CUS400M

RELIABILITY DATA

TDK·Lambda

I N D E X

※Test results are example data based on a unit under our standard measurement condition.

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1. Calculated Values for MTBF

MODEL : CUS400M-12

Calculating Method

Test Specifications:	Telcordia SR332 Issue 4, 2016
Test Method:	Method I-D (Black Box)
Confidence Level:	90%
Environment:	Ground, Fixed, Controlled
Device Method:	I
Quality Level:	II

The failure rates in Failures In Time (FITs) is given for the different sub-assemblies at a confidence level of 90% in the table below at 20°C; 30°C; 40°C; 50°C; 60°C; and 70°C.

Telcordia SR332 Issue 4		
Ambient (°C)	**FITs**	**MTBF (hrs)**
20	279	3584229
30	279	3584229
40	412	2427184
50	610	1639344
60	904	1106194
70	1340	746268

2. Components Derating List

MODEL : CUS400M-12

Test Conditions:

Vout:	12V
Vin:	115Vac
Pout:	250W
Ambient:	50°C
Mounting:	U-channel

XD111 28KC-13 Diodes Inc	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =117.5°C D.F.=78.3%
XD112 28KC-13 Diodes Inc	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =117.5°C D.F.=78.3%
XD113 28KC-13 Diodes Inc	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =117.5°C D.F.=78.3%
XD114 28KC-13 Diodes Inc	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =117.5°C D.F.=78.3%
XD108 STPSC4H065 ST	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =97.2°C D.F.=64.8%
XD109 STPSC4H065 ST	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =97.2°C D.F.=64.8%
XQ206 STD16N60M2 ST	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =91.0°C D.F.=60.6%
XQ207 STD16N60M2 ST	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =91.0°C D.F.=60.6%

XQ208 STD16N60M2 ST	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =91.0°C D.F.= 60.6%
XQ209 STD16N60M2 ST	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =91.0°C D.F.= 60.6%
XQ103 IPD60R180P7 Infineon	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =114.2°C D.F.=76.1%
XQ104 IPD60R180P7 Infineon	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =116°C D.F.=77.3%
XQ301 TK55S10N1 Toshiba	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =83.7°C D.F.=56%
XQ304 TK55S10N1 Toshiba	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =83.7°C D.F.=56%
XU101 LNK304 Power Integrations	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =98.1°C D.F.=65.4%
XU100 UCC28180 Texas Instruments	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =102°C D.F.=68%
XU200 L6699 ST	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =100.1°C D.F.=66.7%
XU301 TEA1995T NXP	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =96.2°C D.F.=64.1%

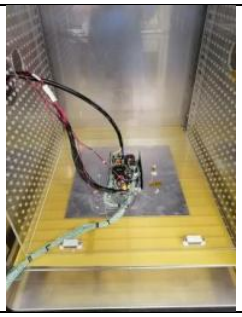
XU400 KA431SAMF2F Fairchild	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =86.5°C D.F.=57.7%
XU401 KA431SAMF2F Fairchild	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =86.5°C D.F.=57.7%
L1 25098 TDK-Lambda	Tjmax=105°C Tj = Tc + ((θ j-c) × Pd) =88.6°C D.F.=84.4%
L2 230342 TDK-Lambda	Tjmax=125°C Tj = Tc + ((θ j-c) × Pd) =98.7°C D.F.=79%
L4 230359 TDK-Lambda	Tjmax=125°C Tj = Tc + ((θ j-c) × Pd) =77.6°C D.F.=62.1%
L6 230429 TDK-Lambda	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =82.7°C D.F.=55.1%
L7 230428 TDK-Lambda	Tjmax=150°C Tj = Tc + ((θ j-c) × Pd) =79.1°C D.F.=52.7%
TX1 230403 TDK-Lambda	Tjmax=125°C Tj = Tc + ((θ j-c) × Pd) =89.7 °C D.F.= 71.8%
TX3 230390 TDK-Lambda	Tjmax=125°C Tj = Tc + ((θ j-c) × Pd) =96.3 °C D.F.=77%

XU2 Vishay VOL618A	Tjmax=125°C Tj = Tc + ((θ j-c) × Pd) =90.1°C D.F.=72.1%
XU3 Vishay VOL618A	Tjmax=125°C Tj = Tc + ((θ j-c) × Pd) =90.1°C D.F.= 72.1%
XU203 Vishay VOL618A	Tjmax=125°C Tj = Tc + ((θ j-c) × Pd) =80°C D.F.=64%
XU204 Vishay VOL618A	Tjmax=125°C Tj = Tc + ((θ j-c) × Pd) =80°C D.F.=64%

3. Main components temperature rise ΔT list

MODEL: CUS400M-12

Measuring conditions

Mounting Method Standard Mounting: Open Frame on 300x300x0.8mm Aluminium sheet	
Input Voltage (VAC)	115
Output Voltage (VDC)	12
Output Current (A)	20.83 / 10.42

Measuring Results

		ΔT Temperature Rise (°C)	
Output Derating		**Io = 100% Ta = 50°C**	**Io = 50% Ta = 50°C**
Location No.	**Parts Name**	**Mounting(A)**	**Mounting (A)**
C1	Aux Supply Capacitor	28.7	17.2
L1	Aux Supply Inductor	36.8	24.0
C15	Boost Capacitor	28.1	17.2
L2 Core	PFC Inductor	42.8	26.9
L2 Wind	PFC Inductor	46.6	28.7
TX3	Standby supply Transformer	43.4	25.3
C14	Fan supply Capacitor	20.6	11.7
C16	Standby Output Cap	21.6	11.6
C13	Output Capacitor	16.3	8.9
C4	Input capacitor	38.9	23.0
J1	Input connector	10.0	6.7
TH1	Inrush limiter	43.5	25.9
L6	Common mode Choke	31.0	14.0
C7	Filter capacitor	17.2	10.6
L7	Common mode Choke	22.3	10.6
TX1 Core	Main transformer	21.8	12.0
TX1 P Wind	Main transformer	37.1	19.2
TX1 S Wind	Main transformer	32.5	15.3
L4	Output Inductor	26.0	11.3
XC315	Output Capacitor	28.6	15.1
XR308	Snubber Resistor	30.0	15.2
XU302	Fan Supply Regulator	21.5	12.2
XU400	Feedback Amplifier	24.5	13.7
XU301	Rectifier control IC	32.4	19.8
XQ304	Rectifier FET	31.7	16.3
XU203/XU204	Optocouplers	27.8	16.2

XQ208	Half-bridge FET	37.0	21.5
XU100	PFC Controller	42.5	25.5
XC225	Resonant Capacitor	32.4	18.7
XU200	LLC Controller	30.1	19.5
XD112	Bridge Rectifier Diode	42.2	23.5
XD109	Bypass Diode	42.5	23.7
XU101	Aux Supply IC	34.9	21.4
XR109	PFC Current Sense	37.5	20.1
XD115	Inrush Bypass SCR	45.0	23.8
XD5	Transient limiter	67.4	37.0
XU3/XU2	Optocouplers	36.9	21.5
XD1	Standby Supply Rectifier	38.2	19.8
XC10	Standby Sup Output Cap	24.6	12.7
XL1	Standby Sup Output Ind	25.8	13.2
XU8	Standby Supply Feedback Amplifier	28.4	15.9
XU6	Standby Supply Control IC	54.7	38.6
XR6	Snubber Resistor	54.6	35.1
XQ103 tab	PFC FET	57.9	33.0
XQ104 tab	PFC FET	59.8	33.9

4. Forced air requirements

MODEL: CUS400M-12

Conditions	Ta	50°C
	Line	85V, 115V & 230V
	Load	100W – Max W

Forced air cooled, mounted in a wind tunnel.
Airflow measured 150mm from EUT

		Input Voltage (V)		
		85Vin	115Vin	230Vin
Output Power (W)	100	0.1	0.1	0.1
	200	0.1	0.1	0.1
	300	0.32	0.1	0.1
	320	0.42	0.18	0.14
	400		0.3	0.2

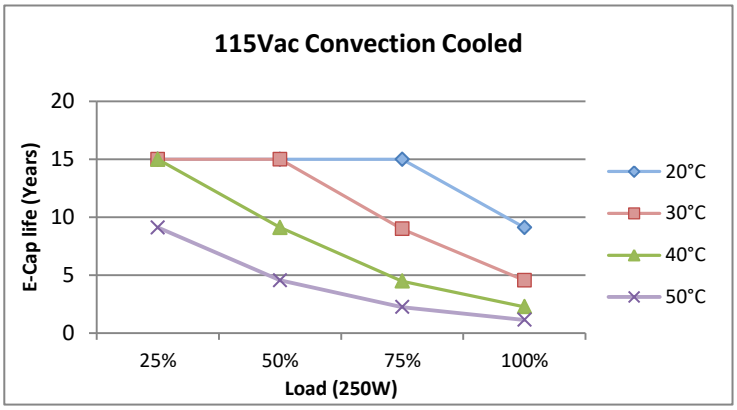
5. Electrolytic capacitor lifetime

MODEL: CUS400M-12

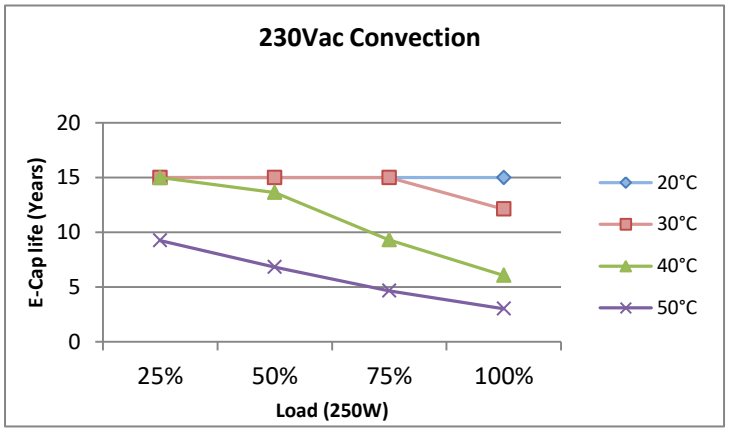
Conditions Ta 20°C - 50°C
Line 115V & 230V
Load 250W

Convection Cooled, mounted on 50mm standoffs

E-Cap life (Years) 115Vac Convection Cooled				
Load (%)	Tamb (°C)			
	20	30	40	50
25%	15	15	15	9.12
50%	15	15	9.11	4.56
75%	15	8.99	4.49	2.25
100%	9.11	4.56	2.28	1.14

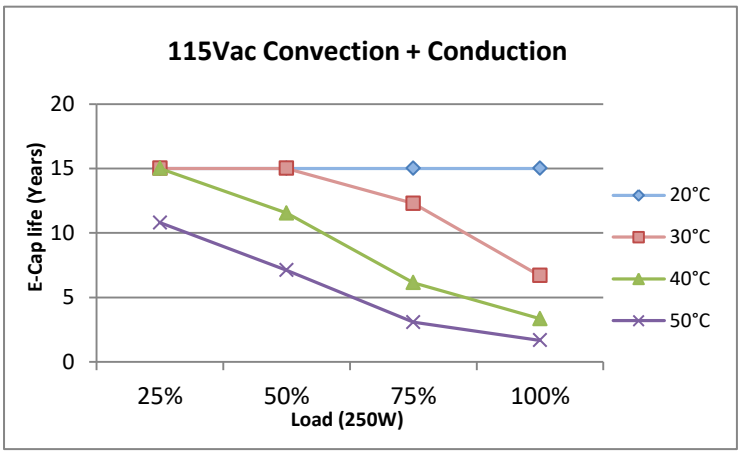


E-Cap life (Years) 230Vac Convection Cooled				
Load (%)	Tamb (°C)			
	20	30	40	50
25%	15	15	15	9.25
50%	15	15	13.63	6.82
75%	15	15	9.31	4.66
100%	15	12.11	6.06	3.03

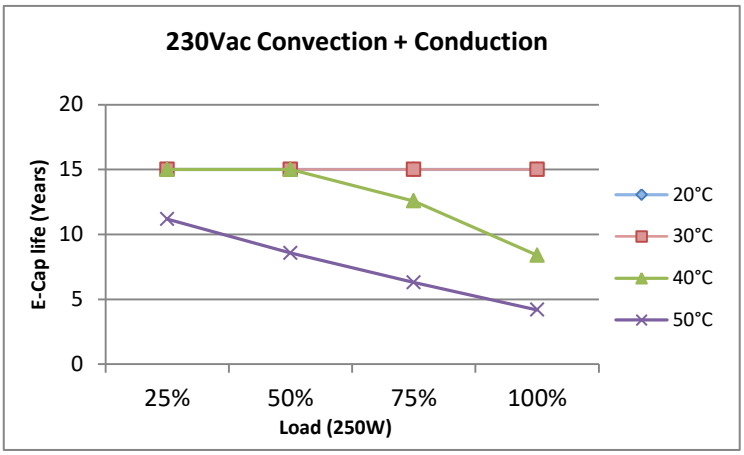


Convection & Conduction Cooled
Mounted on 300x300x0.8mm Aluminium sheet

E-Cap life (Years) 115Vac Convection + Conduction				
Load (%)	Tamb (°C)			
	20	30	40	50
25%	15	15	15	10.79
50%	15	15	11.54	7.11
75%	15	12.29	6.14	3.07
100%	15	6.69	3.35	1.67



E-Cap life (Years) 230Vac Convection + Conduction				
Load (%)	Tamb (°C)			
	20	30	40	50
25%	15	15	15	11.18
50%	15	15	15	8.57
75%	15	15	12.57	6.29
100%	15	15	8.39	4.19



Note :

E-cap life calculation is based on 24hrs/day operation.
e.g. For 12Hrs/day operation life numbers will double

The lifetime is calculated based on our method and doesn't include the seal rubber degradation effect etc

6. Vibration Test

MODEL: CUS400M-24

(1) Vibration Test Class

Frequency Variable Endurance Test

(2) Equipment Used

Controller:	LDS Dactron Comet
Vibrator:	V830-335 T M8 R-CE
Accelerometer:	DeltaTron 4533-B

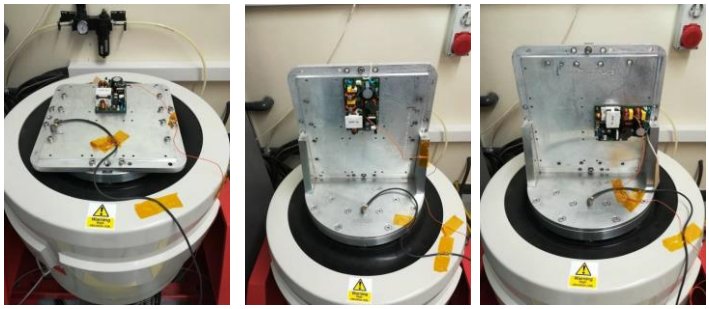
(3) The Number of D.U.T. (Device Under Test)

3 Units

(4) Test Conditions

Sweep Frequency:	10 – 200 Hz	Direction:	X, Y, Z
Sweep Time:	6 minutes	Test Time:	60 minutes
Acceleration:	2.2G	Non-operation	
Mounting:	Customer Fixings		

(5) Test Method



Standard mounting position as per pictures above.

(6) Acceptable Conditions

1. Not to be broken.
2. No abnormal output after test.

(7) Test Results

(8) Visually OK and functions after test

7. Thermal shock test

MODEL : CUS400M-24

(1) Equipment used

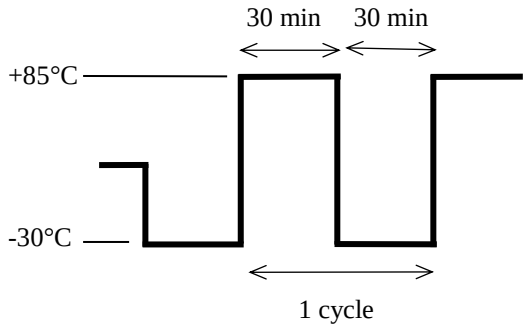
Thermotron ATSS-80-10-10

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

1 unit

(3) Test Conditions

Ambient Temperature:	-40°C ↔ 85°C
Test Time:	30 min ~ 30 min
Test Cycle:	500 cycles
Operating Condition:	Not 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

Visually and electrically OK.