



TEST DATA OF ZUS31215

(12.0V INPUT)

Regulated DC Power Supply

Date : Nov. 5. 1996

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COSEL CO., LTD.

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Model	ZUS31215	Temperature	25℃
Item	Line Regulation 静的入力変動	Testing Circuitry	Figure A
Object	+15V0.2A		

1. Graph

-----□----- Load 50%

-----△----- Load 100%

[V]

15.37

15.27

15.17

15.07

14.97

14.87

14.77

0

Output Voltage

0

10

15

20

Input Voltage [V]

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% Output Volt. [V]	Load 100% Output Volt. [V]
8.0	15.016	15.014
9.0	15.017	15.014
10.0	15.017	15.014
12.0	15.017	15.014
15.0	15.016	15.014
18.0	15.016	15.014
20.0	15.016	15.013
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

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Model	ZUS31215	Temperature	25℃
Item	Efficiency 効率	Testing Circuitry	Figure A
Object			

1. Graph

-----□----- Load 50%

——△—— Load 100%

Efficiency [%]

Input Voltage [V]

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。

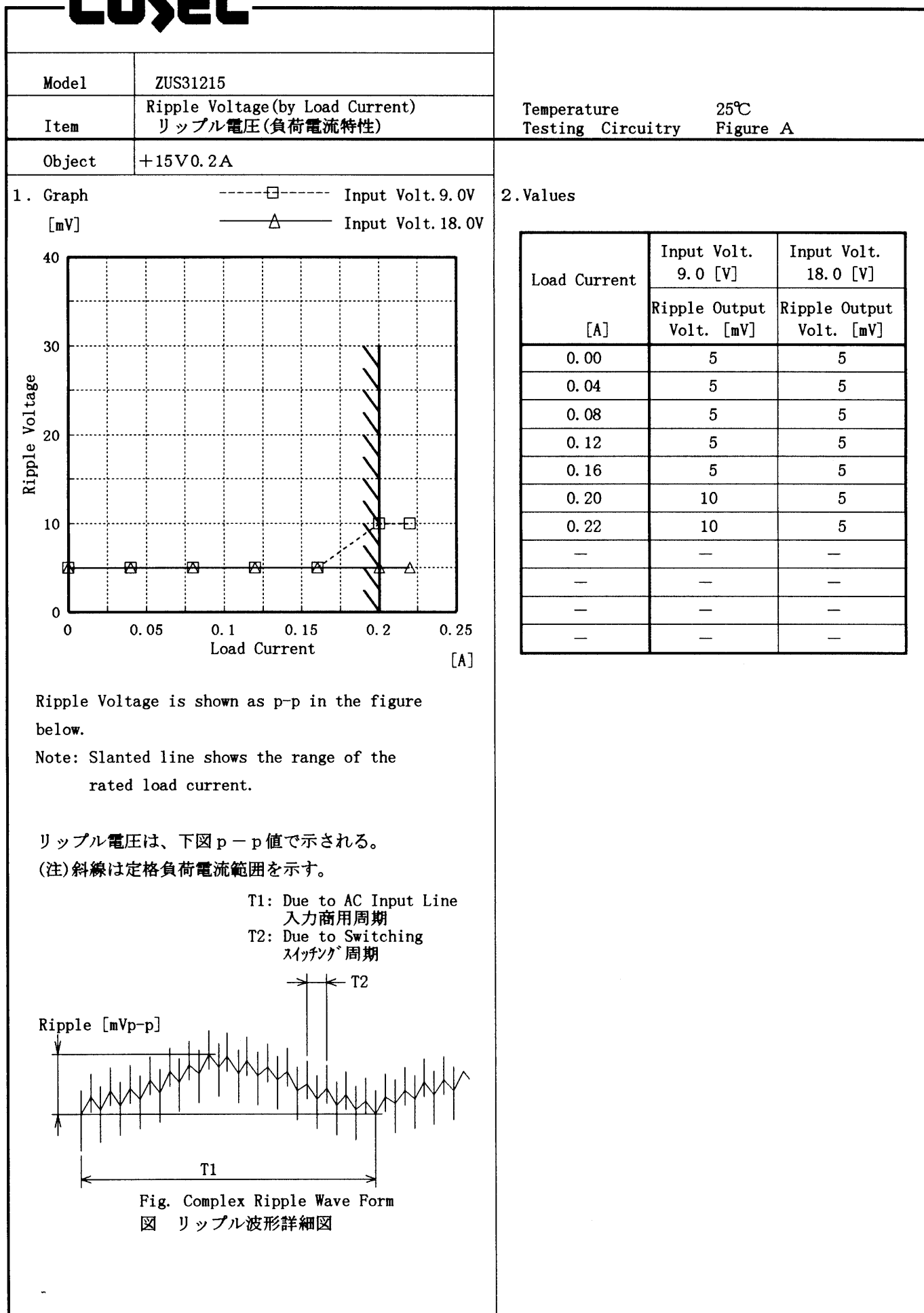
2. Values

Input Voltage [V]	Load 50% Efficiency [%]	Load 100% Efficiency [%]
8.0	73.5	78.1
9.0	73.1	78.5
10.0	72.3	78.2
12.0	70.6	77.7
15.0	67.1	76.2
18.0	63.1	73.8
20.0	60.5	72.2
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

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Model		ZUS31215		Temperature		25℃																																																
Item		Load Regulation 静的負荷変動		Testing Circuitry		Figure A																																																
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<div><div><div>—△—</div><div>Input Volt. 9.0V</div></div><div><div>- - -□- - -</div><div>Input Volt. 12.0V</div></div><div><div>- - -○- - -</div><div>Input Volt. 18.0V</div></div></div> <div><div><div>[V]</div><div><div>15.16</div><div>15.12</div><div>15.08</div><div>15.04</div><div>15.00</div><div>14.96</div><div>14.92</div><div>0</div></div><div>Output Voltage</div></div><div><div>0</div><div>0.05</div><div>0.1</div><div>0.15</div><div>0.2</div><div>0.25</div></div><div>Load Current</div><div>[A]</div></div> <div><div>Note: Slanted line shows the range of the rated load current.</div><div>(注)斜線は定格負荷電流範囲を示す。</div></div>				<table><tr><th rowspan="2">Load Current [A]</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>Output Volt. [V]</th><th>Output Volt. [V]</th><th>Output Volt. [V]</th></tr><tr><td>0.00</td><td>15.018</td><td>15.018</td><td>15.019</td></tr><tr><td>0.04</td><td>15.018</td><td>15.018</td><td>15.017</td></tr><tr><td>0.08</td><td>15.017</td><td>15.017</td><td>15.016</td></tr><tr><td>0.12</td><td>15.016</td><td>15.016</td><td>15.016</td></tr><tr><td>0.16</td><td>15.016</td><td>15.016</td><td>15.015</td></tr><tr><td>0.20</td><td>15.015</td><td>15.015</td><td>15.014</td></tr><tr><td>0.22</td><td>15.015</td><td>15.015</td><td>15.014</td></tr><tr><td>—</td><td>—</td><td>—</td><td>—</td></tr><tr><td>—</td><td>—</td><td>—</td><td>—</td></tr><tr><td>—</td><td>—</td><td>—</td><td>—</td></tr></table>				Load Current [A]	Input Volt. 9.0[V]	Input Volt. 12.0[V]	Input Volt. 18.0[V]	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]	0.00	15.018	15.018	15.019	0.04	15.018	15.018	15.017	0.08	15.017	15.017	15.016	0.12	15.016	15.016	15.016	0.16	15.016	15.016	15.015	0.20	15.015	15.015	15.014	0.22	15.015	15.015	15.014	—	—	—	—	—	—	—	—	—	—	—	—
Load Current [A]	Input Volt. 9.0[V]	Input Volt. 12.0[V]	Input Volt. 18.0[V]																																																			
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Model		ZUS31215	
Item		Ripple-Noise リップルノイズ	
Object		+15V0.2A	

1. Graph

-----□----- Input Volt. 9.0V

———△——— Input Volt. 18.0V

50

40

30

20

10

0

Ripple Voltage

[mV]

0

0.05

0.1

0.15

0.2

0.25

Load Current

[A]

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

Ripple-Noise

[mVp-p]

T1

T2

Fig. Complex Ripple Wave Form

図 リップル波形詳細図

Load Current	Input Volt.	Input Volt.
	9.0 [V]	18.0 [V]
[A]	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
0.00	5	5
0.04	5	5
0.08	5	5
0.12	10	5
0.16	10	5
0.20	15	10
0.22	15	10
—	—	—
—	—	—
—	—	—
—	—	—

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Model		ZUS31215	Temperature		25℃																																																				
Item		Overcurrent Protection 過電流保護	Testing Circuitry		Figure A																																																				
Object		+15V0.2A																																																							
1. Graph			2. Values																																																						
<div><div>~~~~~ Input Volt. 9.0V ——— Input Volt. 12.0V ———— Input Volt. 18.0V</div><div><div>[V]</div><div>Output Voltage [V]</div><div>Load Current [A]</div></div></div> <div><div>Note: Slanted line shows the range of the rated load current.</div><div>(注)斜線は定格負荷電流範囲を示す。</div></div>			<table><tr><th>Output Voltage [V]</th><th>Input Volt. 9.0[V] Load Curr-ent [A]</th><th>Input Volt. 12.0[V] Load Curr-ent [A]</th><th>Input Volt. 18.0[V] Load Curr-ent [A]</th></tr><tr><td>15.00</td><td>0.29</td><td>0.32</td><td>0.28</td></tr><tr><td>14.25</td><td>0.29</td><td>0.32</td><td>0.28</td></tr><tr><td>13.50</td><td>0.29</td><td>0.32</td><td>0.28</td></tr><tr><td>12.00</td><td>0.30</td><td>0.32</td><td>0.27</td></tr><tr><td>10.50</td><td>0.30</td><td>0.32</td><td>0.26</td></tr><tr><td>9.00</td><td>0.30</td><td>0.31</td><td>0.25</td></tr><tr><td>7.50</td><td>0.29</td><td>0.30</td><td>0.24</td></tr><tr><td>6.00</td><td>0.29</td><td>0.29</td><td>0.22</td></tr><tr><td>4.50</td><td>0.27</td><td>0.26</td><td>0.20</td></tr><tr><td>3.00</td><td>0.25</td><td>0.23</td><td>0.17</td></tr><tr><td>1.50</td><td>0.22</td><td>0.20</td><td>0.16</td></tr><tr><td>0.00</td><td>0.21</td><td>0.19</td><td>0.17</td></tr></table>			Output Voltage [V]	Input Volt. 9.0[V] Load Curr-ent [A]	Input Volt. 12.0[V] Load Curr-ent [A]	Input Volt. 18.0[V] Load Curr-ent [A]	15.00	0.29	0.32	0.28	14.25	0.29	0.32	0.28	13.50	0.29	0.32	0.28	12.00	0.30	0.32	0.27	10.50	0.30	0.32	0.26	9.00	0.30	0.31	0.25	7.50	0.29	0.30	0.24	6.00	0.29	0.29	0.22	4.50	0.27	0.26	0.20	3.00	0.25	0.23	0.17	1.50	0.22	0.20	0.16	0.00	0.21	0.19	0.17
Output Voltage [V]	Input Volt. 9.0[V] Load Curr-ent [A]	Input Volt. 12.0[V] Load Curr-ent [A]	Input Volt. 18.0[V] Load Curr-ent [A]																																																						
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Model	ZUS31215	Temperature	25℃
Item	Dynamic Load Responce 動的負荷変動	Testing Circuitry	Figure A
Object	+15V0.2A		

Input Volt. 12.0 V

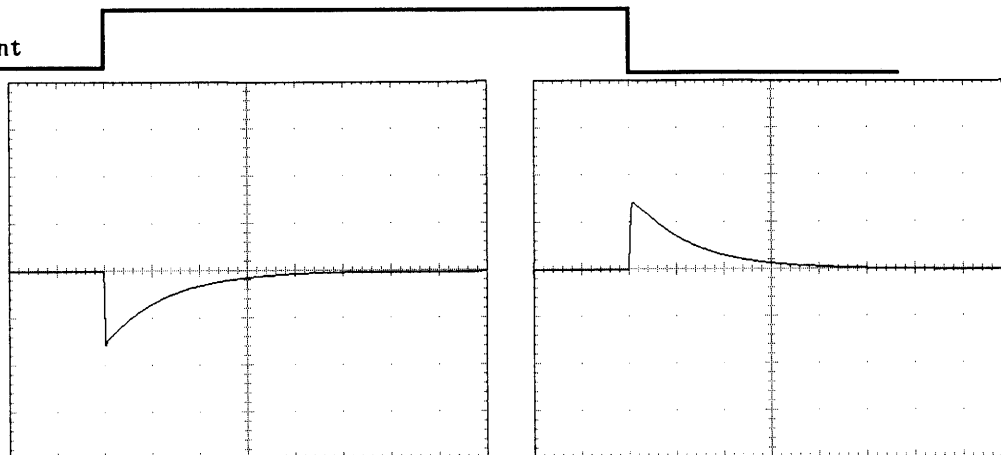
Cycle 100 mS

Load Current

Min. Load ↔

Load 100 %

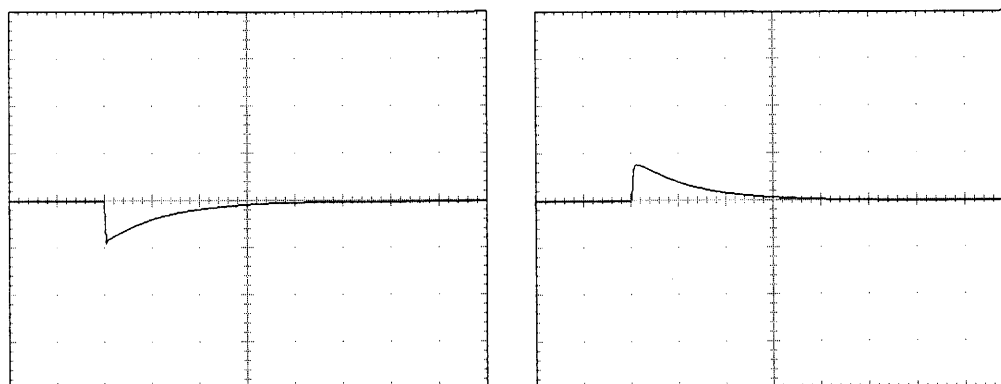
200 mV/div



Min. Load ↔

Load 50 %

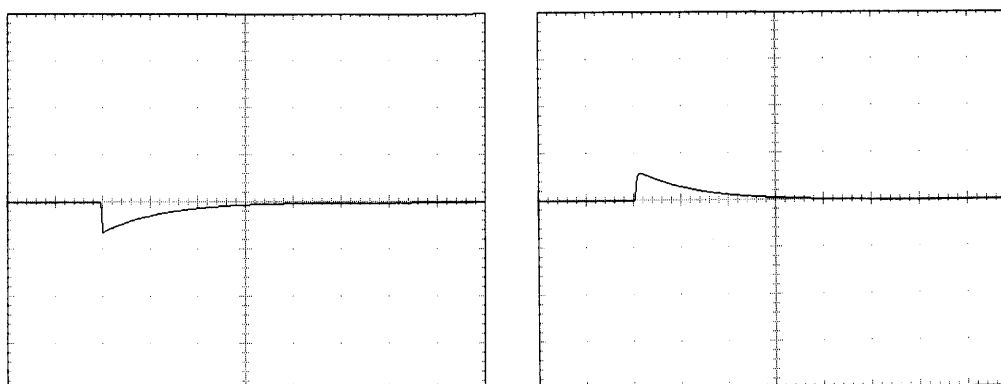
200 mV/div



Load 50% ↔

Load 100 %

200 mV/div



1 mS/div

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Model ZUS31215

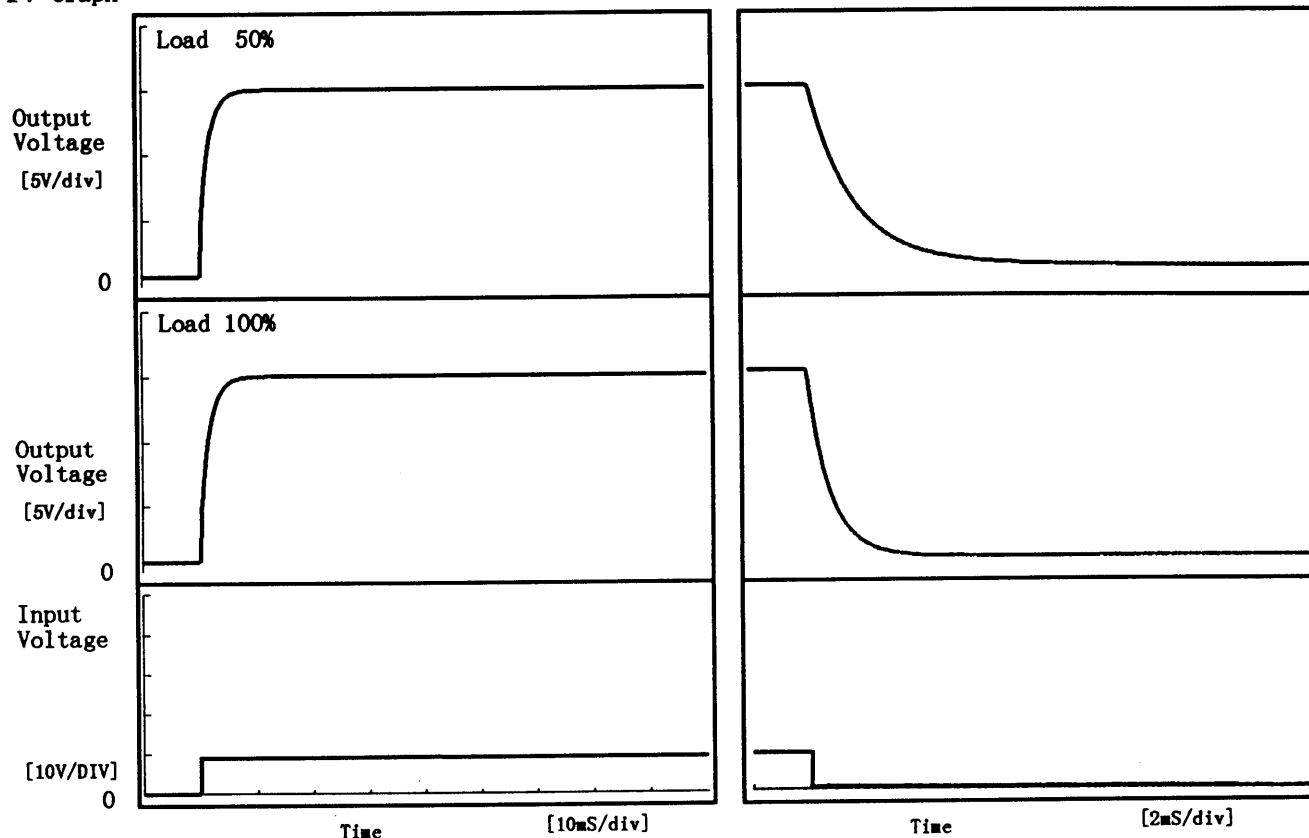
Item Rise and Fall Time 立上り、立下り時間

Temperature 25°C
Testing Circuitry Figure A

Object +15V0.2A

1. Graph

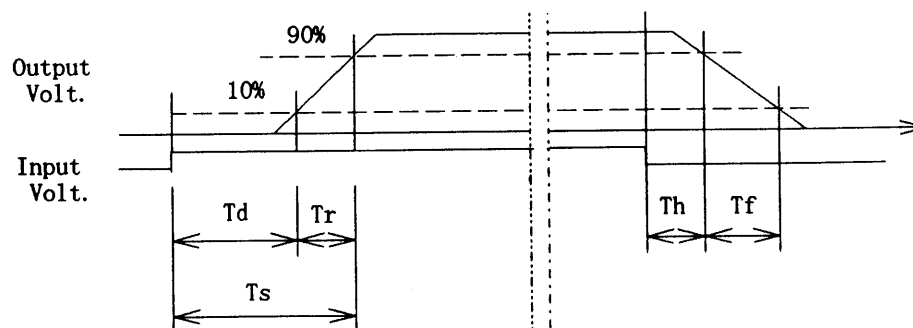
Input Volt. 9.0 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.10	3.50	3.60	0.30	5.68
100 %	0.10	3.55	3.65	0.14	2.13

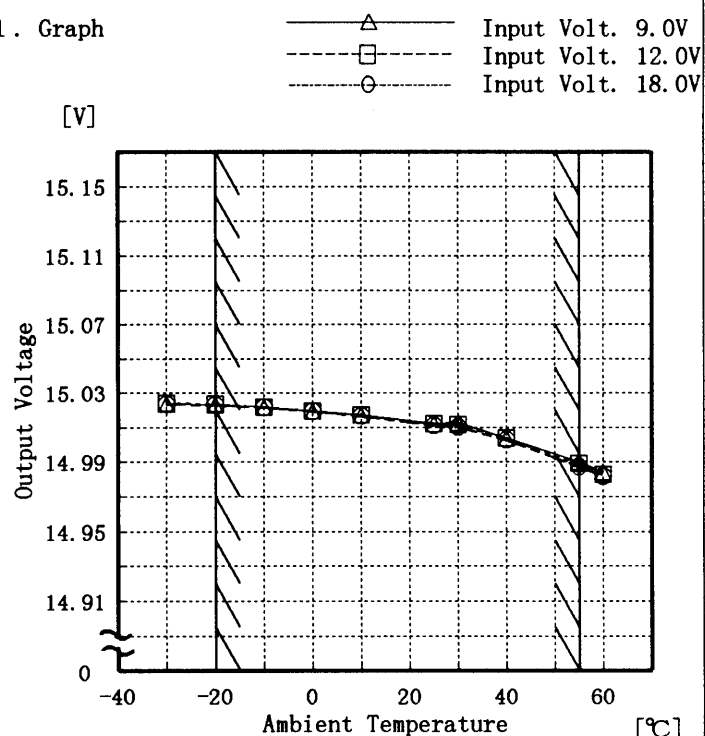


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Model	ZUS31215
Item	Ambient Temperature Drift 周囲温度変動
Object	+15V0.2A

Testing Circuitry Figure A

1. Graph



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。

2. Values

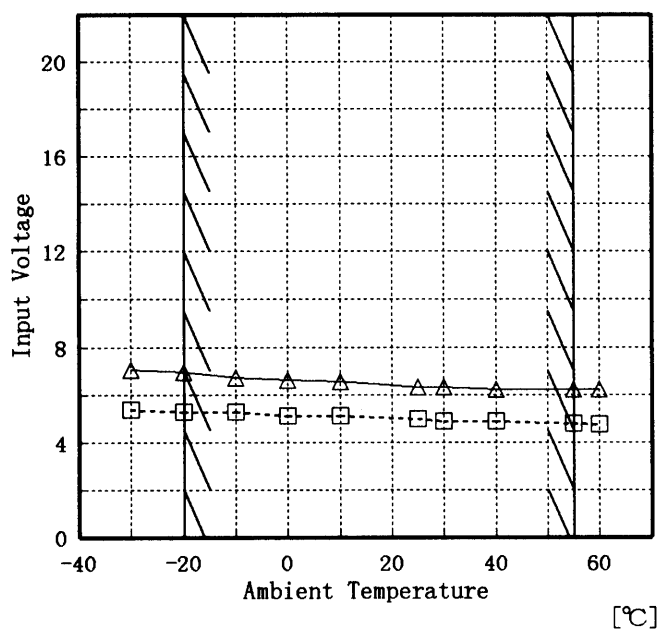
Temperature [°C]	Input Volt. 9.0[V]	Input Volt. 12.0[V]	Input Volt. 18.0[V]
	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]
-30	15.024	15.024	15.024
-20	15.023	15.024	15.023
-10	15.022	15.022	15.022
0	15.020	15.020	15.019
10	15.017	15.017	15.017
25	15.012	15.012	15.011
30	15.013	15.012	15.011
40	15.004	15.004	15.003
55	14.990	14.989	14.988
60	14.984	14.983	14.982
—	—	—	—

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Model	ZUS31215
Item	Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧
Object	+15V0.2A

Testing Circuitry Figure A

1. Graph
- [V]
- Load 50%
- △----- Load 100%



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。

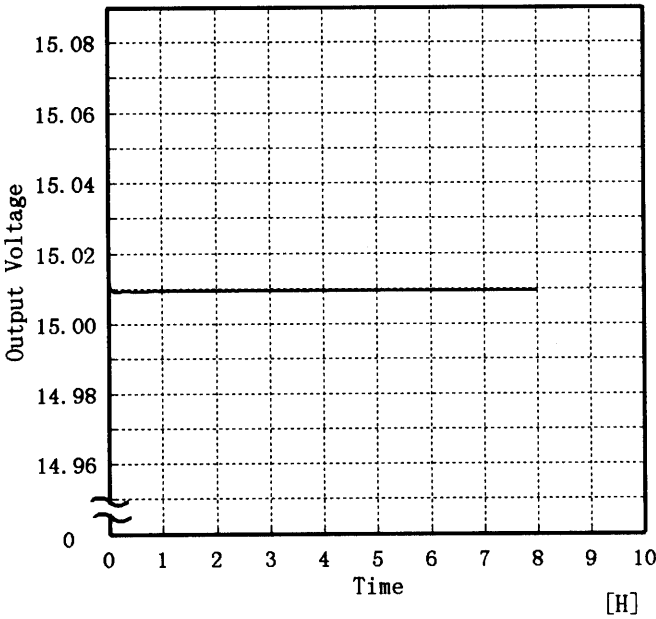
2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Input Volt. [V]	Input Volt. [V]
-30	5.4	7.1
-20	5.3	7.0
-10	5.3	6.7
0	5.1	6.6
10	5.1	6.6
25	5.0	6.3
30	4.9	6.3
40	4.9	6.2
55	4.8	6.2
60	4.8	6.2
—	—	—

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Model ZUS31215		Testing Circuitry Figure A																																				
Item	Ripple Voltage (by Ambient Temp.) リップル電圧 (周囲温度特性)																																					
Object	+15V0.2A																																					
1. Graph <div> -----□----- Load 50% ————△——— Load 100% </div> <div> [mV] 60 40 20 0 Ripple Voltage -40 -20 0 20 40 60 Ambient Temperature [°C] </div> <div> Input Volt. 9.0 V </div> <div> Note: Slanted line shows the range of the rated ambient temperature. </div> <div> (注)斜線は定格周囲温度範囲を示す。 </div>		2. Values <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>5</td><td>20</td></tr> <tr><td>-20</td><td>5</td><td>20</td></tr> <tr><td>-10</td><td>5</td><td>10</td></tr> <tr><td>0</td><td>5</td><td>10</td></tr> <tr><td>10</td><td>5</td><td>10</td></tr> <tr><td>25</td><td>5</td><td>10</td></tr> <tr><td>30</td><td>5</td><td>10</td></tr> <tr><td>40</td><td>5</td><td>10</td></tr> <tr><td>55</td><td>5</td><td>5</td></tr> <tr><td>60</td><td>5</td><td>5</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	5	20	-20	5	20	-10	5	10	0	5	10	10	5	10	25	5	10	30	5	10	40	5	10	55	5	5	60	5	5	—	—	—
Ambient Temp. [°C]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]																																				
-30	5	20																																				
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0	5	10																																				
10	5	10																																				
25	5	10																																				
30	5	10																																				
40	5	10																																				
55	5	5																																				
60	5	5																																				
—	—	—																																				

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Model	ZUS31215	Temperature	25 ℃																						
Item	Time Lapse Drift 経時ドリフト	Testing Circuitry	Figure A																						
Object	+15V0.2A																								
1. Graph		2.Values																							
<p>[V]</p>  <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 12V</p> <p>Load 100%</p>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>15.014</td></tr><tr><td>0.5</td><td>15.009</td></tr><tr><td>1.0</td><td>15.009</td></tr><tr><td>2.0</td><td>15.009</td></tr><tr><td>3.0</td><td>15.010</td></tr><tr><td>4.0</td><td>15.009</td></tr><tr><td>5.0</td><td>15.009</td></tr><tr><td>6.0</td><td>15.010</td></tr><tr><td>7.0</td><td>15.009</td></tr><tr><td>8.0</td><td>15.009</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	15.014	0.5	15.009	1.0	15.009	2.0	15.009	3.0	15.010	4.0	15.009	5.0	15.009	6.0	15.010	7.0	15.009	8.0	15.009
Time since start [H]	Output Voltage [V]																								
0.0	15.014																								
0.5	15.009																								
1.0	15.009																								
2.0	15.009																								
3.0	15.010																								
4.0	15.009																								
5.0	15.009																								
6.0	15.010																								
7.0	15.009																								
8.0	15.009																								

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Model		ZUS31215	Testing Circuitry Figure A
Item		Output Voltage Accuracy 定電圧精度	
Object		+15V0.2A	

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 : 0.0~0.2 A

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

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

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 : 0.0~0.2 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) = $\frac{\text{変動値}}{\text{定格出力電圧}} \times 100$

Item	Temperature [°C]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy (Ratio) [%]
Maximum Voltage	-20	18.0	0.0	15.028	±20	±0.2
Minimum Voltage	55	18.0	0.2	14.988		

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Model	ZUS31215
Item	Condensation 結露特性
Object	+15V0.2A

Testing Circuitry Figure A

1. Condensation test

Testing procedure is as follows.

- ① Keeping and cooling the unit in a tank at -10℃ 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℃ 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	15.041	5	10
	2	15.045	5	10
	3	15.045	5	10
Load 100 %	1	15.037	5	15
	2	15.043	5	15
	3	15.042	5	15

Input Volt. 12.0 V

COSEL

