Z+200 Series

RELIABILITY DATA

DWG No.: IA709-79-01		
APPD	CHK	DWG
14/5/12	29/4/12	08.01.2012

TDK-Lambda

INDEX

Terminology used

FG..... Frame Ground

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

1. Calculated value of MTBF

MODEL : 10V-20A

(1) Calculating Method

Method of calculation according to MIL-HDBK-217F.
Individual failure rates is given to each part, and MTBF is calculated by the count of each part.

Formula:

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

Where:

λ_{equip} = Total Equipment Failure Rate (Failures / 10^6 Hours)

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

N_i = Quantity of i th Generic Part

n = Number of Different Generic Part Categories

π_Q = Generic Quality factor for the i th Generic Part (π_Q = 1)

(2) MTBF Values

G_F : (GROUND, FIXED)

MTBF = 78778 (HOURS)

(MTBF calculation for fan isn't included.)

2. Components derating

MODEL : 10V-20A

(1) Calculation method

1. Measuring Conditions

Input: 100 , 200Vac — Ambient temperature: 50°C

Output: 10V - 20A (100%) — Mounting Method: Standard Mounting

2. Semiconductors

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

3. IC, Resistors, Capasitors, etc.

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

4. Calculation Method of Thermal Impedance:

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

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

$\Theta_{j\text{-}c}$: Thermal impedance between junction and case

$\Theta_{j\text{-}a}$: Thermal impedance between junction and air

(2) Component derating list

Location No.	Vin=100Vac Load=100% Ta=50°C								
A101	Tjmax=	150	℃	θj-a =	120.0	℃/W			
L4981AD	Pd =	0.23	W	ΔTa =	15.0	℃	Ta =	65.0	℃
ST	Tj = Ta + (θ j-a x Pd) =>			Tj =	92.6	℃	D.F. =	61.7	%
D101	Tjmax=	150	℃	θj-c =	1.0	℃/W			
D25XB60-7000	Pd =	4.1	W	ΔTc =	25.7	℃	Tc =	75.7	℃
SHINDENGEN	Tj = Tc + (θ j-c x Pd) =>			Tj =	79.8	℃	D.F. =	53.2	%
D106	Tjmax=	150	℃	θj-c =	2.6	℃/W			
STTH806DTI	Pd =	2.6	W	ΔTc =	16.4	℃	Tc =	66.4	℃
ST	Tj = Tc + (θ j-c x Pd) =>			Tj =	73.2	℃	D.F. =	48.8	%
D118	Tjmax=	150	℃	θj-c =	0.85	℃/W			
STPS30L45CT	Pd =	2.5	W	ΔTc =	33.5	℃	Tc =	83.5	℃
ST	Tj = Tc + (θ j-c x Pd) =>			Tj =	85.6	℃	D.F. =	57.1	%
D119	Tjmax=	150	℃	θj-c =	0.85	℃/W			
STPS30L45CT	Pd =	2.5	W	ΔTc =	32.3	℃	Tc =	82.6	℃
ST	Tj = Tc + (θ j-c x Pd) =>			Tj =	84.7	℃	D.F. =	56.5	%
Q101	Tjmax=	150	℃	θj-c =	0.83	℃/W			
IPW60R190C6	Pd =	2.84	W	ΔTc =	17.3	℃	Tc =	67.3	℃
INFINEON	Tj = Tc + (θ j-c x Pd) =>			Tj =	69.7	℃	D.F. =	46.4	%
Q104	Tjmax=	150	℃	θj-c =	0.8	℃/W			
SPP15N60C3	Pd =	4.28	W	ΔTc =	21.9	℃	Tc =	71.9	℃
INFINEON	Tj = Tc + (θ j-c x Pd) =>			Tj =	75.3	℃	D.F. =	50.2	%
Q105	Tjmax=	150	℃	θj-c =	0.8	℃/W			
SPP15N60C3	Pd =	4.86	W	ΔTc =	23.9	℃	Tc =	73.9	℃
INFINEON	Tj = Tc + (θ j-c x Pd) =>			Tj =	77.8	℃	D.F. =	51.9	%
Q106	Tjmax=	150	℃	θj-c =	0.8	℃/W			
SPP15N60C3	Pd =	4.95	W	ΔTc =	15.0	℃	Tc =	64.7	℃
INFINEON	Tj = Tc + (θ j-c x Pd) =>			Tj =	68.7	℃	D.F. =	45.8	%
Q107	Tjmax=	150	℃	θj-c =	0.8	℃/W			
SPP15N60C3	Pd =	4.36	W	ΔTc =	20.0	℃	Tc =	70.0	℃
INFINEON	Tj = Tc + (θ j-c x Pd) =>			Tj =	73.5	℃	D.F. =	49.0	%
Q118	Tjmax=	150	℃	θj-c =	2.78	℃/W			
TK20A25D	Pd =	2.7	W	ΔTc =	24.9	℃	Tc =	74.9	℃
TOSHIBA	Tj = Tc + (θ j-c x Pd) =>			Tj =	82.4	℃	D.F. =	54.9	%
PC101	Tjmax=	125	℃	θj-a =	1666.00	℃/W			
PS2801-1-F3-A(P)	Pd =	0.001	W	ΔTa =	16.7	℃	Ta =	66.7	℃
NEC	Tj = Ta + (θ j-a x Pd) =>			Tj =	68.4	℃	D.F. =	54.7	%

Location No.	Vin=100Vac Load=100% Ta=50°C								
A109	Tjmax=	150	℃	θj-a =	180.0	℃/W			
AD7798BRUZ	Pd =	0.002	W	ΔTa =	17.4	℃	Ta =	67.4	℃
NATIONAL	Tj = Ta + (θ j-a x Pd) =>			Tj =	67.8	℃	D.F. =	45.2	%
A110	Tjmax=	150	℃	θj-a =	136.9	℃/W			
DAC8830ICDRG4	Pd =	0.0001	W	ΔTa =	14.2	℃	Ta =	64.2	℃
TI	Tj = Ta + (θ j-a x Pd) =>			Tj =	64.2	℃	D.F. =	42.8	%
A115	Tjmax=	150	℃	θj-a =	46.0	℃/W			
STM32F105VCT6TR	Pd =	0.434	W	ΔTa =	9.2	℃	Ta =	59.2	℃
ST	Tj = Ta + (θ j-a x Pd) =>			Tj =	79.1	℃	D.F. =	52.7	%
A141	Tjmax=	125	℃	θj-a =	180.0	℃/W			
LM78L15ACM NOPB	Pd =	0.1	W	ΔTa =	14.8	℃	Ta =	64.8	℃
NATIONAL	Tj = Ta + (θ j-a x Pd) =>			Tj =	82.8	℃	D.F. =	66.3	%
A142	Tjmax=	150	℃	θj-c =	3.0	℃/W			
MIP2E4DMY	Pd =	1.4	W	ΔTc =	16.5	℃	Tc =	66.5	℃
MATSUSHITA	Tj = Tc + (θ j-c x Pd) =>			Tj =	70.7	℃	D.F. =	47.1	%
A145	Tjmax=	125	℃	θj-a =	231.0	℃/W			
LM78L05ACMNOPB	Pd =	0.08	W	ΔTa =	23.2	℃	Ta =	73.2	℃
NATIONAL	Tj = Ta + (θ j-a x Pd) =>			Tj =	91.7	℃	D.F. =	73.4	%
A148	Tjmax=	125	℃	θj-c =	4.0	℃/W			
LM3940IT-3.3NOPB	Pd =	0.8	W	ΔTc =	12.6	℃	Tc =	62.6	℃
NATIONAL	Tj = Tc + (θ j-c x Pd) =>			Tj =	65.8	℃	D.F. =	52.7	%
A149	Tjmax=	150	℃	θj-c =	3.0	℃/W			
L4941BV	Pd =	0.6	W	ΔTc =	10.8	℃	Tc =	60.8	℃
ST	Tj = Tc + (θ j-c x Pd) =>			Tj =	62.6	℃	D.F. =	41.8	%
D122	Tjmax=	150	℃	θj-c =	130.0	℃/W			
CRH01(TE85L,Q)	Pd =	0.06	W	ΔTc =	15.4	℃	Tc =	65.4	℃
TOSHIBA	Tj = Tc + (θ j-c x Pd) =>			Tj =	73.2	℃	D.F. =	48.8	%
D130	Tjmax=	150	℃	θj-c =	130.0	℃/W			
CRH01(TE85L,Q)	Pd =	0.03	W	ΔTc =	24.5	℃	Tc =	74.5	℃
TOSHIBA	Tj = Tc + (θ j-c x Pd) =>			Tj =	78.4	℃	D.F. =	52.3	%
D136	Tjmax=	150	℃	θj-c =	130.0	℃/W			
CRH01(TE85L,Q)	Pd =	0.03	W	ΔTc =	19.0	℃	Tc =	69.0	℃
TOSHIBA	Tj = Tc + (θ j-c x Pd) =>			Tj =	72.9	℃	D.F. =	48.6	%
Q129	Tjmax=	150	℃	θj-c =	6.3	℃/W			
2SK4033	Pd =	0.01	W	ΔTc =	31.2	℃	Tc =	81.2	℃
TOSHIBA	Tj = Tc + (θ j-c x Pd) =>			Tj =	81.3	℃	D.F. =	54.2	%
PC106	Tjmax=	125	℃	θj-a =	666.00	℃/W			
PS2581L2-E3-A(D)	Pd =	0.004	W	ΔTa =	10.7	℃	Ta =	60.7	℃
NEC	Tj = Ta + (θ j-c x Pd) =>			Tj =	63.4	℃	D.F. =	50.7	%
PC117	Tjmax=	125	℃	θj-a =	1666.00	℃/W			
PS2801-1-F3-A(P)	Pd =	0.001	W	ΔTa =	9.2	℃	Ta =	59.2	℃
NEC	Tj = Ta + (θ j-a x Pd) =>			Tj =	60.9	℃	D.F. =	48.7	%
PC118	Tjmax=	125	℃	θj-a =	1666.00	℃/W			
PS2801-1-F3-A(P)	Pd =	0.001	W	ΔTa =	9.2	℃	Ta =	59.2	℃
NEC	Tj = Ta + (θ j-a x Pd) =>			Tj =	60.9	℃	D.F. =	48.7	%

(2) Component Derating list

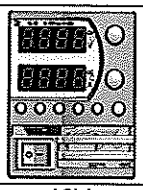
Location No.	Vin=200Vac Load=100% Ta=50°C								
A101	Tjmax=	150	℃	θj-a =	120.0	℃/W			
L4981AD	Pd =	0.23	W	ΔTa =	14.0	℃	Ta =	64.0	℃
ST	Tj = Ta + (θ j-a x Pd) =>			Tj =	91.6	℃	D.F. =	61.1	%
D101	Tjmax=	150	℃	θj-c =	1.0	℃/W			
D25XB60-7000	Pd =	1.26	W	ΔTc =	16.2	℃	Tc =	80.4	℃
SHINDENGEN	Tj = Tc + (θ j-c x Pd) =>			Tj =	81.7	℃	D.F. =	54.4	%
D106	Tjmax=	150	℃	θj-c =	2.6	℃/W			
STTH806DTI	Pd =	2.3	W	ΔTc =	12.1	℃	Tc =	62.1	℃
ST	Tj = Tc + (θ j-c x Pd) =>			Tj =	68.1	℃	D.F. =	45.4	%
D118	Tjmax=	150	℃	θj-c =	0.85	℃/W			
STPS30L45CT	Pd =	2.5	W	ΔTc =	32.8	℃	Tc =	82.8	℃
ST	Tj = Tc + (θ j-c x Pd) =>			Tj =	84.9	℃	D.F. =	56.6	%
D119	Tjmax=	150	℃	θj-c =	0.85	℃/W			
STPS30L45CT	Pd =	2.5	W	ΔTc =	31.9	℃	Tc =	81.9	℃
ST	Tj = Tc + (θ j-c x Pd) =>			Tj =	84.0	℃	D.F. =	56.0	%
Q101	Tjmax=	150	℃	θj-c =	0.5	℃/W			
IPW60R099CP	Pd =	4	W	ΔTc =	10.0	℃	Tc =	60.0	℃
INFINEON	Tj = Tc + (θ j-c x Pd) =>			Tj =	62.0	℃	D.F. =	41.3	%
Q104	Tjmax=	150	℃	θj-c =	0.8	℃/W			
SPP15N60C3	Pd =	4.28	W	ΔTc =	21.6	℃	Tc =	71.6	℃
INFINEON	Tj = Tc + (θ j-c x Pd) =>			Tj =	75.0	℃	D.F. =	50.0	%
Q105	Tjmax=	150	℃	θj-c =	0.8	℃/W			
SPP15N60C3	Pd =	4.86	W	ΔTc =	23.6	℃	Tc =	73.6	℃
INFINEON	Tj = Tc + (θ j-c x Pd) =>			Tj =	77.5	℃	D.F. =	51.7	%
Q106	Tjmax=	150	℃	θj-c =	0.8	℃/W			
SPP15N60C3	Pd =	4.95	W	ΔTc =	14.7	℃	Tc =	64.7	℃
INFINEON	Tj = Tc + (θ j-c x Pd) =>			Tj =	68.7	℃	D.F. =	45.8	%
Q107	Tjmax=	150	℃	θj-c =	0.8	℃/W			
SPP15N60C3	Pd =	4.36	W	ΔTc =	19.8	℃	Tc =	69.8	℃
INFINEON	Tj = Tc + (θ j-c x Pd) =>			Tj =	73.3	℃	D.F. =	48.9	%
Q118	Tjmax=	150	℃	θj-c =	2.78	℃/W			
TK20A25D	Pd =	2.7	W	ΔTc =	2.3	℃	Tc =	72.3	℃
TOSHIBA	Tj = Tc + (θ j-c x Pd) =>			Tj =	79.8	℃	D.F. =	53.2	%
PC101	Tjmax=	125	℃	θj-a =	1666.00	℃/W			
PS2801-1-F3-A(P)	Pd =	0.001	W	ΔTa =	15.9	℃	Ta =	65.9	℃
NEC	Tj = Ta + (θ j-a x Pd) =>			Tj =	67.5	℃	D.F. =	54.0	%

Location No.	Vin=200Vac Load=100% Ta=50°C								
A109	Tjmax=	150	℃	θj-a =	180.0	℃/W			
AD7798BRUZ	Pd =	0.002	W	ΔTa =	16.7	℃	Ta =	66.7	℃
NATIONAL	Tj = Ta + (θ j-a x Pd) =>			Tj =	67.1	℃	D.F. =	44.7	%
A110	Tjmax=	150	℃	θj-a =	136.9	℃/W			
DAC8830ICDRG4	Pd =	0.0001	W	ΔTa =	13.4	℃	Ta =	63.4	℃
TI	Tj = Ta + (θ j-a x Pd) =>			Tj =	63.4	℃	D.F. =	42.3	%
A115	Tjmax=	150	℃	θj-a =	46.0	℃/W			
STM32F105VCT6TR	Pd =	0.434	W	ΔTa =	7.9	℃	Ta =	57.9	℃
ST	Tj = Ta + (θ j-a x Pd) =>			Tj =	77.9	℃	D.F. =	51.9	%
A141	Tjmax=	125	℃	θj-a =	180.0	℃/W			
LM78L15ACM NOPB	Pd =	0.1	W	ΔTa =	14.5	℃	Ta =	64.5	℃
NATIONAL	Tj = Ta + (θ j-a x Pd) =>			Tj =	82.5	℃	D.F. =	66.0	%
A142	Tjmax=	150	℃	θj-c =	3.0	℃/W			
MIP2E4DMY	Pd =	1.4	W	ΔTc =	16.4	℃	Tc =	66.4	℃
MATSUSHITA	Tj = Tc + (θ j-c x Pd) =>			Tj =	70.6	℃	D.F. =	47.1	%
A145	Tjmax=	125	℃	θj-a =	231.0	℃/W			
LM78L05ACMNOPB	Pd =	0.08	W	ΔTa =	22.8	℃	Ta =	72.8	℃
NATIONAL	Tj = Ta + (θ j-a x Pd) =>			Tj =	91.3	℃	D.F. =	73.0	%
A148	Tjmax=	125	℃	θj-c =	4.0	℃/W			
LM3940IT-3.3NOPB	Pd =	0.8	W	ΔTc =	12.0	℃	Tc =	62.0	℃
NATIONAL	Tj = Tc + (θ j-c x Pd) =>			Tj =	65.2	℃	D.F. =	52.2	%
A149	Tjmax=	150	℃	θj-c =	3.0	℃/W			
L4941BV	Pd =	0.6	W	ΔTc =	10.2	℃	Tc =	60.2	℃
ST	Tj = Tc + (θ j-c x Pd) =>			Tj =	62.0	℃	D.F. =	41.3	%
D122	Tjmax=	150	℃	θj-c =	130.0	℃/W			
CRH01(TE85L,Q)	Pd =	0.06	W	ΔTc =	15.3	℃	Tc =	65.3	℃
TOSHIBA	Tj = Tc + (θ j-c x Pd) =>			Tj =	73.1	℃	D.F. =	48.7	%
D130	Tjmax=	150	℃	θj-c =	130.0	℃/W			
CRH01(TE85L,Q)	Pd =	0.03	W	ΔTc =	24.0	℃	Tc =	74.0	℃
TOSHIBA	Tj = Tc + (θ j-c x Pd) =>			Tj =	77.9	℃	D.F. =	51.9	%
D136	Tjmax=	150	℃	θj-c =	130.0	℃/W			
CRH01(TE85L,Q)	Pd =	0.03	W	ΔTc =	18.8	℃	Tc =	68.8	℃
TOSHIBA	Tj = Tc + (θ j-c x Pd) =>			Tj =	72.7	℃	D.F. =	48.5	%
Q129	Tjmax=	150	℃	θj-c =	6.3	℃/W			
2SK4033	Pd =	0.01	W	ΔTc =	30.7	℃	Tc =	80.7	℃
TOSHIBA	Tj = Tc + (θ j-c x Pd) =>			Tj =	80.8	℃	D.F. =	53.8	%
PC106	Tjmax=	125	℃	θj-a =	666.00	℃/W			
PS2581L2-E3-A(D)	Pd =	0.004	W	ΔTa =	10.4	℃	Ta =	58.0	℃
NEC	Tj = Ta + (θ j-a x Pd) =>			Tj =	60.7	℃	D.F. =	48.5	%
PC117	Tjmax=	125	℃	θj-a =	1666.00	℃/W			
PS2801-1-F3-A(P)	Pd =	0.001	W	ΔTa =	8.7	℃	Ta =	58.7	℃
NEC	Tj = Ta + (θ j-a x Pd) =>			Tj =	60.4	℃	D.F. =	48.3	%
PC118	Tjmax=	125	℃	θj-a =	1666.00	℃/W			
PS2801-1-F3-A(P)	Pd =	0.001	W	ΔTa =	8.7	℃	Ta =	58.7	℃
NEC	Tj = Ta + (θ j-a x Pd) =>			Tj =	60.4	℃	D.F. =	48.3	%

3. Main components temperature rise

MODEL : 10V-20A

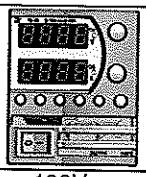
Condition:

Standard Mounting	
Output Voltage	10V
Output Current	20A
Ta	50°C

Location No.	Parts Name	ΔT Temperature Rise (°C)	
		100Vac	200Vac
A101	CHIP PFC IC	15.0	14.0
C101	FILM CAPACITOR	16.9	11.7
C102	FILM CAPACITOR	20.6	12.4
C103	CERAMIC CAPACITOR	18.6	11.4
C105	FILM CAPACITOR	14.9	12.3
C111	FILM CAPACITOR	9.3	7.6
C113	CERAMIC CAPACITOR	3.6	3.4
C116	ELEC. CAPACITOR	7.7	6.6
C140	FILM CAPACITOR	29.6	28.3
C147	ELEC. CAPACITOR	17.5	16.4
D101	BRIDGE	25.7	16.2
D106	DIODE	16.4	12.1
D118	DIODE	33.5	32.8
D119	DIODE	32.3	31.9
F101	FUSE	27.4	13.1
L101	COMMON CHOKE	33.7	15.2
L102	COMMON CHOKE	31.4	15.3
L103	PF CHOKE	38.6	38.4
L104	CHOKE	18.0	17.5
PC101	OPTO COUPLER	16.7	15.9
PC118	OPTO COUPLER	9.2	8.7
Q101	MOSFET	17.3	10.0
Q106	MOSFET	15.0	14.7
R199	RES. SHUNT	21.1	18.2
T101	TRANSFORMER	37.6	36.8
T102	TRANSFORMER	10.7	10.3
T103	TRANSFORMER	13.1	12.8
A107	DIGITAL ISOLATOR	13.1	12.4
A115	MICROCONTROLLER	9.2	7.9
A141	LINEAR REGULATOR	14.8	14.5
A142	TOP SWITCH	16.5	16.4
A145	LINEAR REGULATOR	23.2	22.8
D125	DIODE	7.6	7.4
D130	DIODE	27.4	27.3
D133	DIODE	12.5	12.4
T201	TRANSFORMER	11.2	10.8
ZD116	ZENER	17.9	17.5
ZD123	ZENER	8.7	8.5

4. Electrolytic capacitor lifetime

Condition:

Standard Mounting	
Input Voltage	100Vac

	COMPUTED LIFE (year) at T(ambient)		
LOAD (%)	**30℃**	**40℃**	**50℃**
20	15.0	15.0	15.0
40	15.0	15.0	15.0
60	15.0	15.0	15.0
80	15.0	15.0	12.0
100	15.0	15.0	9.2

5. Abnormal test

MODEL : 10V-20A

(1) Test condition and circuit:

Input Voltage: 100Vac Output: 10V 20A Ta : 50℃

(2) Test results

No.	Test Position		Test Mode		Test Result												
	Location	Test point	Short	Open	1 Fire	2 Smoke	3 Burst	4 Smell	5 Red hot	6 Damaged	7 Fuse open	8 OVP	9 OTP	10 No output	11 No change	12 Others	Note
1	Q101	D-S	•								•			•			F101 opened
		G-S	•							•				•			R112,R111,R135,R136 - damaged
		D-G	•							•	•			•			F101 opened, Q102, A101, ZD101, R111, R112 - damaged
		D		•										•			
		S		•										•			
		G		•										•			
2	D106	A-K	•							•	•						F101 opened, Q101 damaged
		A		•										•			
3	D115	A-K	•												•		
		A		•											•		
4	D103	A-K	•							•	•			•			F101 opened, Q101 damaged
		A		•											•		
5	D101	1-3	•								•			•			F101 opened
		2-4	•								•			•			F101 opened
6	C116		•							•	•			•			F101 opened, Q101 damaged
				•											•		
7	Q102	E-C	•							•				•			R135, R136 - damaged;
		B-E	•							•				•			R135, R136 - damaged;
8	D118	A-K	•											•		•	Pin=35W, Iin=0.2A. PS functional normaly after removing short
		A		•											•		
9	Q106	D-S	•							•	•			•			F101 opened; R176, Q104, Q105, Q107 - damaged
		G-S	•							•	•			•			F101 opened; R176, Q104, Q105, Q107, Q110 - damaged
		D-G	•											•		•	Pin=30W, Iin=0.14A. P.S functional normaly after removing short
		D		•						•	•			•			F101 opened; Q105,Q107 - damaged
		S		•						•	•			•			F101 opened; Q105,Q107 - damaged
		G		•						•	•			•			F101 opened; Q105,Q107 - damaged
10	C148		•													•	P.S in CC mode output unstable P.S functional normaly after removing short and AC recycled
				•										•			
11	T101	5-6	•							•				•			Q104~Q107, R181, R182 - damaged
		2-7	•							•				•			Q104~Q107, R181, R182 - damaged
12	L104		•							•				•			
13	PC101	A-K	•												•		
				•											•		
		C-E	•										•	•			OTP
				•											•		
14	PC106	A-K		•										•			
			•											•			
		C-E		•										•			
			•												•		
15	PC109	A-K	•												•		
				•											•		
		C-E	•									•		•			
				•											•		
16	PC116	A-K		•										•			
			•											•			
		C-E		•										•			
			•												•		
17	PC118	A-K		•										•			
			•											•			
		C-E		•										•			
			•												•		
18	PC119	A-K		•									•				
			•										•				
		C-E		•									•				
			•												•		

6. Vibration test

MODEL: 10V-20A

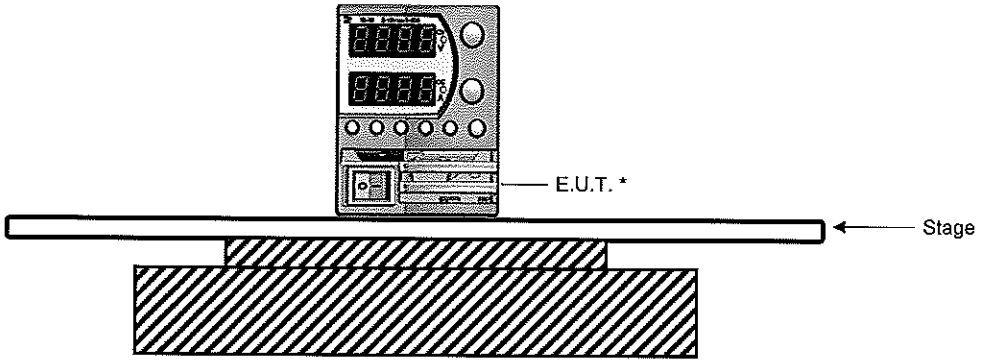
(1) Vibration test class

Frequency variable endurance test

(2) Equipment used

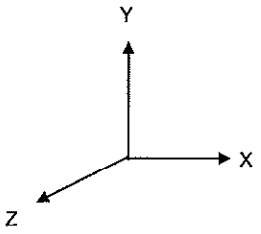
Name	Manufacturer	Model
Vibration Test System	Ling Dynamic Systems	V875
Laser Shaker Control System	DACTRON	LASER
Isotron Accelerometer 98.2 mV/g	Dytran instruments Inc.	3256A2
Isotron Accelerometer 101.7 mV/g	Dytran instruments Inc.	3049E3

(3) Testing method



Test condition:

Sweep frequency:	5~500Hz
Acceleration:	1.07G
Direction:	X, Y, Z
Test time:	1 hour per each axis



*E.U.T. is fixed to vibrator surface by mounting straps

***(4)Test result** **OK**

Check item	Output Voltage (V)	Ripple (mVp-p)	E.U.T. state
Before test / Direction	10.00	40.00	O.K.
X	10.00	39.16	O.K.
Y	10.00	41.28	O.K.
Z	10.00	40.00	O.K.

* Z+400 Test result represent also Z+200

7. Noise Simulation Test

MODEL : 60V-3.5A

(1) Test equipment:

NoiseKen INS-4040 impulse noise simulator
NoiseKen IJ-4050 coupling decoupling network

(2) Acceptance criteria:

1. No damage to PS
2. No output shutdown
3. No other abnormalities

(3) Test condition:

Ta=25°C

Noise level- ± (0.6kV,1kV,2kV, 1.8kV, 2kV) (50Ω term.)

Pulse width- 50ns ~ 1us

Injection phase (AC input only) - 0°~360° (with step 45°)

Input voltage - 230Vac

Output Current - 100%

Output voltage - Rated

(4) Test result: **OK**

1. No damage to PS
2. No output shutdown
3. No other abnormalities

Pulse	Polarity	Line-Neutral	Line-FG	Neutral-FG
2kV	+	OK		
2kV	-	OK		
2kV	+		OK	OK
2kV	-		OK	OK

(1) Test Equipment

Thermal Shock Chamber: TSA-101S-W , ESPEC

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

1 (unit)

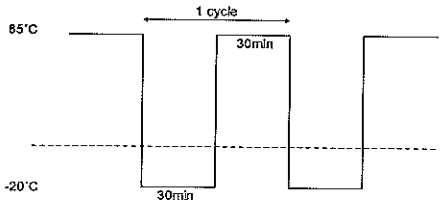
(3) Test condition

Ambient temperature: -20°C <=> +85°C

Test time: Refer to Dwg.

Test cycle: 100cycles

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. Later leave it for 1hour at room temperature, then check if there is no abnormal output.

***(5) Test Result** **OK**

Vin:100Vac

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
36.000V	36.002V	25mV	35.999V	36.000V	23mV

* Z^{+}400 Test result represent also Z^{+}200

9. Fan Life Expectancy

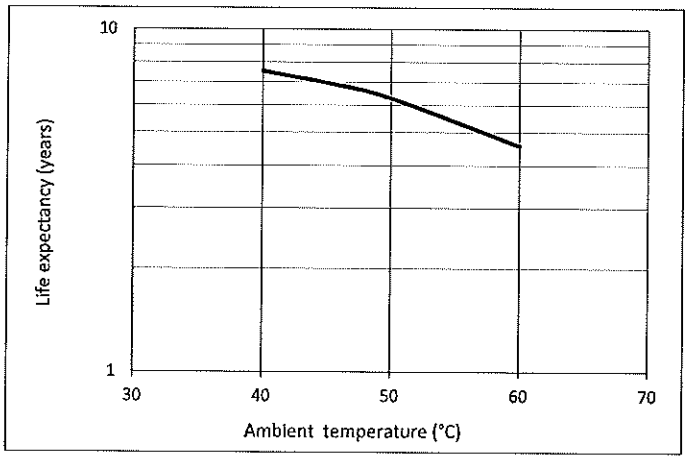
(1) Part name

9A0612S4D041 (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 ambient temperature.



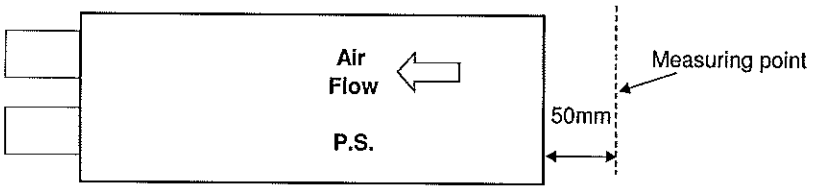


Fig1.Measuring point of fan ambient temperature.

1 year=365 day x 24 hours/day=8760 hours