



# TEST DATA OF SFS104805

Regulated DC Power Supply  
Jul.15. 2003

E

Approved by : Isao Yasuda Isao Yasuda Design Manager

Prepared by : Toshiyuki Tsuru Toshiyuki Tsuru Design Engineer

C

COSEL CO.,LTD.

## CONTENTS

1.Input Current (by Input Voltage) . . . . .	1
2.Input Current (by Load Current) . . . . .	2
3.Input Power (by Load Current) . . . . .	3
4.Efficiency (by Input Voltage) . . . . .	4
5.Efficiency (by Load Current) . . . . .	5
6.Line Regulation . . . . .	6
7.Load Regulation . . . . .	7
8.Dynamic Load Response . . . . .	8
9.Ripple Voltage (by Load Current) . . . . .	9
10.Ripple-Noise . . . . .	10
11.Ripple Voltage (by Ambient Temperature) . . . . .	11
12.Ambient Temperature Drift . . . . .	12
13.Output Voltage Accuracy . . . . .	13
14.Time Lapse Drift . . . . .	14
15.Rise and Fall Time . . . . .	15
16.Minimum Input Voltage for Regulated Output Voltage . . . . .	16
17.Overcurrent Protection . . . . .	17
18.Overvoltage Protection . . . . .	18
19.Figure of Testing Circuitry . . . . .	19

(Final Page 19)

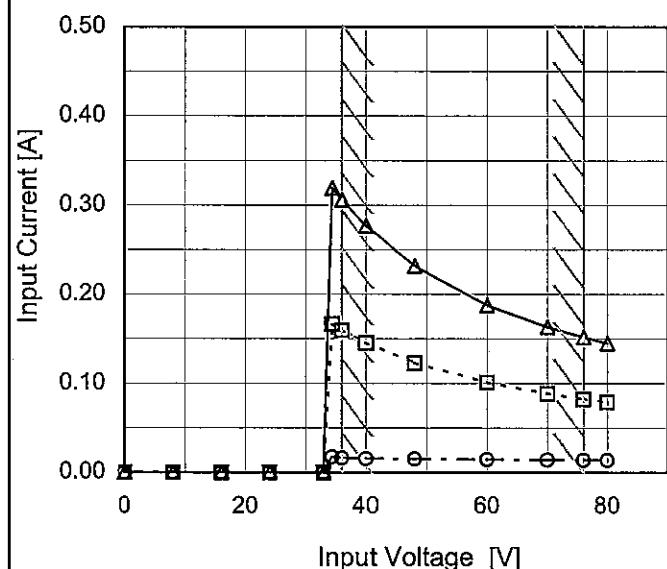
**COSEL**

Model	SFS104805
Item	Input Current (by Input Voltage)
Object	_____

Temperature 25°C  
Testing Circuitry Figure A

## 1.Graph

—△— Load 100%  
 - -□--- Load 50%  
 - -○--- Load 0%



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

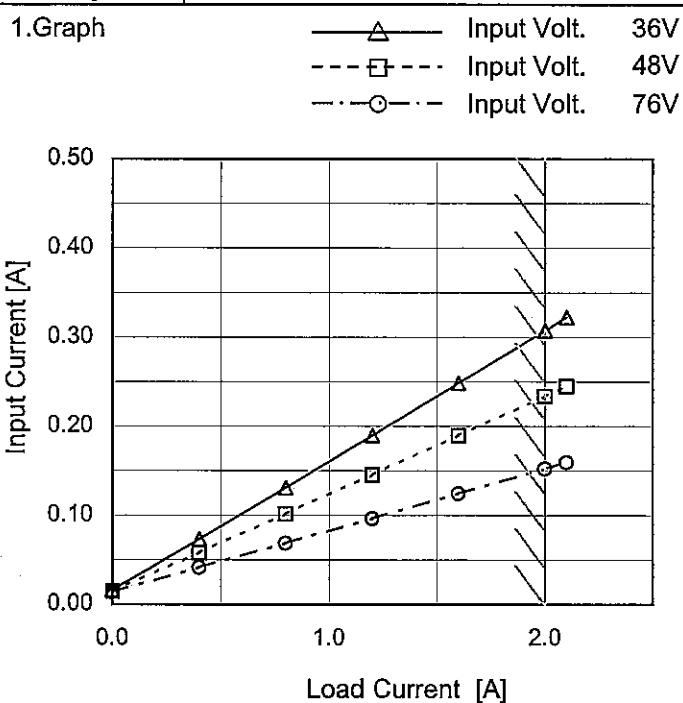
## 2.Values

Input Voltage [V]	Input Current [A]		
	Load 0%	Load 50%	Load 100%
0	0.000	0.000	0.000
8	0.000	0.000	0.000
16	0.000	0.000	0.000
24	0.000	0.000	0.000
33	0.000	0.000	0.000
34	0.017	0.167	0.319
36	0.016	0.160	0.306
40	0.016	0.145	0.277
48	0.015	0.123	0.232
60	0.014	0.101	0.188
70	0.014	0.088	0.164
76	0.014	0.082	0.152
80	0.014	0.079	0.145
--	-	-	-
--	-	-	-
--	-	-	-

**COSEL**

Model.	SFS104805
Item	Input Current (by Load Current)
Object	_____

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	0.016	0.015	0.014
0.4	0.073	0.058	0.041
0.8	0.131	0.102	0.069
1.2	0.190	0.145	0.096
1.6	0.248	0.190	0.124
2.0	0.308	0.234	0.152
2.1	0.322	0.245	0.159
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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

**COSSEL**

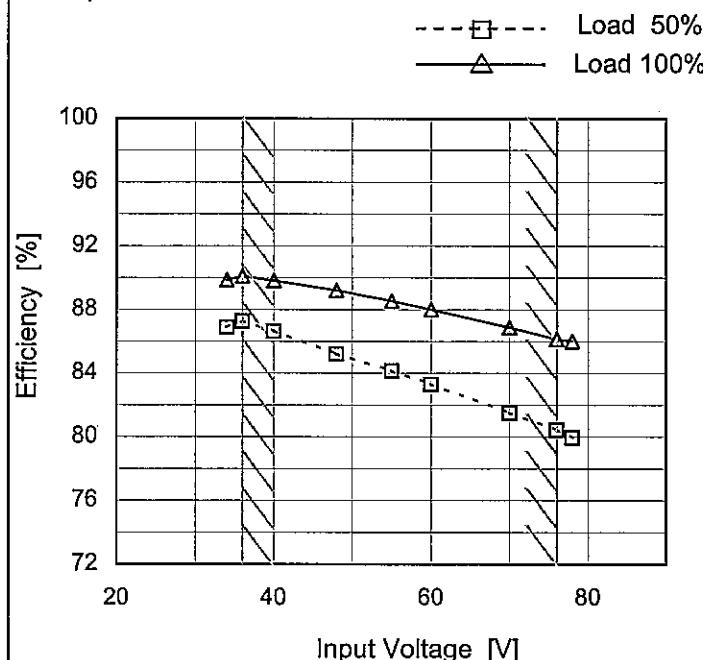
Model	SFS104805	Temperature 25°C Testing Circuitry Figure A																																																					
Item	Input Power (by Load Current)																																																						
Object	_____																																																						
1.Graph	<p>—△— Input Volt. 36V        - - -□- - Input Volt. 48V        - - ○ - - Input Volt. 76V</p> <table border="1"> <caption>Data points estimated from the graph</caption> <thead> <tr> <th>Load Current [A]</th> <th>36V [W]</th> <th>48V [W]</th> <th>76V [W]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>0.58</td><td>0.71</td><td>1.05</td></tr> <tr><td>0.4</td><td>2.64</td><td>2.79</td><td>3.14</td></tr> <tr><td>0.8</td><td>4.73</td><td>4.87</td><td>5.22</td></tr> <tr><td>1.2</td><td>6.83</td><td>6.96</td><td>7.33</td></tr> <tr><td>1.6</td><td>8.94</td><td>9.07</td><td>9.45</td></tr> <tr><td>2.0</td><td>11.07</td><td>11.19</td><td>11.58</td></tr> <tr><td>2.1</td><td>11.60</td><td>11.72</td><td>12.13</td></tr> </tbody> </table>			Load Current [A]	36V [W]	48V [W]	76V [W]	0.0	0.58	0.71	1.05	0.4	2.64	2.79	3.14	0.8	4.73	4.87	5.22	1.2	6.83	6.96	7.33	1.6	8.94	9.07	9.45	2.0	11.07	11.19	11.58	2.1	11.60	11.72	12.13																				
Load Current [A]	36V [W]	48V [W]	76V [W]																																																				
0.0	0.58	0.71	1.05																																																				
0.4	2.64	2.79	3.14																																																				
0.8	4.73	4.87	5.22																																																				
1.2	6.83	6.96	7.33																																																				
1.6	8.94	9.07	9.45																																																				
2.0	11.07	11.19	11.58																																																				
2.1	11.60	11.72	12.13																																																				
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Input Power [W]</th> </tr> <tr> <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>0.58</td><td>0.71</td><td>1.05</td></tr> <tr><td>0.4</td><td>2.64</td><td>2.79</td><td>3.14</td></tr> <tr><td>0.8</td><td>4.73</td><td>4.87</td><td>5.22</td></tr> <tr><td>1.2</td><td>6.83</td><td>6.96</td><td>7.33</td></tr> <tr><td>1.6</td><td>8.94</td><td>9.07</td><td>9.45</td></tr> <tr><td>2.0</td><td>11.07</td><td>11.19</td><td>11.58</td></tr> <tr><td>2.1</td><td>11.60</td><td>11.72</td><td>12.13</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>				Load Current [A]	Input Power [W]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.0	0.58	0.71	1.05	0.4	2.64	2.79	3.14	0.8	4.73	4.87	5.22	1.2	6.83	6.96	7.33	1.6	8.94	9.07	9.45	2.0	11.07	11.19	11.58	2.1	11.60	11.72	12.13	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Input Power [W]																																																						
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]																																																				
0.0	0.58	0.71	1.05																																																				
0.4	2.64	2.79	3.14																																																				
0.8	4.73	4.87	5.22																																																				
1.2	6.83	6.96	7.33																																																				
1.6	8.94	9.07	9.45																																																				
2.0	11.07	11.19	11.58																																																				
2.1	11.60	11.72	12.13																																																				
--	-	-	-																																																				
--	-	-	-																																																				
--	-	-	-																																																				
--	-	-	-																																																				
Note:	Slanted line shows the range of the rated load current.																																																						

**COSSEL**

Model	SFS104805
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%
34	86.9	89.9
36	87.3	90.1
40	86.6	89.8
48	85.2	89.2
55	84.1	88.6
60	83.3	88.0
70	81.5	86.9
76	80.4	86.2
78	80.0	86.0

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

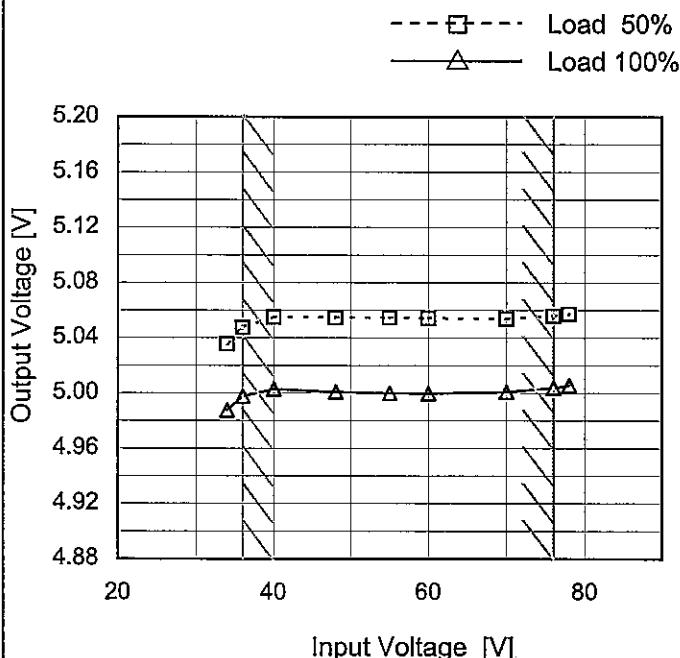
**COSEL**

Model	SFS104805	Temperature 25°C Testing Circuitry Figure A		
Item	Efficiency (by Load Current)			
Object	_____	2.Values		
1.Graph	Input Volt. 36V Input Volt. 48V Input Volt. 76V			
	<p>The graph plots Efficiency [%] on the y-axis (44 to 100) against Load Current [A] on the x-axis (0.0 to 2.0). Three curves are shown for input voltages of 36V, 48V, and 76V. The 76V curve is the highest, followed by 48V, and then 36V. All curves show an increase in efficiency as load current increases, with a slight plateau around 1.5-2.0A. A slanted line on the right side of the graph indicates the rated load current range.</p>			
Note:	Slanted line shows the range of the rated load current.			
Load Current [A]	0.0	36[V]	48[V]	76[V]
	-	-	-	-
	0.4	77.0	73.1	65.2
	0.8	85.6	83.3	77.6
	1.2	88.4	86.9	82.5
	1.6	89.6	88.4	84.9
	2.0	90.2	89.2	86.3
	2.1	90.2	89.4	86.4
	--	--	--	--
	--	--	--	--
	--	--	--	--
	--	--	--	--

Model	SFS104805
Item	Line Regulation
Object	+5V2A

Temperature 25°C  
Testing Circuitry Figure A

## 1.Graph

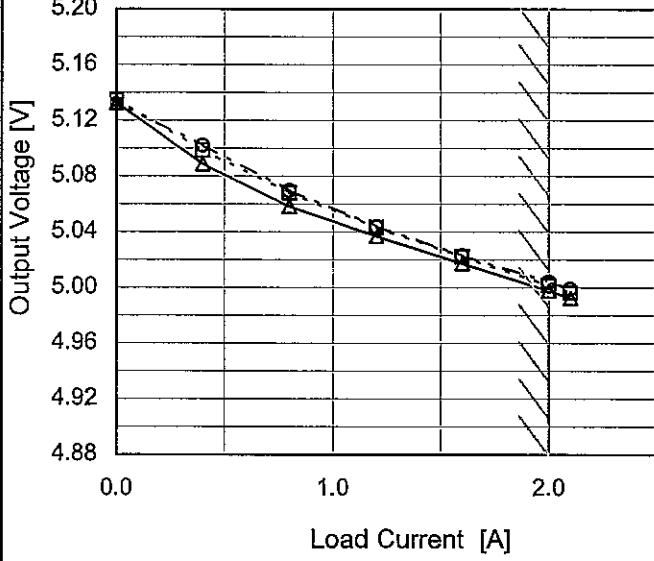


## 2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
34	5.036	4.988
36	5.048	4.998
40	5.055	5.003
48	5.055	5.001
55	5.055	5.000
60	5.054	5.000
70	5.054	5.001
76	5.056	5.004
78	5.057	5.006

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

**COSSEL**

Model	SFS104805	Temperature 25°C Testing Circuitry Figure A																																																					
Item	Load Regulation																																																						
Object	+5V2A																																																						
1.Graph	<p>—▲— Input Volt. 36V      - - - □ - - Input Volt. 48V      - - - ○ - - Input Volt. 76V</p>  <p>Output Voltage [V]</p> <p>Load Current [A]</p>	2.Values																																																					
		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <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>5.133</td><td>5.135</td><td>5.132</td></tr> <tr><td>0.4</td><td>5.089</td><td>5.099</td><td>5.102</td></tr> <tr><td>0.8</td><td>5.059</td><td>5.068</td><td>5.070</td></tr> <tr><td>1.2</td><td>5.037</td><td>5.043</td><td>5.044</td></tr> <tr><td>1.6</td><td>5.017</td><td>5.022</td><td>5.023</td></tr> <tr><td>2.0</td><td>4.998</td><td>5.002</td><td>5.004</td></tr> <tr><td>2.1</td><td>4.993</td><td>4.996</td><td>4.999</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>			Load Current [A]	Output Voltage [V]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.0	5.133	5.135	5.132	0.4	5.089	5.099	5.102	0.8	5.059	5.068	5.070	1.2	5.037	5.043	5.044	1.6	5.017	5.022	5.023	2.0	4.998	5.002	5.004	2.1	4.993	4.996	4.999	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Output Voltage [V]																																																						
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]																																																				
0.0	5.133	5.135	5.132																																																				
0.4	5.089	5.099	5.102																																																				
0.8	5.059	5.068	5.070																																																				
1.2	5.037	5.043	5.044																																																				
1.6	5.017	5.022	5.023																																																				
2.0	4.998	5.002	5.004																																																				
2.1	4.993	4.996	4.999																																																				
--	-	-	-																																																				
--	-	-	-																																																				
--	-	-	-																																																				
--	-	-	-																																																				

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

**COSSEL**

Model	SFS104805	Temperature Testing Circuitry Figure A	25°C
Item	Dynamic Load Response		
Object	+5V2A		

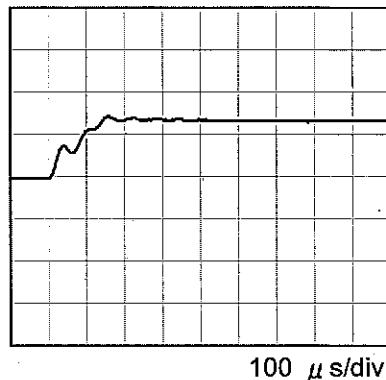
Input Volt. 48 V  
 Cycle 1000 ms

Load Current 2A/200  $\mu$ s

Min. Load (0A) ↔

Load 100% (2A)

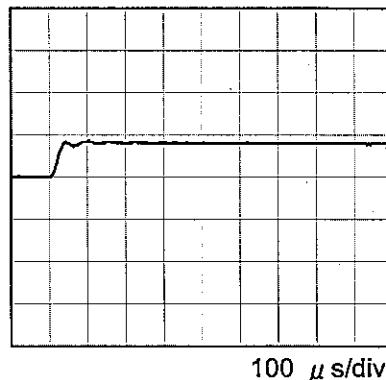
100 mV/div

100  $\mu$ s/div100  $\mu$ s/div

Min. Load (0A) ↔

Load 50% (1A)

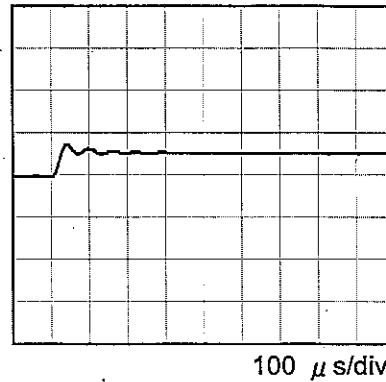
100 mV/div

100  $\mu$ s/div100  $\mu$ s/div

Load 50% (1A) ↔

Load 100% (2A)

100 mV/div

100  $\mu$ s/div100  $\mu$ s/div

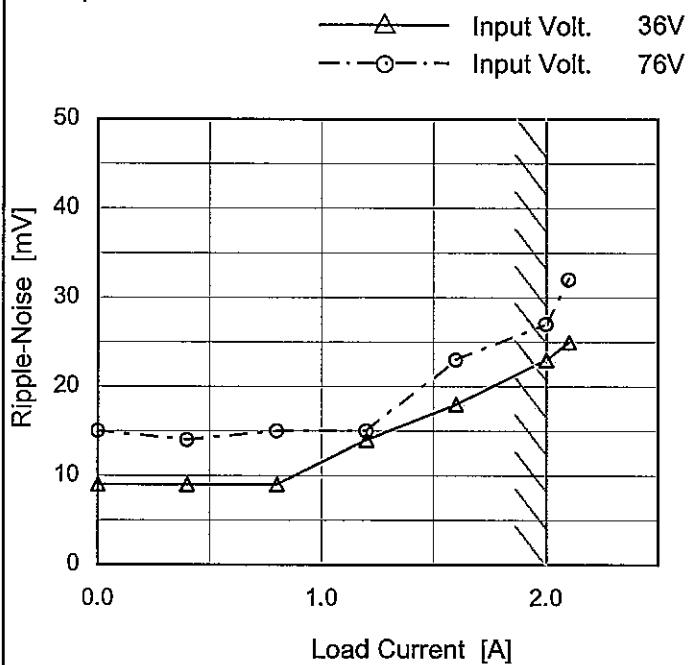
**COSEL**

Model	SFS104805																																							
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure C																																						
Object	+5V2A																																							
1. Graph																																								
<p>—△— Input Volt. 36V ---○--- Input Volt. 76V</p> <p>Ripple Voltage [mV]</p> <p>Load Current [A]</p>																																								
<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>																																								
2. Values																																								
<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 36 [V]</th> <th>Input Volt. 76 [V]</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>3</td> <td>5</td> </tr> <tr> <td>0.4</td> <td>3</td> <td>5</td> </tr> <tr> <td>0.8</td> <td>3</td> <td>5</td> </tr> <tr> <td>1.2</td> <td>3</td> <td>5</td> </tr> <tr> <td>1.6</td> <td>3</td> <td>5</td> </tr> <tr> <td>2.0</td> <td>3</td> <td>5</td> </tr> <tr> <td>2.1</td> <td>3</td> <td>5</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table>			Load Current [A]	Ripple Voltage [mV]		Input Volt. 36 [V]	Input Volt. 76 [V]	0.0	3	5	0.4	3	5	0.8	3	5	1.2	3	5	1.6	3	5	2.0	3	5	2.1	3	5	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																							
	Input Volt. 36 [V]	Input Volt. 76 [V]																																						
0.0	3	5																																						
0.4	3	5																																						
0.8	3	5																																						
1.2	3	5																																						
1.6	3	5																																						
2.0	3	5																																						
2.1	3	5																																						
--	-	-																																						
--	-	-																																						
--	-	-																																						
--	-	-																																						

Model	SFS104805
Item	Ripple-Noise
Object	+5V2A

Temperature 25°C  
Testing Circuitry Figure C

## 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	9	15
0.4	9	14
0.8	9	15
1.2	14	15
1.6	18	23
2.0	23	27
2.1	25	32
--	-	-
--	-	-
--	-	-
--	-	-

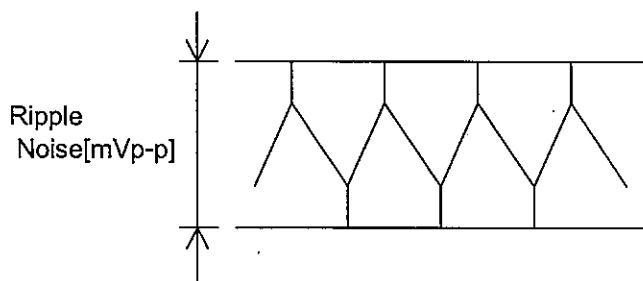
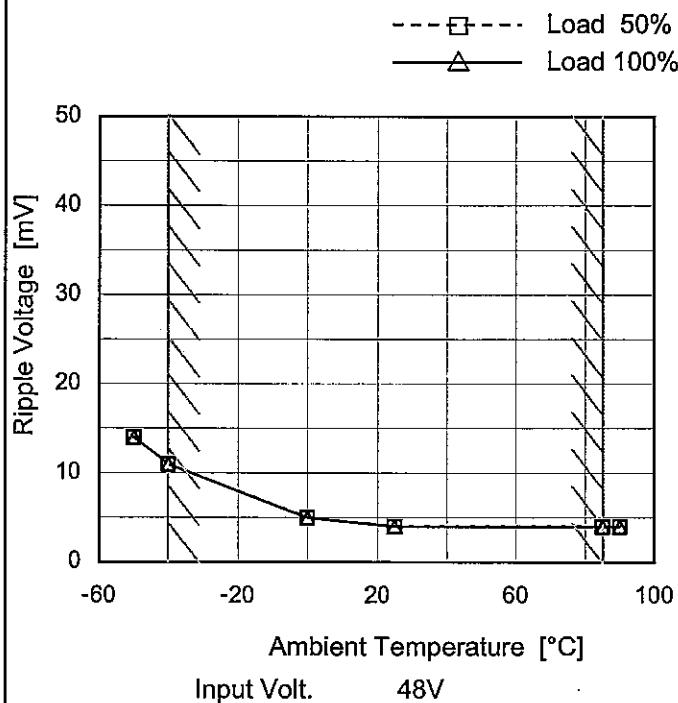


Fig.Complex Ripple Noise Wave Form

**COSEL**

Model	SFS104805
Item	Ripple Voltage (by Ambient Temp.)
Object	+5V2A

## 1.Graph



Measured by 100 MHz Oscilloscope.  
Note: Slanted line shows the range of the rated ambient temperature.

Testing Circuitry Figure C

## 2.Values

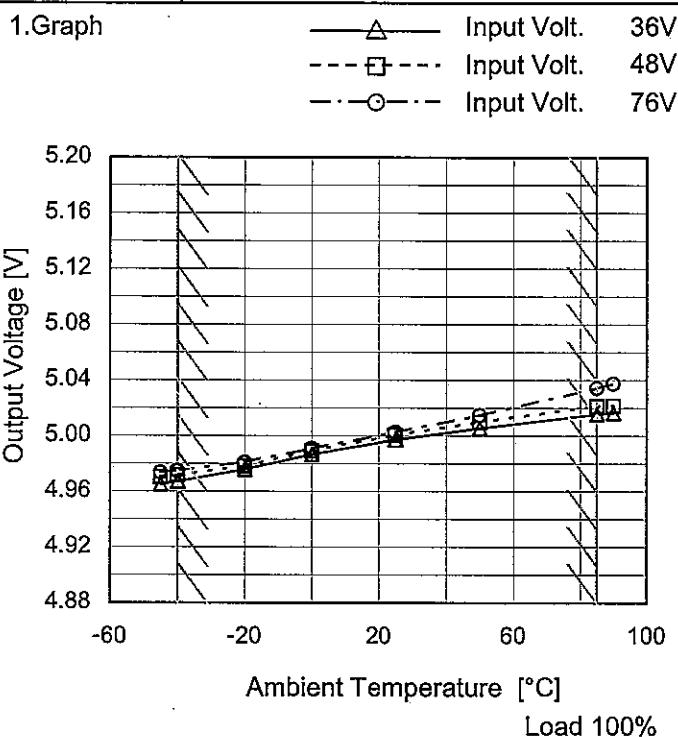
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-50	14	14
-40	11	11
0	5	5
25	4	4
85	4	4
90	4	4
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

**COSSEL**

Model SFS104805

Item Ambient Temperature Drift

Object +5V2A



Testing Circuitry Figure A

## 2. Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-45	4.965	4.970	4.974
-40	4.967	4.972	4.975
-20	4.976	4.978	4.981
0	4.987	4.989	4.991
25	4.997	5.000	5.003
50	5.006	5.010	5.015
85	5.016	5.021	5.034
90	5.016	5.022	5.037
--	-	-	-
--	-	-	-
--	-	-	-

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



Model	SFS104805	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+5V2A	

### 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 - 85°C

Input Voltage : 36 - 76V

Load Current : 0 - 2A

\* 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	5.179	$\pm 106$	$\pm 2.1$
Minimum Voltage	-40	36	2	4.968		

**COSSEL**

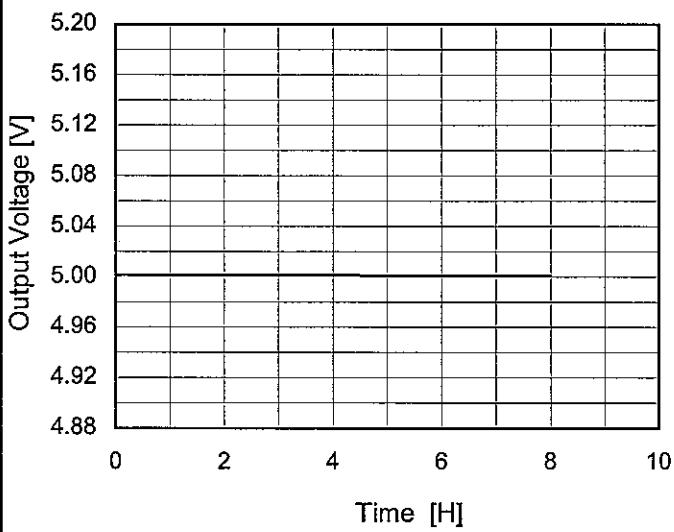
Model SFS104805

Item Time Lapse Drift

Object +5V2A

Temperature 25°C  
Testing Circuitry Figure A

## 1. Graph



## 2. Values

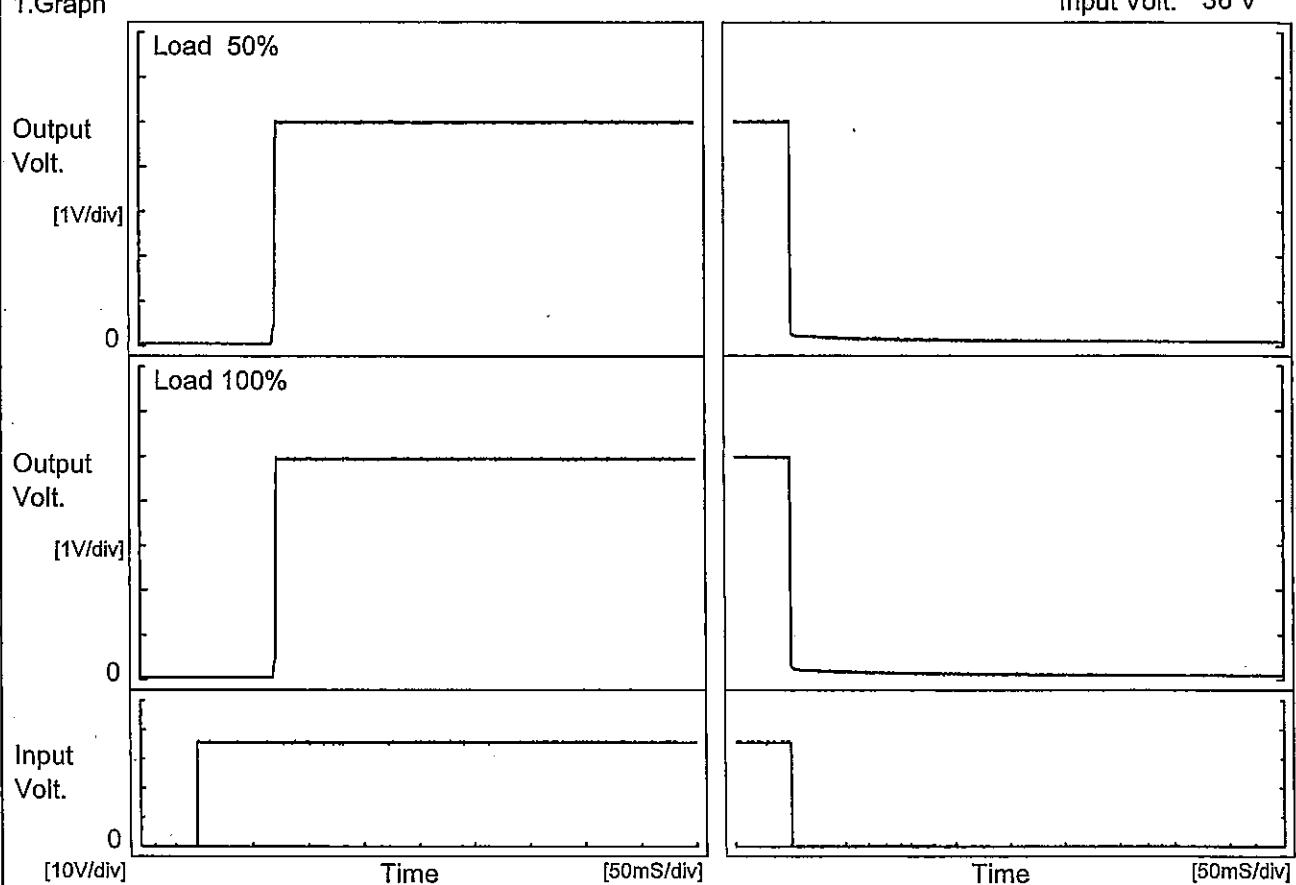
Time since start [H]	Output Voltage [V]
0.0	4.999
0.5	5.002
1.0	5.002
2.0	5.002
3.0	5.002
4.0	5.001
5.0	5.001
6.0	5.001
7.0	5.001
8.0	5.001

**COSEL**

Model	SFS104805
Item	Rise and Fall Time
Object	+5V2A

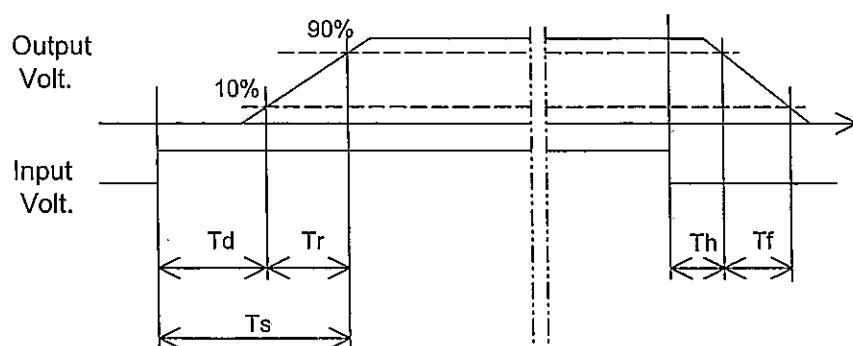
Temperature 25°C  
Testing Circuitry Figure A

## 1. Graph



## 2. Values

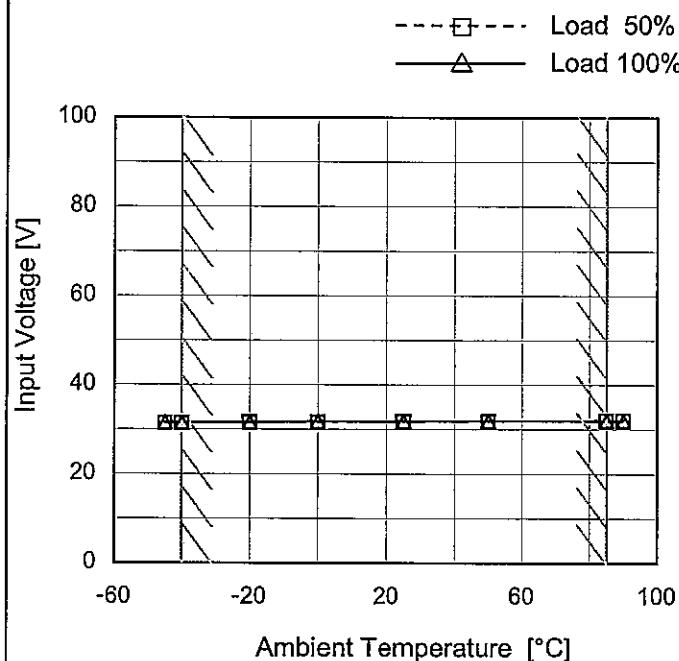
Load	Time	Td	Tr	Ts	Th	Tf	[mS]
50 %		71.0	0.5	71.5	0.3	0.8	
100 %		70.8	0.5	71.3	0.3	0.5	



Model	SFS104805
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+5V2A

Testing Circuitry Figure A

## 1. Graph



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

## 2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-45	31.4	31.6
-40	31.5	31.6
-20	31.7	31.6
0	31.7	31.8
25	31.9	31.8
50	31.9	32.0
85	32.1	32.0
90	32.1	32.0
--	-	-
--	-	-
--	-	-

**COSEL**

Model	SFS104805	Temperature Testing Circuitry Figure A
Item	Overcurrent Protection	
Object	+5V2A	

1.Graph

Output Voltage [V]

Load Current [A]

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

When output voltage fell to less than 4.5V ,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.	Input Volt.	Input Volt.
36[V]	48[V]	76[V]	
5.00	2.05	2.05	2.11
4.75	2.25	2.26	2.32
4.50	2.26	2.28	2.35
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

**COSSEL**

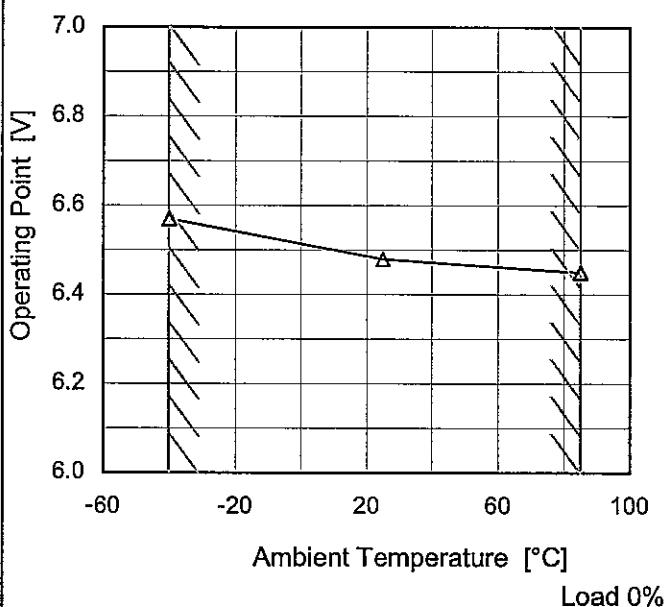
Model SFS104805

Item Overvoltage Protection

Object +5V2A

1. Graph

—△— Input Volt. 48V



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. -[V]	Input Volt. -[V]
-40	6.57	-	-
25	6.48	-	-
85	6.45	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

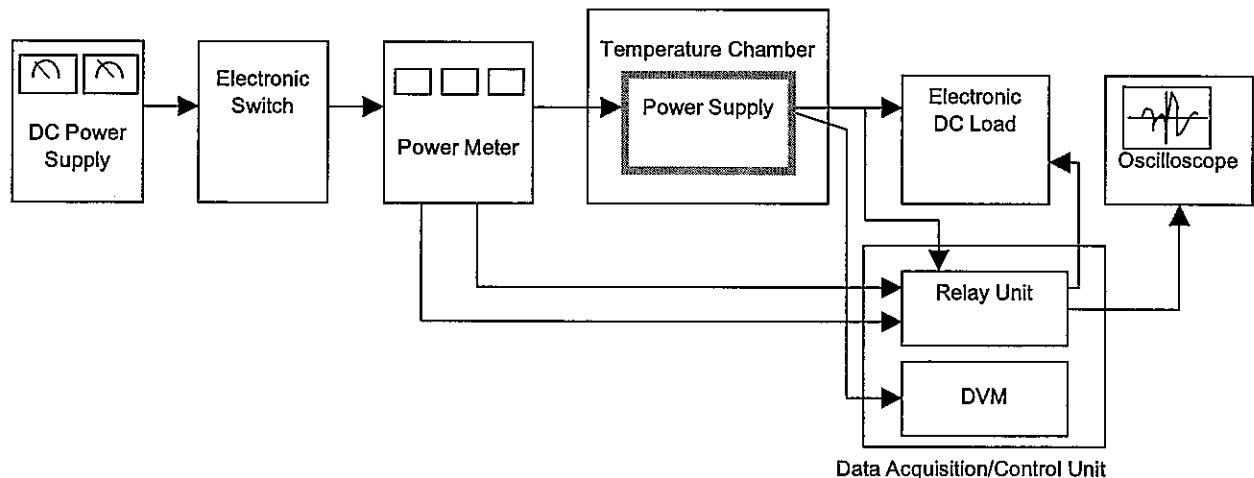


Figure A

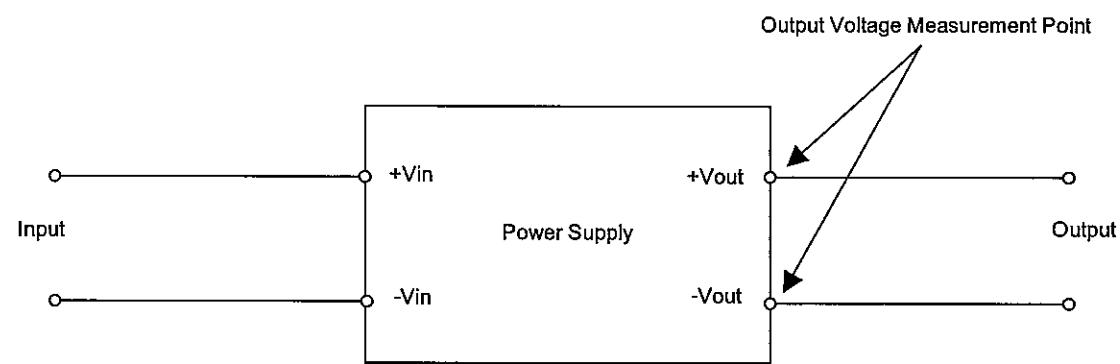


Figure B (General Electric Characteristic)

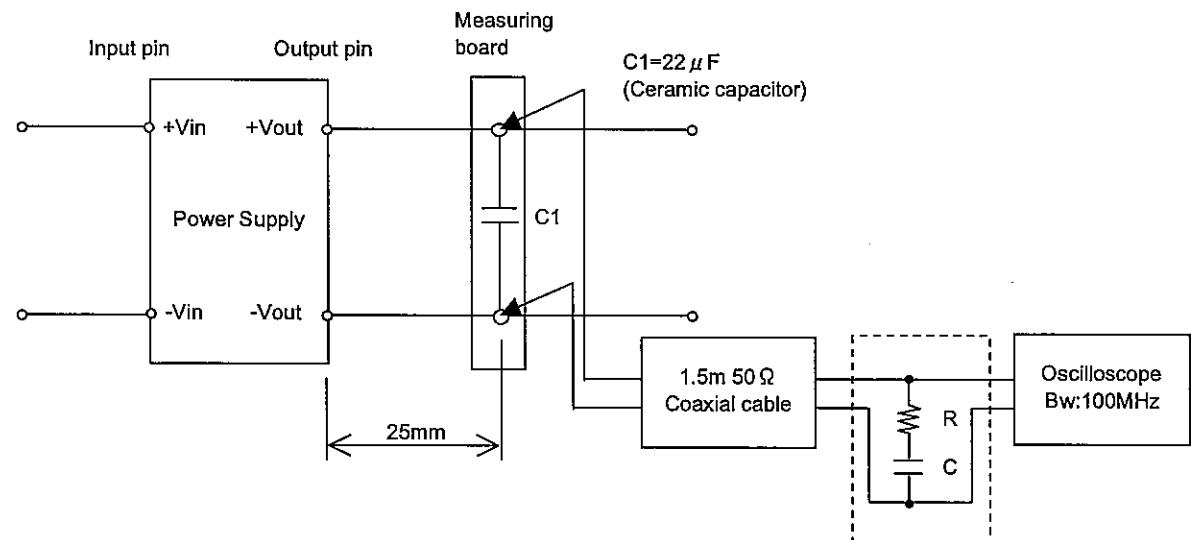


Figure C (Ripple and Ripple noise Characteristic)