



EMC TEST REPORT

No. 140401227SHA-005

Applicant : G-Lab GmbH
Schiffbaustrasse 10, 8005, Zurich, Switzerland

Factory : Hansong(Nanjing) Technology Ltd
8th Kangping Road, Jiangning Economy&Technology
Development Zone, Nanjing, 211106, China

Product Name : GENEVA

Product description : Amplified speaker

Type/Model : A020

TEST RESULT : PASS

SUMMARY

The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2013): Radio Frequency Devices

ANSIC63.4 (2009): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

RSS-210 Issue 8 (December 2010): Low-power Licence-exempt Radio communication Devices (All Frequency Bands): Category I Equipment

RSS-Gen Issue 3 (December 2010): General Requirements and Information for the Certification of Radio communication Equipment

Date of issue: Sep 09, 2014

Prepared by:

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Reviewed by:

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FCC ID: ZXX-A020
IC: 10107A-A020

Description of Test Facility

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1. General Information

1.1 Applicant Information

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Factory : Hansong(Nanjing) Technology Ltd
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Development Zone, Nanjing, 211106, China

1.2 Identification of the EUT

Equipment : GENEVA
Product description : Amplified speaker
Trade name : GENEVA
Type/model : A020
FCC ID : ZXX-A020
IC : 10107A-A020

1.3 Technical specification

Operation Frequency : 2402~2480 MHz
Band
Type of Modulation : Bluetooth V3.0 (FHSS)
Channel Description : There are 79 channels in all. The designed channel spacing is 1MHz.
Gain of Antenna : 1.0dBi
Description of EUT : There is one model only. The EUT is a Bluetooth audio device.
Port identification : power port 1;
Audio In port 1.
Rating : AC100-240V, 50/60Hz, 120W, Class II apparatus
Declared Temperature : 5°C ~ 40°C
range
Category of EUT : Class B
EUT type : ☒ Table top ☐ Floor standing
Sample received date : 2014.04.16
Sample Identification : 0140416-04-002
No
Date of test : 2014.04.16~2014.06.13

1.4 Mode of operation during the test / Test peripherals used

Within this test report, EUT was tested with modulation and tested under its rating voltage and frequency.

The test setting software is offered by the manufactory. The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases.

The worst case modulation configuration:

Worst Modulation Used for Conformance Testing			
Bluetooth Mode	Data Rate	Modulation Mode	Worst Mode
BR	1 Mbps	BR-1Mbps	EDR-3Mbps
EDR	2 Mbps	EDR-2Mbps	
EDR	3 Mbps	EDR-3Mbps	
Note 1: Modulation modes consist of BR-1Mbps, EDR-2Mbps, EDR-3Mbps FHSS BR-1Mbps: GFSK (1Mbps), EDR-2Mbps: $\pi/4$ -DQPSK (2Mbps), EDR-3Mbps: 8DPSK(3Mbps)			



The power setting parameter:

The worst case power setting parameter			
Test software Version	V01		
Modulation Mode	2402MHz	2441MHz	2480MHz
EDR-3Mbps	default	default	default

Test Peripherals:

Equipment	Brand Name	Model	Note
Notebook	HP	6470b	

2. Test Specification

2.1 Instrument list

Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
Test Receiver	ESCS 30	R&S	EC 2107	2013-10-21	2014-10-20
Test Receiver	ESIB 26	R&S	EC 3045	2013-10-21	2014-10-20
Test Receiver	ESCI 7	R&S	EC4501	2013-12-29	2014-12-28
Spectrum Analyzer	N9010	Agilent	EC4890	2013-10-21	2014-10-20
Power meter	ML 2495A	Anritsu	EC 4895	2013-10-21	2014-10-20
A.M.N.	ESH2-Z5	R&S	EC 3119	2014-1-9	2015-1-8
Bilog Antenna	CBL 6112D	TESEQ	EC 4206	2014-5-15	2015-5-14
Horn antenna	HF 906	R&S	EC 3049	2014-5-12	2015-5-11
Pre-amplifier	Pre-amp 18	R&S	EC 3222	2014-4-11	2015-4-10
Pre-amplifier	Tpa0118-40	R&S	EC 4792-2	2014-4-11	2015-4-10
Log-period antenna	AT 1080	AR	EC 3044-7	2014-5-21	2015-5-20
Biconical antenna	3109PX	ETS	EC3564	2013-8-25	2014-8-24
Semi-anechoic chamber	-	Albatross project	EC 3048	2014-5-20	2015-5-19
Shielded room	-	Zhongyu	EC 2838	2014-1-12	2015-1-9
Shielded room	-	Zhongyu	EC 2839	2014-1-12	2015-1-9
High Pass Filter	WHKX 1.0/15G-10SS	Wainwright	EC4297-1	2014-2-1	2015-1-31
High Pass Filter	WHKX 2.8/18G-12SS	Wainwright	EC4297-2	2014-2-1	2015-1-31
High Pass Filter	WHKX 7.0/1.8G-8SS	Wainwright	EC4297-3	2014-2-1	2015-1-31
Loop Antenna	9230-1	Schwarzbeck	086814	2013-12-16	2014-12-15

2.2 Test Standard

47CFR Part 15 (2013);
ANSI C63.4 (2009);
RSS-210 Issue 8 (December 2010);
RSS-Gen Issue 3 (December 2010).

2.3 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERENCE	IC REFERENCE	RESULT
Radiated emission	15.249 & 15.209	RSS-210 Issue 8 Annex A2.9 & Clause 2.2	Pass
Assigned bandwidth (20dB bandwidth)	15.215(c)	-	Pass
Occupied bandwidth	-	RSS-Gen Issue 3 Clause 4.6.1	Pass
Power line conducted emission	15.207	RSS-Gen Issue 3 Clause 7.2.4	NA

3. Radiated emission

Test result: **PASS**

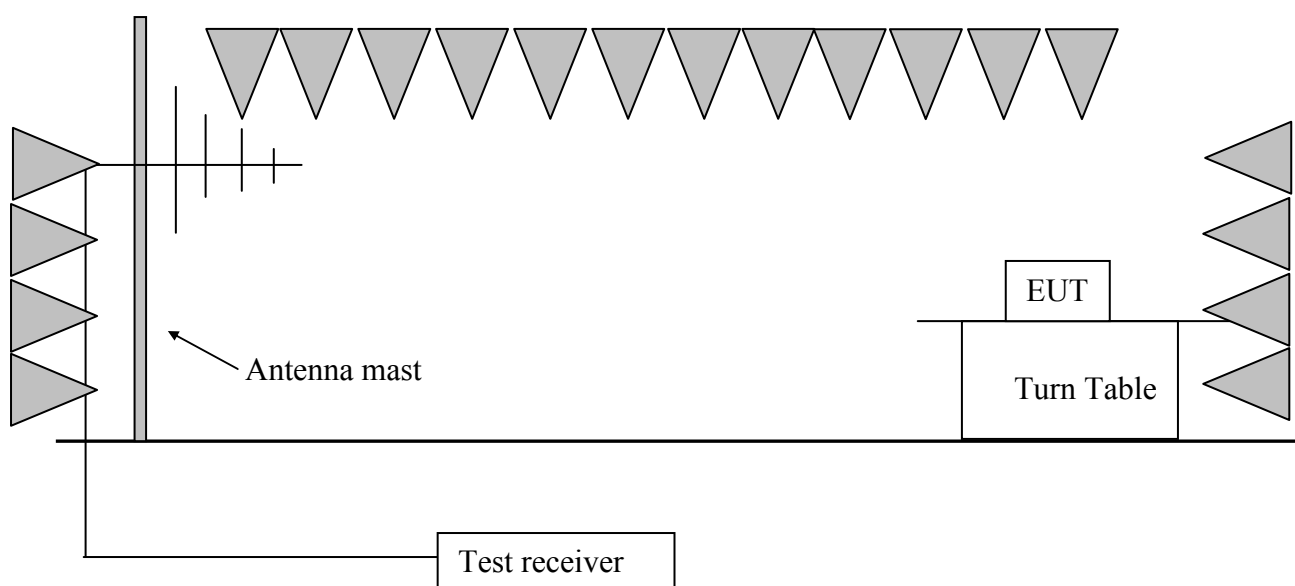
3.1 Test limit

Fundamental Frequency (MHz)	Fundamental limit (dBuV/m)	Harmonic limit (dBuV/m)
☐ 902 - 928	94	54
☒ 2400 - 2483.5	94	54
☐ 5725 - 5875	94	54
☐ 24000 - 24250	108	68

The radiated emissions which fall outside allocated band (2400-2483.5MHz),, must also comply with the radiated emission limits specified in §15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

3.2 Test Configuration



3.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.

The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW=300 Hz, VBW=1 kHz (9 kHz~150 kHz);
RBW=10kHz, VBW=30kHz (150kHz~30MHz);
RBW = 100 kHz, VBW = 300 kHz (30MHz~1GHz for PK)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);
RBW = 1MHz, VBW = 10Hz (>1GHz for AV);
RBW 3MHz used for fundamental emission.

3.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

CH	Antenna	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
L	H	2402.00	34.50	88.30	94.00	5.70	PK
	H	148.58	14.50	35.10	43.50	8.40	PK
	H	214.67	12.20	37.80	43.50	5.70	PK
	H	306.03	15.60	35.70	46.00	10.30	PK
	V	30.00	22.00	33.80	40.00	6.20	QP
	V	40.00	17.90	32.80	40.00	7.20	QP
	V	49.44	11.30	30.50	40.00	9.50	QP
	V	96.09	13.60	32.40	43.50	11.10	QP
	H	2400.00	34.40	55.40	74.00	18.60	PK
	H	2400.00	34.40	33.50	54.00	20.50	AV
	V	3182.76	-8.10	42.40	54.00	11.60	PK
	H	4804.22	-3.60	58.70	74.00	15.30	PK
	H	4804.23	-3.60	42.50	54.00	11.50	AV
	H	9088.23	4.70	47.20	54.00	6.80	PK
M	H	2441.00	34.60	87.60	94.00	6.40	PK
	H	148.58	14.50	35.10	43.50	8.40	PK
	H	214.67	12.20	37.80	43.50	5.70	PK
	H	306.03	15.60	35.70	46.00	10.30	PK
	V	30.00	22.00	33.80	40.00	6.20	QP
	V	40.00	17.90	32.80	40.00	7.20	QP
	V	49.44	11.30	30.50	40.00	9.50	QP
	V	96.09	13.60	32.40	43.50	11.10	QP
	H	2363.44	34.30	55.20	74.00	18.80	PK
	H	2377.54	34.40	34.70	54.00	19.30	AV
	H	3378.33	-7.40	45.30	54.00	8.70	PK
	H	4883.32	-3.30	55.50	74.00	18.50	PK
	H	4883.32	-3.30	34.70	54.00	19.30	AV
	H	9088.16	4.70	45.80	54.00	8.20	PK
H	H	2480.00	34.70	88.20	94.00	5.80	PK
	H	148.58	14.50	35.10	43.50	8.40	PK
	H	214.67	12.20	37.80	43.50	5.70	PK
	H	306.03	15.60	35.70	46.00	10.30	PK
	V	30.00	22.00	33.80	40.00	6.20	QP
	V	40.00	17.90	32.80	40.00	7.20	QP
	V	49.44	11.30	30.50	40.00	9.50	QP
	V	96.09	13.60	32.40	43.50	11.10	QP
	H	2483.50	34.70	53.50	74.00	20.50	PK
	H	2483.50	34.70	35.30	54.00	18.70	AV
	H	3294.27	-5.20	43.30	54.00	10.70	PK
	H	4823.44	-3.50	40.50	54.00	13.50	PK
	H	4963.24	-3.10	57.70	74.00	16.30	PK
	H	4960.64	-3.10	39.00	54.00	15.00	AV
	H	9088.13	4.70	45.50	54.00	8.50	PK

Remark:

1. For fundamental emission test, no pre-amplifier is employed;
2. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed);
3. Corrected Reading = Original Receiver Reading + Correct Factor;
4. Margin = limit – Corrected Reading;
5. If the PK reading is lower than AV limit, the AV test can be elided;
6. The shaded data is the fundamental emission;
7. Both emissions on “horizontal” and “vertical” axes were assessed and the worse test data was listed in this report;

Example:

Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV,
Then Correct Factor = $30.20 + 2.00 - 32.00 = 0.20\text{dB/m}$,
Corrected Reading = $10\text{dBuV} + 0.20\text{dB/m} = 10.20\text{dBuV/m}$,
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m,
Then Margin = $54 - 10.20 = 43.80\text{dBuV/m}$.

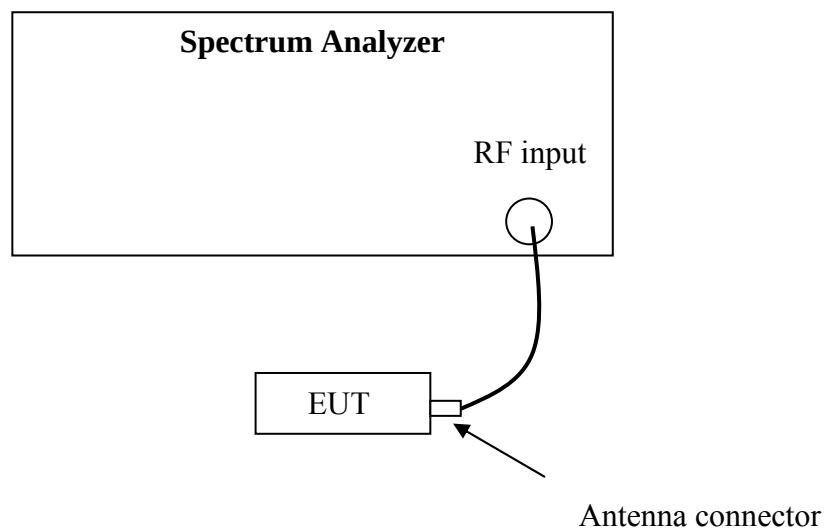
4. Assigned bandwidth (20dB bandwidth)

Test result: PASS

4.1 Limit

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emission is contained within the allocated frequency band as clause 3.1 shows.

4.2 Test Configuration



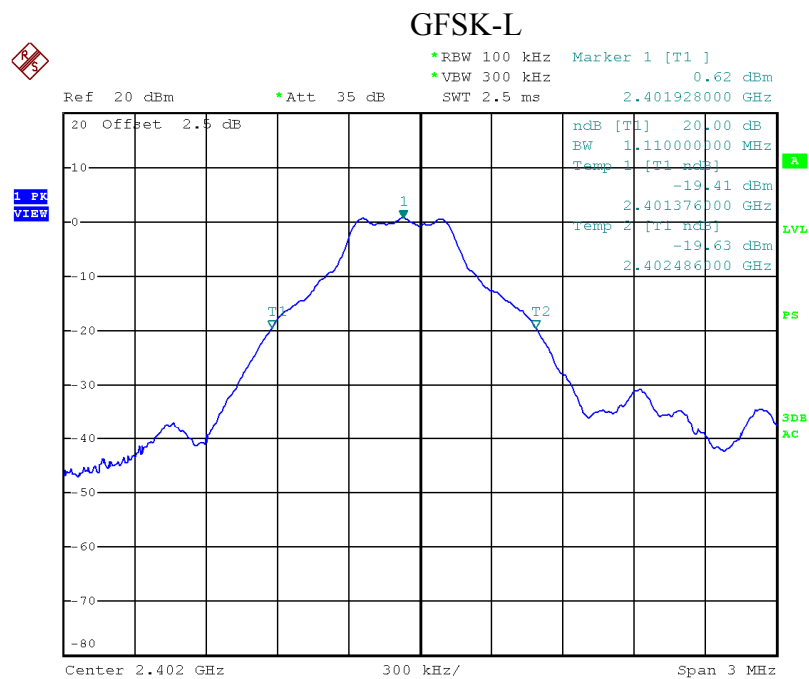
4.3 Test procedure and test setup

The 20dB Bandwidth per FCC § 15.215(c) is measured using the Spectrum Analyzer. Set Span = 2 to 3 times the 20 dB bandwidth, $RBW \geq 1\%$ of the 20 dB bandwidth, $VBW \geq RBW$, Sweep = auto, Detector = peak, Trace = max hold. The test was performed at 3 channels (lowest, middle and highest channel).

4.4 Test protocol

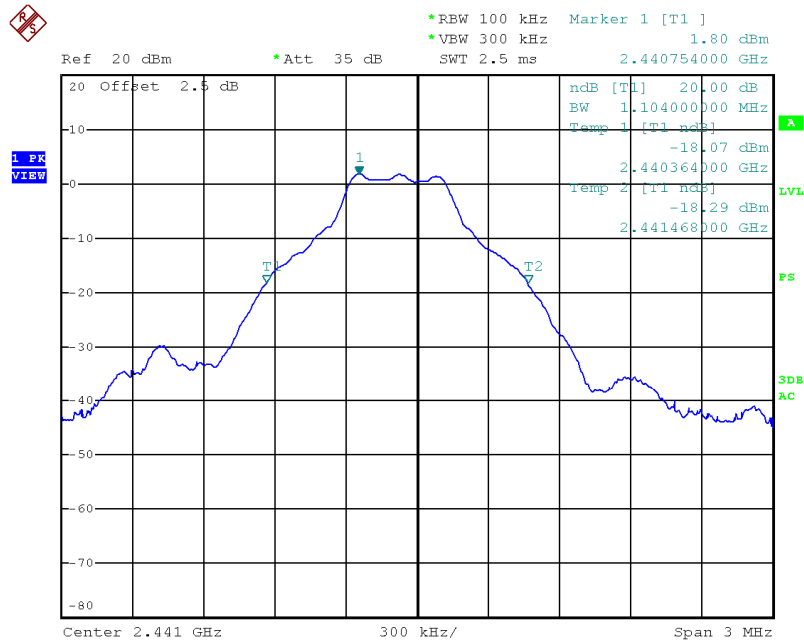
Temperature : 25°C
Relative Humidity : 55 %

Mode	Channel	20dB Bandwidth (kHz)	F _L (MHz)	F _H (MHz)
GFSK	L	1110	2401.376	-
	M	1104	-	-
	H	1110	-	2480.468
8DPSK	L	1368	2401.244	-
	M	1374	-	-
	H	1374	-	2480.606



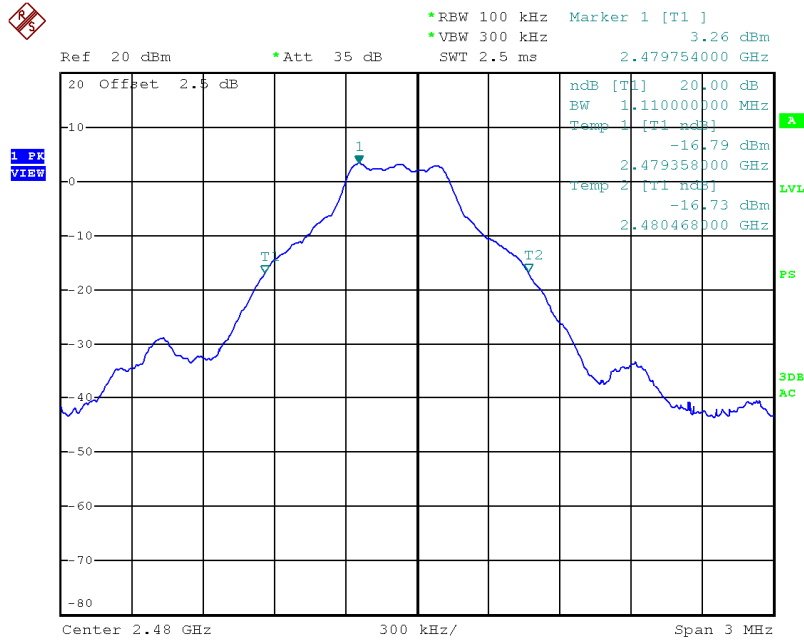
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GFSK-M

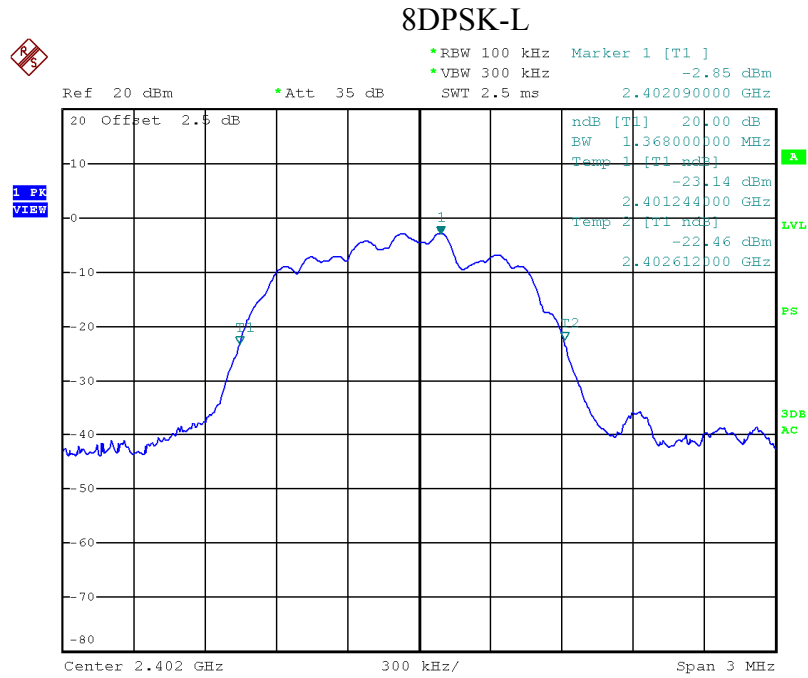


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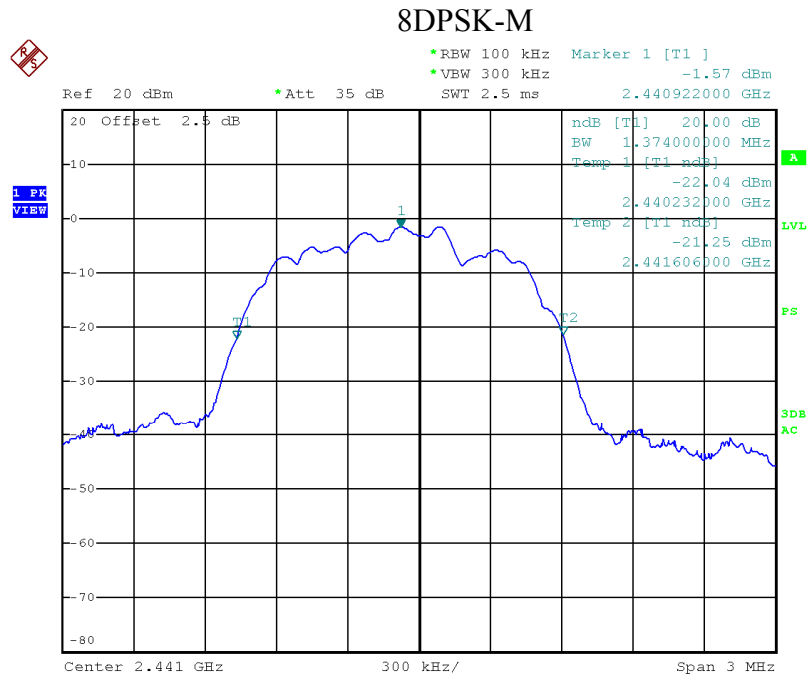
GFSK-H



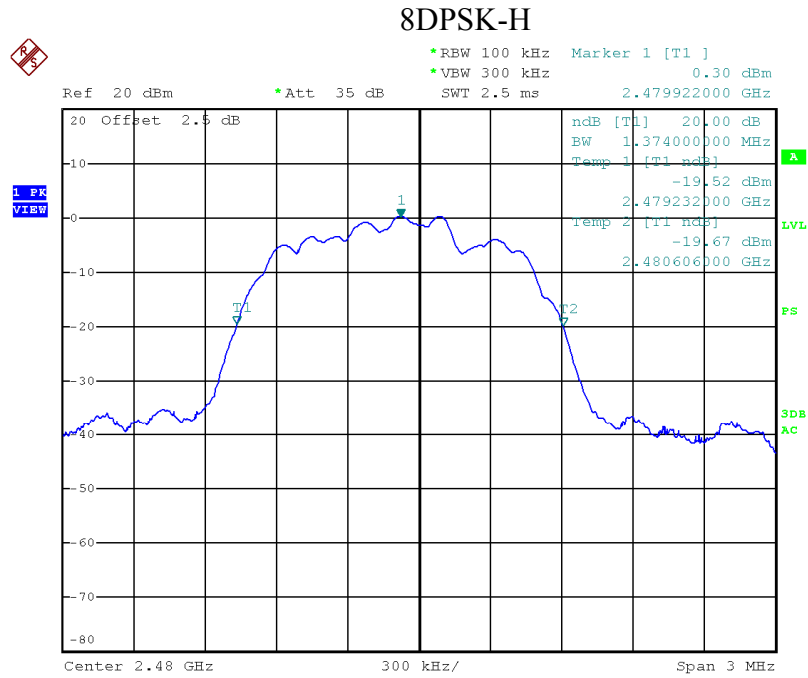
Date: 30.APR.2014 15:02:07



Date: 30.APR.2014 15:04:48



Date: 30.APR.2014 15:06:13



Date: 30.APR.2014 15:07:27

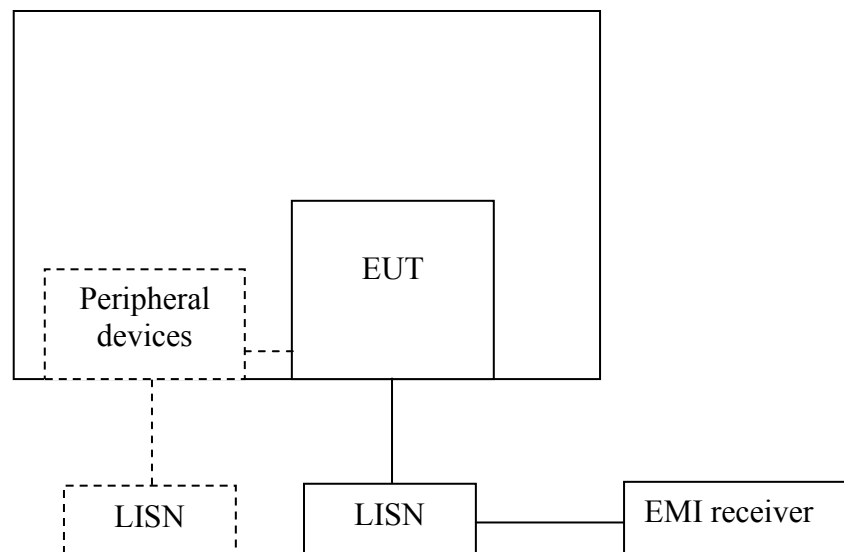
5. Power line conducted emission

Test result: **PASS**

5.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

5.2 Test configuration



☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

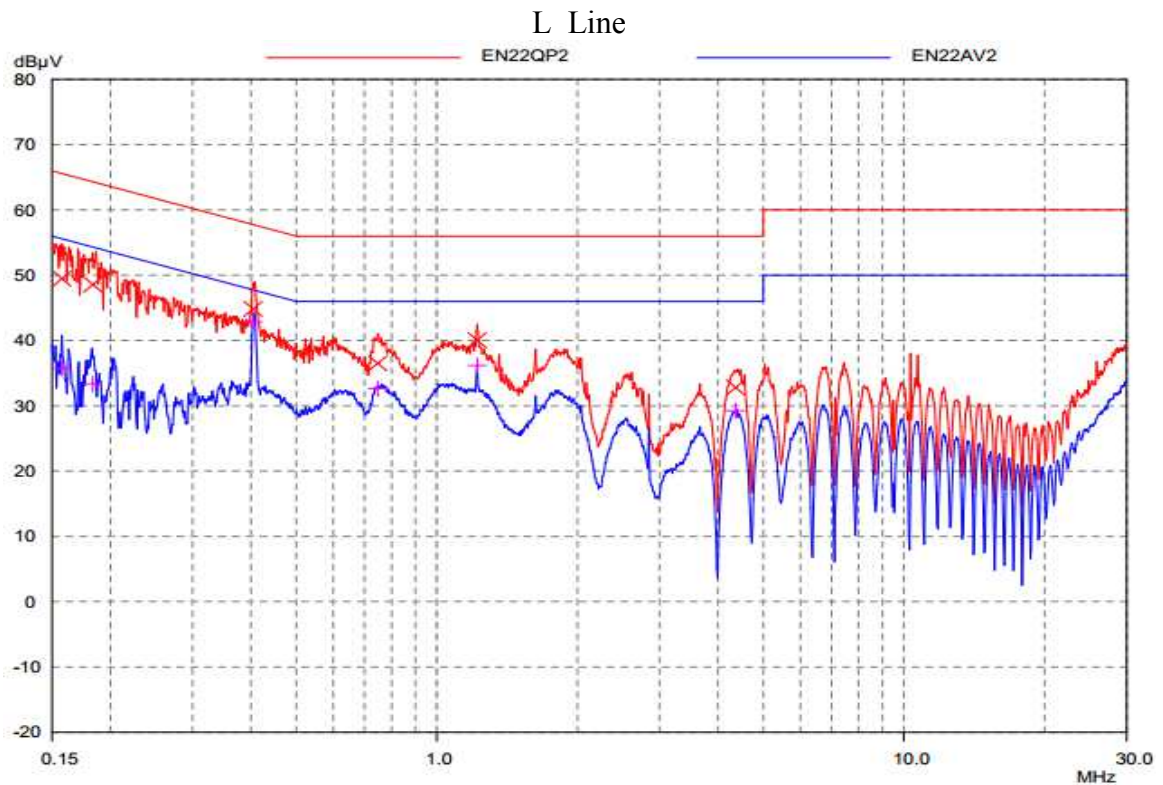
5.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a $50\Omega/50\mu\text{H}$ coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a $50\Omega/50\mu\text{H}$ coupling impedance with 50Ω termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement. The bandwidth of the test receiver is set at 9 kHz.

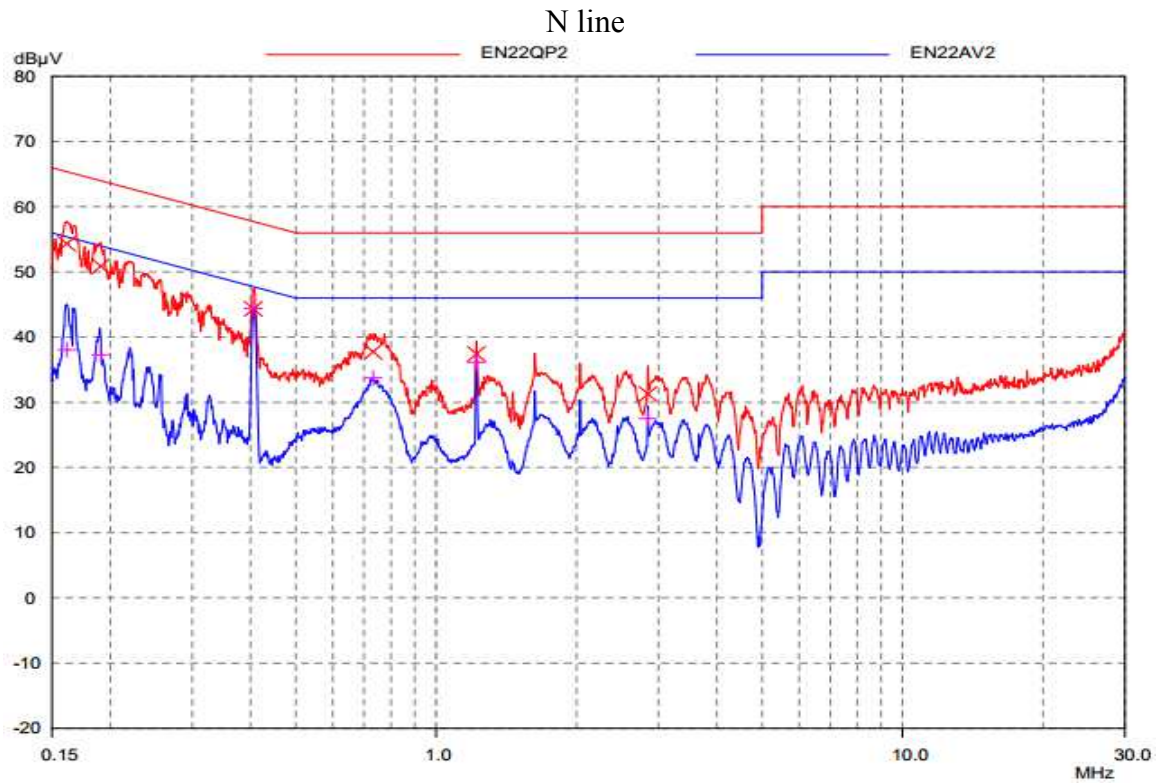
5.4 Test protocol

Temperature : 25°C
Relative Humidity : 55 %



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.157	49.48	65.60	16.12	35.78	55.60	19.82
0.183	48.58	64.34	15.76	33.37	54.34	20.97
0.404	44.85	57.78	12.93	42.86	47.78	4.92
0.747	36.52	56.00	19.48	32.63	46.00	13.37
1.220	40.03	56.00	15.97	36.18	46.00	9.82
4.359	32.79	56.00	23.21	29.26	46.00	16.74



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.161	54.33	65.40	11.07	38.07	55.40	17.33
0.191	50.87	64.01	13.14	37.30	54.01	16.71
0.405	44.33	57.74	13.41	44.40	47.74	3.34
0.732	37.74	56.00	18.26	33.74	46.00	12.26
1.220	37.43	56.00	18.57	36.14	46.00	9.86
2.843	31.28	56.00	24.72	27.51	46.00	18.49

6. Occupied Bandwidth

Test result: **Tested**

6.1 Test limit

None

6.2 Test Configuration

See clause 3.2.

6.3 Test procedure and test setup

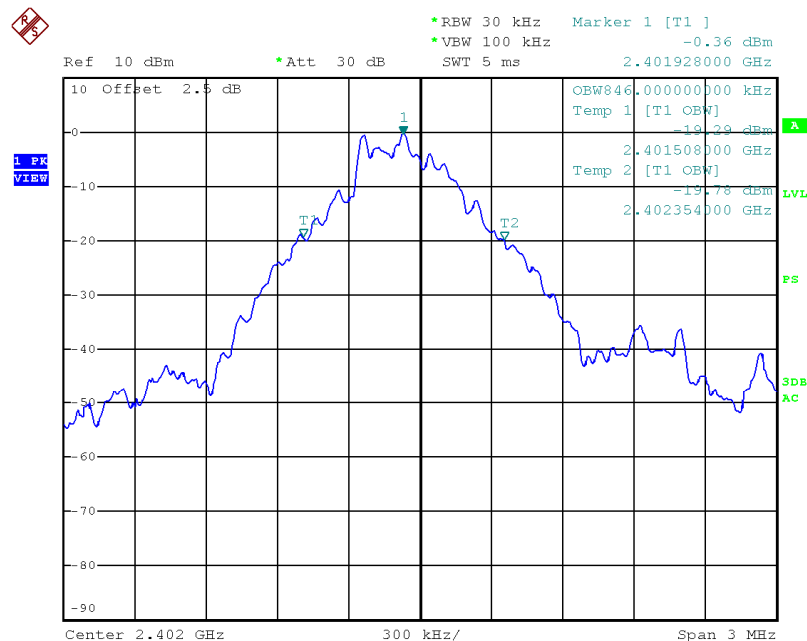
The occupied bandwidth per RSS-Gen Issue 3 Clause 4.6.1 was measured using the Spectrum Analyzer.

6.4 Test protocol

Temperature : 25 °C
Relative Humidity : 55 %

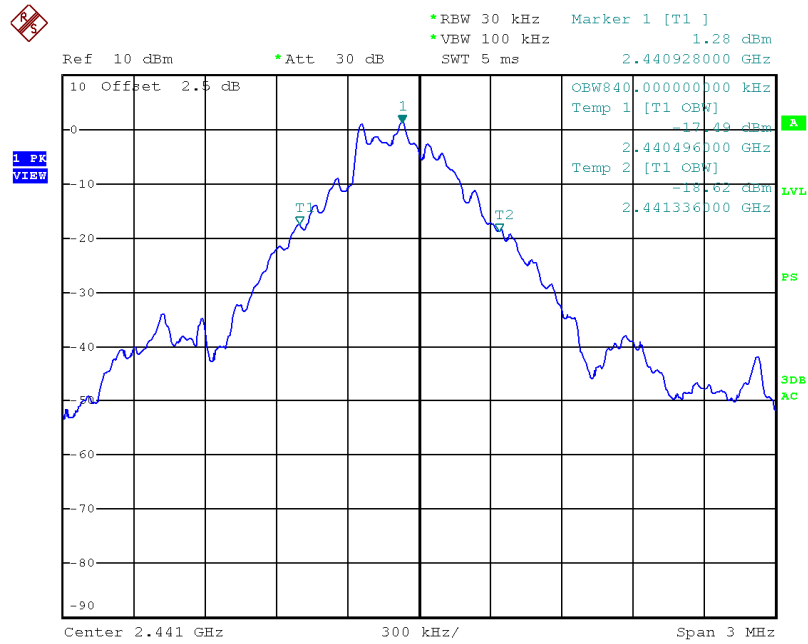
Mode	Channel	Occupied Bandwidth (MHz)
GFSK	L	0.846
	M	0.840
	H	0.840
8DPSK	L	1.176
	M	1.188
	H	1.206

GFSK-Channel L



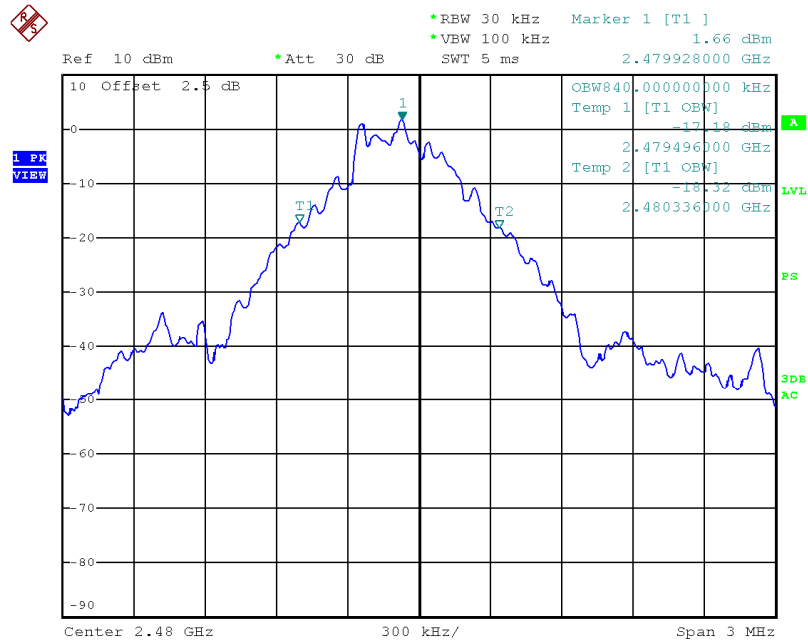
Date: 13.MAY.2014 15:48:05

GFSK-Channel M



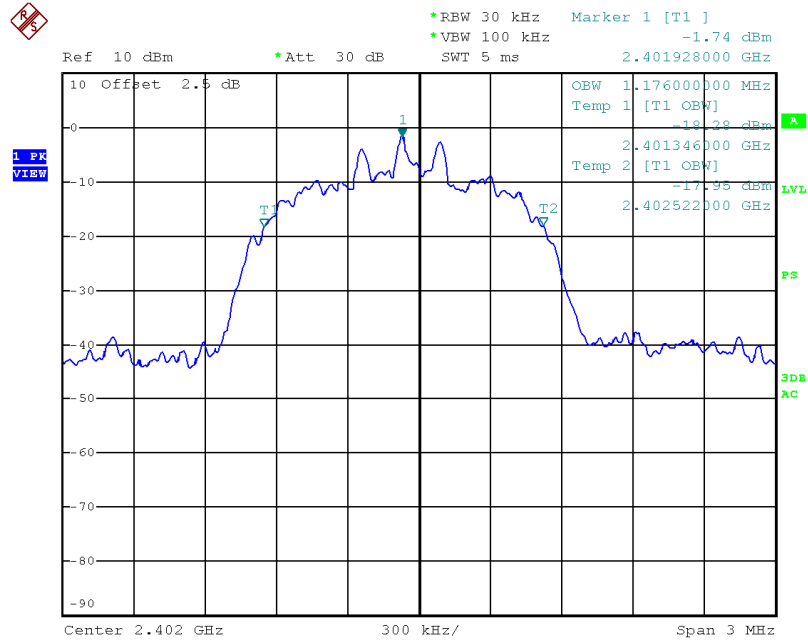
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GFSK-Channel H

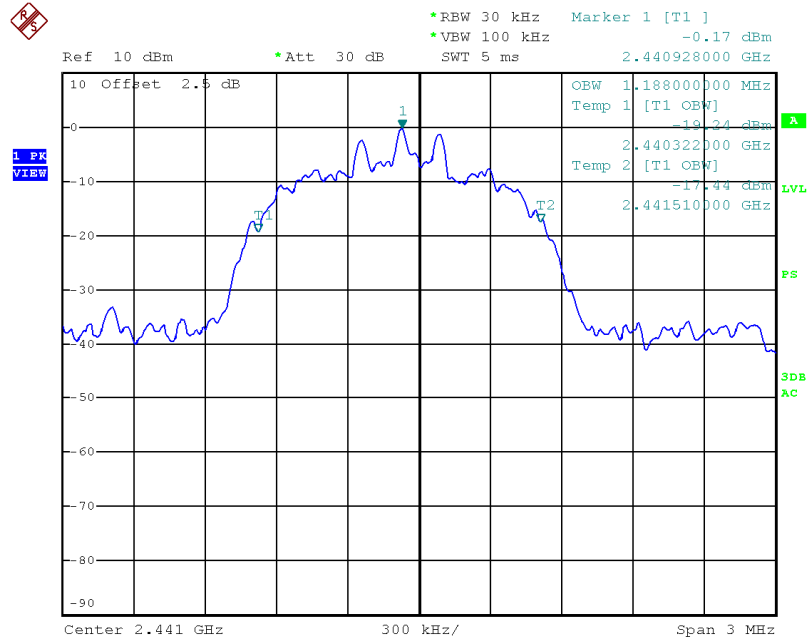


Date: 13.MAY.2014 15:50:18

8DPSK-Channel L



8DPSK-Channel M



8DPSK-Channel H

