ZWD225PAF

RELIABILITY DATA

DWG No.	PA574-57-01A	
APPD	CHK	DWG
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07/3/14	06/03/14	6/3/14

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

1. CALCULATED VALUES OF MTBF

MODEL : ZWD225PAF-0524

1. Calculating Method

Calculated based on part count reliability projection of JEITA (RCR-9102).
Individual failure rates λ_G is given to each part and MTBF is calculated by the count of each part.

Formula :

$$MTBF = \frac{1}{\lambda_{equip}}$$

$$= \frac{1}{\sum_{i=1}^{n} N_i (\lambda_G \pi_Q) i} \times 10^6 \text{ (HOURS)}$$

where :

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

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

N_i = Quantity of ith Generic Part

n = Number of Different Generic Part Categories

π_Q = Generic Quality Factor for the ith Generic Part (π_Q = 1)

2. MTBF Values

G_F : (GROUND, FIXED)

MTBF = 212,028 Hours

2. COMPONENT DERATING

MODEL : ZWD225PAF-0524

1. Calculating Method

a) Measuring Conditions

Input Voltage	:	100VAC
Output Current	:	100%
Mounting Method	:	Standard Mounting
Ambient Temperature	:	50°C

b) Semiconductors

The derating is derived by comparing the junction temperature with the device maximum rating temperature. The junction temperature is calculated base on case temperature, power dissipation and thermal impedance.

c) IC , Resistor , Capacitors , etc.

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

d) Calculating Method of Thermal Impedance

$$\theta_{j-c} = \frac{T_{j(max)} - T_c}{P_{c(max)}} \qquad \theta_{j-a} = \frac{T_{j(max)} - T_a}{P_{c(max)}} \qquad \theta_{j-1} = \frac{T_{j(max)} - T_1}{P_{c(max)}}$$

Tc	=	Case Temperature at Start Point of Derating , 25°C in General
Ta	=	Ambient Temperature at Start Point of Derating , 25°C in General
T_l	=	Lead Temperature at Start Point of Derating , 25°C in General
$P_{c(max)}$ ($P_{ch(max)}$)	=	Maximum Collector (Channel) Dissipation
$T_{j(max)}$ ($T_{ch(max)}$)	=	Maximum Junction (Channel) Temperature
θ_{j-c} (θ_{ch-c})	=	Thermal Impedance between Junction(channel) and Case
θ_{j-a}	=	Thermal Impedance between Junction and Air
θ_{j-1}	=	Thermal Impedance between Junction and Lead

(2) Component Derating List

Conditions Ta : 50°C
Vin : 100VAC
I1 : 5A
I2 : 8.33A

Standard Mounting Position

Q1 2SK2698 PAIR NEMIC TOSHIBA	Tj(Tch)max	=	150 °C	delta Tc	=	55.0 °C	Tc	=	105.0 °C
	Rj(Rch) - c	=	0.833 °C/W	Pd(max)	=	150 W	Pd	=	2.09 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	106.74 °C			
	Derating	=	71.16 %						
Q2 2SK2698 PAIR NEMIC TOSHIBA	Tj(Tch)max	=	150 °C	delta Tc	=	54.2 °C	Tc	=	104.2 °C
	Rj(Rch) - c	=	0.833 °C/W	Pd(max)	=	150 W	Pd	=	2.09 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	105.94 °C			
	Derating	=	70.63 %						
Q3 2SK1985-01MR FUJI ELEC.	Tj(Tch)max	=	150 °C	delta Tc	=	53.8 °C	Tc	=	103.8 °C
	Rj(Rch) - c	=	2.5 °C/W	Pd(max)	=	50 W	Pd	=	1.23 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	106.88 °C			
	Derating	=	71.25 %						
Q4 2SK2611 PAIR NEMIC TOSHIBA	Tj(Tch)max	=	150 °C	delta Tc	=	42.6 °C	Tc	=	92.6 °C
	Rj(Rch) - c	=	0.833 °C/W	Pd(max)	=	150 W	Pd	=	5.5 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	97.18 °C			
	Derating	=	64.79 %						
Q5 2SK2611 PAIR NEMIC TOSHIBA	Tj(Tch)max	=	150 °C	delta Tc	=	45.1 °C	Tc	=	95.1 °C
	Rj(Rch) - c	=	0.833 °C/W	Pd(max)	=	150 W	Pd	=	5.5 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	99.68 °C			
	Derating	=	66.45 %						
Q104 2SC2873-Y TOSHIBA	Tj(Tch)max	=	150 °C	delta Tc	=	48.6 °C	Tc	=	98.6 °C
	Rj(Rch) -c	=	250 °C/W	Pd(max)	=	0.5 W	Pd	=	0.01 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	100.70 °C			
	Derating	=	67.13 %						
Q105 2SA1213-Y TOSHIBA	Tj(Tch)max	=	150 °C	delta Tc	=	49.3 °C	Tc	=	99.3 °C
	Rj(Rch) -c	=	250 °C/W	Pd(max)	=	0.5 W	Pd	=	0.01 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	101.65 °C			
	Derating	=	67.77 %						
Q106 2SC2873-Y TOSHIBA	Tj(Tch)max	=	150 °C	delta Tc	=	44.7 °C	Tc	=	94.7 °C
	Rj(Rch) -c	=	250 °C/W	Pd(max)	=	0.5 W	Pd	=	0.01 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	96.50 °C			
	Derating	=	64.33 %						
Q107 2SA1213-Y TOSHIBA	Tj(Tch)max	=	150 °C	delta Tc	=	44.9 °C	Tc	=	94.9 °C
	Rj(Rch) -c	=	250 °C/W	Pd(max)	=	0.5 W	Pd	=	0.01 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	97.15 °C			
	Derating	=	64.77 %						

(2) Component Derating List

Conditions Ta : 50°C
Vin : 100VAC
I1 : 5A
I2 : 8.33A

Standard Mounting Position

A1 UC2842AN ON-SEMI	Tj(Tch)max	=	150 °C	delta Tc	=	51.0 °C	Tc	=	101.0 °C
	Rj(Rch) - a	=	100 °C/W	Pd(max)	=	1.0 W	Pd	=	0.21 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]		=	122.00 °C			
	Derating	=	81.33 %						
A100 FA5502M FUJI ELEC.	Tj(Tch)max	=	150 °C	delta Tc	=	47.3 °C	Tc	=	97.3 °C
	Rj(Rch) - c	=	50 °C/W	Pd(max)	=	0.65 W	Pd	=	0.2 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	107.30 °C			
	Derating	=	71.53 %						
A101 M51995AFP-600C MITSUBISHI	Tj(Tch)max	=	150 °C	delta Tc	=	50.3 °C	Tc	=	100.3 °C
	Rj(Rch) - c	=	37 °C/W	Pd(max)	=	1.5 W	Pd	=	0.27 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	110.29 °C			
	Derating	=	73.53 %						
A102 HA17431UA HITACHI	Tj(Tch)max	=	150 °C	delta Tc	=	17.8 °C	Tc	=	67.8 °C
	Rj(Rch) - c	=	156 °C/W	Pd(max)	=	0.8 W	Pd	=	0.005 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	68.58 °C			
	Derating	=	45.72 %						
A103 HA17431UA HITACHI	Tj(Tch)max	=	150 °C	delta Tc	=	55.8 °C	Tc	=	105.8 °C
	Rj(Rch) - c	=	156 °C/W	Pd(max)	=	0.8 W	Pd	=	0.027 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	110.01 °C			
	Derating	=	73.34 %						
A104 UPC358G2-T1 NEC	Tj(Tch)max	=	125 °C	delta Tc	=	61.3 °C	Tc	=	111.3 °C
	Rj(Rch) - c	=	227 °C/W	Pd(max)	=	0.44 W	Pd	=	0.01 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	112.44 °C			
	Derating	=	89.95 %						
PC1 TLP721F (LED) TOSHIBA	Tj(Tch)max	=	125 °C	delta Tc	=	25.8 °C	Tc	=	75.8 °C
	Rj(Rch) - a	=	- °C/W	Pd(max)	=	- W	I_F	=	2.00 mA
	ALLOWABLE I_F (max) ≈ 35mA (at Ta=75.8°C)								
	Derating	=	5.71 %						
PC1 TLP721F (TRANSISTOR) TOSHIBA	Tj(Tch)max	=	125 °C	delta Tc	=	25.8 °C	Tc	=	75.8 °C
	Rj(Rch) - a	=	667 °C/W	Pd(max)	=	0.15 W	Pd	=	0.002 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	77.13 °C			
	Derating	=	61.71 %						
PC2 TLP721F (LED) TOSHIBA	Tj(Tch)max	=	125 °C	delta Tc	=	44.5 °C	Tc	=	94.5 °C
	Rj(Rch) - a	=	- °C/W	Pd(max)	=	- W	I_F	=	0.00 mA
	ALLOWABLE I_F (max) ≈ 20mA (at Ta=94.5°C)								
	Derating	=	0.00 %						

(2) Component Derating List

Conditions Ta : 50°C
Vin : 100VAC
I1 : 5A
I2 : 8.33A

Standard Mounting Position

PC2	Tj(Tch)max	=	125 °C	delta Tc	=	44.5 °C	Tc	=	94.5 °C
TLP721F	Rj(Rch) - a	=	667 °C/W	Pd(max)	=	0.15 W	Pd	=	0 W
(TRANSISTOR)	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	94.50 °C				
TOSHIBA	Derating	=	75.60 %						
PC3	Tj(Tch)max	=	125 °C	delta Tc	=	20.9 °C	Tc	=	70.9 °C
TLP721F	Rj(Rch) - a	=	- °C/W	Pd(max)	=	- W	I_F	=	6.00 mA
(LED)	ALLOWABLE I_F (max) ≈ 30mA (at Ta=70.9°C)								
TOSHIBA	Derating	=	20.00 %						
PC3	Tj(Tch)max	=	125 °C	delta Tc	=	20.9 °C	Tc	=	70.9 °C
TLP721F	Rj(Rch) - a	=	667 °C/W	Pd(max)	=	0.15 W	Pd	=	0.006 W
(TRANSISTOR)	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	74.90 °C				
TOSHIBA	Derating	=	59.92 %						
PC4	Tj(Tch)max	=	125 °C	delta Tc	=	44.5 °C	Tc	=	94.5 °C
TLP721F	Rj(Rch) - a	=	- °C/W	Pd(max)	=	- W	I_F	=	5.00 mA
(LED)	ALLOWABLE I_F (max) ≈ 20mA (at Ta=94.5°C)								
TOSHIBA	Derating	=	25.00 %						
PC4	Tj(Tch)max	=	125 °C	delta Tc	=	44.5 °C	Tc	=	94.5 °C
TLP721F	Rj(Rch) - a	=	667 °C/W	Pd(max)	=	0.15 W	Pd	=	0.005 W
(TRANSISTOR)	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	97.84 °C				
TOSHIBA	Derating	=	78.27 %						
PC5	Tj(Tch)max	=	125 °C	delta Tc	=	25.8 °C	Tc	=	75.8 °C
TLP721F	Rj(Rch) - a	=	- °C/W	Pd(max)	=	- W	I_F	=	0.00 mA
(LED)	ALLOWABLE I_F (max) ≈ 38mA (at Ta=75.8°C)								
TOSHIBA	Derating	=	0.00 %						
PC5	Tj(Tch)max	=	125 °C	delta Tc	=	25.8 °C	Tc	=	75.8 °C
TLP721F	Rj(Rch) - a	=	667 °C/W	Pd(max)	=	0.15 W	Pd	=	0 W
(TRANSISTOR)	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	75.80 °C				
TOSHIBA	Derating	=	60.64 %						
D1	Tj(Tch)max	=	150 °C	delta Tc	=	60.7 °C	Tc	=	110.7 °C
D15XB60	Rj(Rch) - c	=	1.5 °C/W	Pd(max)	=	- W	Pd	=	5.6 W
SHINDENGEN	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	119.10 °C				
	Derating	=	79.40 %						
D2	Tj(Tch)max	=	150 °C	delta Tc	=	55.4 °C	Tc	=	105.4 °C
10FL2CZ47A	Rj(Rch) - c	=	3.6 °C/W	Pd(max)	=	30 W	Pd	=	0.9 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	108.64 °C				
	Derating	=	72.43 %						

(2) Component Derating List

Conditions Ta : 50°C
Vin : 100VAC
I1 : 5A
I2 : 8.33A

Standard Mounting Position

D3 10FL2CZ47A TOSHIBA	Tj(Tch)max	=	150 °C	delta Tc	=	54.0 °C	Tc	=	104.0 °C
	Rj(Rch) - c	=	3.6 °C/W	Pd(max)	=	30 W	Pd	=	0.9 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	107.24 °C				
	Derating	=	71.49 %						
D4 SF30SC4 SHINDENGEN	Tj(Tch)max	=	150 °C	delta Tc	=	44.3 °C	Tc	=	94.3 °C
	Rj(Rch) - c	=	2 °C/W	Pd(max)	=	20 W	Pd	=	2.75 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	99.80 °C				
	Derating	=	66.53 %						
D5 ESAD92M-02R FUJI ELEC.	Tj(Tch)max	=	150 °C	delta Tc	=	64.5 °C	Tc	=	114.5 °C
	Rj(Rch) - c	=	2 °C/W	Pd(max)	=	- W	Pd	=	3.96 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	122.42 °C				
	Derating	=	81.61 %						
D6 ESAD92M-02R FUJI ELEC.	Tj(Tch)max	=	150 °C	delta Tc	=	61.0 °C	Tc	=	111.0 °C
	Rj(Rch) - c	=	2 °C/W	Pd(max)	=	- W	Pd	=	3.96 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	118.92 °C				
	Derating	=	79.28 %						
D102 D3F60-4063 SHINDENGEN	Tj(Tch)max	=	150 °C	delta Tc	=	57.0 °C	Tc	=	107.0 °C
	Rj(Rch) - c	=	80 °C/W	Pd(max)	=	- W	Pd	=	0 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	107.00 °C				
	Derating	=	71.33 %						
D103 U05NU44 TOSHIBA	Tj(Tch)max	=	150 °C	delta Tc	=	55.4 °C	Tc	=	105.4 °C
	Rj(Rch) - a	=	125 °C/W	Pd(max)	=	- W	Pd	=	0.046 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	111.15 °C				
	Derating	=	74.10 %						
D104 D1FL20U-4063 SHINDENGEN	Tj(Tch)max	=	150 °C	delta Tc	=	51.8 °C	Tc	=	101.8 °C
	Rj(Rch) - a	=	157 °C/W	Pd(max)	=	- W	Pd	=	0.012 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	103.68 °C				
	Derating	=	69.12 %						
D106 1SS184-TE85L TOSHIBA	Tj(Tch)max	=	125 °C	delta Tc	=	53.8 °C	Tc	=	103.8 °C
	Rj(Rch) - l	=	667 °C/W	Pd(max)	=	0.15 W	Pd	=	0 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	103.80 °C				
	Derating	=	83.04 %						
D107 1SS226-TE85L TOSHIBA	Tj(Tch)max	=	125 °C	delta Tc	=	50.4 °C	Tc	=	100.4 °C
	Rj(Rch) - a	=	667 °C/W	Pd(max)	=	0.15 W	Pd	=	0 W
	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]	=	100.40 °C				
	Derating	=	80.32 %						

(2) Component Derating List

Conditions Ta : 50°C
Vin : 100VAC
I1 : 5A
I2 : 8.33A

Standard Mounting Position

D109	Tj(Tch)max	=	150 °C	delta Tc	=	45.7 °C	Tc	=	95.7 °C
D1FL20U-4063	Rj(Rch) - a	=	157 °C/W	Pd(max)	=	- W	Pd	=	0.0162 W
SHINDENGEN	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]	=	98.24 °C				
	Derating	=	65.50 %						
D113	Tj(Tch)max	=	150 °C	delta Tc	=	50.0 °C	Tc	=	100.0 °C
D1FL20U-4063	Rj(Rch) - a	=	157 °C/W	Pd(max)	=	- W	Pd	=	0.08 W
SHINDENGEN	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]	=	112.56 °C				
	Derating	=	75.04 %						
D115	Tj(Tch)max	=	125 °C	delta Tc	=	35.8 °C	Tc	=	85.8 °C
SFPB-54V	Rj(Rch) - a	=	155 °C/W	Pd(max)	=	- W	Pd	=	0.08 W
SANKEN	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]	=	98.20 °C				
	Derating	=	78.56 %						
ZD100	Tj(Tch)max	=	150 °C	delta Tc	=	43.6 °C	Tc	=	93.6 °C
U1ZB27-TE12L	Rj(Rch) - a	=	125 °C/W	Pd(max)	=	1 W	Pd	=	0 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]	=	93.60 °C				
	Derating	=	62.40 %						
ZD101	Tj(Tch)max	=	150 °C	delta Tc	=	48.9 °C	Tc	=	98.9 °C
U1ZB27-TE12L	Rj(Rch) - a	=	125 °C/W	Pd(max)	=	1 W	Pd	=	0 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]	=	98.90 °C				
	Derating	=	65.93 %						
ZD102	Tj(Tch)max	=	150 °C	delta Tc	=	45.1 °C	Tc	=	95.1 °C
U1ZB27-TE12L	Rj(Rch) - a	=	125 °C/W	Pd(max)	=	1 W	Pd	=	0 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]	=	95.10 °C				
	Derating	=	63.40 %						
ZD103	Tj(Tch)max	=	150 °C	delta Tc	=	38.7 °C	Tc	=	88.7 °C
U1ZB27-TE12L	Rj(Rch) - a	=	125 °C/W	Pd(max)	=	1 W	Pd	=	0 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]	=	88.70 °C				
	Derating	=	59.13 %						
ZD104	Tj(Tch)max	=	150 °C	delta Tc	=	44.6 °C	Tc	=	94.6 °C
02CZ15-Y-TE12L	Rj(Rch) - a	=	625 °C/W	Pd(max)	=	0.2 W	Pd	=	0.025 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]	=	110.23 °C				
	Derating	=	73.48 %						
ZD105	Tj(Tch)max	=	150 °C	delta Tc	=	43.1 °C	Tc	=	93.1 °C
02CZ11-X-TE85L	Rj(Rch) - a	=	625 °C/W	Pd(max)	=	0.2 W	Pd	=	0 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]	=	93.10 °C				
	Derating	=	62.07 %						

(2) Component Derating List

Conditions Ta : 50°C
Vin : 100VAC
I1 : 5A
I2 : 8.33A

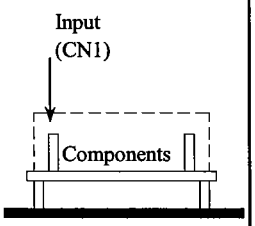
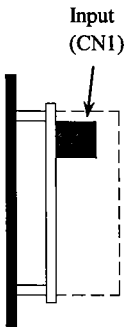
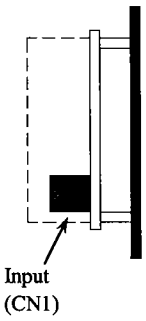
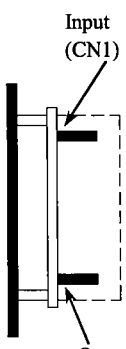
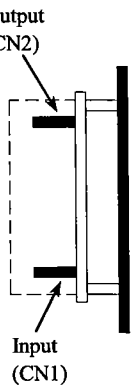
Standard Mounting Position

ZD106	Tj(Tch)max	=	150 °C	delta Tc	=	37.6 °C	Tc	=	87.6 °C
U1ZB27-TE12L	Rj(Rch) - c	=	125 °C/W	Pd(max)	=	0.2 W	Pd	=	0 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	87.60 °C			
	Derating	=	58.40 %						
ZD107	Tj(Tch)max	=	150 °C	delta Tc	=	38.2 °C	Tc	=	88.2 °C
U1ZB27-TE12L	Rj(Rch) - c	=	125 °C/W	Pd(max)	=	1 W	Pd	=	0 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-c) x Pd]		=	88.20 °C			
	Derating	=	58.80 %						
ZD108	Tj(Tch)max	=	150 °C	delta Tc	=	34.6 °C	Tc	=	84.6 °C
02CZ5.6-Y-TE85L	Rj(Rch) - a	=	625 °C/W	Pd(max)	=	0.2 W	Pd	=	0 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]		=	84.60 °C			
	Derating	=	56.40 %						
ZD109	Tj(Tch)max	=	150 °C	delta Tc	=	56.6 °C	Tc	=	106.6 °C
02CZ30-TE85R	Rj(Rch) - a	=	625 °C/W	Pd(max)	=	0.2 W	Pd	=	0 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]		=	106.60 °C			
	Derating	=	71.07 %						
ZD110	Tj(Tch)max	=	150 °C	delta Tc	=	45.3 °C	Tc	=	95.3 °C
U1ZB6.8-TE12L	Rj(Rch) - a	=	625 °C/W	Pd(max)	=	0.2 W	Pd	=	0 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]		=	95.30 °C			
	Derating	=	63.53 %						
ZD111	Tj(Tch)max	=	150 °C	delta Tc	=	23.2 °C	Tc	=	73.2 °C
O2CZ2.2-X-TE12L	Rj(Rch) - a	=	625 °C/W	Pd(max)	=	0.2 W	Pd	=	0.013 W
TOSHIBA	Tj(Tch)	=	Tc + [(Rj(Rch)-a) x Pd]		=	81.33 °C			
	Derating	=	54.22 %						

3. Main Component Temperature Rise ΔT List

MODEL : ZWD225PAF-0524

Measuring Conditions

	A	B	C	D	E
Mounting Method (Standard Mounting Method:(A))					
Input (VAC)	100				
Output (VDC)	5, 24				
Output Current (A)	5.0, 8.33	2.5,4.165	1.65,2.75	2.5,4.165	1.65,2.75

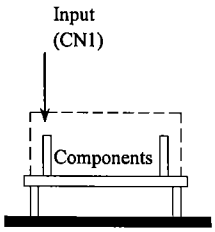
※ Condition Ta = 50°C , Convection cooling.

		ΔT List Temperature Rise (°C)				
Output Derating (%) Ta = 50°C		100	50	33.3	50	33.3
Location No.	Parts Name	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
L1	BALUN COIL	44.5	27.1	16.0	39.3	15.1
L2	BALUN COIL	49.3	30.5	19.0	43.4	16.2
L3	CHOKE COIL	54.4	38.7	35.5	44.2	35.7
L5	CHOKE COIL	68.9	57.5	48.2	57.1	52.9
D1	BRIDGE DIODE	60.7	36.5	33.9	48.1	33.9
D2	DIODE	55.4	35.5	36.1	45.2	37.6
D4	S.B.D.	44.3	27.1	30.2	30.6	37.3
D5	LLD	64.5	49.5	29.3	44.9	38.4
Q1	MOSFET	55	33.7	35.6	44.7	36.6
Q3	MOSFET	53.8	37.0	42.1	45.9	45.3
Q5	MOSFET	45.1	42.9	29.3	48.2	35.6
A1	I.C.	51.0	43.9	50.7	48.3	56.7
A100	CHIP I.C.	47.3	49.8	35.5	47.5	41.3
A101	CHIP I.C.	50.3	45.0	38.1	50.0	46.2
T1	TRANS. PULSE	56.2	38.0	36.7	43.8	46.1
T2	TRANS. PULSE	66.9	47.8	37.1	51.7	47.1
C6	CAP.,ELECT.	38.1	26.1	23.4	28.7	27.6
C8	CAP., ELECT	27.3	20.8	32.7	25.3	37.9
C9	CAP., ELECT	39.2	35.2	29.0	40.7	35.4
C10	CAP., ELECT	42.9	37.6	31.8	42.5	38.6
C12	CAP., ELECT	35.8	22.5	28.5	23.5	35.6
C13	CAP., ELECT	27.4	17.0	26.0	19.4	34.1
C14	CAP., ELECT	32.5	21.2	28.9	23.2	36.1
C15	CAP., ELECT	36.9	25.0	28.0	23.8	32.5
C16	CAP., ELECT	31.7	22.6	25.0	20.3	31.6

4. ELECTROLYTIC CAPACITOR LIFETIME

MODEL : ZWD225PAF-0524

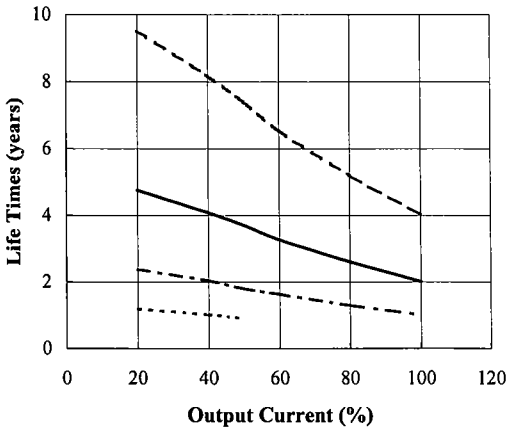
Mounting A



Ta = 30°C ----
= 40°C ——
= 50°C -·-·-
= 60°C ·····

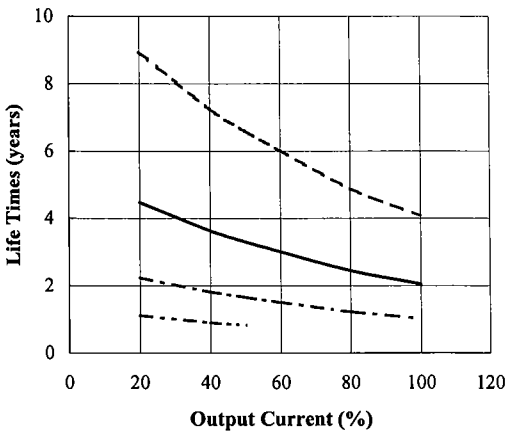
Vin = 100VAC

Load (%)	Life Time (years)			
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C
20	9.5	4.8	2.4	1.2
40	8.2	4.1	2.0	1.0
50	7.4	3.7	1.8	0.9
60	6.5	3.3	1.6	-
80	5.2	2.6	1.3	-
100	4.0	2.0	1.0	-



Vin = 200VAC

Load (%)	Life Time (years)			
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C
20	8.9	4.5	2.2	1.1
40	7.3	3.6	1.8	0.9
50	6.6	3.3	1.7	0.8
60	6.0	3.0	1.5	-
80	4.9	2.4	1.2	-
100	4.1	2.0	1.0	-

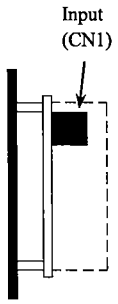


4. ELECTROLYTIC CAPACITOR LIFETIME

MODEL : ZWD225PAF-0524

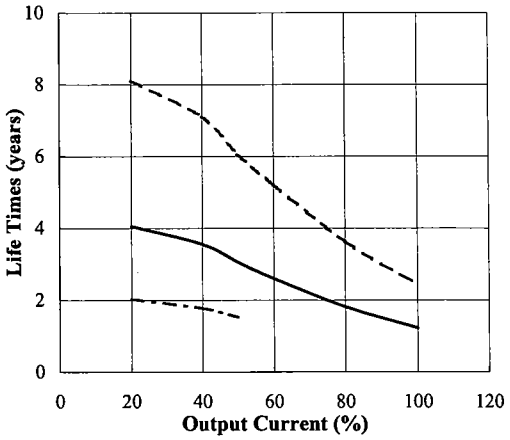
Ta = 30°C ----
= 40°C ——
= 50°C -·-·-
= 60°C ·····

Mounting B



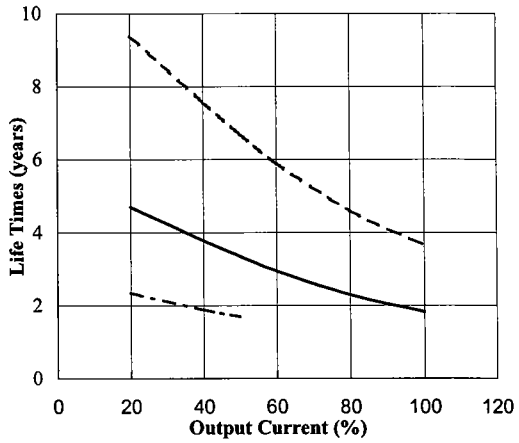
Vin = 100VAC

Load (%)	Life Time (years)			
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C
20	8.1	4.1	2.0	-
40	7.1	3.6	1.8	-
50	6.1	3.1	1.5	-
60	5.2	2.6	-	-
80	3.6	1.8	-	-
100	2.4	1.2	-	-



Vin = 200VAC

Load (%)	Life Time (years)			
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C
20	9.4	4.7	2.3	-
40	7.6	3.8	1.9	-
50	6.7	3.4	1.7	-
60	5.9	2.9	-	-
80	4.6	2.3	-	-
100	3.7	1.8	-	-



4. ELECTROLYTIC CAPACITOR LIFETIME

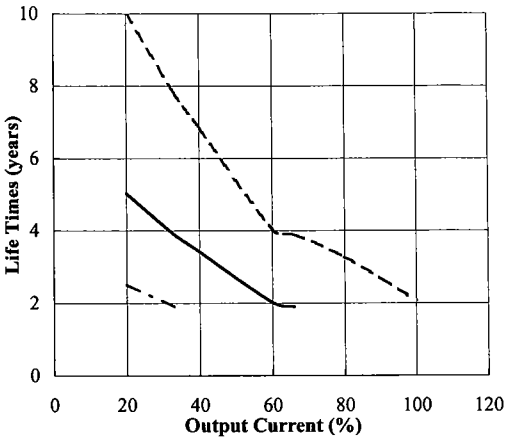
MODEL : ZWD225PAF-0524

Ta = 30°C ----
= 40°C ——
= 50°C -·-·-
= 60°C ·····

Mounting C

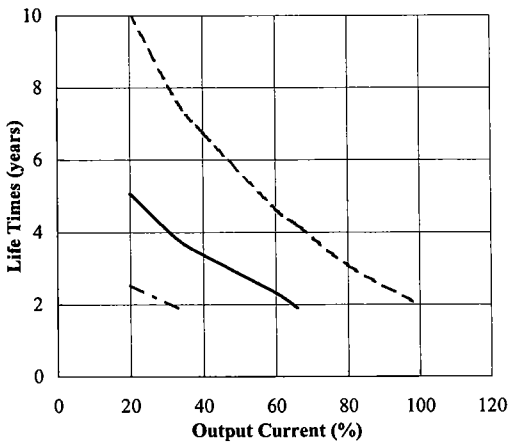
Vin = 100VAC

Load (%)	Life Time (years)			
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C
20	10.0	5.0	2.5	-
33	7.8	3.9	1.9	-
40	6.8	3.4	-	-
60	4.0	2.0	-	-
66	3.9	1.9	-	-
80	3.3	-	-	-
100	2.1	-	-	-



Vin = 200VAC

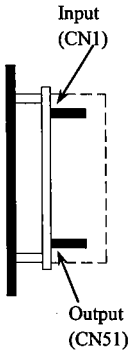
Load (%)	Life Time (years)			
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C
20	10.1	5.1	2.5	-
33	7.6	3.8	1.9	-
40	6.7	3.4	-	-
60	4.6	2.3	-	-
66	4.2	1.9	-	-
80	3.1	-	-	-
100	2.0	-	-	-



4. ELECTROLYTIC CAPACITOR LIFETIME

MODEL : ZWD225PAF-0524

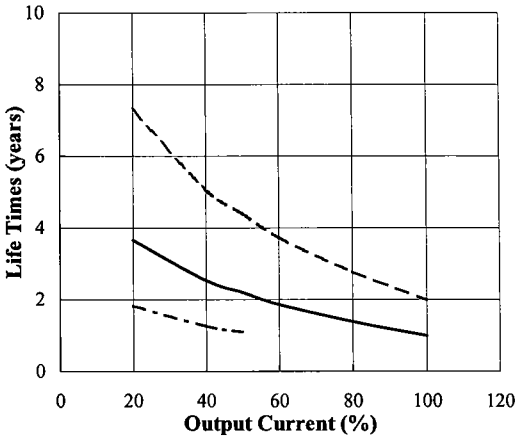
Mounting D



Ta = 30°C
= 40°C
= 50°C
= 60°C

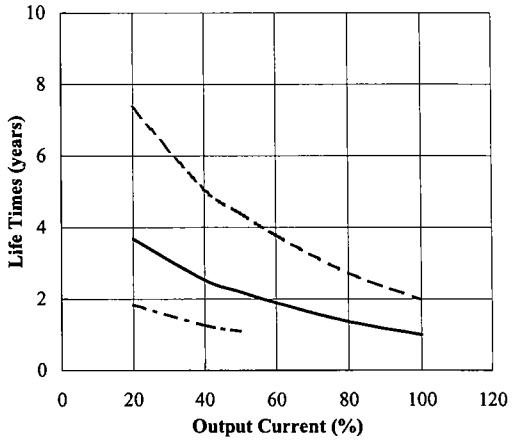
Vin = 100VAC

Load (%)	Life Time (years)			
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C
20	7.3	3.7	1.8	-
40	5.1	2.5	1.3	-
50	4.4	2.2	1.1	-
60	3.7	1.9	-	-
80	2.8	1.4	-	-
100	2.0	1.0	-	-



Vin = 200VAC

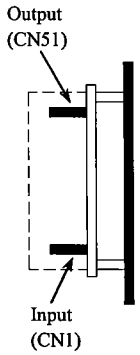
Load (%)	Life Time (years)			
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C
20	7.4	3.7	1.8	-
40	5.1	2.5	1.3	-
50	4.4	2.2	1.1	-
60	3.8	1.9	-	-
80	2.7	1.4	-	-
100	2.0	1.0	-	-



4. ELECTROLYTIC CAPACITOR LIFETIME

MODEL : ZWD225PAF-0524

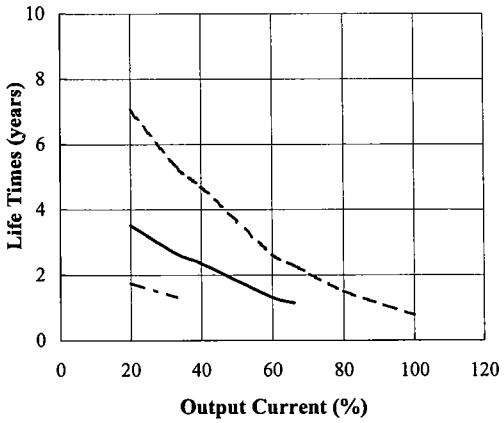
Mounting E



Ta = 30°C
= 40°C
= 50°C
= 60°C

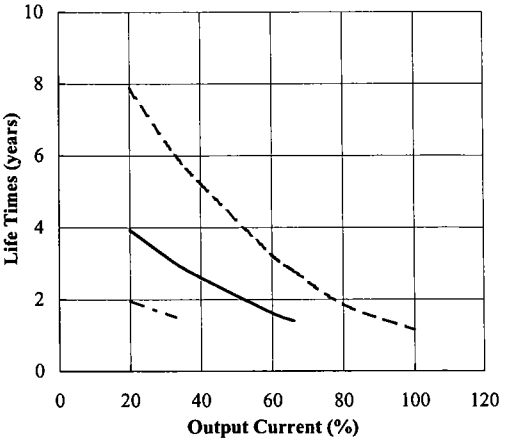
Vin = 100VAC

Load (%)	Life Time (years)			
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C
20	7.0	3.5	1.8	-
33	5.3	2.7	1.3	-
40	4.7	2.4	-	-
60	2.6	1.3	-	-
66	2.3	1.2	-	-
80	1.5	-	-	-
100	0.8	-	-	-



Vin = 200VAC

Load (%)	Life Time (years)			
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C
20	7.9	3.9	2.0	-
33	6.0	3.0	1.5	-
40	5.2	2.6	-	-
60	3.2	1.6	-	-
66	2.8	1.4	-	-
80	1.9	-	-	-
100	1.2	-	-	-



5. Abnormal Test

MODEL : ZWD225PAF

(1) Test Condition and Circuit

Input Voltage : 200VAC Output Current : 100% Ta : 25°C

(2) Test Results

(Da: Damaged)

No.	Test Position		Test Mode		Test Results												
					1	2	3	4	5	6	7	8	9	10	11	12	
	LOCATION	TEST POINT	SHORT	OPEN	FIRE	SMOKE	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOW	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHER	NOTE
1	Q1	G		●						●	●			●		●	Da: Q1
		D		●											●		
		S		●										●			
		G - S	●													●	Input Power Increase
		D - G	●							●	●			●			Da: ZD100
		D - S	●								●			●			
2	Q3	G		●						●				●			Da: Q3,ZD103,ZD110,R6,A1
		D		●										●			
		S		●										●			
		G - S	●											●			
		D - G	●							●				●			Da: A1,ZD103,Q3
		D - S	●							●				●			Da: ZD110
3	Q4	G		●											●		
		D		●											●		
		S		●											●		
		G - S	●											●			Only for V2
		D - G	●							●	●			●			Da: ZD106,D112, R200,R201
		D - S	●							●	●			●			Da: D112, R200,R201
4	D1	AC - AC	●								●			●			
		AC - DC	●								●			●			
		AC		●										●			
		DC		●										●			
5	D2		●												●		
				●						●	●			●			Da: Q2, ZD101
6	D4	A1		●											●		
		A2		●											●		
		K		●										●			
		A1 - K	●											●			
		A2 - K	●											●			
7	D5	A1		●											●		
		A2		●											●		
		K		●											●		
		A1 - K	●											●			Only For V2
		A2 - K	●											●			Only For V2
8	D103	A - K	●													●	Output Hiccup
		A - K		●											●		
9	D104	A - K	●											●			
		A - K		●												●	Output Hiccup
10	D108	A - K	●							●						●	Da: R186,R187
		A - K		●											●		
11	D109	A - K	●							●						●	Da: R186,R187
		A - K		●											●		
12	D113	A - K	●											●			Only For V2
		A - K		●												●	Output Hiccup Only For V2

5. Abnormal Test

MODEL : ZWD225PAF

(1) Test Condition and Circuit

Input Voltage : 200VAC Output Current : 100% Ta : 25°C

(2) Test Results

(Da: Damaged)

No.	Test Position		Test Mode		Test Results												
					1	2	3	4	5	6	7	8	9	10	11	12	
	LOCATION	TEST POINT	SHORT	OPEN	FIRE	SMOKE	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOW	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHER	NOTE
13	ZD102	A - K	●											●			
		A - K		●											●		
14	ZD110		●												●		very noisy
				●											●		
15	A1	1		●										●			
		2		●										●			
		3		●										●			
		4		●										●			
		5		●										●			
		6		●										●			
		7		●										●			
		8		●										●			
16	A100	1 - 2	●												●		
		2 - 3	●													●	Input power increase
		3 - 4	●												●		
		4 - 5	●												●		
		5 -6	●												●		
		6 -7	●													●	Input power increase
		7 - 8	●												●		
		9 - 10	●												●		
		10 - 11	●												●		
		11 - 12	●												●		
		12 - 13	●												●		
		13 - 14	●													●	Input power increase
		14 - 15	●												●		
		15 - 16	●												●		
17	A101	1 - 2	●												●		
		2 - 3	●											●			Only For V2
		3 - 4	●												●		
		4 - 5	●												●		
		6 - 7	●												●		
		7 - 8	●												●		
		9 - 10	●											●			Only For V2
		11 - 12	●											●			Only For V2
		12 - 13	●											●			Only For V2
		13 - 14	●												●		
		14 - 15	●												●		
		18 - 19	●												●		
		19 - 20	●											●			Only For V2
18	T1	2,3 - 4,5	●											●			
		9 - 10	●											●			
		7 - 8	●											●			
		2,3		●										●			
		7		●												●	Output Hiccup
		9		●												●	Output Hiccup

5. Abnormal Test

MODEL : ZWD225PAF

(1) Test Condition and Circuit

Input Voltage : 200VAC Output Current : 100% Ta : 25°C

(2) Test Results

(Da: Damaged)

No.	Test Position		Test Mode		Test Results												
	LOCATION	TEST POINT	SHORT	OPEN	1 FIRE	2 SMOKE	3 BURST	4 SMELL	5 RED HOT	6 DAMAGE	7 FUSE BLOW	8 O.C.P.	9 O.V.P.	10 NO OUTPUT	11 NO CHANGE	12 OTHER	NOTE
19	T2	1 - 5	●													●	Output Hiccup Only for V2
		1 - 2	●							●	●			●			
		2 - 3	●											●			Only for V2
		6,7 - 8,9	●											●			Only for V2
		2		●										●			Only for V2
		3		●										●			Only for V2
		6,7		●										●			Only for V2
20	L3	4-6	●											●			
		10-12	●													●	Output Voltage Unstable
		4		●										●			
		10		●												●	Output Voltage Unstable
		12		●												●	Output Voltage Unstable
21	L4		●												●		Only for V1
				●										●			
22	L5		●													●	Output Voltage Low Only for V2
				●										●			Only for V2
23	C6		●								●			●			
				●						●	●			●			Da: D102
24	C13		●											●			
				●												●	Output Noise Increase only For V1
25	C16		●									●		●			Only For V2. V1 No Changed
				●												●	Output Noise Increase only For V2
26	R5		●												●		
				●										●			

6. VIBRATION TEST

MODEL : ZWD225PAF-0524

(1) Vibration Test Class
Frequency Variable Endurance Test

(2) Equipment Used

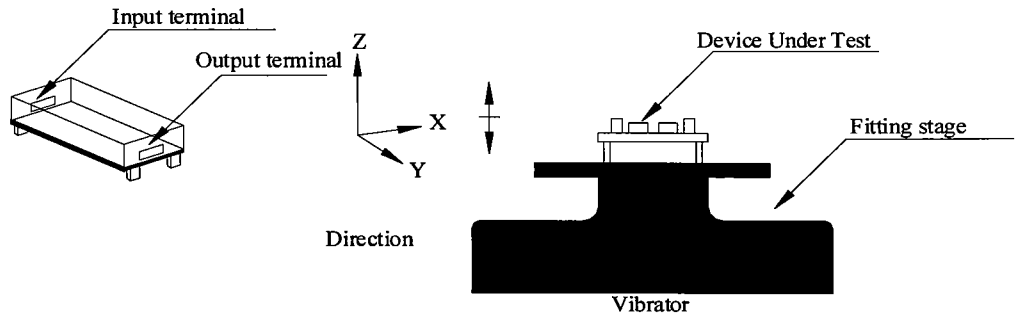
Controller	:	F-400-BM-E47 (EMIC CORP.)
Vibrator	:	905-FN (EMIC CORP.)

(3) The Number Of D.U.T. (Device Under Test)
1 Unit

(4) Test Conditions

Sweep Frequency	:	10 - 55Hz	Direction	:	X, Y, Z
Sweep Time	:	1 min.	Test Time	:	1 hour each axis
Acceleration	:	Constant 19.6m/s^2 (2G)			

(5) Test Method



(6) Test results - OK

Test Conditions :- Vin = 100 VAC I1 = 5A
Ambient Temperature = 25 °C I2 = 9A

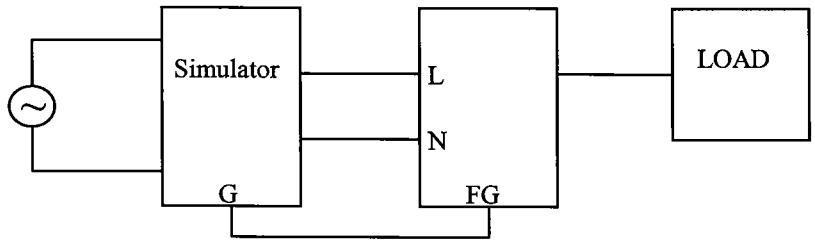
Output Voltage		V1	V2	D.U.T	V1	V2	D.U.T
Check Item		Output Voltage(V)		State	Ripple & Noise (mV)		State
Before Test		5.008	24.140	OK	43	70	OK
After Test	X	5.006	24.139	OK	45	71	OK
	Y	5.004	24.138	OK	47	72	OK
	Z	5.003	24.138	OK	49	71	OK

7. NOISE SIMULATION TEST

MODEL : ZWD225PAF-0524

(1) Test Circuit And Equipment

Noise Simulator : ENS-24X SANKI E.IND



(2) Test Conditions

Input voltage	:	100 , 230VAC	Noise level	:	0V - 2KV
Output Voltage	:	Rated	Phase shift	:	0° - 360°
Output Current	:	0%, 100%	Polarity	:	+ , -
Ambient Temperature	:	25°C	Mode	:	NORMAL, COMMON
Pulse width	:	50ns - 1000ns	Trig Select	:	LINE

(3) Acceptable Conditions

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

(5) Test results - OK

8. THERMAL SHOCK TEST

MODEL : ZWD225PAF-0524

(1) Equipment Used

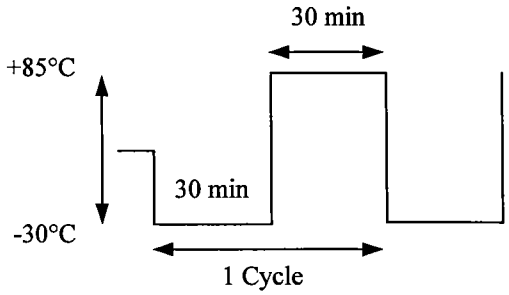
Thermal Shock Chamber TSA - 715 - A (ESPEC CORP.)

(2) The Number Of D.U.T. (Device Under Test)

1 unit

(3) Test Conditions

Ambient Temperature	:	-30°C ~ +85°C
Test Time	:	Refer to drawing
Test Cycle	:	100 Cycles
Not Operating		



(4) Test Method

Before testing, check if there is no abnormal output, then put the D.U.T. in testing chamber, and test it according to the above cycle. 100 cycles later, leave it for 1 hour at the room temperature, then check if there is no abnormal output.

(5) Test Results - OK

Vin : 100Vac
I1 : 5A
I2 : 9A

			V1				V2			
			From		To		From		To	
Ripple & Noise		mV	50		52		45		60	
Line Regulation	MIN	V	5.002	5mV	5.019	6mV	24.004	13mV	24.059	20mV
	MAX	V	5.007		5.025		24.017		24.079	
Load Regulation	0%	V	5.007	1mV	2.024	2mV	24.041	25mV	24.096	30mV
	100%	V	5.006		2.022		24.016		24.069	
Solder Condition • etc			OK							