NNS15

RELIABILITY DATA

DWG. No. IA500-79-01			
Q.A. NLJ	Q.A. NLI	ENG.	APP.
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NEMIC-LAMBDA

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The above data are typical values. As all units have the same characteristics, the data to be considered as ability values.

NEMIC-LAMBDA

NNS15

M. T. B. F.

1. Mthod of calculation:

This calculation is by 'components count method' laid down by the DC Stabilized Power Supplies (Switcing mode) committee of EIAJ.

The MTBF is determined by means of a fixed component failure rate λ_G given to each component and the number of component count of each type of component. λ_G is determined based on MIL-HDBK-217D.

Please refer to EIAJ handbook no. RCF-9021 for formula:

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

λ_{equip} = Total equipment failure rate (failures / 10^6 hrs)

λ_G = Failure rate of the i^{th} compoment

Ni = Number of i^{th} component

n = Number of categories of component

2. MTBF Value:

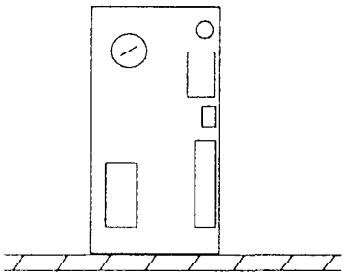
Conditions: Nominal line, rated load

Ambient Temperature 25 C °

MTBF = 139,800 hrs

2. COMPONENT DERATING

MODEL : NNS15 - 5



Mounting Method : Standard

(1) calculation method:

conditions:

Input: 100VAC Output 5V 3A (100%)

Ambient temperature : 50° C

(b) Semiconductor

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

(c) IC, Resistors, Capacitors, etc.

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

(d) Calculating criteria:

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

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.	Parts Name	MAX Rating	Actual Rating	Derating Factor	Note
Q1	MOSFET	Tj_{max} = 150°C	Tj = 97°C	64.7%	
Q4	SCR	Tj_{max} = 125°C	Tj = 82.2°C	65.7%	
Q5	MOSFET	Tj_{max} = 150°C	Tj = 97°C	64.7%	
CR1	S.B.D.	Tj_{max} = 150°C	Tj = 111.6°C	74.4%	
CR4	DIODE	Tj_{max} = 150°C	Tj = 80.2°C	53.5%	
CR5	LED	If_{max} = 35mA	If = 10mA	28.5%	
CR6	ZENER	Tj_{max} = 150°C	Tj = 80°C	53.3%	
CR8	DIODE	Tj_{max} = 150°C	Tj = 80.2°C	53.5%	
IC1	OP - AMP	Tj_{max} = 150°C	Tj = 89°C	59.3%	
IC2	REF. DIODE	Tj_{max} = 150°C	Tj = 80.3°C	53.5%	

3. △T TEMPERATURE RISE

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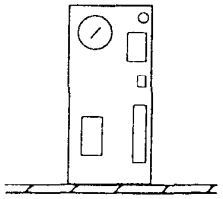
Location No.	Parts Name	△T°C TEMP. RISE
Q1	MOSFET	41.2
Q4	SCR	32.2
Q5	MOSFET	41.2
CR1	S. B. D.	55.6
C2	ELEC. CAP.	30.1
C4	ELEC. CAP	29.7
T1	TRANSFORMER	51.6

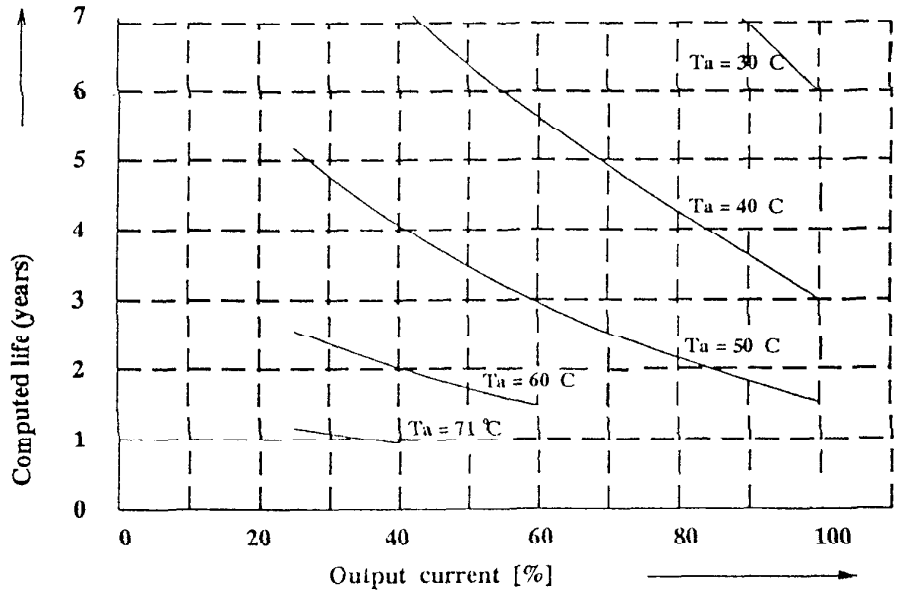
Conditions:

Mounting Method	 (STANDARD)
Input Voltage	100VAC
Output Volt.	5V
Output Curr.	3A (100%)

ELEC. CAPACITOR COMPUTED LIFE

MODEL: NNS15 - 5

Computation Life curve



Formula: $L = L_0 \times 2^{\frac{105 - Tc}{10}}$ (year)

L: Elec. capacitor computed life

(24 houres per day, 365 days operation)

L_0: Guarentee life for Elec. Cap.

Tc: Case temperature of Elec. Cap.

CONDITIONS: Mounting method: Standard mounting

Input Voltage: 100VAC

Output Voltage: 5V

Cooling: convection cooling

5. ABNORMAL TEST

MODEL - NNS15 - 5

(1) Conditions

Input: 115VAC Output: 5V 3A Ta: 25c

(2) Test Results

No.	Test Point		Test Mode		Test Result												
					①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	
	Location No.	Test Point	Short	Open	Fire	Smoke	Burst	Smell	Red Hot	Damaged	Fuse Blown	OVP	OCP	No Output	No Change	Others	Note
1	C2		●								●			●			
2				●												●	LOW OUTPUT VOLTAGE HIGH RIPPLE
3	C4		●										●	●			
4				●												●	OUTPUT OSCILLATIONS
5	CR1	~		●										●			
6		+		●										●			
7		+–~	●								●			●			
8		–~	●								●			●			
9	CR4		●									●		●			
10				●											●		
11	CR6		●									●		●			
12				●											●		
13	CR8		●									●		●			
14				●											●		
15	Q1	D		●											●		
16		S		●											●		
17		G		●							●			●			
18		D-S	●								●			●			
19		G-S	●											●			
20		D-G	●								●			●			

No.	Test Point		Test Mode		Test Result												
					①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	
	Location No.	Test Point	Short	Open	Fire	Smoke	Burst	Smell	Red Hot	Damaged	Fuse Blown	OVP	OCP	No Output	No Change	Others	Note
21	Q2	C		●										●			
22		B		●										●			
23		E		●										●			
24		C-E	●								●			●			
25		C-B	●								●			●			
26		B-E	●											●			
27	Q3	C		●										●			
28		B		●										●			
29		E		●										●			
30		C-E	●								●			●			
31		C-B	●								●			●			
32		B-E	●											●			
33	Q4	A-K	●									●		●			
34		A		●											●		
35		K		●											●		
36	Q5	D		●											●		
37		S		●											●		
38		G		●							●			●			
39		D-S	●								●			●			
40		G-S	●											●			
41		G-D	●								●			●			
42	IC2		●											●			
43				●								●		●			
44	T1	PRIM WINDING	●								●			●			
45				●										●			
46		SEC WINDING	●								●			●			
47				●										●			
48		AUX WINDING	●											●			TF1 OPEN
49				●										●			
50																	

6. VIBRATION TEST

MODEL: NNS15 - 5

(1) Vibration test class:

Frequency variable endurance test

(2) Equipment used:

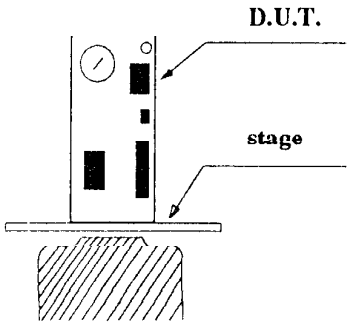
Controller: F - 400 - BM - E47

SHIN - NIPPON

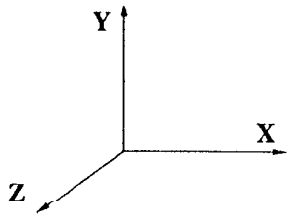
SHOKKI Co. LTD.

Vibrator 905 - FN

(3) Testing method:



Vibrator



D.U.T. Direction

Sweep frequency : 10 ~ 55Hz

Sweep time: 1min

Acceleration: const. (2G)

Direction: X, Y, Z.

Test time: 1H each

Result: (OK) NG

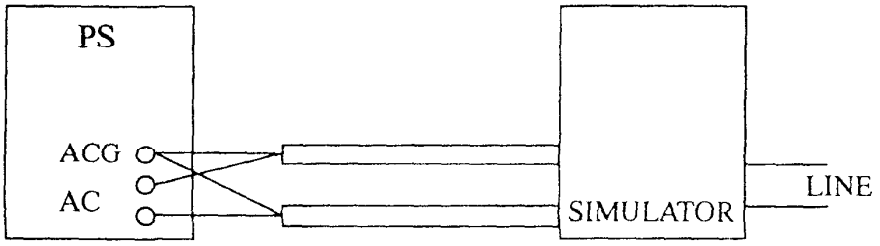
Check item / Initial Direc.	Vout	Ripple (mVp-p)	D.U.T. stage	Note
Initial	5.003	1	OK	
X	5.003	1	OK	
Y	5.003	1	OK	
Z	5.003	1	OK	

NNS 15

NOISE SIMULATE TEST

MODEL : NNS 15

(1) Test circuit and equipment



Simulator: INS - 4420
(Noise laboratory Co. Ltd.)

(2) Measuring Conditions

Input voltage	: Rated
Output voltage	: Rated
Output current	: 0%, 100%
Ambient temperature	: 25°C
Pulse width	: 50ns ~ 1000ns
Noise level	: 0 ~ 2KV
Phase shift	: 0 ~ 360 °C
Polarity	: +, −
MODE	: NORMAL, COMMON
TRIG SELECT	: LINE

(3) Acceptable conditions

1. Not to be broken
2. Output not to be shut down
3. No other out of orders

(4) Results

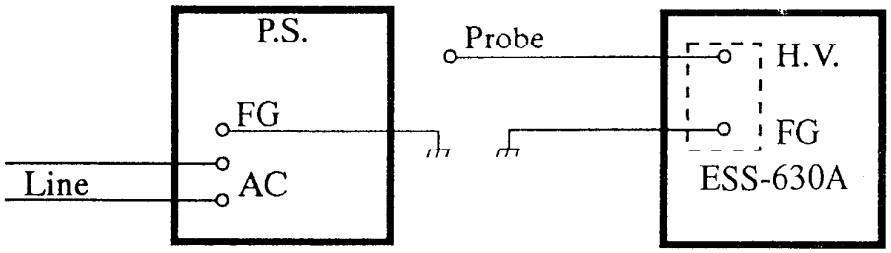
(OK) NG

ELECTRO - STATIC DISCHARGE TEST
MODEL : NNS 15

(1) Equipment used
ESS - 630A (Noise Laboratory Co. Ltd.)
Discharge resistance : 330 OHM Capacity : 150 pF

(2) Measuring Conditions
Input voltage : Rated (100 VAC)
Output voltage : Rated
Output current : Rated
Ambient temperature : 25°C
Test voltage : ± 3KV, ± 5KV, ± 10KV, ± 15KV

(3) Testing Method
Check if there is no abnormal output when the testing voltage is applied to operating D.U.T. (Device Under Test) on its case, input terminal, output terminal, FG terminal and ACG terminal - which are parts exposed to the human body. Testing cycle is at positive, negative polarity for three times each, and the applied voltage is to be gradually increased from 3KV to 15KV.



(4) Acceptable Conditions
1. Not to be broken
2. Output not to be shut down
3. No other out of order conditions

(5) Results
(OK) NG

IMPULSE TEST

NNS 15

MODEL : NNS 15

(1) Equipment used

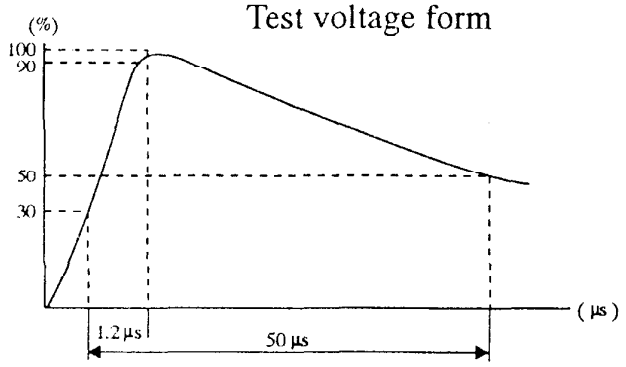
LSS - 710B (Noise laboratory Co. Ltd.)

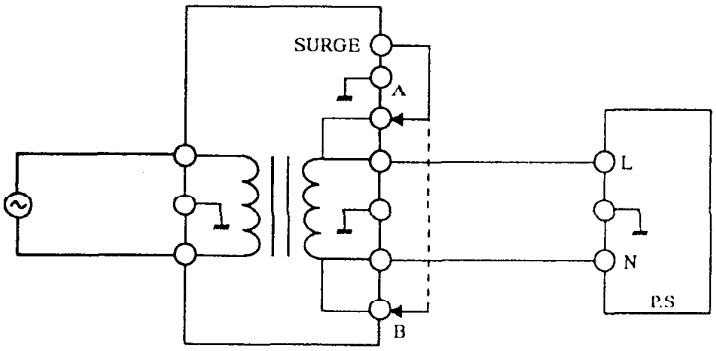
(2) Measuring Conditions

Input voltage	: Rated	Test voltage	: 5KV
Output voltage	: Rated	Test point	: Between FG - AC
Output current	: Full load	Test time	: 3 times
Ambient temperature	: 25 °C	Polarity	: + , −

(3) Testing method

Test voltage form





(4) Acceptable conditions

1. Not to be broken
2. Output not to be shut down
3. No other out of orders

(5) Results

(OK) NG