

TEST DATA OF GT4-5

Regulated DC Power Supply
July 23, 2010

Approved by : Eiyoshi Wakamatsu
Eiyoshi Wakamatsu Design Manager

Prepared by : Satoshi Kinoshita
Satoshi Kinoshita Design Engineer

COSEL CO.,LTD.

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Model		GT4-5		Temperature		25°C																																																				
Item		Input Current (by Load Current)		Testing Circuitry		Figure A																																																				
Object																																																										
1.Graph		<div><div>—△—</div>Input Volt. 90V</div> <div><div>---□---</div>Input Volt. 100V</div> <div><div>-·-○-·-</div>Input Volt. 110V</div>		2.Values																																																						
<div><div><div>Input Current [A]</div><div><div>Load Current [A]</div></div></div><div>Note: Slanted line shows the range of the rated load current.</div></div>				<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Input Current [A]</th></tr><tr><th>Input Volt. 90[V]</th><th>Input Volt. 100[V]</th><th>Input Volt. 110[V]</th></tr><tr><td>0.0</td><td>0.041</td><td>0.043</td><td>0.045</td></tr><tr><td>1.5</td><td>0.345</td><td>0.352</td><td>0.358</td></tr><tr><td>3.0</td><td>0.595</td><td>0.607</td><td>0.618</td></tr><tr><td>4.5</td><td>0.827</td><td>0.843</td><td>0.858</td></tr><tr><td>6.0</td><td>1.046</td><td>1.066</td><td>1.084</td></tr><tr><td>7.5</td><td>1.255</td><td>1.280</td><td>1.302</td></tr><tr><td>9.0</td><td>1.457</td><td>1.486</td><td>1.512</td></tr><tr><td>10.0</td><td>1.590</td><td>1.620</td><td>1.650</td></tr><tr><td>11.0</td><td>1.718</td><td>1.750</td><td>1.782</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 Current [A]			Input Volt. 90[V]	Input Volt. 100[V]	Input Volt. 110[V]	0.0	0.041	0.043	0.045	1.5	0.345	0.352	0.358	3.0	0.595	0.607	0.618	4.5	0.827	0.843	0.858	6.0	1.046	1.066	1.084	7.5	1.255	1.280	1.302	9.0	1.457	1.486	1.512	10.0	1.590	1.620	1.650	11.0	1.718	1.750	1.782	--	-	-	-	--	-	-	-
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Object			
1.Graph		2.Values	
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4

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BC-10203

Model		GT4-5	
Item		Power Factor (by Input Voltage)	
Object			

1.Graph

Load 50%

Load 100%

Power Factor

0.8

0.7

0.6

0.5

0.4

0.3

0.2

80

90

100

110

120

Input Voltage [V]

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

2.Values

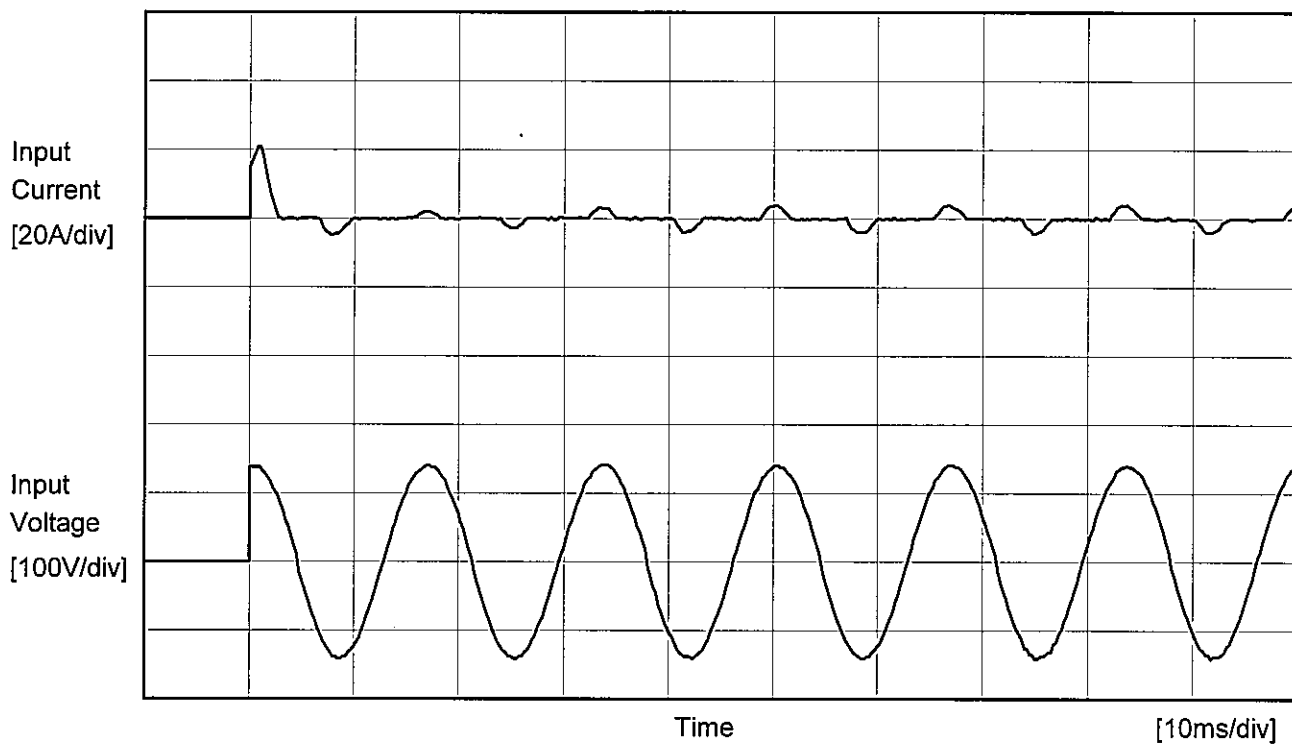
Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
85	0.703	0.769
90	0.695	0.761
100	0.685	0.749
110	0.674	0.740
115	0.671	0.735
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--	-	-
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COSEL

Model	GT4-5																																																					
Item	Power Factor (by Load Current)	Temperature	25°C																																																			
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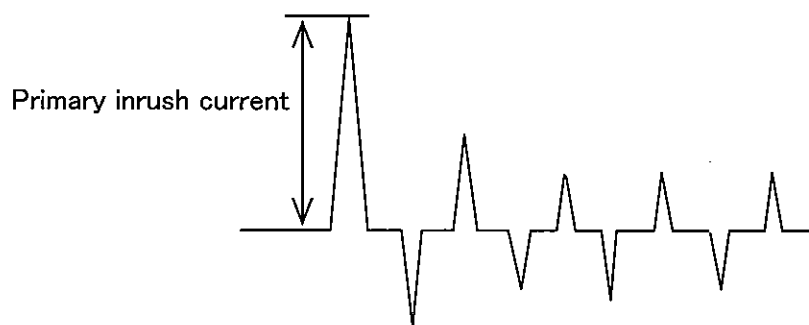
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Model	GT4-5	Temperature 25°C Testing Circuitry Figure A
Item	Inrush Current	
Object	_____	



Input Voltage 100 V
Frequency 60 Hz
Load 100 %

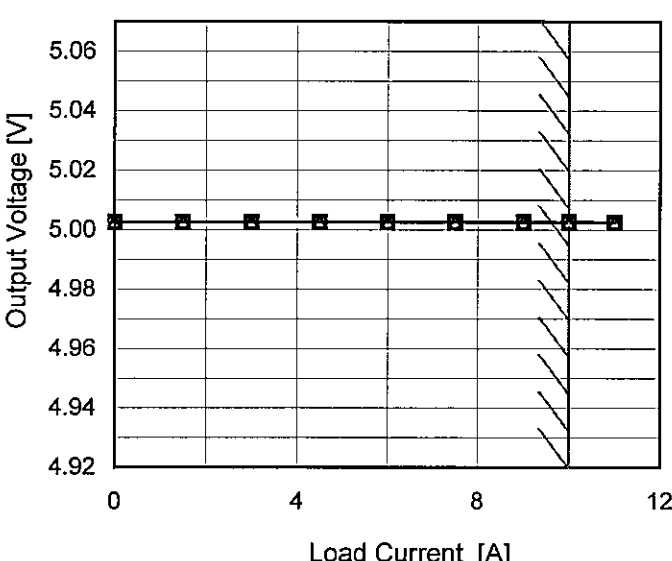
Primary inrush current 20.8 A



COSEL

Model	GT4-5																																		
Item	Line Regulation	Temperature	25°C																																
Object	+5V10A	Testing Circuitry	Figure A																																
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<div><div><div>—△—</div><div>Input Volt.</div><div>90V</div></div><div><div>---□---</div><div>Input Volt.</div><div>100V</div></div><div><div>---○---</div><div>Input Volt.</div><div>110V</div></div></div>  <p>Note: Slanted line shows the range of the rated load current.</p>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Output Voltage [V]</th></tr><tr><th>Input Volt. 90[V]</th><th>Input Volt. 100[V]</th><th>Input Volt. 110[V]</th></tr><tr><td>0.0</td><td>5.003</td><td>5.003</td><td>5.003</td></tr><tr><td>1.5</td><td>5.003</td><td>5.003</td><td>5.003</td></tr><tr><td>3.0</td><td>5.003</td><td>5.003</td><td>5.003</td></tr><tr><td>4.5</td><td>5.003</td><td>5.003</td><td>5.003</td></tr><tr><td>6.0</td><td>5.003</td><td>5.003</td><td>5.003</td></tr><tr><td>7.5</td><td>5.003</td><td>5.003</td><td>5.003</td></tr><tr><td>9.0</td><td>5.003</td><td>5.003</td><td>5.003</td></tr><tr><td>10.0</td><td>5.003</td><td>5.003</td><td>5.003</td></tr><tr><td>11.0</td><td>5.002</td><td>5.003</td><td>5.003</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]	Output Voltage [V]			Input Volt. 90[V]	Input Volt. 100[V]	Input Volt. 110[V]	0.0	5.003	5.003	5.003	1.5	5.003	5.003	5.003	3.0	5.003	5.003	5.003	4.5	5.003	5.003	5.003	6.0	5.003	5.003	5.003	7.5	5.003	5.003	5.003	9.0	5.003	5.003	5.003	10.0	5.003	5.003	5.003	11.0	5.002	5.003	5.003	--	-	-	-	--	-	-	-
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- 9 -

BC-10203

COSEL

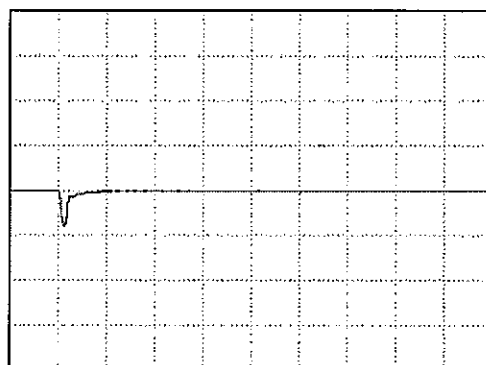
Model	GT4-5	Temperature Testing Circuitry	25°C Figure A
Item	Dynamic Load Response		
Object	+5V10A		

Input Volt. 100 V
Cycle 1000 ms

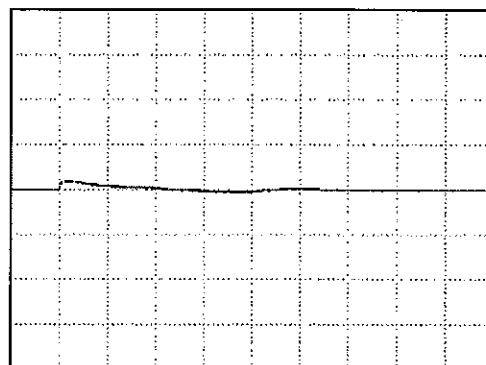
Load Current

Min. Load (0A) ←→
Load 100% (10A)

200 mV/div



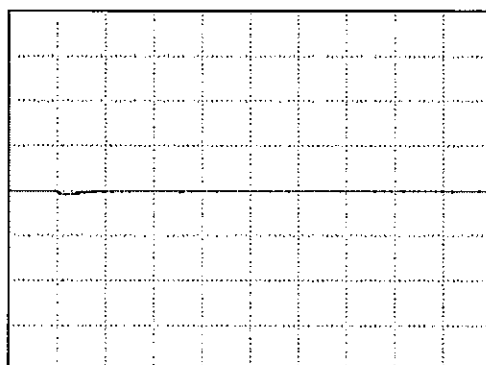
100 μs/div



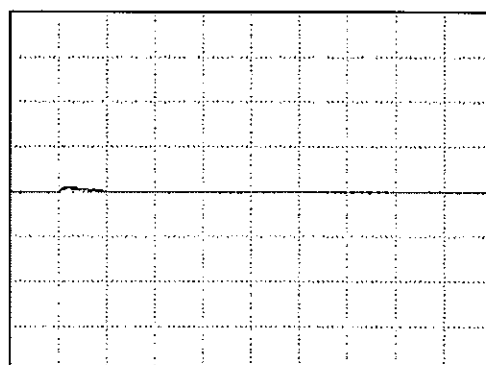
100 μs/div

Load 50% (5A) ←→
Load 100% (10A)

200 mV/div



100 μs/div



100 μs/div

Model	GT4-5																																											
Item	Ripple Voltage (by Load Current)	Temperature	25°C																																									
Object	+5V10A	Testing Circuitry	Figure A																																									
1.Graph		2.Values																																										
<div><div><div>—△—</div><div>Input Volt.</div><div>90V</div></div><div><div>---○---</div><div>Input Volt.</div><div>110V</div></div></div> <p>Measured by 20 MHz Oscilloscope. Note: Slanted line shows the range of the rated load current.</p>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple Voltage [mV]</th></tr><tr><th>Input Volt. 90 [V]</th><th>Input Volt. 110 [V]</th></tr><tr><td>0.0</td><td>1.0</td><td>1.0</td></tr><tr><td>5.0</td><td>1.0</td><td>1.0</td></tr><tr><td>10.0</td><td>1.0</td><td>1.0</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><tr><td>--</td><td>-</td><td>-</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><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 90 [V]	Input Volt. 110 [V]	0.0	1.0	1.0	5.0	1.0	1.0	10.0	1.0	1.0	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																											
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Model

GT4-5

Item

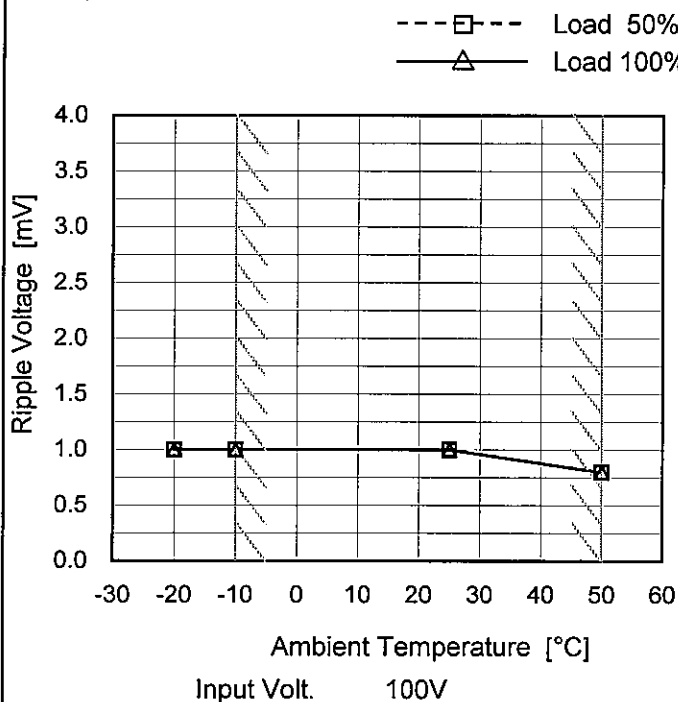
Ripple Voltage (by Ambient Temp.)

Object

+5V10A

Testing Circuitry Figure A

1. Graph



Measured by 20 MHz Oscilloscope.

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

2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-20	1.0	1.0
-10	1.0	1.0
25	1.0	1.0
50	0.8	0.8
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Model	GT4-5	
Item	Ambient Temperature Drift	Testing Circuitry Figure A
Object	+5V10A	

1. Graph

The graph plots Output Voltage [V] on the y-axis (ranging from 4.92 to 5.06) against Ambient Temperature [°C] on the x-axis (ranging from -40 to 80). Three data series are shown for input voltages of 90V (solid line with triangles), 100V (dashed line with squares), and 110V (dash-dot line with circles). All three series show a constant output voltage of approximately 5.00V across the entire temperature range. A slanted shaded region indicates the rated ambient temperature range from -20°C to 60°C.

Legend:

- △— Input Volt. 90V
- - □ - - Input Volt. 100V
- · ○ · - Input Volt. 110V

Output Voltage [V]

Ambient Temperature [°C]

Load 100%

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

2. Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 90[V]	Input Volt. 100[V]	Input Volt. 110[V]
-20	5.000	5.000	5.000
-10	5.001	5.001	5.001
0	5.001	5.002	5.002
10	5.003	5.003	5.003
20	5.003	5.003	5.003
25	5.003	5.003	5.003
30	5.003	5.003	5.003
40	5.002	5.002	5.002
50	5.001	5.001	5.001
60	5.000	5.000	5.000
--	-	-	-



		Testing Circuitry Figure A
Model	GT4-5	
Item	Output Voltage Accuracy	
Object	+5V10A	

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 : -10 - 50°C

Input Voltage : 90 - 110V

Load Current : 0 - 10A

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

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

2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	20	110	0	5.003	±2	±0.1
Minimum Voltage	-10	90	0	5.000		

COSEL

Model		GT4-5	
Item		Time Lapse Drift	
Object		+5V10A	

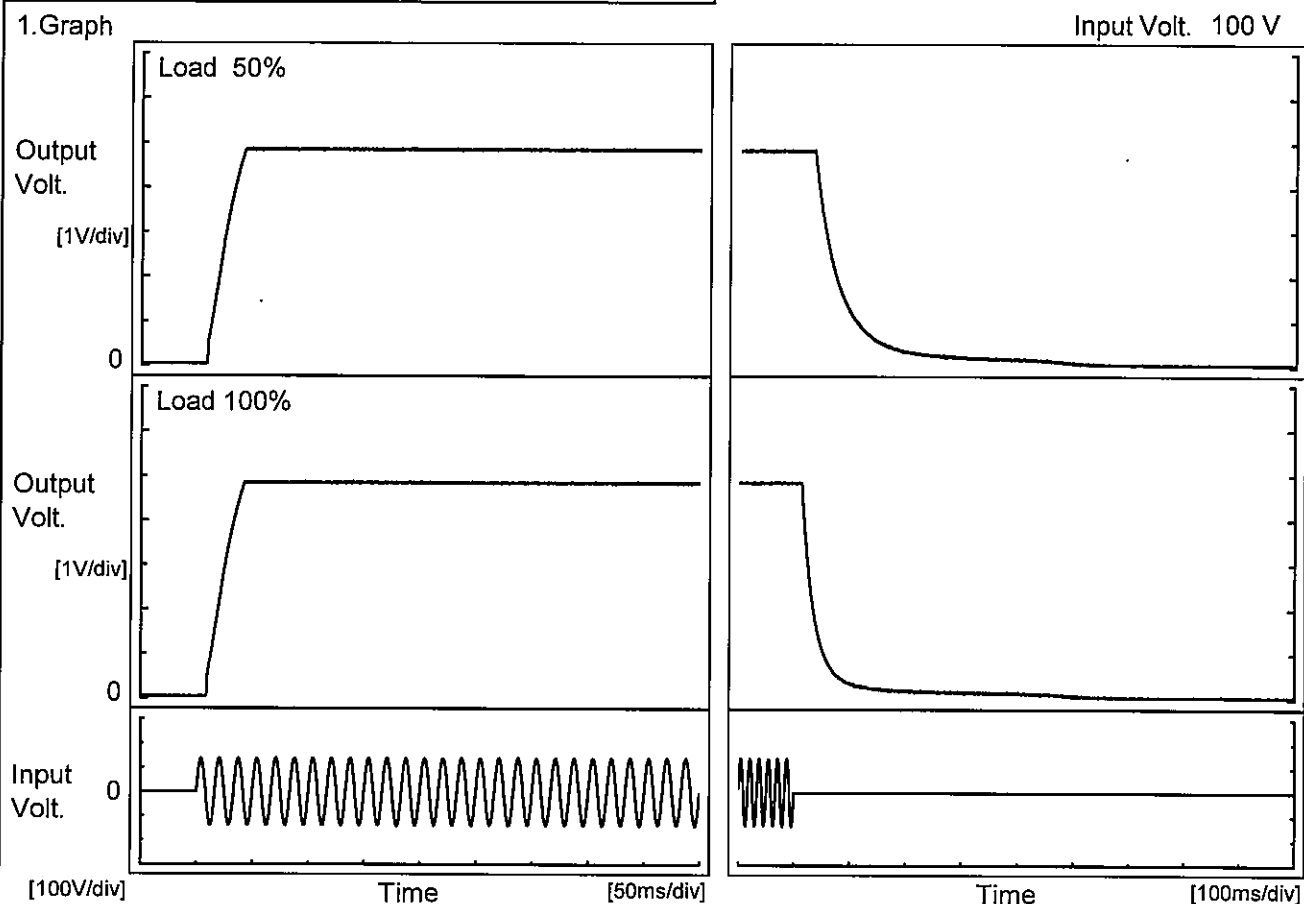
1.Graph

Output Voltage [V]

COSEL

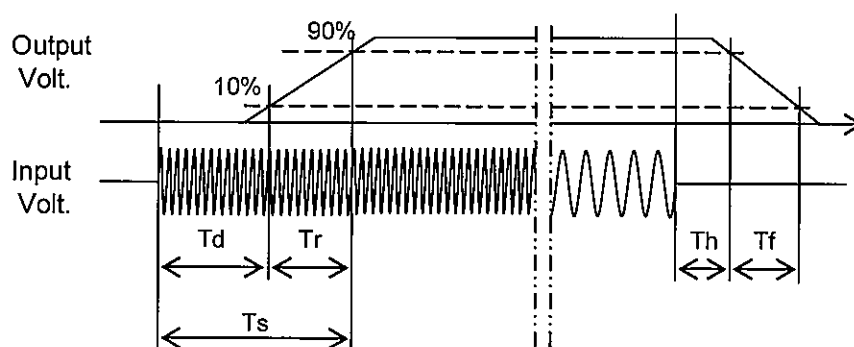
Model	GT4-5	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+5V10A		

1. Graph



2. Values

		[ms]				
Load	Time	Td	Tr	Ts	Th	Tf
50 %		9.8	29.0	38.8	37.5	116.5
100 %		9.8	29.0	38.8	14.5	62.5



COSEL

Model	GT4-5																																
Item	Hold-Up Time	Temperature	25°C																														
Object	+5V10A	Testing Circuitry	Figure A																														
1.Graph		2.Values																															
<div><div><div>---□---</div><div>Load 50%</div></div><div><div>—△—</div><div>Load 100%</div></div></div> <p>The graph shows Hold-Up Time [ms] on a logarithmic y-axis (1 to 1000) versus Input Voltage [V] on a linear x-axis (80 to 120). Two data series are plotted: Load 50% (dashed line with square markers) and Load 100% (solid line with triangle markers). Both series show an increasing trend. A slanted line indicates the range of the rated input voltage from 90V to 110V.</p> <table border="1"><thead><tr><th>Input Voltage [V]</th><th>Load 50% [ms]</th><th>Load 100% [ms]</th></tr></thead><tbody><tr><td>85</td><td>22</td><td>7</td></tr><tr><td>90</td><td>26</td><td>9</td></tr><tr><td>100</td><td>35</td><td>13</td></tr><tr><td>110</td><td>44</td><td>18</td></tr><tr><td>115</td><td>49</td><td>20</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><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table>		Input Voltage [V]	Load 50% [ms]	Load 100% [ms]	85	22	7	90	26	9	100	35	13	110	44	18	115	49	20	--	-	-	--	-	-	--	-	-	--	-	-		
Input Voltage [V]	Load 50% [ms]	Load 100% [ms]																															
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115	49	20																															
--	-	-																															
--	-	-																															
--	-	-																															
--	-	-																															
This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy. Note: Slanted line shows the range of the rated input voltage.																																	

Model	GT4-5																																																					
Item	Instantaneous Interruption Compensation	Temperature	25°C																																																			
Object	+5V10A	Testing Circuitry	Figure A																																																			
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Load Current [A]	Time [ms]																																																					
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COSEL

Model		GT4-5
Item		Minimum Input Voltage for Regulated Output Voltage
Object		+5V10A

1.Graph

□

Load 50%

—

△

—

Load 100%

Input Voltage [V]

Model	GT4-5																																																									
Item	Overcurrent Protection	Temperature	25°C																																																							
Object	+5V10A	Testing Circuitry	Figure A																																																							
1.Graph		2.Values																																																								
<div><div></div>Input Volt. 90V</div> <div><div></div>Input Volt. 100V</div> <div><div></div>Input Volt. 110V</div> <p>Note: Slanted line shows the range of the rated load current.</p>		<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="3">Load Current [A]</th></tr><tr><th>Input Volt. 90[V]</th><th>Input Volt. 100[V]</th><th>Input Volt. 110[V]</th></tr><tr><td>5.00</td><td>12.38</td><td>12.38</td><td>12.36</td></tr><tr><td>4.75</td><td>12.00</td><td>11.92</td><td>11.87</td></tr><tr><td>4.50</td><td>11.55</td><td>11.47</td><td>11.42</td></tr><tr><td>4.00</td><td>11.13</td><td>11.06</td><td>11.02</td></tr><tr><td>3.50</td><td>10.40</td><td>10.34</td><td>10.30</td></tr><tr><td>3.00</td><td>9.78</td><td>9.73</td><td>9.69</td></tr><tr><td>2.50</td><td>9.00</td><td>8.96</td><td>8.92</td></tr><tr><td>2.00</td><td>8.37</td><td>8.33</td><td>8.30</td></tr><tr><td>1.50</td><td>7.63</td><td>7.60</td><td>7.58</td></tr><tr><td>1.00</td><td>6.87</td><td>6.84</td><td>6.82</td></tr><tr><td>0.50</td><td>6.08</td><td>6.15</td><td>6.13</td></tr><tr><td>0.00</td><td>5.32</td><td>5.37</td><td>5.35</td></tr></table>		Output Voltage [V]	Load Current [A]			Input Volt. 90[V]	Input Volt. 100[V]	Input Volt. 110[V]	5.00	12.38	12.38	12.36	4.75	12.00	11.92	11.87	4.50	11.55	11.47	11.42	4.00	11.13	11.06	11.02	3.50	10.40	10.34	10.30	3.00	9.78	9.73	9.69	2.50	9.00	8.96	8.92	2.00	8.37	8.33	8.30	1.50	7.63	7.60	7.58	1.00	6.87	6.84	6.82	0.50	6.08	6.15	6.13	0.00	5.32	5.37	5.35
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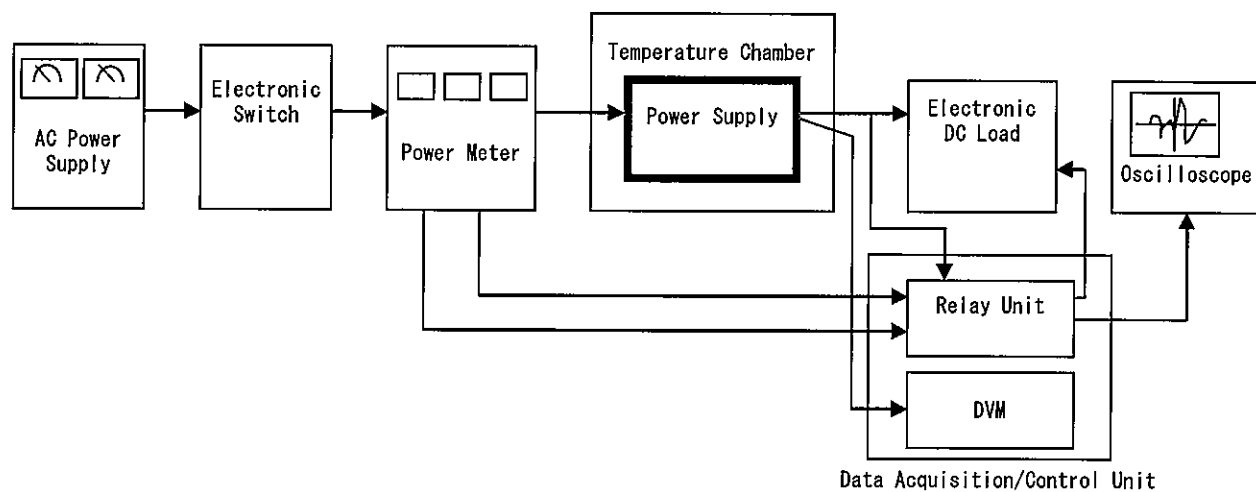


Figure A