DRL30-1

RELIABILITY DATA

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※ Test results are typical data. Nevertheless the following results are considered to be actual capability data because all units have nearly the same characteristics.

1. Calculated Values of MTBF

MODEL：DRL30-24-1

(1) Calculating Method

Calculated based on stress reliability projection of Telcordia SR-332 issue3.
Individual failure rates FR is given to each part and MTBF is calculated
by the count of each part.(Method I)

$$MTBF = \frac{1}{FR_{equip}} = \frac{1}{\sum_{i=1}^{n} n_i \left(L_G \times \pi_Q \times \pi_S \times \pi_T \times \pi_E \times \pi_{CF}\right)_i} \times 10^9 \quad \text{Hours}$$

FR_{equip} : Total Equipment Failure Rate (Failure／10^9Hours)

L_G : Mean generic (or base) failure rate.

n_i : Quantity of ith Generic Part

n : Number of Different Generic Part Categories

π_Q : Quality factor, which depends on the part's quality level.

π_S : Stress factor, which depends on the part's stress level.

π_T : Temperature factor, which depends on the part's operating temperature.

π_E : Environment factor, which depends on the circuit's operating environment.

π_{CF} : Correction Factor, which depends on the part's correction factor.

(2) MTBF Values

Condition:

G_F : Ground, Fixed — Ambient Temperature: 55℃

Model Type: Serial — UCL(upper confidence level): 90%

Io=100% load — Quality Level: II

Vin: 115Vac : MTBF ≒ 609542 (hours)

Vin: 230Vac : MTBF ≒ 704390 (hours)

2. Components Derating

MODEL : DRL30-1

(1) Calculating Method

(a) Measuring method

Mounting method : Standard mounting	Ambient temperature : 55℃
Input voltage : 115, 230VAC	Output voltage & current : 100%

(b) Semiconductors

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

(c) IC, Resistors, Capacitors, etc.

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

(d) Calculating method of thermal impedance

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

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

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

Tl : Lead Temperature at Start Point of Derating ; 25℃ in General

Pd(max) : Maximum Power Dissipation

Pch(max) : Maximum Channel Dissipation

Tj(max) (Tch(max)) : Maximum Junction (channel) Temperature

θj-c (θch-c) : Thermal Impedance between Junction (channel) and Case

θj-a : Thermal Impedance between Junction and air

θj-l : Thermal Impedance between Junction and Lead

(2) Component Derating List

Model: DRL30-12-1

Location No.	Vin = 115VAC Ta = 55℃ Load = 100%(Vo: 12V, Io: 2.1A)		
A1 (MOS) ICE3A2065ELJ INFINEON	Tch (max) = 150 ℃ Pd = 0.82 W Tch= Tc+ ((θch-c)× Pd) =106.5℃ D.F. = 71.02%	θch-c = 8.7 ℃/W ΔTc= 44.4℃	Pd (max) = 17.0 W Tc= 99.4 ℃
A201 TL432AIPK TI	Tj (max) = 150 ℃ Pt = 16.15 mW Tj= Tc+ ((θj-c)× Pt) =85.7℃ D.F. = 57.16%	θj-c = 9.0 ℃/W ΔTc= 30.6℃	 Tc= 85.6 ℃
D1 DF06M LITE-ON	Tj (max) = 150 ℃ Pd = 0.66 W Tj= Tl+ ((θj-l)× Pd) =100.4℃ D.F. = 66.91%	θj-l = 15.0 ℃/W ΔTl= 35.4℃	 Tl= 90.4 ℃
D51 STPS20H100CFP STMICRO	Tj (max) = 150 ℃ Pd = 1.52 W Tj= Tc+ ((θj-c)× Pd) =120.2℃ D.F. = 80.13%	θj-c = 4.0 ℃/W ΔTc= 59.1℃	 Tc= 114.1 ℃
D101 D1F60-5053 SHINDENGEN	Tj (max) = 150 ℃ Pd = 11.9 mW Tj= Tc+ ((θj-c)× Pd) =86.7℃ D.F. = 57.78%	θj-c = 23.0 ℃/W ΔTc= 31.4℃	 Tc= 86.4 ℃
D102 CRH01(TE85L,Q) TOSHIBA	Tj (max) = 150 ℃ Pd = 31.36 mW Tj= Tc+ ((θj-a)× Pd) =90.9℃ D.F. = 60.58%	θj-a = 130.0 ℃/W ΔTc= 31.8℃	 Tc= 86.8 ℃
PC101 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.98 mW Tj= Tc+ ((θj-a)× Pd) =85.9℃ D.F. = 68.68%	θj-a = 666.7 ℃/W ΔTc= 30.2℃	Pd(max) = 150.0 mW Tc= 85.2 ℃
PC101 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 1.28 mW Tj= Tc+ ((θj-a)× Pd) =85.6℃ D.F. = 68.50%	θj-a = 333.3 ℃/W ΔTc= 30.2℃	Pd(max) = 100.0 mW Tc= 85.2 ℃
PC102 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =85.2℃ D.F. = 68.16%	θj-a = 666.7 ℃/W ΔTc= 30.2℃	Pd(max) = 150.0 mW Tc= 85.2 ℃
PC102 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =85.2℃ D.F. = 68.16%	θj-a = 333.3 ℃/W ΔTc= 30.2℃	Pd(max) = 100.0 mW Tc= 85.2 ℃

(2) Component Derating List

Model: DRL30-12-1

Location No.	Vin = 230VAC Ta = 55℃ Load = 100%(Vo: 12V, Io: 2.1A)		
A1 (MOS) ICE3A2065ELJ INFINEON	Tch (max) = 150 ℃ Pd = 0.70 W Tch= Tc+ ((θch-c)× Pd) =97.8℃ D.F. = 65.2%	θch-c = 8.7 ℃/W ΔTc= 36.7℃	Pd (max) = 17.0 W Tc= 91.7 ℃
A201 TL432AIPK TI	Tj (max) = 150 ℃ Pt = 16.13 mW Tj= Tc+ ((θj-c)× Pt) =84.5℃ D.F. = 56.36%	θj-c = 9.0 ℃/W ΔTc= 29.4℃	 Tc= 84.4 ℃
D1 DF06M LITE-ON	Tj (max) = 150 ℃ Pd = 0.48 W Tj= Tl+ ((θj-l)× Pd) =87.3℃ D.F. = 58.17%	θj-l = 15.0 ℃/W ΔTl= 25.1℃	 Tl= 80.1 ℃
D51 STPS20H100CFP STMICRO	Tj (max) = 150 ℃ Pd = 1.52 W Tj= Tc+ ((θj-c)× Pd) =119.0℃ D.F. = 79.33%	θj-c = 4.0 ℃/W ΔTc= 57.9℃	 Tc= 112.9 ℃
D101 D1F60-5053 SHINDENGEN	Tj (max) = 150 ℃ Pd = 17.16 mW Tj= Tc+ ((θj-c)× Pd) =82.7℃ D.F. = 55.13%	θj-c = 23.0 ℃/W ΔTc= 27.3℃	 Tc= 82.3 ℃
D102 CRH01(TE85L,Q) TOSHIBA	Tj (max) = 150 ℃ Pd = 22.54 mW Tj= Tc+ ((θj-a)× Pd) =85.0℃ D.F. = 56.69%	θj-a = 130.0 ℃/W ΔTc= 27.1℃	 Tc= 82.1 ℃
PC101 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 1.00 mW Tj= Tc+ ((θj-a)× Pd) =82.3℃ D.F. = 65.82%	θj-a = 666.7 ℃/W ΔTc= 26.6℃	Pd(max) = 150.0 mW Tc= 81.6 ℃
PC101 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 1.43 mW Tj= Tc+ ((θj-a)× Pd) =82.1℃ D.F. = 65.66%	θj-a = 333.3 ℃/W ΔTc= 26.6℃	Pd(max) = 100.0 mW Tc= 81.6 ℃
PC102 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =81.6℃ D.F. = 65.28%	θj-a = 666.7 ℃/W ΔTc= 26.6℃	Pd(max) = 150.0 mW Tc= 81.6 ℃
PC102 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =81.6℃ D.F. = 65.28%	θj-a = 333.3 ℃/W ΔTc= 26.6℃	Pd(max) = 100.0 mW Tc= 81.6 ℃

(2) Component Derating List

Model: DRL30-24-1

Location No.	Vin = 115VAC Ta = 55℃ Load = 100%(Vo: 24V, Io: 1.25A)		
A1 (MOS) ICE3A2065ELJ INFINEON	Tch (max) = 150 ℃ Pd = 0.69 W Tch= Tc+ ((θch-c)× Pd) =117.1℃ D.F. = 78.07%	θch-c = 8.7 ℃/W ΔTc= 56.1℃	Pd (max) = 17.0 W Tc= 111.1 ℃
A201 TL432AIPK TI	Tj (max) = 150 ℃ Pt = 31.80 mW Tj= Tc+ ((θj-c)× Pt) =85.1℃ D.F. = 56.72%	θj-c = 9.0 ℃/W ΔTc= 29.8℃	 Tc= 84.8 ℃
D1 DF06M LITE-ON	Tj (max) = 150 ℃ Pd = 0.35 W Tj= Tl+ ((θj-l)× Pd) =105.4℃ D.F. = 70.25%	θj-l = 15.0 ℃/W ΔTl= 45.1℃	 Tl= 100.1 ℃
D51 YG902C2R FUJI ELECTRIC	Tj (max) = 150 ℃ Pd = 1.19 W Tj= Tc+ ((θj-c)× Pd) =114.2℃ D.F. = 76.1%	θj-c = 3.5 ℃/W ΔTc= 55.0℃	 Tc= 110.0 ℃
D101 D1F60-5053 SHINDENGEN	Tj (max) = 150 ℃ Pd = 43.22 mW Tj= Tc+ ((θj-c)× Pd) =90.5℃ D.F. = 60.33%	θj-c = 23.0 ℃/W ΔTc= 34.5℃	 Tc= 89.5 ℃
D102 CRH01(TE85L,Q) TOSHIBA	Tj (max) = 150 ℃ Pd = 14.11 mW Tj= Tc+ ((θj-a)× Pd) =94.8℃ D.F. = 63.22%	θj-a = 130.0 ℃/W ΔTc= 38.0℃	 Tc= 93.0 ℃
PC101 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.24 mW Tj= Tc+ ((θj-a)× Pd) =89.1℃ D.F. = 71.25%	θj-a = 666.7 ℃/W ΔTc= 33.9℃	Pd(max) = 150.0 mW Tc= 88.9 ℃
PC101 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 6.56 mW Tj= Tc+ ((θj-a)× Pd) =91.1℃ D.F. = 72.87%	θj-a = 333.3 ℃/W ΔTc= 33.9℃	Pd(max) = 100.0 mW Tc= 88.9 ℃
PC102 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =88.9℃ D.F. = 71.12%	θj-a = 666.7 ℃/W ΔTc= 33.9℃	Pd(max) = 150.0 mW Tc= 88.9 ℃
PC102 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =88.9℃ D.F. = 71.12%	θj-a = 333.3 ℃/W ΔTc= 33.9℃	Pd(max) = 100.0 mW Tc= 88.9 ℃

(2) Component Derating List

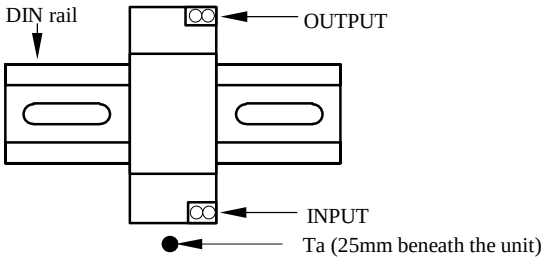
Model: DRL30-24-1

Location No.	Vin = 230VAC Ta = 55℃ Load = 100%(Vo: 24V, Io: 1.25A)		
A1 (MOS) ICE3A2065ELJ INFINEON	Tch (max) = 150 ℃ Pd = 0.99 W Tch= Tc+ ((θch-c)× Pd) =117.6℃ D.F. = 78.4%	θch-c = 8.7 ℃/W ΔTc= 54.0℃	Pd (max) = 17.0 W Tc= 109.0 ℃
A201 TL432AIPK TI	Tj (max) = 150 ℃ Pt = 32.80 mW Tj= Tc+ ((θj-c)× Pt) =84.6℃ D.F. = 56.4%	θj-c = 9.0 ℃/W ΔTc= 29.3℃	 Tc= 84.3 ℃
D1 DF06M LITE-ON	Tj (max) = 150 ℃ Pd = 0.22 W Tj= Tl+ ((θj-l)× Pd) =89.4℃ D.F. = 59.58%	θj-l = 15.0 ℃/W ΔTl= 31.0℃	 Tl= 86.0 ℃
D51 YG902C2R FUJI ELECTRIC	Tj (max) = 150 ℃ Pd = 1.19 W Tj= Tc+ ((θj-c)× Pd) =113.7℃ D.F. = 75.77%	θj-c = 3.5 ℃/W ΔTc= 54.5℃	 Tc= 109.5 ℃
D101 D1F60-5053 SHINDENGEN	Tj (max) = 150 ℃ Pd = 27.93 mW Tj= Tc+ ((θj-c)× Pd) =87.5℃ D.F. = 58.36%	θj-c = 23.0 ℃/W ΔTc= 31.9℃	 Tc= 86.9 ℃
D102 CRH01(TE85L,Q) TOSHIBA	Tj (max) = 150 ℃ Pd = 6.05 mW Tj= Tc+ ((θj-a)× Pd) =91.3℃ D.F. = 60.86%	θj-a = 130.0 ℃/W ΔTc= 35.5℃	 Tc= 90.5 ℃
PC101 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.27 mW Tj= Tc+ ((θj-a)× Pd) =86.3℃ D.F. = 69.02%	θj-a = 666.7 ℃/W ΔTc= 31.1℃	Pd(max) = 150.0 mW Tc= 86.1 ℃
PC101 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 5.12 mW Tj= Tc+ ((θj-a)× Pd) =87.8℃ D.F. = 70.25%	θj-a = 333.3 ℃/W ΔTc= 31.1℃	Pd(max) = 100.0 mW Tc= 86.1 ℃
PC102 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =86.1℃ D.F. = 68.88%	θj-a = 666.7 ℃/W ΔTc= 31.1℃	Pd(max) = 150.0 mW Tc= 86.1 ℃
PC102 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =86.1℃ D.F. = 68.88%	θj-a = 333.3 ℃/W ΔTc= 31.1℃	Pd(max) = 100.0 mW Tc= 86.1 ℃

3. Main Components Temperature Rise △T List

MODEL : DRL30-1

(1) Measuring Conditions

Mounting Method (Standard Mounting)	Standard Mounting 	
Input Voltage	115VAC	
Output Voltage	12VDC	24VDC
Output Current	2.1A(100%)	1.25A(100%)

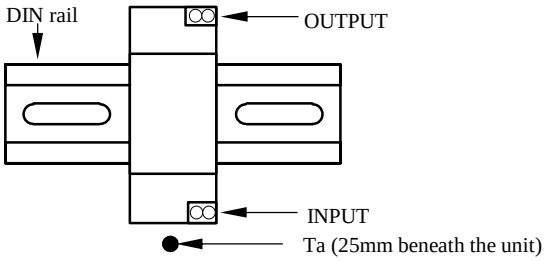
(2) Measuring Results

Output Derating		ΔT Temperature Rise (℃)	
		Io=100 %	
		Ta=55℃	
Location No.	Part name	Standard Mounting	
		12VDC	24VDC
A1	IPD	44.4	56.1
A201	IC	30.6	29.8
C3	E.CAP.	15.1	18.6
C4	E.CAP.	16.2	19.3
C51	E.CAP.	33.3	31.4
C52	E.CAP.	30.6	29.7
C53	E.CAP.	23.4	22.1
D1	BRIDGE DIODE	35.4	45.1
D51	S.B.D / F.R.D	59.1	55.0
L1	BALUN COIL	30.8	39.0
L51	CHOKE COIL	27.4	24.6
PC101	PHOTO COUPLER	30.2	33.9
PC102	PHOTO COUPLER	30.2	33.9
T1	TRANSFORMER	42.4	50.7

3. Main Components Temperature Rise △T List

MODEL : DRL30-1

(1) Measuring Conditions

Mounting Method (Standard Mounting)	Standard Mounting 	
Input Voltage	230VAC	
Output Voltage	12VDC	24VDC
Output Current	2.1A(100%)	1.25A(100%)

(2) Measuring Results

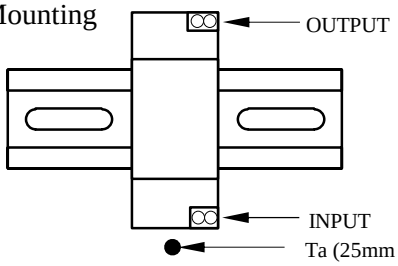
Output Derating		ΔT Temperature Rise (℃)	
		Io=100 %	
		Ta=55℃	
Location No.	Part name	Standard Mounting	
		12VDC	24VDC
A1	IPD	36.7	54.0
A201	IC	29.4	29.3
C3	E.CAP.	12.2	16.1
C4	E.CAP.	13.1	16.8
C51	E.CAP.	31.7	30.4
C52	E.CAP.	27.8	27.4
C53	E.CAP.	20.7	19.7
D1	BRIDGE DIODE	25.1	31.0
D51	S.B.D / F.R.D	57.9	54.5
L1	BALUN COIL	20.8	26.0
L51	CHOKE COIL	25.4	22.9
PC101	PHOTO COUPLER	26.6	31.1
PC102	PHOTO COUPLER	26.6	31.1
T1	TRANSFORMER	40.5	50.5

4. Electrolytic Capacitor Lifetime

MODEL : DRL30-12-1

Cooling condition : Convection cooling

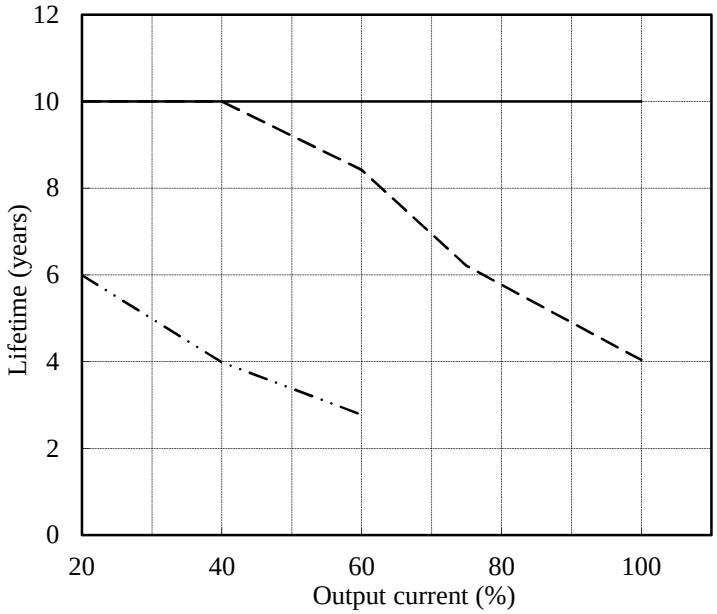
Standard Mounting



Conditions Ta 40℃ : ——
55℃ : – – –
71℃ : —·—

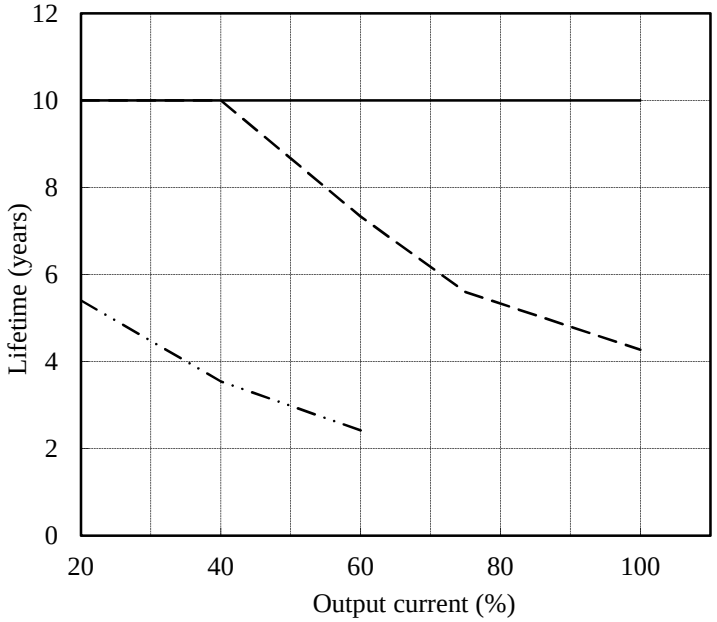
Vin=115VAC

Load (%)	Lifetime (years)		
	Ta= 40℃	Ta= 55℃	Ta= 71℃
20	10.0	10.0	6.0
40	10.0	10.0	4.1
60	10.0	8.3	2.7
75	10.0	6.3	-
100	9.2	3.3	-



Vin=230VAC

Load (%)	Lifetime (years)		
	Ta= 40℃	Ta= 55℃	Ta= 71℃
20	10.0	10.0	5.5
40	10.0	10.0	3.6
60	10.0	7.6	2.5
75	10.0	6.0	-
100	10.0	3.7	-

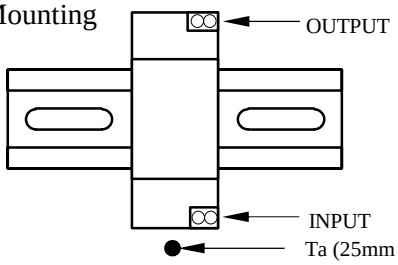


4. Electrolytic Capacitor Lifetime

MODEL : DRL30-24-1

Cooling condition : Convection cooling

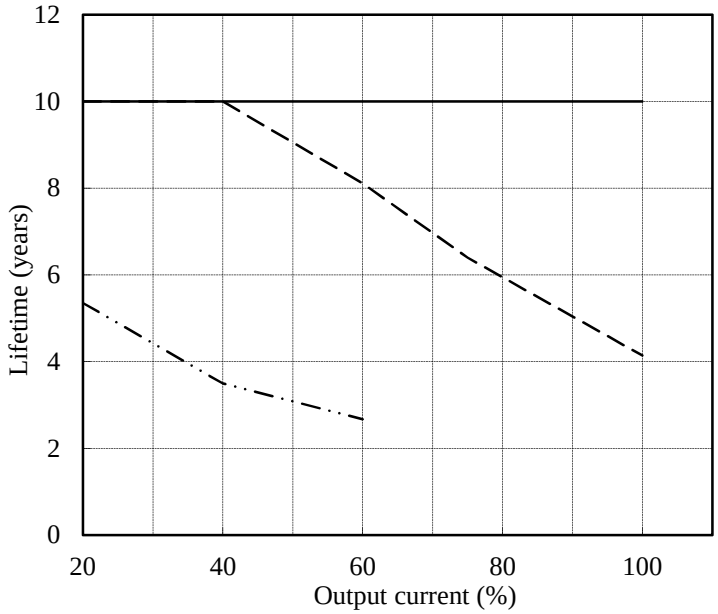
Standard Mounting



Conditions Ta 40℃ : ——
55℃ : – – –
71℃ : —·—

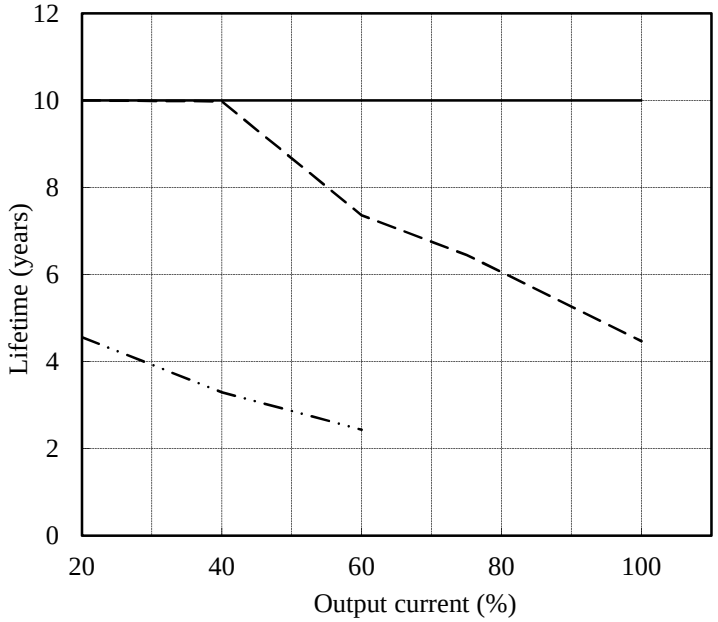
Vin=115VAC

Load (%)	Lifetime (years)		
	Ta= 40℃	Ta= 55℃	Ta= 71℃
20	10.0	10.0	5.3
40	10.0	10.0	4.0
60	10.0	8.6	2.9
75	10.0	6.7	-
100	10.0	3.7	-



Vin=230VAC

Load (%)	Lifetime (years)		
	Ta= 40℃	Ta= 55℃	Ta= 71℃
20	10.0	10.0	4.6
40	10.0	10.0	3.6
60	10.0	8.1	2.7
75	10.0	6.0	-
100	10.0	4.0	-



5. Abnormal Test

MODEL :DRL30-24-1

(1) Test Conditions

Input : 230VAC Output : 24V, 1.25A Ta : 25℃

(2) Test Results

(Da: Damaged)

No.	Test point		Test Mode		Test Results												Note
					a	b	c	d	e	f	g	h	i	j	k	l	
	Location No.	Test point	Short	Open	Fire	Smoke	Burst	Smell	Red Hot	Damaged	Fuse Blown	O.V.P	O.C.P	No Output	No Change	Others	
1	D1	AC-AC	O							O	O			O			Da: F1
2		AC-DC	O							O	O			O			Da: F1,D1
3		DC-DC	O							O	O			O			Da: F1,D1
4		AC		O										O			
5		DC		O										O			
6	D51	A-K	O											O			A1：latched off
7		A/K		O										O			A1：latched off
8	D101	A-K	O											O			A1：latched off
9		A/K		O												O	Effi. Increase
10	D102	A-K	O											O			
11		A/K		O												O	Output hiccup (Pin max 34.47W and Vout max 24.4V)
12	Z101	A-K	O											O			A1：latched off
13		A/K		O											O		
14	Z102	A-K	O												O		
15		A/K		O											O		
16	Z103	A-K	O											O			
17		A/K		O											O		
18	Z104	A-K	O											O			
19		A/K		O											O		
20	Z105	A-K	O												O		
21		A/K		O											O		
22	Z106	A-K	O											O			A1：latched off
23		A/K		O											O		class 2 malfunction
24	Z202	A-K	O									O		O			
25		A/K		O											O		
26	Z203	A-K	O									O		O			
27		A/K		O											O		
28	L1	1-2	O												O		
29		1-3	O							O	O			O			Da: F1
30		1-4	O							O	O			O			Da: F1
31		2-3	O							O	O			O			Da: F1
32		2-4	O							O	O			O			Da: F1
33		3-4	O												O		
34		1/2		O										O			
35		3/4		O										O			

(Da: Damaged)

No.	Test point		Test Mode		Test Results												
					a	b	c	d	e	f	g	h	i	j	k	l	13
	Location No.	Test point	Short	Open	Fire	Smoke	Burst	Smell	Red Hot	Damaged	Fuse Blown	O.V.P	O.C.P	No Output	No Change	Others	Note
36	L51	1-2	O											O			A1：latched off
37		1-3	O											O			A1：latched off
38		1-4	O												O		Vo: 24.025V => 24.032V
39		2-3	O												O		Vo: 24.025V => 24.032V
40		2-4	O											O			A1：latched off
41		3-4	O											O			A1：latched off
42		1/2		O										O			
43		3/4		O										O			
44	Q101	G-D	O												O		OVP and class 2 malfunction
45		G-S	O												O		OVP and class 2 malfunction
46		D-S	O											O			A1：latched off
47		G		O											O		OVP andclass 2 malfunction
48		D		O											O		OVP andclass 2 malfunction
49		S		O											O		OVP andclass 2 malfunction
50	T1	1-2	O							O	O			O			Da: F1,D1
51		1-3	O							O	O			O			Da: F1,D1
52		1-5	O											O			A1：latched off
53		2-3	O													O	Output hiccup (Pin max 20.46W and Vout max 7.0V)
54		2-5	O							O	O			O			Da: F1,D1
55		3-5	O							O	O			O			Da: F1,D1
56		6/7-8/9	O											O			A1：latched off
57		1/5		O										O			
58		2		O										O			
59		3		O										O			
60		6/8		O											O		
61		7/9		O										O			A1：latched off
62	A201	A-K	O													O	Output hiccup (Pin max 6.37W and Vout max 4.0V)
63		A-Ref	O									O		O			A1：latched off
64		K-Ref	O													O	Output hiccup (Pin max 9.42W and Vout max 6.6V)
65		K		O								O		O			A1：latched off
66		A		O								O		O			A1：latched off
67		Ref		O								O		O			A1：latched off
68	PC101	1-2	O									O		O			A1：latched off
69		3-4	O											O			
70		1/2		O								O		O			A1：latched off
71		3/4		O								O		O			A1：latched off

(Da: Damaged)

No.	Test point		Test Mode		Test Results												
					a	b	c	d	e	f	g	h	i	j	k	l	13
	Location No.	Test point	Short	Open	Fire	Smoke	Burst	Smell	Red Hot	Damaged	Fuse Blown	O.V.P	O.C.P	No Output	No Change	Others	Note
72	PC102	1-2	O												O		OVP malfunction
73		3-4	O									O		O			A1：latched off
74		1/2		O											O		OVP malfunction
75		3/4		O											O		OVP malfunction
76	PD201	A-K	O												O		
77		A/K		O								O		O			A1：latched off
78	A1	1-2	O											O		O	Output hiccup (Pin max 5.72W and Vout max 3.6V)
79		1-3	O												O	O	If 1-3 pin short change to open A1 latched off
80		1-4/5	O							O	O			O			Da:F1,D1,A1,Z101,Z102, Z105,Q101,R107
81		1-6	O												O		If 1-3 pin short change to open A1 latched off
82		1-7	O							O				O			Da: A1
83		1-8	O											O			A1：latched off
84		2-3	O											O			
85		2-4/5	O							O	O			O			Da:F1,A1,Z101,Z103,R106 ,R107
86		2-6	O											O			
87		2-7	O									O		O			A1：latched off
88		2-8	O											O			
89		3-4/5	O							O	O			O			Da: F1,D1,A1,Z101
90		3-6	O												O		
91		3-7	O											O			
92		3-8	O											O			A1：latched off
93		4/5-6	O							O	O			O			Da: F1,D1,A1,Z101
94		4/5-7	O							O	O			O			Da: F1,D1,A1,Z104
95		4/5-8	O							O	O			O			Da: F1, D1
96		6-7	O											O			
97		6-8	O											O			A1：latched off
98		7-8	O											O			
99		1		O											O		
100		2		O								O		O			A1：latched off
101		3		O										O			
102		4		O											O		
103		5		O											O		
104		6		O											O		
105		7		O										O			
106		8		O										O			
107	TH1		O													O	Effi. Increase
108				O										O			
109	C1		O							O	O						Da: F1
110				O											O		
111	C2		O												O		
112				O											O		

(Da: Damaged)

No.	Test point		Test Mode		Test Results												
					a	b	c	d	e	f	g	h	i	j	k	l	13
	Location No.	Test point	Short	Open	Fire	Smoke	Burst	Smell	Red Hot	Damaged	Fuse Blown	O.V.P	O.C.P	No Output	No Change	Others	Note
113	C3~4		O							O	O						Da: F1,D1
114				O												O	Effi. Decrease
115	C51~53		O											O			A1：latched off
116				O											O		
117	C101		O											O		O	Output hiccup (Pin max 22.16W and Vout max 2.2V)
118				O												O	Effi. Decrease
119	C102		O											O			A1：latched off
120				O											O		
121	C103		O											O			
122				O											O		
123	C105~106		O											O			
124				O											O		
125	C107~108		O												O		
126				O											O		
127	C111		O												O		OVP and class 2 malfunction
128				O											O		
129	C112		O											O			
130				O											O		
131	C113~114		O												O		
132				O											O		
133	C201		O											O			A1：latched off
134				O												O	Effi. Increase
135	C202		O									O		O			A1：latched off
136				O											O		
137	C203		O											O		O	Output hiccup (Pin max 8.73W and Vout max 7.2V)
138				O												O	Have noise ; Vo: 24.03V => 23.44V
139	C205		O											O		O	Power hiccup (Pin max 8.1W and Vout max 6.2V)
140				O											O		
141	C207~208		O											O			A1：latched off
142				O											O		
143	C210~211		O											O			A1：latched off
144				O											O		
145	C212		O											O			A1：latched off
146				O											O		
147	C216		O											O			A1：latched off
148				O											O		
149	C217		O													O	
150				O											O		

6. Vibration Test

MODEL : DRL30-1

(1) Vibration Test Class

Frequency variable endurance test

(2) Equipment Used

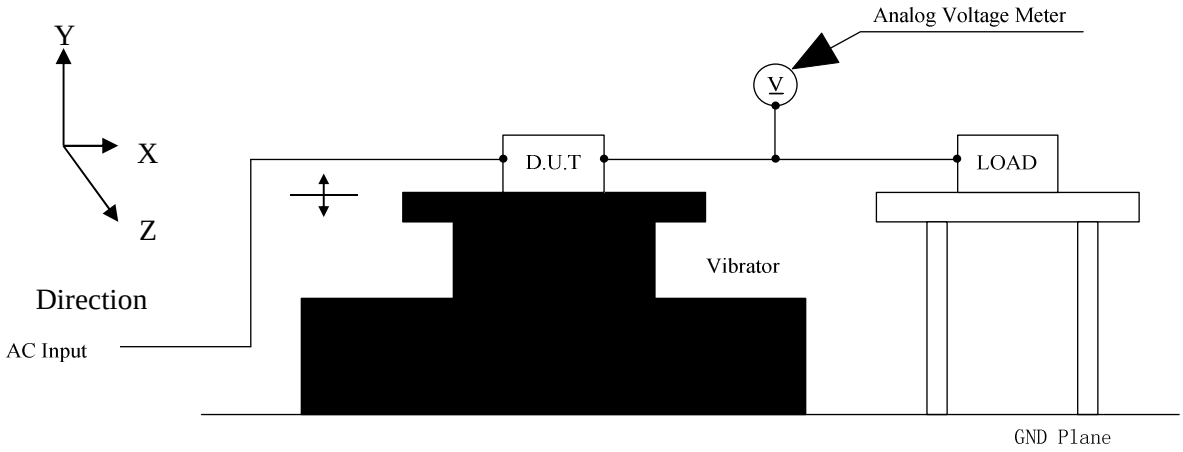
Controller	: ES-30-370 Suzhou Dongling	Vibrator	: ES-30-370 Suzhou Dongling

(3) Test Conditions

D.U.T is fixed on the DIN rail(TS-35) during the vibration test.

Test Spec	: IEC60068-2-6	D.U.T condition	: Operating
Sweep frequency	: 10～500Hz(sine wave)	Direction	: X, Y, Z
Sweep time	: 10.0min per cycle	Sweep count	: 1 hour each
Acceleration	: Constant 19.6m/s^2 (2G)		

(4) Test Method



(5) Judging Conditions

1. Output voltage not to exceed ±5% of initial value during test.
2. Not broken during test, sold pads no change by visual check after test.
3. Characteristic to be within regulation specification after the test.

(6) Test Results

OK

7. Shock Test

MODEL : DRL30-1

(1) Shock Test Class

Refer to IEC 60068-2-27, Half sine wave

(2) Equipment Used

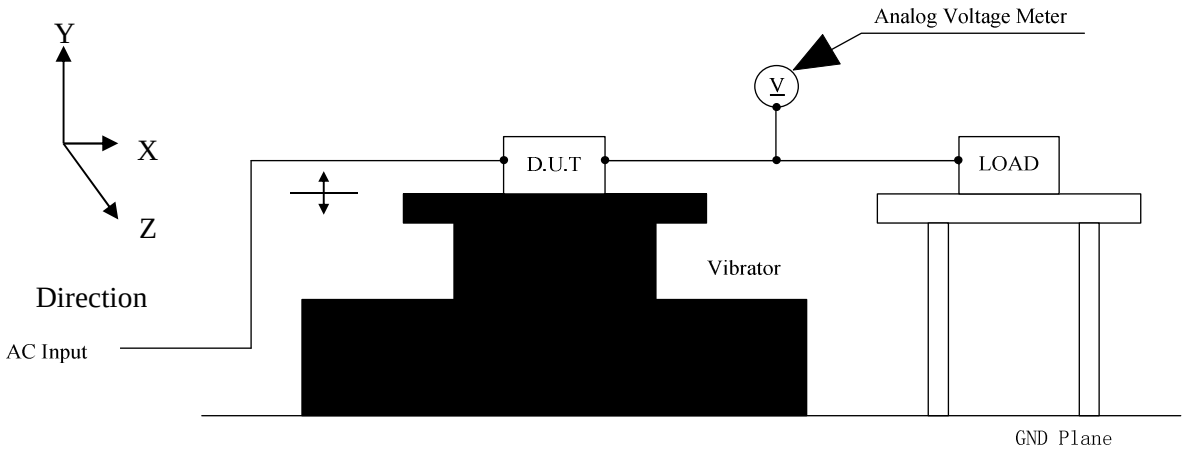
Controller	: ES-30-370 Suzhou Dongling	Vibrator	: ES-30-370 Suzhou Dongling

(3) Test Conditions

D.U.T is fixed on the DIN rail(TS-35) during the shock test.

Test Spec	: IEC60068-2-27	D.U.T condition	: Operating
Waveform	: Half sine wave	Direction	: X, Y, Z
Duration time	: 22ms	Shock times	: 3 shocks each
Acceleration	: Constant 39.2m/s^2 (4G)		

(4) Test Method



(5) Judging Conditions

1. Output voltage not to exceed ±5% of initial value during test.
2. Not broken during test, sold pads no change by visual check after test.
3. Characteristic to be within regulation specification after the test.

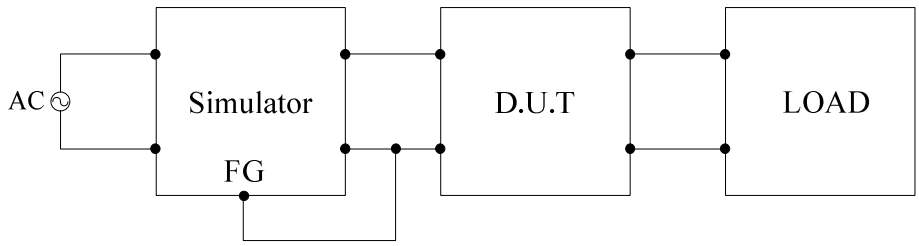
(6) Test Results

OK

8. Noise Simulate Test

MODEL：DRL30-1

(1) Test Circuit and Equipment



Simulator ：INS-400L （Noise Laboratory Co.,LTD）

(2) Test Conditions

Input voltage	: 115, 230VAC	Noise level	: 0～2kV
Output Voltage	: Rated	Phase	: 0～360 deg
Output current	: 0, 100%	Polarity	: ＋,－
Ambient temperature	: 25℃	Mode	: Normal
Pulse width	: 50～1000ns	Trigger select	: Line

(3) Judging Conditions

1. Output voltage not to exceed ±5% of initial value during test.
2. Not broken during test.

(4) Test Results

OK

9. Thermal Shock Test

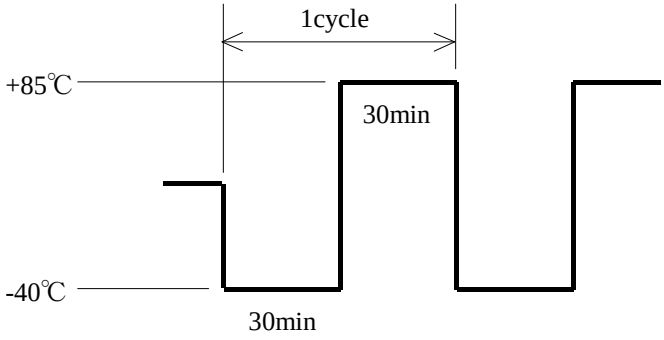
MODEL : DRL30-1

(1) Equipment Used

TSA-101S-W : ESPEC

(2) Test Conditions

Ambient Temperature : -40℃ ⇔ 85℃
Test Time : Refer to Dwg.
Test Cycle : 100 Cycles
Not Operating



(3) 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. 100 cycles later, leave it for 1 hour at the room temperature , then check if there is no abnormal output.

(4) Judging Conditions

1. Not to be broken
2. Characteristic to be within regulation specification after the test.

(5) Test Results

OK

10. Voltage Dips, Short Interruptions Immunity Test (SEMI-F47)

MODEL : DRL30-1

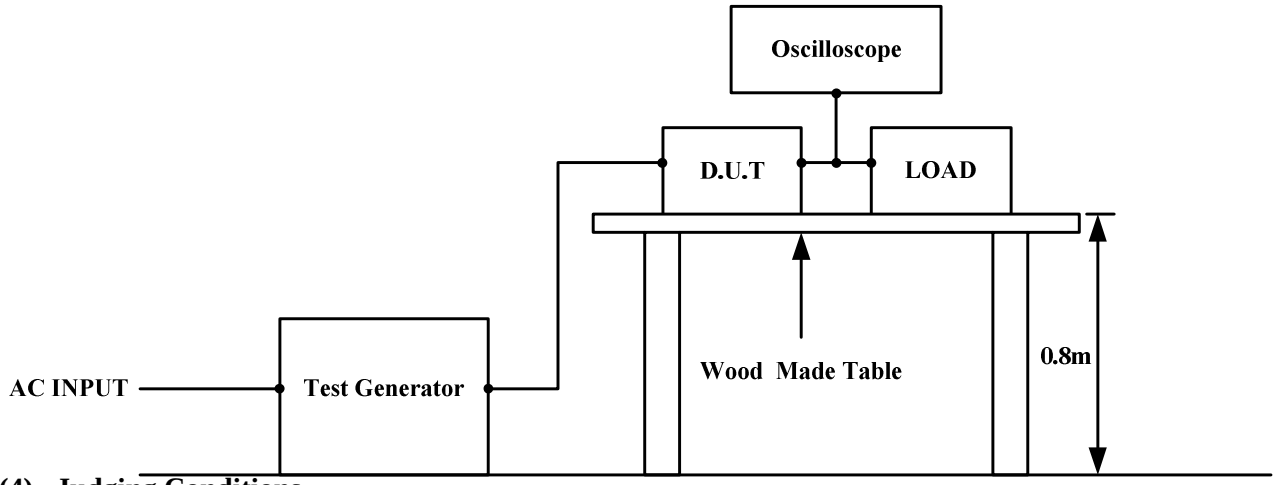
(1) Equipment Used

Test Generator :PCR2000L（KIKUSUI）

(2) Test Conditions

Input Voltage	: 200VAC	Output Voltage	: Rated
Output Current	: 100%	Ambient Temperature	: 25℃
Number of Tests	: 3 times	Test interval	: More than 10 seconds

(3) Test Method and Device Test Point



(4) Judging Conditions

1. Output voltage to be within output voltage regulation specification after the test.
2. Smoke and fire do not occur.

(5) Test Result

Test Level	Dip rate	Continue Time	DRL30-* -1
50%	50%	50~200ms	PASS
70%	30%	200~500ms	PASS
80%	20%	500~1000ms	PASS
50%	50%	1000ms	PASS