

# Z<sup>+</sup> 800 H.V Series

## RELIABILITY

## DATA

DWG No.: IA798-79-01		
APPD	CHK	DWG
Kalmi S.	Kalmi S.	MICHAEL G.
Oct-2-14	Oct-2-14	2.06.2014

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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****Z<sup>+</sup> 800 H.V Series****(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:

$\lambda_{equip}$  = Total Equipment Failure Rate (Failures / 10<sup>6</sup> Hours)

$\lambda_G$  = Generic Failure Rate For The *i*th Generic Part (Failure / 10<sup>6</sup> Hours)

$N_i$  = Quantity of *i*th Generic Part

$n$  = Number of Different Generic Part Categories

$\pi_Q$  = Generic Quality factor for the *i*th Generic Part ( $\pi_Q = 1$ )

**(2) MTBF Values**

$G_F$  : (GROUND, FIXED)

**MTBF = 76.274 (HOURS)**

(MTBF calculation for fan isn't included.)

**2. Components derating****Z<sup>+</sup> 800 H.V Series****(1) Calculation method**

## 1. Measuring Conditions

Input: 100 , 200Vac

Ambient temperature: 50°C

Output: Full load

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:

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

$T_c$  : Case temperature at start point of derating; 25°C in general

$T_a$  : Ambient temperature at start point of derating; 25°C in general

$P_{c(\max)}$  : Maximum power dissipation

$T_{j(\max)}$  : Maximum junction temperature

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

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

## (2) Component derating list

Location No.	Vin = 100Vac Load=100% Ta=50°C			
A101 L4981AD013TR ST	Tjmax= 150 °C Pd = 0.23 W Tj = Ta + (θ j-a x Pd) =>	θj-a = 120.0 °C/W ΔTa = 21.0 °C Tj = 98.6 °C	Ta = 71.0 °C D.F. = 65.7 %	
D101 GBJ2506-F DIODES	Tjmax= 150 °C Pd = 14.83 W Tj = Tc + (θ j-c x Pd) =>	θj-c = 0.6 °C/W ΔTc = 58.4 °C Tj = 117.3 °C	Tc = 108.4 °C D.F. = 78.2 %	
D106 IDH12SG60C INFINEON	Tjmax= 175 °C Pd = 3.4 W Tj = Tc + (θ j-c x Pd) =>	θj-c = 1.2 °C/W ΔTc = 57.0 °C Tj = 111.1 °C	Tc = 107.0 °C D.F. = 63.5 %	
D116 IDH02SG120 INFINEON	Tjmax= 175 °C Pd = 2.25 W Tj = Tc + (θ j-c x Pd) =>	θj-c = 2.0 °C/W ΔTc = 55.5 °C Tj = 110.0 °C	Tc = 105.5 °C D.F. = 62.9 %	
Q101 IPW60R045CP INFINEON	Tjmax= 150 °C Pd = 8.60 W Tj = Tc + (θ j-c x Pd) =>	θj-c = 0.3 °C/W ΔTc = 53.9 °C Tj = 106.4 °C	Tc = 103.9 °C D.F. = 70.9 %	
Q107 IPP60R099CP INFINEON	Tjmax= 150 °C Pd = 7.24 W Tj = Tc + (θ j-c x Pd) =>	θj-c = 0.5 °C/W ΔTc = 68.8 °C Tj = 122.4 °C	Tc = 118.8 °C D.F. = 81.6 %	
SC101 CR12CM-12A B00 RENESAS	Tjmax= 125 °C Pd = 2.9 W Tj = Tc + (θ j-c x Pd) =>	θj-c = 1.2 °C/W ΔTc = 46.9 °C Tj = 100.4 °C	Tc = 96.9 °C D.F. = 80.3 %	
PC101 PS2801-1-F3-A(P) NEC	Tjmax= 125 °C Pd = 0.06 W Tj = Tc + (θ j-c x Pd) =>	θj-c = 1.67 °C/W ΔTc = 17.4 °C Tj = 67.5 °C	Tc = 67.4 °C D.F. = 54.0 %	
Q117 FMH09N90E FUJI	Tjmax= 150 °C Pd = 0.0 W Tj = Tc + (θ j-c x Pd) =>	θj-c = 0.61 °C/W ΔTc = 30.1 °C Tj = 80.1 °C	Tc = 80.1 °C D.F. = 53.4 %	

Location No.	Vin=100Vac Load=100% Ta=50°C					
A109 AD7798BRUZ ANALOG DEVICES	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 0.002 W	θj-c = ΔTc = Tj =	14.0 °C/W 20.0 °C 70.0 °C	Tc = D.F. =	70.0 °C 46.7 %
A110 DAC8830ICDRG4 TI	Tjmax= Pd = Tj = Ta + (θ j-a x Pd) =>	150 °C 1E-04 W	θj-a = ΔTa = Tj =	136.9 °C/W 13.0 °C 63.0 °C	Ta = D.F. =	63.0 °C 42.0 %
A115 STM32F105VCT6TR ST	Tjmax= Pd = Tj = Ta + (θ j-a x Pd) =>	125 °C 0.434 W	θj-a = ΔTa = Tj =	46.0 °C/W 17.6 °C 87.6 °C	Ta = D.F. =	67.6 °C 70.1 %
A126 L4941BV ST	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 0.6 W	θj-c = ΔTc = Tj =	3.0 °C/W 13.1 °C 64.9 °C	Tc = D.F. =	63.1 °C 43.3 %
A127 LM3940IT-3.3NOPB NATIONAL	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	125 °C 0.5 W	θj-c = ΔTc = Tj =	4.0 °C/W 16.0 °C 68.0 °C	Tc = D.F. =	66.0 °C 54.4 %
A141 LM78L15ACM NOPB NATIONAL	Tjmax= Pd = Tj = Ta + (θ j-a x Pd) =>	125 °C 0.1 W	θj-a = ΔTa = Tj =	180.0 °C/W 26.6 °C 94.6 °C	Ta = D.F. =	76.6 °C 75.7 %
A142 MIP2E5DMY MATSUSHITA	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 1.4 W	θj-c = ΔTc = Tj =	3.0 °C/W 24.4 °C 78.6 °C	Tc = D.F. =	74.4 °C 52.4 %
A145 LM78L05ACMNOPB NATIONAL	Tjmax= Pd = Tj = Ta + (θ j-a x Pd) =>	125 °C 0.08 W	θj-a = ΔTa = Tj =	231.0 °C/W 18.8 °C 87.3 °C	Ta = D.F. =	68.8 °C 69.8 %
D122 CRH01(TE85L,Q) TOSHIBA	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 0.06 W	θj-c = ΔTc = Tj =	130.0 °C/W 27.3 °C 85.1 °C	Tc = D.F. =	77.3 °C 56.7 %
D130 CRH01(TE85L,Q) TOSHIBA	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 0.035 W	θj-c = ΔTc = Tj =	130.0 °C/W 17.4 °C 72.0 °C	Tc = D.F. =	67.4 °C 48.0 %
D136 CRH01(TE85L,Q) TOSHIBA	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 0.03 W	θj-c = ΔTc = Tj =	130.0 °C/W 14.6 °C 68.5 °C	Tc = D.F. =	64.6 °C 45.7 %
Q116 IPI037N06L3 G INFINEON	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	175 °C 0.46 W	θj-c = ΔTc = Tj =	6.3 °C/W 38.8 °C 91.7 °C	Tc = D.F. =	88.8 °C 52.4 %
PC106 PS2581L2-E3-A(D) NEC	Tjmax= Pd = Tj = Ta + (θ j-a x Pd) =>	125 °C 0.004 W	θj-a = ΔTa = Tj =	666.7 °C/W 11.1 °C 63.8 °C	Ta = D.F. =	61.1 °C 51.0 %

## (2) Component derating list

Location No.	Vin = 200Vac Load=100% Ta=50°C					
A101 L4981AD013TR ST	Tjmax=	150 °C	θj-a =	120.0 °C/W		
	Pd =	0.23 W	ΔTa =	20.2 °C	Ta =	70.2 °C
	Tj = Ta + (θ j-a x Pd) =>		Tj =	97.8 °C	D.F. =	65.2 %
D101 GBJ2506-F DIODES	Tjmax=	150 °C	θj-c =	0.6 °C/W		
	Pd =	14.83 W	ΔTc =	33.3 °C	Tc =	83.3 °C
	Tj = Tc + (θ j-c x Pd) =>		Tj =	92.2 °C	D.F. =	61.5 %
D106 IDH12SG60C INFINEON	Tjmax=	175 °C	θj-c =	1.2 °C/W		
	Pd =	3.4 W	ΔTc =	35.3 °C	Tc =	85.3 °C
	Tj = Tc + (θ j-c x Pd) =>		Tj =	89.4 °C	D.F. =	51.1 %
D116 IDH02SG120 INFINEON	Tjmax=	175 °C	θj-c =	2.0 °C/W		
	Pd =	2.25 W	ΔTc =	52.1 °C	Tc =	102.1 °C
	Tj = Tc + (θ j-c x Pd) =>		Tj =	106.6 °C	D.F. =	60.9 %
Q101 IPW60R045CP INFINEON	Tjmax=	150 °C	θj-c =	0.3 °C/W		
	Pd =	8.60 W	ΔTc =	28.7 °C	Tc =	78.7 °C
	Tj = Tc + (θ j-c x Pd) =>		Tj =	81.2 °C	D.F. =	54.1 %
Q107 IPP60R099CP INFINEON	Tjmax=	150 °C	θj-c =	0.5 °C/W		
	Pd =	7.24 W	ΔTc =	68.0 °C	Tc =	118.0 °C
	Tj = Tc + (θ j-c x Pd) =>		Tj =	121.6 °C	D.F. =	81.1 %
SC101 CR12CM-12A B00 RENESAS	Tjmax=	125 °C	θj-c =	1.2 °C/W		
	Pd =	2.9 W	ΔTc =	30.2 °C	Tc =	80.2 °C
	Tj = Tc + (θ j-c x Pd) =>		Tj =	83.7 °C	D.F. =	67.0 %
PC101 PS2801-1-F3-A(P) NEC	Tjmax=	125 °C	θj-c =	1.67 °C/W		
	Pd =	0.06 W	ΔTc =	13.8 °C	Tc =	63.8 °C
	Tj = Tc + (θ j-c x Pd) =>		Tj =	63.9 °C	D.F. =	51.1 %
Q117 FMH09N90E FUJI	Tjmax=	150 °C	θj-c =	0.61 °C/W		
	Pd =	0.0 W	ΔTc =	22.2 °C	Tc =	72.2 °C
	Tj = Tc + (θ j-c x Pd) =>		Tj =	72.2 °C	D.F. =	48.1 %

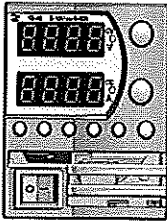
Location No.	Vin=200Vac Load=100% Ta=50°C					
A109 AD7798BRUZ ANALOG DEVICES	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 0.002 W	θj-c = ΔTc = Tj =	14.0 °C/W 18.8 °C 68.8 °C	Tc = D.F. =	68.8 °C 45.9 %
A110 DAC8830ICDRG4 TI	Tjmax= Pd = Tj = Ta + (θ j-a x Pd) =>	150 °C 1E-04 W	θj-a = ΔTa = Tj =	136.9 °C/W 12.5 °C 62.5 °C	Ta = D.F. =	62.5 °C 41.7 %
A115 STM32F105VCT6TR ST	Tjmax= Pd = Tj = Ta + (θ j-a x Pd) =>	125 °C 0.434 W	θj-a = ΔTa = Tj =	46.0 °C/W 15.2 °C 85.2 °C	Ta = D.F. =	65.2 °C 68.1 %
A126 L4941BV ST	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 0.6 W	θj-c = ΔTc = Tj =	3.0 °C/W 11.1 °C 62.9 °C	Tc = D.F. =	61.1 °C 41.9 %
A127 LM3940IT-3.3NOPB NATIONAL	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	125 °C 0.5 W	θj-c = ΔTc = Tj =	4.0 °C/W 14.3 °C 66.3 °C	Tc = D.F. =	64.3 °C 53.0 %
A141 LM78L15ACM NOPB NATIONAL	Tjmax= Pd = Tj = Ta + (θ j-a x Pd) =>	125 °C 0.1 W	θj-a = ΔTa = Tj =	180.0 °C/W 25.0 °C 93.0 °C	Ta = D.F. =	75.0 °C 74.4 %
A142 MIP2E5DMY MATSUSHITA	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 1.4 W	θj-c = ΔTc = Tj =	3.0 °C/W 24.3 °C 78.5 °C	Tc = D.F. =	74.3 °C 52.3 %
A145 LM78L05ACMNOPB NATIONAL	Tjmax= Pd = Tj = Ta + (θ j-a x Pd) =>	125 °C 0.08 W	θj-a = ΔTa = Tj =	231.0 °C/W 18.6 °C 87.1 °C	Ta = D.F. =	68.6 °C 69.7 %
D122 CRH01(TE85L,Q) TOSHIBA	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 0.06 W	θj-c = ΔTc = Tj =	130.0 °C/W 26.4 °C 84.2 °C	Tc = D.F. =	76.4 °C 56.1 %
D130 CRH01(TE85L,Q) TOSHIBA	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 0.035 W	θj-c = ΔTc = Tj =	130.0 °C/W 16.1 °C 70.7 °C	Tc = D.F. =	66.1 °C 47.1 %
D136 CRH01(TE85L,Q) TOSHIBA	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	150 °C 0.03 W	θj-c = ΔTc = Tj =	130.0 °C/W 13.8 °C 67.7 °C	Tc = D.F. =	63.8 °C 45.1 %
Q116 IPI037N06L3 G INFINEON	Tjmax= Pd = Tj = Tc + (θ j-c x Pd) =>	175 °C 0.46 W	θj-c = ΔTc = Tj =	6.3 °C/W 37.7 °C 90.6 °C	Tc = D.F. =	87.7 °C 51.8 %
PC106 PS2581L2-E3-A(D) NEC	Tjmax= Pd = Tj = Ta + (θ j-a x Pd) =>	125 °C 0.004 W	θj-a = ΔTa = Tj =	666.7 °C/W 10.4 °C 63.1 °C	Ta = D.F. =	60.4 °C 50.5 %



## 3. Main components temperature rise

MODEL : 160V-5A

Condition:

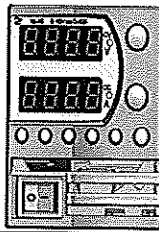
Standard Mounting	
Output Voltage	160V
Output Current	5A
Ta	50°C

Location No.	Parts Name	$\Delta T$ Temperature Rise (°C)	
		100Vac	200Vac
D116	DIODE	50.3	48.4
D117	DIODE	50.0	46.0
D118	DIODE	32.0	30.7
D119	DIODE	48.9	44.9
D101	BRIDGE	50.0	27.7
L101	COMMON CHOKE	39.1	20.2
L102	COMMON CHOKE	33.6	18.0
L103	CHOKE PFC	39.1	29.9
L104	CHOKE DC-DC	47.1	43.7
Q101	MOSFET	53.7	28.7
Q104	MOSFET	36.7	35.9
Q105	MOSFET	39.9	39.0
Q106	MOSFET	34.0	33.2
Q107	MOSFET	40.5	39.7
Q117	MOSFET	30.1	22.2
T101	TRANSFORMER CORE	32.9	32.0
T101	TRANSFORMER IN	63.7	61.9
T102	TRANSFORMER	21.7	20.5
T103	TRANSFORMER	25.1	24.2
TB101	AC INLET	24.6	14.0
C101	FILM CAP.	29.9	18.8
C102	FILM CAP.	26.9	16.1
C103	CERAMIC CAP.	25.8	15.2
F101	FUSE	36.6	18.1
D106	DIODE	54.5	33.8
SC101	TRIAC	44.8	30.2
C112	CAP.ELECT.	16.0	13.3
C113	CAP.ELECT.	8.8	6.9
C105	FILM CAP.	28.1	20.5
R189	TH.RESISTOR	32.8	26.0
C500	CAP.ELECT.	25.2	21.9
C502	CAP.ELECT.	26.4	22.9
C508	CAP.CER.	29.2	25.7
L500	CHOKE COIL	33.8	29.5
R500	CHIP RESISTOR	40.0	35.2
C507	CAP.ELECT.	29.2	25.9

## 3. Main components temperature rise

MODEL : 325V-2.5A

Condition:

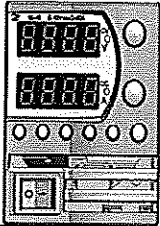
Standard Mounting	
Output Voltage	320V
Output Current	2.5A
Ta	50°C

Location No.	Parts Name	$\Delta T$ Temperature Rise (°C)	
		100Vac	200Vac
D116	DIODE	50.5	52.1
D117	DIODE	50.5	44.6
D118	DIODE	55.6	52.6
D119	DIODE	53.2	47.0
D101	BRIDGE	51.4	29.5
L101	COMMON CHOKE	47.3	24.1
L102	COMMON CHOKE	42.4	24.2
L103	CHOKE PFC	51.4	39.4
L104	CHOKE DC-DC	52.8	48.0
Q101	MOSFET	49.7	27.2
Q104	MOSFET	37.7	34.6
Q105	MOSFET	42.6	39.7
Q106	MOSFET	39.8	37.4
Q107	MOSFET	41.0	38.7
Q117	MOSFET	32.7	23.5
T101	TRANSFORMER IN	71.7	64.5
T101	TRANSFORMER CORE	39.6	36.0
T102	TRANSFORMER	23.5	20.5
T103	TRANSFORMER	27.0	24.0
TB101	AC INLET	33.4	18.7
C101	FILM CAP.	32.8	20.2
C102	FILM CAP.	37.9	22.4
C103	CERAMIC CAP.	28.9	19.3
F101	FUSE	33.0	22.1
D106	DIODE	43.7	31.2
SC101	TRIAC	46.9	27.1
C112	CAP.ELECT.	15.0	13.4
C113	CAP.ELECT.	16.7	8.4
C105	FILM CAP.	29.3	22.0
R189	TH.RESISTOR	11.9	28.1
C500	CAP.ELECT.	25.0	21.4
C502	CAP.ELECT.	25.4	25.8
C508	CAP.CER.	29.6	26.9
L500	CHOKE COIL	31.9	33.7
R500	CHIP RESISTOR	37.6	38.0
C507	CAP.ELECT.	30.2	26.5

## 3. Main components temperature rise

MODEL : 650V-1.25A

Condition:

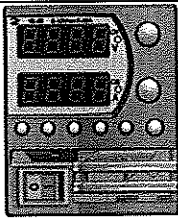
Standard Mounting	
Output Voltage	650V
Output Current	1.25A
Ta	50°C

Location No.	Parts Name	$\Delta T$ Temperature Rise (°C)	
		100Vac	200Vac
D116	DIODE	35.1	33.6
D117	DIODE	34.0	30.4
D118	DIODE	34.8	33.3
D119	DIODE	36.7	33.2
D101	BRIDGE	58.4	33.3
L101	COMMON CHOKE	46.3	23.2
L102	COMMON CHOKE	46.8	24.0
L103	CHOKE PFC	58.1	44.1
L104	CHOKE DC-DC	67.8	64.5
Q101	MOSFET	53.9	28.3
Q104	MOSFET	51.2	50.3
Q105	MOSFET	54.5	53.6
Q106	MOSFET	62.4	61.7
Q107	MOSFET	68.8	68.0
Q117	MOSFET	56.0	49.3
T101	TRANSFORMER CORE	54.7	52.6
T101	TRANSFORMER IN	69.9	65.9
T102	TRANSFORMER	27.2	25.7
T103	TRANSFORMER	31.0	29.9
TB101	AC INLET	32.2	17.3
C101	FILM CAP.	36.0	21.8
C102	FILM CAP.	36.4	21.2
C103	CERAMIC CAP.	29.5	17.4
F101	FUSE	44.5	21.6
D106	DIODE	57.0	35.3
SC101	TRIAC	41.9	27.6
C112	CAP.ELECT.	18.2	14.8
C113	CAP.ELECT.	12.7	10.6
C105	FILM CAP.	29.4	22.3
R189	TH.RESISTOR	36.2	30.2
C500	CAP.ELECT.	23.7	20.9
C502	CAP.ELECT.	26.7	24.2
C508	CAP.CER.	30.1	27.0
L500	CHOKE COIL	32.7	30.0
R500	CHIP RESISTOR	31.6	29.7
C507	CAP.ELECT.	30.3	27.4

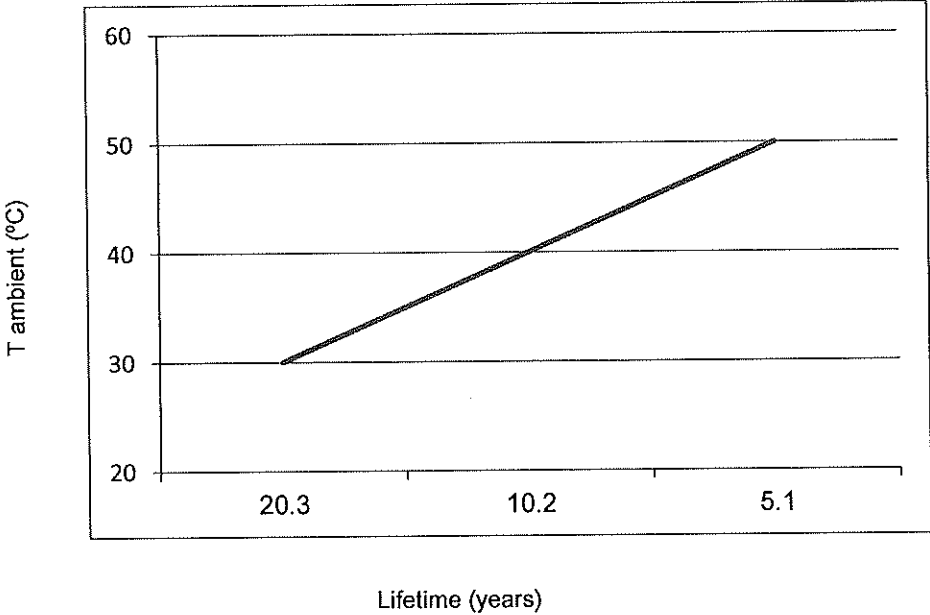
4. Electrolytic capacitor lifetime

Z<sup>+</sup> 800 H.V Series

Condition:

Standard Mounting	
Input Voltage	100Vac

COMPUTED LIFE (year) at T(ambient)			
LOAD (%)	30°C	40°C	50°C
100	20.3	10.2	5.1



5. Abnormal test

MODEL : 650V-1.25A

(1) Test condition and circuit:

Input Voltage: 230Vac Output: 650V 1.25A

Ta : 50°C

(2) Test results

No.	Test Position		Test Mode		Test Result													Note	
	Location	Test point	Short	Open	1	2	3	4	5	6	7	8	9	10	11	12	PS functional after AC recycle		Others
					Fire	Smoke	Burst	Smell	Red hot	Damaged	Fuse open	P < V	O P	P I O	AC FAIL	No output			
1	C112		•								•			•	•			F101	
2	D101	1-2	•								•			•	•			F101	
3		2-4	•								•			•	•			F101	
4	D104	A-K	•													•			
5	D106	A-K	•						•	•				•	•			D103, F101, Q101	
6	D107	A-K	•															• Pin decreased to 775W	
7	D116	A-K	•						•	•				•	•			• F101,Q104,Q106,D118	
8	L103	3-4	•						•	•				•	•			L103,F101,Q101	
9	Q101	D-G	•						•	•				•	•			F101, Q101	
10		D-S	•						•	•				•	•			F101	
11		G		•						•	•				•	•		F101, Q101	
12	Q102	C-E	•						•								•	R135, R136	
13	Q104	D-G	•						•	•				•	•			F101, Q104, Q105,D103	
14		D-S	•						•	•				•	•			F101,Q105,D103	
15		G		•														• Pin decreased to 88W	
16	Q108	C-E	•															• Pin decreased to 98W	
17	Q112	C-E	•												•				
18	Q117	D-S	•						•				•				•	Q117, Q118, R185, R186, R187, R189,R191	
19		D-G	•						•				•				•	Q118, R185, R186, R187, R189, R199, A103	
20	R125			•														• Pin increased to 900W	
21	SC101	2		•					•	•				•	•			F101, Q101, R123,R124	
22	T101	8-9	•						•	•				•	•			F101, Q104, Q105,Q106,Q107,D103,R172	
23	A126	1-2	•												•			No Display, No Fan	
24	A141	2-8	•												•			No Display, No Fan	
25	A142	1		•											•			No Display, No Fan	
26		1-3	•							•	•				•	•		A142, F101, ZD120	
27		2-3	•								•				•	•			F101
28	A143	3-5	•															• Pin decreased to 625W	
29	A145	2-8	•						•						•			No Fan, D136	
30	D126	A-K	•												•			No Display, No Fan	
31	D123	A-K	•												•			No Display, No Fan	
32	D130	A-K	•												•			No Display, No Fan	
33	D135	A-K	•															• Pin decreased to 275W	
34	D136	A-K	•												•			No Display, No Fan	
35	C500		•						•	•				•	•			F101,L104,D116,D118,D103	
36	C502		•							•				•	•			R123,R124,Q104,Q106,D116,L104	
37	C503		•												•			• Pin decreased to 22W	
38	D500	A-K	•															• V Fan decreased to 8.2V;All temperatures are normal	

5. Abnormal test

MODEL : 160V-5A

(1) Test condition and circuit:

Input Voltage: 230Vac Output:160V 5A

Ta : 50°C

(2) Test results

No.	Test Position		Test Mode		Test Result												
	Location	Test point	Short	Open	1	2	3	4	5	6	7	8	9	10	11	12	13
					Fire	Smoke	Burst	Smell	Red hot	Damaged	Fuse open	V	O	P	AC FAIL	No output	
1	D116	A-K	•														• Pin decreased to 40W
2	T101	8-10	•														• Pin decreased to 40W
3	C500		•														• Pin decreased to 74W
4	C502		•														• Pin decreased to 34W
5	D500	A-K	•														• V Fan decreased to 10.1V; All temperatures are normal

6. Vibration test

Z<sup>+</sup> 800 H.V Series

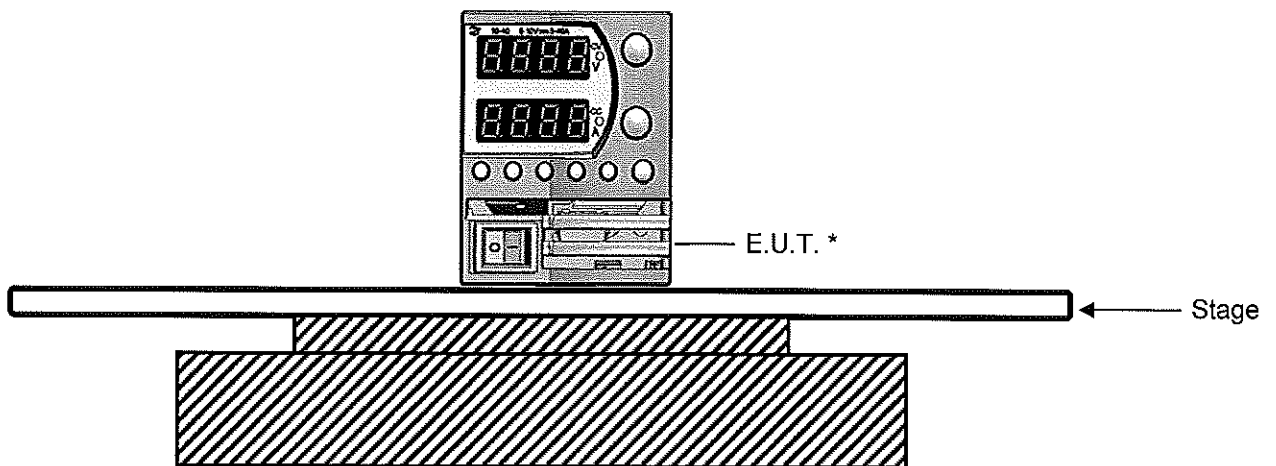
(1) Vibration test class

Frequency variable endurance test

(2) Equipment used

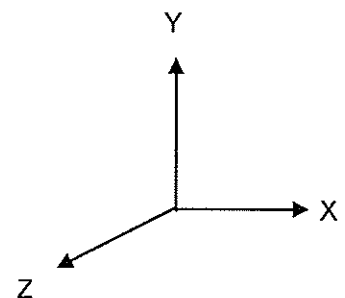
Name	Manufacturer	Model
Vibration Test System	Ling Dynamic Systems	V875
Laser Shaker Control System	DACTRON	LASER
Isotron Accelerometer 98.2 mV/g	Dytran instruments Inc.	3256A2
Isotron Accelerometer 101.7 mV/g	Dytran instruments Inc.	3049E3

(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	319.998	75.00	O.K.
Direction			
X	319.998	75.00	O.K.
Y	319.982	70.00	O.K.
Z	322.998	75.00	O.K.

**7. Noise Simulation Test****Z<sup>+</sup> 800 H.V Series****(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, 1.2kV, 1.8kV, 2kV) ( 50Ω term.)

Pulse width - 50ns ~ 1us

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

Input voltage - 230Vac 50Hz

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



**8. Thermal Shock Test**

**Z<sup>+</sup> 800 H.V Series**

**(1) Test Equipment**

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

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

1 (unit)

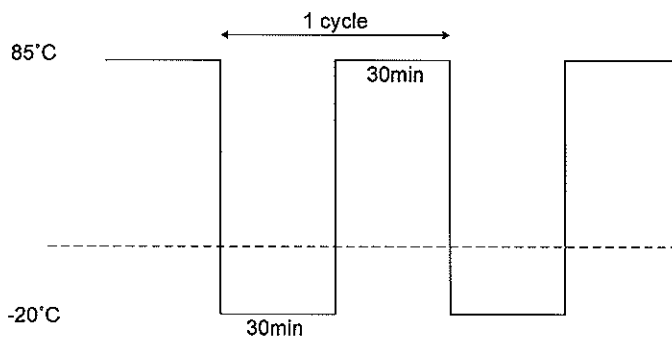
**(3) Test condition**

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
319.975V	319.975V	60mV	319.903V	319.904V	51mV

9. Fan Life Expectancy

Z<sup>+</sup> 800 H.V Series

(1) Part name

H60T12BLA7-52 ("NIDECC")

(2) Life expectancy

The data shows fan life expectancy for fan only by manufacture (90% survival rate).

Fig1. shows measuring point of ambient temperature.

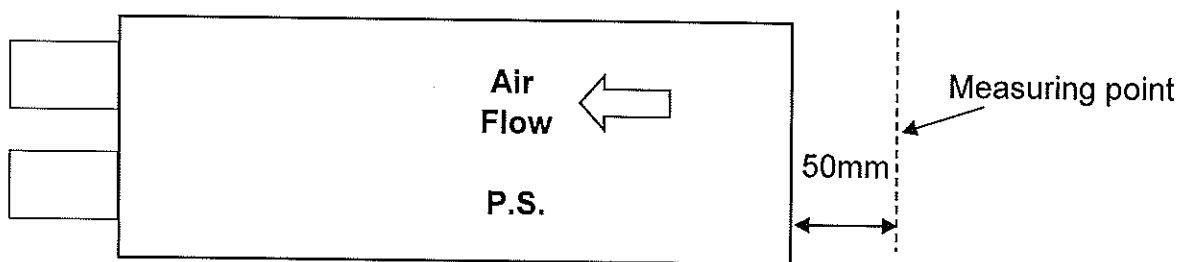
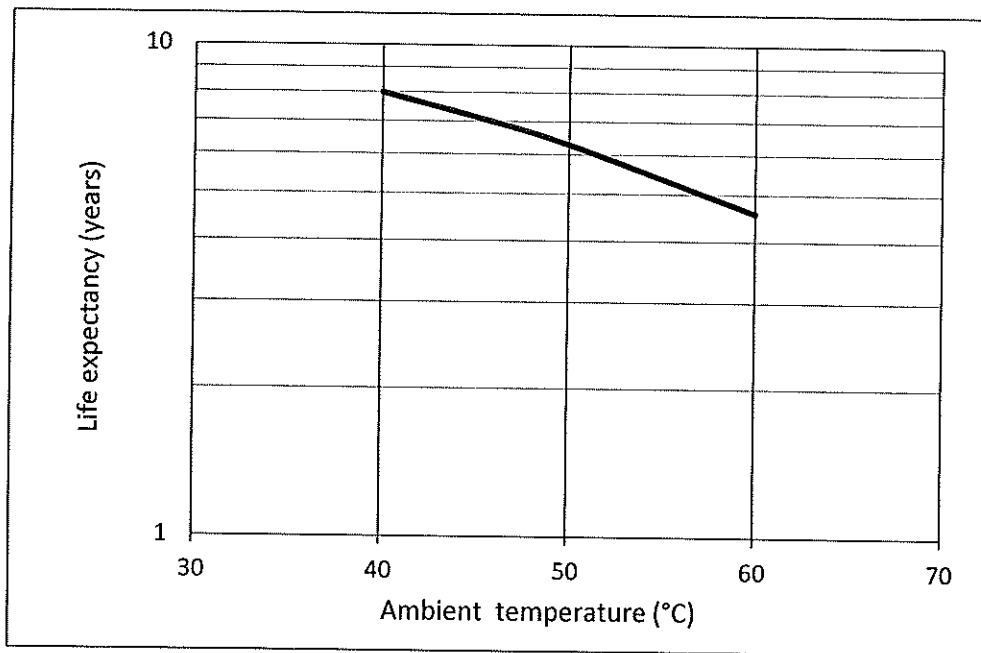


Fig1.Measuring point of fan ambient temperature.

$$1 \text{ year} = 365 \text{ day} \times 24 \text{ hours/day} = 8760 \text{ hours}$$