

TEST DATA OF MGFW302415

Regulated DC Power Supply
November 22, 2010

Approved by : *Kazunari Asano*
Kazunari Asano Design Manager

Prepared by : *Masashi Ueda*
Masashi Ueda Design Engineer

COSEL CO.,LTD.

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COSEL																																																																																		
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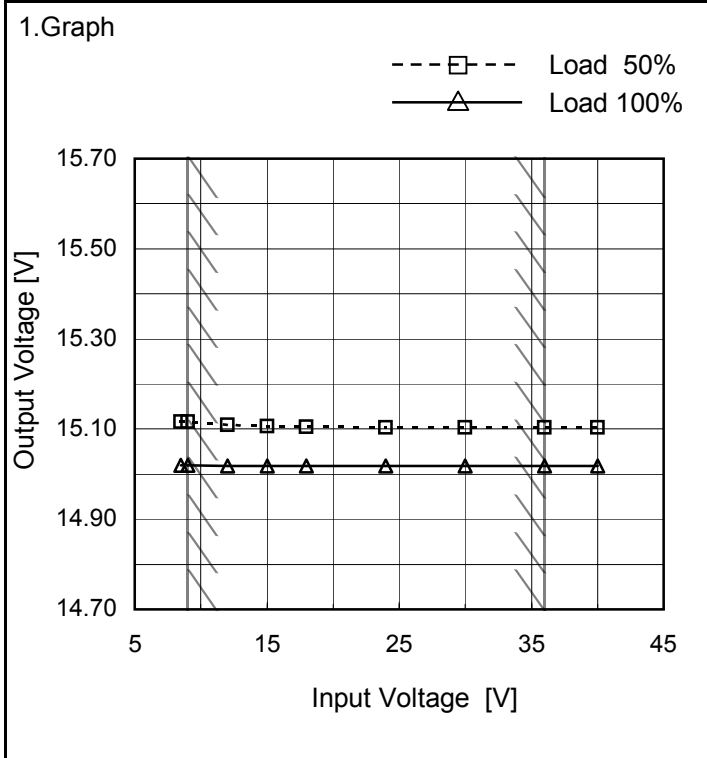


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Model	MGFW302415
Item	Line Regulation
Object	+15V1A

Temperature 25°C
Testing Circuitry Figure A

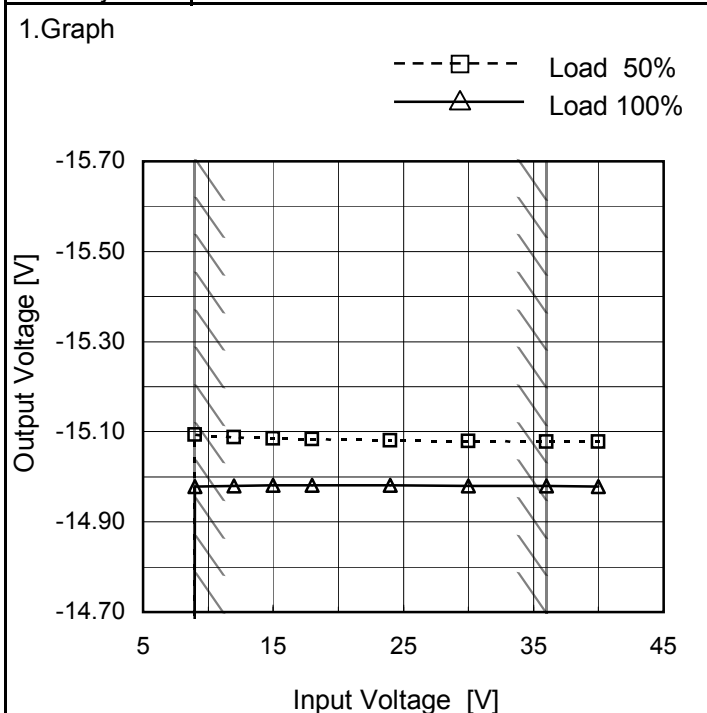


2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8.5	15.116	15.020
9.0	15.116	15.020
12.0	15.110	15.019
15.0	15.107	15.018
18.0	15.105	15.018
24.0	15.104	15.018
30.0	15.104	15.018
36.0	15.103	15.018
40.0	15.103	15.018

-15V: Rated output current

Object	-15V1A
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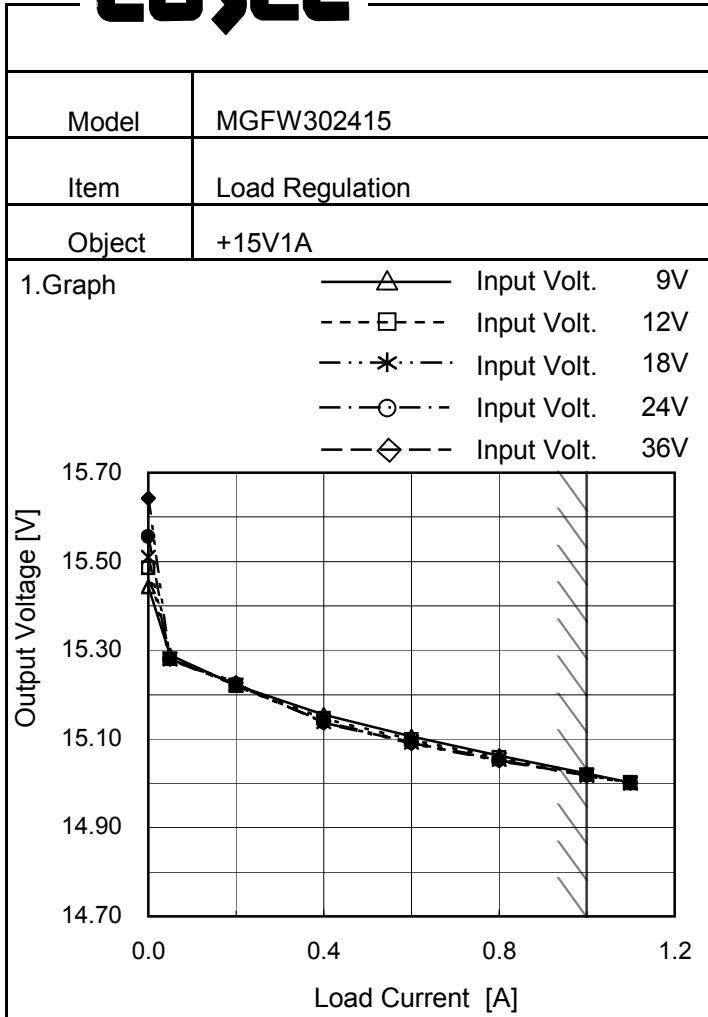


2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8	-0.001	-0.001
9	-15.093	-14.978
12	-15.088	-14.980
15	-15.085	-14.981
18	-15.083	-14.981
24	-15.080	-14.981
30	-15.079	-14.980
36	-15.078	-14.980
40	-15.078	-14.979

+15V: Rated output current

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

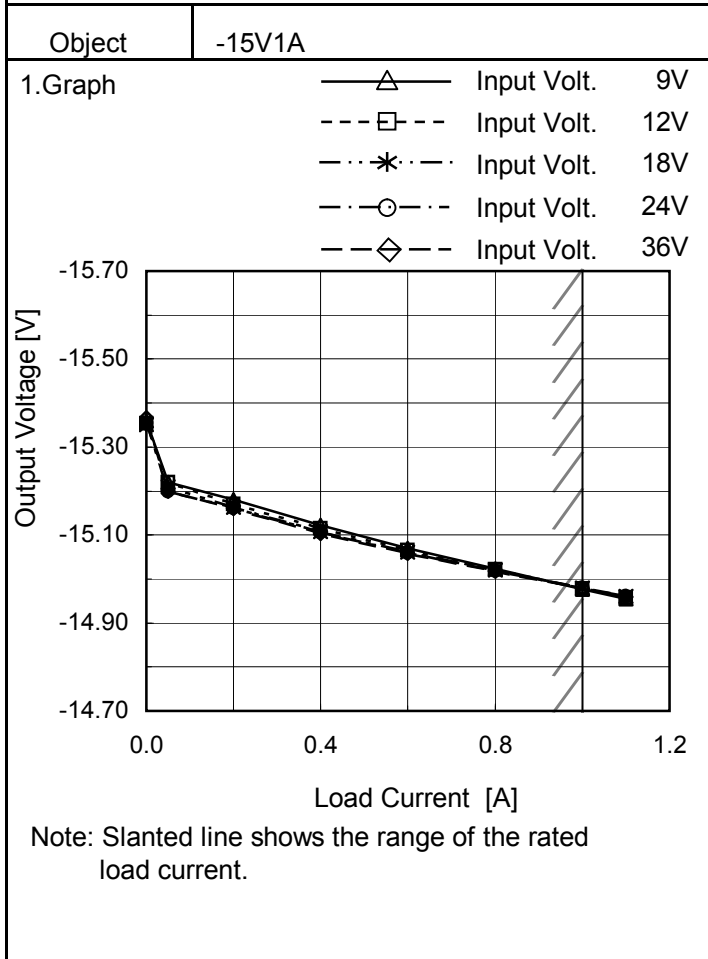


Temperature 25°C
Testing Circuitry Figure A

2.Values

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]
0.000	15.443	15.485	15.510	15.556	15.642
0.050	15.288	15.280	15.280	15.280	15.280
0.200	15.222	15.221	15.221	15.224	15.226
0.400	15.154	15.146	15.139	15.137	15.135
0.600	15.106	15.098	15.092	15.091	15.089
0.800	15.062	15.057	15.054	15.052	15.051
1.000	15.022	15.019	15.018	15.017	15.017
1.100	15.002	15.002	15.001	15.001	15.001
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

-15V: Rated output current



2.Values

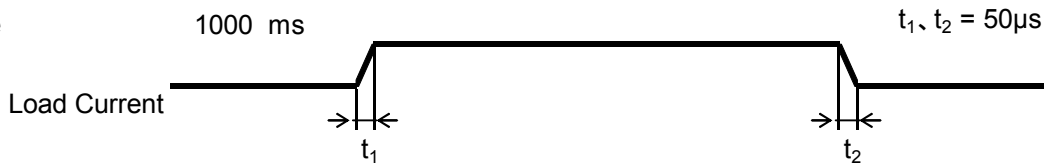
Load Current [A]	Output Voltage [V]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.000	-15.360	-15.354	-15.350	-15.354	-15.366
0.05	-15.220	-15.220	-15.210	-15.200	-15.200
0.20	-15.180	-15.171	-15.163	-15.162	-15.160
0.40	-15.122	-15.114	-15.108	-15.106	-15.103
0.60	-15.070	-15.066	-15.062	-15.060	-15.058
0.80	-15.023	-15.022	-15.020	-15.018	-15.017
1.00	-14.977	-14.979	-14.980	-14.979	-14.978
1.10	-14.955	-14.958	-14.960	-14.960	-14.959
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

+15V: Rated output current

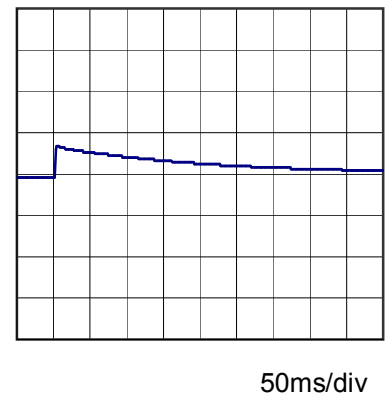
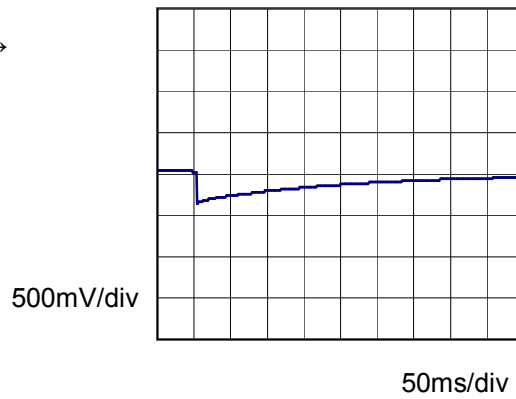


Model	MGFW302415	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+15V1A		

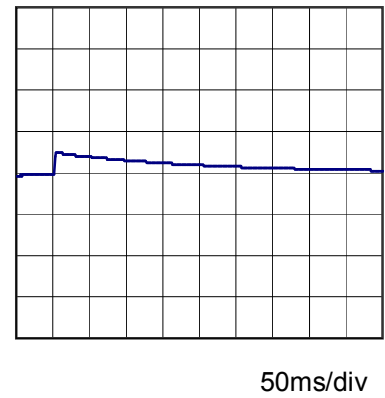
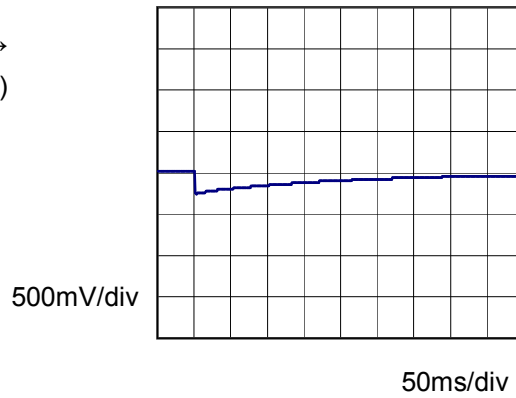
Input Volt. 24 V
 Other output current rated
 Cycle 1000 ms



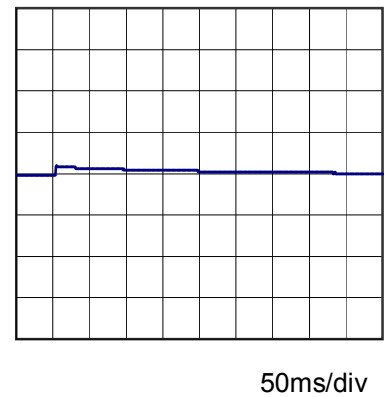
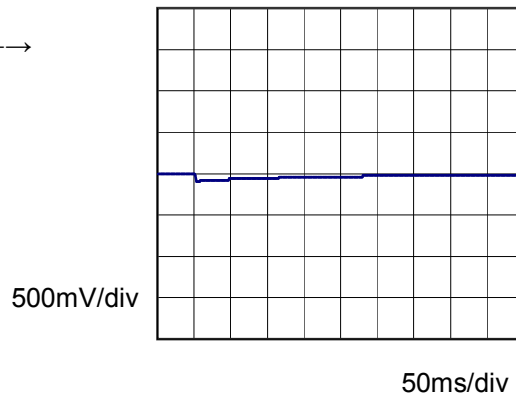
Min. Load (0A) ←→
 Load 100% (1A)



Min. Load (0A) ←→
 Load 50% (0.5A)



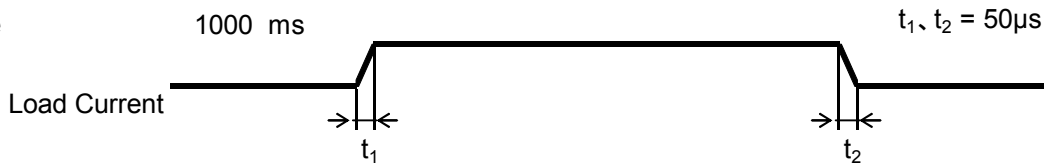
Load 50% (0.5A) ←→
 Load 100% (1A)



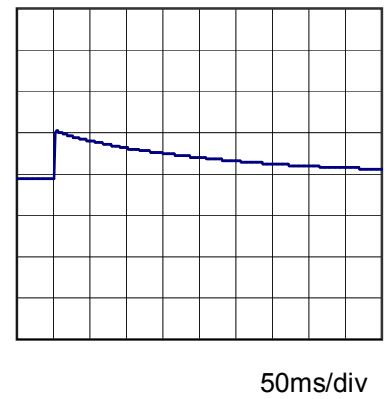
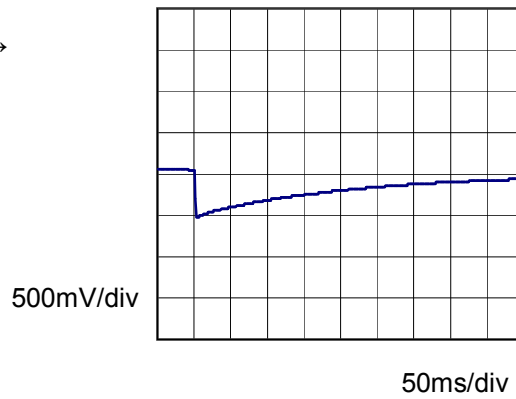


Model	MGFW302415	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+15V1A		

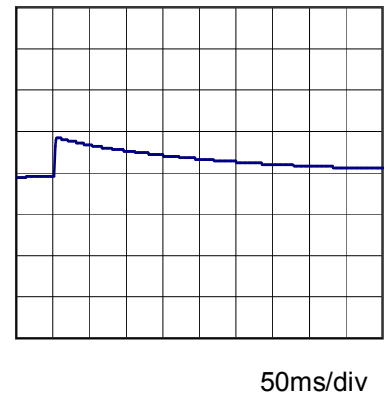
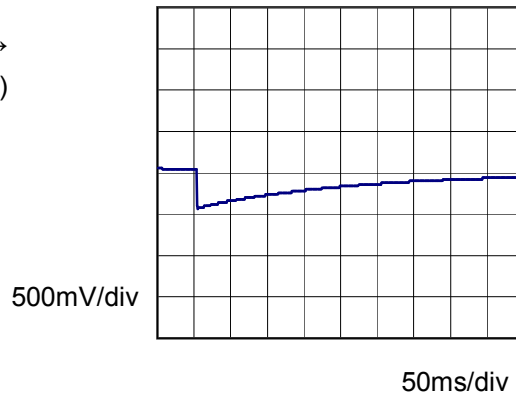
Input Volt. 24 V
 Other output current rated
 Cycle 1000 ms



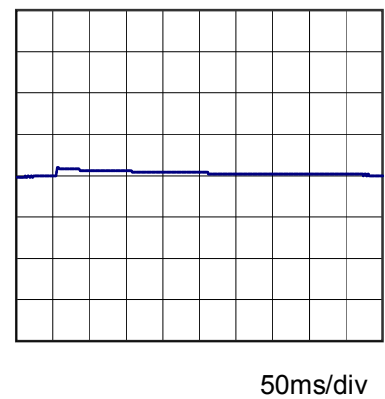
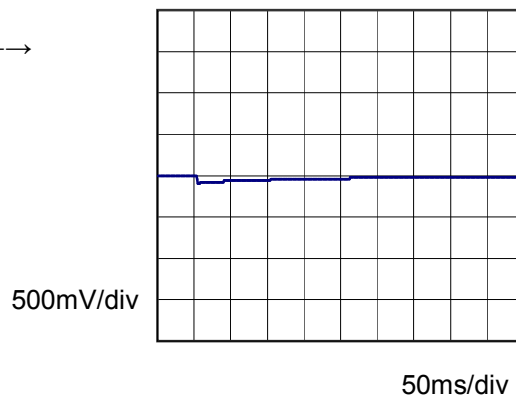
Min. Load (0A) ←→
 Load 100% (1A)



Min. Load (0A) ←→
 Load 50% (0.5A)



Load 50% (0.5A) ←→
 Load 100% (1A)





COSEL																																								
Model	MGFW302415	Temperature 25°C Testing Circuitry Figure B																																						
Item	Ripple Voltage (by Load Current)																																							
Object	+15V1A																																							
1.Graph		2.Values																																						
<p style="text-align: right;"> —△— Input Volt. 9V -.-○-.- Input Volt. 36V </p> <p style="text-align: center;">Ripple Voltage [mV]</p> <p style="text-align: center;">Load Current [A]</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. 9 [V]</th> <th>Input Volt. 36 [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>9</td><td>16</td></tr> <tr><td>0.2</td><td>8</td><td>9</td></tr> <tr><td>0.4</td><td>8</td><td>9</td></tr> <tr><td>0.6</td><td>8</td><td>9</td></tr> <tr><td>0.8</td><td>6</td><td>6</td></tr> <tr><td>1.0</td><td>6</td><td>6</td></tr> <tr><td>1.1</td><td>6</td><td>6</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> <p style="text-align: center;">-15V: Rated output current</p>	Load Current [A]	Ripple Voltage [mV]		Input Volt. 9 [V]	Input Volt. 36 [V]	0.0	9	16	0.2	8	9	0.4	8	9	0.6	8	9	0.8	6	6	1.0	6	6	1.1	6	6	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																							
	Input Volt. 9 [V]	Input Volt. 36 [V]																																						
0.0	9	16																																						
0.2	8	9																																						
0.4	8	9																																						
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1.0	6	6																																						
1.1	6	6																																						
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<p>Ripple [mVp-p]</p> <p style="text-align: center;">Fig.Complex Ripple Wave Form</p>																																								

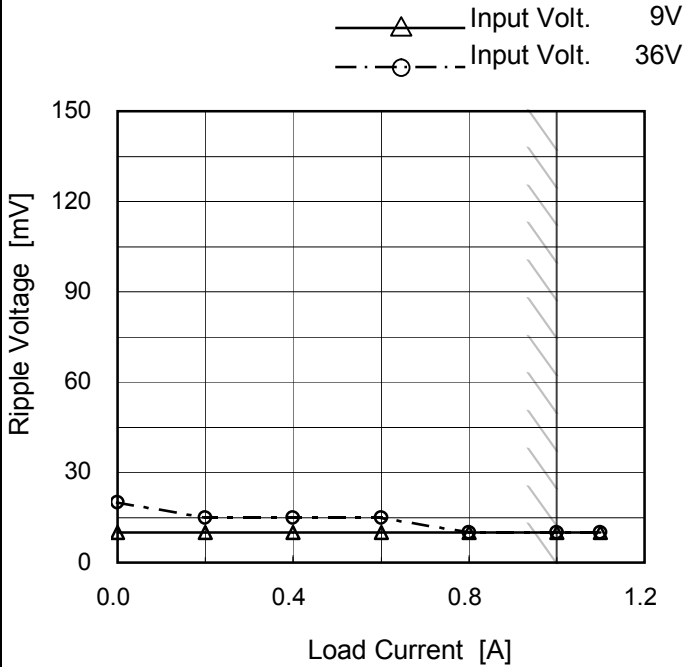


COSEL																																								
Model	MGFW302415	Temperature 25°C Testing Circuitry Figure B																																						
Item	Ripple Voltage (by Load Current)																																							
Object	-15V1A																																							
<p>1.Graph</p> <div style="text-align: right;"> <p>—△— Input Volt. 9V</p> <p>-.-○-.- Input Volt. 36V</p> </div> <p style="text-align: center;">Ripple Voltage [mV]</p> <p style="text-align: center;">Load Current [A]</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. 9 [V]</th> <th>Input Volt. 36 [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>11</td><td>17</td></tr> <tr><td>0.2</td><td>15</td><td>26</td></tr> <tr><td>0.4</td><td>15</td><td>26</td></tr> <tr><td>0.6</td><td>15</td><td>26</td></tr> <tr><td>0.8</td><td>13</td><td>24</td></tr> <tr><td>1.0</td><td>13</td><td>24</td></tr> <tr><td>1.1</td><td>13</td><td>24</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> <p style="text-align: center;">+15V: Rated output current</p>	Load Current [A]	Ripple Voltage [mV]		Input Volt. 9 [V]	Input Volt. 36 [V]	0.0	11	17	0.2	15	26	0.4	15	26	0.6	15	26	0.8	13	24	1.0	13	24	1.1	13	24	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																							
	Input Volt. 9 [V]	Input Volt. 36 [V]																																						
0.0	11	17																																						
0.2	15	26																																						
0.4	15	26																																						
0.6	15	26																																						
0.8	13	24																																						
1.0	13	24																																						
1.1	13	24																																						
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<p>Ripple [mVp-p]</p> <p style="text-align: center;">Fig.Complex Ripple Wave Form</p>																																								



Model	MGFW302415	Temperature	25°C
Item	Ripple-Noise	Testing Circuitry	Figure B
Object	+15V1A		

1. Graph



2. Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 9 [V]	Input Volt. 36 [V]
0.0	10	20
0.2	10	15
0.4	10	15
0.6	10	15
0.8	10	10
1.0	10	10
1.1	10	10
--	-	-
--	-	-
--	-	-
--	-	-

-15V: Rated output current

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

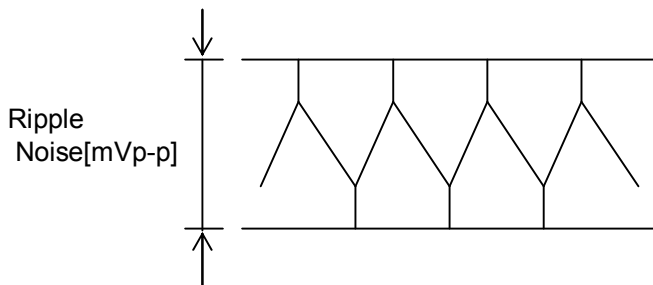


Fig. Complex Ripple Noise Wave Form

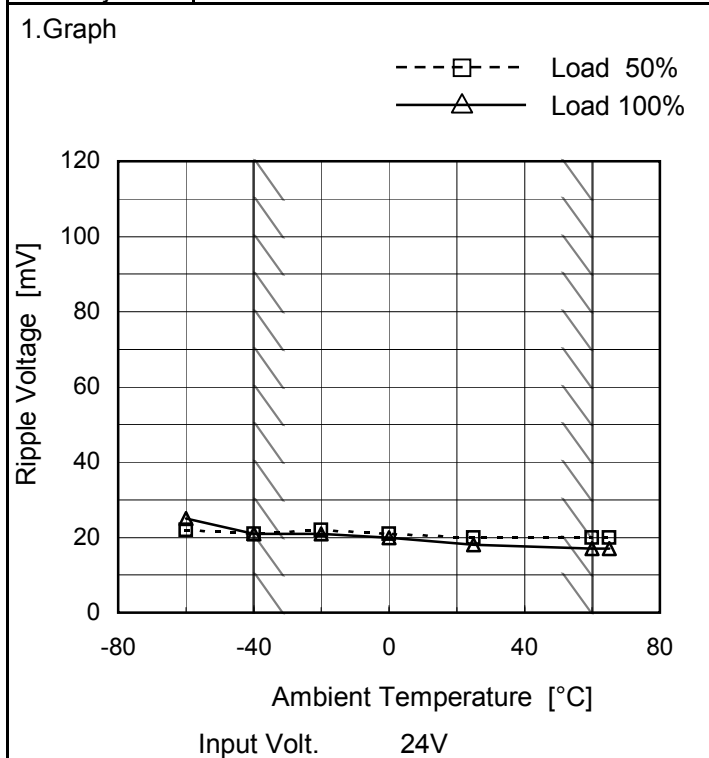


<p>Model MGFW302415</p> <p>Item Ripple-Noise</p> <p>Object -15V1A</p>		<p>Temperature 25°C</p> <p>Testing Circuitry Figure B</p>																																						
<p>1.Graph</p> <div style="text-align: right;"> <p>—△— Input Volt. 9V</p> <p>-.-○-.- Input Volt. 36V</p> </div> <p>Ripple Voltage [mV]</p> <p>Load Current [A]</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple-Noise [mV]</th> </tr> <tr> <th>Input Volt. 9 [V]</th> <th>Input Volt. 36 [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>15</td><td>20</td></tr> <tr><td>0.2</td><td>20</td><td>30</td></tr> <tr><td>0.4</td><td>20</td><td>30</td></tr> <tr><td>0.6</td><td>20</td><td>30</td></tr> <tr><td>0.8</td><td>15</td><td>30</td></tr> <tr><td>1.0</td><td>15</td><td>30</td></tr> <tr><td>1.1</td><td>15</td><td>30</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> <p>+15V: Rated output current</p>	Load Current [A]	Ripple-Noise [mV]		Input Volt. 9 [V]	Input Volt. 36 [V]	0.0	15	20	0.2	20	30	0.4	20	30	0.6	20	30	0.8	15	30	1.0	15	30	1.1	15	30	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple-Noise [mV]																																							
	Input Volt. 9 [V]	Input Volt. 36 [V]																																						
0.0	15	20																																						
0.2	20	30																																						
0.4	20	30																																						
0.6	20	30																																						
0.8	15	30																																						
1.0	15	30																																						
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<p>Ripple Noise[mVp-p]</p>																																								
<p>Fig.Complex Ripple Noise Wave Form</p>																																								



Model	MGFW302415
Item	Ripple Voltage (by Ambient Temp.)
Object	+15V1A

Testing Circuitry Figure A

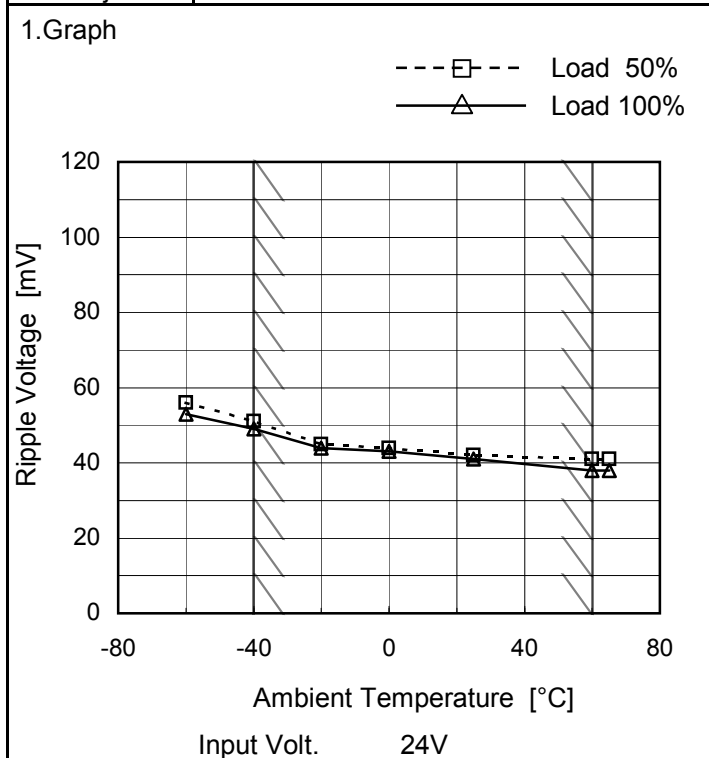


2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	22	25
-40	21	21
-20	22	21
0	21	20
25	20	18
60	20	17
65	20	17
--	-	-
--	-	-
--	-	-
--	-	-

-15V: Rated output current

Object	-15V1A
--------	--------



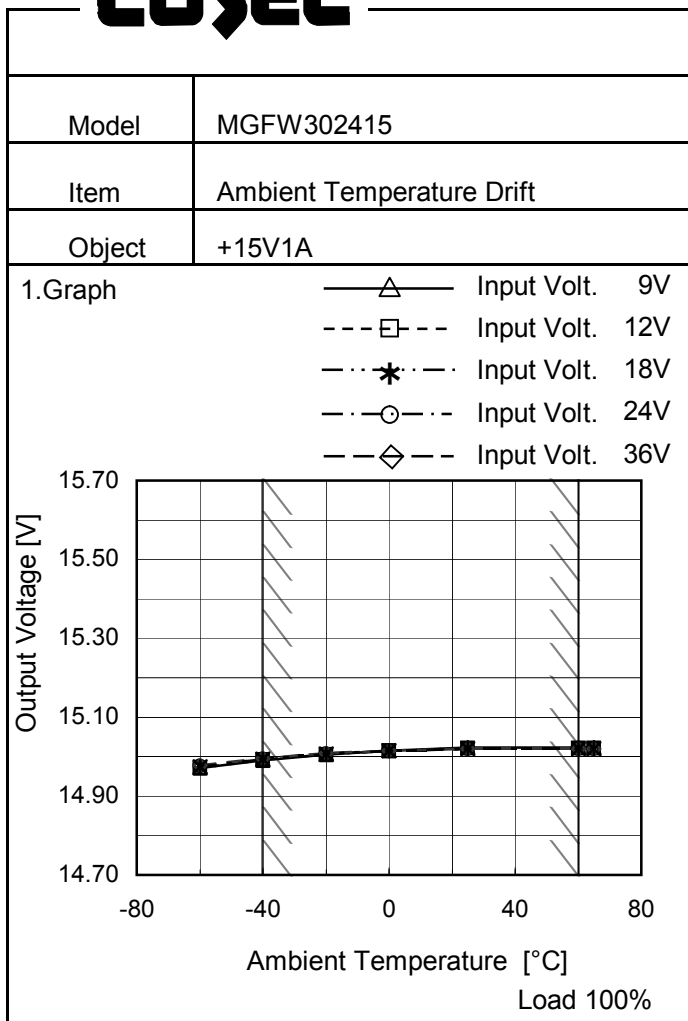
2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	56	53
-40	51	49
-20	45	44
0	44	43
25	42	41
60	41	38
65	41	38
--	-	-
--	-	-
--	-	-
--	-	-

+15V: Rated output current

Measured by 100 MHz Oscilloscope.

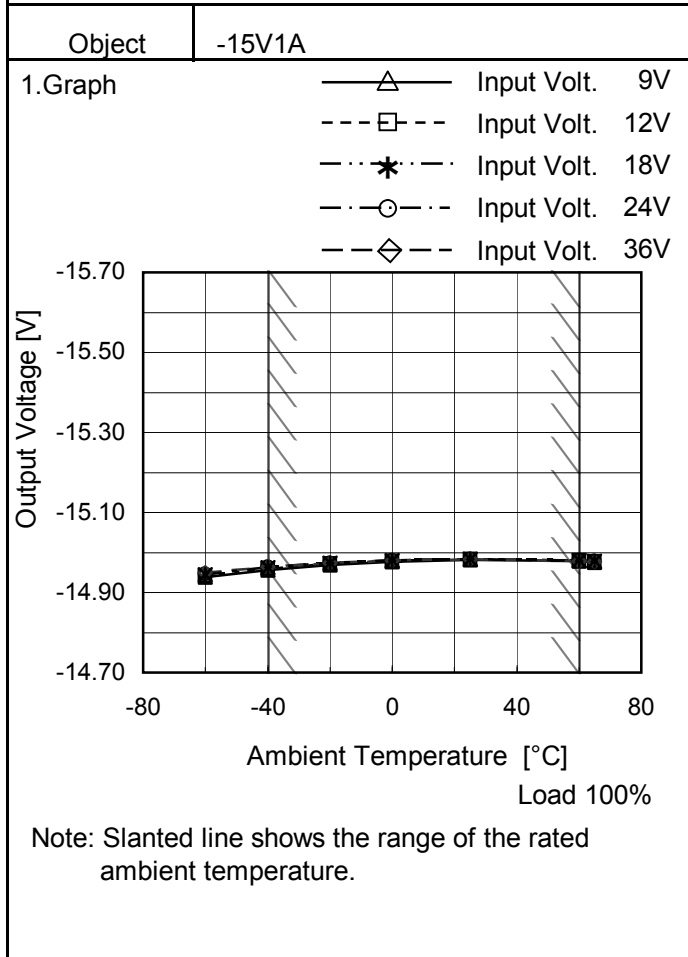
Note: Slanted line shows the range of the rated ambient temperature.



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	14.971	14.972	14.974	14.976	14.978
-40	14.991	14.992	14.993	14.995	14.996
-20	15.005	15.005	15.006	15.007	15.008
0	15.015	15.015	15.014	15.015	15.016
25	15.022	15.021	15.020	15.020	15.021
60	15.023	15.022	15.020	15.020	15.020
65	15.022	15.021	15.020	15.019	15.019
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-



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	-14.938	-14.942	-14.946	-14.947	-14.949
-40	-14.957	-14.960	-14.963	-14.963	-14.965
-20	-14.969	-14.972	-14.974	-14.974	-14.974
0	-14.977	-14.979	-14.980	-14.980	-14.980
25	-14.981	-14.983	-14.984	-14.984	-14.983
60	-14.978	-14.980	-14.980	-14.980	-14.979
65	-14.975	-14.977	-14.979	-14.978	-14.977
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-



COSEL		
Model	MGFW302415	
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 : -40 - 60°C

Input Voltage : 9 - 36V

Load Current (AVR 1) : 0 - 1A (AVR 2) : 0 - 1A

* Other Output : Rated Load

* 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	+15V1A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ration [%]
			Maximum Voltage	60		
Minimum Voltage	-40	9	1	14.911		

Object	-15V1A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ration [%]
			Maximum Voltage	60		
Minimum Voltage	-40	9	1	-14.957		



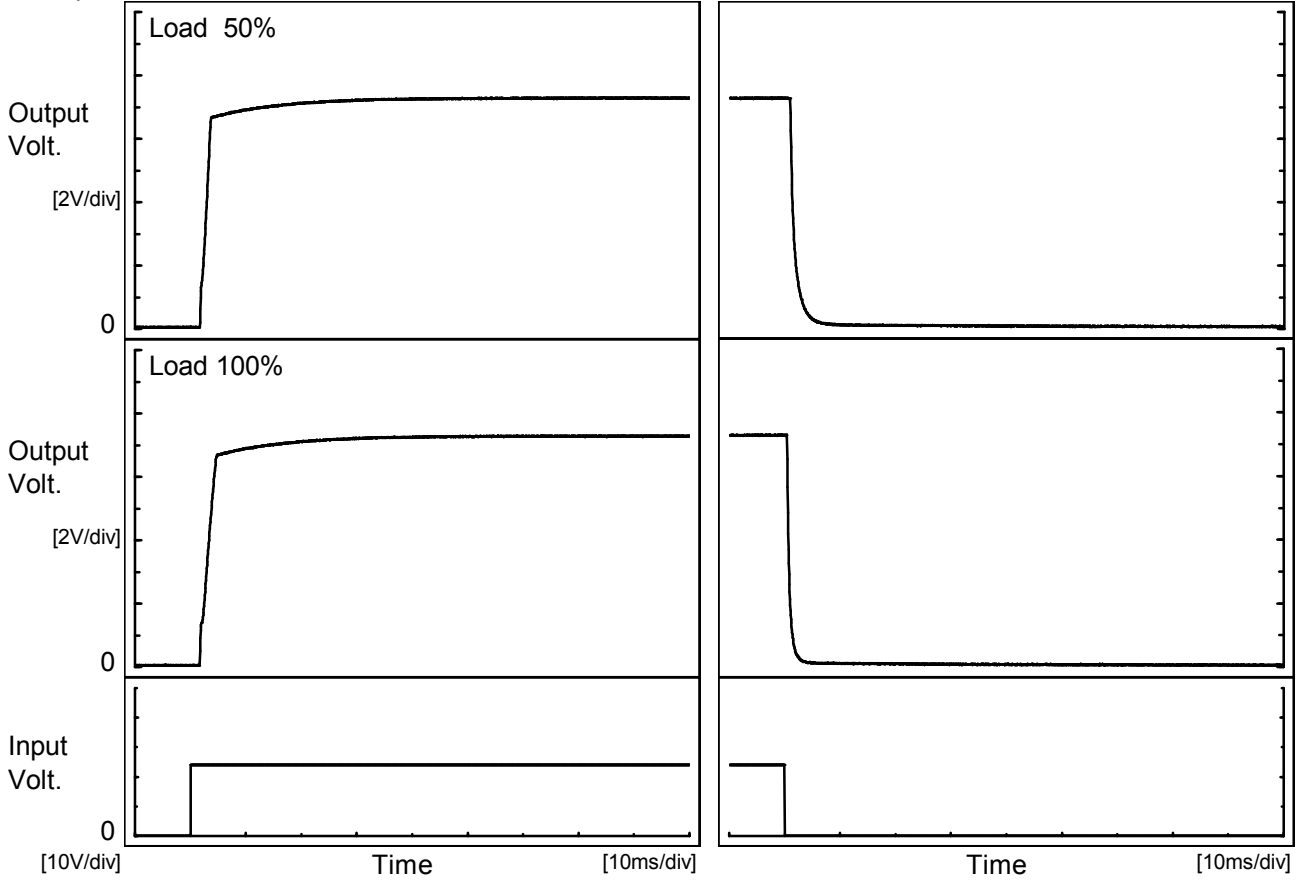
COSEL																									
Model	MGFW302415	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+15V1A																								
<p>1.Graph</p> <p style="text-align: center;">Time [H]</p> <p style="text-align: center;">Input Volt. 24V 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>15.002</td></tr> <tr><td>0.5</td><td>15.016</td></tr> <tr><td>1.0</td><td>15.016</td></tr> <tr><td>2.0</td><td>15.016</td></tr> <tr><td>3.0</td><td>15.016</td></tr> <tr><td>4.0</td><td>15.016</td></tr> <tr><td>5.0</td><td>15.016</td></tr> <tr><td>6.0</td><td>15.016</td></tr> <tr><td>7.0</td><td>15.016</td></tr> <tr><td>8.0</td><td>15.016</td></tr> </tbody> </table>		Time since start [H]	Output Voltage [V]	0.0	15.002	0.5	15.016	1.0	15.016	2.0	15.016	3.0	15.016	4.0	15.016	5.0	15.016	6.0	15.016	7.0	15.016	8.0	15.016
Time since start [H]	Output Voltage [V]																								
0.0	15.002																								
0.5	15.016																								
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Object	-15V1A																								
<p>1.Graph</p> <p style="text-align: center;">Time [H]</p> <p style="text-align: center;">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>-14.978</td></tr> <tr><td>0.5</td><td>-14.981</td></tr> <tr><td>1.0</td><td>-14.981</td></tr> <tr><td>2.0</td><td>-14.981</td></tr> <tr><td>3.0</td><td>-14.981</td></tr> <tr><td>4.0</td><td>-14.981</td></tr> <tr><td>5.0</td><td>-14.981</td></tr> <tr><td>6.0</td><td>-14.981</td></tr> <tr><td>7.0</td><td>-14.981</td></tr> <tr><td>8.0</td><td>-14.981</td></tr> </tbody> </table>		Time since start [H]	Output Voltage [V]	0.0	-14.978	0.5	-14.981	1.0	-14.981	2.0	-14.981	3.0	-14.981	4.0	-14.981	5.0	-14.981	6.0	-14.981	7.0	-14.981	8.0	-14.981
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Model		MGFW302415	Temperature	25°C
Item		Rise and Fall Time	Testing Circuitry	Figure A
Object		+15V1A		

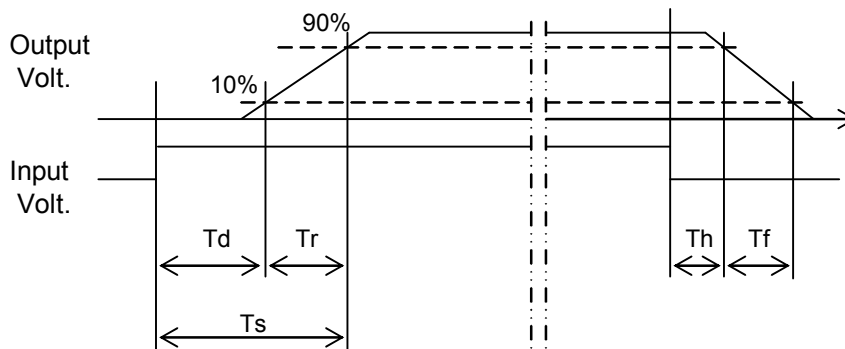
1. Graph

Input Volt. 24 V



2. Values

		[ms]				
Load \ Time	Td	Tr	Ts	Th	Tf	
50 %	1.9	4.6	6.5	1.0	2.2	
100 %	1.8	5.4	7.2	0.5	1.1	

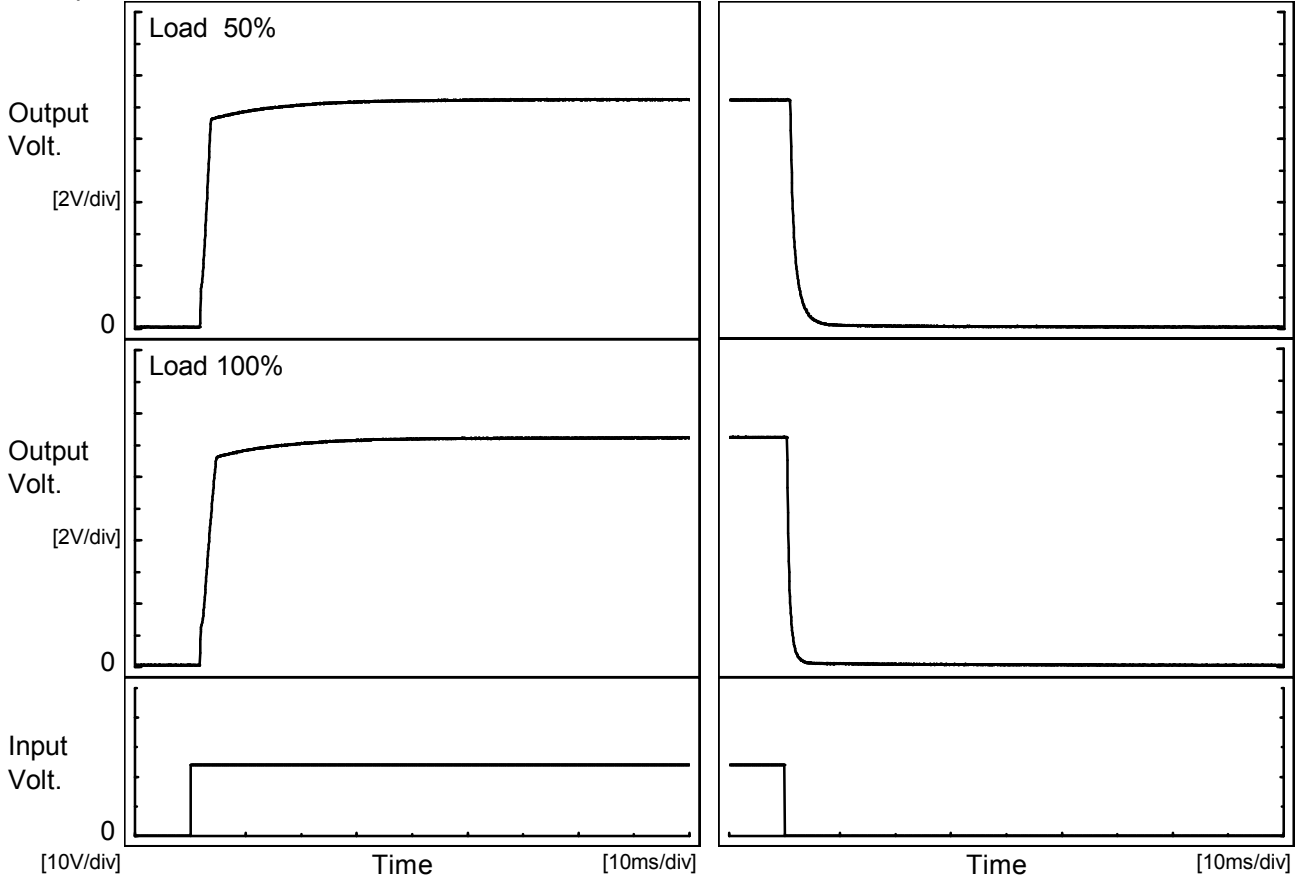




COSEL		
Model	MGFW302415	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	-15V1A	

1. Graph

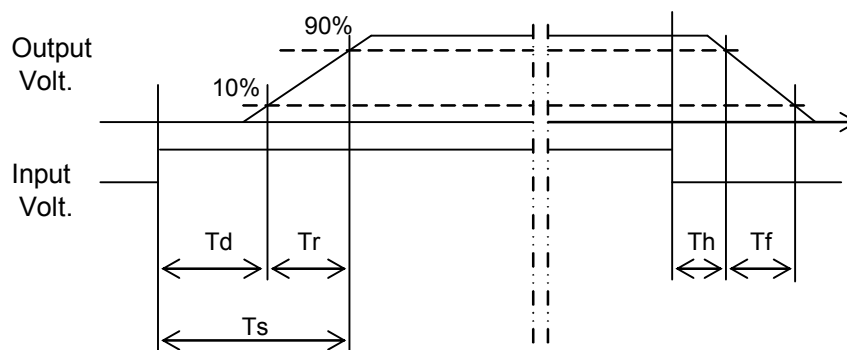
Input Volt. 24 V



2. Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	1.9	5.7	7.6	0.9	2.3
100 %	1.8	6.6	8.4	0.5	1.2





Model		MGFW302415		Testing Circuitry Figure A																																							
Item		Minimum Input Voltage for Regulated Output Voltage																																									
Object		+15V1A																																									
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Model		MGFW302415		Temperature 25°C																																																																																				
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COSEL																																								
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Item	Overvoltage Protection	Testing Circuitry Figure A																																						
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<p>1.Graph</p> <div style="text-align: right;"> <p>—△— Input Volt. 24V</p> <p>---□--- Input Volt. 36V</p> </div> <p style="text-align: center;">Ambient Temperature [°C] Load 0%</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Operating Point [V]</th> </tr> <tr> <th>Input Volt. 24[V]</th> <th>Input Volt. 36[V]</th> </tr> </thead> <tbody> <tr><td>-60</td><td>40.10</td><td>40.10</td></tr> <tr><td>-40</td><td>40.03</td><td>40.03</td></tr> <tr><td>-20</td><td>40.03</td><td>40.03</td></tr> <tr><td>0</td><td>40.32</td><td>40.40</td></tr> <tr><td>25</td><td>41.18</td><td>41.25</td></tr> <tr><td>60</td><td>42.24</td><td>42.31</td></tr> <tr><td>65</td><td>42.38</td><td>42.46</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]	Operating Point [V]		Input Volt. 24[V]	Input Volt. 36[V]	-60	40.10	40.10	-40	40.03	40.03	-20	40.03	40.03	0	40.32	40.40	25	41.18	41.25	60	42.24	42.31	65	42.38	42.46	--	-	-	--	-	-	--	-	-	--	-	-
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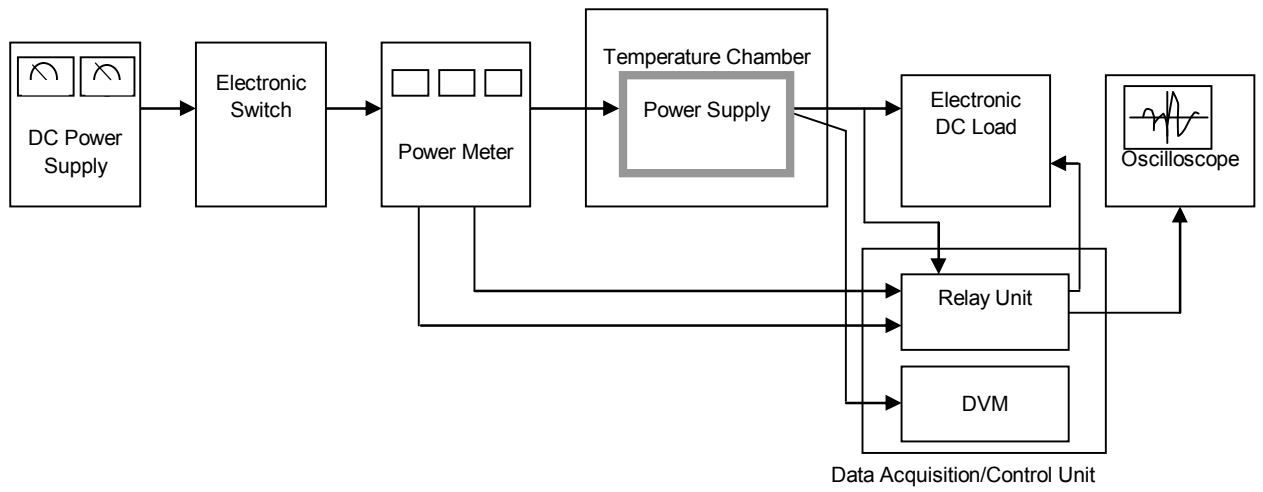


Figure A

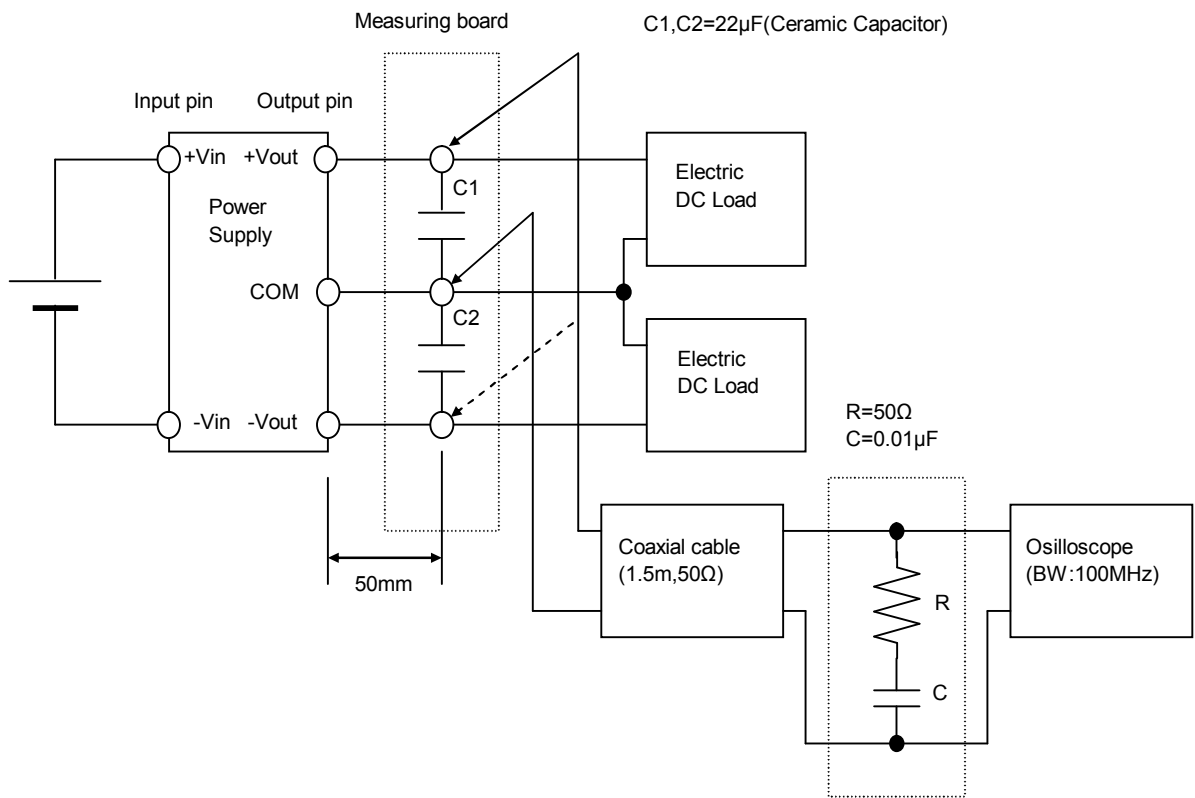


Figure B (Ripple and Ripple noise Characteristic)