



**SGS-CSTC Standards Technical Services
(Shanghai) Co., Ltd.**

Report No.: SHEM190901681201V01

Page: 1 of 38

TEST REPORT

Application No.: SHEM1909016812MD
Applicant: Shanghai JAKA Robotics Ltd
Address of Applicant: 1st Floor, No.1 building, No. 251 Yaohua Road, China (Shanghai) Pilot Free Trade Zone
Manufacturer: Shanghai JAKA Robotics Ltd
Address of Manufacturer: 1st Floor, No.1 building, No. 251 Yaohua Road, China (Shanghai) Pilot Free Trade Zone
Factory: Changzhou JAKA Intelligent Equipment Co., Ltd
Address of Factory: Building 10, No.377 South Wuyi Road, Wujin District, Changzhou, Jiangsu, China
Equipment Under Test (EUT):
EUT Name: JAKA Zu Cobot
Model No.: JAKA Zu 3, JAKA Zu 7, JAKA Zu 12
□ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade Mark: JAKA
Standards: EN 61000-6-4:2007+A1:2011, EN 61000-6-2:2005
Date of Receipt: 2019-08-01
Date of Test: 2019-08-05 to 2019-08-08
Date of Issue: 2019-12-02

Test Result :	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EU Declaration of Conformity and compliance with all relevant EU Directives.

Parlan Zhan

Parlan Zhan
E&E Section Manager



The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.
Testing Center (China) Ltd.

NO.588 West Jindu Road, Songjiang District, Shanghai, China 201612
中国·上海·松江区金都西路588号 邮编: 201612

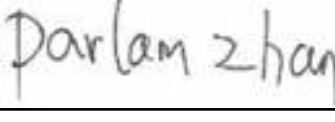
(86-21) 61915666 (86-21) 61915678 www.sgsgroup.com.cn
(86-21) 61915666 (86-21) 61915678 sgs.china@sgs.com

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Revision Record			
Version	Description	Date	Remark
00	Original	2019-11-20	/
01	Update §1	2019-12-02	Amendment

Remark: The version 01 of the report had replaced the version 00 which was invalid.

Authorized for issue by:				
				
		Bruce Tang / Project Engineer		
				
		Parlam Zhan / Reviewer		



2 Test Summary

Emission Part			
Item	Method	Class	Result
Conducted Emissions	EN 61000-6-4:2007+A1:2011	Table 1	Pass
Radiated Emissions (30MHz-1GHz)	EN 61000-6-4:2007+A1:2011	Table 1	Pass
Radiated Emissions (above 1GHz)	EN 61000-6-4:2007+A1:2011	Table 1	Pass

Immunity Part			
Item	Method	Requirement	Result
Electrostatic Discharge	EN 61000-4-2:2009	4kV Contact Discharge 8kV Air Discharge	Pass
Radiated Immunity	EN 61000-4-3:2006 +A1:2008+A2:2010	10V/m, 80%, 1kHz Amp. Mod. 3V/m, 80%, 1kHz Amp. Mod. 1V/m, 80%, 1kHz Amp. Mod.	Pass
Electrical Fast Transients/Burst at Power Port	EN 61000-4-4:2012	2kV 5/50ns Tr/Td 5kHz Repetition Frequency	Pass
Surge at Power Port	EN 61000-4-5:2014	1.2/50 μ s Tr/Td 1kV Line to Line 2kV Line to Ground	Pass
Conducted Immunity at Power Port	EN 61000-4-6:2014	10Vrms (emf), 80%, 1kHz Amp. Mod.	Pass
Power Frequency Magnetic Field	EN 61000-4-8:2010	50Hz 30A/m	Pass
Voltage Dips and Interruptions	EN 61000-4-11:2004 +A1:2017	0 % UT for 1per 40 % UT for 10per 70 % UT for 25per 0 % UT for 250per UT is Supply Voltage	Pass

Remark:

Floor-standing

Note1: Declaration of EUT Family Grouping:

There are series models mentioned in this report and they are the similar in electrical and electronic characters. Only the model JAKA Zu 12 was tested since their differences are model number and appearance.



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4 General Information

4.1 Details of E.U.T.

Power supply: AC100-240V , 450W

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conducted Emission at mains port using AMN	±2.6dB (9kHz to 150kHz)
		±2.3dB (150kHz to 30MHz)
2	Conducted Emission at mains port using VP	±1.9 dB (9kHz to 30MHz)
3	Conducted Emission at telecommunication port using AAN	±4.1 dB (150kHz to 30MHz)
4	Radiated Power	±3.0dB
5	Radiated emission	±4.4dB (30MHz-1GHz)
		±4.8dB (1GHz-6GHz)
		±5.2dB (6GHz-18GHz)

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



4.4 Test Location

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab
588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

sub-contracted.

Shanghai Electrical Apparatus Research Institute(Group) Co.,Ltd
505 Wuning Road, Shanghai , China

4.5 Test Facility

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

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **NVLAP (Certificate No. 201034-0)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the National Voluntary Laboratory Accreditation Program(NVLAP). Certificate No. 201034-0.

- **FCC –Designation Number: CN5033**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

Designation Number: CN5033. Test Firm Registration Number: 479755.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

IC Registration No.: 8617A-1. CAB Identifier: CN0020.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

4.8 Monitoring of EUT for All Immunity Test

Visual: work status



5 Equipment List

Conducted Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESR7	SHEM162-1	2018-12-20	2019-12-19
Line impedance stabilization network	SCHWARZBECK	NSLK8127	SHEM061-1	2018-12-20	2019-12-19
Line impedance stabilization network	EMCO	3816/2	SHEM019-1	2018-12-20	2019-12-19
Pulse limiter	Rohde & Schwarz	ESH3-Z2	SHEM029-1	2018-12-20	2019-12-19
Shielding Room	ZHONGYU	8*4*3M	SHEM079-2	2017-12-20	2020-12-19
CE test Cable	/	/	CE01	2018-12-26	2019-12-25

Radiated Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI test receiver	Rohde & Schwarz	ESU40	SHEM051-1	2018-12-20	2019-12-19
CONTROLLER	INNCO	CO200	SHEM047-1	2018-12-20	2019-12-19
ANTENNA MAST	INNCO	MA400-EP	SHEM047-2	2018-12-20	2019-12-19
TURN DEVICE	INNCO	DE 3600-RH	SHEM047-3	2018-12-20	2019-12-19
Broadband UHF-VHF ANTENNA	SCHWARZBECK	VULB9168	SHEM048-1	2018-12-20	2019-12-19
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2018-12-20	2019-12-19
Low Amplifier	CLAVIO	BDLNA-0001-412010	SHEM164-1	2018-12-26	2019-12-25

Electrostatic Discharge					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Electrostatic Discharge Simulator	TESEQ	NSG 437	SHEM041-1	2018-08-13	2019-08-12

Radiated Immunity					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Signal generator	Rohde & Schwarz	SMJ100A	SHEM141-1	2018-08-13	2019-08-12
Power Meter	Rohde & Schwarz	NRP	SHEM057-1	2018-12-20	2019-12-19
Power meter sensor	Rohde & Schwarz	NRP-Z91	SHEM057-2	2018-12-20	2019-12-19
Antenna	SCHWARZBECK	STLP9128D	SHEM130-1	N/A	N/A
Antenna	SCHWARZBECK	STLP9149	SHEM131-1	N/A	N/A
Amplifier	MILMEGA	80RF1000-250	SHEM132-1	2018-12-20	2019-12-19
Amplifier	MILMEGA	AS0840-55-55	SHEM133-1	2018-12-20	2019-12-19
Power meter sensor	Rohde & Schwarz	NRP-Z22	SHEM136-1	2018-12-20	2019-12-19
ElectroMagnetic Field Probe	ETS-Lindgren	HI-6113	SHEM134-1	2018-12-11	2019-12-10
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2017-07-22	2020-07-21



Electrical Fast Transients/Burst					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2018-12-20	2019-12-19

Surge					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2018-12-20	2019-12-19

Conducted Immunity					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Signal generator	Rohde & Schwarz	SMJ100A	SHEM141-1	2018-08-13	2019-08-12
PAMP Conducted RF test system	HAEFFLY	PAMP250	SHEM023-1	2018-12-20	2019-12-19
6dB Attenuator	HUAXIANG	TST-150-761	SHEM151-1	2018-12-20	2019-12-19
CDN impedance and K-factor	LUTHI	L-801 M1	SHEM023-5	2018-12-20	2019-12-19
CDN impedance and K-factor	LUTHI	L-801 M2/M3	SHEM023-6	2018-12-20	2019-12-19
Shielding Room	ZHONGYU	5*5*3M	SHEM079-6	2018-12-20	2019-12-19

Power Frequency Magnetic Field					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2017-12-20	2019-12-19
Motorised Variac	MV2616	MV2616	SHEM026-6	N/A	N/A
Current transformer for magnetic field coil	EM test	MC2630	SHEM026-7	2017-12-20	2019-12-19
Current transformer for magnetic field coil	EM test	MC26100	SHEM026-8	2017-12-20	2019-12-19
Magnetic field coil	EM test	MS100	SHEM026-9	2017-12-20	2019-12-19

Voltage Dips and Interruptions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Immunity Test System	EMC PARTNER	TRA3000 F-S-D-V	SHEM163-1	2017-12-20	2019-12-19

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Digital pressure meter	YONGZHI	DYM3-01	SHEM082-1	2018-01-25	2021-01-24
Temperature&humidity recorder	ShangHai weather meter work	ZJ 1-2B	SHEM042-1~6	2018-08-31	2019-08-30
Digital Multimeter	FLUKE	17B	SHEM043-3	2018-09-03	2019-09-02
Autoformer regulator	Guangzhou bao de	TDGC2-5KVA	SHEM150-1	N/A	N/A
Multi-purpose tong tester	FLUKE	316	SHEM001-1	2018-12-20	2019-12-19

6 Emission Test Results

6.1 Conducted Emissions

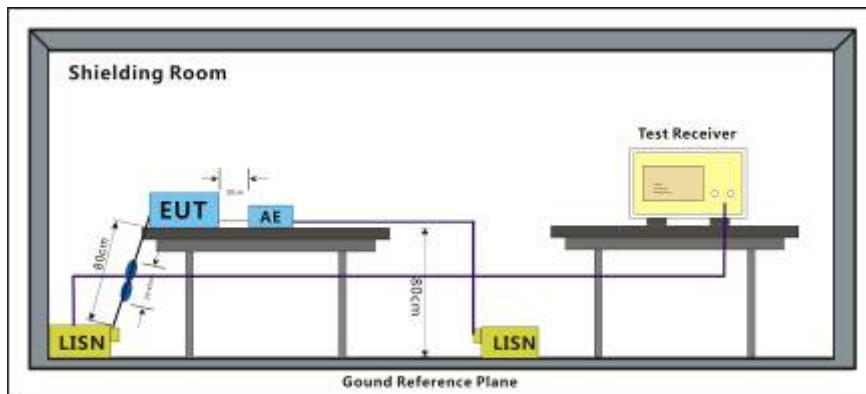
Test Requirement:	EN 61000-6-4:2007+A1:2011
Test Method:	EN 61000-6-4:2007+A1:2011
Frequency Range:	150kHz to 30MHz
Limit:	
0.15MHz – 0.5MHz	79dB(μV) quasi-peak, 73dB(μV) average
0.5MHz – 30MHz	66dB(μV) quasi-peak, 60dB(μV) average
Detector:	Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz

6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 48 % RH Atmospheric Pressure: 1007 mbar
Test mode a:Normal Working_keep EUT running continual .

6.1.2 Test Setup Diagram



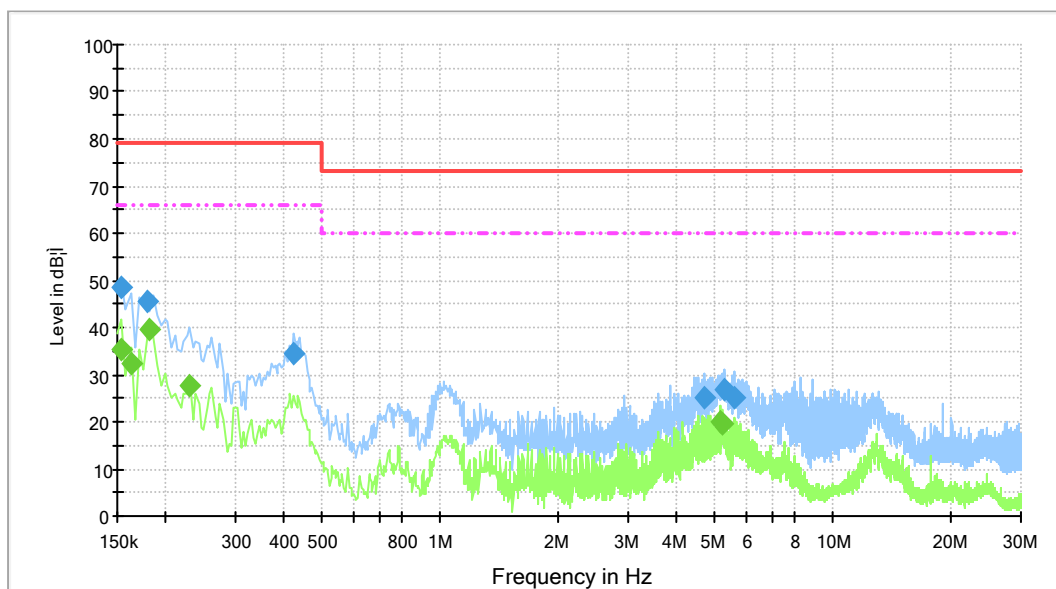
6.1.3 Measurement Data

An initial pre-scan was performed with peak detector. Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.

Notes: Emission Level=Read Level + LISN Factor + Cable Loss



Mode:a; Line:Live Line



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154000	48.7	1000.0	9.000	GN	L1	7.6	30.3	79.0
0.178000	45.7	1000.0	9.000	GN	L1	7.2	33.3	79.0
0.422000	34.6	1000.0	9.000	GN	L1	6.7	44.4	79.0
4.702000	25.0	1000.0	9.000	GN	L1	6.5	48.0	73.0
5.298000	26.7	1000.0	9.000	GN	L1	6.5	46.3	73.0
5.578000	25.1	1000.0	9.000	GN	L1	6.5	47.9	73.0

Final Result 2

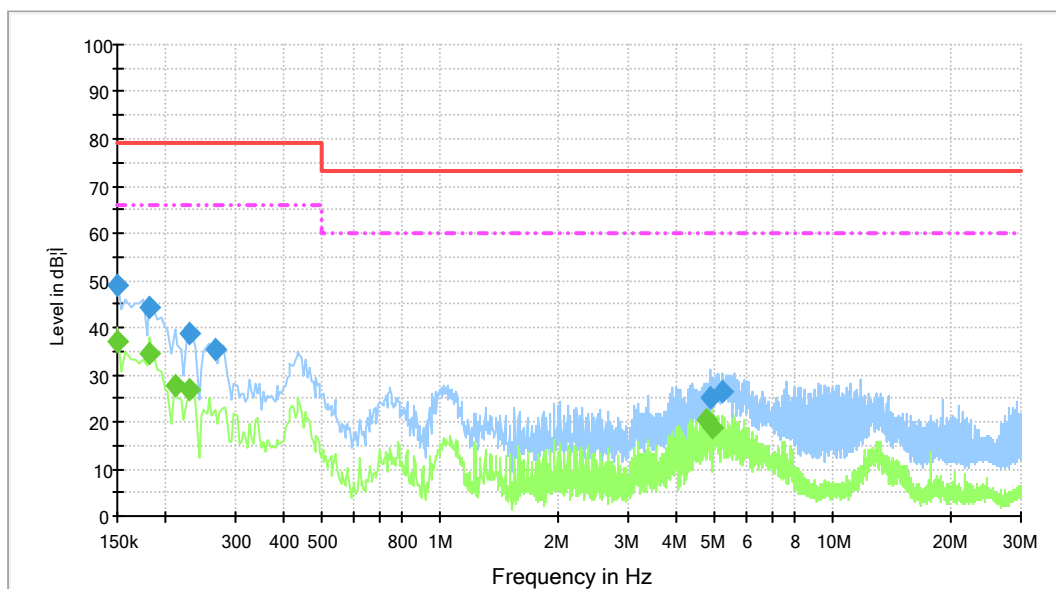
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154000	35.4	1000.0	9.000	L1	7.6	30.6	66.0
0.162000	32.5	1000.0	9.000	L1	7.5	33.5	66.0
0.182000	39.6	1000.0	9.000	L1	7.1	26.4	66.0
0.230000	27.7	1000.0	9.000	L1	6.7	38.3	66.0
5.138000	19.8	1000.0	9.000	L1	6.5	40.2	60.0
5.218000	19.4	1000.0	9.000	L1	6.5	40.6	60.0

Note: 1. Level = Read Level + Probe Factor + Cable loss

2. If QP Result comply with AV limit, AV Result is deemed to comply with AV limit



Mode:a; Line:Neutral Line



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	48.8	1000.0	9.000	GN	N	7.7	30.2	79.0
0.182000	44.2	1000.0	9.000	GN	N	7.1	34.8	79.0
0.230000	38.8	1000.0	9.000	GN	N	6.7	40.2	79.0
0.266000	35.1	1000.0	9.000	GN	N	6.7	43.9	79.0
4.862000	25.3	1000.0	9.000	GN	N	6.6	47.7	73.0
5.218000	26.4	1000.0	9.000	GN	N	6.6	46.6	73.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	37.0	1000.0	9.000	N	7.7	29.0	66.0
0.182000	34.3	1000.0	9.000	N	7.1	31.7	66.0
0.210000	27.6	1000.0	9.000	N	6.7	38.4	66.0
0.230000	27.0	1000.0	9.000	N	6.7	39.0	66.0
4.718000	20.4	1000.0	9.000	N	6.6	39.6	60.0
4.902000	18.9	1000.0	9.000	N	6.6	41.1	60.0

Note: 1. Level = Read Level + Probe Factor + Cable loss

2. If QP Result comply with AV limit, AV Result is deemed to comply with AV limit

6.2 Radiated Emissions(30MHz-1GHz)

Test Requirement: EN 61000-6-4:2007+A1:2011

Test Method: EN 61000-6-4:2007+A1:2011

Frequency Range: 30MHz to 1GHz

Measurement Distance: 3m

Limit:

30MHz-230MHz 50 dB(μV/m) quasi-peak

230MHz-1GHz 57 dB(μV/m) quasi-peak

Detector: Peak for pre-scan (120kHz resolution bandwidth) 30M to 1000MHz

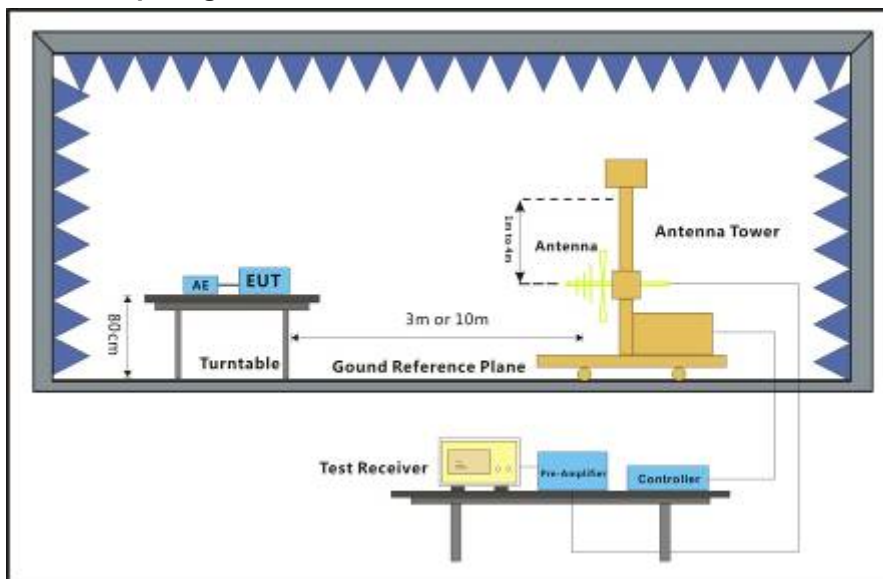
6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 51 % RH Atmospheric Pressure: 1010 mbar

Test mode a:Normal Working_ keep EUT running continual .

6.2.2 Test Setup Diagram



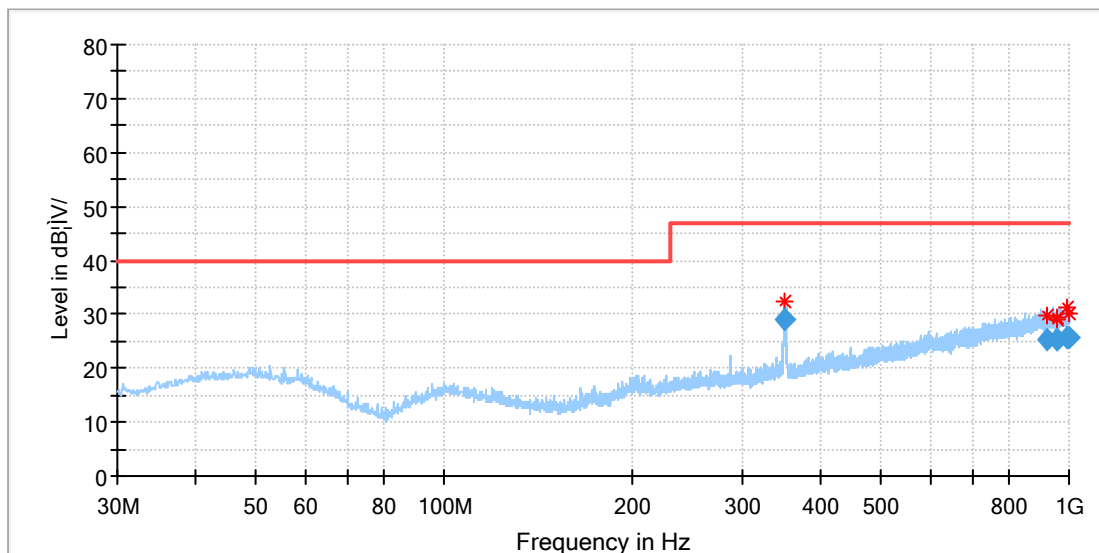
6.2.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

Notes: Emission Level=Read Level + Antenna Factor + Cable Loss - Preamplifier Factor



Mode:a;Polarization:Horizontal

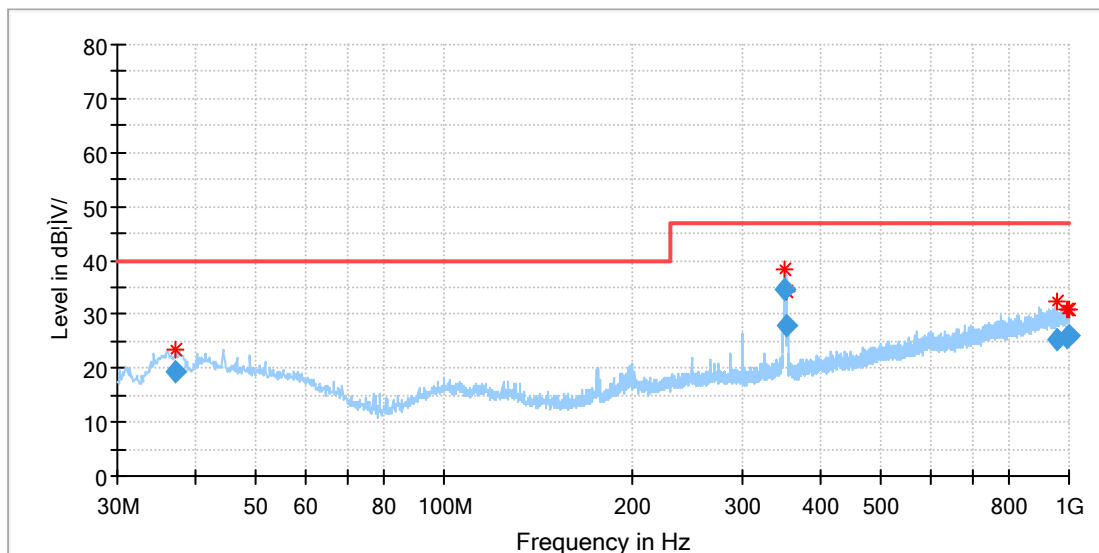


Final Result

Frequency (MHz)	QuasiPea k (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
351.312500	29.13	47.00	17.87	1000.0	120.000	400.0	H	128.0
919.490000	25.17	47.00	21.83	1000.0	120.000	400.0	H	-180.0
954.895000	25.35	47.00	21.65	1000.0	120.000	100.0	H	180.0
958.411250	25.36	47.00	21.64	1000.0	120.000	300.0	H	134.0
991.755000	25.84	47.00	21.16	1000.0	120.000	400.0	H	-118.0
996.483750	25.73	47.00	21.27	1000.0	120.000	300.0	H	40.0



Mode:a;Polarization:Vertical



Final Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
37.153750	19.31	40.00	20.69	1000.0	120.000	100.0	V	30.0
351.797500	34.49	47.00	12.51	1000.0	120.000	200.0	V	76.0
353.737500	27.85	47.00	19.15	1000.0	120.000	100.0	V	88.0
956.713750	25.44	47.00	21.56	1000.0	120.000	300.0	V	27.0
995.998750	25.81	47.00	21.19	1000.0	120.000	400.0	V	-150.0
997.817500	25.88	47.00	21.12	1000.0	120.000	100.0	V	-180.0

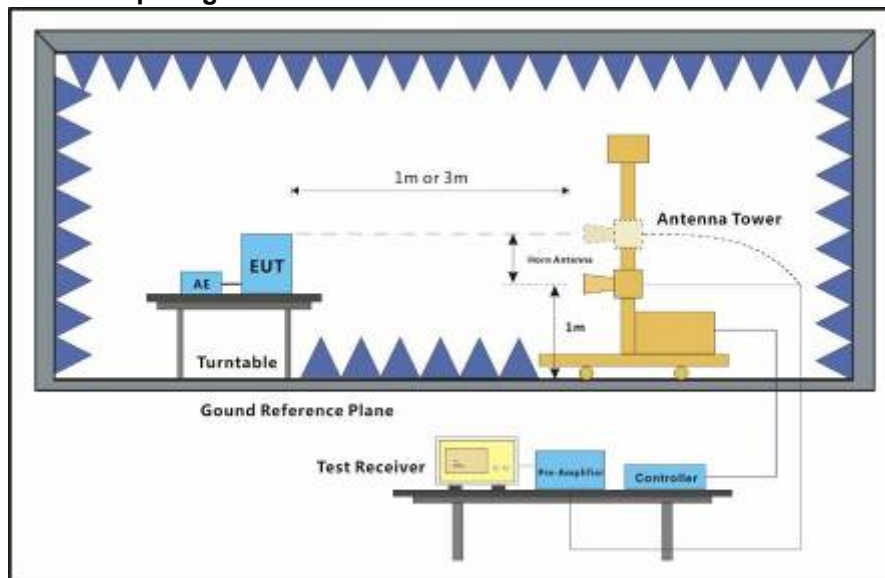
6.3 Radiated Emissions (above 1GHz)

Test Requirement: EN 61000-6-4:2007+A1:2011
Test Method: EN 61000-6-4:2007+A1:2011
Frequency Range: Above 1GHz
Measurement Distance: 3m
Limit:
1GHz-3GHz 76 dB(μV/m) peak, 56 dB(μV/m) average
3GHz-6GHz 80 dB(μV/m) peak, 60dB(μV/m) average
Detector: Peak for pre-scan (1000kHz resolution bandwidth) 1000M to 6000MHz

6.3.1 E.U.T. Operation

Operating Environment:
Temperature: 23 °C Humidity: 57 % RH Atmospheric Pressure: 1022 mbar
Test mode a: Normal Working_keep EUT running continual .

6.3.2 Test Setup Diagram



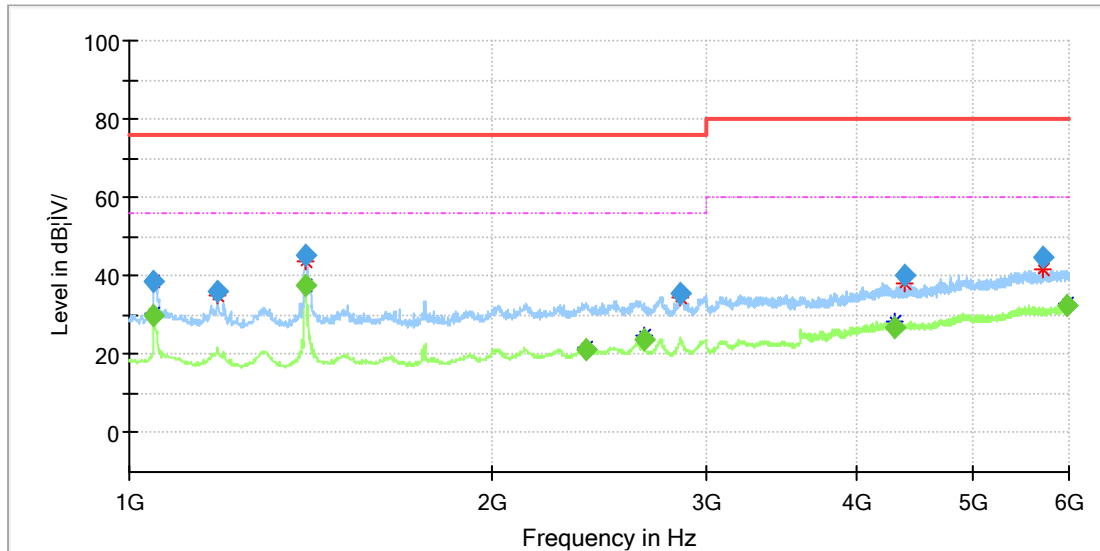
6.3.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

Notes : Emission Level=Read Level + Antenna Factor + Cable Loss – Preamp Factor



Mode:a;Polarization:Horizontal



Final Result

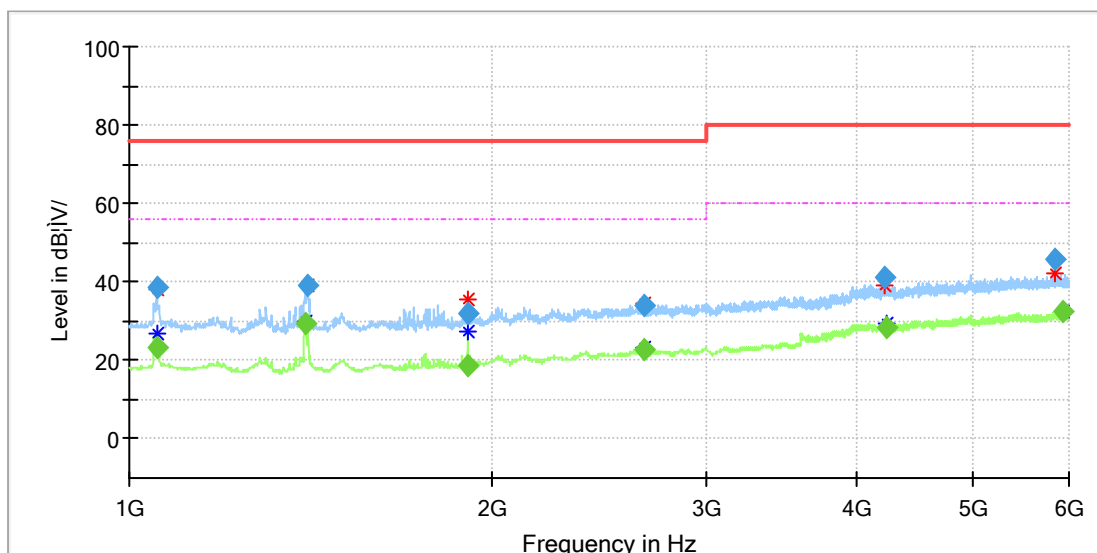
Frequency (MHz)	MaxPeak (dB V/m)	Limit (dB V/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1048.750000	38.44	76.00	37.56	1000.000	100.0	H	100.0
1182.500000	36.08	76.00	39.92	1000.000	100.0	H	89.0
1400.000000	45.50	76.00	30.50	1000.000	100.0	H	176.0
2860.000000	35.69	76.00	40.31	1000.000	100.0	H	-53.0
4387.500000	40.34	80.00	39.66	1000.000	100.0	H	-21.0
5712.500000	44.96	80.00	35.04	1000.000	100.0	H	-53.0

Final Result

Frequency (MHz)	Average (dB V/m)	Limit (dB V/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1048.750000	29.86	56.00	26.14	1000.000	100.0	H	100.0
1398.750000	37.39	56.00	18.61	1000.000	100.0	H	176.0
2388.750000	21.14	56.00	34.86	1000.000	100.0	H	-133.0
2666.250000	23.78	56.00	32.22	1000.000	100.0	H	62.0
4307.500000	27.08	60.00	32.92	1000.000	100.0	H	-161.0
5968.750000	32.22	60.00	27.78	1000.000	100.0	H	-176.0



Mode:a;Polarization:Vertical



Final Result

Frequency (MHz)	MaxPeak (dB V/m)	Limit (dB V/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1055.000000	38.49	76.00	37.51	1000.000	100.0	V	-125.0
1406.250000	38.93	76.00	37.07	1000.000	100.0	V	67.0
1905.000000	32.03	76.00	43.97	1000.000	100.0	V	28.0
2673.750000	33.85	76.00	42.15	1000.000	100.0	V	-180.0
4228.750000	41.35	80.00	38.65	1000.000	100.0	V	-65.0
5837.500000	45.70	80.00	34.30	1000.000	100.0	V	-22.0

Final Result

Frequency (MHz)	Average (dB V/m)	Limit (dB V/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1053.750000	23.17	56.00	32.83	1000.000	100.0	V	-125.0
1398.750000	29.55	56.00	26.45	1000.000	100.0	V	-114.0
1905.000000	18.68	56.00	37.32	1000.000	100.0	V	28.0
2666.250000	22.54	56.00	33.46	1000.000	100.0	V	-98.0
4235.000000	28.47	60.00	31.53	1000.000	100.0	V	-180.0
5942.500000	32.25	60.00	27.75	1000.000	100.0	V	-120.0



7 Immunity Test Results

7.1 Performance Criteria Description in EN 61000-6-2:2005

Criterion A

The apparatus 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 apparatus 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 apparatus if used as intended.

Criterion B

The apparatus 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 apparatus 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 apparatus 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.

7.2 Electrostatic Discharge

Test Requirement:	EN 61000-6-2:2005
Test Method:	EN 61000-4-2:2009
Performance Criterion:	B
Discharge Impedance:	330Ω/150pF
Number of Discharge:	Minimum 10 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

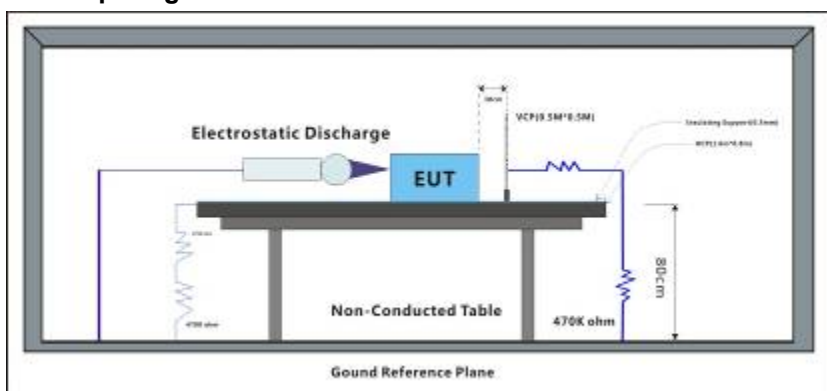
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode: a:Normal Working keep EUT running continual .

7.2.2 Test Setup Diagram



7.2.3 Test Results:

Observations: Test Point:

1. All insulated enclosure and seams.
2. All accessible metal parts of the enclosure.
3. All side

Discharge type	Level (kV)	Polarity	Test Point	Result / Observations
Air Discharge	8	+	1	A
Air Discharge	8	-	1	A
Contact Discharge	4	+	2	A
Contact Discharge	4	-	2	A
Horizontal Coupling	4	+	3	A
Horizontal Coupling	4	-	3	A
Vertical Coupling	4	+	3	A
Vertical Coupling	4	-	3	A

Results:

A: No degradation in the performance of the EUT was observed.

7.3 Radiated Immunity

Test Requirement: EN 61000-6-2:2005
Test Method: EN 61000-4-3:2006 +A1:2008+A2:2010
Performance Criterion: A
Frequency Range: 80MHz-1G, 1.4G-2G, 2G-2.7G
Antenna Polarisation: Vertical and Horizontal
Modulation: 1kHz,80% Amp. Mod,1% increment

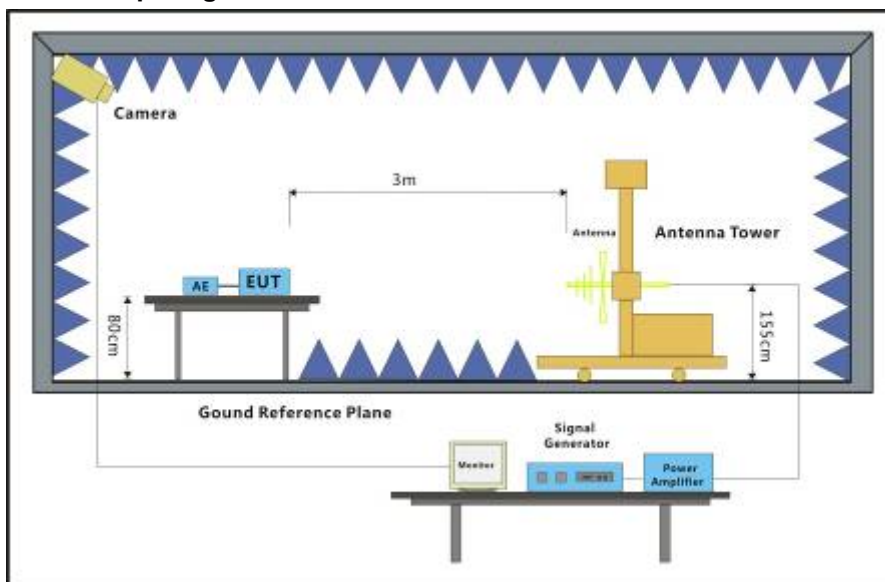
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 51 % RH Atmospheric Pressure: 1020 mbar

Test mode: a:Normal Working_keep EUT running continual .

7.3.2 Test Setup Diagram



7.3.3 Test Results:

Frequency	Level (V/m)	EUT Face	Dwell time	Result / Observations
80MHz-1GHz	10	Front	3s	A
80MHz-1GHz	10	Back	3s	A
80MHz-1GHz	10	Left	3s	A
80MHz-1GHz	10	Right	3s	A
1.4GHz-2GHz	3	Front	3s	A
1.4GHz-2GHz	3	Back	3s	A
1.4GHz-2GHz	3	Left	3s	A
1.4GHz-2GHz	3	Right	3s	A
2GHz-2.7GHz	1	Front	3s	A



2GHz-2.7GHz	1	Back	3s	A
2GHz-2.7GHz	1	Left	3s	A
2GHz-2.7GHz	1	Right	3s	A

Results:

A: No degradation in the performance of the EUT was observed.

7.4 Electrical Fast Transients/Burst at Power Port

Test Requirement: EN 61000-6-2:2005
Test Method: EN 61000-4-4:2012
Performance Criterion: B
Repetition Frequency: 5kHz
Burst Period: 300ms
Test Duration: 2 minute per level & polarity

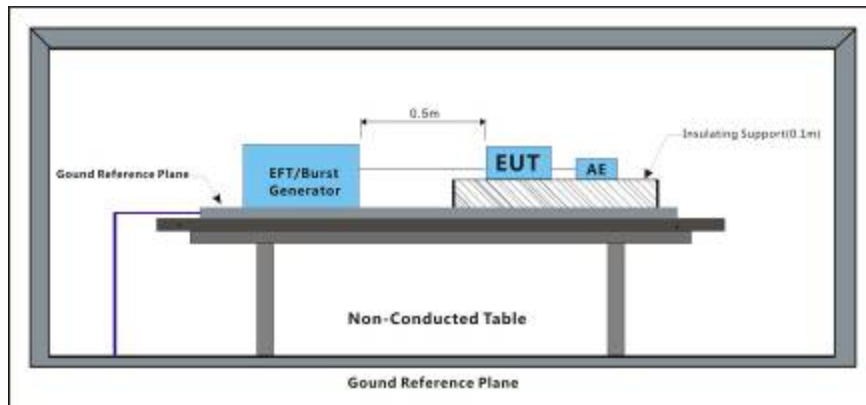
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1017 mbar

Test mode: a:Normal Working_keep EUT running continual .

7.4.2 Test Setup Diagram



7.4.3 Test Results:

Test Line	Level (kV)	Polarity	CDN/Clamp	Result / Observations
AC power port	2	+	Clamp	A
AC power port	2	-	Clamp	A

Results:

A: No degradation in the performance of the EUT was observed.

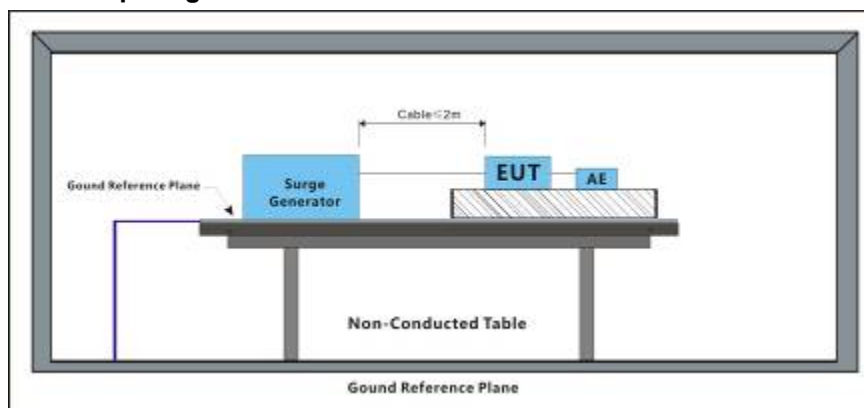
7.5 Surge at Power Port

Test Requirement: EN 61000-6-2:2005
Test Method: EN 61000-4-5:2014
Performance Criterion: B
Interval: 60s between each surge
No. of surges: 5 positive, 5 negative at 0°, 90°, 180°, 270°.

7.5.1 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 47 % RH Atmospheric Pressure: 1017 mbar
Test mode: a:Normal Working_keep EUT running continual .

7.5.2 Test Setup Diagram



7.5.3 Test Results:

Test Line	Level (kV)	Polarity	Phase (deg)	Result / Observations
L1-N	1	+/-	0°	A
L1-N	1	+/-	90°	A
L1-N	1	+/-	180°	A
L1-N	1	+/-	270°	A
L2-N	1	+/-	0°	A
L2-N	1	+/-	90°	A
L2-N	1	+/-	180°	A
L2-N	1	+/-	270°	A
L3-N	1	+/-	0°	A
L3-N	1	+/-	90°	A
L3-N	1	+/-	180°	A
L3-N	1	+/-	270°	A
L1-PE	2	+/-	0°	A
L1-PE	2	+/-	90°	A
L1-PE	2	+/-	180°	A
L1-PE	2	+/-	270°	A
L2-PE	2	+/-	0°	A
L2-PE	2	+/-	90°	A
L2-PE	2	+/-	180°	A
L2-PE	2	+/-	270°	A
L3-PE	2	+/-	0°	A
L3-PE	2	+/-	90°	A



L3-PE	2	+/-	180°	A
L3-PE	2	+/-	270°	A
N-PE	2	+/-	0°	A
N-PE	2	+/-	90°	A
N-PE	2	+/-	180°	A
N-PE	2	+/-	270°	A

Results:

A: No degradation in the performance of the EUT was observed.

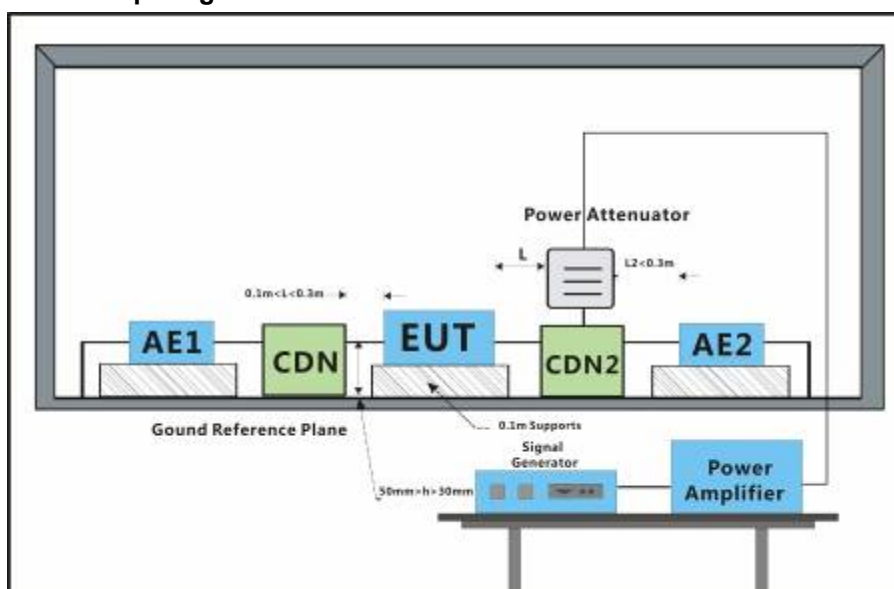
7.6 Conducted Immunity at Power Port

Test Requirement: EN 61000-6-2:2005
Test Method: EN 61000-4-6:2014
Performance Criterion: A
Frequency Range: 0.15MHz to 80MHz
Modulation: 80%, 1kHz Amplitude Modulation
Step Size 1%

7.6.1 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
Test mode: a:Normal Working_keep EUT running continual .

7.6.2 Test Setup Diagram



7.6.3 Test Results:

Cable port	Level (Vrms)	CDN/Clamp/CIP	Dwell time	Result / Observations
AC power port	10	CIP	3s	A

Results:

A: No degradation in the performance of the EUT was observed.

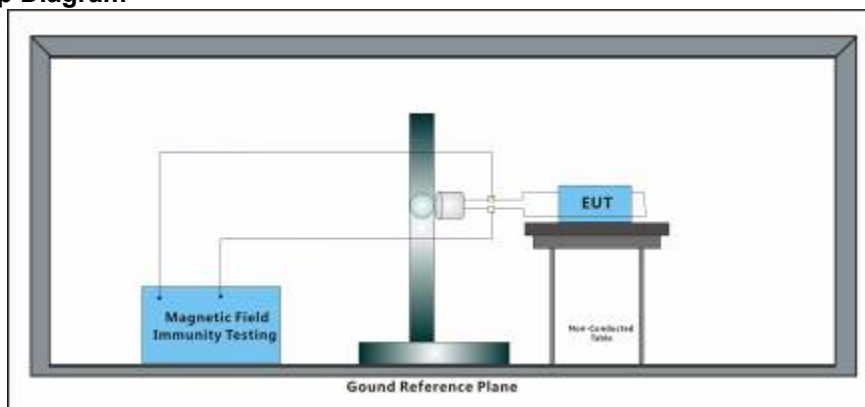
7.7 Power Frequency Magnetic Field

Test Requirement: EN 61000-6-2:2005

Test Method: EN 61000-4-8:2010

Performance Criterion: A

7.7.1 Test Setup Diagram



7.7.2 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode: a:Normal Working_keep EUT running continual .

7.7.3 Test Results:

Frequency	Level (A/m)	Axial	Magnetic Field Type	Result / Observations
50Hz	3	X	Continuous filed	A
50Hz	3	Y	Continuous filed	A
50Hz	3	Z	Continuous filed	A

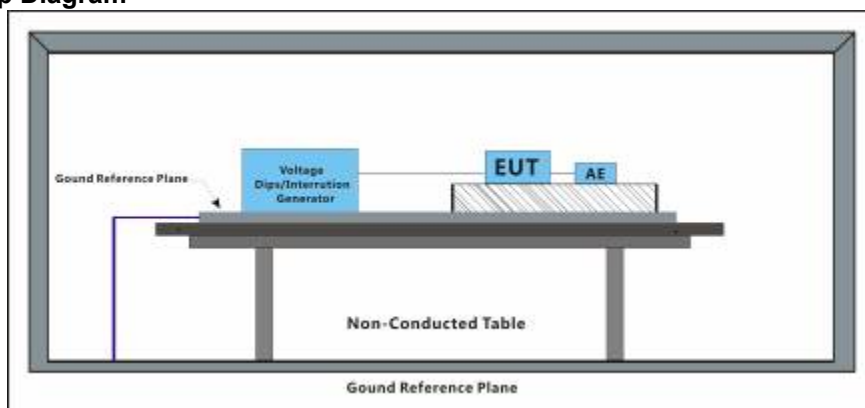
Results:

A: No degradation in the performance of the EUT was observed.

7.8 Voltage Dips and Interruptions

Test Requirement: EN 61000-6-2:2005
Test Method: EN 61000-4-11:2004 +A1:2017
Performance Criterion: 0% of UT (Supply Voltage) for 1 Periods; 40% of UT for 10 Periods;
70% of UT for 25 Periods; 0% of UT for 250 Periods;
No. of Dips / Interruptions: 3 per Level
Time between dropout 10s

7.8.1 Test Setup Diagram



7.8.2 E.U.T. Operation

Operating Environment:
Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar
Test mode: a:Normal Working_keep EUT running continual .

7.8.3 Test Results:

Level % UT	Phase (deg)	Duration	No. of Dips / Interruptions	Result / Observations
0	0°	250 Cycles	3	A
0	180°	250 Cycles	3	A
70	0°	25 Cycles	3	A
70	180°	25 Cycles	3	A
40	0°	10 Cycles	3	A
40	180°	10 Cycles	3	A
0	0°	1 Cycles	3	A
0	180°	1 Cycles	3	A

Results:

A: No degradation in the performance of the EUT was observed.

8 Photographs

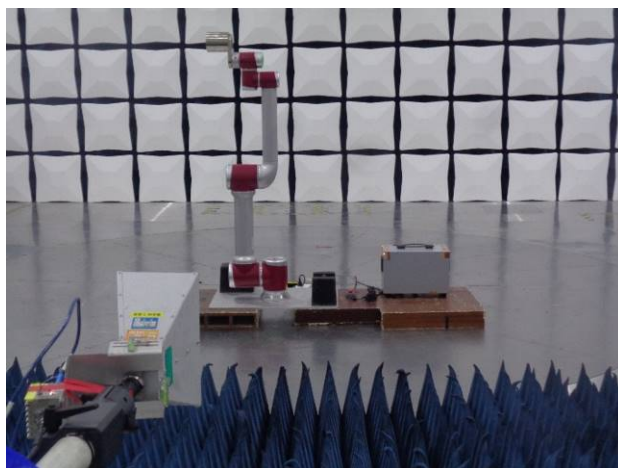
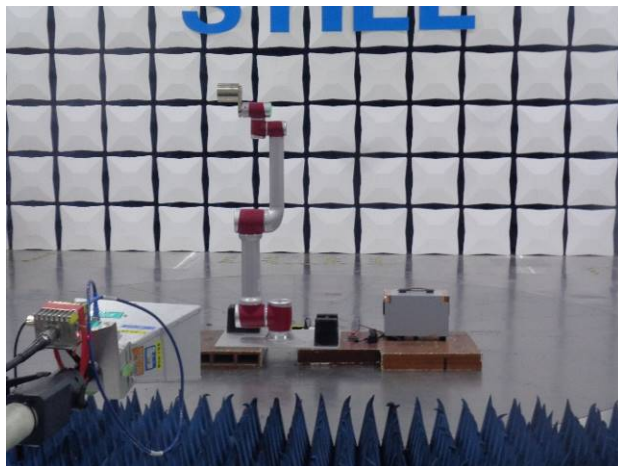
8.1 Conducted Emissions Test Setup



8.2 Radiated Emissions (30MHz-1GHz) Test Setup



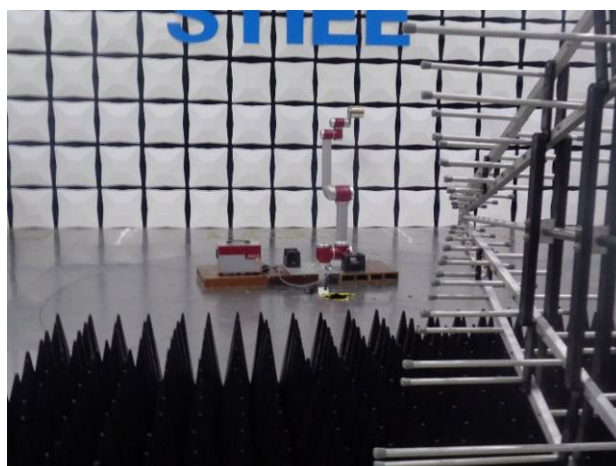
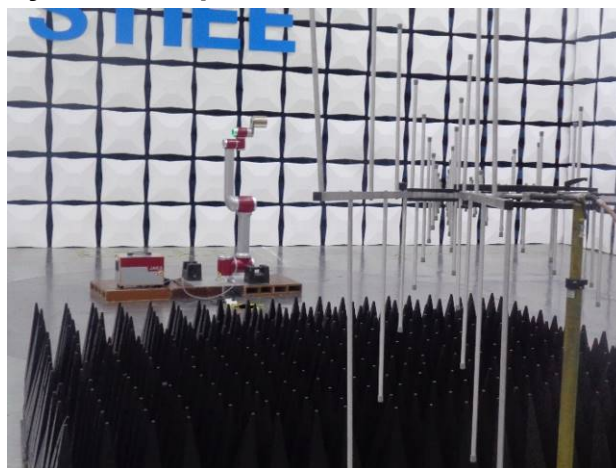
8.3 Radiated Emissions (above 1GHz) Test Setup



8.4 Electrostatic Discharge Test Setup



8.5 Radiated Immunity Test Setup





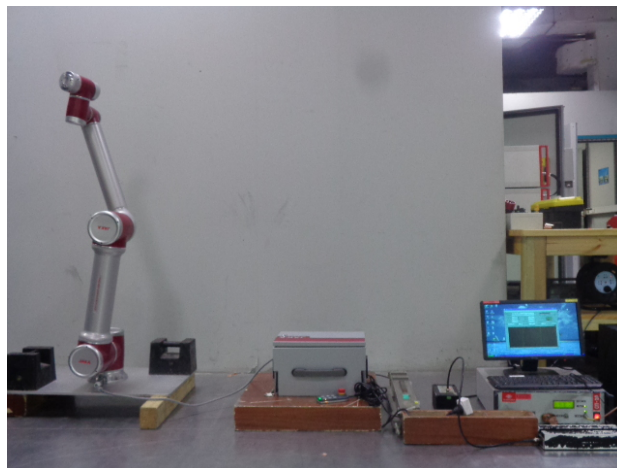
8.6 Electrical Fast Transients/Burst at Power Port Test Setup



8.7 Surge Test Setup



8.8 Conducted Immunity Test Setup



8.9 Power Frequency Magnetic Field Test Setup





8.10 Voltage Dips and Interruptions Test Setup



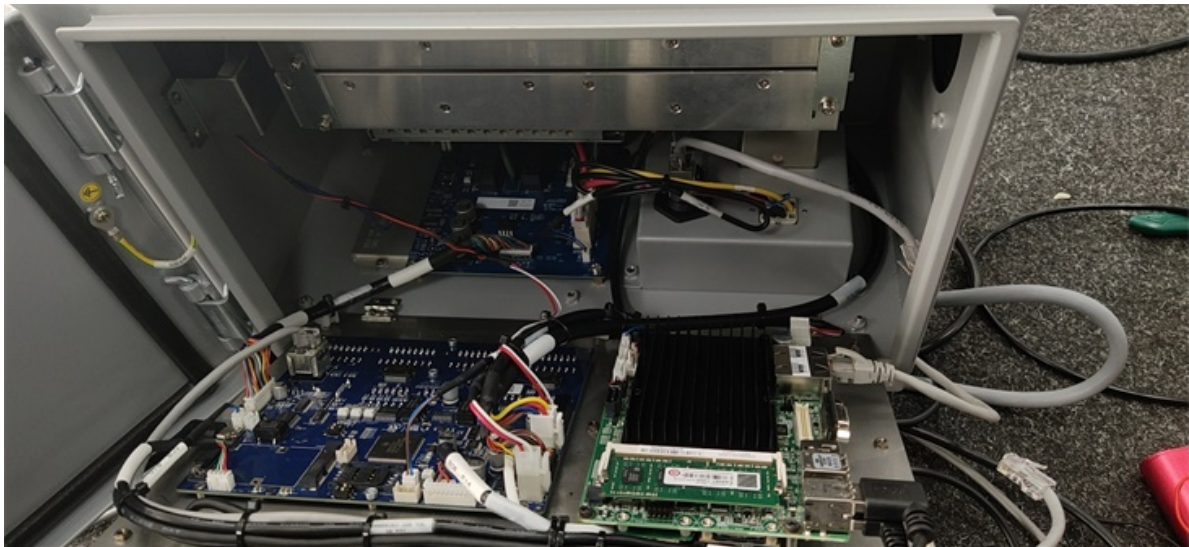
8.11 EUT Constructional Details











--End of the Report--