COSEL

参考資料

TEST DATA OF SUTW30512

Regulated DC Power Supply
March 5, 2009

Approved by : Kazunari Asano
Kazunari Asano Design Manager

Prepared by : Sho Saito
Sho Saito Design Engineer

COSEL CO.,LTD.

COSEL

CONTENTS

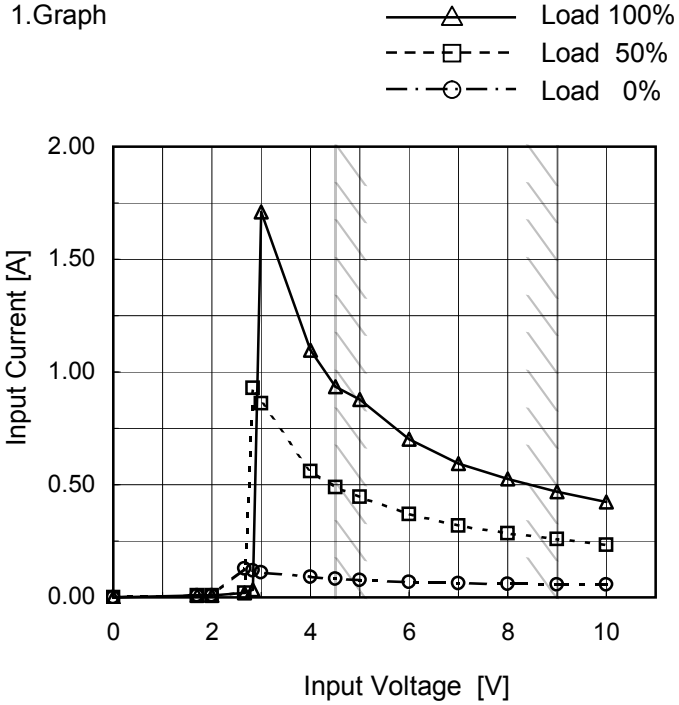
1.Input Current (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・ 1
2.Input Current (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・ 2
3.Input Power (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・・ 3
4.Efficiency (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・ 4
5.Efficiency (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・・ 5
6.Line 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	SUTW30512
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%
0.00	0.000	0.000	0.000
1.70	0.008	0.008	0.008
2.00	0.009	0.009	0.009
2.66	0.127	0.021	0.020
2.83	0.120	0.930	0.033
3.00	0.112	0.862	1.710
4.00	0.091	0.560	1.098
4.50	0.084	0.488	0.936
5.00	0.077	0.446	0.879
6.00	0.067	0.370	0.702
7.00	0.062	0.319	0.593
8.00	0.058	0.284	0.524
9.00	0.057	0.258	0.468
10.00	0.056	0.234	0.423
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

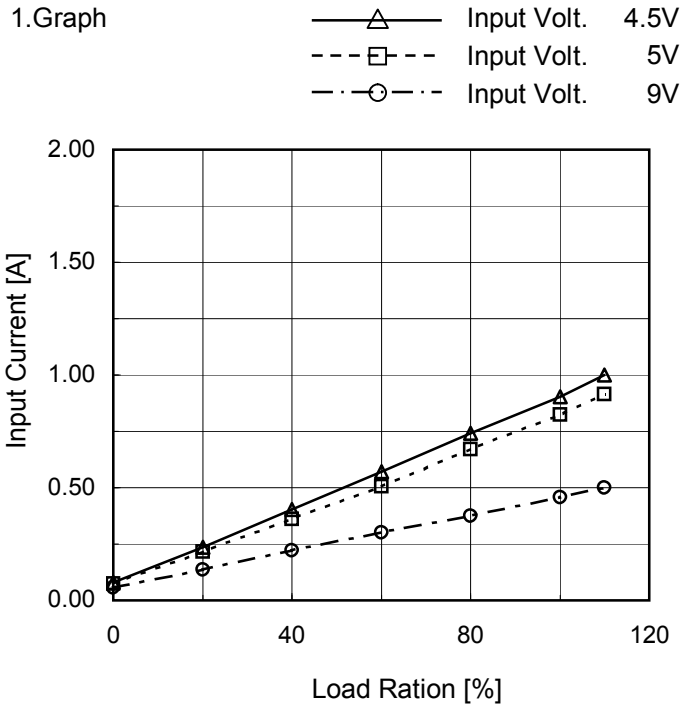
BC-10242

COSEL

Model	SUTW30512
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. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0	0.080	0.074	0.057
20	0.237	0.215	0.137
40	0.403	0.362	0.220
60	0.570	0.507	0.301
80	0.740	0.670	0.375
100	0.902	0.824	0.459
110	1.000	0.915	0.500
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

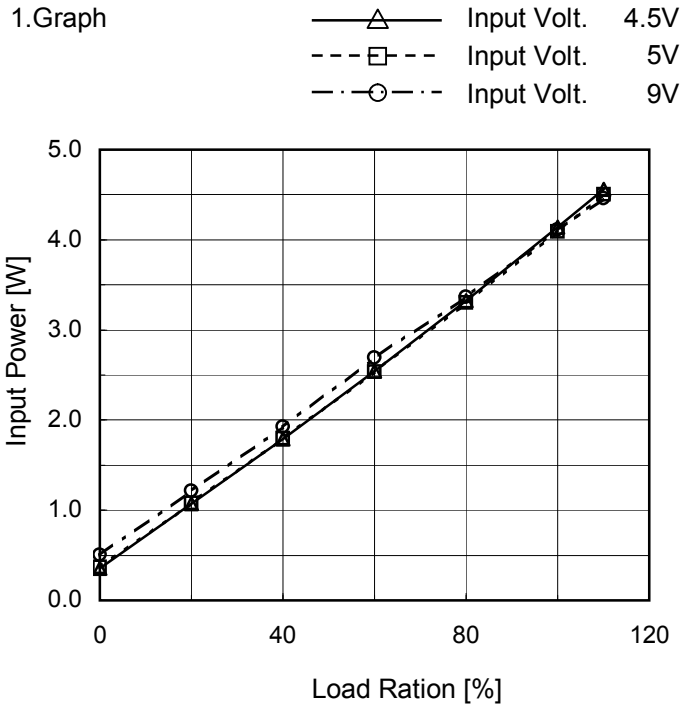
BC-10242

COSEL

Model	SUTW30512
Item	Input Power (by Load Current)
Object	――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

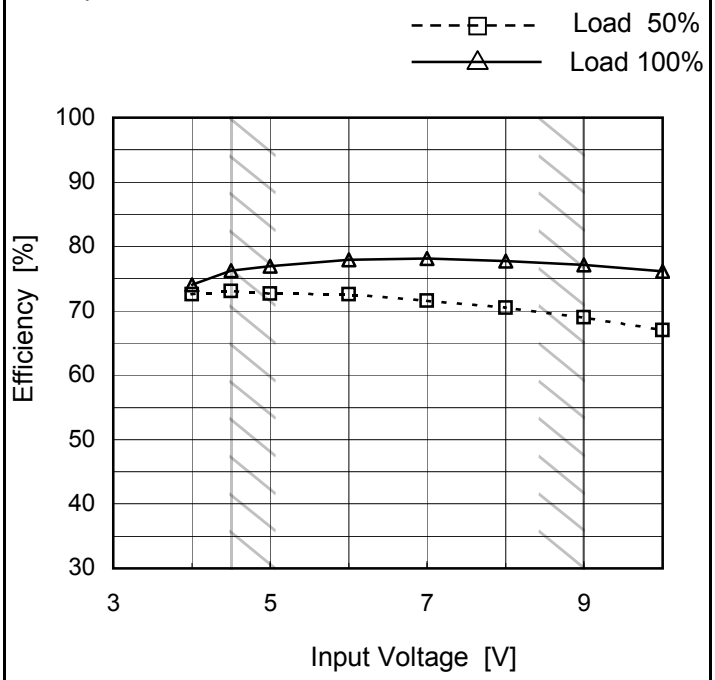
Load Ration [%]	Input Power [W]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0	0.36	0.37	0.50
20	1.07	1.08	1.22
40	1.79	1.80	1.93
60	2.54	2.53	2.69
80	3.33	3.30	3.37
100	4.14	4.09	4.11
110	4.56	4.50	4.46
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	SUTW30512
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

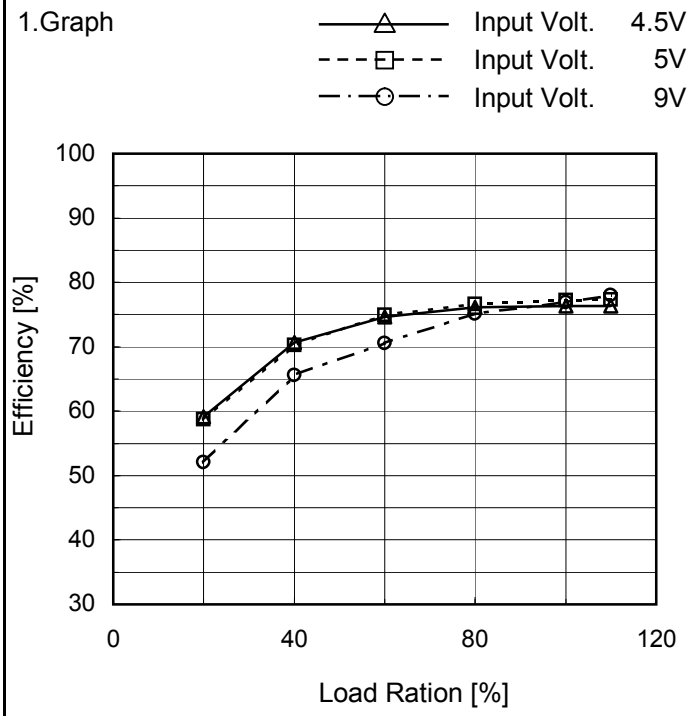
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
4.0	72.6	74.1
4.5	73.1	76.2
5.0	72.7	76.9
6.0	72.6	78.0
7.0	71.5	78.2
8.0	70.5	77.8
9.0	69.0	77.1
10.0	67.0	76.1
--	-	-

COSEL

Model	SUTW30512
Item	Efficiency (by Load Current)
Object	――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Ration [%]	Efficiency [%]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0	-	-	-
20	59.2	58.7	52.1
40	70.7	70.3	65.6
60	74.7	74.9	70.5
80	76.1	76.6	75.1
100	76.4	77.3	76.9
110	76.3	77.3	78.0
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

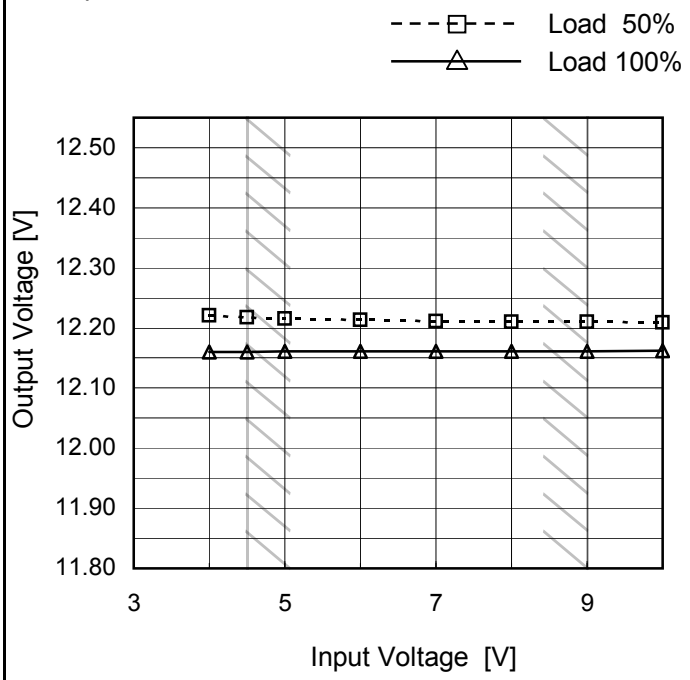
BC-10242

COSEL

Model	SUTW30512
Item	Line Regulation
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

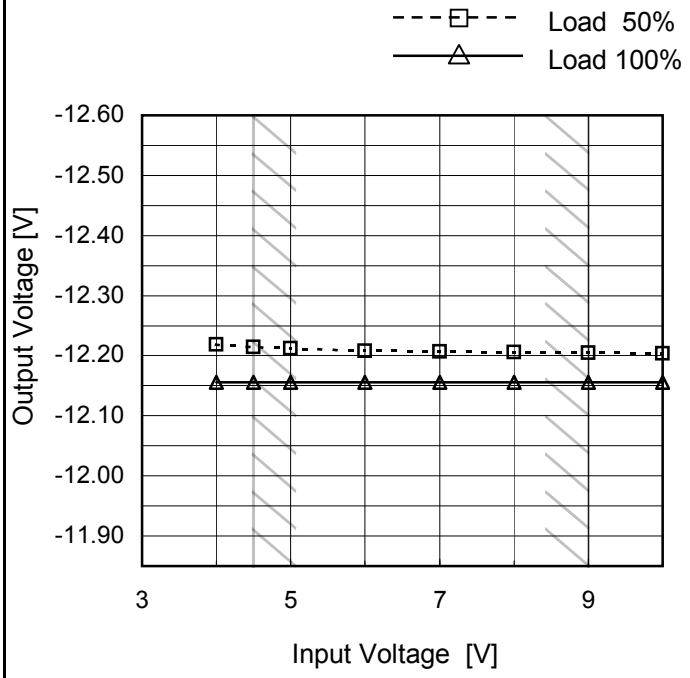


2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
4.0	12.221	12.160
4.5	12.218	12.160
5.0	12.216	12.161
6.0	12.213	12.161
7.0	12.212	12.161
8.0	12.210	12.162
9.0	12.210	12.162
10.0	12.209	12.162
--	-	-

Object	-12V0.13A

1.Graph



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

2.Values

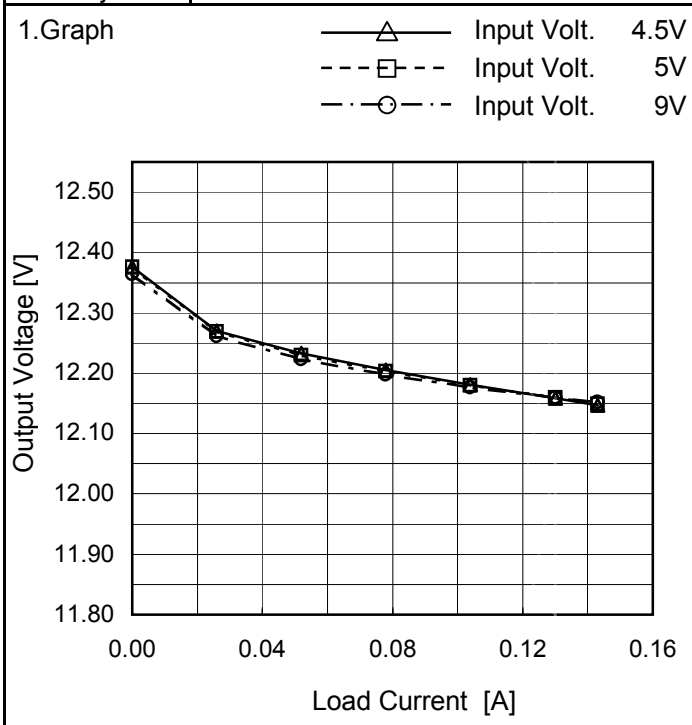
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
4.0	-12.218	-12.155
4.5	-12.214	-12.156
5.0	-12.212	-12.156
6.0	-12.208	-12.156
7.0	-12.207	-12.156
8.0	-12.205	-12.156
9.0	-12.204	-12.156
10.0	-12.204	-12.156
--	-	-

COSEL

Model	SUTW30512
Item	Load Regulation
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

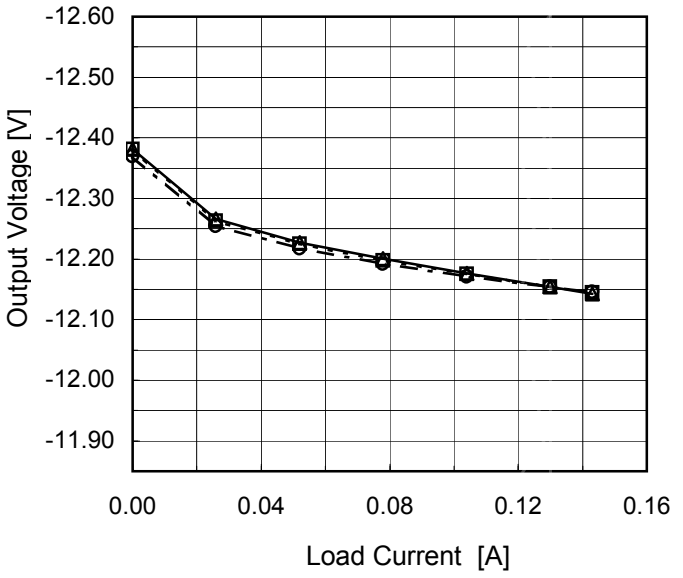


2.Values

Load Current [A]	Output Voltage [V] Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0.000	12.376	12.376	12.365
0.026	12.270	12.268	12.261
0.052	12.232	12.230	12.223
0.078	12.205	12.203	12.198
0.104	12.181	12.180	12.177
0.130	12.158	12.160	12.160
0.143	12.147	12.149	12.152
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

Object	-12V0.13A

1.Graph



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

2.Values

Load Current [A]	Output Voltage [V] Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0.000	-12.381	-12.381	-12.369
0.026	-12.266	-12.263	-12.255
0.052	-12.228	-12.225	-12.217
0.078	-12.200	-12.198	-12.192
0.104	-12.177	-12.175	-12.172
0.130	-12.154	-12.154	-12.154
0.143	-12.143	-12.145	-12.146
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

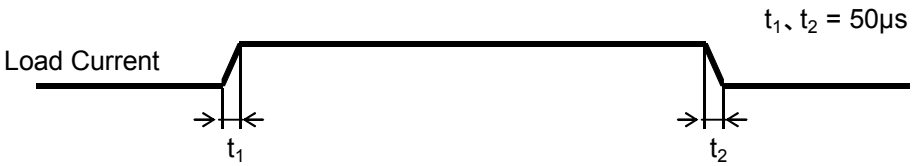
BC-10242

COSEL

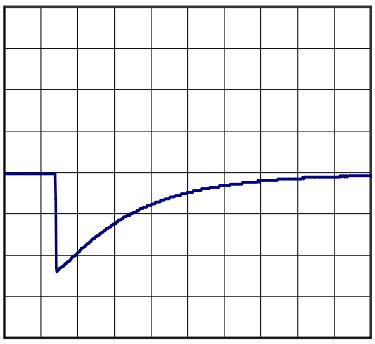
Model	SUTW30512
Item	Dynamic Load Response
Object	+12V0.13A

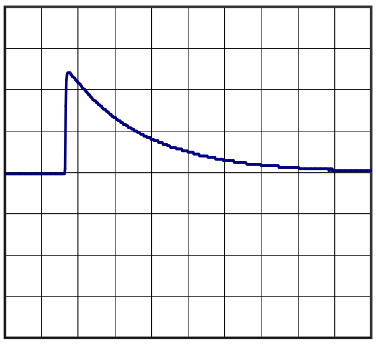
Temperature 25°C
Testing Circuitry Figure A

Input Volt. 5 V
Cycle 100 mS



Min. Load (0A) ←→
Load 100% (0.13A)

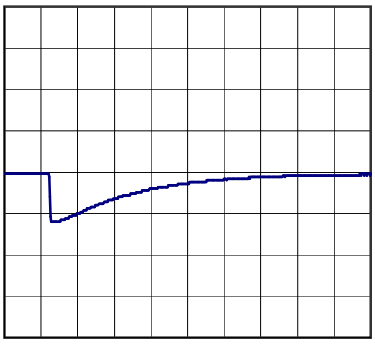


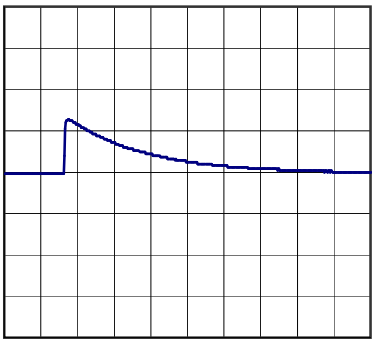


200mV/div

2ms/div 2ms/div

Min. Load (0A) ←→
Load 50% (0.065A)

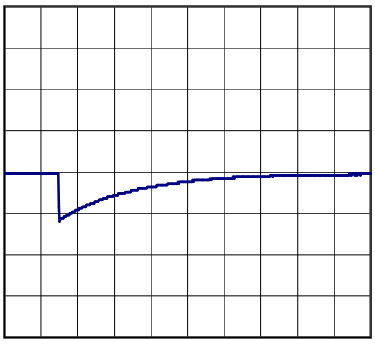


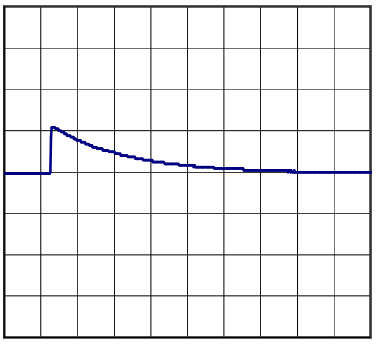


200mV/div

2ms/div 2ms/div

Load 50% (0.065A) ←→
Load 100% (0.13A)





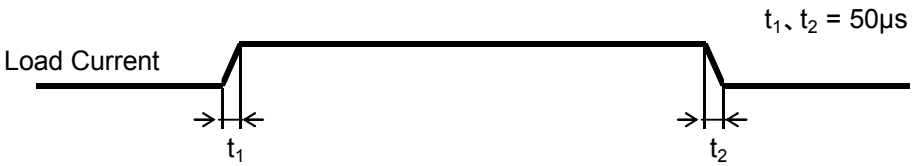
200mV/div

2ms/div 2ms/div

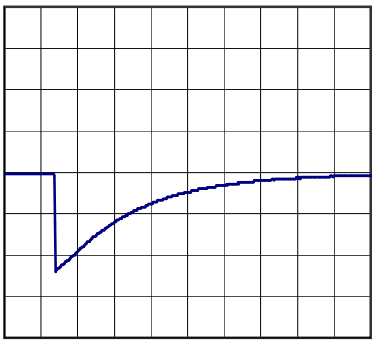
COSEL

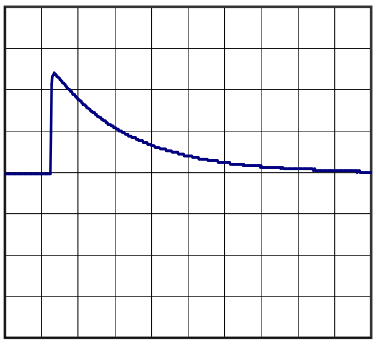
Model	SUTW30512	Temperature 25°C
Item	Dynamic Load Response	Testing Circuitry Figure A
Object	-12V0.13A	

Input Volt. 5 V
Cycle 100 mS



Min. Load (0A) ←→
Load 100% (0.13A)

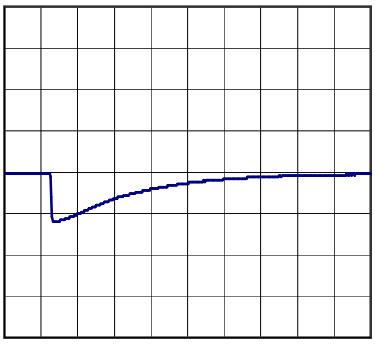


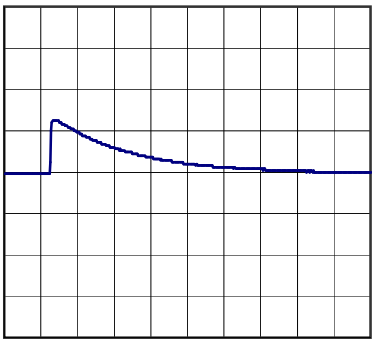


200mV/div

2ms/div 2ms/div

Min. Load (0A) ←→
Load 50% (0.065A)

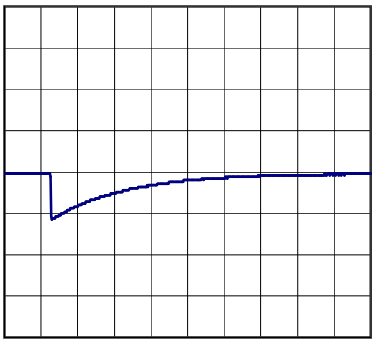


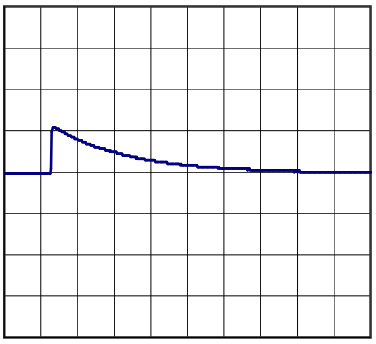


200mV/div

2ms/div 2ms/div

Load 50% (0.065A) ←→
Load 100% (0.13A)





200mV/div

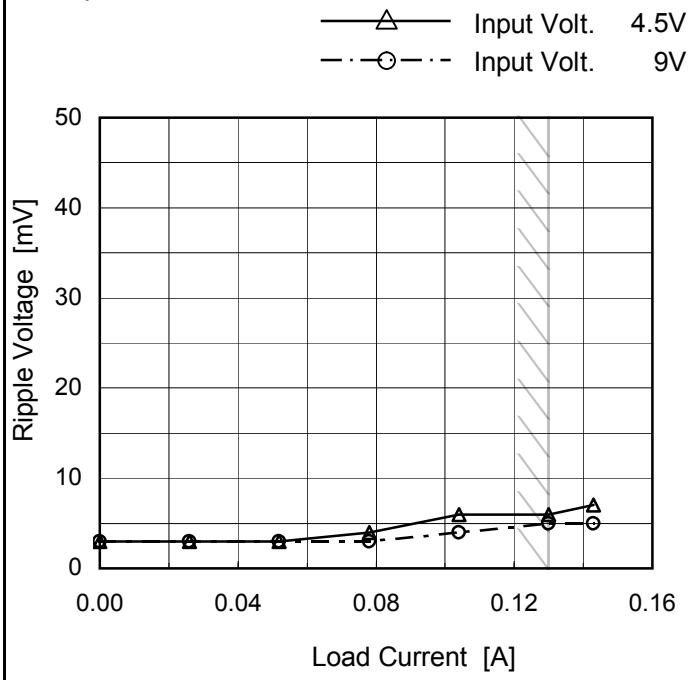
2ms/div 2ms/div

COSEL

Model	SUTW30512
Item	Ripple Voltage (by Load Current)
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure B

1.Graph



Ripple Voltage is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

Ripple [mVp-p]

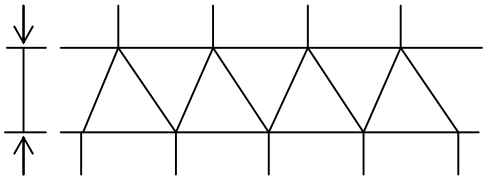


Fig.Complex Ripple Wave Form

2.Values

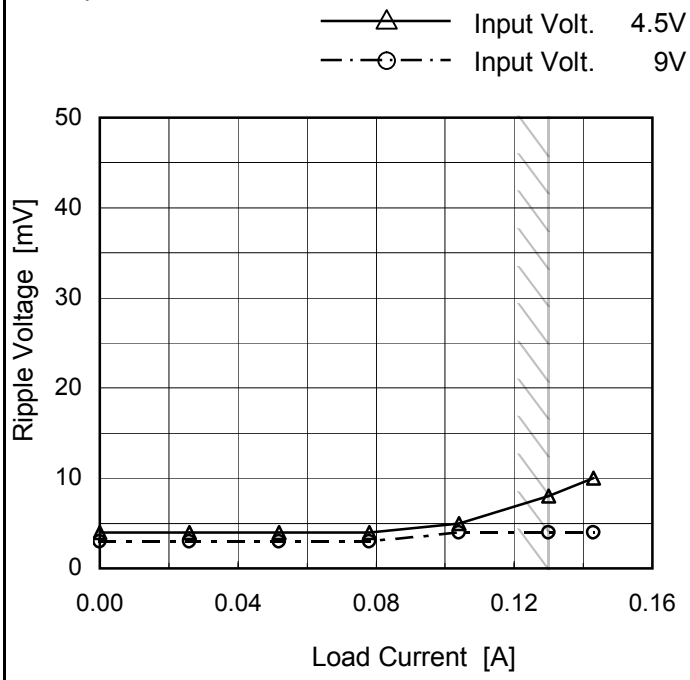
Load Current [A]	Ripple Voltage [mV] Input Volt. 4.5 [V]	Ripple Voltage [mV] Input Volt. 9 [V]
0.000	3	3
0.026	3	3
0.052	3	3
0.078	4	3
0.104	6	4
0.130	6	5
0.143	7	5
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	SUTW30512
Item	Ripple Voltage (by Load Current)
Object	-12V0.13A

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

Ripple [mVp-p]

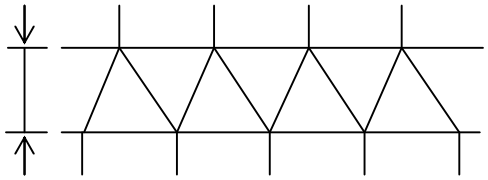


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV] Input Volt. 4.5 [V]	Ripple Voltage [mV] Input Volt. 9 [V]
0.000	4	3
0.026	4	3
0.052	4	3
0.078	4	3
0.104	5	4
0.130	8	4
0.143	10	4
--	-	-
--	-	-
--	-	-
--	-	-

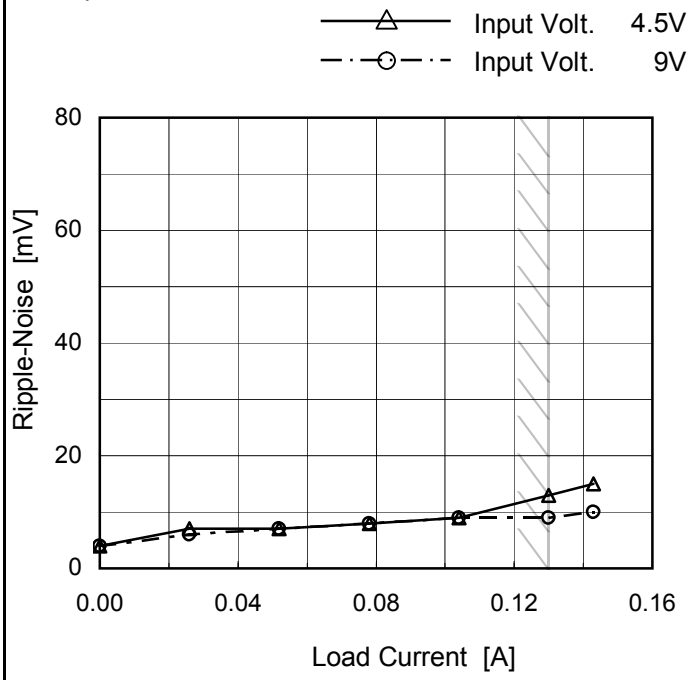
BC-10242

COSEL

Model	SUTW30512
Item	Ripple-Noise
Object	+12V0.13A

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.

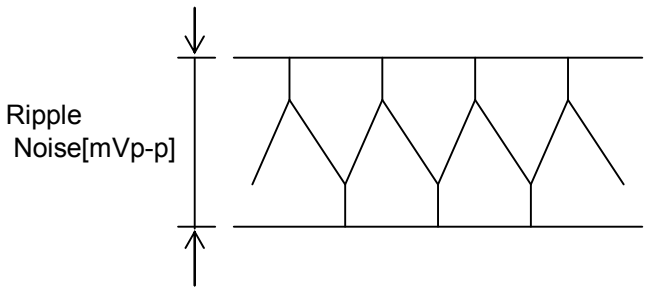


Fig.Complex Ripple Noise Wave Form

2.Values

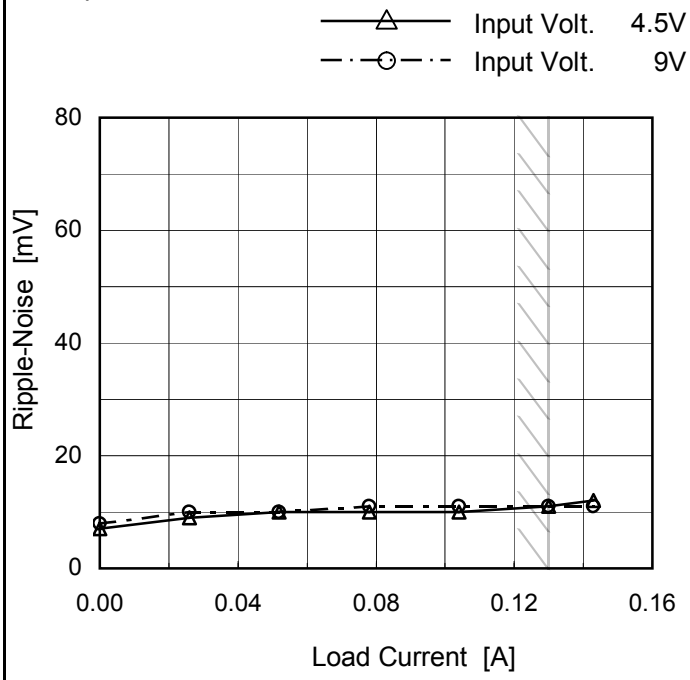
Load Current [A]	Ripple-Noise [mV] Input Volt. 4.5 [V]	Ripple-Noise [mV] Input Volt. 9 [V]
0.000	4	4
0.026	7	6
0.052	7	7
0.078	8	8
0.104	9	9
0.130	13	9
0.143	15	10
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	SUTW30512
Item	Ripple-Noise
Object	-12V0.13A

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.

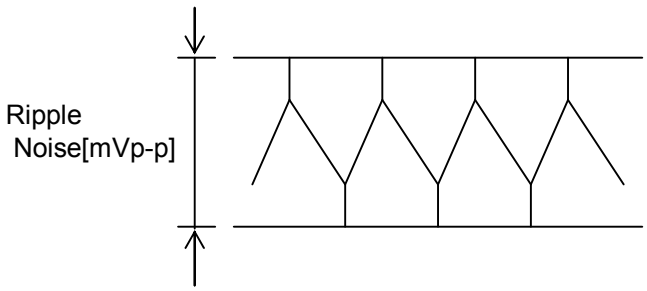


Fig.Complex Ripple Noise Wave Form

2.Values

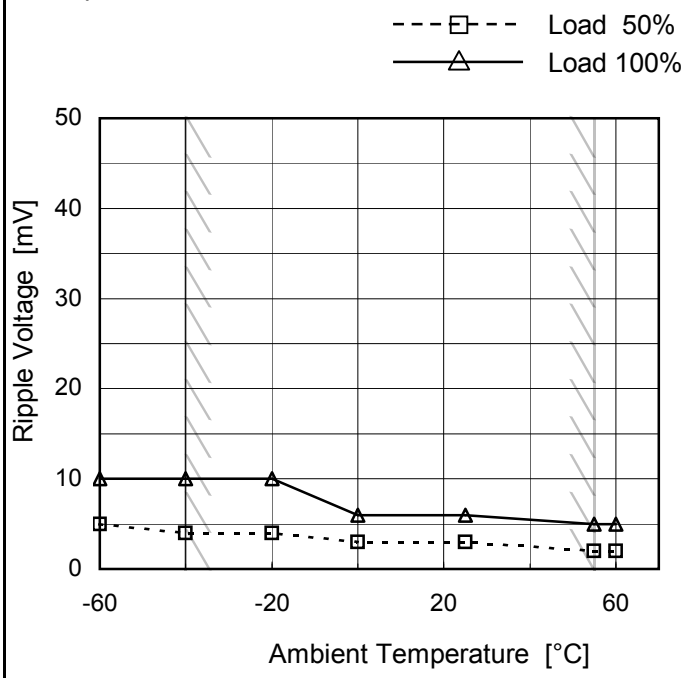
Load Current [A]	Ripple-Noise [mV] Input Volt. 4.5 [V]	Ripple-Noise [mV] Input Volt. 9 [V]
0.000	7	8
0.026	9	10
0.052	10	10
0.078	10	11
0.104	10	11
0.130	11	11
0.143	12	11
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	SUTW30512
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V0.13A

Testing Circuitry Figure B

1.Graph



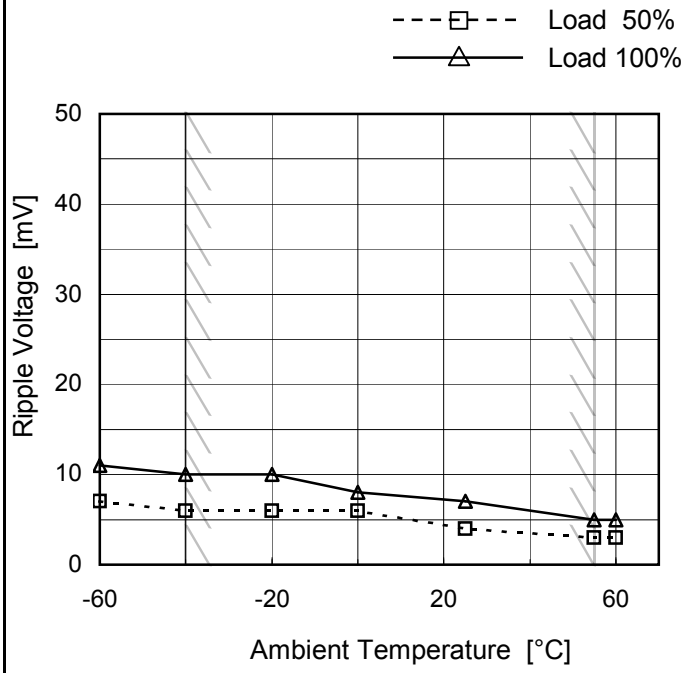
Input Volt. 5V

2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	5	10
-40	4	10
-20	4	10
0	3	6
25	3	6
55	2	5
60	2	5
--	-	-
--	-	-
--	-	-
--	-	-

Object	-12V0.13A

1.Graph



Input Volt. 5V

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	7	11
-40	6	10
-20	6	10
0	6	8
25	4	7
55	3	5
60	3	5
--	-	-
--	-	-
--	-	-
--	-	-

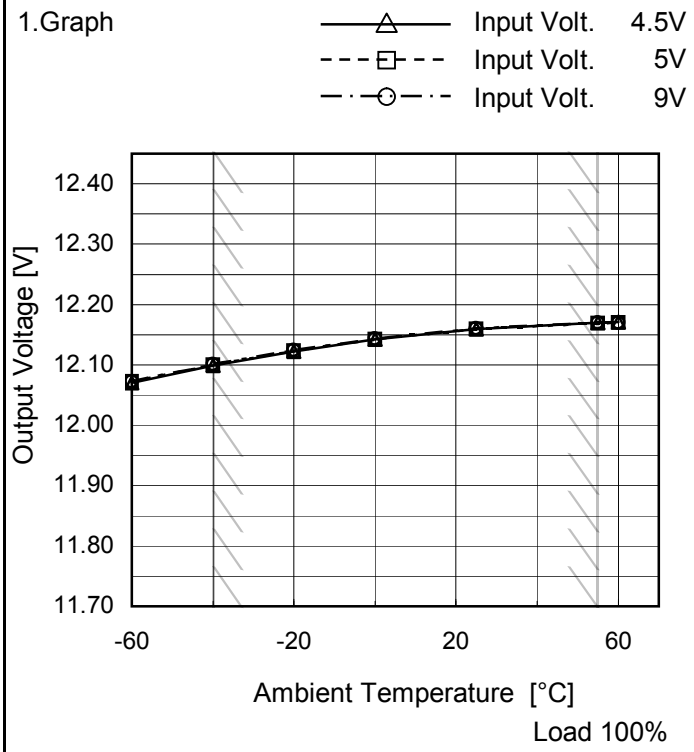
COSEL

Model	SUTW30512
Item	Ambient Temperature Drift

Testing Circuitry Figure A

Object +12V0.13A

1.Graph

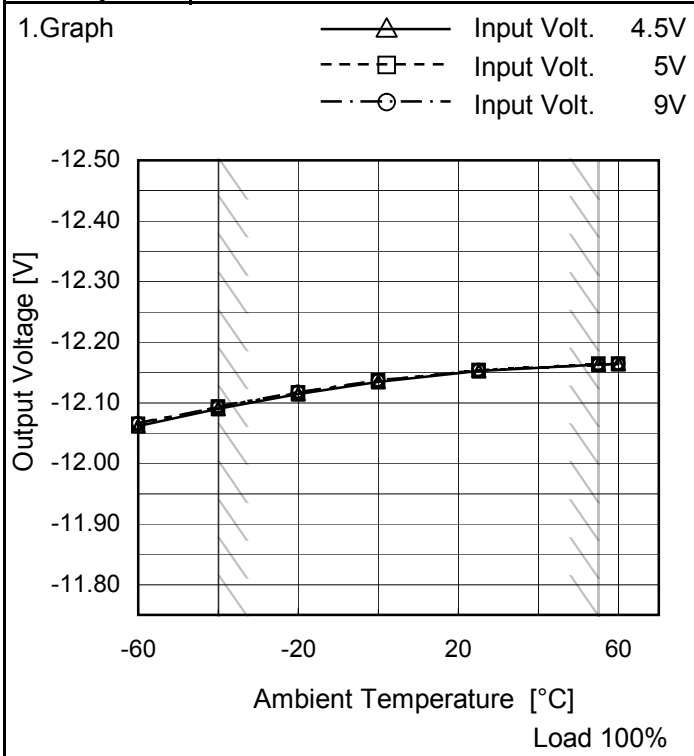


2.Values

Ambient Temperature [°C]	Output Voltage [V] Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
-60	12.070	12.072	12.073
-40	12.098	12.100	12.101
-20	12.122	12.123	12.124
0	12.142	12.143	12.143
25	12.159	12.159	12.160
55	12.170	12.169	12.170
60	12.171	12.170	12.170
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

Object -12V0.13A

1.Graph



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

2.Values

Ambient Temperature [°C]	Output Voltage [V] Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
-60	-12.062	-12.065	-12.066
-40	-12.090	-12.093	-12.094
-20	-12.115	-12.117	-12.117
0	-12.135	-12.136	-12.136
25	-12.153	-12.154	-12.154
55	-12.163	-12.164	-12.164
60	-12.164	-12.165	-12.164
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	SUTW30512	
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 : 4.5 - 9V

Load Current (AVR 1) : 0 - 0.13A (AVR 2) : 0 - 0.13A

* 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	+12V0.13A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	55	4.5	0	12.390	±253	±2.1
Minimum Voltage	-40	4.5	0.13	11.885		

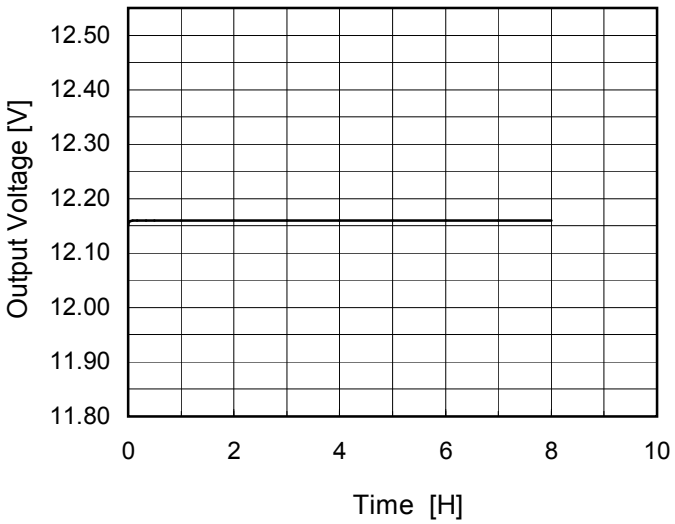
Object	-12V0.13A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	55	4.5	0	-12.395	±253	±2.1
Minimum Voltage	-40	4.5	0.13	-11.890		

COSEL

Model	SUTW30512
Item	Time Lapse Drift
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



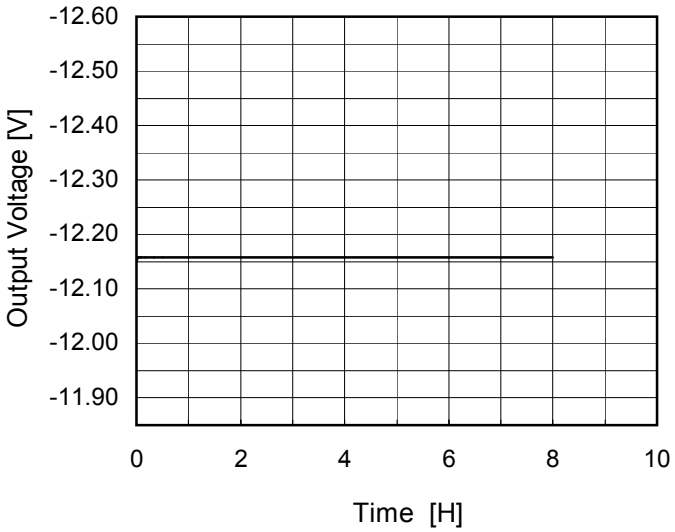
Input Volt. 5V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	12.150
0.5	12.160
1.0	12.160
2.0	12.160
3.0	12.160
4.0	12.160
5.0	12.160
6.0	12.160
7.0	12.160
8.0	12.160

Object	-12V0.13A

1.Graph



Input Volt. 5V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	-12.149
0.5	-12.158
1.0	-12.158
2.0	-12.158
3.0	-12.158
4.0	-12.158
5.0	-12.158
6.0	-12.158
7.0	-12.158
8.0	-12.158

BC-10242

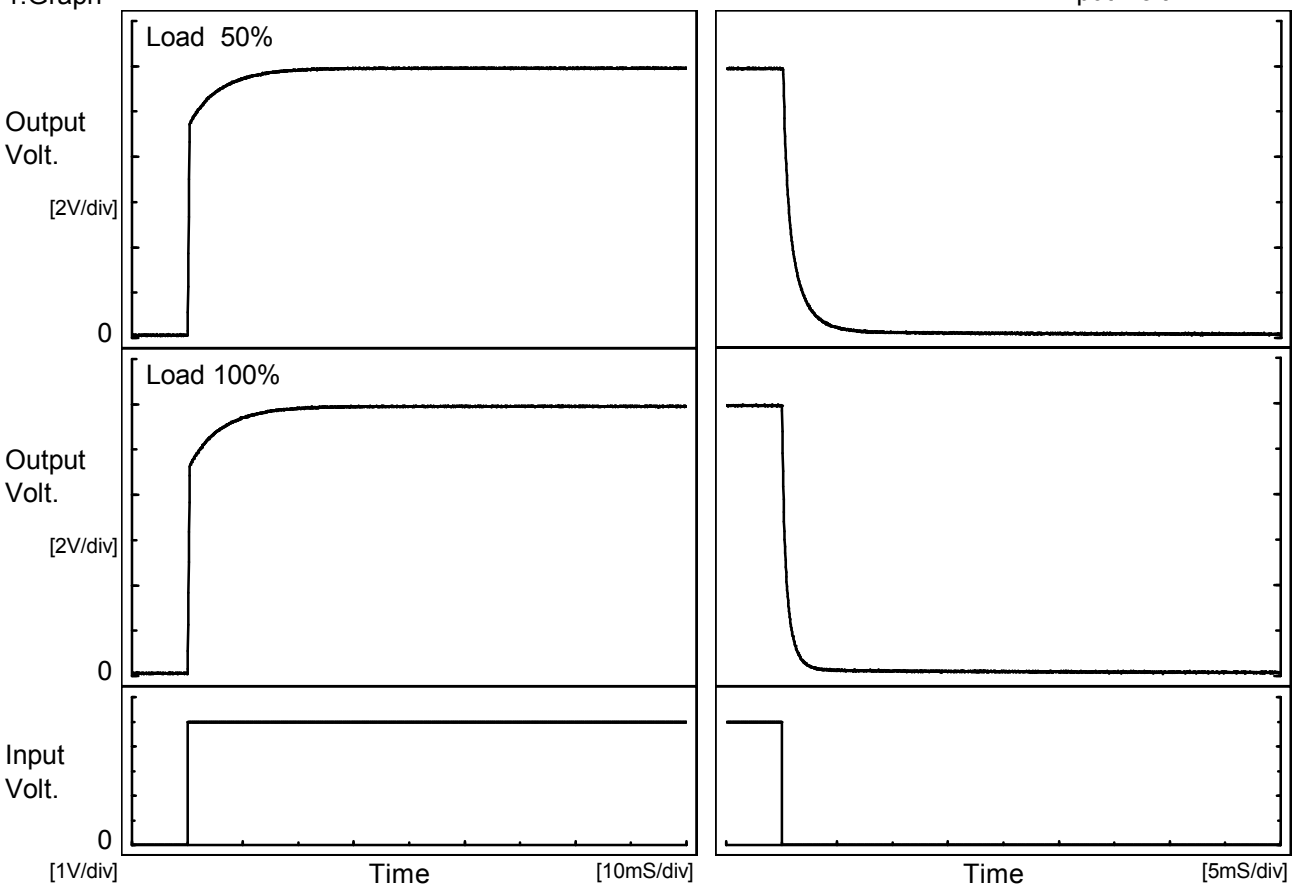
COSEL

Model	SUTW30512
Item	Rise and Fall Time
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

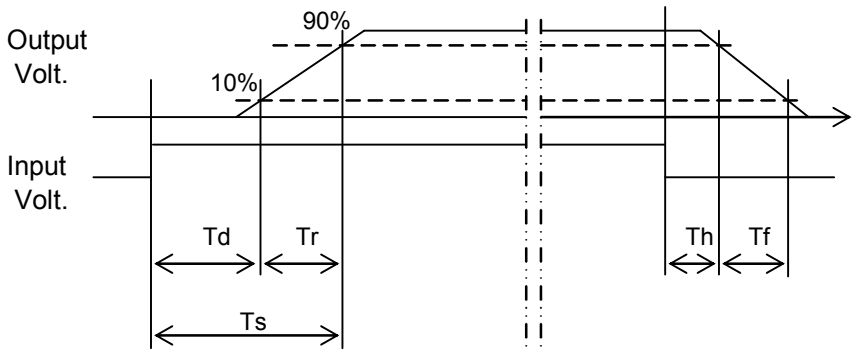
Input Volt. 5 V



2.Values

[mS]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	0.2	5.0	5.2	0.1	2.4
100 %	0.2	5.6	5.8	0.1	1.2

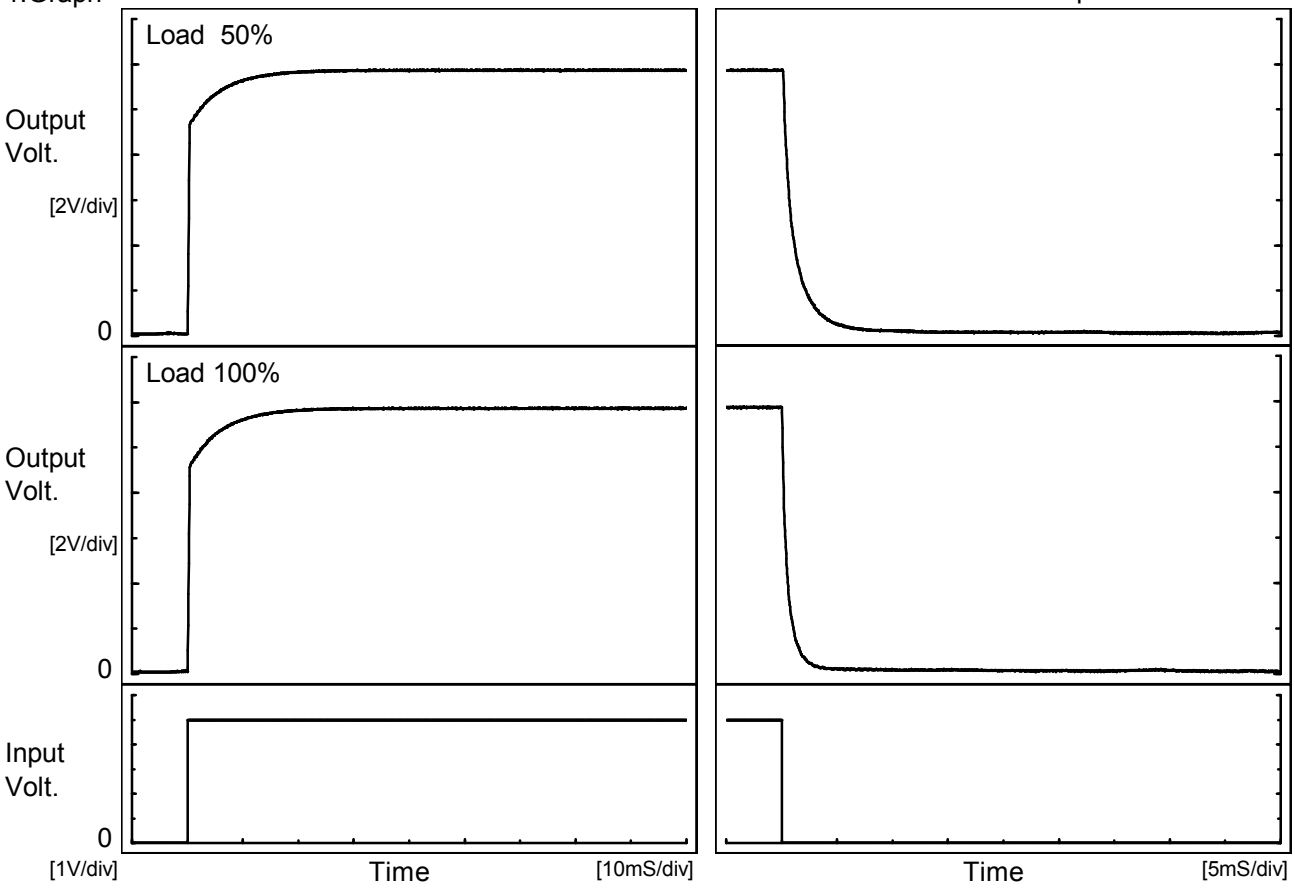


COSEL

Model	SUTW30512	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	-12V0.13A	

1.Graph

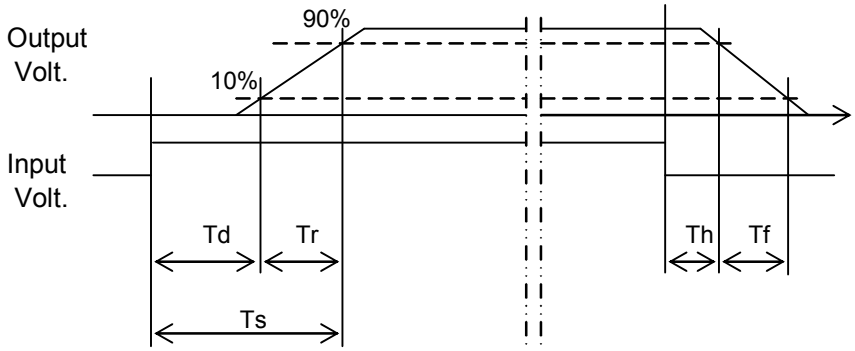
Input Volt. 5 V



2.Values

[mS]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	0.2	6.1	6.3	0.1	2.8
100 %	0.2	6.7	6.9	0.1	1.4



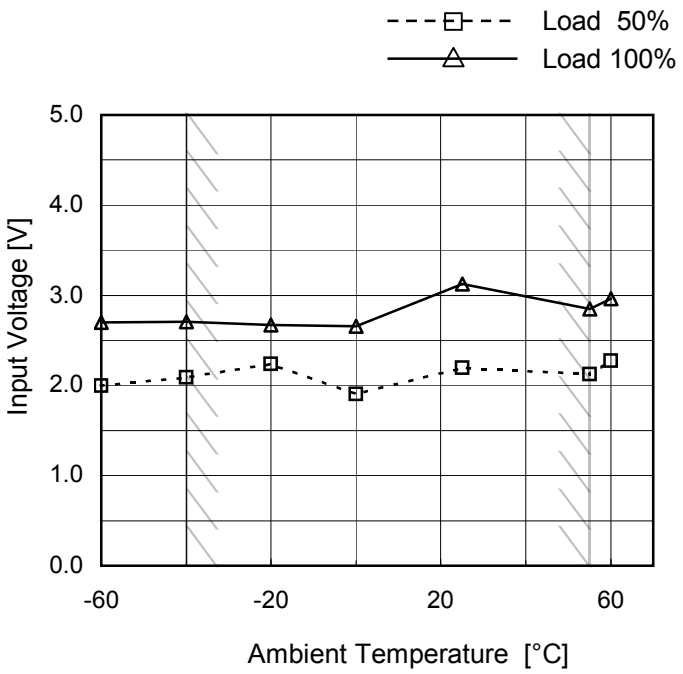
COSEL

Model	SUTW30512
Item	Minimum Input Voltage for Regulated Output Voltage

Testing Circuitry Figure A

Object +12V0.13A

1.Graph

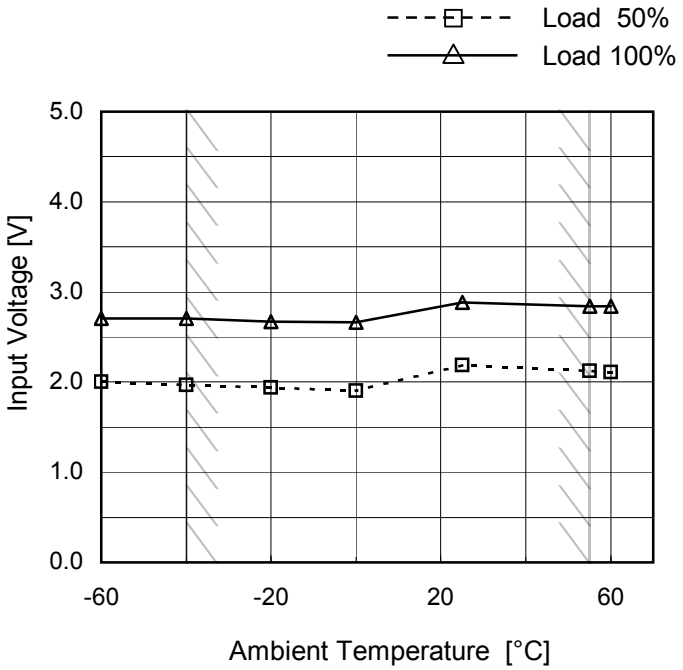


2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	2.0	2.7
-40	2.1	2.7
-20	2.3	2.7
0	1.9	2.7
25	2.2	3.2
55	2.2	2.9
60	2.3	3.0
--	-	-
--	-	-
--	-	-
--	-	-

Object -12V0.13A

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	2.0	2.7
-40	2.0	2.7
-20	2.0	2.7
0	1.9	2.7
25	2.2	2.9
55	2.2	2.9
60	2.2	2.9
--	-	-
--	-	-
--	-	-
--	-	-

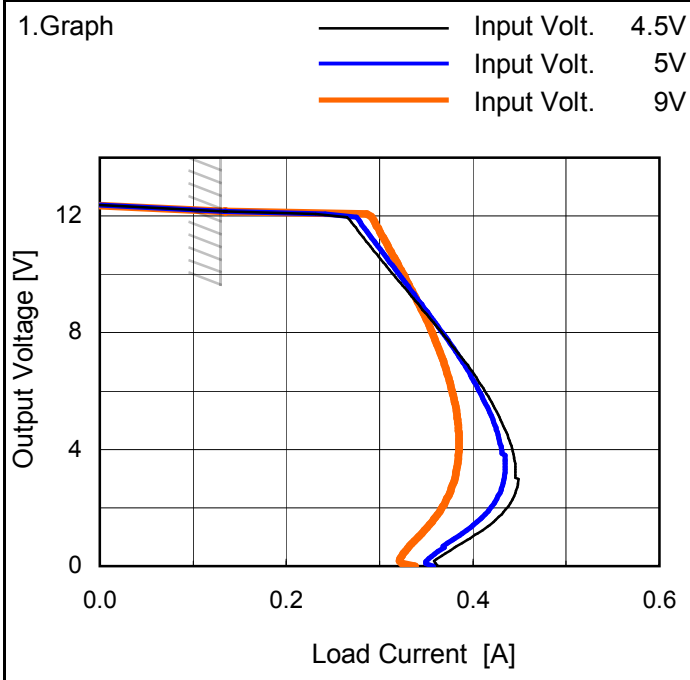
COSEL

Model	SUTW30512
Item	Overcurrent Protection

Temperature 25°C
Testing Circuitry Figure A

Object +12V0.13A

1.Graph

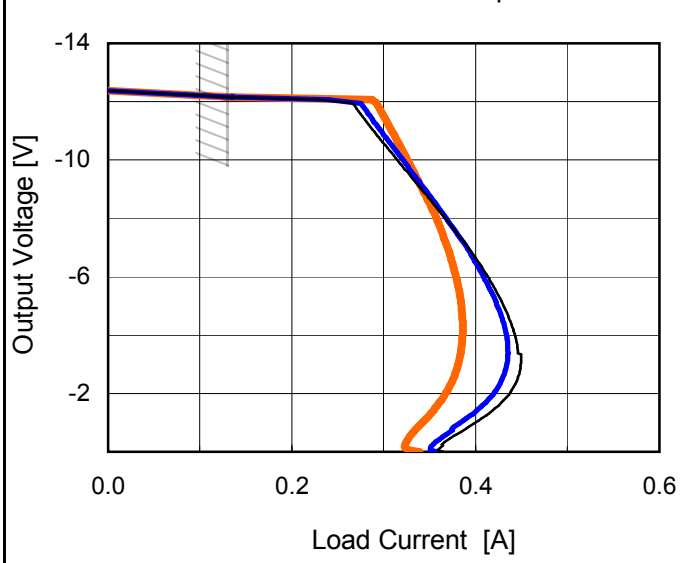


2.Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
12.0	0.13	0.13	0.13
11.4	0.28	0.29	0.30
10.8	0.29	0.30	0.31
9.6	0.32	0.33	0.33
8.4	0.36	0.36	0.35
7.2	0.38	0.38	0.37
6.0	0.41	0.41	0.38
4.8	0.43	0.42	0.38
3.6	0.44	0.43	0.38
2.4	0.45	0.43	0.37
1.2	0.41	0.39	0.35
0.0	0.36	0.36	0.34

Object -12V0.13A

1.Graph



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

2.Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
-12.0	0.13	0.13	0.13
-11.4	0.28	0.29	0.30
-10.8	0.29	0.30	0.31
-9.6	0.33	0.33	0.33
-8.4	0.36	0.36	0.35
-7.2	0.39	0.38	0.37
-6.0	0.41	0.41	0.38
-4.8	0.43	0.43	0.39
-3.6	0.45	0.43	0.38
-2.4	0.44	0.43	0.38
-1.2	0.41	0.39	0.35
0.0	0.36	0.36	0.34

COSEL

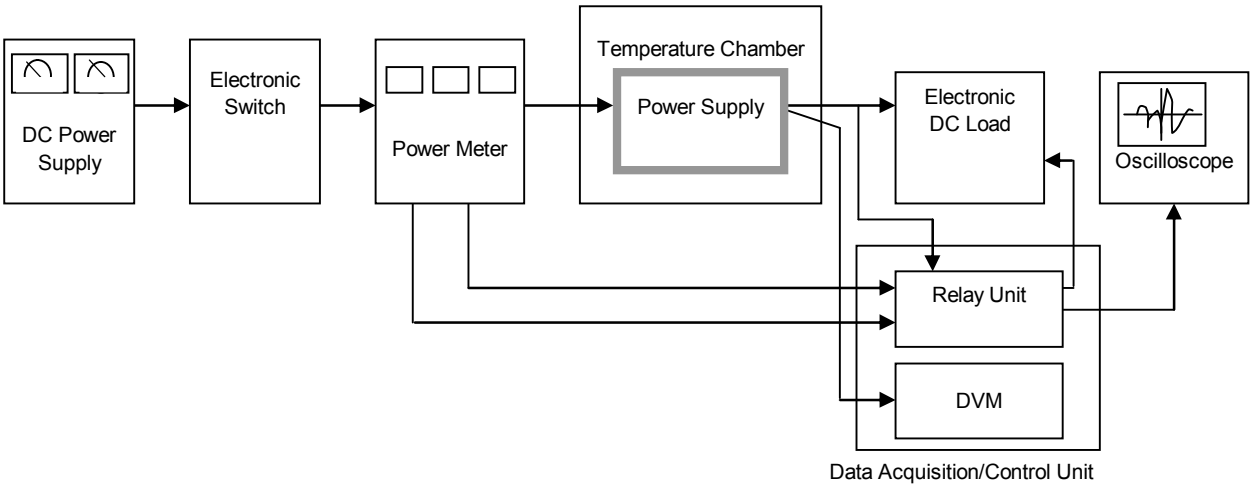


Figure A

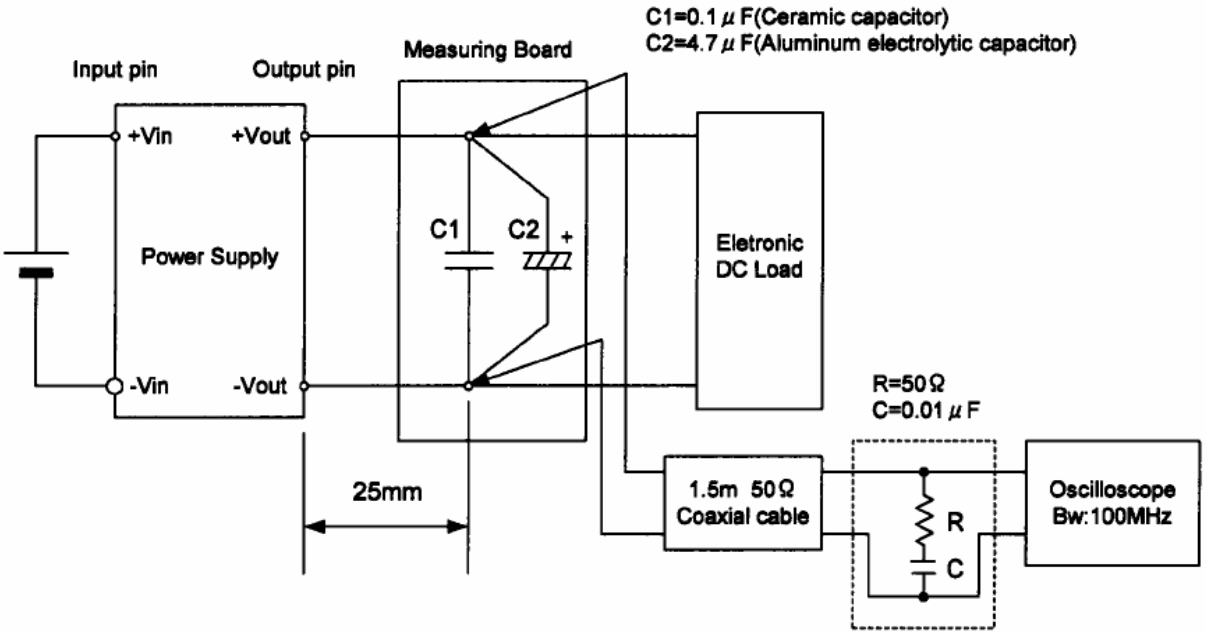


Figure B (Ripple and Ripple noise Characteristic)