DRL10-1

RELIABILITY DATA

INDEX

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

TDK-Lambda

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)

TDK-Lambda

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

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

   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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tl= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tl= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tl= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tl= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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 △Tc= 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%)
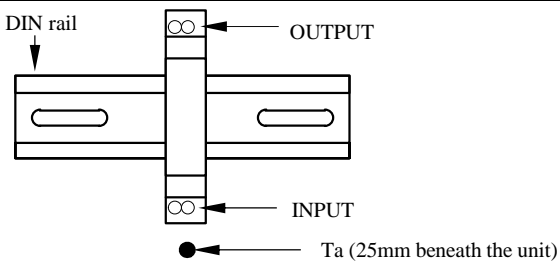
(2) Measuring Results

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

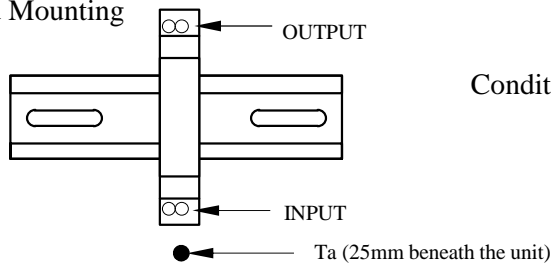| Mounting Method (Standard Mounting)	Standard Mounting
Input voltage (Vin)	230VAC
Output voltage (Vo)	12VDC	24VDC
Output current (Io)	0.84A(100%)	0.42A(100%)

(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

TDK-Lambda

4. Electrolytic Capacitor Lifetime

MODEL : DRL10-12-1

Cooling condition : Convection cooling

Standard Mounting

OUTPUT

INPUT

Ta (25mm beneath the unit)

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	-
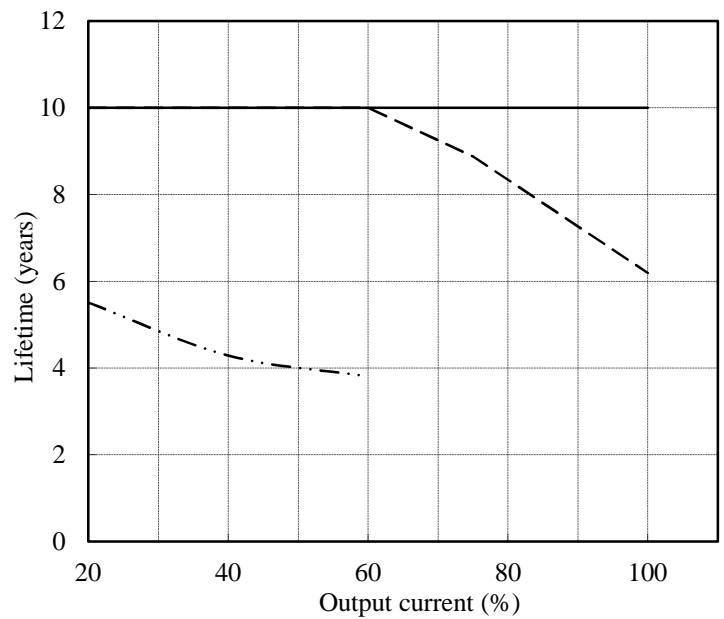
Vin=230VAC

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	-

TDK-Lambda
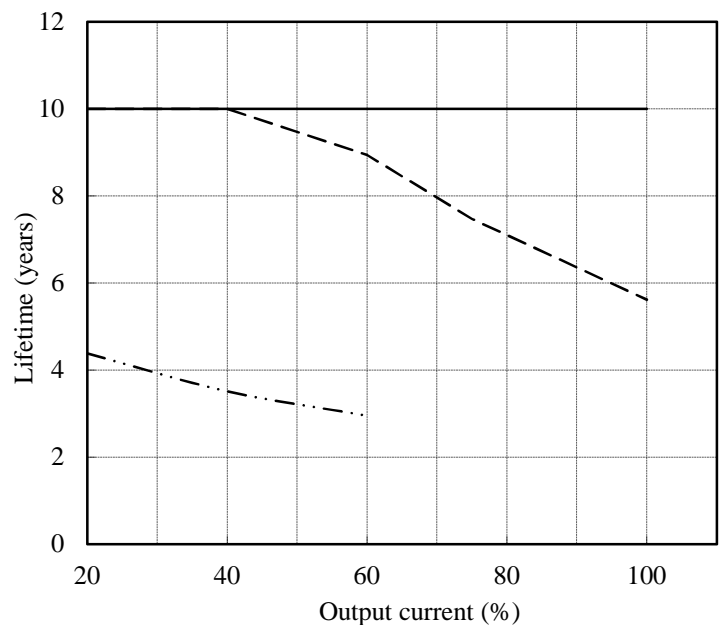
4. Electrolytic Capacitor Lifetime

MODEL : DRL10-24-1

Cooling condition : Convection cooling

Standard Mounting

OUTPUT

INPUT

Ta (25mm beneath the unit)

Conditions   Ta   40℃ : ——
                            55℃ : ― ― ―
                            71℃ : ―‥―
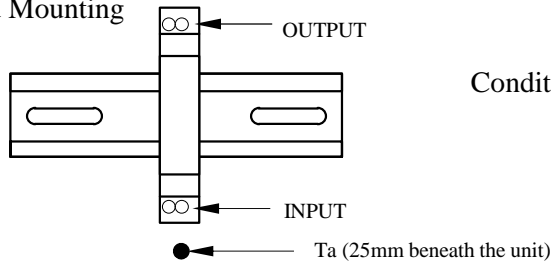
Vin=115VAC

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	-
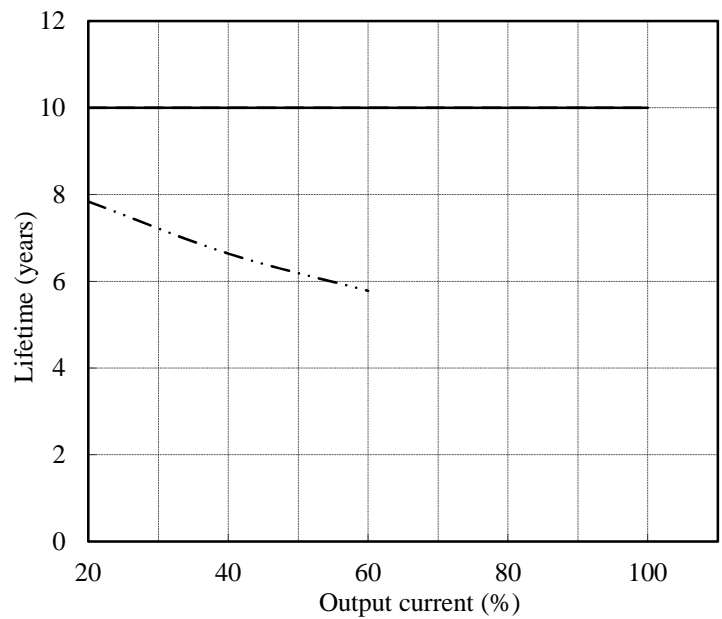
Vin=230VAC

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	-

TDK-Lambda
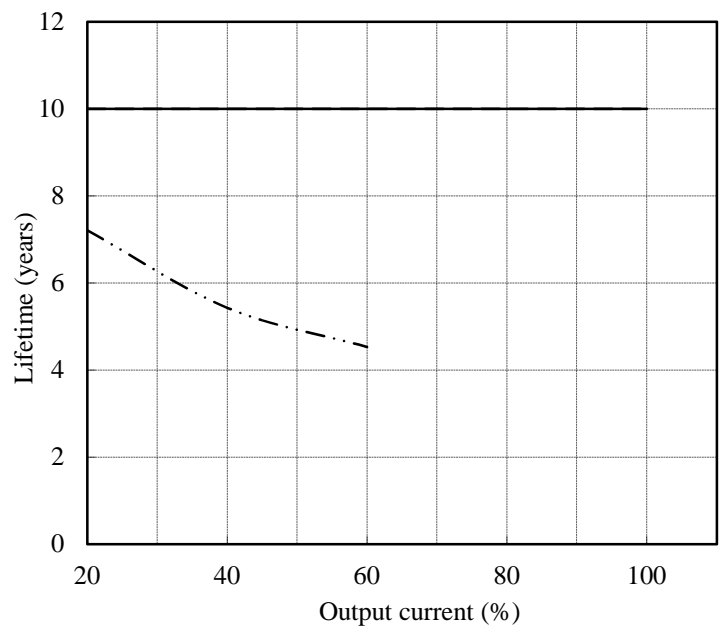
5. Abnormal Test

MODEL : DRL10-24-1

(1) Test Conditions
Vin : 230VAC   Output: 24V , 0.42A   Ta : 25℃

(2) Test Results

(Da: Damaged)

No.	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	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 |
	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	
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

TDK-Lambda

(Da: Damaged)

No.	Location No.	Test point	Short	Open	Fire (a)	Smoke (b)	Burst (c)	Smell (d)	Red Hot (e)	Damaged (f)	Fuse Blown (g)	O.V.P (h)	O.C.P (i)	No Output (j)	No Change (k)	Others (l)	Note
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				○											○		

TDK-Lambda

(Da: Damaged)

No.	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
					a	b	c	d	e	f	g	h	i	j	k	l	
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

TDK-Lambda

6. Vibration Test

MODEL：DRL10-1

(1) Vibration Test Class

Frequency variable endurance test

(2) Equipment Used

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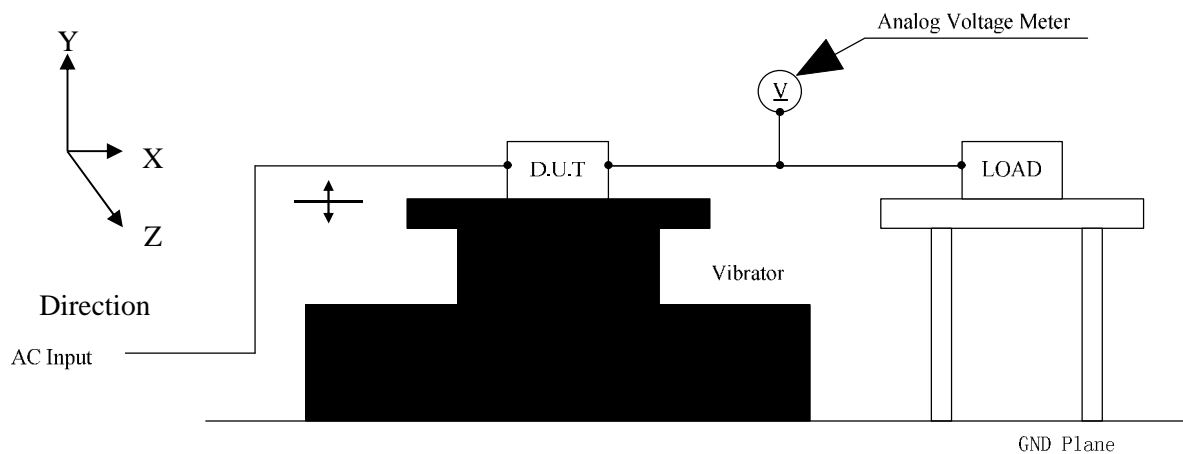Suzhou Dongling   Suzhou Dongling

(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

TDK-Lambda   R-15

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   Vibrator   : ES-30-370
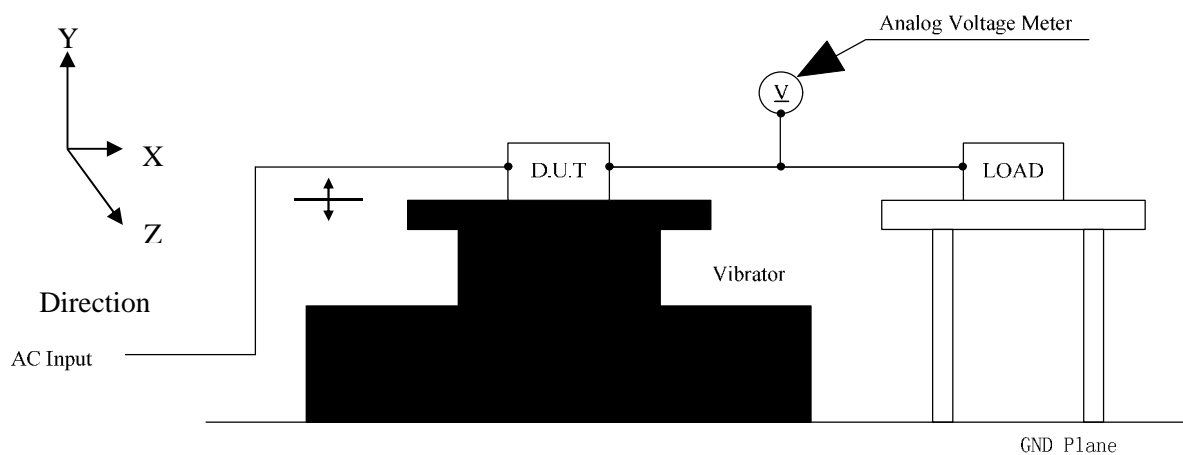   Suzhou Dongling   Suzhou Dongling

(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.
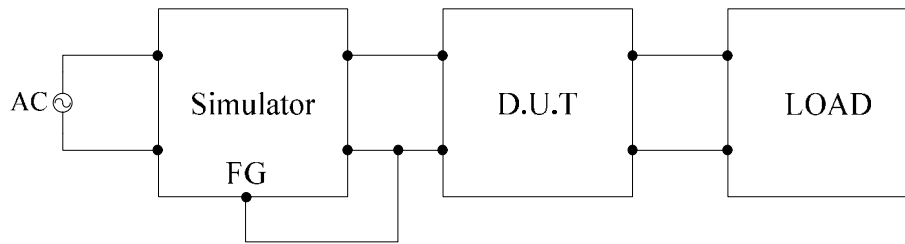
(6) Test Results

<div align="center">

OK

</div>

8. Noise Simulate Test

      MODEL : DRL10-1

(1) Test Circuit and Equipment

```
AC ⊘    │ Simulator │   │ D.U.T │   │ LOAD │
         │    FG     │
```

    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

<div align="center">

OK

</div>

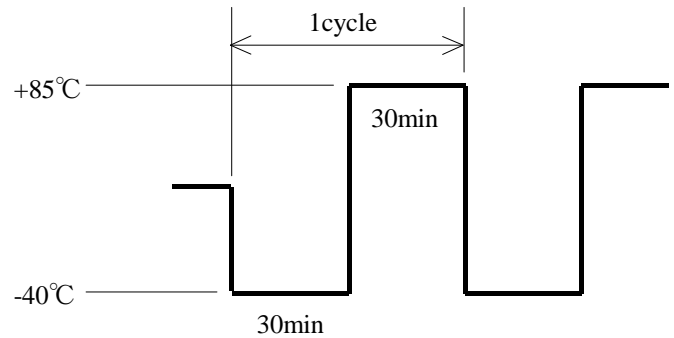<div align="center">

TDK-Lambda

</div>

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

TDK-Lambda

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

        MODEL : DRL10-1

(1) Equipment Used

      Test Generator   : PCR2000L（KIKUSUI）

(2) Test Conditions

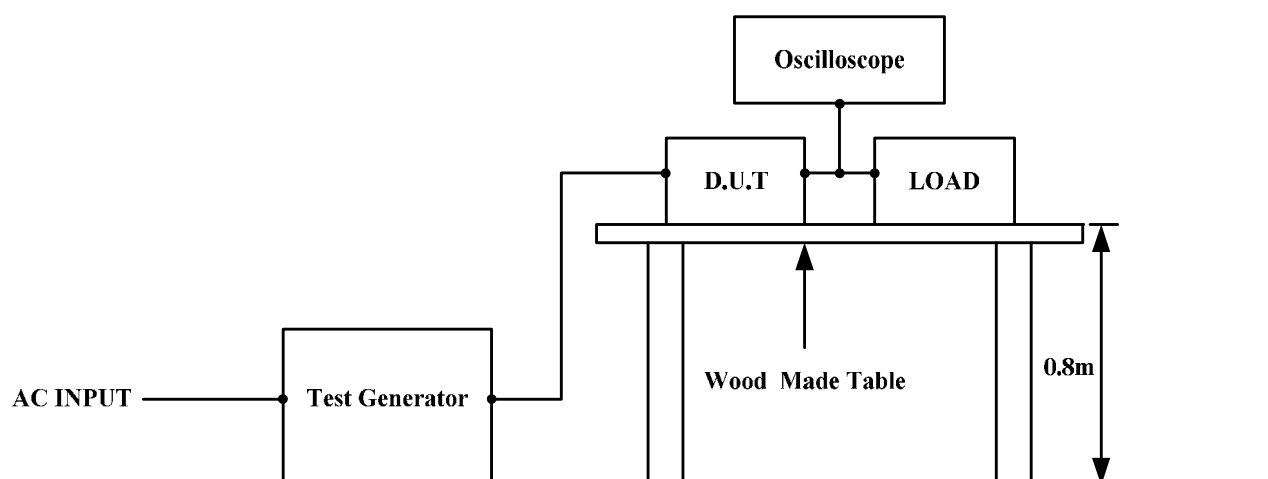|			
Input Voltage	: 200VAC	Output Voltage	: Rated
Output Current	: 100％	Ambient Temperature	: 25℃
Number of Tests	: 3 times	Test interval	: More than 10 seconds

(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