

# TEST DATA OF CQHS3004850

# Regulated DC Power Supply

## October 28, 2010

Approved by : Toshiyuki Tsuri Design Manager

Prepared by : Tomoaki Oiwake Tomoaki Oiwake Design Engineer

**COSEL CO.,LTD.**

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(Final Page 19)

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Model	CQHS3004850	Temperature Testing Circuitry	25°C Figure A																																																																											
Item	Input Current (by Input Voltage)																																																																													
Object	_____																																																																													
1. Graph		2. Values																																																																												
<p>The graph plots Input Current [A] on the y-axis (0 to 10) against Input Voltage [V] on the x-axis (0 to 80). Three curves are shown: Load 100% (triangles), Load 50% (squares), and Load 0% (circles). All curves show a decreasing trend. A slanted line is drawn through the origin, representing the rated input voltage range.</p>		<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="3">Input Current [A]</th> </tr> <tr> <th>Load 0%</th> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>25.0</td><td>0.010</td><td>0.010</td><td>0.010</td></tr> <tr><td>30.0</td><td>0.006</td><td>0.006</td><td>0.006</td></tr> <tr><td>33.0</td><td>0.007</td><td>0.007</td><td>0.007</td></tr> <tr><td>35.5</td><td>0.168</td><td>4.470</td><td>8.940</td></tr> <tr><td>36.0</td><td>0.165</td><td>4.408</td><td>8.820</td></tr> <tr><td>40.0</td><td>0.131</td><td>3.970</td><td>7.930</td></tr> <tr><td>48.0</td><td>0.106</td><td>3.330</td><td>6.620</td></tr> <tr><td>54.0</td><td>0.103</td><td>2.976</td><td>5.900</td></tr> <tr><td>60.0</td><td>0.101</td><td>2.694</td><td>5.330</td></tr> <tr><td>68.0</td><td>0.113</td><td>2.400</td><td>4.720</td></tr> <tr><td>76.0</td><td>0.111</td><td>2.167</td><td>4.242</td></tr> <tr><td>80.0</td><td>0.110</td><td>2.068</td><td>4.042</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>		Input Voltage [V]	Input Current [A]			Load 0%	Load 50%	Load 100%	0.0	0.000	0.000	0.000	25.0	0.010	0.010	0.010	30.0	0.006	0.006	0.006	33.0	0.007	0.007	0.007	35.5	0.168	4.470	8.940	36.0	0.165	4.408	8.820	40.0	0.131	3.970	7.930	48.0	0.106	3.330	6.620	54.0	0.103	2.976	5.900	60.0	0.101	2.694	5.330	68.0	0.113	2.400	4.720	76.0	0.111	2.167	4.242	80.0	0.110	2.068	4.042	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Note: Slanted line shows the range of the rated input voltage.

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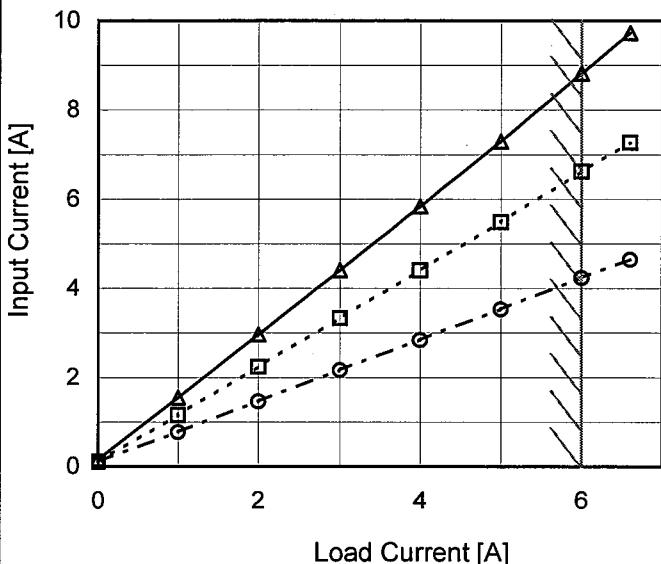
Model CQHS3004850

Item Input Current (by Load Current)

Object \_\_\_\_\_

## 1. Graph

—△— Input Volt. 36V  
 - -□--- Input Volt. 48V  
 - -○--- Input Volt. 76V



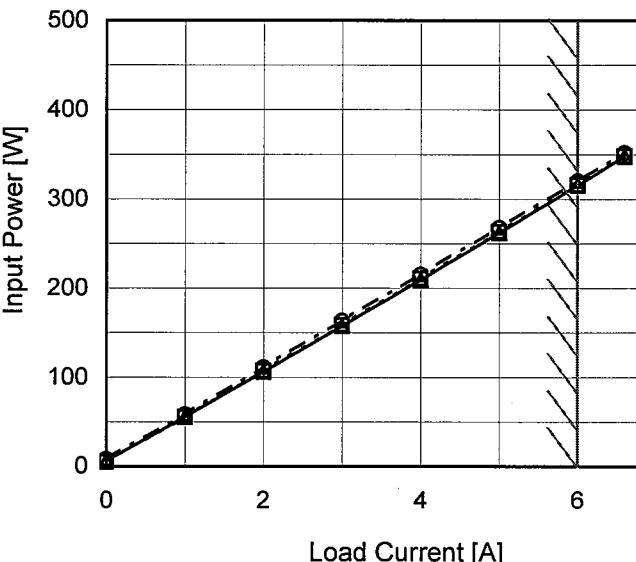
Note: Slanted line shows the range of the rated load current.

 Temperature 25°C  
 Testing Circuitry Figure A

## 2. Values

Load Current [A]	Input Current [A]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0.0	0.165	0.106	0.111
1.0	1.554	1.154	0.773
2.0	2.965	2.242	1.469
3.0	4.408	3.330	2.167
4.0	5.840	4.404	2.842
5.0	7.300	5.490	3.536
6.0	8.820	6.620	4.242
6.6	9.730	7.270	4.650
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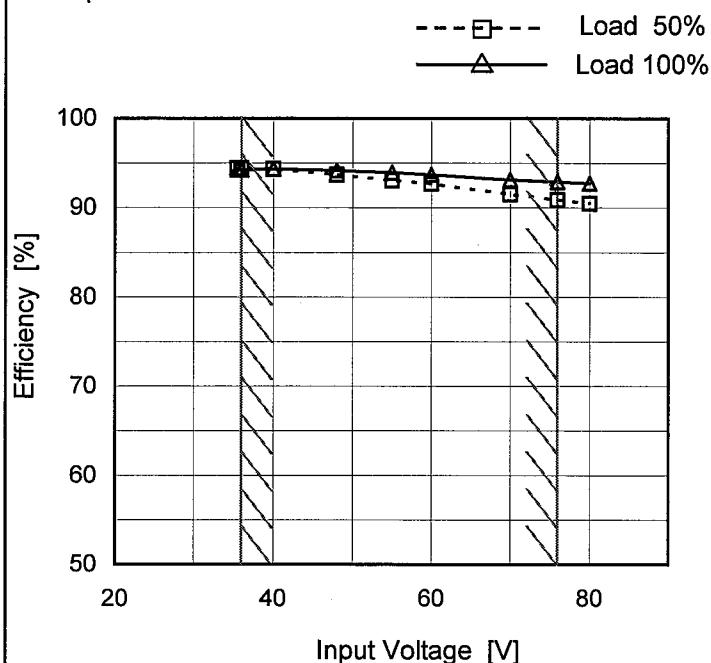
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Model	CQHS3004850
Item	Efficiency (by Input Voltage)
Object	_____

 Temperature 25°C  
 Testing Circuitry Figure A

## 1. Graph



## 2. Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
35.5	94.4	94.3
36.0	94.4	94.3
40.0	94.3	94.4
48.0	93.7	94.2
55.0	93.1	94.0
60.0	92.7	93.7
70.0	91.5	93.1
76.0	90.9	92.9
80.0	90.5	92.7

Note: Slanted line shows the range of the rated input voltage.

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1.Graph	—△— Input Volt. 36V - - □ - - Input Volt. 48V - - ○ - - Input Volt. 76V	2.Values																																																
<p>The graph plots Efficiency [%] on the y-axis (50 to 100) against Load Current [A] on the x-axis (0 to 6). Three curves are shown for different input voltages: 36V (solid line with triangles), 48V (dashed line with squares), and 76V (dash-dot line with circles). All curves show efficiency increasing with load current. A slanted line on the right side of the graph indicates the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>1.0</td><td>88.8</td><td>89.8</td><td>84.6</td></tr> <tr><td>2.0</td><td>93.4</td><td>92.4</td><td>89.2</td></tr> <tr><td>3.0</td><td>94.4</td><td>93.7</td><td>90.9</td></tr> <tr><td>4.0</td><td>94.8</td><td>94.1</td><td>92.2</td></tr> <tr><td>5.0</td><td>94.6</td><td>94.3</td><td>92.6</td></tr> <tr><td>6.0</td><td>94.3</td><td>94.2</td><td>92.9</td></tr> <tr><td>6.6</td><td>94.1</td><td>94.0</td><td>93.1</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.0	-	-	-	1.0	88.8	89.8	84.6	2.0	93.4	92.4	89.2	3.0	94.4	93.7	90.9	4.0	94.8	94.1	92.2	5.0	94.6	94.3	92.6	6.0	94.3	94.2	92.9	6.6	94.1	94.0	93.1	--	-	-	-	--	-	-	-	--	-	-	-
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Note: Slanted line shows the range of the rated load current.

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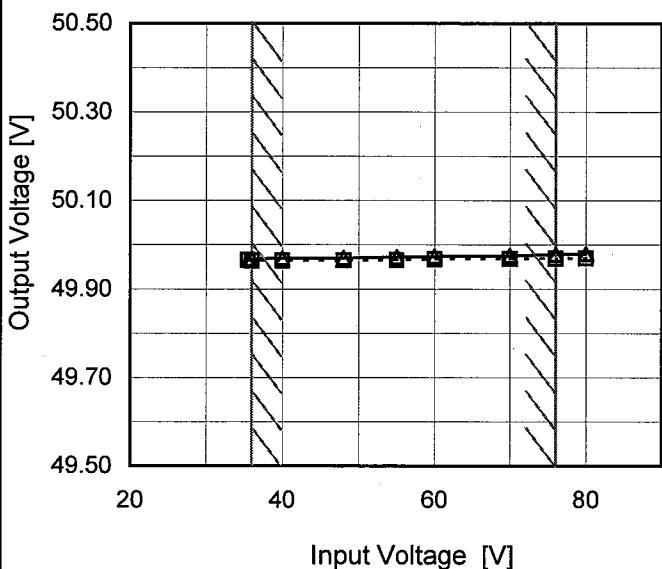
Model CQHS3004850

Item Line Regulation

Object +50V6A

## 1. Graph

---□--- Load 50%  
 —△— Load 100%



Note: Slanted line shows the range of the rated input voltage.

Temperature 25°C  
 Testing Circuitry Figure A

## 2. Values

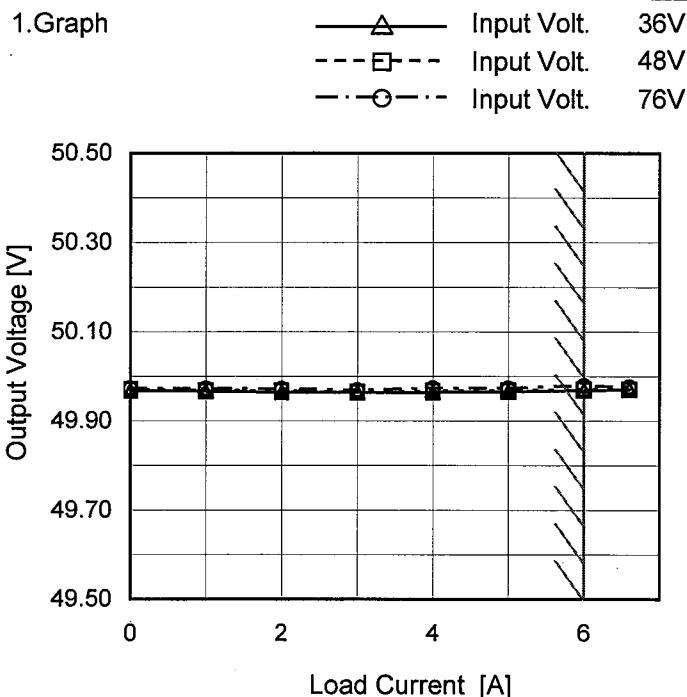
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
35.5	49.965	49.967
36.0	49.964	49.969
40.0	49.964	49.970
48.0	49.965	49.971
55.0	49.966	49.973
60.0	49.968	49.974
70.0	49.968	49.976
76.0	49.969	49.979
80.0	49.970	49.980

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Model CQHS3004850

Item Load Regulation

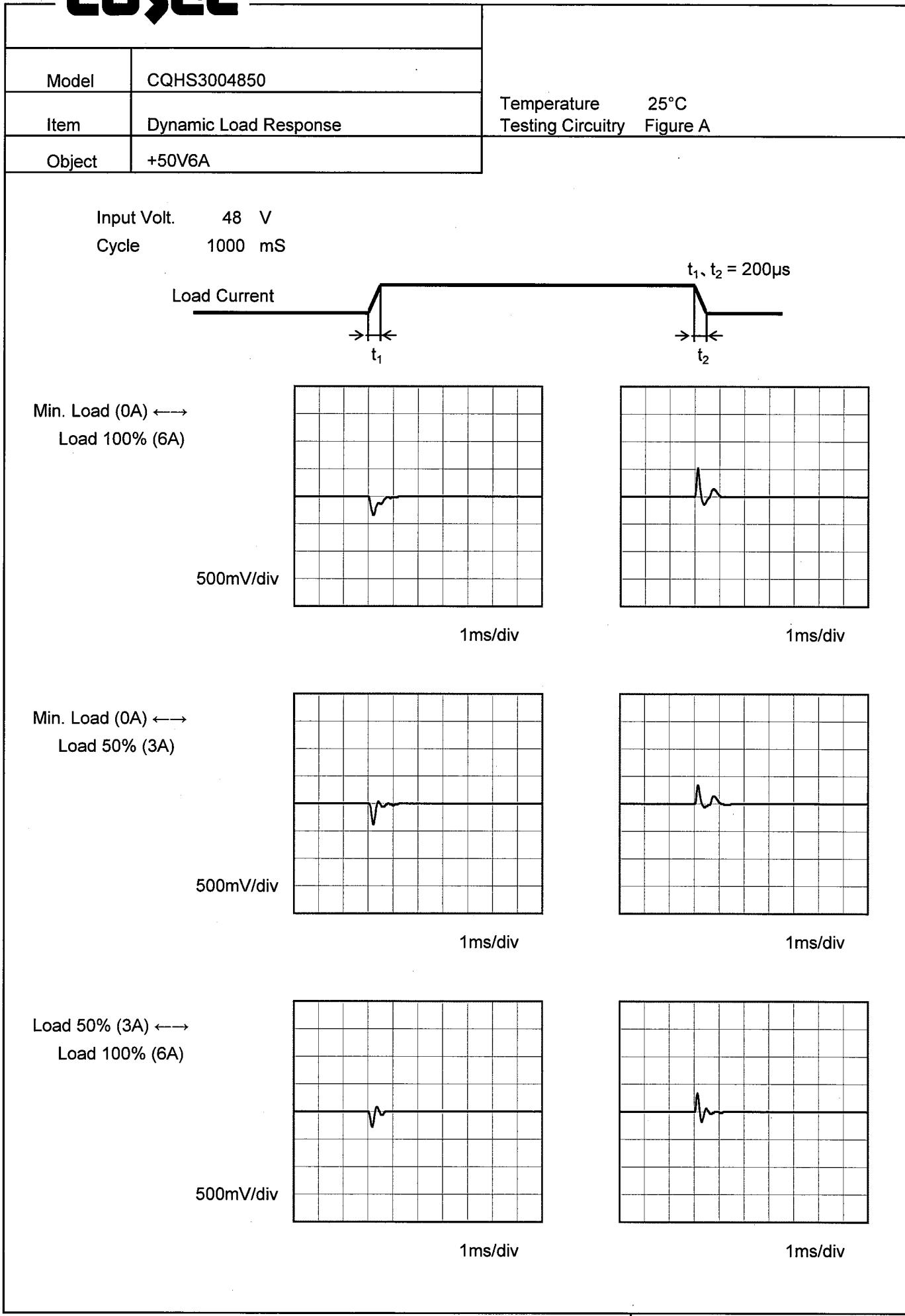
Object +50V6A

Temperature 25°C  
Testing Circuitry Figure A

## 2. Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0.0	49.968	49.971	49.973
1.0	49.967	49.968	49.973
2.0	49.965	49.967	49.972
3.0	49.964	49.965	49.969
4.0	49.965	49.967	49.973
5.0	49.966	49.968	49.974
6.0	49.969	49.971	49.979
6.6	49.971	49.971	49.976
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--	-	-	-
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Note: Slanted line shows the range of the rated load current.

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**COSEL**

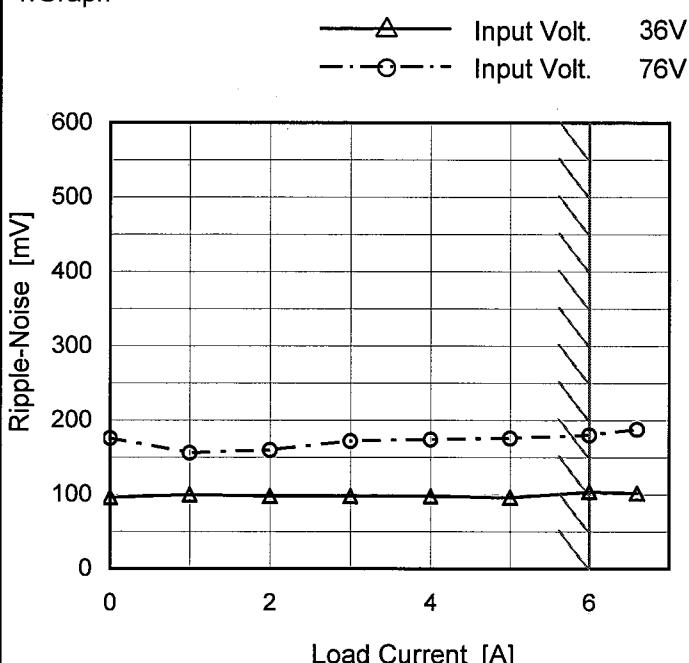
Model	CQHS3004850																																							
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure B																																						
Object	+50V6A																																							
1. Graph																																								
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 600 mV, and the X-axis ranges from 0 to 6 A. Two sets of data points are plotted: solid triangles for 36V and open circles for 76V. A slanted line indicates the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (36V)</th> <th>Ripple Voltage [mV] (76V)</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>73</td><td>144</td></tr> <tr><td>1.0</td><td>73</td><td>144</td></tr> <tr><td>2.0</td><td>72</td><td>145</td></tr> <tr><td>3.0</td><td>72</td><td>145</td></tr> <tr><td>4.0</td><td>72</td><td>151</td></tr> <tr><td>5.0</td><td>72</td><td>155</td></tr> <tr><td>6.0</td><td>75</td><td>158</td></tr> <tr><td>6.6</td><td>75</td><td>158</td></tr> </tbody> </table>			Load Current [A]	Ripple Voltage [mV] (36V)	Ripple Voltage [mV] (76V)	0.0	73	144	1.0	73	144	2.0	72	145	3.0	72	145	4.0	72	151	5.0	72	155	6.0	75	158	6.6	75	158											
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Load Current [A]	Ripple Voltage [mV]																																							
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<p>Measured by 100 MHz Oscilloscope.      Ripple Voltage is shown as p-p in the figure below.      Note: Slanted line shows the range of the rated load current.</p>																																								
<p>Ripple [mVp-p]</p> <p>Fig. Complex Ripple Wave Form</p>																																								

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Model	CQHS3004850
Item	Ripple-Noise
Object	+50V6A

Temperature 25°C  
 Testing Circuitry Figure B

## 1. Graph



Measured by 100 MHz Oscilloscope.  
 Ripple-Noise is shown as p-p in the figure below.  
 Note: Slanted line shows the range of the rated load current.

## 2. Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 36 [V]	Input Volt. 76 [V]
0.0	96	176
1.0	100	156
2.0	98	160
3.0	98	172
4.0	98	174
5.0	96	176
6.0	104	180
6.6	102	188
--	-	-
--	-	-
--	-	-

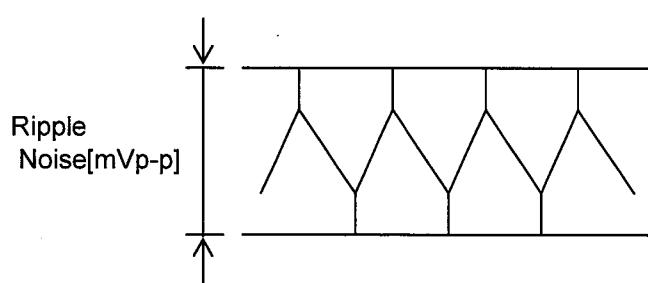
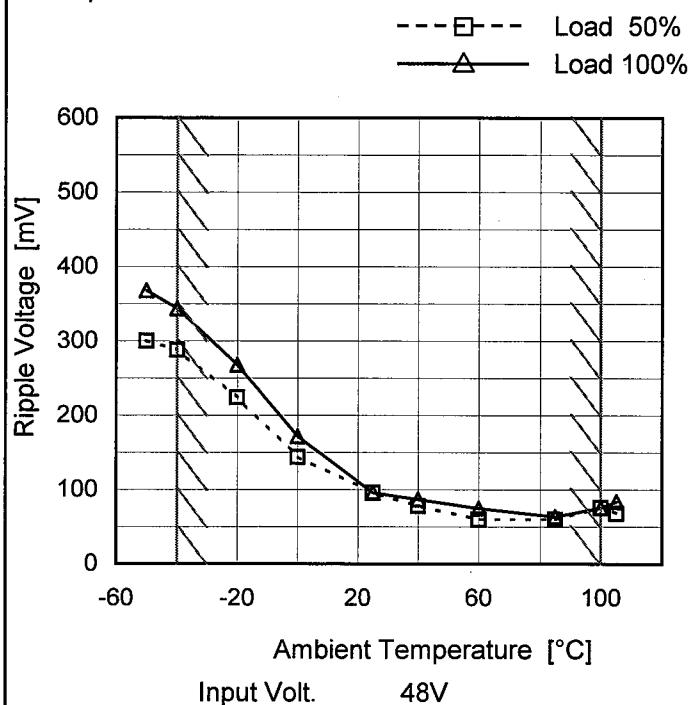


Fig.Complex Ripple Noise Wave Form

**COSEL**

Model	CQHS3004850
Item	Ripple Voltage (by Ambient Temp.)
Object	+50V6A

## 1. Graph



Measured by 100 MHz Oscilloscope.

Note: Slanted line shows the range of the rated ambient temperature.

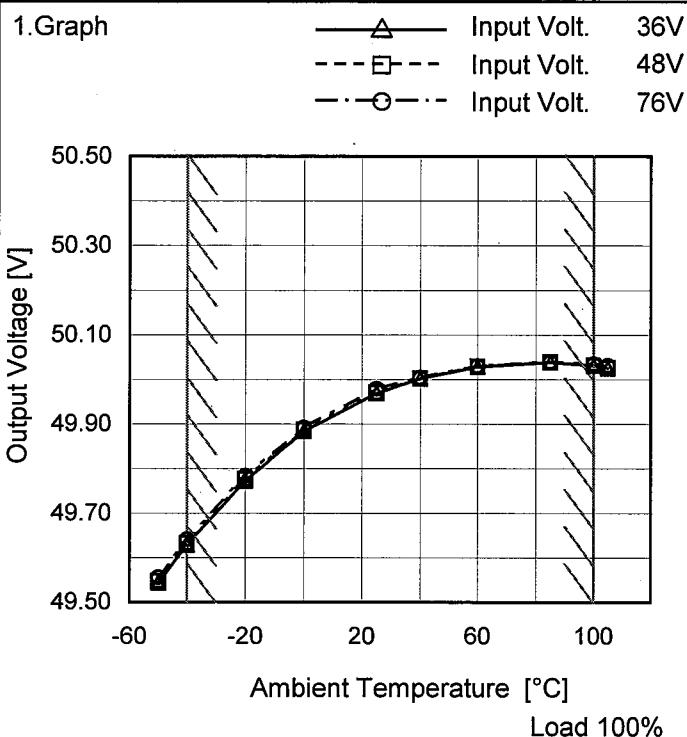
## Testing Circuitry Figure B

## 2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-50	300	368
-40	288	344
-20	224	268
0	144	172
25	96	96
40	78	87
60	60	75
85	60	64
100	76	76
105	68	84
--	-	-

**COSEL**

Model	CQHS3004850
Item	Ambient Temperature Drift
Object	+50V6A



Note: Slanted line shows the range of the rated ambient temperature.

**Testing Circuitry Figure A**
**2. Values**

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-50	49.544	49.547	49.556
-40	49.629	49.633	49.642
-20	49.773	49.776	49.784
0	49.884	49.888	49.892
25	49.969	49.971	49.979
40	50.002	50.003	50.005
60	50.029	50.030	50.030
85	50.039	50.039	50.040
100	50.032	50.032	50.035
105	50.026	50.027	50.032
--	-	-	-



Model	CQHS3004850	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+50V6A	

### 1. Output Voltage Accuracy

This is defined as the value of the output voltage, regulation load, ambient temperature and input voltage varied at random in the range as specified below.

Temperature : -40 - 100°C

Input Voltage : 36 - 76V

Load Current : 0 - 6A

\* Output Voltage Accuracy =  $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

$$\text{* Output Voltage Accuracy (Ration)} = \frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$$

### 2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	85	76	0	50.040	$\pm 207$	$\pm 0.4$
Minimum Voltage	-40	76	0	49.627		

**COSEL**

Model	CQHS3004850	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+50V6A																								
1. Graph			2. Values																						
<p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 48V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>49.956</td></tr> <tr><td>0.5</td><td>49.979</td></tr> <tr><td>1.0</td><td>49.979</td></tr> <tr><td>2.0</td><td>49.979</td></tr> <tr><td>3.0</td><td>49.979</td></tr> <tr><td>4.0</td><td>49.979</td></tr> <tr><td>5.0</td><td>49.979</td></tr> <tr><td>6.0</td><td>49.979</td></tr> <tr><td>7.0</td><td>49.979</td></tr> <tr><td>8.0</td><td>49.979</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	49.956	0.5	49.979	1.0	49.979	2.0	49.979	3.0	49.979	4.0	49.979	5.0	49.979	6.0	49.979	7.0	49.979	8.0	49.979
Time since start [H]	Output Voltage [V]																								
0.0	49.956																								
0.5	49.979																								
1.0	49.979																								
2.0	49.979																								
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5.0	49.979																								
6.0	49.979																								
7.0	49.979																								
8.0	49.979																								

**COSEL**

Model CQHS3004850

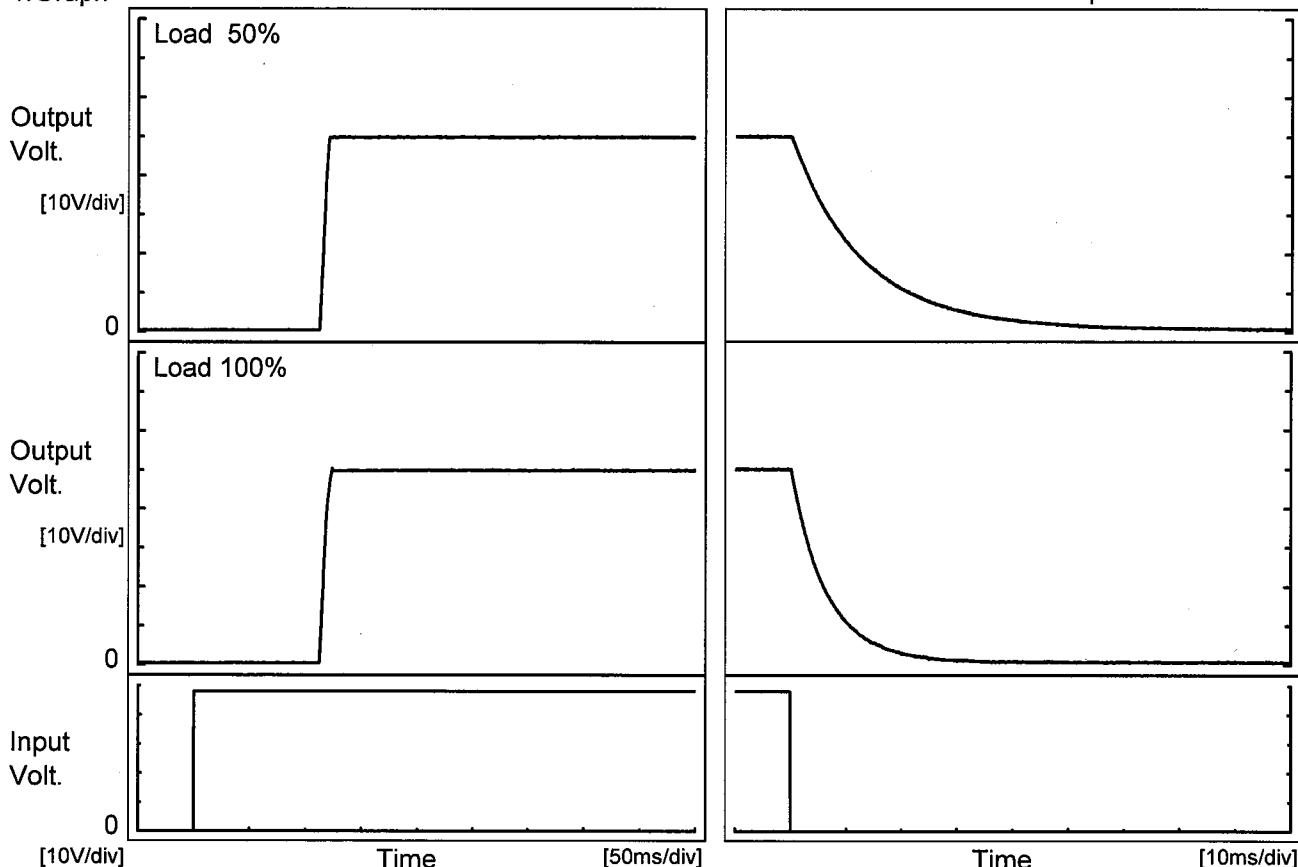
Item Rise and Fall Time

Temperature 25°C  
Testing Circuitry Figure A

Object +50V6A

## 1. Graph

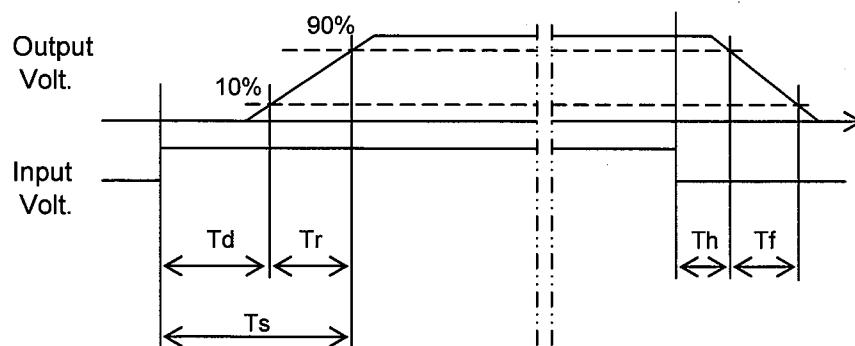
Input Volt. 48 V



## 2. Values

[ms]

Load	Time	Td	Tr	Ts	Th	Tf
50 %		113.3	6.5	119.8	1.3	30.0
100 %		113.3	7.8	121.1	0.7	14.7



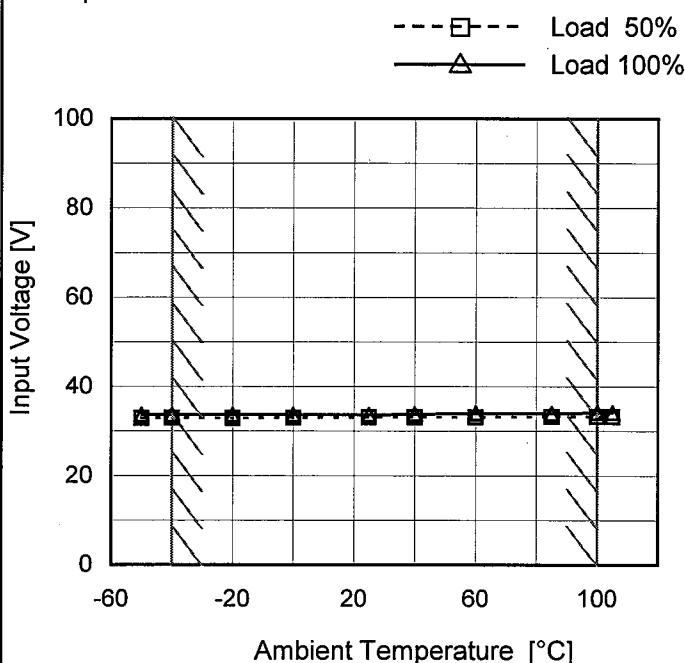
**COSEL**

Model CQHS3004850

Item Minimum Input Voltage  
for Regulated Output Voltage

Object +50V6A

## 1. Graph



Note: Slanted line shows the range of the rated ambient temperature.

Testing Circuitry Figure A

## 2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-50	33.0	33.7
-40	33.0	33.7
-20	33.0	33.7
0	33.0	33.7
25	33.2	33.7
40	33.2	33.9
60	33.1	34.1
85	33.3	34.0
100	33.3	34.2
105	33.3	34.2
--	-	-

**COSEL**

Model	CQHS3004850
Item	Overcurrent Protection
Object	+50V6A

1. Graph

Input Volt.	36V	48V	76V
Output Voltage [V]	50	50	50
Load Current [A]	6	7	7

Note: Slanted line shows the range of the rated load current.

When the output voltage fell to less than 45.0V ,the unit shuts off the output by operating low voltage protection .

Temperature 25°C  
 Testing Circuitry Figure A

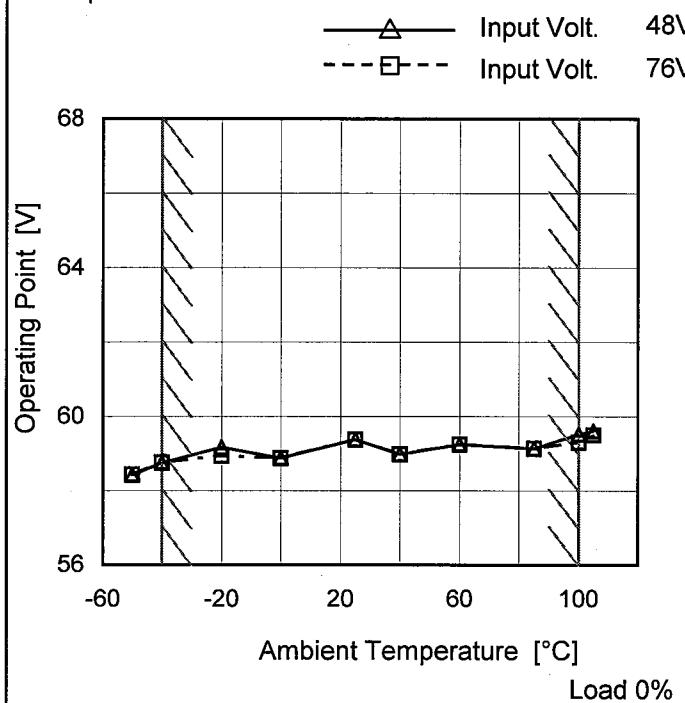
## 2.Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
47.5	7.01	6.90	7.03
45.0	6.89	6.95	7.14
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

**COSEL**

Model	CQHS3004850
Item	Oversupply Protection
Object	+50V6A

## 1. Graph



Note: Slanted line shows the range of the rated ambient temperature.

## Testing Circuitry Figure A

## 2. Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 48[V]	Input Volt. 76[V]
-50	58.42	58.43
-40	58.75	58.76
-20	59.17	58.94
0	58.88	58.88
25	59.38	59.38
40	58.98	58.98
60	59.25	59.25
85	59.14	59.14
100	59.53	59.30
105	59.61	59.50
--	-	-

COSEL

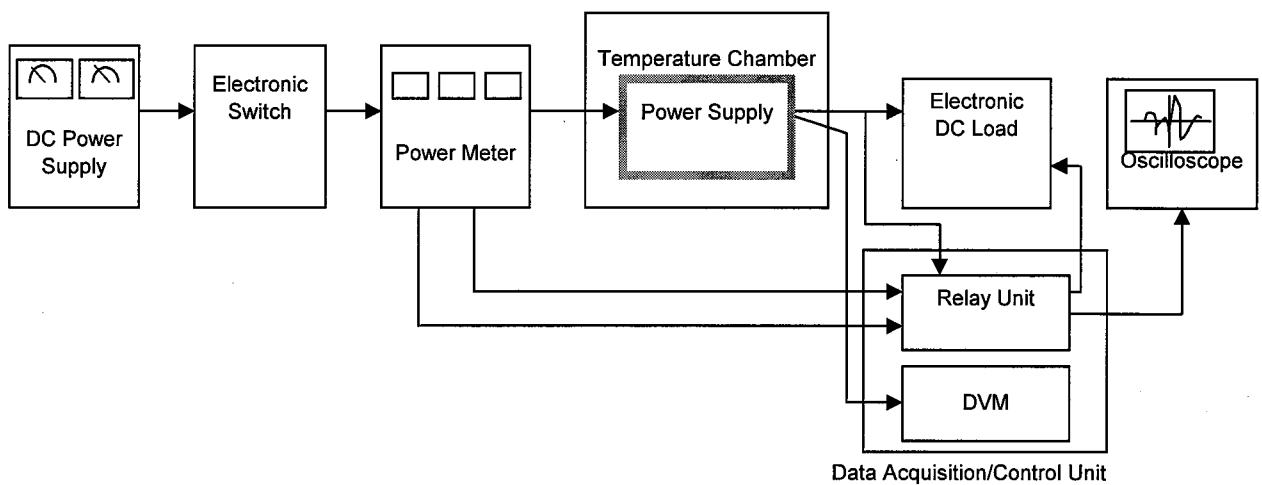
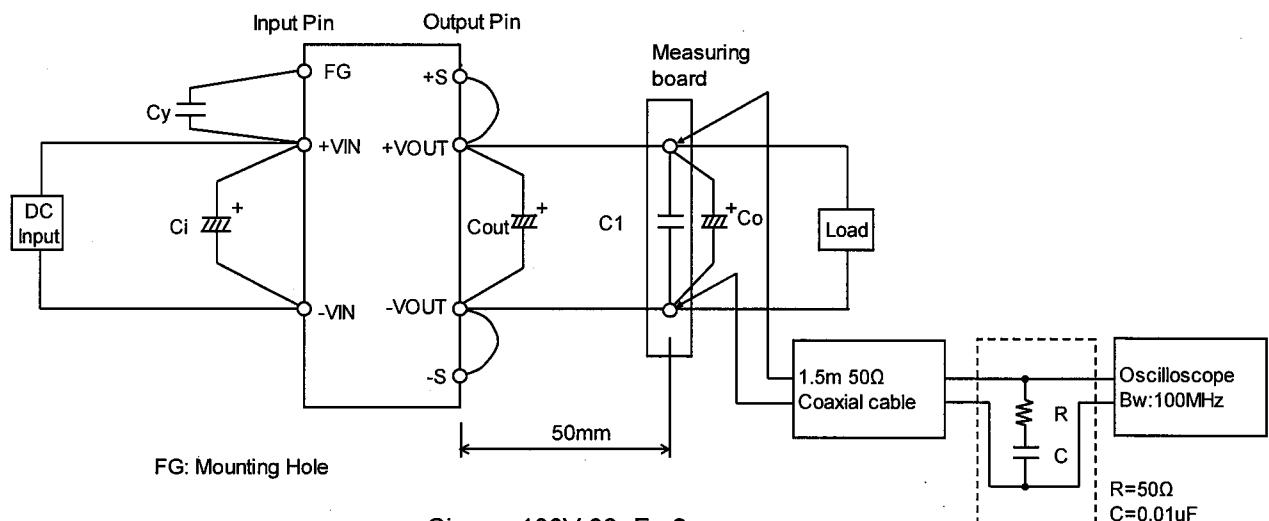


Figure A



FG: Mounting Hole

$C_i$  : 100V 68 $\mu$ F ×2  
 $C_y$  : 4700pF  
 $C_1$  : 100V 0.1 $\mu$ F  
 $C_o$  : 80V 220 $\mu$ F  
 $C_{out}$  : 80V 330 $\mu$ F ×2 ( $-40^\circ\text{C} \leq T_B \leq -20^\circ\text{C}$ )  
          : 80V 330 $\mu$ F ( $-20^\circ\text{C} < T_B \leq 100^\circ\text{C}$ )  
 $T_B$  : Base Plate Temp.

Figure B (Ripple and Ripple noise Characteristic)