

EMC-TRF-01 Rev 1.1

Report No.: GZCR241100141102 Page: 1 of 56 FCC ID: SAK-RGSARRW

TEST REPORT

Application No.:	GZCR2411001411DS
Applicant:	Walter Kidde Portable Equipment
Address of Applicant:	1016 Corporate Park Drive, Mebane, NC, 27302, USA
Manufacturer:	Walter Kidde Portable Equipment
Address of Manufacturer:	1016 Corporate Park Drive, Mebane, NC, 27302, USA
Factory:	Dongguan Fyrnetics Co., Ltd.
Address of Factory:	No.1 Rongwen Road, Dongguan Changan, Guangdong, China 523842
Product Name:	Smart Smoke Alarm
Model No.:	RGSAR-RW
Trade Mark:	Kidde
Standard(s) :	47 CFR Part 15, Subpart C 15.247
Date of Receipt:	2024-11-28
Date of Test:	2024-12-02 to 2024-12-06
Date of Issue:	2024-12-16
Test Result:	Pass*

* In the configuration tested, the EUT complied with the standards specified above.

Ridge Lin

Ricky Liu Manager



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	Revision Record				
Version	Report No.	Date	Remark		
01	GZCR241100141102	2024-12-16	Original		

Authorized for issue by:		
	Jim Li	
	Jim Li/Project Engineer	
	vius cui	
	Vico Cui/Reviewer	



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Test Summary 2

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(b)(4)	Pass	

Radio Spectrum Matter Part					
ltem	Standard	Method	Requirement	Result	
Conducted Emissions at AC Power Line (150kHz-30MHz)		ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass	
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 11.12	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass	
Radiated Spurious Emissions Below 1GHz		ANSI C63.10 (2013) Section 6.4,6.5	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass	
Radiated Spurious Emissions Above 1GHz	47 CFR Part 15, Subpart C 15.247	ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass	
Conducted Peak Output Power		ANSI C63.10 (2013) Section 11.9.2	47 CFR Part 15, Subpart C 15.247(b)(3)	Pass	
Minimum 6dB Bandwidth		ANSI C63.10 (2013) Section 11.8.1	47 CFR Part 15, Subpart C 15.247a(2)	Pass	
Power Spectrum Density		ANSI C63.10 (2013) Section 11.10.2	47 CFR Part 15, Subpart C 15.247(e)	Pass	
Conducted Band Edges Measurement		ANSI C63.10 (2013) Section 11.13.3.2	47 CFR Part 15, Subpart C 15.247(d)	Pass	
Conducted Spurious Emissions		ANSI C63.10 (2013) Section 11.11	47 CFR Part 15, Subpart C 15.247(d)	Pass	

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.



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General Information 4

Details of E.U.T. 4.1

Power supply:	Option 1: AC 120 V, 60 Hz
	Option 2: DC 3 V (2*AA size batteries)
Cable(s):	AC mains
Test Voltage:	AC 120 V, 60 Hz & DC 3 V
Operation Frequency:	916.55MHz to 922.15MHz
Modulation Type:	GFSK
Number of Channels:	8
Channel Spacing:	0.8 MHz
Antenna Type:	IPEX Antenna
Antenna Gain:	0.4 dBi according to antenna specification
Antenna Number:	1

Remark: The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

Channel	Frequency	Channe	Frequency	Channel	Frequency	Channel	Frequency
1	916.55 MHz	2	917.35 MHz	3	918.15 MHz	0	918.95 MHz
4	919.75 MHz	5	920.55 MHz	6	921.35 MHz	7	922.15 MHz

Using test software was control EUT work in continuous transmitter mode and select test channel as below:

Channel	Frequency
The lowest channel (CH1)	916.55 MHz
The middle channel (CH4)	919.75 MHz
The highest channel (CH7)	922.15 MHz

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Note Book Computer	LENOVO	ThinkPad T490	PF1D1MVJ



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4.3 Measurement Uncertainty

Measurement Uncertainty
±3.22dB
±5.14dB (3m); ±4.90dB (10m);±4.88dB (1GHz-6GHz);±5.06dB (6GHz-18GHz); ±5.30dB (18GHz-40GHz)
±3.08dB (9kHz to 150kHz);±3.19dB(150kHz to 30MHz);±5.14dB (30MHz-1GHz) (3m); ±4.90dB (30MHz-1GHz) (10m)
±4.88dB (1GHz-6GHz);±5.06dB (6GHz- 18GHz); ±5.30dB (18GHz-40GHz)
± 0.75dB
± 0.274%
± 2.84dB
± 0.75dB
± 0.75dB

Remark:

The U_{lab} (lab Uncertainty) is less than U_{cisor} (CISPR Uncertainty) or U_{ETSI}(ETSI Uncertainty).

Emission decision rule:

- Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit. marked as Pass in the report.

 Non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit, marked as Fail in the report.

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory, No.198, Kezhu Road, Science City, Economic & Technological Development Area, Guangzhou, Guangdong, China 510663 Tel: +86 20 82155555

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:

• 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.

• 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.

• ISED (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-20107 and T-11179)

The 10m Semi-anechoic chamber, 966 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-20107 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 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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Equipment List 5

Conducted Emissions at AC Power Line (150kHz-30MHz)								
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date			
Coaxial Cable	HangTianXing	2m	EMC0107	2023-08-24	2025-08-23			
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	2022-10-16	2025-10-15			
Two-Line V-Network-GZ	Rohde & Schwarz	ENV216	EMC2135	2024-09-02	2025-09-01			
EMI Test Receiver (9kHz-3.6GHz)	Rohde & Schwarz	ESR3	EMC2221	2024-12-04	2025-12-03			
Test Software E3r Audix		Ver.6.191211	GZE100-77	N/A	N/A			

Radiated Emissions which fall in the restricted bands								
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date			
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13			
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01			
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18			
Horn Antenna (1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22			
Horn Antenna (14- 40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17			
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18			
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2024-10-14	2025-10-13			
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19			
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A			

Radiated Spurious Emissions Below 1GHz									
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date				
966 Anechoic Chamber	Shenzhen C.R.T	CRTSGSSAC9 66	EMC2230	2022-04-12	2025-04-11				
EMI Test Receiver(1Hz- 8GHz)	Scowarz I		EMC2229	2024-12-03	2025-12-02				
Amplifier(9k-1000MHz)	SONOMA	310	EMC2237	2024-12-03	2025-12-02				
Trilog Broadband Antenna (25MHz-2GHz)	Schwarzbeck Mess- Elektronik	VULB 9168	EMC2238	2022-04-20	2025-04-19				
Coaxial Cable	Coaxial Cable Mirco-COAX UTIFLEX ve		EMC2239	2024-12-04	2026-12-03				
Test Software E3	Audix	Ver.6.191211	GZE100-81	N/A	N/A				
Active Loop Antenna- RED	ETS-Lindgren	6502	EMC2190	2024-04-08	2026-04-07				



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Radiated Spurious Emissions Above 1GHz								
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date			
1GHz-26.5 GHz Pre- Amplifier	Agilent	8449B	EMC0521	2024-10-14	2025-10-13			
EMI Test Receiver (10Hz-26.5GHz)	Rohde & Schwarz	ESIB26	EMC0522	2024-09-02	2025-09-01			
Chamber cable (Above 1GHz)	Scoflex	KMKM-8.0m	EMC0545	2024-08-19	2026-08-18			
Horn Antenna (1GHz- 18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120D	EMC2026	2022-09-23	2025-09-22			
Horn Antenna (14- 40GHz)	SCHWARZBECK	BBHA 9170	EMC2041	2023-06-18	2026-06-17			
High Pass Filter (915MHz)	FSY MICROWAVE	HM1465-9SS	EMC2079	2024-10-14	2025-10-13			
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18			
MXE EMI Receiver (10Hz-8.4GHz)	Keysight	N9038A	EMC2139	2024-10-14	2025-10-13			
966 Anechoic Chamber	C.R.T	9m x 6m x 6m	EMC2142	2023-12-20	2026-12-19			
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A			

RF Conducted Test								
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date			
MI CABLE	SGS-EMC	0.8M	EMC2137	2023-11-02	2025-11-01			
4X4 Power sensor Unit	wer sensor Unit TST		EMC2226	2024-08-19	2025-08-18			
Test Software	ftware TST		GZE100-78	N/A	N/A			
EXA Signal Analyzer (10Hz-44GHz)	Keysight	N9010A	EMC2138	2024-08-19	2025-08-18			

General used equipment							
Equipment	Manufacturer	Model No	Inventory No	Cal Due Date			
DMM	Fluke	73	EMC0006	2024-06-13	2025-06-12		



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203 & 15.247(b)(4)

6.1.2 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 0.4 dBi.

Antenna location: Refer to internal photo.



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Radio Spectrum Matter Test Results 7

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

Test Requirement	47 CFR Part 15, Subpart C 15.207
Test Method:	ANSI C63.10 (2013) Section 6.2

Limit:

Frequency of emission	Conducted limit (dBµV)					
(MHz)	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.						
Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz						

7.1.1 E.U.T. Operation

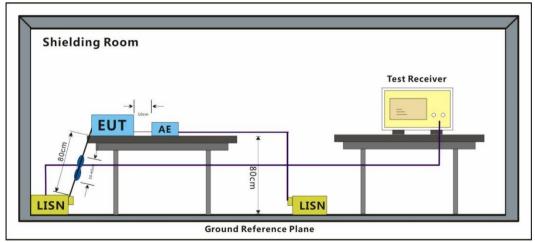
Operating Environment:

Temperature:	23.5 °C	Humidity:	48.4 % RH	Atmospheric Pressure:	1017	mbar
romporataro.	20.0 0	riannancy.	10.1 /0101		1011	moun

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.1.3 Test Setup Diagram





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7.1.4 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/50 μ H + 50hm 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: Level=Read Level+ Cable Loss+ LISN Factor



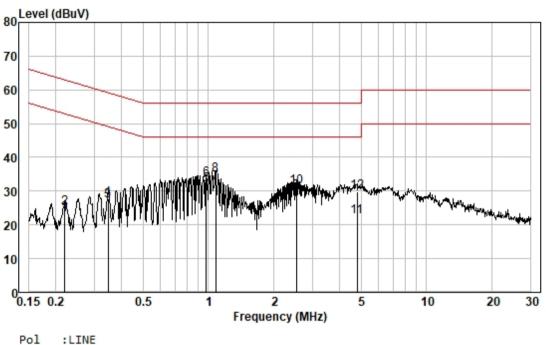
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Test Mode: 00; Line: Live line

Pol	:LIN
Mode	:
Model	:
Power	:

	Frequenc MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
1	0.220	13.29	0.04	9.57	22.90	52.83	-29.93	Average
2	0.220	15.48	0.04	9.57	25.09	62.83	-37.74	QP
3	0.346	17.41	0.05	9.59	27.05	49.05	-22.00	Average
4	0.346	18.24	0.05	9.59	27.88	59.05	-31.17	QP
5	0.979	22.24	0.07	9.56	31.87	46.00	-14.13	Average
6	0.979	24.03	0.07	9.56	33.66	56.00	-22.34	QP
7	1.077	22.80	0.08	9.54	32.42	46.00	-13.58	Average
8	1.077	25.27	0.08	9.54	34.89	56.00	-21.11	QP
9	2.527	20.17	0.14	9.54	29.85	46.00	-16.15	Average
10	2.527	21.61	0.14	9.54	31.29	56.00	-24.71	QP
11	4.797	12.55	0.19	9.61	22.35	46.00	-23.65	Average
12	4.797	20.03	0.19	9.61	29.83	56.00	-26.17	QP -



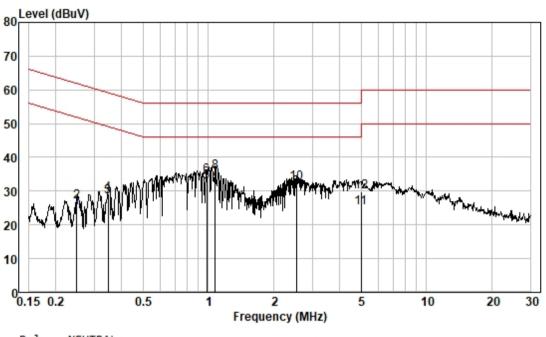
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Test Mode: 00; Line: Neutral Line

Pol :NEUTRAL Mode : Model : Power :

	Frequenc MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
1	0.249	15.54	0.04	9.53	25.11	51.78	-26.67	Average
2	0.249	17.28	0.04	9.53	26.85	61.78	-34.93	QP
3	0.346	18.87	0.05	9.51	28.43	49.05	-20.62	Average
4	0.346	19.56	0.05	9.51	29.12	59.05	-29.93	QP
5	0.984	23.19	0.07	9.56	32.82	46.00	-13.18	Average
6	0.984	24.96	0.07	9.56	34.59	56.00	-21.41	QP
7	1.071	24.01	0.08	9.56	33.65	46.00	-12.35	Average
8	1.071	25.93	0.08	9.56	35.57	56.00	-20.43	QP
9	2.527	21.36	0.14	9.58	31.08	46.00	-14.92	Average
10	2.527	22.80	0.14	9.58	32.52	56.00	-23.48	QP
11	5.005	15.29	0.20	9.66	25.15	50.00	-24.85	Average
12	5.005	19.95	0.20	9.66	29.81	60.00	-30.19	QP



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7.2 Radiated Emissions which fall in the restricted bands

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 11.12
Limit:	

Test Distance: 3 m

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.

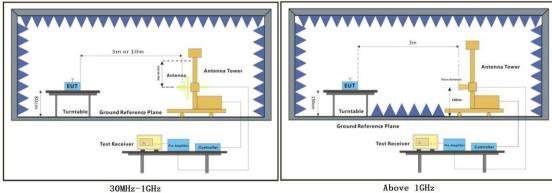
7.2.1 E.U.T. Operation

Operating Environment:							
Temperature:	22.7 °C	Humidity:	54.5 % RH	Atmospheric Pressure:	1017	mbar	

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.2.3 Test Setup Diagram





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7.2.4 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: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

Remark 2: 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 in the report.

Remark 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.

Remark 4:For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is \geq 1/T (Duty cycle \leq 98%) or 10Hz (Duty cycle \geq 98%) for Average detection (AV) at frequency above 1GHz.



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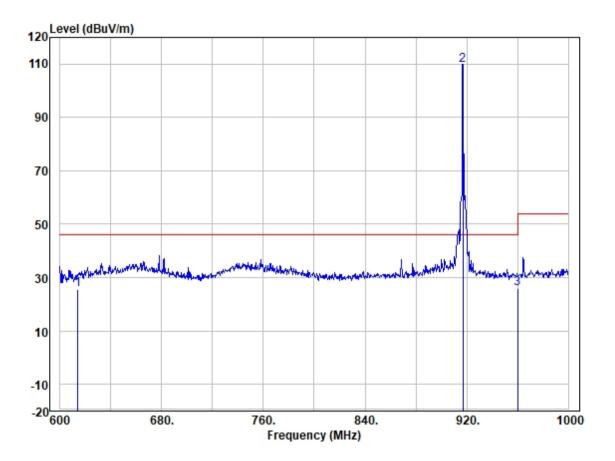
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low

Site	:	966	Chamber
Job	:		
Model	:		
Power	:		
Test Mode	:		

	Freq					Measured Level			Pol/ Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	614.000	31.05	25.92	1.44	32.86	25.55	46.02	-20.47	VERTICAL	QP
2	916.800	110.00	29.49	1.77	31.87	109.39	46.02	63.37	VERTICAL	Peak
3	960.000	26.19	29.74	1.82	31.71	26.04	46.02	-19.98	VERTICAL	QP

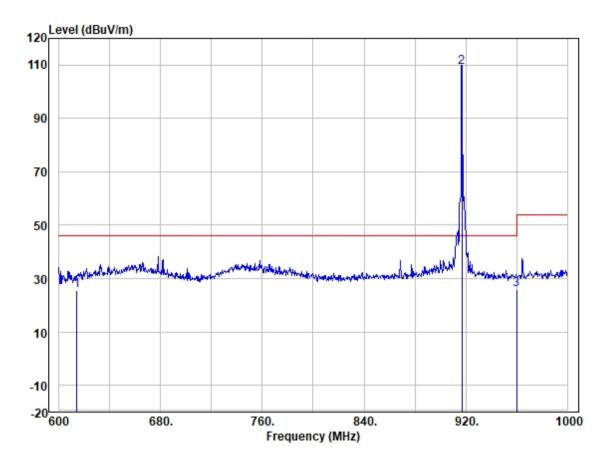


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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low

Site	:	966	Chamber
Job	:		
Model	:		
Power	:		
Test Mode	:		

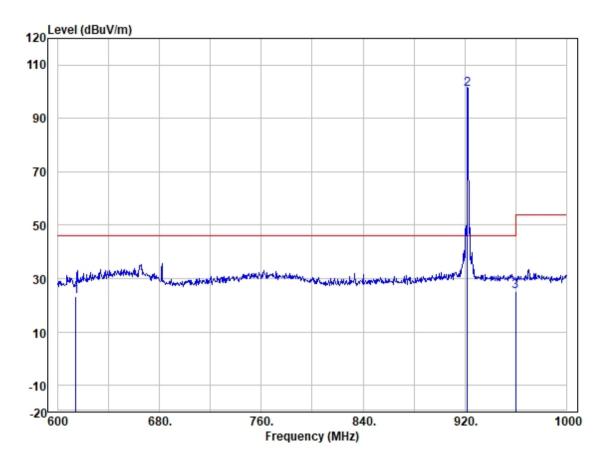
	Freq					Measured Level				Remark
	MHZ	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	614.000	30.94	25.92	1.44	32.86	25.44	46.02	-20.58	HORIZONTAL	QP
2	916.800	109.86	29.49	1.77	31.87	109.25	46.02	63.23	HORIZONTAL	Peak
3	960.000	26.22	29.74	1.82	31.71	26.07	46.02	-19.95	HORIZONTAL	QP



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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High

Site	:	966	Chamber
Job	:		
Model	:		
Power	:		
Test Mode	:		

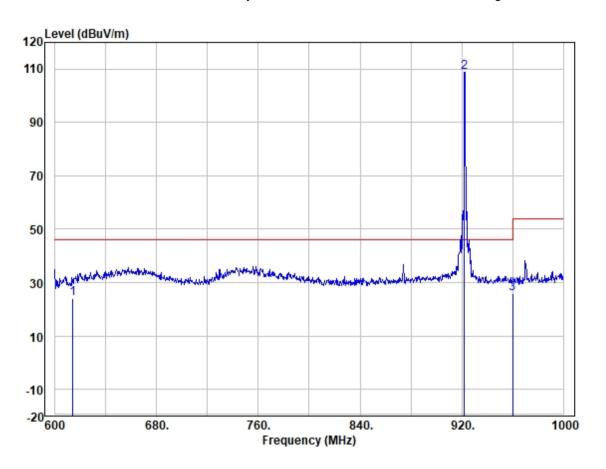
	Freq					Measured Level				Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	614.000	28.86	25.92	1.44	32.86	23.36	46.02	-22.66	VERTICAL	QP
2	922.200	101.56	29.54	1.77	31.84	101.03	46.02	55.01	VERTICAL	Peak
3	960.000	25.34	29.74	1.82	31.71	25.19	46.02	-20.83	VERTICAL	QP



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Test Mode: 00; Polarity: Vertical; Modulation: GFSK; Channel:High

Site	:	966	Chamber
Job	:		
Model	:		
Power	:		
Test Mode	:		

	Freq					Measured Level				Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	614.000	29.65	25.92	1.44	32.86	24.15	46.02	-21.87	HORIZONTAL	QP
2	922.200	109.22	29.54	1.77	31.84	108.69	46.02	62.67	HORIZONTAL	Peak
3	960.000	26.15	29.74	1.82	31.71	26.00	46.02	-20.02	HORIZONTAL	QP



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7.3 Radiated Spurious Emissions Below 1GHz

Test Requirement	47 CFR Part 15, Subpart C 15.205 & 15.209
Test Method:	ANSI C63.10 (2013) Section 6.4,6.5
Limit:	
Test Distances	0

Test Distance: 3 m

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
960-1000	500	3

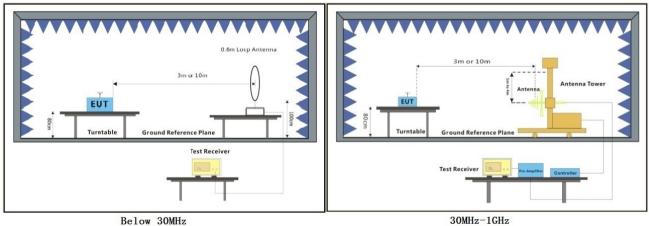
7.3.1 E.U.T. Operation

Operating Enviror	nment:					
Temperature:	24.1 °C	Humidity:	46.9 % RH	Atmospheric Pressure:	1017	mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.3.3 Test Setup Diagram





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7.3.4 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. 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.

c. 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.

d. 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.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. 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 quasi-peak method as specified and then reported in a data sheet.

g. Test the EUT in the lowest channel, the middle channel, the Highest channel.

h. 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.

i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2. Scan from 9kHz to 30MHz, the disturbance 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.



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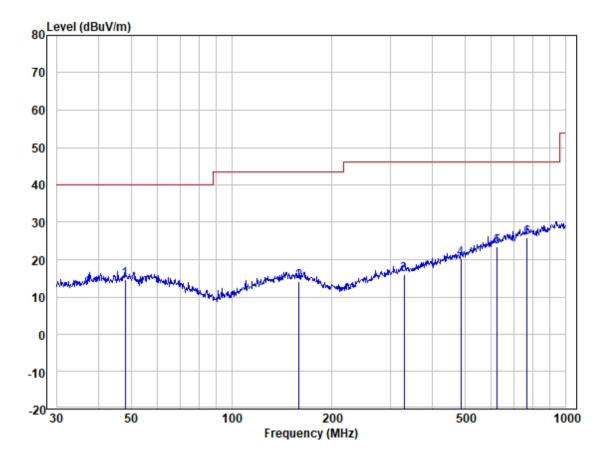
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Site	:	966	Chamber
Job	:		
Model	:		
Power	:		
Test Mode	:	BO	

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Guangzhou

es Co. Ltd

C Laboratory.

	-					Measured				
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	47.994	27.72	19.52	0.38	32.88	14.74	40.00	-25.26	HORIZONTAL	QP
2	159.225	26.97	19.20	0.70	32.83	14.04	43.52	-29.48	HORIZONTAL	QP
3	329.039	27.70	20.15	1.01	32.89	15.97	46.02	-30.05	HORIZONTAL	QP
4	485.609	28.73	23.22	1.28	32.99	20.24	46.02	-25.78	HORIZONTAL	QP
5	625.078	28.70	26.20	1.45	32.84	23.51	46.02	-22.51	HORIZONTAL	QP
6	768.748	28.43	28.30	1.64	32.45	25.92	46.02	-20.10	HORIZONTAL	QP

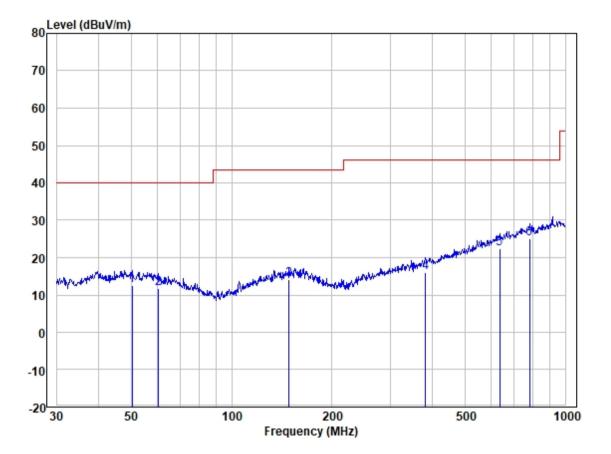
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Test Mode: 00; Polarity: Vertical

Site	:	966	Chamber
Job	:		
Model	:		
Power	:		
Test Mode	:	BO	

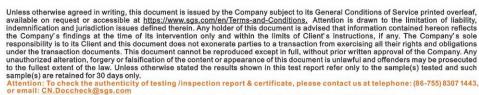
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Guangzhou

es Co. Ltd

C Laboratory.

	Enor					Measured			Pol/ Phase	Bomank
	rreq	LEVEL	ractor	LUSS	ractor	Level	LINE	LIMIC	FlidSe	Kellidi K
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	50.409	25.54	19.55	0.39	32.88	12.60	40.00	-27.40	VERTICAL	QP
2	60.492	25.48	18.79	0.41	32.87	11.81	40.00	-28.19	VERTICAL	QP
3	148.441	27.27	18.96	0.66	32.82	14.07	43.52	-29.45	VERTICAL	QP
4	381.249	26.84	21.02	1.14	32.91	16.09	46.02	-29.93	VERTICAL	QP
5	636.134	27.37	26.48	1.46	32.80	22.51	46.02	-23.51	VERTICAL	QP
6	779.607	27.45	28.40	1.65	32.44	25.06	46.02	-20.96	VERTICAL	QP



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7.4 Radiated Spurious Emissions Above 1GHz

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

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance(meters)
Above 1000	500	3

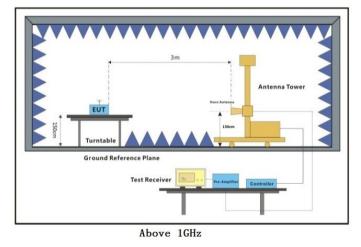
7.4.1 E.U.T. Operation

Operating Enviro	nment:					
Temperature:	22.7 °C	Humidity:	54.5 % RH	Atmospheric Pressure:	1017	mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.4.3 Test Setup Diagram







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7.4.4 Measurement Procedure and Data

a. 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.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. 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.

d. 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.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. 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 or average method as specified and then reported in a data sheet.

g. Test the EUT in the lowest channel, the middle channel, the Highest channel.

h. 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.

i. Repeat above procedures until all frequencies measured was complete.

Remark:

1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2. Scan from 1GHz to 25GHz, the disturbance above 18GHz 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.

3. As shown in this section, 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 in the report.

4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz.

5:For fundamental and harmonic signal measurement, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is \geq 1/T (Duty cycle \leq 98%) or 10Hz (Duty cycle \geq 98%) for Average detection (AV) at frequency above 1GHz.



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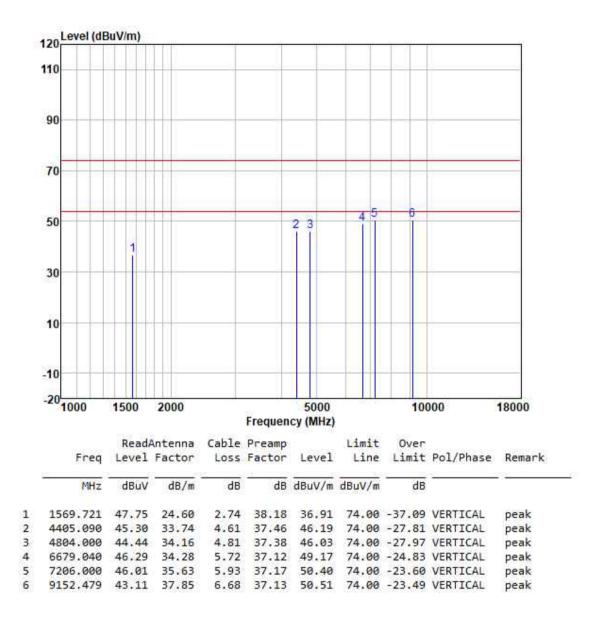
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:Low





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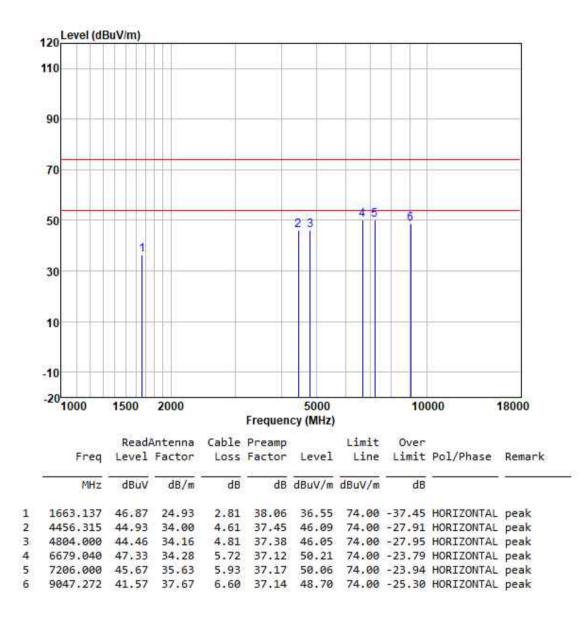
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:Low





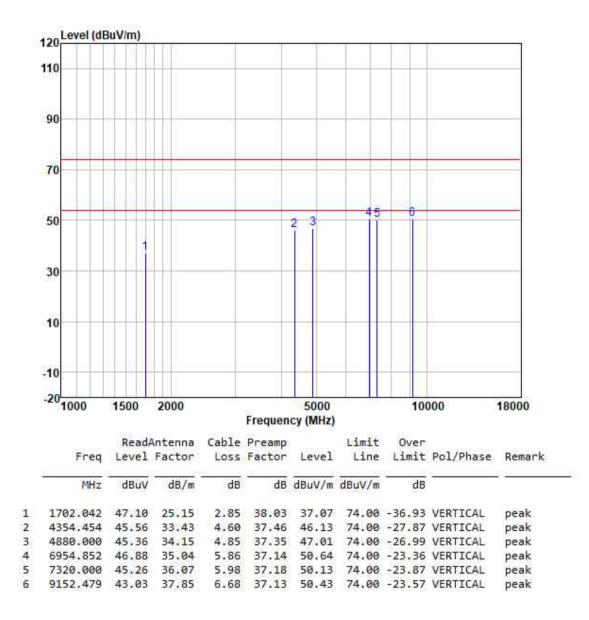
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:middle





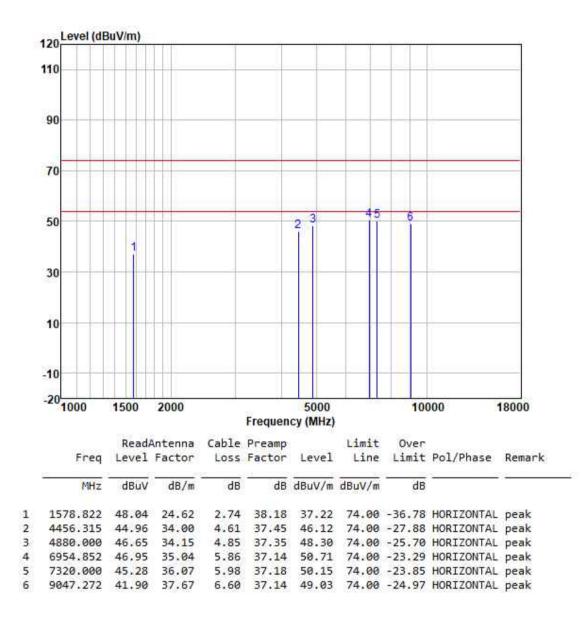
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:middle





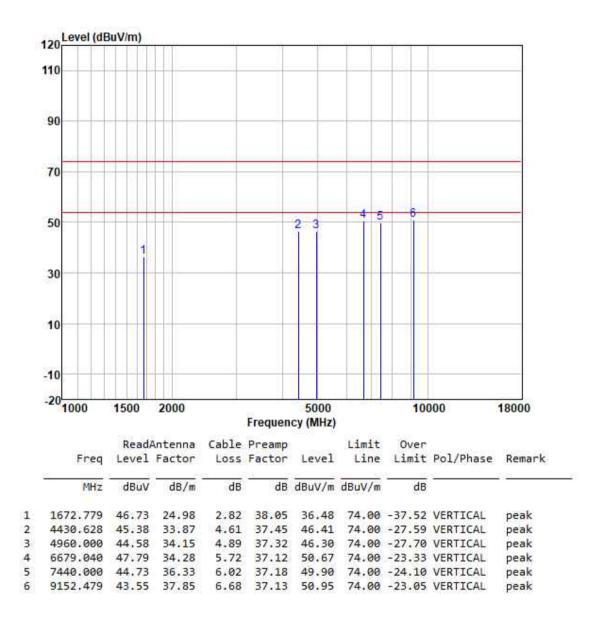
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Test Mode: 00; Polarity: Vertical; Modulation:GFSK; Channel:High





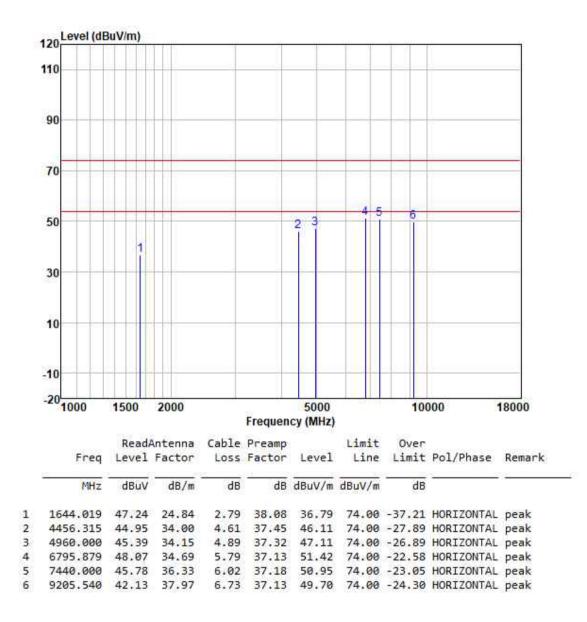
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Test Mode: 00; Polarity: Horizontal; Modulation:GFSK; Channel:High





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7.5 Conducted Peak Output Power

Test Requirement47 CFR Part 15, Subpart C 15.247(b)(3)Test Method:ANSI C63.10 (2013) Section 11.9.2

Limit:

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

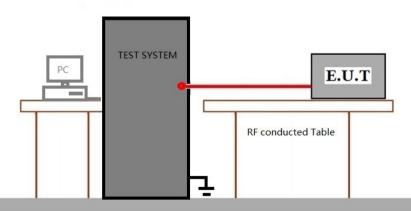
7.5.1 E.U.T. Operation

Operating Enviro	nment:					
Temperature:	21.9 °C	Humidity:	60.9 % RH	Atmospheric Pressure:	1017	mbar

7.5.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.5.3 Test Setup Diagram



Ground Reference Plane

7.5.4 Measurement Procedure and Data

Note: Since the verify power the same operating range bandwidth and smaller power can be covered by the higher power.

Please Refer to Appendix for Details



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7.6 Minimum 6dB Bandwidth

Test Requirement	47 CFR Part 15, Subpart C 15.247a(2)
Test Method:	ANSI C63.10 (2013) Section 11.8.1
Limit:	≥500 kHz

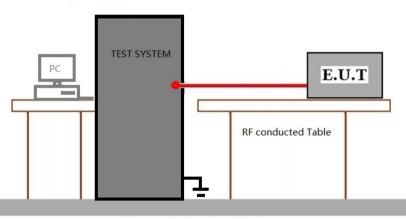
7.6.1 E.U.T. Operation

Operating Environment: Temperature: 21.9 °C Humidity: 60.9 % RH Atmospheric Pressure: 1017 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.6.3 Test Setup Diagram



Ground Reference Plane

7.6.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.7 Power Spectrum Density

Test Requirement	47 CFR Part 15, Subpart C 15.247(e)	
Test Method:	ANSI C63.10 (2013) Section 11.10.2	
Limit:		
≤8dBm in any 3 kHz band during any time interval of continuous transmission		

7.7.1 E.U.T. Operation

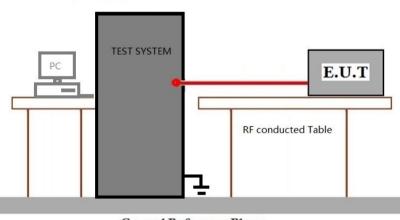
Operating Environment:

Temperature: 21.9 °C Humidity: 60.9 % RH Atmospheric Pressure: 1017 mbar

7.7.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.7.3 Test Setup Diagram



Ground Reference Plane

7.7.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.8 Conducted Band Edges Measurement

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.13.3.2

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).

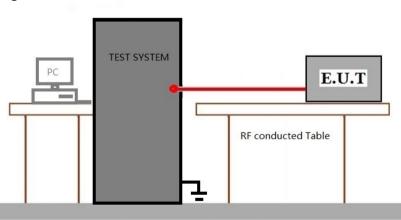
7.8.1 E.U.T. Operation

Operating Environment:							
Temperature:	21.9 °C	Humidity:	60.9 % RH	Atmospheric Pressure:	1017	mbar	

7.8.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.8.3 Test Setup Diagram



Ground Reference Plane

7.8.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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7.9 Conducted Spurious Emissions

Test Requirement	47 CFR Part 15, Subpart C 15.247(d)
Test Method:	ANSI C63.10 (2013) Section 11.11

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).

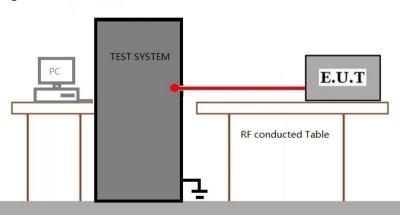
7.9.1 E.U.T. Operation

Operating Environment:							
Temperature:	21.9 °C	Humidity:	60.9 % RH	Atmospheric Pressure:	1017	mbar	

7.9.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	00	TX mode_Keep the EUT in continuously transmitting mode with GFSK modulation.

7.9.3 Test Setup Diagram



Ground Reference Plane

7.9.4 Measurement Procedure and Data

Please Refer to Appendix for Details



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Test Setup Photo 8

Refer to Appendix - Test Setup Photo for GZCR241100141102



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EUT Constructional Details (EUT Photos) 9

Refer to External and Internal Photos for GZCR2411001411DS



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10 Appendix

- 1. Duty Cycle
- 1.1 Test Result
- 1.1.1 Ant1

	Ant1								
Mode	Mode TX Frequency Type (MHz)			Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	Max. DC Variation (%)		
		916.55	100.000	100.000	100.00	0.00	0.00		
GFSK	SISO	919.75	100.000	100.000	100.00	0.00	0.00		
		922.15	100.000	100.000	100.00	0.00	0.00		



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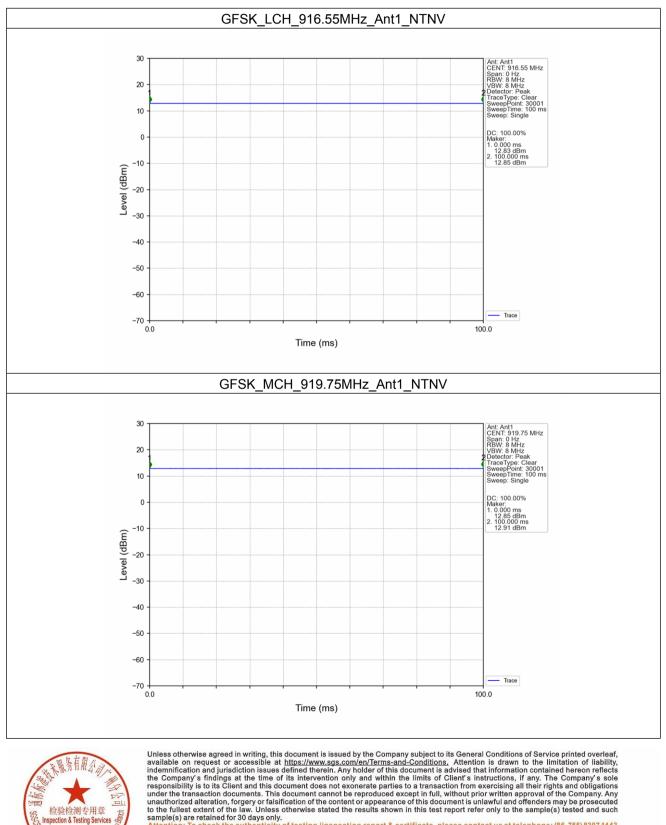


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1.2 Test Graph

1.2.1 Ant1



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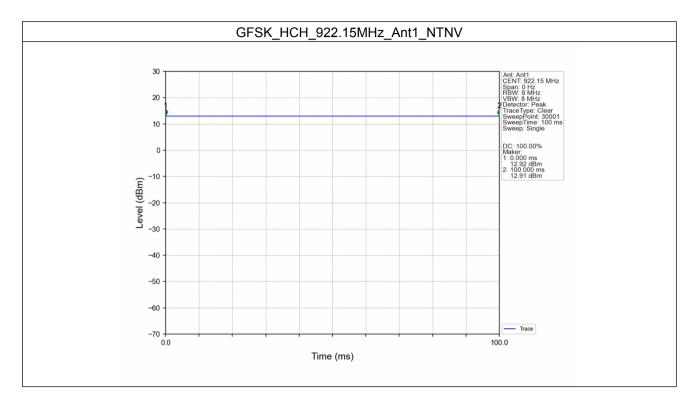
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- 2. Bandwidth
- 2.1 Test Result

2.1.1 6dB BW

Mada	Mode TX Fre		Frequency ANT		6dB Bandwidth (MHz)		
Mode Type	Туре	(MHz)	ANT	Result	Limit	Verdict	
	916.55	1	0.540	>=0.5	Pass		
GFSK	GFSK SISO	919.75	1	0.541	>=0.5	Pass	
		922.15	1	0.533	>=0.5	Pass	



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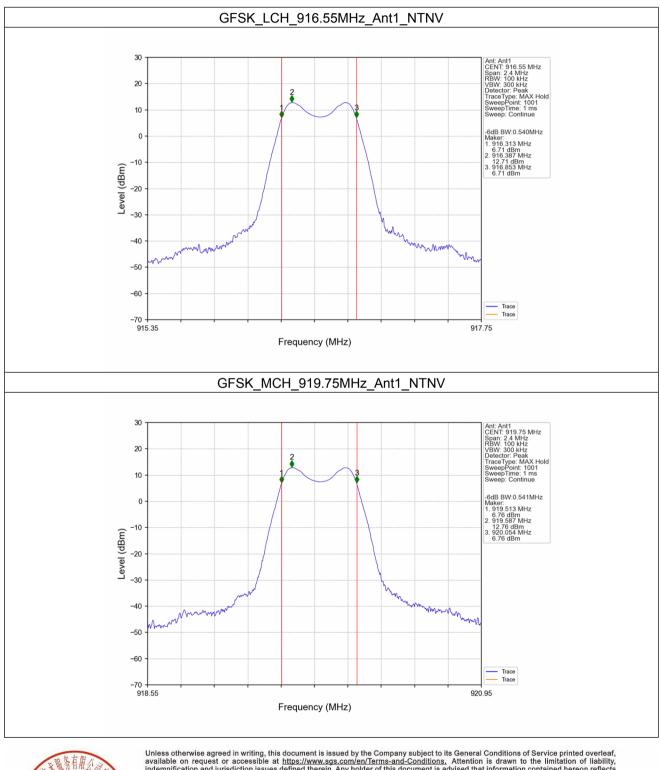


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2.2 Test Graph

2.2.1 6dB BW





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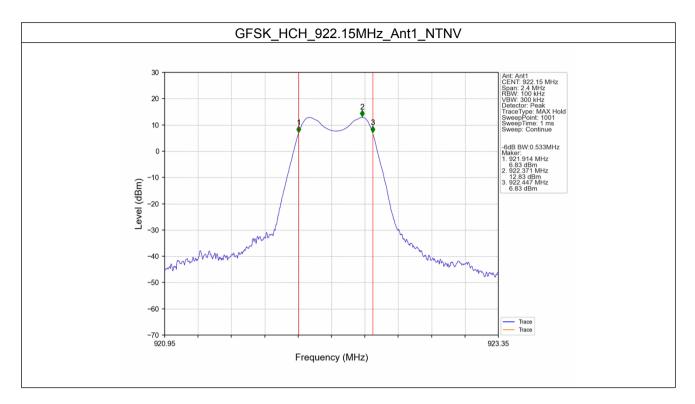
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3. Maximum Conducted Output Power

3.1 Test Result

3.1.1 Power

ModeTX		Frequency	Maximum Peak Conduc	Verdict			
Mode	Туре	(MHz)	ANT1	Limit	verdict		
		916.55	12.82	<=30	Pass		
GFSK	SISO	919.75	12.88	<=30	Pass		
		922.15	12.94	<=30	Pass		
Note1: Anten	Note1: Antenna Gain: Ant1: 0.40dBi;						



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4. Maximum Power Spectral Density

4.1 Test Result

4.1.1 PSD

Mada TX		Frequency	Maximum PS	Verdict			
Mode	Туре	(MHz)	ANT1	Limit	verdici		
		916.55	6.98	<=8	Pass		
GFSK	SISO	919.75	7.56	<=8	Pass		
		922.15	6.74	<=8	Pass		
Note1: Antenna Gain: Ant1: 0.40dBi;							



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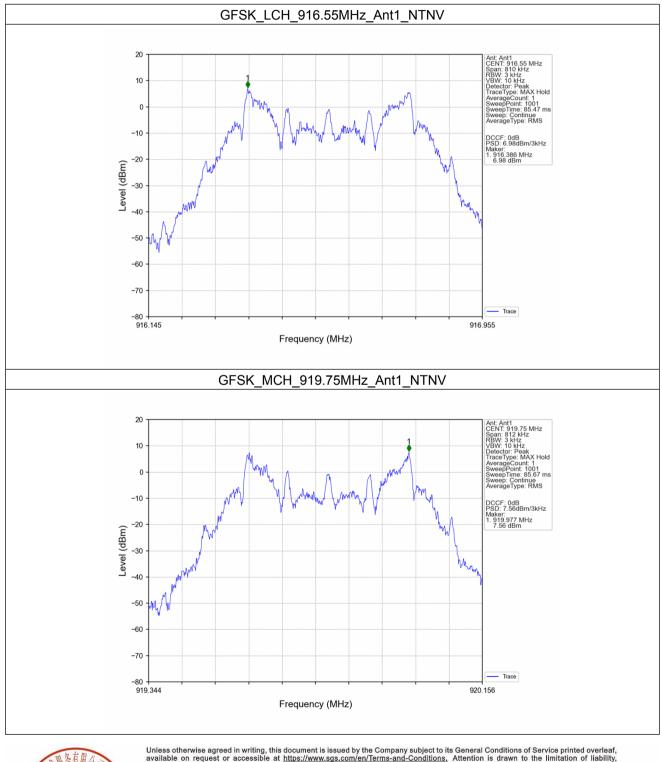


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4.2 Test Graph

4.2.1 PSD





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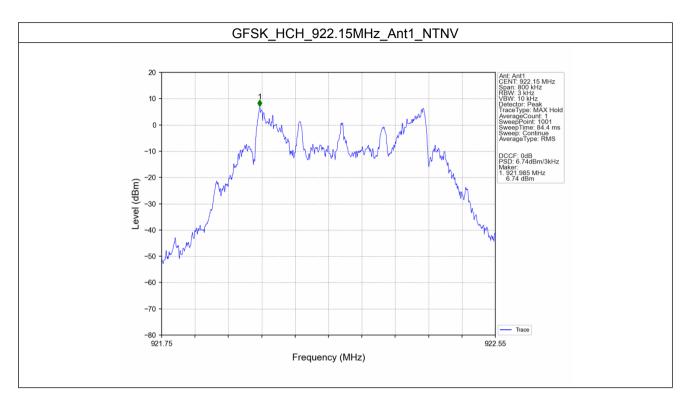
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Unwanted Emissions In Non-restricted Frequency Bands

5.1 Test Result

5.1.1 Ref

Mode	ТХ Туре	Frequency (MHz)	ANT	Level of Reference (dBm)
GFSK	SISO	916.55	1	12.70
		919.75	1	12.76
		922.15	1	12.82

Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.

5.1.2 CSE and Band Edges

Mode	ТХ Туре	Frequency (MHz)	ANT	Level of Reference (dBm)	Limit (dBm)	Verdict	
		916.55	1	12.82	-7.18	Pass	
GFSK	SISO	919.75	1	12.82	-7.18	Pass	
		922.15	1	12.82	-7.18	Pass	
Note1: Refer to FCC Part 15.247 (d) and ANSI C63.10-2013, the channel contains the maximum PSD level was used to establish the reference level.							



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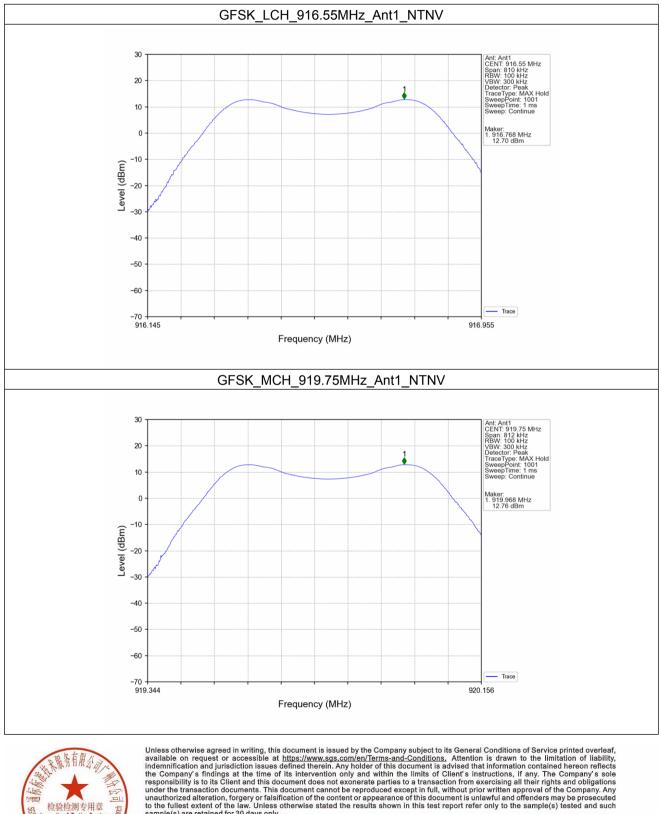
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5.2 Test Graph

5.2.1 Ref





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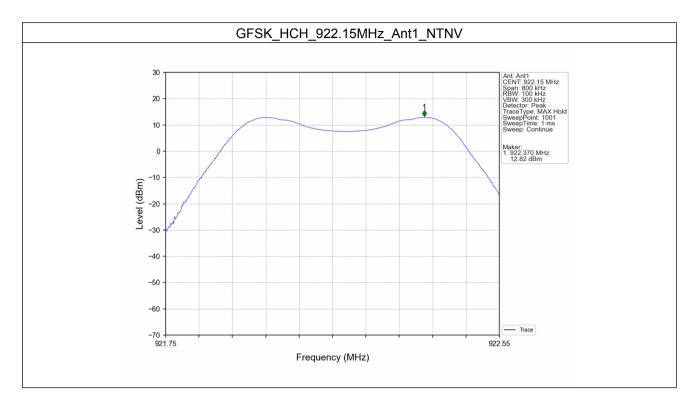
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5.2.2 CSE and Band Edges

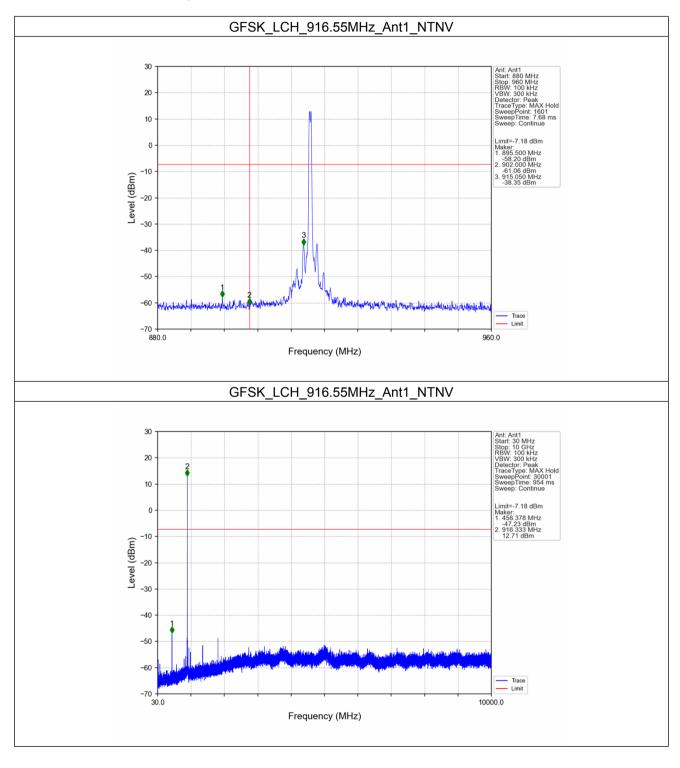
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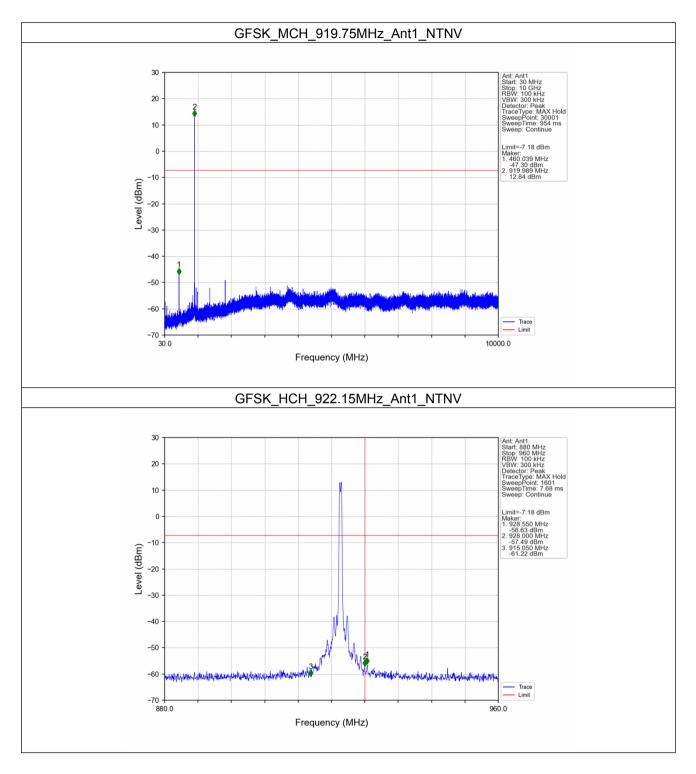
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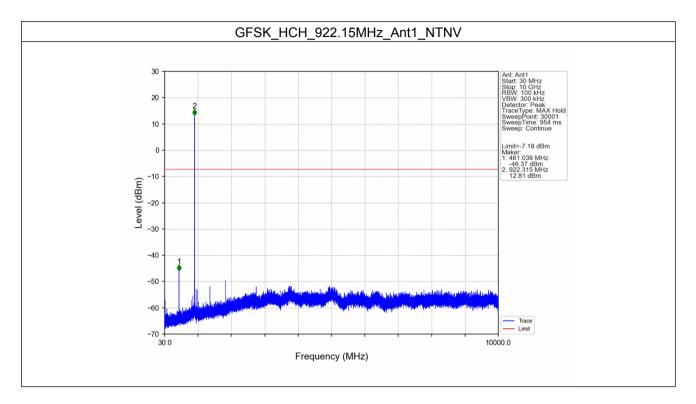
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