



TEST DATA OF ZUW1R51212  
(12.0V INPUT)

Regulated DC Power Supply

Date : June 14. 1996

Approved by : T. Sugimori  
Design Manager

Prepared by : K. Shimano  
Design Engineer

コーセル株式会社  
COSEL CO., LTD.

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(Final Page 20)



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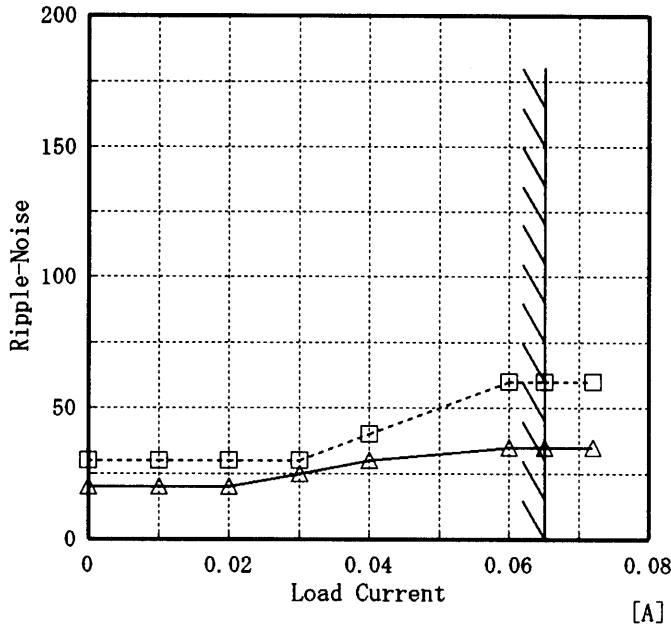


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Object	+12V0.065A		

1. Graph  
 [mV]  
 -----□----- Input Volt. 9.0V  
 -----△----- Input Volt. 18.0V



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

リップルノイズは、下図 p-p 値で示される。  
 (注) 斜線は定格負荷電流範囲を示す。

T1: Due to AC Input Line  
 入力商用周期  
 T2: Due to Switching  
 スイッチング周期

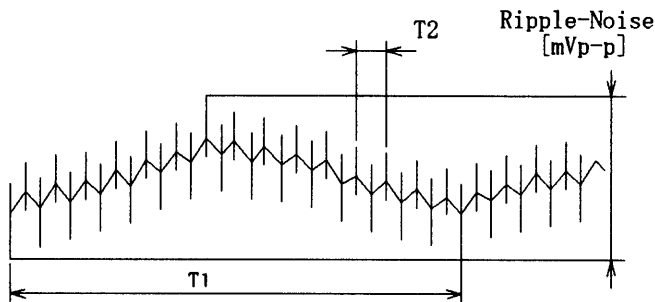


Fig. Complex Ripple Wave Form  
 図 リップル波形詳細図

2. Values

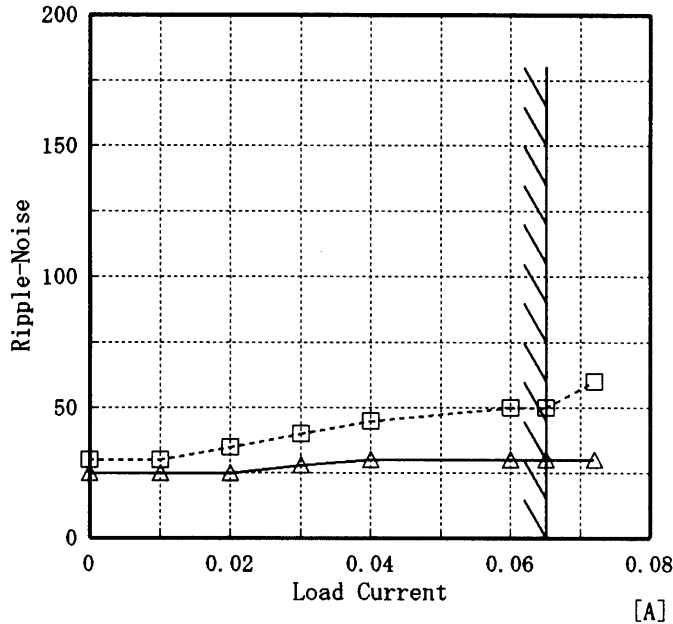
Load current [A]	Input Volt. 9.0 [V]	Input Volt. 18.0 [V]
	Ripple-Noise [mV]	Ripple-Noise [mV]
0.000	30	20
0.010	30	20
0.020	30	20
0.030	30	25
0.040	40	30
0.060	60	35
0.065	60	35
0.072	60	35
—	—	—
—	—	—
—	—	—





Model	ZUW1R51212	Temperature	25°C
Item	Ripple-Noise リップルノイズ	Testing Circuitry	Figure A
Object	-12V0.065A		

1. Graph  
 [mV]  
 -----□----- Input Volt. 9.0V  
 -----△----- Input Volt. 18.0V



2. Values

Load current [A]	Input Volt. 9.0 [V]	Input Volt. 18.0 [V]
	Ripple-Noise [mV]	Ripple-Noise [mV]
0.000	30	25
0.010	30	25
0.020	35	25
0.030	40	28
0.040	45	30
0.060	50	30
0.065	50	30
0.072	60	30
—	—	—
—	—	—
—	—	—

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

リップルノイズは、下図 p-p 値で示される。  
 (注) 斜線は定格負荷電流範囲を示す。

T1: Due to AC Input Line  
 入力商用周期  
 T2: Due to Switching  
 スイッチング周期

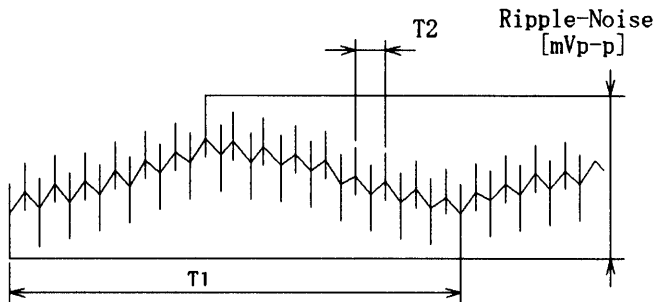


Fig. Complex Ripple Wave Form  
 図 リップル波形詳細図



<p>Model ZUW1R51212</p> <p>Item Overcurrent Protection 過電流保護</p> <p>Object +12V0.065A</p>		<p>Temperature 25°C</p> <p>Testing Circuitry Figure A</p>																																																							
<p>1. Graph</p> <p>Legend:              ..... Input Volt. 9.0 V              _____ Input Volt. 12.0 V              _____ Input Volt. 18.0 V</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th>Input Volt. 9.0[V]</th> <th>Input Volt. 12.0[V]</th> <th>Input Volt. 18.0[V]</th> </tr> <tr> <th>Load Current [A]</th> <th>Load Current [A]</th> <th>Load Current [A]</th> </tr> </thead> <tbody> <tr><td>12.00</td><td>0.075</td><td>0.097</td><td>0.103</td></tr> <tr><td>11.40</td><td>0.132</td><td>0.145</td><td>0.117</td></tr> <tr><td>10.80</td><td>0.137</td><td>0.148</td><td>0.118</td></tr> <tr><td>9.60</td><td>0.145</td><td>0.153</td><td>0.120</td></tr> <tr><td>8.40</td><td>0.152</td><td>0.157</td><td>0.120</td></tr> <tr><td>7.20</td><td>0.159</td><td>0.160</td><td>0.121</td></tr> <tr><td>6.00</td><td>0.166</td><td>0.160</td><td>0.120</td></tr> <tr><td>4.80</td><td>0.171</td><td>0.161</td><td>0.118</td></tr> <tr><td>3.60</td><td>0.176</td><td>0.158</td><td>0.119</td></tr> <tr><td>2.40</td><td>0.183</td><td>0.161</td><td>0.124</td></tr> <tr><td>1.20</td><td>0.165</td><td>0.168</td><td>0.111</td></tr> <tr><td>0.00</td><td>0.164</td><td>0.176</td><td>0.138</td></tr> </tbody> </table>	Output Voltage [V]	Input Volt. 9.0[V]	Input Volt. 12.0[V]	Input Volt. 18.0[V]	Load Current [A]	Load Current [A]	Load Current [A]	12.00	0.075	0.097	0.103	11.40	0.132	0.145	0.117	10.80	0.137	0.148	0.118	9.60	0.145	0.153	0.120	8.40	0.152	0.157	0.120	7.20	0.159	0.160	0.121	6.00	0.166	0.160	0.120	4.80	0.171	0.161	0.118	3.60	0.176	0.158	0.119	2.40	0.183	0.161	0.124	1.20	0.165	0.168	0.111	0.00	0.164	0.176	0.138
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<p>Object -12V0.065A</p> <p>1. Graph</p> <p>Legend:              ..... Input Volt. 9.0 V              _____ Input Volt. 12.0 V              _____ Input Volt. 18.0 V</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th>Input Volt. 9.0[V]</th> <th>Input Volt. 12.0[V]</th> <th>Input Volt. 18.0[V]</th> </tr> <tr> <th>Load Current [A]</th> <th>Load Current [A]</th> <th>Load Current [A]</th> </tr> </thead> <tbody> <tr><td>-12.00</td><td>0.080</td><td>0.103</td><td>0.109</td></tr> <tr><td>-11.40</td><td>0.136</td><td>0.149</td><td>0.120</td></tr> <tr><td>-10.80</td><td>0.140</td><td>0.151</td><td>0.121</td></tr> <tr><td>-9.60</td><td>0.148</td><td>0.156</td><td>0.123</td></tr> <tr><td>-8.40</td><td>0.156</td><td>0.161</td><td>0.125</td></tr> <tr><td>-7.20</td><td>0.164</td><td>0.164</td><td>0.125</td></tr> <tr><td>-6.00</td><td>0.170</td><td>0.165</td><td>0.124</td></tr> <tr><td>-4.80</td><td>0.176</td><td>0.164</td><td>0.123</td></tr> <tr><td>-3.60</td><td>0.181</td><td>0.164</td><td>0.123</td></tr> <tr><td>-2.40</td><td>0.188</td><td>0.165</td><td>0.128</td></tr> <tr><td>-1.20</td><td>0.196</td><td>0.173</td><td>0.116</td></tr> <tr><td>0.00</td><td>0.156</td><td>0.165</td><td>0.130</td></tr> </tbody> </table>	Output Voltage [V]	Input Volt. 9.0[V]	Input Volt. 12.0[V]	Input Volt. 18.0[V]	Load Current [A]	Load Current [A]	Load Current [A]	-12.00	0.080	0.103	0.109	-11.40	0.136	0.149	0.120	-10.80	0.140	0.151	0.121	-9.60	0.148	0.156	0.123	-8.40	0.156	0.161	0.125	-7.20	0.164	0.164	0.125	-6.00	0.170	0.165	0.124	-4.80	0.176	0.164	0.123	-3.60	0.181	0.164	0.123	-2.40	0.188	0.165	0.128	-1.20	0.196	0.173	0.116	0.00	0.156	0.165	0.130
Output Voltage [V]	Input Volt. 9.0[V]	Input Volt. 12.0[V]		Input Volt. 18.0[V]																																																					
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Model	ZUW1R51212	Temperature	25°C
Item	Dynamic Load Responce 動的負荷変動	Testing Circuitry	Figure A
Object	+12V0.065A		

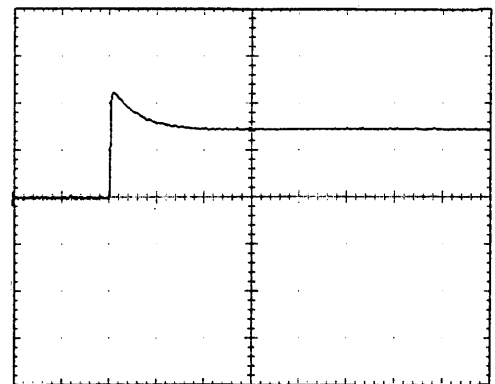
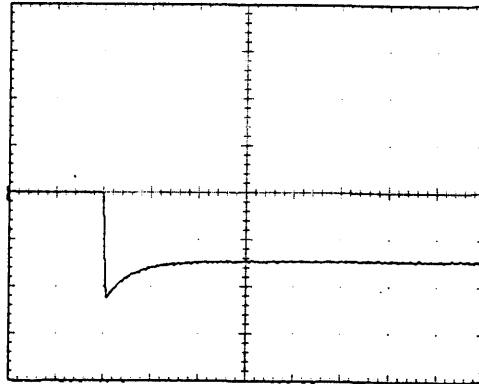
Input Volt. 12.0 V  
Cycle 100 mS

Load Current



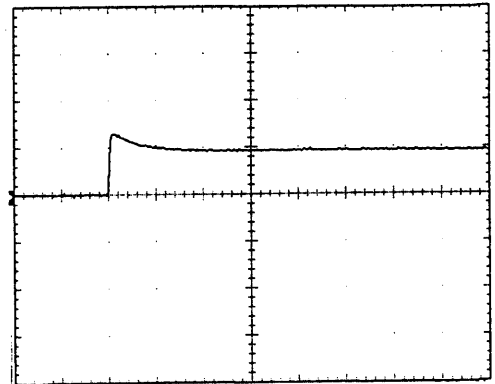
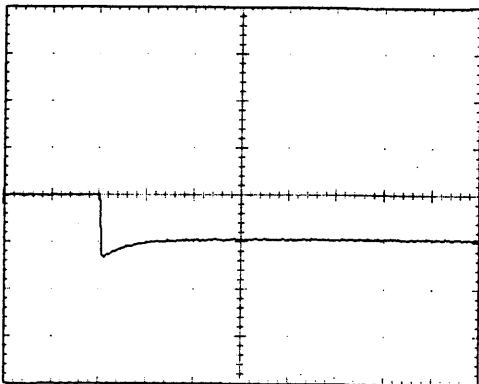
Min. Load ↔  
Load 100 %

200 mV/div



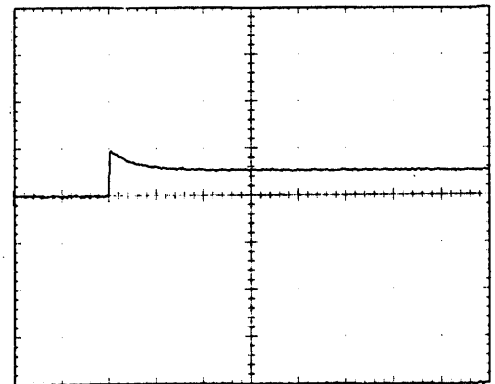
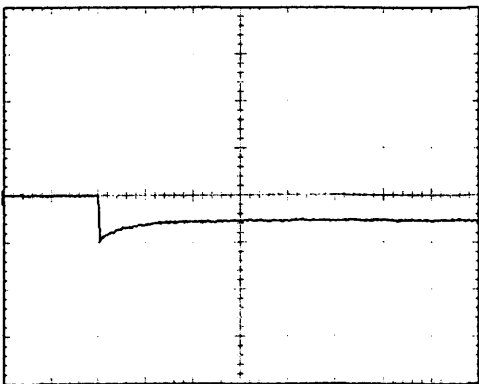
Min. Load ↔  
Load 50 %

200 mV/div



Load 50% ↔  
Load 100 %

200 mV/div



1 mS/div

# COSEL

Model	ZUW1R51212	Temperature	25°C
Item	Dynamic Load Responce 動的負荷変動	Testing Circuitry	Figure A
Object	-12V0.065A		

Input Volt. 12.0 V

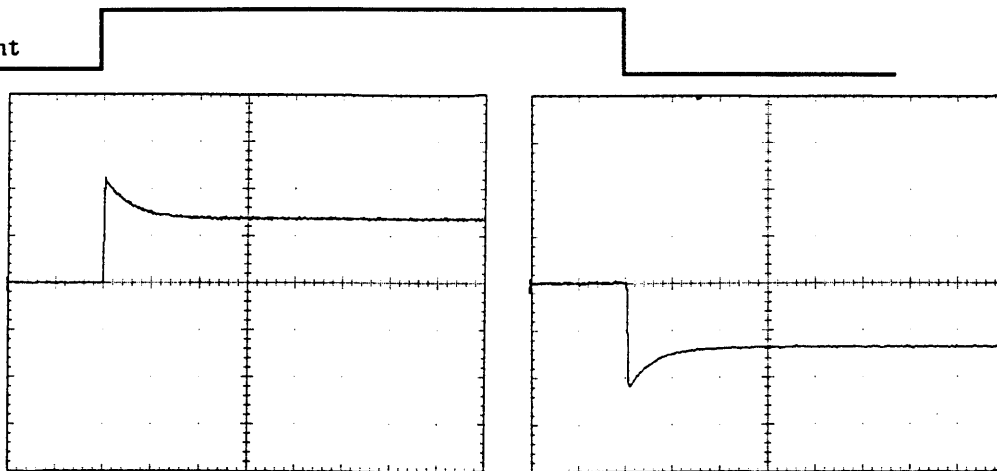
Cycle 100 mS

Load Current

Min. Load ↔

Load 100 %

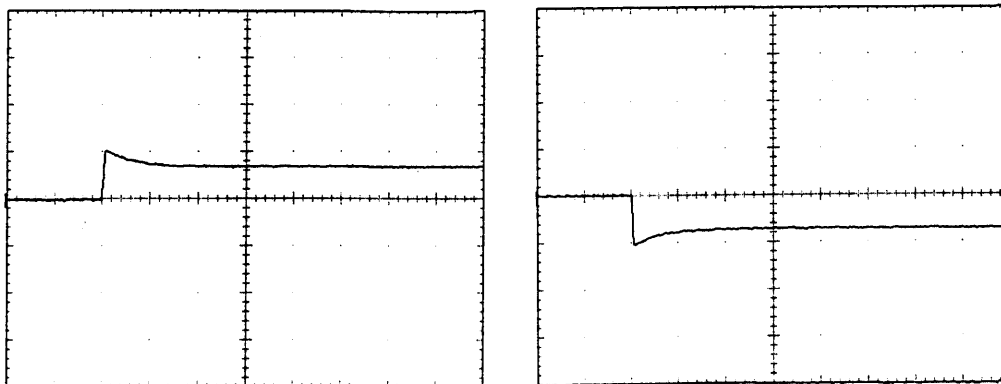
200 mV/div



Min. Load ↔

Load 50 %

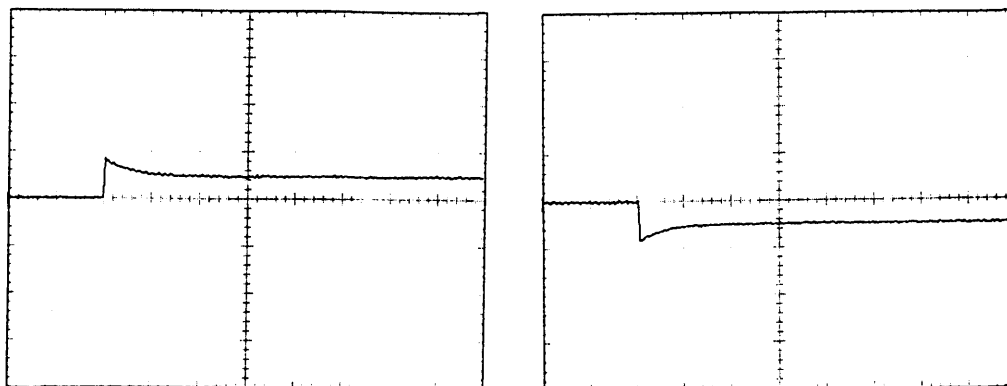
200 mV/div



Load 50% ↔

Load 100 %

200 mV/div



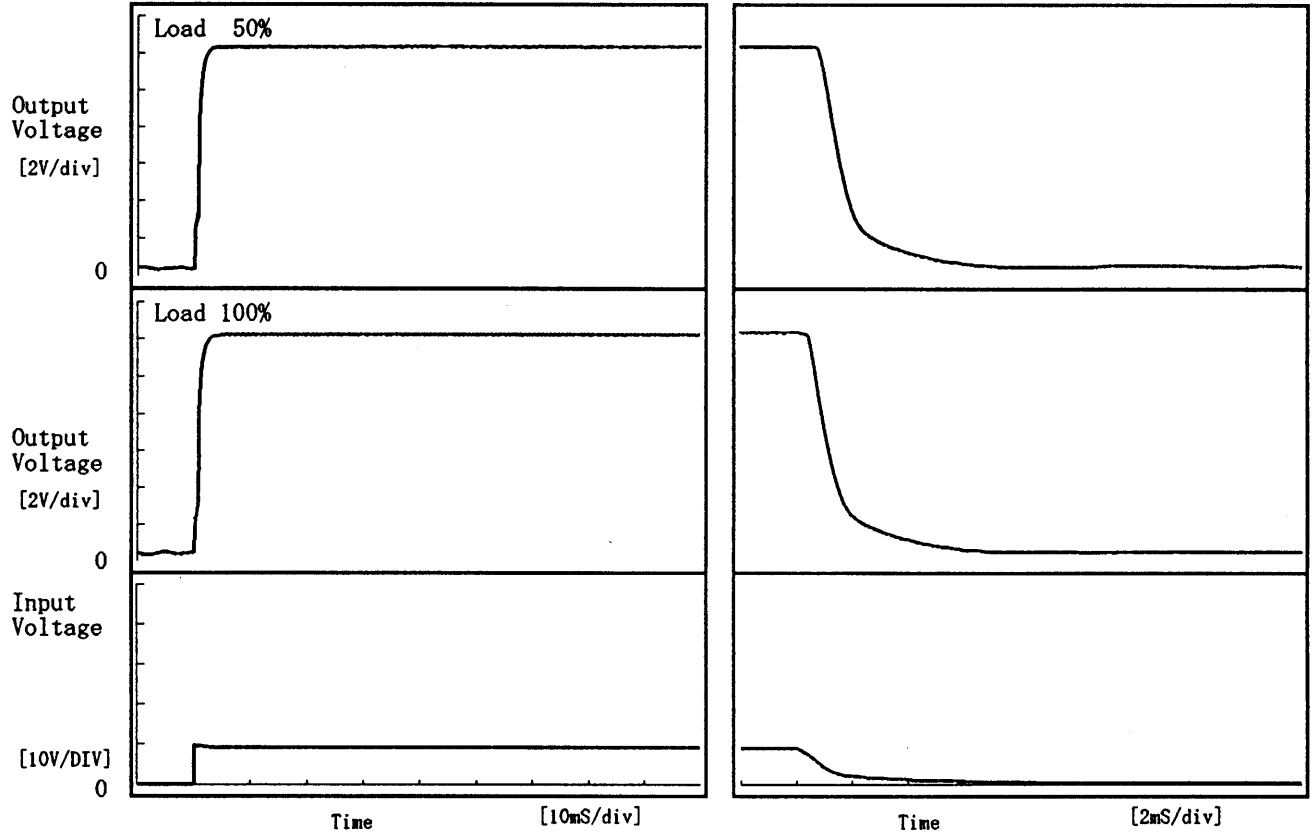
1 mS/div



Model	ZUW1R51212	Temperature	25°C
Item	Rise and Fall Time 立上り、立下り時間	Testing Circuitry	Figure A
Object	+12V0.065A		

1. Graph

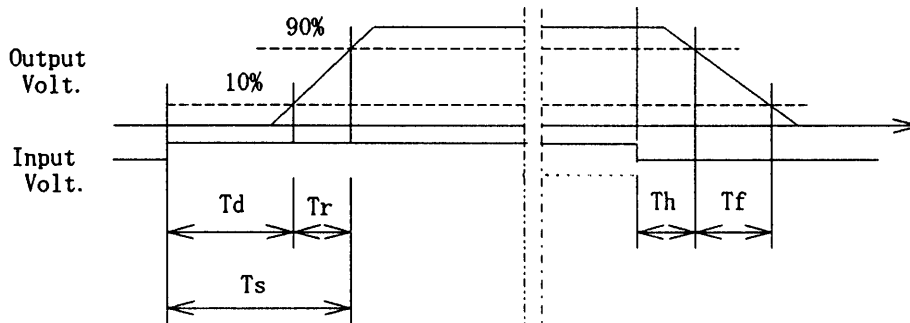
Input Volt. 9.0 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.05	1.55	1.60	0.97	2.58
100 %	0.05	1.65	1.70	0.59	2.66

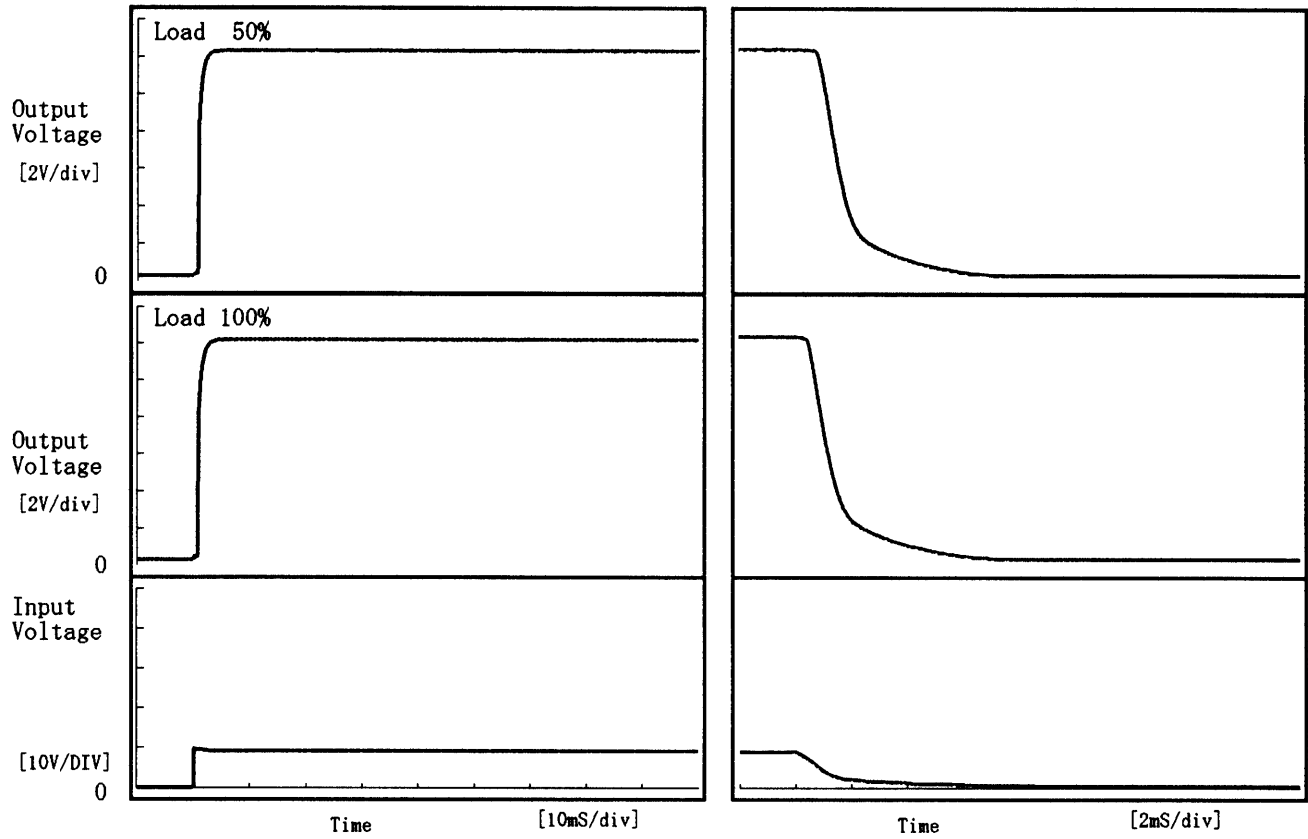




Model	ZUW1R51212	Temperature	25°C
Item	Rise and Fall Time 立上り、立下り時間	Testing Circuitry	Figure A
Object	-12V0.065A		

1. Graph

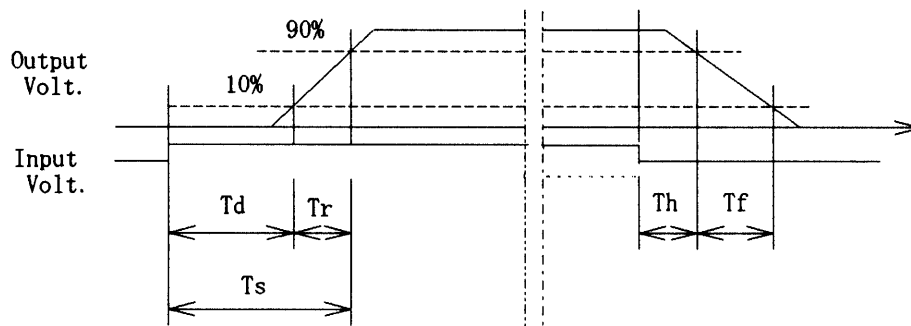
Input Volt. 9.0 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.70	0.95	1.65	0.96	2.45
100 %	0.70	1.00	1.70	0.59	2.60



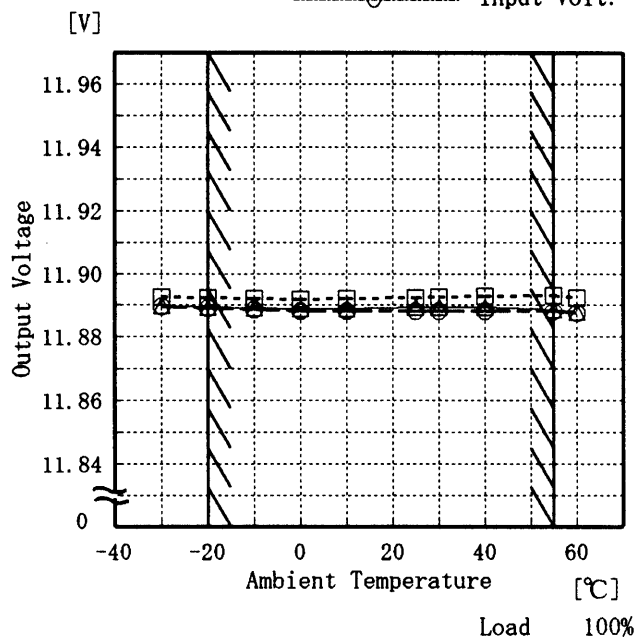


Model	ZUW1R51212
Item	Ambient Temperature Drift 周囲温度変動
Object	+12V0.065A

Testing Circuitry Figure A

1. Graph

—△— Input Volt. 9.0V  
 - - -□- - - Input Volt. 12.0V  
 - - -○- - - Input Volt. 18.0V



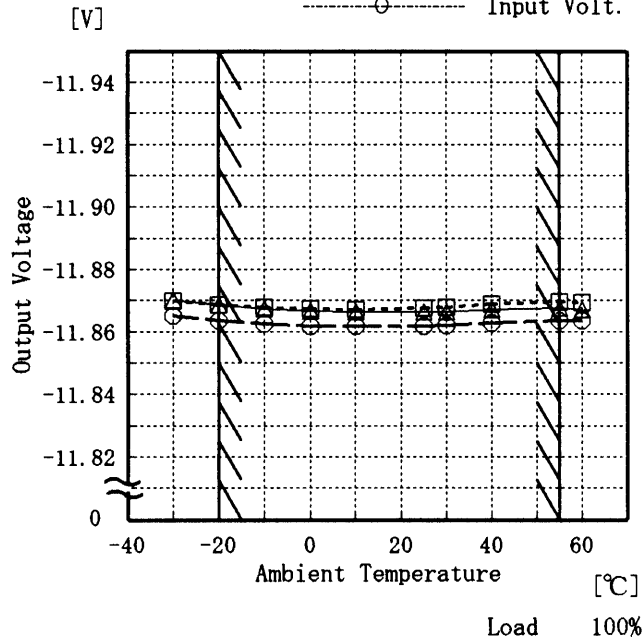
2. Values

Temperature [°C]	Input Volt. 9.0[V]	Input Volt. 12.0[V]	Input Volt. 18.0[V]
	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]
-30	11.890	11.893	11.889
-20	11.889	11.892	11.889
-10	11.889	11.892	11.889
0	11.889	11.892	11.888
10	11.889	11.892	11.888
25	11.889	11.892	11.888
30	11.889	11.893	11.888
40	11.889	11.893	11.888
55	11.889	11.893	11.888
60	11.888	11.892	11.887
-	-	-	-

Object	-12V0.065A
--------	------------

1. Graph

—△— Input Volt. 9.0V  
 - - -□- - - Input Volt. 12.0V  
 - - -○- - - Input Volt. 18.0V



2. Values

Temperature [°C]	Input Volt. 9.0[V]	Input Volt. 12.0[V]	Input Volt. 18.0[V]
	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]
-30	-11.870	-11.870	-11.865
-20	-11.869	-11.869	-11.863
-10	-11.867	-11.868	-11.862
0	-11.867	-11.867	-11.862
10	-11.866	-11.867	-11.862
25	-11.866	-11.868	-11.862
30	-11.866	-11.868	-11.862
40	-11.867	-11.869	-11.863
55	-11.867	-11.870	-11.864
60	-11.867	-11.869	-11.863
-	-	-	-

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

(注)斜線は定格周囲温度範囲を示す。

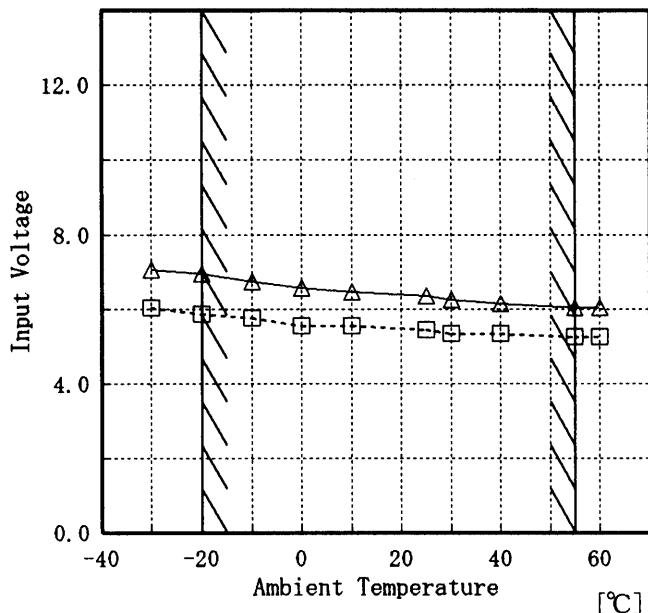


Model	ZUW1R51212
Item	Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧
Object	+12V0.065A

Testing Circuitry Figure A

1. Graph  
[V]

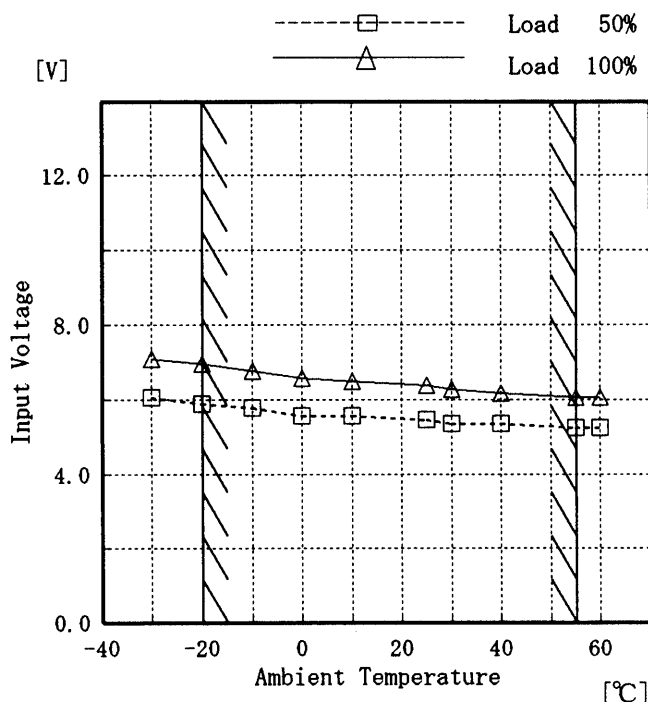
-----□----- Load 50%  
-----△----- Load 100%



2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Input Volt. [V]	Input Volt. [V]
-30	6.1	7.1
-20	5.9	7.0
-10	5.8	6.8
0	5.6	6.6
10	5.6	6.5
25	5.5	6.4
30	5.4	6.3
40	5.4	6.2
55	5.3	6.1
60	5.3	6.1
—	—	—

Object	-12V0.065A
--------	------------



2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Input Volt. [V]	Input Volt. [V]
-30	6.1	7.1
-20	5.9	7.0
-10	5.8	6.8
0	5.6	6.6
10	5.6	6.5
25	5.5	6.4
30	5.4	6.3
40	5.4	6.2
55	5.3	6.1
60	5.3	6.1
—	—	—

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

(注)斜線は定格周囲温度範囲を示す。

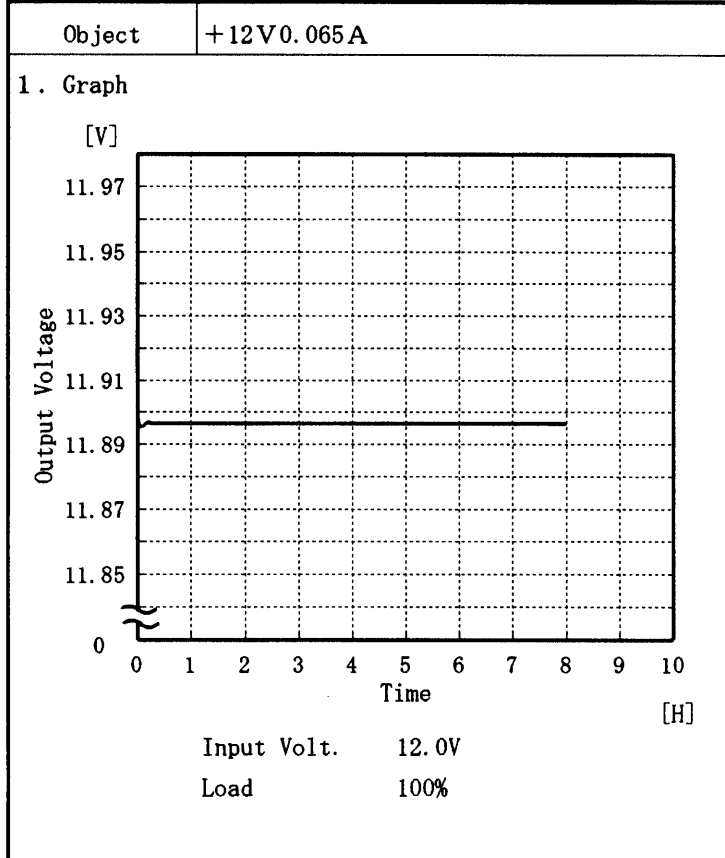




<b>Model</b> ZUW1R51212		Testing Circuitry Figure A																																				
<b>Item</b>	Ripple Voltage (by Ambient Temp.) リップル電圧 (周囲温度特性)																																					
<b>Object</b>	+12V0.065A																																					
<p>1. Graph</p> <p style="text-align: right;">-----□----- Load 50%</p> <p style="text-align: right;">-----△----- Load 100%</p> <p>[mV]</p> <p style="text-align: center;">Ambient Temperature [°C]</p> <p style="text-align: center;">Input Volt. 9.0 V</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th>Ambient Temp. [°C]</th> <th>Load 50% Ripple Output Volt. [mV]</th> <th>Load 100% Ripple Output Volt. [mV]</th> </tr> </thead> <tbody> <tr><td>-30</td><td>25</td><td>70</td></tr> <tr><td>-20</td><td>20</td><td>60</td></tr> <tr><td>-10</td><td>15</td><td>45</td></tr> <tr><td>0</td><td>10</td><td>40</td></tr> <tr><td>10</td><td>10</td><td>40</td></tr> <tr><td>25</td><td>10</td><td>35</td></tr> <tr><td>30</td><td>10</td><td>35</td></tr> <tr><td>40</td><td>10</td><td>35</td></tr> <tr><td>55</td><td>10</td><td>35</td></tr> <tr><td>60</td><td>10</td><td>30</td></tr> <tr><td>—</td><td>—</td><td>—</td></tr> </tbody> </table>	Ambient Temp. [°C]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]	-30	25	70	-20	20	60	-10	15	45	0	10	40	10	10	40	25	10	35	30	10	35	40	10	35	55	10	35	60	10	30	—	—	—
Ambient Temp. [°C]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]																																				
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-10	15	45																																				
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10	10	40																																				
25	10	35																																				
30	10	35																																				
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55	10	35																																				
60	10	30																																				
—	—	—																																				
<p>Object -12V0.065A</p> <p>1. Graph</p> <p style="text-align: right;">-----□----- Load 50%</p> <p style="text-align: right;">-----△----- Load 100%</p> <p style="text-align: center;">Ambient Temperature [°C]</p> <p style="text-align: center;">Input Volt. 9.0 V</p> <p>Note: Slanted line shows the range of the rated ambient temperature. (注)斜線は定格周囲温度範囲を示す。</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th>Ambient Temp. [°C]</th> <th>Load 50% Ripple Output Volt. [mV]</th> <th>Load 100% Ripple Output Volt. [mV]</th> </tr> </thead> <tbody> <tr><td>-30</td><td>25</td><td>70</td></tr> <tr><td>-20</td><td>20</td><td>65</td></tr> <tr><td>-10</td><td>15</td><td>50</td></tr> <tr><td>0</td><td>15</td><td>45</td></tr> <tr><td>10</td><td>10</td><td>45</td></tr> <tr><td>25</td><td>10</td><td>40</td></tr> <tr><td>30</td><td>10</td><td>35</td></tr> <tr><td>40</td><td>10</td><td>35</td></tr> <tr><td>55</td><td>10</td><td>35</td></tr> <tr><td>60</td><td>10</td><td>30</td></tr> <tr><td>—</td><td>—</td><td>—</td></tr> </tbody> </table>	Ambient Temp. [°C]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]	-30	25	70	-20	20	65	-10	15	50	0	15	45	10	10	45	25	10	40	30	10	35	40	10	35	55	10	35	60	10	30	—	—	—
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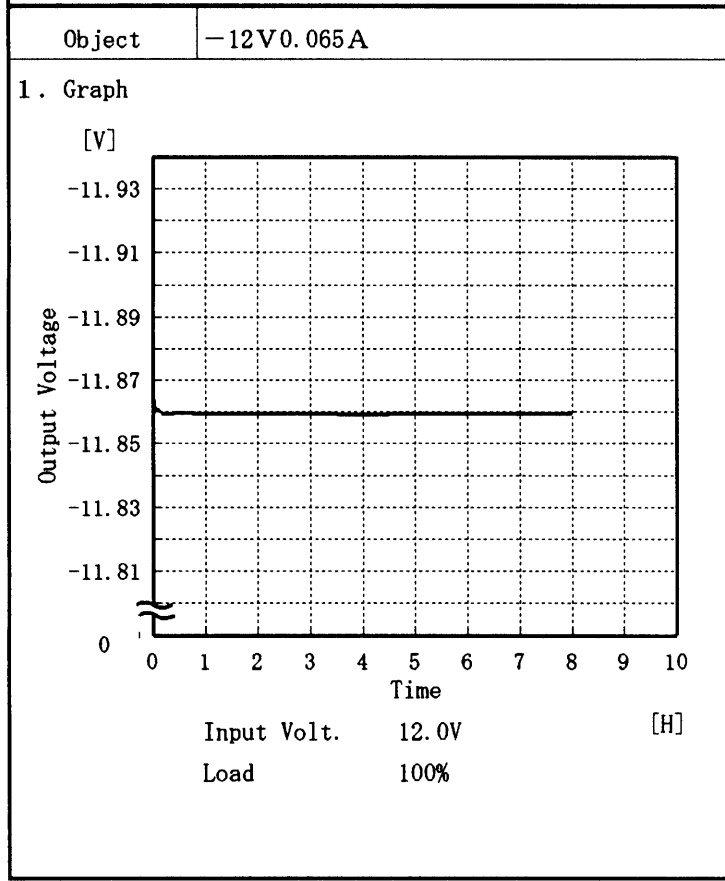


Model	ZUW1R51212	Temperature	25 °C
Item	Time Lapse Drift 経時ドリフト	Testing Circuitry	Figure A



2. Values

Time since start [H]	Output Voltage [V]
0.0	11.899
0.5	11.897
1.0	11.897
2.0	11.897
3.0	11.897
4.0	11.897
5.0	11.897
6.0	11.897
7.0	11.897
8.0	11.897



2. Values

Time since start [H]	Output Voltage [V]
0.0	-11.865
0.5	-11.860
1.0	-11.860
2.0	-11.859
3.0	-11.860
4.0	-11.859
5.0	-11.860
6.0	-11.860
7.0	-11.860
8.0	-11.860



Model		ZUW1R51212	Testing Circuitry Figure A
Item		Output Voltage Accuracy 定電圧精度	

**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 : -20~55 °C

Input Voltage : 9.0~18.0 V

Load Current ( AVR 1 ) : 0.000~0.065 A

( AVR 2 ) : 0.000~0.065 A

\* Output Voltage Accuracy =  $\pm (\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

**定電圧精度**

周囲温度、入力電圧、負荷を下記仕様内で、任意に変動させたときの出力電圧の変動をいう。

周囲温度 -20~55 °C

入力電圧 9.0~18.0 V

負荷電流 (AVR 1) 0.000~0.065 A

(AVR 2) 0.000~0.065 A

\* 定電圧精度(変動値) =  $\pm (\text{出力電圧の最高値} - \text{出力電圧の最低値}) / 2$

$$* \text{ 定電圧精度(変動率) } = \frac{\text{変動値}}{\text{定格出力電圧}} \times 100$$

Object	+12V0.065A
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Item	Temperature [°C]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration) [%]
Maximum Voltage	25	12.0	0.065	11.891	±129	±1.1
Minimum Voltage	55	9.0	0.000	11.634		

Object	-12V0.065A
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Item	Temperature [°C]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration) [%]
Maximum Voltage	55	12.0	0.065	-11.869	±133	±1.2
Minimum Voltage	55	9.0	0.000	-11.603		

# COSEL

Model	ZUW1R51212	Testing Circuitry Figure A
Item	Condensation 結露特性	
Object	+12V 0.065A	

## 1. Condensation test

Testing procedure is as follows.

- ① Keeping and cooling the unit in a tank at  $-10^{\circ}\text{C}$  for an hour with the input off.
- ② Taking it out of the tank and dewing itself in a room where the temperature is  $25^{\circ}\text{C}$  and the humidity is 40%RH.
- ③ Testing electrical characteristics of the unit to confirm there be no fault.
- ④ Repeating ①, ② and ③ three times.

## 1. 結露特性試験

入力を切った状態で、恒温槽で $-10^{\circ}\text{C}$ に冷却しておき、約1時間後に恒温槽から取り出し、室温 $25^{\circ}\text{C}$ 、湿度40%RHの状態におき結露させ、その電気的特性の測定を3度行い、異常のないことを確認する。

## 2. Values

	Times	Output Voltage [V]	Ripple Voltage [mV]	Ripple Noise [mV]
Load 50 %	1	11.962	15	30
	2	11.882	15	30
	3	11.976	15	30
Load 100 %	1	11.938	30	60
	2	11.841	30	60
	3	11.831	30	60

Input Volt. 12.0 V



Model		ZUW1R51212	Testing Circuitry	Figure A
Item		Condensation 結露特性		
Object		-12V 0.065A		

1. Condensation test

Testing procedure is as follows.

- ① Keeping and cooling the unit in a tank at -10°C for an hour with the input off.
- ② Taking it out of the tank and dewing itself in a room where the temperature is 25°C and the humidity is 40%RH.
- ③ Testing electrical characteristics of the unit to confirm there be no fault.
- ④ Repeating ①, ② and ③ three times.

1. 結露特性試験

入力を切った状態で、恒温槽で-10℃に冷却しておき、約1時間後に恒温槽から取り出し、室温25℃、湿度40%RHの状態におき結露させ、その電気的特性の測定を3度行い、異常のないことを確認する。

2. Values

	Times	Output Voltage [V]	Ripple Voltage [mV]	Ripple Noise [mV]
Load 50%	1	-11.842	10	40
	2	-11.878	10	40
	3	-11.846	10	40
Load 100%	1	-11.820	25	50
	2	-11.841	25	50
	3	-11.864	25	50

Input Volt. 12.0 V

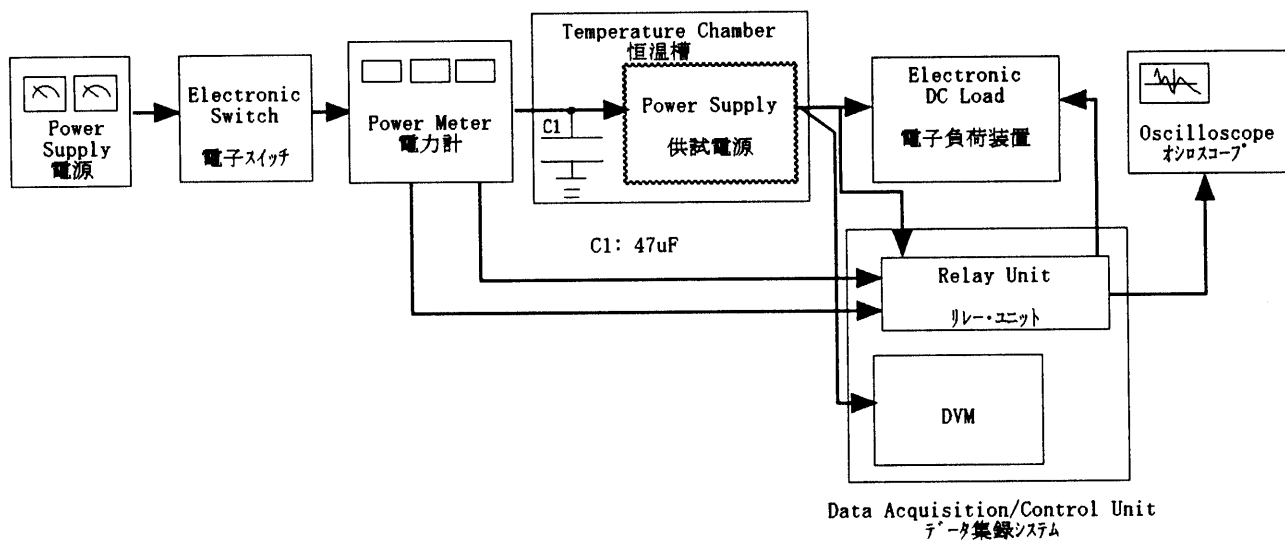


Figure A