

TEST DATA OF MGFS32415

Regulated DC Power Supply
January 6, 2017

Approved by : Takayuki Fukuda
Takayuki Fukuda Design Manager

Prepared by : Takaaki Sekiguchi
Takaaki Sekiguchi Design Engineer

COSEL CO.,LTD.

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<p>1.Graph</p> <p style="text-align: right;"> ---□--- Load 50% —△— Load 100% </p> <p>Note: Slanted line shows the range of the rated input voltage.</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Output Voltage [V]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr> <td>8.6</td> <td>14.987</td> <td>- ※</td> </tr> <tr> <td>9.0</td> <td>14.987</td> <td>- ※</td> </tr> <tr> <td>12.0</td> <td>14.988</td> <td>14.980</td> </tr> <tr> <td>15.0</td> <td>14.988</td> <td>14.985</td> </tr> <tr> <td>18.0</td> <td>14.988</td> <td>14.980</td> </tr> <tr> <td>24.0</td> <td>14.987</td> <td>14.980</td> </tr> <tr> <td>30.0</td> <td>14.987</td> <td>14.984</td> </tr> <tr> <td>36.0</td> <td>14.986</td> <td>14.980</td> </tr> <tr> <td>40.0</td> <td>14.986</td> <td>14.983</td> </tr> </tbody> </table> <p>※ Maximum output current at minimum input Voltage is 80% of rated load current. Refer to instruction manuals for details of input derating.</p>		Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	8.6	14.987	- ※	9.0	14.987	- ※	12.0	14.988	14.980	15.0	14.988	14.985	18.0	14.988	14.980	24.0	14.987	14.980	30.0	14.987	14.984	36.0	14.986	14.980	40.0	14.986	14.983
Input Voltage [V]	Output Voltage [V]																																		
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<p>Model MGFS32415</p>		<p>Temperature 25°C</p>																																																																														
<p>Item Load Regulation</p>		<p>Testing Circuitry Figure A</p>																																																																														
<p>Object +15V0.2A</p>																																																																																
<p>1.Graph</p> <p> —△— Input Volt. 9V ---□--- Input Volt. 12V -·*·-·- Input Volt. 18V -·○-·- Input Volt. 24V --◇-- Input Volt. 36V </p> <p>Output Voltage [V]</p> <p>Load Current [A]</p> <p>Note: Slanted line shows the range of the rated load current.</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="5">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 9[V]</th> <th>Input Volt. 12[V]</th> <th>Input Volt. 18[V]</th> <th>Input Volt. 24[V]</th> <th>Input Volt. 36[V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>14.994</td><td>14.994</td><td>14.994</td><td>14.993</td><td>14.994</td></tr> <tr><td>0.04</td><td>14.992</td><td>14.992</td><td>14.991</td><td>14.991</td><td>14.990</td></tr> <tr><td>0.08</td><td>14.990</td><td>14.990</td><td>14.989</td><td>14.989</td><td>14.988</td></tr> <tr><td>0.12</td><td>14.988</td><td>14.989</td><td>14.988</td><td>14.987</td><td>14.986</td></tr> <tr><td>0.16</td><td>14.985</td><td>14.986</td><td>14.986</td><td>14.985</td><td>14.984</td></tr> <tr><td>0.18</td><td>14.983</td><td>14.984</td><td>14.984</td><td>14.984</td><td>14.983</td></tr> <tr><td>0.20</td><td>- ※</td><td>14.983</td><td>14.983</td><td>14.982</td><td>14.981</td></tr> <tr><td>0.22</td><td>- ※</td><td>14.983</td><td>14.983</td><td>14.982</td><td>14.981</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table> <p>※ Maximum output current at minimum input Voltage is 80% of rated load current. Refer to instruction manuals for details of input derating.</p>		Load Current [A]	Output Voltage [V]					Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	0.00	14.994	14.994	14.994	14.993	14.994	0.04	14.992	14.992	14.991	14.991	14.990	0.08	14.990	14.990	14.989	14.989	14.988	0.12	14.988	14.989	14.988	14.987	14.986	0.16	14.985	14.986	14.986	14.985	14.984	0.18	14.983	14.984	14.984	14.984	14.983	0.20	- ※	14.983	14.983	14.982	14.981	0.22	- ※	14.983	14.983	14.982	14.981	--	-	-	-	-	-	--	-	-	-	-	-	--	-	-	-	-	-
Load Current [A]	Output Voltage [V]																																																																															
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Model		MGFS32415	
Item		Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object		+15V0.2A	

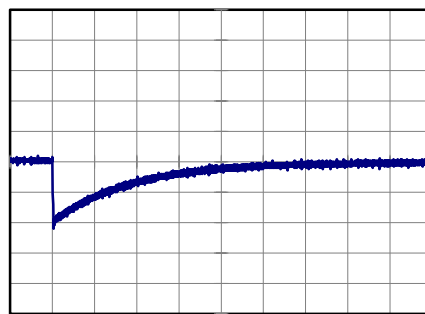
Input Volt. 24 V
Cycle 100 ms

t1,t2 = 100 μs

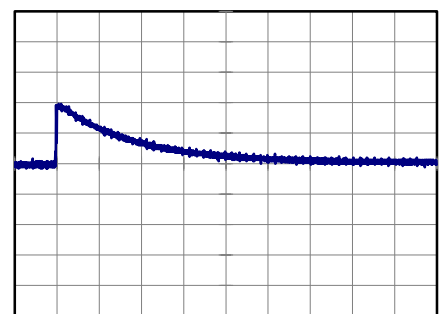


Min.Load (0A) ←→
Load 100% (0.2A)

100 mV/div



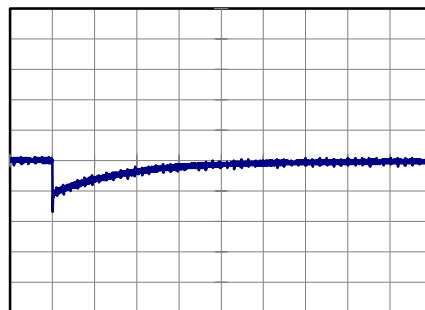
4 ms/div



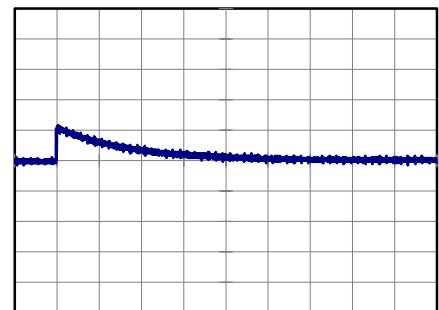
4 ms/div

Min.Load (0A) ←→
Load 50% (0.1A)

100 mV/div



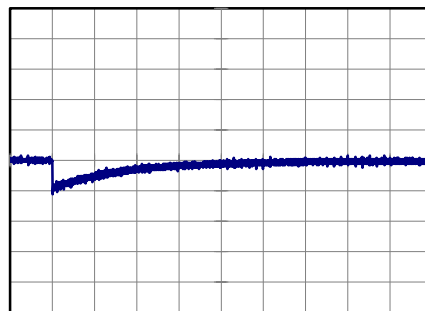
4 ms/div



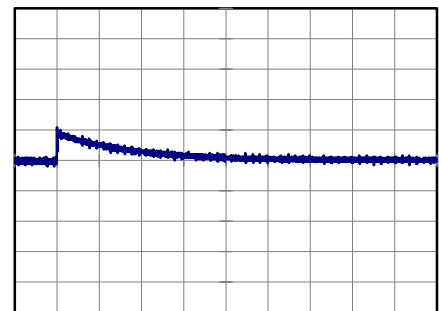
4 ms/div

Load 50% (0.1A) ←→
Load 100% (0.2A)

100 mV/div



4 ms/div



4 ms/div

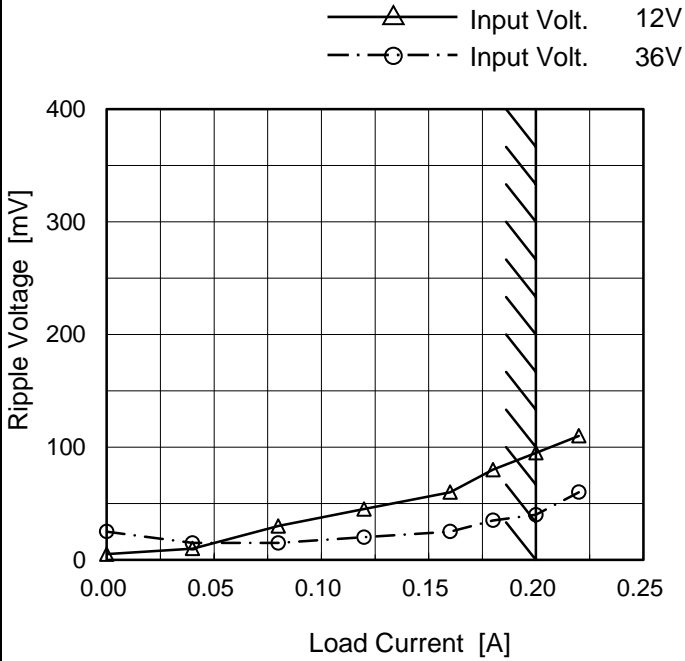


<p>Model MGFS32415</p>		<p>Temperature 25°C Testing Circuitry Figure B</p>																																						
Item	Ripple Voltage (by Load Current)																																							
Object	+15V0.2A																																							
<p>1.Graph</p> <div style="text-align: right;"> <p>—△— Input Volt. 12V -·-○-·- Input Volt. 36V</p> </div> <p>Measured by 100 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>Ripple [mVp-p]</p> <p>Fig.Complex Ripple Wave Form</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. 12 [V]</th> <th>Input Volt. 36 [V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>5</td><td>20</td></tr> <tr><td>0.04</td><td>10</td><td>10</td></tr> <tr><td>0.08</td><td>30</td><td>15</td></tr> <tr><td>0.12</td><td>40</td><td>15</td></tr> <tr><td>0.16</td><td>55</td><td>20</td></tr> <tr><td>0.18</td><td>70</td><td>30</td></tr> <tr><td>0.20</td><td>85</td><td>35</td></tr> <tr><td>0.22</td><td>100</td><td>55</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. 12 [V]	Input Volt. 36 [V]	0.00	5	20	0.04	10	10	0.08	30	15	0.12	40	15	0.16	55	20	0.18	70	30	0.20	85	35	0.22	100	55	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																							
	Input Volt. 12 [V]	Input Volt. 36 [V]																																						
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Model	MGFS32415	Temperature	25°C
Item	Ripple-Noise	Testing Circuitry	Figure B
Object	+15V0.2A		

1.Graph



2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 12 [V]	Input Volt. 36 [V]
0.00	5	25
0.04	10	15
0.08	30	15
0.12	45	20
0.16	60	25
0.18	80	35
0.20	95	40
0.22	110	60
--	-	-
--	-	-
--	-	-

Measured by 100 MHz Oscilloscope.
 Ripple-Noise is shown as p-p in the figure below.
 Note: Slanted line shows the range of the rated load current.

Ripple Noise[mVp-p]

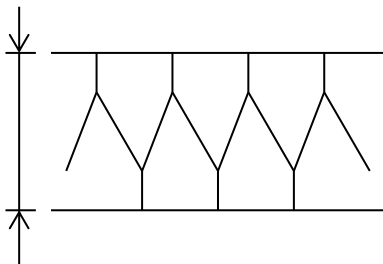


Fig.Complex Ripple Noise Wave Form

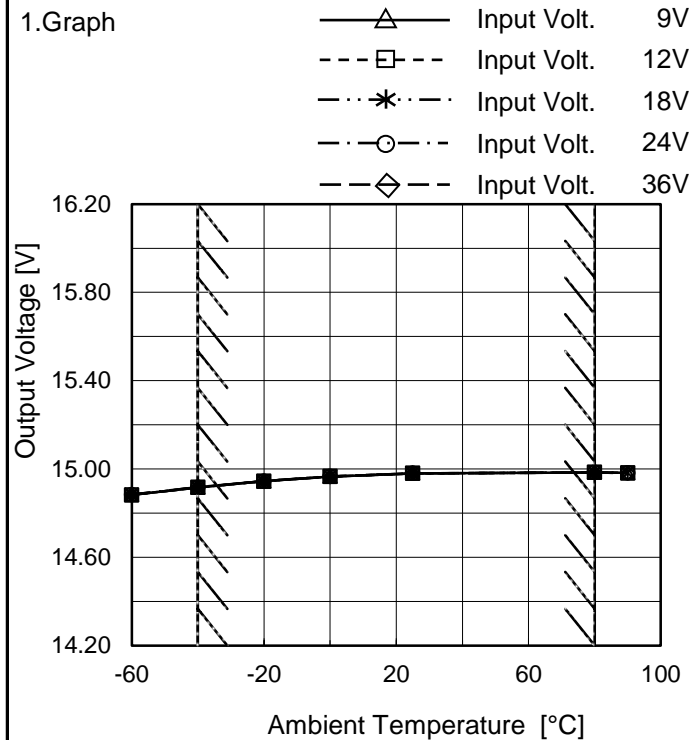


COSEL																																								
Model	MGFS32415																																							
Item	Ripple Voltage (by Ambient Temp.)	Testing Circuitry Figure B																																						
Object	+15V0.2A																																							
<p>1.Graph</p> <p style="text-align: center;">Ambient Temperature [°C] Input Volt. 24V</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>-60</td><td>25</td><td>55</td></tr> <tr><td>-40</td><td>20</td><td>55</td></tr> <tr><td>-20</td><td>15</td><td>50</td></tr> <tr><td>0</td><td>15</td><td>50</td></tr> <tr><td>25</td><td>15</td><td>50</td></tr> <tr><td>80</td><td>20</td><td>50</td></tr> <tr><td>90</td><td>20</td><td>50</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>	Ambient Temperature [°C]	Ripple Voltage [mV]		Load 50%	Load 100%	-60	25	55	-40	20	55	-20	15	50	0	15	50	25	15	50	80	20	50	90	20	50	--	-	-	--	-	-	--	-	-	--	-	-
Ambient Temperature [°C]	Ripple Voltage [mV]																																							
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<p>Measured by 100 MHz Oscilloscope. Note: Slanted line shows the range of the rated ambient temperature.</p>																																								



Model	MGFS32415
Item	Ambient Temperature Drift
Object	+15V0.2A

Testing Circuitry Figure A



2.Values

Ambient Temperature [°C]	Output Voltage [V]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
-60	14.883	14.883	14.884	14.884	14.883
-40	14.917	14.916	14.917	14.917	14.916
-20	14.945	14.944	14.945	14.945	14.944
0	14.966	14.966	14.966	14.966	14.965
25	14.980	14.980	14.980	14.980	14.980
80	14.985	14.985	14.985	14.984	14.984
90	14.982	14.982	14.982	14.982	14.982
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

Note: In case of Input Volt. 9V, Load 80%.
Other case Load 100%.



COSEL		Testing Circuitry Figure A
Model	MGFS32415	
Item	Output Voltage Accuracy	
Object	+15V0.2A	

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 : -40 - 80°C

Input Voltage : 12 - 36V

Load Current : 0 - 0.2A

* 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	70	36	0	14.999	±42	±0.3
Minimum Voltage	-40	12	0.2	14.916		



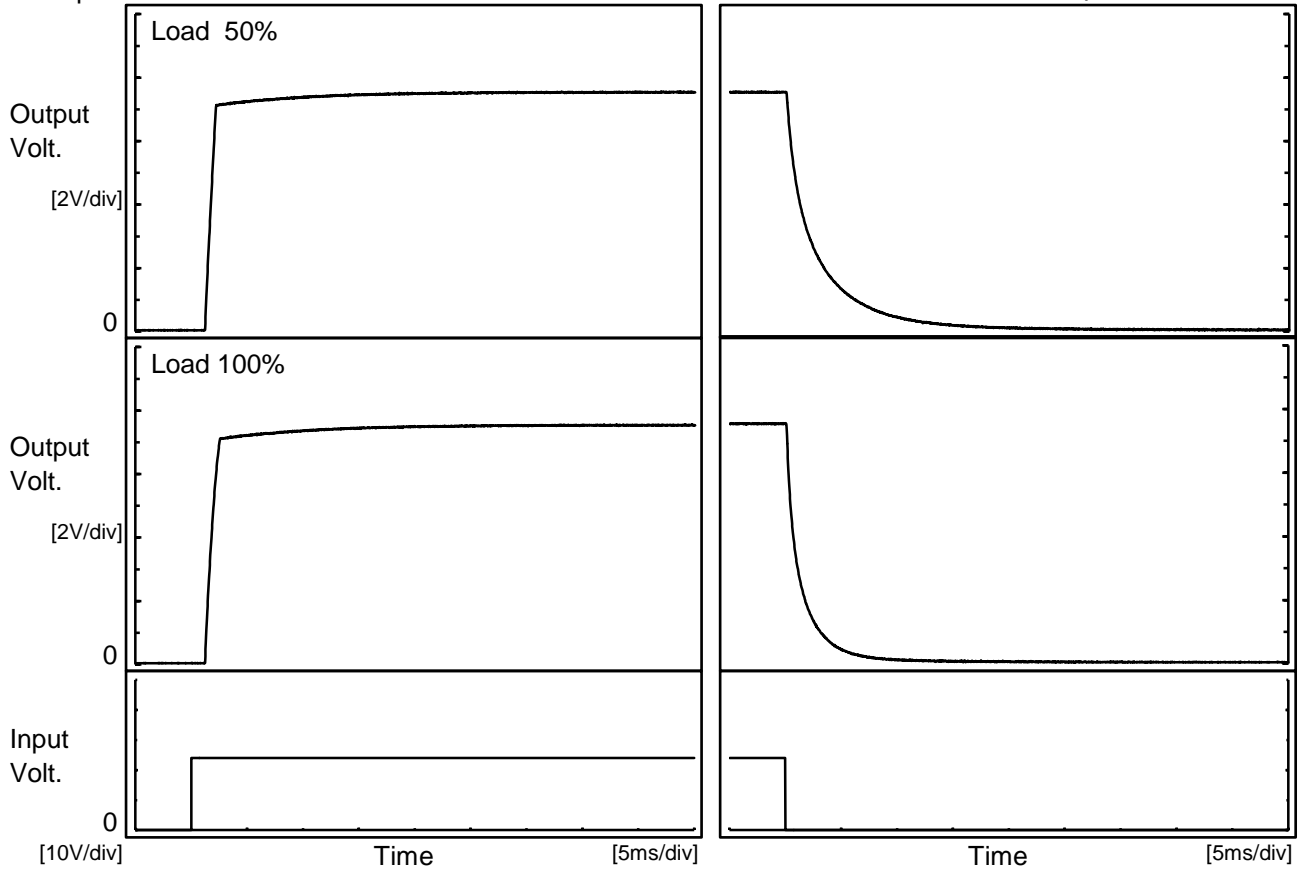
COSEL																								
Model	MGFS32415																							
Item	Time Lapse Drift	Temperature 25°C Testing Circuitry Figure A																						
Object	+15V0.2A																							
<p>1.Graph</p> <p style="text-align: center;">Time [H]</p> <p>Input Volt. 24V Load 100%</p>		<p>2.Values</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>14.980</td></tr> <tr><td>0.5</td><td>14.983</td></tr> <tr><td>1.0</td><td>14.983</td></tr> <tr><td>2.0</td><td>14.983</td></tr> <tr><td>3.0</td><td>14.983</td></tr> <tr><td>4.0</td><td>14.983</td></tr> <tr><td>5.0</td><td>14.983</td></tr> <tr><td>6.0</td><td>14.983</td></tr> <tr><td>7.0</td><td>14.983</td></tr> <tr><td>8.0</td><td>14.983</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	14.980	0.5	14.983	1.0	14.983	2.0	14.983	3.0	14.983	4.0	14.983	5.0	14.983	6.0	14.983	7.0	14.983	8.0	14.983
Time since start [H]	Output Voltage [V]																							
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7.0	14.983																							
8.0	14.983																							



Model	MGFS32415	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+15V0.2A		

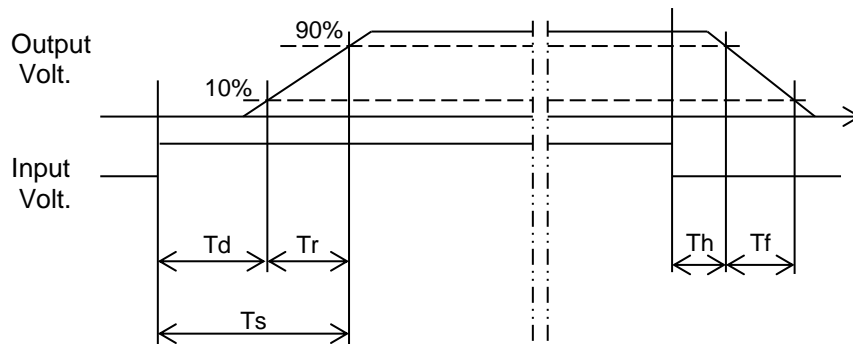
1.Graph

Input Volt. 24 V



2.Values

		[ms]				
Load \ Time	Td	Tr	Ts	Th	Tf	
50 %	1.3	0.9	2.2	0.3	7.2	
100 %	1.3	1.1	2.4	0.2	3.5	





COSEL																																								
Model	MGFS32415																																							
Item	Minimum Input Voltage for Regulated Output Voltage	Testing Circuitry Figure A																																						
Object	+15V0.2A																																							
<p>1.Graph</p> <p style="text-align: right;"> ---□--- Load 50% —△— Load 80% </p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Input Voltage [V]</th> </tr> <tr> <th>Load 50%</th> <th>Load 80%</th> </tr> </thead> <tbody> <tr><td>-60</td><td>7.4</td><td>7.5</td></tr> <tr><td>-40</td><td>7.4</td><td>7.4</td></tr> <tr><td>-20</td><td>7.4</td><td>7.4</td></tr> <tr><td>0</td><td>7.4</td><td>7.4</td></tr> <tr><td>25</td><td>7.3</td><td>7.4</td></tr> <tr><td>80</td><td>7.3</td><td>7.4</td></tr> <tr><td>90</td><td>7.3</td><td>7.4</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>	Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 80%	-60	7.4	7.5	-40	7.4	7.4	-20	7.4	7.4	0	7.4	7.4	25	7.3	7.4	80	7.3	7.4	90	7.3	7.4	--	-	-	--	-	-	--	-	-	--	-	-
Ambient Temperature [°C]	Input Voltage [V]																																							
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COSEL																																																																																				
Model	MGFS32415	Temperature 25°C																																																																																		
Item	Overcurrent Protection	Testing Circuitry Figure A																																																																																		
Object	+15V0.2A																																																																																			
<p>1.Graph</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p style="text-align: center;">Load Current [A]</p> </div> <div style="width: 50%;"> <p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th colspan="5">Load Current [A]</th> </tr> <tr> <th>Input Volt. 9[V]</th> <th>Input Volt. 12[V]</th> <th>Input Volt. 18[V]</th> <th>Input Volt. 24[V]</th> <th>Input Volt. 36[V]</th> </tr> </thead> <tbody> <tr><td>14.3</td><td>0.220</td><td>0.252</td><td>0.257</td><td>0.249</td><td>0.249</td></tr> <tr><td>13.5</td><td>0.227</td><td>0.261</td><td>0.265</td><td>0.257</td><td>0.256</td></tr> <tr><td>12.0</td><td>0.245</td><td>0.282</td><td>0.284</td><td>0.272</td><td>0.269</td></tr> <tr><td>10.5</td><td>0.267</td><td>0.305</td><td>0.303</td><td>0.288</td><td>0.283</td></tr> <tr><td>9.0</td><td>0.293</td><td>0.330</td><td>0.323</td><td>0.305</td><td>0.297</td></tr> <tr><td>7.5</td><td>0.321</td><td>0.357</td><td>0.344</td><td>0.324</td><td>0.313</td></tr> <tr><td>6.0</td><td>0.355</td><td>0.387</td><td>0.368</td><td>0.344</td><td>0.331</td></tr> <tr><td>4.5</td><td>0.392</td><td>0.422</td><td>0.395</td><td>0.366</td><td>0.348</td></tr> <tr><td>3.0</td><td>0.436</td><td>0.461</td><td>0.424</td><td>0.389</td><td>0.366</td></tr> <tr><td>1.5</td><td>0.485</td><td>0.500</td><td>0.449</td><td>0.408</td><td>0.379</td></tr> <tr><td>0.0</td><td>0.467</td><td>0.463</td><td>0.401</td><td>0.358</td><td>0.328</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table> </div> </div>		Output Voltage [V]	Load Current [A]					Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	14.3	0.220	0.252	0.257	0.249	0.249	13.5	0.227	0.261	0.265	0.257	0.256	12.0	0.245	0.282	0.284	0.272	0.269	10.5	0.267	0.305	0.303	0.288	0.283	9.0	0.293	0.330	0.323	0.305	0.297	7.5	0.321	0.357	0.344	0.324	0.313	6.0	0.355	0.387	0.368	0.344	0.331	4.5	0.392	0.422	0.395	0.366	0.348	3.0	0.436	0.461	0.424	0.389	0.366	1.5	0.485	0.500	0.449	0.408	0.379	0.0	0.467	0.463	0.401	0.358	0.328	--	-	-	-	-	-
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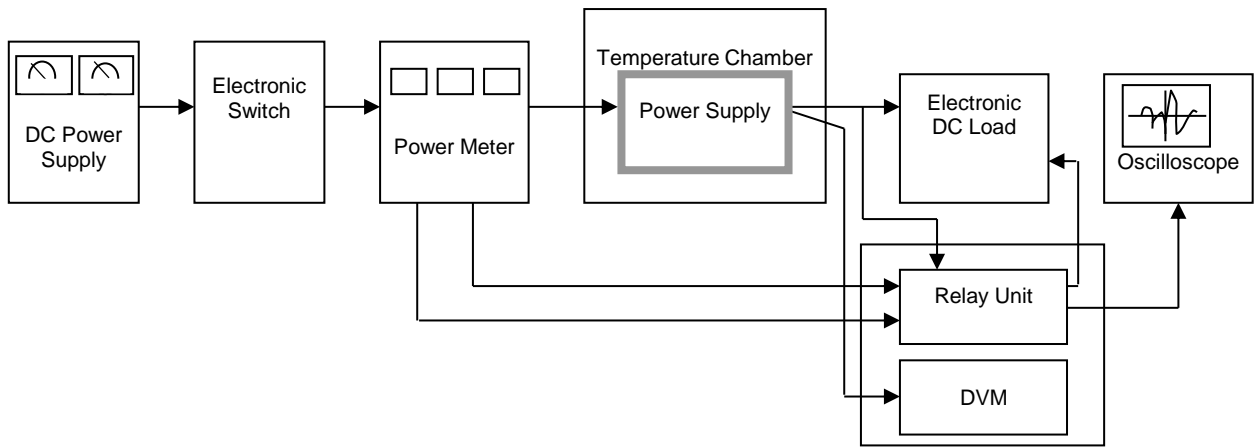


Figure A

Data Acquisition/Control Unit

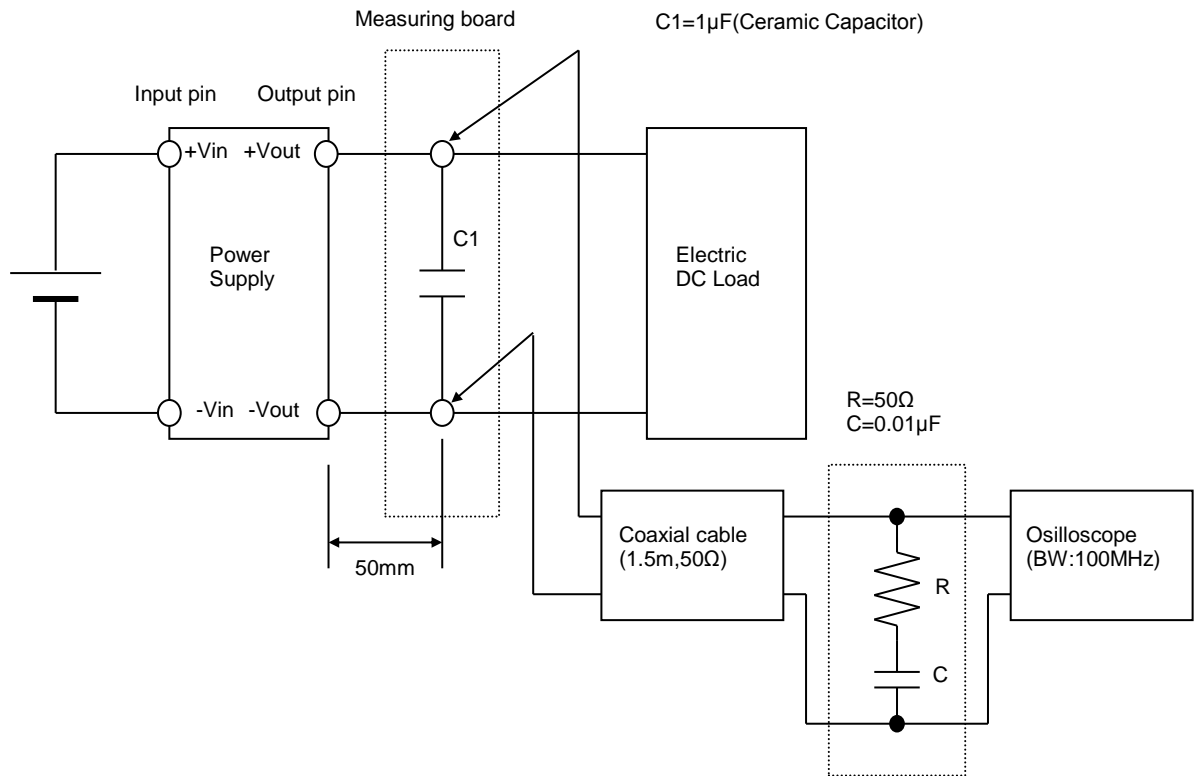


Figure B (Ripple and Ripple noise Characteristic)