

# TEST DATA OF MMC75B-2

Regulated DC Power Supply  
December 24, 2010

Approved by : Naoki Tonami  
Naoki Tonami Design Manager

Prepared by : Hironobu Shimizu  
Hironobu Shimizu Design Engineer

**COSEL CO.,LTD.**

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Model		MMC75B-2		Temperature 25°C																																																				
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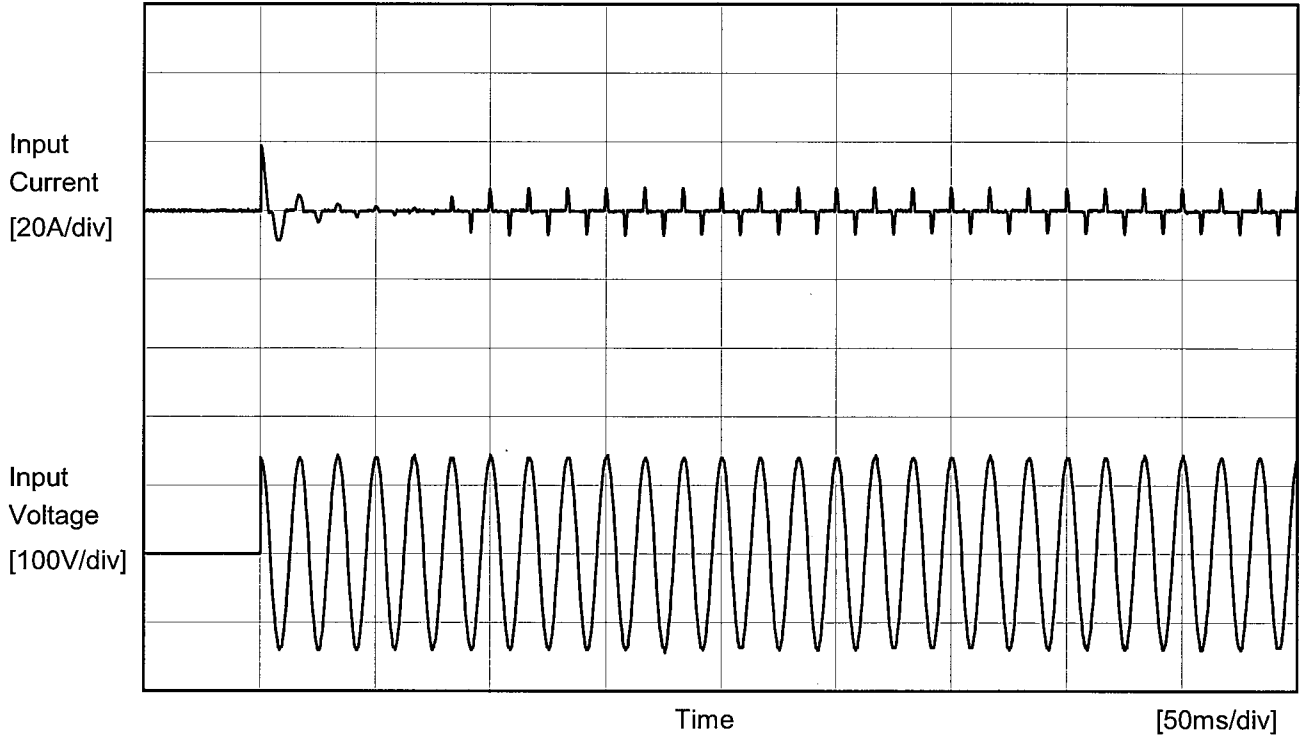


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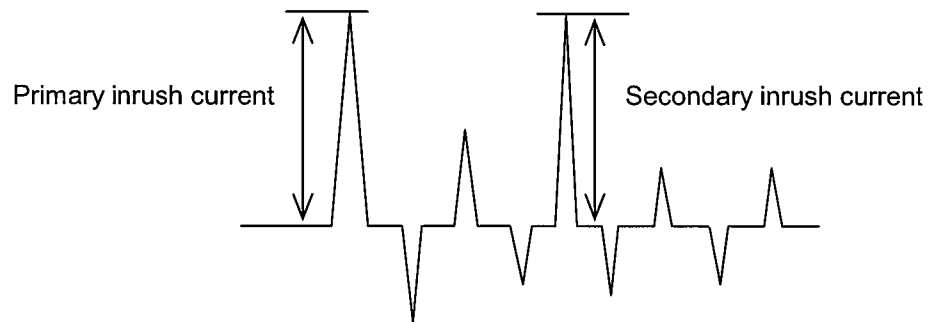


Model		MMC75B-2	
Item		Temperature	25°C
Object		Testing Circuitry	Figure A



Input Voltage      100 V  
 Frequency        60 Hz  
 Load              100 %

Primary inrush current    18.8 A  
 Secondary inrush current   7.2 A





<b>COSEL</b>		
Model	MMC75B-2	Temperature 25°C Testing Circuitry Figure B
Item	Leakage Current	
Object	_____	

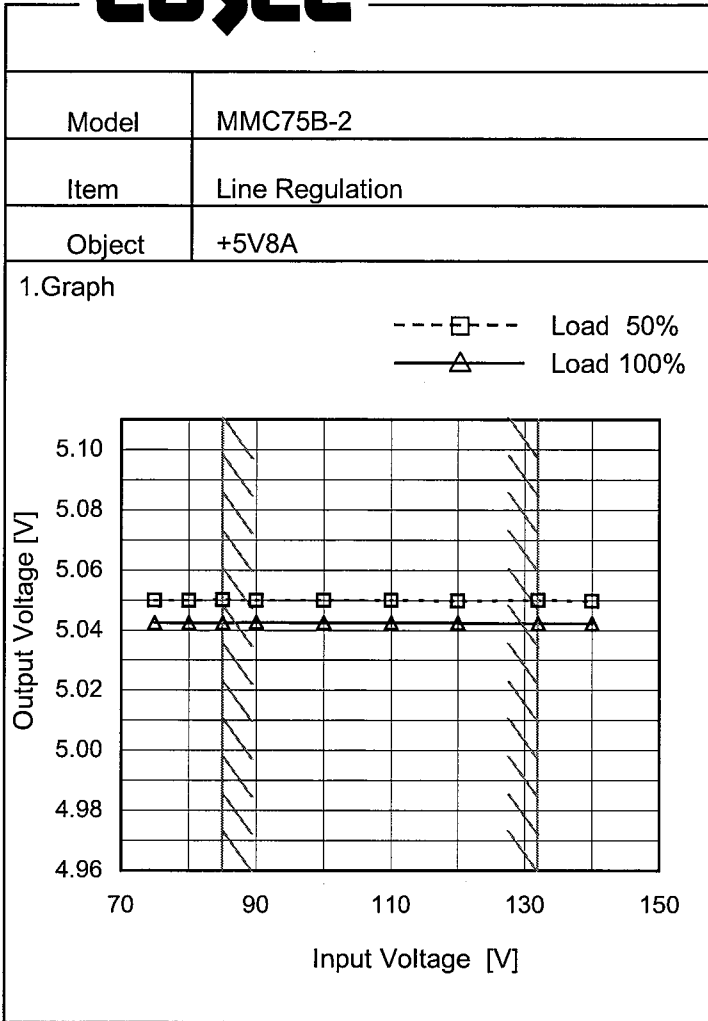
1.Results

Standards	Leakage Current [mA]		
	Input Volt. 85 [V]	Input Volt. 100 [V]	Input Volt. 132 [V]
(A)DEN-AN	0.11	0.13	0.18
(B)IEC60950-1	0.22	0.26	0.36

Standards	Leakage Current [mA]		
	Input Volt. 170 [V]	Input Volt. 240 [V]	Input Volt. 264 [V]
(B)IEC60950-1	-	-	-

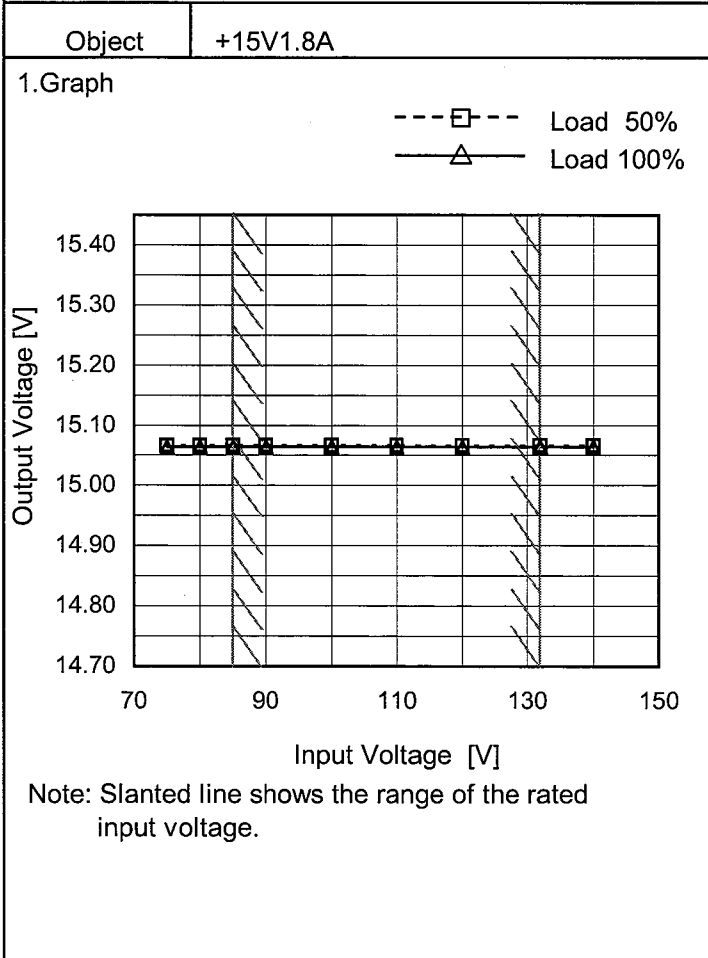
2.Condition

Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.



2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	5.050	5.043
80	5.050	5.042
85	5.050	5.043
90	5.050	5.043
100	5.050	5.043
110	5.050	5.042
120	5.050	5.042
132	5.050	5.042
140	5.050	5.042



2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	15.067	15.065
80	15.066	15.065
85	15.066	15.065
90	15.066	15.065
100	15.066	15.065
110	15.066	15.065
120	15.066	15.065
132	15.066	15.065
140	15.066	15.065



Model		MMC75B-2																																	
Item		Line Regulation																																	
Object		-15V0.5A																																	
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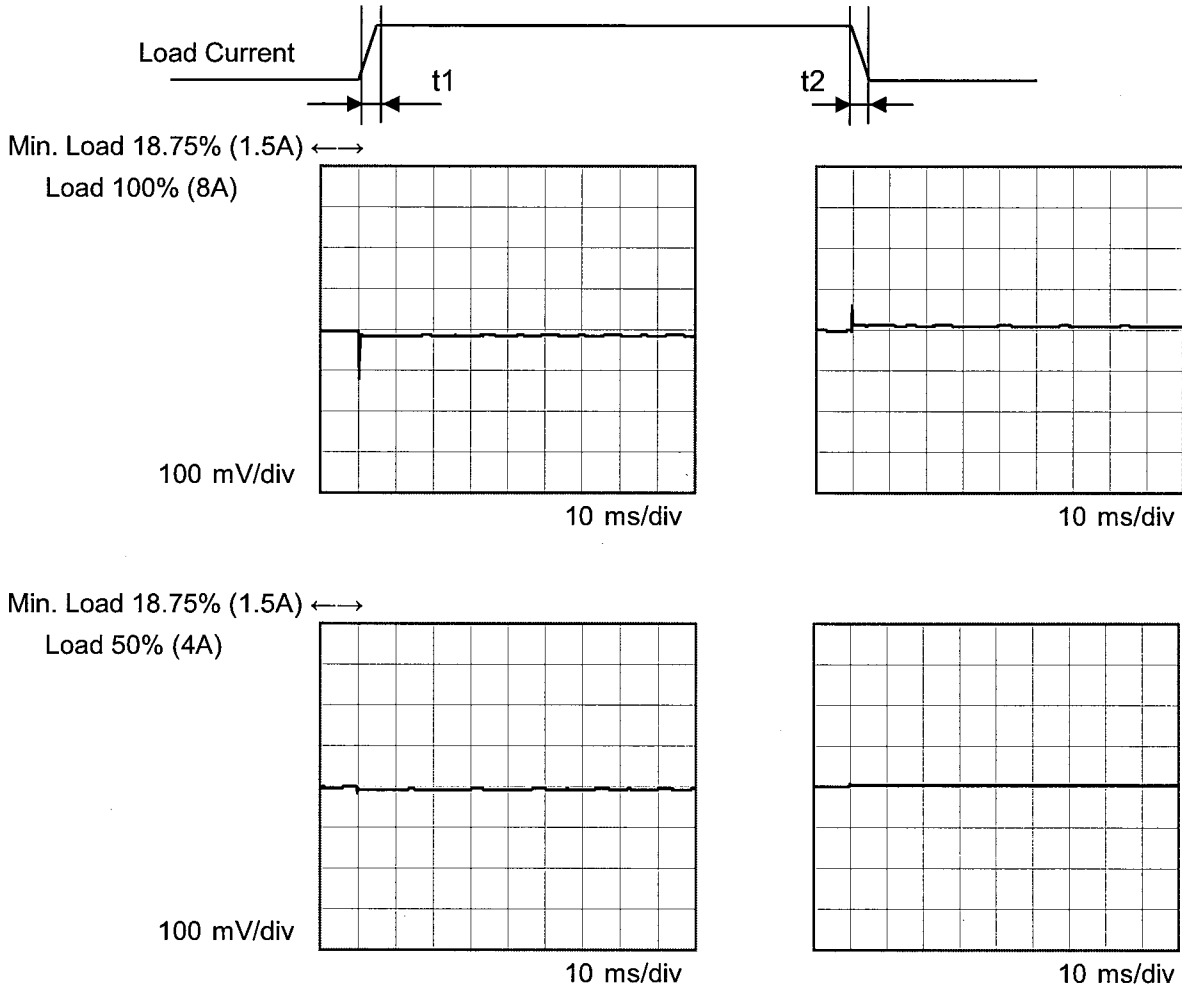
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Model	MMC75B-2	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+5V8A		

Input Volt. 100 V  
Cycle 200 ms

Response.  $t_1=t_2=50\mu\text{s}$ . Typ





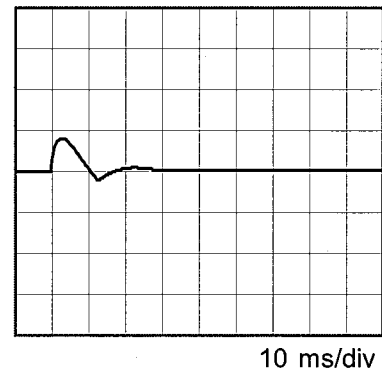
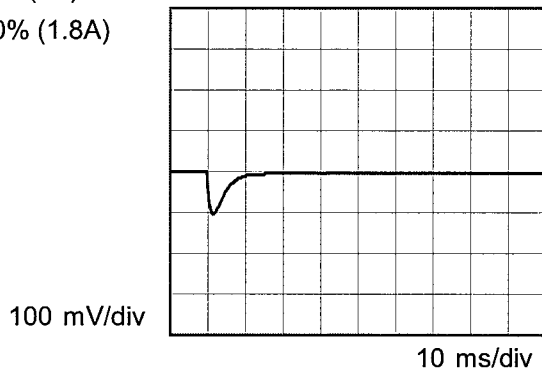
Model	MMC75B-2	Temperature	25°C
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Object	+15V1.8A		

Input Volt. 100 V  
Cycle 200 ms

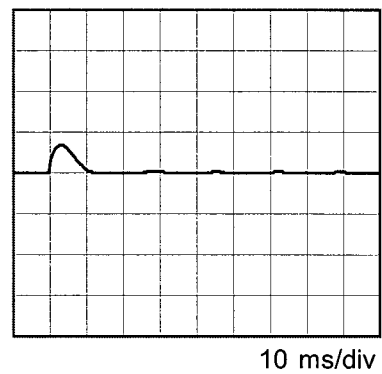
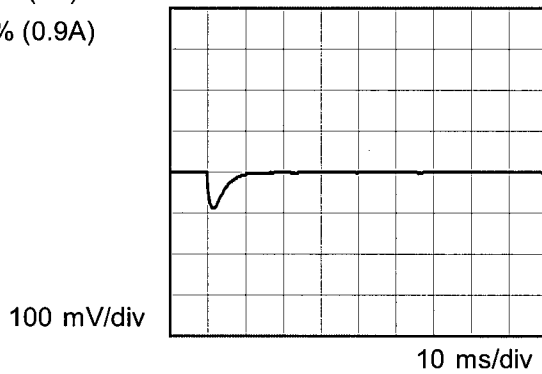
Response.  $t_1=t_2=50\mu\text{s}$ . Typ



Min. Load 0% (0A)  $\longleftrightarrow$   
Load 100% (1.8A)



Min. Load 0% (0A)  $\longleftrightarrow$   
Load 50% (0.9A)



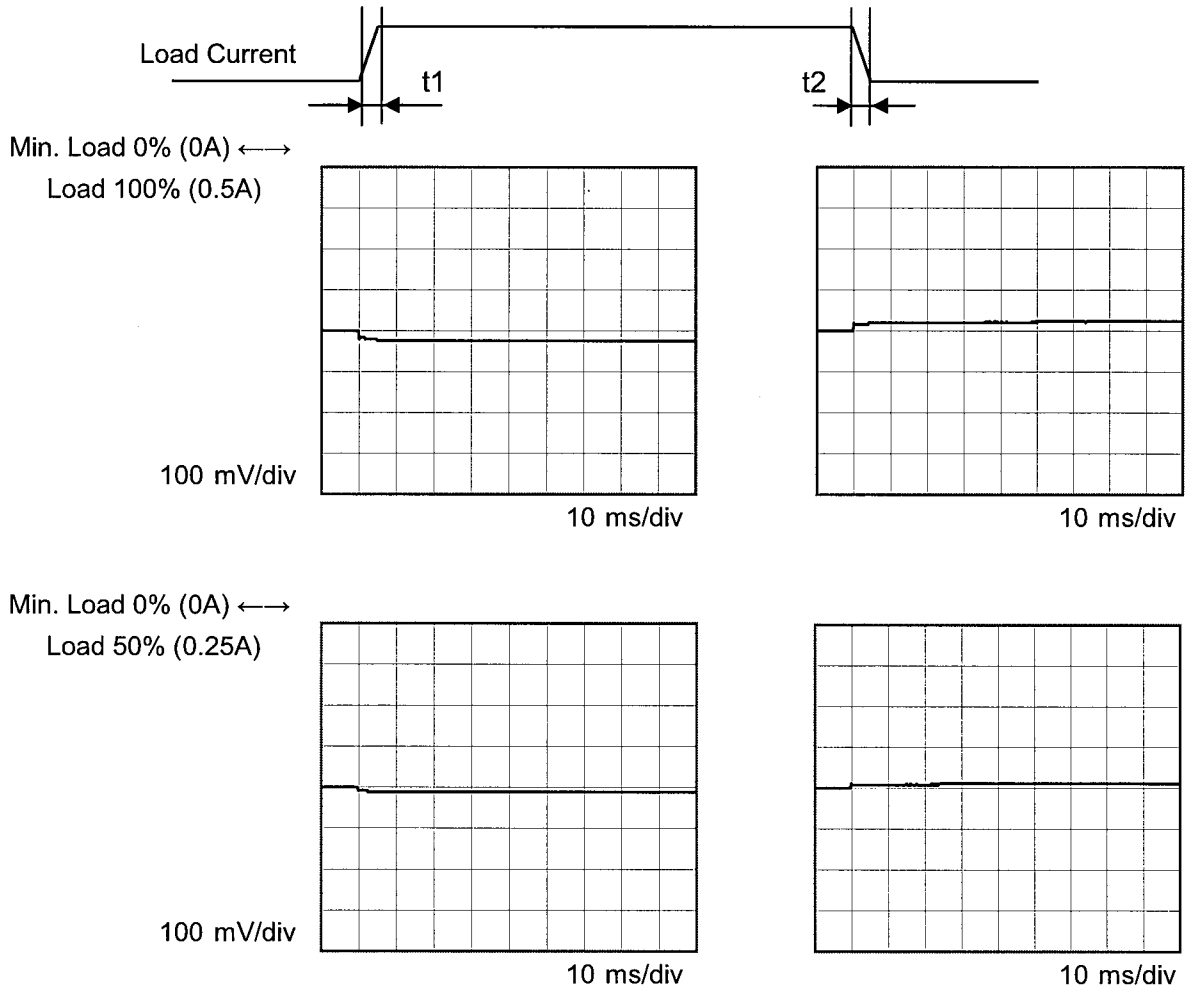




Model	MMC75B-2	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	-15V0.5A		

Input Volt. 100 V  
Cycle 200 ms

Response.  $t_1=t_2=50\mu\text{s}$ . Typ





Model		MMC75B-2		Temperature 25°C																																							
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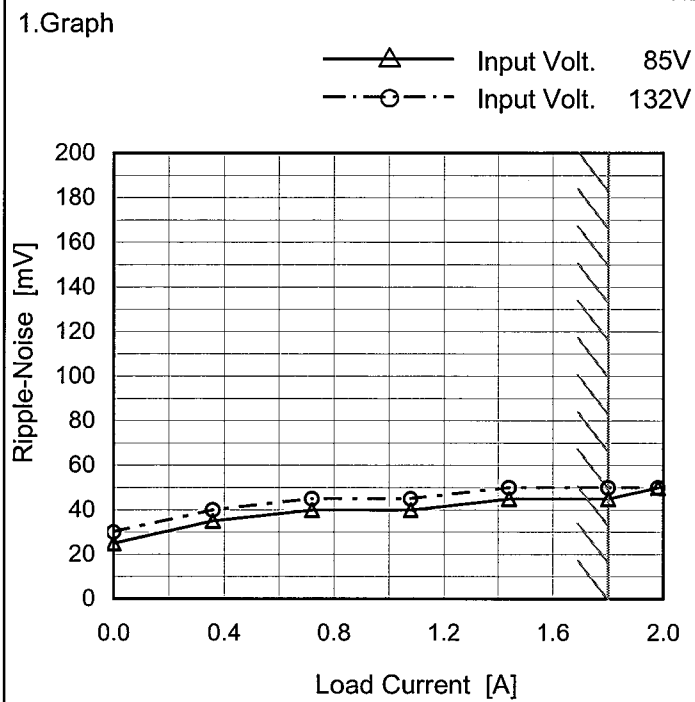
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<p>Model MMC75B-2</p>		<p>Temperature 25°C Testing Circuitry Figure B</p>																																						
<p>Item</p>	<p>Ripple-Noise</p>																																							
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Model	MMC75B-2	Temperature	25°C
Item	Ripple-Noise	Testing Circuitry	Figure B
Object	+15V1.8A		



2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 85 [V]	Input Volt. 132 [V]
0.00	25	30
0.36	35	40
0.72	40	45
1.08	40	45
1.44	45	50
1.80	45	50
1.98	50	50
--	-	-
--	-	-
--	-	-
--	-	-

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.

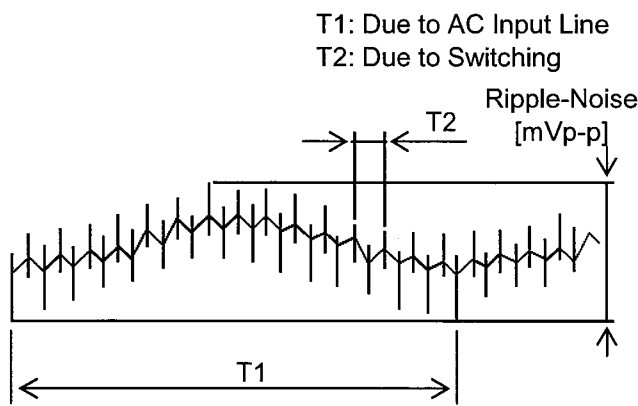
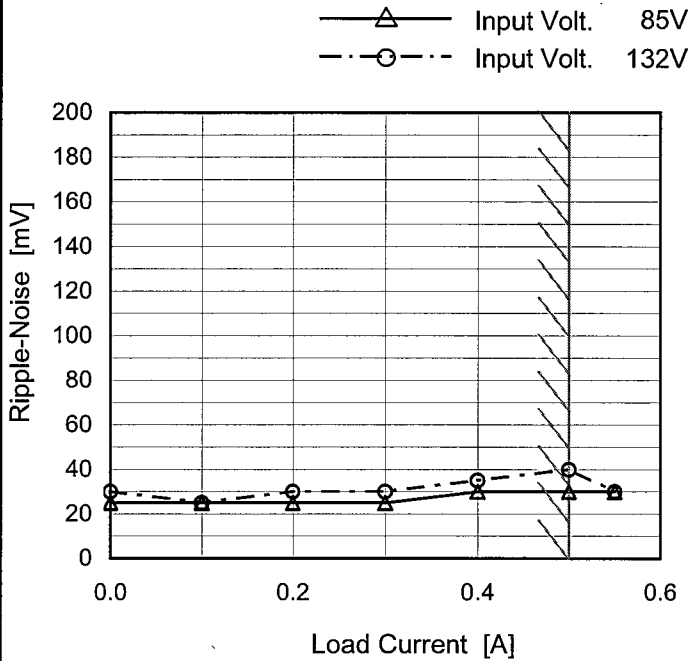


Fig. Complex Ripple Wave Form



Model	MMC75B-2	Temperature	25°C
Item	Ripple-Noise	Testing Circuitry	Figure B
Object	-15V0.5A		

1.Graph



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.

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 85 [V]	Input Volt. 132 [V]
0.000	25	30
0.100	25	25
0.200	25	30
0.300	25	30
0.400	30	35
0.500	30	40
0.550	30	30
--	-	-
--	-	-
--	-	-
--	-	-

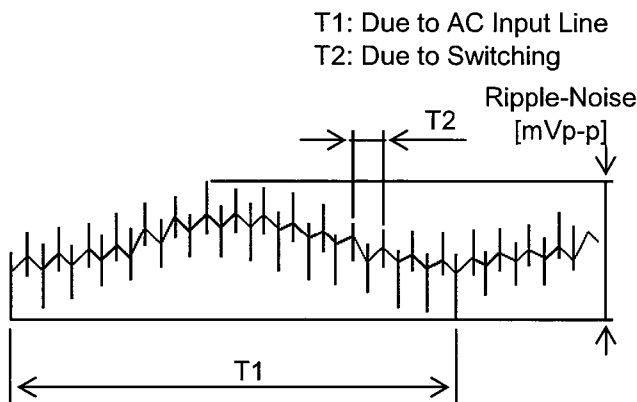
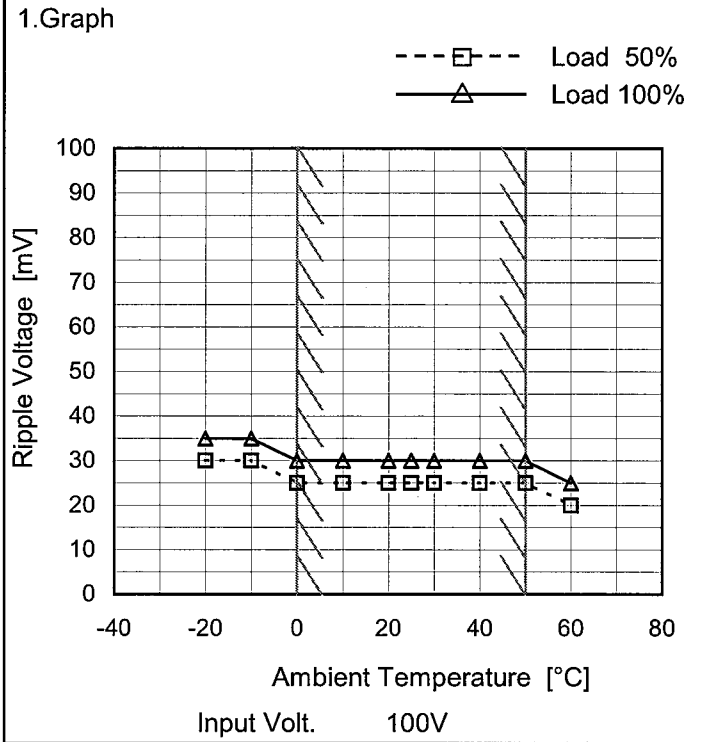


Fig. Complex Ripple Wave Form



Model	MMC75B-2
Item	Ripple Voltage (by Ambient Temp.)
Object	+5V8A

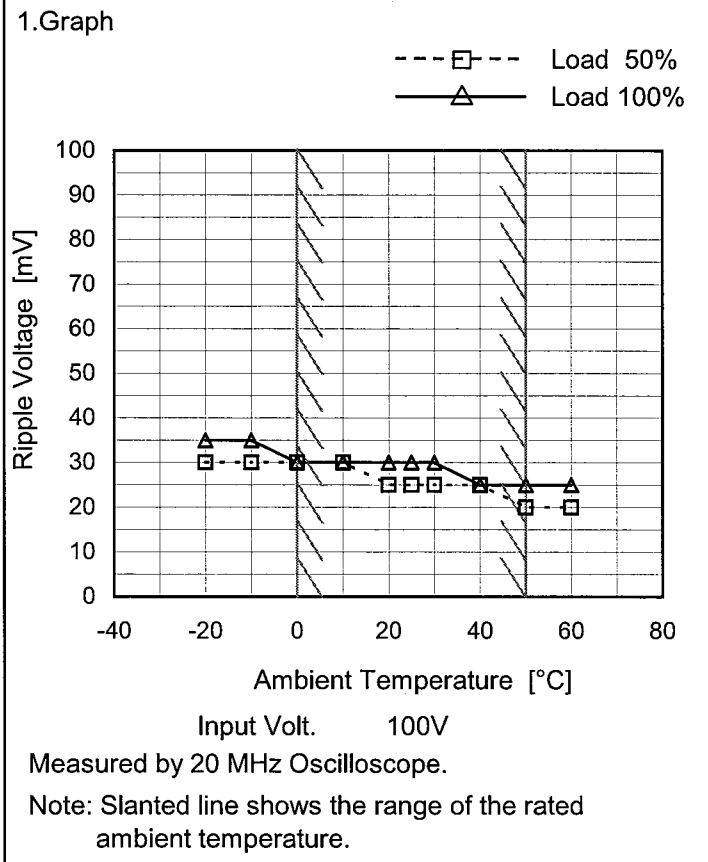
Testing Circuitry Figure A



2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-20	30	35
-10	30	35
0	25	30
10	25	30
20	25	30
25	25	30
30	25	30
40	25	30
50	25	30
60	20	25
--	-	-

Object	+15V1.8A
--------	----------



2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-20	30	35
-10	30	35
0	30	30
10	30	30
20	25	30
25	25	30
30	25	30
40	25	25
50	20	25
60	20	25
--	-	-





Model		MMC75B-2																																							
Item		Ripple Voltage (by Ambient Temp.)																																							
Object		-15V0.5A																																							
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<p>                     ---□--- Load 50%                      ---△--- Load 100%                 </p> <p>                     Ambient Temperature [°C]                      Input Volt. 100V                 </p>		2.Values																																							
<p>Measured by 20 MHz Oscilloscope.                      Note: Slanted line shows the range of the rated ambient temperature.</p> <p>Fig.Complex Ripple Noise Wave Form</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>-20</td><td>10</td><td>10</td></tr> <tr><td>-10</td><td>10</td><td>10</td></tr> <tr><td>0</td><td>10</td><td>10</td></tr> <tr><td>10</td><td>10</td><td>10</td></tr> <tr><td>20</td><td>10</td><td>10</td></tr> <tr><td>25</td><td>10</td><td>10</td></tr> <tr><td>30</td><td>10</td><td>10</td></tr> <tr><td>40</td><td>10</td><td>10</td></tr> <tr><td>50</td><td>10</td><td>10</td></tr> <tr><td>60</td><td>10</td><td>10</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Ambient Temperature [°C]	Ripple Voltage [mV]		Load 50%	Load 100%	-20	10	10	-10	10	10	0	10	10	10	10	10	20	10	10	25	10	10	30	10	10	40	10	10	50	10	10	60	10	10	--	-	-
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Model		MMC75B-2		Testing Circuitry Figure A																																																				
Item		Ambient Temperature Drift																																																						
Object		+5V8A		2.Values																																																				
1.Graph		<p>—△— Input Volt. 85V</p> <p>---□--- Input Volt. 100V</p> <p>-·-○-·- Input Volt. 132V</p>		<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 85[V]</th> <th>Input Volt. 100[V]</th> <th>Input Volt. 132[V]</th> </tr> </thead> <tbody> <tr><td>-20</td><td>5.040</td><td>5.040</td><td>5.040</td></tr> <tr><td>-10</td><td>5.041</td><td>5.041</td><td>5.041</td></tr> <tr><td>0</td><td>5.041</td><td>5.041</td><td>5.041</td></tr> <tr><td>10</td><td>5.042</td><td>5.042</td><td>5.042</td></tr> <tr><td>20</td><td>5.043</td><td>5.043</td><td>5.043</td></tr> <tr><td>25</td><td>5.044</td><td>5.044</td><td>5.044</td></tr> <tr><td>30</td><td>5.044</td><td>5.044</td><td>5.044</td></tr> <tr><td>40</td><td>5.045</td><td>5.045</td><td>5.044</td></tr> <tr><td>50</td><td>5.043</td><td>5.043</td><td>5.043</td></tr> <tr><td>60</td><td>5.043</td><td>5.043</td><td>5.043</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>		Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]	-20	5.040	5.040	5.040	-10	5.041	5.041	5.041	0	5.041	5.041	5.041	10	5.042	5.042	5.042	20	5.043	5.043	5.043	25	5.044	5.044	5.044	30	5.044	5.044	5.044	40	5.045	5.045	5.044	50	5.043	5.043	5.043	60	5.043	5.043	5.043	--	-	-	-
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Model		MMC75B-2		Testing Circuitry Figure A																																																				
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<b>COSEL</b>		
Model	MMC75B-2	
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 : 0 - 50°C

Input Voltage : 85 - 132V

Load Current (AVR 1) : 1.5 - 8A (AVR 2) : 0 - 1.8A (AVR 3) : 0 - 0.5A

\* 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	+5V8A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ration [%]
			Maximum Voltage	40		
Minimum Voltage	0	132	8	5.041		

Object	+15V1.8A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ration [%]
			Maximum Voltage	20		
Minimum Voltage	50	132	1.8	15.063		

Object	-15V0.5A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ration [%]
			Maximum Voltage	50		
Minimum Voltage	0	85	0.5	-15.203		



<b>COSEL</b>																									
Model	MMC75B-2	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+5V8A																								
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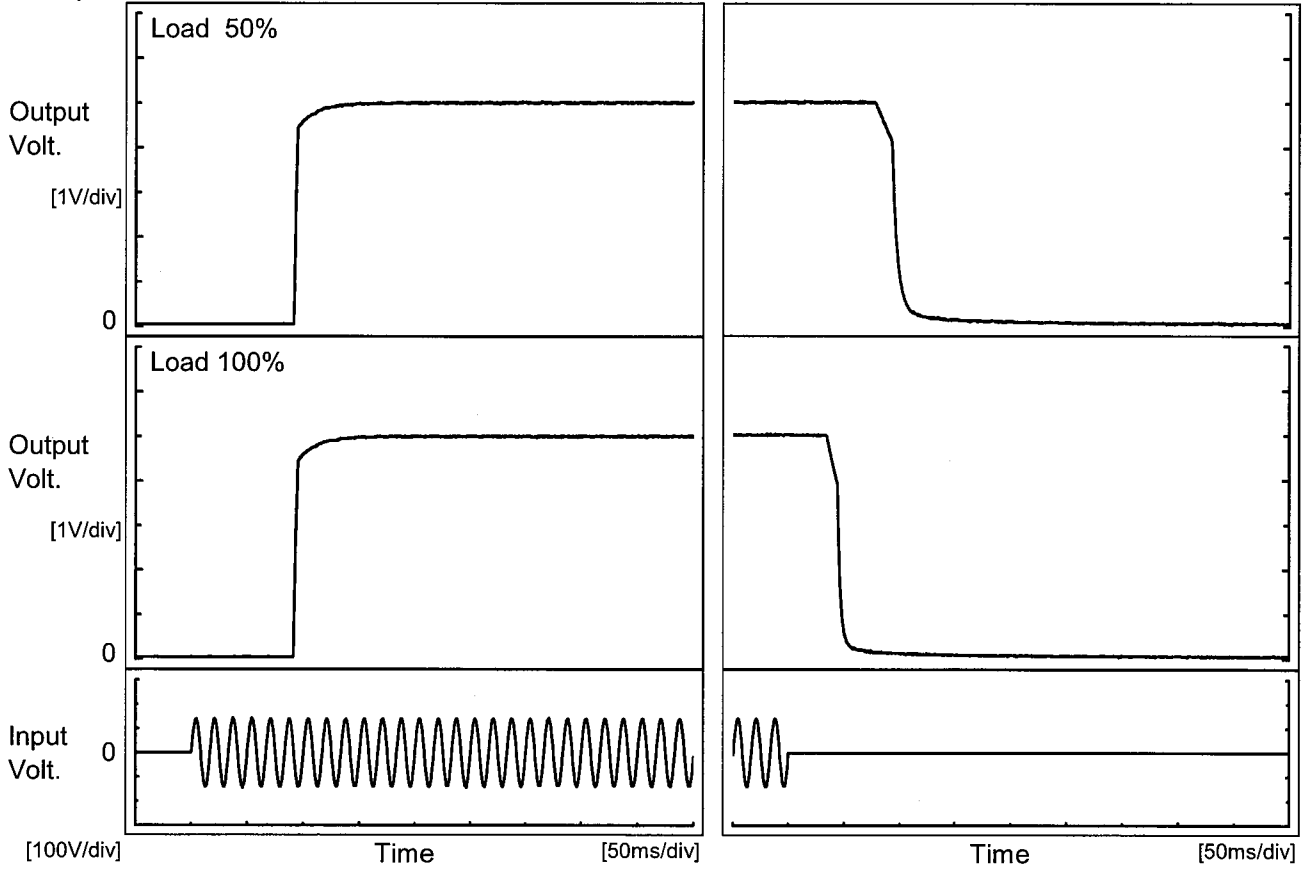
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Time since start [H]	Output Voltage [V]																							
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Model	MMC75B-2	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+5V8A		

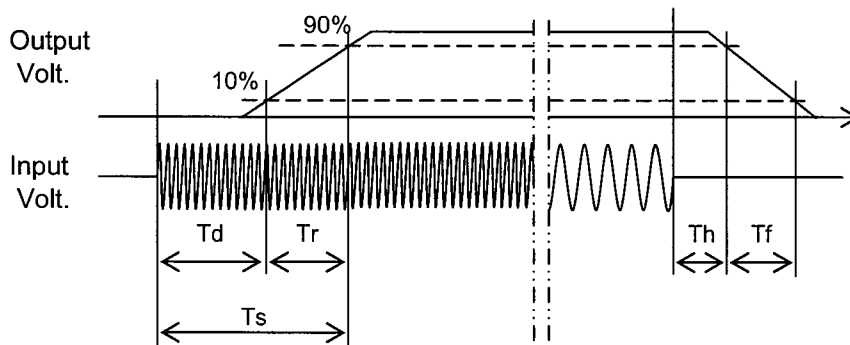
1. Graph

Input Volt. 100 V



2. Values

		[ms]				
Load	Time	Td	Tr	Ts	Th	Tf
50 %		92.3	6.3	98.6	86.0	19.0
100 %		92.3	5.8	98.1	38.5	12.3

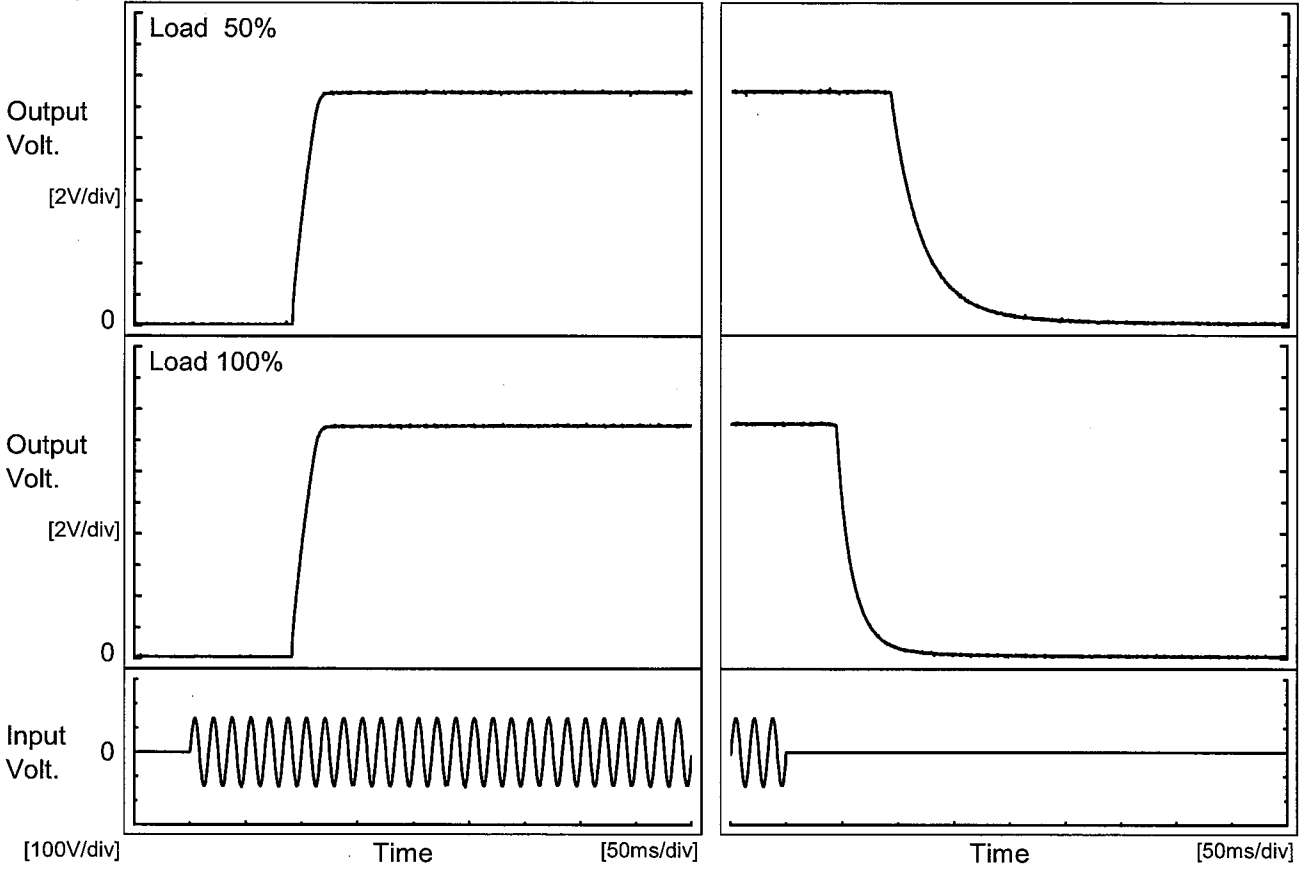




Model	MMC75B-2	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+15V1.8A		

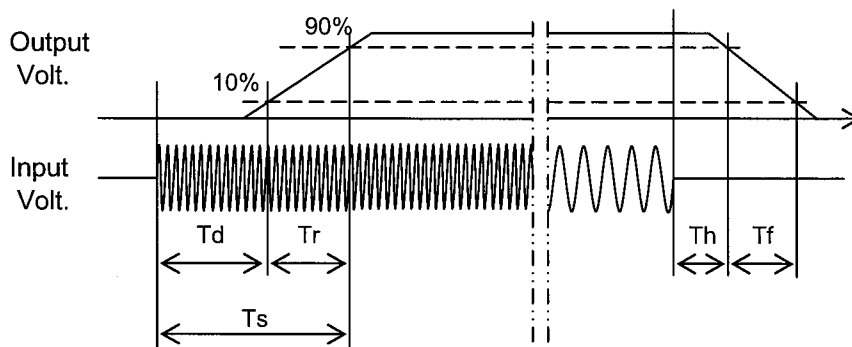
1. Graph

Input Volt. 100 V



2. Values

Load	Time	Td	Tr	Ts	Th	Tf
50 %		92.5	20.0	112.5	94.8	67.0
100 %		92.3	20.3	112.6	45.8	34.5



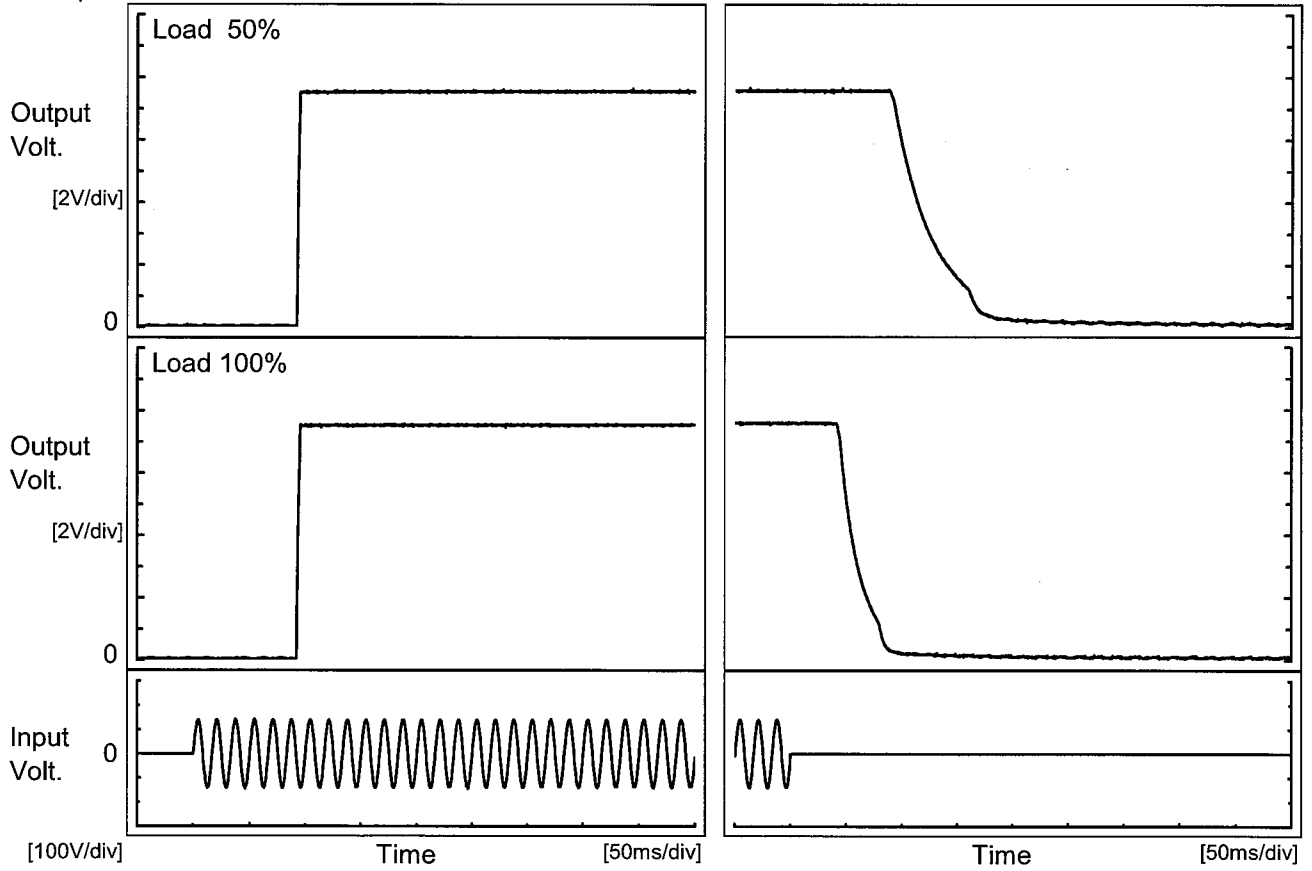




Model	MMC75B-2	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	-15V0.5A		

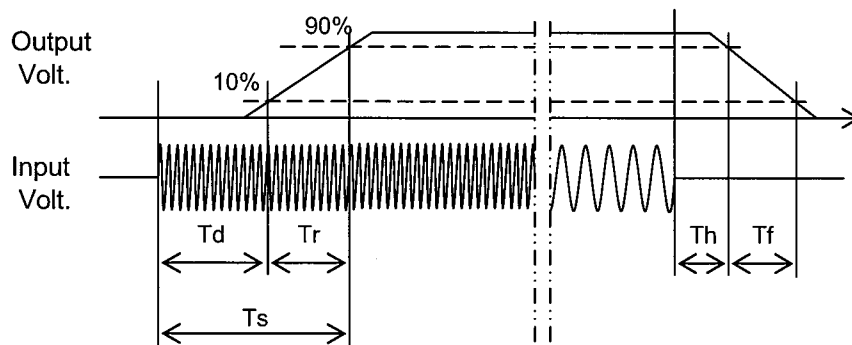
1. Graph

Input Volt. 100 V



2. Values

		[ms]				
Load	Time	Td	Tr	Ts	Th	Tf
50 %		92.8	2.3	95.1	94.5	70.5
100 %		92.5	2.8	95.3	45.3	36.5





Model		MMC75B-2																																	
Item		Hold-Up Time																																	
Object		+5V8A																																	
Temperature		25°C																																	
Testing Circuitry		Figure A																																	
1.Graph		2.Values																																	
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Input Voltage [V]	Hold-Up Time [ms]																																		
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Input Voltage [V]	Hold-Up Time [ms]																																			
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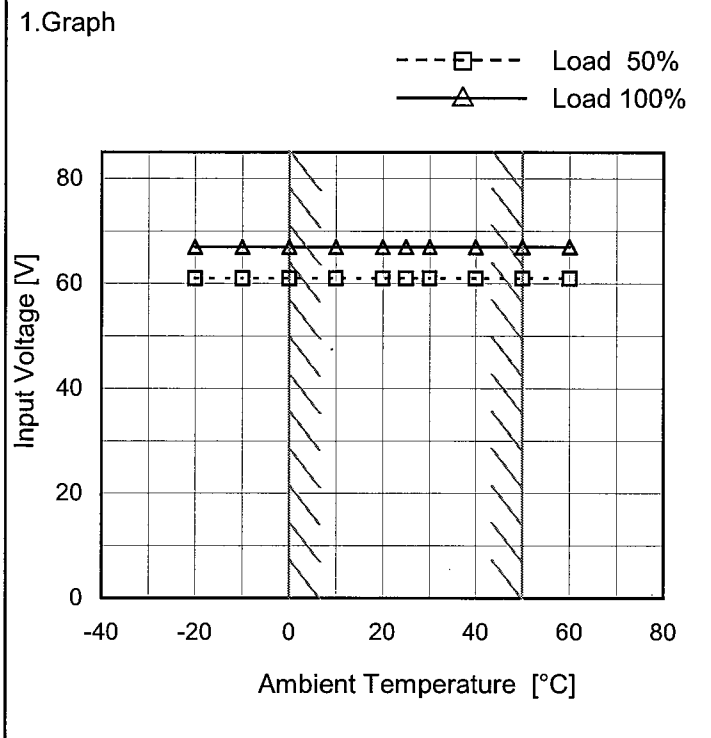


<p>Model      MMC75B-2</p>		<p>Temperature      25°C Testing Circuitry      Figure A</p>																																																			
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Model	MMC75B-2
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+5V8A

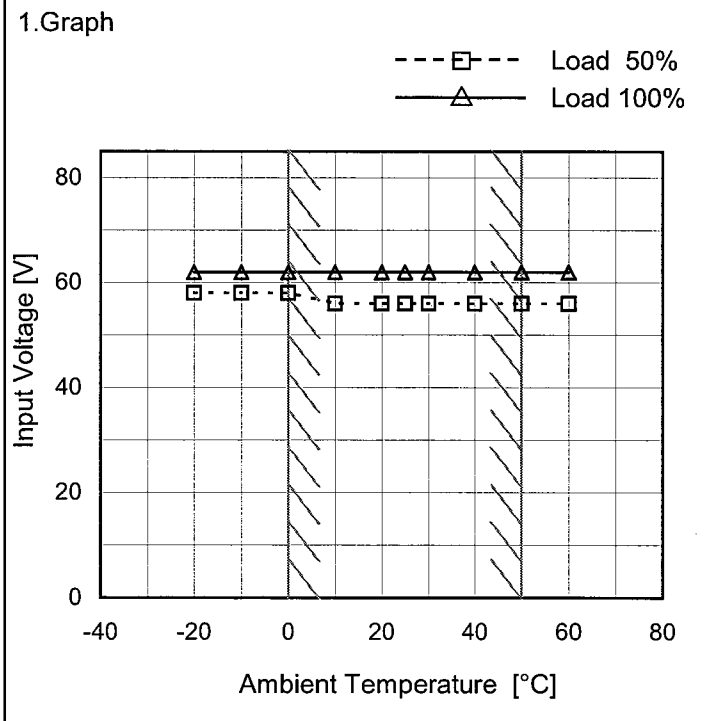
Testing Circuitry Figure A



2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	61	67
-10	61	67
0	61	67
10	61	67
20	61	67
25	61	67
30	61	67
40	61	67
50	61	67
60	61	67
--	-	-

Object	+15V1.8A
--------	----------



2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	58	62
-10	58	62
0	58	62
10	56	62
20	56	62
25	56	62
30	56	62
40	56	62
50	56	62
60	56	62
--	-	-

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



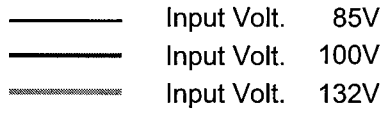
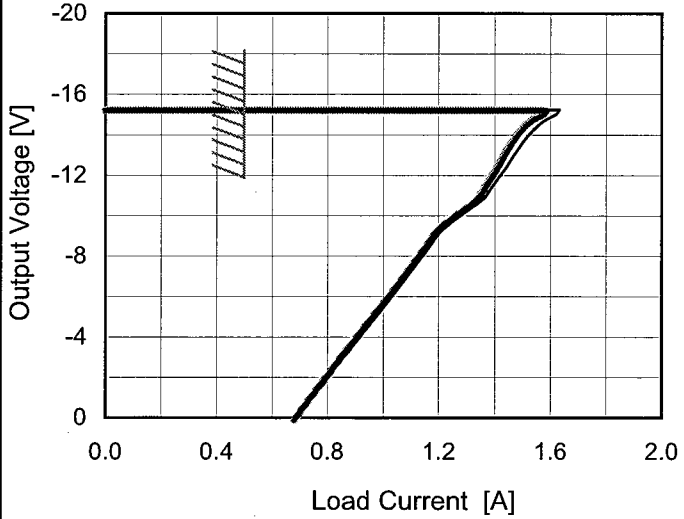


<p>Model MMC75B-2</p> <p>Item Minimum Input Voltage for Regulated Output Voltage</p> <p>Object -15V0.5A</p>		<p>Testing Circuitry Figure A</p>																																						
<p>1.Graph</p> <p style="text-align: right;">             ---□--- Load 50%              —△— Load 100%         </p>		<p>2.Values</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 100%</th> </tr> </thead> <tbody> <tr><td>-20</td><td>58</td><td>62</td></tr> <tr><td>-10</td><td>58</td><td>62</td></tr> <tr><td>0</td><td>58</td><td>62</td></tr> <tr><td>10</td><td>56</td><td>62</td></tr> <tr><td>20</td><td>56</td><td>62</td></tr> <tr><td>25</td><td>56</td><td>62</td></tr> <tr><td>30</td><td>56</td><td>62</td></tr> <tr><td>40</td><td>56</td><td>62</td></tr> <tr><td>50</td><td>56</td><td>62</td></tr> <tr><td>60</td><td>56</td><td>62</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>	Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 100%	-20	58	62	-10	58	62	0	58	62	10	56	62	20	56	62	25	56	62	30	56	62	40	56	62	50	56	62	60	56	62	--	-	-
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<p>Model      MMC75B-2</p>		<p>Temperature      25°C</p>																																																								
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<p>1.Graph</p> <p> <span style="border-bottom: 1px solid black; width: 50px; display: inline-block;"></span> Input Volt. 85V  <span style="border-bottom: 3px double black; width: 50px; display: inline-block;"></span> Input Volt. 100V  <span style="border-bottom: 3px dashed black; width: 50px; display: inline-block;"></span> Input Volt. 132V                 </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">Output Voltage [V]</th> <th colspan="3">Load Current [A]</th> </tr> <tr> <th>Input Volt. 85[V]</th> <th>Input Volt. 100[V]</th> <th>Input Volt. 132[V]</th> </tr> </thead> <tbody> <tr><td>14.25</td><td>3.79</td><td>3.85</td><td>3.90</td></tr> <tr><td>13.50</td><td>3.91</td><td>3.96</td><td>4.02</td></tr> <tr><td>12.00</td><td>4.13</td><td>4.18</td><td>4.26</td></tr> <tr><td>10.50</td><td>4.36</td><td>4.41</td><td>4.50</td></tr> <tr><td>9.00</td><td>4.59</td><td>4.65</td><td>4.75</td></tr> <tr><td>7.50</td><td>4.82</td><td>4.88</td><td>4.99</td></tr> <tr><td>6.00</td><td>5.05</td><td>5.10</td><td>5.24</td></tr> <tr><td>4.50</td><td>5.28</td><td>5.33</td><td>5.44</td></tr> <tr><td>3.00</td><td>5.47</td><td>5.51</td><td>5.61</td></tr> <tr><td>1.50</td><td>5.63</td><td>5.65</td><td>5.73</td></tr> <tr><td>0.00</td><td>5.88</td><td>6.00</td><td>6.29</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>		Output Voltage [V]	Load Current [A]			Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]	14.25	3.79	3.85	3.90	13.50	3.91	3.96	4.02	12.00	4.13	4.18	4.26	10.50	4.36	4.41	4.50	9.00	4.59	4.65	4.75	7.50	4.82	4.88	4.99	6.00	5.05	5.10	5.24	4.50	5.28	5.33	5.44	3.00	5.47	5.51	5.61	1.50	5.63	5.65	5.73	0.00	5.88	6.00	6.29	--	-	-	-
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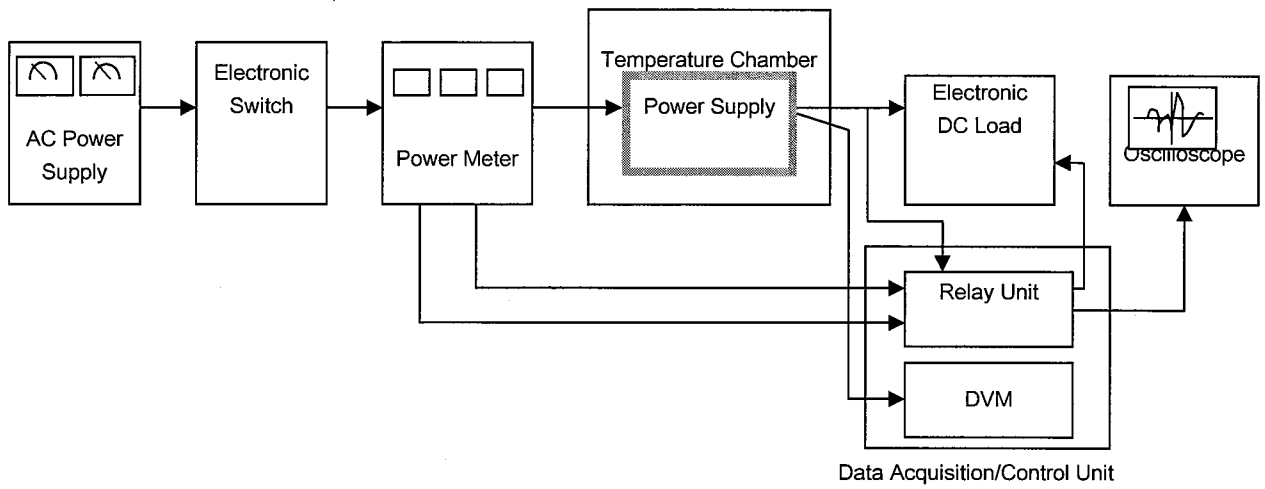


Figure A

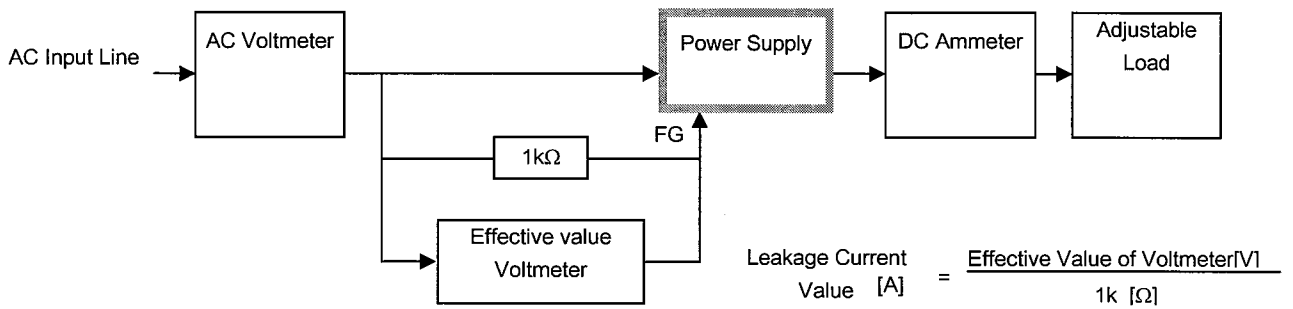


Figure B ( DEN-AN )

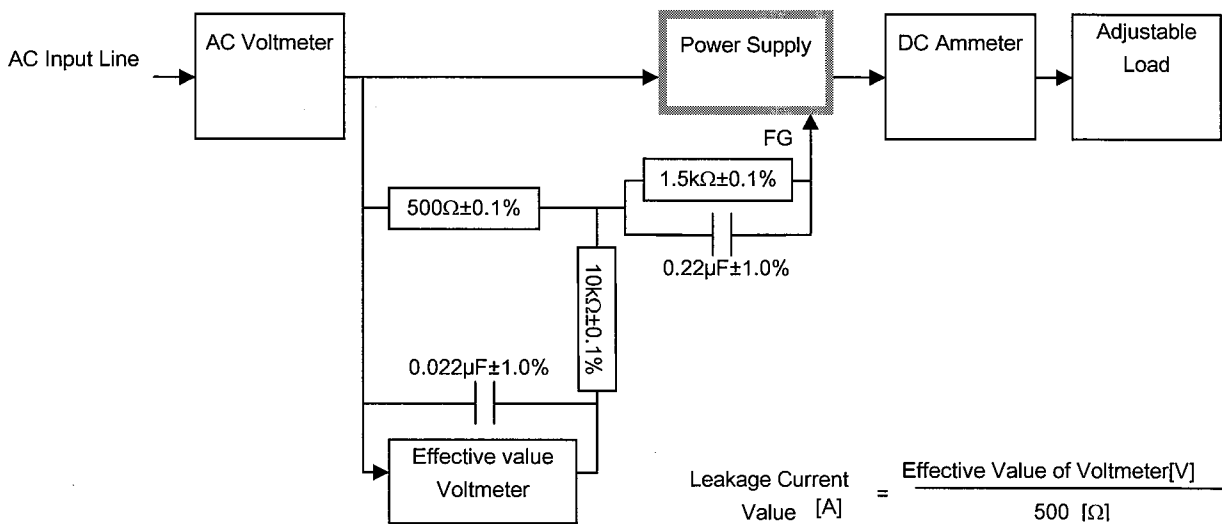


Figure B ( IEC60950-1 )