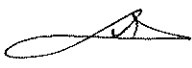



Z⁺400 Series

RELIABILITY

DATA

| DWG No.: IA710-79-01 | | |
|-------------------------|--|---|
| APPD | CHK | DWG |
| Dorou P. Nov-10-2011 |  10/11/11 |  10/11/11 |

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Terminology used

FG..... Frame Ground

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

1. Calculated value of MTBF

MODEL : 10V-40A

(1) Calculating Method

Method of calculation according to MIL-HDBK-217F.

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

Formula:

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

Where:

λ_{equip} = Total Equipment Failure Rate (Failures / 10^6 Hours)

λ_G = Generic Failure Rate For The i th Generic Part (Failure / 10^6 Hours)

N_i = Quantity of i th Generic Part

n = Number of Different Generic Part Categories

π_Q = Generic Quality factor for the i th Generic Part ($\pi_Q = 1$)

(2) MTBF Values

G_F : (GROUND, FIXED)

MTBF = 78569 (HOURS)

(MTBF calculation for fan isn't included.)

2. Components derating

MODEL : 10V-40A

(1) Calculation method

1. Measuring Conditions

Input: 100 , 200Vac

Ambient temperature: 50°C

Output: 10V - 40A (100%)

Mounting Method: Standard Mounting

2. Semiconductors

Compared with maximum junction temperature and actual one which is calculated based on on case temperature, power dissipation and thermal impedance.

3. IC, Resistors, Capacitors, etc.

Ambient temperature, operating conditions, power dissipation and so on are within derating criteria.

4. Calculation Method of Thermal Impedance:

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

T_c : Case temperature at start point of derating; 25°C in general

T_a : Ambient temperature at start point of derating; 25°C in General

$P_{c(\max)}$: Maximum power dissipation

$T_{j(\max)}$: Maximum junction temperature

Θ_{j-c} : Thermal impedance between junction and case

Θ_{j-a} : Thermal impedance between junction and air

(2) Component derating list

| Location No. | Vin=100Vac Load=100% Ta=50°C | | | | | | | |
|------------------------------------|-----------------------------------|-------|----|-----------------|---------|------|--------|----------|
| A101 L4981AD ST | Tjmax= | 150 | °C | θ -j-a = | 120.0 | °C/W | | |
| | Pd = | 0.23 | W | Δ Ta = | 25.0 | °C | Ta = | 75.0 °C |
| | Tj = Ta + (θ j-a x Pd) => | | | Tj = | 102.6 | °C | D.F. = | 68.4 % |
| D101 D25XB60-7000 SHINDENGEN | Tjmax= | 150 | °C | θ -j-c = | 1.0 | °C/W | | |
| | Pd = | 8 | W | Δ Tc = | 50.0 | °C | Tc = | 100.0 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 108.0 | °C | D.F. = | 72.0 % |
| D106 STTH806DTI ST | Tjmax= | 150 | °C | θ -j-c = | 2.6 | °C/W | | |
| | Pd = | 3 | W | Δ Tc = | 31.7 | °C | Tc = | 81.7 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 89.5 | °C | D.F. = | 59.7 % |
| D117 STPS30L45CT ST | Tjmax= | 150 | °C | θ -j-c = | 0.85 | °C/W | | |
| | Pd = | 4.8 | W | Δ Tc = | 40.0 | °C | Tc = | 90.0 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 94.1 | °C | D.F. = | 62.7 % |
| D118 STPS30L45CT ST | Tjmax= | 150 | °C | θ -j-c = | 0.85 | °C/W | | |
| | Pd = | 4.8 | W | Δ Tc = | 46.2 | °C | Tc = | 96.2 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 100.3 | °C | D.F. = | 66.9 % |
| D119 STPS30L45CT ST | Tjmax= | 150 | °C | θ -j-c = | 0.85 | °C/W | | |
| | Pd = | 4.8 | W | Δ Tc = | 37.6 | °C | Tc = | 87.6 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 91.7 | °C | D.F. = | 61.1 % |
| D120 STPS30L45CT ST | Tjmax= | 150 | °C | θ -j-c = | 0.85 | °C/W | | |
| | Pd = | 4.8 | W | Δ Tc = | 40.7 | °C | Tc = | 90.7 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 94.8 | °C | D.F. = | 63.2 % |
| Q101 IPW60R099CP INFINEON | Tjmax= | 150 | °C | θ -j-c = | 0.5 | °C/W | | |
| | Pd = | 8.6 | W | Δ Tc = | 35.2 | °C | Tc = | 85.2 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 89.5 | °C | D.F. = | 59.7 % |
| Q104 SPP15N60C3 INFINEON | Tjmax= | 150 | °C | θ -j-c = | 0.8 | °C/W | | |
| | Pd = | 7.24 | W | Δ Tc = | 37.7 | °C | Tc = | 87.7 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 93.5 | °C | D.F. = | 62.3 % |
| Q105 SPP15N60C3 INFINEON | Tjmax= | 150 | °C | θ -j-c = | 0.8 | °C/W | | |
| | Pd = | 5.12 | W | Δ Tc = | 37.5 | °C | Tc = | 87.5 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 91.6 | °C | D.F. = | 61.1 % |
| Q106 SPP15N60C3 INFINEON | Tjmax= | 150 | °C | θ -j-c = | 0.8 | °C/W | | |
| | Pd = | 6.5 | W | Δ Tc = | 38.1 | °C | Tc = | 88.1 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 93.3 | °C | D.F. = | 62.2 % |
| Q107 SPP15N60C3 INFINEON | Tjmax= | 150 | °C | θ -j-c = | 0.8 | °C/W | | |
| | Pd = | 6.6 | W | Δ Tc = | 30.6 | °C | Tc = | 80.6 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 85.9 | °C | D.F. = | 57.3 % |
| SC101 CR12CM-12A B00 RENESAS | Tjmax= | 125 | °C | θ -j-c = | 1.20 | °C/W | | |
| | Pd = | 2 | W | Δ Tc = | 21.4 | °C | Tc = | 71.4 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 73.8 | °C | D.F. = | 59.0 % |
| Q118 TK20A25D TOSHIBA | Tjmax= | 150 | °C | θ -j-c = | 2.78 | °C/W | | |
| | Pd = | 2.7 | W | Δ Tc = | 34.6 | °C | Tc = | 84.6 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 92.1 | °C | D.F. = | 61.4 % |
| PC101 PS2801-1-F3-A(P) NEC | Tjmax= | 125 | °C | θ -j-c = | 1666.00 | °C/W | | |
| | Pd = | 0.001 | W | Δ Ta = | 31.4 | °C | Ta = | 81.4 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 83.1 | °C | D.F. = | 66.5 % |

| Location No. | Vin=100Vac Load=100% Ta=50°C | | | | | | |
|--------------------------------------|-----------------------------------|--------|----|---------------|---------|------|---------------|
| A109 AD7798BRUZ NATIONAL | Tjmax= | 150 | °C | θ -a = | 180.0 | °C/W | |
| | Pd = | 0.002 | W | Δ Ta = | 20.0 | °C | Ta = 70.0 °C |
| | Tj = Ta + (θ j-a x Pd) => | | | Tj = | 70.4 | °C | D.F. = 46.9 % |
| A110 DAC8830ICDRG4 TI | Tjmax= | 150 | °C | θ -a = | 136.9 | °C/W | |
| | Pd = | 0.0001 | W | Δ Ta = | 20.0 | °C | Ta = 70.0 °C |
| | Tj = Ta + (θ j-a x Pd) => | | | Tj = | 70.0 | °C | D.F. = 46.7 % |
| A115 STM32F105VCT6TR ST | Tjmax= | 150 | °C | θ -a = | 46.0 | °C/W | |
| | Pd = | 0.434 | W | Δ Ta = | 15.0 | °C | Ta = 65.0 °C |
| | Tj = Ta + (θ j-a x Pd) => | | | Tj = | 85.0 | °C | D.F. = 56.6 % |
| A141 LM78L15ACM NOPB NATIONAL | Tjmax= | 125 | °C | θ -a = | 180.0 | °C/W | |
| | Pd = | 0.1 | W | Δ Ta = | 18.0 | °C | Ta = 68.0 °C |
| | Tj = Ta + (θ j-a x Pd) => | | | Tj = | 86.0 | °C | D.F. = 68.8 % |
| A142 MIP2E4DMY MATSUSHITA | Tjmax= | 150 | °C | θ -c = | 3.0 | °C/W | |
| | Pd = | 1.4 | W | Δ Tc = | 19.4 | °C | Tc = 69.4 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 73.6 | °C | D.F. = 49.1 % |
| A145 LM78L05ACMNOPB NATIONAL | Tjmax= | 125 | °C | θ -a = | 231.0 | °C/W | |
| | Pd = | 0.08 | W | Δ Ta = | 18.0 | °C | Ta = 68.0 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 86.5 | °C | D.F. = 69.2 % |
| A148 LM3940IT-3.3NOPB NATIONAL | Tjmax= | 125 | °C | θ -c = | 4.0 | °C/W | |
| | Pd = | 0.5 | W | Δ Tc = | 11.7 | °C | Tc = 61.7 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 63.7 | °C | D.F. = 51.0 % |
| A149 L4941BV ST | Tjmax= | 150 | °C | θ -c = | 3.0 | °C/W | |
| | Pd = | 0.6 | W | Δ Tc = | 10.4 | °C | Tc = 60.4 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 62.2 | °C | D.F. = 41.5 % |
| D122 CRH01(TE85L,Q) TOSHIBA | Tjmax= | 150 | °C | θ -c = | 130.0 | °C/W | |
| | Pd = | 0.06 | W | Δ Tc = | 24.7 | °C | Tc = 74.7 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 82.5 | °C | D.F. = 55.0 % |
| D130 CRH01(TE85L,Q) TOSHIBA | Tjmax= | 150 | °C | θ -c = | 130.0 | °C/W | |
| | Pd = | 0.03 | W | Δ Tc = | 25.0 | °C | Tc = 75.0 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 78.9 | °C | D.F. = 52.6 % |
| D136 CRH01(TE85L,Q) TOSHIBA | Tjmax= | 150 | °C | θ -c = | 130.0 | °C/W | |
| | Pd = | 0.03 | W | Δ Tc = | 19.6 | °C | Tc = 69.6 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 73.5 | °C | D.F. = 49.0 % |
| Q129 2SK4033 TOSHIBA | Tjmax= | 150 | °C | θ -c = | 6.3 | °C/W | |
| | Pd = | 0.01 | W | Δ Tc = | 32.2 | °C | Tc = 82.2 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 82.3 | °C | D.F. = 54.8 % |
| Q129 2SK4033 TOSHIBA | Tjmax= | 150 | °C | θ -c = | 6.3 | °C/W | |
| | Pd = | 0.01 | W | Δ Tc = | 32.2 | °C | Tc = 82.2 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 82.3 | °C | D.F. = 54.8 % |
| PC106 PS2581L2-E3-A(D) NEC | Tjmax= | 125 | °C | θ -c = | 666.00 | °C/W | |
| | Pd = | 0.004 | W | Δ Tc = | 9.0 | °C | Ta = 59.0 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 61.7 | °C | D.F. = 49.3 % |
| PC117 PS2801-1-F3-A(P) NEC | Tjmax= | 125 | °C | θ -c = | 1666.00 | °C/W | |
| | Pd = | 0.001 | W | Δ Ta = | 10.0 | °C | Ta = 60.0 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 61.7 | °C | D.F. = 49.3 % |
| PC118 PS2801-1-F3-A(P) NEC | Tjmax= | 125 | °C | θ -c = | 1666.00 | °C/W | |
| | Pd = | 0.001 | W | Δ Ta = | 10.0 | °C | Ta = 60.0 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 61.7 | °C | D.F. = 49.3 % |

(2) Component Derating list

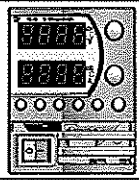
| Location No. | Vin=200Vac Load=100% Ta=50°C | | | | | | | |
|------------------------------------|------------------------------|-------|----|--------|---------|------|--------|---------|
| A101 L4981AD ST | Tjmax= | 150 | °C | θj-a = | 120.0 | °C/W | | |
| | Pd = | 0.23 | W | ΔTa = | 24.2 | °C | Ta = | 74.2 °C |
| | Tj = Ta + (θ j-a x Pd) => | | | Tj = | 101.8 | °C | D.F. = | 67.9 % |
| D101 D25XB60-7000 SHINDENGEN | Tjmax= | 150 | °C | θj-c = | 1.0 | °C/W | | |
| | Pd = | 4 | W | ΔTc = | 30.4 | °C | Tc = | 80.4 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 84.4 | °C | D.F. = | 56.3 % |
| D106 STTH806DTI ST | Tjmax= | 150 | °C | θj-c = | 2.6 | °C/W | | |
| | Pd = | 0.6 | W | ΔTc = | 22.4 | °C | Tc = | 72.4 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 74.0 | °C | D.F. = | 49.3 % |
| D117 STPS30L45CT ST | Tjmax= | 150 | °C | θj-c = | 0.85 | °C/W | | |
| | Pd = | 4.8 | W | ΔTc = | 37.7 | °C | Tc = | 87.7 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 91.8 | °C | D.F. = | 61.2 % |
| D118 STPS30L45CT ST | Tjmax= | 150 | °C | θj-c = | 0.85 | °C/W | | |
| | Pd = | 4.8 | W | ΔTc = | 45.0 | °C | Tc = | 95.0 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 99.1 | °C | D.F. = | 66.1 % |
| D119 STPS30L45CT ST | Tjmax= | 150 | °C | θj-c = | 0.85 | °C/W | | |
| | Pd = | 4.8 | W | ΔTc = | 35.7 | °C | Tc = | 85.7 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 89.8 | °C | D.F. = | 59.9 % |
| D120 STPS30L45CT ST | Tjmax= | 150 | °C | θj-c = | 0.85 | °C/W | | |
| | Pd = | 4.8 | W | ΔTc = | 38.7 | °C | Tc = | 88.7 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 92.8 | °C | D.F. = | 61.9 % |
| Q101 IPW60R099CP INFINEON | Tjmax= | 150 | °C | θj-c = | 0.5 | °C/W | | |
| | Pd = | 4 | W | ΔTc = | 20.1 | °C | Tc = | 70.1 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 72.1 | °C | D.F. = | 48.1 % |
| Q104 SPP15N60C3 INFINEON | Tjmax= | 150 | °C | θj-c = | 0.8 | °C/W | | |
| | Pd = | 7.24 | W | ΔTc = | 37.2 | °C | Tc = | 87.2 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 93.0 | °C | D.F. = | 62.0 % |
| Q105 SPP15N60C3 INFINEON | Tjmax= | 150 | °C | θj-c = | 0.8 | °C/W | | |
| | Pd = | 5.12 | W | ΔTc = | 37.1 | °C | Tc = | 87.1 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 91.2 | °C | D.F. = | 60.8 % |
| Q106 SPP15N60C3 INFINEON | Tjmax= | 150 | °C | θj-c = | 0.8 | °C/W | | |
| | Pd = | 6.5 | W | ΔTc = | 37.7 | °C | Tc = | 87.7 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 92.9 | °C | D.F. = | 61.9 % |
| Q107 SPP15N60C3 INFINEON | Tjmax= | 150 | °C | θj-c = | 0.8 | °C/W | | |
| | Pd = | 6.6 | W | ΔTc = | 30.2 | °C | Tc = | 80.2 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 85.5 | °C | D.F. = | 57.0 % |
| SC101 CR12CM-12A B00 RENESAS | Tjmax= | 125 | °C | θj-c = | 1.20 | °C/W | | |
| | Pd = | 1 | W | ΔTc = | 15.3 | °C | Tc = | 65.3 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 66.5 | °C | D.F. = | 53.2 % |
| Q118 TK20A25D TOSHIBA | Tjmax= | 150 | °C | θj-c = | 2.78 | °C/W | | |
| | Pd = | 2.7 | W | ΔTc = | 32.7 | °C | Tc = | 82.7 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 90.2 | °C | D.F. = | 60.1 % |
| PC101 PS2801-1-F3-A(P) NEC | Tjmax= | 125 | °C | θj-c = | 1666.00 | °C/W | | |
| | Pd = | 0.001 | W | ΔTa = | 30.4 | °C | Ta = | 80.4 °C |
| | Tj = Tc + (θ j-c x Pd) => | | | Tj = | 82.1 | °C | D.F. = | 65.7 % |

| Location No. | Vin=200Vac Load=100% Ta=50°C | | | | | | | | |
|--------------------------------------|---|--------------------|---------------|-------------------------|------------------------|------------------|----------------|--------------|---------|
| A109 AD7798BRUZ NATIONAL | Tjmax= Pd = Tj = Ta + (θ j-a x Pd) => | 150 0.002 W | °C W °C | θj-a = ΔTa = Tj = | 180.0 19.0 69.4 | °C/W °C °C | Ta = D.F. = | 69.0 46.2 | °C % |
| A110 DAC8830ICDRG4 TI | Tjmax= Pd = Tj = Ta + (θ j-a x Pd) => | 150 0.0001 W | °C W °C | θj-a = ΔTa = Tj = | 136.9 19.0 69.0 | °C/W °C °C | Ta = D.F. = | 69.0 46.0 | °C % |
| A115 STM32F105VCT6TR ST | Tjmax= Pd = Tj = Ta + (θ j-a x Pd) => | 150 0.434 W | °C W °C | θj-a = ΔTa = Tj = | 46.0 14.0 84.0 | °C/W °C °C | Ta = D.F. = | 64.0 56.0 | °C % |
| A141 LM78L15ACM NOPB NATIONAL | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 125 0.1 W | °C W °C | θj-a = ΔTa = Tj = | 180.0 17.0 85.0 | °C/W °C °C | Ta = D.F. = | 67.0 68.0 | °C % |
| A142 MIP2E4DMY MATSUSHITA | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 150 1.4 W | °C W °C | θj-c = ΔTc = Tj = | 3.0 18.1 72.3 | °C/W °C °C | Tc = D.F. = | 68.1 48.2 | °C % |
| A145 LM78L05ACMNOPB NATIONAL | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 125 0.08 W | °C W °C | θj-a = ΔTa = Tj = | 231.0 17.0 85.5 | °C/W °C °C | Ta = D.F. = | 67.0 68.4 | °C % |
| A148 LM3940IT-3.3NOPB NATIONAL | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 125 0.2 W | °C W °C | θj-c = ΔTc = Tj = | 4.0 11.4 62.2 | °C/W °C °C | Tc = D.F. = | 61.4 49.8 | °C % |
| A149 L4941BV ST | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 150 0.2 W | °C W °C | θj-c = ΔTc = Tj = | 3.0 10.0 60.6 | °C/W °C °C | Tc = D.F. = | 60.0 40.4 | °C % |
| D122 CRH01(TE85L,Q) TOSHIBA | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 150 0.06 W | °C W °C | θj-c = ΔTc = Tj = | 130.0 24.3 82.1 | °C/W °C °C | Tc = D.F. = | 74.3 54.7 | °C % |
| D130 CRH01(TE85L,Q) TOSHIBA | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 150 0.03 W | °C W °C | θj-c = ΔTc = Tj = | 130.0 24.5 78.4 | °C/W °C °C | Tc = D.F. = | 74.5 52.3 | °C % |
| D136 CRH01(TE85L,Q) TOSHIBA | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 150 0.03 W | °C W °C | θj-c = ΔTc = Tj = | 130.0 19.0 72.9 | °C/W °C °C | Tc = D.F. = | 69.0 48.6 | °C % |
| Q129 2SK4033 TOSHIBA | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 150 0.01 W | °C W °C | θj-c = ΔTc = Tj = | 6.3 31.3 81.4 | °C/W °C °C | Tc = D.F. = | 81.3 54.2 | °C % |
| PC106 PS2581L2-E3-A(D) NEC | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 125 0.004 W | °C W °C | θj-c = ΔTa = Tj = | 666.00 8.0 60.7 | °C/W °C °C | Ta = D.F. = | 58.0 48.5 | °C % |
| PC117 PS2801-1-F3-A(P) NEC | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 125 0.001 W | °C W °C | θj-c = ΔTa = Tj = | 1666.00 9.0 60.7 | °C/W °C °C | Ta = D.F. = | 59.0 48.5 | °C % |
| PC118 PS2801-1-F3-A(P) NEC | Tjmax= Pd = Tj = Tc + (θ j-c x Pd) => | 125 0.001 W | °C W °C | θj-c = ΔTa = Tj = | 1666.00 9.0 60.7 | °C/W °C °C | Ta = D.F. = | 59.0 48.5 | °C % |

3. Main components temperature rise

MODEL : 10V-40A

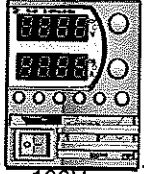
Condition:

| | |
|-------------------|---|
| Standard Mounting |  |
| Output Voltage | 10V |
| Output Current | 40A |
| Ta | 50°C |

| Location No. | Parts Name | ΔT Temperature Rise (°C) | |
|--------------|-------------------|----------------------------------|--------|
| | | 100Vac | 200Vac |
| A101 | CHIP PFC IC | 25.0 | 24.2 |
| C101 | FILM CAPACITOR | 27.2 | 18.3 |
| C102 | FILM CAPACITOR | 28.2 | 18.6 |
| C103 | CERAMIC CAPACITOR | 19.4 | 19.3 |
| C105 | FILM CAPACITOR | 25.2 | 21.0 |
| C111 | FILM CAPACITOR | 10.7 | 9.6 |
| C113 | CERAMIC CAPACITOR | 4.2 | 4.5 |
| C115 | ELEC. CAPACITOR | 15.2 | 13.2 |
| C116 | ELEC. CAPACITOR | 9.3 | 8.4 |
| C140 | FILM CAPACITOR | 36.4 | 36.2 |
| C147 | ELEC. CAPACITOR | 27.7 | 24.0 |
| D101 | BRIDGE | 50.0 | 30.4 |
| D106 | DIODE | 31.7 | 22.4 |
| D117 | DIODE | 40.0 | 37.7 |
| D118 | DIODE | 46.2 | 45.0 |
| D120 | DIODE | 40.7 | 38.7 |
| F101 | FUSE | 33.1 | 18.7 |
| L101 | COMMON CHOKE | 33.3 | 18.8 |
| L102 | COMMON CHOKE | 39.3 | 22.3 |
| L103 | PF CHOKE | 55.4 | 52.5 |
| L104 | CHOKE | 50.2 | 46.0 |
| PC101 | OPTO COUPLER | 31.4 | 30.4 |
| PC118 | OPTO COUPLER | 10.0 | 9.0 |
| Q101 | MOSFET | 35.2 | 20.1 |
| Q106 | MOSFET | 38.1 | 37.7 |
| R199 | RES. SHUNT | 37.3 | 33.7 |
| T101 | TRANSFORMER | 64.9 | 63.0 |
| T102 | TRANSFORMER | 15.5 | 16.2 |
| T103 | TRANSFORMER | 21.6 | 21.3 |
| A107 | DIGITAL ISOLATOR | 15.5 | 15.0 |
| A115 | MICROCONTROLLER | 15.0 | 13.5 |
| A141 | LINEAR REGULATOR | 18.0 | 17.0 |
| A142 | TOP SWITCH | 19.4 | 18.1 |
| A145 | LINEAR REGULATOR | 18.0 | 17.0 |
| D125 | DIODE | 13.0 | 12.4 |
| D130 | DIODE | 24.9 | 24.5 |
| D133 | DIODE | 19.7 | 19.3 |
| T201 | TRANSFORMER | 24.0 | 23.6 |
| ZD116 | ZENER | 30.0 | 28.5 |
| ZD123 | ZENER | 28.7 | 26.8 |

4. Electrolytic capacitor lifetime

Condition:

| | |
|-------------------|---|
| Standard Mounting |  |
| Input Voltage | 100Vac |

| COMPUTED LIFE (year) at T(ambient) | | | |
|------------------------------------|------|------|------|
| LOAD (%) | 30°C | 40°C | 50°C |
| 20 | 15.0 | 15.0 | 12.2 |
| 40 | 15.0 | 15.0 | 10.6 |
| 60 | 15.0 | 15.0 | 9.9 |
| 80 | 15.0 | 15.0 | 8.0 |
| 100 | 15.0 | 10.6 | 5.3 |

5. Abnormal test

MODEL : 10V-40A

(1) Test condition and circuit:

Input Voltage: 100Vac

Output: 10V 40A

Ta : 50°C

(2) Test results

| No. | Location | Test Position Test point | Test Mode | | Test Result | | | | | | | | | | | | | |
|-----|----------|-----------------------------|-----------|------|-------------|-------|-------|-------|---------|---------|-----------|-----|-----|-----------|-----------|--------|--|--------------|
| | | | Short | Open | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Note | |
| | | | | | Fire | Smoke | Burst | Smell | Red hot | Damaged | Fuse open | OVP | OTP | No output | No change | Others | | |
| 1 | Q101 | D-S | • | | | | | | | | | | | • | | | F101 opened | |
| | | G-S | • | | | | | | | • | | | | • | | | R112,R111,R135,R136 - damaged | |
| | | D-G | • | | | | | | | • | • | | | • | | | F101 opened, Q102, A101, ZD101, R111, R112 - damaged | |
| | | D | | • | | | | | | | | | | | • | | | |
| | | S | | • | | | | | | | | | | | • | | | |
| 2 | D106 | A-K | • | | | | | | | • | • | | | | | | F101 opened, Q101 damaged | |
| | | A | | • | | | | | | | | | | • | | | | |
| 3 | D115 | A-K | • | | | | | | | | | | | | • | | | |
| | | A | | • | | | | | | | | | | | • | | | |
| 4 | D103 | A-K | • | | | | | | | • | • | | | • | | | F101 opened, Q101 damaged | |
| | | A | | • | | | | | | | | | | | • | | | |
| 5 | D101 | 1-3 | • | | | | | | | | • | | | • | | | F101 opened | |
| | | 2-4 | • | | | | | | | | • | | | • | | | F101 opened | |
| 6 | C116 | | • | | | | | | | • | • | | | • | | | F101 opened, Q101 damaged | |
| | | | | • | | | | | | | | | | | • | | | |
| 7 | Q102 | E-C | • | | | | | | | • | | | | • | | | R135, R136 - damaged; | |
| | | B-E | • | | | | | | | • | | | | • | | | R135, R136 - damaged; | |
| 8 | D118 | A-K | • | | | | | | | | | | | • | | • | Pin=35W, Iin=0.2A. PS functional normally after removing short | |
| | | A | | • | | | | | | | | | | | • | | | |
| 9 | Q106 | D-S | • | | | | | | | • | • | | | • | | | F101 opened; R123, R176, Q104, Q105, Q107 - damaged | |
| | | G-S | • | | | | | | | • | • | | | • | | | F101 opened; R123, R176, Q104, Q105, Q107, Q110 - damaged | |
| | | D-G | • | | | | | | | | | | | • | | • | Pin=30W, Iin=0.14A. P.S functional normally after removing short | |
| | | D | | • | | | | | | • | • | | | • | | | F101 opened; Q105,Q107 - damaged | |
| | | S | | • | | | | | | • | • | | | • | | | F101 opened; Q105,Q107 - damaged | |
| 10 | C148 | G | | • | | | | | | • | • | | | • | | | F101 opened; Q105,Q107 - damaged | |
| | | | • | | | | | | | | | | | | • | | P.S in CC mode output unstable P.S functional normally after removing short and AC recycled | |
| 11 | T101 | 5-6 | • | | | | | | | • | | | | • | | | Q104-Q107, R123, R181, R182 - damaged | |
| | | 2-7 | • | | | | | | | • | | | | • | | | Q104-Q107, R123, R181, R182 - damaged | |
| 12 | L104 | | • | | | | | | | • | | | | • | | | R123- damaged | |
| 13 | SC101 | A | | • | | | | | | | | | | • | | | R123 damaged | |
| | | K | | • | | | | | | | | | | • | | | R123 damaged | |
| | | G | | • | | | | | | | | | | • | | | R123 damaged | |
| | | A-K | • | | | | | | | • | | | | • | | | Fuse opened | |
| | | A-G | • | | | | | | | | | | | | • | | | R123 damaged |
| | | K-G | • | | | | | | | | | | | | • | | | R123 damaged |
| 14 | PC101 | A-K | | • | | | | | | | | | | | • | | | |
| | | C-E | • | • | | | | | | | | | • | • | • | | OTP | |
| 15 | PC106 | A-K | • | • | | | | | | | | | | • | | | | |
| | | C-E | • | • | | | | | | | | | | • | | | | |
| 16 | PC109 | A-K | • | • | | | | | | | | | | • | | | | |
| | | C-E | • | • | | | | | | | • | | | • | | | | |
| 17 | PC116 | A-K | • | • | | | | | | | | | | • | | | | |
| | | C-E | • | • | | | | | | | | | | • | | | | |
| 18 | PC118 | A-K | • | • | | | | | | | | | | • | | | | |
| | | C-E | • | • | | | | | | | | | | • | | | | |
| 19 | PC119 | A-K | • | • | | | | | | | | | | • | | | | |
| | | C-E | • | • | | | | | | | | | | • | | | | |

6. Vibration test

MODEL: 10V-40A

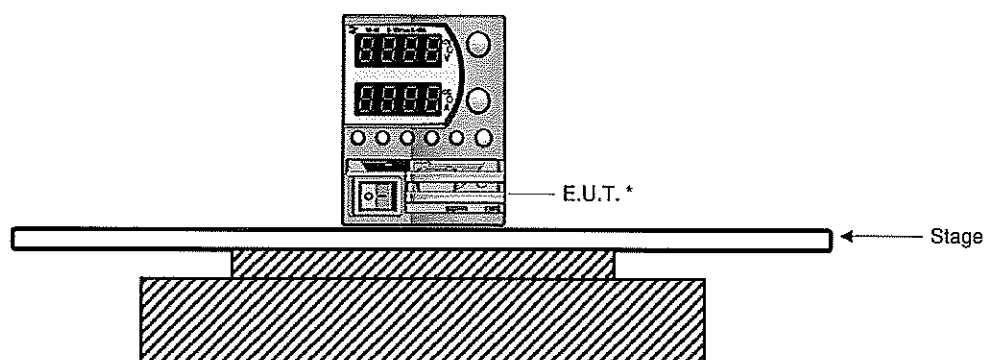
(1) Vibration test class

Frequency variable endurance test

(2) Equipment used

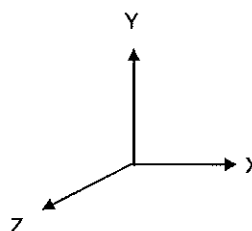
| Name | Manufacturer | Model |
|----------------------------------|-------------------------|--------|
| Vibration Test System | Ling Dynamic Systems | V875 |
| Laser Shaker Control System | DACTRON | LASER |
| Isotron Accelerometer 98.2 mV/g | Dytran instruments Inc. | 3256A2 |
| Isotron Accelerometer 101.7 mV/g | Dytran instruments Inc. | 3049E3 |

(3) Testing method



Test condition:

Sweep frequency: 5~500Hz
 Acceleration: 1.07G
 Direction: X, Y, Z
 Test time: 1 hour per each axis



*E.U.T. is fixed to vibrator surface by mounting straps

(4) Test result

OK

| Check item | Output Voltage (V) | Ripple (mVp-p) | E.U.T. state |
|-------------|--------------------|----------------|--------------|
| Before test | 10.00 | 40.00 | O.K. |
| Direction | | | |
| X | 10.00 | 39.16 | O.K. |
| Y | 10.00 | 41.28 | O.K. |
| Z | 10.00 | 40.00 | O.K. |

7. Noise Simulation Test

MODEL : 60V-7A

(1) Test equipment:

NoiseKen INS-4040 impulse noise simulator
NoiseKen IJ-4050 coupling decoupling network

(2) Acceptance criteria:

1. No damage to PS
2. No output shutdown
3. No other abnormalities

(3) Test condition:

Ta=25°C

Noise level- ± (0.6kV, 1.2kV, 1.8kV, 2kV) (50Ω term.)

Pulse width- 50ns ~ 1us

Injection phase (AC input only) - 0°~360° (with step 45°)

Input voltage - 230Vac

Output Current - 100%

Output voltage - Rated

(4) Test result:

OK

1. No damage to PS
2. No output shutdown
3. No other abnormalities

| Pulse | Polarity | Line-Neutral | Line-FG | Neutral-FG |
|-------|----------|--------------|---------|------------|
| 2kV | + | OK | | |
| 2kV | - | OK | | |
| 2kV | + | | OK | OK |
| 2kV | - | | OK | OK |

8. Thermal Shock Test

(1) Test Equipment

Thermal Shock Chamber: TSA-101S-W , ESPEC

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

1 (unit)

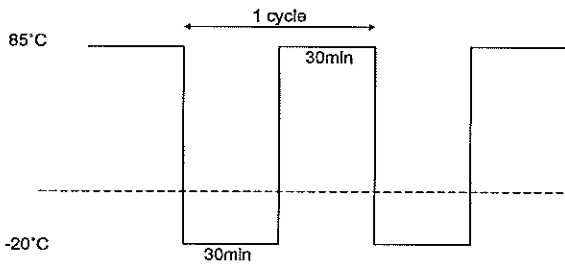
(3) Test condition

Ambient temperature: -20°C <=> +85°C

Test time: Refer to Dwg.

Test cycle: 100cycles

Not operating



(4) Test method

Before testing, check if there is no abnormal output, then put the D.U.T. in testing chamber, and test it according to the above cycle. Later leave it for 1 hour at room temperature, then check if there is no abnormal output.

(5) Test Result OK

Vin:100Vac

| Before testing | | | After testing | | |
|-------------------------|-----------------------|-------|-------------------------|-----------------------|-------|
| Vout-100%, Iout-100% | Vout-100%, Iout-0% | P-t-P | Vout-100%, Iout-100% | Vout-100%, Iout-0% | P-t-P |
| 36.000V | 36.002V | 25mV | 35.999V | 36.000V | 23mV |

9. Fan Life Expectancy

(1) Part name

9A0612S4D041 (SANYO DENKI CO.)

(2) Life expectancy

The data shows fan life expectancy for fan only by manufacture (90% survival rate).

Fig1. shows measuring point of ambient temperature.

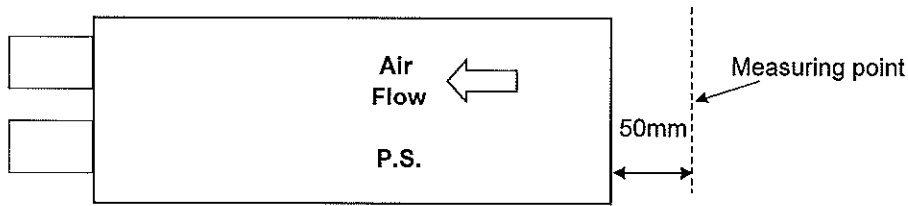
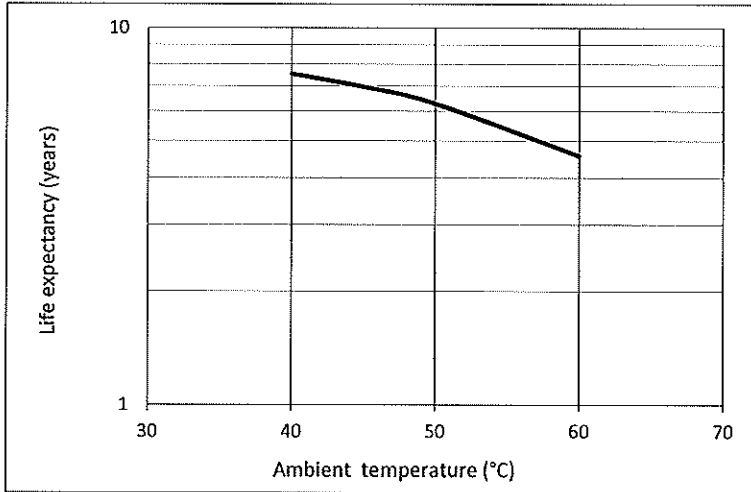


Fig1.Measuring point of fan ambient temperature.

$$1 \text{ year} = 365 \text{ day} \times 24 \text{ hours/day} = 8760 \text{ hours}$$