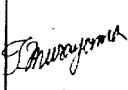

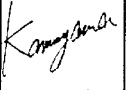
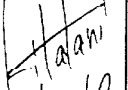


# JWS300

## RELIABILITY DATA

### 信頼性データ

DWG No. A161-57-01A			
QA APPD	APPD	CHK	DWG
			
22/Sep/99	21/Sep/99	18/Sep/99	18/Sep/99

REV. A

CHANGE ABNORMAL DATA :R-15A~R-20A

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※ 信頼性試験は、代表データであり、全ての製品は、ほぼ同等な特性を示します。  
従いましてこの値は実力値とお考え願います。

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

**1. MTBF 計算値 CALCULATED VALUES OF MTBF**

MODEL : JWS300-5

**(1) 算出方法 Calculating method**

EIAJ (RCR-9102) の部品点数法で算出されています。  
 それぞれの部品ごとに、部品故障率 $\lambda_G$ が与えられ、各々の点数によって決定されます。  
 Calculated based on part count reliability projection of EIAJ (RCR-9102).  
 Individual failure rates  $\lambda_G$  is given to each part and MTBF is calculated by the count of each part.

<算出式>

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

- $\lambda_{equip}$  : 全機器故障率 (故障数/10<sup>6</sup>時間)  
Total Equipment Failure Rate (Failure/10<sup>6</sup>hours)
- $\lambda_G$  :  $i$  番目の同属部品に対する故障率 (故障数/10<sup>6</sup>時間)  
Generic Failure Rate for The  $i$ th Generic Part (Failure/10<sup>6</sup>hours)
- $N_i$  :  $i$  番目の同属部品の個数  
Quantity of  $i$ th Generic Part
- $n$  : 異なった同属部品のカテゴリーの数  
Number of Different Generic Part Categories
- $\pi_Q$  :  $i$  番目の同属部品に対する品質ファクタ ( $\pi_Q=1$ )  
Generic Quality Factor for The  $i$ th Generic Part ( $\pi_Q=1$ )

**(2) MTBF 値 MTBF Values**

$G_F$  : 地上固定 (GROUND, FIXED)

$MTBF \doteq 268,989$  時間 (hours)  
 (但し、MTBFにファンは含まれておりません。)  
 However MTBF Calculation for FAN isn't Included.

**2. 部品ディレーティング COMPONENT DERATING**

MODEL : JWS300-5

**(1) 算出方法 Calculating Method**

・入力 Input	: 100,200VAC	・周囲温度 Ambient temperature	: 50°C
・出力 Output	: 5V 60A(100%)	・取付方法 Mounting method	: 標準取付 Standard Mounting

**(a) 半導体 Semiconductors**

ケース温度、消費電力、熱抵抗より使用状態の接合点温度を求め最大定格、接合点温度との比較を求めました。  
Compared with maximum junction temperature and actual one which is calculated based on case temperature, power dissipation and thermal impedance.

**(b) IC、抵抗、コンデンサー等 IC, Resistors, Capacitors, etc.**

周囲温度、使用状態、消費電力など、個々の値は設計基準内に入っています。  
Ambient temperature, operating condition, power dissipation and so on are within derating criteria.

**(c) 熱抵抗算出方法 Calculating method of thermal impedance**

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

$T_c$  : ディレーティングの始まるケース温度 一般に25°C  
Case Temperature at Start Point of Derating; 25°C in General

$T_a$  : ディレーティングの始まる周囲温度 一般に25°C  
Ambient Temperature at Start Point of Derating; 25°C in General

$T_l$  : ディレーティングの始まるリード温度 一般に25°C  
Lead Temperature at Start Point of Derating; 25°C in General

$P_{c(max)}$  : 最大コレクタ(チャネル)損失

(  $P_{ch(max)}$  ) Maximum Collector(channel) Dissipation

$T_{j(max)}$  : 最大接合点温度

(  $T_{ch(max)}$  ) Maximum Junction(channel) Temperature

$\theta_{j-c}$  : 接合点からケースまでの熱抵抗

(  $\theta_{ch-c}$  ) Thermal Impedance between Junction(channel) and Case

$\theta_{j-a}$  : 接合点から周囲までの熱抵抗

Thermal Impedance between Junction and Air

$\theta_{j-l}$  : 接合点からリードまでの熱抵抗

Thermal Impedance between Junction and Lead

(2) 部品デレーティング表 Component Derating List

部品番号 Location No.	Vin = 100VAC	Load = 100%	Ta = 50°C
Q1 2SK2372 NEC	Tchmax = 150°C, Pd = 24.9W, Tch = Tc + ((θch - c) × Pd) = 106.7°C D.F. = 71.1%	θch-c = 0.781°C/W, ΔTc = 37.2°C,	Pch(max) = 160W Tc = 87.2°C
Q2 2SC3074Y TOSHIBA	Tjmax = 150°C, Pd = 0.015W, Tj = Tc + ((θj - c) × Pd) = 64.6°C D.F. = 43.1%	θj-c = 6.25°C/W, ΔTc = 14.5°C,	Pc(max) = 20W Tc = 64.5°C
Q3 2SA1244Y TOSHIBA	Tjmax = 150°C, Pd = 0.032W, Tj = Ta + ((θj - c) × Pd) = 65.6°C D.F. = 43.8%	θj-c = 6.25 °C/W, ΔTc = 15.4°C,	Pc(max) = 20W Tc = 65.4°C
Q51 2SK2082-01 FUJII-ELEC.	Tchmax = 150°C, Pd = 17.5W, Tch = Tc + ((θch - c) × Pd) = 115.9°C D.F. = 77.3%	θch-c = 0.833°C/W, ΔTc = 51.3°C,	Pch(max) = 150W Tc = 101.3°C
Q101 2SA1162-Y TOSHIBA	Tjmax = 125°C, Pd = 0.5mW, Tj = Ta + ((θj - a) × Pd) = 64.6°C D.F. = 51.7%	θj-a = 0.667°C/mW, ΔTa = 14.2°C,	Pc(max) = 0.15W Ta = 64.2°C
Q201 2SA1162-Y TOSHIBA	Tjmax = 125°C, Pd = 0.4mW, Tj = Ta + ((θj - a) × Pd) = 59.8°C, D.F. = 47.8%	θj-a = 0.667°C/mW, ΔTa = 9.5°C,	Pc(max) = 0.15W Ta = 59.5°C
Q203 2SB1302T SANYO	Tjmax = 150°C, Pd = 0.074W, Tj = Ta + ((θj - a) × Pd) = 66.1°C, D.F. = 44.1%	θj-a = 96°C/W, ΔTa = 9.0°C,	Pc(max) = 1.3W Ta = 59.0°C
Q204 2SC2712-Y TOSHIBA	Tjmax = 125°C, Pd = 0.9mW, Tj = Ta + ((θj - a) × Pd) = 58.0°C D.F. = 46.4%	θj-a = 0.667°C/mW, ΔTa = 7.4°C,	Pc(max) = 0.15W Ta = 57.4°C
Q207 2SA1162-Y TOSHIBA	Tjmax = 125°C, Pd = 0.8mW, Tj = Ta + ((θj - a) × Pd) = 68.6°C D.F. = 54.9%	θj-a = 0.667°C/mW, ΔTa = 18.0°C,	Pc(max) = 0.15W Ta = 68.0°C
Q208 2SC2712-Y TOSHIBA	Tjmax = 125°C, Pd = 0.6mW, Tj = Ta + ((θj - a) × Pd) = 71.5°C D.F. = 57.2%	θj-a = 0.667°C/mW, ΔTa = 21.1°C,	Pc(max) = 0.15W Ta = 71.1°C
D1 D15XB60 SHINDENGEN	Tjmax = 150°C, Pd = 4.4W, Tj = Tc + ((θj - c) × Pd) = 95.6°C D.F. = 63.7%	θj-c = 1.5°C/W, ΔTc = 39.0°C,	P(max) = - Tc = 89.0°C
D2,D3 10FL2CZ47A TOSHIBA	Tjmax = 150°C, Pd = 3.0W, Tj = Tc + ((θj - c) × Pd) = 90.6°C D.F. = 60.4%	θj-c = 3.6°C/W, ΔTc = 29.8°C,	P(max) = - Tc = 79.8°C

部品番号 Location No.	Vin = 100VAC	Load = 100%	Ta = 50°C
D51, D52, D53 S60SC4M SHINDENGEN	Tjmax = 150°C, Pd = 11.0W, Tj = Tc + ((θj - c) × Pd) = 115.9°C D.F. = 77.3%	θj-c = 0.5°C/W, ΔTc = 60.4°C,	P(max) = - Tc = 110.4°C
D101 D1FL20U SHINDENGEN	Tjmax = 150°C, Pd = 0.0013W, Tj = Ta + ((θj - a) × Pd) = 65.3°C D.F. = 43.4%	θj-a = 157°C/W, ΔTa = 15.1°C,	P(max) = - Ta = 65.1°C
D104 U05NU44 TOSHIBA	Tjmax = 150°C, Pd = 0.007W, Tj = Ta + ((θj - a) × Pd) = 54.9°C D.F. = 36.6%	θj-a = 83.3°C/W, ΔTa = 4.3°C,	P(max) = 1.5W Ta = 54.3°C
D105 ISS184 TOSHIBA	Tjmax = 125°C, Pd = 0.0028W, Tj = Ta + ((θj - a) × Pd) = 59.4°C D.F. = 47.6%	θj-a = 666.7°C/W, ΔTa = 7.5°C,	P(max) = 150mW Ta = 57.5°C
D106 D1FL20U SHINDENGEN	Tjmax = 150°C, Pd = 0.102W, Tj = Ta + ((θj - a) × Pd) = 73.2°C D.F. = 48.8%	θj-a = 157°C/W, ΔTa = 7.1°C,	P(max) = - Ta = 57.1°C
D107 D1FL20U SHINDENGEN	Tjmax = 150°C, Pd = 0.033W, Tj = Ta + ((θj - a) × Pd) = 57.8°C D.F. = 38.6%	θj-a = 157°C/W, ΔTa = 2.6°C,	P(max) = - Ta = 52.6°C
D108 D1FL20U SHINDENGEN	Tjmax = 150°C, Pd = 0.18W, Tj = Ta + ((θj - a) × Pd) = 85.9°C D.F. = 57.3%	θj-a = 157°C/W, ΔTa = 7.6°C,	P(max) = - Ta = 57.6°C
Z102 O2CZ13X TOSHIBA	Tjmax = 150°C, Pd = 0.030W, Tj = Ta + ((θj - a) × Pd) = 82.5°C D.F. = 55.0%	θj-a = 625°C/W, ΔTa = 13.8°C,	Pc(max) = 0.2W Ta = 63.8°C
Z103, Z104 O2CZ18Y TOSHIBA	Tjmax = 150°C, Pd = 0.0029W, Tj = Ta + ((θj - a) × Pd) = 63.4°C D.F. = 42.3%	θj-a = 625°C/W, ΔTa = 11.6°C,	Pc(max) = 0.2W Ta = 61.6°C
Z105 U12B220-Y TOSHIBA	Tjmax = 150°C, Pd = 0.263W, Tj = Ta + ((θj - a) × Pd) = 87.8°C D.F. = 58.5%	θj-a = 125°C/W, ΔTa = 4.9°C,	Pc(max) = 1.0W Ta = 54.9°C
PC52 (発光側) TLP721F TOSHIBA	Tjmax = 125°C, If = 3.75mA, If(max) = 46.9mA D.F. = 8.0%	θj-a = - , ΔTa = 7.7°C,	Ta = 57.7°C
PC52 (受光部) TLP721F TOSHIBA	Tjmax = 125°C, Pd = 0.0063W, Tj = Ta + ((θj - a) × Pd) = 61.9°C D.F. = 49.6%	θj-a = 667°C/W, ΔTa = 7.7°C,	Pc(max) = 150mW Ta = 57.7°C

部品番号 Location No.	Vin = 100VAC	Load = 100%	Ta = 50°C
PC53 (発光側) TLP721F TOSHIBA	Tjmax = 125°C, If = 2.8mA, If(max) = 45.8mA D.F. = 6.1%	$\theta_{j-a} = -$ , $\Delta Ta = 9.2^\circ C$ ,	Ta = 59.2°C
PC53 (受光側) TLP721F TOSHIBA	Tjmax = 125°C, Pd = 0.8mW, Tj = Ta + (( $\theta_{j-a}$ ) × Pd) = 59.7°C D.F. = 47.8%	$\theta_{j-a} = 0.667^\circ C/mW$ , $\Delta Ta = 9.2^\circ C$ ,	Pc(max) = 150mW Ta = 59.2°C
PC54 (発光側) TLP721F TOSHIBA	Tjmax = 125°C, If = 13.8mA, If(max) = 44.6mA D.F. = 30.9%	$\theta_{j-a} = -$ , $\Delta Ta = 11.0^\circ C$ ,	Ta = 61.0°C
PC54 (受光側) TLP721F TOSHIBA	Tjmax = 125°C, Pd = 0.0035W, Tj = Ta + (( $\theta_{j-a}$ ) × Pd) = 63.3°C D.F. = 50.7%	$\theta_{j-a} = 667^\circ C/W$ , $\Delta Ta = 11.0^\circ C$ ,	Pc(max) = 150mW Ta = 61.0°C
PD51 TLG-223 TOSHIBA	Tjmax = 75°C, If = 5.0mA, If(max) = 17.0mA D.F. = 29.4%	$\theta_{j-a} = -$ , $\Delta Ta = 1.3^\circ C$ ,	Pc(max) = 70mW Ta = 51.3°C
SR1 SM8JZ47A TOSHIBA	Tjmax = 125°C, Pd = 3.45W, Tj = Tc + (( $\theta_{j-c}$ ) × Pd) = 93.4°C D.F. = 74.7%	$\theta_{j-c} = 3.6^\circ C/W$ , $\Delta Tc = 31.0^\circ C$ ,	Pc(max) = 0.5W Tc = 81.0°C

部品番号 Location No.	Vin = 200VAC	Load = 100%	Ta = 50°C
Q1 2SK2372 NEC	Tchmax = 150°C, Pd = 9.2W, Tj = Tc + ((θch - c) × Pd) = 72.2°C D.F. = 48.1%	θch-c = 0.781°C/W, ΔTc = 15.0°C,	Pch(max) = 160W Tc = 65.0°C
Q2 2SC3074Y TOSHIBA	Tjmax = 150°C, Pd = 0.015W, Tj = Tc + ((θj - c) × Pd) = 63.4°C D.F. = 42.3%	θj-c = 6.25°C/W, ΔTc = 13.3°C,	Pc(max) = 20W Tc = 63.3°C
Q3 2SA1244Y TOSHIBA	Tjmax = 150°C, Pd = 0.032W, Tj = Tc + ((θj - c) × Pd) = 64.7°C D.F. = 43.1%	θj-c = 6.25°C/W, ΔTc = 14.5°C,	Pc(max) = 20W Tc = 64.5°C
Q51 2SK2082-01 FUJI-ELEC.	Tchmax = 150°C, Pd = 17.5W, Tj = Tc + ((θch - c) × Pd) = 116.4°C D.F. = 77.6%	θch-c = 0.833°C/W, ΔTc = 51.8°C,	Pch(max) = 150W Tc = 101.8°C
Q101 2SA1162-Y TOSHIBA	Tjmax = 125°C, Pd = 0.5mW, Tj = Ta + ((θj - a) × Pd) = 60.5°C D.F. = 48.4%	θj-a = 0.667°C/mW, ΔTa = 10.2°C,	Pc(max) = 0.15W Ta = 60.2°C
Q201 2SA1162-Y TOSHIBA	Tjmax = 125°C, Pd = 0.4mW, Tj = Ta + ((θj - a) × Pd) = 59.7°C D.F. = 47.8%	θj-a = 0.667°C/mW ΔTa = 9.4°C,	Pc(max) = 0.15W Ta = 59.4°C
Q203 2SB1302T SANYO	Tjmax = 150°C, Pd = 0.074W, Tj = Ta + ((θj - a) × Pd) = 65.7°C D.F. = 43.8%	θj-a = 96°C/W, ΔTa = 8.6°C,	Pc(max) = 1.3W Ta = 58.6°C
Q204 2SC2712-Y TOSHIBA	Tjmax = 125°C, Pd = 0.9mW, Tj = Ta + ((θj - a) × Pd) = 57.9°C D.F. = 46.3%	θj-a = 0.667°C/mW ΔTa = 7.3°C,	Pc(max) = 0.15W Ta = 57.3°C
Q207 2SA1162-Y TOSHIBA	Tjmax = 125°C, Pd = 0.8mW, Tj = Ta + ((θj - a) × Pd) = 68.3°C D.F. = 54.6%	θj-a = 0.667°C/mW, ΔTa = 17.8°C,	Pc(max) = 0.15W Ta = 67.8°C
Q208 2SC2712-Y TOSHIBA	Tjmax = 125°C, Pd = 0.6mW, Tj = Ta + ((θj - a) × Pd) = 71.4°C D.F. = 57.1%	θj-a = 0.667°C/mW, ΔTa = 21.0°C,	Pc(max) = 0.15W Ta = 71.0°C
D1 D15XB60 SHINDENGEN	Tjmax = 150°C, Pd = 2.2W, Tj = Tc + ((θj - c) × Pd) = 69.8°C D.F. = 46.5%	θj-c = 1.5°C/W, ΔTc = 16.6°C,	P(max) = - Tc = 66.6°C
D2, D3 10FL2CZ47A TOSHIBA	Tjmax = 150°C, Pd = 3.0W, Tj = Tc + ((θj - c) × Pd) = 83.3°C D.F. = 55.5%	θj-c = 3.6°C/W, ΔTc = 22.5°C,	P(max) = - Tc = 72.5°C



部品番号 Location No.	$V_{in} = 200VAC$	Load = 100%	$T_a = 50^{\circ}C$
D51,D52,D53 S60SC4M SHINDENGEN	$T_{jmax} = 150^{\circ}C,$ $P_d = 11.0W,$ $T_j = T_c + ((\theta_j - c) \times P_d) = 116.2^{\circ}C$ D.F. = 77.5%	$\theta_{j-c} = 0.5^{\circ}C/W,$ $\Delta T_c = 60.7^{\circ}C,$	$P(max) = -$ $T_c = 110.7^{\circ}C$
D101 D1FL20U SHINDENGEN	$T_{jmax} = 150^{\circ}C,$ $P_d = 0.0013W,$ $T_j = T_a + ((\theta_j - a) \times P_d) = 59.0^{\circ}C$ D.F. = 39.3%	$\theta_{j-a} = 157^{\circ}C/W,$ $\Delta T_a = 8.8^{\circ}C,$	$P(max) = -$ $T_a = 50.8^{\circ}C$
D104 U05NU44 TOSHIBA	$T_{jmax} = 150^{\circ}C,$ $P_d = 0.007W,$ $T_j = T_a + ((\theta_j - a) \times P_d) = 54.3^{\circ}C$ D.F. = 36.2%	$\theta_{j-a} = 83.3^{\circ}C/W,$ $\Delta T_a = 3.7^{\circ}C,$	$P(max) = 1.5W$ $T_a = 53.7^{\circ}C$
D105 1SS184 TOSHIBA	$T_{jmax} = 125^{\circ}C,$ $P_d = 0.0028W,$ $T_j = T_a + ((\theta_j - a) \times P_d) = 58.4^{\circ}C$ D.F. = 46.7%	$\theta_{j-a} = 666.7^{\circ}C/W,$ $\Delta T_a = 6.5^{\circ}C,$	$P(max) = 150mW$ $T_a = 56.5^{\circ}C$
D106 D1FL20U SHINDENGEN	$T_{jmax} = 150^{\circ}C,$ $P_d = 0.102W,$ $T_j = T_a + ((\theta_j - a) \times P_d) = 72.6^{\circ}C$ D.F. = 48.4%	$\theta_{j-a} = 157^{\circ}C/W,$ $\Delta T_a = 6.6^{\circ}C,$	$P(max) = -$ $T_a = 56.6^{\circ}C$
D107 D1FL20U SHINDENGEN	$T_{jmax} = 150^{\circ}C,$ $P_d = 0.033W,$ $T_j = T_a + ((\theta_j - a) \times P_d) = 57.6^{\circ}C$ D.F. = 38.4%	$\theta_{j-a} = 157^{\circ}C/W,$ $\Delta T_a = 2.4^{\circ}C,$	$P(max) = -$ $T_a = 52.4^{\circ}C$
D108 D1FL20U SHINDENGEN	$T_{jmax} = 150^{\circ}C,$ $P_d = 0.18W,$ $T_j = T_a + ((\theta_j - a) \times P_d) = 85.9^{\circ}C$ D.F. = 57.3%	$\theta_{j-a} = 157^{\circ}C/W,$ $\Delta T_a = 7.6^{\circ}C,$	$P(max) = -$ $T_a = 57.6^{\circ}C$
Z102 02CZ13X TOSHIBA	$T_{jmax} = 150^{\circ}C,$ $P_d = 0.030W,$ $T_j = T_a + ((\theta_j - a) \times P_d) = 81.7^{\circ}C$ D.F. = 54.5%	$\theta_{j-a} = 625^{\circ}C/W,$ $\Delta T_a = 13.0^{\circ}C,$	$P_c(max) = 0.2W$ $T_a = 63.0^{\circ}C$
Z103,Z104 02CZ18Y TOSHIBA	$T_{jmax} = 150^{\circ}C,$ $P_d = 0.0029W,$ $T_j = T_a + ((\theta_j - a) \times P_d) = 59.5^{\circ}C$ D.F. = 39.7%	$\theta_{j-a} = 625^{\circ}C/W,$ $\Delta T_a = 7.7^{\circ}C,$	$P_c(max) = 0.2W$ $T_a = 57.7^{\circ}C$
Z105 U1ZB220-Y TOSHIBA	$T_{jmax} = 150^{\circ}C,$ $P_d = 0.263W,$ $T_j = T_a + ((\theta_j - a) \times P_d) = 87.4^{\circ}C$ D.F. = 58.3%	$\theta_{j-a} = 125^{\circ}C/W,$ $\Delta T_a = 4.5^{\circ}C,$	$P_c(max) = 1.0W$ $T_a = 54.5^{\circ}C$
PC52 (発光側) TLP721F TOSHIBA	$T_{jmax} = 125^{\circ}C,$ $I_f = 3.75mA,$ $I_f(max) = 46.9mA$ D.F. = 8.0%	$\theta_{j-a} = - ,$ $\Delta T_a = 7.7^{\circ}C,$	$T_a = 57.7^{\circ}C$
PC52 (受光部) TLP721F TOSHIBA	$T_{jmax} = 125^{\circ}C,$ $P_d = 0.0063W,$ $T_j = T_a + ((\theta_j - a) \times P_d) = 61.9^{\circ}C$ D.F. = 49.6%	$\theta_{j-a} = 667^{\circ}C/W,$ $\Delta T_a = 7.7^{\circ}C,$	$P_c(max) = 150mW$ $T_a = 57.7^{\circ}C$

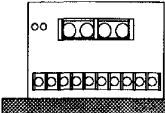
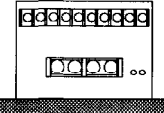
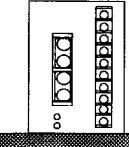
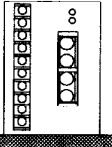
部品番号 Location No.	$V_{in} = 200VAC$	Load = 100%	$T_a = 50^{\circ}C$
PC53 (発光側) TLP721F TOSHIBA	$T_{jmax} = 125^{\circ}C,$ $I_f = 2.8mA,$ $I_f(max) = 46.0mA$ D.F. = 6.0%	$\theta_{j-a} = - ,$ $\Delta T_a = 9.0^{\circ}C,$	$T_a = 59.0^{\circ}C$
PC53 (受光側) TLP721F TOSHIBA	$T_{jmax} = 125^{\circ}C,$ $P_d = 0.8mW,$ $T_j = T_a + ((\theta_{j-a}) \times P_d) = 59.5^{\circ}C$ D.F. = 47.6%	$\theta_{j-a} = 0.667^{\circ}C/mW,$ $\Delta T_a = 9.0^{\circ}C,$	$P_c(max) = 150mW$ $T_a = 59.0^{\circ}C$
PC54 (発光側) TLP721F TOSHIBA	$T_{jmax} = 125^{\circ}C,$ $I_f = 13.8mA,$ $I_f(max) = 44.2mA$ D.F. = 31.2%	$\theta_{j-a} = - ,$ $\Delta T_a = 11.9^{\circ}C,$	$T_a = 61.9^{\circ}C$
PC54 (受光側) TLP721F TOSHIBA	$T_{jmax} = 125^{\circ}C,$ $P_d = 0.0035W,$ $T_j = T_a + ((\theta_{j-a}) \times P_d) = 64.2^{\circ}C$ D.F. = 51.4%	$\theta_{j-a} = 667^{\circ}C/W,$ $\Delta T_a = 11.9^{\circ}C,$	$P_c(max) = 150mW$ $T_a = 61.9^{\circ}C$
PD51 TLG-223 TOSHIBA	$T_{jmax} = 75^{\circ}C,$ $I_f = 5.0mA,$ $I_f(max) = 16.2mA$ D.F. = 30.9%	$\theta_{j-a} = - ,$ $\Delta T_c = 1.4^{\circ}C,$	$P(max) = 70mW$ $T_c = 51.4^{\circ}C$
SR1 SM8JZ47A TOSHIBA	$T_{jmax} = 125^{\circ}C,$ $P_d = 3.45W,$ $T_j = T_c + ((\theta_{j-c}) \times P_d) = 93.4^{\circ}C$ D.F. = 74.7%	$\theta_{j-c} = 3.6^{\circ}C/W,$ $\Delta T_c = 31.0^{\circ}C,$	$P(max) = 0.5W$ $T_c = 81.0^{\circ}C$

3. 主要部品温度上昇値

**MAIN COMPONENTS TEMPERATURE RISE  $\Delta T$  LIST**

MODEL : JWS300-5

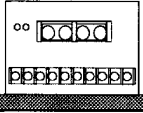
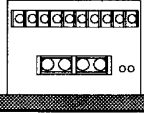
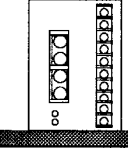
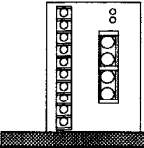
・ 測定条件 Measuring Conditions

取付方法 Mounting Method	(A)	(B)	(C)	(D)
(標準取付:(A)) (Standard Mounting Method:(A))				
入力電圧 Input Voltage (VAC)	100			100
出力電圧 Output Voltage (VDC)	5			5
出力電流 Output Current (A)	60			33

※Condition Ta = 50°C

出力ディレーティング Output Derating (%) Ta = 50°C		$\Delta T$ Temperature rise (°C)	
		100	55
部品番号 Location No.	部品名 Parts Name	取付方向Mounting A, B, C	取付方向Mounting D
L1	BALUN COIL	25.4	6.2
L3	CHOKE COIL	17.3	12.2
T1	TRANSE PULSE	7.0	5.2
T52	TRANSE PULSE	30.6	12.8
L57	CHOKE COIL	40.5	13.8
D1	BRIDGE DIODE	39.0	21.2
D2	LLD	29.8	16.3
Q1	MOS FET	37.2	17.4
A1	IC	5.8	5.8
D51	SBD	60.4	26.9
Q51	MOS FET	51.3	45.3
A102	CHIP IC	19.9	18.5
A204	CHIP IC	29.0	28.8
C8	E. CAP.	6.2	2.9
C12	E. CAP.	4.0	2.8
C54	E. CAP.	8.1	0.4
C55	E. CAP.	10.5	1.3
C56	E. CAP.	7.4	0.6
C57	E. CAP.	11.8	1.6
C58	E. CAP.	14.1	2.1
C66	E. CAP.	14.4	5.0

・ 測定条件 Measuring Conditions

取付方法 Mounting Method  (標準取付:(A)) (Standard Mounting Method:(A))	(A)	(B)	(C)	(D)
				
入力電圧 Input Voltage (VAC)	200			200
出力電圧 Output Voltage (VDC)	5			5
出力電流 Output Current (A)	60			33

※Condition Ta = 50°C

出力ディレーティング Output Derating (%) Ta = 50°C		ΔT Temperature rise (°C)	
		100	55
部品番号 Location No.	部品名 Parts Name	取付方向Mounting A, B, C	取付方向Mounting D
L1	BALUN COIL	4.2	0.6
L3	CHOKE COIL	12.3	10.7
T1	TRANSE PULSE	6.3	5.1
T52	TRANSE PULSE	30.6	15.5
L57	CHOKE COIL	39.6	13.7
D1	BRIDGE DIODE	16.6	9.3
D2	LLD	22.5	12.3
Q1	MOS FET	15.0	7.3
A1	IC	4.6	5.7
D51	SBD	60.7	26.4
Q51	MOS FET	51.8	48.0
A102	CHIP IC	17.0	17.9
A204	CHIP IC	27.8	29.4
C8	E. CAP.	3.5	2.4
C12	E. CAP.	2.4	2.6
C54	E. CAP.	5.7	0.3
C55	E. CAP.	8.2	1.0
C56	E. CAP.	6.4	0.3
C57	E. CAP.	9.1	1.4
C58	E. CAP.	9.7	1.6
C66	E. CAP.	8.6	3.9

**4. 電解コンデンサ推定寿命計算値  
ELECTROLYTIC CAPACITOR LIFETIME**

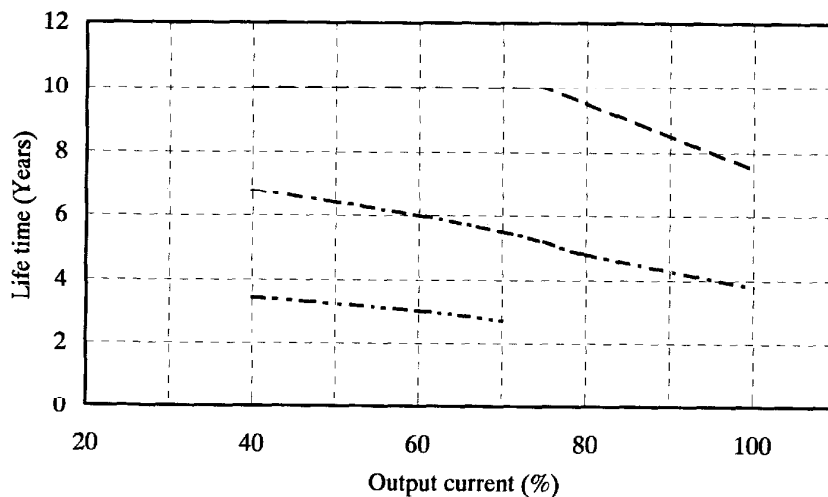
MODEL : JWS300-5

取付方向 A,B,C  
Mounting A,B,C

Vin : 100VAC

電解コンデンサー推定寿命特性  
E,Cap Lifetime Characteristic

LOAD %	Life time (years)		
	Ta(°C)=40.0	Ta(°C)=50.0	Ta(°C)=60.0
40	10.0	6.8	3.4
60	10.0	6.0	3.0
80	9.5	4.8	-
100	7.5	3.8	-

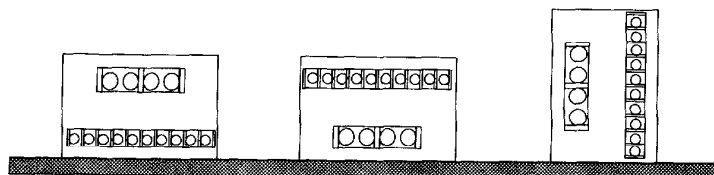


Ta=40°C; - - - - Ta=50°C; - · - · - Ta=60°C; · · · · ·

A 取付  
mounting A

B 取付  
mounting B

C 取付  
mounting C

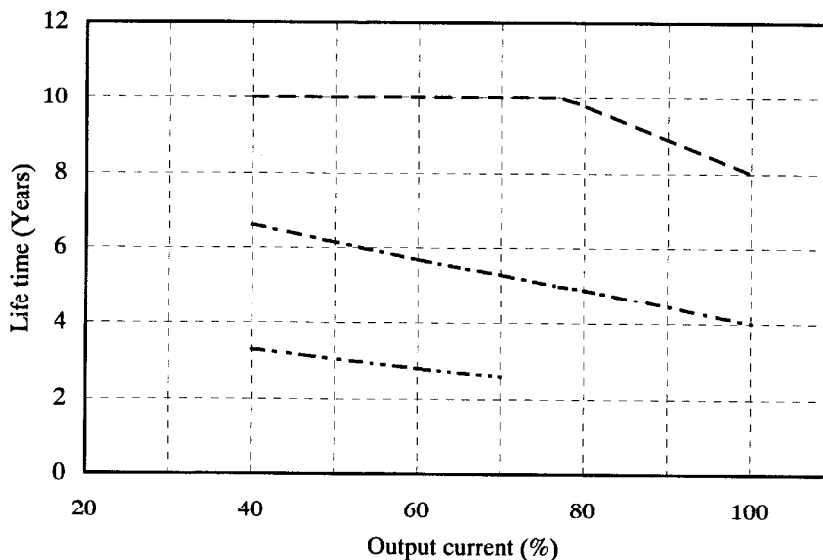


取付方向 A,B,C  
Mounting A,B,C

Vin : 200VAC

電解コンデンサー推定寿命特性  
E,Cap Lifetime Characteristic

LOAD %	Life time (years)		
	Ta (°C)=40.0	Ta (°C)=50.0	Ta (°C)=60.0
40	10.0	6.6	3.3
60	10.0	5.7	2.8
80	9.8	4.9	-
100	8.0	4.0	-

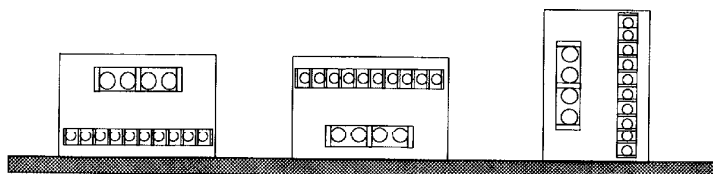


Ta=40°C; - - - - Ta=50°C; - · - · - Ta=60°C; - · - · -

A 取付  
mounting A

B 取付  
mounting B

C 取付  
mounting C

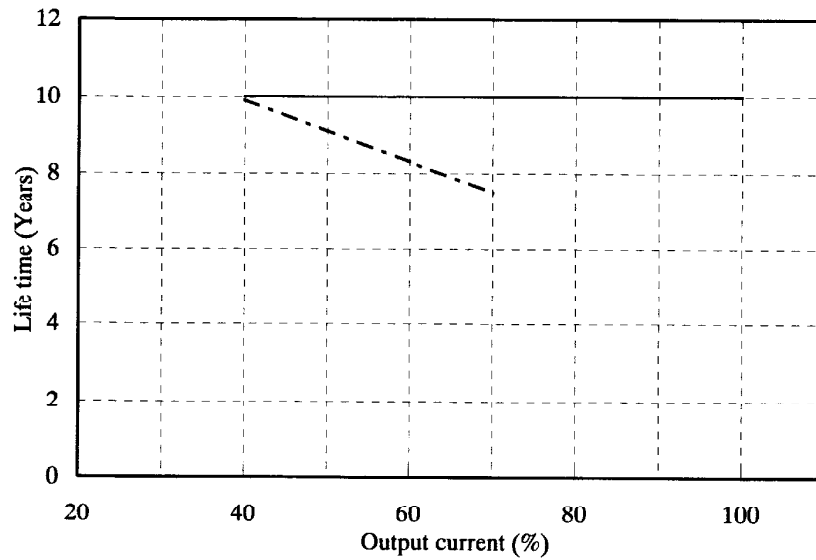


取付方向 D  
Mounting D

Vin : 100VAC

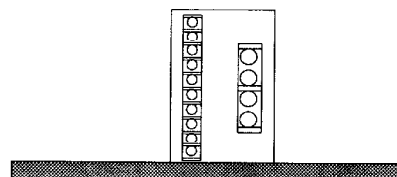
電解コンデンサー推定寿命特性  
E, Cap Lifetime Characteristic

LOAD %	Life time (years)	
	Ta (°C)=35.0	Ta (°C)=45.0
40	10.0	9.9
60	10.0	8.3
80	10.0	-
100	10.0	-



Ta=35°C; ——— Ta=45°C; - - -

D 取付  
mounting D

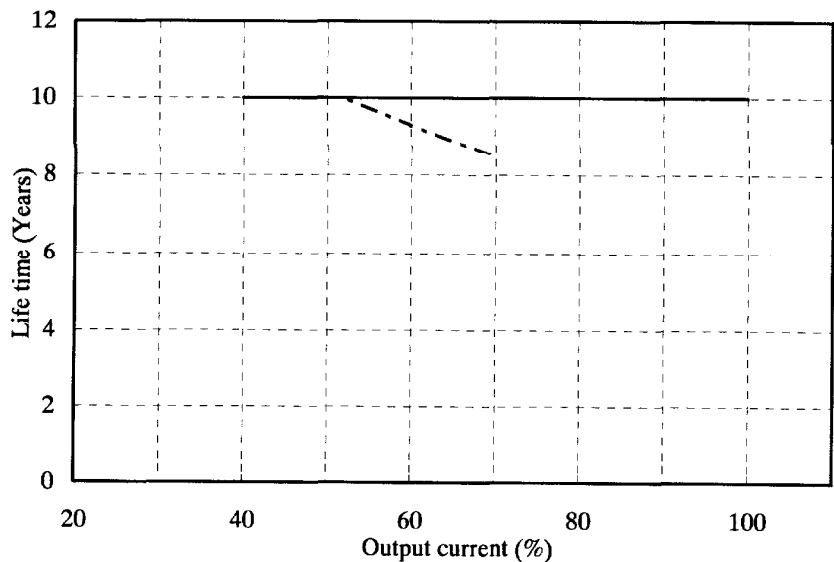


取付方向 D  
Mounting D

Vin : 200VAC

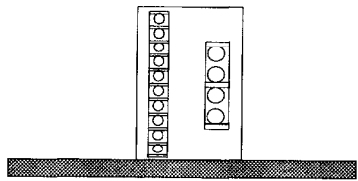
電解コンデンサー推定寿命特性  
E, Cap Lifetime Characteristic

LOAD %	Life time (years)	
	Ta (°C)=35.0	Ta (°C)=45.0
40	10.0	10.0
60	10.0	9.3
80	10.0	7.8
100	10.0	6.2



Ta=35°C; — Ta=45°C; - - -

D 取付  
mounting D





5. アブノーマル試験 ABNORMAL TEST

**JWS300**

MODEL: JWS300-5

(1)試験条件 Condition

Input : 200VAC Output : 5V60A Ta : 25°C 70%RH

(2)試験結果 Test Result

( Da : Damaged )

No.	試験箇所 Test Position		試験モード Test Mode		試験結果 Test Result												記事 Note
	部品No. Location No.	試験端子 Test Point	ショート Short	オープン Open	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	
					発火 Fire	発煙 Smoke	破裂 Burst	異臭 Smell	発熱 Red Hot	破損 Damaged	ヒューズ断 Fuse Blown	OVP	OCP	出力断 No Output	変化なし No Change	その他 Others	
1	Q1	D-S	○								○			○			
2		D-G	○							○	○			○			破損 Da : Z101
3		G-S	○							○				○			破損 Da : R142-134, R144-147
4		D		○										○			
5		S		○										○			
6		G		○							○			○			
7	Q2	C-E	○							○					○		破損 Da : R144-147
8		C-B	○							○	○			○			破損 Da : Q1
9		B-E	○												○		
10		C		○											○		
11		E		○							○	○			○		破損 Da : Q1
12		B		○							○	○			○		破損 Da : Q1
13	Q3	C-E	○							○				○			破損 Da : R144-147
14		C-B	○							○				○			破損 Da : R142,R143
15		B-E	○												○		
16		C		○											○		
17		E		○							○	○			○		破損 Da : Q1,Z101
18		B		○							○	○			○		破損 Da : Q1,Z101
19	Q51	D-S	○							○	○			○			破損 Da : D202, R245,R246
20		D-G	○							○	○			○			破損 Da : Z204, R246,R245,D202
21		G-S	○											○			
22		D		○										○			
23		S		○										○			
24		G		○							○				○		破損 Da : D202, R245,R246,A204
25	D1	AC-AC	○								○			○			
26		AC-DC	○								○			○			
27		AC		○										○			
28		DC		○										○			
29	D2	2-3	○												○		
30		1-3		○							○	○			○		破損 Da : Q1

No.	試験箇所 Test Position		試験モード Test Mode		試験結果 Test Result												記事 Note
	部品No. Location No.	試験端子 Test Point	ショート Short	オープン Open	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	
					発火 Fire	発煙 Smoke	破裂 Burst	異臭 Smell	発熱 Red Hot	破損 Damaged	ヒューズ断 Fuse Blown	OVP	OCP	出力断 No Output	変化なし No Change	その他 Others	
31	D51	K-A1	○													○	出力電圧低下 Output voltage Low
32		K-A2	○													○	出力電圧低下 Output voltage Low
33		K		○												○	
34		A1		○												○	
35		A2		○												○	
36	SR1	T1-T2	○													○	
37		T1-G	○						○	○				○			破損 Da : TFR1,Q1, Z101,D1
38		T2-G	○						○	○				○			破損 Da : TFR1,Q1, Z101,D1
39		T1		○					○	○				○			破損 Da : TFR1,Q1, Z101,D1
40		T2		○					○	○				○			破損 Da : TFR1,Q1, Z101,D1
41		G		○					○	○				○			破損 Da : TFR1,Q1, Z101,D1
42	PC51	1-2	○													○	
43		3-4	○									○		○			
44		1		○												○	
45		2		○												○	
46		3		○												○	
47		4		○											○		
48	PC52	1-2	○													○	出力電圧上昇 Output voltage High
49		3-4	○											○			
50		1		○												○	出力電圧上昇 Output voltage High
51		2		○												○	出力電圧上昇 Output voltage High
52		3		○												○	出力電圧上昇 Output voltage High
53		4		○											○	出力電圧上昇 Output voltage High	
54	PC53	1-2	○											○			
55		3-4	○												○		
56		1		○										○			
57		2		○										○			
58		3		○										○			
59		4		○									○				

No.	試験箇所 Test Position		試験モード Test Mode		試験結果 Test Result												記事 Note		
	部品No. Location No.	試験端子 Test Point	ショート Short	オープン Open	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫			
					発火 Fire	発煙 Smoke	破裂 Burst	異臭 Smell	発熱 Red Hot	破損 Damaged	ヒューズ断 Fuse Blown	OVP	OCP	出力断 No Output	変化なし No Change	その他 Others			
60	PC54	1-2	○													○	PF-High		
61		3-4	○													○			
62		1		○													○	PF-High	
63		2		○														○	PF-High
64		3		○														○	PF-High
65		4		○													○	PF-High	
66	L1	1-2	○													○			
67		2-3	○								○				○				
68		3-4	○													○			
69		4-1	○								○				○				
70		1		○												○			
71		2		○												○			
72		3		○												○			
73		4		○												○			
74	L3	5-11	○							○	○						破損 Da : Q1,TFR1		
75		11-14	○							○	○						破損 Da : Q1,SR1, TFR1,D1		
76		1-14	○							○	○						破損 Da : TFR1,Q1, Z101,D1		
77		5		○												○			
78		14		○						○	○					○	○	破損 Da : TFR1,Q1, Z101,D1	
79	L57		○														○	出力電圧低下 Output voltage Low	
80			○																
81	T1	1-2	○												○				
82		5-4	○												○				
83		6-7	○														○	出力電圧低下 Output voltage Low	
84		9-10	○												○				
85		1		○												○			
86		4		○												○			
87		6		○														○	出力電圧上昇 Output voltage High
88		9		○															
89	T51	1-2	○												○				
90		3-4	○														○	PC機能停止 PC function failure	
91		1		○											○				
92		3		○														○	PC機能停止 PC function failure

No.	試験箇所 Test Position		試験モード Test Mode		試験結果 Test Result												記事 Note
	部品No. Location No.	試験端子 Test Point	ショート Short	オープン Open	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	
					発火 Fire	発煙 Smoke	破裂 Burst	異臭 Smell	発熱 Red Hot	破損 Damaged	ヒューズ断 Fuse Blown	OVP	OCP	出力断 No Output	変化なし No Change	その他 Others	
93	T52	3-5	○											○			
94		9-19	○													○	出力電圧低下 Output voltage Low
95		3		○											○		
96		9		○											○		
97		A1	D-S	○								○			○		
98	D-C		○								○			○			Fuse : F2
99	S-C		○											○			
100	D			○										○			
101	c			○												○	出力電圧不安定 Output voltage unstable
102	S			○										○			
103	A2	1-2	○											○			
104		2 3	○											○			
105		1-3	○												○		
106		1		○										○			
107		2		○										○			
108	3		○										○				
109	D101		○												○		
110				○						○	○			○			破損 Da : TFR1,Q1, Z101,D1
111	D102		○												○		
112				○											○		
113	D104		○											○			
114				○											○		
115	D106		○											○			
116				○										○			
117	D107		○											○			
118				○												○	出力電圧上昇 Output voltage High
119	D108		○											○			
120				○										○			
121	Z106		○							○	○			○			Fuse : F2 破損 Da : Z107
122				○											○		

No.	試験箇所 Test Position		試験モード Test Mode		試験結果 Test Result												記事 Note
	部品No. Location No.	試験端子 Test Point	ショート Short	オープン Open	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	
					発火 Fire	発煙 Smoke	破裂 Burst	異臭 Smell	発熱 Red Hot	破損 Damaged	ヒューズ断 Fuse Blown	OVP	OCP	出力断 No Output	変化なし No Change	その他 Others	
123	Z201		○									○		○			
124				○											○		
125	C1		○								○			○			
126				○											○		
127	C5		○								○			○			
128				○											○		
129	C8		○								○			○			
130				○											○		
131	C12		○								○			○			Fuse : F2
132				○											○		
133	C19		○												○		
134				○											○		
135	C51		○							○							破損 Da : R51
136				○											○		
137	C52		○													○	出力電圧低下 Output voltage Low
138				○											○		
139	C53		○							○							破損 Da : R52
140				○											○		
141	C54		○									○					
142				○											○		
143	C68		○							○	○			○			破損 Da : D202
144				○											○		
145	C201		○													○	PC機能停止 PC function failure
146				○											○		
147	R3		○												○		
148				○						○	○			○			破損 Da : TFR1,Q1, Z101,D1
149	R51		○												○		
150				○											○		
151	R52		○												○		
152				○											○		
153	R108		○												○		
154				○											○		
155	R112		○												○		
156				○										○			
157	R116		○											○			
158				○						○	○			○			Fuse : F2 破損 Da : Z106,Z107

No.	試験箇所 Test Position		試験モード Test Mode		試験結果 Test Result												記事 Note
	部品No. Location No.	試験端子 Test Point	ショート Short	オープン Open	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	
					発火 Fire	発煙 Smoke	破裂 Burst	異臭 Smell	発熱 Red Hot	破損 Damaged	ヒューズ断 Fuse Blown	OVP	OCP	出力断 No Output	変化なし No Change	その他 Others	
159	R131		○											○			
160				○											○		
161	R132		○						○	○				○			
162				○										○			
163	R142		○											○			
164				○										○			
165	R244		○											○			
166				○										○			
167	R245		○											○			
168				○									○		○	出力電圧低下 Output voltage Low	

**6. 振動試験 VIBRATION TEST**

MODEL : JWS300-48

**(1) 振動試験種類 Vibration test class**

掃引振動数耐久試験 Frequency variable endurance test

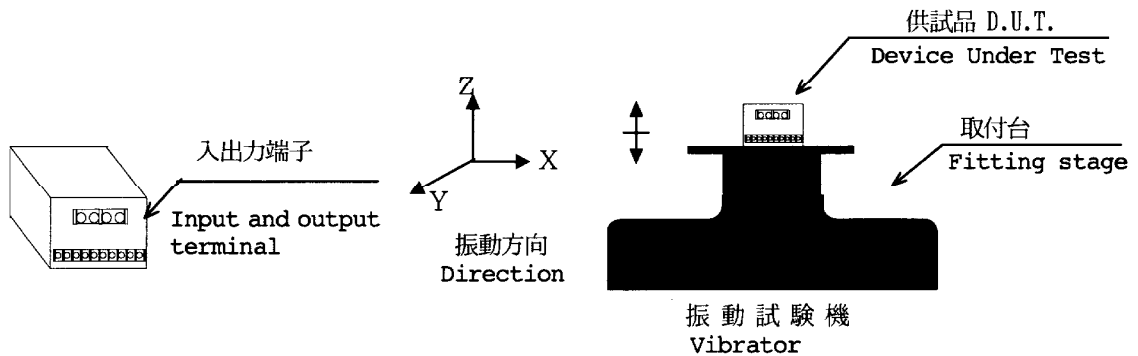
**(2) 使用振動試験装置 Equipment used**

・EMIC (株)製 制御部 : F-400-BM-DCS-7800 ・加振部 : 905-FN  
 EMIC CORP Controller Vibrator

**(3) 試験条件 Test Conditions**

- ・周波数範囲 10~55Hz  
Sweep frequency
- ・掃引時間 1.0分間  
Sweep time 1.0min.
- ・加速度 一定 19.6 m/s<sup>2</sup>(2G)  
Acceleration constant
- ・振幅方向 X, Y, Z,  
Direction
- ・試験時間 各方向共 1 時間  
Test time 1 hour each

**(4) 試験方法 Test method**



**(5) 試験結果 Test Results**

合格 O K

入力電圧  $V_{in}$ :100VAC

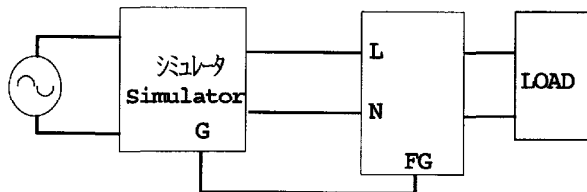
出力電流  $I_o$ :100%

測定確認項目 Check item	出力電圧 (V) Output voltage	リップル電圧 (mVp-p) Ripple voltage	機構・実装状態 D.U.T.state	
試験前 Before Test	48.030	100	異常なし OK	
試験後 After Test	X	48.070	99	異常なし OK
	Y	48.110	98	異常なし OK
	Z	48.060	98	異常なし OK

**7. ノイズシミュレート試験 NOISE SIMULATE TEST**

MODEL : JWS300-5

**(1) 試験回路及び測定器 Test circuit and equipment**



シミュレータ Simulator : INS-4420 (ノイズ研究所) Noise Laboratory Co.,LTD

**(2) 試験条件 Test Conditions**

- |                              |               |                       |                    |
|------------------------------|---------------|-----------------------|--------------------|
| ・入力電圧<br>Input voltage       | : 100,230VAC  | ・ノイズ電圧<br>Noise level | : 0V~2kV           |
| ・出力電圧<br>Output voltage      | : 定格<br>Rated | ・位相<br>Phase shift    | : 0°~360°          |
| ・出力電流<br>Output Current      | : 0%,100%     | ・極性<br>Polarity       | : +,-              |
| ・周囲温度<br>Ambient temperature | : 25°C        | ・MODE                 | : NORMAL<br>COMMON |
| ・パルス幅<br>Pulse width         | : 50ns~1000ns | ・TRIG SELECT          | : LINE             |

**(3) 判定条件 Acceptable conditions**

- |              |                            |
|--------------|----------------------------|
| 1.破壊しない事     | Not to be broken           |
| 2.出力がダウンしない事 | Not to be shut down output |
| 3.その他異常のない事  | No other out of orders     |

**(4) 試験結果 Test Result**

合格 O K



**8. 熱衝撃試験 THERMAL SHOCK TEST**

MODEL : JWS300-24

**(1) 使用計測器 Equipment used**

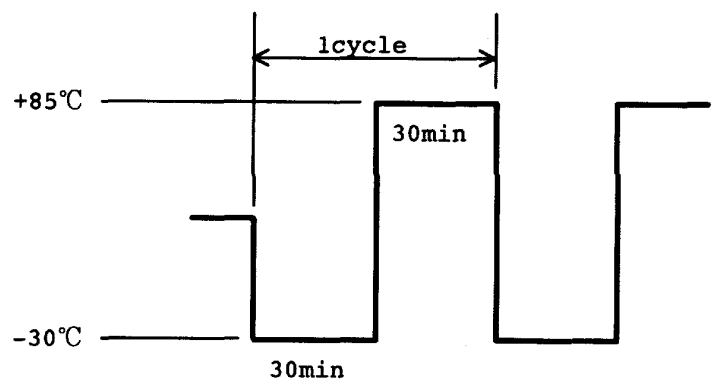
THERMAL SHOCK CHAMBER TSV-40 (TABAI ESPEC CORP.)

**(2) 供試品台数 The number of D.U.T.(Device Under Test)**

2 台 (units)

**(3) 試験条件 Test conditions**

- ・電源周囲温度 :  $-30^{\circ}\text{C} \longleftrightarrow 85^{\circ}\text{C}$   
Ambient temperature
- ・試験時間 :  
Test time



- ・試験サイクル : 100 サイクル  
Test cycle : cycles
- ・非動作  
not operating

**(4) 試験方法 Test method**

初期測定の後、供試品を試験槽に入れ、上記サイクルで試験を行う。100サイクル後に、供試品を常温常湿下に1時間放置し、出力に異常がない事を確認する。

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) 試験結果 Test Results**

合 格 O K

入力電圧 $V_{in}$ :100VAC 出力電流 $I_o$ :100%			24V			
			FROM		TO	
リップル ノイズ Ripple Noise		mV	20		20	
スパイク ノイズ Spike Noise		mV	70		70	
入力変動 Line regulation	MIN	V	24.059	1mV	24.004	1mV
	MAX	V	24.060		24.005	
負荷変動 Load regulation	0%	V	24.053	7mV	24.000	6mV
	100%	V	24.060		24.006	
効率 Efficiency	$W_{in}$	W	419	80.3%	419	80.2%
	$V_{out}$	V	24.060		24.005	
	$I_{out}$	A	14.0		14.0	
半田状態・その他 Solder condition・etc.			異常なし OK		異常なし OK	

9. ファン期待寿命 FAN LIFE EXPECTANCY

MODEL : JWS300

(1) 使用製品名 PART NAME  
109P0812HD011 (SANYO DENKI CO.)

(2) 期待寿命 LIFE EXPECTANCY  
メーカーによるファン単体の期待寿命データを示す(残存率90%)。  
また、ファン排気温度測定個所は、fig 1.に示す。

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

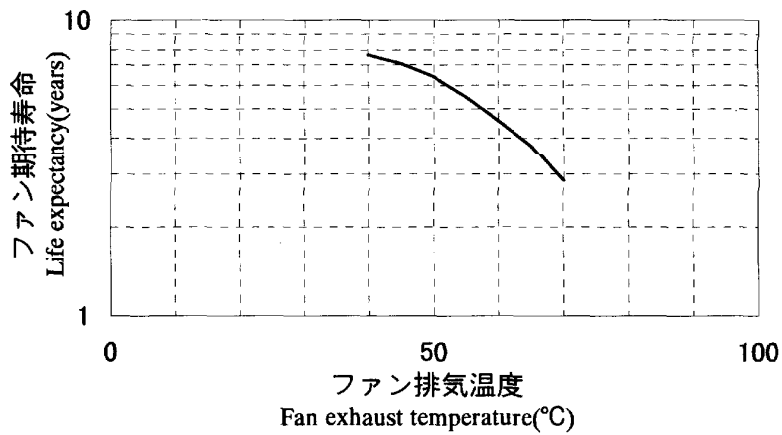


fig 1. ファン排気温度測定個所  
Measuring point of fan exhaust temperature.

