EMC Test Report

Report No.: AGC05443250540ER01

PRODUCT DESIGNATION	:	Magnetic wireless charger
BRAND NAME	:	N/A
MODEL NAME	:	MO2686
APPLICANT	:	MID OCEAN BRANDS B.V.
DATE OF ISSUE	:	Jul. 14, 2025
STANDARD(S)	:	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.3.2 (2023-01)
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jul. 14, 2025	Valid	Initial Release

Table of Contents

1. General Information

Applicant	MID OCEAN BRANDS B.V.
Address	Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong.
Manufacturer	MID OCEAN BRANDS B.V.
Address	Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong.
Factory	MID OCEAN BRANDS B.V.
Address	Unit 711-716, 7/F., Tower A, 83 King Lam Street, Cheung Sha Wan, Kowloon, Hong Kong.
Product Designation	Magnetic wireless charger
Brand Name	N/A
Test Model	MO2686
Series Model(s)	N/A
Difference Description	N/A
Date of receipt of test item	May 27, 2025
Date of Test	May 27, 2025~Jul. 14, 2025
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-EU-EMC_BT/WLAN -V1

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By	CiCi Li (Project Engineer)	Jul. 14, 2025
Reviewed By	Bibo Zhang (Reviewer)	Jul. 14, 2025
Approved By	Angela Li (Authorized Officer)	Jul. 14, 2025

2. Product Information

2.1 Product Technical Description

Product Designation	Magnetic wireless charger
Test Model	MO2686
Hardware Version	V1.0
Software Version	V1.0
Power Supply	DC 9V by Car Charger
Input/ output	Input: 5V/2A, 9V/2A, 9V/2.22A Output: 5V/1A, 7.5V/1A, 9V/1.1A, 9V/1.66A Wireless output:5W,7.5W,10W,15W
WPT Technical Parameters	
Operation Frequency Range	110-205kHz
Modulation Type	ASK
Antenna Designation	Coil Antenna

Note: For more details, refer to the user's manual of the EUT.

2.2 Objective

Perform Electro Magnetic Interference (EMI) and Electro Magnetic Susceptibility (EMS) tests for CE Marking.

2.3 Test Items and The Results

The tests were performed according to following standards:

EN 301 489-1 V2.2.3 (2019-11)	Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for Electro Magnetic Compatibility
EN 301 489-3 V2.3.2 (2023-01)	Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard for Electro Magnetic Compatibility

Test items are been completed as follows (ETSI EN 301489-1):

Phenomenon	Application	Equipment test requirement		
		fixed use	vehicular use	portable use
Radiated emission	enclosure of ancillary equipment	applicable for stand alone testing	applicable for stand alone testing	applicable for stand alone testing
Conducted emission	DC power input/output port	applicable	applicable	not applicable
	AC mains input/output port	applicable	not applicable	not applicable
	Telecommunication port	applicable	not applicable	not applicable
Harmonic current emissions	AC mains input port	applicable	not applicable	not applicable
Voltage fluctuations and flicker	AC mains input port	applicable	not applicable	not applicable
RF electromagnetic Field (80 MHz to 6000 MHz)	enclosure	applicable	applicable	applicable
Electrostatic discharge	enclosure	applicable	not applicable	applicable
Fast Transients Common mode	signal, Telecommunication and control ports,	applicable	not applicable	not applicable
	DC and AC power ports	applicable	not applicable	not applicable
RF common mode 0,15 MHz to 80 MHz	Signal telecommunication and control ports	applicable	applicable	not applicable
	DC and AC powerports	applicable	applicable	not applicable
transients and surges	DC power inputports	not applicable	applicable	not applicable
voltage dips and interruptions	AC mains powerinput ports	applicable	not applicable	not applicable
surges, line toline and line toground	AC mains power input ports, telecommunication ports	applicable	not applicable	not applicable

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

EMISSION (EN 301 489-1 §7.1)		
Test items	Test Standard(s)	Verdict
Radiated Emission	EN 55032	Pass

Conducted Emission, DC ports	EN 55032	Pass
Conducted Emission, AC ports	EN 55032	Not applicable
Conducted Emission, Telecom ports	EN 55032	Not applicable
Harmonic Current Emissions	EN IEC 61000-3-2	Not applicable
Voltage Fluctuations & Flicker	EN 61000-3-3	Not applicable
IMMUNITY (EN 301 489-1 §7.2)		
Electrostatic Discharge	IEC 61000-4-2 [a]	Pass
Radiated RF Electromagnetic Field	IEC 61000-4-3 [a]	Pass
Electrical Fast Transient/Burst	IEC 61000-4-4 [a]	Not applicable
Transients and Surges, DC ports	ISO 7637-1, -2	Pass
Surge Immunity, AC ports	IEC 61000-4-5 [a]	Not applicable
Radio-Frequency Common mode	IEC 61000-4-6 [a]	Pass
Voltage dips and interruptions	IEC 61000-4-11 [a]	Not applicable

Note:
a. The applicable versions of the basic standards are defined in the standard which listed in the test specification.

2.4 General Performance Criteria

■ **Performance criteria for continuous phenomena**

During the test, the equipment shall:

- continue to operate as intended;
- not unintentionally transmit;
- not unintentionally change its operating state;
- not unintentionally change critical stored data.

■ **Performance criteria for transient phenomena**

➢ For all ports and transient phenomena with the exception described below, the following applies:
- The application of the transient phenomena shall not result in a change of the mode of operation
- (e.g. unintended transmission) or the loss of critical stored data.
- After application of the transient phenomena, the equipment shall operate as intended.

■ For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:
- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

■ For a 0 % residual voltage dip tests the following performance criteria apply:
- The performance criteria for transient phenomena shall apply.

■ For a 70 % residual voltage dip and voltage interruption tests, the following performance criteria apply:
- in the case where the equipment is fitted with or connected to a battery back-up, the performance criteria for transient phenomena shall apply;
- in the case where the equipment is powered solely from the AC mains supply (without the use of a parallel battery back-up) volatile user data may have been lost and if applicable the communication link need not to be maintained and lost functions should be recoverable by user or operator;
- no unintentional responses shall occur at the end of the test, when the voltage is restored to nominal;
- in the event of loss of function(s) or in the event of loss of user stored data, this fact shall be recorded.

◆ **Performance Table**

◆ According to ETSI EN 301 489-3 standard, the general performance criteria are as follows:

EN 301 489-3 Performance Criteria_SRD		
Criteria	During Test	After Test
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May show loss of function No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions
• performance criterion A applies for immunity tests with phenomena of a continuous nature; • performance criterion B applies for immunity tests with phenomena of a transient nature.		
Where "operate as intended" or "no loss of function" is specified, the EUT shall demonstrate correct functioning as described in EN 301 489-3 clause 5. Where the EUT has more than one mode of operation, an unplanned transition from one mode to another is considered as an unintentional response. The EUT shall be tested in sufficient modes to confirm there are no such unintentional responses.		

2.5 Description of Test Modes

No.	Test Mode Description
1	DC 9V/2.22A by Car Charger +EUT+Wireless load(15W)
2	DC 9V/2A by Car Charger +EUT +Wireless load(10W)
3	DC 5V/2A by Car Charger +EUT+Wireless load(7.5W)
4	DC 5V/2A by Car Charger +EUT+Wireless load(5W)
5	DC 5V/2A by Car Charger +EUT+Wireless load(0W)

Note: 1.All modes are pre-tested for EMI and the worst mode is finally reflected.

2. The car charger was supplied by DC 12V and DC 24V. Only the worst mode test data (DC 24V) recorded in the test report.

3. Setup of Equipment Under Test

3.1 Setup Configuration of EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

3.2 Support Equipment

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.
The following peripheral devices and interface cables were connected during the measurement:

☒ Test Accessories Come From The Laboratory

No.	Equipment	Manufacturer	Model No.	Specification Information	Cable
1	Wireless Charging Load	YBZ	N/A	--	--
2	Car Battery	--	--	DC 12V	--

☒ Test Accessories Come From The Manufacturer

No.	Equipment	Manufacturer	Model No.	Specification Information	Cable
1	Car Charger information	--	CC07ZM	Input:12V-24V, 9.5A Single-port Output: USB-A: 5V 3A,9V 2A Type-C: 20V 5A Refreshing Output: 68W	--

4. Test Environment

4.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

4.2 Test Facility

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

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories.)

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842(CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

4.3 Environmental Conditions

	Normal Conditions
Temperature range (℃)	15 - 35
Relative humidity range	45 % - 85 %
Pressure range (kPa)	86 - 106

4.4 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in Measurement” (GUM) published by ISO.

- Uncertainty of Conducted Emission, Uc = ±2.9dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.9dB

4.5 List of Equipment Used

● Radiated Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-A139	Attenuator	East sheep	LM-XX-6-5W	N/A	2025-05-16	2027-05-15
☒	AGC-EM-E116	Test Receiver	R&S	ESCI	100034	2025-05-08	2026-05-07
☒	AGC-ER-E005	Antenna	SCHWARZBECK	VULB9168	VULB9168-494	2025-01-15	2027-01-14
☒	AGC-EM-E086	Active loop antenna(9K-30MHz)	ZHINAN	ZN30900C	18051	2024-03-05	2026-03-04

● DC Power Line Conducted Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-A171	Attenuator	Mini-Circuits	UNAT-10A+	N/A	2024-02-01	2026-01-31
☒	AGC-EM-E024	Artificial Network	R&S	ESH3-Z6	100398	2025-05-08	2026-05-07
☒	AGC-EM-E025	Artificial Network	R&S	ESH3-Z6	100399	2025-05-08	2026-05-07
☒	AGC-EM-E116	Test Receiver	R&S	ESCI	100034	2025-05-08	2026-05-07

● ESD (Electrostatic Discharge)							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-E013	ESD Simulator	Schaffner	NSG 438	782	2024-11-12	2025-11-11

● Transients and Surges in the Vehicular Environment							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-E154	Automotive Transient Simulator	NoiseKen	ISS-7610	ISS0930327	2025-03-24	2026-03-23
☒	AGC-EM-E155	Automotive Transient Simulator	NoiseKen	ISS-7630	ISS0930329	2025-03-24	2026-03-23
☒	AGC-EM-E156	Automotive Transient Simulator	NoiseKen	ISS-7690	ISS0930330	2025-03-24	2026-03-23
☒	AGC-EM-E157	Automotive Transient Simulator	NoiseKen	ISS-7650	ISS0930326	2025-03-24	2026-03-23
☒	AGC-EM-E158	Bipolar DC Source	NF	BP4620	9107414	2025-03-24	2026-03-23
☒	AGC-EM-E159	Switch Simulator	SCHAFFNER	NSG 417	N/A	2025-03-24	2026-03-23

● RS (Radio Frequency Electromagnetic Field)							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-E029	Double-Ridged Waveguide Horn Antenna	ETS-LINDGREN	3117	00034609	2025-03-27	2026-03-26
☒	AGC-EM-E005	Power Meter	R&S	NRVD	8323781027	2025-03-24	2027-03-23
☒	AGC-EM-E016	Power Amplifier	KALMUS	7100LC	04-02/17-06-001	2024-07-24	2025-07-23
☒	AGC-EM-E028	Wideband Antenna	ETS-LINDGREN	3142C	00060447	N/A	N/A
☒	AGC-EM-E035	Power Probe	R&S	URV5-Z4	100124	2025-03-24	2027-03-23
☒	AGC-EM-E040	Directional Coupler	Werlatone	C5571-10	99463	2024-02-01	2026-01-31
☒	AGC-EM-E041	Directional Coupler	Werlatone	C6026-10	99482	2024-02-01	2026-01-31
☒	AGC-EM-E080	Power Amplifier	Rflight	NTWPA-2560100	17063183	2024-07-24	2025-07-23
☒	AGC-EM-E115	Signal Generator	AGILENT	N5182A	MY49060745	2025-03-07	2026-03-06
☒	AGC-EM-E160	Power Amplifier	TESEQ	CBA3G-100	T43913	2025-05-21	2026-05-20

● CS (Radio Frequency Common Mode)							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-EM-A048	Attenuator	ZHINAN	E-002	N/A	2024-07-24	2026-07-23
☒	AGC-EM-E005	Power Meter	R&S	NRVD	8323781027	2025-03-24	2027-03-23
☒	AGC-EM-E017	Power Amplifier	AR	75A250	18464	2024-07-24	2025-07-23
☒	AGC-EM-E035	Power Probe	R&S	URV5-Z4	100124	2025-03-24	2027-03-23
☒	AGC-EM-E040	Directional Coupler	Werlatone	C5571-10	99463	2024-02-01	2026-01-31
☒	AGC-EM-E115	Signal Generator	Aglient	N5182A	MY49060745	2025-03-07	2026-03-06
☒	AGC-EM-E161	CDN	3C TEST	CDN M2M3	ES064002624028	2024-09-25	2025-09-24

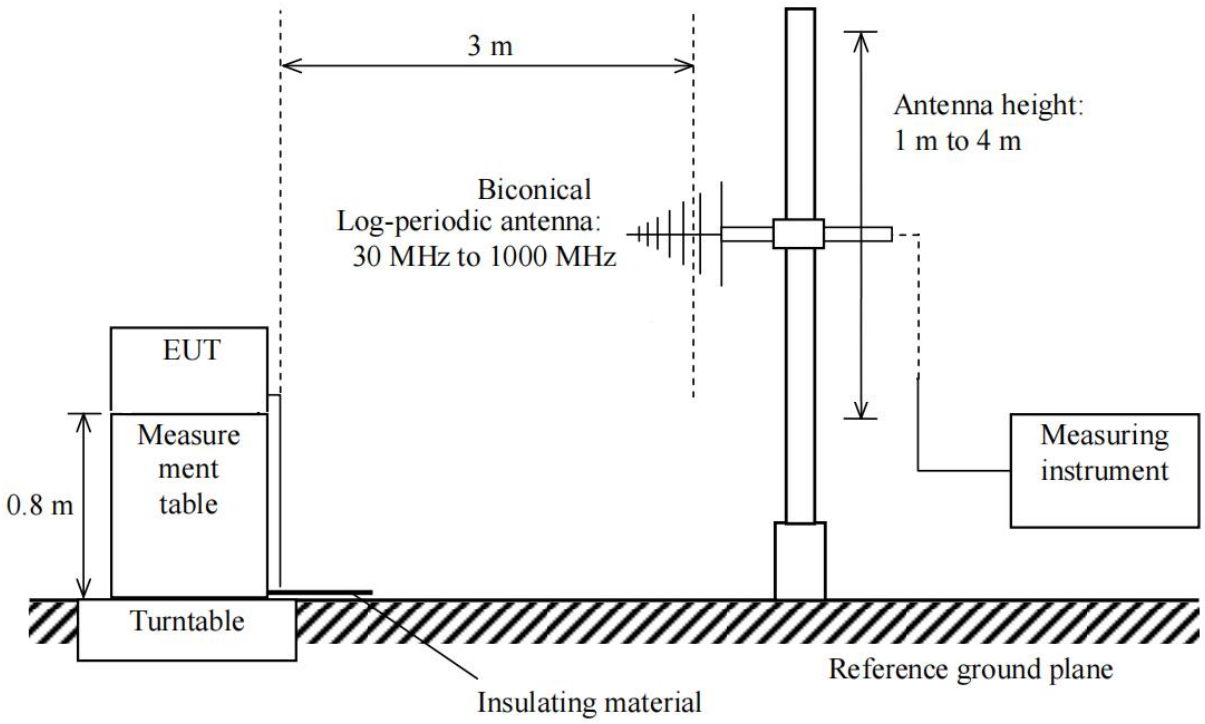
● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
☒	AGC-EM-S004	RE Test System	Tonscend	TS$^+$ Ver2.1(JS32-RE)	4.0.0.0
☒	AGC-EM-S003	RE Test System	FARA	EZ-EMC	V.RA-03A
☒	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71
☒	AGC-EM-S006	RS Test System	Tonscend	TS$^+$ Ver2.1(JS35-RS)	2.0.1.8
☒	AGC-EM-S007	CS Test System	Tonscend	TS$^+$ Ver2.1(JS35-CS)	2.0.1.7

5. Measurement of Radiated Emissions at Frequencies up to 1GHz

5.1. Requirements

Test facility	Detector type/ bandwidth	Frequency Range (MHz)	Limits dB(μV/m)	Measurement specifications
SAC	Quasi-peak/ 120kHz	30 to 230	40	Instrumentation: CISPR 16-1-1, Clauses 4, 5 Antennas: CISPR 16-1-4, Clause 4.5 Test Site: CISPR 16-1-4, Clause 6 Method: CISPR 16-2-3, Clause 7.6
		230 to 1000	47	
Note: The lower limit shall apply at the transition frequency.				

5.2. Block Diagram of Test Setup



5.3. Configuration of the EUT and method of measurement

a. The EUT 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, the EUT was placed on the top surface of a measurement table, 0.8 m high from the horizontal reference plane. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 10 cm non-conductive covering to insulate the EUT from the ground plane.

b. Support equipment, if needed, was placed as per CISPR 16-2-3.

c. All I/O cables were positioned to simulate typical actual usage as per CISPR 16-2-3.

d. The maximum receiving level of radiated emissions from the EUT was measured while the turntable was rotated from 0° to 360° and the antenna height was scanned between 1 m and 4 m. The cables were laid out to attain the maximum level of radiated emissions.

e. The more description of the tests, the test methods, and the test set-ups are given in the applicable test standard.

f. Record at least six highest emissions relative to the limits at each frequency of interest unless the emission is 10 dB or greater below the limit.

g. A radiated emission is calculated by the following equation:

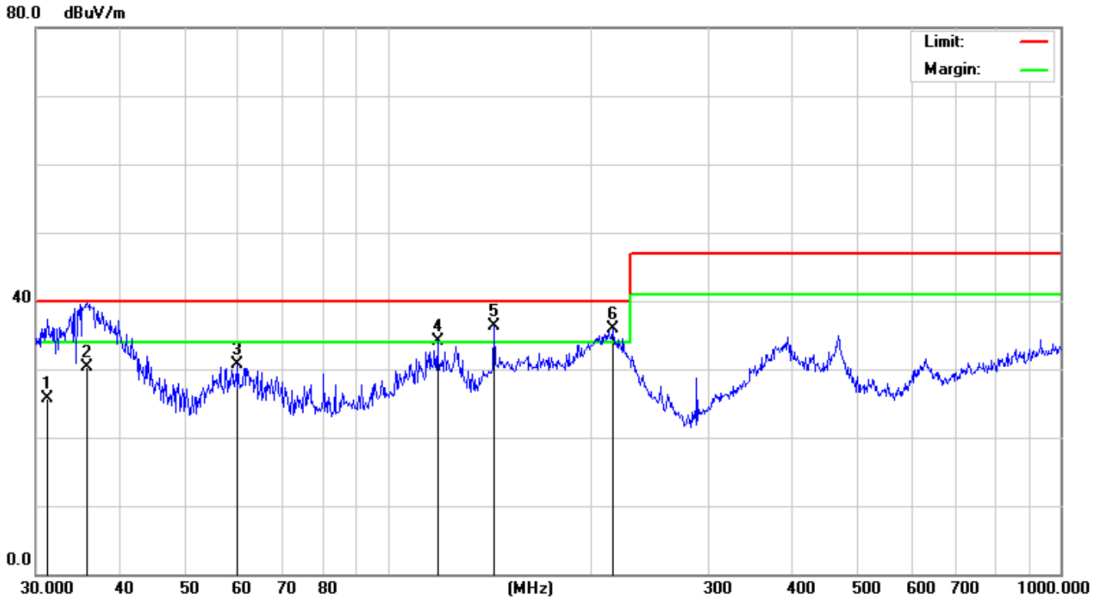
- Measurement Level dB(μV/m) = Receiver reading dB(μV) + Factor(dB/m)
- Factor(dB/m) = Antenna Factor(dB/m) + Cable Loss(dB)
- Margin= Limit-Level

5.4. Test Result

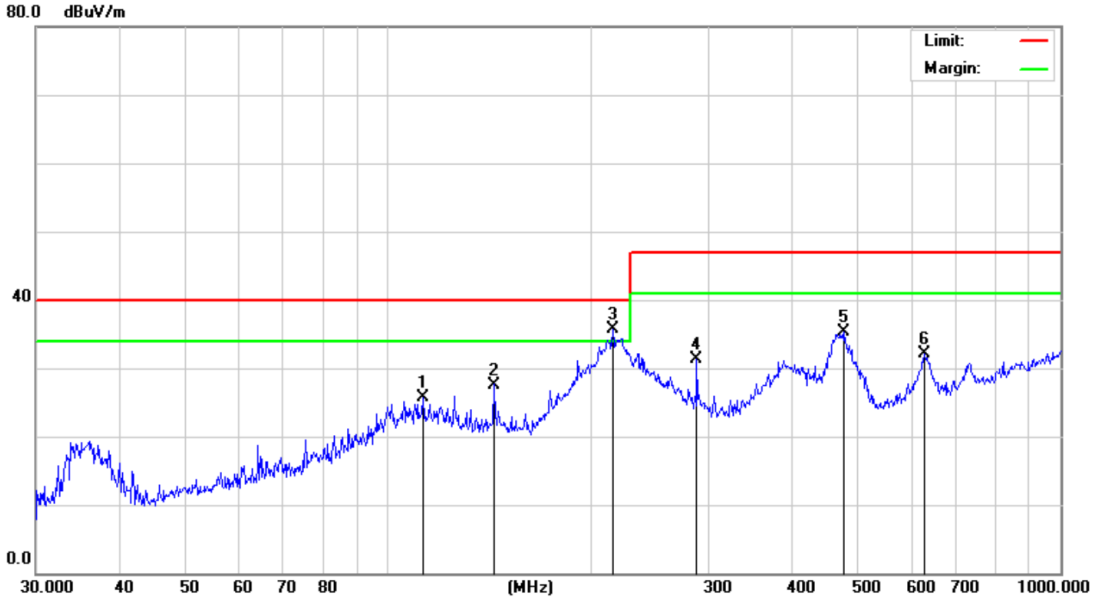
Test Equipment	Magnetic wireless charger	Model Name	MO2686
Test Engineer	Alex Yang	Temperature	22.1℃
Relative Humidity	56.4 %	Air Pressure	985 Mbar
Worst Mode	Mode 1	Power supply	DC 9V, 2.22Aby Car Charger
Test Date	2025-07-09	Verdict	Pass

Test graph and data for Radiated Emission up to 1GHz

Test Mode: Mode 1



No.	Frequency [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	31.1798	25.69	-23.34	40.00	14.31	QP	Horizontal
2	35.7490	30.34	-22.79	40.00	9.66	QP	Horizontal
3	59.8588	30.68	-21.43	40.00	9.32	peak	Horizontal
4	118.6013	34.05	-23.13	40.00	5.95	peak	Horizontal
5	143.8294	36.34	-19.92	40.00	3.66	peak	Horizontal
6	216.0240	36.00	-22.47	40.00	4.0	peak	Horizontal

Test graph and data for Radiated Emission up to 1GHz							
Test Mode: Mode 1							
							
No.	Frequency [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Detector	Polarity
1	112.9196	25.70	-24.54	40.00	14.3	peak	Vertical
2	143.8295	27.60	-20.85	40.00	12.4	peak	Vertical
3	216.0240	35.72	-23.32	40.00	4.28	peak	Vertical
4	287.9904	31.24	-19.83	47.00	15.76	peak	Vertical
5	477.1694	35.30	-17.36	47.00	11.7	peak	Vertical
6	627.2738	32.13	-13.29	47.00	14.87	peak	Vertical

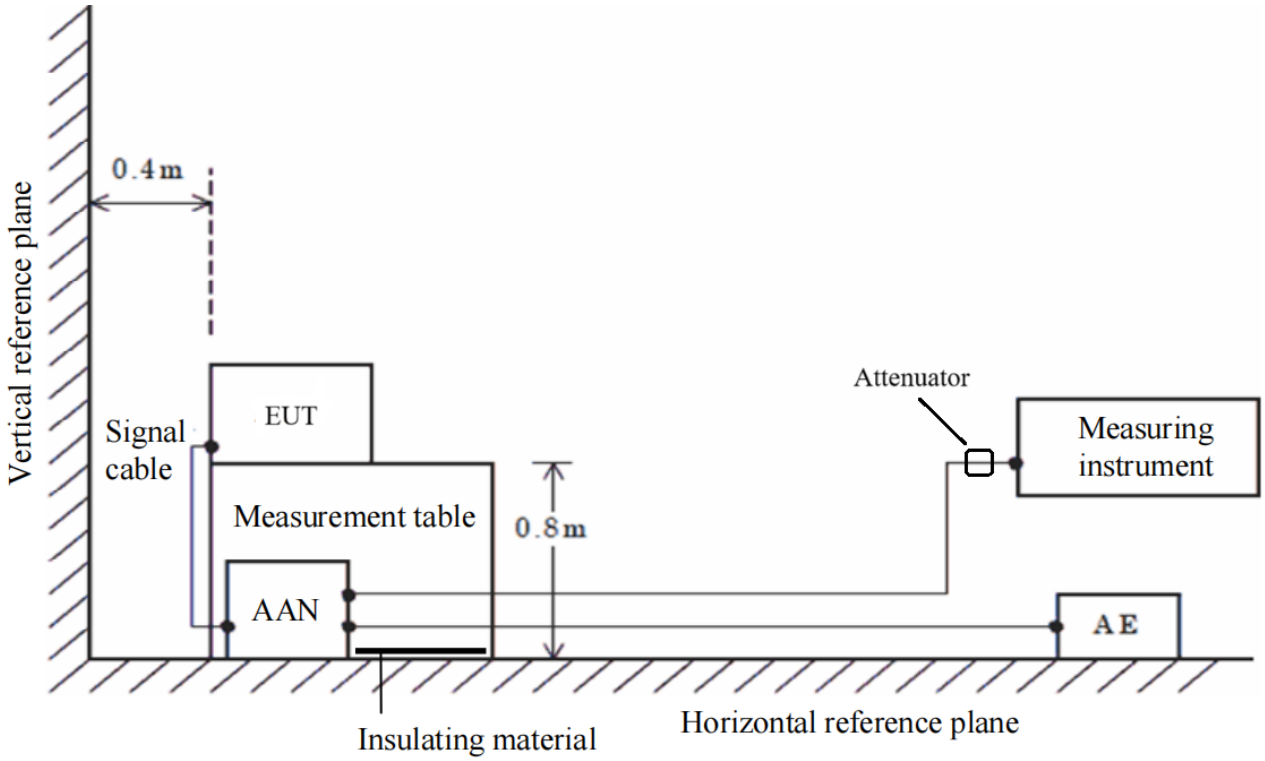
6. Measurement of Conducted Emissions from the DC Power Ports

6.1. Requirements

Requirements for conducted emissions, DC power port

Network device	Detector type/ bandwidth	Frequency Range (MHz)	Limits dB(μV)	Measurement specifications
AN	Quasi-peak/ 9kHz	0.15 to 0.5	79	Instrumentation: CISPR 16-1-1, Clauses 4, 5 and 7 Networks: CISPR 16-1-2, Clauses 4 Method: CISPR 16-2-1, Clause 7 Set-up: CISPR 16-2-1, Clause 7
		0.5 to 30	73	
	Average/ 9kHz	0.15 to 0.5	66	
		0.5 to 30	60	
Note: 1. The lower limit shall apply at the transition frequency.				

6.2. Block Diagram of Test Setup



6.3. Configuration of the EUT and method of measurement

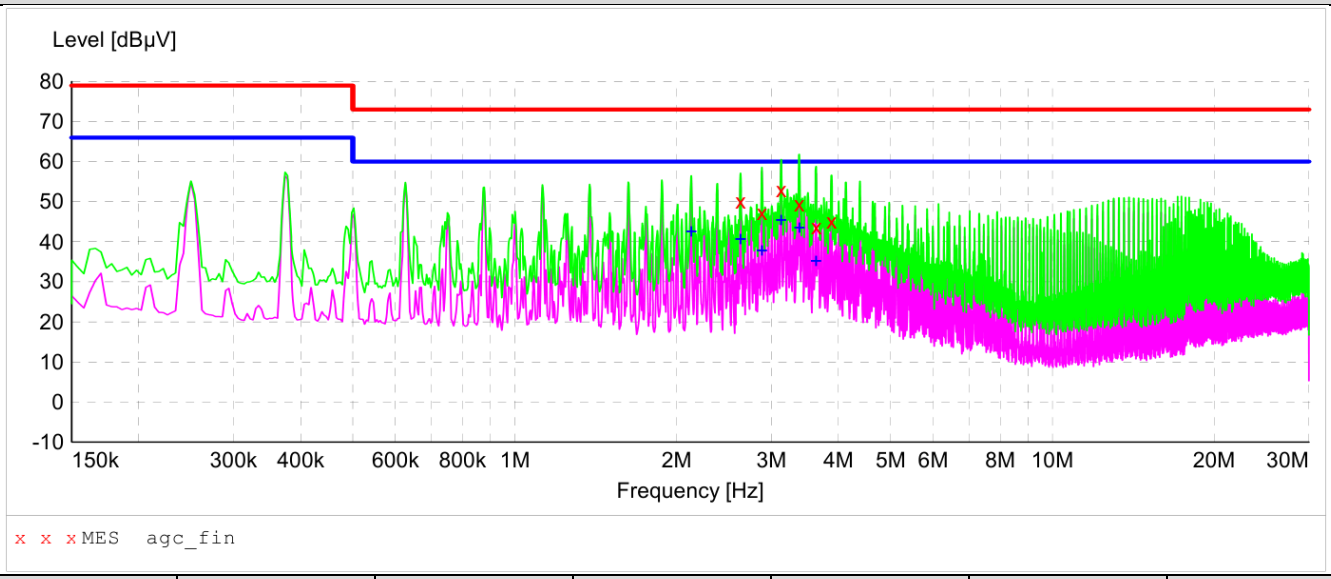
a. The EUT was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, the EUT was placed on the top surface of a measurement table, 0.8 m high from the horizontal reference plane, and was positioned at a distance of 0.4 m away from the vertical reference plane. When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 10 cm non-conductive covering to insulate the EUT from the ground plane.
b. Support equipment, if needed, was placed as per CISPR 16-2-1.
c. All I/O cables were positioned to simulate typical actual usage as per CISPR 16-2-1.
d. The EMI receiver measured the emission levels emanating from the EUT into the DC ports through an Artificial Network (AN) and an attenuator used on the front end of the EMI receiver. Testing included measurements on positive and negative lines.
e. The more description of the tests, the test methods, and the test set-ups are given in the applicable test standard.
f. Record at least six highest emissions relative to the limits at each frequency of interest unless the emission is 10 dB or greater below the limit.
g. A conducted emission is calculated by the following equation:
    - Measurement Level (dBμV) = Receiver reading (dBμV) + Tansd (dB)
    - Transd(dB)= AN Factor(dB)+Cable Loss(dB)+Attenuation(dB)
    - Margin= Limit-Level

6.4. Test Result

Test Equipment	Magnetic wireless charger	Model Name	MO2686
Test Engineer	Carl Chen	Temperature	21.0℃
Relative Humidity	62.9%	Air Pressure	985 Mbar
Worst Mode	Mode 1	Power supply	DC 9V, 2.22Aby Car Charger
Test Date	2025-07-09	Verdict	Pass

Test graph and data for Conducted Emission

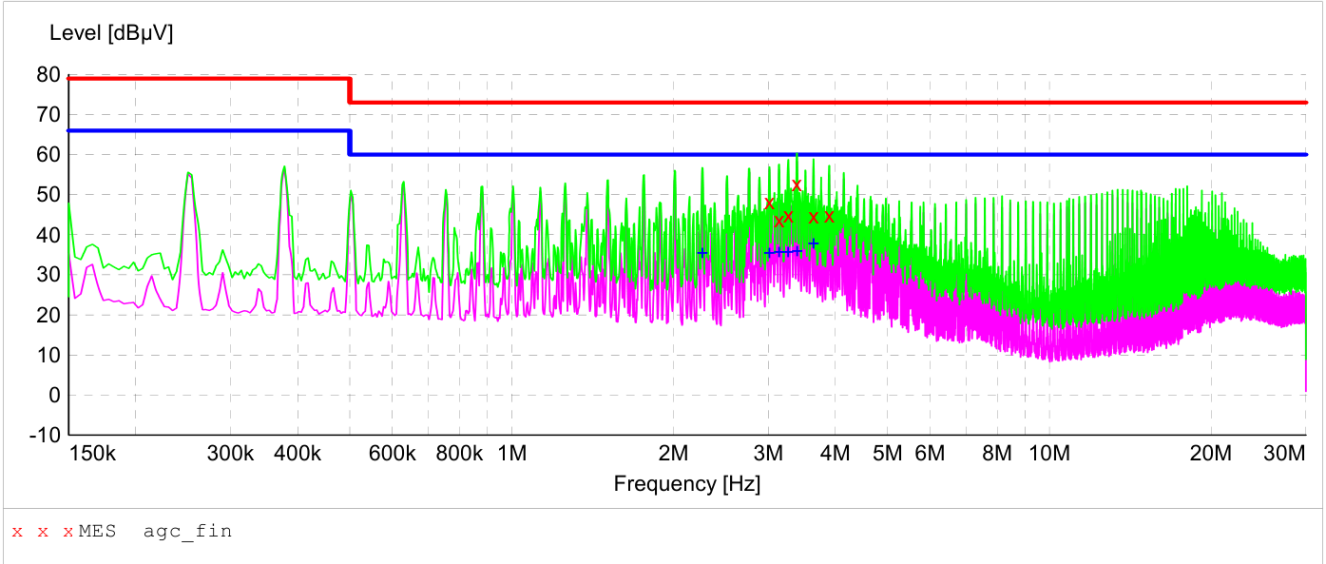
Test Mode: Mode 1



Frequency [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector	Line
2.630000	50.1	10.5	73.0	22.9	QP	P
2.882000	47.3	10.5	73.0	25.7	QP	P
3.130000	53.0	10.5	73.0	20.0	QP	P
3.382000	49.3	10.6	73.0	23.7	QP	P
3.634000	43.7	10.6	73.0	29.3	QP	P
3.882000	45.0	10.7	73.0	28.0	QP	P
2.130000	42.6	10.5	60.0	17.4	AV	P
2.630000	40.6	10.5	60.0	19.4	AV	P
2.882000	37.8	10.5	60.0	22.2	AV	P
3.130000	45.4	10.5	60.0	14.6	AV	P
3.382000	43.4	10.6	60.0	16.6	AV	P
3.634000	35.1	10.6	60.0	24.9	AV	P

Test graph and data for Conducted Emission

Test Mode: Mode 1



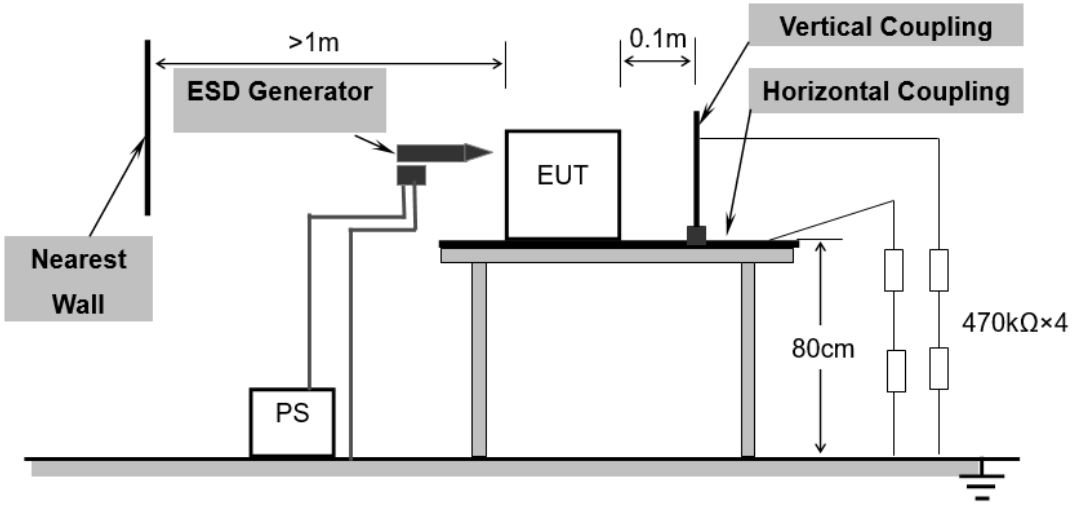
Frequency [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector	Line
3.014000	48.1	10.5	73.0	24.9	QP	N
3.142000	43.6	10.5	73.0	29.4	QP	N
3.270000	44.8	10.6	73.0	28.2	QP	N
3.390000	52.8	10.6	73.0	20.2	QP	N
3.642000	44.5	10.6	73.0	28.5	QP	N
3.890000	44.9	10.7	73.0	28.1	QP	N
2.262000	35.4	10.5	60.0	24.6	AV	N
3.014000	35.3	10.5	60.0	24.7	AV	N
3.142000	35.7	10.5	60.0	24.3	AV	N
3.266000	35.6	10.6	60.0	24.4	AV	N
3.394000	35.8	10.6	60.0	24.2	AV	N
3.642000	37.7	10.6	60.0	22.3	AV	N

7. Measurement of Electrostatic Discharge

7.1. Requirements

Port	Enclosure
Basic Standard	IEC 61000-4-2
Test Level	±8.0 kV (Air Discharge) ±4.0 kV (Contact Discharge) ±4.0 kV (Indirect Discharge)
Required Performance Criterion	B
Time Between Each Discharge:	1 second
Number of Discharge for Each Applied Voltage	10

7.2. Block Diagram of Test Setup



7.3. Configuration of the EUT and method of measurement

a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
c. The time interval between two successive single discharges was at least 1 second.
d. The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.
e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were completed.
g. At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator was positioned vertically at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.
h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m×0.5m) was placed vertically to and 0.1 meters from the EUT.
i. The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

7.4. Test Result

Test Engineer	Ikun Yu	Temperature	22.8℃
Test Date	2025-06-04	Air Pressure	985 Mbar
Test Mode(s)	Mode 1/2/3/4/5	Relative Humidity	52.6 %
Verdict	Pass		

Voltage	Coupling	Observation	Performance
±4kV	Contact Discharge	No degradation of performance	A
±2KV, ±4kV, ±8kV	Air Discharge	No degradation of performance	A
±4kV	Indirect Discharge HCP	No degradation of performance	A
±4kV	Indirect Discharge VCP	No degradation of performance	A

Blue line: Air discharge
Red line: Contact Discharge

8. Measurement of Radio-Frequency Electromagnetic Field

8.1. Requirements

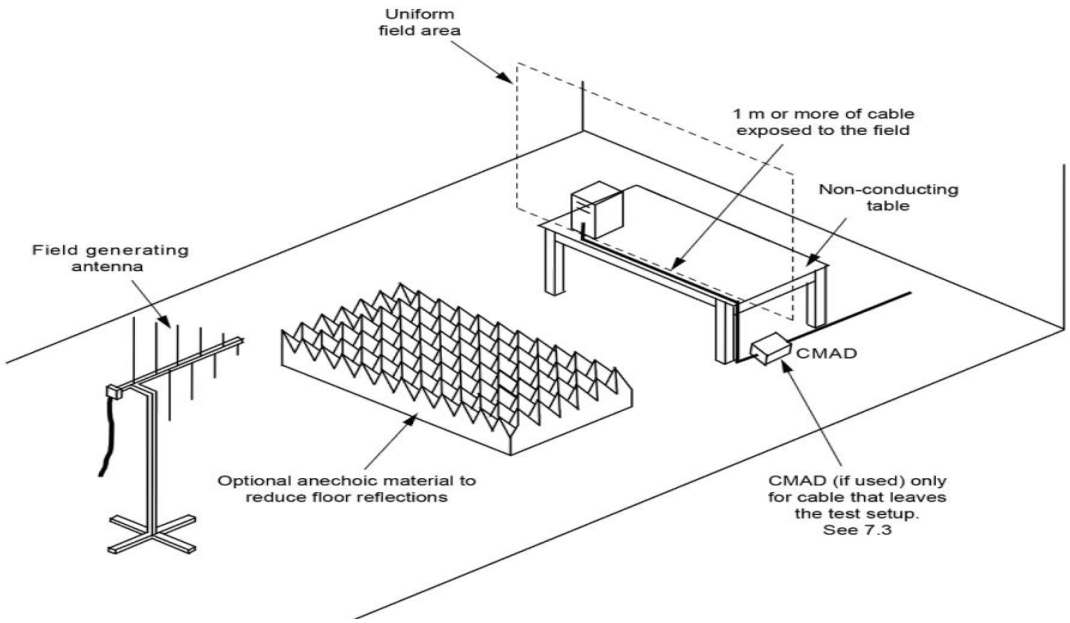
Port	Enclosure
Basic Standard	IEC 61000-4-3
Test Level	3V/m with 80% AM. 1kHz Modulation at 80 to 6000MHz
Required Performance Criterion	A
Antenna polarization	Vertical and Horizontal
Step size increment [a]	1%
Dwell time [b]	≤5 seconds
Test Distance	3m
EUT position facing antenna	Front side, back side, left side and right side

Notes:

a. Recognizing that a 1% step size is preferred, the frequency range can be swept incrementally with a step size not exceeding 4% of the previous frequency with a test level of twice the value of the specified test level in order to reduce the testing time for equipment requiring testing in multiple configurations and/or long cycle times.

b. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond. However, the dwell time shall not exceed 5 seconds at each of the frequencies during the scan. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.

8.2. Block Diagram of Test Setup



8.3. Configuration of the EUT and method of measurement

a. The Equipment Under Test (EUT) was positioned within the Uniform Field Area (UFA) on a supporting table, ensuring a 3-meter separation from the transmitting antenna. This setup aligns with the calibrated square area, guaranteeing field uniformity during testing. The supporting units were strategically located outside the UFA to avoid any potential interference. Nonetheless, the cables connected to the EUT were intentionally exposed to the precisely calibrated field within the UFA.

b. Before testing, it will verify the proper operation of the test equipment/system. This verification will involve measuring the field strength at one point within the Uniform Field Area (UFA) at various frequencies.

c. The test shall be performed according to the above requirements and block diagram which shall specify the test setup.

d. The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

8.4. Test Result

Test Engineer	Alex Yang	Temperature	21.8℃
Test Date	2025-06-04	Air Pressure	985 Mbar
Test Mode(s)	Mode 1/2/3/4/5	Relative Humidity	53.3 %
Verdict	Pass		

Frequency (MHz)	Polarity	Exposed Side	Field Strength (V/m)	Observation	Performance
80-6000	Vertical	Front	3V/m (rms)	No performance degradation	A
80-6000		Left	3V/m (rms)	No performance degradation	A
80-6000		Rear	3V/m (rms)	No performance degradation	A
80-6000		Right	3V/m (rms)	No performance degradation	A
80-6000	Horizontal	Front	3V/m (rms)	No performance degradation	A
80-6000		Left	3V/m (rms)	No performance degradation	A
80-6000		Rear	3V/m (rms)	No performance degradation	A
80-6000		Right	3V/m (rms)	No performance degradation	A

9. Measurement of Radio-Frequency Common Mode

9.1. Requirements

Port	☐AC mains power ports	☐signal, wired network and control ports [a]
	☒DC power ports [a]	
Basic Standard	IEC 61000-4-6	
Required Performance Criterion	A	
Test Level	0.15 to 80 MHz, 3V RMS (unmodulated), 80 % AM (1 kHz)	
Step size increment [b]	1%	
Dwell time [c]	≤5 seconds	

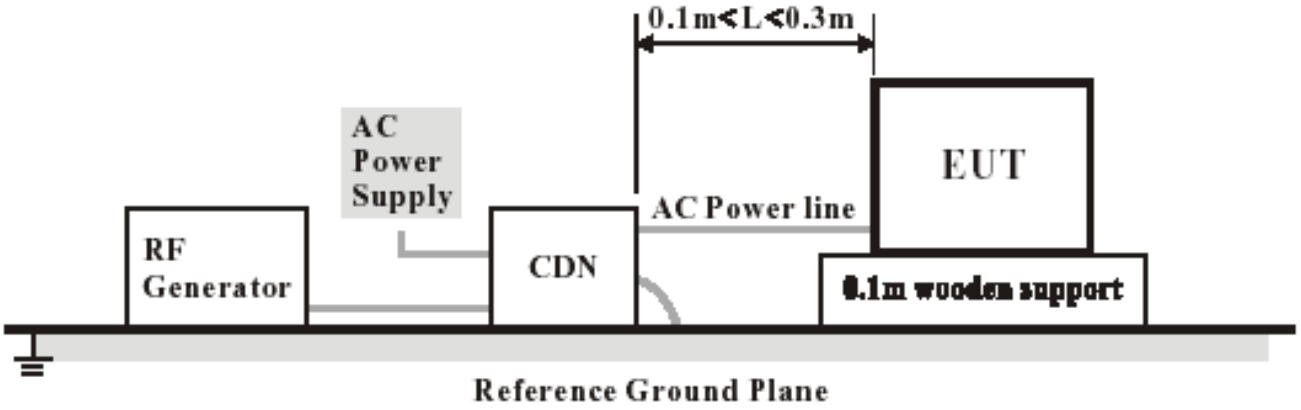
Notes:

a. Applicable only to ports which, according to the manufacturer's specification, supports cable lengths greater than 3 m.

b. Recognizing that a 1% step size is preferred, the frequency range can be swept incrementally with a step size not exceeding 4% of the previous frequency with a test level of twice the value of the specified test level in order to reduce the testing time for equipment requiring testing in multiple configurations and/or long cycle times.

c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond. However, the dwell time shall not exceed 5 seconds at each of the frequencies during the scan. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.

9.2. Block Diagram of Test Setup



9.3. Configuration of the EUT and method of measurement

a. The Equipment Under Test (EUT) shall be tested within its intended operating and climatic conditions.

b. The test generator and the coupling/decoupling network shall be placed directly on, and bonded to, the ground reference plane. The test shall be performed with the test generator connected to each of the coupling devices (CDN, EM clamp, current clamp) in turn. All other cables not under test shall either be disconnected (when functionally allowed) or provided with decoupling networks or unterminated CDNs only.

c. The test shall be performed according to the above requirements and block diagram which shall specify the test setup.

d. The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

9.4. Test Result

Test Engineer	Ikun Yu	Temperature	22.8℃
Test Date	2025-06-04	Air Pressure	985 Mbar
Test Mode(s)	Mode 1/2/3/4/5	Relative Humidity	52.6 %
Verdict	Pass		

Test port	Test Level	Coupling method	Observation	Performance
DC Power Input	3V	CDN	No performance degradation	A

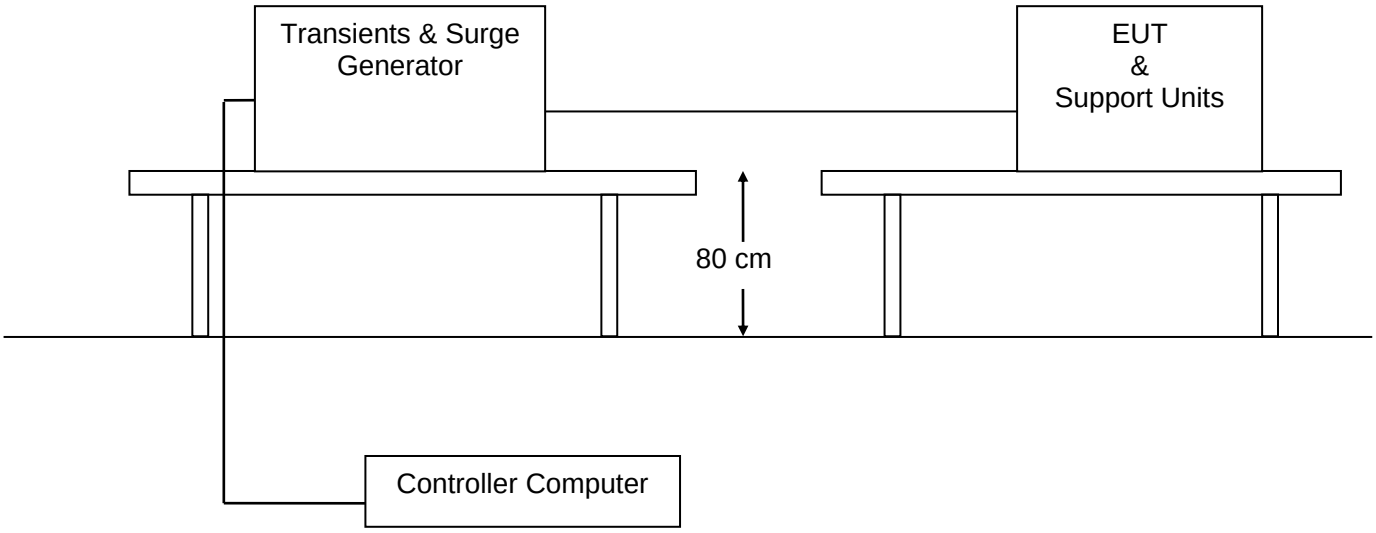
10. Measurement of Transients and Surges in the Vehicular Environment

10.1. Requirements

Port		DC power input ports					
Basic Standard		ISO 7637-2					
Required Performance Criterion		Where, pulse 3a and 3b are applied, the performance criteria for continuous phenomena shall apply. Where pulse 1, 2a, 2b, and 4 are applied, the performance criteria for transient phenomena shall apply, with the exception that a communication link need not to be maintained during the EMC exposure and may have to be re-established.					
Applying pulses		1	2a	2b	3a	3b	4
Test level (V)	12V [a]	-75	37	10	-112	75	-6
	24V [b]	-450	37	20	-150	150	-12
Number of pulses or test time		10 pulses	10 pulses	10 pulses	20 minutes	20 minutes	10 pulses
Burst cycle/pulse repletion time	min	0.5s	0.2s	0.5s	90ms	90ms	1min
	max	5s	2s	5s	100ms	100ms	

Note:
a. For nominal 12 V system, the supply voltage at the output of the pulse generator is 13.5 ± 0.5 V.
b. For nominal 24 V system, the supply voltage at the output of the pulse generator is 27 ± 1 V.

10.2. Block Diagram of Test Setup



10.3. Configuration of the EUT and method of measurement

a. This test method shall ensure the immunity of EUT to conducted transients on the vehicle power supply.
b. The test shall be performed according to the above requirements and block diagram which shall specify the test setup.
c. Apply the test pulses 1, 2a, 2b, 3a, 3b and 4 according to the International Standard ISO 7637-2 to the supply lines of EUT.
d. The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance criterion defined in the report.

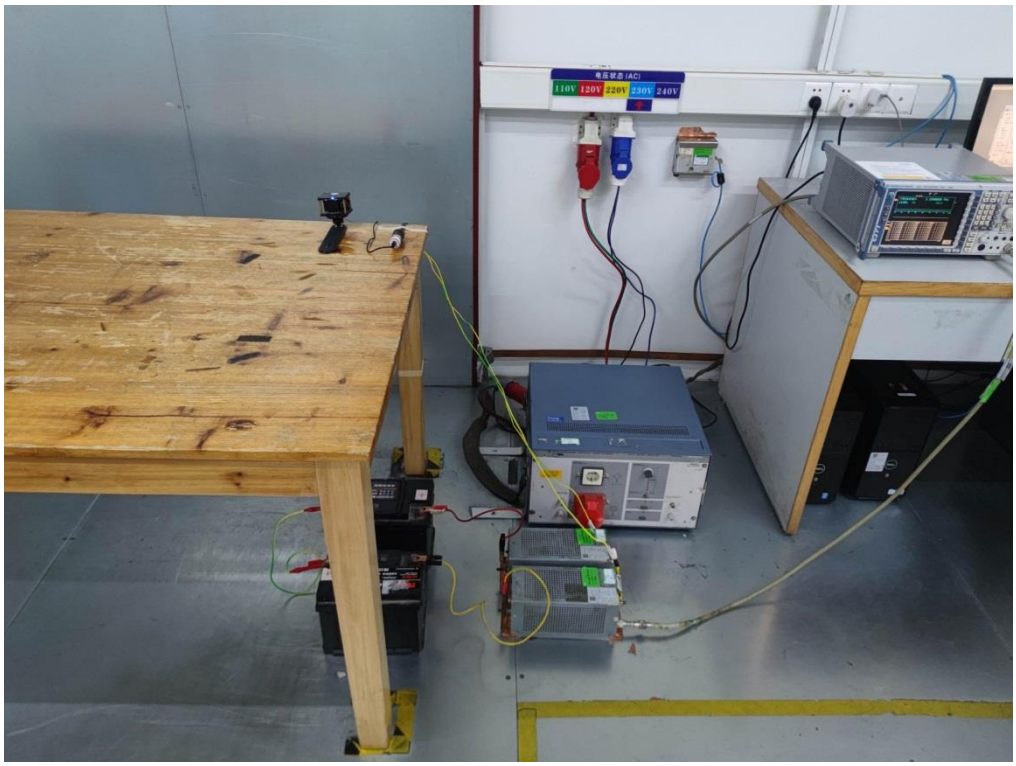
10.4. Test Result

Test Engineer	Ikun Yu	Temperature	22.8℃
Test Date	2025-06-04	Air Pressure	985 Mbar
Test Mode(s)	Mode 1/2/3/4/5	Relative Humidity	52.6 %
Verdict	Pass		

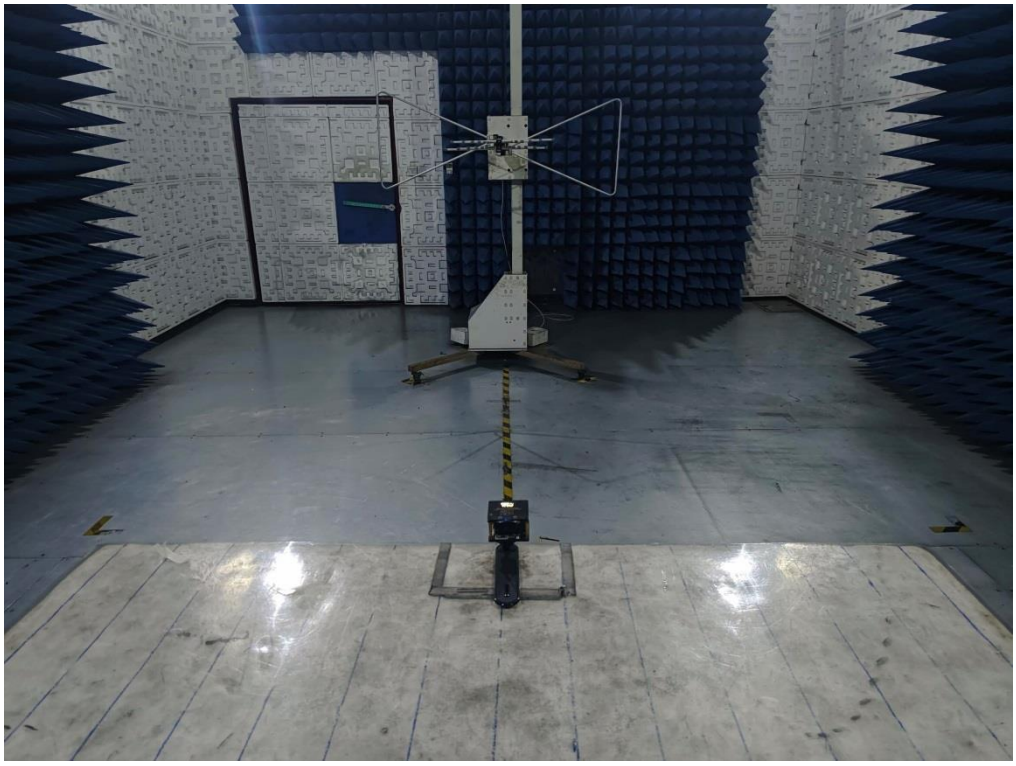
Supply voltage system	Test pulse	Observation	Request Status	Performance
Nominal 12 V	1	No degradation of performance	B	B
	2a	No degradation of performance	B	A
	2b	No degradation of performance	B	B
	3a	No degradation of performance	A	A
	3b	No degradation of performance	A	A
	4	No degradation of performance	B	B

Note:
1. During test, the EUT hasn't loss of function and no unintended RF-Transmission, and no loss of primary user functions.
2. After test, the EUT can operate as intended with no loss of primary and secondary user functions, and the communication link has been maintained.

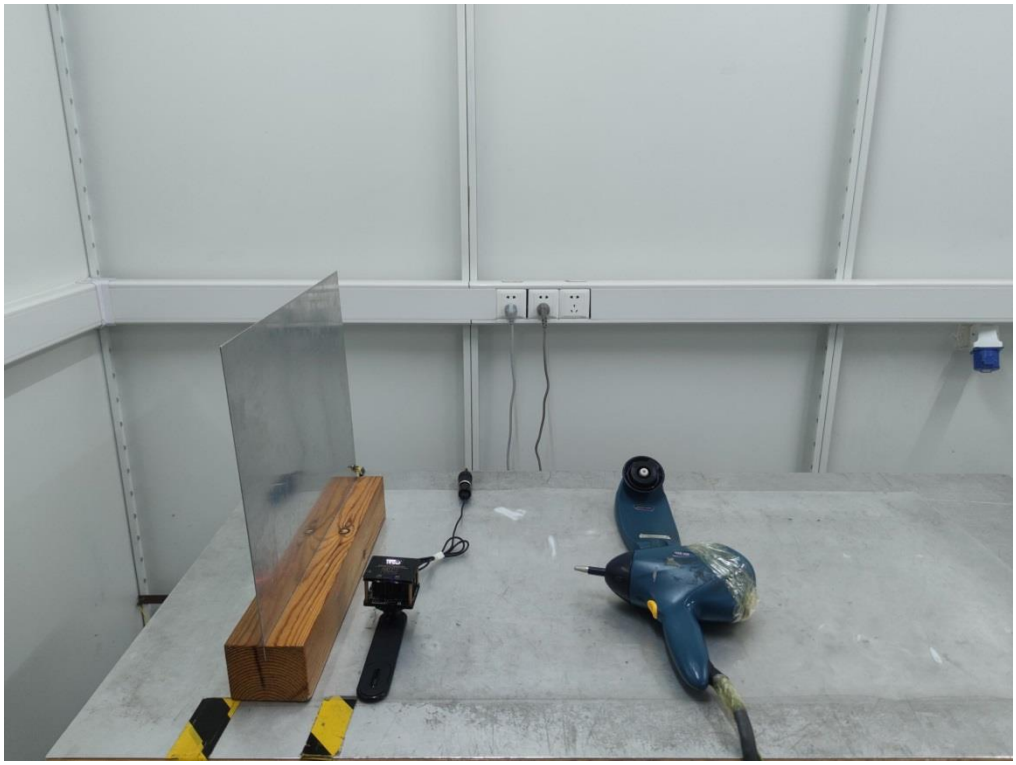
Appendix I: Photographs of Test Setup



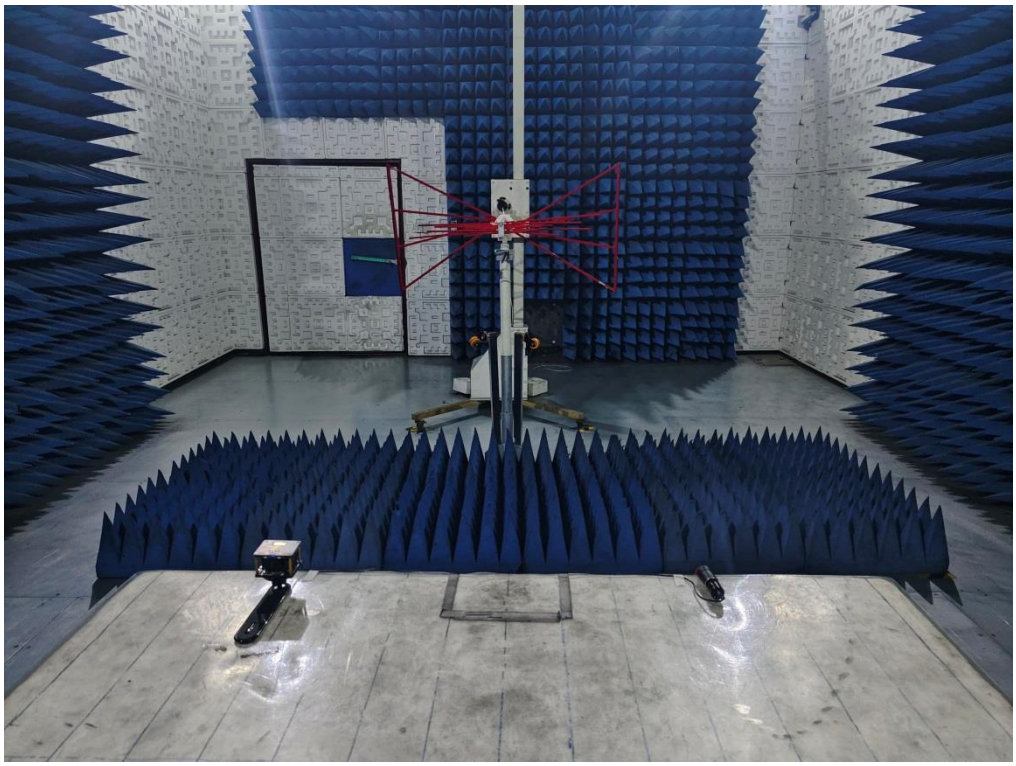
Conducted emissions from the DC power ports



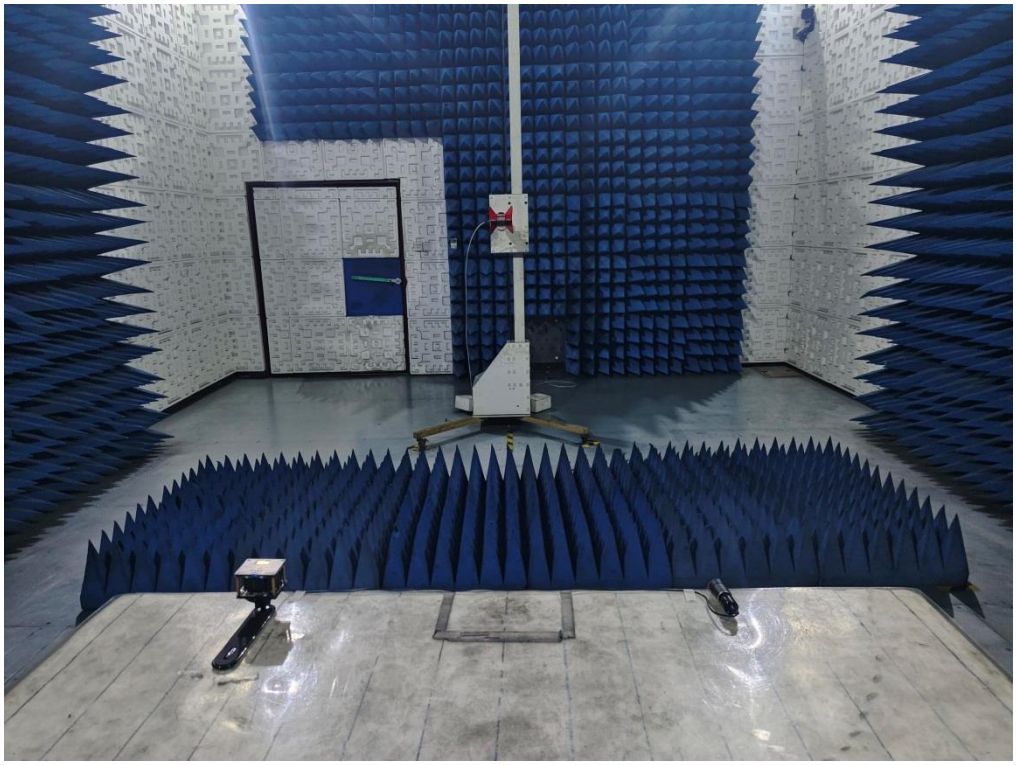
Radiated emissions at frequencies up to 1GHz



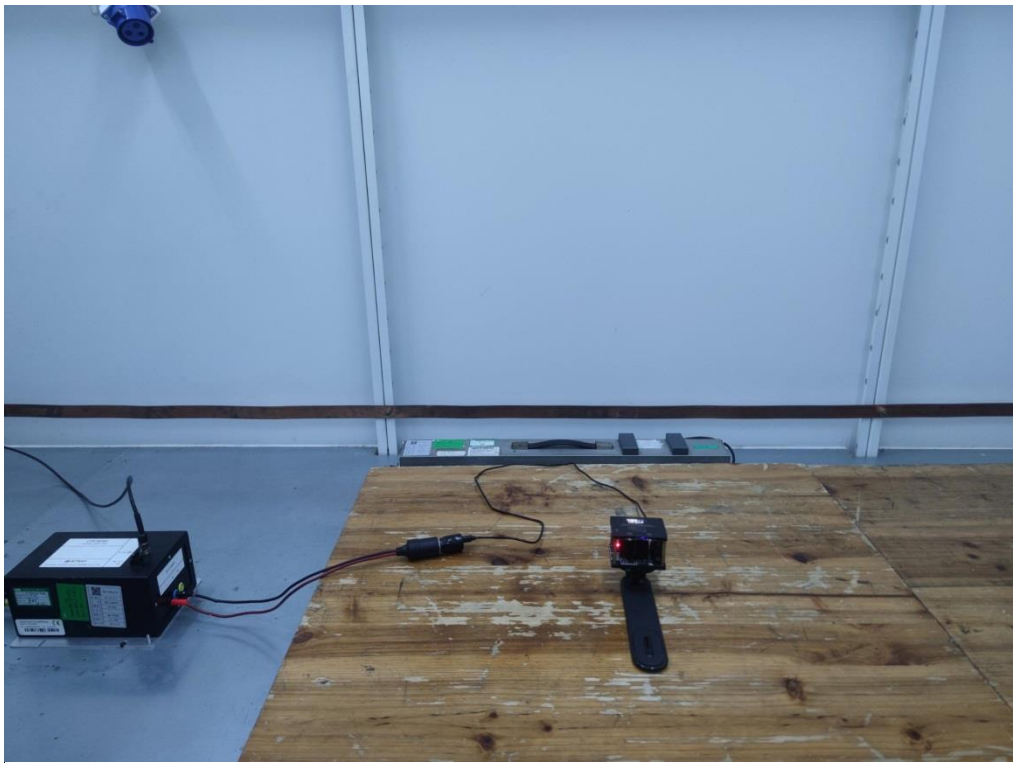
Electrostatic Discharge



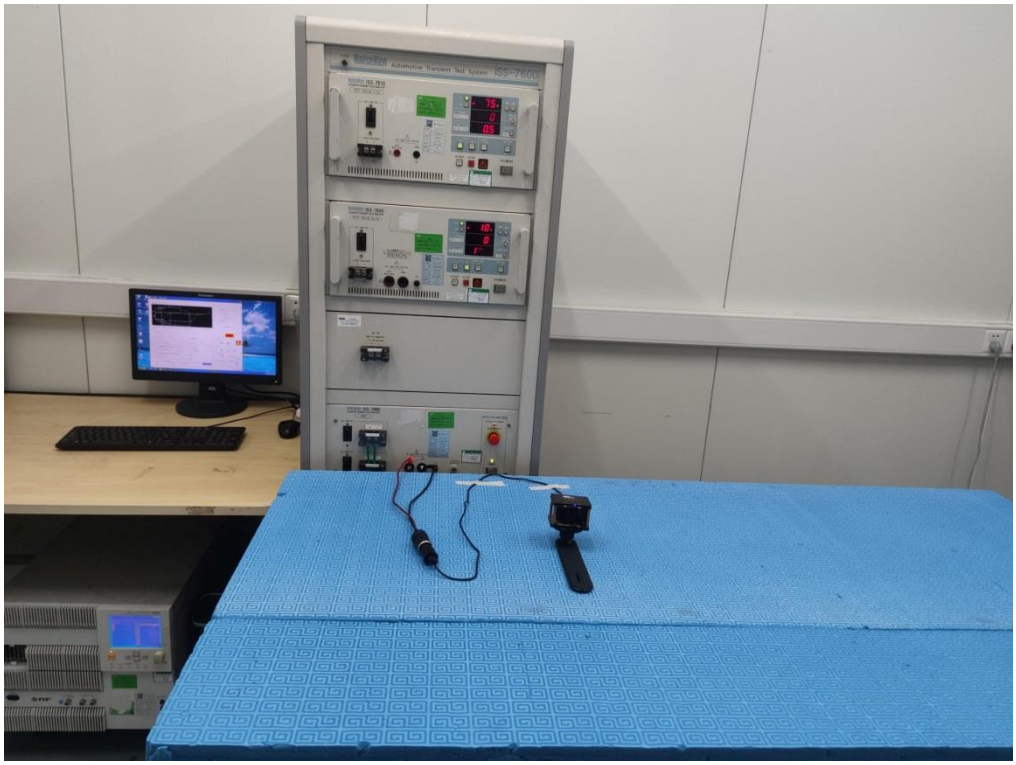
Radio-Frequency Electromagnetic Field up to 1 GHz



Radio-Frequency Electromagnetic Field Above 1 GHz



Radio-Frequency Common Mode at the DC Power Ports



Transients and Surges in the Vehicular Environment

Appendix II: Photographs of Test EUT

Refer to the Report No.: AGC05443250540AP01

Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the “Company”) solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the “Clients”).
2. Any report issued by Company as a result of this application for testing services (the “Report”) shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
3.The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
7.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

-----End of Report-----