



FCC RADIO TEST REPORT

Applicant	: Aidialink Corp.
Address	: No. 6, Lising 6th Rd., Science Park, Hsinchu City, 30078, Taiwan
Equipment	: UHF RFID Reader
Model No.	: AL-510
Trade Name	: AidiaLink
FCC ID.	: 2ATLGAL510

I HEREBY CERTIFY THAT :

The sample was received on Mar. 20, 2019 and the testing was completed on Jul. 08, 2019 at CerpPASS Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of CerpPASS Technology Corp., the test report shall not be reproduced except in full.

Approved by:

Mark Liao / Supervisor

Laboratory Accreditation:

CerpPASS Technology Corporation Test Laboratory





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History of this test report

[illegible]



1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.4:2014

ANSI C63.10:2013

FCC Rules and Regulations Part 15 Subpart C §15.247

FCC Rule	Description of Test	Result
15.203	. Antenna Requirement	PASS
15.207	. AC Power Line Conducted Emission	PASS
15.209 15.205	. Radiated Spurious Emission	PASS
15.247(d)	. Conducted Spurious Emission	PASS
15.247(a)(1)	. Channel Carrier Frequencies Separation	PASS
15.247(a)(1)	. 20dB Bandwidth	PASS
15.247(a)(1)	. Dwell Time	PASS
15.247(b)	. Number of Hopping Channels	PASS
15.247(b)	. Peak Output Power Measurement Data	PASS

*The principle of judgment is made according to the laboratory's reporting control and measurement uncertainty standard procedures.



2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Frequency Range		902MHz~928MHz
Type of Modulation		ASK
Antenna Type / Gain	Antenna A	Directional Antenna / 7dBi
	Antenna B	Directional Antenna / 7dBi
	Antenna C	Directional Antenna / 7dBi
	Antenna D	Directional Antenna / 7dBi

For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.2 Carrier Frequency of Channes

Channel	Frequency (MHz)	Channel	Frequency (MHz)
*01	903.24	26	915.24
02	903.72	27	915.72
03	904.20	28	916.20
04	904.68	29	916.68
05	905.16	30	917.16
06	905.64	31	917.64
07	906.12	32	918.12
08	906.60	33	918.60
09	907.08	34	919.08
10	907.56	35	919.56
11	908.04	36	920.04
12	908.52	37	920.52
13	909.00	38	921.00
14	909.48	39	920.48
15	909.96	40	921.96
16	910.44	41	922.44
17	910.92	42	922.92
18	911.40	43	923.04
19	911.88	44	923.88
20	912.36	45	924.36
21	912.84	46	924.84
22	913.32	47	925.32
23	913.80	48	925.80
24	914.28	49	926.28
*25	914.76	*50	926.76

Note: Channels remarked * are selected to perform test.



2.3 Test Mode & Test Software

- During testing, the interface cables and equipment positions were varied according to ANSI C63.10
- The complete test system included Notebook and EUT for RF test.
- An executive program, "Yeon S150: V2.2" under WIN 7 s executed to transmit and receive data via Bluetooth.
- The following test modes were performed for the test:
Test Mode 1.RFID

2.4 Description of Test System

RF Conducted				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	ASUS	P2430U	N/A	Adapter / 1.8m / NS
USB cable	N/A	N/A	1.5m / NS	N/A
Radiated Emissions				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	ASUS	P2430U	N/A	Adapter / 1.8m / NS
USB cable	N/A	N/A	1.5m / NS	N/A
AC Power Line Conducted Emission				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Notebook	ASUS	P2430U	N/A	Adapter / 1.8m / NS
USB cable	N/A	N/A	1.5m / NS	N/A



2.5 General Information of Test

Test Site	Cerpass Technology Corporation Test Laboratory Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel:+886-3-3226-888 Fax:+886-3-3226-881 Address: No.68-1, Shihbachongsi, Shihding Township, New Taipei City 223, Taiwan, R.O.C. Tel: +886-2-2663-8582	
	FCC	TW1079, TW1061, TW1439
	IC	4934E-1, 4934E-2
	VCCI	T-2205 for Telecommunication test C-4663 for Conducted emission test R-4399, R-4218 for Radiated emission test G-10812, G-10813 for radiated disturbance above 1GHz
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 25,000MHz	
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.	

Test Item	Test Site	Tested Date	Environmental Conditions	Tested By
RF Conducted	RFCON01-NK	2019/07/08	22°C / 63%	Nick Guan
Radiated Emissions	3M02-NK	2019/07/03	27°C / 47%	Leon Huang
RF Conduction	CON01-NK	2019/06/24	21°C / 45%	Spree Yeh



2.6 Measurement Uncertainty

Measurement Item	Uncertainty
Radiated Spurious Emission(9KHz~30MHz)	$\pm 3.405\text{dB}$
Radiated Spurious Emission(30MHz~1GHz)	$\pm 5.326\text{dB}$
Radiated Spurious Emission(1GHz~25GHz)	$\pm 5.918\text{dB}$
Conducted Spurious Emission	$\pm 2.156\text{dB}$
20dB Bandwidth	$\pm 4.40\%$
Peak Output Power(Conducted Power Meter)	$\pm 1.31\text{dB}$
Dwell Time	$\pm 0.11\%$
Duty Cycle	$\pm 0.17\%$



3. Test Equipment and Ancillaries Used for Tests

Test Item	Radiated Emissions				
Test Site	Semi Anechoic Room(3M02-NK)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	275	2018/09/17	2019/09/16
Active Loop Antenna	EMCO	6507	40855	2019/05/24	2020/05/23
Horn Antenna	EMCO	3115	31589	2019/04/01	2020/03/31
Horn Antenna	EMCO	3116	31974	2018/09/07	2019/09/06
EMI Receiver	ROHDE & SCHWARZ	ESCI	101423	2019/05/14	2020/05/13
Spectrum Analyzer	ROHDE & SCHWARZ	FSP 40	100047	2019/03/28	2020/03/27
Preamplifier	EM Electronics corp.	EM330	60660	2019/03/11	2020/03/10
Preamplifier	EMC INSTRUMENTS	EMC051845SE	980333	2018/09/18	2019/09/17
Bluetooth Tester	ROHDE & SCHWARZ	CBT	101133	2019/04/07	2020/04/06
Cable-3in1(30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1316	2018/09/12	2019/09/11
Cable-0.5m(1G-40G)	Rapidtek	40GHZ 50CM	38MS-38MS50314	2019/04/09	2020/04/08
Cable-3m(1G-40G)	Rapidtek	40GHZ 300CM	38MS-38MS300314	2019/04/09	2020/04/08
Cable-8m(1G-40G)	Rapidtek	40GHZ 800CM	38MS-38MS800314	2019/04/10	2020/04/09
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA

Test Item	RF Conducted				
Test Site	RFCON01-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Spectrum Analyzer	ROHDE & SCHWARZ	FSP 40	100047	2019/03/28	2020/03/27
Bluetooth Tester	ROHDE & SCHWARZ	CBT	101133	2019/04/07	2020/04/06
Attenuator	KEYSIGHT	8491B	MY39250705	2018/09/04	2019/09/03
TEMP & HUMID CHAMBER	T-MACHINE	TMJ-9712	T-12-040111	2018/08/30	2019/08/29
Power Sensor	Anritsu	MA2411B	1207295	2019/04/11	2020/04/10

Test Item	AC Power Line Conducted Emission				
Test Site	CON01-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
EMI Receiver	ROHDE & SCHWARZ	ESCI	100821	2018/9/12	2019/09/11
Line Impedance Stabilization Network	Schwarzbeck	NSLK 8127	8127-740	2019/5/22	2020/05/21
Pulse Limiter	ROHDE & SCHWARZ	ESH3-Z2	101933	2018/9/4	2019/09/03
E3	AUDIX	v8.2014-8-6	RK-000531	NA	NA



4. Antenna Requirements

4.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, 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.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.2 Antenna Construction and Directional Gain

Antenna Type		Antenna Gain
Antenna A	Directional Antenna	7 dBi
Antenna B	Directional Antenna	7 dBi
Antenna C	Directional Antenna	7 dBi
Antenna D	Directional Antenna	7 dBi

Directional gain greater than 6dBi are used, the power limit shall be reduced by 1 dB.



5. Test of AC Power Line Conducted Emission

5.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz, according to the methods defined in ANSI C63.4-2014. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

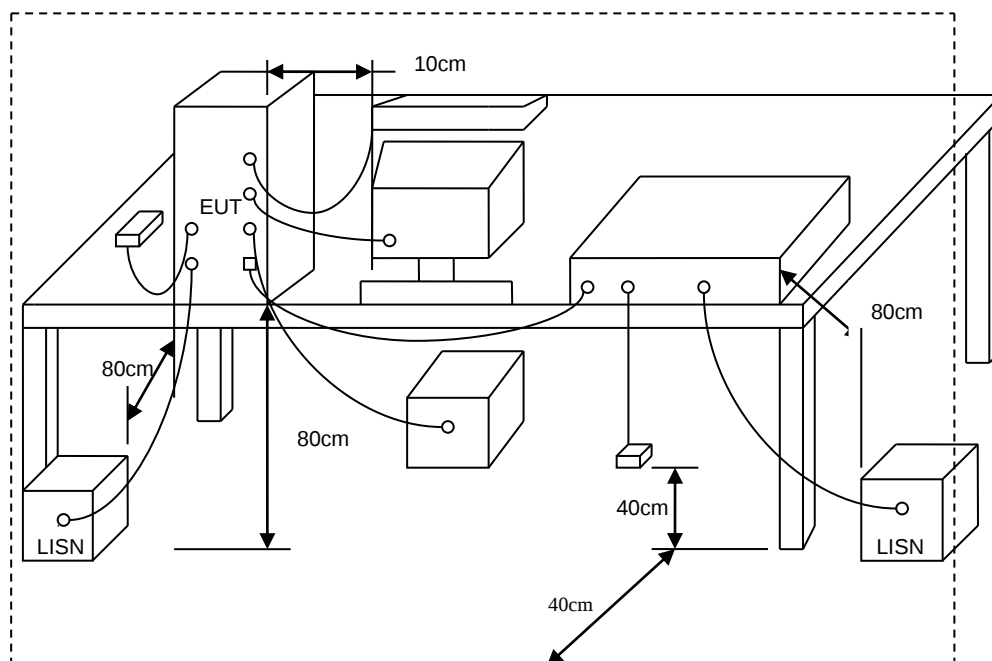
*Decreases with the logarithm of the frequency.

5.2 Test Procedures

- The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- Connect EUT to the power mains through a line impedance stabilization network (LISN).
- All the support units are connecting to the other LISN.
- The LISN provides 50 ohm coupling impedance for the measuring instrument.
- The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
- Both sides of AC line were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.



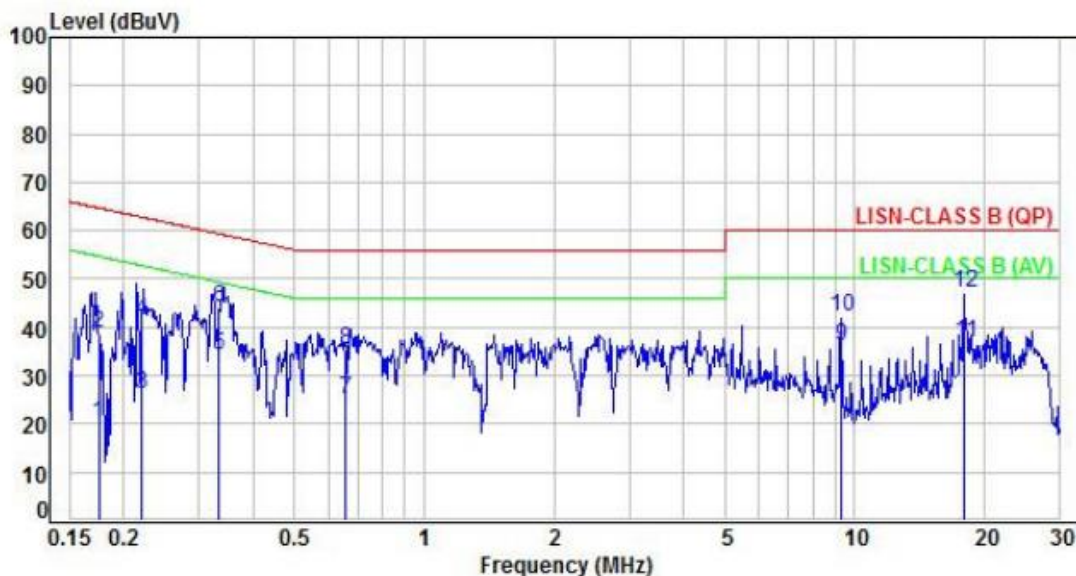
5.3 Typical Test Setup





5.4 Test Result and Data

Power	: AC 120V / 60Hz	Pol/Phase	: LINE
Test Mode	: Mode 1		



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.18	9.92	10.41	20.33	54.71	-34.38	Average	P
2	0.18	9.92	29.05	38.97	64.71	-25.74	QP	P
3	0.22	9.92	16.32	26.24	52.77	-26.53	Average	P
4	0.22	9.92	31.71	41.63	62.77	-21.14	QP	P
5	0.33	9.94	24.46	34.40	49.35	-14.95	Average	P
6	0.33	9.94	34.04	43.98	59.35	-15.37	QP	P
7	0.66	9.95	15.03	24.98	46.00	-21.02	Average	P
8	0.66	9.95	25.57	35.52	56.00	-20.48	QP	P
9	9.27	10.26	25.86	36.12	50.00	-13.88	Average	P
10	9.27	10.26	31.95	42.21	60.00	-17.79	QP	P
11	18.00	10.54	26.27	36.81	50.00	-13.19	Average	P
12	18.00	10.54	36.58	47.12	60.00	-12.88	QP	P

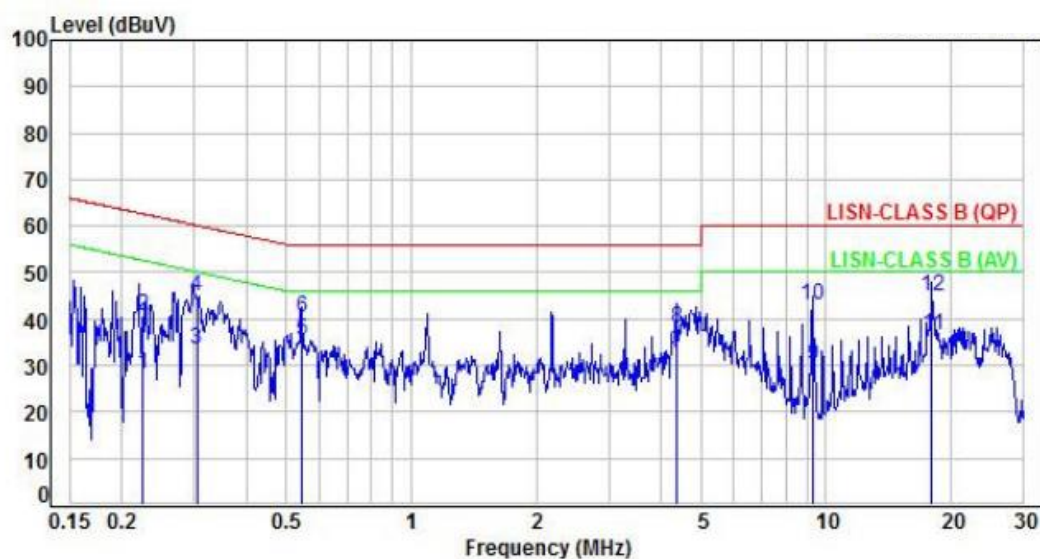
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=(LISN or ISN or Current Probe)Factor + Cable Loss



Power	: AC 120V / 60Hz	Pol/Phase	: NEUTRAL
Test Mode	: Mode 1		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.23	9.95	18.03	27.98	52.62	-24.64	Average	P
2	0.23	9.95	30.74	40.69	62.62	-21.93	QP	P
3	0.30	9.95	23.35	33.30	50.15	-16.85	Average	P
4	0.30	9.95	35.07	45.02	60.15	-15.13	QP	P
5	0.55	9.96	25.48	35.44	46.00	-10.56	Average	P
6	0.55	9.96	30.17	40.13	56.00	-15.87	QP	P
7	4.36	10.13	22.42	32.55	46.00	-13.45	Average	P
8	4.36	10.13	28.08	38.21	56.00	-17.79	QP	P
9	9.26	10.28	19.73	30.01	50.00	-19.99	Average	P
10	9.26	10.28	32.84	43.12	60.00	-16.88	QP	P
11	18.00	10.58	25.78	36.36	50.00	-13.64	Average	P
12	18.00	10.58	34.41	44.99	60.00	-15.01	QP	P

Note: Level=Reading+Factor

Margin=Level-Limit

Factor=(LISN or ISN or Current Probe)Factor + Cable Loss



6. Test of Radiated Spurious Emission

6.1 Test Limit

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 measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

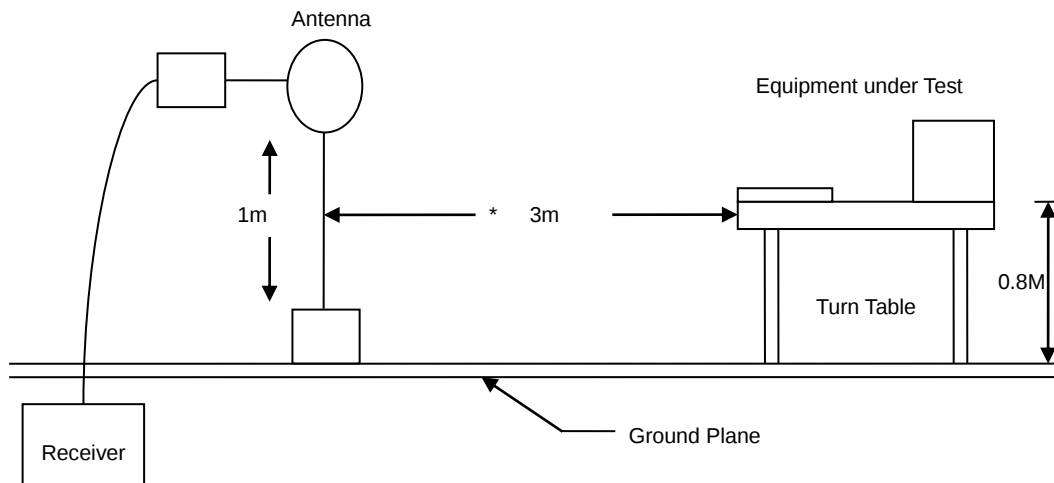
6.2 Test Procedures

- The EUT was placed on a rotatable table top 0.8 meter above ground.
- The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- The table was rotated 360 degrees to determine the position of the highest radiation.
- The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

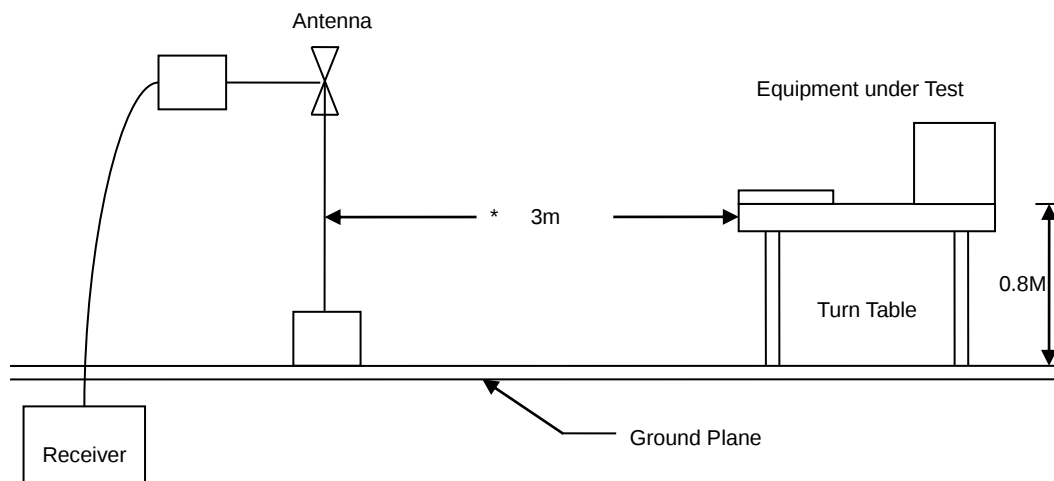


6.3 Typical Test Setup

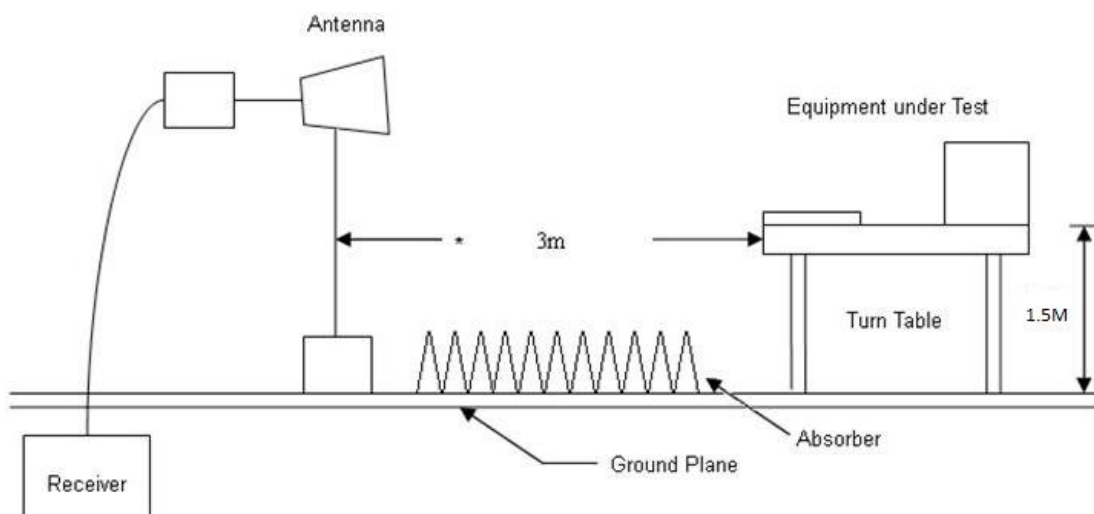
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup



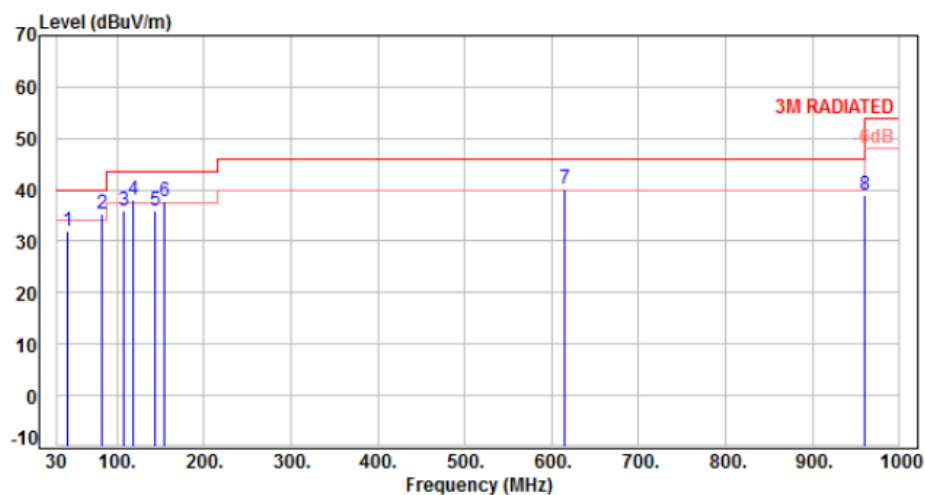


6.4 Test Result and Data (9kHz ~ 30MHz)

The 9kHz-30MHz spurious emission is under limit 20dB more.

6.5 Test Result and Data (30MHz ~ 1GHz)

Power	: AC 120V / 60Hz	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH01		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	42.32	-9.62	41.62	32.00	40.00	-8.00	Peak	400	0	P
2	83.13	-14.47	49.87	35.40	40.00	-4.60	Peak	400	0	P
3	107.00	-13.27	49.11	35.84	43.50	-7.66	Peak	400	0	P
4	119.32	-11.92	50.03	38.11	43.50	-5.39	Peak	400	0	P
5	143.19	-9.71	45.50	35.79	43.50	-7.71	QP	100	0	P
6	155.06	-9.46	47.10	37.64	43.50	-5.86	QP	100	43	P
7	614.00	-1.33	41.50	40.17	46.00	-5.83	Peak	100	360	P
8	960.00	3.66	35.20	38.86	46.00	-7.14	QP	100	0	P

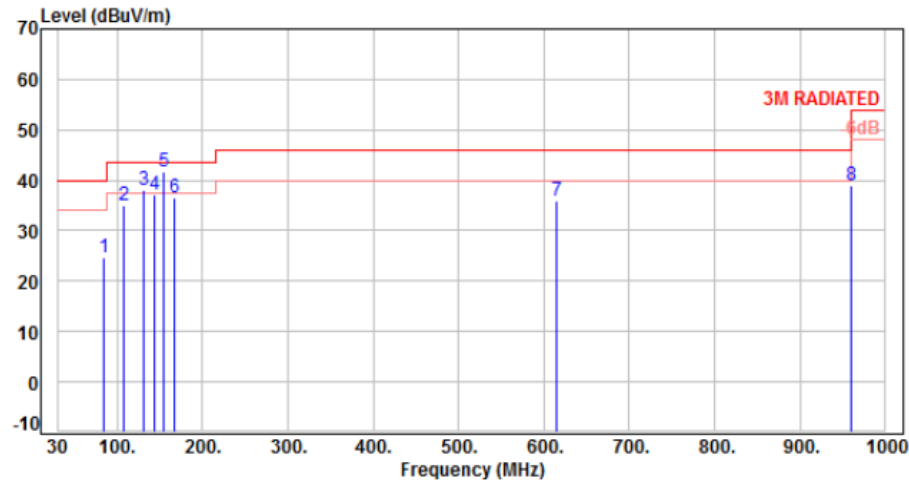
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60Hz	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH01		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBUV)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	83.61	-14.55	39.10	24.55	40.00	-15.45	QP	225	36	P
2	107.00	-13.27	48.40	35.13	43.50	-8.37	QP	320	225	P
3	131.15	-10.74	48.81	38.07	43.50	-5.43	QP	135	35	P
4	143.19	-9.71	46.90	37.19	43.50	-6.31	QP	205	40	P
5	154.98	-9.47	51.30	41.83	43.50	-1.67	QP	180	15	P
6	166.90	-9.38	45.80	36.42	43.50	-7.08	QP	155	20	P
7	614.00	-1.33	37.40	36.07	46.00	-9.93	Peak	100	360	P
8	960.00	3.66	35.20	38.86	46.00	-7.14	QP	100	0	P

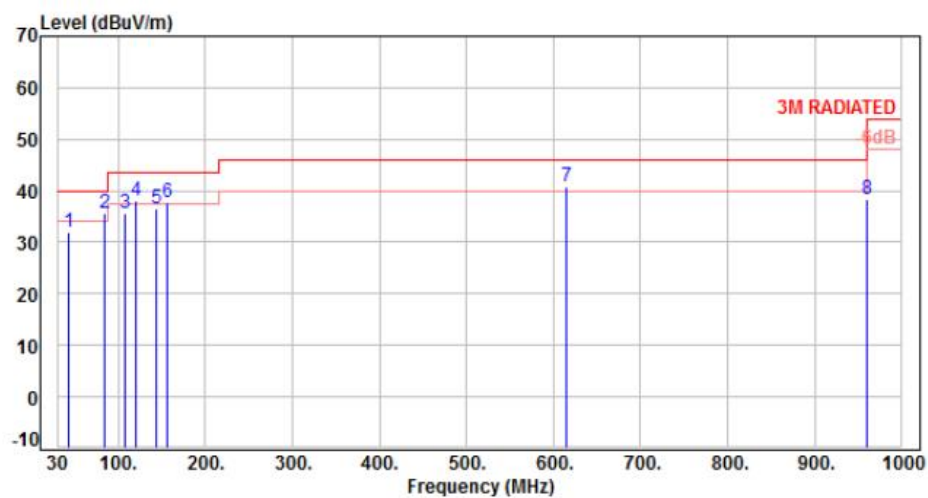
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	:	AC 120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH25		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	42.52	-9.58	41.67	32.09	40.00	-7.91	Peak	400	0	P
2	83.51	-14.53	50.12	35.59	40.00	-4.41	Peak	400	0	P
3	108.00	-13.16	48.72	35.56	43.50	-7.94	Peak	400	0	P
4	120.22	-11.83	49.81	37.98	43.50	-5.52	Peak	400	0	P
5	144.50	-9.71	46.10	36.39	43.50	-7.11	QP	100	0	P
6	156.70	-9.45	47.19	37.74	43.50	-5.76	QP	100	43	P
7	614.00	-1.33	42.10	40.77	46.00	-5.23	Peak	100	360	P
8	960.00	3.66	34.80	38.46	46.00	-7.54	QP	100	0	P

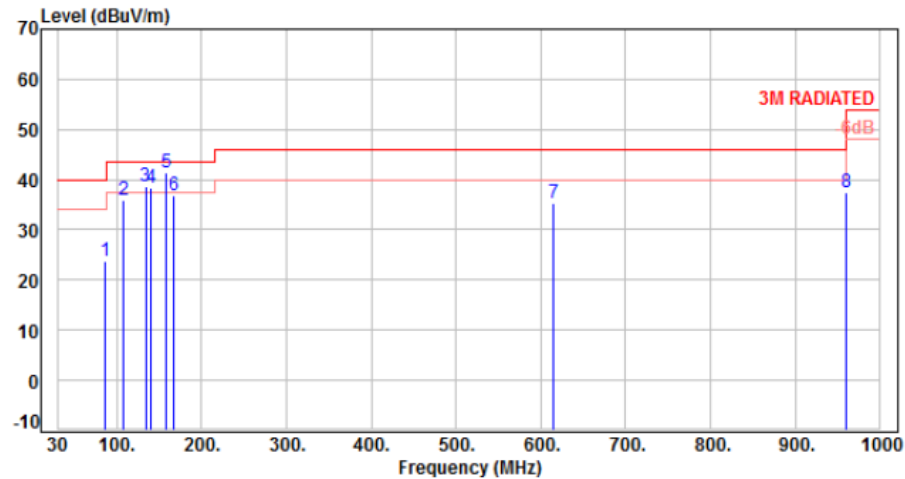
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60Hz	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH25		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	85.54	-14.89	38.59	23.70	40.00	-16.30	QP	225	36	P
2	107.00	-13.27	49.10	35.83	43.50	-7.67	QP	320	225	P
3	133.80	-10.46	49.20	38.74	43.50	-4.76	QP	135	35	P
4	140.85	-9.83	48.20	38.37	43.50	-5.13	QP	205	40	P
5	158.30	-9.42	50.90	41.48	43.50	-2.02	QP	180	15	P
6	167.82	-9.45	46.30	36.85	43.50	-6.65	QP	155	20	P
7	614.00	-1.33	36.80	35.47	46.00	-10.53	Peak	100	360	P
8	960.00	3.66	33.90	37.56	46.00	-8.44	QP	100	0	P

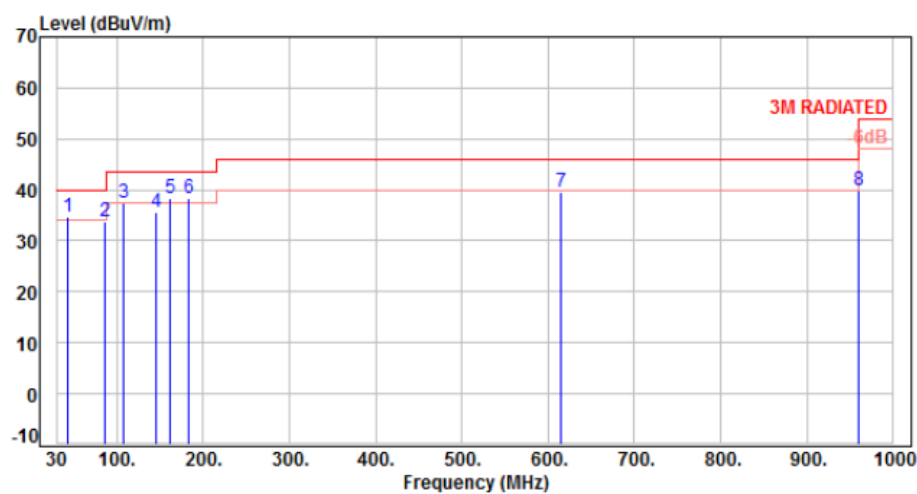
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60Hz	Pol/Phase	: VERTICAL
Test Mode	: Mode 1, CH50		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	43.57	-9.43	44.23	34.80	40.00	-5.20	Peak	400	0	P
2	85.69	-14.92	48.82	33.90	40.00	-6.10	Peak	400	0	P
3	107.00	-13.27	50.76	37.49	43.50	-6.01	Peak	400	0	P
4	144.91	-9.71	45.30	35.59	43.50	-7.91	QP	100	0	P
5	161.26	-9.40	47.70	38.30	43.50	-5.20	QP	100	43	P
6	183.62	-11.36	49.75	38.39	43.50	-5.11	Peak	400	0	P
7	614.00	-1.33	40.90	39.57	46.00	-6.43	Peak	100	360	P
8	960.00	3.66	36.10	39.76	46.00	-6.24	QP	100	0	P

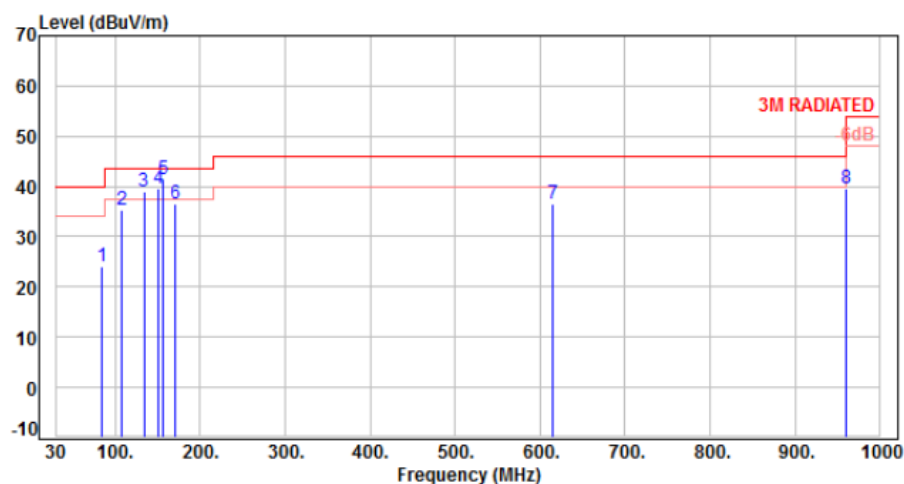
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60Hz	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH50		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	83.76	-14.58	38.50	23.92	40.00	-16.08	QP	225	36	P
2	107.00	-13.27	48.63	35.36	43.50	-8.14	QP	320	225	P
3	133.82	-10.46	49.50	39.04	43.50	-4.46	QP	135	35	P
4	151.60	-9.58	49.10	39.52	43.50	-3.98	QP	205	40	P
5	155.72	-9.46	50.80	41.34	43.50	-2.16	QP	180	15	P
6	170.00	-9.65	46.30	36.65	43.50	-6.85	QP	155	20	P
7	614.00	-1.33	37.80	36.47	46.00	-9.53	Peak	100	360	P
8	960.00	3.66	35.80	39.46	46.00	-6.54	QP	100	0	P

Note: Level=Reading+Factor

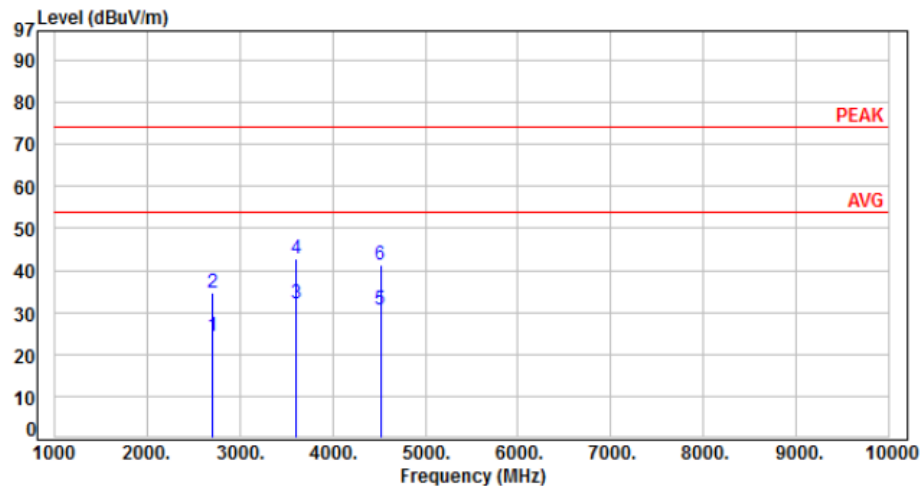
Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



6.6 Test Result and Data (1GHz ~ 25GHz)

Power	:	AC 120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH01		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2709.72	-13.10	37.27	24.17	54.00	-29.83	Average	100	300	P
2	2709.72	-13.10	47.84	34.74	74.00	-39.26	Peak	100	300	P
3	3612.96	-9.53	41.64	32.11	54.00	-21.89	Average	100	185	P
4	3612.96	-9.53	52.21	42.68	74.00	-31.32	Peak	100	185	P
5	4516.20	-7.60	38.27	30.67	54.00	-23.33	Average	100	150	P
6	4516.20	-7.60	48.84	41.24	74.00	-32.76	Peak	100	150	P

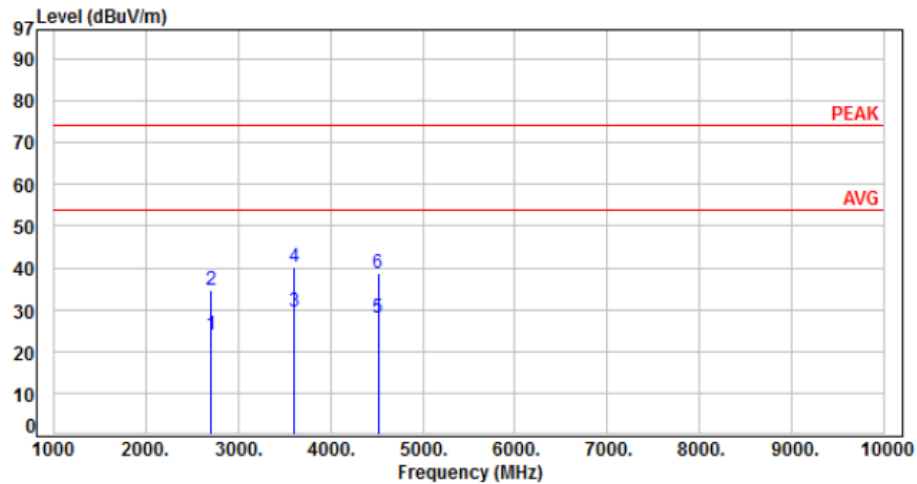
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60Hz	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH01		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2709.72	-13.10	37.21	24.11	54.00	-29.89	Average	100	150	P
2	2709.72	-13.10	47.78	34.68	74.00	-39.32	Peak	100	150	P
3	3612.96	-9.53	39.20	29.67	54.00	-24.33	Average	100	0	P
4	3612.96	-9.53	49.77	40.24	74.00	-33.76	Peak	100	0	P
5	4516.20	-7.60	35.80	28.20	54.00	-25.80	Average	100	0	P
6	4516.20	-7.60	46.37	38.77	74.00	-35.23	Peak	100	0	P

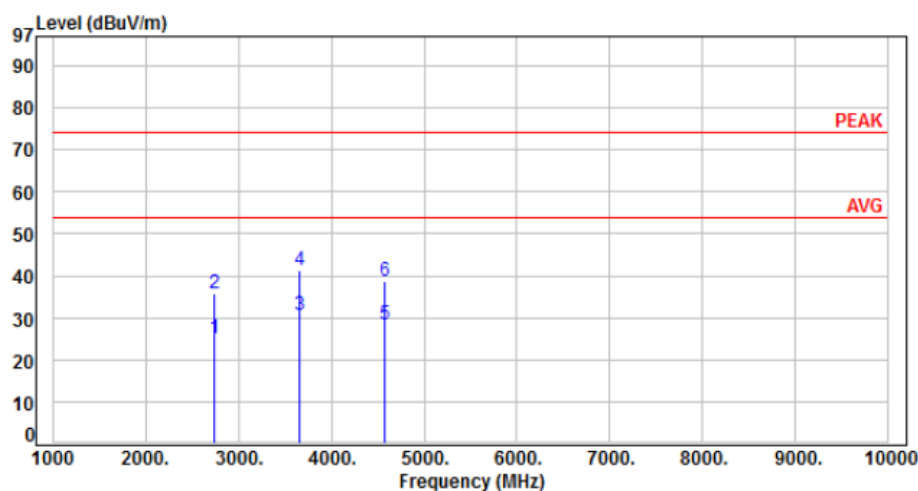
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	:	AC 120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH25		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBUV)	Level (dBUV/m)	Limit (dBUV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2744.28	-12.94	38.16	25.22	54.00	-28.78	Average	400	285	P
2	2744.28	-12.94	48.73	35.79	74.00	-38.21	Peak	400	285	P
3	3659.04	-9.35	39.97	30.62	54.00	-23.38	Average	100	180	P
4	3659.04	-9.35	50.54	41.19	74.00	-32.81	Peak	100	180	P
5	4573.80	-7.44	35.71	28.27	54.00	-25.73	Average	400	130	P
6	4573.80	-7.44	46.28	38.84	74.00	-35.16	Peak	400	130	P

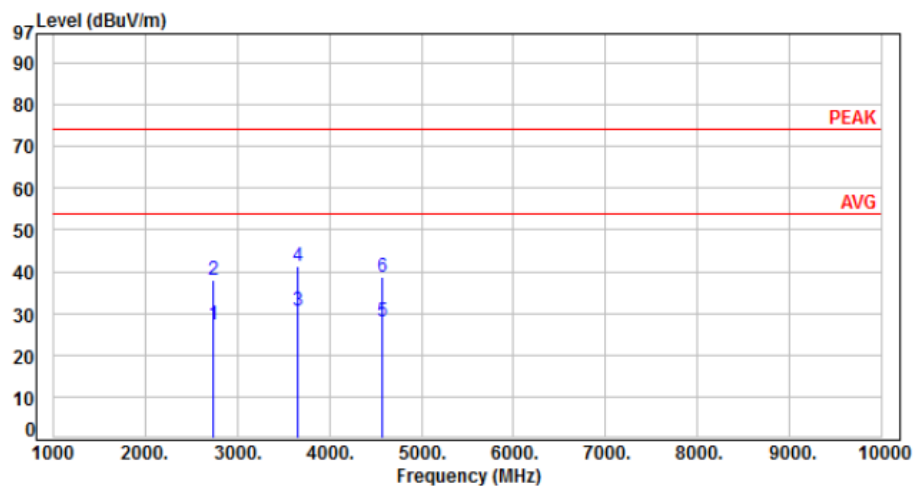
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60Hz	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH25		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2744.28	-12.94	40.28	27.34	54.00	-26.66	Average	400	330	P
2	2744.28	-12.94	50.85	37.91	74.00	-36.09	Peak	400	330	P
3	3659.04	-9.35	40.03	30.68	54.00	-23.32	Average	400	250	P
4	3659.04	-9.35	50.60	41.25	74.00	-32.75	Peak	400	250	P
5	4573.80	-7.44	35.54	28.10	54.00	-25.90	Average	400	120	P
6	4573.80	-7.44	46.11	38.67	74.00	-35.33	Peak	400	120	P

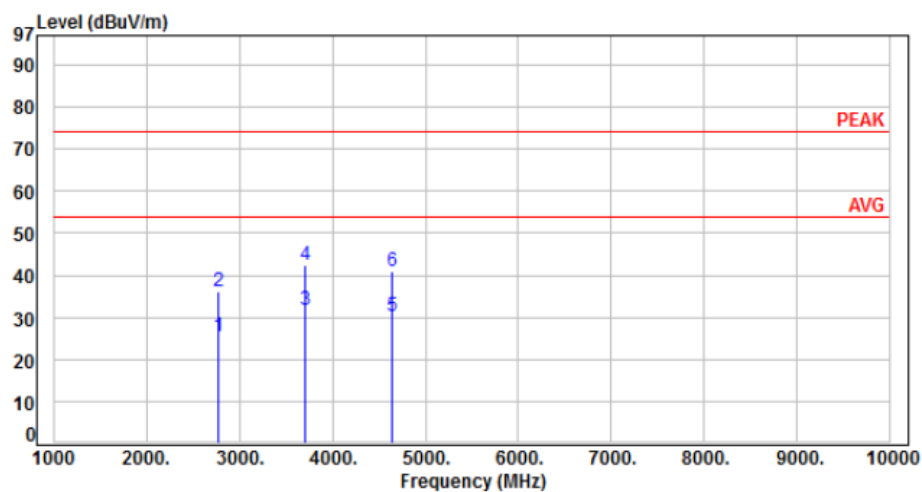
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	:	AC 120V / 60Hz	Pol/Phase	:	VERTICAL
Test Mode	:	Mode 1, CH50		:	



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2780.28	-12.78	38.39	25.61	54.00	-28.39	Average	400	160	P
2	2780.28	-12.78	48.96	36.18	74.00	-37.82	Peak	400	160	P
3	3707.04	-9.18	40.85	31.67	54.00	-22.33	Average	100	320	P
4	3707.04	-9.18	51.42	42.24	74.00	-31.76	Peak	100	320	P
5	4633.80	-7.26	37.64	30.38	54.00	-23.62	Average	400	125	P
6	4633.80	-7.26	48.21	40.95	74.00	-33.05	Peak	400	125	P

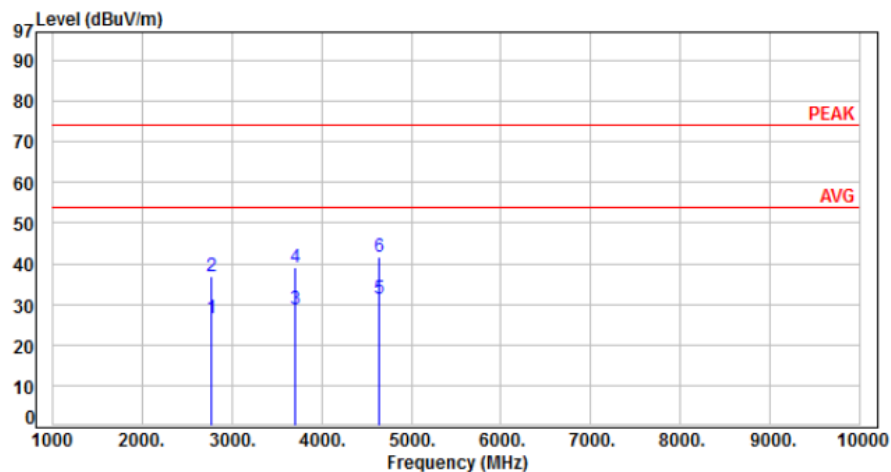
Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



Power	: AC 120V / 60Hz	Pol/Phase	: HORIZONTAL
Test Mode	: Mode 1, CH50		:



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg)	P/F
1	2780.24	-12.78	39.27	26.49	54.00	-27.51	Average	400	320	P
2	2780.24	-12.78	49.84	37.06	74.00	-36.94	Peak	400	320	P
3	3707.04	-9.18	37.81	28.63	54.00	-25.37	Average	400	205	P
4	3707.04	-9.18	48.38	39.20	74.00	-34.80	Peak	400	205	P
5	4633.80	-7.26	38.51	31.25	54.00	-22.75	Average	400	175	P
6	4633.80	-7.26	49.08	41.82	74.00	-32.18	Peak	400	175	P

Note: Level=Reading+Factor

Margin=Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor



6.7 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.250
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz



7. Test of Conducted Spurious Emission

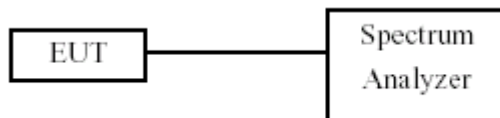
7.1 Test Limit

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

7.2 Test Procedure

- The transmitter output was connected to the spectrum analyzer via a low loss cable.
- Set both RBW and VBW of spectrum analyzer to 100 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
- The band edges was measured and recorded.

7.3 Test Setup Layout

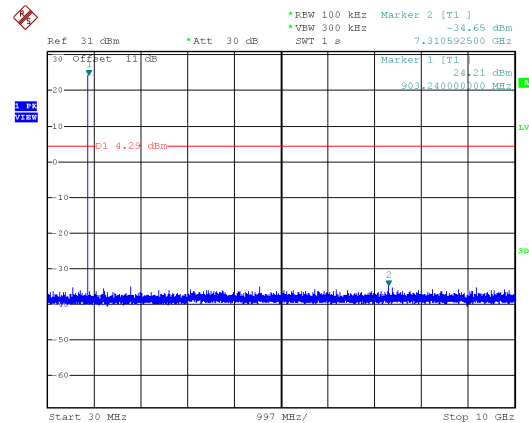
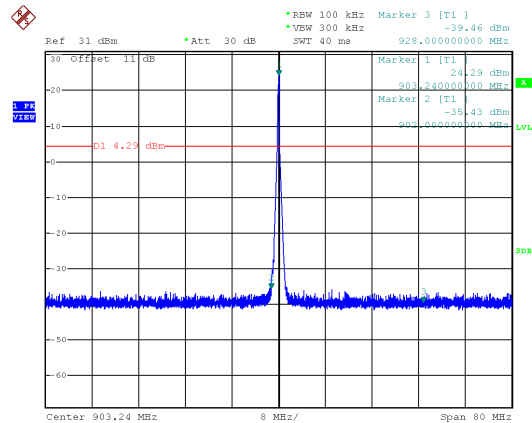


7.4 Test Result and Data

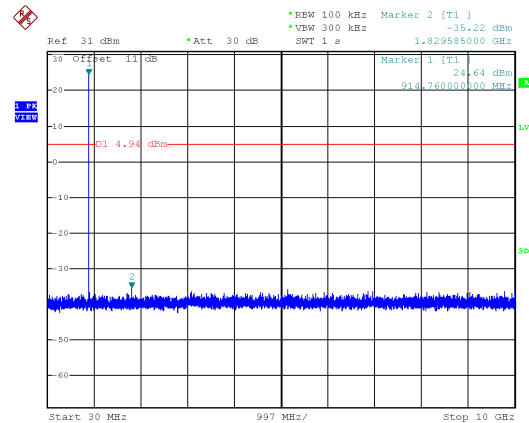
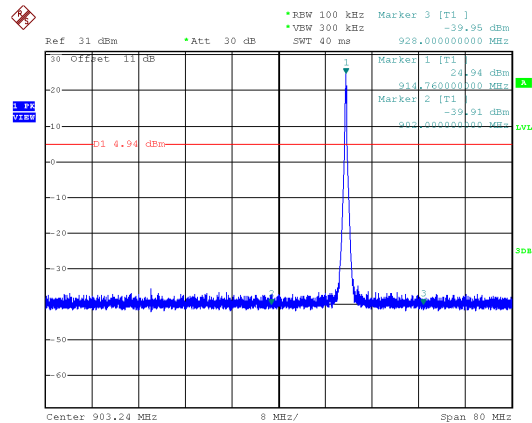
Note: Test plots refer to the following pages.



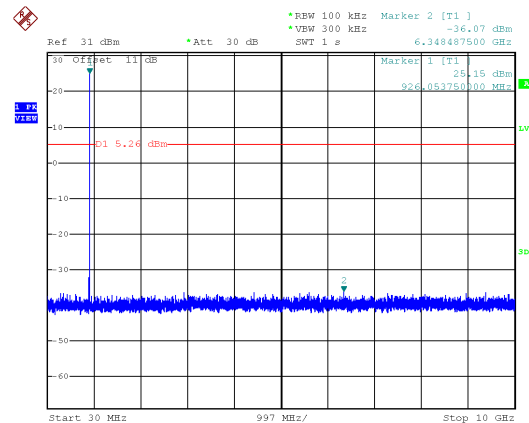
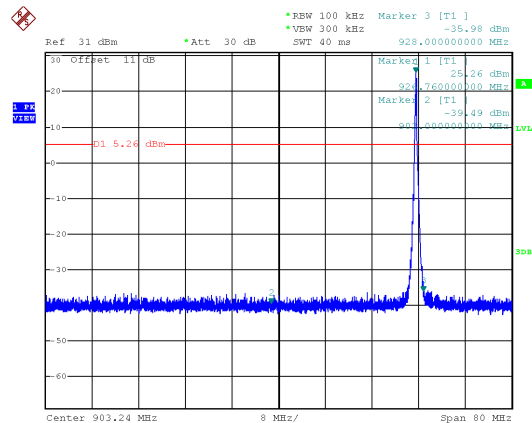
Modulation Mode: ASK
CH01



CH25

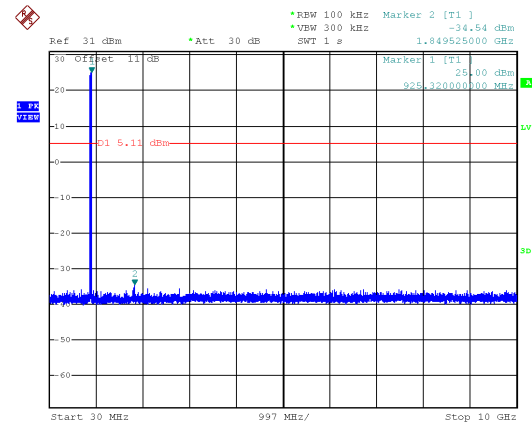
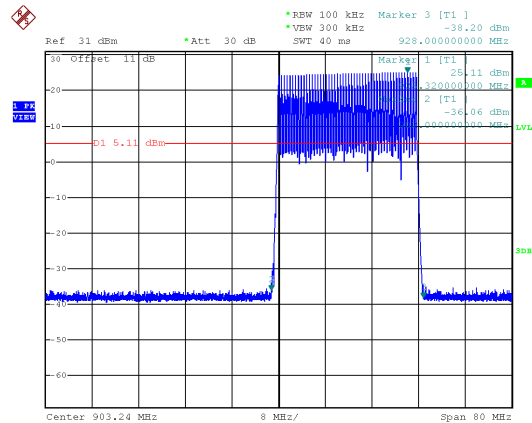


CH50





Modulation Mode: ASK
Hopping





8. 20dB Bandwidth Measurement Data

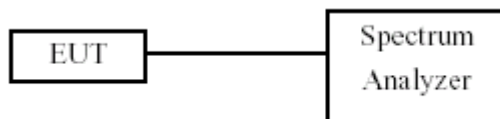
8.1 Test Limit

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz..

8.2 Test Procedures

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 30 KHz and VBW to 100 KHz.
- The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

8.3 Test Setup Layout

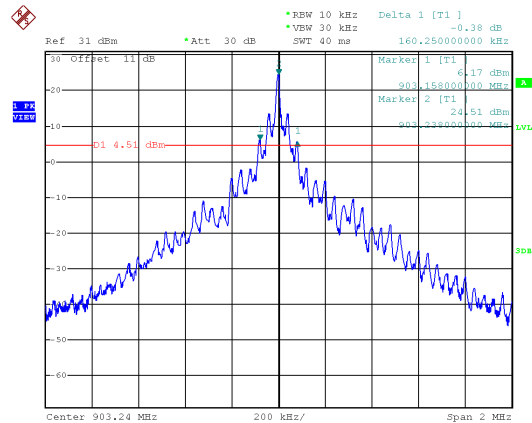


8.4 Test Result and Data

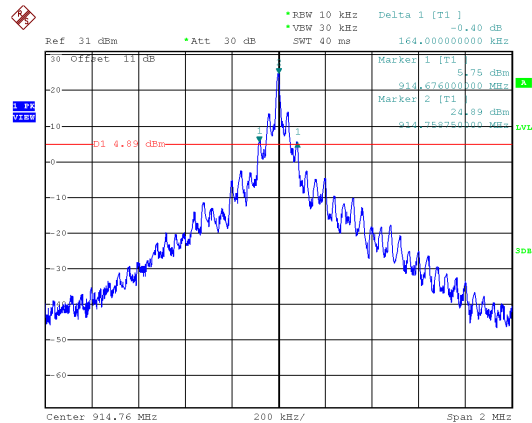
Modulation Mode	Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)
ASK	1	903.24	0.160
	25	914.76	0.164
	50	926.76	0.164



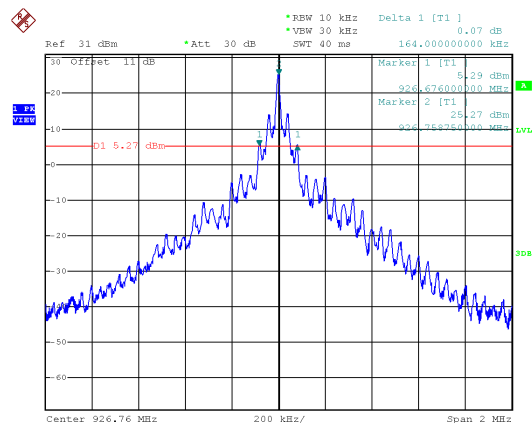
Modulation Mode: ASK
CH01



CH25



CH50





9. Frequencies Separation

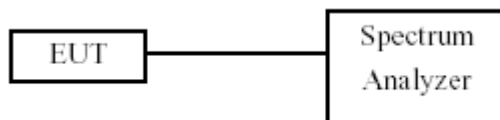
9.1 Test Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

9.2 Test Procedures

- The transmitter output was connected to the spectrum analyzer.
- Set RBW of spectrum analyzer to 30 KHz and VBW to 100 KHz.
- By using the MaxHold function record the separation of two adjacent channels.
- Measure the frequency difference of these two adjacent channels.

9.3 Test Setup Layout

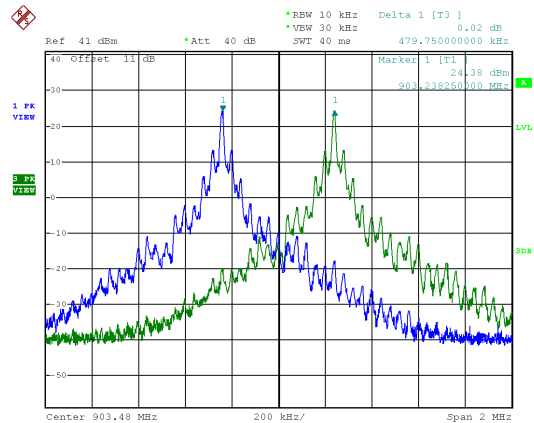


9.4 Test Result and Data

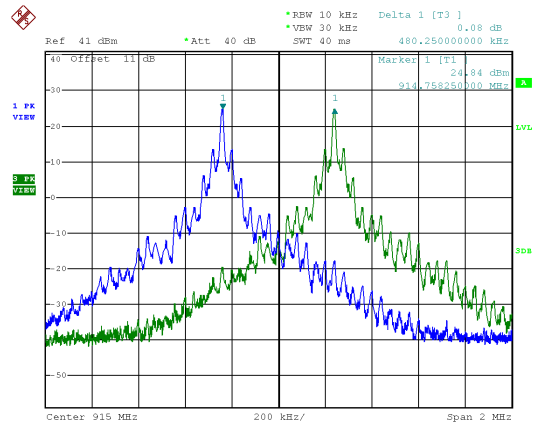
Modulation Mode	Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
ASK	1	903.24	0.48	0.160
	25	914.76	0.48	0.164
	50	926.76	0.48	0.164



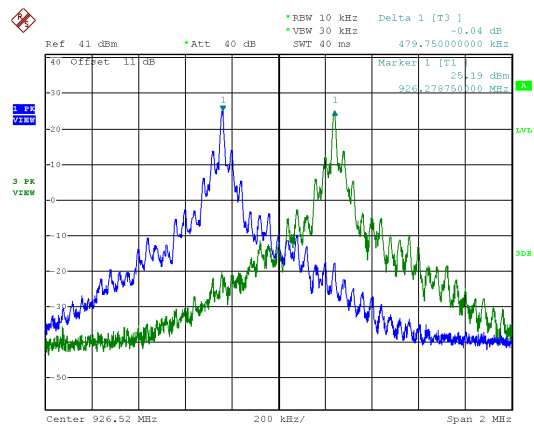
Modulation Mode: ASK
CH01



CH25



CH50





10. Dwell Time on each channel

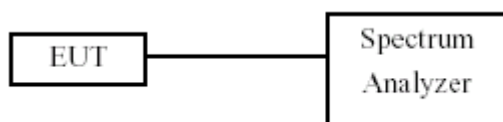
10.1 Test Limit

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 the number of hopping channels employed.

10.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer.
2. Adjust the center frequency to measure frequency, then set zero span mode.
2. Set RBW of spectrum analyzer to 1 MHz and VBW to 1 MHz.
4. Measure the time duration of one transmission on the measured frequency.

10.3 Test Setup Layout

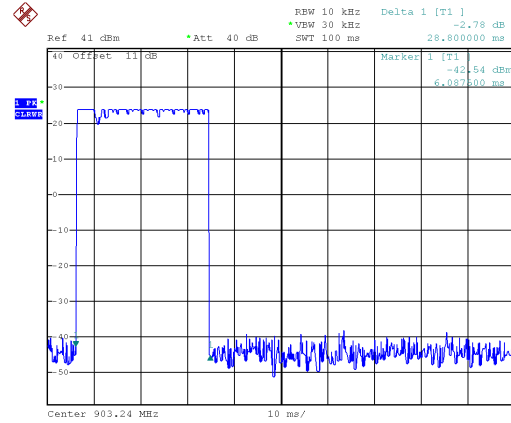
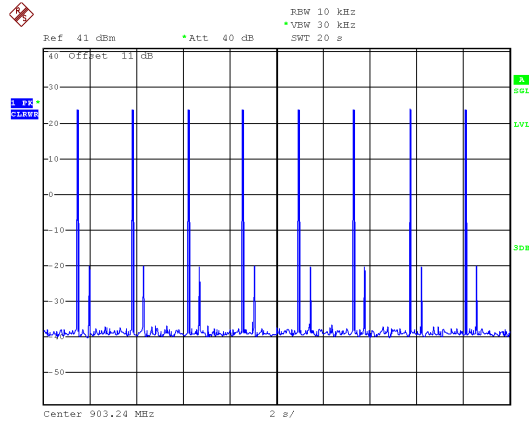


10.4 Test Result and Data

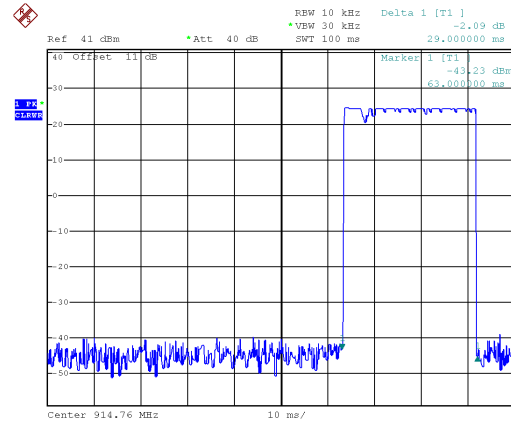
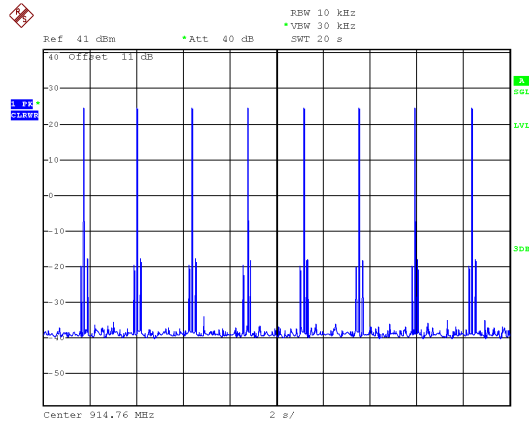
Channel	Channel Frequency (MHz)	Length of transmission time (ms)	Number of transmission in a 20 sec	Dwell Time(ms)	Limit (ms)
1	903.24	28.800	8.00	230.40	400
25	914.76	29.000	8.00	232.00	400
50	926.76	29.200	8.00	233.60	400



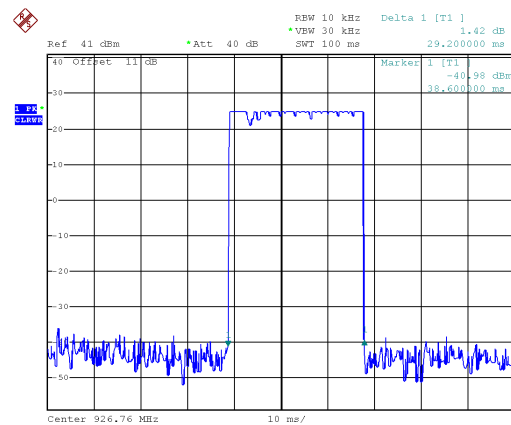
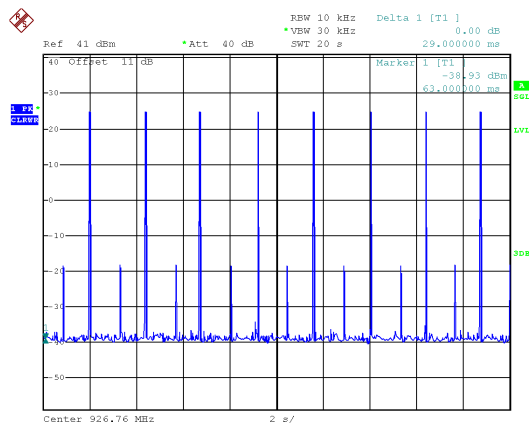
Modulation Type: ASK CH01



CH25



CH50





11. Number of Hopping Channels

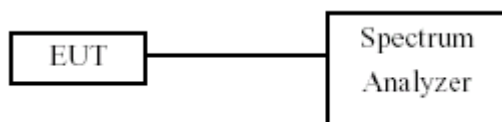
11.1 Test Limit

Frequency hopping systems in the 902 ~ 928MHz band shall use at least 50 channels.

11.2 Test Procedures

- a. The transmitter output was connected to the spectrum analyzer.
- b. 2. Set RBW of spectrum analyzer to 100 KHz and VBW to 100 KHz.
- c. 3. Set the MaxHold function, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been record.

11.3 Test Setup Layout

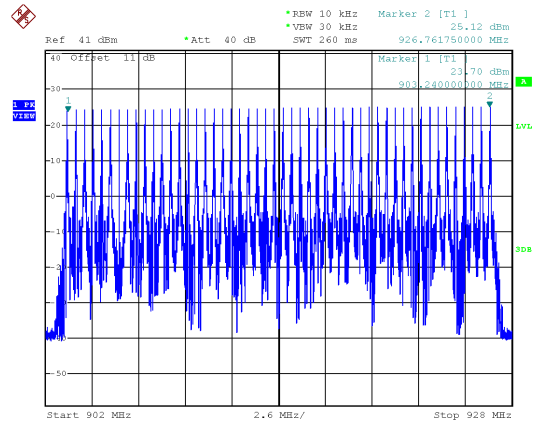


11.4 Test Result and Data

Modulation Type	Hopping Channels
ASK	50



Modulation Mode: ASK





12. Maximum Peak Output Power

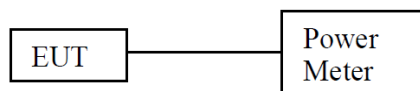
12.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

12.2 Test Procedures

The antenna port(RF output)of the EUT was connected to the input(RF input)of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

12.3 Test Setup Layout





12.4 Test Result and Data

ANT A

Modulation Type	Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (mW)
ASK	1	903.24	23.87	243.781
	25	914.76	24.59	287.740
	50	926.76	25.02	317.687

Modulation Type	Channel	Frequency (MHz)	Average Output Power (dBm)	Average Output Power (mW)
ASK	1	903.24	23.82	240.991
	25	914.76	24.55	285.102
	50	926.76	24.97	314.051

Note: Average power is for reference only.

ANT B

Modulation Type	Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (mW)
ASK	1	903.24	24.04	253.513
	25	914.76	24.67	293.089
	50	926.76	25.12	325.087

Modulation Type	Channel	Frequency (MHz)	Average Output Power (dBm)	Average Output Power (mW)
ASK	1	903.24	24	251.189
	25	914.76	24.62	289.734
	50	926.76	25.07	321.366

Note: Average power is for reference only.

ANT C

Modulation Type	Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (mW)
ASK	1	903.24	24.15	260.016
	25	914.76	24.75	298.538
	50	926.76	25.14	326.588

Modulation Type	Channel	Frequency (MHz)	Average Output Power (dBm)	Average Output Power (mW)
ASK	1	903.24	24.1	257.040
	25	914.76	24.7	295.121
	50	926.76	25.09	322.849

Note: Average power is for reference only.



ANT D

Modulation Type	Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (mW)
ASK	1	903.24	24.11	257.632
	25	914.76	24.7	295.121
	50	926.76	25.11	324.340

Modulation Type	Channel	Frequency (MHz)	Average Output Power (dBm)	Average Output Power (mW)
ASK	1	903.24	24.07	255.270
	25	914.76	24.65	291.743
	50	926.76	25.05	319.890

Note: Average power is for reference only.



13. Radio Frequency Exposure

The measurements shown in this test report were made in accordance with the procedures given in

FCC Part 2 (Section 2.1091)

KDB 447498

IEEE C95.1

13.1 EUT Specification

Frequency band (Operating)	902MHz~928MHz
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation)
Exposure classification	☐ Occupational/Controlled exposure ☒ General Population/Uncontrolled exposure
Antenna diversity	☐ Single antenna ☒ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☒ Tx/Rx diversity
Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark:

1. The maximum conducted output power is 25.14dBm (326.588mW) at 926.76MHz (with 7dBi antenna gain.)
2. DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
3. For mobile or fixed location transmitters, no SAR consideration applied.

*Note: Simultaneous transmission is not applicable for this EUT.

13.2 Test Results

No non-compliance noted.



13.3 Calculation

$$\text{Given } E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{3770}$$

Where E = Field strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

$P \text{ (mW)} = P \text{ (W)} / 1000$ and

$d \text{ (cm)} = d \text{ (m)} / 100$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \textbf{Equation 1}$$

Where d = Distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power density in mW / cm²

**13.4 Maximum Permissible Exposure**

Channel Frequency (MHz)	Max. Conducted output power(dBm)	Antenna Gain(dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
903.24	24.15	7	20	0.259	0.602
914.76	24.75	7	20	0.298	0.610
926.76	25.14	7	20	0.326	0.618