Z⁺800 H.V Series

EVALUATION DATA

<table>
<thead>
<tr>
<th>APPD</th>
<th>CHK</th>
<th>DWG</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Kami S.</td>
<td>1.06.2014</td>
</tr>
<tr>
<td>2/10/14</td>
<td>Oct-2-14</td>
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</tr>
</tbody>
</table>

DWG No.: IA798-53-01
INDEX

1. EVALUATION METHOD
   1.1 Circuit used for determination
      (1) Steady state data
      (2) Warm up voltage drift characteristics
      (3) Warm up current drift characteristics
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      (5) Output voltage rise/fall characteristics
      (6) Output current rise/fall characteristics
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      (10) Inrush current characteristics
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   2.12 Input current waveform
   2.13 Leakage current characteristics
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TERMINOLOGY USED
Definition

\[ \begin{align*}
  \text{Vin} & \quad \text{Input voltage} \\
  \text{Vout} & \quad \text{Output voltage} \\
  \text{lin} & \quad \text{Input current} \\
  \text{lout} & \quad \text{Output current} \\
  \text{Ta} & \quad \text{Ambient temperature} \\
  \text{f} & \quad \text{Frequency} \\
  \text{C.V} & \quad \text{Constant voltage mode} \\
  \text{C.C} & \quad \text{Constant current mode}
\end{align*} \]
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% \(\rightarrow\) 100%

Output current waveform
lout 50% \(\rightarrow\) 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>
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<td>3</td>
<td>Digital power meter</td>
<td>YOKOGAWA</td>
<td>WT230 / WT110</td>
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<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>
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<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>
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<td>9</td>
<td>Current probe</td>
<td>YOKOGAWA</td>
<td>701933</td>
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<td>10</td>
<td>Inrush Current Meter</td>
<td>TAKAMISAWA</td>
<td>PSA-210</td>
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<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>
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<tr>
<td>13</td>
<td>Controlled temp. chamber</td>
<td>THERMOTRON</td>
<td>SM-16-6200</td>
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<td>Controlled temp. chamber</td>
<td>THERMOTRON</td>
<td>SE-600-5-5</td>
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<td>15</td>
<td>Controlled temp. chamber</td>
<td>THERMOTRON</td>
<td>SE-600-6-6</td>
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2. CHARACTERISTIC

2.1 Steady state data

(1) Regulation - Line & Load, Temperature drift

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

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>
<th>( \Delta V(\text{mV}) )</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>159.9967</td>
<td>159.9966</td>
<td>159.9966</td>
<td>159.9965</td>
<td>0.3</td>
<td>0.000</td>
<td></td>
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<tr>
<td>25%</td>
<td>159.9963</td>
<td>159.9966</td>
<td>159.9961</td>
<td>159.9965</td>
<td>0.5</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td>159.9958</td>
<td>159.9959</td>
<td>159.9962</td>
<td>159.9962</td>
<td>0.4</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>75%</td>
<td>159.9961</td>
<td>159.9962</td>
<td>159.9961</td>
<td>159.9961</td>
<td>0.1</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td>159.9950</td>
<td>159.9951</td>
<td>159.9953</td>
<td>159.9958</td>
<td>0.8</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Load Regulation</td>
<td>0.9</td>
<td>0.7</td>
<td>1.3</td>
<td>0.8</td>
<td>( \Delta V(\text{mV}) )</td>
<td>(%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.001</td>
<td>0.000</td>
<td>0.001</td>
<td>0.001</td>
<td>(%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Temperature drift, C.V mode

Conditions: \( Vin:100\text{Vac} \)
\( Iout:100\% \)

<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>159.989</td>
<td>159.973</td>
<td>159.978</td>
<td>16 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>Vin (AC)</th>
<th>Line Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>649.9532</td>
<td>649.9539</td>
</tr>
<tr>
<td>25%</td>
<td>649.9846</td>
<td>649.9853</td>
</tr>
<tr>
<td>50%</td>
<td>649.9867</td>
<td>649.9869</td>
</tr>
<tr>
<td>75%</td>
<td>649.9859</td>
<td>649.9862</td>
</tr>
<tr>
<td>100%</td>
<td>649.9829</td>
<td>649.9831</td>
</tr>
<tr>
<td>Load</td>
<td>33.5</td>
<td>33.0</td>
</tr>
<tr>
<td>Regulation</td>
<td>0.005</td>
<td>0.005</td>
</tr>
</tbody>
</table>

2. Temperature drift, C.V mode

Conditions: \( V_{in}: 100 \)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>650.029</td>
<td>650.022</td>
<td>650.140</td>
<td>118 mV</td>
</tr>
</tbody>
</table>
2.1 Steady state data

(1) Regulation - Line & Load, Temperature drift

Conditions: Ta = 25°C

<table>
<thead>
<tr>
<th>Vo</th>
<th>Vin (AC)</th>
<th>Line Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>5.0019</td>
<td>5.0018 0.1 0.002</td>
</tr>
<tr>
<td>25%</td>
<td>4.9997</td>
<td>4.9996 0.1 0.002</td>
</tr>
<tr>
<td>50%</td>
<td>4.9995</td>
<td>4.9994 0.1 0.002</td>
</tr>
<tr>
<td>75%</td>
<td>4.9993</td>
<td>4.9991 0.2 0.004</td>
</tr>
<tr>
<td>100%</td>
<td>4.9993</td>
<td>4.9992 0.2 0.004</td>
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</tbody>
</table>

Load Regulation: 
- 0.052 %
- 0.052 %
- 0.054 %
- 0.052 %

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

2. Temperature drift, C.C mode

Conditions: Vin:100Vac
Iout: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>Iout</td>
<td>4.9992</td>
<td>4.9995</td>
<td>5.0033</td>
<td>4.1 mA 16 ppm/°C</td>
</tr>
</tbody>
</table>
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>0%</td>
<td>1.2497</td>
<td>1.2497</td>
<td>1.2497</td>
<td>1.2497</td>
<td>0.0</td>
</tr>
<tr>
<td>25%</td>
<td>1.2499</td>
<td>1.2499</td>
<td>1.2499</td>
<td>1.2499</td>
<td>0.0</td>
</tr>
<tr>
<td>50%</td>
<td>1.2500</td>
<td>1.2500</td>
<td>1.2500</td>
<td>1.2500</td>
<td>0.0</td>
</tr>
<tr>
<td>75%</td>
<td>1.2501</td>
<td>1.2501</td>
<td>1.2501</td>
<td>1.2501</td>
<td>0.0</td>
</tr>
<tr>
<td>100%</td>
<td>1.2501</td>
<td>1.2501</td>
<td>1.2501</td>
<td>1.2501</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Load Regulation: 0.032 0.032 0.032 0.032 (\%)

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>1.2472</td>
<td>1.2477</td>
<td>1.24832</td>
<td>0.8 mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[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: Iout: 100%

Ta: 0°C  25°C  50°C

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

C.C mode

Conditions: Vout: 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\%  
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

TDK-Lambda
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
2.1 Steady state data

(4) Efficiency and Input current vs. Output current

Conditions:
- $V_{in}$: 85 VAC
- 100VAC
- 200 VAC
- 265 VAC
- $V_{out}$: 100%
- $T_a$: 25°C

![Graph showing efficiency and input current vs. output current](image)
2.2 Warm up drift & stability

C.V mode

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

C.C mode
2.2 Warm up drift & stability

C.V mode

| Z650-1.25 |

Output voltage drift

<table>
<thead>
<tr>
<th>Time (hrs)</th>
<th>0.0</th>
<th>0.5</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
<th>3.5</th>
<th>4.0</th>
<th>4.5</th>
<th>5.0</th>
<th>5.5</th>
<th>6.0</th>
<th>6.5</th>
<th>7.0</th>
<th>7.5</th>
<th>8.0</th>
</tr>
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<tbody>
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<td>0.05%</td>
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</table>

C.C mode

| Z650-1.25 |

Output current drift

<table>
<thead>
<tr>
<th>Time (hrs)</th>
<th>0.0</th>
<th>0.5</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
<th>3.5</th>
<th>4.0</th>
<th>4.5</th>
<th>5.0</th>
<th>5.5</th>
<th>6.0</th>
<th>6.5</th>
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Conditions: Vin:100Vac
Vout: 100%
lout: 100%
Ta = 25°C
2.3 Over voltage protection characteristics

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

OVP setting: 176V

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

C.V mode

**Z160-5**

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

**Z650-1.25**

TDK-Lambda
2.4 ON/OFF Output rise characteristics

C.V mode

\[ Z^{+} 800 \text{ H.V} \]

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

**Z160-5**

\[
\begin{align*}
50V_{\text{DIV}} & \quad 20\text{ms}_{\text{DIV}}
\end{align*}
\]

**Z650-1.25**

\[
\begin{align*}
200V_{\text{DIV}} & \quad 50\text{ms}_{\text{DIV}}
\end{align*}
\]
2.4 ON/OFF Output rise characteristics

C.C mode

Z160-5

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

Z650-1.25

$$2^A_{/DIV}$$  $$100\text{ms}_{/DIV}$$

$$0.5^A_{/DIV}$$  $$50\text{ms}_{/DIV}$$

TDK-Lambda
2.4 ON/OFF Output rise characteristics

C.C mode

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

C.V mode

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

**Z^+ 800 H.V**

**Z160-5**

50 V/Div | 500 ms/Div

**Z650-1.25**

200 V/Div | 500 ms/Div

TDK-Lambda
2.5 ON/OFF Output fall characteristics

C.V mode

Conditions:
Vin: 100 Vac
Vout: 100%
lout: 100%
Iset=105%
Load: CR
Ta = 25°C
2.5 ON/OFF Output fall characteristics

C.C mode

Z160-5

Z650-1.25

Conditions:
- Vin: 100 Vac
- Vout: 100%
- Iout: 100%
- Vset=105%
- Load: CR
- Ta = 25°C
2.5 ON/OFF Output fall characteristics

C.C mode

**Conditions:**
- Vin: 100Vac
- Iout: 100%
- Vset=105%
- Shorted output
- Ta = 25°C

**Z160-5**

**Z650-1.25**
2.6 Hold up time characteristics

Conditions:

Vin: 100Vac
Vout: 100%
Ta = 25°C

![Graph showing hold up time characteristics](image)
2.6 Hold up time characteristics

Conditions:
Vin: 100Vac
Vout: 100%
Ta = 25°C
2.7 Dynamic line response characteristics

C.V mode

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

Vout: 20mV/Div
500μs/Div

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

Vout: 20mV/Div
500μs/Div
2.7 Dynamic line response characteristics

C.V mode

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

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

C.C mode

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

**Z160-5**

![Graph 1](image)

- Vin
- Iout: 20mA/Div
- 500ms/Div

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

![Graph 2](image)

- Vin
- Iout: 20mA/Div
- 500ms/Div
2.7 Dynamic line response characteristics

C.C mode

![Graph showing voltage and current responses with conditions: Vin: 85→132V, Vout: 100%, Iout: 100%, Ta = 25°C.]

![Graph showing voltage and current responses with conditions: Vin: 170→265V, Vout: 100%, Iout: 100%, Ta = 25°C.]

Z^+ 800 H.V
2.8 Dynamic load response characteristics

C.V mode

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

Load current:  tr=tf=100us

---

**Z160-5**

<table>
<thead>
<tr>
<th>lout:0%↔100%</th>
<th>f:100HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.33%</td>
<td>-0.50%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>lout:50%↔100%</th>
<th>f:100HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.17%</td>
<td>-0.15%</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>lout:0%↔100%</th>
<th>f:1000HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.26%</td>
<td>-0.26%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>lout:50%↔100%</th>
<th>f:1000HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.12%</td>
<td>-0.12%</td>
</tr>
</tbody>
</table>

---

**Z^+ 800 H.V**

TDK-Lambda  
T-31
2.8 Dynamic load response characteristics

C.V mode

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

Load current: tr=tf=100us

<table>
<thead>
<tr>
<th>lout:0%↔100%</th>
<th>f:100HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V/Div</td>
<td>2ms/Div</td>
</tr>
<tr>
<td>0.29%</td>
<td>-0.77%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>lout:50%↔100%</th>
<th>f:100HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1V/Div</td>
<td>2ms/Div</td>
</tr>
<tr>
<td>0.13%</td>
<td>-0.13%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>lout:0%↔100%</th>
<th>f:1000HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2V/Div</td>
<td>200us/Div</td>
</tr>
<tr>
<td>0.18%</td>
<td>-0.19%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>lout:50%↔100%</th>
<th>f:1000HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1V/Div</td>
<td>200us/Div</td>
</tr>
<tr>
<td>0.10%</td>
<td>-0.10%</td>
</tr>
</tbody>
</table>
2.8 Dynamic load response characteristics

C.C mode

Z160-5

\( I_o = 5A \)

<table>
<thead>
<tr>
<th>Vout: 144( \rightarrow )120V</th>
<th>f: 10HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1^A/\text{DIV}</td>
<td>20^ms/\text{DIV}</td>
</tr>
<tr>
<td>17.6%</td>
<td></td>
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</tbody>
</table>

\( I_o = 2.5A \)

<table>
<thead>
<tr>
<th>Vout: 144( \rightarrow )120V</th>
<th>f: 10HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5^A/\text{DIV}</td>
<td>20^ms/\text{DIV}</td>
</tr>
<tr>
<td>8.6%</td>
<td></td>
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</tbody>
</table>

Z650-1.25

\( I_o = 1.25A \)

<table>
<thead>
<tr>
<th>Vout: 585( \rightarrow )487.5V</th>
<th>f: 10HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2^A/\text{DIV}</td>
<td>20^ms/\text{DIV}</td>
</tr>
<tr>
<td>17.9%</td>
<td></td>
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</tbody>
</table>

\( I_o = 0.625A \)

<table>
<thead>
<tr>
<th>Vout: 585( \rightarrow )487.5V</th>
<th>f: 10HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1^A/\text{DIV}</td>
<td>20^ms/\text{DIV}</td>
</tr>
<tr>
<td>10.1%</td>
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</tbody>
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Conditions:

Vin: 100Vac

Ta = 25°C
2.9 Response to brown-out characteristics

C.V mode

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

Brown-out time:
- A - 16mS
- C - 48mS

Diagram:
- Vout: 50V/Div
- 100ms/Div
2.9 Response to brown-out characteristics

C.V mode

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

Brown-out time:
- A - 15ms
- C - 18ms

Vout: 200V/DIV

100ms/DIV
2.9 Response to brown-out characteristics

C.C mode

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

Brown-out time:
- A - 17mS
- C - 48mS

Current scale:
- Iout: $2^h/\text{DIV}$
- 100$\mu$s/\text{DIV}
2.9 Response to brown-out characteristics

C.C mode

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

Brown-out time
A - 15mS
C - 49mS

Z650-1.25

lout: 0.5A/Div
100ms/Div
2.10 Inrush Current Characteristics during line brown outs

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

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

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

Max Inrush Current (A)

Brown out time (s)
2.11 Inrush current waveform

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

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

Switch on phase angle of input AC voltage
- \( \phi = 90^\circ \)
2.11 Inrush current waveform

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

Switch on phase angle of input AC voltage

\( \Phi = 0° \)

Switch on phase angle of input AC voltage

\( \Phi = 90° \)
2.11 Inrush current waveform

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

Switch on phase angle of input AC voltage

\[ \Phi = 0^\circ \]

\[ 20^A_{/DIV} \quad 100^ms_{/DIV} \]

Switch on phase angle of input AC voltage

\[ \Phi = 90^\circ \]

\[ 20^A_{/DIV} \quad 100^ms_{/DIV} \]
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: 200V
Vout: 100%
lout: 100%
Ta = 25°C
2.12 Input current waveform

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

Z160-5

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

TDK-Lambda
2.12 Input current waveform

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

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

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

Z650-1.25

![Graph showing leakage current vs input voltage]
2.14 Output voltage ripple & noise waveform

C.V mode

Normal Mode

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

**Z160-5**

![Graph of Z160-5 waveform]

- 20mV/DIV
- 5μs/DIV

**Z650-1.25**

![Graph of Z650-1.25 waveform]

- 50mV/DIV
- 5μs/DIV