

TEST REPORT

Application No.: GZEM2009015103CR
Applicant: Chamberlain Group Inc,The
Address of Applicant: 300 Windsor DrOak Brook, 60523, Illinois, United States
Manufacturer: Grupo Chamberlain S de RL de CV
Address of Manufacturer: Boulevard Luis Donaldo Colosio Murrieta 1891 Colonia Obrera Codigo Postal 84048 Nogales, Sonora, Mexico
Factory: Foshan Foresee Intelligent Control Technology Co., Ltd
Address of Factory: 33 Changbao West Road, Rongli, Ronggui, Shunde, Foshan, 528305 Guangdong, China
Equipment Under Test (EUT):
EUT Name: Sliding Gate Operator
Model No.: SL1000
Standard(s): 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2020-09-15
Date of Test: 2020-09-23 to 2021-01-04
Date of Issue: 2021-02-07

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Kobe Jian
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-02-07		Original

Authorized for issue by:			
Tested By	<i>Lily Kuang</i>		2020-09-23 to 2021-01-04
	Lily_Kuang /Project Engineer		Date
Checked By	<i>Ricky Liu</i>		2021-02-07
	Ricky_Liu /Reviewer		Date



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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.203 & 15.247(c)	Pass
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence	47 CFR Part 15, Subpart C 15.247	N/A	47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Conducted Peak Output Power	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.5	47 CFR Part 15, Subpart C 15.247(b)(1)	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.7	47 CFR Part 15, Subpart C 15.247(a)(1)	Pass
Carrier Frequencies Separation	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.2	47 CFR Part 15, Subpart C 15.247a(1)	Pass
Hopping Channel Number	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.3	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.247a(1)(iii)	Pass
Conducted Band Edges Measurement	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.6	47 CFR Part 15, Subpart C 15.247(d)	Pass
Conducted Spurious Emissions	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 7.8.8	47 CFR Part 15, Subpart C 15.247(d)	Pass
Radiated Emissions & Restricted bands	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.4,6.5,6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass**

** : The EUT pass Radiated Spurious Emissions test after modification.

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

According to the declaration from the applicant, the motor is changed for the product, so all the tests were done for the EUT.



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4 General Information

4.1 Details of E.U.T.

Power Supply:	AC 120 V, 60Hz
Cable:	AC mains
Test Voltage:	AC 120 V, 60Hz
Antenna Gain:	-5 dBi declared by applicant
Antenna Type:	Integrated antenna
Channel Spacing:	500 kHz
Modulation Type:	GFSK
Number of Channels:	50
Operation Frequency:	902.25MHz to 926.75MHz
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Hardware Version:	SL1000-R
Firmware Version:	V1.1
S/N:	SN00652
Test Software Version:	N/A
RF Power setting level	Default

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 5.5 \times 10^{-8}$
2	Duty cycle	$\pm 0.57\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF Conducted power	0.68dB
5	RF Power Density	1.50dB
6	Conducted Spurious Emissions	1.04dB
7	RF Radiated Power	4.5dB (below 1GHz)
		4.8dB (above 1GHz)
8	Radiated Spurious Emission Test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-18GHz)
9	Temperature	$\pm 0.4^{\circ}\text{C}$
10	Humidity	$\pm 1.3\%$
11	Supply Voltages	$\pm 1.5\%$
12	Time	$\pm 3\%$



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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



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4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

● **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

● **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

● **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

● **FCC Recognized 2.948 Listed Test Firm(Registration No.: 282399)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 282399, May 31, 2002.

● **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818, Jul 13, 2017.

● **Industry Canada (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

● **VCCI (Registration No.: R-12460, C-12584, G-10449 and T-11179)**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-10449 and T-11179 respectively.

● **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2005, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



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4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	N/A	N/A
Two-Line V-Network	Rohde & Schwarz	ENV216	EMC0118	2020-01-10	2021-01-09
LISN	Rohde & Schwarz	ENV216	EMC2135	2020-09-25	2021-09-24
EMI Test Receiver	Rohde & Schwarz	ESCS30	EMC0506	2020-11-13	2021-11-12
Coaxial Cable	HangTianXing	2m	EMC0107	2020-09-09	2022-09-08
Voltage Probe	SGS-EMC	N/A	EMC0106	2019-05-10	2021-05-09
Conical Metal Housing	SGS-EMC	N/A	EMC0167	2020-04-19	2022-04-18
Test Software E3c	Audix	Ver. 5.4.1221b	GZE100-62	N/A	N/A

Conducted Peak Output Power					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer	AgilentTechnologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01

Carrier Frequencies Separation					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer	AgilentTechnologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01



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 Guangzhou Branch Testing Center EEC Laboratory 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

Hopping Channel Number					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

Dwell Time					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

Conducted Band Edges Measurement					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

Conducted Spurious Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01



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Radiated Emissions & Restricted bands					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Test Receiver	Rohde & Schwarz	ESIB26	EMC0522	2020-01-10	2021-01-09
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC0056	2020-01-10	2021-01-09
Chamber cable	HangTianXing	N/A	EMC0542	2019-06-28	2021-06-27
Trilog Broadband Antenna 25MHz-1GHz	SCHWARZBECKME SS-ELEKTRONIK	VULB 9168	EMC2174	2018-09-06	2021-09-05
Trilog Broadband Antenna 30MHz-1GHz	SCHWARZBECKME SS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22
Bi-log Type Antenna	Schaffner Chase	CBL6143	EMC0519	2020-06-08	2023-06-07
Horn Antenna 1GHz-18GHz	Rohde & Schwarz	HF906	EMC0518	2018-09-02	2021-09-01
1GHz-26.5 GHz Pre-Amplifier	Agilent	8449B	EMC0521	2020-01-10	2021-01-09
Amplifier	HP	8447F	EMC2065	2020-05-26	2021-05-25
Pre-Amplifier MH648A	ANRITSU CORP	MH648A	EMC2086	2020-11-13	2021-11-12
Active Loop Antenna	ETS-Lindgren	6502	EMC2190	2019-12-27	2021-12-26
High Pass Filter(915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2020-01-10	2021-01-09
2.4GHz Filter	Micro-Tronics	BRM 50702	EMC2069	2020-01-10	2021-01-09
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2020-12-19	2023-12-18
MXE EMI Receiver	Keysight	N9038A	EMC2139	2020-11-13	2021-11-12
EXA Signal Analyzer	Keysight	N9010A	EMC2138	2020-09-17	2021-09-16
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2020-07-09	2021-07-08
DMM	Fluke	73	EMC0007	2020-07-09	2021-07-08



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

6.1.2 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(c)

6.1.3 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

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

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is -5dBi. Please refer to the internal photos for details.



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6.2 Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.247(a)(1),(g),(h)

6.2.2 Conclusion

Standard Requirement:

The system shall hop to channel frequencies that are selected at the system hopping rate from a Pseudorandom ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Compliance for section 15.247(a)(1):

According to Technical Specification, the pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones.

- > Number of shift register stages: 9
- > Length of pseudo-random sequence: $2^9 - 1 = 511$ bits
- > Longest sequence of zeros: 8 (non-inverted signal)

Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:

Each frequency used equally on the average by each transmitter.

According to Technical Specification, the receivers are designed to have input and IF bandwidths that match the hopping channel bandwidths of any transmitters and shift frequencies in synchronization with the transmitted signals.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum bands



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7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission(MHz)	Conducted limit(dBµV)	
	Quasi-peak	Average
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.

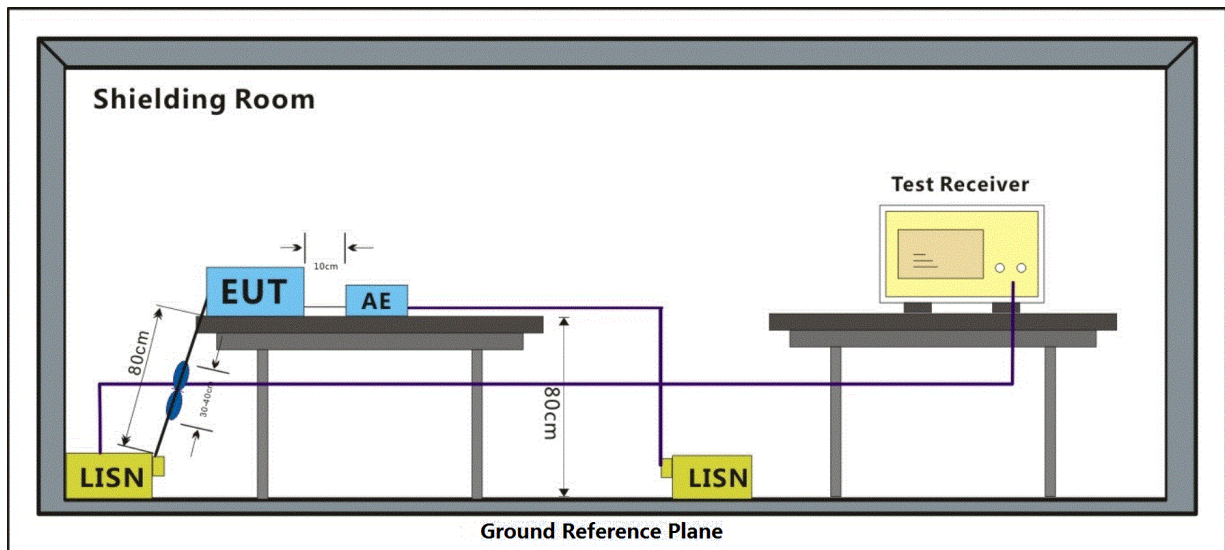
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 52 % RH Atmospheric Pressure: 1020 mbar

Test Mode: b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.1.2 Test Setup Diagram



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7.1.3 Measurement Procedure and Data

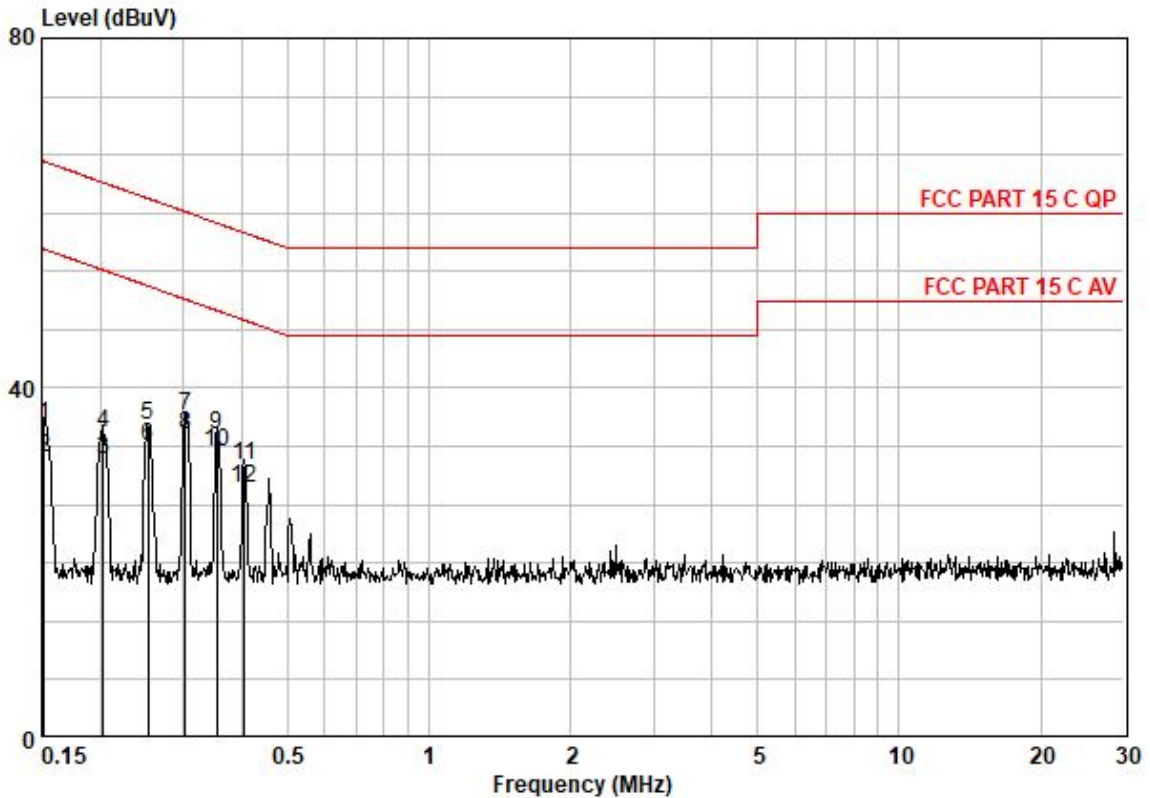
- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor



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Mode:b; Line:Live Line



Pol :LIVE
Mode :
Model :

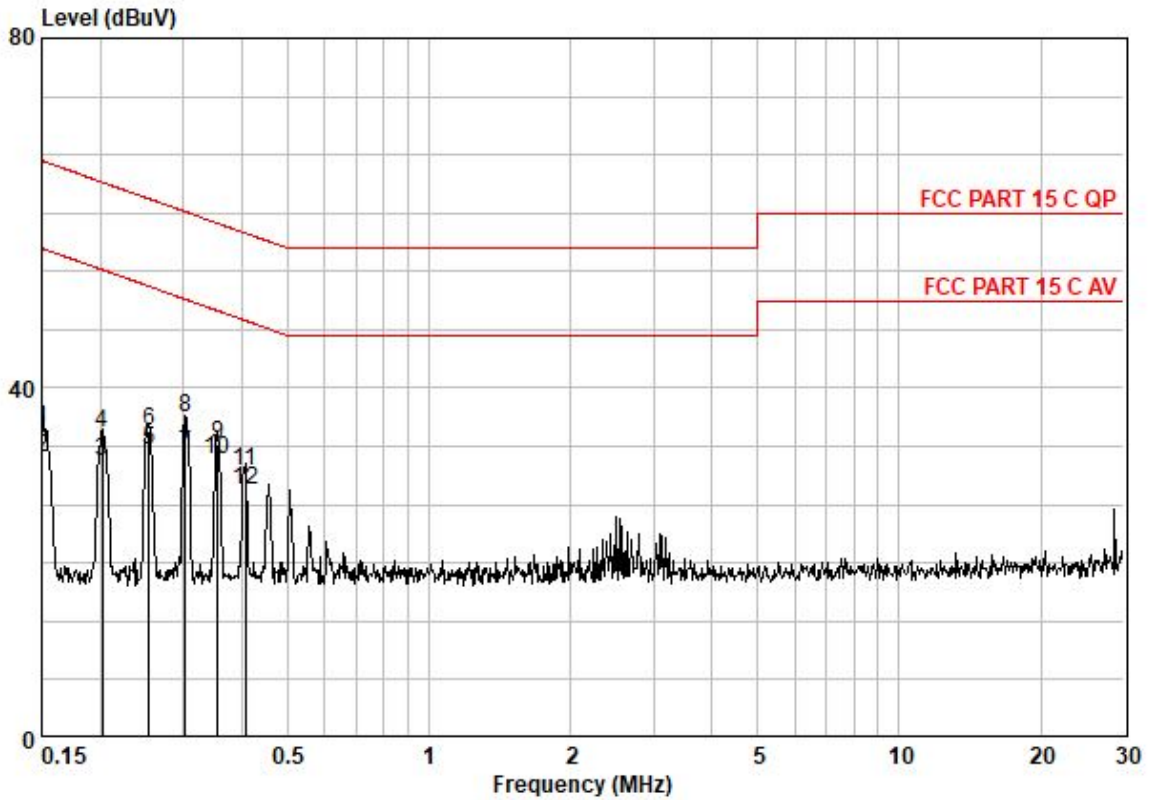
Frequency MHz	read level dBuV	Cable Loss dB	LISN Factor dB	Measured level dBuV	Limit Line dBuV	Over limit dB	Remark
0.15	26.06	0.10	9.61	35.77	65.91	-30.14	QP
0.15	22.24	0.10	9.61	31.95	55.91	-23.96	AVERAGE
0.20	22.02	0.10	9.60	31.72	53.49	-21.77	AVERAGE
0.20	25.16	0.10	9.60	34.86	63.49	-28.63	QP
0.25	26.04	0.10	9.61	35.75	61.69	-25.94	QP
0.25	23.75	0.10	9.61	33.46	51.69	-18.23	AVERAGE
0.30	27.14	0.10	9.60	36.84	60.15	-23.31	QP
0.30	25.04	0.10	9.60	34.74	50.15	-15.41	AVERAGE
0.35	25.04	0.10	9.60	34.74	58.87	-24.13	QP
0.35	22.99	0.10	9.60	32.69	48.87	-16.18	AVERAGE
0.40	21.42	0.10	9.61	31.13	57.77	-26.64	QP
0.40	18.76	0.10	9.61	28.47	47.77	-19.30	AVERAGE



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Mode:b; Line:Neutral Line



Pol : NEUTRAL
Mode :
Model :

Frequency MHz	read level dBuV	Cable Loss dB	LISN Factor dB	Measured level dBuV	Limit Line dBuV	Over limit dB	Remark
0.15	25.60	0.10	9.61	35.31	66.00	-30.69	QP
0.15	22.41	0.10	9.61	32.12	56.00	-23.88	AVERAGE
0.20	21.98	0.10	9.62	31.70	53.54	-21.84	AVERAGE
0.20	25.12	0.10	9.62	34.84	63.54	-28.70	QP
0.25	23.22	0.10	9.62	32.94	51.64	-18.70	AVERAGE
0.25	25.44	0.10	9.62	35.16	61.64	-26.48	QP
0.30	22.83	0.10	9.63	32.56	50.15	-17.59	AVERAGE
0.30	26.86	0.10	9.63	36.59	60.15	-23.56	QP
0.36	23.86	0.10	9.63	33.59	58.83	-25.24	QP
0.36	22.02	0.10	9.63	31.75	48.83	-17.08	AVERAGE
0.41	20.74	0.10	9.64	30.48	57.73	-27.25	QP
0.41	18.57	0.10	9.64	28.31	47.73	-19.42	AVERAGE



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7.2 Conducted Peak Output Power

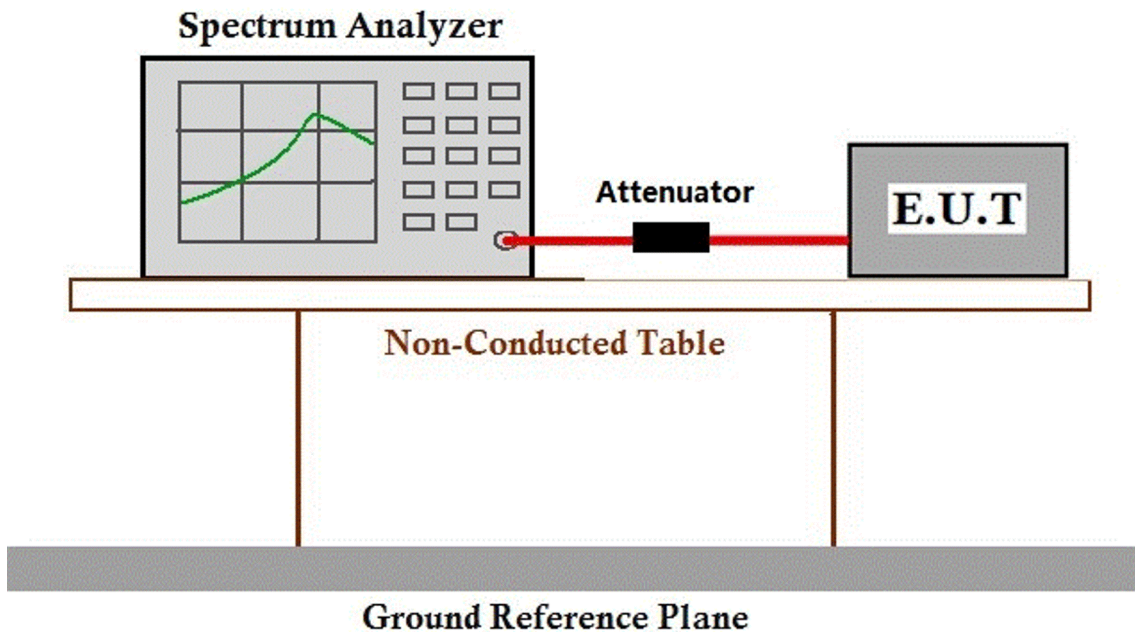
Test Requirement 47 CFR Part 15, Subpart C 15.247(b)(1)
 Test Method: ANSI C63.10 (2013) Section 7.8.5
 Limit:

Frequency range(MHz)	Output power of the intentional radiator(watt)
902-928	1 for ≥50 hopping channels
	0.25 for 25≤ hopping channels <50
	1 for digital modulation
2400-2483.5	1 for ≥75 non-overlapping hopping channels
	0.125 for all other frequency hopping systems
	1 for digital modulation
5725-5850	1 for frequency hopping systems and digital modulation

7.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 24.9 °C Humidity: 64.4 % RH Atmospheric Pressure: 1020 mbar
 Test Mode: b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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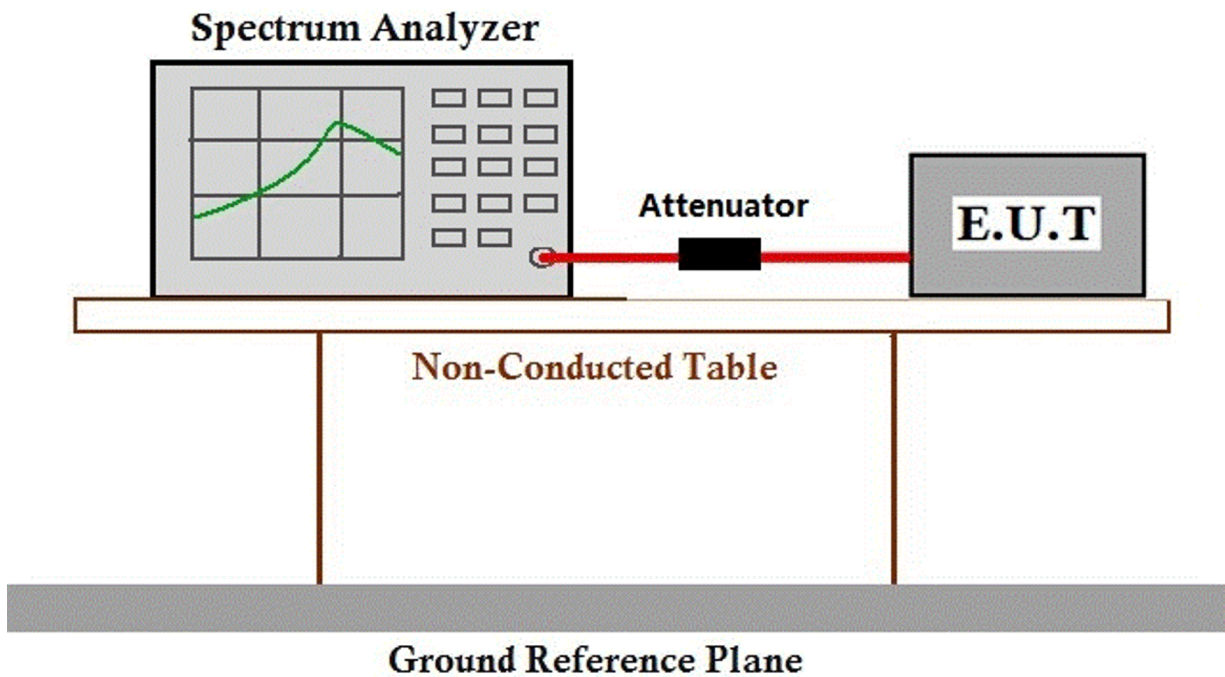
7.3 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.247(a)(1)
 Test Method: ANSI C63.10 (2013) Section 7.8.7
 Limit: <= 500kHz

7.3.1 E.U.T. Operation

Operating Environment:
 Temperature: 24.9 °C Humidity: 64.4 % RH Atmospheric Pressure: 1020 mbar
 Test Mode: b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation,. The mode has been tested and which is recorded in the report.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



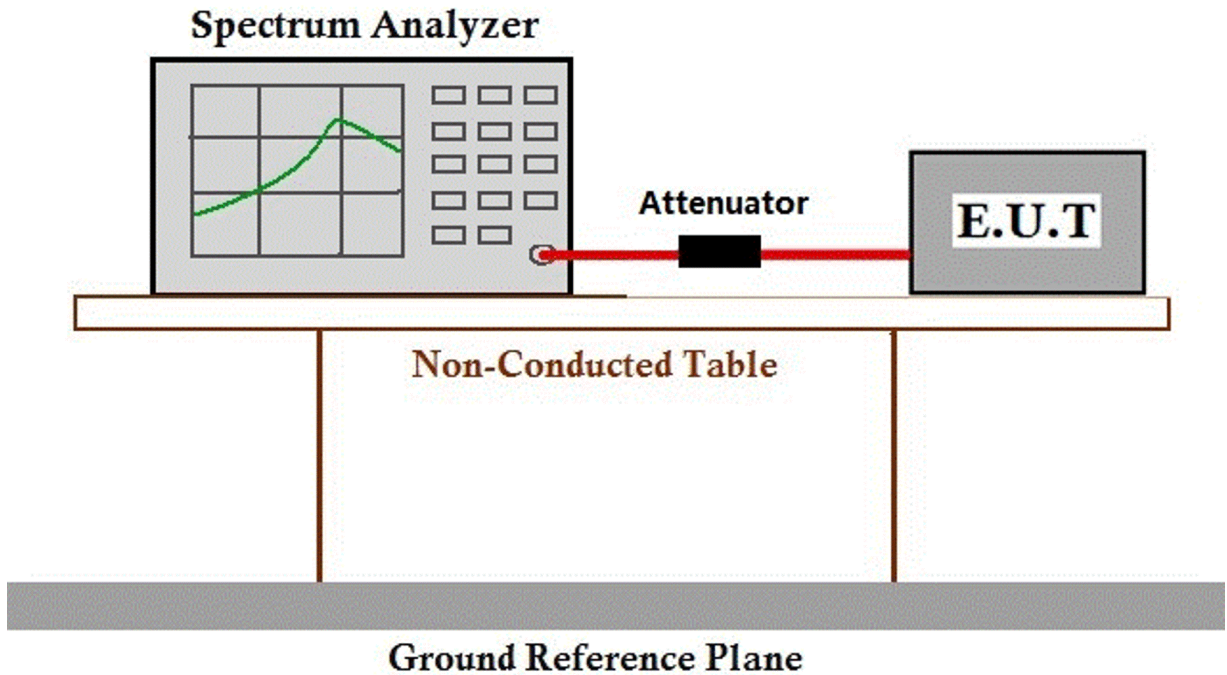
7.4 Carrier Frequencies Separation

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)
 Test Method: ANSI C63.10 (2013) Section 7.8.2
 Limit: 2/3 of the 20dB bandwidth base on the transmission power is less than 0.125W

7.4.1 E.U.T. Operation

Operating Environment:
 Temperature: 24.9 °C Humidity: 64.4 % RH Atmospheric Pressure: 1020 mbar
 Test Mode: a:TX_Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation,. The mode has been tested and which is recorded in the report.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



7.5 Hopping Channel Number

Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)
 Test Method: ANSI C63.10 (2013) Section 7.8.3
 Limit:

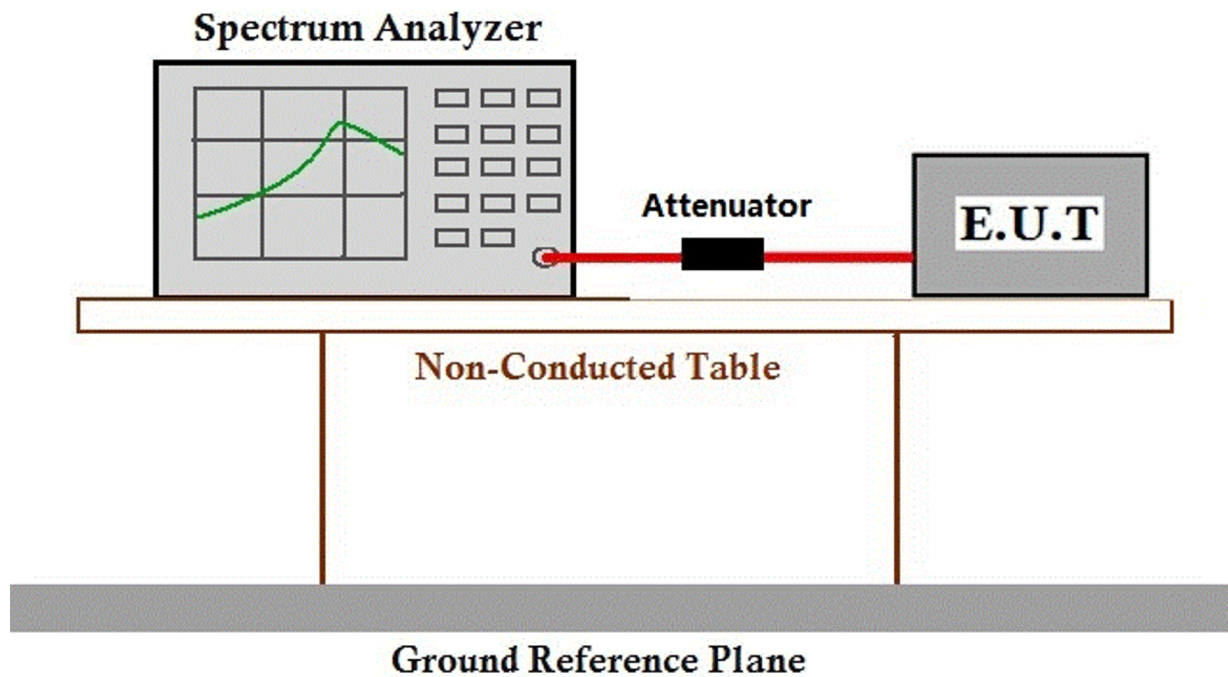
Frequency range(MHz)	Number of hopping channels (minimum)
902-928	50 for 20dB bandwidth <250kHz
	25 for 20dB bandwidth ≥250kHz
2400-2483.5	15
5725-5850	75

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 24.9 °C Humidity: 64.4 % RH Atmospheric Pressure: 1020 mbar
 Test Mode: a:TX_Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation,. The mode has been tested and which is recorded in the report.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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7.6 Dwell Time

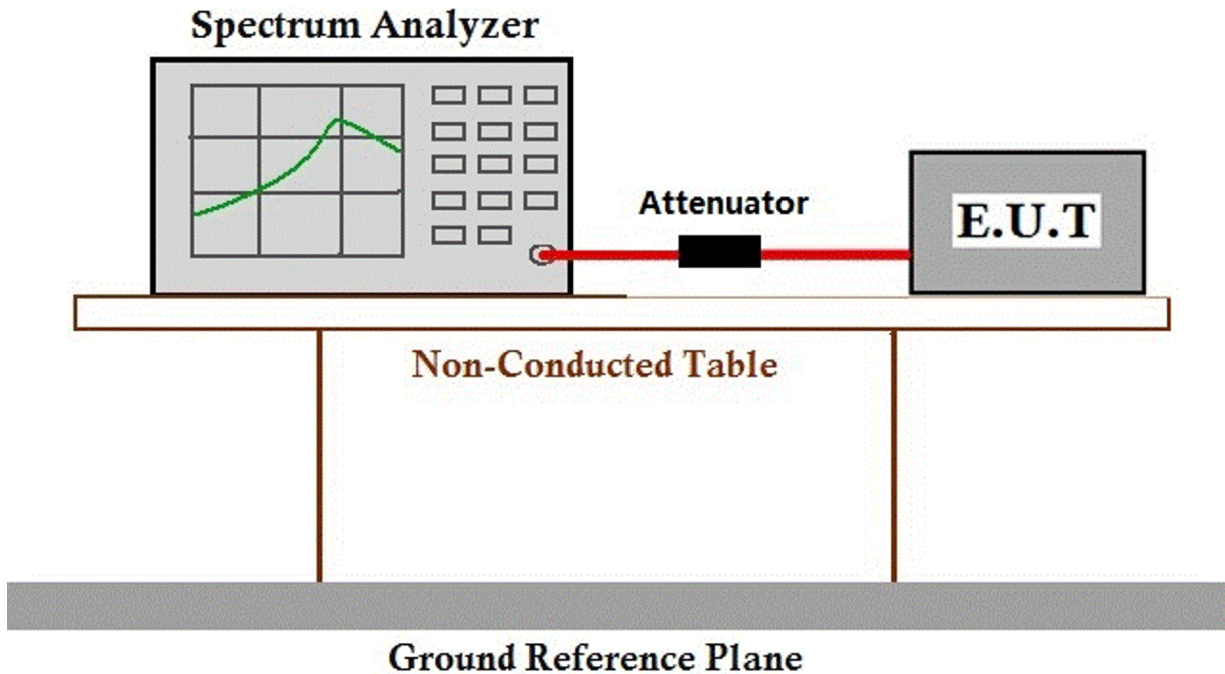
Test Requirement 47 CFR Part 15, Subpart C 15.247a(1)(iii)
 Test Method: ANSI C63.10 (2013) Section 7.8.4
 Limit:

Frequency(MHz)	Limit
902-928	0.4S within a 20S period(20dB bandwidth<250kHz)
	0.4S within a 10S period(20dB bandwidth≥250kHz)
2400-2483.5	0.4S within a period of 0.4S multiplied by the number of hopping channels
5725-5850	0.4S within a 30S period

7.6.1 E.U.T. Operation

Operating Environment:
 Temperature: 24.9 °C Humidity: 64.3 % RH Atmospheric Pressure: 1020 mbar
 Test Mode: a:TX_Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation,. The mode has been tested and which is recorded in the report.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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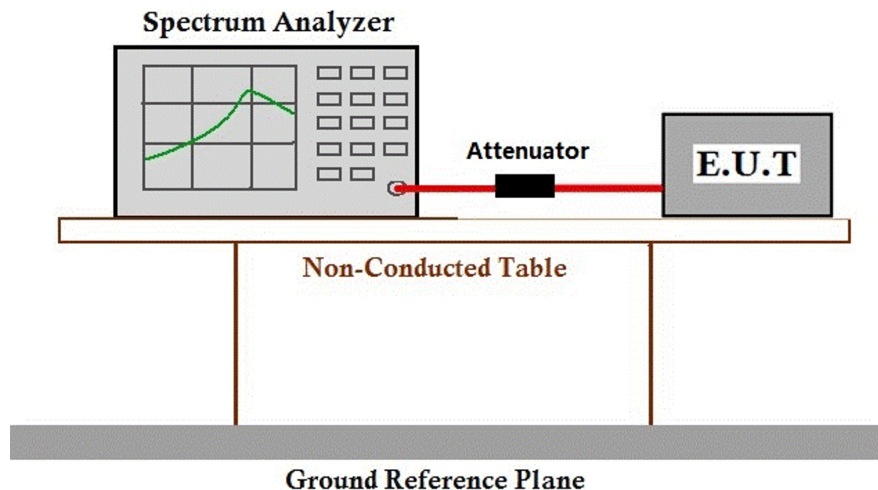
7.7 Conducted Band Edges Measurement

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)
Test Method: ANSI C63.10 (2013) Section 7.8.6
Limit: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))

7.7.1 E.U.T. Operation

Operating Environment:
Temperature: 24.9 °C **Humidity:** 63.7 % RH **Atmospheric Pressure:** 1020 mbar
Test mode:
 a:TX_Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation,. The mode has been tested and which is recorded in the report.
 b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation,. The mode has been tested and which is recorded in the report.

7.7.2 Test Setup Diagram



7.7.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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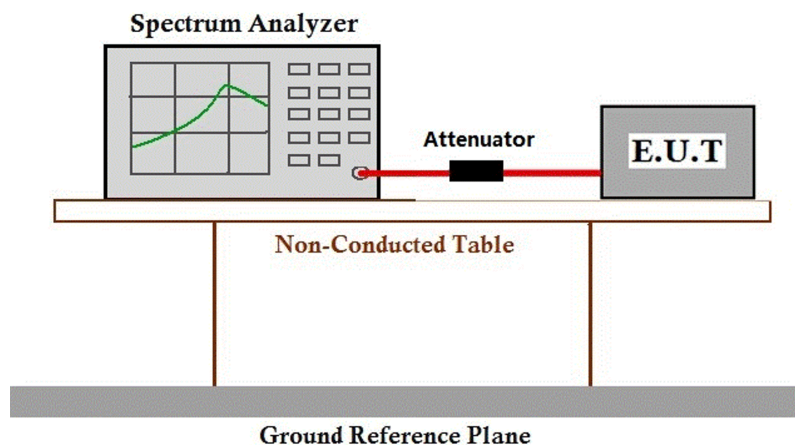
7.8 Conducted Spurious Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.247(d)
Test Method: ANSI C63.10 (2013) Section 7.8.8
Limit: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))

7.8.1 E.U.T. Operation

Operating Environment:
Temperature: 24.9 °C **Humidity:** 63.3 % RH **Atmospheric Pressure:** 1020 mbar
Pretest these modes to find the worst case:
a:TX_Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation,. The mode has been tested and is recorded in the report.
b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation,. The mode has been tested and which is recorded in the report.
The worst case for final test:
a:TX_Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation,. The mode has been tested and which is recorded in the report.

7.8.2 Test Setup Diagram



7.8.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.247



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7.9 Radiated Emissions & Restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.205 & 15.209
 Test Method: ANSI C63.10 (2013) Section 6.4,6.5,6.6
 Measurement Distance: 3m
 Limit:

Frequency(MHz)	Field strength (microvolts/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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.9.1 E.U.T. Operation

Operating Environment:

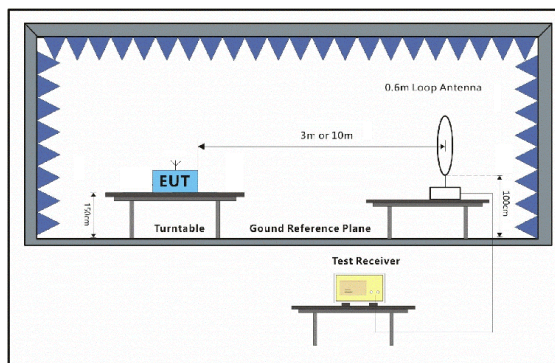
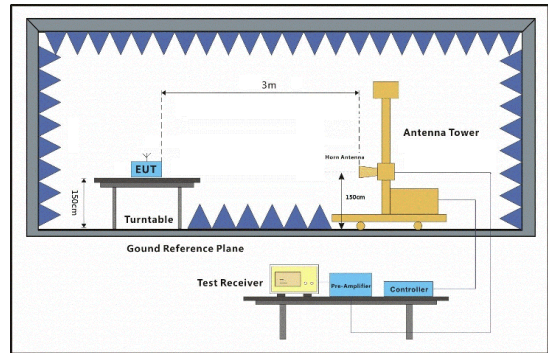
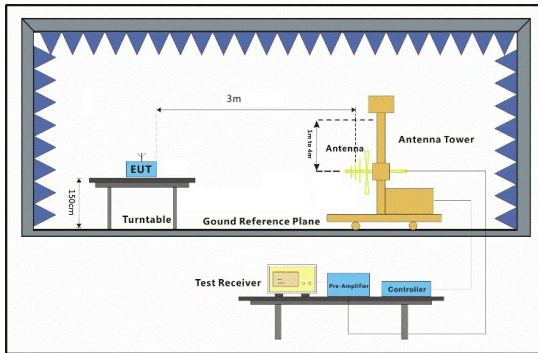
Temperature: 22 °C Humidity: 52 % RH Atmospheric Pressure: 1020 mbar

Test Mode: b:TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation,. The mode has been tested and which is recorded in the report.



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7.9.2 Test Setup Diagram



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 中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075058 sgs.china@sgs.com

7.9.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

- 1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.
- 2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
 Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown



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According to the clause 7.5 of ANSI C63.10-2013:

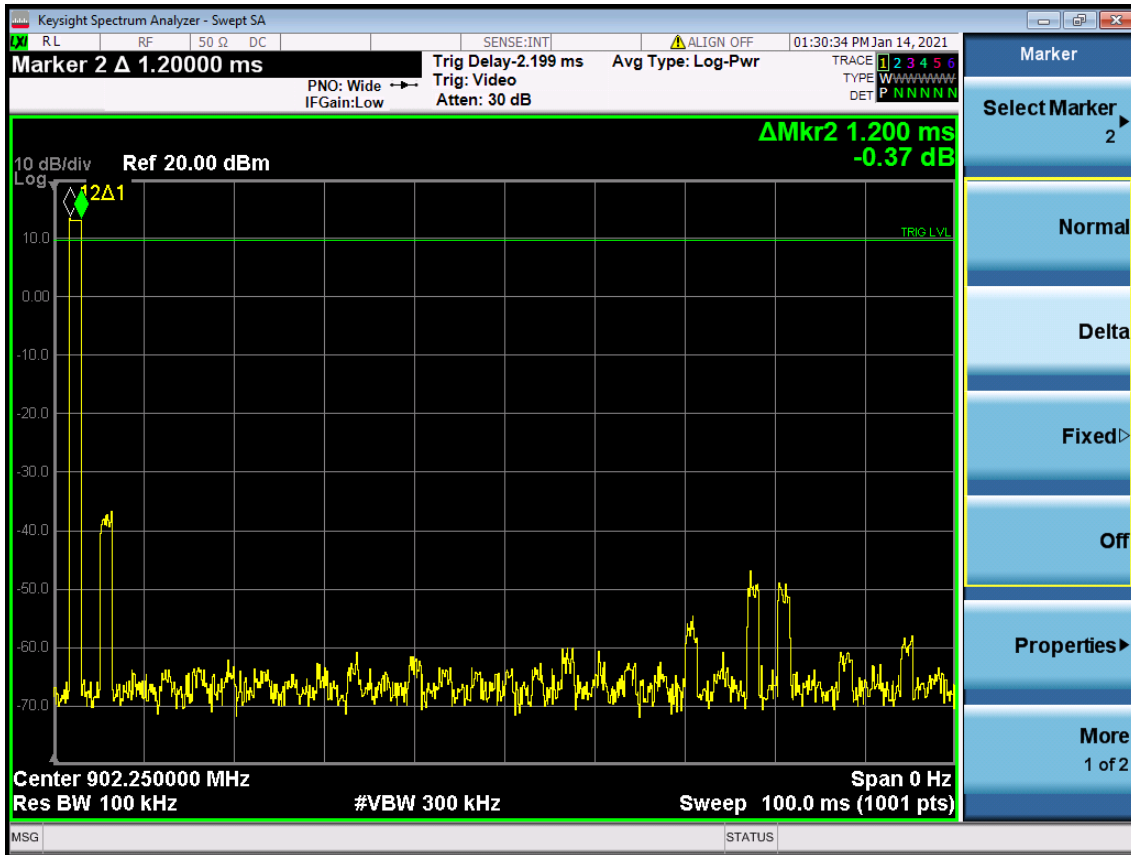
The average correction factor is computed by analyzing the on time in 100ms over one complete pulse train. Analysis of the remote transmitter on time in one complete pulse train, therefore the average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle), where the duty factor is calculated from following formula:

$$20\log(\text{Duty cycle}) = 20\log(T_{pulse}/100) = 20\log(1.2/100) = -38.4\text{dB}$$

Here $T_{pulse} = 1.2$ (ms)

Please refer to below plots for more details.

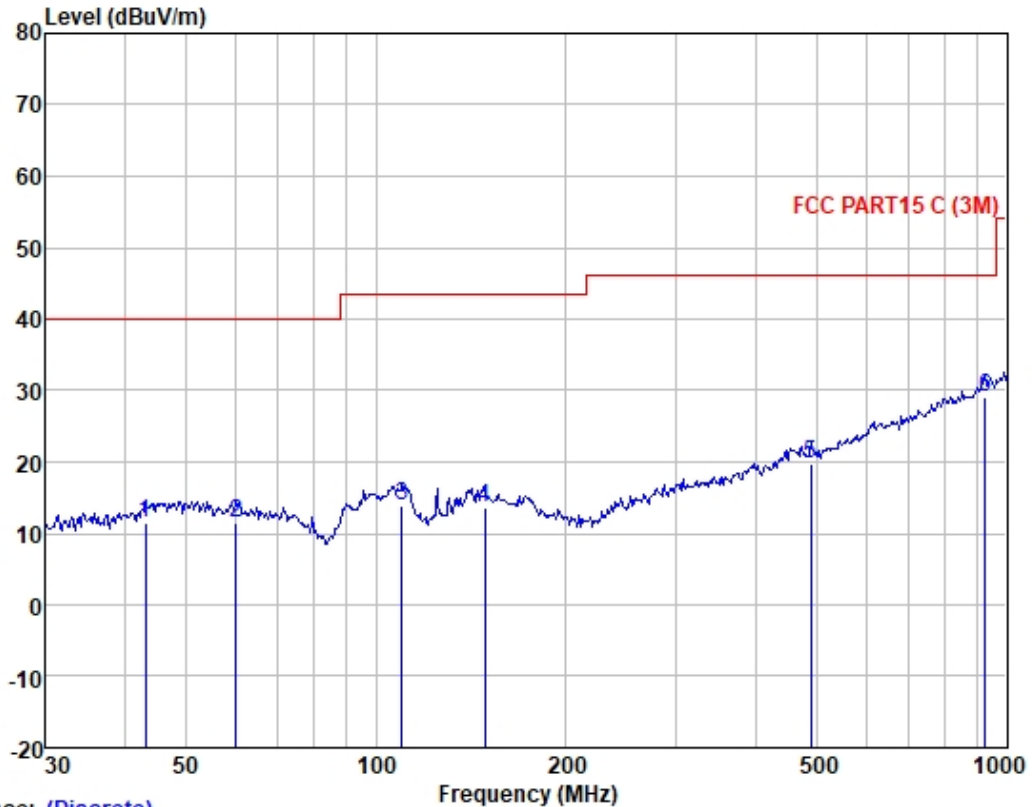
Duty cycle:



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30MHz- 1G: Field Strength of Unwanted Emissions. Quasi-Peak Measurement:

Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



Trace: (Discrete)

Site : SGS
 Condition: FCC PART15 C (3M) 3m HORIZONTAL
 Job :
 Model :
 Power :
 Test Mode:

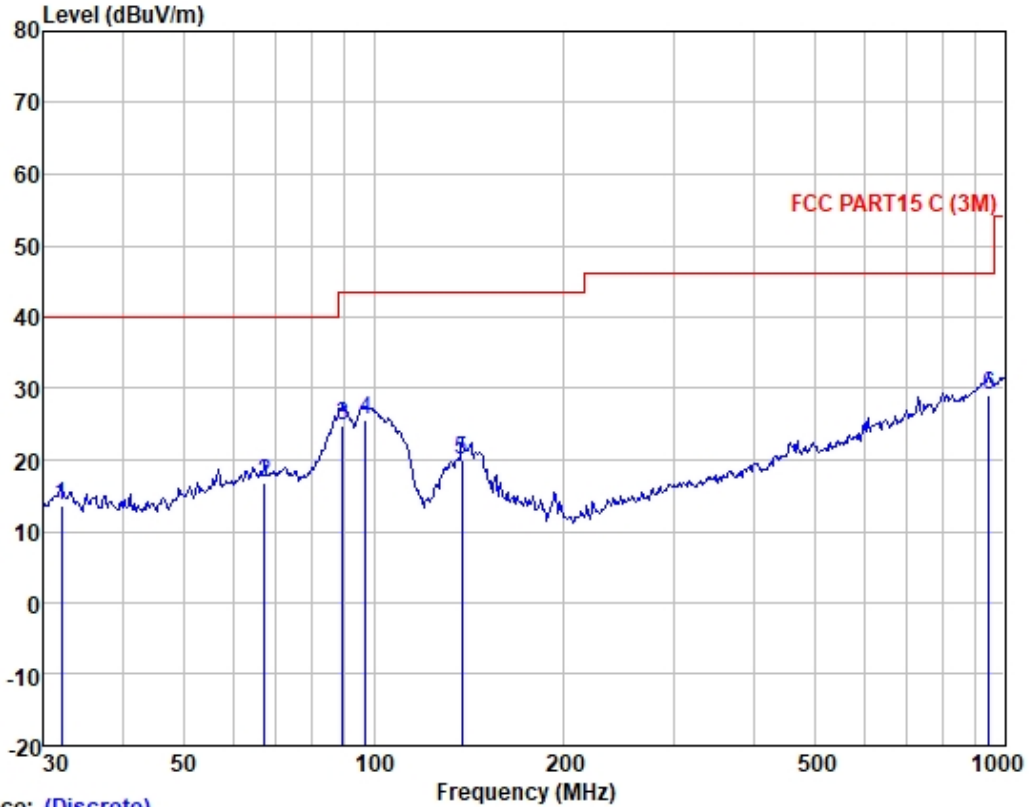
	Freq	ReadLevel	AntennaFactor	CableLoss	PreampFactor	Level	LimitLine	OverLimit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	43.202	23.70	13.77	1.15	27.17	11.45	40.00	-28.55	HORIZONTAL	QP
2	60.069	23.95	13.40	1.33	27.16	11.52	40.00	-28.48	HORIZONTAL	QP
3	110.182	28.72	10.40	1.71	27.06	13.77	43.50	-29.73	HORIZONTAL	QP
4	148.963	24.74	13.75	2.05	26.84	13.70	43.50	-29.80	HORIZONTAL	QP
5	489.027	25.77	17.77	4.06	27.94	19.66	46.00	-26.34	HORIZONTAL	QP
6	925.756	26.51	23.73	6.63	27.81	29.06	46.00	-16.94	HORIZONTAL	QP



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Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Trace: (Discrete)
 Site : SGS
 Condition: FCC PART15 C (3M) 3m VERTICAL
 Job :
 Model :
 Power :
 Test Mode:

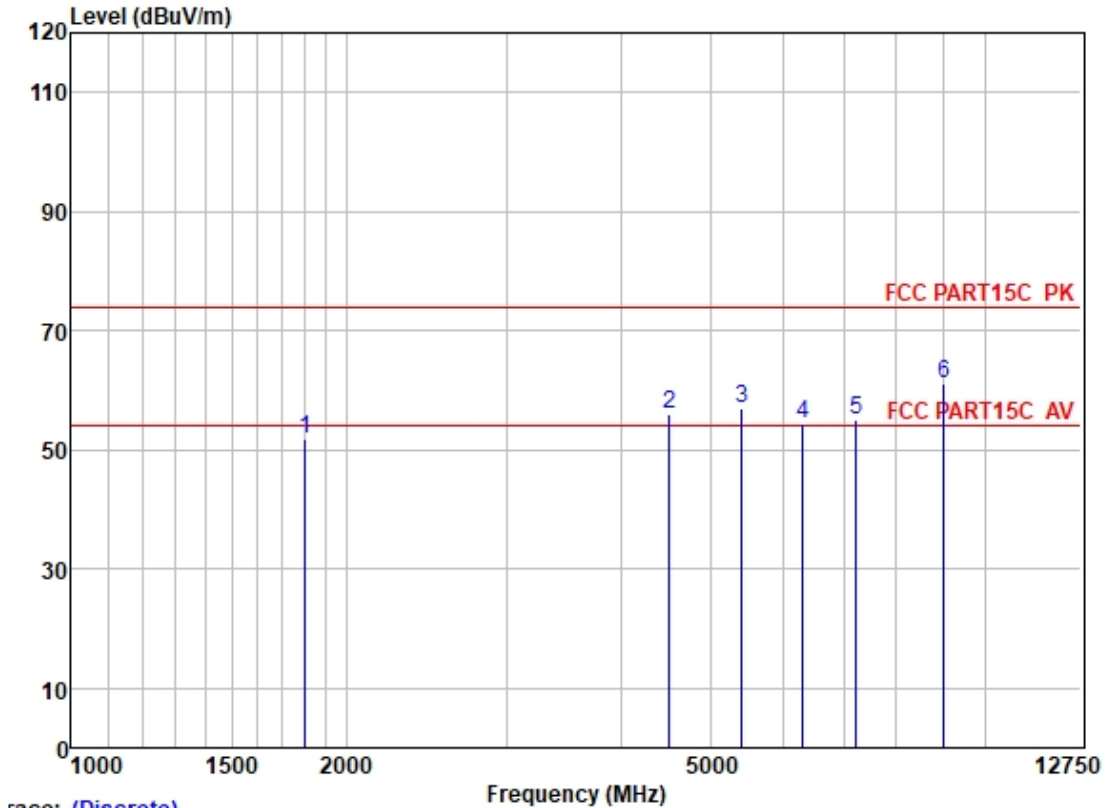
	Read	Antenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	31.955	27.21	12.70	1.01	27.19	13.73	40.00	-26.27	VERTICAL QP
2	67.202	30.30	12.34	1.34	27.14	16.84	40.00	-23.16	VERTICAL QP
3	89.276	42.45	7.77	1.61	27.09	24.74	43.50	-18.76	VERTICAL QP
4	97.115	42.28	8.70	1.61	27.08	25.51	43.50	-17.99	VERTICAL QP
5	137.903	32.02	13.00	1.94	26.94	20.02	43.50	-23.48	VERTICAL QP
6	945.440	26.18	23.87	6.67	27.76	28.96	46.00	-17.04	VERTICAL QP



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1GHz~10GHz Field Strength of Unwanted Emissions Measurement:

Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:Low



Trace: (Discrete)

	ReadAntenna	Cable	Preamp	Limit	Over				
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1804.416	60.36	25.95	3.00	37.55	51.76	74.00	-22.24	HORIZONTAL Peak
2	4511.966	56.87	30.82	5.11	36.92	55.88	74.00	-18.12	HORIZONTAL Peak
3	5413.961	56.02	31.79	6.06	36.99	56.88	74.00	-17.12	HORIZONTAL Peak
4	6315.233	51.98	33.51	5.95	36.99	54.45	74.00	-19.55	HORIZONTAL Peak
5	7218.015	50.30	35.62	6.01	36.93	55.00	74.00	-19.00	HORIZONTAL Peak
6	9022.050	53.32	37.43	7.54	37.02	61.27	74.00	-12.73	HORIZONTAL Peak



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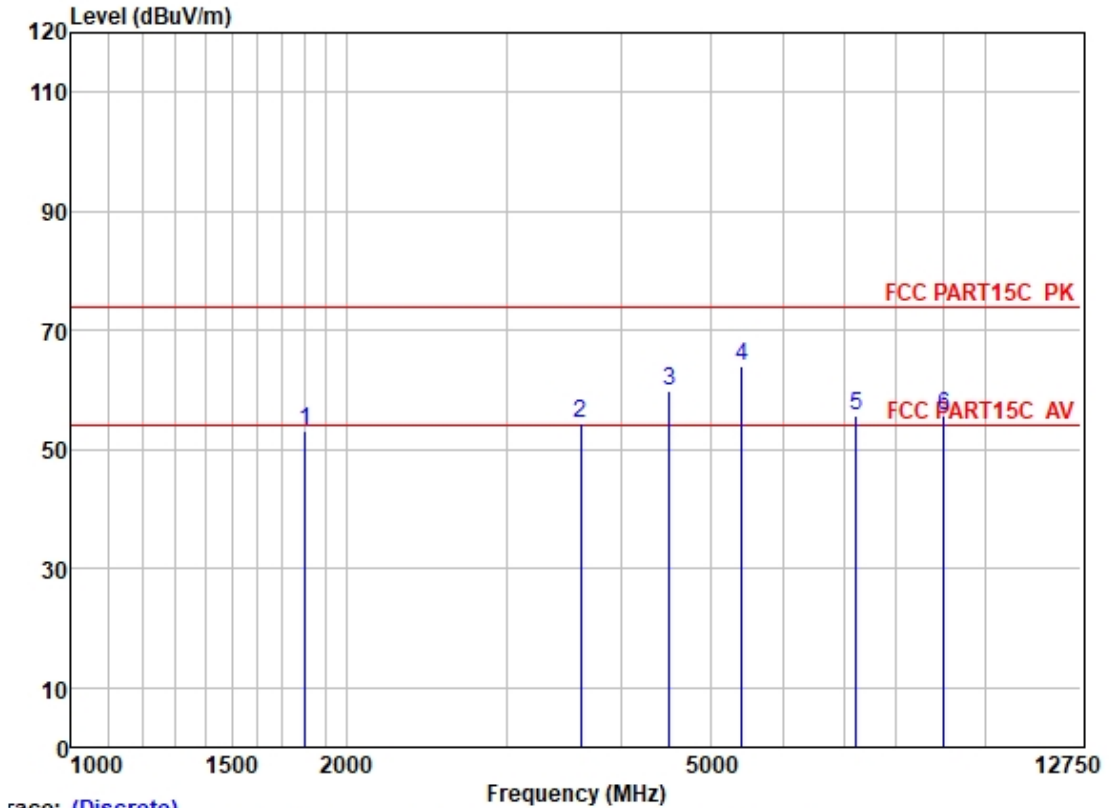
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
1804.416	60.36	25.95	3.00	37.55	51.76	74.00	-22.24	Peak
1804.416	N/A	N/A	N/A	N/A	13.36	54.00	-40.64	Average
4511.966	56.87	30.82	5.11	36.92	55.88	74.00	-18.12	Peak
4511.966	N/A	N/A	N/A	N/A	17.48	54.00	-36.52	Average
5413.961	56.02	31.79	6.06	36.99	56.88	74.00	-17.12	Peak
5413.961	N/A	N/A	N/A	N/A	18.48	54.00	-35.52	Average
6315.233	51.98	33.51	5.95	36.99	54.45	74.00	-19.55	Peak
6315.233	N/A	N/A	N/A	N/A	16.05	54.00	-37.95	Average
7218.015	50.30	35.62	6.01	36.93	55.00	74.00	-19.00	Peak
7218.015	N/A	N/A	N/A	N/A	16.6	54.00	-37.4	Average
9022.050	53.32	37.43	7.54	37.02	61.27	74.00	-12.73	Peak
9022.050	N/A	N/A	N/A	N/A	22.87	54.00	-31.13	Average



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Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:Low



Trace: (Discrete)

	Read	Antenna	Cable	Preamp	Limit	Over				
Freq	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark		
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1	1804.416	61.73	25.95	3.00	37.55	53.13	74.00	-20.87	VERTICAL	Peak
2	3609.451	57.63	29.05	4.50	36.94	54.24	74.00	-19.76	VERTICAL	Peak
3	4511.966	60.82	30.82	5.11	36.92	59.83	74.00	-14.17	VERTICAL	Peak
4	5413.323	62.99	31.79	6.06	36.99	63.85	74.00	-10.15	VERTICAL	Peak
5	7218.015	50.90	35.62	6.01	36.93	55.60	74.00	-18.40	VERTICAL	Peak
6	9022.050	47.58	37.43	7.54	37.02	55.53	74.00	-18.47	VERTICAL	Peak



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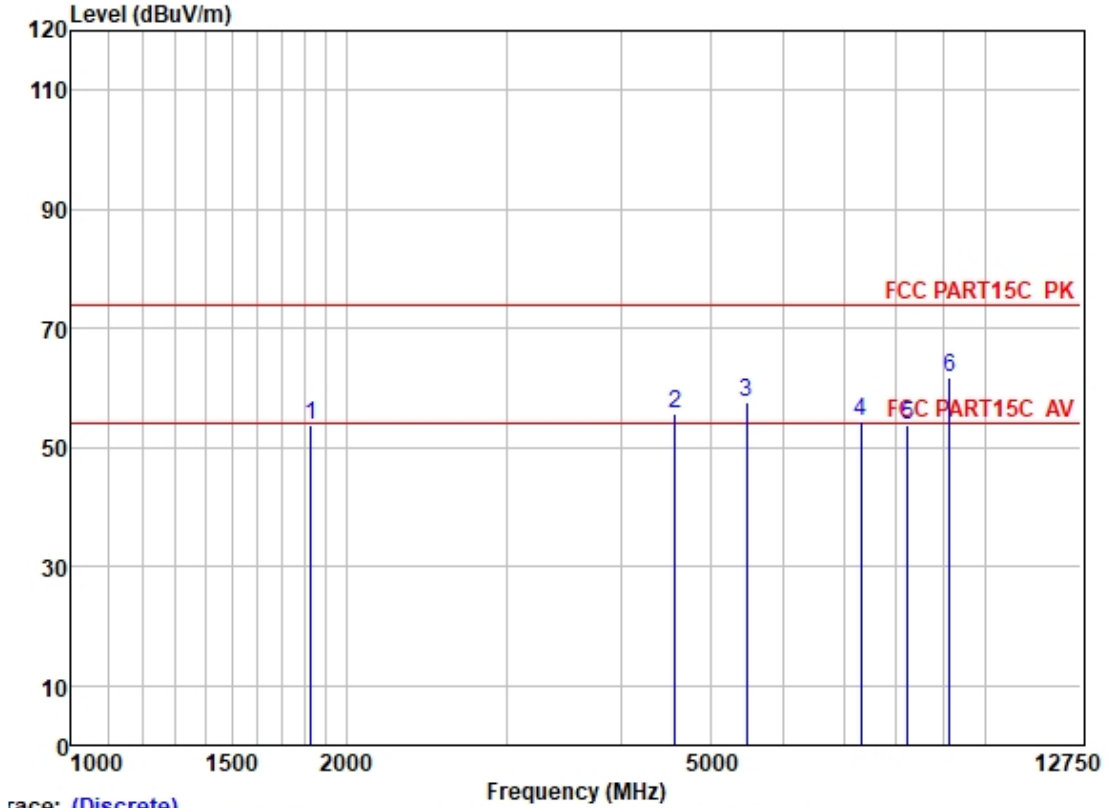
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
1804.416	61.73	25.95	3.00	37.55	53.13	74.00	-20.87	Peak
1804.416	N/A	N/A	N/A	N/A	14.73	54.00	-39.27	Average
3609.451	57.63	29.05	4.50	36.94	54.24	74.00	-19.76	Peak
3609.451	N/A	N/A	N/A	N/A	15.84	54.00	-38.16	Average
4511.966	60.82	30.82	5.11	36.92	59.83	74.00	-14.17	Peak
4511.966	N/A	N/A	N/A	N/A	21.43	54.00	-32.57	Average
5413.323	62.99	31.79	6.06	36.99	63.85	74.00	-10.15	Peak
5413.323	N/A	N/A	N/A	N/A	25.45	54.00	-28.55	Average
7218.015	50.90	35.62	6.01	36.93	55.60	74.00	-18.40	Peak
7218.015	N/A	N/A	N/A	N/A	17.2	54.00	-36.8	Average
9022.050	47.58	37.43	7.54	37.02	55.53	74.00	-18.47	Peak
9022.050	N/A	N/A	N/A	N/A	17.13	54.00	-36.87	Average



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Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:middle



Trace: (Discrete)

	Read	Antenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Line	Limit	Pol/Phase	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1829.477	62.31	25.98	2.97	37.54	53.72	74.00	-20.28	HORIZONTAL Peak
2	4573.422	56.36	30.91	5.33	36.92	55.68	74.00	-18.32	HORIZONTAL Peak
3	5488.170	56.59	31.80	6.36	36.99	57.76	74.00	-16.24	HORIZONTAL Peak
4	7318.355	49.07	36.00	6.13	36.92	54.28	74.00	-19.72	HORIZONTAL Peak
5	8232.291	47.28	36.99	6.39	36.92	53.74	74.00	-20.26	HORIZONTAL Peak
6	9147.857	53.78	37.63	7.44	37.04	61.81	74.00	-12.19	HORIZONTAL Peak



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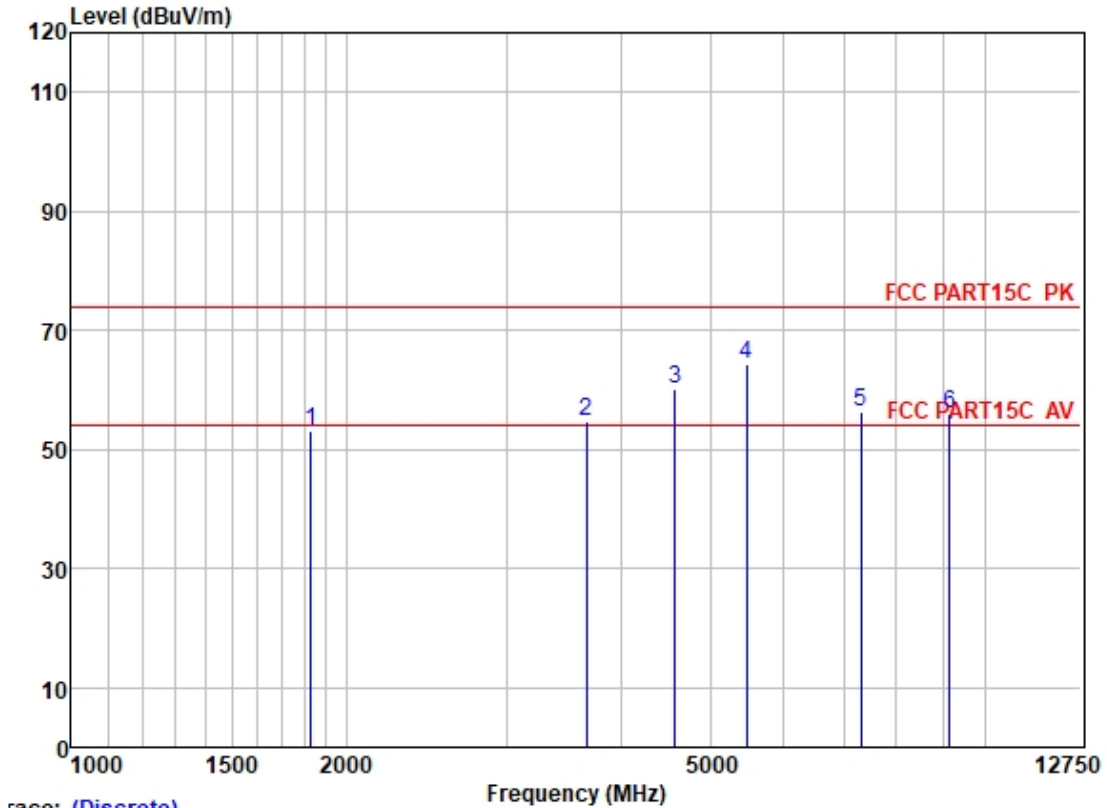
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
1829.477	62.31	25.98	2.97	37.54	53.72	74.00	-20.28	Peak
1829.477	N/A	N/A	N/A	N/A	15.32	54.00	-38.68	Average
4573.422	56.36	30.91	5.33	36.92	55.68	74.00	-18.32	Peak
4573.422	N/A	N/A	N/A	N/A	17.28	54.00	-36.72	Average
5488.170	56.59	31.80	6.36	36.99	57.76	74.00	-16.24	Peak
5488.170	N/A	N/A	N/A	N/A	19.36	54.00	-34.64	Average
7318.355	49.07	36.00	6.13	36.92	54.28	74.00	-19.72	Peak
7318.355	N/A	N/A	N/A	N/A	15.88	54.00	-38.12	Average
8232.291	47.28	36.99	6.39	36.92	53.74	74.00	-20.26	Peak
8232.291	N/A	N/A	N/A	N/A	15.34	54.00	-38.66	Average
9147.857	53.78	37.63	7.44	37.04	61.81	74.00	-12.19	Peak
9147.857	N/A	N/A	N/A	N/A	23.41	54.00	-30.59	Average



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Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:middle



Trace: (Discrete)

	ReadAntenna	Cable	Preamp	Limit	Over					
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB			
1	1829.477	61.61	25.98	2.97	37.54	53.02	74.00	-20.98	VERTICAL	Peak
2	3659.775	57.83	29.15	4.53	36.93	54.58	74.00	-19.42	VERTICAL	Peak
3	4573.422	60.81	30.91	5.33	36.92	60.13	74.00	-13.87	VERTICAL	Peak
4	5488.170	63.09	31.80	6.36	36.99	64.26	74.00	-9.74	VERTICAL	Peak
5	7318.355	51.00	36.00	6.13	36.92	56.21	74.00	-17.79	VERTICAL	Peak
6	9147.857	47.90	37.63	7.44	37.04	55.93	74.00	-18.07	VERTICAL	Peak



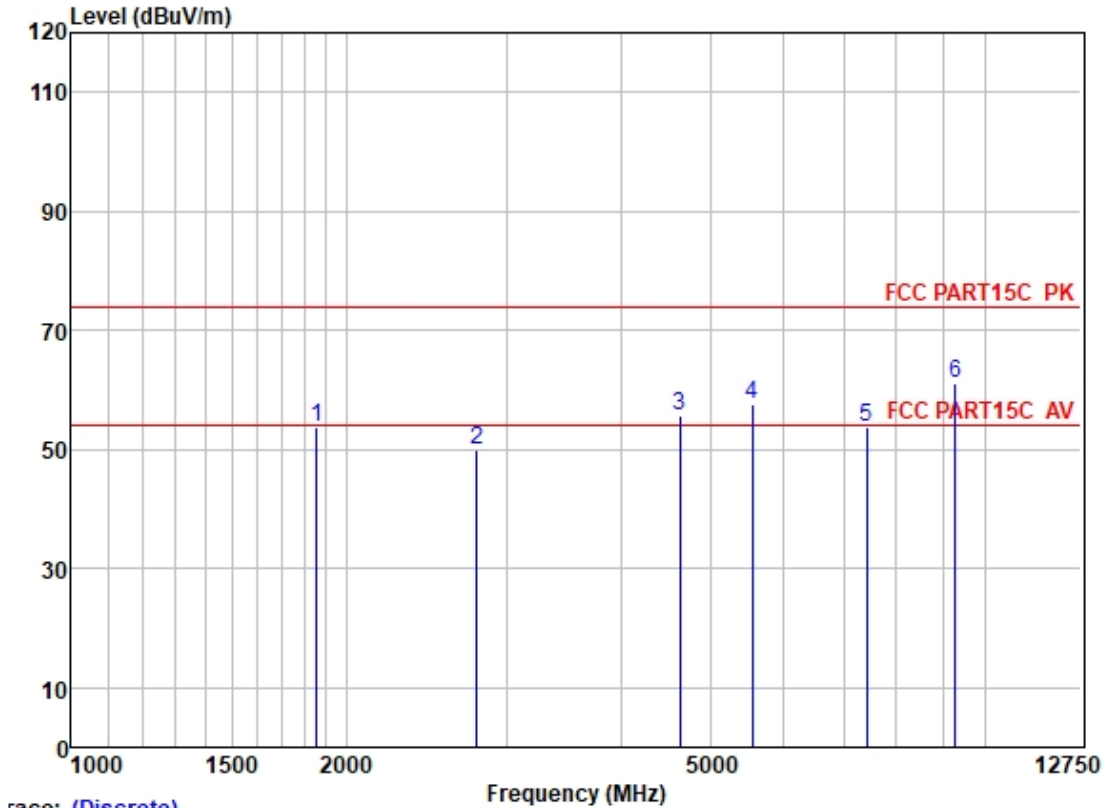
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Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
1829.477	61.61	25.98	2.97	37.54	53.02	74.00	-20.98	Peak
1829.477	N/A	N/A	N/A	N/A	14.62	54.00	-39.38	Average
3659.775	57.83	29.15	4.53	36.93	54.58	74.00	-19.42	Peak
3659.775	N/A	N/A	N/A	N/A	16.18	54.00	-37.82	Average
4573.422	60.81	30.91	5.33	36.92	60.13	74.00	-13.87	Peak
4573.422	N/A	N/A	N/A	N/A	21.73	54.00	-32.27	Average
5488.170	63.90	31.80	6.36	36.99	64.26	74.00	-9.74	Peak
5488.170	N/A	N/A	N/A	N/A	25.86	54.00	-28.14	Average
7318.355	51.00	36.00	6.13	36.92	56.21	74.00	-17.79	Peak
7318.355	N/A	N/A	N/A	N/A	17.81	54.00	-36.19	Average
9147.857	47.90	37.63	7.44	37.04	55.93	74.00	-18.07	Peak
9147.857	N/A	N/A	N/A	N/A	17.53	54.00	-36.47	Average



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Mode:a; Polarization:Horizontal; Modulation:GFSK; ; Channel:High



Trace: (Discrete)

	Read Freq	Antenna Level	Cable Factor	Preamp Loss	Preamp Factor	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1853.834	62.32	26.00	2.94	37.54	53.72	74.00	-20.28	HORIZONTAL	Peak
2	2780.242	55.29	28.10	3.69	37.25	49.83	74.00	-24.17	HORIZONTAL	Peak
3	4633.319	56.22	30.99	5.40	36.93	55.68	74.00	-18.32	HORIZONTAL	Peak
4	5560.673	56.47	31.86	6.33	36.99	57.67	74.00	-16.33	HORIZONTAL	Peak
5	7414.726	48.36	36.22	6.20	36.92	53.86	74.00	-20.14	HORIZONTAL	Peak
6	9267.160	52.99	37.85	7.33	37.05	61.12	74.00	-12.88	HORIZONTAL	Peak



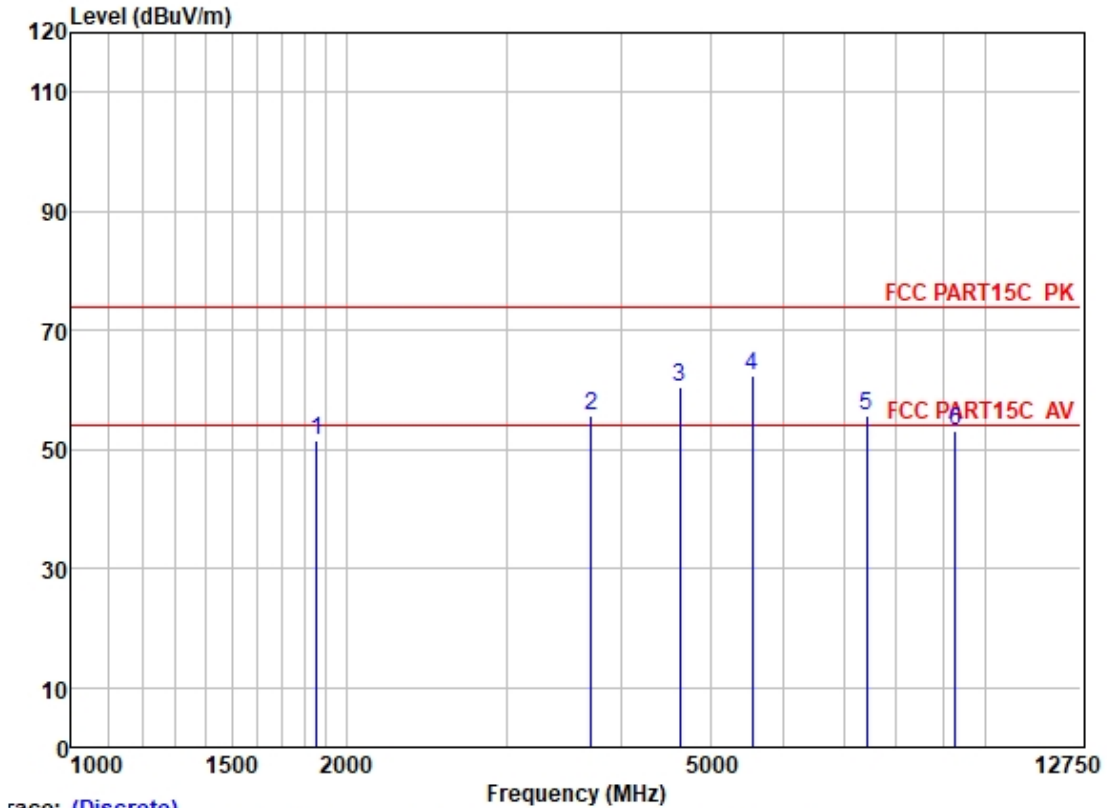
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Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
1853.834	62.32	26.00	2.94	37.54	53.72	74.00	-20.28	Peak
1853.834	N/A	N/A	N/A	N/A	15.32	54.00	-38.68	Average
2780.242	55.29	28.10	3.69	37.25	49.83	74.00	-24.17	Peak
2780.242	N/A	N/A	N/A	N/A	11.43	54.00	-42.57	Average
4633.319	56.22	30.99	5.40	36.93	55.68	74.00	-18.32	Peak
4633.319	N/A	N/A	N/A	N/A	17.28	54.00	-36.72	Average
5560.673	56.47	31.86	6.33	36.99	57.67	74.00	-16.33	Peak
5560.673	N/A	N/A	N/A	N/A	19.27	54.00	-34.73	Average
7414.726	48.36	36.22	6.20	36.92	53.86	74.00	-20.14	Peak
7414.726	N/A	N/A	N/A	N/A	15.46	54.00	-38.54	Average
9267.160	52.99	37.85	7.33	37.05	61.12	74.00	-20.88	Peak
9267.160	N/A	N/A	N/A	N/A	22.72	54.00	-31.28	Average



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Mode:a; Polarization:Vertical; Modulation:GFSK; ; Channel:High



Trace: (Discrete)

	ReadAntenna	Cable	Preamp	Limit	Over				
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Pol/Phase	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	1853.834	60.09	26.00	2.94	37.54	51.49	74.00	-22.51	VERTICAL Peak
2	3707.691	58.70	29.25	4.56	36.93	55.58	74.00	-18.42	VERTICAL Peak
3	4633.319	60.96	30.99	5.40	36.93	60.42	74.00	-13.58	VERTICAL Peak
4	5560.673	61.07	31.86	6.33	36.99	62.27	74.00	-11.73	VERTICAL Peak
5	7414.726	50.14	36.22	6.20	36.92	55.64	74.00	-18.36	VERTICAL Peak
6	9267.160	45.10	37.85	7.33	37.05	53.23	74.00	-20.77	VERTICAL Peak



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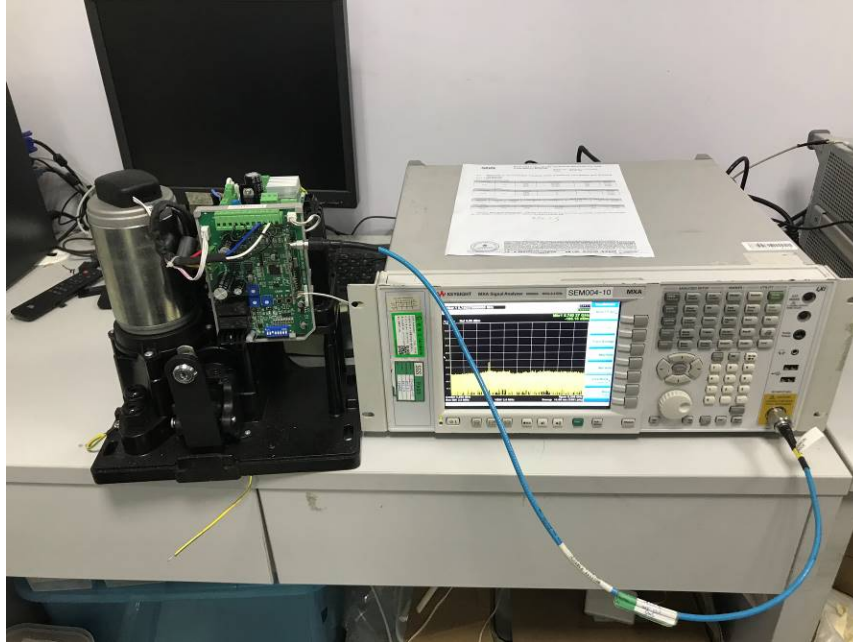
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
1853.834	60.09	26.00	2.94	37.54	51.49	74.00	-22.51	Peak
1853.834	N/A	N/A	N/A	N/A	13.09	54.00	-40.91	Average
3707.691	58.70	29.25	4.56	36.93	55.58	74.00	-18.42	Peak
3707.691	N/A	N/A	N/A	N/A	17.18	54.00	-36.82	Average
4633.319	60.96	30.99	5.40	36.93	60.42	74.00	-13.58	Peak
4633.319	N/A	N/A	N/A	N/A	22.02	54.00	-31.98	Average
5560.673	61.07	31.86	6.33	36.99	62.27	74.00	-11.73	Peak
5560.673	N/A	N/A	N/A	N/A	23.87	54.00	-30.13	Average
7414.726	50.14	36.22	6.20	36.92	55.64	74.00	-18.36	Peak
7414.726	N/A	N/A	N/A	N/A	17.24	54.00	-36.76	Average
9267.160	45.10	37.85	7.33	37.05	53.23	74.00	-20.77	Peak
9267.160	N/A	N/A	N/A	N/A	14.83	54.00	-39.17	Average



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8 Photographs

8.1 RF Conducted Test Setup

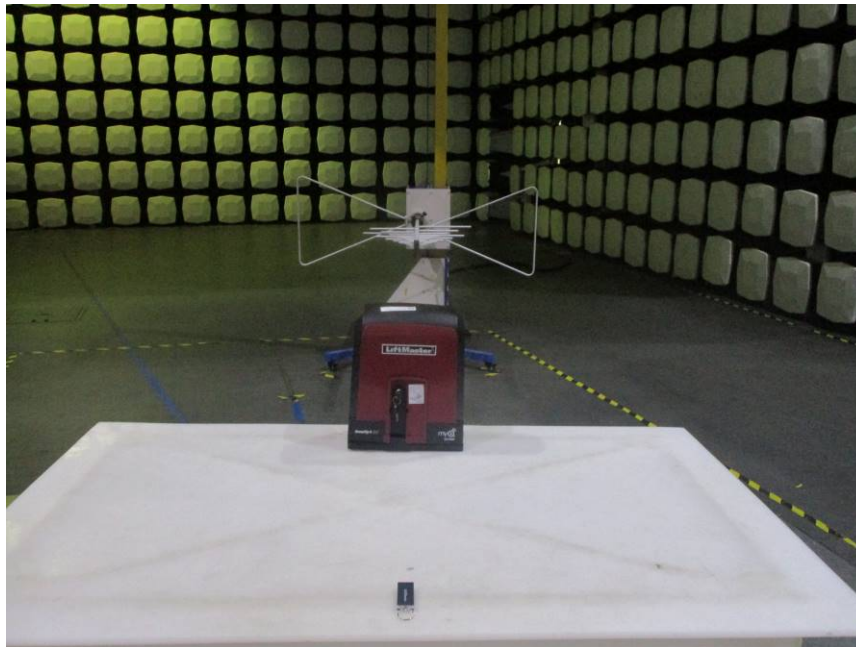
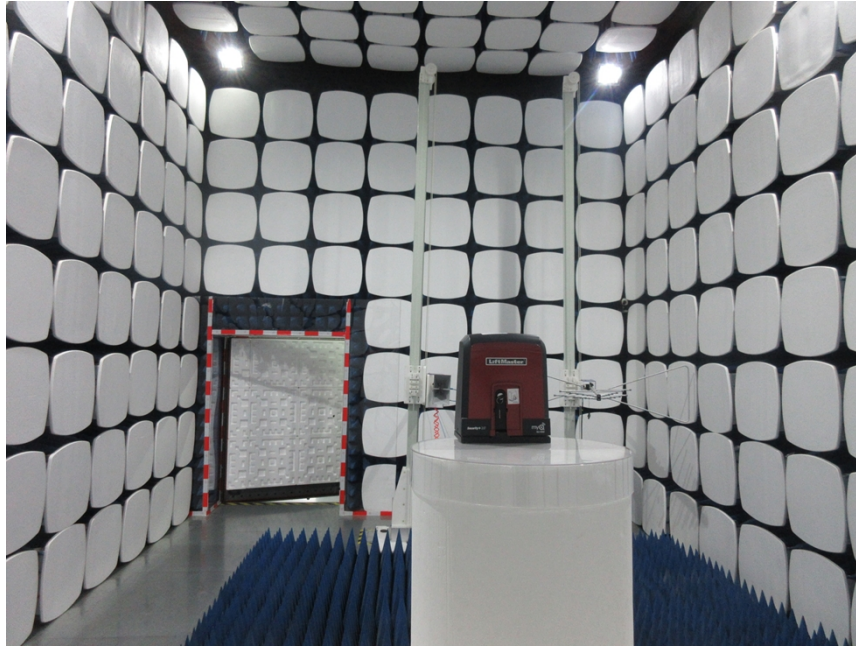


8.2 Conducted Emissions at AC Power Line (150kHz-30MHz) Test Setup



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8.3 Radiated Emissions Test Setup



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8.4 EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for GZEM2009015103CR.



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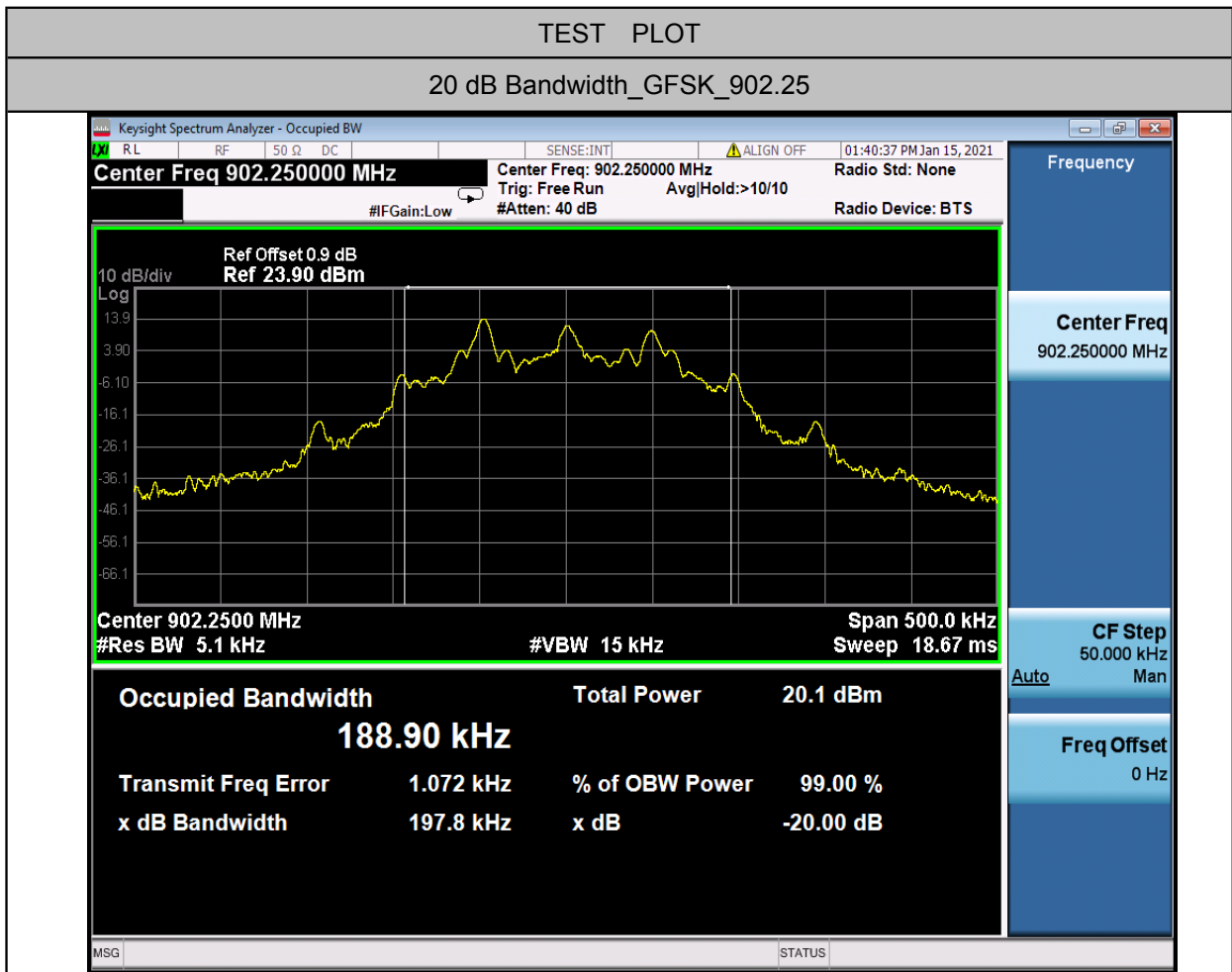
9 Appendix

9.1 Appendix 15.247

Cable Loss = 0.9 dB

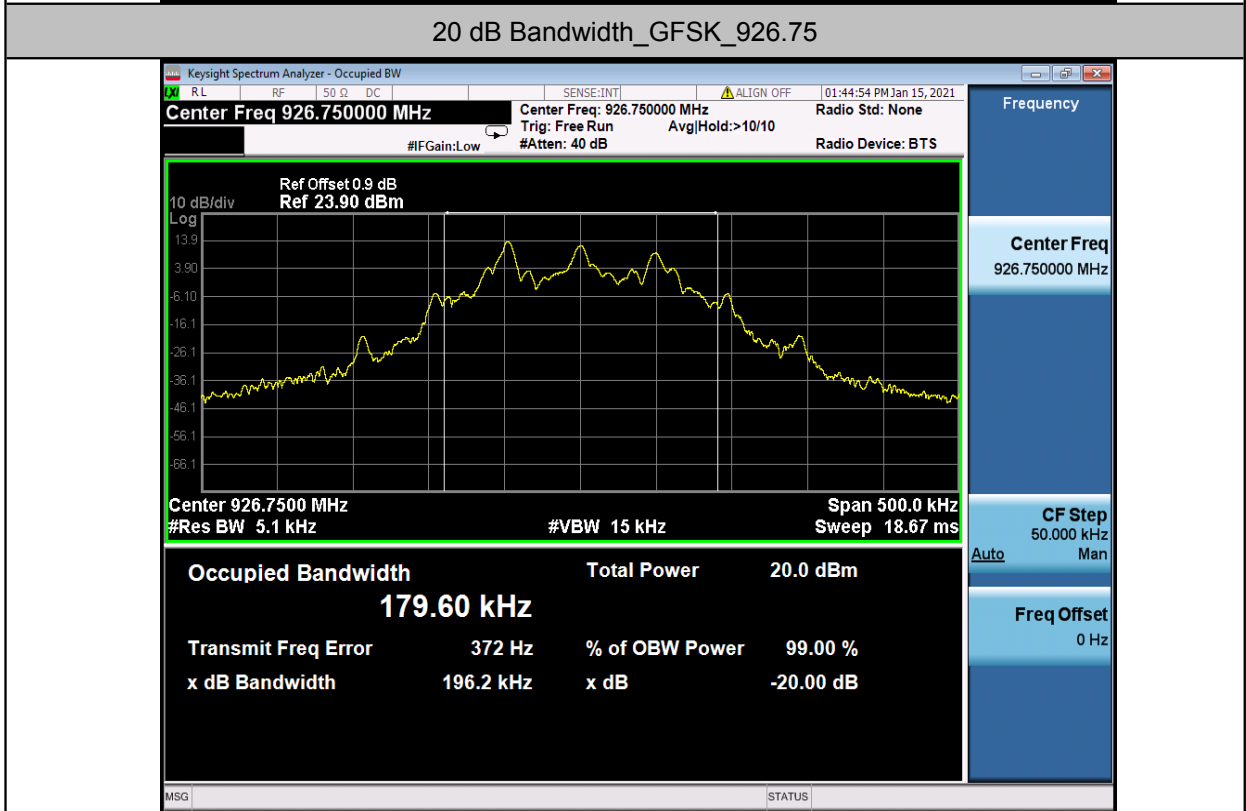
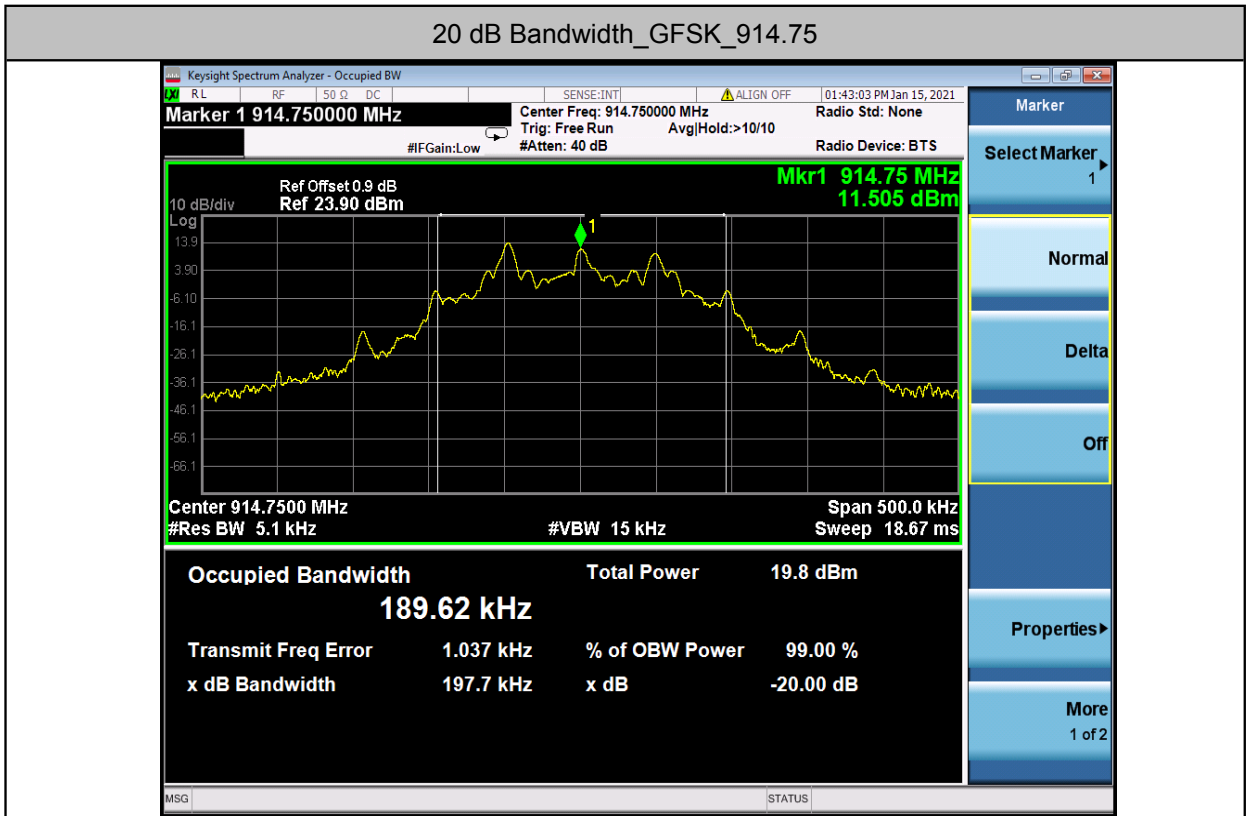
1.20 dB Bandwidth

Test Mode	Test Channel	OBW[MHz]	EBW[MHz]	Limit[MHz]	Verdict
GFSK	902.25	0.18884	0.1978	<=0.5	PASS
GFSK	914.75	0.18962	0.1977	<=0.5	PASS
GFSK	926.75	0.17971	0.1962	<=0.5	PASS



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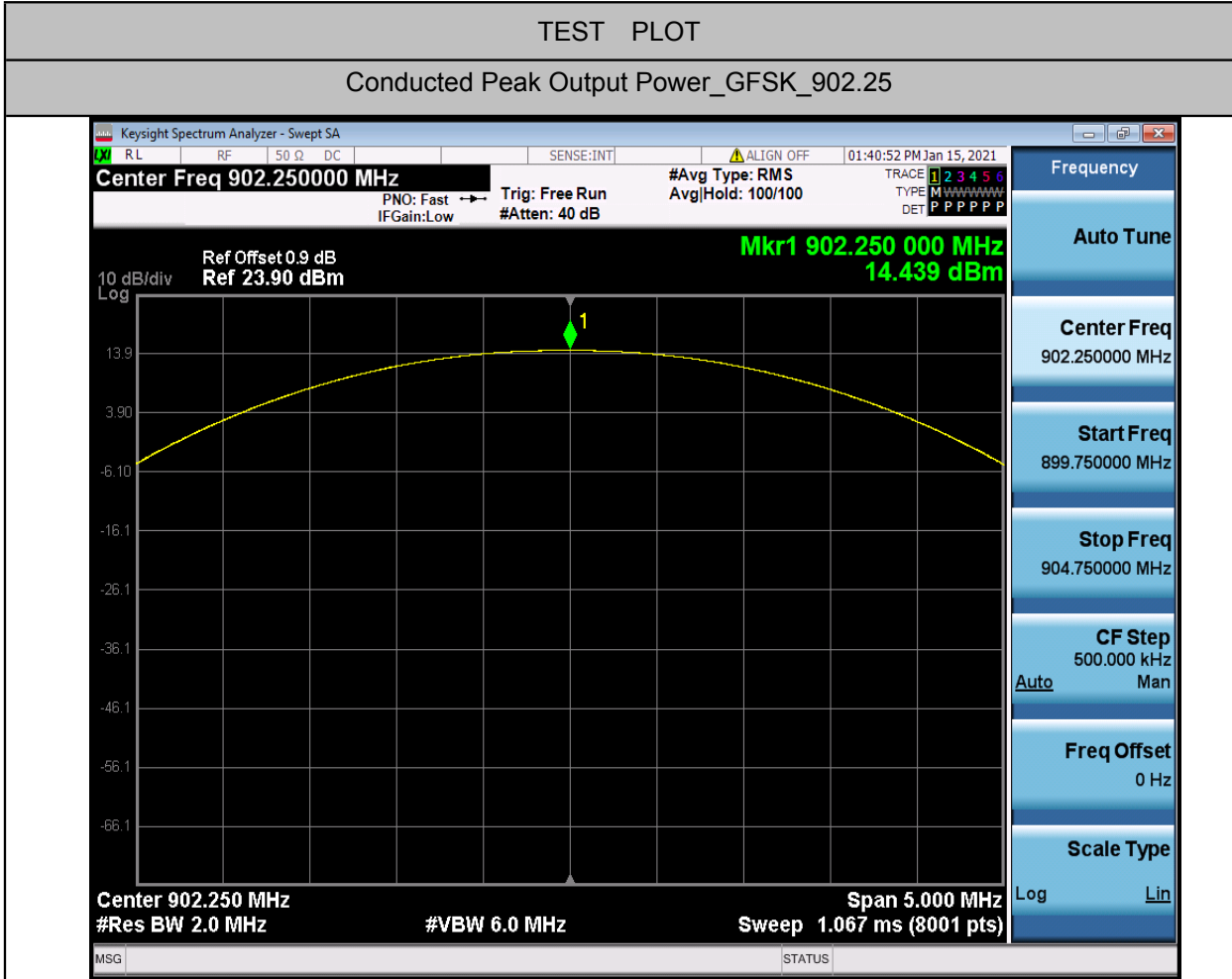
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2. Conducted Peak Output Power

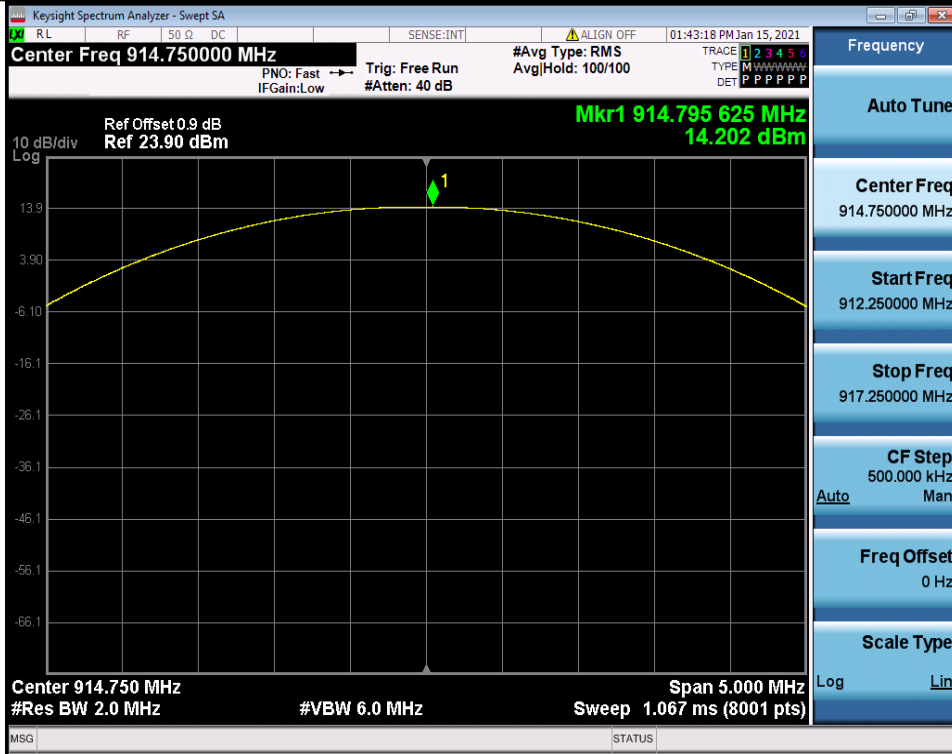
Test Mode	Test Channel	Power[dBm]	Limit[dBm]	Verdict
GFSK	902.25	14.439	<=30	PASS
GFSK	914.75	14.202	<=30	PASS
GFSK	926.75	14.054	<=30	PASS



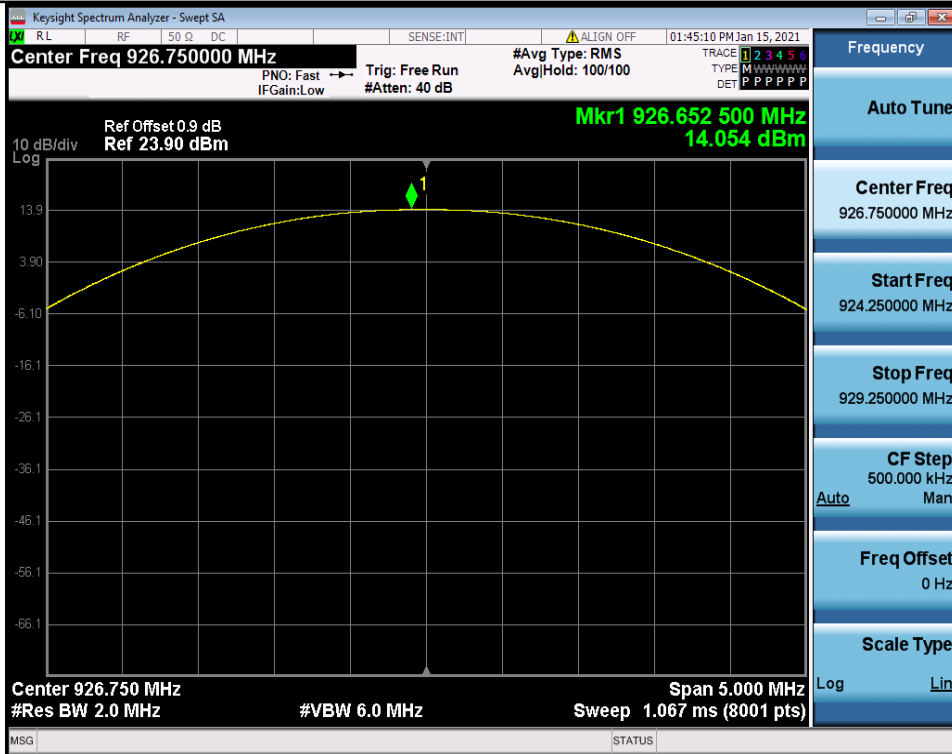
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Conducted Peak Output Power_GFSK_914.75



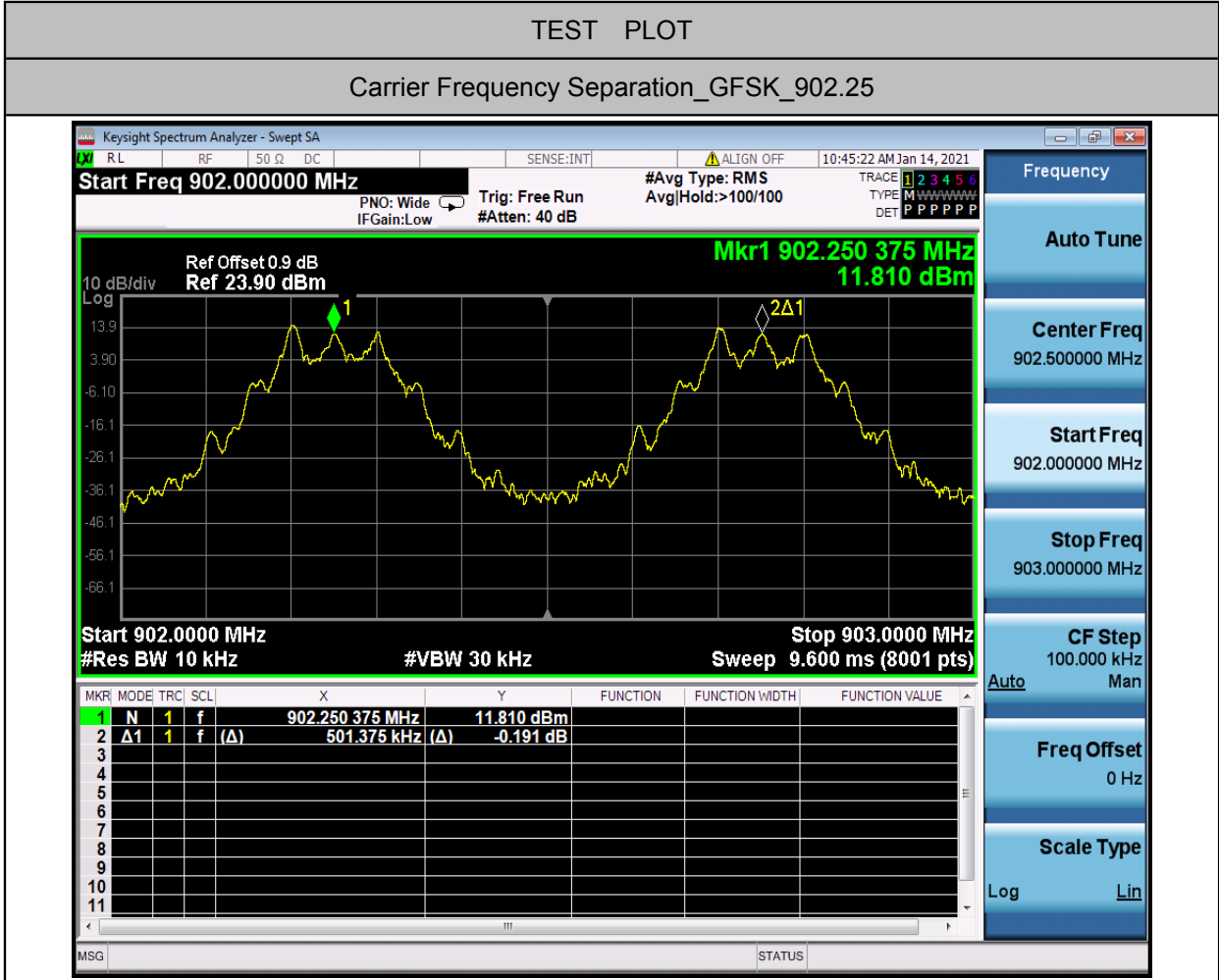
Conducted Peak Output Power_GFSK_926.75



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3.Carrier Frequency Separation

Test Mode	Test Channel	Result[MHz]	Limit[MHz]	Verdict
GFSK	902.25	0.501	>=0.1978	PASS
GFSK	914.75	0.501	>=0.1977	PASS
GFSK	926.75	0.500	>=0.1962	PASS



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Carrier Frequency Separation_GFSK_914.75



Carrier Frequency Separation_GFSK_926.75



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4.Dwell Time

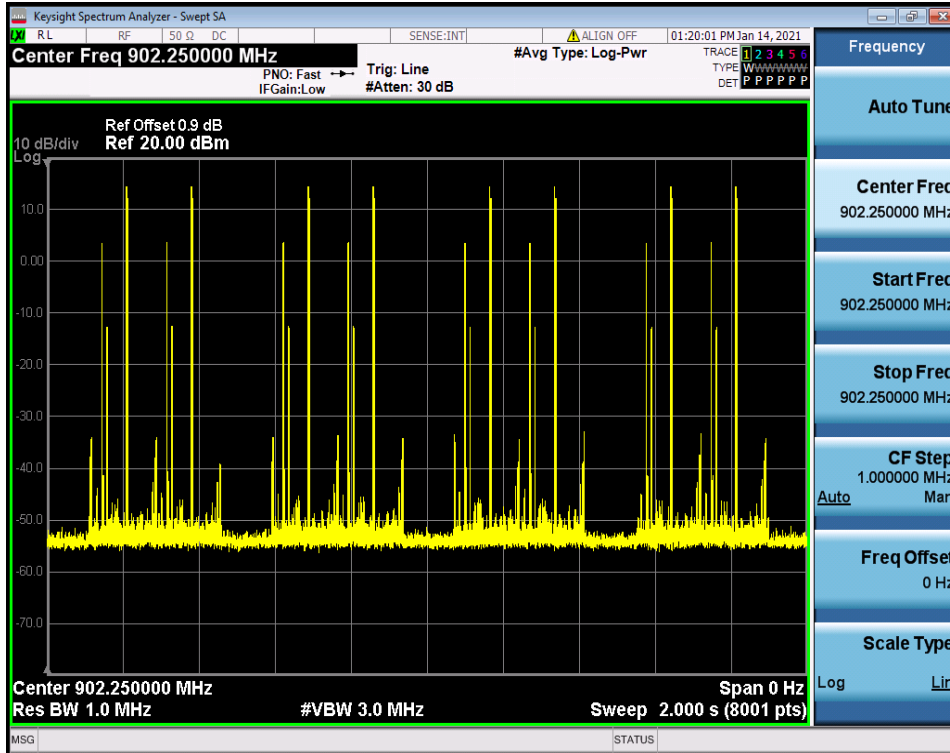
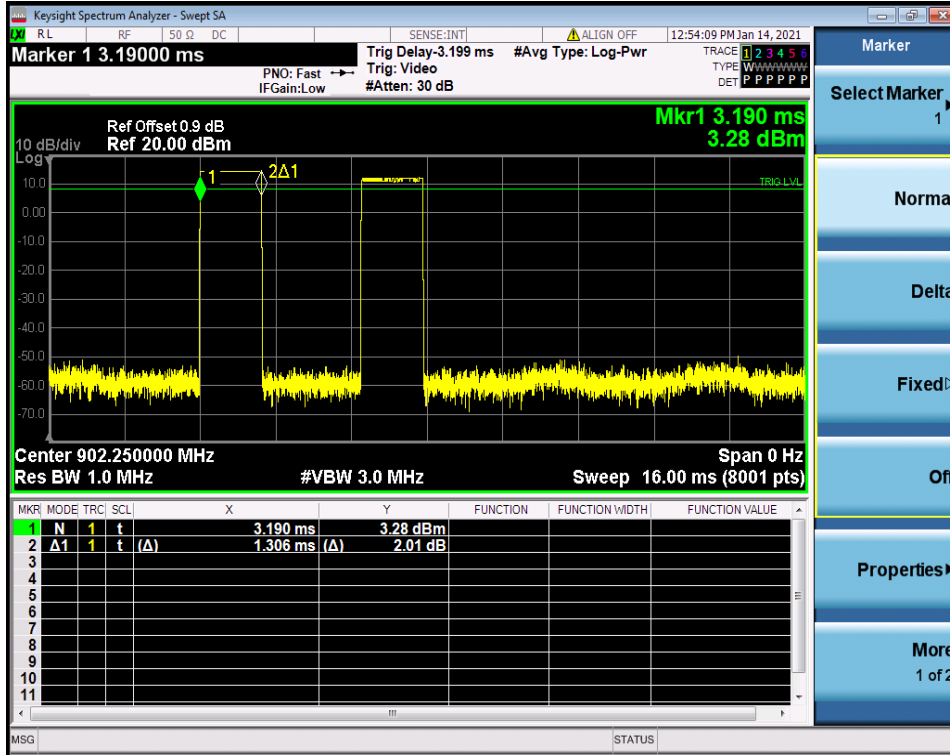
Test Mode	Test Channel	Burst Width[ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit[s]	Verdict
GFSK	902.25	1.31	80	0.11	0.4	PASS
GFSK	914.75	1.31	80	0.11	0.4	PASS
GFSK	926.75	1.31	80	0.11	0.4	PASS



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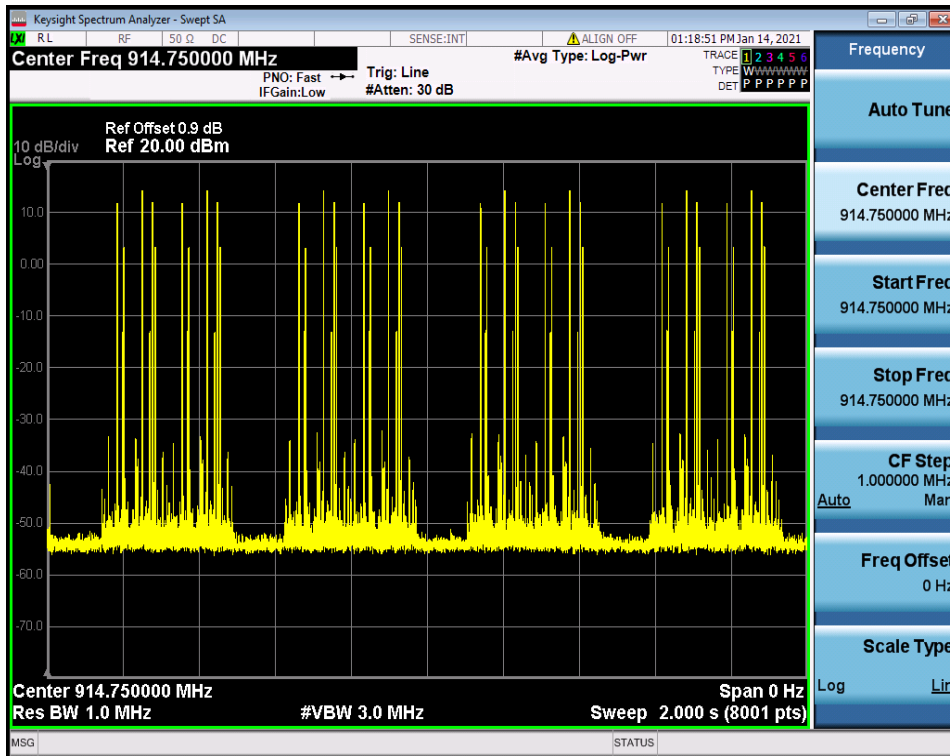
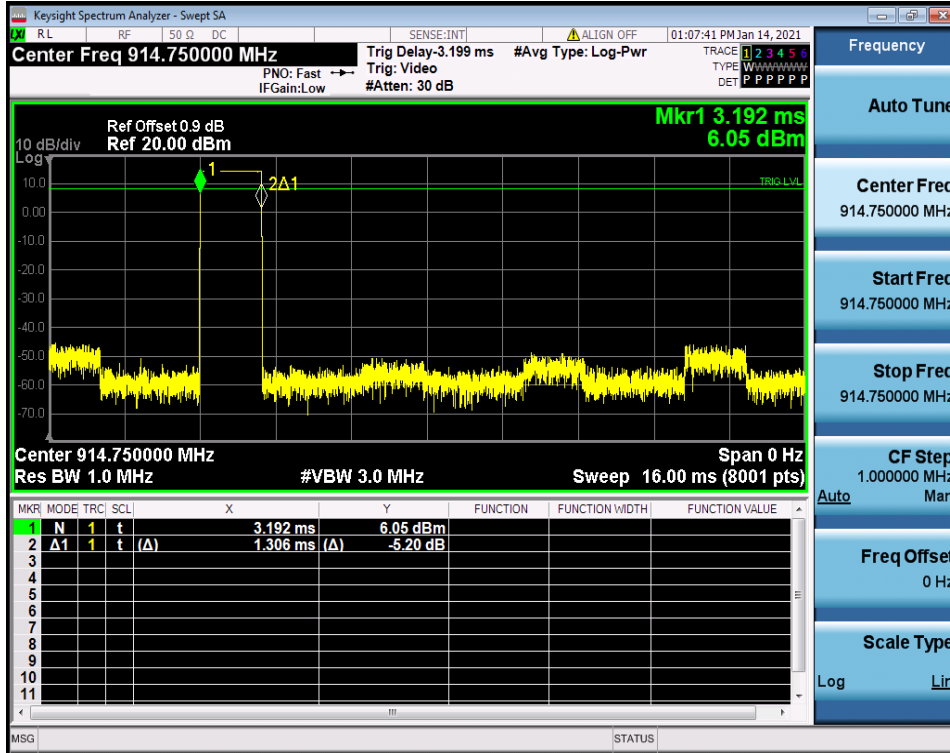
TEST PLOT

Dwell Time_GFSK_902.25



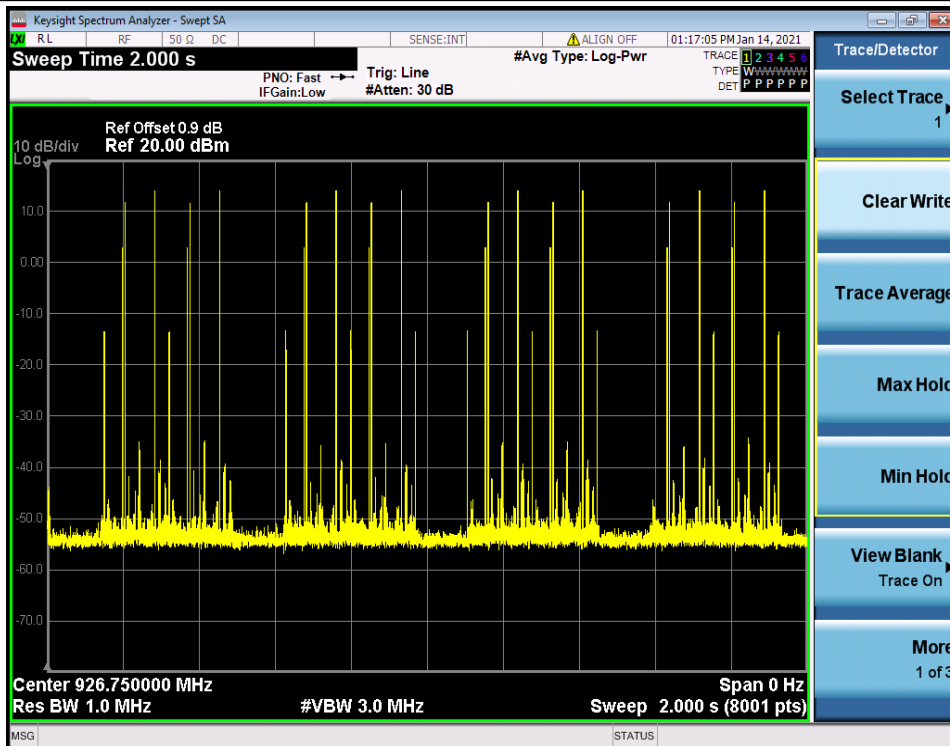
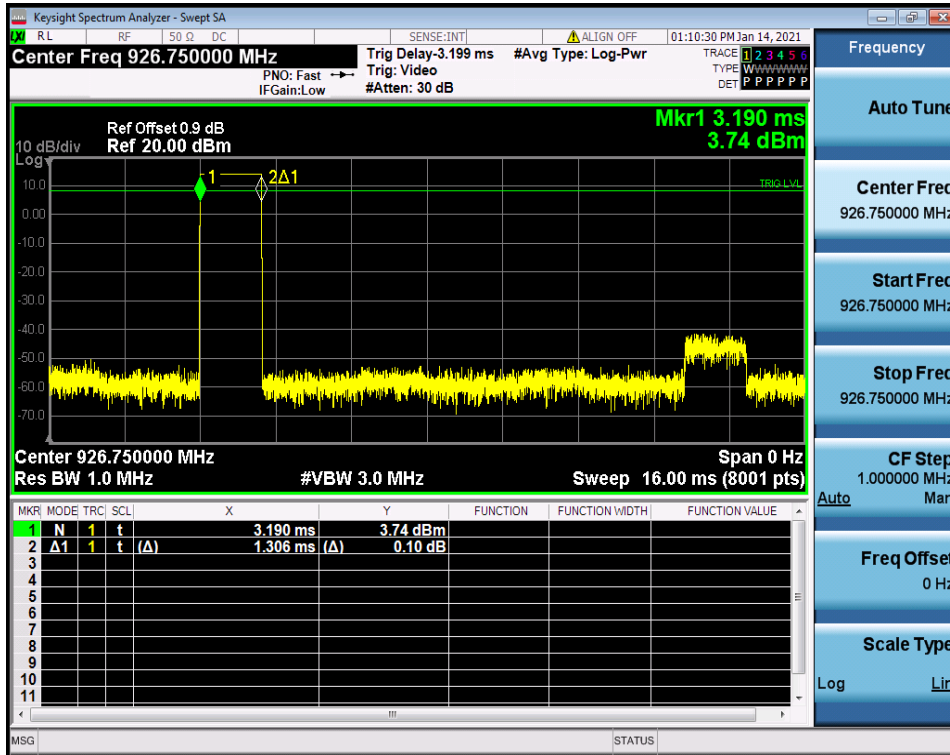
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Dwell Time_GFSK_914.75



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Dwell Time_GFSK_926.75

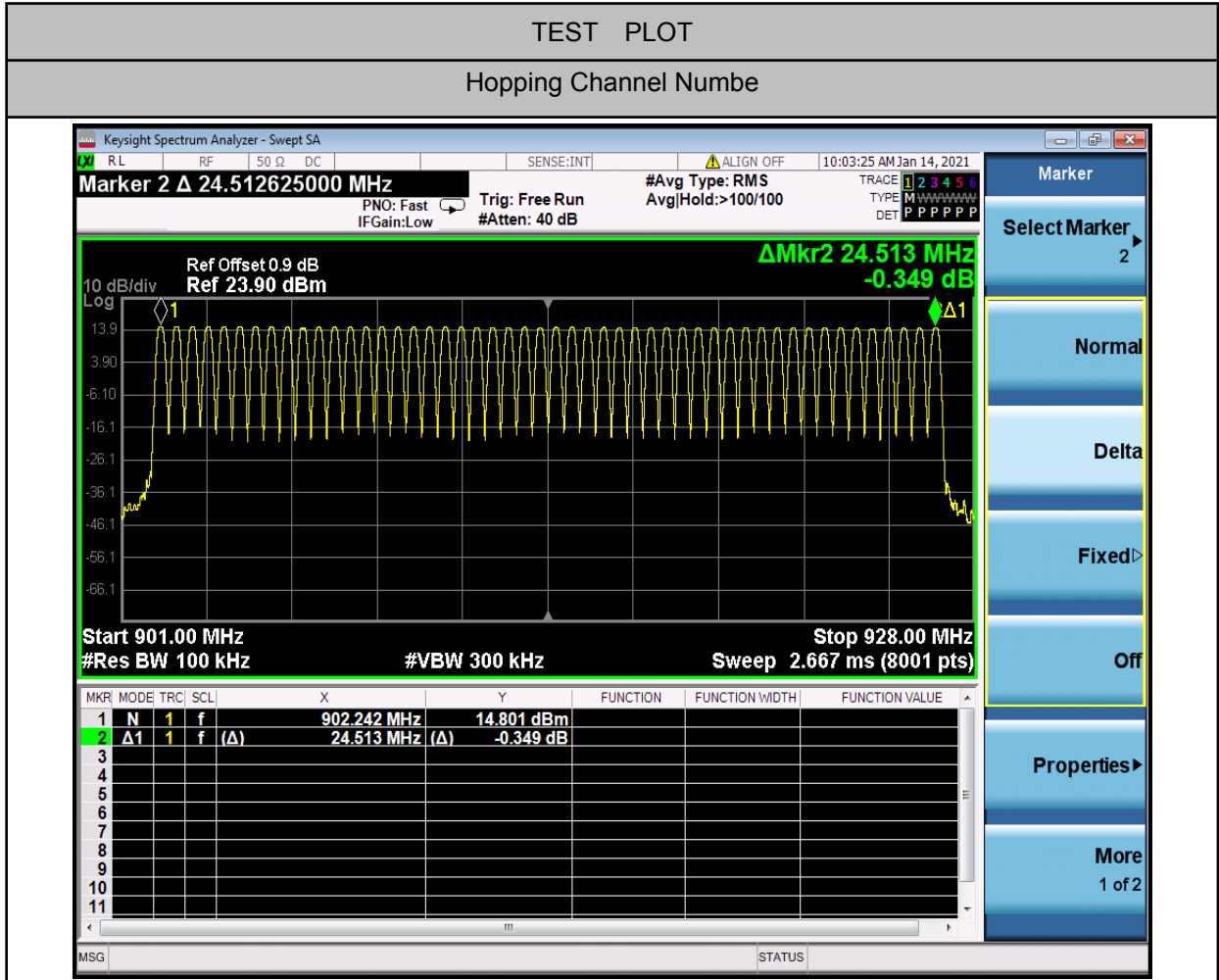


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5.Hopping Channel Number

Test Mode	Test Channel	Number of Hopping Channel[N]	Limit[N]	Verdict
GFSK	All hopping channels	50	>=50	PASS



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6. Band-edge for RF Conducted Emissions

Test Mode	Test Channel	Hopping	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit[dBm]	Verdict
GFSK	902.25	On	14.751	-45.740	<=-5.249	PASS
GFSK	902.25	Off	14.824	-42.463	<=-5.176	PASS
GFSK	926.75	On	14.558	-37.427	<=-5.442	PASS
GFSK	926.75	Off	14.484	-42.878	<=-5.516	PASS

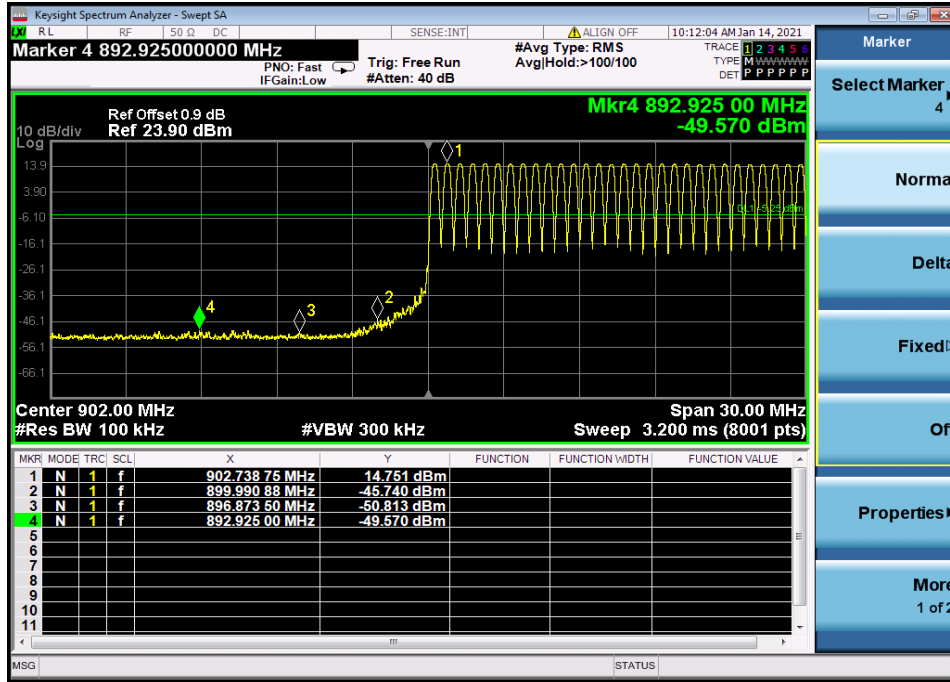


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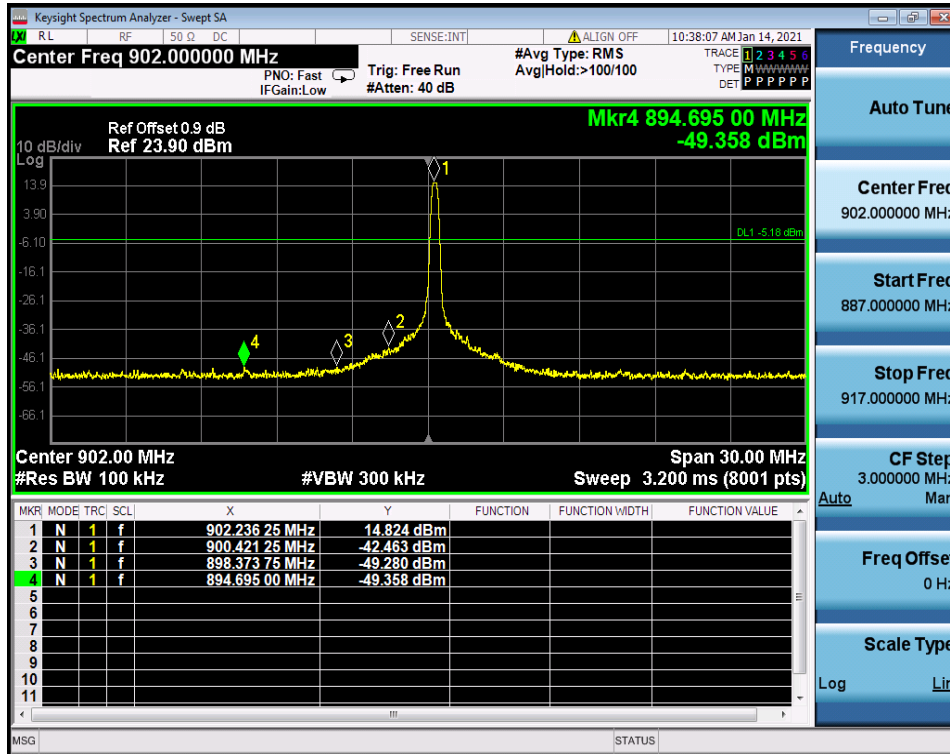
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TEST PLOT

Band-edge for RF Conducted Emissions_GFSK_902.25_Hopping On

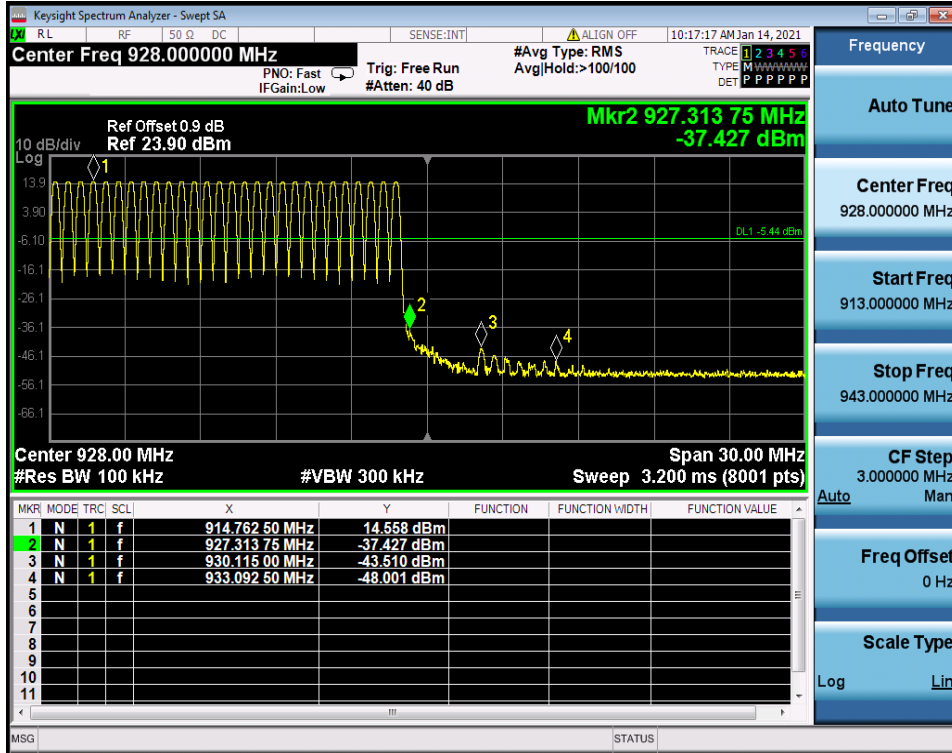


Band-edge for RF Conducted Emissions_GFSK_902.25_Hopping Off

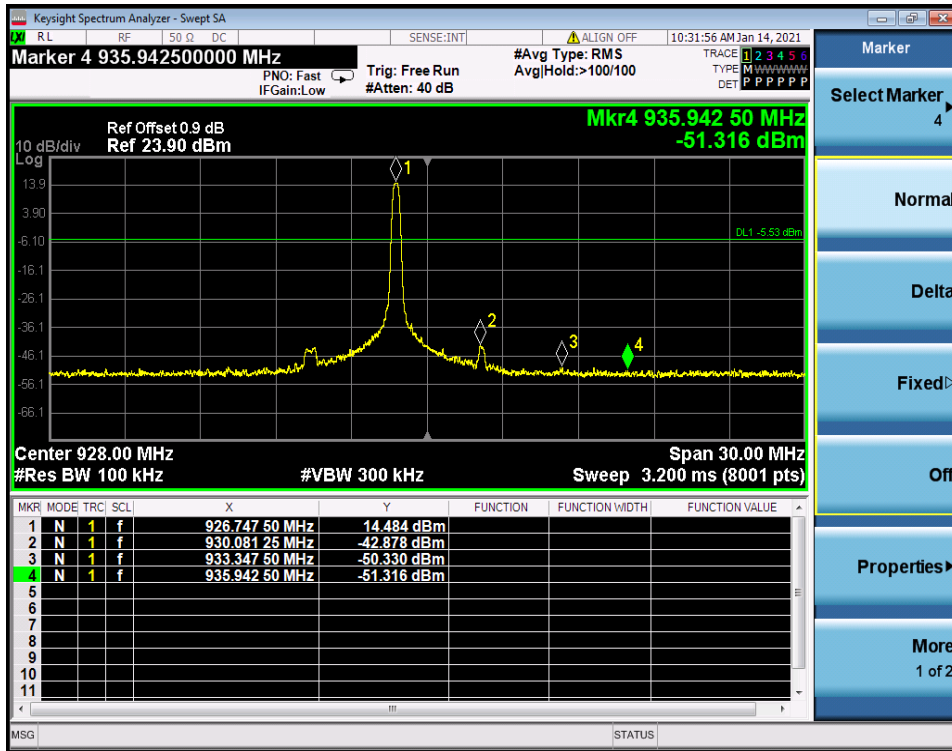


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Band-edge for RF Conducted Emissions_GFSK_926.75_Hopping On



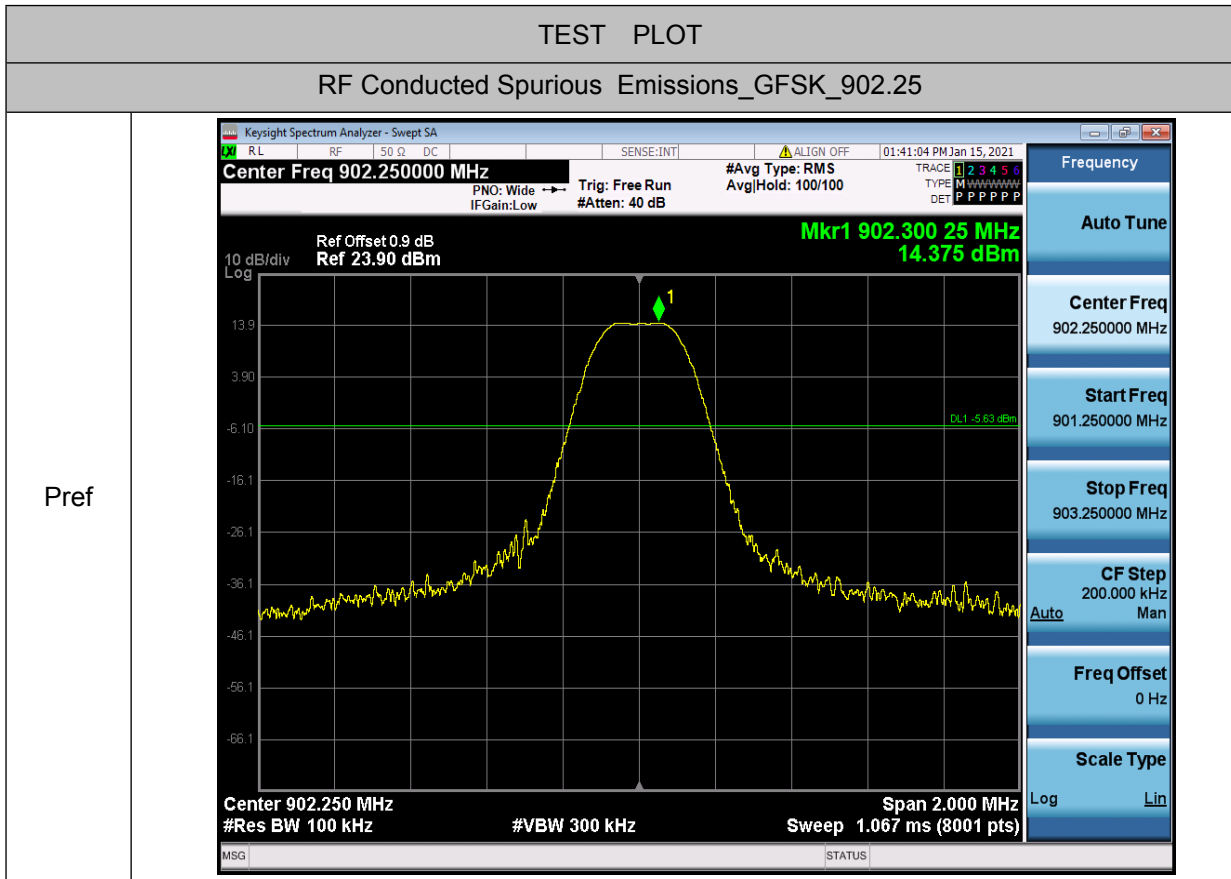
Band-edge for RF Conducted Emissions_GFSK_926.75_Hopping Off



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7.RF Conducted Spurious Emissions

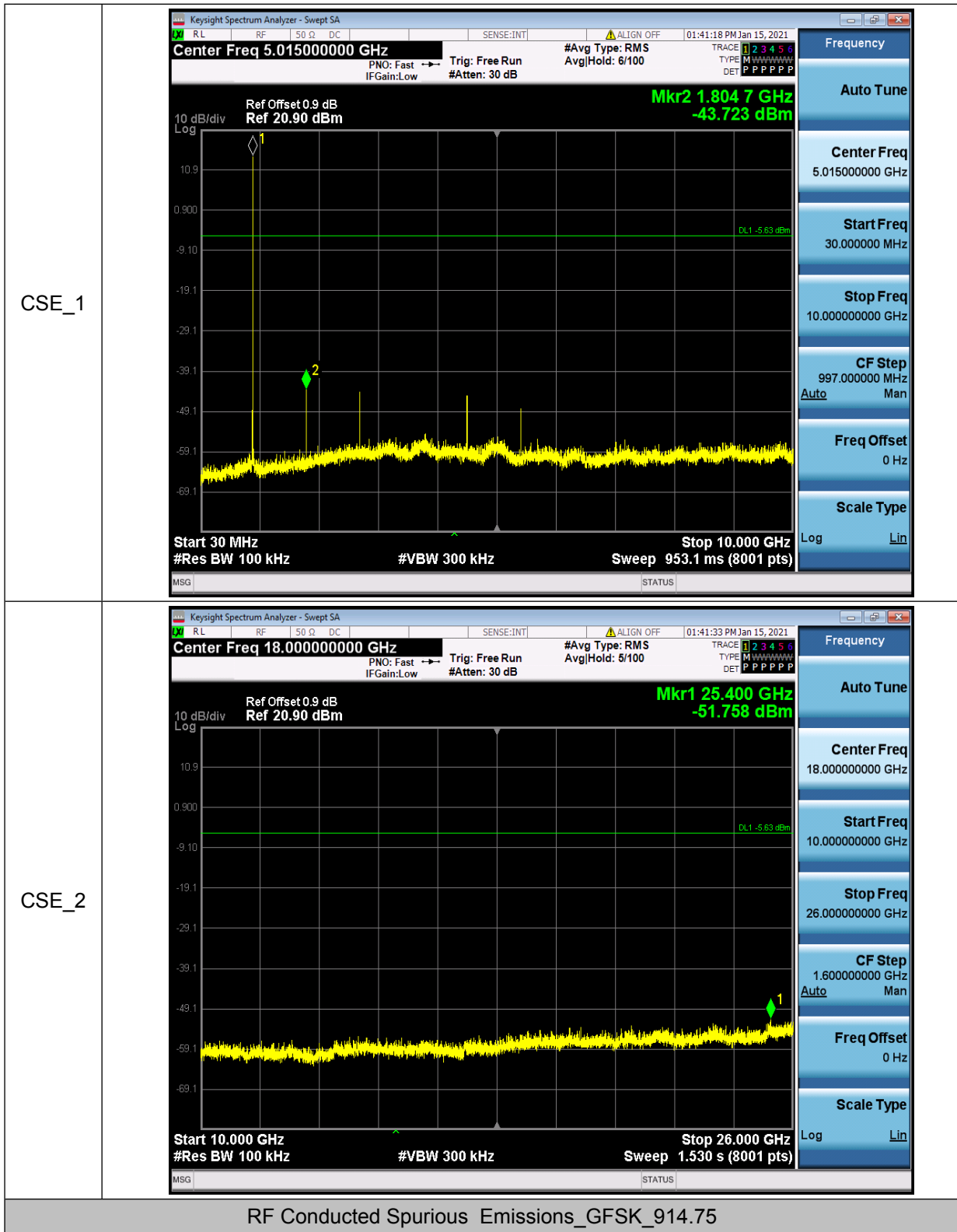
Test Mode	Test Channel	StartFre [MHz]	StopFre [MHz]	RBW [kHz]	VBW [kHz]	Pref[dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	902.25	30	10000	100	300	14.375	-43.723	<-5.625	PASS
GFSK	902.25	10000	26000	100	300	14.375	-51.758	<-5.625	PASS
GFSK	914.75	30	10000	100	300	14.117	-39.765	<-5.883	PASS
GFSK	914.75	10000	26000	100	300	14.117	-51.651	<-5.883	PASS
GFSK	926.75	30	10000	100	300	13.984	-40.670	<-6.016	PASS
GFSK	926.75	10000	26000	100	300	13.984	-51.574	<-6.016	PASS



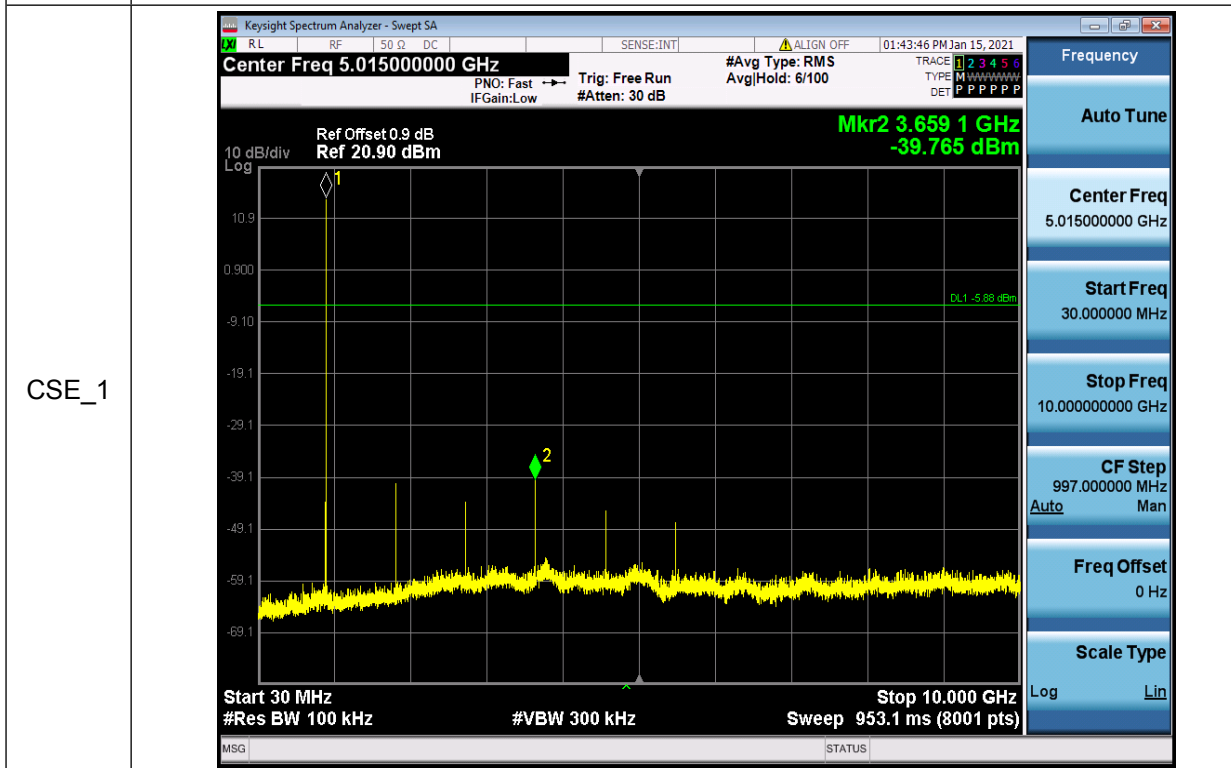
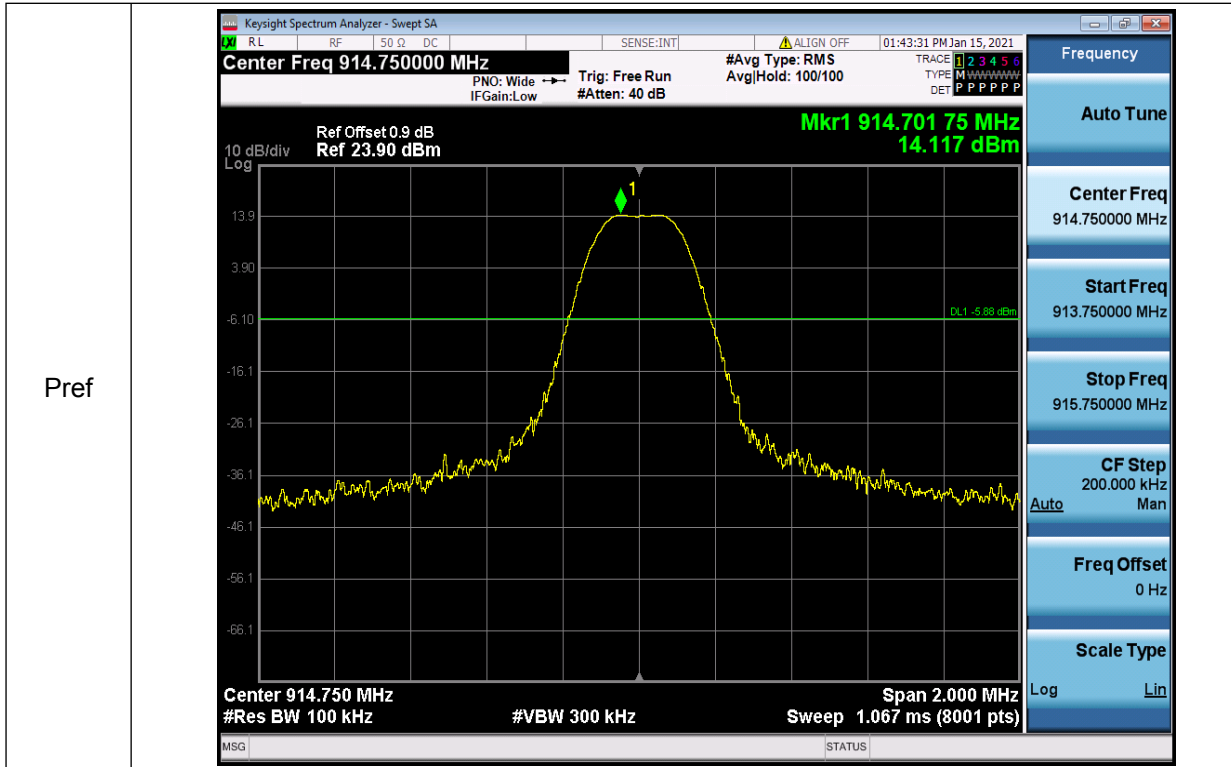
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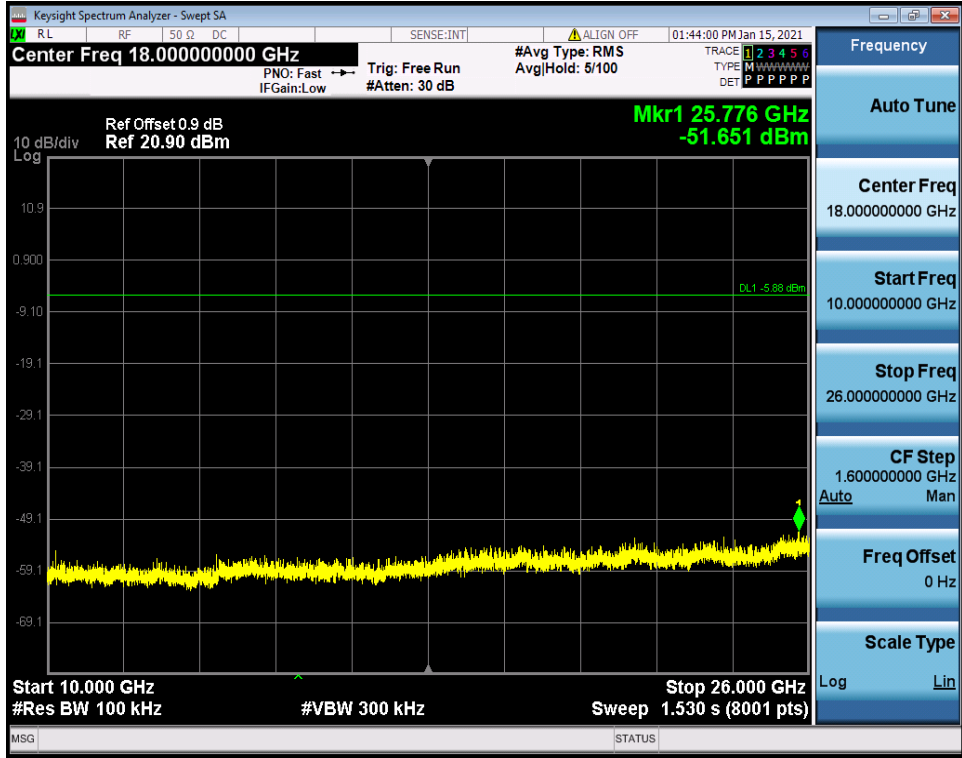


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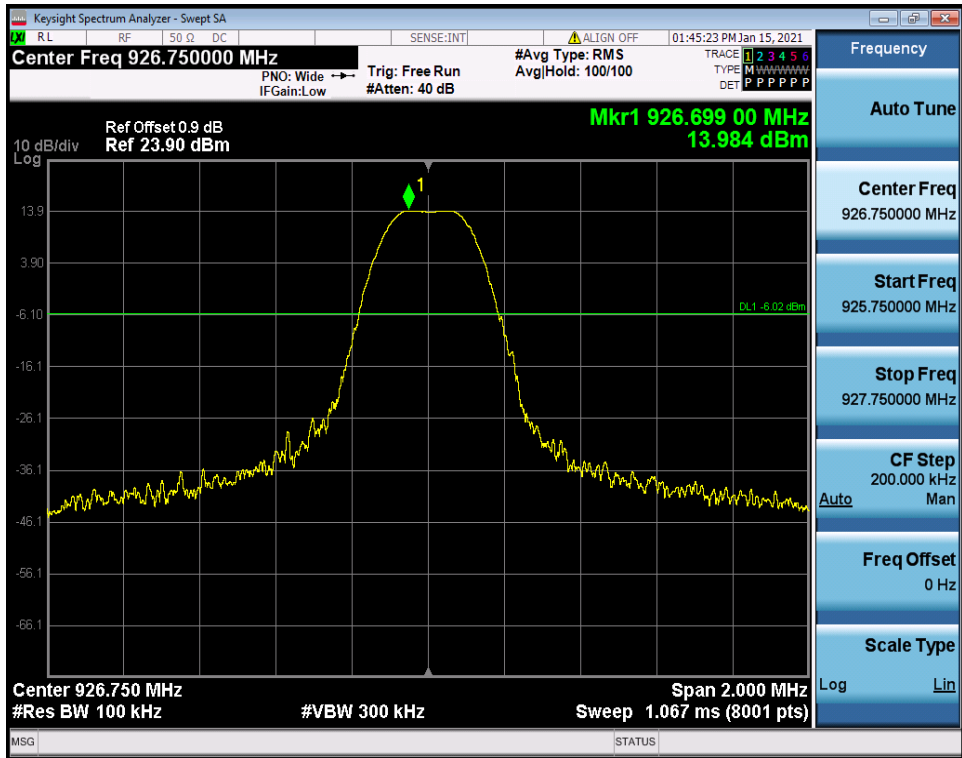
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CSE_2

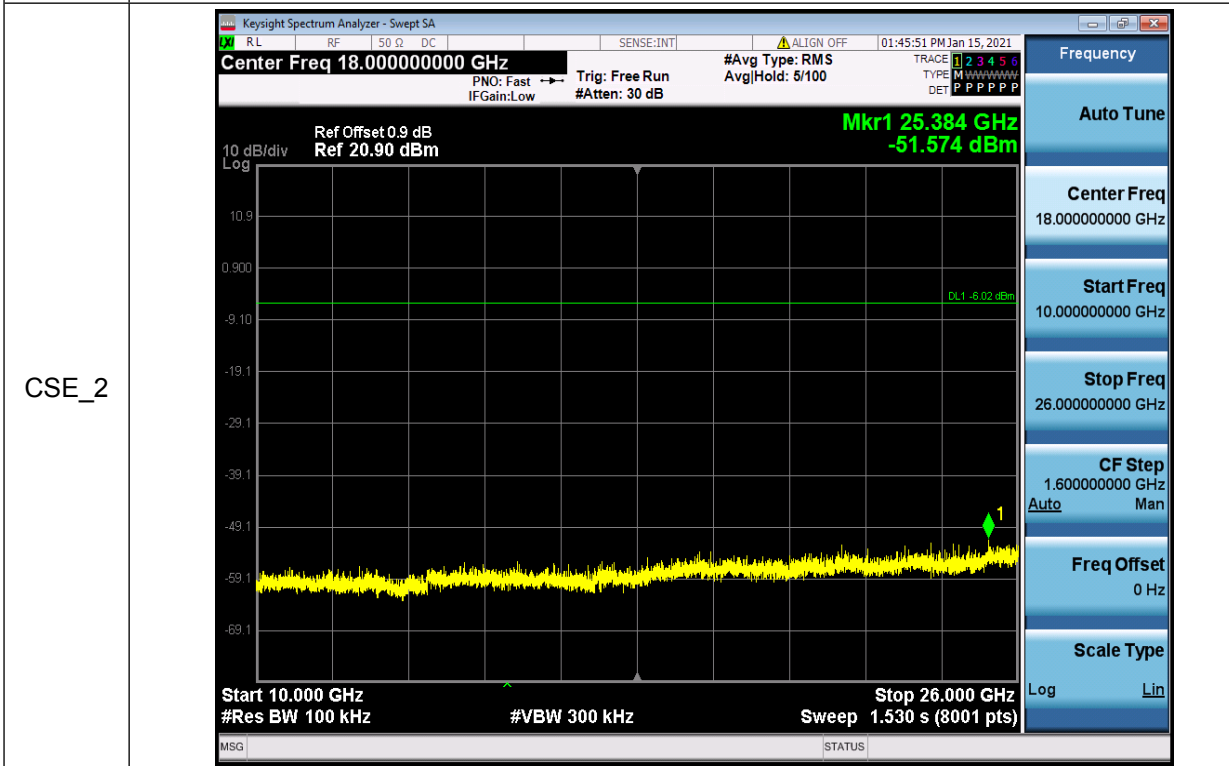
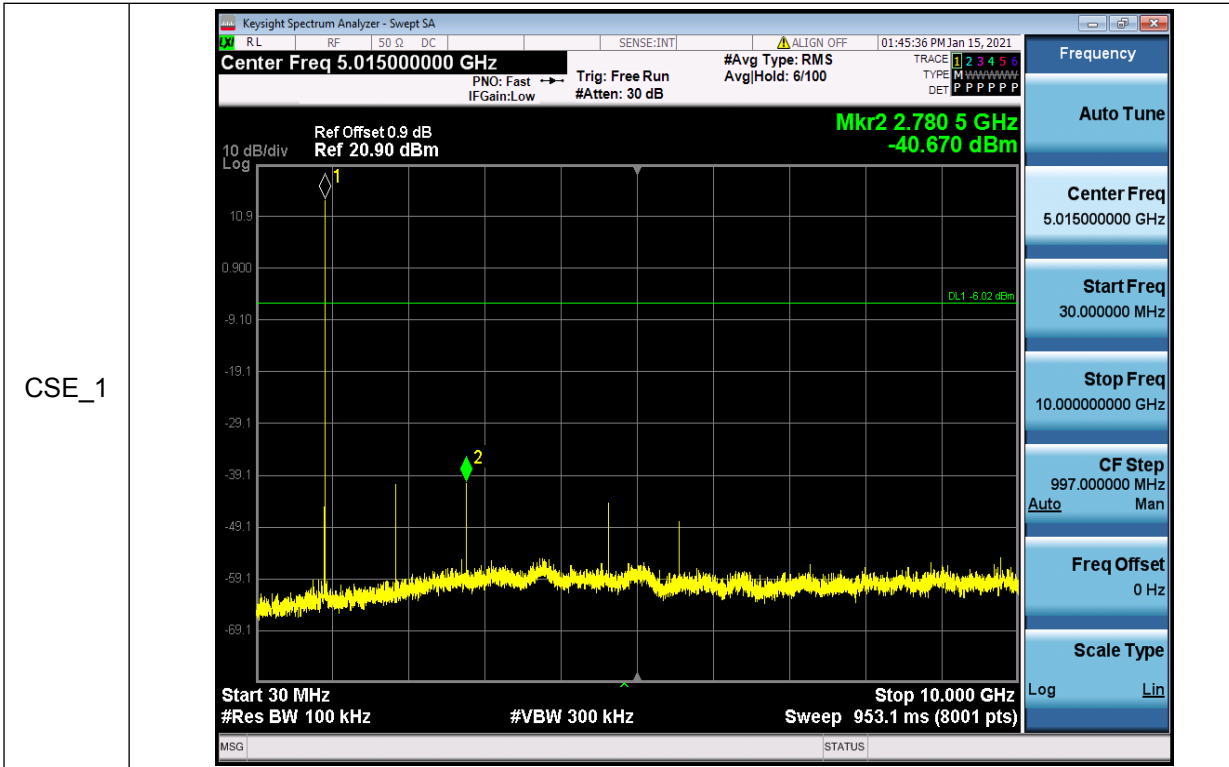


RF Conducted Spurious Emissions_GFSK_926.75

Pref



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--End of Report--



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