

# KWD5

## RELIABILITY DATA

### 信頼性データ

No. RD-08T-642A		
承認	査閲	担当
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※信頼性試験は代表データであり、この値は実力値とお考え願います。

※本データに掲載してあります内蔵部品の名称は、本製品を開発した当初のものです。

これらは改善等の為に変更されている可能性もありますが、ご了承下さい。

The following data are typical values and the data to be considered as ability values.

The built-in components names on this data are the things the time of Development.

Please understand that it may be changed for an improvement etc.

M . T . B . F

1. Method of calculation

This calculation is by the components count method laid down by the DC Stabilized Power Supplies (Switching mode) committee of EIAJ.

The MTBF is determined by means of a fixed component failure rate  $\lambda_o$  given to each component and the number of component count of each type of component.  $\lambda_o$  is determined based on MIL-HDBK-217D.

Please refer to the EIAJ handbook no. RCF-9021 for detail.

Formula:

$$MTBF = \frac{1}{\lambda_{o\text{equip}}} = \frac{1}{\sum_{i=1}^n N_i(\lambda_o)_i} \times 10^6 \quad (\text{Hrs})$$

$\lambda_{o\text{equip}}$  = Total equipment failure rate (Failures/10<sup>6</sup>hrs)

$\lambda_o$  = Failure rate of the i<sup>th</sup> component

$N_i$  = Number of i<sup>th</sup> component

n = Number of categories of components

2. MTBF Value

Condition : Nominal line, rated load

Ambient Temperature 25°C

MTBF = 91,735 hrs.

Components Derating Data(At Nominal Line and Rated Load, Ambient Temperature 50°C)Calculation Method

## A. Semiconductors

The derating factor is taken as the ratio of the actual operating junction temperature taking into consideration operating ambient temperature, power loss and thermal resistance to the maximum rated junction temperature specifications of the components.

## B. IC, Resistors, Capacitors etc.

Operating ambient temperature, operating condition, power loss for each individual component are all designed to meet the requirements of Nemic-Lambda's design standard.

## C. Thermal Resistance Calculation

$$\theta_{jc} = \frac{T_j(\max) - T_c}{P_c(\max)}$$

$$\theta_{ja} = \frac{T_j(\max) - T_a}{P_c(\max)}$$

$T_c$  : Case Temperature (Normally 25°C)

$T_a$  : Ambient Temperature (Normally 25°C)

$P_c(\max)$  : Maximum Power Loss

$T_j(\max)$  : Maximum Junction Temperature

$\theta_{jc}$  : Junction to Case Thermal Resistance

$\theta_{ja}$  : Junction to ambient Thermal Resistance

認 APPD		設 計 ENGR		図面番号 DWG-No. PA773-56-02 - <input type="checkbox"/>
検 図 CHK		製 図 DWG		

SEMICONDUCTOR DERATING

4/40

DWG. NO. : PA773-56-03

DATE : 6-DEC-92

MODEL : KWD5-1212

VIN = AC 100V

LOAD = 100%

Ta = 50°C

Q1 2SK1533 FUJI	Tchmax = 150 °C	$\Theta_{ch-c} = 1.563$ °C/W	Pdmax = 80 W
	Pd = 0.57 W	$\Delta T_c = 31.3$ °C	Tc = 81.3 °C
	Tch = Tc + ( $\Theta_{ch-c}$ )*Pd = 82.2 °C		
	D.F. = 54.8 %		
Q2 2SC2712 TOSHIBA	Tjmax = 150 °C	$\Theta_{j-c} = 125$ °C/W	Pdmax = 1 W
	Pd = 0.0 W	$\Delta T_c = 31.3$ °C	Tc = 81.3 °C
	Tj = Tc + ( $\Theta_{j-c}$ )*Pd = 81.3 °C		
	D.F. = 54.2 %		
A1 UC2842ADW UNITRODE	Tjmax = 150	$\Theta_{j-c} = 70$ °C/W	Pdmax = 0.725 W
	Pd = 0.383 W	$\Delta T_c = 34.2$ °C	Tc = 84.2 °C
	Tj = Tc + ( $\Theta_{j-c}$ )*Pd = 111.0 °C		
	D.F. = 74.0 %		
A2 HA17431UA HITACHI	Tjmax = 125 °C	$\Theta_{j-c} = 259.7$ C/W	Pdmax = 0.385 W
	Pd = 15.6 mW	$\Delta T_c = 24.0$ °C	Tc = 74.0 °C
	Tj = Tc + ( $\Theta_{j-c}$ )*Pd = 78.1 °C		
	D.F. = 62.5 %		
PC1 (LED) TLP121GR TOSHIBA	Tjmax = 125 °C	$\Theta_{j-c} = 400$ °C/W	Pdmax = 50 mW
	If = 1.0 mA	$\Delta T_c = 25.4$ °C	Tc = 75.4 °C
	ALLOWABLE If (max) = 35.0 mA (at 75.4°C)		
	D.F. = 2.9 %		
PC1 (TRANSISTOR) TLP121GR TOSHIBA	Tjmax = 125 °C	$\Theta_{j-c} = 400$ °C/W	Pdmax = 150 mW
	Pd = 5.4 mW	$\Delta T_c = 25.4$ °C	Tc = 75.4 °C
	Tj = Tc + ( $\Theta_{j-c}$ )*Pd = 77.6 °C		
	D.F. = 62.0 %		
D1 S1WB(A)60B SHINDENGEN	Tjmax = 150 °C	$\Theta_{j-l} = 10$ °C/W	Pdmax = 12.5 W
	Pd = 0.213 W	$\Delta T_l = 20.7$ °C	T(lead) = 70.7 °C
	Tj = Tl + ( $\Theta_{j-l}$ )*Pd = 72.8 °C		
	D.F. = 48.6 %		

SEMICONDUCTOR DERATING

DWG. NO. : PA773-56-04

DATE : 6-DEC-92

MODEL : KWD5-1212

VIN = AC 100V

LOAD = 100%

Ta = 50°C

D2 EC8FS6 NIHON-INTER	Tjmax = 150 °C	$\Theta_{j-l} = 23$ °C/W	Pdmax = 5.43 W
	Pd = 25.0 mW	$\Delta T = 27.3$ °C	T(lead) = 77.3 °C
	Tj = Tl + ( $\Theta_{j-l}$ ) * Pd = 77.9 °C		
	D.F. = 51.9 %		
D3 1SS184TE85L TOSHIBA	Tjmax = 125 °C	$\Theta_{j-l} = 100$ °C/W	Pdmax = 150 mW
	Pd = 0.0 W	$\Delta T = 31.0$ °C	T(lead) = 81.0 °C
	Tj = Tl + ( $\Theta_{j-l}$ ) * Pd = 81.0 °C		
	D.F. = 64.8 %		
D4 1SS184TE85L TOSHIBA	Tjmax = 125 °C	$\Theta_{j-l} = 100$ °C/W	Pdmax = 150 mW
	Pd = 5.8 mW	$\Delta T = 26.0$ °C	T(lead) = 76.0 °C
	Tj = Tl + ( $\Theta_{j-l}$ ) * Pd = 76.6 °C		
	D.F. = 61.3 %		
D5 D1FL20U SHINDENGEN	Tjmax = 150 °C	$\Theta_{j-l} = 23$ °C/W	Pdmax = 5.43 W
	Pd = 30.0 mW	$\Delta T = 28.8$ °C	T(lead) = 78.8 °C
	Tj = Tl + ( $\Theta_{j-l}$ ) * Pd = 79.5 °C		
	D.F. = 53.0 %		
D6 D1FL20U SHINDENGEN	Tjmax = 150 °C	$\Theta_{j-l} = 23$ °C/W	Pdmax = 5.43 W
	Pd = 0.108 W	$\Delta T = 30.9$ °C	T(lead) = 80.9 °C
	Tj = Tl + ( $\Theta_{j-l}$ ) * Pd = 83.4 °C		
	D.F. = 55.6 %		
D7 D1FL20U SHINDENGEN	Tjmax = 150 °C	$\Theta_{j-l} = 23$ °C/W	Pdmax = 5.43 W
	Pd = 0.108 W	$\Delta T = 30.9$ °C	T(lead) = 80.9 °C
	Tj = Tl + ( $\Theta_{j-l}$ ) * Pd = 83.4 °C		
	D.F. = 55.6 %		
D10 D1FL20U SHINDENGEN	Tjmax = 150 °C	$\Theta_{j-l} = 23$ °C/W	Pdmax = 5.43 W
	Pd = 0.108 W	$\Delta T = 31.8$ °C	T(lead) = 81.8 °C
	Tj = Tl + ( $\Theta_{j-l}$ ) * Pd = 84.3 °C		
	D.F. = 56.2 %		

SEMICONDUCTOR DERATING

6/40

DWG. NO. : PA773-56-05

DATE : 6-DEC-92

MODEL : KWD5-1212

VIN = AC 100V		LOAD = 100%		Ta = 50°C	
D11 D1FL20U SHINDENGEN	Tjmax =	150 °C	$\Theta_{j-l} =$	23 °C/W	Pdmax = 5.43 W
	Pd =	0.108 W	$\Delta T_l =$	31.8 °C	T(lead) = 81.8 °C
	Tj = Tl + ( $\Theta_{j-l}$ )*Pd =	84.3 °C			
	D.F. =	56.2 %			
ZD1 1N4744A MOTOROLA	Tjmax =	200 °C	$\Theta_{j-l} =$	175 °C/W	Pdmax = 1 W
	Pd =	0.0 W	$\Delta T_l =$	25.5 °C	T(lead) = 75.5 °C
	Tj = Tl + ( $\Theta_{j-l}$ )*Pd =	75.5 °C			
	D.F. =	37.8 %			
ZD2 02CZ12-Z TOSHIBA	Tjmax =	150 °C	$\Theta_{j-l} =$	100 °C/W	Pdmax = 150 mW
	Pd =	19.0 mW	$\Delta T_l =$	29.1 °C	T(lead) = 79.1 °C
	Tj = Tl + ( $\Theta_{j-l}$ )*Pd =	81.0 °C			
	D.F. =	54.0 %			

TDK-Lambda

Δ T TEMPERATURE RISE

DWG. NO. PA773-66-02

MODEL : KWD5-1212

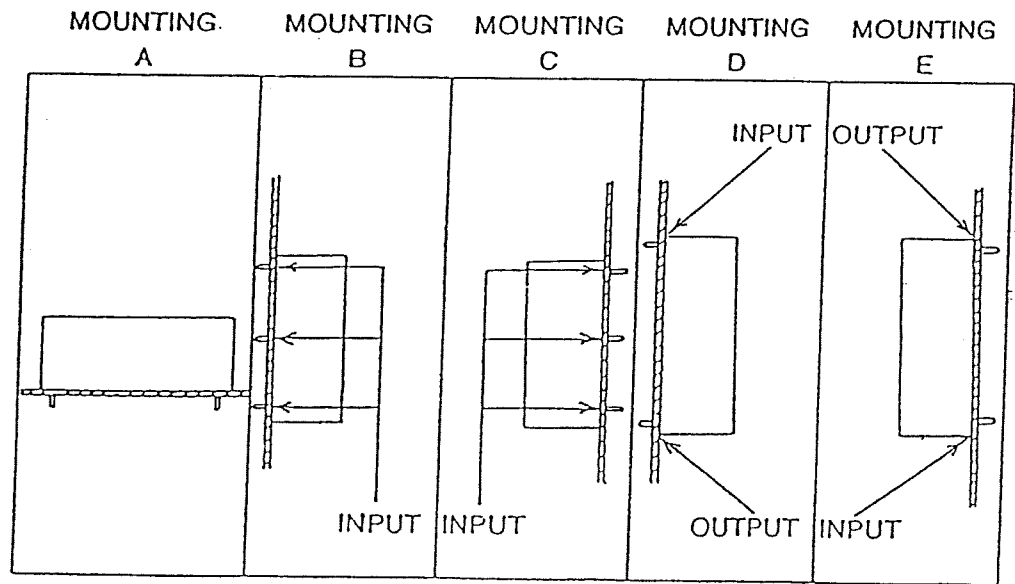
DATE : 6-DEC-92

INPUT VOLTAGE = 100VAC

Ta = 50°C		Δ T TEMPERATURE RISE (°C)				
OUTPUT DERATING (%)		100%	100%	100%	100%	100%
SYMBOL	PARTS NAME	MOUNTING A	MOUNTING B	MOUNTING C	MOUNTING D	MOUNTING E
Q1	MOSFET	31.3	31.0	30.0	30.2	29.7
A1	PWM IC	34.2	34.5	33.9	34.5	33.7
D6	UFRD	30.9	28.6	29.0	27.4	29.1
D11	UFRD	31.8	32.2	31.9	32.0	32.1
C6	E. CAP	24.3	25.3	23.4	24.0	24.1
C18	OS CAP	24.6	23.8	23.7	22.6	25.2
C21	OS CAP	24.2	24.1	22.6	22.2	24.6

INPUT VOLTAGE = 200VAC

Ta = 50°C		Δ T TEMPERATURE RISE (°C)				
OUTPUT DERATING (%)		100%	100%	100%	100%	100%
SYMBOL	PARTS NAME	MOUNTING A	MOUNTING B	MOUNTING C	MOUNTING D	MOUNTING E
Q1	MOSFET	44.2	45.8	47.6	45.5	47.0
A1	PWM IC	42.0	41.1	42.0	42.0	41.8
D6	UFRD	36.0	36.2	35.5	35.4	35.3
D11	UFRD	37.2	38.0	37.9	38.0	37.1
C6	E. CAP	31.3	31.9	34.1	30.4	32.5
C18	OS CAP	29.3	31.8	30.7	29.6	30.2
C21	OS CAP	28.7	31.0	30.9	28.0	29.8





## ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWD5-1212

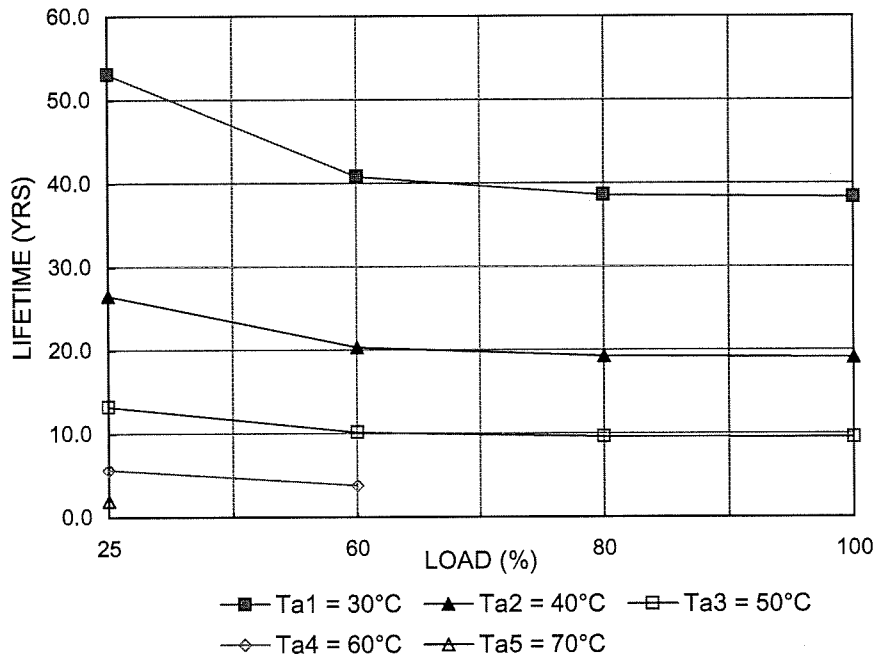
MOUNTING : A

VIN : 100VAC

DATE: SEPT 12, 2008

LOAD (%)	LIFETIME (YRS)				
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
25	53.1	26.6	13.3	5.7	2.0
60	40.8	20.4	10.2	3.8	
80	38.6	19.3	9.7		
100	38.3	19.2	9.6		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD  
MOUNTING A KWD5-1212



計算式 **FORMULA**

1. アルミ電解コンデンサ  
AL. Electrolytic capacitor  
 $L = L_o \times 2^{(105-T_c)/10}$  (year)      L : 電解コンデンサ推定寿命計算値  
 Elec. Capacitor computed life.  
 (24時間連続稼動、365日)  
 (24 hrs per day, 365 days per year)

2. OSコンデンサ  
O.S capacitor  
 $L = L_o \times 10^{(105-T_c)/22}$  (year)      L<sub>o</sub> : 電解コンデンサ保証寿命値  
 Guarantee life for Elec. cap.  
 T<sub>c</sub> : 電解コンデンサのケース温度  
 Case temperature of Elec. cap.

## ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWD5-1212

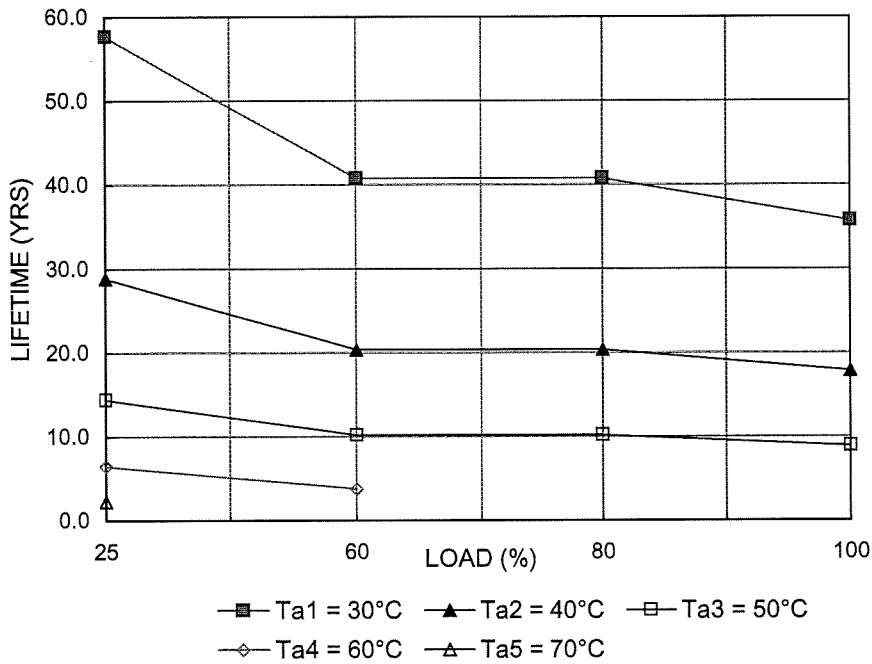
MOUNTING : B

VIN : 100VAC

DATE: SEPT 12, 2008

LOAD (%)	LIFETIME (YRS)				
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
25	57.7	28.9	14.4	6.5	2.3
60	40.8	20.4	10.2	3.8	
80	40.8	20.4	10.2		
100	35.8	17.9	8.9		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD  
MOUNTING B KWD5-1212



計算式 **FORMULA**

1. アルミ電解コンデンサ  
AL. Electrolytic capacitor  
 $L = L_o \times 2^{(105-T_c)/10}$  (year)      L : 電解コンデンサ推定寿命計算値  
 Elec. Capacitor computed life.  
 (24時間連続稼動、365日)  
 (24 hrs per day, 365 days per year)

2. OSコンデンサ  
O.S capacitor  
 $L = L_o \times 10^{(105-T_c)/22}$  (year)      L<sub>o</sub> : 電解コンデンサ保証寿命値  
 Guarantee life for Elec. cap.  
 T<sub>c</sub> : 電解コンデンサのケース温度  
 Case temperature of Elec. cap.

## ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWD5-1212

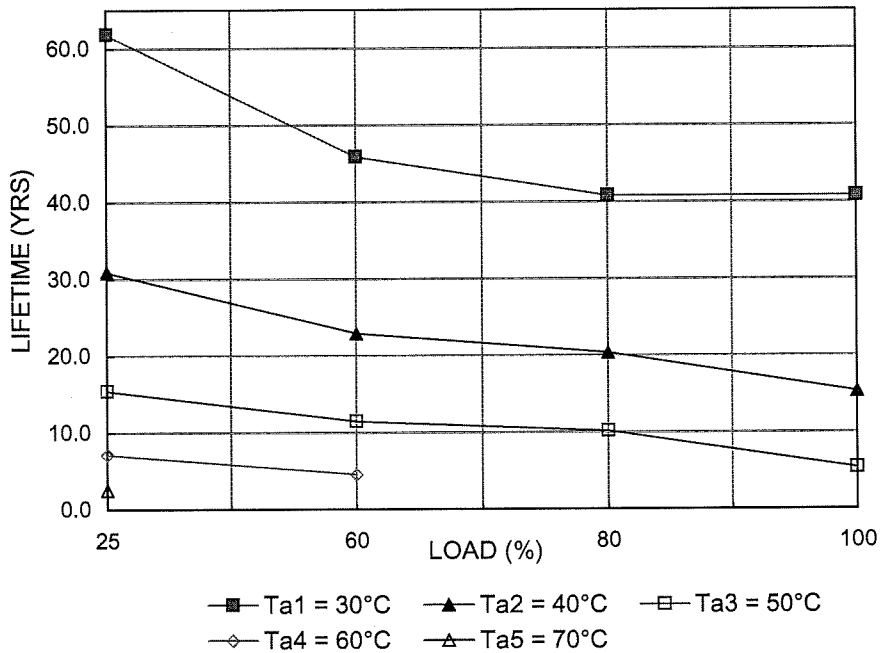
MOUNTING : C

VIN : 100VAC

DATE: SEPT 12, 2008

LOAD (%)	LIFETIME (YRS)				
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
25	61.9	30.9	15.5	7.2	2.5
60	45.9	23.0	11.5	4.6	
80	40.8	20.4	10.2		
100	40.8	15.4	5.4		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD  
MOUNTING C KWD5-1212



計算式 **FORMULA**

<p>1. アルミ電解コンデンサ AL. Electrolytic capacitor <math>L = L_o \times 2^{(105-T_c)/10}</math> (year)</p>	L :	<p>電解コンデンサ推定寿命計算値 Elec. Capacitor computed life. (24時間連続稼動、365日) (24 hrs per day, 365 days per year)</p>
<p>2. OSコンデンサ O.S capacitor <math>L = L_o \times 10^{(105-T_c)/22}</math> (year)</p>	Lo :	<p>電解コンデンサ保証寿命値 Guarantee life for Elec. cap.</p>
	Tc :	<p>電解コンデンサのケース温度 Case temperature of Elec. cap.</p>

## ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWD5-1212

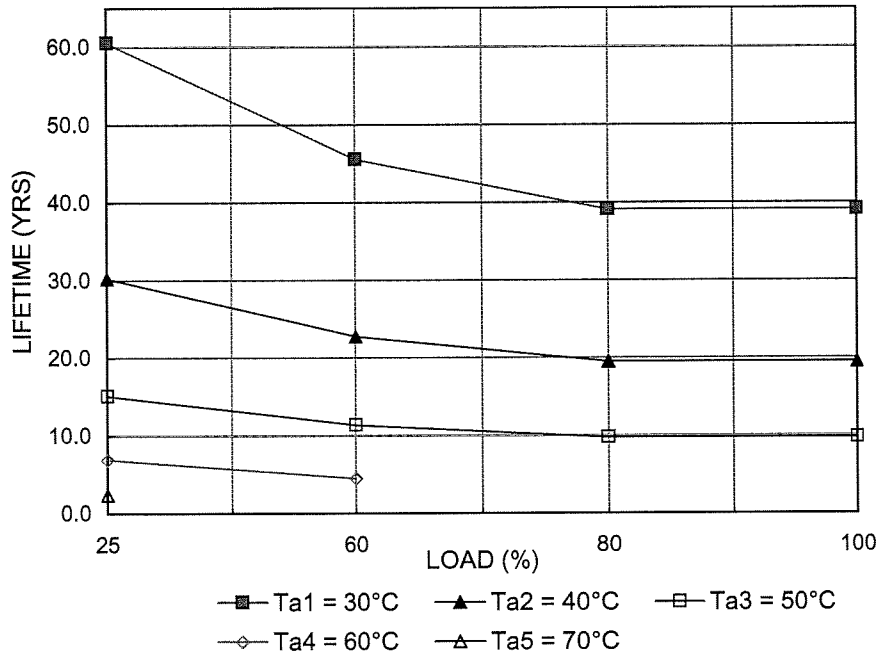
MOUNTING : D

VIN : 100VAC

DATE: SEPT 12, 2008

LOAD (%)	LIFETIME (YRS)				
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
25	60.6	30.3	15.1	7.0	2.4
60	45.6	22.8	11.4	4.5	
80	39.2	19.6	9.8		
100	39.2	19.6	9.8		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD  
MOUNTING D KWD5-1212



### 計算式 FORMULA

- |   |                                    |        |      |  |
|---|------------------------------------|--------|------|--|
| 1. アルミ電解コンデンサ<br>AL. Electrolytic capacitor | $L = L_o \times 2^{(105-T_c)/10}$  | (year) | L :  | 電解コンデンサ推定寿命計算値<br>Elec. Capacitor computed life.<br>(24時間連続稼動、365日)<br>(24 hrs per day, 365 days per year) |
| 2. OSコンデンサ<br>O.S capacitor                 | $L = L_o \times 10^{(105-T_c)/22}$ | (year) | Lo : | 電解コンデンサ保証寿命値<br>Guarantee life for Elec. cap.  |
|   |                                    |        | Tc : | 電解コンデンサのケース温度<br>Case temperature of Elec. cap.  |

## ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWD5-1212

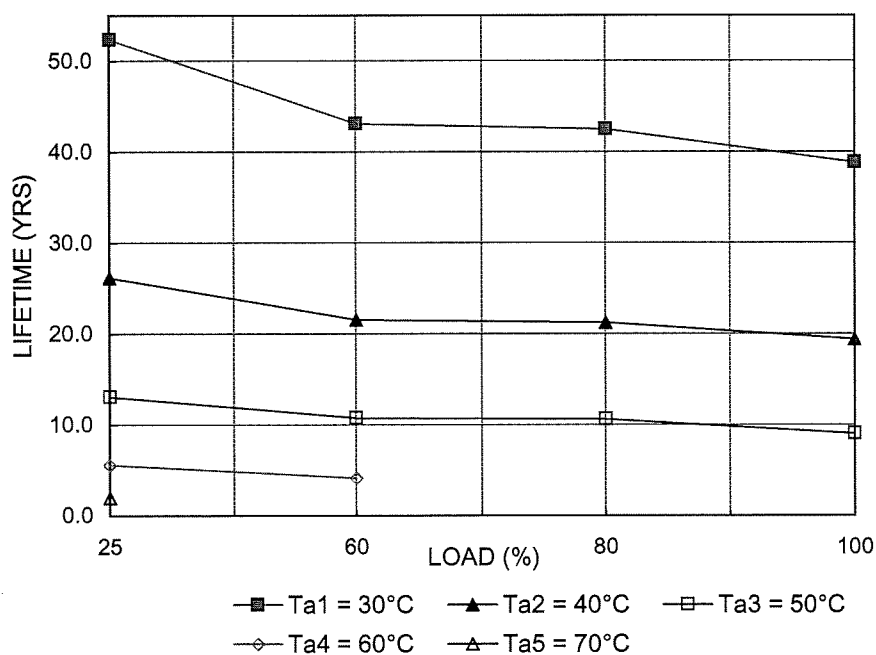
MOUNTING : E

VIN : 100VAC

DATE: SEPT 12, 2008

LOAD (%)	LIFETIME (YRS)				
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
25	52.4	26.2	13.1	5.6	2.0
60	43.1	21.6	10.8	4.2	
80	42.5	21.3	10.6		
100	38.9	19.4	9.0		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD  
MOUNTING E KWD5-1212



### 計算式 FORMULA

- |   |  |
|---|--|
| <p>1. アルミ電解コンデンサ<br/>AL. Electrolytic capacitor<br/><math>L = L_0 \times 2^{(105-T_c)/10}</math> (year)</p> | <p>L : 電解コンデンサ推定寿命計算値<br/>Elec. Capacitor computed life.<br/>(24時間連続稼動、365日)<br/>(24 hrs per day, 365 days per year)</p>                   |
| <p>2. OSコンデンサ<br/>O.S capacitor<br/><math>L = L_0 \times 10^{(105-T_c)/22}</math> (year)</p>                | <p>L<sub>0</sub> : 電解コンデンサ保証寿命値<br/>Guarantee life for Elec. cap.<br/>T<sub>c</sub> : 電解コンデンサのケース温度<br/>Case temperature of Elec. cap.</p> |

## ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWD5-1212

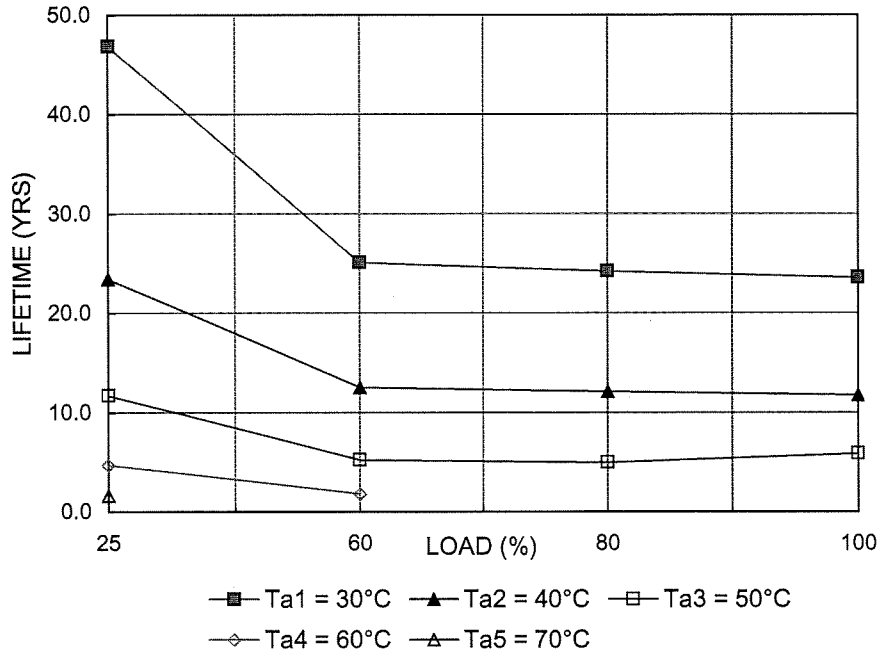
MOUNTING : A

VIN : 200VAC

DATE: SEPT 12, 2008

LOAD (%)	LIFETIME (YRS)				
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
25	46.9	23.4	11.7	4.72379684	1.65861564
60	25.1	12.6	5.2	1.84162118	
80	24.3	12.1	5.0		
100	23.6	11.8	5.9		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD  
MOUNTING A KWD5-1212



計算式 **FORMULA**

- |   |  |
|---|--|
| <p>1. アルミ電解コンデンサ<br/>AL. Electrolytic capacitor<br/><math>L = L_o \times 2^{(105-T_c)/10}</math> (year)</p> | <p>L : 電解コンデンサ推定寿命計算値<br/>Elec. Capacitor computed life.<br/>(24時間連続稼動、365日)<br/>(24 hrs per day, 365 days per year)</p>                   |
| <p>2. OSコンデンサ<br/>O.S capacitor<br/><math>L = L_o \times 10^{(105-T_c)/22}</math> (year)</p>                | <p>L<sub>o</sub> : 電解コンデンサ保証寿命値<br/>Guarantee life for Elec. cap.<br/>T<sub>c</sub> : 電解コンデンサのケース温度<br/>Case temperature of Elec. cap.</p> |

## ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWD5-1212

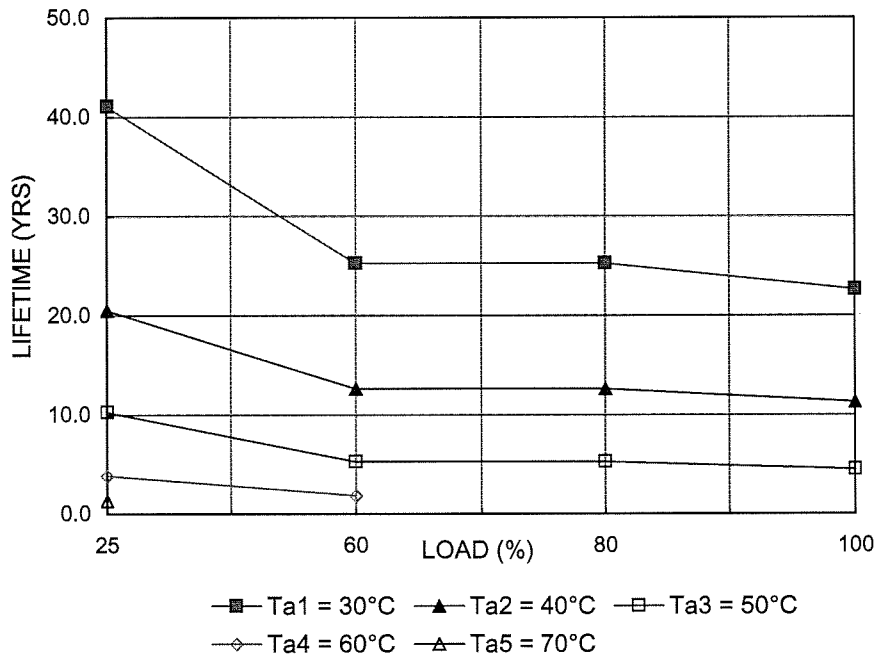
MOUNTING : B

VIN : 200VAC

DATE: SEPT 12, 2008

LOAD (%)	LIFETIME (YRS)				
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
25	41.1	20.5	10.3	3.9	1.4
60	25.3	12.6	5.3	1.9	
80	25.3	12.6	5.3		
100	22.6	11.3	4.5		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD  
MOUNTING B KWD5-1212



### 計算式 **FORMULA**

- |   |  |
|---|--|
| <p>1. アルミ電解コンデンサ<br/>AL. Electrolytic capacitor<br/><math>L = L_o \times 2^{(105-T_c)/10}</math> (year)</p> | <p>L : 電解コンデンサ推定寿命計算値<br/>Elec. Capacitor computed life.<br/>(24時間連続稼働、365日)<br/>(24 hrs per day, 365 days per year)</p>                   |
| <p>2. OSコンデンサ<br/>O.S capacitor<br/><math>L = L_o \times 10^{(105-T_c)/22}</math> (year)</p>                | <p>L<sub>o</sub> : 電解コンデンサ保証寿命値<br/>Guarantee life for Elec. cap.<br/>T<sub>c</sub> : 電解コンデンサのケース温度<br/>Case temperature of Elec. cap.</p> |

## ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWD5-1212

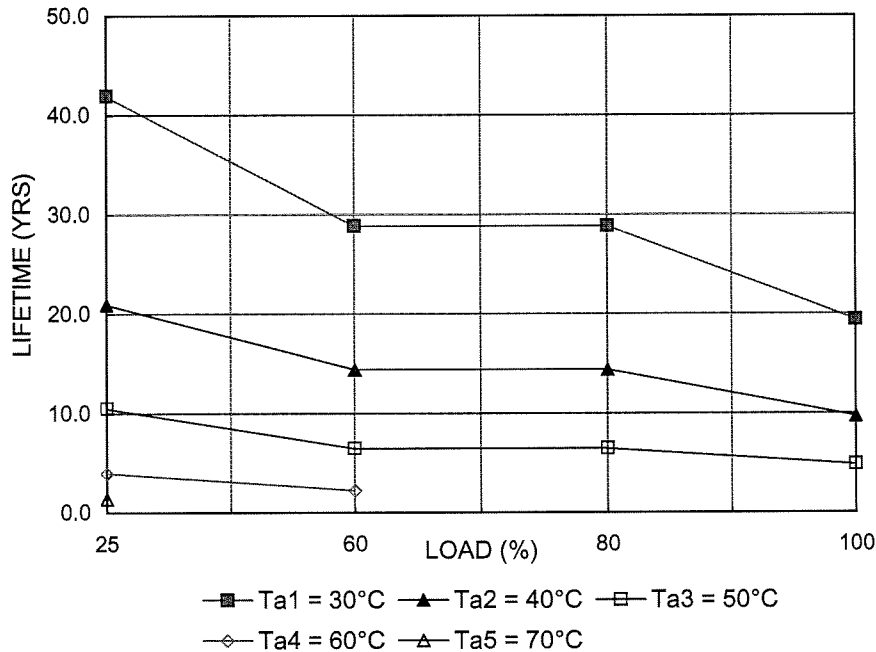
MOUNTING : C

VIN : 200VAC

DATE: SEPT 12, 2008

LOAD (%)	LIFETIME (YRS)				
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
25	42.0	21.0	10.5	4.0	1.4
60	28.9	14.4	6.5	2.3	
80	28.9	14.4	6.5		
100	19.4	9.7	4.9		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD  
MOUNTING C KWD5-1212



計算式 **FORMULA**

<p>1. アルミ電解コンデンサ AL. Electrolytic capacitor <math>L = L_o \times 2^{(105-T_c)/10}</math> (year)</p>	L :	<p>電解コンデンサ推定寿命計算値 Elec. Capacitor computed life. (24時間連続稼働、365日) (24 hrs per day, 365 days per year)</p>
<p>2. OSコンデンサ O.S capacitor <math>L = L_o \times 10^{(105-T_c)/22}</math> (year)</p>	L <sub>o</sub> :	<p>電解コンデンサ保証寿命値 Guarantee life for Elec. cap.</p>
	T <sub>c</sub> :	<p>電解コンデンサのケース温度 Case temperature of Elec. cap.</p>



## ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL: KWD5-1212

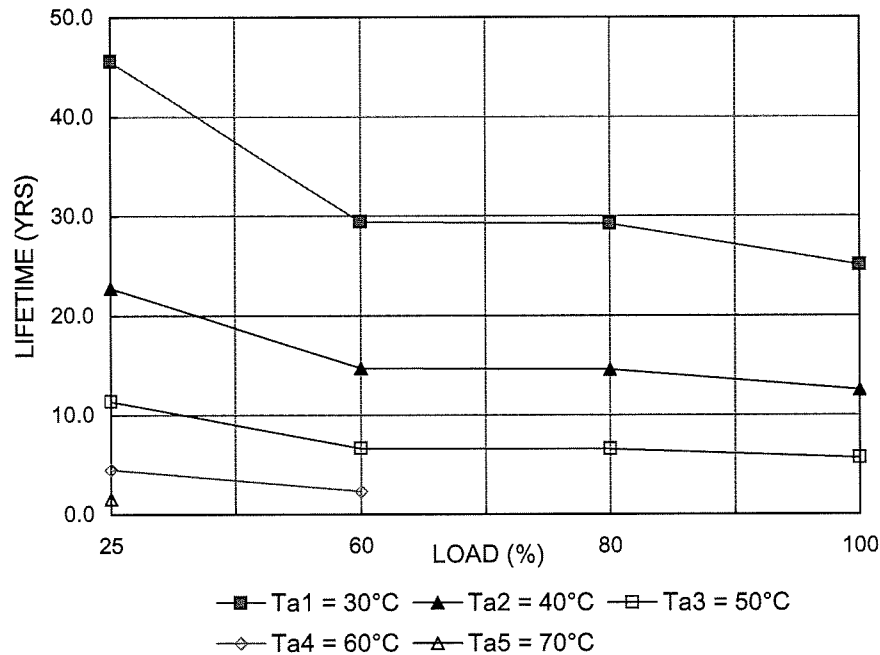
MOUNTING : D

VIN : 200VAC

DATE: SEPT 12, 2008

LOAD (%)	LIFETIME (YRS)				
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
25	45.6	22.8	11.4	4.5	1.6
60	29.5	14.7	6.7	2.3	
80	29.3	14.6	6.6		
100	25.1	12.6	5.7		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD  
MOUNTING D KWD5-1212



### 計算式 **FORMULA**

- |   |  |
|---|--|
| 1. アルミ電解コンデンサ<br>AL. Electrolytic capacitor<br>$L = L_o \times 2^{(105-T_c)/10}$ (year) | L : 電解コンデンサ推定寿命計算値<br>Elec. Capacitor computed life.<br>(24時間連続稼動、365日)<br>(24 hrs per day, 365 days per year)                     |
| 2. OSコンデンサ<br>O.S capacitor<br>$L = L_o \times 10^{(105-T_c)/22}$ (year)                | L <sub>o</sub> : 電解コンデンサ保証寿命値<br>Guarantee life for Elec. cap.<br>T <sub>c</sub> : 電解コンデンサのケース温度<br>Case temperature of Elec. cap. |

## ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL: KWD5-1212

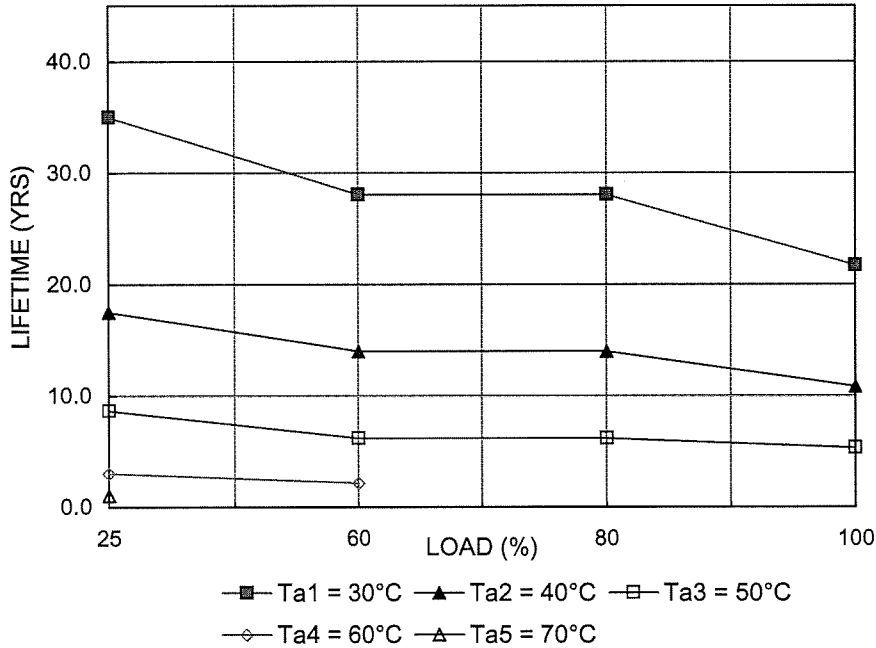
MOUNTING : E

VIN : 200VAC

DATE: SEPT 12, 2008

LOAD (%)	LIFETIME (YRS)				
	Ta = 30°C	Ta = 40°C	Ta = 50°C	Ta = 60°C	Ta = 70°C
25	35.0	17.5	8.7	3.0	1.1
60	28.1	14.0	6.2	2.2	
80	28.1	14.0	6.2		
100	21.7	10.9	5.4		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD  
MOUNTING E KWD5-1212



計算式 **FORMULA**

- |   |  |
|---|--|
| <p>1. アルミ電解コンデンサ<br/>AL. Electrolytic capacitor<br/><math>L = L_o \times 2^{(105-T_c)/10}</math> (year)</p> | <p>L : 電解コンデンサ推定寿命計算値<br/>Elec. Capacitor computed life.<br/>(24時間連続稼働、365日)<br/>(24 hrs per day, 365 days per year)</p> |
| <p>2. OSコンデンサ<br/>O.S capacitor<br/><math>L = L_o \times 10^{(105-T_c)/22}</math> (year)</p>                | <p>Lo : 電解コンデンサ保証寿命値<br/>Guarantee life for Elec. cap.<br/>Tc : 電解コンデンサのケース温度<br/>Case temperature of Elec. cap.</p>     |

18/40

MODEL : KWD5 - 1212		ABNORMAL TESTING												TEST CONDITIONS		APPROVED BY TESTED BY										
		TEST MODE												LOAD = 100%		Vin = 200VAC Ta = 25°C		DC/NO.								
PARTS NAME	PART NO.	TEST MODE	OPEN	FIRE	SMOKE	A	B	SMOKE	BURST	SMELL	HOT	DAMAGE	DOWN	FUSE	O.C.	P.	O.V.	P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE		OK	RETEST	NO GOOD
		S	O	A	B	A	B	A	B	S	H	D	F	O	P	N	O	O	O	O	O	Q1,A1,R24,R25,R26,R17. Q1,A1,R24,R25,R26,R17.	Y	Y	Y	Y
1 MOSFET	Q1	D-G	Y									Y	Y													
2 2SK1533-4100		D-S	Y									Y	Y													
3		G-S	Y																Y							
4		D		Y															Y							
5		S		Y															Y							
6		G		Y															Y							
7																										
8 TRANSISTOR	Q2	C-E	Y																Y							
9 2SC2712-Y-TE85L		C-B	Y																Y							
10		B-E	Y																Y							
11		C		Y																						
12		E		Y																						
13		B		Y																						
14																										
15	I.C.	1-2	Y																							
16 UC2842ADW	A1	2-3	Y																							
17		3-4	Y																							
18		4-5	Y																							
19		5-6	Y																							
20		6-7	Y																							
21		7-8	Y																							
22		9-10	Y																							
23		10-11	Y																							
24		11-12	Y																							
25																										

\*\*\* A : SLIGHT B : PROLONGED

**TDK-Lambda**



MODEL : KWD5-1212		ABNORMAL TESTING								TEST CONDITIONS				APPROVED	TESTED											
		TEST MODE								LOAD = 100%	NO CHANGES	OTHERS	NOTE		APPROVED <i>CCNEO</i> 15/03/93	TESTED <i>[Signature]</i>										
PARTS NAME	PART NO.		SHORT	OPEN	FIRING	SMOKE A	SMOKE B	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	O.V.P.			NO OUTPUT	NO CHANGES	OTHERS							
1 SHUNT REGULATOR HA17431UA-TL	A2		Y															Hiccup: Vout low Hiccup: Vout low	Y	Y	O K	NO GOOD				
2		K-A	Y																		Y	Y	O K			
3		K-R	Y																			Y	Y	O K		
4		R-A	Y																			Y	Y	O K		
5		K	Y																			Y	Y	O K		
6		A	Y																			Y	Y	O K		
7		R	Y																			Y	Y	O K		
8 PHOTO COUPLER TLP121GR-TPL	PC1	1-3	Y																							
9		4-6	Y																							
10		1	Y												Y											
11		3	Y												Y											
12		4	Y												Y											
13		6	Y												Y											
14																										
15 CHIP BRIDGE S1WB(A)60B	D1	AC	Y																							
16		AC	Y																							
17		DC	Y																							
18		DC	Y																							
19																										
20 CHIP DIODE EC8FS6-TE12L	D2	A-K	Y																							
21		A-K	Y																							
22																										
23 CHIP DIODE 1SS184-TE85L	D3	A-K	Y																							
24		A-K	Y																							
25																										

\*\*\* A: SLIGHT B: PROLONGED

**TDK-Lambda**



MODEL : KWD5-1212		ABNORMAL TESTING										TEST CONDITIONS		APPROVED	TESTED								
												LOAD = 100%	$V_{in} = 200VAC$ $T_a = 25^{\circ}C$	CCNEO 15/03/93	<i>[Signature]</i>								
	PARTS NAME	PART NO.	TEST MODE										NOTE	O K	R E T E S T	N O G O O D							
			S H O R T	O P E N	F I R E	S M O K E A	S M O K E B	B U R S T	S M E L L	R E D H O T	D A M A G E	F U S B L O W N					O . C . P .	O . V . P .	N O U T P U T	N O C H A N G E	O T H E R S		
1	NOT ASSIGNED	D12																					
2				A-K																			
3				A-K																			
4	NOT ASSIGNED	D13																					
5				A-K																			
6				A-K																			
7	ZENER DIODE	ZD1			Y																		
8	1N4744A			A-K																			
9				A-K		Y																	
10	CHIP ZENER	ZD2			Y																		
11	02CZ12Z-TE85L			A-K																			
12				A-K		Y																	
13																							
14																							
15																							
16																							
17																							
18																							
19																							
20																							
21																							
22																							
23																							
24																							
25																							

\*\*\* A: SUIGHT B: PROLONGED

TDK-Lambda

MODEL : KWD5-1212		ABNORMAL TESTING										TEST CONDITIONS					APPROVED	TESTED		
		TEST MODE		TEST CONDITIONS		LOAD = 100%										CCNELD	1/15/03/17/3			
				Vin = 200VAC																
				Ta = 25°C																
PARTS NAME	PART NO.	SHORT	OPEN	SMOKE A	SMOKE B	BURST	SMELL	RED HOT	DAMAGE	FUSE	DOWN	O.C.P.	O.V.P.	O.U.P.	NO CHANGE	OTHERS	NOTE	O.K	TEST	GOOD
1 CAP. FILM	C1	Y																Y		
2 MKC-S683M			Y												Y			Y		
3																				
4 CAP. CERAMIC	C2		Y							Y								Y		
5 ECKDNS221MB			Y												Y			Y		
6																				
7 NOT ASSINGED	C3																			
8																				
9 CAP. CERAMIC	C4	Y													Y			Y		
10 DE7100F222MVA1N			Y												Y			Y		
11																				
12 CAP. CERAMIC	C5	Y													Y			Y		
13 DE7100F222MVA1N			Y												Y			Y		
14																				
15 CAP. ELECT	C6		Y							Y								Y		
16 LXA400VBSN -27(M)			Y												Y			Y		
17																				
18 CHIP CAP. CERAMIC	C7	Y														Y	Hiccup	Y		
19 GR43-2W5R103K500PT			Y												Y			Y		
20																				
21 CHIP CAP. CERAMIC	C8		Y															Y		
22 C3216X7R1E104KT			Y												Y			Y		
23																				
24 CHIP CAP. CERAMIC	C9		Y															Y		
25 GR40B472K50PT			Y												Y			Y		

TDK-Lambda

\*\*\* A : SLIGHT B : PROLONGED



MODEL : KWD5-1212		ABNORMAL TESTING												TEST CONDITIONS		APPROVED	TESTED					
PARTS NAME		PART NO.	TEST MODE												LOAD = 100%	TEST CONDITIONS	O K	RETESTED				
			S H O R T	O P E N	F I R E	S M O K E A	S M O K E B	B U R S T	S M E L L	R E D H O T	D A M A G E	F U S E B L O W N	O . C . P .	O . V . P .	N O U T P U T	N O C H A N G E			O T H E R S	N O T E	Y	Y
1	CHIP CAP. CERAMIC	C10	Y												Y					Y		
2	C55Y5U1E186Z-TE12		Y												Y						Y	
3																						
4	NOT ASSIGNED	C11																				
5																						
6																						
7	CHIP CAP. CERAMIC	C12	Y												Y						Y	
8	C3225COG1H332JT		Y												Y						Y	
9																						
10	CHIP CAP. CERAMIC	C13	Y												Y						Y	
11	C2012COG1H101KT		Y												Y						Y	
12																Y						
13	CHIP CAP. CERAMIC	C14	Y																		Y	
14	C2012X7R1H223KT		Y																		Y	
15																					Y	
16	CHIP CAP. CERAMIC	C15	Y																		Y	
17	C2012COG1H101KT		Y																		Y	
18																						
19																						
20	CHIP CAP. CERAMIC	C16	Y																			
21	CM21W5R271K200BT		Y																		Y	
22																					Y	
23	CHIP CAP. CERAMIC	C17	Y																			
24	C25Y5U1E106Z		Y																		Y	
25																					Y	

\*\*\* A : SLIGHT B : PROLONGED

TDK-Lambda

MODEL: KWD5-1212		ABNORMAL TESTING															TEST CONDITIONS			APPROVED	TESTED						
		PARTS NAME		PART NO.	TEST MODE														NOTE	OK	REST	GOOD					
					S H O R T	O P E N	F I R E	S M O K E A	S M O K E B	B U R S T	S M E L L	R E D H O T	D A M A G E	F U S E B L O W N	O . C . P .	O . V . P .	N O U T P U T	N O C H A N G E					O T H E R S				
1	O.S.CAP	C18																									
2	20SA33M+H																										
3																											
4	CHIP CERAMIC CAP.	C19																									
5	CM21W5R271K200BT																										
6																											
7	CHIP CERAMIC CAP	C20																									
8	C25Y5U1E106Z																										
9																											
10	O.S.CAP	C21																									
11	20SA33M+H																										
12																											
13	CAP. CERAMIC	C22																									
14	DE7100F222MVA1N																										
15																											
16	CHIP CERAMIC CAP	C23																									
17	C2012X7R1H223KT																										
18																											
19																											
20																											
21																											
22																											
23																											
24																											
25																											

\*\*\* A : SLIGHT. B : PROLONGED

**TDK-Lambda**

DWG NO: PA773-57-09

LOAD = 100%  
Vin = 200VAC  
Ta = 25°C

APPROVED  
CCN 50  
15/03/23

TESTED  
IND

TEST CONDITIONS  
LOAD = 100%  
Vin = 200VAC  
Ta = 25°C

NOTE

Hiccup

R33, R34 gradually open

Hiccup

Hiccup

Hiccup

TDK-Lambda

MODEL: KWD5-1212		ABNORMAL TESTING										TEST CONDITIONS		APPROVED	TESTED					
		TEST MODE										LOAD = 100%	$V_{in} = 200VAC$ $T_a = 25^{\circ}C$	CCN EO 1.57.0.3/83	WJL					
PARTS NAME	PART NO.	OPEN	SHORT	FIRE	SMOKE A	SMOKE B	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	V.P.	NO OUTPUT	NO CHANGES	OTHERS	NOTE	OK	RETEST	NO GOOD
1	CHIP RESISTOR		Y												Y			Y		
2	ERJ8GEYJ514V		Y												Y			Y		
3																				
4	CHIP RESISTOR		Y												Y			Y		
5	ERJ8GEYJ514V		Y												Y			Y		
6																				
7	CHIP RESISTOR		Y												Y			Y		
8	ERJ8GEYJ514V		Y												Y			Y		
9																				
10	METAL O. RESISTOR		Y												Y			Y		
11	ERG1SJ-623														Y			Y		
12																				
13	METAL O. RESISTOR		Y												Y			Y		
14	ERG1SJ-623														Y			Y		
15																				
16	CHIP RESISTOR		Y												Y			Y		
17	ERJ8GEYJ823V														Y			Y		
18																				
19	CHIP RESISTOR		Y												Y			Y		
20	ERJ8GEYJ823V														Y			Y		
21																				
22	CHIP RESISTOR		Y												Y			Y		
23	ERJ8GEYJ823V														Y			Y		
24																				
25																				

\*\*\* A : SLIGHT B : PROLONGED

TDK-Lambda

MODEL : KWD5-1212		ABNORMAL TESTING										TEST CONDITIONS		APPROVED	TESTED					
		TEST MODE										LOAD = 100%	$V_{in} = 200VAC$ $T_a = 25^{\circ}C$	<i>RCNEO</i> <i>1/3/03/RS</i>	<i>Wdmark</i>					
PARTS NAME	PART NO.																			
		S H O R T	O P E N	F I R E	S M O K E A	S M O K E B	B U R S T	S M E L L	R E D H O T	D A M A G E	F U S E B L O W N	O . V . P .	O . C . P .	N O O U T P U T	N O C H A N G E	O T H E R S	N O T E	O K	R E T E S T	N O G O O D
1	CHIP RESISTOR R9	Y	Y											Y				Y		
2	ERJ8GEYJ823V													Y				Y		
3																				
4	NOT ASSIGNED R10																			
5																				
6																				
7	NOT ASSIGNED R11																			
8																				
9																				
10	NOT ASSIGNED R12																			
11																				
12																				
13	CHIP RESISTOR R13		Y											Y				Y		
14	CR1/10W330JV													Y				Y		
15																				
16	CHIP RESISTOR R14		Y											Y				Y		
17	CR1/10W2211DV													Y				Y		
18																				
19	CHIP RESISTOR R15		Y															Y		
20	CR1/10W152JV																Y	Vout increase but < OVP	Y	
21																		Y		
22	CHIP RESISTOR R16		Y																	
23	CR1/10W331JV													Y				Y		
24														Y				Y		
25																				

\*\*\* A: SLIGHT B: PROLONGED

**TDK-Lambda**

DWG NO: PA773-57-12  
 APPROVED  
 CCNEO  
 15/03/73

TEST CONDITIONS

LOAD = 100%  
 $V_{in} = 200VAC$   
 $T_a = 25^{\circ}C$

ABNORMAL TESTING

TEST MODE

MODEL : KWD5 - 1212		PART NO.	PARTS NAME	TEST MODE																	NOTE	O K	R E T E S T	N O G O O D
				S H O R T	O P E N	F I R E	S M O K E A	S M O K E B	B U R S T	S M E L L	R E D H O T	D A M A G E	F U S E L O W N	O . C . P .	O . V . P .	N O U T P U T	N O C H A N G E	O T H E R S						
1	CHIP RESISTOR	R17		Y											Y			Y						
2	ERJ8GEYJ100V																							
3																								
4	CHIP RESISTOR	R18		Y											Y			Y						
5	ERJ8GEYJ390V																							
6																								
7	CHIP RESISTOR	R19		Y											Y			Y						
8	CR1/10W272JV																							
9																								
10	CHIP RESISTOR	R20		Y											Y			Y						
11	ERJ8GEYJ100V																							
12																								
13	CHIP RESISTOR	R21		Y											Y			Y						
14	ERJ8GEYJ100V																							
15																								
16	NOT ASSIGNED	R22																						
17																								
18																								
19	CHIP RESISTOR	R23		Y											Y			Y						
20	CR1/10W183JV																							
21																								
22	CHIP RESISTOR	R24		Y														Y						
23	ERJ8GEYJ7R5V																							
24																								
25																								

\*\*\* A: SLIGHT B: PROLONGED

TDK-Lambda

MODEL : KWD5-1212		ABNORMAL TESTING										TEST CONDITIONS		APPROVED		TESTED										
DWG NO: PA773-57-13												LOAD = 100%		Vin = 200VAC Ta = 25°C		RCCNEO 15703/93		Rajesh								
	PARTS NAME	PART NO.	TEST MODE										O.THERS	NOTE	O.K	TESTED										
			S.HORT	O.PEN	F.I.R.E	S.M.O.K.E A	S.M.O.K.E B	B.U.R.S.T	S.M.E.L.L	R.E.D H.O.T	D.A.M.A.G.E	F.U.S.E L.O.W N					O.C.P.	O.V.P.	N.O.U.T.P.U.T	N.O.C.H.A.N.G.E	H.I.C.C.U.P					
1	CHIP RESISTOR	R25	Y																							
2	ERJ8GEYJ7R5V			Y																	Y					
3																					Y					
4	CHIP RESISTOR	R26	Y																			Y				
5	ERJ8GEYJ7R5V			Y																		Y				
6																						Y				
7	CHIP RESISTOR	R27	Y																				Y			
8	ERJ8GEYJ300V			Y																			Y			
9																							Y			
10	CHIP RESISTOR	R28	Y																					Y		
11	ERJ8GEYJ300V			Y																				Y		
12																								Y		
13	NOT ASSIGNED	R29																								
14																										
15																										
16	NOT ASSIGNED	R30																								
17																										
18																										
19	CHIP RESISTOR	R31	Y																							Y
20	ERJ8GEYJ132V			Y																						Y
21																										
22	CHIP RESISTOR	R32	Y																							Y
23	ERJ8GEYJ132V			Y																						Y
24																										
25																										

\*\*\* A : SLIGHT B : PROLONGED

TDK-Lambda

DWG NO: PA773-57-14

MODEL: KWD5-1212

ABNORMAL TESTING

TEST CONDITIONS

LOAD = 100%  
 Vin = 200VAC  
 Ta = 25°C

APPROVED

CCNEP  
 1.17.03/93

TESTED

*[Signature]*

PARTS NAME	PART NO.	TEST MODE															NOTE	OK	TESTED				
		S H O R T	O P E N	F I R E	S M O K E A	S M O K E B	B U R S T	S M E L L	R E D H O T	D A M A G E	F U S I O N	O V E R P O W E R	O C P	O U T P U T	N O C H A N G E	O T H E R S							
1 CHIP RESISTOR ERJ8GEYJ300V	R33	Y	Y											Y	Y						Y		
2																							
3																							
4 CHIP RESISTOR ERJ8GEYJ300V	R34	Y	Y																				
5																							
6																							
7 NOT ASSIGNED	R35																						
8																							
9																							
10 NOT ASSIGNED	R36																						
11																							
12																							
13 CHIP RESISTOR ERJ8GEYJ132V	R37	Y	Y											Y									
14																							
15																							
16 CHIP RESISTOR ERJ8GEYJ132V	R38	Y	Y											Y									
17																							
18																							
19 CHIP RESISTOR ERJ8GEYJ102V	R39	Y	Y																				
20																							
21																							
22 CHIP RESISTOR CR1/10W222JV	R40	Y	Y											Y									
23																							
24																							
25																							

\*\*\* A: SLIGHT B: PROLONGED

TDK-Lambda

MODEL : KWD5-1212		ABNORMAL TESTING										TEST CONDITIONS		APPROVED	TESTED			
												LOAD = 100%	Vin = 200VAC Ta = 25°C	CCNEO 27/10/93	<i>M. K. ...</i>			
	PARTS NAME	PART NO.	TEST MODE							O . C . P .	O . V . P .	N O U T P U T	N O C H A N G E	O T H E R S	NOTE	O K	R E T E S T	N O G O O D
			S H O R T	O P E N	F I R E	S M O K E A	S M O K E B	B U R S T	S M E L L									
1	CHIP RESISTOR	R41	Y	Y														
2	CR1/10W7681DV																	
3																		
4	CHIP RESISTOR	R42	Y	Y														
5	CR1/10W1742DV																	
6																		
7	CHIP RESISTOR	R43	Y	Y														
8	CR1/10W2001DV																	
9																		
10	TRANSFORMER	T1	Y	Y														
11	PA77301		Y	Y														
12			Y	Y														
13			Y	Y														
14			Y	Y														
15			Y	Y														
16			Y	Y														
17			Y	Y														
18			Y	Y														
19			Y	Y														
20			Y	Y														
21			Y	Y														
22																		
23																		
24																		
25																		

\*\*\* A: SLIGHT B: PROLONGED

TDK-Lambda



MODEL : KWD5-1212		ABNORMAL TESTING											TEST CONDITIONS		APPROVED	TESTED				
													LOAD = 100%	Vin = 200VAC Ta = 25°C	CCNEO 15/03/93	MAR				
		TEST MODE																		
PARTS NAME	PART NO.	SHORT	OPEN	FIRE	SMOKE A	SMOKE B	BURST	SMELL	HOT	DAMAGE	FUSION	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RETEST	NO GOOD
1	BALUN COIL		1-2																	
2	UF171H-123YR15-02	Y	3-4											Y	Y			Y		
3			1	Y										Y						
4			2	Y										Y						
5			3	Y										Y						
6			4	Y										Y						
7																				
8	CHIP COIL																			
9	LQH3C2R2M04	Y												Y				Y		
10																				
11	NOT ASSIGNED		L5																	
12																				
13																				
14	CHIP COIL		L6																	
15	LQH3C2R2M04	Y												Y				Y		
16																				
17	NOT ASSIGNED		L7																	
18																				
19																				
20																				
21																				
22																				
23																				
24																				
25																				

\*\*\* A: SLIGHT B: PROLONGED

TDK-Lambda

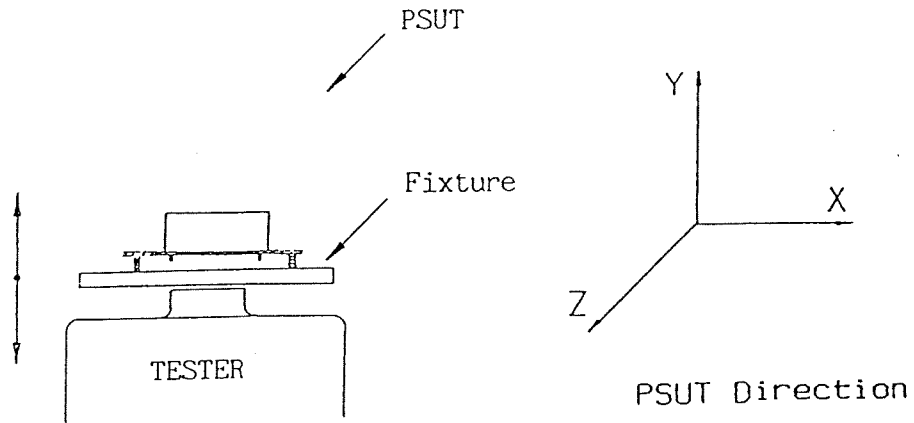
VIBRATION TEST

TYPES OF VIBRATION TEST :

- A) OSCILLATOR FREQUENCY SWEEP
- B) RESONANCE FREQUENCY

EQUIPMENT : EMIC CORPORATION VIBRATION TEST SYSTEM F-400-BM-E47  
 VIBRATION GENERATOR 905-FN

PROCEDURE :



VIBRATION TEST WITH FREQUENCY SWEEP

FREQUENCY	10 ~ 55 Hz.
SWEEP TIME	1 min.
ACCELERATION	MAX 10G.
AMPLITUDE	1.65mmPP CONSTANT.
DIRECTION	X, Y, Z.
DURATION	1 hr. for each direction.

TEST POINT :

1. Output voltage (Apply some shock when checking the o/p voltage, and observe any abnormalities.)
2. Ripple voltage (At AC 100V input and output)
3. Mechanical Condition (No breakage)

認 APPD	<i>[Signature]</i> 5/MAR/93	設 計 ENGR	<i>[Signature]</i> 27·NOV·92	圖面番号 DWG-No.	PA773-64-01	<input type="checkbox"/>
檢 査 CHK	CCNEO. 30·DEC 92	製 作 DWG	WILLIAM PHIA 25·NOV·92			

DATE

TEST RESULTS :  
(after vibration)

TEST POINT	OUTPUT VOLTAGE (V)			RIPPLE VOLTAGE (mV)			MECHANICAL CONDITION	NOTE
	CH1	CH2	CH3	CH1	CH2	CH3		
BEFORE DIRECT TEST	11.818	11.781	—	20	20	—	O.K	
X	11.817	11.778	—	20	20	—	O.K	
Y	11.820	11.776	—	20	20	—	O.K	
Z	11.827	11.771	—	20	20	—	O.K	

EVALUATION RESULT :

PASS

/ FAIL

VISUAL INSPECTION RESULT :

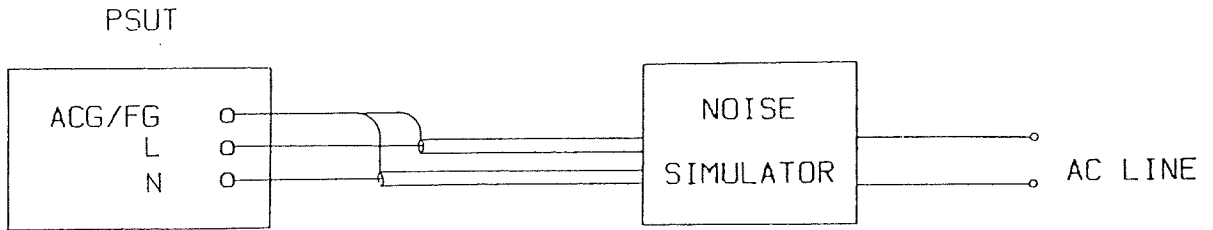
PASS

/ FAIL

認 APPD		設 計 ENGR		図面番号 DWG-No.
検 査 CHK		製 図 DWG		

NOISE SIMULATION TEST

Circuit for measurement and equipment used :



MODEL : ENS-24X (SANKI)

Testing Conditions :

- Input Voltage : AC100V
- Output Voltage : Rated
- Output Current : 0% , 100%
- Ambient Temp. : 25 °C

Settings :

- MODE ..... Normal , Common
- TRIG SELECT .... Line or Ext (Line)
- PULSE WIDTH .... 50, 200, 800, 1000ns
- PHASE SHIFT .... 0 ~ 360 Degree
- POLARITY ..... + , -
- NOISE LEVEL .... 0 ~ 2KV

Acceptance Criteria :

- 1) No damage of PSUT
- 2) No output failure  
(eg. Over/Undershoot  $\leq 3\%$  of Vo)
- 3) Check any abnormalities (eg. noise)

Evaluation Result :

(PASS) / FAIL

認 APPD	<i>[Signature]</i> 11·MAR·93	設 計 ENGR	<i>[Signature]</i> 12·1·93	図面番号 DWG-No.	PA773-61-01 - <input type="checkbox"/>
検 図 CHK	CCNEO 15·1·93	製 図 DWG	Ranekim 12·1·93		

ELECTROSTATIC DISCHARGE TEST

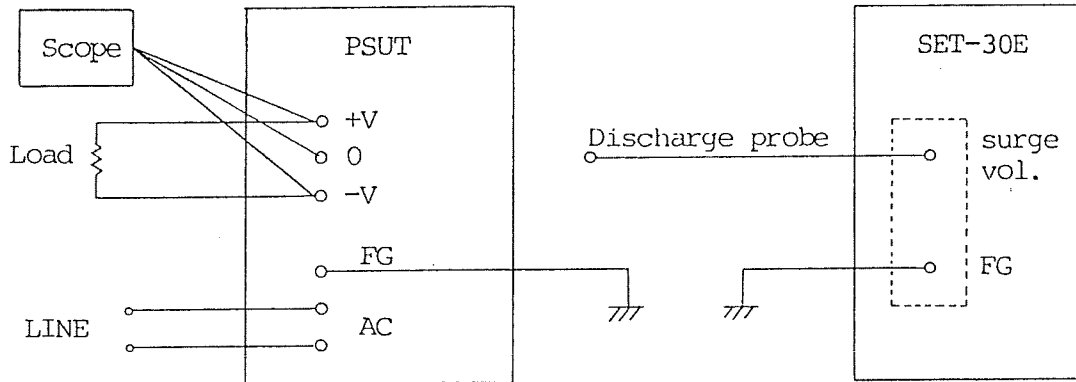
EQUIPMENT : SET-30E (SANKI ELECTRONIC)

Discharge Resistor : 250 ohm  
Capacitor unit : 200 pF

CONDITIONS : Ambient Temperature : 25°C  
Input Voltage : AC100V  
Output Voltage : Rated  
Output Current : Rated  
Applied Voltage : ±3kV, ±5kV, ±10kV, ±15kV

PROCEDURE : The PSUT should be in a good working condition. Discharge the applied voltage to the touchable parts of the PSUT (Chassis, Input Terminal; Output Terminal, FG Terminal, ACG Terminal) and check any abnormalities.

Each point to be tested 3 times with different polarity. Voltage should be applied from 3kV to 15kV.



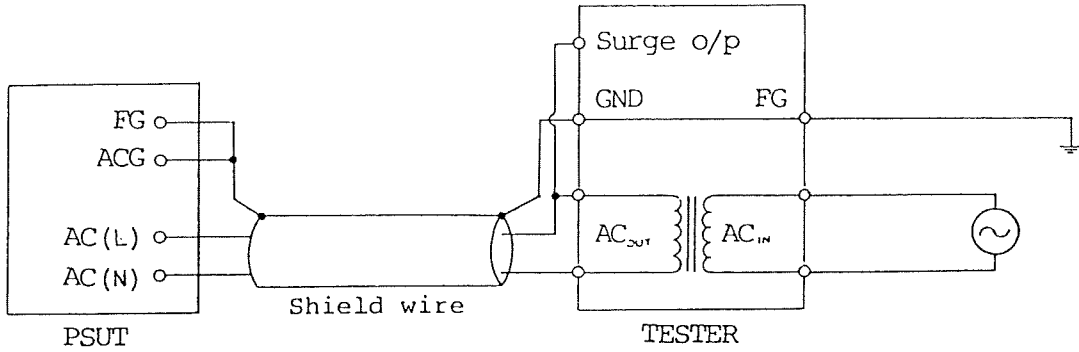
- ACCEPTANCE CRITERIA :
1. No damage of PSUT
  2. No output failure ( $\Delta V_o < 3\%$  of  $V_o$ )
  3. No abnormalities

EVALUATION RESULT : PASS / FAIL

認 APPD	<i>[Signature]</i> 11. MAR. 93	設 計 ENGR	Rm 12. 1. 93	図面番号 D WG - No. PA773-62-01 -- <span style="border: 1px dashed black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span>
検 図 C H K	CCNEO 12. 01. 93	製 図 D WG	Ranem 12. 1. 93	

LIGHTNING SURGE TEST

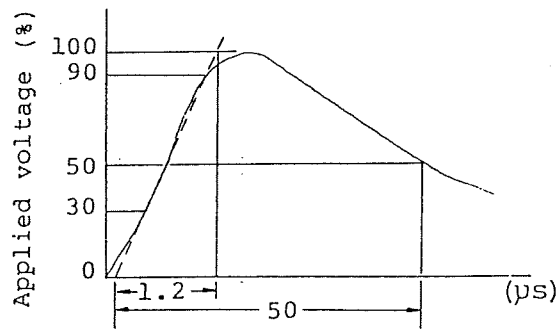
TEST CIRCUIT, TEST EQUIPMENT



MODEL : LSG - 12K - E (SANKI)

- CONDITIONS :
- Input Voltage : AC100V
  - Output Voltage : Rated
  - Output Current : Rated
  - Applied Voltage : From 3kV in steps of 0.5kV  
Check the max. withstand voltage
  - Applied Point : Between FG - AC
  - Number of Test : Each voltage 3 times
  - Polarity : + , -
  - Ambient Temp. : 25°C

APPLIED VOLTAGE WAVEFORM :



- ACCEPTANCE CRITERIA :
1. No damage to the PSUT
  2. No output failure
  3. No abnormalities

EVALUATION RESULT :

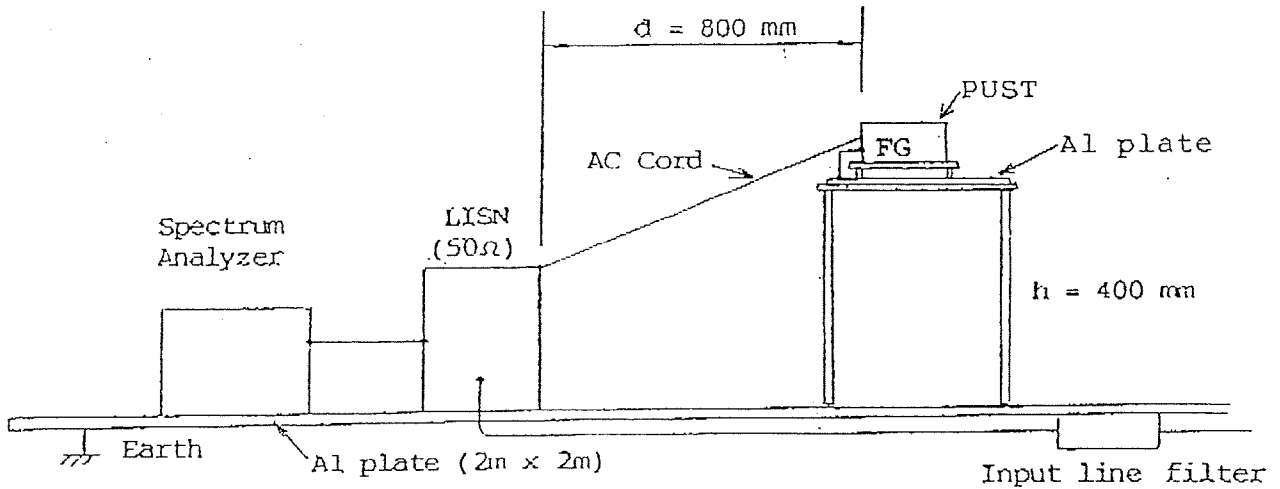
PASS  
5KV

/ FAIL

認・ APPD	<i>[Signature]</i> 8·MAR·93	設 計 ENGR	<i>psk</i> 12·1·93	図面番号 DWG-No.	PA773-74-01 - <span style="border: 1px dashed black; display: inline-block; width: 20px; height: 20px; vertical-align: middle;"></span>
検 査 CHK	CCNEO 12·01·93	製 作 DWG	<i>Ramesh M</i> 12·1·93		

EMI TEST

TEST CIRCUIT :



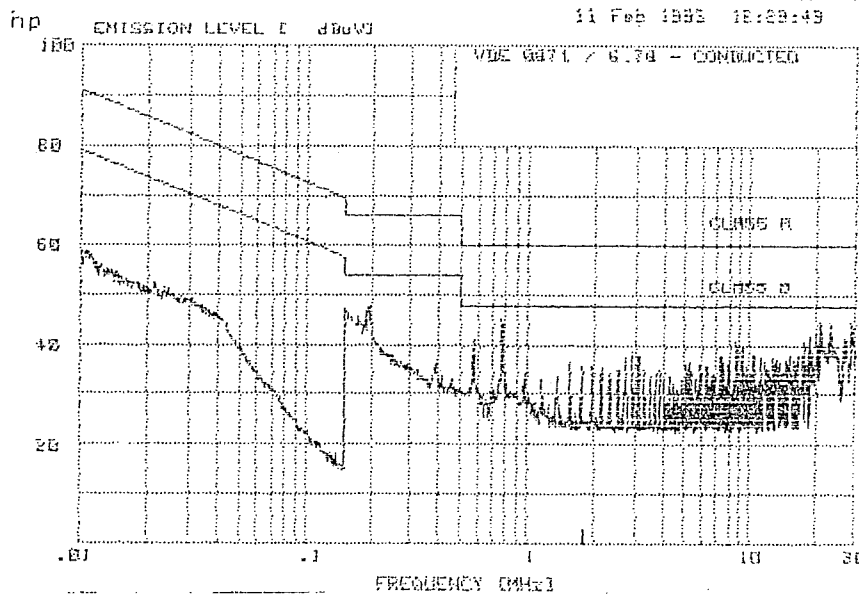
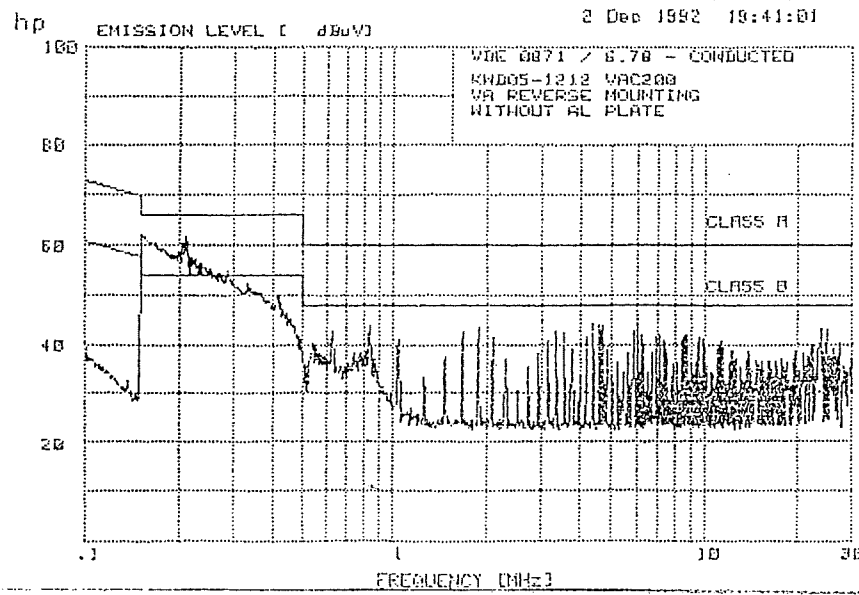
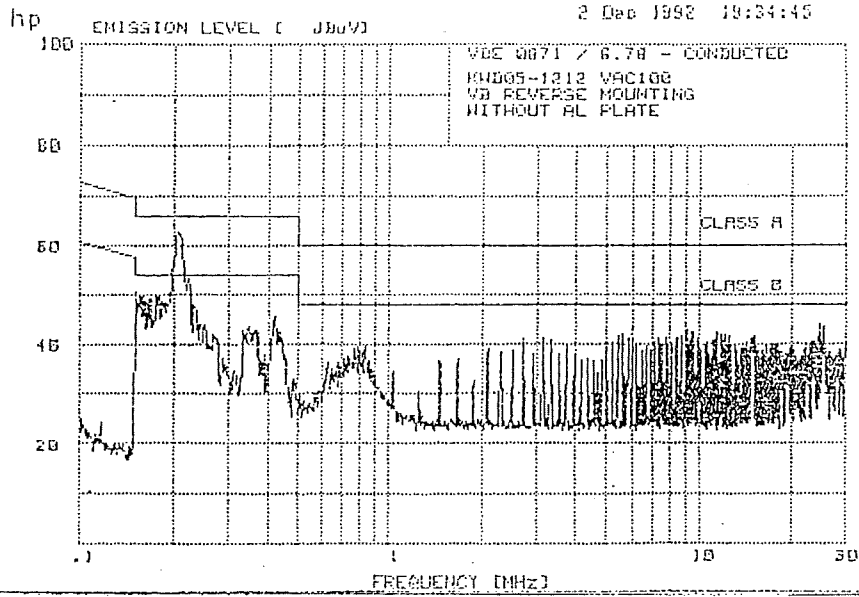
TEST EQUIPHMENTS :

SPECTRUM ANALYZER	8568B	HEWLETT PACKARD
QUASI-PEAK ADAPTER	85650A	HEWLETT PACKARD
RF PRESELECTOR	85685A	HEWLETT PACKARD
LISN	3825/2	EHCO

CONDITIONS :

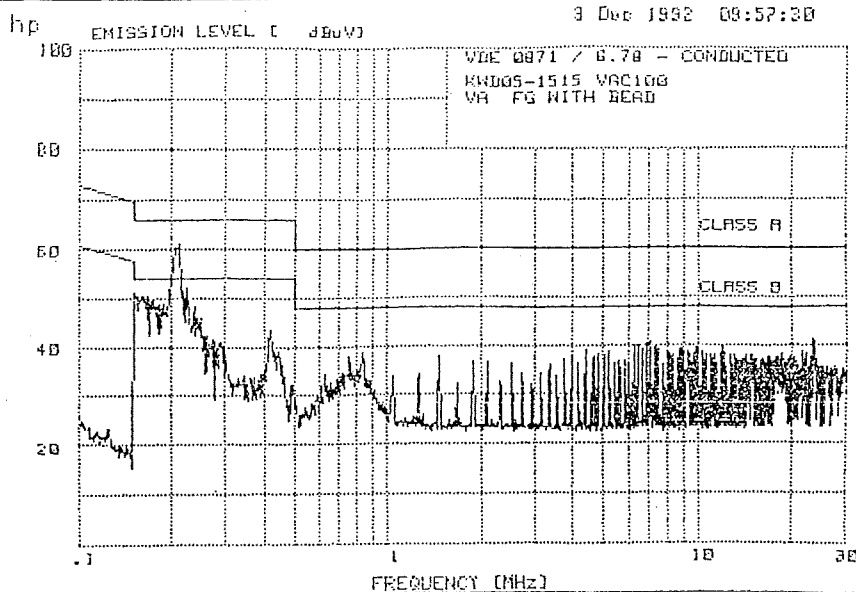
INPUT VOLTAGE	:	AC100V, AC200V
OUTPUT VOLTAGE	:	RATED
OUTPUT CURRENT	:	RATED
AMBIENT TEMP	:	25°C

認 APPD		設 計 ENGR		図面番号 DWG-No.	
検 査 CHK		製 作 DWG			□

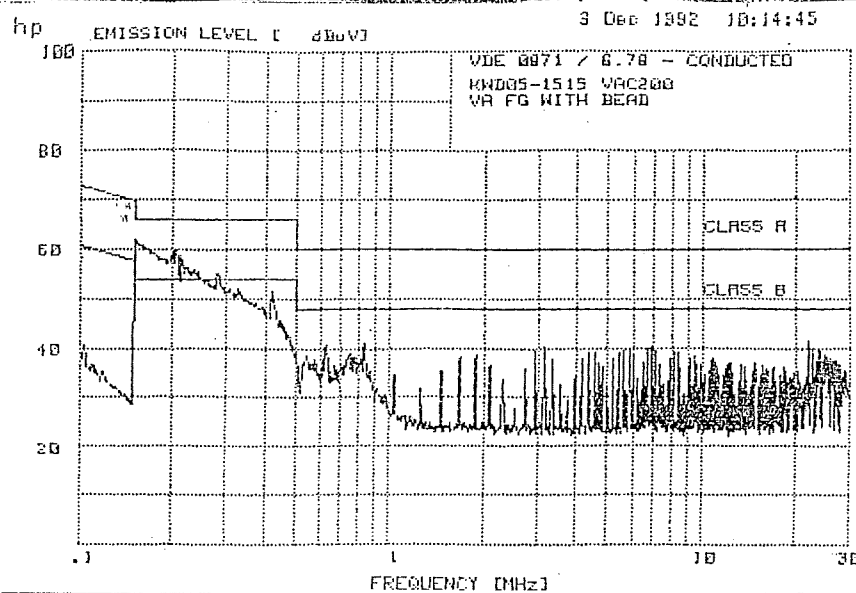


認 APPD	.	設 計 ENGR	.	図面番号 D W G - No. PA773-70-02 -	<input type="checkbox"/>
検 図 C H K	.	製 図 D W G	.		

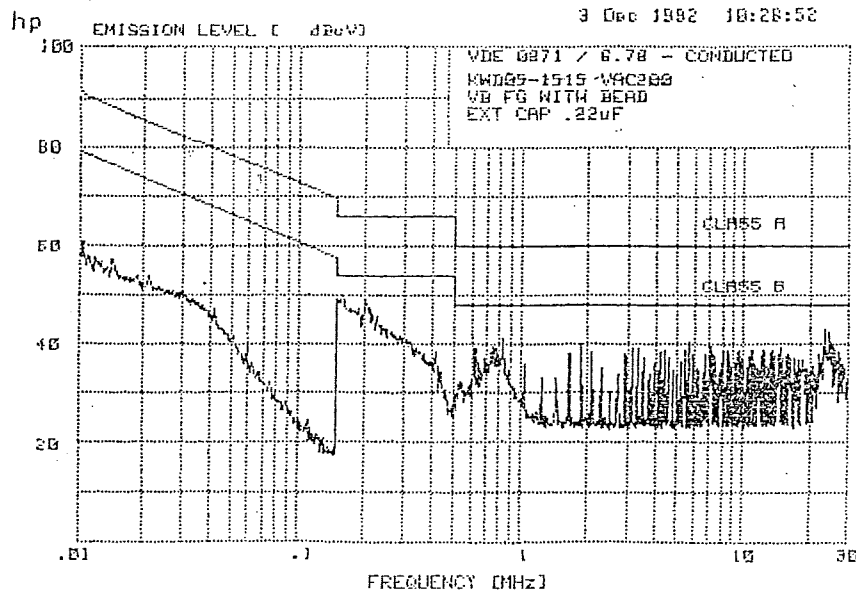




Vin = 100Vac



Vin = 200VAC



Vin = 200Vac

V D E

with external cap.  
0.22 $\mu$ F between  
AC(L) and AC(N)

認 APPD	.	設 計 ENGR	.	図面番号 DWG - No.	PA773-70-03 - <input type="checkbox"/>
検 図 CHK	.	製 図 DWG	.		