

**CUS600M1**

**RELIABILITY DATA**

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※ Test results are typical data. Nevertheless the following results are considered to be reference data because all units have nearly the same characteristics.

1. Calculated Values of MTBF

Parts stress reliability prediction MTBF

MODEL : CUS600M1-12

Calculating Method

Calculated based on parts stress reliability prediction of Telcordia (\*1).

Individual failure rate  $\lambda_{SS}$  is calculated by the electric stress and temperature rise of the each part.

\*1: Telcordia document “Reliability Prediction Procedure for Electronic Equipment”  
(Document number SR-332,Issue3)

<Formula> 
$$MTBF = \frac{1}{\lambda_{equip}} = \frac{1}{\pi_E \sum_{i=1}^m (N_i \cdot \lambda_{ssi})} \times 10^9 \quad \text{(Hours)}$$

$$\lambda_{ssi} = \lambda_{Gi} \cdot \pi_{Qi} \cdot \pi_{Si} \cdot \pi_{Ti}$$

$\lambda_{equip}$  : Total equipment failure rate (FITs = Failures in  $10^9$  hours)

$\lambda_{Gi}$  : Generic failure rate for the  $i$ th part

$\pi_{Qi}$  : Quality factor for the  $i$ th part

$\pi_{Si}$  : Stress factor for the  $i$ th part

$\pi_{Ti}$  : Temperature factor for the  $i$ th part

$m$  : Number of different part types

$N_i$  : Quantity of  $i$ th part type

$\pi_E$  : Equipment environmental factor

MTBF Values

Conditions

- Input voltage : 115VAC
- Output voltage & current : 12VDC, 33.4A
- Environmental factor : GB (Ground, Benign)
- Mounting method : Standard mounting A
- Cooling : Convection

SR-332,Issue3

$$\underline{MTBF(Ta=25^\circ C) \approx 528304 \quad \text{(Hours)}}$$

$$\underline{MTBF(Ta=35^\circ C) \approx 368197 \quad \text{(Hours)}}$$

2. Components Derating

MODEL : CUS600M1-12

(1) Calculating Method

(a) Measuring method

· Mounting method	: Standard mounting A	· Ambient temperature	: 40°C
· Input voltage	: 115, 230VAC	· Output voltage & current	: 12V, 33.4A
· Cooling	: Convection		

(b) Semiconductors

Compared with maximum junction temperature and actual one which is calculated based on case temperature, power dissipation and thermal impedance.

(c) IC, Resistors, Capacitors, etc.

Ambient temperature, operating condition, power dissipation and so on are within derating criteria.

(d) Calculating method of thermal impedance

$$\theta_{j-c} = \frac{T_{j(max)} - T_c}{P_{ch(max)}} \quad \theta_{j-a} = \frac{T_{j(max)} - T_a}{P_{ch(max)}} \quad \theta_{j-l} = \frac{T_{j(max)} - T_l}{P_{ch(max)}}$$

T<sub>c</sub> : Case Temperature at Start Point of Derating; 25°C in General

T<sub>a</sub> : Ambient Temperature at Start Point of Derating; 25°C in General

T<sub>l</sub> : Lead Temperature at Start Point of Derating; 25°C in General

P<sub>ch(max)</sub> : Maximum Channel Dissipation

T<sub>j(max)</sub> : Maximum Junction (channel) Temperature  
(T<sub>ch(max)</sub>)

θ<sub>j-c</sub> : Thermal Impedance between Junction (channel) and Case  
(θ<sub>ch-c</sub>)

θ<sub>j-a</sub> : Thermal Impedance between Junction and air

θ<sub>j-l</sub> : Thermal Impedance between Junction and Lead

(2) Component Derating List

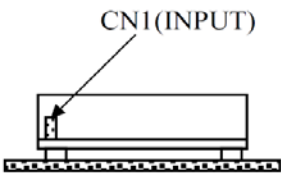
Location No.	Vin = 115VAC Convection cooling	Load = 33.4A	Ta = 40°C
BD1 D25XB60-7000 SHINDENGEN	Tch (max) = 150 °C Pch= 5.4 W Tch = Tc + ((θch-c) × Pch) = 129.9 °C D.F. = 86.6 %	θch-c = 1 °C/W ΔTc = 84.5 °C	Tc = 124.5 °C
SCR1 TN1605H-6FP STMICRO	Tch (max) = 150 °C Pch = 1.2 W Tch = Tc + ((θch-c) × Pch) = 126.9 °C D.F. = 84.6 %	θch-c = 4.5 °C/W ΔTc = 81.5 °C	Tc = 121.5 °C
D1 TRS6A65F,S1Q TOSHIBA	Tch (max) = 175 °C Pch= 1.6 W Tch = Tc + ((θch-c) × Pch) = 131.9 °C D.F. = 75.4 %	θch-c = 4.24 °C/W ΔTc = 85.1 °C	Tc = 125.1 °C
Q1 IPA60R060P7 INFINEON	Tj (max) = 150 °C Pd = 2.8 W Tj = Tc + ((θj-c) × Pd) = 139.1 °C D.F. = 92.7 %	θj-c = 4.24 °C/W ΔTc = 87.2 °C	Tc = 127.2 °C
Q2A,Q2B TK20A60W5 TOSHIBA	Tj (max) = 150 °C Pd = 1.2 W Tj = Tc + ((θj-c) × Pd) = 126.2 °C D.F. = 84.2 %	θj-c = 2.78 °C/W ΔTc = 82.9 °C	Tc = 122.9 °C
Q201,Q202 TPW1R005PL,L1Q TOSHIBA	Tj (max) = 175 °C Pd = 0.8 W Tj = Tc + ((θj-c) × Pd) = 116.5 °C D.F. = 66.6%	θj-c = 0.93 °C/W ΔTc = 75.8 °C	Tc = 115.8 °C

Location No.	Vin = 230VAC Convection cooling	Load = 33.4A	Ta = 40°C
BD1 D25XB60-7000 SHINDENGEN	Tch (max) = 150 °C Pch= 2.7 W Tch = Tc + ((θch-c) × Pch) = 99.4 °C D.F. = 66.3 %	θch-c = 1 °C/W ΔTc = 56.7 °C	Tc = 96.7 °C
SCR1 TN1605H-6FP STMICRO	Tch (max) = 150 °C Pch = 1.2 W Tch = Tc + ((θch-c) × Pch) = 103.7 °C D.F. = 69.1 %	θch-c = 4.5 °C/W ΔTc = 58.3 °C	Tc = 98.3 °C
D1 TRS6A65F,S1Q TOSHIBA	Tch (max) = 175 °C Pch= 1.3 W Tch = Tc + ((θch-c) × Pch) = 105.9 °C D.F. = 60.5 %	θch-c = 4.24 °C/W ΔTc = 60.4 °C	Tc = 100.4 °C
Q1 IPA60R060P7 INFINEON	Tj (max) = 150 °C Pd = 1.3 W Tj = Tc + ((θj-c) × Pd) = 103.5 °C D.F. = 69 %	θj-c = 4.24 °C/W ΔTc = 58 °C	Tc = 98 °C
Q2A,Q2B TK20A60W5 TOSHIBA	Tj (max) = 150 °C Pd = 1.2 W Tj = Tc + ((θj-c) × Pd) = 103.3 °C D.F. = 68.9 %	θj-c = 2.78 °C/W ΔTc = 60 °C	Tc = 100 °C
Q201,Q202 TPW1R005PL,L1Q TOSHIBA	Tj (max) = 175 °C Pd = 0.8 W Tj = Tc + ((θj-c) × Pd) = 113 °C D.F. = 64.6%	θj-c = 0.93 °C/W ΔTc = 72.3 °C	Tc = 112.3 °C

3. Main Components Temperature Rise  $\Delta T$  List

MODEL : CUS600M1-12

(1) Measuring Conditions

Mounting Method  (Standard Mounting : A)	Mounting A	
		
Input Voltage	115VAC	230VAC
Output Voltage	12V	
Output Current	33.4A	
Cooling	Convect cooling	

(2) Measuring Results

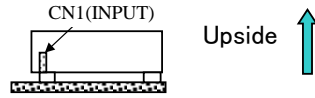
Input Voltage		$\Delta T$ Temperature Rise ( $^{\circ}C$ )	
		115VAC	230VAC
Location No.	Part name	Mounting A	
A101	IC	70.7	49.9
A102	IC	64.9	45.1
A103	IC	73.8	58.9
A104	IPD	44.7	36.1
A201	IC	68.4	65.5
BD1	Diode Bridge	84.5	56.7
C51B	E.CAP.	56.3	53.1
C51C	E.CAP.	56.9	54.4
C51D	E.CAP.	56.2	53.6
C6	E.CAP.	49	37.2
C7	Cap., Film	35.8	30.1
C8	Cap., Film	33.8	28.9
D1	SBD	85.1	60.4
L2	CHOKE COIL	69.4	41.7
L4	CHOKE COIL	81.3	52.8
Q1	MOS FET	87.2	58
Q2A	MOS FET	82.9	60
Q2B	MOS FET	80.7	58.8
Q201	MOS FET	75.8	72.3
Q202	MOS FET	73.9	70.5
R108	RESISTOR	82.9	53.7
SCR1	Thyristor	81.5	58.3
T1	TRANS	87.1	81.8

4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-12

Cooling condition : Convection cooling

Mounting A

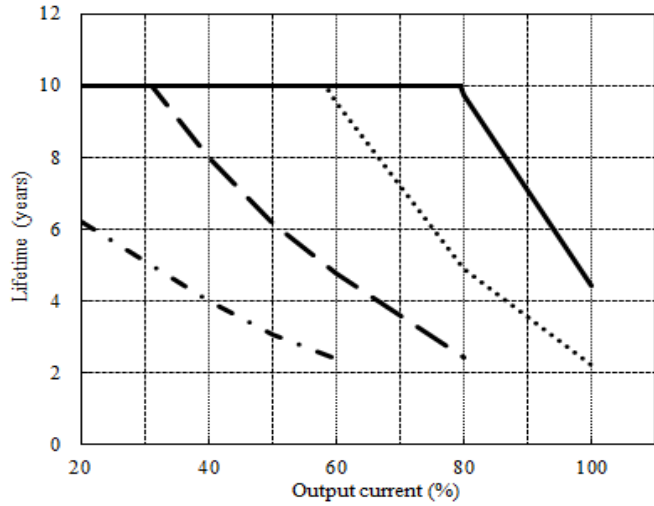


Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - . - . -

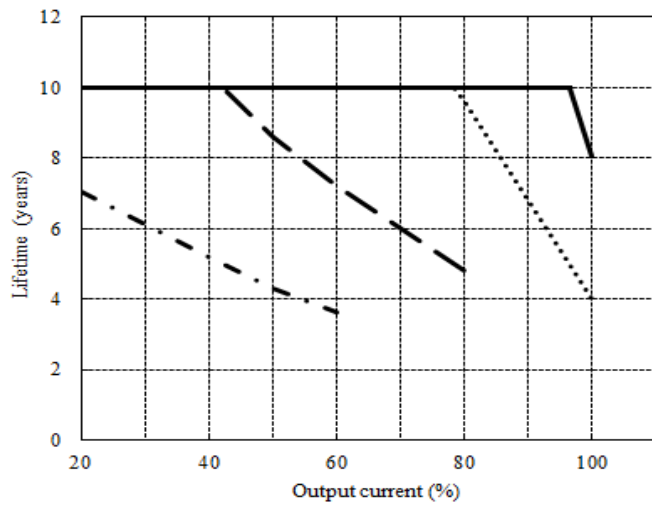
Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	6.2
40	10.0	10.0	8.0	4.0
50	10.0	10.0	6.1	3.1
60	10.0	9.5	4.8	2.4
80	9.7	4.9	2.4	-
100	4.4	2.2	-	-



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.0
40	10.0	10.0	10.0	5.2
50	10.0	10.0	8.6	4.3
60	10.0	10.0	7.2	3.6
80	10.0	9.6	4.8	-
100	8.0	4.0	-	-

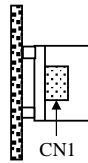


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-12

Cooling condition : Convection cooling

Mounting B



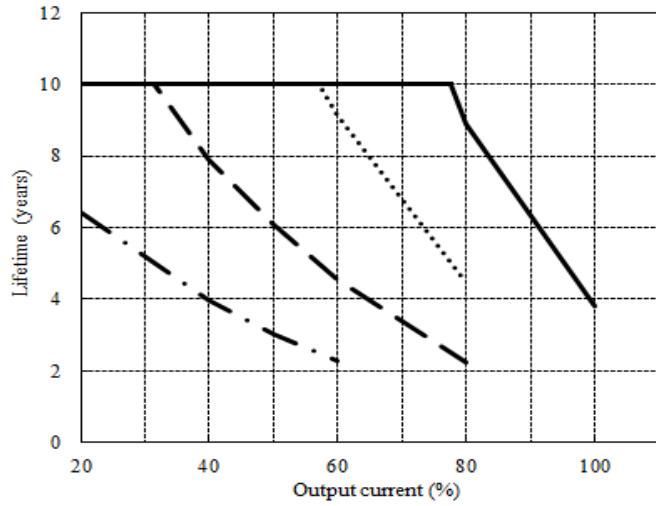
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Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - . - . -

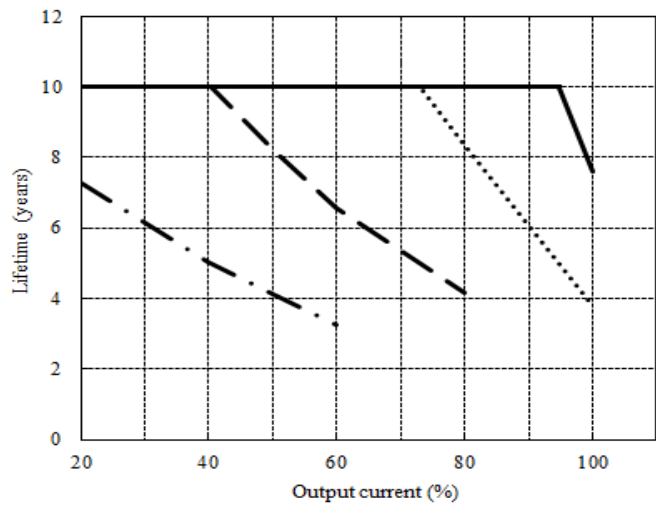
Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	6.4
40	10.0	10.0	7.9	4.0
50	10.0	10.0	6.1	3.0
60	10.0	9.1	4.6	2.3
80	8.9	4.5	2.2	-
100	3.8	-	-	-



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.3
40	10.0	10.0	10.0	5.0
50	10.0	10.0	8.2	4.1
60	10.0	10.0	6.5	3.3
80	10.0	8.3	4.2	-
100	7.6	3.8	-	-



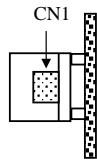


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-12

Cooling condition : Convection cooling

Mounting C



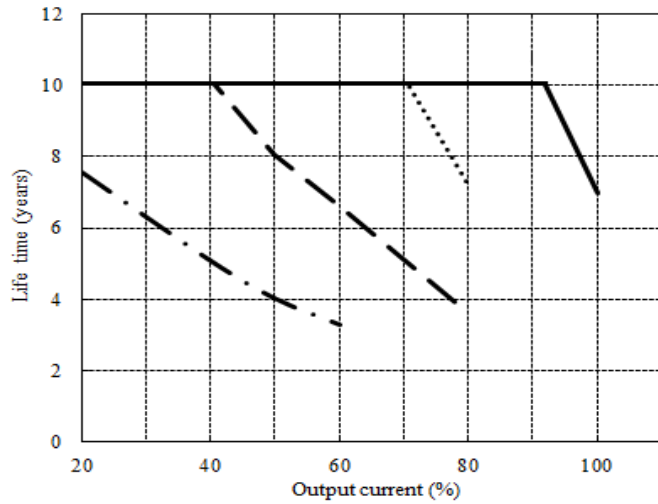
Upside ↑

Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - . - . -

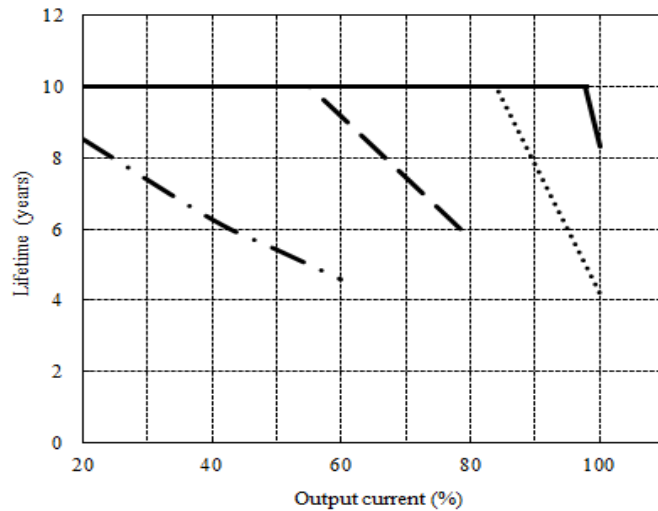
Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.6
40	10.0	10.0	10.0	5.1
50	10.0	10.0	8.1	4.0
60	10.0	10.0	6.6	3.3
80	10.0	7.2	3.6	-
100	7.0	-	-	-



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	8.5
40	10.0	10.0	10.0	6.3
50	10.0	10.0	10.0	5.4
60	10.0	10.0	9.2	4.6
80	10.0	10.0	5.7	-
100	8.3	4.2	-	-

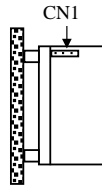


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-12

Cooling condition : Convection cooling

Mounting D



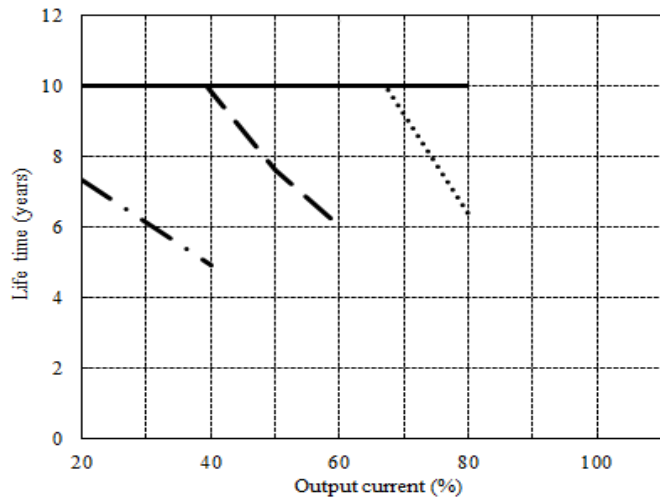
Upside ↑

Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - . - . -

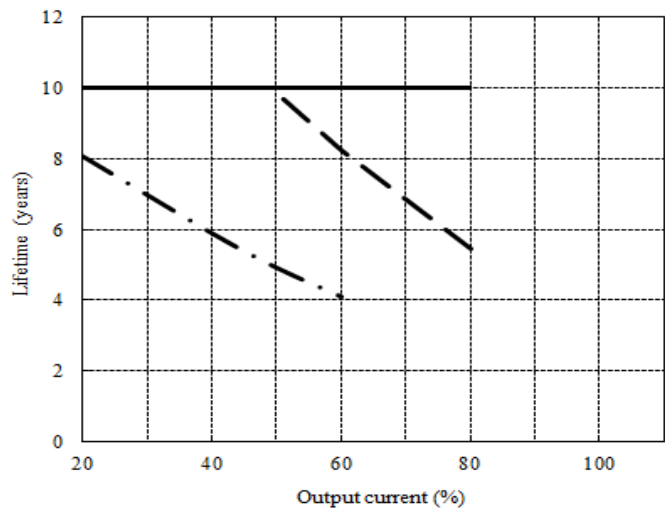
Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.4
40	10.0	10.0	9.8	4.9
50	10.0	10.0	7.6	-
60	10.0	10.0	6.0	-
80	10.0	6.4	-	-
100	-	-	-	-



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	8.1
40	10.0	10.0	10.0	5.9
50	10.0	10.0	9.9	4.9
60	10.0	10.0	8.2	4.1
80	10.0	10.0	5.5	-
100	-	-	-	-

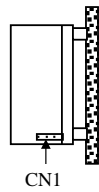


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-12

Cooling condition : Convection cooling

Mounting E



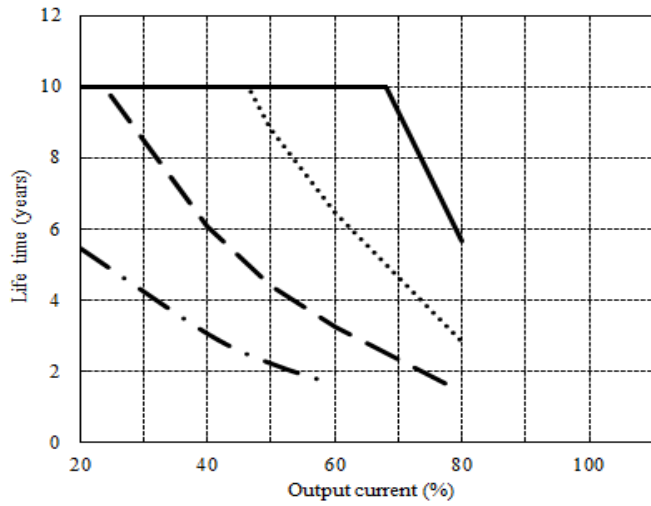
Upside ↑

V<sub>in</sub>=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	5.5
40	10.0	10.0	6.1	3.0
50	10.0	8.8	4.4	2.2
60	10.0	6.5	3.2	1.6
80	5.6	2.8	1.4	-
100	-	-	-	-

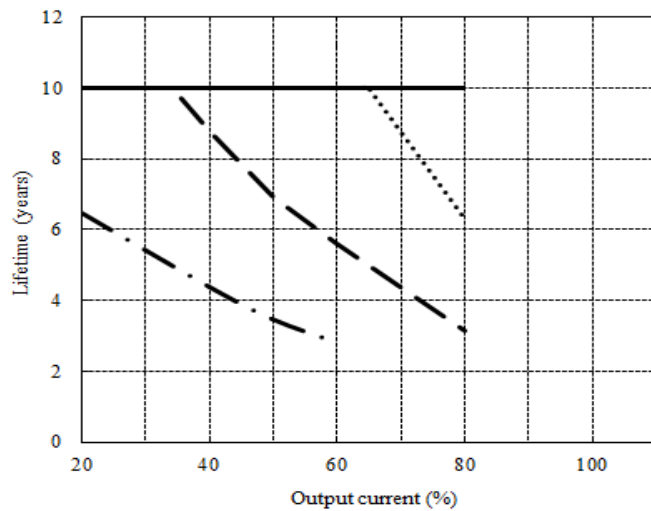
Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - . - . -



V<sub>in</sub>=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	6.5
40	10.0	10.0	8.8	4.4
50	10.0	10.0	6.9	3.5
60	10.0	10.0	5.6	2.8
80	10.0	6.3	3.2	-
100	-	-	-	-

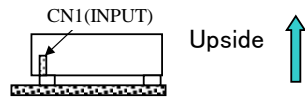


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-24

Cooling condition : Convection cooling

Mounting A

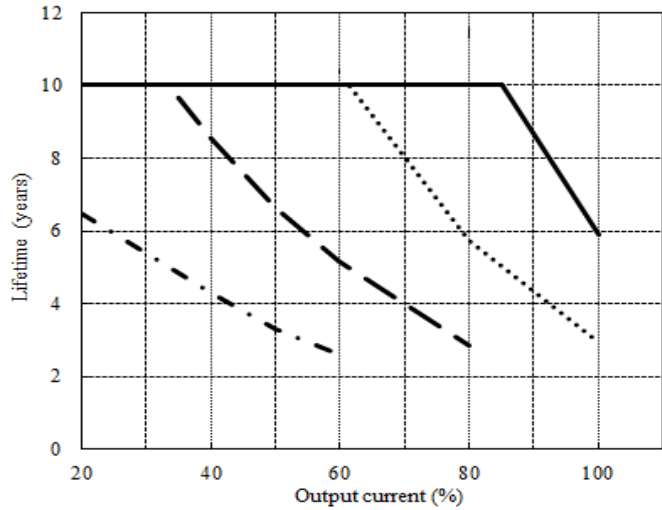


Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - · - · -

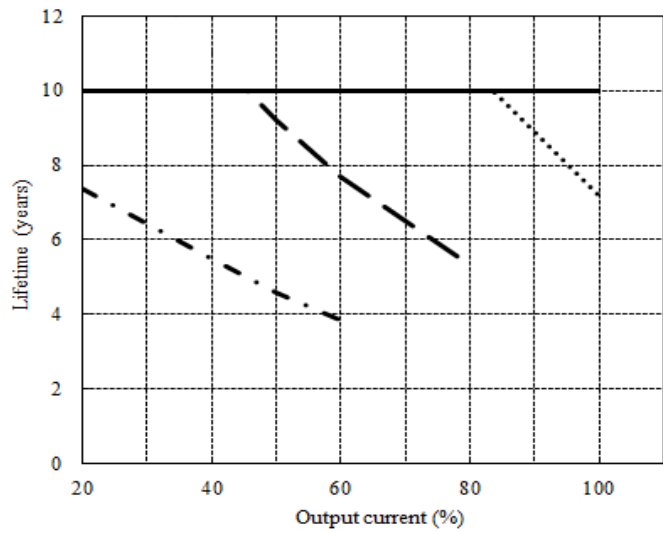
Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	6.5
40	10.0	10.0	8.5	4.3
50	10.0	10.0	6.6	3.3
60	10.0	10.0	5.2	2.6
80	10.0	5.7	2.9	-
100	5.9	2.9	-	-



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.4
40	10.0	10.0	10.0	5.5
50	10.0	10.0	9.2	4.6
60	10.0	10.0	7.7	3.8
80	10.0	10.0	5.3	-
100	10.0	7.2	-	-

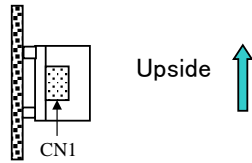


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-24

Cooling condition : Convection cooling

Mounting B

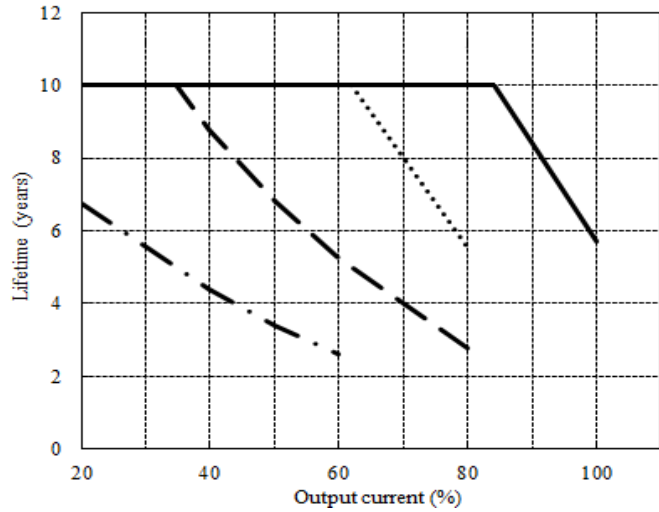


Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	6.8
40	10.0	10.0	8.8	4.4
50	10.0	10.0	6.8	3.4
60	10.0	10.0	5.2	2.6
80	10.0	5.6	2.8	-
100	5.7	-	-	-

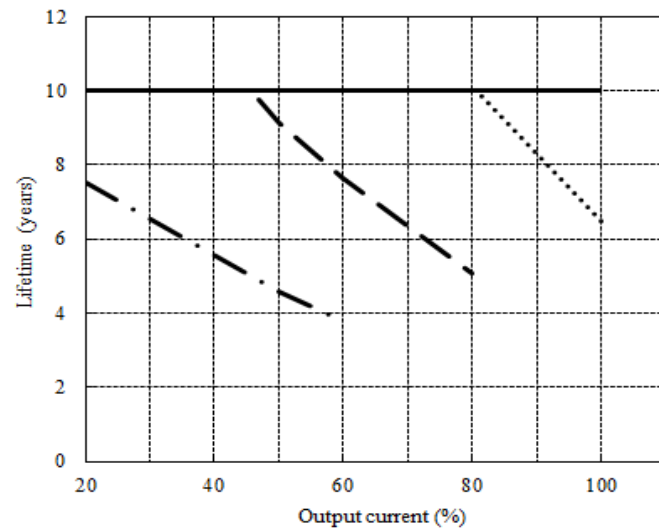
Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - · - · -



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.5
40	10.0	10.0	10.0	5.6
50	10.0	10.0	9.1	4.6
60	10.0	10.0	7.6	3.8
80	10.0	10.0	5.1	-
100	10.0	6.5	-	-

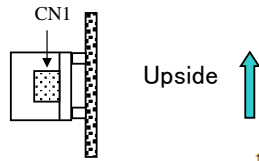


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-24

Cooling condition : Convection cooling

Mounting C

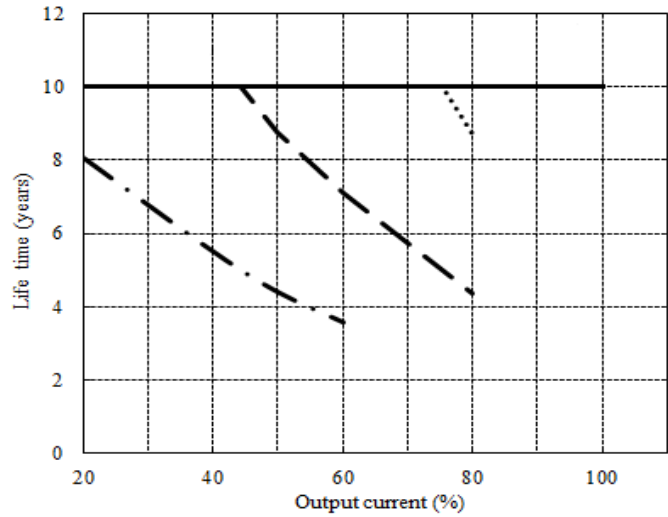


Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	8.0
40	10.0	10.0	10.0	5.5
50	10.0	10.0	8.8	4.4
60	10.0	10.0	7.1	3.6
80	10.0	8.7	4.4	-
100	10.0	-	-	-

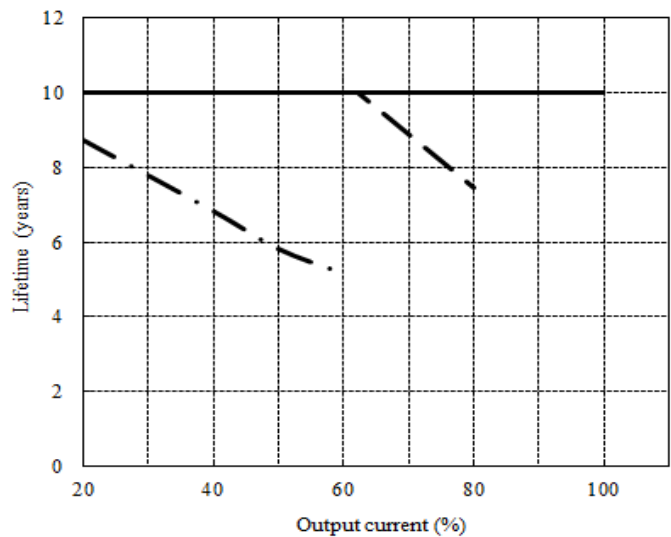
Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - · - · -



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	8.7
40	10.0	10.0	10.0	6.8
50	10.0	10.0	10.0	5.8
60	10.0	10.0	10.0	5.2
80	10.0	10.0	7.5	-
100	10.0	10.0	-	-

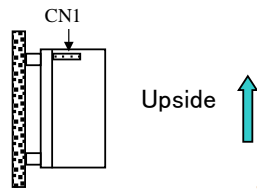


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-24

Cooling condition : Convection cooling

Mounting D

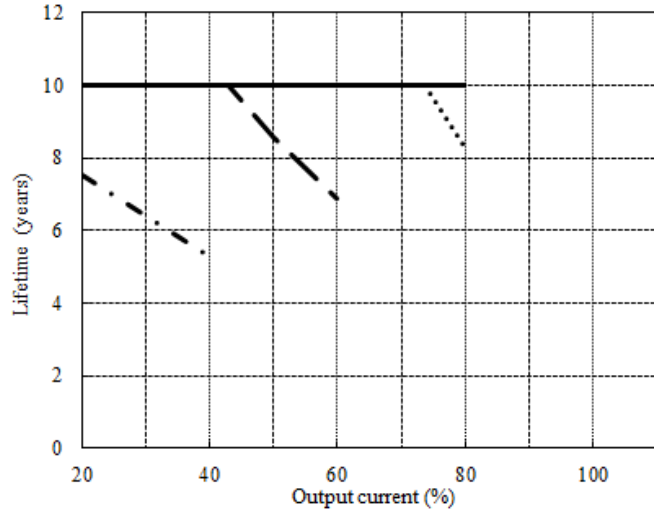


Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.5
40	10.0	10.0	10.0	5.3
50	10.0	10.0	8.6	-
60	10.0	10.0	6.9	-
80	10.0	8.3	-	-
100	-	-	-	-

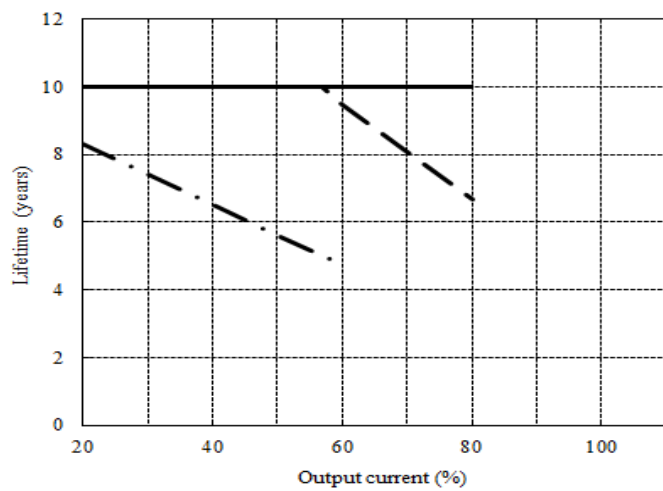
Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - · - · -



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	8.3
40	10.0	10.0	10.0	6.5
50	10.0	10.0	10.0	5.6
60	10.0	10.0	9.5	4.7
80	10.0	10.0	6.7	-
100	-	-	-	-

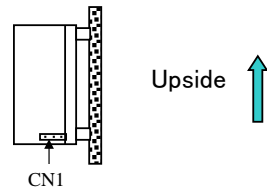


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-24

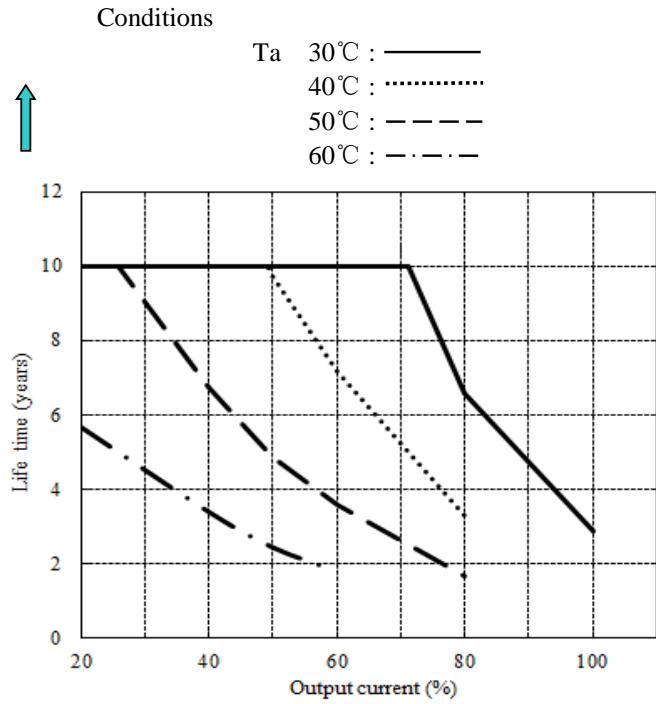
Cooling condition : Convection cooling

Mounting E



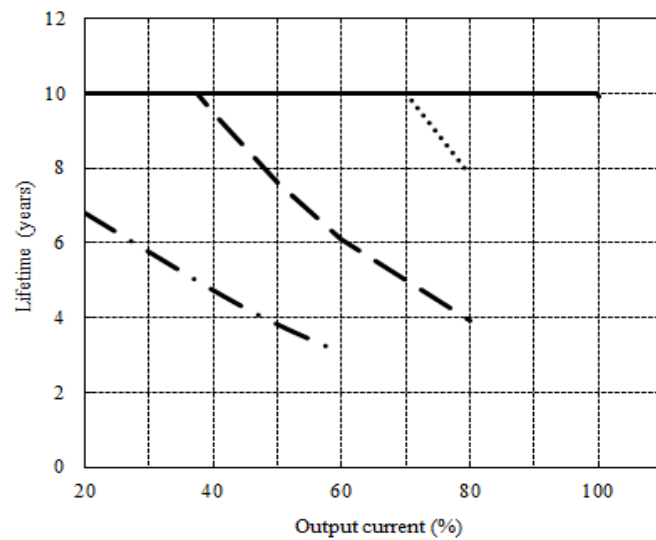
Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	5.6
40	10.0	10.0	6.8	3.4
50	10.0	9.7	4.9	2.4
60	10.0	7.2	3.6	1.8
80	6.6	3.3	1.6	-
100	2.9	-	-	-



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	6.8
40	10.0	10.0	9.5	4.7
50	10.0	10.0	7.6	3.8
60	10.0	10.0	6.1	3.1
80	10.0	7.8	3.9	-
100	9.9	-	-	-



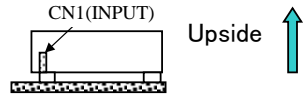


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-48

Cooling condition : Convection cooling

Mounting A

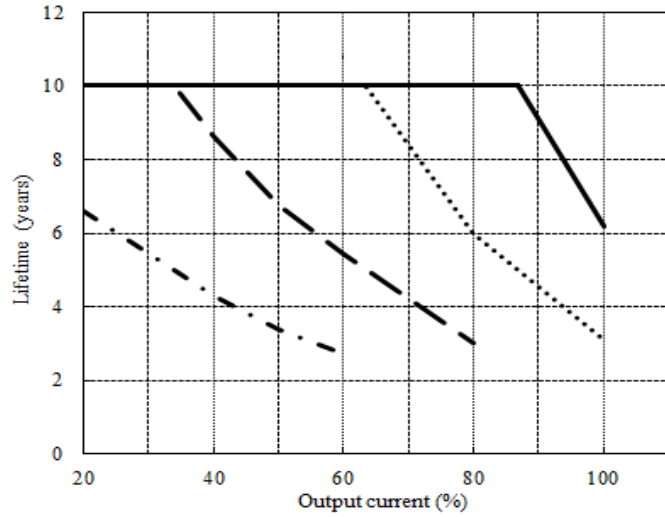


Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - · - · -

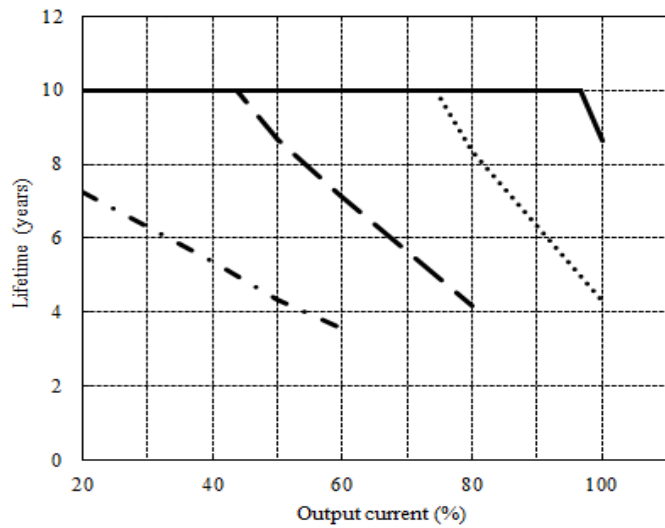
Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	6.6
40	10.0	10.0	8.6	4.3
50	10.0	10.0	6.8	3.4
60	10.0	10.0	5.4	2.7
80	10.0	6.0	3.0	-
100	6.2	3.1	-	-



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.3
40	10.0	10.0	10.0	5.4
50	10.0	10.0	8.7	4.3
60	10.0	10.0	7.1	3.6
80	10.0	8.3	4.2	-
100	8.6	4.3	-	-

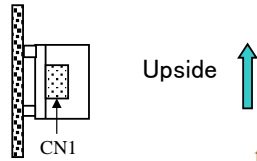


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-48

Cooling condition : Convection cooling

Mounting B

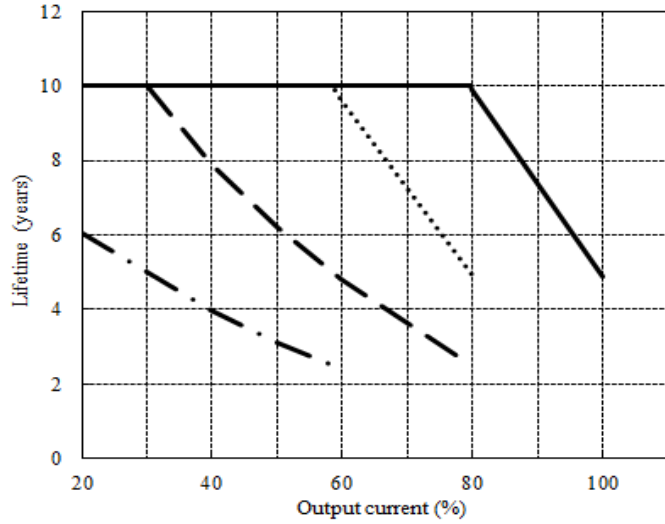


Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	6.1
40	10.0	10.0	7.9	4.0
50	10.0	10.0	6.2	3.1
60	10.0	9.6	4.8	2.4
80	9.9	4.9	2.5	-
100	4.9	-	-	-

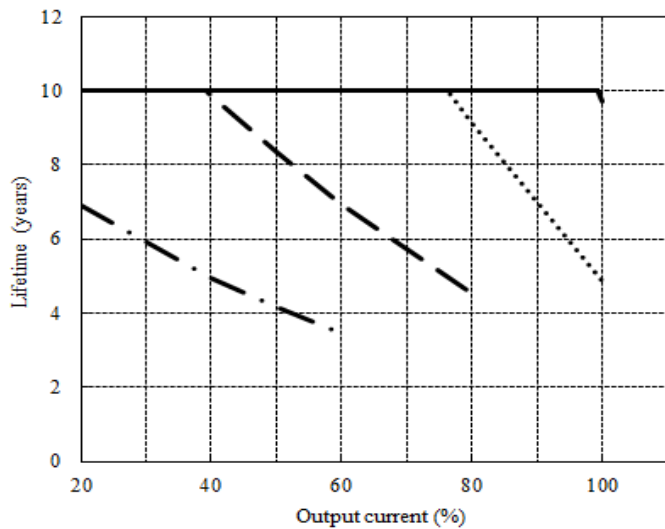
Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - · - · -



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	6.9
40	10.0	10.0	9.9	4.9
50	10.0	10.0	8.4	4.2
60	10.0	10.0	6.9	3.5
80	10.0	9.1	4.6	-
100	9.7	4.8	-	-

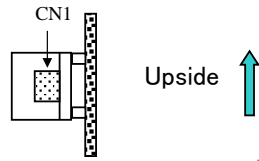


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-48

Cooling condition : Convection cooling

Mounting C

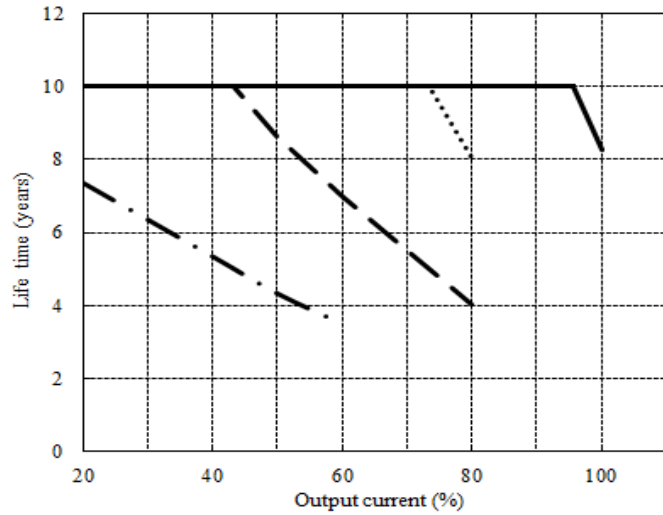


Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - · - · -

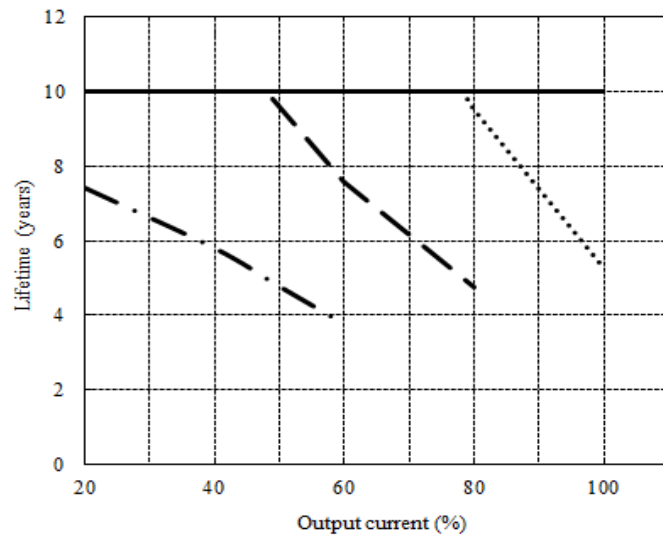
Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.4
40	10.0	10.0	10.0	5.3
50	10.0	10.0	8.6	4.3
60	10.0	10.0	7.0	3.5
80	10.0	8.1	4.0	-
100	8.3	-	-	-



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.4
40	10.0	10.0	10.0	5.8
50	10.0	10.0	9.6	4.8
60	10.0	10.0	7.6	3.8
80	10.0	9.5	4.8	-
100	10.0	5.2	-	-

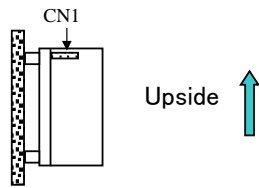


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-48

Cooling condition : Convection cooling

Mounting D

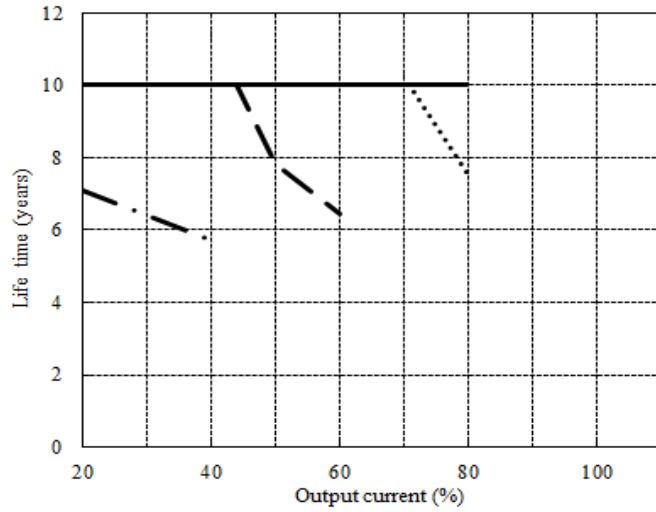


Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.1
40	10.0	10.0	10.0	5.7
50	10.0	10.0	7.8	-
60	10.0	10.0	6.5	-
80	10.0	7.5	-	-
100	-	-	-	-

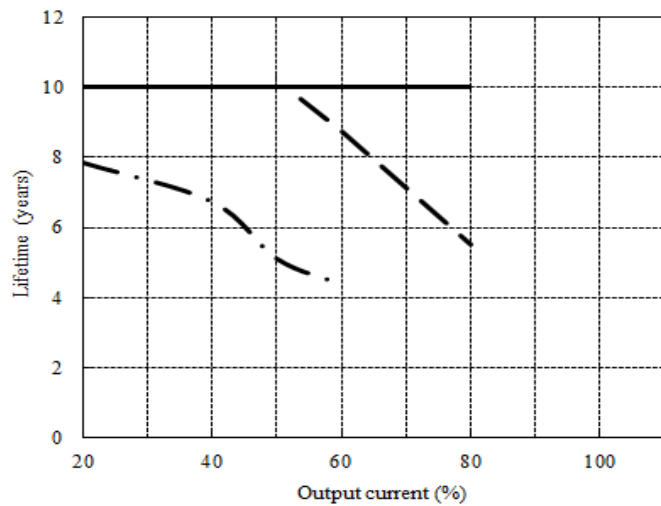
Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - · - · -



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	7.9
40	10.0	10.0	10.0	6.7
50	10.0	10.0	10.0	5.1
60	10.0	10.0	8.8	4.4
80	10.0	10.0	5.5	-
100	-	-	-	-

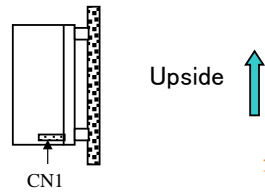


4. Electrolytic Capacitor Lifetime

MODEL : CUS600M1-48

Cooling condition : Convection cooling

Mounting E

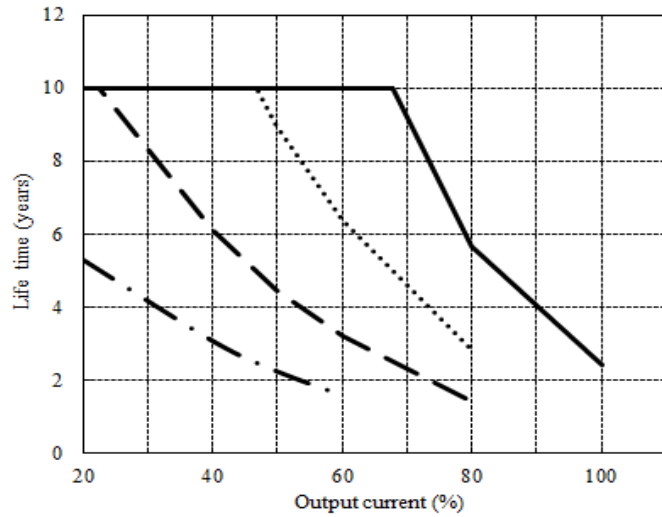


Vin=115VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	5.3
40	10.0	10.0	6.1	3.1
50	10.0	8.9	4.5	2.2
60	10.0	6.4	3.2	1.6
80	5.6	2.8	1.4	-
100	2.4	-	-	-

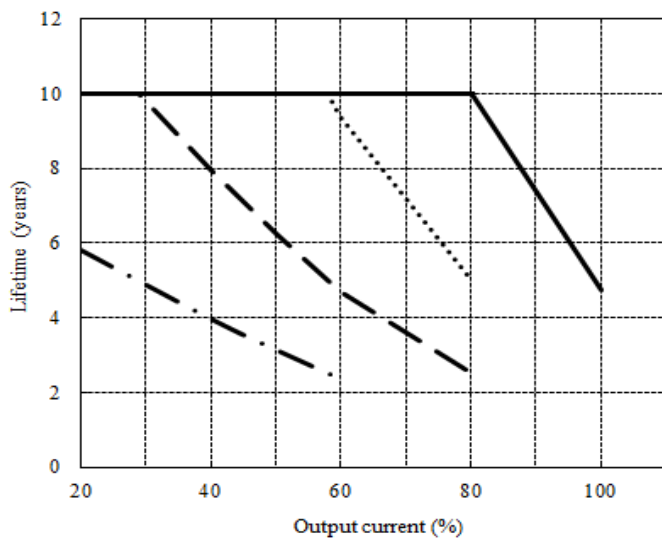
Conditions

Ta 30°C : ———  
 40°C : .....  
 50°C : - - - -  
 60°C : - · - · -



Vin=230VAC

Load (%)	Lifetime (years)			
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C
20	10.0	10.0	10.0	5.8
40	10.0	10.0	7.9	4.0
50	10.0	10.0	6.3	3.1
60	10.0	9.4	4.7	2.3
80	10.0	5.0	2.5	-
100	4.7	-	-	-



5. Abnormal Test

MODEL : CUS600M1-24

(1) Test Conditions

Input : 115VAC Output : 24V, 25A Ta : 25°C

(2) Test Results

No.	Test position		Test mode		Test result													Note
	Location No.	Test point	Short	Open	*1: Equivalent one smoke less than of a cigarette													
					a	b	c	d	e	f	g	h	i	j	k	l		
				Fire	Slight Smoke	Burst	Smell	Red hot	Damaged	Fuse blown	O.V.P.	O.C.P.	No output	No change	Others			
1	SCR1	A		○												○	Input Power increase	
		K		○												○	Input Power increase	
		G		○												○		
		A-K		○													○	Input Power decrease
		A-G		○													○	
		G-K		○													○	
2	Q1	G		○						○	○			○			Da: F1A ,F1B,R108, D117	
		D		○										○				
		S		○											○			
		G-S		○											○			
		G-D		○							○	○			○			Da: F1A ,F1B,Q1, R108, D117, R110
		D-S		○							○	○			○			Da: F1A ,F1B,R108, D117
3	D1			○						○	○			○			Da: F1A ,Q1, R108, D117	
				○										○			Da: F1A ,Q1, R108, D117	
4	L4			○						○	○			○			Da: F1A ,F1B, Q1, R108, D117	
				○										○				
5	C1			○						○	○			○			Da: F1A ,F1B	
				○										○				
6	SA1			○						○	○			○			Da: F1A ,F1B	
				○										○				
7	C4			○						○	○			○			Da: F1A ,F1B	
				○														
8	C7			○						○	○			○			Da:F1A,F1B,R108,D117,Q2B	
				○										○				
9	C8			○						○	○			○			Da:F1A,F1B,R108,D117,Q2A	
				○										○				
10	BD1	1		○										○				
		2		○										○				
		3		○										○				
		4		○										○				
		1-2		○							○	○			○			Da: F1A ,F1B
		2-3		○							○	○			○			Da: F1A ,F1B
		3-4		○							○	○			○			Da: F1A ,F1B
		1-4		○							○	○			○			Da: F1A ,F1B
11	Q2A	d		○										○				
		s		○						○				○			Da: Q2A, A103, Z102, Q103, A101	
		g		○						○	○			○			Da: Q2A, Q2B, F1A, F1B, D117, R108	
		d~s		○						○	○			○			Da: Q2B, F1A, F1B, D117, R108	
		g~s		○										○				
		g~d		○						○	○			○				Da: Q2A, Q2B, F1A ,F1B, D117, R108

5. Abnormal Test

MODEL : CUS600M1-24

(1) Test Conditions

Input : 115VAC Output : 24V, 25A Ta : 25°C

(2) Test Results

No.	Test position		Test mode		Test result													Note
	Location No.	Test point	Short	Open	*1: Equivalent one smoke less than of a cigarette													
					a	b	c	d	e	f	g	h	I	j	k	l		
				Fire	Slight Smoke	Burst	Smell	Red hot	Damaged	Fuse blown	O.V.P.	O.C.P.	No output	No change	Others			
12	Q2B	d		○														
		s		○														
		g		○						○	○							Da: Q2A, Q2B, F1A, F1B, D117, R108
		d~s	○							○	○							Da: Q2A, F1A ,F1B, D117, R108
		g~s	○															
		g~d	○								○	○						Da: Q2A, Q2B, F1A ,F1B, D117, R108
13	Q201	d		○									○	○				
		s		○									○	○				
		g		○						○								Da:Q201
		d~s	○															
		g~s	○													○		OTP
		g~d	○															
14	Q202	d		○									○	○				
		s		○									○	○				
		g		○						○								Da:Q202
		d~s	○															
		g~s	○													○		OTP
		g~d	○															
15	T1	1		○										○	○			
		2		○										○	○			
		3		○										○	○			
		4		○										○	○			
		5		○										○	○			
		8		○										○	○			
		3~4	○											○	○			
		2~3	○											○	○			
5~8	○											○	○					
16	T2	3		○										○	○			
		4		○										○	○			
		5		○										○	○			
		7		○										○	○			
		3~4	○											○	○			
		5~7	○											○	○			

**6. Vibration Test**

**MODEL :** CUS600M1-12/19/24/28/32/36/48

**(1) Vibration Test Class**

Frequency variable endurance test

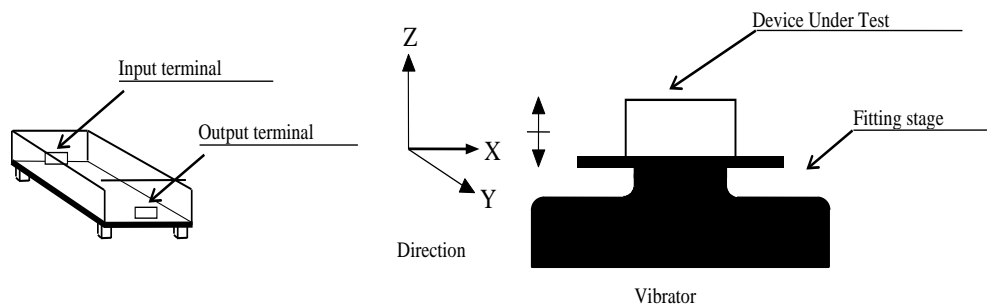
**(2) Equipment Used**

IMV CORP. DC-6000-65

**(3) Test Conditions**

- Sweep frequency : 10~55Hz
- Direction : X, Y, Z
- Sweep time : 1.0min
- Sweep count : 1 hour each
- Acceleration : Constant 19.6m/s<sup>2</sup> (2G)

**(4) Test Method**



**(5) Acceptable Conditions**

1. Not to be broken
2. No abnormal output after test.

**(6) Test Results**

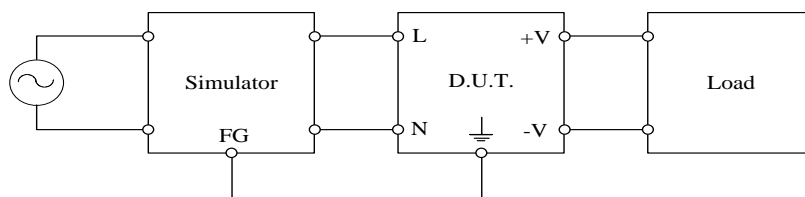
**Judgement : OK**



7. Noise Simulate Test

MODEL : CUS600M1-12/19/24/28/32/36/48

(1) Test Circuit and Equipment



Simulator : INS-400L (Noise Laboratory Co.,LTD)

(2) Test Conditions

• Input voltage	: 115, 230VAC	• Noise level	: 0~2kV
• Output voltage	: Rated	• Phase	: 0~360 deg
• Output current	: 0%, Full load	• Polarity	: +, -
• Ambient temperature	: 25°C	• Mode	: Common, Normal
• Pulse width	: 50~1000ns	• Trigger select	: Line

(3) Acceptable Conditions

1. The regulation of output voltage must not exceed 5% of initial value during test.
2. The output voltage must be within the regulation of specification after the test.
3. Smoke and fire are not allowed.

(4) Test Results

Judgement : OK

**8. Thermal Shock Test**

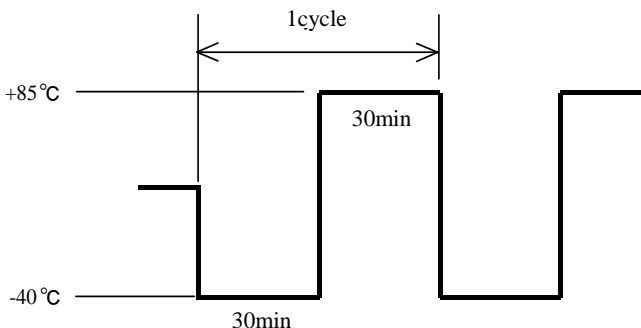
**MODEL : CUS600M1-12**

**(1) Equipment Used (Thermal Shock Chamber)**

ESPEC CORP. TSA-101S-W

**(2) Test Conditions**

- Ambient Temperature : -40°C 85°C +85°C
- Test Time : 30 min each temp.
- Test Cycle : 700 Cycles
- Not Operating



**(3) Test Method**

Before testing, check if there is no abnormal output, then put the D.U.T. in testing chamber, and test it according to the above cycle. 700 cycles later, leave it for 1 hour at the room temperature , then check if there is no abnormal output.

**(4) Acceptable Conditions**

No abnormal output after test.

**(5) Test Results**

**Judgement : OK**