Report No. : EED39N804328

CE

EMC TEST REPORT

Product	:	Visual fault locator
Trade mark	:	/
Model/Type reference	:	VLS-8-30
Serial Model	:	VLS-8-01、VLS-8-10、VLS-8-15
Ratings	:	DC 3V(2*1.5V AAA Battery)
Report Number	:	EED39N804328
Date of Issue	:	Jun 18, 2021
Regulations	:	See below

Test Standards	Results
☒ EN 61326-1:2013	PASS
☒ EN 61000-3-2: 2019	N/A
☒ EN 61000-3-3:2013+A1:2019	N/A

Prepared for:

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Prepared by:

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检验检测专用章
Inspection & Testing Services

Compiled by: Emily .chao Reviewed by: Tony.qi

Approved by: Jeff fang Date of Issue: Jun 18, 2021

Check No.: 3932010621

Modification Record

No.	Last Report No.	Modification Description
1	EED39n804328	First report

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1. GENERAL INFORMATION

Applicant: Zhejiang Grandway Telecom Tech. Co., Ltd
6 Building, No.8 Haining Avenue, Haining, Haining City, Zhejiang Province

Manufacturer: Shanghai Grandway Telecom Tech. Co., Ltd.
6F, Xin'an Building No.99 Tian Zhou Road, Shanghai China
Zhejiang Grandway Telecom Tech. Co., Ltd
6 Building, No.8 Haining Avenue,Haining , Haining City, Zhejiang Province

EMC Directive: 2014/30/EU

Product: Visual fault locator

Trade mark: /

Model/Type reference: VLS-8-30

Serial Model: VLS-8-01、VLS-8-10、VLS-8-15

Report Number: EED39N804328

Sample Received Date: Jun 01, 2021

Sample tested Date: Jun 02, 2021 to Jun 12, 2021

The tested sample(s) and the sample information are provided by the client.

2. TEST SUMMARY

The Product has been tested according to the following specifications:

EMISSION		
Standard	**Test Item**	**Test**
CISRP 11	Conducted emission	N/A[1]
CISRP 11	Radiated emission	Yes
EN 61000-3-2	Harmonic current emission	N/A[1]
EN 61000-3-3	Voltage fluctuations & flicker	N/A[1]

IMMUNITY (EN 61326-1:2013)		
Standard	**Test Item**	**Test**
IEC 61000-4-2	Electrostatic discharge immunity	Yes
IEC 61000-4-3	Radio-frequency electromagnetic field immunity	Yes
IEC 61000-4-4	Electrical fast transient/burst immunity	N/A[1]
IEC 61000-4-5	Surges immunity	N/A[1]
IEC 61000-4-6	Conducted disturbances induced by radio-frequency fields Immunity	N/A[1]
IEC 61000-4-8	Power-frequency magnetic field immunity	Yes
IEC 61000-4-11	Voltage dips, short interruptions and voltage variations immunity	N/A[1]

Notes:1. The product is powered by battery.

3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Radiated disturbance (30MHz to 1GHz)	+/- 4.45

4. PRODUCT INFORMATION AND TEST SETUP

4.1 PRODUCT INFORMATION

Ratings: DC 3V(2*1.5V AAA Battery)

The highest frequency of the internal sources of the EUT is (less than 108 MHz) MHz:

☒ less than 108 MHz, the measurement shall only be made up to 1 GHz.

☐ between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz.

☐ between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz.

☐ above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

Adapter information: /

Model difference: The model differences are shown in the following table：

Model	VLS-8-01	VLS-8-10	VLS-8-15	VLS-8-30
appearance	same	same	same	same
colour	same	same	same	same
structure	same	same	same	same
circuitous philosophy	same	same	same	same
PCB	same	same	same	same
List of Key Components	same	same	same	same
Red emission power	1mw	10mw	15mw	30mw
weight	67g	67g	67g	67g

4.2 TEST SETUP CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between Product and support equipment.

4.3 DECISION OF FINAL TEST MODE

1. The EUT was tested together with the above additional components, and a configuration, which produced the worst emission levels, was selected and recorded in this report.
   The following test mode(s) were scanned during the preliminary test:

Pre Test Mode		
Emission	Radiated Emission	**Mode 1: Normal Operation**

2. After the preliminary scan, the following test mode was found to produce the final emission level.

Final Test Mode		
Emission	Radiated Emission	**Mode 1: Normal Operation**

Then, the above highest emission mode of the configuration of the EUT and cable was chosen for all final test items.

5. FACILITIES AND ACCREDITATIONS

5.1 TEST FACILITY

All test facilities used to collect the test data are located at Building 18, Zhihui New Town Ecological Industrial Park, No. 1206, Jinyang East Road, Lujia Town, Kunshan, Jiangsu, China.The site and apparatus are constructed in conformance with the requirements of ANSI C63.4, CISPR 16-1-1 and other equivalent standards.

5.2 TEST EQUIPMENT LIST

Instrumentation: The following list contains equipments used at CTI for testing.
The calibrations of the Monitoring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the Monitoring instrument.

Equipment used during the tests:

Radiated emission Test				
Equipment Type	**Manufacturer**	**Model Number**	**Serial Number**	**Calibration Due**
3M Chamber	RIKEN	9.25(L)m*6.25(W) m*6.45(H)m	AC-K	2022-09-06
Receiver	R&S	ESU8	100537	2021-12-09
Spectrum analyzer	R&S	FSV40	101185	2021-12-09
Microwave Preamplifier	R&S	SCU-18D	1987397	2021-12-09
Antenna (30MHz~1GHz)	SCHWARZBECK	VULB9163	9163-965	2021-10-15
Antenna (1GHz~18GHz)	R&S	HF907	102524	2021-12-14

Electrostatic discharge Test (IEC 61000-4-2)				
Equipment Type	**Manufacturer**	**Model Number**	**Serial Number**	**Calibration Due**
ESD Simulator	NOISEKEN	ESS-B3011A	ESS1940818	2021-12-08

Radio-frequency electromagnetic field Immunity Test (IEC 61000-4-3)				
Equipment Type	**Manufacturer**	**Model Number**	**Serial Number**	**Calibration Due**
3M Chamber	RIKEN	9.25(L)m*6.25(W) m*6.45(H)m	AC-K	2022-09-06
Radiated immunity test system	TESEQ	ITS 6006	77394	2021-12-04
Stacked double Log.-Per. Antenna	SCHWARZBECK	STLP 9129	00131	NCR
Power Amplifier (80MHz~1GHz)	TESEQ	CBA 1G-600B	T2491-0819	2021-12-02
Power Amplifier (1GHz~6GHz)	MILMEGA	AS0860B-50/50	1087034	2021-12-03
Power Meter	TESEQ	PMU 6006	77681	2021-12-03
Power Meter	TESEQ	PMU 6006	77688	2021-12-03

Power-frequency magnetic field Immunity Test (IEC 61000-4-8)				
Equipment Type	**Manufacturer**	**Model Number**	**Serial Number**	**Calibration Due**
Programmable AC/DC Power Source	TESEQ	NSG1007-03-240	1926A02176	2021-12-02
Power frequency magnetic field suite	AMETEK	Option 8-300	1459	2021-12-31

5.3 LABORATORY ACCREDITATIONS AND LISTINGS

The Monitoring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

6. RADIATED EMISSION

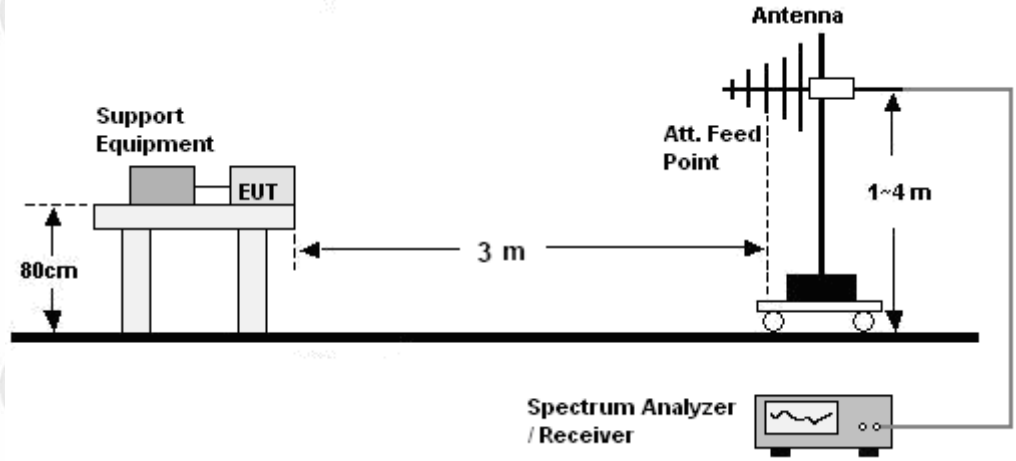
6.1 LIMITS

Limits for Group 1 class A Equipment

Frequency (MHz)	Quasi-peak limits at 3m dB(μV/m)
30-230	50
230-1000	57

Note: The lower limit shall apply at the transition frequencies.

6.2 BLOCK DIAGRAM OF TEST SETUP



6.3 TEST PROCEDURE

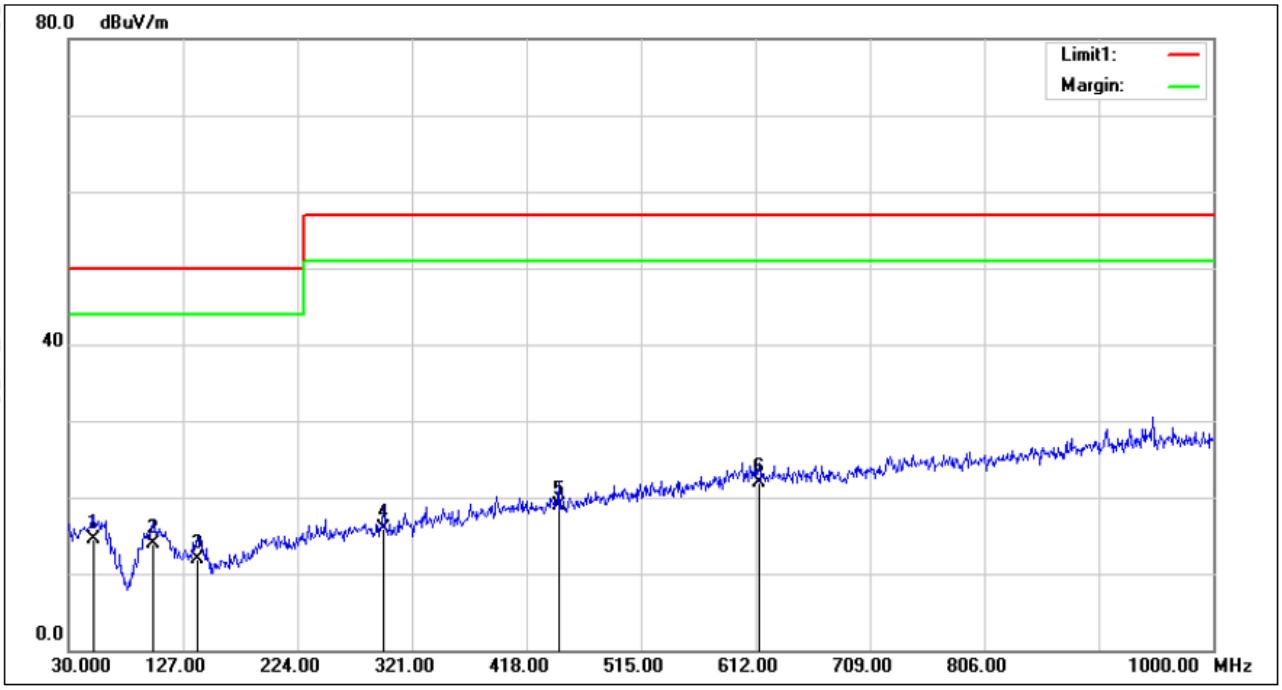
a The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.

b Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

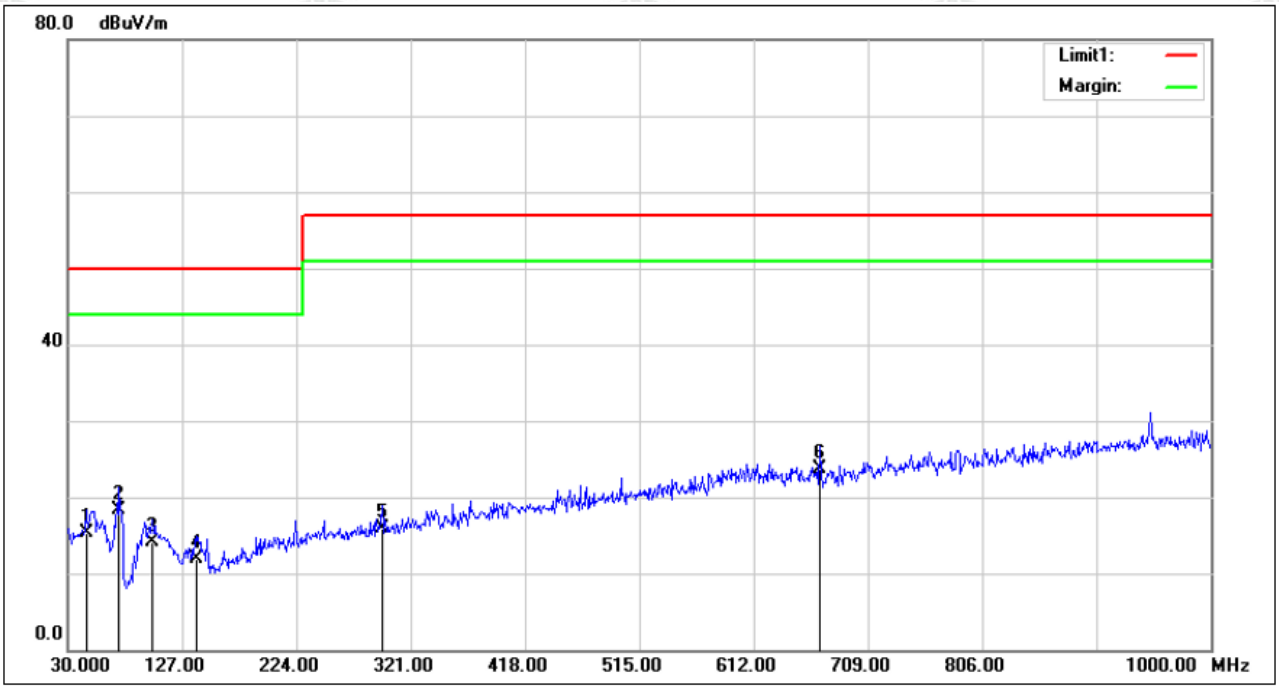
6.4 GRAPHS AND DATA

Product	:	Visual fault locator	**Model/Type reference**	:	VLS-8-30
Power	:	DC 3V	**Temperature**	:	22.3℃
Mode	:	Mode 1	**Humidity**	:	56.7%
Polarization	:	Horizontal	**Press**	:	100.8kPa
Test Date	:	2021-06-02			



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	51.3400	35.82	-21.29	14.53	50.00	-35.47	100	117	QP
2	101.7800	35.35	-21.52	13.83	50.00	-36.17	200	0	QP
3	139.6100	34.87	-22.90	11.97	50.00	-38.03	200	66	QP
4	296.7500	36.48	-20.63	15.85	57.00	-41.15	100	248	QP
5	445.1600	36.16	-17.32	18.84	57.00	-38.16	110	0	QP
6	614.9100	35.42	-13.53	21.89	57.00	-35.11	200	45	QP

Product	:	Visual fault locator	**Model/Type reference**	:	VLS-8-30
Power	:	DC 3V	**Temperature**	:	22.3℃
Mode	:	Mode 1	**Humidity**	:	56.7%
Polarization	:	Vertical	**Press**	:	100.8kPa
Test Date	:	2021-06-02			



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg.)	
1	45.5200	37.06	-21.70	15.36	50.00	-34.64	100	360	QP
2	73.6500	45.59	-27.24	18.35	50.00	-31.65	200	41	QP
3	101.7800	35.63	-21.52	14.11	50.00	-35.89	100	295	QP
4	138.6400	35.17	-23.18	11.99	50.00	-38.01	200	67	QP
5	296.7500	36.49	-20.63	15.86	57.00	-41.14	180	360	QP
6	668.2600	37.21	-13.48	23.73	57.00	-33.27	100	27	QP

7. IMMUNITY TEST

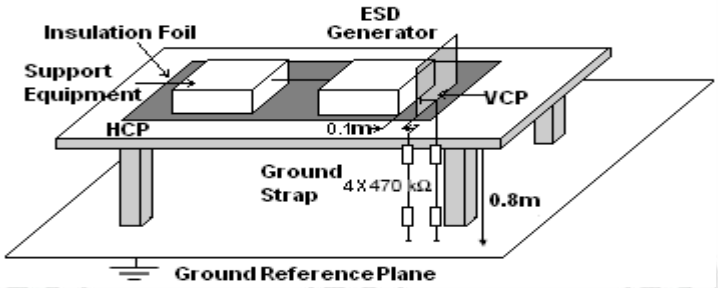
General Performance Criteria	
Product Standard	**EN 61326-1:2013**
CRITERION A	The equipment shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the equipment is used 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, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.
CRITERION B	The equipment shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, 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 however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.
CRITERION C	Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

8. ELECTROSTATIC DISCHARGE IMMUNITY

8.1 TEST SPECIFICATION

Basic Standard	:	EN 61326-1 & IEC 61000-4-2
Test Port	:	Enclosure port
Discharge Impedance	:	330 ohm / 150 pF
Discharge Mode	:	Single Discharge
Discharge Period	:	one second between each discharge

8.2 BLOCK DIAGRAM OF TEST SETUP



8.3 TEST PROCEDURE

a Electrostatic discharges were applied only to those points and surfaces of the Product 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 Product.

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 Product as fast as possible (without causing mechanical damage) to touch the Product. After each discharge, the ESD generator was removed from the Product and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

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 Product. The ESD generator was positioned vertically at a distance of 0.1 meters from the Product 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 Product were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the Product.

8.4 RESULTS & PERFORMANCE

Product	:	Visual fault locator	**Model/Type reference**	:	VLS-8-30
Power	:	DC 3V	**Temperature**	:	22.6℃
Mode	:	Mode 1	**Humidity**	:	45.2%
Test Date	:	2021.06.12	**Press**	:	101.1kPa

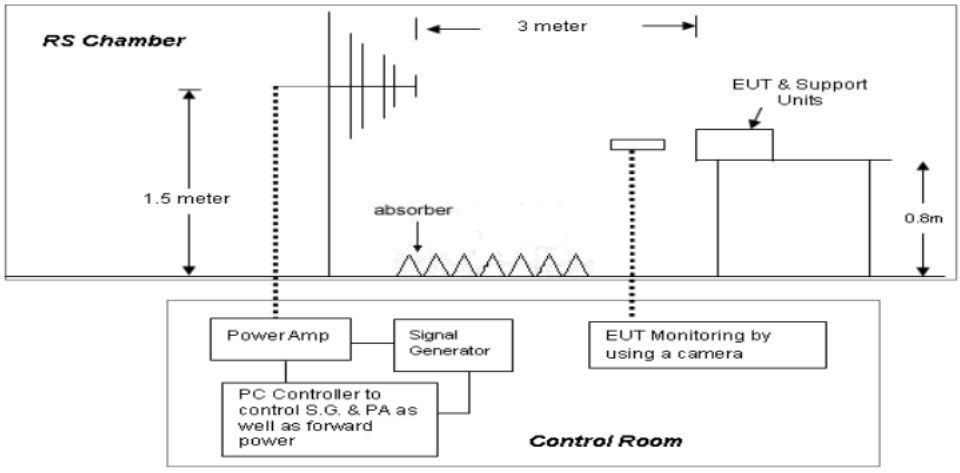
Discharge Method	Discharge Position	Voltage (±kV)	No. of Discharge per polarity (Each Point)	Required Level	Performance Criterion
Contact Discharge	Indirect Discharge VCP	± 4	25	B	A
	Indirect Discharge HCP	± 4	25	B	A
	Conductive Surfaces	± 4	25	B	A
Air Discharge	Slots, Apertures, and Insulating Surfaces	± 8	10	B	A

9. RADIO-FREQUENCY ELECTROMAGNETIC FIELD IMMUNITY

9.1 TEST SPECIFICATION

Basic Standard	:	EN 61326-1 & IEC 61000-4-3
Test Port	:	Enclosure port
Step Size	:	1%
Modulation	:	1kHz, 80% AM
Dwell Time	:	3 second
Polarization	:	Horizontal & Vertical

9.2 BLOCK DIAGRAM OF TEST SETUP



9.3 TEST PROCEDURE

a The testing was performed in a fully-anechoic chamber. The transmit antenna was located at a distance of 3m from the Product.

b The frequency range is swept from 80MHz to 1000MHz and 1400MHz to 2700MHz, with the signal 80% amplitude modulated with a 1 kHz sine wave. The rate of sweep did not exceed 1.5×10^{-3} decade/s. Where the frequency range is swept incrementally, the step size was 1%.

c The test was performed with the Product exposed to both vertically and horizontally polarized fields on each of the four sides.

9.4 RESULTS & PERFORMANCE

Product	:	Visual fault locator	**Model/Type reference**	:	VLS-8-30
Power	:	DC 3V	**Temperature**	:	24.1℃
Mode	:	Mode 1	**Humidity**	:	52.7%
Test Date	:	2021-06-06	**Press**	:	100.7kPa

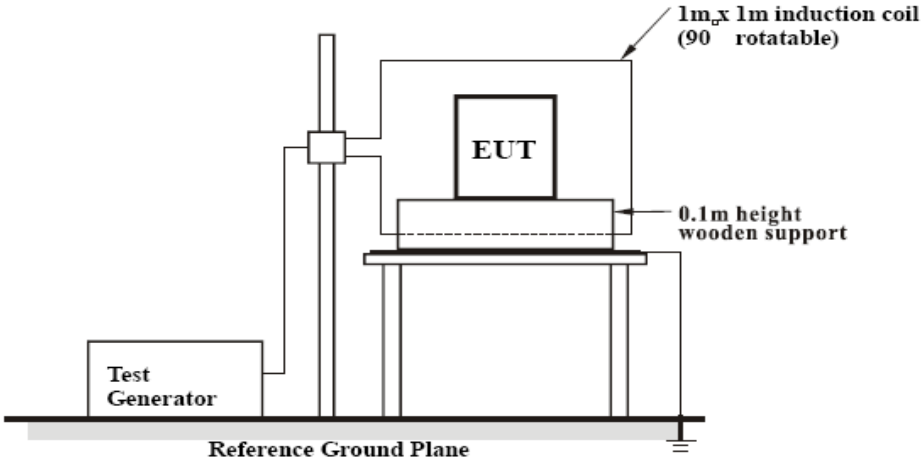
Frequency (MHz)	Position	Field Strength (V/m)	Required Level	Performance Criterion
80 - 1000	Front, Back, Left, Right	10	A	A
1400 - 2000	Front, Back, Left, Right	3	A	A
2000 - 2700	Front, Back, Left, Right	1	A	A

10. POWER-FREQUENCY MAGNETIC FIELD IMMUNITY

10.1 TEST SPECIFICATION

Basic Standard	:	EN 61326-1 & IEC 61000-4-8
Test Port	:	Enclosure port
Power Frequency	:	50Hz / 60Hz
Duration	:	1 Min
Direction	:	X axis; Y axis; Z axis

10.2 BLOCK DIAGRAM OF TEST SETUP



10.3 TEST PROCEDURE

a The Product and support units were located on a table, 0.8m away from ground floor.

b The Product is configured and connected to satisfy its functional requirements. It shall be place on the GRP with the interposition of a 0.1m thickness insulating support (e.g.dry wood)

c Setting the parameter of tests and then perform the test software of test simulator.

d The induction coil shall enclose the Product placed at its center.

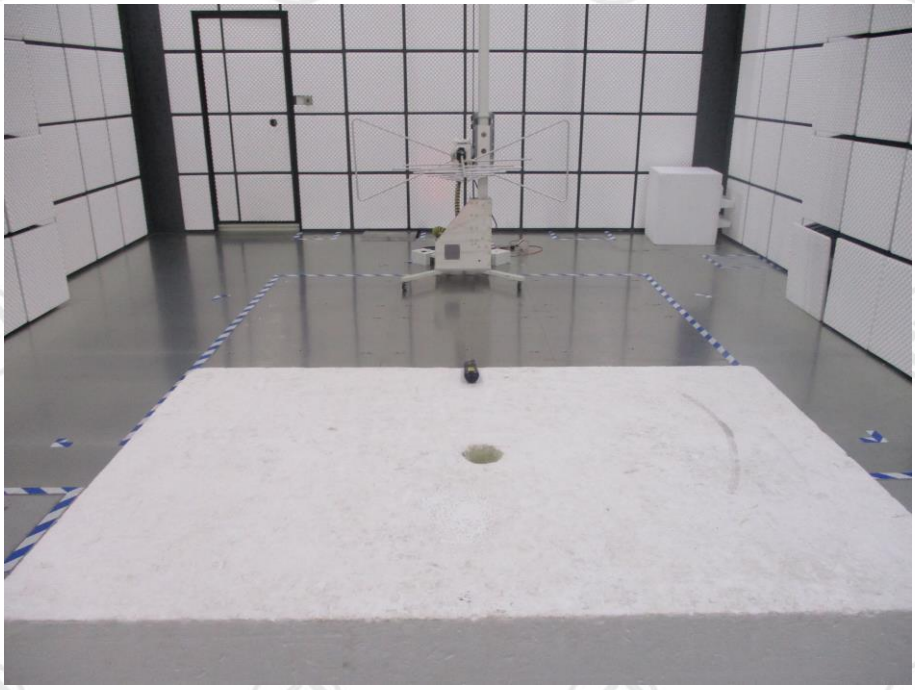
10.4 RESULTS & PERFORMANCE

Product	:	Visual fault locator	**Model/Type reference**	:	VLS-8-30
Power	:	DC 3V	**Temperature**	:	23.9℃
Mode	:	Mode 1	**Humidity**	:	50.2%
Test Date	:	2021-06-12	**Press**	:	101.1kPa

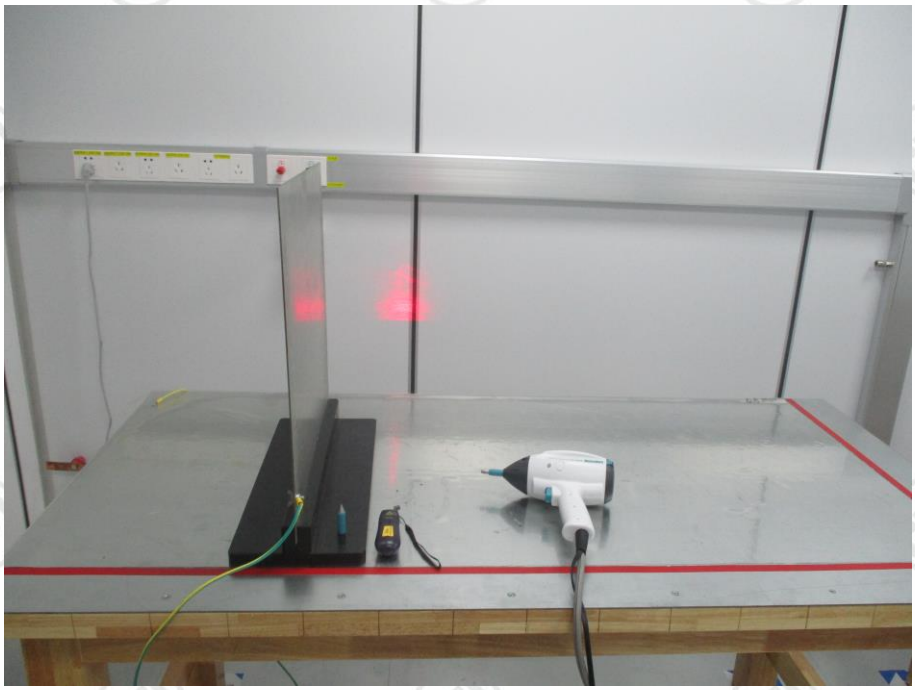
Direction	Field Strength (A/m)	Duration (Min)	Required Criterion	Performance Criterion
X	30	1	A	A
Y	30	1	A	A
Z	30	1	A	A

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Radiated Emission Test Setup

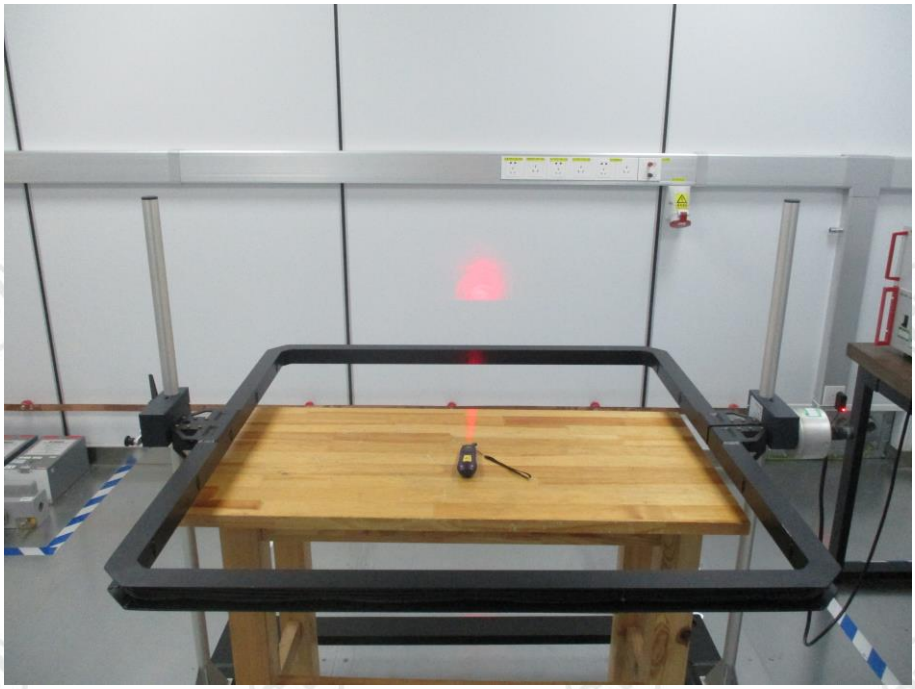


Electrostatic Discharge Immunity Test Setup



Radio-frequency electromagnetic field Immunity Test Setup

Power-frequency Magnetic Field Immunity Test Setup



APPENDIX 2 PHOTOGRAPHS OF PRODUCT

View of Product-1

View of Product-2

View of Product-3

View of Product-4

*** End of Report ***