



# TEST DATA OF Q MODULE

Regulated DC Power Supply  
Mar.22. 2004

Approved by : *K. Shibutani*  
K.Shibutani Design Manager

Prepared by : *M. Hamaguchi*  
M.Hamaguchi Design Engineer

**COSEL CO.,LTD.**



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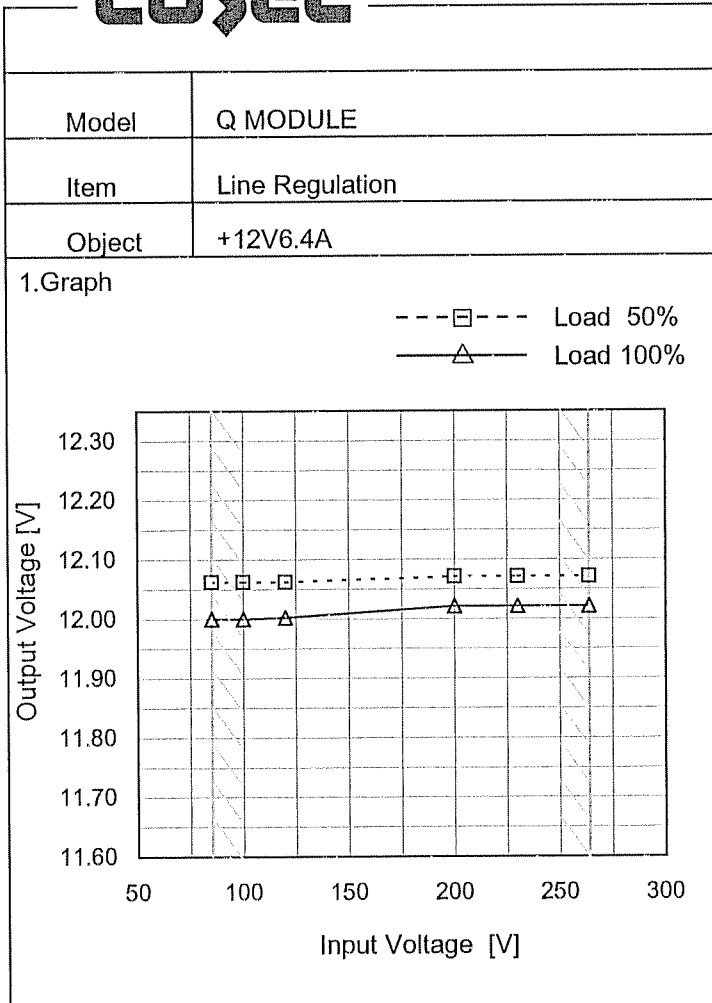
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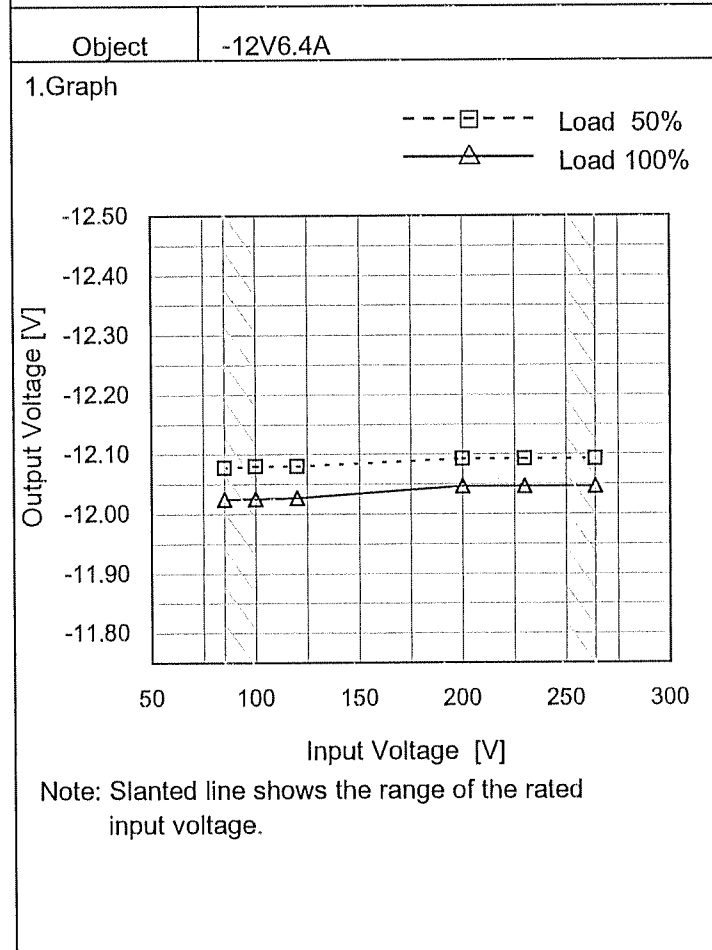
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Temperature 25°C  
Testing Circuitry Figure A

2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	12.062	12.000
100	12.062	12.000
120	12.062	12.002
200	12.071	12.021
230	12.071	12.021
264	12.071	12.021
--	-	-
--	-	-
--	-	-



2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	-12.078	-12.024
100	-12.080	-12.025
120	-12.080	-12.027
200	-12.092	-12.046
230	-12.092	-12.046
264	-12.092	-12.046
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--	-	-
--	-	-



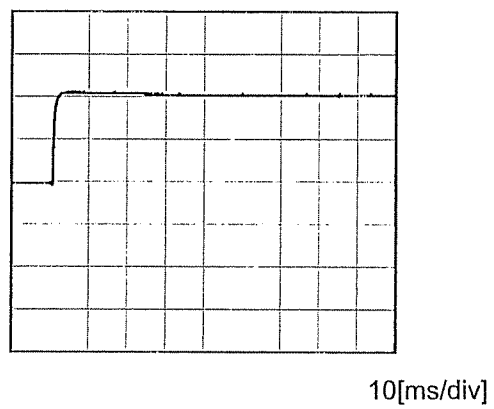
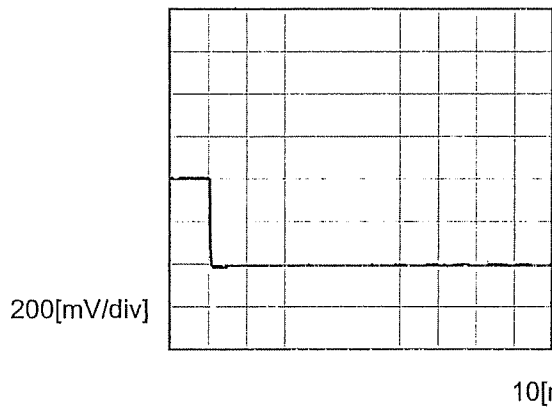
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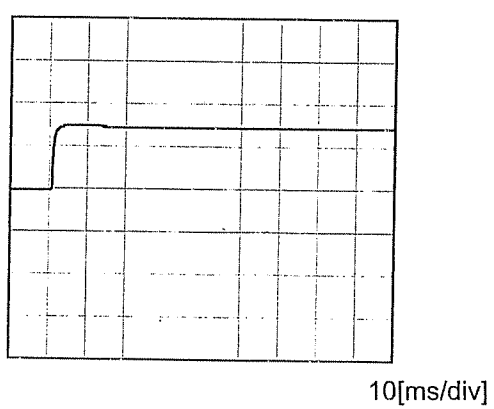
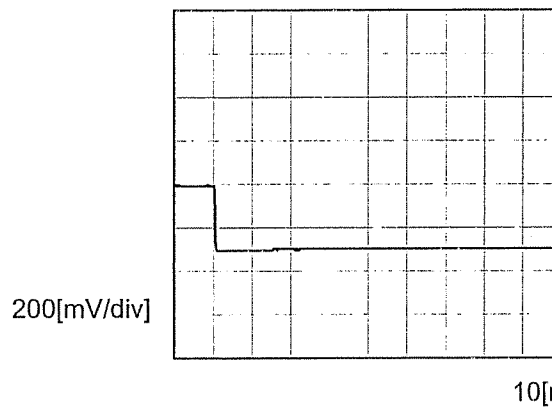
Model	Q MODULE	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+12V6.4A		

Input Volt. 100 V  
 Cycle 1000 ms

Min. Load ( 0 A ) -- Load 100% ( 6.4 A )



Min. Load ( 0 A ) -- Load 50% ( 3.2 A )



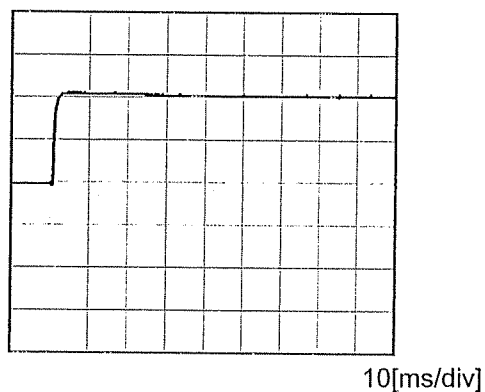
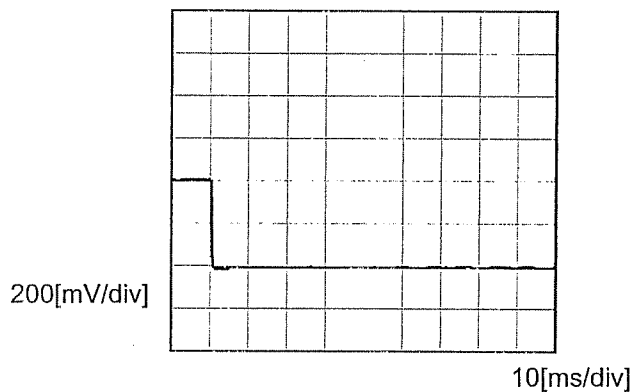
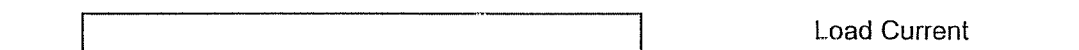
\* The characteristic of AC200V is equal.



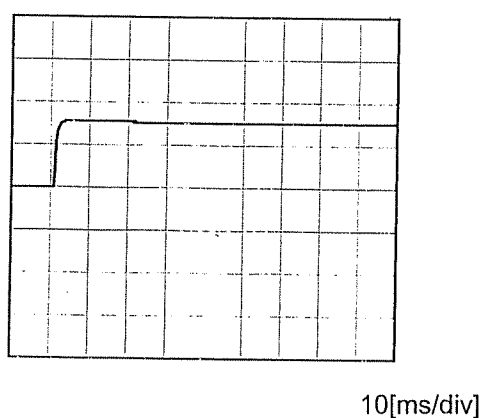
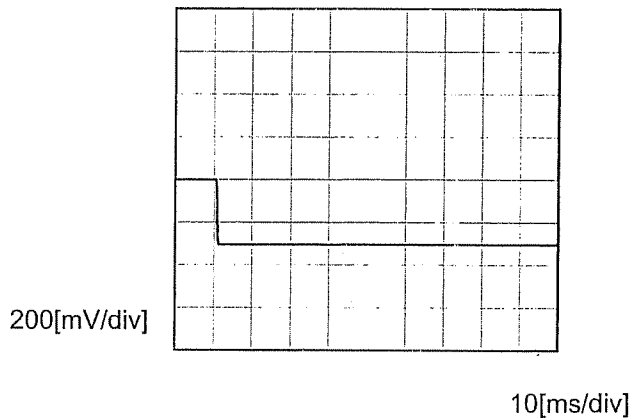
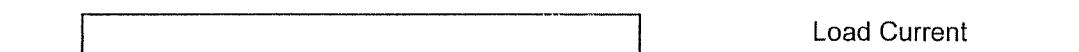
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Item	Dynamic Load Response	Testing Circuitry	Figure A
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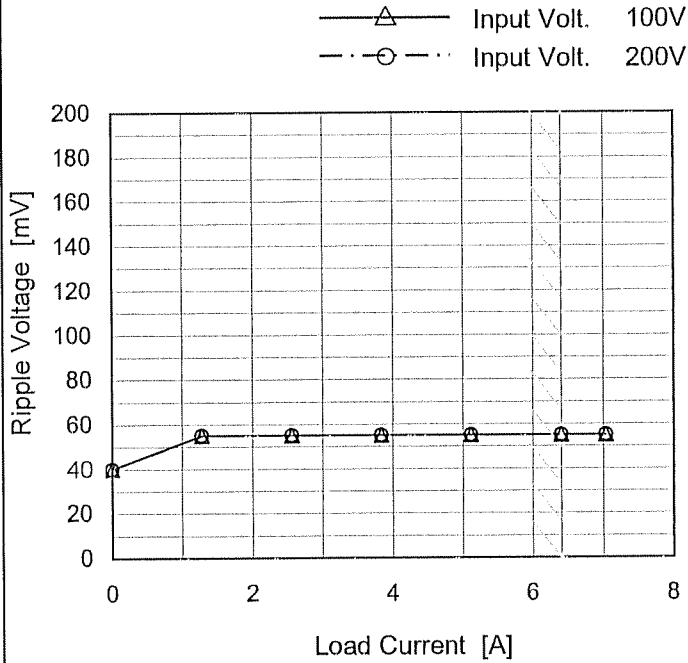
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Model	Q MODULE
Item	Ripple Voltage (by Load Current)
Object	+12V6.4A

Temperature 25°C  
Testing Circuitry Figure A

1. Graph



2. Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.00	40	40
1.28	55	55
2.56	55	55
3.84	55	55
5.12	55	55
6.40	55	55
7.04	55	55
--	-	-
--	-	-
--	-	-
--	-	-

Measured by 20 MHz Oscilloscope.  
Ripple Voltage is shown as p-p in the figure below.  
Note: Slanted line shows the range of the rated load current.

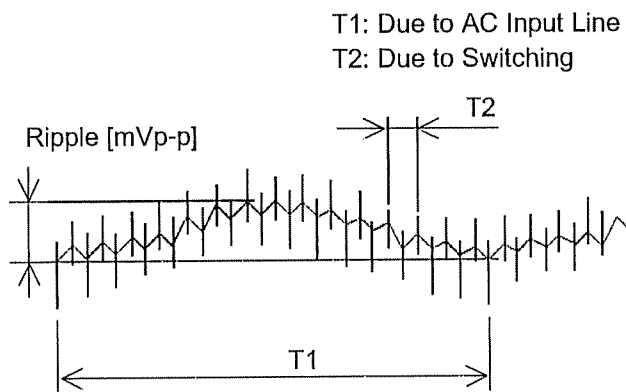


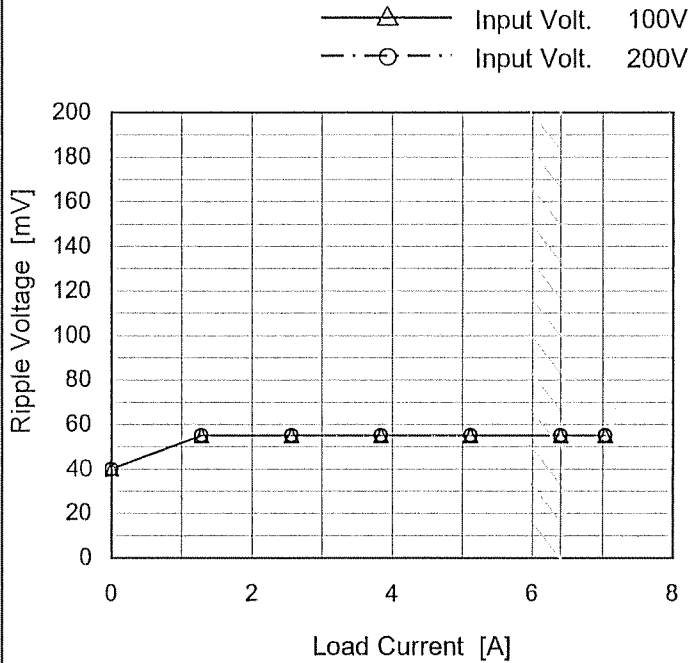
Fig. Complex Ripple Wave Form



Model	Q MODULE
Item	Ripple Voltage (by Load Current)
Object	-12V6.4A

Temperature 25°C  
Testing Circuitry Figure A

1. Graph



2. Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
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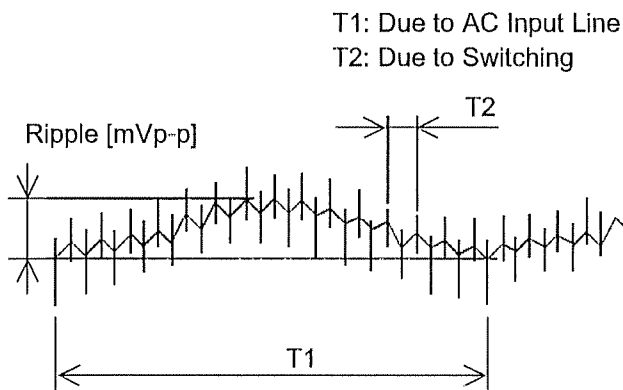


Fig. Complex Ripple Wave Form





Model		Q MODULE		Temperature 25°C Testing Circuitry Figure A																																						
Item		Ripple-Noise																																								
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1.Graph				2.Values																																						
<p>                     —△— Input Volt. 100V                      - - ○ - - Input Volt. 200V                 </p> <p>                     Measured by 20 MHz Oscilloscope.                      Ripple-Noise is shown as p-p in the figure below.                      Note: Slanted line shows the range of the rated load current.                 </p>																																										
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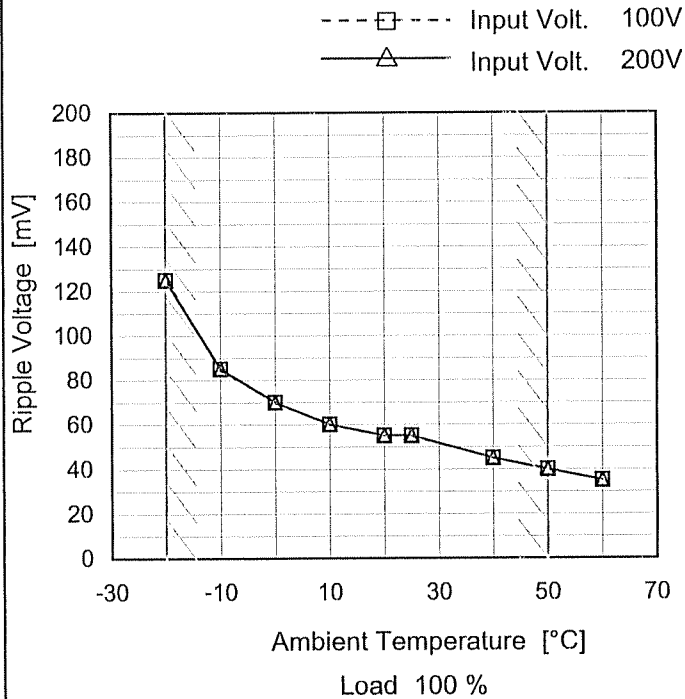
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Model	Q MODULE
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V6.4A

Testing Circuitry Figure A

1.Graph

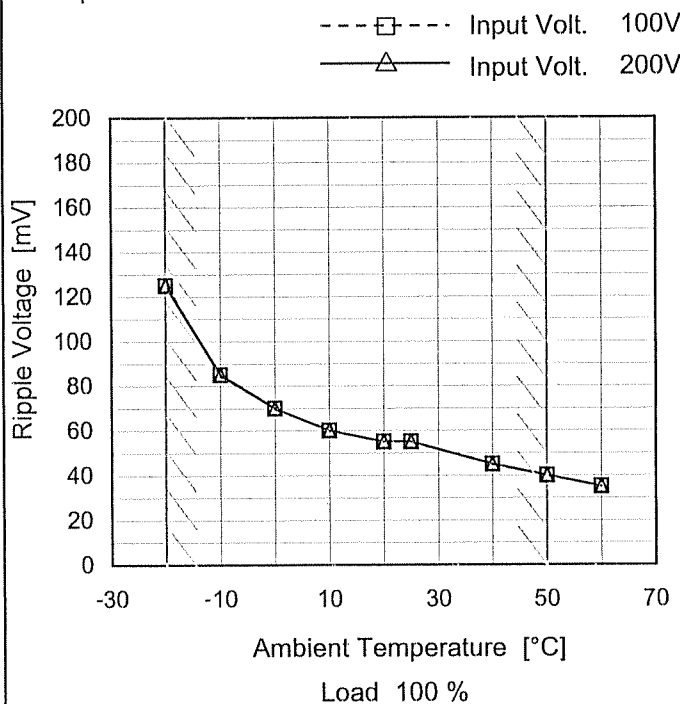


2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-20	125	125
-10	85	85
0	70	70
10	60	60
20	55	55
25	55	55
40	45	45
50	40	40
60	35	35
--	-	-
--	-	-

Object	-12V6.4A
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1.Graph

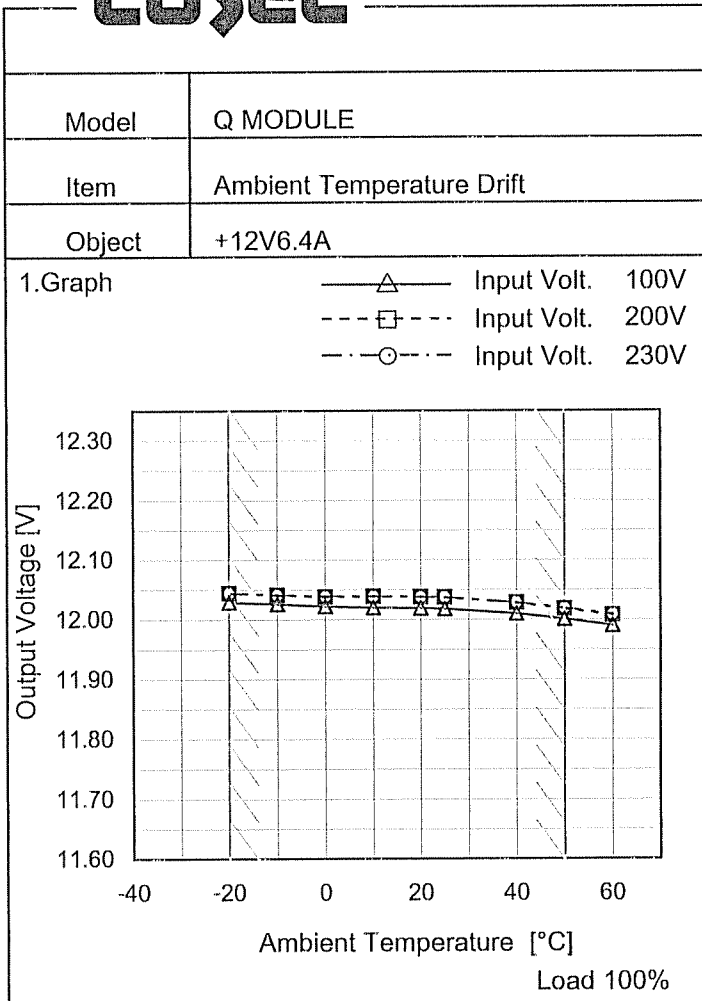


2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-20	125	125
-10	85	85
0	70	70
10	60	60
20	55	55
25	55	55
40	45	45
50	40	40
60	35	35
--	-	-
--	-	-

Measured by 20 MHz Oscilloscope.

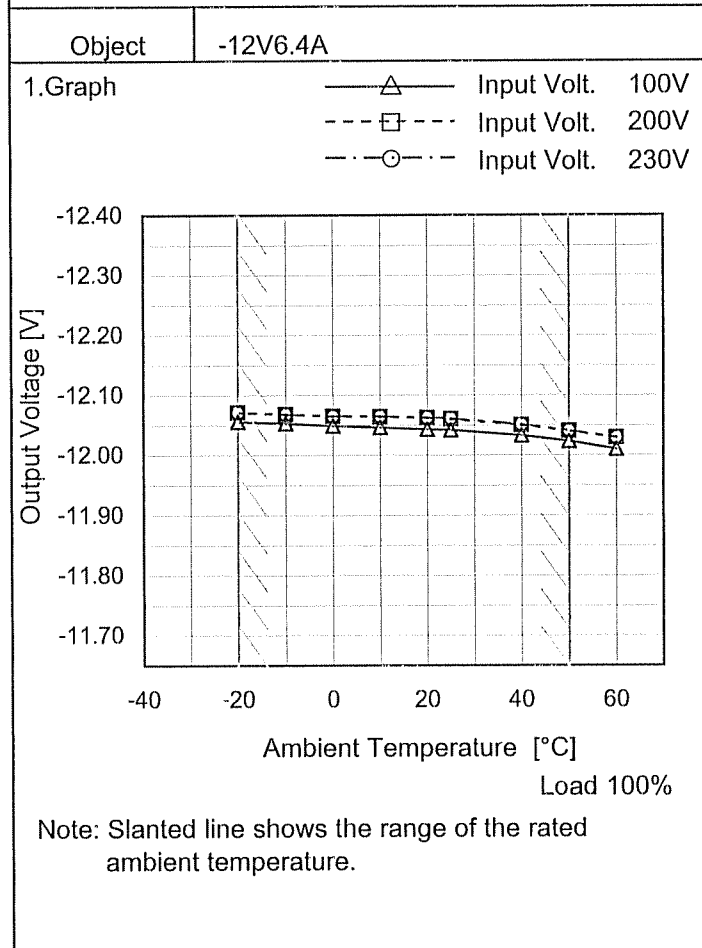
Note: Slanted line shows the range of the rated ambient temperature.



Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-20	12.029	12.044	12.044
-10	12.026	12.041	12.041
0	12.022	12.038	12.039
10	12.020	12.039	12.039
20	12.019	12.038	12.038
25	12.018	12.037	12.037
40	12.010	12.028	12.028
50	12.001	12.018	12.019
60	11.990	12.007	12.008
--	-	-	-
--	-	-	-



2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-20	-12.056	-12.071	-12.071
-10	-12.053	-12.068	-12.068
0	-12.049	-12.065	-12.065
10	-12.046	-12.064	-12.065
20	-12.043	-12.062	-12.062
25	-12.042	-12.060	-12.061
40	-12.033	-12.050	-12.051
50	-12.023	-12.040	-12.041
60	-12.010	-12.029	-12.029
--	-	-	-
--	-	-	-



Model		Q MODULE	Testing Circuitry Figure A
Item		Output Voltage Accuracy	

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 : -20 - 50°C

Input Voltage : 85 - 264V

Load Current (AVR 1) : 0 - 6.4A (AVR 2): 0 - 6.4A

\* 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		+12V6.4A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Output		Value [mV]	Ration [%]	
			Current[A]	Voltage[V]			
Maximum Voltage	25	170	0	12.448	±224	±1.9	
Minimum Voltage	50	85	6.4	12.000			

Object		-12V6.4A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Output		Value [mV]	Ration [%]	
			Current[A]	Voltage[V]			
Maximum Voltage	25	170	0	-12.460	±220	±1.8	
Minimum Voltage	50	85	6.4	-12.021			



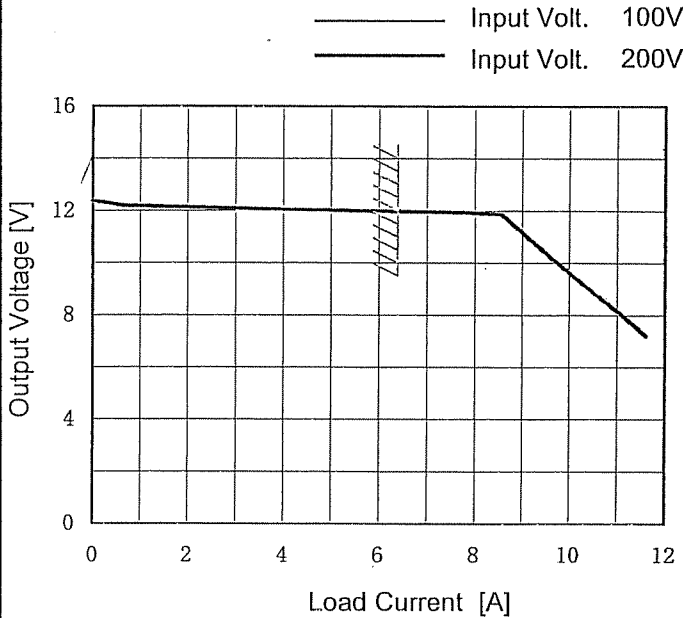
<b>COSEL</b>																									
Model	Q MODULE	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+12V6.4A																								
<p>1.Graph</p> <p style="text-align: center;">Time [H]</p> <p>Input Volt. 100V Load 100%</p>		<p>2.Values</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>11.982</td></tr> <tr><td>0.5</td><td>11.978</td></tr> <tr><td>1.0</td><td>11.978</td></tr> <tr><td>2.0</td><td>11.979</td></tr> <tr><td>3.0</td><td>11.979</td></tr> <tr><td>4.0</td><td>11.979</td></tr> <tr><td>5.0</td><td>11.979</td></tr> <tr><td>6.0</td><td>11.979</td></tr> <tr><td>7.0</td><td>11.979</td></tr> <tr><td>8.0</td><td>11.979</td></tr> </tbody> </table>		Time since start [H]	Output Voltage [V]	0.0	11.982	0.5	11.978	1.0	11.978	2.0	11.979	3.0	11.979	4.0	11.979	5.0	11.979	6.0	11.979	7.0	11.979	8.0	11.979
Time since start [H]	Output Voltage [V]																								
0.0	11.982																								
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Object	-12V6.4A																								
<p>1.Graph</p> <p style="text-align: center;">Time [H]</p> <p>Input Volt. 100V 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>-12.009</td></tr> <tr><td>0.5</td><td>-12.005</td></tr> <tr><td>1.0</td><td>-12.005</td></tr> <tr><td>2.0</td><td>-12.005</td></tr> <tr><td>3.0</td><td>-12.006</td></tr> <tr><td>4.0</td><td>-12.006</td></tr> <tr><td>5.0</td><td>-12.006</td></tr> <tr><td>6.0</td><td>-12.006</td></tr> <tr><td>7.0</td><td>-12.006</td></tr> <tr><td>8.0</td><td>-12.006</td></tr> </tbody> </table>		Time since start [H]	Output Voltage [V]	0.0	-12.009	0.5	-12.005	1.0	-12.005	2.0	-12.005	3.0	-12.006	4.0	-12.006	5.0	-12.006	6.0	-12.006	7.0	-12.006	8.0	-12.006
Time since start [H]	Output Voltage [V]																								
0.0	-12.009																								
0.5	-12.005																								
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7.0	-12.006																								
8.0	-12.006																								
<p>* The characteristic of AC200V is equal.</p>																									



Model	Q MODULE
Item	Overcurrent Protection
Object	+12V6.4A

Temperature 25°C  
Testing Circuitry Figure A

1.Graph



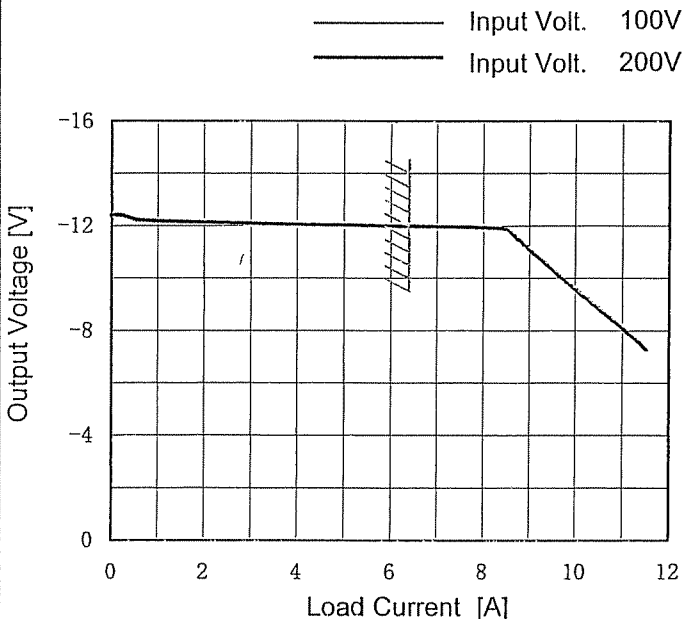
Intermittent operation occurs when the output voltage is from 7.2V to 0V.

2.Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
12.0	7.79	7.78
11.4	8.88	8.85
10.8	9.26	9.23
9.6	10.06	10.05
8.4	10.86	10.83
7.2	11.59	11.58
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Object	-12V6.4A
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1.Graph



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

Intermittent operation occurs when the output voltage is from 7.2V to 0V.

2.Values

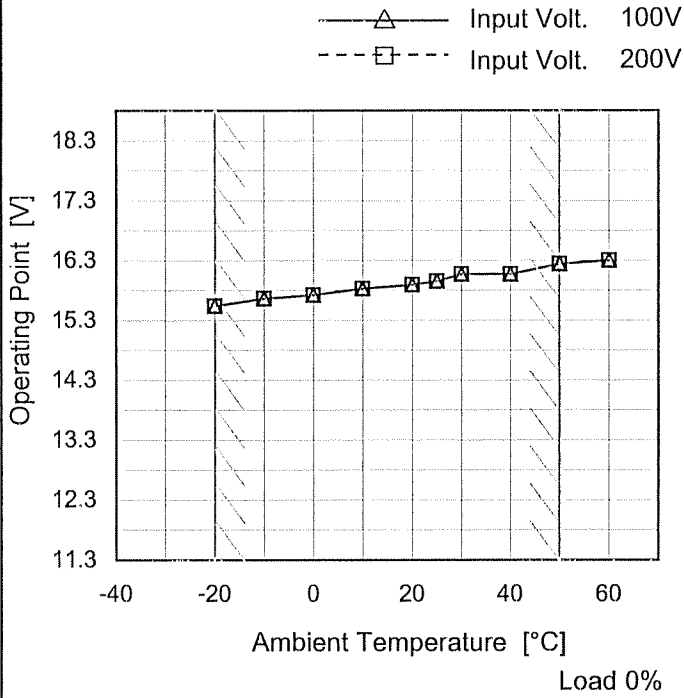
Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
12.0	8.03	8.03
11.4	8.83	8.83
10.8	8.83	8.83
9.6	8.83	8.83
8.4	8.83	8.83
7.2	8.83	8.83
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-



Model	Q MODULE
Item	Overvoltage Protection
Object	+12V6.4A

Testing Circuitry Figure A

1.Graph

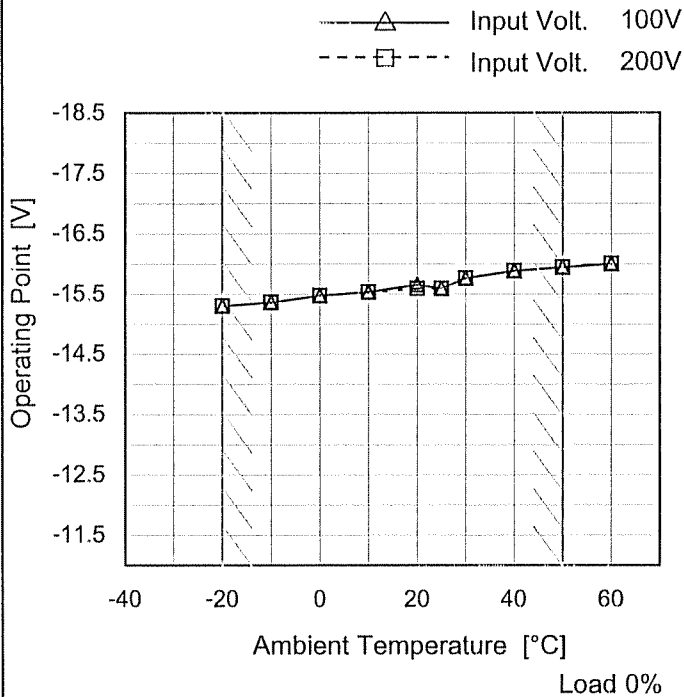


2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	15.54	15.54
-10	15.66	15.66
0	15.72	15.72
10	15.83	15.83
20	15.89	15.89
25	15.95	15.95
30	16.07	16.07
40	16.07	16.07
50	16.24	16.24
60	16.30	16.30
--	-	-

Object	-12V6.4A
--------	----------

1.Graph



2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	-15.31	-15.31
-10	-15.37	-15.37
0	-15.48	-15.48
10	-15.54	-15.54
20	-15.66	-15.60
25	-15.60	-15.60
30	-15.77	-15.77
40	-15.89	-15.89
50	-15.95	-15.95
60	-16.01	-16.01
--	-	-

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



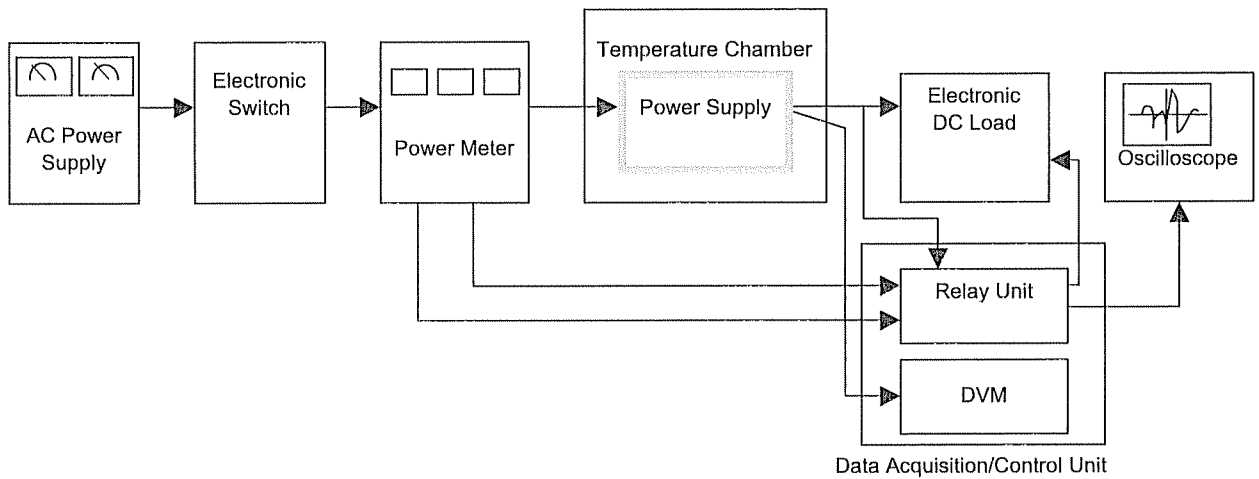


Figure A

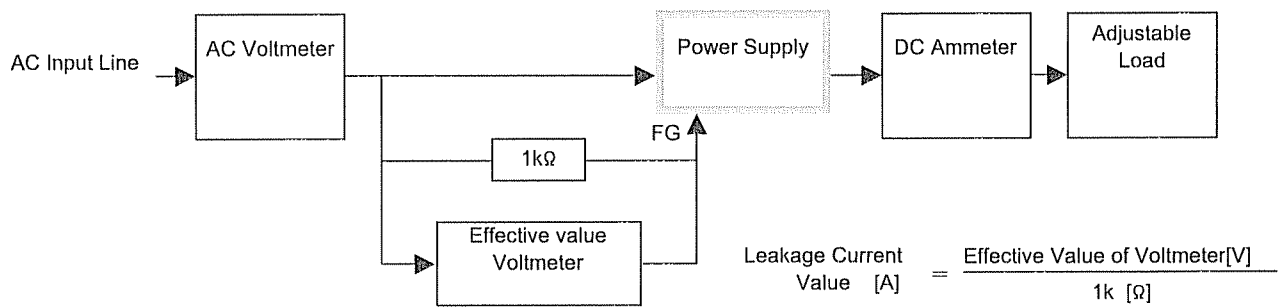


Figure B ( DEN-AN )

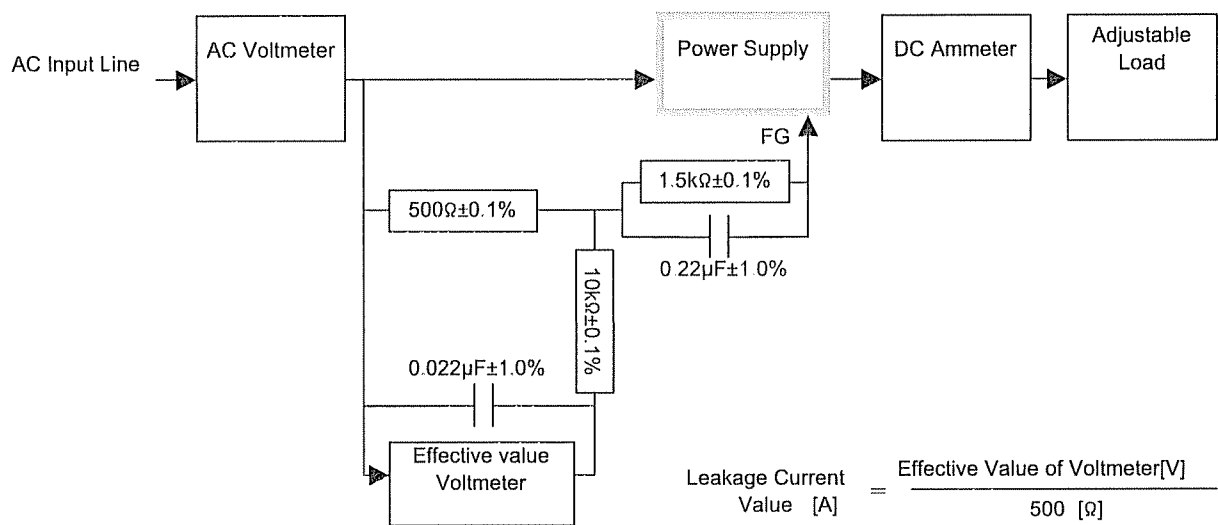


Figure B ( IEC60950 )