EMC TEST REPORT

EN 55032:2015/A1:2020
EN 55035:2017/A11:2020
MEASUREMENT AND TEST REPORT

For

INVT Network Power (Shenzhen) Co.,Ltd.

Room 601, Building 1, INVT Guangming Technology Building, Shutianpu Community, Matian Street, Guangming District, Shenzhen City, Guangdong Province, China

Model: IW100, IW100-AUX, IW110, IW110-AUX, IW120, IW120-AUX, IW130, IW130-AUX, IW140, IW140-AUX, IW150, IW150-AUX, IW160, IW160-AUX, IW160-AUX2, IW170, IW170-AUX

2022-12-01

This Report Concerns:	**Equipment Type:**
Original Report	iWit Series Modular Data Center

Test Engineer:	Sinphy Xie/ Sinphy Xie
Report Number:	TH2211384-C01-R01
Test Date:	2022-11-28 to 2022-12-01
Reviewed By:	Neo Dong/ Neo Dong
Approved By:	Binglee/ Binglee
Prepared By:	**Shenzhen Tian Hai Test Technology Co., Ltd.** 125-126, No.66, Zhangge Road, Zhangge Community, Fucheng Street, Longhua District, Shenzhen, Guangdong, China Tel : +86-755-86615100 Fax: +86-755-86615105

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of TianHai Compliance Testing Laboratory Ltd.

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1 - SUMMARY OF STANDARDS AND RESULTS

1.1 DESCRIPTION OF STANDARDS AND RESULTS

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

EMISSION				
Description of Test Item	**Test Standard**	**Basic Standard**	**Requirement**	**Results**
Conducted disturbance at mains terminals	EN 55032:2015 /A1:2020	EN 55032:2015 /A1:2020	Class A	PASS
Asymmetric mode conducted emission	EN 55032:2015 /A1:2020	EN 55032:2015 /A1:2020	/	N/A
Radiated disturbance	EN 55032:2015 /A1:2020	EN 55032:2015 /A1:2020	Class A	PASS
IMMUNITY				
Description of Test Item	**Test Standard**	**Basic Standard**	**Test configuration**	**Results**
Electrostatic discharge (ESD)	EN 55035:2017 /A11:2020	IEC 61000-4-2:2008	Air Discharge: ±2KV, ±4KV, ±8KV Contact Discharge: ±2kV,±4kV	PASS
Radio-frequency, Continuous radiated disturbance	EN 55035:2017 /A11:2020	IEC 61000-4-3:2020	1%1kHz, 80% AM, 80 ~ 1000MHz, 1800MHz,2600MHz 3500MHz,6000MHz 3V/m	PASS
Electrical fast transient (EFT)	EN 55035:2017 /A11:2020	IEC 61000-4-4:2012	Tr/Td 5/50 ns, 5kHz, AC power port: ±1kV	PASS
Surge (Input a.c. power ports)	EN 55035:2017 /A11:2020	IEC 61000-4-5:2014 +AMD1:2017	AC port: 1.2/50 (8/20)Tr/Th us Line-Line:±1kV Line-PE:±2kV	PASS
Radio-frequency, Continuous conducted disturbance	EN 55035:2017 /A11:2020	IEC 61000-4-6:2013	1%1kHz, 80%, AM Mod. 0.15 ~ 10MHz: 3V/m 10 ~ 30MHz: 3V/m to1V/m 30 ~ 80MHz: 1V/m	PASS
Power frequency Magnetic field	EN 55035:2017 /A11:2020	IEC 61000-4-8:2009	1A/m, 50Hz or 60Hz	PASS
Voltage dips, ＜5% reduction	EN 55035:2017 /A11:2020	IEC 61000-4-11: 2020	0.5 Cycle	PASS
Voltage dips, 70% reduction			25 Cycle	PASS
Voltage interruptions ＜5% reduction			250 Cycle	PASS
Remark: N/A is an abbreviation for Not Applicable.				

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1.2 DESCRIPTION OF PERFORMANCE CRITERIA

General Performance Criteria

General performance criteria are defined in 8.2, 8.3 and 8.4. These criteria shall be used during the testing of primary functions where no relevant annex is applicable.
When assessing the impact of a disturbance on a function, the assessment should take into consideration the function's performance prior to the application of the disturbance and only identify as failures those changes in performance that are a result of the disturbance.

1.2.1 Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state 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, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.2 Performance criterion B

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the 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), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

1.2.3 Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.
Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

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2 - GENERAL INFORMATION

2.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST

Client Information

Applicant:	**INVT Network Power (Shenzhen) Co.,Ltd.**
Address:	Room 601, Building 1, INVT Guangming Technology Building, Shutianpu Community, Matian Street, Guangming District, Shenzhen City, Guangdong Province, China
Manufacturer:	**INVT Network Power (Shenzhen) Co.,Ltd.**
Address:	Room 601, Building 1, INVT Guangming Technology Building, Shutianpu Community, Matian Street, Guangming District, Shenzhen City, Guangdong Province, China

General Description of E.U.T

EUT Name:	**iWit Series Modular Data Center**
Trade Mark:	INVT
Model No.:	IW100, IW100-AUX, IW110, IW110-AUX, IW120, IW120-AUX, IW130, IW130-AUX, IW140, IW140-AUX, IW150, IW150-AUX, IW160, IW160-AUX, IW160-AUX2, IW170, IW170-AUX
Model Difference:	They are identical to each other except for product name and model number
Sample No.:	TH2211384
Ratings:	AC 220V/AC 380V, 50/60Hz, 13.6A-159A, 3kW-105kW
Test Mode:	A. ON 1.Work normally (AC 220V/50Hz) 2.Work normally (AC 380V/50Hz)
Note:	/

2.2 STATEMENT OF THE MEASUREMENT UNCERTAINTY TEST FACILITY

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration Limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16-4-2 “Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-2: Uncertainties, statistics and limit modelling – Measurement instrumentation uncertainty” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.3 MEASUREMENT UNCERTAINTY

Test	Parameters	Expanded uncertainty (U_{lab})	Expanded uncertainty (U_{cispr})
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	 ±2.52 dB ±2.36 dB	 ±3.80 dB ±3.40 dB

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Power disturbance	Level accuracy (30MHz to 300MHz)	±3.20dB	±4.50 dB
Electromagnetic Radiated Emission (3-loop)	Level accuracy (9kHz to 30MHz)	±3.10dB	N/A
Radiated emission	Level accuracy (30MHz to 1000MHz)	±5.78dB	±6.30dB
	Level accuracy (above 1000MHz)	±4.62dB	N/A
Mains Harmonic	Voltage	±1.80%	N/A
Voltage Fluctuations & Flicker	Voltage	±0.64%	N/A

(1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.
(2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.
(3) The measurement uncertainty is not included in the test result.

2.4 TEST LOCATION

All tests were performed at Shenzhen Tianhai Test Technology Co., Ltd.
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2.5 PRINCIPLE OF CONFIGURATION SELECTION

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.
Immunity: The equipment under test (EUT) was configured to have its highest possible susceptibility against the tested phenomena. The test modes were adapted accordingly in reference to the instructions for use.

2.6 TEST OPERATION

Test operation refers to test setup in chapter 4 & 5 & 6 & 7 & 8.
Pre-test in all operation modes, and find out the worst case for compliance test.
According to section 2.1, full tests were applied on model:IW100

2.7 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT

The EUT was tested together with the following accessories:

Kind of Equipment	Manufacturer	Type	S/N
/	/	/	/

The EUT was tested with following cables:

Cable name	Length (m)	Shield	Core No.	Detachable
/	/	/	/	/

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3 - TEST EQUIPMENT LIST AND DETAILS

Kind of Equipment	Manufacturer	Type	S/N	Calibrate until
Conducted Emission				
EMI Test Receiver	R&S	ESR7	102333	2023-11-13
L.I.S.N	Schwarzbeck	NNLK 8128	5089	2023-11-13
8-Wire ISN CAT6	Schwarzbeck	NTFM 8158	231	2023-11-13
Pulse Limiter	Schwarzbeck	VTSD 9561-F	847	2023-11-13
Test software	FALA	/	EMC-CON 3A1.1	/
Radiated Emission (3m)				
EMI Test Receiver	R&S	ESR7	102333	2023-11-13
MXA Signal Analyzer	Keysight	N9020A	MY51281805	2023-04-15
Bilog Antenna	Schwarzbeck	VULB 9168	01148	2023-11-20
Pre-Amplifier	Schwarzbeck	BBV 9718 B	00109	2023-11-13
Pre-Amplifier	Schwarzbeck	BBV 9743 B	00253	2023-11-13
Horn Antenna	Schwarzbeck	BBHA 9120	02379	2023-11-20
Test software	FALA	/	FA-03A2 RE	/
Harmonics & Flicker				
5kVA AC Power Source	AMETEK CTS	5001iX-CTS-400	2046A03237	2023-11-13
Signal Conditioning Unit	AMETEK CTS	PACS-1	2046A03238	2023-11-13
Test software	AMETEK CTS	CTS 4	Version 4.26.0	/
Electrostatic discharge (ESD)				
ESD Simulator	TESEQ	NSG 437	1569	2023-11-15
Pistol	TESEQ	V06.04	/	/
Base Station	TESEQ	V06.02	/	/
Radio-frequency,Continuous radiated disturbance (RS)				
Signal generator	R&S	SMB 100A	113650	2023-04-15
Power meter	Agilent	E4417A	MY45100899	2023-04-15
Power sensor	Agilent	E9321A	US40390494	2023-04-15
Power sensor	Agilent	E9322A	MY44420219	2023-04-15
Power amplifier	Micotop	MPA-80-1000-250	MPA2112426	2023-04-15

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Power amplifier	Micotop	MPA-1000-6000-100	MPA2201013	2023-04-15
Stacked Log. Periodic Antenna	Schwarzbeck	STLP 9129	201	/
RF Switch	Emtrace	SW X4	/	/
Test Software	Emtrace	EM 3	V1.2.1	/
Electrical fast transient (EFT)				
Burst Tester	3C test	EFT 500T	ES027000120015	2023-11-13
Coupling Clamp	3C test	CCC 100	CCC 20092269	2023-11-13
Test Software	3C test	V4.2.7	ES027000120015	/
Surge				
Surge simulator	3C test	CWS 600CT	ES058000920005	2023-11-13
Three phases CDN	3C test	SPN 3832T	ES0911910	2023-11-13
CDN for unshielded symmetrical high-speed Telecom cable	3C test	CDN405T8A	ES064001220010	2023-11-13
CDN for Telecom cable	3C test	CDN405M40-5	ES1071910	2023-11-13
Test Software	3C test	V1.0.5.2	ES058000920005	/
Radio-frequency,Continuous conducted disturbance (CS)				
Conducted Immunity Test System	3C test	CST 1075	ES096000120008	2023-11-13
6dB Attenuator	3C test	DTC75-6	ES095000120006	2023-11-13
Single phase CDN	3C test	CDN M2M3	ES064002620007	2023-11-13
Three phases CDN	3C test	CDN M5-16	ES064003320004	2023-11-13
Calibration Set	3C test	CDN 100KIT	ES064002820016	2023-11-13
Calibration Set	3C test	EM CL100KIT	EM C20032816	2023-11-13
EM-Clamp	3C test	EM CL100	EM C20032811	2023-11-13
Test software	SKET	/	V1.4.0.54	/
Power Frequency Magnetic Field (PFMF)				
PFMF simulator	3C test	MFS 400	ES045000720001	2023-11-13
Transformer	3C test	MFT 400	ES046000220003	2023-11-13
Magnetic field antenna	3C test	TCXS111	TCXS20060910	2023-11-13
Test software	3C test	V4.2.7	ES045000720001	/
Voltage dips &Voltage interruptions				

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Power failure simulator	3C test	PFS 2216SD	ES049001220003	2023-11-13
Test software	3C test	V4.2.8	ES049001220003	/

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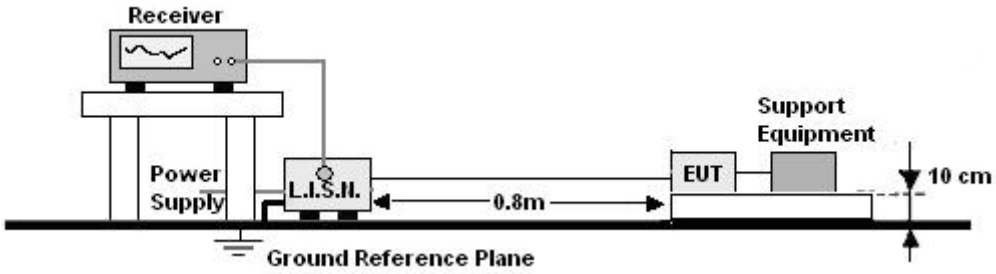
4 - CONDUCTED EMISSION MEASUREMENT

4.1 BLOCK DIAGRAM OF TEST SETUP



4.2 LIMITS

Frequency range (MHz)	Class A Limits (dBµV)	
	Quasi-peak	Average
0.15 ~ 0.5	79	66
0.50 ~ 30	73	60

4.3 TEST PROCEDURE

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through a Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 55032 regulations during conducted emission measurement.

The bandwidth of the field strength meter is set at 9kHz.

The frequency range from 150kHz to 30MHz is investigated. The scanning waveform please refer to the next page.

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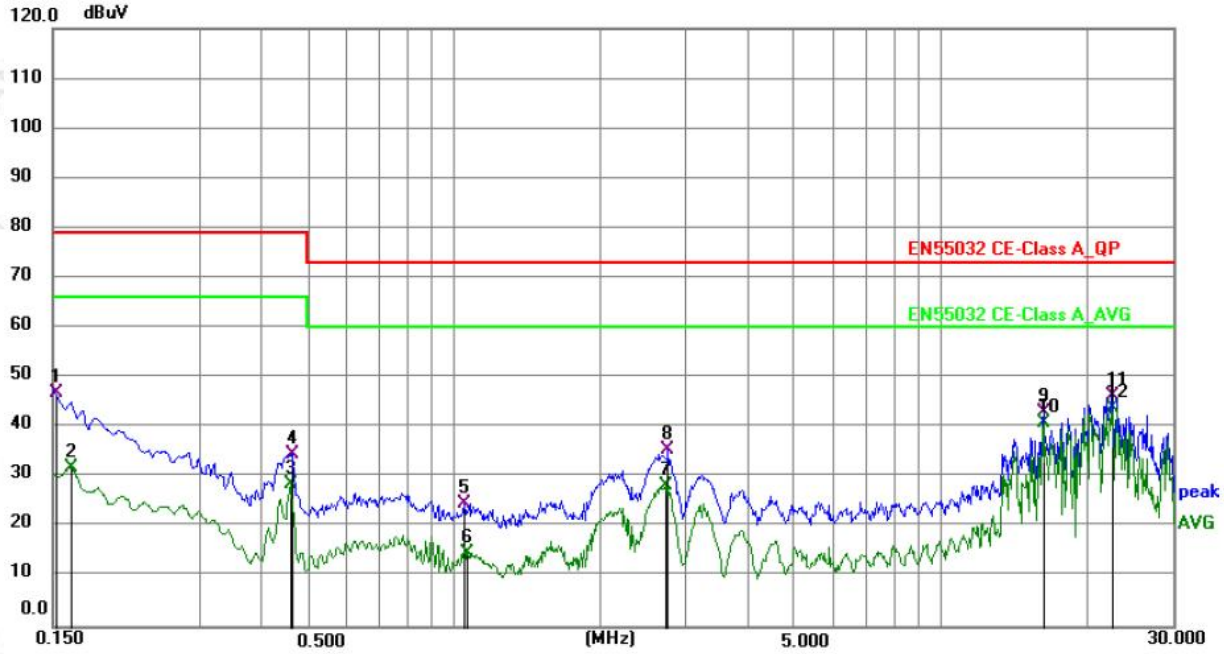
4.4 TEST RESULTS AND DATA

EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.1
Test Voltage :	AC 220V/50Hz
Temperature:	23℃
Humidity:	55%
Atmosphere pressure:	101Kpa
Test Results:	Pass

Phase:L1



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1516	36.76	10.26	47.02	79.00	-31.98	QP	P
2	0.1624	21.80	10.23	32.03	66.00	-33.97	AVG	P
3	0.4605	18.36	10.31	28.67	66.00	-37.33	AVG	P
4	0.4650	24.47	10.31	34.78	79.00	-44.22	QP	P
5	1.0500	14.49	10.39	24.88	73.00	-48.12	QP	P
6	1.0680	4.50	10.39	14.89	60.00	-45.11	AVG	P
7	2.7330	17.89	10.44	28.33	60.00	-31.67	AVG	P
8	2.7554	25.13	10.43	35.56	73.00	-37.44	QP	P
9	16.2280	32.35	10.76	43.11	73.00	-29.89	QP	P
10	16.2280	30.29	10.76	41.05	60.00	-18.95	AVG	P
11	22.4560	35.31	10.96	46.27	73.00	-26.73	QP	P
12 *	22.4560	32.94	10.96	43.90	60.00	-16.10	AVG	P

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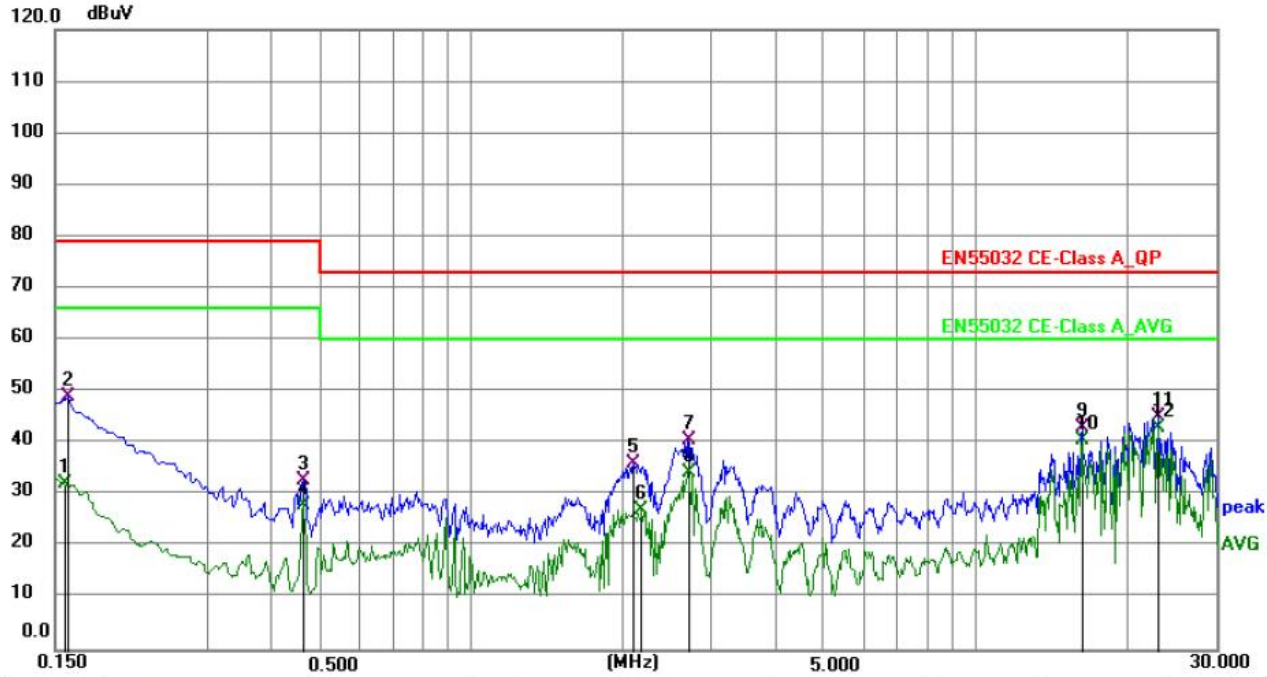
Phase:N



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1556	21.93	10.22	32.15	66.00	-33.85	AVG	P
2	0.1590	38.84	10.22	49.06	79.00	-29.94	QP	P
3	0.4650	22.52	10.32	32.84	79.00	-46.16	QP	P
4	0.4650	17.87	10.32	28.19	66.00	-37.81	AVG	P
5	2.1030	25.63	10.47	36.10	73.00	-36.90	QP	P
6	2.1840	16.83	10.47	27.30	60.00	-32.70	AVG	P
7	2.7060	30.06	10.46	40.52	73.00	-32.48	QP	P
8	2.7060	23.85	10.46	34.31	60.00	-25.69	AVG	P
9	16.2280	32.39	10.75	43.14	73.00	-29.86	QP	P
10	16.2280	29.99	10.75	40.74	60.00	-19.26	AVG	P
11	23.1265	34.18	10.91	45.09	73.00	-27.91	QP	P
12 *	23.1265	32.22	10.91	43.13	60.00	-16.87	AVG	P

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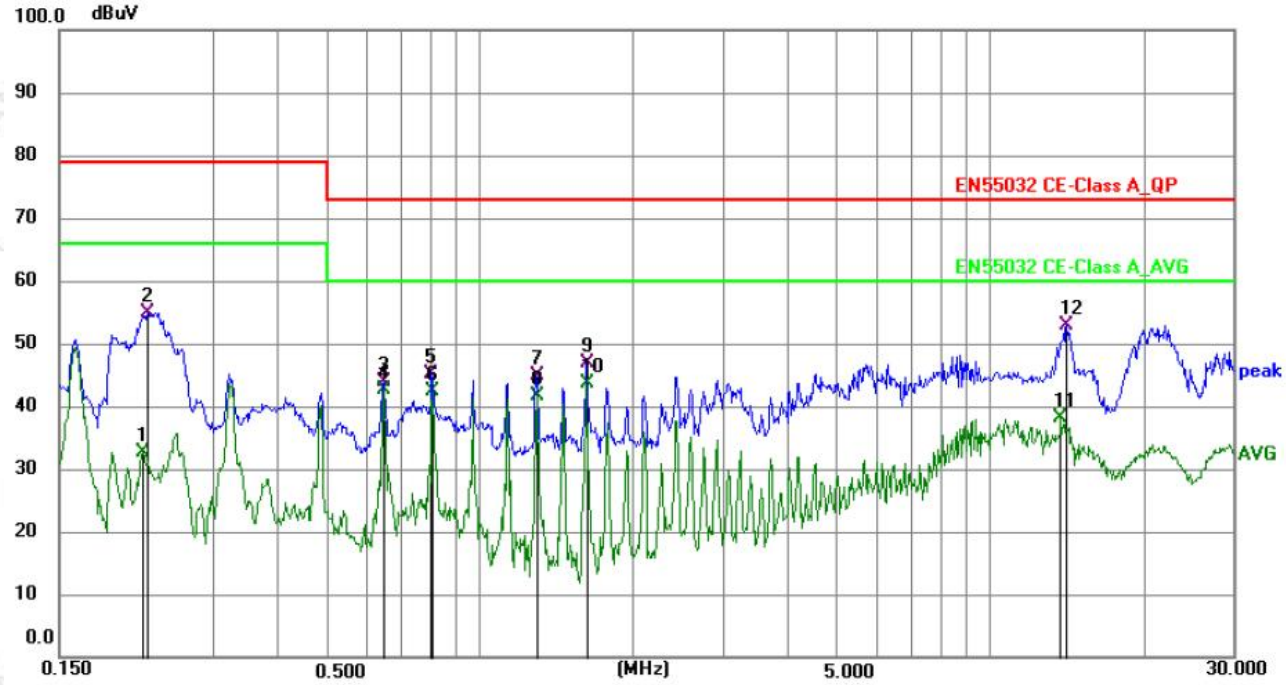
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.1
Test Voltage :	AC 380V/50Hz
Temperature:	23℃
Humidity:	55%
Atmosphere pressure:	101Kpa
Test Results:	Pass

Phase:L1



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.2174	22.44	10.24	32.68	66.00	-33.32	AVG	P
2	0.2230	44.59	10.24	54.83	79.00	-24.17	QP	P
3	0.6491	33.56	10.36	43.92	73.00	-29.08	QP	P
4	0.6491	32.26	10.36	42.62	60.00	-17.38	AVG	P
5	0.8070	34.91	10.34	45.25	73.00	-27.75	QP	P
6	0.8114	31.95	10.34	42.29	60.00	-17.71	AVG	P
7	1.2925	34.49	10.41	44.90	73.00	-28.10	QP	P
8	1.2975	31.19	10.41	41.60	60.00	-18.40	AVG	P
9	1.6210	36.56	10.43	46.99	73.00	-26.01	QP	P
10 *	1.6210	33.13	10.43	43.56	60.00	-16.44	AVG	P
11	13.8025	27.43	10.67	38.10	60.00	-21.90	AVG	P
12	14.1400	42.31	10.68	52.99	73.00	-20.01	QP	P

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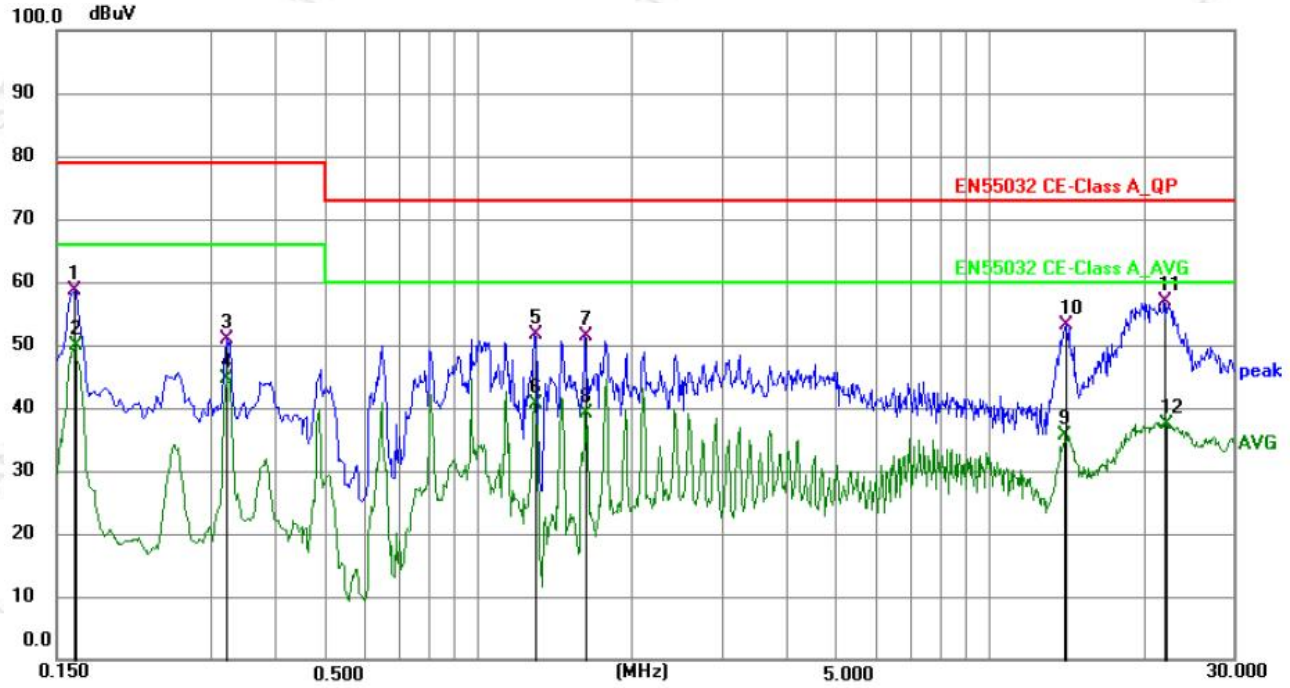
Phase:L2



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1621	48.43	10.20	58.63	79.00	-20.37	QP	P
2	0.1632	39.58	10.20	49.78	66.00	-16.22	AVG	P
3	0.3234	40.57	10.26	50.83	79.00	-28.17	QP	P
4	0.3234	34.35	10.26	44.61	66.00	-21.39	AVG	P
5	1.2925	41.09	10.47	51.56	73.00	-21.44	QP	P
6	1.2925	30.16	10.47	40.63	60.00	-19.37	AVG	P
7	1.6211	40.81	10.46	51.27	73.00	-21.73	QP	P
8	1.6211	28.56	10.46	39.02	60.00	-20.98	AVG	P
9	14.1036	24.89	10.72	35.61	60.00	-24.39	AVG	P
10	14.1850	42.29	10.73	53.02	73.00	-19.98	QP	P
11 *	22.0551	45.91	11.00	56.91	73.00	-16.09	QP	P
12	22.2895	26.45	11.01	37.46	60.00	-22.54	AVG	P

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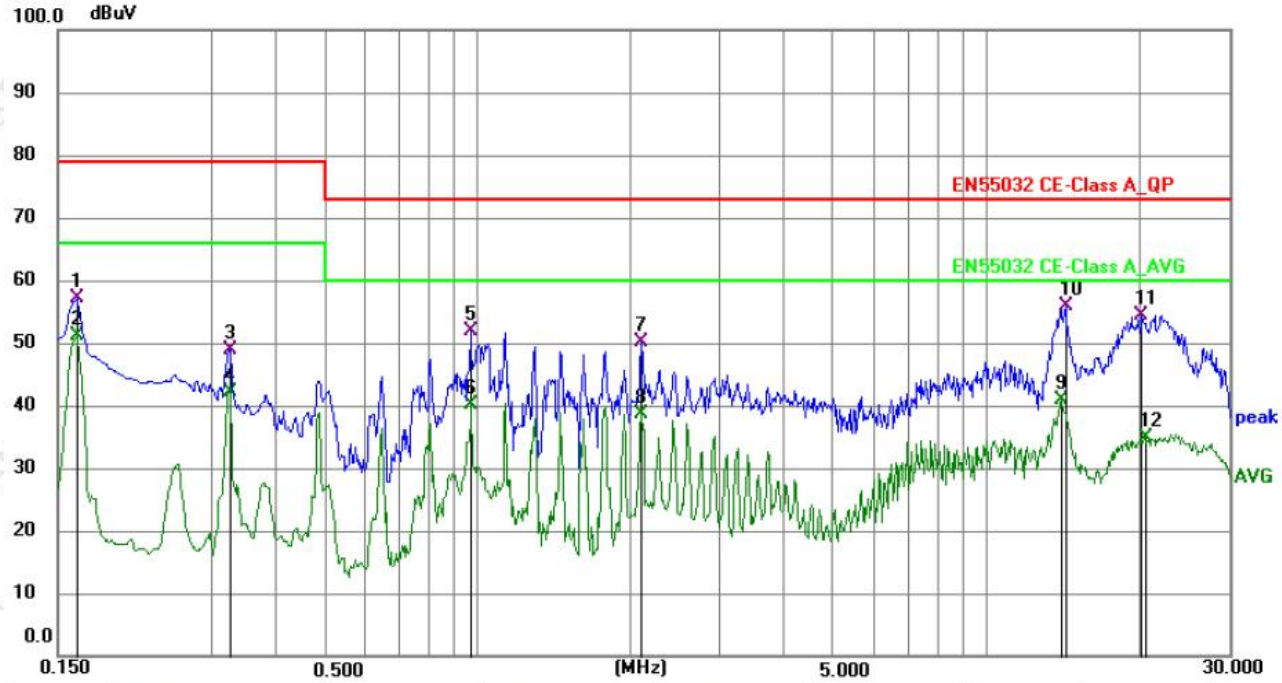
Phase:L3



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1635	47.02	10.20	57.22	79.00	-21.78	QP	P
2 *	0.1635	41.05	10.20	51.25	66.00	-14.75	AVG	P
3	0.3255	38.65	10.26	48.91	79.00	-30.09	QP	P
4	0.3255	31.97	10.26	42.23	66.00	-23.77	AVG	P
5	0.9735	41.36	10.41	51.77	73.00	-21.23	QP	P
6	0.9778	29.61	10.41	40.02	60.00	-19.98	AVG	P
7	2.1074	39.71	10.43	50.14	73.00	-22.86	QP	P
8	2.1074	28.18	10.43	38.61	60.00	-21.39	AVG	P
9	14.0545	30.19	10.72	40.91	60.00	-19.09	AVG	P
10	14.3018	45.27	10.73	56.00	73.00	-17.00	QP	P
11	20.2012	43.48	10.95	54.43	73.00	-18.57	QP	P
12	20.6920	23.84	10.96	34.80	60.00	-25.20	AVG	P

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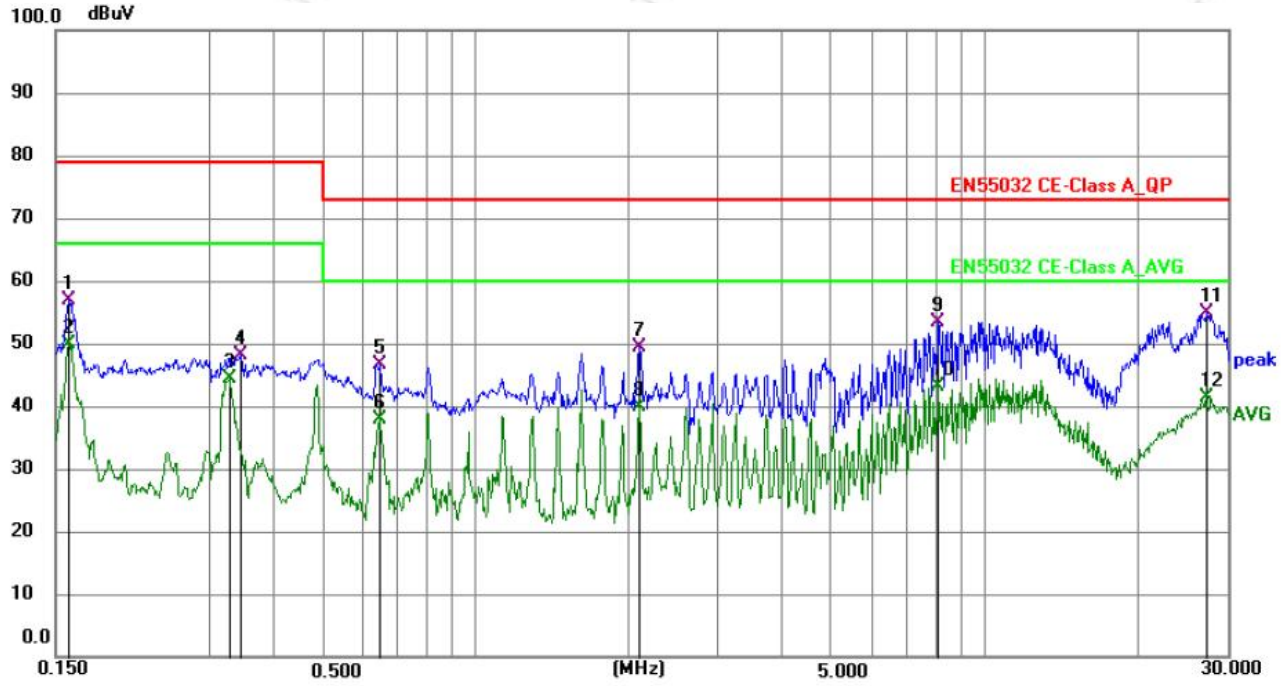
Phase:N



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.1590	46.71	10.22	56.93	79.00	-22.07	QP	P
2 *	0.1590	39.56	10.22	49.78	66.00	-16.22	AVG	P
3	0.3285	34.22	10.25	44.47	66.00	-21.53	AVG	P
4	0.3462	37.75	10.26	48.01	79.00	-30.99	QP	P
5	0.6491	36.31	10.39	46.70	73.00	-26.30	QP	P
6	0.6491	27.44	10.39	37.83	60.00	-22.17	AVG	P
7	2.1030	38.97	10.47	49.44	73.00	-23.56	QP	P
8	2.1030	29.44	10.47	39.91	60.00	-20.09	AVG	P
9	8.1272	42.95	10.55	53.50	73.00	-19.50	QP	P
10	8.1272	32.61	10.55	43.16	60.00	-16.84	AVG	P
11	27.3246	44.01	10.98	54.99	73.00	-18.01	QP	P
12	27.3246	30.51	10.98	41.49	60.00	-18.51	AVG	P

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5 - RADIATED DISTURBANCE MEASUREMENT

5.1 BLOCK DIAGRAM OF TEST SETUP

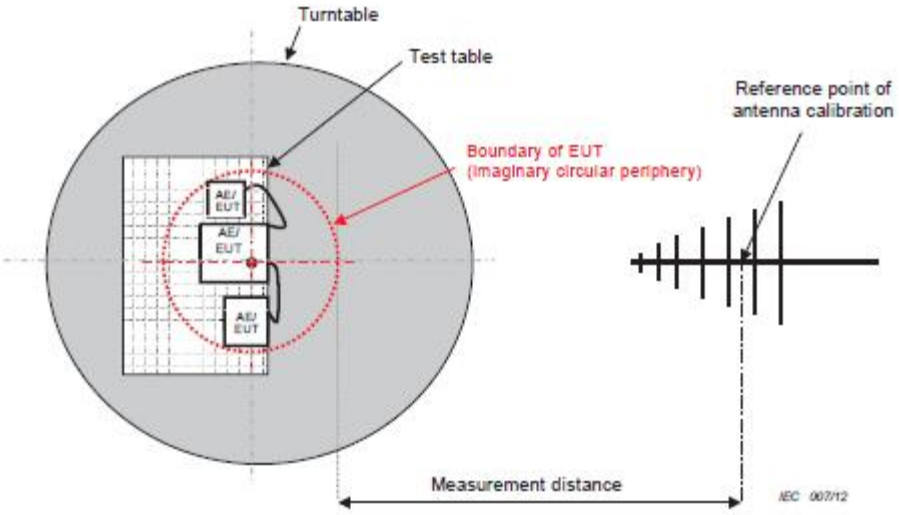

Figure C.1 – Measurement distance

5.2 LIMITS

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

5.3 TEST PROCEDURE

a. The Product was placed on the non-conductive turntable 0.8/0.1 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

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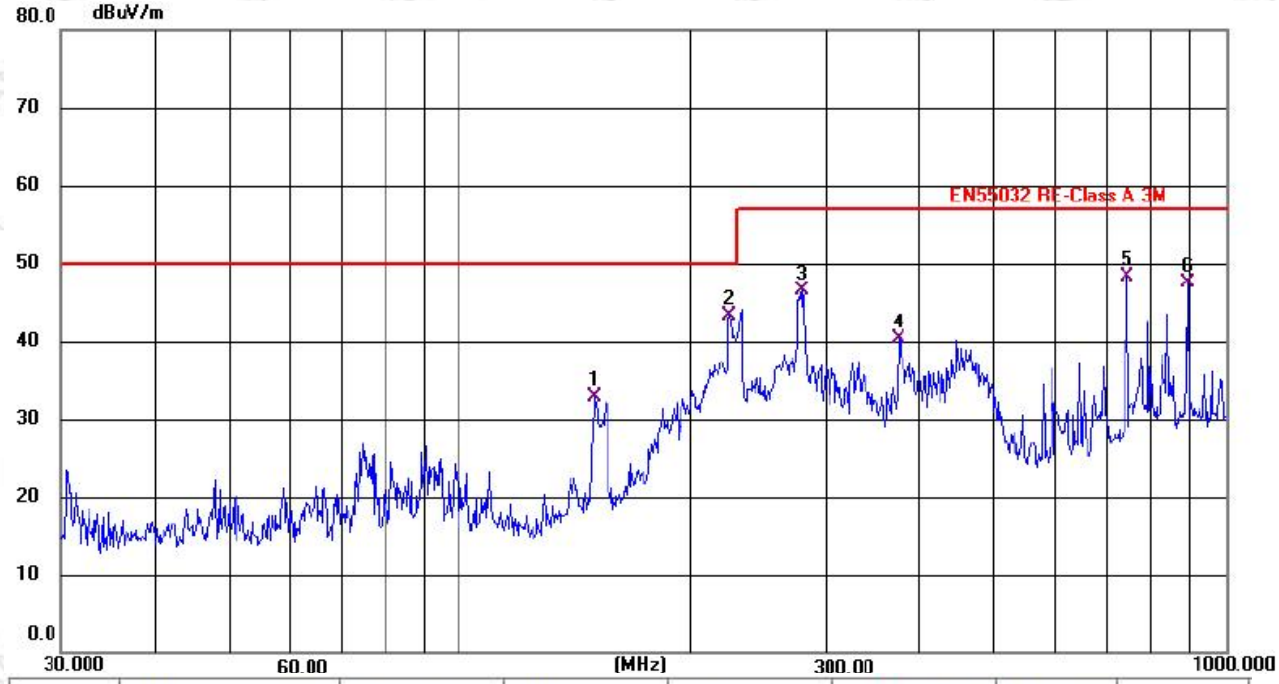
5.4 TEST RESULTS AND DATA

EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.1
Test Voltage :	AC 220V/50Hz
Temperature:	26℃
Humidity:	54%
Atmosphere pressure:	101Kpa
Test Results:	Pass

Polarization:Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	149.7479	48.43	-15.54	32.89	50.00	-17.11	QP
2 *	225.1105	60.47	-17.16	43.31	50.00	-6.69	QP
3	280.5644	61.25	-14.74	46.51	57.00	-10.49	QP
4	374.2285	52.89	-12.63	40.26	57.00	-16.74	QP
5	742.5190	53.26	-4.94	48.32	57.00	-8.68	QP
6	891.0401	49.91	-2.41	47.50	57.00	-9.50	QP

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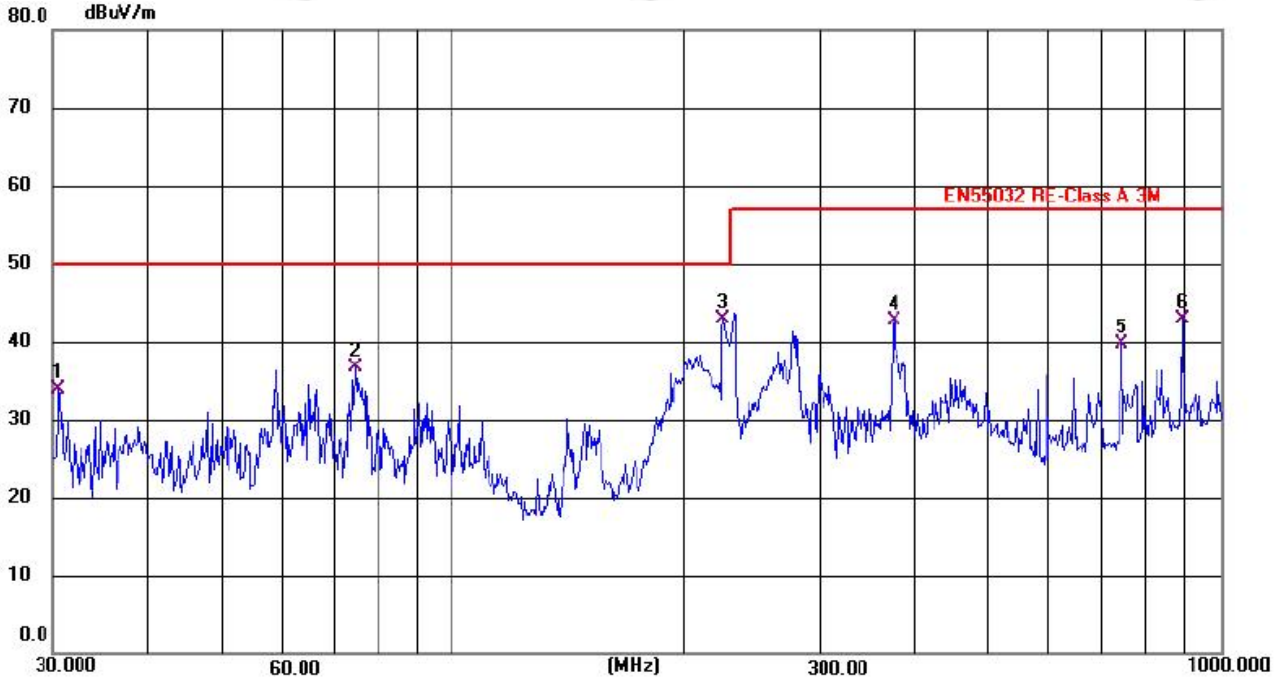
Polarization:Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	30.6110	50.19	-16.33	33.86	50.00	-16.14	QP
2	74.5522	55.23	-18.47	36.76	50.00	-13.24	QP
3 *	225.1105	60.03	-17.16	42.87	50.00	-7.13	QP
4	375.1484	55.25	-12.60	42.65	57.00	-14.35	QP
5	742.5190	44.70	-4.94	39.76	57.00	-17.24	QP
6	891.0401	45.33	-2.41	42.92	57.00	-14.08	QP

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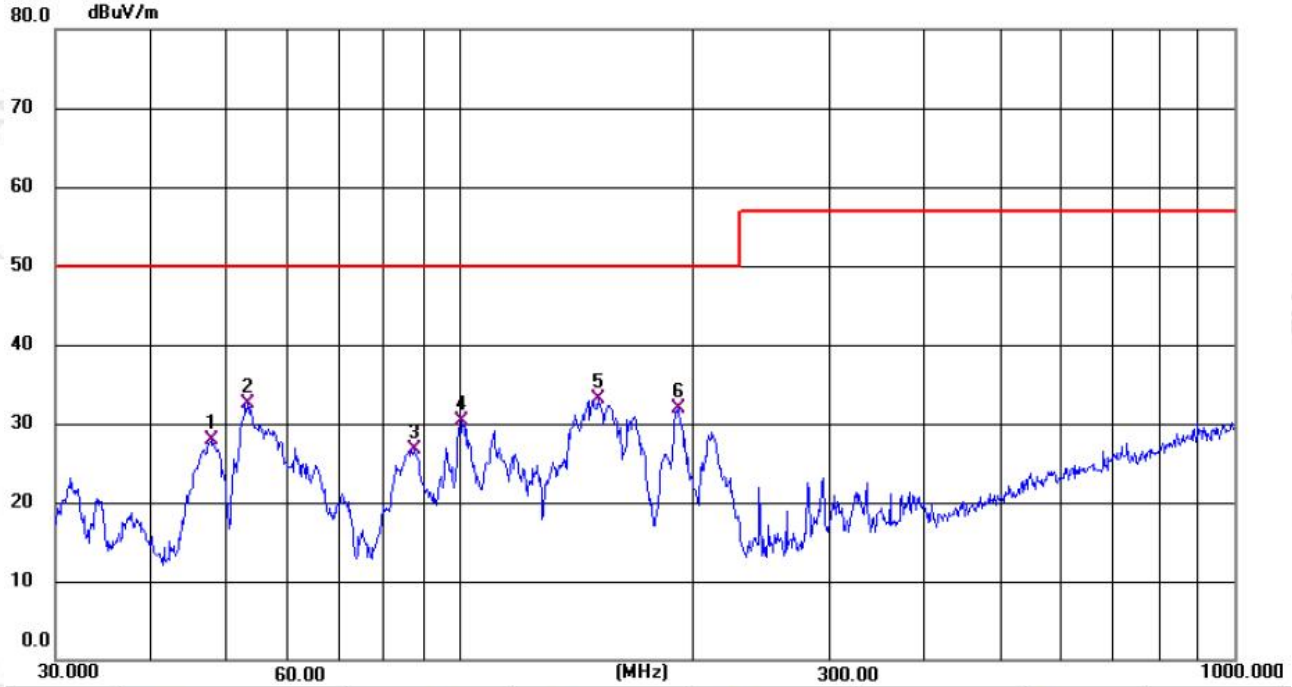
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.2
Test Voltage :	AC 380V/50Hz
Temperature:	26℃
Humidity:	54%
Atmosphere pressure:	101Kpa
Test Results:	Pass

Polarization:Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	47.6920	42.80	-14.81	27.99	50.00	-22.01	QP
2	53.3085	47.61	-15.10	32.51	50.00	-17.49	QP
3	87.2185	46.15	-19.50	26.65	50.00	-23.35	QP
4	100.7924	48.57	-18.35	30.22	50.00	-19.78	QP
5 *	150.5903	48.61	-15.53	33.08	50.00	-16.92	QP
6	191.9805	49.89	-18.06	31.83	50.00	-18.17	QP

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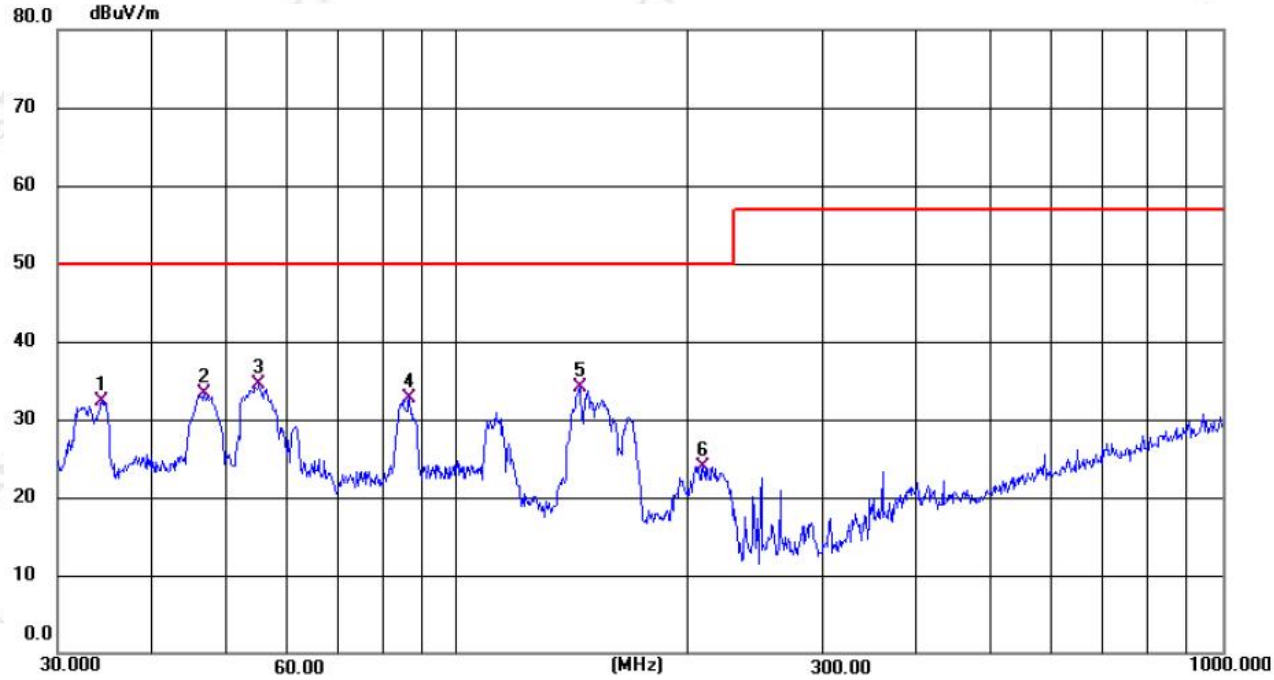
Polarization:Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	34.3783	47.83	-15.52	32.31	50.00	-17.69	QP
2	46.7727	48.37	-15.02	33.35	50.00	-16.65	QP
3 *	55.0949	50.22	-15.72	34.50	50.00	-15.50	QP
4	86.5939	52.65	-19.90	32.75	50.00	-17.25	QP
5	144.8163	49.72	-15.60	34.12	50.00	-15.88	QP
6	209.3863	41.86	-17.94	23.92	50.00	-26.08	QP

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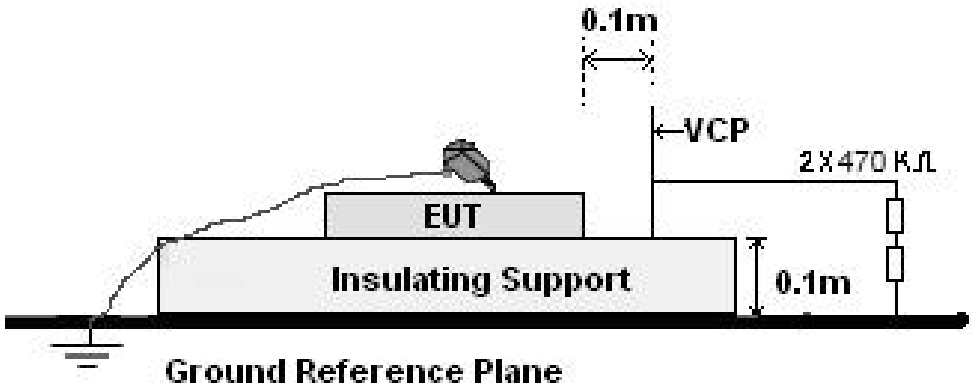
6 - IMMUNITY TEST

6.1 ELECTROSTATIC DISCHARGE IMMUNITY TEST

6.1.1 BLOCK DIAGRAM OF TEST SETUP



6.1.2 TEST SPECIFICATION

Basic Standard	:	IEC 61000-4-2:2008
Test Port	:	Enclosure port
Discharge Impedance	:	330 ohm / 150 pF
Discharge Mode	:	Single Discharge
Discharge Period	:	one second between each discharge

6.1.3 TEST PROCEDURE

6.1.3.1. Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

6.1.3.2. Contact Discharge

All the procedure shall be same as Section 6.1.3.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

6.1.3.3. Indirect Discharge for Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

6.1.3.4. Indirect Discharge for Vertical Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

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6.1.4 TEST RESULTS

Electrostatic Discharge	
Basic Standard:	IEC 61000-4-2:2008
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.1
Test Voltage:	AC 220V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Discharge Method	Discharge Position	Voltage (±kV)	Min. No. of Discharge per polarity (Each Point)	Performance criteria	Result
Contact Discharge	Metal Surfaces	2, 4	10	B	Pass
	Indirect Discharge HCP	2, 4	10	B	Pass
	Indirect Discharge VCP	2, 4	10	B	Pass
Air Discharge	Insulating Surfaces, Display	2, 4, 8	10	B	Pass

Electrostatic Discharge	
Basic Standard:	IEC 61000-4-2:2008
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.2
Test Voltage:	AC 380V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Discharge Method	Discharge Position	Voltage (±kV)	Min. No. of Discharge per polarity (Each Point)	Performance criteria	Result
Contact Discharge	Metal Surfaces	2, 4	10	B	Pass
	Indirect Discharge HCP	2, 4	10	B	Pass
	Indirect Discharge VCP	2, 4	10	B	Pass
Air Discharge	Insulating Surfaces, Display	2, 4, 8	10	B	Pass

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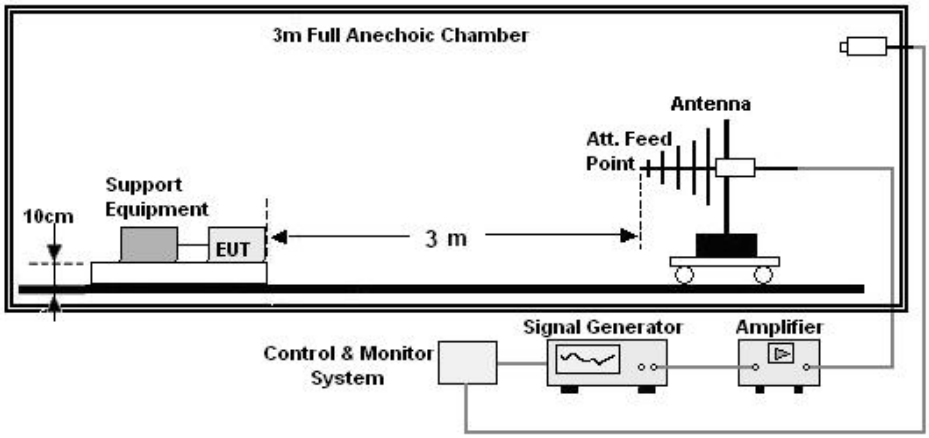
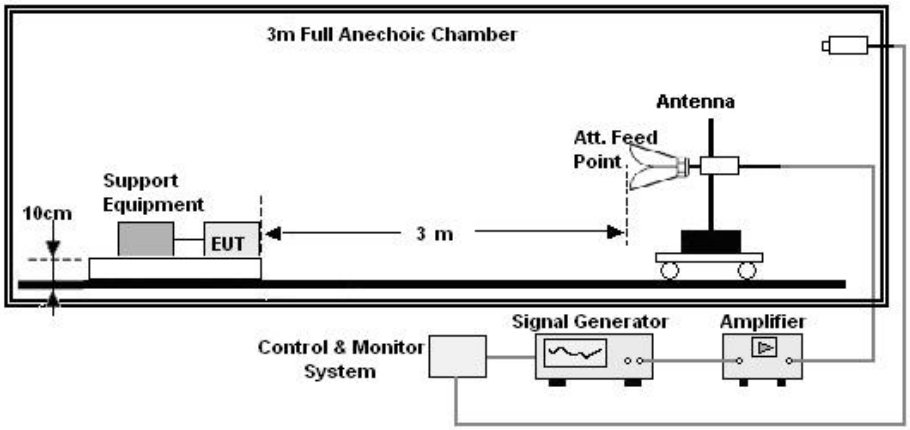
6.2 RADIO FREQUENCY ELECTROMAGNETIC FIELDS

6.2.1 BLOCK DIAGRAM OF TEST SETUP

80-1000MHz:



80-6000MHz:



6.2.2 TEST SPECIFICATION

Basic Standard	:	IEC 61000-4-3:2020
Test Port	:	Enclosure port
Step Size	:	1%
Modulation	:	1kHz, 80% AM
Dwell Time	:	1 second
Polarization	:	Horizontal & Vertical

6.2.3 TEST PROCEDURE

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

b. The frequency range is swept from 80MHz to 1000MHz, 1800MHz, 2600MHz, 3500MHz, 6000MHz, with the signal 80% amplitude modulated with a 1 kHz sine wave. The rate of sweep did not exceed 1.5x 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.

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6.2.4 TEST RESULTS

Radio frequency electromagnetic fields	
Basic Standard:	IEC 61000-4-3:2020
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.1
Test Voltage:	AC 220V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Frequency (MHz)	Position	Field Strength (V/m)	Performance criteria	Result
80 - 1000	Front	3	A	Pass
	Right	3	A	Pass
	Back	3	A	Pass
	Left	3	A	Pass
1800	Front	3	A	Pass
	Right	3	A	Pass
	Back	3	A	Pass
	Left	3	A	Pass
2600	Front	3	A	Pass
	Right	3	A	Pass
	Back	3	A	Pass
	Left	3	A	Pass
3500	Front	3	A	Pass
	Right	3	A	Pass
	Back	3	A	Pass
	Left	3	A	Pass
6000	Front	3	A	Pass
	Right	3	A	Pass
	Back	3	A	Pass
	Left	3	A	Pass

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Radio frequency electromagnetic fields	
Basic Standard:	IEC 61000-4-3:2020
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.2
Test Voltage:	AC 380V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Frequency (MHz)	Position	Field Strength (V/m)	Performance criteria	Result
80 - 1000	Front	3	A	Pass
	Right	3	A	Pass
	Back	3	A	Pass
	Left	3	A	Pass
1800	Front	3	A	Pass
	Right	3	A	Pass
	Back	3	A	Pass
	Left	3	A	Pass
2600	Front	3	A	Pass
	Right	3	A	Pass
	Back	3	A	Pass
	Left	3	A	Pass
3500	Front	3	A	Pass
	Right	3	A	Pass
	Back	3	A	Pass
	Left	3	A	Pass
6000	Front	3	A	Pass
	Right	3	A	Pass
	Back	3	A	Pass
	Left	3	A	Pass

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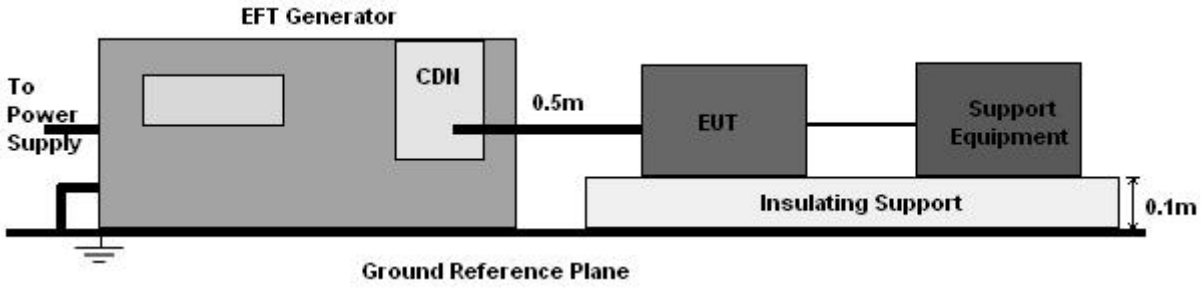
6.3 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

6.3.1 BLOCK DIAGRAM OF TEST SETUP



6.3.2 TEST SPECIFICATION

Basic Standard	:	IEC 61000-4-4:2012
Test Port	:	input a.c.power port
Impulse Frequency	:	5 kHz
Impulse Wave-shape	:	5/50 ns
Burst Duration	:	15 ms
Burst Period	:	300 ms
Test Duration	:	2 minutes per polarity

6.3.3 TEST PROCEDURE

The EUT is put on the table which is 0.8 meter high above the ground. This reference ground plane shall 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 beneath the EUT, shall be more than 0.5m.

6.3.3.1. For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

6.3.3.2. For signal lines and control lines ports:

No I/O ports. It’s unnecessary to test.

6.3.3.3. For DC output line ports:

No DC output ports. It’s unnecessary to test.

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6.3.4 TEST RESULTS

Electrical Fast Transient/Burst	
Basic Standard:	IEC 61000-4-4:2012
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.1
Test Voltage:	AC 220V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Line	Test Voltage	Performance criteria	Result
L	±1kV	B	Pass
N	±1kV	B	Pass
PE	±1kV	B	Pass
L - N	±1kV	B	Pass
L - PE	±1kV	B	Pass
N - PE	±1kV	B	Pass
L - N - PE	±1kV	B	Pass

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Electrical Fast Transient/Burst	
Basic Standard:	IEC 61000-4-4:2012
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.2
Test Voltage:	AC 380V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Line	Test Voltage	Performance criteria	Result
L1	±1kV	B	Pass
L2	±1kV	B	Pass
L3	±1kV	B	Pass
N	±1kV	B	Pass
PE	±1kV	B	Pass
L1-L2	±1kV	B	Pass
L1-L3	±1kV	B	Pass
L2-L3	±1kV	B	Pass
L1-N	±1kV	B	Pass
L2-N	±1kV	B	Pass
L3-N	±1kV	B	Pass
N-PE	±1kV	B	Pass
L1-PE	±1kV	B	Pass
L2-PE	±1kV	B	Pass
L3-PE	±1kV	B	Pass
L1-L2-L3	±1kV	B	Pass
L1-L2-N	±1kV	B	Pass
L1-N-PE	±1kV	B	Pass
L1-L3-N	±1kV	B	Pass
L1-L3-PE	±1kV	B	Pass
L1-L2-PE	±1kV	B	Pass
L2-L3-N	±1kV	B	Pass
L2-L3-PE	±1kV	B	Pass
L2-N-PE	±1kV	B	Pass
L3-N-PE	±1kV	B	Pass
L1-L2-L3-N	±1kV	B	Pass
L1-L2-L3-PE	±1kV	B	Pass
L1-L3-N-PE	±1kV	B	Pass
L1-L2-N-PE	±1kV	B	Pass
L2-L3-N-PE	±1kV	B	Pass
L1-L2-L3-N-PE	±1kV	B	Pass

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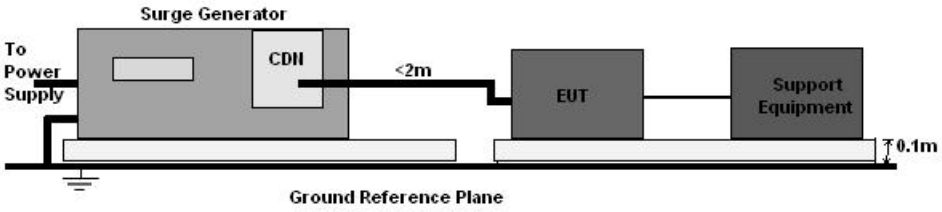
6.4 SURGE IMMUNITY TEST

6.4.1 BLOCK DIAGRAM OF TEST SETUP



6.4.2 TEST SPECIFICATION

Basic Standard	IEC 61000-4-5:2014+AMD1:2017
Test Port	input a.c. power port
Wave-Shape	Open Circuit Voltage - 1.2 / 50 us Short Circuit Current - 8 / 20 us
Pulse Repetition Rate	1 pulse / min.
Test Events	Five positive/negative polarity pulses at the0°,90°,180°,270° phase angel

6.4.3 TEST PROCEDURE

6.4.1.1. Set up the EUT and test generator as shown on Section 6.4.1.

6.4.1.2. For line to line coupling mode, provide a 1.0 KV or 2.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.

6.4.1.3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test

6.4.1.4. Different phase angles are done individually.

6.4.1.5. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

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6.4.4 TEST RESULTS

SURGE IMMUNITY	
Basic Standard:	IEC 61000-4-5:2014+AMD1:2017
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.1
Test Voltage:	AC 220V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Line	Phase Angle	Test Voltage	Number of Pulse	Performance criteria	Result
L - N	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
L - PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
N - PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L - N - PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass

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SURGE IMMUNITY	
Basic Standard:	IEC 61000-4-5:2014+AMD1:2017
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.2
Test Voltage:	AC 380V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Line	Phase Angle	Test Voltage	Number of Pulse	Performance criteria	Result
L1-L2	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
L1-L3	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
L2-L3	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
L1-N	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
L2-N	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
L3-N	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
N-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L1-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L2-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L3-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L1-L2-L3	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
L1-L2-N	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
L1-N-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L1-L3-N	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
L1-L3-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L1-L2-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L2-L3-N	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass

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Line	Phase Angle	Test Voltage	Number of Pulse	Performance criteria	Result
L2-L3-PE	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
L2-N-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L3-N-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L1-L2-L3-N	90°	+ 1kV	5	B	Pass
	270°	- 1kV	5	B	Pass
L1-L2-N-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L2-L3-N-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L1-L2-L3-N-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L1-L3-N-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass
L1-L2-L3-PE	90°	+ 2kV	5	B	Pass
	270°	- 2kV	5	B	Pass

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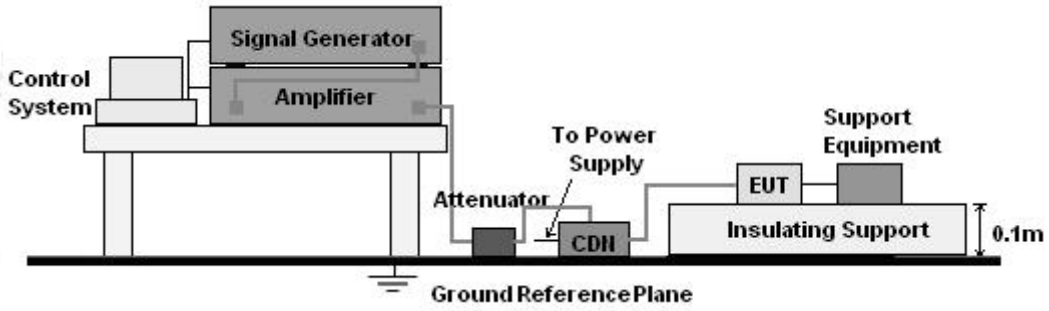
6.5 INJECTED CURRENTS SUSCEPTIBILITY TEST

6.5.1 BLOCK DIAGRAM OF TEST SETUP



6.5.2 TEST SPECIFICATION

Basic Standard	:	IEC 61000-4-6:2013
Test Port	:	input a.c. power port
Step Size	:	1%
Modulation	:	1kHz,80% AM
Dwell Time	:	1 second

6.5.3 TEST PROCEDURE

6.5.3.1. Set up the EUT, CDN and test generators as shown on Section 6.5.1.

6.5.3.2. Let the EUT work in test mode and measure it.

6.5.3.3. 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).

6.5.3.4. The disturbance signal described below is injected to EUT through CDN.

6.5.3.5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.

6.5.3.6. The frequency range is swept from 150kHz to 10MHz using 3V, 10MHz to 30MHz using 3V to 1V,30MHz to 80MHz using 1V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

6.5.3.7. 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.

6.5.3.8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

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6.5.4 TEST RESULTS

INJECTED CURRENTS SUSCEPTIBILITY	
Basic Standard:	IEC 61000-4-6:2013
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.1
Test Voltage:	AC 220V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Frequency Range (MHz)	Injected Position	Strength (Non-modulated)	Performance criteria	Result
0.15 ~ 10	AC Mains	3V r.m.s.	A	Pass
10 ~ 30	AC Mains	3V r.m.s. to 1V r.m.s.	A	Pass
30 ~ 80	AC Mains	1V r.m.s.	A	Pass

INJECTED CURRENTS SUSCEPTIBILITY	
Basic Standard:	IEC 61000-4-6:2013
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.2
Test Voltage:	AC 380V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Frequency Range (MHz)	Injected Position	Strength (Non-modulated)	Performance criteria	Result
0.15 ~ 10	AC Mains	3V r.m.s.	A	Pass
10 ~ 30	AC Mains	3V r.m.s. to 1V r.m.s.	A	Pass
30 ~ 80	AC Mains	1V r.m.s.	A	Pass

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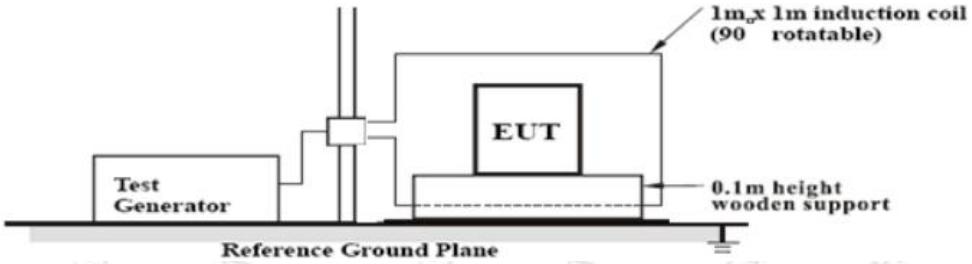
6.6 POWER FREQUENCY MAGNETIC FIELD TEST

6.6.1 BLOCK DIAGRAM OF TEST SETUP



6.6.2 TEST SPECIFICATION

Basic Standard	:	IEC 61000-4-8:2009
Test Port	:	Enclosure port
Test Frequency	:	50Hz, 60Hz
Test Duration	:	5 minutes
Direction	:	X -axis, Y -axis, Z -axis

6.6.3 TEST PROCEDURE

a. The EUT is put on the table which is 0.8 meter high above the ground and shall be placed on the GRP with the interposition of a 0.1m-thick insulating support.

b. The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.

c. The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

6.6.4 TEST RESULTS

Power frequency magnetic field	
Basic Standard:	IEC 61000-4-8:2009
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.1
Test Voltage:	AC 220V/50Hz
Temperature:	24.2℃
Humidity:	50%
Atmosphere pressure:	101Kpa

Direction	Field Strength (A/m)	Observation Time (min)	Test Frequency (Hz)	Performance criteria	Result
X	1	5	50	A	Pass
Y	1	5	50	A	Pass
Z	1	5	50	A	Pass

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Power frequency magnetic field	
Basic Standard:	IEC 61000-4-8:2009
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.2
Test Voltage:	AC 380V/50Hz
Temperature:	24.2℃
Humidity:	50%
Atmosphere pressure:	101Kpa

Direction	Field Strength (A/m)	Observation Time (min)	Test Frequency (Hz)	Performance criteria	Result
X	1	5	50	A	Pass
Y	1	5	50	A	Pass
Z	1	5	50	A	Pass

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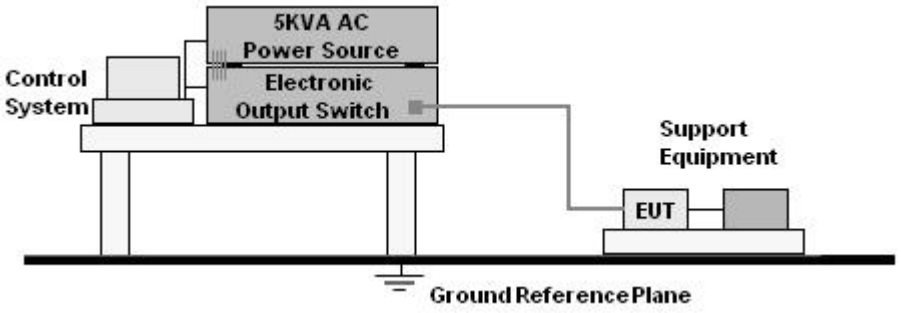
6.7 VOLTAGE DIPS AND INTERRUPTIONS TEST

6.7.1 BLOCK DIAGRAM OF TEST SETUP



6.7.2 TEST SPECIFICATION

Basic Standard	:	IEC 61000-4-11:2020
Test Port	:	input a.c. power port
Phase Angle	:	0°, 180°

6.7.3 TEST PROCEDURE

6.7.3.1. Set up the EUT and test generator as shown on Section 6.7.1.

6.7.3.2. The interruptions is introduced at selected phase angles with specified duration.

6.7.3.3. Record any degradation of performance.

6.7.4 TEST RESULTS

VOLTAGE DIPS AND INTERRUPTIONS	
Basic Standard:	IEC 61000-4-11:2020
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.1
Test Voltage:	AC 220V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Test Level % UT	Voltage Dips & Short Interruptions % UT	Duration (in periods)	Performance criteria	Result
< 5	100	0.5	B	Pass
70	30	25	C	Pass
< 5	100	250	C	Pass

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VOLTAGE DIPS AND INTERRUPTIONS	
Basic Standard:	IEC 61000-4-11:2020
EUT:	iWit Series Modular Data Center
M/N:	IW100
Test Mode:	Mode A.2
Test Voltage:	AC 380V/50Hz
Temperature:	24℃
Humidity:	60%
Atmosphere pressure:	101Kpa

Test Level % UT	Voltage Dips & Short Interruptions % UT	Duration (in periods)	Performance criteria	Result
< 5	100	0.5	B	Pass
70	30	25	C	Pass
< 5	100	250	C	Pass

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APPENDIX A - EUT PHOTOGRAPHS

External Photos of EUT

1#

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