TEST DATA OF DHS50B12

Regulated DC Power Supply
May 25, 2009

Approved by : *Tatsuya Mano*   Design Manager

Tatsuya Mano

Prepared by : *Shuuhei Sawada*   Design Engineer

Shuuhei Sawada

COSEL CO.,LTD.

CONTENTS

COSEL

Model	DHS50B12
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
50	0.000	0.000	0.000
100	0.000	0.000	0.000
150	0.000	0.000	0.000
170	0.002	0.002	0.002
180	0.028	0.176	0.325
200	0.023	0.157	0.299
250	0.010	0.125	0.239
280	0.008	0.113	0.212
300	0.007	0.107	0.202
350	0.007	0.095	0.176
400	0.006	0.086	0.157
420	0.006	0.083	0.151
--	-	-	-
---	-	-	-
--	-	-	-
--	-	-	-
---	-	-	-

BC-10330

CO$EL

Model	DHS50B12
Item	Input Current (by Load Current)
Object	
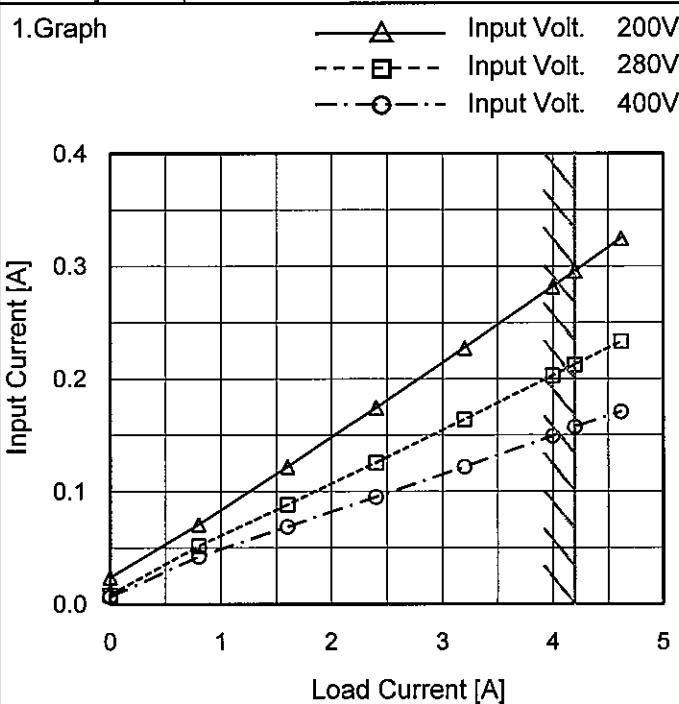
Temperature 25°C
Testing Circuitry Figure A

1.Graph

——△—— Input Volt. 200V
- - -⊟- - - Input Volt. 280V
—·-○—·- Input Volt. 400V

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

2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
0.00	0.024	0.008	0.006
0.80	0.070	0.052	0.042
1.60	0.122	0.088	0.069
2.40	0.174	0.125	0.095
3.20	0.227	0.164	0.122
4.00	0.282	0.203	0.149
4.20	0.295	0.212	0.157
4.62	0.325	0.233	0.171
--	-	-	-
--	-	-	-
--	-	-	-

BC-10330

COSEL

Model	DHS50B12
Item	Input Power (by Load Current)
Object	

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

Input Volt. 200V
Input Volt. 280V
Input Volt. 400V

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

2.Values

Load Current [A]	Input Power [W]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
0.00	4.80	2.40	2.70
0.80	14.10	14.50	17.00
1.60	24.40	24.80	27.60
2.40	34.90	35.20	38.20
3.20	45.50	45.90	48.90
4.00	56.40	56.80	59.80
4.20	59.20	59.60	62.60
4.62	65.00	65.40	68.40
--	-	-	-
--	-	-	-
--	-	-	-

BC-10330

COSEL

Model	DHS50B12
Item	Efficiency (by Input Voltage)
Object	

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

--□-- Load 50%
—△— Load 100%

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

2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
195	79.7	84.2
200	79.7	84.4
240	80.1	84.8
280	79.3	84.2
320	77.4	82.8
360	74.7	81.3
400	72.2	80.0
420	71.2	79.2
--	-	-

BC-10330

COSEL

Model	DHS50B12
Item	Efficiency (by Load Current)
Object	
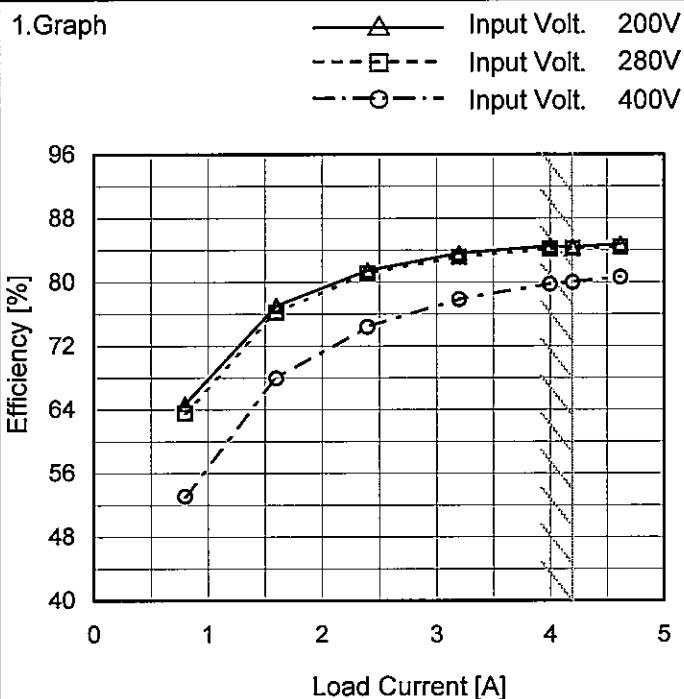
Temperature	25°C
Testing Circuitry	Figure A

1.Graph

——△—— Input Volt. 200V
- - -◻- - - Input Volt. 280V
—·—◯—·· Input Volt. 400V

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

2.Values

Load Current [A]	Efficiency [%]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
0.00	-	-	-
0.80	64.7	63.6	53.1
1.60	77.0	76.2	68.0
2.40	81.5	81.1	74.4
3.20	83.6	83.2	77.8
4.00	84.5	84.1	79.8
4.20	84.4	84.2	80.0
4.62	84.8	84.4	80.6
--	-	-	-
--	-	-	-
---	-	-	-

BC-10330

COSEL

Model	DHS50B12
Item	Line Regulation
Object	+12V4.2A
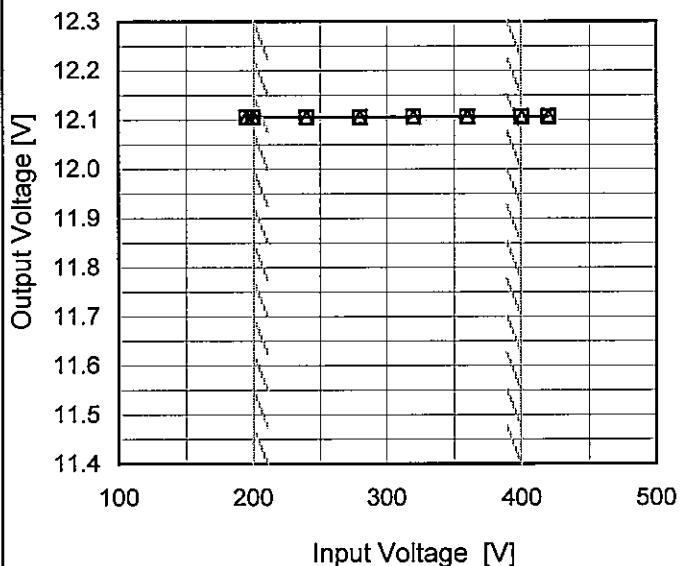
Temperature 25°C
Testing Circuitry Figure A

1.Graph

- - -⊟- - - Load 50%
——△—— Load 100%

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

2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
195	12.106	12.106
200	12.106	12.106
240	12.106	12.106
280	12.106	12.106
320	12.106	12.107
360	12.106	12.107
400	12.107	12.107
420	12.107	12.107
--	-	--

BC-10330

COSEL

Model	DHS50B12
Item	Load Regulation
Object	+12V4.2A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

——△—— Input Volt. 200V
---□--- Input Volt. 280V
—·—○—·· Input Volt. 400V

Output Voltage [V] vs Load Current [A]

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

2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
0.00	12.112	12.113	12.113
0.80	12.106	12.106	12.106
1.60	12.105	12.105	12.106
2.40	12.106	12.106	12.106
3.20	12.105	12.105	12.106
4.00	12.106	12.106	12.106
4.20	12.106	12.106	12.106
4.62	12.106	12.106	12.106
--	-	-	-
--	-	-	-
--	-	-	-

BC-10330

CO$EL

Model	DHS50B12
Item	Dynamic Load Response
Object	+12V4.2A

Temperature	25°C
Testing Circuitry	Figure A

Input Volt.　　280 V

Cycle　　1000　ms

Load Current

4.2A / 20 μs

Min. Load (0A) ←→
Load 100% (4.2A)

500mV/div

500 μs/div

5 ms/div

Min. Load (0A) ←→
Load 50% (2.1A)

500mV/div

500 μs/div

5 ms/div

Load 10% (0.42A) ←→
Load 100% (4.2A)

500mV/div

500 μs/div

5 ms/div

BC-10330

CO$EL
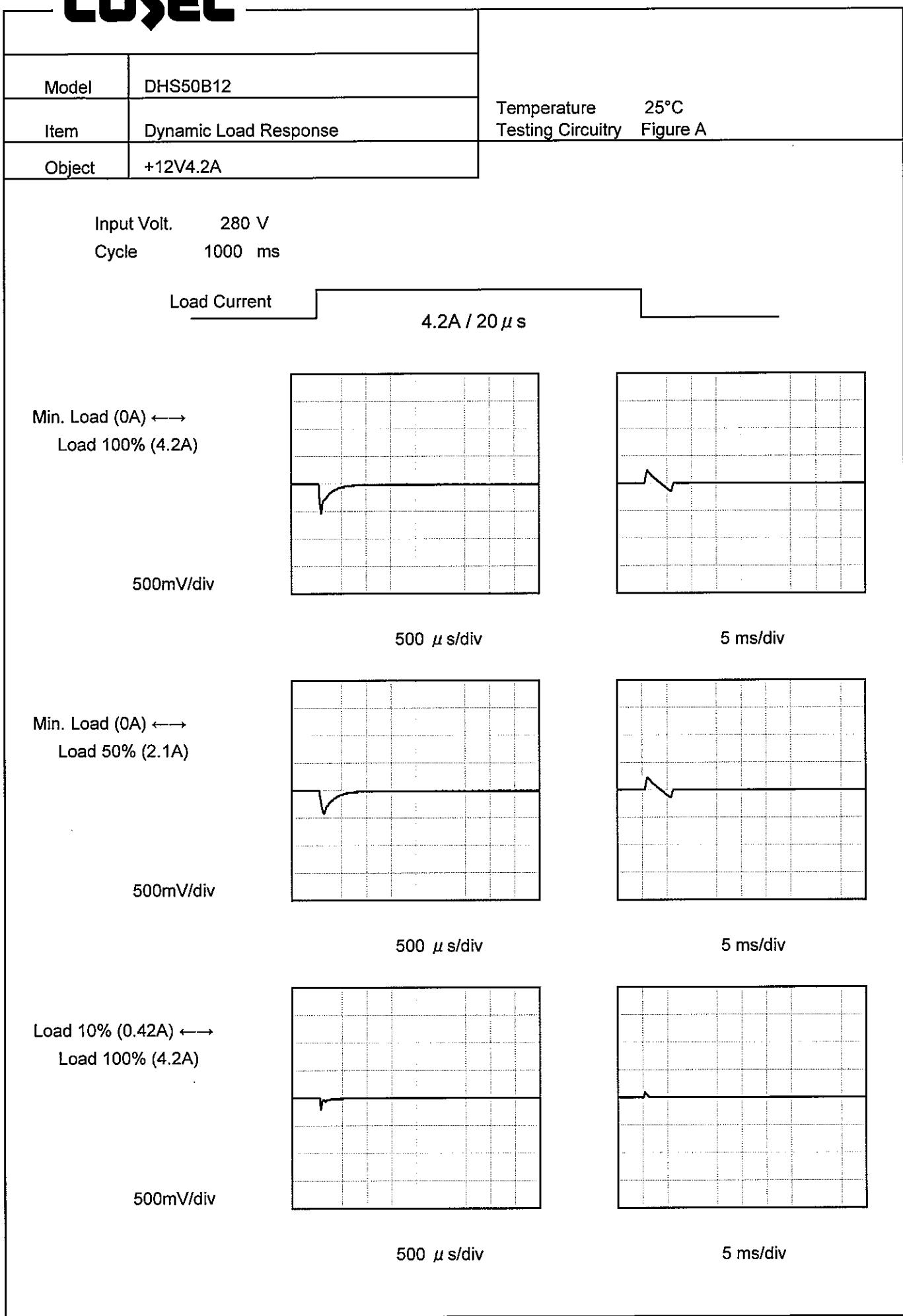
Model	DHS50B12
Item	Ripple Voltage (by Load Current)
Object	+12V4.2A

Temperature   25°C
Testing Circuitry   Figure B

1.Graph

——△—— Input Volt. 200V
— ·—○—·· — Input Volt. 400V
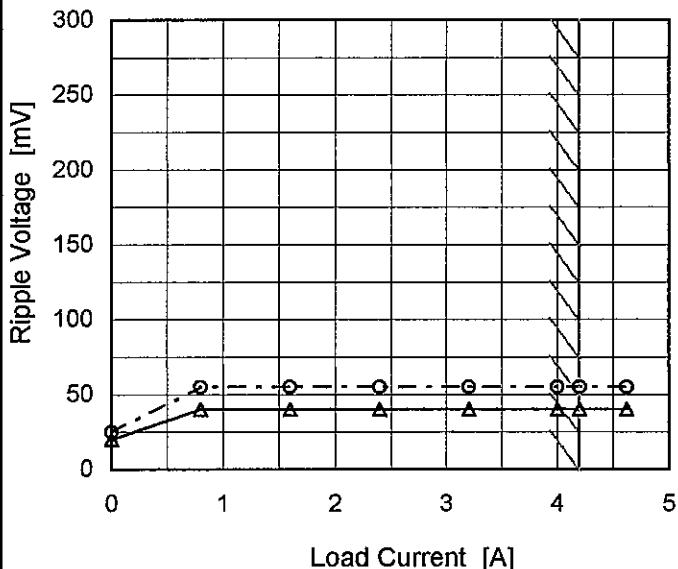
Load Current [A]

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.

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 200 [V]	Input Volt. 400 [V]
0.00	20	25
0.80	40	55
1.60	40	55
2.40	40	55
3.20	40	55
4.00	40	55
4.20	40	55
4.62	40	55
--	-	-
--	-	-
--	-	-

Ripple [mVp-p]
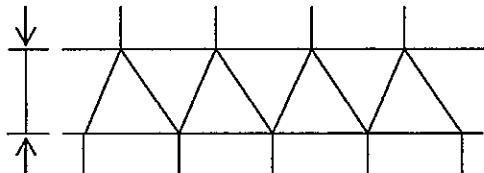
Fig.Complex Ripple Wave Form

BC-10330

CO$EL

Model	DHS50B12
Item	Ripple-Noise
Object	+12V4.2A

Temperature	25°C
Testing Circuitry	Figure B

1.Graph

——△—— Input Volt. 200V
—·—◯—·— Input Volt. 400V

Load Current [A]

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. 200 [V]	Input Volt. 400 [V]
0.00	25	40
0.80	55	60
1.60	60	60
2.40	70	60
3.20	70	60
4.00	70	60
4.20	70	60
4.62	70	60
--	-	-
--	-	-
--	-	-

Ripple
Noise[mVp-p]

Fig.Complex Ripple Noise Wave Form

BC-10330

COSEL

Model	DHS50B12
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V4.2A

Testing Circuitry   Figure B

1.Graph

--- ⊟ --- Load 50%
—— △ —— Load 100%

Input Volt.   280V

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

2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-50	90	90
-40	90	90
-20	90	90
0	60	55
25	45	55
40	45	55
55	45	55
70	45	55
85	45	55
100	40	45
--	--	-

BC-10330

COSEL

Model	DHS50B12
Item	Ambient Temperature Drift
Object	+12V4.2A

Testing Circuitry   Figure A

1.Graph

——△—— Input Volt.   200V
- - -◻- - - Input Volt.   280V
—·—○—·— Input Volt.   400V

Output Voltage [V] vs Ambient Temperature [°C]
Load 100%

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

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
-50	12.026	12.028	12.030
-40	12.041	12.043	12.045
-20	12.068	12.068	12.070
0	12.088	12.089	12.090
25	12.105	12.106	12.105
40	12.112	12.110	12.110
55	12.115	12.113	12.113
70	12.115	12.114	12.114
85	12.115	12.114	12.114
100	12.114	12.113	12.114
—	-	-	-

BC-10330

COSEL

Model	DHS50B12
Item	Output Voltage Accuracy
Object	+12V4.2A

Testing Circuitry Figure A

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 : 200 - 400V

Load Current : 0 - 4.2A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - 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 Current[A]	Output Voltage[V]	Output Voltage Accuracy Value [mV]	Output Voltage Accuracy Ration [%]
Maximum Voltage	70	400	0	12.127	±43	±0.4
Minimum Voltage	-40	200	4.2	12.041		

BC-10330

COSEL

Model	DHS50B12
Item	Time Lapse Drift
Object	+12V4.2A

Temperature	25°C
Testing Circuitry	Figure A

1.Graph

Output Voltage [V] vs Time [H]

Input Volt. 280V
Load 100%
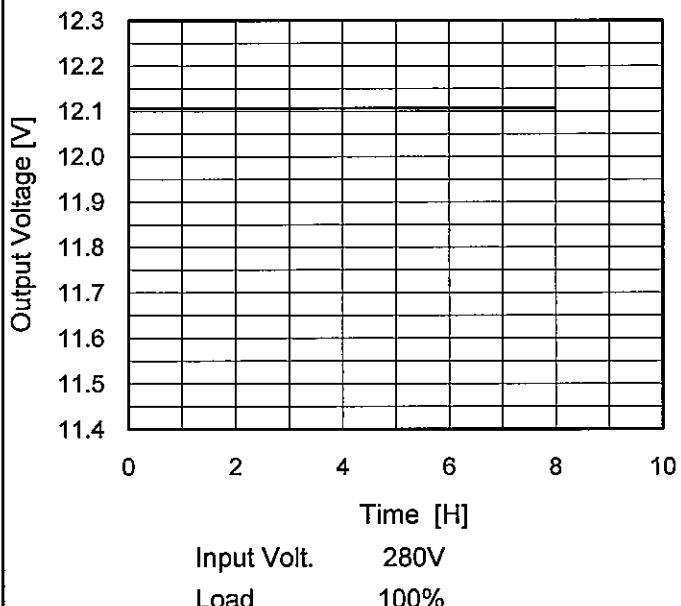
2.Values

Time since start [H]	Output Voltage [V]
0.0	12.106
0.5	12.106
1.0	12.106
2.0	12.106
3.0	12.106
4.0	12.106
5.0	12.106
6.0	12.106
7.0	12.106
8.0	12.106

BC-10330

COSEL

Model	DHS50B12		
Item	Rise and Fall Time	Temperature	25°C
		Testing Circuitry	Figure A
Object	+12V4.2A		

1.Graph   Input Volt. 280 V
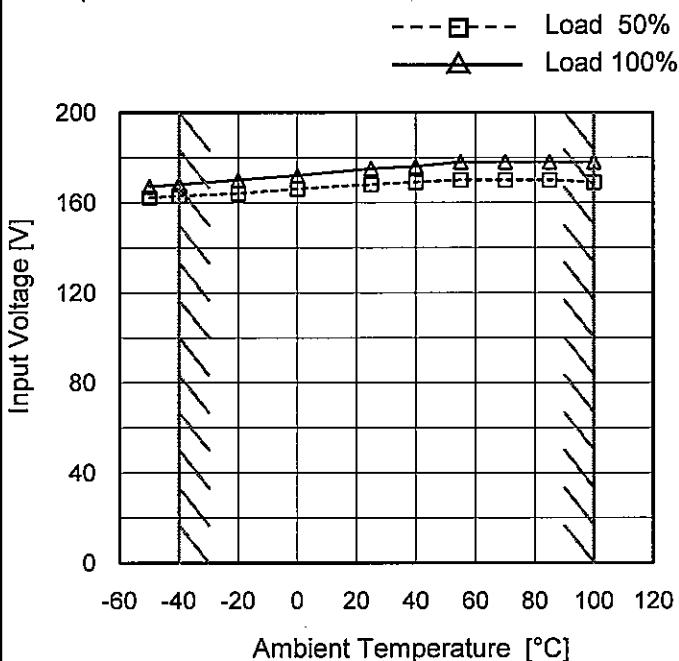
Load 50%

Output Volt.
[2V/div]

0

Load 100%

Output Volt.
[2V/div]

0

Input Volt.

0
[100V/div]   Time   [50ms/div]   Time   [10ms/div]

2.Values   [ms]

Load ＼ Time	Td	Tr	Ts	Th	Tf
50 %	26.3	3.5	29.8	1.1	23.6
100 %	26.3	5.5	31.8	1.6	23.0

Output Volt.

90%

10%

Input Volt.

Td   Tr   Th   Tf

Ts

BC-10330

COSEL

Model	DHS50B12
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V4.2A

Testing Circuitry   Figure A

1.Graph

--- ⊟ --- Load 50%
—— △ —— Load 100%

Input Voltage [V] vs Ambient Temperature [°C]

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

2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-50	162	167
-40	163	168
-20	164	170
0	166	172
25	168	175
40	169	176
55	170	178
70	170	178
85	170	178
100	169	178
---	-	-

BC-10330

CO$EL

Model	DHS50B12
Item	Overcurrent Protection
Object	+12V4.2A

Temperature 25°C
Testing Circuitry Figure A
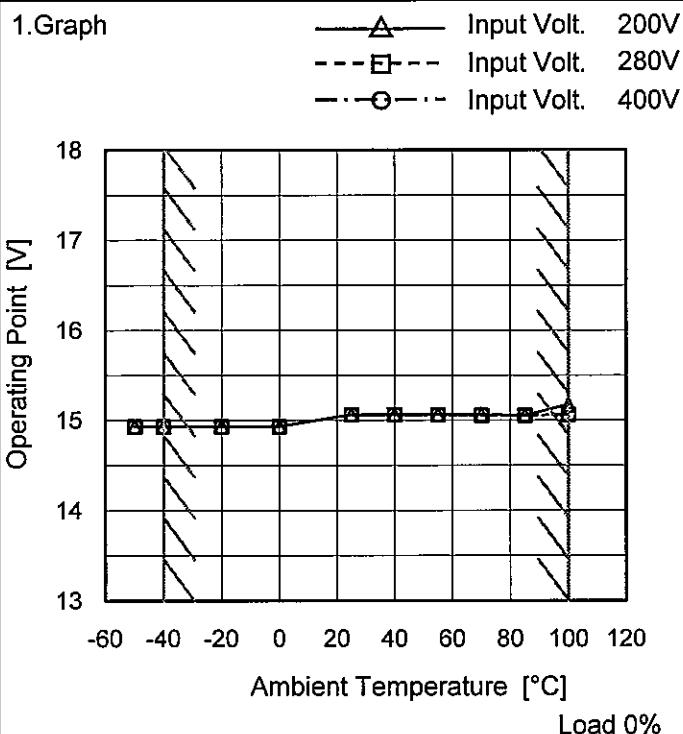
1.Graph
—————— Input Volt. 200V
—————— Input Volt. 280V
~~~~~~~~ Input Volt. 400V

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

Intermittent operation occurs when the output voltage is from 6V to 0V.

2.Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
12.0	4.20	4.21	4.21
11.4	5.09	5.15	5.33
10.8	5.12	5.19	5.36
9.6	5.18	5.29	5.43
8.4	5.25	5.37	5.45
7.2	5.34	5.46	5.43
6.0	5.43	5.51	5.46
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

BC-10330

COSEL

Model	DHS50B12
Item	Overvoltage Protection
Object	+12V4.2A

Testing Circuitry   Figure A

1.Graph

————△———— Input Volt.   200V
- - -☐- - - Input Volt.   280V
—·-○—·- Input Volt.   400V

Ambient Temperature [°C]

Load 0%

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

2.Values

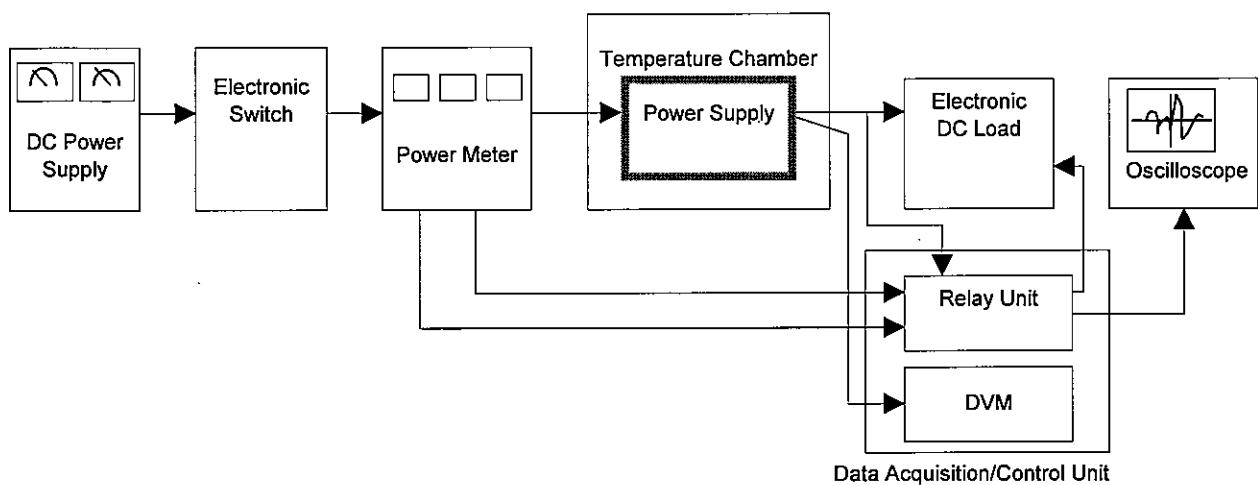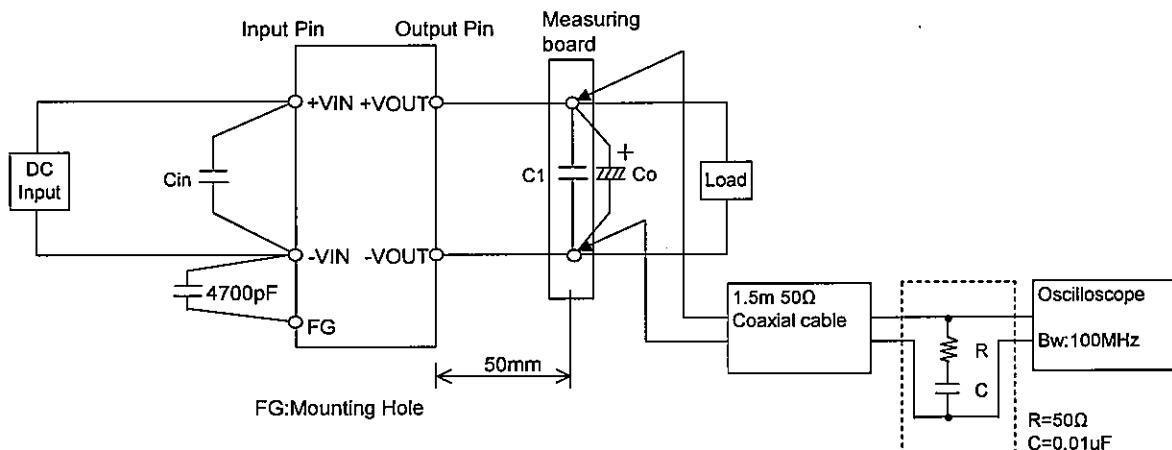| Ambient Temperature [°C]	Operating Point [V]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
-50	14.93	14.93	14.93
-40	14.93	14.93	14.93
-20	14.93	14.93	14.93
0	14.93	14.93	14.93
25	15.06	15.06	15.06
40	15.06	15.06	15.06
55	15.06	15.06	15.06
70	15.06	15.05	15.06
85	15.05	15.05	15.05
100	15.17	15.06	15.06
--	-	-	-

BC-10330

COSEL

Figure A

Components in Figure A: DC Power Supply → Electronic Switch → Power Meter → Temperature Chamber (Power Supply) → Electronic DC Load → Oscilloscope; Relay Unit; DVM; Data Acquisition/Control Unit

Input Pin   Output Pin   Measuring board

+VIN +VOUT
-VIN -VOUT
FG

Cin
4700pF
C1   Co   Load
DC Input
50mm
FG:Mounting Hole

1.5m 50Ω Coaxial cable
R=50Ω
C=0.01uF
Oscilloscope Bw:100MHz

C1 : DHS50B24   4.7uF
      DHS50B28   4.7uF
      Others   10uF
Co : DHS50B03   2200uF
      DHS50B05   2200uF
      DHS50B12   470uF
      DHS50B15   470uF
      DHS50B24   220uF
      DHS50B28   220uF

Figure B

BC-10330