

TEST DATA OF MGFS32412

Regulated DC Power Supply
January 6, 2017

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Takayuki Fukuda Design Manager

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Takaaki Sekiguchi Design Engineer

COSEL CO.,LTD.

CONTENTS

1.Input Current (by Input Voltage)	1
2.Input Current (by Load Current)	2
3.Input Power (by Load Current)	3
4.Efficiency (by Input Voltage)	4
5.Efficiency (by Load Current)	5
6.Line Regulation	6
7.Load Regulation	7
8.Dynamic Load Response	8
9.Ripple Voltage (by Load Current)	9
10.Ripple-Noise	10
11.Ripple Voltage (by Ambient Temperature)	11
12.Ambient Temperature Drift	12
13.Output Voltage Accuracy	13
14.Time Lapse Drift	14
15.Rise and Fall Time	15
16.Minimum Input Voltage for Regulated Output Voltage	16
17.Overcurrent Protection	17
18.Switching frequency (by Load Current)	18
19.Figure of Testing Circuitry	19

(Final Page 19)

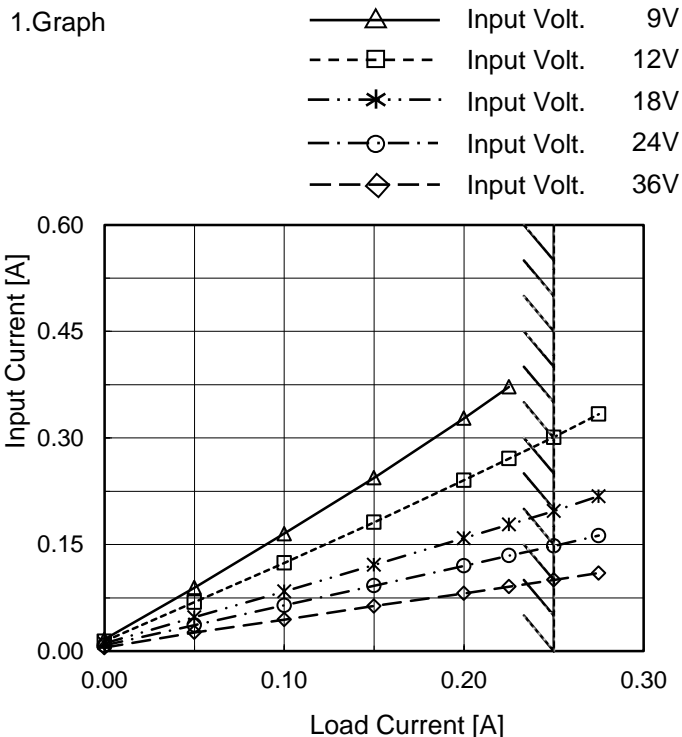


<p>Model MGFS32412</p>		<p>Temperature 25°C Testing Circuitry Figure A</p>																																																																															
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<p>1.Graph</p> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;"> <p>—△— Load 100%</p> <p>- - -□- - Load 50%</p> <p>- · -○- · - Load 0%</p> </div> </div>		<p>2.Values</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="3">Input Current [A]</th> </tr> <tr> <th>Load 0%</th> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>6.0</td><td>0.003</td><td>0.003</td><td>0.002</td></tr> <tr><td>8.0</td><td>0.004</td><td>0.004</td><td>0.003</td></tr> <tr><td>8.2</td><td>0.003</td><td>0.003</td><td>0.004</td></tr> <tr><td>8.4</td><td>0.018</td><td>0.218</td><td>0.449</td></tr> <tr><td>8.6</td><td>0.019</td><td>0.217</td><td>0.431</td></tr> <tr><td>8.8</td><td>0.017</td><td>0.208</td><td>0.424</td></tr> <tr><td>9.0</td><td>0.017</td><td>0.202</td><td>0.413</td></tr> <tr><td>12.0</td><td>0.014</td><td>0.151</td><td>0.301</td></tr> <tr><td>18.0</td><td>0.011</td><td>0.102</td><td>0.197</td></tr> <tr><td>24.0</td><td>0.008</td><td>0.078</td><td>0.148</td></tr> <tr><td>30.0</td><td>0.004</td><td>0.064</td><td>0.119</td></tr> <tr><td>36.0</td><td>0.005</td><td>0.055</td><td>0.100</td></tr> <tr><td>40.0</td><td>0.004</td><td>0.049</td><td>0.090</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> </tbody> </table>	Input Voltage [V]	Input Current [A]			Load 0%	Load 50%	Load 100%	0.0	0.000	0.000	0.000	6.0	0.003	0.003	0.002	8.0	0.004	0.004	0.003	8.2	0.003	0.003	0.004	8.4	0.018	0.218	0.449	8.6	0.019	0.217	0.431	8.8	0.017	0.208	0.424	9.0	0.017	0.202	0.413	12.0	0.014	0.151	0.301	18.0	0.011	0.102	0.197	24.0	0.008	0.078	0.148	30.0	0.004	0.064	0.119	36.0	0.005	0.055	0.100	40.0	0.004	0.049	0.090	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Model	MGFS32412
Item	Input Current (by Load Current)
Object	_____

Temperature 25°C
Testing Circuitry Figure A



2.Values

Load Current [A]	Input Current [A]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.000	0.017	0.014	0.011	0.008	0.005
0.050	0.089	0.069	0.048	0.037	0.026
0.100	0.165	0.124	0.084	0.064	0.044
0.150	0.244	0.181	0.122	0.092	0.064
0.200	0.328	0.241	0.159	0.120	0.081
0.225	0.372	0.271	0.178	0.135	0.091
0.250	- ※	0.301	0.197	0.148	0.100
0.275	- ※	0.334	0.218	0.163	0.110
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

※ Maximum output current at minimum input Voltage is 80% of rated load current. Refer to instruction manuals for details of input derating.



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1.Graph		<p>—△— Input Volt. 9V</p> <p>---□--- Input Volt. 12V</p> <p>-·-·*·-·-·- Input Volt. 18V</p> <p>-·-·○-·-·- Input Volt. 24V</p> <p>---◇--- Input Volt. 36V</p>		2.Values																																																																														
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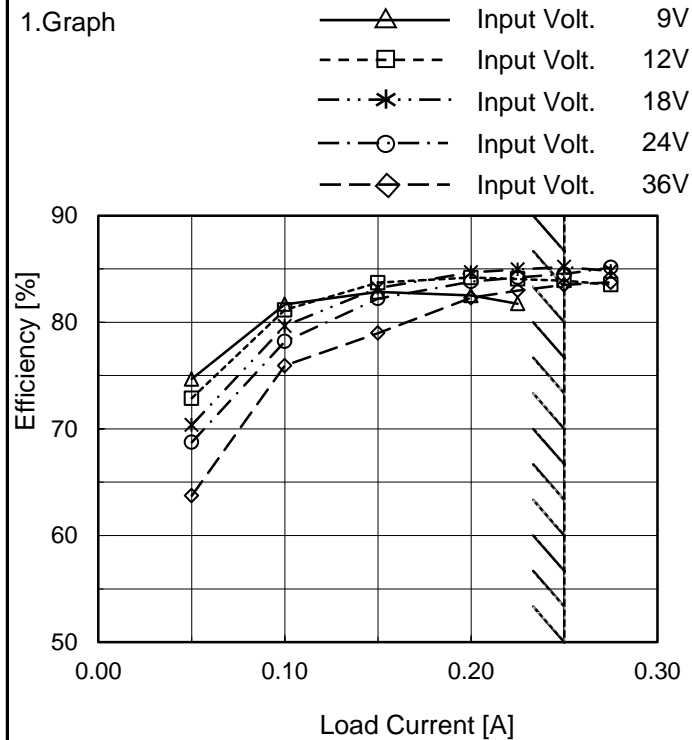


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Item	Efficiency (by Load Current)
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Temperature 25°C
Testing Circuitry Figure A



2.Values

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	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.000	-	-	-	-	-
0.050	74.7	72.9	70.4	68.7	63.7
0.100	81.7	81.2	79.6	78.2	75.9
0.150	82.8	83.7	83.2	82.2	79.0
0.200	82.5	84.2	84.7	83.8	82.3
0.225	81.7	84.0	84.9	84.2	83.0
0.250	- ※	83.9	85.2	84.5	83.5
0.275	- ※	83.5	84.8	85.1	83.7
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Object		Testing Circuitry	Figure A
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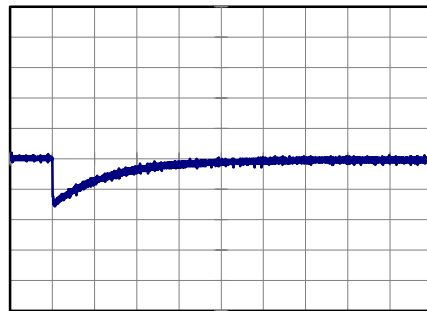
Input Volt. 24 V
Cycle 100 ms

t1,t2 = 100 μs

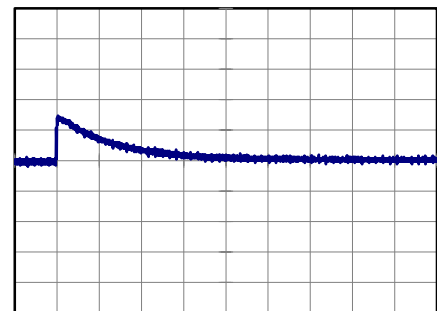


Min.Load (0A) ←→
Load 100% (0.25A)

100 mV/div



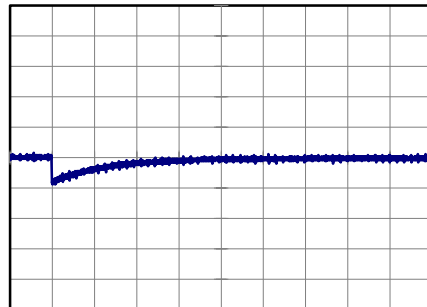
4 ms/div



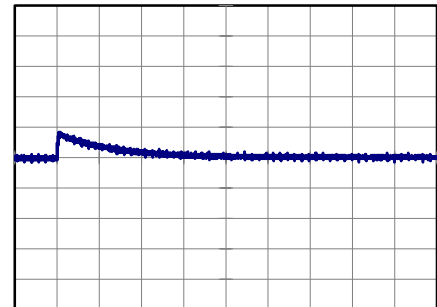
4 ms/div

Min.Load (0A) ←→
Load 50% (0.125A)

100 mV/div



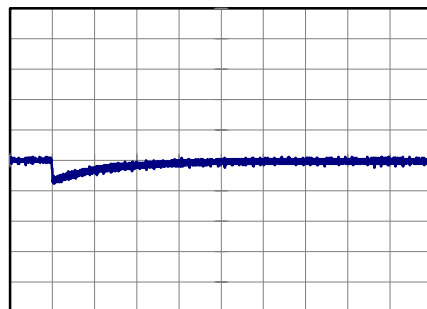
4 ms/div



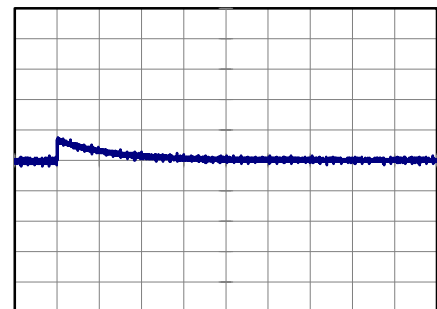
4 ms/div

Load 50% (0.125A) ←→
Load 100% (0.25A)

100 mV/div



4 ms/div



4 ms/div

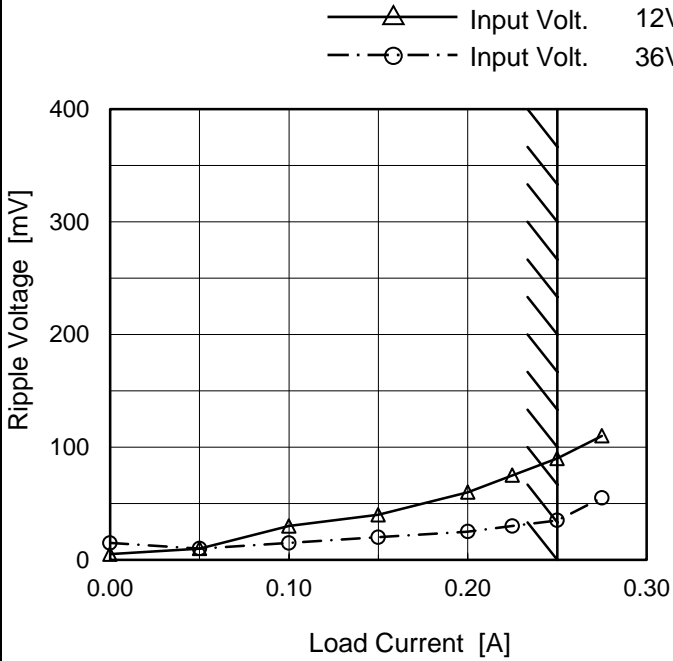


<p>Model MGFS32412</p>		<p>Temperature 25°C Testing Circuitry Figure B</p>																																						
Item	Ripple Voltage (by Load Current)																																							
Object	+12V0.25A																																							
<p>1.Graph</p> <p> —△— Input Volt. 12V - -○- - Input Volt. 36V </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>0.000</td><td>5</td><td>15</td></tr> <tr><td>0.050</td><td>10</td><td>10</td></tr> <tr><td>0.100</td><td>25</td><td>10</td></tr> <tr><td>0.150</td><td>35</td><td>15</td></tr> <tr><td>0.200</td><td>50</td><td>20</td></tr> <tr><td>0.225</td><td>65</td><td>25</td></tr> <tr><td>0.250</td><td>80</td><td>30</td></tr> <tr><td>0.275</td><td>100</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> </tbody> </table>	Load Current [A]	Ripple Voltage [mV]		Input Volt. 12 [V]	Input Volt. 36 [V]	0.000	5	15	0.050	10	10	0.100	25	10	0.150	35	15	0.200	50	20	0.225	65	25	0.250	80	30	0.275	100	50	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																							
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<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>																																								



Model	MGFS32412	Temperature	25°C
Item	Ripple-Noise	Testing Circuitry	Figure B
Object	+12V0.25A		

1.Graph



2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 12 [V]	Input Volt. 36 [V]
0.000	5	15
0.050	10	10
0.100	30	15
0.150	40	20
0.200	60	25
0.225	75	30
0.250	90	35
0.275	110	55
--	-	-
--	-	-
--	-	-

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]

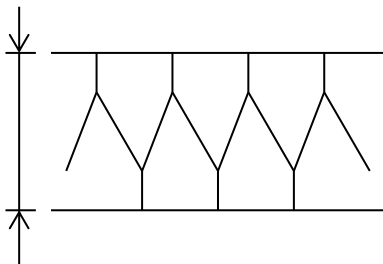


Fig.Complex Ripple Noise Wave Form

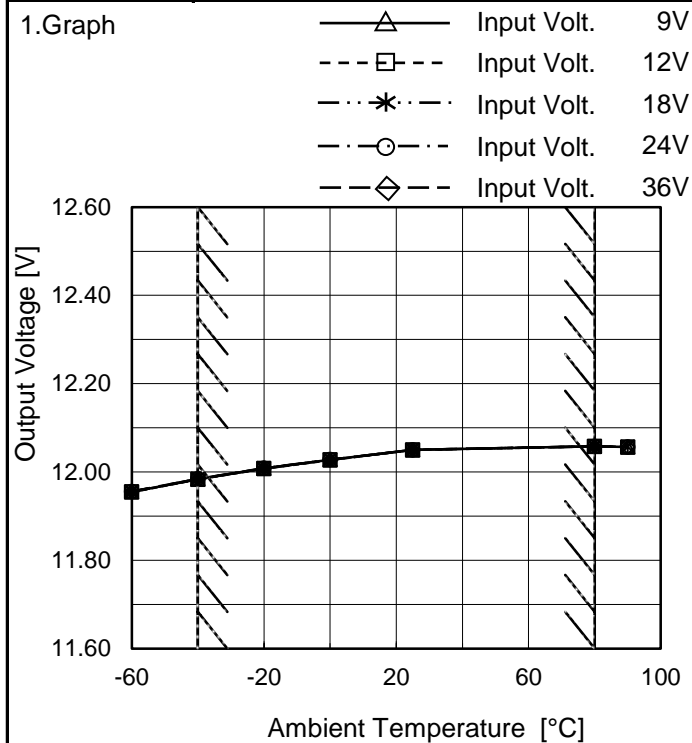


COSEL																																								
Model	MGFS32412																																							
Item	Ripple Voltage (by Ambient Temp.)	Testing Circuitry Figure B																																						
Object	+12V0.25A																																							
<p>1.Graph</p> <p style="text-align: center;">Ambient 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>20</td><td>55</td></tr> <tr><td>-40</td><td>15</td><td>50</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>15</td><td>50</td></tr> <tr><td>90</td><td>15</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> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>	Ambient Temperature [°C]	Ripple Voltage [mV]		Load 50%	Load 100%	-60	20	55	-40	15	50	-20	15	50	0	15	50	25	15	50	80	15	50	90	15	55	--	-	-	--	-	-	--	-	-	--	-	-
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<p>Measured by 100 MHz Oscilloscope. Note: Slanted line shows the range of the rated ambient temperature.</p>																																								



Model	MGFS32412
Item	Ambient Temperature Drift
Object	+12V0.25A

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	11.955	11.954	11.955	11.956	11.956
-40	11.984	11.983	11.984	11.984	11.984
-20	12.008	12.008	12.008	12.009	12.008
0	12.027	12.027	12.028	12.028	12.027
25	12.050	12.050	12.050	12.050	12.050
80	12.058	12.058	12.058	12.058	12.058
90	12.057	12.056	12.057	12.057	12.056
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

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



COSEL		Testing Circuitry Figure A
Model	MGFS32412	
Item	Output Voltage Accuracy	
Object	+12V0.25A	

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 - 0.25A

* 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	80	36	0	12.068	±43	±0.4
Minimum Voltage	-40	12	0.25	11.983		



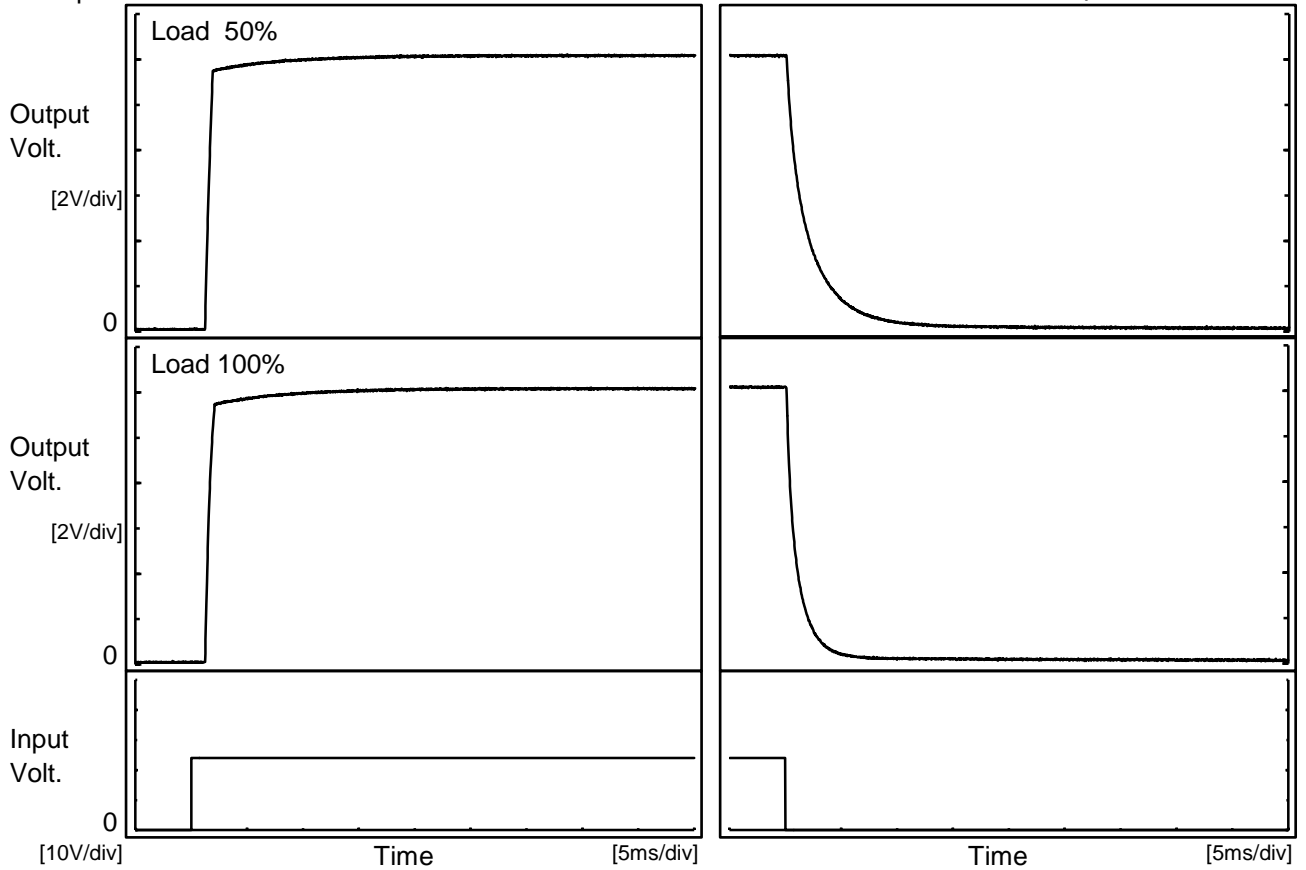
COSEL																									
Model	MGFS32412	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+12V0.25A																								
<p>1.Graph</p> <p style="text-align: center;">Time [H]</p> <p>Input Volt. 24V Load 100%</p>		<p>2.Values</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>12.043</td></tr> <tr><td>0.5</td><td>12.047</td></tr> <tr><td>1.0</td><td>12.047</td></tr> <tr><td>2.0</td><td>12.047</td></tr> <tr><td>3.0</td><td>12.047</td></tr> <tr><td>4.0</td><td>12.047</td></tr> <tr><td>5.0</td><td>12.047</td></tr> <tr><td>6.0</td><td>12.048</td></tr> <tr><td>7.0</td><td>12.047</td></tr> <tr><td>8.0</td><td>12.047</td></tr> </tbody> </table>		Time since start [H]	Output Voltage [V]	0.0	12.043	0.5	12.047	1.0	12.047	2.0	12.047	3.0	12.047	4.0	12.047	5.0	12.047	6.0	12.048	7.0	12.047	8.0	12.047
Time since start [H]	Output Voltage [V]																								
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Model	MGFS32412	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+12V0.25A		

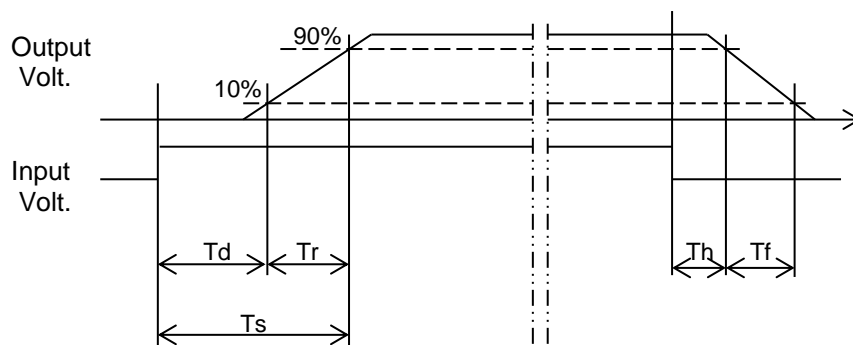
1.Graph

Input Volt. 24 V



2.Values

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	1.3	0.6	1.9	0.2	5.1
100 %	1.3	0.7	2.0	0.2	2.5





COSEL																																								
Model	MGFS32412																																							
Item	Minimum Input Voltage for Regulated Output Voltage	Testing Circuitry Figure A																																						
Object	+12V0.25A																																							
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Model	MGFS32412	Temperature	25°C																																																																																			
Item	Overcurrent Protection	Testing Circuitry	Figure A																																																																																			
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<p>1.Graph</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> </div> <div style="width: 45%;"> <p>— Input Volt. 9V</p> <p>— Input Volt. 12V</p> <p>— Input Volt. 18V</p> <p>— Input Volt. 24V</p> <p>— Input Volt. 36V</p> </div> </div>		<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>11.4</td><td>0.285</td><td>0.326</td><td>0.333</td><td>0.322</td><td>0.324</td></tr> <tr><td>10.8</td><td>0.294</td><td>0.337</td><td>0.343</td><td>0.332</td><td>0.331</td></tr> <tr><td>9.6</td><td>0.317</td><td>0.364</td><td>0.367</td><td>0.352</td><td>0.348</td></tr> <tr><td>8.4</td><td>0.345</td><td>0.394</td><td>0.391</td><td>0.373</td><td>0.367</td></tr> <tr><td>7.2</td><td>0.378</td><td>0.425</td><td>0.416</td><td>0.394</td><td>0.385</td></tr> <tr><td>6.0</td><td>0.414</td><td>0.461</td><td>0.445</td><td>0.419</td><td>0.406</td></tr> <tr><td>4.8</td><td>0.457</td><td>0.499</td><td>0.476</td><td>0.445</td><td>0.427</td></tr> <tr><td>3.6</td><td>0.506</td><td>0.545</td><td>0.510</td><td>0.473</td><td>0.450</td></tr> <tr><td>2.4</td><td>0.564</td><td>0.596</td><td>0.547</td><td>0.502</td><td>0.474</td></tr> <tr><td>1.2</td><td>0.629</td><td>0.646</td><td>0.580</td><td>0.527</td><td>0.491</td></tr> <tr><td>0.0</td><td>0.656</td><td>0.663</td><td>0.558</td><td>0.489</td><td>0.443</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>		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]	11.4	0.285	0.326	0.333	0.322	0.324	10.8	0.294	0.337	0.343	0.332	0.331	9.6	0.317	0.364	0.367	0.352	0.348	8.4	0.345	0.394	0.391	0.373	0.367	7.2	0.378	0.425	0.416	0.394	0.385	6.0	0.414	0.461	0.445	0.419	0.406	4.8	0.457	0.499	0.476	0.445	0.427	3.6	0.506	0.545	0.510	0.473	0.450	2.4	0.564	0.596	0.547	0.502	0.474	1.2	0.629	0.646	0.580	0.527	0.491	0.0	0.656	0.663	0.558	0.489	0.443	--	-	-	-	-	-
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Model		MGFS32412		Temperature 25°C																																																																														
Item		Switching frequency (by Load Current)		Testing Circuitry Figure A																																																																														
Object		+12V0.25A																																																																																
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0.000	710	800	920	960	1040																																																																													
0.050	410	509	637	713	793																																																																													
0.100	287	373	487	563	644																																																																													
0.150	220	293	395	464	543																																																																													
0.200	177	241	333	395	469																																																																													
0.225	162	222	309	369	441																																																																													
0.250	- ※	203	285	344	414																																																																													
0.275	- ※	188	267	322	390																																																																													
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<p>Note: Slanted line shows the range of the rated load current.</p> <p>When load current is low, MG operates intermittently, so switching frequency would not become constant.</p>				<p>※ Maximum output current at minimum input Voltage is 80% of rated load current. Refer to instruction manuals for details of input derating.</p>																																																																														

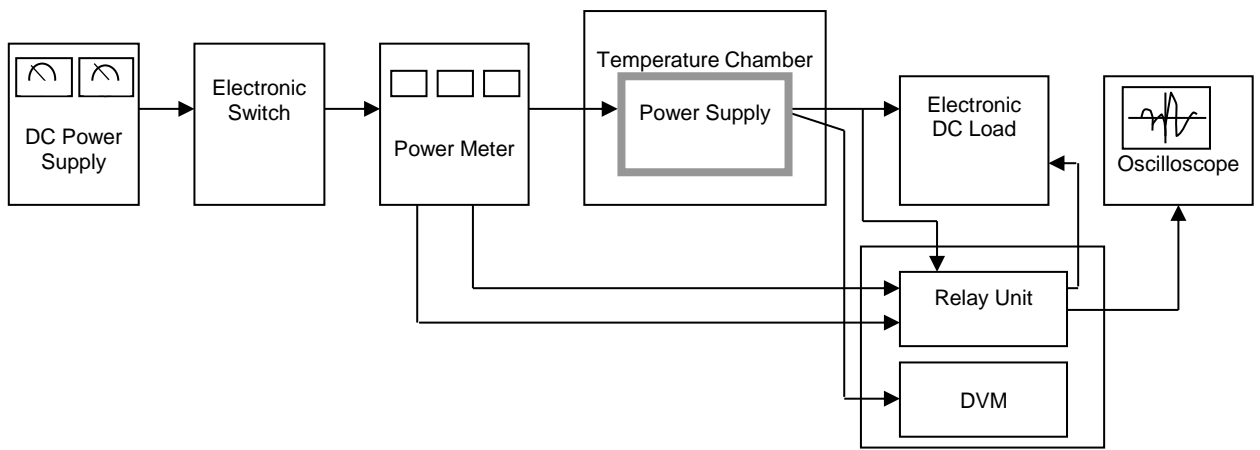


Figure A

Data Acquisition/Control Unit

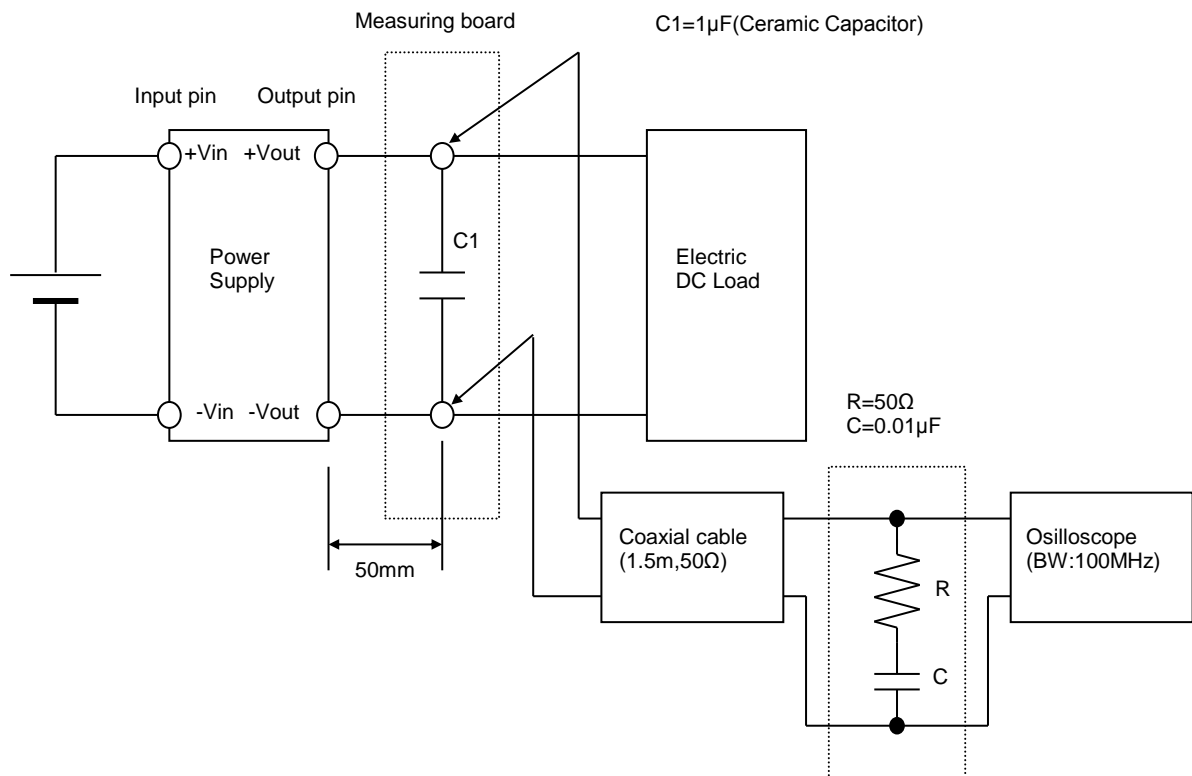


Figure B (Ripple and Ripple noise Characteristic)