SWS600L

RELIABILITY DATA

I N D E X

Terminology used

FG ………Frame Ground

※ The above data is typical value. As all units have nearly the same characteristics, the data to be considered as ability value.

1. Calculated values of MTBF

(1) Parts stress reliability prediction MTBF

MODEL：SWS600L-24

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)

＜Formula＞

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

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

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 : 230VAC
- ・Output voltage & current : 24VDC, 27A (100%)
- ・Environmental factor : GB (Ground, Benign)
- ・Mounting method : Standard mounting A

SR-332,Issue3

MTBF(Ta=25℃) ≒ 1,144,923 Hours

MTBF(Ta=40℃) ≒ 579,055 Hours

(2) Part count reliability prediction MTB

MODEL : SWS600L-5

Calculating method

Calculated based on part count reliability projection of JEITA (RCR-9102).

Individual failure rates λ_G is given to each part and MTBF is calculated by the count of each part.

<Formula> :

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

λ_{equip} : Total equipment failure rate (Failure/10^6 Hours)

λ_G : Generic failure rate for the ith generic part (Failure/10^6 Hours)

N_i : Quantity of ith generic part

n : Number of different generic part categories

π_Q : Generic quality factor for the ith generic part (π_Q =1)

MTBF values

G_F : (Ground , Fixed)

MTBF =136,721 (Hours)

However MTBF calculation for fan isn't included.

2. Component derating

MODEL : SWS600L-5

(1) Calculating method

(a) Measuring Conditions

Input	:	115 , 230VAC	Ambient temperature	:	50°C
Output	:	5V 120A(100%)	Mounting method	:	Mounting A,B,C

(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

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

T_c	: Case temperature at start point of derating ; 25°C in general
T_a	: Ambient temperature at start point of derating ; 25°C in general
T_l	: Lead temperature at start point of derating ; 25°C in general
$P_{c(max)}$ ($P_{ch(max)}$)	: Maximum collector(channel) dissipation
$T_{j(max)}$ ($T_{ch(max)}$)	: Maximum junction(channel) temperature
θ_{j-c} (θ_{ch-c})	: Thermal impedance between junction(channel) and case
θ_{j-a}	: Thermal impedance between junction and air
θ_{j-l}	: Thermal impedance between junction and lead

(2) Component derating list

Location No.	Vin = 115VAC Load = 100% Ta = 50°C
Q1,Q2 F20W60C3 SHINDENGEN	Tchmax = 150°C, θ ch-c = 1.66°C/W, Pch(max) = 75W, Pch = 8.6W, Δ Tc = 41.6°C, Tc = 91.6 °C Tch = Tc + ((θ ch-c) × Pch) =105.9°C D.F. = 70.6%
Q31,Q32 2SK2611 TOSHIBA	Tchmax = 150 °C, θ ch-c = 0.833°C/W, Pch(max) = 150W, Pch =18.6 W, Δ Tc =45.8 °C, Tc =95.8 °C Tch = Tc + ((θ ch-c) × Pch) = 111.3°C D.F. = 74.2%
Q304 2SA1213-Y-TE12L TOSHIBA	Tjmax = 150 °C, θ j-a = 250°C/W, Pc(max) = 0.5W Pc =82.7 mW, Δ Ta =25 .0°C, Ta = 75.0°C Tj = Ta + ((θ j-a) × Pc) = 95.7°C D.F. = 63.8%
Q331 2SC2712-Y-TE85L TOSHIBA	Tjmax = 125 °C, θ j-a = 666.67°C/W, Pc(max) = 150mW Pc = 16.0mW, Δ Ta = 41.3°C, Ta = 91.3°C Tj = Ta + ((θ j-a) × Pc) = 102.0°C D.F. =81.6 %
SR1 SF10JZ47(F) TOSHIBA	Tjmax = 125 °C, θ j-c = 3.4°C/W, Pc = 3.2 W, Δ Tc =41.8 °C, Tc = 91.8°C Tj = Tc + ((θ j-c) × Pc) = 102.7°C D.F. =82.2 %
D1 D25XB60 SHINDENGEN	Tjmax = 150°C, θ j-c = 1.0°C/W, Pd = 14.3W, Δ Tc =36.2°C, Tc = 86.2°C Tj = Tc + ((θ j-c) × Pd) = 100.5°C D.F. = 67.0%
D2 S20LC60US SHINDENGEN	Tjmax = 150 °C, θ j-c = 1.0°C/W, Pd = 8.0 W, Δ Tc = 37.3°C, Tc = 87.3°C Tj = Tc + ((θ j-c) × Pd) = 95.3°C D.F. =63.5%
D51,D52 S60SC4M SINDENGEN	Tjmax = 150°C, θ j-c = 0.5°C/W, Pd =9.9W, Δ Tc =48.2 °C, Tc = 98.2°C Tj = Tc + ((θ j-c) × Pd) =103.2 °C D.F. = 68.8%
D53,D54,D55 S60SC4M SINDENGEN	Tjmax = 150 °C, θ j-c = 0.5°C/W, Pd = 15.4 W, Δ Tc = 55.3°C, Tc =105.3 °C Tj = Tc + ((θ j-c) × Pd) = 113.0°C D.F. = 75.3 %
D101 CRH01 TOSHIBA	Tjmax = 150°C, θ j-a = 130°C/W, Pd = 9.3mW, Δ Ta = 17.0°C, Ta = 67.0°C Tj = Ta + ((θ j-a) × Pd) = 68.2°C D.F. =45.5 %
D102 CRH01 TOSHIBA	Tjmax = 150°C, θ j-a = 130°C/W, Pd =9.6 mW, Δ Ta =15.4°C, Ta =65.4 °C Tj = Ta + ((θ j-a) × Pd) =66.6°C D.F. = 44.4%
D151 U05NU44 TOSHIBA	Tjmax = 150 °C, θ j-a = 105 °C/W, Pd =270.0 mW, Δ Ta =33.9°C, Ta = 83.9°C Tj = Ta + ((θ j-a) × Pd) = 112.3°C D.F. = 74.8%
D301,D305 CRH01 TOSHIBA	Tjmax = 150°C, θ j-a = 130°C/W, Pd =112.0mW, Δ Ta =37.8°C, Ta = 87.8°C Tj = Ta + ((θ j-a) × Pd) =102.4°C D.F. = 68.2%
D331 CRH01 TOSHIBA	Tjmax = 150 °C, θ j-a = 130°C/W, Pd = 48.0mW, Δ Ta = 32.1°C, Ta =82.1 °C Tj = Ta + ((θ j-a) × Pd) = 88.3°C D.F. =58.9 %
D353 CRH01 TOSHIBA	Tjmax = 150°C, θ j-a = 130°C/W, Pd = 147.0mW, Δ Ta =31.0°C, Ta = 81.0°C Tj = Ta + ((θ j-a) × Pd) = 100.1°C D.F. = 66.7%

Location No.	Vin = 115VAC Load = 100% Ta = 50°C
D371 CRH01 TOSHIBA	Tjmax =150°C, θ j-a = 130°C/W, Pd = 6.7mW, Δ Ta =51.1°C, Ta=101.1°C Tj = Ta + ((θ j-a) × Pd) =102.0 °C D.F. = 68.0%
A102 FA5502M FUJI-ELEC.	Tjmax = 150°C, θ j-a = 192.3 °C/W, Pd = 61.4mW, Δ Ta =30.2°C, Ta=80.2°C Tj = Ta + ((θ j-a) × Pd) = 92.0°C D.F. =61.3 %
A152 M51995AFP-600C MITSUBISHI	Tjmax = 150°C, θ j-a = 83.3°C/W, Pd=50.0mW, Δ Ta =31.1 °C, Ta = 81.1°C Tj = Ta + ((θ j-a) × Pd) = 85.3°C D.F. = 56.8%
A301 BA178M12FP-E2 ROHM	Tjmax = 150°C, θ j-c = 125°C/W, Pd = 260.0mW, Δ Tc = 23.8°C, Tc =73.8 °C Tj = Tc + ((θ j-c) × Pd) = 106.3°C D.F. = 70.9%
A303 BA178M05FP-E2 ROHM	Tjmax = 150 °C, θ j-c = 125°C/W, Pd = 0.2W, Δ Tc = 29.0°C, Tc =79 .0°C Tj = Tc + ((θ j-c) × Pd) = 104.0°C D.F. = 69.3%
A331 UPC1093T-E1 NEC	Tjmax = 150 °C, θ j-a = 312.5°C/W, Pd =40.0mW, Δ Ta =34.9 °C, Ta = 84.9°C Tj = Ta + ((θ j-a) × Pd) =97.4 °C D.F. =64.9 %
A351 MIP2E2DMUL MATSUSHIBA	Tjmax = 150 °C, θ j-c = 10°C/W, Pd = 1.5W, Δ Tc =30.0°C, Tc =80.0 °C Tj = Tc + ((θ j-c) × Pd) = 95.0°C D.F. =63.3 %
PC31 PS2581L2 (LED) NEC	Tjmax = 125 °C, θ j-a = 666.7°C/W, Pc(max) = 150mW, Pc = 4.7mW, Δ Ta = 21.9°C, Ta =71.9 °C Tj = Ta + ((θ j-a) × Pc) =75.0 °C D.F. = 60.0%
PC31 PS2581L2 (TRANSISTOR) NEC	Tjmax = 125°C, θ j-a = 666.7°C/W, Pc(max) = 150mW, Pc =3.0mW, Δ Ta = 21.9°C, Ta = 71.9°C Tj = Ta + ((θ j-a) × Pc) = 73.9°C D.F. =59.1%
PC52 PS2581L2 (LED) NEC	Tjmax = 125°C, θ j-a = 666.7°C/W, Pc(max) = 150mW, Pc =9.0mW, Δ Ta =21.0 °C, Ta = 71.0°C Tj = Ta + ((θ j-a) × Pc) =77.0 °C D.F. = 61.6%
PC52 PS2581L2 (TRANSISTOR) NEC	Tjmax = 125°C, θ j-a = 666.7°C/W, Pc(max) = 150mW, Pc =2.0mW, Δ Ta = 21.0 °C, Ta =71.0 °C Tj = Ta + ((θ j-a) × Pc) = 72.3°C D.F. =57.9 %
PC302 TLP172A (LED) TOSHIBA	I_F(max) = 50mA, Δ I_F /°C = -0.5mA/°C, I_F = 7.7mA, Δ Ta =23.9 °C , Ta = 73.9°C I_F(max) at Ta = 25.6mA D.F. = 30.1%
PC302 TLP172A (MOSFET) TOSHIBA	I_{ON}(max) = 400mA, Δ I_{ON} /°C = -4.0mA/°C, I_{ON} = 10.0 mA, Δ Ta =23.9 °C, Ta =73.9 °C I_{ON}(max) at Ta = 204.4mA D.F. = 4.9%
PC303 PS2801-1 (LED) NEC	Tjmax = 125°C, θ j-a = 1666.7°C/W, Pc(max) = 60mW, Pc =2.5 mW, Δ Ta = 40.2°C, Ta = 90.2°C Tj = Ta + ((θ j-a) × Pc) = 94.4°C D.F. =75.5 %
PC303 PS2801-1 (TRANSISTOR) NEC	Tjmax = 125 °C, θ j-a = 833.3°C/W, Pc(max) = 120mW, Pc = 1.0mW, Δ Ta = 40.2°C, Ta = 90.2°C Tj = Ta + ((θ j-a) × Pc) = 91.0°C D.F. = 72.8%

(2) Component derating list

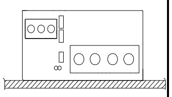
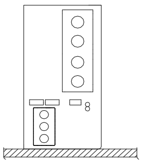
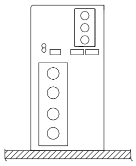
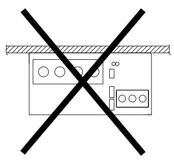
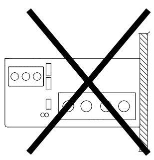
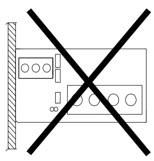
Location No.	Vin = 230VAC Load = 100% Ta = 50°C		
Q1,Q2 F20W60C3 SHINDENGEN	Tchmax = 150°C, Pch = 2.7 W, Tch = Tc + ((θ ch-c) × Pch) =80.5°C D.F. = 53.7%	θ ch-c = 1.66°C/W, Δ Tc =26.0 °C,	Pch(max) = 75W, Tc = 76 .0°C
Q31,Q32 2SK2611 TOSHIBA	Tchmax = 150 °C, Pch =18.6 W, Tch = Tc + ((θ ch-c) × Pch) =107.8 °C D.F. = 71.9%	θ ch-c = 0.833°C/W, Δ Tc =42.3 °C,	Pch(max) = 150W, Tc = 92.3°C
Q304 2SA1213-Y-TE12L TOSHIBA	Tjmax = 150 °C, Pc =82.7mW, Tj = Ta + ((θ j-a) × Pc) = 95.7°C D.F. = 63.8%	θ j-a = 250°C/W, Δ Ta = 25.0°C,	Pc(max) = 0.5W Ta = 75.0°C
Q331 2SC2712-Y-TE85L TOSHIBA	Tjmax = 125 °C, Pc = 16.0mW, Tj = Ta + ((θ j-a) × Pc) =100.3 °C D.F. = 80.2%	θ j-a = 666.67°C/W, Δ Ta = 39.6°C,	Pc(max) = 150mW Ta =89.6 °C
SR1 SF10JZ47(F) TOSHIBA	Tjmax = 125 °C, Pc = 3.1 W, Tj = Tc + ((θ j-c) × Pc) = 91.5°C D.F. = 73.2%	θ j-c = 3.4°C/W, Δ Tc = 31.0°C,	Tc = 81.0°C
D1 D25XB60 SHINDENGEN	Tjmax = 150°C, Pd = 7.1W, Tj = Tc + ((θ j-c) × Pd) = 78.9°C D.F. = 52.6%	θ j-c = 1.0°C/W, Δ Tc = 21.8°C,	Tc = 71.8°C
D2 S20LC60US SHINDENGEN	Tjmax = 150 °C, Pd = 7.5W, Tj = Tc + ((θ j-c) × Pd) =83.5°C D.F. =55.7 %	θ j-c = 1.0°C/W, Δ Tc = 26.0°C,	Tc = 76.0°C
D51,D52 S60SC4M SINDENGEN	Tjmax = 150°C, Pd = 9.9W, Tj = Tc + ((θ j-c) × Pd) = 98.2°C D.F. = 65.4%	θ j-c = 0.5°C/W, Δ Tc =43.2 °C,	Tc = 93.2°C
D53,D54,D55 S60SC4M SINDENGEN	Tjmax = 150 °C, Pd = 15.4W, Tj = Tc + ((θ j-c) × Pd) = 113.2°C D.F. = 75.5%	θ j-c = 0.5°C/W, Δ Tc =55.5 °C,	Tc = 105.5°C
D101 CRH01 TOSHIBA	Tjmax = 150°C, Pd =12.7 mW, Tj = Ta + ((θ j-a) × Pd) = 67.2°C D.F. = 44.8%	θ j-a = 130°C/W, Δ Ta = 15.5°C,	Ta =65.5 °C
D102 CRH01 TOSHIBA	Tjmax = 150°C, Pd =8.4 mW, Tj = Ta + ((θ j-a) × Pd) =65.3 °C D.F. = 43.5%	θ j-a = 130°C/W, Δ Ta =14.2°C,	Ta = 64.2°C
D151 U05NU44 TOSHIBA	Tjmax = 150 °C, Pd = 270.0mW, Tj = Ta + ((θ j-a) × Pd) = 112.8°C D.F. = 75.2%	θ j-a = 105 °C/W, Δ Ta =34.4°C,	Ta = 84.4°C
D301 CRH01 TOSHIBA	Tjmax = 150°C, Pd =112.0mW, Tj = Ta + ((θ j-a) × Pd) = 100.2°C D.F. = 66.8%	θ j-a = 130°C/W, Δ Ta =35.6°C,	Ta =85.6 °C
D331 CRH01 TOSHIBA	Tjmax = 150 °C, Pd = 48.0mW, Tj = Ta + ((θ j-a) × Pd) =86.2 °C D.F. = 57.5%	θ j-a = 130°C/W, Δ Ta =30.0°C,	Ta = 80.0°C
D353 CRH01 TOSHIBA	Tjmax = 150°C, Pd = 147.0mW, Tj = Ta + ((θ j-a) × Pd) = 95.8°C D.F. = 63.9%	θ j-a = 130°C/W, Δ Ta = 26.7°C,	Ta = 76.7°C

Location No.	Vin = 230VAC	Load = 100%	Ta = 50°C
D371 CRH01 TOSHIBA	Tjmax =150°C, Pd = 6.7mW, Tj = Ta + ((θ j-a) × Pd) 100.3°C D.F. = 66.8%	θ j-a = 130°C/W, Δ Ta =49.4°C,	 Ta=99.4°C
A102 FA5502M FUJI-ELEC.	Tjmax = 150°C, Pd =38.1mW, Tj = Ta + ((θ j-a) × Pd) = 83.1°C D.F. = 55.4%	θ j-a = 192.3 °C/W, Δ Ta =25.8°C,	 Ta=75.8°C
A152 M51995AFP-600C MITSUBISHI	Tjmax = 150°C, Pd= 50.0mW, Tj = Ta + ((θ j-a) × Pd) =81.2 °C D.F. = 54.1%	θ j-a = 83.3°C/W, Δ Ta = 27.0°C,	 Ta = 77.0°C
A301 BA178M12FP-E2 ROHM	Tjmax = 150°C, Pd =260 mW, Tj = Tc + ((θ j-c) × Pd) = 101.4°C D.F. = 67.6%	θ j-c = 125°C/W, Δ Tc = 18.9°C,	 Tc = 68.9°C
A303 BA178M05FP-E2 ROHM	Tjmax = 150 °C, Pd = 0.2W, Tj = Tc + ((θ j-c) × Pd) = 104.0°C D.F. = 69.3%	θ j-c = 125°C/W, Δ Tc =29.0°C,	 Tc =79 °C
A331 UPC1093T-E1 NEC	Tjmax = 150 °C, Pd =40.0mW, Tj = Ta + ((θ j-a) × Pd) = 94.3°C D.F. = 62.9%	θ j-a = 312.5°C/W, Δ Ta = 31.8°C,	 Ta = 81.8°C
A351 MIP2E2DMUL MATSUSHIBA	Tjmax = 150 °C, Pd = 1.5W, Tj = Tc + ((θ j-c) × Pd) = 91.7°C D.F. =61.1 %	θ j-c = 10°C/W, Δ Tc =26.7 °C,	 Tc = 76.7°C
PC31 PS2581L2 (LED) NEC	Tjmax = 125 °C, Pc = 4.7mW, Tj = Ta + ((θ j-a) × Pc) =70.8 °C D.F. = 56.7%	θ j-a = 666.7°C/W, Δ Ta =17.7 °C,	Pc(max) = 150mW, Ta = 67.7°C
PC31 PS2581L2 (TRANSISTOR) NEC	Tjmax = 125°C, Pc = 3.0mW, Tj = Ta + ((θ j-a) × Pc) = 69.7°C D.F. = 55.8%	θ j-a = 666.7°C/W, Δ Ta = 17.7°C,	Pc(max) = 150mW, Ta = 67.7°C
PC52 PS2581L2 (LED) NEC	Tjmax = 125°C, Pc = 9.0mW, Tj = Ta + ((θ j-a) × Pc) = 72.9°C D.F. = 58.3%	θ j-a = 666.7°C/W, Δ Ta = 16.9°C,	Pc(max) = 150mW, Ta =66.9 °C
PC52 PS2581L2 (TRANSISTOR) NEC	Tjmax = 125°C, Pc = 2.0mW, Tj = Ta + ((θ j-a) × Pc) = 68.2°C D.F. = 54.6%	θ j-a = 666.7°C/W, Δ Ta = 16.9 °C,	Pc(max) = 150mW, Ta =66.9 °C
PC302 TLP172A (LED) TOSHIBA	I_F(max) = 50mA, I_F = 7.7mA, I_F(max) at Ta = 27.8mA D.F. =27.7%	Δ I_F /°C = -0.5mA/°C, Δ Ta =19.4 °C,	 Ta =69.4 °C
PC302 TLP172A (MOSFET) TOSHIBA	I_{ON}(max) = 400mA, I_{ON} = 10.0 mA, I_{ON}(max) at Ta = 222.4mA D.F. =4.5 %	Δ I_{ON} /°C = -4.0mA/°C, Δ Ta = 19.4°C,	 Ta = 69.4°C
PC303 PS2801-1 (LED) NEC	Tjmax = 125°C, Pc =2.5 mW, Tj = Ta + ((θ j-a) × Pc) = 92.8°C D.F. = 74.2%	θ j-a = 1666.7°C/W, Δ Ta =38.6 °C,	Pc(max) = 60mW, Ta = 88.6°C
PC303 PS2801-1 (TRANSISTOR) NEC	Tjmax = 125 °C, Pc =1.0 mW, Tj = Ta + ((θ j-a) × Pc) = 89.4°C D.F. =71.5 %	θ j-a = 833.3°C/W, Δ Ta = 38.6°C,	Pc(max) = 120mW, Ta =88.6 °C

3. Main components temperature rise ΔT list

MODEL : SWS600L-5

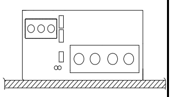
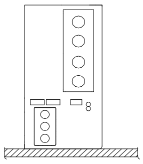
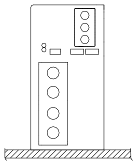
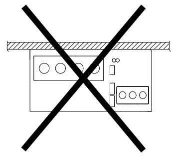
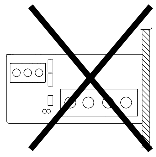
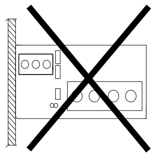
Conditions

	(A)	(B)	(C)			
Mounting Method (Standard Mounting Method:(A))						
Input Voltage (VAC)	115					
Output Voltage (VDC)	5					
Output Current (A)	120					

Output derating		ΔT Temperature rise (°C) Io=100% (Ta =50°C)			Io=50% (Ta =74°C)		
Location No.	Parts Name	Mounting A	Mounting B	Mounting C	Mounting A	Mounting B	Mounting C
L1	BALUN COIL	33.7	34.1	33.8	12.5	12.8	13.5
L2	BALUN COIL	33.5	31.6	31.8	12.7	12.3	13.1
L31	CHOKE COIL	43.8	46.1	45.0	29.4	30.3	30.4
L51	CHOKE COIL	69.9	70.6	68.2	23.7	23.8	23.9
T21	TRANSE PULSE	37.2	38.2	36.7	23.1	24.4	24.6
T32	TRANSE PULSE	46.2	45.9	44.2	20.2	20.6	20.8
D1	BRIDGE DIODE	33.6	36.0	36.2	16.6	17.4	18.2
D2	LLD	34.2	37.3	36.2	15.3	17.5	17.8
D51~D52	SBD	48.2	43.1	40.8	20.7	18.9	18.8
D53~D54	SBD	55.3	51.8	50.0	24.2	23.0	23.2
Q1~Q2	MOS FET	40.4	41.6	41.2	19.0	20.4	21.0
Q31~Q32	MOS FET	45.8	45.8	45.0	25.0	25.2	25.3
SR1	THYRISTOR	39.1	41.8	41.8	17.4	19.7	20.2
A102	CHIP IC	28.7	30.2	30.1	18.7	20.9	21.3
A152	CHIP IC	29.9	31.1	30.2	21.1	22.3	22.5
A351	CHIP IC	30.0	29.7	29.0	20.1	21.0	21.7
C12	E. CAP.	19.4	20.3	19.7	11.2	12.5	12.8
C13	E. CAP.	11.3	11.5	11.3	3.7	4.4	4.9
C51	E. CAP.	33.5	34.2	32.5	13.8	14.4	14.8
C52	E. CAP.	23.1	23.7	23.0	11.0	12.0	12.1
C53	E. CAP.	24.3	24.2	23.8	11.2	11.8	11.8
C54	E. CAP.	29.8	31.1	29.0	12.8	13.3	13.3

MODEL : SWS600L-5

Conditions

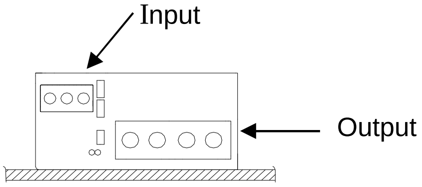
	(A)	(B)	(C)			
Mounting Method (Standard Mounting Method:(A))				Don't Use 	Don't Use 	Don't Use 
Input Voltage (VAC)	230					
Output Voltage (VDC)	5					
Output Current (A)	120					

Output derating		ΔT Temperature rise (°C) Io=100% (Ta =50°C)			Io=50% (Ta =74°C)		
Location No.	Parts Name	Mounting A	Mounting B	Mounting C	Mounting A	Mounting B	Mounting C
L1	BALUN COIL	16.0	16.3	17.2	7.2	7.9	8.4
L2	BALUN COIL	16.3	15.8	16.8	7.3	7.6	8.2
L31	CHOKE COIL	33.0	33.6	33.3	23.0	23.4	23.5
L51	CHOKE COIL	69.1	68.6	68.9	23.4	23.2	23.3
T21	TRANSE PULSE	33.5	35.0	34.9	22.3	23.2	23.4
T32	TRANSE PULSE	45.0	44.6	44.0	19.9	19.8	20.1
D1	BRIDGE DIODE	20.3	21.1	21.8	10.4	10.8	11.2
D2	LLD	24.6	26.0	25.9	11.9	13.0	13.1
D51~D52	SBD	43.2	42.0	41.0	20.7	18.4	18.4
D53~D54	SBD	55.5	50.7	50.5	24.1	22.7	23.0
Q1~Q2	MOS FET	25.0	25.4	26.0	13.5	14.2	14.3
Q31~Q32	MOS FET	42.3	40.6	41.0	23.8	23.2	23.7
SR1	THYRISTOR	29.1	30.6	31.0	14.1	15.3	15.5
A102	CHIP IC	23.4	25.2	25.8	17.3	19.1	19.4
A152	CHIP IC	26.5	27.0	26.8	19.8	20.5	20.7
A351	CHIP IC	26.1	26.3	26.7	19.0	19.8	20.2
C12	E. CAP.	16.3	16.6	16.8	10.2	10.9	11.3
C13	E. CAP.	8.5	8.0	8.1	2.6	3.1	3.6
C51	E. CAP.	32.6	32.8	32.6	13.7	13.8	14.0
C52	E. CAP.	21.0	20.2	20.7	10.3	10.8	10.9
C53	E. CAP.	22.8	21.0	21.9	10.5	10.5	10.8
C54	E. CAP.	30.0	29.4	28.8	12.8	12.8	12.9

4. Electrolytic capacitor lifertime

MODEL : SWS600L-5

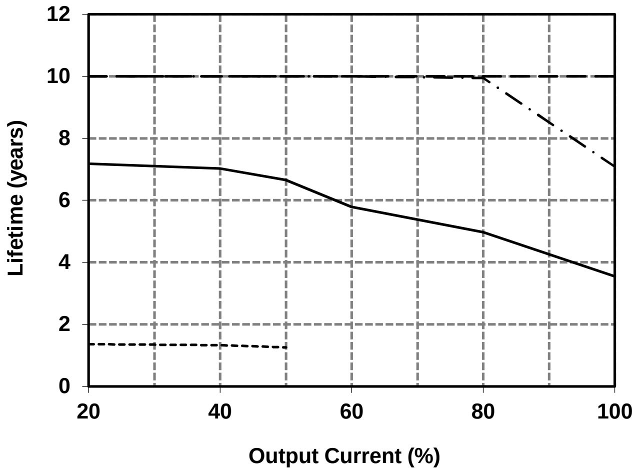
Mounting A



Conditons Ta 25°C - - - - -
40°C -·-·-·-
50°C ———
74°C --------

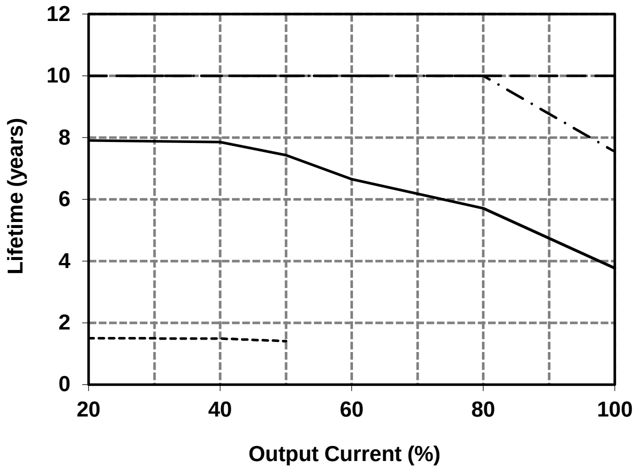
Vin = 115VAC

Load (%)	Lifetime (years)			
	Ta = 25°C	Ta = 40°C	Ta = 50°C	Ta = 74°C
20	10.0	10.0	7.2	1.4
40	10.0	10.0	7.0	1.3
50	10.0	10.0	6.7	1.3
60	10.0	10.0	5.8	—
80	10.0	9.9	5.0	—
100	10.0	7.1	3.5	—



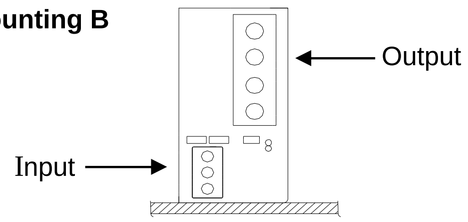
Vin = 230VAC

Load (%)	Lifetime (years)			
	Ta = 25°C	Ta = 40°C	Ta = 50°C	Ta = 74°C
20	10.0	10.0	7.9	1.5
40	10.0	10.0	7.9	1.5
50	10.0	10.0	7.4	1.4
60	10.0	10.0	6.7	—
80	10.0	10.0	5.7	—
100	10.0	7.5	3.8	—



MODEL : SWS600L-5

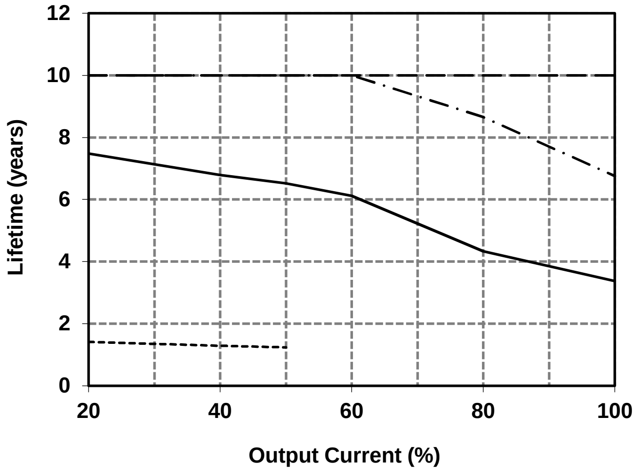
Mounting B



Conditons Ta 25°C - - - - -
40°C -·-·-·-
50°C ———
74°C - - - - - - -

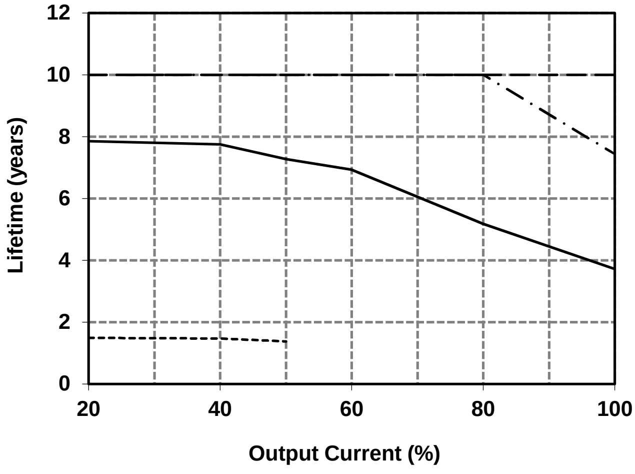
Vin = 115VAC

Load (%)	Lifetime (years)			
	Ta = 25°C	Ta = 40°C	Ta = 50°C	Ta = 74°C
20	10.0	10.0	7.5	1.4
40	10.0	10.0	6.8	1.3
50	10.0	10.0	6.5	1.2
60	10.0	10.0	6.1	—
80	10.0	8.7	4.3	—
100	10.0	6.8	3.4	—



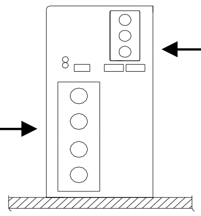
Vin = 230VAC

Load (%)	Lifetime (years)			
	Ta = 25°C	Ta = 40°C	Ta = 50°C	Ta = 74°C
20	10.0	10.0	7.9	1.5
40	10.0	10.0	7.8	1.5
50	10.0	10.0	7.3	1.4
60	10.0	10.0	6.9	—
80	10.0	10.0	5.2	—
100	10.0	7.4	3.7	—



MODEL : SWS600L-5

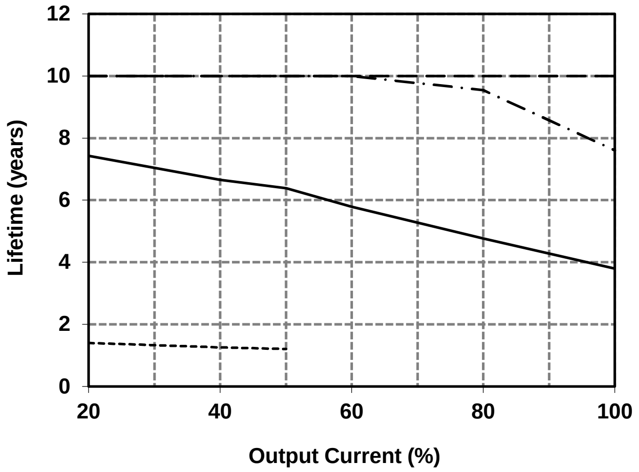
Mounting C



Conditons Ta 25°C – – – – –
40°C –·–·–·–
50°C ———
74°C - - - - - - -

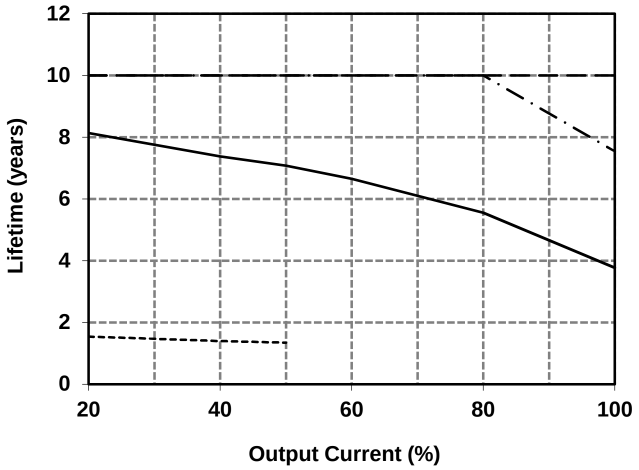
Vin = 115VAC

Load (%)	Lifetime (years)			
	Ta = 25°C	Ta = 40°C	Ta = 50°C	Ta = 74°C
20	10.0	10.0	7.4	1.4
40	10.0	10.0	6.7	1.3
50	10.0	10.0	6.4	1.2
60	10.0	10.0	5.8	—
80	10.0	9.5	4.8	—
100	10.0	7.6	3.8	—



Vin = 230VAC

Load (%)	Lifetime (years)			
	Ta = 25°C	Ta = 40°C	Ta = 50°C	Ta = 74°C
20	10.0	10.0	8.1	1.5
40	10.0	10.0	7.4	1.4
50	10.0	10.0	7.1	1.3
60	10.0	10.0	6.7	—
80	10.0	10.0	5.6	—
100	10.0	7.5	3.8	—



5. Abnormal test

MODEL : SWS600L-5

(1) Conditions :

Input : 230VAC Output: 5V 120A Ta : 25°C , 70%RH

(2) Test result

(Da: Damaged)

No.	Test point: Location No.	Test point: Test Piont	Test mode: Short	Test mode: Open	1 Fire	2 Smoke	3 Burst	4 Smell	5 Red Hot	6 Damaged	7 Fuse Blown	8 OVP	9 OCP	10 No Output	11 No Change	12 Others	13 Note
1	D1	AC-AC	O							O	O			O			Da:F1
2		AC-DC	O							O	O			O			Da:F1
3		AC		O										O			
4		DC		O										O			
5	Q1	D-S	O							O	O			O			Da:F1
6		D-G	O							O	O			O			Da:F1,Q1
7		G-S	O							O				O			Da:TFR1
8		D		O						O				O			Da:Q1
9		S		O						O				O			Da:Q1
10		G		O						O	O			O			Da:F1,Q1
11	Q2	D-S	O							O	O			O			Da:F1
12		D-G	O							O	O			O			Da:F1,Q2
13		G-S	O							O				O			Da:TFR1
14		D		O						O				O			Da:Q2
15		S		O						O				O			Da:Q2
16		G		O						O	O			O			Da:F1,Q2
17	SR1	1-2	O												O		
18		2-3	O												O		
19		3-1	O							O				O			Da:TFR1
20		1		O						O				O			Da:TFR1
21		2		O						O				O			Da:TFR1
22		3		O						O				O			Da:TFR1
23	D2	A-K	O							O	O			O			Da:F1,Q1,Q2
24		A1		O											O		
25		A2		O											O		
26		K		O						O	O			O			Da:F1,Q1,Q2
27	D101	A-K	O							O				O			Da:TFR1
28		A		O						O				O			Da:TFR1
29	D102	A-K	O							O				O			Da:TFR1
30		A		O						O				O			Da:Q1,Q2
31	Q31	D-S	O							O	O			O			Da:F1
32		D-G	O							O	O			O			Da:F1, Q31,D155
33		G-S	O							O				O			Da:R163
34		D		O						O	O			O			Da:F1,Q31
35		S		O										O			
36		G		O						O	O			O			Da:F1,Q31
37	Q32	D-S	O							O	O			O			Da:F1
38		D-G	O							O	O			O			Da:F1, Q32,D155

No.	Test point: Location No.	Test point: Test Piont	Test mode: Short	Test mode: Open	1 Fire	2 Smoke	3 Burst	4 Smell	5 Red Hot	6 Damaged	7 Fuse Blown	8 OVP	9 OCP	10 No Output	11 No Change	12 Others	13 Note
39	Q32	G-S	O							O				O			Da:R163
40		D		O						O	O			O			Da:F1,Q32
41		S		O										O			
42		G		O						O	O			O			Da:F1,Q32
43	Q152	B-C	O							O	O			O			Da:F1, Q31,Q32
44		C-E	O											O			
45		E-B	O							O	O			O			Da:F1,D155, Q31,Q32
46		B		O						O	O			O			Da:F1,D155, Q31,Q32
47		C		O						O	O			O			Da:F1,D155, Q31,Q32
48		E		O						O	O			O			Da:F1, Q31,D155
49	Q153	B-C	O											O			
50		C-E	O							O				O			Da:R163
51		E-B	O							O	O			O			Da:F1, Q31,D155
52		B		O						O	O			O			Da:F1, Q31,D155
53		C		O						O	O			O			Da:F1, Q31,D155
54		E		O						O	O			O			Da:F1, Q31,D155
55	Z151	A-K	O							O				O			Da:R163
56		A		O											O		
57		K		O											O		
58	D151	A-K	O												O		
59		A		O											O		
60		K		O											O		
61	D155	A-K	O												O		
62		A		O											O		
63		K		O											O		
64	D51	A-K	O							O	O			O			Da:F1, Q31,Q32,D155
65		A		O											O		
66		K		O						O				O			Da:D52
67	D53	A-K	O											O			
68		A		O											O		
69		K		O						O				O			Da:D54,D55
70	A351	1-2	O											O			
71		2-3	O							O	O			O			Da:F201
72		3-1	O							O	O			O			Da:F201,A351,R351,R352,Z351, D352,Q351
73		1		O										O			
74		2		O										O			
75		3		O										O			
76	T32	3-5	O											O		O	Pin about 180W
77		13-14	O							O	O			O			Da: F1,Q31,Q32,D155
78		3		O										O			
79		5		O										O			
80		13		O											O		
81		14		O											O		
82		13'		O											O		
83		14'		O											O		

No.	Test point: Location No.	Test point: Test Piont	Test mode: Short	Test mode: Open	Test result: 1 Fire	2 Smoke	3 Burst	4 Smell	5 Red Hot	6 Damaged	7 Fuse Blown	8 OVP	9 OCP	10 No Output	11 No Change	12 Others	13 Note
84	T21	1-2	O											O			
85		3-4	O											O			
86		6-7	O											O			
87		8-9	O											O			
88		1		O										O			
89		2		O										O			
90		3		O										O			
91		4		O										O			
92		6		O										O			
93		7		O										O			
94		8		O								O		O			
95		9		O								O		O			
96	T33	1-2	O												O		
97		3-4	O												O		
98		1		O										O			
99		2		O										O			
100		3		O											O		
101		4		O											O		
102	L31	2-11	O							O				O			Da:TFR1
103		6-7	O							O	O			O			Da: F1,Q1,Q2
104		2		O						O				O			Da:TFR1
105		6		O										O			
106		7		O										O			
107		11		O						O				O			Da:TFR1
108	L51	3-9	O													O	Pin increase, Vout drop to 4.8V
109		13-16	O												O		ALM Malfunction
110		3		O										O			
111		9		O										O			
112		13		O											O		
113		16		O											O		
114	Q301	C-E	O												O		
115		C-B	O												O		
116		B-E	O													O	LED OFF
117		C		O												O	LED OFF
118		E		O												O	LED OFF
119		B		O												O	LED OFF
120	Q304	C-E	O												O		
121		C-B	O													O	FAN SPEED LOW
122		B-E	O													O	FAN STOP, LED OFF
123		C		O												O	FAN STOP, LED OFF
124		E		O												O	FAN STOP, LED OFF
125		B		O												O	FAN STOP, LED OFF
126	Q306	C-E	O												O		
127		C-B	O												O		
128		B-E	O											O			
129		C		O										O			

No.	Test point: Location No.	Test point: Test Piont	Test mode: Short	Test mode: Open	1 Fire	2 Smoke	3 Burst	4 Smell	5 Red Hot	6 Damaged	7 Fuse Blown	8 OVP	9 OCP	10 No Output	11 No Change	12 Others	13 Note
130	Q306	E		O										O			
131		B		O										O			
132	Q307	C-E	O													O	LED OFF
133		C-B	O													O	LED OFF
134		B-E	O												O		
135		C		O											O		
136		E		O											O		
137		B		O											O		
138	Q373	C-E	O												O		
139		C-B	O												O		
140		B-E	O												O		
141		C		O											O		
142		E		O											O		
143		B		O											O		
144	Q331	C-E	O												O		
145		C-B	O												O		
146		B-E	O												O		
147		C		O											O		
148		E		O								O		O			
149		B		O								O		O			
150	Q151	C-E	O											O			
151		C-B	O											O			
152		B-E	O												O		
153		C		O											O		
154		E		O											O		
155		B		O											O		
156	Q154	C-E	O												O		
157		C-B	O												O		
158		B-E	O											O			
159		C		O										O			
160		E		O										O			
161		B		O											O		
162	Q155	C-E	O												O		
163		C-B	O												O		
164		B-E	O											O			
165		C		O										O			
166		E		O										O			
167		B		O										O			
168	Q158	C-E	O												O		
169		C-B	O												O		
170		B-E	O												O		
171		C		O											O		
172		E		O											O		
173		B		O											O		
174	D301		O											O			
175				O											O		

No.	Test point		Test mode		Test result												
					1	2	3	4	5	6	7	8	9	10	11	12	13
	Location No.	Test Piont	Short	Open	Fire	Smoke	Burst	Smell	Red Hot	Damaged	Fuse Blown	OVP	OCP	No Output	No Change	Others	Note
176	D303		O													O	FAN SPEED HIGH
177				O											O		
178	D305		O											O			
179				O											O		
180	D384		O													O	FAN STOP, LED OFF
181				O											O		
182	D371		O													O	LED OFF,ALM Malfunction
183				O												O	LED OFF,ALM Malfunction
184	D331		O											O			
185				O								O		O			
186	D204		O												O		
187				O												O	Output unstable
188	D153		O												O		
189				O								O		O			
190	D156		O												O		
191				O											O		
192	Z331		O									O		O			
193				O											O		
194	Z153		O												O		
195				O											O		
196	Z203		O									O		O			
197				O											O		OVP malfunction
198	PC 303	1-2	O													O	LED OFF
199		3-4	O												O		
200		1,2		O												O	LED OFF
201		3,4		O												O	LED OFF
202	PC 302	1-2	O													O	ALM malfunction
203		3-4	O													O	ALM malfunction
204		1,2		O												O	ALM malfunction
205		3,4		O												O	ALM malfunction
206	PC 305	1-2	O													O	ON/OFF control malfunctiion
207		3-4	O											O			
208		1,2		O												O	ON/OFF control malfunctiion
209		3,4		O												O	ON/OFF control malfunctiion
210	PC31	1-2	O											O			
211		3-4	O													O	ON/OFF control malfunctiion
212		1,2		O										O			
213		3,4		O										O			
214	PC51	1-2	O													O	OVP malfunction
215		3-4	O									O		O			
216		1,2		O												O	OVP malfunction
217		3,4		O												O	OVP malfunction
218	PC52	1-2	O									O		O			
219		3-4	O											O			
220		1,2		O								O		O			
221		3,4		O								O		O			

No.	Test point		Test mode		Test result												
	Location No.	Test Piont	Short	Open	1 Fire	2 Smoke	3 Burst	4 Smell	5 Red Hot	6 Damaged	7 Fuse Blown	8 OVP	9 OCP	10 No Output	11 No Change	12 Others	13 Note
222	PD91		O													O	LED OFF
223				O												O	LED OFF
224	A331	1-2	O											O			
225		1-3	O													O	5V drop to 1.53V
226		2-3	O											O			
227		1		O								O		O			
228		2		O								O		O			
229		3		O								O		O			
230	A151	1-2	O												O		
231		1-3	O												O		
232		2-3	O											O			
233		1		O										O			
234		2		O										O			
235		3		O											O		
236	A301	1-2	O													O	FAN SPEED HIGH
237		1-3	O											O			
238		2-3	O											O			
239		1		O										O			
240		2		O										O			
241		3		O												O	FAN SPEED HIGH
242	A201	4-5	O													O	OUTPUT LOW
243		5-6	O									O		O			
244		6-7	O													O	OUTPUT LOW
245		7-8	O									O		O			
246		4		O								O		O			
247		5		O								O		O			
248		6		O												O	OUTPUT LOW
249		7		O								O		O			
250		8		O								O		O			

6. MIL-STD-810F VIBRATION & SHOCK TEST

(1).Truck transportation over U.S. highways vibration test

(MIL-STD-810F 514.5 Category 4- Truck/trailer/tracked-restrained cargo)

1. Purpose

Test based on [MIL-STD-810F 514.5 Category 4-Truck/trailer/tracked-restrained cargo-Truck transportation over U.S. highways]

2. Test method

Unit was taken directly from production line.Unit was compliant with production standards.
The performance of vibration test machine is confirmed before vibration test.
Unit is tested in random vibration conditions based on [MIL-STD-810F_figure 514.5C-1]

<MIL-STD-810F_table 514.5C-VII>

Break points for curves of figure 514.5C-1 U.S.highway truck vibration exposures					
Vertical		Transverse		Longitudinal	
Hz	g^2/Hz	Hz	g^2/Hz	Hz	g^2/Hz
10	0.01500	10	0.00013	10	0.00650
40	0.01500	20	0.00065	20	0.00650
500	0.00015	30	0.00065	120	0.00020
1.04	g rms	78	0.00002	121	0.00300
		79	0.00019	200	0.00300
		120	0.00019	240	0.00150
		500	0.00001	340	0.00003
		0.204	g rms	500	0.0002
				0.740	g rms

* See the APPENDIX B [Direction of vibration]

* Test time is 1 hour in each directions. (It shows road transportation of 1000 miles in U.S.by truck.)

3. Acceptable conditions

During vibration test,no destruction in the test unit.
After vibration test,no abnormality in the electric characteristics and the mechanism.

4. Test result

Model: SWS600L-5,SWS600L-12,SWS600L-24

Io=100%	Check item	From			To		
Input voltage: AC115V	Output voltage (V)	5.01	12.07	24.05	5.01	12.06	24.04
	Efficiency (%)	75.9	80.8	82.8	75.9	80.8	82.8
	Ripple (mV)	51	40	34	52	40	38
Input voltage: AC230V	Output voltage (V)	5.00	12.07	24.05	5.00	12.06	24.04
	Efficiency (%)	78.5	83.4	85.6	78.5	83.4	85.6
	Ripple (mV)	51	40	34	52	40	38

Judgement : PASS

(2).Composite two-wheeled trailer vibration test

(MIL-STD-810F 514.5 Category 4- Truck/trailer/tracked-restrained cargo)

1. Purpose

Test based on [MIL-STD-810F 514.5 Category 4-Truck/trailer/tracked-restrained cargo-Mission/field transportation - Two-wheeled trailer]

2. Test method

Unit was taken directly from production line.Unit was compliant with production standards.
The performance of vibration test machine is confirmed before vibration test.
Unit is tested in random vibration conditions based on [MIL-STD-810F_figure 514.5C-2]

<MIL-STD-810F_table 514.5C-VII>

Break points for curves of figure 514.5C-2 Composite two-wheeled trailer vibration exposures

Vertical				Transverse				Longitudinal			
Hz	g^2/Hz	Hz	g^2/Hz	Hz	g^2/Hz	Hz	g^2/Hz	Hz	g^2/Hz	Hz	g^2/Hz
5	0.2252	45	0.0241	5	0.0474	46	0.0039	5	0.0563	121	0.0214
8	0.5508	51	0.0114	6	0.0303	51	0.0068	6	0.0563	146	0.0450
10	0.0437	95	0.0266	7	0.0761	55	0.0042	8	0.1102	153	0.0236
13	0.0253	111	0.0166	13	0.0130	158	0.0029	13	0.0140	158	0.0549
15	0.0735	136	0.0683	15	0.0335	235	0.0013	16	0.0303	164	0.0261
19	0.0143	147	0.0266	16	0.0135	257	0.0027	20	0.0130	185	0.0577
23	0.0358	185	0.0603	21	0.0120	317	0.0016	23	0.0378	314	0.0015
27	0.0123	262	0.0634	23	0.0268	326	0.0057	27	0.0079	353	0.0096
30	0.0286	330	0.0083	25	0.0090	343	0.0009	30	0.0200	398	0.0009
34	0.0133	360	0.0253	28	0.0090	384	0.0018	33	0.0068	444	0.0027
36	0.0416	500	0.0017	30	0.0137	410	0.0008	95	0.0019	500	0.0014
41	0.0103			34	0.0055	462	0.0020	2.40 g rms			
3.85 g rms				37	0.0081	500	0.0007				
				1.28 g rms							

* See the APPENDIX B [Direction of vibration]
* Test time is 40 minutes in each directions. (It shows road transportation of 500 miles in U.S.by composite two-wheeled trailer.)

3. Acceptable conditions

During vibration test,no destruction in the test unit.
After vibration test,no abnormality in the electric characteristics and the mechanism.

4. Test result

Model: SWS600L-5,SWS600L-12,SWS600L-24

Io=100%	Check item	From			To		
Input voltage: AC115V	Output voltage (V)	5.01	12.07	24.05	5.01	12.06	24.04
	Efficiency (%)	75.9	80.8	82.8	75.9	80.8	82.8
	Ripple (mV)	51	40	34	52	40	38
Input voltage: AC230V	Output voltage (V)	5.00	12.07	24.05	5.00	12.06	24.04
	Efficiency (%)	78.5	83.4	85.6	78.5	83.4	85.6
	Ripple (mV)	51	40	34	52	40	38

Judgement : PASS

(3).Shipboard random vibration test

(MIL-STD-810F 514.5 Category 10- Ship-surface ship)

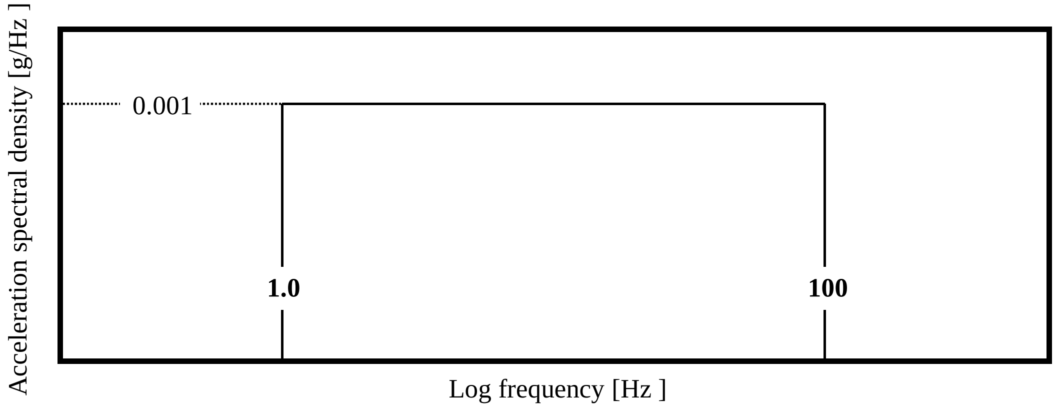
1. Purpose

Test based on [MIL-STD-810F 514.5 Category 10-Ship-surface ship].

2. Test method

Unit was taken directly from production line.Unit was compliant with production standards.
The performance of vibration test machine is confirmed before vibration test.
Unit is tested in random vibration conditions based on [MIL-STD-810F_figure 514.5C-15]

Figure 514.5C-15 Shipboard random vibration exposures



* See the APPENDIX B [Direction of vibration]

* Test time is 2 hours in each directions. (vertical,transverse and longitudinal.)

3. Acceptable conditions

During vibration test,no destruction in the test unit.
After vibration test,no abnormality in the electric characteristics and the mechanism.

4. Test result

Model: SWS600L-5,SWS600L-12,SWS600L-24

Io=100%	Check item	From			To		
Input voltage: AC115V	Output voltage (V)	5.01	12.07	24.05	5.01	12.06	24.04
	Efficiency (%)	75.9	80.8	82.8	75.9	80.8	82.8
	Ripple (mV)	51	40	34	52	40	38
Input voltage: AC230V	Output voltage (V)	5.00	12.07	24.05	5.00	12.06	24.04
	Efficiency (%)	78.5	83.4	85.6	78.5	83.4	85.6
	Ripple (mV)	51	40	34	52	40	38

Judgement : PASS

(4).Functional shock test

(MIL-STD-810F 516.5 Procedure I)

1. Purpose

Test based on [MIL-STD-810F 516.5 Procedure I - Functional shock].

2. Test method

Unit was taken directly from production line.Unit was compliant with production standards.
The performance of vibration test machine is confirmed before vibration test.
Unit is operating during shock test.

Min.peak value (g's)	Duration	Qty.
40G Sawtooth pulse	11ms	5V,12V,24V models,each 1 pc

Input voltage	Output voltage	Output current
AC100V 50Hz	Rated	100%

* See the APPENDIX B [Direction of vibration]

* It does in the directions of ± X, ± Y and ± Z 3 times for each and 18 times in total.

3. Acceptable conditions

During shock test,no discharge of fire or smoke, as well as no output failure.
After shock test,no abnormality in the electric characteristics and the mechanism.

4. Test result

Model: SWS600L-5,SWS600L-12,SWS600L-24

Io=100%	Check item	From			To		
Input voltage: AC115V	Output voltage (V)	5.01	12.07	24.05	5.01	12.06	24.04
	Efficiency (%)	75.9	80.8	82.8	75.9	80.8	82.8
	Ripple (mV)	51	40	34	52	40	38
Input voltage: AC230V	Output voltage (V)	5.00	12.07	24.05	5.00	12.06	24.04
	Efficiency (%)	78.5	83.4	85.6	78.5	83.4	85.6
	Ripple (mV)	51	40	34	52	40	38

Judgement : PASS

(5).Bench handing test

(MIL-STD-810F 516.5 Procedure VI)

1. Purpose

Test based on [MIL-STD-810F 516.5 Procedure VI - Bench handing].

2. Test method

Unit was taken directly from production line.Unit was compliant with production standards.

Use test bench with thickness of at least 4.25cm.

With unit switched off.

Raise until the chassis forms an angle of 45° with the bench top.

Drop unit on each face on which unit could be placed practically.

In the above test method, repeat drop 4 times in total.

3. Acceptable conditions

During shock test,no destruction in the test unit.

After shock test,no abnormality in the electric characteristics and the mechanism.

4. Test result

Model: SWS600L-5,SWS600L-12,SWS600L-24

Io=100%	Check item	From			To		
Input voltage: AC115V	Output voltage (V)	5.01	12.07	24.05	5.01	12.06	24.04
	Efficiency (%)	75.9	80.8	82.8	75.9	80.8	82.8
	Ripple (mV)	51	40	34	52	40	38
Input voltage: AC230V	Output voltage (V)	5.00	12.07	24.05	5.00	12.06	24.04
	Efficiency (%)	78.5	83.4	85.6	78.5	83.4	85.6
	Ripple (mV)	51	40	34	52	40	38

Judgement : PASS

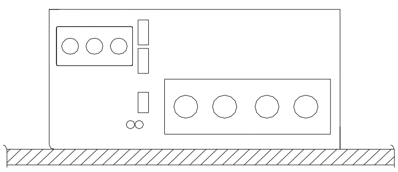
(6).APPENDIX

APPENDIX A : List of equipment used

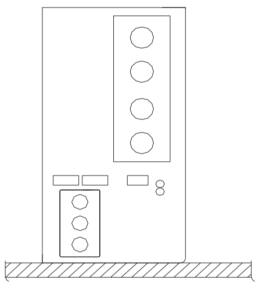
EQUIPMENT USED	MANUFACTURER	MODEL NO.
TRUE RMS MULTIMETER	FLUKE	111
DIGITAL POWER METER	YOKOGAWA ELECT.	WT110
ELECTRONIC LOAD	CHROMA	63030
AC POWER SUPPLY	KIKUSUI	PCR2000L
VIBRATION MACHINE	IMV	CV-300
VIBRATION MACHINE	Shinken	G-0145
VIBRATION MACHINE	Unholtz-Dickie	SAI30-R16C
SHOCK MACHINE	NORTHWEST MACHINE.	S-015

APPENDIX B : Direction of vibration

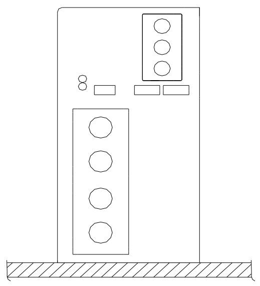
Mounting A

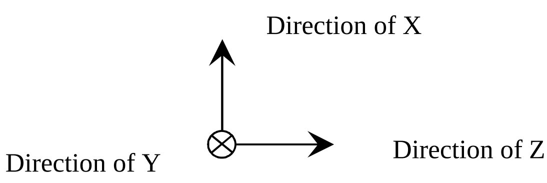


Mounting B



Mounting C





Direction of X : Vertical

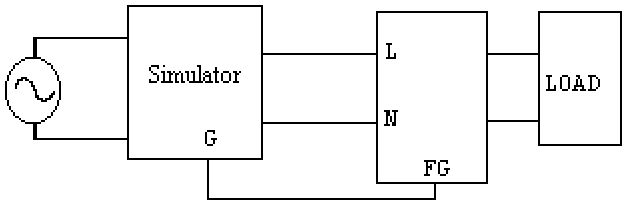
Direction of Y : Transverse

Direction of Z : Longitudinal

7. Noise simulate test

MODEL : SWS600L-5

(1) Test circuit and equipment



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

(2) Test conditions

• Input voltage	:	115, 230VAC	• Noise level	:	0V~2.0kV
• Output voltage	:	Rated	• Phase shift	:	0° ~ 360°
• Output current	:	0%, 100%	• Polarity	:	＋ , −
• Ambient temperature	:	25°C	• Mode	:	Normal Common
• Pulse width	:	50ns ~ 1000ns	• Trigger select	:	Line

(3) Acceptable conditions

1. Not to be broken.
2. Not to be shut down output.
3. No other out of orders.

(4) Test result

O K

8. Thermal shock test

MODEL : SWS600L-5

(1) Equipment used

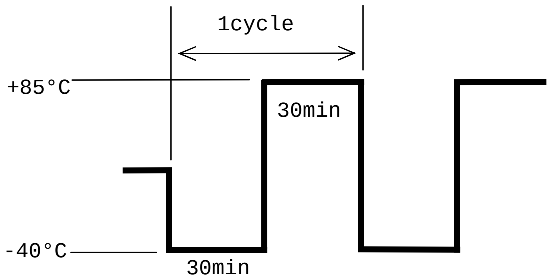
THERMAL SHOCK CHAMBER TSV-40 (TABAI ESPEC CORP.)

(2) The number of D.U.T.(Device Under Test)

1 unit

(3) Test Conditions

- Ambient temperature : -40°C ⟷ 85°C
- Test time : Refer to drawing
- Test cycle : 100 cycles
- Not operating



(4) 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. 100 cycles later, leave it for 1 hour at the room temperature, then check if there is no abnormal output.

(5) Test Results

O K

Vin : 115VAC
Io : 100%

			5V			
			From		To	
Ripple&Spike noise		mV	51.4		51.4	
Line regulation	Full load	mV	2		2	
Load regulation	Vin:115V	mV	6		6	
Efficiency	Pin	W	785.3	76.57%	785.0	76.59%
	Vout	V	5.011		5.010	
	Iout	A	120		120	
Solder condition • etc.			————		OK	

9. Fan life expectancy

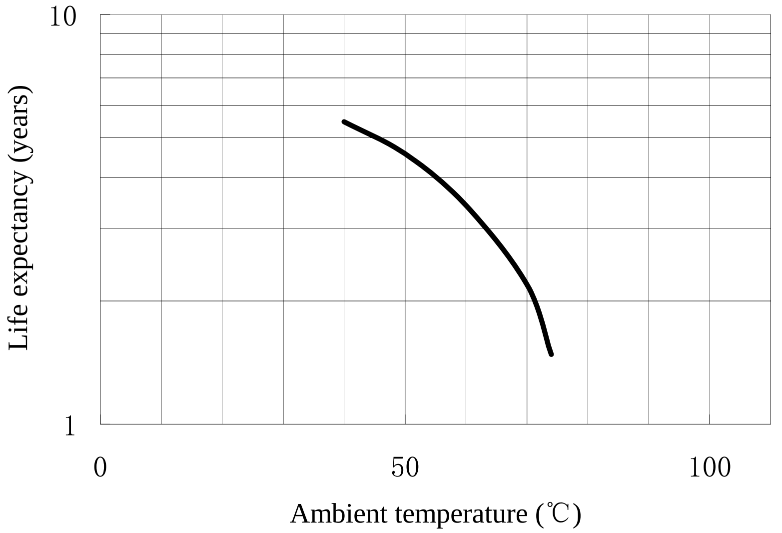
MODEL: SWS600L

(1) Part name

9A0612G4D041(SANYO DENKI CO.)

(2) Life expectancy

The data shows fan life expectancy for fan only by manufacture (90% survival rate).
Fig1 shows measuring point of ambient temperature.



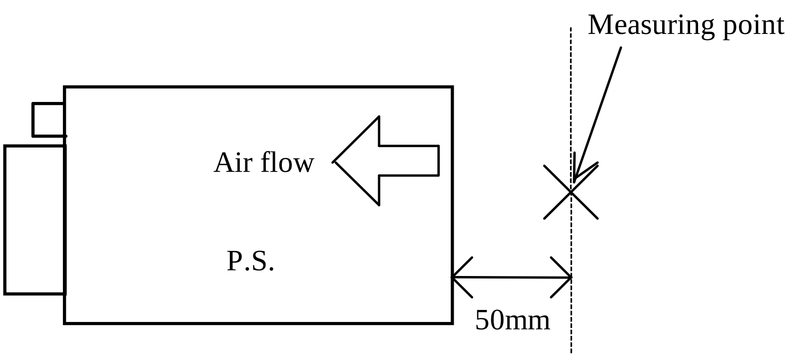


Fig1. Measuring point of ambient temperature.

1year = 365 day x 24 hours/day = 8760 hours