

EMC TECHNICAL FILE

Product Name : Low-voltage active power filter(APF)

Model Name : YDK-APF

Prepared for:

ZHEJIANG YIDEK TECHNOLOGY CO.LTD
No.51, Wenxiu Road, Puzhou Street, Longwan
Area, WenZhou City, Zhejiang

Prepared by:

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Report Number : TEZJ22032237797

Date of Report : March 22,2022

Date of Test : March 12,2022 to March 22,2022

Notes:

The review results only relate to these samples which have been reviewed.
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Applicant: ZHEJIANG YIDEK TECHNOLOGY CO.LTD
No.51, Wenxiu Road, Puzhou Street, Longwan Area, WenZhou City,
Zhejiang

Manufacturer: ZHEJIANG YIDEK TECHNOLOGY CO.LTD
No.51, Wenxiu Road, Puzhou Street, Longwan Area, WenZhou City,
Zhejiang

Product Name: Low-voltage active power filter(APF)

Brand Name: /

Model Name: YDK-APF

Serial Number: /

Rating: 400V, 100A, 50Hz, IP20

Date of Receipt: March 12,2022

Date of Test: March 12,2022 to March 22,2022

Test Standard: EN IEC 61000-6-1:2019, EN 61000-6-3:2007+A1:2011+AC:2012,
EN IEC 61000-3-2:2019, EN 61000-3-3:2013+A1:2019

Test Result: PASS

Prepared by :

Approved by :



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1. GENERAL INFORMATION

1.1 Description of EUT

Product Name:	Low-voltage active power filter(APF)
Model Name:	YDK-APF
Serial Number:	N/A
Power Supply	400V
Applicant:	ZHEJIANG YIDEK TECHNOLOGY CO.LTD No.51, Wenxiu Road, Puzhou Street, Longwan Area, WenZhou City, Zhejiang
Manufacturer:	ZHEJIANG YIDEK TECHNOLOGY CO.LTD No.51, Wenxiu Road, Puzhou Street, Longwan Area, WenZhou City, Zhejiang

1.2 Description of Test Facility

Site Description:	Shanghai Global Testing Services Co., Ltd.
Name of Firm:	Shanghai Global Testing Services Co., Ltd
Site Location:	Floor 2nd, Building D-1, No. 128, Shenfu Road, Minhang District, Shanghai, China.
The site and apparatus are constructed in conformance with the requirements of ANSI C63.4, CISPR 16-1-1 and other equivalent standards.	

1.3 Measurement Uncertainty

Conducted Emission Expanded Uncertainty:	U = 1.76 dB
Radiated Emission Expanded Uncertainty:	U = 3.02 dB

2. TECHNICAL SUMMARY

2.1 SUMMARY OF STANDARDS AND TEST RESULTS

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

EN 61000-6-3:2007+A1:2011+AC:2012			
Test Item	Test Standard	Limits	Results
Conducted Disturbance at low voltage AC mains ports	CISPR 16-1-1:2015,CISPR 16-1-2:2014,CISPR 16-2-1:2014	See 4.3	P
Radiated Disturbance	CISPR 16-2-3:2016	See 7.3	P

EN IEC 61000-6-1:2019			
Test Item	Basic Standard	Performance Criteria	Results
Electrostatic discharge Immunity	IEC 61000-4-2:2008	B	P
RF Electromagnetic Field Immunity	IEC 61000-4-3:2006+A1:2007+A2:2010	A	P
Electrical Fast Transient/Burst Immunity	IEC 61000-4-4:2012	B	P
Surge Immunity	IEC 61000-4-5:2014	B	P
Conducted Disturbances Immunity	IEC 61000-4-6:2013+Cor 1:2015	A	P
Power-frequency Magnetic Field Immunity	IEC 61000-4-8:2009	A	P

Note: P means pass, F means failure, N/A means not applicable

2.2 Description of Performance Criteria

The variety and the diversity of the apparatus within the scope of this standard make it difficult to define precise criteria for the evaluation of the immunity test results.

If, as result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe, the apparatus shall be deemed to have failed the test.

A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer and noted in the test report, based on the following criteria:

2.2.1 Performance criterion A

The apparatus shall continue to operate as intended during 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. 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 from what the user may reasonably expect from the apparatus if used as intended.

2.2.2 Performance 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 allowed however. 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, then either of these may be derived from the product description and documentation, and from what the user may reasonably expect from the apparatus if used as intended.

2.2.3 Performance criterion C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

3. TEST EQUIPMENT LIST

Conducted Disturbance at DC power ports				
Equipment	Manufacturer	Model	Serial No.	Next Cal.
Shielding Room	CHENGYU	5m×4m×3m	CR	Jul 24, 2022
EMI Test Receiver	R&S	ESCI7	100787	Jul 24, 2022
Artificial Mains Network	TESEQ	NNB 51	33285	Jul 24, 2022

Radiated Disturbance Test				
Equipment	Manufacturer	Model	Serial No.	Next Cal.
3m Semi-anechoic Chamber	CHENGYU	9.2×6.25×6.15m	SAR	Jul 24, 2022
EMI Test Receiver	R&S	ESCI7	100787	Jul 24, 2022
EMC Shielding room	Changzhou FeiTe	8 x 5 x 3 mm	Nil	Jul 24, 2022
Broadband Log Antenna	Schwarzbeck	VULB 9163	9163-561	Jul 24, 2022

Electrostatic Discharge Immunity Test				
Equipment	Manufacturer	Model	Serial No.	Next Cal.
ESD Generator	SCHAFFNER	NSG 438	849	Jul 24, 2022

RF Electromagnetic Field Immunity				
Equipment	Manufacturer	Model	Serial No.	Next Cal.
Radiated Immunity Test System	TESEQ	ITS 6006	37546	Jul 24, 2022
Power Meter	TESEQ	PMR 6006	73819	Jul 24, 2022
Power Amplifier	MILMEGA	AS1860-50	1066592	Jul 24, 2022
Log Periodic Antenna	Schwarzbeck	STLP 9128 D	9128 D 048	Jul 24, 2022
Field Probe	ETS-Lindgren	HI-6105	00161798	Dec 08, 2022

Electrical Fast Transient/SURGE Immunity Test				
Equipment	Manufacturer	Model	Serial No.	Next Cal.
EFT/SURGE Generator	TESEQ	NSG 3060	1468	Jul 24, 2022
Single Phase Coupling/decoupling Network	TESEQ	CDN 3061	1404	Jul 24, 2022
Capacitive clamp	TESEQ	CDN 3425	1736	Jul 24, 2022

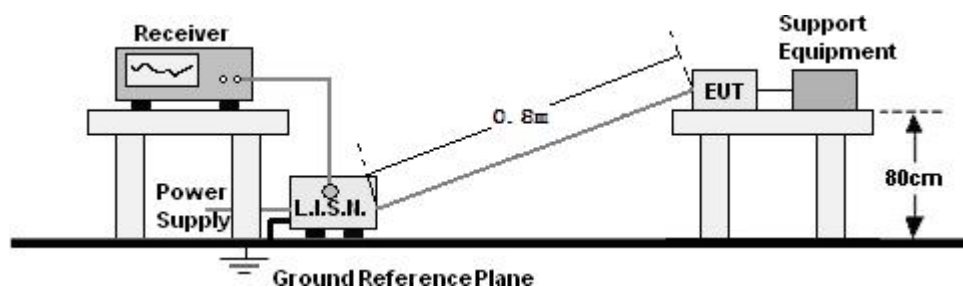
Conducted Disturbances Immunity Test				
Equipment	Manufacturer	Model	Serial No.	Next Cal.
Conducted Immunity Test System	TESEQ	NSG 4070	25795	Jul 24, 2022
Coupling/Decoupling Network	TESEQ	CDN M116S	35371	Jul 24, 2022
EM-clamp	TESEQ	KEMZ 801	29530	Jul 24, 2022

Power-frequency Magnetic Field Immunity Test				
Equipment	Manufacturer	Model	Serial No.	Next Cal.
P-f Magnetic Field Loop	FCC	F-1000-4-8/9/10-1M	13	Jul 24, 2022
Power Magnetic Field Generator	SANKI	SKS-0805	/	Jul 24, 2022

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and has been calibrated by accredited calibration laboratories.

4. CONDUCTED DISTURBANCE AT LOW VOLTAGE AC MAINS PORTS

4.1 DIAGRAM OF TEST SETUP



4.2 APPLICABLE STANDARD

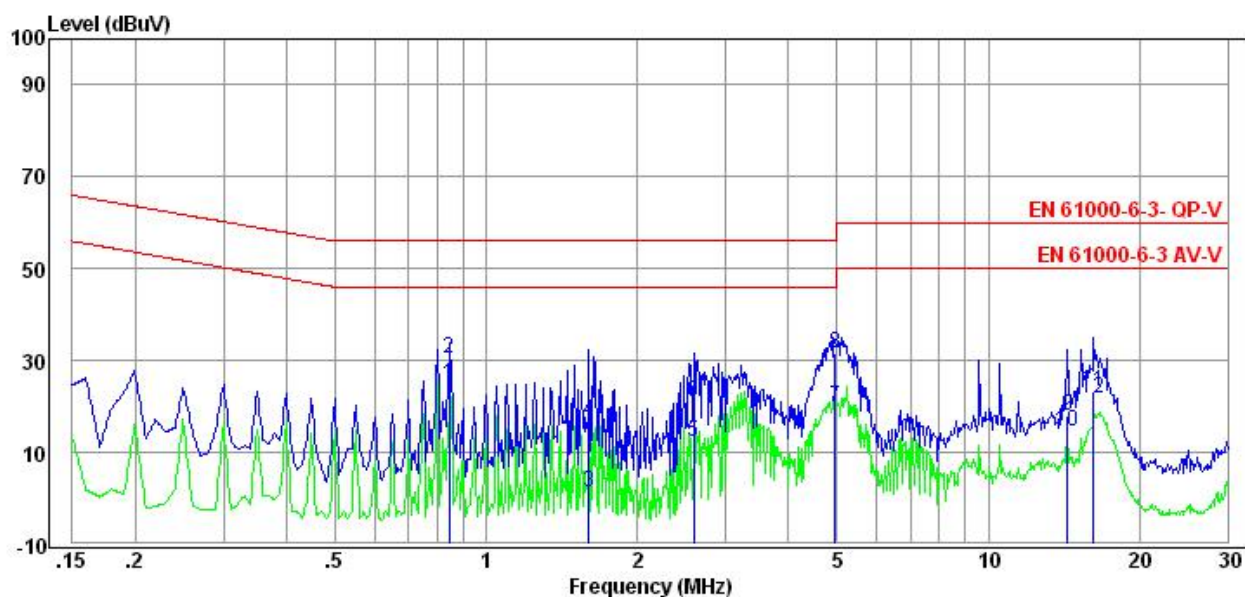
EN 61000-6-3:2007+A1:2011+AC:2012(CISPR 16-1-1:2015, CISPR 16-1-2:2014, CISPR 16-2-1:2014)

4.3 LIMITS FOR CONDUCTED DISTURBANCE

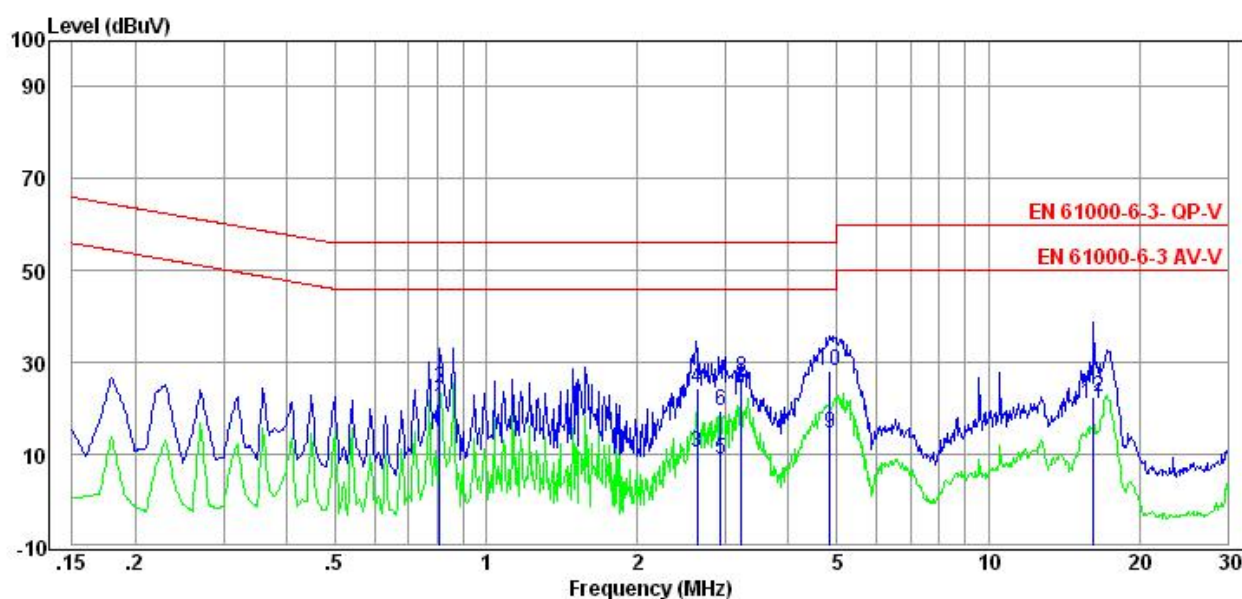
Frequency Range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66-56	56-46
0.5 ~ 5	56	46
5 ~ 30	60	50
NOTE – The lower limit shall apply at the transition frequencies.		

4.4 TEST RESULT

TEMPERATURE:	22℃	HUMIDITY:	43%
TEST MODEL:	Operating	POWER SUPPLY:	400V



Freq MHz	Reading dBuV	C.F dB	Result dBuV	Limit dBuV	Margin dB	Detector
0.85	15.03	9.70	24.73	46.00	21.27	Average
0.85	20.74	9.70	30.44	56.00	25.56	QP
1.61	-8.32	9.74	1.42	46.00	44.58	Average
1.61	6.94	9.74	16.68	56.00	39.32	QP
2.60	2.30	9.87	12.17	46.00	33.83	Average
2.60	11.26	9.87	21.13	56.00	34.87	QP
4.95	10.01	9.92	19.93	46.00	26.07	Average
4.95	21.62	9.92	31.54	56.00	24.46	QP
14.37	7.86	10.03	17.89	50.00	32.11	Average
14.37	4.48	10.03	14.51	60.00	45.49	QP
16.21	13.11	10.12	23.23	50.00	26.77	Average
16.21	11.67	10.12	21.79	60.00	38.21	QP



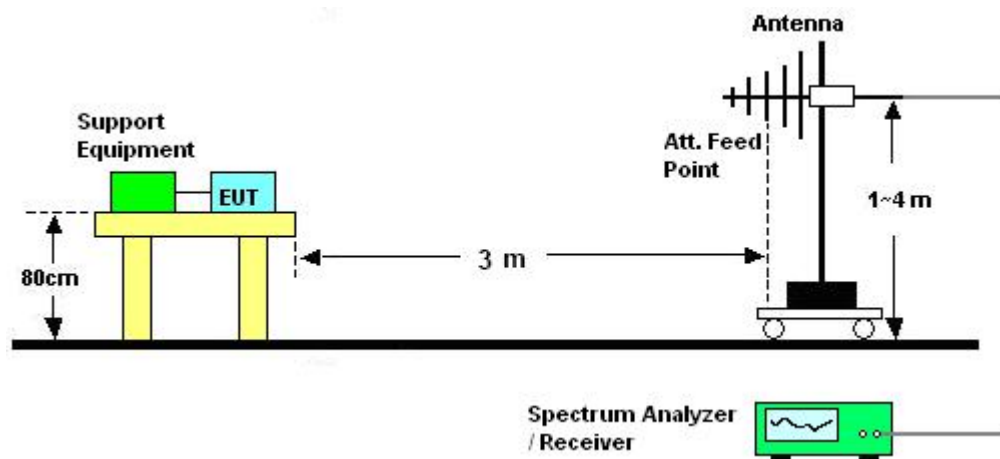
Freq MHz	Reading dBUV	C.F dB	Result dBUV	Limit dBUV	Margin dB	Detector
0.81	10.50	9.69	20.19	46.00	25.81	Average
0.81	14.81	9.69	24.50	56.00	31.50	QP
2.63	0.51	9.89	10.40	46.00	35.60	Average
2.63	14.41	9.89	24.30	56.00	31.70	QP
2.93	-0.88	9.91	9.03	46.00	36.97	Average
2.93	9.74	9.91	19.65	56.00	36.35	QP
3.23	14.34	9.89	24.23	46.00	21.77	Average
3.23	16.65	9.89	26.54	56.00	29.46	QP
4.83	4.58	9.91	14.49	46.00	31.51	Average
4.83	18.15	9.91	28.06	56.00	27.94	QP
16.24	11.00	10.14	21.14	50.00	28.86	Average
16.24	12.48	10.14	22.62	60.00	37.38	QP

4.5 TEST CONCLUSION

PASS

5. RADIATED DISTURBANCE TEST

5.1 DIAGRAM OF TEST SETUP



5.2 APPLICABLE STANDARD

EN 61000-6-3:2007+A1:2011+AC:2012 (CISPR 16-2-3:2016)

5.3 LIMITS FOR RADIATED DISTURBANCE

Below 1GHz

Frequency (MHz)	Distance (m)	Field Strength Limits dB(V/m)	Converted Field Strength Limits By 3 Meters Measuring Distance dB(V/m)
30 ~ 230	10	30	40
230 ~ 1000	10	37	47

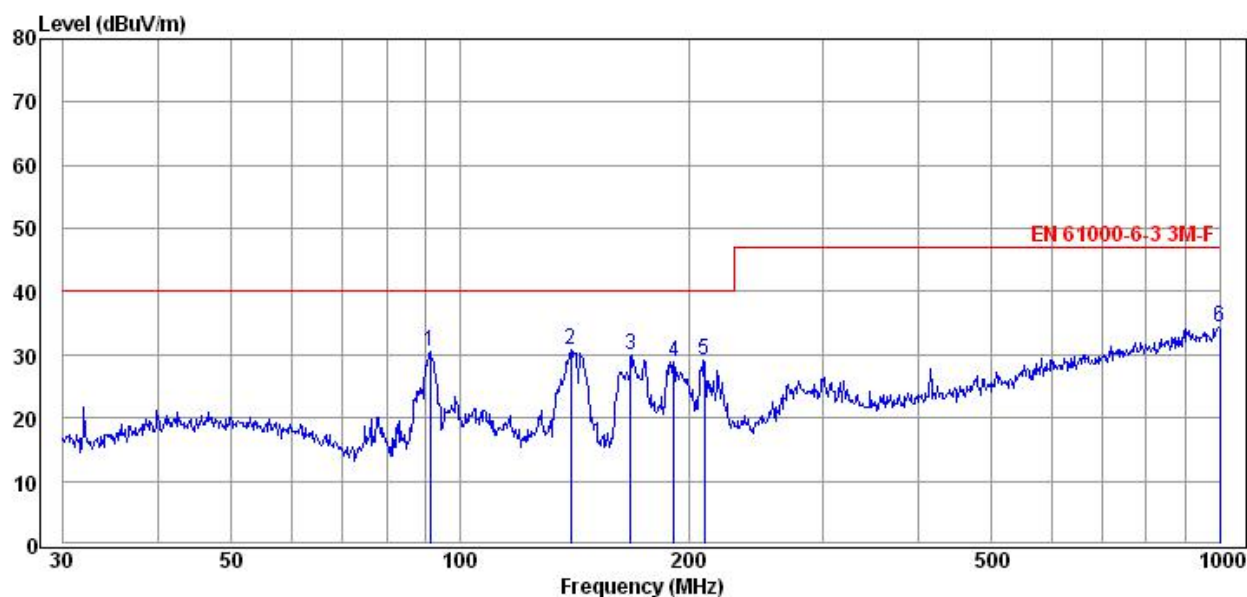
NOTE 1 - The lower limit shall apply at the transition frequency.

NOTE 2 – Additional provisions may be required for cases where interference occurs.

5.4 TEST RESULT

TEMPERATURE:	22°C	HUMIDITY:	43%
TEST MODEL:	Operating	POWER SUPPLY:	400V

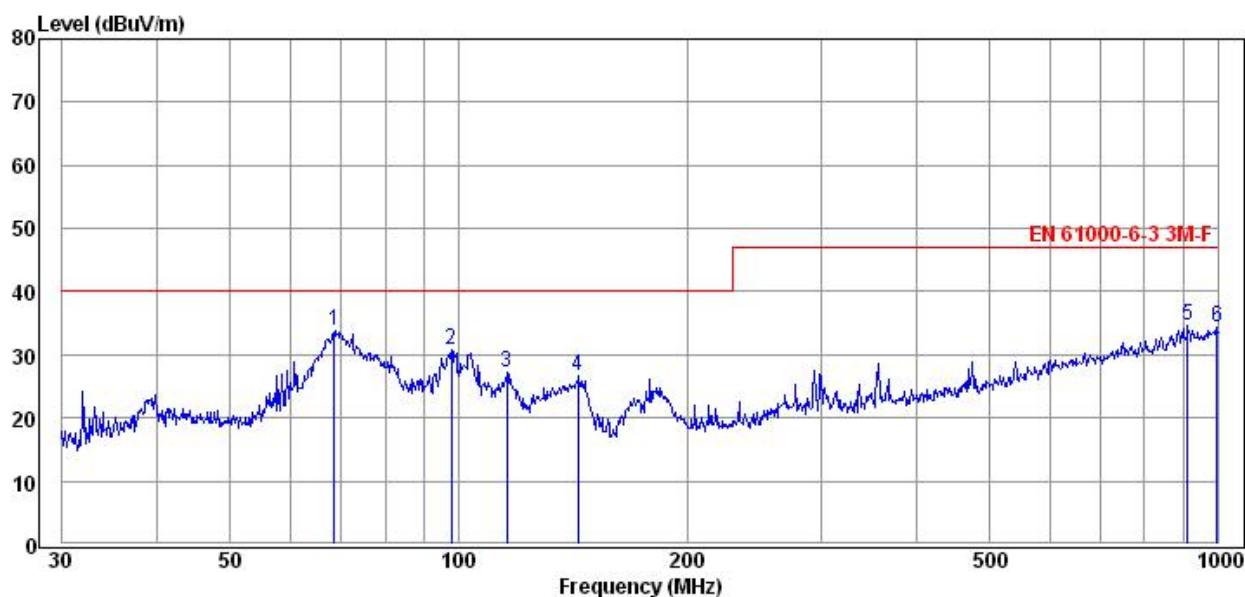
HORIZONTAL:



Freq MHz	Reading dBuV	C.F dB	Result dBuV	Limit dBuV	Margin dB	Detector
91.31	17.73	12.84	30.57	40.00	9.43	QP
139.76	19.85	10.91	30.76	40.00	9.24	QP
167.57	18.14	11.78	29.92	40.00	10.08	QP
191.32	14.98	13.86	28.84	40.00	11.16	QP
209.49	14.97	14.17	29.14	40.00	10.86	QP
1000.00	5.40	29.03	34.43	47.00	12.57	QP

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

VERTICAL:



Freq MHz	Reading dBuV	C.F dB	Result dBuV	Limit dBuV	Margin dB	Detector
68.46	21.87	11.92	33.79	40.00	6.21	QP
97.80	16.65	14.16	30.81	40.00	9.19	QP
115.66	13.49	13.63	27.12	40.00	12.88	QP
143.66	15.74	10.88	26.62	40.00	13.38	QP
913.10	6.67	28.07	34.74	47.00	12.26	QP
996.50	5.34	28.98	34.32	47.00	12.68	QP

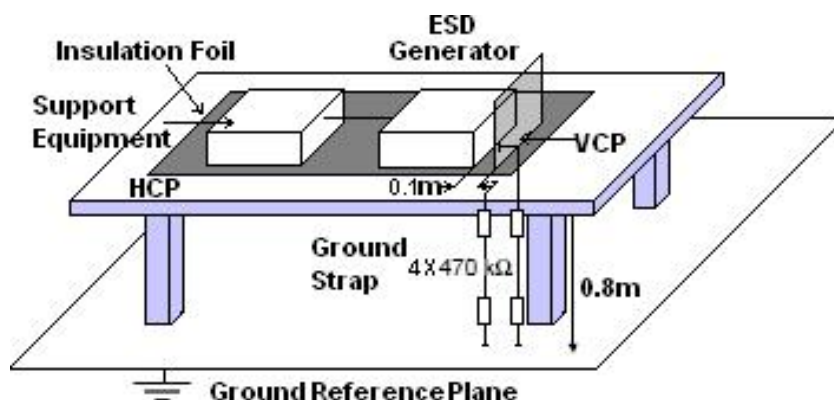
Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

5.5 TEST CONCLUSION

PASS

6. ELECTROSTATIC DISCHARGE IMMUNITY TEST

6.1 DIAGRAM OF TEST SETUP



6.2 APPLICABLE STANDARD

IEC 61000-4-2:2008, Contact Discharge: $\pm 4\text{kV}$;

Air Discharge: $\pm 8\text{kV}$

6.3 SEVERITY LEVELS AND PERFORMANCE CRITERION

6.3.1 Severity levels

Level	Test Voltage	
	Contact Discharge (kV)	Air Discharge (kV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X	Special	Special

6.3.2 Performance criterion: B

6.4 TEST RESULT

TEMPERATURE:	22°C	HUMIDITY:	43%
TEST MODEL:	Operating	POWER SUPPLY:	400V

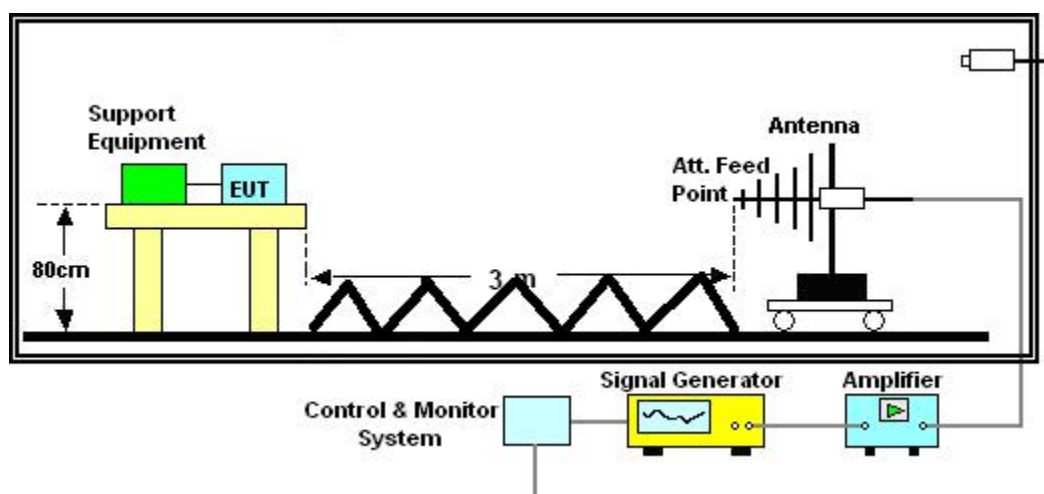
Air Discharge Voltage: $\pm 2\text{kV}$, $\pm 4\text{kV}$, $\pm 8\text{kV}$			
Contact Discharge Voltage: $\pm 2\text{kV}$, $\pm 4\text{kV}$			
Contact Discharge: For each point positive 10 times and negative 10 times discharge			
Air Discharge: For each point positive 10 times and negative 10 times discharge			
Location	Point	Kind	Result
Around the EUT	4	C (VCP)	A
Around the EUT	4	C (HCP)	A
Metal part of EUT and screws	20	C	B
Gap and Button	/	A	B
NOTE 1 – C (Contact Discharge), A(Air Discharge);			
NOTE 2 – HCP (Horizontal Coupling Plane), VCP (Vertical Coupling Plane).			

6.5 TEST CONCLUSION

PASS

7. RF ELECTROMAGNETIC FIELD IMMUNITY TEST

7.1 Diagram of Test Setup



7.2 Applicable Standard

IEC 61000-4-3:2006+A1:2007+A2:2010,

Frequency Range:

80 - 1000 MHz, Field Strength: 10 V/m, Unmodulation:, 80% AM 1kHz;

1400 - 2000 MHz, Field Strength: 10V/m, Unmodulation, 80% AM

1kHz; 2000 - 2700 MHz, Field Strength: 10 V/m, Unmodulation, 80% AM 1kHz

7.3 Severity Levels and Performance Criterion

7.3.1 Severity levels

Level	Field Strength V/m
1	1
2	3
3	10
X	Special

7.3.2 Performance criterion: A

7.4 Test Result

TEMPERATURE:	22°C	HUMIDITY:	43%
TEST MODEL:	Operating	POWER SUPPLY:	400V

Frequency Range		80 MHz to 1000 MHz		1400 MHz to 2000 MHz		2000 MHz to 2700 MHz	
Modulation		80% AM 1 kHz		80% AM 1 kHz		80% AM 1 kHz	
Steps		1 %		1 %		1 %	
Dwell Time		3 s		3 s		3 s	
Antenna Polarization		80 MHz to 1000 MHz		1400 MHz to 2000 MHz		2000 MHz to 2700 MHz	
Field Strength		10V/m		10V/m		10V/m	
Antenna Polarization		Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
EUT Position	Front	A	A	A	A	A	A
	Rear	A	A	A	A	A	A
	Right	A	A	A	A	A	A
	Left	A	A	A	A	A	A
	Floor	--	--	--	--	--	--
	Top	--	--	--	--	--	--
NOTE – “--” means the item is no applicable.							

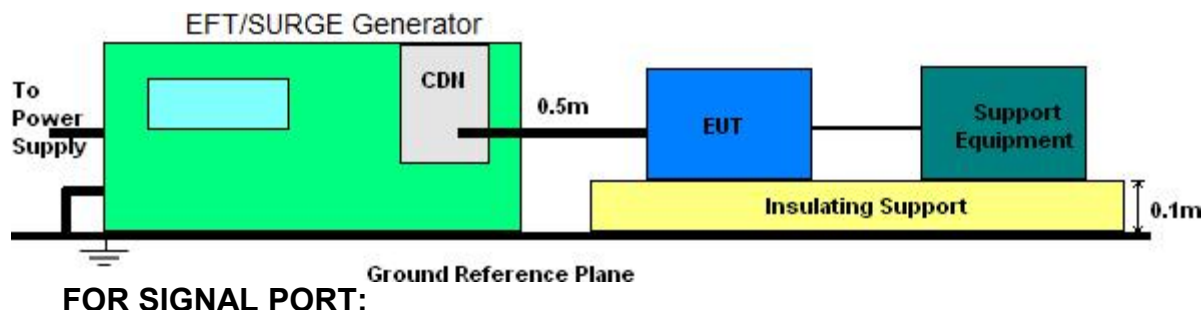
7.5 TEST CONCLUSION

PASS

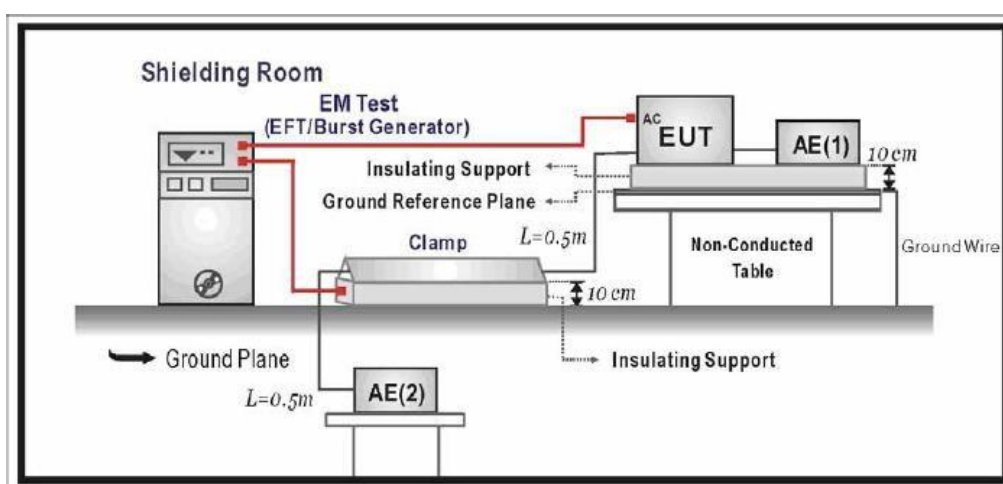
8. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

8.1 DIAGRAM OF TEST SETUP

FOR POWER PORT:



FOR SIGNAL PORT:



8.2 APPLICABLE STANDARD

IEC 61000-4-4:2012, Signal ports and AC Power ports: ± 2 kV, 5/50ns, 5kHz

8.3 SEVERITY LEVELS AND PERFORMANCE CRITERION

8.3.1 SEVERITY LEVELS

Open circuit output test voltage and repetition rate of the impulses				
Level	On power port, PE		On I/O (input/output) signal, data and control ports	
	Voltage peak kV	Repetition rate kHz	Voltage peak kV	Repetition rate kHz
1.	0.5	5 or 100	0.25	5 or 100
2.	1	5 or 100	0.5	5 or 100
3.	2	5 or 100	1	5 or 100
4.	4	5 or 100	2	5 or 100
Xa	Special	Special	Special	Special

Note 1: Use of 5kHz repetition rates is traditional; however, 100kHz is closer to reality. Product committees should determine which frequencies are relevant for specific products or product types.

Note 2: With some products, there may be no clear distinction between power ports and I/O ports, in which case it is up to product committees to make this determination for test purposes.

“Xa” is an open level. The level has to be specified in the dedicated equipment specification.

8.3.2 PERFORMANCE CRITERION: B

8.4 TEST RESULTS

TEMPERATURE:	22℃	HUMIDITY:	43%
TEST MODEL:	Operating	POWER SUPPLY:	400V

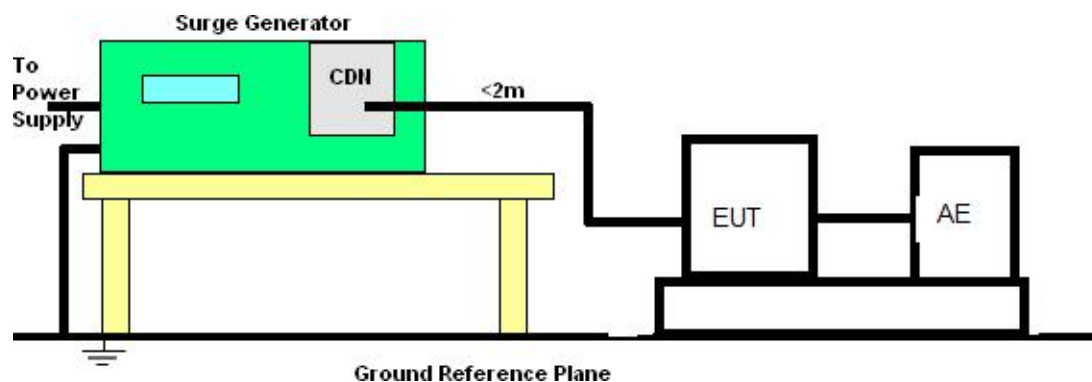
Inject Line	Voltage kV	Repetition rate kHz	Duration of Test (seconds)	Inject Method	Result
AC power port	±2	5	120	Direct	B
DC power port	--	--	--	--	--
Signal Port	--	--	--	--	--
NOTE – “--” means the item is no applicable.					

8.5 TEST CONCLUSION

PASS

9. SURGE IMMUNITY TEST

9.1 Diagram of Test Setup



9.2 Applicable Standard

IEC 61000-4-5:2014

AC power port: Line to line: ± 1 kV, 1.2/50 (8/20)

Line to earth: ± 2 kV, 1.2/50 (8/20)

9.3 Severity Levels and Performance Criterion

9.3.1 Severity levels

Test Level	Power Supply Coupling Mode	
	Line to Line kV	Line to Earth kV
1	NA	0.5
2	0.5	1.0
3	1.0	2.0
4	2.0	4.0
X	Special	Special

9.3.2 Performance criterion: B

9.4 Test Result

TEMPERATURE:	22℃	HUMIDITY:	43%
TEST MODEL:	Operating	POWER SUPPLY:	400V

AC Input Power Port						
Location	Polarity		Coupling Mode	No. of Pulse	Pulse Voltage (kV)	Result
AC power ports	--	-	--	--	--	--
	+	-	Line to Line	10	1	P
DC power ports	--	--	--	--	--	--
	--	--	--	--	--	--
NOTE "--" means the item is no applicable.						

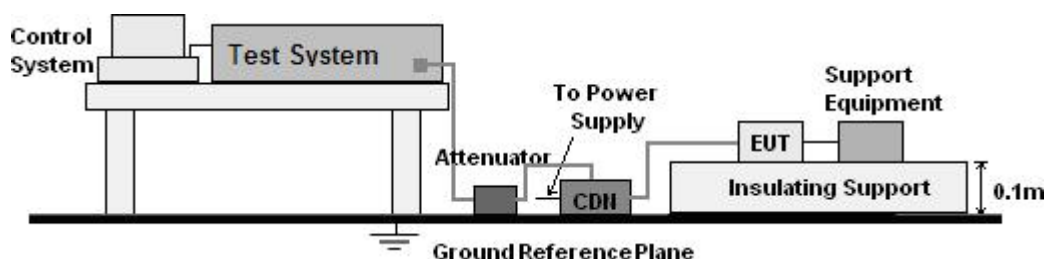
9.5 TEST CONCLUSION

PASS

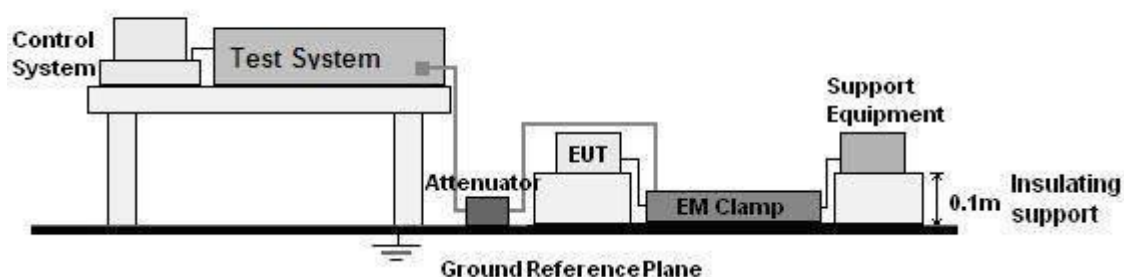
10. CONDUCTED DISTURBANCES IMMUNITY TEST

10.1 Diagram of Test Setup

FOR POWER PORT:



FOR SIGNAL PORT:



10.2 APPLICABLE STANDARD

IEC 61000-4-6:2013+Cor 1:2015, AC and DC Power ports : 0.15-80MHz, 10V Unmodulation, 80%AM (1kHz), Signal ports: 0.15-80MHz, 10V Unmodulation, 80%AM (1kHz)

10.3 SEVERITY LEVELS AND PERFORMANCE CRITERION

10.3.1 Severity levels

Frequency Range 0.15 MHz – 80 MHz		
Level	Voltage Level (e.m.f.)	
	U0 dB(μV)	U0 (V)
1.	120	1
2.	130	3
3.	140	10
Xa	Special	
Xa is an open level.		

10.3.2 Performance criterion: A

10.4 TEST RESULTS

TEMPERATURE:	22°C	HUMIDITY:	43%
TEST MODEL:	Operating	POWER SUPPLY:	400V

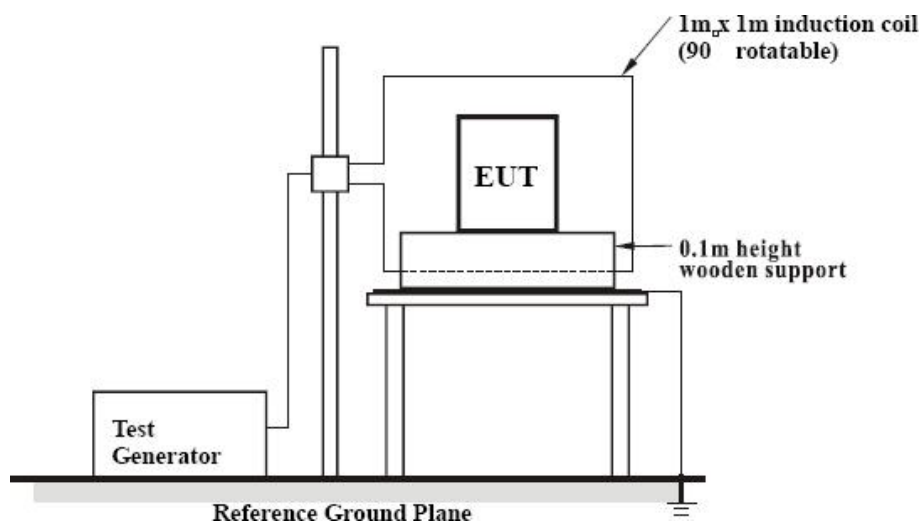
Injected Position	Frequency Range(MHz)	Strength (Unmodulated)	Results
AC power ports	0.15 ~ 80	10V(r.m.s)	A
DC power ports	---	--	--
Signal ports	---	--	--
NOTE “--” means the item is no applicable.			

10.5 TEST CONCLUSION

PASS

11. POWER-FREQUENCY MAGNETIC FIELD IMMUNITY TEST

11.1 DIAGRAM OF TEST SETUP



11.2 APPLICABLE STANDARD

IEC 61000-4-8:2009, Magnetic field strength: 10A/m, 50Hz

11.3 SEVERITY LEVELS AND PERFORMANCE CRITERION

11.3.1 Severity level:

Test Level	Magnetic field strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

11.3.2 Performance criterion: A

11.4 TEST RESULTS

TEMPERATURE:	22°C	HUMIDITY:	43%
TEST MODEL:	Operating	POWER SUPPLY:	400V

Test Level (A/m)	Testing Duration (in second)	Coil Orientation	Criterion
10	120	Axis-X	A
10	120	Axis-Y	A
10	120	Axis-Z	A

11.5 TEST CONCLUSION

PASS

-----End of the report-----

Type of equipment, model: Low-voltage active power filter(APF),
YDK-APF

Details of:

View:

☒ general

☐ front

☐ rear

☐ right

☐ left

☐ top

☐ bottom



Details of:

View:

☒ general

☐ front

☐ rear

☐ right

☐ left

☐ top

☐ bottom

