DRL10-1

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 : DRL10-24-1

(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.

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

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 ≒ 1607190 (hours)

Vin: 230Vac : MTBF ≒ 1401366 (hours)

2. Components Derating

MODEL : DRL10-1

(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

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: DRL10-12-1

Location No.	Vin = 115VAC Ta = 55℃ Load = 100%(Vo: 12V, Io: 0.84A)		
A1 ICE3A2065ELJ INFINEON	Tch (max) = 150 ℃ Pd = 258.0 mW Tj= Tc+ ((θj-a)× Pd) =89.7℃ D.F. = 59.81%	θj-a = 6.64 ℃/W ΔTc= 33.0℃	Pd (max) = 17 W Tc= 88.0 ℃
A201 TL432AIPK TI	Tj (max) = 150 ℃ Pd = 19.0 mW Tj= Tc+ ((θj-a)× Pd) =79.4℃ D.F. = 52.91%	θj-c = 9.0 ℃/W ΔTc= 24.2℃	 Tc= 79.2 ℃
D1 DF06M LITE ON	Tj (max) = 150 ℃ Pd = 0.3 W Tj= Tc+ ((θj-l)× Pd) =81.0℃ D.F. = 54.%	θj-l = 15.0 ℃/W ΔTc= 21.5℃	 Tc= 76.5 ℃
D201 / D202 RF201L2S TE25 ROHM	Tj (max) = 150 ℃ Pd = 0.6 W Tj= Tc+ ((θj-c)× Pd) =120.1℃ D.F. = 80.07%	θj-c = 30.0 ℃/W ΔTc= 47.1℃	 Tc= 102.1 ℃
D102 D1F60-5053 SHINDENGEN	Tj (max) = 150 ℃ Pd = 38.5 mW Tj= Tl+ ((θj-l)× Pd) =82.6℃ D.F. = 55.06%	θj-l = 23.0 ℃/W ΔTl= 26.7℃	 Tl= 81.7 ℃
D103 CRH01(TE85L,Q) TOSHIBA	Tj (max) = 150 ℃ Pd = 4.2 mW Tj= Tc+ ((θj-a)× Pd) =78.9℃ D.F. = 52.63%	θj-a = 130.0 ℃/W ΔTc= 23.4℃	 Tc= 78.4 ℃
PC101 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 2.6 mW Tj= Tc+ ((θj-a)× Pd) =83.7℃ D.F. = 66.99%	θj-a = 666.7 ℃/W ΔTc= 27.0℃	Pd (max) = 150.0 mW Tc= 82.0 ℃
PC101 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.4 mW Tj= Tc+ ((θj-a)× Pd) =82.1℃ D.F. = 65.71%	θj-a = 333.3 ℃/W ΔTc= 27.0℃	Pd (max) = 100.0 mW Tc= 82.0 ℃
PC102 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =84.8℃ D.F. = 67.84%	θj-a = 666.7 ℃/W ΔTc= 29.8℃	Pd (max) = 150.0 mW Tc= 84.8 ℃
PC102 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =84.8℃ D.F. = 67.84%	θj-a = 333.3 ℃/W ΔTc= 29.8℃	Pd (max) = 100.0 mW Tc= 84.8 ℃

(2) Component Derating List

Model: DRL10-12-1

Location No.	Vin = 230VAC Ta = 55℃ Load = 100%(Vo: 12V, Io: 0.84A)		
A1 ICE3A2065ELJ INFINEON	Tch (max) = 150 ℃ Pd = 540.0 mW Tj= Tc+ ((θj-a)× Pd) =99.1℃ D.F. = 66.06%	θj-a = 6.64 ℃/W ΔTc= 40.5℃	Pd (max) = 17 W Tc= 95.5 ℃
A201 TL432AIPK TI	Tj (max) = 150 ℃ Pd = 19.0 mW Tj= Tc+ ((θj-a)× Pd) =80.6℃ D.F. = 53.71%	θj-c = 9.0 ℃/W ΔTc= 25.4℃	 Tc= 80.4 ℃
D1 DF06M LITE ON	Tj (max) = 150 ℃ Pd = 0.2 W Tj= Tc+ ((θj-l)× Pd) =73.9℃ D.F. = 49.27%	θj-l = 15.0 ℃/W ΔTc= 15.9℃	 Tc= 70.9 ℃
D201 / D202 RF201L2S TE25 ROHM	Tj (max) = 150 ℃ Pd = 0.6 W Tj= Tc+ ((θj-c)× Pd) =123.3℃ D.F. = 82.2%	θj-c = 30.0 ℃/W ΔTc= 50.3℃	 Tc= 105.3 ℃
D102 D1F60-5053 SHINDENGEN	Tj (max) = 150 ℃ Pd = 30.8 mW Tj= Tl+ ((θj-l)× Pd) =83.9℃ D.F. = 55.94%	θj-l = 23.0 ℃/W ΔTl= 28.2℃	 Tl= 83.2 ℃
D103 CRH01(TE85L,Q) TOSHIBA	Tj (max) = 150 ℃ Pd = 4.1 mW Tj= Tc+ ((θj-a)× Pd) =80.2℃ D.F. = 53.49%	θj-a = 130.0 ℃/W ΔTc= 24.7℃	 Tc= 79.7 ℃
PC101 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 2.6 mW Tj= Tc+ ((θj-a)× Pd) =85.3℃ D.F. = 68.27%	θj-a = 666.7 ℃/W ΔTc= 28.6℃	Pd (max) = 150.0 mW Tc= 83.6 ℃
PC101 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.4 mW Tj= Tc+ ((θj-a)× Pd) =83.7℃ D.F. = 66.99%	θj-a = 333.3 ℃/W ΔTc= 28.6℃	Pd (max) = 100.0 mW Tc= 83.6 ℃
PC102 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =86.7℃ D.F. = 69.36%	θj-a = 666.7 ℃/W ΔTc= 31.7℃	Pd (max) = 150.0 mW Tc= 86.7 ℃
PC102 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =86.7℃ D.F. = 69.36%	θj-a = 333.3 ℃/W ΔTc= 31.7℃	Pd (max) = 100.0 mW Tc= 86.7 ℃

(2) Component Derating List

Model: DRL10-24-1

Location No.	Vin = 115VAC Ta = 55℃ Load = 100%(Vo: 24V, Io: 0.42A)		
A1 ICE3A2065ELJ INFINEON	Tch (max) = 150 ℃ Pd = 230.0 mW Tj= Tc+ ((θj-a)× Pd) =112.6℃ D.F. = 75.07%	θj-a = 120.0 ℃/W ΔTc= 30.0℃	Pd (max) = 17 W Tc= 85.0 ℃
A201 TL432AIPK TI	Tj (max) = 150 ℃ Pd = 33.27 mW Tj= Tc+ ((θj-a)× Pd) =69.4℃ D.F. = 46.27%	θj-c = 9.0 ℃/W ΔTc= 14.1℃	 Tc= 69.1 ℃
D1 DF06M LITE ON	Tj (max) = 150 ℃ Pd = 0.3 W Tj= Tc+ ((θj-l)× Pd) =77.3℃ D.F. = 51.53%	θj-l = 15.0 ℃/W ΔTc= 17.8℃	 Tc= 72.8 ℃
D201 / D202 RF201L2S TE25 ROHM	Tj (max) = 150 ℃ Pd = 0.7 W Tj= Tc+ ((θj-c)× Pd) =103.0℃ D.F. = 68.67%	θj-c = 30.0 ℃/W ΔTc= 27.0℃	 Tc= 82.0 ℃
D102 D1F60-5053 SHINDENGEN	Tj (max) = 150 ℃ Pd = 40.0 mW Tj= Tl+ ((θj-l)× Pd) =76.9℃ D.F. = 51.28%	θj-l = 23.0 ℃/W ΔTl= 21.0℃	 Tl= 76.0 ℃
D103 CRH01(TE85L,Q) TOSHIBA	Tj (max) = 150 ℃ Pd = 25.186 mW Tj= Tc+ ((θj-a)× Pd) =76.6℃ D.F. = 51.05%	θj-a = 130.0 ℃/W ΔTc= 18.3℃	 Tc= 73.3 ℃
PC101 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 2.88 mW Tj= Tc+ ((θj-a)× Pd) =73.9℃ D.F. = 59.14%	θj-a = 666.7 ℃/W ΔTc= 17.0℃	Pd (max) = 150.0 mW Tc= 72.0 ℃
PC101 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 5.21 mW Tj= Tc+ ((θj-a)× Pd) =73.7℃ D.F. = 58.99%	θj-a = 333.3 ℃/W ΔTc= 17.0℃	Pd (max) = 100.0 mW Tc= 72.0 ℃
PC102 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =72.4℃ D.F. = 57.92%	θj-a = 666.7 ℃/W ΔTc= 17.4℃	Pd (max) = 150.0 mW Tc= 72.4 ℃
PC102 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =72.4℃ D.F. = 57.92%	θj-a = 333.3 ℃/W ΔTc= 17.4℃	Pd (max) = 100.0 mW Tc= 72.4 ℃

(2) Component Derating List

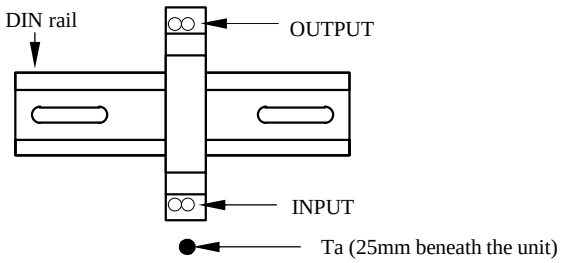
Model: DRL10-24-1

Location No.	Vin = 230VAC Ta = 55℃ Load = 100%(Vo: 24V, Io: 0.42A)		
A1 ICE3A2065ELJ INFINEON	Tch (max) = 150 ℃ Pd = 510.0 mW Tj= Tc+ ((θj-a)× Pd) =157.0℃ D.F. = 104.67%	θj-a = 120.0 ℃/W ΔTc= 40.8℃	Pd (max) = 17 W Tc= 95.8 ℃
A201 TL432AIPK TI	Tj (max) = 150 ℃ Pd = 33.27 mW Tj= Tc+ ((θj-a)× Pd) =70.7℃ D.F. = 47.13%	θj-c = 9.0 ℃/W ΔTc= 15.4℃	 Tc= 70.4 ℃
D1 DF06M LITE ON	Tj (max) = 150 ℃ Pd = 0.2 W Tj= Tc+ ((θj-l)× Pd) =71.0℃ D.F. = 47.33%	θj-l = 15.0 ℃/W ΔTc= 13.0℃	 Tc= 68.0 ℃
D201 / D202 RF201L2S TE25 ROHM	Tj (max) = 150 ℃ Pd = 0.7 W Tj= Tc+ ((θj-c)× Pd) =105.4℃ D.F. = 70.27%	θj-c = 30.0 ℃/W ΔTc= 29.4℃	 Tc= 84.4 ℃
D102 D1F60-5053 SHINDENGEN	Tj (max) = 150 ℃ Pd = 40.0 mW Tj= Tl+ ((θj-l)× Pd) =79.4℃ D.F. = 52.95%	θj-l = 23.0 ℃/W ΔTl= 23.5℃	 Tl= 78.5 ℃
D103 CRH01(TE85L,Q) TOSHIBA	Tj (max) = 150 ℃ Pd = 28.03 mW Tj= Tc+ ((θj-a)× Pd) =78.1℃ D.F. = 52.1%	θj-a = 130.0 ℃/W ΔTc= 19.5℃	 Tc= 74.5 ℃
PC101 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 2.88 mW Tj= Tc+ ((θj-a)× Pd) =76.1℃ D.F. = 60.9%	θj-a = 666.7 ℃/W ΔTc= 19.2℃	Pd (max) = 150.0 mW Tc= 74.2 ℃
PC101 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 5.21 mW Tj= Tc+ ((θj-a)× Pd) =75.9℃ D.F. = 60.75%	θj-a = 333.3 ℃/W ΔTc= 19.2℃	Pd (max) = 100.0 mW Tc= 74.2 ℃
PC102 TLP291(GR,SE (TRANSISTOR) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =74.6℃ D.F. = 59.68%	θj-a = 666.7 ℃/W ΔTc= 19.6℃	Pd (max) = 150.0 mW Tc= 74.6 ℃
PC102 TLP291(GR,SE (LED) TOSHIBA	Tj (max) = 125 ℃ Pd = 0.0 mW Tj= Tc+ ((θj-a)× Pd) =74.6℃ D.F. = 59.68%	θj-a = 333.3 ℃/W ΔTc= 19.6℃	Pd (max) = 100.0 mW Tc= 74.6 ℃

3. Main Components Temperature Rise △T List

MODEL : DRL10-1

(1) Measuring Conditions

Mounting Method (Standard Mounting)	Standard Mounting 	
Input voltage (Vin)	115VAC	
Output voltage (Vo)	12VDC	24VDC
Output current (Io)	0.84A(100%)	0.42A(100%)

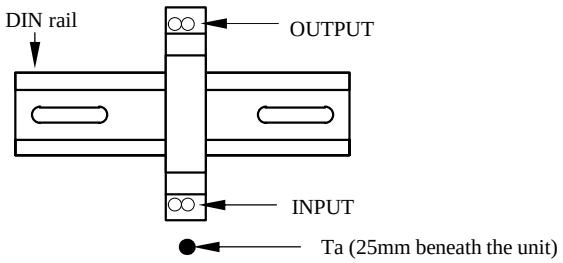
(2) Measuring Results

Output Derating		ΔT Temperature Rise (℃) Io=100 % Ta=55℃	
Location No.	Part name	Standard Mounting	
		12VDC	24VDC
A1	IPD	33.0	30.0
A201	IC	24.2	14.1
C2	E.CAP.	24.7	18.2
C51	E.CAP.	25.6	15.6
D1	BRIDGE DIODE	21.5	17.8
D202	F.R.D	47.1	27.0
L1	BALUN COIL	22.9	20.1
L52	CHOKE COIL	26.6	15.9
PC101	PHOTO COUPLER	27.0	17.0
PC102	PHOTO COUPLER	29.8	17.4
T1	TRANSFORMER	31.4	23.8

3. Main Components Temperature Rise △T List

MODEL : DRL10-1

(1) Measuring Conditions

Mounting Method (Standard Mounting)	Standard Mounting 	
Input voltage (Vin)	230VAC	
Output voltage (Vo)	12VDC	24VDC
Output current (Io)	0.84A(100%)	0.42A(100%)

(2) Measuring Results

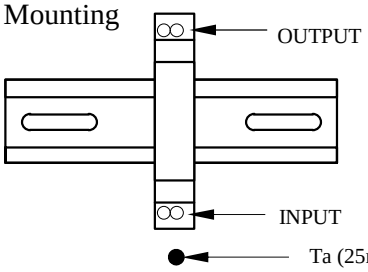
Output Derating		ΔT Temperature Rise (℃) Io=100 % Ta=55℃	
Location No.	Part name	Standard Mounting	
		12VDC	24VDC
A1	IPD	40.5	40.8
A201	IC	25.4	15.4
C2	E.CAP.	26.5	18.3
C51	E.CAP.	27.0	17.9
D1	BRIDGE DIODE	15.9	13.0
D202	F.R.D	50.3	29.4
L1	BALUN COIL	15.6	12.9
L52	CHOKE COIL	28.1	17.9
PC101	PHOTO COUPLER	28.6	19.2
PC102	PHOTO COUPLER	31.7	19.6
T1	TRANSFORMER	33.7	27.0

4. Electrolytic Capacitor Lifetime

MODEL : DRL10-12-1

Cooling condition : Convection cooling

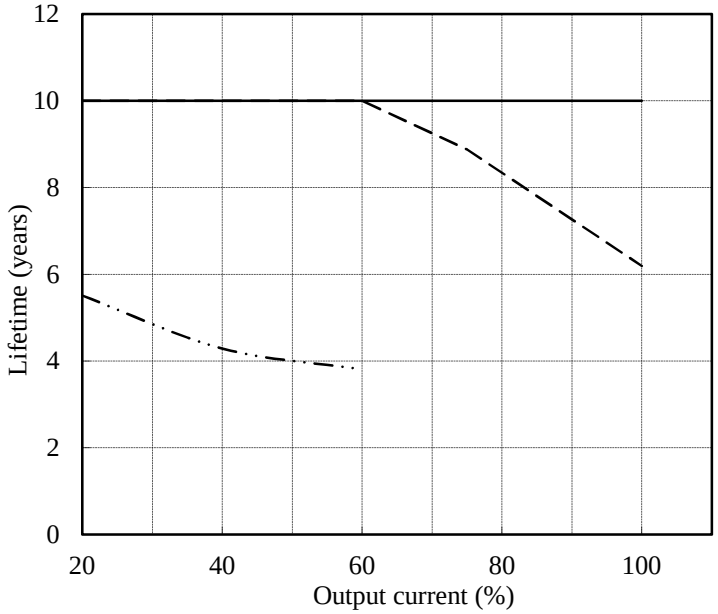
Standard Mounting



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

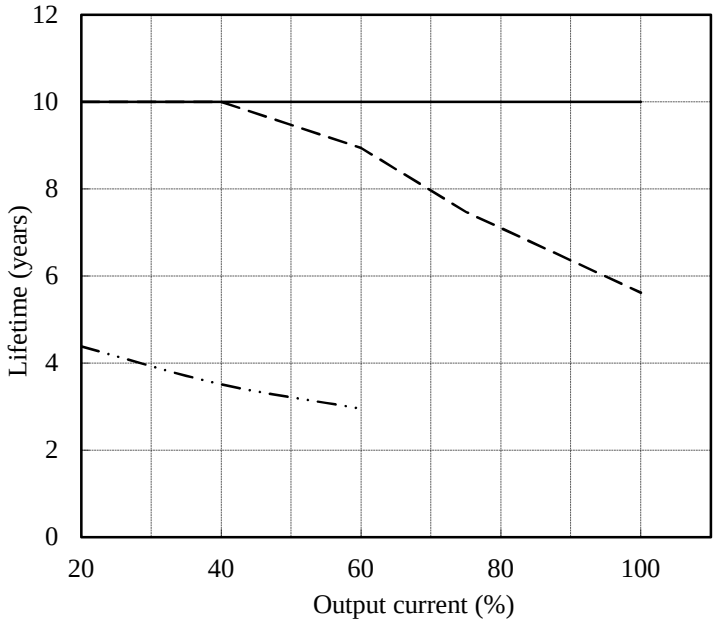
Vin=115VAC

Load (%)	Lifetime (years)		
	Ta= 40℃	Ta= 55℃	Ta= 71℃
20	10.0	10.0	5.5
40	10.0	10.0	4.3
60	10.0	10.0	3.8
75	10.0	8.9	-
100	10.0	6.2	-



Vin=230VAC

Load (%)	Lifetime (years)		
	Ta= 40℃	Ta= 55℃	Ta= 71℃
20	10.0	10.0	4.4
40	10.0	10.0	3.5
60	10.0	8.9	3.0
75	10.0	7.5	-
100	10.0	5.6	-

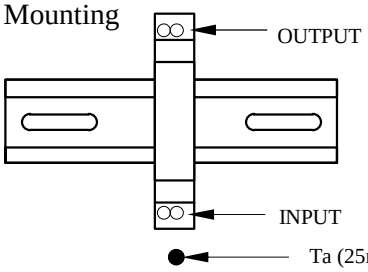


4. Electrolytic Capacitor Lifetime

MODEL : DRL10-24-1

Cooling condition : Convection cooling

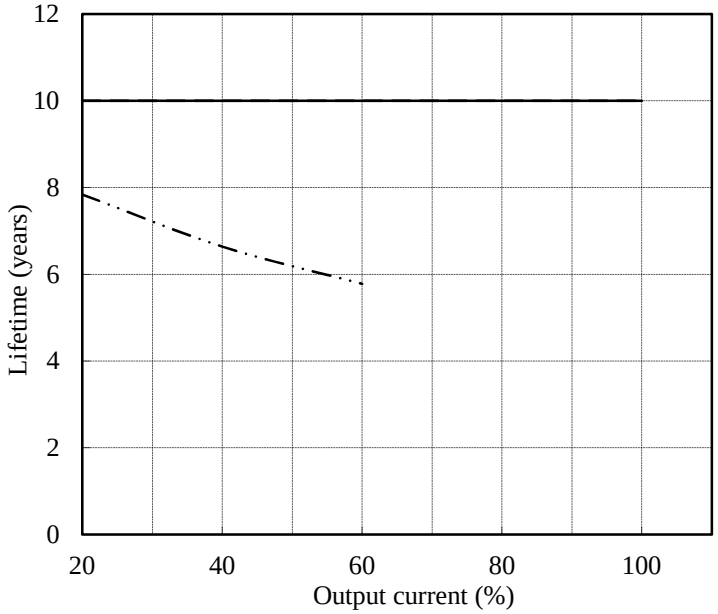
Standard Mounting



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

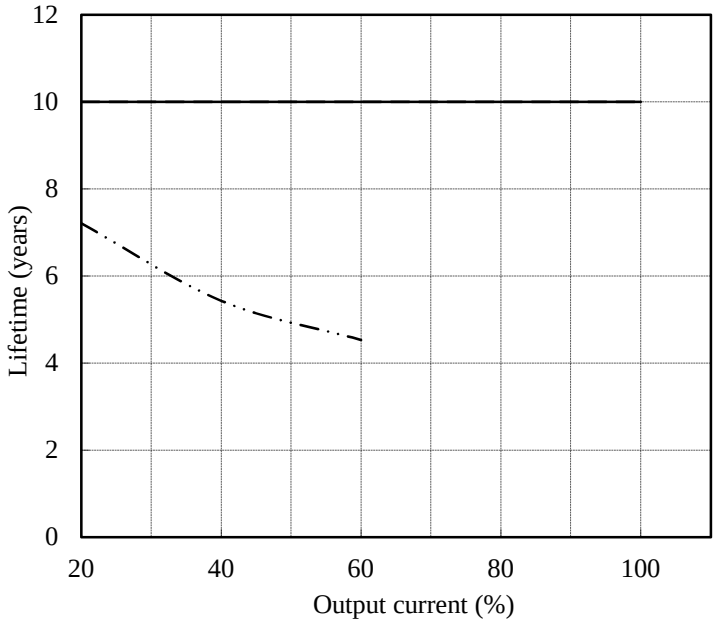
Vin=115VAC

Load (%)	Lifetime (years)		
	Ta= 40℃	Ta= 55℃	Ta= 71℃
20	10.0	10.0	7.8
40	10.0	10.0	6.6
60	10.0	10.0	5.8
75	10.0	10.0	-
100	10.0	10.0	-



Vin=230VAC

Load (%)	Lifetime (years)		
	Ta= 40℃	Ta= 55℃	Ta= 71℃
20	10.0	10.0	7.2
40	10.0	10.0	5.4
60	10.0	10.0	4.5
75	10.0	10.0	-
100	10.0	10.0	-



5. Abnormal Test

MODEL : DRL10-24-1

(1) Test Conditions

Vin : 230VAC Output: 24V , 0.42A Ta : 25℃

(2) Test Results

(Da: Damaged)

No.	Test point		Test Mode		Test Results													
					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	Note	
1	D1	AC-AC	○							○	○			○			Da:F1	
2		AC-DC	○							○	○			○			Da:F1	
3		DC-DC	○							○	○			○			Da:F1	
4		AC		○										○				
5		DC		○										○				
6	D201	A-K	○											○			A1：latched off	
7		A/K		○										○			A1：latched off	
8	D102	A-K	○											○			A1：latched off	
9		A/K		○											○			
10	D103	A-K	○											○			A1：latched off	
11		A/K		○										○			Power hiccup	
12	Z101	A-K	○											○			A1：latched off	
13		A/K		○											○			
14	Z102	A-K	○												○			
15		A/K		○											○			
16	Z103	A-K	○											○			A1：latched off	
17		A/K		○											○			
18	Z104	A-K	○												○			
19		A/K		○											○			
20	Z105	A-K	○											○			A1：latched off	
21		A/K		○											○			
22	Z106	A-K	○											○			A1：latched off	
23		A/K		○											○			
24	Z203	A-K	○											○			A1：latched off	
25		A/K		○														
26	Z204	A-K	○											○			A1：latched off	
27		A/K		○											○			
28	L52	1-2	○												○			
29		1		○										○			A1：latched off	
30		2		○										○				
31	PC101	1-2	○									○		○			A1：latched off	
32		3-4	○											○				
33		1/2		○								○		○			A1：latched off	
34		3/4		○								○		○			A1：latched off	
35	PC102	1-2	○												○		OVP malfunction	
36		3-4	○									○		○			A1：latched off	
37		1/2		○											○		OVP malfunction	
38		3/4		○											○		OVP malfunction	
39	PD201	A-K	○												○			
40		A/K		○										○			A1：latched off	

(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	
41	mosfet	G-S	○												○		
42		S-D	○											○			A1：latched off
43		D-G	○												○		
44		G		○											○		
45		D		○											○		
46		S		○											○		
47	T1	1-2	○											○		○	A1：latched off
48		2-4	○								○			○			
49		1-3	○							○	○			○		○	Da:F1,Q101
50		7-9	○											○		○	A1：latched off
51		1		○										○		○	Power hiccup
52		2		○						○				○		○	Da:D103 A1：latched off
53		3		○										○			
54		4		○										○			
55		7/9		○										○		○	A1：latched off
56	A1	1-2	○											○			A1：latched off
57		1-3	○											○			A1：latched off
58		1-4/5	○							○	○			○		○	Da:F1,A1,Z101,Z102,Z104,R107
59		1-6	○												○		
60		1-7	○							○				○			Da:A1
61		1-8	○											○			A1：latched off
62		2-3	○											○			
63		2-4/5	○							○	○			○		○	Da:F1,A1,Z101,Z102,Z104,R106
64		2-6	○												○		
65		2-7	○											○			
66		2-8	○											○			
67		3-4/5	○							○	○			○			Da:F1,A1,Z101
68		3-6	○												○		
69		3-7	○											○			
70		3-8	○												○		A1：latched off
71		4/5-6	○												○		
72		4/5-7	○							○	○			○		○	Da:F1,A1,Z103
73		4/5-8	○							○	○			○		○	Da:F1,A1
74		6-7	○												○		
75		6-8	○												○		
76		7-8	○											○			Power hiccup
77		1		○											○		
78		2		○										○			
79		3		○										○			A1：latched off
80		4		○											○		
81		5		○											○		
82		6		○											○		
83		7		○										○			Power hiccup
84		8		○										○			Power hiccup

(Da: Damaged)

No.	Test point		Test Mode		Test Results												Note
	Location No.	Test point	Short	Open	a Fire	b Smoke	c Burst	d Smell	e Red Hot	f Damaged	g Fuse Blown	h O.V.P	i O.C.P	j No Output	k No Change	l Others	
85	A201	A-K	○													○	Vo hiccup
86		A-Ref	○									○		○			
87		K-Ref	○													○	Vo hiccup
88		K		○								○		○			
89		A		○								○		○			
90		Ref		○								○		○			
91	C1		○							○	○					○	Da:F1
92				○											○		
93	C2		○							○	○			○			Da:F1
94				○												○	Effi. Descrease
95	C3		○												○		
96				○											○		
97	C51		○										○	○			
98				○											○		
99	C101		○											○		○	A1：latched off
100				○											○		
101	C109		○											○		○	A1：latched off
102				○											○		
103	C110		○											○			A1：latched off
104				○											○		
105	C104/C105 /C106		○											○			
106				○											○		
107	C107		○									○		○			
108				○											○		
109	C201		○											○			A1：latched off
110				○												○	Effi. Increase
111	C204		○									○		○			
112				○											○		
113	C203		○											○		○	Power hiccup
114				○												○	Have noise ; Vout drop and Effi. descrease
115	C205		○											○		○	Power hiccup
116				○											○		
117	C207/C208 /C209		○										○	○			
118				○											○		
119	C210		○										○	○			
120				○											○		

(Da: Damaged)

No.	Test point		Test Mode		Test Results												Note
	Location No.	Test point	Short	Open	a Fire	b Smoke	c Burst	d Smell	e Red Hot	f Damaged	g Fuse Blown	h O.V.P	i O.C.P	j No Output	k No Change	l Others	
121	TH1		○												○		
122				○											○		
123	R101/R102 /R103		○												○		
124				○											○		
125	R104/R105		○												○		
126				○											○		
127	R106		○												○	○	power supply have noise
128				○											○	○	
129	R107		○												○	○	power supply have noise
130				○											○	○	
131	R108		○												○		
132				○												○	Power hiccup
133	R113		○												○		
134				○											○		OVP and class 2 protection
135	R112		○												○		OVP and class 2 protection
136				○											○		
137	R201/R202		○												○		
138				○												○	Effi. Descrease
139	R203		○												○		
140				○								○		○			A1：latched off
141	R204		○												○		
142				○								○		○			A1：latched off
143	R205		○									○		○			A1：latched off
144				○											○		
145	R206		○									○		○			A1：latched off
146				○												○	Vo drop
147	R207		○												○		
148				○												○	Have noise;Vout drop and Effi.descrease
149	R208		○												○		
150				○											○		OVP malfunction
151	R209		○									○		○			A1：latched off
152				○												○	Vo drop
153	R211		○									○		○			A1：latched off
154				○								○		○			A1：latched off
155	R212		○									○		○			A1：latched off
156				○								○		○			A1：latched off

6. Vibration Test

MODEL：DRL10-1

(1) Vibration Test Class

Frequency variable endurance test

(2) Equipment Used

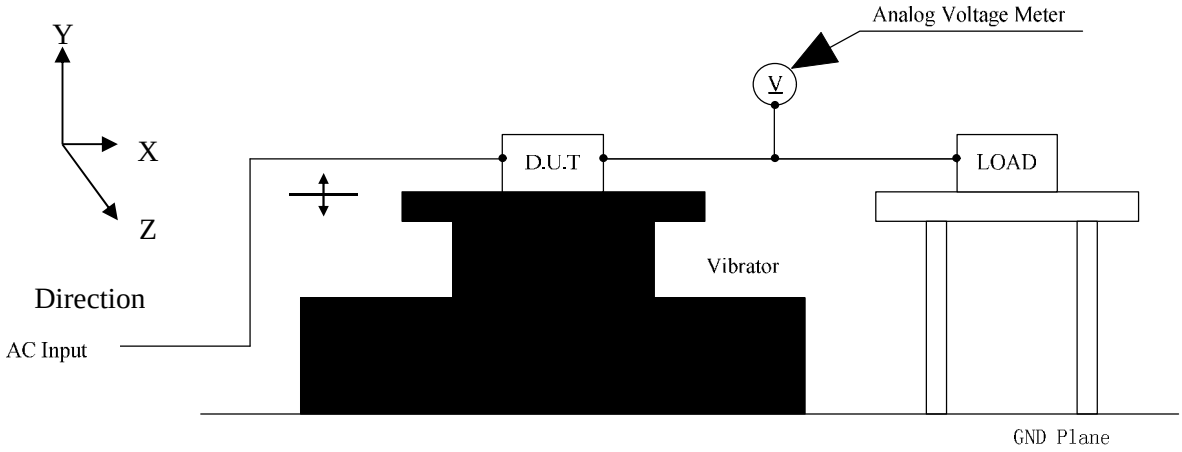
Controller	: ES-30-370 Suzhou Dongling	Vibrator	: ES-30-370 Suzhou Dongling

(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 : DRL10-1

(1) Shock Test Class

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

(2) Equipment Used

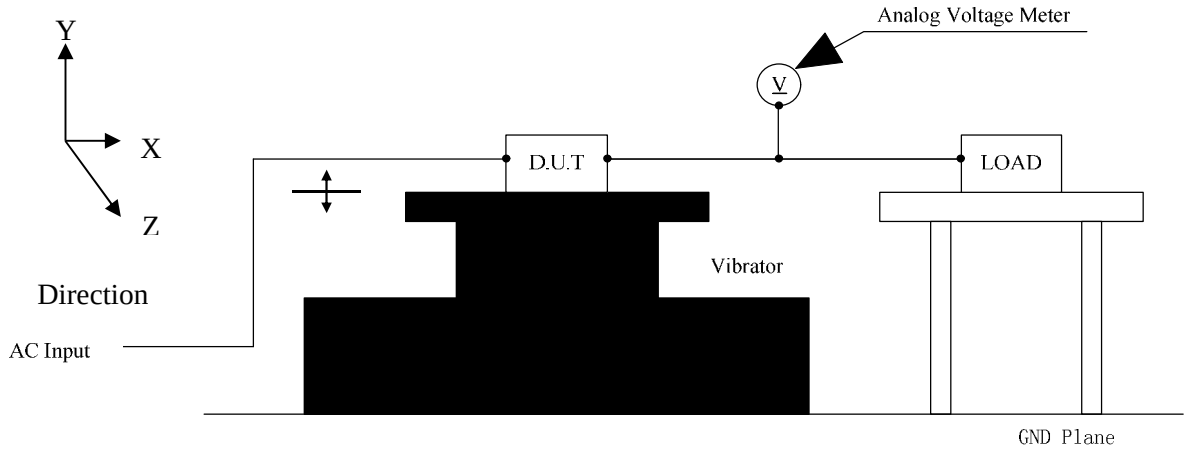
Controller	: ES-30-370 Suzhou Dongling	Vibrator	: ES-30-370 Suzhou Dongling

(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.

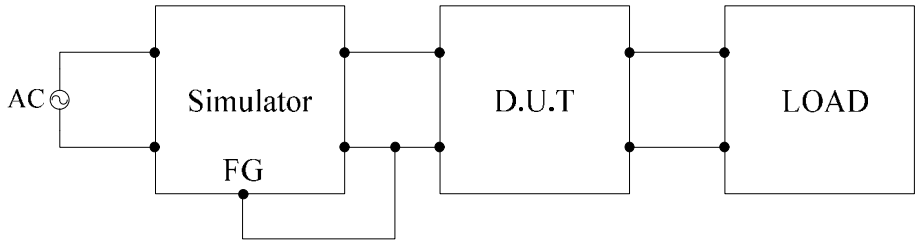
(6) Test Results

OK

8. Noise Simulate Test

MODEL：DRL10-1

(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

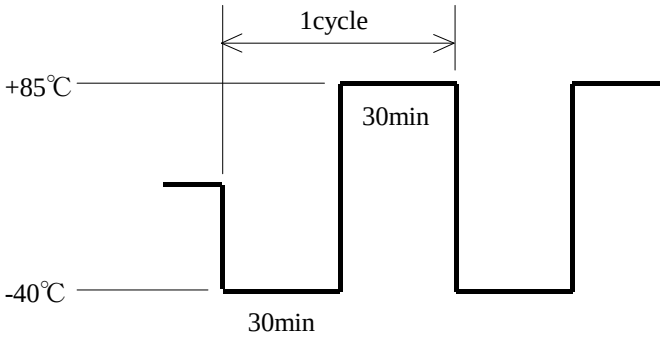
MODEL : DRL10-1

(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 : DRL10-1

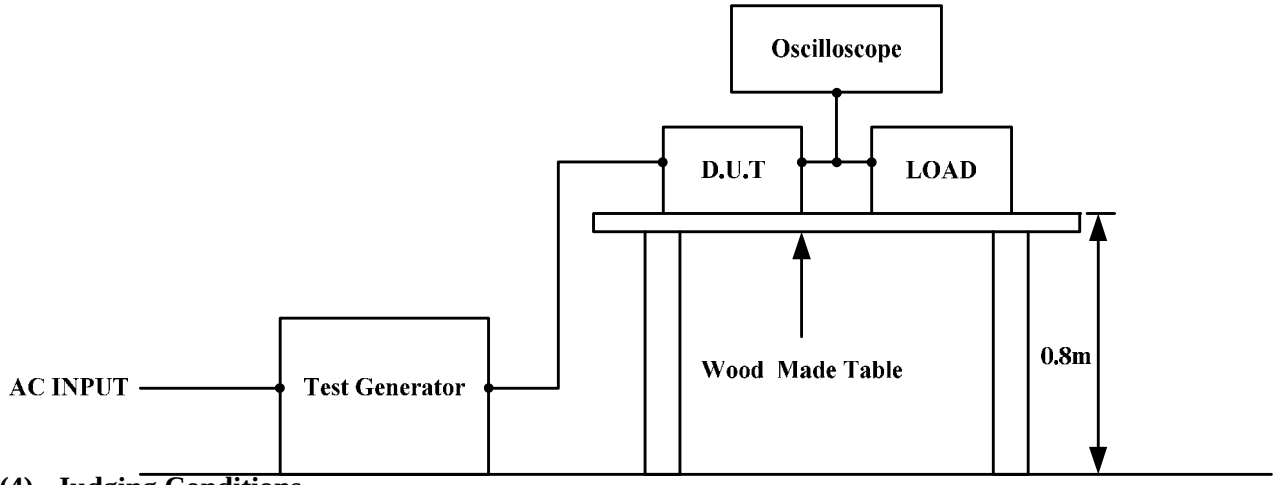
(1) Equipment Used

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	DRL10-* -1
50%	50%	50~200ms	PASS
70%	30%	200~500ms	PASS
80%	20%	500~1000ms	PASS
50%	50%	1000ms	PASS