EMC TEST REPORT

Applicant:	Shenwei Ruowo (Suzhou) Technology Co., LTD
Address of Applicant:	No. 116 Chengyang Road, Chengyang Street, Xiangcheng District, Suzhou City, Jiangsu Province
Manufacturer/Factory:	ShenZhen Sky-Win Technology Co., LTD
Address of Manufacturer/Factory:	Building 401, Building 1, Nanchang Huafeng Industrial Park, Nanchang Community, Xixiang Street, Bao'an District, Shenzhen City, Guangdong Province

Equipment Under Test (EUT)

Product Name:	Rebocap
Model No.:	Rebocap_tracker
Trade Mark:	REBOCAP
Applicable standards:	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-17 V3.2.4 (2020-09) EN 55032:2015+A11:2020 EN 55035:2017+A11:2020 EN 61000-3-3:2013/A1:2019
Date of sample receipt:	Apr.26, 2023
Date of Test:	Apr.26-May.08,2023
Date of report issue:	July.03,2023
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

This device described above has been tested by CST, and the test results show that the equipment under test (EUT) is in compliance with the Radio Equipment regulations 2014/53/UE requirements. And it is applicable only to the tested sample identified in the report.

Shenzhen CST Testing Co., Ltd.

David Zhong
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver

2 Version

Version No.	Date	Description
00	*July.03,2023*	*Original*

Prepared By: kyle Wang ***Date:*** *July.03,2023*

Project Engineer

Check By: ***Date:*** *July.03,2023*

Reviewer

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4 Test Summary

EMI Test				
Test Item	Test Requirement	Test Method	Application	Result
Radiated Emission	ETSI EN 301 489-17	EN 55032	Enclosure	Pass
Conducted Emission	ETSI EN 301 489-17	EN 55032	AC port	Pass
Harmonic Current Emissions	ETSI EN 301 489-17	EN IEC 61000-3-2	AC port	N/A
Voltage Fluctuations and Flicker	ETSI EN 301 489-17	EN 61000-3-3	AC port	Pass
EMS Test				
ESD (Electrostatic Discharge)	ETSI EN 301 489-17 EN 55035	EN 61000-4-2	Enclosure	Pass
Radio Frequency Electromagnetic Field (80 MHz to 6 000 MHz)	ETSI EN 301 489-17 EN 55035	EN 61000-4-3	Enclosure	Pass
EFT (Electrical Fast Transients	ETSI EN 301 489-17 EN 55035	EN 61000-4-4	AC port	Pass
Surges	ETSI EN 301 489-17 EN 55035	EN 61000-4-5	AC port	Pass
Radio Frequency, Common Mode	ETSI EN 301 489-17 EN 55035	EN 61000-4-6	AC port	Pass
Voltage Dips and Interruptions	ETSI EN 301 489-17 EN 55035	EN 61000-4-8	AC port	Pass

Remark:
Pass: The EUT complies with the essential requirements in the standard.

5 General Information

5.1 General Description of EUT

Product Name:	Rebocap
Model No.:	Rebocap_tracker
Operation Frequency:	2408MHz~2480MHz
Channel numbers:	40
Channel separation:	2MHz
Modulation technology:	FHSS
Antenna Type:	PCB Antenna
Antenna gain:	0 dBi
Power Supply:	DC 5.0V/1.0 A

5.2 Operating Modes

Operating mode	Detail description
Transmit mode	Keep the EUT in communications with receiver via wireless function and connect an AC adapter.
Charging mode	Keep the EUT in charging mode

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
-	-	-	-

5.4 Test Location

All tests were performed at:
Shenzhen CST Testing Co., Ltd Room 202-203, Floor 2st, Building B, Baoan Zhigu Technology Park, Xixiang Street, Baoan District, Shenzhen, China. 518101

5.5 Deviation from Standards

None.

5.6 Abnormalities from Standard Conditions

None.

5.7 Other Information Requested by the Customer

None.

5.8 Monitoring of EUT for All Immunity Test

Visual:	Monitored of the status of the EUT.
Audio:	N/A

6 Equipment Used during Test

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	CST250	Oct. 15, 2022	Oct. 14, 2026
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	CST251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	CST203	Oct. 15, 2022	Oct. 14, 2023
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	CST214	Oct. 15, 2022	Oct. 14, 2023
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	CST208	Oct. 15, 2022	Oct. 14, 2023
6	Horn Antenna	ETS-LINDGREN	3160	CST217	Oct. 15, 2022	Oct. 14, 2023
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	CST	N/A	CST213	Oct. 15, 2022	Oct. 14, 2023
9	Coaxial Cable	CST	N/A	CST211	Oct. 15, 2022	Oct. 14, 2023
10	Coaxial cable	CST	N/A	CST210	Oct. 15, 2022	Oct. 14, 2023
11	Coaxial Cable	CST	N/A	CST212	Oct. 15, 2022	Oct. 14, 2023
12	Amplifier(100kHz-3GHz)	HP	8347A	CST204	Oct. 15, 2022	Oct. 14, 2023
13	Amplifier(2GHz-20GHz)	HP	84722A	CST206	Oct. 15, 2022	Oct. 14, 2023
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	CST218	Oct. 15, 2022	Oct. 14, 2023
15	Band filter	Amindeon	82346	CST219	Oct. 15, 2022	Oct. 14, 2023
16	Power Meter	Anritsu	ML2495A	CST540	Oct. 15, 2022	Oct. 14, 2023
17	Power Sensor	Anritsu	MA2411B	CST541	Oct. 15, 2022	Oct. 14, 2023
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	CST575	Oct. 15, 2022	Oct. 14, 2023
19	Splitter	Agilent	11636B	CST237	Oct. 15, 2022	Oct. 14, 2023
20	Loop Antenna	ZHINAN	ZN30900A	CST534	Oct. 15, 2022	Oct. 14, 2023
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	CST579	Oct. 18, 2022	Oct. 17, 2023
22	Amplifier	TDK	PA-02-02	CST574	Oct. 18, 2022	Oct. 17, 2023
23	Amplifier	TDK	PA-02-03	CST576	Oct. 18, 2022	Oct. 17, 2023
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	CST578	Oct. 15, 2022	Oct. 14, 2023

Conducted Emission						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	CST252	May. 15, 2021	May. 14, 2024
2	EMI Test Receiver	R&S	ESCI 7	CST552	Oct. 15, 2022	Oct. 14, 2023
3	Coaxial Switch	ANRITSU CORP	MP59B	CST225	Oct. 15, 2022	Oct. 14, 2023
4	ENV216 2-L-V-NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	CST226	Oct. 15, 2022	Oct. 14, 2023
5	Coaxial Cable	CST	N/A	CST227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	CST233	Oct. 15, 2022	Oct. 14, 2023
8	Absorbing clamp	Elektronik-Feinmechanik	MDS21	CST229	Oct. 15, 2022	Oct. 14, 2023
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	Oct. 15, 2022	Oct. 14, 2023

ESD						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	ESD Simulator	KIKUSUI	KES4021A	CST242	Oct. 15, 2022	Oct. 14, 2023
2	Thermo meter	KTJ	TA328	CST243	Oct. 15, 2022	Oct. 14, 2023

Conducted Immunity						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Signal Generator	ROHDE & SCHWARZ	SMB 100A	CST553	Oct. 15, 2022	Oct. 14, 2023
2	CDN	LionCEL	CDN-M3-16	CST554	Oct. 15, 2022	Oct. 14, 2023
3	CDN	CYBERTEK	EM 5070	CST559	Oct. 15, 2022	Oct. 14, 2023
4	Power amplifier	rflight	NTWPA-00010475	CST555	Oct. 15, 2022	Oct. 14, 2023
5	ATT	SUNWAVE	SJ-50-06DB	CST556	Oct. 15, 2022	Oct. 14, 2023
6	Clamp	SCHAFFNER	KEMZ 801	CST558	Oct. 15, 2022	Oct. 14, 2023

Harmonic/ Flicker						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Power Analyzer H/F	EMTEST	DPA500	CST235	Oct. 15, 2022	Oct. 14, 2023
2	AC POWER SUPPLY	EMTEST	ACS500	CST236	Oct. 15, 2022	Oct. 14, 2023
3	Thermo meter	KTJ	TA328	CST256	Oct. 15, 2022	Oct. 14, 2023

EFT, Surge, Voltage dips and Interruption						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	EMTEST system	EMTEST	UCS500N	CST239	Oct. 15, 2022	Oct. 14, 2023
2	Clamp	EMTEST	HFK	CST557	Oct. 15, 2022	Oct. 14, 2023
3	Thermo meter	KTJ	TA328	CST238	Oct. 15, 2022	Oct. 14, 2023

Radiated Immunity						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Fully-Anechoic Chamber 2	Chang Zhou Zhong Shuo	854	SEM001-05	2020-05-09	2023-05-08
2	Power Sensor	Rohde & Schwarz	NRP-Z91	SEM009-09	2022-03-31	2023-03-30
3	Stacked Log.-Per.-Broadband Antenna (70MHz-10GHz)	Schwarzbeck	STLP 9129	SEM003-25	N/A	N/A
4	Signal Generator (9kHz-6GHz)	Rohde & Schwarz	SMB100A	SEM006-11	2022-03-31	2023-03-30
5	Broadband Amplifier (80MHz-1GHz)	Rohde & Schwarz	BBA150-BC250	SEM005-12	2022-03-31	2023-03-30
6	Broadband Amplifier(800MHz-3GHz)	Rohde & Schwarz	BBA150-D110	SEM005-13	2022-03-31	2023-03-30
7	Broadband Amplifier(2.5GHz-6GHz)	Rohde & Schwarz	BBA150-E60	SEM005-16	2022-03-31	2023-03-30
8	Measurement Software	Rohde & Schwarz	EMC32 V9.25.00	N/A	N/A	N/A

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	CST243	2022-03-31	2023-03-30
2	Barometer	ChangChun	DYM3	CST255	2022-03-31	2023-03-30

7 EMC Requirements Specification in ETSI EN 301 489-17

7.1 EMI (Emission)

7.1.1 Radiated Emission

Test Requirement:	ETSI EN 301 489-17
Test Method:	ETSI EN 301 489-1 and EN 55032
Test Frequency Range:	30MHz to 6GHz
Test site:	Measurement Distance: 3m

Receiver setup:

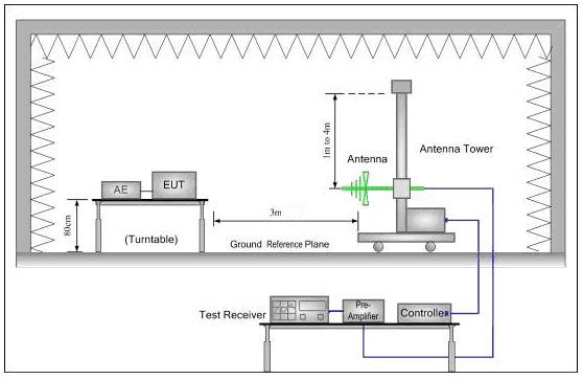
Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	100kHz	300kHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	AV	1MHz	3MHz	Average Value

Limit:

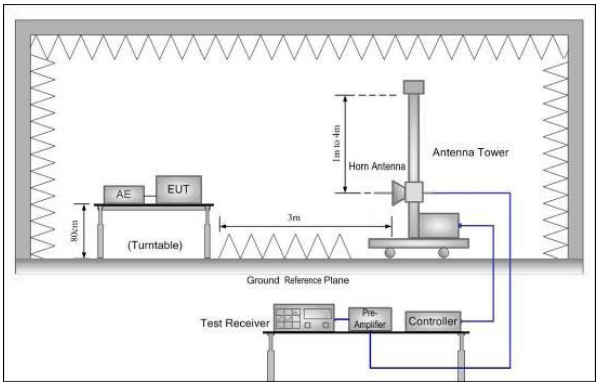
Frequency	Limit (dBuV/m @3m)	Remark
30MHz-230MHz	40.00	Quasi-peak Value
230MHz-1GHz	47.00	Quasi-peak Value
1GHz-3GHz	50.00	Average Value
	70.00	Peak Value
3GHz-6GHz	54.00	Average Value
	74.00	Peak Value

Test setup:

Below 1GHz



Above 1GHz



Test Procedure:	■ **From 30MHz to 1GHz:** 1. The radiated emissions test was conducted in a semi-anechoic chamber. 2. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation. 3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT. 4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization. ■ **Above 1GHz:** 1. The radiated emissions test was conducted in a fully-anechoic chamber. 2. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation. 3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum plots of the EUT. 4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.
Test environment:	Temp.: 25 ◦C Humid.: 50% Press.: 1 010mbar
Measurement Record:	Uncertainty: 3.8039dB （30MHz-200MHz） 3.9679dB （200MHz-1GHz） 4.29dB（1GHz-18GHz）
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details.
Test results:	Pass

Remark:
1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

Measurement Data

Below 1GHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarity
30.32	56.89	0.00	0.55	32.06	25.48	40.00	-14.52	Vertical
79.80	54.40	0.00	1.03	31.76	23.77	40.00	-16.23	Vertical
98.14	54.66	0.00	1.18	31.75	24.19	40.00	-15.81	Vertical
185.14	58.28	0.00	1.77	32.10	28.05	40.00	-11.95	Vertical
265.68	55.05	0.00	2.20	32.17	25.18	47.00	-21.82	Vertical
576.64	61.09	0.00	3.63	31.15	33.67	47.00	-13.33	Vertical
64.21	47.63	0.00	0.90	31.91	16.72	40.00	-23.28	Horizontal
109.41	53.55	0.00	1.28	31.81	23.12	40.00	-16.88	Horizontal
153.20	56.17	0.00	1.59	31.99	25.87	40.00	-14.13	Horizontal
278.07	57.26	0.00	2.26	32.17	27.45	47.00	-12.55	Horizontal
396.24	57.70	0.00	2.83	31.90	28.73	47.00	-18.27	Horizontal
793.40	57.90	0.00	4.43	31.31	31.12	47.00	-15.88	Horizontal

Above 1GHz

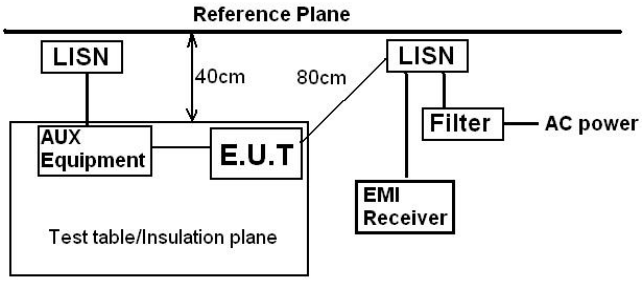
Peak measurement

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarity
1126.31	44.98	24.86	4.40	32.95	44.98	70.00	-28.71	Vertical
2026.31	42.81	26.29	4.99	34.44	42.81	70.00	-30.35	Vertical
2986.31	39.72	28.46	5.91	33.33	39.72	70.00	-29.24	Vertical
3906.31	37.06	29.52	7.69	32.29	37.06	74.00	-32.02	Vertical
5041.31	34.53	31.98	8.83	32.21	34.53	74.00	-30.87	Vertical
5861.31	32.61	32.72	10.02	32.21	32.61	74.00	-30.86	Vertical
1436.31	43.78	25.40	4.64	33.50	43.78	70.00	-29.68	Horizontal
2176.31	40.88	27.74	5.16	34.27	40.88	70.00	-30.49	Horizontal
3106.31	39.56	28.70	6.15	33.20	39.56	74.00	-32.79	Horizontal
4086.31	34.68	29.86	7.95	32.09	34.68	74.00	-33.6	Horizontal
4636.31	34.51	31.57	8.46	32.01	34.51	74.00	-31.47	Horizontal
5476.31	34.67	31.95	9.47	32.41	34.67	74.00	-30.32	Horizontal

Remark:

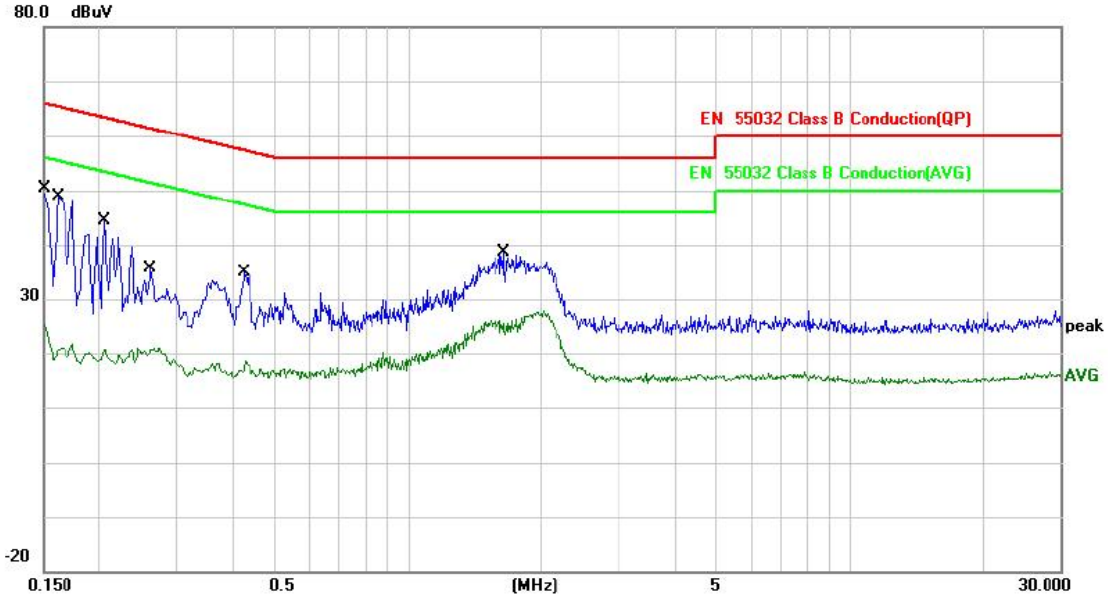
1. The EUT was test at 3m in field chamber.
2. If the average limit is met when using a Peak detector, the EUT shall be deemed to meet both peak and average limits. And measurement with the average detector is unnecessary.

7.1.2 Conducted Emissions

Test Requirement:	ETSI EN 301 489-17
Test Method:	ETSI EN 301 489-1 and EN 55032
Test Frequency Range:	150kHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9kHz, VBW=30kHz
Limit:	Frequency range (MHz) / Limit (dBuV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 * Decreases with the logarithm of the frequency.
Test setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to EN55032 Class B on conducted measurement.
Test Instruments:	Temp.: 24 °C | Humid.: 51% | Press.: 1 010mbar
Measurement Record:	Uncertainty: 3.44dB
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details, only show the worst case.
Test results:	Pass

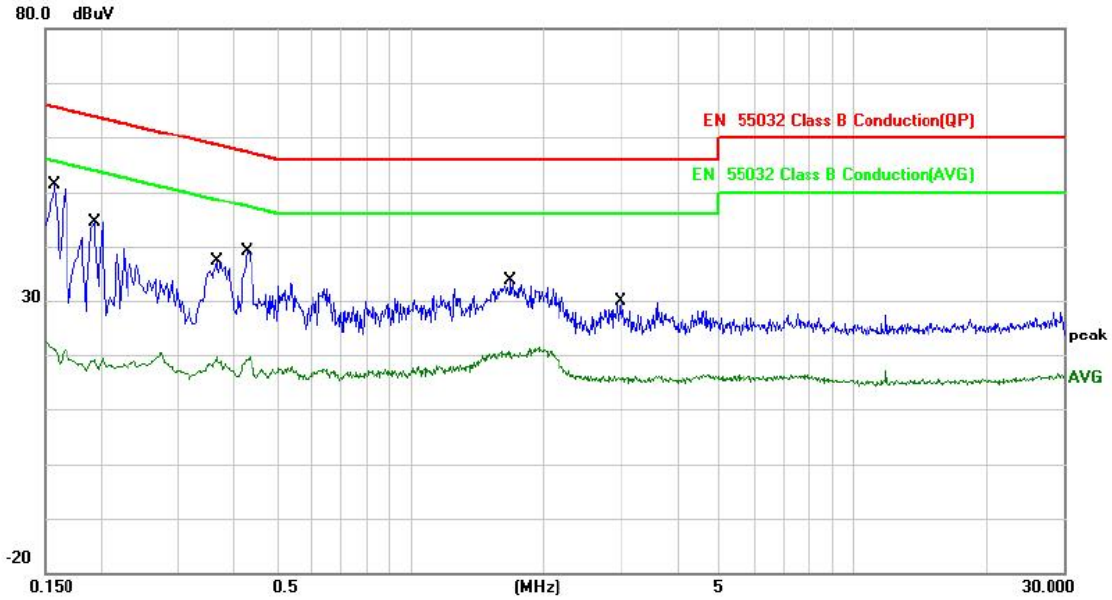
Measurement Data

Line:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1500	20.83	19.88	40.71	66.00	-25.29	QP
2		0.1500	5.57	19.88	25.45	56.00	-30.55	AVG
3		0.1620	18.31	19.88	38.19	65.36	-27.17	QP
4		0.1620	0.06	19.88	19.94	55.36	-35.42	AVG
5		0.2060	10.02	19.88	29.90	63.37	-33.47	QP
6		0.2060	-0.31	19.88	19.57	53.37	-33.80	AVG
7		0.2620	5.86	19.88	25.74	61.37	-35.63	QP
8		0.2620	0.81	19.88	20.69	51.37	-30.68	AVG
9		0.4260	8.66	19.88	28.54	57.33	-28.79	QP
10		0.4260	-1.91	19.88	17.97	47.33	-29.36	AVG
11		1.6460	15.19	19.90	35.09	56.00	-20.91	QP
12	*	1.6460	5.32	19.90	25.22	46.00	-20.78	AVG

Neutral:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1580	19.16	19.88	39.04	65.57	-26.53	QP
2		0.1580	-0.64	19.88	19.24	55.57	-36.33	AVG
3		0.1940	12.05	19.88	31.93	63.86	-31.93	QP
4		0.1940	-2.40	19.88	17.48	53.86	-36.38	AVG
5		0.3660	7.15	19.88	27.03	58.59	-31.56	QP
6		0.3660	-2.00	19.88	17.88	48.59	-30.71	AVG
7	*	0.4300	10.91	19.88	30.79	57.25	-26.46	QP
8		0.4300	-0.86	19.88	19.02	47.25	-28.23	AVG
9		1.6980	7.09	19.90	26.99	56.00	-29.01	QP
10		1.6980	-0.46	19.90	19.44	46.00	-26.56	AVG
11		2.9820	0.69	19.91	20.60	56.00	-35.40	QP
12		2.9820	-4.72	19.91	15.19	46.00	-30.81	AVG

Notes:

1. *An initial pre-scan was performed on the live and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss*
4. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

7.1.3 Harmonics Test Results

Test Requirement:	ETSI EN 301 489-17:EN IEC 61000-3-2
Test Method:	N/A: See Remark Below
Remark:	There is no need for Harmonics test to be performed on this product (rated power is less than 75W) in accordance with EN IEC 61000-3-2. For further details, please refer to Clause 7, Note 1 of EN IEC 61000-3-2 Which states: "For the following categories of equipment limits are not specified in this edition of the standard. Note 1: Equipment with a rated power of 75W or less, other than lighting equipment."

7.1.4 Flicker Test Results

Test Requirement:	ETSI EN 301 489-17, EN 61000-3-3					
Test Method:	EN 61000-3-3					
Class/Severity:	Clause 5 of EN 61000-3-3					
Measurement Time:	10 min					
Detector:	As per EN 61000-3-3					
Test Instruments:	Temp.:	24 °C	Humid.:	51%	Press.:	1 010mbar
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details.					
Test results:	Pass					

Measurement Data

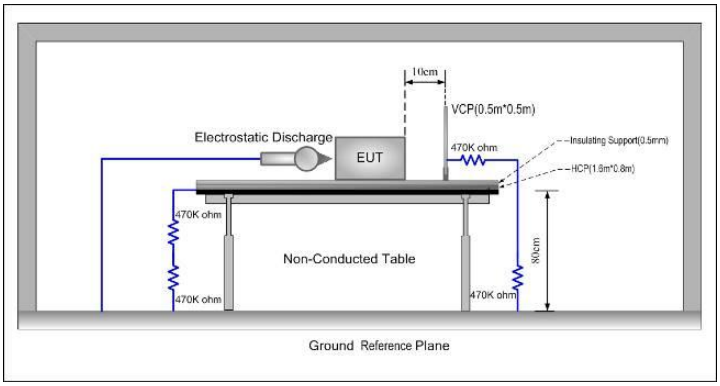
	EUT values	Limit	Result
Pst	0.026	1.00	PASS
dc [%]	0.005	3.30	PASS
dmax [%]	0.057	4.00	PASS
dt [s]	0.000	0.50	PASS

7.2 Immunity

Performance Criteria of ETSI EN 301 489-1, clause 6	
6.0 Introduction	The performance criteria are used to take a decision on whether a radio equipment passes or fails immunity tests. For the purpose of the present document two categories of performance criteria apply: • Performance criteria for continuous phenomena. •Performance criteria for transient phenomena. NOTE: Normally, the performance criteria depends upon the type of radio equipment and/or its intended application. Thus, the present document only contains general performance criteria commonly used for the assessment of radio equipment.
6.1 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.
6.2 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.

Performance Criteria of ETSI EN 301 489-17/EN 55035, clause 6		
Criteria	During Test	After Test
A	Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function .	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function .	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
Note:	Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.	
6.2.2	**Minimum performance level** For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to10 %. For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wirelesstransmission function needed for the intended use of the equipment.	
6.3	**Performance criteria for Continuous phenomena** The performance criteria A shall apply. Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test. Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.	
6.4	**Performance criteria for Transient phenomena** The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test. Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.	

7.2.1 Electrostatic Discharge

Test Requirement:	ETSI EN 301489-17/EN 55035
Test Method:	EN 61000-4-2
Discharge Voltage:	Contact Discharge: ±4kV Air Discharge: ±2kV, ±4kV, ±8kV HCP/VCP: ±4kV
Polarity:	Positive & Negative
Number of Discharge:	Contact Discharge: Minimum 10 times at each test point, Air Discharge: Minimum 10 times at each test point.
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum
Limit:	Criteria B
Test setup:	
Test Procedure:	**Air discharge:** 1. The test was applied on non-conductive surfaces of EUT. 2. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. 3. After each discharge, the discharge electrode was removed from the EUT. 4. The generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. 5. This procedure was repeated until all the air discharge completed **Contact Discharge:** 1. The test was applied on conductive surfaces of EUT. 2. the generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. 3. the tip of the discharge electrode was touch the EUT before the discharge switch was operated. **Indirect discharge for horizontal coupling plane** 1. At least 10 single discharges shall be applied at the front edge of each HCP opposite the centre point of each unit of the EUT and 0.1m from the front of the EUT. 2. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge. 3. Consideration should be given to exposing all sides of the EUT.

	Indirect discharge for vertical coupling plane 1. At least 10 single discharges were applied to the center of one vertical edge of the coupling plane. 2. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. 3. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.					
Test environment:	Temp.:	24 °C	Humid.:	51%	Press.:	1 010mbar
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test results:	Pass					

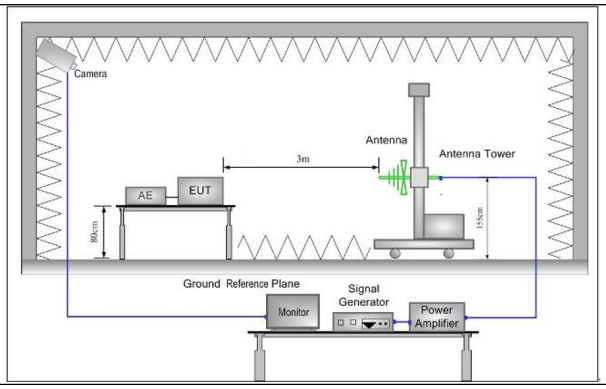
Measurement Record:

Test points:	I: N/A			
	II: Plastic seams, Camera, Holes, Switch, Keys			
Direct discharge				
Discharge Voltage (KV)	**Type of discharge**	**Test points**	**Observations Performance**	**Result**
± 4	Contact	I	A	Pass
± 2, ± 4,± 8	Air	II	A	Pass
Indirect discharge				
Discharge Voltage (KV)	**Type of discharge**	**Test points**	**Observation Performance**	**Result**
± 4	HCP-Bottom/Top/ Front/Back/Left/Right	Edge of the HCP	A	Pass
± 4	VCP-Front/Back /Left/Right	Center of the VCP	A	Pass

Remark:

A: Normal performance within the specification limits.

7.2.2 Radiated Immunity

Test Requirement:	ETSI EN 301 489-17/EN 55035
Test Method:	EN 61000-4-3
Frequency range:	80MHz to 6GHz
Test Level:	3V/m
Modulation:	80%, 1kHz Amplitude Modulation
Performance Criterion:	Criteria A
Test setup:	
Test Procedure:	1. For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items. 2. If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length. 3. The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area). 4. The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary.Where the frequency range was swept incrementally, the step size was not exceed 1 % of the preceding frequency value. 5. The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 0,5 s. 6. The test normally was performed with the generating antenna facing each side of the EUT. 7. The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally. 8. The EUT was performed in a configuration to actual installation conditions, a video camera and/or a audio monitor were used to monitor the performance of the EUT.
Test monitor:	**Traffic mode:**

	1. The test system shall simulate a Base Station (BS) with Broadcast Control Channel/Common Control Channel (BCCH/CCCH) on one carrier. 2. The EUT shall be synchronized to the BCCH, listening to the CCCH and able to respond to paging messages.					
	Idle mode: 1. The test system shall simulate a Base Station (BS) with Broadcast Control Channel/Common Control Channel (BCCH/CCCH) on one carrier. 2. The EUT shall be synchronized to the BCCH, listening to the CCCH and able to respond to paging messages.					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1 010mbar
Test Instruments:	Refer to section 6.0 for details					
Test results:	Pass					

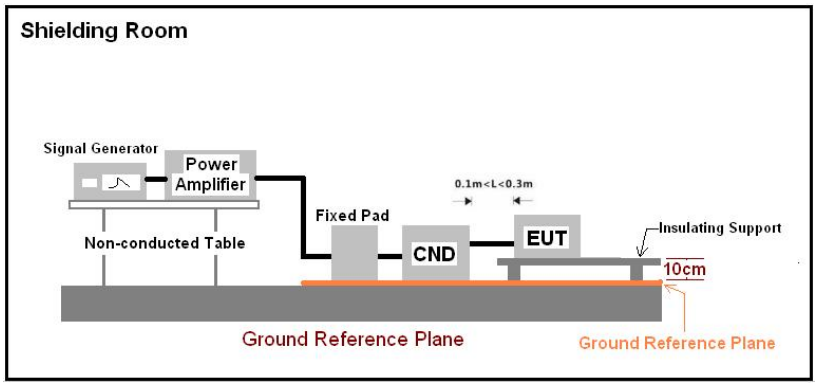
Measurement Record:

Frequency	Level	Modulation	Operating Mode	Antenna Polarization	EUT Face	Observations (Performance Criterion)
80 MHz-6 GHz	3 V/m	1 kHz, 80 % Amp. Mod, 1 % increment	All modes	V	Front	A
				H		A
				V	Rear	A
				H		A
				V	Left	A
				H		A
				V	Right	A
				H		A
				V	Top	A
				H		A
				V	Bottom	A
				H		A

Remarks:

A: normal performance within the specification limits

7.2.3 Radio frequency common mode

Test Requirement:	ETSI EN 301 489-17/EN 55035					
Test Method:	EN 61000-4-6					
Frequency range:	0.15MHz to 80MHz					
Test Level:	3V rms on AC Ports (unmodulated emf into 150 Ω)					
Modulation:	80%, 1kHz Amplitude Modulation					
Performance Criterion:	Criteria A					
Test setup:						
Test Procedure:	1. Let the EUT work in test mode and test it. 2. The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible). 3. The disturbance signal described below is injected to EUT through CDN. 4. The EUT operates within its operational mode(s) under intended climatic conditions after power on. 5. The frequency range is swept from 0.150MHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.The rate of sweep shall not exceed $1.5*10^{-3}$decades/s. Where the frequency is swept incrementally; the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value. 6. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.					
Test environment:	Temp.:	24 °C	Humid.:	51%	Press.:	1 010mbar
Test Instruments:	Refer to section 6.0 for details					
Test results:	Pass					

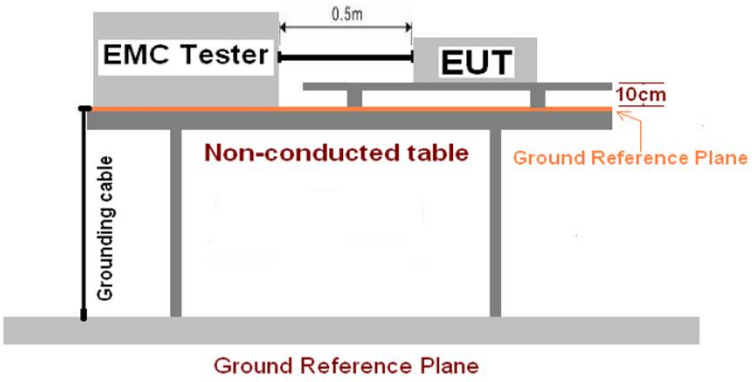
Measurement Record:

Frequency	Injected Position	Test Level	Modulation	Step Size	Dwell Time	Observations (Performance Criterion)
150kHz to 80MHz	AC Main	3Vrms	80%, 1kHz Amp. Mod.	1%	2s	A

Remark:

A: Normal performance within the specification limits.

7.2.4 Electrical Fast Transients

Test Requirement:	ETSI EN 301 489-17/EN 55035					
Test Method:	EN 61000-4-4					
Test Level:	1.0kV on AC port					
Polarity:	Positive & Negative					
Repetition Frequency:	5kHz					
Burst Duration:	15ms					
Burst Period:	300ms					
Test Duration:	2 minute per level & polarity					
Performance Criterion:	B					
Test setup:						
Test Procedure:	1. The EUT and its simulators were placed on the ground reference plane and were insulated from it by a wood support 0.1m + 0.01m thick. The ground reference plane was 1m*1m metallic sheet with 0.65mm minimum thickness. 2. This reference ground plane was project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane was more than 0.5m. 3. All cables to the EUT was placed on the wood support, cables not subject to EFT/B was routed as far as possible from the cable under test to minimize the coupling between the cables. 4. The length of the signal and power lines between the coupling device and the EUT is 0.5m **Test on Signal Ports, Telecommunication Ports and Control Ports:** The EFT interference signal is through a coupling clamp device couples to the signal and control lines of the EUT with burst noise for 2 minutes. **Test on power supply ports:** 1. The EUT is connected to the power mains through a coupling device that directly couples the EFT/B interference signal. 2. Each of the Line and Neutral conductors is impressed with burst noise for 2 minutes.					
Test environment:	Temp.:	26 °C	Humid.:	54%	Press.:	1 010mbar
Test Instruments:	Refer to section 6.0 for details					

Test mode:	Refer to section 5.2 for details
Test results:	Pass

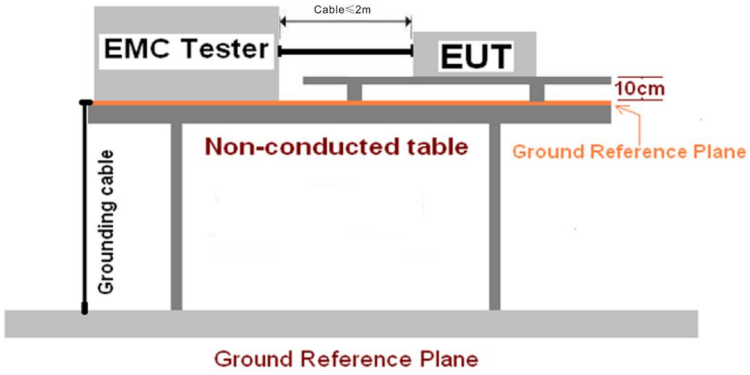
Measurement Record:

Lead under Test	Level (±kV)	Coupling Direct/Clamp	Observations (Performance Criterion)	Result
L	± 1.0	Direct	A	Pass
N	± 1.0	Direct	A	Pass
L-N	± 1.0	Direct	A	Pass

Remark:

A: Normal performance within the specification limits

7.2.5 Surge

Test Requirement:	ETSI EN 301 489-17/EN 55035					
Test Method:	EN 61000-4-5					
Test Level:	1kV line to line: Differential mode 2kV line to earth: Common mode					
Polarity:	Positive & Negative					
Test Interval:	60s between each surge					
No. of surges:	5 positive, 5 negative at 0°, 90°, 180°, 270°.					
Performance Criterion:	B					
Test setup:						
Test Procedure:	1. For line-to-line coupling mode, provide a 1kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points, and for active line / neutral lines to ground are same except test level is 2kV. 2. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are applied during test. 3. Different phase angles are done individually. 4. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.					
Test environment:	Temp.:	26 ◦C	Humid.:	53%	Press.:	1 010mbar
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test results:	Pass					

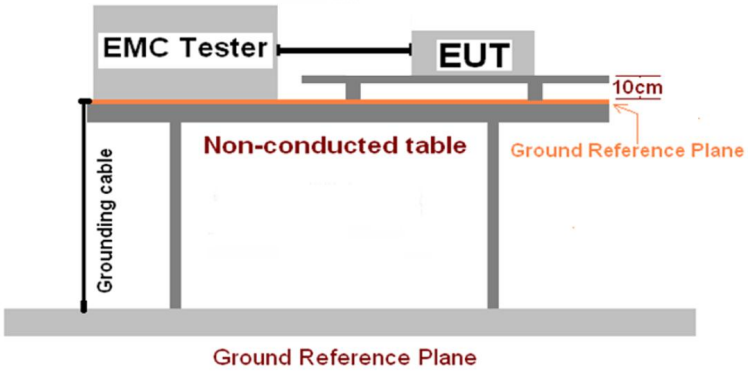
Measurement Record:

Location	Level(kV)	Pulse No	Surge Interval	Phase(deg)	Observations (Performance Criterion)
L-N	± 1	5	60s	0°	A
				90°	A
				180°	A
				270°	A

Remark:

A. Normal performance within the specification limits

7.2.6 Voltage Dip and Voltage Interruptions

Test Requirement:	ETSI EN 301489-17/EN 55035					
Test Method:	EN 61000-4-11					
Test Level:	0% of VT(Supply Voltage) for 0.5 period 0% of VT(Supply Voltage) for 1.0 period 70% of VT(Supply Voltage) for 25 period 0% of VT(Supply Voltage) for 250 period					
No. of Dips / Interruptions:	3 per Level					
Performance Criterion:	0% VD, 0.5 period----Performance criterion: B 0% VD, 1 period----Performance criterion: B 70% VD, 25 period----Performance criterion: C 0% VI, 250 period----Performance criterion: C					
Test setup:						
Test Procedure:	1>.The EUT and test generator were setup as shown on above setup photo. 2>.The interruptions are introduced at selected phase angles with specified duration. 3>.Record any degradation of performance.					
Test environment:	Temp.:	26 °C	Humid.:	53%	Press.:	1 010mbar
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test results:	Pass					

Measurement Record:

Test Level U_T	Duration (Periods)	Phase angle	No of dropout	Time between dropout	Observations (Performance Criterion)
0%	0.5	0°, 90°, 180°, 270°	3	10s	A
0%	1.0	0°, 90°, 180°, 270°	3	10s	A
70%	25	0°, 90°, 180°, 270°	3	10s	A
0%	250	0°, 90°, 180°, 270°	3	10s	B

Remark:

A: No loss of function was observed.

B: During the test, the EUT stops charging, but after the test, it can automatically return to normal.

8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details

------End------