
FCC Test Report

Report No.: AGC02170230702FR02

FCC ID : 2AANZAIR2

APPLICATION PURPOSE : Class II Equipment

PRODUCT DESIGNATION : QUIRKY AIR

BRAND NAME : QUIRKY

MODEL NAME : QKY-AIR, QKY-AIR-5, QKY-AIR-5-BLK, EU-QKY-AIR,
EU-QKY-AIR-5, EU-QKY-AIR-7

APPLICANT : DGL Group LTD.

DATE OF ISSUE : Aug. 04, 2023

STANDARD(S) : FCC Part 15.407

TEST PROCEDURE(S) : KDB 789033 D02 v02r01

REPORT VERSION : V1.0

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug. 04, 2023	Valid	Initial Release

Note:

The original test report AGC01559190905FE06 (dated Oct. 21, 2019 and tested from Sep. 12, 2019 to Sep. 20, 2019) was modified on Aug. 04, 2023, including the following changes and additions:

- Changed the address of the applicant and Manufacturer;
- Added the name and address of the factory;
- Reduced the series model;
- Optimize charging port grounding;
- Change in product appearance color.

For the above described change(s) the following tests was considered to be necessary:

Clause	Testing
15.209	Radiated Emission
15.207	Line Conduction Emission

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1. VERIFICATION OF CONFORMITY

Applicant	DGL Group LTD.
Address	2045 Lincoln Highway, 3rd Floor, Edison, NJ 08817, United States
Manufacturer	DGL Group LTD.
Address	2045 Lincoln Highway, 3rd Floor, Edison, NJ 08817, United States
Factory	Asimom Technology Co., Ltd
Address	1/F Block C , No.431 Yangxin Road, Yangyong Village, Dalang Town, Dongguan, 523770, China
Product Designation	QUIRKY AIR
Brand Name	QUIRKY
Test Model	QKY-AIR
Series Model	QKY-AIR-5, QKY-AIR-5-BLK, EU-QKY-AIR, EU-QKY-AIR-5, EU-QKY-AIR-7
Model Difference	All the same except for the model name and different appearance color
Date of receipt of test item	Jul. 28, 2023
Date of test	Jul. 28, 2023 to Aug, 04, 2023
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BGN/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.

Prepared By



Alan Duan
(Project Engineer)

Aug, 04, 2023

Reviewed By



Calvin Liu
(Reviewer)

Aug, 04, 2023

Approved By



Max Zhang
(Authorized Officer)

Aug, 04, 2023

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as “QUIRKY AIR”. It is designed by way of utilizing the GFSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	5727 MHz~5800MHz
Output Power(Max)	9.21dBm
Modulation	GFSK
Number of channels	16
Hardware Version	V1.1
Software Version	V1.0
Antenna Designation	FPC Antenna
Number of transmit chain	1
Antenna Gain	0.5dBi
Power Supply	DC 3.7V by battery or DC 5V by adapter

2.2. TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency	Channel Number	Frequency
5727 MHz~5800MHz	1	5727	9	5767
	2	5731	10	5771
	3	5734	11	5774
	4	5738	12	5778
	5	5749	13	5789
	6	5753	14	5793
	7	5756	15	5796
	8	5760	16	5800

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2.3. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AANZAIR2** filing to comply with the FCC Part 15 requirements.

2.4. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013).

Radiated testing was performed at an antenna to EUT distance 3 meters.

Others testing (listed at item 5.3) was performed according to the procedures in FCC Part 15.407 rules KDB 789033 D02

2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.7. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, $U_c = \pm 2.9$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.9$ dB

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4. DESCRIPTION OF TEST MODES

Mode	Available channel	Tested channel	Date rate(Mbps)
GFSK	1~16	1,8,16	1

Note:

1. The EUT has been set to operate continuously on tested channel individually, and the EUT is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.
3. Use engineering instruction set the EUT into the individual test modes.

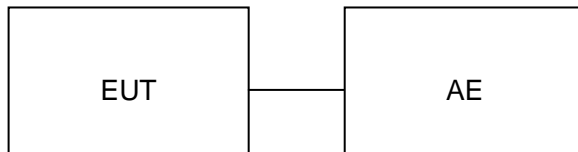
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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure 1:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	QUIRKY AIR	QKY-AIR	2AANZAIR2	EUT
2	Xiaomi phone	Mi 10	N/A	AE
3	Huawei adapter	HW-200325CP0	N/A	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.209	Radiated Emission	Compliant
§15.207	Line Conduction Emission	Compliant

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun. 03, 2023	Jun. 02, 2024
LISN	R&S	ESH2-Z5	100086	Jun. 03, 2023	Jun. 02, 2024
Test software	FARA	EZ-EMC (Ver. AGC-CON03A1)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Feb. 18, 2023	Feb. 17, 2024
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Jun. 01, 2023	May 31, 2024
5GHz Fliter	EM Electronics	5150-5880MHz	N/A	Mar. 18, 2022	Mar. 19, 2024
Attenuator	ZHINAN	E-002	N/A	Aug. 04, 2022	Aug. 03, 2024
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Oct. 31, 2021	Oct. 30, 2023
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Apr. 23, 2023	Apr. 22, 2024
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 01, 2022	Sep. 02, 2024
ANTENNA	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 05, 2023	Jan. 04, 2025
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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7. RADIATED EMISSION

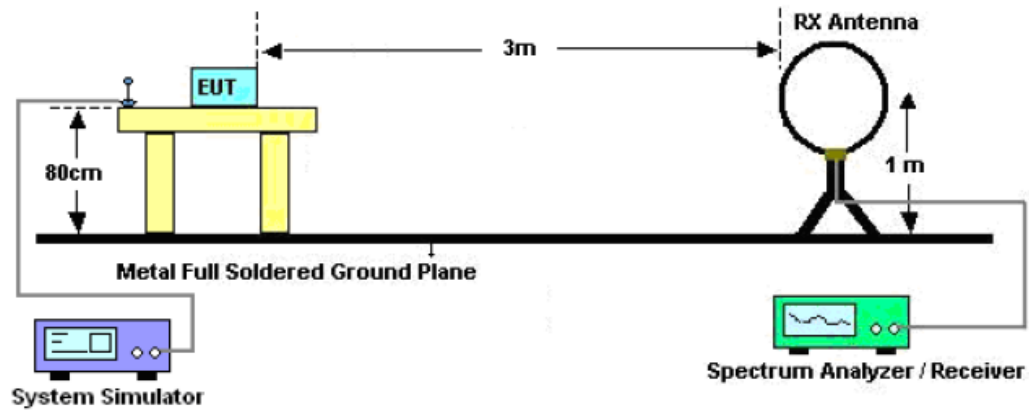
7.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3M VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. 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. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average 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 for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions 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.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

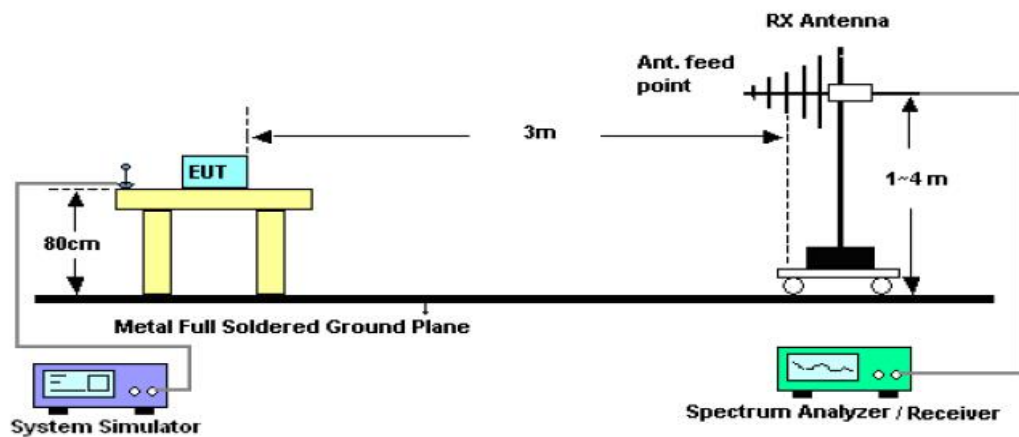
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7.2. TEST SETUP

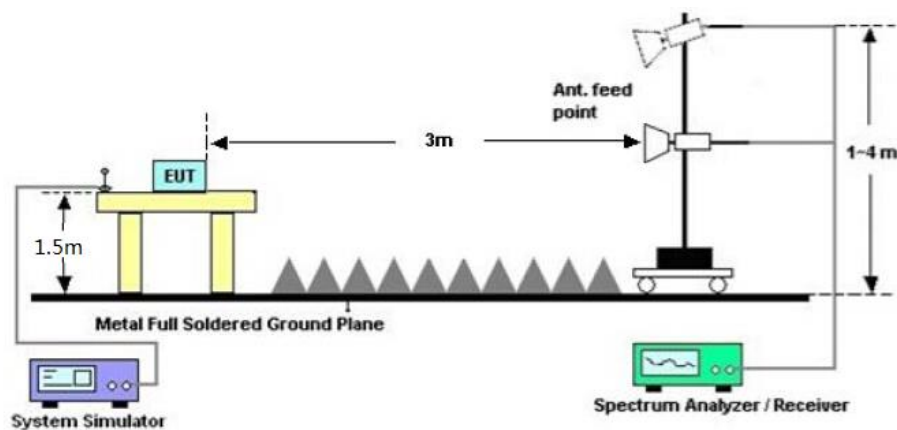
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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7.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/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

Note: All modes were tested For restricted band radiated emission,
the test records reported below are the worst result compared to other modes.

7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

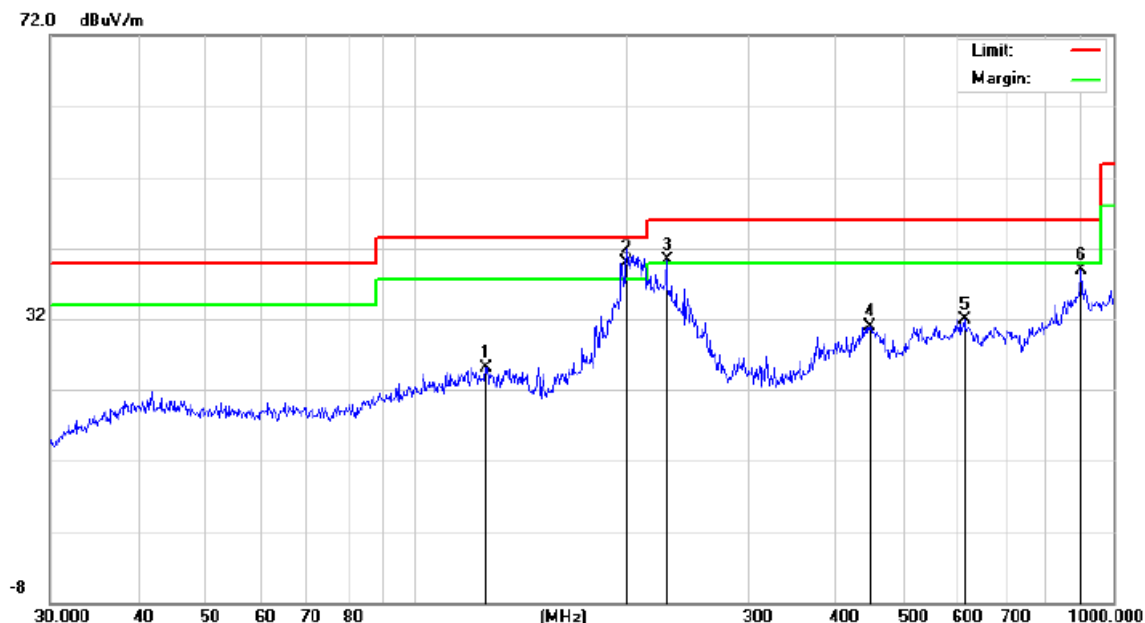
No emission found between lowest internal used/generated frequencies to 30MHz.

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RADIATED EMISSION BELOW 1GHZ

EUT	QUIRKY AIR	Model Name	QKY-AIR
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	5727MHz	Antenna	Horizontal



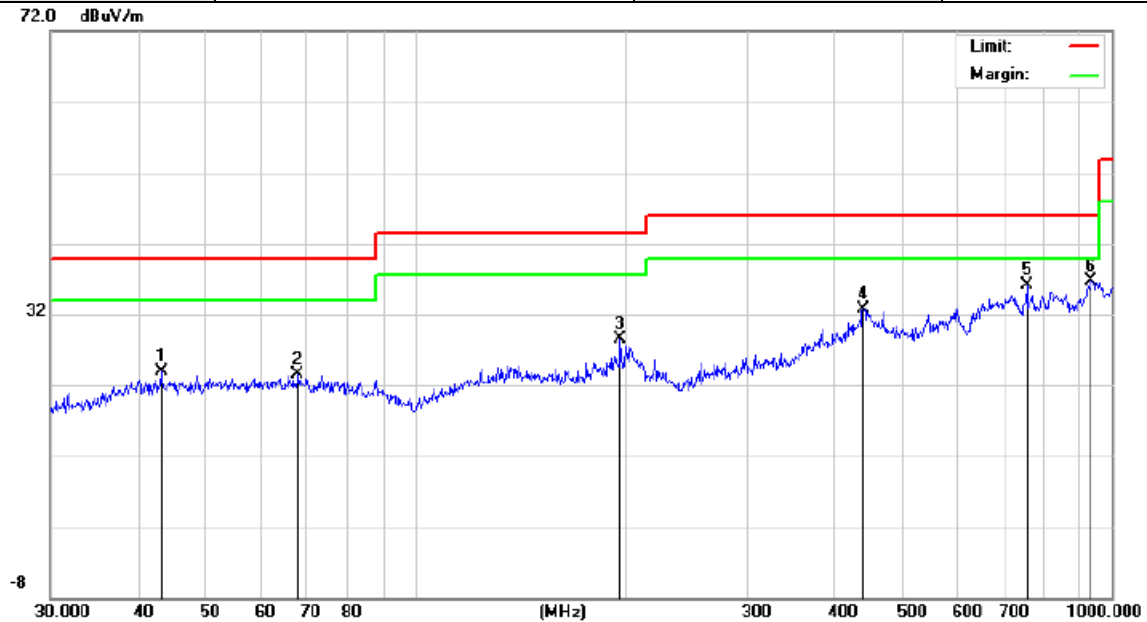
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		126.3285	9.10	16.02	25.12	43.50	-18.38	peak
2	*	200.6881	25.41	14.50	39.91	43.50	-3.59	QP
3	!	229.2931	25.44	14.86	40.30	46.00	-5.70	peak
4		447.9821	6.17	24.82	30.99	46.00	-15.01	peak
5		612.0642	6.73	25.16	31.89	46.00	-14.11	peak
6		900.1471	7.09	31.78	38.87	46.00	-7.13	peak

RESULT: PASS

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EUT	QUIRKY AIR	Model Name	QKY-AIR
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	5727MHz	Antenna	Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		43.2017	7.00	16.93	23.93	40.00	-16.07	peak
2		67.9128	6.43	17.02	23.45	40.00	-16.55	peak
3		197.1999	10.60	17.98	28.58	43.50	-14.92	peak
4		440.1963	6.59	26.09	32.68	46.00	-13.32	peak
5		755.3872	8.13	27.90	36.03	46.00	-9.97	peak
6	*	935.5461	6.24	30.40	36.64	46.00	-9.36	peak

RESULT: PASS

Note: All test channels had been tested. The 5727MHz is the worst case and recorded in the test report.

Factor = Antenna Factor + Cable loss - Amplifier gain, Margin= Limit-Level.

The "Factor" value can be calculated automatically by software of measurement system.

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RADIATED EMISSION ABOVE 1GHZ

EUT	QUIRKY AIR	Model Name	QKY-AIR
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	5727MHz	Antenna	Horizontal/Vertical

RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11454.062	47.25	9.42	56.67	74.00	-17.33	peak
11454.062	37.49	9.42	46.91	54.00	-7.09	AVG
17181.093	41.65	10.51	52.16	68.20	-16.04	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11454.062	46.37	9.42	55.79	74.00	-18.21	peak
11454.062	37.54	9.42	46.96	54.00	-7.04	AVG
17181.093	41.05	10.51	51.56	68.20	-16.64	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT	QUIRKY AIR	Model Name	QKY-AIR
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	5760MHz	Antenna	Horizontal/Vertical

RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11520.062	46.87	9.42	56.29	74.00	-17.71	peak
11520.062	36.49	9.42	45.91	54.00	-8.09	AVG
17280.093	40.58	10.51	51.09	68.20	-17.11	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11520.062	46.33	9.42	55.75	74.00	-18.25	peak
11520.062	37.48	9.42	46.90	54.00	-7.10	AVG
17280.093	41.09	10.51	51.60	68.20	-16.60	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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EUT	QUIRKY AIR	Model Name	QKY-AIR
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	5800MHz	Antenna	Horizontal/Vertical

RADIATED EMISSION ABOVE 1GHZ–Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11600.062	46.29	9.62	55.91	74.00	-18.09	peak
11600.062	36.57	9.62	46.19	54.00	-7.81	AVG
17400.093	41.05	10.75	51.80	68.20	-16.40	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RADIATED EMISSION ABOVE 1GHZ–Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
11600.062	46.25	9.62	55.87	74.00	-18.13	peak
11600.062	37.54	9.62	47.16	54.00	-6.84	AVG
17400.093	40.15	10.75	50.90	68.20	-17.30	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Note: Other frequencies radiation emission from 1GHz to 40GHz at least have 20dB margin and not recorded in the test report.

Factor = Antenna Factor + Cable loss - Amplifier gain, Margin= Limit-Level.

The “Factor” value can be calculated automatically by software of measurement system.

8. FCC LINE CONDUCTED EMISSION TEST

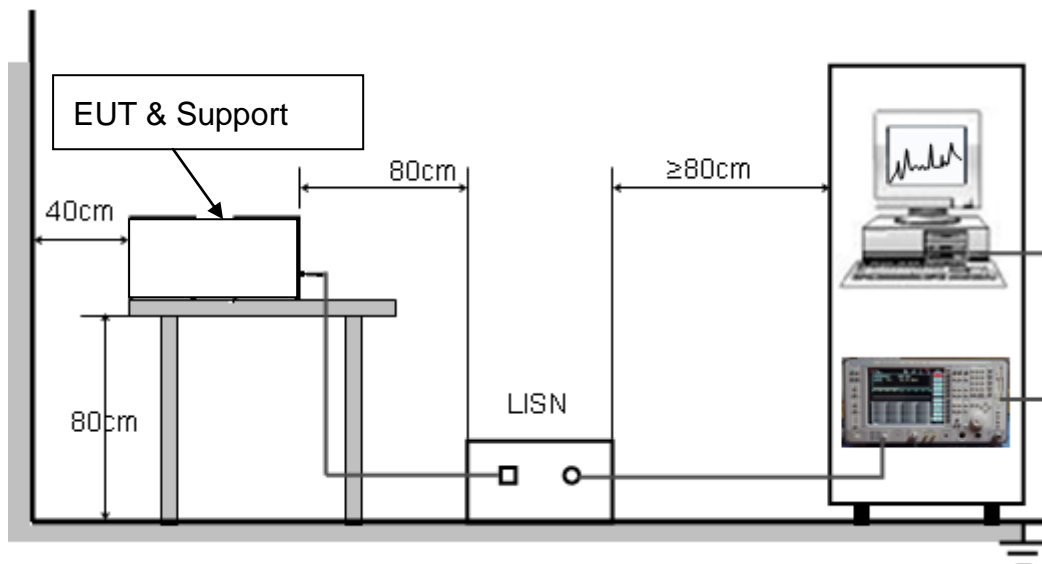
8.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

8.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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8.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received charging voltage by adapter which received 120V/60Hz power by a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

8.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

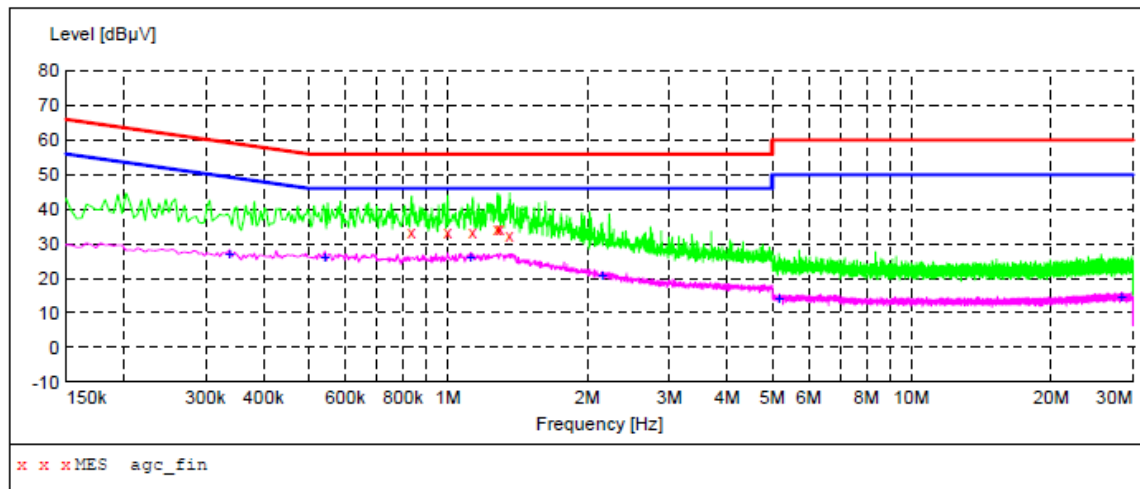
1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

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8.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST-L



MEASUREMENT RESULT: "agc_fin"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.834000	33.10	6.2	56	22.9	QP	L1
0.998000	33.40	6.2	56	22.6	QP	L1
1.130000	33.50	6.2	56	22.5	QP	L1
1.278000	34.10	6.2	56	21.9	QP	L1
1.294000	34.10	6.2	56	21.9	QP	L1
1.358000	32.40	6.2	56	23.6	QP	L1

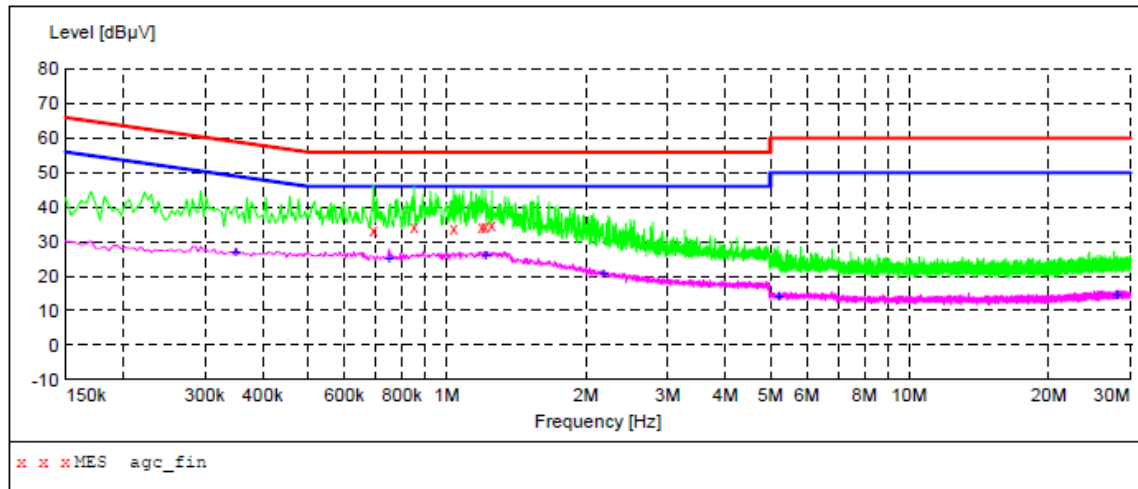
MEASUREMENT RESULT: "agc_fin2"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.338000	27.00	6.1	49	22.3	AV	L1
0.542000	26.20	6.2	46	19.8	AV	L1
1.118000	26.00	6.2	46	20.0	AV	L1
2.150000	20.90	6.2	46	25.1	AV	L1
5.178000	14.30	6.4	50	35.7	AV	L1
28.358000	14.50	8.2	50	35.5	AV	L1

RESULT: PASS

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LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT: "agc_fin"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.694000	33.30	6.2	56	22.7	QP	N
0.850000	34.10	6.2	56	21.9	QP	N
1.034000	34.00	6.2	56	22.0	QP	N
1.190000	34.30	6.2	56	21.7	QP	N
1.210000	34.40	6.2	56	21.6	QP	N
1.250000	34.60	6.2	56	21.4	QP	N

MEASUREMENT RESULT: "agc_fin2"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.350000	27.20	6.1	49	21.8	AV	N
0.750000	25.40	6.2	46	20.6	AV	N
1.214000	26.20	6.2	46	19.8	AV	N
2.182000	20.80	6.3	46	25.2	AV	N
5.226000	14.40	6.4	50	35.6	AV	N
28.010000	14.50	8.2	50	35.5	AV	N

RESULT: PASS

Note: All the test modes had been tested, the 5727MHz was the worst case. Only the data of the worst case would be record in this test report.

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APPENDIX I: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC02170230702AP01

APPENDIX II: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC02170230702AP02

----END OF REPORT----

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