KWS10

RELIABILITY DATA

信頼性データ

No. RD-08T-624A		
承認	査閲	担当
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TDK-Lambda

I N D E X

※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.

1．MTBF計算値　CALCULATED VALUES OF MTBF

MODEL：KWS10

(1) 算出方法　Part count reliability projection

(社) 日本電子機械工業会　直流安定化電源（スイッチング方式）委員会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λ_Gが与えられ、各々の点数によって決定されます。λ_Gは，MIL－HDBK－217 Dに準じて定められています。

Calculated based on part count reliability projection by the Technical Comittee on Stabilized Power Supplies of EIAJ.

Fixed failure rate λ_G is given to each individual part and MTBF is determined by the count of each part.

λ_G is determined based on MIL—HDBK—217D.

＜算出式＞

$$MTBF=\frac{1}{\lambda\ equip}=\frac{1}{\sum_{i=1}^{n} Ni(\lambda_G)i}\times 10^6 \text{ 時間 (Hours)}$$

λequip ：全機器故障率（故障数／10^6時間）

Total Equipment Failure Rate (Failure／10^6Hour)

λ_G ：i番目の同属部品に対する故障率（故障数／10^6時間）

Generic Failure Rate for The ith Generic Part

Ni ：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

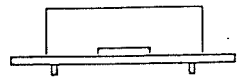
Number of Different Generic Part Categories

(2) MTBF値

$$MTBF=\frac{1\times 10^6}{5.0333}\fallingdotseq 198{,}676 \text{ 時間 (Hours)}$$

2．部品ディレーティグ　COMPONENT DERATING

MODEL：KWS10-5



(1) 算出方法　Calculating method

(a) 測定条件　Condition

・入　　力：100VAC　　・出力：5V2A（100%）
Input　　Output

・周囲温度：50℃　　・取付方法：標準取付(A)
Ambient temperature　　Mounting Method：Standard Mounting Method (A)

(b) 半導体　Semiconductors

周囲温度，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 ambient temperature, power dissipation and thermal impedance.

(c) ＩＣ，抵抗，コンデンサー等　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

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

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

T_a　：ディレーティングの始まる周囲温度　一般に25℃
Ambient Temperature at Start Point of Derating ; 25℃ in General

$P_{c(max)}$　：最大コレクタ損失
Maximum Collector Dissipation

$T_{j(max)}$　：最大接合点温度
Maximum Junction Temperature

θ_{j-c}　：接合点からケースまでの熱抵抗
Thermal Impedance between Junction and Case

θ_{j-a}　：接合点から周囲までの熱抵抗
Thermal Impedance between Junction and Air

SEMICONDUCTOR DERATING

DWG. NO. PA767-56-03

DATE : 21-MAY-1992

MODEL : KWS10-5

VIN = AC 100V LOAD = 100% Ta = 50 °C

Q1 2SK1663L FUJI	Tchmax = 150 °C	θch-c = 1.563 °C/W	Pd(max) = 80.0 W
	Pd = 0.826 W	ΔTc = 45.1 °C	Tc = 95.1 °C
	Tch = Tc + (θch-c) * Pd = 96.39 °C		
	D.F. = 64.26 %		
A1 UC2842ADW UNITRODE	Tjmax = 150 °C	θj-c = 70.0 °C/W	Pd(max) = 0.725 W
	Pd = 0.298 W	ΔTc = 45.2 °C	Tc = 95.2 °C
	Tj = Tc + (θj-c) * Pd = 116.06 °C		
	D.F. = 77.37 %		
A2 HA17431FPA HITACHI	Tjmax = 125 °C	θj-c = 259.74 °C/W	Pd(max) = 0.385 W
	Pd = 0.25 mW	ΔTc = 32.2 °C	Tc = 82.2 °C
	Tj = Tc + (θj-c) * Pd = 82.3 °C		
	D.F. = 65.84 %		
PC1 (LED) TLP121GR TOSHIBA	Tjmax = 125 °C	θj-c = -- °C/W	Pd(max) = 50 mW
	If = 0.09 mA	ΔTc = 31.0 °C	Tc = 81.0 °C
	ALLOWABLE If (max) = 31mA (AT Tc = 81.0 °C)		
	D.F. = 0.18 %		
PC1 (TRANSISTOR) TLP121GR TOSHIBA	Tjmax = 125 °C	θj-c = 400 °C/W	Pd(max) = 150 mW
	Pd = 0.243 mW	ΔTc = 31.0 C	Tc = 81.0 °C
	Tj = Tc + (θj-c) * Pd = 81.09 °C		
	D.F. = 64.87 %		
D1 S1WB(A)60B SHINDENGEN	Tjmax = 150 °C	θj-l = 10.0 °C/W	Pd(max) = 12.5 W
	Pd = 0.422 W	ΔT(lead) = 29.5 °C	T(lead) = 79.5 °C
	Tj = Tl + (θj-l) * Pd ≒ 83.72 °C		
	D.F. = 55.81 %		
D2 1SS184TE85L TOSHIBA	Tjmax = 125 °C	θj-l = 100 °C/W	Pd(max) = 150 mW
	Pd = 39.2 mW	ΔT(lead) = 36.3 °C	T(lead) = 86.3 °C
	Tj = Tl + (θj-l) * Pd = 90.22 °C		
	D.F. = 72.18 %		

SEMICONDUCTOR DERATING

DWG. NO. PA767-56-04

DATE : 21-MAY-1992

MODEL : KWS10-5

VIN = AC 100V LOAD = 100% Ta = 50 °C

D3 D1FL20U SHINDENGEN	Tchmax = 150 °C	Θj-l = 23.0 °C/W	Pd(max) = 5.43 W
	Pd = 32.34 mW	ΔT(lead) = 42.7 °C	T(lead) = 92.7 °C
	Tj = Tl + (Θj-l) * Pd = 93.44 °C		
	D.F. = 62.3 %		
D4 EC8FS6 NIHON-INTER	Tchmax = 150 °C	Θj-l = 23.0 °C/W	Pd(max) = 5.43 W
	Pd = 40.26 mW	ΔT(lead) = 44.6 °C	T(lead) = 94.6 °C
	Tj = Tl + (Θj-l) * Pd = 95.53 °C		
	D.F. = 63.69 %		
D5 TP802C04 FUJI	Tjmax = 150 °C	Θj-c = 3.0 °C/W	Pd(max) = 41.7 W
	Pd = 1.21 W	ΔTc = 56.3 °C	Tc = 106.3 °C
	Tj = Tc + (Θj-c) * Pd = 109.93 °C		
	D.F. = 73.29 %		
ZD1 1N4735A MOTOROLA	Tjmax = 200 °C	Θj-c = 175 °C/W	Pd(max) = 1.0 W
	Pd = 0 W	ΔTc = 40.8 °C	Tc = 90.8 °C
	Tj = Tc + (Θj-c) * Pd = 90.8 °C		
	D.F. = 45.4 %		
ZD2 U1ZB240-Y TOSHIBA	Tjmax = 150 °C	Θj-c = 125 °C/W	Pd(max) = 1.0 W
	Pd = 0 W	ΔTc = 36.2 °C	Tc = 86.2 °C
	Tj = Tc + (Θj-c) * Pd = 86.2 °C		
	D.F. = 57.5 %		
D7 1SS184TE85L TOSHIBA	Tjmax = 125 °C	Θj-l = 100 °C/W	Pd(max) = 150 mW
	Pd = 0 mW	ΔT(lead) = 39.6 °C	T(lead) = 89.6 °C
	Tj = Tl + (Θj-l) * Pd = 89.6 °C		
	D.F. = 71.7 %		
Q2 2SC2873-Y TOSHIBA	Tchmax = 150 °C	Θch-c = 125 °C/W	Pd(max) = 1.0 W
	Pd = 0 W	ΔTc = 34.8 °C	Tc = 84.8 °C
	Tch = Tc + (Θch-c) * Pd = 84.8 °C		
	D.F. = 56.5 %		

dT TEMPERATURE RISE

DWG. NO. PA767-66-02

MODEL : KWS10-5

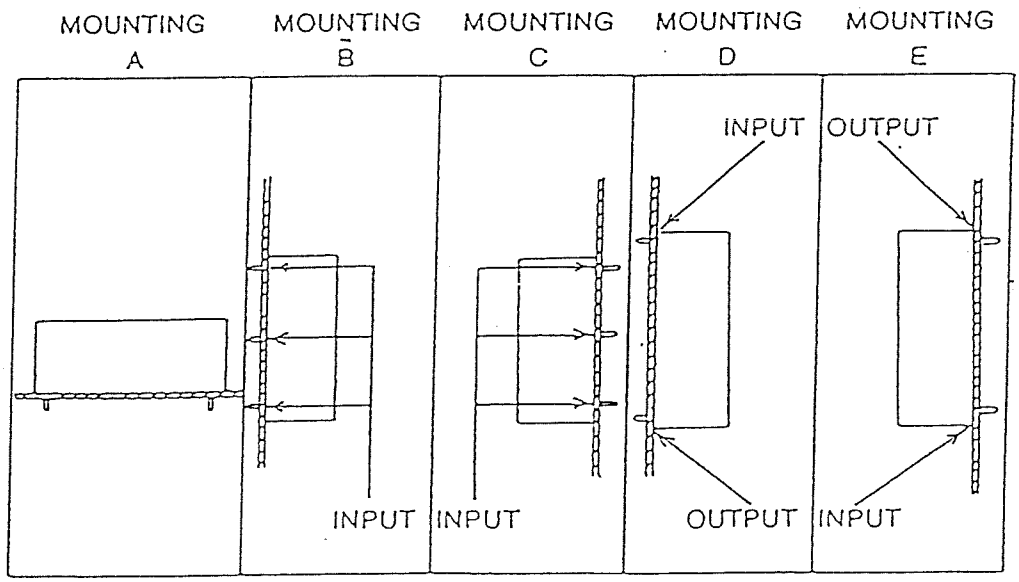
DATE : 15-MAY-1992

INPUT VOLTAGE = 100VAC

Ta = 50 °C		dT 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	45.1	44.6	42.8	42.6	44.0
A1	PWM IC	45.2	45.2	42.5	43.2	43.1
D5	SBD	56.3	55.3	55.9	53.0	56.7
T1	X'TMER	45.8	44.8	44.9	43.3	44.9
C5	E.CAP	35.1	36.2	32.9	33.1	34.6
C16	OS CAP.	40.5	39.6	38.6	37.0	40.5

INPUT VOLTAGE = 200VAC

Ta = 50 °C		dT 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	57.1	56.1	54.3	53.9	46.9
A1	PWM IC	51.7	51.3	48.5	49.1	48.9
D5	SBD	61.7	60.3	61.2	57.8	61.9
T1	X'TMER	53.4	51.7	52.1	50.3	51.7
C5	E.CAP	41.8	42.6	39.0	39.2	40.6
C16	OS CAP.	45.8	44.7	43.8	41.9	45.7



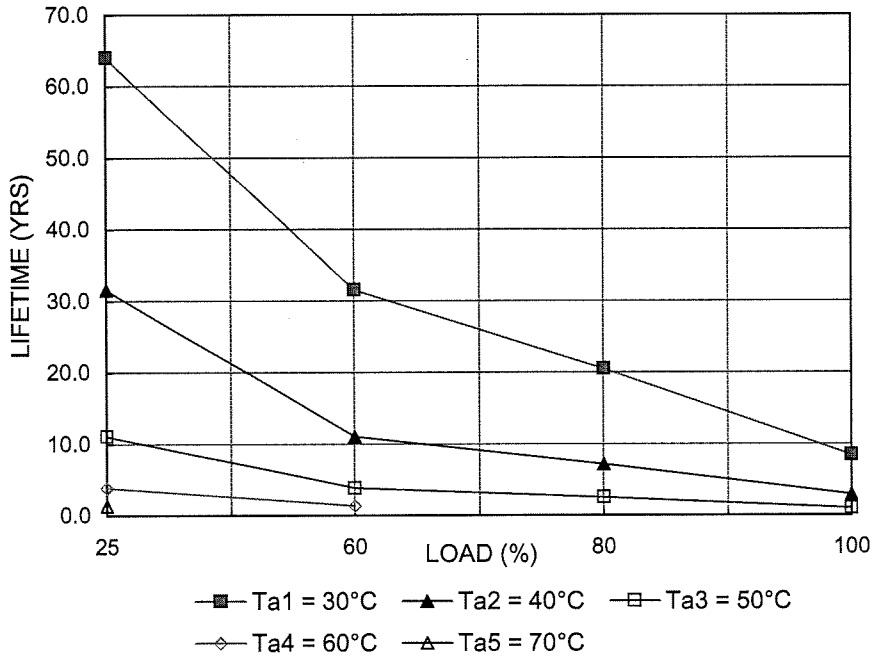
ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWS10-5 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	64.0	31.6	11.1	3.9	1.4
60	31.6	11.1	3.9	1.4	
80	20.6	7.2	2.5		
100	8.4	3.0	1.0		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD
MOUNTING A KWS10-5



計算式 **FORMULA**

1. アルミ電解コンデンサ
   AL. Electrolytic capacitor
   $L = Lo \times 2^{(105-Tc)/10}$ (year)

2. OSコンデンサ
   O.S capacitor
   $L = Lo \times 10^{(105-Tc)/20}$ (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)

Lo : 電解コンデンサ保証寿命値
Guarantee life for Elec. cap.

Tc : 電解コンデンサのケース温度
Case temperature of Elec. cap.

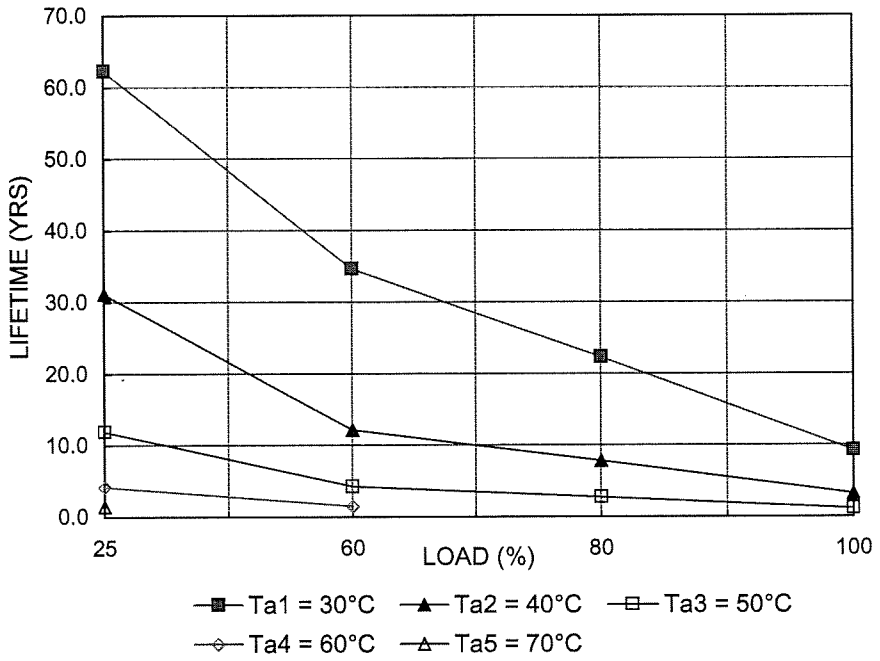
ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWS10-5 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	62.3	31.1	11.9	4.2	1.5
60	34.7	12.2	4.3	1.5	
80	22.4	7.9	2.8		
100	9.3	3.3	1.1		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD
MOUNTING B KWS10-5



計算式 **FORMULA**

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   O.S capacitor
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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)

Lo : 電解コンデンサ保証寿命値
Guarantee life for Elec. cap.

Tc : 電解コンデンサのケース温度
Case temperature of Elec. cap.

ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWS10-5

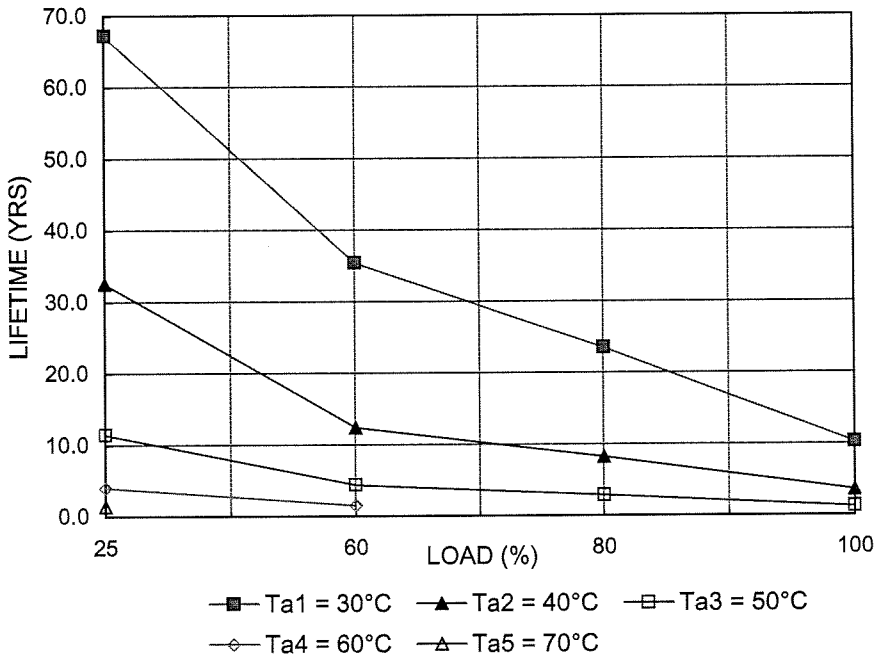
MOUNTING : C

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	67.2	32.6	11.4	4.0	1.4
60	35.4	12.4	4.4	1.5	
80	23.6	8.3	2.9		
100	10.3	3.6	1.3		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD
MOUNTING C KWS10-5



計算式 **FORMULA**

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2. OSコンデンサ
   O.S capacitor
   $L = Lo \times 10^{(105-Tc)/20}$ (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)

Lo : 電解コンデンサ保証寿命値
Guarantee life for Elec. cap.

Tc : 電解コンデンサのケース温度
Case temperature of Elec. cap.

ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWS10-5

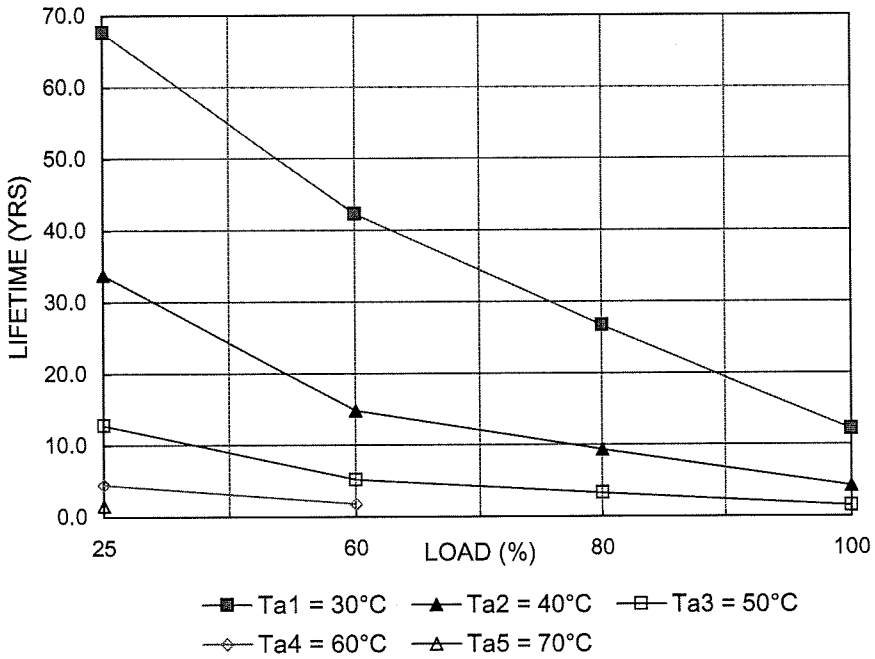
MOUNTING : D

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	67.7	33.8	12.8	4.5	1.6
60	42.3	14.9	5.2	1.8	
80	26.7	9.4	3.3		
100	12.2	4.3	1.5		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD
MOUNTING D KWS10-5



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   O.S capacitor
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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)

Lo : 電解コンデンサ保証寿命値
Guarantee life for Elec. cap.

Tc : 電解コンデンサのケース温度
Case temperature of Elec. cap.

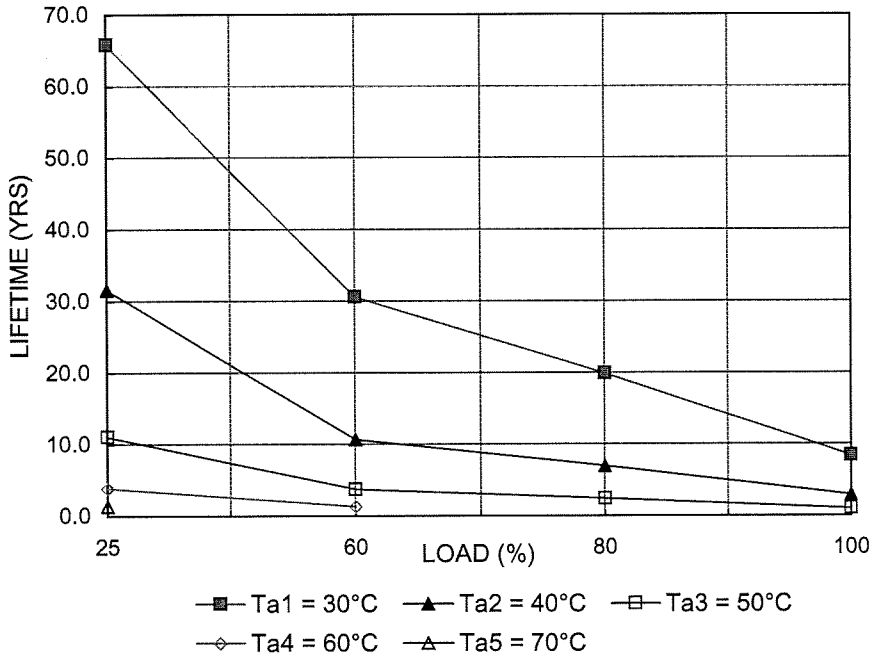
ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWS10-5 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	65.8	31.6	11.1	3.9	1.4
60	30.6	10.7	3.8	1.3	
80	19.9	7.0	2.5		
100	8.4	3.0	1.0		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD
MOUNTING E KWS10-5



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(24 hrs per day, 365 days per year)

Lo : 電解コンデンサ保証寿命値
Guarantee life for Elec. cap.

Tc : 電解コンデンサのケース温度
Case temperature of Elec. cap.

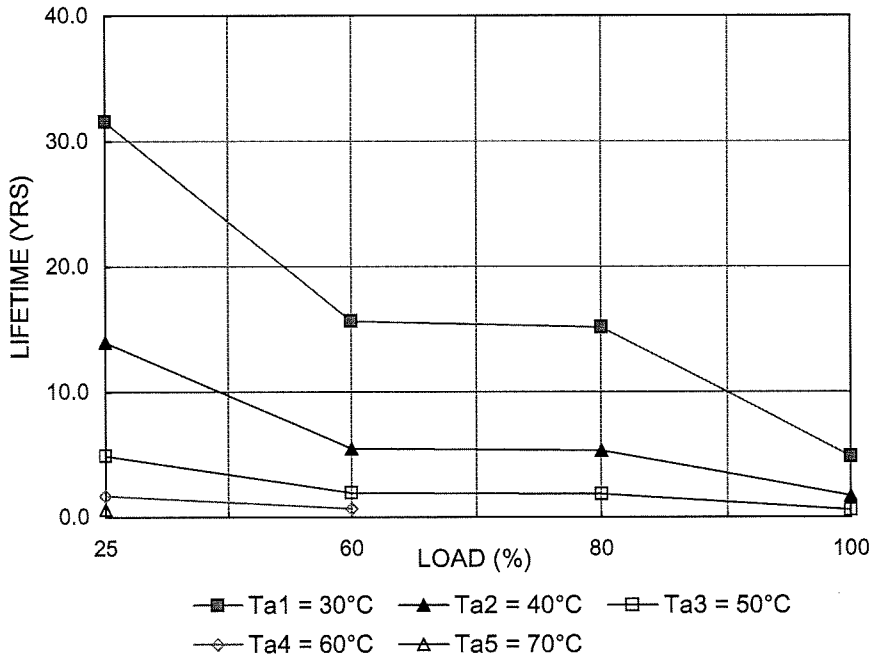
ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWS10-5 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	31.6	14.0	4.9	1.7	0.6
60	15.7	5.5	1.9	0.7	
80	15.2	5.3	1.9		
100	4.9	1.7	0.6		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD
MOUNTING A KWS10-5



計算式 **FORMULA**

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2. OSコンデンサ
   O.S capacitor
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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)

Lo : 電解コンデンサ保証寿命値
Guarantee life for Elec. cap.

Tc : 電解コンデンサのケース温度
Case temperature of Elec. cap.

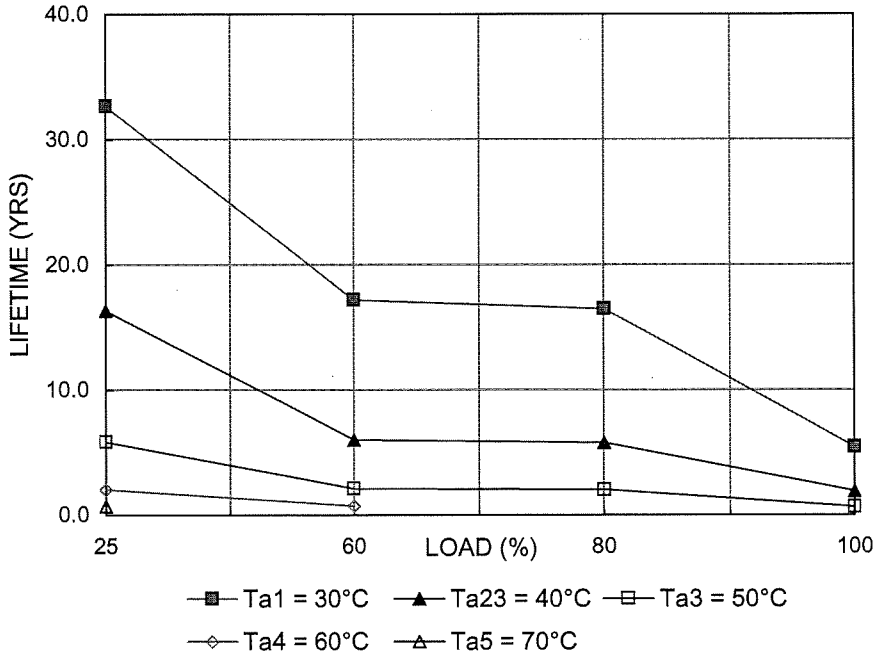
ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWS10-5 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	32.7	16.3	5.9	2.1	0.7
60	17.2	6.0	2.1	0.7	
80	16.5	5.8	2.0		
100	5.4	1.9	0.7		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD
MOUNTING B KWS10-5



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Lo : 電解コンデンサ保証寿命値
Guarantee life for Elec. cap.

Tc : 電解コンデンサのケース温度
Case temperature of Elec. cap.

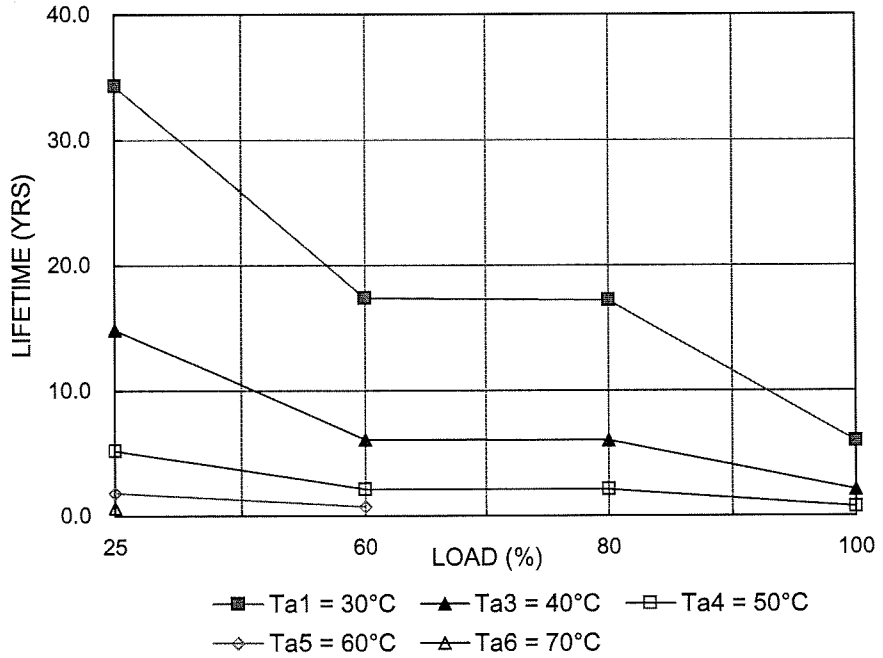
ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWS10-5 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	34.3	14.9	5.22	1.8	0.6
60	17.4	6.1	2.14	0.8	
80	17.2	6.0	2.12		
100	6.0	2.1	0.74		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD
MOUNTING C KWS10-5



計算式 **FORMULA**

1. アルミ電解コンデンサ
   AL. Electrolytic capacitor
   $L = Lo \times 2^{(105-Tc)/10}$ (year)

2. OSコンデンサ
   O.S capacitor
   $L = Lo \times 10^{(105-Tc)/20}$ (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)

Lo : 電解コンデンサ保証寿命値
Guarantee life for Elec. cap.

Tc : 電解コンデンサのケース温度
Case temperature of Elec. cap.

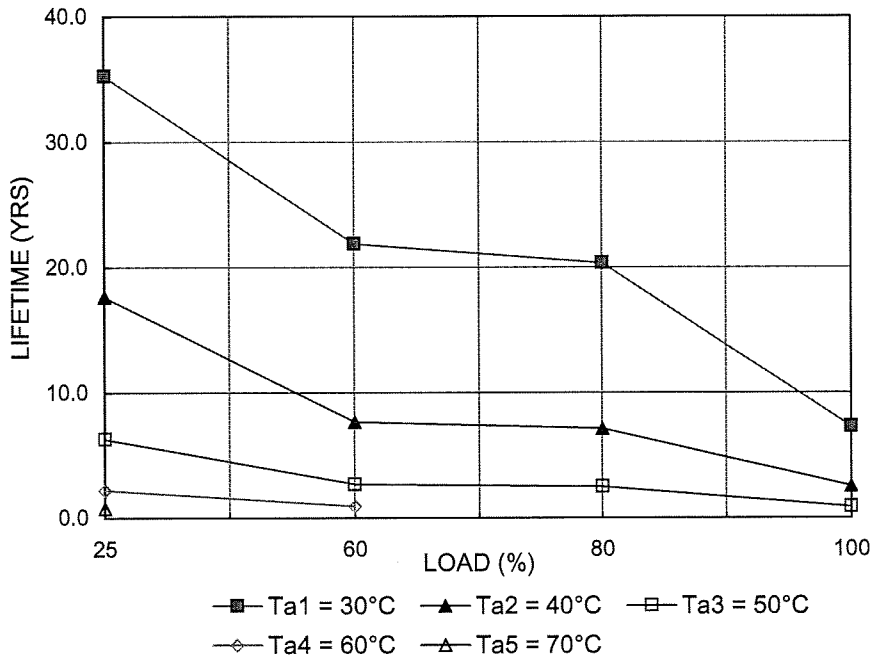
ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWS10-5 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	35.3	17.6	6.3	2.2	0.8
60	21.9	7.7	2.7	0.9	
80	20.3	7.1	2.5		
100	7.3	2.6	0.9		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD
MOUNTING D KWS10-5



計算式 **FORMULA**

1. アルミ電解コンデンサ
   AL. Electrolytic capacitor
   $L = Lo \times 2^{(105-Tc)/10}$ (year)

2. OSコンデンサ
   O.S capacitor
   $L = Lo \times 10^{(105-Tc)/20}$ (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)

Lo : 電解コンデンサ保証寿命値
Guarantee life for Elec. cap.

Tc : 電解コンデンサのケース温度
Case temperature of Elec. cap.

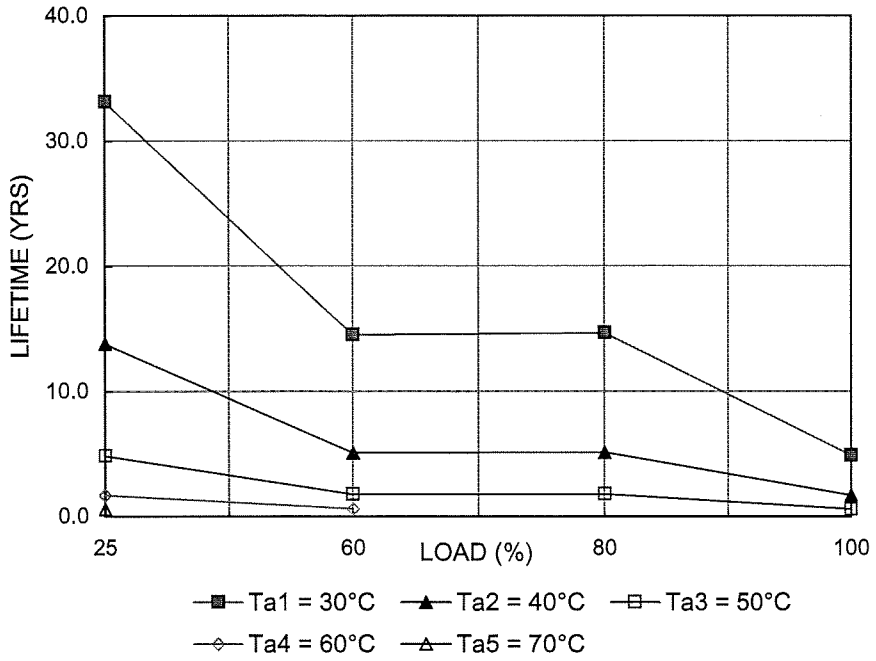
ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD

MODEL : KWS10-5 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	33.2	13.8	4.9	1.7	0.6
60	14.6	5.1	1.8	0.6	
80	14.7	5.2	1.8		
100	4.9	1.7	0.6		

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VS LOAD
MOUNTING E KWS10-5



計算式 **FORMULA**

1. アルミ電解コンデンサ
   AL. Electrolytic capacitor
   $L = Lo \times 2^{(105-Tc)/10}$ (year)

2. OSコンデンサ
   O.S capacitor
   $L = Lo \times 10^{(105-Tc)/20}$ (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)

Lo : 電解コンデンサ保証寿命値
Guarantee life for Elec. cap.

Tc : 電解コンデンサのケース温度
Case temperature of Elec. cap.

DWG NO : PA767-57-02

MODEL : KWS10-5	ABNORMAL TESTING	TEST CONDITIONS. LOAD = 100 % Vin = 100VAC Ta = 25℃	APPROVED BY	TESTED BY

	PARTS NAME	PART NO.	TEST MODE	SHORT	OPEN		FIRE	SMOKE (a)	SMOKE (b)	BURST	SMELL	RED HOT	DAMAGE	F.FUSE BLOWN	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RE TEST	NO GOOD
1	UF1717H-103YR25-01	L1		*														*			*		
2	UF1717H-702YOR3-01	L1			*												*				*		
3																							
4	S1WB(A)60B	D1	AC	*										*							*		
5	S1WB(A)60B	D1	AC		*												*				*		
6	S1WB(A)60B	D1	DC	*										*							*		
7	S1WB(A)60B	D1	DC		*												*				*		
8																							
9	1SS184TE85L	D2	A-K	*														*			*		
10	1SS184TE85L	D2	A-K		*													*			*		
11																							
12	D1FL20U	D3	A-K	*													*				*		
13	D1FL20U	D3	A-K		*														*	hiccup	*		
14																							
15	EC8FS6	D4	A-K	*															*	hiccup	*		
16	EC8FS6	D4	A-K		*													*			*		
17																							
18	TP802C04	D5	A-K	*															*	hiccup	*		
19	TP802C04	D5	A-K		*												*				*		
20																							
21	1SS184TE85L	D7	A-K	*														*			*		
22	1SS184TE85L	D7	A-K		*													*			*		
23																							
24																							

*** a : slight b : prolonged

TDK-Lambda

MODEL : KWS10-5			ABNORMAL TESTING																				DWG NO : PA767-57-03		
			TEST MODE				TEST CONDITIONS																APPROVED BY		TESTED BY
							LOAD = 100 %																		
							Vin = 100VAC																		
							Ta = 25℃																		
	PARTS NAME	PART NO.		SHORT	OPEN		FIRE	SMOKE		BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RE TEST	NO GOOD
								(a)	(b)																
1	1N4735A	ZD1	A-K	*															*	hiccup	*		
2	1N4735A	ZD1	A-K		*													*			*		
3																							
4	U1ZB240-Y(TE12L)	ZD2	A-K	*															*	hiccup	*		
5	U1ZB240-Y(TE12L)	ZD2	A-K		*													*			*		
6																							
7	TLP121GR (DIODE)	PC1	1-3	*															*	hiccup ZD1 - shorted	*		
8	TLP121GR (DIODE)	PC1	1-3		*														*	hiccup ZD1 - shorted	*		
9	TLP121GR (TRANS)	PC1	4-6	*													*				*		
10	TLP121GR (TRANS)	PC1	4-6		*													*			*		
11																							
12	HA17431FPA-TR	A2	A-K	*															*	hiccup	*		
13	HA17431FPA-TR	A2	REF-A	*															*	hiccup ZD1 - shorted	*		
14																							
15	2SK1663L	Q1	D-S	*									*							Q1,A1,R13,R14,R15,F1	*		
16	2SK1663L	Q1	G-S	*													*				*		
17																							
18	2SC2873-Y	Q2	B-E	*														*					
19	2SC2873-Y	Q2	C-E	*													*				*		
20	2SC2873-Y	Q2	B-C	*													*				*		
21																							
22																							
23																							
24																							

*** a : slight b : prolonged

TDK-Lambda

DWG NO : PA767-57-04

MODEL : KWS10-5	ABNORMAL TESTING	TEST CONDITIONS	APPROVED BY	TESTED BY
		LOAD = 100 % Vin = 100VAC Ta = 25℃		

	PARTS NAME	PART NO.	TEST MODE	SHORT	OPEN		FIRE	SMOKE (a)	SMOKE (b)	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RE TEST	NO GOOD
1	MKC-S683M	C1		*										*							*		
2	MKC-S683M	C1			*													*			*		
3																							
4	PME290MA4330M	C3		*														*			*		
5	PME290MA4330M	C3			*													*			*		
6																							
7	PME290MA4330M	C4		*														*			*		
8	PME290MA4330M	C4			*													*			*		
9																							
10	LXA400VBSN-47(M)	C5		*										*							*		
11	LXA400VBSN-47(M)	C5			*													*			*		
12																							
13	C55Y5U1E186Z-TE12	C6		*													*				*		
14	C55Y5U1E186Z-TE12	C6			*												*				*		
15																							
16	C2012X7R1E104KT	C7		*													*				*		
17	C2012X7R1E104KT	C7			*													*			*		
18																							
19	C3225C0G1H332J	C8		*													*				*		
20	C3225C0G1H332J	C8			*														*	Pin incr, D-S w/f unstable	*		
21																							
22																							
23																							
24																							

*** a : slight b : prolonged

TDK-Lambda

DWG NO : PA767-57-05

MODEL : KWS10-5	ABNORMAL TESTING	TEST CONDITIONS	APPROVED BY	TESTED BY
		LOAD = 100 %		
	TEST MODE	Vin = 100VAC Ta = 25℃		

	PARTS NAME	PART NO.		SHORT	OPEN		FIRE	SMOKE (a)	SMOKE (b)	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RE TEST	NO GOOD
1	C2012C0G1H101KT	C9		*									*							Q1,A1,R8,R10,R13,R14,R15	*		
2	C2012C0G1H101KT	C9			*													*			*		
3																							
4	C2012C0G1H331KT	C10		*													*				*		
5	C2012C0G1H331KT	C10			*													*			*		
6																							
7	GR43-2W5R103K500PT	C11		*															*	hiccup	*		
8	GR43-2W5R103K500PT	C11			*													*			*		
9																							
10	C2012X7R1H473KT	C12		*															*	hiccup	*		
11	C2012X7R1H473KT	C12			*													*			*		
12																							
13	C25Y5U1E106Z	C13		*															*	hiccup	*		
14	C25Y5U1E106Z	C13			*													*			*		
15																							
16	C25Y5U1E106Z	C14		*															*	hiccup	*		
17	C25Y5U1E106Z	C14			*													*			*		
18																							
19	10SA68M+H	C16		*															*	hiccup	*		
20	10SA68M+H	C16			*													*			*		
21																							
22	C2012X7R1E104KT	C17		*															*	low Vout and Pin	*		
23	C2012X7R1E104KT	C17			*													*		high pitch sound	*		
24																							

*** a : slight b : prolonged

TDK-Lambda

DWG NO : PA767-57-06

MODEL : KWS10-5	ABNORMAL TESTING	TEST CONDITIONS	APPROVED BY	TESTED BY
		LOAD = 100 % Vin = 100VAC Ta = 25℃		

	PARTS NAME	PART NO.	TEST MODE	SHORT	OPEN		FIRE	SMOKE (a)	SMOKE (b)	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RE TEST	NO GOOD
1	DE7100F222MVAIN	C18		*														*			*		
2	DE7100F222MVAIN	C18			*													*			*		
3																							
4	C3216X7R1H154KT	C19		*															*	hiccup	*		
5	C3216X7R1H154KT	C19			*													*			*		
6																							
7	CM21W5R102K200BT	C20		*															*	hiccup	*		
8	CM21W5R102K200BT	C20			*													*			*		
9																							
10	C3216X7R1E334KT	C21		*														*			*		
11	C3216X7R1E334KT	C21			*													*			*		
12																							
13	ERJ8GEYJ514V	R1		*														*			*		
14	ERJ8GEYJ514V	R1			*													*			*		
15																							
16	ERJ8GEYJ514V	R2		*														*			*		
17	ERJ8GEYJ514V	R2			*													*			*		
18																							
19	ERJ8GEYJ514V	R3		*														*			*		
20	ERJ8GEYJ514V	R3			*													*			*		
21																							
22																							
23																							
24																							

*** a : slight b : prolonged

TDK-Lambda

DWG NO : PA767-57-07

MODEL : KWS10-5	ABNORMAL TESTING	TEST CONDITIONS	APPROVED BY	TESTED BY
	TEST MODE	LOAD = 100 % Vin = 100VAC Ta = 25℃		

	PARTS NAME	PART NO.		SHORT	OPEN		FIRE	SMOKE (a)	SMOKE (b)	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RE TEST	NO GOOD
1	ERG1SJ623	R4		*														*			*		
2	ERG1SJ623	R4			*													*			*		
3																							
4	ERG1SJ623	R5		*														*			*		
5	ERG1SJ623	R5			*													*			*		
6																							
7	CR1/10W2001DV	R6		*													*				*		
8	CR1/10W2001DV	R6			*												*				*		
9																							
10	CR1/10W152JV	R7		*															*	high Vout and Pin	*		
11	CR1/10W152JV	R7			*													*			*		
12																							
13	ERJ8GEYJ100V	R8		*														*			*		
14	ERJ8GEYJ100V	R8			*												*				*		
15																							
16	ERJ8GEYJ510V	R9		*														*			*		
17	ERJ8GEYJ510V	R9			*												*				*		
18																							
19	CR1/10W152JV	R10		*														*			*		
20	CR1/10W152JV	R10			*												*				*		
21																							
22	CR1/10W331JV	R11		*														*			*		
23	CR1/10W331JV	R11			*													*			*		
24																							

*** a : slight b : prolonged

TDK-Lambda

DWG NO : PA767-57-08

MODEL : KWS10-5			ABNORMAL TESTING																	TEST CONDITIONS		APPROVED BY	TESTED BY		
			TEST MODE																	LOAD = 100 %	Vin = 100VAC Ta = 25℃				
	PARTS NAME	PART NO.		SHORT	OPEN		FIRE	SMOKE (a)	SMOKE (b)	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RE TEST	NO GOOD	
1	CR1/10W183JV	R12		*													*				*			
2	CR1/10W183JV	R12			*													*			*			
3																								
4	ERJ8GEYJ7R5V	R13		*														*		D-S waveform unstable	*			
5	ERJ8GEYJ7R5V	R13			*										*						*			
6																								
7	ERJ8GEYJ4R7V	R14		*														*		Vds waveform unstable	*			
8	ERJ8GEYJ4R7V	R14			*										*						*			
9																								
10	ERJ8GEYJ4R7V	R15		*														*		Vds waveform unstable	*			
11	ERJ8GEYJ4R7V	R15			*										*						*			
12																								
13	ERJ8GEYJ300V	R16		*														*			*			
14	ERJ8GEYJ300V	R16			*													*			*			
15																								
16	ERJ8GEYJ300V	R17		*														*			*			
17	ERJ8GEYJ300V	R17			*													*			*			
18																								
19	ERJ8GEYJ300V	R18		*														*			*			
20	ERJ8GEYJ300V	R18			*													*			*			
21																								
22	ERJ8GEYJ823V	R19		*														*			*			
23	ERJ8GEYJ823V	R19			*													*			*			
24																								

*** a : slight b : prolonged

TDK-Lambda

DWG NO : PA767-57-09

MODEL : KWS10-5	ABNORMAL TESTING	TEST CONDITIONS	APPROVED BY	TESTED BY
		LOAD = 100 % Vin = 100VAC Ta = 25℃		

	PARTS NAME	PART NO.	TEST MODE	SHORT	OPEN		FIRE	SMOKE (a)	SMOKE (b)	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RE TEST	NO GOOD
1	ERJ8GEYJ823V	R20		*														*			*		
2	ERJ8GEYJ823V	R20			*													*			*		
3																							
4	ERJ8GEYJ823V	R21		*														*			*		
5	ERJ8GEYJ823V	R21			*													*			*		
6																							
7	ERJ8GEYJ823V	R22		*														*			*		
8	ERJ8GEYJ823V	R22			*													*			*		
9																							
10	ERJ8GEYJ150V	R23		*														*			*		
11	ERJ8GEYJ150V	R23			*													*			*		
12																							
13	ERJ8GEYJ150V	R24		*														*			*		
14	ERJ8GEYJ150V	R24			*													*			*		
15																							
16	ERJ8GEYJ150V	R25		*														*			*		
17	ERJ8GEYJ150V	R25			*													*			*		
18																							
19	ERJ8GEYJ150V	R26		*														*			*		
20	ERJ8GEYJ150V	R26			*													*			*		
21																							
22	ERJ8GEYJ241V	R27		*													*			hiccup	*		
23	ERJ8GEYJ241V	R27			*													*			*		
24																							

*** a : slight b : prolonged

TDK-Lambda

DWG NO : PA767-57-10

MODEL : KWS10-5	ABNORMAL TESTING	TEST CONDITIONS	APPROVED BY	TESTED BY
		LOAD = 100 % Vin = 100VAC Ta = 25℃		

	PARTS NAME	PART NO.	TEST MODE	SHORT	OPEN		FIRE	SMOKE (a)	SMOKE (b)	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RE TEST	NO GOOD
1	ERJ8GEYJ241V	R28		*															*	hiccup	*		
2	ERJ8GEYJ241V	R28			*													*			*		
3																							
4	ERJ8GEYJ241V	R29		*															*	hiccup	*		
5	ERJ8GEYJ241V	R29			*													*			*		
6																							
7	CR1/10W2001DV	R30		*															*	high Pin and Vout	*		
8	CR1/10W2001DV	R30			*														*	low Pin and Vout	*		
9																							
10	CR1/10W2051DV	R31		*															*	high Pin and Vout	*		
11	CR1/10W2051DV	R31			*														*	high Pin and Vout	*		
12																							
13	CR1/10W911JV	R32		*														*			*		
14	CR1/10W911JV	R32			*													*			*		
15																							
16	CR1/10W222JV	R33		*															*	high Pin and Vout	*		
17	CR1/10W222JV	R33			*													*			*		
18																							
19	ERJ8GEYJ161V	R34		*															*	low Pin and Vout	*		
20	ERJ8GEYJ161V	R34			*														*	high Pin and Vout	*		
21																							
22	ERJ8GEYJ101V	R35		*														*			*		
23	ERJ8GEYJ101V	R35			*													*			*		
24																							

*** a : slight b : prolonged

TDK-Lambda

DWG NO : PA767-57-11

MODEL : KWS10-5	ABNORMAL TESTING	TEST CONDITIONS	APPROVED BY	TESTED BY
		LOAD = 100 %		
		Vin = 100VAC Ta = 25℃		

	PARTS NAME	PART NO.	TEST MODE	SHORT	OPEN		FIRE	SMOKE (a)	SMOKE (b)	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RE TEST	NO GOOD
1	ERJ8GEYJ563V	R36		*													*				*		
2	ERJ8GEYJ563V	R36			*													*			*		
3																							
4	ERJ8GEYJ332V	R37		*														*			*		
5	ERJ8GEYJ332V	R37			*													*			*		
6																							
7	ERJ8GEYJ100V	R38		*														*			*		
8	ERJ8GEYJ100V	R38			*													*			*		
9																							
10	ERJ8GEYJ241V	R39		*															*	hiccup	*		
11	ERJ8GEYJ241V	R39			*													*			*		
12																							
13																							
14																							
15																							
16																							
17																							
18																							
19																							
20																							
21																							
22																							
23																							
24																							

*** a : slight b : prolonged

TDK-Lambda

振動試験　VIBRATION TEST

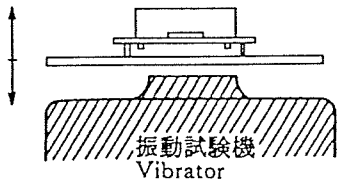
MODEL : KWS10-12

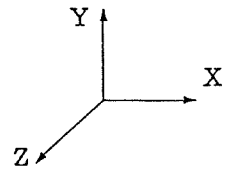
(1) 振動試験種類　Vibration test class
　　掃引振動数耐久試験　Frequency variable endurance test

(2) 使用振動試験装置　Equipment used
　　新日本測器㈱製　制御部　F−400−BM−E47
　　SHIN−NIPPON　Controller
　　SOKKI Co., LTD

　　加振部　905−FN
　　Vibrator

(3) 試験方法　Testing method





供試品　振動方向
D.U.T.　Direction

可変周波数振動試験
- 周波数範囲　10～55Hz
  Sweep frequency
- 掃引時間　1分間
  Sweep time　1 min.
- 振幅　一定 (1.65mm)
  Amplitude　const.
- 振幅方向　X, Y, Z.
  Direction
- 試験時間　各方向共1H
  Test time　1H each

(4) 試験結果　Result

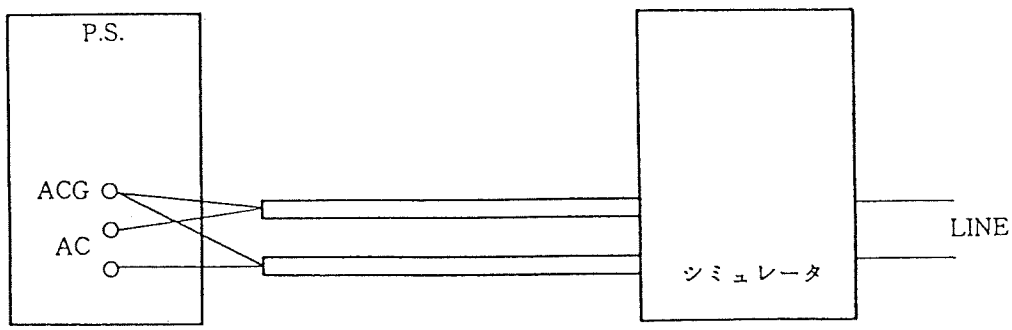
(合格)　不合格
(OK)　NG

測定確認項目 Check item	出力電圧 (V) Vout	リップル (mVp−p) Ripple (mVp−p)	機能・実装状態 D. U. T. state	備考 Note
試験前 Initial / 振動方向 Directions	11.90	78.0	異常なし OK	
X	11.90	78.0	異常なし OK	
Y	11.90	78.5	異常なし OK	
Z	11.90	78.5	異常なし OK	

ノイズシミュレート試験　NOISE SIMULATE TEST

MODEL : KWS10

(1)　測定回路及び測定機　Test circuit and equipment



シミュレータ　：ENS−24X　(三基電子工業㈱)
simulator　(SANKI E. IND)

(2)　測定条件　Measuring Conditions

- 入　力　電　圧：定　格
  Input voltage　Rated
- 出　力　電　圧：定　格
  Output voltage　Rated
- 出　力　電　流：0％，100％
  Output Current
- 電 源 周 囲 温 度：25℃
  Ambient temperature
- パ　ル　ス　幅：50ns～1000ns
  Pulse width
- ノ　イ　ズ　電　圧：0～2 kV
  Noise level
- 位　相：0～360°
  Phase shift
- 極　性：＋，－
  Polarity
- MODE　：NORMAL, COMMON
- TRIG 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　Results

(合格)　不合格
(OK)　NG

静電気シミュレーション試験
ELECTRO—STATIC DISCHARGE TEST

MODEL : KWS10

(1) 使用計測器 Equipment used

SET-30E (三基電子工業(株))
(SANKI. E. IND.)

放電抵抗：250Ω　　静電容量：200pF
Discharge resistance　　Capacity

(2) 測定条件 Measuring conditions

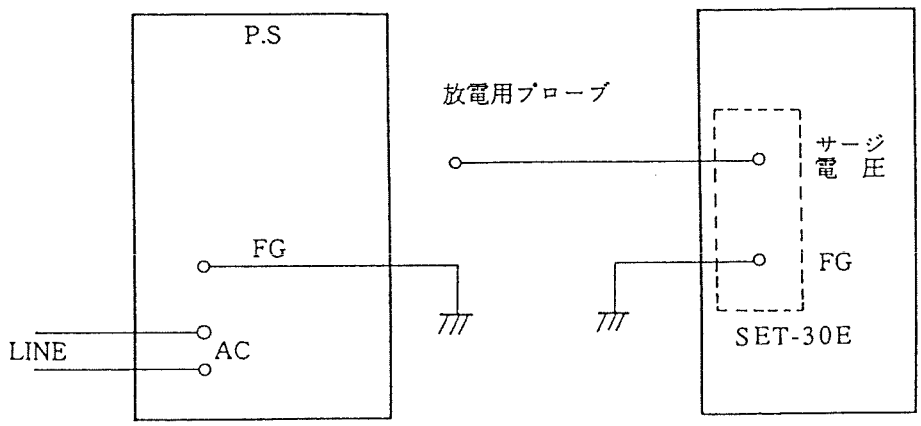
・入力電圧：定格　・出力電圧：定格　・出力電流：定格
Input voltage ：Rated　Output voltage：Rated　Output current：Rated

・電源周囲温度：25℃　・印加電圧：±3KV, ±5KV, ±10KV, ±15KV
Ambient temperature　Test voltage

(3) 試験方法 Testing method

被試験電源を稼働状態にしておき，露出部分で人体がふれる可能性のある部分（ケース，入力端子，出力端子，FG 端子，ACG 端子）に放電をさせ，出力に異常の無い事を確認する。

尚，試験回数は，＋，－各３回とし，引加電圧は３KVから15KVまで順次上げていくものとする。Check if there is no abnormal output when the testing voltage is applied to operating D. U. T. (Device Under Test) on its case, input terminal, output terminal, FG terminal and ACG terminal which are exposed parts to human body. Testing cycle is at ＋, － for three times each, and the applied voltage to be gradually increased from 3KV to 15KV.



(4) 判定条件 Acceptable conditions

1．破壊しない事　Not to be broken
2．出力電圧がダウンしない事　Not to be shut down output
3．その他異常の無いこと　No other out of orders

(5) 試験結果 Result

(合格)　不合格
(OK)　NG

雷サージ試験　IMPULSE TEST

MODEL：KWS10

(1) 使用計測器　Equipment used

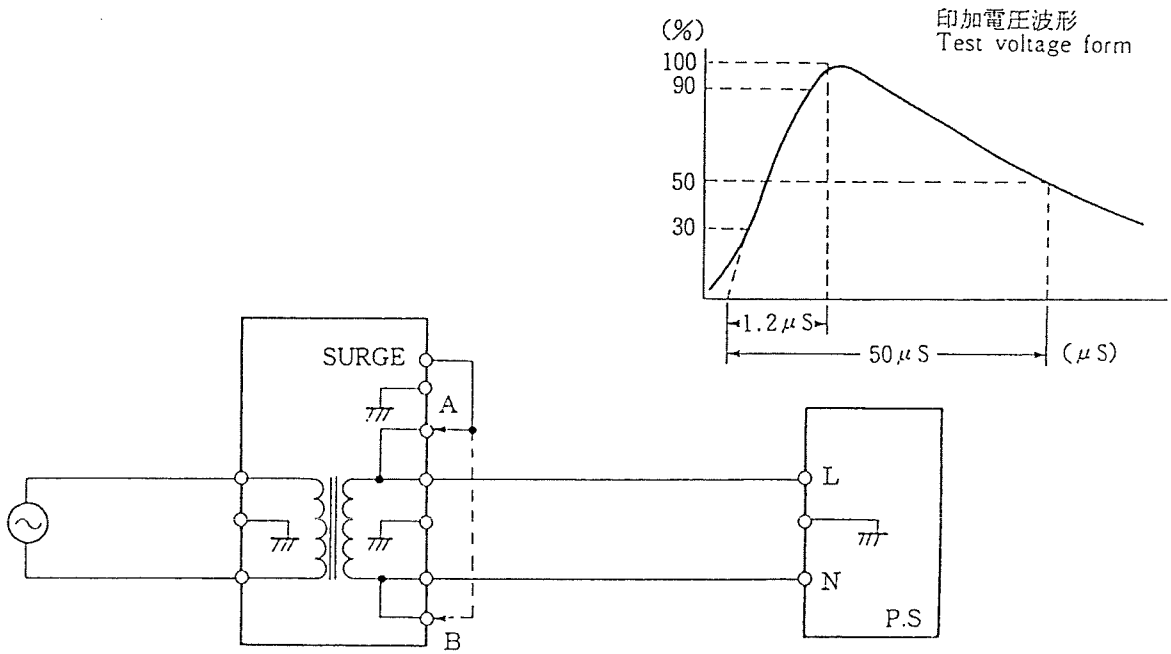
LSG-12K-E　(三基電子工業(株))

(SANKI. E. IND.)

(2) 測定条件　Measuring conditions

- 入力電圧：定格　Input voltage　：Rated
- 出力電圧：定格　Output voltage　：Rated
- 出力電流：無負荷　Output current　：No load
- 電源周囲温度：25℃　Ambient temperature
- 印加電圧：5kV　Test voltage
- 印加箇所：FG－AC間　Test point　：Between FG－AC
- 試験回数：3回　Test time　：3 times
- 極　　性：＋，－　Polarity

(3) 試験方法　Testing method



(4) 判定条件　Acceptable conditions

1．破壊しない事　Not to be broken

2．出力電圧がダウンしない事　Not to be shut down output

3．その他異常の無いこと　No other out of orders

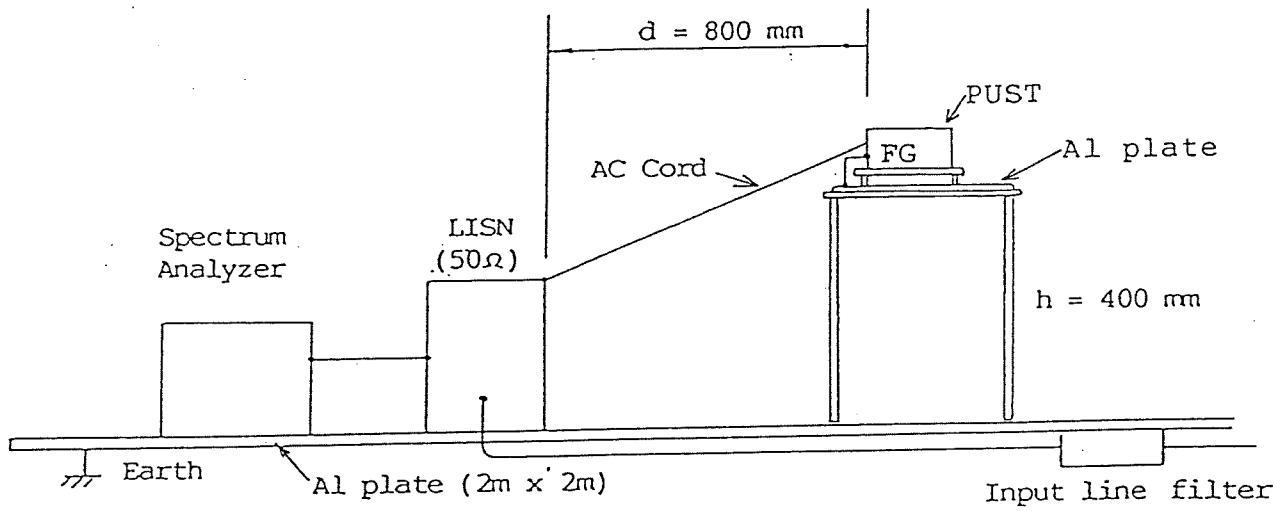
(5) 試験結果　Result

(合格)　不合格

(OK)　NG

EMI TEST

TEST CIRCUIT :



TEST EQUIPHENTS :

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

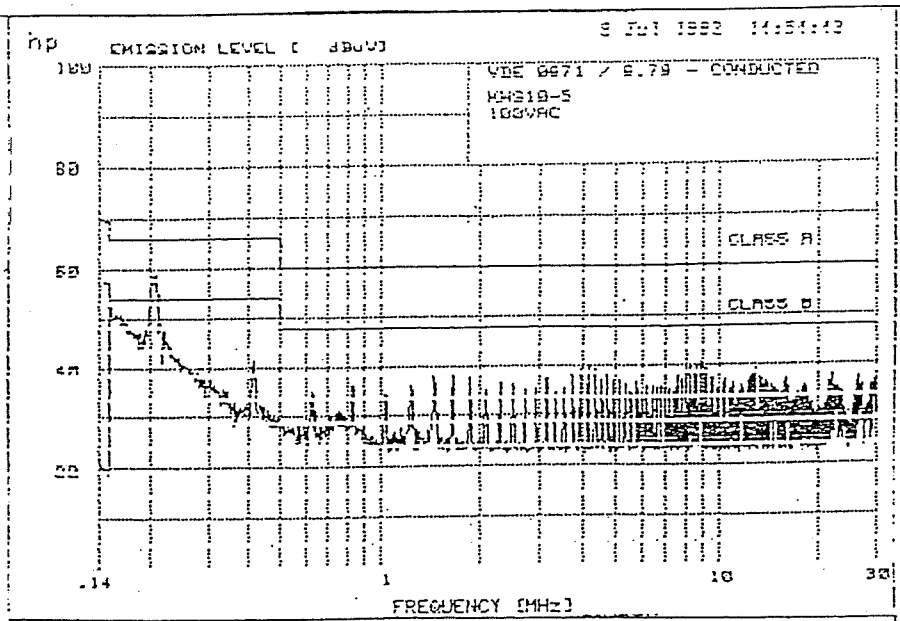
CONDITIONS :

INPUT VOLTAGE	:	AC100V, AC200V
OUTPUT VOLTAGE	:	RATED
OUTPUT CURRENT	:	RATED
AMBIENT TEHP.	:	25℃

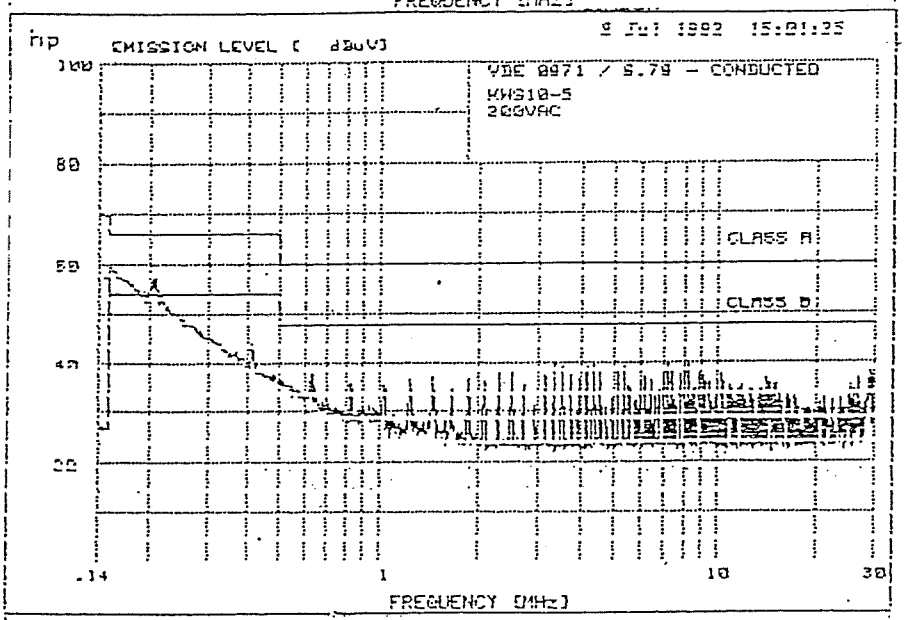
認・ APPD		設 計 ENGR		図面番号 DWG－No.	PA767-71-02-
検 図 CHK		製 図 DWG			

KWS10-5

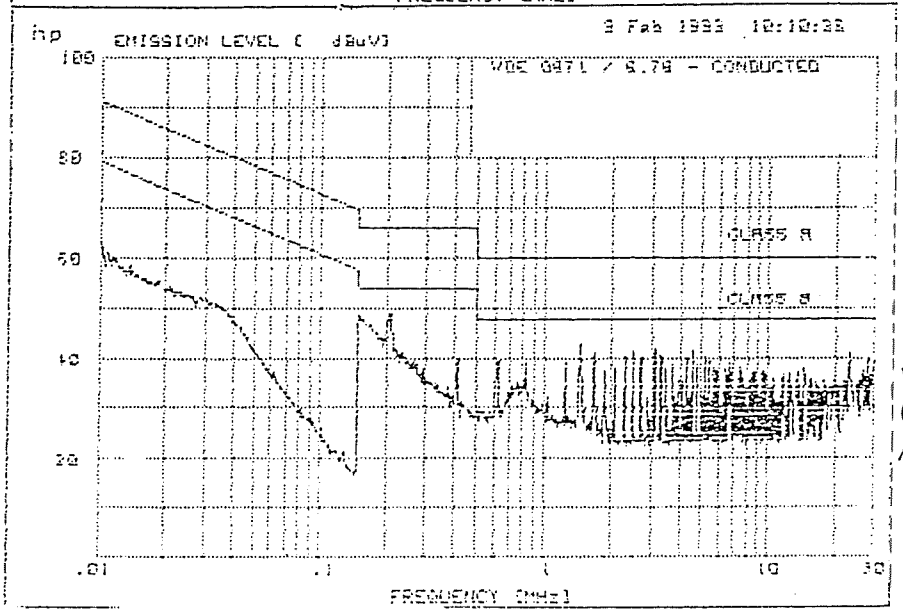
DATE 2-FEB-1993-



Vin = 100Vac



Vin = 200Vac



Vin = 200Vac

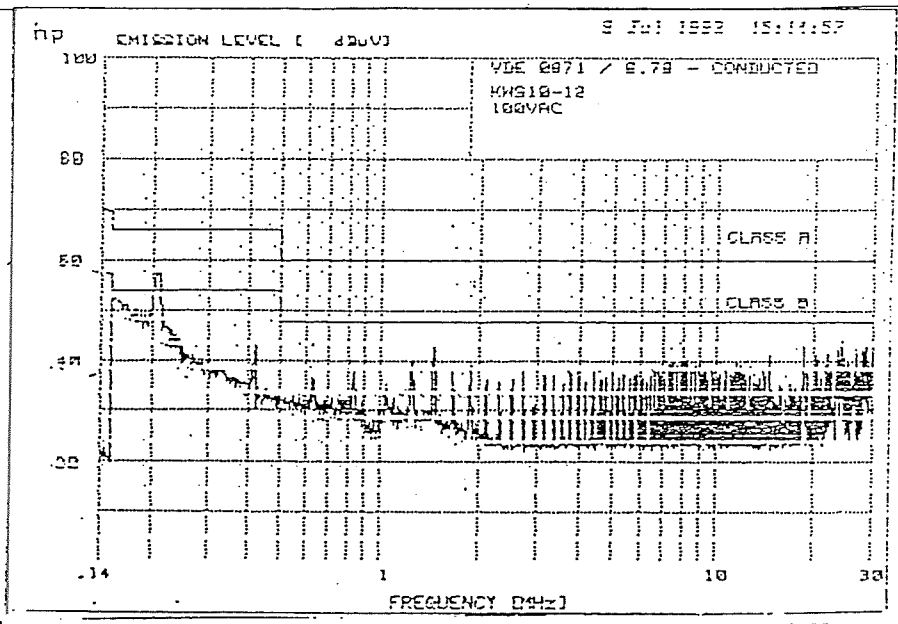
V D E

With external cap. 0.22μF between Ac(L) and Ac(N).

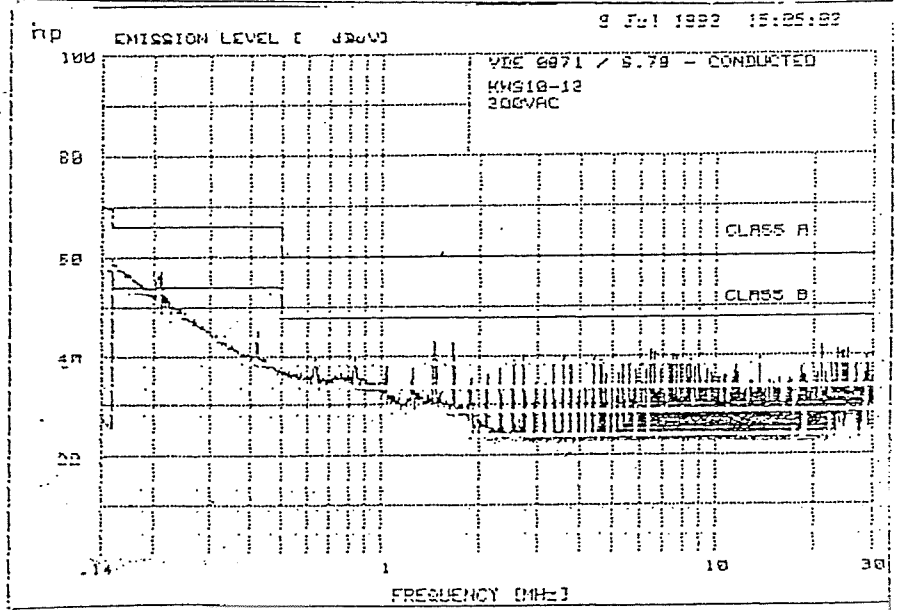
認・ APPD		設 計 ENGR		図面番号 D WG — No.	PA767-71-03-
検 図 CHK		製 図 DWG			

KWS10-12

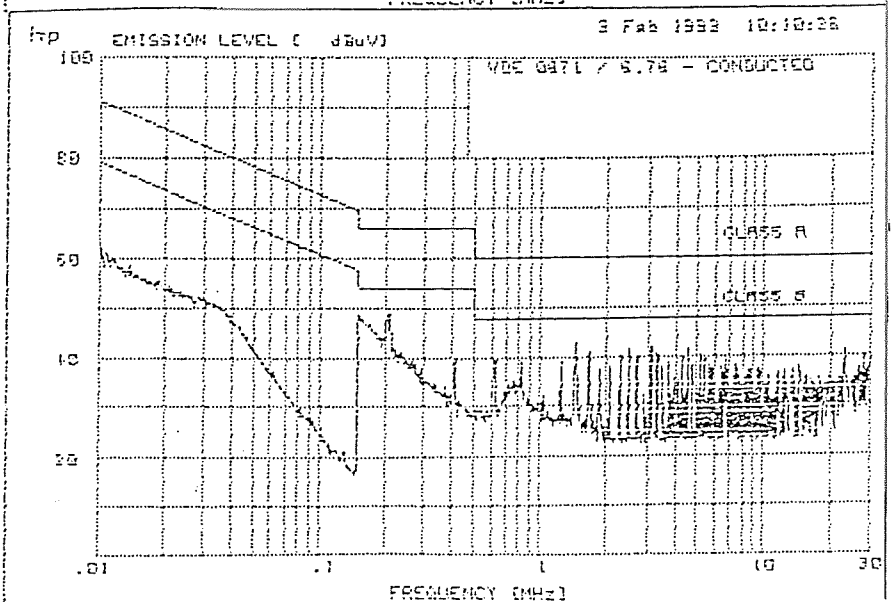
DATE 2-FEB-1993



Vin = 100Vac



Vin = 200Vac



Vin = 200Vac

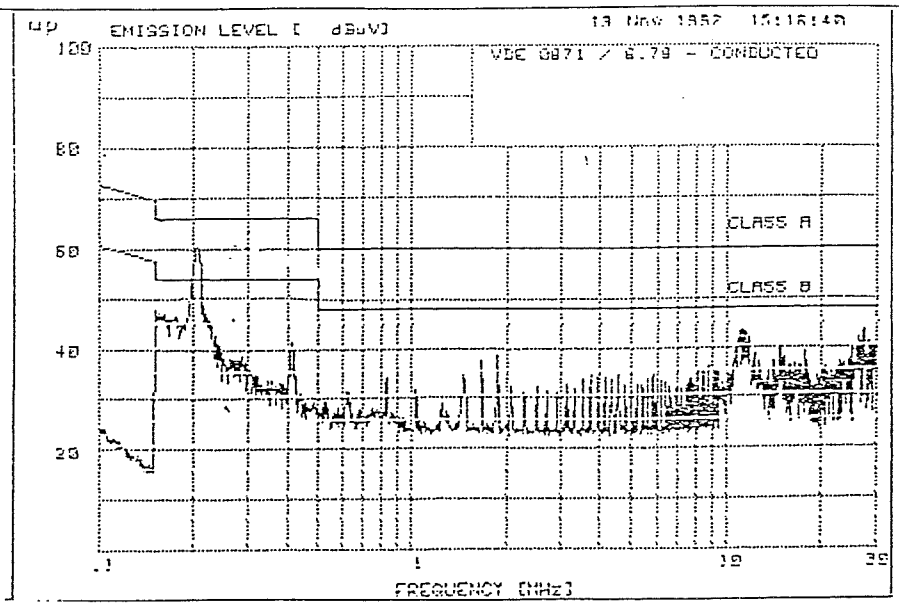
V D E

With external cap. 0.22μF between Ac(L) and Ac(N).

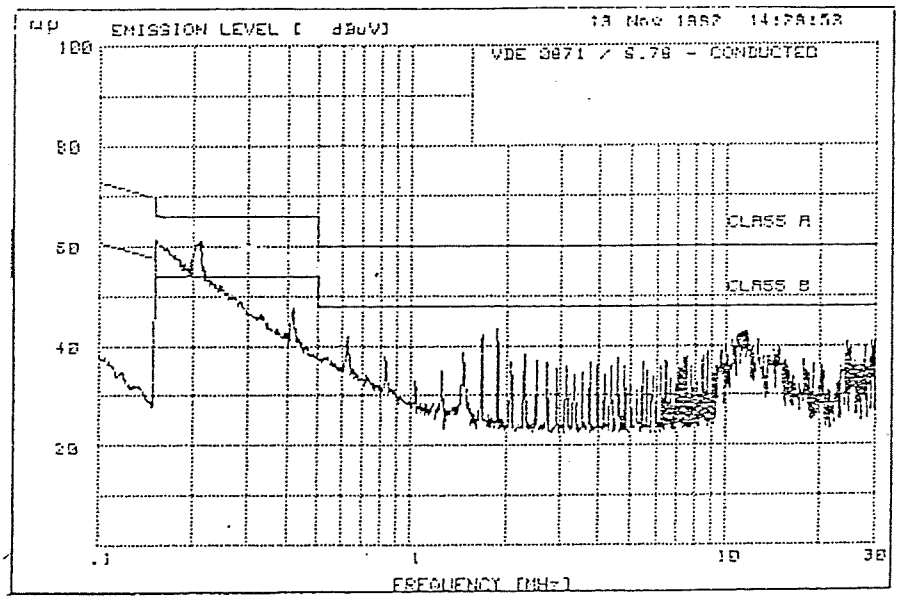
認・APPD		設　計 ENGR		図面番号 DWG—No.	PA767-71-04-
検　図 CHK		製　図 DWG			

KWS10-15

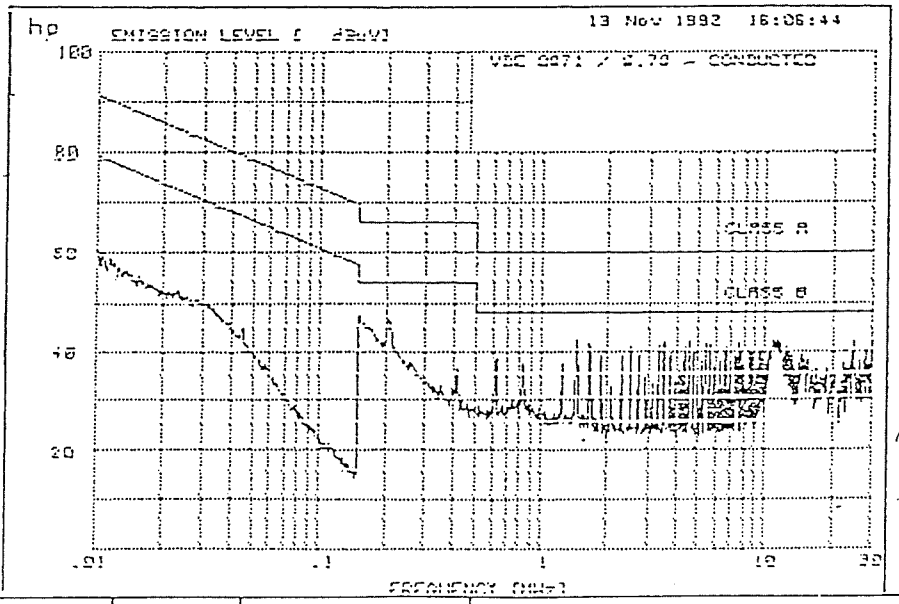
DATE 2-FEB-1993



Vin = 100Vac



Vin = 200Vac



Vin = 200Vac

V D E
With external cap. 0.22μF between Ac(L) and Ac(N)

認・APPD		設計 ENGR		図面番号 DWG—No.	PA767-71-05 –
検図 CHK		製図 DWG			

TDK-Lambda