



TEST DATA OF ZTW32415

(24.0V INPUT)

Regulated DC Power Supply

Date : Mar. 5. 1998

Approved by : N. Shiraishi
Design Manager

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Design Engineer

コーセル株式会社
COSEL CO., LTD.

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(Final Page 20)

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Model		ZTW32415																																								
Item		Line Regulation 静的入力変動																																								
Object		+15V0.1A																																								
1. Graph		-----□----- Load 50% -----△----- Load 100%																																								
[V]																																										
2. Values																																										
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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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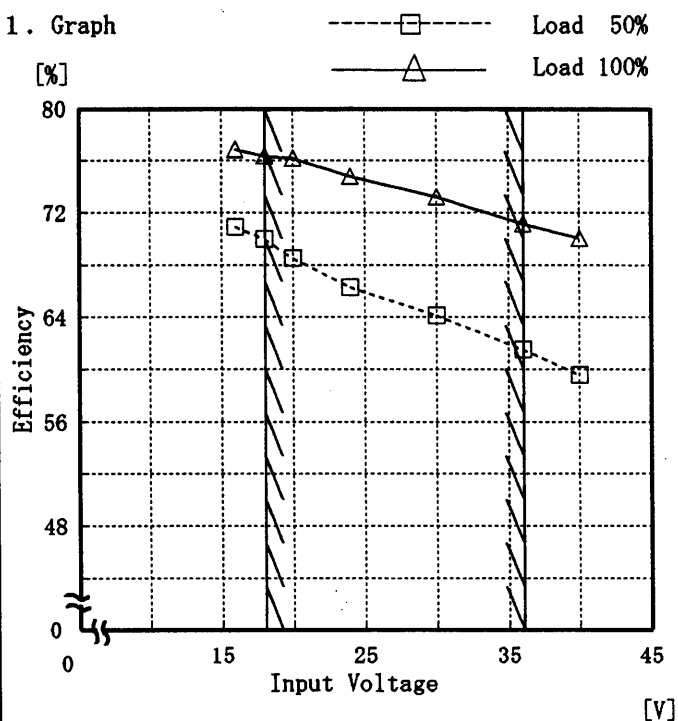
Model ZTW32415

Item Efficiency 効率

Object

Temperature 25°C
Testing Circuitry Figure A

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 [%]
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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Model ZTW32415

Item Load Regulation 静的負荷変動

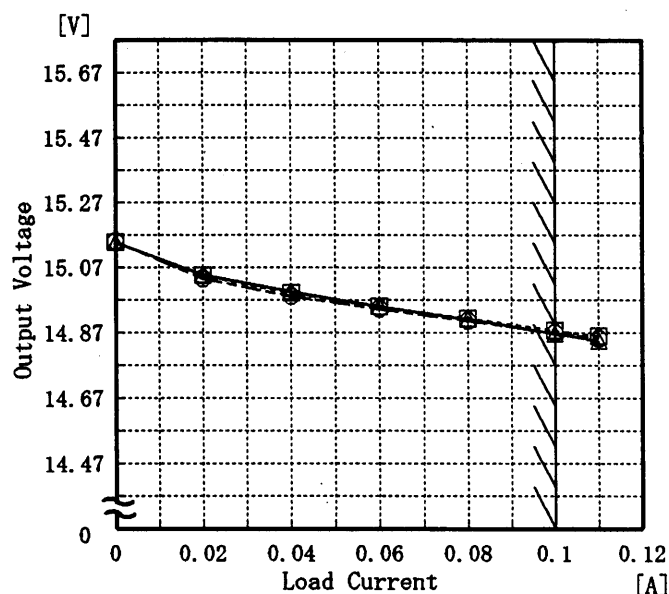
Object +15V0.1A

Temperature 25°C

Testing Circuitry Figure A

1. Graph

—△— Input Volt. 18.0V
 - - -□- - - Input Volt. 24.0V
 —○— Input Volt. 36.0V



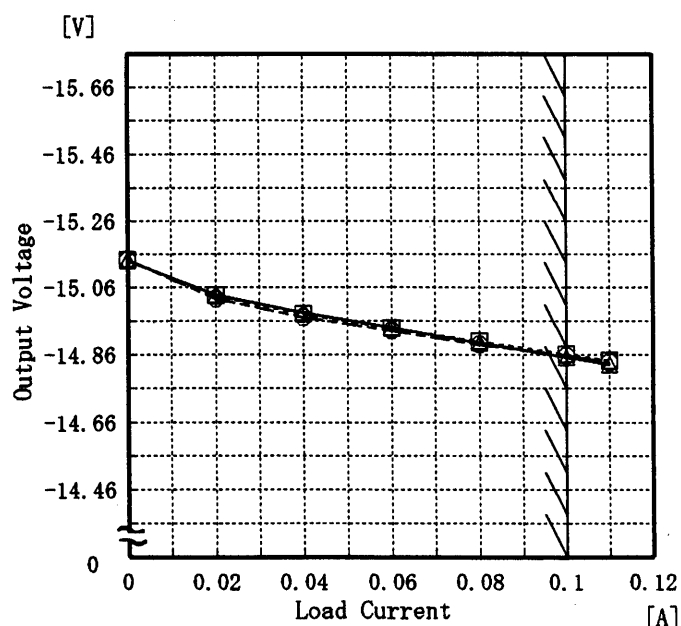
2. Values

Load Current [A]	Input Volt. 18.0[V]	Input Volt. 24.0[V]	Input Volt. 36.0[V]
	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]
0.000	15.147	15.149	15.150
0.020	15.049	15.045	15.037
0.040	14.996	14.993	14.983
0.060	14.952	14.951	14.942
0.080	14.910	14.913	14.905
0.100	14.868	14.877	14.871
0.110	14.846	14.859	14.854
—	—	—	—
—	—	—	—
—	—	—	—

Object -15V0.1A

1. Graph

—△— Input Volt. 18.0V
 - - -□- - - Input Volt. 24.0V
 —○— Input Volt. 36.0V



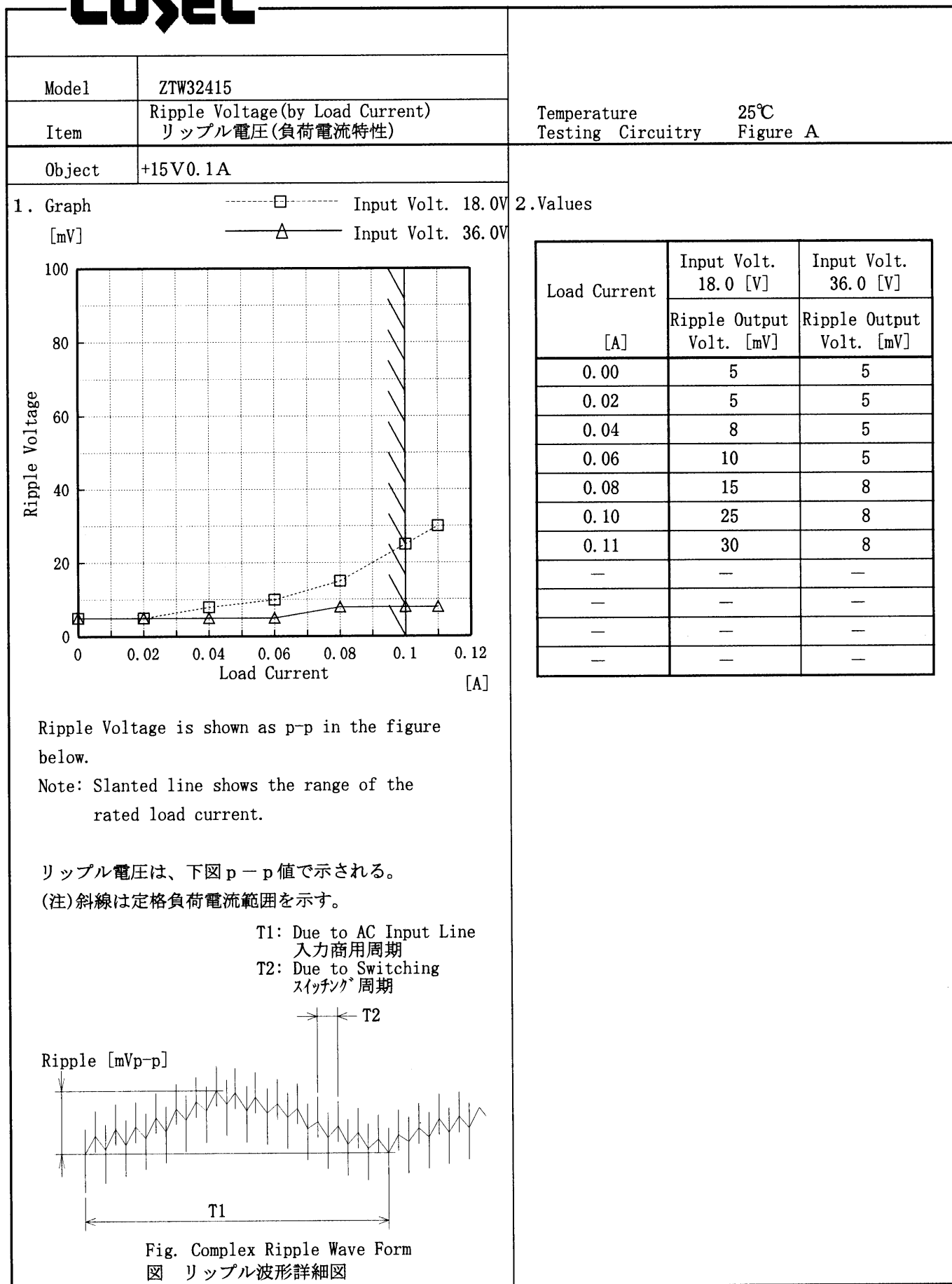
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Load Current [A]	Input Volt. 18.0[V]	Input Volt. 24.0[V]	Input Volt. 36.0[V]
	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]
0.000	-15.142	-15.144	-15.144
0.020	-15.041	-15.036	-15.028
0.040	-14.986	-14.983	-14.974
0.060	-14.942	-14.941	-14.932
0.080	-14.897	-14.901	-14.893
0.100	-14.854	-14.864	-14.858
0.110	-14.832	-14.845	-14.841
—	—	—	—
—	—	—	—
—	—	—	—

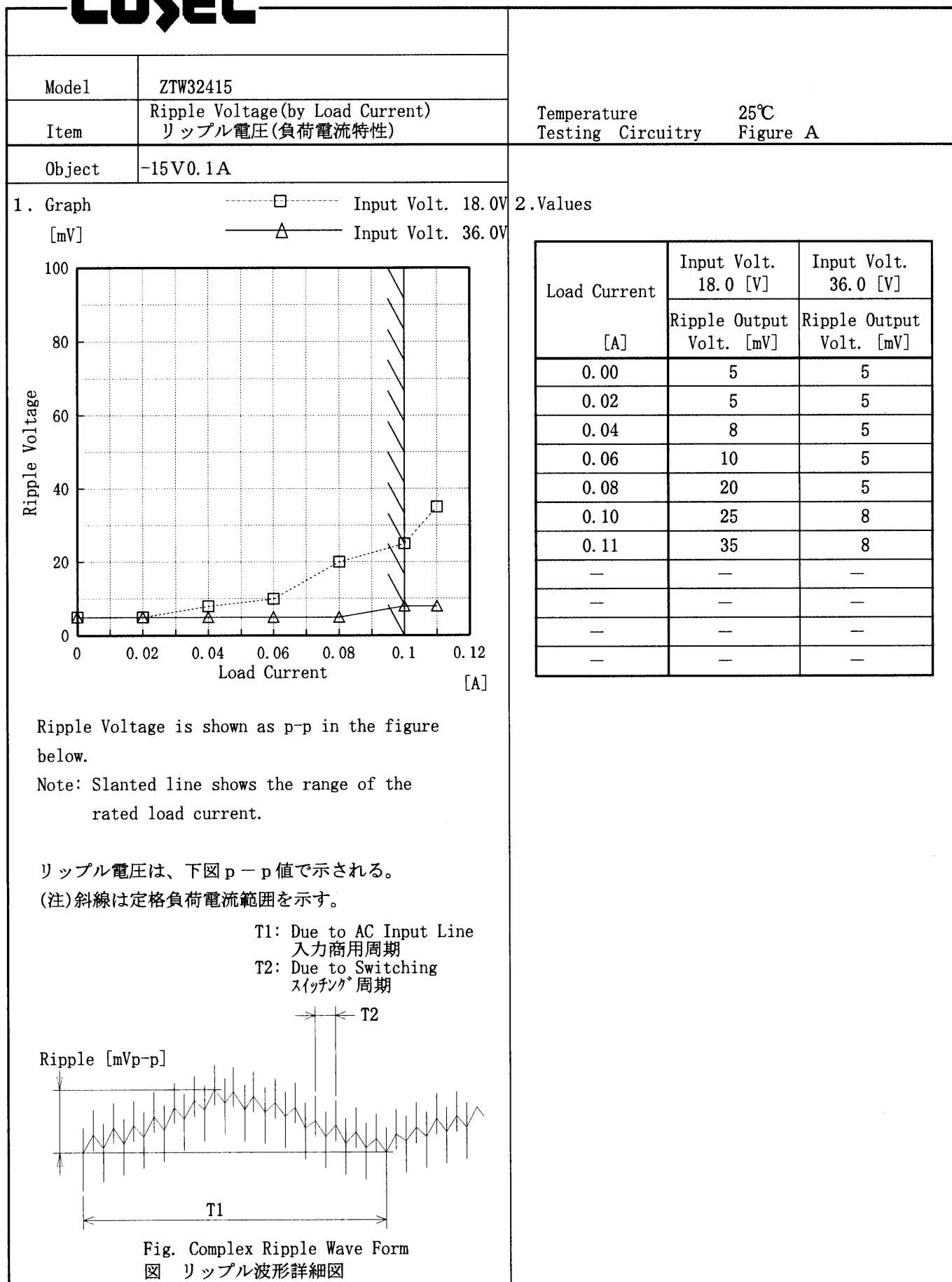
Note: Slanted line shows the range of the rated load current.

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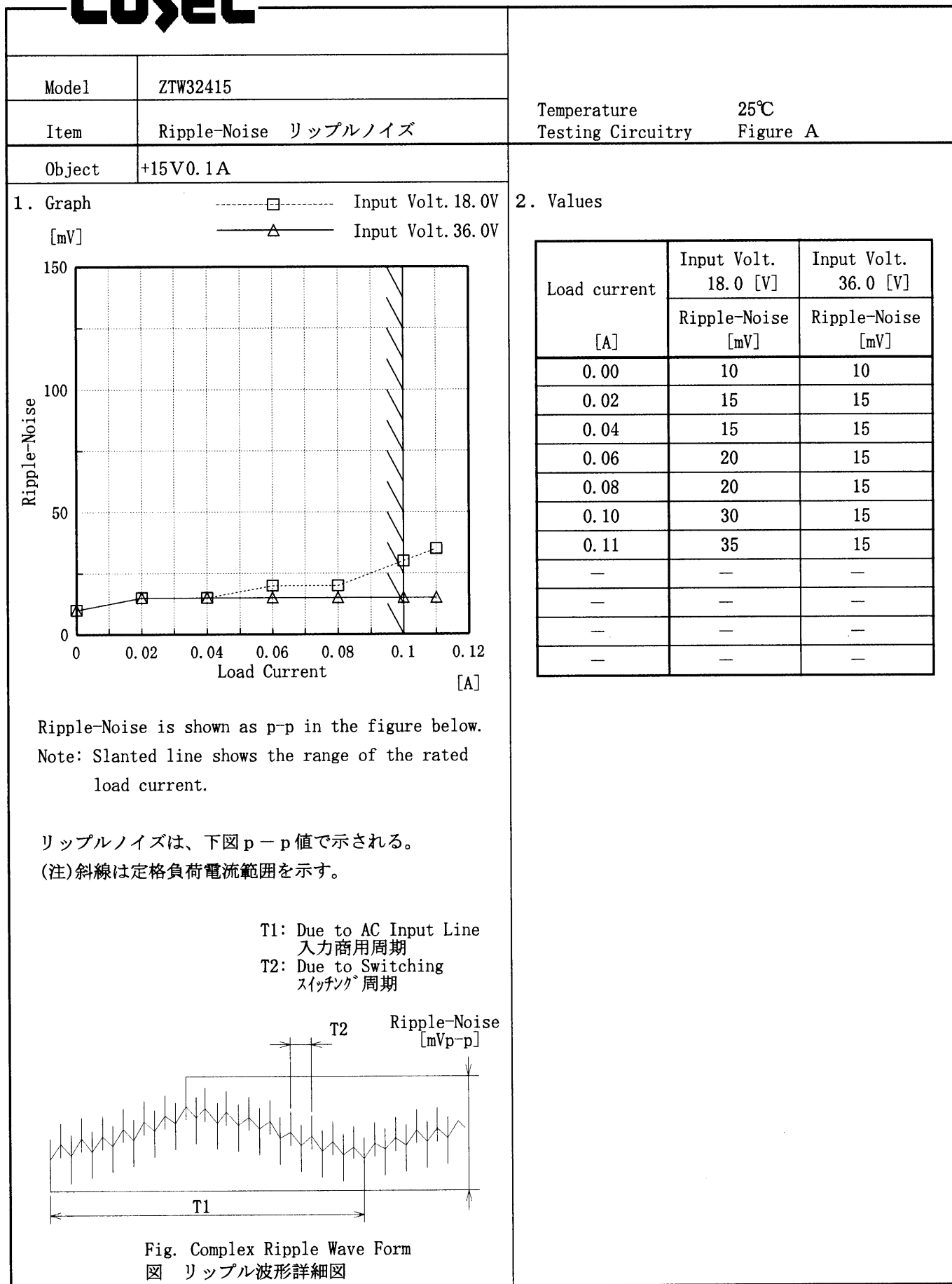
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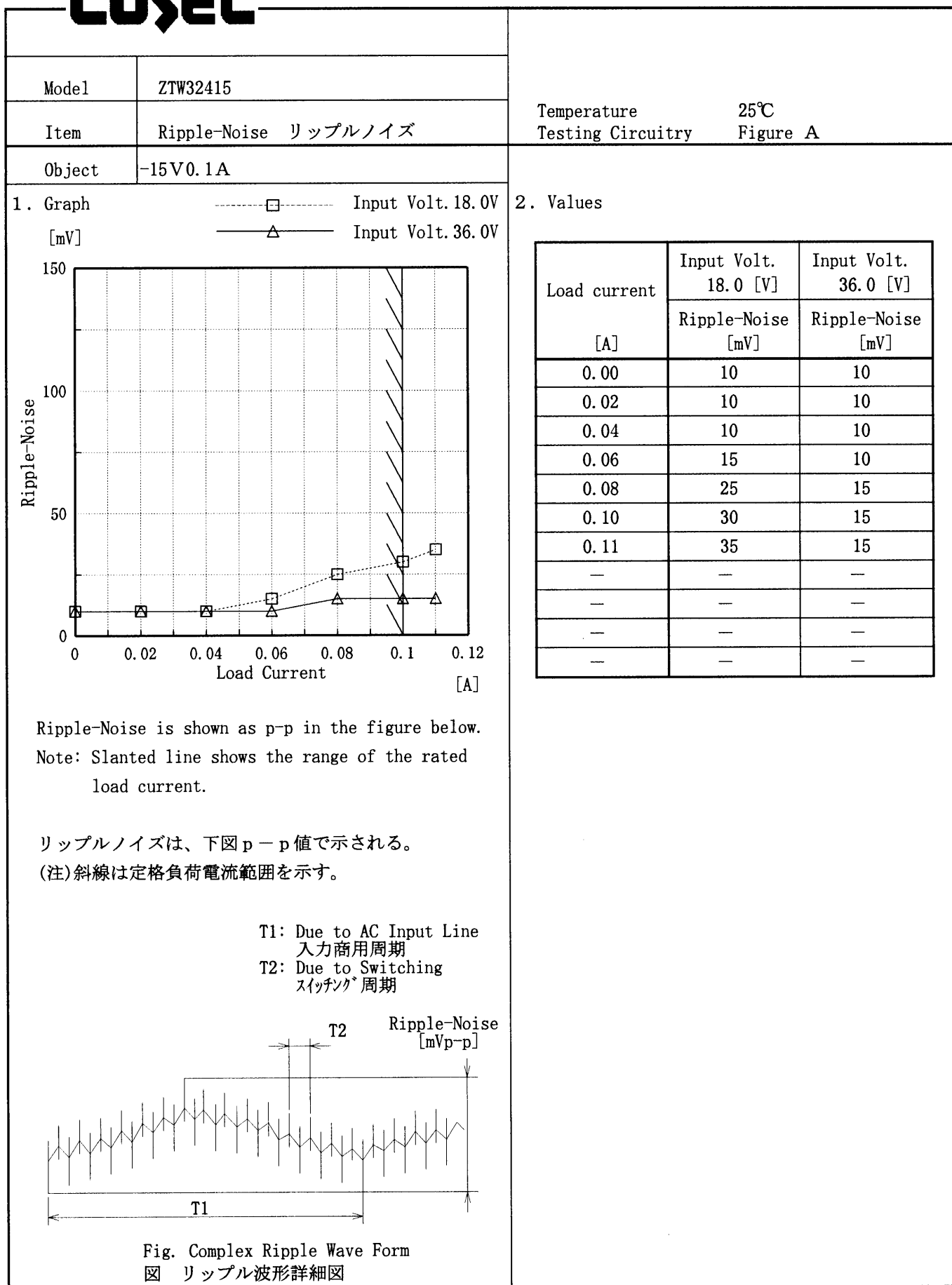
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Model ZTW32415		Temperature 25°C																																																					
Item Overcurrent Protection 過電流保護		Testing Circuitry Figure A																																																					
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Model	ZTW32415	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

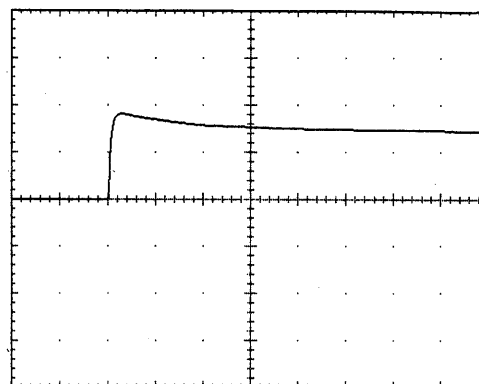
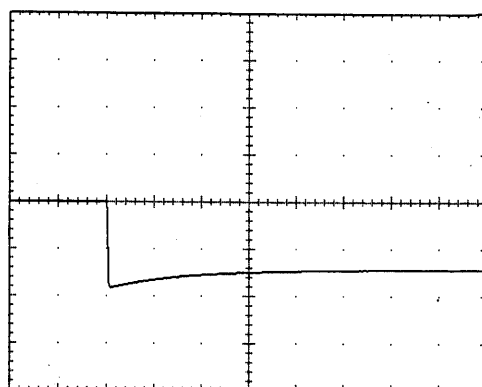
Cycle 100 mS

Load Current

Min. Load ←→

Load 100 %

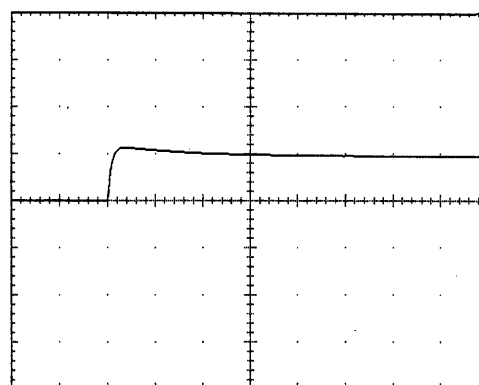
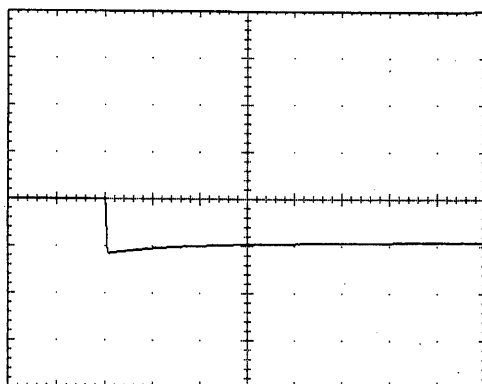
200 mV/div



Min. Load ←→

Load 50 %

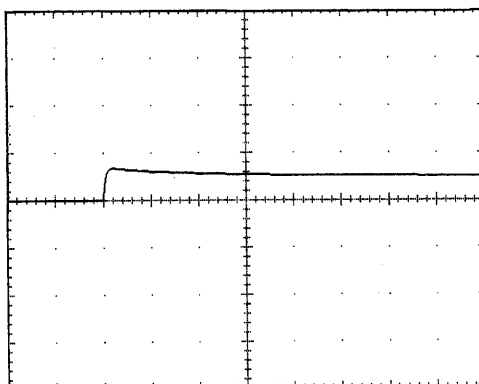
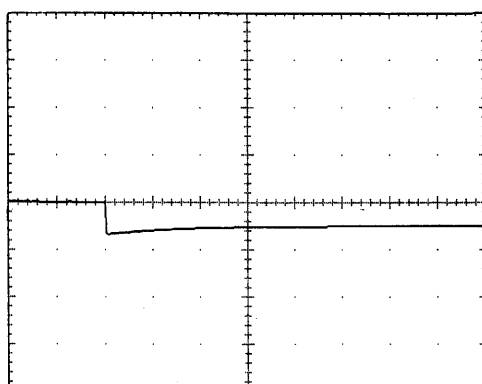
200 mV/div



Load 50%←→

Load 100 %

200 mV/div



1 mS/div

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Model	ZTW32415	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

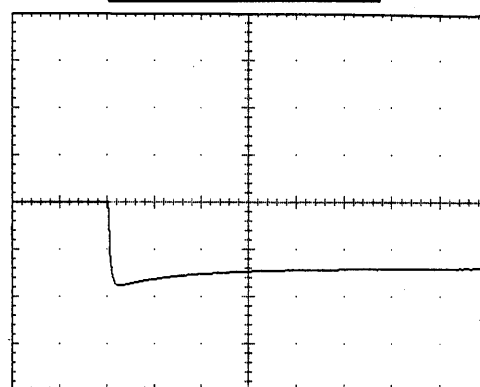
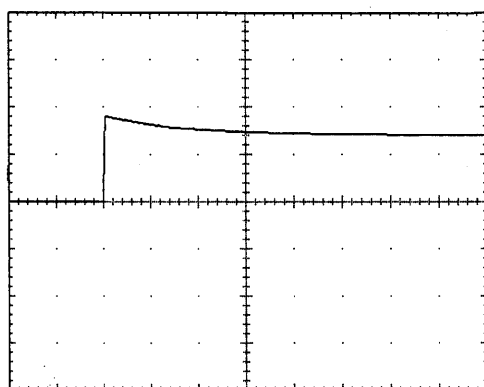
Cycle 100 mS

Load Current

Min. Load ↔

Load 100 %

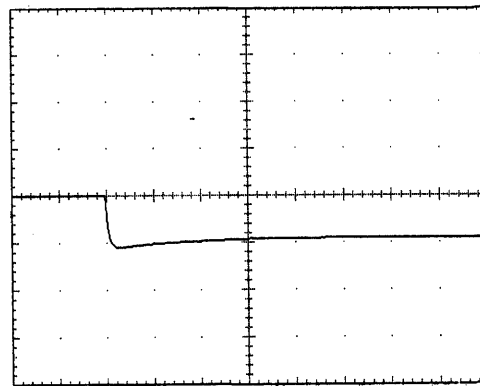
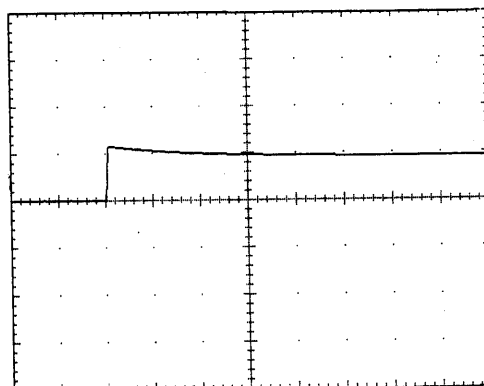
200 mV/div



Min. Load ↔

Load 50 %

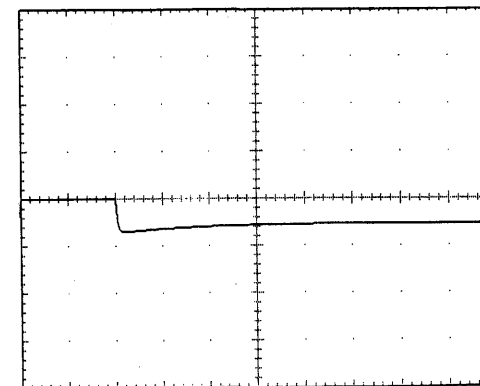
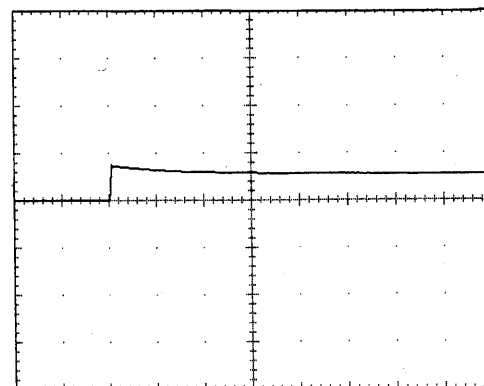
200 mV/div



Load 50% ↔

Load 100 %

200 mV/div



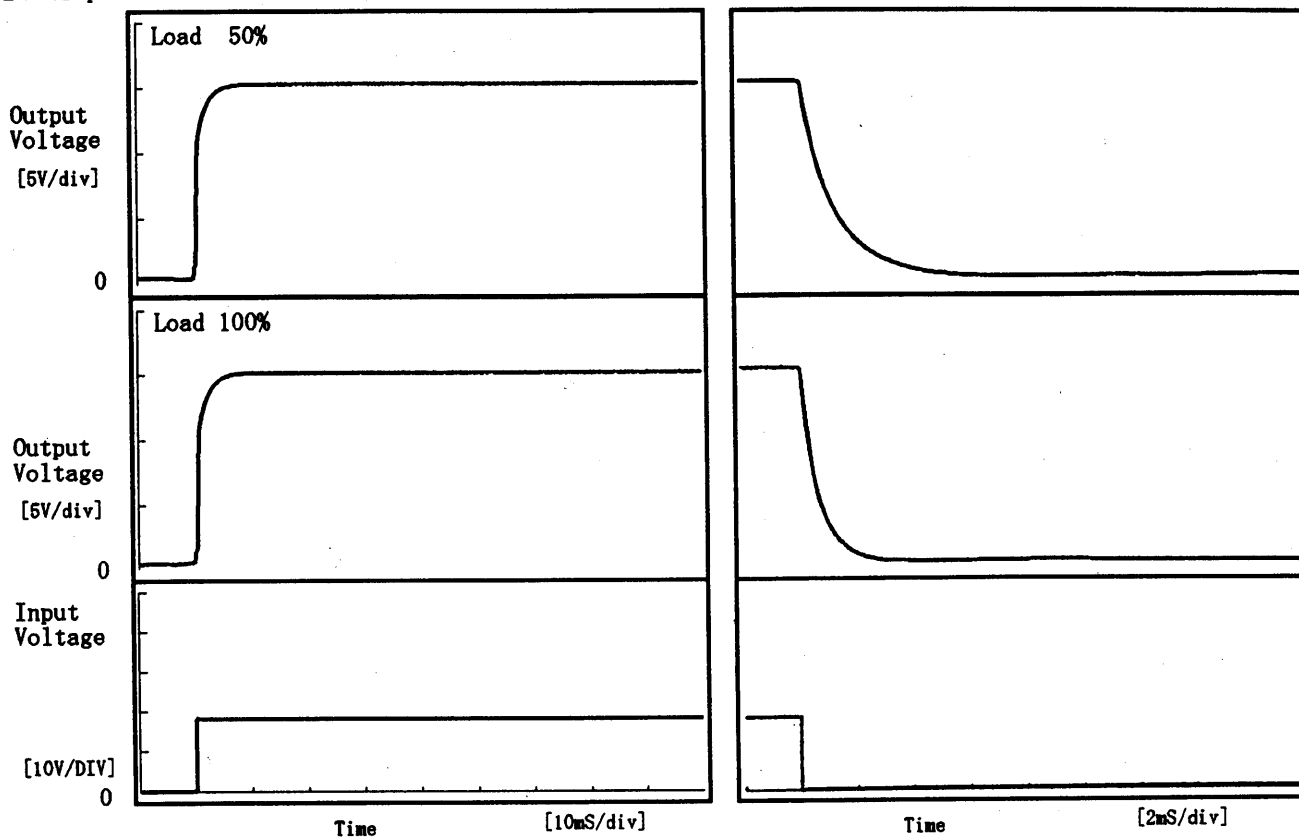
1 mS/div

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Model	ZTW32415	Temperature	25°C
Item	Rise and Fall Time 立上り、立下り時間	Testing Circuitry	Figure A
Object	+15V0.1A		

1. Graph

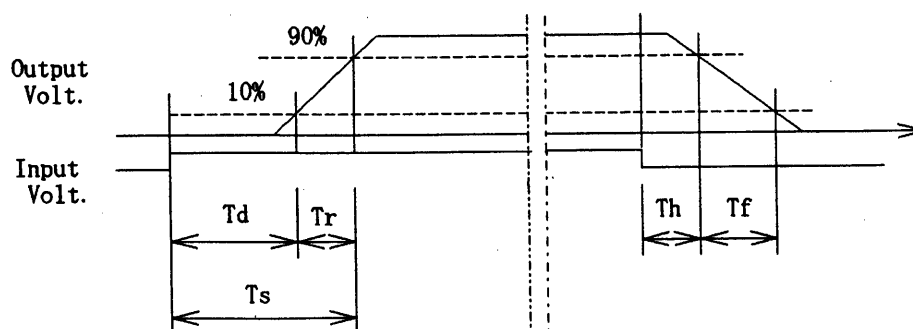
Input Volt. 18.0 V



2. Values

[ns]

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

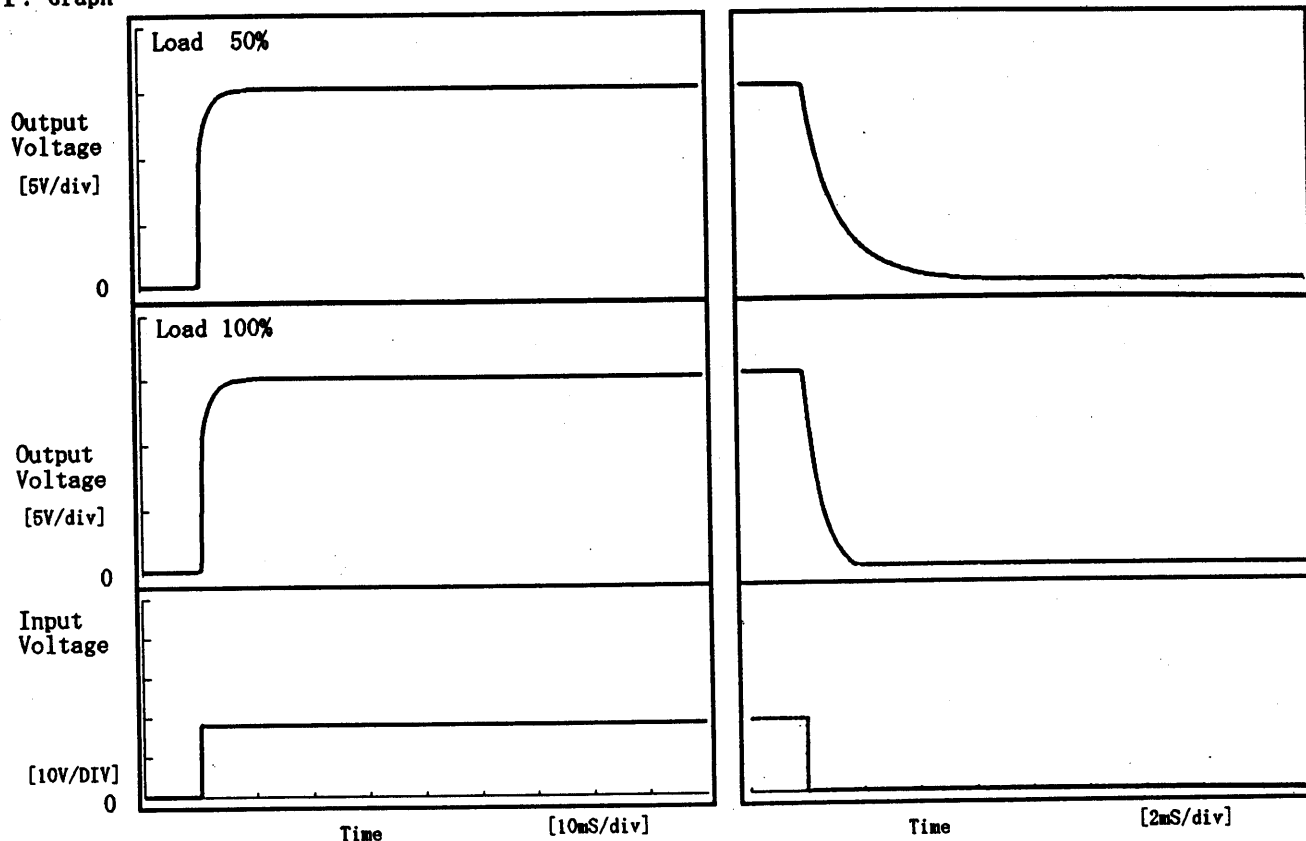


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Model	ZTW32415	Temperature	25°C
Item	Rise and Fall Time 立上り、立下り時間	Testing Circuitry	Figure A
Object	-15V0.1A		

1. Graph

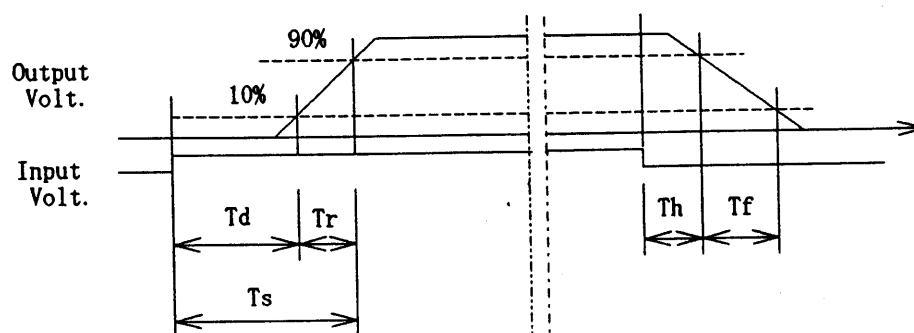
Input Volt. 18.0 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.50	2.30	2.80	0.28	2.62
100 %	0.50	2.45	2.95	0.19	1.17



COSEL

Model		ZTW32415																																																					
Item		Ambient Temperature Drift 周囲温度変動																																																					
Object		+15V0.1A																																																					
1. Graph		2. Values																																																					
<div><div><div>△</div><div>Input Volt. 18.0V</div></div><div><div>□</div><div>Input Volt. 24.0V</div></div><div><div>○</div><div>Input Volt. 36.0V</div></div></div> <div><div>Output Voltage [V]</div><div>Ambient Temperature [°C]</div><div>Load 100%</div></div>		<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	—	—	—	—
Temperature	Input Volt. 18.0[V]	Input Volt. 24.0[V]	Input Volt. 36.0[V]																																																				
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Temperature	Input Volt. 18.0[V]	Input Volt. 24.0[V]	Input Volt. 36.0[V]																																																				
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-20	-14.886	-14.892	-14.885																																																				
-10	-14.882	-14.887	-14.880																																																				
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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。																																																							

COSEL

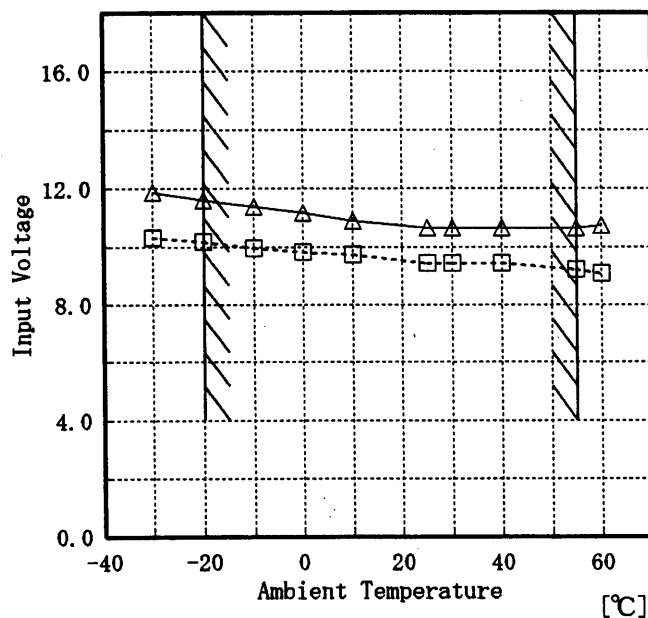
Model ZTW32415

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

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



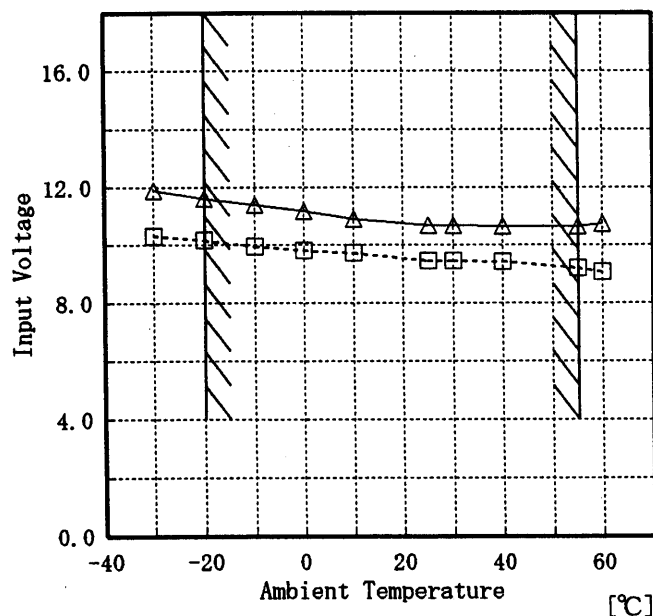
Testing Circuitry Figure A

2. Values

Ambient Temp.	Load 50%	Load 100%
[°C]	Input Volt. [V]	Input Volt. [V]
-30	10.3	11.9
-20	10.2	11.6
-10	10.0	11.4
0	9.8	11.2
10	9.7	10.9
25	9.5	10.7
30	9.5	10.7
40	9.4	10.7
55	9.2	10.6
60	9.1	10.7
—	—	—

Object -15V0.1A

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



2. Values

Ambient Temp.	Load 50%	Load 100%
[°C]	Input Volt. [V]	Input Volt. [V]
-30	10.3	11.9
-20	10.2	11.6
-10	10.0	11.4
0	9.8	11.2
10	9.7	10.9
25	9.5	10.7
30	9.5	10.7
40	9.4	10.7
55	9.2	10.6
60	9.1	10.7
—	—	—

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。

COSEL

Model		ZTW32415	
Item		Ripple Voltage (by Ambient Temp.) リップル電圧 (周囲温度特性)	
Object		+15V0.1A	
1. Graph		2. Values	

Ripple Voltage [mV]	-----□-----	Load 50%
	-----△-----	Load 100%

Input Volt. 18 V

Ambient Temp. [°C]	Load 50% Ripple Output Volt. [mV]	Load 100% 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
—	—	—

Object		-15V0.1A	
1. Graph		2. Values	

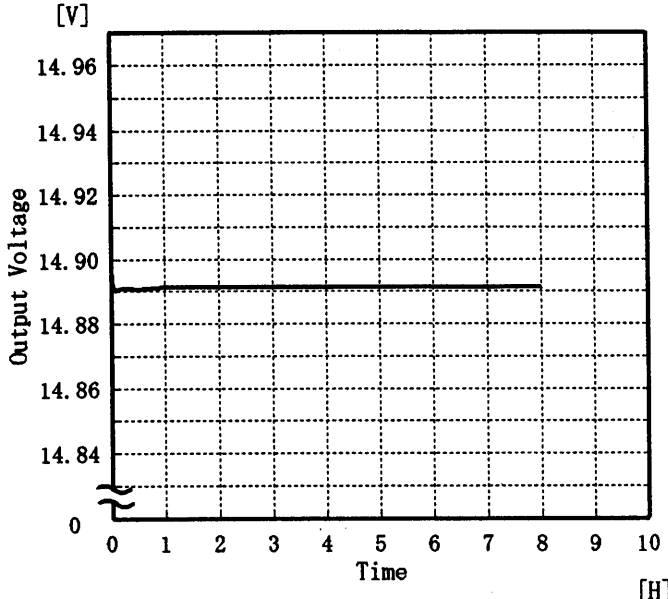
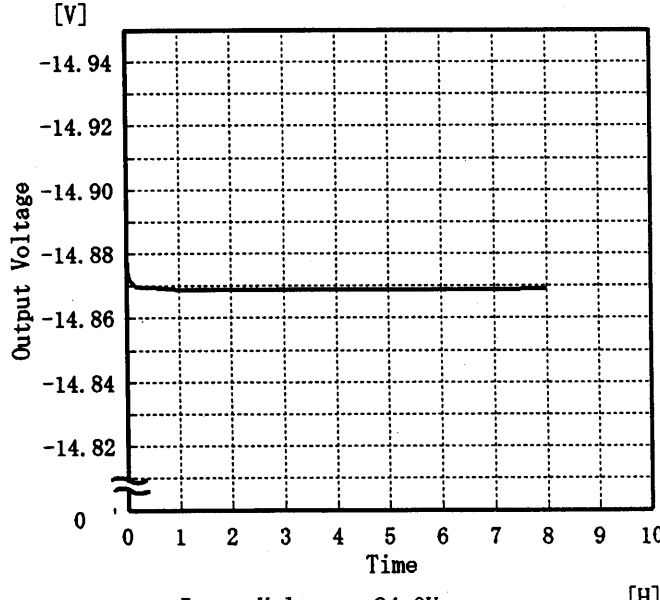
Ripple Voltage [mV]	-----□-----	Load 50%
	-----△-----	Load 100%

Input Volt. 18 V

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。

Ambient Temp. [°C]	Load 50% Ripple Output Volt. [mV]	Load 100% 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	ZTW32415																						
Item	Time Lapse Drift 経時ドリフト																						
Object	+15V0.1A																						
1. Graph																							
<div><div>Output Voltage [V]</div><div></div><div>Time [H]</div></div> <div>Input Volt. 24.0V Load 100%</div>																							
2. Values																							
<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>14.897</td></tr><tr><td>0.5</td><td>14.891</td></tr><tr><td>1.0</td><td>14.892</td></tr><tr><td>2.0</td><td>14.891</td></tr><tr><td>3.0</td><td>14.892</td></tr><tr><td>4.0</td><td>14.892</td></tr><tr><td>5.0</td><td>14.892</td></tr><tr><td>6.0</td><td>14.892</td></tr><tr><td>7.0</td><td>14.892</td></tr><tr><td>8.0</td><td>14.891</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	14.897	0.5	14.891	1.0	14.892	2.0	14.891	3.0	14.892	4.0	14.892	5.0	14.892	6.0	14.892	7.0	14.892	8.0	14.891
Time since start [H]	Output Voltage [V]																						
0.0	14.897																						
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5.0	14.892																						
6.0	14.892																						
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8.0	14.891																						
Object -15V0.1A																							
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2. Values																							
<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>-14.880</td></tr><tr><td>0.5</td><td>-14.870</td></tr><tr><td>1.0</td><td>-14.869</td></tr><tr><td>2.0</td><td>-14.869</td></tr><tr><td>3.0</td><td>-14.869</td></tr><tr><td>4.0</td><td>-14.869</td></tr><tr><td>5.0</td><td>-14.869</td></tr><tr><td>6.0</td><td>-14.869</td></tr><tr><td>7.0</td><td>-14.869</td></tr><tr><td>8.0</td><td>-14.869</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	-14.880	0.5	-14.870	1.0	-14.869	2.0	-14.869	3.0	-14.869	4.0	-14.869	5.0	-14.869	6.0	-14.869	7.0	-14.869	8.0	-14.869
Time since start [H]	Output Voltage [V]																						
0.0	-14.880																						
0.5	-14.870																						
1.0	-14.869																						
2.0	-14.869																						
3.0	-14.869																						
4.0	-14.869																						
5.0	-14.869																						
6.0	-14.869																						
7.0	-14.869																						
8.0	-14.869																						
Temperature 25 ℃ Testing Circuitry Figure A																							

COSEL

Model	ZTW32415	
Item	Output Voltage Accuracy 定電圧精度	Testing Circuitry Figure A

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
--------	----------

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		

COSEL

		Testing Circuitry Figure A												
Model	ZTW32415													
Item	Condensation 結露特性													
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.														
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行い、異常のないことを確認する。														
2. Values														
<table><tr><td>Item</td><td>Data</td><td>Testing Conditions</td></tr><tr><td>Output Voltage [V]</td><td>14.800</td><td>Input Volt.: 24V, Load Current:0.1A</td></tr><tr><td>Line Regulation [mV]</td><td>9</td><td>Input Volt.: 18～36V, Load Current:0.1A</td></tr><tr><td>Load Regulation [mV]</td><td>291</td><td>Input Volt.: 24V, Load Current:0～0.1A</td></tr></table>			Item	Data	Testing Conditions	Output Voltage [V]	14.800	Input Volt.: 24V, Load Current:0.1A	Line Regulation [mV]	9	Input Volt.: 18～36V, Load Current:0.1A	Load Regulation [mV]	291	Input Volt.: 24V, Load Current:0～0.1A
Item	Data	Testing Conditions												
Output Voltage [V]	14.800	Input Volt.: 24V, Load Current:0.1A												
Line Regulation [mV]	9	Input Volt.: 18～36V, Load Current:0.1A												
Load Regulation [mV]	291	Input Volt.: 24V, Load Current:0～0.1A												
-18-														
		BC-3143												

COSEL

LOREL

		Testing Circuitry Figure A
Model	ZTW32415	
Item	Condensation 結露特性	
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.

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行い、異常のないことを確認する。

2. Values

Item	Data	Testing Conditions
Output Voltage [V]	−14.789	Input Volt. : 24V, Load Current:0.1A
Line Regulation [mV]	5	Input Volt. : 18~36V, Load Current:0.1A
Load Regulation [mV]	303	Input Volt. : 24V, Load Current:0~0.1A

COSEL

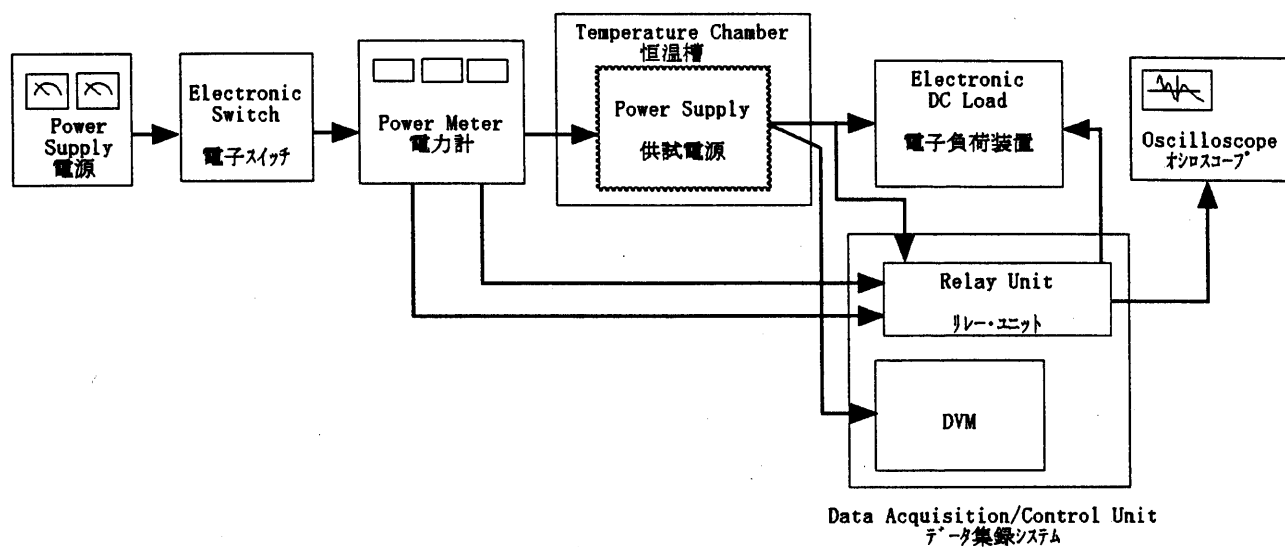


Figure A