COSEL

TEST DATA OF SUW60512
SUCW60512

Regulated DC Power Supply
Feb 24, 2005

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# COSEL CO.,LTD.

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Model	SUW60512/SUCW60512
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%
0.00	0.000	0.000	0.000
1.70	0.003	0.002	0.002
2.00	0.002	0.002	0.002
3.00	0.003	0.003	0.003
3.66	0.127	0.356	0.690
4.00	0.117	0.788	1.993
4.16	0.115	0.931	1.860
4.50	0.108	0.860	1.700
5.00	0.101	0.770	1.499
6.00	0.090	0.648	1.248
7.00	0.084	0.558	1.057
8.00	0.081	0.493	0.927
9.00	0.079	0.446	0.827
10.00	0.079	0.408	0.748
--	-	-	-
--	-	-	-

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Model	SUW60512/SUCW60512
Item	Input Current (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph

—△— Input Volt. 4.5V
---□--- Input Volt. 5V
—·○·— Input Volt. 9V

2.Values

Load Ration [%]	Input Current [A]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0	0.107	0.100	0.079
20	0.408	0.369	0.227
40	0.708	0.635	0.375
60	1.036	0.926	0.518
80	1.348	1.189	0.669
100	1.710	1.503	0.823
110	1.829	1.667	0.890
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	SUW60512/SUCW60512
Item	Input Power (by Load Current)
Object	

Temperature	25°C
Testing Circuitry	Figure A

1.Graph

Input Volt. 4.5V
Input Volt. 5V
Input Volt. 9V

X-axis: Load Ration [%]
Y-axis: Input Power [W]

2.Values

Load Ration [%]	Input Power [W]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0	0.48	0.50	0.71
20	1.80	1.81	2.03
40	3.15	3.16	3.33
60	4.58	4.55	4.65
80	6.03	5.97	5.99
100	7.56	7.46	7.34
110	8.30	8.22	8.02
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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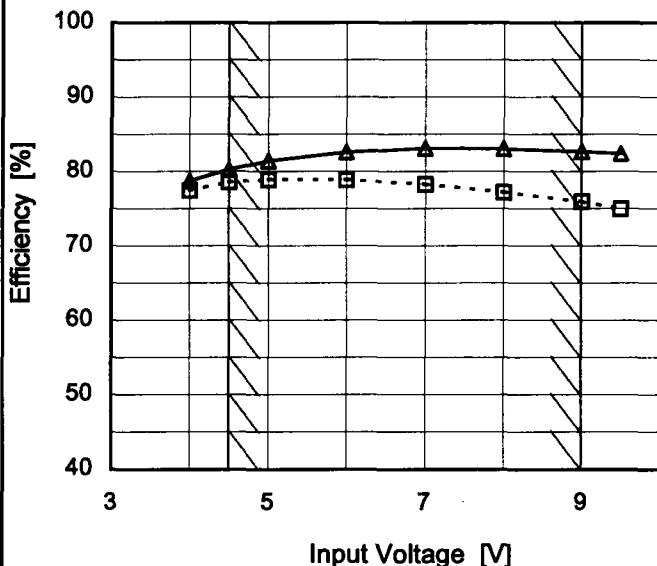
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Model	SUW60512/SUCW60512
Item	Efficiency (by Input Voltage)
Object	————————

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
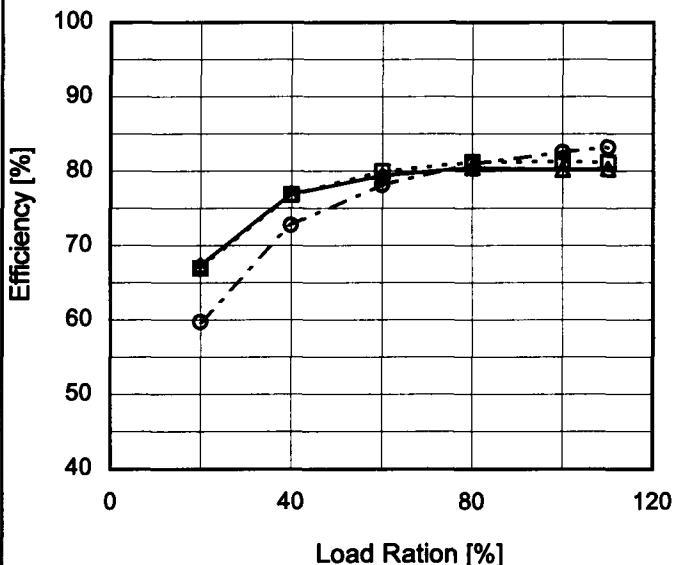
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
4.0	77.5	78.7
4.5	78.6	80.3
5.0	78.9	81.4
6.0	78.9	82.6
7.0	78.3	83.1
8.0	77.2	83.1
9.0	75.9	82.7
9.5	75.0	82.4
--	-	-

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Model	SUW60512/SUCW60512
Item	Efficiency (by Load Current)
Object	———————

Temperature　　25°C
Testing Circuitry　Figure A

1.Graph

———△——— Input Volt.　4.5V
- - -☐- - - Input Volt.　5V
—·—○—·— Input Volt.　9V

2.Values
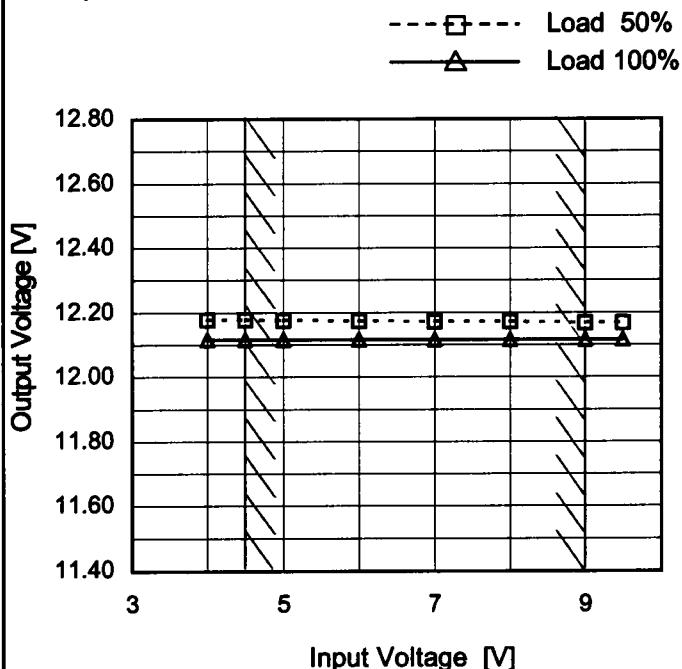
Load Ration [%]	Efficiency [%]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0	-	-	-
20	67.4	67.0	59.7
40	76.9	76.9	72.8
60	79.4	79.9	78.2
80	80.5	81.2	80.9
100	80.2	81.3	82.6
110	80.3	81.1	83.2
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	SUW60512/SUCW60512
Item	Line Regulation
Object	+12V0.25A
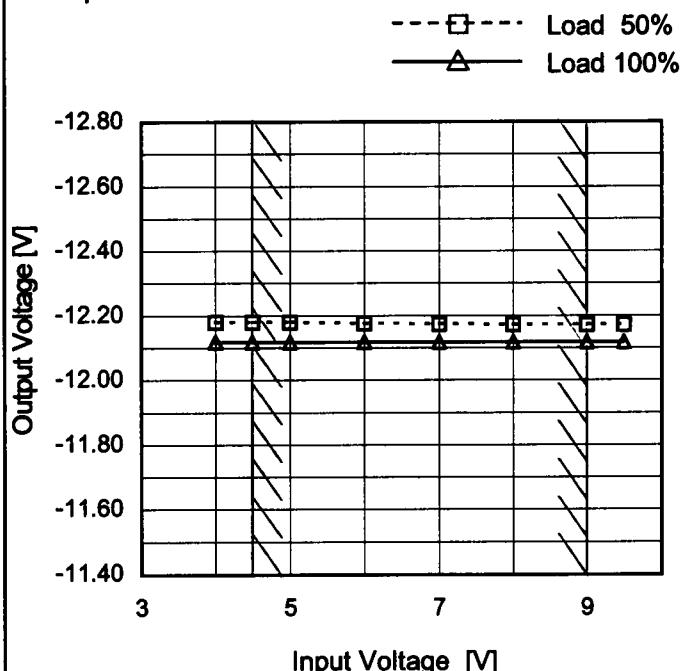
Temperature 25°C
Testing Circuitry Figure A

1.Graph

--☐-- Load 50%
--△-- Load 100%

Output Voltage [V] vs Input Voltage [V]

2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
4.0	12.178	12.116
4.5	12.178	12.116
5.0	12.176	12.116
6.0	12.173	12.117
7.0	12.171	12.117
8.0	12.171	12.117
9.0	12.168	12.116
9.5	12.168	12.116
--	-	-

Object	-12V0.25A

1.Graph

--☐-- Load 50%
--△-- Load 100%

Output Voltage [V] vs Input Voltage [V]

2.Values
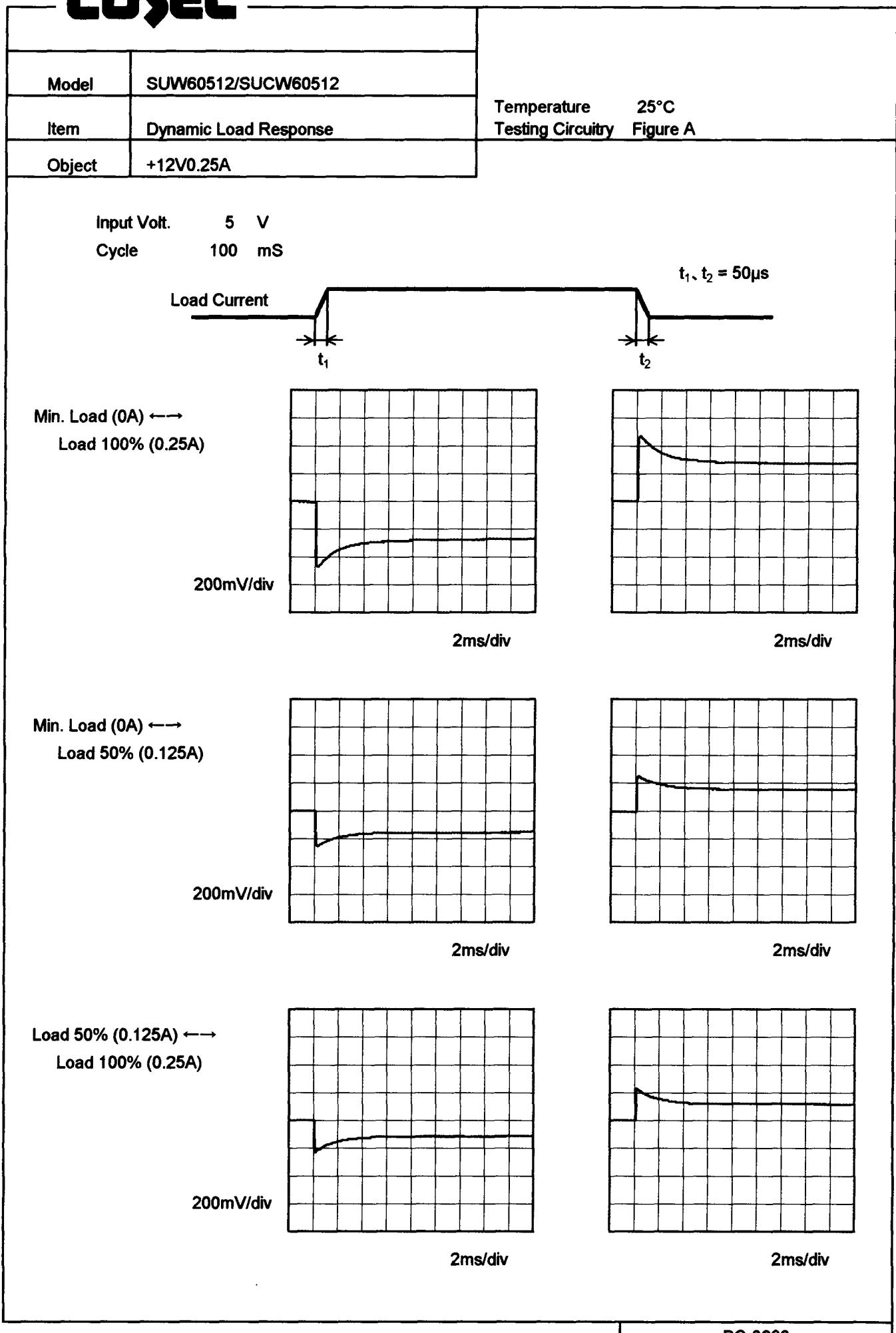
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
4.0	-12.179	-12.117
4.5	-12.179	-12.117
5.0	-12.179	-12.117
6.0	-12.176	-12.117
7.0	-12.174	-12.118
8.0	-12.172	-12.117
9.0	-12.172	-12.117
9.5	-12.172	-12.118
--	-	-
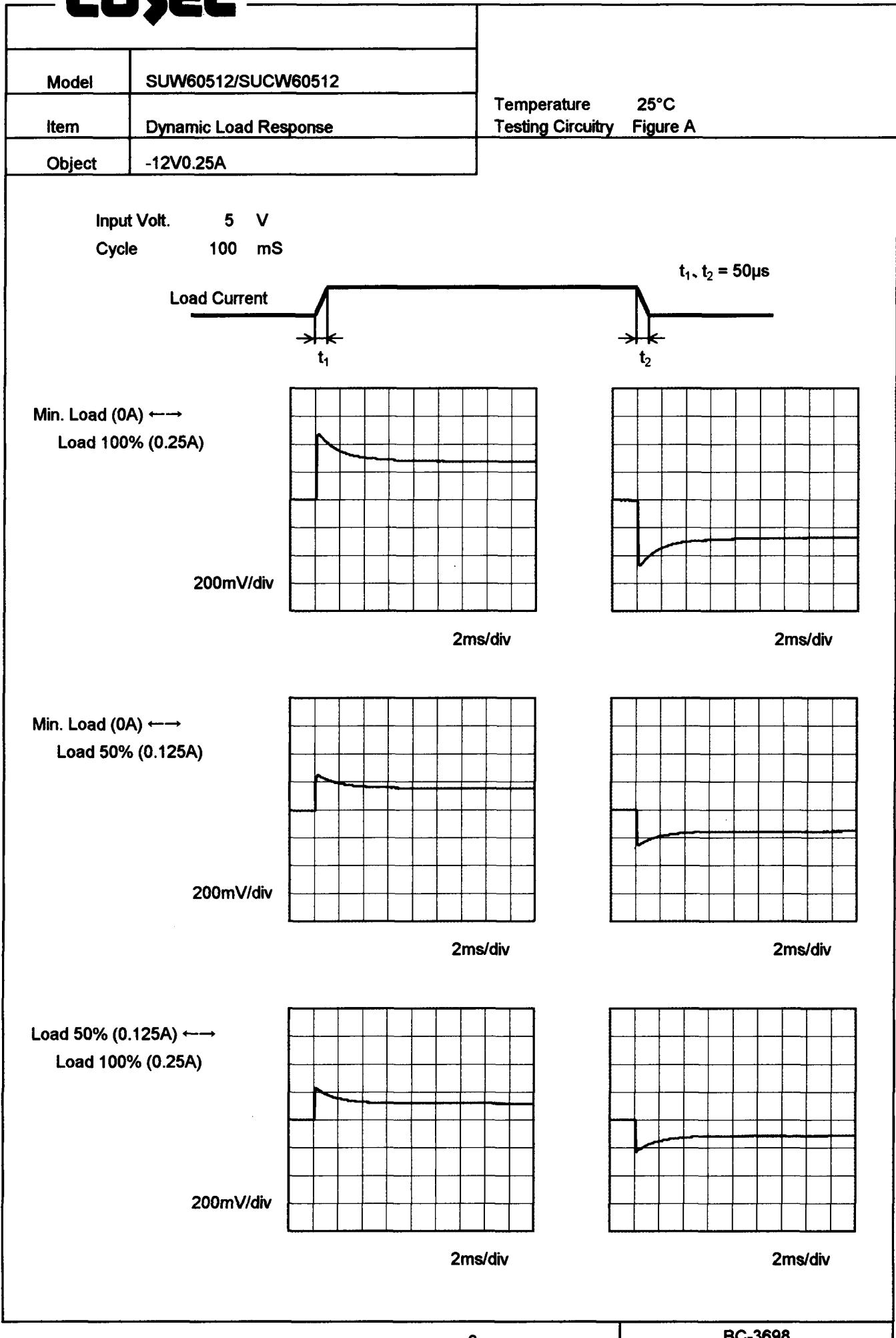
Note: Slanted line shows the range of the rated input voltage.

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Model	SUW60512/SUCW60512
Item	Load Regulation
Object	+12V0.25A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

———△——— Input Volt. 4.5V
- - -☐- - - Input Volt. 5V
—·—○—·— Input Volt. 9V

Output Voltage [V] vs Load Current [A]

2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0.000	12.375	12.371	12.337
0.050	12.236	12.234	12.225
0.100	12.193	12.192	12.184
0.150	12.165	12.163	12.157
0.200	12.140	12.139	12.135
0.250	12.116	12.116	12.116
0.275	12.104	12.105	12.107
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

Object	-12V0.25A

1.Graph

———△——— Input Volt. 4.5V
- - -☐- - - Input Volt. 5V
—·—○—·— Input Volt. 9V

Output Voltage [V] vs Load Current [A]

2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0.000	-12.411	-12.404	-12.369
0.050	-12.247	-12.246	-12.239
0.100	-12.197	-12.195	-12.189
0.150	-12.166	-12.165	-12.158
0.200	-12.141	-12.140	-12.137
0.250	-12.117	-12.118	-12.117
0.275	-12.106	-12.106	-12.108
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
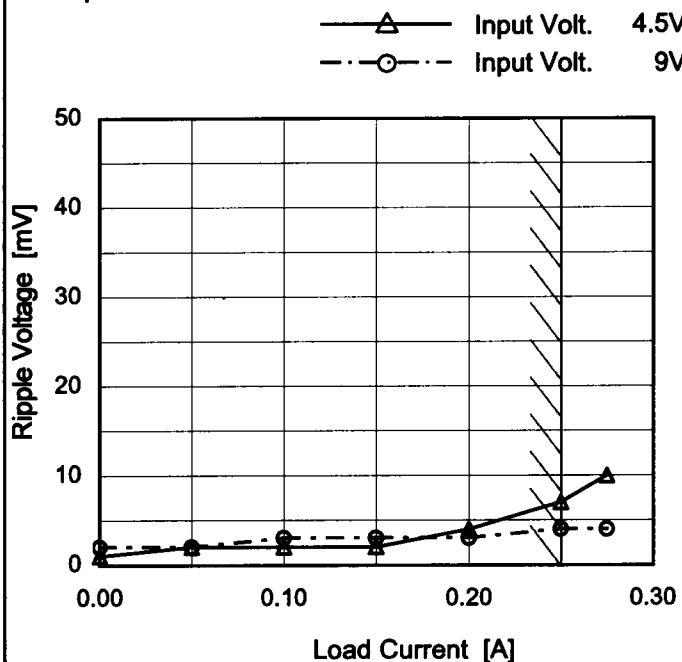
Note: Slanted line shows the range of the rated load current.

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Model	SUW60512/SUCW60512
Item	Dynamic Load Response
Object	+12V0.25A

Temperature 25°C
Testing Circuitry Figure A

Input Volt. 5 V
Cycle 100 mS

t_1、t_2 = 50µs

Load Current

t_1

t_2

Min. Load (0A) ←→
Load 100% (0.25A)

200mV/div

2ms/div

2ms/div

Min. Load (0A) ←→
Load 50% (0.125A)

200mV/div

2ms/div

2ms/div

Load 50% (0.125A) ←→
Load 100% (0.25A)

200mV/div

2ms/div

2ms/div

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Model	SUW60512/SUCW60512
Item	Dynamic Load Response
Object	-12V0.25A

Temperature	25°C
Testing Circuitry	Figure A

Input Volt.   5   V

Cycle   100   mS

t_1、t_2 = 50µs

Load Current

t_1 t_2

Min. Load (0A) ←→
Load 100% (0.25A)

200mV/div

2ms/div   2ms/div

Min. Load (0A) ←→
Load 50% (0.125A)

200mV/div

2ms/div   2ms/div

Load 50% (0.125A) ←→
Load 100% (0.25A)

200mV/div

2ms/div   2ms/div

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Model	SUW60512/SUCW60512
Item	Ripple Voltage (by Load Current)
Object	+12V0.25A

Temperature 25°C
Testing Circuitry Figure B

1.Graph

——△—— Input Volt. 4.5V
—·—○—·— Input Volt. 9V

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.

Ripple [mVp-p]

Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 4.5 [V]	Input Volt. 9 [V]
0.000	1	2
0.050	2	2
0.100	2	3
0.150	2	3
0.200	4	3
0.250	7	4
0.275	10	4
--	-	-
--	-	-
--	-	-
--	-	-

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Model	SUW60512/SUCW60512
Item	Ripple Voltage (by Load Current)
Object	-12V0.25A

Temperature   25°C
Testing Circuitry   Figure B

1.Graph

———△——— Input Volt.   4.5V
—·—○—·— Input Volt.   9V

Ripple Voltage [mV] vs Load Current [A]

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 4.5 [V]	Input Volt. 9 [V]
0.000	1	2
0.050	2	2
0.100	2	3
0.150	2	3
0.200	2	3
0.250	6	3
0.275	8	3
--	-	-
--	-	-
--	-	-
--	-	-
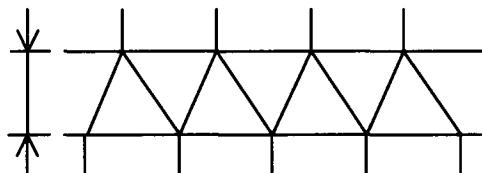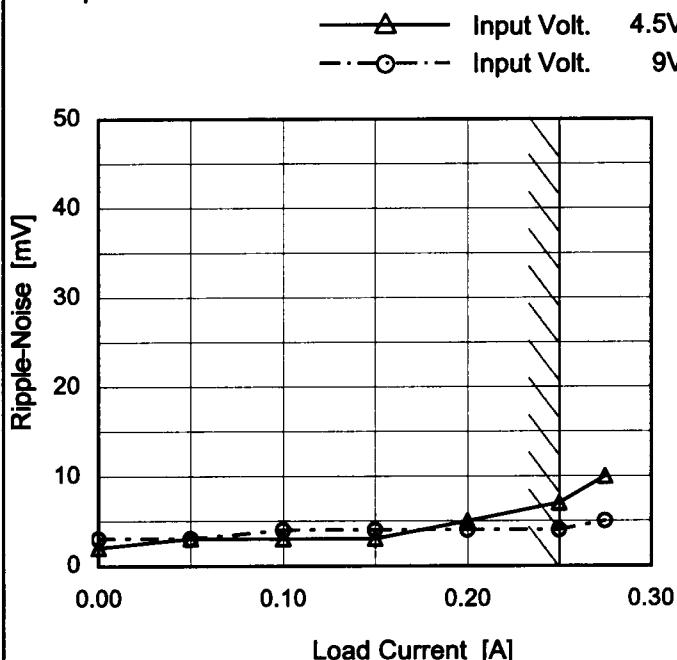
Measured by 100 MHz Oscilloscope.
Ripple Voltage is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated
load current.

Ripple [mVp-p]

Fig.Complex Ripple Wave Form

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Model	SUW60512/SUCW60512
Item	Ripple-Noise
Object	+12V0.25A

Temperature   25°C
Testing Circuitry   Figure B

1.Graph

——△—— Input Volt.   4.5V
— · -○- · — Input Volt.   9V

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.
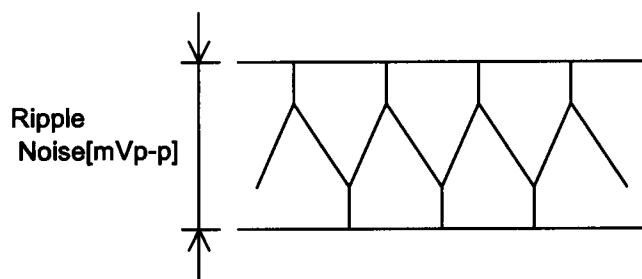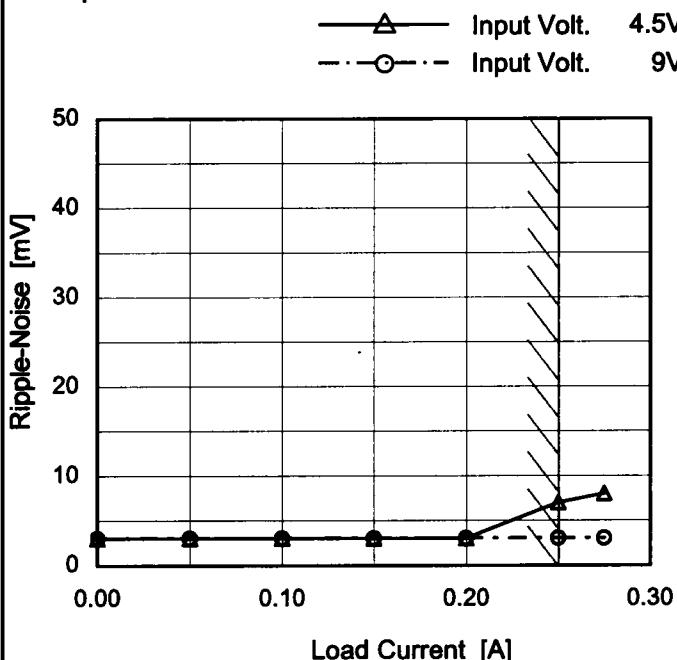
2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 4.5 [V]	Input Volt. 9 [V]
0.000	2	3
0.050	3	3
0.100	3	4
0.150	3	4
0.200	5	4
0.250	7	4
0.275	10	5
--	-	-
--	-	-
--	-	-
--	-	-

Ripple Noise[mVp-p]

Fig.Complex Ripple Noise Wave Form

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Model	SUW60512/SUCW60512
Item	Ripple-Noise
Object	-12V0.25A

Temperature   25°C
Testing Circuitry   Figure B

1.Graph

———△——— Input Volt.   4.5V
—·—○—·— Input Volt.   9V

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.
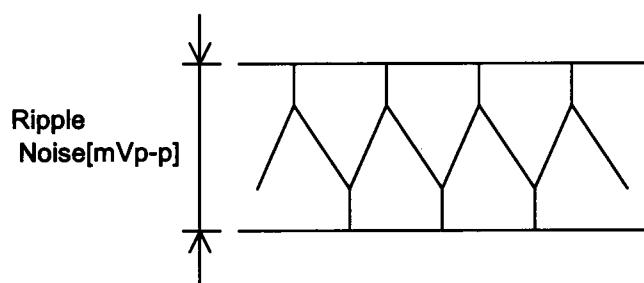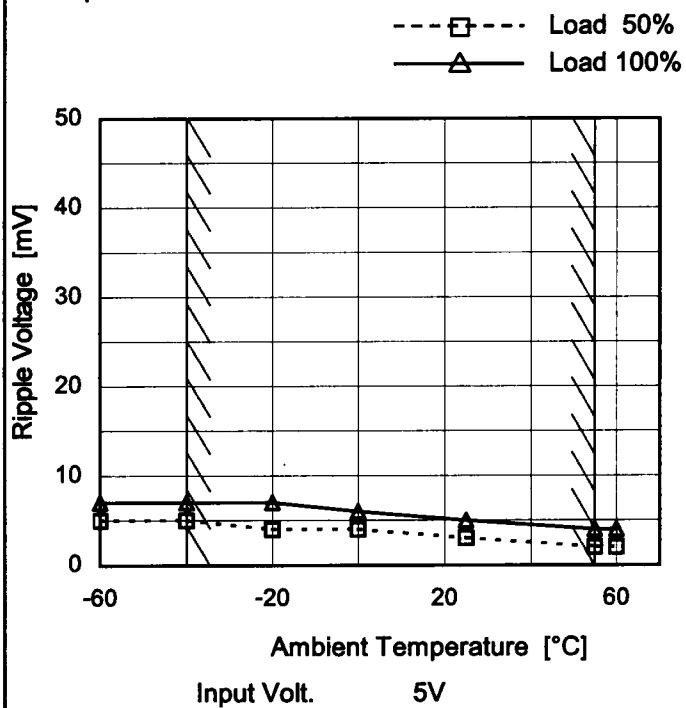
2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 4.5 [V]	Input Volt. 9 [V]
0.000	3	3
0.050	3	3
0.100	3	3
0.150	3	3
0.200	3	3
0.250	7	3
0.275	8	3
--	-	-
--	-	-
--	-	-
--	-	-

Ripple
Noise[mVp-p]

Fig.Complex Ripple Noise Wave Form

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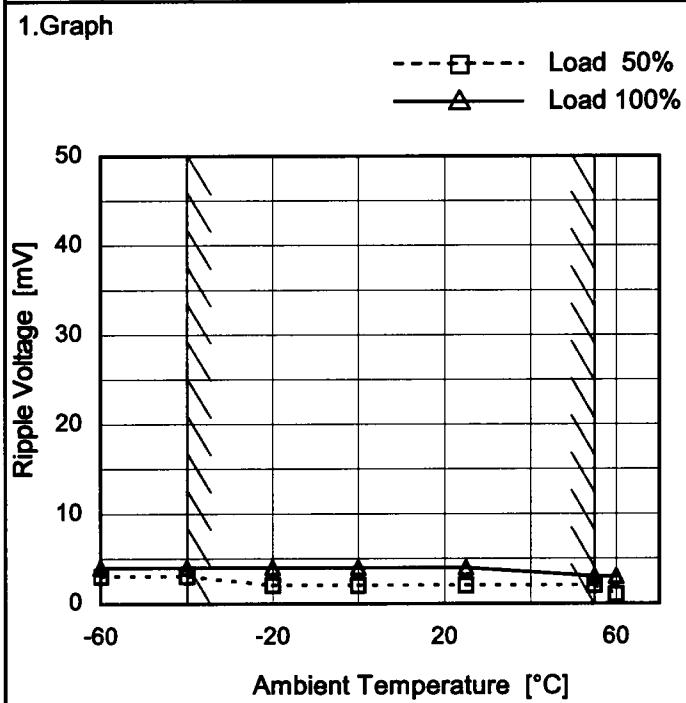
Model	SUW60512/SUCW60512
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V0.25A

Testing Circuitry   Figure B

1.Graph

--☐-- Load 50%
--△-- Load 100%

Ambient Temperature [°C]

Input Volt.   5V

2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	5	7
-40	5	7
-20	4	7
0	4	6
25	3	5
55	2	4
60	2	4
--	-	-
--	-	-
--	-	-
--	-	-

Object	-12V0.25A

1.Graph

--☐-- Load 50%
--△-- Load 100%

Ambient Temperature [°C]

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	3	4
-40	3	4
-20	2	4
0	2	4
25	2	4
55	2	3
60	1	3
--	-	-
--	-	-
--	-	-
--	-	-

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Model	SUW60512/SUCW60512
Item	Ambient Temperature Drift
Object	+12V0.25A

Testing Circuitry   Figure A

1.Graph

———△——— Input Volt. 4.5V
- - -☐- - - Input Volt. 5V
—·—○—·— Input Volt. 9V

Ambient Temperature [°C]

Load 100%

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
-60	12.046	12.048	12.047
-40	12.072	12.073	12.073
-20	12.091	12.092	12.092
0	12.106	12.106	12.106
25	12.116	12.117	12.116
55	12.119	12.119	12.119
60	12.119	12.119	12.118
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

Object	-12V0.25A

1.Graph

———△——— Input Volt. 4.5V
- - -☐- - - Input Volt. 5V
—·—○—·— Input Volt. 9V

Ambient Temperature [°C]

Load 100%

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
-60	-12.044	-12.046	-12.047
-40	-12.070	-12.072	-12.073
-20	-12.090	-12.092	-12.092
0	-12.106	-12.107	-12.107
25	-12.116	-12.117	-12.117
55	-12.120	-12.120	-12.120
60	-12.120	-12.120	-12.120
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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

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Model	SUW60512/SUCW60512
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 - 0.25A   (AVR 2):0 - 0.25A

* Other Output : Rated Load

* Output Voltage Accuracy = ±(Maximum of Output Voltage - Minimum of Output Voltage) / 2
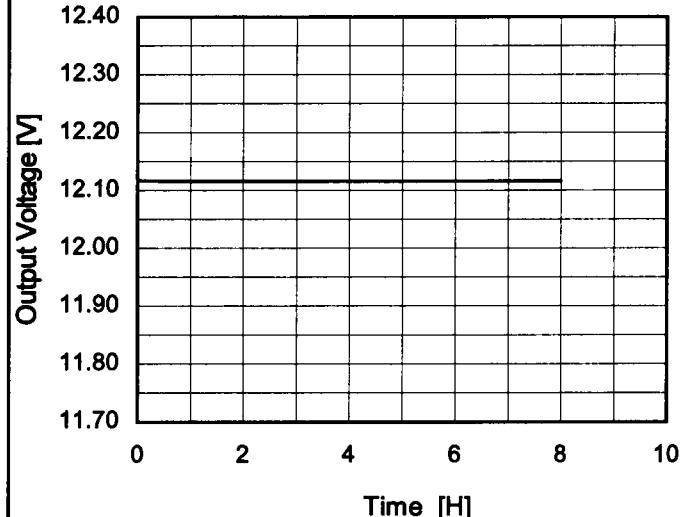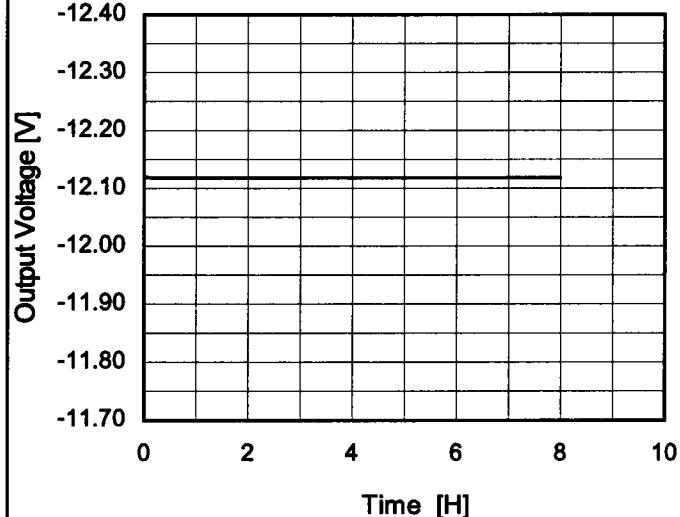
* Output Voltage Accuracy (Ration) = $\dfrac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}}$ × 100

2.Values

Object	+12V0.25A				
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	55	4.5	0	12.389	±159	±1.3
Minimum Voltage	-40	4.5	0.25	12.072		

Object	-12V0.25A				
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	55	4.5	0	-12.424	±177	±1.5
Minimum Voltage	-40	4.5	0.25	-12.070		

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Model	SUW60512/SUCW60512
Item	Time Lapse Drift
Object	+12V0.25A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

Time [H]
Input Volt. 5V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	12.118
0.5	12.116
1.0	12.116
2.0	12.116
3.0	12.116
4.0	12.116
5.0	12.116
6.0	12.116
7.0	12.116
8.0	12.116

Object	-12V0.25A

1.Graph

Time [H]
Input Volt. 5V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	-12.120
0.5	-12.118
1.0	-12.118
2.0	-12.118
3.0	-12.118
4.0	-12.118
5.0	-12.118
6.0	-12.118
7.0	-12.118
8.0	-12.118
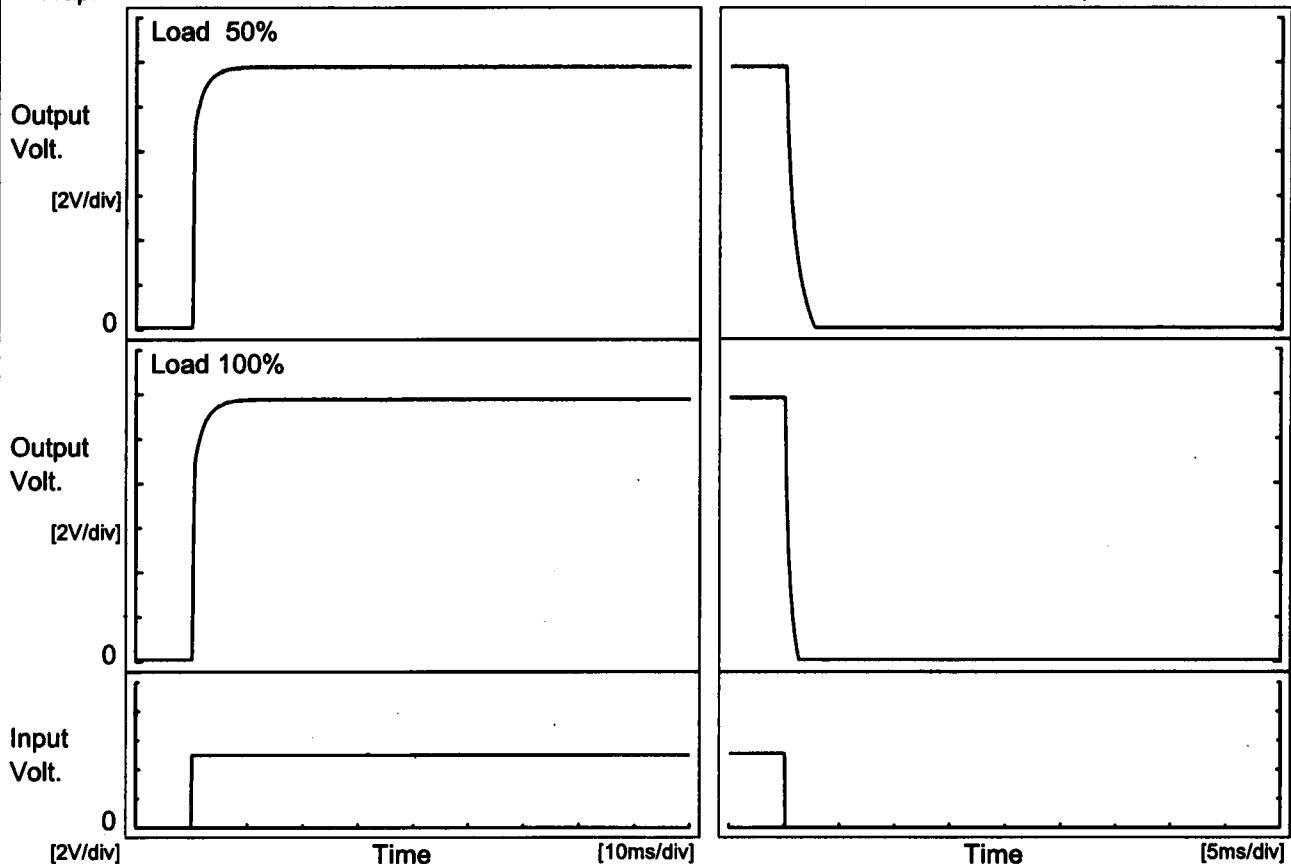
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Model	SUW60512/SUCW60512
Item	Rise and Fall Time
Object	+12V0.25A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

Input Volt. 5 V

Output Volt. [2V/div] — Load 50%

0

Output Volt. [2V/div] — Load 100%

0

Input Volt. [2V/div]

0

Time [10ms/div]

Time [5ms/div]

2.Values

[ms]
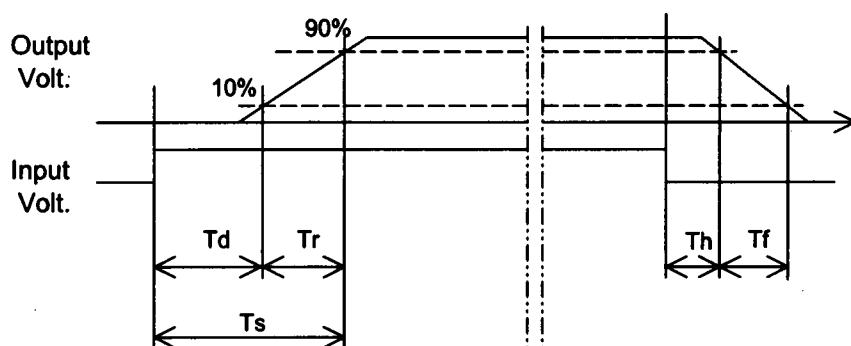
Load \ Time	Td	Tr	Ts	Th	Tf
50 %	0.2	2.4	2.6	0.1	1.8
100 %	0.2	2.6	2.8	0.1	0.9
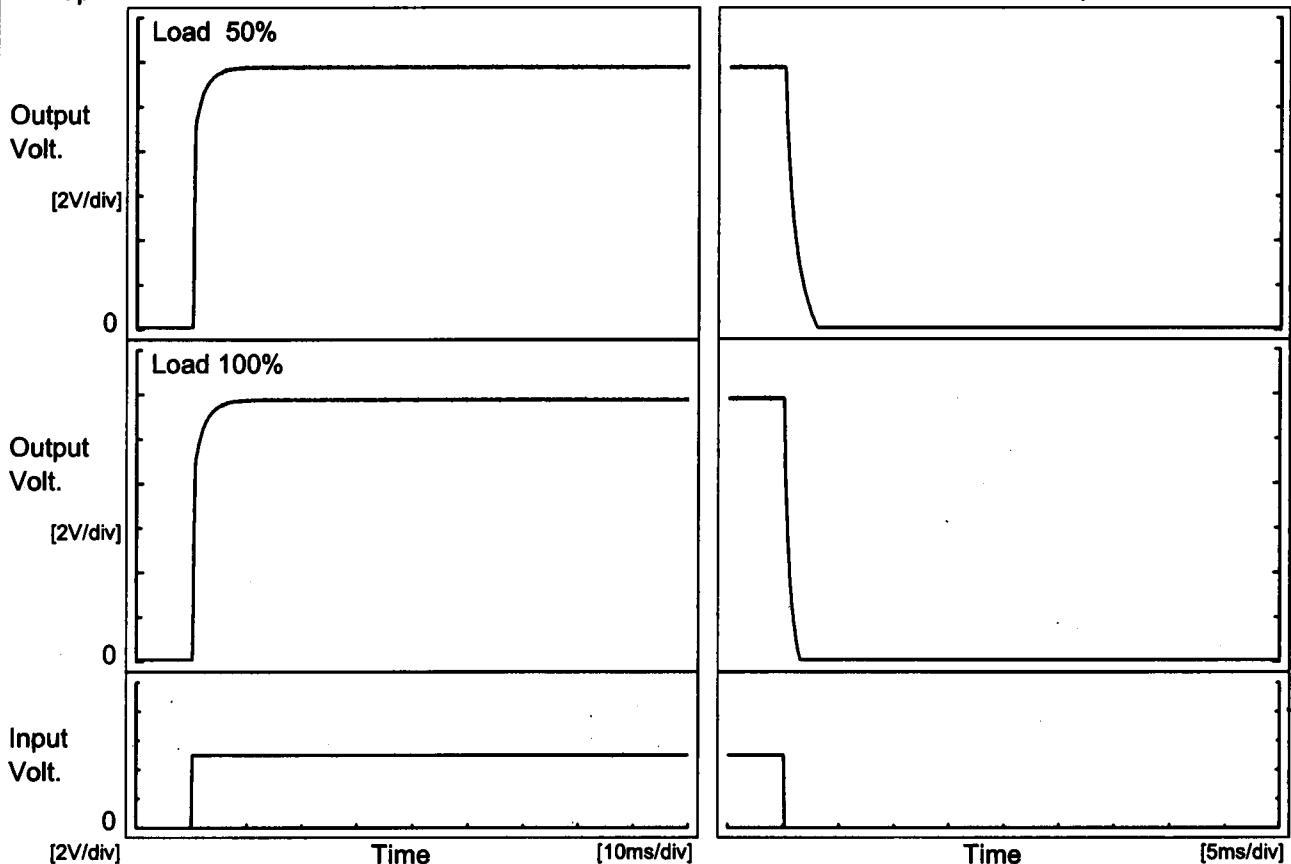
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COSEL

Model	SUW60512/SUCW60512
Item	Rise and Fall Time
Object	-12V0.25A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

Input Volt. 5 V

Load 50%

Output Volt. [2V/div]

0

Load 100%

Output Volt. [2V/div]

0

Input Volt.

0

[2V/div] Time [10ms/div] Time [5ms/div]

2.Values

[ms]
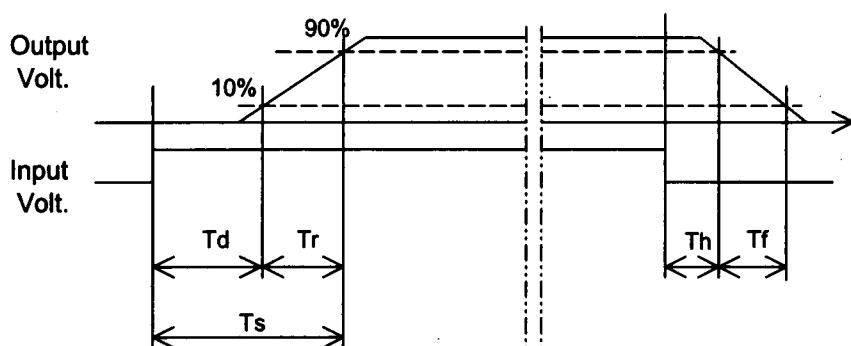
Load \ Time	Td	Tr	Ts	Th	Tf
50 %	0.2	2.4	2.6	0.1	2.0
100 %	0.2	2.7	2.9	0.1	1.0

Output Volt.
90%
10%
Input Volt.
Td Tr Th Tf
Ts

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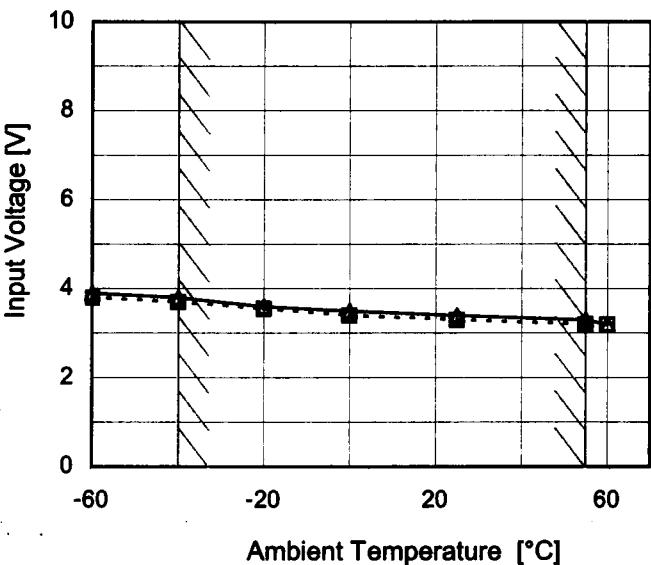
COSEL

Model	SUW60512/SUCW60512
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V0.25A
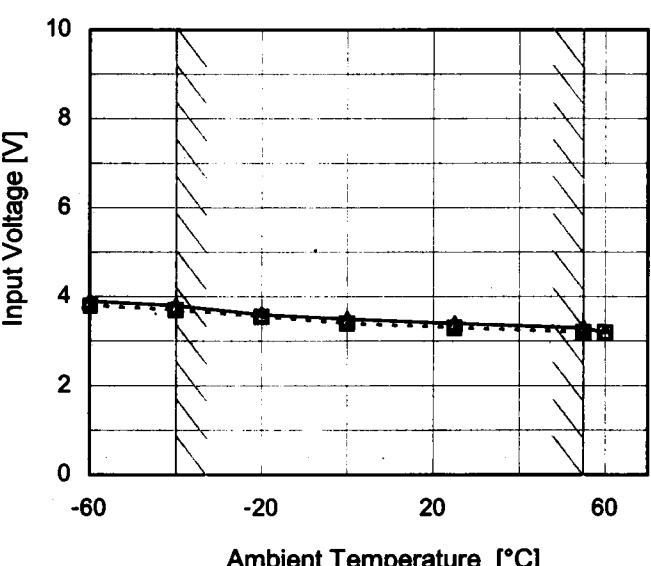
Testing Circuitry   Figure A

1.Graph

--- ⊟ --- Load 50%
—△— Load 100%

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

2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	3.8	3.9
-40	3.7	3.8
-20	3.6	3.6
0	3.4	3.5
25	3.3	3.4
55	3.2	3.3
60	3.2	3.2
--	-	-
--	-	-
--	-	-
--	-	-

Object	-12V0.25A

1.Graph
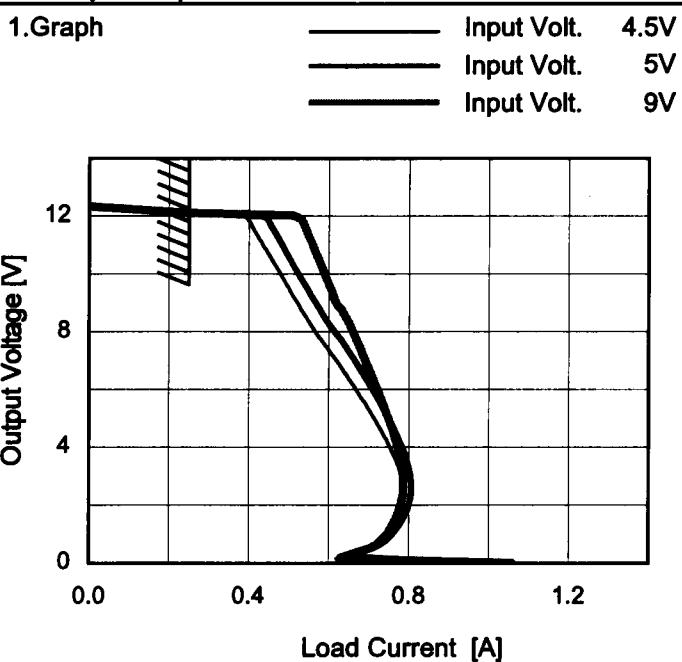
--- ⊟ --- Load 50%
—△— Load 100%

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

2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	3.8	3.9
-40	3.7	3.8
-20	3.6	3.6
0	3.4	3.5
25	3.3	3.4
55	3.2	3.3
60	3.2	3.2
--	-	-
--	-	-
--	-	-
--	-	-

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

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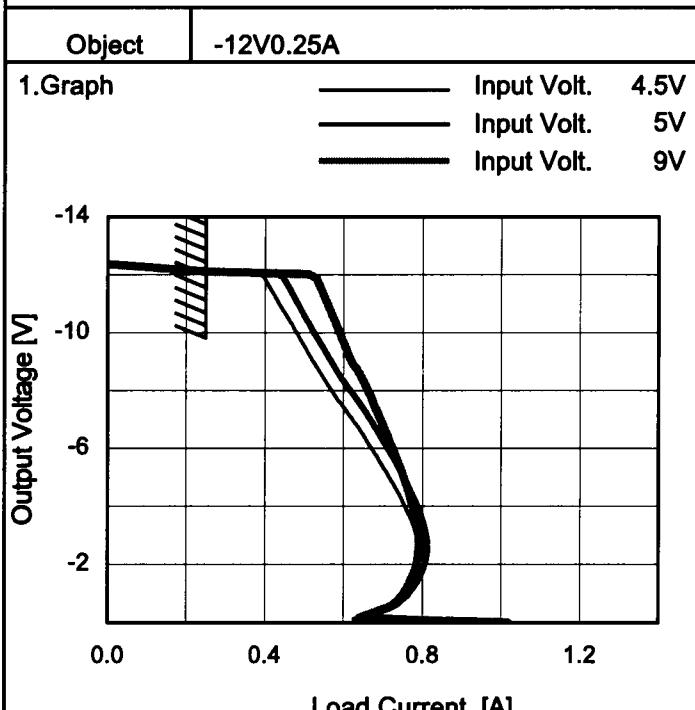
COSEL

Model	SUW60512/SUCW60512
Item	Overcurrent Protection
Object	+12V0.25A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

Input Volt. 4.5V
Input Volt. 5V
Input Volt. 9V

Output Voltage [V] vs Load Current [A]

2.Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
12.0	0.25	0.25	0.25
11.4	0.42	0.47	0.55
10.8	0.45	0.49	0.56
9.6	0.50	0.54	0.60
8.4	0.55	0.59	0.65
7.2	0.61	0.65	0.68
6.0	0.67	0.71	0.72
4.8	0.72	0.76	0.75
3.6	0.77	0.79	0.78
2.4	0.79	0.81	0.79
1.2	0.76	0.77	0.75
0.0	0.92	0.96	1.06

Object	-12V0.25A

1.Graph

Input Volt. 4.5V
Input Volt. 5V
Input Volt. 9V

Output Voltage [V] vs Load Current [A]

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	0.25	0.25	0.25
-11.4	0.42	0.47	0.55
-10.8	0.44	0.49	0.57
-9.6	0.50	0.54	0.60
-8.4	0.55	0.60	0.65
-7.2	0.62	0.66	0.69
-6.0	0.67	0.71	0.72
-4.8	0.72	0.76	0.76
-3.6	0.77	0.80	0.78
-2.4	0.79	0.81	0.79
-1.2	0.77	0.78	0.76
0.0	0.87	0.92	1.02

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CO$EL

Figure A


C1,C3=0.1 μ F(Ceramic capacitor)
C2,C4=4.7 μ F(Aluminum electrolytic capacitor)
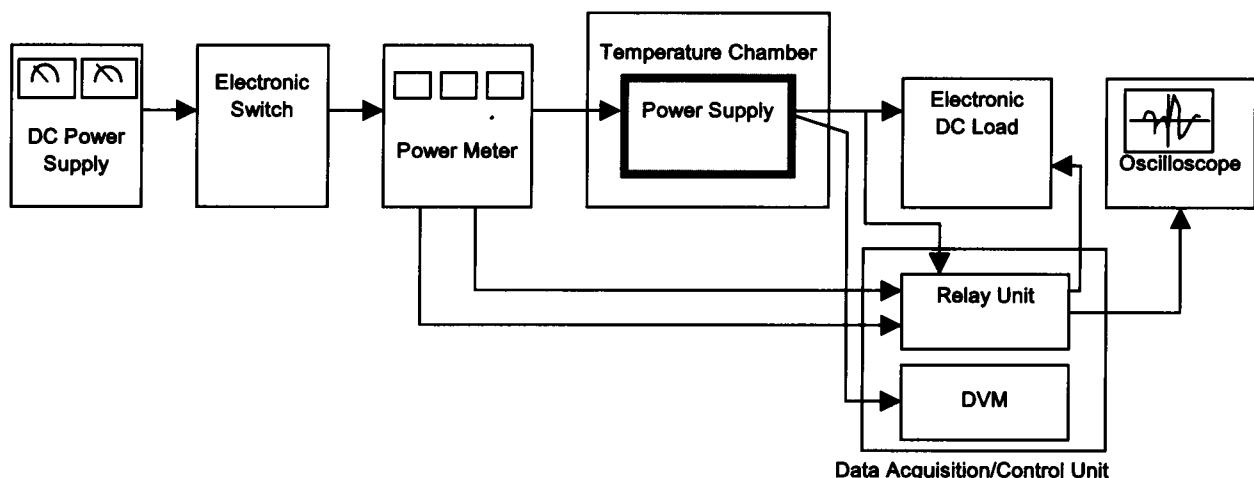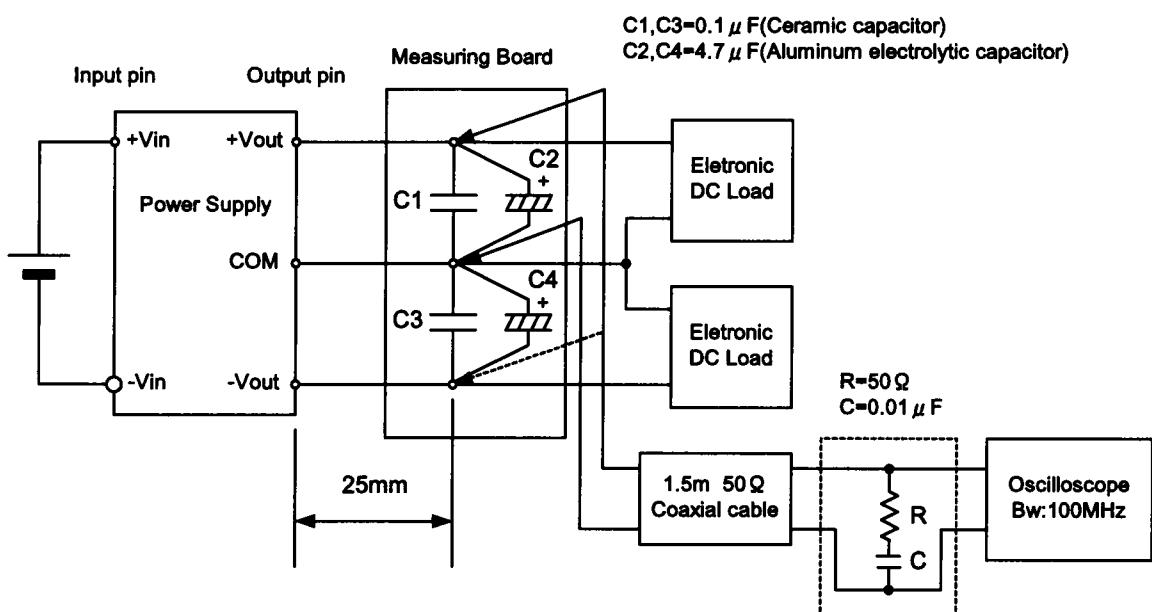
Figure B (Ripple and Ripple noise Characteristic)

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