



Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR230200003001

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TEST REPORT

Application No.: FYCR2302000030AT
Applicant: DT Research, Inc.
Address of Applicant: 2000 Concourse Drive, San Jose, CA 95131, USA
Manufacturer: DT Research, Inc.
Address of Manufacturer: 3RD FL NO 36 WUQUAN 7TH RD WUGU DISTRICT, NEW TAIPEI, Taiwan
Factory: DT Research, Inc. Taiwan Branch
Address of Factory: 6F., No.36 Wuquan 7 th Rd., Wugu Dist. New Taipei City 248 Taiwan
Equipment Under Test (EUT):
EUT Name: Rugged Tablet
Model Name: DT361xxxx(x= 0-9, A-Z, - or null, or .,or /), DT361DM ♣
♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.

Trade mark:



FCC ID: YE3600-AX210D2
Standard(s) : 47 CFR Part 15, Subpart C 15.247
Date of Receipt: 2023-02-03
Date of Test: 2023-02-17 to 2023-02-21
Date of Issue: 2023-03-07

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

Winkey Wang
EMC Technical Manager



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Revision Record

Version	Chapter	Date	Modifier	Remark
01		2023-03-07		Original

Authorized for issue by:

	 _____ Tree Zhan/Project Engineer	
	 _____ Winkey Wang/Reviewer	

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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(b)(4)	Pass
Other requirements Frequency Hopping Spread Spectrum System Hopping Sequence		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
Radiated Emissions which fall in the restricted bands		ANSI C63.10 (2013) Section 6.10.5	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		ANSI C63.10 (2013) Section 6.6	47 CFR Part 15, Subpart C 15.205 & 15.209	Pass

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Remark:

Model No.: DT361xxxx(x= 0-9, A-Z, - or null, or .,or /), DT361DM

Only the model DT361DM was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on model No..

This report is prepared for FCC class II permissive change.

The modular approval by TCB, FCC ID:YE3600-AX210D2, Granted on 05/06/2022.

The module installed into host platform mentioned above is electronically and mechanically identical to the original certified module. The Original FCC testing on module under FCC ID: PD9AX210D2 was performed with an antenna of higher gain, and the antenna was connected to the module in an open environment. The current host platform under application is used a new antenna of the same type and a different gain than the original certified module, and it is installed inside the host platform enclosure. Also, the band above 6GHz(5925-7125MHz) is blocked by the software for the module, and it is installed inside the host platform enclosure.

Therefore in this report Conducted Emissions at AC Power Line (150kHz-30MHz), Radiated Emissions which fall in the restricted bands and Radiated Spurious Emissions were fully retested on model DT361DM and shown the data in this report.

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4 General Information

4.1 Details of E.U.T.

Power supply:	<p>AC Adapter Model: EA10731J-120 Input: AC 100-240V, 50/60Hz, 2.0A Output: DC 12V, 5A 60W</p> <p>Rechargeable Lithium-Ion Battery Model: ACC-006-362G Rated Capacity: 3100mAh Voltage: 7.6V Watt-Hour: 23.56Wh Max Charge Voltage: 8.7V</p> <p>Rechargeable Lithium-Ion Polymer Battery Model: PT352044 Rated Capacity: 250mAh Voltage: 3.7V Watt-Hour: 0.93Wh Max Charge Voltage: 4.2V</p>
Cable(s):	AC cable:174cm unshielded DC cable:175cm unshielded
Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V5.2
Spectrum Spread Technology:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, pi/4DQPSK, 8DPSK
Number of Channels:	79
Channel Spacing:	1MHz
Antenna Type:	PIFA Antenna
Antenna Gain:	2.8dBi

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

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
--	--	--	--

The EUT has been tested as an independent unit.



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4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	± 2.1 dB (9kHz to 30MHz)
Radiated Emissions which fall in the restricted bands	± 4.4dB (Above 1GHz)
Radiated Spurious Emissions Below 1GHz	± 3.1dB (Below 1GHz)
Radiated Spurious Emissions Above 1GHz	± 4.4dB (Above 1GHz)

Remark:

The U_{lab} (lab Uncertainty) is less than $U_{cispr/ETSI}$ (CISPR/ETSI Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

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4.4 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc. Shenzhen branch.

Fuyong lab. Xinlong TechnoPark, Fengtang Road, Fuyong Subdistrict, Bao'an, Shenzhen, China

Tel: +86 755 8866 3988 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

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

- **A2LA (Certificate No. 6606.01)**

Compliance Certification Services (Kunshan) Inc. Shenzhen branch is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6606.01.

- **FCC –Designation Number: CN1322**

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized as an accredited testing laboratory.

Designation Number: CN1322. Test Firm Registration Number: 718073

- **Innovation, Science and Economic Development Canada**

Compliance Certification Services (Kunshan) Inc. Shenzhen branch has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0129.

IC#: 28189.

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	CRT	N/A	SEM001-14	2021/7/13	2024/7/12
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-01	2022/7/12	2023/7/11
Two-Line V-Network	Rohde & Schwarz	ENV216	SEM007-16	2022/7/12	2023/7/11
Two-Line V-Network	Rohde & Schwarz	ESH3-Z5	SEM007-22	2023/1/9	2024/1/8
Coaxial Cable	CCS	N/A	SEM033-02	2022/5/16	2023/5/15
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

Radiated Emissions which fall in the restricted bands					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
3m Anechoic Chamber	CRT	N/A	SEM001-13	2021/7/13	2024/7/12
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-23	2022/4/24	2023/4/23
Coaxial Cable	CCS	N/A	SEM035-02	2022/5/16	2023/5/15
Pre-amplifier	TST PASS	LNA04080G30	SEM005-27	2022/4/15	2023/4/14
Pre-amplifier	TST PASS	LNA10180G45	SEM005-28	2022/4/15	2023/4/14
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

Radiated Spurious Emissions Below 1GHz					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
3m Anechoic Chamber	CRT	N/A	SEM001-13	2021/7/13	2024/7/12
Trilog-Broadband Antenna	Schwarzbeck	VULB9168	SEM003-33	2021/9/25	2024/9/24
Loop Antenna	ETS-LINDGREN	6502	SEM003-36	2021/9/26	2024/9/25
MXE EMI receiver	Agilent	N9038A	SEM004-05	2022/7/12	2023/7/11
Pre-amplifier	HP	8447D	SEM005-02	2022/7/12	2023/7/11
Coaxial Cable	CCS	N/A	SEM035-01	2022/5/16	2023/5/15
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A



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SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR230200003001

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Radiated Spurious Emissions Above 1GHz

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
3m Anechoic Chamber	CRT	N/A	SEM001-13	2021/7/13	2024/7/12
Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120D	SEM003-32	2021/9/26	2024/9/25
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-23	2022/4/24	2023/4/23
Coaxial Cable	CCS	N/A	SEM035-02	2022/5/16	2023/5/15
Pre-amplifier	TST PASS	LNA04080G30	SEM005-27	2022/4/15	2023/4/14
Pre-amplifier	TST PASS	LNA10180G45	SEM005-28	2022/4/15	2023/4/14
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

General used equipment

Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Mingle	TH607	SEM002-22	2022/7/12	2023/7/11
Humidity/ Temperature Indicator	Mingle	TH607	SEM002-23	2022/7/12	2023/7/11
Barometer	DUMAI	DYM3	SEM002-24	2022/7/12	2023/7/11

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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

15.203 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 shall be considered sufficient to comply with the provisions of this section. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of 15.211, 15.213, 15.217, 15.219, 15.221, or 15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

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 connector is a IPEX type that comply with Part15.203, the best case gain of the antenna is 2.8dBi.

Antenna location: Refer to internal photo.

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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)

Limit:

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

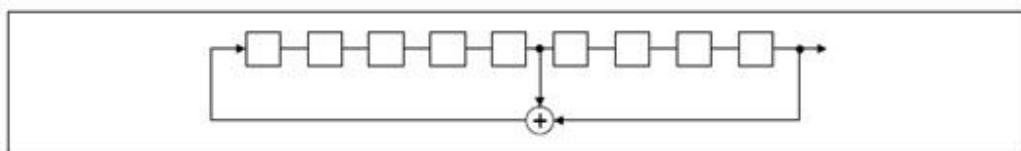
An example of Pseudorandom Frequency Hopping Sequence as follow:



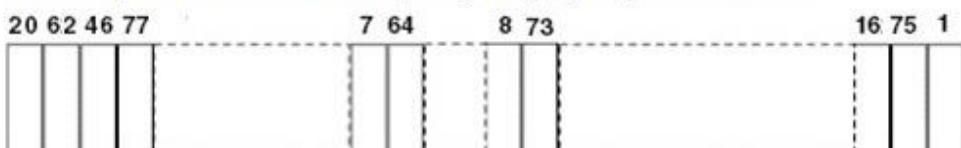
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*Linear Feedback Shift Register for Generation of the PRBS sequence*

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(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinate with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.

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.



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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

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(g):

According to Technical Specification, the system transmits the packet with the pseudorandom hopping frequency with a continuous data and the short burst transmission from the Bluetooth system is also transmitted under the frequency hopping system with the pseudorandom hopping frequency system.

Compliance for section 15.247(h):

According to Technical specification, the system incorporates with an adaptive system to detect other user within the spectrum band so that it individually and independently to avoid hopping on the occupied channels.

The system is designed not have the ability to coordinate with other FHSS System in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitter.



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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(dB μ V)	
	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

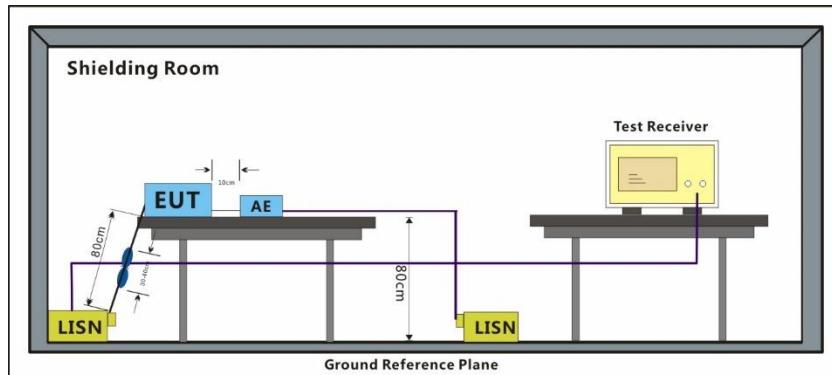
Operating Environment:

Temperature: 22.1 °C Humidity: 51.3 % RH Atmospheric Pressure: 1020 mbar

7.1.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	10	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, p/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

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

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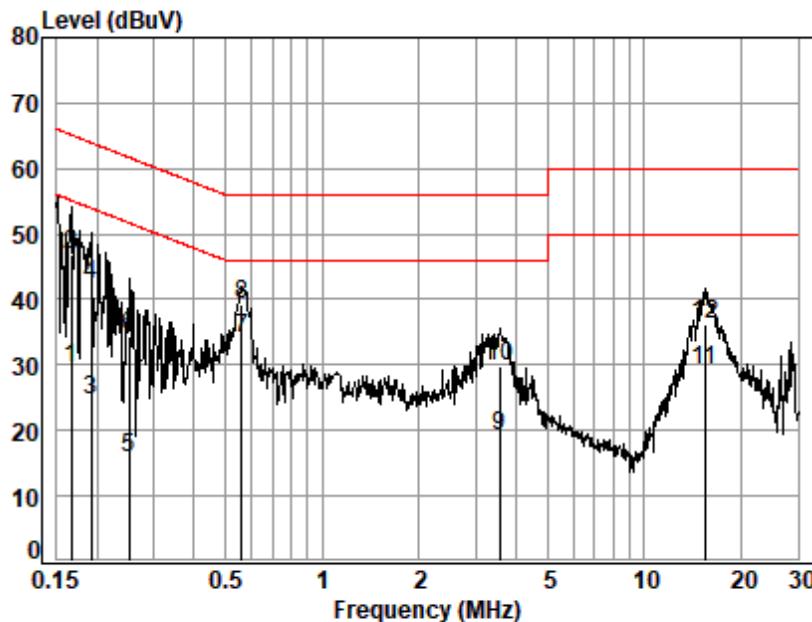
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Test Mode: 10; Line: Live line



Site : Shielding Room

Condition: Line

Job No. : 00030AT

Test mode: 10

Freq	Cable	LISN	Read	Limit		Over	Remark
	Freq	Loss	Factor	Level	Level	Line	
	MHz	dB	dB	dBuV	dBuV	dBuV	
1	0.1659	0.02	0.13	29.40	29.55	55.16	-25.61 Average
2	0.1659	0.02	0.13	46.73	46.88	65.16	-18.28 QP
3	0.1924	0.02	0.12	24.51	24.65	53.93	-29.28 Average
4	0.1924	0.02	0.12	42.12	42.26	63.93	-21.67 QP
5	0.2521	0.03	0.12	15.55	15.70	51.69	-35.99 Average
6	0.2521	0.03	0.12	34.18	34.33	61.69	-27.36 QP
7	0.5641	0.04	0.12	33.87	34.03	46.00	-11.97 Average
8	0.5641	0.04	0.12	39.08	39.24	56.00	-16.76 QP
9	3.5654	0.03	0.24	18.76	19.03	46.00	-26.97 Average
10	3.5654	0.03	0.24	29.69	29.96	56.00	-26.04 QP
11	15.3883	0.05	0.60	28.67	29.32	50.00	-20.68 Average
12	15.3883	0.05	0.60	35.52	36.17	60.00	-23.83 QP

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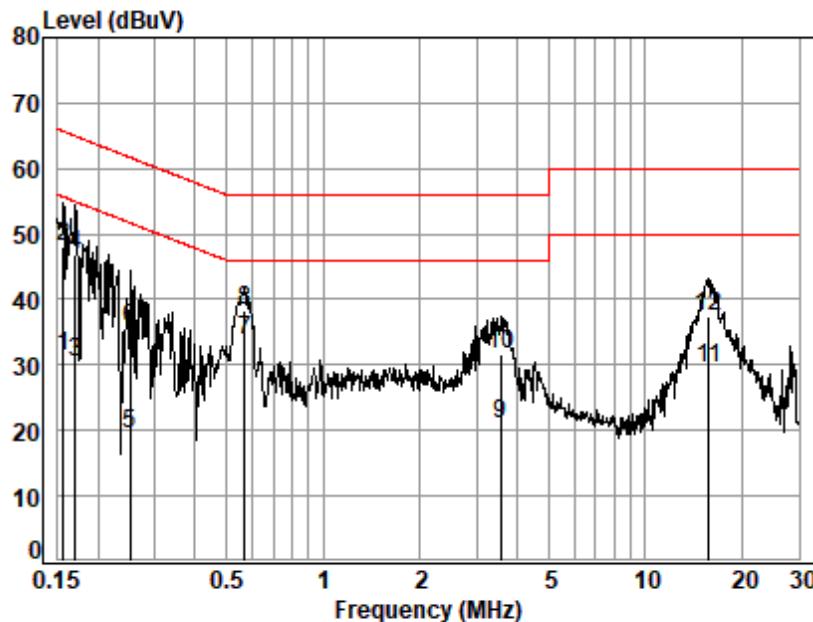
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Test Mode: 10; Line: Neutral Line



Site : Shielding Room

Condition: Neutral

Job No. : 00030AT

Test mode: 10

Freq	Cable	LISN	Read	Limit	Over	Remark
	Loss	Factor	Level	Level	Line	
	MHz	dB	dB	dBuV	dBuV	dB
1	0.1565	0.02	0.13	31.11	31.26	55.65 -24.39 Average
2	0.1565	0.02	0.13	47.77	47.92	65.65 -17.73 QP
3	0.1694	0.02	0.12	30.20	30.34	54.99 -24.65 Average
4	0.1694	0.02	0.12	46.76	46.90	64.99 -18.09 QP
5	0.2508	0.03	0.12	19.17	19.32	51.73 -32.41 Average
6	0.2508	0.03	0.12	35.47	35.62	61.73 -26.11 QP
7	0.5701	0.04	0.14	33.50	33.68	46.00 -12.32 Average
8	0.5701	0.04	0.14	38.00	38.18	56.00 -17.82 QP
9	3.5654	0.03	0.22	20.71	20.96	46.00 -25.04 Average
10	3.5654	0.03	0.22	31.38	31.63	56.00 -24.37 QP
11	15.7179	0.05	0.44	28.91	29.40	50.00 -20.60 Average
12	15.7179	0.05	0.44	36.91	37.40	60.00 -22.60 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 6.10.5

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.

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22.2 °C Humidity: 55.5 % RH Atmospheric Pressure: 1020 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	09	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, p/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.
Final test	10	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, p/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

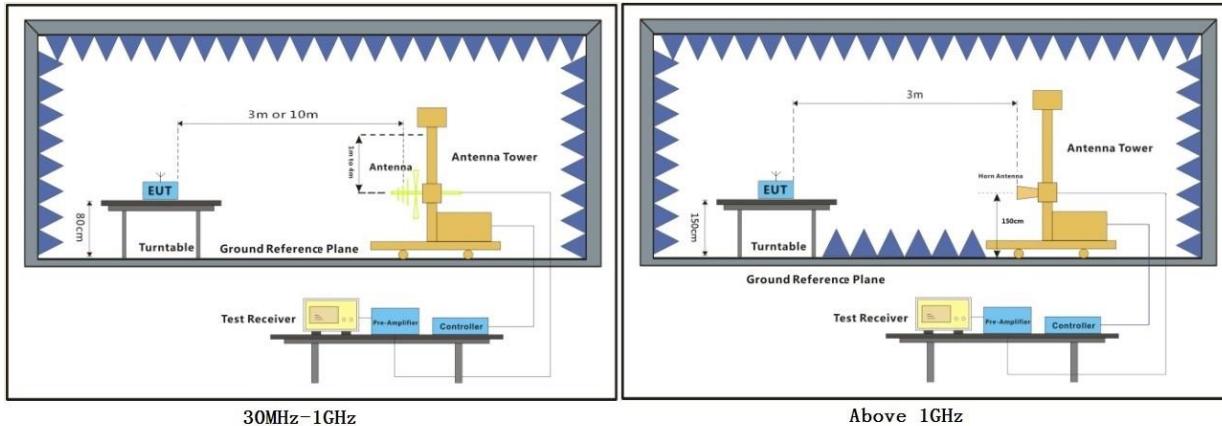


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7.2.3 Test Setup Diagram



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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.



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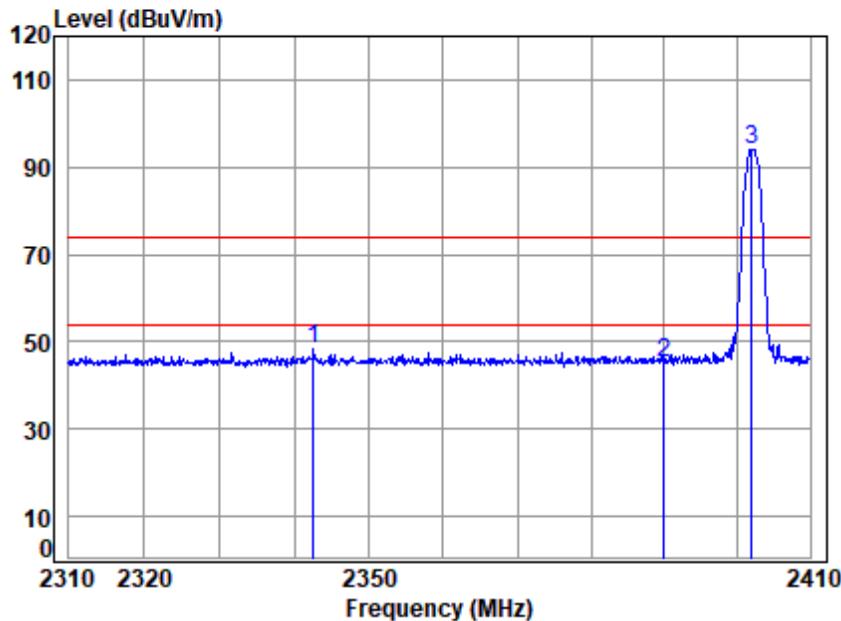
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Test Mode: 10; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00030AT
Mode : 2402 Band edge
Note : BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark
	MHz	dB	dB/m		dB	dBuV	dBuV/m	dBuV/m	dB
1	2342.533	5.02	27.05	32.50	48.64	48.21	74.00	-25.79	peak
2	2390.000	5.05	27.16	32.50	45.33	45.04	74.00	-28.96	peak
3	2402.000	5.06	27.18	32.50	94.21	93.95	74.00	19.95	peak

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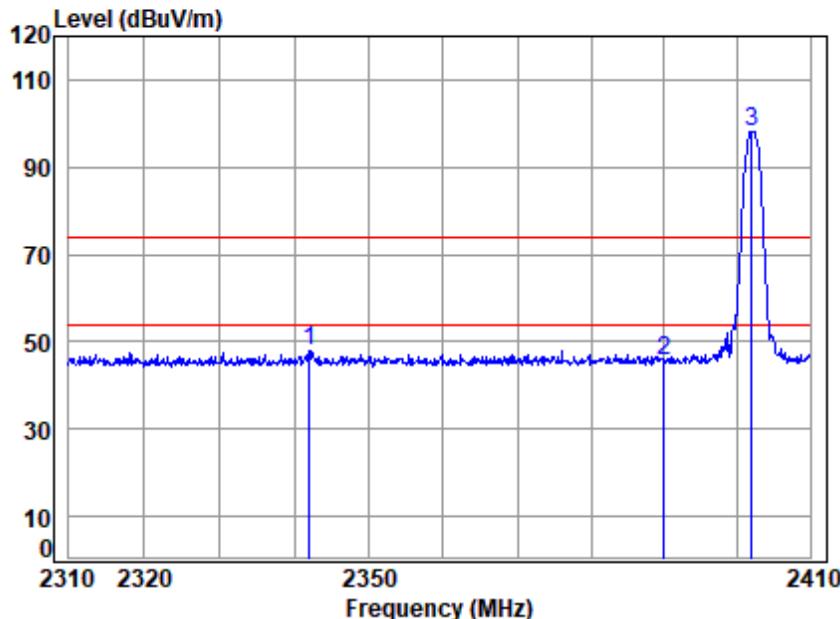
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Test Mode: 10; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m VERTICAL
Job No : 00030AT
Mode : 2402 Band edge
Note : BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark
	MHz	dB	dB/m		dB	dBuV	dBuV/m	dBuV/m	
1	2342.036	5.02	27.05	32.50	48.49	48.06	74.00	-25.94	peak
2	2390.000	5.05	27.16	32.50	45.95	45.66	74.00	-28.34	peak
3	2402.000	5.06	27.18	32.50	98.35	98.09	74.00	24.09	peak

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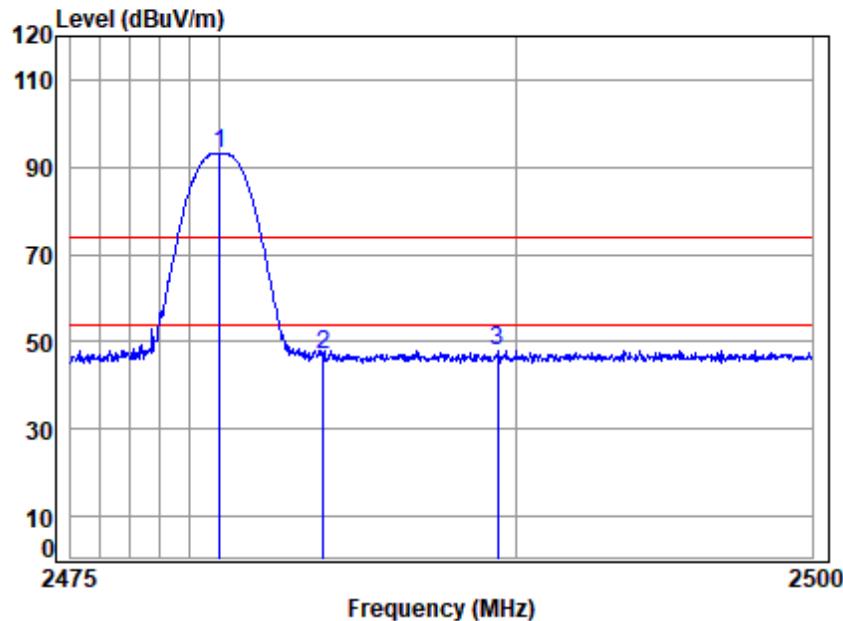
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Test Mode: 10; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00030AT
Mode : 2480 Band edge
Note : BT

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark
	MHz	dB	dB/m		dB	dBuV	dBuV/m	dBuV/m	dB
1	2480.000	5.12	27.36	32.50	93.25	93.23	74.00	19.23	peak
2	2483.500	5.12	27.36	32.50	47.01	46.99	74.00	-27.01	peak
3	2489.369	5.12	27.38	32.50	47.95	47.95	74.00	-26.05	peak

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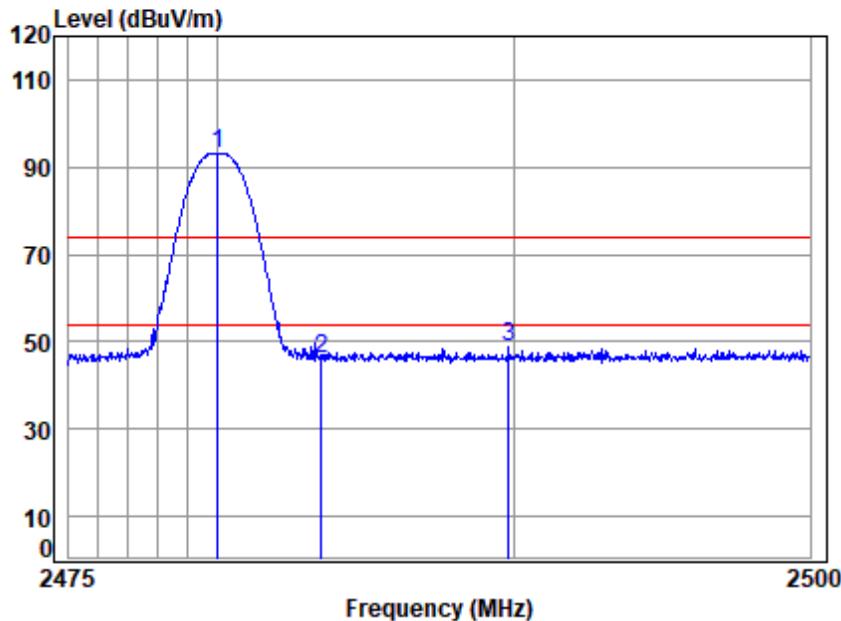
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Test Mode: 10; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00030AT
Mode : 2480 Band edge
Note : BT

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark	
								MHz	dB
1	2480.000	5.12	27.36	32.50	93.20	93.18	74.00	19.18	peak
2	2483.500	5.12	27.36	32.50	46.10	46.08	74.00	-27.92	peak
3	2489.795	5.12	27.38	32.50	48.85	48.85	74.00	-25.15	peak

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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

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
960-1000	500	3

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23.6 °C

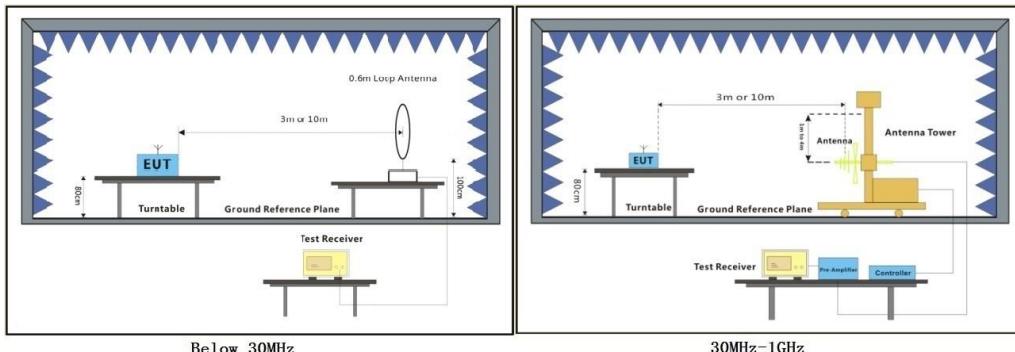
Humidity: 52.9 % RH

Atmospheric Pressure: 1020 mbar

7.3.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	09	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, p/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.
Final test	10	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, p/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

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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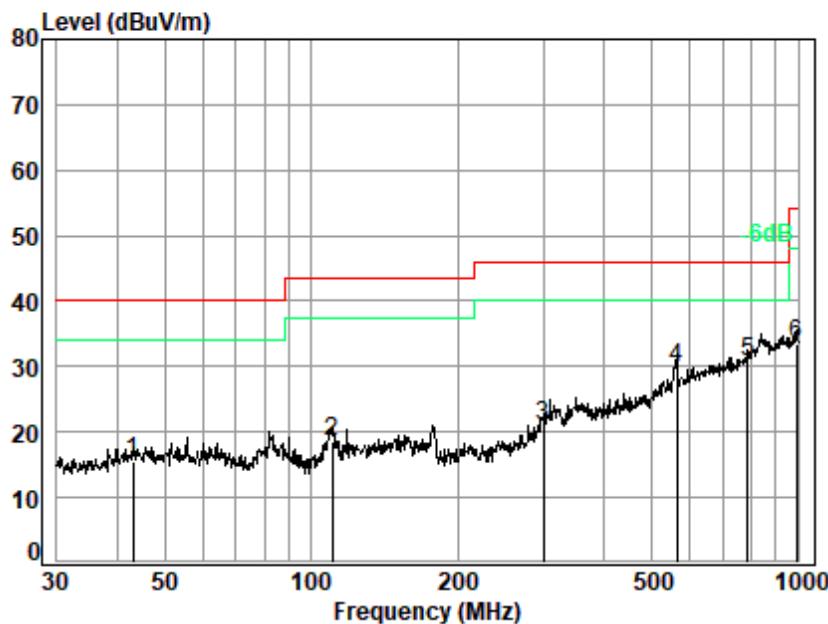
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Test Mode: 10; Polarity: Horizontal



Site : chamber

Condition: 3m HORIZONTAL

Job No : 00030AT

Mode : 10

Freq	Cable	Ant	Preamp	Read	Limit	Over	Remark
	Loss	Factor	Factor	Level			
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 43.050	0.22	17.23	26.01	24.22	15.66	40.00	-24.34 QP
2 110.569	0.94	15.24	25.58	28.01	18.61	43.50	-24.89 QP
3 300.367	1.01	18.34	25.40	26.99	20.94	46.00	-25.06 QP
4 562.662	1.97	23.90	25.17	29.13	29.83	46.00	-16.17 QP
5 787.851	1.98	26.91	24.24	25.93	30.58	46.00	-15.42 QP
6 993.011	2.79	29.31	24.01	25.44	33.53	54.00	-20.47 QP

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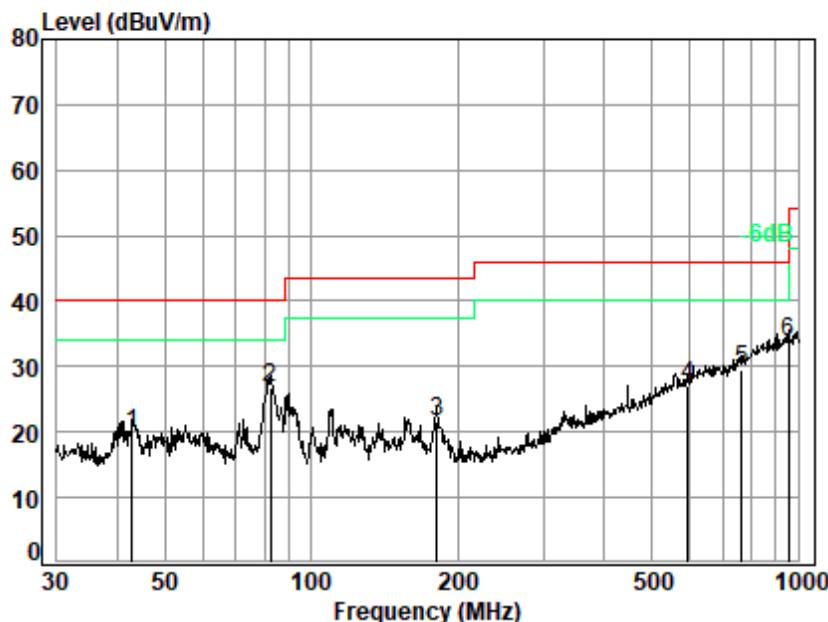
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Test Mode: 10; Polarity: Vertical



Site : chamber

Condition: 3m VERTICAL

Job No : 00030AT

Mode : 10

Freq	Cable	Ant	Preamp	Read	Limit	Over	Remark
	MHz	Loss	Factor	Factor	Level	Level	
	dB	dB/m		dBuV	dBuV/m	dBuV/m	dB
1	42.900	0.22	17.22	26.01	28.39	19.82	40.00 -20.18 QP
2	82.359	0.53	14.19	25.77	37.69	26.64	40.00 -13.36 QP
3	181.283	0.67	16.07	25.49	30.37	21.62	43.50 -21.88 QP
4	595.133	2.23	24.25	25.02	25.46	26.92	46.00 -19.08 QP
5	766.057	1.92	26.58	24.32	25.47	29.65	46.00 -16.35 QP
6	955.438	2.26	29.30	24.04	26.22	33.74	46.00 -12.26 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

Measurement Distance: 3m

Limit:

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

7.4.1 E.U.T. Operation

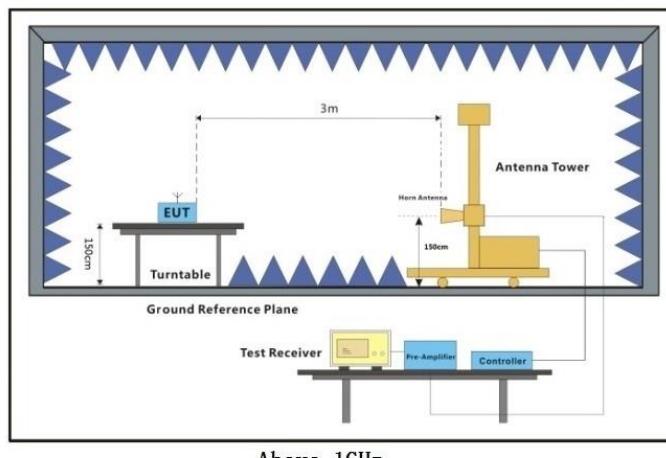
Operating Environment:

Temperature: 20.9 °C Humidity: 54.3 % RH Atmospheric Pressure: 1020 mbar

7.4.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Pre-scan	09	TX_non-Hop mode_Keep the EUT in continuously transmitting mode with GFSK modulation, p/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.
Final test	10	Charge + TX_non-Hop mode_Keep the EUT in charging and continuously transmitting mode with GFSK modulation, p/4DQPSK modulation, 8DPSK modulation. All modes have been tested and only the data of worst case is recorded in the report.

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.

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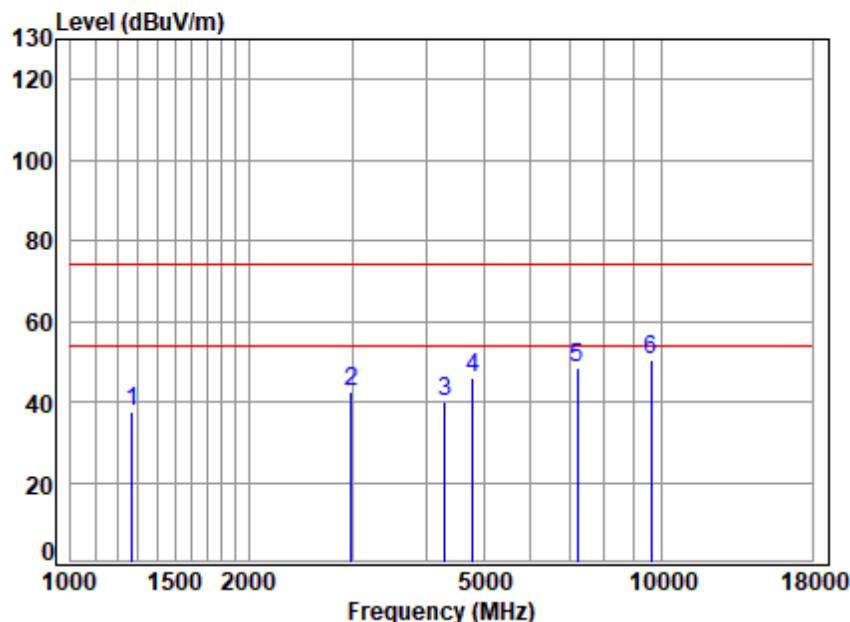
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Test Mode: 10; Polarity: Horizontal; Modulation:GFSK; Channel:Low



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00030AT
Mode : 2402 TX RSE
Note : BT

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark	
								MHz	dB
								dB	dB/m
1	1271.123	3.31	24.26	52.71	62.68	37.54	74.00	-36.46	peak
2	2990.531	5.71	28.58	53.10	61.52	42.71	74.00	-31.29	Peak
3	4304.400	7.48	29.94	52.90	55.34	39.86	74.00	-34.14	peak
4	4804.000	7.98	30.94	53.05	60.27	46.14	74.00	-27.86	peak
5	7206.000	8.29	36.05	53.52	57.58	48.40	74.00	-25.60	peak
6	9608.000	11.41	37.53	53.58	55.25	50.61	74.00	-23.39	peak

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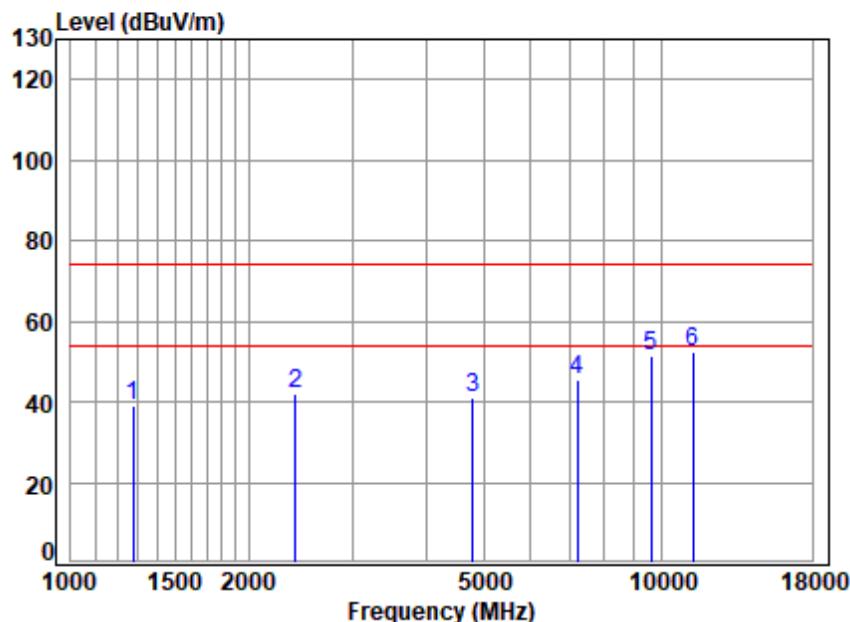
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Test Mode: 10; Polarity: Vertical; Modulation:GFSK; Channel:Low



Site : chamber
 Condition: 3m VERTICAL
 Job No : 00030AT
 Mode : 2402 TX RSE
 Note : BT

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Remark	
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 1274.802	3.32	24.26	52.71	64.20	39.07	74.00	-34.93	peak
2 2400.753	5.06	27.18	53.10	62.90	42.04	74.00	-31.96	Peak
3 4804.000	7.98	30.94	53.05	55.10	40.97	74.00	-33.03	peak
4 7206.000	8.29	36.05	53.52	54.58	45.40	74.00	-28.60	peak
5 9608.000	11.41	37.53	53.58	56.04	51.40	74.00	-22.60	peak
6 11302.480	11.51	39.66	53.72	54.87	52.32	74.00	-21.68	Peak

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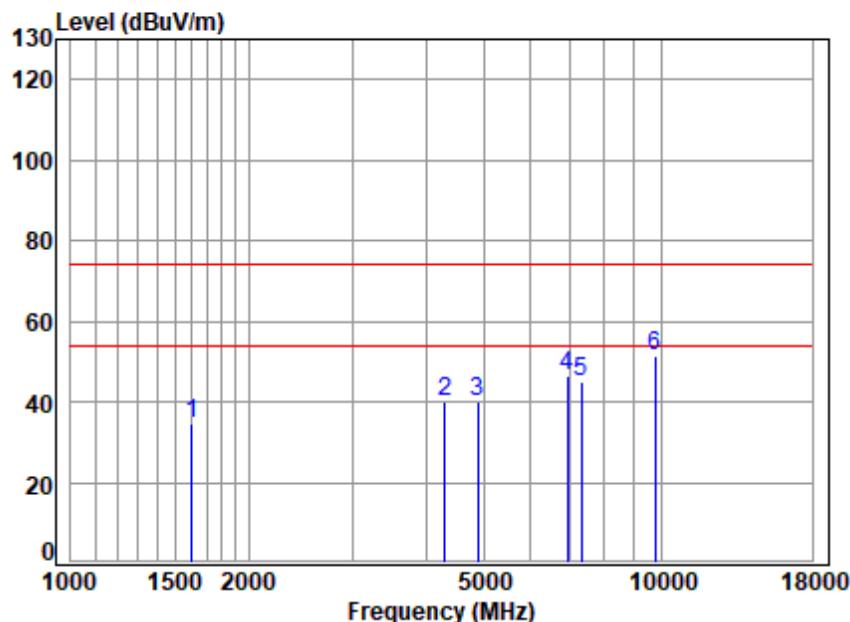
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Test Mode: 10; Polarity: Horizontal; Modulation:GFSK; Channel:middle



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00030AT
Mode : 2441 TX RSE
Note : BT

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over Limit	Remark	
								MHz	dB
								dB	dB/m
1	1601.804	3.99	24.80	52.91	58.48	34.36	74.00	-39.64	peak
2	4304.400	7.48	29.94	52.90	55.43	39.95	74.00	-34.05	peak
3	4882.000	8.11	31.13	53.07	54.01	40.18	74.00	-33.82	peak
4	6934.778	8.13	35.65	53.46	56.29	46.61	74.00	-27.39	peak
5	7323.000	8.35	36.19	53.53	54.03	45.04	74.00	-28.96	peak
6	9764.000	11.29	37.88	53.43	55.85	51.59	74.00	-22.41	peak

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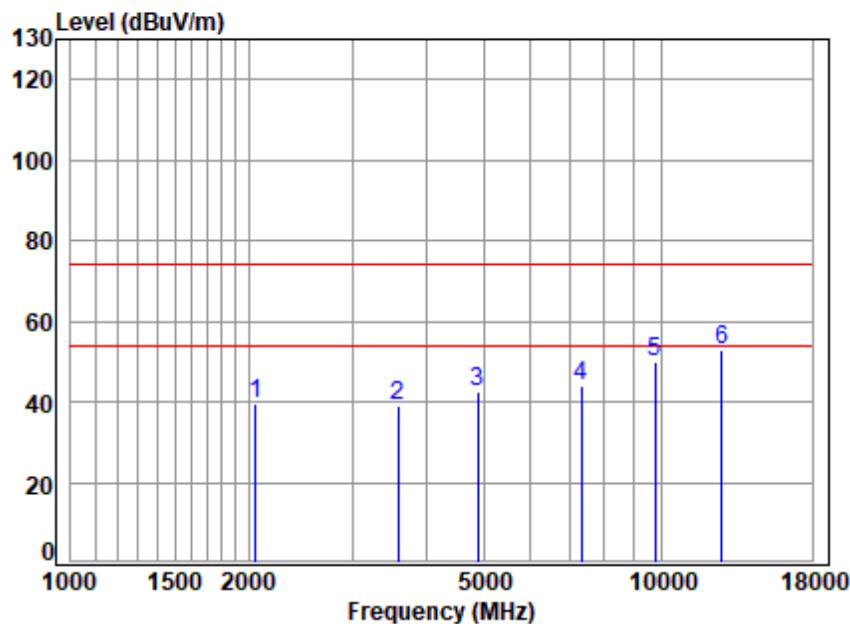
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Test Mode: 10; Polarity: Vertical; Modulation:GFSK; Channel:middle



Site : chamber
Condition: 3m VERTICAL
Job No : 00030AT
Mode : 2441 TX RSE
Note : BT

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over	Remark	
								MHz	dB
1	2059.767	4.80	26.36	53.10	61.64	39.70	74.00	-34.30	Peak
2	3577.463	7.07	28.83	52.92	56.21	39.19	74.00	-34.81	Peak
3	4882.000	8.11	31.13	53.07	56.15	42.32	74.00	-31.68	peak
4	7323.000	8.35	36.19	53.53	52.96	43.97	74.00	-30.03	peak
5	9764.000	11.29	37.88	53.43	54.10	49.84	74.00	-24.16	peak
6	12651.130	12.46	39.73	54.13	54.83	52.89	74.00	-21.11	Peak

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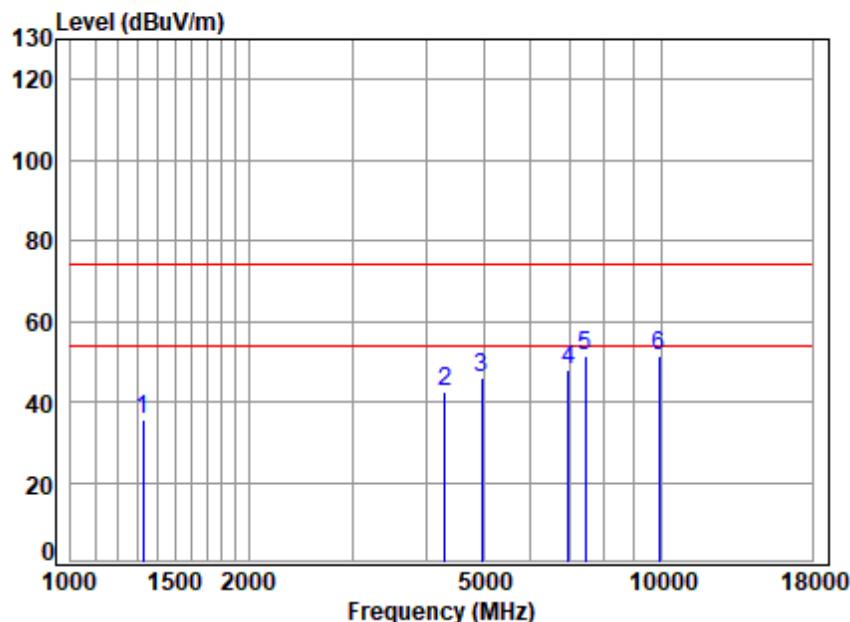
Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR230200003001

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Test Mode: 10; Polarity: Horizontal; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m HORIZONTAL
Job No : 00030AT
Mode : 2480 TX RSE
Note : BT

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Line Limit	Over	Remark
							dB	
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	1323.614	3.42	24.24	52.74	60.71	35.63	74.00	-38.37 peak
2	4304.400	7.48	29.94	52.90	58.06	42.58	74.00	-31.42 peak
3	4960.000	8.24	31.31	53.09	59.63	46.09	74.00	-27.91 peak
4	6954.852	8.15	35.70	53.47	57.61	47.99	74.00	-26.01 peak
5	7440.000	8.40	36.33	53.55	60.00	51.18	74.00	-22.82 peak
6	9920.000	11.18	38.22	53.28	55.53	51.65	74.00	-22.35 peak

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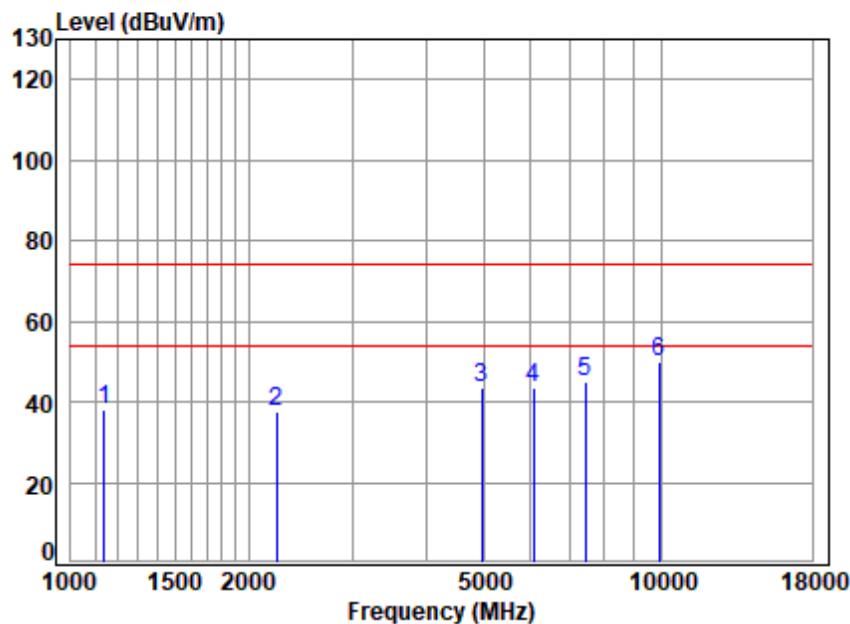
Compliance Certification Services (Kunshan) Inc. Shenzhen Branch

SZCCS-TRF-01 Rev. A/0 Aug01,2022

Report No.: FYCR230200003001

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Test Mode: 10; Polarity: Vertical; Modulation:GFSK; Channel:High



Site : chamber
Condition: 3m VERTICAL
Job No : 00030AT
Mode : 2480 TX RSE
Note : BT

Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Limit Level	Limit Line	Over Limit	Remark	
								MHz	dB
								dB	dB/m
1	1138.904	3.00	24.24	52.61	63.62	38.25	74.00	-35.75	peak
2	2233.396	4.94	26.79	53.10	59.08	37.71	74.00	-36.29	Peak
3	4960.000	8.24	31.31	53.09	56.89	43.35	74.00	-30.65	peak
4	6071.417	7.65	32.73	52.85	56.08	43.61	74.00	-30.39	Peak
5	7440.000	8.40	36.33	53.55	53.91	45.09	74.00	-28.91	peak
6	9920.000	11.18	38.22	53.28	53.73	49.85	74.00	-24.15	peak

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8 Test Setup Photo

Refer to Setup Photos for FYCR2302000030AT

9 EUT Constructional Details (EUT Photos)

Refer to External and Internal Photos for FYCR2302000030AT

- End of the Report -



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