

CUS350MP-1000

IMMUNITY DATA

INDEX

	PAGE
1. Summary of Immunity Test Result	3
----- IEC61000-6-2 Standard Test -----	
2. Electrostatic Discharge Immunity Test (IEC61000-4-2)	4
3. Radiated Radio-Frequency Electromagnetic Field Immunity Test (IEC61000-4-3)	5
4. Electrical Fast Transient / Burst Immunity Test (IEC61000-4-4)	6
5. Surge Immunity Test (IEC61000-4-5)	7
6. Conducted Disturbances Induced by Radio-Frequency Field Immunity Test (IEC61000-4-6)	8
7. Power Frequency Magnetic Field Immunity Test (IEC61000-4-8)	9
8. Voltage Dips, Short Interruptions Immunity Test (IEC61000-4-11)	10
----- IEC60601-1-2 Ed.4.1 Standard Test -----	
9. Electrostatic Discharge Immunity Test (IEC61000-4-2)	11
10. Radiated Radio-Frequency Electromagnetic Field Immunity Test (IEC61000-4-3)	12
11. Electrical Fast Transient / Burst Immunity Test (IEC61000-4-4)	13
12. Voltage Dips, Short Interruptions Immunity Test (IEC61000-4-11)	14
13. Radiated fields in close proximity Immunity Test (IEC61000-4-39)	15

Terminology Used

- FG Frame GND
- \perp Earth (\perp) terminal
- L Live line
- N Neutral line
- /// Earth
- +V + Output
- V - Output
- +STB + Standby Output
- STB - Standby Output

※ Test results are reference data based on our standard measurement condition.

1. Summary of Immunity Test Result

TEST STANDARD: IEC61000-6-2

Item	Standard	Test Level	Criteria	Result	Page No.
Electrostatic Discharge Immunity Test	IEC61000-4-2	3	A	PASS	4
Radiated Radio-Frequency Electromagnetic Field Immunity Test	IEC61000-4-3	3	A	PASS	5
Electrical Fast Transient / Burst Immunity Test	IEC61000-4-4	3	A	PASS	6
Surge Immunity Test (*1)	IEC61000-4-5	3, 4	A	PASS	7
Conducted Disturbances Induced by Radio-Frequency Field Immunity Test	IEC61000-4-6	3	A	PASS	8
Power Frequency Magnetic Field Immunity Test	IEC61000-4-8	4	A	PASS	9
Voltage Dips, Short Interruptions Immunity Test (*2)	IEC61000-4-11	Dip 30% 500ms	A / A	PASS	10
		Dip 60% 200ms	B / A	PASS	
		Dip 100% 20ms	A / A	PASS	
		Dip 100% 5000ms	B / B	PASS	

(*1) Level4 : Common mode only

(*2) Criteria : 100VAC / 230VAC

TEST STANDARD: IEC60601-1-2 Ed.4.1

Item	Standard	Test Level	Criteria	Result	Page No.
Electrostatic Discharge Immunity Test	IEC61000-4-2	4	A	PASS	11
Radiated Radio-Frequency Electromagnetic Field Immunity Test	IEC61000-4-3	3	A	PASS	12
Electrical Fast Transient / Burst Immunity Test	IEC61000-4-4	3	A	PASS	13
Voltage Dips, Short Interruptions Immunity Test (*2)	IEC61000-4-11	Dip 30% 500ms	A	PASS	14
		Dip 100% 10ms	A	PASS	
		Dip 100% 20ms	A	PASS	
		Dip 100% 5000ms	B	PASS	
Radiated fields in close proximity Immunity Test	IEC61000-4-39	30kHz, 8A/m	A	PASS	15
		134.2kHz, 65A/m	A	PASS	
		13.56MHz, 7.5A/m	A	PASS	

Refer to each test pages for detail of test condition.

Criteria A

- 1.No output voltage fluctuation more than 5% during test.
- 2.The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

Criteria B

1. There shall be no temporary function degradation that requires manual interference such as recycle of input.
- 2.The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

2. Electrostatic Discharge Immunity Test (IEC61000-4-2)

MODEL : CUS350MP-1000

(1) Equipment Used

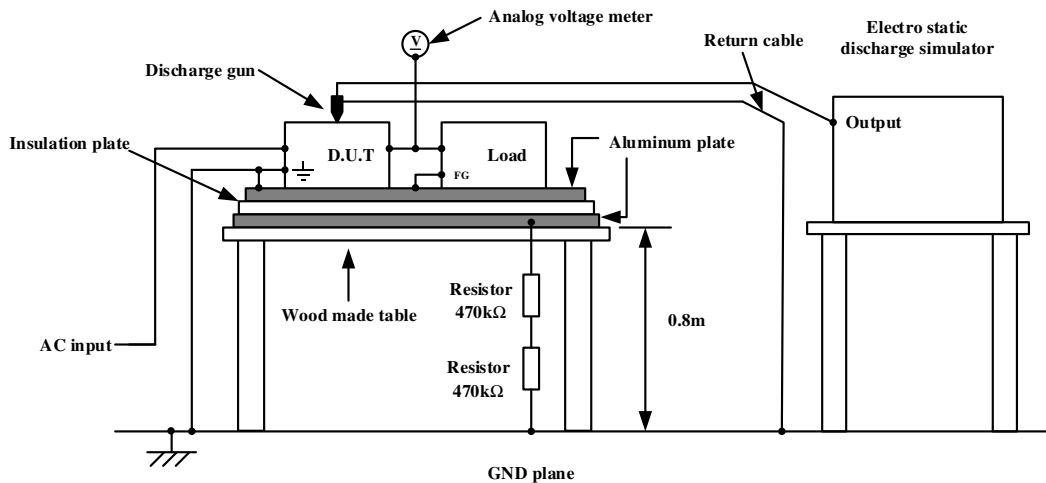
Electro Static Discharge Simulator : ESS-S3011/GT-30R (Noiseken)
 Discharge Resistance : 330Ω Capacity : 150pF

(2) Test Conditions

- Input Voltage : 100, 230VAC
- Output Current : 0%, Full load
- Polarity : +, -
- Discharge Interval : > 1 second
- Output Voltage : Rated
- STB Output Current : 0%, Full load
- Number of tests : 10 times
- Ambient Temperature : 25°C

(3) Test Method and Test Point

Contact Discharge : Input terminal (⊥), D.U.T screw and base plate (⊥)
 Air Discharge : Input and Output terminal (L, N, +V, -V)



(4) Acceptable Conditions

1. No output voltage fluctuation more than 5% during test.
2. The output voltage after test shall not have obvious deviation from the output voltage before test.
3. No smoke and fire are allowed.

(5) Test Result

Contact Discharge (kV)	CUS350MP-1000-24 CUS350MP-1000-48
4	PASS

Air Discharge(kV)	CUS350MP-1000-24 CUS350MP-1000-48
8	PASS

3. Radiated Radio-Frequency Electromagnetic Field Immunity Test (IEC61000-4-3)

MODEL : CUS350MP-1000

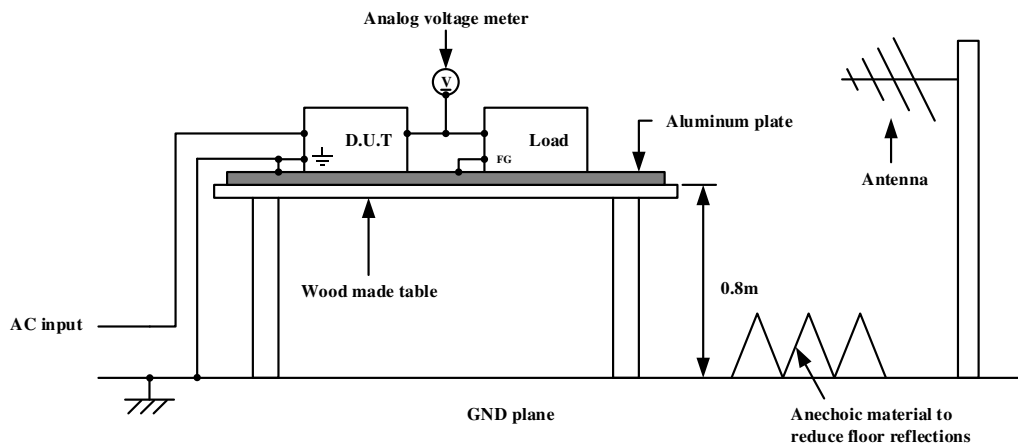
(1) Equipment Used

Signal Generator : N5181A (Agilent)
 Power Amplifier System : BBA150-BC500 (RohdeSchwarz)
 : BBA150-D110/E100 (RohdeSchwarz)
 Bilog Antenna : VULP9118E (Schwarzbeck)
 : 3117 (Schwarzbeck)
 : ATH800M5GA, ATH4G8 (Schwarzbeck)

(2) Test Conditions

- Input Voltage : 100, 230VAC
- Output Current : 0%, Full load
- Wave Angle : Horizontal and Vertical
- Ambient Temperature : 25°C
- Sweep Condition : 1.0% step up, 0.5 seconds hold
- Test Angle : Top/Bottom, Left/Right, Front/Back
- Electromagnetic Frequency : 80 - 1000MHz, 1.4 - 6.0GHz
- Output Voltage : Rated
- STB Output Current : 0%, Full load
- Amplitude Modulated : 80%, 1kHz
- Distance : 3.0m

(3) Test Method



(4) Acceptable Conditions

- 1.No output voltage fluctuation more than 5% during test.
- 2.The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

(5) Test Result

Radiation Strength (V/m)	Electromagnetic Frequency	CUS350MP-1000-24 CUS350MP-1000-48
3	1.4 - 6.0GHz	PASS
10	80 - 1000MHz	PASS

4. Electrical Fast Transient / Burst Immunity Test (IEC61000-4-4)

MODEL : CUS350MP-1000

(1) Equipment Used

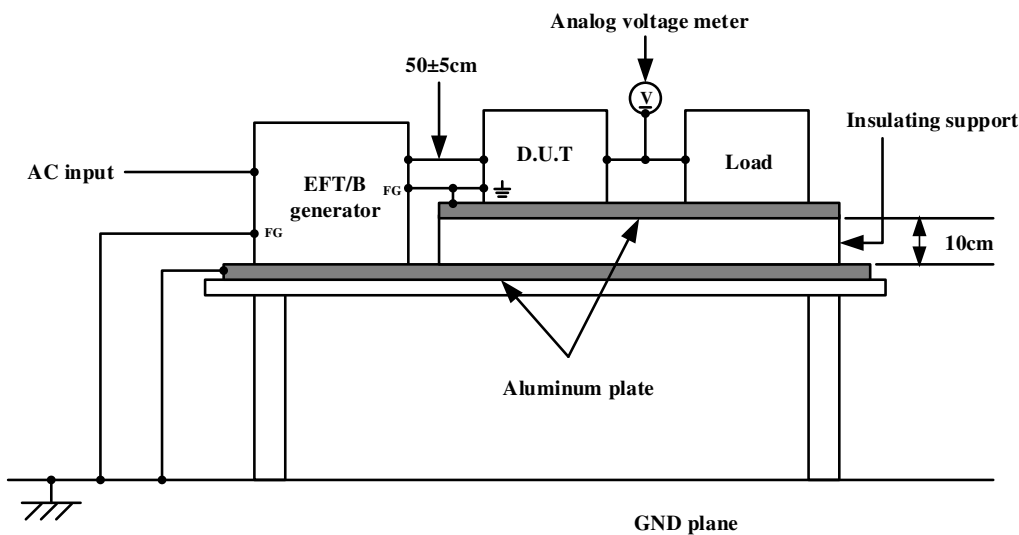
EFT/B Generator : FNS-AX3-B50B (Noiseken)

(2) Test Conditions

- Input Voltage : 100, 230VAC
- Output Current : 0%, Full load
- Polarity : +, -
- Number of Test : 1 time
- Burst Duration : 15msec
- Burst Cycle : 300msec
- Output Voltage : Rated
- STB Output Current : 0%, Full load
- Ambient Temperature : 25°C
- Pulse Frequency : 5kHz
- Number of Pulse : 75 pulses
- Test Time : 1 minute

(3) Test Method and Test Point

Input terminal (N, L, \perp), Output terminal (+V, -V) and Signal terminal (+STB, -STB, +RS, -R).



(4) Acceptable Conditions

1. No output voltage fluctuation more than 5% during test.
2. The output voltage after test shall not have obvious deviation from the output voltage before test.
3. No smoke and fire are allowed.

(5) Test Result

Test terminal	Test Voltage (kV)	CUS350MP-1000-24 CUS350MP-1000-48	Test terminal	Test Voltage (kV)	CUS350MP-1000-24 CUS350MP-1000-48
Input/Output	2	PASS	Signal	1	PASS

5. Surge Immunity Test (IEC61000-4-5)

MODEL : CUS350MP-1000

(1) Equipment Used

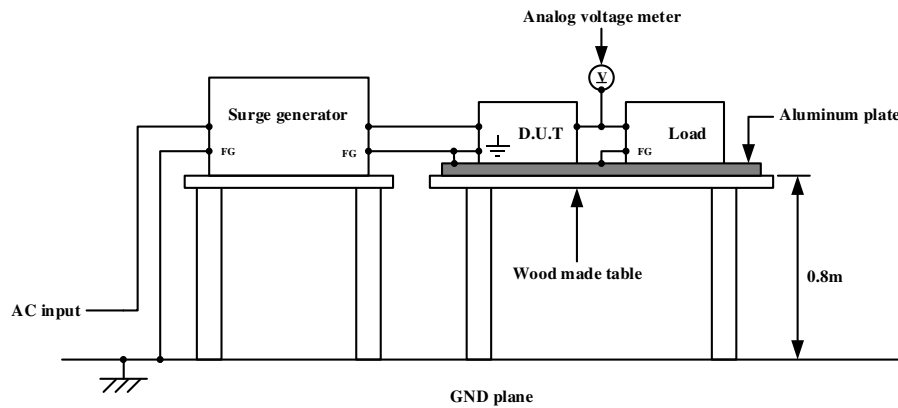
Surge Generator : Compact NX5 (AMETEK)
 Coupling Impedance : Common 12Ω Normal 2Ω
 Coupling Capacitance : Common 9μF Normal 18μF

(2) Test Conditions

- Input Voltage : 100, 230VAC
- Output Current : 0%, Full load
- Polarity : +, -
- Phase : 0, 90, 180, 270deg
- Ambient Temperature : 25°C
- Output Voltage : Rated
- STB Output Current : 0%, Full load
- Mode : Common and Normal
- Number of Tests : 5 times

(3) Test Method and Test Point

Input terminal : Common mode (N - $\frac{L}{2}$, L - $\frac{L}{2}$) and Normal mode (N - L).



(4) Acceptable Conditions

- 1.No output voltage fluctuation more than 5% during test.
- 2.The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

(5) Test Result

Common mode	
Test Voltage (kV)	CUS350MP-1000-24 CUS350MP-1000-48
4	PASS

Normal mode	
Test Voltage (kV)	CUS350MP-1000-24 CUS350MP-1000-48
2	PASS

6. Conducted Disturbances Induced by Radio-Frequency Field Immunity Test (IEC61000-4-6)

MODEL : CUS350MP-1000

(1) Equipment Used

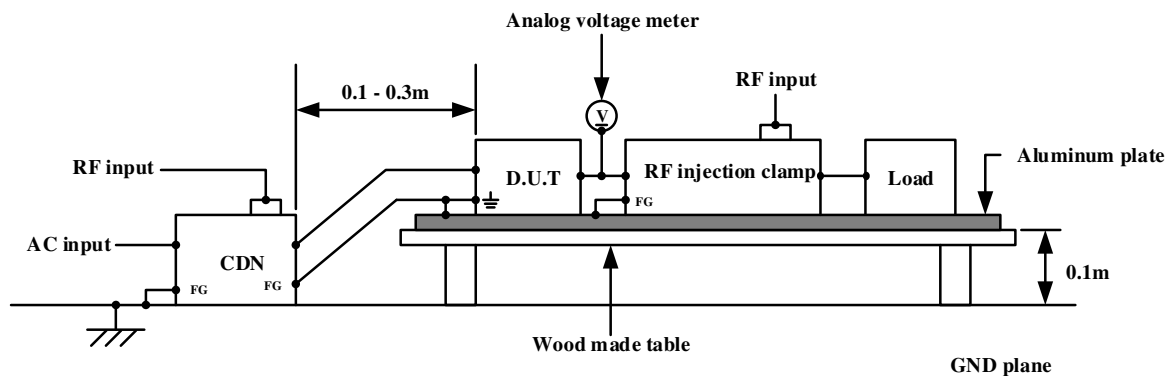
Power Amplifier : 116FC (Kalmus)
 Signal Generator : SMY01 (RohdeSchwarz)
 Coupling De-Coupling Network (CDN) : M016 (Teseq)
 EM Injection Clamp : EM101 (Luthi)

(2) Test Conditions

• Input Voltage : 100, 230VAC
 • Output Current : 0%, Full load
 • Electromagnetic Frequency : 150kHz - 80MHz
 • Sweep Condition : 1.0% step up, 0.5 seconds hold
 • Output Voltage : Rated
 • STB Output Current : 0%, Full load
 • Ambient Temperature : 25°C

(3) Test Method and Test Point

Input terminal (N, L, \perp), Output terminal (+V, -V) and signal terminal (+STB, -STB, +RS, -R).



(4) Acceptable Conditions

- 1.No output voltage fluctuation more than 5% during test.
- 2.The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

(5) Test Result

Voltage Level (V)	CUS350MP-1000-24 CUS350MP-1000-48
10	PASS

7. Power Frequency Magnetic Field Immunity Test (IEC61000-4-8)

MODEL : CUS350MP-1000

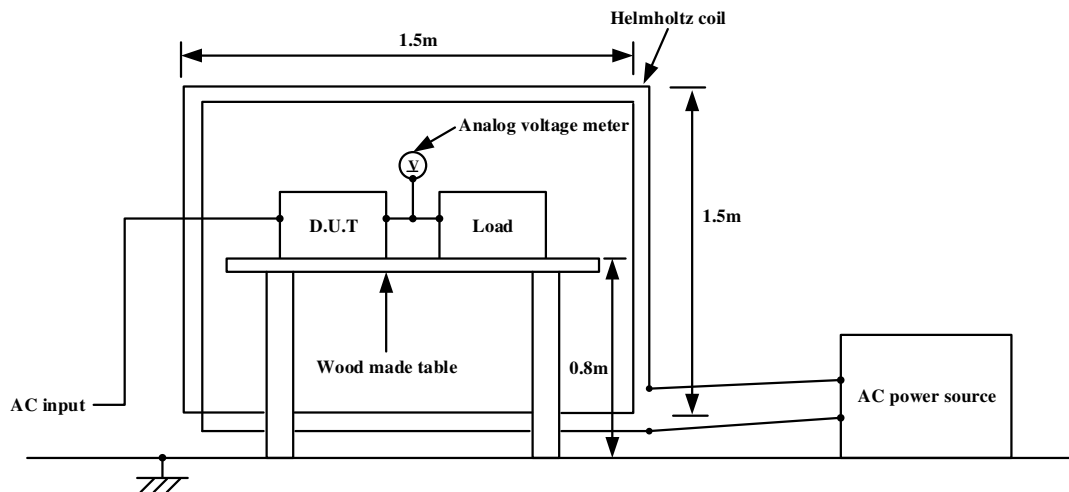
(1) Equipment Used

AC Power Source : AA2000XG (Takasago)
 Helmholtz Coil : HHS5215 (Spulen)

(2) Test Conditions

- Input Voltage : 100, 230VAC
- Output Current : 0%, Full load
- Magnetic Frequency : 50Hz, 60Hz
- Test Time : More than 10 seconds (each direction)
- Output Voltage : Rated
- STB Output Current : 0%, Full load
- Direction : X, Y, Z
- Ambient Temperature : 25°C

(3) Test Method



(4) Acceptable Conditions

- 1.No output voltage fluctuation more than 5% during test.
- 2.The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

(5) Test Result

Magnetic Field Strength (A/m)	CUS350MP-1000-24 CUS350MP-1000-48
30	PASS

8. Voltage Dips, Short Interruptions Immunity Test (IEC61000-4-11)

MODEL : CUS350MP-1000

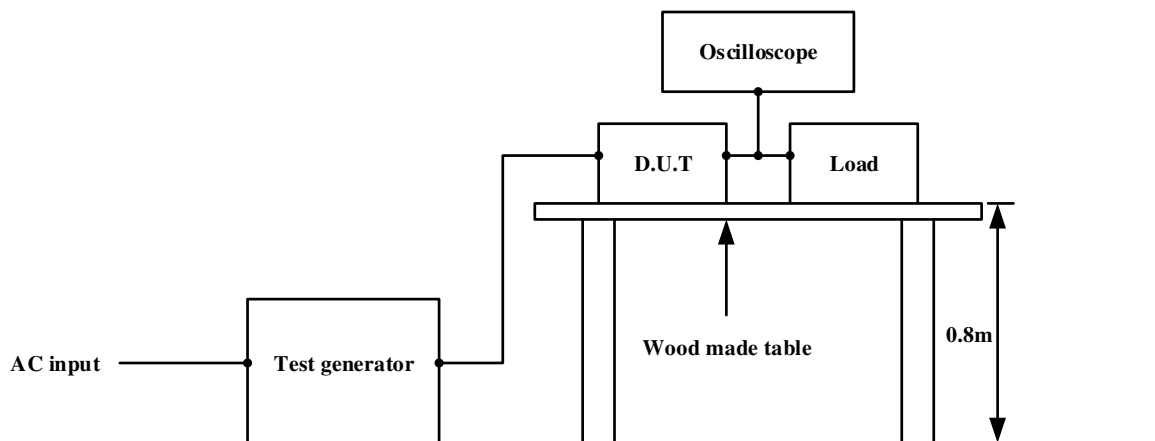
(1) Equipment Used

Test Generator : 6520 (Chroma)

(2) Test Conditions

- Input Voltage : 100, 230VAC
- Output Current : Full load
- Number of Tests : 1 time
- Ambient Temperature : 25°C
- Output Voltage : Rated
- STB Output Current : Full load
- Test Interval : More than 10 seconds

(3) Test Method



(4) Acceptable Conditions

Criteria A

- 1.No output voltage fluctuation more than 5% during test.
2. The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

Criteria B

1. There shall be no temporary function degradation that requires manual interference such as recycle of input.
2. The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

(5) Test Result

Test Level	Dip Rate	Hold time	Criteria (100/230VAC)	CUS350MP-1000-24 CUS350MP-1000-48
70%	30%	500ms	A / A	PASS
40%	60%	200ms	B / A	PASS
0%	100%	20ms	A / A	PASS
0%	100%	5000ms	B / B	PASS

9. Electrostatic Discharge Immunity Test (IEC61000-4-2)

MODEL : CUS350MP-1000

(1) Equipment Used

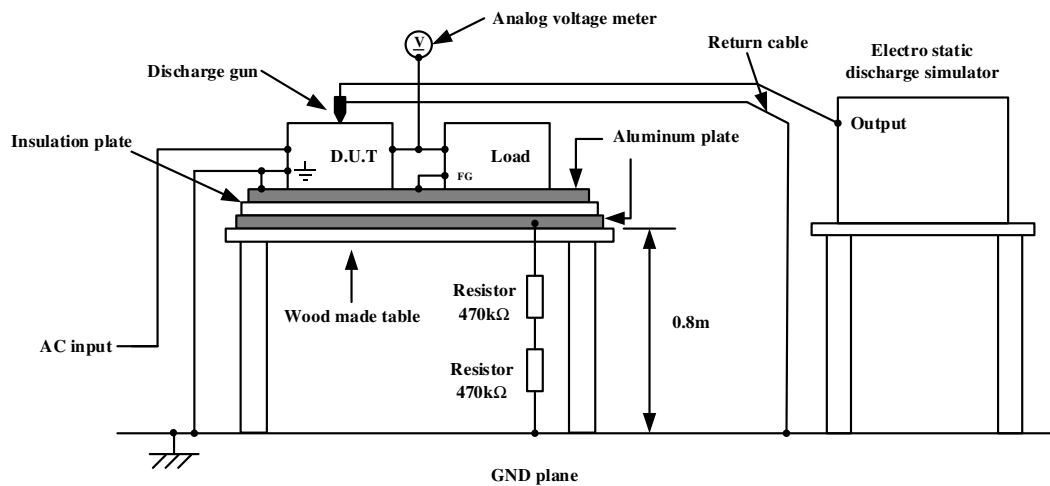
Electro Static Discharge Simulator : ESS-S3011/GT-30R (Noiseken)
 Discharge Resistance : 330Ω Capacity : 150pF

(2) Test Conditions

- Input Voltage : 100, 230VAC
- Output Current : 0%, Full load
- Polarity : +, -
- Discharge Interval : > 1 second
- Output Voltage : Rated
- STB Output Current : 0%, Full load
- Number of tests : 10 times
- Ambient Temperature : 25°C

(3) Test Method and Test Point

Contact Discharge : Input terminal (⊖), DUT screw and base plate (⊖)
 Air Discharge : Input and Output terminal (L, N, +V, -V)



(4) Acceptable Conditions

- 1.No output voltage fluctuation more than 5% during test.
- 2.The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

(5) Test Result

Contact Discharge (kV)	CUS350MP-1000-24 CUS350MP-1000-48
8	PASS

Air Discharge(kV)	CUS350MP-1000-24 CUS350MP-1000-48
15	PASS

10. Radiated Radio-Frequency Electromagnetic Field Immunity Test (IEC61000-4-3)

MODEL : CUS350MP-1000

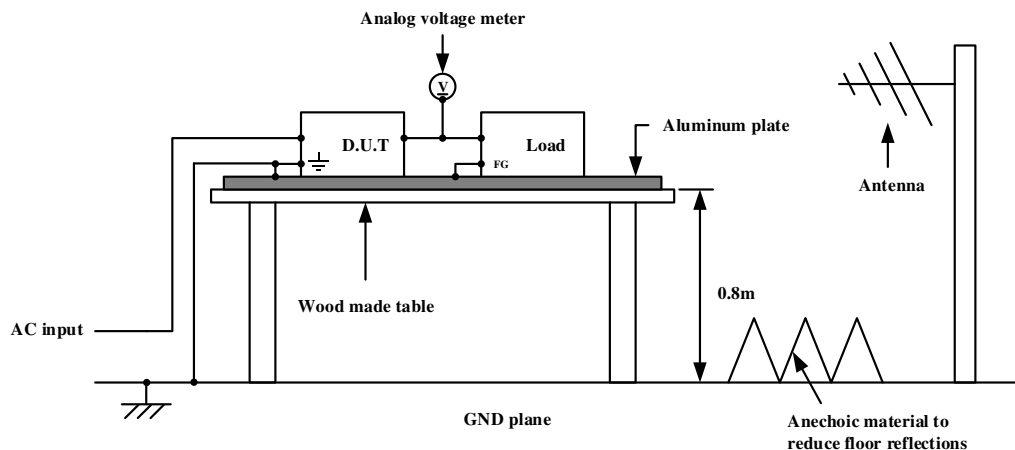
(1) Equipment Used

- Signal Generator : N5181A (Agilent)
- Power Amplifier System : BBA150-BC500 (RohdeSchwarz)
- : BBA150-D110/E100 (RohdeSchwarz)
- Bilog Antenna : VULP9118E (Schwarzbeck)
- : 3117 (Schwarzbeck)
- : ATH800M5GA, ATH4G8 (Schwarzbeck)

(2) Test Conditions

- Input Voltage : 100, 230VAC
- Output Current : 0%, Full load
- STB Output Current : 0%, Full load
- Wave Angle : Horizontal and Vertical
- Test Angle : Top/Bottom, Left/Right, Front/Back
- Amplitude Modulation : 80%, 1kHz, 1.0% step up, 0.5 seconds hold
- Pulse Modulation : 18Hz, 217Hz, 0.5 seconds hold
- Frequency Modulation : 5kHz deviation, 1kHz sine, 0.5 seconds hold
- Output Voltage : Rated
- Distance : 3.0m
- Ambient Temperature : 25°C

(3) Test Method



(4) Acceptable Conditions

- 1.No output voltage fluctuation more than 5% during test.
- 2.The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

(5) Test Result

Modulation	Radiation Strength (V/m)	Electromagnetic Frequency	CUS350MP-1000-24 CUS350MP-1000-48
AM	10	80 - 2700MHz	PASS
PM (18Hz)	27	385MHz	PASS
	28	810,870,930MHz	PASS
PM (217Hz)	9	710,745,780,5240,5500,5785MHz	PASS
	28	1720,1845,1970,2450MHz	PASS
FM	28	450MHz	PASS

11. Electrical Fast Transient / Burst Immunity Test (IEC61000-4-4)

MODEL : CUS350MP-1000

(1) Equipment Used

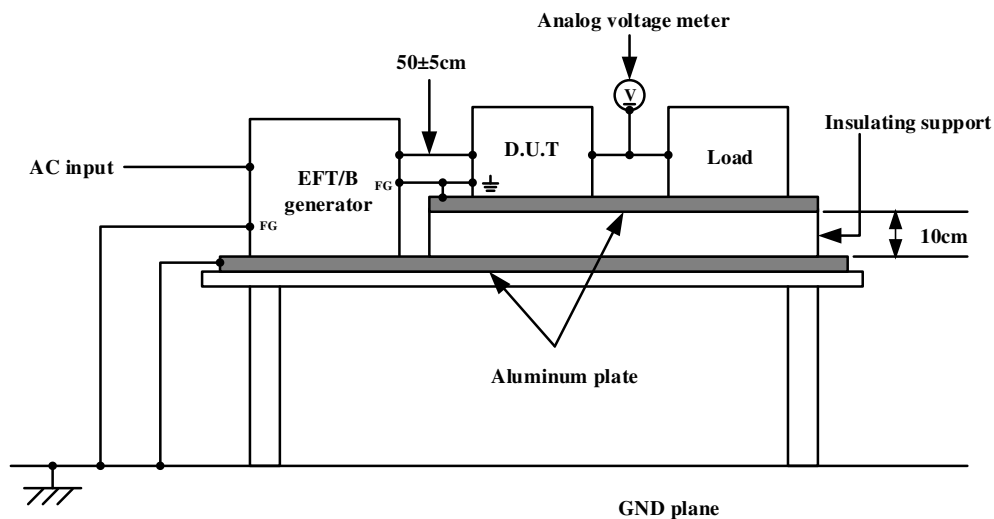
EFT/B Generator : FNS-AX3-B50B (Noiseken)

(2) Test Conditions

- Input Voltage : 100, 230VAC
- Output Current : 0%, Full load
- Polarity : +, -
- Number of Test : 1 time
- Burst Duration : 0.75msec
- Burst Cycle : 300msec
- Output Voltage : Rated
- STB Output Current : 0%, Full load
- Ambient Temperature : 25°C
- Pulse Frequency : 100kHz
- Number of Pulse : 75 pulses
- Test Time : 1 minute

(3) Test Method and Test Point

Input terminal (N, L, \perp), Output terminal (+V, -V) and Signal terminal (+STB, -STB, +RS, -R).



(4) Acceptable Conditions

- 1.No output voltage fluctuation more than 5% during test.
- 2.The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

(5) Test Result

Test terminal	Test Voltage (kV)	CUS350MP-1000-24 CUS350MP-1000-48	Test terminal	Test Voltage (kV)	CUS350MP-1000-24 CUS350MP-1000-48
Input/Output	2	PASS	Signal	1	PASS
		PASS			PASS

12. Voltage Dips, Short Interruptions Immunity Test (IEC61000-4-11)

MODEL : CUS350MP-1000

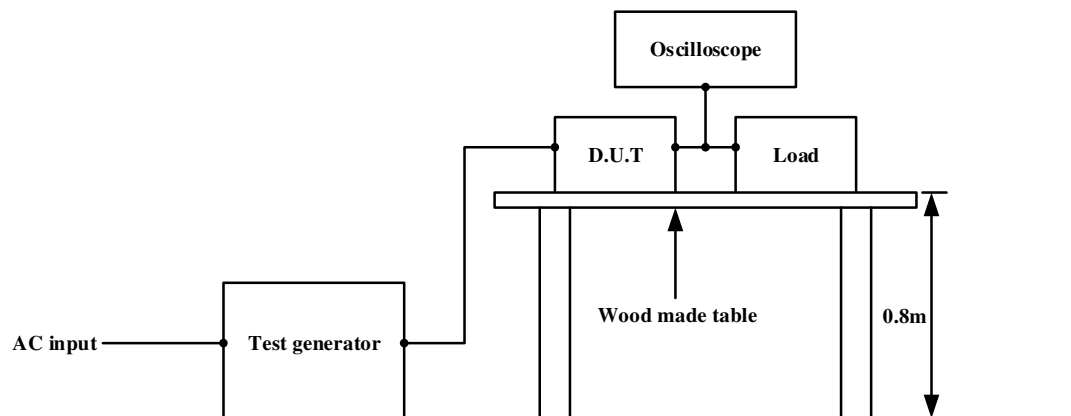
(1) Equipment Used

Test Generator : 6520 (Chroma)

(2) Test Conditions

- Input Voltage : 100, 230VAC
- Output Current : Full load
- Number of Tests : 1 time
- Ambient Temperature : 25°C
- Output Voltage : Rated
- STB Output Current : Full load
- Test Interval : More than 10 seconds

(3) Test Method



(4) Acceptable Conditions

Criteria A

- 1.No output voltage fluctuation more than 5% during test.
2. The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

Criteria B

1. There shall be no temporary function degradation that requires manual interference such as recycle of input.
2. The output voltage after test shall not have obvious deviation from the output voltage before test.
- 3.No smoke and fire are allowed.

(5) Test Result

Test Level	Dip Rate	Hold time	Intersection Angle	Criteria	CUS350MP-1000-24 CUS350MP-1000-48
70%	30%	500ms	0 deg	A	PASS
0%	100%	10ms	0,45,90,135,180, 225,270,315 deg	A	PASS
0%	100%	20ms	0 deg	A	PASS
0%	100%	5000ms	0 deg	B	PASS

13. Radiated fields in close proximity Immunity Test (IEC61000-4-39)

MODEL : CUS350M-1000

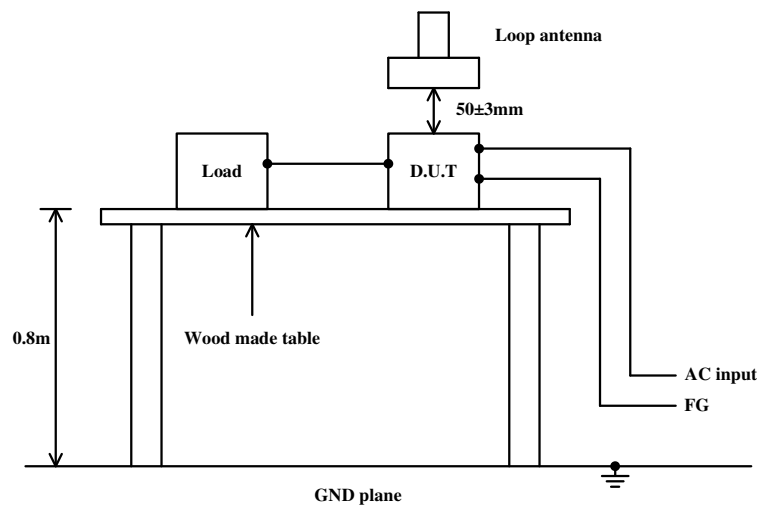
(1) Equipment Used

Signal Generator : SMY01 (Rohde & Schwarz)
 Power Amplifier : DP1300DC (Prana)
 Radiating Loop : 9230-1 (Solar)
 Loop Antenna : HFRA 5164 (Schwarzbeck)
 Loop Sensor : 9229-1 (Solar)
 Field Monitoring Loop : FESP 5134-1 (Schwarzbeck)

(2) Test Conditions

• Input Voltage : 100, 230VAC • Output Voltage : Rated
 • Output Current : 100% • Ambient Temperature : 25°C
 • Frequency : 30kHz, 134.2kHz, 13.56MHz
 • Minimum Dwell Time : 2 seconds
 • Test Direction : Top/Bottom, Right/Left, and Front/Rear

(3) Test Method



(4) Acceptable Conditions

Criteria A

1. The regulation of output voltage must not exceed 5% of initial value during test.
2. The output voltage must be within the regulation of specification after the test.
3. Smoke and fire are not allowed.

(5) Test Result

Frequency	Modulation	Test Level (A/m)	Criteria	CUS350MP-1000-24 CUS350MP-1000-48
30kHz	Continuous wave	8	A	PASS
134.2kHz	Pulse modulation 2.1kHz (Duty 50%)	65	A	PASS
13.56MHz	Pulse modulation 50kHz (Duty 50%)	7.5	A	PASS