



TEST DATA OF ZUW1R50512
(5.0V INPUT)

Regulated DC Power Supply

Date : June 14. 1996

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Design Manager

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Design Engineer

コーセル株式会社
COSEL CO., LTD.

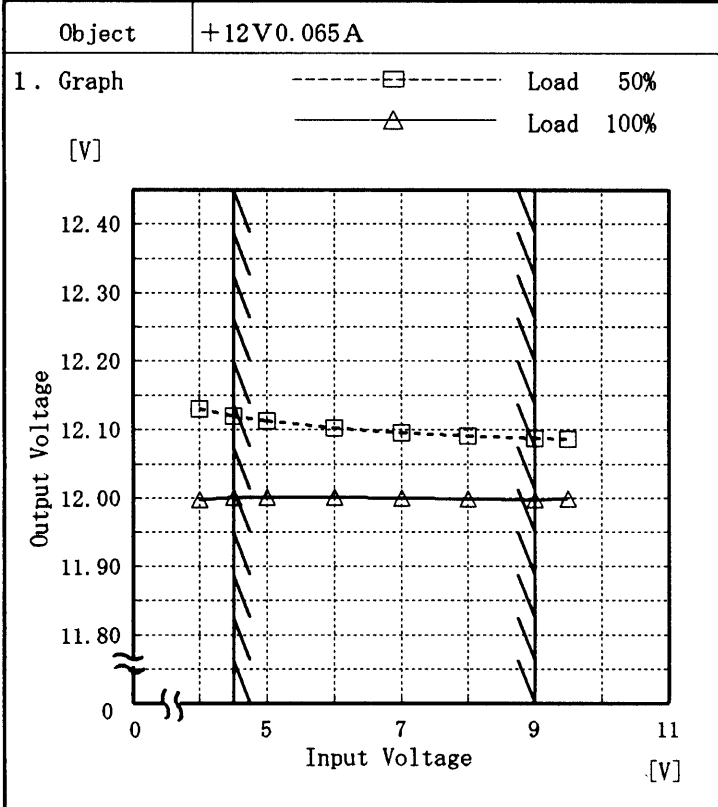
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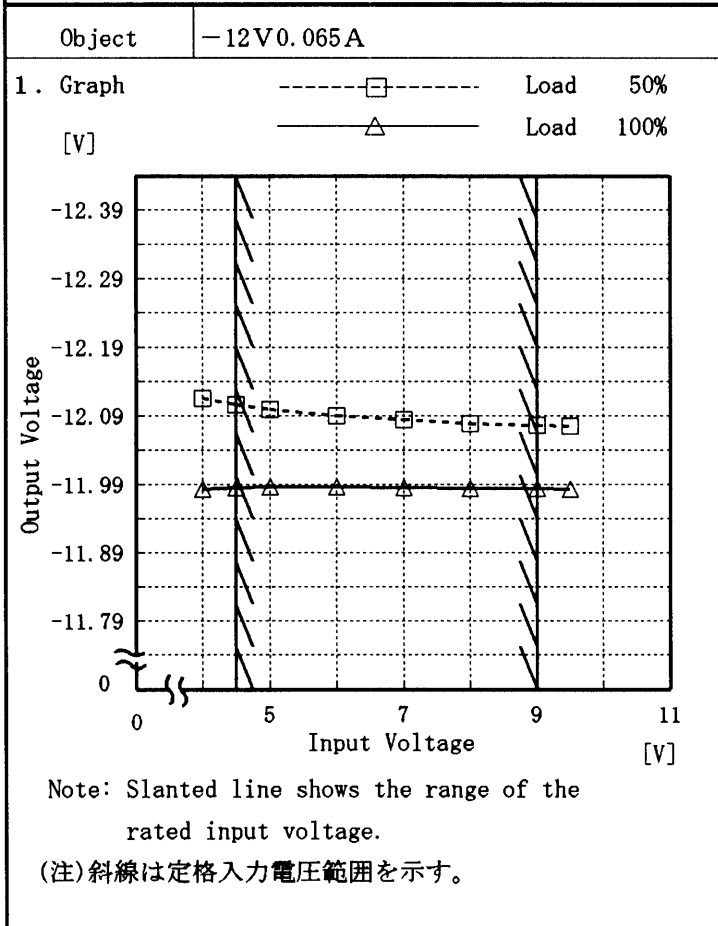


Model	ZUW1R50512	Temperature	25°C
Item	Line Regulation 静的入力変動	Testing Circuitry	Figure A



2. Values

Input Voltage [V]	Load 50%	Load 100%
	Output Volt. [V]	Output Volt. [V]
4.0	12.130	11.998
4.5	12.120	12.000
5.0	12.113	12.001
6.0	12.103	12.001
7.0	12.096	12.000
8.0	12.092	11.998
9.0	12.088	11.998
9.5	12.086	11.998
—	—	—
—	—	—
—	—	—
—	—	—



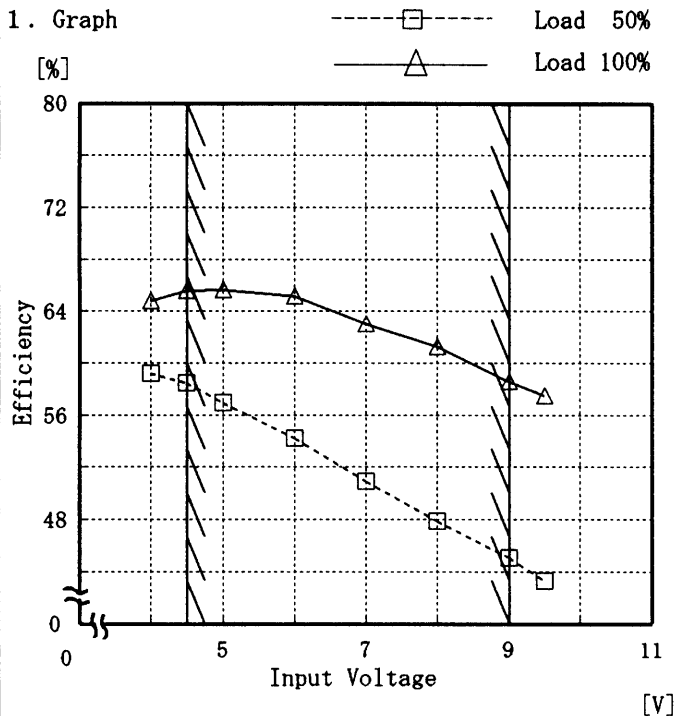
2. Values

Input Voltage [V]	Load 50%	Load 100%
	Output Volt. [V]	Output Volt. [V]
4.0	-12.115	-11.983
4.5	-12.106	-11.985
5.0	-12.099	-11.986
6.0	-12.090	-11.986
7.0	-12.083	-11.985
8.0	-12.079	-11.985
9.0	-12.076	-11.984
9.5	-12.074	-11.984
—	—	—
—	—	—
—	—	—
—	—	—



Model	ZUW1R50512	Temperature	25°C
Item	Efficiency 効率	Testing Circuitry	Figure A
Object	_____		

1. Graph



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

(注)斜線は定格入力電圧範囲を示す。

2. Values

Input Voltage [V]	Load 50%	Load 100%
	Efficiency [%]	Efficiency [%]
4.0	59.2	64.8
4.5	58.5	65.6
5.0	57.0	65.7
6.0	54.2	65.2
7.0	50.9	63.1
8.0	47.9	61.3
9.0	45.0	58.6
9.5	43.3	57.5
—	—	—
—	—	—
—	—	—
—	—	—



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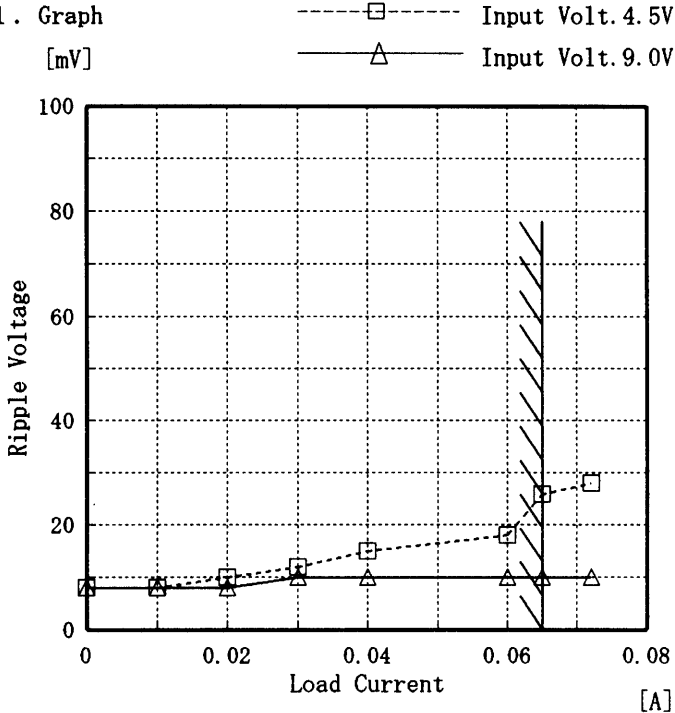


Model		ZUW1R50512	Temperature		25°C																																						
Item		Ripple Voltage (by Load Current) リップル電圧(負荷電流特性)	Testing Circuitry		Figure A																																						
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<p>1. Graph</p> <p>[mV]</p> <p>-----□----- Input Volt. 4.5V</p> <p>-----△----- Input Volt. 9.0V</p> <p>Ripple Voltage</p> <p>Load Current [A]</p>			<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th>Input Volt. 4.5 [V]</th> <th>Input Volt. 9.0 [V]</th> </tr> <tr> <th>Ripple Output Volt. [mV]</th> <th>Ripple Output Volt. [mV]</th> </tr> </thead> <tbody> <tr><td>0.000</td><td>8</td><td>8</td></tr> <tr><td>0.010</td><td>10</td><td>8</td></tr> <tr><td>0.020</td><td>12</td><td>10</td></tr> <tr><td>0.030</td><td>14</td><td>10</td></tr> <tr><td>0.040</td><td>16</td><td>10</td></tr> <tr><td>0.060</td><td>20</td><td>10</td></tr> <tr><td>0.065</td><td>28</td><td>12</td></tr> <tr><td>0.072</td><td>30</td><td>12</td></tr> <tr><td>—</td><td>—</td><td>—</td></tr> <tr><td>—</td><td>—</td><td>—</td></tr> <tr><td>—</td><td>—</td><td>—</td></tr> </tbody> </table>			Load Current [A]	Input Volt. 4.5 [V]	Input Volt. 9.0 [V]	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]	0.000	8	8	0.010	10	8	0.020	12	10	0.030	14	10	0.040	16	10	0.060	20	10	0.065	28	12	0.072	30	12	—	—	—	—	—	—	—	—	—
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Model	ZUW1R50512	Temperature	25°C
Item	Ripple Voltage (by Load Current) リップル電圧(負荷電流特性)	Testing Circuitry	Figure A
Object	-12V 0.065A		

1. Graph



Ripple Voltage is shown as p-p in the figure below.

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

リップル電圧は、下図 p-p 値で示される。
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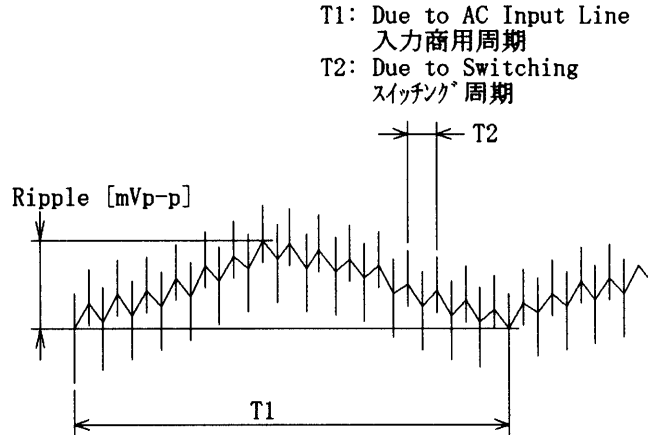


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

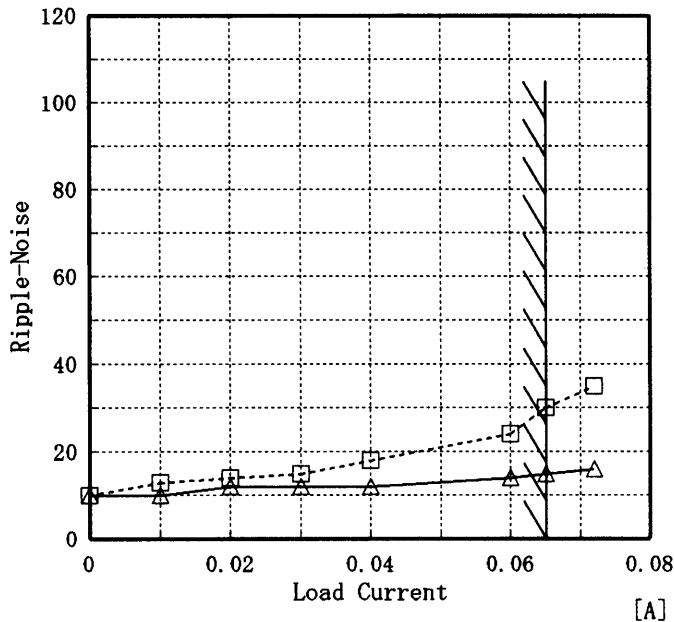
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	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
0.000	8	8
0.010	8	8
0.020	10	8
0.030	12	10
0.040	15	10
0.060	18	10
0.065	26	10
0.072	28	10
—	—	—
—	—	—
—	—	—



Model	ZUW1R50512	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. 4.5V
 -----△----- Input Volt. 9.0V



2. Values

Load current [A]	Input Volt. 4.5 [V]	Input Volt. 9.0 [V]
	Ripple-Noise [mV]	Ripple-Noise [mV]
0.000	10	10
0.010	13	10
0.020	14	12
0.030	15	12
0.040	18	12
0.060	24	14
0.065	30	15
0.072	35	16
—	—	—
—	—	—
—	—	—

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

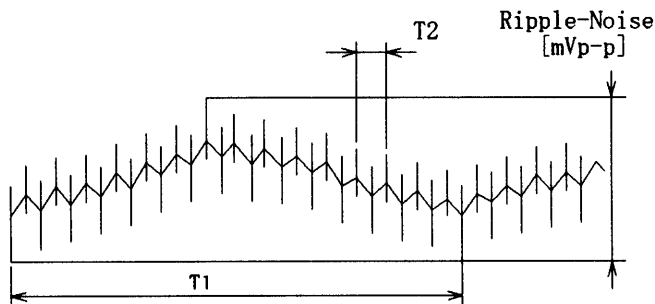


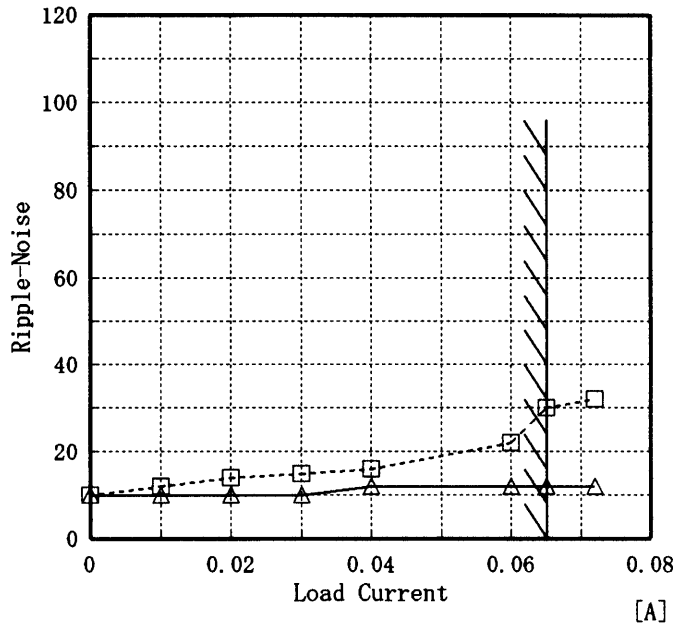
Fig. Complex Ripple Wave Form
 図 リップル波形詳細図



Model	ZUW1R50512	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. 4.5V
 - - - - △ - - - - Input Volt. 9.0V



2. Values

Load current [A]	Input Volt. 4.5 [V]	Input Volt. 9.0 [V]
	Ripple-Noise [mV]	Ripple-Noise [mV]
0.000	10	10
0.010	12	10
0.020	14	10
0.030	15	10
0.040	16	12
0.060	22	12
0.065	30	12
0.072	32	12
-	-	-
-	-	-
-	-	-

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

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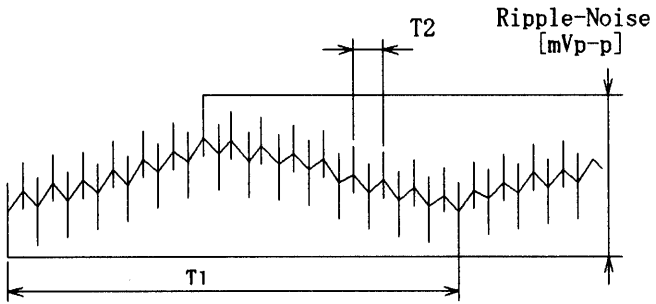


Fig. Complex Ripple Wave Form
 図 リップル波形詳細図



<p>Model ZUW1R50512</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>																																																								
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<p>Object -12V0.065A</p> <p>1. Graph</p> <p>Legend: Input Volt. 4.5 V _____ Input Volt. 5.0 V _____ Input Volt. 9.0 V</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th>Input Volt. 4.5[V]</th> <th>Input Volt. 5.0[V]</th> <th>Input Volt. 9.0[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>0.081</td><td>0.084</td><td>0.091</td></tr> <tr><td>-11.40</td><td>0.132</td><td>0.135</td><td>0.123</td></tr> <tr><td>-10.80</td><td>0.138</td><td>0.141</td><td>0.127</td></tr> <tr><td>-9.60</td><td>0.152</td><td>0.154</td><td>0.135</td></tr> <tr><td>-8.40</td><td>0.167</td><td>0.168</td><td>0.144</td></tr> <tr><td>-7.20</td><td>0.183</td><td>0.181</td><td>0.151</td></tr> <tr><td>-6.00</td><td>0.197</td><td>0.194</td><td>0.158</td></tr> <tr><td>-4.80</td><td>0.212</td><td>0.205</td><td>0.162</td></tr> <tr><td>-3.60</td><td>0.225</td><td>0.214</td><td>0.166</td></tr> <tr><td>-2.40</td><td>0.237</td><td>0.222</td><td>0.170</td></tr> <tr><td>-1.20</td><td>0.253</td><td>0.233</td><td>0.182</td></tr> <tr><td>0.00</td><td>0.300</td><td>0.277</td><td>0.193</td></tr> </tbody> </table>		Output Voltage [V]	Input Volt. 4.5[V]	Input Volt. 5.0[V]	Input Volt. 9.0[V]	Load Current [A]	Load Current [A]	Load Current [A]	-12.00	0.081	0.084	0.091	-11.40	0.132	0.135	0.123	-10.80	0.138	0.141	0.127	-9.60	0.152	0.154	0.135	-8.40	0.167	0.168	0.144	-7.20	0.183	0.181	0.151	-6.00	0.197	0.194	0.158	-4.80	0.212	0.205	0.162	-3.60	0.225	0.214	0.166	-2.40	0.237	0.222	0.170	-1.20	0.253	0.233	0.182	0.00	0.300	0.277	0.193
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<p>Note: Slanted line shows the range of the rated load current.</p> <p>(注)斜線は定格負荷電流範囲を示す。</p>																																																										

COSEL

Model	ZUW1R50512	Temperature	25°C
Item	Dynamic Load Responce 動的負荷変動	Testing Circuitry	Figure A
Object	+12V0.065A		

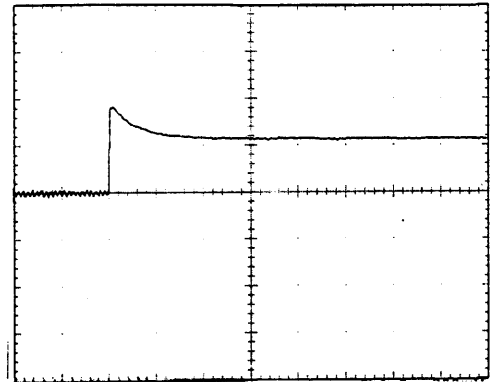
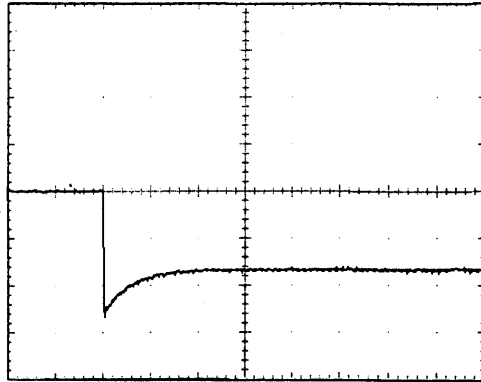
Input Volt. 5.0 V
Cycle 100 mS

Load Current



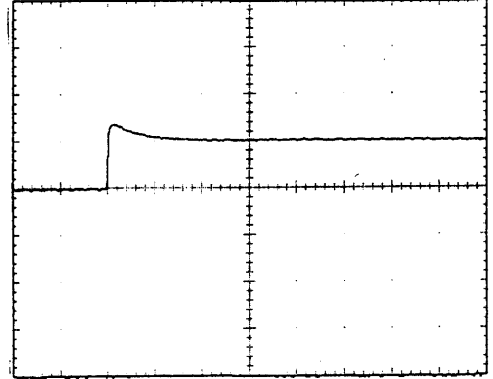
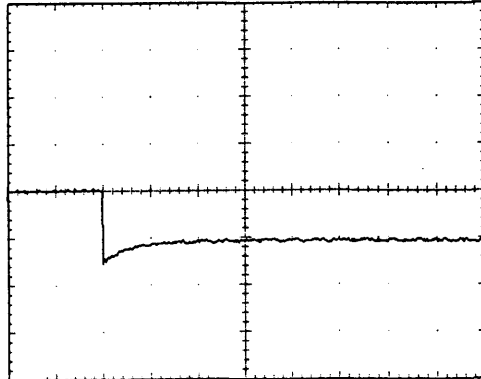
Min. Load ↔
Load 100 %

200 mV/div



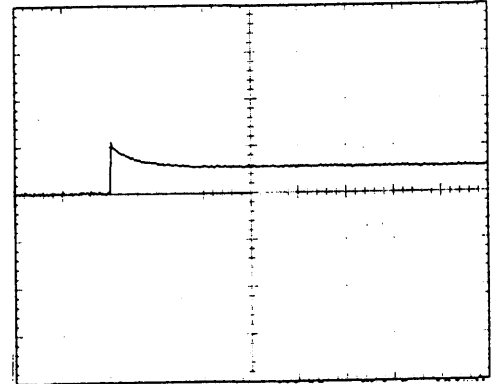
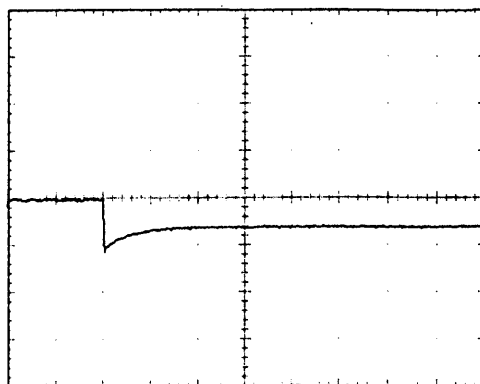
Min. Load ↔
Load 50 %

200 mV/div



Load 50% ↔
Load 100 %

200 mV/div



1 mS/div

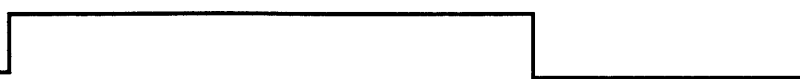


Model		ZUW1R50512	Temperature		25°C
Item		Dynamic Load Responce 動的負荷変動	Testing Circuitry		Figure A
Object		-12V0.065A			

Input Volt. 5.0 V

Cycle 100 mS

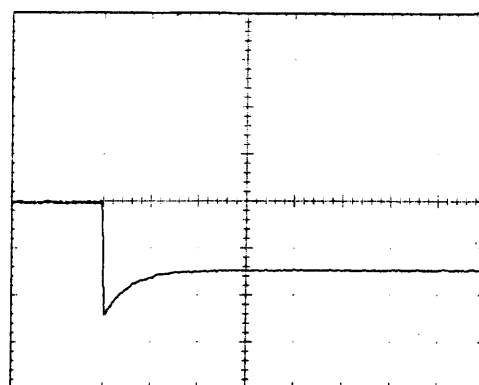
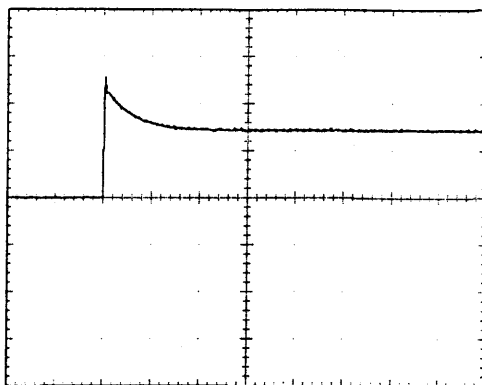
Load Current



Min. Load ↔

Load 100 %

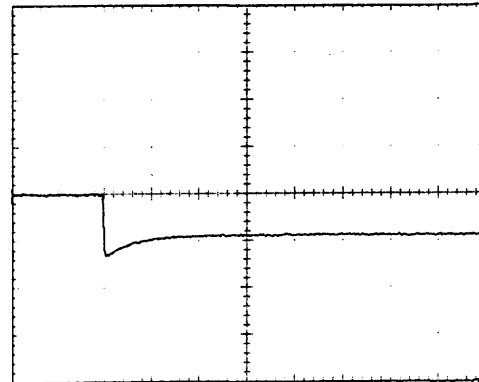
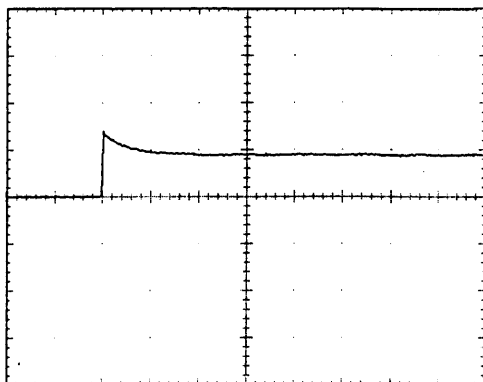
200 mV/div



Min. Load ↔

Load 50 %

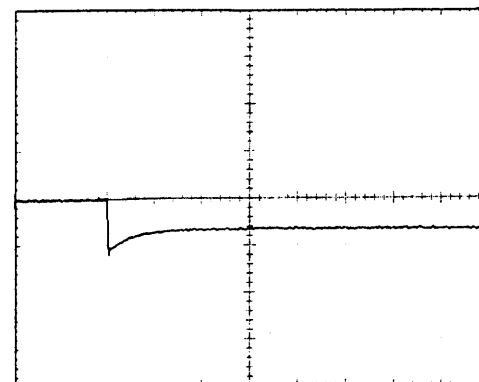
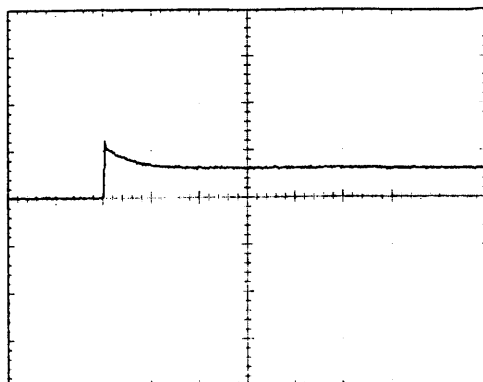
200 mV/div



Load 50% ↔

Load 100 %

200 mV/div



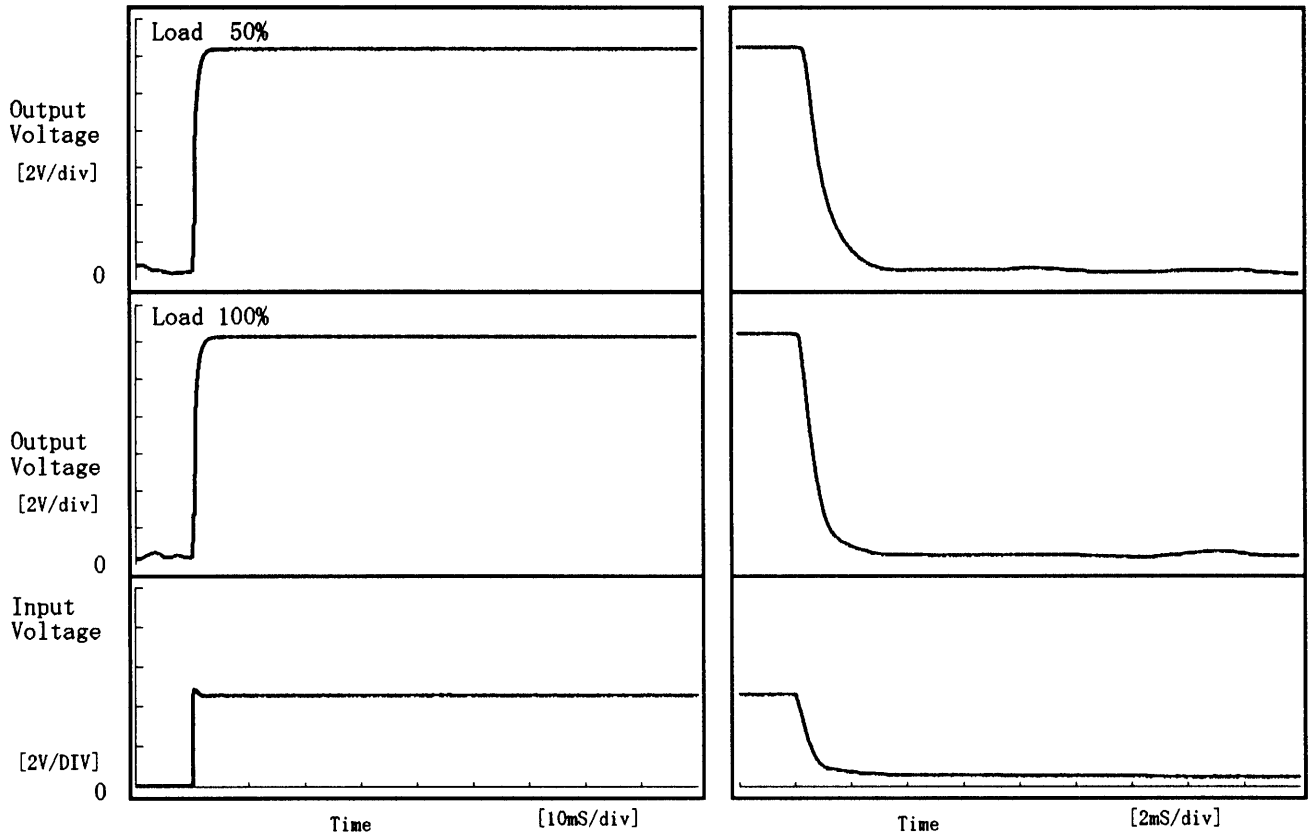
1 mS/div



Model	ZUW1R50512	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

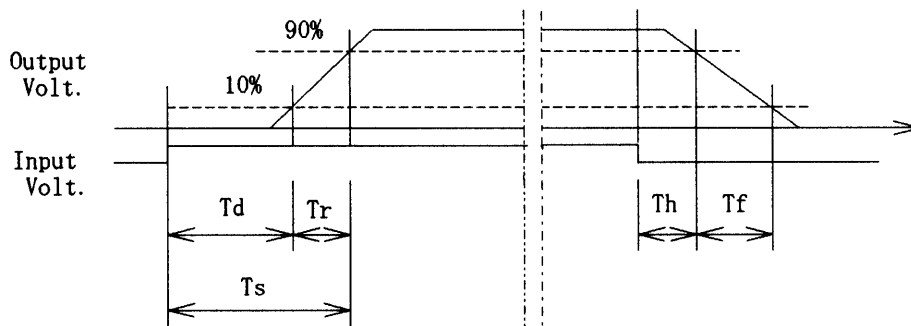
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.05	1.25	1.30	0.49	1.64
100 %	0.05	1.30	1.35	0.30	1.19

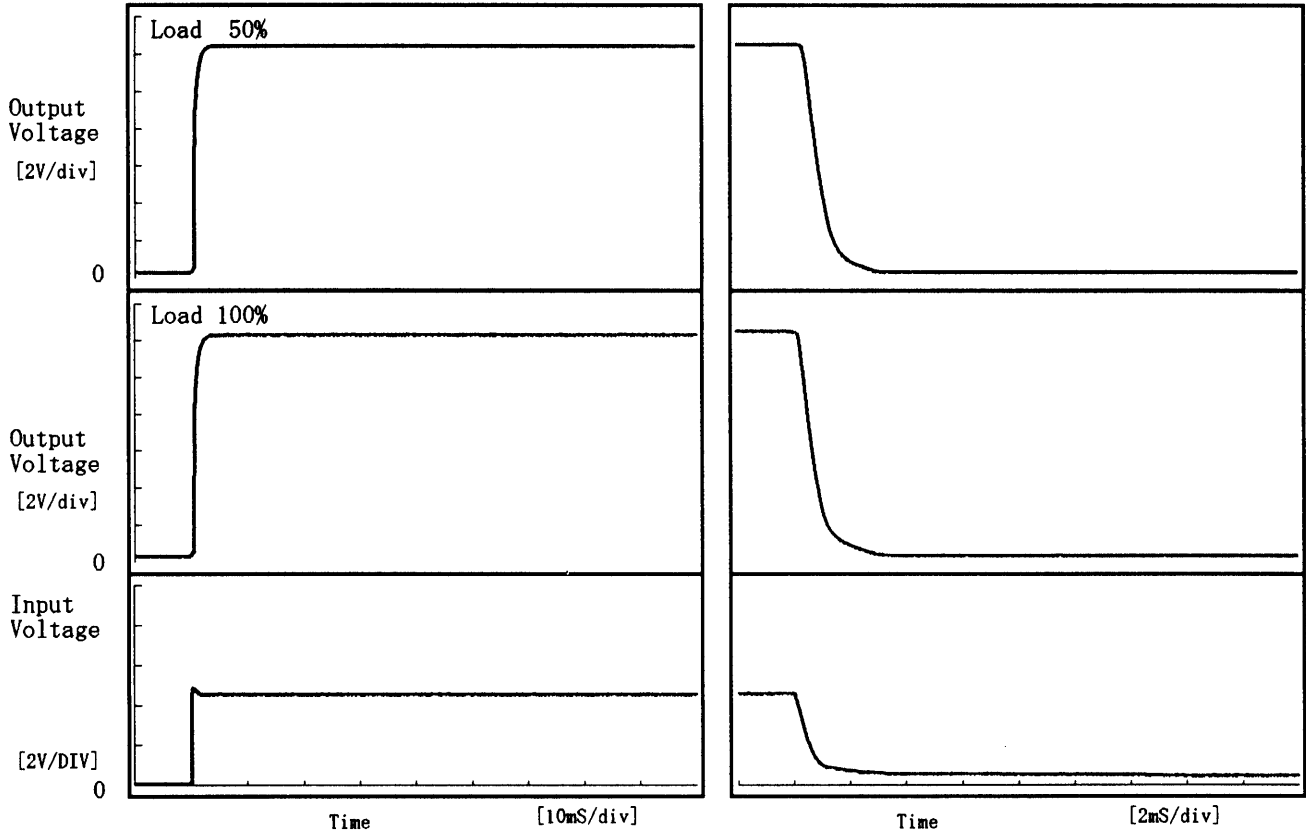




Model	ZUW1R50512	Temperature	25°C
Item	Rise and Fall Time 立上り、立下り時間	Testing Circuitry	Figure A
Object	-12V0.065A		

1. Graph

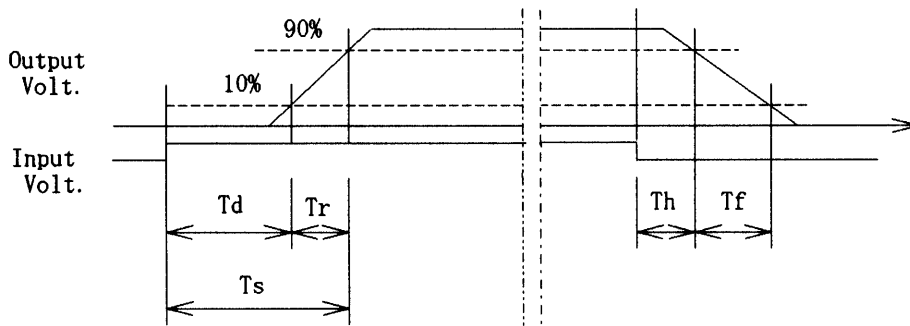
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.40	0.85	1.25	0.48	1.16
100 %	0.40	0.90	1.30	0.30	1.15

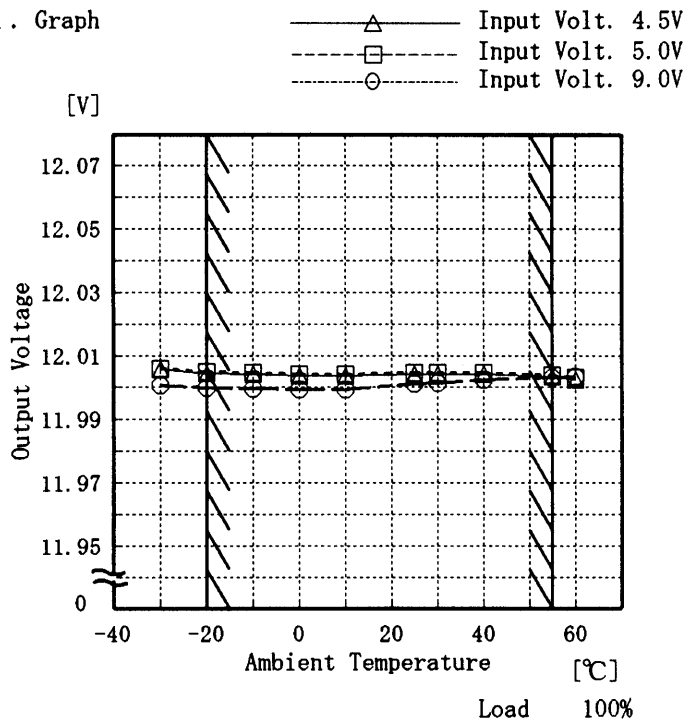




Model	ZUW1R50512
Item	Ambient Temperature Drift 周囲温度変動
Object	+12V0.065A

Testing Circuitry Figure A

1. Graph

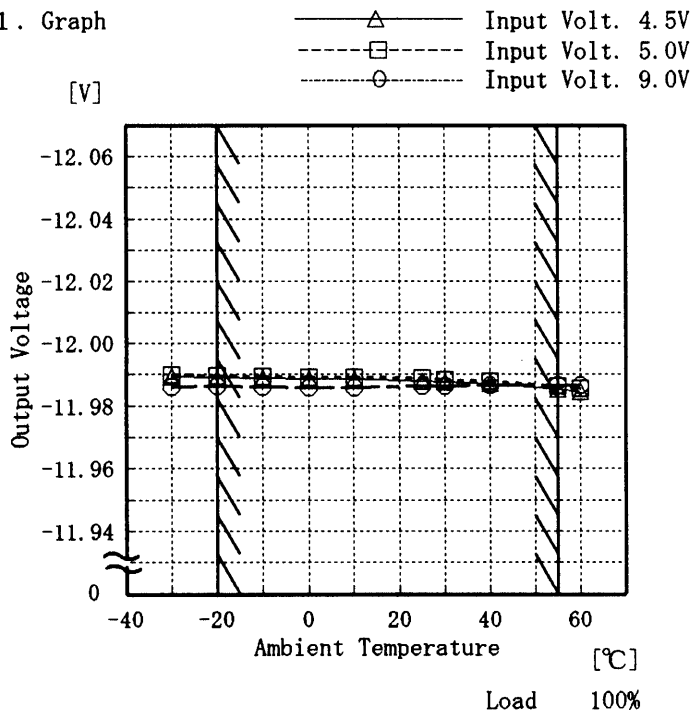


2. Values

Temperature [°C]	Input Volt. 4.5[V]	Input Volt. 5.0[V]	Input Volt. 9.0[V]
	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]
-30	12.005	12.006	12.001
-20	12.004	12.005	12.000
-10	12.004	12.005	12.000
0	12.003	12.004	11.999
10	12.004	12.004	11.999
25	12.004	12.004	12.001
30	12.004	12.005	12.001
40	12.004	12.005	12.002
55	12.003	12.004	12.003
60	12.002	12.003	12.003
-	-	-	-

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

1. Graph



2. Values

Temperature [°C]	Input Volt. 4.5[V]	Input Volt. 5.0[V]	Input Volt. 9.0[V]
	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]
-30	-11.989	-11.990	-11.986
-20	-11.989	-11.990	-11.986
-10	-11.989	-11.989	-11.986
0	-11.989	-11.989	-11.986
10	-11.989	-11.989	-11.986
25	-11.988	-11.989	-11.986
30	-11.987	-11.988	-11.986
40	-11.987	-11.988	-11.986
55	-11.985	-11.986	-11.987
60	-11.984	-11.985	-11.987
-	-	-	-

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。

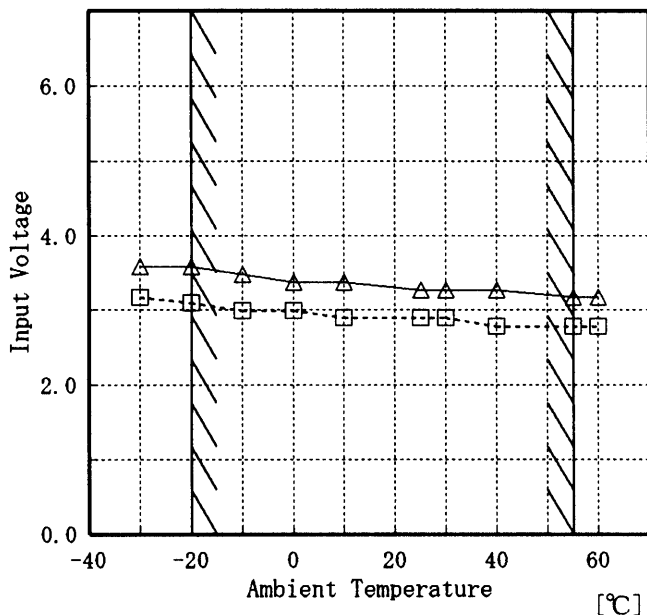


Model	ZUW1R50512
Item	Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧
Object	+12V0.065A

Testing Circuitry Figure A

1. Graph
[V]

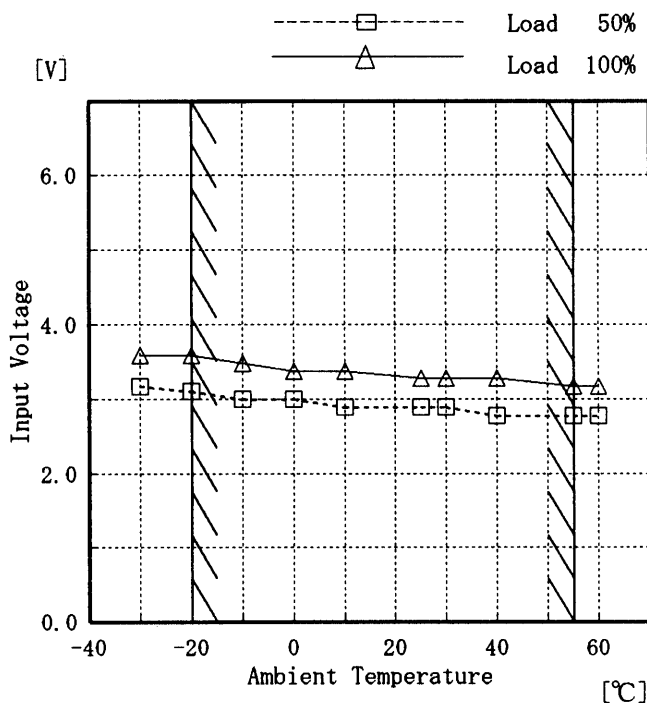
-----□----- Load 50%
-----△----- Load 100%



2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Input Volt. [V]	Input Volt. [V]
-30	3.2	3.6
-20	3.1	3.6
-10	3.0	3.5
0	3.0	3.4
10	2.9	3.4
25	2.9	3.3
30	2.9	3.3
40	2.8	3.3
55	2.8	3.2
60	2.8	3.2
—	—	—

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

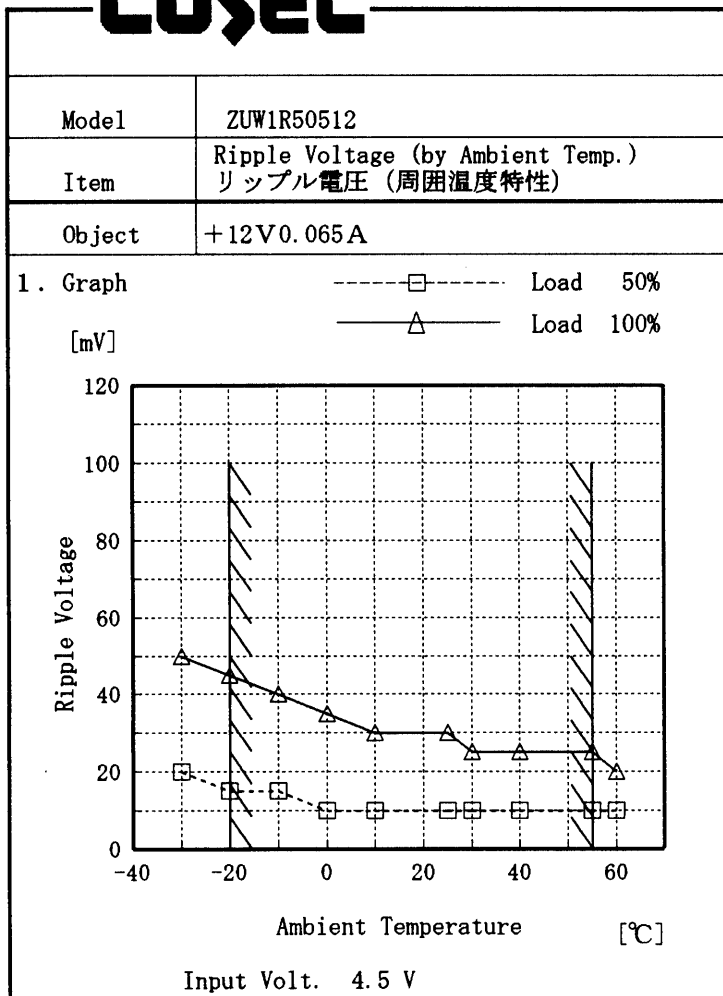


2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Input Volt. [V]	Input Volt. [V]
-30	3.2	3.6
-20	3.1	3.6
-10	3.0	3.5
0	3.0	3.4
10	2.9	3.4
25	2.9	3.3
30	2.9	3.3
40	2.8	3.3
55	2.8	3.2
60	2.8	3.2
—	—	—

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

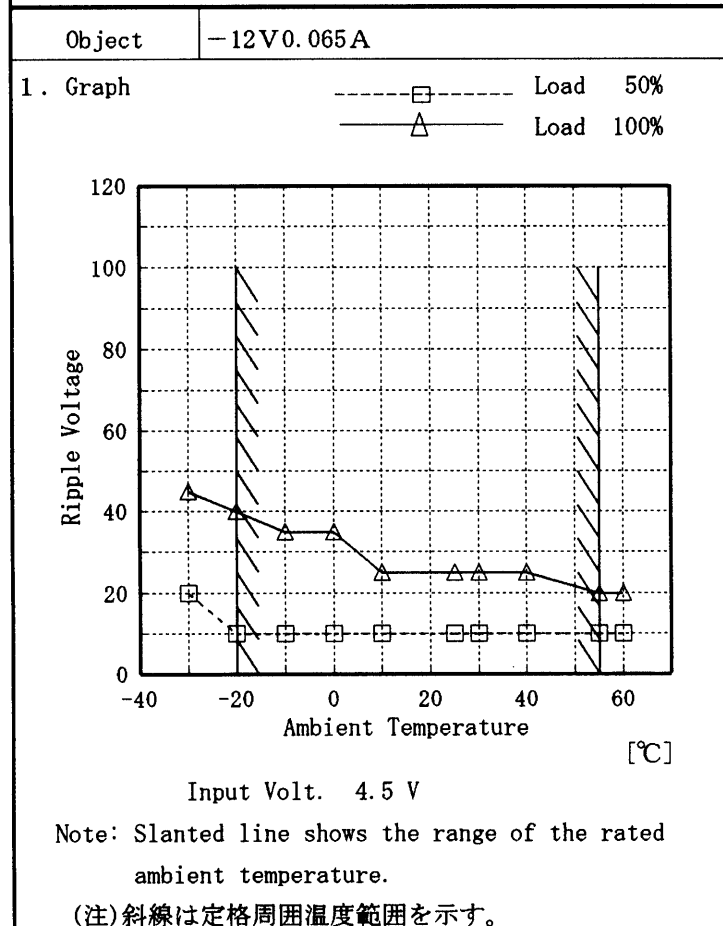
(注)斜線は定格周囲温度範囲を示す。



Testing Circuitry Figure A

2. Values

Ambient Temp. [°C]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]
-30	20	50
-20	15	45
-10	15	40
0	10	35
10	10	30
25	10	30
30	10	25
40	10	25
55	10	25
60	10	20
—	—	—



2. Values

Ambient Temp. [°C]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]
-30	20	45
-20	10	40
-10	10	35
0	10	35
10	10	25
25	10	25
30	10	25
40	10	25
55	10	20
60	10	20
—	—	—



Model	ZUW1R50512	Temperature	25 °C
Item	Time Lapse Drift 経時ドリフト	Testing Circuitry	Figure A

Object +12V0.065A

1. Graph

Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	12.015
0.5	12.007
1.0	12.007
2.0	12.007
3.0	12.007
4.0	12.007
5.0	12.007
6.0	12.007
7.0	12.007
8.0	12.007

Object -12V0.065A

1. Graph

Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	-11.985
0.5	-11.980
1.0	-11.980
2.0	-11.980
3.0	-11.980
4.0	-11.980
5.0	-11.980
6.0	-11.980
7.0	-11.980
8.0	-11.980



COSEL		Testing Circuitry Figure A
Model	ZUW1R50512	
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 : 4.5~9.0 V

Load Current (AVR 1) : 0.000~0.065 A

(AVR 2) : 0.000~0.065 A

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

* 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 4.5~9.0 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) = $\pm (\text{出力電圧の最高値} - \text{出力電圧の最低値}) / 2$

* 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
--------	------------

Item	Temperature [°C]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration) [%]
Maximum Voltage	-20	5.0	0.065	12.003	±135	±1.2
Minimum Voltage	25	4.5	0.000	11.733		

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

Item	Temperature [°C]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration) [%]
Maximum Voltage	-20	5.0	0.065	-11.988	±136	±1.2
Minimum Voltage	55	4.5	0.000	-11.717		



Model		ZUW1R50512	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°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°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	11.963	15	20
	2	11.867	15	20
	3	11.872	15	20
Load 100%	1	11.912	30	35
	2	11.845	30	35
	3	11.839	30	35

Input Volt. 5.0 V

COSEL

Model		ZUW1R50512		
Item		Condensation 結露特性		
Object		-12V 0.065A		
		Testing Circuitry Figure A		
<p>1. Condensation test</p> <p>Testing procedure is as follows.</p> <p>① Keeping and cooling the unit in a tank at -10°C for an hour with the input off.</p> <p>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.</p> <p>③ Testing electrical characteristics of the unit to confirm there be no fault.</p> <p>④ Repeating ①, ② and ③ three times.</p>				
<p>1. 結露特性試験</p> <p>入力を切った状態で、恒温槽で-10°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°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。</p>				
<p>2. Values</p>				
	Times	Output Voltage [V]	Ripple Voltage [mV]	Ripple Noise [mV]
Load 50 %	1	-12.021	15	15
	2	-12.063	15	15
	3	-12.102	15	15
Load 100 %	1	-11.963	25	30
	2	-11.985	25	30
	3	-12.046	25	30
Input Volt. 5.0 V				

COSEL

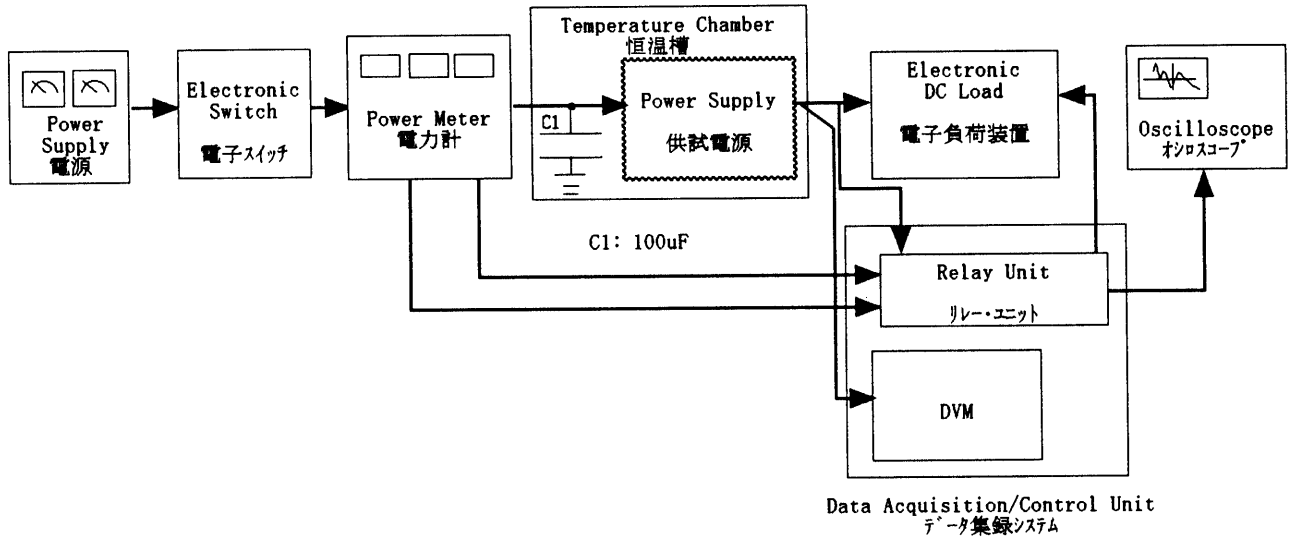


Figure A