SWT100 -- *

RELIABILITY DATA

DWG. NO. CA703--79--01			
APPROVED	APPROVED	CHECKED	ENGR.
T.Murayama	K.T.M	K.T.M	潘军胜
5. FEB. '96	12. DEC 95	12 DEC 95	12. Dec. 1995

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

SWT100 - *

M.T.B.F.

1. Method of calculation

Calculated based on part count reliability projection of MIL - HDBK - 217F.

Individual failure rates λ_G is given to each part and M.T.B.F. is calculated by the count of each part.

Formula :

$$M.T.B.F. = \frac{1}{\lambda equip}$$

$$= \frac{1}{\sum_{i=1}^{n} Ni\,(\lambda_G \pi_Q)_i} \quad (HOURS)$$

Where :

λ equip = Total Equipment Failure Rate (Failures/10^6 Hours)

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

Ni = Quantity of ith Generic Part

n = Number of Different Generic Part Categories

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

2. M.T.B.F. Values

G_F (GROUND , FIXED)

M.T.B.F. = 472,067 (HOURS)

COMPONENT DERATING

(At nominal Line and Rated Load , Ambient Temperature 50°C)

Method of calculation

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

$$Rth_{(j-c)} = \frac{Tj(max) - Tc}{Pd(max)} \quad , \quad Rth_{(j-a)} = \frac{Tj(max) - Ta}{Pd(max)}$$

Tc : Case Temperature (Normally 25°C)

Ta : Ambient Temperature (Normally 25°C)

Pd(max) : Maximum Power Loss

Tj(max) : Maximum Junction temperature

Rth(j-c) : Junction to Case Thermal Resistance

Rth(j-a) : Junction to Ambient Thermal Resistance

SEMICONDUCTOR DERATING

MODEL No. : SWT100 - 522

MOUNTING: A Vin = 100VAC LOAD = 100% Ta = 50°C

A1 PWR-TOP204YA1 P.I.	Tjmax = 150°C Rth(j-c) =2°C/W Pd(max) = --W Pd =3.3W dTc = 35.4°C Tc =85.4°C Tj = 92°C D.F. = 61.3%
A2 PWR-TOP204YAI P.I.	Tjmax = 150°C Rth(j-c) =2°C/W Pd(max) = --W Pd =3.3W dTc = 35.3°C Tc =85.3°C Tj = 91.9°C D.F. = 61.3%
A3 KA431Z SAMSUNG	Tjmax = 150°C Rth(j-c) = 103.9°C/W Pd(max) =0.77W Pd = 0.0138W dTc =20.2°C Tc =70.2°C Tj =71.6°C D.F. = 47.7%
A4 KA431Z SAMSUNG	Tjmax = 150°C Rth(j-c) = 103.9°C/W Pd(max) =0.77W Pd = 0.0352W dTc =34.6°C Tc =84.6°C Tj =88.3°C D.F. = 58.8%
A5 uPC7912H NEC	Tjmax = 125°C Rth(j-c) =4°C/W Pd(max) = --W Pd =2.8W dTc =51.6°C Tc =101.6°C Tj = 112.8°C D.F. = 90.2%
D1 D5SB60 SHINDENGEN	Tjmax = 150°C Rth(j-c) = 3.4°C/W Pd(max) = --W Pd =4.0W dTc = 42.2°C Tc = 92.2°C Tj = 105.8°C D.F. = 70.5%
D2 1NU41 TOSHIBA	Tjmax = 150°C Rth(j-l) = 34.0°C/W Pd(max) = --W Pd =0.015W dTl = 47.4°C Tl =97.4°C Tj = 97.9°C D.F. = 65.3%
D3 GI1003 G.I.	Tjmax = 175°C Rth(j-l) = 20°C/W Pd(max) = -- W Pd = 0.08W dTl =40.2°C Tl =90.2°C Tj =91.8°C D.F. = 52.5%
D4 1NU41 TOSHIBA	Tjmax = 150°C Rth(j-l) = 34°C/W Pd(max) = --W Pd =0.015W dTl = 48.1°C Tl =98.1°C Tj = 98.6°C D.F. = 65.7%
D5 1SS178 TOSHIBA	Tjmax = 175°C Rth(j-l) =500°C/W Pd(max) =0.3W Pd =0.016W dTl =38.3°C Tl = 88.3°C Tj = 96.3°C D.F. = 55%
D6 SBL2040PT G.I.	Tjmax = 125°C Rth(j-c) = 1.5°C/W Pd(max) = --W Pd =5.2W dTc = 41.8°C Tc = 91.8°C Tj = 99.6°C D.F. = 79.7%
D7 UF5402 G.I.	Tjmax = 150°C Rth(j-l) = 8.5°C/W Pd(max) = --W Pd =0.876W dTl =51.0°C Tl = 101.0°C Tj = 108.4°C D.F. = 72.3%
D8 UF5402 G.I.	Tjmax = 150°C Rth(j-l) = 8.5°C/W Pd(max) = --W Pd =0.876W dTl =55.0°C Tl = 105.0°C Tj = 112.565°C D.F. = 75.0%
D9 20DL2C41A TOSHIBA	Tjmax = 150°C Rth(j-c) = 1.5°C/W Pd(max) = --W Pd =4.0W dTc = 59.3°C Tc = 109.3°C Tj =115.3°C D.F. = 76.9%

SEMICONDUCTOR DERATING

MODEL No. : SWT100 - 522

MOUNTING: A Vin = 100VAC LOAD = 100% Ta = 50°C

D12 1SS178 TOSHIBA	Tjmax = 175°C	Rth(j-l) =500°C/W	Pd(max) =0.3W
	Pd =0.0W	dTl =28.0°C	Tl =78.0°C
	Tj = 78.0°C		
	D.F. =44. 6%		
D13 1SS178 TOSHIBA	Tjmax = 175°C	Rth(j-l) =500°C/W	Pd(max) =0.3W
	Pd =0.0W	dTl =32.6°C	Tl = 82.6°C
	Tj =82.6°C		
	D.F. = 47.2%		
D14 1N4001 G.I.	Tjmax = 175°C	Rth(j-l) = 50°C/W	Pd(max) =--W
	Pd = 0.0W	dTl =16.4°C	Tl =66.4°C
	Tj =66.4°C		
	D.F. = 37.9%		
PC1(LED) 4N35TV MOTOLORA	Tjmax = 125°C	Rth(j-c) = -- °C/W	Pd(max) = -- W
	If = 2.77mA		
	Ifmax = 23mA	Ta = 80.4°C	
	D.F. = 12.0%		
PC1(TR.) 4N35TV MOTOLORA	Tjmax = 125°C	Rth(j-c) = 568.2°C/W	Pd(max) = -- W
	Pd = 0.0069W	dTc = 30.4°C	Tc = 80.4°C
	Tj = 84.3°C		
	D.F. =67.4%		
PC2(LED) 4N35TV MOTOLORA	Tjmax = 125°C	Rth(j-c) = -- °C/W	Pd(max) = -- W
	If = 2.56mA		
	Ifmax = 23mA	Ta = 83.8°C	
	D.F. = 11.1%		
PC2(TR.) 4N35TV MOTOLORA	Tjmax = 125°C	Rth(j-c) = 568.2°C/W	Pd(max) = -- W
	Pd = 0.0069W	dTc = 33.8°C	Tc = 83.8°C
	Tj = 87.7°C		
	D.F. = 70.2%		
Q1 2SA1015-Y TOSHIBA	Tjmax = 125°C	Rth(j-c) = -- °C/W	Pd(max) = --W
	Pd =0.0W	dTc =26.4°C	Tc = 76.4°C
	Tj = 76.4°C		
	D.F. = 61.1%		
Q2 2SA1015-Y TOSHIBA	Tjmax = 125°C	Rth(j-c) = -- °C/W	Pd(max) = --W
	Pd =0.0W	dTc =32.6°C	Tc = 82.6°C
	Tj =82.6°C		
	D.F. =66.1%		
ZD1 P6KE220CA G.I.	Tjmax = 175°C	Rth(j-l) =20°C/W	Pd(max) =5W
	Pd =0.0W	dTl = 50.2°C	Tl =100.2°C
	Tj = 100.2°C		
	D.F. =57.3%		
ZD2 1N4736 MOTOLORA	Tjmax = 200°C	Rth(j-l) = -- °C/W	Pd(max) =--W
	Pd =0.0W	dTl =26.4°C	Tl = 76.4°C
	Tj = 76.4°C		
	D.F. = 38.2%		
ZD3 P6KE220CA G.I.	Tjmax = 175°C	Rth(j-l) =20°C/W	Pd(max) =5W
	Pd =0.0W	dTl = 49.4°C	Tl =99.4°C
	Tj = 99.4°C		
	D.F. = 56.8%		
ZD4 1N4736 MOTOLORA	Tjmax = 200°C	Rth(j-l) = -- °C/W	Pd(max) = --W
	Pd =0.0W	dTl =35.0°C	Tl =85.0°C
	Tj = 85.0°C		
	D.F. =42.5%		
ZD5 AW01-07 HITACHI	Tjmax = 150°C	Rth(j-l) = -- °C/W	Pd(max) =1.0W
	Pd =0.0W	dTl =16.4°C	Tl =66.4°C
	Tj = 66.4°C		
	D.F. =44.3%		
SR1 SM12JZ47A TOSHIBA	Tjmax = 125°C	Rth(j-l) = 3.0 °C/W	Pd(max) = -- W
	Pd =2.3W	dTl =32.7°C	Tl =82.7°C
	Tj = 89.6°C		
	D.F. =71.7%		

SEMICONDUCTOR DERATING

MODEL No. ; SWT100 - 522

MOUNTING: A Vin =200VAC LOAD = 100% Ta = 50°C

A1 PWR-TOP204YA1 P.I.	Tjmax = 150°C Rth(j-c) =2°C/W Pd(max) = --W Pd =1.3W dTc = 32.0°C Tc =82.0°C Tj = 84.6°C D.F. = 56.4%
A2 PWR-TOP204YAI P.I.	Tjmax = 150°C Rth(j-c) =2°C/W Pd(max) = --W Pd =1.3W dTc = 35.2°C Tc =85.2°C Tj =87.8°C D.F. = 58.5%
A3 KA431Z SAMSUNG	Tjmax = 150°C Rth(j-c) = 103.9°C/W Pd(max) =0.77W Pd = 0.0152W dTc =22.5°C Tc =72.5°C Tj =74.1°C D.F. – 49.4%
A4 KA431Z SAMSUNG	Tjmax = 150°C Rth(j-c) = 103.9°C/W Pd(max) =0.77W Pd = 0.0393W dTc =37.3°C Tc =87.3°C Tj =91.4°C D.F. =60.9%
A5 uPC7912H NEC	Tjmax = 125°C Rth(j-c) =4°C/W Pd(max) = --W Pd =2.8W dTc =48.7°C Tc =98.7°C Tj = 109.9°C D.F. =87.9%
D1 D5SB60 SHINDENGEN	Tjmax = 150°C Rth(j-c) = 3.4°C/W Pd(max) = --W Pd =2.0W dTc = 26.3°C Tc = 76.3°C Tj = 83.1°C D.F. = 55.4%
D2 1NU41 TOSHIBA	Tjmax = 150°C Rth(j-l) = 34°C/W Pd(max) = --W Pd –0.014W dTl – 45.5°C Tl –95.5°C Tj = 96.0°C D.F. = 64.0%
D3 GI1003 G.I.	Tjmax = 175°C Rth(j-l) = 20°C/W Pd(max) = -- W Pd = 0.08W dTl =37.4°C Tl =87.4°C Tj = 89.0°C D.F. = 51.0%
D4 1NU41 TOSHIBA	Tjmax = 150°C Rth(j-l) = 34°C/W Pd(max) = --W Pd =0.014W dTl = 42.5°C Tl =92.5°C Tj = 93.0°C D.F. = 62.0%
D5 1SS178 TOSHIBA	Tjmax = 175°C Rth(j-l) =500°C/W Pd(max) =0.3W Pd =0.016W dTl =33.2°C Tl = 83.2°C Tj = 91.2°C D.F. = 52.1%
D6 SBL2040PT G.I.	Tjmax = 125°C Rth(j-c) = 1.5°C/W Pd(max) = --W Pd =5.3W dTc = 40.2°C Tc = 90.2°C Tj = 98.2°C D.F. = 78.5%
D7 UF5402 G.I.	Tjmax = 150°C Rth(j-l) = 8.5°C/W Pd(max) = --W Pd =0.84W dTl =48.7°C Tl = 98.7°C Tj =105.8°C D.F. = 70.6%
D8 UF5402 G.I.	Tjmax = 150°C Rth(j-l) = 8.5°C/W Pd(max) = --W Pd =0.84W dTl =53.8°C Tl =103.8°C Tj = 110.9°C D.F. = 74.0%
D9 20DL2C41A TOSHIBA	Tjmax = 150°C Rth(j-c) = 1.5°C/W Pd(max) = --W Pd –4.2W dTc = 59.8°C Tc = 109.8°C Tj =116.1°C D.F. = 77.4%

SEMICONDUCTOR DERATING

MODEL No. : SWT100 - 522

MOUNTING: A Vin =200VAC LOAD = 100% Ta = 50°C

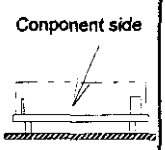
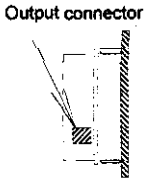
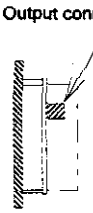
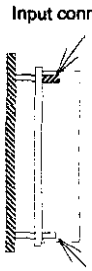
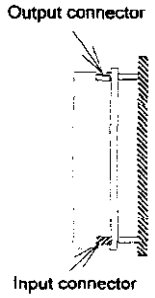
D12 1SS178 TOSHIBA	Tjmax = 175°C Rth(j-l) =500°C/W Pd(max) =0.3W Pd =0.0W dTl =26.0°C Tl =76.0°C Tj = 76.0°C D.F. =43.4%
D13 1SS178 TOSHIBA	Tjmax = 175°C Rth(j-l) =500°C/W Pd(max) =0.3W Pd =0.0W dTl =28.6°C Tl =78.6°C Tj =78.6°C D.F. = 44.9%
D14 1N4001 G.I.	Tjmax = 175°C Rth(j-l) = 50°C/W Pd(max) =--W Pd = 0.0W dTl =15.9°C Tl =65.9°C Tj =65.9°C D.F. = 37.7%
PC1(LED) 4N35TV MOTOLORA	Tjmax = 125°C Rth(j-c) = -- °C/W Pd(max) = -- W If = 3.17mA Ifmax = 23mA Ta = 82.4°C D.F. = 13.8%
PC1(TR.) 4N35TV MOTOLORA	Tjmax = 125°C Rth(j-c) = 568.2°C/W Pd(max) = -- W Pd = 0.007W dTc = 32.4°C Tc = 82.4°C Tj = 86.4°C D.F. = 69.1%
PC2(LED) 4N35TV MOTOLORA	Tjmax = 125°C Rth(j-c) = -- °C/W Pd(max) = -- W If = 3.0mA Ifmax = 23mA Ta = 80.9°C D.F. = 13.0%
PC2(TR.) 4N35TV MOTOLORA	Tjmax = 125°C Rth(j-c) = 568.2°C/W Pd(max) = -- W Pd = 0.007W dTc = 30.9°C Tc = 80.9°C Tj = 84.9°C D.F. = 67.9%
Q1 2SA1015-Y TOSHIBA	Tjmax = 125°C Rth(j-c) = -- °C/W Pd(max) = --W Pd =0.0W dTc =29.8°C Tc = 79.8°C Tj = 79.8°C D.F. = 63.8%
Q2 2SA1015-Y TOSHIBA	Tjmax = 125°C Rth(j-c) = -- °C/W Pd(max) = --W Pd =0W dTc = 28.6°C Tc =78.6°C Tj =78.6°C D.F. = 62.9%
ZD1 P6KE220CA G.I.	Tjmax = 175°C Rth(j-l) = 34°C/W Pd(max) = 5W Pd =0.0W dTl = 45.5°C Tl =95.5°C Tj = 95.5°C D.F. = 54.6%
ZD2 1N4736 MOTOLORA	Tjmax = 200°C Rth(j-l) = -- °C/W Pd(max) = -- W Pd =0.0W dTl =29.8°C Tl = 79.8°C Tj =79.8°C D.F. = 39.9%
ZD3 P6KE220CA G.I.	Tjmax = 175°C Rth(j-l) = 20°C/W Pd(max) = 5 W Pd =0.0W dTl = 44.4°C Tl = 94.4°C Tj = 94.4°C D.F. = 54.6%
ZD4 1N4736 MOTOLORA	Tjmax = 200°C Rth(j-l) = --°C/W Pd(max) = --W Pd =0.0W dTl =30°C Tl = 80°C Tj =80°C D.F. =40%
ZD5 AW01-07 HITACHI	Tjmax = 150°C Rth(j-l) = -- °C/W Pd(max) = 1.0W Pd =0.0W dTl =15.9°C Tl = 65.9°C Tj =65.9°C D.F. = 43.9%
SR1 SM12JZ47A TOSHIBA	Tjmax = 125°C Rth(j-l) = 3.0 °C/W Pd(max) = -- W Pd =2.3W dTl =19.5°C Tl =69.5°C Tj = 76.4°C D.F. =61.1%

TEMPERATURE RISE

Ta : 50°C

Symbol	Parts name	dT Temperature Rise (°C)				
		Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
A1	TOP SWITCH	35.4	33.9	28.5	36.0	30.1
A5	3T REGULATOR	51.6	49.0	43.0	47.6	49.4
D6	DIODE,S.B.D	41.8	45.4	36.6	37.5	40.2
C6	E.CAP	21.8	18.7	16.2	28.1	18.4
C7	E.CAP	20.4	16.1	18.8	24.6	15.5
T1	X'MER	47.9	40.2	32.7	43.8	39.4
T2	X'MER	46.5	34.8	33.4	45.6	40.0

Conditions

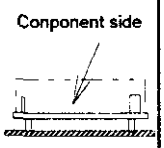
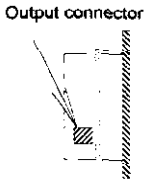
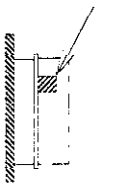
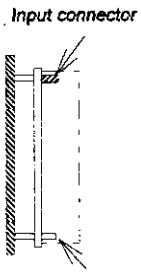
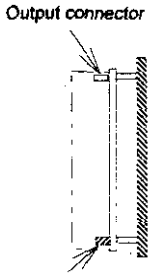
Mounting Method (Standard Mounting : A)	(A)	(B)	(C)	(D)	(E)
					
Input Voltage	100VAC	100VAC	100VAC	100VAC	100VAC
Output Voltage	Rated	Rated	Rated	Rated	Rated
Output Current	100%	75%	75%	75%	75%

TEMPERATURE RISE

Ta : 50°C

Symbol	Parts name	dT Temperature Rise (°C)				
		Mounting A	Mounting B	Mounting C	Mounting D	Mounting E
A1	TOP SWITCH	32.0	34.2	30.3	35.2	29.7
A5	3T REGULATOR	48.7	48.2	42.5	46.9	48.6
D6	DIODE,S.B.D	40.2	44.7	36.2	35.7	38.2
C6	E.CAP	18.2	17.2	14.3	25.8	14.2
C7	E.CAP	17.3	15.6	16.1	23.0	12.0
T1	X'MER	44.9	40.8	33.0	43.3	38.6
T2	X'MER	44.5	36.4	34.6	45.9	40.6

Conditions

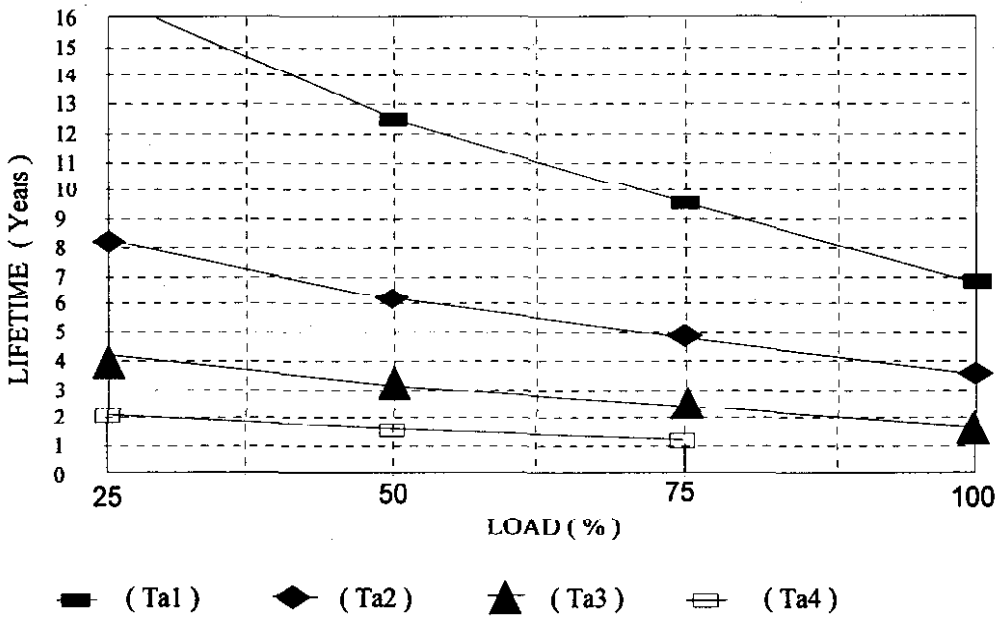
Mounting Method (Standard Mounting : A)	(A)	(B)	(C)	(D)	(E)
					
Input Voltage	200VAC	200VAC	200VAC	200VAC	200VAC
Output Voltage	Rated	Rated	Rated	Rated	Rated
Output Current	100%	75%	75%	75%	75%

E - CAP LIFETIME versus LOAD

Vin = 100VAC
8 hours per day,365 days operation

Mounting Position : A

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD



Load (%)	LIFETIME (Yrs.)			
	Ta1 = 30°C	Ta2 = 40°C	Ta3 = 50°C	Ta4 = 60°C
100	6.84	3.42	1.71	-
75	9.54	4.77	2.39	1.19
50	12.33	6.17	3.08	1.54
25	16.61	8.31	4.15	2.08

Formula :

1.For 105°C Elec. capacitor

$$L = Lo * 2^{(105-dT-Ta)/10} /(8 * 365) \text{ (Yrs.)}$$

2. For 85°C Elec. capacitor

$$L = Lo * 2^{(85-dT-Ta)/10} /(8 * 365) \text{ (Yrs)}$$

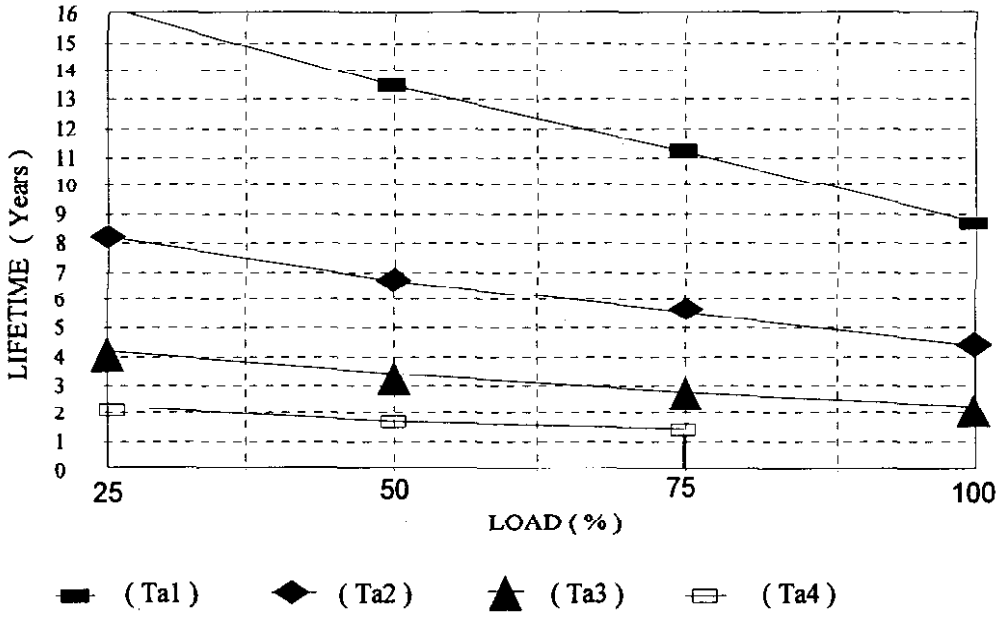
Where : L —Elec. capacitor computed life
(8 hours per day , 365 days operation)
Lo—Guarantee life for Elec. capacitor
Ta —Ambient temperature
dT—Temperature rise of Elec. capacitor

E - CAP LIFETIME versus LOAD

Vin = 200VAC　　Mounting Position : A

8 hours per day,365 days operation

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD



Load (%)	LIFETIME (Yrs.)			
	Ta1 = 30°C	Ta2 = 40°C	Ta3 = 50°C	Ta4 = 60°C
100	8.78	4.39	2.20	-
75	11.11	5.56	2.78	1.39
50	13.40	6.70	3.35	1.68
25	16.16	8.08	4.04	2.02

Formula :

1.For 105°C Elec. capacitor

$$L = Lo * 2^{(105-dT-Ta)/10} /(8 * 365) \text{ (Yrs.)}$$

2. For 85°C Elec. capacitor

$$L = Lo * 2^{(85-dT-Ta)/10} /(8 * 365) \text{ (Yrs)}$$

Where :
- L —Elec. capacitor computed life (8 hours per day , 365 days operation)
- Lo—Guarantee life for Elec. capacitor
- Ta —Ambient temperature
- dT—Temperature rise of Elec. capacitor

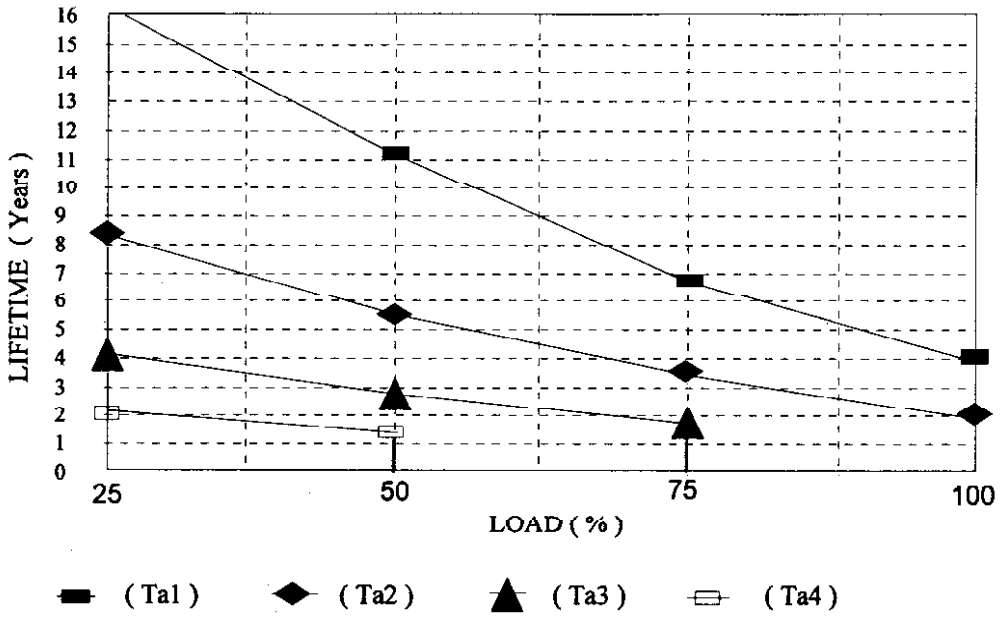
E - CAP LIFETIME versus LOAD

Vin = 100VAC

Mounting Position : B

8 hours per day,365 days operation

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD



Load (%)	LIFETIME (Yrs.)			
	Ta1 = 30°C	Ta2 = 40°C	Ta3 = 50°C	Ta4 = 60°C
100	3.93	1.96	-	-
75	6.84	3.42	1.71	-
50	11.11	5.56	2.78	1.39
25	16.27	8.13	4.07	2.03

Formula :

1.For 105°C Elec. capacitor

$$L = Lo * 2^{(105-dT-Ta)/10} /(8 * 365) \text{ (Yrs.)}$$

2. For 85°C Elec. capacitor

$$L = Lo * 2^{(85-dT-Ta)/10} /(8 * 365) \text{ (Yrs)}$$

Where :

L —Elec. capacitor computed life (8 hours per day , 365 days operation)

Lo—Guarantee life for Elec. capacitor

Ta—Ambient temperature

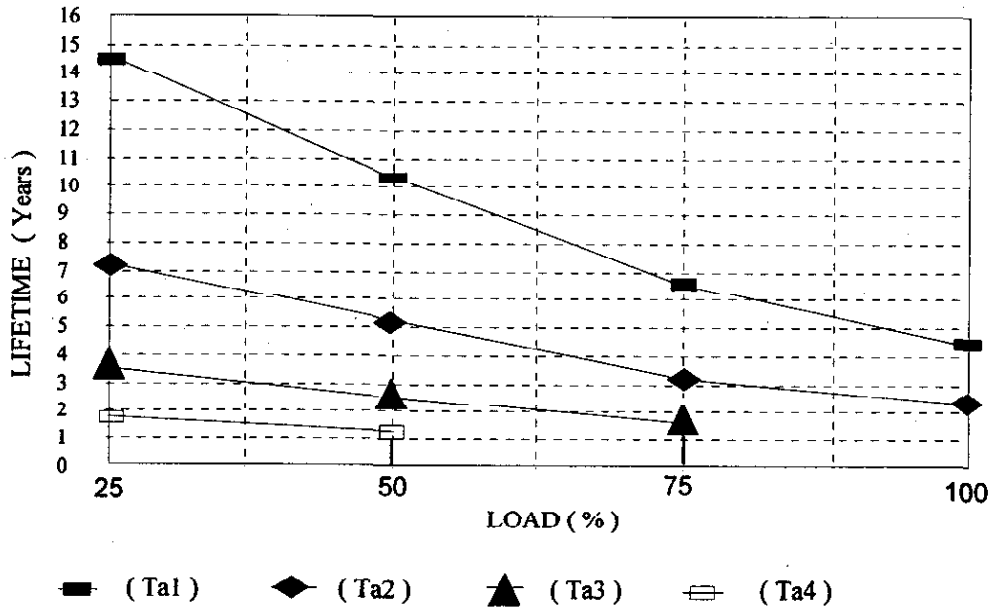
dT—Temperature rise of Elec. capacitor

E-CAP LIFETIME versus LOAD

Vin = 200VAC
8 hours per day,365 days operation

Mounting Position : B

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD



Load (%)	LIFETIME (Yrs.)			
	Ta1 = 30°C	Ta2 = 40°C	Ta3 = 50°C	Ta4 = 60°C
100	4.42	2.21	-	-
75	6.38	3.19	1.60	-
50	10.30	5.15	2.57	1.29
25	14.46	7.23	3.62	1.81

Formula :

1.For 105°C Elec. capacitor

$$L = Lo * 2^{(105-dT-Ta)/10} /(8 * 365) \text{ (Yrs.)}$$

2. For 85°C Elec. capacitor

$$L = Lo * 2^{(85-dT-Ta)/10} /(8 * 365) \text{ (Yrs)}$$

Where :
L —Elec. capacitor computed life
(8 hours per day , 365 days operation)
Lo —Guarantee life for Elec. capacitor
Ta —Ambient temperature
dT —Temperature rise of Elec. capacitor

SWT100 - *

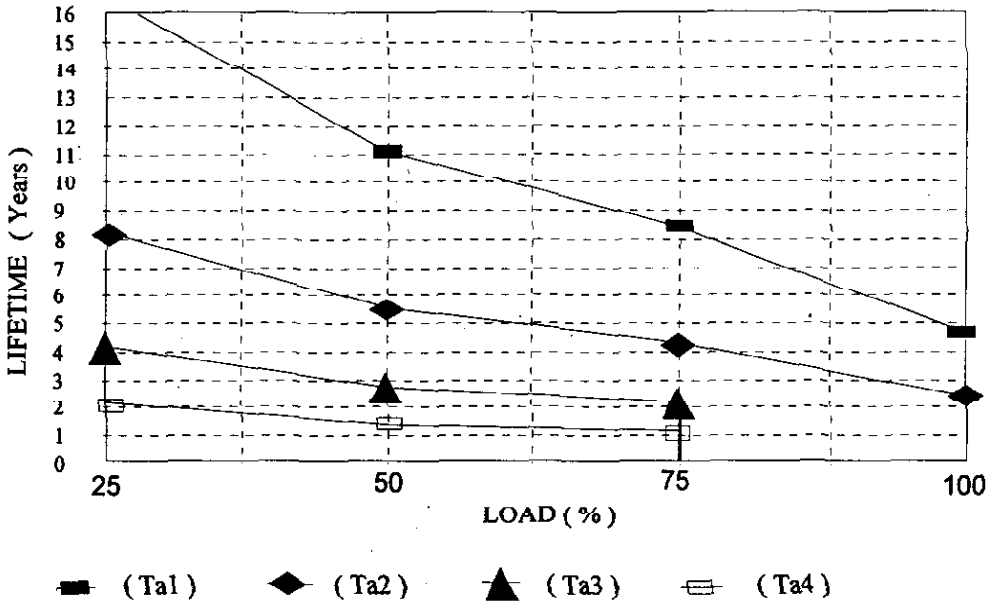
E - CAP LIFETIME versus LOAD

Vin = 100VAC

8 hours per day,365 days operation

Mounting Position : C

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD



Load (%)	LIFETIME (Yrs.)			
	Ta1 = 30°C	Ta2 = 40°C	Ta3 = 50°C	Ta4 = 60°C
100	4.74	2.37	-	-
75	8.42	4.21	2.11	1.05
50	11.04	5.52	2.76	1.38
25	16.50	8.25	4.12	2.06

Formula :

1.For 105°C Elec. capacitor

$$L = Lo * 2^{(105-dT-Ta)/10} /(8 * 365) \quad (Yrs.)$$

2. For 85°C Elec. capacitor

$$L = Lo * 2^{(85-dT-Ta)/10} /(8 * 365) \quad (Yrs)$$

Where :

L —Elec. capacitor computed life (8 hours per day , 365 days operation)

Lo—Guarantee life for Elec. capacitor

Ta—Ambient temperature

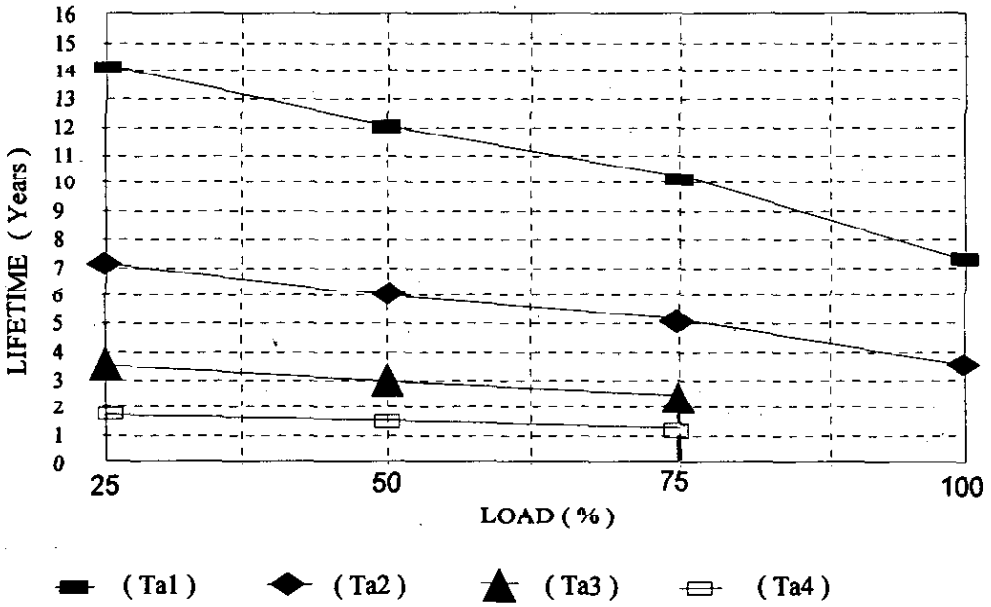
dT—Temperature rise of Elec. capacitor

E - CAP LIFETIME versus LOAD

Vin = 200VAC
8 hours per day,365 days operation

Mounting Position : C

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD



Load (%)	LIFETIME (Yrs.)			
	Ta1 = 30°C	Ta2 = 40°C	Ta3 = 50°C	Ta4 = 60°C
100	7.23	3.62	-	-
75	10.15	5.08	2.54	1.27
50	11.99	6.00	3.00	1.50
25	14.07	7.03	3.52	1.76

Formula :

1.For 105°C Elec. capacitor

$$L = Lo * 2^{(105-dT-Ta)/10} /(8 * 365) \text{ (Yrs.)}$$

2. For 85°C Elec. capacitor

$$L = Lo * 2^{(85-dT-Ta)/10} /(8 * 365) \text{ (Yrs)}$$

Where :
L —Elec. capacitor computed life
(8 hours per day , 365 days operation)
Lo—Guarantee life for Elec. capacitor
Ta —Ambient temperature
dT—Temperature rise of Elec. capacitor

SWT100 - *

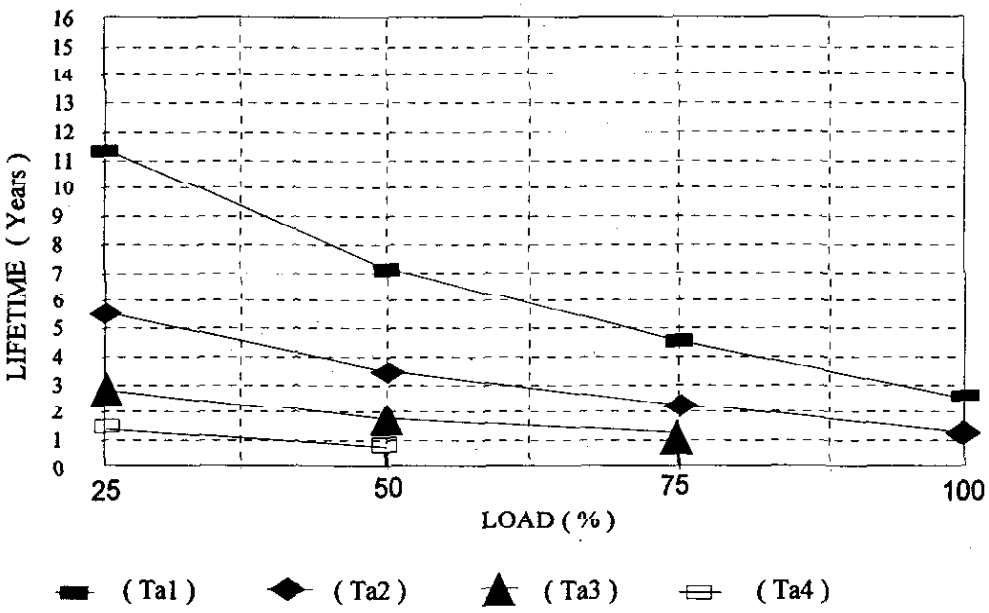
E - CAP LIFETIME versus LOAD

Vin = 100VAC

8 hours per day,365 days operation

Mounting Position : D

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD



Load (%)	LIFETIME (Yrs.)			
	Ta1 = 30°C	Ta2 = 40°C	Ta3 = 50°C	Ta4 = 60°C
100	2.42	1.21	-	-
75	4.42	2.21	1.11	-
50	7.13	3.57	1.78	0.89
25	11.27	5.63	2.82	1.41

Formula :

1.For 105°C Elec. capacitor

$$L = Lo * 2^{(105-dT-Ta)/10} /(8 * 365) \text{ (Yrs.)}$$

2. For 85°C Elec. capacitor

$$L = Lo * 2^{(85-dT-Ta)/10} /(8 * 365) \text{ (Yrs)}$$

Where :

L —Elec. capacitor computed life (8 hours per day , 365 days operation)

Lo—Guarantee life for Elec. capacitor

Ta—Ambient temperature

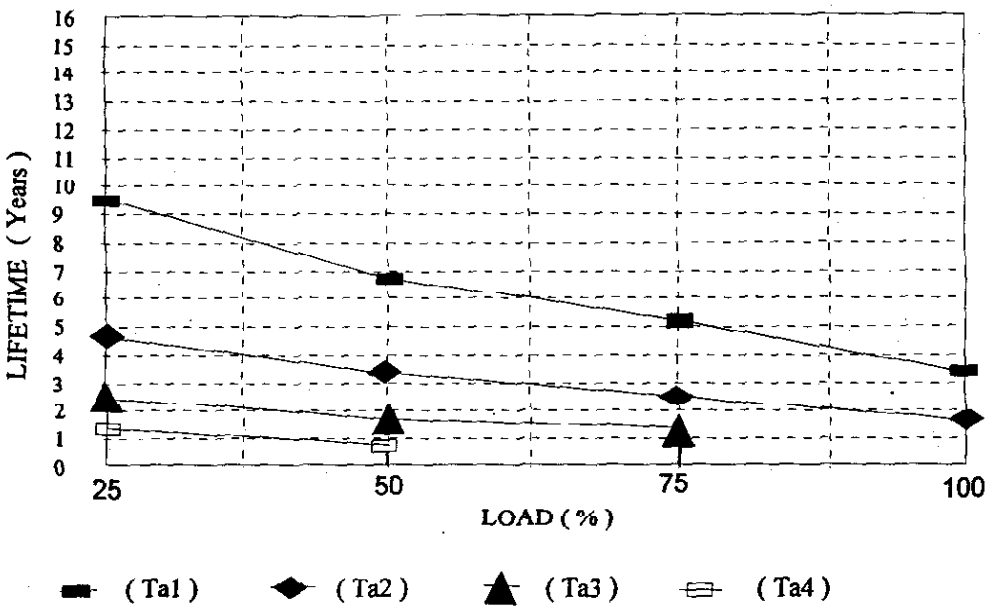
dT—Temperature rise of Elec. capacitor

E - CAP LIFETIME versus LOAD

Vin = 200VAC
8 hours per day,365 days operation

Mounting Position : D

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD



Load (%)	LIFETIME (Yrs.)			
	Ta1 = 30°C	Ta2 = 40°C	Ta3 = 50°C	Ta4 = 60°C
100	3.26	1.63	-	-
75	5.18	2.59	1.30	-
50	6.79	3.40	1.70	0.85
25	9.67	4.84	2.42	1.21

Formula :

1.For 105°C Elec. capacitor

$$L = Lo * 2^{(105-dT-Ta)/10} /(8 * 365) \text{ (Yrs.)}$$

2. For 85°C Elec. capacitor

$$L = Lo * 2^{(85-dT-Ta)/10} /(8 * 365) \text{ (Yrs)}$$

Where :
L —Elec. capacitor computed life
(8 hours per day , 365 days operation)
Lo—Guarantee life for Elec. capacitor
Ta—Ambient temperature
dT—Temperature rise of Elec. capacitor

SWT100 - *

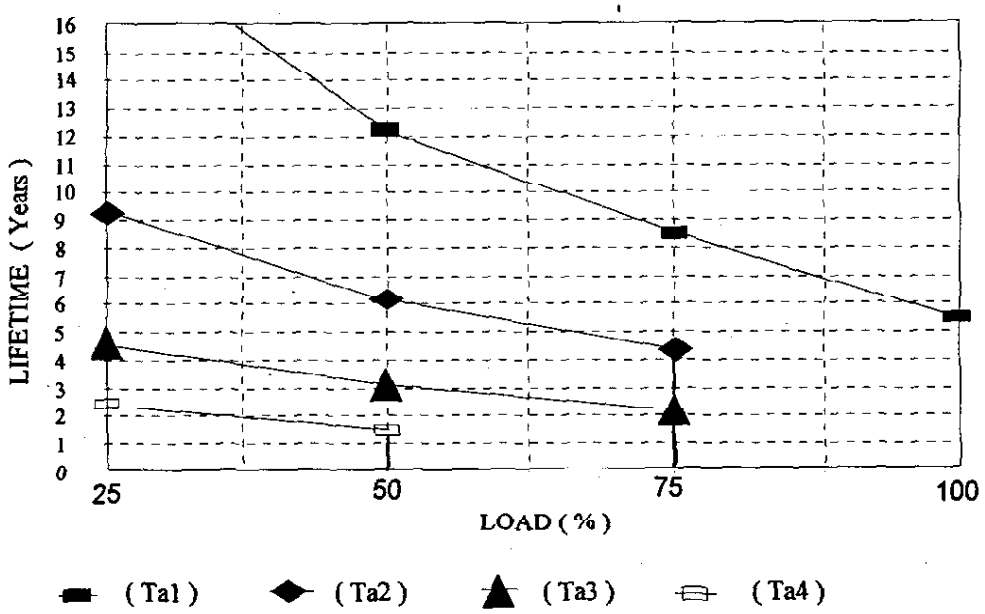
E - CAP LIFETIME versus LOAD

Vin = 100VAC

8 hours per day,365 days operation

Mounting Position : E

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD



Load (%)	LIFETIME (Yrs.)			
	Ta1 = 30°C	Ta2 = 40°C	Ta3 = 50°C	Ta4 = 60°C
100	5.44	-	-	-
75	8.66	4.33	2.16	-
50	12.08	6.04	3.02	1.51
25	18.56	9.28	4.64	2.32

Formula .

1.For 105°C Elec. capacitor

$$L = Lo * 2^{(105-dT-Ta)/10} /(8 * 365) \text{ (Yrs.)}$$

2. For 85°C Elec. capacitor

$$L = Lo * 2^{(85-dT-Ta)/10} /(8 * 365) \text{ (Yrs)}$$

Where :

L —Elec. capacitor computed life (*8 hours per day , 365 days operation*)

Lo—Guarantee life for Elec. capacitor

Ta —Ambient temperature

dT —Temperature rise of Elec. capacitor

SWT100 - *

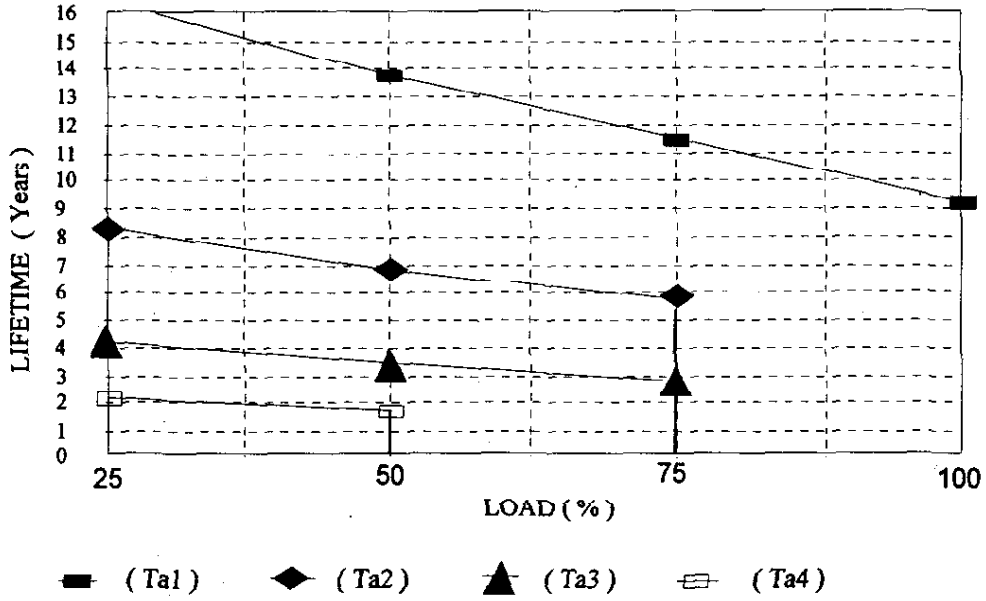
E - CAP LIFETIME versus LOAD

Vin = 200VAC

Mounting Position : E

8 hours per day,365 days operation

GRAPH OF ELECTROLYTIC CAPACITOR LIFETIME VERSUS LOAD



Load (%)	LIFETIME (Yrs.)			
	Ta1 = 30°C	Ta2 = 40°C	Ta3 = 50°C	Ta4 = 60°C
100	9.03	-	-	-
75	11.58	5.79	2.90	-
50	13.87	6.94	3.47	1.73
25	16.50	8.25	4.12	2.06

Formula :

1.For 105°C Elec. capacitor

$$L = Lo * 2^{(105-dT-Ta)/10} /(8 * 365) \text{ (Yrs.)}$$

2. For 85°C Elec. capacitor

$$L = Lo * 2^{(85-dT-Ta)/10} /(8 * 365) \text{ (Yrs)}$$

Where :

L Elec. capacitor computed life (8 hours per day , 365 days operation)

Lo—Guarantee life for Elec. capacitor

Ta—Ambient temperature

dT—Temperature rise of Elec. capacitor

MODEL : SWT100 -522	ABNORMAL TESTING	TEST CONDITIONS: LOAD = 100%	Vin = AC200V Ta = 25 ℃	APPROVED	TESTED

				TEST MODE		TEST RESULTS																	
	PARTS NAME	PART NO.	TEST POINT	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	RETEST	NO GOOD
1	TOPSWITCH	A1	C-D	Y									Y			Y				Y		
2	PVR-TOP204YAI		S-D	Y									Y			Y				Y		
3			C-S	Y												Y			CH1,CH3 NO O/P	Y		
4			C		Y											Y				Y		
5			D		Y											Y				Y		
6			S		Y											Y				Y		
7	SHUNT REG.	A3	1-2	Y										Y								
8	KA431Z		2-3	Y														Y	CH1 O/P LOW			
9			1-3	Y														Y	CH1 O/P LOW			
10			1		Y									Y								
11			2		Y									Y								
12			3		Y									Y								
13	3T-REG.	A5	1-2	Y														Y	CH3 OCP			
14	uPC7912H		2-3	Y														Y	CH3 O/P HIGH			
15			1-3	Y										Y								
16			1		Y												Y					
17			2		Y											Y						
18			3		Y											Y						
19	CAP.,FILM	C1		Y									Y									
20	PA474-L				Y												Y					
21	CAP.,CERAMIC	C2		Y													Y					
22	CD16E2GA332MYAS				Y												Y					
23	CAP.,CERAMIC	C3		Y													Y					
24	CD16E2GA332MYAS				Y												Y					
25																						

*** A : SLIGHT B : PROLONGED

MODEL : SWT100-522	ABNORMAL TESTING	TEST CONDITIONS	APPROVED	TESTED
		LOAD = 100% Vin = AC200V Ta = 25°c	12-DEC-95	詹翠珍

				TEST MODE										TEST RESULTS								
	PARTS NAME	PART NO.	TEST POINT	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		OK	RE-TEST	NO GOOD
26	CAP.,FILM	C4		Y									Y							Y		
27	PA104-L				Y												Y			Y		
28	CAP.,CERAMIC	C5		Y													Y			Y		
29	CD16E2GA332MYAS				Y												Y			Y		
30	CAP.,ELECT	C6		Y												Y				Y		
31	LP4-400V271MS3				Y												Y			Y		
32	CAP.,ELECT	C7		Y												Y				Y		
33	LP4-400V271MS3				Y												Y			Y		
34	CAP.,FILM	C8		Y										Y						Y		
35	ECQE4103KFB				Y												Y			Y		
36	CAP.,FILM	C9		Y										Y						Y		
37	MMH-104K63A				Y												Y			Y		
38	CAP.,ELECT	C10		Y												Y				Y		
39	RSH-25V560MA22				Y												Y			Y		
40	CAP.,FILM	C11		Y												Y				Y		
41	MMH-104K63A				Y												Y			Y		
42	CAP.,CERAMIC	C16		Y										Y						Y		
43	DE5I2-979R682K250				Y												Y			Y		
44	CAP.,ELECT	C17		Y										Y						Y		
45	RSH-10V392MA66				Y												Y			Y		
46	CAP.,ELECT	C18		Y										Y						Y		
47	RSH-10V392MA66				Y												Y			Y		
48	CAP.,ELECT	C19		Y										Y						Y		
49	RSH-10V392MA66				Y												Y			Y		
50																						

*** A : SLIGHT B : PROLONGED

MODEL : SWT100 -522	ABNORMAL TESTING	TEST CONDITIONS		APPROVED	TESTED
		LOAD = 100%	Vin = AC200V Ta =25℃	12DEC95	

	PARTS NAME	PART NO.	TEST POINT	TEST MODE		TEST RESULTS																
				SHORT	OPEN	FIRE	SMOKE A	SMOKE B	BURST	SMELL	RED HOT	DAMAGE	FUSE BROWN	O.C.P.	O.V.P.	NO OUTPUT	NO CHANGE	OTHERS		OK	RETEST	NO GOOD
51	CAP.,ELECT.	C20		Y										Y						Y		
52	RSH-10V681MA43				Y												Y			Y		
53	CAP.,FILM	C21		Y													Y			Y		
54	MMD22J333K				Y												Y			Y		
55	CAP.,ELECT.	C22		Y										Y						Y		
56	RSH-50V561MA64				Y												Y			Y		
57	CAP.,ELECT.	C23		Y										Y					CH3 OCP			
58	RSH-25V331MA43				Y												Y					
59	CAP.,FILM	C24		Y													Y					
60	MMD22J333K				Y												Y					
61	CAP.,CRAMIC	C25		Y										Y								
62	DE510-979R472K250				Y												Y					
63	CAP.,ELECT.	C31		Y														Y	CH1 O/P LOW			
64	RJ3-50V010M				Y												Y					
65	DIODE,BRIDGE	D1	ONE DIODE	Y									Y			Y						
66	D5SB60		ONE LEAD		Y											Y						
67	DIODE	D2		Y												Y						
68	1NU41				Y												Y					
69	DIODE	D3		Y												Y						
70	GI1003				Y									Y					HICCUP			
71	DIODE,S.B.D	D6		Y												Y						
72	SBL2040PT				Y										Y	Y						
73	ZENTER DIODE	ZD1		Y										Y					HICCUP			
74	P6KE220CA				Y												Y					
75																						

*** A : SLIGHT B : PROLONGED

MODEL : SWT100-522	ABNORMAL TESTING	TEST CONDITIONS: LOAD = 100%	Vin = AC200V, Ta = 25°c	APPROVED: 12-DEC-95	TESTED

				TEST MODE		TEST RESULTS																	
	PARTS NAME	PART NO.	TEST POINT	SHORT	OPEN	FIRE	SMOKE A	SMOKE B	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOWN	O.C.P.	C.V.F.	NO OUTPUT	NO CHANGE	OTHERS	NOTE	OK	RETEST	NO GOOD
76	ZENER DIODE	ZD2		Y												Y				Y		
77	1N4736				Y												Y			Y		
78	ZENER DIODE	ZD5		Y										Y					HICCUP	Y		
79	AW01-07				Y												Y			Y		
80	PHOTO-COUPLER	PC1	1-2	Y										Y					HICCUP	Y		
81	4N35TV		1-3	Y													Y			Y		
82			2-3	Y													Y					
83			4-5	Y										Y					HICCUP			
84			4-6	Y													Y					
85			5-6	Y													Y					
86			1		Y									Y								
87			2		Y									Y								
88			3		Y												Y					
89			4		Y									Y								
90			5		Y									Y								
91			6		Y												Y					
92	RES.,M.C.	R1		Y										Y								
93	RY27A-51KJ				Y												Y					
94	RES.,CAREON	R2		Y													Y					
95	RD16S20CJ				Y											Y						
96	RES.,M.C.	R5		Y													Y					
97	RY26-6.8J				Y												Y					
98	RES.,CAREON	R6		Y										Y					CH3 OCP			
99	RD16S2KJ				Y												Y					
100																						

*** A : SLIGHT B : PROLONGED

MODEL : SWT100 -522	ABNORMAL TESTING	TEST CONDITIONS: LOAD = 100%	Vin = AC200V Ta = 25℃	APPROVED: 12DEC 95	TESTED

				TEST MODE										TEST RESULTS								
	PARTS NAME	PART NO.	TEST POINT	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	RETEST	NO GOOD
100	RES.,M.O.	R7		Y													Y			Y		
10	RY26-6.8J				Y												Y			Y		
102	RES.,M.O.	R8		Y										Y					CH2 OCP	Y		
103	RY27A-200J				Y												Y			Y		
104	RES.,M.O.	R9		Y										Y					CH2 OCP	Y		
105	RY27A-200J				Y												Y			Y		
106	RES.,M.O.	R10		Y										Y					CH2 OCP			
107	RY27A-200J				Y												Y					
108	RES.,CARBON	R11		Y													Y					
109	RD16S200J				Y									Y								
110	RES.,CARBON	R12		Y										Y								
111	RD16S3.3KJ				Y												Y					
112	RES.,CARBON	R13		Y										Y								
113	RD16S2KJ				Y									Y								
114	RES.,CARBON	R14		Y										Y								
115	RD16S1KJ				Y													Y	CH1 O/P LOW			
116	X'MER	T1	3-4	Y												Y						
117	CA70401		1-2	Y												Y						
118			6		Y											Y						
119			1		Y									Y								
120			10-11	Y										Y								
121			7-8	Y										Y								
122			7		Y													Y	CH3 NO O/P			
123			9		Y												Y					
124			10		Y												Y					

*** A : SLIGHT B : PROLONGED

MODEL : SWT100-522	ABNORMAL TESTING	TEST CONDITIONS		APPROVED	TESTED
		LOAD = 100%	Vin = AC200V Ta = 25 'c	12.Dec.95	

				TEST MODE										TEST RESULTS								
	PARTS NAME	PART NO.	TEST POINT	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	RETEST	NO GOOD
125	RES.,VARIABLE	VR1		Y										Y						Y		
126	KVSF637ASB2K				Y													Y	CH1 O/P LOW	Y		
127	BALUN COIL	L1		Y									Y			Y				Y		
128	SS28V-R30030				Y											Y				Y		
129																				Y		
130																				Y		
131																						
132																						
133																						
134																						
135																						
136																						
137																						
138																						
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144																						
145																						
146																						
147																						
148																						
149																						

*** A : SLIGHT B : PROLONGED

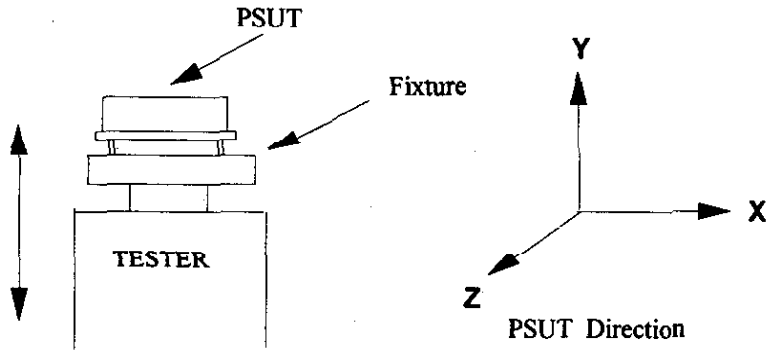
SWT100 - *

VIBRATION TEST

Type of vibration test : A) Oscillator frequency sweep

Equipment used : Vibration test system F - 400 - BM - E47 (EMIC CORP.)
Vibration generator 905 - FN(EMIC CORP.)

Proceduce :



A) Vibration test with frequency sweep

Sweep frequency	:	10 - 55Hz
Sweep time	:	1min
Acceleration	:	Fixed 2G
Direction	:	X,Y,Z.
Duration	:	1hour for each direction.

Test point :

1) Output voltage (Apply some shock when checking the output voltage, and observe any abnormalities.)
2) Ripple voltage (At nominal input and output.)
3) Mechanical condition (No breakage.)

SWT100 - *

Test result :

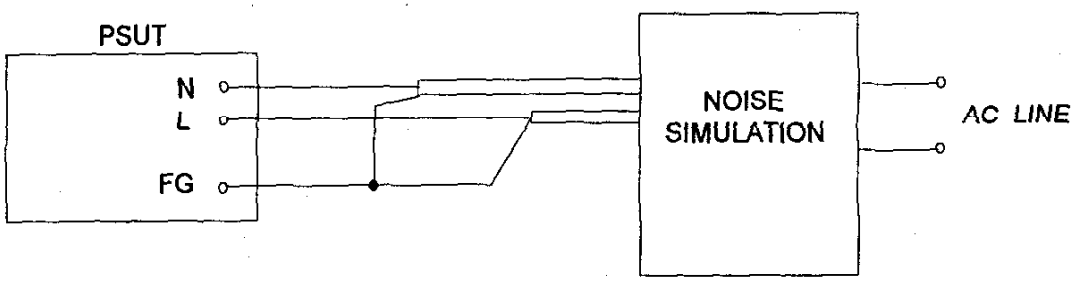
Test Point		Output voltage (V)			Ripple voltage (mV)			Mechanical Condition	Note
		CH1	CH2	CH3	CH1	CH2	CH3		
Before test		4.995	12.125	12.268	20	25	2	O.K	
After test	Direction X	4.998	12.127	12.275	22	27	2	O.K	
	Y	4.996	12.125	12.266	22	25	2	O.K.	
	Z	4.999	12.128	12.263	22	27	2	O.K.	

Evaluation result : (PASS) / FAIL

Visual inpection result : (PASS) / FAIL

NOISE SIMULATION TEST

Circuit for measurement and equipmet used :



MODEL : ENS - 24X (SANKI)

Test condition :

Input voltage	:	100VAC
Output voltage	:	Rated
Output current	:	Min , 100%
Ambient temp.	:	25°C

Settings :

MODE	:	Normal , Common
TRIG SELECT	:	Line
PULSE WIDTH	:	50 , 200 , 800 , 1000ns
PHASE SHIFT	:	0° ~ 360°
POLARITY	:	+ , -
NOISE LEVEL	:	0 ~ 2KV

Acceptance criteria :

1) No damage of PSUT.
2) No output failure.
3) Check any abnormalities. (e.g. noise)

Evaluation result : (PASS) / FAIL

ELECTROSTATIC DISCHARGE TEST

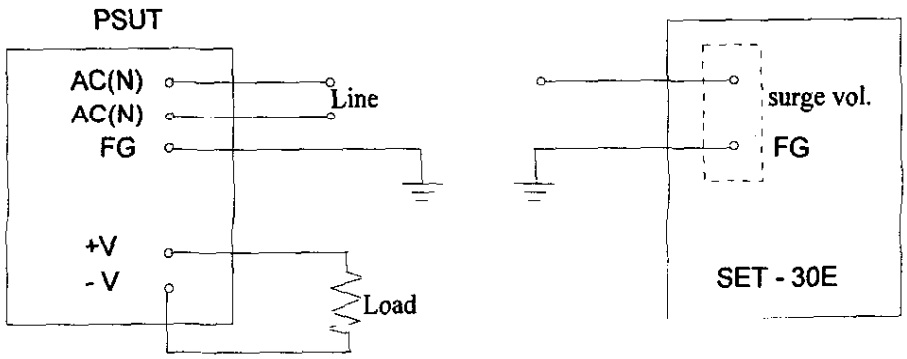
Equipment used : SET - 30E (SANKI ELECTRONIC)
Discharge resistor : 250 Ω
Capacitor unit : 200 pF

Test conditions : Input voltage : Nominal Line (100VAC)
Output voltage : Rated
Output current : 100%
Ambient temperature : 25°C
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 Terminals, Output Terminals, FG Terminal) and check any abnormalities.

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

Test circuit :

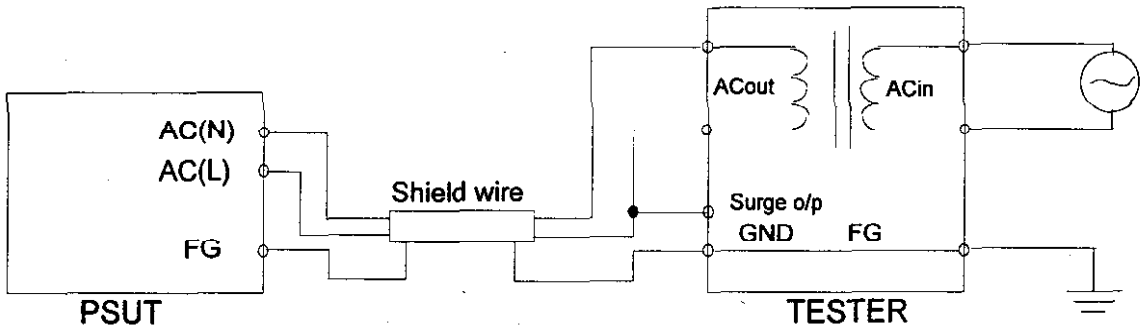


Acceptance criteria : 1) No damage of PSUT.
2) No output failure.
3) No abnormalities.

Evaluation result : (PASS) / FAIL

LIGHTNING SURGE TEST

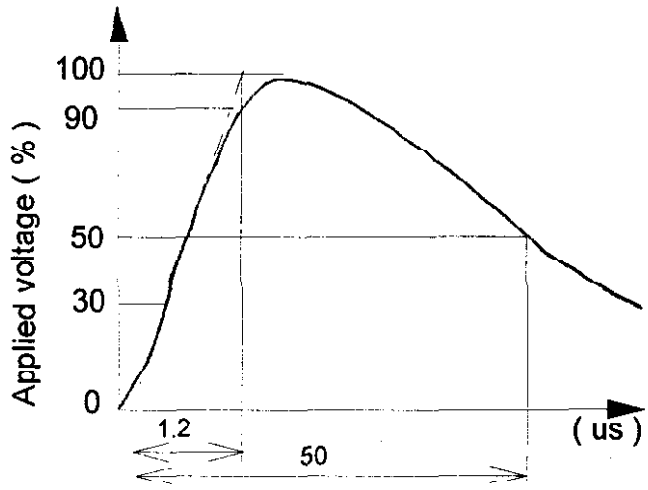
Test circuit, Test equipment



MODEL : LSG - 12K - E (SANKI)

Test conditions :	Input voltage	:	100VAC
	Output voltage	:	Rated
	Output current	:	Rated
	Ambient temp.	:	25°C
	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	:	+ , -

Applied voltage waveform :



Acceptance criteria
1) No damage of PSUT.
2) No output failure.
3) No abnormalities.

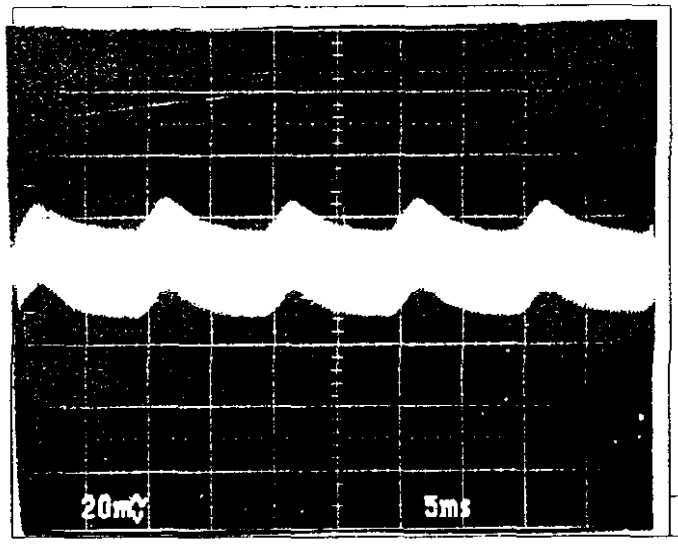
Evaluation result : 5.0KV (PASS) / FAIL

OUTPUT-RIPPLE, NOISE

SWT100 - 522	
Conditions	Vin = 100VAC
	Iout = 100%
	Ta = 25 °C

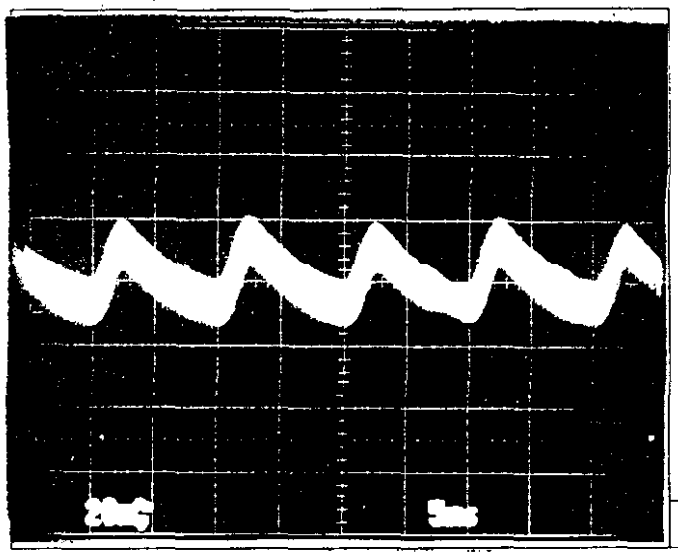
COMMON + NORMAL

CH1



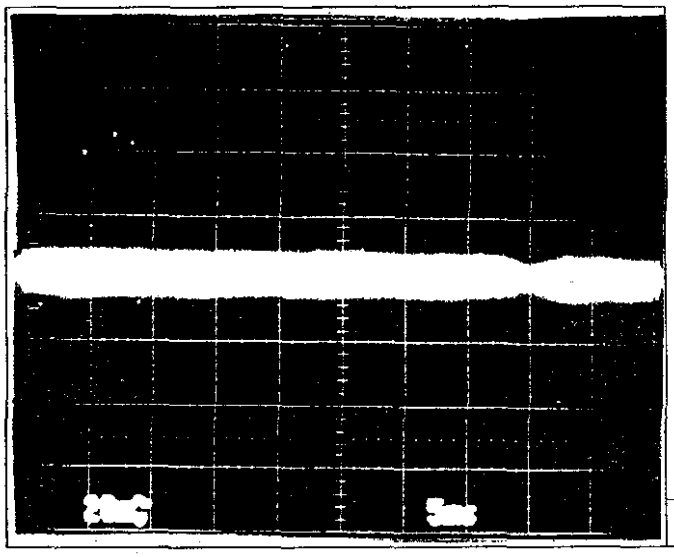
20mV/DIV	5mS/DIV

CH2



20mV/DIV	5mS/DIV

CH3



20mV/DIV	5mS/DIV