Z400 Series
EVALUATION
DATA

DWG No.: IA710-53-01

<table>
<thead>
<tr>
<th>APPD</th>
<th>CHK</th>
<th>DWG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daren P.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov-10-2011</td>
<td>10/11/11</td>
<td>10/11/11</td>
</tr>
</tbody>
</table>

TDK-Lambda
INDEX

<table>
<thead>
<tr>
<th>1. EVALUATION METHOD</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Circuit used for determination</td>
<td>T-1~4</td>
</tr>
<tr>
<td>(1) Steady state data</td>
<td></td>
</tr>
<tr>
<td>(2) Warm up voltage drift characteristic</td>
<td></td>
</tr>
<tr>
<td>(3) Warm up current drift characteristic</td>
<td></td>
</tr>
<tr>
<td>(4) Over voltage protection (OVP) characteristics</td>
<td></td>
</tr>
<tr>
<td>(5) Output voltage rise/fall characteristics</td>
<td></td>
</tr>
<tr>
<td>(6) Output current rise/fall characteristics</td>
<td></td>
</tr>
<tr>
<td>(7) Dynamic line voltage and current response characteristic</td>
<td></td>
</tr>
<tr>
<td>(8) Dynamic load voltage and current response characteristics</td>
<td></td>
</tr>
<tr>
<td>(9) Response to brown-out characteristic</td>
<td></td>
</tr>
<tr>
<td>(10) Inrush current characteristics</td>
<td></td>
</tr>
<tr>
<td>(11) Leakage current characteristics</td>
<td></td>
</tr>
<tr>
<td>(12) Output Voltage ripple &amp; noise waveform 10V to 100V models</td>
<td></td>
</tr>
<tr>
<td>(13) Output Current ripple &amp; noise waveform 10V to 100V models</td>
<td></td>
</tr>
<tr>
<td>1.2 List of equipment used</td>
<td>T-5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. CHARACTERISTICS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Steady state data</td>
<td>T-6~11</td>
</tr>
<tr>
<td>(1) Regulation - Line &amp; Load, Temperature drift</td>
<td></td>
</tr>
<tr>
<td>(2) Output voltage and ripple voltage v.s input voltage</td>
<td>T-12~14</td>
</tr>
<tr>
<td>(3) Output current and ripple current v.s input voltage</td>
<td></td>
</tr>
<tr>
<td>(4) Efficiency and Input current vs. Output current</td>
<td>T-15~17</td>
</tr>
<tr>
<td>2.2 Warm up voltage drift &amp; temperature stability</td>
<td>T-18~20</td>
</tr>
<tr>
<td>2.3 Over voltage protection (OVP) characteristic</td>
<td>T-21~22</td>
</tr>
<tr>
<td>2.4 ON/OFF Output rise characteristics</td>
<td>T-23~30</td>
</tr>
<tr>
<td>2.5 ON/OFF Output fall characteristics</td>
<td>T-31~38</td>
</tr>
<tr>
<td>2.6 Hold up time characteristic</td>
<td>T-39~41</td>
</tr>
<tr>
<td>2.7 Dynamic line response</td>
<td>T-42~47</td>
</tr>
<tr>
<td>2.8 Dynamic load response</td>
<td>T-48~52</td>
</tr>
<tr>
<td>2.9 Response to brown-out characteristic</td>
<td>T-53~58</td>
</tr>
<tr>
<td>2.10 Inrush current characteristic</td>
<td>T-59~60</td>
</tr>
<tr>
<td>2.11 Inrush current waveform</td>
<td>T-61~64</td>
</tr>
<tr>
<td>2.12 Input current waveform</td>
<td>T-65~66</td>
</tr>
<tr>
<td>2.13 Leakage current characteristic</td>
<td>T-67</td>
</tr>
<tr>
<td>2.14 Output voltage ripple &amp; noise waveform</td>
<td>T-68~69</td>
</tr>
</tbody>
</table>

TERMINOLOGY USED
Definition

<table>
<thead>
<tr>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vin</td>
</tr>
<tr>
<td>Vout</td>
</tr>
<tr>
<td>lin</td>
</tr>
<tr>
<td>lout</td>
</tr>
<tr>
<td>Ta</td>
</tr>
<tr>
<td>C.V</td>
</tr>
<tr>
<td>C.C</td>
</tr>
</tbody>
</table>
1. EVALUATION METHOD

1.1 Circuit used for determination

(1) Steady state data

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

(3) Warm up current drift characteristic 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
\[ \text{lout}_0 \% \leftrightarrow 100\% \]

Output current waveform
\[ \text{lout}_{50\%} \leftrightarrow 100\% \]
1.1 Circuit used for determination

(9) Response to brown-out characteristic

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

(11) Leakage current characteristics

(12) Output Voltage ripple & noise waveform 10V up to 100V models

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

(12) Output Voltage ripple & noise waveform 10V up to 100V models

(b) Normal + Common mode

(13) Output Current rms ripple 10V to 100V 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>EQUIPMENT USED</th>
<th>MANUFACTURER</th>
<th>MODEL No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Digital oscilloscope</td>
<td>YOKOGAWA</td>
<td>DL7100</td>
</tr>
<tr>
<td>2 Digital oscilloscope</td>
<td>YOKOGAWA</td>
<td>DL1740EL</td>
</tr>
<tr>
<td>3 Digital multimeter</td>
<td>AGILENT</td>
<td>34401A</td>
</tr>
<tr>
<td>4 Digital power meter</td>
<td>YOKOGAWA</td>
<td>WT230</td>
</tr>
<tr>
<td>5 AC Source</td>
<td>CHROMA</td>
<td>6590</td>
</tr>
<tr>
<td>6 AC Source</td>
<td>CHROMA</td>
<td>6530</td>
</tr>
<tr>
<td>7 Electronic load</td>
<td>H&amp;H</td>
<td>ZS6060 SC150</td>
</tr>
<tr>
<td>8 Electronic load</td>
<td>H&amp;H</td>
<td>ZS7006</td>
</tr>
<tr>
<td>9 Electronic load</td>
<td>H&amp;H</td>
<td>ZS7060</td>
</tr>
<tr>
<td>10 Electronic load</td>
<td>CHROMA</td>
<td>63203</td>
</tr>
<tr>
<td>11 Electronic load</td>
<td>CHROMA</td>
<td>63204</td>
</tr>
<tr>
<td>12 Electronic load</td>
<td>CHROMA</td>
<td>63206</td>
</tr>
<tr>
<td>13 Controlled temp. chamber</td>
<td>THERMOTRON</td>
<td>SM-16-3800</td>
</tr>
<tr>
<td>14 Controlled temp. chamber</td>
<td>THERMOTRON</td>
<td>SE-600-5-5</td>
</tr>
<tr>
<td>15 Controlled temp. chamber</td>
<td>THERMOTRON</td>
<td>SE-600-6-6</td>
</tr>
<tr>
<td>16 Leakage Current Tester</td>
<td>KIKUSUI</td>
<td>TOS3200</td>
</tr>
<tr>
<td>17 Voltage probe</td>
<td>YOKOGAWA</td>
<td>700988</td>
</tr>
<tr>
<td>18 Current probe</td>
<td>YOKOGAWA</td>
<td>701933</td>
</tr>
<tr>
<td>19 Current probe</td>
<td>LEM Danfysik</td>
<td>IT 60-S Ultrastab</td>
</tr>
<tr>
<td>20 Inrush Current Meter</td>
<td>TAKAMISÁWA</td>
<td>PSA-210</td>
</tr>
<tr>
<td>21 Data Acquisition/Switch Unit</td>
<td>AGILENT</td>
<td>34970A</td>
</tr>
</tbody>
</table>
2. CHARACTERISTIC

2.1 Steady state data

(1) Regulation - Line & Load, Temperature drift

Conditions: Ta = 25°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>10.001</td>
<td>10.001</td>
<td>10.001</td>
<td>10.001</td>
<td>0.0</td>
</tr>
<tr>
<td>25%</td>
<td>9.9993</td>
<td>9.9993</td>
<td>9.9993</td>
<td>9.9994</td>
<td>0.1</td>
</tr>
<tr>
<td>50%</td>
<td>9.9993</td>
<td>9.9993</td>
<td>9.9994</td>
<td>9.9993</td>
<td>0.1</td>
</tr>
<tr>
<td>75%</td>
<td>9.9990</td>
<td>9.9990</td>
<td>9.9990</td>
<td>9.9990</td>
<td>0.0</td>
</tr>
<tr>
<td>100%</td>
<td>9.9986</td>
<td>9.9986</td>
<td>9.9986</td>
<td>9.9986</td>
<td>0.0</td>
</tr>
<tr>
<td>Load</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>ΔV(mV) (%)</td>
</tr>
<tr>
<td>Regulation</td>
<td>0.015</td>
<td>0.015</td>
<td>0.015</td>
<td>0.015</td>
<td>(%)</td>
</tr>
</tbody>
</table>

2. Temperature drift, C.V 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>Vout</td>
<td>10.007</td>
<td>10.006</td>
<td>10.008</td>
<td>2 mV</td>
</tr>
</tbody>
</table>

TDK-Lambda
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>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>36.0011</td>
<td>36.0011</td>
<td>36.0011</td>
<td>36.0011</td>
<td>0.0</td>
</tr>
<tr>
<td>25%</td>
<td>36.0012</td>
<td>36.0012</td>
<td>36.0012</td>
<td>36.0012</td>
<td>0.0</td>
</tr>
<tr>
<td>50%</td>
<td>36.0012</td>
<td>36.0012</td>
<td>36.0012</td>
<td>36.0012</td>
<td>0.0</td>
</tr>
<tr>
<td>75%</td>
<td>36.0011</td>
<td>36.0011</td>
<td>36.0011</td>
<td>36.0011</td>
<td>0.0</td>
</tr>
<tr>
<td>100%</td>
<td>36.0011</td>
<td>36.0011</td>
<td>36.0011</td>
<td>36.0011</td>
<td>0.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Load Regulation</th>
<th>0.1</th>
<th>0.1</th>
<th>0.1</th>
<th>0.1</th>
<th>( \Delta V (mV) ) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000 (%)</td>
<td></td>
</tr>
</tbody>
</table>

2. Temperature drift, C.V mode

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

<table>
<thead>
<tr>
<th>( T_a ) (^\circ C)</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>( V_{out} )</td>
<td>35.998</td>
<td>35.999</td>
<td>36.003</td>
<td>5 mV</td>
</tr>
<tr>
<td></td>
<td>3 ppm/°C</td>
<td></td>
<td></td>
<td></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>$I_o$</th>
<th>Vin (AC)</th>
<th>Line Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>99.9982</td>
<td>99.9985</td>
</tr>
<tr>
<td>25%</td>
<td>99.9985</td>
<td>99.9985</td>
</tr>
<tr>
<td>50%</td>
<td>99.9984</td>
<td>99.9984</td>
</tr>
<tr>
<td>75%</td>
<td>99.9983</td>
<td>99.9984</td>
</tr>
<tr>
<td>100%</td>
<td>99.9983</td>
<td>99.9983</td>
</tr>
<tr>
<td>Load</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Regulation</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

2. Temperature drift, C.V mode

Conditions: $V_{in}:100V_{ac}$

$V_{out}$: 99.986  99.992  100.010

<table>
<thead>
<tr>
<th>$T_a$</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>Vout</td>
<td>99.986</td>
<td>99.992</td>
<td>100.010</td>
<td>24 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>$V_o$</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>40.0130</td>
<td>40.0150</td>
<td>40.0160</td>
<td>40.0130</td>
<td>3.0</td>
</tr>
<tr>
<td>25%</td>
<td>40.0178</td>
<td>40.0166</td>
<td>40.0158</td>
<td>40.0152</td>
<td>2.6</td>
</tr>
<tr>
<td>50%</td>
<td>40.0142</td>
<td>40.0138</td>
<td>40.0135</td>
<td>40.0132</td>
<td>1.0</td>
</tr>
<tr>
<td>75%</td>
<td>40.0127</td>
<td>40.0122</td>
<td>40.0120</td>
<td>40.0117</td>
<td>1.0</td>
</tr>
<tr>
<td>100%</td>
<td>40.0112</td>
<td>40.0110</td>
<td>40.0109</td>
<td>40.0106</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Load Regulation

| Load Regulation | 0.016 | 0.014 | 0.013 | 0.011 | (%) |

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

2. Temperature drift, C.C mode

Conditions: $V_{in}:100$ Vac

| $I_{out}$ | 39.9790 | 39.9670 | 39.9580 |
| Temp. Coefficient (0°C-50°C) | 21.0 mA | 11 ppm/°C |
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>Vin (AC) 85</th>
<th>100</th>
<th>200</th>
<th>265</th>
<th>Line Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>12.0010</td>
<td>12.0009</td>
<td>12.0010</td>
<td>12.0011</td>
<td>0.2</td>
</tr>
<tr>
<td>25%</td>
<td>12.0008</td>
<td>12.0007</td>
<td>12.0008</td>
<td>12.0009</td>
<td>0.2</td>
</tr>
<tr>
<td>50%</td>
<td>12.0003</td>
<td>12.0002</td>
<td>12.0003</td>
<td>12.0002</td>
<td>0.1</td>
</tr>
<tr>
<td>75%</td>
<td>12.0001</td>
<td>12.0000</td>
<td>12.0001</td>
<td>12.0000</td>
<td>0.1</td>
</tr>
<tr>
<td>100%</td>
<td>12.0002</td>
<td>12.0004</td>
<td>12.0002</td>
<td>12.0001</td>
<td>0.3</td>
</tr>
<tr>
<td>Load Regulation</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>1.1</td>
<td>$\Delta I$ (mA) (%)</td>
</tr>
</tbody>
</table>
| 0.007 | 0.007 | 0.007 | 0.009 | (%)

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

2. Temperature drift, C.C mode

Conditions: $V_{in}: 100$ Vac
lout:100%

<table>
<thead>
<tr>
<th>Ta °C</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>lout</td>
<td>11.9887</td>
<td>11.9901</td>
<td>11.9953</td>
<td>6.6 mA</td>
</tr>
</tbody>
</table>

TDK-Lambda

T-10
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>
<th>(\Delta I (mA))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>3.9993</td>
<td>3.9990</td>
<td>3.9996</td>
<td>3.9999</td>
<td>0.9</td>
<td>0.023</td>
</tr>
<tr>
<td>25%</td>
<td>3.9994</td>
<td>3.9994</td>
<td>3.9994</td>
<td>3.9994</td>
<td>0.0</td>
<td>0.000</td>
</tr>
<tr>
<td>50%</td>
<td>3.9992</td>
<td>3.9992</td>
<td>3.9992</td>
<td>3.9992</td>
<td>0.0</td>
<td>0.000</td>
</tr>
<tr>
<td>75%</td>
<td>3.9990</td>
<td>3.9990</td>
<td>3.9989</td>
<td>3.9990</td>
<td>0.1</td>
<td>0.003</td>
</tr>
<tr>
<td>100%</td>
<td>3.9987</td>
<td>3.9987</td>
<td>3.9987</td>
<td>3.9987</td>
<td>0.0</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Notes:

(*) Not including load regulation thermal drift effect.

2. Temperature drift, C.C mode

Conditions: Vin:100 Vac
lout: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></td>
<td>3.9992</td>
<td>3.9981</td>
<td>3.9993</td>
<td>1.2 mA</td>
</tr>
<tr>
<td>lout</td>
<td></td>
<td></td>
<td></td>
<td>6 ppm/°C</td>
</tr>
</tbody>
</table>
2.1 Steady state data

(2) Output voltage and ripple voltage vs input voltage

C.V mode

(3) Output current and ripple current vs input voltage

C.C mode
2.1 Steady state data

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

C.V mode

Conditions: Vin:100Vac
lout:100%

Ta:
0°C ————
25°C ————
50°C ————

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

C.C mode

Conditions: Vin:100Vac
lout: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: Vin:100Vac
            Iout:100%
            Ta: 0°C
            25°C
            50°C

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

C.C mode

Conditions: Vin:100Vac
            Iout:100%
            Ta: 0°C
            25°C
            50°C
2.1 Steady state data

(4) Efficiency and Input current vs. Output current

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

![Graph showing Efficiency and Input current vs. Output current]
2.1 Steady state data

(4) Efficiency and Input current vs. Output current

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

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

C.V mode

Z10-40

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

C.C mode

Z10-40

Output voltage drift

Time (hrs)

Output current drift

Time (hrs)
2.2 Warm up drift & stability

C.V mode

[Graph showing output voltage drift over time]

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

C.C mode

[Graph showing output current drift over time]
2.2 Warm up drift & stability

C.V mode

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

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

**Z10-40**

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

OVP setting: 12V

**Z36-12**

OVP setting: 40V
2.3 Over voltage protection (OVP) characteristic

Conditions: Vin: 100Vac
            Iout: 0%
            Ta = 25℃

OVP setting: 110V
2.4 ON/OFF Output rise characteristics

C.V mode

Conditions: Vin: 100Vac
Vout: 100%
lout: 0%
lset=105%
Ta = 25°C
2.4 ON/OFF Output rise characteristics

C.V mode

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

20V/Div  5ms/Div
2.4 ON/OFF Output rise characteristics

C.V mode

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

C.V mode

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

C.C mode

Conditions: Vin:100Vac
Vout: 100%
lout: 100%
Vsel=105%
Load: CR
Ta = 25°C

[Graph for Z10-40]

[Graph for Z36-12]
2.4 ON/OFF Output rise characteristics

C.C mode

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

C.C mode

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

C.C mode

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

C.V mode

Conditions: Vin: 100Vac
Vout: 100%
lout: 0%
iset=105%
Ta = 25°C
2.5 ON/OFF Output fall characteristics

C.V mode

Conditions: Vin: 100Vac
Vout: 100%
lout: 0%
lset=105%
Ta = 25°C
2.5 ON/OFF Output fall characteristics

C.V mode

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

Z10-40

| 2V/div | 5ms/div |

Z36-12

| 10V/div | 10ms/div |
2.5 ON/OFF Output fall characteristics

C.V mode

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

TDK-Lambda
2.5 ON/OFF Output fall characteristics

C.C mode

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

Z10-40

Z36-12

TDK-Lambda
2.5 ON/OFF Output fall characteristics

C.C mode

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

C.C mode

Conditions: Vin: 100 Vac
lout: 100%
Vset=105%
shorted output
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
2.6 Hold up time characteristics

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

![Diagram showing hold up time characteristics](image-url)
2.6 Hold up time characteristics

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

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

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

[Graph showing hold up time (ms) vs. output current (%)]

Hold up time (ms)
0 10 20 30 40 50 60 70 80 90
0 20 40 60 80 100 120
Output current (%)
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.V mode

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

Conditions: Vin: 170V → 265V
Vout: 100%
Iout: 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.C mode

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

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

C.C mode

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

Conditions: Vin: 170V → 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
### 2.8 Dynamic load response characteristics

**C.V mode**

<table>
<thead>
<tr>
<th>Conditions:</th>
<th>Vin: 100Vac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vout: 100%</td>
<td></td>
</tr>
<tr>
<td>Ta = 25°C</td>
<td></td>
</tr>
</tbody>
</table>

Load current: \( tr=tl=100 \mu s \)

<table>
<thead>
<tr>
<th>( i_{out}:0% \rightarrow 100% )</th>
<th>( f: 100 \text{HZ} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2 ( V_{\text{DIV}} )</td>
<td>( 2^m\text{s}/\text{DIV} )</td>
</tr>
<tr>
<td>1.76%</td>
<td>-3.27%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( i_{out}:50% \rightarrow 100% )</th>
<th>( f: 100 \text{HZ} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05 ( V_{\text{DIV}} )</td>
<td>( 2^m\text{s}/\text{DIV} )</td>
</tr>
<tr>
<td>0.85%</td>
<td>-1.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( i_{out}:0% \rightarrow 100% )</th>
<th>( f: 1000 \text{HZ} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2 ( V_{\text{DIV}} )</td>
<td>( 500\mu\text{s}/\text{DIV} )</td>
</tr>
<tr>
<td>1.54%</td>
<td>-2.49%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( i_{out}:50% \rightarrow 100% )</th>
<th>( f: 1000 \text{HZ} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 ( V_{\text{DIV}} )</td>
<td>( 500\mu\text{s}/\text{DIV} )</td>
</tr>
<tr>
<td>0.78%</td>
<td>-0.89%</td>
</tr>
</tbody>
</table>
2.8 Dynamic load response characteristics

C.V mode

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

Load current: tr=tf=100us

<table>
<thead>
<tr>
<th>Z36-12</th>
<th>f: 100Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>iout: 0%→100%</td>
<td>1.10%</td>
</tr>
<tr>
<td>0.5V/Div</td>
<td>2ms/Div</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>f: 100Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>iout: 50%→100%</td>
</tr>
<tr>
<td>0.1V/Div</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>f: 1000Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>iout: 0%→100%</td>
</tr>
<tr>
<td>0.5V/Div</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>f: 1000Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>iout: 50%→100%</td>
</tr>
<tr>
<td>0.1V/Div</td>
</tr>
</tbody>
</table>
2.8 Dynamic load response characteristics

C.V mode

Conditions: Vin: 100Vdc  
Vout: 100%  
Ta = 25°C  
Load current: tr=tf=100us

![Graphs showing dynamic load response characteristics for Z100-4 with different frequency ranges and voltage changes.](image)
2.8 Dynamic load response characteristics

C.C mode

Conditions: Vin: 100 Vac  
Ta = 25°C

Z10-40

- Io=40A
- Vout: 9 V → 7.5 V  
- f: 10 Hz
- 6 A/Div  
- 20 ms/Div
- 19.05%  
- -15.75%

Z36-12

- Io=12 A
- Vout: 32.4 V → 27 V  
- f: 10 Hz
- 4 A/Div  
- 20 ms/Div
- 15.62%  
- -18.75%

Z400

- Io=20 A
- Vout: 9 V → 7.5 V  
- f: 10 Hz
- 3 A/Div  
- 20 ms/Div
- 10.05%  
- -8.45%

- Io=6 A
- Vout: 32.4 V → 27 V  
- f: 10 Hz
- 0.5 A/Div  
- 20 ms/Div
- 8.33%  
- -10.24%
2.8 Dynamic load response characteristics

C.C mode

Conditions: Vin: 100 Vac
Ta = 25°C

<table>
<thead>
<tr>
<th>Z100-4</th>
<th>Io=4A</th>
<th></th>
<th>Z100-4</th>
<th>Io=2A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vout:90→75V</td>
<td>f:10HZ</td>
<td>0.5A/ΔV</td>
<td>20ns/ΔV</td>
<td>0.2A/ΔV</td>
</tr>
<tr>
<td>18.25%</td>
<td>-15.32%</td>
<td>8.91%</td>
<td>-7.35%</td>
<td></td>
</tr>
</tbody>
</table>
2.9 Response to brown-out characteristics

C.V mode

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

Brown-out time
A - 16 ms
B - 17 ms
C - 24 ms
2.9 Response to brown-out characteristics

C.V mode

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

Brown-out time:
A - 18ms
B - 19ms
2.9 Response to brown-out characteristics

C.V mode

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

Brown-out time
A - 17ms
B - 16ms
C - 25ms
2.9 Response to brown-out characteristics

C.C mode

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

Brown-out time
A -16mS
B -17mS
C -24mS

lout: 12A/DIV
100ms/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 - 16ms
B - 17ms
2.9 Response to brown-out characteristics

C.C mode

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

Brown-out time
A - 17ms
B - 16ms
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)

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

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

Max Inrush Current (A) vs. Brown out time (s)
2.11 Inrush current waveform

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

Switch on phase angle of input AC voltage
Φ = 0°

Switch on phase angle of input AC voltage
Φ = 90°
2.11 Inrush current waveform

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

Switch on phase angle of input AC voltage
Φ=0°

Switch on phase angle of input AC voltage
Φ=90°
2.11 Inrush current waveform

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

Switch on phase angle of input AC voltage

\[ \Phi = 0^\circ \]

Switch on phase angle of input AC voltage

\[ \Phi = 90^\circ \]

Factors:
- \( 10^4 / \text{DIV} \)
- \( 100 \text{ms} / \text{DIV} \)
2.11 Inrush current waveform

Switch on phase angle of input AC voltage
\( \Phi = 0° \)

Switch on phase angle of input AC voltage
\( \Phi = 90° \)

Conditions:
- Vin: 200V
- Vout: 100%
- Iout: 100%
- Ta = 25°C
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
2.12 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
2.14 Output voltage ripple & noise waveform

C.V mode

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

Normal Mode

Z10-40

Z36-12

TDK-Lambda
2.14 Output voltage ripple & noise waveform

C.V mode

Normal Mode

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

10mV/Div  5μs/Div