

TEST DATA OF MODULE T

(ACE series)

Regulated DC Power Supply
Dec.10. 2003

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COSEL CO.,LTD.



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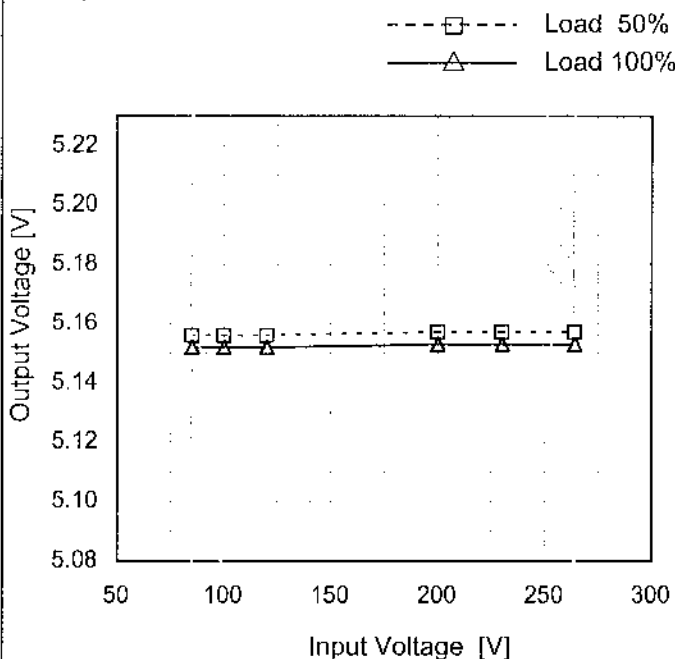
(Final Page 15)



Model	MODULE T
Item	Line Regulation
Object	+5V10A

Temperature	25°C
Testing Circuitry	Figure A

1.Graph

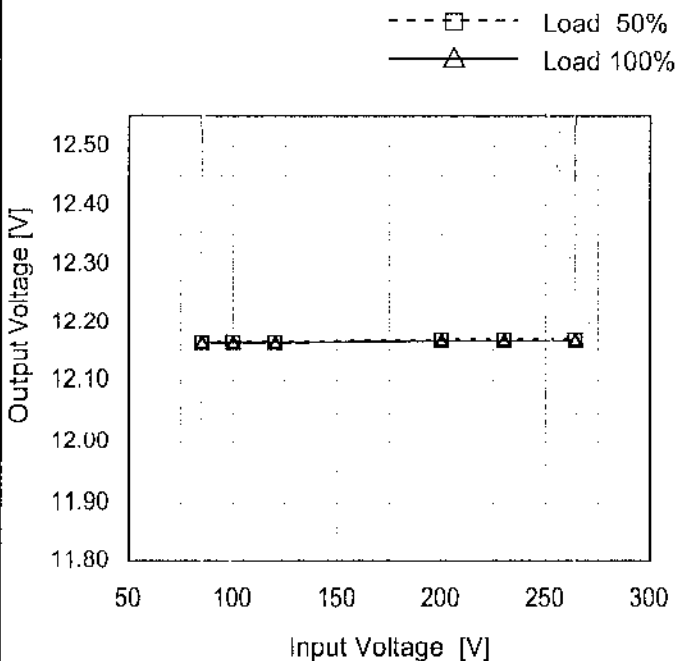


2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	5.156	5.152
100	5.156	5.152
120	5.156	5.152
200	5.157	5.153
230	5.157	5.153
264	5.157	5.153
--	-	-
--	-	-
--	-	-

Object	+12V4.2A
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1.Graph



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

2.Values

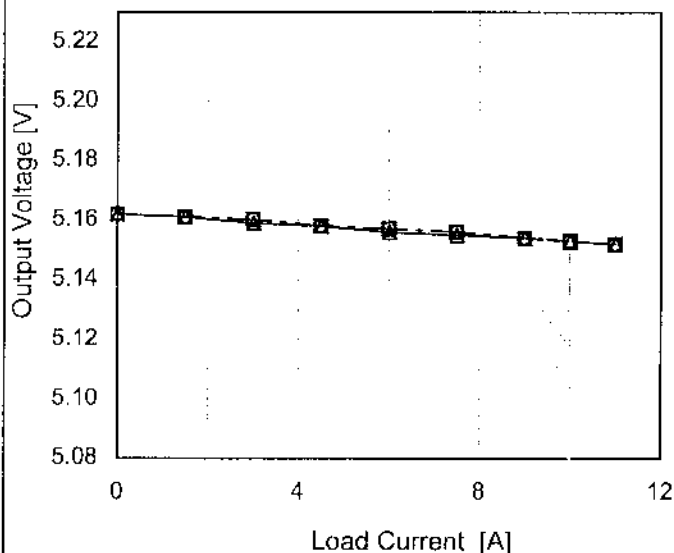
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	12.164	12.163
100	12.165	12.163
120	12.165	12.163
200	12.169	12.167
230	12.169	12.167
264	12.169	12.167
--	-	-
--	-	-
--	-	-



Model	MODULE T
Item	Load Regulation
Object	+5V10A

Temperature 25°C
Testing Circuitry Figure A

1.Graph
 —△— Input Volt. 100V
 - - - □ - - - Input Volt. 200V
 - - - ○ - - - Input Volt. 230V

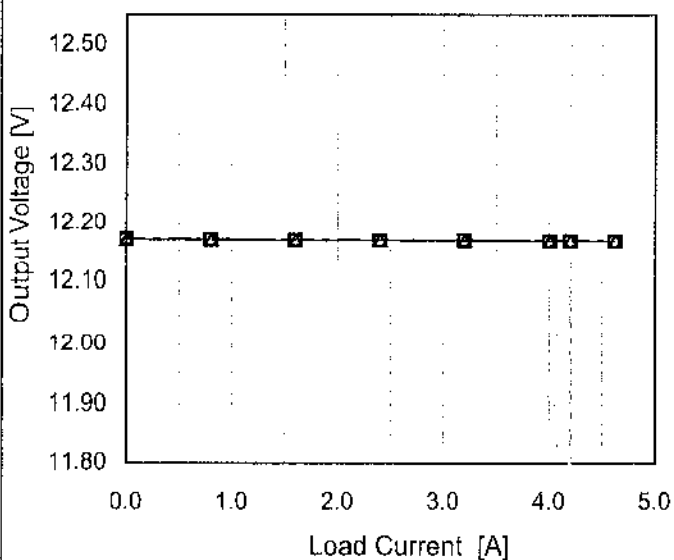


2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	5.162	5.162	5.162
1.5	5.161	5.161	5.161
3.0	5.159	5.160	5.160
4.5	5.158	5.158	5.158
6.0	5.156	5.157	5.157
7.5	5.155	5.156	5.156
9.0	5.154	5.154	5.154
10.0	5.153	5.153	5.153
11.0	5.152	5.152	5.152
--	-	-	-
--	-	-	-

Object	+12V4.2A
--------	----------

1.Graph
 —△— Input Volt. 100V
 - - - □ - - - Input Volt. 200V
 - - - ○ - - - Input Volt. 230V



2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	12.171	12.172	12.172
0.80	12.170	12.171	12.171
1.60	12.169	12.170	12.170
2.40	12.169	12.169	12.169
3.20	12.168	12.169	12.169
4.00	12.167	12.168	12.168
4.20	12.167	12.168	12.168
4.62	12.167	12.167	12.167
--	-	-	-
--	-	-	-
--	-	-	-

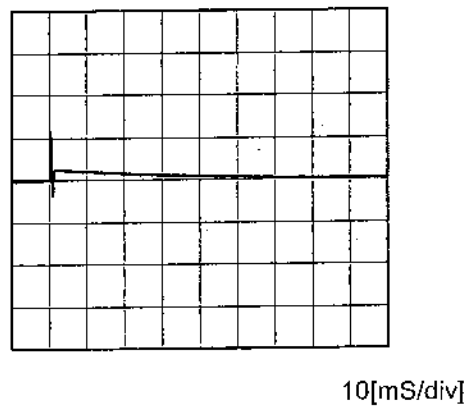
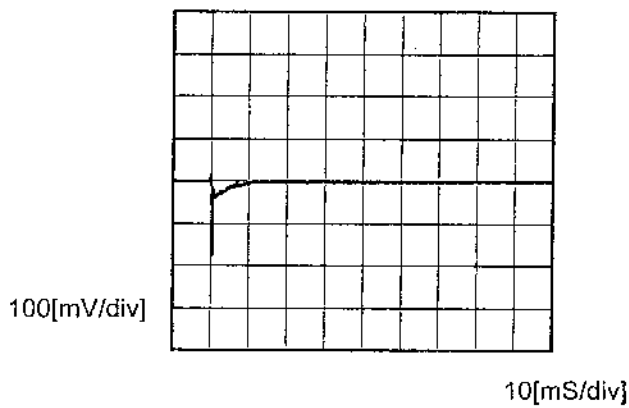
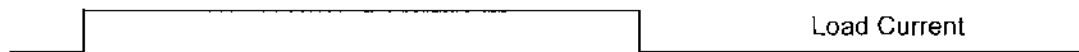
Note: Slanted line shows the range of the rated load current.



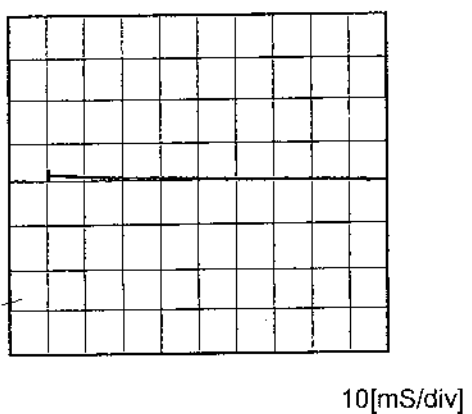
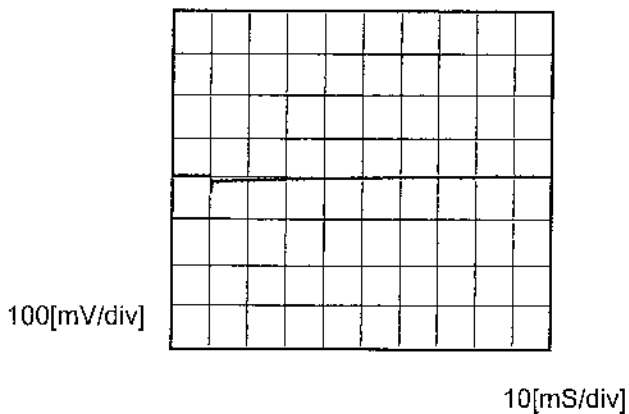
Model		MODULE T	
Item		Temperature	25°C
Object		Testing Circuitry	Figure A
		+5V10A	

Input Volt. 100 V
 Cycle 1000 mS

Min. Load (0 A) -- Load 100% (10 A)



Min. Load (0 A) -- Load 50% (5 A)



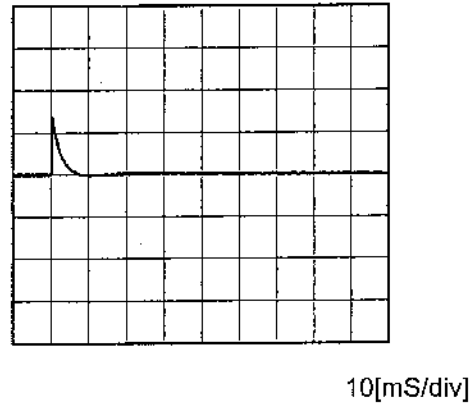
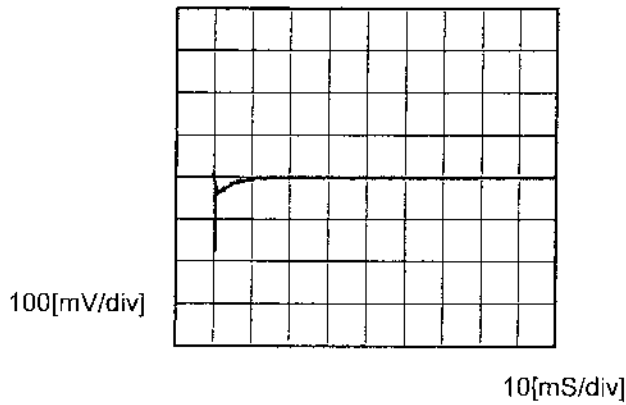
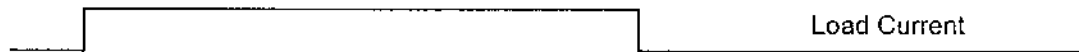
* The characteristic of AC200V is equal.



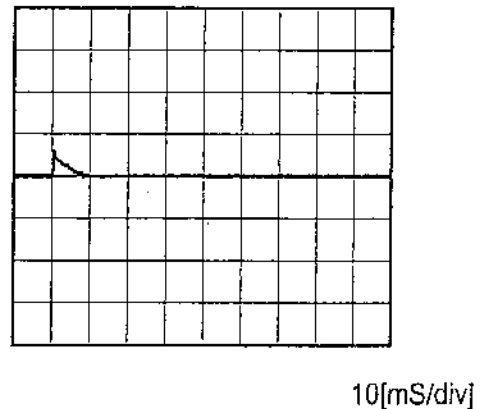
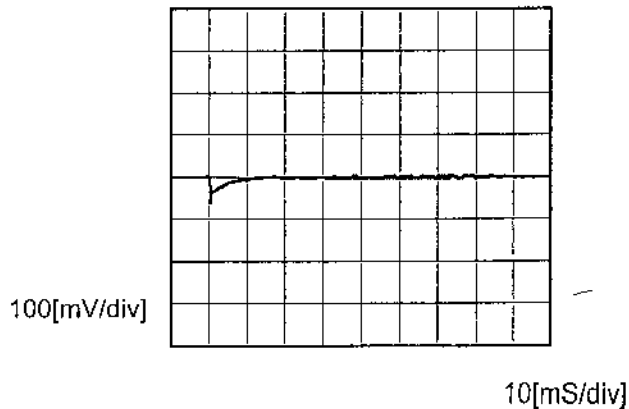
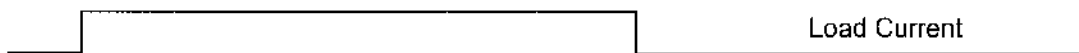
Model		MODULE T	
Item		Temperature	25°C
Object		Testing Circuitry	Figure A
		+12V4.2A	

Input Volt. 100 V
 Cycle 1000 mS

Min. Load (0 A) -- Load 100% (4.2 A)



Min. Load (0 A) -- Load 50% (2.1 A)

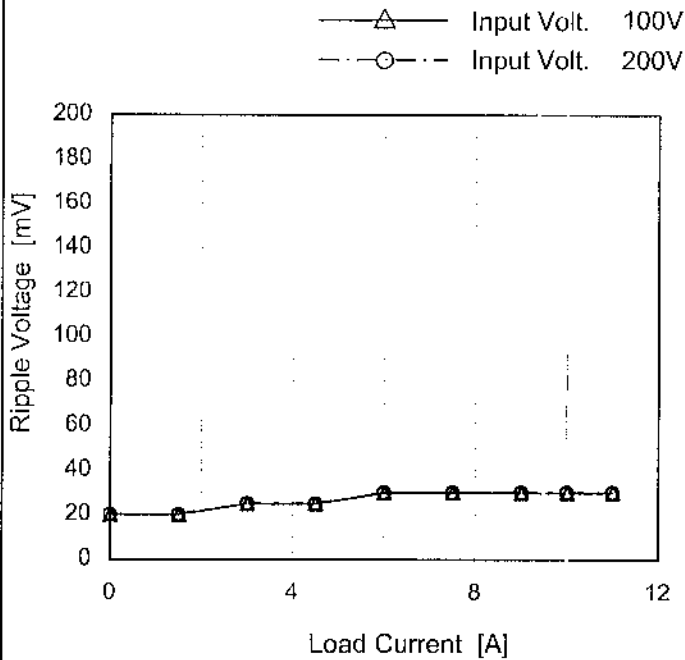


* The characteristic of AC200V is equal.



Model	MODULE T	Temperature	25°C
Item	Ripple Voltage (by Load Current)	Testing Circuitry	Figure A
Object	+5V10A		

1. Graph



2. Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.0	20	20
1.5	20	20
3.0	25	25
4.5	25	25
6.0	30	30
7.5	30	30
9.0	30	30
10.0	30	30
11.0	30	30
--	-	-
--	-	-

Measured by 20 MHz Oscilloscope.
 Ripple Voltage is shown as p-p in the figure below.
 Note: Slanted line shows the range of the rated load current.

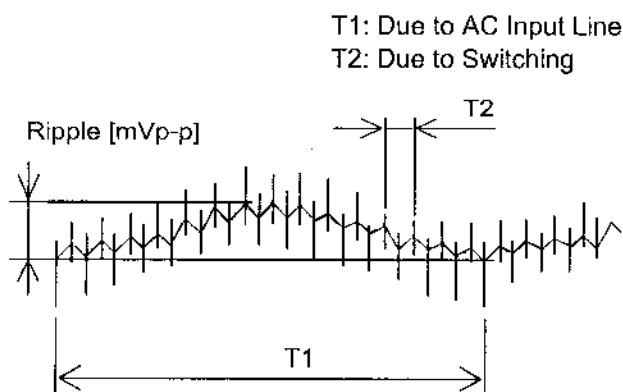


Fig. Complex Ripple Wave Form

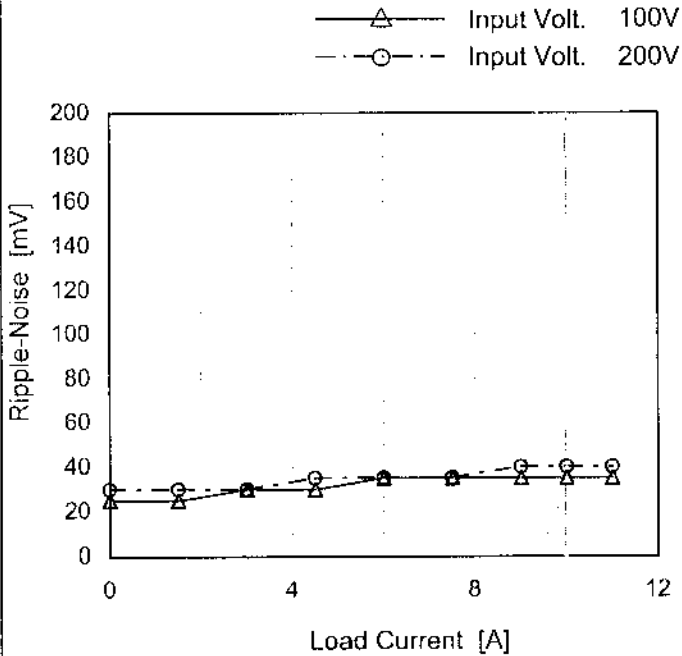


Model	MODULE T																																							
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure A																																						
Object	+12V4.2A																																							
<p>1.Graph</p> <p> —△— Input Volt. 100V - -○- - Input Volt. 200V </p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 100 [V]</th> <th>Input Volt. 200 [V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>20</td><td>20</td></tr> <tr><td>0.80</td><td>30</td><td>30</td></tr> <tr><td>1.60</td><td>35</td><td>35</td></tr> <tr><td>2.40</td><td>40</td><td>40</td></tr> <tr><td>3.20</td><td>40</td><td>40</td></tr> <tr><td>4.00</td><td>45</td><td>45</td></tr> <tr><td>4.20</td><td>45</td><td>45</td></tr> <tr><td>4.62</td><td>45</td><td>45</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]	Ripple Voltage [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	0.00	20	20	0.80	30	30	1.60	35	35	2.40	40	40	3.20	40	40	4.00	45	45	4.20	45	45	4.62	45	45	--	-	-	--	-	-	--	-	-
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<p>Measured by 20 MHz Oscilloscope. Ripple Voltage is shown as p-p in the figure below. Note: Slanted line shows the range of the rated load current.</p>																																								
<p> T1: Due to AC Input Line T2: Due to Switching </p>																																								
<p>Fig. Complex Ripple Wave Form</p>																																								



Model	MODULE T	Temperature	25°C
Item	Ripple-Noise	Testing Circuitry	Figure A
Object	+5V10A		

1. Graph



Measured by 20 MHz Oscilloscope.
 Ripple-Noise is shown as p-p in the figure below.
 Note: Slanted line shows the range of the rated load current.

2. Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.0	25	30
1.5	25	30
3.0	30	30
4.5	30	35
6.0	35	35
7.5	35	35
9.0	35	40
10.0	35	40
11.0	35	40
--	-	-
--	-	-

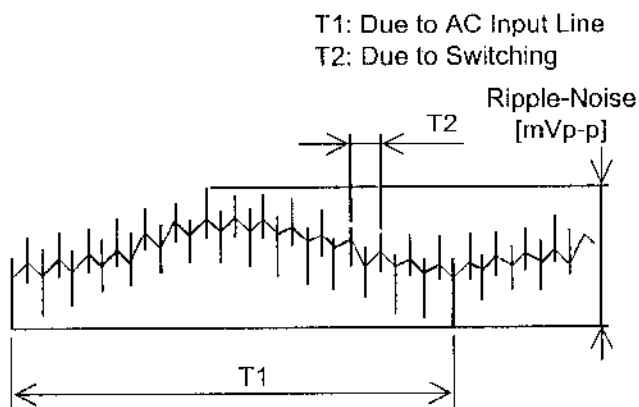
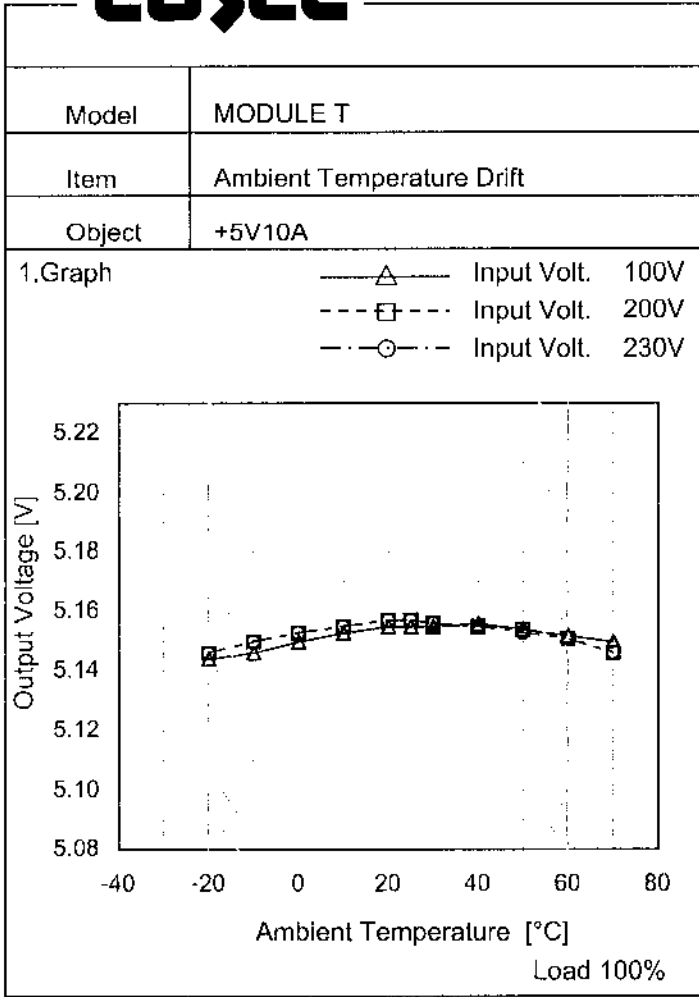


Fig. Complex Ripple Wave Form

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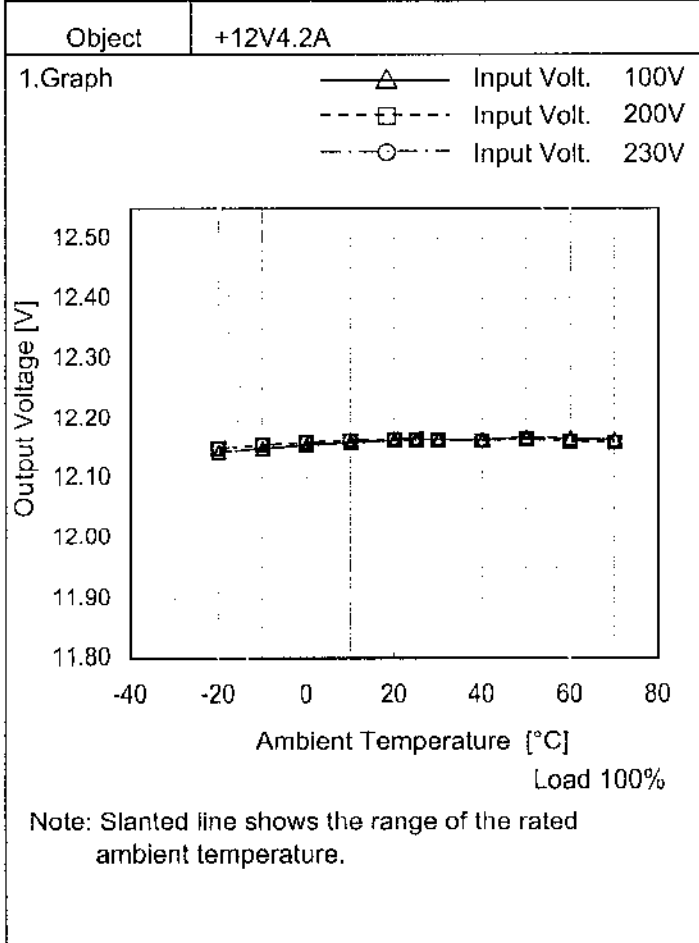
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Object		+5V10A																																									
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<p>Measured by 20 MHz Oscilloscope.</p> <p>Note: Slanted line shows the range of the rated ambient temperature.</p>																																											



Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-20	5.144	5.146	5.146
-10	5.146	5.150	5.150
0	5.150	5.153	5.153
10	5.153	5.155	5.155
20	5.155	5.157	5.157
25	5.155	5.157	5.157
30	5.155	5.156	5.156
40	5.156	5.155	5.155
50	5.154	5.154	5.153
60	5.152	5.151	5.151
70	5.150	5.146	5.146



2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-20	12.142	12.148	12.148
-10	12.148	12.154	12.154
0	12.154	12.158	12.158
10	12.158	12.162	12.162
20	12.162	12.164	12.164
25	12.163	12.164	12.164
30	12.163	12.163	12.163
40	12.163	12.161	12.162
50	12.167	12.164	12.163
60	12.165	12.160	12.160
70	12.163	12.158	12.158



COSEL		
Model	MODULE T	
Item	Output Voltage Accuracy	Testing Circuitry Figure A

1. 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 - 60°C

Input Voltage : 85 - 264V

Load Current (AVR 1) : 0.5 - 10A (AVR 2): 0 - 4.2A

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

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

2. Values

Object		+5V10A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy		
			Current[A]	Voltage[V]	Value [mV]	Ration [%]	
Maximum Voltage	25	132	0.5	5.165	±10	±0.2	
Minimum Voltage	-20	132	10	5.146			

Object		+12V4.2A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy		
			Current[A]	Voltage[V]	Value [mV]	Ration [%]	
Maximum Voltage	50	264	0	12.165	±9	±0.1	
Minimum Voltage	-20	100	4.2	12.148			



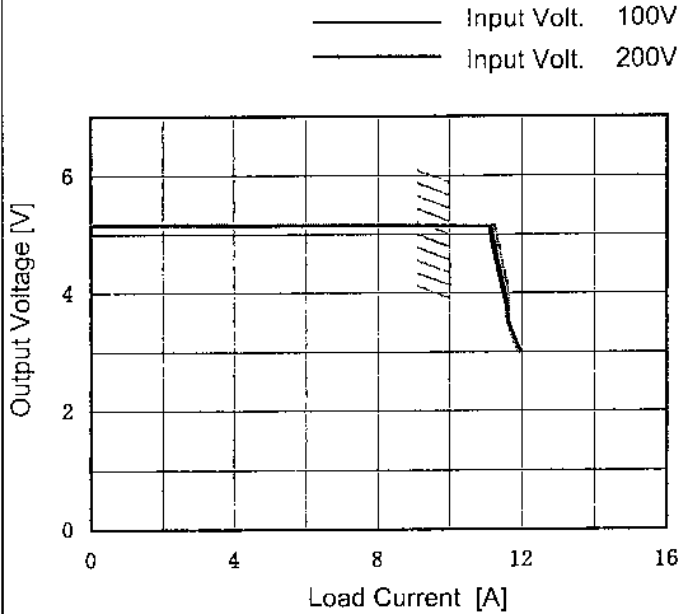
COSEL																								
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Item	Time Lapse Drift	Temperature 25°C Testing Circuitry Figure A																						
Object	+5V10A																							
<p>1.Graph</p> <p style="text-align: center;">Time [H]</p> <p style="text-align: center;">Input Volt. 100V Load 100%</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>5.150</td></tr> <tr><td>0.5</td><td>5.154</td></tr> <tr><td>1.0</td><td>5.154</td></tr> <tr><td>2.0</td><td>5.155</td></tr> <tr><td>3.0</td><td>5.155</td></tr> <tr><td>4.0</td><td>5.155</td></tr> <tr><td>5.0</td><td>5.155</td></tr> <tr><td>6.0</td><td>5.155</td></tr> <tr><td>7.0</td><td>5.155</td></tr> <tr><td>8.0</td><td>5.155</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	5.150	0.5	5.154	1.0	5.154	2.0	5.155	3.0	5.155	4.0	5.155	5.0	5.155	6.0	5.155	7.0	5.155	8.0	5.155
Time since start [H]	Output Voltage [V]																							
0.0	5.150																							
0.5	5.154																							
1.0	5.154																							
2.0	5.155																							
3.0	5.155																							
4.0	5.155																							
5.0	5.155																							
6.0	5.155																							
7.0	5.155																							
8.0	5.155																							
Object	+12V4.2A																							
<p>1.Graph</p> <p style="text-align: center;">Time [H]</p> <p style="text-align: center;">Input Volt. 100V Load 100%</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>12.166</td></tr> <tr><td>0.5</td><td>12.169</td></tr> <tr><td>1.0</td><td>12.169</td></tr> <tr><td>2.0</td><td>12.169</td></tr> <tr><td>3.0</td><td>12.169</td></tr> <tr><td>4.0</td><td>12.170</td></tr> <tr><td>5.0</td><td>12.170</td></tr> <tr><td>6.0</td><td>12.170</td></tr> <tr><td>7.0</td><td>12.170</td></tr> <tr><td>8.0</td><td>12.171</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	12.166	0.5	12.169	1.0	12.169	2.0	12.169	3.0	12.169	4.0	12.170	5.0	12.170	6.0	12.170	7.0	12.170	8.0	12.171
Time since start [H]	Output Voltage [V]																							
0.0	12.166																							
0.5	12.169																							
1.0	12.169																							
2.0	12.169																							
3.0	12.169																							
4.0	12.170																							
5.0	12.170																							
6.0	12.170																							
7.0	12.170																							
8.0	12.171																							
<p>* The characteristic of AC200V is equal.</p>																								



Model	MODULE T
Item	Overcurrent Protection
Object	+5V10A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



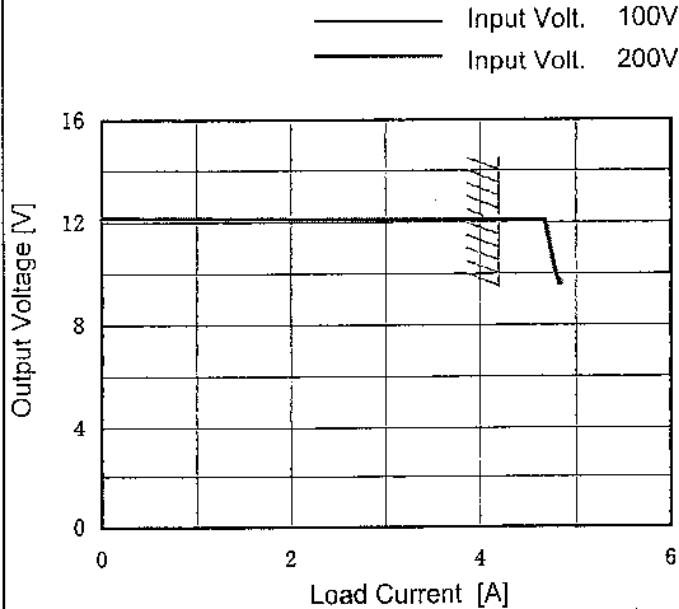
Intermittent operation occurs when the output voltage is from 3V to 0V.

2.Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
5.00	11.19	11.35
4.75	11.29	11.45
4.50	11.37	11.54
4.00	11.56	11.63
3.50	11.63	11.62
3.00	11.96	11.93
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Object	+12V4.2A
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1.Graph



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

Intermittent operation occurs when the output voltage is from 9.6V to 0V.

2.Values

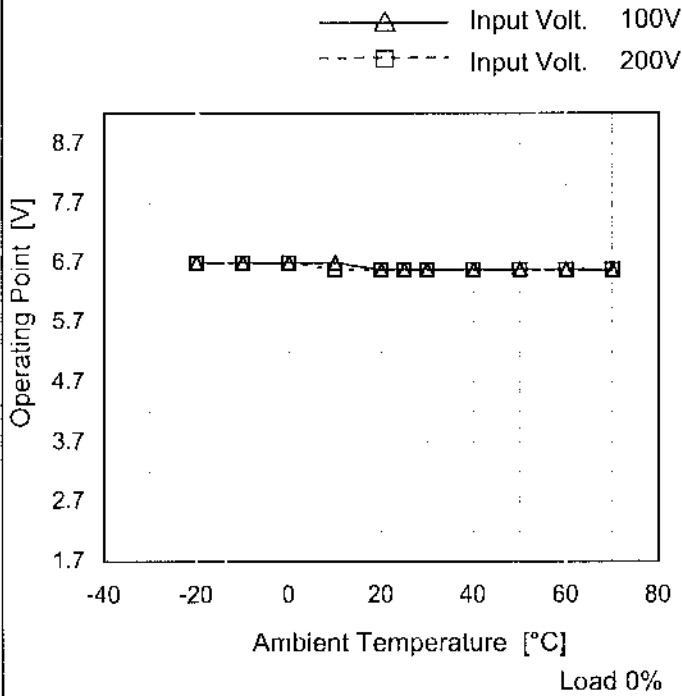
Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
12.00	4.67	4.67
11.40	4.71	4.71
10.80	4.75	4.74
9.60	4.81	4.81
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-



Model	MODULE T
Item	Overvoltage Protection
Object	+5V10A

Testing Circuitry Figure A

1.Graph

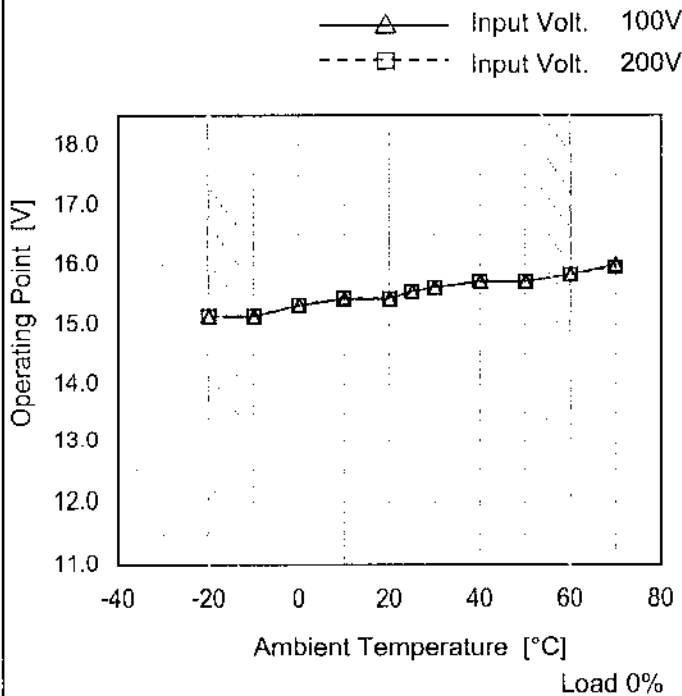


2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	6.69	6.69
-10	6.69	6.69
0	6.69	6.69
10	6.69	6.57
20	6.57	6.57
25	6.57	6.57
30	6.57	6.57
40	6.57	6.57
50	6.57	6.57
60	6.57	6.57
70	6.56	6.57

Object	+12V4.2A
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1.Graph



2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	15.14	15.14
-10	15.14	15.14
0	15.32	15.32
10	15.43	15.44
20	15.43	15.43
25	15.55	15.55
30	15.62	15.62
40	15.72	15.72
50	15.72	15.72
60	15.84	15.84
70	16.01	15.96

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

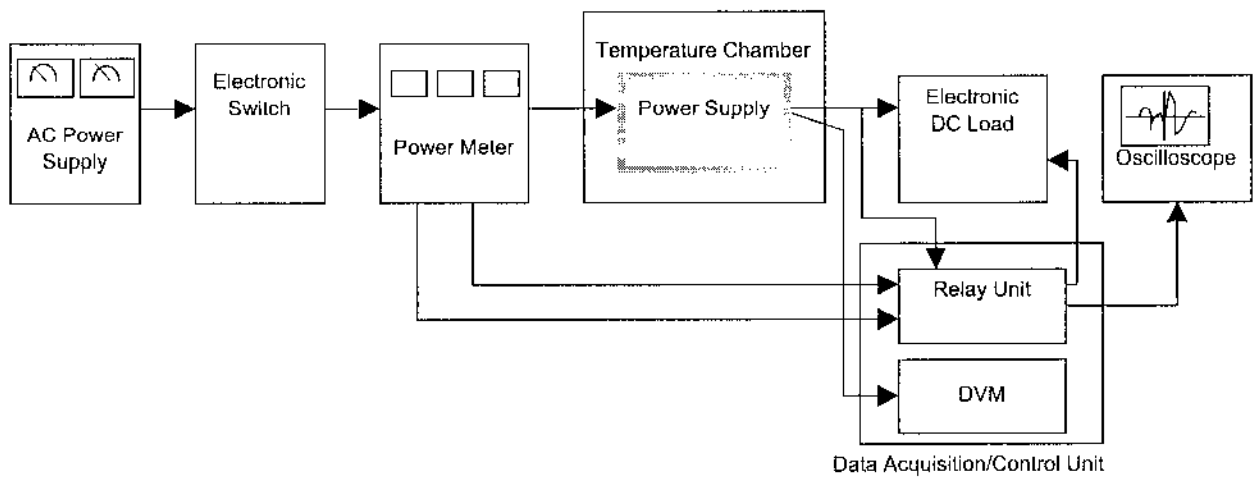


Figure A

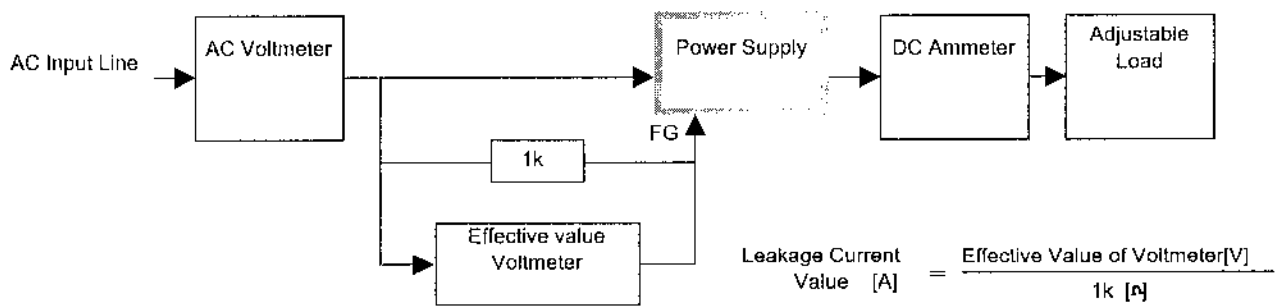


Figure B (DEN-AN)

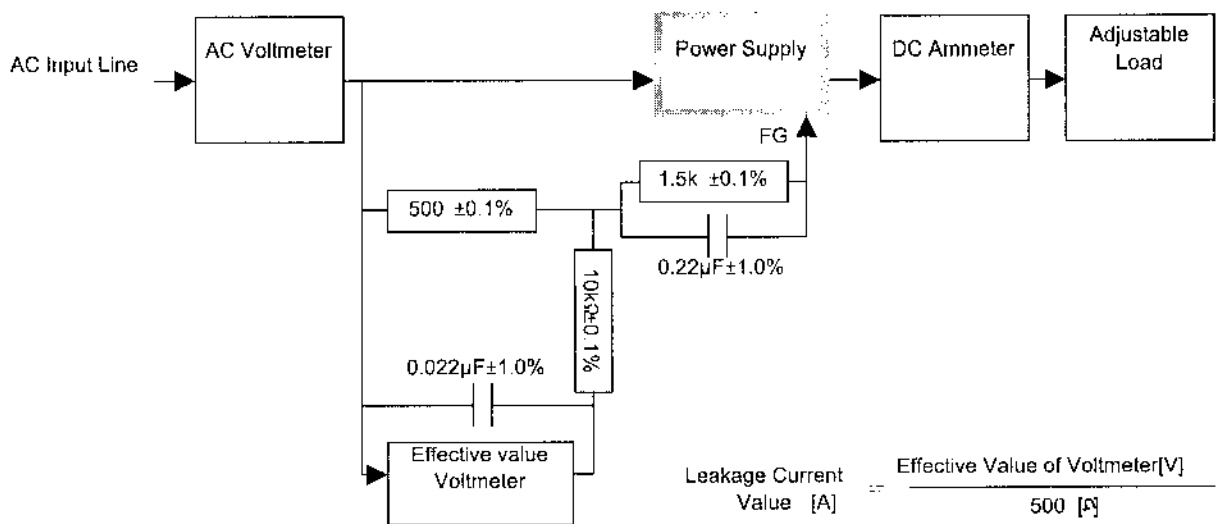


Figure B (IEC60950)