

**CUS200M**

**IMMUNITY DATA**

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## Terminology Used

FG	.....	Frame GND
$\perp$	.....	Earth ( $\perp$ ) terminal
L	.....	Live line
N	.....	Neutral line
$\perp$	.....	Earth
+V	.....	+ Output
-V	.....	- Output

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

## 1.0 Summary of Immunity Test Result

MODEL: CUS200M

### (1) IEC61000 Series Test Result:

Item	Standard	Test level	Criteria	Result	Page	Notes & Conditions
Electrostatic Discharge Immunity Test	IEC61000-4-2	1,2,(3)	A	PASS	R-2	Level3 : Air discharge only
Radiated Radio-Frequency Electromagnetic Field Immunity Test	IEC61000-4-3	1,2,3	A	PASS	R-3	
Electrical Fast Transient / Burst Immunity Test	IEC61000-4-4	1,2,3	A	PASS	R-4	
Surge Immunity Test	IEC61000-4-5	1,2,3,(4)	A	PASS	R-5	Level4 : Common mode only
Conducted Disturbances Induced by Radio-Frequency Field Immunity Test	IEC61000-4-6	1,2,3	A	PASS	R-6	
Power Frequency Magnetic Field Immunity Test	IEC61000-4-8	1,2,3,4	A	PASS	R-7	
Voltage Dips Immunity Test	IEC61000-4-11	Class 3	B	PASS	R-8	
Short Interruptions Immunity Test	IEC61000-4-11	Class 3	B	PASS	R-8	

Detail of test condition refer to each test page.

### (2) IEC60601-1-2 Series Test Result:

Item	Standard	Test level	Criteria	Result	Page	Notes & Conditions
Electrostatic Discharge Immunity Test	IEC60601-1-2 Ed.4.1	1,2,3,4	A	PASS	R-9	ENCLOSURE PORT
Radiated Radio-Frequency Electromagnetic Field Immunity Test	IEC60601-1-2 Ed.4.1	1,2,3	A	PASS	R-10	ENCLOSURE PORT
Electrical Fast Transient / Burst Immunity Test	IEC60601-1-2 Ed.4.1	1,2,3	A	PASS	R-11	Input a.c. power PORT
Surge Immunity Test	IEC60601-1-2 Ed.4.1	1,2	A	PASS	R-12	Input a.c. power PORT
Conducted Disturbances Induced by Radio-Frequency Field Immunity Test	IEC60601-1-2 Ed.4.1	1,2	A	PASS	R-13	Input a.c. power PORT
Power Frequency Magnetic Field Immunity Test	IEC60601-1-2 Ed.4.1	1,2,3,4	A	PASS	R-14	ENCLOSURE PORT
Voltage Dips Immunity Test	IEC60601-1-2 Ed.4.1	Class 2	A (200VAC~ 240VAC and (Po ≤ 160W))	PASS	R-15	Input a.c. power PORT
			B (100VAC~ 120VAC or (Po > 160W))	PASS		
Voltage Interruptions Immunity Test	IEC60601-1-2 Ed.4.1	Class 2	B	PASS	R-15	Input a.c. power PORT
Radiated Field In Close Proximity Immunity Test	IEC60601-1-2 Ed.4.1	-	A	PASS	R-16	ENCLOSURE PORT

Detail of test condition refer to each test page.

#### 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.

#### Criteria B

1. Must not have temporary function degradation that requires input restart.
2. The output voltage must be within the regulation of specification after the test.
3. Smoke and fire are not allowed.

2.0 IEC61000 Series Data

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

MODEL : CUS200M

(1) Equipment Used

Electro Static Discharge Simulator : NSG435 (SCHAFFNER)

Discharge Resistance : 330Ω Capacity : 150pF

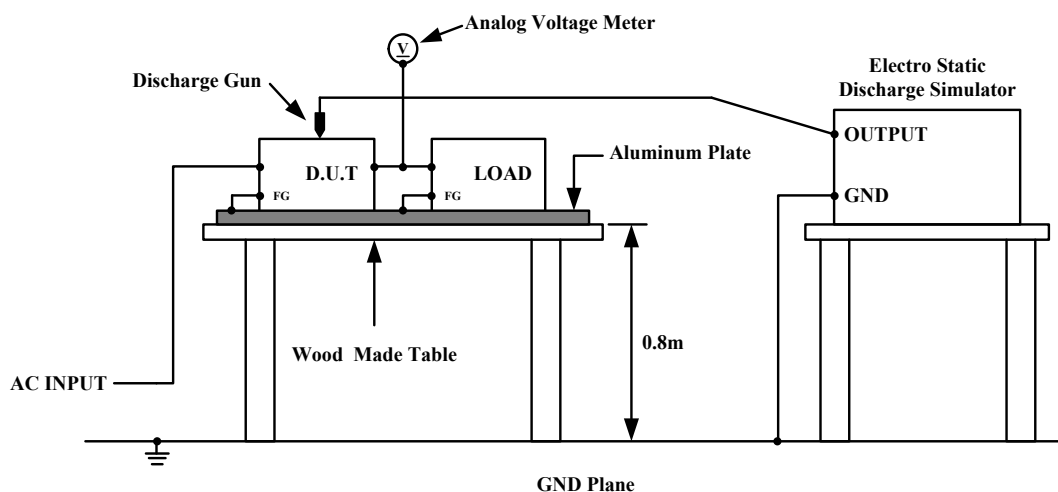
(2) Test Conditions

- Input Voltage : 115, 230VAC • Output Voltage : Rated
- Output Current : 0%, 100% • Polarity : +, -
- Test Times : 10 times • Discharge Interval : > 1 second
- Ambient Temperature : 25°C

(3) Test Method and Device Test Point

Contact Discharge : ⚡, Mounting screw

Air Discharge : ⚡, Input and output terminal, Mounting screw



(4) Acceptable Conditions

1. Output voltage regulation not to exceed ±5% of initial (before test) value during test.
2. Output voltage to be within regulation specification after the test.
3. Along with 1 and 2, without the occurrence of smoke and fire, as well as no output failure.

(5) Test Result

Contact Discharge (kV)	CUS200M-12/18/24/36/48	Air Discharge(kV)	CUS200M-12/18/24/36/48
2	PASS	2	PASS
4	PASS	4	PASS
		8	PASS

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

MODEL : CUS200M

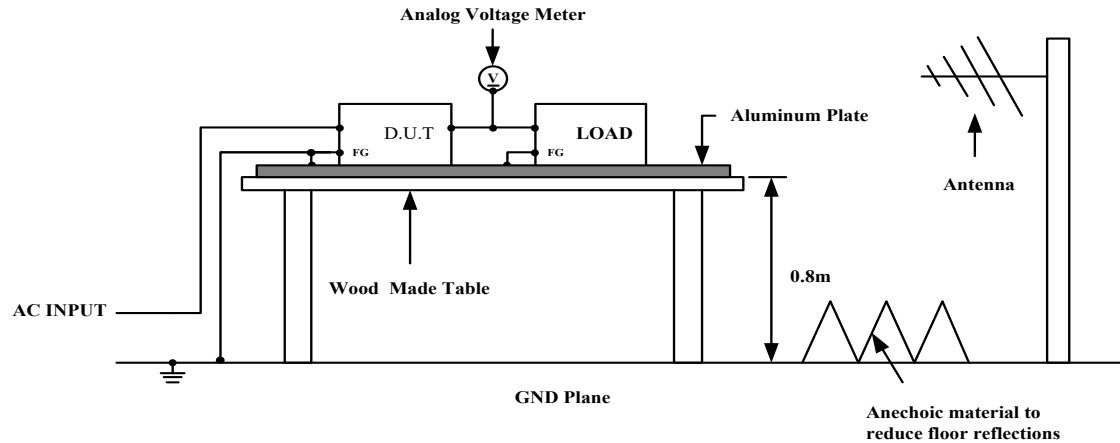
(1) Equipment Used

- SML 03(RS CORPORATION)
- HL 046(RS CORPORATION)
- AR500W 1000A(AR CORPORATION)
- FM5004(AR CORPORATION)
- FP6001(AR CORPORATION)

(2) Test Conditions

- Input Voltage : 115, 230VAC
- Output Voltage : Rated
- Output Current : 0%, 100%
- Amplitude Modulated : 80%, 1kHz
- Electromagnetic Frequency : 80~1000MHz
- Ambient Temperature : 25°C
- Wave Angle : Horizontal and Vertical
- Distance : 3.0m
- Sweep Condition : 1.0%Step Up, 2.8 Seconds Hold
- Test Angle : Top/Bottom, Both Sides, Front/Back

(3) Test Method



(4) Acceptable Conditions

1. Output voltage regulation not to exceed  $\pm 5\%$  of initial (before test) value during test.
2. Output voltage to be within regulation specification after the test.
3. Along with 1 and 2, without the occurrence of smoke and fire, as well as no output failure.

(5) Test Result

Radiation Field Strength (V/m)	CUS200M-12/18/24/36/48
1	PASS
3	PASS
10	PASS

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

**MODEL : CUS200M**

### (1) Equipment Used

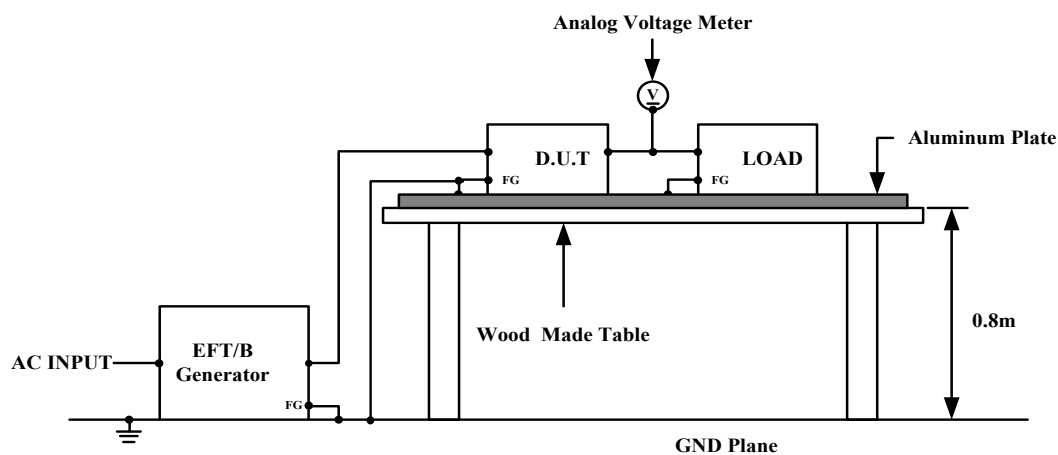
EFT/B Generator : FNS-100L (NOISEKEN)

### (2) Test Conditions

• Input Voltage : 115, 230VAC      • Output Voltage : Rated  
 • Output Current : 0%, 100%      • Test Time : 1 minute  
 • Polarity : +, -      • Ambient Temperature : 25°C  
 • Number of Tests : 3 times

### (3) Test Method and Device Test Point

Apply to (N, L,  $\pm$ ), (N, L), (N), (L), ( $\pm$ ).



### (4) Acceptable Conditions

1. Output voltage regulation not to exceed  $\pm 5\%$  of initial (before test) value during test.
2. Output voltage to be within output voltage regulation specification after the test.
3. Along with 1 and 2, without the occurrence of smoke and fire, as well as no output failure.

### (5) Test Result

Test Voltage (kV)	Repetition Rate (kHz)	CUS200M-12/18/24/36/48
0.5	5 / 100	PASS
1	5 / 100	PASS
2	5 / 100	PASS

**2.4 Surge Immunity Test (IEC61000-4-5)**

**MODEL : CUS200M**

**(1) Equipment Used**

Surge Generator : 6100 (SCHAFFNER)

Coupling Impedance : Common 12Ω  
Normal 2Ω

Coupling Capacitance : Common 9μF  
Normal 18μF

**(2) Test Conditions**

• Input Voltage : 115, 230VAC

• Output Voltage : Rated

• Output Current : 0, 100%

• Number of Tests : 3 times

• Polarity : +, -

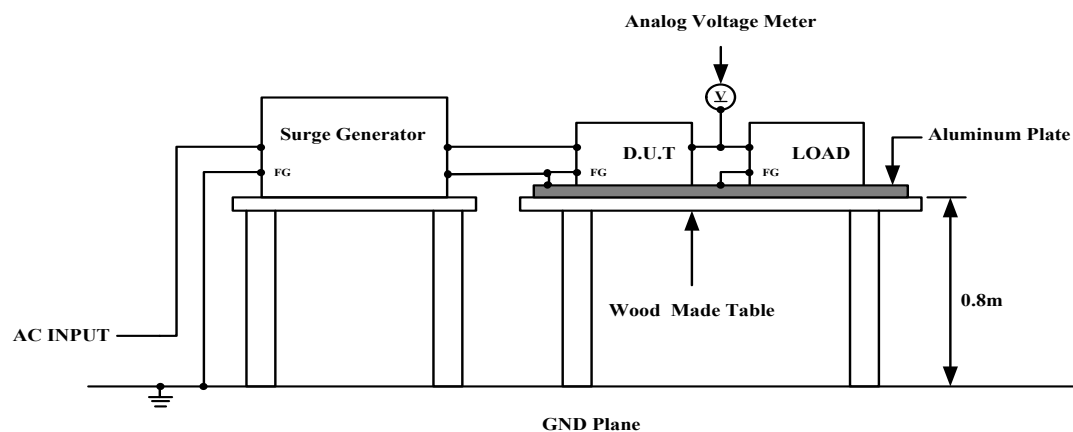
• Mode : Common, Normal

• Phase : 0, 90 deg

• Ambient Temperature : 25°C

**(3) Test Method and Device Test Points**

Apply to Common mode (N-⊥, L-⊥) and Normal mode (N-L).



**(4) Acceptable Conditions**

1. Output voltage regulation not to exceed ±5% of initial (before test) value during test.
2. Output voltage to be within regulation specification after the test.
3. Along with 1 and 2, without the occurrence of smoke and fire, as well as no output failure.

**(5) Test Result**

Common		Normal	
Test Voltage (kV)	CUS200M-12/18/24/36/48	Test Voltage (kV)	CUS200M-12/18/24/36/48
0.5	PASS	0.5	PASS
1	PASS	1	PASS
2	PASS	2	PASS
4	PASS		

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

**MODEL : CUS200M**

**(1) Equipment Used**

RF POWER AMPLIFIER : (AR U.S.A)

SIGNAL GENERATOR : IFR 2023A (IFR U.K)

**(2) Test Conditions**

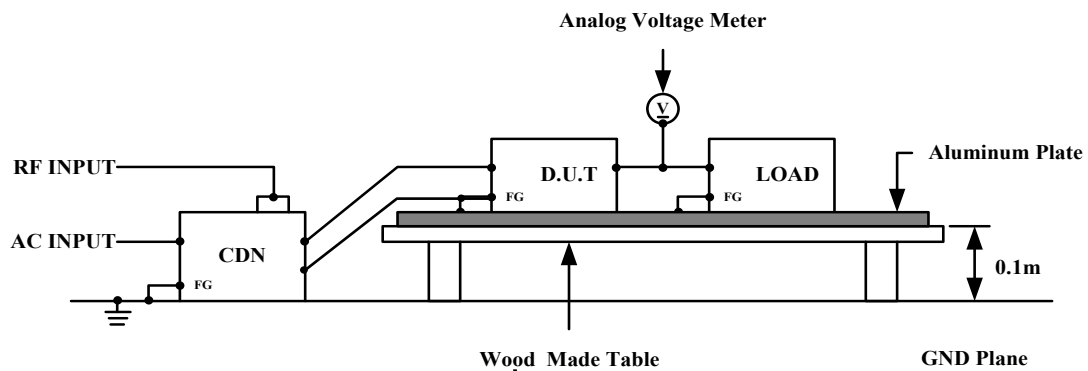
•Input Voltage : 115, 230VAC •Output Voltage : Rated

•Output Current : 100% •Electromagnetic Frequency : 150kHz~80MHz

•Ambient Temperature : 25°C

•Sweep Condition : 1.0%Step Up, 2.8 Seconds Hold

**(3) Test Method**



**(4) Acceptable Conditions**

1. Output voltage regulation not to exceed  $\pm 5\%$  of initial (before test) value during test.
2. Output voltage to be within regulation specification after the test.
3. Along with 1 and 2, without the occurrence of smoke and fire, as well as no output failure.

**(5) Test Result**

Voltage Level (V)	CUS200M-12/18/24/36/48
1	PASS
3	PASS
10	PASS



**2.6 Power Frequency Magnetic Field Immunity Test (IEC61000-4-8)**

**MODEL : CUS200M**

**(1) Equipment Used**

AC Power Source : 1501L (California Instrument)

Helmholts Coil : HHS5215 (Spulen)

**(2) Test Conditions**

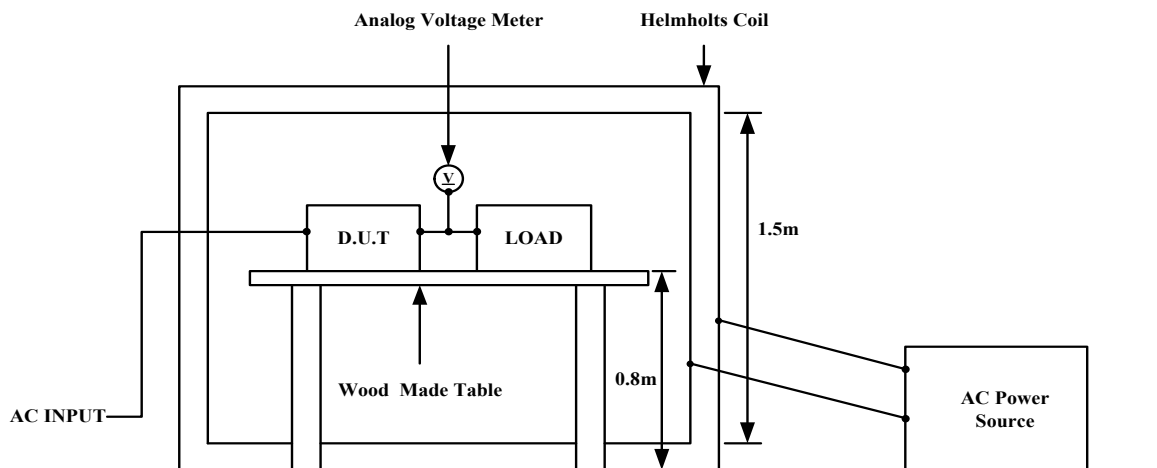
•Input Voltage : 115, 230VAC •Output Voltage : Rated

•Output Current : 100% •Magnetic Frequency : 50Hz

•Ambient Temperature : 25°C •Direction : X, Y, Z

•Test Time : More than 10 seconds(Each direction)

**(3) Test Method and Device Test Point**



**(4) Acceptable Conditions**

1. Output voltage regulation not to exceed  $\pm 5\%$  of initial (before test) value during test.
2. Output voltage to be within regulation specification after the test.
3. Along with 1 and 2, without the occurrence of smoke and fire, as well as no output failure.

**(5) Test Result**

Magnetic Field Strength (A/m)	CUS200M-12/18/24/36/48
1	PASS
3	PASS
10	PASS
30	PASS

**2.7 Voltage Dips, Short Interruptions Immunity Test (IEC61000-4-11)**

**MODEL : CUS200M**

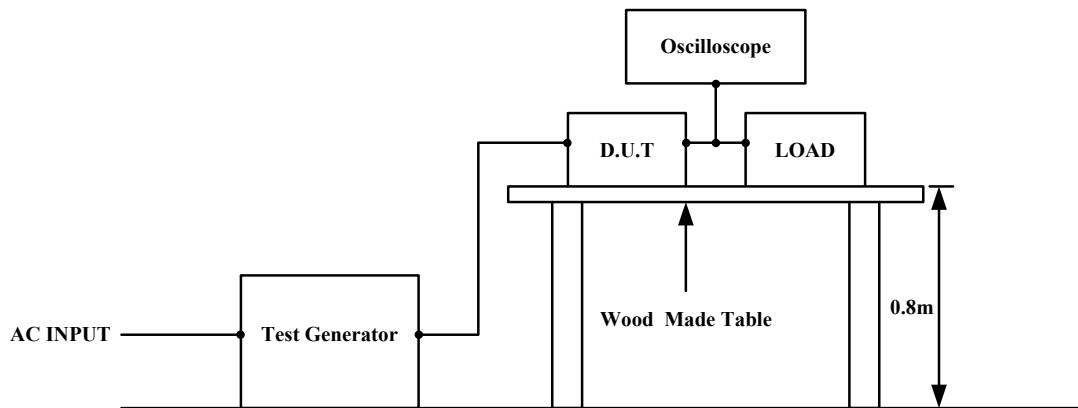
**(1) Equipment Used**

Test Generator : PCR2000L (KIKUSUI)

**(2) Test Conditions**

- Input Voltage : 115, 230VAC
- Output Voltage : Rated
- Output Current : 100%
- Ambient Temperature : 25°C
- Number of Tests : 3 times
- Test interval : More than 10 seconds

**(3) Test Method and Device Test Point**



**(4) Acceptable Conditions**

1. Output voltage to be within output voltage regulation specification after the test.
2. Smoke and fire do not occur.

**(5) Test Result**

Test Level	Dip rate	Continue Time	CUS200M-12/18/24/36/48
70%	30%	500ms	PASS
40%	60%	200ms	PASS
0%	100%	20ms	PASS
0%	100%	5000ms	PASS

**3.0 IEC60601-1-2 Series Test Data**

**3.1 Electrostatic Discharge Immunity Test (IEC60601-1-2 Ed.4.1)**

**MODEL: CUS200M**

**(1) Equipment Used**

Electro Static Discharge Simulator : NSG435 (SCHAFFNER)

Discharge Resistance : 330Ω Capacity : 150pF

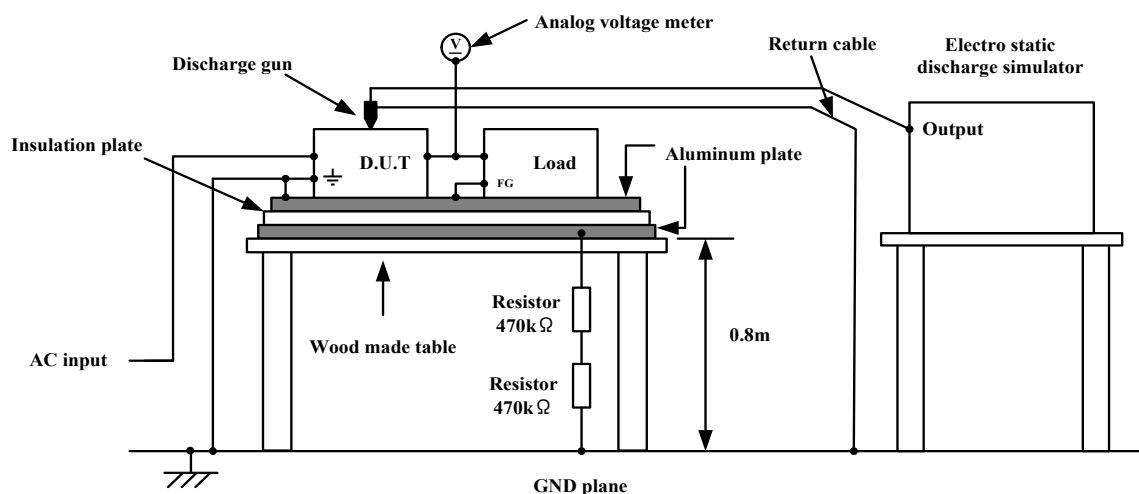
**(2) Test Conditions**

- Input Voltage : 100, 240VAC
- Output Voltage : Rated
- Output Current : 0%, Full load
- Polarity : +, -
- Number of Tests : 10 times
- Discharge Interval : > 1 second
- Ambient Temperature : 25°C

**(3) Test Method and Device Test Point (IEC61000-4-2, ENCLOSURE PORT)**

Contact Discharge : ⚡, Mounting screw.

Air Discharge : ⚡, Mounting screw, and Input (L, N).



**(4) Acceptable Conditions**

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**

Contact Discharge (kV) (Level 4)	CUS200M-12/18/24/36/48	Air Discharge(kV) (Level 4)	CUS200M-12/18/24/36/48
2	PASS	2	PASS
4	PASS	4	PASS
6	PASS	8	PASS
8	PASS	15	PASS

3.2 Radiated Radio-Frequency Electromagnetic Field Immunity Test (IEC60601-1-2 Ed.4.1)

MODEL: CUS200M

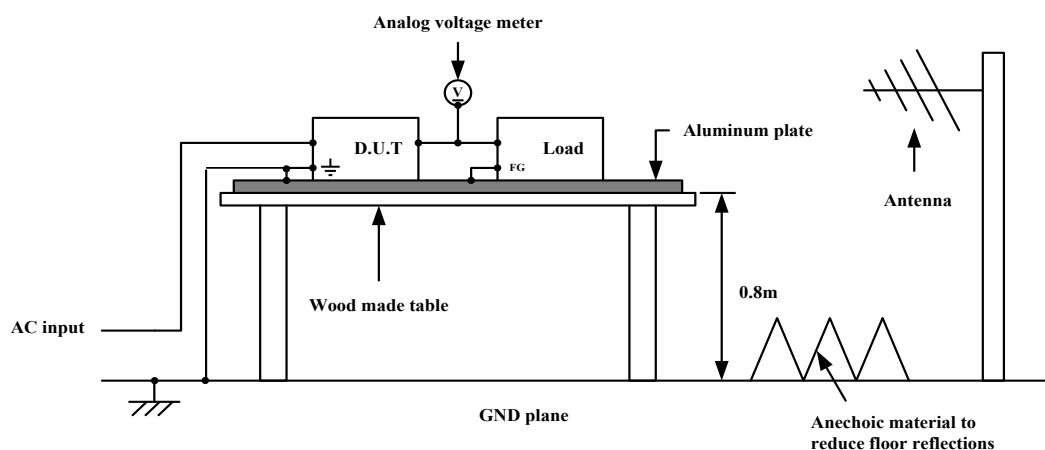
(1) Equipment Used

Signal generator	: MG3692B ( Anritsu)
Power amplifier system	: AP32 SW210 (PRANA)
	: AP32 MT255 (PRANA)
Electric field sensor	: HI-6105 (ETS-Lindgren)
Bilog antenna	: AT4510 (AR)
	: VULP9118E(SCHWARZBECK)

(2) Test Conditions

• Input Voltage	: 100, 240VAC	• Output Voltage	: Rated
• Output Current	: 0%, Full load	• Distance(AM)	: 3.0m
• Wave An,	: Horizontal and Vertical	• Distance(FM,PM)	: 0.3m
• Test Angle	: Top/Bottom, Both Sides, Front/Back	• Ambient Temperature	: 25°C
• Amplitude Modulated(AM)	: 80%, 1kHz, 1.0% step up, 0.5 seconds hold.	• Pulse Modulated(PM)	: 18Hz, 217Hz, 0.5 seconds hold
• Frequency Modulated(FM)	: 5kHz deviation, 1kHz sine, 0.5 seconds hold.		

(3) Test Method (IEC61000-4-3, ENCLOSURE PORT)



(4) Acceptable Conditions

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

Modulation	Radiation Field Strength (V/m) (Level 3)	Electromagnetic Frequency	CUS200M-12/18/24/36/48
AM	10	80MHz ~2.7GHz	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

**3.3 Electrical Fast Transient / Burst Immunity Test (IEC60601-1-2 Ed.4.1)**

**MODEL: CUS200M**

**(1) Equipment Used**

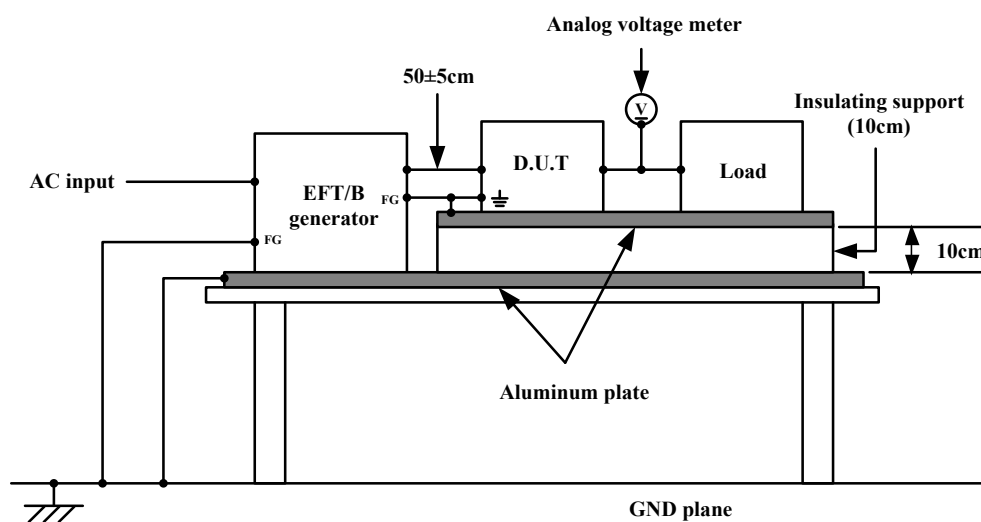
EFT/B Generator : FNS-100L (NOISEKEN)

**(2) Test Conditions**

- Input Voltage : 100, 240VAC
- Output Voltage : Rated
- Output Current : 0%, Full load
- Test Time : 1 minute
- Polarity : +, -
- Ambient Temperature : 25°C
- Number of Tests : 1 time
- Pulse Frequency : 100kHz
- Burst Time : 15msec
- Number of Pulse : 75pcs
- Burst Cycle : 300msec

**(3) Test Method and Device Test Point (IEC61000-4-4, Input a.c. power PORT)**

Apply to (N, L,  $\overline{\text{L}}$ ).



**(4) Acceptable Conditions**

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**

Test Voltage (kV) (Level 3)	CUS200M-12/18/24/36/48
0.5	PASS
1	PASS
2	PASS

3.4 Surge Immunity Test (IEC60601-1-2 Ed.4.1)

**MODEL: CUS200M**

**(1) Equipment Used**

Surge Generator : NSG3040 (TESEQ)

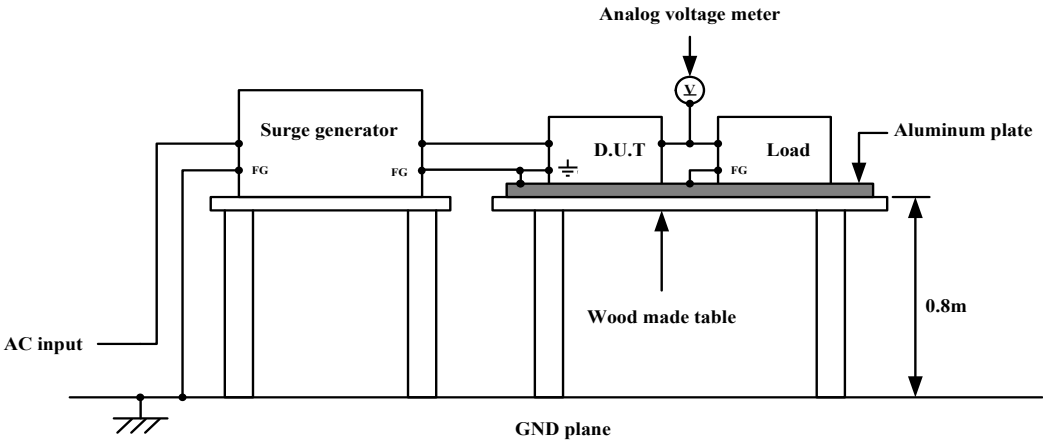
Coupling Impedance : Common	12Ω	Coupling Capacitance : Common	9μF
Normal	2Ω	Normal	18μF

**(2) Test Conditions**

- Input Voltage : 100, 240VAC
- Output Voltage : Rated
- Output Current : 0%, Full load
- Number of Tests : 5 times
- Polarity : +, -
- Mode : Common and Normal
- Phase : 0, 90deg
- Ambient Temperature : 25°C

**(3) Test Method and Device Test Point (IEC61000-4-5, Input a.c. power PORT)**

Apply to Common mode (N-⊕ , L- ⊕) and Normal mode (N-L).



**(4) Acceptable Conditions**

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**

Common(Level 3)		Normal(Level 2)	
Test Voltage (kV)	CUS200M-12/18/24/36/48	Test Voltage (kV)	CUS200M-12/18/24/36/48
0.5	PASS	0.5	PASS
1	PASS	1	PASS
2	PASS		

3.5 Conducted Disturbances Induced by Radio-Frequency Field Immunity Test (IEC60601-1-2 Ed.4.1)

**MODEL: CUS200M**

**(1) Equipment Used**

Compact RF Simulator : NSG 4070-30 (TESEQ)

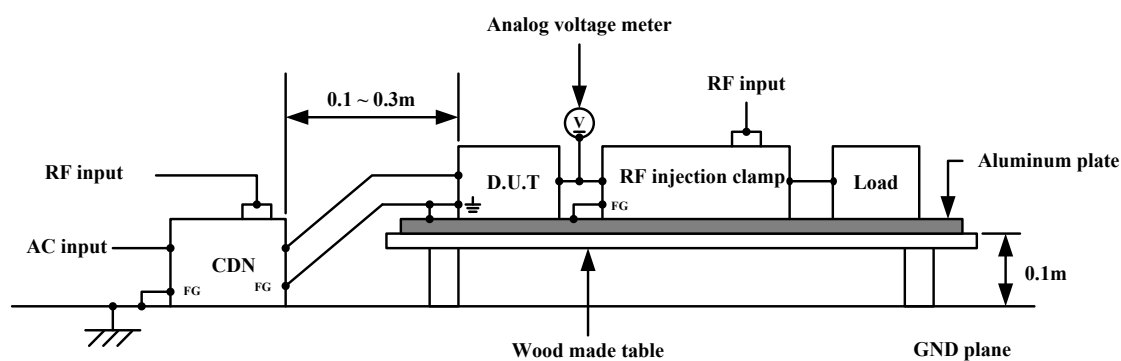
Coupling-Decoupling Network : CDN L-801 M2/M3 (Liithi)

**(2) Test Conditions**

- Input Voltage : 100, 240VAC • Output Voltage : Rated
- Output Current : 0%, Full load • Electromagnetic Frequency : 150kHz~80MHz
- Ambient Temperature : 25°C
- Sweep Condition : 1.0% step up, 0.5 seconds hold

**(3) Test Method and Device Test Point (IEC61000-4-6, Input a.c. power PORT)**

Apply to (N, L,  $\frac{\perp}{\perp}$ ).



**(4) Acceptable Conditions**

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**

Voltage Level (V) (Level 2)	CUS200M-12/18/24/36/48
1	PASS
3	PASS

**3.6 Power Frequency Magnetic Field Immunity Test (IEC60601-1-2 Ed.4.1)**

**MODEL: CUS200M**

**(1) Equipment Used**

AC Power Source : NSG 1007(SCHAFFNER)

Helmholts Coil : R-1000-4-8/9-L-1M (TESEQ)

**(2) Test Conditions**

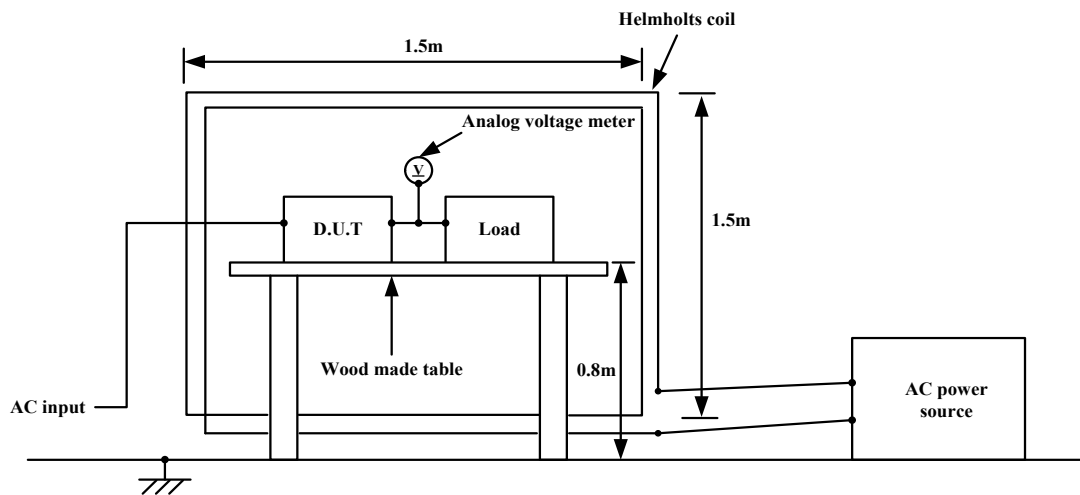
•Input Voltage : 100, 240VAC •Output Voltage : Rated

•Output Current : 0%, Full load •Magnetic Frequency : 50Hz

•Ambient Temperatur : 25°C •Direction : X, Y, Z

•Test Time : More than 10 seconds (each direction)

**(3) Test Method (IEC61000-4-8, ENCLOSURE PORT)**



**(4) Acceptable Conditions**

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**

Magnetic Field Strength (A/m) (Level 4)	CUS200M-12/18/24/36/48
1	PASS
3	PASS
10	PASS
30	PASS



3.7 Voltage Dips, Voltage Interruptions Immunity Test (IEC60601-1-2 Ed.4.1)

**MODEL: CUS200M**

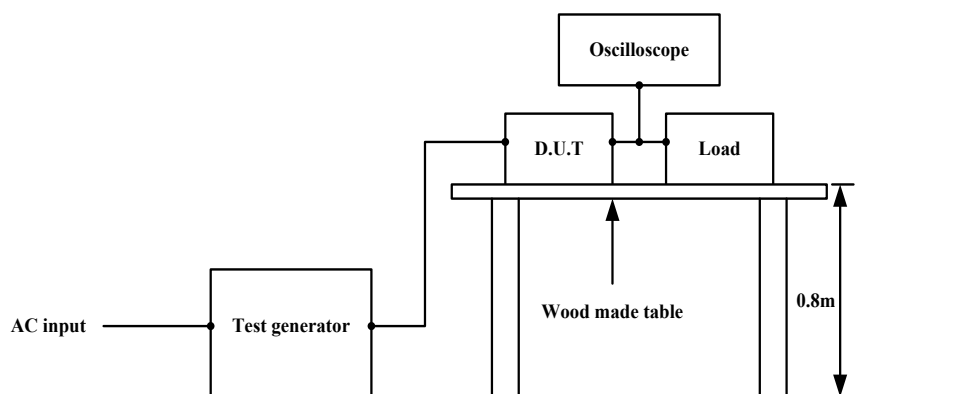
**(1) Equipment Used**

Test generator : PCR2000LA(KIKUSUI)

**(2) Test Conditions**

- Input Voltage : 100, 240VAC
- Output Voltage : Rated
- Output Current : Full load
- Ambient Temperature : 25°C
- Number of Tests : 1time
- Test Interval : More than 10 seconds

**(3) Test Method (IEC61000-4-11,Class 2, Input a.c. power PORT)**



**(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.

Criteria B

1. Must not have temporary function degradation that requires input restart.
2. The output voltage must be within the regulation of specification after the test.
3. Smoke and fire are not allowed.

**(5) Test Result**

Phenomenon	Test Level (Class 2)	Continue Time	Phase Angles	Criteria				CUS200M-12/18/24/36/48
				100VAC~120VAC and Po ≤ 160W	200VAC~240VAC and Po ≤ 160W	100VAC~120VAC and Po > 160W	200VAC~240VAC and Po > 160W	
Voltage dips	70%	500ms	0 deg	B	A	B	A	PASS
	0%	10ms	0,45,90,135,180,225,270,315 deg	A	A	A	A	PASS
	0%	20ms	0 deg	A	A	B	B	PASS
Voltage interruptions	0%	5000ms	0 deg	B	B	B	B	PASS

**3.8 Radiated Field In Close Proximity Immunity Test (IEC60601-1-2 Ed.4.1)**

**MODEL : CUS200M**

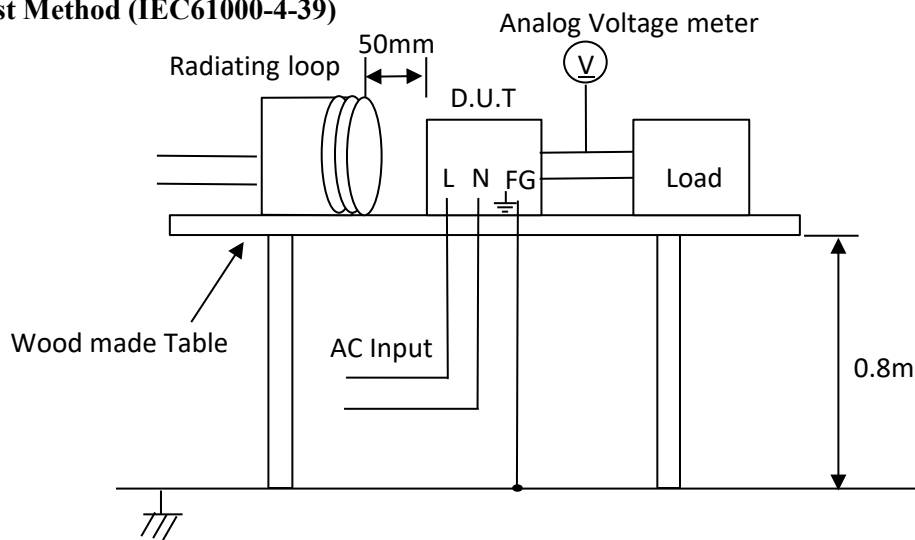
**(1) Equipment Used**

Signal generator	: SMC100A ( R&S)
Power amplifier system	: BBA150-AB200 (R&S)
	: NFCN9734 (SCHWARZBECK)
loop sensor	: FESP5134-40 (SCHWARZBECK)
Radiating loop	: FESP5132 (SCHWARZBECK)
	: FESP5139 (SCHWARZBECK)

**(2) Test Conditions**

Input Voltage	: 100, 240VAC	Output Voltage	: Rated
Output Current	: Full load	Distance	: 50mm
Test Angle	: Top/Bottom, Both Sides, Front/Back	Ambient Temperature	: 25°C
Test Time	: 2sec for each coil position		

**(3) Test Method (IEC61000-4-39)**



**(4) Acceptable Conditions**

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**

Test Frequency	Immunity test level (A/m)	Modulation	CUS200M-12/18/24/36/48
30kHz	8	Continuous waves	PASS
134.2kHz	65	Pulse Modulation 50%, 2.1kHz	PASS
13.56MHz	7.5	Pulse Modulation 50%, 50kHz	PASS