参考資料

TEST DATA OF MGFW32412

Regulated DC Power Supply
January 6, 2017

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Takaaki Sekiguchi Design Engineer

COSEL CO.,LTD.

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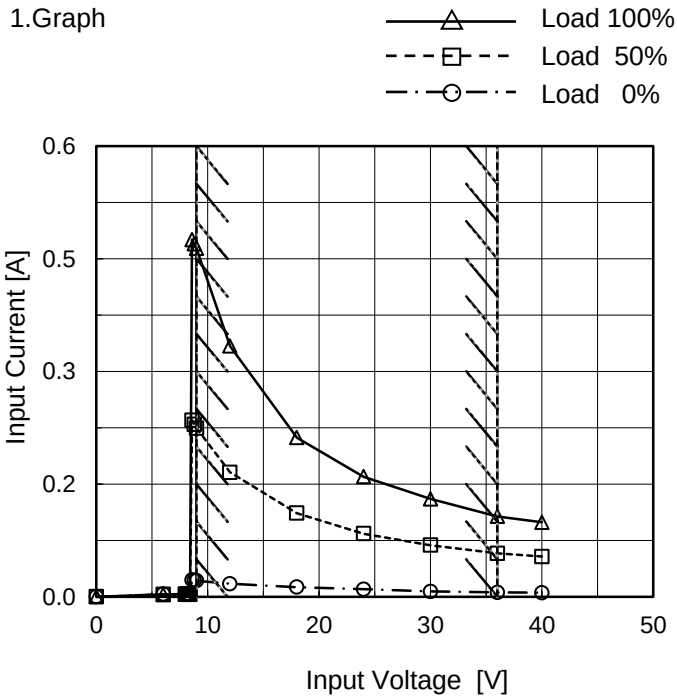
COSEL

Model	MGFW32412
Item	Input Current (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

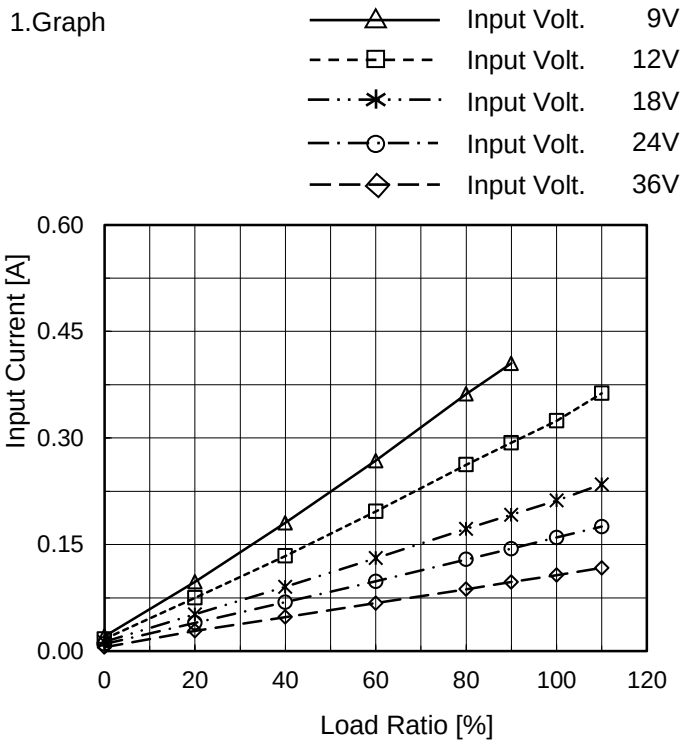
Input Voltage [V]	Input Current [A]		
	Load 0%	Load 50%	Load 100%
0.0	0.000	0.000	0.000
6.0	0.003	0.003	0.003
8.0	0.004	0.003	0.003
8.2	0.003	0.003	0.003
8.4	0.003	0.003	0.004
8.6	0.022	0.235	0.476
8.8	0.022	0.230	0.470
9.0	0.021	0.225	0.464
12.0	0.017	0.166	0.334
18.0	0.013	0.111	0.212
24.0	0.010	0.084	0.160
30.0	0.007	0.069	0.130
36.0	0.006	0.058	0.107
40.0	0.005	0.054	0.099
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	MGFW32412
Item	Input Current (by Load Ratio)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Ratio [%]	Input Current [A]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0	0.021	0.017	0.013	0.010	0.006
20	0.098	0.075	0.052	0.040	0.029
40	0.181	0.134	0.091	0.069	0.048
60	0.268	0.197	0.131	0.098	0.068
80	0.362	0.262	0.172	0.129	0.087
90	0.405	0.293	0.192	0.144	0.097
100	- ※	0.324	0.212	0.160	0.107
110	- ※	0.363	0.235	0.175	0.117
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

※ 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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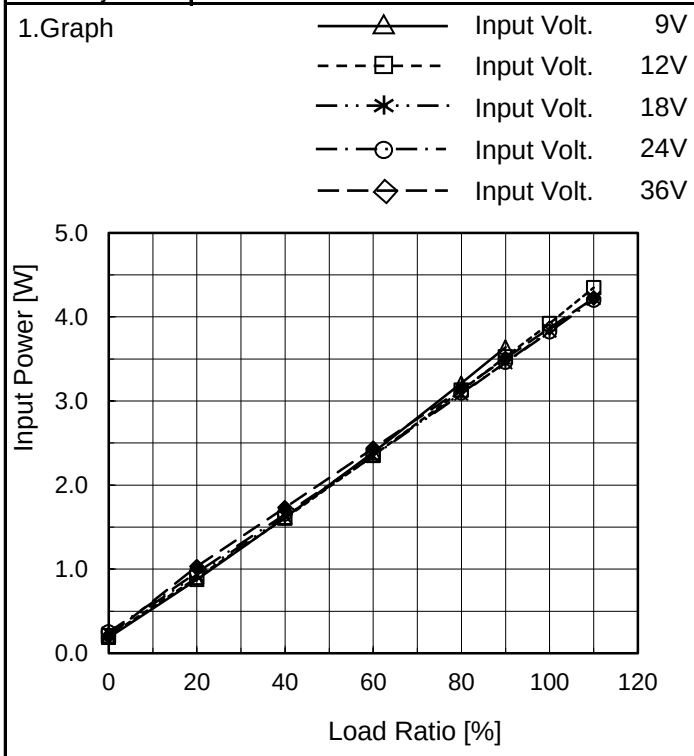
Model	MGFW32412
Item	Input Power (by Load Ratio)
Object	――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Ratio [%]	Input Power [W]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0	0.19	0.21	0.23	0.25	0.20
20	0.88	0.90	0.93	0.96	1.03
40	1.61	1.61	1.63	1.65	1.73
60	2.39	2.35	2.35	2.35	2.44
80	3.21	3.13	3.08	3.09	3.14
90	3.64	3.52	3.46	3.46	3.51
100	- ※	3.92	3.83	3.82	3.87
110	- ※	4.35	4.22	4.20	4.22
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

※ 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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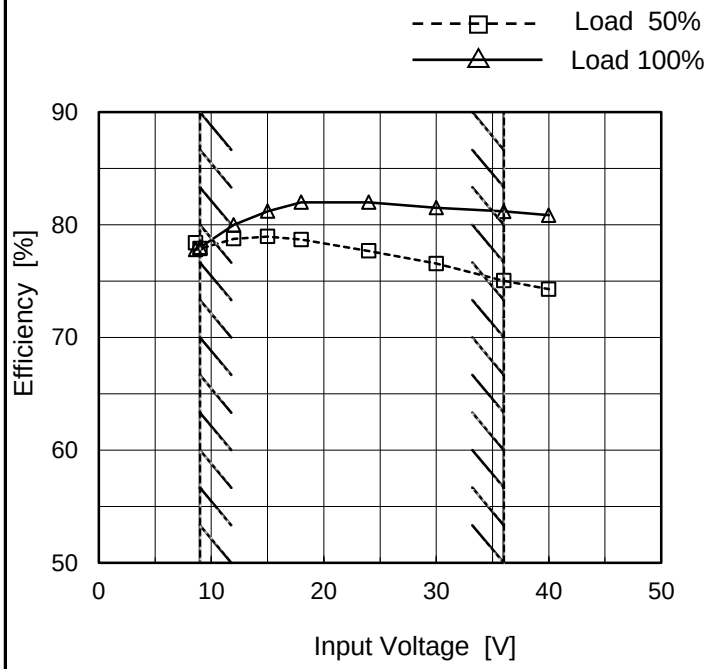
Model	MGFW32412
Item	Efficiency (by Input Voltage)
Object	――――――――――

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%
8.6	78.4	77.8 ※1
9.0	77.9	78.0 ※1
12.0	78.8	80.0
15.0	79.0	81.2
18.0	78.7	82.0
24.0	77.7	82.0
30.0	76.6	81.5
36.0	75.0	81.2
40.0	74.3	80.9

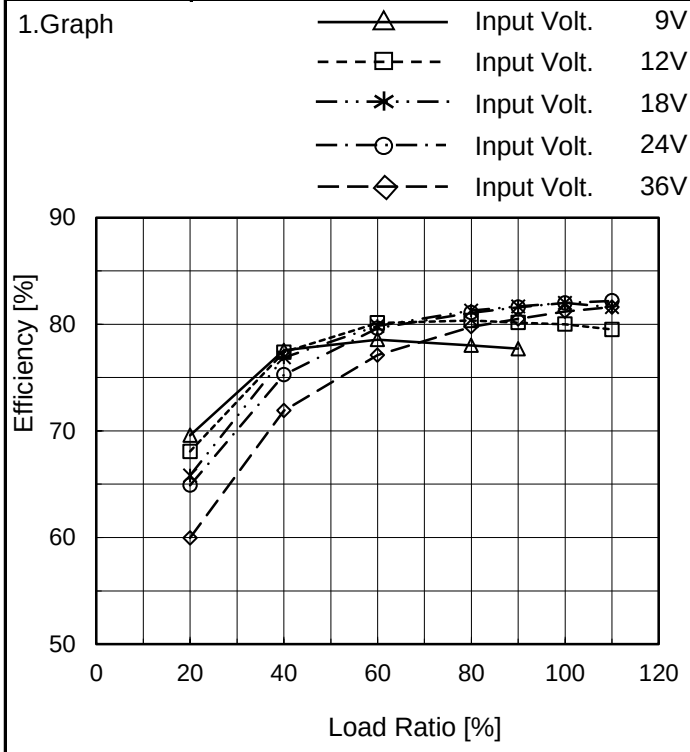
※1:Load 80%

COSEL

Model	MGFW32412
Item	Efficiency (by Load Ratio)
Object	――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Ratio [%]	Efficiency [%]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0	-	-	-	-	-
20	69.6	68.1	65.8	64.9	60.0
40	77.5	77.4	76.9	75.3	71.9
60	78.6	80.1	79.8	79.6	77.1
80	78.0	80.3	81.3	81.1	79.8
90	77.7	80.2	81.7	81.6	80.5
100	- ※	80.0	82.0	82.0	81.2
110	- ※	79.5	81.6	82.2	81.6
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

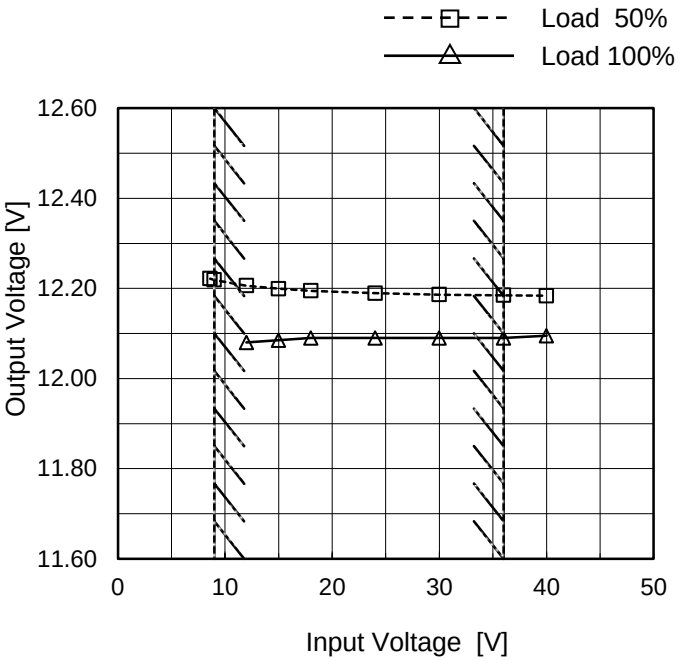
※ Maximum output current at minimum input Voltage is 80% of rated load current. Refer to instruction manuals for details of input derating.

COSEL

Model	MGFW32412
Item	Line Regulation
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



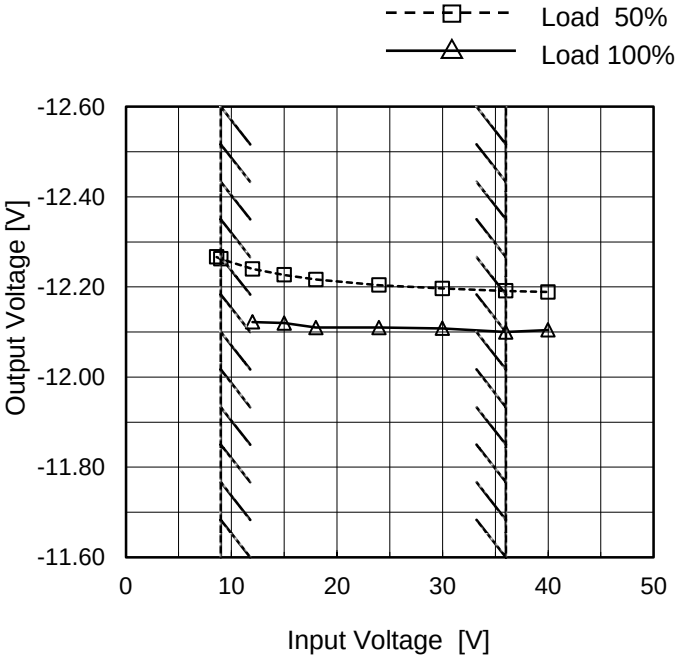
2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8.6	12.222	- ※
9.0	12.219	- ※
12.0	12.206	12.080
15.0	12.199	12.085
18.0	12.195	12.090
24.0	12.189	12.090
30.0	12.186	12.090
36.0	12.185	12.090
40.0	12.184	12.095

-12V: Rated Load Current

Object	-12V0.13A

1.Graph



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

2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8.6	-12.266	- ※
9.0	-12.262	- ※
12.0	-12.240	-12.122
15.0	-12.227	-12.120
18.0	-12.217	-12.110
24.0	-12.204	-12.110
30.0	-12.197	-12.108
36.0	-12.191	-12.100
40.0	-12.189	-12.105

+12V: Rated Load Current

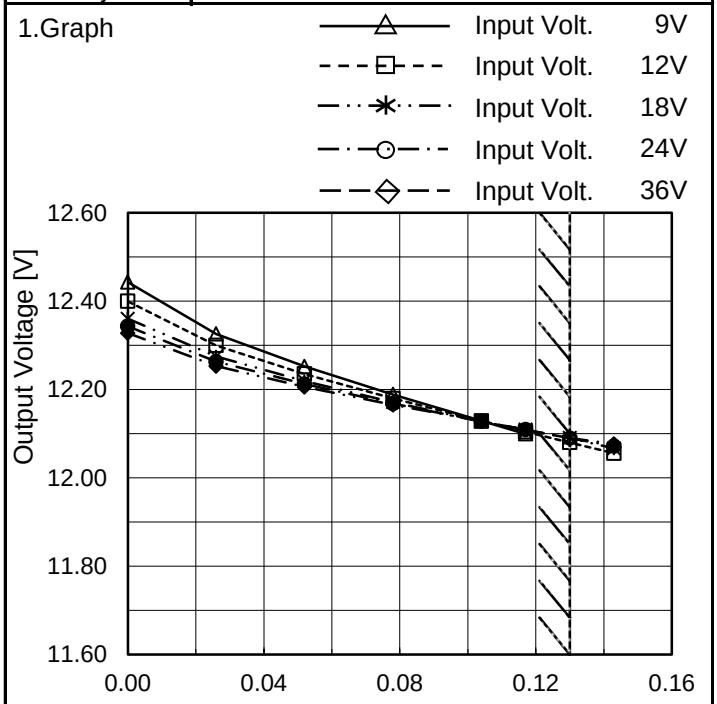
※ Maximum output current at minimum input Voltage is 80% of rated load current. Refer to instruction manuals for details of input derating.

COSEL

Model	MGFW32412
Item	Load Regulation
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



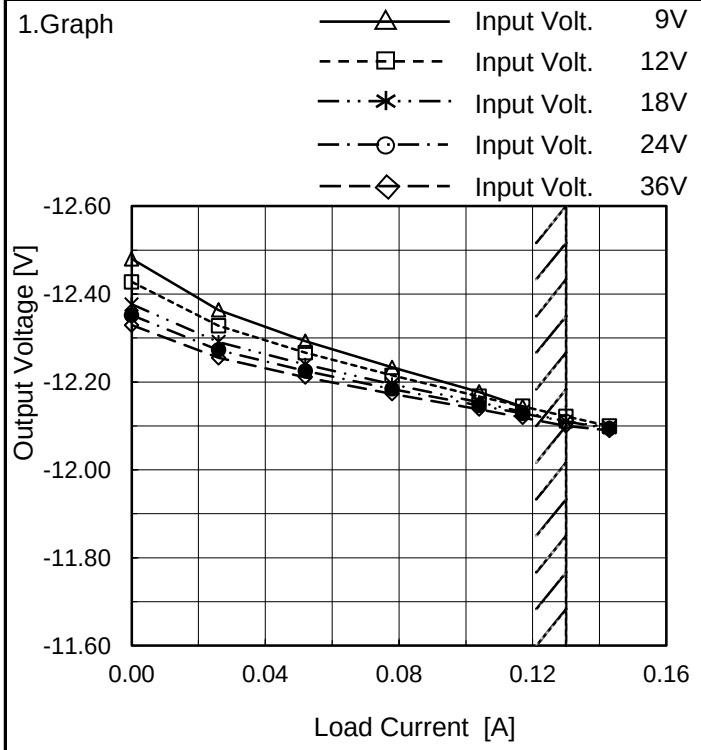
2.Values

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	12.443	12.400	12.360	12.343	12.328
0.026	12.326	12.300	12.275	12.263	12.253
0.052	12.252	12.235	12.219	12.212	12.206
0.078	12.189	12.180	12.172	12.168	12.165
0.104	12.129	12.129	12.128	12.128	12.128
0.117	12.100	12.104	12.109	12.109	12.109
0.130	- ※	12.080	12.090	12.090	12.090
0.143	- ※	12.056	12.067	12.072	12.077
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

-12V: Rated Load Current

Object	-12V0.13A

1.Graph



Note: Slanted line shows the range of the rated load 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	-12.480	-12.427	-12.376	-12.352	-12.329
0.026	-12.364	-12.328	-12.291	-12.273	-12.255
0.052	-12.293	-12.267	-12.240	-12.225	-12.211
0.078	-12.233	-12.215	-12.195	-12.184	-12.173
0.104	-12.177	-12.167	-12.154	-12.146	-12.138
0.117	-12.144	-12.144	-12.132	-12.128	-12.119
0.130	- ※	-12.122	-12.110	-12.110	-12.100
0.143	- ※	-12.099	-12.097	-12.094	-12.089
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

+12V: Rated Load Current

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

COSEL

Model	MGFW32412	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	+12V0.13A	

Input Volt. 24 V

-12V:rated load current.

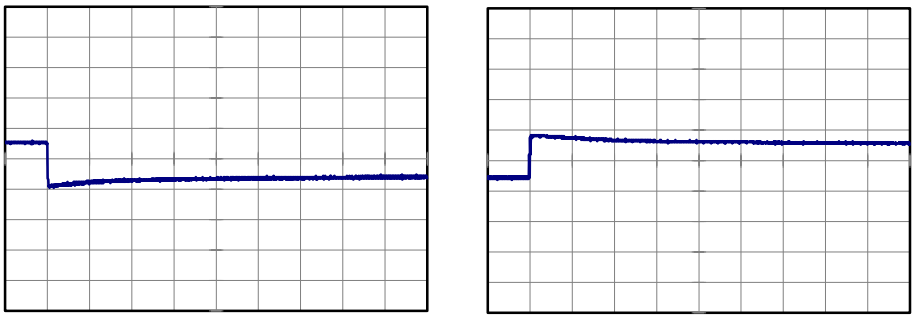
Cycle 100 ms

t1,t2 = 100 μ s

Load Current

t1 t2

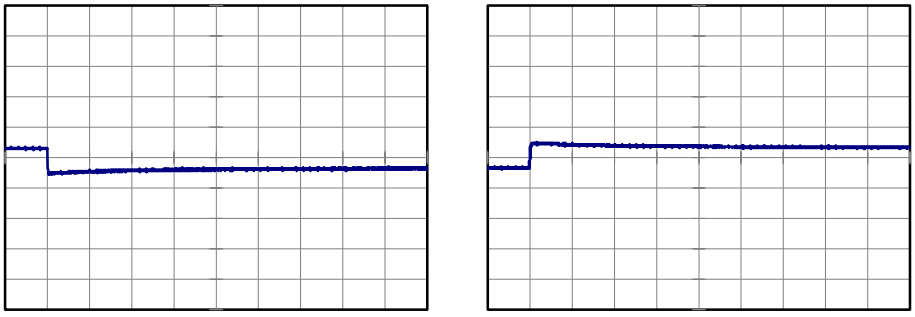
Min.Load (0A)←→
Load 100% (0.13A)



200 mV/div

4 ms/div 4 ms/div

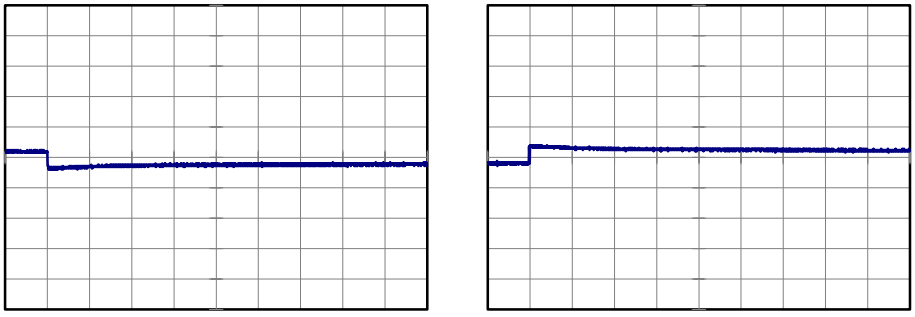
Min.Load (0A)←→
Load 50% (0.065A)



200 mV/div

4 ms/div 4 ms/div

Load 50% (0.065A)←→
Load 100% (0.13A)



200 mV/div

4 ms/div 4 ms/div

COSEL

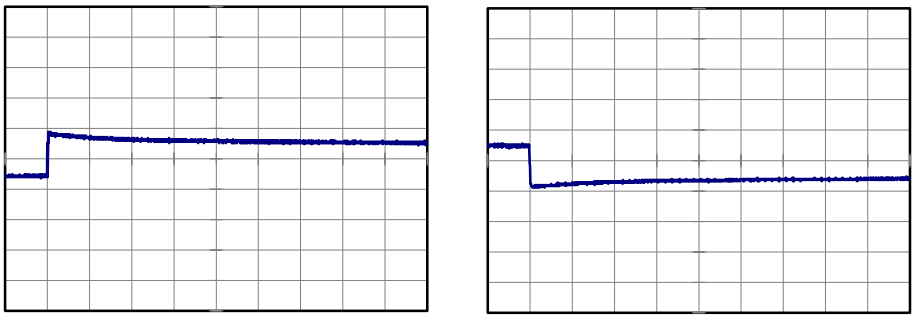
Model	MGFW32412	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	-12V0.13A	

Input Volt. 24 V

+12V:rated load current.

Cycle 100 ms

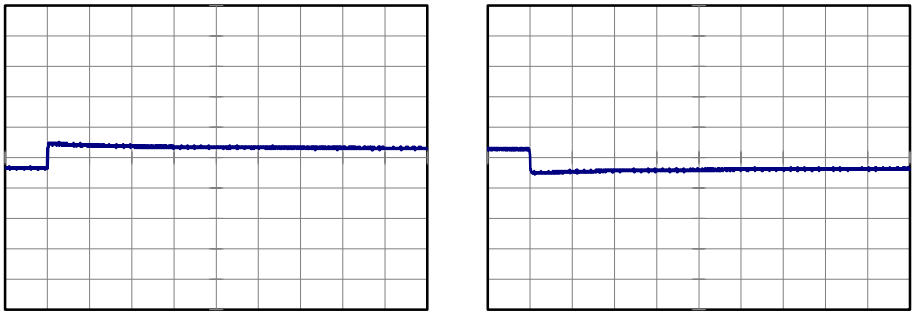
Min.Load (0A)←→
Load 100% (0.13A)



200 mV/div

4 ms/div 4 ms/div

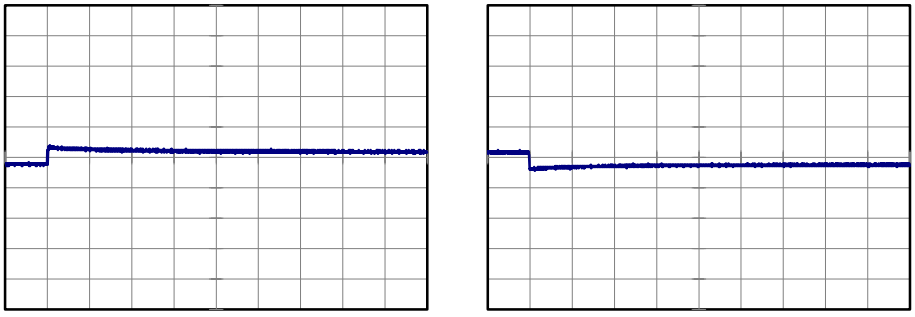
Min.Load (0A)←→
Load 50% (0.065A)



200 mV/div

4 ms/div 4 ms/div

Load 50% (0.065A)←→
Load 100% (0.13A)



200 mV/div

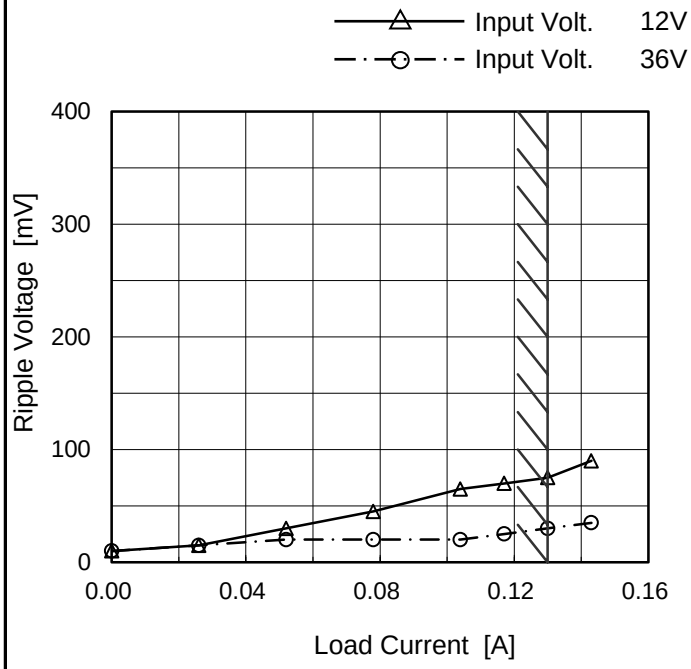
4 ms/div 4 ms/div

COSEL

Model	MGFW32412
Item	Ripple Voltage (by Load Current)
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure B

1.Graph



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.

Ripple [mVp-p]

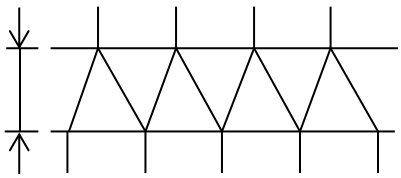


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 12 [V]	Input Volt. 36 [V]
0.000	10	10
0.026	15	15
0.052	30	20
0.078	45	20
0.104	65	20
0.117	70	25
0.130	75	30
0.143	90	35
--	-	-
--	-	-
--	-	-

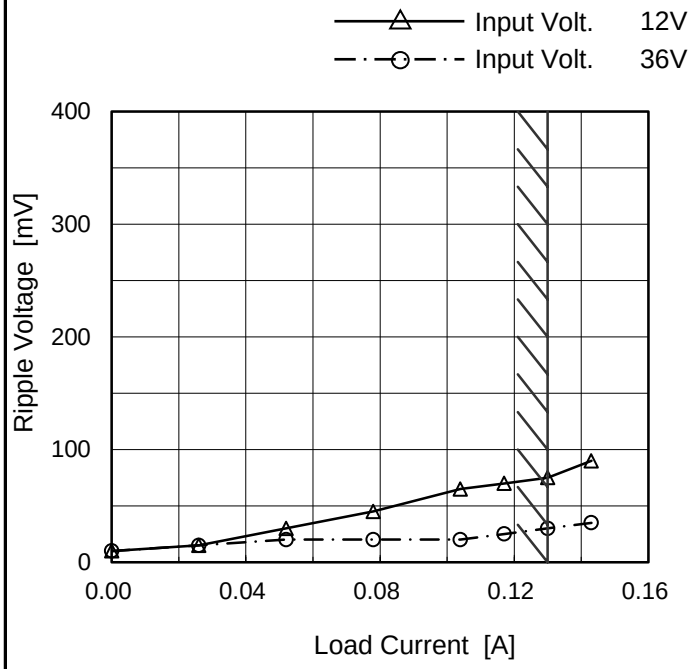
-12V: Rated Load Current

COSEL

Model	MGFW32412
Item	Ripple Voltage (by Load Current)
Object	-12V0.13A

Temperature 25°C
Testing Circuitry Figure B

1.Graph



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.

Ripple [mVp-p]

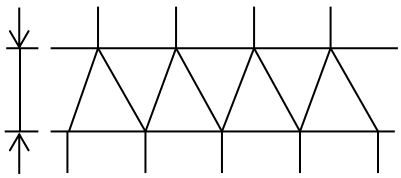


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 12 [V]	Input Volt. 36 [V]
0.000	10	10
0.026	15	15
0.052	30	20
0.078	45	20
0.104	65	20
0.117	70	25
0.130	75	30
0.143	90	35
--	-	-
--	-	-
--	-	-

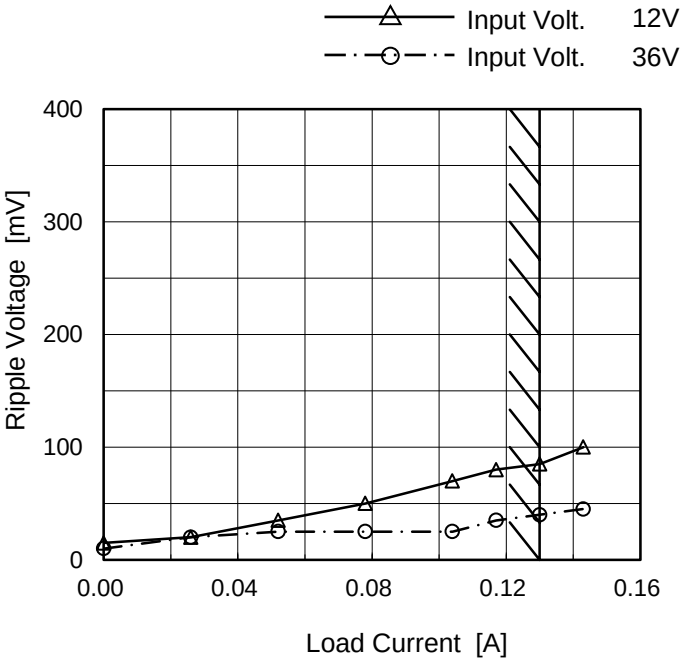
+12V: Rated Load Current

COSEL

Model	MGFW32412
Item	Ripple-Noise
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure B

1.Graph



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]

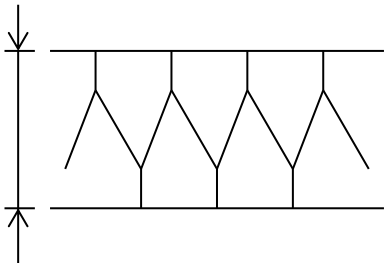


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 12 [V]	Input Volt. 36 [V]
0.000	15	10
0.026	20	20
0.052	35	25
0.078	50	25
0.104	70	25
0.117	80	35
0.130	85	40
0.143	100	45
--	-	-
--	-	-
--	-	-

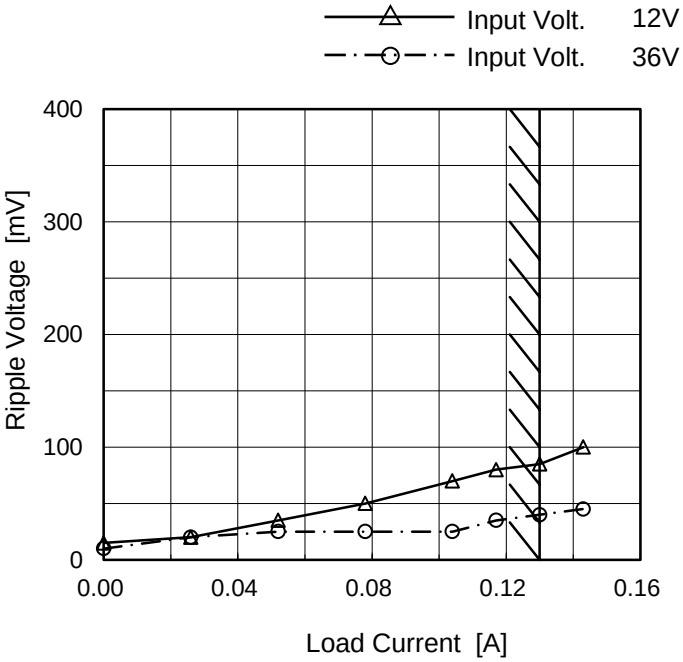
-12V: Rated Load Current

COSEL

Model	MGFW32412
Item	Ripple-Noise
Object	-12V0.13A

Temperature 25°C
Testing Circuitry Figure B

1.Graph



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]

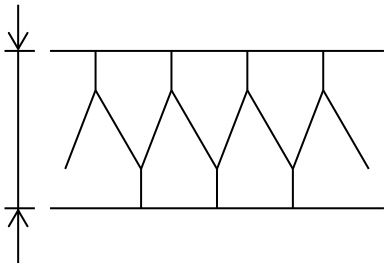


Fig.Complex Ripple Noise Wave Form

2.Values

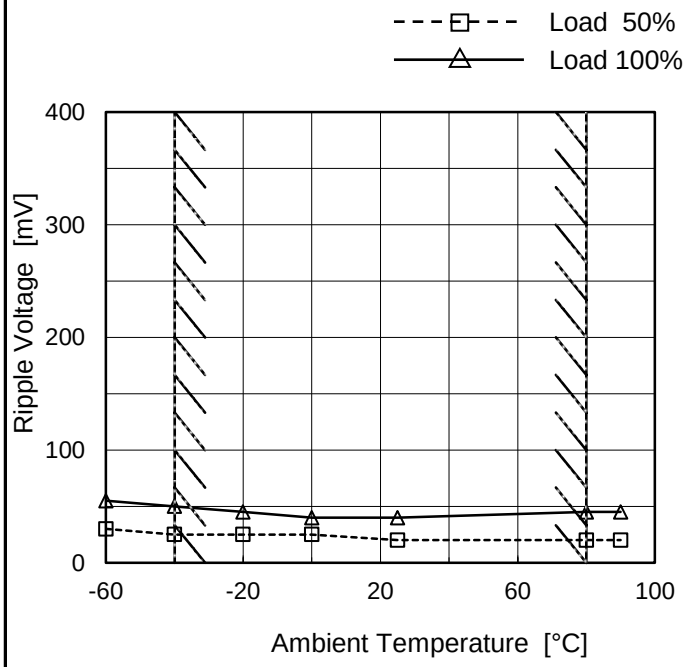
Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 12 [V]	Input Volt. 36 [V]
0.000	15	10
0.026	20	20
0.052	35	25
0.078	50	25
0.104	70	25
0.117	80	35
0.130	85	40
0.143	100	45
--	-	-
--	-	-
--	-	-

+12V: Rated Load Current

COSEL

Model	MGFW32412	
Item	Ripple Voltage (by Ambient Temp.)	Testing Circuitry Figure B
Object	+12V0.13A	

1.Graph



Input Volt. 24V

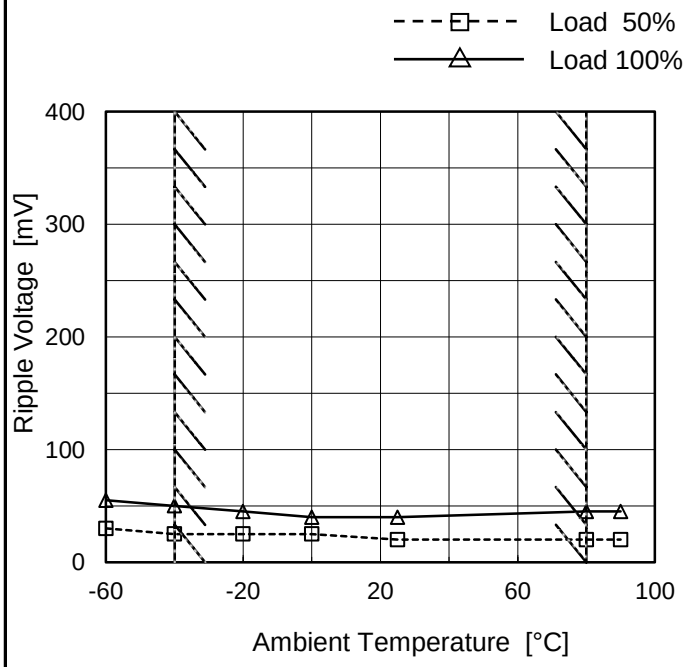
2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	30	55
-40	25	50
-20	25	45
0	25	40
25	20	40
80	20	45
90	20	45
--	-	-
--	-	-
--	-	-
--	-	-

-12V: Rated Load Current

Object	-12V0.13A

1.Graph



Input Volt. 24V

Measured by 100 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%
-60	30	55
-40	25	50
-20	25	45
0	25	40
25	20	40
80	20	45
90	20	45
--	-	-
--	-	-
--	-	-
--	-	-

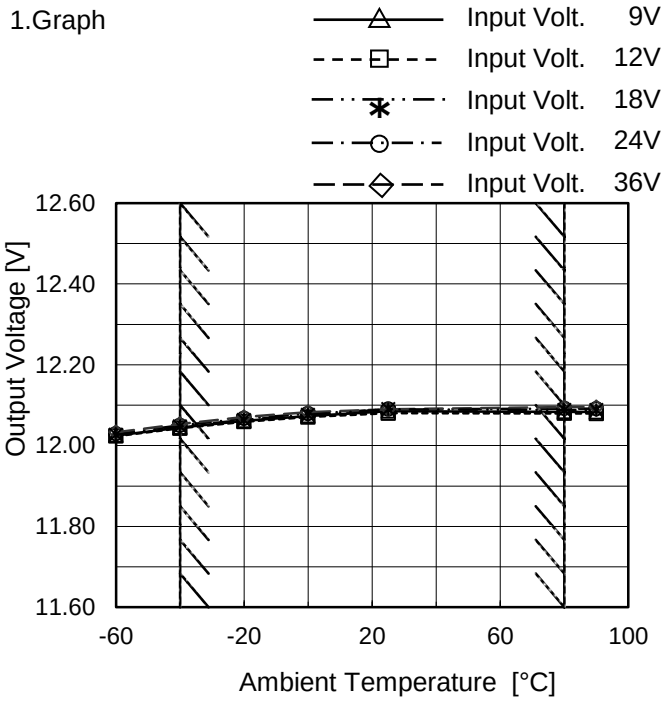
+12V: Rated Load Current

COSEL

Model	MGFW32412
Item	Ambient Temperature Drift
Object	+12V0.13A

Testing Circuitry Figure A

1.Graph



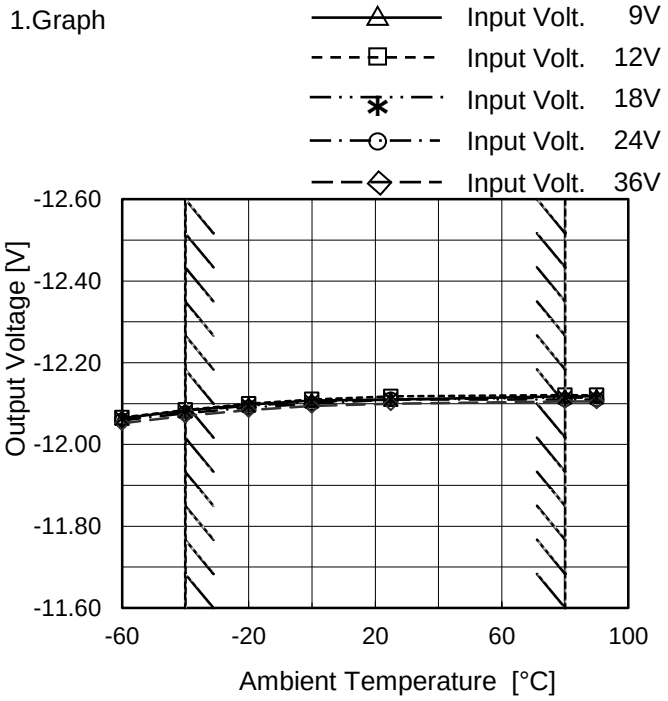
2.Values

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	12.025	12.023	12.027	12.029	12.033
-40	12.045	12.043	12.047	12.050	12.054
-20	12.061	12.059	12.064	12.067	12.071
0	12.073	12.070	12.076	12.079	12.082
25	12.085	12.080	12.090	12.090	12.090
80	12.084	12.080	12.088	12.092	12.095
90	12.083	12.079	12.088	12.091	12.095
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

-12V: Rated Load Current

Object	-12V0.13A

1.Graph



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	-12.064	-12.066	-12.063	-12.059	-12.052
-40	-12.083	-12.084	-12.081	-12.077	-12.070
-20	-12.097	-12.100	-12.095	-12.091	-12.084
0	-12.108	-12.110	-12.105	-12.100	-12.094
25	-12.110	-12.118	-12.110	-12.110	-12.100
80	-12.118	-12.121	-12.114	-12.110	-12.105
90	-12.117	-12.121	-12.114	-12.110	-12.105
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

+12V: Rated Load Current

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

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

COSEL

Model	MGFW32412	
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 - 80°C
Input Voltage : 12 - 36V
Load Current (AVR 1) : 0 - 0.13A (AVR 2) : 0 - 0.13A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - Minimum of Output Voltage) / 2

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

2.Values

Object	+12V0.13A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	80	12	0	12.412	±324	±2.7
Minimum Voltage	-40	12	0.13	11.765		

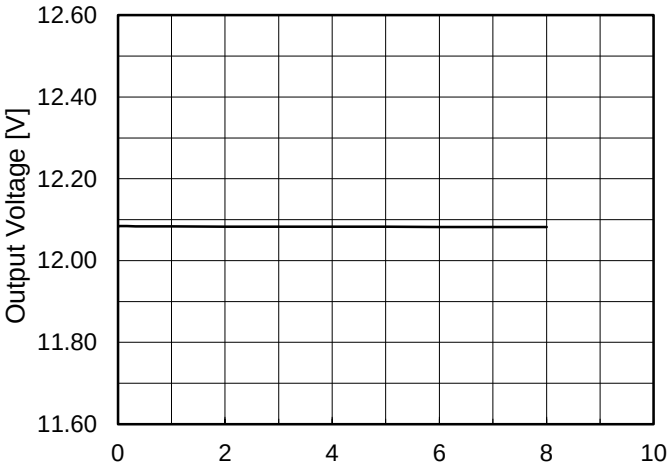
Object	-12V0.13A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	80	12	0	-12.436	±321	±2.7
Minimum Voltage	-40	12	0.13	-11.795		

COSEL

Model	MGFW32412
Item	Time Lapse Drift
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 24V
Load 100%

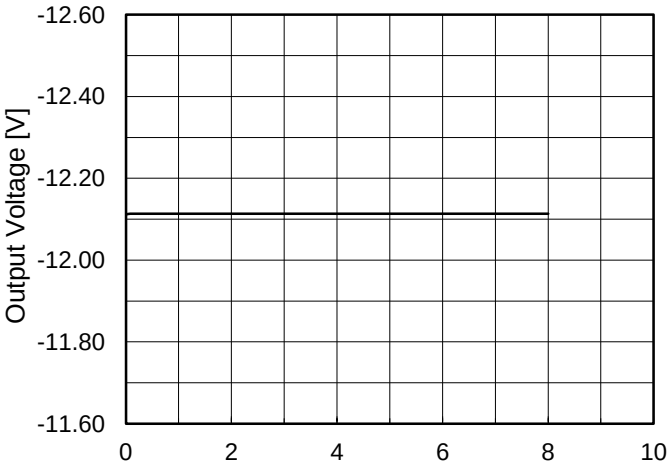
2.Values

Time since start [H]	Output Voltage [V]
0.0	12.083
0.5	12.084
1.0	12.084
2.0	12.083
3.0	12.083
4.0	12.083
5.0	12.083
6.0	12.082
7.0	12.082
8.0	12.082

-12V: Rated Load Current

Object	-12V0.13A

1.Graph



Input Volt. 24V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	-12.111
0.5	-12.113
1.0	-12.113
2.0	-12.113
3.0	-12.113
4.0	-12.113
5.0	-12.113
6.0	-12.113
7.0	-12.113
8.0	-12.113

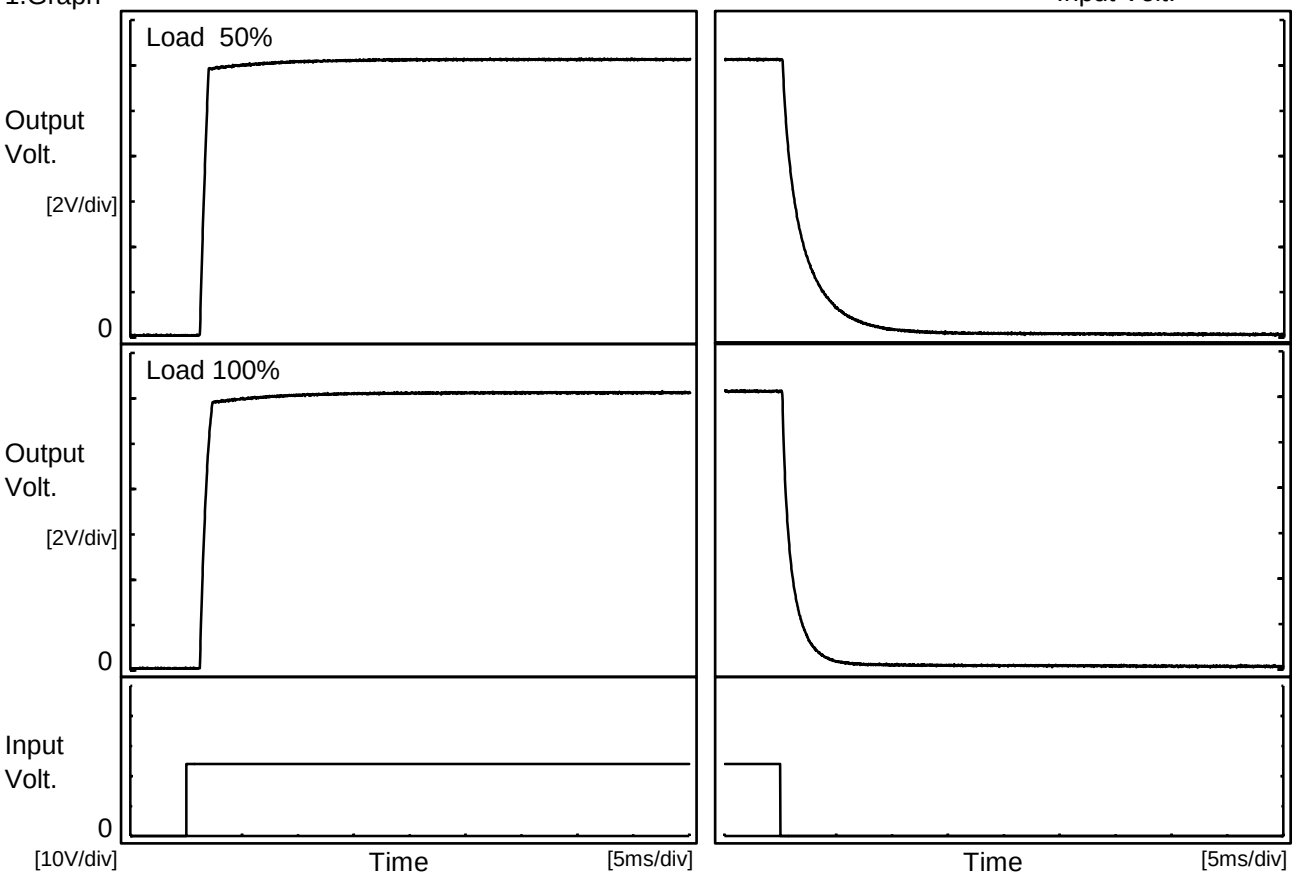
+12V: Rated Load Current

COSEL

Model	MGFW32412	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	+12V0.13A	

1.Graph

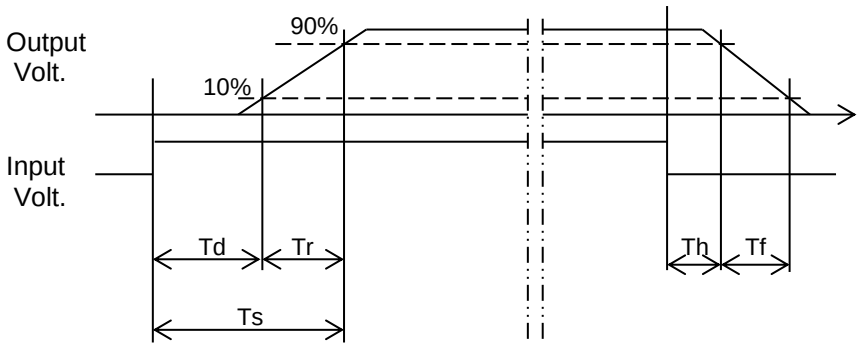
Input Volt. 24 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	1.3	0.6	1.9	0.3	4.8
100 %	1.3	0.9	2.2	0.3	2.3

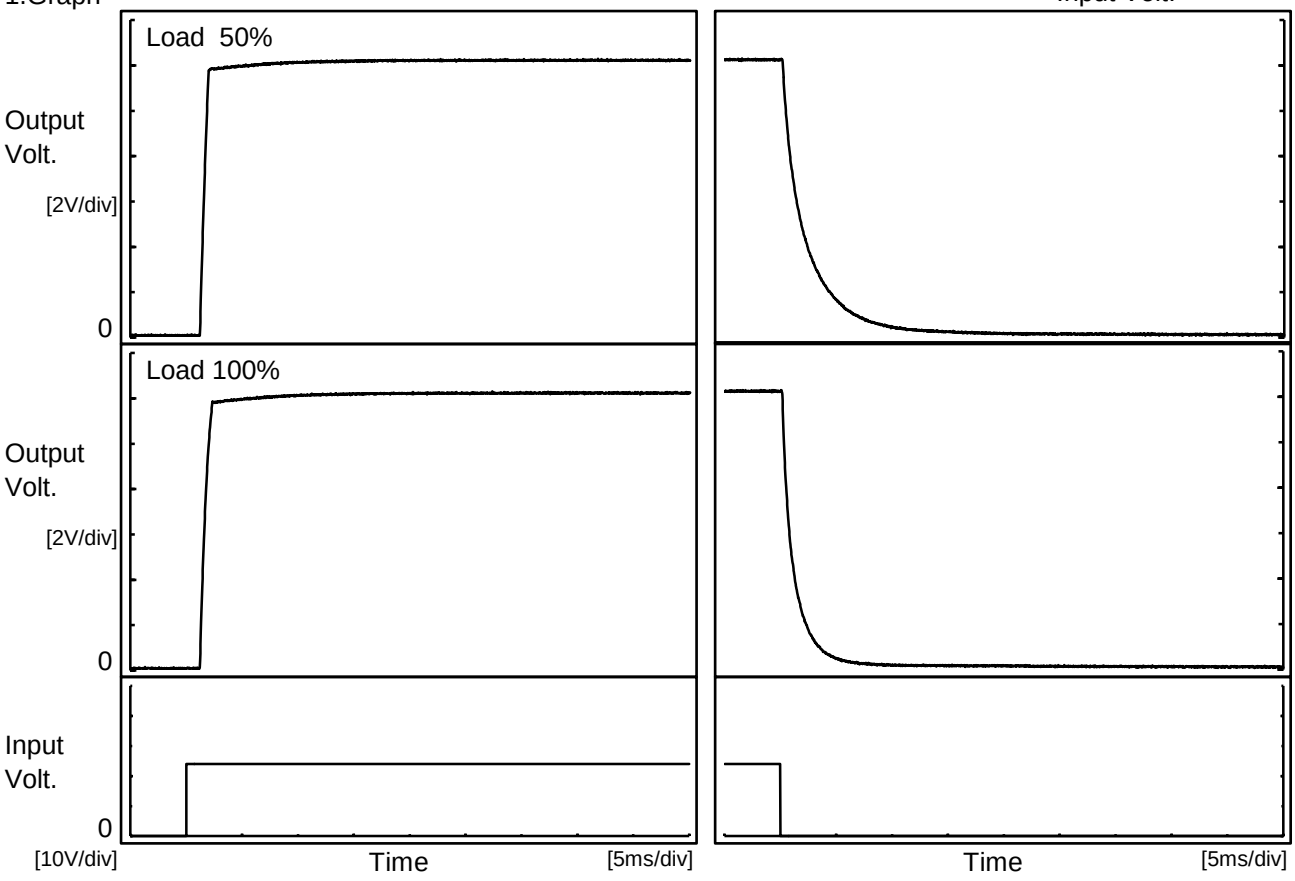


COSEL

Model	MGFW32412	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	-12V0.13A	

1.Graph

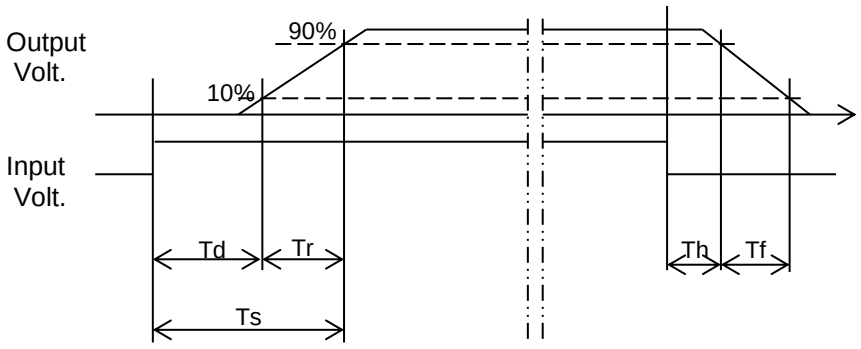
Input Volt. 24 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	1.3	0.6	1.9	0.3	5.5
100 %	1.3	0.9	2.2	0.3	2.8



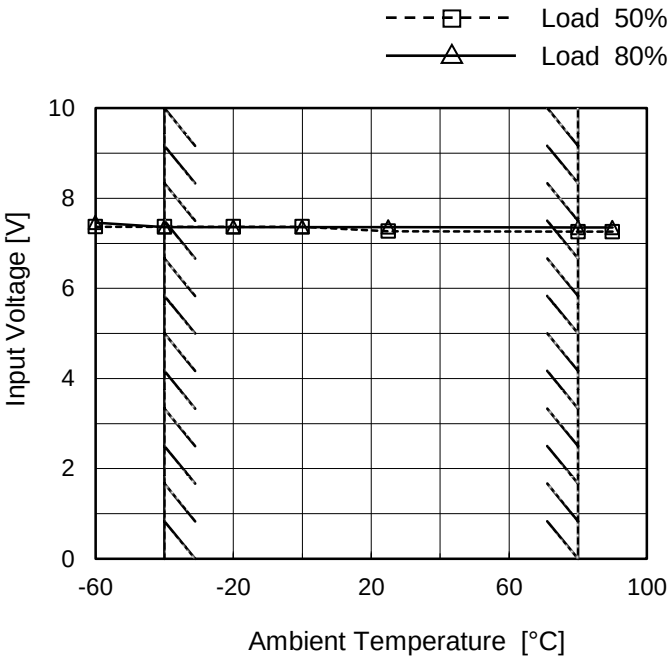
COSEL

Model	MGFW32412
Item	Minimum Input Voltage for Regulated Output Voltage

Testing Circuitry Figure A

Object +12V0.13A

1.Graph

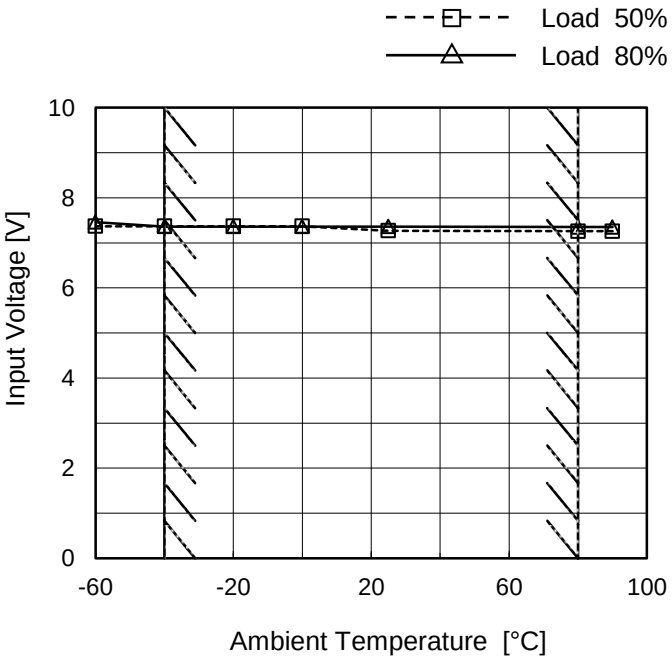


2.Values

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
--	-	-
--	-	-
--	-	-
--	-	-

Object -12V0.13A

1.Graph



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

2.Values

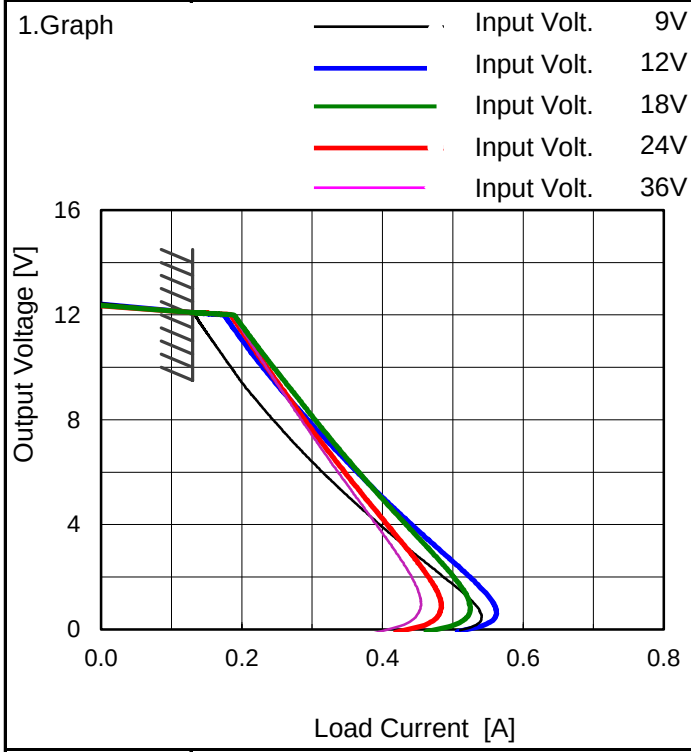
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 80%
-60	7.4	7.5
-40	7.4	7.4
-20	7.4	7.4
0	7.4	7.4
25	7.3	7.4
80	7.3	7.4
90	7.3	7.4
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	MGFW32412
Item	Overcurrent Protection
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



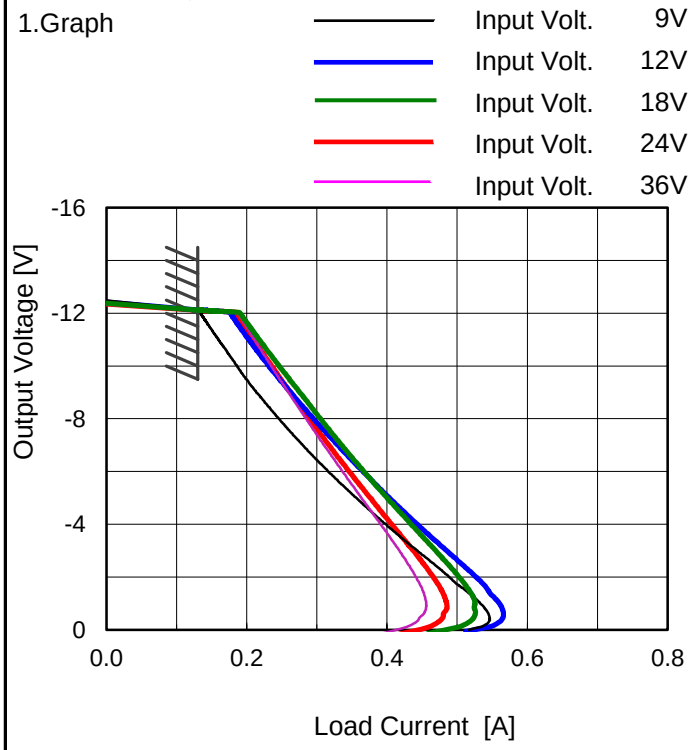
2.Values

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	0.148	0.191	0.205	0.200	0.202
10.8	0.163	0.207	0.222	0.214	0.215
9.6	0.195	0.241	0.256	0.246	0.244
8.4	0.231	0.280	0.292	0.278	0.274
7.2	0.272	0.320	0.328	0.311	0.305
6.0	0.314	0.364	0.365	0.346	0.337
4.8	0.361	0.409	0.406	0.382	0.369
3.6	0.414	0.457	0.446	0.419	0.402
2.4	0.468	0.508	0.488	0.454	0.433
1.2	0.523	0.552	0.521	0.481	0.454
0.0	0.511	0.506	0.462	0.419	0.388
--	-	-	-	-	-

-12V: Rated Load Current

Object	-12V0.13A

1.Graph



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

2.Values

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	0.149	0.192	0.207	0.200	0.201
-10.8	0.165	0.208	0.224	0.214	0.216
-9.6	0.196	0.243	0.257	0.245	0.244
-8.4	0.233	0.281	0.293	0.278	0.274
-7.2	0.273	0.322	0.329	0.311	0.304
-6.0	0.316	0.365	0.366	0.345	0.336
-4.8	0.363	0.411	0.407	0.381	0.369
-3.6	0.415	0.459	0.447	0.418	0.401
-2.4	0.471	0.510	0.490	0.454	0.433
-1.2	0.525	0.553	0.523	0.483	0.455
0.0	0.517	0.512	0.458	0.418	0.390
--	-	-	-	-	-

+12V: Rated Load Current

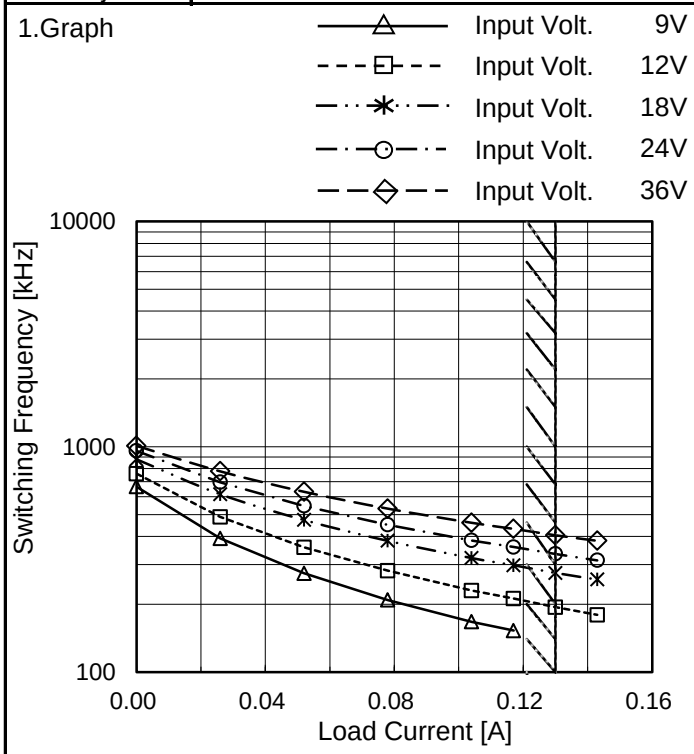
Maximum output current at minimum input Voltage is 80% of rated load current.
Refer to instruction manuals for details of input derating.

COSEL

Model	MGFW32412
Item	Switching frequency (by Load Current)
Object	+/-12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

When load current is low, MG operates intermittently, so switching frequency would not become constant.

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	665	760	880	960	1010
0.026	392	488	616	696	778
0.052	275	358	473	547	631
0.078	209	282	382	451	532
0.104	167	230	321	384	460
0.117	153	212	298	359	432
0.130	- ※	194	276	334	405
0.143	- ※	179	258	313	383
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

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

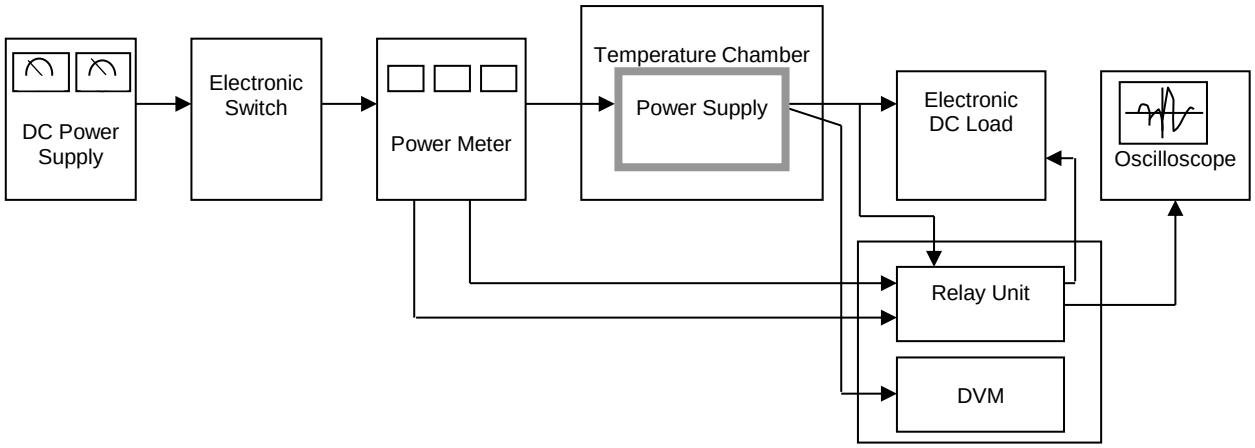


Figure A

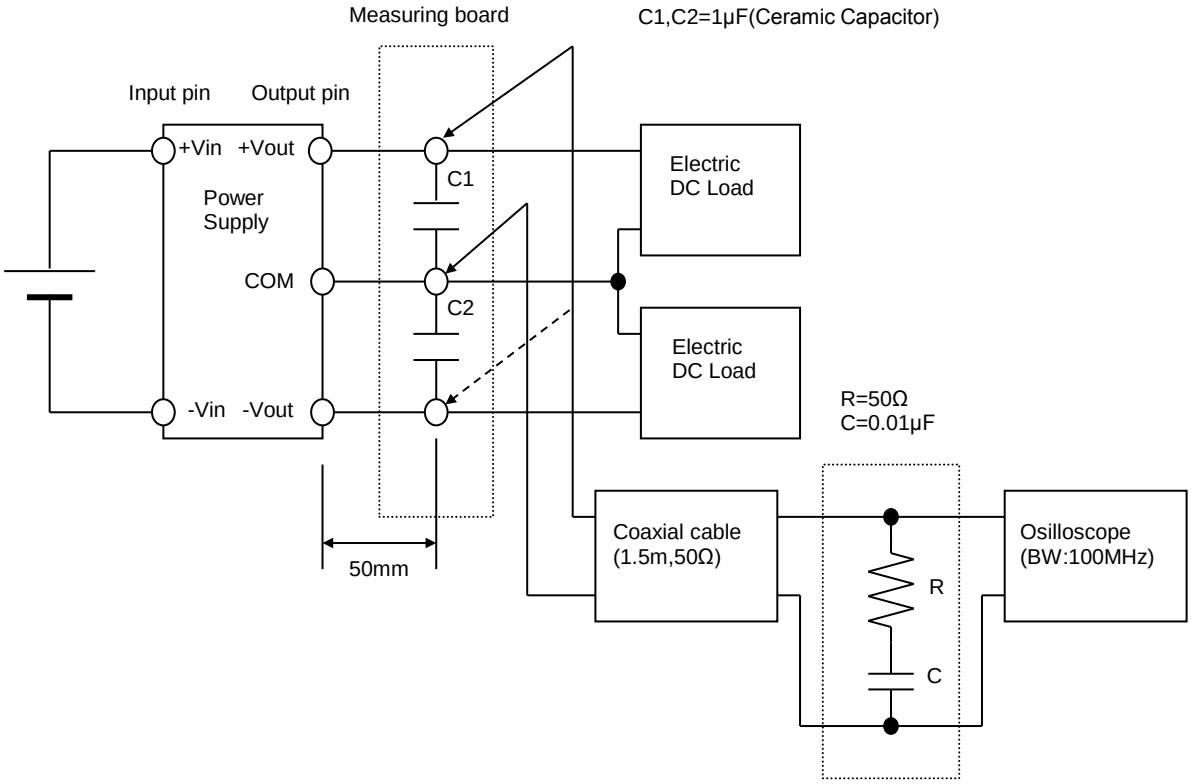


Figure B（Ripple and Ripple noise Characteristic）