### HFE2500

**IEC 61000 TEST DATA**

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<tr>
<th>APPD</th>
<th>CHK</th>
<th>DWG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doreau P.</td>
<td>Ali P</td>
<td>Michael G.</td>
</tr>
</tbody>
</table>

**DWG: IA689-58-01**

**TDK-Lambda**
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Test results are typical data. Nevertheless, the following results are considered to be actual capability data because all units have nearly the same characteristics.
1. Electrostatic Discharge Immunity Test (IEC 61000-4-2)

(1) Equipment used
NOISEKEN ESS-2000
Discharge resistance: 330 Ohm  Capacity: 150pF

(2) Test conditions
Input voltage: Rated  Output voltage: Rated
Output current: 100%  Polarity: -,+  Discharge interval: >1 Second
Number of tests: 10 times

(3) Test method and Device test point
Contact discharge: FG, Case screw
Air discharge: Input and Output terminal

(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, no discharge of fire or smoke, as well as no output failure.

(5) Test Result

<table>
<thead>
<tr>
<th>Contact Discharge (kV)</th>
<th>HFE2500</th>
<th>Air Discharge (kV)</th>
<th>HFE2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>PASS</td>
<td>8</td>
<td>PASS</td>
</tr>
</tbody>
</table>
2. Radiated Radio-Frequency Electromagnetic Field Immunity Test (IEC61000-4-3)

(1) Equipment used

Test Laboratory: Hermon Laboratories Ltd.

(2) Test conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>Rated</td>
</tr>
<tr>
<td>Output current</td>
<td>100%</td>
</tr>
<tr>
<td>Electromagnetic Frequency</td>
<td>80~1000MHz</td>
</tr>
<tr>
<td>Distance</td>
<td>2.4m</td>
</tr>
<tr>
<td>Sweep condition</td>
<td>1.0% Step Up, 2.0 second Hold</td>
</tr>
<tr>
<td>Test Angle</td>
<td>Top/Bottom, Both Sides, Front/Back</td>
</tr>
<tr>
<td>Output voltage</td>
<td>Amplitude Modulated: 80%, 1kHz</td>
</tr>
<tr>
<td>Ambience temperature</td>
<td>25°C</td>
</tr>
<tr>
<td>Wave Angle</td>
<td>Horizontal and Vertical</td>
</tr>
</tbody>
</table>

(3) 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, no discharge of fire or smoke, as well as no output failure.

(4) Test Result

<table>
<thead>
<tr>
<th>Radiated Field Strength (V/m)</th>
<th>HFE2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>PASS</td>
</tr>
</tbody>
</table>
3. Electrical Fast Transient / Burst Immunity Test (IEC61000-4-4)

(1) Equipment used
EFT/B Generator: SCHAFFNER NSG2025

(2) Test conditions
Input voltage: Rated
Output current: 100%
Polarity: -,+ 
Output voltage: Rated
Test time: 1 minute
Ambient temperature: 25°C
Number of tests: 3 times

(3) Test method and Device test point: Neutral (N), Line (L), Ground (FG)
Apply pulses from EFT/B Generator to N, L, FG separately, as well as all at the same time.

(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, no discharge of fire or smoke, as well as no output failure.

(5) Test Result

<table>
<thead>
<tr>
<th>Test Voltage (kV)</th>
<th>Repetition Rate (kHz)</th>
<th>HFE2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5</td>
<td>PASS</td>
</tr>
</tbody>
</table>

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

(1) Equipment used
- Surge Generator: SCHAFFNER-NSG651
- Coupling impedance:
  - Common: 12 Ohm
  - Normal: 2 Ohm
- Coupling capacitance:
  - Common: 9 uF
  - Normal: 18 uF
- Coupling network: SCHAFFNER-CDN110

(2) Test method and devise test point
- Input voltage: Rated
- Output current: 100%
- Polarity: -+, +
- Phase: 0.90 DEG.
- Output voltage: Rated
- Number of tests: 5 times
- Mode: Common, Normal
- Ambient temperature: 25°C

(3) 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, no discharge of fire or smoke, as well as no output failure.

(4) Test Result

<table>
<thead>
<tr>
<th>Test Voltage (kV)</th>
<th>HFE2500</th>
<th>Test Voltage (kV)</th>
<th>HFE2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common</td>
<td></td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>PASS</td>
<td>2.0</td>
<td>PASS</td>
</tr>
<tr>
<td>4.0</td>
<td>PASS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Conducted Disturbances Induced by Radio-Frequency Field Immunity Test (IEC61000-4-6)

(1) Equipment used
RF Signal Generator 10kHz-1050MHz: Fluke,6061A
RF Amplifier 10kHz-220MHz, 150W: Amplifier Research, 150L
Coupling/Decoupling Network: HL CDN 801-M3

(2) Test Condition:
Input voltage: Rated
Output current: 100%
Output voltage: Rated
Electromagnetic Frequency: 150kHz~80MHz
Sweep Condition: 1.0% Step Up, 2.0 Seconds Hold
Ambient temperature: 25°C

(3) Test Method:

![Diagram of test setup]

*Used Analog Voltage Meter

(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, no discharge of fire or smoke, as well as no output failure.

(5) Test Result

<table>
<thead>
<tr>
<th>Voltage Level (V)</th>
<th>HFE2500</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>PASS</td>
</tr>
</tbody>
</table>
6. Power Frequency Magnetic Field Immunity Test (IEC61000-4-8)

(1) Equipment used
AC High Current Generator for
Magnetic Field immunity tests: HL, MFG-130A

(2) Test Condition:
Input voltage: Rated
Output current: 100%
Magnetic Field Strength: 30A/m
Duration Time: 10min.
Output voltage: Rated
Frequency: 50Hz
Ambient temperature: 25°C

(3) Test Method:

(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, no discharge of fire or smoke, as well as no output failure.

(5) Test Result

<table>
<thead>
<tr>
<th>EUT positions</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>PASS</td>
</tr>
<tr>
<td>Y</td>
<td>PASS</td>
</tr>
<tr>
<td>Z</td>
<td>PASS</td>
</tr>
</tbody>
</table>
7. Voltage Dips, Short Interruptions Immunity Test (IEC61000-4-11)

(1) Equipment used
- Voltage Dips Generator: CI, 5001ix
- Oscilloscope: Yokogawa, DL1740EL

(2) Test Condition:
- Input voltage: Rated
- Output current: 100%
- Repetition: 0.1Hz
- Number of pulse: 3
- Output voltage: Rated
- Frequency: 50Hz
- Ambient temperature: 25°C

(3) Test Method:

(4) Acceptable conditions
1. Output voltage to be within output voltage regulation specification after the test
2. No discharge of fire or smoke

(5) Test Result

<table>
<thead>
<tr>
<th>Dip rate</th>
<th>Continue time</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>30% voltage dip</td>
<td>500ms</td>
<td>PASS</td>
</tr>
<tr>
<td>60% voltage dip</td>
<td>200ms</td>
<td>PASS</td>
</tr>
<tr>
<td>&gt;95% voltage dip</td>
<td>20ms; 5,000ms</td>
<td>PASS</td>
</tr>
</tbody>
</table>
8. Input Current Harmonics Test (IEC61000-3-2)

Model:
(1) Equipment used
AC Power Analyzer: PACS-1 (California Instruments)
AC Source: 5001 IX (California Instruments)

(2) Test conditions:
Input voltage: 115VAC, 230VAC
Output current: 100%

(3) Test Method:

![Diagram of test setup]

 Vin = 115VAC

Vin = 230VAC

Harmonic Number

<table>
<thead>
<tr>
<th>Vin</th>
<th>3</th>
<th>5</th>
<th>7</th>
<th>9</th>
<th>11</th>
<th>13</th>
<th>15</th>
<th>17</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>115</td>
<td>4.6</td>
<td>2.28</td>
<td>1.64</td>
<td>0.8</td>
<td>0.66</td>
<td>0.42</td>
<td>0.3</td>
<td>0.264</td>
<td>0.236</td>
</tr>
<tr>
<td>VAC</td>
<td>0.21</td>
<td>0.05</td>
<td>0.02</td>
<td>0.04</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.06</td>
<td>0.05</td>
</tr>
<tr>
<td>230</td>
<td>2.3</td>
<td>1.14</td>
<td>0.77</td>
<td>0.4</td>
<td>0.33</td>
<td>0.21</td>
<td>0.15</td>
<td>0.132</td>
<td>0.118</td>
</tr>
<tr>
<td>VAC</td>
<td>0.58</td>
<td>0.14</td>
<td>0.17</td>
<td>0.07</td>
<td>0.06</td>
<td>0.05</td>
<td>0.05</td>
<td>0.06</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Input Current Harmonics EN61000-3-2 Limit
Input Current Harmonics Measurement

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