

CUS100MB

IMMUNITY DATA

I N D E X

	PAGE
1.0 Summary of Immunity Test Result	R-1
----- IEC61000 Series Test Data-----	
2.0 IEC61000 Series Test Data	R-2
2.1 Electrostatic Discharge Immunity Test (IEC61000-4-2)	R-2
2.2 Radiated Radio-Frequency Electromagnetic Field Immunity Test (IEC61000-4-3)	R-3
2.3 Electrical Fast Transient / Burst Immunity Test (IEC61000-4-4)	R-4
2.4 Surge Immunity Test (IEC61000-4-5)	R-5
2.5 Conducted Disturbances Induced by Radio-Frequency Field Immunity Test (IEC61000-4-6)	R-6
2.6 Power Frequency Magnetic Field Immunity Test (IEC61000-4-8)	R-7
2.7 Voltage Dips, Short Interruptions Immunity Test (IEC61000-4-11)	R-8
----- IEC60601-1-2 Series Test Data-----	
3.0 IEC60601-1-2 Series Test Data	R-9
3.1 Electrostatic Discharge Immunity Test (IEC60601-1-2 Ed.4.1)	R-9
3.2 Radiated Radio-Frequency Electromagnetic Field Immunity Test (IEC60601-1-2 Ed.4.1)	R-10
3.3 Electrical Fast Transient / Burst Immunity Test (IEC60601-1-2 Ed.4.1)	R-11
3.4 Surge Immunity Test (IEC60601-1-2 Ed.4.1)	R-12
3.5 Conducted Disturbances Induced by Radio-Frequency Field Immunity Test (IEC60601-1-2 Ed.4.1)	R-13
3.6 Power Frequency Magnetic Field Immunity Test (IEC60601-1-2 Ed.4.1)	R-14
3.7 Voltage Dips, Voltage Interruptions Immunity Test (IEC60601-1-2 Ed.4.1)	R-15
3.8 Radiated Field in Close Proximity Immunity Test (IEC60601-1-2 Ed.4.1)	R-16

Terminology Used

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

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

1.0 Summary of Immunity Test Result

MODEL: CUS100MB

(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,(3)	A	PASS	R-12	Input a.c. power PORT Level3 : Common mode only
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)	PASS	R-15	Input a.c. power PORT
			A (100VAC~ 120VAC and $I_o \leq 45\%$)	PASS		
			B (100VAC~ 120VAC and $I_o > 45\%$)	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 : CUS100MB

(1) Equipment Used

Electro Static Discharge Simulator : NSG435 (SCHAFFNER)

Discharge Resistance : 330Ω Capacity : 150pF

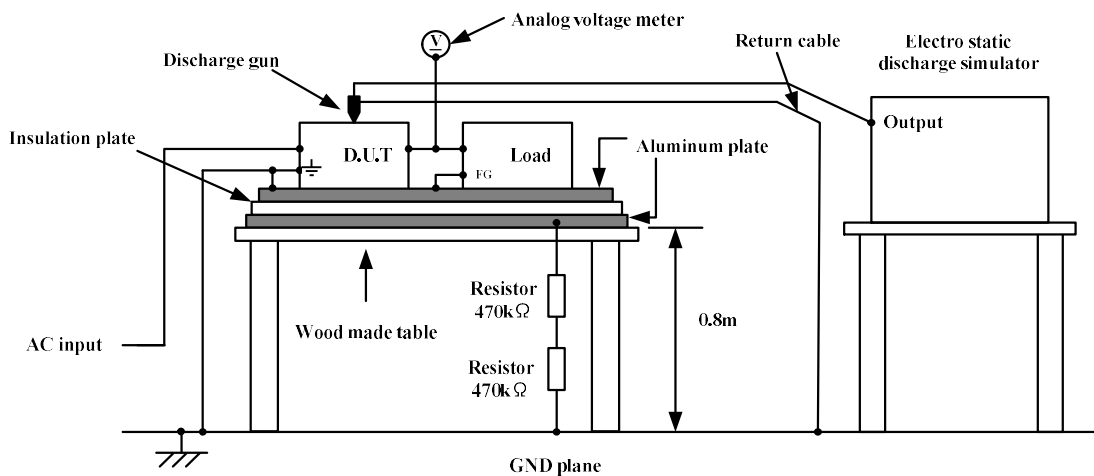
(2) Test Conditions

• Input Voltage	: 115, 230VAC	• Output Voltage	: Rated
• Output Current	: 0%, Full load	• Polarity	: +, -
• Number of Tests	: 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 (L,N,+V,-V), ⚡, Mounting screw



(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)	CUS100MB-24	Air Discharge(kV)	CUS100MB-24
2	PASS	2	PASS
4	PASS	4	PASS
		8	PASS

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

MODEL : CUS100MB

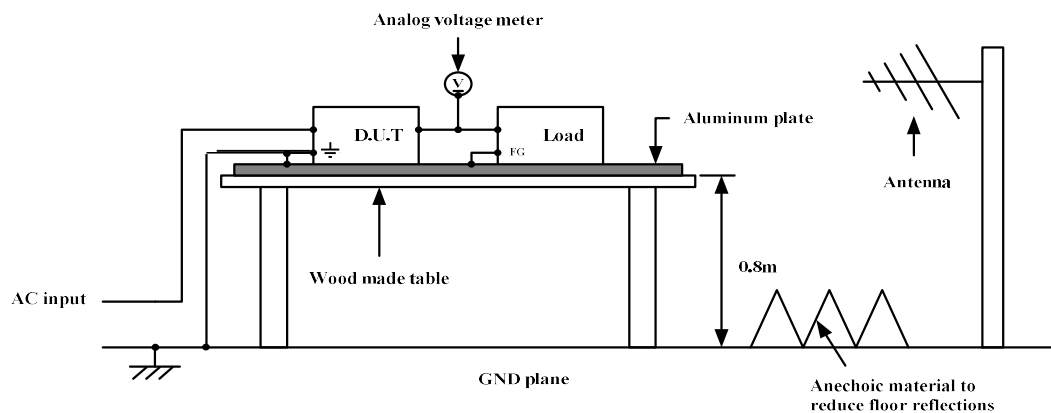
(1) Equipment Used

- 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 : 115, 230VAC
- Output Voltage : Rated
- Output Current : 0%, Full load
- Amplitude Modulated : 80%, 1kHz
- Wave Angle : Horizontal and Vertical
- Ambient Temperature : 25°C
- Sweep Condition : 1.0% step up, 0.5 seconds hold
- Distance : 3.0m
- Test Angle : Top/Bottom, Both Sides, Front/Back
- Electromagnetic Frequency : 80~1000MHz , 1.4~2.0GHz , 2.0~2.7GHz

(3) Test Method



(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

Radiation Field Strength (V/m)	Electromagnetic Frequency	CUS100MB-24
1	2.0~2.7GHz	PASS
3	1.4~2.0GHz	PASS
10	80~1000MHz	PASS

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

MODEL : CUS100MB

(1) Equipment Used

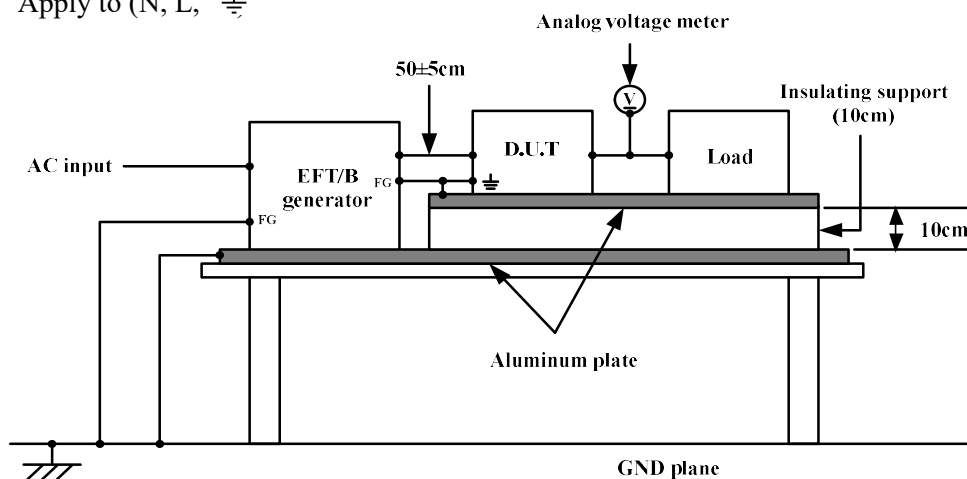
EFT/B Generator : FNS-100L (NOISEKEN)

(2) Test Conditions

• Input Voltage	: 115, 230VAC	• 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	: 0.75msec	• Number of Pulse	: 75pcs
• Burst Cycle	: 300msec		

(3) Test Method and Device Test Point

Apply to (N, L, \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

Test Voltage (kV)	CUS100MB-24
0.5	PASS
1	PASS
2	PASS

2.4 Surge Immunity Test (IEC61000-4-5)

MODEL : CUS100MB

(1) Equipment Used

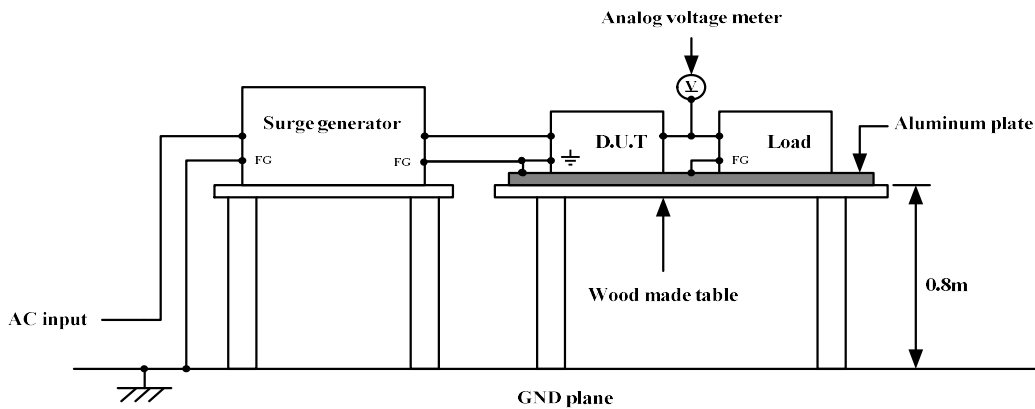
Surge Generator : NSG3040 (TESEQ)
 Coupling Impedance : Common 12Ω : Normal 2Ω
 Coupling Capacitance : Common 9μF : Normal 18μF

(2) Test Conditions

• Input Voltage : 115, 230VAC
 • Output Voltage : Rated
 • Output Current : 0%, 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 Points

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	
Test Voltage (kV)	CUS100MB-24
0.5	PASS
1	PASS
2	PASS
4	PASS

Normal	
Test Voltage (kV)	CUS100MB-24
0.5	PASS
1	PASS
2	PASS

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

MODEL : CUS100MB

(1) Equipment Used

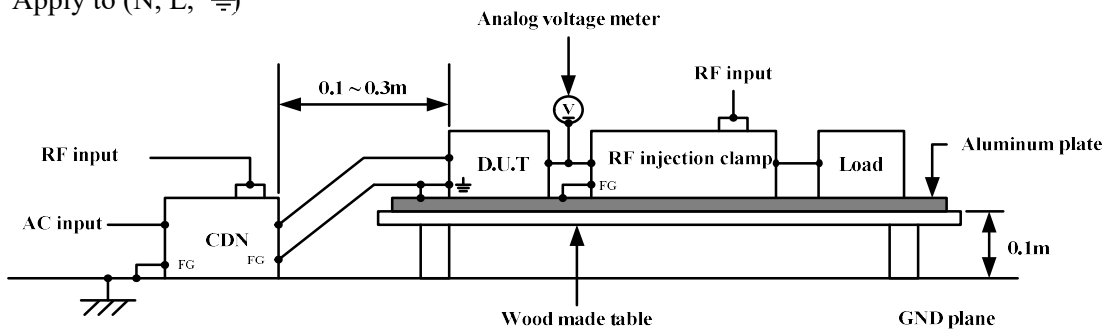
Compact RF Simulator : NSG 4070-30 (TESEQ)
 Coupling-Decoupling Network : CDN L-801 M2/M3 (Liithi)

(2) Test Conditions

• Input Voltage : 115, 230VAC • Output Voltage : Rated
 • Output Current : Full load • Electromagnetic Frequency : 150kHz~80MHz
 • Ambient Temperature : 25°C
 • Sweep Condition : 1.0% step up, 2.8 seconds hold

(3) Test Method and Device Test Point

Apply to (N, L, $\frac{\text{—}}{\text{—}}$)



(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)	CUS100MB-24
1	PASS
3	PASS
10	PASS

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

MODEL : CUS100MB

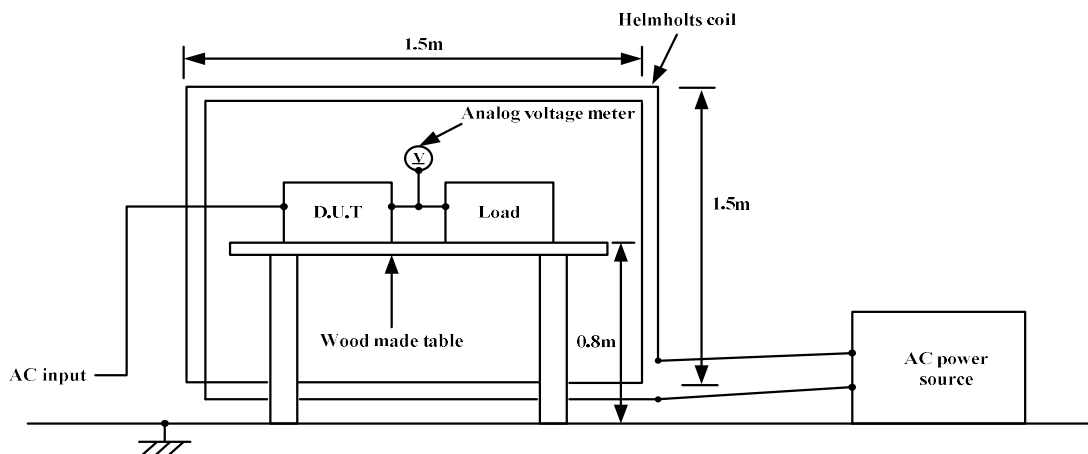
(1) Equipment Used

AC Power Source : NSG 1007 (SCHAFFNER)
 Helmholts Coil : R-1000-4-8/9-L-1M (TESEQ)

(2) Test Conditions

• Input Voltage : 115, 230VAC • Output Voltage : Rated
 • Output Current : Full load • Magnetic Frequency : 50Hz
 • Ambient Temperature : 25°C • Direction : X, Y, Z
 • Test Time : More than 10 seconds(each direction)

(3) Test Method



(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)	CUS100MB-24
1	PASS
3	PASS
10	PASS
30	PASS

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

MODEL : CUS100MB

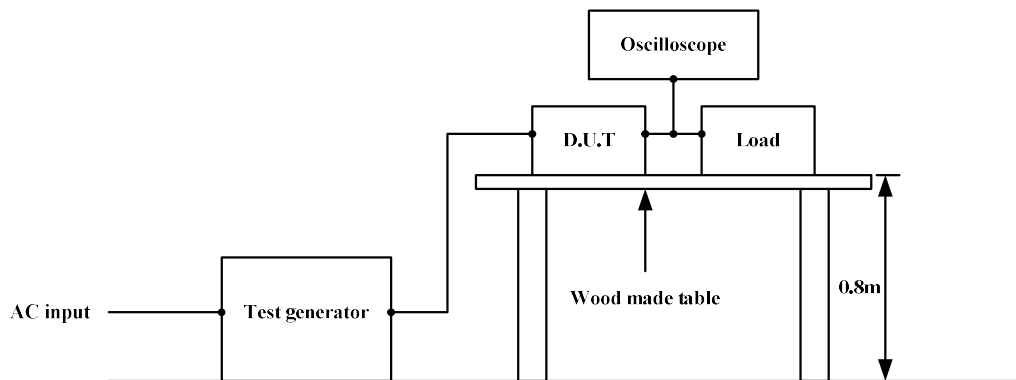
(1) Equipment Used

Test Generator : PCR2000LA (KIKUSUI)

(2) Test Conditions

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

(3) Test Method



(4) Acceptable Conditions

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.
2. Smoke and fire are not allowed.

(5) Test Result

Test Level	Dip rate	Continue Time	CUS100MB-24
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: CUS100MB

(1) Equipment Used

Electro Static Discharge Simulator : NSG435 (SCHAFFNER)

Discharge Resistance : 330Ω Capacity : 150pF

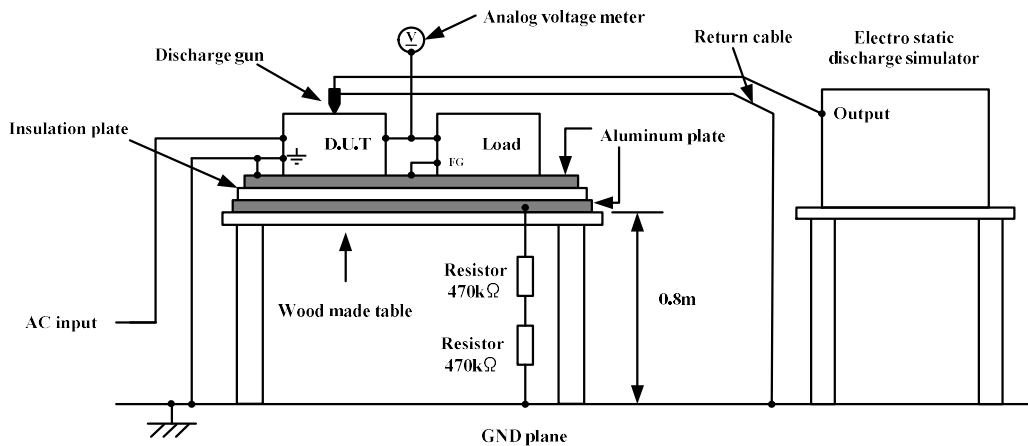
(2) Test Conditions

- Input Voltage : 115, 230VAC • Output Voltage : Rated
- Output Current : 0%, Full load • Polarity : +, -
- Number of Tests : 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 (L,N,+V,-V), ⚡, Mounting screw



(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)	CUS100MB-12
2	PASS
4	PASS
6	PASS
8	PASS

Air Discharge(kV)	CUS100MB-12
2	PASS
4	PASS
8	PASS
15	PASS

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

MODEL: CUS100MB

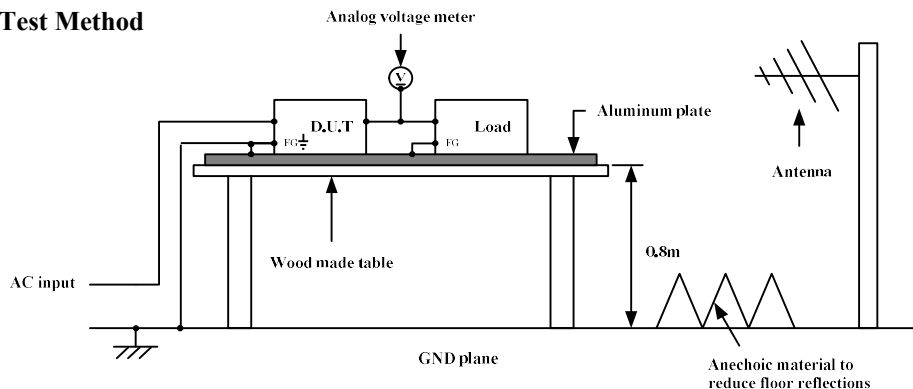
(1) Equipment Used

Signal Generator : N5181A (Agilent)
 Power Amplifier System : CBA 1G-250 (Teseq)
 : AS0104-55/55 (Milmega)
 Antenna : 3106B (ETS Lindgren)
 : ATH800M 5GA (ar)
 : ATH4G8 (ar)

(2) Test Conditions

- Input Voltage : 115, 230VAC
- Output Voltage : Rated
- Output Current : 0%, 100%
- Distance(AM) : 3.0m
- Wave Angle : 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



(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)	Electromagnetic Frequency	CUS100MB-12
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

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

MODEL: CUS100MB

(1) Equipment Used

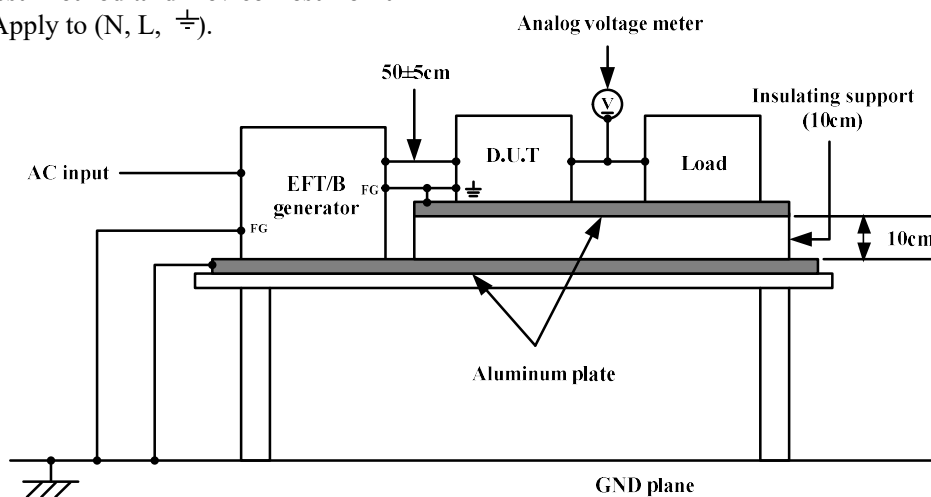
EFT/B Generator : FNS-100L (NOISEKEN)

(2) Test Conditions

- Input Voltage : 115, 230VAC
- 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 : 0.75msec
- Number of Pulse : 75pcs
- Burst Cycle : 300msec

(3) Test Method and Device Test Point

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)	CUS100MB-12
0.5	PASS
1	PASS
2	PASS

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

MODEL : CUS100MB

(1) Equipment Used

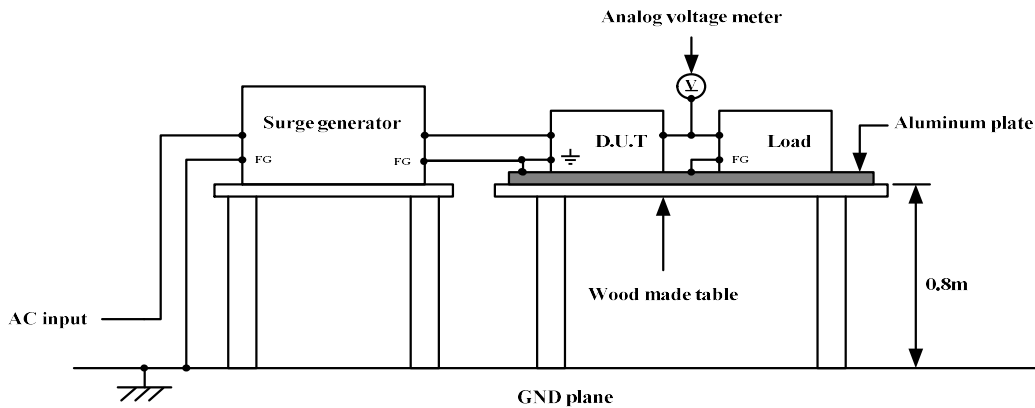
Surge Generator : NSG3040 (TESEQ)
 Coupling Impedance : Common 12Ω : Normal 2Ω
 Coupling Capacitance : Common 9μF : Normal 18μF

(2) Test Conditions

• Input Voltage : 115, 230VAC
 • Output Voltage : Rated
 • Output Current : 0%, 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 Points

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	
Test Voltage (kV)	CUS100MB-24
0.5	PASS
1	PASS
2	PASS

Normal	
Test Voltage (kV)	CUS100MB-24
0.5	PASS
1	PASS

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

MODEL : CUS100MB

(1) Equipment Used

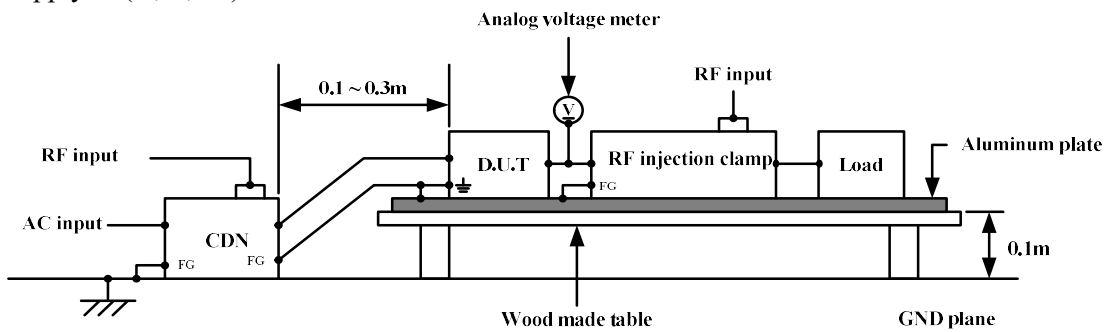
Compact RF Simulator : NSG 4070-30 (TESEQ)
 Coupling-Decoupling Network : CDN L-801 M2/M3 (Liithi)

(2) Test Conditions

• Input Voltage : 115, 230VAC • Output Voltage : Rated
 • Output Current : Full load • Electromagnetic Frequency : 150kHz~80MHz
 • Ambient Temperature : 25°C
 • Sweep Condition : 1.0% step up, 2.8 seconds hold

(3) Test Method and Device Test Point

Apply to (N, L, $\frac{\text{---}}{\text{---}}$)



(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)	CUS100MB-24
1	PASS
3	PASS

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

MODEL : CUS100MB

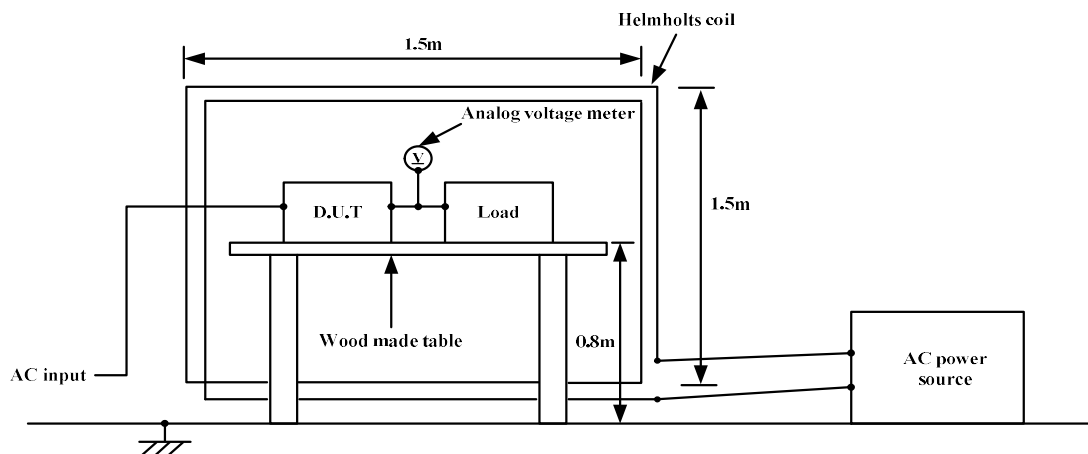
(1) Equipment Used

AC Power Source : NSG 1007 (SCHAFFNER)
 Helmholts Coil : R-1000-4-8/9-L-1M (TESEQ)

(2) Test Conditions

• Input Voltage : 115, 230VAC • Output Voltage : Rated
 • Output Current : Full load • Magnetic Frequency : 50Hz
 • Ambient Temperature : 25°C • Direction : X, Y, Z
 • Test Time : More than 10 seconds(each direction)

(3) Test Method



(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)	CUS100MB-24
1	PASS
3	PASS
10	PASS
30	PASS

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

MODEL: CUS100MB

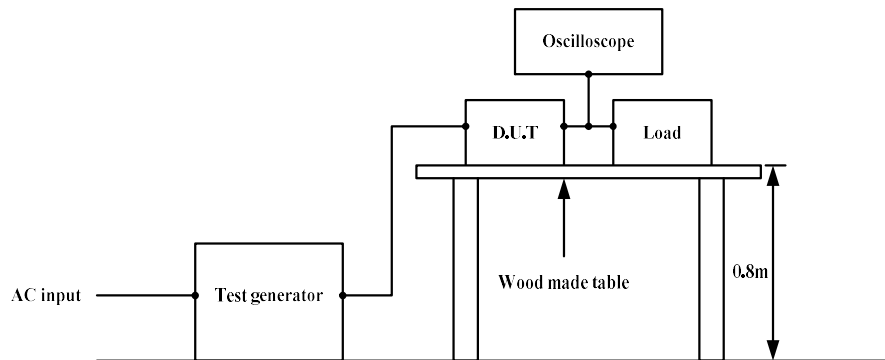
(1) Equipment Used

Test Generator : PCR2000LA(KIKUSUI)

(2) Test Conditions

- Input Voltage : 100 ~ 240VAC
- Output Voltage : Rated
- Output Current : 100%
- Ambient Temperature : 25°C
- Number of Tests : 3 times
- 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		CUS100MB-12
				100VAC~120VAC	200VAC~240VAC	
Voltage dips	70%	500ms	0 deg	A (0% ≤ I _o ≤ 75%) B (75% < I _o ≤ 100%)	A	PASS
	0%	10ms	0,45,90,135,180, 225,270,315 deg	A (0% ≤ I _o ≤ 75%) B (75% < I _o ≤ 100%)	A	PASS
	0%	20ms	0 deg	A (0% ≤ I _o ≤ 45%) B (45% < I _o ≤ 100%)	A	PASS
Voltage interruptions	0%	5000ms	0 deg	B	B	PASS

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

MODEL : CUS100MB

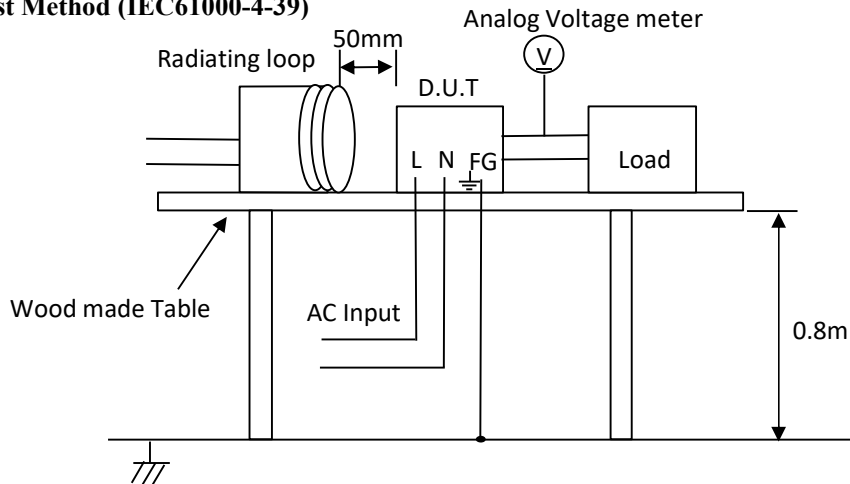
(1) Equipment Used

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 : 115, 230VAC 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	CUS100MB-24
30kHz	8	Continuous waves	PASS
134.2kHz	65	Pulse Modulation 50%, 2.1kHz	PASS
13.56MHz	7.5	Pulse Modulation 50%, 50kHz	PASS