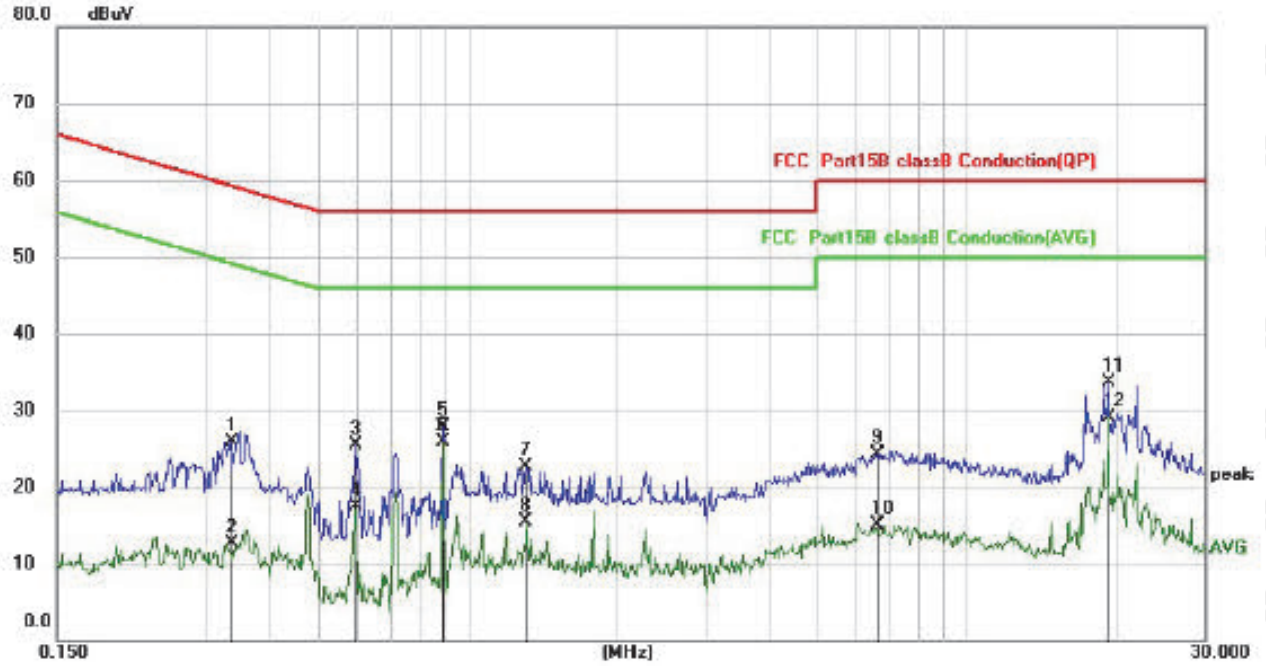
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

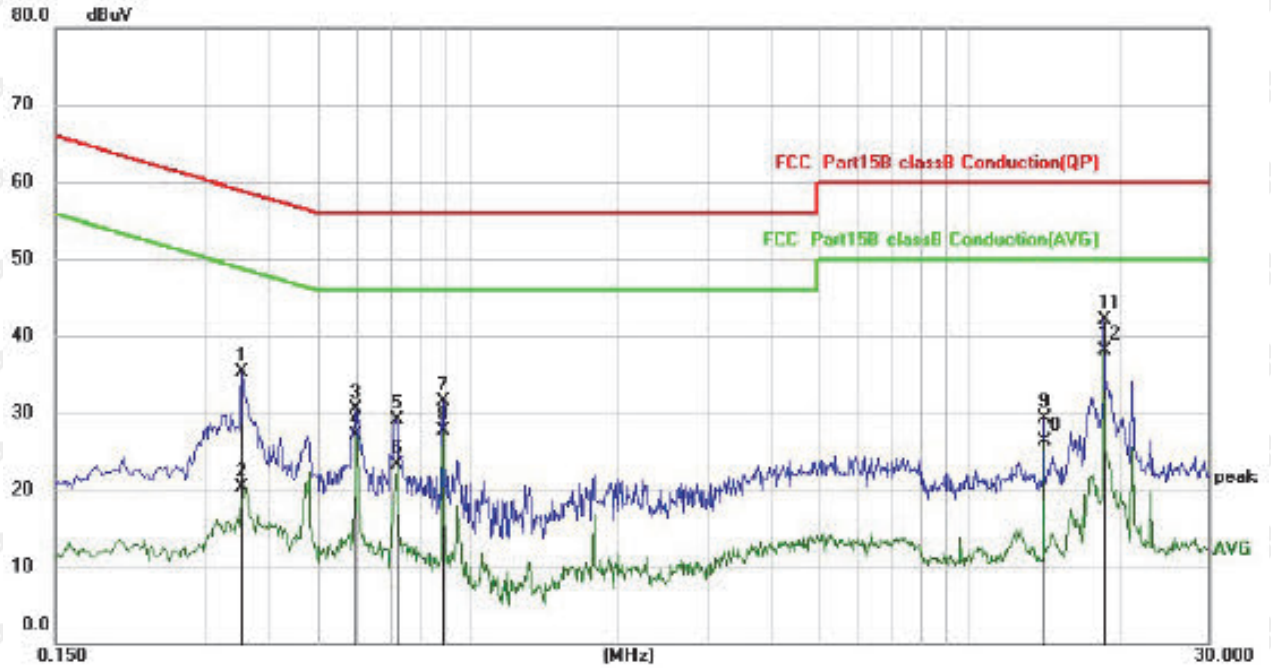
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.

5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

6.4 Test Result



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.3339	15.38	10.62	26.00	59.35	-33.35	QP
2		0.3339	2.06	10.62	12.68	49.35	-36.67	AVG
3		0.5977	14.80	10.61	25.41	56.00	-30.59	QP
4		0.5977	6.93	10.61	17.54	46.00	-28.46	AVG
5		0.8900	17.08	10.87	27.95	56.00	-28.05	QP
6	*	0.8900	15.09	10.87	25.96	46.00	-20.04	AVG
7		1.3060	11.59	11.14	22.73	56.00	-33.27	QP
8		1.3060	4.31	11.14	15.45	46.00	-30.55	AVG
9		6.5937	11.56	12.80	24.36	60.00	-35.64	QP
10		6.5937	2.36	12.80	15.16	50.00	-34.84	AVG
11		19.2939	20.11	13.55	33.66	60.00	-26.34	QP
12		19.2939	15.57	13.55	29.12	50.00	-20.88	AVG



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.3537	24.62	10.60	35.22	58.88	-23.66	QP
2		0.3537	9.77	10.60	20.37	48.88	-28.51	AVG
3		0.5977	19.93	10.61	30.54	56.00	-25.46	QP
4		0.5977	16.43	10.61	27.04	46.00	-18.96	AVG
5		0.7177	18.44	10.73	29.17	56.00	-26.83	QP
6		0.7177	12.57	10.73	23.30	46.00	-22.70	AVG
7		0.8900	20.54	10.87	31.41	56.00	-24.59	QP
8		0.8900	16.91	10.87	27.78	46.00	-18.22	AVG
9		14.1300	15.93	13.32	29.25	60.00	-30.75	QP
10		14.1300	13.03	13.32	26.35	50.00	-23.65	AVG
11		18.6219	28.64	13.52	42.16	60.00	-17.84	QP
12	*	18.6219	24.50	13.52	38.02	50.00	-11.98	AVG

Remark:
1. Factor = Cable loss + LISN factor, Margin = Limit – Level
2. All modes were tested at AC 120V and 240V, only the worst result of AC 120V 60Hz was reported.
3. All the test modes completed for test. Only the worst result of GFSK Low Channel was reported.

7. RADIATED SPURIOUS EMISSION

7.1 Block Diagram Of Test Setup

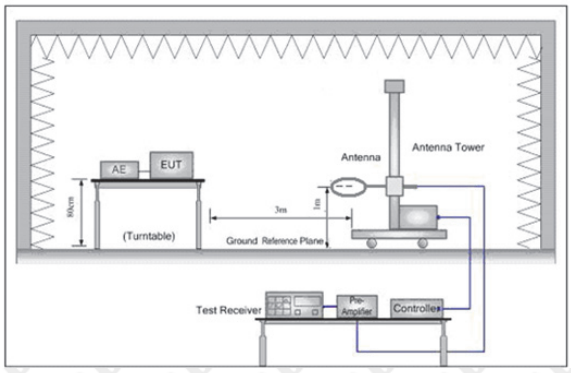


Figure 1. Below 30MHz

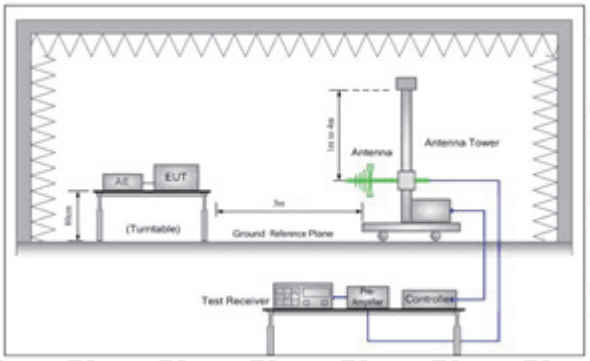


Figure 2. 30MHz to 1GHz

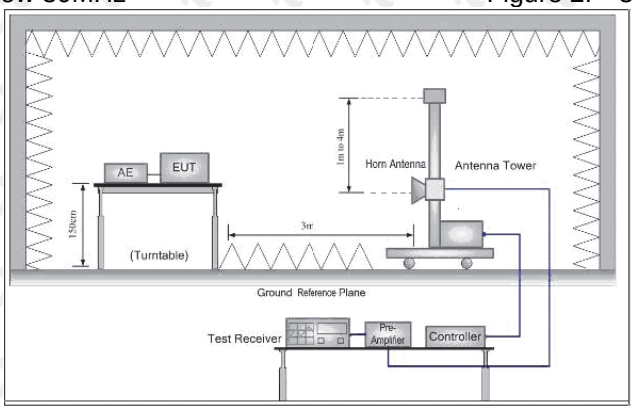


Figure 3. Above 1GHz

7.2 Limit

Spurious Emissions:

Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: a.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.
b. The lower limit shall apply at the transition frequencies.
c. Emission level(dBuV/m)=20log Emission level(uV/m)

7.3 Test procedure

Below 1GHz test procedure as below:

a.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.The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c.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.

d.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 rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.

e.The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f.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.

Above 1GHz test procedure as below:

g.Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).

h.Test the EUT in the lowest channel ,the middle channel ,the Highest channel

j.Repeat above procedures until all frequencies measured was complete.

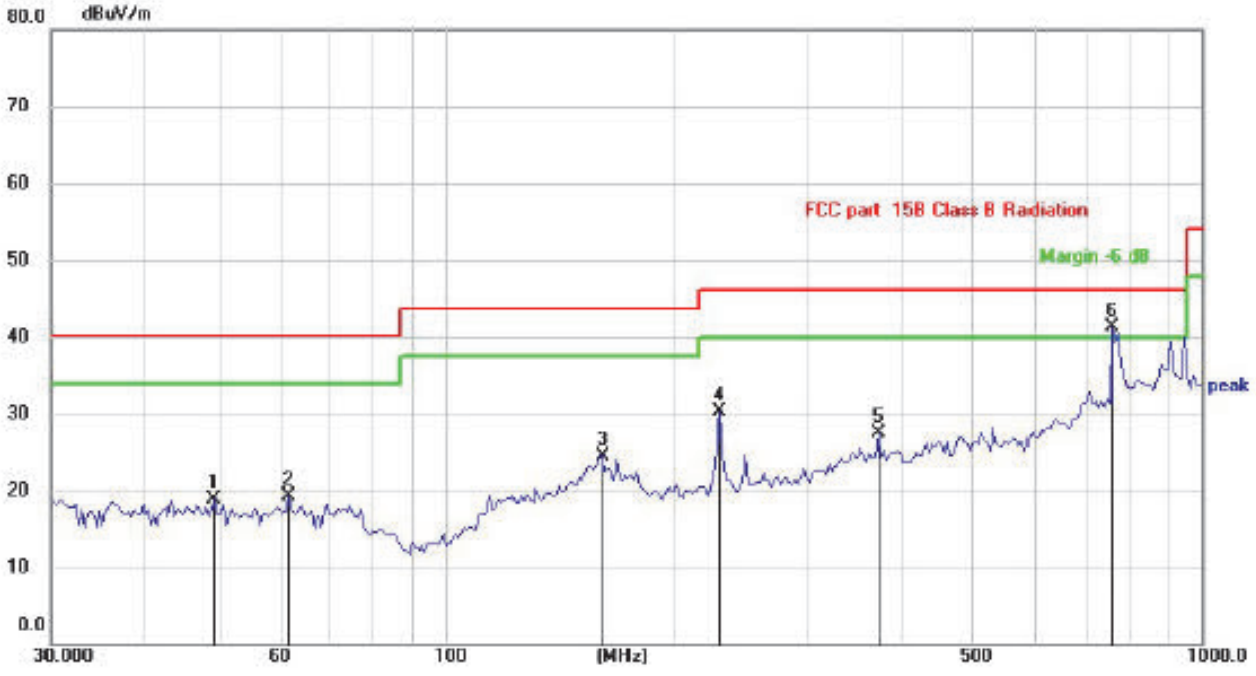
Receiver set:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

7.4 Test Result

Low channel below 1GHz Test Results:

Antenna polarity: H



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		49.4459	26.01	-7.16	18.85	40.00	-21.15	QP
2		62.1037	27.42	-8.13	19.29	40.00	-20.71	QP
3		161.4738	25.82	-1.23	24.59	43.50	-18.91	QP
4		231.3119	34.69	-4.43	30.26	46.00	-15.74	QP
5		374.6225	29.09	-1.64	27.45	46.00	-18.55	QP
6	*	762.0384	33.63	7.66	41.29	46.00	-4.71	QP

Remark: Transd = Cableloss + Antenna factor - Pre-amplifier; Margin = Limit – Level.

Antenna polarity: V

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		80.0805	27.54	-9.18	18.36	40.00	-21.64	QP
2		117.7724	24.96	-6.11	18.85	43.50	-24.65	QP
3		161.4738	28.23	-1.23	27.00	43.50	-16.50	QP
4		229.2930	34.02	-4.47	29.55	46.00	-16.45	QP
5		478.8455	27.68	1.06	28.74	46.00	-17.26	QP
6	*	775.5167	33.26	7.98	41.24	46.00	-4.76	QP

Remark: Transd = Cableloss + Antenna factor - Pre-amplifier; Margin = Limit – Level

Above 1 GHz Test Results:
CH Low

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1804.6	108.38	-5.84	52.69	74	-21.31	peak
1804.6	95.59	-5.84	43.65	54	-10.35	AVG
2706.9	56.34	-3.64	52.70	74	-21.30	peak
2706.9	47.07	-3.64	43.43	54	-10.57	AVG
3609.2	58.20	-0.95	57.25	74	-16.75	peak
3609.2	48.18	-0.95	47.23	54	-6.77	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1804.6	108.42	-5.84	52.69	74	-21.31	peak
1804.6	95.58	-5.84	43.65	54	-10.35	AVG
2706.9	56.34	-3.64	52.70	74	-21.30	peak
2706.9	47.08	-3.64	43.44	54	-10.56	AVG
3609.2	58.09	-0.95	57.14	74	-16.86	peak
3609.2	48.06	-0.95	47.11	54	-6.89	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

CH Middle

Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1829.8	108.43	-5.71	52.67	74	-21.33	peak
1829.8	95.07	-5.71	45.61	54	-8.39	AVG
2744.7	56.02	-3.51	52.51	74	-21.49	peak
2744.7	46.84	-3.51	43.33	54	-10.67	AVG
3659.6	57.95	-0.82	57.13	74	-16.87	peak
3659.6	47.84	-0.82	47.02	54	-6.98	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1829.8	108.44	-5.71	52.67	74	-21.33	peak
1829.8	95.16	-5.71	45.61	54	-8.39	AVG
2744.7	56.02	-3.51	52.51	74	-21.49	peak
2744.7	46.85	-3.51	43.34	54	-10.66	AVG
3659.6	57.98	-0.82	57.16	74	-16.84	peak
3659.6	47.89	-0.82	47.07	54	-6.93	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

CH High
Horizontal:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1855	56.33	-5.65	52.36	74	-21.64	peak
1855	47.33	-5.65	46.89	54	-7.11	AVG
2782.5	56.13	-3.43	52.70	74	-21.30	peak
2782.5	47.44	-3.43	44.01	54	-9.99	AVG
3710	57.23	-0.75	56.48	74	-17.52	peak
3710	47.63	-0.75	46.88	54	-7.12	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

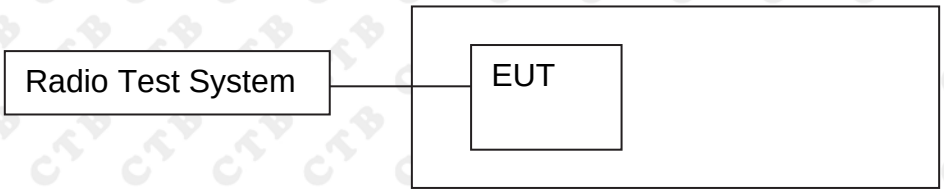
Vertical:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
1855	56.32	-5.65	52.36	74	-21.64	peak
1855	47.33	-5.65	46.89	54	-7.11	AVG
2782.5	56.18	-3.43	52.75	74	-21.25	peak
2782.5	47.30	-3.43	43.87	54	-10.13	AVG
3710	57.27	-0.75	56.52	74	-17.48	peak
3710	47.64	-0.75	46.89	54	-7.11	AVG
Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Remark:
(1). Measuring frequencies from 1 GHz to the 25 GHz。
(2). All modes of operation were investigated and the worst-case emissions are reported.
(3). Radiated emission test from 9kHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9kHz to 30MHz and not recorded in this report.

8. BAND EDGE AND RF COUNDUCTED SPURIOUS EMISSIONS

8.1 Block Diagram Of Test Setup



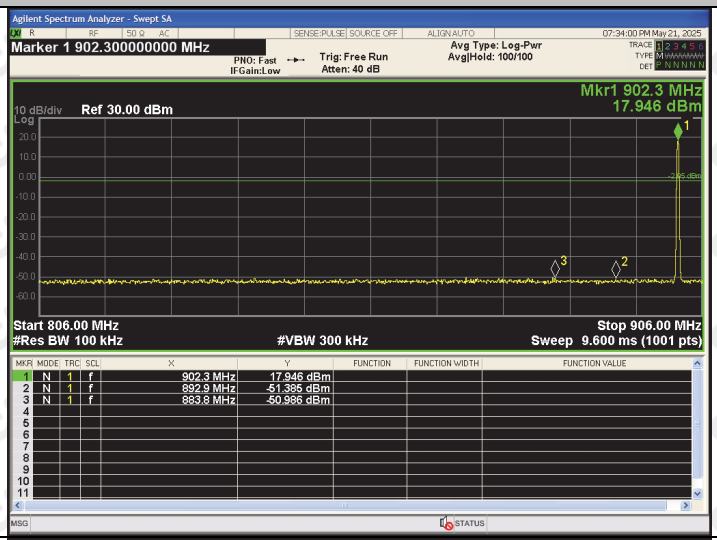
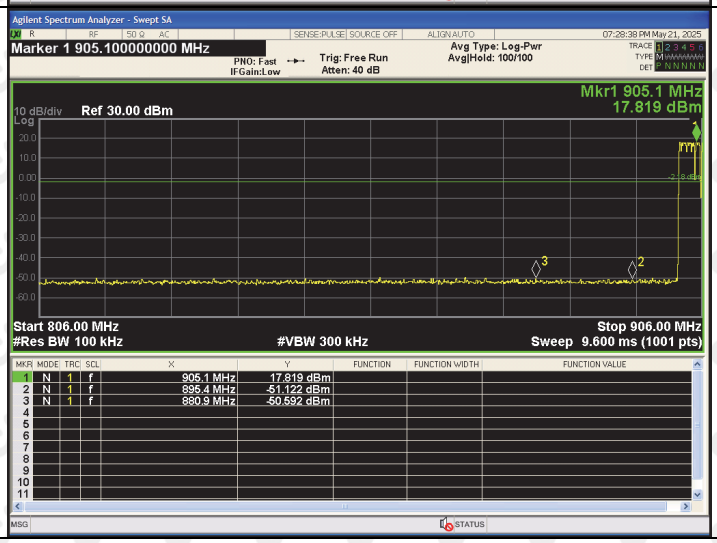
8.2 Limit

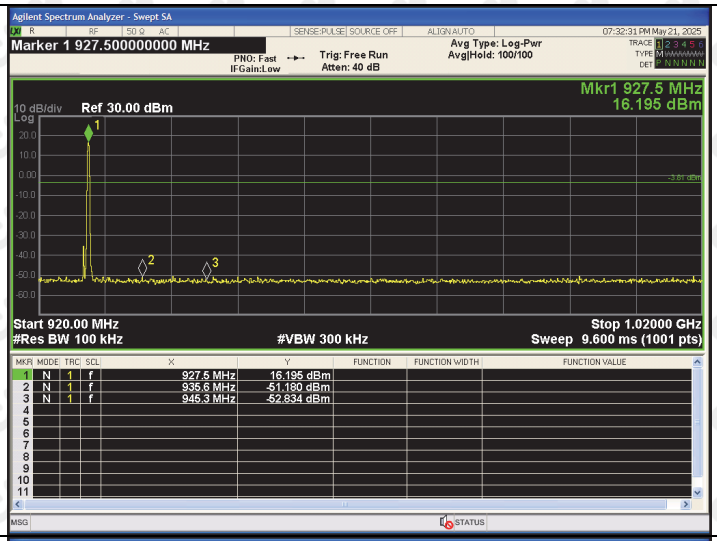
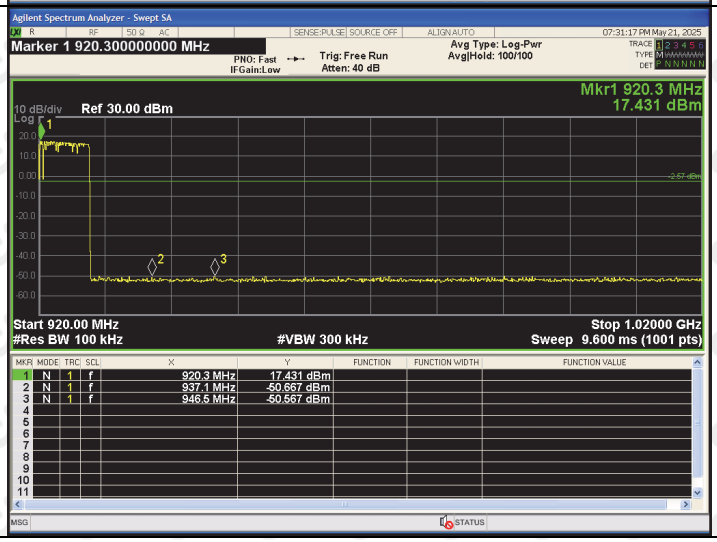
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

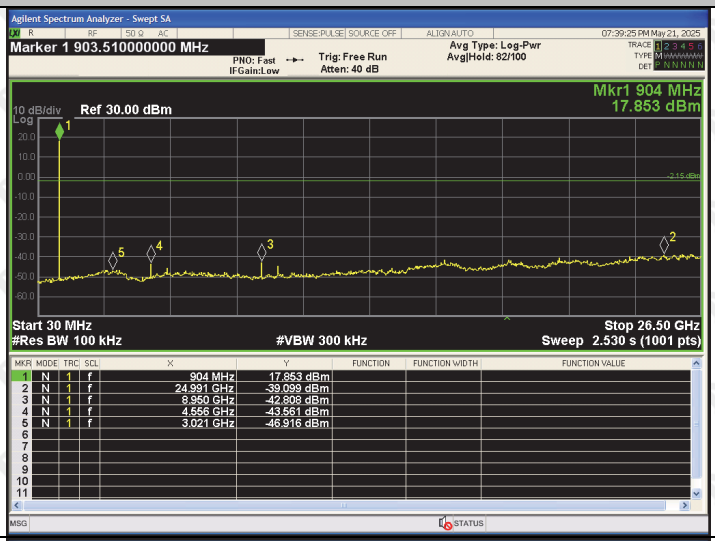
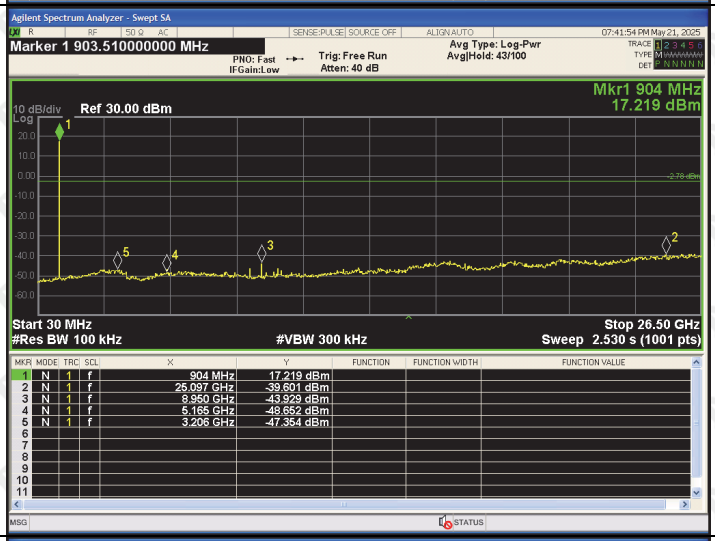
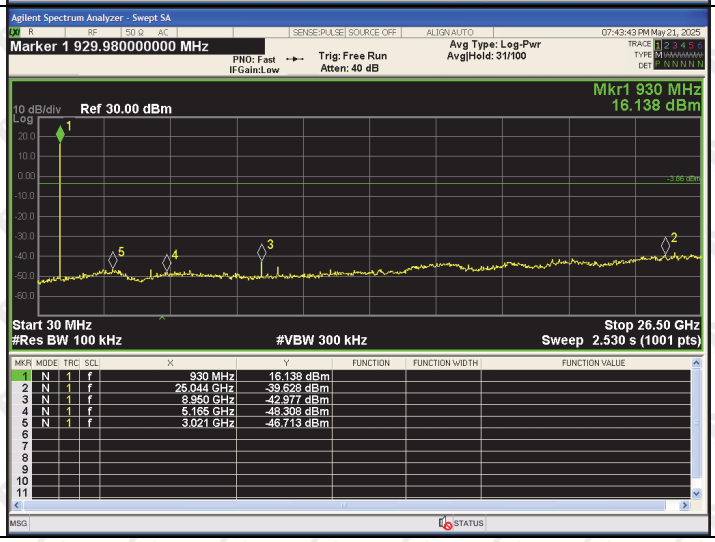
8.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:
Blow 30MHz:
RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold
Above 30MHz:
RBW = 100KHz, VBW = 300KHz, Sweep = auto
Detector function = peak, Trace = max hold

8.4 Test Result

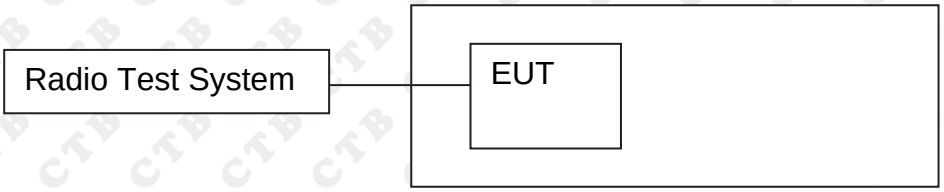
BAND EDGE Graphs		
LCH/ No Hop		
LCH/ Hop		

HCH/ No Hop		
HCH/ Hop		

RF Conducted Spurious Emissions Graphs			
LCH			
MCH			
HCH			

9. COUDUCTED PEAK OUTPUT POWER

9.1 Block Diagram Of Test Setup



9.2 Limit

The maximum peak conducted output power of the intentional radiator shall not exceed the following:
(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.
(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.
(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Peak output Power: <1W=30dBm-(12-6)=24dBm

9.3 Test procedure

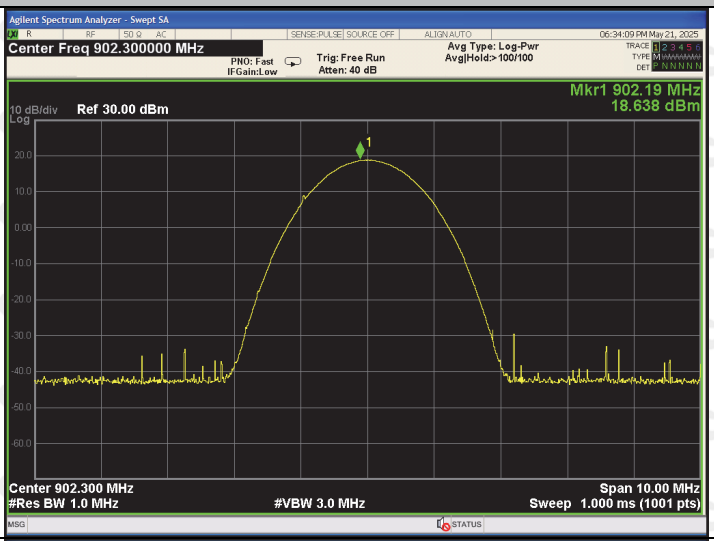
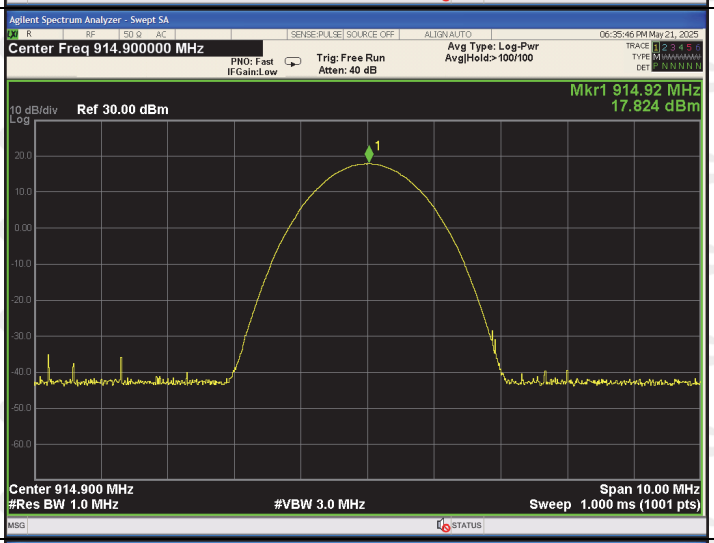
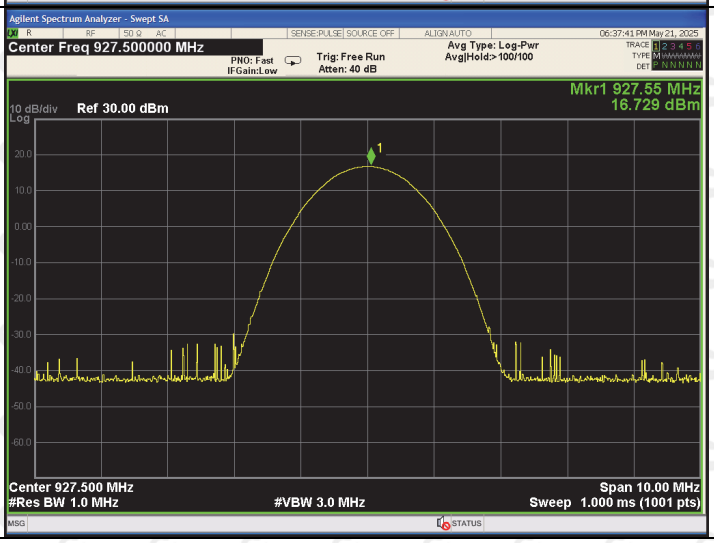
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1MHz. VBW = 3MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

9.4 Test Result

Antenna Gain: 12dBi

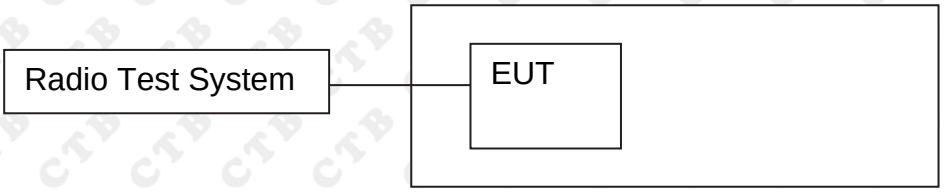
Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
LCH	18.638	24	PASS
MCH	17.824	24	PASS
HCH	16.729	24	PASS

Test Graph:

Graphs		
LCH		
MCH		
HCH		

10. 20DB OCCUPIED BANDWIDTH

10.1 Block Diagram Of Test Setup



10.2 Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies

10.3 Test procedure

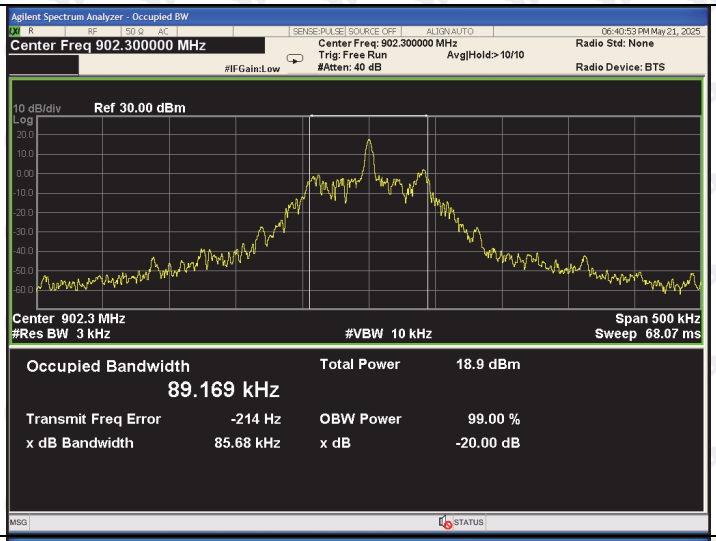
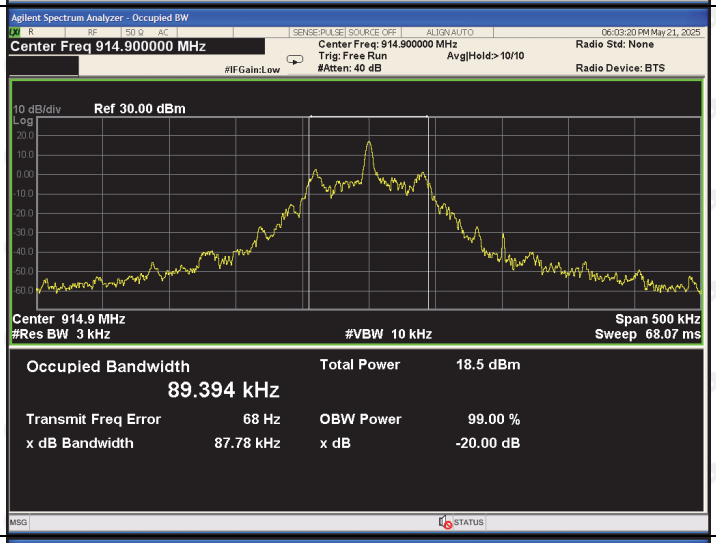
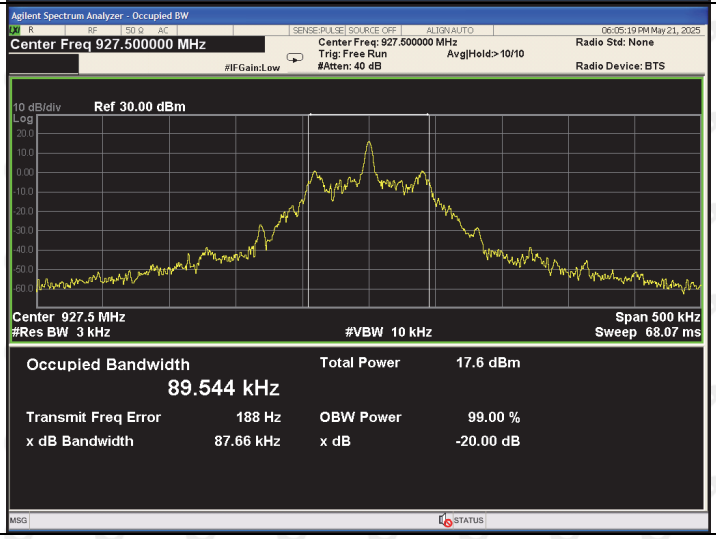
1. Rem1. Set RBW = 10 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak. Span=500KHz
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

10.4 Test Result

Frequency	20dB Bandwidth (kHz)	Result
Low channel	85.68	**PASS**
Mid channel	87.78	**PASS**
High channel	87.66	**PASS**

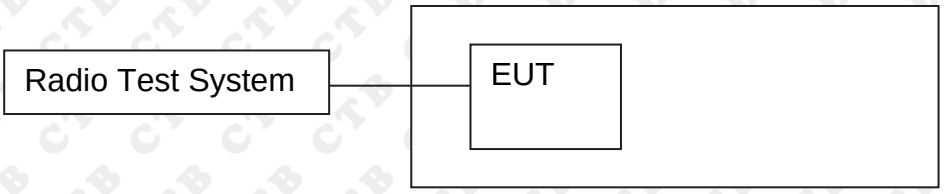
Note: All modes of operation were Pre-scan and the worst-case emissions are reported.

Test Graph:

Low channel	
Mid channel	
High channel	

11. CARRIERFREQUENCIES SEPARATION

11.1 Block Diagram Of Test Setup



11.2 Limit

At least 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

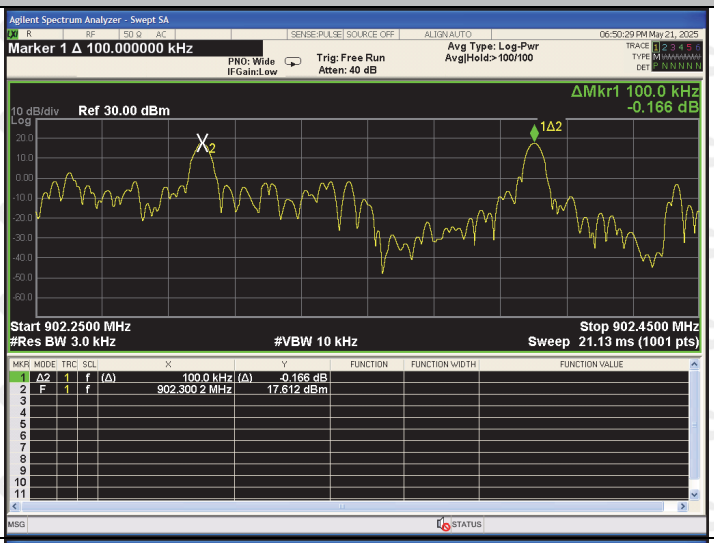
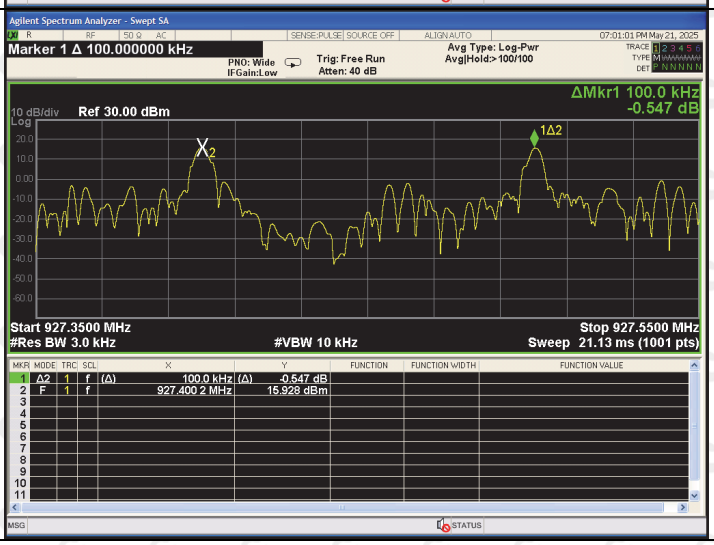
11.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 10kHz. VBW = 30kHz , Span = 1.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

11.4 Test Result

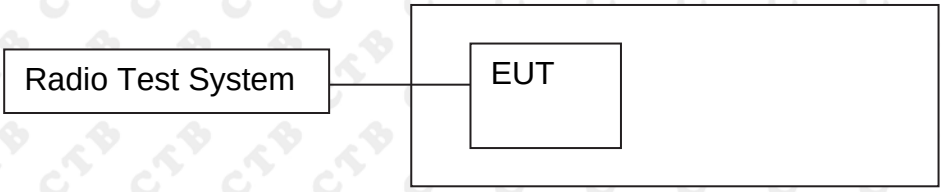
Channel.	Carrier Frequency Separation [MHz]	Verdict
LCH	0.100	PASS
MCH	0.100	PASS
HCH	0.100	PASS

Test Graph

Graphs		
LCH	
MCH	
HCH	

12. HOPPING CHANNEL NUMBER

12.1 Block Diagram Of Test Setup



12.2 Limit

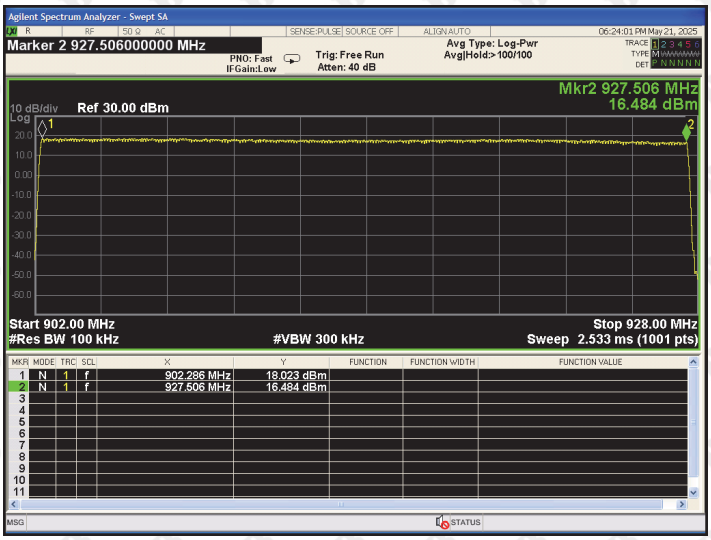
Frequency hopping systems in the 920-928 MHz band shall use at least 50 channels.

12.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
4. Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

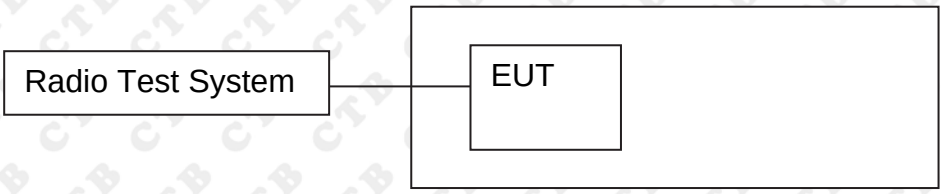
12.4 Test Result

Mode	Channel.	Number of Hopping Channel	Verdict
8FSK	Hop	253	PASS



13. DWELL TIME

13.1 Block Diagram Of Test Setup



13.2 Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel
is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

13.3 Test procedure

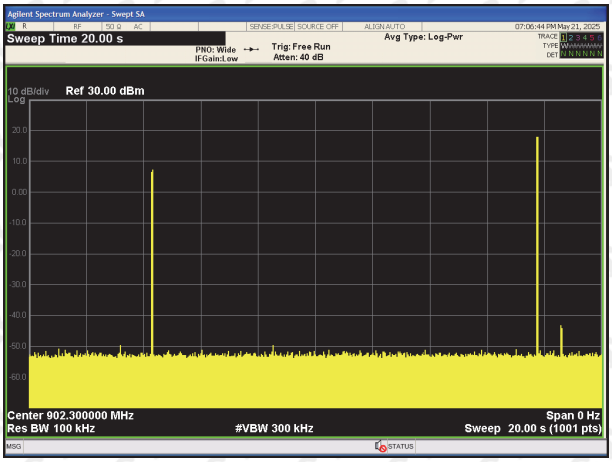
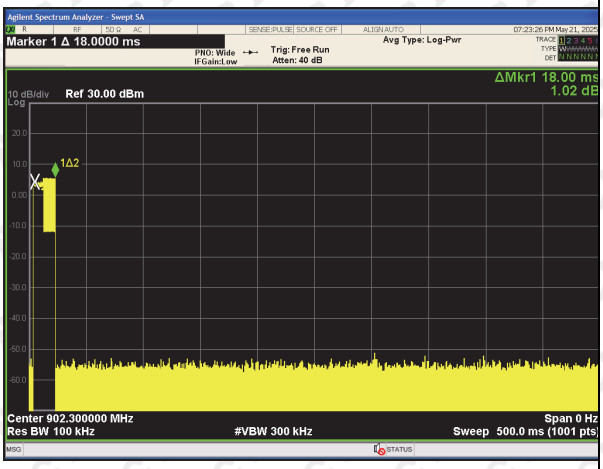
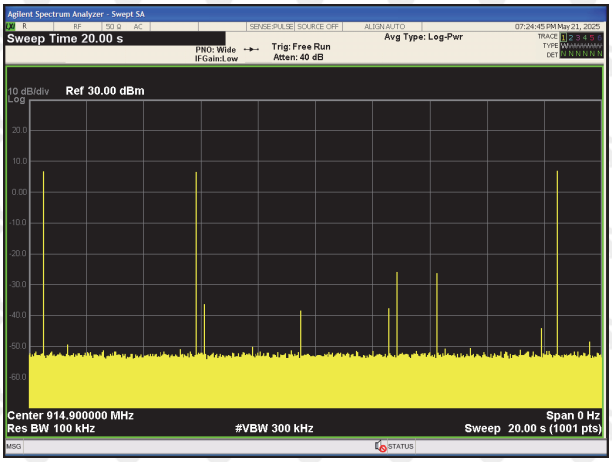
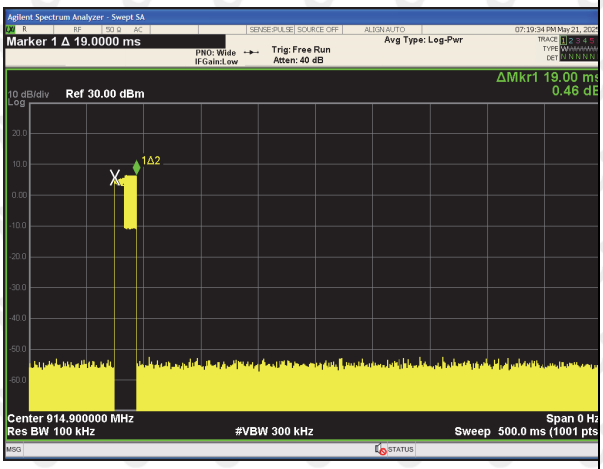
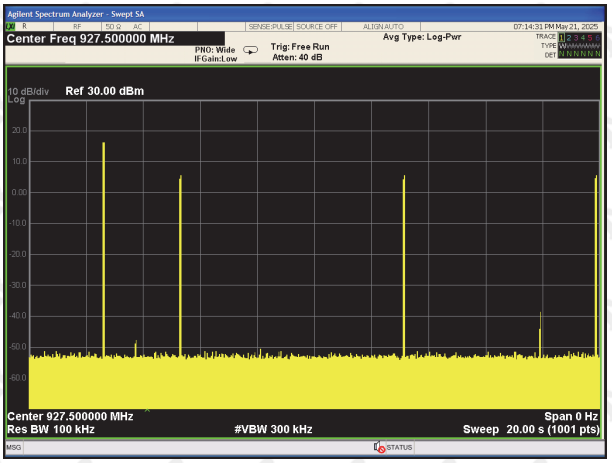
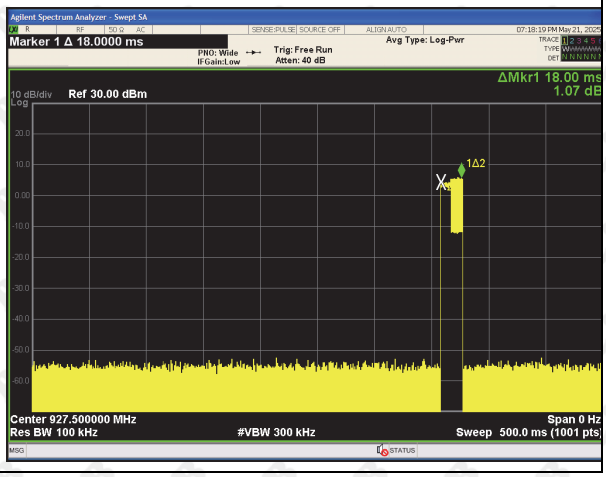
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set spectrum analyzer span = 0. Centred on a hopping channel;
3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.
4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

13.4 Test Result

Channel	No. of transmission in10s(a)	Pulse Time (ms)(b)	Total Dwell Time in 20s (ms) (c)	Limit (ms)	Verdict
LCH	2	18.00	36.00	400	PASS
MCH	3	19.00	57.00	400	PASS
HCH	4	18.00	72.00	400	PASS

Remark: Total dwell time in 20s, c=(a)*(b)*2

Test Graph

Graphs		
LCH		
MCH		
HCH		

14. ANTENNA REQUIREMENT

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.
15.247(b) (4) requirement:
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:

The antenna is Internal antenna and no consideration of replacement. The best case gain of the antenna is 12dBi.

15. EUT TEST SETUP PHOTOGRAPHS

Radiated Emission

Below 1G

Above 1G

Conducted emission

※※※※※ END OF REPORT ※※※※※