RFE1600
RELIABILITY DATA

DWG: IA745-79-01		
APPD	CHK	DWG
5-Mar-2014	20-Feb-14	19-2-14

TDK-Lambda

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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.

1. M.T.B.F

1.1 Method of calculation according to JEITA (RCR-9102B)

based on part count reliability projection of MIL-HDBK-217F, GF (Ground,Fixed)
Individual failure rates is given to each part and M.T.B.F is
calculated by the count of each part.

$$MTBF = \frac{1}{\lambda_{equip}} = \frac{1}{\sum_{i=1}^{n} N_i (\lambda_G \pi_Q)_i} \times 10^6 (Hours)$$

Where:

λ_{equip} = Total Equipment Failure Rate (Failures / 10^6 Hours)
λ_G = Generic Failure Rate For The ith Generic Part (Failure / 10^6 Hours)
N_i = Quantity of ith Generic Part
n = Number of Different Generic Part Categories
π_Q = Generic Quality factor for the Generic Part (π_Q = 1)

1.2 M.T.B.F Value according to JEITA (RCR-9102B)

M.T.B.F = 34,221 (HOURS)

(MTBF calculation for fan isn't included)

2.COMPONENT DERATING

Calculation method

a) Condition

Output:	Vout - 100%, Iout - 100%
Ambient temperature:	50°C
Mounting Method:	Standard (horizontal) mounting

b) Semiconductors

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

c) Semiconductors, Resistors, Capacitors, etc.

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

d) Calculation method of thermal impedance

$$\theta j\text{-}c = \frac{Tj(max)-Tc}{Pc(max)} \qquad \theta j\text{-}a = \frac{Tj(max)-Ta}{Pc(max)} \qquad \theta j\text{-}l = \frac{Tj(max)-Tl}{Pc(max)}$$

Tc: Case Temperature at Start Point of Derating; 25°C in General

Ta: Ambient Temperature at Start Point of Derating; 25°C in General

Pc(max): Maximum Power Dissipation

Tj(max): Maximum Junction temperature

θ j-c: Thermal Impedance between Junction and Case

θ j-a: Thermal Impedance between Junction and Air

θ j-l: Thermal Impedance between Junction and Lead

(2) Component derating list

Location №	Vin=230VAC			Load = 100%				Ta=50°C	
A107	Tjmax=	150	°C	θ_{j-c} =	3.0	°C/W			
MIP0224SY	Pd =	3.5	W	ΔTc =	37.8	°C	Tc =	87.8	°C
MATSUSHITA	Tj = Tc + (θ_{j-c} x Pd) =				98.3	°C	D.F. =	65.5	%
A104	Tjmax=	150	°C	θ_{j-c} =	42.0	°C/W			
MC33063AD	Pd =	0.9	W	ΔTc =	37.9	°C	Tc =	87.9	°C
TI	Tj = Tc + (θ_{j-c} x Pd) =				125.7	°C	D.F. =	83.8	%
A801	Tjmax=	150	°C	θ_{j-c} =	42.0	°C/W			
MC33063AD	Pd =	0.5	W	ΔTc =	61.8	°C	Tc =	106.1	°C
TI	Tj = Tc + (θ_{j-c} x Pd) =				127.1	°C	D.F. =	85.7	%
D101	Tjmax=	150	°C	θ_{j-c} =	0.6	°C/W			
GBJ2506	Pd =	24	W	ΔTc =	37.7	°C	Tc =	87.7	°C
DIODES	Tj = Tc + (θ_{j-c} x Pd) =				102.1	°C	D.F. =	68.1	%
D107	Tjmax=	150	°C	θ_{j-c} =	3.5	°C/W			
YG912S6RR	Pd =	4	W	ΔTc =	25.6	°C	Tc =	75.6	°C
FUJI	Tj = Tc + (θ_{j-c} x Pd) =				89.6	°C	D.F. =	59.7	%
D108	Tjmax=	150	°C	θ_{j-c} =	3.5	°C/W			
YG912S6RR	Pd =	4	W	ΔTc =	26.1	°C	Tc =	76.1	°C
FUJI	Tj = Tc + (θ_{j-c} x Pd) =				90.1	°C	D.F. =	60.0	%
D109	Tjmax=	150	°C	θ_{j-c} =	3.5	°C/W			
YG902C3R	Pd =	3.5	W	ΔTc =	36.0	°C	Tc =	86.0	°C
FUJI	Tj = Tc + (θ_{j-c} x Pd) =				98.3	°C	D.F. =	65.5	%
D110	Tjmax=	150	°C	θ_{j-c} =	3.5	°C/W			
YG902C3R	Pd =	3.5	W	ΔTc =	35.8	°C	Tc =	85.8	°C
FUJI	Tj = Tc + (θ_{j-c} x Pd) =				98.1	°C	D.F. =	65.4	%
Q101	Tjmax=	150	°C	θ_{j-c} =	0.5	°C/W			
IPW60R099CP	Pd =	4	W	ΔTc =	25.2	°C	Tc =	75.2	°C
INFINEON	Tj = Tc + (θ_{j-c} x Pd) =				77.2	°C	D.F. =	51.5	%
Q102	Tjmax=	150	°C	θ_{j-c} =	0.5	°C/W			
IPW60R099CP	Pd =	4	W	ΔTc =	21.4	°C	Tc =	71.4	°C
INFINEON	Tj = Tc + (θ_{j-c} x Pd) =				73.4	°C	D.F. =	48.9	%
Q103	Tjmax=	150	°C	θ_{j-c} =	0.5	°C/W			
IPP60R099CP	Pd =	10	W	ΔTc =	57.8	°C	Tc =	107.8	°C
INFINEON	Tj = Tc + (θ_{j-c} x Pd) =				112.8	°C	D.F. =	75.2	%
Q104	Tjmax=	150	°C	θ_{j-c} =	0.5	°C/W			
IPP60R099CP	Pd =	10.0	W	ΔTc =	63.3	°C	Tc =	113.3	°C
INFINEON	Tj = Tc + (θ_{j-c} x Pd) =				118.3	°C	D.F. =	78.9	%
Q113	Tjmax=	150	°C	θ_{j-c} =	0.4	°C/W			
IPW60R075CP	Pd =	12.0	W	ΔTc =	69.6	°C	Tc =	119.6	°C
INFINEON	Tj = Tc + (θ_{j-c} x Pd) =				124.4	°C	D.F. =	82.9	%
Q114	Tjmax=	150	°C	θ_{j-c} =	0.4	°C/W			
IPW60R075CP	Pd =	12.0	W	ΔTc =	48.2	°C	Tc =	98.2	°C
INFINEON	Tj = Tc + (θ_{j-c} x Pd) =				101.2	°C	D.F. =	67.5	%

12V

Location №	Vin=230VAC			Load = 100%			Ta=50°C	
Q502	Tjmax=	150	°C	θ_{j-c} =	0.9	°C/W		
BSC017N04NS G	Pd =	0.47	W	ΔTc =	29.0	°C	Tc =	79.0 °C
INFINEON	Tj = Tc + (θ j-c x Pd) =				79.4	°C	D.F. =	52.9 %
Q503	Tjmax=	150	°C	θ_{j-c} =	0.9	°C/W		
BSC017N04NS G	Pd =	0.47	W	ΔTc =	36.7	°C	Tc =	86.7 °C
INFINEON	Tj = Tc + (θ j-c x Pd) =				87.1	°C	D.F. =	58.1 %
Q504	Tjmax=	150	°C	θ_{j-c} =	0.9	°C/W		
BSC017N04NS G	Pd =	0.47	W	ΔTc =	33.6	°C	Tc =	83.6 °C
INFINEON	Tj = Tc + (θ j-c x Pd) =				84.0	°C	D.F. =	56.0 %
Q510	Tjmax=	150	°C	θ_{j-c} =	0.9	°C/W		
BSC017N04NS G	Pd =	0.47	W	ΔTc =	27.3	°C	Tc =	77.3 °C
INFINEON	Tj = Tc + (θ j-c x Pd) =				77.7	°C	D.F. =	51.8 %

24V

Location №	Vin=230VAC			Load = 100%			Ta=50°C	
Q503	Tjmax=	150	°C	θ_{j-c} =	0.8	°C/W		
BSC079N10NS G	Pd =	0.69	W	ΔTc =	42.4	°C	Tc =	92.4 °C
INFINEON	Tj = Tc + (θ j-c x Pd) =				93.0	°C	D.F. =	62.0 %
Q504	Tjmax=	150	°C	θ_{j-c} =	0.8	°C/W		
BSC079N10NS G	Pd =	0.69	W	ΔTc =	29.9	°C	Tc =	79.9 °C
INFINEON	Tj = Tc + (θ j-c x Pd) =				80.5	°C	D.F. =	53.7 %
Q508	Tjmax=	150	°C	θ_{j-c} =	0.8	°C/W		
BSC079N10NS G	Pd =	0.69	W	ΔTc =	46.8	°C	Tc =	96.8 °C
INFINEON	Tj = Tc + (θ j-c x Pd) =				97.4	°C	D.F. =	64.9 %
Q509	Tjmax=	150	°C	θ_{j-c} =	0.8	°C/W		
BSC079N10NS G	Pd =	0.69	W	ΔTc =	29.4	°C	Tc =	79.4 °C
INFINEON	Tj = Tc + (θ j-c x Pd) =				80.0	°C	D.F. =	53.3 %
Q510	Tjmax=	150	°C	θ_{j-c} =	0.8	°C/W		
BSC079N10NS G	Pd =	0.69	W	ΔTc =	42.8	°C	Tc =	92.8 °C
INFINEON	Tj = Tc + (θ j-c x Pd) =				93.4	°C	D.F. =	62.2 %

48V

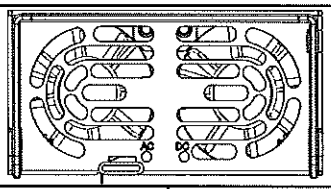
Location №	Vin=230VAC			Load = 100%			Ta=50°C		
Q551	Tjmax=	150	°C	θ_{j-c} =	0.8	°C/W			
BSC079N10NS G	Pd =	0.65	W	ΔTc =	30.4	°C	Tc =	80.4	°C
INFINEON	Tj = Tc + (θ j-c x Pd) =				80.9	°C	D.F. =	53.9	%
Q552	Tjmax=	150	°C	θ_{j-c} =	0.8	°C/W			
BSC079N10NS G	Pd =	0.65	W	ΔTc =	39.8	°C	Tc =	89.8	°C
INFINEON	Tj = Tc + (θ j-c x Pd) =				90.3	°C	D.F. =	60.2	%
Q553	Tjmax=	150	°C	θ_{j-c} =	0.8	°C/W			
BSC079N10NS G	Pd =	0.65	W	ΔTc =	36.6	°C	Tc =	86.6	°C
INFINEON	Tj = Tc + (θ j-c x Pd) =				87.1	°C	D.F. =	58.1	%
Q554	Tjmax=	150	°C	θ_{j-c} =	0.8	°C/W			
BSC079N10NS G	Pd =	0.65	W	ΔTc =	30.1	°C	Tc =	80.1	°C
INFINEON	Tj = Tc + (θ j-c x Pd) =				80.6	°C	D.F. =	53.7	%
Q555	Tjmax=	150	°C	θ_{j-c} =	0.8	°C/W			
BSC079N10NS G	Pd =	0.65	W	ΔTc =	31.3	°C	Tc =	81.3	°C
INFINEON	Tj = Tc + (θ j-c x Pd) =				81.8	°C	D.F. =	54.5	%
Q557	Tjmax=	150	°C	θ_{j-c} =	0.8	°C/W			
BSC079N10NS G	Pd =	0.65	W	ΔTc =	27.3	°C	Tc =	77.3	°C
INFINEON	Tj = Tc + (θ j-c x Pd) =				77.8	°C	D.F. =	51.9	%

3.MAIN COMPONENTS TEMPERATURE RISE ΔT LIST

12V

		ΔT Temperature Rise (°C)	
Location No.	Parts Name	115Vac	230Vac
A107	TOP SWITCH	31.0	30.8
A801	AUX REGULATOR	53.4	61.8
C101	"X" CAPACITOR	26.4	26.0
C110	ELEC. CAP.	9.5	9.7
C162	ELEC. CAP.	23.0	31.8
C180	ELEC. CAP.	17.1	21.5
D101	BRIDGE	42.5	34.5
D108	PF DIODE	23.5	26.1
D110	BUCK CLMP.DIODE	37.9	35.1
L102	EMI CHOKE	47.7	33.6
L104	PF CHOKE	62.2	60.1
L105	BUCK CHOKE	22.7	29.5
Q101	PF MOSFET	49.0	24.2
Q103	BUCK MOSFET	44.3	43.7
Q113	DC-DC MOSFET	27.2	37.8
Q503	RECTIFIER	25.1	36.7
Q701	ORING	32.6	50.3
T101	BIAS X'MER	38.8	39.7
T102	DRIVER X'MER	12.1	11.7
T104	DC-DC X'MER	38.1	61.3

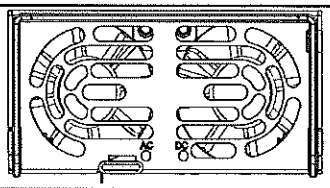
Conditions:

Standard Mounting		
Input Voltage	115VAC	230VAC
Output Voltage	12V	12V
Output Current	92A	133A
Aux. Output Voltage	12V	12V
Aux. Output Current	0.5A	0.5A
Ambient Temperature	50°C	

24V

		ΔT Temperature Rise (°C)	
Location No.	Parts Name	115Vac	230Vac
A107	TOP SWITCH	37.0	37.8
A801	AUX REGULATOR	47.5	56.2
C101	"X" CAPACITOR	26.2	27.2
C110	ELEC. CAP.	10.9	11.0
C162	ELEC. CAP.	22.9	34.5
C180	ELEC. CAP.	18.4	28.0
D101	BRIDGE	44.5	37.7
D108	PF DIODE	22.3	25.0
D110	BUCK CLMP.DIODE	37.4	35.8
L102	EMI CHOKE	47.8	37.5
L104	PF CHOKE	53.4	55.0
L105	BUCK CHOKE	18.1	22.6
Q101	PF MOSFET	43.7	23.9
Q103	BUCK MOSFET	54.4	57.8
Q113	DC-DC MOSFET	29.6	69.6
Q510	RECTIFIER	25.5	42.8
Q701	ORING	27.9	42.7
T101	BIAS X'MER	49.0	50.7
T102	DRIVER X'MER	15.2	16.1
T104	DC-DC X'MER	52.4	71.1

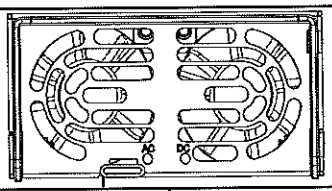
Conditions:

Standard Mounting		
Input Voltage	115VAC	230VAC
Output Voltage	24V	24V
Output Current	46A	67A
Aux. Output Voltage	12V	12V
Aux. Output Current	0.5A	0.5A
Ambient Temperature	50°C	

48V

Location No.	Parts Name	ΔT Temperature Rise (°C) 115Vac	230Vac
A107	TOP SWITCH	29.3	28.3
A801	AUX REGULATOR	51.6	57.1
C101	"X" CAPACITOR	26.6	24.3
C110	ELEC. CAP.	10.2	9.8
C162	ELEC. CAP.	19.0	27.3
C180	ELEC. CAP.	16.0	23.4
D101	BRIDGE	45.3	36.5
D108	PF DIODE	19.4	20.0
D110	BUCK CLMP.DIODE	38.3	35.7
L102	EMI CHOKE	42.1	32.6
L104	PF CHOKE	64.9	61.8
L105	BUCK CHOKE	22.5	29.4
Q101	PF MOSFET	48.3	25.2
Q103	BUCK MOSFET	50.2	49.9
Q113	DC-DC MOSFET	26.0	52.3
Q552	RECTIFIER	24.2	39.8
Q701	ORING	24.9	37.6
T101	BIAS X'MER	47.9	48.7
T102	DRIVER X'MER	21.8	21.8
T104	DC-DC X'MER	58.6	64.4

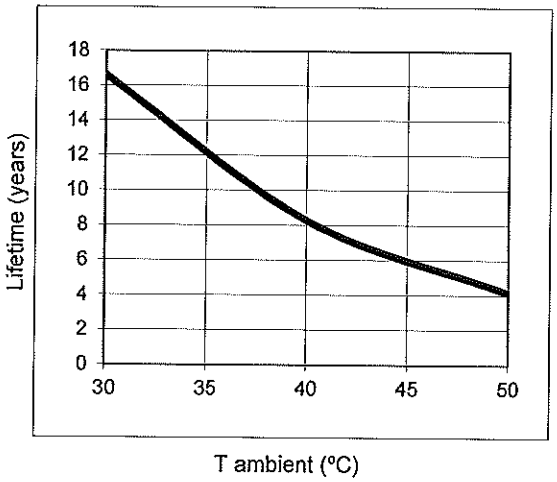
Conditions:

Standard Mounting		
Input Voltage	115VAC	230VAC
Output Voltage	48V	48V
Output Current	23A	33A
Aux. Output Voltage	12V	12V
Aux. Output Current	0.5A	0.5A
Ambient Temperature	50°C	

4.ELECTROLYTIC CAPACITORS LIFE TIME ESTIMATION

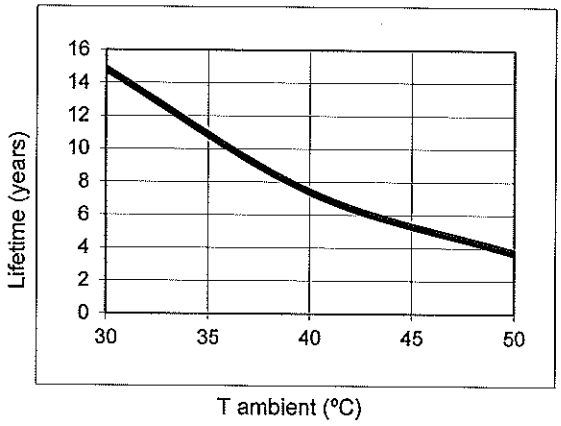
Vin=115Vac

MODEL	COMPUTED LIFE (year) at Tambient		
	30°C	40°C	50°C
RFE-1600	16.6	8.3	4.1



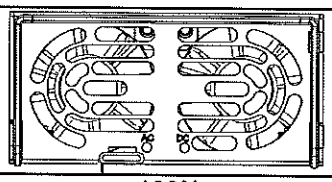
Vin=230Vac

MODEL	COMPUTED LIFE (year) at Tambient		
	30°C	40°C	50°C
RFE-1600	14.8	7.4	3.7



FORMULA: $$L = L_0 \times 2^{\frac{105 - T_C}{10}}$$ (years)

L: Elec.capacitor computed life (24 hours per day,365 days operation)
Lo: Guaranteed life for Elec.capacitor
Tc: Case temperature of Elec.capacitor

Standard Mounting	
Output Voltage	100%
Output Current	100%

5. ABNORMAL TEST

RFE1600

Vout=48V
Iout=33A

Model:48V
Input:230VAC

Ta:25°C, 70% RH

(Da:Damaged)

№	Test Position		Test Mode		Test Result												
					1	2	3	4	5	6	7	8	9	10	11	12	
	Location №	Test Point	Short	Open	Fire	Smoke	Burst	Smell	Red Hot	Damaged	Fuse opened	OVP	OCP	No Output	No Change	Others	Note
1	D101	AC-DC	O											O			D101
		AC-AC	O								O			O			F101
		AC		O											O		
		DC		O											O		
2	D107		O							O	O			O			D101, F101, MOD104, MOD103
				O						O	O			O			F101, Q101
3	D108		O							O	O			O			F101, Q102, PFC/BUCK Control circuit
				O						O	O			O			F101, Q102
4	D109		O							O				O			F101, D101, ZD101, ZD104, Q103, Q104
				O										O			R122, R123, Q103, Q104,
5	D110		O							O				O			R103, Q103, Q104, D109
				O						O	O			O			F101, Q103, Q104,
6	D111		O											O			R103
7	Q101	G-S	O							O						O	Vo decrease to 35V Da: R408
		D-S	O								O			O			R103, Q101, RL101, R271, R272, R273, F101, MOD101
		D-G	O							O	O			O			D101, Q101, Q102, F101
		S		O						O				O			Q101, R408, R411, R412, Q402, ZD401, A401
		G		O						O	O			O			F101, D101, Q101, Q102
		D		O												O	Vo decrease to 35V
8	Q102	G-S	O							O						O	Vo decrease to 35V Da: R407
		D-S	O								O			O			F101
		D-G	O							O	O			O			F101, Q102, R407, R409, R410, Q401, ZD402, A401
		S		O						O				O			Q102, R407, R409, R410, Q401, ZD402, A401
		G		O						O	O			O			F101, Q102
		D		O												O	Vo decrease to 30V
9	Q103	G-S	O											O		O	Pin=22W
		D-S	O									O		O			
		D-G	O							O				O			ZD101, Q106, R444, R445, D404, A403
		S		O						O				O			ZD101, Q106, R444, R445, D404, A403
		G		O						O				O			Da: Q103
		D		O												O	Q104 temp. rise 52°C --> 72°C
10	Q104	G-S	O											O			Pin=22W
		D-S	O									O		O			
		D-G	O							O				O			ZD101, Q106, R444, R445, D404, A403
		S		O						O				O			ZD101, Q106, R444, R445, D404, A403
		G		O						O				O			Da: Q104
		D		O												O	Q103 temp. rise 50°C --> 72°C

№	Test Position		Test Mode		Test Result												
					1	2	3	4	5	6	7	8	9	10	11	12	
	Location №	Test Point	Short	Open	Fire	Smoke	Burst	Smell	Red Hot	Damaged	Fuse opened	OVP	OCP	No Output	No Change	Others	Note
11	Q113	G-S	O											O			
		D-S	O							O			O	O			Q114
		D-G	O							O			O	O			Q113, Q114, D130, R188, R265
		S		O						O			O	O			Q113, Q114, D130, R188, R265
		G		O						O			O	O			Q113, Q114
		D		O										O			
12	Q114	G-S	O											O			
		D-S	O							O			O	O			Q113
		D-G	O							O			O	O			Q113, Q114, D132, R190, R266
		S		O						O			O	O			Q113, Q114, D132, R190, R266
		G		O						O			O	O			Q113, Q114
		D		O										O			
13	Q501~Q504	G-S	O							O			O	O		O	Pin up by 50W; after 7min No Output Da: Q501~Q504
		D-S	O							O			O	O			Q507~Q510
		D-G	O							O			O	O			Q501~Q504, Q505
		S		O												O	Input power was increased by 5W
		G		O												O	Input power was increased by 5W
		D		O												O	Input power was increased by 5W
14	Q507~Q510	G-S	O							O			O	O		O	Pin up by 50W; after 7min No Output Da: Q507~Q510
		D-S	O							O			O	O			Q501~Q504
		D-G	O							O			O	O			Q507~Q510, Q506
		S		O												O	Input power was increased by 5W
		G		O												O	Input power was increased by 5W
		D		O												O	Input power was increased by 5W
15	Q551, Q552	G-S	O													O	Input power was increased by 10W
		D-S	O							O			O	O			Q555, Q556
		D-G	O							O			O	O			Q551, Q552, Q555, Q556, D656, R663, A652
		S		O												O	Input power was increased by 5W
		G		O												O	Input power was increased by 5W
		D		O												O	Input power was increased by 5W
16	Q553, Q554	G-S	O													O	Input power was increased by 10W
		D-S	O							O			O	O			Q557, Q558
		D-G	O							O			O	O			Q553, Q554, Q557, Q558, D657, R657, A653
		S		O												O	Input power was increased by 5W
		G		O												O	Input power was increased by 5W
		D		O												O	Input power was increased by 5W

№	Test Position		Test Mode		Test Result												
					1	2	3	4	5	6	7	8	9	10	11	12	
	Location №	Test Point	Short	Open	Fire	Smoke	Burst	Smell	Red Hot	Damaged	Fuse opened	OVP	OCP	No Output	No Change	Others	Note
17	Q555, Q556	G-S	O													O	Input power was increased by 10W
		D-S	O							O			O	O			Q551, Q552
		D-G	O							O			O	O			Q551, Q552, Q555, Q556, D654, R662, A652
		S		O												O	Input power was increased by 5W
		G		O												O	Input power was increased by 5W
		D		O												O	Input power was increased by 5W
18	Q557, Q558	G-S	O													O	Input power was increased by 10W
		D-S	O							O			O	O			Q553, Q554
		D-G	O							O			O	O			Q553, Q554, Q557, Q558, D655, R656, A653
		S		O												O	Input power was increased by 5W
		G		O												O	Input power was increased by 5W
		D		O												O	Input power was increased by 5W
19	C106~C109		O											O			D101, D107, D108
				O											O		Output voltage ripple increase
20	C144~C159		O										O	O			
				O											O		
21	C160~C162		O										O	O			
				O												O	Output voltage ripple increase
22	C611~C618		O										O	O			
				O											O		
23	C619~C626		O							O			O	O			Q113, Q114, Q551, Q552, Q555, Q556
				O											O		
24	C627~C634		O							O			O	O			Q113, Q114, Q553, Q554, Q557, Q558
				O											O		
25	T101	1-2	O											O			
		3-5	O							O				O			R151, R172, R173
		6-7	O											O			
		7-8	O											O			
		9-10	O											O			
		11-12	O											O			
		3		O										O			
		1		O										O			
		6		O												O	Voutput increase to maximum
		8		O											O		
		9		O										O			
		11		O												O	Vaux=0

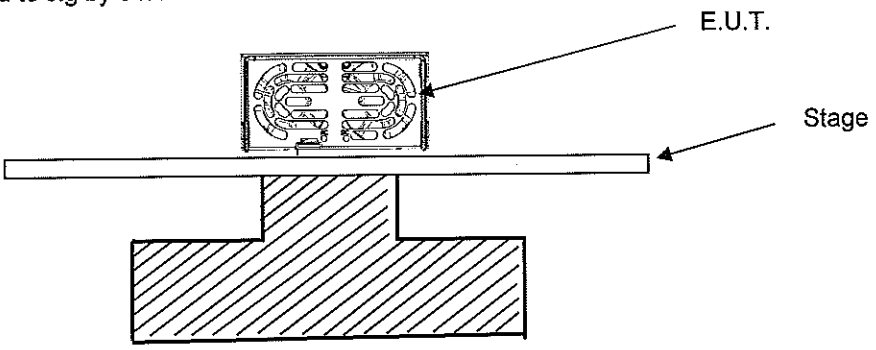
№	Test Position		Test Mode		Test Result												
					1	2	3	4	5	6	7	8	9	10	11	12	
	Location №	Test Point	Short	Open	Fire	Smoke	Burst	Smell	Red Hot	Damaged	Fuse opened	OVP	OCP	No Output	No Change	Others	Note
26	T102	1-2	O							O				O			Q651~Q654, D658~D661
		3-4	O							O				O			Q651~Q654, D658~D661
		7-8	O							O				O			Q651~Q654, D658~D661
		1		O										O			
		3		O										O			
		7		O										O			
27	T103	1-2	O												O		
		1		O											O		
28	T104	Prim	O							O				O			Q113, Q114, Q103, Q104, R103
		Sec	O							O				O			Q113, Q114, Q103, Q104, R103
		Prim		O										O			
		Sec		O										O			
29	L104		O							O	O			O			Q102
				O												O	Q101 temp. rise increase from 45°C to 95°C, D107 temp. rise increase from 50°C to 80°C
30	L105		O							O				O			Q103, Q104, R103
				O										O			

6.VIBRATION TEST

1) Vibration test class
Sinusoidal vibration test

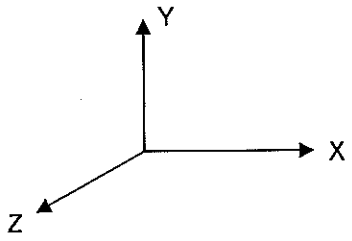
2) Equipment used
Controller: Dactron Model:Laser
Vibrator: Ling Dynamic Systems Model:V875

3) Testing method
RFE1600 mounted to Jig by 3 x M3 screw.



4)Test condition

A) Sinusoidal vibration test (in non-operational mode).



Sinusoidal Vibration in Freq.: 10 - 55 Hz
Test level: 2G constant.
Test time: Sweeps for 1min Per axis (60min Duration per axis).
Test performed in Axes x-y-z

B) Mech. Shock

Test level: Sawtooth, 30G 11ms
Shock directions ±Z, ±X, ±Y
3 mech.shocks in all of the 3 axes at each direction.

5)Test Result

Vibration:

Check item	Vout	Ripple and noise
Initial Directions	24.06	177mV
X	24.06	175mV
Y	24.06	175mV
Z	24.06	175mV

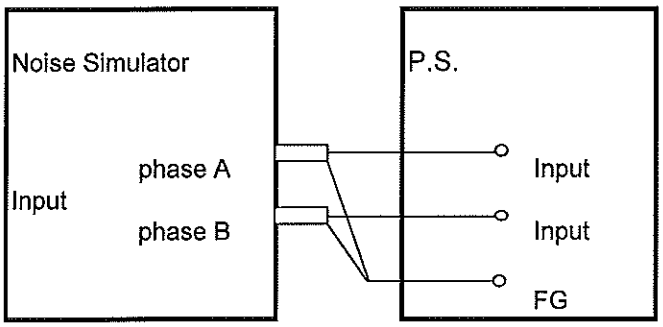
Shock:

Check item	Vout	Ripple and noise
Initial Directions	24.06V	177mV
X	24.07	175mV
Y	24.07	175mV
Z	24.06	175mV

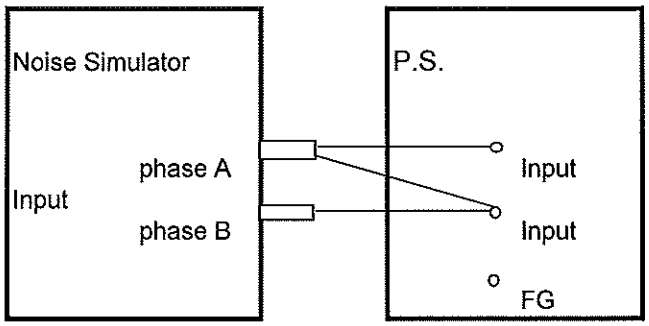
7.NOISE SIMULATION TEST

48V

1) Test circuit and Equipment



Common Mode Noise Test



Normal Mode Noise Test

Impulse noise simulator: INS-4040 (NoiseKen)
Coupling decoupling network: IJ -4050 (NoiseKEN)

2) Acceptance criteria
No damage to P.S.
No output shutdown
No other abnormalities

3)Test condition:

Input voltage:115,230Vac
Output voltage:Rated
Output current:0%,100%
Ambient temperature:25°C
Pulse width:50ns~1000ns

Noise level:0V~2kV
Phase shift:0~360° (step 45°)
Polarity: +,-
Mode:Normal,Common
Line:Trigger select

4)Test Result : **OK**

8.THERMAL SHOCK TEST

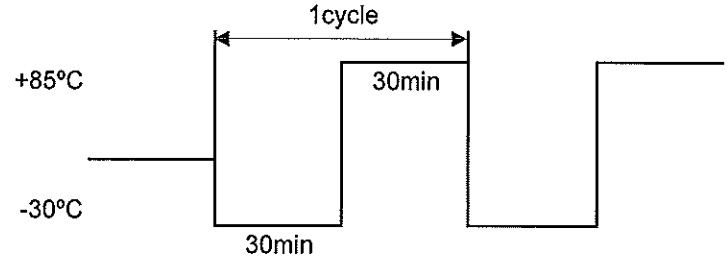
24V

1) Test Equipment

Thermal Shock Chamber: TSA-101S-W (TABAI ESPEC CORP.)

2)The number of D.U.T.(Device Under Test)
1 (unit)

3)Test condition
Ambient temperature:-30°C <=> +85°C
Test time: Refer to Dwg.
Test cycle: 200cycles
Not operating



4)Test method
Before testing,check if there is no abnormal output,then put the D.U.T. in testing chamber, and test it according to the above cycle. 200cycles later,leave it for 1hour at the room temperature,then check if there is no abnormal output.

5)Test Result **OK**

Vin:200Vac

Before testing			After testing		
Vout-100%,Iout-100%	Vout-100%,Iout-0%	P-t-P	Vout-100%,Iout-100%	Vout-100%,Iout-0%	P-t-P
24.05V	24.01V	91.6mV	24.046V	23.994V	92mV

9.FAN LIFE EXPECTANCY

1) Part name
109P0412K3563 (SANYO DENKI CO.)

2)Life expectancy
The data shows fan life expectancy for fan only by manufacture (90% survival rate).
Fig1. shows measuring point of fan exhaust temperature.

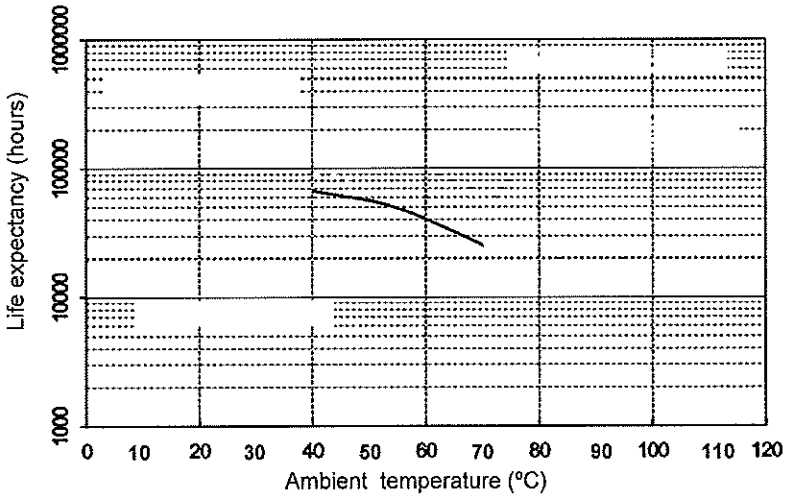


Fig1.
Measuring point of fan exhaust temperature.