

# PAH350S24 - \*

## RELIABILITY DATA

### 信頼性データ

| DWG.No. C175-57-01/350A   |                          |                         |                           |
|---------------------------|--------------------------|-------------------------|---------------------------|
| 承認                        | 承認                       | 査閲                      | 担当                        |
| Takahashi<br>19. Dec. '03 | Tomidaka<br>19. Dec. '03 | Kawagoe<br>18. Dec. '03 | Y. Hiyama<br>18. Dec. '03 |

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※ 振動試験、ノイズシミュレート試験、はんだ耐熱性試験、高温貯蔵試験、低温貯蔵試験、高温加湿通電試験におきましては PAH300S24-\* とほぼ同等の特性を示し、信頼性に変化はありません。詳細につきましては PAH300S24-\* 信頼性データをご参照下さい。

Regarding Vibration Test , Noise Shimulate Test , Resistance to Soldering Heat Test , High Temperature Storage Test , Low Temperature Storage Test and High Temperature and High Humidity Bias Test , result shows equivalent characteristic to PAH300S24-\* and reliability does not have change.  
For details, please refer to PAH300S24-\* RELIABILITY DATA.

※ 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 following data are typical values. As all units have nearly the same characteristics, the data to be considered as ability values.

1. MTBF 計算値 Calculated Values of MTBF

MODEL : PAH350S24-28

(1) 算出方法 Calculating Method

Telcordiaの部品ストレス解析法(\*1)で算出されています。

故障率  $\lambda_{SS}$  は、それぞれの部品ごとに電気ストレスと動作温度によって決定されます。

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

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

\*1: Telcordia (Bellcore) "Reliability Prediction Procedure for Electronic Equipment"  
(Document number TR-332, Issue5)

<算出式>

$$MTBF = \frac{1}{\lambda_{equip}} = \frac{1}{\pi_E \sum_{i=1}^m N_i \cdot \lambda_{SSi}} \times 10^9 \text{ 時間 (hours)}$$

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

$\lambda_{equip}$  : 全機器故障率 (FITs) Total Equipment failure rate (FITs = Failures in  $10^9$  hours)

$\lambda_{Gi}$  :  $i$ 番目の部品に対する基礎故障率 Generic failure rate for the  $i$ th device

$\pi_{Qi}$  :  $i$ 番目の部品に対する品質ファクタ Quality factor for the  $i$ th device

$\pi_{Si}$  :  $i$ 番目の部品に対するストレスファクタ Stress factor for the  $i$ th device

$\pi_{Ti}$  :  $i$ 番目の部品に対する温度ファクタ Temperature factor for the  $i$ th device

$m$  : 異なる部品の数 Number of different device types

$N_i$  :  $i$ 番目の部品の個数 Quantity of  $i$ th device type

$\pi_E$  : 機器の環境ファクタ Equipment environmental factor

(2) MTBF値 MTBF Values

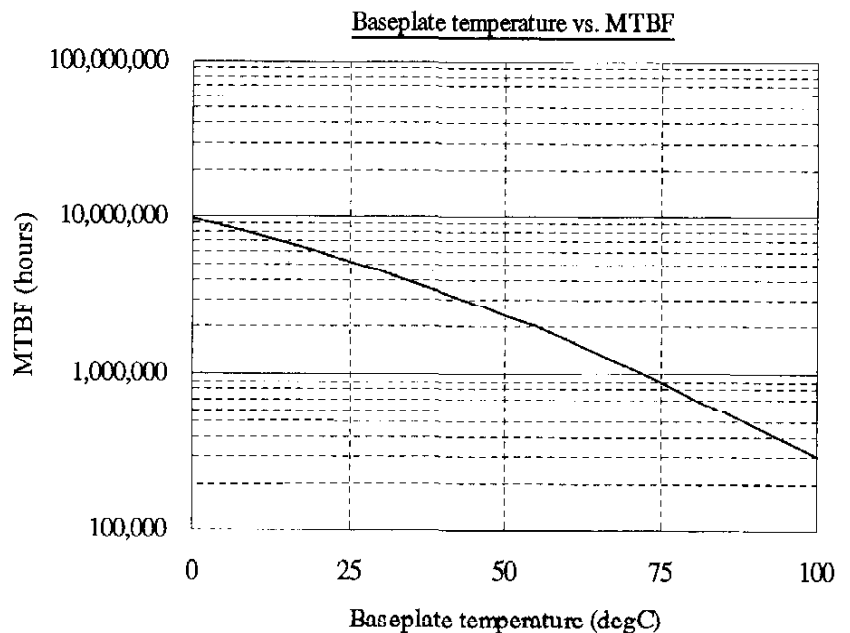
条件 Conditions :  $V_{in} = 24VDC$

Environment GB (Ground, Benign)

PAH350S24-28

Output current: 12.5A (100%)

| Baseplate temperature | MTBF              |
|-----------------------|-------------------|
| 25°C                  | 5,181,681 (hours) |
| 50°C                  | 2,383,142 (hours) |
| 75°C                  | 892,307 (hours)   |



## 2. 部品ディレーティング Component Derating

MODEL : PAH350S24-28

## (1) 算出方法 Calculating Method

## (a) 測定条件 Measuring Conditions

- ・入力電圧 : 24VDC  
Input Voltage
- ・出力電流 : 12.5A (100%)  
Output Current
- ・取付方法 : 標準取付  
Mounting Method Standard Mounting Method
- ・ベースプレート温度 : 90℃  
Baseplate Temperature

## (b) 半導体 Semiconductors

ケース温度、消費電力および熱抵抗より使用状態の接合点温度を求め、最大定格との比較を行いました。

The maximum rating temperature is compared with junction temperature 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.

ベースプレート温度、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。

Baseplate temperature, operating condition, power dissipation, etc are within derating criteria.

## (d) 熱抵抗算出方法 Calculating Method of Thermal Impedance

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

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

$T_{bp}$  : ディレーティングの始まるベースプレート温度 一般に25℃  
Baseplate Temperature at Start Point of Derating ; 25℃ 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℃  
Lead Temperature at Start Point of Derating ; 25℃ 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  
( $T_{cb(max)}$ ) Maximum Junction(Channel) Temperature

$\theta_{j-c}$  : 接合部からケースまでの熱抵抗  
( $\theta_{ch-c}$ ) Thermal Impedance between Junction(Channel) and Case

$\theta_{j-bp}$  : 接合点からベースプレートまでの熱抵抗  
Thermal Impedance between Junction and Baseplate

$\theta_{j-l}$  : 接合点からリードまでの熱抵抗  
Thermal Impedance between Junction and Lead

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

| 部品番号<br>Location No. | 部品名<br>Part Name | 最大定格<br>MAX Rating             | 使用状態<br>Actual Rating      | ディレーティング率<br>Derating Factor | 備考<br>Note |
|----------------------|------------------|--------------------------------|----------------------------|------------------------------|------------|
| Q1                   | CHIP TRANSISTOR  | T <sub>j</sub> (max): 150.0°C  | T <sub>j</sub> : 102.40°C  | 68.3%                        |            |
| Q2                   | CHIP TRANSISTOR  | T <sub>j</sub> (max): 150.0°C  | T <sub>j</sub> : 102.89°C  | 68.6%                        |            |
| Q3                   | CHIP MOS FET     | T <sub>ch</sub> (max): 150.0°C | T <sub>ch</sub> : 105.17°C | 70.1%                        |            |
| Q102                 | CHIP MOS FET     | T <sub>ch</sub> (max): 150.0°C | T <sub>ch</sub> : 113.21°C | 75.5%                        |            |
| Q202                 | CHIP TRANSISTOR  | T <sub>j</sub> (max): 150.0°C  | T <sub>j</sub> : 103.45°C  | 69.0%                        |            |
| D103                 | CHIP DIODE       | T <sub>j</sub> (max): 150.0°C  | T <sub>j</sub> : 100.20°C  | 66.8%                        |            |
| D104                 | CHIP DIODE       | T <sub>j</sub> (max): 150.0°C  | T <sub>j</sub> : 100.90°C  | 67.3%                        |            |
| A1                   | Pri PWM IC       | T <sub>j</sub> (max): 150.0°C  | T <sub>j</sub> : 110.48°C  | 73.7%                        |            |

## 3. 主要部品温度上昇値

Main Components Temperature Rise  $\Delta T$  List

MODEL : PAH350S24-28

| 部品番号<br>Location No. | 部品名<br>Part Name | 温度上昇値 $\Delta T_{C,P}$<br>Temperature Rise(°C) |
|----------------------|------------------|--|
| Q3                   | CHIP MOS FET     | 14.6   |
| Q102                 | CHIP MOS FET     | 17.2   |
| L103                 | CHOKE COIL       | 6.2  |
| T101                 | TRANS.,PULSE     | 22.2   |
| D103                 | CHIP DIODE       | 1.8  |
| D104                 | CHIP DIODE       | 0.2  |
|                      | BASE-PLATE       | 0.0 (basis)                                    |

## ・ 測定条件 Measuring Conditions

|                         |   |
|-------------------------|---|
| 取付方法<br>Mounting Method | 標準取付 (放熱器有)<br>Standard Mounting Method (with Heatsink)   |
|                         | <p><math>T_a = 25^\circ\text{C}</math></p> <p>放熱器 Heatsink</p> <p>ベースプレート Base-Plate</p> <p>電源 Power Supply</p> <p>ベースプレート温度測定点 (90°C)<br/>Measuring point of Base-Plate Temperature</p> <p>入力側 Input</p> <p>出力側 Output</p> <p>21mm</p> |
| 入力電圧<br>Input Voltage   | 24VDC   |
| 出力電圧<br>Output Voltage  | 28VDC   |
| 出力電流<br>Output Current  | PAH350S24-28 : 12.5A (100%)   |

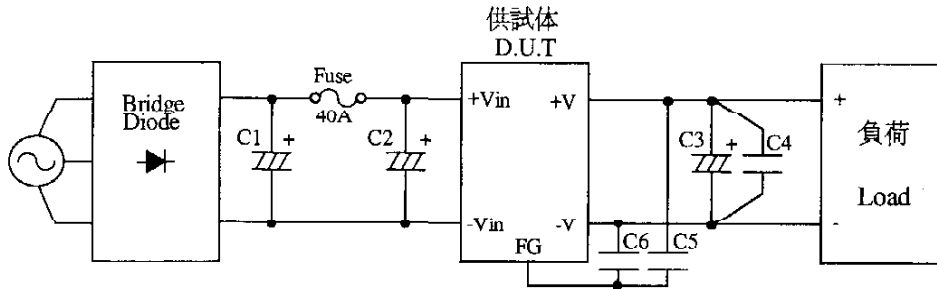
$\Delta T_{C,P}$  : 周囲温度 $25^\circ\text{C}$ においてベースプレート温度が $90^\circ\text{C}$ となる放熱器を装着し、その時のベースプレート温度を基準とした各部品の $\Delta T$  (ベースプレートと部品との温度差)を表したもの。

Temperature difference between a case of each component and base-plate, fitted power supply with heatsink to be maintained  $90^\circ\text{C}$  (base-plate temperature) at  $25^\circ\text{C}$  (ambient temperature).

4. アブノーマル試験 Abnormal Test

MODEL : PAH350S24-28

(1) 試験条件及び回路 Test Condition and Circuit



- ・ 入力電圧 : 36VDC
- Input Voltage
- ・ ベースプレート温度 : 25°C
- Base-Plate Temperature
- ・ブリッジダイオード (D) : PGH758A
- Bridge Rectifier
- ・ 電解コンデンサ (C2) : 50V 220  $\mu$ F  $\times$  2para
- Electrolytic Cap.
- ・セラミックコンデンサ (C4) : 50V 0.1  $\mu$ F
- Ceramic Cap.
- ・ 出力電流 : 12.5A(100%)
- Output Current
- ・ 使用ヒューズ : 40A
- Additional Fuse
- ・ 電解コンデンサ (C1) : 250V 15000  $\mu$ F
- Electrolytic Cap.
- ・ 電解コンデンサ (C3) : 50V 220  $\mu$ F
- Electrolytic Cap.
- ・ フィルムコンデンサ (C5,C6) : 250V 0.022  $\mu$ F
- Film Cap

(2) 試験結果 Test Results

| No. | 試験箇所<br>Test Position |                    | 試験モード<br>Test Mode    |                  | 試験結果 Test Results |          |          |          |            |            |               |              |              |           |    |              | 備考<br>Note |
|-----|-----------------------|--------------------|-----------------------|------------------|-------------------|----------|----------|----------|------------|------------|---------------|--------------|--------------|-----------|----|--------------|------------|
|     | 部品<br>Location<br>No. | 試験端子<br>Test Point | S<br>H<br>O<br>R<br>T | O<br>P<br>E<br>N | Fi:Fire           | So:Smoke | Bu:Burst | Se:Smell | Re:Red Hot | Da:Damaged | Fu:Fuse Blown | NO:No Output | NC:No Change | Ot:Others |    |              |            |
|     |                       |                    |                       |                  | 1                 | 2        | 3        | 4        | 5          | 6          | 7             | 8            | 9            | 10        | 11 | 12           |            |
| 1   | Q101                  | G                  | ●                     |                  |                   |          |          |          |            | ●          | ●             |              |              | ●         |    | Da:Q101,Q102 |            |
| 2   |                       | S                  | ●                     |                  |                   |          |          |          |            | ●          | ●             |              |              | ●         |    | Da:Q102      |            |
| 3   |                       | D                  | ●                     |                  |                   |          |          |          |            | ●          | ●             |              |              | ●         |    | Da:Q102      |            |
| 4   |                       | D-S                | ●                     |                  |                   |          |          |          |            |            | ●             |              |              |           | ●  |              |            |
| 5   |                       | G-S                | ●                     |                  |                   |          |          |          |            |            |               |              |              |           | ●  |              |            |
| 6   |                       | D-G                | ●                     |                  |                   |          |          |          |            |            | ●             | ●            |              |           | ●  |              | Da:R3,Q101 |

| No. | 試験箇所<br>Test Position |                    | 試験モード<br>Test Mode    |                  | 試験結果 Test Results |              |              |              |              |              |                         |              |              |                   |                        |                   | 備考<br>Note   |  |
|-----|-----------------------|--------------------|-----------------------|------------------|-------------------|--------------|--------------|--------------|--------------|--------------|-------------------------|--------------|--------------|-------------------|------------------------|-------------------|--|--|
|     | 部品<br>Location<br>No. | 試験端子<br>Test Point | S<br>H<br>O<br>R<br>T | O<br>P<br>E<br>N | Fi:Fire           | So:Smoke     | Ru:Burst     | Se:Small     | Re:Red Hot   | Da:Damaged   | Fu:Fuse Blown           | NO:No Output | NC:No Change | Ot:Others         |                        |                   |  |  |
|     |                       |                    |                       |                  | 1                 | 2            | 3            | 4            | 5            | 6            | 7                       | 8            | 9            | 10                | 11                     | 12                |  |  |
|     |                       |                    |                       |                  | 発<br>火<br>Fi      | 発<br>煙<br>So | 破<br>裂<br>Bu | 異<br>臭<br>Se | 発<br>熱<br>Re | 破<br>損<br>Da | ヒ<br>ュー<br>ズ<br>断<br>Fu | O<br>V<br>P  | O<br>C<br>P  | 出<br>力<br>断<br>NO | 変<br>化<br>な<br>し<br>NC | そ<br>の<br>他<br>Ot |  |  |
| 7   | Q1                    | E                  |                       | ●                |                   |              |              |              |              |              |                         |              |              |                   |                        |                   |  |  |
| 8   |                       | C                  |                       | ●                |                   |              |              |              |              |              |                         |              |              |                   |                        | ●                 | 効率低下<br>(Efficiency Down)                            |  |
| 9   |                       | B                  |                       | ●                |                   |              |              |              |              |              |                         |              |              |                   |                        |                   |  |  |
| 10  |                       | B-E                | ●                     |                  |                   |              |              |              |              |              |                         |              |              |                   |                        |                   |  |  |
| 11  |                       | C-E                | ●                     |                  |                   |              |              |              |              |              |                         |              |              |                   |                        |                   |  |  |
| 12  |                       | B-C                | ●                     |                  |                   |              |              |              |              |              |                         |              |              |                   |                        |                   |  |  |
| 13  | Q2                    | E                  |                       | ●                |                   |              |              |              |              | ●            | ●                       |              |              | ●                 |                        |                   | Da:Q101,Q102   |  |
| 14  |                       | C                  |                       | ●                |                   |              |              |              |              |              |                         |              |              |                   |                        | ●                 | 効率低下<br>(Efficiency Down)                            |  |
| 15  |                       | B                  |                       | ●                |                   |              |              |              |              | ●            | ●                       |              |              | ●                 |                        |                   | Da:Q101,Q102   |  |
| 16  |                       | B-E                | ●                     |                  |                   |              |              |              |              |              |                         |              |              |                   |                        | ●                 | 効率低下<br>(Efficiency Down)                            |  |
| 17  |                       | C-E                | ●                     |                  |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 18  |                       | B-C                | ●                     |                  |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 19  | Q3                    | G                  |                       | ●                |                   |              |              |              |              |              |                         |              |              | ●                 |                        |                   |  |  |
| 20  |                       | S                  |                       | ●                |                   |              |              |              |              |              |                         |              |              | ●                 |                        |                   |  |  |
| 21  |                       | D                  |                       | ●                |                   |              |              |              |              |              |                         |              |              | ●                 |                        |                   |  |  |
| 22  |                       | D-S                | ●                     |                  |                   |              |              |              |              | ●            |                         |              |              | ●                 |                        |                   | Da:Q3,R30,R34  |  |
| 23  |                       | G-S                | ●                     |                  |                   |              |              |              |              |              |                         |              |              | ●                 |                        |                   |  |  |
| 24  |                       | D-G                | ●                     |                  |                   |              |              |              |              | ●            |                         |              |              | ●                 |                        |                   | Da: R30,R34  |  |
| 25  | Q201                  | E                  |                       | ●                |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 26  |                       | C                  |                       | ●                |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 27  |                       | B                  |                       | ●                |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 28  |                       | B-E                | ●                     |                  |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 29  |                       | C-E                | ●                     |                  |                   |              |              |              |              |              |                         |              |              | ●                 |                        |                   |  |  |
| 30  |                       | B-C                | ●                     |                  |                   |              |              |              |              |              |                         |              |              | ●                 |                        |                   |  |  |
| 31  | Q202                  | E                  |                       | ●                |                   |              |              |              |              |              | ●                       |              |              | ●                 |                        |                   |  |  |
| 32  |                       | C                  |                       | ●                |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 33  |                       | B                  |                       | ●                |                   |              |              |              |              |              |                         | ●            |              | ●                 |                        |                   |  |  |
| 34  |                       | B-E                | ●                     |                  |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 35  |                       | C-E                | ●                     |                  |                   |              |              |              |              | ●            |                         |              |              |                   |                        | ●                 | 出力電圧低下<br>(Output Voltage Down)<br>Da:A202,D205,Z204 |  |
| 36  |                       | B-C                | ●                     |                  |                   |              |              |              |              | ●            |                         |              |              |                   |                        | ●                 | 出力電圧低下<br>(Output Voltage Down)<br>Da:A202,Z204      |  |
| 37  | Q203                  | E                  |                       | ●                |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 38  |                       | C                  |                       | ●                |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 39  |                       | B                  |                       | ●                |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 40  |                       | B-E                | ●                     |                  |                   |              |              |              |              |              |                         |              |              |                   | ●                      |                   |  |  |
| 41  |                       | C-E                | ●                     |                  |                   |              |              |              |              |              |                         |              |              | ●                 |                        |                   |  |  |
| 42  |                       | B-C                | ●                     |                  |                   |              |              |              |              |              |                         |              |              | ●                 |                        |                   |  |  |



| No. | 試験箇所<br>Test Position |                       | 試験<br>モード<br>Test<br>Mode |                  | 試験結果 Test Results |               |              |              |              |              |                         |             |             |                   |                        |                   | 備考<br>Note                                      |                                 |
|-----|-----------------------|-----------------------|---------------------------|------------------|-------------------|---------------|--------------|--------------|--------------|--------------|-------------------------|-------------|-------------|-------------------|------------------------|-------------------|---|---------------------------------|
|     | 部品<br>Location<br>No. | 試験端子<br>Test<br>Point | S<br>H<br>O<br>R<br>T     | O<br>P<br>E<br>N | Fi:Fire           | So:Smoke      | Bu:Burst     | Se:Smell     | Re:Red Hot   |              |                         |             |             |                   |                        |                   |   |                                 |
|     |                       |                       |                           |                  | Da:Damaged        | Fu:Fuse Blown | NO:No Output | NC:No Change | Ot:Others    | 1            | 2                       | 3           | 4           | 5                 | 6                      | 7                 |   | 8                               |
|     |                       |                       |                           |                  | 発<br>火<br>Fi      | 発<br>煙<br>So  | 破<br>裂<br>Bu | 異<br>臭<br>Se | 発<br>熱<br>Re | 破<br>損<br>Da | ヒ<br>ュー<br>ズ<br>断<br>Fu | O<br>V<br>P | O<br>C<br>P | 出<br>力<br>断<br>NO | 変<br>化<br>な<br>し<br>NC | そ<br>の<br>他<br>Ot |   |                                 |
| 43  | Q204                  | E                     |                           | ●                |                   |               |              |              |              |              |                         | ●           |             | ●                 |                        |                   |   |                                 |
| 44  |                       | C                     |                           | ●                |                   |               |              |              |              |              |                         | ●           |             | ●                 |                        |                   |   |                                 |
| 45  |                       | B                     |                           | ●                |                   |               |              |              |              |              |                         | ●           |             | ●                 |                        |                   |   |                                 |
| 46  |                       | B-E                   | ●                         |                  |                   |               |              |              |              |              |                         |             |             |                   | ●                      |                   |   |                                 |
| 47  |                       | C-E                   | ●                         |                  |                   |               |              |              |              |              |                         |             |             | ●                 |                        |                   |   |                                 |
| 48  |                       | B-C                   | ●                         |                  |                   |               |              |              |              |              |                         |             |             | ●                 |                        |                   |   |                                 |
| 49  | D101                  |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   | ●                      |                   |   |                                 |
| 50  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             | ●                 |                        |                   |   |                                 |
| 51  | D103                  |                       |                           | ●                |                   |               |              |              |              | ●            |                         |             |             |                   |                        | ●                 | 出力電圧低下<br>(Output Voltage Down)<br>Da:D201,D204 |                                 |
| 52  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 | 出力電圧低下<br>(Output Voltage Down)                 |                                 |
| 53  | D104                  |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 | 効率低下<br>(Efficiency Down)                       |                                 |
| 54  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             | ●           |                   |                        |                   |   |                                 |
| 55  | D1                    |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        |                   |   |                                 |
| 56  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        |                   | ●   | 出力電圧低下<br>(Output Voltage Down) |
| 57  | D2                    |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 58  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 59  | D3                    |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             | ●                 |                        |                   |   |                                 |
| 60  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 61  | D4                    |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             | ●                 |                        |                   |   |                                 |
| 62  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             | ●                 |                        |                   |   |                                 |
| 63  | D5                    |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             | ●                 |                        |                   |   |                                 |
| 64  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 65  | D6                    |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 66  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 67  | D7                    |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 68  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 69  | D201                  |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 70  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 71  | D202                  |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 72  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 73  | D203                  |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 74  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             | ●           |                   |                        |                   |   |                                 |
| 75  | D204                  |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 76  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 77  | D205                  |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 78  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 79  | Z1                    |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             |                   |                        | ●                 |   |                                 |
| 80  |                       |                       |                           | ●                |                   |               |              |              |              |              |                         |             |             | ●                 |                        |                   |   |                                 |

| 試験箇所<br>Test Position |                                      | 試験モード<br>Test Mode    |                  | 試験結果 Test Results |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         | 備考<br>Note |   |
|-----------------------|--------------------------------------|-----------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------------------|------------------|------------------|-------------------------|------------------------------|-------------------------|------------|---|
| 部品<br>Location<br>No. | 試験端子<br>Test Point                   | S<br>H<br>O<br>R<br>T | O<br>P<br>E<br>N | Fi:Fire           | So:Smoke          | Bu:Burst          | Se:Smell          | Re:Red Hot        | Du:Damaged        | Fu:Fuse Blown                | NO:No Output     | NC:No Change     | Ot:Others               |                              |                         |            |   |
|                       |                                      |                       |                  | 1<br>発<br>火<br>Fi | 2<br>発<br>煙<br>So | 3<br>破<br>裂<br>Bu | 4<br>異<br>臭<br>Se | 5<br>発<br>熱<br>Re | 6<br>破<br>損<br>Da | 7<br>ヒ<br>ュー<br>ズ<br>断<br>Fu | 8<br>O<br>V<br>P | 9<br>O<br>C<br>P | 10<br>出<br>力<br>断<br>NO | 11<br>変<br>化<br>な<br>し<br>NC | 12<br>そ<br>の<br>他<br>Ot |            |   |
| 81                    | Z201                                 |                       | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 82                    | Z201                                 | ●                     |                  |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 83                    | Z202                                 |                       | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 84                    | Z202                                 | ●                     |                  |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 85                    | Z204                                 |                       | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 86                    | Z204                                 | ●                     |                  |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 87                    | C101                                 |                       | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 88                    | C101                                 | ●                     |                  |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 89                    | C103                                 |                       | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 90                    | C103                                 | ●                     |                  |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 91                    | C108                                 |                       | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 92                    | C108                                 | ●                     |                  |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 93                    | L101                                 |                       | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 94                    | L101                                 | ●                     |                  |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 95                    | L103                                 |                       | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 96                    | L103                                 | ●                     |                  |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            | ● 出力電圧低下<br>(Output Voltage Down)                 |
| 97                    | L1                                   |                       | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 98                    | L1                                   | ●                     |                  |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 99                    | T101                                 | 1,2                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 100                   | T101                                 | 3,4                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            | ● 出力電圧低下<br>(Output Voltage Down)<br>Da:D201,D204 |
| 101                   | T101                                 | 1-3                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            | ● 効率低下<br>(Efficiency down)                       |
| 102                   | T101                                 | 1-4                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            | ● 出力電圧低下<br>(Output Voltage Down)                 |
| 103                   | T101                                 | 2-3                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            | ● 効率低下<br>(Efficiency down)                       |
| 104                   | T101                                 | 2-4                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            | ● 出力電圧低下<br>(Output Voltage Down)                 |
| 105                   | T102                                 | 2,3                   |                  | ●                 |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 106                   | T102                                 | 7,8                   |                  | ●                 |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 107                   | T102                                 | 2-3                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 108                   | T102                                 | 7-8                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 109                   | T102                                 | 2-7                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 110                   | T102                                 | 2-8                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 111                   | T102                                 | 3-7                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 112                   | T102                                 | 3-8                   | ●                |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            |   |
| 113                   | 入力逆接続<br>Inverse Input<br>Connection |                       |                  |                   |                   |                   |                   |                   |                   |                              |                  |                  |                         |                              |                         |            | ●   |

## 5. 熱衝撃試験 Thermal Shock Test

MODEL : PAH350S24-28

### (1) 使用計測器 Equipment Used

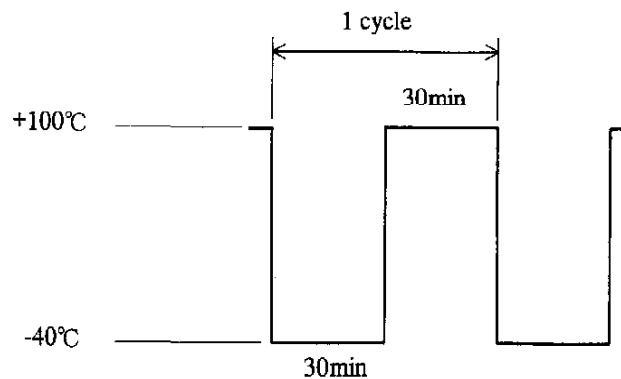
THERMAL SHOCK CHAMBER TSV-40 (TABAI ESPEC CORP.)

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

3 台 (units)

### (3) 試験条件 Test Conditions

- ・ 電源周囲温度 : -40℃  $\longleftrightarrow$  +100℃  
Ambient Temperature
- ・ 試験時間 : 30min  $\longleftrightarrow$  30min  
Test Time



- ・ 試験サイクル : 100、200 サイクル  
Test Cycles 100, 200 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、200 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 the test check if there is no abnormal output and put the D.U.T. in the testing chamber. Then test it in the above cycles. After the test is completed leave it for 1 hour at room temperature and check it if there is no abnormal output.

### (5) 試験結果 Test Results

合格 OK

測定データは、次頁に示す。  
See next page for measuring data.

