HWS600P

RELIABILITY DATA

信頼性データ

DWG No. A238-57-01A		
APPD	CHK	DWG
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使用記号　Terminology used

FG ･･････フレームグラウンド Frame GND

※ 試験結果は、代表データでありますが、全ての製品はほぼ同等な特性を示します。
従いまして、以下の結果は実力値とお考え願います。

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

1. MTBF計算値 Calculated Values of MTBF

MODEL : HWS600P-24

(1) 算出方法 Calculating method

JEITA (RCR-9102, RCR-9102B)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λ_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 JEITA (RCR-9102, RCR-9102B).
Individual failure rates λ_G is given to each part and MTBF is calculated
by the count of each part.

＜算出式＞

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

λequip :全機器故障率 (故障数／10^6時間)
Total Equipment Failure Rate (Failure／10^6Hours)

λ_G :i 番目の同属部品に対する故障率 (故障数／10^6時間)
Generic Failure Rate for The ith Generic Part (Failure／10^6Hours)

Ni :i 番目の同属部品の個数
Quantity of ith 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

π_Q :i 番目の同属部品に対する品質ファクタ (π_Q=1)
Generic Quality Factor for The ith Generic Part (π_Q=1)

(2) MTBF値 MTBF values

G_F : 地上固定 (Ground, Fixed)

RCR-9102

MTBF ≒ 158,524 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.

RCR-9102B

MTBF ≒ 84,342 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 : HWS600P-24

(1) 算出方法 Calculating method

(a) 測定条件 Measuring Condition

・入力 Input	: 100, 200VAC	・周囲温度 Ambient temperature	: 50℃
・出力 Output	: 24V 25A(100%)	・取付け方法 Mounting method	: 標準取付け(A) Standard mounting (A)

(b) 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.

(c) 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.

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

$$\theta_{j\text{-}c} = \frac{Tj(max) - Tc}{Pc(max)} \qquad \theta_{j\text{-}l} = \frac{Tj(max) - Tl}{Pc(max)} \qquad \theta_{j\text{-}a} = \frac{Tj(max) - Ta}{Pc(max)}$$

Tc	:ディレーティングの始まるケース温度 一般に25℃ Case Temperature at Start Point of Derating;25℃ in general
Tl	:ディレーティングの始まるリード温度 一般に25℃ Lead Temperature at Start Point of Derating;25℃ in general
Ta	:ディレーティングの始まる周囲温度 一般に25℃ Ambient Temperature at Start Point of Derating;25℃ in general
Pc(max) (Pch(max))	:最大コレクタ(チャネル)損失 Maximum collector (channel) dissipation
Tj(max) (Tch(max))	:最大接合点(チャネル)温度 Maximum junction (channel) temperature
θj-c (θch-c)	:接合点(チャネル)からケースまでの熱抵抗 Thermal impedance between junction (channel) and case
θj-l (θch-l)	:接合点(チャネル)からリードまでの熱抵抗 Thermal impedance between junction (channel) and lead
θj-a (θch-a)	:接合点(チャネル)から周囲までの熱抵抗 Thermal impedance between junction (channel) and air

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

部品番号 Location No.	Vin = 100VAC	Load = 100%	Ta = 50℃
Q1-Q2 F20W60C3 SHINDENGEN	Tch (max) = 150℃ Pch= 15.0 W Tch= Tc+ ((θch-c) × Pch)= 95.1 ℃ D.F. = 63.4 %	θch-c = 0.6 ℃/W ΔTc= 36.1 ℃	Pch (max) = 75W Tc= 86.1 ℃
Q31 TK40J60T TOSHIBA	Tch (max) = 150℃ Pch= 7.0 W Tch= Tc+ ((θch-c) × Pch)= 70.6 ℃ D.F. = 47.1 %	θch-c = 0.313 ℃/W ΔTc= 18.4 ℃	Pch (max) = 400W Tc= 68.4 ℃
Q32 TK40J60T TOSHIBA	Tch (max) = 150℃ Pch= 7.8 W Tch= Tc+ ((θch-c) × Pch)= 71.8 ℃ D.F. = 47.9 %	θch-c = 0.313 ℃/W ΔTc= 19.4 ℃	Pch (max) = 400W Tc= 69.4 ℃
Q102 2SC2873-Y TOSHIBA	Tj (max) = 150℃ Pc= 60.0 mW Tj= Ta+ ((θj-a) × Pc)= 76.6 ℃ D.F. = 51.1 %	θj-a = 250 ℃/W ΔTa= 11.6 ℃	Pc (max) = 0.5W Ta= 61.6 ℃
Q103 2SA1213-Y TOSHIBA	Tj (max) = 150℃ Pc= 132.0 mW Tj= Ta+ ((θj-a) × Pc)= 94.6 ℃ D.F. = 63.1 %	θj-a = 250 ℃/W ΔTa= 11.6 ℃	Pc (max) = 0.5W Ta= 61.6 ℃
Q201 2SK1334BY RENESAS	Tch (max) = 150℃ Pch= 22.0 mW Tch= Ta+ ((θch-a) × Pch)= 66.7 ℃ D.F. = 44.4 %	θch-a = 125 ℃/W ΔTa= 13.9 ℃	Pch (max) = 1.0W Ta= 63.9 ℃
Q203 2SA1213-Y TOSHIBA	Tj (max) = 150℃ Pc= 30.2 mW Tj= Ta+ ((θj-a) × Pc)= 77.3 ℃ D.F. = 51.5 %	θj-a = 250 ℃/W ΔTa= 19.7 ℃	Pc (max) = 0.5W Ta= 69.7 ℃
Q304 2SA1213-Y TOSHIBA	Tj (max) = 150℃ Pc= 195.0 mW Tj= Ta+ ((θj-a) × Pc)= 109.4 ℃ D.F. = 72.9 %	θj-a = 250 ℃/W ΔTa= 10.6 ℃	Pc (max) = 0.5W Ta= 60.6 ℃
Q308 2SA1244-Y TOSHIBA	Tj (max) = 150℃ Pc= 1.4 W Tj= Tc+ ((θj-c) × Pc)= 78.3 ℃ D.F. = 52.2 %	θj-c = 6.25 ℃/W ΔTc= 19.5 ℃	Pc (max) = 20.0W Tc= 69.5 ℃
Q331 2SC2712-Y TOSHIBA	Tj (max) = 150℃ Pc= 50.3 mW Tj= Ta+ ((θj-a) × Pc)= 101.5 ℃ D.F. = 67.7 %	θj-a = 833 ℃/W ΔTa= 9.6 ℃	Pc (max) = 0.15W Ta= 59.6 ℃
D1 LL25XB60-7000 SHINDENGEN	Tj (max) = 150℃ Pd= 13.1 W Tj= Tc+ ((θj-c) × Pd)= 92.8 ℃ D.F. = 61.9 %	θj-c = 0.8 ℃/W ΔTc= 32.3 ℃	Tc= 82.3 ℃
D2-D3 RF2001TA6S ROHM	Tj (max) = 150℃ Pd= 3.8 W Tj= Tc+ ((θj-c) × Pd)= 93.1 ℃ D.F. = 62.1 %	θj-c = 2 ℃/W ΔTc= 35.5 ℃	Tc= 85.5 ℃
D51-D55 20DL2C41A TOSHIBA	Tj (max) = 150℃ Pd= 4.9 W Tj= Tc+ ((θj-c) × Pd)= 85.9 ℃ D.F. = 57.2 %	θj-c = 1.5 ℃/W ΔTc= 28.5 ℃	Tc= 78.5 ℃
D101 CRH01 TOSHIBA	Tj (max) = 150℃ Pd= 28.2 mW Tj= Tl+ ((θj-l) × Pd)= 70.7 ℃ D.F. = 47.2 %	θj-l = 30 ℃/W ΔTl= 19.9 ℃	Tl= 69.9 ℃

部品番号 Location No.	Vin = 100VAC　Load = 100%　Ta = 50℃		
D102 CRH01 TOSHIBA	Tj (max) = 150℃ Pd= 23.8 mW Tj= Tl+ ((θj-l) × Pd)= 70.6 ℃ D.F. = 47.1 %	θj-l = 30 ℃/W ΔTl= 19.9 ℃	Tl= 69.9 ℃
D203 NSF03A60 NIHON INTER	Tj (max) = 150℃ Pd= 20.0 mW Tj= Tl+ ((θj-l) × Pd)= 68.8 ℃ D.F. = 45.8 %	θj-l = 13 ℃/W ΔTl= 18.5 ℃	Tl= 68.5 ℃
D204 NSF03A60 NIHON INTER	Tj (max) = 150℃ Pd= 10.0 mW Tj= Tl+ ((θj-l) × Pd)= 65.5 ℃ D.F. = 43.7 %	θj-l = 13 ℃/W ΔTl= 15.4 ℃	Tl= 65.4 ℃
D301 CRH01 TOSHIBA	Tj (max) = 150℃ Pd= 0.2 W Tj= Tl+ ((θj-l) × Pd)= 69.3 ℃ D.F. = 46.2 %	θj-l = 30 ℃/W ΔTl= 13.3 ℃	Tl= 63.3 ℃
D331 CRH01 TOSHIBA	Tj (max) = 150℃ Pd= 80.0 mW Tj= Tl+ ((θj-l) × Pd)= 59.2 ℃ D.F. = 39.5 %	θj-l = 30 ℃/W ΔTl= 6.8 ℃	Tl= 56.8 ℃
D352 1SS184 TOSHIBA	Tj (max) = 150℃ Pd= 2.0 mW Tj= Ta+ ((θj-a) × Pd)= 60.8 ℃ D.F. = 40.5 %	θj-a = 833 ℃/W ΔTa= 9.1 ℃	P (max) = 0.15W Ta= 59.1 ℃
D353 CRH01 TOSHIBA	Tj (max) = 150℃ Pd= 0.2 W Tj= Tl+ ((θj-l) × Pd)= 65.4 ℃ D.F. = 43.6 %	θj-l = 30 ℃/W ΔTl= 9.4 ℃	Tl= 59.4 ℃
PC31 PS2581L1 (LED) NEC	Tj (max) = 125℃ Pd= 4.7 mW Tj= Tc+ ((θj-c) × Pd)= 57.4 ℃ D.F. = 45.9 %	θj-c = 150 ℃/W ΔTc= 6.7 ℃	Pd (max) = 0.15W Tc= 56.7 ℃
PC31 PS2581L1 (TRANSISTOR) NEC	Tj (max) = 125℃ Pc= 0.7 mW Tj= Tc+ ((θj-c) × Pc)= 56.8 ℃ D.F. = 45.4 %	θj-c = 150 ℃/W ΔTc= 6.7 ℃	Pc (max) = 0.15W Tc= 56.7 ℃
PC52 PS2581L1 (LED) NEC	Tj (max) = 125℃ Pd= 5.1 mW Tj= Tc+ ((θj-c) × Pd)= 57.5 ℃ D.F. = 46.0 %	θj-c = 150 ℃/W ΔTc= 6.7 ℃	Pd (max) = 0.15W Tc= 56.7 ℃
PC52 PS2581L1 (TRANSISTOR) NEC	Tj (max) = 125℃ Pc= 20.5 mW Tj= Tc+ ((θj-c) × Pc)= 59.8 ℃ D.F. = 47.8 %	θj-c = 150 ℃/W ΔTc= 6.7 ℃	Pc (max) = 0.15W Tc= 56.7 ℃
PC331 PS2801-1 (LED) NEC	Tj (max) = 125℃ Pd= 7.7 mW Tj= Tc+ ((θj-c) × Pd)= 57.9 ℃ D.F. = 46.3 %	θj-c = 150 ℃/W ΔTc= 6.7 ℃	Pd (max) = 0.12W Tc= 56.7 ℃
PC331 PS2801-1 (TRANSISTOR) NEC	Tj (max) = 125℃ Pc= 1.3 mW Tj= Tc+ ((θj-c) × Pc)= 56.9 ℃ D.F. = 45.5 %	θj-c = 150 ℃/W ΔTc= 6.7 ℃	Pc (max) = 0.12W Tc= 56.7 ℃
SR1 SMG16C60 SANREX	Tj (max) = 125℃ Pc= 2.6 W Tj= Tc+ ((θj-c) × Pc)= 93.0 ℃ D.F. = 74.4 %	θj-c = 1.4 ℃/W ΔTc= 39.4 ℃	Tc= 89.4 ℃

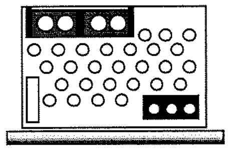
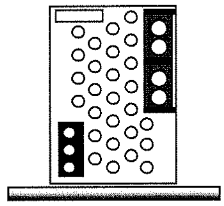
部品番号 Location No.	Vin = 200VAC	Load = 100%	Ta = 50℃
Q1-Q2 F20W60C3 SHINDENGEN	Tch (max) = 150℃ Pch= 7.3 W Tch= Tc+ ((θch-c) × Pch)= 71.1 ℃ D.F. = 47.4 %	θch-c = 0.6 ℃/W ΔTc= 16.7 ℃	Pch (max) = 75W Tc= 66.7 ℃
Q31 TK40J60T TOSHIBA	Tch (max) = 150℃ Pch= 7.0 W Tch= Tc+ ((θch-c) × Pch)= 70.7 ℃ D.F. = 47.1 %	θch-c = 0.313 ℃/W ΔTc= 18.5 ℃	Pch (max) = 400W Tc= 68.5 ℃
Q32 TK40J60T TOSHIBA	Tch (max) = 150℃ Pch= 7.8 W Tch= Tc+ ((θch-c) × Pch)= 72.0 ℃ D.F. = 48.0 %	θch-c = 0.313 ℃/W ΔTc= 19.6 ℃	Pch (max) = 400W Tc= 69.6 ℃
Q102 2SC2873-Y TOSHIBA	Tj (max) = 150℃ Pc= 60.0 mW Tj= Ta+ ((θj-a) × Pc)= 74.3 ℃ D.F. = 49.5 %	θj-a = 250 ℃/W ΔTa= 9.3 ℃	Pc (max) = 0.5W Ta= 59.3 ℃
Q103 2SA1213-Y TOSHIBA	Tj (max) = 150℃ Pc= 132.0 mW Tj= Ta+ ((θj-a) × Pc)= 92.3 ℃ D.F. = 61.5 %	θj-a = 250 ℃/W ΔTa= 9.3 ℃	Pc (max) = 0.5W Ta= 59.3 ℃
Q201 2SK1334BY RENESAS	Tch (max) = 150℃ Pch= 22.0 mW Tch= Ta+ ((θch-a) × Pch)= 65.7 ℃ D.F. = 43.8 %	θch-a = 125 ℃/W ΔTa= 12.9 ℃	Pch (max) = 1.0W Ta= 62.9 ℃
Q203 2SA1213-Y TOSHIBA	Tj (max) = 150℃ Pc= 30.2 mW Tj= Ta+ ((θj-a) × Pc)= 77.5 ℃ D.F. = 51.6 %	θj-a = 250 ℃/W ΔTa= 19.9 ℃	Pc (max) = 0.5W Ta= 69.9 ℃
Q304 2SA1213-Y TOSHIBA	Tj (max) = 150℃ Pc= 195.0 mW Tj= Ta+ ((θj-a) × Pc)= 109.4 ℃ D.F. = 72.9 %	θj-a = 250 ℃/W ΔTa= 10.6 ℃	Pc (max) = 0.5W Ta= 60.6 ℃
Q308 2SA1244-Y TOSHIBA	Tj (max) = 150℃ Pc= 1.4 W Tj= Tc+ ((θj-c) × Pc)= 78.3 ℃ D.F. = 52.2 %	θj-c = 6.25 ℃/W ΔTc= 19.5 ℃	Pc (max) = 20.0W Tc= 69.5 ℃
Q331 2SC2712-Y TOSHIBA	Tj (max) = 150℃ Pc= 50.3 mW Tj= Ta+ ((θj-a) × Pc)= 101.4 ℃ D.F. = 67.6 %	θj-a = 833 ℃/W ΔTa= 9.5 ℃	Pc (max) = 0.15W Ta= 59.5 ℃
D1 LL25XB60-7000 SHINDENGEN	Tj (max) = 150℃ Pd= 6.7 W Tj= Tc+ ((θj-c) × Pd)= 70.2 ℃ D.F. = 46.8 %	θj-c = 0.8 ℃/W ΔTc= 14.8 ℃	Tc= 64.8 ℃
D2-D3 RF2001TA6S ROHM	Tj (max) = 150℃ Pd= 3.7 W Tj= Tc+ ((θj-c) × Pd)= 77.8 ℃ D.F. = 51.9 %	θj-c = 2 ℃/W ΔTc= 20.4 ℃	Tc= 70.4 ℃
D51-D55 20DL2C41A TOSHIBA	Tj (max) = 150℃ Pd= 4.9 W Tj= Tc+ ((θj-c) × Pd)= 85.4 ℃ D.F. = 56.9 %	θj-c = 1.5 ℃/W ΔTc= 28.0 ℃	Tc= 78.0 ℃
D101 CRH01 TOSHIBA	Tj (max) = 150℃ Pd= 28.2 mW Tj= Tl+ ((θj-l) × Pd)= 65.9 ℃ D.F. = 44.0 %	θj-l = 30 ℃/W ΔTl= 15.1 ℃	Tl= 65.1 ℃

部品番号 Location No.	Vin = 200VAC	Load = 100%	Ta = 50℃
D102 CRH01 TOSHIBA	Tj (max) = 150℃ Pd= 23.8 mW Tj= Tl+ ((θj-l) × Pd)= 65.8 ℃ D.F. = 43.9 %	θj-l = 30 ℃/W ΔTl= 15.1 ℃	 Tl= 65.1 ℃
D203 NSF03A60 NIHON INTER	Tj (max) = 150℃ Pd= 20.0 mW Tj= Tl+ ((θj-l) × Pd)= 68.7 ℃ D.F. = 45.8 %	θj-l = 13 ℃/W ΔTl= 18.4 ℃	 Tl= 68.4 ℃
D204 NSF03A60 NIHON INTER	Tj (max) = 150℃ Pd= 10.0 mW Tj= Tl+ ((θj-l) × Pd)= 64.2 ℃ D.F. = 42.8 %	θj-l = 13 ℃/W ΔTl= 14.1 ℃	 Tl= 64.1 ℃
D301 CRH01 TOSHIBA	Tj (max) = 150℃ Pd= 0.2 W Tj= Tl+ ((θj-l) × Pd)= 69.4 ℃ D.F. = 46.3 %	θj-l = 30 ℃/W ΔTl= 13.4 ℃	 Tl= 63.4 ℃
D331 CRH01 TOSHIBA	Tj (max) = 150℃ Pd= 80.0 mW Tj= Tl+ ((θj-l) × Pd)= 59.4 ℃ D.F. = 39.6 %	θj-l = 30 ℃/W ΔTl= 7.0 ℃	 Tl= 57.0 ℃
D352 1SS184 TOSHIBA	Tj (max) = 150℃ Pd= 2.0 mW Tj= Ta+ ((θj-a) × Pd)= 60.7 ℃ D.F. = 40.4 %	θj-a = 833 ℃/W ΔTa= 9.0 ℃	P (max) = 0.15W Ta= 59.0 ℃
D353 CRH01 TOSHIBA	Tj (max) = 150℃ Pd= 0.2 W Tj= Tl+ ((θj-l) × Pd)= 65.4 ℃ D.F. = 43.6 %	θj-l = 30 ℃/W ΔTl= 9.4 ℃	 Tl= 59.4 ℃
PC31 PS2581L1 (LED) NEC	Tj (max) = 125℃ Pd= 4.7 mW Tj= Tc+ ((θj-c) × Pd)= 57.2 ℃ D.F. = 45.8 %	θj-c = 150 ℃/W ΔTc= 6.5 ℃	Pd (max) = 0.15W Tc= 56.5 ℃
PC31 PS2581L1 (TRANSISTOR) NEC	Tj (max) = 125℃ Pc= 0.7 mW Tj= Tc+ ((θj-c) × Pc)= 56.6 ℃ D.F. = 45.3 %	θj-c = 150 ℃/W ΔTc= 6.5 ℃	Pc (max) = 0.15W Tc= 56.5 ℃
PC52 PS2581L1 (LED) NEC	Tj (max) = 125℃ Pd= 5.1 mW Tj= Tc+ ((θj-c) × Pd)= 57.3 ℃ D.F. = 45.8 %	θj-c = 150 ℃/W ΔTc= 6.5 ℃	Pd (max) = 0.15W Tc= 56.5 ℃
PC52 PS2581L1 (TRANSISTOR) NEC	Tj (max) = 125℃ Pc= 20.5 mW Tj= Tc+ ((θj-c) × Pc)= 59.6 ℃ D.F. = 47.7 %	θj-c = 150 ℃/W ΔTc= 6.5 ℃	Pc (max) = 0.15W Tc= 56.5 ℃
PC331 PS2801-1 (LED) NEC	Tj (max) = 125℃ Pd= 7.7 mW Tj= Tc+ ((θj-c) × Pd)= 57.8 ℃ D.F. = 46.2 %	θj-c = 150 ℃/W ΔTc= 6.6 ℃	Pd (max) = 0.12W Tc= 56.6 ℃
PC331 PS2801-1 (TRANSISTOR) NEC	Tj (max) = 125℃ Pc= 1.3 mW Tj= Tc+ ((θj-c) × Pc)= 56.8 ℃ D.F. = 45.4 %	θj-c = 150 ℃/W ΔTc= 6.6 ℃	Pc (max) = 0.12W Tc= 56.6 ℃
SR1 SMG16C60 SANREX	Tj (max) = 125℃ Pc= 1.6 W Tj= Tc+ ((θj-c) × Pc)= 76.0 ℃ D.F. = 60.8 %	θj-c = 1.4 ℃/W ΔTc= 23.8 ℃	 Tc= 73.8 ℃

3. 主要部品温度上昇値
Main Components Temperature Rise △T List

MODEL : HWS600P-24

・測定条件 Measuring Condition

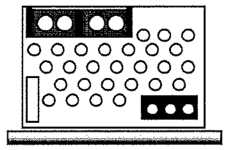
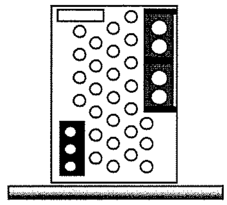
	Mounting A	Mounting B
取付方法 Mounting Method (標準取付 : A) (Standard Mounting Method : A)		
入力電圧 Input Voltage	100VAC	
出力電圧 Output Voltage	24VDC	
出力電流 Output Current	25A	

		ΔT Temperature Rise (℃)	
出力ディレーティング Output Derating Ta=50℃		Io=100%	
部品番号 Location No.	部品名 Part name	取付方向 Mounting A	取付方向 Mounting B
Q1-Q2	MOS FET	36.1	36.1
Q31	MOS FET	18.4	18.2
Q32	MOS FET	19.4	19.3
D1	BRIDGE DIODE	32.3	32.0
D2-D3	F.R.D	35.5	35.4
D51-D55	L.L.D	28.5	28.5
SR1	THYRISTOR	39.4	39.3
A102	CHIP IC	11.3	11.3
A202	CHIP IC	17.0	17.1
A351	IPD	14.3	14.3
T21	TRANS PULSE	5.7	5.7
T31	DRIVE TRANS	13.5	13.5
T32	TRANS PULSE	37.1	37.0
L1	BALUN COIL	13.9	14.1
L2	BALUN COIL	9.5	9.7
L3	CHOKE COIL	20.3	20.3
L51	CHOKE COIL	16.7	16.6
C9	E.CAP.	3.8	3.8
C12	E.CAP.	5.0	5.1
C13	E.CAP.	5.9	5.8
C35	E.CAP.	7.5	7.7
C51	E.CAP.	2.5	2.6
C52	E.CAP.	2.6	2.9
C53	E.CAP.	1.2	1.2
C54	E.CAP.	0.9	1.2

3. 主要部品温度上昇値
Main Components Temperature Rise △T List

MODEL：HWS600P-24

・測定条件 Measuring Condition

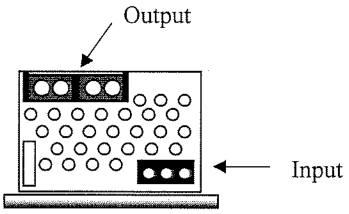
	Mounting A	Mounting B
取付方法 Mounting Method (標準取付 : A) (Standard Mounting Method : A)		
入力電圧 Input Voltage	200VAC	
出力電圧 Output Voltage	24VDC	
出力電流 Output Current	25A	

		ΔT Temperature Rise (℃)	
出力ディレーティング Output Derating Ta=50℃		Io=100%	
部品番号 Location No.	部品名 Part name	取付方向 Mounting A	取付方向 Mounting B
Q1-Q2	MOS FET	16.7	16.7
Q31	MOS FET	18.5	18.4
Q32	MOS FET	19.6	19.4
D1	BRIDGE DIODE	14.8	14.8
D2-D3	F.R.D	20.4	20.6
D51-D55	L.L.D	28.0	28.1
SR1	THYRISTOR	23.8	24.0
A102	CHIP IC	10.6	10.4
A202	CHIP IC	16.9	16.8
A351	IPD	14.3	14.1
T21	TRANS PULSE	5.6	5.6
T31	DRIVE TRANS	11.6	11.6
T32	TRANS PULSE	36.7	36.8
L1	BALUN COIL	4.0	4.3
L2	BALUN COIL	2.8	2.7
L3	CHOKE COIL	14.6	14.7
L51	CHOKE COIL	16.7	16.6
C9	E.CAP.	2.5	2.6
C12	E.CAP.	3.8	4.0
C13	E.CAP.	4.8	4.8
C35	E.CAP.	6.9	7.1
C51	E.CAP.	2.4	2.5
C52	E.CAP.	2.7	2.8
C53	E.CAP.	1.2	1.3
C54	E.CAP.	1.0	1.2

4. 電解コンデンサ推定寿命計算値　Electrolytic Capacitor Lifetime

MODEL : HWS600P-24

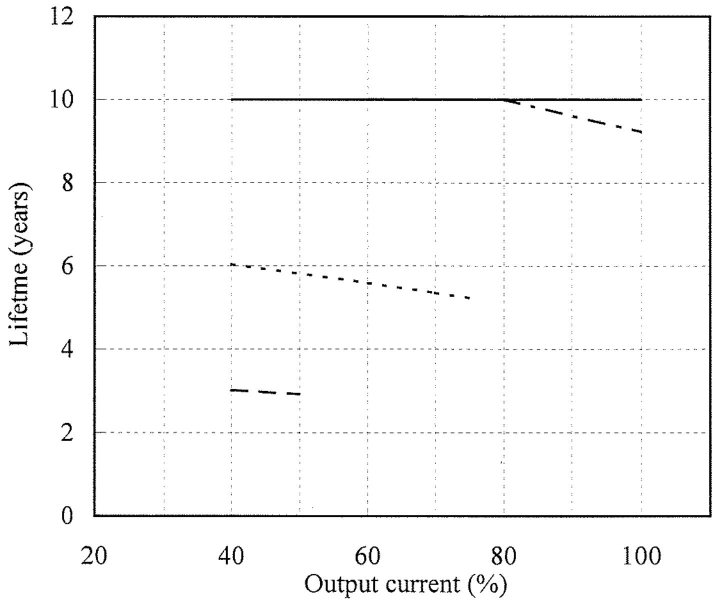
取付方向 **A**
Mounting A



Conditions　Ta　40℃ : ———
50℃ : —·—·
60℃ : - - - -
70℃ : — — —

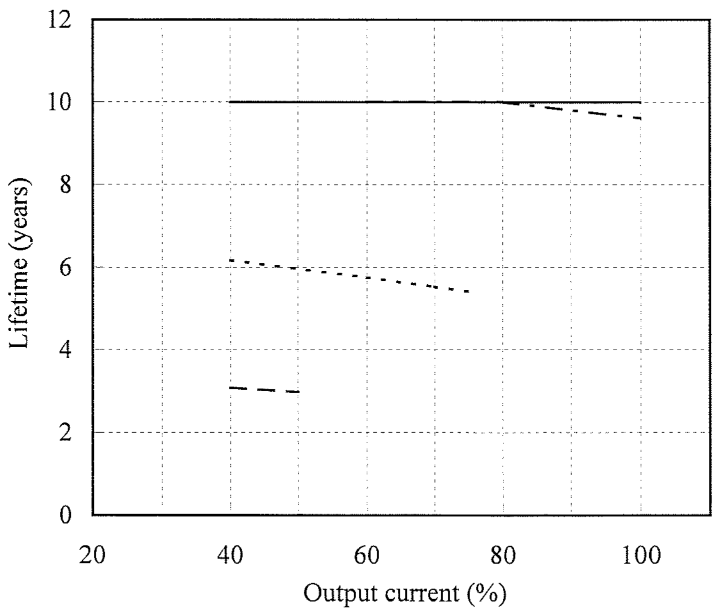
Vin=100VAC

Load	Lifetime (years)			
	Ta= 40℃	Ta= 50℃	Ta= 60℃	Ta= 70℃
40%	10.0	10.0	6.0	3.0
60%	10.0	10.0	5.6	-
80%	10.0	10.0	-	-
100%	10.0	9.2	-	-



Vin=200VAC

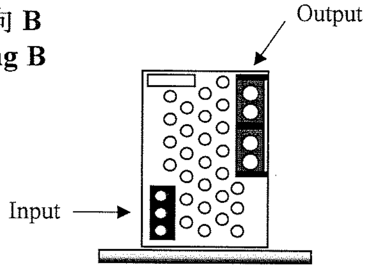
Load	Lifetime (years)			
	Ta= 40℃	Ta= 50℃	Ta= 60℃	Ta= 70℃
40%	10.0	10.0	6.2	3.1
60%	10.0	10.0	5.8	-
80%	10.0	10.0	-	-
100%	10.0	9.6	-	-



4. 電解コンデンサ推定寿命計算値　Electrolytic Capacitor Lifetime

MODEL : HWS600P-24

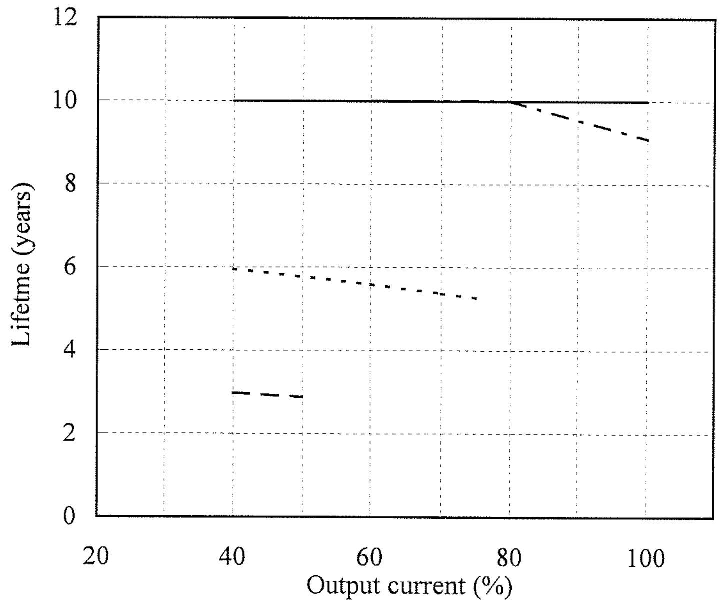
取付方向 B
Mounting B



Conditions　Ta　40℃ : ———
50℃ : —·—·
60℃ : - - - -
70℃ : — — —

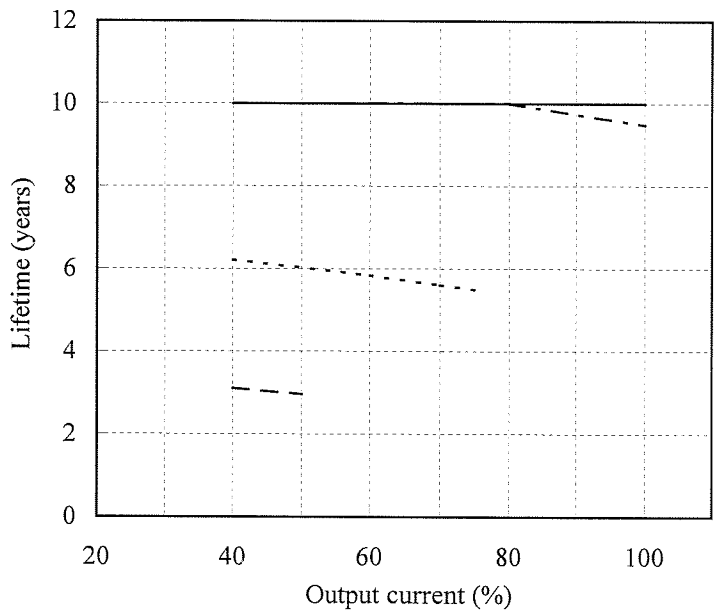
Vin=100VAC

Load	Lifetime (years)			
	Ta= 40℃	Ta= 50℃	Ta= 60℃	Ta= 70℃
40%	10.0	10.0	6.0	3.0
60%	10.0	10.0	5.6	-
80%	10.0	10.0	-	-
100%	10.0	9.1	-	-



Vin=200VAC

Load	Lifetime (years)			
	Ta= 40℃	Ta= 50℃	Ta= 60℃	Ta= 70℃
40%	10.0	10.0	6.2	3.1
60%	10.0	10.0	5.8	-
80%	10.0	10.0	-	-
100%	10.0	9.5	-	-



5. アブノーマル試験 Abnormal Test

MODEL : HWS600P-24

(1) 試験条件 Test conditions

Input : 200VAC Output : 24V 25A Ta : R.T.

(2) 試験結果 Test result

(Da : Damaged)

No.	Test position		Test mode		Test result												
					a	b	c	d	e	f	g	h	I	j	k	l	
	Location No.	Test point	Short	Open	Fire	Smoke	Burst	Smell	Red hot	Damaged	Fuse blown	O.V.P.	O.C.P.	No output	No change	Others	Note
1	Q1	D-S	○								○			○			Fuse blown:F1
2	Q1	D-G	○							○	○			○			Fuse blown:F1 Da:Q1,Q2,R106,R107
3	Q1	G-S	○												○		
4	Q1	D		○											○		
5	Q1	S		○											○		
6	Q1	G		○						○	○			○			Fuse blown:F1 Da:Q1,Q2
7	Q31	D-S	○							○				○			Da:D203
8	Q31	D-G	○											○			
9	Q31	G-S	○											○			
10	Q31	D		○										○			
11	Q31	S		○										○			
12	Q31	G		○										○			
13	Q32	D-S	○							○				○			Da:D204
14	Q32	D-G	○											○			
15	Q32	G-S	○											○			
16	Q32	D		○										○			
17	Q32	S		○										○			
18	Q32	G		○										○			
19	D1	DC-DC	○							○	○			○			Fuse blown:F1 Da:D1
20	D1	AC-"+"	○							○	○			○			Fuse blown:F1 Da:D1
21	D2	A-K	○							○	○			○			Fuse blown:F1 Da:Q1,Q2,R106,R107,R1 08R109
22	D51	A-K	○											○			
23	C13	-	○							○	○			○			Fuse blown:F1 Da:D1,SR1,D103,D104 D105,D106

(Da : Damaged)

No.	Test position		Test mode		Test result												
	Location No.	Test point	Short	Open	a	b	c	d	e	f	g	h	I	j	k	l	Note
					Fire	Smoke	Burst	Smell	Red hot	Damaged	Fuse blown	O.V.P.	O.C.P.	No output	No change	Others	
24	SR1	A-K	○												○		
25		K-G	○							○	○			○			Fuse blown:F1 Da:Q1,Q2,D2,D3 TFR1,TFR2,R106,R107 R108,R109,Q103
26		G-A	○												○		
27		A		○						○	○			○			Fuse blown:F1 Da:Q1,Q2,D2,D3 TFR1,TFR2,R106,R107 R108,R109,Q103
28		K		○						○	○			○			Fuse blown:F1 Da:Q1,Q2,D2,D3 TFR1,TFR2,R106,R107 R108,R109,Q103
29		G		○						○	○			○			Fuse blown:F1 Da:Q1,Q2,D2,D3 TFR1,TFR2,R106,R107 R108,R109,Q103
30	T21	1-2	○											○			
31		3-4	○											○			
32		5-6	○											○			
33		7-8	○											○			
34		1		○										○			
35		3		○										○			
36		5		○										○			
37		7		○										○			
38	T32	1-2	○											○			
39		5-6	○											○			
40		1		○										○			
41		5		○										○			

(Da : Damaged)

No.	Test position		Test mode		Test result												
					a	b	c	d	e	f	g	h	I	j	k	l	
	Location No.	Test point	Short	Open	Fire	Smoke	Burst	Smell	Red hot	Damaged	Fuse blown	O.V.P.	O.C.P.	No output	No change	Others	Note
42	Q201	D-S	○											○			
43		D-G	○											○			
44		G-S	○											○			
45		D		○										○			
46		S		○										○			
47		G		○										○			
48	Q202	C-E	○											○			
49		B-E	○											○			
50		B-C	○											○			
51		C		○										○			
52		E		○						○				○			Da:D203
53		B		○						○				○			Da:D203
54	Q203	C-E	○											○			
55		B-E	○											○			
56		B-C	○											○			
57		C		○										○			
58		E		○						○				○			Da:D204
59		B		○						○				○			Da:D204
60	A351	D-S	○								○			○			Fuse blown:F22
61		D-CON	○							○	○			○			Fuse blown:F22 Da:A351
62		CON-S	○							○	○			○			Fuse blown:F22 Da:A351
63		D		○										○			
64		S		○										○			
65		CON		○										○			
66	D203	A-K	○										○	○			
67		A-K		○											○		
68	D204	A-K	○										○	○			
69		A-K		○											○		

6. 振動試験 Vibration Test

MODEL : HWS600P-24

(1) 振動試験種類 Vibration test class

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

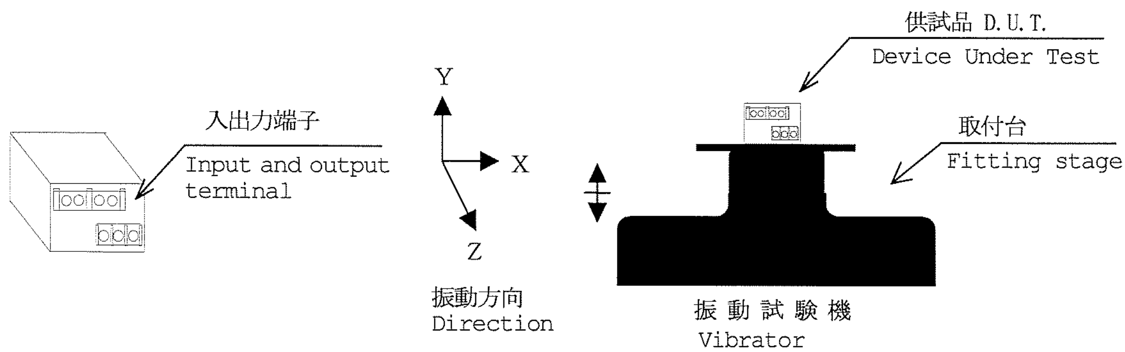
(2) 使用振動試験装置 Equipment used

EMIC (株) 製 EMIC CORP	・制御部 Controller	: F-400-BM-E47	・加振部 Vibrator	: 905-FN

(3) 試験条件 Test Conditions

・周波数範囲 Sweep frequency	: 10～55Hz	・振動方向 Direction	: X, Y, Z
・掃引時間 Sweep time	: 1.0min	・試験時間 Sweep count	: 各方向共 1時間 1 hour each
・加速度 Acceleration	: Constant 19.6m/s^2 (2G)	・周囲温度 Ambient temperature	: 25℃

(4) 試験方法 Test method



(5) 試験結果 Test Results

合格 OK

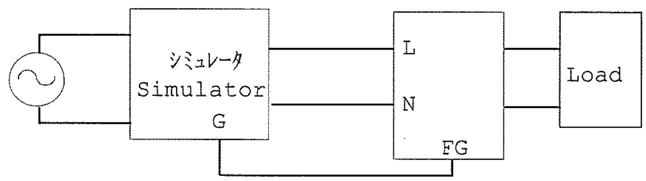
入力電圧 Vin:100VAC
出力電流 Io:100%

測定確認項目 Check Item		出力電圧 (V) Output Voltage	リップルノイズ (mVp-p) Ripple Noise	機構・実装状態 D.U.T. State
試験前 Before Test	-	24.018	112	-
試験後 After Test	X	24.025	106	異常なし OK
	Y	24.022	115	異常なし OK
	Z	24.026	106	異常なし OK

7. ノイズシミュレート試験 Noise Simulate Test

MODEL : HWS600P-24

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



ｼﾐｭﾚｰﾀｰ	: INS-4320(A)	(ﾉｲｽﾞ研究所)
Simulator		(Noise Laboratory Co.,LTD)

(2) 試験条件 Test Conditions

・入力電圧 Input voltage	: 100, 230VAC	・ノイズ電圧 Noise level	: 0V～2kV
・出力電圧 Output Voltage	: 定格 Rated	・位相 Phase	: 0°～360°
・出力電流 Output current	: 0%, 100%	・極性 Polarity	: ＋,－
・周囲温度 Ambient temperature	: 25℃	・印加モード Mode	: Normal Common
・パルス幅 Pulse width	: 50ns～1000ns	・トリガ選択 Trigger 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 Results

合格 **OK**

8. 熱衝撃試験 Thermal Shock Test

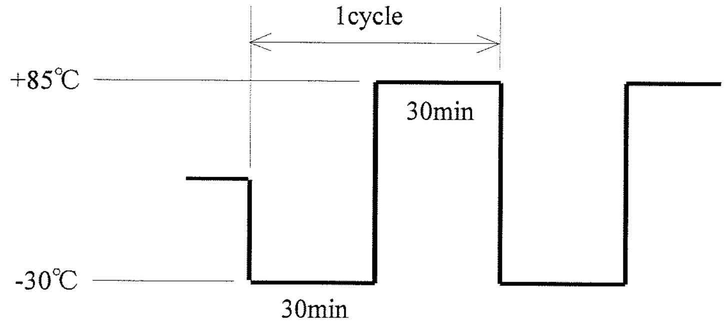
MODEL : HWS600P-24

(1) 使用計測器 Equipment Used

TSA-70H-W : ESPEC

(2) 試験条件 Test Conditions

- 電源周囲温度 Ambient Temperature : -30℃ ⇔ 85℃
- 試験時間 Test Time : 図参照 Refer to Dwg.
- 試験サイクル Test Cycle : 100 サイクル 100 Cycles
- 非動作 Not Operating



(3) 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.

(4) 試験結果 Test Results

合格 **OK**

入力電圧 Vin:100VAC 出力電流 Io:100%			24V			
			From		To	
リップル電圧 Ripple voltage		mVp-p	31		31	
スパイクノイズ Spike noise		mVp-p	112		112	
入力変動 Line regulation	MIN	V	24.019	1.0mV	23.987	1.0mV
	MAX	V	24.020		23.988	
負荷変動 Load regulation	0%	V	24.070	50.0mV	24.039	52.0mV
	100%	V	24.020		23.987	
効率 Efficiency	Pin	W	708.6	84.7%	707.3	84.8%
	Vout	V	24.020		23.987	
	Iout	A	25.0		25.0	
半田状態・その他 Solder condition・etc.			-		異常なし OK	

9. FAN期待寿命　Fan Life Expectancy

MODEL : HWS600P

(1) 使用製品名　Part name

9A0812G4D031 (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箇所は、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.

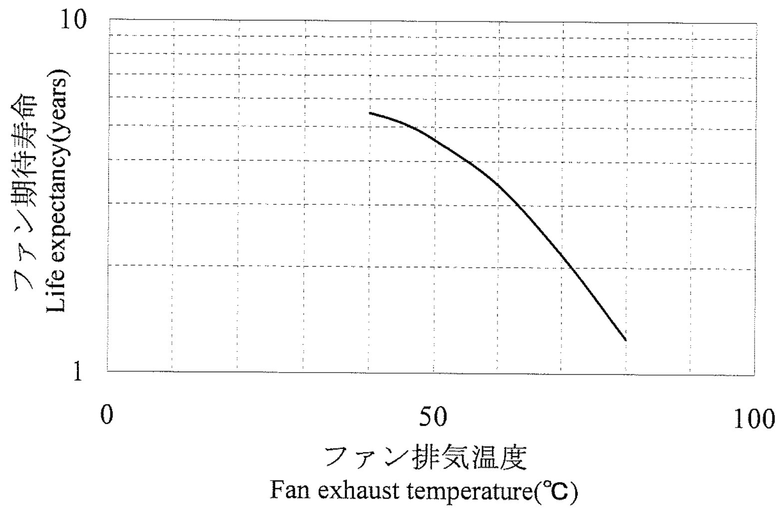
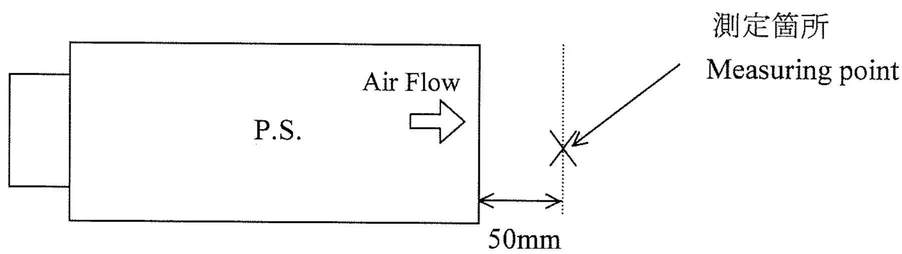


fig 1．ファン排気温度測定箇所
Measuring point of fan exhaust temperature.



※電源の吸排気温度差はIo=100%で約8℃です。
The difference between the intake temperature and the exhaust temperature of the power supply is about 8℃ at Io=100%.