

FCC Test Report

Report No.: AGC07102201001FE02

FCC ID	0	2AAVD-D1023E
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Wireless Dual Mode Mouse
BRAND NAME	:	N/A
MODEL NAME	÷	D1023E, D1018E
APPLICANT	:	SHENZHEN LOYAL ELECTRONICS CO., LTD.
DATE OF ISSUE	© •	Nov. 10, 2020
STANDARD(S)	:	FCC Part 15.247
REPORT VERSION	:	V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0		Nov. 10, 2020	Valid	Initial Release

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1. VERIFICATION OF COMPLIANCE

Applicant	SHENZHEN LOYAL ELECTRONICS CO., LTD.	
Address	No.5, First Industry Park, Shanmen, Songgang, Baoan, Shenzhen, Guangdong China.	
Manufacturer	SHENZHEN LOYAL ELECTRONICS CO., LTD.	
Address	No.5, First Industry Park, Shanmen, Songgang, Baoan, Shenzhen, Guangdong China.	
Factory	SHENZHEN LOYAL ELECTRONICS CO., LTD.	
Address	No.5, First Industry Park, Shanmen, Songgang, Baoan, Shenzhen, Guangdong China.	
Product Designation	Wireless Dual Mode Mouse	
Brand Name	N/A	
Test Model	D1023E	
Series Model	D1018E	
Difference Description	All the same except for the position of power toggle switch and the structure of indicator plate.	
Date of test	Oct. 21, 2020 to Nov. 06, 2020	
Deviation	No any deviation from the test method	
Condition of Test Sample	Normal	
Test Result	Pass	
Report Template	AGCRT-US-BLE/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 part 15.247.

Prepared By

Then Hurry

Thea Huang (Project Engineer)

Nov. 06, 2020

Max Zhan

Reviewed By

Max Zhang (Reviewer)

Nov. 10, 2020

Approved By

Forrest Lei (Authorized Officer)

Nov. 10, 2020

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Attestation of Global Compliance(Shenzhen)Co., Ltd Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Web: http://cn.agc-cert.com/



2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as a "Wireless Dual Mode Mouse". It is designed by way of utilizing the GFSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	-7.186dBm (Max)
Bluetooth Version	V4.2
Modulation	BR □GFSK, EDR □π /4-DQPSK, □8DPSK BLE ⊠GFSK 1Mbps □GFSK 2Mbps
Number of channels	40 Channel
Antenna Designation	PCB Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	OdBi
Hardware Version	V1.1
Software Version	28940AB7
Power Supply	DC 1.5V by battery
Note: 1. The EUT doesn't st 2. Both the main test	upport BR/EDR. and the series models have tests, and only the test data of the main test is

recorded in the report..

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
0	GY ZO	2404 MHz
2400~2483.5MHz		
	38	2478 MHz
	39	2480 MHz

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2.3. RELATED SUBMITTAL(S)/GRANT(S)

This submittal(s) (test report) is intended for FCC ID: 2AAVD-D1023E filing to comply with the FCC Part 15.247 requirements.

2.4. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.5. SPECIAL ACCESSORIES

Refer to section 5.2.

2.6. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.7. 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 reported uncertainty of measurement y $\pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

- Uncertainty of Conducted Emission, Uc = ±3.1 dB
- Uncertainty of Radiated Emission below 1GHz, $Uc = \pm 4.0 \text{ dB}$
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, $Uc = \pm 0.8 dB$
- Uncertainty of RF power density, conducted, Uc = ±2.6 dB
- Uncertainty of spurious emissions, conducted, $Uc = \pm 2.7 dB$
- Uncertainty of Occupied Channel Bandwidth: $Uc = \pm 2 \%$

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX

Note:

1. 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. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

4.For battery operated equipment, the equipment tests are performed using a new battery.

Software Setting

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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF TESTED SYSTEM

Radiated Emission Configure:

EUT

Conducted Emission Configure:

EUT	AE
LUT	

5.2. EQUIPMENT USED IN TESTED SYSTEM

ltem	Equipment	Model No.	ID or Specification	Remark
1	Wireless Dual Mode Mouse	D1023E	2AAVD-D1023E	EUT
2	Control Box	N/A	USB-TTL	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
15.247 (b)(3)	Peak Output Power	Compliant
15.247 (a)(2)	6 dB Bandwidth	Compliant
15.247 (d)	Conducted Spurious Emission	Compliant
15.247 (e)	Maximum Conducted Output Power Density	Compliant
15.209	Radiated Emission	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	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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7. PEAK OUTPUT POWER

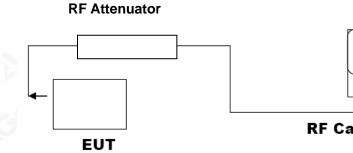
7.1. MEASUREMENT PROCEDURE

For peak power test:

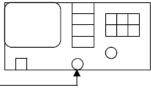
- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. RBW≥DTS bandwidth
- 3. VBW≥3*RBW.
- 4. SPAN≥VBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) PEAK POWER TEST SETUP







RF Cable

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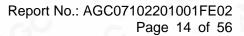
7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT					
FOR GFSK MOUDULATION					
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail		
2.402	-7.186	30	Pass		
2.440	-7.989	30	Pass		
2.480	-8.653	30	Pass		

CH0



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8.6 DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 kHz, VBW≥3×RBW.
- 4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

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

The same as described in section 7.2.

8.3. LIMITS AND MEASUREMENT RESULTS

LIMITS AND MEASUREMENT RESULT					
Appliachia Limita	Applicable Limits				
Applicable Limits	Test Data	Criteria			
>500KHZ	Low Channel	681.0	PASS		
	Middle Channel	695.6	PASS		
	High Channel	679.0	PASS		



TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

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

The same as described in section 7.2.

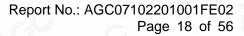
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT				
	Measurement Result			
Applicable Limits	Test Data	Criteria		
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.	At least -20dBc than the reference level	PASS		

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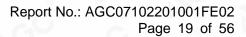






TEST RESULT FOR ENTIRE FREQUENCY RANGE GFSK MODULATION IN LOW CHANNEL

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Agilent Spectrum Analyzer - Swept SA					
<mark>(X)</mark> R RF 50Ω AC				2 AM Nov 02, 2020	Frequency
Center Freq 13.74175000			≊:Log-Pwr ⊺ ∙10/10		Trequency
	PNO: Fast Trig: Free IFGain:Low Atten: 30		. 10/10	DET P N N N N N	
	II Comicon		NALend O.A.A		Auto Tune
			Mkr1 24.4	09 3 GHZ	
10 dB/div Ref 20.00 dBm			-40.	211 dBm	
10.0					
10.0					Center Freq
0.00					13.741750000 GHz
-10.0					
-20.0					
				-27.34 dBm	Start Freq
-30.0					2.483500000 GHz
-40.0				1	
-50.0					
and been been as a set	and the second second second	and a second	al a segurited with the second se		Stop Freq
-60.0		and the second secon			25.00000000 GHz
-70.0					
Start 2.48 GHz			Stop	25.00 GHz	CF Step
#Res BW 100 kHz	#VBW 300 kHz		Sweep 2.152 s	(30000 pts)	2.251650000 GHz
MKRI MODEI TRCI SCLI X	Y	FUNCTION FUN	NCTION WIDTH FUN	CTION VALUE	<u>Auto</u> Man
	1.409 3 GHz -48.211 dB		Choire with the second		
2					Freq Offset
3					•
4					0 Hz
6					
7					
8					
10					
11				•	
MSG			STATUS		

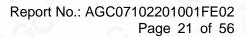
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<mark>gilent Spectrum Analyzer - Swept S</mark> <mark>G R RF 50 Ω</mark>		SENSE:INT	ALIGN AUTO/NORF	09:43:22 AM Nov 02, 2020	
enter Freq 2.44000		_ Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 123456 TYPE MWWWW DET PNNNNN	Frequency
) dB/div Ref 20.00 d	IFGain:Low	Atten: 30 dB	Mkr1 2.4	40 028 4 GHz -8.152 dBm	Auto Tun
0.0		1			Center Free 2.440000000 GH:
10.0 20.0 30.0	Mary Mary Mary Mary Mary Mary Mary Mary		and the second s	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Start Fred 2.438500000 GH:
50.0 ********************************** 50.0 ****** 70.0 ****				••••••••••••••••••••••••••••••••••••••	Stop Free 2.441500000 GH:
Center 2.440000 GHz Res BW 100 kHz	#VBM	/ 300 kHz	Sweep 2.00	Span 3.000 MHz 0 ms (30000 pts)	CF Step 300.000 kH: <u>Auto</u> Mar
2 2 3 4	× 2.440 028 4 GHz	Y Fi -8.152 dBm	JNCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offse
5 6 7 8 9 10					
10 11				▼ 	
SG			STATUS		
gilent Spectrum Analyzer - Swept 9 R RF 50 Ω Center Freq 1.21500	AC CORREC	SENSE:INT	ALIGN AUTO/NORF	09:43:31 AM Nov 02, 2020 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast ↔ IFGain:Low	- Trig: Free Run Atten: 30 dB	Avg Hold: 10/10 Mkr1	2.318 55 GHz	Auto Tune
0 dB/div Ref 20.00 d 99 10.0	Bm			-46.854 dBm	Center Fred 1.215000000 GH:
10.0 20.0 30.0				-28.15 dBm	Start Free 30.000000 MH:
50.0 60.0 70.0 Constant Market Market Market Market			a ta di ya kawang manata ing katang manang di katang katang Katang katang kat		Stop Fred 2.400000000 GHz
Start 30 MHz #Res BW 100 kHz	#VBM	/ 300 kHz	Sweep 228.	Stop 2.400 GHz 0 ms (30000 pts)	CF Step 237.000000 MH: <u>Auto</u> Mar
MKR MODE TRC SCL	× 2.318 55 GHz	Y Fi -46.854 dBm	JNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Mar Freq Offse 0 H:
4 5					U HA
6 7 8 9					

GFSK MODULATION IN MIDDLE CHANNEL

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Agilent Spectrum Analyzer - Swept SA					
💢 R RF 50Ω AC			ALIGN AUTO/NORF		Frequency
Center Freq 13.74175000			pe:Log-Pwr Id:10/10	TRACE 123456 TYPE MINAMANA	
	PNO: Fast Trig: Fre IFGain:Low Atten: 3		10. 10/10	TYPE MWWWWW DET P N N N N	
	II COMILEON		Dillord	-02 642 7 CU-	Auto Tune
			WIKI	23.613 7 GHz	
10 dB/div Ref 20.00 dBm				-48.670 dBm	
10.0					Center Freq
0.00					13.741750000 GHz
-10.0					
-20.0					
				-28.15 dBm	Start Freq
-30.0					2.483500000 GHz
-40.0					
-50.0					
مرابع بريجيني	and the second sec	and the second strength on the	and the second second second		Stop Freq
-60.0 Hereiten der der Referenten der Bestern			الأفكال معتقد الأقدياة ويست		25.00000000 GHz
-70.0					20.000000000000000
Start 2.48 GHz				Stop 25.00 GHz	CF Step
#Res BW 100 kHz	#VBW 300 kHz	Z	Sweep 2	.152 s (30000 pts)	2.251650000 GHz
MKR MODE TRC SCL X	Y	FUNCTION	UNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
	3.613 7 GHz -48.670 d		UNCTION WIDTH		
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2					Ener Offert
3					Freq Offset
4					0 Hz
6					
7					
8					
9					
11					
MSG			STATUS		

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center Freq 2.4800	Ω AC CORREC 000000 GHz PNO:Wide ↔	SENSE:INT	Avg Type: Log-Pwr Avg Hold: 10/10	09:47:28 AMNov 02, 2020 TRACE 123456 TYPE MWWWW DET PNNNNN	Frequency
	IFGain:Low	Atten: 30 dB		180 047 0 GHz -8.755 dBm	Auto Tune
0 dB/div Ref 20.00 99 10.0		_ 1			Center Free 2.480000000 GH:
	North Martin Contraction		A and a second s		Start Free 2.478500000 GH;
50.0 *************************** 50.0 ***** *******************************					Stop Fred 2.481500000 GH:
enter 2.480000 GH: Res BW 100 kHz		V 300 kHz	Sweep 2.00	Span 3.000 MHz 0 ms (30000 pts)	CF Step 300.000 kHz
MODE TRC SCL 1 N 1 F 2	× 2.480 047 0 GHz	Y Fi -8.755 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Mar Freq Offse 0 Hz
7 8 9 0 1 1				▼ 	
G ilent Spectrum Analyzer - Swep	pt SA		STATUS		
R RF 50 Center Freq 1.2150	Ω AC CORREC 000000 GHz PN0: Fast ↔ IFGain:Low	SENSE:INT Trig: Free Run Atten: 30 dB	ALIGN AUTO/NORF Avg Type: Log-Pwr Avg Hold: 10/10	09:47:37 AMNov 02, 2020 TRACE 123456 TYPE MWWWWW DET PNNNNN	Frequency
0 dB/div Ref 20.00) dBm		Mkr1	2.196 33 GHz -56.758 dBm	Auto Tune
og					Auto Func
0.00					Center Free 1.215000000 GHz
10.0 0.00 10.0 20.0 30.0				-28.76 dBm	Center Free
					Center Frec 1.21500000 GHz Start Frec 30.000000 MHz Stop Frec
10.0 000 10.0 20.0 40.0 5		V 300 kHz		1 Stop 2.400 GHz 0 ms (30000 pts)	Center Frec 1.21500000 GHz Start Frec 30.000000 MHz Stop Frec 2.400000000 GHz CF Step 237.000000 MHz
10.0 000 10.0 000 10.0 000 10.0 000 10.0 000 10.0 1	#VBW		Sweep 228.	Stop 2.400 GHz	Center Frec 1.21500000 GHz Start Frec 30.000000 MHz Stop Frec 2.400000000 GHz CF Step 237.000000 MHz
10.0 000 10.0 10.0 10.0 10.0 10.0 10.0	X	Y FI		1 Stop 2.400 GHz 0 ms (30000 pts)	Center Frec 1.21500000 GHz Start Frec 30.000000 MHz 2.400000000 GHz 2.400000000 GHz CF Step 237.000000 MHz Auto Mar

GFSK MODULATION IN HIGH CHANNEL

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Agilent Spectrum Analyzer - Swept SA				
X R RF 50 Ω AC		SE:INT ALIGN AUTO/NOF Avg Type: Log-Pwr	F 09:48:02 AM Nov 02, 2020 TRACE 1 2 3 4 5 6	Frequency
Center Freq 13.7500000	PN0: Fast ↔ Trig: Free			
	IFGain:Low Atten: 30	dB	DET P NNNN	
		Mkr	1 23.659 0 GHz	Auto Tune
10 dB/div Ref 20.00 dBm			-48.833 dBm	
Log				
10.0				Center Freq
0.00				13.750000000 GHz
-10.0				
-20.0				Start Freq
-30.0			-28.76 dBm	2.50000000 GHz
-40.0			. 1	2.50000000 GH2
-50.0	ىرى يىلى يىلى يىلى ي	والتفريق والمربية أوردار ويربيك ومعريه والمراوي والمراوي		Stop Freq
-60.0 Here have a state of the second state of		and a state of the		25.00000000 GHz
-70.0				
			8 4	05.04.0
Start 2.50 GHz #Res BW 100 kHz	#VBW 300 kHz	Sween	Stop 25.00 GHz 2.152 s (30000 pts)	CF Step 2.25000000 GHz
		-		<u>Auto</u> Man
MKR MODE TRC SCL X	Y 3.659 0 GHz -48.833 dB	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	
2	-40.000 dB			Freq Offset
3				0 Hz
5				0 H2
6				
8				
9				
11			-	
MSG		STATU	S	

Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit.

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TEST RESULT FOR BAND EDGE GFSK MODULATION IN LOW CHANNEL

GFSK MODULATION IN HIGH CHANNEL



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10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1. MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set the SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the KDB 558074 item 10.2 was used in this testing.

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

Refer to Section 7.2.

10.3. MEASUREMENT EQUIPMENT USED

Refer to Section 6.

10.4. LIMITS AND MEASUREMENT RESULT

Channel No.	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	-20.791	8	Pass
Middle Channel	-21.573	8	Pass
High Channel	-21.984	8	Pass

TEST PLOT OF SPECTRAL DENSITY FOR LOW CHANNEL



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TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL

TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



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11. RADIATED EMISSION

11.1. MEASUREMENT PROCEDURE

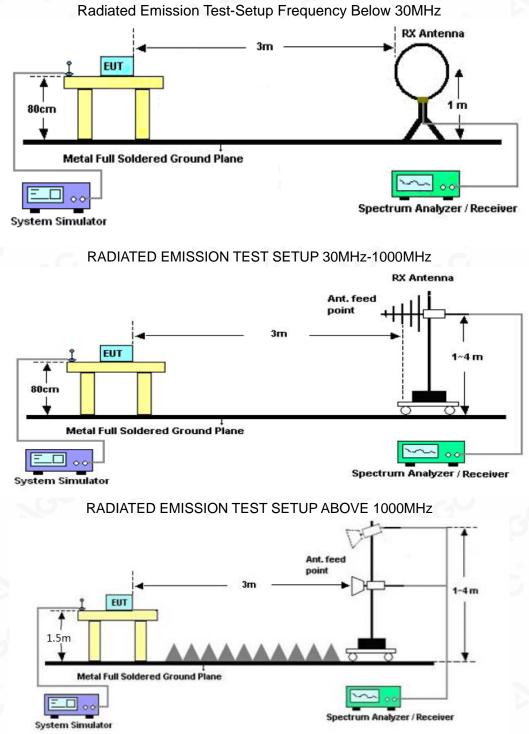
- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated 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 emission, 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 1MHz RBW and 3MHz VBW for peak reading. 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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11.2. TEST SETUP



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11.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

Frequencies (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

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

11.4. 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.

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EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

RADIATED EMISSION BELOW 1GHZ

									Limit: — Margin: —
27	J	ſ					53	i ulla	Mahud
MM	hyp ^{My} hn ^y	h huww	* MANAM	And	3 Mary Mary Mary Mary	nn inn hann ann ann ann ann ann ann ann ann	Jowell Low Con Con	A A A A A A A A A A A A A A A A A A A	Marhud
3 30.000	127.00	224.	.00 321.	00 418.00	515.00	612.00	709.00	806.00	1000.00 M
	121.00								
		Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
CO			Freq. MHz					Over dB	Detector
60		Mk.	· · ·	Level	Factor	ment	Limit		Detector peak
C C	No.	Mk. 10	MHz	Level dBuV	Factor dB	ment dBuV/m	Limit dBuV/m	dB	
SO SO	No.	Mk. 10 25	MHz 60.9500	Level dBuV -1.60	Factor dB 18.81	ment dBuV/m 17.21	Limit dBuV/m 43.50	dB -26.29	peak
SCO C	No.	Mk. 10 25	MHz 60.9500 59.5667	Level dBuV -1.60 0.13	Factor dB 18.81 18.32	ment dBuV/m 17.21 18.45	Limit dBuV/m 43.50 46.00	dB -26.29 -27.55	peak peak
C C	No.	Mk. 10 25 45	MHz 60.9500 59.5667 55.1833	Level dBuV -1.60 0.13 -1.52	Factor dB 18.81 18.32 23.19	ment dBuV/m 17.21 18.45 21.67	Limit dBuV/m 43.50 46.00 46.00	dB -26.29 -27.55 -24.33	peak peak peak

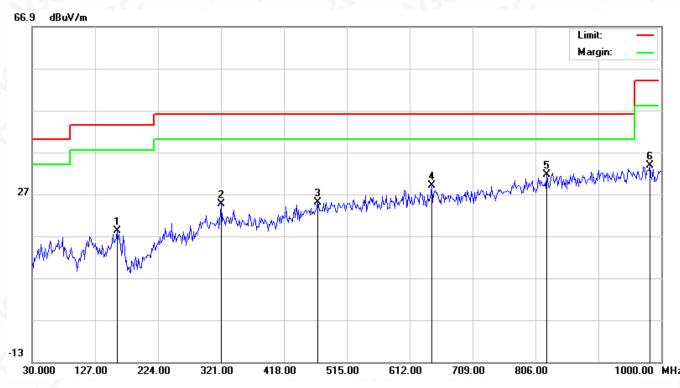
RESULT: PASS

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Report No.: AGC07102201001FE02 Page 31 of 56

EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	1	60.9500	-0.69	18.81	18.12	43.50	-25.38	peak
2	3	21.0000	3.16	21.37	24.53	46.00	-21.47	peak
3	4	69.7333	1.32	23.78	25.10	46.00	-20.90	peak
4	6	45.9500	1.45	27.50	28.95	46.00	-17.05	peak
5	* 8	23.7833	0.92	30.72	31.64	46.00	-14.36	peak
6	9	82.2167	1.33	32.41	33.74	54.00	-20.26	peak

RESULT: PASS Note:

1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

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

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Report No.: AGC07102201001FE02 Page 32 of 56

EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

RADIATED EMISSION ABOVE 1GHZ

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4804.000	44.36	0.08	44.44	74	-29.56	peak
4804.000	36.47	0.08	36.55	54	-17.45	AVG
7206.000	39.58	2.21	41.79	74	-32.21	peak
7206.000	32.76	2.21	34.97	54 💿	-19.03	AVG
C	8			C	8	
	- Ci					0
emark:		G	0			- 6
actor = Anter	na Factor + Cabl	e Loss – Pre-	amplifier.			0

8			
EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

Meter Reading	Factor	Emission Level	Limits	Margin	
(dBµV)	(dB)	<pre>(dBµV/m)</pre>	(dBµV/m)	(dB)	 Value Type
45.31	0.08	45.39	74	-28.61	peak
34.69	0.08	34.77	54	-19.23	AVG
40.52	2.21	42.73	74	-31.27	peak
32.45	2.21	34.66	54	-19.34	AVG
	C.			0	G
	- 62				
8				0	
	(dBµV) 45.31 34.69 40.52	(dBµV) (dB) 45.31 0.08 34.69 0.08 40.52 2.21	(dBµV) (dB) (dBµV/m) 45.31 0.08 45.39 34.69 0.08 34.77 40.52 2.21 42.73	(dBµV) (dB) (dBµV/m) (dBµV/m) 45.31 0.08 45.39 74 34.69 0.08 34.77 54 40.52 2.21 42.73 74	(dBµV) (dB) (dBµV/m) (dBµV/m) (dB) 45.31 0.08 45.39 74 -28.61 34.69 0.08 34.77 54 -19.23 40.52 2.21 42.73 74 -31.27

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4880.000	43.59	0.14	43.73	74	-30.27	peak
4880.000	34.62	0.14	34.76	54	-19.24	AVG
7320.000	39.65	2.36	42.01	74	-31.99	peak
7320.000	31.49	2.36	33.85	54	-20.15	AVG
					Ċ	
emark:						
actor = Anter	na Factor + Cable	Loss – Pre-	amplifier.			- 6

EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	- Value Type
4880.000	42.87	0.14	43.01	74	-30.99	peak
4880.000	33.94	0.14	34.08	54	-19.92	AVG
7320.000	38.77	2.36	41.13	74	-32.87	peak
7320.000	30.83	2.36 💿	33.19	54	-20.81	AVG
		Cr				
8						1 C.

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4960.000	42.14	0.22	42.36	74	-31.64	peak
4960.000	33.62	0.22	33.84	54	-20.16	AVG
7440.000	37.64	2.64	40.28	74	-33.72	peak
7440.000	29.51	2.64	32.15	54	-21.85	AVG
(3)					0	
emark:		8		- 69	C.	8
actor = Anter	na Factor + Cable	Loss – Pre-	amplifier.			- 6

EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4960.000	41.25	0.22	41.47	74	-32.53	peak
4960.000	32.14	0.22	32.36	54	-21.64	AVG
7440.000	37.49	2.64	40.13	74	-33.87	peak
7440.000	28.32	2.64	30.96	54	-23.04	AVG
mark:		- C				0

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, Over=Measure-Limit.

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

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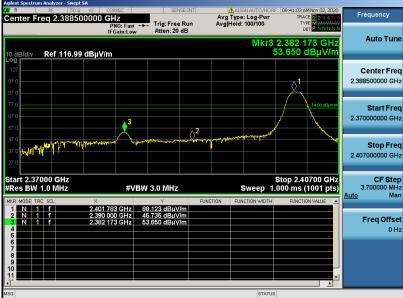


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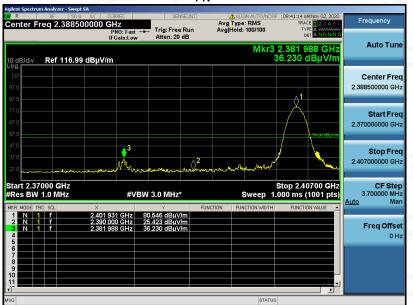
EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS

PK







RESULT: PASS

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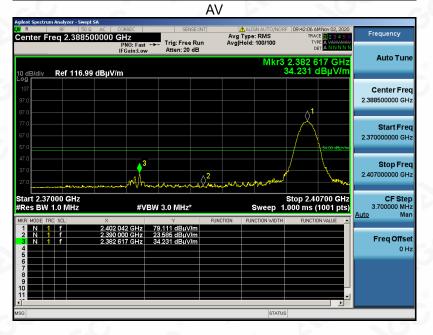
Attestation of Global Compliance(Shenzhen)Co., Ltd Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Web: http://cn.agc-cert.com/



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EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical
	DI		





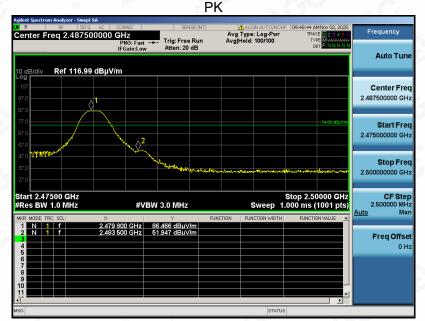
RESULT: PASS

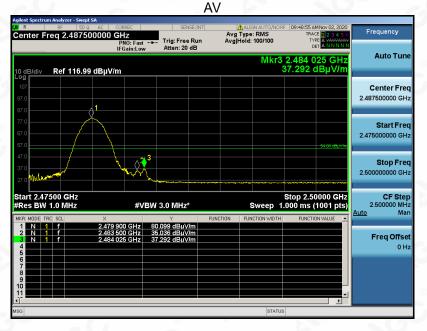
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EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal





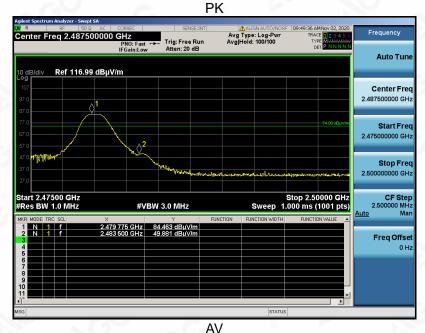
RESULT: PASS

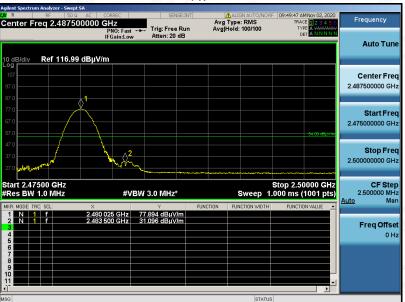
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EUT	Wireless Dual Mode Mouse	Model Name	D1023E
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical





RESULT: PASS Note: The factor had been edited in the "Input Correction" of the Spectrum Analyzer.

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12. FCC LINE CONDUCTED EMISSION TEST

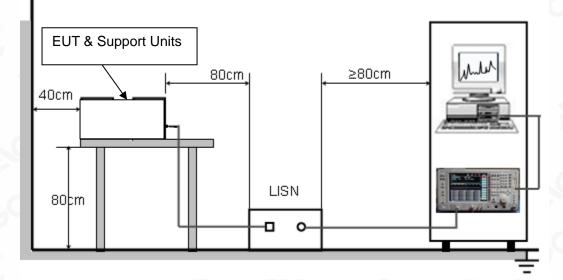
12.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	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.

12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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12.3. 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 DC 5V power from adapter which 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.

12.4. 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.
- 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.

12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

N/A

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

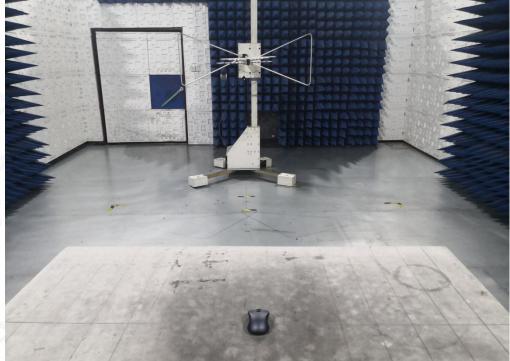
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APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST SETUP BELOW 1GHZ



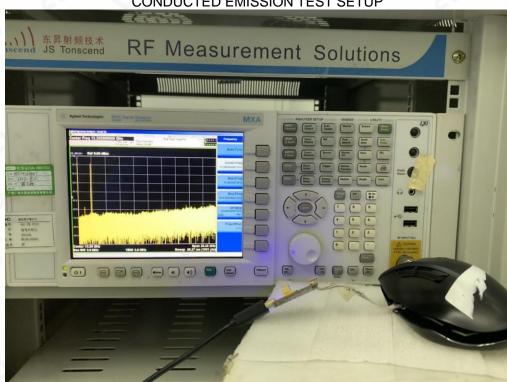
RADIATED EMISSION TEST SETUP ABOVE 1GHZ



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CONDUCTED EMISSION TEST SETUP

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APPENDIX B: PHOTOGRAPHS OF EUT EXTERNAL VIEW-1 OF EUT(D1023E)



EXTERNAL VIEW-2 OF EUT(D1023E)



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EXTERNAL VIEW-3 OF EUT(D1023E)



EXTERNAL VIEW-4 OF EUT(D1023E)



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EXTERNAL VIEW-5 OF EUT(D1023E)



EXTERNAL VIEW-6 OF EUT(D1023E)



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EXTERNAL VIEW-7 OF EUT(D1023E)



INTERNAL VIEW-1 OF EUT(D1023E)



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