

TEST DATA OF SUW60515 SUCW60515

Regulated DC Power Supply
Feb 24, 2005

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COSEL CO.,LTD.

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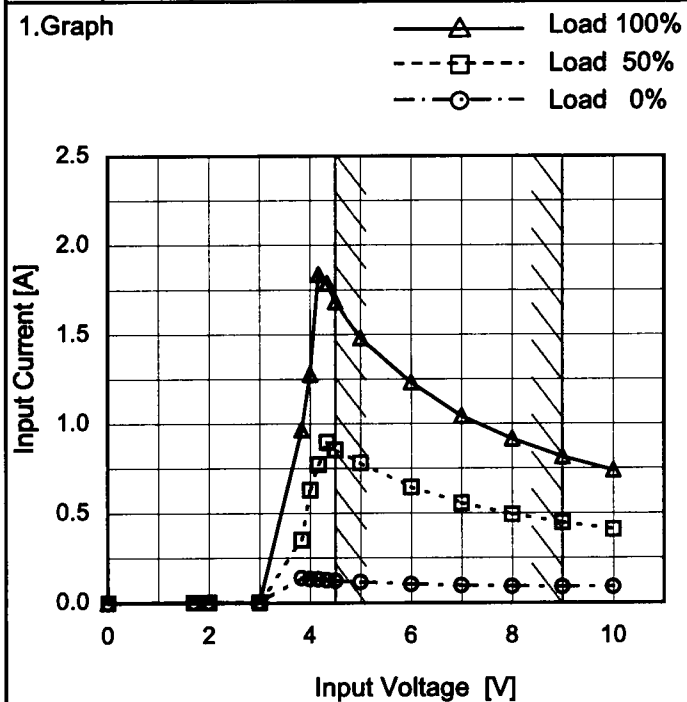
(Final Page 22)

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Model SUW60515/SUCW60515

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%
0.00	0.000	0.000	0.000
1.70	0.001	0.003	0.001
2.00	0.002	0.002	0.002
3.00	0.003	0.003	0.003
3.83	0.138	0.352	0.966
4.00	0.133	0.630	1.277
4.16	0.130	0.772	1.837
4.33	0.126	0.898	1.788
4.50	0.122	0.855	1.684
5.00	0.115	0.782	1.479
6.00	0.102	0.646	1.232
7.00	0.095	0.557	1.043
8.00	0.090	0.493	0.915
9.00	0.088	0.447	0.816
10.00	0.088	0.410	0.740
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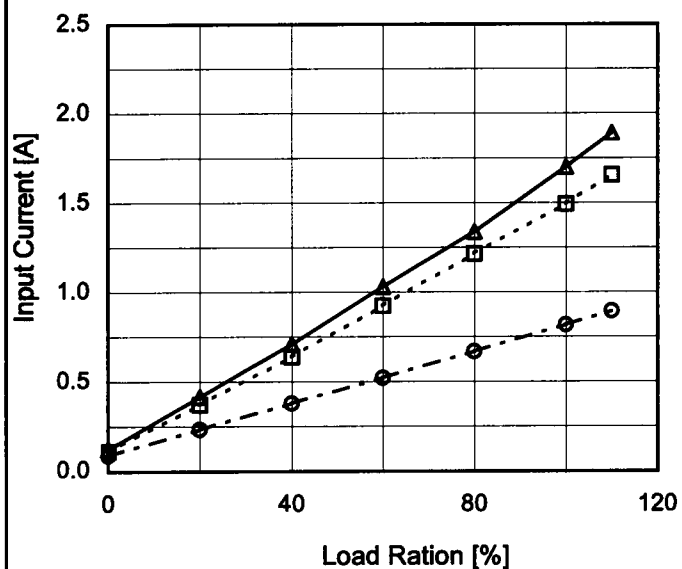
Model SUW60515/SUCW60515

Item Input Current (by Load Current)

Object
Temperature 25°C
Testing Circuitry Figure A

1.Graph

—△— Input Volt. 4.5V
 ---□--- Input Volt. 5V
 - - ○ - - Input Volt. 9V


2.Values

Load Ration [%]	Input Current [A]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0	0.121	0.112	0.088
20	0.416	0.372	0.234
40	0.709	0.639	0.379
60	1.030	0.925	0.520
80	1.338	1.216	0.668
100	1.701	1.493	0.818
110	1.892	1.655	0.894
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	SUW60515/SUCW60515
Item	Efficiency (by Input Voltage)
Object	

1.Graph

---□--- Load 50%

—△— Load 100%

Input Voltage [V]	Load 50% Efficiency [%]	Load 100% Efficiency [%]
4.0	77.7	78.4
4.5	78.4	80.1
5.0	78.6	81.2
6.0	78.3	82.6
7.0	77.7	83.3
8.0	76.4	83.1
9.0	75.0	82.7
9.5	74.2	82.3

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

2.Values

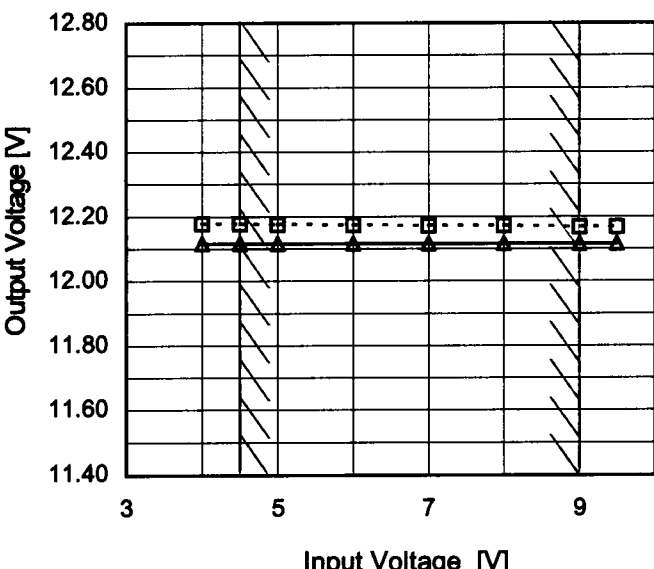
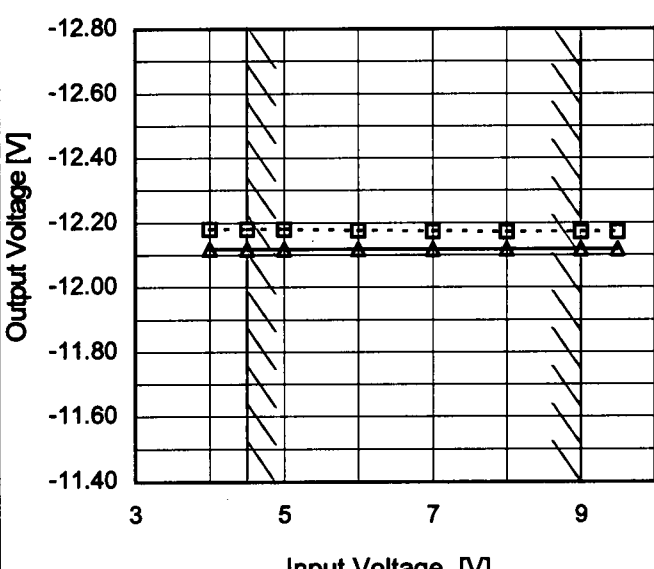
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
4.0	77.7	78.4
4.5	78.4	80.1
5.0	78.6	81.2
6.0	78.3	82.6
7.0	77.7	83.3
8.0	76.4	83.1
9.0	75.0	82.7
9.5	74.2	82.3
--	-	-

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Model		SUW60515/SUCW60515																																																				
Item		Efficiency (by Load Current)																																																				
Object																																																						
1.Graph		2.Values																																																				
<div><div><div>—△—</div><div>Input Volt.</div><div>4.5V</div></div><div><div>---□---</div><div>Input Volt.</div><div>5V</div></div><div><div>-·-○-·-</div><div>Input Volt.</div><div>9V</div></div></div> <div><div><div>Efficiency [%]</div><div>100</div><div>90</div><div>80</div><div>70</div><div>60</div><div>50</div><div>40</div></div><div><div>0</div><div>40</div><div>80</div><div>120</div></div><div><div>Load Ration [%]</div><div></div></div></div>		<table><tr><th rowspan="2">Load Ration [%]</th><th colspan="3">Efficiency [%]</th></tr><tr><th>Input Volt. 4.5[V]</th><th>Input Volt. 5[V]</th><th>Input Volt. 9[V]</th></tr><tr><td>0</td><td>-</td><td>-</td><td>-</td></tr><tr><td>20</td><td>65.9</td><td>65.1</td><td>58.0</td></tr><tr><td>40</td><td>76.1</td><td>76.1</td><td>71.7</td></tr><tr><td>60</td><td>79.2</td><td>79.8</td><td>77.5</td></tr><tr><td>80</td><td>80.4</td><td>80.9</td><td>80.7</td></tr><tr><td>100</td><td>79.9</td><td>81.3</td><td>82.6</td></tr><tr><td>110</td><td>79.5</td><td>81.2</td><td>83.3</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></table>		Load Ration [%]	Efficiency [%]			Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]	0	-	-	-	20	65.9	65.1	58.0	40	76.1	76.1	71.7	60	79.2	79.8	77.5	80	80.4	80.9	80.7	100	79.9	81.3	82.6	110	79.5	81.2	83.3	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Load Ration [%]	Efficiency [%]																																																					
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]																																																			
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Model	SUW60512/SUCW60512	Temperature 25°C Testing Circuitry Figure A																																	
Item	Line Regulation																																		
Object	+12V0.25A																																		
1.Graph		2.Values																																	
<div><div>---□--- Load 50%</div><div>—△— Load 100%</div></div>		<table><tr><th rowspan="2">Input Voltage [V]</th><th colspan="2">Output Voltage [V]</th></tr><tr><th>Load 50%</th><th>Load 100%</th></tr><tr><td>4.0</td><td>12.178</td><td>12.116</td></tr><tr><td>4.5</td><td>12.178</td><td>12.116</td></tr><tr><td>5.0</td><td>12.176</td><td>12.116</td></tr><tr><td>6.0</td><td>12.173</td><td>12.117</td></tr><tr><td>7.0</td><td>12.171</td><td>12.117</td></tr><tr><td>8.0</td><td>12.171</td><td>12.117</td></tr><tr><td>9.0</td><td>12.168</td><td>12.116</td></tr><tr><td>9.5</td><td>12.168</td><td>12.116</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	4.0	12.178	12.116	4.5	12.178	12.116	5.0	12.176	12.116	6.0	12.173	12.117	7.0	12.171	12.117	8.0	12.171	12.117	9.0	12.168	12.116	9.5	12.168	12.116	--	-	-
Input Voltage [V]	Output Voltage [V]																																		
	Load 50%	Load 100%																																	
4.0	12.178	12.116																																	
4.5	12.178	12.116																																	
5.0	12.176	12.116																																	
6.0	12.173	12.117																																	
7.0	12.171	12.117																																	
8.0	12.171	12.117																																	
9.0	12.168	12.116																																	
9.5	12.168	12.116																																	
--	-	-																																	
Object	-12V0.25A	2.Values																																	
<div><div>---□--- Load 50%</div><div>—△— Load 100%</div></div>		<table><tr><th rowspan="2">Input Voltage [V]</th><th colspan="2">Output Voltage [V]</th></tr><tr><th>Load 50%</th><th>Load 100%</th></tr><tr><td>4.0</td><td>-12.179</td><td>-12.117</td></tr><tr><td>4.5</td><td>-12.179</td><td>-12.117</td></tr><tr><td>5.0</td><td>-12.179</td><td>-12.117</td></tr><tr><td>6.0</td><td>-12.176</td><td>-12.117</td></tr><tr><td>7.0</td><td>-12.174</td><td>-12.118</td></tr><tr><td>8.0</td><td>-12.172</td><td>-12.117</td></tr><tr><td>9.0</td><td>-12.172</td><td>-12.117</td></tr><tr><td>9.5</td><td>-12.172</td><td>-12.118</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	4.0	-12.179	-12.117	4.5	-12.179	-12.117	5.0	-12.179	-12.117	6.0	-12.176	-12.117	7.0	-12.174	-12.118	8.0	-12.172	-12.117	9.0	-12.172	-12.117	9.5	-12.172	-12.118	--	-	-
Input Voltage [V]	Output Voltage [V]																																		
	Load 50%	Load 100%																																	
4.0	-12.179	-12.117																																	
4.5	-12.179	-12.117																																	
5.0	-12.179	-12.117																																	
6.0	-12.176	-12.117																																	
7.0	-12.174	-12.118																																	
8.0	-12.172	-12.117																																	
9.0	-12.172	-12.117																																	
9.5	-12.172	-12.118																																	
--	-	-																																	
Note: Slanted line shows the range of the rated input voltage.																																			

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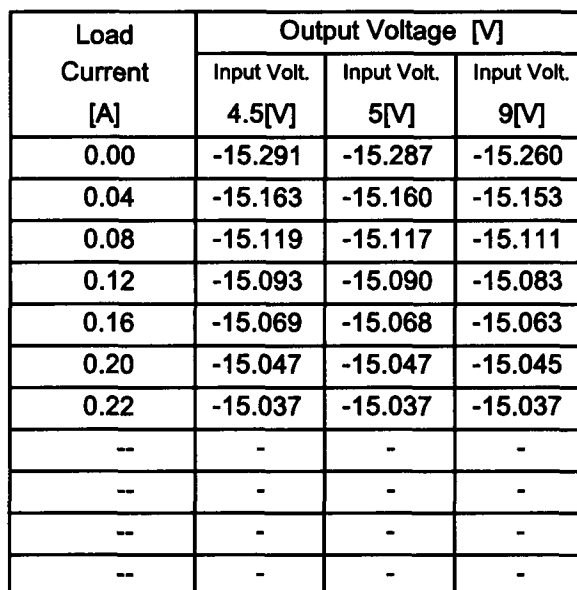
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Temperature 25°C
Testing Circuitry Figure A



Load Current [A]	Output Voltage [V]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0.00	15.275	15.275	15.247
0.04	15.164	15.161	15.151
0.08	15.125	15.122	15.115
0.12	15.098	15.096	15.091
0.16	15.074	15.073	15.071
0.20	15.053	15.053	15.054
0.22	15.041	15.043	15.046
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

2.Values



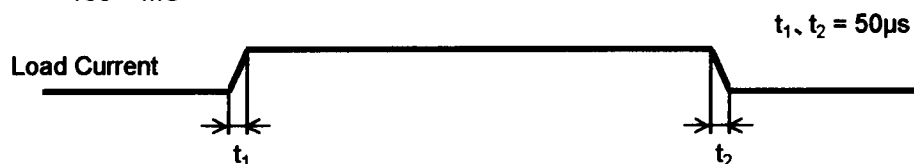
Note: Slanted line shows the range of the rated load current.



Model	SUW60515/SUCW60515
Item	Dynamic Load Response
Object	+15V0.2A

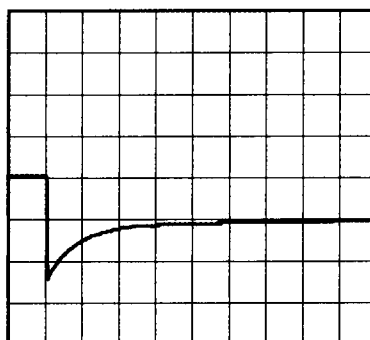
Temperature 25°C
Testing Circuitry Figure A

Input Volt. 5 V
Cycle 100 mS

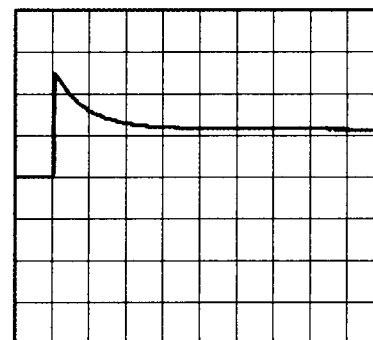


Min. Load (0A) \longleftrightarrow
Load 100% (0.2A)

200mV/div



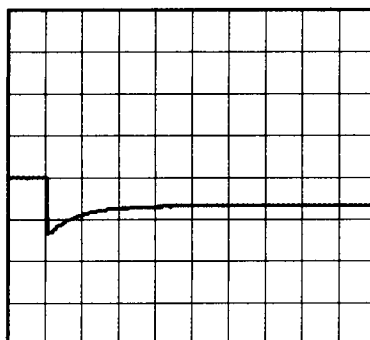
2ms/div



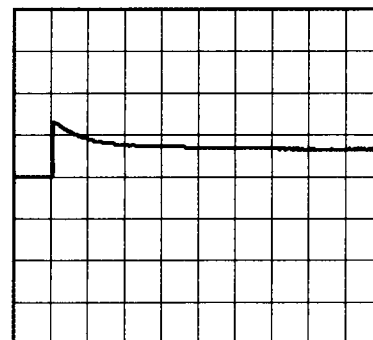
2ms/div

Min. Load (0A) \longleftrightarrow
Load 50% (0.1A)

200mV/div



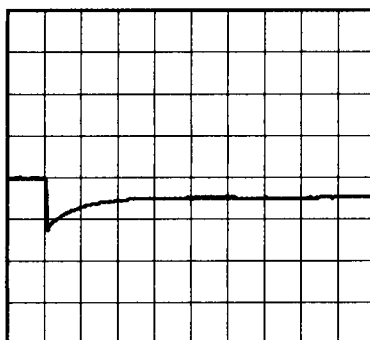
2ms/div



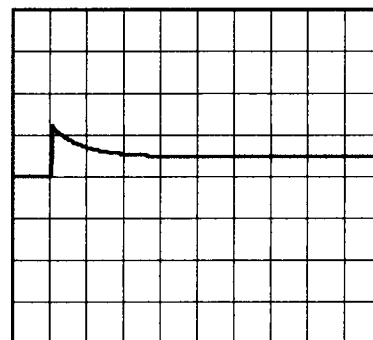
2ms/div

Load 50% (0.1A) \longleftrightarrow
Load 100% (0.2A)

200mV/div



2ms/div

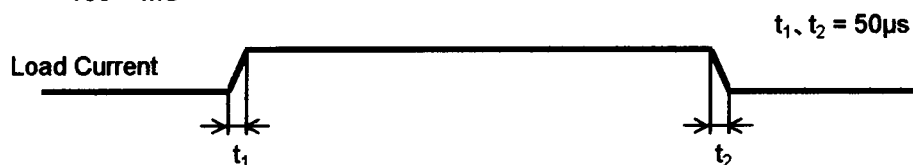


2ms/div

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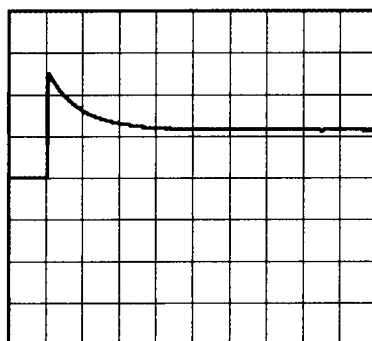
Model	SUW60515/SUCW60515	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	-15V0.2A		

Input Volt. 5 V
Cycle 100 mS

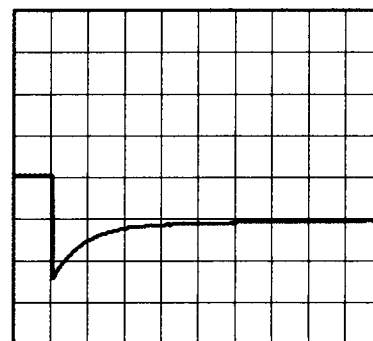


Min. Load (0A) \longleftrightarrow
Load 100% (0.2A)

200mV/div



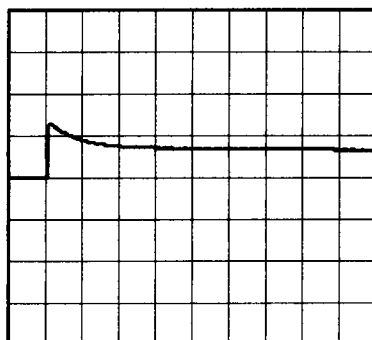
2ms/div



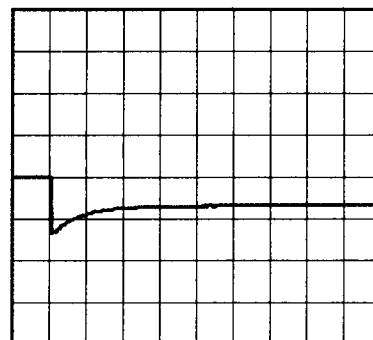
2ms/div

Min. Load (0A) \longleftrightarrow
Load 50% (0.1A)

200mV/div



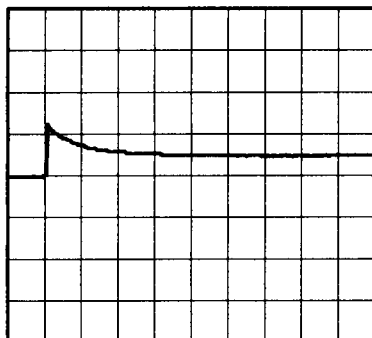
2ms/div



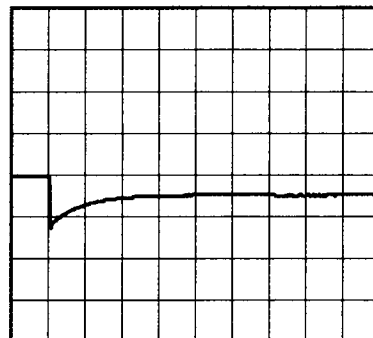
2ms/div

Load 50% (0.1A) \longleftrightarrow
Load 100% (0.2A)

200mV/div



2ms/div



2ms/div

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Model		SUW60515/SUCW60515																																							
Item		Ripple Voltage (by Load Current)																																							
Object		+15V0.2A																																							
1.Graph		2.Values																																							
<div><div><div>—△— Input Volt. 4.5V</div><div>- -○- - Input Volt. 9V</div></div><div><p>Ripple Voltage [mV]</p><p>Load Current [A]</p></div></div>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple Voltage [mV]</th></tr><tr><th>Input Volt. 4.5 [V]</th><th>Input Volt. 9 [V]</th></tr><tr><td>0.00</td><td>2</td><td>2</td></tr><tr><td>0.04</td><td>2</td><td>2</td></tr><tr><td>0.08</td><td>2</td><td>2</td></tr><tr><td>0.12</td><td>2</td><td>3</td></tr><tr><td>0.16</td><td>3</td><td>4</td></tr><tr><td>0.20</td><td>6</td><td>4</td></tr><tr><td>0.22</td><td>8</td><td>4</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 4.5 [V]	Input Volt. 9 [V]	0.00	2	2	0.04	2	2	0.08	2	2	0.12	2	3	0.16	3	4	0.20	6	4	0.22	8	4	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																								
	Input Volt. 4.5 [V]	Input Volt. 9 [V]																																							
0.00	2	2																																							
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0.08	2	2																																							
0.12	2	3																																							
0.16	3	4																																							
0.20	6	4																																							
0.22	8	4																																							
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<div>Measured by 100 MHz Oscilloscope.</div> <div>Ripple Voltage is shown as p-p in the figure below.</div> <div>Note: Slanted line shows the range of the rated load current.</div>																																									
<div><div><div>Ripple [mVp-p]</div><div></div></div><div>Fig.Complex Ripple Wave Form</div></div>																																									

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Model		SUW60515/SUCW60515	
Item		Ripple Voltage (by Load Current)	
Object		-15V0.2A	
1.Graph		2.Values	
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COSEL

Model		SUW60515/SUCW60515		Temperature 25°C																																							
Item		Ripple-Noise		Testing Circuitry Figure B																																							
Object		-15V0.2A																																									
1.Graph				2.Values																																							
<div><div><div>—△— Input Volt. 4.5V</div><div>- - -○- - - Input Volt. 9V</div></div><p>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.</p></div>				<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple-Noise [mV]</th></tr><tr><th>Input Volt. 4.5 [V]</th><th>Input Volt. 9 [V]</th></tr><tr><td>0.00</td><td>2</td><td>3</td></tr><tr><td>0.04</td><td>2</td><td>3</td></tr><tr><td>0.08</td><td>2</td><td>3</td></tr><tr><td>0.12</td><td>3</td><td>3</td></tr><tr><td>0.16</td><td>3</td><td>3</td></tr><tr><td>0.20</td><td>5</td><td>3</td></tr><tr><td>0.22</td><td>7</td><td>3</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Ripple-Noise [mV]		Input Volt. 4.5 [V]	Input Volt. 9 [V]	0.00	2	3	0.04	2	3	0.08	2	3	0.12	3	3	0.16	3	3	0.20	5	3	0.22	7	3	--	-	-	--	-	-	--	-	-	--	-	-
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<div><div><div>Ripple Noise[mVp-p]</div><p>Fig.Complex Ripple Noise Wave Form</p></div></div>																																											

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BC-3699

COSEL

Model		SUW60515/SUCW60515																																							
Item		Ripple Voltage (by Ambient Temp.)																																							
Object		+15V0.2A																																							
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Model		SUW60515/SUCW60515																																																				
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Note: Slanted line shows the range of the rated ambient temperature.																																																						

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BC-3699



Model		SUW60515/SUCW60515	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 : -40 - 55°C

Input Voltage : 4.5 - 9V

Load Current (AVR 1) : 0 - 0.2A (AVR 2): 0 - 0.2A

* Other Output : Rated Load

* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

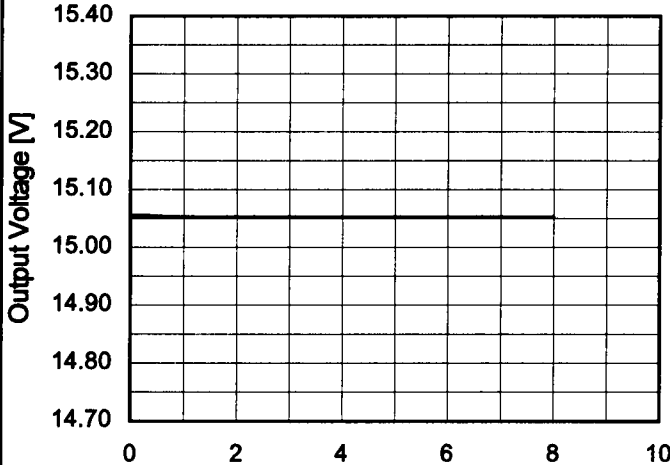
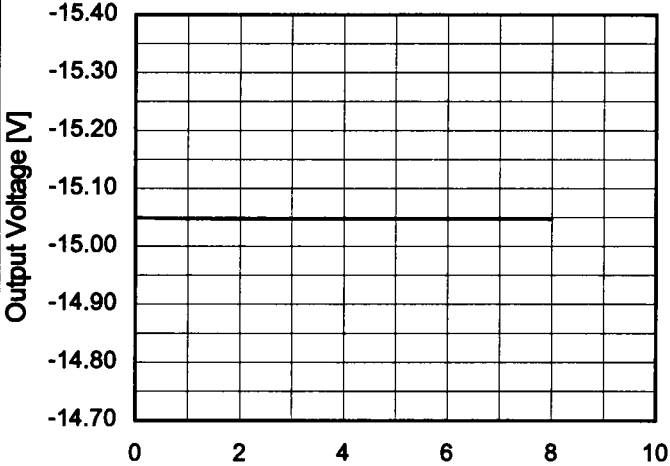
* Output Voltage Accuracy (Ratio) = $\frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$

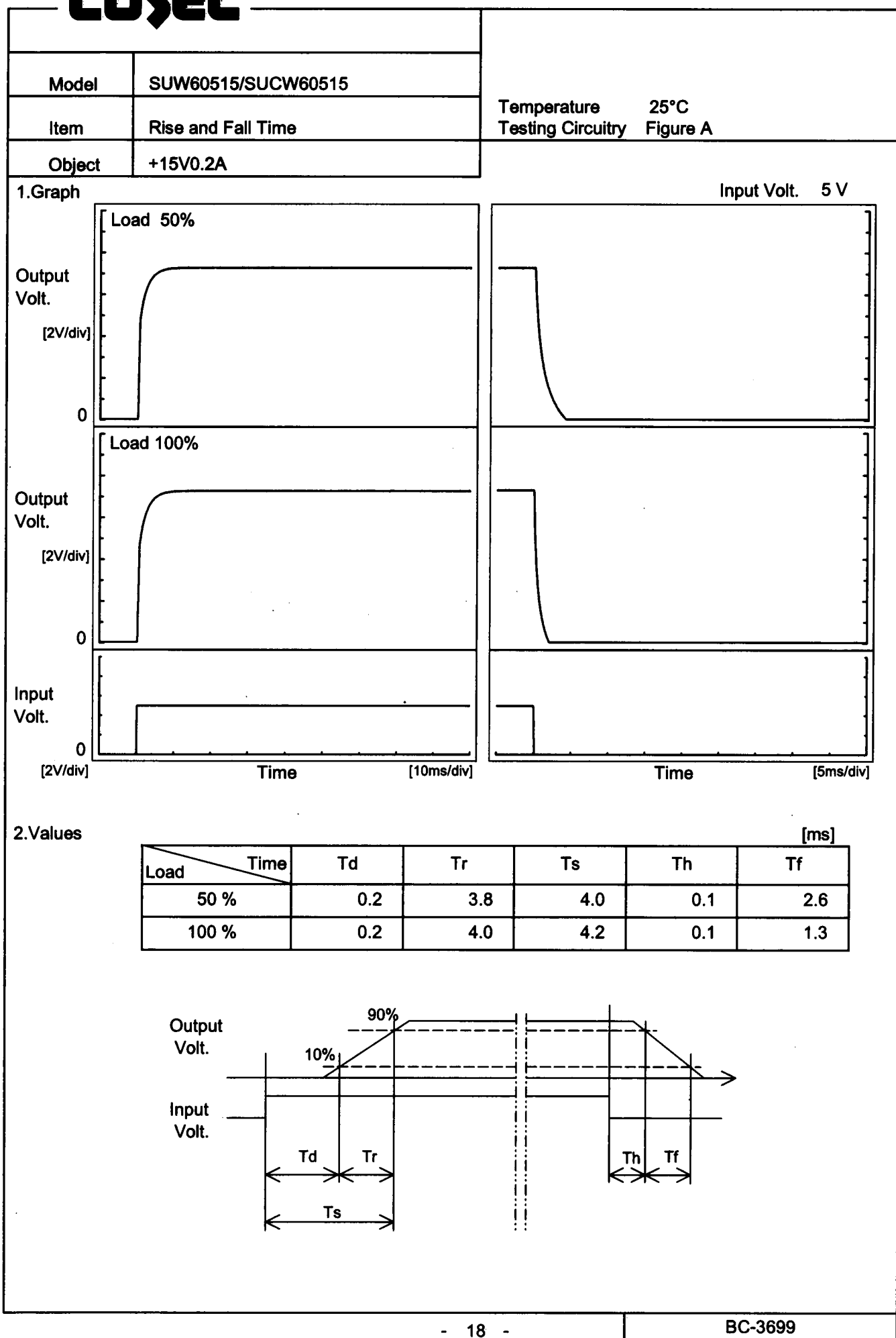
2. Values

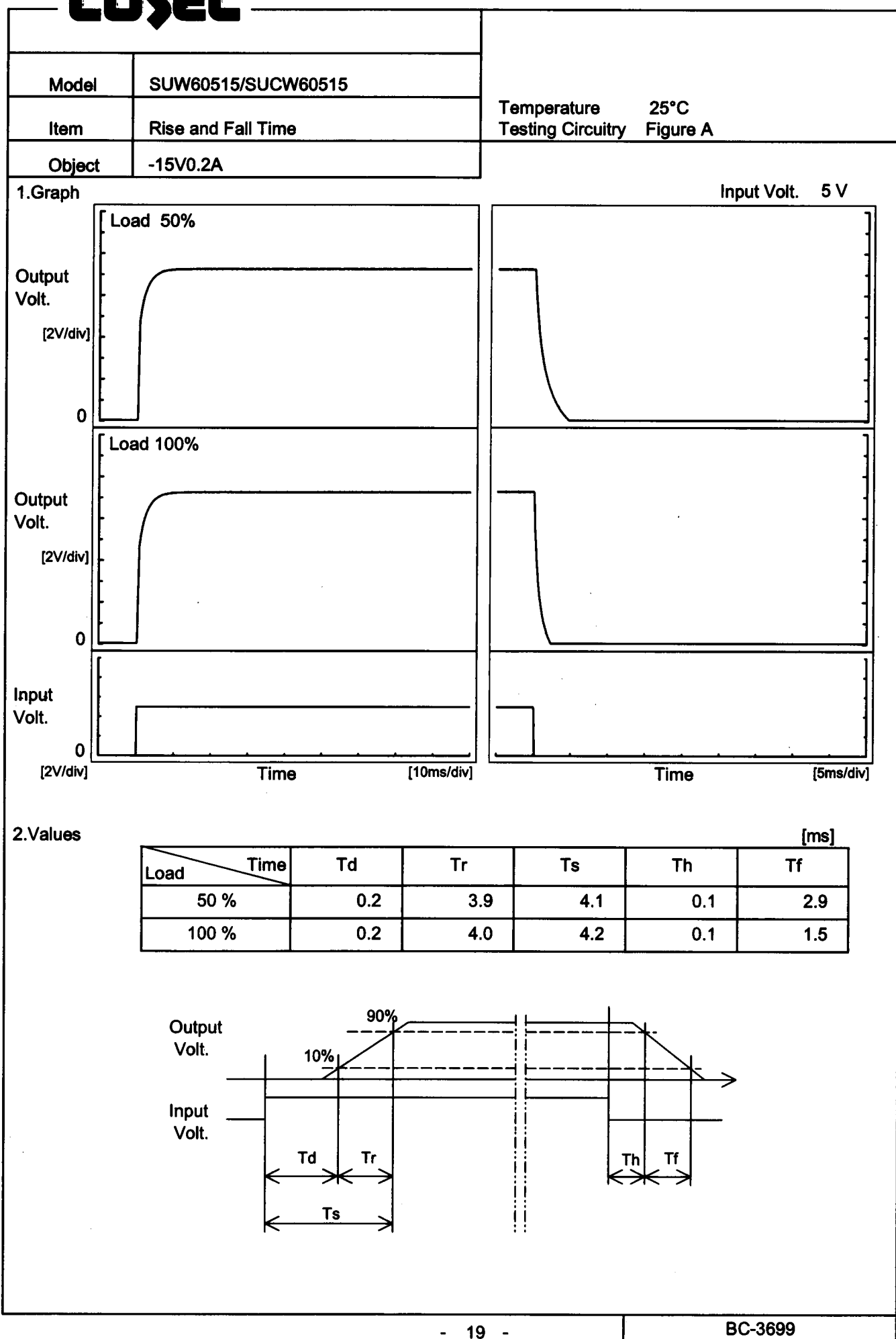
Object	+15V0.2A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	55	4.5	0	15.280	±134	±0.9
Minimum Voltage	-40	4.5	0.2	15.013		

Object	-15V0.2A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	55	4.5	0	-15.296	±145	±1.0
Minimum Voltage	-40	5	0.2	-15.006		

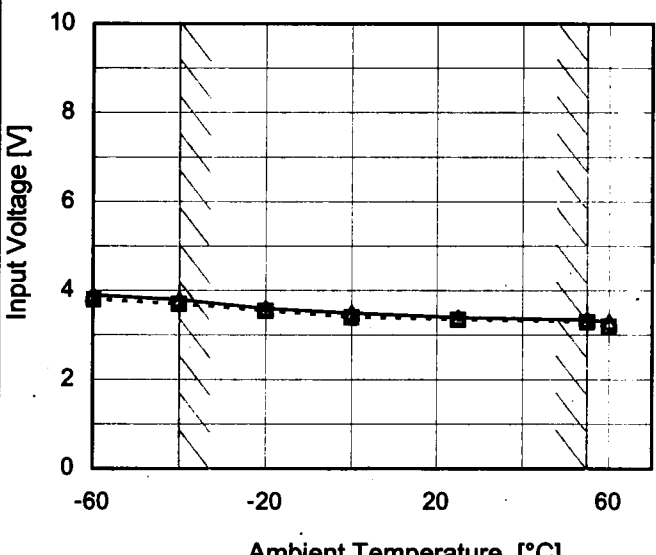
COSEL

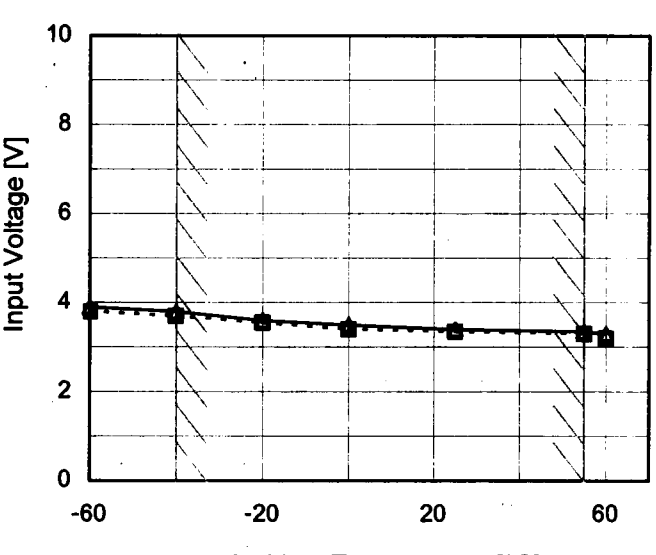
Model	SUW60515/SUCW60515																								
Item	Time Lapse Drift		Temperature 25°C																						
Object	+15V0.2A		Testing Circuitry Figure A																						
1.Graph		2.Values																							
<div><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 5V</p><p>Load 100%</p></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>15.056</td></tr><tr><td>0.5</td><td>15.054</td></tr><tr><td>1.0</td><td>15.053</td></tr><tr><td>2.0</td><td>15.053</td></tr><tr><td>3.0</td><td>15.053</td></tr><tr><td>4.0</td><td>15.053</td></tr><tr><td>5.0</td><td>15.053</td></tr><tr><td>6.0</td><td>15.053</td></tr><tr><td>7.0</td><td>15.053</td></tr><tr><td>8.0</td><td>15.053</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	15.056	0.5	15.054	1.0	15.053	2.0	15.053	3.0	15.053	4.0	15.053	5.0	15.053	6.0	15.053	7.0	15.053	8.0	15.053
Time since start [H]	Output Voltage [V]																								
0.0	15.056																								
0.5	15.054																								
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7.0	15.053																								
8.0	15.053																								
Object	-15V0.2A																								
1.Graph		2.Values																							
<div><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 5V</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>-15.050</td></tr><tr><td>0.5</td><td>-15.049</td></tr><tr><td>1.0</td><td>-15.048</td></tr><tr><td>2.0</td><td>-15.047</td></tr><tr><td>3.0</td><td>-15.047</td></tr><tr><td>4.0</td><td>-15.047</td></tr><tr><td>5.0</td><td>-15.047</td></tr><tr><td>6.0</td><td>-15.047</td></tr><tr><td>7.0</td><td>-15.047</td></tr><tr><td>8.0</td><td>-15.047</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	-15.050	0.5	-15.049	1.0	-15.048	2.0	-15.047	3.0	-15.047	4.0	-15.047	5.0	-15.047	6.0	-15.047	7.0	-15.047	8.0	-15.047
Time since start [H]	Output Voltage [V]																								
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6.0	-15.047																								
7.0	-15.047																								
8.0	-15.047																								

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Model		SUW60515/SUCW60515	
Item		Minimum Input Voltage for Regulated Output Voltage	
Object		+15V0.2A	
1.Graph			
<div><div><div>---□---</div><div>Load 50%</div></div><div><div>—△—</div><div>Load 100%</div></div></div> 			
2.Values			
Ambient Temperature [°C]		Input Voltage [V]	
		Load 50%	Load 100%
-60		3.8	3.9
-40		3.7	3.8
-20		3.6	3.6
0		3.4	3.5
25		3.4	3.4
55		3.3	3.4
60		3.2	3.3
—		-	-
—		-	-
—		-	-
—		-	-
—		-	-

Object		-15V0.2A	
1.Graph			
<div><div><div>---□---</div><div>Load 50%</div></div><div><div>—△—</div><div>Load 100%</div></div></div> 			
2.Values			
Ambient Temperature [°C]		Input Voltage [V]	
		Load 50%	Load 100%
-60		3.8	3.9
-40		3.7	3.8
-20		3.6	3.6
0		3.4	3.5
25		3.4	3.4
55		3.3	3.4
60		3.2	3.3
—		-	-
—		-	-
—		-	-
—		-	-
—		-	-

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

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Model	SUW60515/SUCW60515																																																										
Item	Overcurrent Protection																																																										
Object	+15V0.2A																																																										
1.Graph		2.Values																																																									
<div><div><div></div><div></div><div></div></div><div>Input Volt. 4.5V Input Volt. 5V Input Volt. 9V</div></div>		<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="3">Load Current [A]</th></tr><tr><th>Input Volt. 4.5[V]</th><th>Input Volt. 5[V]</th><th>Input Volt. 9[V]</th></tr><tr><td>15.0</td><td>0.20</td><td>0.20</td><td>0.20</td></tr><tr><td>14.3</td><td>0.34</td><td>0.37</td><td>0.37</td></tr><tr><td>13.5</td><td>0.36</td><td>0.39</td><td>0.39</td></tr><tr><td>12.0</td><td>0.40</td><td>0.42</td><td>0.41</td></tr><tr><td>10.5</td><td>0.44</td><td>0.47</td><td>0.44</td></tr><tr><td>9.0</td><td>0.48</td><td>0.51</td><td>0.47</td></tr><tr><td>7.5</td><td>0.53</td><td>0.55</td><td>0.49</td></tr><tr><td>6.0</td><td>0.56</td><td>0.58</td><td>0.52</td></tr><tr><td>4.5</td><td>0.59</td><td>0.60</td><td>0.53</td></tr><tr><td>3.0</td><td>0.59</td><td>0.60</td><td>0.54</td></tr><tr><td>1.5</td><td>0.56</td><td>0.56</td><td>0.51</td></tr><tr><td>0.0</td><td>0.61</td><td>0.65</td><td>0.67</td></tr></table>			Output Voltage [V]	Load Current [A]			Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]	15.0	0.20	0.20	0.20	14.3	0.34	0.37	0.37	13.5	0.36	0.39	0.39	12.0	0.40	0.42	0.41	10.5	0.44	0.47	0.44	9.0	0.48	0.51	0.47	7.5	0.53	0.55	0.49	6.0	0.56	0.58	0.52	4.5	0.59	0.60	0.53	3.0	0.59	0.60	0.54	1.5	0.56	0.56	0.51	0.0	0.61	0.65	0.67
Output Voltage [V]	Load Current [A]																																																										
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Note: Slanted line shows the range of the rated load current.																																																											

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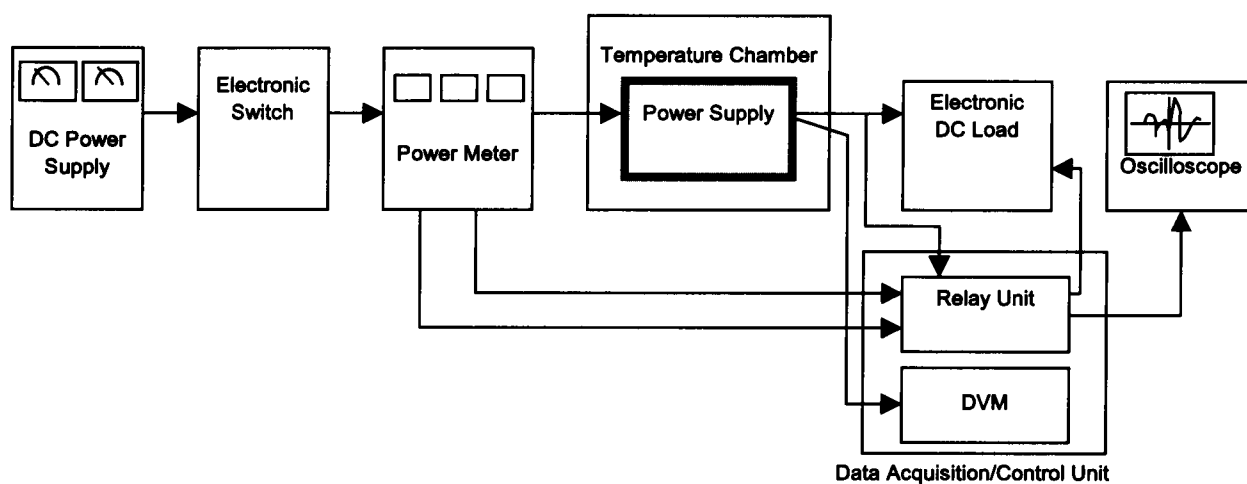


Figure A

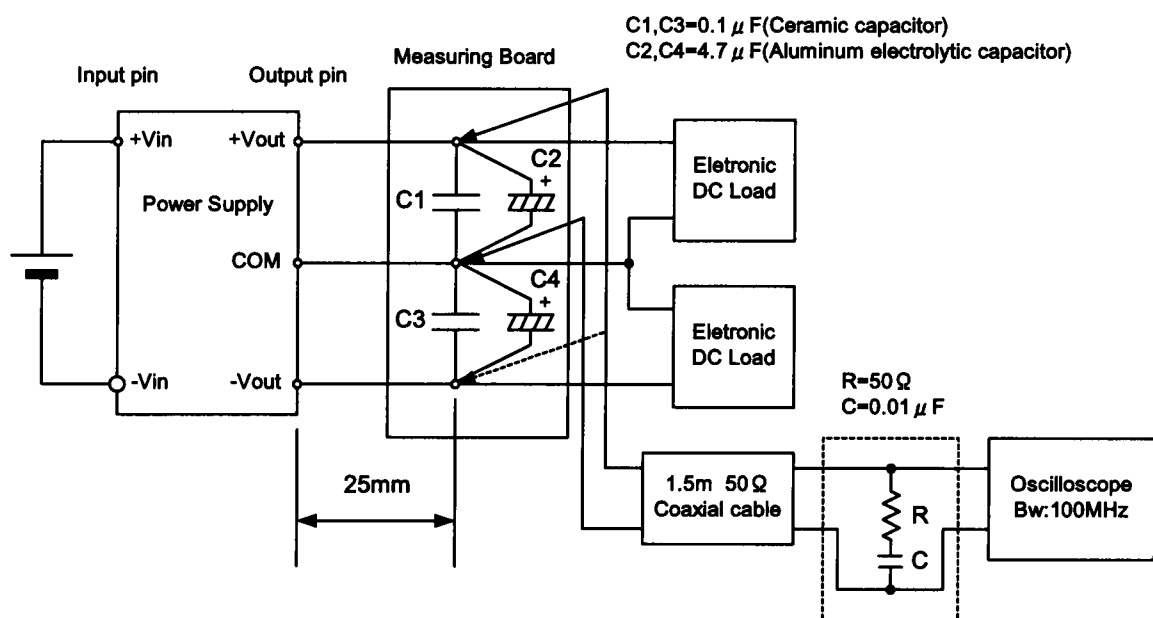


Figure B (Ripple and Ripple noise Characteristic)