COSEL

参考資料

TEST DATA OF SUW1R51215

Regulated DC Power Supply
Sep 17, 2004

Approved by : Tetsuo Sugimori
Tetsuo Sugimori Design Manager

Prepared by : Masahiro Shima
Masahiro Shima Design Engineer

COSEL CO.,LTD.

参考資料

COSEL

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) · 10
10.Ripple-Noise · 12
11.Ripple Voltage (by Ambient Temperature) · 14
12.Ambient Temperature Drift · 15
13.Output Voltage Accuracy · 16
14.Time Lapse Drift · 17
15.Rise and Fall Time · 18
16.Minimum Input Voltage for Regulated Output Voltage · · · · · · · · · · · · · 20
17.Overcurrent Protection · 21
18.Figure of Testing Circuitry · 22

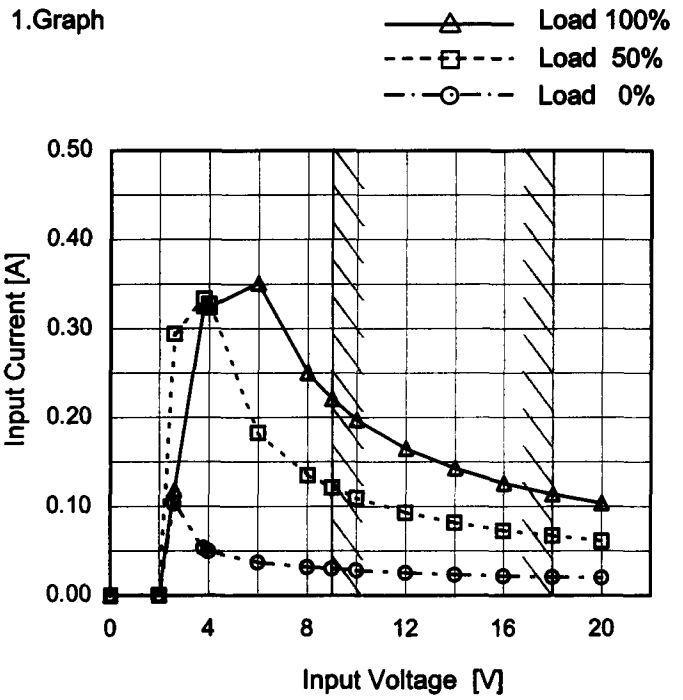
(Final Page 22)

COSEL

Model	SUW1R51215
Item	Input Current (by Input Voltage)
Object	――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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
2.0	0.000	0.000	0.000
2.6	0.103	0.294	0.118
3.8	0.053	0.334	0.325
4.0	0.050	0.327	0.324
6.0	0.037	0.183	0.351
8.0	0.032	0.135	0.251
9.0	0.030	0.121	0.221
10.0	0.028	0.110	0.198
12.0	0.025	0.093	0.165
14.0	0.023	0.082	0.143
16.0	0.021	0.073	0.126
18.0	0.020	0.067	0.114
20.0	0.020	0.061	0.104
--	-	-	-
--	-	-	-

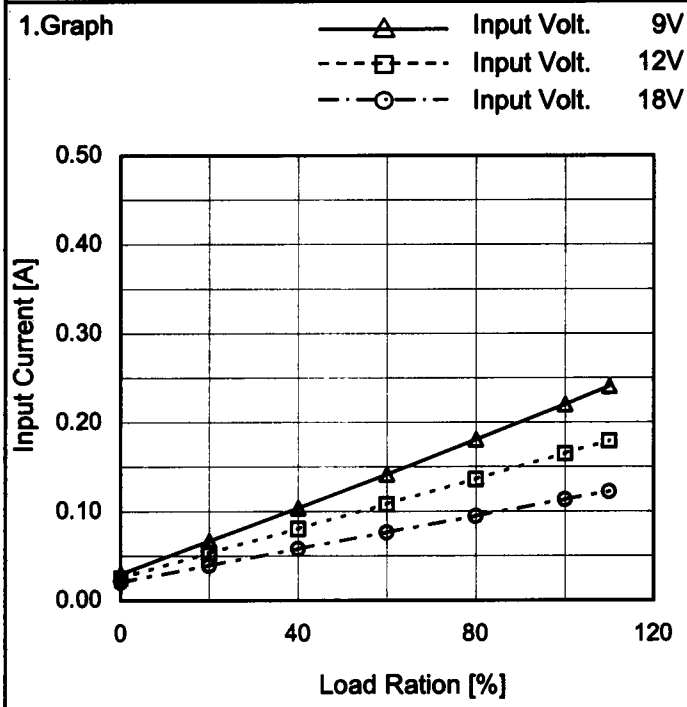
BC-3639

COSEL

Model	SUW1R51215
Item	Input Current (by Load Current)
Object	――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

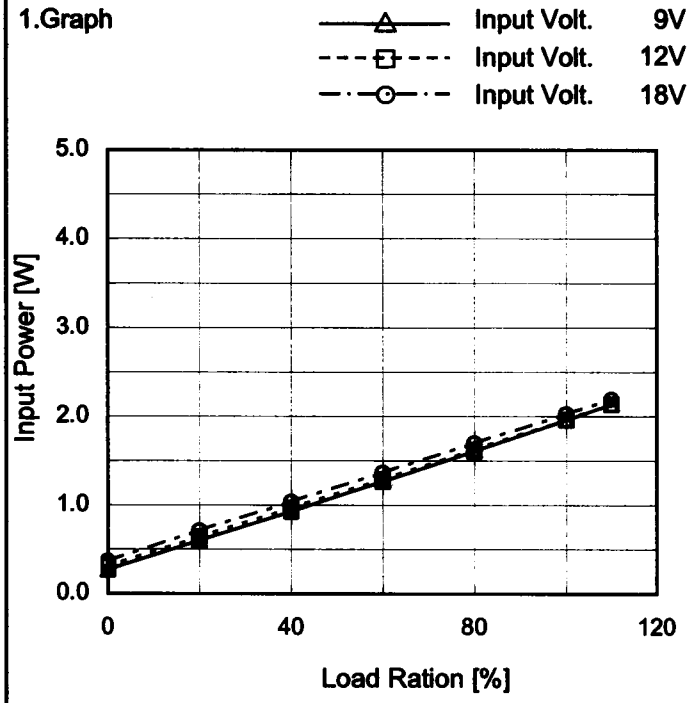
Load Ration [%]	Input Current [A]		
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0	0.030	0.025	0.020
20	0.067	0.053	0.039
40	0.104	0.081	0.058
60	0.142	0.108	0.076
80	0.181	0.136	0.094
100	0.220	0.165	0.113
110	0.241	0.179	0.122
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	SUW1R51215
Item	Input Power (by Load Current)
Object	――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

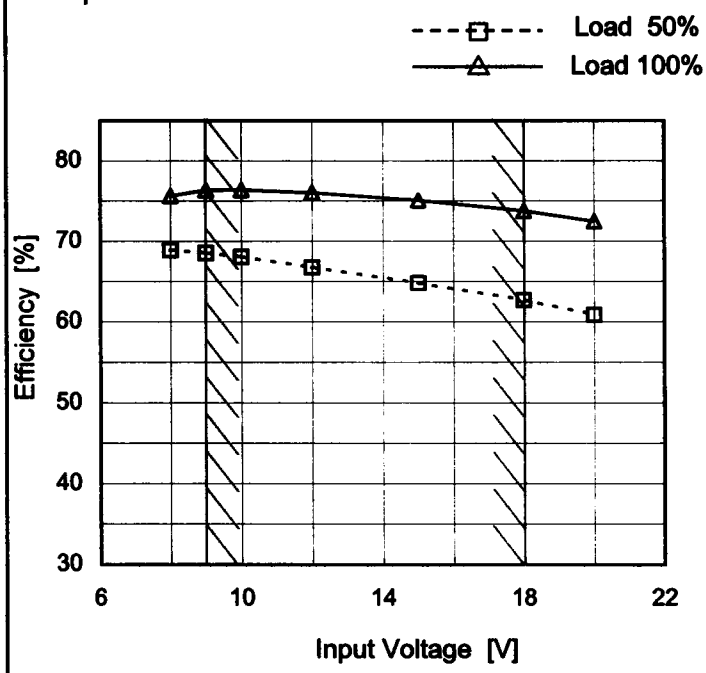
Load Ration [%]	Input Power [W]		
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0	0.27	0.31	0.37
20	0.60	0.64	0.71
40	0.93	0.97	1.04
60	1.27	1.29	1.37
80	1.61	1.63	1.70
100	1.96	1.96	2.03
110	2.14	2.14	2.20
–	-	-	-
–	-	-	-
–	-	-	-
–	-	-	-

COSEL

Model	SUW1R51215
Item	Efficiency (by Input Voltage)
Object	――――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
8	68.9	75.6
9	68.5	76.3
10	68.1	76.4
12	66.7	76.0
15	64.8	75.1
18	62.7	73.8
20	60.9	72.5
–	-	-
–	-	-

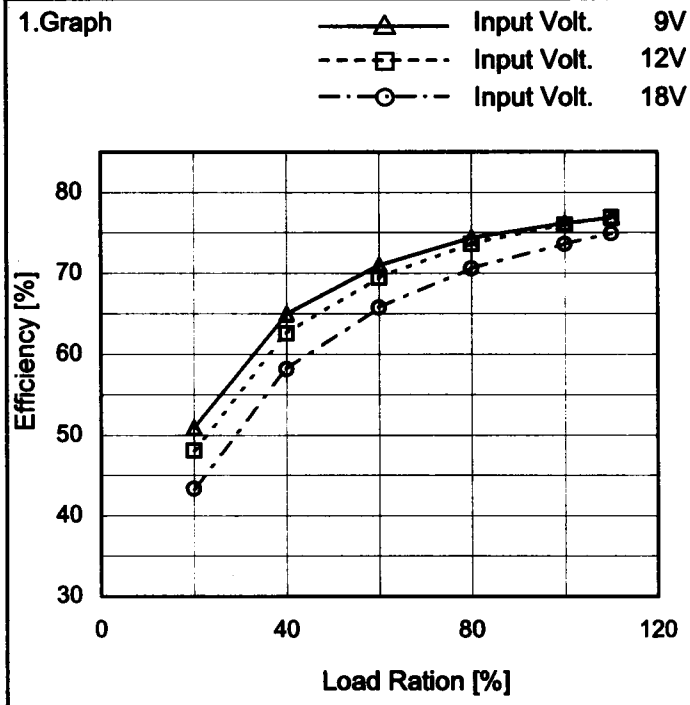
BC-3639

COSEL

Model	SUW1R51215
Item	Efficiency (by Load Current)
Object	――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

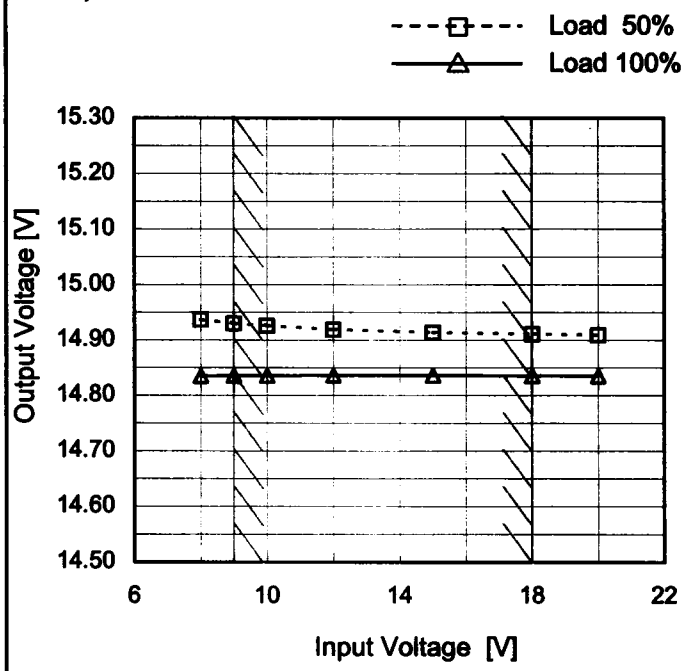
Load Ration [%]	Efficiency [%]		
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0	-	-	-
20	50.9	48.2	43.4
40	65.0	62.6	58.2
60	71.0	69.5	65.7
80	74.4	73.6	70.6
100	76.2	76.0	73.6
110	76.9	76.9	74.9
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	SUW1R51215
Item	Line Regulation
Object	+15V0.05A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

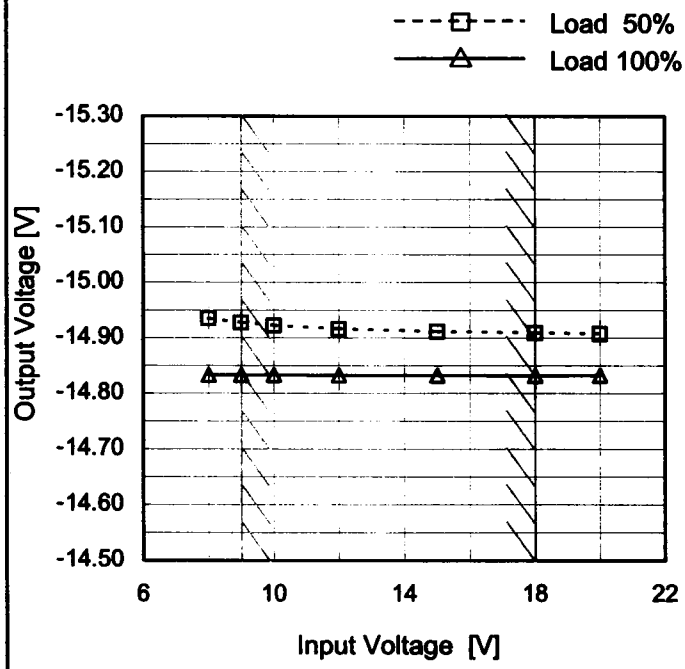


2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8	14.937	14.835
9	14.930	14.836
10	14.926	14.836
12	14.919	14.836
15	14.914	14.836
18	14.911	14.836
20	14.909	14.835
--	-	-
--	-	-

Object	-15V0.05A

1.Graph



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

2.Values

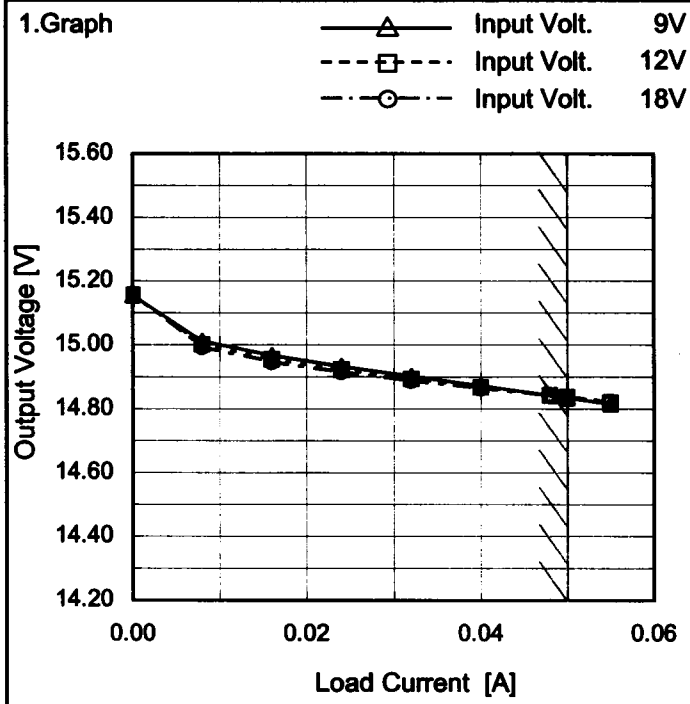
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8	-14.935	-14.834
9	-14.928	-14.833
10	-14.923	-14.833
12	-14.916	-14.833
15	-14.911	-14.833
18	-14.909	-14.832
20	-14.907	-14.833
--	-	-
--	-	-

COSEL

Model	SUW1R51215
Item	Load Regulation
Object	+15V0.05A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

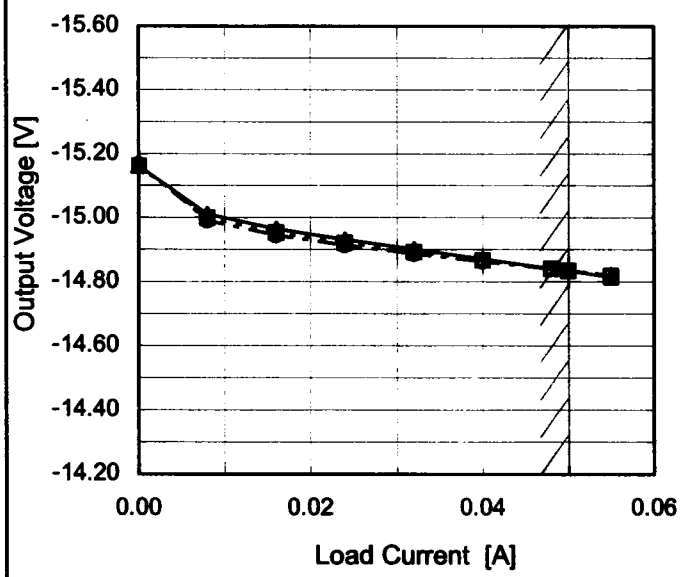


2.Values

Load Current [A]	Output Voltage [V] Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0.000	15.156	15.156	15.159
0.008	15.012	15.001	14.992
0.016	14.967	14.955	14.946
0.024	14.934	14.923	14.915
0.032	14.903	14.894	14.888
0.040	14.873	14.868	14.864
0.048	14.843	14.843	14.842
0.050	14.835	14.837	14.837
0.055	14.816	14.821	14.823
--	-	-	-
--	-	-	-

Object	-15V0.05A

1.Graph



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

2.Values

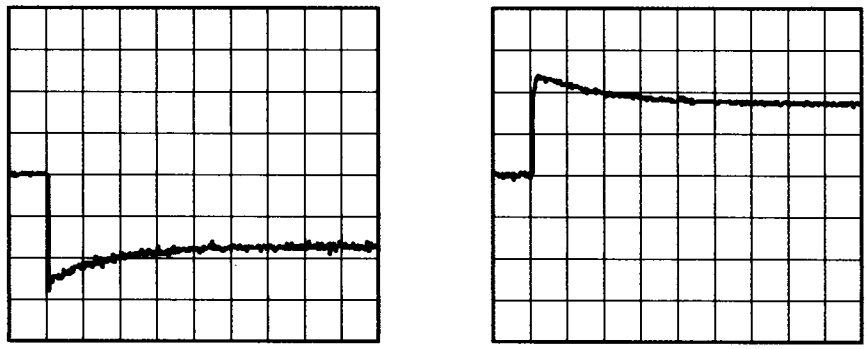
Load Current [A]	Output Voltage [V] Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0.000	-15.162	-15.163	-15.167
0.008	-15.011	-14.999	-14.990
0.016	-14.966	-14.954	-14.945
0.024	-14.932	-14.921	-14.913
0.032	-14.902	-14.893	-14.886
0.040	-14.872	-14.866	-14.862
0.048	-14.842	-14.841	-14.839
0.050	-14.834	-14.834	-14.834
0.055	-14.815	-14.818	-14.821
--	-	-	-
--	-	-	-

COSEL

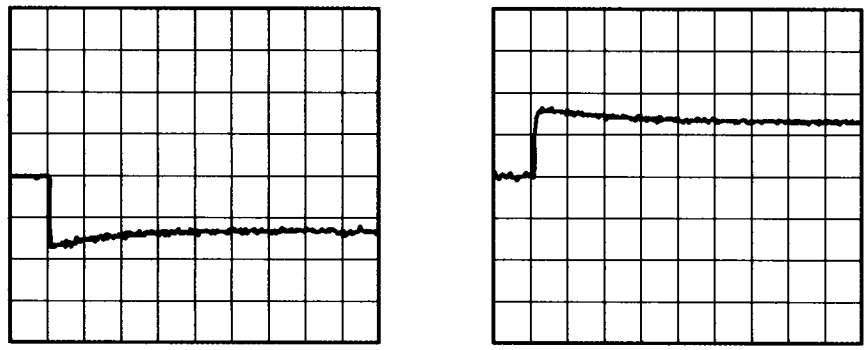
Model	SUW1R51215	Temperature 25°C
Item	Dynamic Load Response	Testing Circuitry Figure A
Object	+15V0.05A	

Input Volt. 12 V
Cycle 100 mS

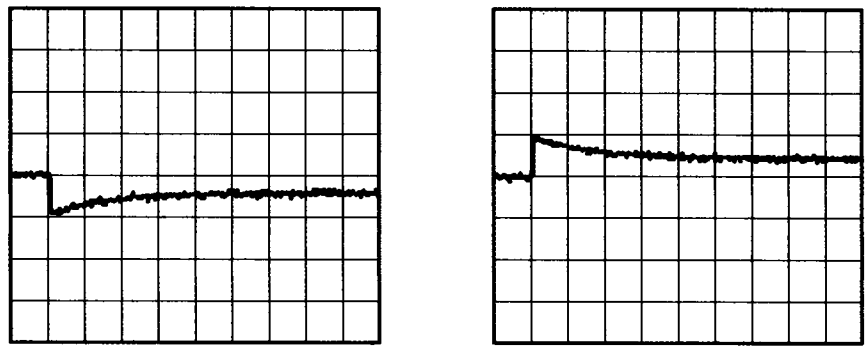
Min. Load (0A) ←→
Load 100% (0.05A)



Min. Load (0A) ←→
Load 50% (0.025A)



Load 50% (0.025A) ←→
Load 100% (0.05A)

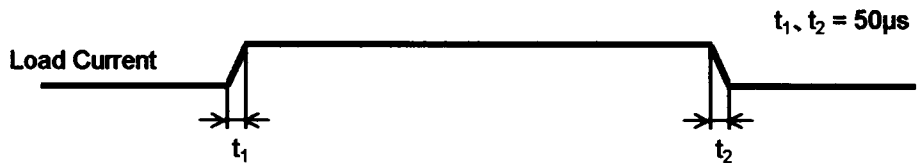


COSEL

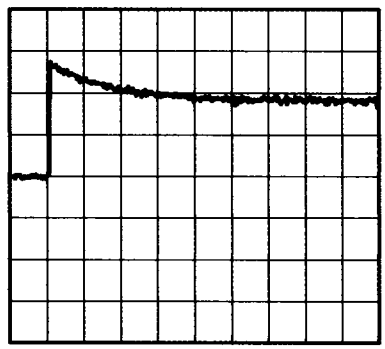
Model	SUW1R51215
Item	Dynamic Load Response
Object	-15V0.05A

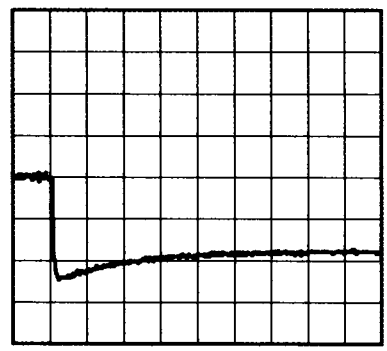
Temperature 25°C
Testing Circuitry Figure A

Input Volt. 12 V
Cycle 100 mS



Min. Load (0A) ⟷
Load 100% (0.05A)

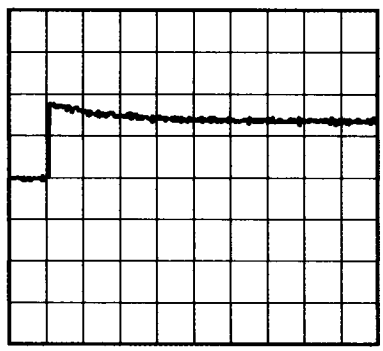


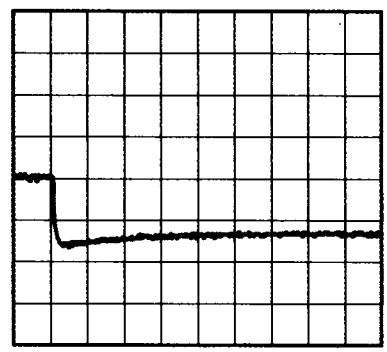


200mV/div

2ms/div 2ms/div

Min. Load (0A) ⟷
Load 50% (0.025A)

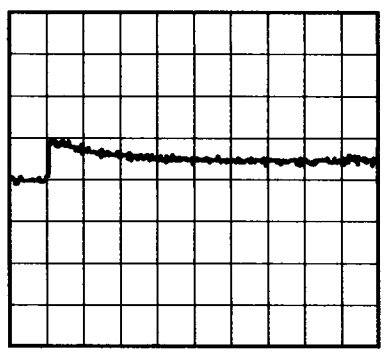


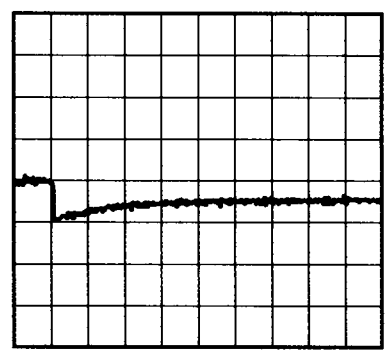


200mV/div

2ms/div 2ms/div

Load 50% (0.025A) ⟷
Load 100% (0.05A)





200mV/div

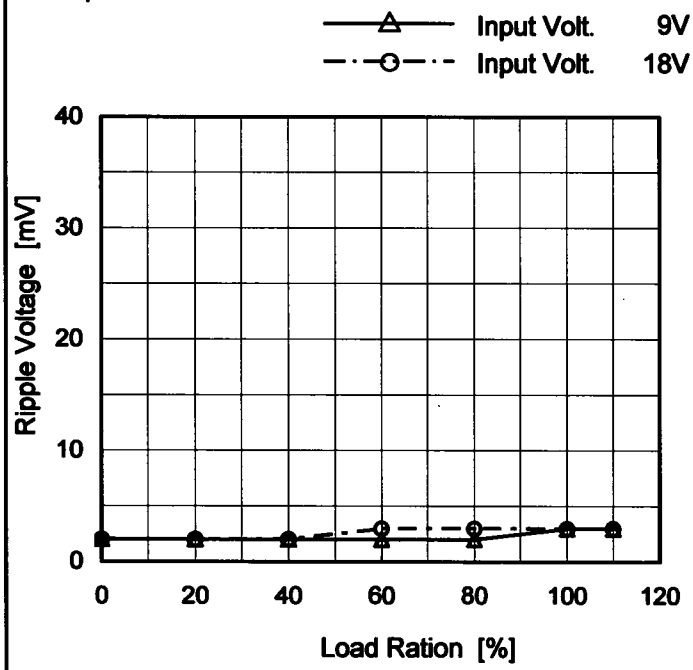
2ms/div 2ms/div

COSEL

Model	SUW1R51215
Item	Ripple Voltage (by Load Current)
Object	+15V0.05A

Temperature 25°C
Testing Circuitry Figure B

1.Graph



Measured by 100 MHz Oscilloscope.
Ripple Voltage is shown as p-p in the figure below.

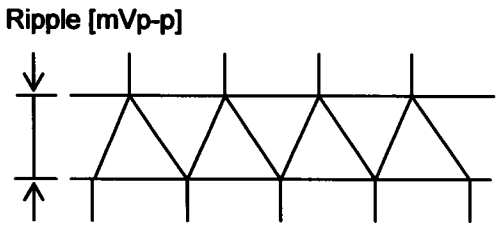


Fig.Complex Ripple Wave Form

2.Values

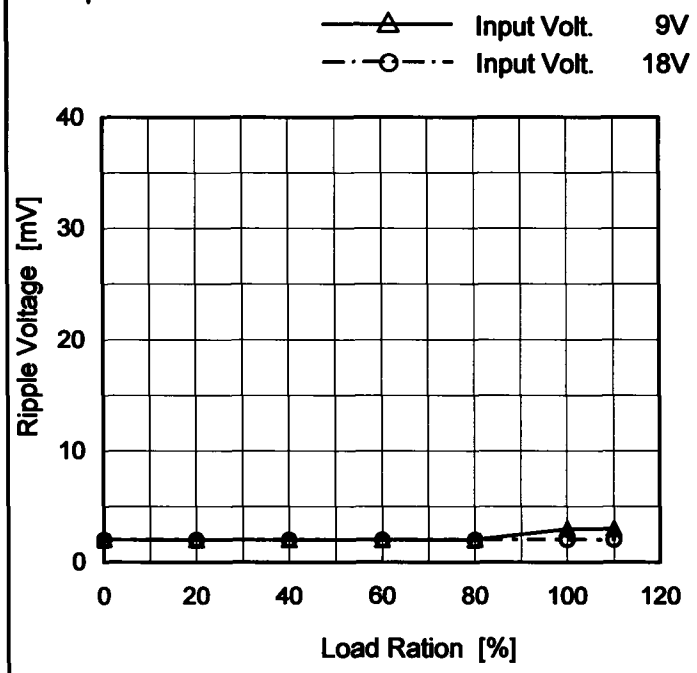
Load Ration [%]	Ripple Voltage [mV]	
	Input Volt. 9 [V]	Input Volt. 18 [V]
0	2	2
20	2	2
40	2	2
60	2	3
80	2	3
100	3	3
110	3	3
–	-	-
–	-	-
–	-	-
–	-	-

COSEL

Model	SUW1R51215
Item	Ripple Voltage (by Load Current)
Object	-15V0.05A

Temperature 25°C
Testing Circuitry Figure B

1.Graph



Measured by 100 MHz Oscilloscope.
Ripple Voltage is shown as p-p in the figure below.

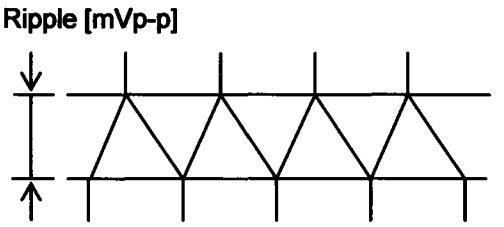


Fig.Complex Ripple Wave Form

2.Values

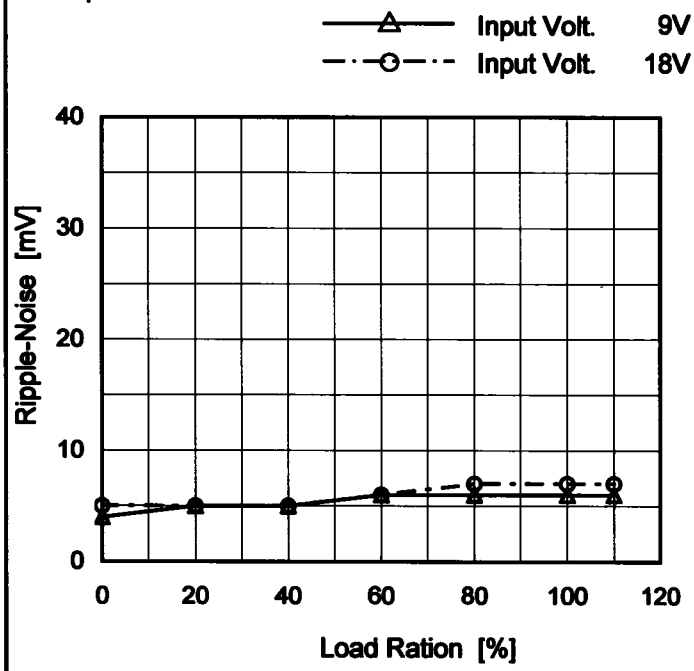
Load Ration [%]	Ripple Voltage [mV]	
	Input Volt. 9 [V]	Input Volt. 18 [V]
0	2	2
20	2	2
40	2	2
60	2	2
80	2	2
100	3	2
110	3	2
–	-	-
–	-	-
–	-	-
–	-	-

COSEL

Model	SUW1R51215
Item	Ripple-Noise
Object	+15V0.05A

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.

2.Values

Load Ration [%]	Ripple-Noise [mV]	
	Input Volt. 9 [V]	Input Volt. 18 [V]
0	4	5
20	5	5
40	5	5
60	6	6
80	6	7
100	6	7
110	6	7
–	-	-
–	-	-
–	-	-
–	-	-

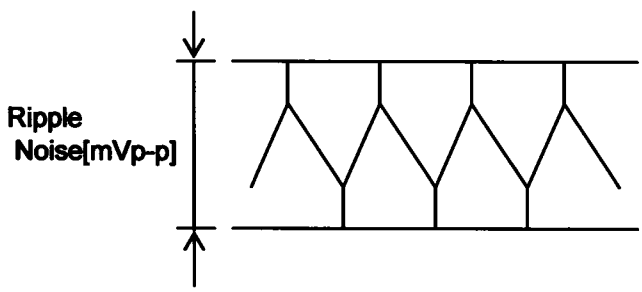


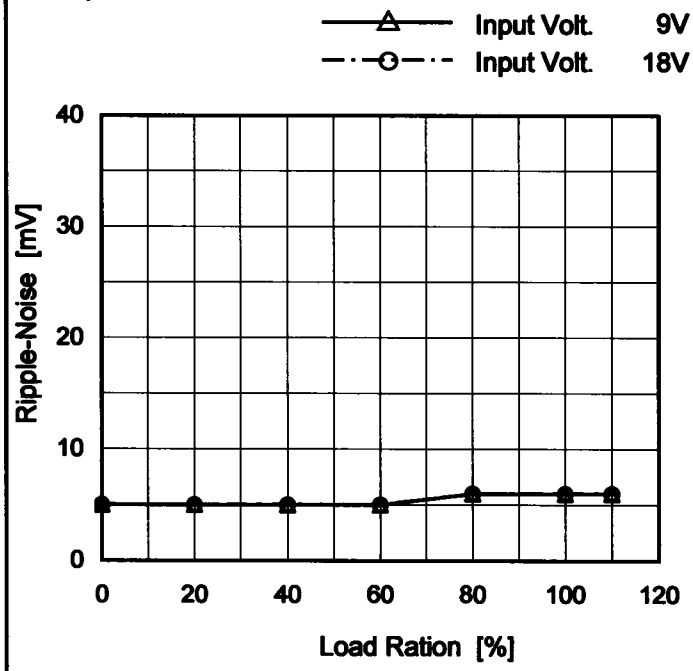
Fig.Complex Ripple Noise Wave Form

COSEL

Model	SUW1R51215
Item	Ripple-Noise
Object	-15V0.05A

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.

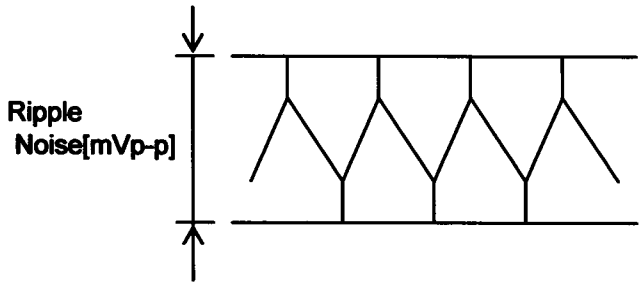


Fig.Complex Ripple Noise Wave Form

2.Values

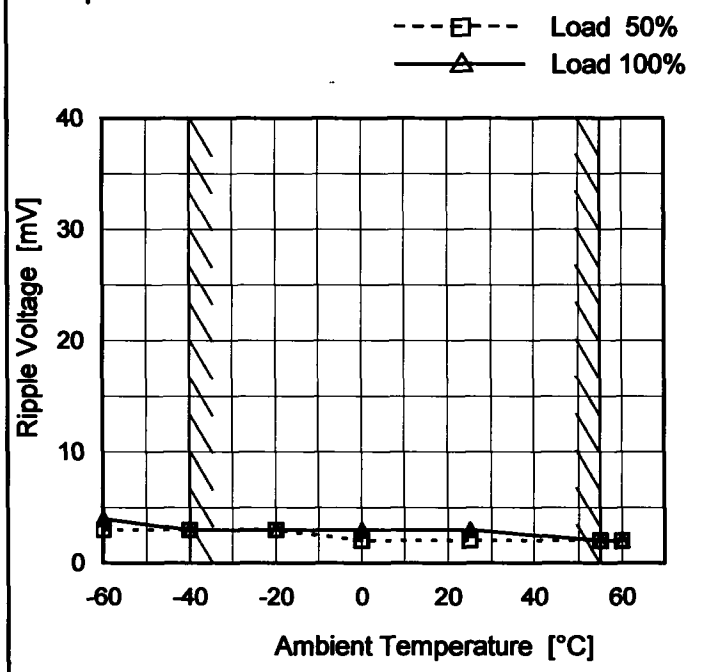
Load Ration [%]	Ripple-Noise [mV]	
	Input Volt. 9 [V]	Input Volt. 18 [V]
0	5	5
20	5	5
40	5	5
60	5	5
80	6	6
100	6	6
110	6	6
–	-	-
–	-	-
–	-	-
–	-	-

COSEL

Model	SUW1R51215
Item	Ripple Voltage (by Ambient Temp.)
Object	+15V0.05A

Testing Circuitry Figure B

1.Graph



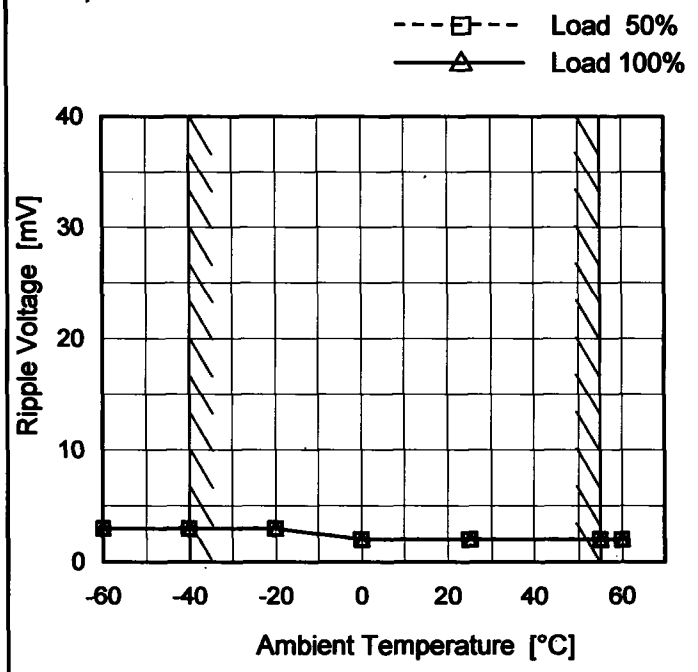
Input Volt. 12V

2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	3	4
-40	3	3
-20	3	3
0	2	3
25	2	3
55	2	2
60	2	2
–	-	-
–	-	-
–	-	-
–	-	-

Object	-15V0.05A

1.Graph



Input Volt. 12V

Measured by 100 MHz Oscilloscope.

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

2.Values

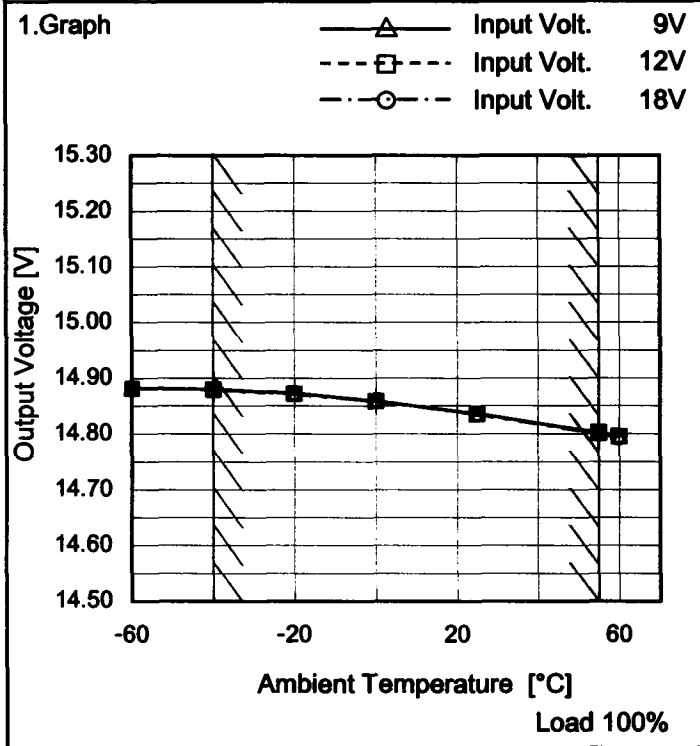
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	3	3
-40	3	3
-20	3	3
0	2	2
25	2	2
55	2	2
60	2	2
–	-	-
–	-	-
–	-	-
–	-	-

COSEL

Model	SUW1R51215
Item	Ambient Temperature Drift
Object	+15V0.05A

Testing Circuitry Figure A

1.Graph

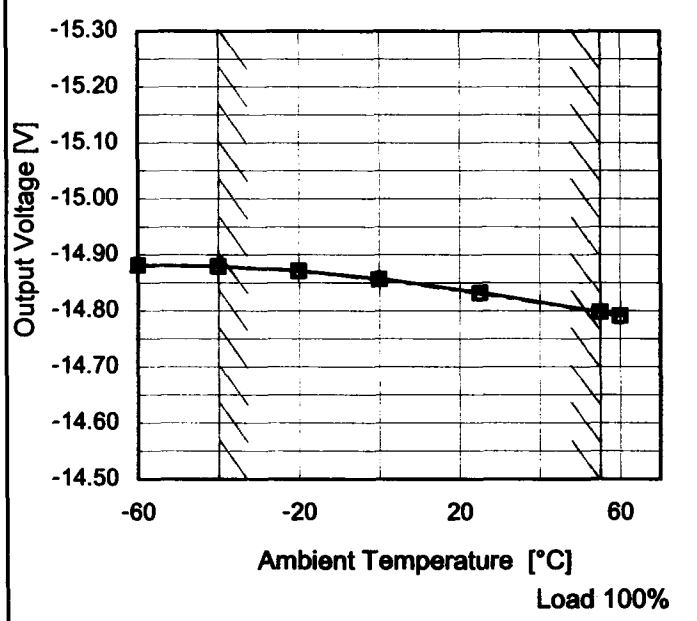


2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
-60	14.882	14.881	14.882
-40	14.880	14.880	14.879
-20	14.873	14.872	14.871
0	14.859	14.859	14.858
25	14.836	14.835	14.834
55	14.802	14.802	14.800
60	14.796	14.795	14.793
–	-	-	-
–	-	-	-
–	-	-	-
–	-	-	-

Object	-15V0.05A

1.Graph



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

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
-60	-14.882	-14.882	-14.881
-40	-14.880	-14.880	-14.879
-20	-14.872	-14.872	-14.871
0	-14.858	-14.857	-14.856
25	-14.833	-14.832	-14.831
55	-14.799	-14.798	-14.797
60	-14.792	-14.791	-14.789
–	-	-	-
–	-	-	-
–	-	-	-
–	-	-	-

COSEL

Model	SUW1R51215	
Item	Output Voltage Accuracy	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 - 55°C
Input Voltage : 9 - 18V
Load Current (AVR 1) : 0 - 0.05A (AVR 2) : 0 - 0.05A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - Minimum of Output Voltage) / 2

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

2.Values

Object	+15V0.05A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	-40	18	0	15.199	±200	±1.3
Minimum Voltage	55	12	0.05	14.800		

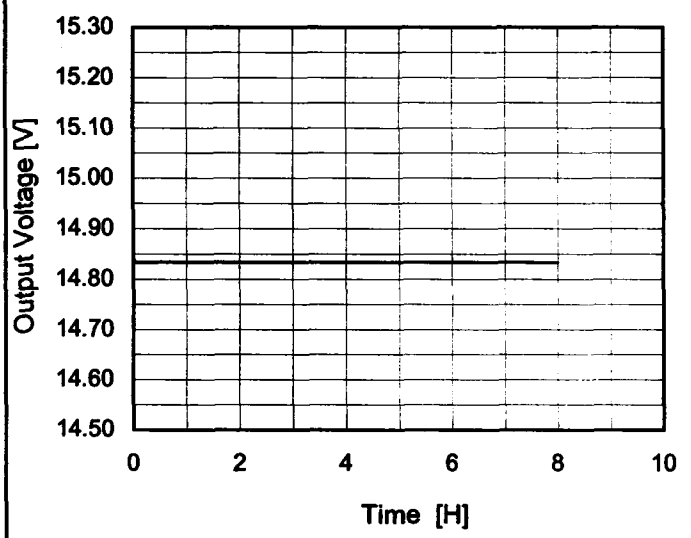
Object	-15V0.05A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	-40	18	0	-15.208	±206	±1.4
Minimum Voltage	55	18	0.05	-14.797		

COSEL

Model	SUW1R51215
Item	Time Lapse Drift
Object	+15V0.05A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



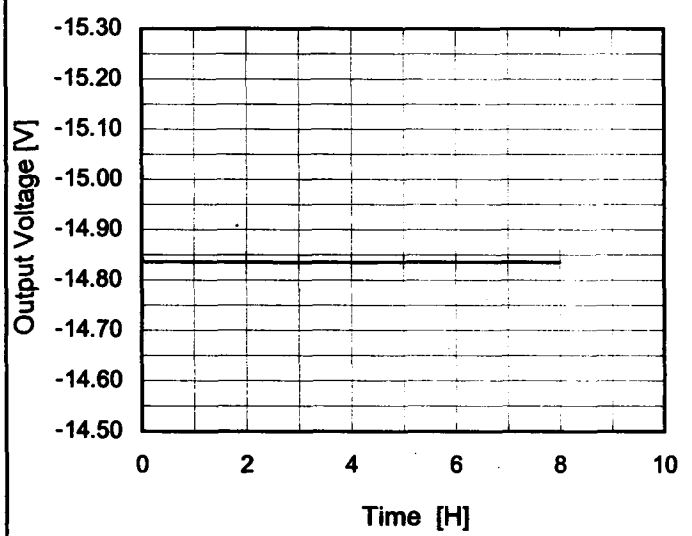
Input Volt. 12V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	14.844
0.5	14.834
1.0	14.834
2.0	14.834
3.0	14.834
4.0	14.834
5.0	14.834
6.0	14.834
7.0	14.834
8.0	14.833

Object	-15V0.05A

1.Graph



Input Volt. 12V
Load 100%

2.Values

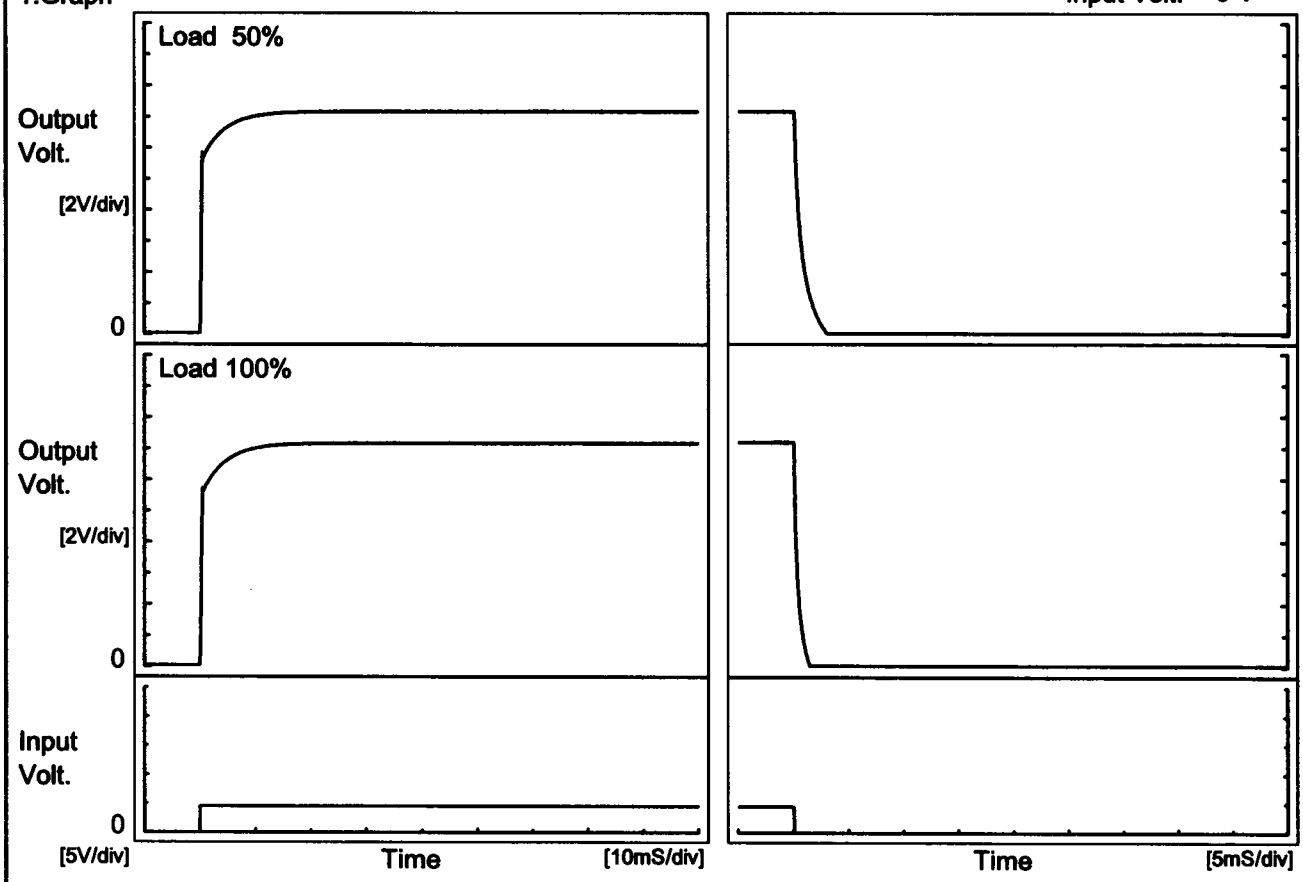
Time since start [H]	Output Voltage [V]
0.0	-14.848
0.5	-14.836
1.0	-14.836
2.0	-14.836
3.0	-14.836
4.0	-14.835
5.0	-14.836
6.0	-14.836
7.0	-14.836
8.0	-14.836

COSEL

Model	SUW1R51215	Temperature 25°C
Item	Rise and Fall Time	Testing Circuitry Figure A
Object	+15V0.05A	

1.Graph

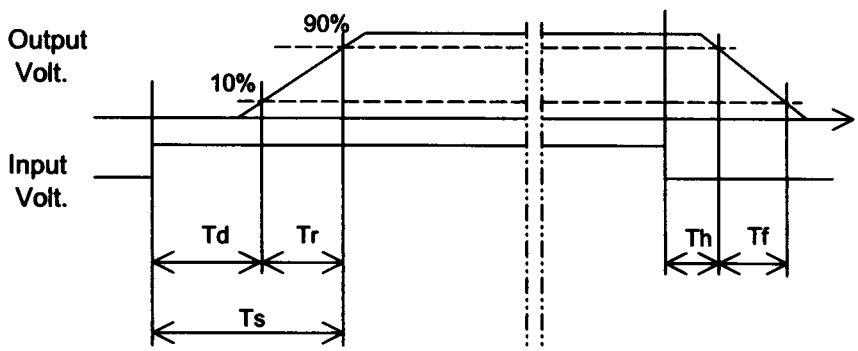
Input Volt. 9 V



2.Values

[mS]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	0.1	6.3	6.4	0.1	1.9
100 %	0.1	6.5	6.6	0.1	1.0



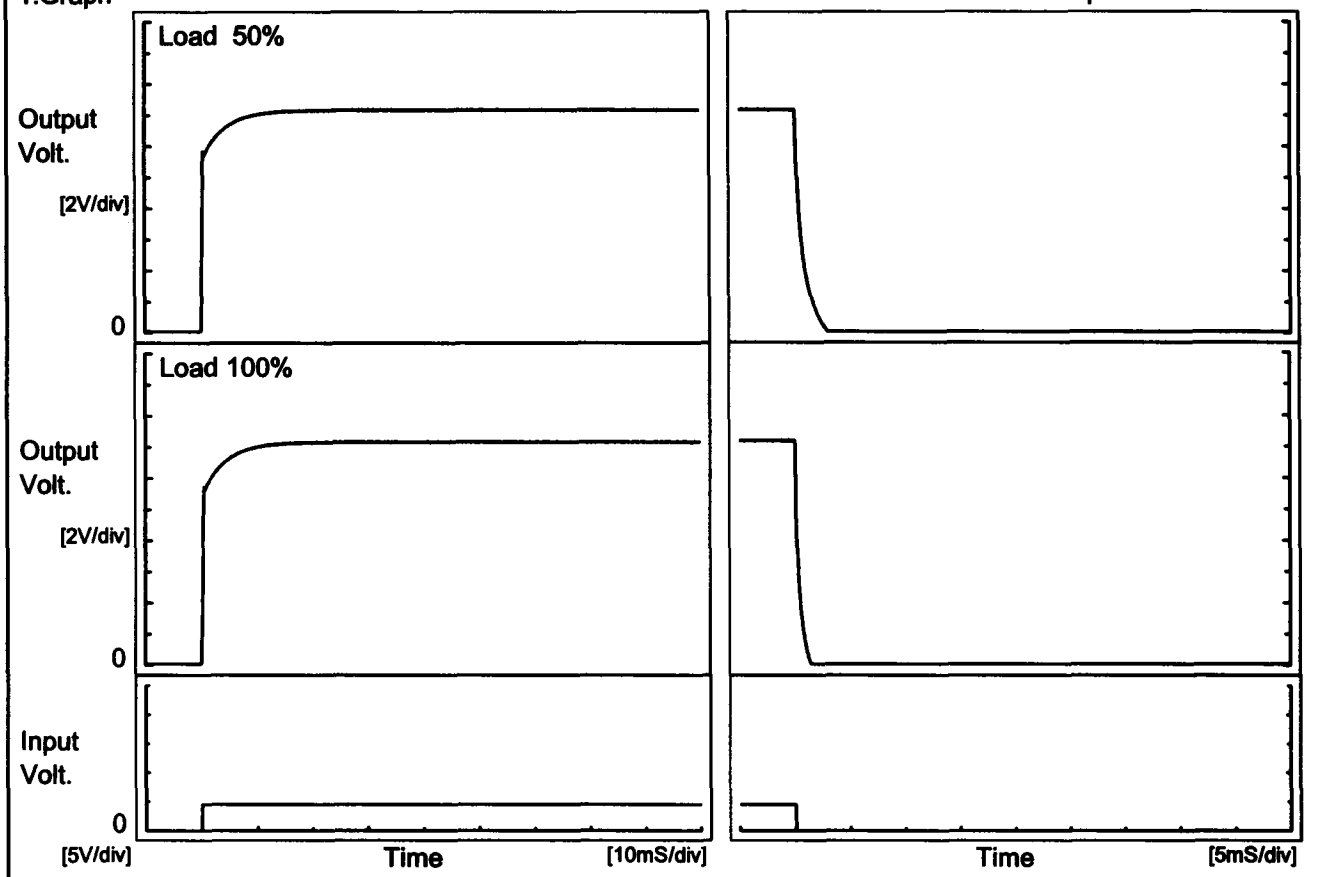
COSEL

Model	SUW1R51215
Item	Rise and Fall Time
Object	-15V0.05A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

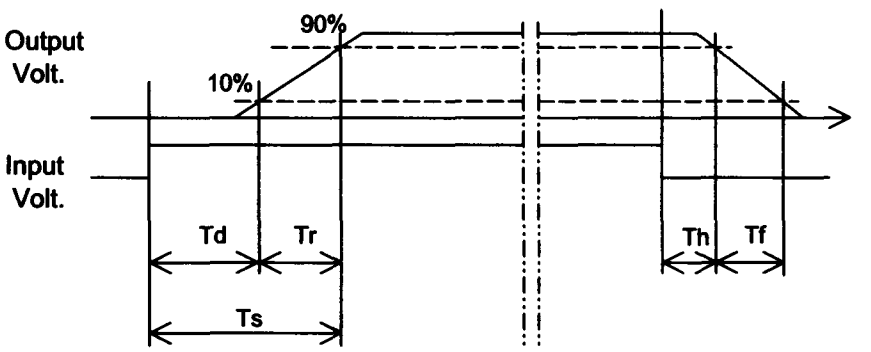
Input Volt. 9 V



2.Values

[mS]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	0.1	6.3	6.4	0.1	1.9
100 %	0.1	6.5	6.6	0.1	1.0



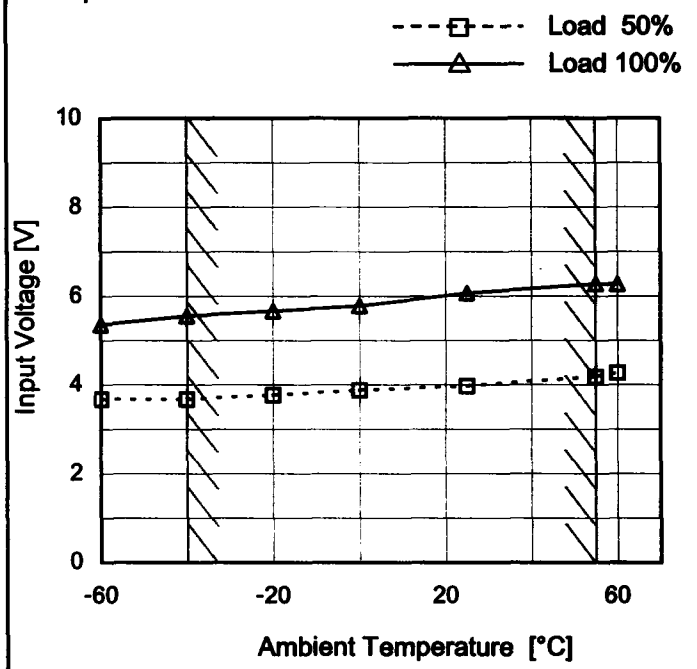
COSEL

Model	SUW1R51215
Item	Minimum Input Voltage for Regulated Output Voltage

Testing Circuitry Figure A

Object: +15V0.05A

1.Graph

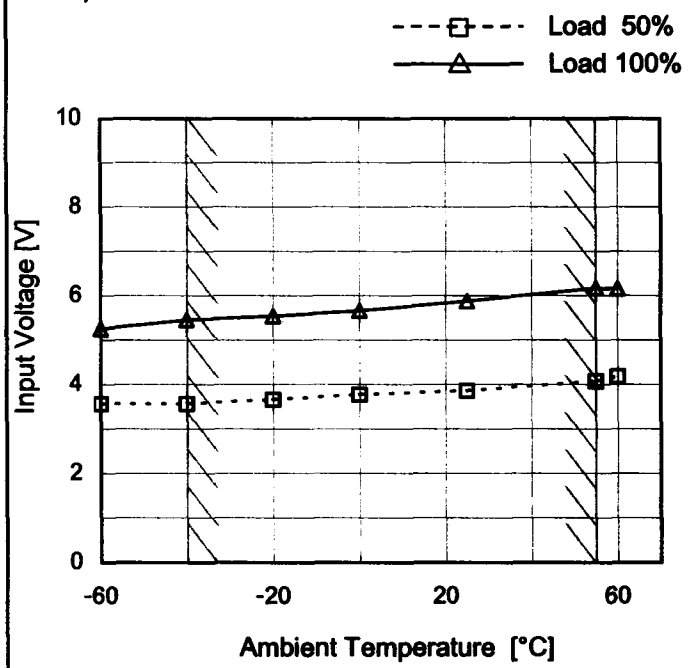


2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	3.7	5.4
-40	3.7	5.6
-20	3.8	5.7
0	3.9	5.8
25	4.0	6.1
55	4.2	6.3
60	4.3	6.3
--	-	-
--	-	-
--	-	-
--	-	-

Object: -15V0.05A

1.Graph



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

2.Values

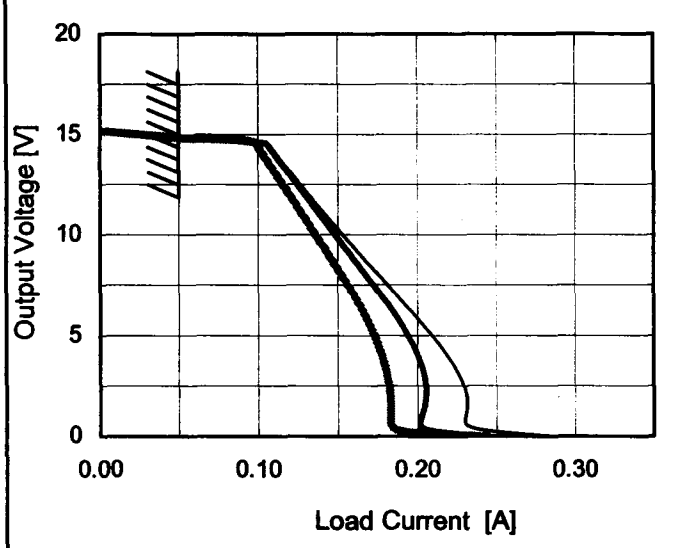
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	3.6	5.3
-40	3.6	5.5
-20	3.7	5.6
0	3.8	5.7
25	3.9	5.9
55	4.1	6.2
60	4.2	6.2
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	SUW1R51215
Item	Overcurrent Protection
Object	+15V0.05A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

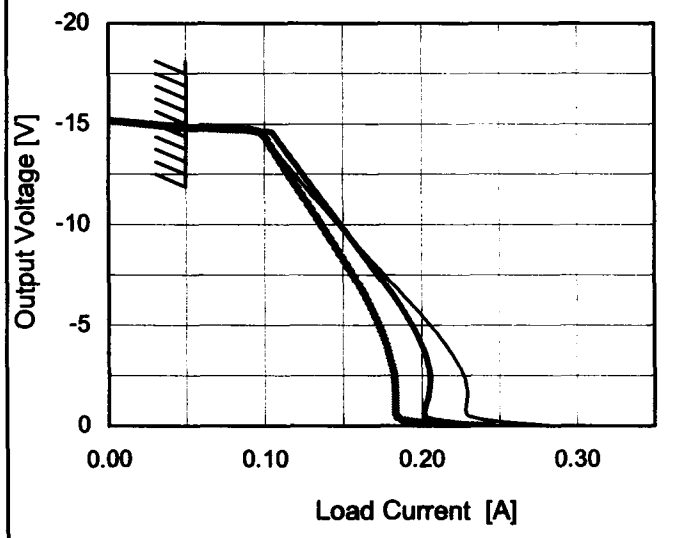


2.Values

Output Voltage [V]	Load Current [A] Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
15.0	0.08	0.05	0.09
14.3	0.11	0.11	0.10
13.5	0.12	0.12	0.11
12.0	0.13	0.13	0.12
10.5	0.15	0.14	0.13
9.0	0.17	0.16	0.14
7.5	0.18	0.17	0.16
6.0	0.20	0.19	0.17
4.5	0.21	0.20	0.18
3.0	0.23	0.20	0.18
1.5	0.23	0.20	0.18
0.0	0.29	0.25	0.22

Object	-15V0.05A

1.Graph



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

2.Values

Output Voltage [V]	Load Current [A] Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
-15.00	0.05	0.05	0.05
-14.25	0.10	0.11	0.10
-13.50	0.11	0.12	0.11
-12.00	0.13	0.13	0.12
-10.50	0.14	0.14	0.13
-9.00	0.16	0.16	0.14
-7.50	0.18	0.17	0.16
-6.00	0.19	0.19	0.17
-4.50	0.21	0.20	0.18
-3.00	0.22	0.20	0.18
-1.50	0.23	0.20	0.18
0.00	0.29	0.25	0.22

COSEL

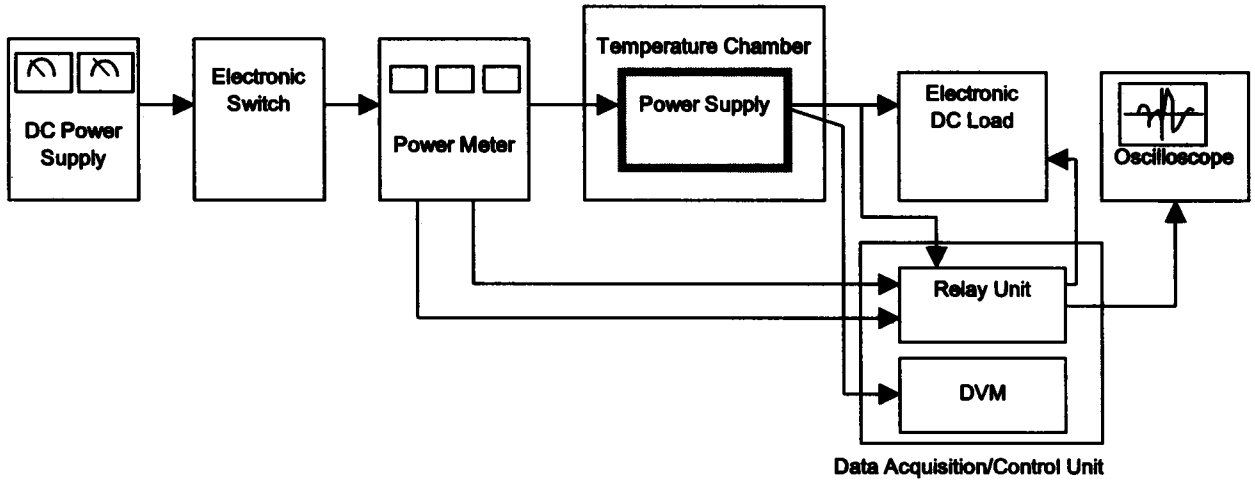


Figure A

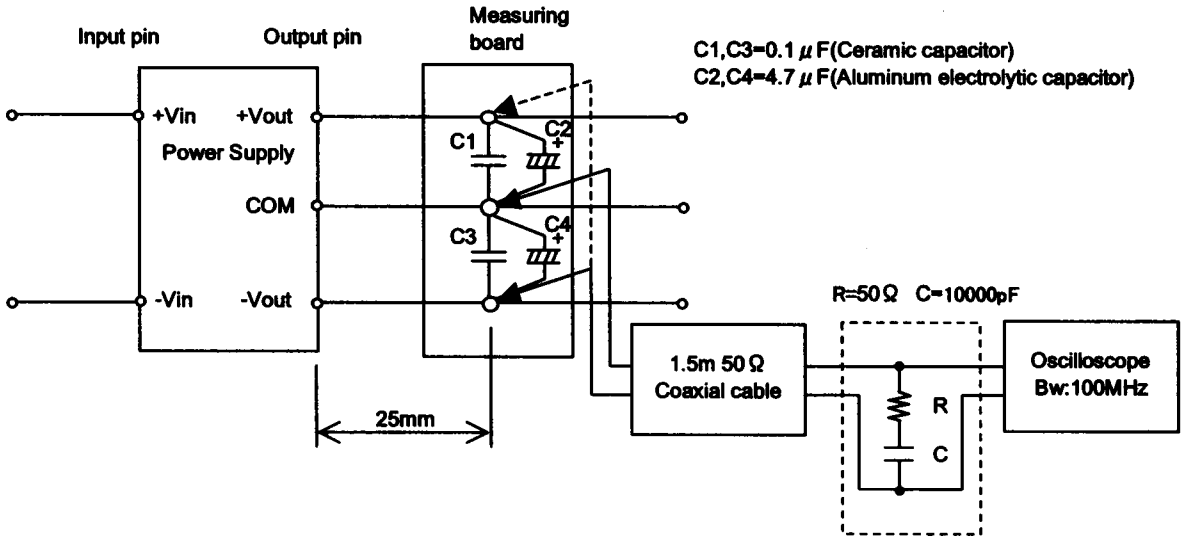


Figure B (Ripple and Ripple noise Characteristic)