





For

Mid Ocean Brands B.V.

Calculator

Test Model: MO8192

Prepared for : Mid Ocean Brands B.V.

Address : 7/F., Kings Tower, 111 King Lam Street, Cheung Sha Wan,

Kowloon, Hong Kong

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.

Address : Room 101, 201, Building A and Room 301, Building C, Juji

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Date of receipt of test sample : March 03, 2023

Number of tested samples : 1

Sample No. : A030223067

Date of Test : March 03, 2023 ~ March 06, 2023

Date of Report : March 06, 2023







Page 2 of 26 Report No.: LCSA030223067E

EMC TEST REPORT

EN 55032:2015/A11:2020

Electromagnetic compatibility of multimedia equipment - Emission Requirements

EN 55035:2017/A11: 2020

Electromagnetic compatibility of multimedia equipment – Immunity requirements

Report Reference No. : LCSA030223067E

Date of Issue : March 06, 2023

Testing Laboratory Name.....: Shenzhen LCS Compliance Testing Laboratory Ltd.

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Industrial Park, Yabianxueziwei, Shajing Street, Bao' an District,

Shenzhen, Guangdong, China

Testing Location/ Procedure : Full application of Harmonised standards

Partial application of Harmonised standards

Other standard testing method

Applicant's Name.....: : Mid Ocean Brands B.V.

Address : 7/F., Kings Tower, 111 King Lam Street, Cheung Sha Wan,

Kowloon, Hong Kong

Test Specification

Standard : EN 55032:2015/A11:2020

EN 55035:2017/A11: 2020

Test Report Form No. : LCSEMC-1.0

TRF Originator...... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF..... : Dated 2011-03

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Test Item Description.:: : Calculator

Trade Mark: N/A

Test Model: MO8192

Ratings : Please Refer to Page 9

Result: : Positive

Compiled by:

Supervised by:

Baron Wen

Approved by:

Coco Song/ File administrators

Baron Wen/Technique principal

Gavin Liang/ Manager





EMC -- TEST REPORT

Test Report No. :	LCSA030223067E	March 06, 2023 Date of issue
Test Report No. :	LCSA030223067E	· · · · · · · · · · · · · · · · · · ·

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



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Revision History

	Revi	sion History	
Revision	Issue Date	Revisions Content	Revised By
000	March 06, 2023	Initial Issue	

Report No.: LCSA030223067E

















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1. TEST STANDARDS

The tests were performed according to following standards:

EN 55032:2015/A11:2020 Electromagnetic compatibility of multimedia equipment - Emission Requirements

EN 55035:2017/A11: 2020 Electromagnetic compatibility of multimedia equipment – Immunity requirements

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2.SUMMARY OF STANDARDS AND RESULTS

2.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

	mission (EN 55032:2015/A11:2	2020)		
Description of Test Item	Standard	Limits	Results	
Conducted disturbance at mains terminals	EN 55032:2015/A11:2020	Class B	N/A	
Conducted disturbance at telecommunication port	EN 55032:2015/A11:2020	Class B	N/A	
Radiated disturbance	EN 55032:2015/A11:2020	Class B	PASS	
Harmonic current emissions	EN IEC 61000-3-2: 2019/A1:2021	Class A	N/A	
Voltage fluctuations & flicker	EN 61000-3-3: 2013/A1:2019		N/A	
	munity (EN 55035:2017/A11:	2020)		
Description of Test Item	Basic Standard	Performance Criteria	Results	
Electrostatic Discharge (ESD)	EN 61000-4-2: 2009	В	PASS	
Radio-frequency, Continuous Radiated Disturbance	EN IEC 61000-4-3:2020	А	PASS	
Electrical Fast Transient (EFT)	EN 61000-4-4: 2012	В	N/A	
Surge (Input a.c. Power Ports)	EN 64000 4 5: 2044/84: 2047	Testing La	N/A	
Surge (Telecommunication Ports)	EN 61000-4-5: 2014/A1: 2017	В	N/A	
Conducted disturbances induced by radio-frequency fields	EN61000-4-6:2014/AC:2015	А	N/A	
Power Frequency Magnetic Field	EN 61000-4-8: 2010	А	N/A	
Voltage Dips, >95% Reduction		В	N/A	
Voltage Dips, 30% Reduction	EN 61000-4-11:2020	С	N/A	
Voltage Interruptions ***Note: N/A is an abbreviati	on for Not Applicable	С	N/A	

Test mode:					
Mode	Working	Record			
***Note: All test modes were	***Note: All test modes were tested, but we only recorded the worst case in this report.				



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2.2. Description of Performance Criteria

General Performance Criteria

Examples of functions defined by the manufacturer to be evaluated during testing include, but are not limited to, the following:

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essential operational modes and states;

2.2.1. Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacture when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deriver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

2.2.2. Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacture, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operation state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be deriver from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

2.2.3. Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacture's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be loss.





3. GENERAL INFORMATION

3.1. Description of Device (EUT)

EUT : Calculator

Trade Mark : N/A

Test Model : MO8192

Power Supply : Input: DC 1.5V

EUT Clock Frequency : ≤108MHz

Highest internal frequency (Fx)	Highest measured frequency		
Fx ≤ 108 MHz	1 GHz		
108 MHz < Fx ≤ 500 MHz	2 GHz		
500 MHz < Fx ≤ 1 GHz	5 GHz		
Fx > 1 GHz	5 × Fx up to a maximum of 6 GHz		

NOTE 1 For FM and TV broadcast receivers, Fx is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies. Where Fx is unknown, the radiated emission measurements shall be performed up to 6 GHz.

3.2. Description of Support Device

Name	Manufacturers	M/N	S/N
-	-	-	-

3.3. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.





3.4. Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

3.5. Measurement Uncertainty

A Side of Challing	M 66 . 45	1456 - 651			
Test Parameters		Expanded Uncertainty (U _{lab})	Expanded Uncertainty (U _{cispr})		
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	$\begin{array}{l} \pm \ \text{2.63 dB} \\ \pm \ \text{2.35 dB} \end{array}$	\pm 3.8 dB \pm 3.4 dB		
Power Disturbance	Level accuracy (30MHz to 300MHz)	± 2.90dB	± 4.5 dB		
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	± 3.60 dB	± 3.3 dB		
Radiated Emission	Level accuracy (9kHz to 30MHz)	± 3.68 dB	N/A		
Radiated Emission	Level accuracy (30MHz to 1000MHz)	± 3.48 dB	± 5.3 dB		
Radiated Emission	Level accuracy (above 1000MHz)	± 3.90 dB	± 5.2 dB		

¹⁾ Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.



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²⁾ The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.



4. MEASURING DEVICES AND TEST EQUIPMENT

RADIATED DISTURBANCE

4. MEASURING DEVICES AND TEST EQUIPMENT						
R/	ADIATED DISTURBANCE					
Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	AUDIX	E3	/	N/A	N/A
2	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2021-09-12	2024-09-11
3	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2021-09-05	2024-09-04
4	EMI Test Receiver	R&S	ESR3	102311	2022-08-17	2023-08-16
5	Broadband Preamplifier	/	BP-01M18G	P190501	2022-06-16	2023-06-15

RF ELECTROMAGNETIC FIELD

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	MXG Vector Signal Generator	Agilent	E4438C	MY42081396(6G)	2022-06-16	2023-06-15
2	RF POWER AMPLIFIER	SKET	HAP_0306 G-50W	/	2022-06-16	2023-06-15
3	RF POWER AMPLIFIER	OPHIR	5225R	1052	2022-06-16	2023-06-15
4	RF POWER AMPLIFIER	OPHIR	5273F	1019	2022-06-16	2023-06-15
5	Stacked Broadband Log Periodic Antenna	SCHWARZBECK	STLP 9128	9128ES-145	NCR	NCR
6	Stacked Mikrowellen LogPer	SCHWARZBECK	STLP 9149	9149-484	NCR	NCR
7	RS Electric field probe	narda	EP601	611WX80208	2022-06-16	2023-06-15
Note: NCP means no calibration requirement						

Note: NCR means no calibration requirement

ELECTROSTATIC DISCHARGE

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	ESD Simulator	SCHLODER	SESD 230	604035	2022-07-18	2023-07-17

NCR --- No calibration requirement.



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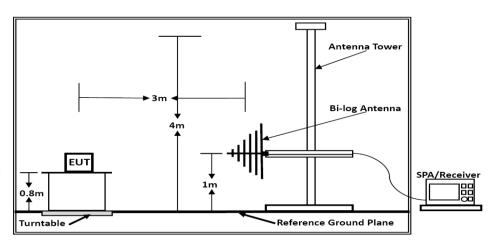
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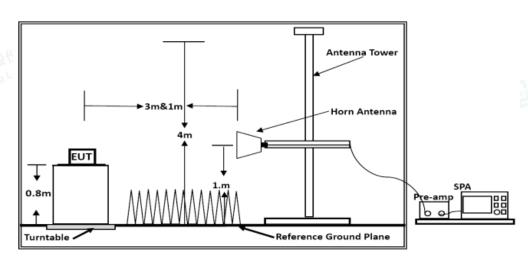
5.TEST RESULTS

5.1. RADIATED EMISSION MEASUREMENT

5.1.1. Block Diagram of Test Setup



Below 1GHz



Above 1GHz



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5.1.2. Test Standard

EN 55032:2015/A11:2020 Class B

All emanations from a class B device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

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Limits for Radiated Emission Below 1GHz				
Frequency Distance Field Strengths Limit				
(MHz)	(Meters)	(dBµV/m)		
30 ~ 230	3	40		
230 ~ 1000	3	47		

^{***}Note:

⁽²⁾ Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

Limits for Radiated Emission Above 1GHz				
Distance	Peak Limit	Average Limit		
(Meters)	(dBµV/m)	(dBµV/m)		
3	70	50		
3	74	54		
	Distance	Distance Peak Limit (Meters) (dBµV/m) 70		

^{***}Note: The lower limit applies at the transition frequency.

5.1.3. EUT Configuration on Test

The EN 55032 regulations test method must be used to find the maximum emission during emission measurement.

5.1.4. Operating Condition of EUT

5.1.4.1. Turn on the power.

5.1.4.2. Let the EUT work in the test USB and measure it.

5.1.5. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter high above the ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. By-log antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test.

The bandwidth of the EMI test receiver is set at RBW/VBW=120kHz/300kHz.

The frequency range from 30MHz to 1000MHz is checked.

The bandwidth of the Spectrum analyzer is set at RBW/VBW=1MHz/3MHz.

The frequency range from 1GHz to the frequency which about 5th carrier harmonic or 6GHz is checked.

5.1.6. Test Results

PASS.

Refer to attached Annex B.1



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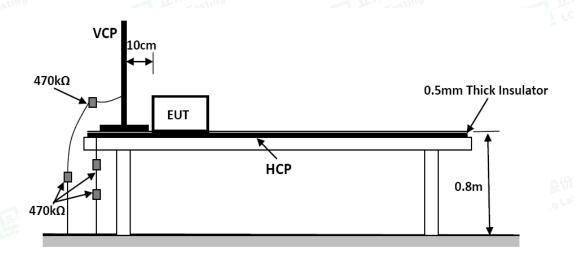
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⁽¹⁾ The smaller limit shall apply at the combination point between two frequency bands.

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5.2.1. Block Diagram of Test Setup

5.2. ELECTROSTATIC DISCHARGE IMMUNITY TEST



5.2.2. Test Standard

EN 55035:2017/A11: 2020 (EN 61000-4-2: 2009, Severity Level: 3 / Air Discharge: ±8KV, Level: 2 / Contact Discharge: ±4KV)

5.2.3. Severity Levels and Performance Criterion

5.2.3.1. Severity level		
Lovel	Test Voltage	Test Voltage
Level	Contact Discharge (KV)	Air Discharge (KV)
1	±2	±2
2	±4	±4
3	±6	±8
4	±8	±15
X	Special	Special

5.2.3.2. Performance Criterion Performance Criterion: B

5.2.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.2.1.

5.2.5. Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 5.1.4. Except the test set up replaced by Section 5.2.1.



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5.2.6. Test Procedure

5.2.6.1. Air Discharge

This test is done on a non-conductive surfaces. The round discharge tip of the Electrostatic Discharge simulator shall be approached as fast as possible then to touch the EUT. After each discharge, the simulator shall be removed from the EUT. The simulator is then re-triggered for a new single discharge and repeated 25 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

5.2.6.2. Contact Discharge

All the procedure shall be same as air discharge, except using the acute discharge tip. The top end of the Electrostatic Discharge simulator is touch the EUT all the time when the simulator is re-triggered for a new single discharge and repeated 25 times for each pre-selected test point.

5.2.6.3. Indirect Discharge For Horizontal Coupling Plane

The vertical coupling plane(VCP) is placed 0.1m away from EUT. The top end of Electrostatic Discharge simulator should aim at the center of one border of the VCP for at least 25 times discharge.

5.2.6.4. Indirect Discharge For Vertical Coupling Plane

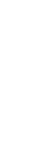
The top end of Electrostatic Discharge simulator should place at the point 0.1m away from EUT on the horizontal coupling plane(HCP). At least 25 times discharge should be done for every pre-selected point around EUT.

Record any performance degradation of the EUT during the test and judge the test result according to ce criterion.

5.2.7. Test Results

PASS.

Refer to attached Annex B.2





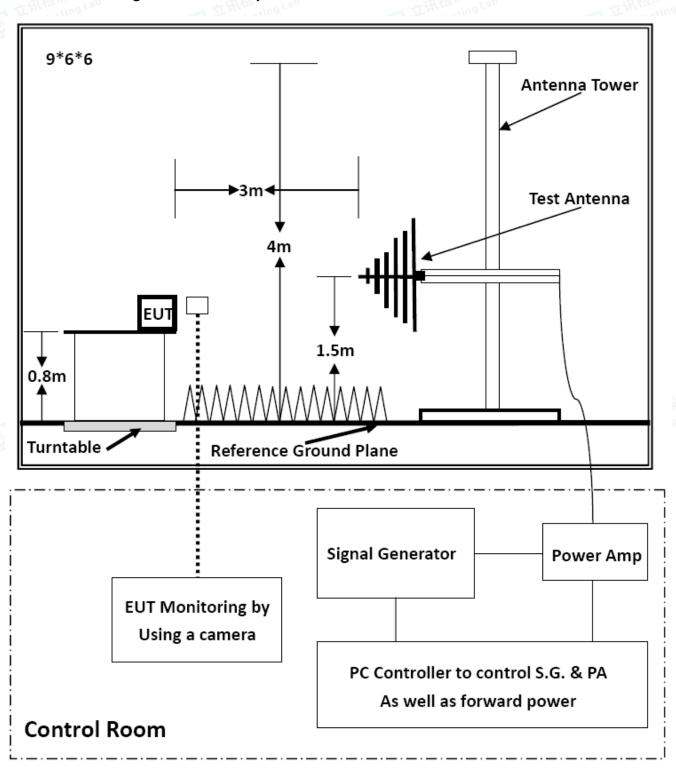
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5.3.1. Block Diagram of Test Setup

5.3. RF FIELD STRENGTH SUSCEPTIBILITY TEST





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5.3.2. Test Standard

EN 55035:2017/A11: 2020 (EN IEC 61000-4-3:2020 Severity Level: 2, 3V/m)

5.3.3. Severity Levels and Performance Criterion

5.3.3.1. Severity level

Level	Field Strength (V/m)
1	1
2	3
3	10
X	Special

5.3.3.2. Performance Criterion

Performance Criterion: A

5.3.4. EUT Configuration on Test

The configuration of EUT is listed in Section 5.3.1.

5.3.5. Operating Condition of EUT

Same as radiated emission measurement, which is listed in Section 5.1.4, except the test setup replaced as Section 5.3.1.

5.3.6. Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD Recording is used to monitor its screen. All the scanning conditions are as following:

Condition of Test	Remark
Fielded Strength	3 V/m (Severity Level 2)
Radiated Signal	Unmodulated
Test Frequency Range (Swept Test)	80-1000MHz
Test Frequency (spot test)	1800MHz, 2600MHz, 3500MHz, 5000MHz
Dwell Time of Radiated	0.0015 decade/s
Waiting Time	3 Sec.

5.3.7. Test Results

PASS.

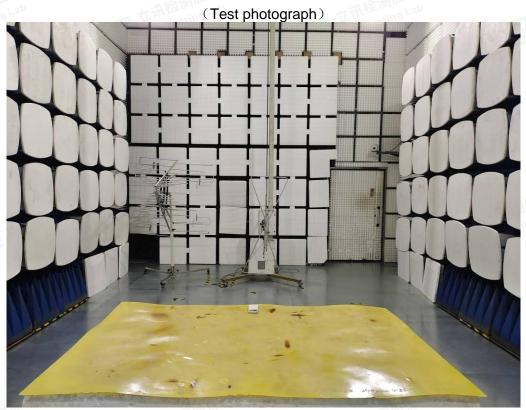
Refer to attached Annex B.3



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ANNEX A



Test Setup Photo of Radiated Measurement (30MHz~1GHz)



Test Setup Photo of Electrostatic Discharge Test

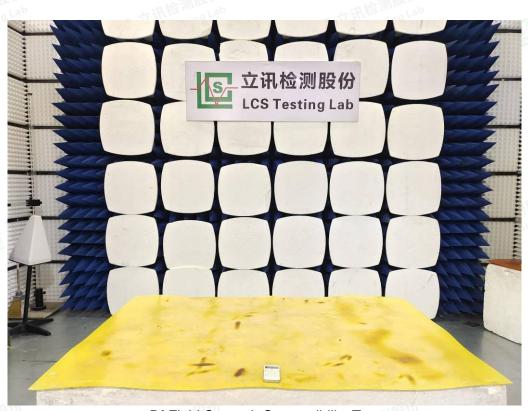


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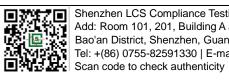


Rf Field Strength Susceptibility Test











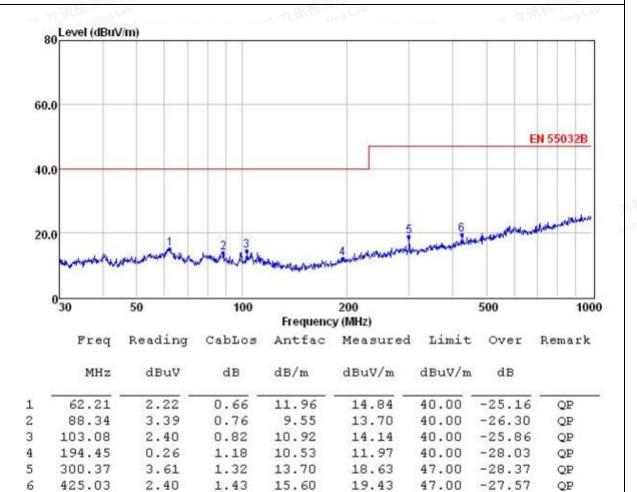
ANNEX B

(Emission and Immunity test results)

B.1 Radiated Disturbance Test Results (30MHz to 1000MHz)

Environmental Conditions:	22.3℃, 53%RH
Test Voltage:	DC
Test Model:	MO8192
Test Mode:	Working
Test Engineer:	Xing Mo
Pol:	Vertical

Detailed results are shown below



Note: 1. All readings are Quasi-peak values.

- 2. Measured= Reading + Antenna Factor + Cable Loss
- 3. The emission that are 20db below the official limit are not reported



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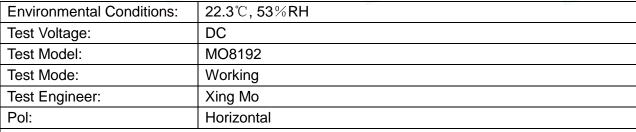
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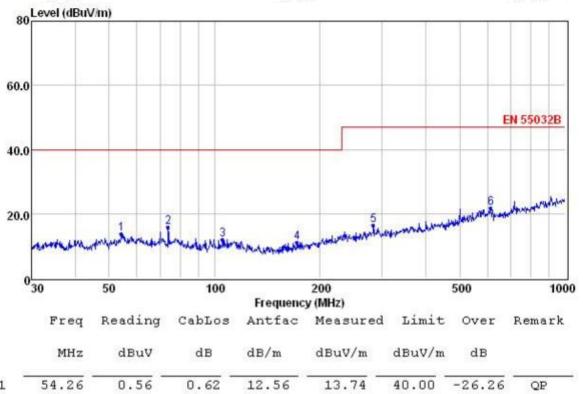




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Detailed results are shown below



	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	54.26	0.56	0.62	12.56	13.74	40.00	-26.26	QP
2	73.62	4.87	0.71	10.05	15.63	40.00	-24.37	QP
3	105.27	0.04	0.83	11.08	11.95	40.00	-28.05	QP
4	171.99	0.23	1.11	9.72	11.06	40.00	-28.94	QP
5	283.98	1.81	1.30	13.38	16.49	47.00	-30.51	QP
6	614.21	0.96	1.55	19.10	21.61	47.00	-25.39	QP

Note: 1. All readings are Quasi-peak values.

- 2. Measured= Reading + Antenna Factor + Cable Loss
- 3. The emission that are 20db below the official limit are not reported



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B.2 ELECTROSTATIC DISCHARGE IMMUNITY TEST

	B.2 ELECTROCIATIO DIOCHARGE IMMORTH TECT				
Electrostatic Discharge Test Results					
Standard	☐ IEC 61000-4-2 ☐ EN 61000-4-2				
Applicant	Mid Ocean Brands B.V.				
EUT	Calculator	Temperature	23.1℃		
M/N	MO8192	Humidity	54.2%		
Criterion	В	Pressure	1021mbar		
Test Mode	Working	Test Engineer	Hy Luo		

			ir Discharge	•		
		Test Levels		Results		
Test Points	± 2kV	± 4kV	± 8kV	Passed	Fail	Performance Criterion
Front	\boxtimes	\boxtimes				□A ⊠B
Back	\boxtimes	\boxtimes	\boxtimes	\boxtimes		□A ⊠B
Left	\boxtimes	\boxtimes	\boxtimes	\boxtimes		□A ⊠B
Right	\boxtimes	\boxtimes				□A ⊠B
Тор	\boxtimes	\boxtimes		\boxtimes		□A ⊠B
Bottom	\boxtimes	\boxtimes	\boxtimes	\boxtimes		□A ⊠B
		Con	tact Discha	rge		
		Test Levels			Resul	ts
Test Points	± 2 kV		±4 kV	Passed	Fail	Performance Criterion
Front			\square			∏A ⊠B
Back	\square		$\overline{\mathbb{X}}$			□A ⊠B
Left			$\overline{\boxtimes}$			□ A ⊠B
Right	\boxtimes		\boxtimes			□A ⊠B
Тор	\square					□A ⊠B
Bottom	\boxtimes		\boxtimes	\boxtimes		□A ⊠B
	Disc	harge To H	Iorizontal C	oupling Plai	ne	
		Test Levels			Resul	ts
Side of EUT	± 2 kV		± 4 kV	Passed	Fail	Performance Criterion
Front		We			166	□A ⊠B
Back	\boxtimes	15		\boxtimes		□A ⊠B
Left	\boxtimes		\boxtimes	\boxtimes		□A ⊠B
Right	\boxtimes			\boxtimes		□A ⊠B
	Dis	scharge To	Vertical Co	upling Plane	9	
Test Levels			Results			
Side of EUT	± 2 kV		± 4 kV	Passed	Fail	Performance Criterion
Front			\boxtimes	\boxtimes		□A ⊠B
Back	\boxtimes	an lik	\boxtimes		AHA	A ⊠B
Left		r 汎险illing Lab	\boxtimes		a Lab	A ⊠B
Right	\boxtimes	LCSTes	\boxtimes			□A ⊠B



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B.3 RF FIELD STRENGTH SUSCEPTIBILITY TEST

- 112		- 112			
RF Field Strength Susceptibility Test Results					
Standard	□ IEC 61000-4-3 ☑ EN 61000-4-3				
Applicant	Mid Ocean Brands B.V.				
EUT	Calculator	Temperature	23.5℃		
M/N	MO8192	Humidity	53.9%		
Field Strength	3 V/m	Criterion	A		
Test Mode	Working	Test Engineer	Hy Luo		
Test Frequency	80MHz to 1000MHz (Swept Test) 1800MHz, 2600MHz, 3500MHz, 5000MHz (spot test)		Till LCS Testing Lab		
Modulation	□None □ Pulse	☑AM 1KHz 80%			
Steps	1%				

	Horizontal	Vertical
Front	PASS	PASS
Right	PASS	PASS PASS
Rear	PASS	PASS
Left	PASS	PASS

Note:



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ANNEX C

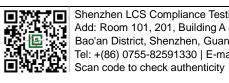
(External and internal photos of the EUT)



Fig. 1



Fig. 2



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Fig. 3

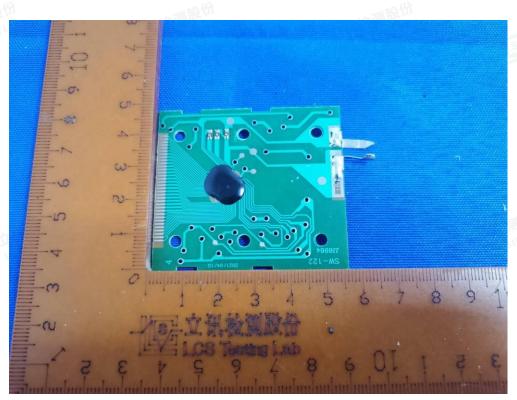


Fig. 4



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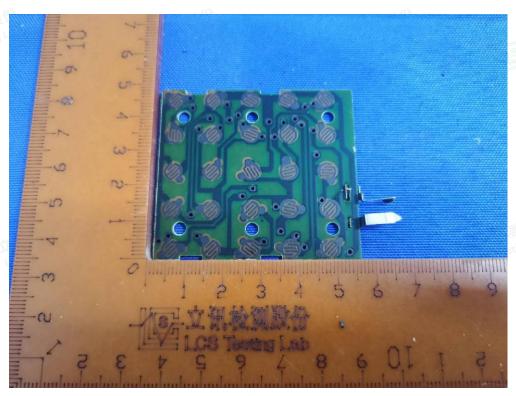


Fig. 5

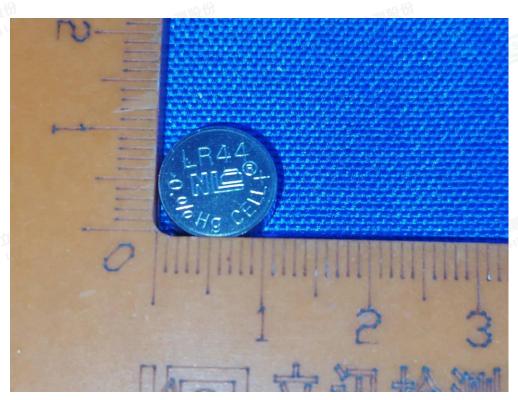


Fig. 6

THE END OF TEST REPORT



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