

# NANOCOM-APL

## Reliability Prediction Report

### (MTBF)

Summary	Failure Rate: 3481.113291 MTBF: 287,264 Hours
---------	--

Issue date	QE Manager	Test Engineer
2018-03-22	KJ Wang	Danny Chen

# Reliability Prediction (MTBF)

---

**I . Model Name:** NANOCOM-APL

**II . Prediction Date:** March. 22nd, 2018

**III . Prediction Site:** AAEON Q.E. Dept.

**IV . Predicted by:** Danny Chen

**V . Equipment:** Windchill Quality Solutions 10.1

## VI. Simulation Environment:

- Temperature: 30 degrees C
- Standard: Telcordia (Bellcore) Standard

## VII. Term and Definition:

- Unit : An assembly of device.
- Duty Cycle : Used to specify the percentage of time that the element is in an on state, and it is equal to the percentage of total time the item is in the active environment.
- Quantity : The quantity of the selected item.
- Failure Rate : Used to specify that the failure rate is to be calculated based the selected Calculation models. The Failure rate multiplier is 1000000000.
- MTBF : MTBF is always specified in hours.

**VIII. Prediction Result:**

NANOCOM-APL (M/B: 9697NUAL0A-D):

- Failure Rate: 3481.113291

- MTBF: 287,264 Hours

**AAEON Reliability Prediction  
Summary**

**File Name:** NANOCOM-APL.rfp  
**Duty Cycle:** 100  
**Calculation Model:** Telcordia Issue 2  
**Method:** Method I Case 3

**Failure Rate:** 3481.113291  
**MTBF (hrs):** 287,264  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Assembly Name	Part Number	Ref Des	Quantity	Failure Rate	MTBF
NANOCOM-APL	9697NUAL0A-D		1	3481.113291	287,264

**File Name:** NANOCOM-APL.rfp  
**Assembly:** 9697NUAL0A-D  
**Ref Des:**  
**Description:**

**Failure Rate:** 3481.113291  
**MTBF (hrs):** 287,264  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
1050297624	Resistor	R179		2.547039	1	282340674.079668
1050500334	Resistor	R319,R347		2.547039	2	154078778.388085
1050501004	Resistor	R198,R199,R200, R201,R202,R203, R204,R205,R213, R215		2.547039	10	35079934.879747
1050501234	Resistor	R448		2.547039	1	282340674.079668
1050501634	Resistor	R536		2.547039	1	282340674.079668
1050502224	Resistor	R314		2.547039	1	282340674.079668
1050504724	Resistor	R158		2.547039	1	282340674.079668
1050504734	Resistor	R194		2.547039	1	282340674.079668
1050505134	Resistor	R225,R494,R496, R499		2.547039	4	82309758.689546
1050507530	Resistor	R422		2.547039	1	282340674.079668
1050510004	Resistor	R44		2.547039	1	282340674.079668
1050510034	Resistor	R223,R224,R406, R415		2.547039	4	82309758.689546
1050510034-00	Resistor	R432		2.547039	1	282340674.079668
1050510504	Resistor	R1,R2		2.547039	2	154078778.388085
1050511824	Resistor	R450		2.547039	1	282340674.079668
1050512734	Resistor	R210		2.547039	1	282340674.079668
1050520004	Resistor	R117,R159,R48		2.547039	3	107020754.986850
1050520034	Resistor	R130		2.547039	1	282340674.079668
1050524934	Resistor	R172		2.547039	1	282340674.079668
1050525524	Resistor	R431		2.547039	1	282340674.079668
1050533034	Resistor	R420,R545		2.547039	2	154078778.388085
1050540204	Resistor	R24,R25,R26		2.547039	3	107020754.986850
1050541224	Resistor	R495		2.547039	1	282340674.079668
1059700001	Resistor	R220		2.547039	1	282340674.079668
105A500103	Resistor	R430		2.547039	1	282340674.079668
105A501039	Resistor	R312,R313		2.547039	2	154078778.388085
105A501139	Resistor	R498		2.547039	1	282340674.079668
105A503309	Resistor	R373,R375,R378, R379		2.547039	4	82309758.689546
105A503363	Resistor	R428		2.547039	1	282340674.079668
105A510003	Resistor	R753,R754		2.547039	2	154078778.388085
105A510733	Resistor	R423		2.547039	1	282340674.079668
105A515009	Resistor	R13,R14,R21		2.547039	3	107020754.986850
105A516903	Resistor	R161		2.547039	1	282340674.079668
105A520003	Resistor	R410		2.547039	1	282340674.079668
105A528703	Resistor	R192		2.547039	1	282340674.079668
105A528723	Resistor	R461		2.547039	1	282340674.079668
105A538323	Resistor	R497		2.547039	1	282340674.079668
105A549919	Resistor	R244		2.547039	1	282340674.079668

**File Name:** NANOCOM-APL.rfp  
**Assembly:** 9697NUAL0A-D  
**Ref Des:**  
**Description:**

**Failure Rate:** 3481.113291  
**MTBF (hrs):** 287,264  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
105A560469	Resistor	R35		2.547039	1	282340674.079668
105A584563	Resistor	R160		2.547039	1	282340674.079668
105A700003	Resistor	R1144,R1146 ,R437, R439,R440,R 444, R451,R454,R 455, R459,R467,R 468, R475,R493		2.547039	14	25477245.255648
105A700009	Resistor	R1142,R1143 ,R122, R128,R149,R 150, R153,R162,R 173, R174,R18,R1 93,R214, R256,R258,R 259, R260,R261,R 262, R263,R264,R 265, R272,R273,R 274, R275,R278,R 281, R282,R283,R 285,R32, R341,R350,R 352, R359,R360,R 361, R408,R426,R 434, R436,R447,R 453, R462,R463,R 474, R476,		2.547039	63	5949421.035389
105A70000A	Resistor	R182,R183,R 234, R348,R433		2.547039	5	67008142.102588
105A700139	Resistor	R156,R157		2.547039	2	154078778.388085
105A701039	Resistor	R177,R181,R 196, R221,R250,R 306, R307		2.547039	7	48991237.965885
105A701059	Resistor	R409		2.547039	1	282340674.079668
105A701069	Resistor	R135		2.547039	1	282340674.079668
105A702039	Resistor	R166,R168		2.547039	2	154078778.388085

**File Name:** NANOCOM-APL.rfp  
**Assembly:** 9697NUAL0A-D  
**Ref Des:**  
**Description:**

**Failure Rate:** 3481.113291  
**MTBF (hrs):** 287,264  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
105A702269	Resistor	R442		2.547039	1	282340674.079668
105A702433	Resistor	R424		2.547039	1	282340674.079668
105A703309	Resistor	R111,R112,R113, R114,R115,R116, R355		2.547039	7	48991237.965885
105A703329	Resistor	R236,R237,R238		2.547039	3	107020754.986850
105A704739	Resistor	R380		2.547039	1	282340674.079668
105A710039	Resistor	R195,R417,R429, R478		2.547039	4	82309758.689546
105A733009	Resistor	R404,R405		2.547039	2	154078778.388085
105A747009	Resistor	R412		2.547039	1	282340674.079668
105B502035	Resistor	R142		2.547039	1	282340674.079668
105B524005	Resistor	R139,R140,R155, R163,R167,R175, R187,R188		2.547039	8	43225424.698300
105B700009	Resistor	R120,R144,R145, R146,R147,R148, R165,R184,R185, R186,R279,R280, R284,R286,R287, R303,R305,R310, R333,R339,R342, R345,R362,R374, R382,R383,R384, R385,R387,R388, R389,R391,R392, R393,R394,R395, R396,R397,R403, R413,R441,R449, R452,R472,R481, R485,R512,R513,		2.547039	59	6343183.296372

**File Name:** NANOCOM-APL.rfp  
**Assembly:** 9697NUAL0A-D  
**Ref Des:**  
**Description:**

**Failure Rate:** 3481.113291  
**MTBF (hrs):** 287,264  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
105B700139	Resistor	R121,R132,R138, R239,R248,R381, R534,R87,R88,R93		2.547039	10	35079934.879747
105B701039	Resistor	R102,R104,R106, R107,R108,R109, R110,R119,R112,R123, R125,R126,R127, R129,R134,R137, R141,R143,R164, R169,R17,R170,R20, R206,R207,R227, R228,R229,R230, R231,R232,R233, R240,R241,R242, R243,R249,R251, R254,R257,R267, R277,R288,R289, R291,R293,R309, R311,R32		2.547039	86	4386956.844700
105B701059	Resistor	R19,R321,R537		2.547039	3	107020754.986850
105B702009	Resistor	R61,R62,R63,R64, R66,R68,R69,R70		2.547039	8	43225424.698300



**File Name:** NANOCOM-APL.rfp  
**Assembly:** 9697NUAL0A-D  
**Ref Des:**  
**Description:**

**Failure Rate:** 3481.113291  
**MTBF (hrs):** 287,264  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
105B702225	Resistor	R1140,R1141 ,R189, R190,R208,R 209, R211,R216,R 217, R218,R245,R 247,R3, R398,R399,R 4,R402, R42,R43,R51 0,R511, R78,R80,R92 ,R94		2.547039	25	14603612.751152
105B704725	Resistor	R296,R299,R 300, R304,R33,R3 4,R353, R354,R357,R 358,R36, R37,R487,R4 89,R49		2.547039	15	23852782.943395
105B710009	Resistor	R317,R435,R 438, R443,R532,R 535		2.547039	6	56573956.677649
105B710039	Resistor	R11,R154,R1 6,R176, R197,R22,R2 46,R253, R269,R271,R 349,R57, R65,R73,R79		2.547039	15	23852782.943395
106B501034	Resistor	RT1,RT2		2.547039	2	154078778.388085
1121501690	Capacitor	C264		1.128806	1	704977644.692287
1124418090	Capacitor	C21,C22,C23 ,C24		1.128806	4	196873384.410843
1124427091	Capacitor	C200,C205		1.128806	2	375289731.076049
1124433090	Capacitor	C363		1.128806	1	704977644.692287
1124522280	Capacitor	C288		1.128806	1	704977644.692287
1124522680	Capacitor	C282		1.128806	1	704977644.692287
1124547290	Capacitor	C306		1.128806	1	704977644.692287
1129622690	Capacitor	C212,C217		1.128806	2	375289731.076049
1129701690	Capacitor	C271,C275,C 360		1.128806	3	257514172.353070
1129701790	Capacitor	C258		1.128806	1	704977644.692287
118C6331B1	Capacitor	C301		1.128806	1	704977644.692287
11A4410240	Capacitor	C234		1.128806	1	704977644.692287
11C1539840	Capacitor	C199		1.128806	1	704977644.692287
11C2410480	Capacitor	C281		1.128806	1	704977644.692287

**File Name:** NANOCOM-APL.rfp  
**Assembly:** 9697NUAL0A-D  
**Ref Des:**  
**Description:**

**Failure Rate:** 3481.113291  
**MTBF (hrs):** 287,264  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
11C2510480	Capacitor	C305,C312,C339		1.128806	3	257514172.353070
11C4501790	Capacitor	C276		1.128806	1	704977644.692287
11C4510480	Capacitor	C284		1.128806	1	704977644.692287
11C4515290	Capacitor	C367		1.128806	1	704977644.692287
11C4533380	Capacitor	C365		1.128806	1	704977644.692287
11C4556690	Capacitor	C278		1.128806	1	704977644.692287
11C9522060	Capacitor	C259		1.128806	1	704977644.692287
11CB510350	Capacitor	C250,C251,C252,C253,C254,C255,C256,C257		1.128806	8	101746760.035398
11E2501040	Capacitor	C290		1.128806	1	704977644.692287
11E2501690	Capacitor	C364		1.128806	1	704977644.692287
11E2610032	Capacitor	C296,C297,C298,C299,C313		1.128806	5	159367490.199266
11E2622021	Capacitor	C280,C283		1.128806	2	375289731.076049
11E9501090	Capacitor	C384		1.128806	1	704977644.692287
11E9510490	Capacitor	C18,C230,C69		1.128806	3	257514172.353070
11E9547680	Capacitor	C216,C355,C356		1.128806	3	257514172.353070
11E9610080	Capacitor	C232		1.128806	1	704977644.692287
11E9622050	Capacitor	C262		1.128806	1	704977644.692287
11E9622052	Capacitor	C285,C286		1.128806	2	375289731.076049
11E9622080	Capacitor	C102,C107,C110,C116,C119,C125,C130,C270,C273,C302,C308,C31,C310,C315,C316,C317,C32,C321,C322,C327,C328,C329,C33,C335,C34,C35,C36,C37,C38,C39,C40,C41,C42,C43,C44,C48,C49,C67,C68,C70,C71,C96,C97		1.128806	43	19845816.558772

**Reliability Prediction  
Summary**

**File Name:** NANOCOM-APL.rfp  
**Assembly:** 9697NUAL0A-D  
**Ref Des:**  
**Description:**

**Failure Rate:** 3481.113291  
**MTBF (hrs):** 287,264  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
11E9647690	Capacitor	C185,C186,C198,C204,C210,C211		1.128806	6	133979725.056342
11EA501050	Capacitor	C100,C101,C103,C104,C105,C106,C108,C109,C111,C113,C114,C115,C117,C118,C120,C121,C122,C123,C124,C126,C127,C128,C129,C131,C140,C141,C142,C143,C144,C145,C146,C147,C148,C149,C150,C151,C152,C153,C154,C155,C156,C157,C158,C159,C160,C161,C166,C167,C215,C227		1.128806	88	9805731.212933
11EA510390	Capacitor	C215,C227		1.128806	2	375289731.076049

**File Name:** NANOCOM-APL.rfp  
**Assembly:** 9697NUAL0A-D  
**Ref Des:**  
**Description:**

**Failure Rate:** 3481.113291  
**MTBF (hrs):** 287,264  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
11EA510450	Capacitor	C10,C11,C12 ,C13, C14,C15,C16 ,C17, C187,C19,C1 91,C192, C196,C197,C 20,C201, C202,C206,C 207, C208,C213,C 214, C218,C219,C 220, C221,C222,C 223, C224,C225,C 226, C228,C233,C 235, C236,C237,C 238, C239,C240,C 241, C242,C243,C 244, C245,C246,C 248, C249,C25,C2 63,C266, C		1.128806	81	10641455.782446
11EA610040	Capacitor	C132,C133,C 134, C135,C136,C 137, C138,C139,C 162, C163,C164,C 165, C195,C203,C 209, C265		1.128806	16	52112480.802928
11EA610120	Capacitor	C293,C294,C 336, C337		1.128806	4	196873384.410843
11EA647010	Capacitor	C45,C46,C47		1.128806	3	257514172.353070
11EB501040	Capacitor	C345,C353,C 357		1.128806	3	257514172.353070
11EB510640	Capacitor	C260		1.128806	1	704977644.692287
11EB522640	Capacitor	C358,C359		1.128806	2	375289731.076049

**File Name:** NANOCOM-APL.rfp  
**Assembly:** 9697NUAL0A-D  
**Ref Des:**  
**Description:**

**Failure Rate:** 3481.113291  
**MTBF (hrs):** 287,264  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
11EB610040	Capacitor	C291,C292,C318,C319,C325,C331,C332,C333,C421,C423,C424,C426,C427,C429		1.128806	14	59316298.011235
11EB622030	Capacitor	C269,C361,C362		1.128806	3	257514172.353070
121110156P	Inductor	L4		4.944252	1	154760964.143460
1211102272	Inductor	L6		4.944252	1	154760964.143460
1211104777	Inductor	L7,L8,L9		4.944252	3	57363284.375370
1211104779	Inductor	L10,L5		4.944252	2	83201062.149749
121112207G	Inductor	L2		4.944252	1	154760964.143460
1211147078	Inductor	L3		4.944252	1	154760964.143460
1212306030	Inductor	FB22,FB23		4.944252	2	83201062.149749
12123A000E	Inductor	FB24		4.944252	1	154760964.143460
12123C0001	Inductor	FB28		4.944252	1	154760964.143460
12310025A3	Miscellaneous	Y3		19.200000	1	23844262.770939
12310192A0	Miscellaneous	Y1		19.200000	1	23844262.770939
1231332726	Miscellaneous	Y2		19.200000	1	23844262.770939
1301005450	Semiconductor	D13		7.793411	1	92807310.010983
1301020400	Semiconductor	D7		7.793411	1	92807310.010983
1301400642	Semiconductor	D12		7.793411	1	92807310.010983
1301793040	Semiconductor	D15,D16,D8,D9		7.793411	4	26989084.126235
1304001340	Optical Device	LED1		79.003355	1	6497172.749112
1304300140	Optical Device	LED2		79.003355	1	6497172.749112
1315036640	Semiconductor	Q50		22.463360	1	31642600.748419
1315044910	Semiconductor	Q70		22.463360	1	31642600.748419
1315492510	Semiconductor	Q67		22.463360	1	31642600.748419
1315720010	Semiconductor	Q1,Q49		22.463360	2	17315095.066101
1315EM6K10	Semiconductor	Q15,Q23,Q39,Q44,Q52,Q53,Q54,Q57,Q58,Q60,Q61,Q63,Q64,Q66,Q69,Q71,Q72,Q73		22.463360	18	2263829.704727
1430006790	Integrated Circuit	U83		43.803003	1	11739202.588727
1430034250	Integrated Circuit	U57		43.803003	1	11739202.588727
1430053250	Integrated Circuit	U33,U34,U35		43.803003	3	4923240.069161
1430080650	Integrated Circuit	U43		43.803003	1	11739202.588727
1430455200	Integrated Circuit	U38		43.803003	1	11739202.588727
1436509401	Integrated Circuit	U56		43.803003	1	11739202.588727

**File Name:** NANOCOM-APL.rfp  
**Assembly:** 9697NUAL0A-D  
**Ref Des:**  
**Description:**

**Failure Rate:** 3481.113291  
**MTBF (hrs):** 287,264  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
1440211AT0	Integrated Circuit	U73		43.803003	1	11739202.588727
1440E39500	Integrated Circuit	U1		21.706765	1	23689035.791249
145S312500	Integrated Circuit	U6		43.803003	1	11739202.588727
1462001282	Integrated Circuit	U79		11.063278	1	58231413.220643
1468K4F6E0	Integrated Circuit	U2,U3		11.063278	2	32567094.099626
1469KS32G0	Integrated Circuit	U12		11.063278	1	58231413.220643
1490001081	Integrated Circuit	U65		43.803003	1	11739202.588727
149F759140	Integrated Circuit	U85,U86		43.803003	2	6834791.244197
149TB01040	Integrated Circuit	U18		43.803003	1	11739202.588727
149TS01040	Integrated Circuit	U62		43.803003	1	11739202.588727
14E0085281	Integrated Circuit	U16		43.803003	1	11739202.588727
14S5A00821	Integrated Circuit	U66,U67		26.018600	2	14194252.866846
14S5A30601	Integrated Circuit	U84		26.018600	1	25551442.237972
14S6216060	Integrated Circuit	U77		11.063278	1	58231413.220643
14S9346001	Integrated Circuit	U75		43.803003	1	11739202.588727
16540M0001	Connection	CN3		16.184835	1	35685591.360212
1654902130	Connection	CN32		16.184835	1	35685591.360212