

TEST DATA OF TUHS5F05

Regulated DC Power Supply
February 28, 2014

Approved by : Nobuyuki Shiraishi
Nobuyuki Shiraishi Design Manager

Prepared by : Takayuki Yamamoto
Takayuki Yamamoto Design Engineer

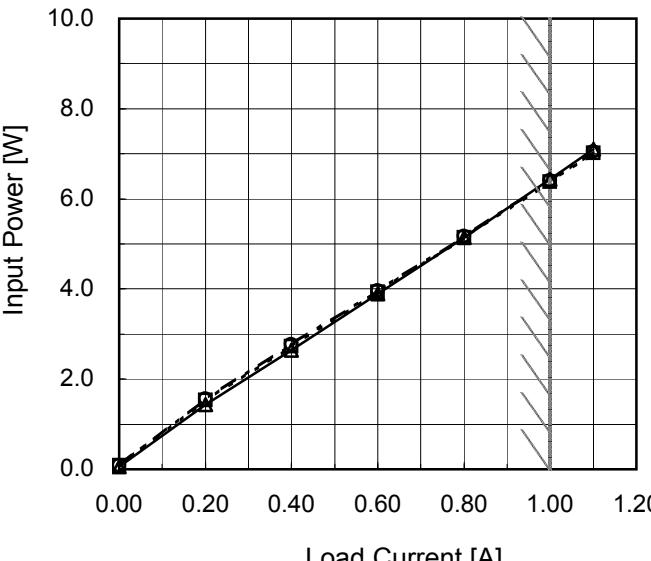
COSEL CO.,LTD.

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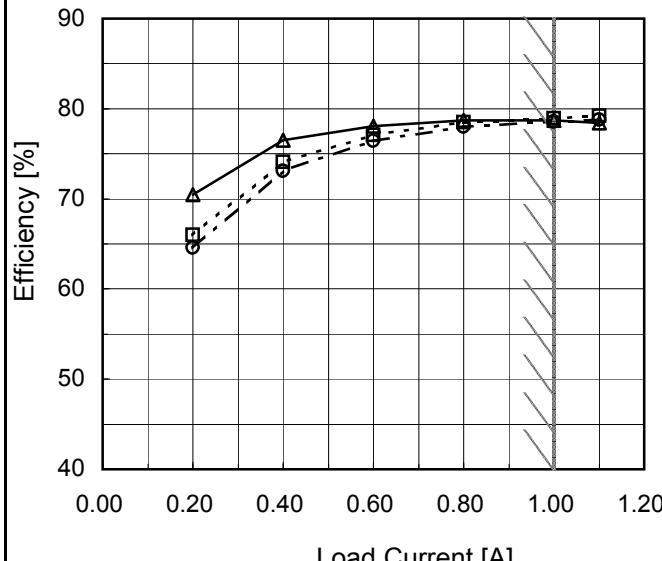
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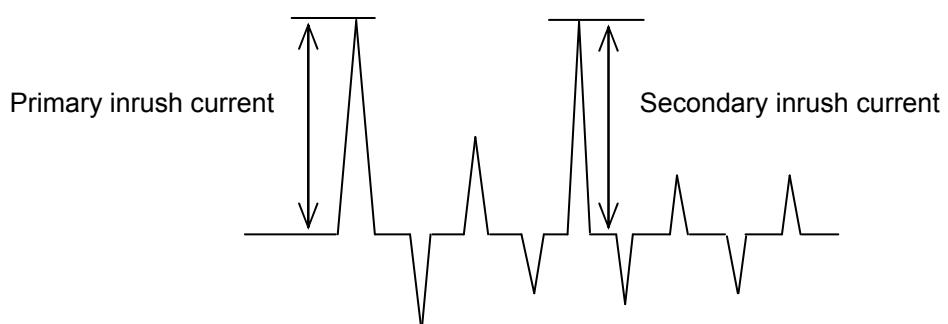
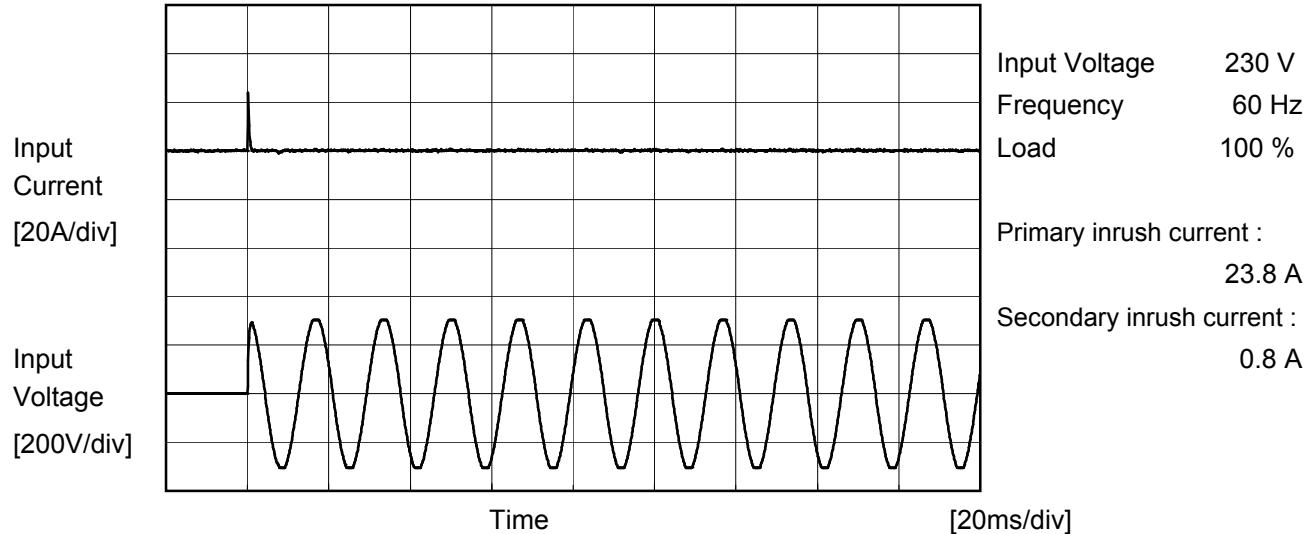
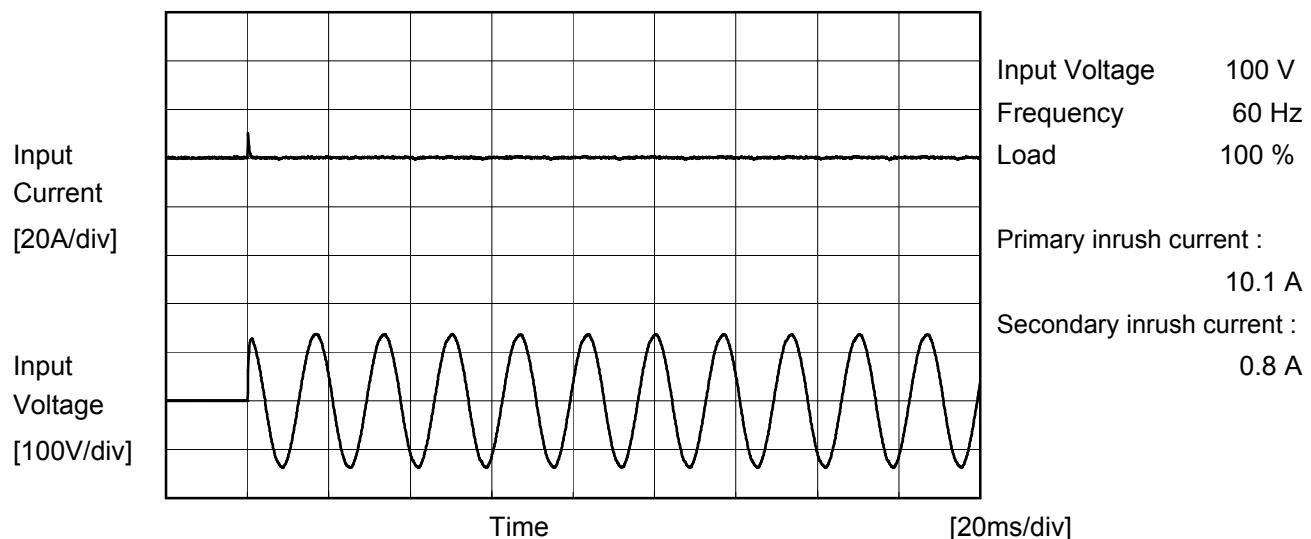
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<p>The graph plots Power Factor against Input Voltage for two load conditions: 50% (dashed line with square markers) and 100% (solid line with triangle markers). The power factor decreases as the input voltage increases across the measured range. A vertical slanted line marks the rated input voltage range.</p> <table border="1"> <thead> <tr> <th>Input Voltage [V]</th> <th>Power Factor (Load 50%)</th> <th>Power Factor (Load 100%)</th> </tr> </thead> <tbody> <tr><td>75</td><td>0.506</td><td>0.560</td></tr> <tr><td>85</td><td>0.487</td><td>0.539</td></tr> <tr><td>100</td><td>0.462</td><td>0.512</td></tr> <tr><td>120</td><td>0.437</td><td>0.483</td></tr> <tr><td>200</td><td>0.370</td><td>0.411</td></tr> <tr><td>230</td><td>0.356</td><td>0.393</td></tr> <tr><td>264</td><td>0.340</td><td>0.377</td></tr> <tr><td>280</td><td>0.335</td><td>0.370</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>			Input Voltage [V]	Power Factor (Load 50%)	Power Factor (Load 100%)	75	0.506	0.560	85	0.487	0.539	100	0.462	0.512	120	0.437	0.483	200	0.370	0.411	230	0.356	0.393	264	0.340	0.377	280	0.335	0.370	--	-	-		
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COSEL

Model	TUHS5F05	Temperature Testing Circuitry Figure A	25°C
Item	Inrush Current		
Object	_____		





Model	TUHS5F05	Temperature Testing Circuitry	25°C Figure B
Item	Leakage Current		
Object	_____		

1. Results

Standards		Input Volt.			Note
		100 [V]	200 [V]	230 [V]	
DEN-AN	Both phases	0.004	0.005	0.005	Operation
	One of phases	0.003	0.007	0.008	Stand by
IEC60950-1	Both phases	0.002	0.004	0.004	Operation
	One of phases	0.003	0.006	0.007	Stand by

The value for "One of phases" is the reference value only.

2. Condition

Leakage current value is concluded after measuring both phases of

AC input and by choosing the larger one.

There is no FG in TUHS series and it is a reinforced insulation power supply of the class 2.

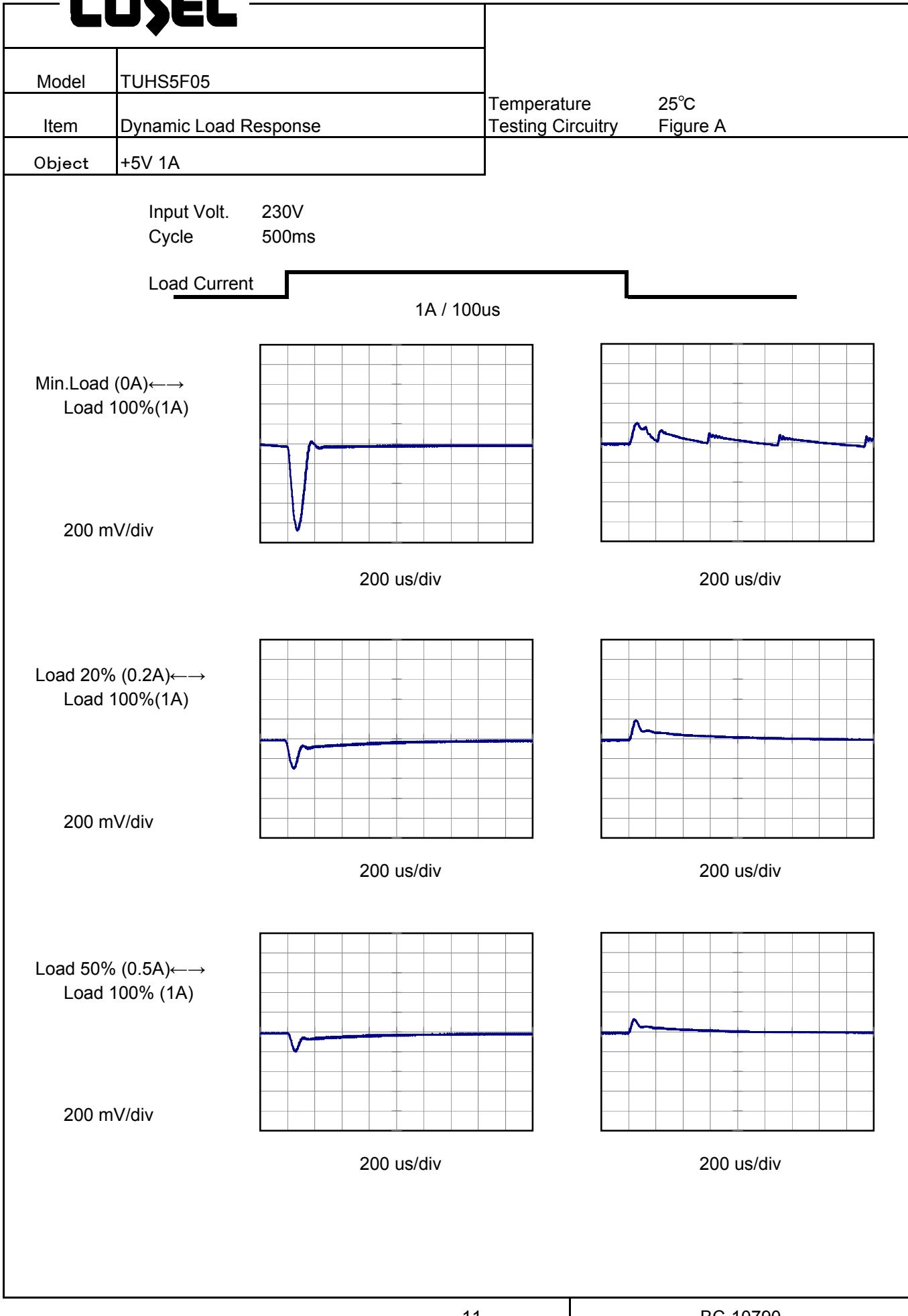
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Object	+5V1A																																	
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Note: Slanted line shows the range of the rated load current.

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Model	TUHS5F05																																							
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure C																																						
Object	+5V1A																																							
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<p>T1: Due to AC Input Line T2: Due to Switching</p> <p>Diagram of a complex ripple wave form. The vertical axis is labeled "Ripple [mVp-p]". The diagram shows a waveform with two types of ripples: T1, which is a low-frequency noise-like component, and T2, which is a higher-frequency switching component. The T2 component has a distinct sawtooth-like shape.</p>																																								
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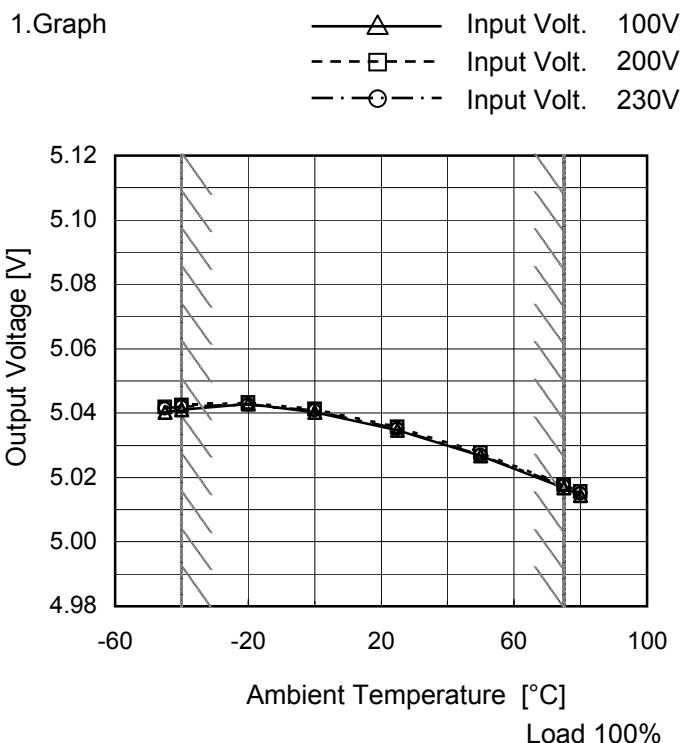
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Item	Ripple-Noise	Temperature 25°C Testing Circuitry Figure C																																					
Object	+5V1A																																						
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Model	TUHS5F05	Testing Circuitry Figure C																																			
Item	Ripple Voltage (by Ambient Temp.)																																				
Object	+5V1A																																				
1. Graph		2. Values																																			
<p>Graph showing Ripple Voltage [mV] vs Ambient Temperature [°C] for TUHS5F05 at Load 100%.</p> <p>Legend:</p> <ul style="list-style-type: none"> - - - □ - - - Input Volt. 100V — △ — Input Volt. 200V <table border="1"> <thead> <tr> <th>Ambient Temperature [°C]</th> <th>Ripple Voltage [mV] (Input Volt. 100V)</th> <th>Ripple Voltage [mV] (Input Volt. 200V)</th> </tr> </thead> <tbody> <tr><td>-45</td><td>45</td><td>15</td></tr> <tr><td>-40</td><td>40</td><td>15</td></tr> <tr><td>-20</td><td>40</td><td>15</td></tr> <tr><td>0</td><td>35</td><td>15</td></tr> <tr><td>25</td><td>35</td><td>15</td></tr> <tr><td>50</td><td>35</td><td>15</td></tr> <tr><td>75</td><td>40</td><td>15</td></tr> <tr><td>80</td><td>40</td><td>15</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> </tbody> </table>		Ambient Temperature [°C]	Ripple Voltage [mV] (Input Volt. 100V)	Ripple Voltage [mV] (Input Volt. 200V)	-45	45	15	-40	40	15	-20	40	15	0	35	15	25	35	15	50	35	15	75	40	15	80	40	15	--	-	-	--	-	-	--	-	-
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<p>Measured by 100 MHz Oscilloscope. Note: Slanted line shows the range of the rated ambient temperature.</p>																																					

Model TUHS5F05

Item Ambient Temperature Drift

Object +5V1A



Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-45	5.040	5.042	5.042
-40	5.041	5.042	5.042
-20	5.043	5.043	5.043
0	5.040	5.041	5.041
25	5.035	5.036	5.035
50	5.027	5.028	5.027
75	5.017	5.018	5.017
80	5.015	5.016	5.015
--	-	-	-
--	-	-	-
--	-	-	-

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



Model	TUHS5F05	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+5V1A	

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 - 75°C

Input Voltage : 85 - 264V

Load Current : 0 - 1A

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

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

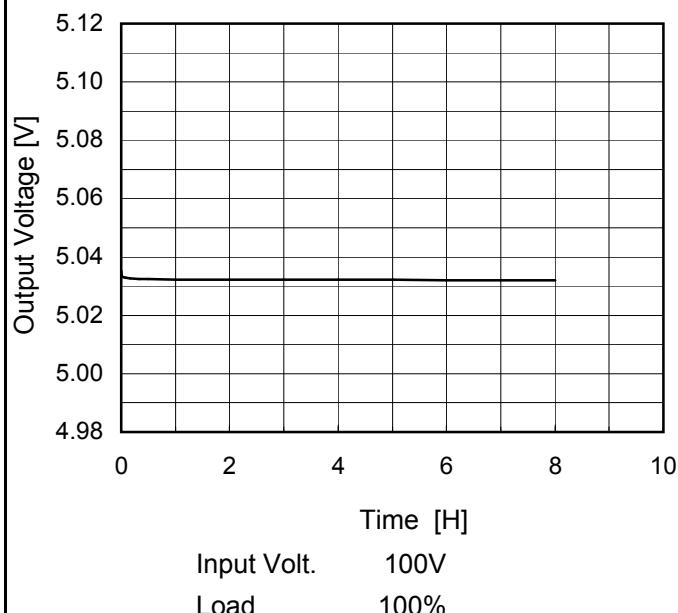
2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	-20	85	0	5.044	±15	±0.3
Minimum Voltage	75	264	1	5.015		

COSEL

Model	TUHS5F05
Item	Time Lapse Drift
Object	+5V1A

1. Graph



Temperature 25°C
Testing Circuitry Figure A

2. Values

Time since start [H]	Output Voltage [V]
0.0	5.035
0.5	5.033
1.0	5.032
2.0	5.032
3.0	5.032
4.0	5.032
5.0	5.032
6.0	5.032
7.0	5.032
8.0	5.032

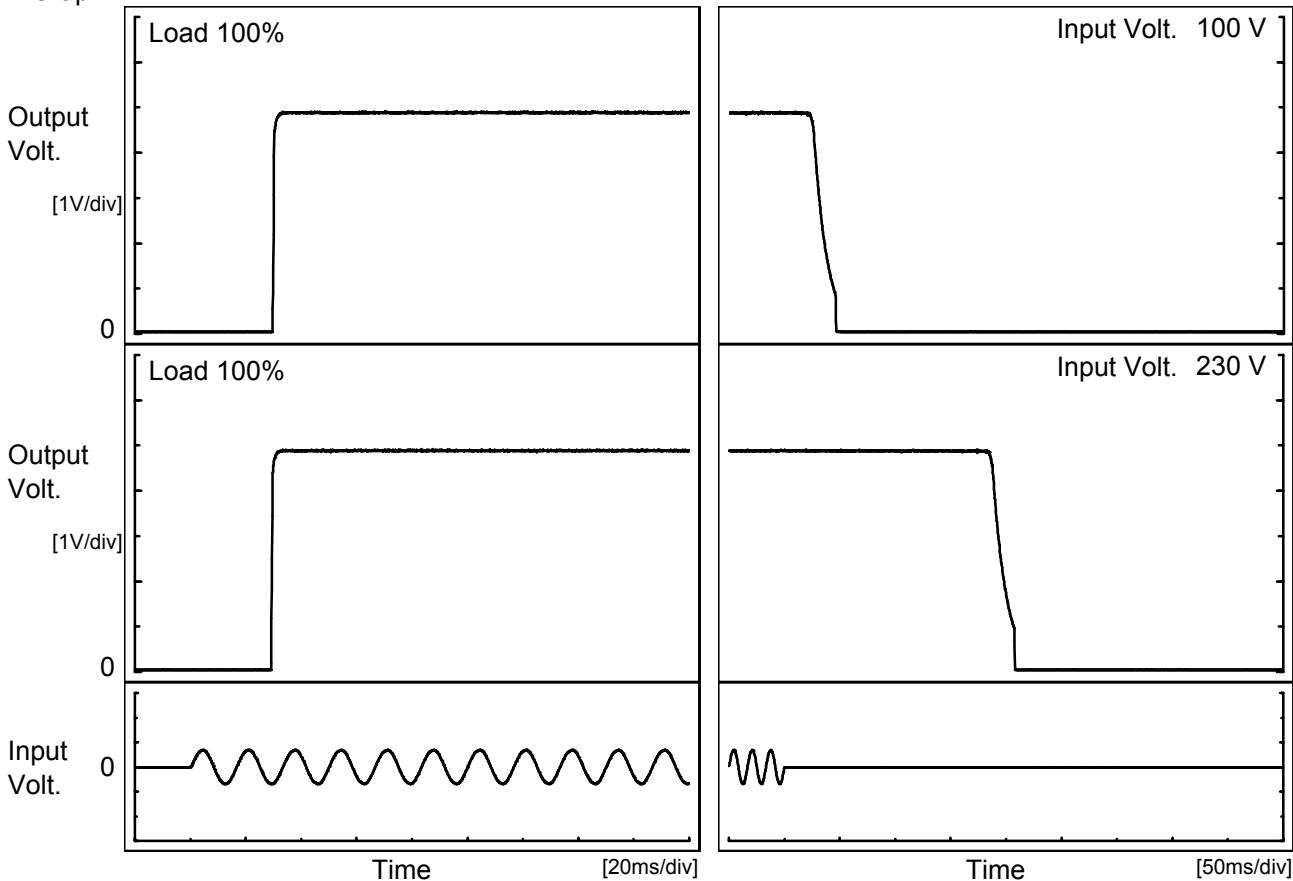
* The characteristic of AC230V is equal.

COSSEL

Model	TUHS5F05
Item	Rise and Fall Time
Object	+5V1A

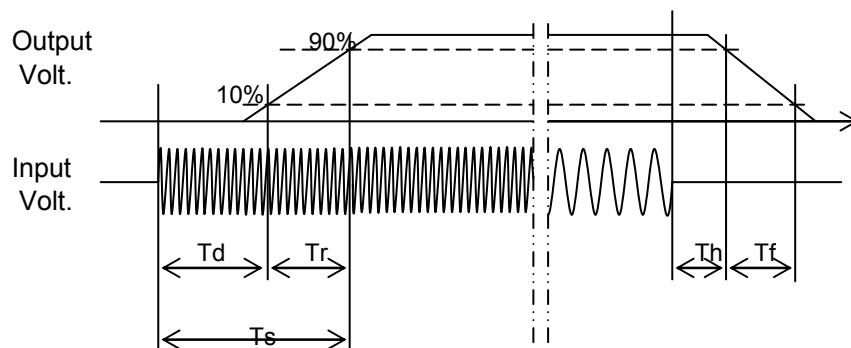
Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

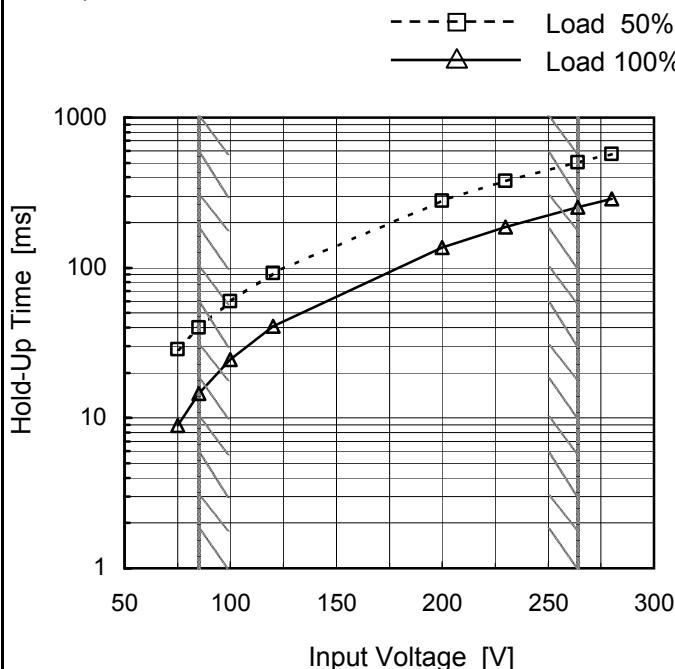
Input Volt.	Time	Td	Tr	Ts	Th	Tf	[ms]
100 V		29.7	0.9	30.6	23.5	20.3	
230 V		29.3	0.6	29.9	186.8	20.0	



Model	TUHS5F05
Item	Hold-Up Time
Object	+5V1A

Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	29	9
85	40	15
100	60	24
120	92	41
200	281	137
230	377	187
264	504	252
280	570	287
--	-	-

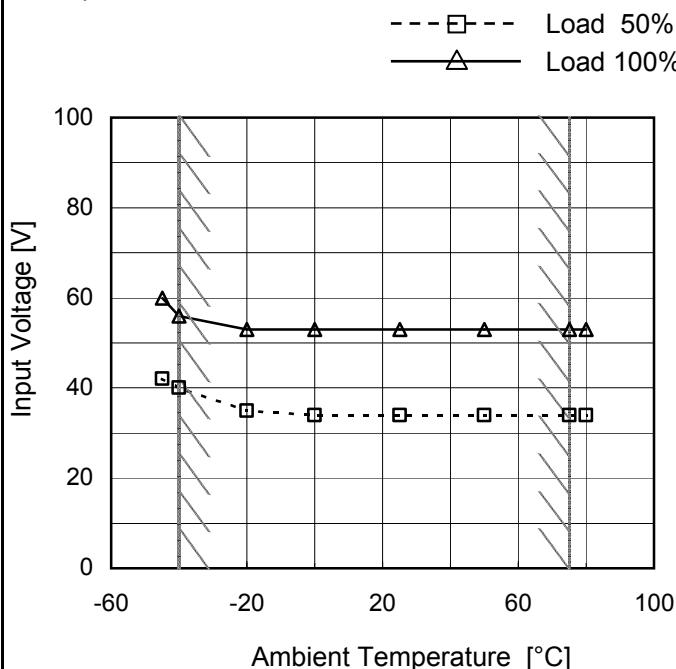
This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.
Note: Slanted line shows the range of the rated input voltage.

Model	TUHS5F05	Temperature Testing Circuitry 25°C Figure A																											
Item	Instantaneous Interruption Compensation																												
Object	+5V1A																												
1.Graph		2.Values																											
<p>—△— Input Volt. 100V - - -□- - Input Volt. 200V - - ○- - Input Volt. 230V</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 100[V]</th> <th>Input Volt. 200[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>0.20</td><td>~70</td><td>~300</td><td>~500</td></tr> <tr><td>0.40</td><td>~55</td><td>~250</td><td>~400</td></tr> <tr><td>0.60</td><td>~45</td><td>~200</td><td>~350</td></tr> <tr><td>0.80</td><td>~35</td><td>~150</td><td>~280</td></tr> <tr><td>1.00</td><td>~25</td><td>~120</td><td>~200</td></tr> <tr><td>1.10</td><td>~20</td><td>~100</td><td>~150</td></tr> </tbody> </table>		Load Current [A]	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.20	~70	~300	~500	0.40	~55	~250	~400	0.60	~45	~200	~350	0.80	~35	~150	~280	1.00	~25	~120	~200	1.10	~20	~100	~150
Load Current [A]	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																										
0.20	~70	~300	~500																										
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1.10	~20	~100	~150																										
<p>Instantaneous Compensation Time [ms]</p> <p>Load Current [A]</p>																													
<p>Note: Slanted line shows the range of the rated load current.</p>																													

Model	TUHS5F05
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+5V1A

Testing Circuitry Figure A

1. Graph



2. Values

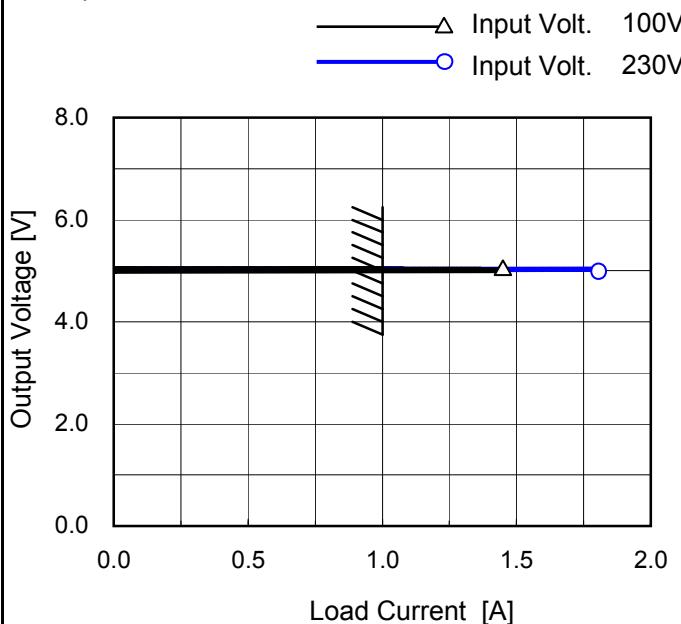
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-45	42	60
-40	40	56
-20	35	53
0	34	53
25	34	53
50	34	53
75	34	53
80	34	53
--	-	-
--	-	-
--	-	-

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

Model	TUHS5F05
Item	Overcurrent Protection
Object	+5V1A

Temperature 25°C
Testing Circuitry Figure A

1. Graph



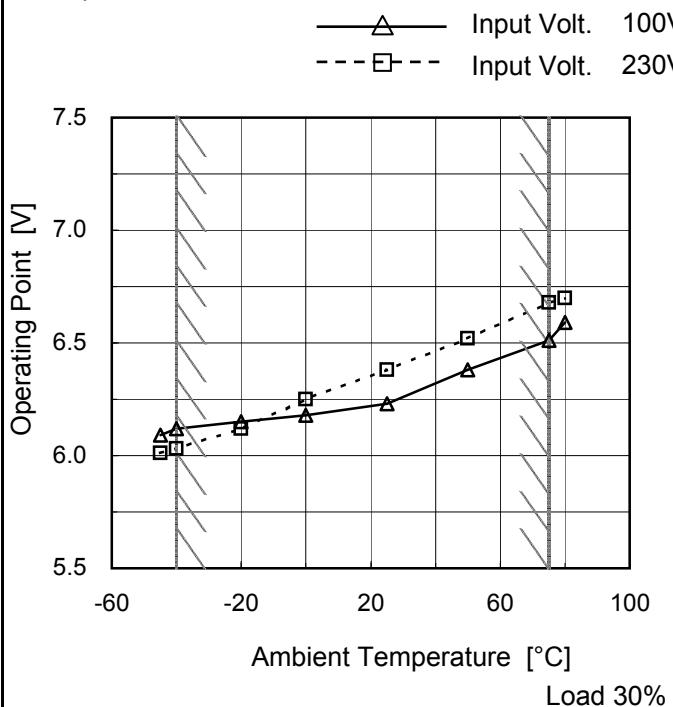
Note: Slanted line shows the range of the rated load current.

2. Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
5	1.43	1.80
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Model	TUHS5F05
Item	Oversupply Protection
Object	+5V1A

1. Graph



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

Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 230[V]
-45	6.09	6.01
-40	6.12	6.03
-20	6.15	6.12
0	6.18	6.25
25	6.23	6.38
50	6.38	6.52
75	6.51	6.68
80	6.59	6.70
--	-	-
--	-	-
--	-	-

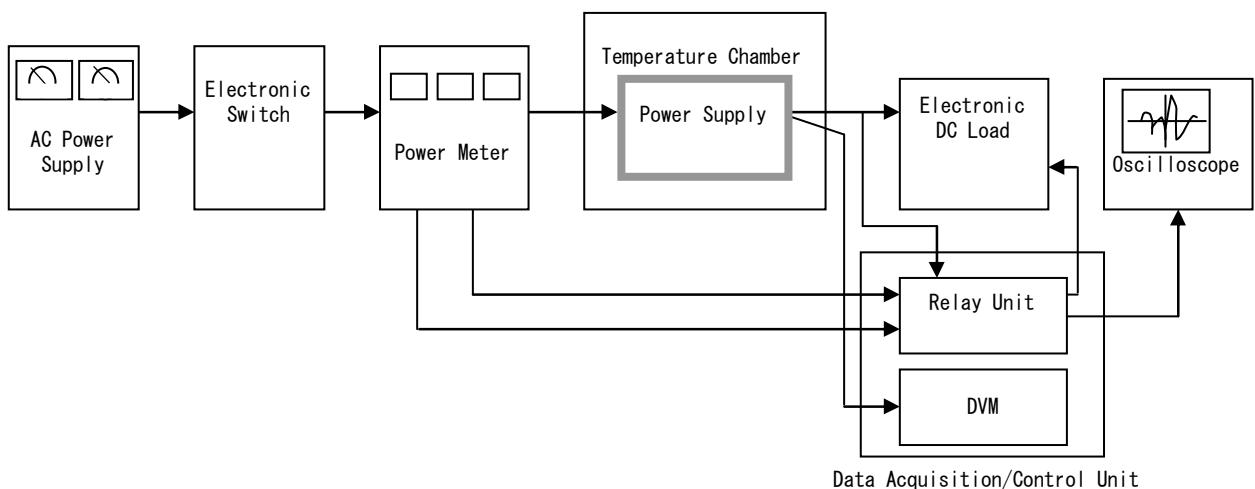


Figure A

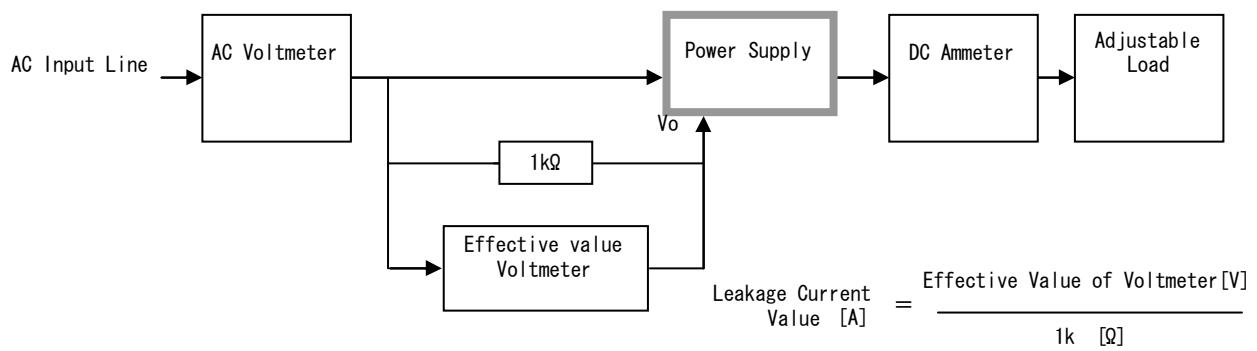


Figure B (DEN-AN)

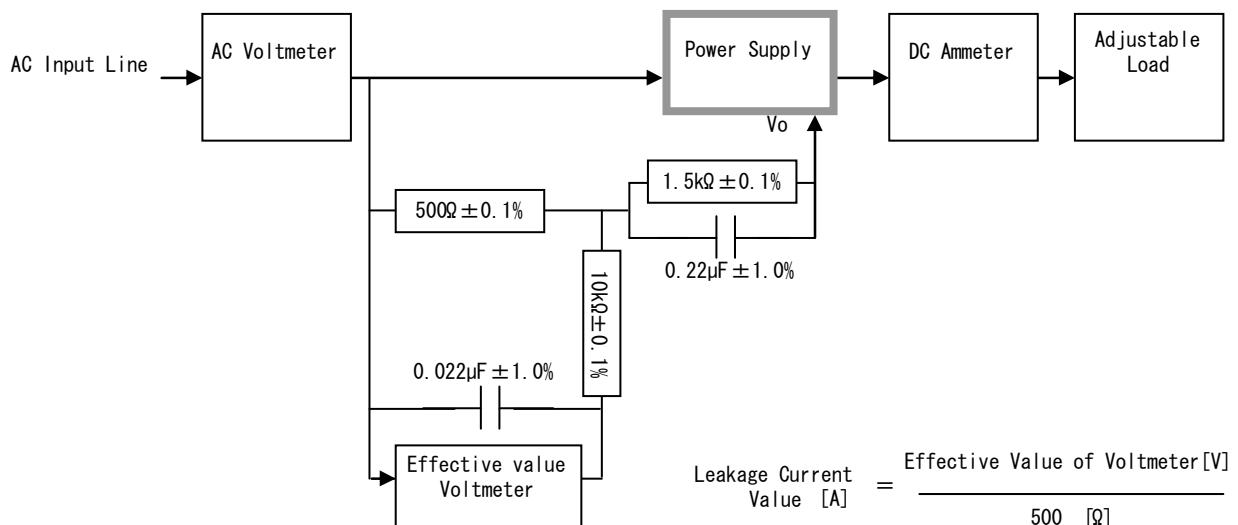


Figure B (IEC60950-1)

COSEL

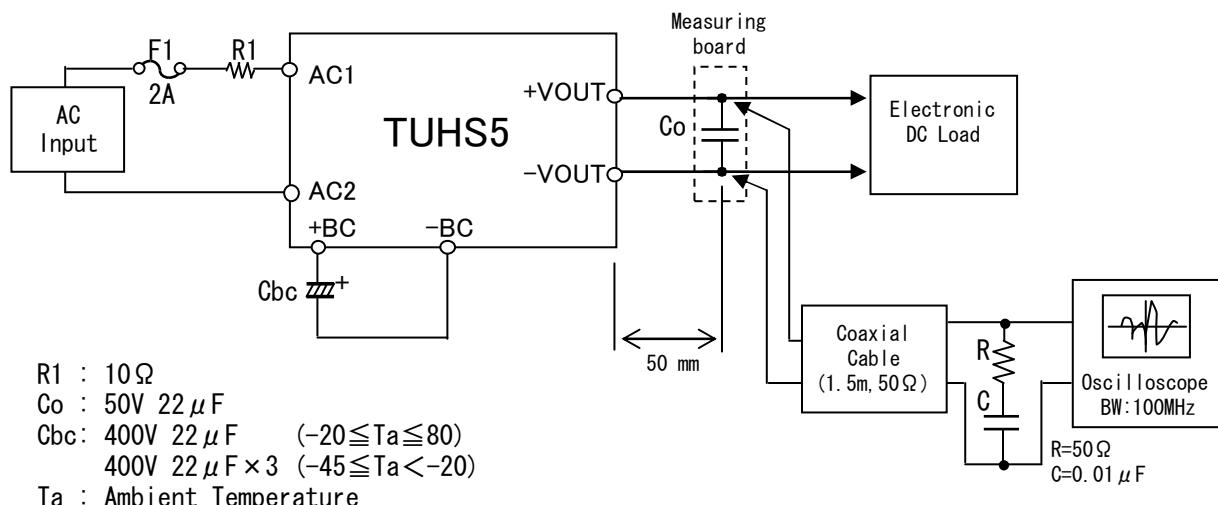


Figure C