



TEST DATA OF ZUW32415

(24.0V INPUT)

Regulated DC Power Supply

Date : Nov. 5. 1996

Approved by : T. Sugimori
Design Manager

Prepared by : y. Nagai
Design Engineer

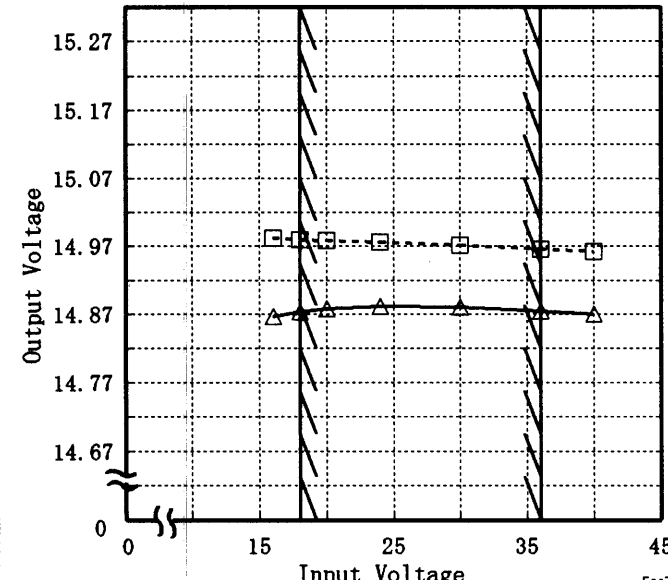
コーセル株式会社
COSEL CO., LTD.

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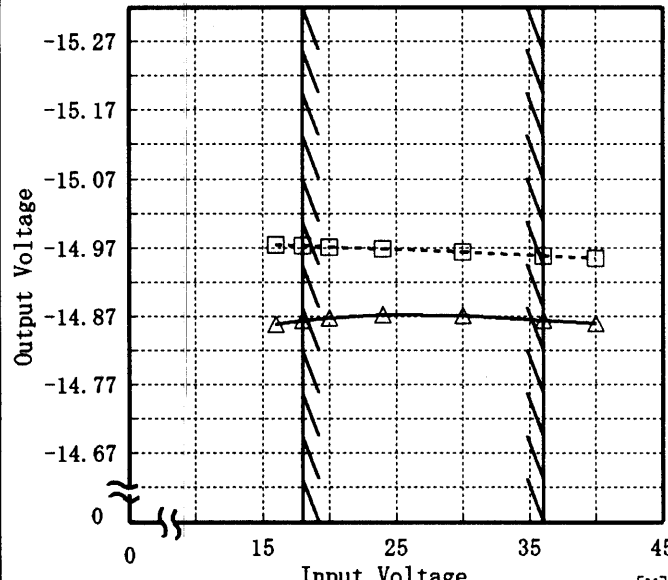
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Model		ZUW32415	
Item		Line Regulation 静的入力変動	
Object		+15V0.1A	
1. Graph		-----□----- Load 50% -----△----- Load 100%	
[V]			
			
Output Voltage		Input Voltage [V]	

Temperature		25°C	
Testing Circuitry		Figure A	

2. Values		
Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
16.0	14.982	14.866
18.0	14.980	14.873
20.0	14.979	14.877
24.0	14.976	14.882
30.0	14.972	14.881
36.0	14.966	14.874
40.0	14.962	14.870
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

Object		-15V0.1A	
1. Graph		-----□----- Load 50% -----△----- Load 100%	
[V]			
			
Output Voltage		Input Voltage [V]	

2. Values		
Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
16.0	-14.974	-14.858
18.0	-14.973	-14.864
20.0	-14.971	-14.868
24.0	-14.969	-14.872
30.0	-14.964	-14.871
36.0	-14.958	-14.865
40.0	-14.955	-14.860
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

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。

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Model		ZUW32415	Temperature		25℃
Item		Efficiency 効率	Testing Circuitry		Figure A
Object					

1. Graph

-----□-----

Load 50%

-----△-----

Load 100%

Efficiency [%]

80

72

64

56

48

0

Input Voltage [V]

0

15

25

35

45

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 [%]
16.0	70.9	76.8
18.0	70.0	76.4
20.0	68.5	76.2
24.0	66.3	74.8
30.0	64.1	73.2
36.0	61.5	71.1
40.0	59.6	70.1
—	—	—
—	—	—
—	—	—
—	—	—
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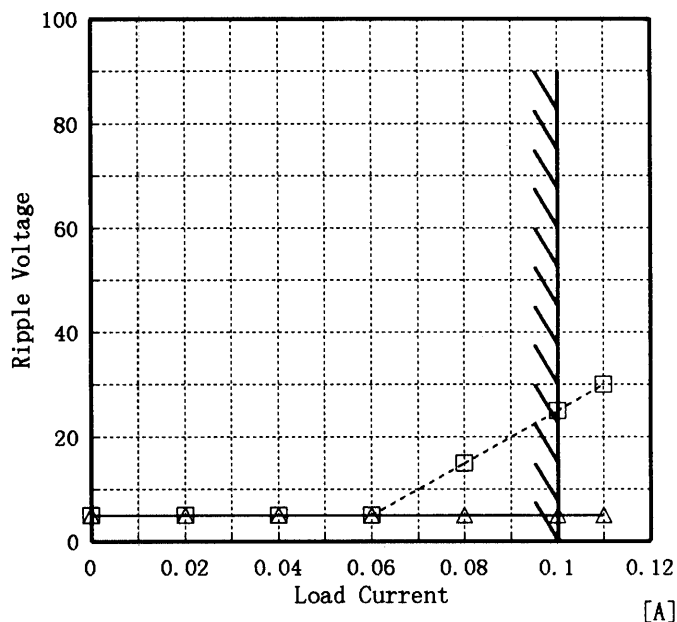
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Model	ZUW32415
Item	Ripple Voltage (by Load Current) リップル電圧(負荷電流特性)
Object	+15V0.1A

Temperature 25°C
Testing Circuitry Figure A

1. Graph
- Input Volt. 18.0V
 -----△----- Input Volt. 36.0V



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。

(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

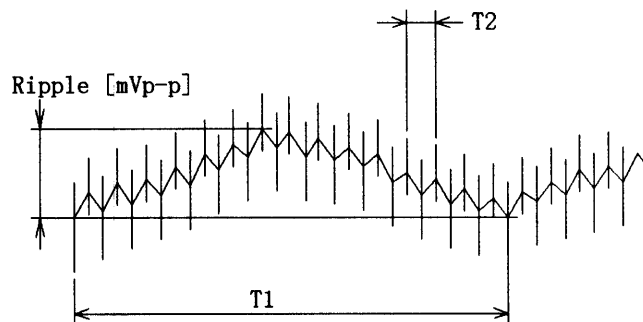


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

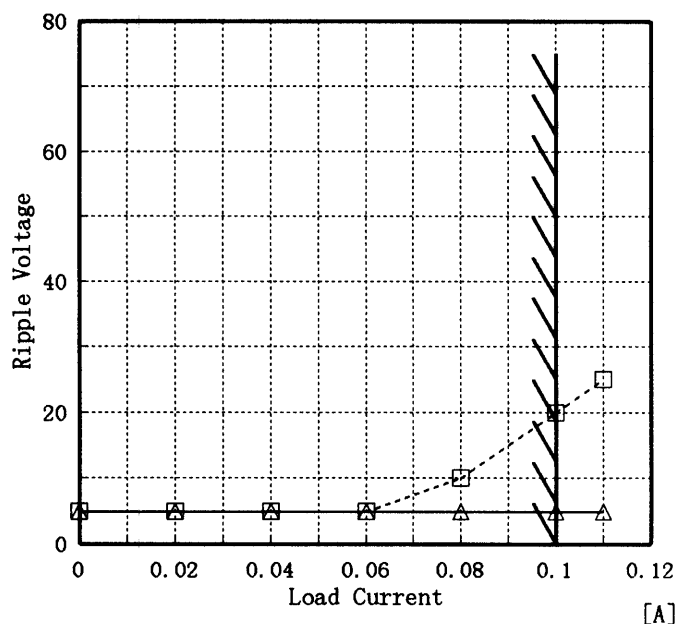
Load Current [A]	Input Volt. 18.0 [V]	Input Volt. 36.0 [V]
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
0.00	5	5
0.02	5	5
0.04	5	5
0.06	5	5
0.08	15	5
0.10	25	5
0.11	30	5
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	ZUW32415
Item	Ripple Voltage (by Load Current) リップル電圧(負荷電流特性)
Object	-15V0.1A

Temperature 25°C
Testing Circuitry Figure A

1. Graph
[mV]
- Input Volt. 18.0V
———△——— Input Volt. 36.0V



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

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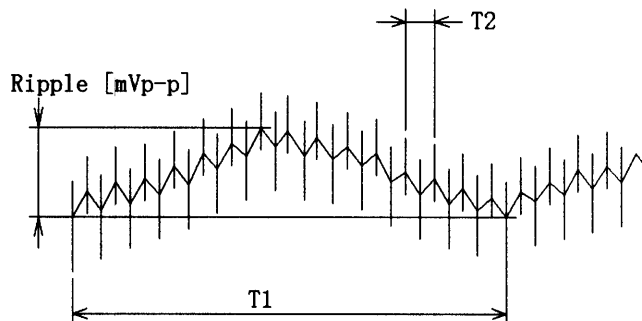


Fig. Complex Ripple Wave Form
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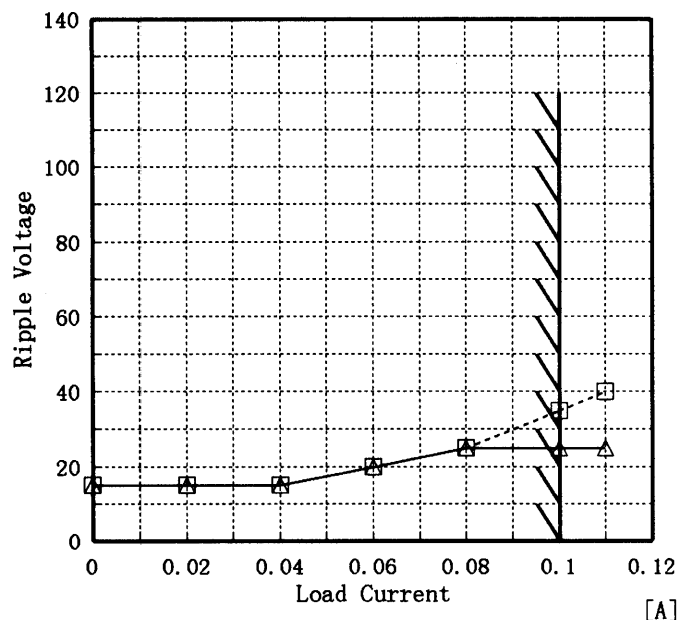
Load Current [A]	Input Volt. 18.0 [V]	Input Volt. 36.0 [V]
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
0.00	5	5
0.02	5	5
0.04	5	5
0.06	5	5
0.08	10	5
0.10	20	5
0.11	25	5
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	ZUW32415
Item	Ripple-Noise リップルノイズ
Object	+15V0.1A

Temperature 25°C
Testing Circuitry Figure A

1. Graph
[mV]
- Input Volt. 18.0V
———△——— Input Volt. 36.0V



2. Values

Load Current [A]	Input Volt. 18.0 [V]	Input Volt. 36.0 [V]
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
0.00	15	15
0.02	15	15
0.04	15	15
0.06	20	20
0.08	25	25
0.10	35	25
0.11	40	25
—	—	—
—	—	—
—	—	—
—	—	—

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。

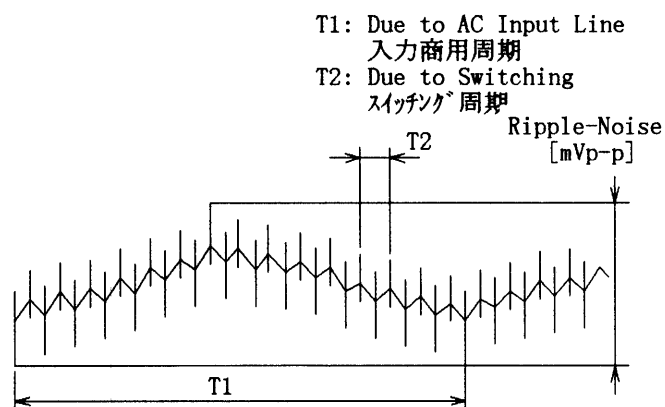


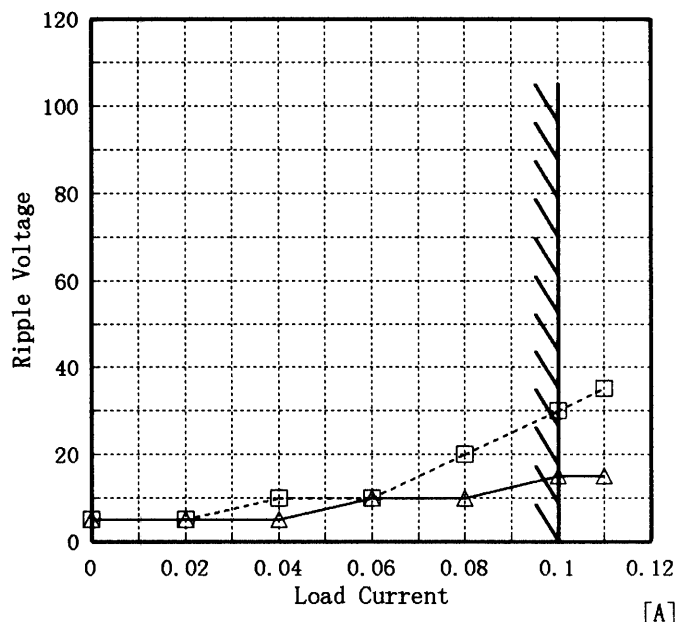
Fig. Complex Ripple Wave Form
図 リップル波形詳細図

COSEL

Model	ZUW32415
Item	Ripple-Noise リップルノイズ
Object	-15V0.1A

Temperature 25°C
Testing Circuitry Figure A

1. Graph
[mV]
- Input Volt. 18.0V
———△——— Input Volt. 36.0V



2. Values

Load Current [A]	Input Volt. 18.0 [V]	Input Volt. 36.0 [V]
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
0.00	5	5
0.02	5	5
0.04	10	5
0.06	10	10
0.08	20	10
0.10	30	15
0.11	35	15
—	—	—
—	—	—
—	—	—
—	—	—

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。

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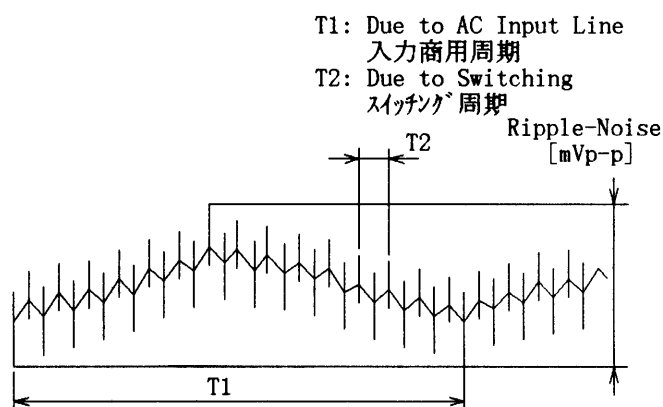
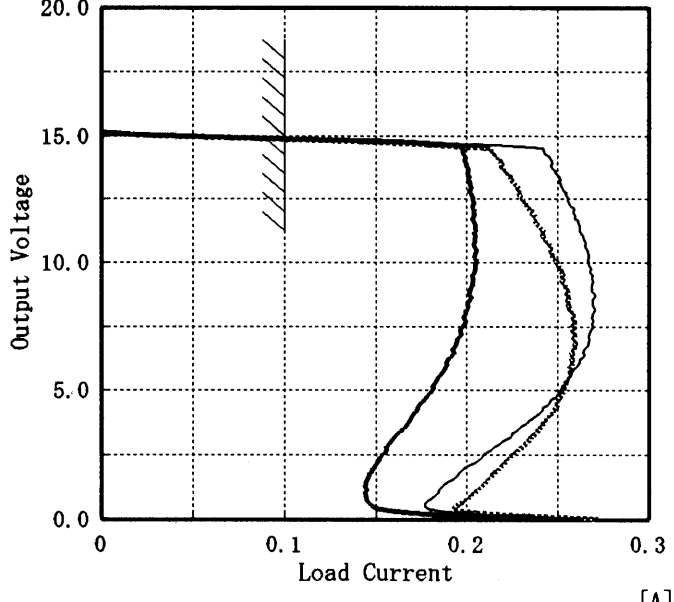
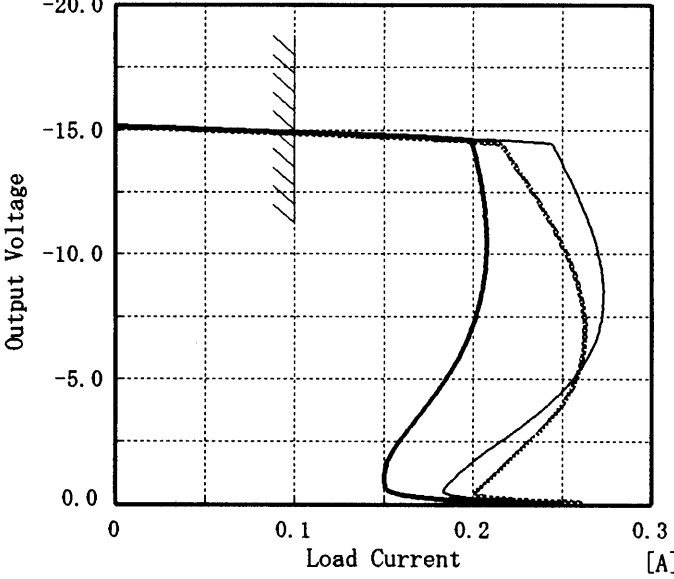


Fig. Complex Ripple Wave Form

図 リップル波形詳細図

COSEL

Model ZUW32415		Temperature 25°C																																																					
Item	Overcurrent Protection 過電流保護	Testing Circuitry Figure A																																																					
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COSEL

Model	ZUW32415	Temperature	25°C
Item	Dynamic Load Responce 動的負荷変動	Testing Circuitry	Figure A
Object	+15V0.1A		

Input Volt. 24.0 V

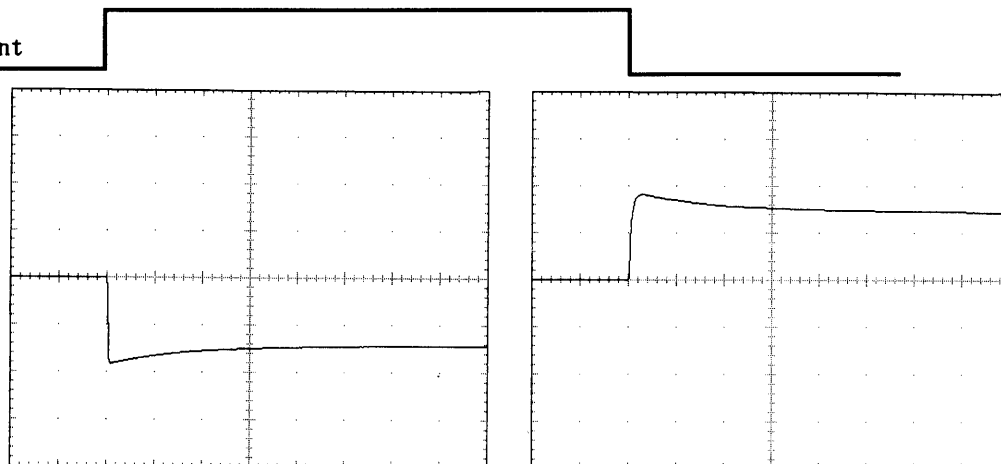
Cycle 100 mS

Load Current

Min. Load ↔

Load 100 %

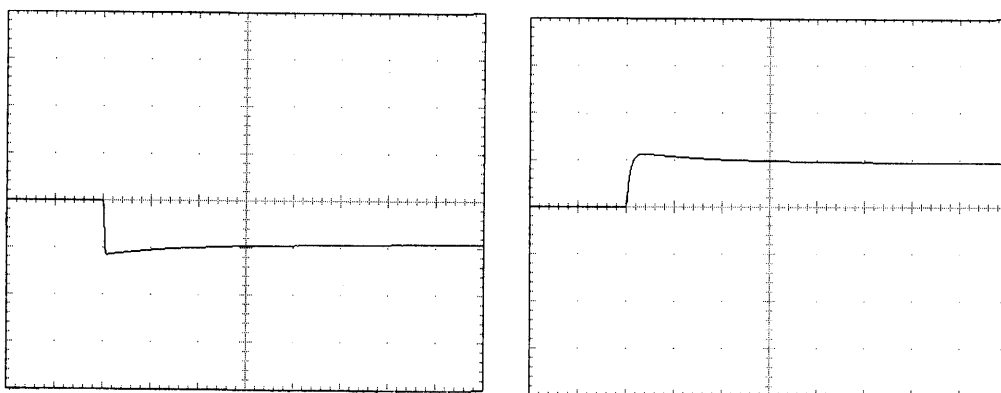
200 mV/div



Min. Load ↔

Load 50 %

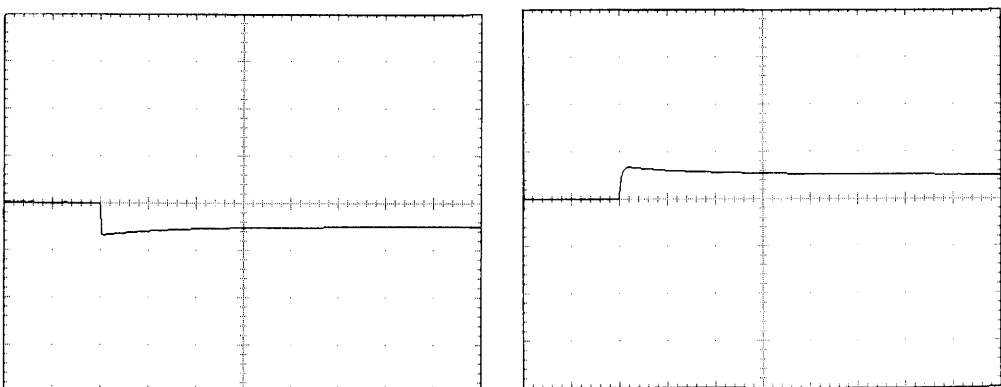
200 mV/div



Load 50%↔

Load 100 %

200 mV/div



1 mS/div

COSEL

Model	ZUW32415	Temperature 25°C Testing Circuitry Figure A
Item	Dynamic Load Responce 動的負荷変動	
Object	-15V0.1A	

Input Volt. 24.0 V

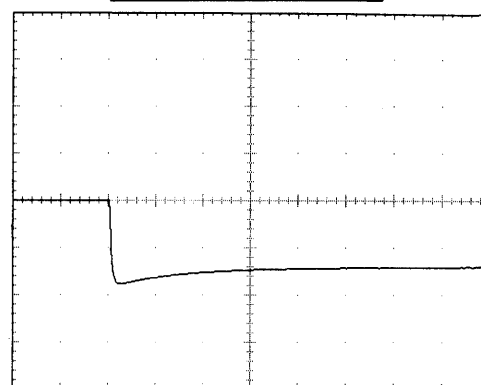
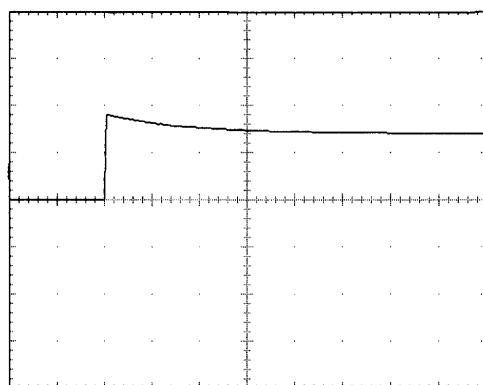
Cycle 100 mS

Load Current

Min. Load ↔

Load 100 %

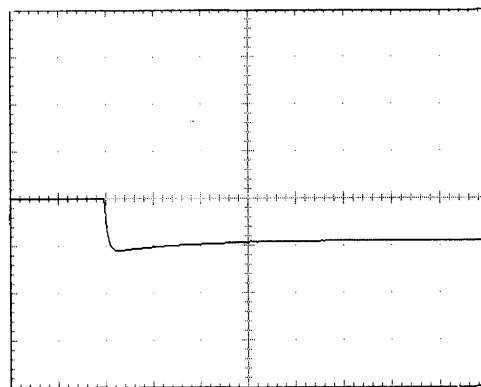
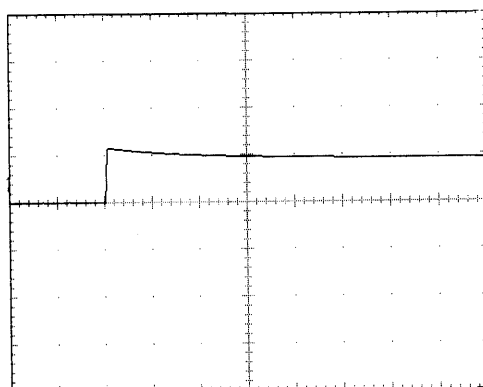
200 mV/div



Min. Load ↔

Load 50 %

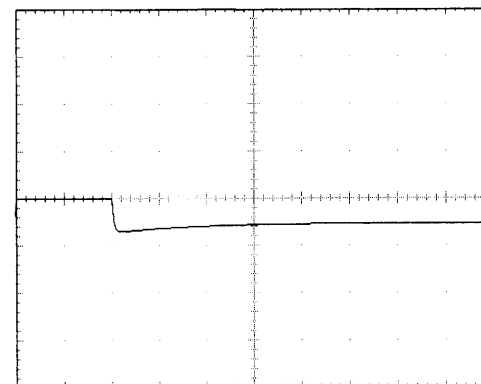
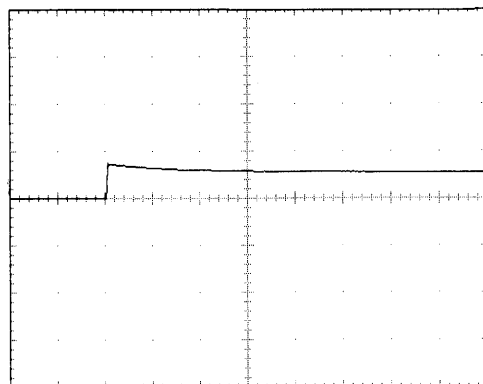
200 mV/div



Load 50% ↔

Load 100 %

200 mV/div



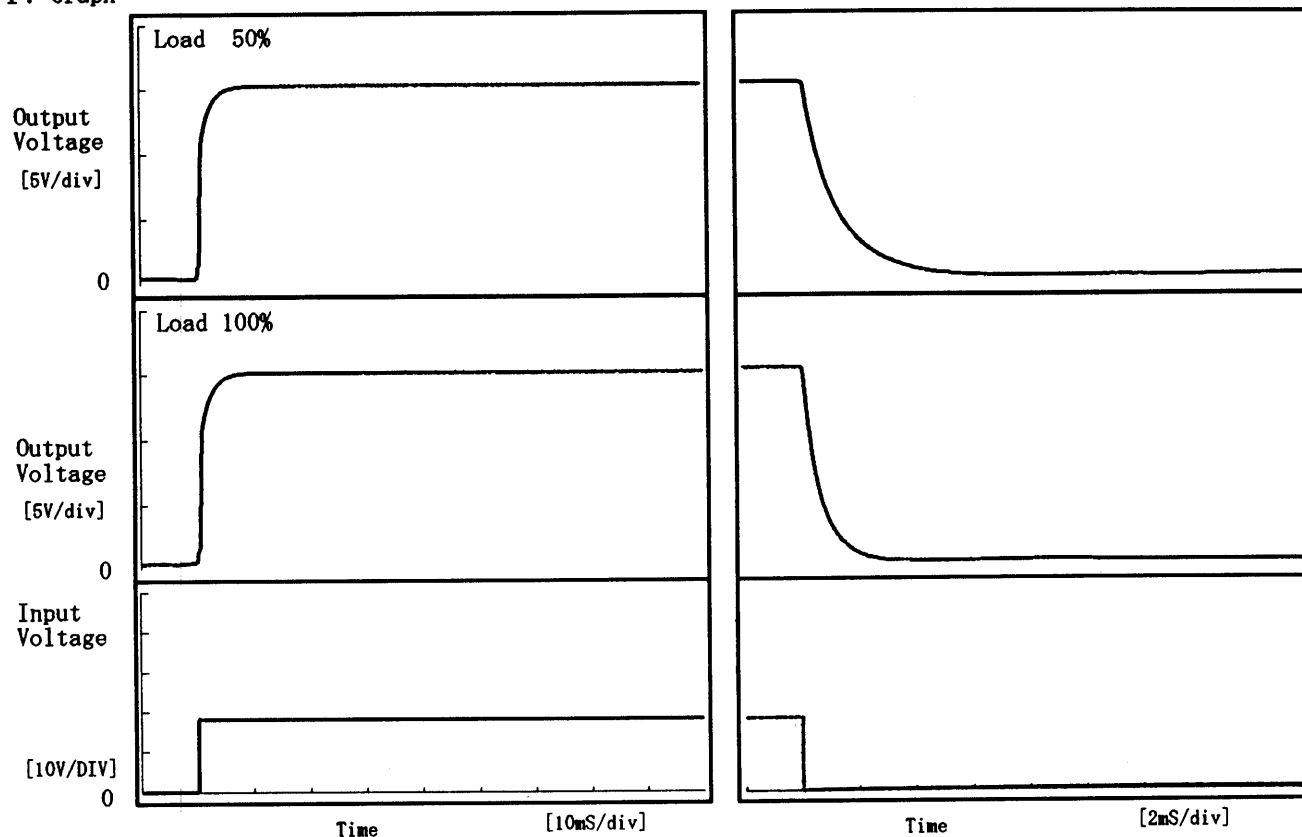
1 mS/div

COSEL

Model	ZUW32415	Temperature 25°C Testing Circuitry Figure A
Item	Rise and Fall Time 立上り、立下り時間	
Object	+15V0.1A	

1. Graph

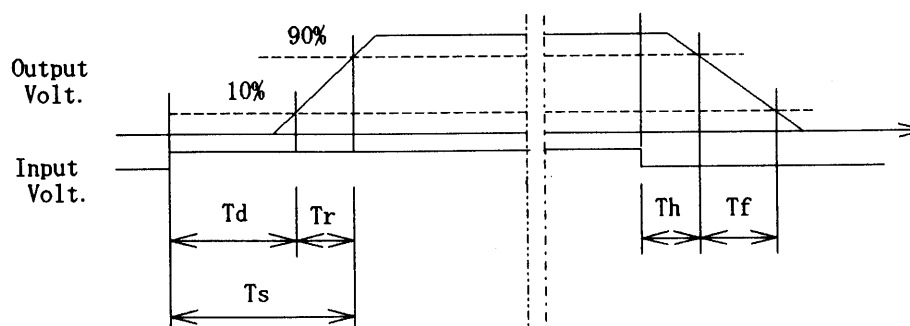
Input Volt. 18.0 V

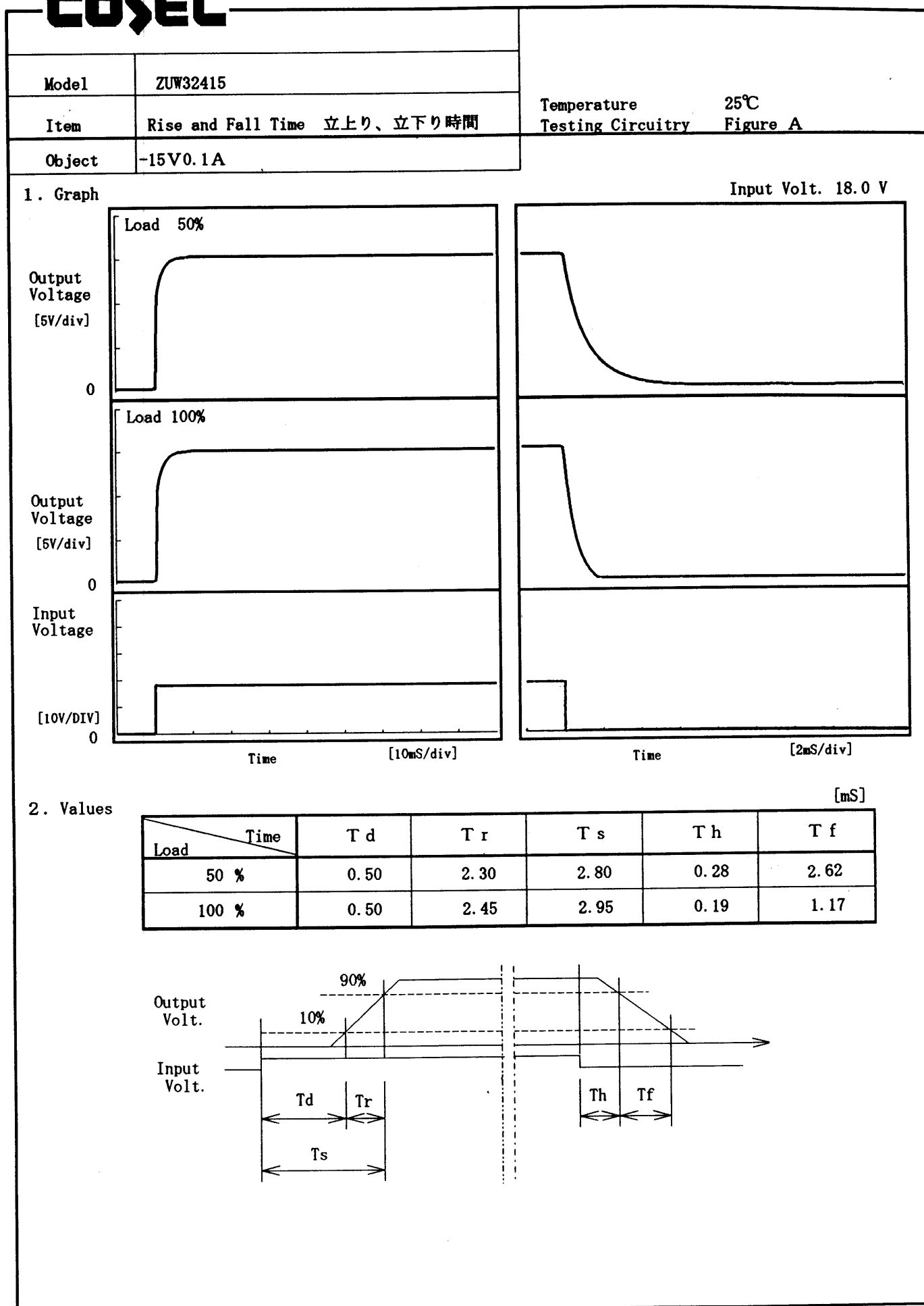


2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.45	2.30	2.75	0.28	2.90
100 %	0.45	2.45	2.90	0.19	1.45



COSEL

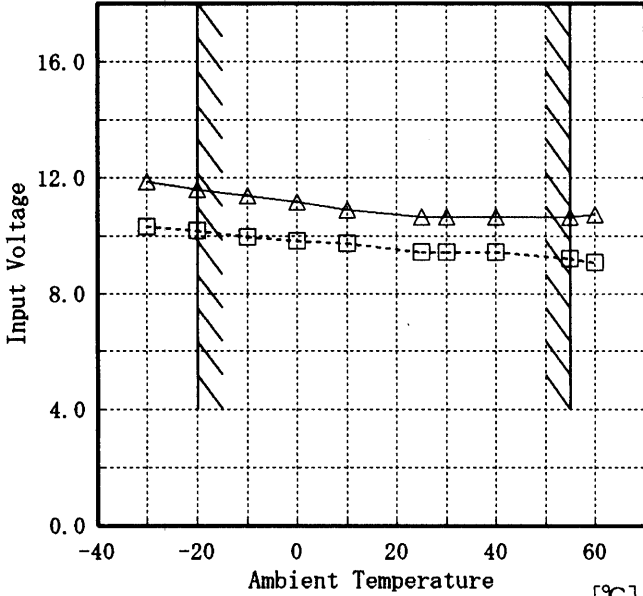
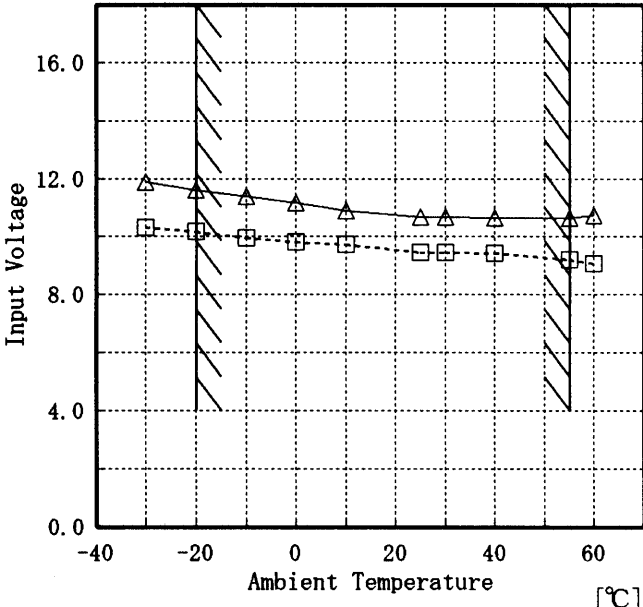
COSEL

Model		ZUW32415																																																					
Item		Ambient Temperature Drift 周囲温度変動																																																					
Object		+15V0.1A																																																					
1. Graph		2. Values																																																					
<div><div>—△—</div><div>---□---</div><div>---○---</div></div> <div>Input Volt. 18.0V</div> <div>Input Volt. 24.0V</div> <div>Input Volt. 36.0V</div> <p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p>		<table><tr><th>Temperature</th><th>Input Volt. 18.0[V]</th><th>Input Volt. 24.0[V]</th><th>Input Volt. 36.0[V]</th></tr><tr><th>[°C]</th><th>Output Volt. [V]</th><th>Output Volt. [V]</th><th>Output Volt. [V]</th></tr><tr><td>-30</td><td>14.907</td><td>14.910</td><td>14.904</td></tr><tr><td>-20</td><td>14.900</td><td>14.905</td><td>14.898</td></tr><tr><td>-10</td><td>14.894</td><td>14.899</td><td>14.893</td></tr><tr><td>0</td><td>14.889</td><td>14.894</td><td>14.888</td></tr><tr><td>10</td><td>14.884</td><td>14.890</td><td>14.883</td></tr><tr><td>25</td><td>14.876</td><td>14.883</td><td>14.876</td></tr><tr><td>30</td><td>14.874</td><td>14.881</td><td>14.873</td></tr><tr><td>40</td><td>14.867</td><td>14.875</td><td>14.867</td></tr><tr><td>55</td><td>14.856</td><td>14.866</td><td>14.857</td></tr><tr><td>60</td><td>14.852</td><td>14.861</td><td>14.853</td></tr><tr><td>—</td><td>—</td><td>—</td><td>—</td></tr></table>		Temperature	Input Volt. 18.0[V]	Input Volt. 24.0[V]	Input Volt. 36.0[V]	[°C]	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]	-30	14.907	14.910	14.904	-20	14.900	14.905	14.898	-10	14.894	14.899	14.893	0	14.889	14.894	14.888	10	14.884	14.890	14.883	25	14.876	14.883	14.876	30	14.874	14.881	14.873	40	14.867	14.875	14.867	55	14.856	14.866	14.857	60	14.852	14.861	14.853	—	—	—	—
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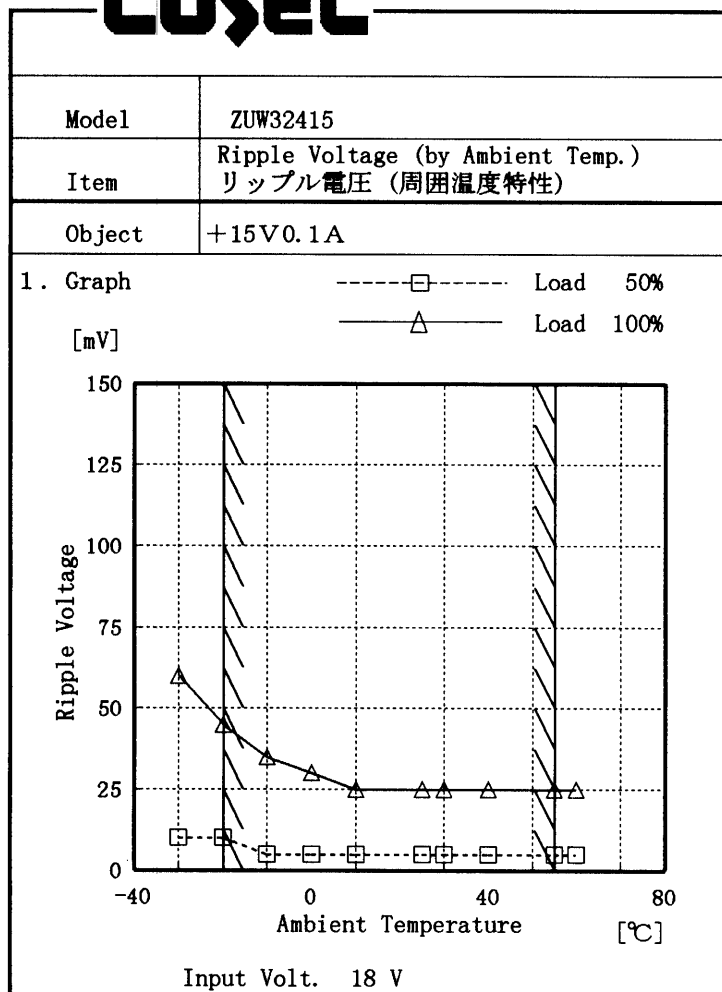
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BC-2040

COSEL

Model		ZUW32415																																					
Item		Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧																																					
Object		+15V0.1A																																					
1. Graph		2. Values																																					
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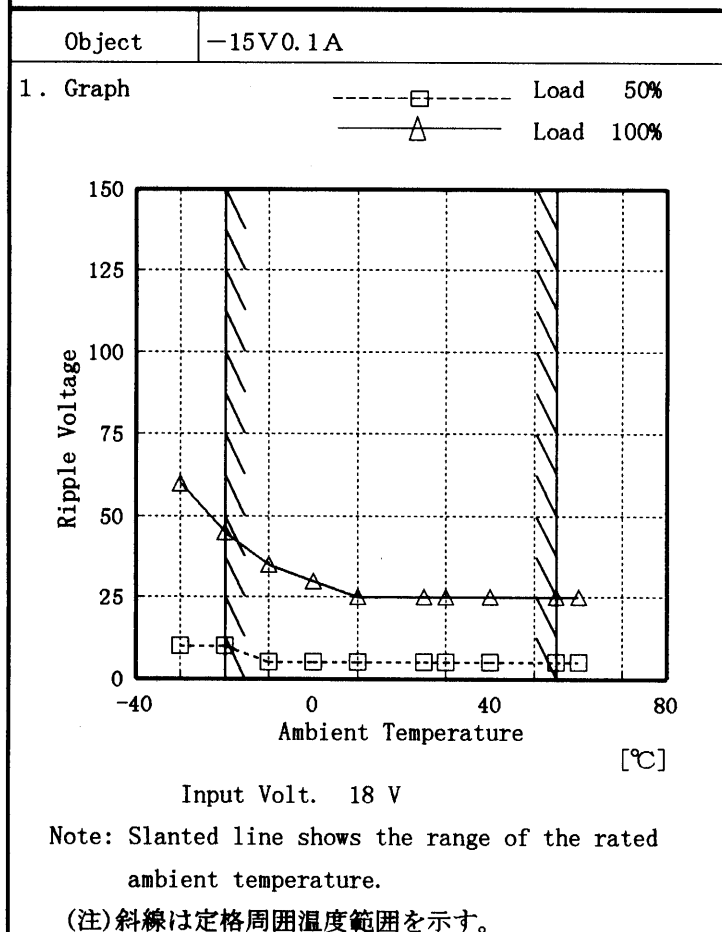
COSEL



Testing Circuitry Figure A

2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
-30	10	60
-20	10	45
-10	5	35
0	5	30
10	5	25
25	5	25
30	5	25
40	5	25
55	5	25
60	5	25
—	—	—



2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
-30	10	45
-20	10	40
-10	5	30
0	5	25
10	5	20
25	5	20
30	5	20
40	5	20
55	5	20
60	5	20
—	—	—

COSEL

COSEL	
Model	ZUW32415
Item	Time Lapse Drift 経時ドリフト
Object	+15V0.1A
1. Graph	
<div><div><div>Output Voltage [V]</div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><di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COSEL

Model		ZUW32415	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 ℃

Input Voltage : 18.0~36.0 V

Load Current (AVR 1) : 0.0~0.1 A

(AVR 2) : 0.0~0.1 A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - 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 ℃

入力電圧 18.0~36.0 V

負荷電流 (AVR 1) 0.0~0.1 A

(AVR 2) 0.0~0.1 A

* 定電圧精度(変動値) = ±(出力電圧の最高値－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	+15V0.1A					
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Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration) [%]
Maximum Voltage	-20	24.0	0.1	14.904	±138	±1.0
Minimum Voltage	25	18.0	0.0	14.628		

Object	-15V0.1A					
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Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration) [%]
Maximum Voltage	-20	24.0	0.1	-14.892	±133	±0.9
Minimum Voltage	55	18.0	0.0	-14.626		

-17-

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Model	ZUW32415		
Item	Condensation 結露特性	Testing Circuitry	Figure A
Object	+15V0.1A		

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	14.989	5	15
	2	14.991	5	15
	3	14.991	5	15
Load 100 %	1	14.895	10	20
	2	14.901	10	20
	3	14.904	10	20

Input Volt. 24.0 V

COSEL

COSEL

Model	ZUW32415		
Item	Condensation 結露特性	Testing Circuitry	Figure A
Object	−15V0.1A		

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	−14.972	5	20
	2	−14.972	5	20
	3	−14.968	5	20
Load 100 %	1	−14.879	10	20
	2	−14.879	10	25
	3	−14.878	10	25

Input Volt. 24.0 V

