

TEST DATA OF G1-24

Regulated DC Power Supply
July 23, 2010

Approved by : Eiyoshi Wakamatsu
Eiyoshi Wakamatsu Design Manager

Prepared by : Satoshi Kinoshita
Satoshi Kinoshita Design Engineer

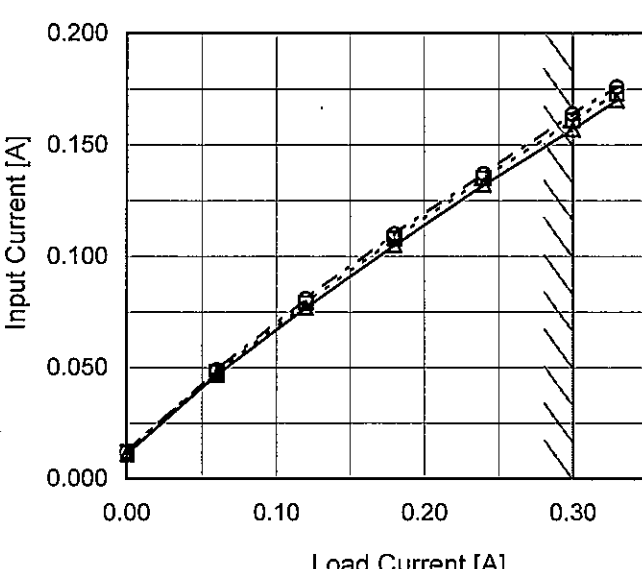
COSEL CO.,LTD.

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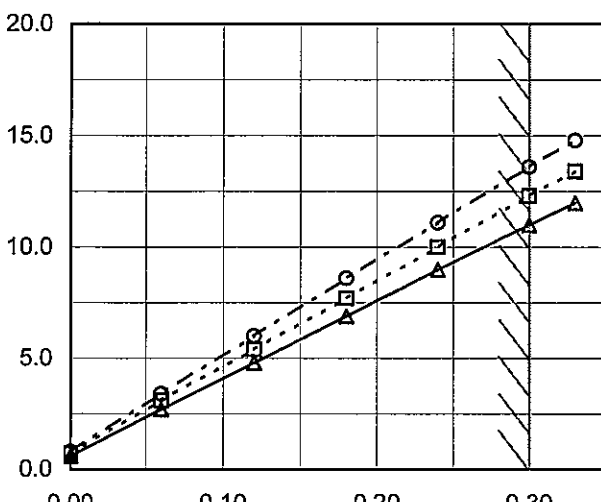
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1.Graph				2.Values																																																				
<div><div><div>—△—</div><div>---□---</div><div>-○-</div></div><div>Input Volt. 90V</div><div>Input Volt. 100V</div><div>Input Volt. 110V</div></div> 				<table><tr><th rowspan="2">Load 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>0.00</td><td>0.011</td><td>0.012</td><td>0.012</td></tr><tr><td>0.06</td><td>0.047</td><td>0.048</td><td>0.049</td></tr><tr><td>0.12</td><td>0.077</td><td>0.079</td><td>0.081</td></tr><tr><td>0.18</td><td>0.105</td><td>0.108</td><td>0.110</td></tr><tr><td>0.24</td><td>0.132</td><td>0.135</td><td>0.137</td></tr><tr><td>0.30</td><td>0.157</td><td>0.161</td><td>0.164</td></tr><tr><td>0.33</td><td>0.170</td><td>0.173</td><td>0.176</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><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]	0.00	0.011	0.012	0.012	0.06	0.047	0.048	0.049	0.12	0.077	0.079	0.081	0.18	0.105	0.108	0.110	0.24	0.132	0.135	0.137	0.30	0.157	0.161	0.164	0.33	0.170	0.173	0.176	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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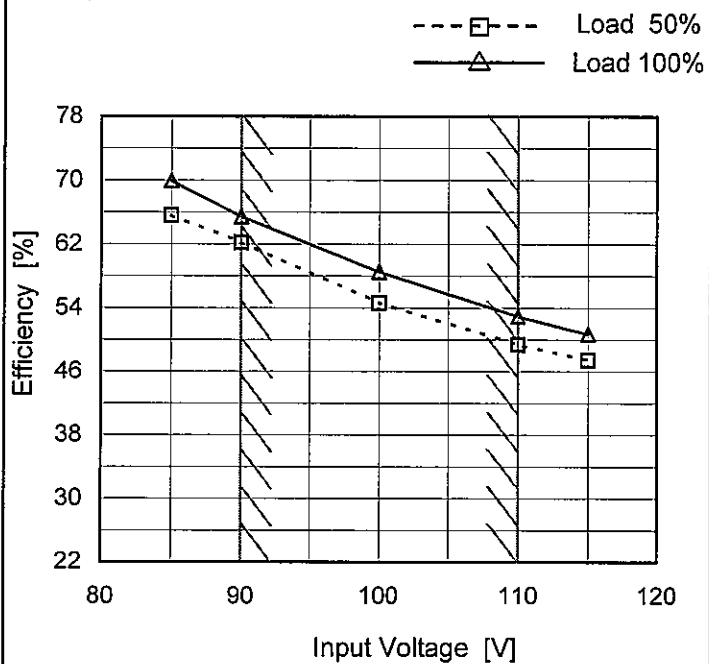
Model G1-24

Item Efficiency (by Input Voltage)

Object

Temperature 25°C
Testing Circuitry Figure A

1. Graph



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

2. Values

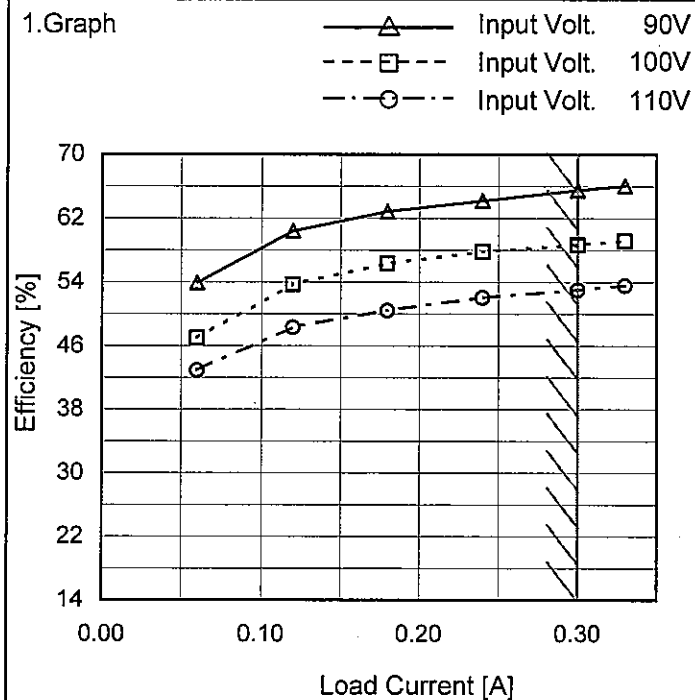
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
85	65.6	69.9
90	62.2	65.5
100	54.6	58.5
110	49.4	52.9
115	47.5	50.7
--	-	-
--	-	-
--	-	-
--	-	-

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Model	G1-24
Item	Efficiency (by Load Current)
Object	

Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

Load Current [A]	Efficiency [%]		
	Input Volt. 90[V]	Input Volt. 100[V]	Input Volt. 110[V]
0.00	-	-	-
0.06	54.0	47.0	42.9
0.12	60.4	53.7	48.3
0.18	62.9	56.3	50.5
0.24	64.2	57.8	52.0
0.30	65.6	58.6	53.0
0.33	66.1	59.2	53.6
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model		G1-24		Temperature		25°C																																	
Item		Power Factor (by Input Voltage)		Testing Circuitry		Figure A																																	
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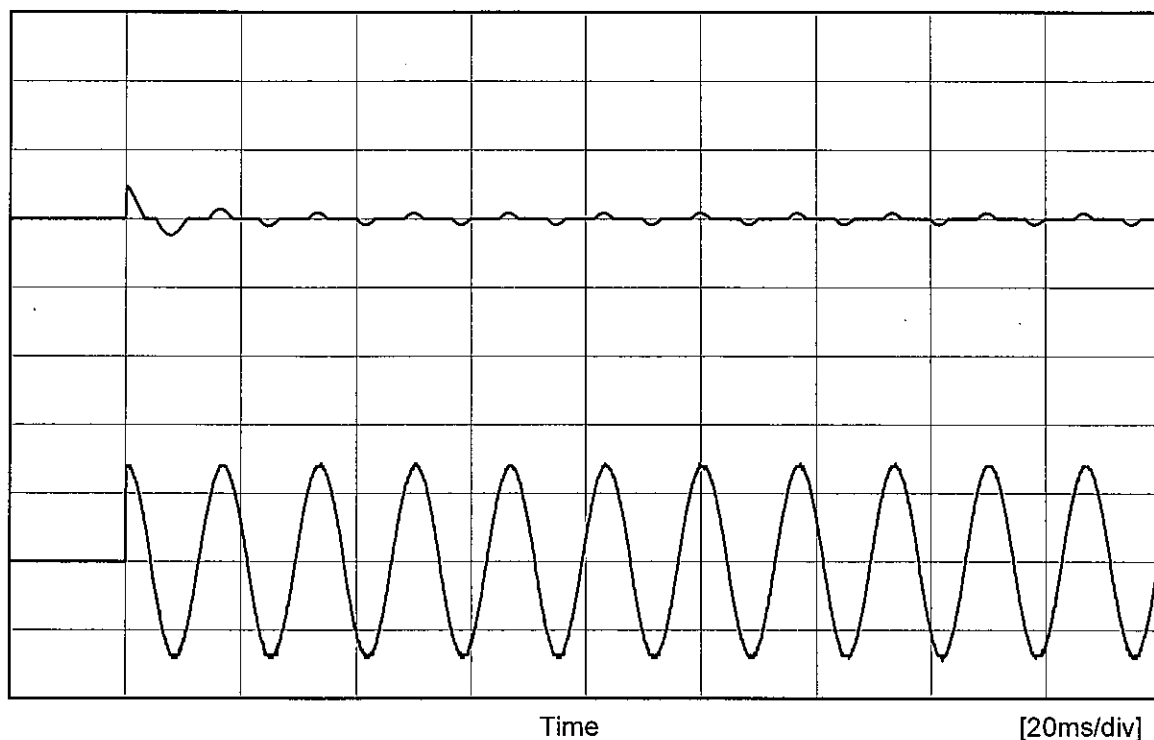
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<div><div><div>—△—</div><div>Input Volt.</div><div>90V</div></div><div><div>---□---</div><div>Input Volt.</div><div>100V</div></div><div><div>---○---</div><div>Input Volt.</div><div>110V</div></div></div> <p>Power Factor</p> <p>Load Current [A]</p> <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">Power Factor</th></tr><tr><th>Input Volt. 90[V]</th><th>Input Volt. 100[V]</th><th>Input Volt. 110[V]</th></tr><tr><td>0.00</td><td>-</td><td>-</td><td>-</td></tr><tr><td>0.06</td><td>0.653</td><td>0.646</td><td>0.630</td></tr><tr><td>0.12</td><td>0.696</td><td>0.684</td><td>0.674</td></tr><tr><td>0.18</td><td>0.726</td><td>0.718</td><td>0.711</td></tr><tr><td>0.24</td><td>0.756</td><td>0.741</td><td>0.735</td></tr><tr><td>0.30</td><td>0.775</td><td>0.764</td><td>0.756</td></tr><tr><td>0.33</td><td>0.784</td><td>0.775</td><td>0.763</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><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>			Load Current [A]	Power Factor			Input Volt. 90[V]	Input Volt. 100[V]	Input Volt. 110[V]	0.00	-	-	-	0.06	0.653	0.646	0.630	0.12	0.696	0.684	0.674	0.18	0.726	0.718	0.711	0.24	0.756	0.741	0.735	0.30	0.775	0.764	0.756	0.33	0.784	0.775	0.763	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Model	G1-24	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	_____		

Input
Current
[5A/div]

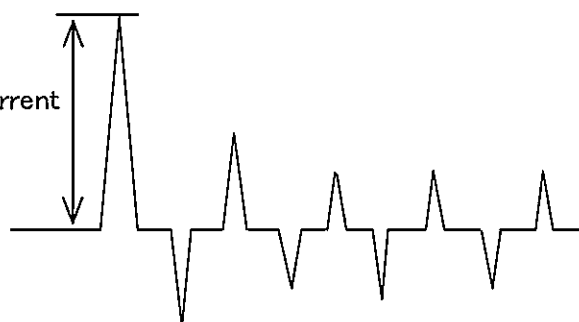
Input
Voltage
[100V/div]



Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current 2.4 A

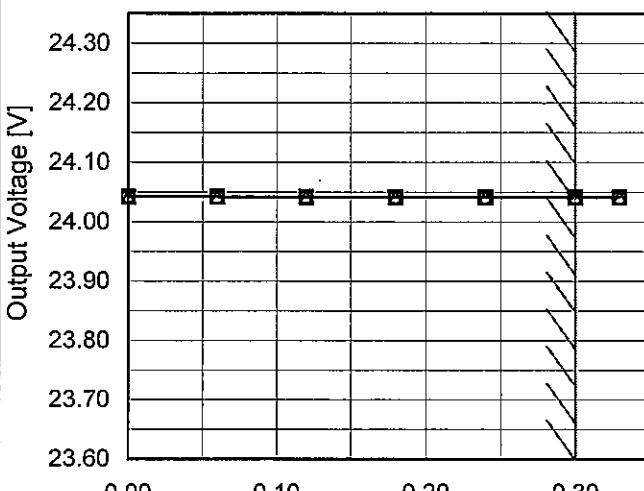
Primary inrush current



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Model	G1-24																																
Item	Line Regulation	Temperature	25°C																														
		Testing Circuitry	Figure A																														
Object	+24V0.3A																																
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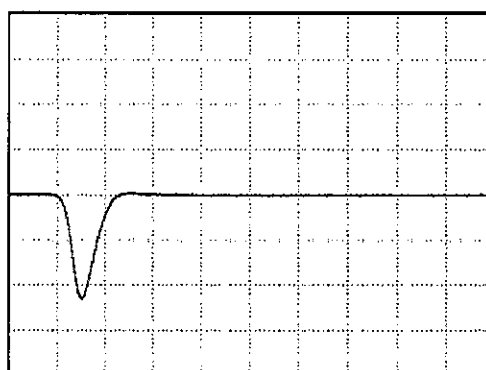
Model	G1-24	Temperature Testing Circuitry	25°C Figure A
Item	Dynamic Load Response		
Object	+24V0.3A		

Input Volt. 100 V
Cycle 1000 ms

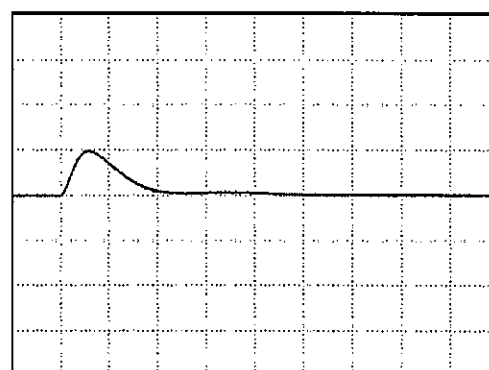
Load Current

Min. Load (0A) \longleftrightarrow
Load 100% (0.3A)

50 mV/div



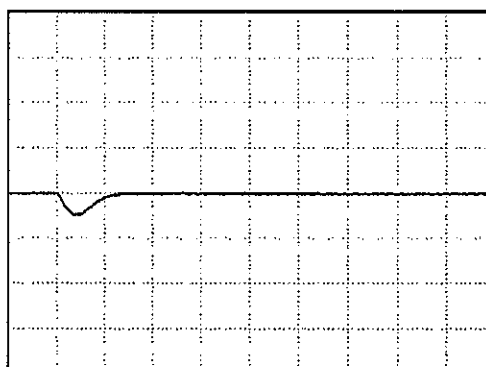
100 μs/div



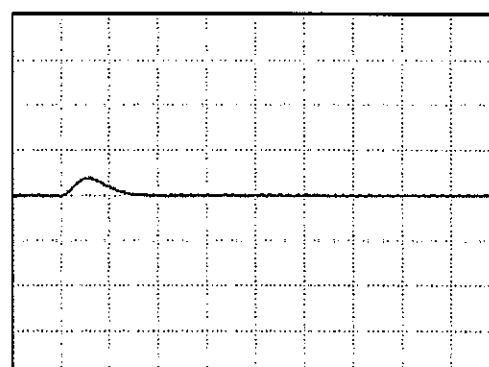
100 μs/div

Load 50% (0.15A) \longleftrightarrow
Load 100% (0.3A)

50 mV/div



100 μs/div



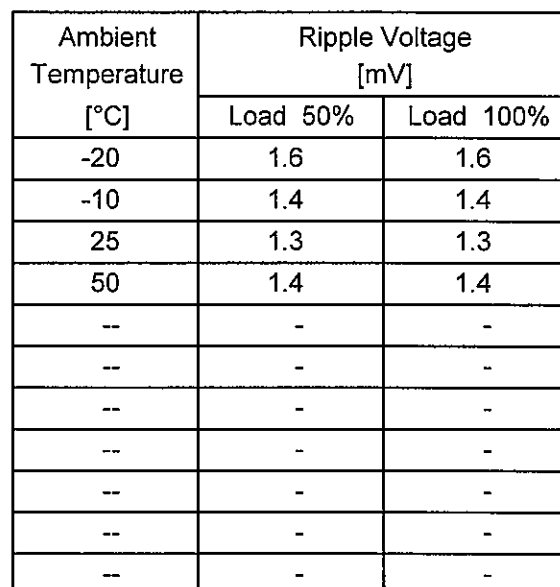
100 μs/div

COSEL

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Object	+24V0.3A																																											
1.Graph		2.Values																																										
<div><div><div>△</div><div>Input Volt.90V</div></div><div><div>○</div><div>Input Volt.110V</div></div></div> <p>Ripple Voltage [mV]</p> <p>Load Current [A]</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>0.00</td><td>1.1</td><td>1.1</td></tr><tr><td>0.15</td><td>1.3</td><td>1.3</td></tr><tr><td>0.30</td><td>1.3</td><td>1.3</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]	0.00	1.1	1.1	0.15	1.3	1.3	0.30	1.3	1.3	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																											
	Input Volt. 90 [V]	Input Volt. 110 [V]																																										
0.00	1.1	1.1																																										
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Measured by 20 MHz Oscilloscope. Note: Slanted line shows the range of the rated load current.																																												

Testing Circuitry Figure A

2.Values



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

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		Testing Circuitry Figure A
Model	G1-24	
Item	Output Voltage Accuracy	
Object	+24V0.3A	

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 - 0.3A

* 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

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	10	100	0	24.044	±10	±0.1
Minimum Voltage	50	110	0.3	24.025		

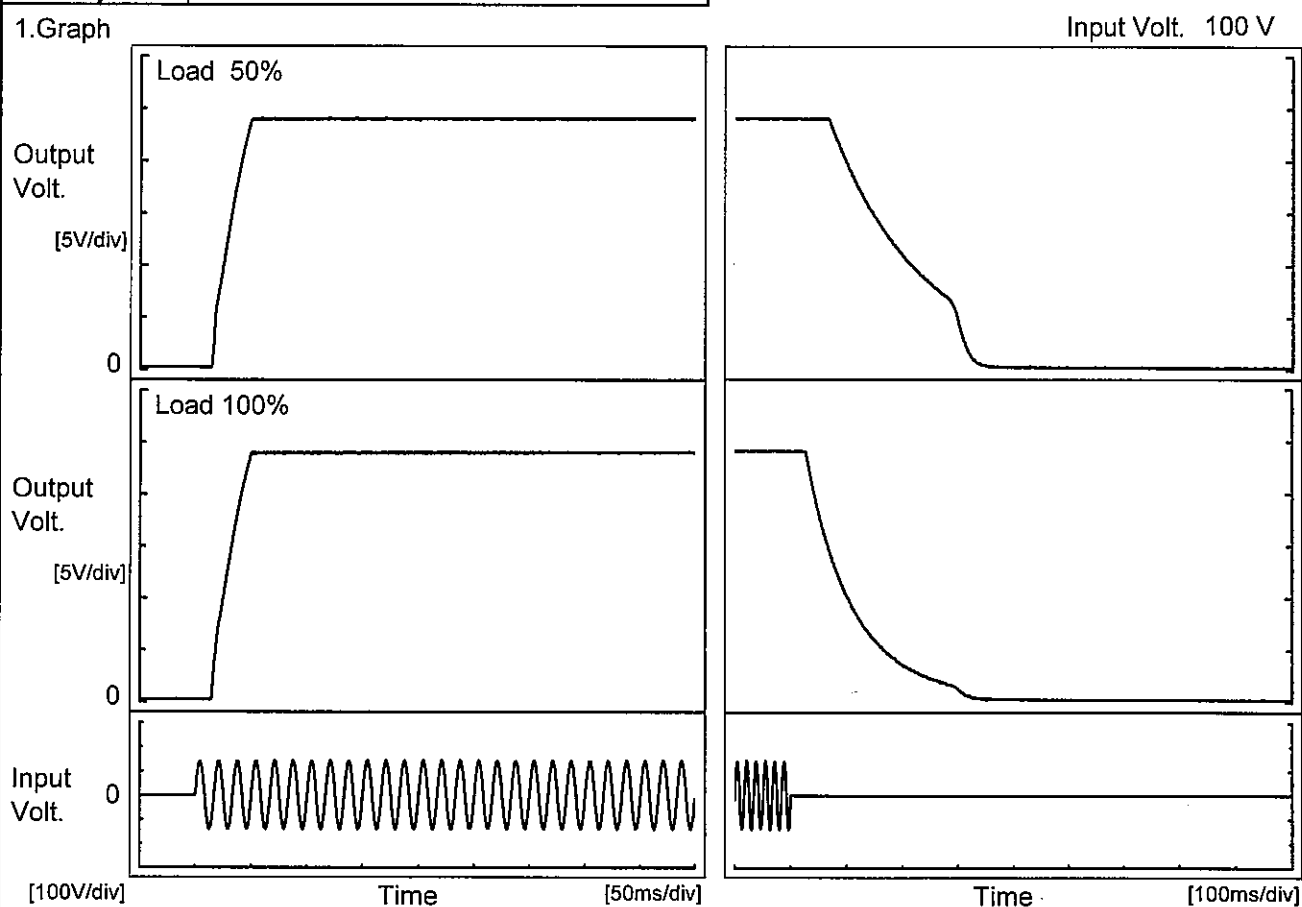
COSEL

Model	G1-24		
Item	Time Lapse Drift	Temperature	25°C
		Testing Circuitry	Figure A
Object	+24V0.3A		
1.Graph		2.Values	
<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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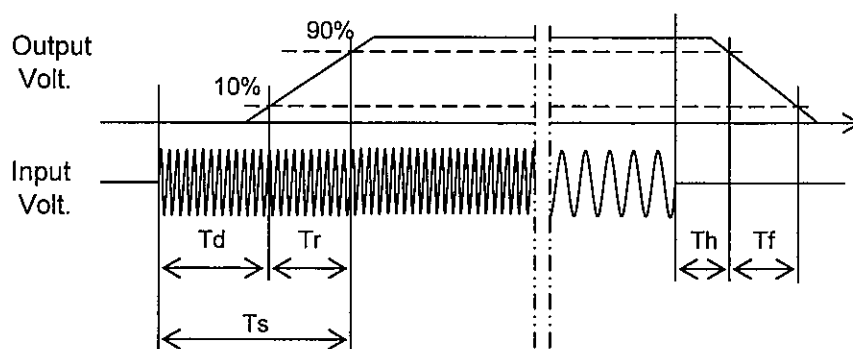
Model	G1-24	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+24V0.3A		

1. Graph



2. Values

		[ms]				
Load	Time	Td	Tr	Ts	Th	Tf
50 %		16.3	28.5	44.8	84.5	226.5
100 %		16.0	28.8	44.8	34.5	201.5



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Model		G1-24	Temperature		25°C																																
Item		Hold-Up Time	Testing Circuitry		Figure A																																
Object		+24V0.3A																																			
1.Graph			2.Values																																		
<div><div><div>---□---</div><div>Load 50%</div></div><div><div>—△—</div><div>Load 100%</div></div></div> <table><thead><tr><th rowspan="2">Input Voltage [V]</th><th colspan="2">Hold-Up Time [ms]</th></tr><tr><th>Load 50%</th><th>Load 100%</th></tr></thead><tbody><tr><td>85</td><td>31</td><td>8</td></tr><tr><td>90</td><td>44</td><td>14</td></tr><tr><td>100</td><td>70</td><td>27</td></tr><tr><td>110</td><td>96</td><td>40</td></tr><tr><td>115</td><td>109</td><td>47</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]	Hold-Up Time [ms]		Load 50%	Load 100%	85	31	8	90	44	14	100	70	27	110	96	40	115	109	47	--	-	-	--	-	-	--	-	-	--	-	-			
Input Voltage [V]	Hold-Up Time [ms]																																				
	Load 50%	Load 100%																																			
85	31	8																																			
90	44	14																																			
100	70	27																																			
110	96	40																																			
115	109	47																																			
--	-	-																																			
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<p>This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.</p> <p>Note: Slanted line shows the range of the rated input voltage.</p>																																					

Model	G1-24	Temperature	25°C																																																			
Item	Instantaneous Interruption Compensation	Testing Circuitry	Figure A																																																			
Object	+24V0.3A																																																					
1.Graph		2.Values																																																				
<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>Instantaneous Compensation Time [ms]</p> <p>Load Current [A]</p> <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">Time [ms]</th></tr><tr><th>Input Volt. 90[V]</th><th>Input Volt. 100[V]</th><th>Input Volt. 110[V]</th></tr><tr><td>0.00</td><td>-</td><td>-</td><td>-</td></tr><tr><td>0.06</td><td>132</td><td>194</td><td>256</td></tr><tr><td>0.12</td><td>59</td><td>91</td><td>124</td></tr><tr><td>0.18</td><td>30</td><td>56</td><td>77</td></tr><tr><td>0.24</td><td>21</td><td>38</td><td>54</td></tr><tr><td>0.30</td><td>6</td><td>23</td><td>40</td></tr><tr><td>0.33</td><td>5</td><td>21</td><td>36</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><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Time [ms]			Input Volt. 90[V]	Input Volt. 100[V]	Input Volt. 110[V]	0.00	-	-	-	0.06	132	194	256	0.12	59	91	124	0.18	30	56	77	0.24	21	38	54	0.30	6	23	40	0.33	5	21	36	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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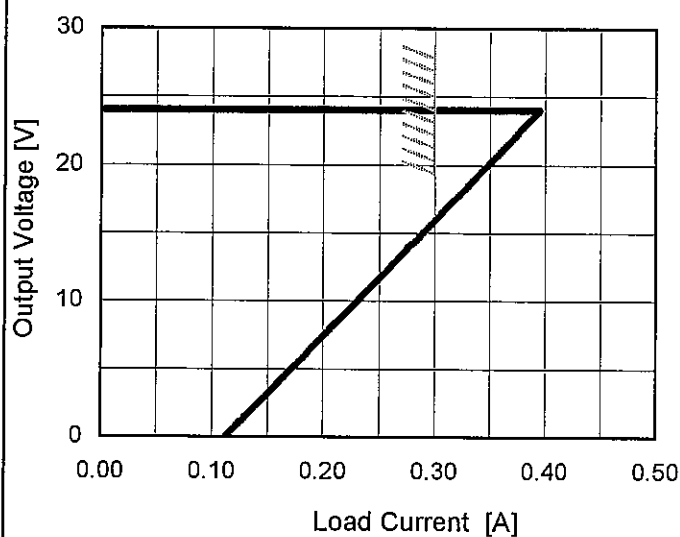
Model	G1-24																																						
Item	Minimum Input Voltage for Regulated Output Voltage	Testing Circuitry Figure A																																					
Object	+24V0.3A																																						
1.Graph		2.Values																																					
<div><div><div>---□---</div><div>Load 50%</div></div><div><div>—△—</div><div>Load 100%</div></div></div> <table><thead><tr><th>Ambient Temperature [°C]</th><th>Load 50% [V]</th><th>Load 100% [V]</th></tr></thead><tbody><tr><td>-20</td><td>71</td><td>76</td></tr><tr><td>-10</td><td>71</td><td>77</td></tr><tr><td>0</td><td>71</td><td>77</td></tr><tr><td>10</td><td>72</td><td>77</td></tr><tr><td>20</td><td>72</td><td>77</td></tr><tr><td>25</td><td>72</td><td>78</td></tr><tr><td>30</td><td>72</td><td>78</td></tr><tr><td>40</td><td>72</td><td>78</td></tr><tr><td>50</td><td>72</td><td>78</td></tr><tr><td>60</td><td>72</td><td>79</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table> <p>Note: Slanted line shows the range of the rated ambient temperature.</p>		Ambient Temperature [°C]	Load 50% [V]	Load 100% [V]	-20	71	76	-10	71	77	0	71	77	10	72	77	20	72	77	25	72	78	30	72	78	40	72	78	50	72	78	60	72	79	--	-	-		
Ambient Temperature [°C]	Load 50% [V]	Load 100% [V]																																					
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Model	G1-24
Item	Overcurrent Protection
Object	+24V0.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

— Input Volt. 90V
— Input Volt. 100V
— Input Volt. 110V



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

2.Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 90[V]	Input Volt. 100[V]	Input Volt. 110[V]
24.0	0.39	0.39	0.39
22.8	0.38	0.38	0.38
21.6	0.37	0.37	0.37
19.2	0.34	0.34	0.34
16.8	0.31	0.31	0.31
14.4	0.29	0.29	0.29
12.0	0.26	0.25	0.25
9.6	0.23	0.23	0.23
7.2	0.20	0.20	0.20
4.8	0.17	0.17	0.17
2.4	0.14	0.14	0.14
0.0	0.11	0.11	0.11

COSEL

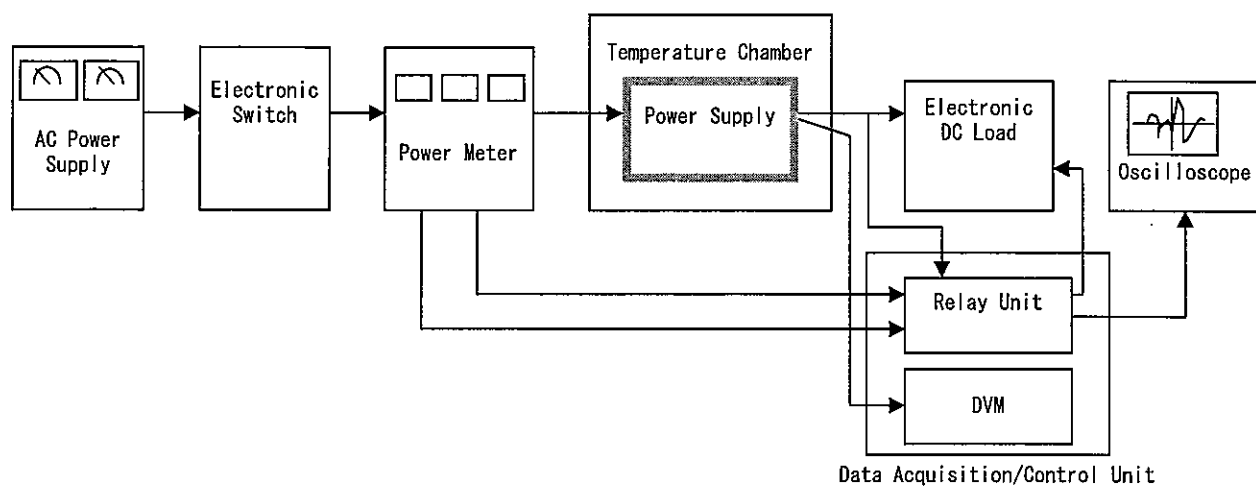


Figure A