

FCC Test Report

Report No.: AGC15705230597FE03

FCC ID : 2AANZTYPKB

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION: TYPEWRITER WIRELESS KEYBOARD

BRAND NAME : SARINA

SA-TYPKB, SA-TYPKB-PNK, SA-TYPKB-MMT,

MODEL NAME : SA-TYPKB-NEPNK, SA-TYPKB-PNK-HG,

SA-TYPKB-MMT-HG, SA-TYPKB-MMT-HG

APPLICANT : DGL Group LTD.

DATE OF ISSUE : Jun. 30, 2023

STANDARD(S)

TEST PROCEDURE(S) : FCC Part 15 Rules

REPORT VERSION : V1.0

Attestation of Global Colored (Shenzhen) Co., Ltd



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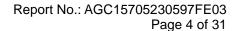
REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jun. 30, 2023	Valid	Initial Release



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1. VERIFICATION OF CONFORMITY

Applicant	DGL Group LTD.		
Address	2045 Lincoln Highway, 3rd Floor, Edison, NJ 08817, United States		
Manufacturer	DGL Group LTD.		
Address	2045 Lincoln Highway, 3rd Floor, Edison, NJ 08817, United States		
Factory	N/A		
Address	N/A		
Product Designation	TYPEWRITER WIRELESS KEYBOARD		
Brand Name	SARINA		
Test Model	SA-TYPKB		
Series Model	SA-TYPKB-PNK, SA-TYPKB-MMT, SA-TYPKB-NEPNK, SA-TYPKB-PNK-HG, SA-TYPKB-MMT-HG		
Difference Description	All the same except for the appearance color		
Date of receipt of test item	May 11, 2023		
Date of test	May 11, 2023 to Jun. 30, 2023		
Deviation	No any deviation from the test method		
Condition of Test Sample	Normal		
Test Result	Pass		
Report Template	AGCRT-US-SRD/RF		

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.249.

Prepared By	Ay Zhou	
	Sky Zhou (Project Engineer)	Jun. 30, 2023
Reviewed By	Calin Liu	
	Calvin Liu (Reviewer)	Jun. 30, 2023
Approved By	Max Zhang	
	Max Zhang (Authorized Officer)	Jun. 30, 2023



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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

	<u> </u>
Operation Frequency	2402.65MHz-2480.65MHz
Maximum field strength	76.53dBµV/m(Peak)@3m
Maximum neid Strength	55.36dBµV/m(Average)@3m
Modulation	GFSK
Number of channels	16 Channels
Antenna Gain	2.03dBi
Antenna Designation	PCB Antenna
Hardware Version	V1.0
Software Version	V1.0
Power Supply	DC 3.0V by battery

2.2. TABLE OF CARRIER FREQUENCY

Channel Number	Frequency (MHZ)	Channel Number	Frequency (MHZ)
01	2402.65	09	2441.65
02	2407.65	10	2445.65
03	2414.65	11	2453.65
04	2419.65	12	2459.65
05	2422.65	13	2463.65
06	2426.65	14	2466.65
07	2436.65	15	2473.65
08	2439.65	16	2480.65



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2.3. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.



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3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in measurement" (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, Uc = ±2.9 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.9 dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %



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4. DESCRIPTION OF TEST MODES

TEST MODE DESCRIPTION
Low channel TX_2402.65MHz_GFSK
Middle channel TX_2441.65MHz_GFSK
High channel TX_2480.65MHz_GFSK

Note:

- 1. All the test modes can be supply by battery, only the result of the worst case was recorded in the report, if no other cases.
- 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
- 3. Set the EUT into the individual test modes by pressing the EUT buttons.
- 4. For battery operated equipment, the equipment tests are performed using a new battery.



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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure:

EUT	EUT	
-----	-----	--

5.2 EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	TYPEWRITER WIRELESS KEYBOARD	SA-TYPKB	2AANZTYPKB	EUT

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249&15.209	Radiated Emission	Compliant
§15.249	Band Edges	Compliant
§15.215	20dB bandwidth	Compliant
§15.207	Conducted Emission	Not applicable

Note: The conducted emission tests at AC port are not required for devices which only employ battery power for operation.



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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Test Receiver	R&S	ESCI	10096	Feb. 18, 2023	Feb. 17, 2024
Signal Analyzer	Aglient	N9020A	MY52090123	Aug. 04, 2022	Aug. 03, 2023
EXA Signal Analyzer	Agilent	N9010A	MY53470504	Jun. 01, 2023	May 31, 2024
2.4GHz Filter	EM Electronics	N/A	N/A	Mar. 18, 2022	Mar. 19, 2024
Attenuator	ZHINAN	E-002	N/A	Aug. 04, 2022	Aug. 03, 2024
Horn Antenna	SCHWARZBEC	BBHA9170	768	Oct. 31, 2021	Oct. 30, 2023
Active Loop Antenna (9K-30Mhz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Double-Ridged Waveguide Horn	ETS	3117	00034609	Mar. 23, 2023	Mar. 22, 2024
Preamplifer	ETS	3117-PA	00246148	Aug. 04, 2022	Aug. 03, 2024
Wideband Antenna	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 05, 2023	Jan. 04, 2024
Test Software	Tonscend	4.0.0.0	N/A	N/A	N/A



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7. RADIATED EMISSION

7.1. TEST LIMIT

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental	Field Strength of Harmonics
	(millivolts/meter)	(microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Standard FCC 15.209

Frequency	Distance	Field Strengths Limit		
(MHz)	Meters	μ V/m	dB(μV)/m	
0.009 ~ 0.490	300	2400/F(kHz)		
0.490 ~ 1.705	30	24000/F(kHz)		
1.705 ~ 30	30	30		
30 ~ 88	3	100	40.0	
88 ~ 216	3	150	43.5	
216 ~ 960	3	200	46.0	
960 ~ 1000	3	500	54.0	
Above 1000	3	Other:74.0 dB(µV)/m (Peal	k) 54.0 dB(μV)/m (Average)	

Remark:

- (1) Emission level dB μ V = 20 log Emission level μ V/m.
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.



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7.2. MEASUREMENT PROCEDURE

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use minimum resolution bandwidth of 1 MHz. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.



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The following table is the setting of spectrum analyzer and receiver.

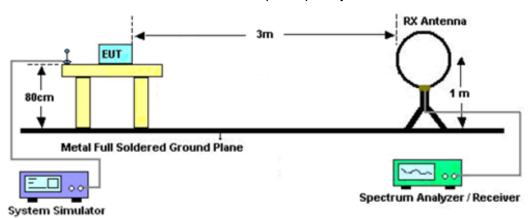
Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
	1GHz~26.5GHz
Start ~Stop Frequency	RBW 2.4MHz/ VBW 8MHz for Peak,
	RBW 2.4MHz/3MHz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

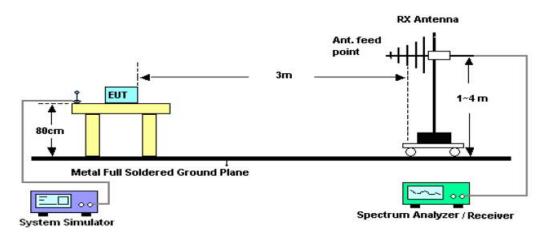


7.3. TEST SETUP

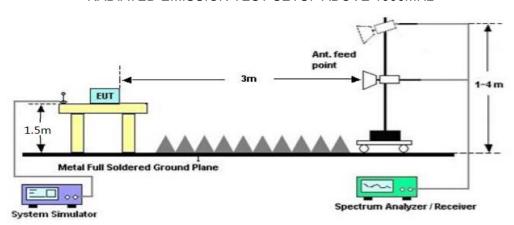
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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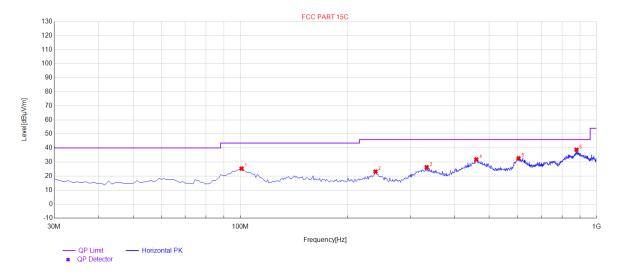
7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

RADIATED EMISSION 30MHz-1GHZ

EUT	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	24.3°C	Relative Humidity	54.8%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Polarization	Horizontal

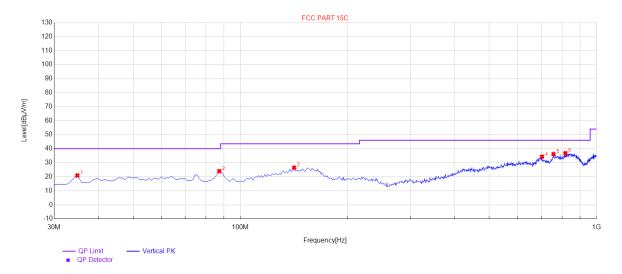


NO.	Fre q.	Level	Factor	Limit	Margin	Height	Angle	Polarity
NO.	[MHz]	[dBµV/m]	[dB]	[dBuV/m]	[dB]	[cm]	[°]	Polanty
1	100.81	25.32	21.07	43.50	18.18	100	260	Horizontal
2	239.52	23.18	17.47	46.00	22.82	100	330	Horizontal
3	333.61	26.31	21.02	46.00	19.69	100	320	Horizontal
4	459.71	31.84	27.60	46.00	14.16	100	320	Horizontal
5	604.24	32.67	28.57	46.00	13.33	100	310	Horizontal
6	878.75	38.76	33.07	46.00	7.24	100	120	Horizontal

RESULT: PASS



	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	24.3°C	Relative Humidity	54.8%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Polarization	Vertical



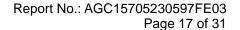
NO.	Fre q.	Level	Factor	Limit	Margin	Height	Angle	Polarity
NO.	[MHz]	[dBµV/m]	[dB]	[dBuV/m]	[dB]	[cm]	[°]	Polanty
1	34.85	20.94	10.75	40.00	19.06	100	310	Vertical
2	87.23	23.98	12.41	40.00	16.02	100	160	Vertical
3	141.55	26.50	20.04	43.50	17.00	100	140	Vertical
4	703.18	34.33	28.80	46.00	11.67	100	350	Vertical
5	757.5	36.16	30.04	46.00	9.84	100	150	Vertical
6	817.64	36.80	31.35	46.00	9.20	100	250	Vertical

RESULT: PASS

Note: Factor=Antenna Factor + Cable loss, Margin=Limit-Level.

The "Factor" value can be calculated automatically by software of measurement system.

All test modes had been tested. The mode 1 is the worst case and recorded in the report.





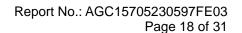
FIELD STRENGTH OF FUNDAMENTAL

EUT	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	23.9°C	Relative Humidity	58.2%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Modulation	GFSK	Polarization	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	\/alua Tima		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type		
2402.65	27.48	49.05	76.53	114.00	-37.47	peak		
2402.65	6.31	49.05	55.36	94.00	-38.64	AVG		
2441.65	26.36	49.12	75.48	114.00	-38.52	peak		
2441.65	6.09	49.12	55.21	94.00	-38.79	AVG		
2480.65	26.14	49.25	75.39	114.00	-38.61	peak		
2480.65	2480.65 5.01 49.25 54.26 94.00 -39.74 AVG							
lemark:								
actor = Anter	nna Factor + Cabl	e Loss – Pre-	amplifier.		_			

EUT	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	23.9°C	Relative Humidity	58.2%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Modulation	GFSK	Polarization	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Time		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type		
2402.65	44.37	49.05	73.10	114.00	-40.90	peak		
2402.65	29.51	49.05	53.23	94.00	-40.77	AVG		
2441.65	45.31	49.12	72.67	114.00	-41.33	peak		
2441.65	30.11	49.12	54.16	94.00	-39.84	AVG		
2480.65	40.78	49.25	71.07	114.00	-42.93	peak		
2480.65	2480.65 30.48 49.25 54.37 94.00 -39.63 AVG							
lemark:								
actor = Anter	nna Factor + Cabl	e Loss – Pre-	amplifier.					





RADIATED EMISSION ABOVE 1GHZ

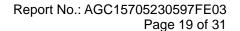
HIII	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	24.3°C	Relative Humidity	54.8%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Polarization	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4805.3	50.03	3.76	53.79	74.00	-20.21	peak
4805.3	38.64	3.76	42.40	54.00	-11.60	AVG
7207.95	47.13	8.17	55.30	74.00	-18.70	peak
7207.95 37.76 8.17 45.93 54.00 -8.07 AVG						
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

Factor =	Antenna	Factor -	+ Cable L	.oss –	Pre-amplifier.

EUT	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	24.3°C	Relative Humidity	54.8%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Polarization	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Volue Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4805.3	48.96	3.76	52.72	74.00	-21.28	peak
4805.3	37.64	3.76	41.40	54.00	-12.60	AVG
7207.95	46.43	8.17	54.60	74.00	-19.40	peak
7207.95	35.96	8.17	44.13	54.00	-9.87	AVG
Remark:						
Factor = Antenna Factor + Cable Loss - Pre-amplifier.						



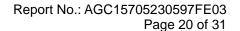


EUT	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	24.3°C	Relative Humidity	54.8%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Polarization	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4883.3	49.62	3.78	53.40	74.00	-20.60	peak
4883.3	37.02	3.78	40.80	54.00	-13.20	AVG
7324.95	46.56	8.23	54.79	74.00	-19.21	peak
7324.95	7324.95 35.78 8.23 44.01 54.00 -9.99 AVG					
Remark:						
Factor = Antenna Factor + Cable Loss - Pre-amplifier.						

EUT	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	24.3°C	Relative Humidity	54.8%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Polarization	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4883.3	47.21	3.78	50.99	74.00	-23.01	peak
4883.3	36.85	3.78	40.63	54.00	-13.37	AVG
7324.95	45.56	8.23	53.79	74.00	-20.21	peak
7324.95	35.05	8.23	43.28	54.00	-10.72	AVG
Remark:						
Factor = Antenna Factor + Cable Loss - Pre-amplifier.						





HIII	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	24.3°C	Relative Humidity	54.8%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Polarization	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	\/alua Typa
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4961.3	49.96	3.81	53.77	74.00	-20.23	peak
4961.3	39.64	3.81	43.45	54.00	-10.55	AVG
7441.95	47.12	8.27	55.39	74.00	-18.61	peak
7441.95	7441.95 37.56 8.27 45.83 54.00 -8.17 AVG					
Remark:						
Factor = Antenna Factor + Cable Loss - Pre-amplifier.						

EUT	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	24.3°C	Relative Humidity	54.8%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Polarization	Vertical

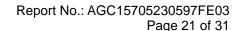
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Tree				
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type				
4961.3	46.78	3.81	50.59	74.00	-23.41	peak				
4961.3	37.45	3.81	41.26	54.00	-12.74	AVG				
7441.95	44.12	8.27	52.39	74.00	-21.61	peak				
7441.95	35.93	8.27	44.20	54.00	-9.80	AVG				
Remark:	Remark:									
Factor = Anter	Factor = Antenna Factor + Cable Loss – Pre-amplifier.									

RESULT: PASS

Note: The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Emission Level-Limit.

The "Factor" value can be calculated automatically by software of measurement system.





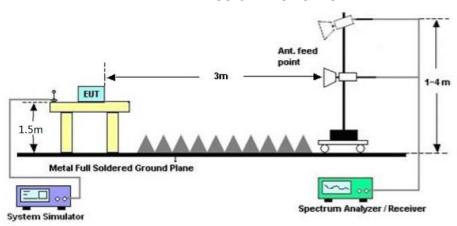
8. BAND EDGE EMISSION

8.1. MEASUREMENT PROCEDURE

- 1. The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
- 2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=1MHz, VBW=3MHz / Sweep=AUTO
- (b) AVERAGE: RBW=1MHz; VBW=3MHz / Sweep=AUTO
- 3. Other procedures refer to clause 7.2.

8.2. TEST SETUP

RADIATED EMISSION TEST SETUP



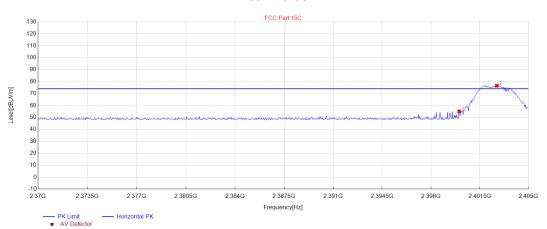
8.3 RADIATED TEST RESULT

Note:

- 1. Factor=Antenna Factor + Cable loss Amplifier gain. Field Strength=Factor + Reading level
- 2. The factor had been edited in the "Input Correction" of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μ V) to represent the Amplitude. Use the F dB(μ V/m) to represent the Field Strength. So A=F.

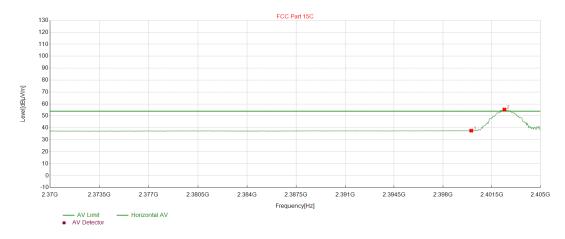


EUT	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	23.9°C	Relative Humidity	58.2%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Polarization	Horizontal



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2400.025	55.02	33.62	74.00	18.98	150	204	Horizontal
2	2402.7227	76.53	33.63	74.00	-2.53	150	196	Horizontal

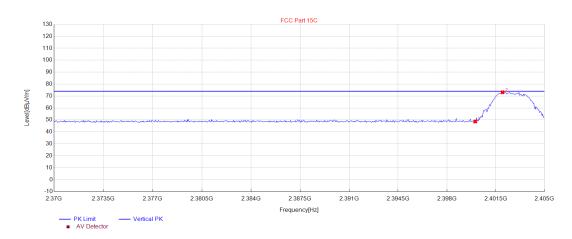
Average Value



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle []	Polarity
1	2400.025	37.65	33.62	54.00	16.35	150	326	Horizontal
2	2402.4074	55.36	33.63	54.00	-1.36	150	199	Horizontal

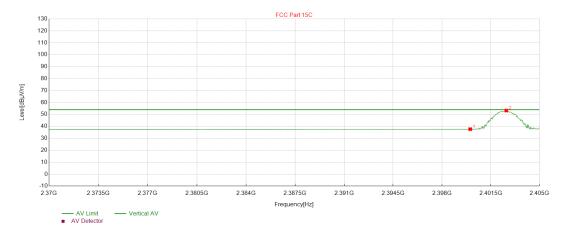


IF())	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	23.9°C	Relative Humidity	58.2%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Polarization	Vertical

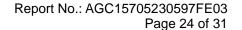


NO.	Freq.	Level	Factor	Limit	Margin	Height	Angle	Polarity
MU. [MHz]	[MHz]	[dBµV/m]	[dB]	[dBuV/m]	[dB]	[cm]	[၅	Folanty
1	2400.025	48.64	33.62	74.00	25.36	150	34	Vertical
2	2401.987	73.10	33.63	74.00	0.90	150	141	Vertical

Average Value

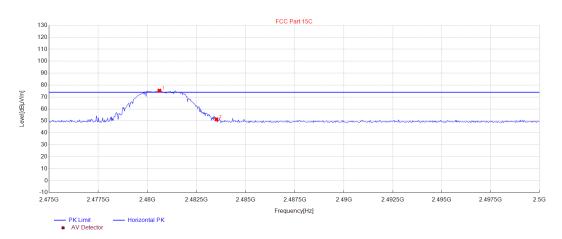


NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [¶	Polarity
1	2400.025	37.67	33.62	54.00	16.33	150	187	Vertical
2	2402.6176	53.23	33.63	54.00	0.77	150	179	Vertical



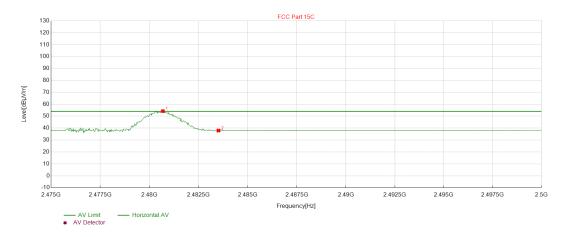


HIII	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	23.9°C	Relative Humidity	58.2%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Polarization	Horizontal



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle []	Polarity
1	2480.6056	75.39	33.99	74.00	-1.39	150	189	Horizontal
2	2483.5085	51.36	34.00	74.00	22.64	150	315	Horizontal

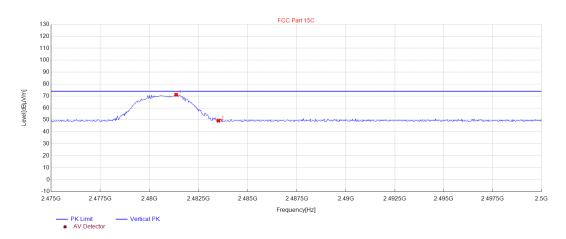
Average Value



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [¶	Polarity
1	2480.6807	54.26	33.99	54.00	-0.26	150	192	Horizontal
2	2483.5085	37.93	34.00	54.00	16.07	150	96	Horizontal

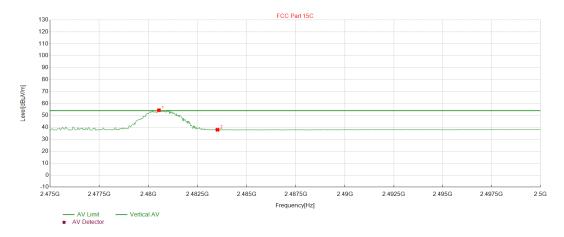


IF())	TYPEWRITER WIRELESS KEYBOARD	Model Name	SA-TYPKB
Temperature	23.9°C	Relative Humidity	58.2%
Pressure	985kPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Polarization	Vertical

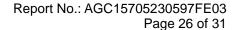


NO.	Freq.	Level	Factor	Limit	Margin	Height	Angle	Polarity
NO.	[MHz]	[dBµV/m]	[dB]	[dBuV/m]	[dB]	[cm]	[၅	Folality
1	2481.3564	71.07	33.99	74.00	2.93	150	186	Vertical
2	2483.5085	49.35	34.00	74.00	24.65	150	186	Vertical

Average Value



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle ["]	Polarity
1	2480.5305	54.37	33.99	54.00	-0.37	150	186	Vertical
2	2483.5085	38.00	34.00	54.00	16.00	150	130	Vertical



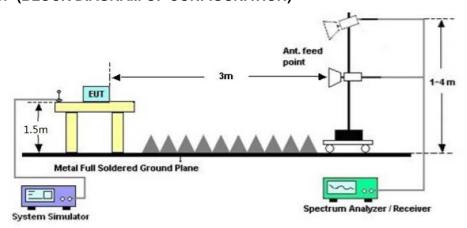


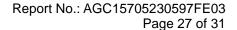
9. 20DB BANDWIDTH

9.1. MEASUREMENT PROCEDURE

- 1. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 2. Set SPA Centre Frequency = Operation Frequency, RBW= 30KHz, VBW≥3×RBW.
- 3. Set SPA Trace 1 Max hold, then View.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)







9.3. MEASUREMENT RESULTS

TEST ITEM	20DB BANDWIDTH		
TEST MODULATION	GFSK		

Test Channel (MHz)	20DB BANDWIDTH (MHz)	99% BANDWIDTH (MHz)	Criteria	
2402.65	2.032	2.1159	PASS	
2441.65	2.028	2.1632	PASS	
2480.65	2.001	2.1917	PASS	

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

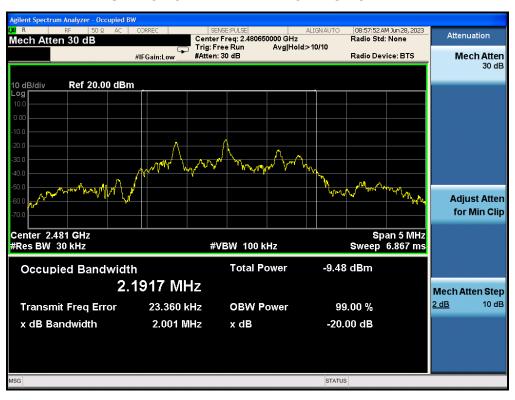




TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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10. FCC LINE CONDUCTED EMISSION TEST

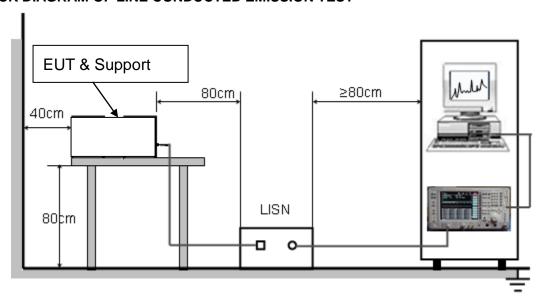
10.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Francis	Maximum RF Line Voltage			
Frequency	Q.P.(dBuV)	Average(dBuV)		
150kHz~500kHz	66-56	56-46		
500kHz~5MHz	56	46		
5MHz~30MHz	60	50		

Note: 1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

10.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST





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10.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2. Support equipment, if needed, was placed as per ANSI C63.10.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4. All support equipment received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received AC120V/60Hz power from a LISN.
- 6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

10.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- 2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3. The test data of the worst case condition(s) was reported on the Summary Data page.

10.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Note: The conducted emission tests at AC port are not required for devices which only employ battery power for operation.



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APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC15705230597AP01

APPENDIX B: PHOTOGRAPHS OF THE EUT

Refer to the Report No.: AGC15705230597AP02

----END OF REPORT----



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