CUS400M

IMMUNITY DATA
INDEX

1. Summary of Immunity Test Result.................................................................................................. 3
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

Terminology used

FG ... Frame GND
L ... Live Line
N ... Neutral line
\(\pm\) ... Earth
+V ... + Output
–V ... – Output

Test results are reference data based on our standard measurement condition.
1. Summary of Immunity Test Result

**Models:** CUS400M-12/BX5; CUS400M-12/FX5
CUS400M-24/BX5; CUS400M-24/FX5
CUS400M-24/BX6; CUS400M-24/FX6

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Test level</th>
<th>Criteria</th>
<th>Result</th>
<th>Page</th>
<th>Notes &amp; Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic Discharge Immunity Test</td>
<td>IEC61000-4-2</td>
<td>4</td>
<td>A</td>
<td>PASS</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Radiated Radio-Frequency Electromagnetic Field Immunity Test</td>
<td>IEC61000-4-3, IEC60601-1-2</td>
<td>3</td>
<td>A</td>
<td>PASS</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Proximity Field to Table 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Fast Transient / Burst Immunity Test</td>
<td>IEC61000-4-4</td>
<td>4</td>
<td>A</td>
<td>PASS</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Surge Immunity</td>
<td>IEC61000-4-5</td>
<td>3</td>
<td>A</td>
<td>PASS</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Conducted Disturbances Induced by Radio-Frequency Field Immunity Test</td>
<td>IEC61000-4-6</td>
<td>3</td>
<td>A</td>
<td>PASS</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Power Frequency Magnetic Field Immunity Test</td>
<td>IEC61000-4-8</td>
<td>4</td>
<td>A</td>
<td>PASS</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Voltage Dips, Short Interruptions Immunity Test</td>
<td>IEC61000-4-11</td>
<td>70%, 25 cycles</td>
<td>A</td>
<td>PASS</td>
<td>10</td>
<td>70% Criteria A at 270W Criteria B above 270W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40%, 10 cycles</td>
<td>A</td>
<td></td>
<td></td>
<td>40% Criteria A at 100W Criteria B above 100W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0%, 1 cycle</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0%, 250 cycles</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0%, 0.5 cycles</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>80%, 250 cycles</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Criteria A

1. The regulation of output voltage must not exceed 5% of initial value during test with a blanking time of 3 ms.
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 test.
3. Smoke and fire are not allowed.
2. Electrostatic Discharge Immunity Test (IEC61000-4-2)

**MODEL: CUS400M-12/FX5; CUS400M-24/FX6**

(1) Equipment Used

- Electro Static Discharge Simulator: NSG435 (Schaffner)
- Discharge Resistance: 330Ω
- Capacity: 150pF

(2) Test Conditions

- Input Voltage: 230VAC
- Output Voltage: Rated
- Output Current: 100%
- Polarity: +,-
- Number of Tests: 10 times
- Discharge Interval: >1 second
- Ambient Temperature: 21°C

(3) Test Method and Device Test Point

- Contact Discharge: FG, Case, AC Input [unit off], HCP, VCP
- Air Discharge: None Applicable

(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 test.
3. Smoke and fire are not allowed.

(5)

(6) Test Result, CUS400M-12/FX5 Class I

<table>
<thead>
<tr>
<th>Contact Discharge (kV)</th>
<th>[Unit]</th>
<th>Air Discharge (kV)</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>CUS400M-12/FX5</td>
<td>None Applicable</td>
<td>CUS400M-12/FX5</td>
</tr>
<tr>
<td>8</td>
<td>CUS400M-24/FX6</td>
<td>None Applicable</td>
<td>CUS400M-24/FX6</td>
</tr>
</tbody>
</table>
3. Radiated Radio-Frequency Electromagnetic Field Immunity Test (IEC61000-4-3)

**MODEL:** CUS400M-12/BX5; CUS400M-24/BX6

(1) Equipment Used

- Signal Generator: Rohde & Schwarz SMB 100A
- Power Amplifier: Prâna MT200
- Power Amplifier: Prâna SX40-15
- Electric Field Sensor: AR FL7006 Kit
- Bilog Antenna: Schwarbeck VULP 9118E
- Horn Antenna: AR ATH800M6G

(2) Test Conditions

- **Input Voltage:** 230VAC
- **Output Voltage:** Rated
- **Output Current:** 100%
- **Amplitude Modulated:** 80% 1kHz
- **Wave Angle:** Horizontal and Vertical
- **Ambient Temperature:** 21°C
- **Test Angle:** Top, Side, Front
- **Electromagnetic Frequency:** 80~1000MHz, 1.4~2.0GHz, 2.0~2.7GHz, 1.4~6.0GHz

(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 test.
3. Smoke and fire are not allowed.

(5) Test Result

<table>
<thead>
<tr>
<th>Radiation Field Strength (V/m)</th>
<th>Electromagnetic Frequency</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>80~6000MHz</td>
<td>CUS400M-12/BX5</td>
</tr>
<tr>
<td>10</td>
<td>80~6000MHz</td>
<td>CUS400M-24/BX6</td>
</tr>
<tr>
<td>IEC60601-1-2 Proximity Field, Table 9</td>
<td>380~5800MHz</td>
<td>CUS400M-12/BX5</td>
</tr>
<tr>
<td>IEC60601-1-2 Proximity Field, Table 9</td>
<td>380~5800MHz</td>
<td>CUS400M-24/BX6</td>
</tr>
</tbody>
</table>
4. Electrical Fast Transient/Burst Immunity Test (IEC61000-4-4)

**MODEL:** CUS400M-12/FX5; CUS400M-24/FX5

(1) Equipment Used

- EFT/B Generator: EMC Partner TRA2000IN6
- Capacitive Coupling Clamp: EMC Partner CN-EFT1000
- Capacitive Coupling Clamp: Schaffner CDN125

(2) Test Conditions

- **Input Voltage:** 100, 230VAC
- **Output Voltage:** Rated
- **Output Current:** 0, 100%
- **Test Time:** 1 minute
- **Polarity:** +, –
- **Ambient Temperature:** 20°C
- **Number of Tests:** 3 times
- **Pulse Frequency:** 5kHz & 100kHz
- **Burst Time:** 15ms, 0.75ms
- **Number of Pulse:** 75
- **Burst Cycle:** 300ms

(3) Test Method and Device Test Point

Apply to (N,L,FG), (+V, –V).

(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 test.
3. Smoke and fire are not allowed.

(5) Test Result

<table>
<thead>
<tr>
<th>Test Voltage (kV)</th>
<th>Port</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Signals and control ports</td>
<td>CUS400M-12/FX5</td>
</tr>
<tr>
<td>2</td>
<td>Signals and control ports</td>
<td>CUS400M-24/FX5</td>
</tr>
<tr>
<td>4</td>
<td>AC input and DC power ports</td>
<td>CUS400M-12/FX5</td>
</tr>
<tr>
<td>4</td>
<td>AC input and DC power ports</td>
<td>CUS400M-24/FX5</td>
</tr>
</tbody>
</table>
5. Surge Immunity Test (IEC61000-4-5)

**MODEL: CUS400M-12/FX5; CUS400M-24/FX5**

(6) Equipment Used
- Surge Generator: EMC Partner TRA2000IN6
- Coupling Impedance: Common – 12Ω, Normal – 2Ω
- Coupling Capacitance: Common – 9µF, Normal – 18µF

(7) Test Conditions
- Input Voltage: 100, 230VAC
- Output Voltage: Rated
- Output Current: 0, 100%
- Number of Tests: 5
- Polarity: +, –
- Mode: Common, Normal
- Phase: 0°, 90°, 180°, 270°
- Ambient Temp: 21°C

(8) Test Method and Device Test Point
Apply to Common mode (N-FG, L-FG) and Normal mode (N-L).

(9) 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 test.
3. Smoke and fire are not allowed.

(10) Test Result

<table>
<thead>
<tr>
<th>Common</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Voltage (kV)</td>
<td>Unit</td>
</tr>
<tr>
<td>2</td>
<td>CUS400M-12/FX5</td>
</tr>
<tr>
<td>2</td>
<td>CUS400M-24/FX5</td>
</tr>
</tbody>
</table>
6. Conducted Disturbances Induced by Radio-Frequency Field Immunity Test (IEC61000-4-6)

**MODEL: CUS400M-12/FX5; CUS400M-24/BX5**

(1) **Equipment Used**

- Signal Generator: Rohde & Schwarz SMB 100A
- Power Amplifier: Ophir RF 5084
- CDN1: Com-Power CDN M350E
- CDN2: Schwarzbeck CDN M2 32A
- CDN3: Schwarzbeck CDN AF2
- Attenuator: Fairview Microwave SA3N10W-10
- RF Load: Fairview Microwave SA4N251-06
- Attenuator: Fairview Microwave SA4N251-06
- Output Monitor: Fairview Microwave ST3N252

(2) **Test Conditions**

- Input Voltage: 100, 230VAC
- Output Voltage: Rated
- Output Current: 100%
- Electromagnetic Frequency: 150kHz~80MHz
- Ambient Temp: 21°C
- Sweep Condition: 1.0% step up, 0.5 seconds hold

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

Apply to (N, L, FG) and (+V, −V).

(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 test.
3. Smoke and fire are not allowed.

(5) **Test Result**

<table>
<thead>
<tr>
<th>Voltage Level (V)</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>CUS400M-12/FX5</td>
</tr>
<tr>
<td>10</td>
<td>CUS400M-24/BX5</td>
</tr>
</tbody>
</table>
7. Power Frequency Magnetic Field Immunity Test (IEC61000-4-8)

**MODEL: CUS400M-12/BX5**

(1) Equipment Used

- AC Power Source: California Instruments 2750L-PT
- Helmholtz Coil: TLU HHC02
- Current Shunt: P74 Calibrated Shunt
- Multimeter: Fluke 287 DMM

(2) Test Conditions

<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>100, 230VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Voltage</td>
<td>Rated</td>
</tr>
<tr>
<td>Output Current</td>
<td>0, 100%</td>
</tr>
<tr>
<td>Magnetic Frequency</td>
<td>50Hz, 60Hz</td>
</tr>
<tr>
<td>Ambient Temp</td>
<td>21°C</td>
</tr>
<tr>
<td>Direction</td>
<td>X, Y, Z</td>
</tr>
<tr>
<td>Test Time (continuous)</td>
<td>&gt;30 seconds</td>
</tr>
<tr>
<td>Test Time (short duration)</td>
<td>3 seconds</td>
</tr>
</tbody>
</table>

(3) Test Method and Device Test Point

(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 test.
3. Smoke and fire are not allowed.

(5) Test Result

<table>
<thead>
<tr>
<th>Continuous Magnetic Field Strength (A/m)</th>
<th>Short Term Magnetic Field Strength (A/m)</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>300</td>
<td>CUS400M-12/BX5</td>
</tr>
</tbody>
</table>
8. Voltage Dips, Short Interruptions Immunity Test (IEC61000-4-11)

MODEL: CUS400M-12/FX5; CUS400M-24/FX6

(1) Equipment Used
Test Generator : EMC Partner TRA2000IN6

(2) Test Conditions
<table>
<thead>
<tr>
<th>Input Voltage</th>
<th>Output Voltage</th>
<th>Output Current</th>
<th>Number of Tests</th>
<th>Mains Frequency</th>
<th>Phase Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>100, 230VAC</td>
<td>:Rated</td>
<td>100%</td>
<td>:3 times</td>
<td>50Hz</td>
<td>0°, 45°, 90°, 135°, 180°, 225°, 270°, 315° (0% for 0.5 cycle)</td>
</tr>
<tr>
<td>Test Interval</td>
<td>:More than 10 seconds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient Temp</td>
<td>21°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(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 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 test.
3. Smoke and fire are not allowed.

(5) Test Result

<table>
<thead>
<tr>
<th>Test Level</th>
<th>Continue Time</th>
<th>Criteria</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>70%</td>
<td>25 cycles</td>
<td>A at 270W; B at &gt;270W</td>
<td>CUS400M-12/FX5; CUS400M-24/FX6</td>
</tr>
<tr>
<td>40%</td>
<td>10 cycles</td>
<td>A at 100W; B at &gt;100W</td>
<td>CUS400M-12/FX5; CUS400M-24/FX6</td>
</tr>
<tr>
<td>0%</td>
<td>1 cycle</td>
<td>A</td>
<td>CUS400M-12/FX5; CUS400M-24/FX6</td>
</tr>
<tr>
<td>0%</td>
<td>250 cycles</td>
<td>B</td>
<td>CUS400M-12/FX5; CUS400M-24/FX6</td>
</tr>
<tr>
<td>0%</td>
<td>0.5 cycles</td>
<td>A</td>
<td>CUS400M-12/FX5; CUS400M-24/FX6</td>
</tr>
<tr>
<td>80%</td>
<td>250 cycles</td>
<td>A</td>
<td>CUS400M-12/FX5; CUS400M-24/FX6</td>
</tr>
</tbody>
</table>

Template No: 260584-1