



TEST DATA OF MMB50A-5 (100V INPUT)

Regulated DC Power Supply

Date : Feb. 12. 1999

Approved by : M. Takahime
Design Manager

Prepared by : H. Ishikawa
Design Engineer

コーセル株式会社
COSEL CO., LTD.

CONTENTS

1. Line Regulation	1
静的入力変動	
2. Efficiency (by Input Voltage)	2
効率 (入力電圧特性)	
3. Power Factor (by Input Voltage)	3
力率 (入力電圧特性)	
4. Hold-Up Time	4
出力保持時間	
5. Instantaneous Interruption Compensation	6
瞬時停電保障	
6. Load Regulation	8
静的負荷変動	
7. Ripple Voltage (by Load Current)	9
リップル電圧 (負荷特性)	
8. Ripple-Noise	11
リップルノイズ	
9. Overcurrent Protection	13
過電流保護	
10. Overvoltage Protection	14
過電圧保護	
11. Inrush Current	15
突入電流	
12. Dynamic Load Responce	16
動的負荷変動	
13. Rise and Fall Time	18
立上り、立下がり時間	
14. Ambient Temperature Drift	20
周囲温度変動	
15. Minimum Input Voltage for Regulated Output Voltage	21
最低レギュレーション電圧	
16. Ripple Voltage (by Ambient Temperature)	22
リップル電圧 (周囲温度特性)	
17. Time Lapse Drift	23
経時ドリフト	
18. Output Voltage Accuracy	24
定電圧精度	
19. Condensation	25
結露特性	
20. Leakage Current	27
漏洩電流	
21. Conducted Emission	28
雑音端子電圧	
22. Figure of Testing Circuitry	29
測定回路図	

(Final Page 30)

COSEL

Model		MMB50A-5																																								
Item		Line Regulation 静的入力変動																																								
Object		+12.0V3.00A																																								
1. Graph		2. Values																																								
<div><div>-----□----- Load 50%</div><div>-----△----- Load 100%</div></div> <div><p>[V]</p><p>Output Voltage</p><p>Input Voltage [V]</p></div>		<table><tr><th>Input Voltage [V]</th><th>Load 50% Output Volt. [V]</th><th>Load 100% Output Volt. [V]</th></tr><tr><td>75</td><td>12.062</td><td>12.057</td></tr><tr><td>80</td><td>12.062</td><td>12.061</td></tr><tr><td>85</td><td>12.062</td><td>12.057</td></tr><tr><td>90</td><td>12.062</td><td>12.058</td></tr><tr><td>100</td><td>12.062</td><td>12.057</td></tr><tr><td>110</td><td>12.062</td><td>12.057</td></tr><tr><td>120</td><td>12.061</td><td>12.057</td></tr><tr><td>132</td><td>12.061</td><td>12.057</td></tr><tr><td>140</td><td>12.061</td><td>12.057</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></table>		Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]	75	12.062	12.057	80	12.062	12.061	85	12.062	12.057	90	12.062	12.058	100	12.062	12.057	110	12.062	12.057	120	12.061	12.057	132	12.061	12.057	140	12.061	12.057	—	—	—	—	—	—	—	—	—
Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]																																								
75	12.062	12.057																																								
80	12.062	12.061																																								
85	12.062	12.057																																								
90	12.062	12.058																																								
100	12.062	12.057																																								
110	12.062	12.057																																								
120	12.061	12.057																																								
132	12.061	12.057																																								
140	12.061	12.057																																								
—	—	—																																								
—	—	—																																								
—	—	—																																								
Object		+12V1.50A																																								
1. Graph		2. Values																																								
<div><div>-----□----- Load 50%</div><div>-----△----- Load 100%</div></div> <div><p>[V]</p><p>Output Voltage</p><p>Input Voltage [V]</p></div>		<table><tr><th>Input Voltage [V]</th><th>Load 50% Output Volt. [V]</th><th>Load 100% Output Volt. [V]</th></tr><tr><td>75</td><td>11.986</td><td>11.983</td></tr><tr><td>80</td><td>11.986</td><td>11.983</td></tr><tr><td>85</td><td>11.986</td><td>11.983</td></tr><tr><td>90</td><td>11.986</td><td>11.983</td></tr><tr><td>100</td><td>11.986</td><td>11.983</td></tr><tr><td>110</td><td>11.986</td><td>11.983</td></tr><tr><td>120</td><td>11.986</td><td>11.983</td></tr><tr><td>132</td><td>11.986</td><td>11.983</td></tr><tr><td>140</td><td>11.986</td><td>11.983</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></table>		Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]	75	11.986	11.983	80	11.986	11.983	85	11.986	11.983	90	11.986	11.983	100	11.986	11.983	110	11.986	11.983	120	11.986	11.983	132	11.986	11.983	140	11.986	11.983	—	—	—	—	—	—	—	—	—
Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]																																								
75	11.986	11.983																																								
80	11.986	11.983																																								
85	11.986	11.983																																								
90	11.986	11.983																																								
100	11.986	11.983																																								
110	11.986	11.983																																								
120	11.986	11.983																																								
132	11.986	11.983																																								
140	11.986	11.983																																								
—	—	—																																								
—	—	—																																								
—	—	—																																								
Note: Slanted line shows the range of the rated input voltage.																																										
(注)斜線は定格入力電圧範囲を示す。																																										

COSEL

Model		MMB50A-5	
Item		Efficiency (by Input Voltage) 効率 (入力電圧特性)	
Object			

1. Graph

-----□-----

Load 50%

-----△-----

Load 100%

Efficiency [%]

86

82

78

74

70

66

62

0

0

80

90

100

110

120

130

140

150

Input Voltage [V]

[V]

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

(注)斜線は定格入力電圧範囲を示す。

Input Voltage [V]	Load 50%	Load 100%
	Efficiency [%]	Efficiency [%]
75	71.6	74.6
80	71.4	75.2
85	71.0	75.4
90	70.5	75.5
100	69.0	75.5
110	67.5	75.2
120	65.8	74.8
132	63.7	73.9
140	62.2	73.3

2. Values

COSEL

Model	MMB50A-5																																	
Item	Power Factor (by Input Voltage) 力率 (入力電圧特性)	Temperature 25°C Testing Circuitry Figure A																																
Object																																		
1. Graph	<div> <div>-----□----- load 50%</div> <div>-----△----- load 100%</div> </div> <p>Power Factor</p> <p>Input Voltage [V]</p> <p>Note: Slanted line shows the range of the rated input voltage.</p> <p>(注)斜線は定格入力電圧範囲を示す。</p>																																	
2. Values	<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th><th>load 50%</th><th>load 100%</th></tr> <tr> <th>Power Factor</th><th>Power Factor</th></tr> </thead> <tbody> <tr><td>75</td><td>0.61</td><td>0.62</td></tr> <tr><td>80</td><td>0.59</td><td>0.60</td></tr> <tr><td>85</td><td>0.58</td><td>0.59</td></tr> <tr><td>90</td><td>0.57</td><td>0.59</td></tr> <tr><td>100</td><td>0.56</td><td>0.57</td></tr> <tr><td>110</td><td>0.55</td><td>0.56</td></tr> <tr><td>120</td><td>0.54</td><td>0.55</td></tr> <tr><td>132</td><td>0.53</td><td>0.54</td></tr> <tr><td>140</td><td>0.52</td><td>0.53</td></tr> </tbody> </table>		Input Voltage [V]	load 50%	load 100%	Power Factor	Power Factor	75	0.61	0.62	80	0.59	0.60	85	0.58	0.59	90	0.57	0.59	100	0.56	0.57	110	0.55	0.56	120	0.54	0.55	132	0.53	0.54	140	0.52	0.53
Input Voltage [V]	load 50%	load 100%																																
	Power Factor	Power Factor																																
75	0.61	0.62																																
80	0.59	0.60																																
85	0.58	0.59																																
90	0.57	0.59																																
100	0.56	0.57																																
110	0.55	0.56																																
120	0.54	0.55																																
132	0.53	0.54																																
140	0.52	0.53																																

COSEL

Model		MMB50A-5		Temperature		25℃																															
Item		Hold-Up Time 出力保持時間		Testing Circuitry		Figure A																															
Object		+12.0V3A																																			
1. Graph				2. Values																																	
<div><div><div>—△—</div><div>Load 50%</div></div><div><div>- - -□- - -</div><div>Load 100%</div></div></div> <div><div>[mS]</div><div>1000</div><div>100</div><div>10</div><div>1</div><div>Hold-Up Time</div></div> <div><div>0</div><div>80</div><div>90</div><div>100</div><div>110</div><div>120</div><div>130</div><div>140</div><div>150</div><div>Input Voltage</div><div>[V]</div></div> <div><p>This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.</p><p>Note: Slanted line shows the range of the rated input voltage.</p><p>出力保持時間とは、入力電圧断から出力電圧が、定電圧精度の規格範囲を保持しているところまでの時間。</p><p>(注)斜線は定格入力電圧範囲を示す。</p></div>				<table><tr><th>Input Voltage [V]</th><th>Load 50% Hold-Up Time [mS]</th><th>Load 100% Hold-Up Time [mS]</th></tr><tr><td>75</td><td>50</td><td>20</td></tr><tr><td>80</td><td>58</td><td>25</td></tr><tr><td>85</td><td>65</td><td>30</td></tr><tr><td>90</td><td>74</td><td>35</td></tr><tr><td>100</td><td>91</td><td>47</td></tr><tr><td>110</td><td>111</td><td>60</td></tr><tr><td>120</td><td>132</td><td>74</td></tr><tr><td>132</td><td>160</td><td>93</td></tr><tr><td>140</td><td>180</td><td>107</td></tr></table>				Input Voltage [V]	Load 50% Hold-Up Time [mS]	Load 100% Hold-Up Time [mS]	75	50	20	80	58	25	85	65	30	90	74	35	100	91	47	110	111	60	120	132	74	132	160	93	140	180	107
Input Voltage [V]	Load 50% Hold-Up Time [mS]	Load 100% Hold-Up Time [mS]																																			
75	50	20																																			
80	58	25																																			
85	65	30																																			
90	74	35																																			
100	91	47																																			
110	111	60																																			
120	132	74																																			
132	160	93																																			
140	180	107																																			

COSEL

Model		MMB50A-5	
Item		Hold-Up Time 出力保持時間	
Object		+12.0V 1.5A	

1. Graph

—△—

Load 50%

- -□- -

Load 100%

Hold-Up Time [mS]

1000

100

10

1

0 80 90 100 110 120 130 140 150

Input Voltage [V]

This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.

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

出力保持時間とは、入力電圧断から出力電圧が、定電圧精度の規格範囲を保持しているところまでの時間。

(注)斜線は定格入力電圧範囲を示す。

Input Voltage [V]	Load 50%	Load 100%
	Hold-Up Time [mS]	Hold-Up Time [mS]
75	46	24
80	52	29
85	58	34
90	64	39
100	78	51
110	94	64
120	110	79
132	133	98
140	149	112

2. Values

COSEL

Model		MMB50A-5		Temperature		25℃	
Item		Instantaneous Interruption Compensation 瞬時停電保障		Testing Circuitry		Figure A	
Object		+12.0V3.00A					
1. Graph				2. Values			

△

Input Volt. 85 V

□

Input Volt. 100 V

○

Input Volt. 132 V

[mS]

10000

1000

100

10

1

Instantaneous Compensation Time

0

1

2

3

4

Load Current [A]

This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.

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

瞬時停電保障時間とは、出力電圧が定電圧精度の規格範囲を保持している瞬時停電時間をいう。

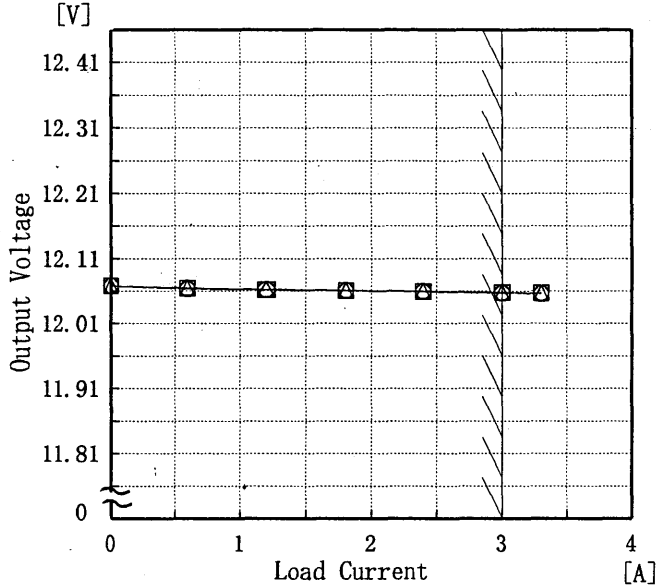
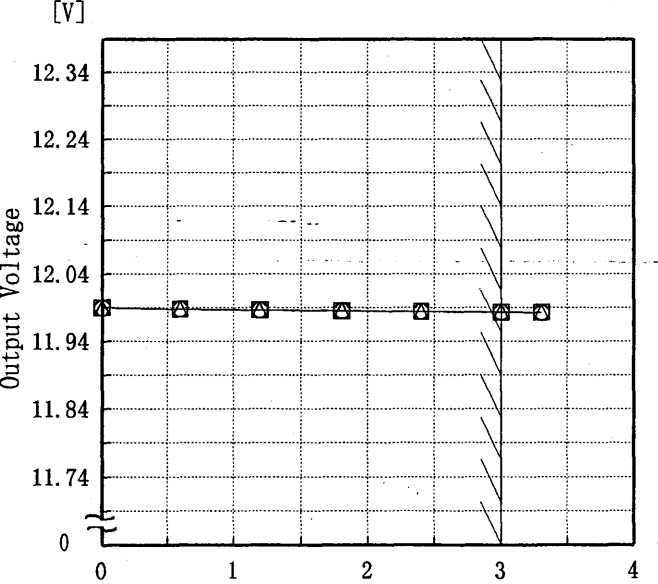
(注)斜線は定格負荷電流範囲を示す。

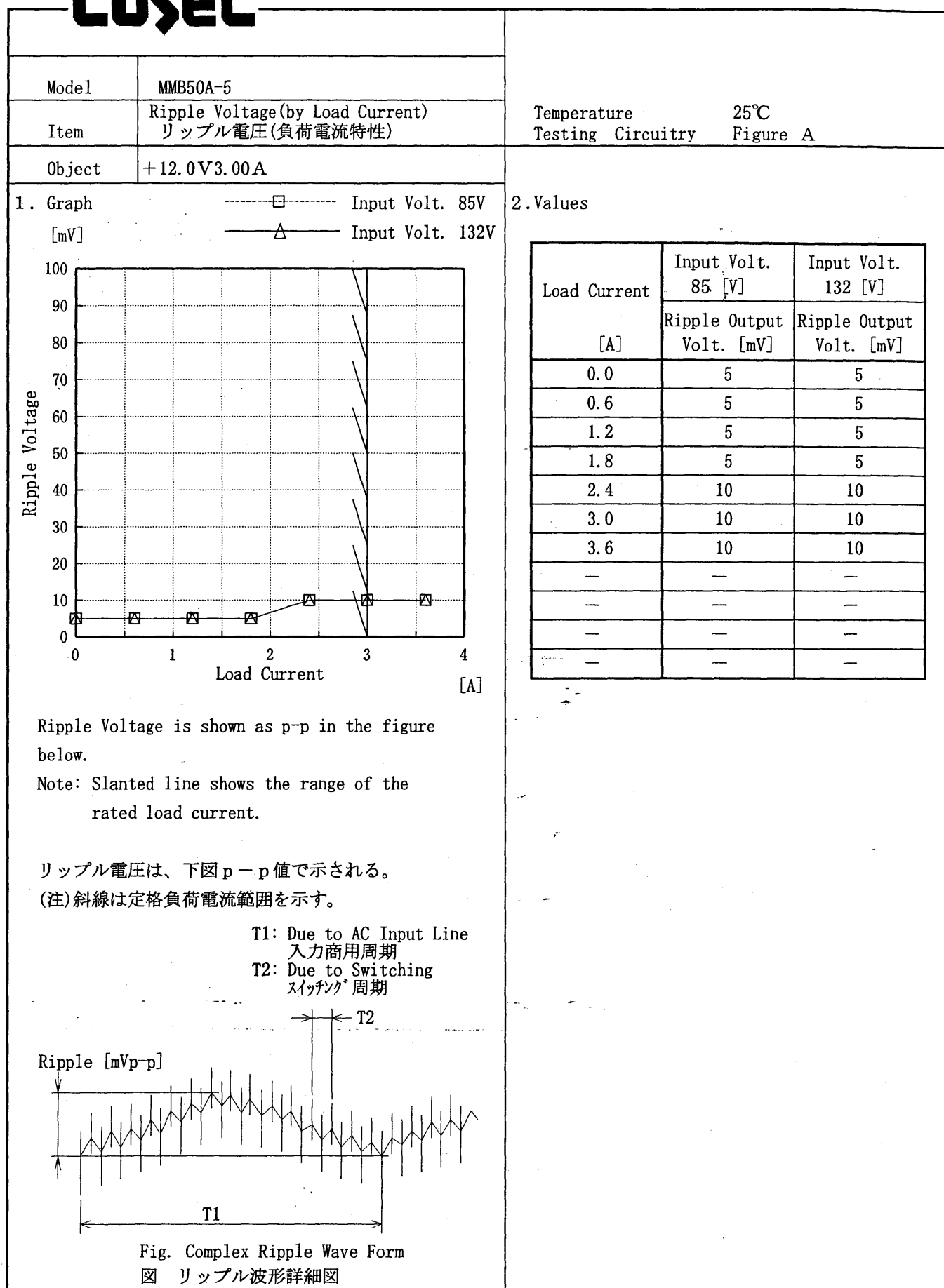
Load Current [A]	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
	Time [mS]		
0.0	—	—	—
0.6	102	138	230
1.2	71	99	177
1.8	52	76	140
2.4	38	56	113
3.0	22	39	90
3.3	14	31	80
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

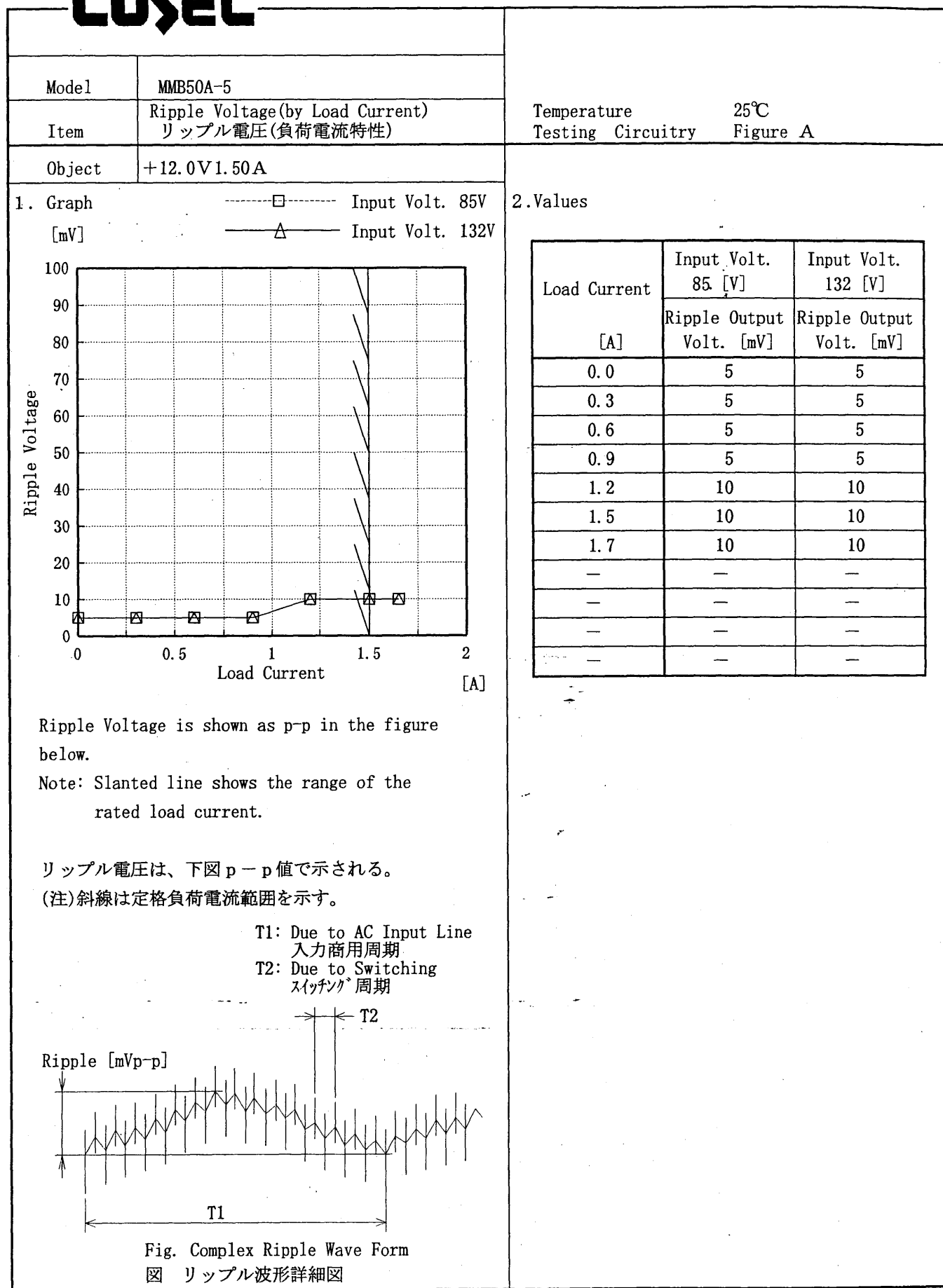
COSEL

Model	MMB50A-5	Temperature	25°C																																																			
Item	Instantaneous Interruption Compensation 瞬時停電保障	Testing Circuitry	Figure A																																																			
Object	+12.0V1.50A																																																					
1. Graph	<div> <div> <div>△</div> <div>Input Volt. 85 V</div> </div> <div> <div>□</div> <div>Input Volt. 100 V</div> </div> <div> <div>○</div> <div>Input Volt. 132 V</div> </div> </div> <p>Instantaneous Compensation Time [mS]</p> <p>Load Current [A]</p> <p>This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy. Note: Slanted line shows the range of the rated load current.</p> <p>瞬時停電保障時間とは、出力電圧が定電圧精度の規格範囲を保持している瞬時停電時間をいう。 (注)斜線は定格負荷電流範囲を示す。</p>																																																					
2. Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th><th>Input Volt. 85[V]</th><th>Input Volt. 100[V]</th><th>Input Volt. 132[V]</th></tr> <tr> <th colspan="3">Time [mS]</th></tr> </thead> <tbody> <tr><td>0.00</td><td>—</td><td>—</td><td>—</td></tr> <tr><td>0.30</td><td>78</td><td>101</td><td>163</td></tr> <tr><td>0.60</td><td>57</td><td>79</td><td>136</td></tr> <tr><td>0.90</td><td>46</td><td>65</td><td>119</td></tr> <tr><td>1.20</td><td>36</td><td>54</td><td>105</td></tr> <tr><td>1.50</td><td>23</td><td>44</td><td>90</td></tr> <tr><td>1.65</td><td>22</td><td>38</td><td>81</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>			Load Current [A]	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]	Time [mS]			0.00	—	—	—	0.30	78	101	163	0.60	57	79	136	0.90	46	65	119	1.20	36	54	105	1.50	23	44	90	1.65	22	38	81	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Load Current [A]	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]																																																			
	Time [mS]																																																					
0.00	—	—	—																																																			
0.30	78	101	163																																																			
0.60	57	79	136																																																			
0.90	46	65	119																																																			
1.20	36	54	105																																																			
1.50	23	44	90																																																			
1.65	22	38	81																																																			
—	—	—	—																																																			
—	—	—	—																																																			
—	—	—	—																																																			
—	—	—	—																																																			

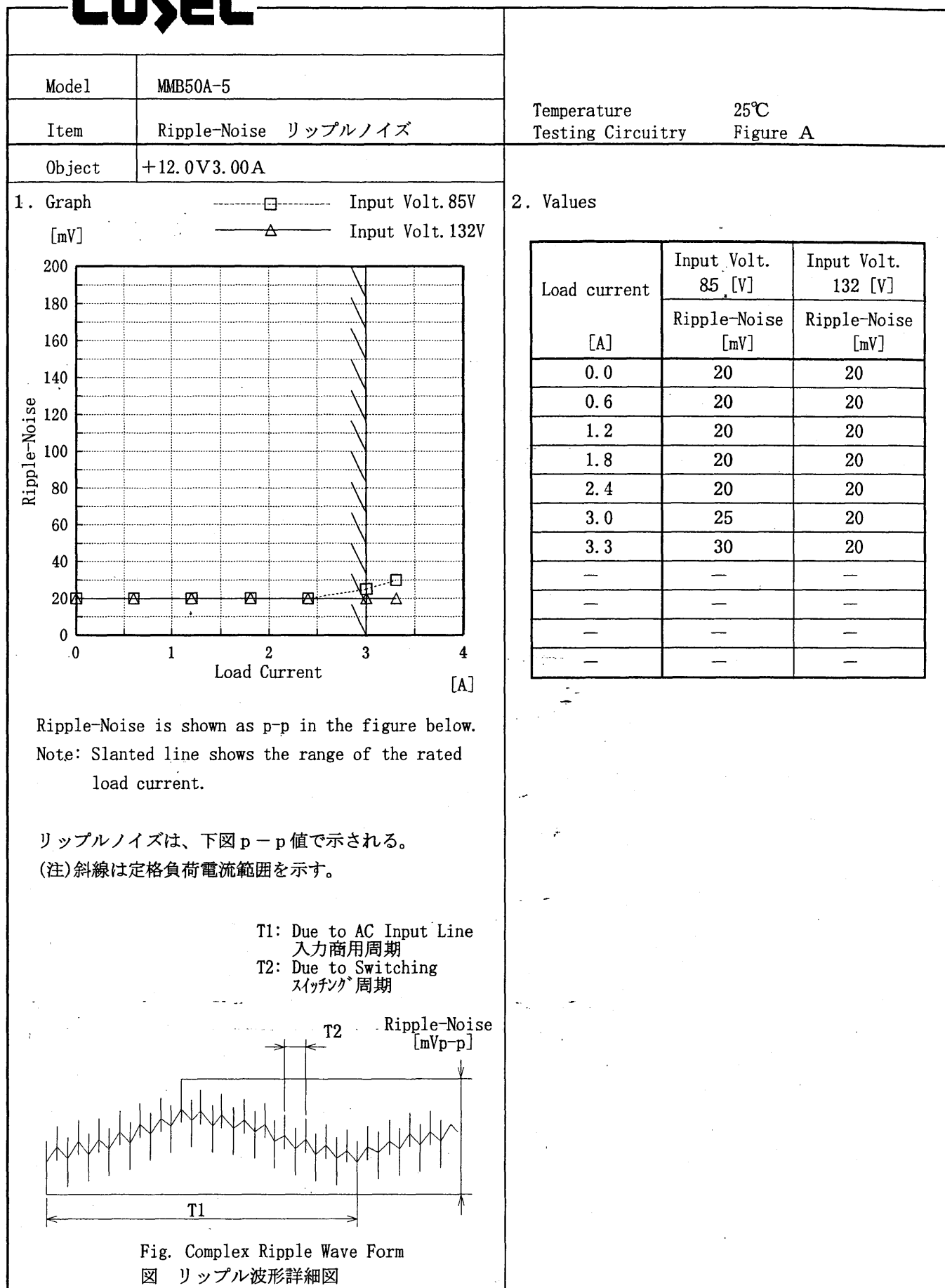
COSEL

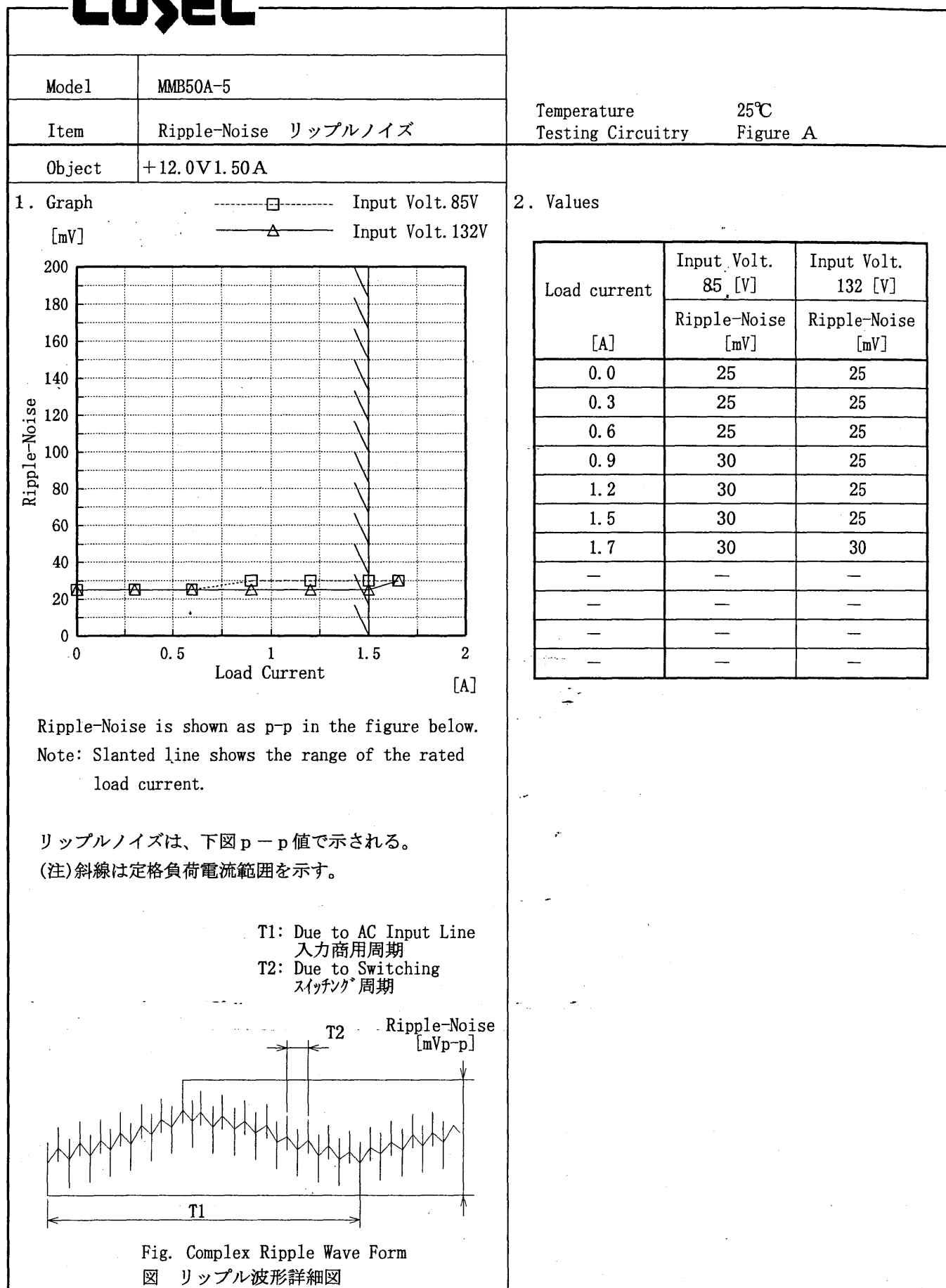
Model		MMB50A-5																																																
Item		Load Regulation 静的負荷変動																																																
Object		+12.0V3.00A																																																
1. Graph		2. Values																																																
<div><div>—△—</div>Input Volt. 85V</div>																																																		
<div><div>---□---</div>Input Volt. 100V</div>																																																		
<div><div>---○---</div>Input Volt. 132V</div>																																																		
		<table><tr><th rowspan="2">Load Current [A]</th><th>Input Volt. 85.0[V]</th><th>Input Volt. 100.0[V]</th><th>Input Volt. 132.0[V]</th></tr><tr><th>Output Volt. [V]</th><th>Output Volt. [V]</th><th>Output Volt. [V]</th></tr><tr><td>0.000</td><td>12.068</td><td>12.068</td><td>12.068</td></tr><tr><td>0.600</td><td>12.065</td><td>12.064</td><td>12.064</td></tr><tr><td>1.200</td><td>12.063</td><td>12.062</td><td>12.062</td></tr><tr><td>1.800</td><td>12.061</td><td>12.061</td><td>12.061</td></tr><tr><td>2.400</td><td>12.060</td><td>12.059</td><td>12.059</td></tr><tr><td>3.000</td><td>12.058</td><td>12.058</td><td>12.057</td></tr><tr><td>3.300</td><td>12.057</td><td>12.057</td><td>12.057</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></table>		Load Current [A]	Input Volt. 85.0[V]	Input Volt. 100.0[V]	Input Volt. 132.0[V]	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]	0.000	12.068	12.068	12.068	0.600	12.065	12.064	12.064	1.200	12.063	12.062	12.062	1.800	12.061	12.061	12.061	2.400	12.060	12.059	12.059	3.000	12.058	12.058	12.057	3.300	12.057	12.057	12.057	—	—	—	—	—	—	—	—	—	—	—	—
Load Current [A]	Input Volt. 85.0[V]	Input Volt. 100.0[V]	Input Volt. 132.0[V]																																															
	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]																																															
0.000	12.068	12.068	12.068																																															
0.600	12.065	12.064	12.064																																															
1.200	12.063	12.062	12.062																																															
1.800	12.061	12.061	12.061																																															
2.400	12.060	12.059	12.059																																															
3.000	12.058	12.058	12.057																																															
3.300	12.057	12.057	12.057																																															
—	—	—	—																																															
—	—	—	—																																															
—	—	—	—																																															
Object		+12V1.50A																																																
1. Graph		2. Values																																																
<div><div>—△—</div>Input Volt. 85V</div>																																																		
<div><div>---□---</div>Input Volt. 100V</div>																																																		
<div><div>---○---</div>Input Volt. 132V</div>																																																		
		<table><tr><th rowspan="2">Load Current [A]</th><th>Input Volt. 85.0[V]</th><th>Input Volt. 100.0[V]</th><th>Input Volt. 132.0[V]</th></tr><tr><th>Output Volt. [V]</th><th>Output Volt. [V]</th><th>Output Volt. [V]</th></tr><tr><td>0.000</td><td>11.990</td><td>11.990</td><td>11.990</td></tr><tr><td>0.300</td><td>11.988</td><td>11.988</td><td>11.988</td></tr><tr><td>0.600</td><td>11.987</td><td>11.986</td><td>11.986</td></tr><tr><td>0.900</td><td>11.985</td><td>11.985</td><td>11.985</td></tr><tr><td>1.200</td><td>11.984</td><td>11.984</td><td>11.984</td></tr><tr><td>1.500</td><td>11.983</td><td>11.983</td><td>11.983</td></tr><tr><td>1.650</td><td>11.983</td><td>11.982</td><td>11.982</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></table>		Load Current [A]	Input Volt. 85.0[V]	Input Volt. 100.0[V]	Input Volt. 132.0[V]	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]	0.000	11.990	11.990	11.990	0.300	11.988	11.988	11.988	0.600	11.987	11.986	11.986	0.900	11.985	11.985	11.985	1.200	11.984	11.984	11.984	1.500	11.983	11.983	11.983	1.650	11.983	11.982	11.982	—	—	—	—	—	—	—	—	—	—	—	—
Load Current [A]	Input Volt. 85.0[V]	Input Volt. 100.0[V]	Input Volt. 132.0[V]																																															
	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]																																															
0.000	11.990	11.990	11.990																																															
0.300	11.988	11.988	11.988																																															
0.600	11.987	11.986	11.986																																															
0.900	11.985	11.985	11.985																																															
1.200	11.984	11.984	11.984																																															
1.500	11.983	11.983	11.983																																															
1.650	11.983	11.982	11.982																																															
—	—	—	—																																															
—	—	—	—																																															
—	—	—	—																																															
Note: Slanted line shows the range of the rated load current.																																																		
(注)斜線は定格負荷電流範囲を示す。																																																		

COSEL

COSEL

COSEL



COSEL

COSEL

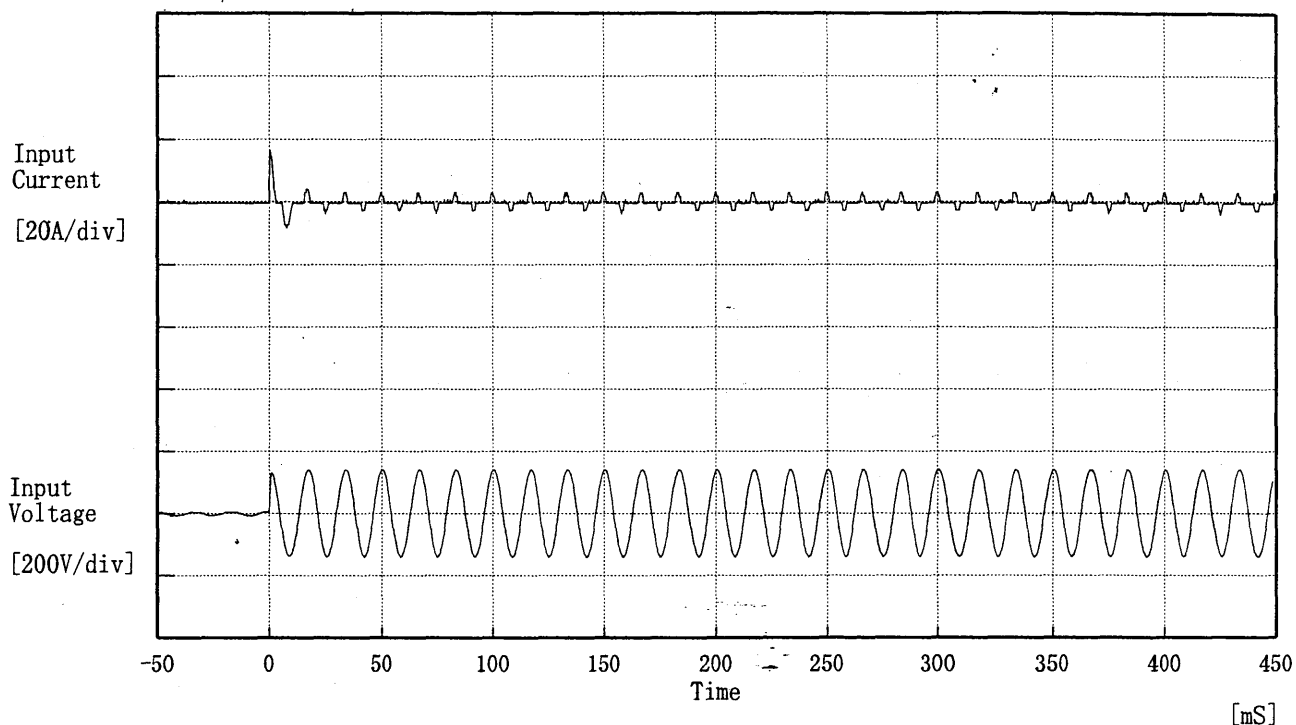
Model	MMB50A-5	Temperature	25°C																																																				
Item	Overcurrent Protection 過電流保護	Testing Circuitry	Figure A																																																				
Object	+12.0V 3.00A																																																						
1. Graph		2. Values																																																					
<div> <div> <div>Input Volt. 85.0 V</div> <div>Input Volt. 100.0 V</div> <div>Input Volt. 132.0 V</div> </div> </div>		<table> <tr> <th>Output Voltage [V]</th><th>Input Volt. 85.0[V] Load Current [A]</th><th>Input Volt. 100.0[V] Load Current [A]</th><th>Input Volt. 132.0[V] Load Current [A]</th></tr> <tr><td>12.00</td><td>—</td><td>—</td><td>—</td></tr> <tr><td>11.40</td><td>3.720</td><td>3.760</td><td>3.697</td></tr> <tr><td>10.80</td><td>3.718</td><td>3.730</td><td>3.667</td></tr> <tr><td>9.60</td><td>3.686</td><td>3.658</td><td>3.582</td></tr> <tr><td>8.40</td><td>3.622</td><td>3.573</td><td>3.488</td></tr> <tr><td>7.20</td><td>3.538</td><td>3.471</td><td>3.380</td></tr> <tr><td>6.00</td><td>3.426</td><td>3.348</td><td>3.254</td></tr> <tr><td>4.80</td><td>3.280</td><td>3.184</td><td>3.094</td></tr> <tr><td>3.60</td><td>3.088</td><td>3.004</td><td>2.926</td></tr> <tr><td>2.40</td><td>2.854</td><td>2.781</td><td>2.718</td></tr> <tr><td>1.20</td><td>2.562</td><td>2.511</td><td>2.466</td></tr> <tr><td>0.00</td><td>2.280</td><td>2.301</td><td>2.282</td></tr> </table>		Output Voltage [V]	Input Volt. 85.0[V] Load Current [A]	Input Volt. 100.0[V] Load Current [A]	Input Volt. 132.0[V] Load Current [A]	12.00	—	—	—	11.40	3.720	3.760	3.697	10.80	3.718	3.730	3.667	9.60	3.686	3.658	3.582	8.40	3.622	3.573	3.488	7.20	3.538	3.471	3.380	6.00	3.426	3.348	3.254	4.80	3.280	3.184	3.094	3.60	3.088	3.004	2.926	2.40	2.854	2.781	2.718	1.20	2.562	2.511	2.466	0.00	2.280	2.301	2.282
Output Voltage [V]	Input Volt. 85.0[V] Load Current [A]	Input Volt. 100.0[V] Load Current [A]	Input Volt. 132.0[V] Load Current [A]																																																				
12.00	—	—	—																																																				
11.40	3.720	3.760	3.697																																																				
10.80	3.718	3.730	3.667																																																				
9.60	3.686	3.658	3.582																																																				
8.40	3.622	3.573	3.488																																																				
7.20	3.538	3.471	3.380																																																				
6.00	3.426	3.348	3.254																																																				
4.80	3.280	3.184	3.094																																																				
3.60	3.088	3.004	2.926																																																				
2.40	2.854	2.781	2.718																																																				
1.20	2.562	2.511	2.466																																																				
0.00	2.280	2.301	2.282																																																				
Object	+12V 1.50A																																																						
1. Graph		2. Values																																																					
<div> <div> <div>Input Volt. 85.0 V</div> <div>Input Volt. 100.0 V</div> <div>Input Volt. 132.0 V</div> </div> </div>		<table> <tr> <th>Output Voltage [V]</th><th>Input Volt. 85.0[V] Load Current [A]</th><th>Input Volt. 100.0[V] Load Current [A]</th><th>Input Volt. 132.0[V] Load Current [A]</th></tr> <tr><td>12.00</td><td>—</td><td>—</td><td>—</td></tr> <tr><td>11.40</td><td>1.942</td><td>1.921</td><td>1.875</td></tr> <tr><td>10.80</td><td>1.933</td><td>1.904</td><td>1.861</td></tr> <tr><td>9.60</td><td>1.906</td><td>1.867</td><td>1.825</td></tr> <tr><td>8.40</td><td>1.868</td><td>1.823</td><td>1.792</td></tr> <tr><td>7.20</td><td>1.819</td><td>1.773</td><td>1.740</td></tr> <tr><td>6.00</td><td>1.755</td><td>1.715</td><td>1.690</td></tr> <tr><td>4.80</td><td>1.676</td><td>1.638</td><td>1.631</td></tr> <tr><td>3.60</td><td>1.579</td><td>1.553</td><td>1.562</td></tr> <tr><td>2.40</td><td>1.465</td><td>1.457</td><td>1.485</td></tr> <tr><td>1.20</td><td>1.335</td><td>1.350</td><td>1.396</td></tr> <tr><td>0.00</td><td>1.505</td><td>1.663</td><td>1.827</td></tr> </table>		Output Voltage [V]	Input Volt. 85.0[V] Load Current [A]	Input Volt. 100.0[V] Load Current [A]	Input Volt. 132.0[V] Load Current [A]	12.00	—	—	—	11.40	1.942	1.921	1.875	10.80	1.933	1.904	1.861	9.60	1.906	1.867	1.825	8.40	1.868	1.823	1.792	7.20	1.819	1.773	1.740	6.00	1.755	1.715	1.690	4.80	1.676	1.638	1.631	3.60	1.579	1.553	1.562	2.40	1.465	1.457	1.485	1.20	1.335	1.350	1.396	0.00	1.505	1.663	1.827
Output Voltage [V]	Input Volt. 85.0[V] Load Current [A]	Input Volt. 100.0[V] Load Current [A]	Input Volt. 132.0[V] Load Current [A]																																																				
12.00	—	—	—																																																				
11.40	1.942	1.921	1.875																																																				
10.80	1.933	1.904	1.861																																																				
9.60	1.906	1.867	1.825																																																				
8.40	1.868	1.823	1.792																																																				
7.20	1.819	1.773	1.740																																																				
6.00	1.755	1.715	1.690																																																				
4.80	1.676	1.638	1.631																																																				
3.60	1.579	1.553	1.562																																																				
2.40	1.465	1.457	1.485																																																				
1.20	1.335	1.350	1.396																																																				
0.00	1.505	1.663	1.827																																																				
Note: Slanted line shows the range of the rated load current. (注) 斜線は定格負荷電流範囲を示す。																																																							

COSEL

Model		MMB50A-5																																																									
Item		Overvoltage Protection 過電圧保護																																																									
Object		+12.0V3.00A																																																									
1. Graph		2. Values																																																									
<div><div><div>△</div><div>Input Volt. 85 V</div></div><div><div>□</div><div>Input Volt. 100 V</div></div><div><div>○</div><div>Input Volt. 132 V</div></div></div> <table><tr><th>Ambient Temp.</th><th>Input Volt.</th><th>Input Volt.</th><th>Input Volt.</th></tr><tr><th>[°C]</th><th>85[V]</th><th>100[V]</th><th>132[V]</th></tr><tr><th colspan="4">Operating Point [V]</th></tr><tr><td>-20</td><td>15.46</td><td>15.43</td><td>15.39</td></tr><tr><td>-10</td><td>15.30</td><td>15.27</td><td>15.24</td></tr><tr><td>0</td><td>15.23</td><td>15.21</td><td>15.17</td></tr><tr><td>10</td><td>15.06</td><td>15.03</td><td>14.98</td></tr><tr><td>20</td><td>14.93</td><td>14.90</td><td>14.86</td></tr><tr><td>25</td><td>14.81</td><td>14.75</td><td>14.70</td></tr><tr><td>30</td><td>14.72</td><td>14.66</td><td>14.61</td></tr><tr><td>40</td><td>14.53</td><td>14.49</td><td>14.42</td></tr><tr><td>50</td><td>14.35</td><td>14.32</td><td>14.23</td></tr><tr><td>60</td><td>14.25</td><td>14.23</td><td>14.10</td></tr><tr><td>-</td><td>-</td><td>-</td><td>-</td></tr></table>		Ambient Temp.	Input Volt.	Input Volt.	Input Volt.	[°C]	85[V]	100[V]	132[V]	Operating Point [V]				-20	15.46	15.43	15.39	-10	15.30	15.27	15.24	0	15.23	15.21	15.17	10	15.06	15.03	14.98	20	14.93	14.90	14.86	25	14.81	14.75	14.70	30	14.72	14.66	14.61	40	14.53	14.49	14.42	50	14.35	14.32	14.23	60	14.25	14.23	14.10	-	-	-	-		
Ambient Temp.	Input Volt.	Input Volt.	Input Volt.																																																								
[°C]	85[V]	100[V]	132[V]																																																								
Operating Point [V]																																																											
-20	15.46	15.43	15.39																																																								
-10	15.30	15.27	15.24																																																								
0	15.23	15.21	15.17																																																								
10	15.06	15.03	14.98																																																								
20	14.93	14.90	14.86																																																								
25	14.81	14.75	14.70																																																								
30	14.72	14.66	14.61																																																								
40	14.53	14.49	14.42																																																								
50	14.35	14.32	14.23																																																								
60	14.25	14.23	14.10																																																								
-	-	-	-																																																								
Object		+12V1.50A																																																									
1. Graph		2. Values																																																									
<div><div><div>△</div><div>Input Volt. 85 V</div></div><div><div>□</div><div>Input Volt. 100 V</div></div><div><div>○</div><div>Input Volt. 132 V</div></div></div> <table><tr><th>Ambient Temp.</th><th>Input Volt.</th><th>Input Volt.</th><th>Input Volt.</th></tr><tr><th>[°C]</th><th>85[V]</th><th>100[V]</th><th>132[V]</th></tr><tr><th colspan="4">Operating Point [V]</th></tr><tr><td>-20</td><td>15.5</td><td>15.5</td><td>15.5</td></tr><tr><td>-10</td><td>15.5</td><td>15.5</td><td>15.5</td></tr><tr><td>0</td><td>15.4</td><td>15.4</td><td>15.4</td></tr><tr><td>10</td><td>15.2</td><td>15.2</td><td>15.2</td></tr><tr><td>20</td><td>15.1</td><td>15.1</td><td>15.1</td></tr><tr><td>25</td><td>15.0</td><td>15.0</td><td>14.9</td></tr><tr><td>30</td><td>14.9</td><td>14.9</td><td>14.8</td></tr><tr><td>40</td><td>14.7</td><td>14.7</td><td>14.6</td></tr><tr><td>50</td><td>14.6</td><td>14.5</td><td>14.4</td></tr><tr><td>60</td><td>14.3</td><td>14.3</td><td>14.1</td></tr><tr><td>-</td><td>-</td><td>-</td><td>-</td></tr></table>		Ambient Temp.	Input Volt.	Input Volt.	Input Volt.	[°C]	85[V]	100[V]	132[V]	Operating Point [V]				-20	15.5	15.5	15.5	-10	15.5	15.5	15.5	0	15.4	15.4	15.4	10	15.2	15.2	15.2	20	15.1	15.1	15.1	25	15.0	15.0	14.9	30	14.9	14.9	14.8	40	14.7	14.7	14.6	50	14.6	14.5	14.4	60	14.3	14.3	14.1	-	-	-	-		
Ambient Temp.	Input Volt.	Input Volt.	Input Volt.																																																								
[°C]	85[V]	100[V]	132[V]																																																								
Operating Point [V]																																																											
-20	15.5	15.5	15.5																																																								
-10	15.5	15.5	15.5																																																								
0	15.4	15.4	15.4																																																								
10	15.2	15.2	15.2																																																								
20	15.1	15.1	15.1																																																								
25	15.0	15.0	14.9																																																								
30	14.9	14.9	14.8																																																								
40	14.7	14.7	14.6																																																								
50	14.6	14.5	14.4																																																								
60	14.3	14.3	14.1																																																								
-	-	-	-																																																								
Note: Slanted line shows the range of the rated ambient temperature. (注)斜線は定格周囲温度範囲を示す。																																																											

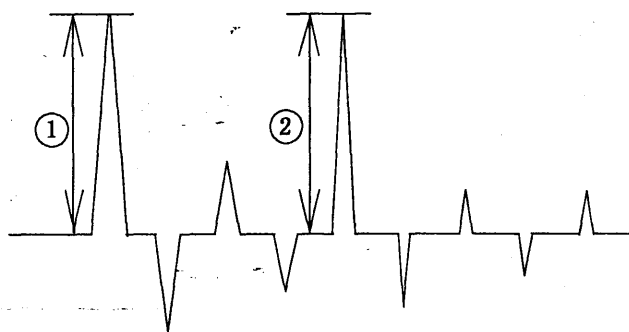
COSEL

Model	MMB50A-5	Temperature 25°C Testing Circuitry Figure A
Item	Inrush Current 突入電流	
Object		



Input Voltage 100 V
Frequency 60 Hz
Load 100 %
Inrush Current

- ① 16.37 [A]
② 3.82 [A]



COSEL

Model	MMB50A-5		
Item	Dynamic Load Responce 動的負荷変動	Temperature	25°C
Object	+12.0V3.00A	Testing Circuitry	Figure A

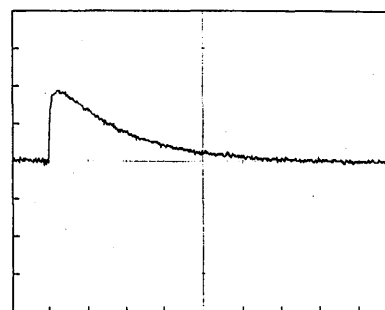
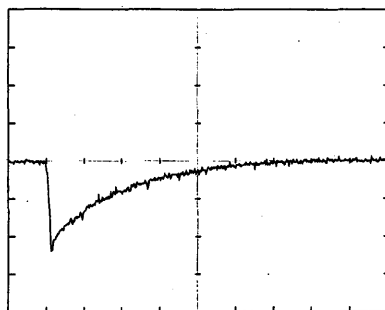
Input Volt. 100 V

Cycle 200 mS

Load Current

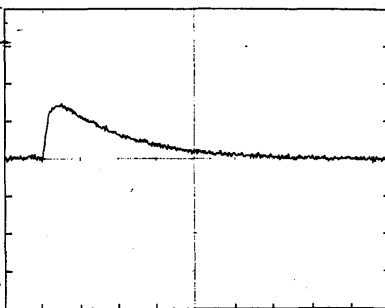
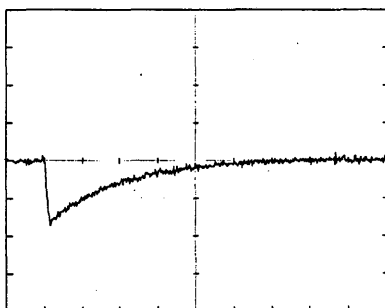
Load 0% ↔

Load 100 %



Load 0% ↔

Load 50 %



100 mV/div

10 mS/div

COSEL

Model	MMB50A-5	Temperature 25℃ Testing Circuitry Figure A
Item	Dynamic Load Responce 動的負荷変動	
Object	+12.0V 1.50A	

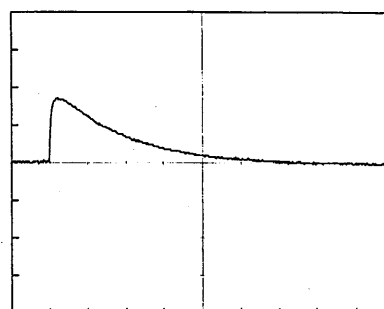
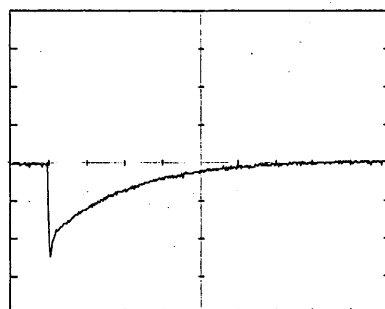
Input Volt. 100 V

Cycle 200 mS

Load Current

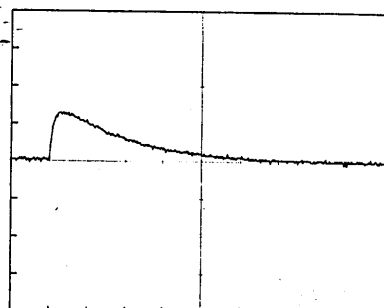
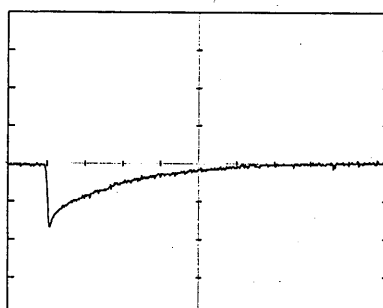
Load 0% ↔

Load 100 %



Load 0% ↔

Load 50 %



100 mV/div

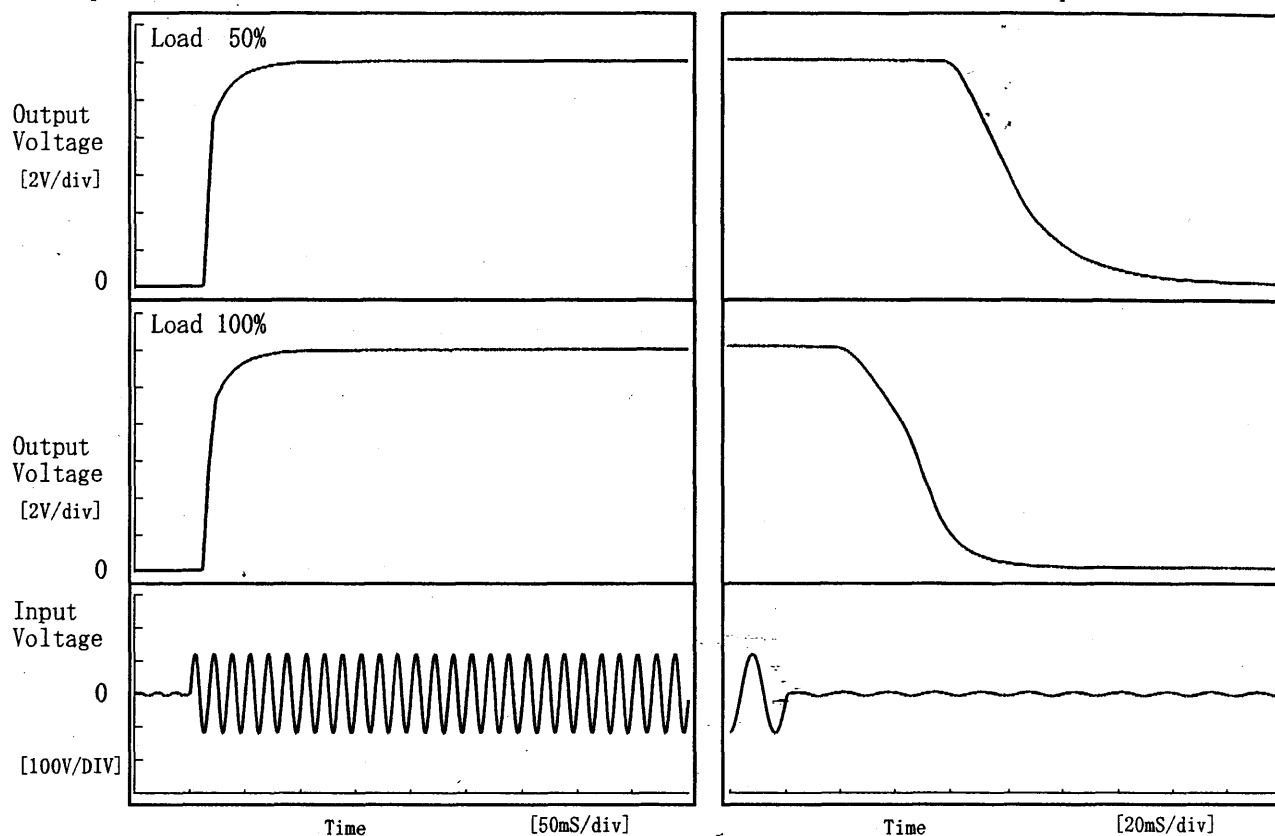
10 mS/div

COSEL

Model	MMB50A-5	Temperature	25°C
Item	Rise and Fall Time 立上り、立下り時間	Testing Circuitry	Figure A
Object	+12.0V3.00A		

1. Graph

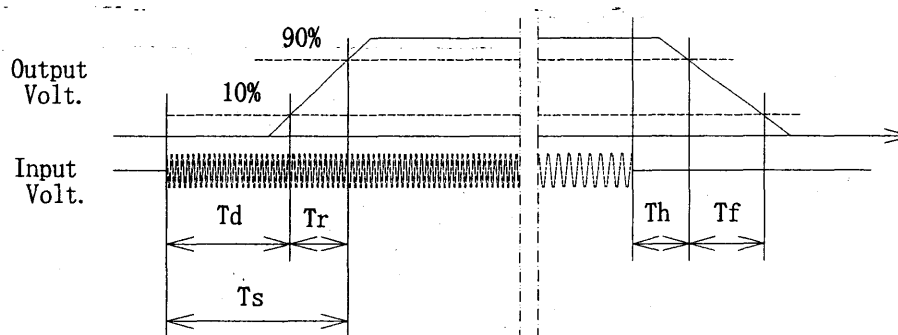
Input Volt. 85 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	12.5	25.3	37.8	65.8	48.6
100 %	12.3	26.5	38.8	30.2	35.8

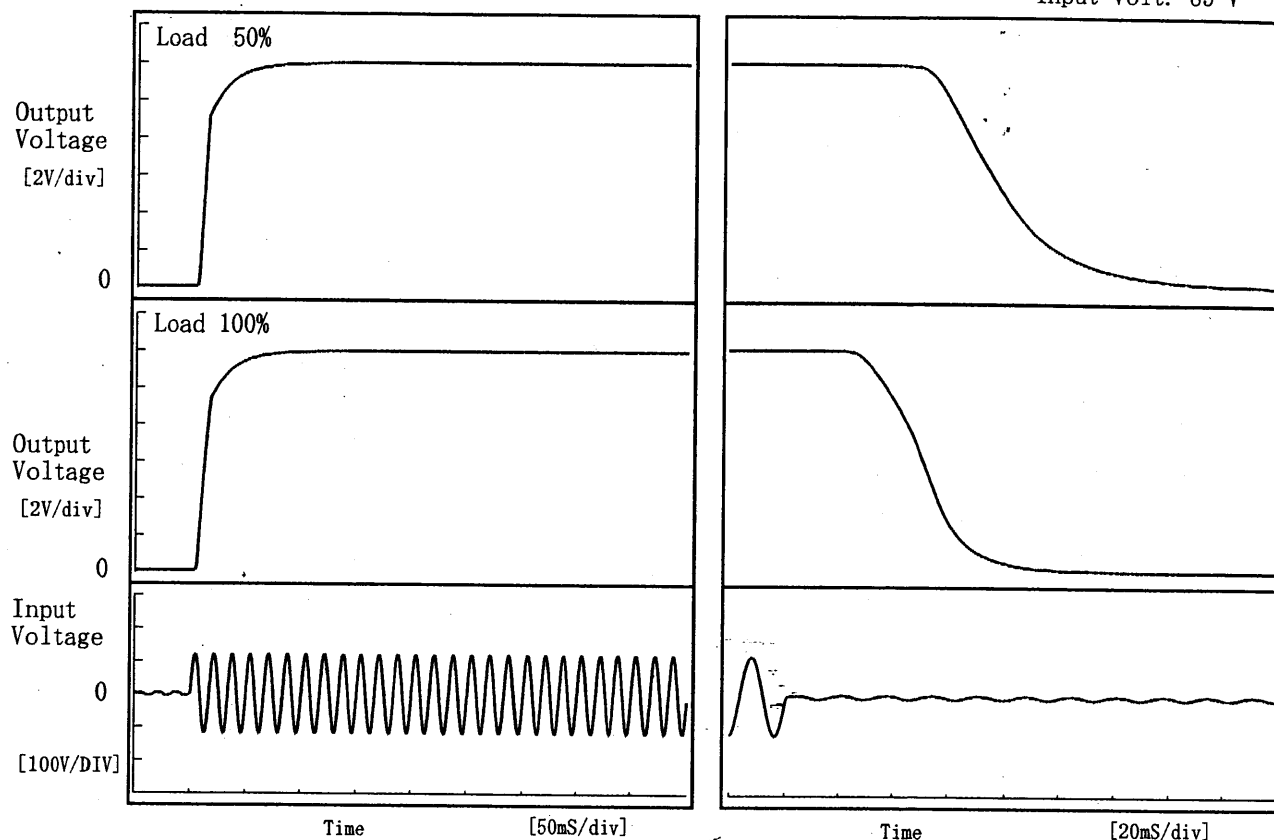


COSEL

Model	MMB50A-5	Temperature Testing Circuitry	25°C Figure A
Item	Rise and Fall Time 立上り、立下り時間		
Object	+12.0V 1.50A		

1. Graph

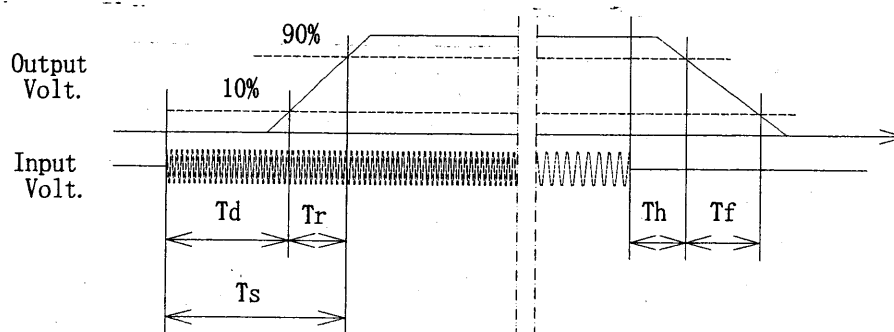
Input Volt. 85 V



2. Values

[mS]

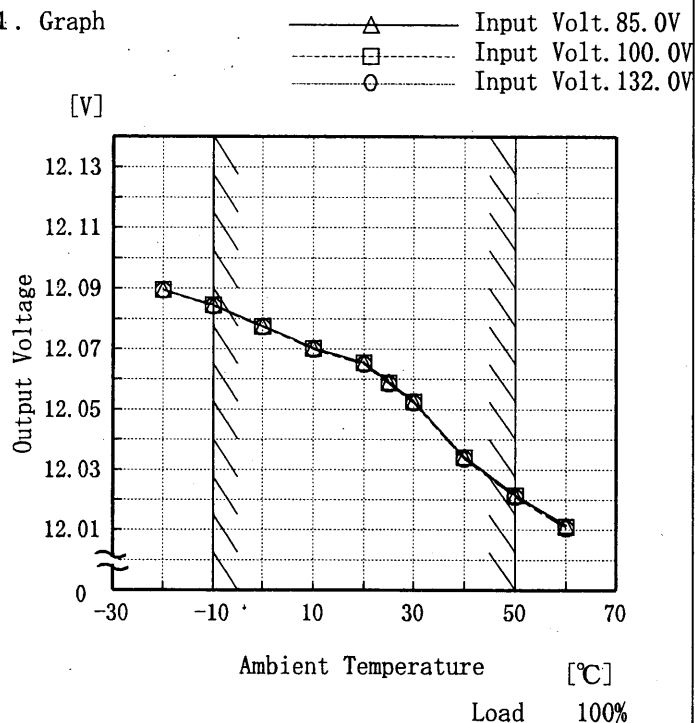
Load \ Time	T _d	T _r	T _s	T _h	T _f
50 %	5.8	27.0	32.8	57.8	56.3
100 %	5.8	28.3	34.0	33.9	36.2



COSEL

Model	MMB50A-5
Item	Ambient Temperature Drift 周囲温度変動
Object	+12.0V3.00A

1. Graph



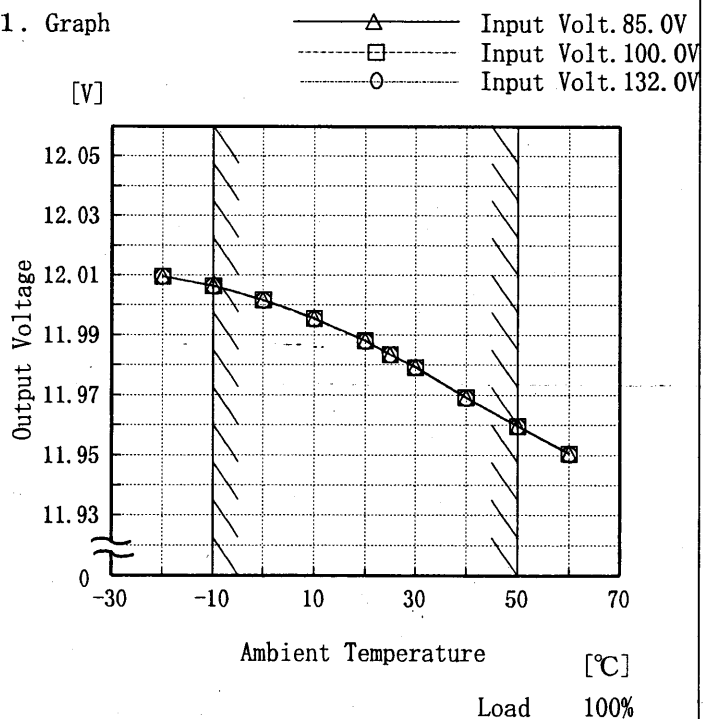
Testing Circuitry Figure A

2. Values

Temperature	Input Volt. 85.0[V]	Input Volt. 100.0[V]	Input Volt. 132.0[V]
[°C]	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]
-20	12.090	12.090	12.089
-10	12.085	12.084	12.084
0	12.078	12.077	12.077
10	12.070	12.070	12.070
20	12.065	12.065	12.065
25	12.059	12.059	12.059
30	12.053	12.052	12.052
40	12.034	12.034	12.034
50	12.022	12.021	12.021
60	12.011	12.011	12.011
—	—	—	—

Object	+12V1.50A
--------	-----------

1. Graph



2. Values

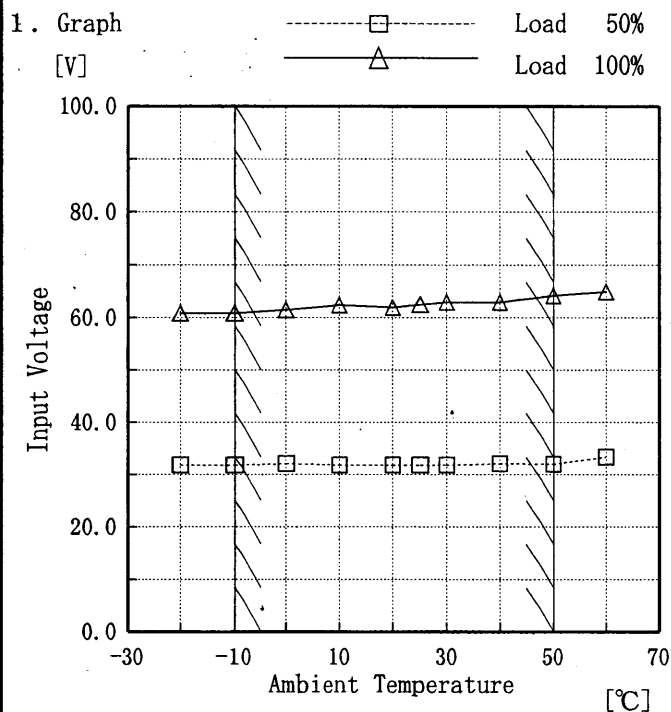
Temperature	Input Volt. 85.0[V]	Input Volt. 100.0[V]	Input Volt. 132.0[V]
[°C]	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]
-20	12.010	12.009	12.009
-10	12.006	12.006	12.006
0	12.002	12.002	12.002
10	11.996	11.995	11.995
20	11.988	11.988	11.988
25	11.983	11.983	11.983
30	11.979	11.979	11.979
40	11.969	11.969	11.969
50	11.960	11.959	11.959
60	11.951	11.950	11.950
—	—	—	—

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

(注) 斜線は定格周囲温度範囲を示す。

COSEL

Model	MMB50A-5
Item	Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧
Object	+12.0V3.00A

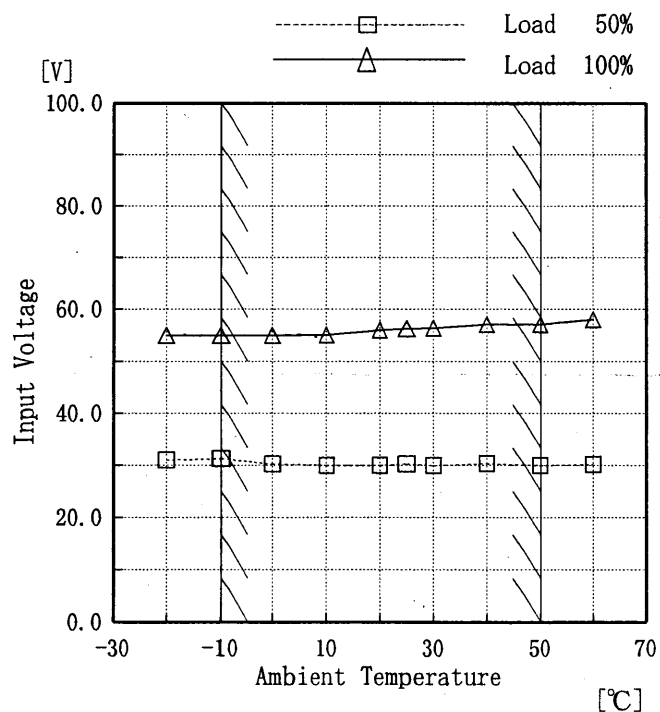


Testing Circuitry Figure A

2. Values

Ambient Temp.	Load 50%	Load 100%
[°C]	Input Volt. [V]	Input Volt. [V]
-20	31.8	60.8
-10	31.8	60.8
0	32.1	61.4
10	31.8	62.4
20	31.8	61.9
25	31.8	62.4
30	31.9	62.8
40	32.1	62.9
50	32.0	64.2
60	33.4	64.8
—	—	—

Object	+12V1.50A
--------	-----------



2. Values

Ambient Temp.	Load 50%	Load 100%
[°C]	Input Volt. [V]	Input Volt. [V]
-20	31.0	55.0
-10	31.3	55.0
0	30.3	55.0
10	30.0	55.1
20	30.0	56.0
25	30.3	56.3
30	30.0	56.3
40	30.4	57.1
50	30.0	57.1
60	30.2	58.0
—	—	—

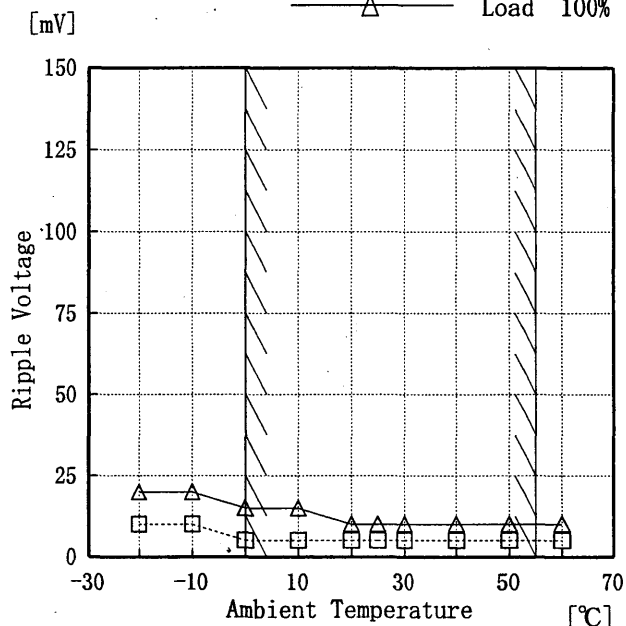
Note: Slanted line shows the range of the rated ambient temperature.

(注)斜線は定格周囲温度範囲を示す。

COSEL

Model	MMB50A-5
Item	Ripple Voltage (by Ambient Temp.) リップル電圧 (周囲温度特性)
Object	+12.0V 3.00A

1. Graph
- Load 50%
-----△----- Load 100%



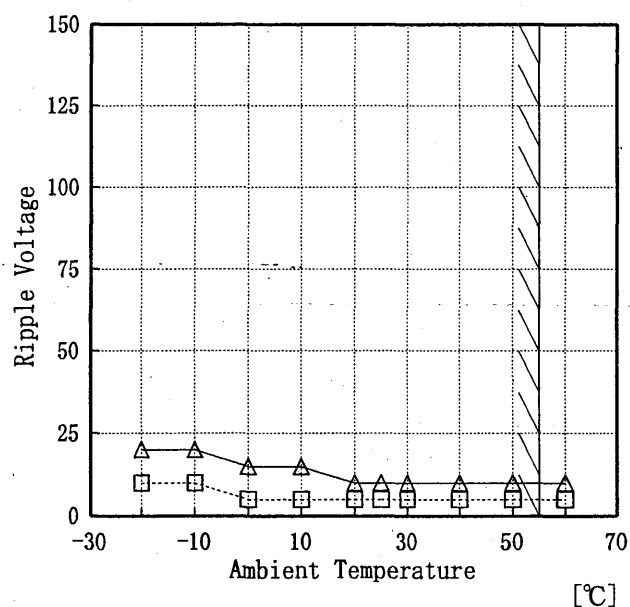
Testing Circuitry Figure A

2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
-20	10	20
-10	10	20
0	5	15
10	5	15
20	5	10
25	5	10
30	5	10
40	5	10
50	5	10
60	5	10
—	—	—

Object	+12V 1.50A
--------	------------

1. Graph
- Load 50%
-----△----- Load 100%



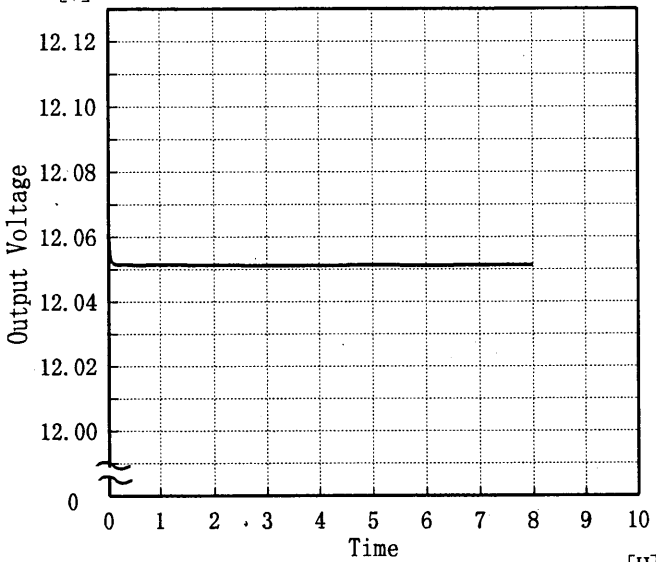
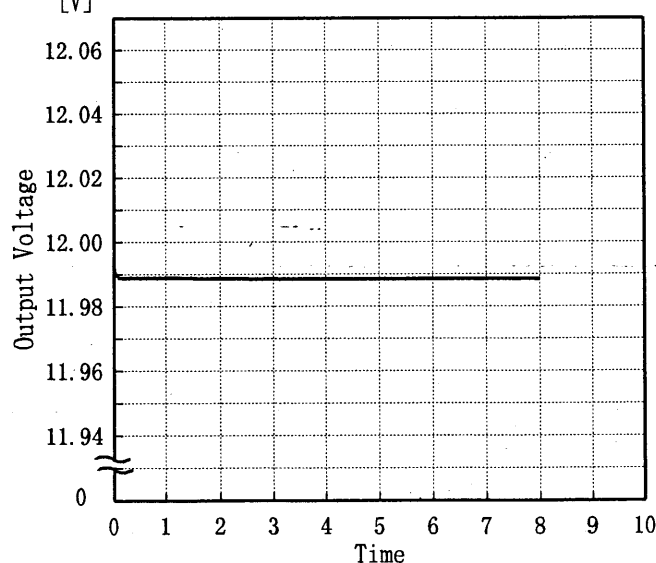
2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
-20	10	25
-10	10	20
0	5	15
10	5	15
20	5	10
25	5	10
30	5	10
40	5	10
50	5	10
60	5	10
—	—	—

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

(注) 斜線は定格周囲温度範囲を示す。

COSEL

COSEL																									
Model	MMB50A-5	Temperature 25℃																							
Item	Time Lapse Drift 経時ドリフト	Testing Circuitry Figure A																							
Object	+12.0V3.00A																								
1. Graph		2.Values																							
<div><p>[V]</p><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 100.0V</p><p>Load 100%</p></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>12.061</td></tr><tr><td>0.5</td><td>12.051</td></tr><tr><td>1.0</td><td>12.051</td></tr><tr><td>2.0</td><td>12.051</td></tr><tr><td>3.0</td><td>12.051</td></tr><tr><td>4.0</td><td>12.051</td></tr><tr><td>5.0</td><td>12.051</td></tr><tr><td>6.0</td><td>12.051</td></tr><tr><td>7.0</td><td>12.051</td></tr><tr><td>8.0</td><td>12.051</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	12.061	0.5	12.051	1.0	12.051	2.0	12.051	3.0	12.051	4.0	12.051	5.0	12.051	6.0	12.051	7.0	12.051	8.0	12.051
Time since start [H]	Output Voltage [V]																								
0.0	12.061																								
0.5	12.051																								
1.0	12.051																								
2.0	12.051																								
3.0	12.051																								
4.0	12.051																								
5.0	12.051																								
6.0	12.051																								
7.0	12.051																								
8.0	12.051																								
Object	+12V1.50A																								
1. Graph		2.Values																							
<div><p>[V]</p><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 100.0V</p><p>Load 100%</p></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>11.993</td></tr><tr><td>0.5</td><td>11.989</td></tr><tr><td>1.0</td><td>11.989</td></tr><tr><td>2.0</td><td>11.989</td></tr><tr><td>3.0</td><td>11.989</td></tr><tr><td>4.0</td><td>11.989</td></tr><tr><td>5.0</td><td>11.988</td></tr><tr><td>6.0</td><td>11.988</td></tr><tr><td>7.0</td><td>11.988</td></tr><tr><td>8.0</td><td>11.988</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	11.993	0.5	11.989	1.0	11.989	2.0	11.989	3.0	11.989	4.0	11.989	5.0	11.988	6.0	11.988	7.0	11.988	8.0	11.988
Time since start [H]	Output Voltage [V]																								
0.0	11.993																								
0.5	11.989																								
1.0	11.989																								
2.0	11.989																								
3.0	11.989																								
4.0	11.989																								
5.0	11.988																								
6.0	11.988																								
7.0	11.988																								
8.0	11.988																								

COSEL

Model		MMB50A-5		Testing Circuitry Figure A	
Item		Output Voltage Accuracy 定電圧精度			

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 : -10~50 °C

Input Voltage : 85.0~132.0 V

Load Current (AVR 1) : 0.00~3.00 A

 (AVR 2) : 0.00~1.50 A

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

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

定電圧精度

周囲温度、入力電圧、負荷を下記仕様内で、任意に変動させたときの出力電圧の変動をいう。

周囲温度 -10~50 °C

入力電圧 85.0~132.0 V

負荷電流 (AVR 1) 0.00~3.00 A

 (AVR 2) 0.00~1.50 A

* 定電圧精度(変動値) = ± (出力電圧の最高値 - 出力電圧の最低値) / 2

* 定電圧精度(変動率) = $\frac{\text{変動値}}{\text{定格出力電圧}} \times 100$

Object	+12.0V3.00A				
--------	-------------	--	--	--	--

Item	Temperature [°C]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration) [%]
Maximum Voltage	-10	132.0	0.00	12.094	±38	±0.4
Minimum Voltage	50	132.0	3.00	12.019		

Object	+12V1.50A				
--------	-----------	--	--	--	--

Item	Temperature [°C]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration) [%]
Maximum Voltage	-10	100.0	0.00	12.012	±27	±0.3
Minimum Voltage	50	132.0	1.50	11.959		

COSEL

Model		MMB50A-5	Testing Circuitry Figure A
Item		Condensation 結露特性	
Object		+12.0V3A	
1. Condensation test		Testing procedure is as follows.	
①		Keeping and cooling the unit in a tank at -10℃ for an hour with the input off.	
②		Taking it out of the tank and dewing itself in a room where the temperature is 25℃ and the humidity is 40%RH.	
③		Testing electrical characteristics of the unit to confirm there be no fault.	
1. 結露特性試験		入力を切った状態で、恒温槽で-10℃に冷却しておき、約1時間後に恒温槽から取り出し、室温25℃、湿度40%RHの状態におき結露させ、その電気的特性の測定を行い、異常のないことを確認する。	
2. Values			
Item	Data	Testing Conditions	
Output Voltage [V]	12.06	Input Volt.: 100V, Load Current:3A	
Line Regulation [mV]	1	Input Volt.: 85~132V, Load Current:3A	
Load Regulation [mV]	8	Input Volt.: 100V, Load Current:0~3A	

COSEL

Model		MMB50A-5	Testing Circuitry	Figure A
Item		Condensation 結露特性		
Object		+12.0V3A		
1. Condensation test Testing procedure is as follows. ① Keeping and cooling the unit in a tank at -10℃ for an hour with the input off. ② Taking it out of the tank and dewing itself in a room where the temperature is 25℃ and the humidity is 40%RH. ③ Testing electrical characteristics of the unit to confirm there be no fault.				
1. 結露特性試験 入力を切った状態で、恒温槽で-10℃に冷却しておき、約1時間後に恒温槽から取り出し、室温25℃、湿度40%RHの状態におき結露させ、その電気的特性の測定を行い、異常のないことを確認する。				
2. Values				
Item		Data	Testing Conditions	
Output Voltage [V]		11.987	Input Volt.: 100V, Load Current:3A	
Line Regulation [mV]		1	Input Volt.: 85~132V, Load Current:3A	
Load Regulation [mV]		7	Input Volt.: 100V, Load Current:0~3A	

-26-

BC-3213

COSEL

Model	MMB50A-5	Temperature	25°C
Item	Leakage Current 漏洩電流	Testing Circuitry	Figure A
Object	_____		

1. Results

Standards	Leakage Current [mA]		
	Input Volt. 85 [V]	Input Volt. 100 [V]	Input Volt. 132 [V]
(A) DENTORI	0.12	0.14	0.19
(B) IEC60950	0.12	0.14	0.19

Standards	Leakage Current [mA]		
	Input Volt. 170 [V]	Input Volt. 230 [V]	Input Volt. 264 [V]
(B) IEC60950	—	—	—

2. Condition

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

交流入力 of 両相について測定し、その大きい方を漏洩電流測定値とする。

COSEL

Model	MMB50A-5	Testing Circuitry Figure D
Item	Conducted Emission 雑音端子電圧	
Object		

1. Graph

Remarks

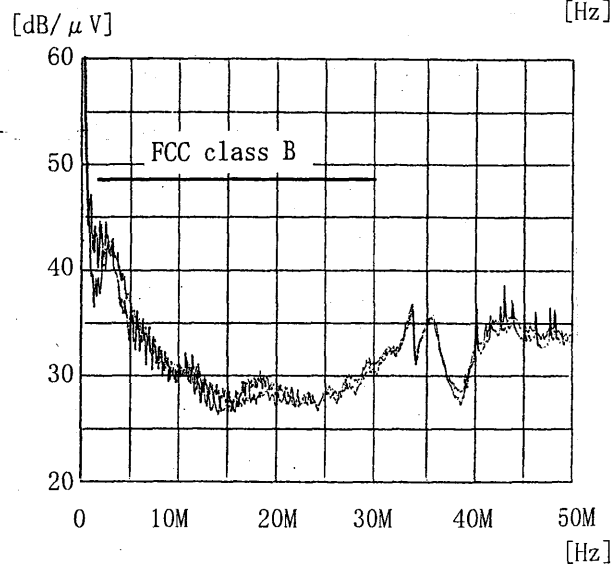
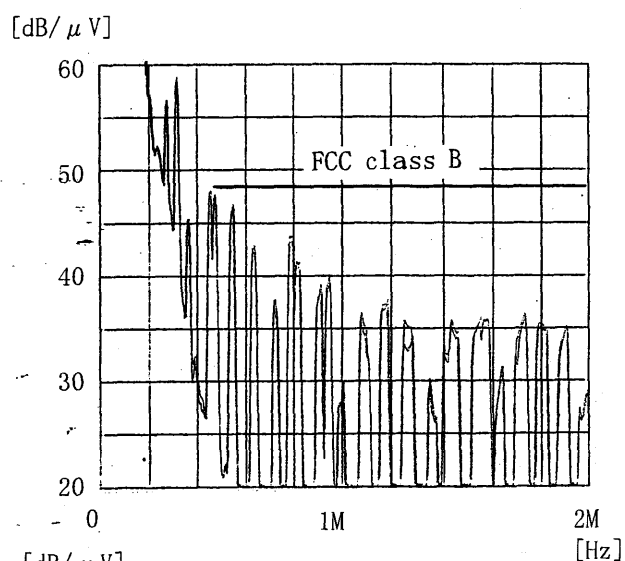
Input Volt. 120 V

Load 100 %

Note: Slanted line shows the range of Tolerance.

(注) 斜線は許容値を示す。

NO	Standards	Standards Complied	Frequency [MHz]	Tolerance [dB/μV]
1	FCC class A		0.45~1.6	60
			1.6~30	69.5
2	FCC class B	○	0.45~30	48
3	VCCI class A		0.15~0.5	79
			0.5~30	73
4	VCCI class B		0.15~0.5	66-56
			0.5~5	56
			5~30	60
5	CISPR Pub. 22 class A (EN55022)		0.15~0.5	79
			0.5~30	73
6	CISPR Pub. 22 class B (EN55022)		0.15~0.5	66-56
			0.5~5	56
			5~30	60



COSEL

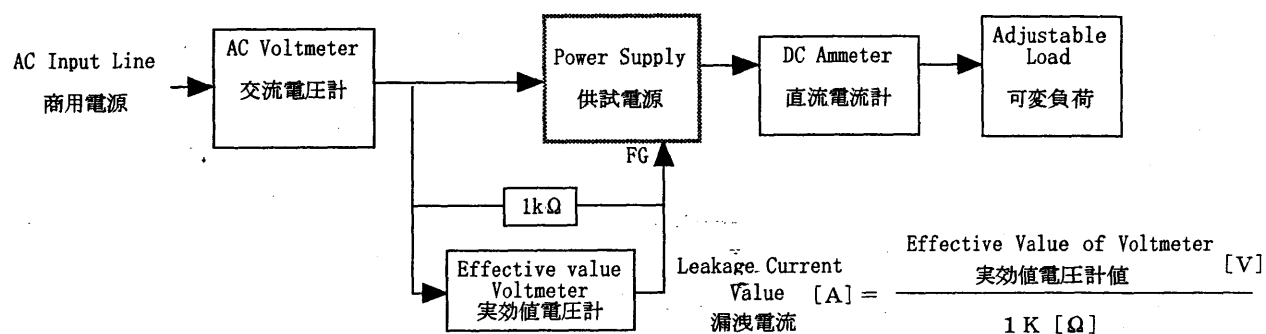
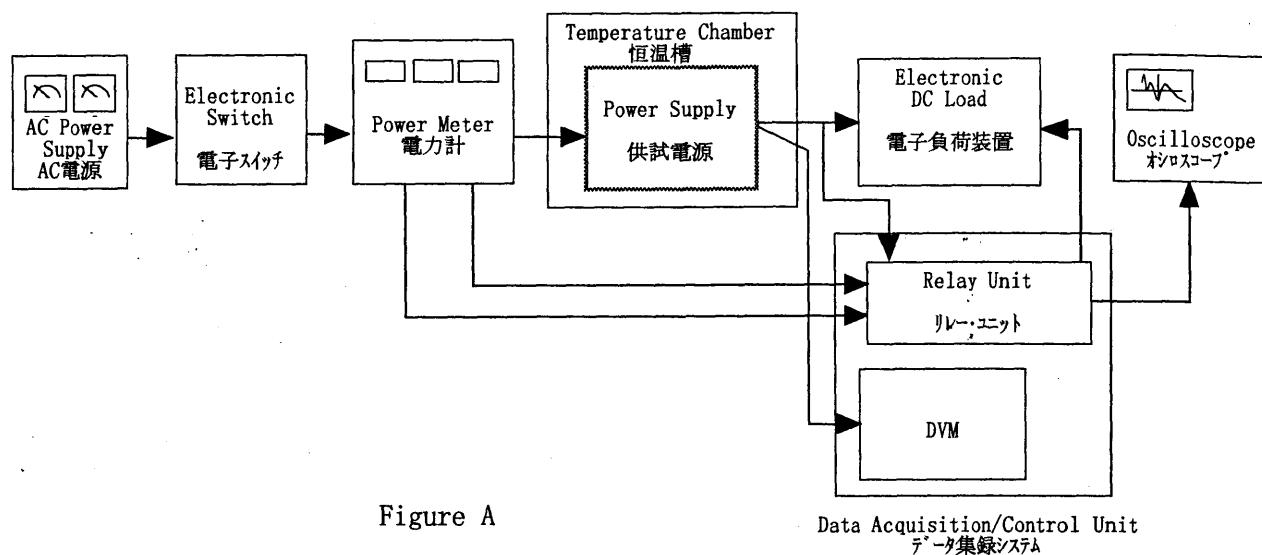


Figure B (DENTORI)

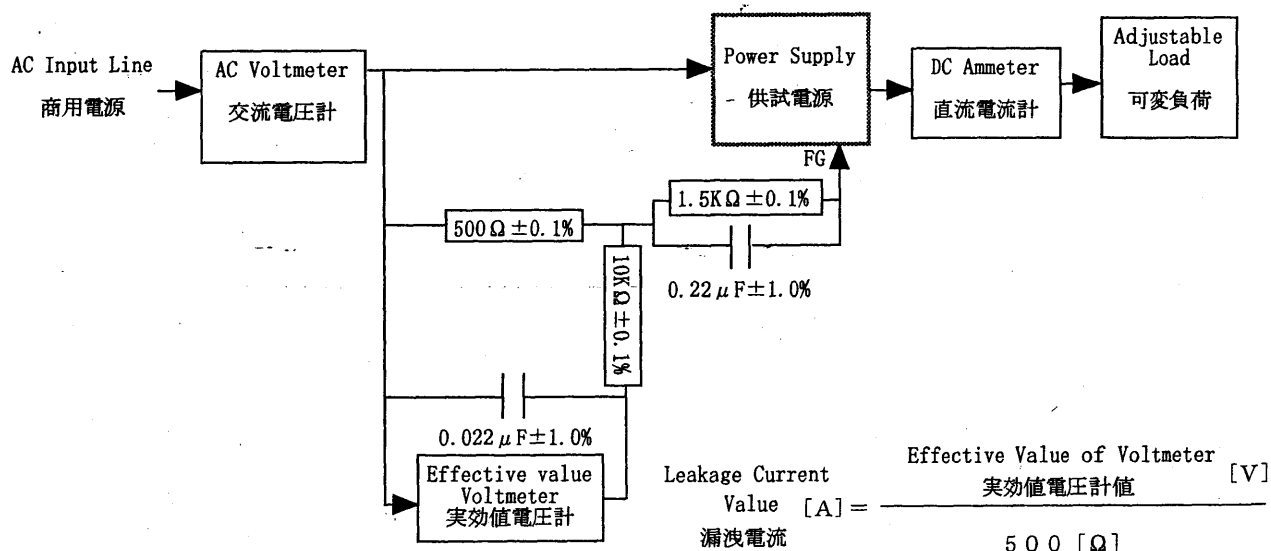


Figure B (IEC 60950)

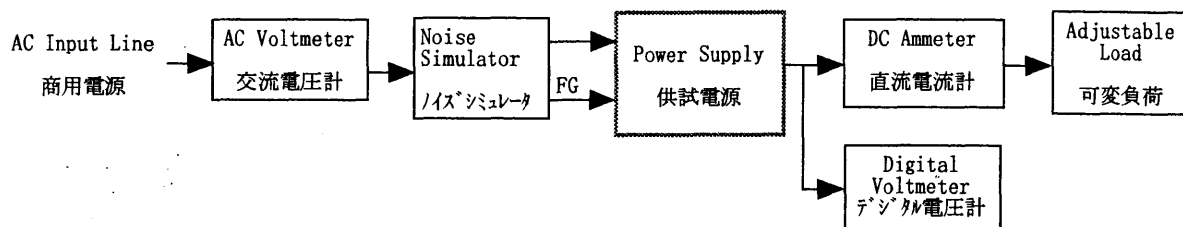


Figure C

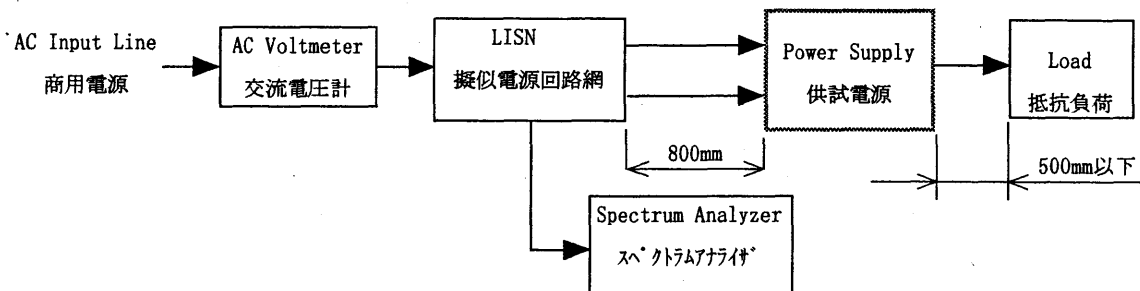


Figure D

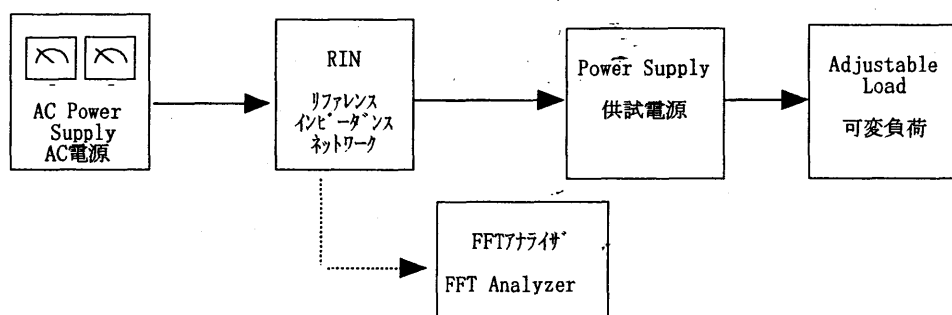


Figure E