GUS600

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.

Load conditions

Output derating is needed when input voltage is less than 90VAC.

Output voltage : 12V, 24V, 36V, 48V

Iout	12V	24V	36V	48V
100%	50.0A	25.0A	16.7A	12.6A

1. Calculated Values of MTBF

(1) Parts stress reliability prediction MTBF

MODEL : GUS600-12

Calculating Method

Calculated based on parts stress reliability prediction of Telcordia (*1).
Individual failure rate λ_{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)

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

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

λ_{equip} : Total equipment failure rate (FITs = Failures in10^9 hours)

λ_{Gi} : Generic failure rate for the ith part

π_{Qi} : Quality factor for the ith part

π_{Si} : Stress factor for the ith part

π_{Ti} : Temperature factor for the ith part

m : Number of different part types

N_i : Quantity of ith part type

π_E : Equipment environmental factor

MTBF Values

Conditions
・Input voltage : 115VAC ・Output voltage & current : 12VDC, 100%

・Environmental factor : GB (Ground, Benign) ・Mounting method : Standard mounting A

SR-332,Issue3

MTBF(Ta=25°C) ≒ 2480315 (Hours)

MTBF(Ta=40°C) ≒ 1673947 (Hours)

MTBF(Ta=50°C) ≒ 1237104 (Hours)

(2) Part count reliability prediction MTBF

MODEL： GUS600-12

Calculating Method

Calculated based on part count reliability projection of JEITA (RCR-9102B).
Individual failure rates λ_G is given to each part and MTBF is calculated by the count of each part.

< Calculation formula >

$$MTBF = \frac{1}{\lambda_{equip}} \times 10^6 = \frac{1}{\sum_{i=1}^{n} n_i \left(\lambda_G \pi_Q\right)_i} \times 10^6 \quad \text{(Hours)}$$

λequip : Total Equipment Failure Rate (Failure / 106Hours)

λ_G : Generic Failure Rate for The ith Generic Part (Failure / 106Hours)

n_i : Quantity of ith Generic Part

n : Number of Different Generic Part Categories

π_Q : Generic Quality Factor for The ith Generic Part (πQ=1)

MTBF Values

G_F : (Ground, Fixed)

RCR-9102B

MTBF ≒ 104,845 時間 (Hours)

2. Components Derating

MODEL : GUS600-12

(1) Calculating Method

(a) Measuring method

・Mounting method : Standard mounting : A	・Ambient temperature : 50°C
・Input voltage : 115 , 230VAC	・Output voltage & current : 12V, 100%

(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

$$\theta\mathrm{j-c} = \frac{\mathrm{Tj(max)} - \mathrm{Tc}}{\mathrm{Pch(max)}} \qquad \theta\mathrm{j-}l = \frac{\mathrm{Tj(max)} - \mathrm{Tl}}{\mathrm{Pch(max)}}$$

Tc : Case Temperature at Start Point of Derating ; 25°C in General

Tl : Lead Temperature at Start Point of Derating ; 25°C in General

Pj(max) (Pch(max)) : Maximum Channel Dissipation

Tj(max) (Tch(max)) : Maximum Junction (channel) Temperature

θj-c (θch-c) : Thermal Impedance between Junction (channel) and Case

θj-l (θch-l) : Thermal Impedance between Junction (channel) and Lead

(2) Component Derating List

Location No.	Measurement condition Vin = 115VAC Iout = 100% Ta = 50°C		
BD1 GBJ25K CHANGZHOU GALAXY	Tch (max) = 150 °C Pch= 9.441 W Tch = Tc + ((θch-c) × Pch) = 96.9 °C D.F. = 64.6 %	θch-c = 1.5 °C/W ΔTc = 32.7 °C	 Tc = 82.7 °C
SCR101 TYN16S-600CTJ WEEN SEMI.	Tch (max) = 150 °C Pch = 1.665 W Tch = Tc + ((θch-c) × Pch) = 103.2 °C D.F. = 68.8 %	θch-c = 1.1 °C/W ΔTc = 51.4 °C	 Tc = 101.4 °C
D114 GSC2D0665D CHANGZHOU GALAXY	Tch (max) = 175 °C Pch= 1.585 W Tch = Tc + ((θch-c) × Pch) = 106.1 °C D.F. = 60.6 %	θch-c = 2.19 °C/W ΔTc = 52.6 °C	 Tc = 102.6 °C
Q1 R6049YNXC7G ROHM	Tj (max) = 150 °C Pd = 7.853 W Tj = Tc + ((θj-c) × Pd) = 92.7 °C D.F. = 61.8 %	θj-c = 1.38 °C/W ΔTc = 31.9 °C	 Tc = 81.9 °C
Q104A,Q104B OSG65R190DT3ZF SUZHOU ORIENTAL	Tj (max) = 150 °C Pd = 1.943 W Tj = Tc + ((θj-c) × Pd) = 95.9 °C D.F. = 63.9 %	θj-c = 0.67 °C/W ΔTc = 44.6 °C	 Tc = 94.6 °C
Q301A,Q301B SFS04R007UGNF SUZHOU ORIENTAL	Tj (max) = 175 °C Pd = 1.079 W Tj = Tc + ((θj-c) × Pd) = 122.3 °C D.F. = 69.9 %	θj-c = 0.89 °C/W ΔTc = 71.3 °C	 Tc = 121.3 °C

Terminology Used

Vin : Input Voltage Iout : Output Current

Ta : Ambient Temperature

(2) Component Derating List

Location No.	Measurement condition Vin = 230VAC Iout = 100%		Ta = 50°C
BD1 GBJ25K CHANGZHOU GALAXY	Tch (max) = 150 °C Pch= 4.643 W Tch = Tc + ((θch-c) × Pch) = 72.7 °C D.F. = 48.4 %	θch-c = 1.5 °C/W ΔTc = 15.7 °C	 Tc = 65.7 °C
SCR101 TYN16S-600CTJ WEEN SEMI.	Tch (max) = 150 °C Pch = 1.665 W Tch = Tc + ((θch-c) × Pch) = 93.5 °C D.F. = 62.4 %	θch-c = 1.1 °C/W ΔTc = 41.7 °C	 Tc = 91.7 °C
D114 GSC2D0665D CHANGZHOU GALAXY	Tch (max) = 175 °C Pch= 1.585 W Tch = Tc + ((θch-c) × Pch) = 95.1 °C D.F. = 54.3 %	θch-c = 2.19 °C/W ΔTc = 41.6 °C	 Tc = 91.6 °C
Q1 R6049YNXC7G ROHM	Tj (max) = 150 °C Pd = 3.247 W Tj = Tc + ((θj-c) × Pd) = 66.6 °C D.F. = 44.4 %	θj-c = 1.38 °C/W ΔTc = 12.1 °C	 Tc = 62.1 °C
Q104A,Q104B OSG65R190DT3ZF SUZHOU ORIENTAL	Tj (max) = 150 °C Pd = 1.943 W Tj = Tc + ((θj-c) × Pd) = 95.1 °C D.F. = 63.4 %	θj-c = 0.67 °C/W ΔTc = 43.8 °C	 Tc = 93.8 °C
Q301A,Q301B SFS04R007UGNF SUZHOU ORIENTAL	Tj (max) = 175 °C Pd = 1.079 W Tj = Tc + ((θj-c) × Pd) = 121.4 °C D.F. = 69.3 %	θj-c = 0.89 °C/W ΔTc = 70.4 °C	 Tc = 120.4 °C

Terminology Used
Vin : Input Voltage
Iout : Output Current
Ta : Ambient Temperature

2. Components Derating

MODEL : GUS600-48

(1) Calculating Method

(a) Measuring method

・Mounting method : Standard mounting : A	・Ambient temperature : 50°C
・Input voltage : 115 , 230VAC	・Output voltage & current : 48V, 100%

(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

$$\theta j - c = \frac{Tj(max) - Tc}{Pch(max)} \qquad \theta j - l = \frac{Tj(max) - Tl}{Pch(max)}$$

Tc : Case Temperature at Start Point of Derating; 25°C in General

Tl : Lead Temperature at Start Point of Derating; 25°C in General

Pj(max) (Pch(max)) : Maximum Channel Dissipation

Tj(max) (Tch(max)) : Maximum Junction (channel) Temperature

θj-c (θch-c) : Thermal Impedance between Junction (channel) and Case

θj-l (θch-l) : Thermal Impedance between Junction (channel) and Lead

(2) Component Derating List

Location No.	Measurement condition Vin = 115VAC Iout = 100%		Ta = 50°C
BD1 GBJ25K CHANGZHOU GALAXY	Tch (max) = 150 °C Pch= 9.441 W Tch = Tc + ((θch-c) × Pch) = 96.4 °C D.F. = 64.2 %	θch-c = 1.5 °C/W ΔTc = 32.2 °C	 Tc = 82.2 °C
SCR101 TYN16S-600CTJ WEEN SEMI.	Tch (max) = 150 °C Pch = 1.665 W Tch = Tc + ((θch-c) × Pch) = 105.8 °C D.F. = 70.6 %	θch-c = 1.1 °C/W ΔTc = 54.0 °C	 Tc = 104.0 °C
D114 GSC2D0665D CHANGZHOU GALAXY	Tch (max) = 175 °C Pch= 1.585 W Tch = Tc + ((θch-c) × Pch) = 110.7 °C D.F. = 63.2 %	θch-c = 2.19 °C/W ΔTc = 57.2 °C	 Tc = 107.2 °C
Q1 R6049YNXC7G ROHM	Tj (max) = 150 °C Pd = 7.853 W Tj = Tc + ((θj-c) × Pd) = 92.6 °C D.F. = 61.8 %	θj-c = 1.38 °C/W ΔTc = 31.8 °C	 Tc = 81.8 °C
Q104A,Q104B OSG65R190DT3ZF SUZHOU ORIENTAL	Tj (max) = 150 °C Pd = 1.963 W Tj = Tc + ((θj-c) × Pd) = 92.9 °C D.F. = 61.9 %	θj-c = 0.67 °C/W ΔTc = 41.6 °C	 Tc = 91.6 °C
Q301A,Q301B SFS15R09GNF SUZHOU ORIENTAL	Tj (max) = 175 °C Pd = 0.881 W Tj = Tc + ((θj-c) × Pd) = 108.4 °C D.F. = 61.9 %	θj-c = 0.78 °C/W ΔTc = 57.7 °C	 Tc = 107.7 °C

Terminology Used

Vin : Input Voltage   Iout : Output Current

Ta : Ambient Temperature

(2) Component Derating List

Location No.	Measurement condition Vin = 230VAC Iout = 100% Ta = 50°C		
BD1 GBJ25K CHANGZHOU GALAXY	Tch (max) = 150 °C Pch= 4.643 W Tch = Tc + ((θch-c) × Pch) = 71.9 °C D.F. = 47.9 %	θch-c = 1.5 °C/W ΔTc = 14.9 °C	 Tc = 64.9 °C
SCR101 TYN16S-600CTJ WEEN SEMI.	Tch (max) = 150 °C Pch = 1.665 W Tch = Tc + ((θch-c) × Pch) = 95.2 °C D.F. = 63.5 %	θch-c = 1.1 °C/W ΔTc = 43.4 °C	 Tc = 93.4 °C
D114 GSC2D0665D CHANGZHOU GALAXY	Tch (max) = 175 °C Pch= 1.585 W Tch = Tc + ((θch-c) × Pch) = 98.5 °C D.F. = 56.3 %	θch-c = 2.19 °C/W ΔTc = 45.0 °C	 Tc = 95.0 °C
Q1 R6049YNXC7G ROHM	Tj (max) = 150 °C Pd = 3.247 W Tj = Tc + ((θj-c) × Pd) = 66.1 °C D.F. = 44.1 %	θj-c = 1.38 °C/W ΔTc = 11.6 °C	 Tc = 61.6 °C
Q104A,Q104B OSG65R190DT3ZF SUZHOU ORIENTAL	Tj (max) = 150 °C Pd = 1.963 W Tj = Tc + ((θj-c) × Pd) = 91.7 °C D.F. = 61.1 %	θj-c = 0.67 °C/W ΔTc = 40.4 °C	 Tc = 90.4 °C
Q301A,Q301B SFS15R09GNF SUZHOU ORIENTAL	Tj (max) = 175 °C Pd = 0.881 W Tj = Tc + ((θj-c) × Pd) = 107.4 °C D.F. = 61.4 %	θj-c = 0.78 °C/W ΔTc = 56.7 °C	 Tc = 106.7 °C

Terminology Used

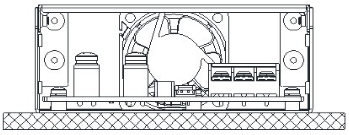
Vin : Input Voltage — Iout : Output Current

Ta : Ambient Temperature

3. Main Components Temperature Rise △T List

MODEL : GUS600-12

(1) Measuring Conditions

	Mounting A	
Mounting Method (Standard Mounting : A)		
Input Voltage	115VAC	230VAC
Output Voltage	12VDC	
Output Current	100%	
Ambient Temperature	50°C	
Cooling Condition	Forced air cooling by Intake FAN	

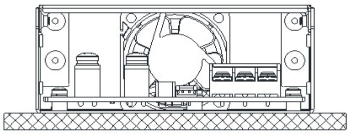
(2) Measuring Results

		ΔT Temperature Rise (°C)	
Input Voltage		115VAC	230VAC
Location No.	Part name	Mounting A	
A101	IPD	6.2	6.0
A102	IC	24.1	15.1
A105	IC	13.2	11.7
A301	IC	57.4	56.5
BD1	BRIDGE DIODE	32.7	15.7
C11A~C11D	E.CAP.	4.7	4.0
C13	Cap., FILM	11.9	11.7
C14	Cap., FILM	6.2	6.1
C51A~C51E	E.CAP.	35.6	34.9
D114	SBD	52.6	41.6
L1	BALUN	25.2	9.7
L2	CHOKE COIL	37.1	14.6
PC103	PHOTO COUPLER	16.6	15.1
Q1	MOS FET	31.9	12.1
Q104A, Q104B	MOS FET	44.6	43.8
Q301A, Q301B	MOS FET	71.3	70.4
R136	RESISTOR	44.5	19.6
SCR101	THYRISTOR	51.4	41.7
T1	TRANS	59.3	58.5
T2	TRANS	2.5	2.5

3. Main Components Temperature Rise △T List

MODEL : GUS600-48

(1) Measuring Conditions

Mounting Method (Standard Mounting : A)	Mounting A 	
Input Voltage	115VAC	230VAC
Output Voltage	48VDC	
Output Current	100%	
Ambient Temperature	50°C	
Cooling Condition	Forced air cooling by Intake FAN	

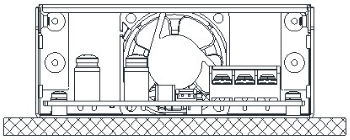
(2) Measuring Results

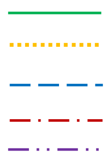
		ΔT Temperature Rise (°C)	
Input Voltage		115VAC	230VAC
Location No.	Part name	Mounting A	
A101	IPD	5.3	4.6
A102	IC	24.5	14.6
A105	IC	10.7	9.0
A301	IC	38.9	37.9
BD1	BRIDGE DIODE	32.2	14.9
C11A~C11D	E.CAP.	3.7	2.6
C13	Cap., FILM	6.2	5.5
C14	Cap., FILM	6.4	5.7
C51A~C51E	E.CAP.	17.5	16.5
D114	SBD	57.2	45.0
L1	BALUN	23.3	9.1
L2	CHOKE COIL	41.3	15.4
PC103	PHOTO COUPLER	10.0	8.3
Q1	MOS FET	31.8	11.6
Q104A, Q104B	MOS FET	41.6	40.4
Q301A, Q301B	MOS FET	57.7	56.7
R136	RESISTOR	44.2	18.8
SCR101	THYRISTOR	54.0	43.4
T1	TRANS	63.7	62.9
T2	TRANS	2.4	1.7

4. Electrolytic Capacitor Lifetime

MODEL : GUS600-12

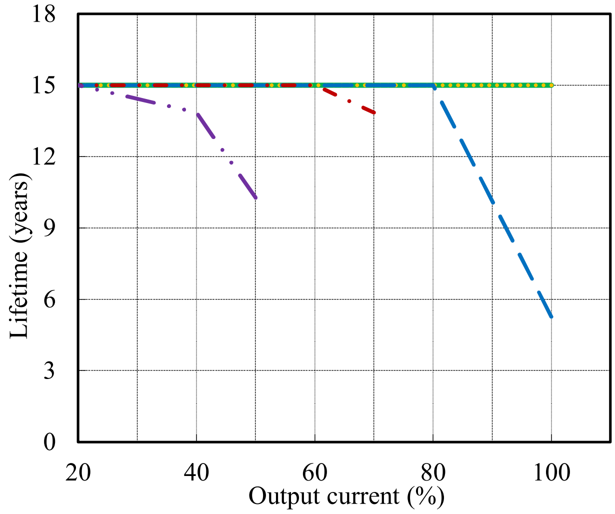
Cooling condition : Forced air cooling by Intake FAN





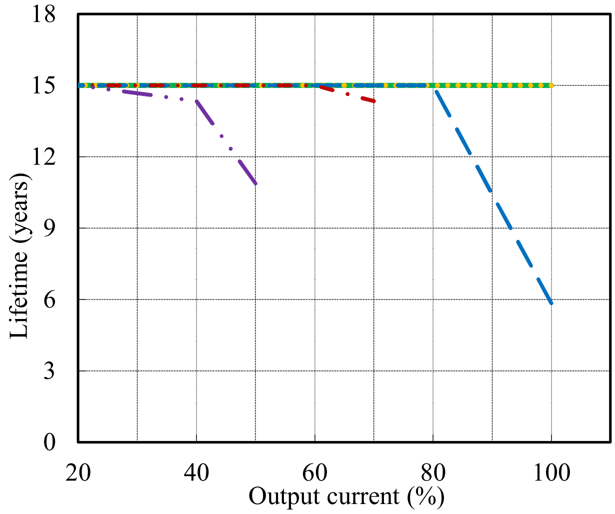
Vin=115VAC

Load (%)	Lifetime (years)				
	Ta=30°C	Ta=40°C	Ta=50°C	Ta=60°C	Ta=70°C
100	15.0	15.0	5.3	-	-
80	15.0	15.0	15.0	-	-
70	15.0	15.0	15.0	13.9	-
60	15.0	15.0	15.0	15.0	-
50	15.0	15.0	15.0	15.0	10.3
40	15.0	15.0	15.0	15.0	13.9
20	15.0	15.0	15.0	15.0	15.0



Vin=230VAC

Load (%)	Lifetime (years)				
	Ta=30°C	Ta=40°C	Ta=50°C	Ta=60°C	Ta=70°C
100	15.0	15.0	5.8	-	-
80	15.0	15.0	15.0	-	-
70	15.0	15.0	15.0	14.3	-
60	15.0	15.0	15.0	15.0	-
50	15.0	15.0	15.0	15.0	10.9
40	15.0	15.0	15.0	15.0	14.3
20	15.0	15.0	15.0	15.0	15.0

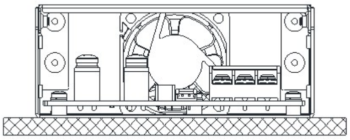


4. Electrolytic Capacitor Lifetime

MODEL : GUS600-24

Cooling condition : Forced air cooling by Intake FAN

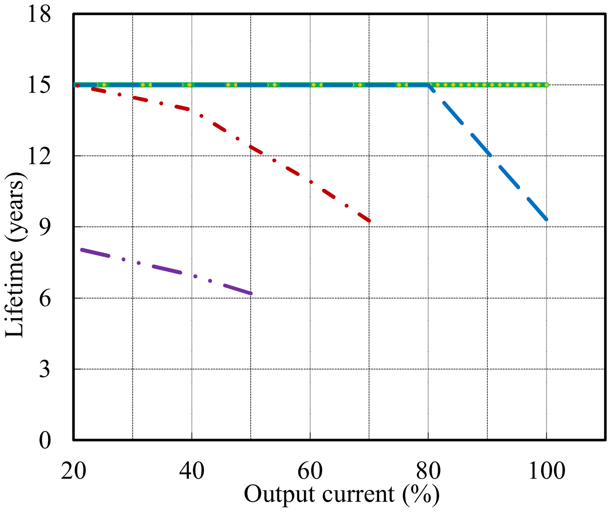
(STANDARD MOUNTING)



Ta 30°C : 40°C : 50°C : 60°C : 70°C :

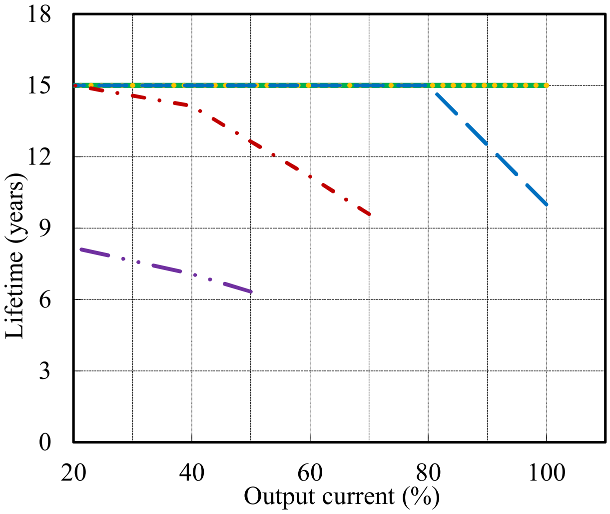
Vin=115VAC

Load (%)	Lifetime (years)				
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C	Ta= 70°C
100	15.0	15.0	9.3	-	-
80	15.0	15.0	15.0	-	-
70	15.0	15.0	15.0	9.3	-
60	15.0	15.0	15.0	10.9	-
50	15.0	15.0	15.0	12.4	6.2
40	15.0	15.0	15.0	13.9	7.0
20	15.0	15.0	15.0	15.0	8.1



Vin=230VAC

Load (%)	Lifetime (years)				
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C	Ta= 70°C
100	15.0	15.0	10.0	-	-
80	15.0	15.0	15.0	-	-
70	15.0	15.0	15.0	9.6	-
60	15.0	15.0	15.0	11.2	-
50	15.0	15.0	15.0	12.6	6.3
40	15.0	15.0	15.0	14.1	7.1
20	15.0	15.0	15.0	15.0	8.2

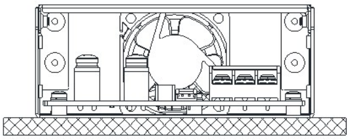


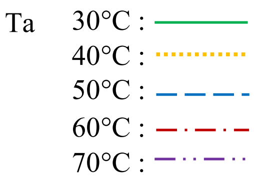
4. Electrolytic Capacitor Lifetime

MODEL : GUS600-36

Cooling condition : Forced air cooling by Intake FAN

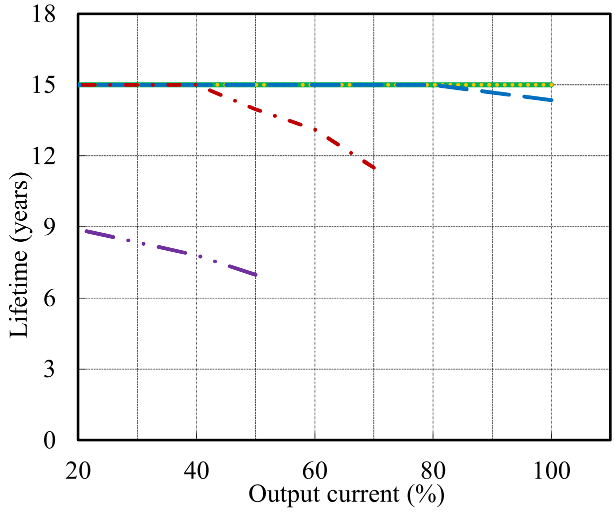
(STANDARD MOUNTING)





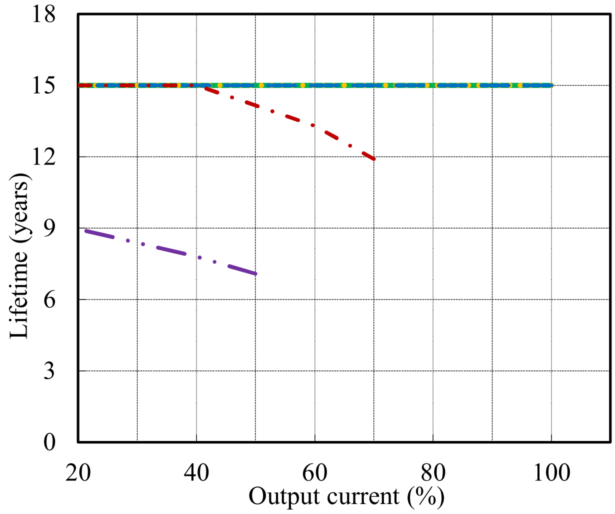
Vin=115VAC

Load (%)	Lifetime (years)				
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C	Ta= 70°C
100	15.0	15.0	14.4	-	-
80	15.0	15.0	15.0	-	-
70	15.0	15.0	15.0	11.5	-
60	15.0	15.0	15.0	13.1	-
50	15.0	15.0	15.0	14.0	7.0
40	15.0	15.0	15.0	15.0	7.8
20	15.0	15.0	15.0	15.0	8.9



Vin=230VAC

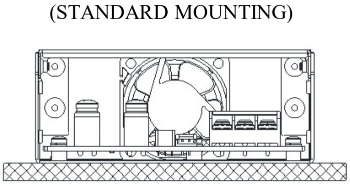
Load (%)	Lifetime (years)				
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C	Ta= 70°C
100	15.0	15.0	15.0	-	-
80	15.0	15.0	15.0	-	-
70	15.0	15.0	15.0	11.9	-
60	15.0	15.0	15.0	13.3	-
50	15.0	15.0	15.0	14.2	7.1
40	15.0	15.0	15.0	15.0	7.8
20	15.0	15.0	15.0	15.0	9.0

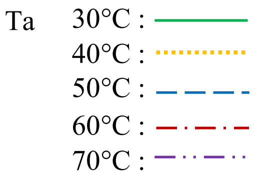


4. Electrolytic Capacitor Lifetime

MODEL : GUS600-48

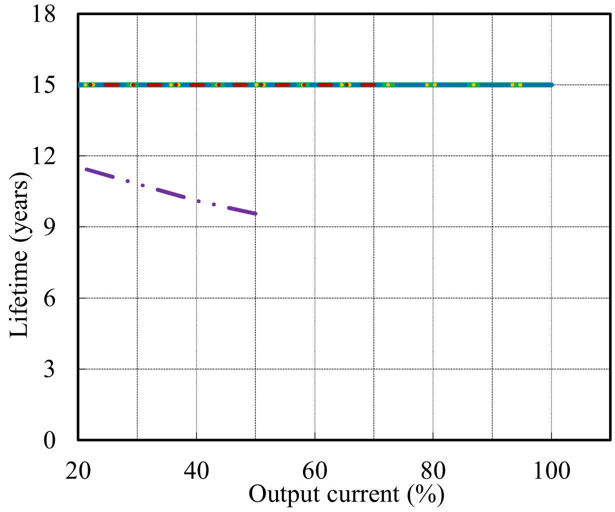
Cooling condition : Forced air cooling by Intake FAN





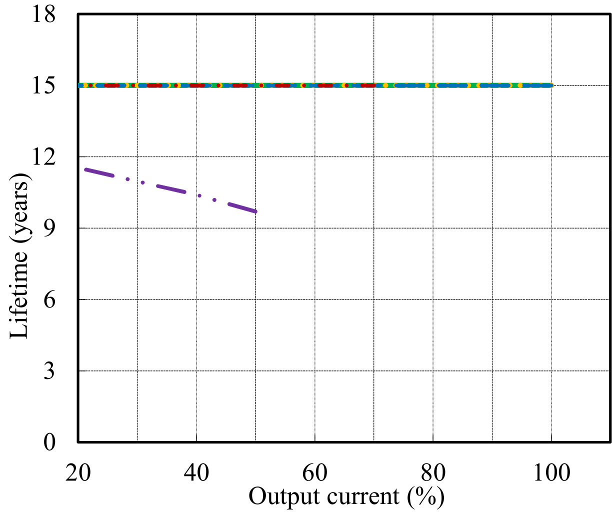
Vin=115VAC

Load (%)	Lifetime (years)				
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C	Ta= 70°C
100	15.0	15.0	15.0	-	-
80	15.0	15.0	15.0	-	-
70	15.0	15.0	15.0	15.0	-
60	15.0	15.0	15.0	15.0	-
50	15.0	15.0	15.0	15.0	9.6
40	15.0	15.0	15.0	15.0	10.1
20	15.0	15.0	15.0	15.0	11.5



Vin=230VAC

Load (%)	Lifetime (years)				
	Ta= 30°C	Ta= 40°C	Ta= 50°C	Ta= 60°C	Ta= 70°C
100	15.0	15.0	15.0	-	-
80	15.0	15.0	15.0	-	-
70	15.0	15.0	15.0	15.0	-
60	15.0	15.0	15.0	15.0	-
50	15.0	15.0	15.0	15.0	9.7
40	15.0	15.0	15.0	15.0	10.4
20	15.0	15.0	15.0	15.0	11.5



5. Abnormal Test

MODEL : GUS600-24

(1) Test Conditions

Input : 230VAC Output : 24V, 100% Ta : 25℃

(2) Test Results

(Da : Damaged)

No.	Test position		Test mode		Test result												
	Location No.	Test point	Short	Open	a Fire	b Smoke	c Burst	d Smell	e Red hot	f Damaged	g Fuse blown	h OVP	I OCP	j No output	k No change	l Others	Note
1	Q1	G		○						○	○			○			Da: F1, Q1
		D		○										○			
		S		○										○			
		G-S	○											○			
		G-D	○							○	○			○			Da: F1, Q1, R156
		D-S	○							○	○			○			Da: F1
2	D114		○							○	○			○			Da: F1, Q1, R173, Q108, SCR101
				○						○	○			○			Da: F1, Q1
3	L2	4-6	○							○	○			○			Da: F1, Q1
		4		○										○			
		6		○										○			
4	C3		○							○	○			○			Da: F1
				○											○		
5	SA101		○												○		
				○											○		
6	C8		○							○	○			○			Da: F1
				○												○	Input power increases 5W
7	BD1	1		○										○			
		2		○										○			
		3		○										○			
		4		○										○			
		1~2	○							○	○			○			Da: F1
		2~3	○							○	○			○			Da: F1
		3~4	○							○	○			○			Da: F1
		1~4	○							○	○			○			Da: F1
8	Q104A	G		○						○	○			○			Da: F2, Q104A, Q104B
		D		○										○			
		S		○										○			
		G-S	○											○			
		G-D	○							○	○			○			Da: Q104A, Q104B, F1, R208, A105, Q106, A104
		D-S	○							○	○			○			Da: F2, Q104A

5. Abnormal Test

MODEL : GUS600-24

(1) Test Conditions

Input : 230VAC Output : 24V, 100% Ta : 25℃

(2) Test Results

(Da : Damaged)

No.	Test position		Test mode		Test result												
	Location No.	Test point	Short	Open	a Fire	b Smoke	c Burst	d Smell	e Red hot	f Damaged	g Fuse blown	h OVP	I OCP	j No output	k No change	l Others	Note
9	Q104B	G		○						○	○			○			Da: F2, Q104A, Q104B
		D		○										○			
		S		○										○			
		G-S	○											○			
		G-D	○							○				○			Da: Q104B
		D-S	○							○	○			○			Da: F2, Q104A
10	T2	3		○										○			
		4		○										○			
		5		○										○			
		7		○										○			
		3~4	○											○			
		5~7	○											○			
11	Q301A	D		○										○			
		S		○										○			
		G		○												○	Input power increase
		D~S	○											○			
		G~S	○													○	Input power increase
		G~D	○							○				○			Da: Q301A
12	Q301B	D		○										○			
		S		○										○			
		G		○												○	Input power increase
		D~S	○											○			
		G~S	○													○	Input power increase
		G~D	○							○				○			Da: Q301B
13	T1	1		○										○			
		2		○										○			
		3		○										○			
		4		○										○			
		5		○										○			
		8		○										○			
		1~4	○											○			
		2~3	○											○			
		5~8	○											○			
14	SCR101	A		○												○	Input power increase
		K		○												○	Input power increase
		G		○												○	Input power increase
		A-K	○												○		
		A-G	○												○		
		G-K	○													○	Input power increase

6. Vibration Test

MODEL： GUS600-12/24/36/48

(1) Vibration Test Class

Frequency variable endurance test

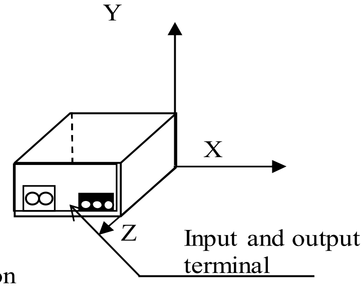
(2) Equipment Used

Unholtz Dickie Corp. DC-3200-36

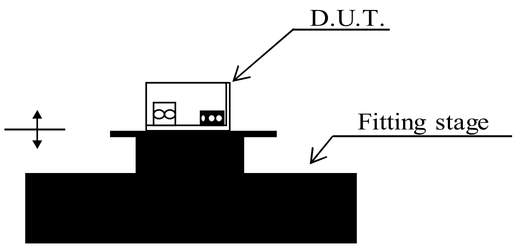
(3) Test Conditions

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

(4) Test Method



Direction



Vibrator

(5) Acceptable Conditions

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

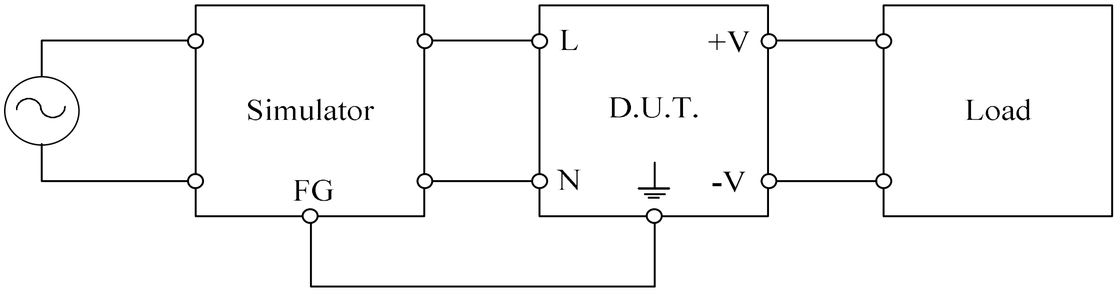
(6) Test Results

OK

7. Noise Simulate Test

MODEL : GUS600-12/24/36/48

(1) Test Circuit and Equipment



Simulator : INS-4040 (Noise Laboratory Co.,LTD)

(2) Test Conditions

・Input voltage	: 100, 230VAC	・Noise level	: 0～2kV(Input Port) 0～2kV(Output Port)
・Output Voltage	: Rated	・Phase	: 0～360 deg
・Output current	: 0%, 100%	・Polarity	: ＋,－
・Ambient temperature	: 25℃	・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

OK

8. Thermal Shock Test

MODEL : GUS600-36

(1) Equipment Used (Thermal Shock Chamber)

ESPEC CORP. : U3S-100-W

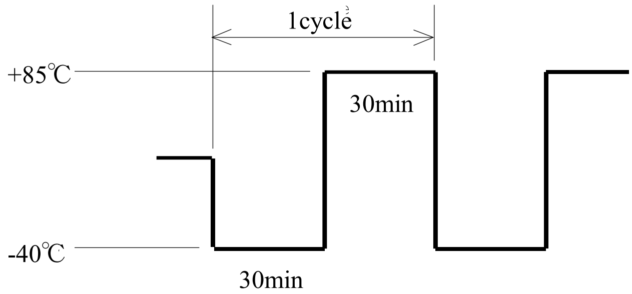
(2) Test Conditions

・Ambient Temperature : -40℃ ⇔ 85℃

・Test Time : Refer to Dwg.

・Test Cycle : 200 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. 200 cycles later, leave it for 1 hour at the room temperature, check if there is no abnormal output.

(4) Acceptable Conditions

No abnormal output after test.

(5) Test Results

OK

9. FAN Life Expectancy

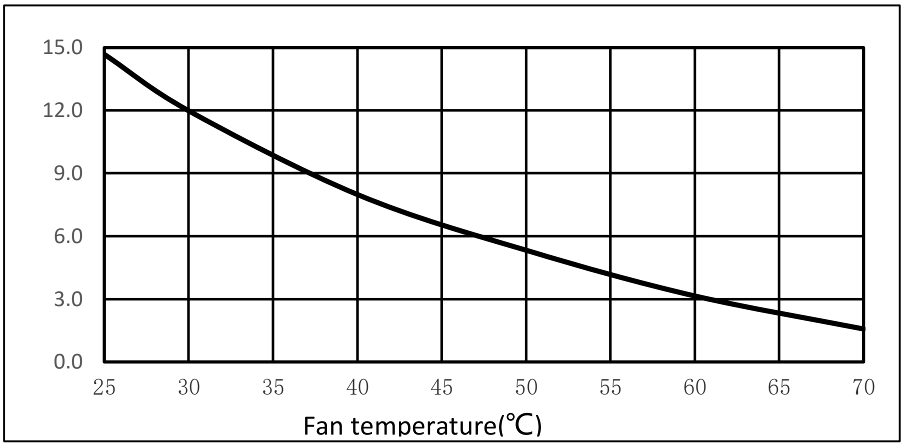
MODEL： GUS600-12

(1) Part Name

SB120420BMCNR012 (SHENGJIU)
or DA04020B12HA-1 (HUAXIA HENGTAI)

(2) Life Expectancy

The data shows fan life expectancy for fan only by manufacture (90% survival tate).
Fig. 1 shows measuring point of fan temperature.



Temperature(℃)	Life(years)
25	14.7
30	12.0
40	8.0
50	5.3
60	3.2
70	1.6

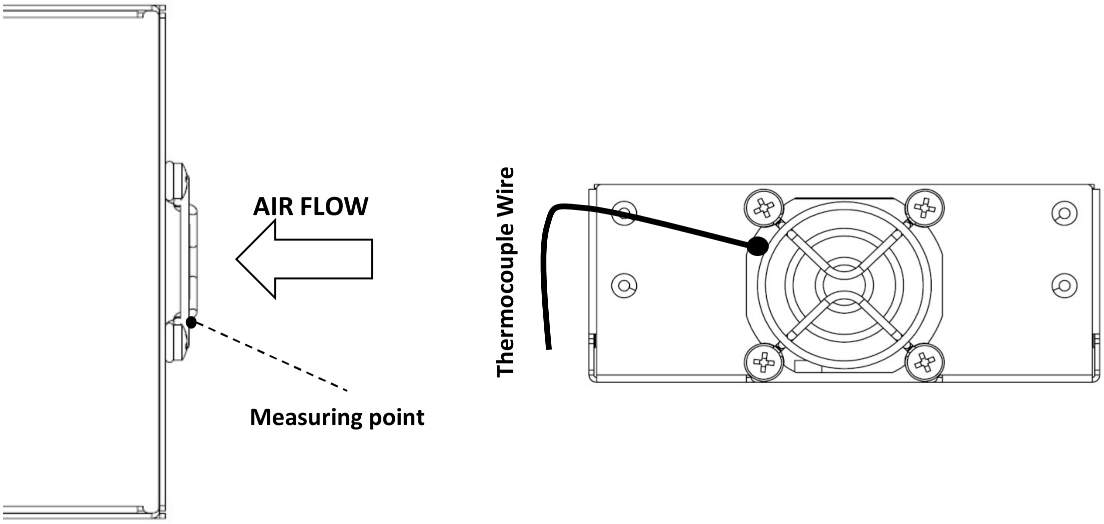


Fig.1 Measuring point of fan temperature.