

**ZWS300BAF**

**RELIABILITY DATA**

**信頼性データ**

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

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

## 1.MTBF計算値 Calculated values of MTBF

MODEL : ZWS300BAF-24

## (1) 算出方法 Calculating method

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

&lt;算出式&gt;

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

- $\lambda_{equip}$  : 全機器故障率 (故障数/10<sup>6</sup>時間)  
 Total equipment failure rate (failure/10<sup>6</sup>hours)
- $\lambda_G$  : i 番目の同属部品に対する故障率 (故障数/10<sup>6</sup>時間)  
 Generic failure rate for the ith generic part (failure/10<sup>6</sup>hours)
- $n_i$  : i 番目の同属部品の個数  
 Quantity of ith generic part
- $n$  : 異なった同属部品のカテゴリーの数  
 Number of different generic part categories
- $\pi_Q$  : i 番目の同属部品に対する品質ファクタ ( $\pi_Q=1$ )  
 Generic quality factor for the ith generic part ( $\pi_Q=1$ )

## (2) MTBF値 MTBF values

 $G_F$  : 地上固定 (Ground, Fixed)

RCR-9102B

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 MTBF ≒ 235,840 時間 (hours)

## 2. 部品デレーティング Components Derating

MODEL : ZWS300BAF-12  
ZWS300BAF-24

## (1) 算出方法 Calculating Method

## (a) 測定方法 Measuring method

## (a-1) ZWS300BAF-12

・取付方法 Mounting method	: 標準取付 : A Standard mounting : A	・周囲温度 Ambient temperature	: 40°C
・入力電圧 Input voltage	: 100, 200VAC	・出力電圧、電流 Output voltage & current	: 12V, 25A(100%)

## (a-2) ZWS300BAF-24

・取付方法 Mounting method	: 標準取付 : A Standard mounting : A	・周囲温度 Ambient temperature	: 45°C
・入力電圧 Input voltage	: 100, 200VAC	・出力電圧、電流 Output voltage & current	: 24V, 12.5A(100%)

## (b) 半導体 Semiconductors

ケース温度、消費電力、熱抵抗より使用状態の接合点温度を求め  
最大定格、接合点温度との比較を求めました。

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

## (c) IC、抵抗、コンデンサ等 IC, Resistors, Capacitors, etc.

周囲温度、使用状態、消費電力など、個々の値は設計基準内に入っています。

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

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

$$\theta_{j-c} = \frac{T_j(\max) - T_c}{P_{ch}(\max)}$$

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

$P_{ch}(\max)$  : 最大チャネル損失  
Maximum Channel Dissipation

$T_j(\max)$  : 最大接合点(チャネル)温度  
( $T_{ch}(\max)$ ) Maximum Junction (channel) Temperature

$\theta_{j-c}$  : 接合点(チャネル)からケースまでの熱抵抗  
( $\theta_{ch-c}$ ) Thermal Impedance between Junction (channel) and Case



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

(2-1) ZWS300BAF-12

部品番号 Location No.	Vin = 100VAC      Load = 100%      Ta = 40°C		
Q1 FMW47N60S1HF FUJI ELECTRIC	Tch (max) = 150 °C Pch = 6.1 W Tch = Tc + ((θch-c) × Pch) = 105.0 °C D.F. = 70.0 %	θch-c = 0.32 °C/W ΔTc = 63 °C	Tc = 103.0 °C
Q2 FMV20N50ES FUJI ELECTRIC	Tch (max) = 150 °C Pch = 3.2 W Tch = Tc + ((θch-c) × Pch) = 106.2 °C D.F. = 70.8 %	θch-c = 1.32 °C/W ΔTc = 62 °C	Tc = 102.0 °C
Q3 FMV20N50ES FUJI ELECTRIC	Tch (max) = 150 °C Pch = 3.3 W Tch = Tc + ((θch-c) × Pch) = 106.4 °C D.F. = 70.9 %	θch-c = 1.32 °C/W ΔTc = 62 °C	Tc = 102.0 °C
Q51 IPA057N08N3G INFINEON	Tch (max) = 175 °C Pch = 7.6 W Tch = Tc + ((θch-c) × Pch) = 150.7 °C D.F. = 86.1 %	θch-c = 3.80 °C/W ΔTc = 82 °C	Tc = 122.0 °C
D52 YG869C08R FUJI ELECTRIC	Tj (max) = 150 °C Pd = 4.5 W Tj = Tc + ((θj-c) × Pd) = 138.4 °C D.F. = 92.3 %	θj-c = 1.2 °C/W ΔTc = 93 °C	Tc = 133.0 °C
D53 YG869C08R FUJI ELECTRIC	Tj (max) = 150 °C Pd = 4.5 W Tj = Tc + ((θj-c) × Pd) = 133.4 °C D.F. = 89.0 %	θj-c = 1.2 °C/W ΔTc = 88 °C	Tc = 128.0 °C
D1 GBJ1506 LITE ON	Tj (max) = 150 °C Pd = 7.5 W Tj = Tc + ((θj-c) × Pd) = 116.0 °C D.F. = 77.4 %	θj-c = 0.8 °C/W ΔTc = 70 °C	Tc = 110.0 °C
D2 RFUS20TF6S ROHM	Tj (max) = 150 °C Pd = 1.4 W Tj = Tc + ((θj-c) × Pd) = 109.8 °C D.F. = 73.2 %	θj-c = 2.0 °C/W ΔTc = 67 °C	Tc = 107.0 °C
PC102 PS2861B-1 (LED) NEC	Tj (max) = 125 °C Pd = 0.9 mW Tj = Tc + ((θj-c) × Pd) = 77.3 °C D.F. = 61.8 %	θj-c = 330 °C/W ΔTc = 37 °C	Tc = 77.0 °C

## (2-1) ZWS300BAF-12

部品番号 Location No.	$V_{in} = 200VAC$	Load = 100%	$T_a = 40^{\circ}C$
Q1 FMW47N60S1HF FUJI ELECTRIC	$T_{ch} (max) = 150^{\circ}C$ Pch = 3.1 W $T_{ch} = T_c + ((\theta_{ch-c}) \times Pch) = 104.0^{\circ}C$ D.F. = 69.3 %	$\theta_{ch-c} = 0.32^{\circ}C/W$ $\Delta T_c = 63^{\circ}C$	$T_c = 103.0^{\circ}C$
Q2 FMV20N50ES FUJI ELECTRIC	$T_{ch} (max) = 150^{\circ}C$ Pch = 3.2 W $T_{ch} = T_c + ((\theta_{ch-c}) \times Pch) = 107.2^{\circ}C$ D.F. = 71.5 %	$\theta_{ch-c} = 1.32^{\circ}C/W$ $\Delta T_c = 63^{\circ}C$	$T_c = 103.0^{\circ}C$
Q3 FMV20N50ES FUJI ELECTRIC	$T_{ch} (max) = 150^{\circ}C$ Pch = 3.3 W $T_{ch} = T_c + ((\theta_{ch-c}) \times Pch) = 107.4^{\circ}C$ D.F. = 71.6 %	$\theta_{ch-c} = 1.32^{\circ}C/W$ $\Delta T_c = 63^{\circ}C$	$T_c = 103.0^{\circ}C$
Q51 IPA057N08N3G INFINEON	$T_{ch} (max) = 175^{\circ}C$ Pch = 7.6 W $T_{ch} = T_c + ((\theta_{ch-c}) \times Pch) = 143.7^{\circ}C$ D.F. = 82.1 %	$\theta_{ch-c} = 3.80^{\circ}C/W$ $\Delta T_c = 75^{\circ}C$	$T_c = 115.0^{\circ}C$
D52 YG869C08R FUJI ELECTRIC	$T_j (max) = 150^{\circ}C$ Pd = 4.5 W $T_j = T_c + ((\theta_{j-c}) \times Pd) = 132.4^{\circ}C$ D.F. = 88.3 %	$\theta_{j-c} = 1.2^{\circ}C/W$ $\Delta T_c = 87^{\circ}C$	$T_c = 127.0^{\circ}C$
D53 YG869C08R FUJI ELECTRIC	$T_j (max) = 150^{\circ}C$ Pd = 4.5 W $T_j = T_c + ((\theta_{j-c}) \times Pd) = 127.4^{\circ}C$ D.F. = 85.0 %	$\theta_{j-c} = 1.2^{\circ}C/W$ $\Delta T_c = 82^{\circ}C$	$T_c = 122.0^{\circ}C$
D1 GBJ1506 LITE ON	$T_j (max) = 150^{\circ}C$ Pd = 3.9 W $T_j = T_c + ((\theta_{j-c}) \times Pd) = 91.1^{\circ}C$ D.F. = 60.7 %	$\theta_{j-c} = 0.8^{\circ}C/W$ $\Delta T_c = 48^{\circ}C$	$T_c = 88.0^{\circ}C$
D2 RFUS20TF6S ROHM	$T_j (max) = 150^{\circ}C$ Pd = 1.4 W $T_j = T_c + ((\theta_{j-c}) \times Pd) = 83.8^{\circ}C$ D.F. = 55.9 %	$\theta_{j-c} = 2.0^{\circ}C/W$ $\Delta T_c = 41^{\circ}C$	$T_c = 81.0^{\circ}C$
PC102 PS2861B-1 (LED) NEC	$T_j (max) = 125^{\circ}C$ Pd = 0.9 mW $T_j = T_c + ((\theta_{j-c}) \times Pd) = 83.3^{\circ}C$ D.F. = 66.6 %	$\theta_{j-c} = 330^{\circ}C/W$ $\Delta T_c = 43^{\circ}C$	$T_c = 83.0^{\circ}C$

## (2-2) ZWS300BAF-24

部品番号 Location No.	$V_{in} = 100VAC$	Load = 100%	$T_a = 45^{\circ}C$
Q1 FMW47N60S1HF FUJI ELECTRIC	$T_{ch} (max) = 150^{\circ}C$ Pch = 6.2 W $T_{ch} = T_c + ((\theta_{ch-c}) \times Pch) = 110.0^{\circ}C$ D.F. = 73.3 %	$\theta_{ch-c} = 0.32^{\circ}C/W$ $\Delta T_c = 63^{\circ}C$	$T_c = 108.0^{\circ}C$
Q2 FMV20N50ES FUJI ELECTRIC	$T_{ch} (max) = 150^{\circ}C$ Pch = 3.3 W $T_{ch} = T_c + ((\theta_{ch-c}) \times Pch) = 113.4^{\circ}C$ D.F. = 75.6 %	$\theta_{ch-c} = 1.32^{\circ}C/W$ $\Delta T_c = 64^{\circ}C$	$T_c = 109.0^{\circ}C$
Q3 FMV20N50ES FUJI ELECTRIC	$T_{ch} (max) = 150^{\circ}C$ Pch = 3.7 W $T_{ch} = T_c + ((\theta_{ch-c}) \times Pch) = 109.9^{\circ}C$ D.F. = 73.3 %	$\theta_{ch-c} = 1.32^{\circ}C/W$ $\Delta T_c = 60^{\circ}C$	$T_c = 105.0^{\circ}C$
D51 YG868C15R FUJI ELECTRIC	$T_j (max) = 150^{\circ}C$ Pd = 3.6 W $T_j = T_c + ((\theta_{j-c}) \times Pd) = 128.4^{\circ}C$ D.F. = 85.6 %	$\theta_{j-c} = 1.2^{\circ}C/W$ $\Delta T_c = 79^{\circ}C$	$T_c = 124.0^{\circ}C$
D52 YG868C15R FUJI ELECTRIC	$T_j (max) = 150^{\circ}C$ Pd = 3.8 W $T_j = T_c + ((\theta_{j-c}) \times Pd) = 126.6^{\circ}C$ D.F. = 84.4 %	$\theta_{j-c} = 1.2^{\circ}C/W$ $\Delta T_c = 77^{\circ}C$	$T_c = 122.0^{\circ}C$
D53 YG868C15R FUJI ELECTRIC	$T_j (max) = 150^{\circ}C$ Pd = 3.8 W $T_j = T_c + ((\theta_{j-c}) \times Pd) = 122.6^{\circ}C$ D.F. = 81.7 %	$\theta_{j-c} = 1.2^{\circ}C/W$ $\Delta T_c = 73^{\circ}C$	$T_c = 118.0^{\circ}C$
D1 GBJ1506 LITE ON	$T_j (max) = 150^{\circ}C$ Pd = 7.3 W $T_j = T_c + ((\theta_{j-c}) \times Pd) = 126.8^{\circ}C$ D.F. = 84.6 %	$\theta_{j-c} = 0.8^{\circ}C/W$ $\Delta T_c = 76^{\circ}C$	$T_c = 121.0^{\circ}C$
D2 RFUS20TF6S ROHM	$T_j (max) = 150^{\circ}C$ Pd = 1.6 W $T_j = T_c + ((\theta_{j-c}) \times Pd) = 109.1^{\circ}C$ D.F. = 72.7 %	$\theta_{j-c} = 2.0^{\circ}C/W$ $\Delta T_c = 61^{\circ}C$	$T_c = 106.0^{\circ}C$
PC102 PS2861B-1 (LED) NEC	$T_j (max) = 125^{\circ}C$ Pd = 0.9 mW $T_j = T_c + ((\theta_{j-c}) \times Pd) = 74.3^{\circ}C$ D.F. = 59.4 %	$\theta_{j-c} = 330^{\circ}C/W$ $\Delta T_c = 29^{\circ}C$	$T_c = 74.0^{\circ}C$

## (2-2) ZWS300BAF-24

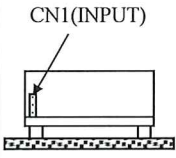
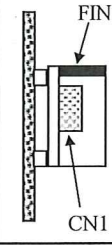
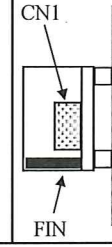
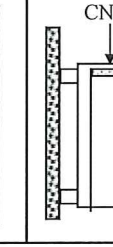
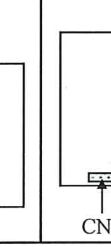
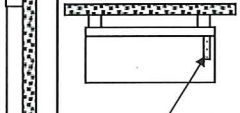
部品番号 Location No.	$V_{in} = 200VAC$	Load = 100%	$T_a = 45^{\circ}C$
Q1 FMW47N60S1HF FUJI ELECTRIC	Tch (max) = 150 °C Pch = 2.9 W Tch = Tc + (( $\theta_{ch-c}$ ) × Pch) = 108.9 °C D.F. = 72.6 %	$\theta_{ch-c} = 0.32^{\circ}C/W$ $\Delta Tc = 63^{\circ}C$	Tc = 108.0 °C
Q2 FMV20N50ES FUJI ELECTRIC	Tch (max) = 150 °C Pch = 3.3 W Tch = Tc + (( $\theta_{ch-c}$ ) × Pch) = 110.4 °C D.F. = 73.6 %	$\theta_{ch-c} = 1.32^{\circ}C/W$ $\Delta Tc = 61^{\circ}C$	Tc = 106.0 °C
Q3 FMV20N50ES FUJI ELECTRIC	Tch (max) = 150 °C Pch = 3.7 W Tch = Tc + (( $\theta_{ch-c}$ ) × Pch) = 106.9 °C D.F. = 71.3 %	$\theta_{ch-c} = 1.32^{\circ}C/W$ $\Delta Tc = 57^{\circ}C$	Tc = 102.0 °C
D51 YG868C15R FUJI ELECTRIC	Tj (max) = 150 °C Pd = 3.6 W Tj = Tc + (( $\theta_{j-c}$ ) × Pd) = 122.4 °C D.F. = 81.6 %	$\theta_{j-c} = 1.2^{\circ}C/W$ $\Delta Tc = 73^{\circ}C$	Tc = 118.0 °C
D52 YG868C15R FUJI ELECTRIC	Tj (max) = 150 °C Pd = 3.8 W Tj = Tc + (( $\theta_{j-c}$ ) × Pd) = 120.6 °C D.F. = 80.4 %	$\theta_{j-c} = 1.2^{\circ}C/W$ $\Delta Tc = 71^{\circ}C$	Tc = 116.0 °C
D53 YG868C15R FUJI ELECTRIC	Tj (max) = 150 °C Pd = 3.8 W Tj = Tc + (( $\theta_{j-c}$ ) × Pd) = 118.6 °C D.F. = 79.0 %	$\theta_{j-c} = 1.2^{\circ}C/W$ $\Delta Tc = 69^{\circ}C$	Tc = 114.0 °C
D1 GBJ1506 LITE ON	Tj (max) = 150 °C Pd = 3.8 W Tj = Tc + (( $\theta_{j-c}$ ) × Pd) = 99.0 °C D.F. = 66.0 %	$\theta_{j-c} = 0.8^{\circ}C/W$ $\Delta Tc = 51^{\circ}C$	Tc = 96.0 °C
D2 RFUS20TF6S ROHM	Tj (max) = 150 °C Pd = 1.6 W Tj = Tc + (( $\theta_{j-c}$ ) × Pd) = 83.1 °C D.F. = 55.4 %	$\theta_{j-c} = 2.0^{\circ}C/W$ $\Delta Tc = 35^{\circ}C$	Tc = 80.0 °C
PC102 PS2861B-1 (LED) NEC	Tj (max) = 125 °C Pd = 0.9 mW Tj = Tc + (( $\theta_{j-c}$ ) × Pd) = 74.3 °C D.F. = 59.4 %	$\theta_{j-c} = 330^{\circ}C/W$ $\Delta Tc = 29^{\circ}C$	Tc = 74.0 °C



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

MODEL : ZWS300BAF-12

(1) 測定条件 Measuring Conditions

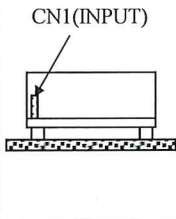
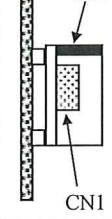
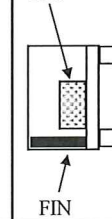
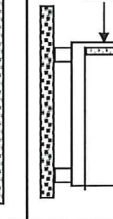
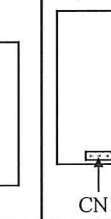
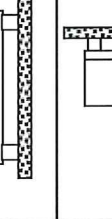
取付方法 Mounting Method  (標準取付 : A) (Standard Mounting : A)	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E	Mounting F
						
入力電圧 $V_{in}$ Input Voltage	100VAC					
出力電圧 $V_o$ Output Voltage	12VDC					
出力電流 $I_o$ Output Current	25A(100%)					

(2) 測定結果 Measuring Results

出力デレーティング Output Derating		$\Delta T$ Temperature Rise ( $^{\circ}C$ )					
		$I_o=100\%$					
		$T_a=40^{\circ}C$	$T_a=30^{\circ}C$	$T_a=30^{\circ}C$	$T_a=20^{\circ}C$	$T_a=20^{\circ}C$	$T_a=20^{\circ}C$
部品番号 Location No.	部品名 Part name	取付方向 Mounting A	取付方向 Mounting B	取付方向 Mounting C	取付方向 Mounting D	取付方向 Mounting E	取付方向 Mounting F
Q1	MOS FET	63	77	74	85	75	87
Q2	MOS FET	62	71	70	77	85	86
Q3	MOS FET	62	70	69	76	85	86
Q51	MOS FET	82	91	83	84	90	88
D52	DIODE	93	98	92	95	102	91
D53	DIODE	88	91	85	90	101	94
D1	BRIDGE DIODE	70	78	72	82	73	73
D2	DIODE	67	77	76	90	75	81
A101	CHIP IC	54	56	41	63	55	70
A102	CHIP IC	52	55	54	57	61	70
A201	CHIP IC	16	16	37	22	36	40
T1	DRIVE TRANS	47	57	43	65	65	75
T2	TRANS	83	79	82	84	96	88
L1	BALUN	45	49	51	76	45	61
L2	BALUN	52	53	50	75	48	60
L3	PFC CHOKE COIL	59	69	54	71	65	67
L51	CHOKE COIL	66	65	70	64	87	82
C6	E.CAP.	25	25	43	27	33	30
C7	E.CAP.	21	20	42	20	27	25
C51	E.CAP.	22	24	40	23	39	28
C52	E.CAP.	31	30	42	30	42	36
PC102	PHOTO COUPLER	37	32	51	42	57	55

MODEL : ZWS300BAF-12

## (1) 測定条件 Measuring Conditions

取付方法 Mounting Method  (標準取付 : A) (Standard Mounting : A)	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E	Mounting F
						
入力電圧 $V_{in}$ Input Voltage	200VAC					
出力電圧 $V_o$ Output Voltage	12VDC					
出力電流 $I_o$ Output Current	25A(100%)					

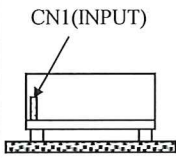
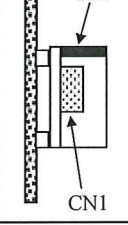
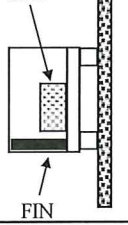
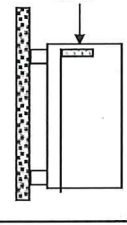
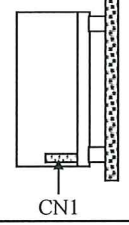
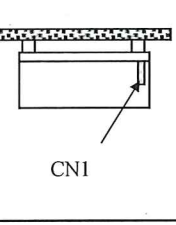
## (2) 測定結果 Measuring Results

出力デレーティング Output Derating		$\Delta T$ Temperature Rise ( $^{\circ}C$ )					
		$I_o=100\%$					
		$T_a=40^{\circ}C$	$T_a=30^{\circ}C$	$T_a=30^{\circ}C$	$T_a=20^{\circ}C$	$T_a=20^{\circ}C$	$T_a=20^{\circ}C$
部品番号 Location No.	部品名 Part name	取付方向 Mounting A	取付方向 Mounting B	取付方向 Mounting C	取付方向 Mounting D	取付方向 Mounting E	取付方向 Mounting F
Q1	MOS FET	38	41	38	54	39	43
Q2	MOS FET	63	66	65	72	72	74
Q3	MOS FET	63	65	65	72	73	74
Q51	MOS FET	75	85	78	77	81	78
D52	DIODE	87	93	88	88	95	81
D53	DIODE	82	87	83	84	93	85
D1	BRIDGE DIODE	48	54	49	60	51	47
D2	DIODE	41	43	41	57	41	43
A101	CHIP IC	43	44	32	55	40	51
A102	CHIP IC	53	51	49	54	50	60
A201	CHIP IC	22	16	38	22	32	37
T1	DRIVE TRANS	42	45	32	58	44	54
T2	TRANS	82	78	78	82	87	80
L1	BALUN	22	25	27	43	19	26
L2	BALUN	30	33	32	50	26	30
L3	PFC CHOKE COIL	44	49	38	56	44	44
L51	CHOKE COIL	67	64	70	62	82	76
C6	E.CAP.	22	22	40	26	27	29
C7	E.CAP.	18	19	41	19	24	25
C51	E.CAP.	20	22	39	24	35	30
C52	E.CAP.	30	28	40	31	37	35
PC102	PHOTO COUPLER	43	32	50	40	49	49



MODEL : ZWS300BAF-24

## (1) 測定条件 Measuring Conditions

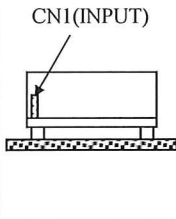
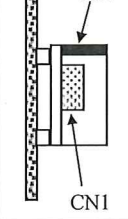
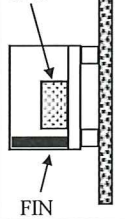
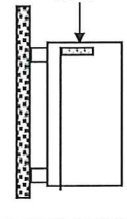
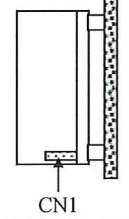
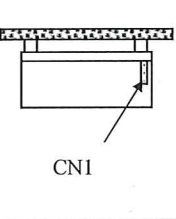
取付方法 Mounting Method  (標準取付 : A) (Standard Mounting : A)	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E	Mounting F
						
入力電圧 $V_{in}$ Input Voltage	100VAC					
出力電圧 $V_o$ Output Voltage	24VDC					
出力電流 $I_o$ Output Current	12.5A(100%)					

## (2) 測定結果 Measuring Results

出力デレーティング Output Derating		$\Delta T$ Temperature Rise ( $^{\circ}C$ )					
		$I_o=100\%$					
		$T_a=45^{\circ}C$	$T_a=45^{\circ}C$	$T_a=40^{\circ}C$	$T_a=20^{\circ}C$	$T_a=20^{\circ}C$	$T_a=20^{\circ}C$
部品番号 Location No.	部品名 Part name	取付方向 Mounting A	取付方向 Mounting B	取付方向 Mounting C	取付方向 Mounting D	取付方向 Mounting E	取付方向 Mounting F
Q1	MOS FET	67	64	74	91	78	77
Q2	MOS FET	64	59	77	87	100	80
Q3	MOS FET	60	60	79	84	98	82
D51	DIODE	79	80	69	78	83	82
D52	DIODE	77	77	67	76	83	80
D53	DIODE	73	74	66	72	82	78
D1	BRIDGE DIODE	76	76	66	83	76	76
D2	DIODE	61	62	72	89	73	78
A101	CHIP IC	51	47	30	57	48	67
A102	CHIP IC	46	40	48	54	69	73
A201	CHIP IC	11	10	33	18	34	34
T1	DRIVE TRANS	51	47	55	66	70	76
T2	TRANS	77	82	85	82	97	89
L1	BALUN	43	42	46	66	42	48
L2	BALUN	48	42	41	72	42	44
L3	PFC CHOKE COIL	54	58	52	65	68	60
L51	CHOKE COIL	56	52	59	53	77	67
C6	E.CAP.	17	16	39	24	33	33
C7	E.CAP.	15	15	35	20	33	30
C51	E.CAP.	11	9	24	13	40	21
C52	E.CAP.	18	16	28	19	44	25
PC102	PHOTO COUPLER	29	28	48	36	59	60

MODEL : ZWS300BAF-24

## (1) 測定条件 Measuring Conditions

取付方法 Mounting Method  (標準取付 : A) (Standard Mounting : A)	Mounting A	Mounting B	Mounting C	Mounting D	Mounting E	Mounting F
						
入力電圧 $V_{in}$ Input Voltage	200VAC					
出力電圧 $V_o$ Output Voltage	24VDC					
出力電流 $I_o$ Output Current	12.5A(100%)					

## (2) 測定結果 Measuring Results

出力デレーティング Output Derating		$\Delta T$ Temperature Rise ( $^{\circ}C$ )					
		$I_o=100\%$					
		$T_a=45^{\circ}C$	$T_a=45^{\circ}C$	$T_a=40^{\circ}C$	$T_a=20^{\circ}C$	$T_a=20^{\circ}C$	$T_a=20^{\circ}C$
部品番号 Location No.	部品名 Part name	取付方向 Mounting A	取付方向 Mounting B	取付方向 Mounting C	取付方向 Mounting D	取付方向 Mounting E	取付方向 Mounting F
Q1	MOS FET	36	36	38	56	40	44
Q2	MOS FET	61	57	72	81	84	74
Q3	MOS FET	57	58	72	78	82	76
D51	DIODE	73	74	64	72	73	74
D52	DIODE	71	72	63	70	74	72
D53	DIODE	69	69	61	67	72	71
D1	BRIDGE DIODE	51	51	43	58	50	50
D2	DIODE	35	35	40	56	39	45
A101	CHIP IC	40	39	23	49	33	51
A102	CHIP IC	43	38	43	51	54	65
A201	CHIP IC	12	11	32	17	29	32
T1	DRIVE TRANS	41	40	42	57	48	59
T2	TRANS	75	80	81	79	86	86
L1	BALUN	20	19	22	39	19	24
L2	BALUN	28	23	23	47	23	26
L3	PFC CHOKE COIL	41	43	36	50	45	42
L51	CHOKE COIL	55	52	58	52	70	64
C6	E.CAP.	16	15	37	22	27	31
C7	E.CAP.	15	14	33	18	28	28
C51	E.CAP.	11	9	23	12	33	20
C52	E.CAP.	18	16	27	18	36	25
PC102	PHOTO COUPLER	29	28	46	34	50	56

MODEL : ZWS300BAF

空冷条件 : 自然空冷

Cooling condition : Convection cooling

取付方向 A

Mounting A

12V

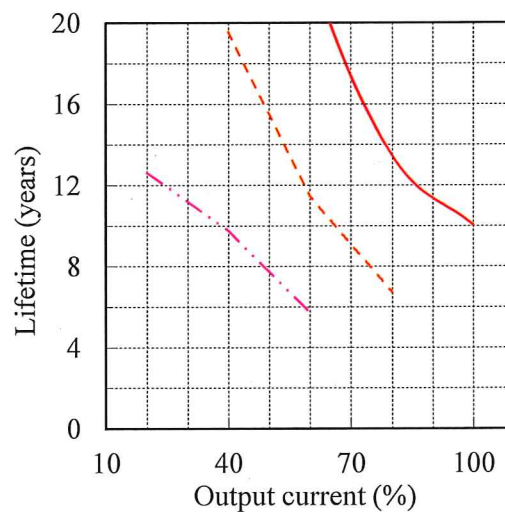
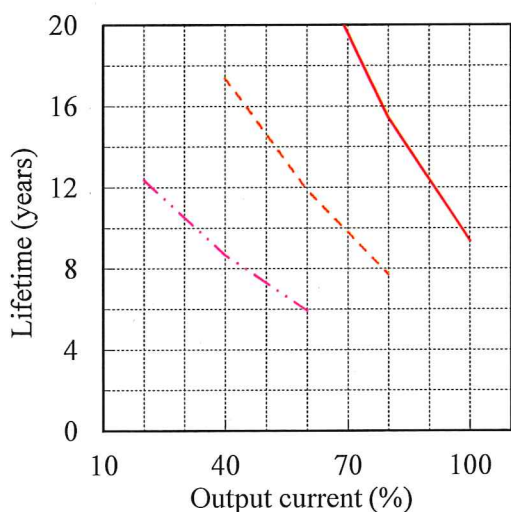
Conditions Ta 40°C : —  
50°C : - - -  
60°C : ····

Vin = 100VAC

Load	Ta	Lifetime (years)		
		40°C	50°C	60°C
40%		20.0	17.4	8.7
60%		20.0	11.9	5.9
80%		15.4	7.7	-
100%		9.4	-	-

Vin = 200VAC

Load	Ta	Lifetime (years)		
		40°C	50°C	60°C
40%		20.0	19.5	9.8
60%		20.0	11.5	5.7
80%		13.4	6.7	-
100%		10.0	-	-



24V

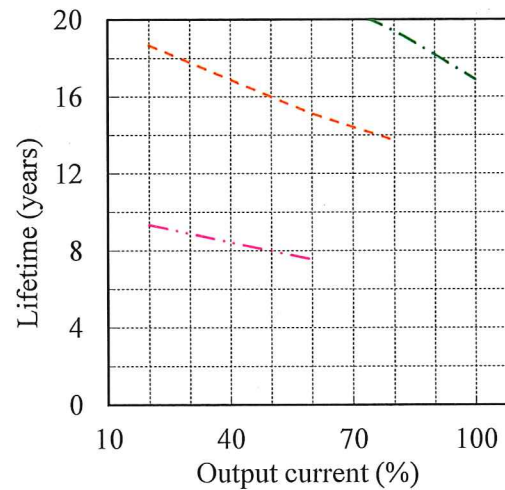
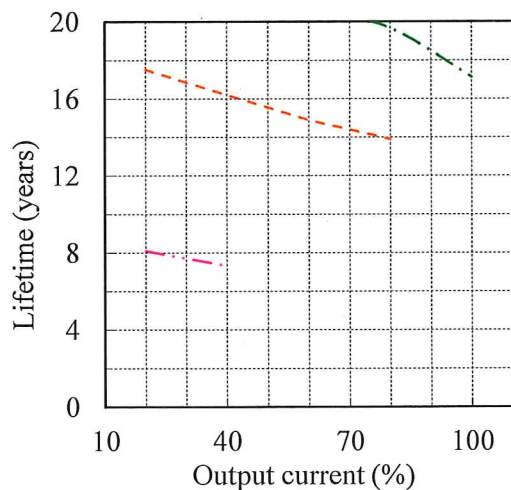
Conditions Ta 45°C : - · - ·  
50°C : - - -  
60°C : ····

Vin = 100VAC

Load	Ta	Lifetime (years)		
		45°C	50°C	60°C
40%		20.0	16.2	8.1
60%		20.0	14.9	7.4
80%		19.7	13.9	-
100%		17.1	-	-

Vin = 200VAC

Load	Ta	Lifetime (years)		
		45°C	50°C	60°C
40%		20.0	16.9	8.5
60%		20.0	15.1	7.6
80%		19.4	13.7	-
100%		16.9	-	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ゴムの劣化等の影響を含めておりません。  
The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.



取付方向 B

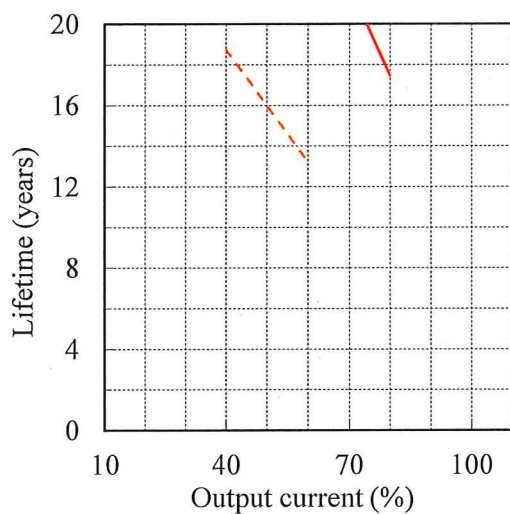
Mounting B

12V

Conditions Ta 30°C : .....  
40°C : .....  
50°C : - - - -

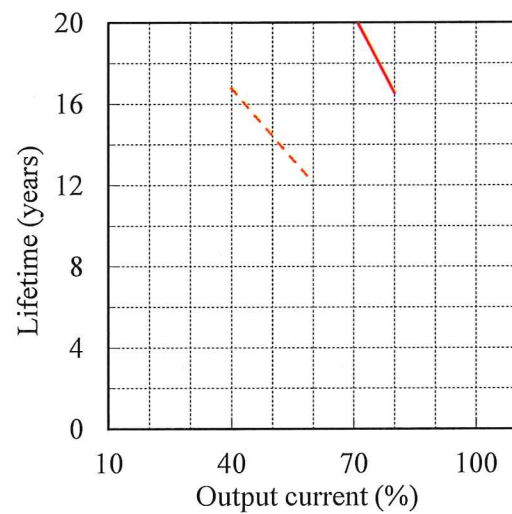
V<sub>in</sub> = 100VAC

Load	Ta	Lifetime (years)		
		30°C	40°C	50°C
40%		20.0	20.0	18.8
60%		20.0	20.0	13.3
80%		20.0	17.5	-
100%		20.0	-	-



V<sub>in</sub> = 200VAC

Load	Ta	Lifetime (years)		
		30°C	40°C	50°C
40%		20.0	20.0	16.8
60%		20.0	20.0	12.1
80%		20.0	16.6	-
100%		20.0	-	-

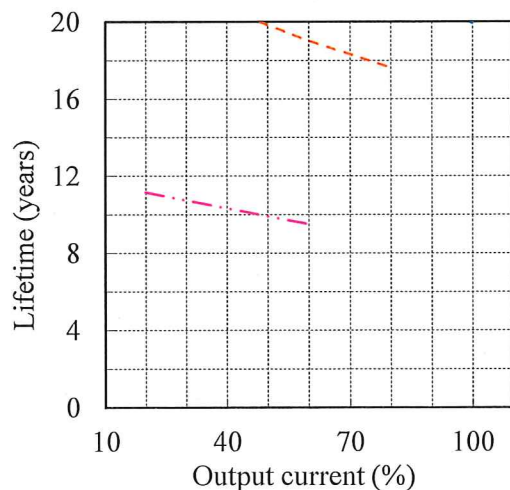


24V

Conditions Ta 45°C : - - - -  
50°C : - - - -  
60°C : - · - ·

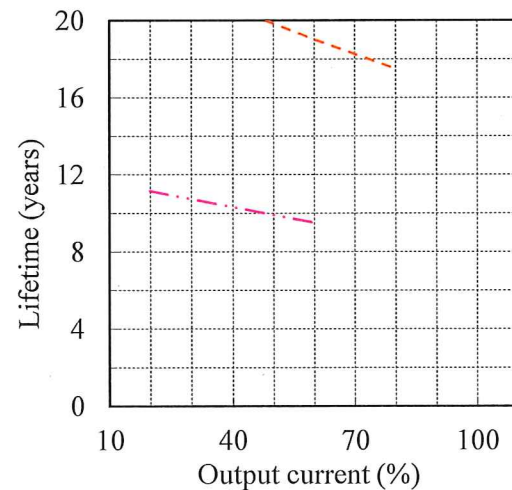
V<sub>in</sub> = 100VAC

Load	Ta	Lifetime (years)		
		45°C	50°C	60°C
40%		20.0	20.0	10.3
60%		20.0	19.0	9.5
80%		20.0	17.6	-
100%		20.0	-	-



V<sub>in</sub> = 200VAC

Load	Ta	Lifetime (years)		
		45°C	50°C	60°C
40%		20.0	20.0	10.3
60%		20.0	19.0	9.5
80%		20.0	17.5	-
100%		20.0	-	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ゴムの劣化等の影響を含めておりません。  
The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

取付方向 C

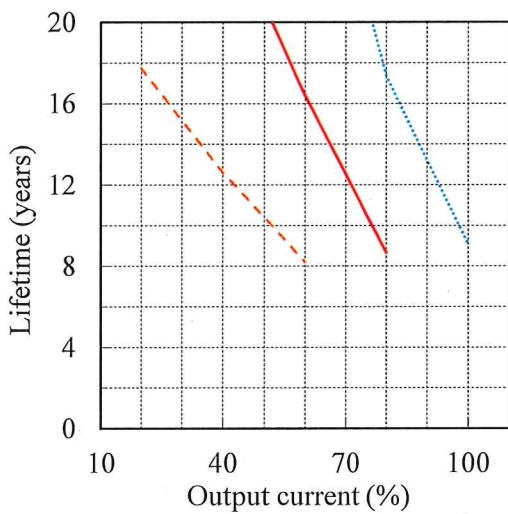
Mounting C

12V

Conditions Ta 30°C : .....  
40°C : .....  
50°C : - - - -

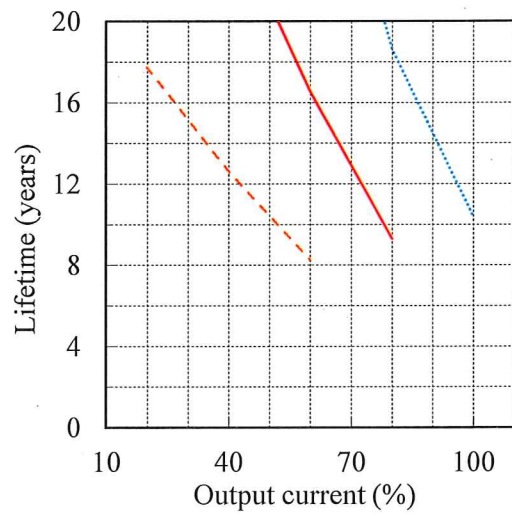
V<sub>in</sub> = 100VAC

Load	Ta	Lifetime (years)		
		30°C	40°C	50°C
40%		20.0	20.0	12.6
60%		20.0	16.4	8.2
80%		17.4	8.7	-
100%		9.1	-	-



V<sub>in</sub> = 200VAC

Load	Ta	Lifetime (years)		
		30°C	40°C	50°C
40%		20.0	20.0	12.6
60%		20.0	16.6	8.3
80%		18.6	9.3	-
100%		10.4	-	-

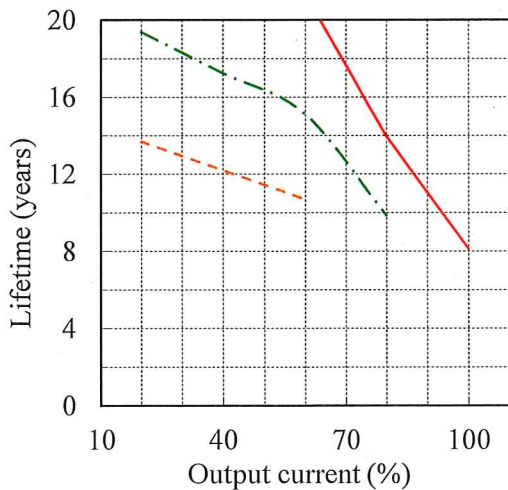


24V

Conditions Ta 40°C : .....  
45°C : - - - -  
50°C : - - - -

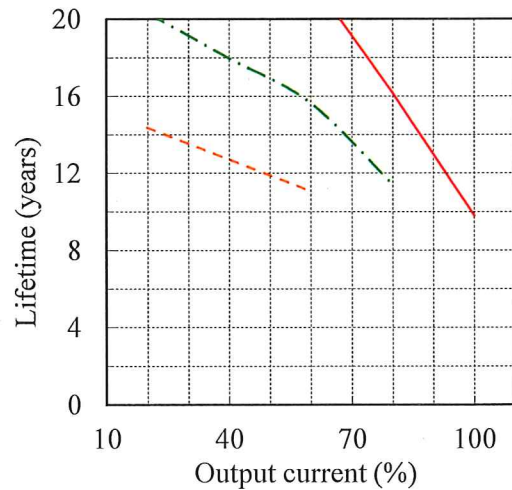
V<sub>in</sub> = 100VAC

Load	Ta	Lifetime (years)		
		40°C	45°C	50°C
40%		20.0	17.3	12.2
60%		20.0	15.1	10.7
80%		14.0	9.9	-
100%		8.1	-	-



V<sub>in</sub> = 200VAC

Load	Ta	Lifetime (years)		
		40°C	45°C	50°C
40%		20.0	18.0	12.7
60%		20.0	15.7	11.1
80%		16.2	11.4	-
100%		9.8	-	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ゴムの劣化等の影響を含めておりません。  
The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

取付方向 D

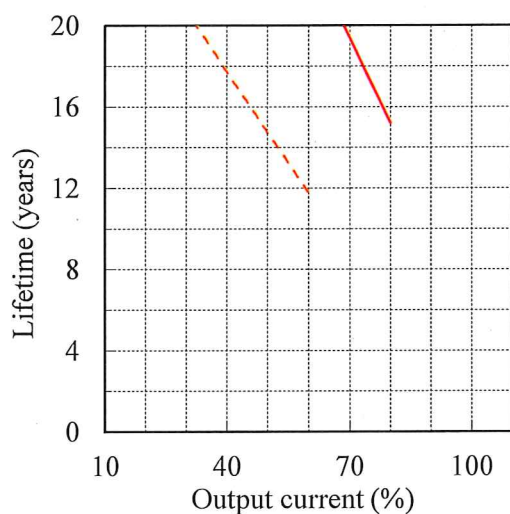
Mounting D

12V

Conditions Ta 20°C : - - - -  
40°C : ————  
50°C : - · - ·

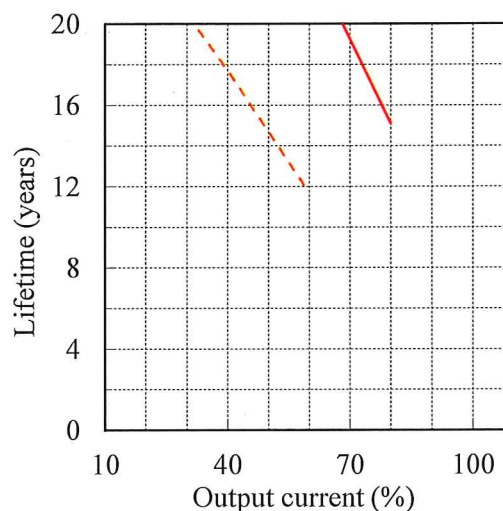
V<sub>in</sub> = 100VAC

Load	Ta	Lifetime (years)		
		20°C	40°C	50°C
40%		20.0	20.0	17.7
60%		20.0	20.0	11.8
80%		20.0	15.2	-
100%		20.0	-	-



V<sub>in</sub> = 200VAC

Load	Ta	Lifetime (years)		
		20°C	40°C	50°C
40%		20.0	20.0	17.7
60%		20.0	20.0	11.7
80%		20.0	15.1	-
100%		20.0	-	-

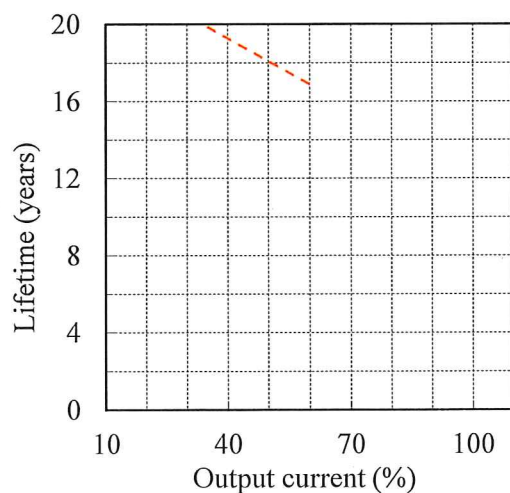


24V

Conditions Ta 20°C : - - - -  
45°C : - · - ·  
50°C : - · - ·

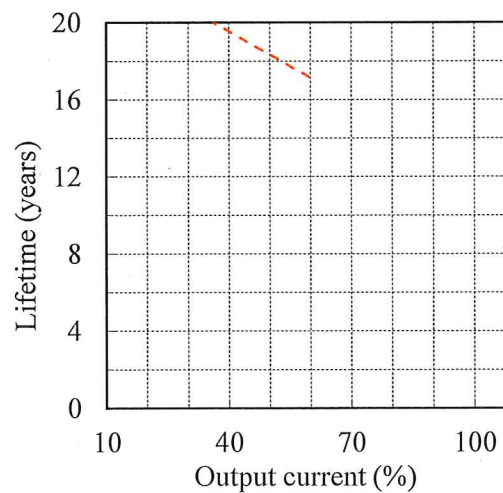
V<sub>in</sub> = 100VAC

Load	Ta	Lifetime (years)		
		20°C	45°C	50°C
40%		20.0	20.0	19.3
60%		20.0	20.0	16.9
80%		20.0	20.0	-
100%		20.0	-	-



V<sub>in</sub> = 200VAC

Load	Ta	Lifetime (years)		
		20°C	45°C	50°C
40%		20.0	20.0	19.5
60%		20.0	20.0	17.1
80%		20.0	20.0	-
100%		20.0	-	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ゴムの劣化等の影響を含めておりません。  
The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.



取付方向 E

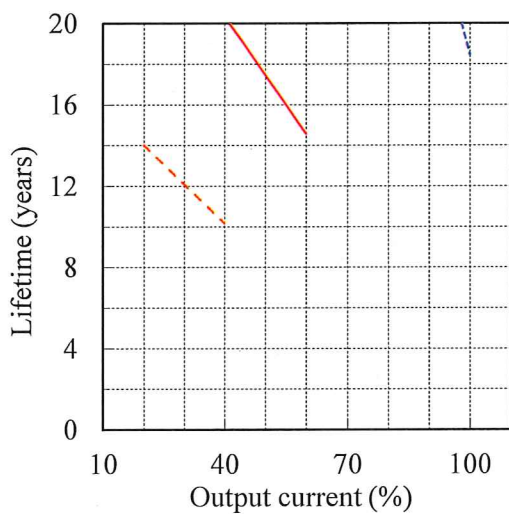
Mounting E

12V

Conditions Ta 20°C : - - - -  
40°C : ————  
50°C : - - - -

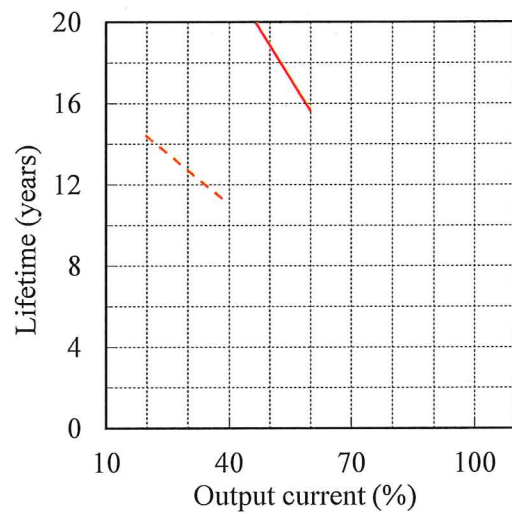
V<sub>in</sub> = 100VAC

Load	Ta	Lifetime (years)		
		20°C	40°C	50°C
40%		20.0	20.0	10.2
60%		20.0	14.6	-
80%		20.0	-	-
100%		18.5	-	-



V<sub>in</sub> = 200VAC

Load	Ta	Lifetime (years)		
		20°C	40°C	50°C
40%		20.0	20.0	11.1
60%		20.0	15.7	-
80%		20.0	-	-
100%		20.0	-	-

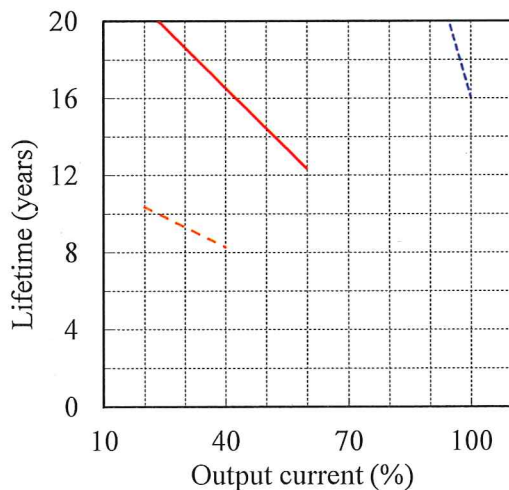


24V

Conditions Ta 20°C : - - - -  
40°C : ————  
50°C : - - - -

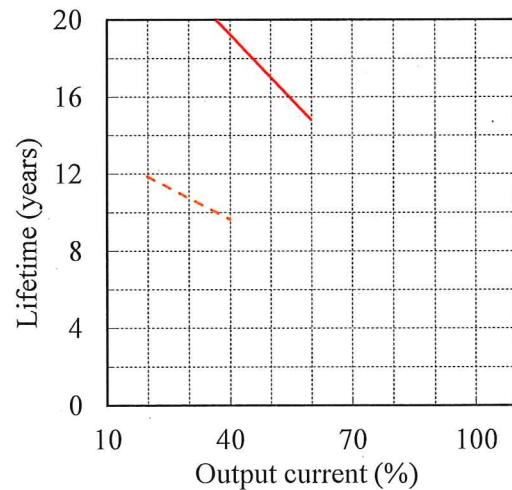
V<sub>in</sub> = 100VAC

Load	Ta	Lifetime (years)		
		20°C	40°C	50°C
40%		20.0	16.6	8.3
60%		20.0	12.4	-
80%		20.0	-	-
100%		16.1	-	-



V<sub>in</sub> = 200VAC

Load	Ta	Lifetime (years)		
		20°C	40°C	50°C
40%		20.0	19.3	9.6
60%		20.0	14.8	-
80%		20.0	-	-
100%		20.0	-	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ゴムの劣化等の影響を含めておりません。  
The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

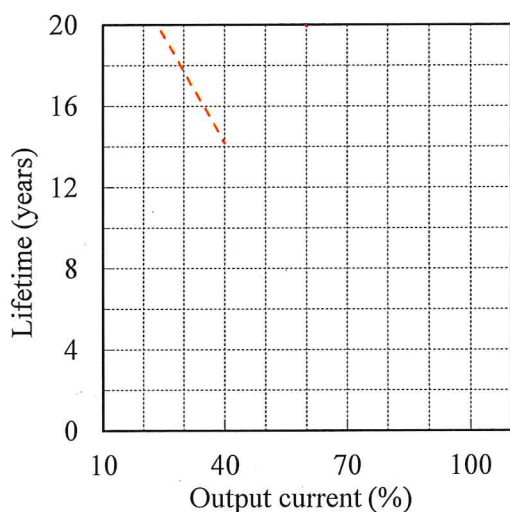
取付方向 F  
Mounting F

12V

Conditions Ta 20°C : - - - -  
40°C : ————  
50°C : - · - · -

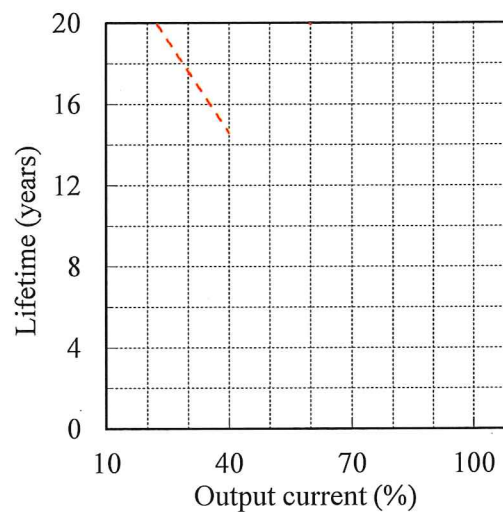
V<sub>in</sub> = 100VAC

Load	Ta	Lifetime (years)		
		20°C	40°C	50°C
40%		20.0	20.0	14.2
60%		20.0	20.0	-
80%		20.0	-	-
100%		20.0	-	-



V<sub>in</sub> = 200VAC

Load	Ta	Lifetime (years)		
		20°C	40°C	50°C
40%		20.0	20.0	14.6
60%		20.0	20.0	-
80%		20.0	-	-
100%		20.0	-	-

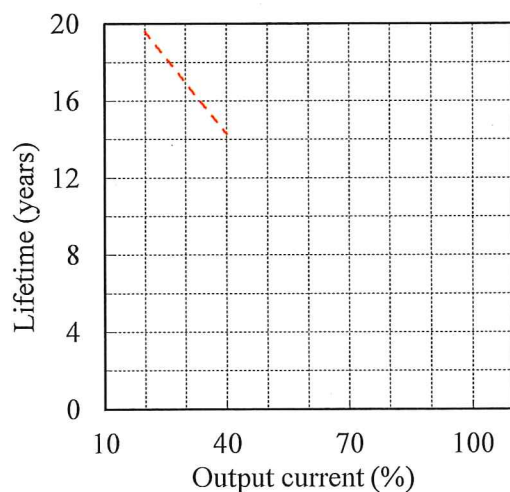


24V

Conditions Ta 20°C : - - - -  
40°C : ————  
50°C : - · - · -

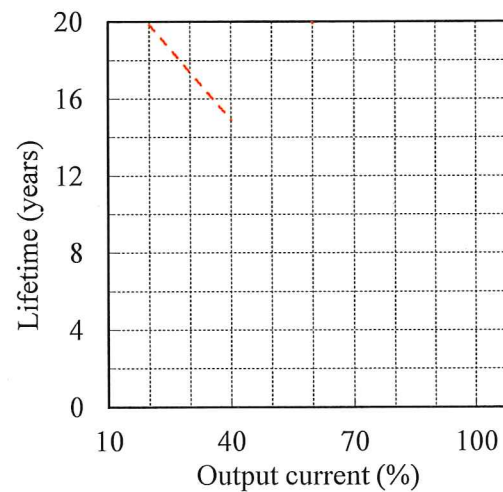
V<sub>in</sub> = 100VAC

Load	Ta	Lifetime (years)		
		20°C	40°C	50°C
40%		20.0	20.0	14.3
60%		20.0	20.0	-
80%		20.0	-	-
100%		20.0	-	-



V<sub>in</sub> = 200VAC

Load	Ta	Lifetime (years)		
		20°C	40°C	50°C
40%		20.0	20.0	14.9
60%		20.0	20.0	-
80%		20.0	-	-
100%		20.0	-	-



上記推定寿命は、弊社計算方法により算出した値であり、封口ロムの劣化等の影響を含めておりません。  
The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc.

## 5. アブノーマル試験 Abnormal Test

MODEL : ZWS300BAF-24

## (1) 試験条件 Test Conditions

Input : 265VAC Output : 24V, 12.5A Ta : 25°C

## (2) 試験結果 Test Results

(Da : Damaged)

No.	Test position		Test mode		Test result											記事 Note	
	部品No. Location No.	試験端子 Test point	ショート Short	オープン Open	a 発火 Fire	b 発煙 Smoke	c 破裂 Burst	d 異臭 Smell	e 赤熱 Red hot	f 破損 Damaged	g ヒューズ断 Fuse blown	h OVP	I OCP	j 出力断 No output	k 変化なし No change		l その他 Others
1	Q1	D-S	○								○			○			
2		D-G	○							○	○			○			Da : Q1, Q105, R104
3		G-S	○													○	Power Factor Decrease
4		D		○												○	Power Factor Decrease
5		S		○												○	Power Factor Decrease
6		G		○						○	○			○			Da : Q1
7	Q2	D-S	○											○			
8		D-G	○											○			
9		G-S	○											○			
10		D		○										○			
11		S		○										○			
12		G		○										○			
13	Q3	D-S	○											○			
14		D-G	○											○			
15		G-S	○											○			
16		D		○										○			
17		S		○										○			
18		G		○										○			
19	D51	A-K	○											○			
20		A		○										○			
21		K		○										○			
22	D52	A-K	○											○			
23		A		○										○			
24		K		○										○			
25	D53	A-K	○											○			
26		A		○										○			
27		K		○										○			

( Da : Damaged )

No.	Test position		Test mode		Test result											記事 Note	
	部品No. Location No.	試験端子 Test point	ショート Short	オープン Open	a	b	c	d	e	f	g	h	I	j	k		l
					発火 Fire	発煙 Smoke	破裂 Burst	異臭 Smell	赤熱 Red hot	破損 Damaged	ヒューズ断 Fuse blown	OVP	OCP	出力断 No output	変化なし No change		その他 Others
28	C6		○								○			○			
29				○											○		
30	C52		○											○			
31				○												○	Output Ripple Increase
32	D1	AC-AC	○								○			○			
33		DC-DC	○							○	○			○			Da : D1
34		AC-DC	○								○			○			
35		AC		○										○			
36		DC		○										○			
37	D2	A-K	○							○	○			○			Da : Q1
38		A		○						○	○			○			Da : Q1
39	D106	A-K	○											○			
40		A		○												○	Input Power Increase
41	D108	A-K	○											○			
42		A		○												○	Input Power Increase
43	T1	1-2	○											○			
44		3-4	○											○			
45		7-8	○											○			
46		1			○										○		
47		3			○										○		
48		7		○										○			
49	T2	1-2	○											○			
50		9-10	○											○			
51		1			○										○		
52		4			○										○		
53		9			○											○	
54			10		○											○	



## 6. 振動試験 Vibration Test

MODEL : ZWS300BAF-24

## (1) 振動試験種類 Vibration Test Class

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

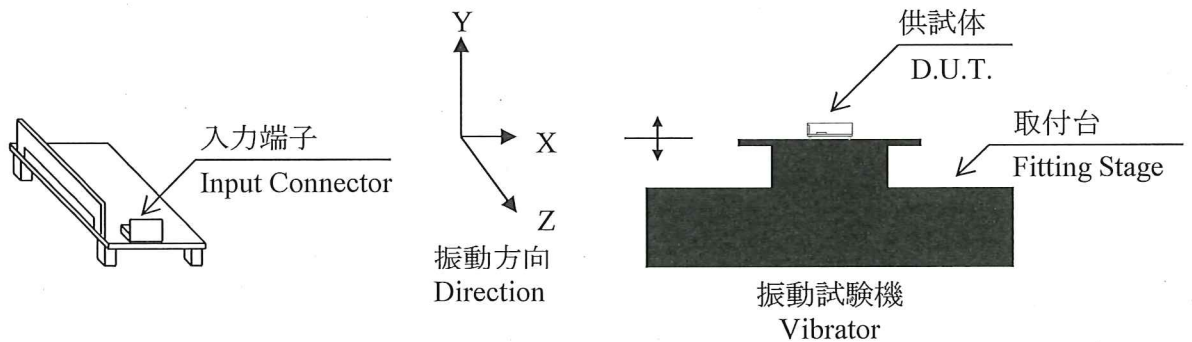
## (2) 使用振動試験装置 Equipment Used

EMIC (株) 製 EMIC CORP	・制御部 : F-400-BM-E47 Controller	・加振部 : 905-FN Vibrator
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## (3) 試験条件 Test Conditions

・周波数範囲 Sweep frequency	: 10~55Hz	・振動方向 Direction	: X, Y, Z
・掃引時間 Sweep time	: 1.0分間 1.0min	・試験時間 Sweep count	: 各方向共 1時間 1 hour each
・加速度 Acceleration	: 一定 $19.6\text{m/s}^2$ (2G) Constant		

## (4) 試験方法 Test Method



## (5) 判定条件 Acceptable Conditions

1. 破壊しない事  
Not to be broken
2. 試験後の特性は初期値から変動していない事  
Characteristic to be within regulation specification after the test.

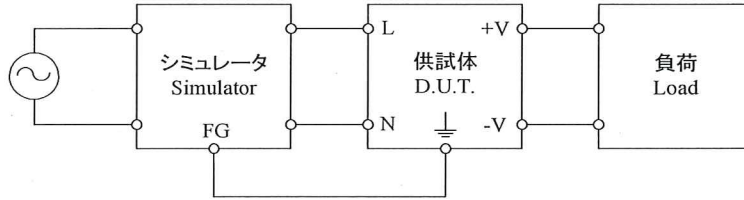
## (6) 試験結果 Test Results

合格 OK

## 7. ノイズシミュレート試験 Noise Simulate Test

MODEL : ZWS300BAF-24

## (1) 試験回路及び測定器 Test Circuit and Equipment



シミュレータ : INS-4320(A) (ノイズ研究所)  
 Simulator : (Noise Laboratory Co.,LTD)

## (2) 試験条件 Test Conditions

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

## (3) 判定条件 Acceptable Conditions

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

## (4) 試験結果 Test Results

合格 OK



## 8. 熱衝撃試験 Thermal Shock Test

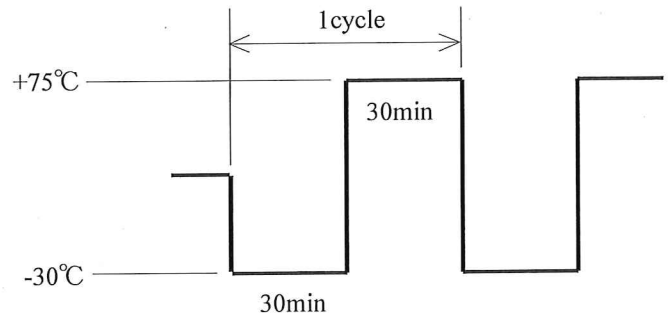
MODEL : ZWS300BAF-24

## (1) 使用計測器 Equipment Used

TSA-70H-W : ESPEC

## (2) 試験条件 Test Conditions

- ・電源周囲温度 : -30°C ⇔ 75°C  
Ambient Temperature
- ・試験時間 : 図参照  
Test Time Refer to Dwg.
- ・試験サイクル : 100 サイクル  
Test Cycle 100 Cycles
- ・非動作  
Not Operating



## (3) 試験方法 Test Method

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

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

## (4) 判定条件 Acceptable Conditions

1. 破壊しない事  
Not to be broken
2. 試験後の特性は初期値から変動していない事  
Characteristic to be within regulation specification after the test.

## (5) 試験結果 Test Results

合格 OK