



TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 51 of 72

Figure 31: Hopping Frequency Separation, Hopping Mode, GFSK

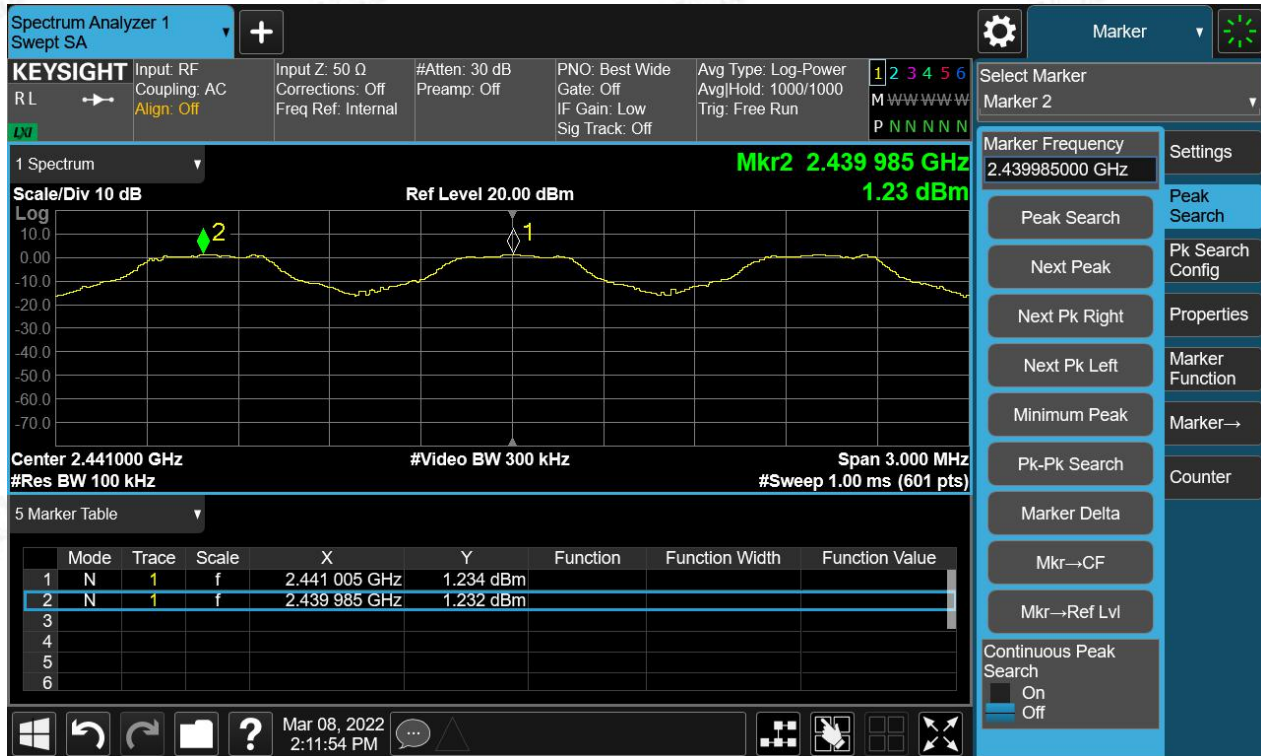


Figure 32: Hopping Frequency Separation, Hopping Mode, $\pi/4$ -DQPSK





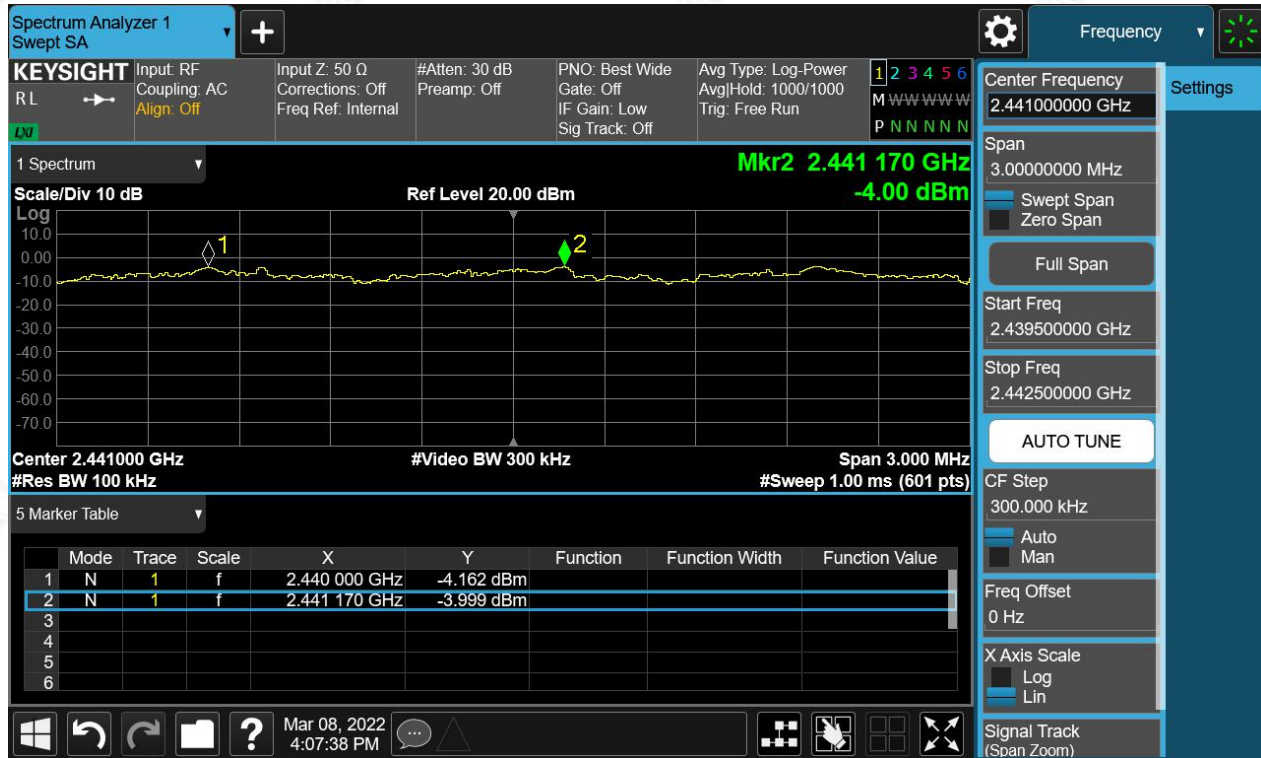
TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 52 of 72

Figure 33: Hopping Frequency Separation, Hopping Mode, 8DPSK





TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 53 of 72

4.1.8 Number of Hopping Frequency

RESULT:

PASS

Test standard : FCC Part 15.247(a)(1)(iii)

Requirement : ANSI C63.10-2013, Clause 7.8.3
KDB 558074 D01 v05r02, Clause 2.2

Kind of test site : Shielded room

Test setup

Test Channel : Hopping

Operation Mode : A.1.a.iv

Ambient temperature : 23°C

Relative humidity : 52%

Table 4: Number of Hopping Frequency

Mode	Frequency Range	Measured Quantity of Hopping Channel	Limit
GFSK	2400 – 2483.5	79	≥15
$\pi/4$ -DQPSK	2400 – 2483.5	79	≥15
8-DPSK	2400 – 2483.5	79	≥15



TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 54 of 72

Figure 34: Number of Hopping Frequency, Hopping Mode, GFSK

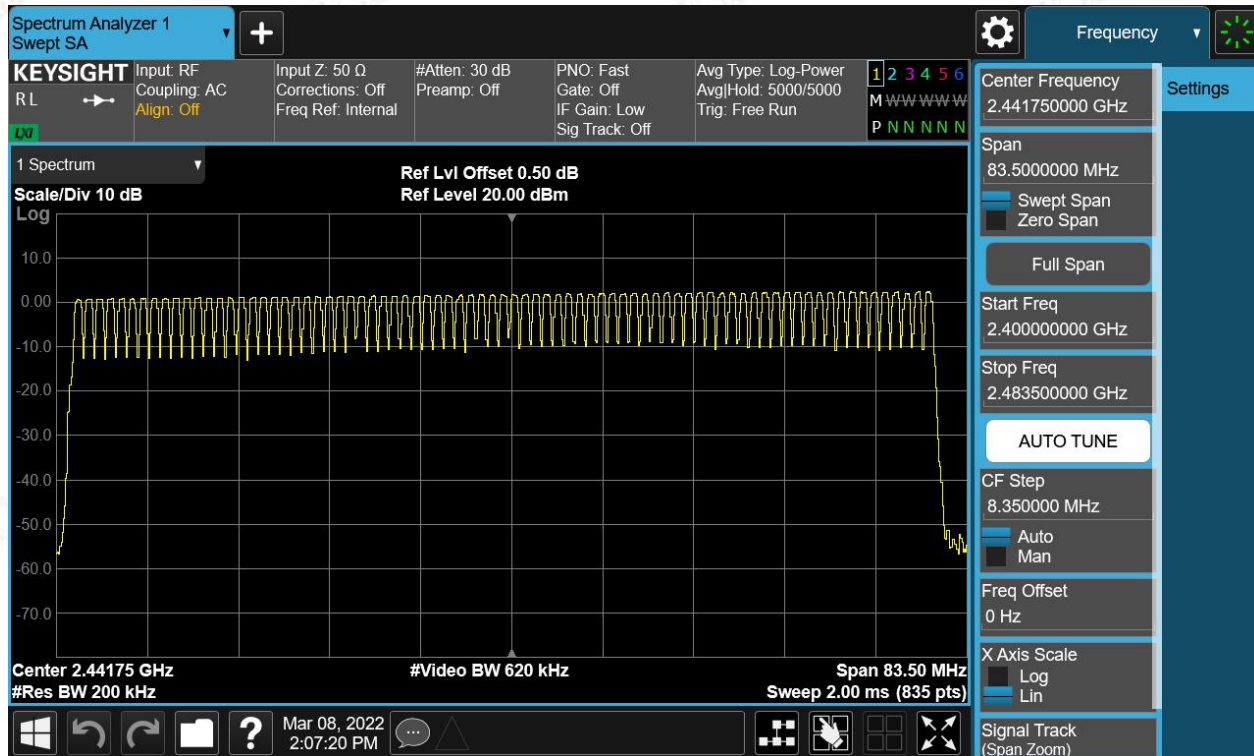
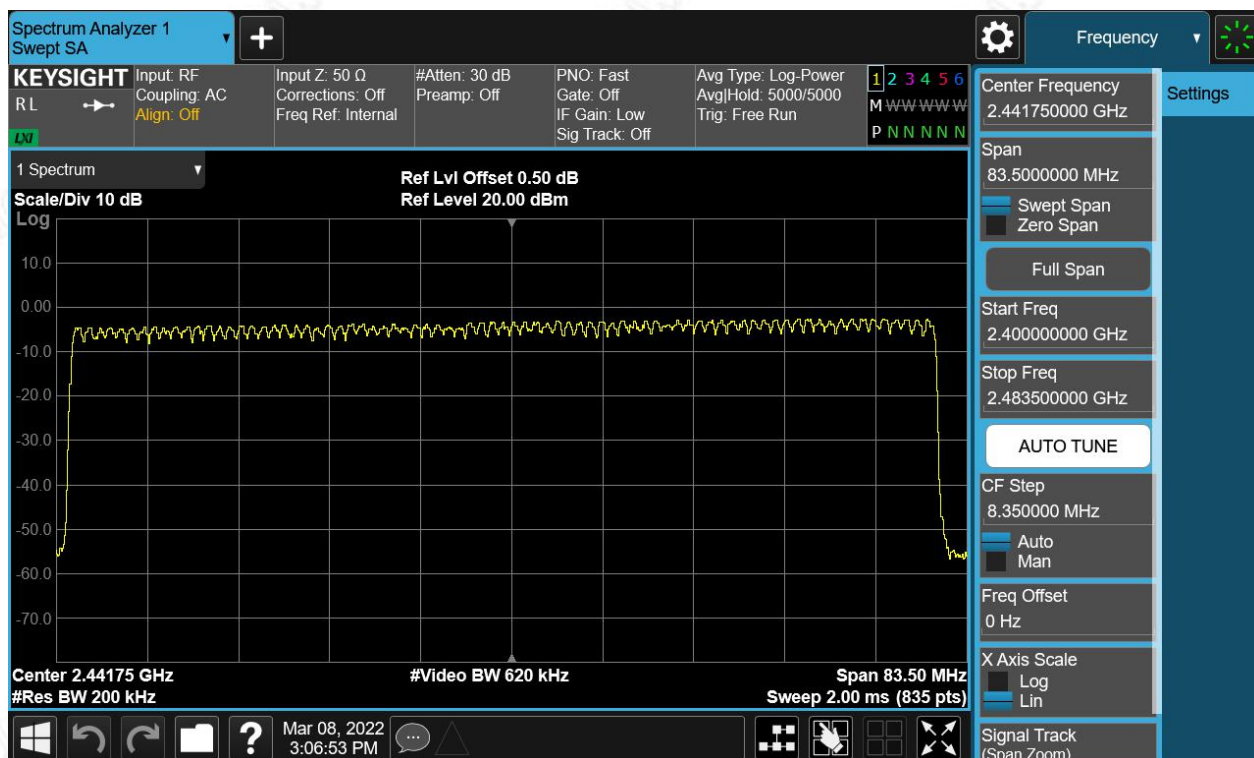


Figure 35: Number of Hopping Frequency, Hopping Mode, $\pi/4$ -DQPSK





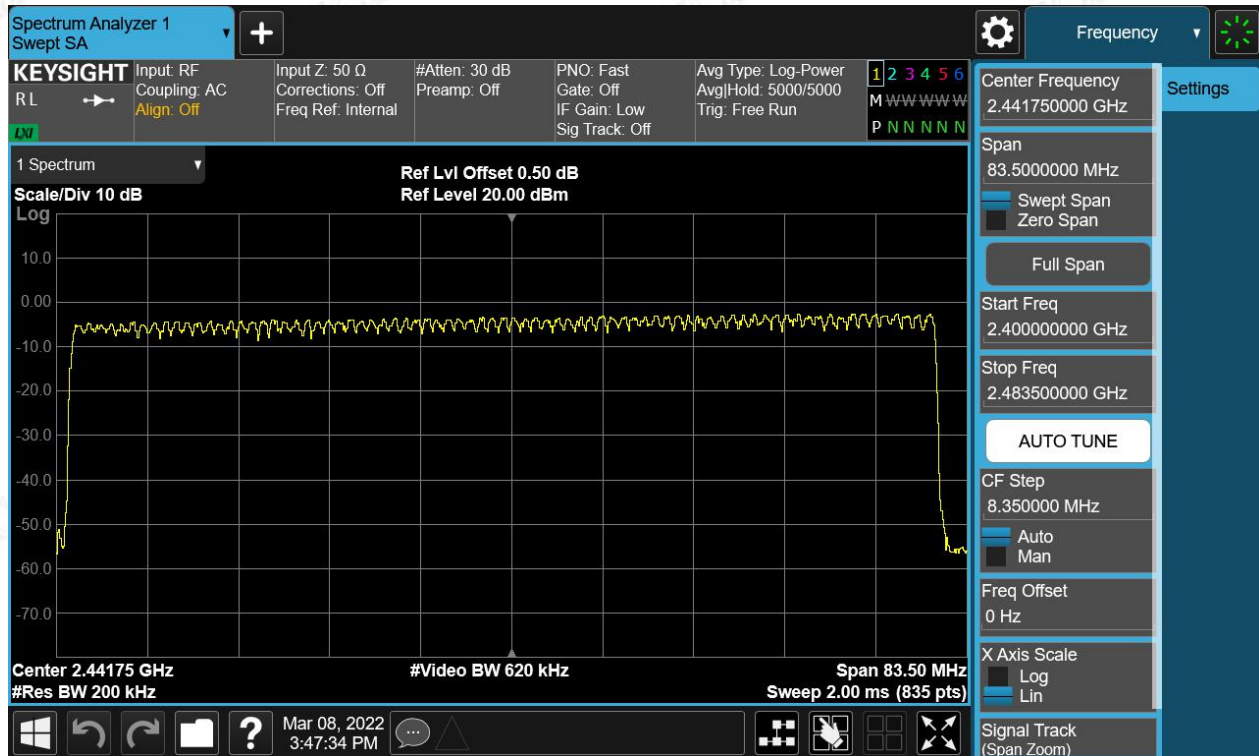
TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 55 of 72

Figure 36: Number of Hopping Frequency, Hopping Mode, 8-DPSK





TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 56 of 72

4.1.9 Time of Occupancy

RESULT:

PASS

Test standard : FCC Part 15.247(a)(1)(iii)

Requirement : ANSI C63.10-2013, Clause 7.8.4
KDB 558074 D01 v05r02, Clause 2.2

Kind of test site : Shielded room

Test setup

Test Channel : Middle

Operation Mode : A.1.a

Ambient temperature : 23°C

Relative humidity : 52%

Table 5: Time of Occupancy

Mode	Packet Type	Pulse Time (ms)	Total of Dwell (ms)	Limit (s)
GFSK	DH1	0.410	131.200	0.4
	DH3	1.670	267.200	0.4
	DH5	2.927	312.213	0.4
$\pi/4$ -DQPSK	DH1	0.415	132.800	0.4
	DH3	1.675	268.000	0.4
	DH5	2.920	311.467	0.4
8-DPSK	DH1	0.413	132.160	0.4
	DH3	1.670	267.200	0.4
	DH5	2.927	312.213	0.4

Note:

For DH1 package type:

Total of Dwell = Pulse Time*(1600/2)/Number of Hopping Frequency*Period

Period = 0.4* Number of Hopping Frequency

For DH3 package type:

Total of Dwell = Pulse Time*(1600/4)/Number of Hopping Frequency*Period

Period = 0.4* Number of Hopping Frequency

For DH5 package type:

Total of Dwell = Pulse Time*(1600/6)/Number of Hopping Frequency*Period

Period = 0.4* Number of Hopping Frequency



TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 57 of 72

Figure 37: Time of Occupancy, 2441MHz, GFSK DH1

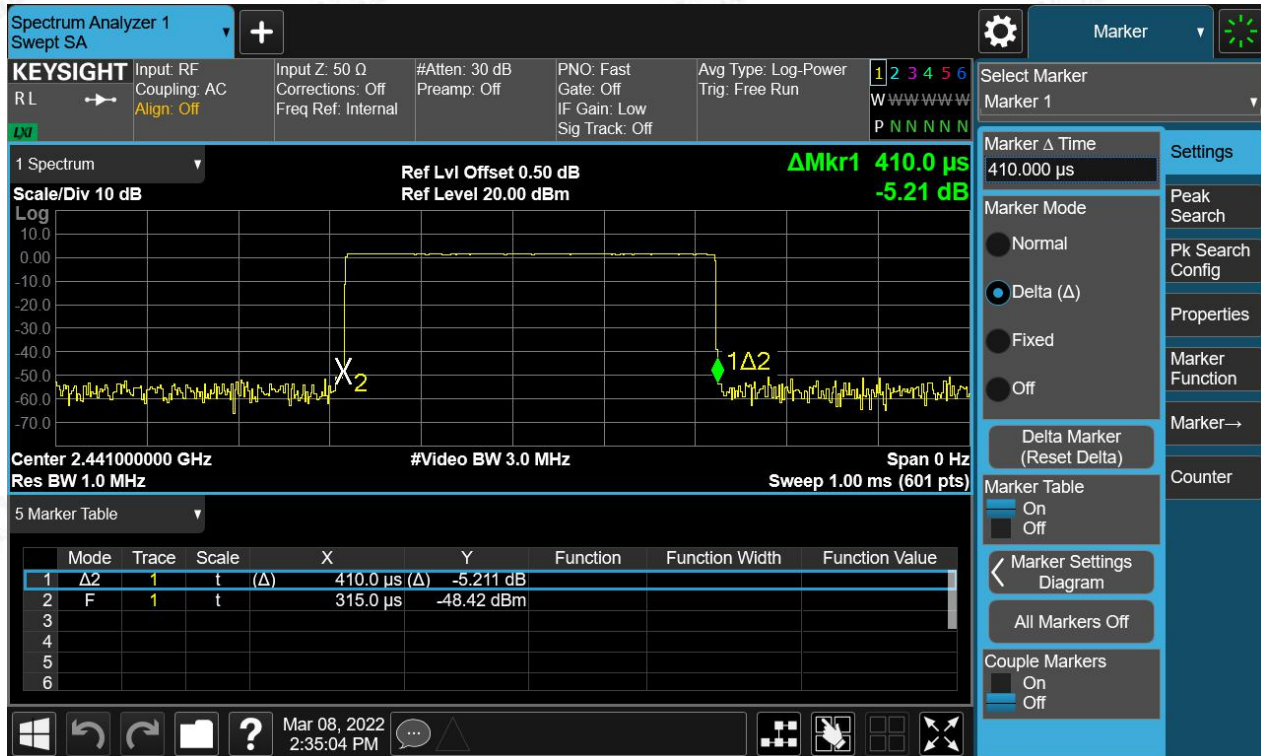
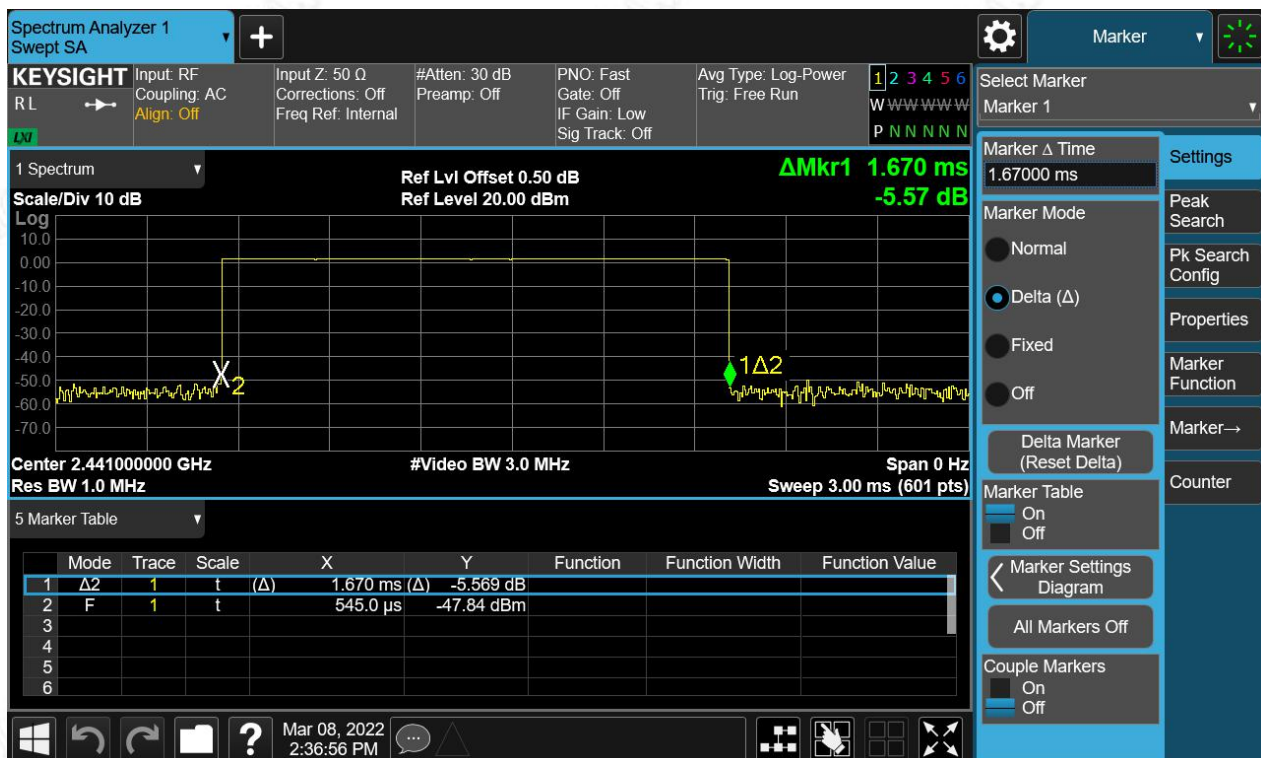


Figure 38: Time of Occupancy, 2441MHz, GFSK DH3





TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 58 of 72

Figure 39: Time of Occupancy, 2441MHz, GFSK DH5

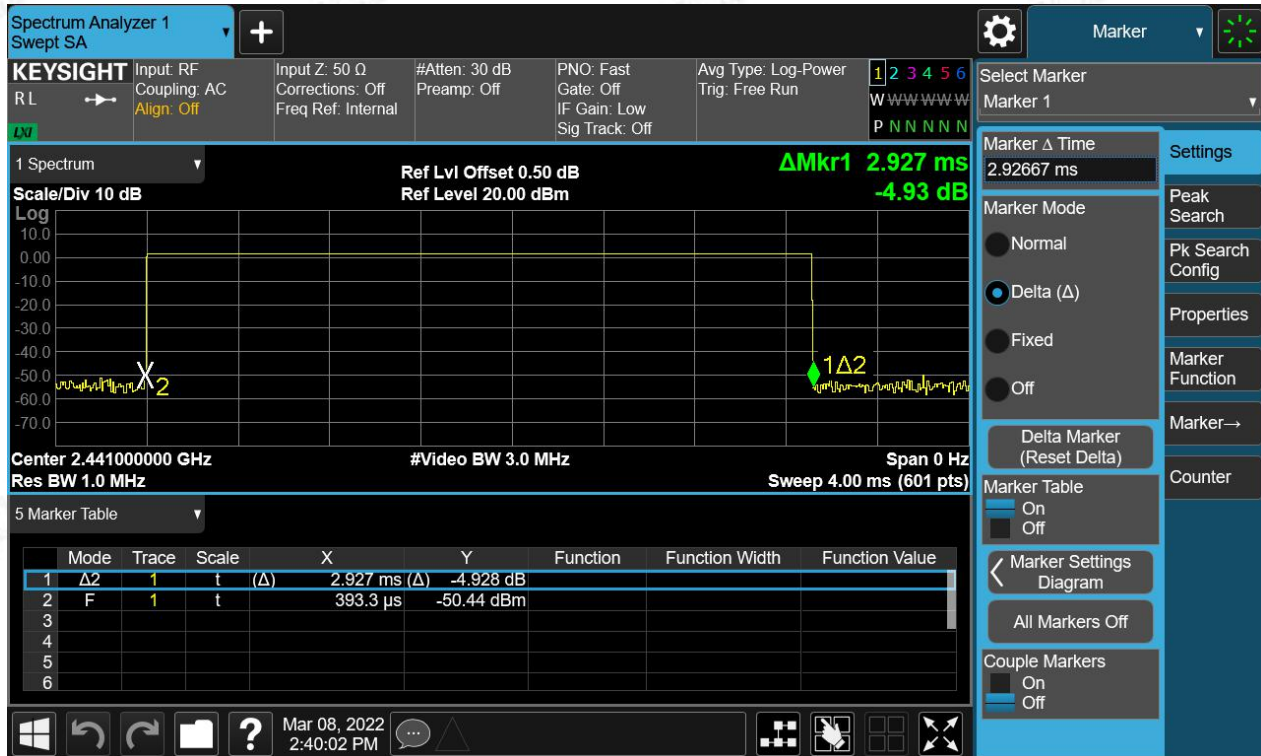
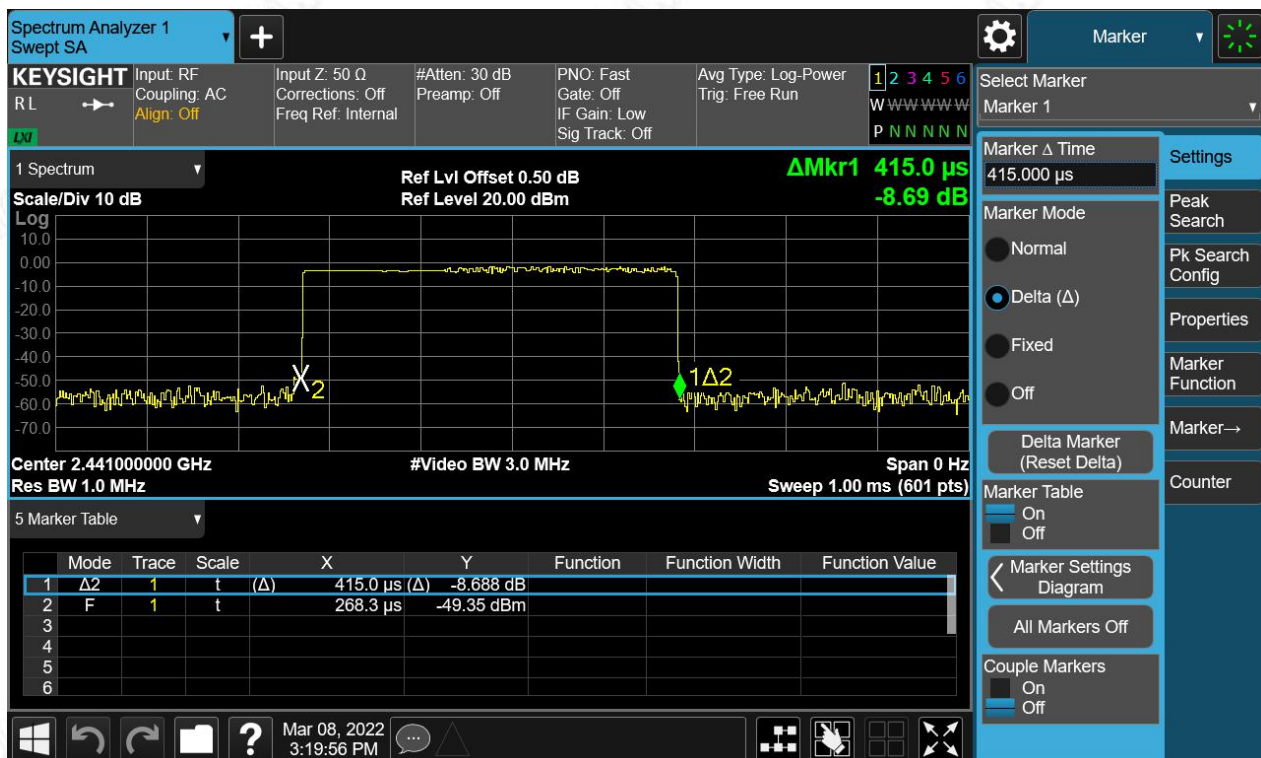


Figure 40: Time of Occupancy, 2441MHz, $\pi/4$ -DQPSK DH1





TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 59 of 72

Figure 41: Time of Occupancy, 2441MHz, $\pi/4$ -DQPSK DH3

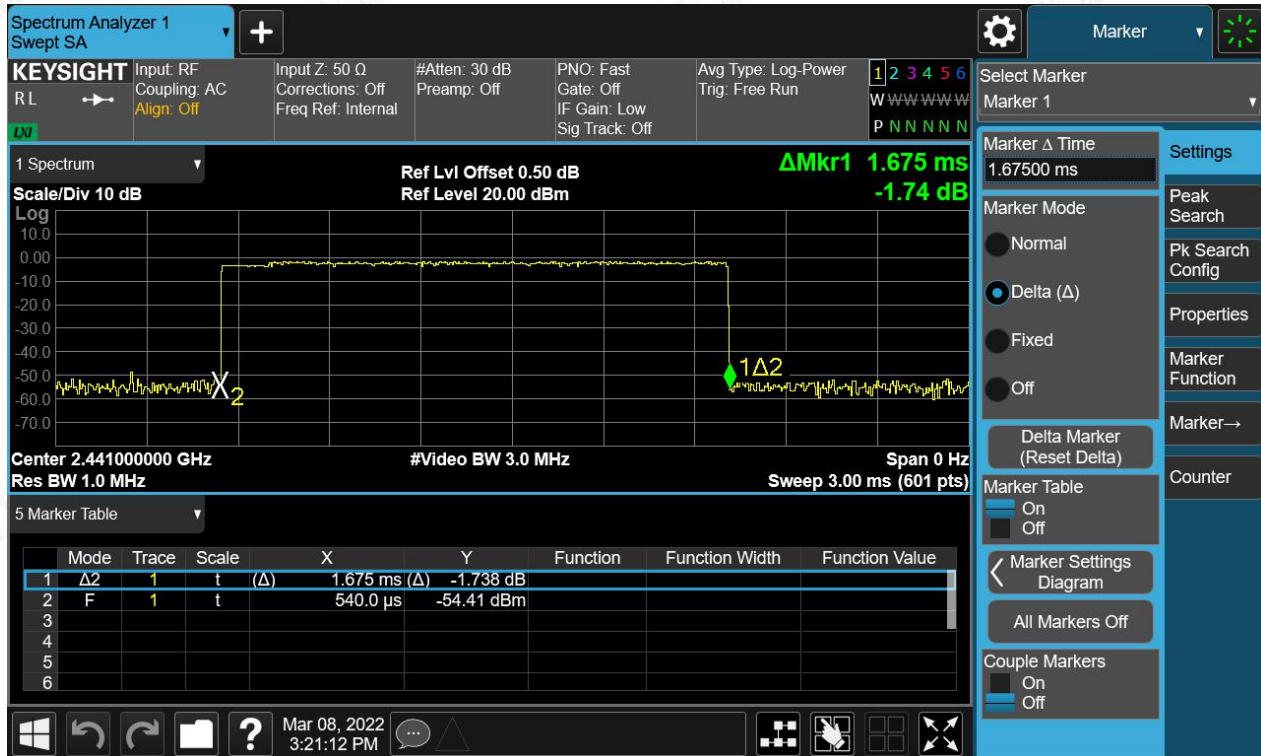
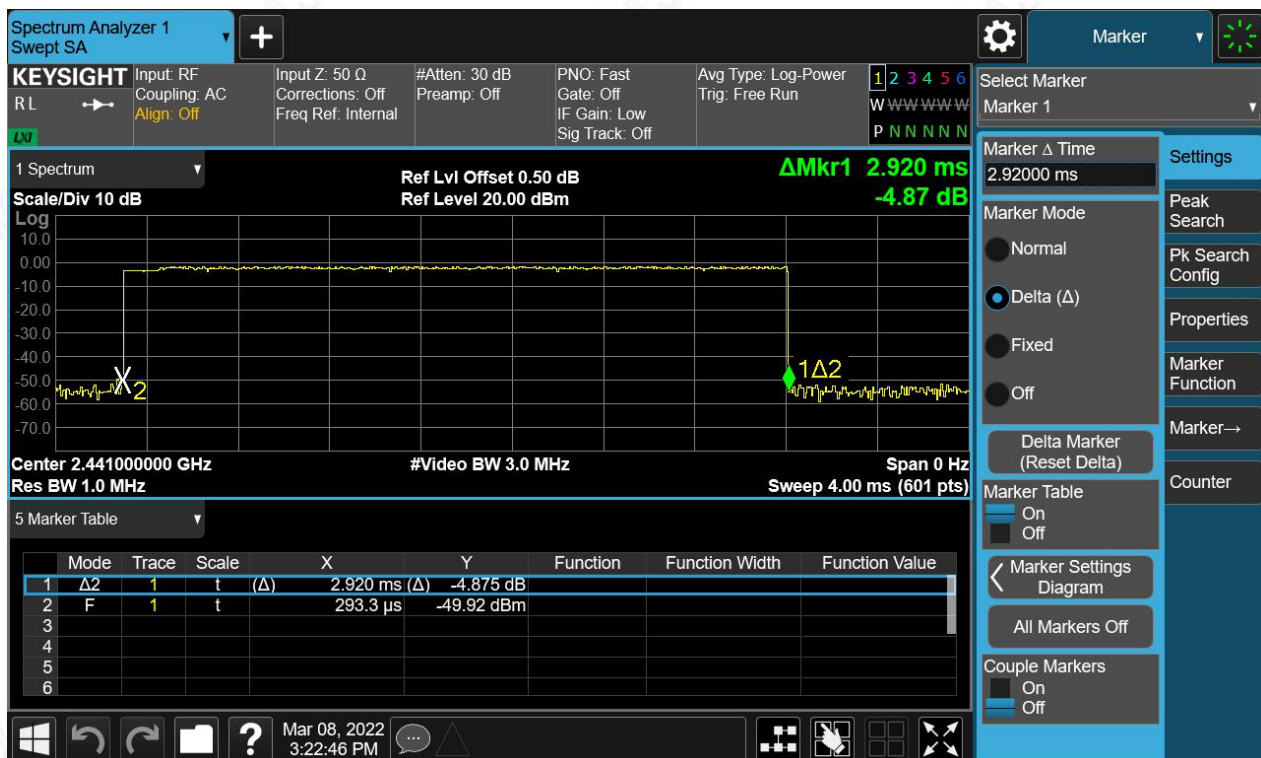


Figure 42: Time of Occupancy, 2441MHz, $\pi/4$ -DQPSK DH5





TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 60 of 72

Figure 43: Time of Occupancy, 2441MHz, 8-DPSK DH1

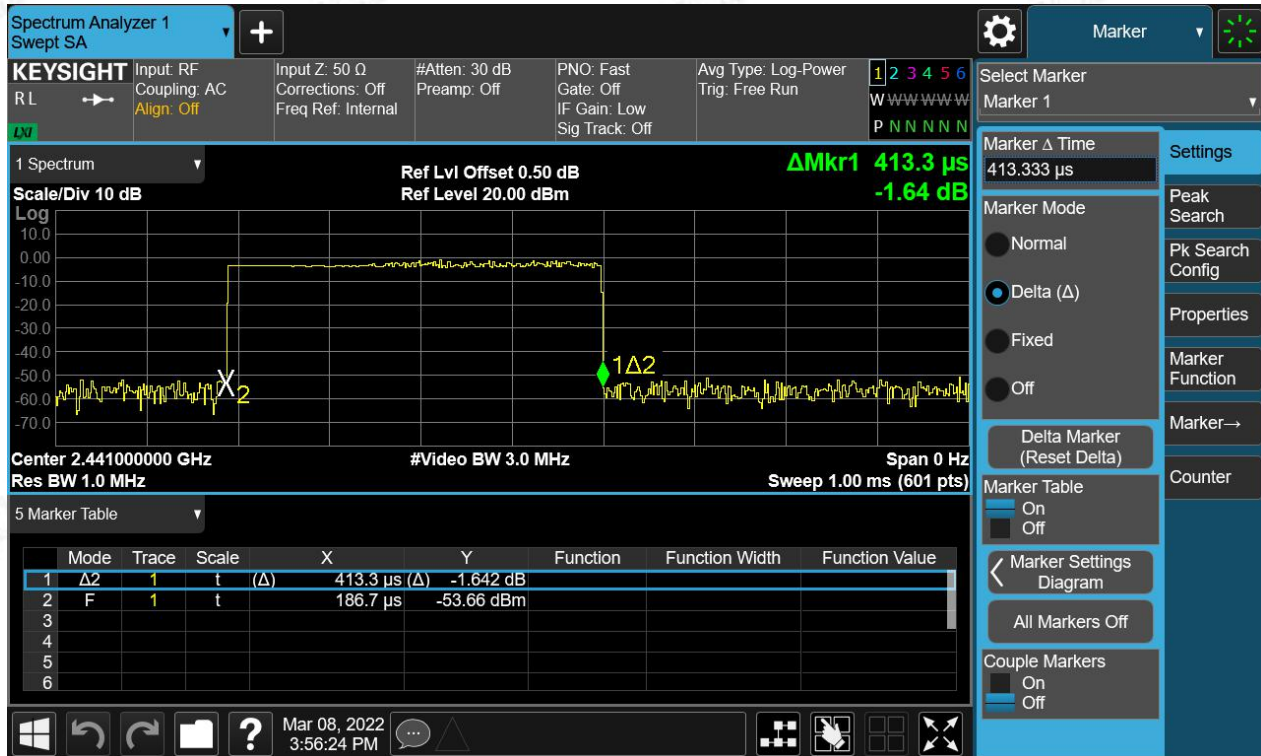
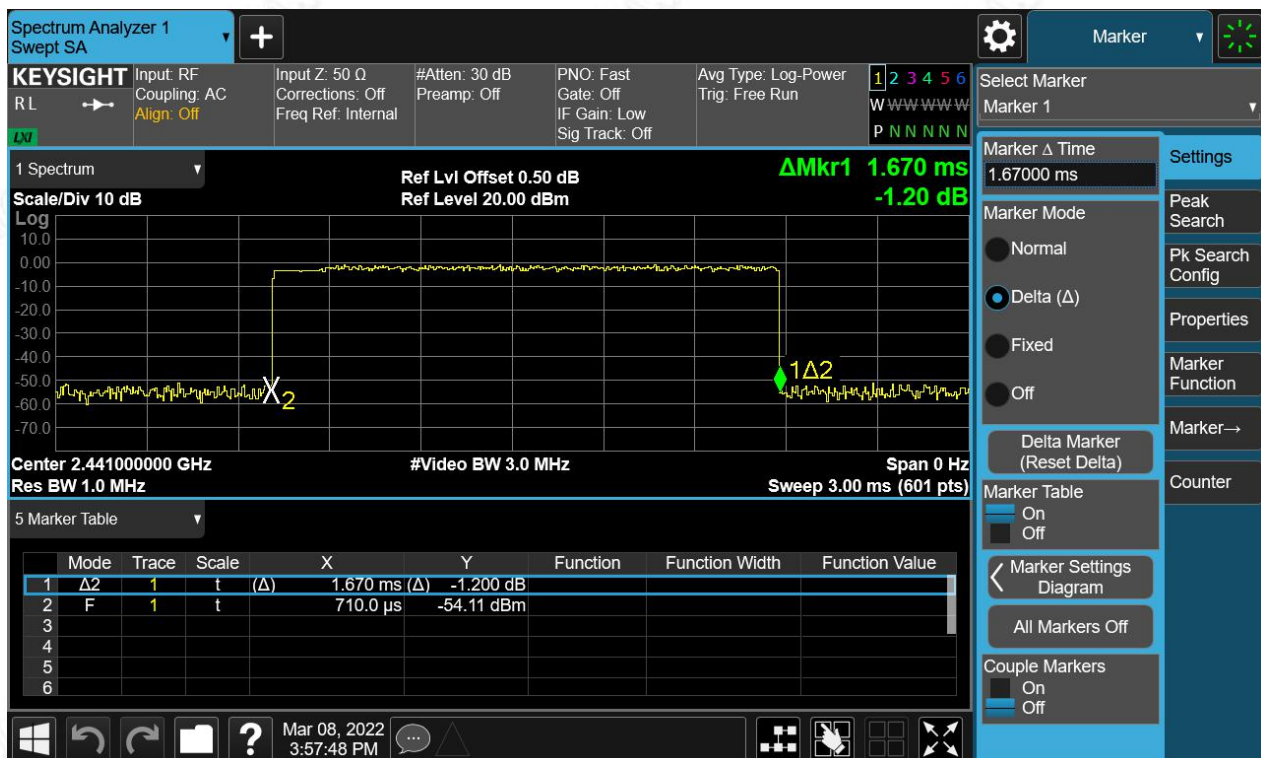


Figure 44: Time of Occupancy, 2441MHz, 8-DPSK DH3





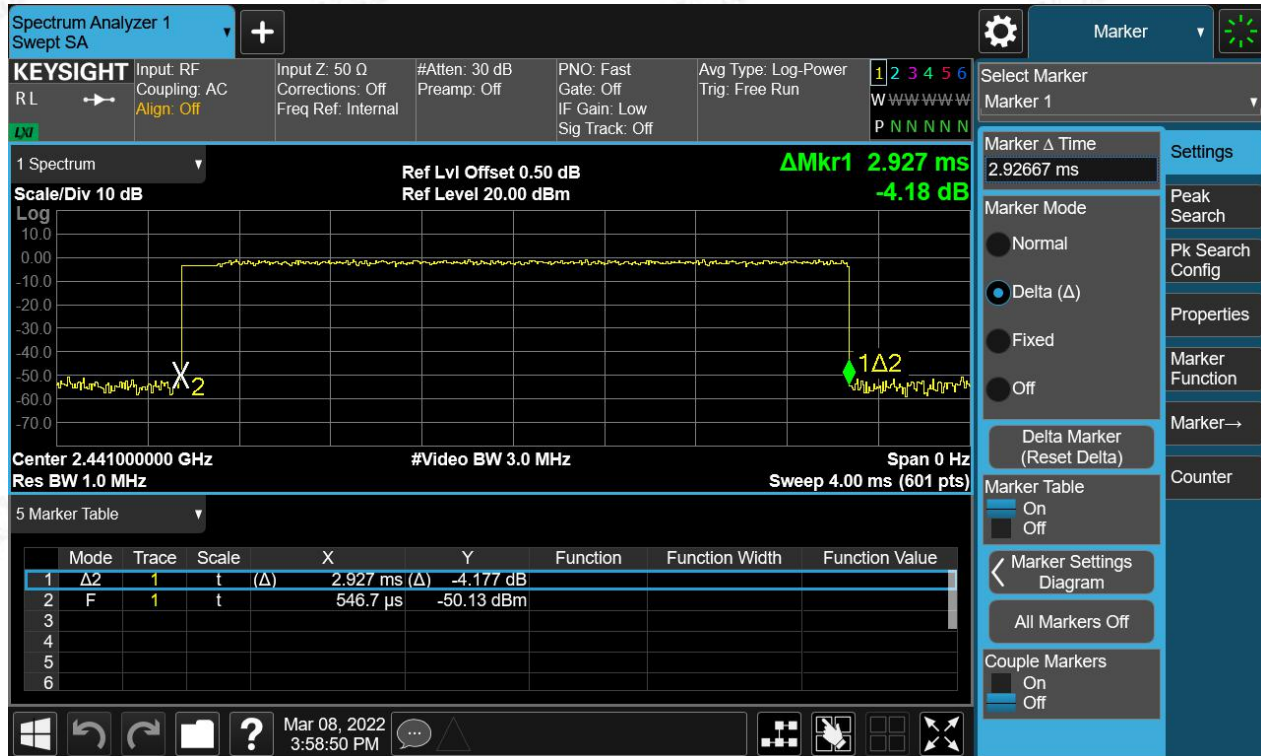
TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 61 of 72

Figure 45: Time of Occupancy, 2441MHz, 8-DPSK DH5





TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 62 of 72

4.2 Mains Emissions

4.2.1 Conducted Emission on AC Mains

RESULT:

PASS

Test standard : FCC Part 15.207(a)
Requirement : ANSI C63.10-2013, Clause 6.2
Kind of test site : Shielded room

Test setup

Input Voltage : DC 12V by power adapter (which received AC 120V, 60Hz power)
Operation Mode : A.1.a
Earthing : Connected to GND
Ambient temperature : 23°C
Relative humidity : 51%

For details refer to following test plot.



TEST REPORT

Report No.: SHE21120035-02BE

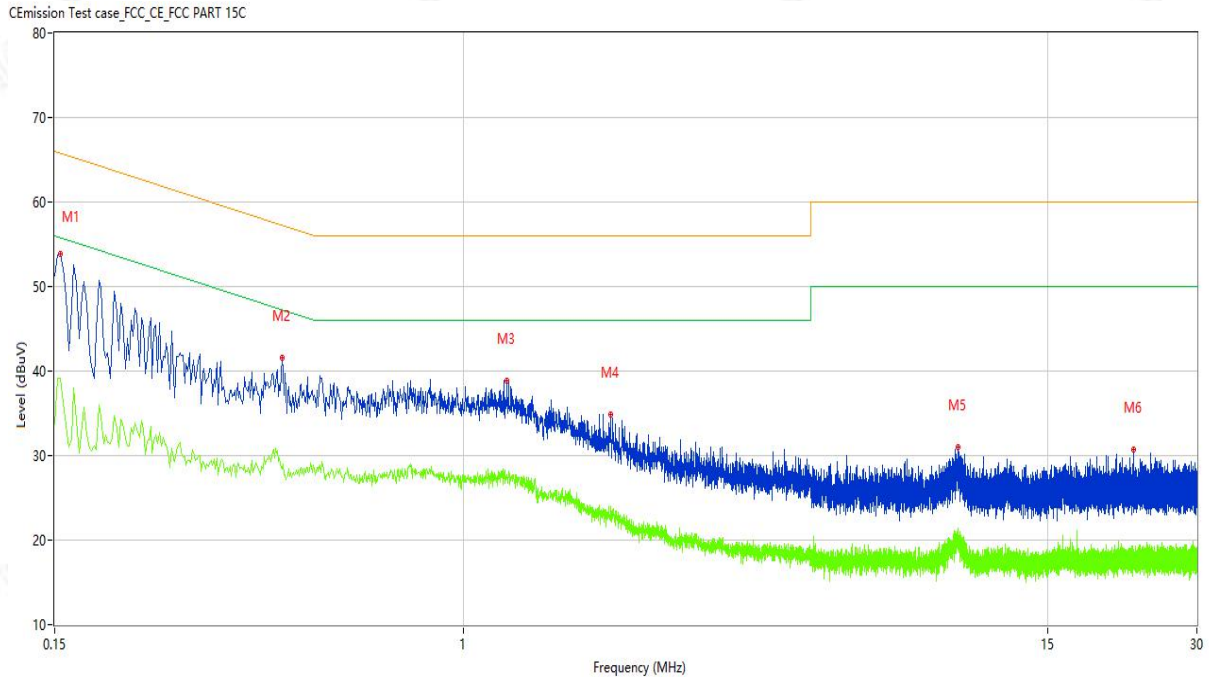
Date: 2022-03-08

Page 63 of 72

Note:

The all configurations were tested respectively, Only the worst mode data of GFSK-hopping-DH5 was recorded in the test report.

Figure 46: Conducted Emission on AC Mains, L Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.154	54.42	10.26	65.78	-11.36	Peak	L	Pass
1*	0.154	50.34	10.26	65.78	-15.44	QP	L	Pass
1**	0.154	39.15	10.26	55.78	-16.63	AV	L	Pass
2	0.430	38.18	10.26	57.25	-19.07	Peak	L	Pass
2*	0.430	32.90	10.26	57.25	-24.35	QP	L	Pass
2**	0.430	28.42	10.26	47.25	-18.83	AV	L	Pass
3	1.224	33.33	10.19	56.00	-22.67	Peak	L	Pass
3*	1.224	28.27	10.19	56.00	-27.73	QP	L	Pass
3**	1.224	27.77	10.19	46.00	-18.23	AV	L	Pass
4	1.974	29.08	10.16	56.00	-26.92	Peak	L	Pass
4*	1.974	22.57	10.16	56.00	-33.43	QP	L	Pass
4**	1.974	22.25	10.16	46.00	-23.75	AV	L	Pass
5	9.888	28.09	10.36	60.00	-31.91	Peak	L	Pass
5*	9.888	22.62	10.36	60.00	-37.38	QP	L	Pass
5**	9.888	20.09	10.36	50.00	-29.91	AV	L	Pass
6	22.346	21.50	11.00	60.00	-38.50	Peak	L	Pass
6*	22.346	13.49	11.00	60.00	-46.51	QP	L	Pass
6**	22.346	18.36	11.00	50.00	-31.64	AV	L	Pass



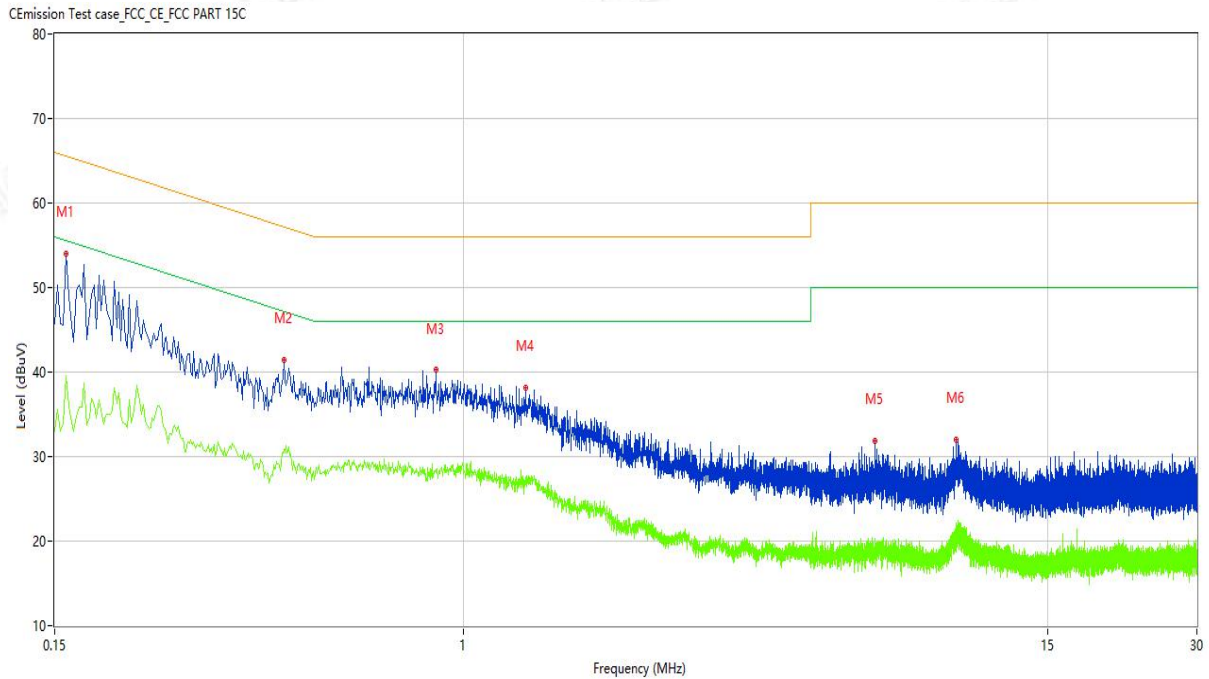
TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 64 of 72

Figure 47: Conducted Emission on AC Mains, N Phase



No.	Frequency (MHz)	Results (dBuV)	Factor (dB)	Limit (dBuV)	Over Limit (dB)	Detector	Line	Verdict
1	0.156	54.34	10.26	65.67	-11.33	Peak	N	Pass
1*	0.156	50.19	10.26	65.67	-15.48	QP	N	Pass
1**	0.156	33.97	10.26	55.67	-21.70	AV	N	Pass
2	0.434	38.57	10.26	57.18	-18.61	Peak	N	Pass
2*	0.434	34.65	10.26	57.18	-22.53	QP	N	Pass
2**	0.434	30.87	10.26	47.18	-16.31	AV	N	Pass
3	0.878	33.93	10.30	56.00	-22.07	Peak	N	Pass
3*	0.878	29.85	10.30	56.00	-26.15	QP	N	Pass
3**	0.878	28.19	10.30	46.00	-17.81	AV	N	Pass
4	1.334	33.20	10.19	56.00	-22.80	Peak	N	Pass
4*	1.334	27.67	10.19	56.00	-28.33	QP	N	Pass
4**	1.334	27.51	10.19	46.00	-18.49	AV	N	Pass
5	6.750	26.48	10.31	60.00	-33.52	Peak	N	Pass
5*	6.750	20.91	10.31	60.00	-39.09	QP	N	Pass
5**	6.750	20.24	10.31	50.00	-29.76	AV	N	Pass
6	9.818	27.69	10.36	60.00	-32.31	Peak	N	Pass
6*	9.818	23.27	10.36	60.00	-36.73	QP	N	Pass
6**	9.818	21.43	10.36	50.00	-28.57	AV	N	Pass



TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 65 of 72

5 Appendixes

5.1 Photographs of the Sample



All of the sample



Front of the sample



TEST REPORT

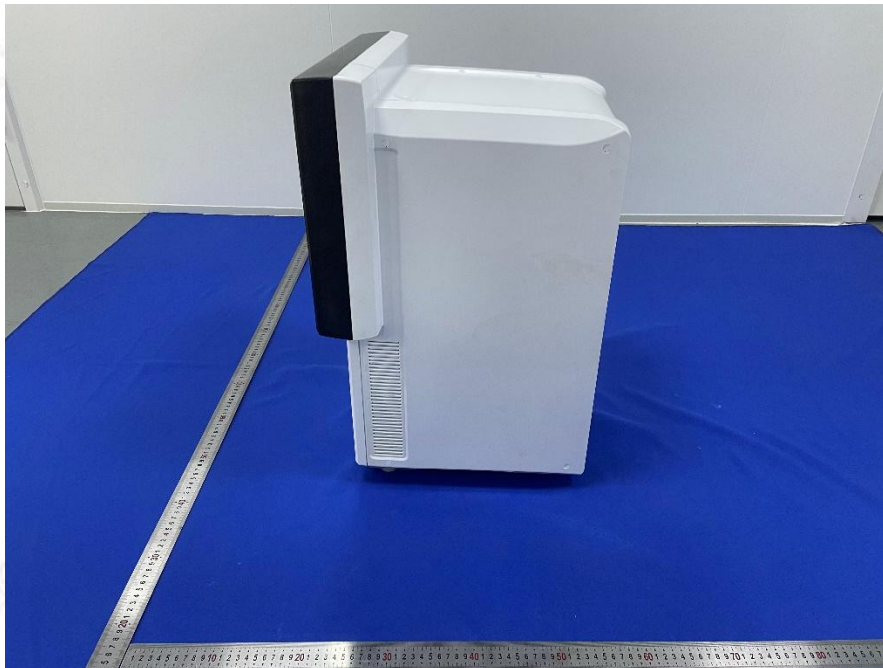
Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 66 of 72



Rear of the sample



Left of the sample

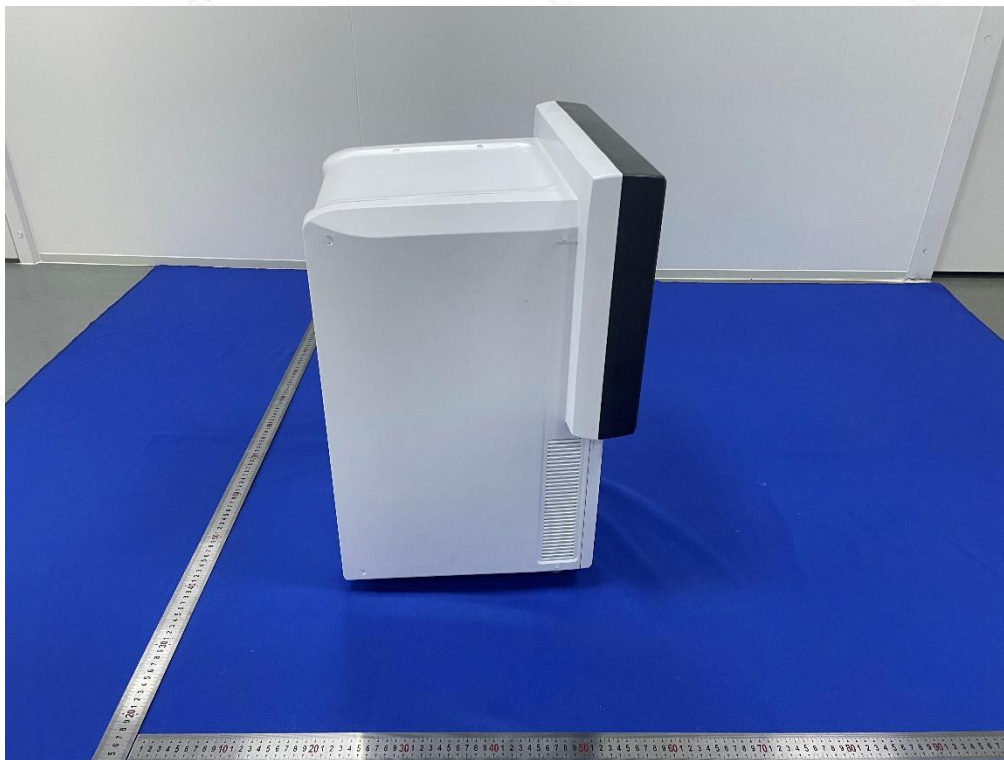


TEST REPORT

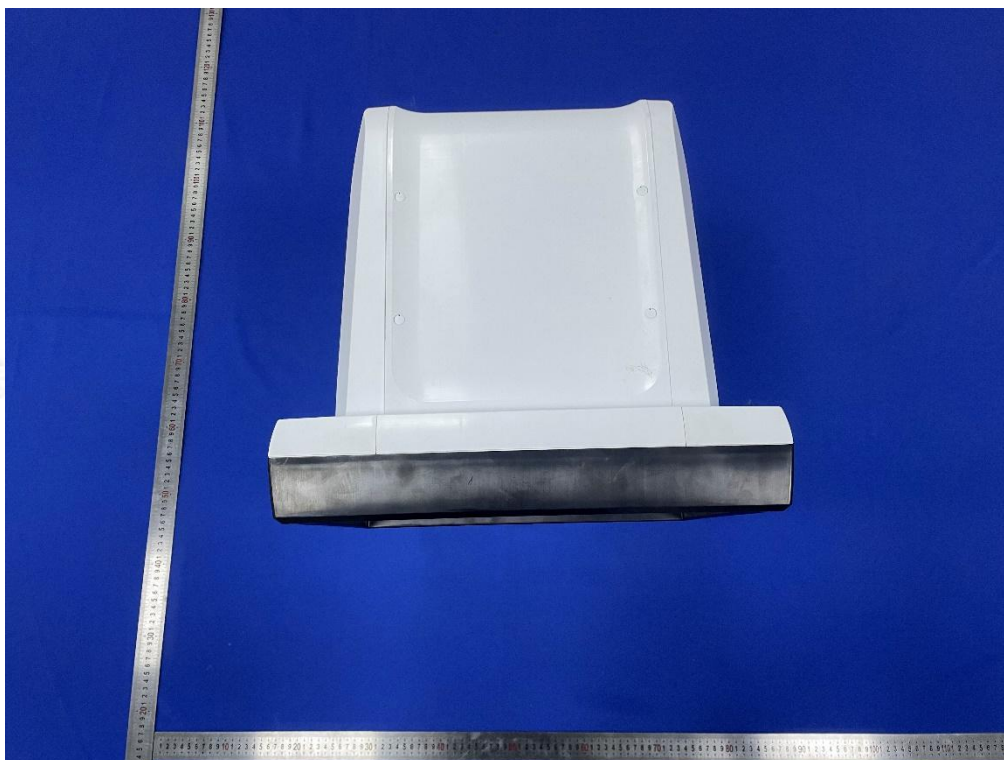
Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 67 of 72



Right of the sample



Top of the sample

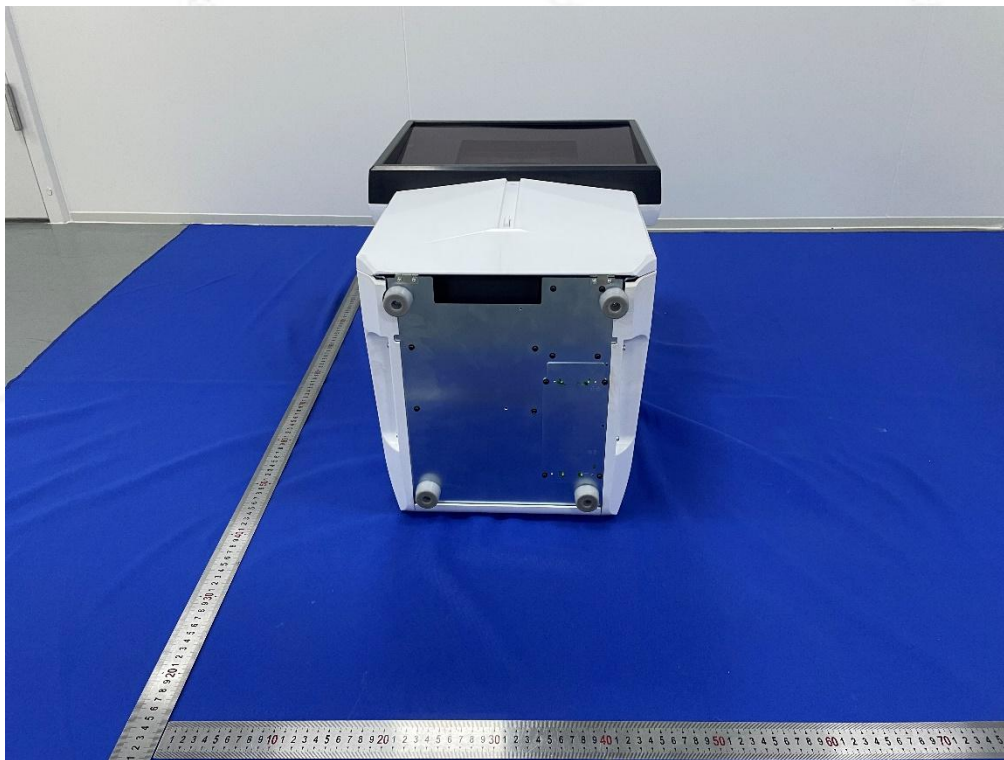


TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 68 of 72



Bottom of the sample

5.2 Set-up for Conducted Emissions





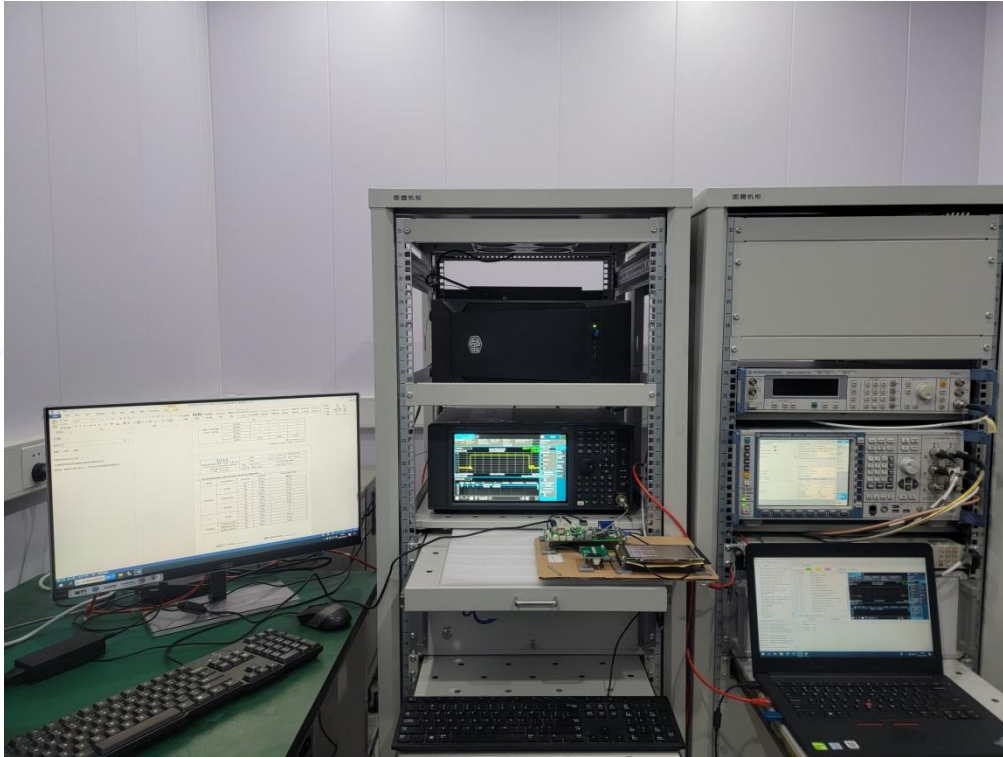
TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 69 of 72

5.3 Set-up for Conducted RF test at Antenna Port



5.4 Set-up for Spurious Emissions below 1GHz

Below 30MHz





TEST REPORT

Report No.:

SHE21120035-02BE

Date:

2022-03-08

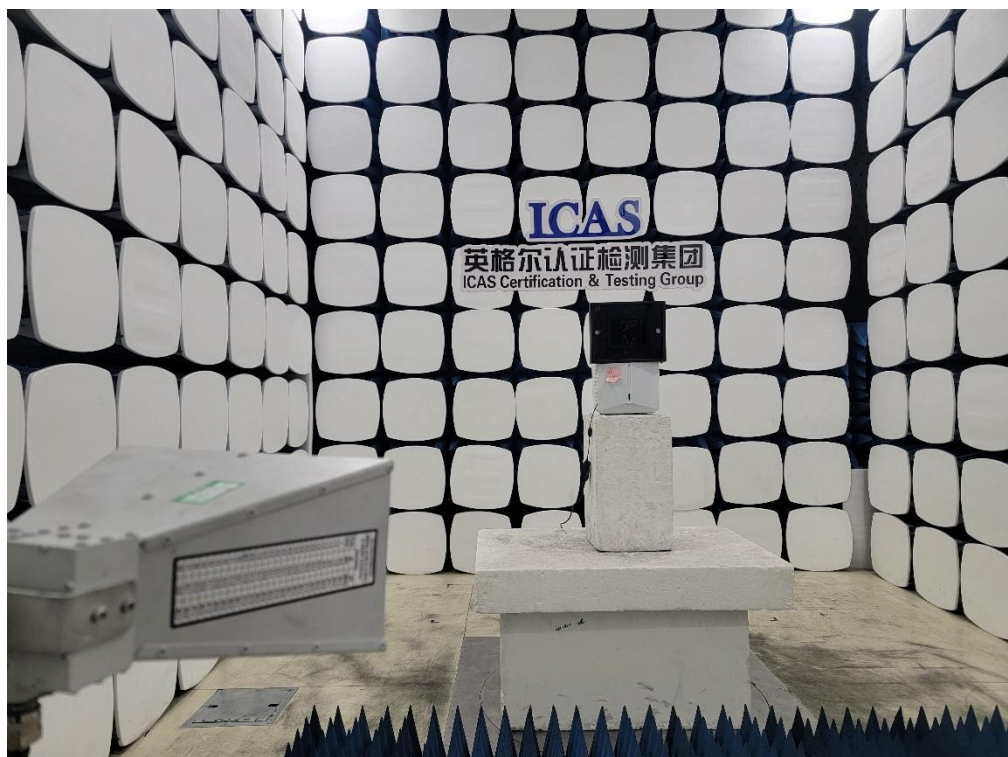
Page 70 of 72

30MHz-1GHz



5.5 Set-up for Spurious Emissions above 1GHz

1GHz-18GHz





TEST REPORT

Report No.: SHE21120035-02BE

Date: 2022-03-08

Page 71 of 72

18GHz-25GHz



End of the report

声明 Terms & conditions

1. 英格尔检测技术服务（上海）有限公司（以下简称“本公司”）以保密的方法处理及签发有关报告予客户。在未得本公司的同意下，该报告不得作部分翻制，或作宣传或其它未经本公司许可的用途。当该客户从本公司收到有关报告后，可以展示或传送该报告或由本公司所制定该报告的核证版本予其顾客、供应商或其它直接有关人士。除非被有关政府机构、法律或法庭命令所要求，本公司在未经客户的同意前，将不会与其他方就报告的内容进行任何讨论、书信的往来或透露。
A report will be issued in confidence to the Clients and it will be strictly treated as such by ICAS Testing Technology Service (Shanghai) Co., Ltd. (hereinafter referred to as "ICAS"). It should not be reproduced in part and it should not be used for advertising or other unauthorized purposes without the written consent of ICAS. The Clients to whom the Report is issued, however, show or send it, or a certified copy thereof prepared by ICAS, to his customer, supplier or other persons directly concerned. ICAS will, without the consent of the Clients, neither enter into any discussion or correspondence with nor disclose to any other party concerning the contents of the report unless required by the relevant governmental authorities, laws or court orders.
2. 假若该客户准备利用本公司所签发的报告在司法或仲裁程序上，该客户于呈交样品予本公司作测试前必须明确阐述此用途。
If the client is prepared to use the report issued by ICAS in the judicial or arbitral, the client must specify this use before submitting the sample to ICAS for testing.
3. 除非本公司的确进行抽样测试及于有关报告内阐明此事实，该报告只适用于已被测试的样品，而不适用于大量额度的有关货品。
Unless ICAS does carry out a sampling test and clarify this fact in the relevant report, the report applies only to the samples that have been tested and do not apply to a large amount of the relevant goods.
4. 假若该客户并未指定该测试所应用的测试方法或标准，本公司将会自行选择适当的方法或标准并在委托协议 / 合同中告知。
If the Clients do not specify the methods / standards to be applied, ICAS will choose the appropriate methods/standards and inform the client in the agreement/contract.
5. 本公司对由于利用本公司所签发的任何报告或通讯内的资料而造成的损失，概不会承担任何责任。
ICAS will not be liable or accept responsibility for any loss or damage arising from the use of in the reports issued by ICAS or communication information.
6. 假若该报告被不适当地运用，本公司将会保留权利撤回该报告，及采取任何适当的措施。
If the report is inappropriately used, ICAS will reserve the right to withdraw the report and take any appropriate action.
7. 该客户同意其委托本公司进行测试所得出之报告，并不能作为针对本公司法律行动的依据。
Samples submitted for testing are accepted on the understanding that the report issued cannot form the basis of, or be the instrument for, legal action against ICAS.
8. 假若该客户的要求令致有关该样品的测试须于该客户或任何第三方的实验室进行，则本公司只会代为传送有关该测试的结果，对其准确性概不负任何责任。如本公司只可证明该客户或任何第三方的实验室已进行有关测试，则本公司只可确认某正确的样品已经被测试，而毋须为该测试的准确性负任何责任。
If the Clients require the analysis of samples by the Client's or any third party's laboratory, ICAS will only convey the result of the analysis without responsibility for its accuracy. If ICAS is only able to witness an analysis by the Client's or any third party's laboratory ICAS will only confirm that the correct sample has been analyzed without responsibility for the accuracy of any analysis or results.
9. 本公司在提供测试服务期间所衍生的任何报告、证书或其它物资，其相关的所有法律产权（包括知识产权），皆由本公司所拥有。
Any legal property right (include intellectual property) in respect of any report, certificate or other materials derived from ICAS during the provision of the testing service are owned by ICAS.
10. 当本公司收到该客户的请求，本公司可以电子媒介传递有关测试服务的结果，但该客户应注意，电子媒介传递不能保证其所含资料不会流失、延误或被其他方截取。对于电子媒介传递导致其所含的任何资料出现泄露、差错或遗漏，本公司将不会负任何责任。
When ICAS receives the request from the Client, ICAS transmit the results of the test service in electronic media, but the Client should note that the Electronic Media Delivery does not guarantee that the information contained therein will not be lost, delayed or intercepted by third party. ICAS is not liable for any disclosure, error or omission in the content of such messages as a result of electronic transmission.
11. 本公司对其可控范围之外发生的样品质量或其它特征的变化不承担责任。本报告不具有对测试项目或样品推荐或认可的作用。
ICAS assumes no responsibility for variations in quality or other characteristics of items submitted under conditions over which ICAS has no control. This Report does not constitute a recommendation for, or endorsement of, the item or material tested.
12. 本公司经与客户协商一致出具纸质版或电子版形式的报告；报告涂改无效；无授权签字人签字无效；纸质版报告未加盖本公司“检验检测专用章”或“报告专用章”和骑缝章无效；电子版报告未加盖本公司“检验检测专用章”或“报告专用章”无效。
The company issues the report in paper or electronic form through consultation with the customer. The report is invalid if altered or without authorized signatory; The paper version of the report is invalid without the company's "special seal for inspection and testing" or "special seal for report" and the cross seal; The electronic version of the report is invalid without the company's "special seal for inspection and testing" or "special seal for report".
13. 对报告若有异议，有法律法规规定的，依照法律法规执行。其它委托类型报告应于收到报告之日起十五日内向本公司提出，逾期不予受理。
Any objection to the report should execute according to laws and regulations if exist, other entrusted report should be submitted to ICAS within 15 days from the date of receiving the report, and overdue will not be handled.
14. 样品及样品信息由客户提供及确认。本公司不负责证实样品的真伪性，不承担证实客户提供信息的准确性、适当性和（或）完整性责任。
The sample(s) and sample information should be provided and confirmed by the Client. ICAS is not responsible for verifying the authenticity of the sample and does not assume responsibility for the accuracy, appropriateness and/or completeness of the information provided by the Client.
15. 不包含 CMA 资质认定标志的报告，检测数据和结果不具有对社会的证明作用，仅供科研、教学、内部质量控制之用。中英文报告内容以中文为准。
The date and results shown in the report without CMA logo are not used as proof for society, only used for reference in study, teaching and internal quality control. The Chinese version of the report written in Chinese and English shall prevail.

备注：1. 报告中带“*”代表暂未在 CNAS 范围内，“\$”代表暂未在本公司 CMA 资质认定许可技术能力。

Note: “*”in the report indicates that it is not included in the scope of CNAS, “\$” indicates that it is not included in the CMA scope of ICAS.

2. “#”号代表数据来源于指定的签约实验室

“#” indicated that data comes from designated contracted lab:

CMA 资质认定证书编号 CMA Certificate No:

CNAS 注册号 CNAS Registration No:

ICAS英格尔检测中心 ICAS Testing Center
Tel:0086 21-51682918 E-mail:info@icas.org.cn
Add:上海市闵行区瓶北路155号/瓶安路1298号/徐汇区中山西路2368号18F
155 Pingbai Rd / 1298 Pingan Rd, Minhang District, Shanghai/18F,2368W.Zhongshan Rd,Xuhui District.

ICAS英格尔认证中心 ICAS Certification Center
Tel:0086 21-51114700 E-mail:info@icas.org.cn
Add:上海市徐汇区中山西路2368号华鼎大厦31F/25F
31/25F Huading Tower, 2368W.Zhongshan Rd,Xuhui District,Shanghai

ICAS全国各分支机构 温州 / 广州 / 深圳 / 福州 / 厦门 / 昆明 / 南宁 / 长沙 / 重庆 / 成都 / 南京 / 合肥 / 青岛 / 郑州 / 济南 / 江西 / 天津
ICAS National Branch Offices Wenzhou/Guangzhou/Shenzhen/Fuzhou/Xiamen/Kunming/Nanning/Changsha/Chongqing/Chengdu/Nanjing/Hefei/Qingdao/Zhengzhou/Jinan/Jiangxi/Tianjin