# Z200 H.V Series

## EVALUATION DATA

<table>
<thead>
<tr>
<th>APPD</th>
<th>CHK</th>
<th>DWG</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/6/14</td>
<td>Karmi S.</td>
<td>19/6/14</td>
</tr>
<tr>
<td></td>
<td>June-19-14</td>
<td></td>
</tr>
</tbody>
</table>

DWG No.: IA779-53-02
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   (5) Output voltage rise/fall characteristics
   (6) Output current rise/fall characteristics
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2.13 Leakage current characteristics
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TERMINOLOGY USED
Definition

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vin</td>
<td>Input voltage</td>
</tr>
<tr>
<td>Vout</td>
<td>Output voltage</td>
</tr>
<tr>
<td>lin</td>
<td>Input current</td>
</tr>
<tr>
<td>lout</td>
<td>Output current</td>
</tr>
<tr>
<td>Ta</td>
<td>Ambient temperature</td>
</tr>
<tr>
<td>f</td>
<td>Frequency</td>
</tr>
<tr>
<td>C.V</td>
<td>Constant voltage mode</td>
</tr>
<tr>
<td>C.C</td>
<td>Constant current mode</td>
</tr>
</tbody>
</table>
1. EVALUATION METHOD

1.1 Circuit used for determination

(1) Steady state data

(2) Warm up voltage drift characteristics same as Steady state data

(3) Warm up current drift characteristics same as Steady state data

(4) Over voltage protection (OVP) characteristics

(5) Output voltage rise/fall characteristics same as Steady state data

(6) Output current rise/fall characteristics
1.1 Circuit used for determination

(7) Dynamic line voltage and current response characteristics

(8) Dynamic load voltage and current response characteristics

Constant Voltage mode

Output current waveform
lout 0% $\longleftrightarrow$ 100%

Output current waveform
lout 50% $\longleftrightarrow$ 100%
1.1 Circuit used for determination

(9) Response to brown-out characteristics

(10) Inrush current characteristics same as Response to brown-out

(11) Leakage current characteristics

(12) Output Voltage ripple & noise waveform 160V up to 650V models

(a) Normal mode (JEITA Standard RC-9131A)
1.1 Circuit used for determination

(12) Output Voltage ripple & noise waveform 160V up to 650V models

(b) Normal + Common mode

(13) Output Current rms ripple 160V to 650V models

Notes:
(*) Output Current rms ripple = Output Voltage rms ripple divided by the Load resistance.
## 1.2 List of equipment used

<table>
<thead>
<tr>
<th></th>
<th>EQUIPMENT USED</th>
<th>MANUFACTURER</th>
<th>MODEL No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digital oscilloscope</td>
<td>YOKOGAWA</td>
<td>DL1740 E/EL</td>
</tr>
<tr>
<td>2</td>
<td>Digital multimeter</td>
<td>AGILENT</td>
<td>34401A</td>
</tr>
<tr>
<td>3</td>
<td>Digital power meter</td>
<td>YOKOGAWA</td>
<td>WT230 / WT110</td>
</tr>
<tr>
<td>4</td>
<td>AC source</td>
<td>CHROMA</td>
<td>6590/6463/6520/6530</td>
</tr>
<tr>
<td>5</td>
<td>Electronic load</td>
<td>H&amp;H</td>
<td>ZS1880/ZS7060/ZS4260</td>
</tr>
<tr>
<td>6</td>
<td>Electronic load</td>
<td>CHROMA</td>
<td>63202 / 63204</td>
</tr>
<tr>
<td>7</td>
<td>Leakage current tester</td>
<td>KIKUSUI</td>
<td>TOS3200</td>
</tr>
<tr>
<td>8</td>
<td>Voltage probe</td>
<td>YOKOGAWA</td>
<td>701939/701944</td>
</tr>
<tr>
<td>9</td>
<td>Current probe</td>
<td>YOKOGAWA</td>
<td>701933</td>
</tr>
<tr>
<td>10</td>
<td>Inrush Current Meter</td>
<td>TAKAMISAWA</td>
<td>PSA-210</td>
</tr>
<tr>
<td>11</td>
<td>Data acquisition / switch unit</td>
<td>AGILENT</td>
<td>34970A</td>
</tr>
<tr>
<td>12</td>
<td>Controlled temp. chamber</td>
<td>THERMOTRON</td>
<td>SM-16-3800</td>
</tr>
<tr>
<td>13</td>
<td>Controlled temp. chamber</td>
<td>THERMOTRON</td>
<td>SM-16-8200</td>
</tr>
<tr>
<td>14</td>
<td>Controlled temp. chamber</td>
<td>THERMOTRON</td>
<td>SE-600-6-6</td>
</tr>
<tr>
<td>15</td>
<td>Controlled temp. chamber</td>
<td>THERMOTRON</td>
<td>SE-600-6-6</td>
</tr>
</tbody>
</table>
2. CHARACTERISTIC

2.1 Steady state data

(1) Regulation - Line & Load, Temperature drift

Conditions: $T_a = 25^\circ C$

1. Regulation - Line & Load, C.V mode (Readings in [V])

<table>
<thead>
<tr>
<th>Io</th>
<th>Vin (AC)</th>
<th></th>
<th></th>
<th></th>
<th>Line Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0.8</td>
<td>159.9978</td>
<td>159.9977</td>
<td>159.9975</td>
<td>159.9980</td>
</tr>
<tr>
<td>25%</td>
<td>0.8</td>
<td>159.9974</td>
<td>159.9975</td>
<td>159.9974</td>
<td>159.9977</td>
</tr>
<tr>
<td>50%</td>
<td>0.8</td>
<td>159.9973</td>
<td>159.9967</td>
<td>159.9970</td>
<td>159.9972</td>
</tr>
<tr>
<td>75%</td>
<td>0.9</td>
<td>159.9970</td>
<td>159.9969</td>
<td>159.9970</td>
<td>159.9971</td>
</tr>
<tr>
<td>100%</td>
<td>0.9</td>
<td>159.9968</td>
<td>159.9971</td>
<td>159.9967</td>
<td>159.9972</td>
</tr>
<tr>
<td>Load</td>
<td>1.0</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Regulation</td>
<td>1.0</td>
<td>1.0</td>
<td>0.8</td>
<td>0.9</td>
<td>(</td>
</tr>
</tbody>
</table>

2. Temperature drift, C.V mode

Conditions: $V_{in:100}Vs$  
I_{out:100}%

<table>
<thead>
<tr>
<th>Ta</th>
<th>0°C</th>
<th>25°C</th>
<th>50°C</th>
<th>Temp. Coefficient (0°C~50°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vout</td>
<td>159.996</td>
<td>159.984</td>
<td>159.995</td>
<td>12 mV</td>
</tr>
</tbody>
</table>
2.1 Steady state data

(1) Regulation - Line & Load, Temperature drift

Conditions: \( T_a = 25^\circ C \)

1. Regulation - Line & Load, C.V mode  (Readings in [V])

<table>
<thead>
<tr>
<th>Io</th>
<th>85</th>
<th>100</th>
<th>200</th>
<th>265</th>
<th>Line Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>649.9770</td>
<td>649.9788</td>
<td>649.9795</td>
<td>649.9808</td>
<td>3.8 0.001</td>
</tr>
<tr>
<td>25%</td>
<td>649.9814</td>
<td>649.9820</td>
<td>649.9816</td>
<td>649.9826</td>
<td>1.2 0.000</td>
</tr>
<tr>
<td>50%</td>
<td>649.9820</td>
<td>649.9824</td>
<td>649.9821</td>
<td>649.9832</td>
<td>1.2 0.000</td>
</tr>
<tr>
<td>75%</td>
<td>649.9821</td>
<td>649.9833</td>
<td>649.9823</td>
<td>649.9837</td>
<td>1.6 0.000</td>
</tr>
<tr>
<td>100%</td>
<td>649.9813</td>
<td>649.9830</td>
<td>649.9810</td>
<td>649.9827</td>
<td>2.0 0.000</td>
</tr>
<tr>
<td>Load</td>
<td>5.1</td>
<td>4.5</td>
<td>2.8</td>
<td>2.9</td>
<td>( \Delta V(\text{mV}) ) (%)</td>
</tr>
<tr>
<td>Regulation</td>
<td>0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
<td>(%)</td>
</tr>
</tbody>
</table>

2. Temperature drift, C.V mode  

Conditions: \( V_{in}:100\text{Vac} \)  
\( I_{out}:100\% \)

<table>
<thead>
<tr>
<th>Ta</th>
<th>0°C</th>
<th>25°C</th>
<th>50°C</th>
<th>Temp. Coefficient (0°C−50°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vout</td>
<td>650.026</td>
<td>649.996</td>
<td>649.992</td>
<td>34 mV</td>
</tr>
</tbody>
</table>
2.1 Steady state data

(1) Regulation - Line & Load, Temperature drift

Conditions: \( T_a = 25^\circ C \)

1. Regulation - Line & Load, C.C mode (*) (Readings in [A])

<table>
<thead>
<tr>
<th>Vo</th>
<th>85</th>
<th>100</th>
<th>200</th>
<th>265</th>
<th>Line Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>1.2995</td>
<td>1.2995</td>
<td>1.2995</td>
<td>1.2995</td>
<td>0.0</td>
</tr>
<tr>
<td>25%</td>
<td>1.2995</td>
<td>1.2995</td>
<td>1.2995</td>
<td>1.2995</td>
<td>0.0</td>
</tr>
<tr>
<td>50%</td>
<td>1.2995</td>
<td>1.2995</td>
<td>1.2995</td>
<td>1.2995</td>
<td>0.0</td>
</tr>
<tr>
<td>75%</td>
<td>1.2994</td>
<td>1.2994</td>
<td>1.2994</td>
<td>1.2994</td>
<td>0.0</td>
</tr>
<tr>
<td>100%</td>
<td>1.2994</td>
<td>1.2994</td>
<td>1.2994</td>
<td>1.2994</td>
<td>0.0</td>
</tr>
<tr>
<td>Load Regulation</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>( \Delta I (mA) ) (%)</td>
</tr>
<tr>
<td></td>
<td>0.008</td>
<td>0.008</td>
<td>0.008</td>
<td>0.008</td>
<td>(%)</td>
</tr>
</tbody>
</table>

Notes:
(*) Not including load regulation thermal drift effect.

2. Temperature drift, C.C mode

Conditions: \( V_{in}: 100 V_{ac} \)
\( I_{out}: 100\% \)

<table>
<thead>
<tr>
<th>Ta</th>
<th>0(^{\circ})C</th>
<th>25(^{\circ})C</th>
<th>50(^{\circ})C</th>
<th>Temp. Coefficient (0(^{\circ})C-50(^{\circ})C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( I_{out} )</td>
<td>1.2995</td>
<td>1.3000</td>
<td>1.2990</td>
<td>1.0 mA</td>
</tr>
</tbody>
</table>

TDK-Lambda T-8
2.1 Steady state data

(1) Regulation - Line & Load, Temperature drift

<table>
<thead>
<tr>
<th>Vo</th>
<th>85</th>
<th>100</th>
<th>200</th>
<th>265</th>
<th>Line Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td>0.3200</td>
<td>0.3200</td>
<td>0.3201</td>
<td>0.3201</td>
<td>0.01</td>
</tr>
<tr>
<td>25%</td>
<td>0.3200</td>
<td>0.3200</td>
<td>0.3200</td>
<td>0.3200</td>
<td>0.01</td>
</tr>
<tr>
<td>50%</td>
<td>0.3200</td>
<td>0.3200</td>
<td>0.3200</td>
<td>0.3200</td>
<td>0.01</td>
</tr>
<tr>
<td>75%</td>
<td>0.3199</td>
<td>0.3200</td>
<td>0.3200</td>
<td>0.3200</td>
<td>0.02</td>
</tr>
<tr>
<td>100%</td>
<td>0.3199</td>
<td>0.3199</td>
<td>0.3199</td>
<td>0.3199</td>
<td>0.01</td>
</tr>
<tr>
<td>Load</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>ΔI(mA) (%)</td>
</tr>
<tr>
<td>Regulation</td>
<td>0.034</td>
<td>0.034</td>
<td>0.038</td>
<td>0.041</td>
<td>(%)</td>
</tr>
</tbody>
</table>

Notes:
(*) Not including load regulation thermal drift effect.

2. Temperature drift, C.C mode

<table>
<thead>
<tr>
<th>Ta</th>
<th>0°C</th>
<th>25°C</th>
<th>50°C</th>
<th>Temp. Coefficient (0°C~50°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iout</td>
<td>0.3204</td>
<td>0.3204</td>
<td>0.3206</td>
<td>0.2 mA 10 ppm/°C</td>
</tr>
</tbody>
</table>
2.1 Steady state data

(2) Output voltage and ripple voltage v.s input voltage

C.V mode

Conditions: I_{out}: 100%

Ta:
- 0°C
- 25°C
- 50°C

(3) Output current and ripple current v.s input voltage

C.C mode

Conditions: V_{out}: 100%

Ta:
- 0°C
- 25°C
- 50°C
2.1 Steady state data

(2) Output voltage and ripple voltage v.s input voltage

C.V mode

Conditions: I_{out}:100%

<table>
<thead>
<tr>
<th>Temperature</th>
<th>0°C</th>
<th>25°C</th>
<th>50°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ta:</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

![Graph of Output voltage, Output noise (P-P), and Output ripple (RMS) vs Input voltage (VAC) at different temperatures.]

(3) Output current and ripple current v.s input voltage

C.C mode

Conditions: V_{out}:100%

<table>
<thead>
<tr>
<th>Temperature</th>
<th>0°C</th>
<th>25°C</th>
<th>50°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ta:</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

![Graph of Output current and Output ripple (RMS) vs Input voltage (VAC) at different temperatures.]

TDK-Lambda

T-11
2.1 Steady state data

(4) Efficiency and Input current vs. Output current

Conditions:
- Vin: 85 VAC
- 100VAC
- 200 VAC
- 285 VAC
- Vout: 100%
- Ta: 25°C

![Graph showing efficiency and input current vs. output current.](image-url)
2.1 Steady state data

(4) Efficiency and Input current vs. Output current

Conditions:
- Vin: 85 VAC
- 100VAC
- 200 VAC
- 265 VAC
- Vout: 100%
- Ta: 25°C

![Graph showing Efficiency and Input current vs. Output current](image-url)
2.2 Warm up drift & stability

C.V mode

Z160-1.3

Output voltage drift

Time (hrs)

C.C mode

Z160-1.3

Output current drift

Time (hrs)
2.2 Warm up drift & stability

C.V mode

Conditions: Vin: 100Vac
Vout: 100%
Iout: 100%
Ta = 25°C

C.C mode
2.3 Over voltage protection (OVP) characteristics

Conditions: Vin: 100Vac
Iout: 0%
Ta = 25°C

OVP setting: 176V

OVP setting: 717V
2.4 ON/OFF Output rise characteristics

C.V mode

Conditions: Vin: 100Vac
Vout: 100%
lout: 0%
lset=105%
Ta = 25°C

Z160-1.3

50V/div 20ms/div

Z650-0.32

200V/div 20ms/div
2.4 ON/OFF Output rise characteristics

C.V mode

Conditions: Vin: 100 Vac
Vout: 100%
lout: 100%
lset=105%
Load: CR
Ta = 25°C
2.4 ON/OFF Output rise characteristics

C.C mode

Z160-1.3

Conditions: Vin: 100 Vac
Vout: 100%
Iout: 100%
Vset=105%
Load: CR
Ta = 25°C

Z650-0.32

0.1 A/div
100 ms/div

0.5 A/div
100 ms/div
2.4 ON/OFF Output rise characteristics

C.C mode

Conditions: Vin: 100Vac
lout: 100%
Vset=105%
shorted output
Ta = 25°C
2.5 ON/OFF Output fall characteristics

C.V mode

**Z160-1.3**

Conditions: Vin: 100 Vac
Vout: 100%
lout: 0%
Iset=105%
Ta = 25°C

**Z650-0.32**
2.5 ON/OFF Output fall characteristics

C.V mode

Conditions: Vin: 100 Vac
Vout: 100%
Iout: 100%
Iset: 105%
Load: CR
Ta = 25°C

Z160-1.3

Z650-0.32
2.5 ON/OFF Output fall characteristics

C.C mode

Conditions: Vin: 100Vac
            Vout: 100%
            Iout: 100%
            Vset=105%
            Load: CR
            Ta = 25°C

Z160-1.3

Z650-0.32

TDK-Lambda
2.5 ON/OFF Output fall characteristics

C.C mode

Conditions: Vin: 100 Vac
Iout: 100%
Vset=105%
shorted output
Ta = 25°C

Z160-1.3

Z650-0.32
2.6 Hold up time characteristics

Conditions: Vin: 100 Vac
Vout: 100%
Ta = 25°C

Output current (%) vs. Hold up time (ms) graph

TDK-Lambda
2.6 Hold up time characteristics

Conditions: Vin: 100 Vac
Vout: 100%
Ta = 25°C

![Graph showing hold up time characteristics](image-url)
2.7 Dynamic line response characteristics

C.V mode

Conditions: Vin: 65→132V
Vout: 100%
Iout: 100%
Ta = 25°C

Z160-1.3

Vout: 20mV/Div

500ms/Div

Conditions: Vin: 170→265V
Vout: 100%
Iout: 100%
Ta = 25°C

Vout: 20mV/Div

500ms/Div
2.7 Dynamic line response characteristics

C.V mode

Z650-0.32

Conditions: Vin: 85→132V
Vout: 100%
lout: 100%
Ta = 25°C

Vout: 50mV/Div  500mV/Div

Vout: 50mV/Div  500mV/Div

Conditions: Vin: 170→265V
Vout: 100%
lout: 100%
Ta = 25°C
2.7 Dynamic line response characteristics

C.C mode

Conditions: Vin: 85→132V
Vout: 100%
lout: 100%
Ta = 25°C

Conditions: Vin: 170→265V
Vout: 100%
lout: 100%
Ta = 25°C
2.7 Dynamic line response characteristics

C.C mode

Conditions: Vin: 85→132V
Vout: 100%
Iout: 100%
Ta = 25°C

Conditions: Vin: 170→265V
Vout: 100%
Iout: 100%
Ta = 25°C
2.8 Dynamic load response characteristics

C.V mode

Conditions: Vin: 100Vac
Vout: 100%
Ta = 25°C

Load current: tr=tf=100us

Z200 H.V

Z160-1.3

lout:0%→100%  f:100Hz

<table>
<thead>
<tr>
<th>0.2 V/Div</th>
<th>2 ms/Div</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.14%</td>
<td>-0.20%</td>
</tr>
</tbody>
</table>

lout:50%→100%  f:100Hz

<table>
<thead>
<tr>
<th>0.1 V/Div</th>
<th>2 ms/Div</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10%</td>
<td>-0.10%</td>
</tr>
</tbody>
</table>

lout:0%→100%  f:1000Hz

<table>
<thead>
<tr>
<th>0.2 V/Div</th>
<th>200 ms/Div</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10%</td>
<td>-0.12%</td>
</tr>
</tbody>
</table>

lout:50%→100%  f:1000Hz

<table>
<thead>
<tr>
<th>0.1 V/Div</th>
<th>200 ms/Div</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05%</td>
<td>-0.05%</td>
</tr>
</tbody>
</table>
2.8 Dynamic load response characteristics

C.V mode

Conditions:
- Vin: 100 Vac
- Vout: 100%
- Ta = 25°C

Z650-0.32

<table>
<thead>
<tr>
<th>lout: 0%→100%</th>
<th>f: 100HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 V/Div</td>
<td>2 ms/Div</td>
</tr>
<tr>
<td>0.13%</td>
<td>-0.20%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>lout: 50%→100%</th>
<th>f: 100HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 V/Div</td>
<td>2 ms/Div</td>
</tr>
<tr>
<td>0.05%</td>
<td>-0.04%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>lout: 0%→100%</th>
<th>f: 1000HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 V/Div</td>
<td>200 ms/Div</td>
</tr>
<tr>
<td>0.03%</td>
<td>-0.03%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>lout: 50%→100%</th>
<th>f: 1000HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2 V/Div</td>
<td>200 ms/Div</td>
</tr>
<tr>
<td>0.02%</td>
<td>-0.02%</td>
</tr>
</tbody>
</table>

TDK-Lambda
2.8 Dynamic load response characteristics

C.C mode

Conditions: Vin: 100 Vac
Ta = 25 °C

Z160-1.3

\[ Io = 1.3A \]

Vout: 144 → 120V
f: 10HZ

\[ 0.2I_{DIV} \]
\[ 20ms_{DIV} \]
19.70% -17.30%

Z650-0.32

\[ Io = 0.32A \]

Vout: 585 → 487.5V
f: 10HZ

\[ 0.05I_{DIV} \]
\[ 20ms_{DIV} \]
19.79% -17.50%

Z200 H.V

TDK-Lambda

T-33
2.9 Response to brown-out characteristics

C.V mode

Conditions: Vin: 100VAC
Vout: 100%
lout: 100%
Ta = 25°C

Brown-out time
A - 34mS
C - 53mS
2.9 Response to brown-out characteristics

C.V mode

Conditions: Vin: 100VAC
Vout: 100%
Iout: 100%
Ta = 25°C

Brown-out time
A - 19ms
B - 44ms
C - 60ms

Vout: 200V/div
200ms/div
2.9 Response to brown-out characteristics

C.C mode

**Z160-1.3**

- **Brown-out time**
  - A - 32mS
  - B - 35mS
  - C - 85mS

**Conditions:**
- Vin: 100VAC
- Vout: 100%
- Iout: 100%
- Ta = 25°C
2.9 Response to brown-out characteristics

C.C mode

Conditions: Vin: 100VAC
Vout: 100%
lout: 100%
Ta = 25°C

Brown-out time
A - 19mS
B - 45mS
C - 227mS
2.10 Inrush Current Characteristics during line brown outs

Conditions: Vin: 100VAC
Vout: 100%
lout: 0%
lout: 100%
Ta = 25°C

Max Inrush Current (A) vs Brown out time (s)
2.10 Inrush Current Characteristics during line brown outs

Conditions:
- Vin: 200VAC
- Vout: 100%
- Iout: 0%
- Iout: 100%
- Ta = 25°C

Z650-0.32

Max Inrush Current (A)

Brown out time (s)
2.11 Inrush current waveform

Switch on phase angle of input AC voltage

$\phi = 0^\circ$

Switch on phase angle of input AC voltage

$\phi = 90^\circ$

Conditions:
- Vin: 100V
- Vout: 100%
- Iout: 100%
- Ta = 25°C
2.11 Inrush current waveform

Conditions: Vin: 200V
Vout: 100%
Iout: 100%
Ta = 25°C

Switch on phase angle of input AC voltage

$\phi = 0^\circ$

Switch on phase angle of input AC voltage

$\phi = 90^\circ$

TDK-Lambda

T-41
2.11 Inrush current waveform

Conditions: Vin: 100V
Vout: 100%
Iout: 100%
Ta = 25°C

Switch on phase angle of input AC voltage

\( \phi = 0° \)

\( 20\mu \text{A/div} \) \hspace{1cm} 100\text{ms/div} \)

\( \phi = 90° \)

\( 20\mu \text{A/div} \) \hspace{1cm} 100\text{ms/div} \)
2.11 Inrush current waveform

Conditions:
Vin: 200V
Vout: 100%
lout: 100%
Ta = 25°C

Switch on phase angle of input AC voltage
\( \phi = 0^\circ \)

Switch on phase angle of input AC voltage
\( \phi = 90^\circ \)
2.12 Input current waveform

Conditions: 
- Vin: 100VAC
- Vout: 100%
- Iout: 100%
- Ta = 25°C

[Diagram of input current waveform with labels for lin and Vin, and scales for 5mAs/Div and 5mAs/Div]

Conditions: 
- Vin: 200VAC
- Vout: 100%
- Iout: 100%
- Ta = 25°C

[Diagram of input current waveform with labels for lin and Vin, and scales for 2mAs/Div and 5mAs/Div]
2.12 Input current waveform

Conditions: Vin: 100VAC
Vout: 100%
lout: 100%
Ta = 25°C

Conditions: Vin: 200VAC
Vout: 100%
lout: 100%
Ta = 25°C
2.13 Leakage current characteristics

Conditions: Vin: 100~265Vac
            Iout: 0%
            Iout: 100%
            Ta = 25°C
            f=50Hz

Z650-0.32
2.14 Output voltage ripple & noise waveform

C.V mode

Conditions: Vin: 100VAC
Vout: 100%
lout: 100%
Ta = 25°C

Normal Mode

Z160-1.3

Z650-0.32

TDK-Lambda