DRF240-24-1

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.

1. Calculated values for MTBF

MODEL : DRF240-24-1

1. Calculating Method

Calculated based on part count reliability projection of JEITA (RCR-9102B).
Individual failure rates λ_G is given to each part and MTBF is calculated by the count of each part.

Formula :

$$MTBF = \frac{1}{\lambda equip} \times 10^6 = \frac{1}{\sum_{i=1}^{n} Ni\,(\lambda_G \pi_Q)_i} \times 10^6 \text{ (HOURS)}$$

where :

$\lambda equip$ = Total Equipment Failure Rate (Failure / 10^6 Hours)

λ_G = Generic Failure Rate For The ith Generic Part (Failure / 10^6 Hours)

Ni = Quantity of ith Generic Part

n = Number of Different Generic Part Categories

π_Q = Generic Quality Factor for the ith Generic Part (π_Q = 1)

2. MTBF Values

G_F : (GROUND, FIXED)

MTBF = 123,911 (Hours)

2. Component derating

MODEL : DRF240-24-1

(1) Calculating method

(a) Measuring Conditions

Input	:	115VAC, 230VAC	Ambient temperature	:	60°C
Output	:	24V, 10A (100%)	Mounting method	:	Standard Mounting

(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

$$\theta_{j-c} = \frac{T_{j(max)} - T_c}{P_{c(max)}} \qquad \theta_{j-a} = \frac{T_{j(max)} - T_a}{P_{c(max)}} \qquad \theta_{j-l} = \frac{T_{j(max)} - T_l}{P_{c(max)}}$$

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

T_l : Lead temperature at start point of derating ; 25°C in general

$P_{c(max)}$ ($P_{ch(max)}$) : Maximum collector(channel) dissipation

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

(θ_{j-c}) (θ_{ch-c}) :Thermal impedance between junction(channel) and case

θ_{j-a} :Thermal impedance between junction and air

θ_{j-l} :Thermal impedance between junction and lead

(2) Component Derating List

MODEL : DRF240-24-1

Location No.	Vin = 115VAC	Load = 100%	Ta = 60°C
Q11 IPP50R250CP INFINEON	Tjmax = 150°C, Pd = 1.77W, Tj = Tc + ((θ j-c) × Pd) = 97.5°C D.F. = 65.03%	θ j-c = 1.1°C/W Δ Tc = 35.6°C	 Tc = 95.6°C
Q12 IPP50R250CP INFINEON	Tjmax = 150°C, Pd = 1.77W, Tj = Tc + ((θ j-c) × Pd) = 98.5°C D.F. = 65.7%	θ j-c = 1.1°C/W Δ Tc = 36.6°C,	 Tc = 96.6°C
Q13 2SCR543RTL ROHM	Tjmax = 150°C, Pd = 0.08W, Tj = Tc + ((θ j-c) × Pd) = 118.9°C D.F. = 79.27%	θj-c = 250°C/W, Δ Tc = 38.9°C,	Pd(max) = 0.5W Tc = 98.9°C
Q14 2SAR543RTL ROHM	Tjmax = 150°C, Pd = 0.01W, Tj = Tc + ((θ j-c) × Pd) = 101.4°C D.F. = 67.6%	θj-c = 250°C/W, Δ Tc = 38.9°C,	Pd(max) = 0.5W Tc = 98.9°C
Q101 IPP50R250CP INFINEON	Tjmax = 150°C, Pd = 0.65W, Tj = Tc + ((θ j-c) × Pd) = 93.2°C D.F. = 62.14%	θ j-c = 1.1°C/W Δ Tc = 32.5°C,	 Tc = 92.5°C
Q102 IPP50R250CP INFINEON	Tjmax = 150°C, Pd = 0.76W, Tj = Tc + ((θ j-c) × Pd) = 93.1°C D.F. = 62.09%	θ j-c = 1.1°C/W Δ Tc = 32.3°C,	 Tc = 92.3°C
Q201 PSMN4R3-100PS,127 NXP	Tjmax = 175°C, Pd = 0.26W, Tj = Tc + ((θ j-c) × Pd) = 114.6°C D.F. = 65.49%	θj-c = 0.44°C/W, Δ Tc = 54.5°C,	Pd(max) = 338W Tc = 114.5°C
Q202 PSMN4R3-100PS,127 NXP	Tjmax = 175°C, Pd = 0.21W, Tj = Tc + ((θ j-c) × Pd) = 112.9°C D.F. = 64.51%	θ j-c = 0.44°C/W Δ Tc = 52.8°C	Pd(max) = 338W Tc = 112.8°C
D11 RS3505M-C RECTRON	Tjmax = 150°C, Pd = 4.38W, Tj = Tc + ((θ j-c) × Pd) = 109.88°C D.F. = 73.25%	θ j-c = 1°C/W Δ Tc = 45.5°C	 Tc = 105.5°C
D12 CRF02(TE85L,Q) TOSHIBA	Tjmax = 150°C, Pd = 0.00015W, Tj = Tc + ((θ j-c) × Pd) = 98.9°C D.F. = 65.94%	θ j-c = 20°C/W Δ Tc = 38.9°C	 Tc = 98.9°C
D13 CRF02(TE85L,Q) TOSHIBA	Tjmax = 150°C, Pd = 0.00015W, Tj = Tc + ((θ j-c) × Pd) = 98.9°C D.F. = 65.94%	θ j-c = 20°C/W Δ Tc = 38.9°C	 Tc = 98.9°C

(2) Component Derating List

MODEL : DRF240-24-1

Location No.	Vin = 115VAC Load = 100% Ta = 60°C		
D15 SCS206AGC ROHM	Tjmax = 175°C, Pd = 1.71W, Tj = Tc + ((θ j-c) × Pd) = 99.03°C D.F. = 56.59%	θ j-c = 2.94°C/W Δ Tc = 34°C	Tc = 94°C
D402 CRF02(TE85L,Q) TOSHIBA	Tjmax = 150°C, Pd = 0.078W, Tj = Tl + ((θ j-l) × Pd) = 100.36°C D.F. = 66.91%	θ j-l = 20°C/W, Δ Tl = 38.8°C,	Tl = 98.8°C
D404 CRH01(TE85L,Q) TOSHIBA	Tjmax = 150°C, Pd = 0.19W, Tj = Ta + ((θ j-a) × Pd) = 110.23°C D.F. = 73.49%	θ j-a = 65°C/W Δ Tc = 38°C	Tc = 98°C
PC201 PS2861B-1Y-F3-A(L) RENESAS	Tjmax = 125°C, Pd = 0.00484W, Tj = Tc + ((θ j-c) × Pd) = 92.63°C D.F. = 74.1%	θ j-c = 150°C/W Δ Tc = 31.9°C,	Tc = 91.9°C
PC202 PS2861B-1Y-F3-A(L) RENESAS	Tjmax = 125°C, Pd = 0W, Tj = Tc + ((θ j-c) × Pd) = 92.4°C D.F. = 73.92%	θ j-c = 150°C/W Δ Tc = 32.4°C	Tc = 92.4°C
PC401 PS2861B-1Y-F3-A(L) RENESAS	Tjmax = 125°C, Pd = 0.006W, Tj = Tc + ((θ j-c) × Pd) = 92.71°C D.F. = 74.17%	θ j-c = 150°C/W Δ Tc = 31.8°C	Tc = 91.8°C
A12 ICE2PCS03G INFINEON	Tjmax = 150°C, Pd = 0.0538W, Tj = Tc + ((θ j-c) × Pd) = 108.85°C D.F. = 72.57%	θj-a = 185°C/W, ΔTc = 38.9°C,	Tc = 98.9°C
A101 L6599ADTR STMICRO	Tjmax = 150°C, Pd = 0.102W, Tj = Tc + ((θ j-c) × Pd) = 111.56°C D.F. = 74.37%	θ j-c = 120°C/W, Δ Tc = 39.3°C,	Tc = 99.3°C
A201 TEA1792AT/1,118 NXP	Tjmax = 150°C, Pd = 0.15W, Tj = Tc + ((θ j-c) × Pd) = 112.94°C D.F. = 75.29%	θ j-c = 95°C/W, Δ Tc = 38.3°C,	Tc = 98.3°C
A202 TEA1792AT/1,118 NXP	Tjmax = 150°C, Pd = 0.15W, Tj = Tc + ((θ j-c) × Pd) = 118.14°C D.F. = 78.76%	θ j-c = 95°C/W, Δ Tc = 43.5°C,	Tc = 103.5°C
A402 ICE3B0565JG INFINEON	Tjmax = 150°C, Pd = 0.413W, Tj = Tc + ((θ j-c) × Pd) = 108.71 °C D.F. = 79.49%	θ j-c = 24°C/W Δ Tc = 38.8°C	Tc = 98.8°C

(2) Component Derating List

MODEL : DRF240-24-1

Location No.	Vin = 230VAC	Load = 100%	Ta = 60°C
Q11 IPP50R250CP INFINEON	Tjmax = 150°C, Pd = 0.95W, Tj = Tc + ((θ j-c) × Pd) = 82.1°C D.F. = 54.76%	θ j-c = 1.1°C/W Δ Tc = 21.1°C	 Tc = 81.1°C
Q12 IPP50R250CP INFINEON	Tjmax = 150°C, Pd = 0.95W, Tj = Tc + ((θ j-c) × Pd) = 82.8°C D.F. = 55.23%	θ j-c = 1.1°C/W Δ Tc = 21.8°C,	 Tc = 81.8°C
Q13 2SCR543RTL ROHM	Tjmax = 150°C, Pd = 0.08W, Tj = Tc + ((θ j-c) × Pd) = 105.7°C D.F. = 70.74%	θj-c = 250°C/W, Δ Tc = 25.7°C,	Pd(max) = 0.5W Tc = 85.7°C
Q14 2SAR543RTL ROHM	Tjmax = 150°C, Pd = 0.01W, Tj = Tc + ((θ j-c) × Pd) = 88.2°C D.F. = 58.8%	θj-c = 250°C/W, Δ Tc = 25.7°C,	Pd(max) = 0.5W Tc = 85.7°C
Q101 IPP50R250CP INFINEON	Tjmax = 150°C, Pd = 0.65W, Tj = Tc + ((θ j-c) × Pd) = 81.8°C D.F. = 54.54%	θ j-c = 1.1°C/W Δ Tc = 21.1°C,	 Tc = 81.1°C
Q102 IPP50R250CP INFINEON	Tjmax = 150°C, Pd = 0.76W, Tj = Tc + ((θ j-c) × Pd) = 82.1°C D.F. = 54.76%	θ j-c = 1.1°C/W Δ Tc = 21.3°C,	 Tc = 81.3°C
Q201 PSMN4R3-100PS,127 NXP	Tjmax = 175°C, Pd = 0.26W, Tj = Tc + ((θ j-c) × Pd) = 102.4°C D.F. = 58.52%	θj-c = 0.44°C/W, Δ Tc = 42.3°C,	Pd(max) = 338W Tc = 102.3°C
Q202 PSMN4R3-100PS,127 NXP	Tjmax = 175°C, Pd = 0.21W, Tj = Tc + ((θ j-c) × Pd) = 100.9°C D.F. = 57.64%	θ j-c = 0.44°C/W Δ Tc = 40.4°C	Pd(max) = 338W Tc = 100.4°C
D11 RS3505M-C RECTRON	Tjmax = 150°C, Pd = 2.38W, Tj = Tc + ((θ j-c) × Pd) = 89.18°C D.F. = 59.45%	θ j-c = 1°C/W Δ Tc = 26.8°C	 Tc = 86.8°C
D12 CRF02(TE85L,Q) TOSHIBA	Tjmax = 150°C, Pd = 0.00031W, Tj = Tc + ((θ j-c) × Pd) = 85.71°C D.F. = 57.14%	θ j-c = 20°C/W Δ Tc = 25.7°C	 Tc = 85.7°C
D13 CRF02(TE85L,Q) TOSHIBA	Tjmax = 150°C, Pd = 0.00031W, Tj = Tc + ((θ j-c) × Pd) = 85.71°C D.F. = 57.14%	θ j-c = 20°C/W Δ Tc = 25.7°C	 Tc = 85.7°C

(2) Component Derating List

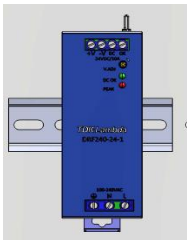
MODEL : DRF240-24-1

Location No.	Vin = 230VAC Load = 100% Ta = 60°C		
D15 SCS206AGC ROHM	Tjmax = 175°C, Pd = 1.69W, Tj = Tc + ((θ j-c) × Pd) = 86.47°C D.F. = 49.41%	θ j-c = 2.94°C/W Δ Tc = 21.5°C	Tc = 81.5°C
D402 CRF02(TE85L,Q) TOSHIBA	Tjmax = 150°C, Pd = 0.078W, Tj = Tl + ((θ j-l) × Pd) = 92.06°C D.F. = 61.37%	θ j-l = 20°C/W, Δ Tl = 30.5°C,	Tl = 90.5°C
D404 CRH01(TE85L,Q) TOSHIBA	Tjmax = 150°C, Pd = 0.19W, Tj = Ta + ((θ j-a) × Pd) = 100.03°C D.F. = 66.69%	θ j-a = 65°C/W Δ Tc = 27.8°C	Tc = 87.8°C
PC201 PS2861B-1Y-F3-A(L) RENESAS	Tjmax = 125°C, Pd = 0.00484W, Tj = Tc + ((θ j-c) × Pd) = 82.33°C D.F. = 65.86%	θ j-c = 150°C/W 150°C/ Δ Tc = 21.6°C,	Tc = 82.6°C
PC202 PS2861B-1Y-F3-A(L) RENESAS	Tjmax = 125°C, Pd = 0W, Tj = Tc + ((θ j-c) × Pd) = 82°C D.F. = 65.6%	θ j-c = 150°C/W 150°C/ Δ Tc = 22°C	Tc = 82°C
PC401 PS2861B-1Y-F3-A(L) RENESAS	Tjmax = 125°C, Pd = 0.006W, Tj = Tc + ((θ j-c) × Pd) = 82.31°C D.F. = 65.85%	θ j-c = 150°C/W θ j-c = Δ Tc = 21.4°C	Tc = 81.4°C
A12 ICE2PCS03G INFINEON	Tjmax = 150°C, Pd = 0.0538W, Tj = Tc + ((θ j-c) × Pd) = 95.65°C D.F. = 63.77%	θj-a = 185°C/W, ΔTc = 25.7°C,	Tc = 85.7°C
A101 L6599ADTR STMICRO	Tjmax = 150°C, Pd = 0.102W, Tj = Tc + ((θ j-c) × Pd) = 99.46°C D.F. = 66.3%	θ j-c = 120°C/W, Δ Tc = 27.2°C,	Tc = 87.2°C
A201 TEA1792AT/1,118 NXP	Tjmax = 150°C, Pd = 0.15W, Tj = Tc + ((θ j-c) × Pd) = 102.54°C D.F. = 68.36%	θ j-c = 95°C/W, Δ Tc = 27.9°C,	Tc = 87.9°C
A202 TEA1792AT/1,118 NXP	Tjmax = 150°C, Pd = 0.15W, Tj = Tc + ((θ j-c) × Pd) = 111.94°C D.F. = 74.63%	θ j-c = 95°C/W, Δ Tc = 37.3°C,	Tc = 97.3°C
A402 ICE3B0565JG INFINEON	Tjmax = 150°C, Pd = 0.413W, Tj = Tc + ((θ j-c) × Pd) = 100.413 °C D.F. = 79.49%	θ j-c = 24°C/W Δ Tc = 30.5°C	Tc = 90.5°C

3. Main components temperature rise ΔT list

MODEL : DRF240-24-1

Condition:

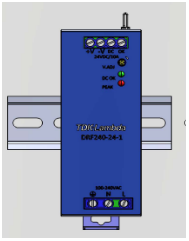
Standard Mounting Method	
Input Voltage (VAC)	115
Output Voltage (VAC)	24
Output Current (A)	10

Output Derating		DT Temperature rise (°C)	
		Io = 100% (Ta = 60°C)	Io = 75% (Ta = 70°C)
Location No	Parts Name	Standard Mounting	
L1	BALUN COIL	33.6	23.1
L13	BALUN COIL	32.2	21.7
L16	CHOKE COIL	36.5	27.2
T1	TRANS. PULSE	60.4	41.4
T401	TRANS. PULSE	45.7	32
D11	BRIDGE DIODE	45.5	32.6
D15	DIODE	34	20.5
Q11	MOS FET	35.6	21
Q12	MOS FET	36.6	21.5
Q101	MOS FET	32.5	19.4
Q102	MOS FET	32.3	19.5
Q201	MOS FET	54.5	35.3
Q202	MOS FET	52.8	34.5
A12	CHIP IC	38.9	27.3
A101	CHIP IC	39.3	26.1
A201	CHIP IC	38.3	25.9
A202	CHIP IC	43.5	34.1
A206	CHIP IC	35.5	22.5
A402	CHIP IC	38.8	33.4
PC201	CHIP OPTO COUPLER	31.9	19.6
PC202	CHIP OPTO COUPLER	32.4	19.9
PC401	CHIP OPTO COUPLER	31.8	19.8
C19	E. CAP	36.6	27.7
C208	E. CAP	47.1	29.7
C209	E. CAP	48.3	31.6
C210	E. CAP	46.8	30.6
C301	E. CAP	34.7	20.8
C409	E. CAP	42.1	29.8
C412	E. CAP	41.9	29.4
C416	E. CAP	39.4	25.1
C501	FILM CAP	39.5	25.5

3. Main components temperature rise ΔT list

MODEL : DRF240-24-1

Condition:

Standard Mounting Method	
Input Voltage (VAC)	230
Output Voltage (VAC)	24
Output Current (A)	10

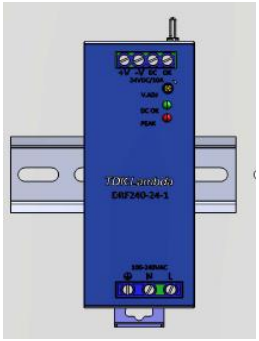
Output Derating		DT Temperature rise (°C)	
		Io = 100% (Ta = 60°C)	Io = 75% (Ta = 70°C)
Location No	Parts Name	Standard Mounting	
L1	BALUN COIL	19.7	9.3
L13	BALUN COIL	18.5	8.1
L16	CHOKE COIL	25.1	15.9
T1	TRANS. PULSE	48.2	22.6
T401	TRANS. PULSE	32.6	24
D11	BRIDGE DIODE	26.8	14
D15	DIODE	21.5	8.1
Q11	MOS FET	21.1	6.6
Q12	MOS FET	21.8	6.8
Q101	MOS FET	21.1	8.1
Q102	MOS FET	21.3	8.6
Q201	MOS FET	42.3	23.2
Q202	MOS FET	40.4	22.2
A12	CHIP IC	25.7	14.2
A101	CHIP IC	27.2	14.1
A201	CHIP IC	27.9	15.5
A202	CHIP IC	37.3	27.9
A206	CHIP IC	25.9	13
A402	CHIP IC	30.5	25.2
PC201	CHIP OPTO COUPLER	21.6	9.4
PC202	CHIP OPTO COUPLER	22	9.6
PC401	CHIP OPTO COUPLER	21.4	9.5
C19	E. CAP	27.4	18.6
C208	E. CAP	35.9	18.6
C209	E. CAP	36.5	19.9
C210	E. CAP	34.6	18.5
C301	E. CAP	25.6	11.8
C409	E. CAP	26.9	14.7
C412	E. CAP	27.6	15.2
C416	E. CAP	29.8	15.6
C501	FILM CAP	26.3	12.4

4. Electrolytic capacitor lifetime

MODEL : DRF240-24-1

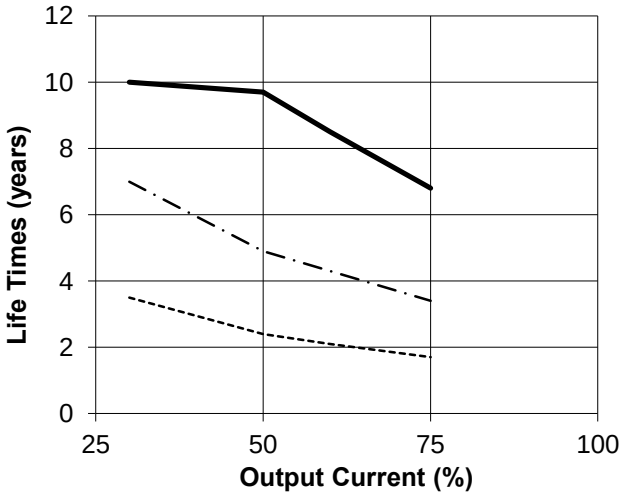
Ta = 40°C
= 50°C
= 60°C

Standard Mounting



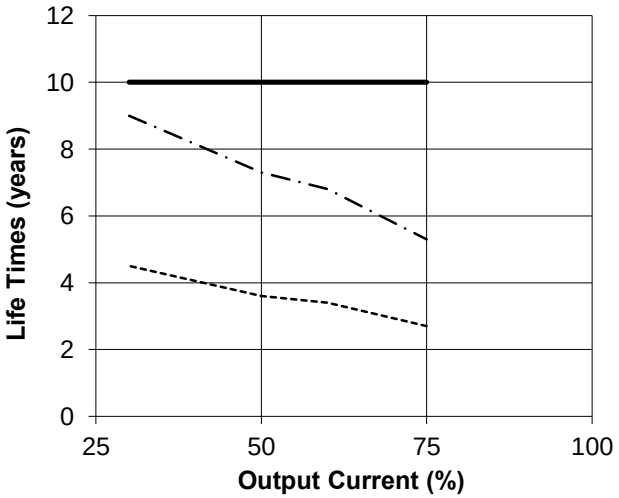
Vin = 115VAC

Load (%)	Life Time (years)		
	Ta = 40°C	Ta = 50°C	Ta = 60°C
30	10.0	7.0	3.5
50	9.7	4.9	2.4
60	8.5	4.3	2.1
75	6.8	3.4	1.7



Vin = 230VAC

Load (%)	Life Time (years)		
	Ta = 40°C	Ta = 50°C	Ta = 60°C
30	10.0	9.0	4.5
50	10.0	7.3	3.6
60	10.0	6.8	3.4
75	10.0	5.3	2.7



5. Vibration Test

MODEL : DRF240-24-1

(1) Vibration Test Class

Frequency Variable Endurance Test

(2) Equipment Used

Controller	:	Laser USB (DACTRON) SN: 7184823
Vibrator	:	LDS V8-440 (Ling Dynamics)
Accelerometer	:	3255A4 (Dytran) SN: 11125

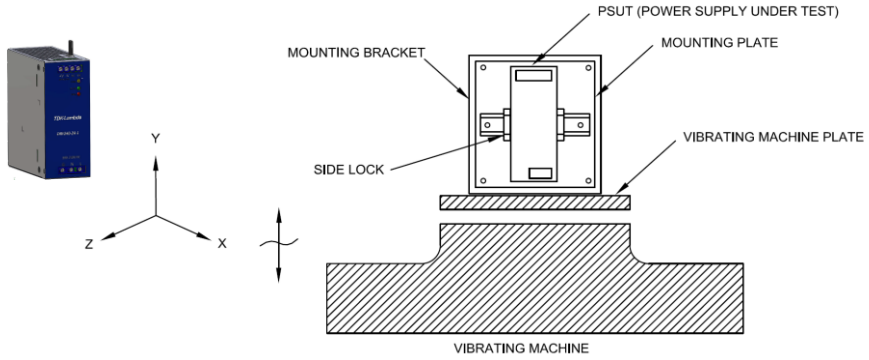
(3) The Number Of D.U.T. (Device Under Test)

1 Unit

(4) Test Conditions

Sweep Frequency	:	10 - 55Hz	Direction	:	X, Y, Z
Sweep Time	:	1 minute	Test Time	:	1 hour each axis
Acceleration	:	2G	Non-operation		
Mounting	:	Standard Mounting			

(5) Test Method



Fix the PSUT on the mounting rail with stopper on each corner.
Standard mounting position as per picture above.

(6) Test results - OK

6. Abnormal test

MODEL : DRF240-24-1

(1) Test Condition and Circuit

Input Voltage: 230Vac Output: 24V, 10A Ta : 25℃ , 70%RH

(2) Test Results

(Da: Damaged)

No.	Test Position		Test Mode		Test Results												
	LOCATION	TEST POINT	SHORT	OPEN	1 FIRE	2 SMOKE	3 BURST	4 SMELL	5 RED HOT	6 DAMAGE	7 FUSE BLOW	8 O.V.P.	9 O.C.P.	10 NO OUTPUT	11 NO CHANGE	12 OTHERS	NOTE
1	Q11	G-D	○							○	○			○			Da: Q11,Z11,R34
		G-S	○											○		○	Hiccup
		D-S	○								○			○			
		G		○						○	○			○			Da: Q11
		D		○												○	Pin increase
		S		○												○	Pin increase
2	Q12	G-D	○							○	○			○			Da: Q12,Z11,R44
		G-S	○											○		○	Hiccup
		D-S	○								○			○			
		G		○						○	○			○			Da: Q12
		D		○												○	Pin increase
		S		○												○	Pin increase
3	Q101	G-D	○							○				○			Da: Q101,Q102,A101,TFR11
		G-S	○											○			
		D-S	○							○				○			Da: Q102,TFR11
		G		○						○	○			○			Da: TFR11,Q101,Q102
		D		○										○			
		S		○										○			
4	Q102	G-D	○							○				○			Da: Q101,Q102,A101,TFR11
		G-S	○											○			
		D-S	○							○				○			Da: Q101,TFR11
		G		○						○	○			○			Da: TFR11,Q101,Q102
		D		○										○			
		S		○										○			
5	Q13	B-E	○													○	Q11,Q12 Vgs decrease
		C-E	○											○			
		B-C	○							○	○			○			Da: Q11,Q12,TFR11
		B		○												○	Power Factor decrease
		C		○												○	Power Factor decrease
		E		○												○	Power Factor decrease

No.	Test Position		Test Mode		Test Results												
	LOCATION	TEST POINT	SHORT	OPEN	1 FIRE	2 SMOKE	3 BURST	4 SMELL	5 RED HOT	6 DAMAGE	7 FUSE BLOW	8 O.V.P.	9 O.C.P.	10 NO OUTPUT	11 NO CHANGE	12 OTHERS	NOTE
6	Q14	B-E	○													○	Q11,Q12 Vgs decrease
		C-E	○											○		○	Hiccup
		B-C	○													○	Power Factor decrease
		B		○						○	○			○			Da: Q11
		C		○						○	○			○			Da: Q11
		E		○						○	○			○			Da: Q11
7	Q201	G-D	○											○			
		G-S	○													○	Pin increase
		D-S	○											○			
		G		○												○	Pin increase
		D		○										○			
		S		○										○			
8	Q202	G-D	○											○			
		G-S	○													○	Pin increase
		D-S	○											○			
		G		○												○	Pin increase
		D		○										○			
		S		○										○			
9	D11	1-2	○								○			○			
		2-3	○								○			○			
		3-4	○								○			○			
		1		○										○			
		2		○										○			
		3		○										○			
		4		○										○			
10	D12	A-K	○								○			○			Da. D12
		A-K		○												○	Power Factor Decrease
11	D13	A-K	○								○			○			Da. D13
		A-K		○												○	Power Factor Decrease
12	D15	A-K	○							○	○			○			Da: Q11
		A-K		○						○	○			○			Da: Q11
13	D402	A-K	○											○			
		A-K		○												○	VDS Increase
14	D404	A-K	○											○			
		A-K		○										○			
15	PC201	1-2	○									○					
		3-4	○											○			
		1		○								○					
		2		○								○					
		3		○								○					
		4		○								○					

No.	Test Position		Test Mode		Test Results												
					1	2	3	4	5	6	7	8	9	10	11	12	
	LOCATION	TEST POINT	SHORT	OPEN	FIRE	SMOKE	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOW	O.V.P.	O.C.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE
16	PC202	1-2	○												○		
		3-4	○											○			
		1		○											○		
		2		○											○		
		3		○											○		
		4		○											○		
17	PC401	1-2	○											○			
		3-4	○													○	CNT on/off cant operate
		1		○										○			
		2		○										○			
		3		○										○			
		4		○										○			
18	A12	1-2	○							○	○			○			Da:Q11,Q12
		2-3	○							○	○			○			Da:Q11,Q12
		3-4	○													○	Power Factor Decrease
		5-6	○													○	Vbulk Increase
		6-7	○							○				○			Da:A12
		7-8	○											○			Da:Q11,Q12
		1		○						○	○			○			Da:Q11
		2		○												○	Pin increase
		3		○						○	○			○			Da:Q12
		4		○										○			
		5		○						○	○			○			Da:Q11
		6		○										○			
		7		○												○	Pin increase
		8		○												○	Power Factor Decrease
19	A101	1-2	○													○	Hiccup
		2-3	○											○			
		3-4	○											○			
		4-5	○									○					
		5-6	○											○			
		6-7	○											○			
		7-8	○											○			
		9-10	○												○		
		10-11	○											○			
		11-12	○							○				○			Da:Q101,Q102,TFR11
		12-13	○												○		
		13-14	○												○		
		14-15	○											○			
		15-16	○											○			
		1		○											○		

No.	Test Position		Test Mode		Test Results												
					1	2	3	4	5	6	7	8	9	10	11	12	
	LOCATION	TEST POINT	SHORT	OPEN	FIRE	SMOKE	BURST	SMELL	RED HOT	DAMAGE	FUSE BLOW	O.V.P.	O.C.P.	NO OUTPUT	NO CHANGE	OTHERS	NOTE
19	A101	2		○										○			
		3		○												○	Hiccup
		4		○												○	Vo decrease
		5		○										○			
		6		○										○			
		7		○										○			
		8		○											○		
		9		○												○	Vds increase
		10		○										○			
		11		○						○	○			○			Da:TFR11,Q101,Q102
		12		○										○			
		13		○											○		
		14		○						○	○			○			Da:TFR11,Q101,Q102
		15		○										○			
		16		○												○	Vo hiccup
20	A201	1-2	○													○	Pin Increase
		2-3	○												○		
		3-4	○												○		
		5-6	○												○		
		6-7	○												○		
		7-8	○												○		
		1		○												○	Pin Increase
		2		○												○	Pin Increase
		3		○											○		
		4		○												○	Pin Increase
		5		○											○		
		6		○											○		
		7		○											○		
		8		○												○	Pin Increase
21	A202	1-2	○													○	Pin Increase
		2-3	○												○		
		3-4	○												○		
		5-6	○												○		
		6-7	○												○		
		7-8	○												○		
		1		○												○	Pin Increase
		2		○												○	Pin Increase
		3		○											○		
		4		○												○	Pin Increase
		5		○											○		

No.	Test Position		Test Mode		Test Results												
	LOCATION	TEST POINT	SHORT	OPEN	1 FIRE	2 SMOKE	3 BURST	4 SMELL	5 RED HOT	6 DAMAGE	7 FUSE BLOW	8 O.V.P.	9 O.C.P.	10 NO OUTPUT	11 NO CHANGE	12 OTHERS	NOTE
21	A202	6		○											○		
		7		○											○		
		8		○												○	Pin Increase
22	A402	1-2	○												○		
		2-3	○												○		
		3-4	○											○			
		4-5	○							○				○			Da:A402,R409
		5-6	○												○		
		7-8	○												○		
		8-9	○												○		
		9-10	○												○		
		10-11	○												○		
		11-12	○											○			
		1		○											○		
		2		○										○			
		3		○										○		○	Hiccup
		4		○										○			
		5		○											○		
		6		○											○		
		7		○											○		
		8		○											○		
		9		○											○		
		10		○											○		
		11		○										○			
		12		○											○		

7. Thermal shock test

MODEL : DRF240-24-1

(1) Equipment used

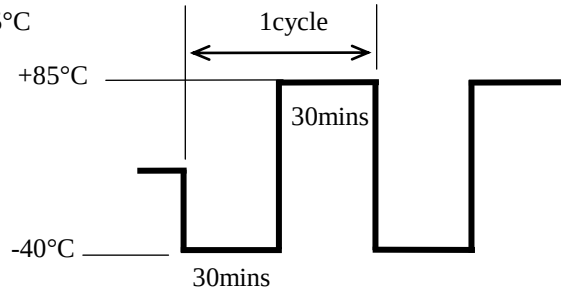
Thermal shock chamber (ESPEC CORP.)

(2) The number of PSUT. (Power Supply Under Test)

1 unit

(3) Test Conditions

- Ambient temperature : -40°C ⟷ +85°C
- Test time : 30min each temp.
- Test cycle : 200 cycles
- Operating : No operating



(4) Test Method

Before the test, check if there is no abnormal output and put the PSUT in the testing chamber. Then test it in above cycles. After the test is completed, leave it for 1 hour at the room temperature and check to make sure that there is no abnormal output.

(5) Test Results OK